LEONARDO
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AgustaWestland AW139

ROTORCRAFT FLIGHT MANUAL

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AW139



ROTORCRAFT FLIGHT MANUAL

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AW139 and AB139 are two names of the same product.

They identify two batches of aircraft manufactured in conformity with a unique Type Certificate Data Sheet

Where not specifically declared, the content of this document is applicable to both AW139 and AB139 helicopters.

Continuing airworthiness criteria for the AW139 is developed and maintained by Agusta, who is the holder of the type certificate in the state of design.

E.A.S.A. Approval Date:
10 November 2010.

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RECORD OF TEMPORARY REVISIONS

ACTIVE TEMPORARY REVISIONS			
The following Temporary Revisions are still active and must be retained in your printed manual. For Temporary Revisions, changes from the basic issue are printed in red.			
TR N°	**Page**	**Approval**	**Note**
-	-	-	-

INACTIVE TEMPORARY REVISIONS

The following Temporary Revisions are inactive and must not be retained in your printed manual:

TR N°	Page	Approval	Note
5-1	S11-8A, S11-8B, S11-21, S11-22, S11-24, S11-25	Approved with NDC-139G0257-026 P. EASA 10072085	Introduced with RFM Issue 2 Revision 25.
5-2	5-5A, 5-5, S52-iA, S52-i, S52-1A, S52-1, S52-6, S52-7	Approved with NDC-139G9350-010 dated 23 September 2020 under the authority of DOA ref. EASA.21J.005	Introduced with RFM Issue 2 Revision 27.
5-3	5-5A, 5-5, S52-iA, S52-i, S52-1A, S52-1, S52-2, S52-3, S52-4, S52-4A, S52-4B, S52-4C	Approved with NDC-139G9350-012 dated 28 May 2021 under the authority of DOA ref. EASA.21J.005	Introduced with RFM Issue 2 Revision 28.
5-4	5-2, 5-2A, S17-i, S17-iA, S17-1, S17-1A	Approved with NDC-139G0257-032 dated 20 January 2023 under the authority of DOA ref. EASA.21J.005	Introduced with RFM Issue 2 Revision 29.
2-3	2-6, 2-9	EASA Approval N° R.A. 01396 dated 22 October 200	Introduced with RFM Issue 2 Revision 30.
5-5	S9-5, S9-6, S9-23, S9-24 S95-7, S95-26	EASA Approval N° 10082537 dated 03 August 2023	Introduced with RFM Issue 2 Revision 30.

INACTIVE TEMPORARY REVISIONS			
2-4	2-12 and 2-13, 5-8 and 5-8A, 5-10 and 5-10A, S37-2 and S37-2A, S67-viA and S67-1, S68-ivA and S68-1, S69-viA and S69-1, S70-viA and S70-1, S74-2 and S74-2A, S74-6A and S74-7, S79-i and S79-iA, S79-ivA and S79-1, S79-6A and S79-7, S79-8A and S79-9, S80-2A and S80-3, S80-4A and S80-5, S81-2A and S81-3, S101-i and S101-iA, S101-4A and S101-5, S101-6A and S101-7, S102-2A and S102-3	Approved with NDC-139G4600-008 dated 26 June 2024 under the authority of DOA ref. EASA.21J.005	Introduced with RFM Issue 2 Revision 31.
5-6	5-10 and 5-10A, 5-20 and 5-20A, S106-i thru S106-iv, S106-1 thru S106-6	Approved with NDC-139G3340-016 P. EASA 10085742	Introduced with RFM Issue 2 Revision 31.
5-7	5-2A, 5-3, S28-i, S28-ivA, S28-1, S28-2, S28-2A	Approved with NDC-139G9310-008 dated 14 February 2025 under the authority of DOA ref. EASA.21J.005	Introduced with RFM Issue 2 Revision 33.

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Record of Revisions

REVISION No.	SUBJECT	APPROVAL
---	Issue 2 is equivalent to Issue 1 Rev 21 with the following changes: • All page headings updated with the new product logo. • Editorial corrections and non sequential pages added in previous revisions incorporated into RFM. • Altitude limitations and performance data presented in feet and meters. • Groundspeed presented in knots and km/hr. • Windspeed limits presented in knots and meters per second.	Approval No. EASA 10032486 Dated: November 10, 2010
	Section 2 Optional standby instrument MEGGITT included.	Approval No. EASA 10032487 Dated: November 10, 2010
	Section 5 Updated Incompatibility Table. Supplement 71 Section 1, Placard page updated IAW 139G3000A001 Icing Compatibility Handbook	Approval No. EASA 10032485 Dated: November 10, 2010
1	Section 5 Pages: 5-i, 5-2 thru 5-4, 5-7 thru 5-16. Section 5 Supp. 12 Pages: S12-A17, S12-B14, S12-C19, and S12-C20, S12-D24 and S12-D25, S12-E2 and S12-E3, S12-E11 and S12-E12, S12-E17 and S12-E18,	Approval No. EASA 10033123 Dated: December 20, 2010

REVISION No.	SUBJECT	APPROVAL
1 (cont.)	S12-E20 and S12-E21, S12-E25, S12-E27, S12-E29, S12-E31, S12-F14, S12-G16, S12-H15 and S12-H16, S12-J8, S12-I1 thru S12-I8, S12-I12 thru S12-I44, S12-L2, S12-L7, S12-L11 thru S12-L17.	
	Section 3 Pages: 3-35 and 3-36. Section 5 Supp. 1 Page: S1-5. Section 5 Supp. 2 Page: S2-16. Section 5 Supp. 5 Pages: S5-iii, S5-16 and S5-17, S5-19. Section 5 Supp. 11 Page: S11-17. Section 5 Supp. 17 Page: S17-i. Section 5 Supp. 29 Pages: S29-iv, S29-1 thru S29-3, S29-6, S29-28. Section 5 Supp. 31 Pages: S31-1, S31-5. Section 5 Supp. 36 Page: S36-i. Section 5 Supp. 41 Pages: S41-18, S41-26. Section 5 Supp. 44 Pages: S44-i, S44-5. Section 5 Supp. 49 Page: S49-20. Section 5 Supp. 50 Pages: S50-5, S50-84, S50-84A and S50-84B, S50-113, S50-115, S50-117, S50-119, S50-121 thru S50-126. Section 5 Supp. 54 Pages: S54-iii, S54-3 thru S54-14. Section 5 Supp. 65 Pages: S65-1, S65-3 thru S65-8. Section 5 Supp. 67 Pages: S67-14 thru S67-17.	Approval No. EASA 10033121 Dated: December 20, 2010

REVISION No.	SUBJECT	APPROVAL
1 (cont.)	Section 5 Supp. 68 Pages: S68-17 and S68-18. Section 5 Supp. 69 Pages: S69-14 thru S69-21. Section 5 Supp. 70 Pages: S70-12 thru S70-15. Section 5 Supp. 71 Page: S71-8. Section 5 New Issue Supplement 74.	
	Section 5 Supp. 23 Page: S23-24. Section 7 Pages: 7-iii thru 7-vi, 7-136 thru 7-138.	Manufacturer's Data
2	Section 5 Supp. 11 Pages: S11-iii and S11-iv, S11-12 thru S11-18, S11-18A and S11-18B, S11-25 and S11-26, S11-29. Section 5 Supp. 41 Pages: S41-iii and S41-iv, S41-12, S41-17, S41-29 and S41-30, S41-33. Section 5 Supp. 49 Pages: S49-iii and S49-iv, S49-14, S49-19, S49-29 and S49-30, S49-32. Section 5 Supp. 50 Page: S50-6.	Approval No. EASA 10037547 and EASA 10037548 Dated: December 5, 2011
	Section 1 Pages: 1-iii, 1-8, 1-32, 1-36. QRH Revision required Section 2 Pages: 2-6 thru 2-9, 2-26, 2-31. QRH Revision required Section 5 Supp. 50 Pages: S50-iii, S50-v thru S50-vii, S50-ix and S50-x, S50-2A and S50-2B, S50-4, S50-19 and S50-20, S50-20A and S50-20B, S50-21, S50-139 thru S50-146.	Approval No. EASA 10037551, EASA 10037550 and EASA 10037545 Dated: December 5, 2011

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2 (cont.)	Section 5 Supp. 38 Pages: S38-i, S38-iii, S38-1 and S38-2, S38-10. Section 5 Supp. 31 Pages: S31-iii, S31-3, S31-5. Section 5 Supp. 54 Pages: S54-9 and S54-10. Section 5 Supp. 65 Page: S65-4. Section 3 Pages: 3-49, 3-126, 3-141, 3-145, and 3-146, 3-151, 3-163 and 3-164, 3-167, 3-173 thru 3-176, 3-178. QRH Revision required Section 5 Supp. 74 Page: S74-1. Section 5 Supp. 12 Pages: S12-B6, S12-D27, S12-F7. QRH Revision required Section 5 Supp. 51 Pages: S51-iii, S51-1 thru S51-4, S51-6, S51-6A and S51-6B. Section 5 Supp. 71 Pages: S71-18, S71-48. Section 5 Supp. 11 Pages: S11-9 thru S11-11. Section 5 Supp. 41 Pages: S41-9 thru S41-11, S41-13 thru S41-16, S41-18, S41-18A and S41-18B, S41-29 thru S41-31, S41-33. Section 5 Supp. 49 Pages: S49-11 thru S49-13, S49-15 thru S49-18, S49-20, S49-20A and S49-20B, S49-29 and S49-30, S49-32. Section 5 Supp. 16 Pages: S16-i, S16-iii, S16-1 thru S16-3.	

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3	Section 5 Pages: 5-7, 5-9 thru 5-16. Section 5 Supp. 9 Pages: S9-i, S9-iv, S9-1 thru S9-3, S9-5 and S9-6, S9-13, S9-16, S9-19. Section 5 New Issue Supplement 77.	Approval No. EASA 10040469 Dated: July 18, 2012
	Section 2 Page: 2-12. Section 5 Supp. 67 Pages: S67-25. Section 5 Supp. 69 Pages: S69-28. Section 5 Supp. 70 Pages: S70-21.	Approval No. EASA 10040467 Dated: July 18, 2012

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3 (cont.)	Section 5 Supp. 69 Page: S69-40. Section 5 Supp. 70 Page: S70-32. Section 4 Pages: 4-7, 4-29 and 4-30. Section 5 Supp. 60 Page: S60-7. Section 5 Supp. 74 Page: S74-1. Section 5 New Issue Supplement 78.	
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	Section 6 Chart E Page: 1. Chart D Page: 1 Section 7 Pages: 7-iii, 7-4, 7-89 and 7-90, 7-134.	Manufacturer's Data
4	Section 5 New Issue Supplement 83.	Approval No. EASA 10042530 Dated: December 06, 2012
	Section 5 Supp. 9 Pages: S9-iv, S9-1 and S9-2, S9-5 and S9-6, S9-6A and S9-6B.	Approval No. EASA 10042531 Dated: December 06, 2012
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	Section 5 Supp. 24 Page: S24-1. Section 5 New Issue Supplement 82.	Approval No. EASA 10043780 Dated: February 25, 2013

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6	Section 5 New Issue Supplement 76. Section 5 Pages: 5-4, 5-7, 5-9 thru 5-18. Section 5 Supp. 71 Page: S71-7.	Approval No. EASA 10044323 Dated: April 5, 2013
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6 (cont.)	Section 5 Supp. 69 Pages: S69-53, S69-55.	
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	Section 5 Supp. 11 Pages: S11-iii, S11-15. Section 5 Supp. 41 Pages: S41-iii and S41-iv, S41-15. Section 5 Supp. 49 Pages: S49-17. Section 5 Supp. 46 Page: S46-5.	Approval No. EASA 10046275 Dated: September 05, 2013
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8	Section 5 Pages: 5-11, 5-13, 5-16. Section 5 Supp. 41 Pages: S41-14 and S41-15. Section 5 Supp. 49 Pages: S49-16, S49-20B.	Approval No. EASA 10046811 Dated: October 25, 2013 & Approval No. EASA 10046812 Dated: October 25, 2013
9	Section 3 Pages: 3-ii, 3-40 and 3-41.	Approval No. EASA 10048407 Dated: March 07, 2014
	Section 5 New Issue Supplement 84	Approval No. EASA 10048408 Dated: March 07, 2014
	Section 5 New Issue Supplement 85	Approval No. EASA 10048410 Dated: March 07, 2014
	Section 1 Page: 1-31. QRH Revision required Section 2 Pages: 2-49 and 2-50. Section 3 Page: 3-75. QRH Revision required Section 4 Page: 4-70. Section 5 Pages: 5-7 thru 5-17. Section 5 Supp. 1 Pages: S1-7 and S1-8. Section 5 Supp. 49 Page: S49-20B. Section 5 Supp. 50 Page: S50-145. Section 5 Supp. 71 Pages: S71-iv thru S71-vi, S71-40, S71-40A and S71-40B, S71-41. QRH Revision required Section 5 Supp. 74 Pages: S74-i, S74-1.	Approval No. EASA 10048409 Dated: March 07, 2014

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	Section 5 Supp. 11 Pages: S11-11 thru S11-13.	Approval No. EASA 10049634 Dated: June 26, 2014

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	Section 9 Pages: 9-i, 9-iii thru 9-vi, 9-1 thru 9-4, 9-63 thru 9-136.	Manufacturer’s Data

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11	Section 2 Pages: 2-7 thru 2-10. Section 3 Page: 3-97. Section 5 Pages: 5-7 and 5-8, 5-10 thru 5-13, 5-15 thru 5-17. Section 5 Supp. 38 Pages: S38-iii and S38-iv, S38-3, S38-8. Section 5 Supp. 71 Pages: S71-iv, S71-20, S71-31 and S71-32, S71-32A and S71-32B. Section 5 Supp. 72 Pages: S72-i thru S72-iv, S72-1 thru S72-10. Section 5 Supp. 76 Pages: S76-1, S76-15. Section 7 Pages: 7-iii, 7-vi, 7-146 thru 7-148. Section 9 Pages: 9-i thru 9-v, 9-136 thru 9-138.	Approval No. EASA 10051365 Dated: November 26, 2014
	Section 1 Pages: 1-30 and 1-31. Section 4 Page: 4-37. Section 5 Supp. 50 Page: S50-65. Section 5 Supp. 9 Page: S9-11. Section 5 Supp. 49 Page: S49-10. Section 5 Supp. 67 Page: S67-9. Section 5 Supp. 69 Page: S69-7.	Approval No. EASA 10051367 Dated: November 26, 2014
12	Section 5 Pages: 5-8 thru 5-18. Section 5 Supp. 11 Pages: S11-iii, S11-11 thru S11-15. Section 5 Supp. 12 Pages: S12-A3 thru S12-A5, S12-A19 and S12-A20, S12-A32A and S12-A32B, S12-A55 thru S12-A60, S12-B2 and S12-B3, S12-B17 and S12-B18, S12-B22, S12-B28A and S12-B28B, S12-C3,	Approval No. EASA 10052093 Dated: January 30, 2015

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12 (cont.)	S12-C5, S12-C21 and S12-C22, S12-C28, S12-C22, S12-C28, S12-D3 and S12-D4, S12-D4A and S12-D4B, S12-D5, S12-D27 and S12-D28, S12-D34A and S12-D34B, S12-D57 thru S12-D62, S12-E3, S12-E6, S12-E20 and S12-E21, S12-E24A and S12-E24B, S12-E30A and S12-E30B, S12-F2 thru S12-F5, S12-F16 and S12-F17, S12-F20A and S12-F20B, S12-F26A, and S12-F26B, S12-F32A and S12-F32B, S12-F51 thru S12-F56, S12-G5, S12-G20 and S12-G21, S12-H3, S12-H21 and S12-H22, S12-I3 and S12-I4, S12-I6, S12-I35 and S12-I36, S12-I45 and S12-I46, S12-J3, S12-J12 thru S12-J14, S12-K2, S12-K4, S12-K30 thru S12-K36, S12-L2, S12-L7, S12-L11, S12-L15, S12-L21 and S12-L22.	

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12 (cont.)	Section 5 Supp. 13 Pages: S13-iv thru S13-viii, S13-8 thru S13-10, S13-36A thru S13-36D, S13-64 thru S13-74. Section 5 Supp. 41 Pages: S41-iii and S41-iv, S41-11 thru S41-16, S41-16A and S41-16B, S41-17 and S41-18. Section 5 Supp. 49 Pages: S49-13 thru S49-17. Section 5 Supp. 50 Pages: S50-iii thru S50-xii, S50-2, S50-2A and S50-2B, S50-5 and S50-6, S50-18, S50-21, S50-32A thru S50-32D, S50-58A thru S50-58J, S50-80A thru S50-80F, S50-81 thru S50-84, S50-84A, S50-108A thru S50-108F, S50-145 thru S50-158. Section 5 Supp. 51 Pages: S51-2 and S51-3. Section 5 New Issue Supplement 86.	
	Section 5 New Issue Supplement 88.	Approval No. EASA 10052091 Dated: January 30, 2015
	Section 2 Page: 2-9.	Manufacturer's Data
13	Section 5 Pages: 5-12 and 5-13, 5-15. Section 5 New Issue Supplement 90. Section 5 Supp. 50 Pages: S50-iii thru S50-xi, S50-1 and S50-2, S50-2A, S50-4 thru S50-6, S50-11,	Approval No. EASA 10052459 Dated: March 03, 2015

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13 (cont.)	S50-13, S50-21, S50-85, S50-89, S50-93, S50-108A.	
	Section 5 Supp. 86 Pages: S86-v and S86-vi, S86-31, S86-42, S86-58, S86-66. Section 5 Supp. 12 Page: S12-C13. Section 5 Supp. 50 Page: S50-2A.	Approval No. EASA 10052462 Dated: March 03, 2015
	Section 5 Supp. 9 Pages: S9-iii, S9-1, S9-5, S9-6B, S9-13, S9-16, S9-19.	Approval No. EASA 10052460 Dated: March 03, 2015
	Section 5 Pages: 5-8, 5-18. Section 5 Supp. 45 Pages: S45-iii, S45-1, S45-7.	Approval No. EASA 10052461 Dated: March 03, 2015
	Section 5 Supp. 81 Page: S81-30.	Manufacturer's Data
14	Section 5 Pages: 5-2, 5-8 thru 5-18. Section 3 Page: 3-71. Section 5 Supp. 50 Page: S50-4.	Approval No. EASA 10053555 Dated: June 05, 2015
	Section 5 New Issue Supplement 89.	Approval No. EASA 10053551 Dated: June 05, 2015
	Section 5 New Issue Supplement 92.	Approval No. EASA 10053552 Dated: June 05, 2015
	Section 5 Supp. 10 Pages: S10-i, S10-4.	Approval No. EASA 10053557 Dated: June 05, 2015
15	Section 2 Pages: 2-40, 2-40A and 2-40B, 2-41 and 2-42. Section 3 Page: 3-40. Section 5 Pages: 5-8, 5-17. Section 5 Supp. 14 Pages: S14-iii, S14-3. Section 5 Supp. 16 Pages: S16-iii, S16-4.	Approval No. EASA 10054259 Dated: July 30, 2015

REVISION No.	SUBJECT	APPROVAL
15 (cont.)	Section 5 Supp. 21 Pages: S21-iii, S21-4. Section 5 Supp. 27 Pages: S27-iii, S27-4. Section 5 Supp. 28 Pages: S28-iii, S28-6. Section 5 Supp. 36 Page: S36-8. Section 5 Supp. 38 Page: S38-6. Section 5 Supp. 42 Page: S42-11. Section 5 Supp. 43 Page: S43-11. Section 5 Supp. 46 Page: S46-6. Section 5 Supp. 50 Pages: S50-85, S50-89, S50-93, S50-103 thru S50-108, S50-108A, S50-133 and S50-134. Section 5 Supp. 52 Page: S52-8. Section 5 Supp. 58 Page: S58-4. Section 5 Supp. 64 Page: S64-8. Section 5 Supp. 72 Page: S72-9. Section 5 Supp. 73 Page: S73-7. Section 5 Supp. 78 Pages: S78-iii, S78-7 thru S78-10. Section 5 Supp. 84 Pages: S84-iii, S84-7 thru S84-10. Section 5 Supp. 90 Pages: S90-123, S90-131, S90-135, S90-145, S90-147, S90-149, S90-153. Section 5 Supp. 92 Page: S92-11.	
	Section 5 Supp. 13 Pages: S13-vii, S13-64 thru S13-76. Section 5 Supp. 86 Pages: S86-5, S86-15, S86-33 thru S86-68.	Approval No. EASA 10054260 Dated: July 30, 2015
	Section 5 Supp. 81 Pages: S81-i thru S81-iv, S81-1 thru S81-30.	Approval No. EASA 10054261 Dated: July 30, 2015

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15 (cont.)	Section 5 Supp. 17 Pages: S17-i, S17-iii, S17-1 thru S17-3, S17-5 and S17-6. Section 5 Supp. 89 Page: S89-i. Section 5 New Issue Supplement 91.	Approval No. EASA 10054262 Dated: July 30, 2015
16	Section 5 Pages: 5-i, 5-6, 5-8 thru 5-20. Section 5 New Issue Supplement 93.	Approval No. EASA 10055268 Dated: October 27, 2015
	Section 5 Supp. 87 Pages: S87-i, S87-iv, S87-1 thru S87-4.	Approved with NDC-139G2100-002 dated October 23, 2015 under the authority of DOA ref. EASA.21J.005
	Section 5 Supp. 9 Page: S9-6B. Section 5 Supp. 13 Pages: S13-vi and S13-vii, S13-68 and S13-69. Section 5 Supp. 34 Page: S34-32. Section 5 Supp. 40 Page: S40-30. Section 5 Supp. 56 Pages: S56-i, S56-iv, S56-1, S56-6 and S56-7, S56-9, S56-11 thru S56-14. Section 5 Supp. 67 Page: S67-40. Section 5 Supp. 69 Pages: S69-9, S69-26 thru S69-28, S69-43. Section 5 Supp. 70 Page: S70-34. Section 5 Supp. 76 Pages: S76-4, S76-6, S76-9, S76-50. Section 5 Supp. 86 Pages: S86-11, S86-18. Section 7 Pages: 7-25, 7-110.	Approved with NDC-139G0257-011 dated October 19, 2015 under the authority of DOA ref. EASA.21J.005

REVISION No.	SUBJECT	APPROVAL
17	Section 5 Supp. 43 Pages: S43-i, S43-iii, S43-1 and S43-2, S43-7 and S43-8.	Approval No. EASA 10056113 Dated: December 18, 2015
	Section 5 Supp. 28 Pages: S28-i thru S28-iv, S28-1 thru S28-6.	Approved with NDC-139G9310-003 dated December 21, 2015 under the authority of DOA ref. EASA.21J.005
	Section 5 Pages: 5-3 and 5-4, 5-9, 5-13, 5-15, 5-19. Section 5 New Issue Supplement 94.	Approved with NDC-139G6700-002 dated December 21, 2015 under the authority of DOA ref. EASA.21J.005
	Section 5 Supp. 42 Pages: S42-i thru S42-iv, S42-1 thru S42-12.	Approved with NDC-139G3441-003 dated December 21, 2015 under the authority of DOA ref. EASA.21J.005
	Section 2 Pages: 2-42 and 2-43. Section 5 Supp. 71 Pages: S71-iii, S71-20. Section 5 Supp. 86 Pages: S86-iv thru S86-vi, S86-15, S86-16A and S86-16B. Section 5 Supp. 91 Page: S91-3. Section 7 Pages: 7-112 and 7-113.	Approved with NDC-139G0257-013 dated December 21, 2015 under the authority of DOA ref. EASA.21J.005
18	Section 5 Supp. 43 Page: S43-7.	Approval No. EASA 10058289 Dated: May 31, 2016

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18 (cont.)	Section 1 Page: 1-29. Section 2 Pages: 2-i and 2-ii, 2-4 and 2-5, 2-7, 2-9, 2-27 and 2-28. Section 1 Pages: 1-33, 1-66. Section 5 Supp. 12 Page: S12-H23. Section 5 Supp. 67 Page: S67-44. Section 5 Supp. 69 Pages: S69-7, S69-26, S69-47. Section 5 Supp. 70 Page: S70-37. Section 7 Pages: 7-iii, 7-91, 7-92A and 7-92B.	Approved with NDC-139G0257-016 dated May 27, 2016 under the authority of DOA ref. EASA.21J.005
	Section 5 Supp. 19 Pages: S19-i, S19-iii, S19-1 and S19-2. Section 5 Supp. 20 Pages: S20-i, S20-1. Section 5 Pages: 5-2 thru 5-9.	Approved with NDC-139G3271-001 dated May 27, 2016 under the authority of DOA ref. EASA.21J.005
19	Section 1 Page: 1-34. Section 5 Pages: 5-12, 5-15. Section 5 Supp. 50 Pages: S50-iii, S50-5 and S50-6, S50-6A and S50-6B.	Approval No. EASA 10059049 Dated: August 5, 2016
	Section 5 Pages: 5-9, 5-19. Section 5 Supp. 9 Page: S9-21. Section 5 New Issue Supplement 95.	Approval No. EASA 10059083 Dated: August 31, 2016
	Section 1 Page: 1-29. Section 2 Pages: 2-34 and 2-35. Section 3 Page: 3-2. Section 5 Page: 5-8. Section 5 Supp. 87 Page: S87-i. Section 7 Page: 7-109. Section 8 Page: 8-13.	Approved with NDC-139G0257-017 dated July 29, 2016 under the authority of DOA ref. EASA.21J.005
20	Section 5 Supp. 77 Pages: S77-6, S77-8.	Approval No. EASA 10060192 Dated: November 24, 2016

REVISION No.	SUBJECT	APPROVAL
20 (cont.)	Section 2 Pages: 2-6, 2-9 and 2-10, 2-33. Section 5 Supp. 93 Pages: S93-1, S93-6. Section 9 Pages: 9-v, 9-125 thru 9-127.	Approved with NDC-139G0257-019 dated November 8, 2016 under the authority of DOA ref. EASA.21J.005
	Section 5 Supp. 89 Pages: S89-i, S89-iii, S89-1 thru S89-6.	Approved with NDC-139G1830-004 dated November 10, 2016 under the authority of DOA ref. EASA.21J.005
21	Section 1 Page: 1-8.	Approval No. EASA 10061566 Dated: April 12, 2017
	Section 5 New Issue Supplement 96. Section 5 Pages: 5-9, 5-13 thru 5-19.	Approval No. EASA 10061568 Dated: April 12, 2017
	Section 5 Supp. 87 Pages: S87-i, S87-1.	Approval No. EASA 10061562 Dated: April 12, 2017
	Section 5 Supp. 90 Page: S90-3.	Approval No. EASA 10061564 Dated: April 12, 2017
	Section 5 New Issue Supplement 97.	Approval No. EASA 10061563 Dated: April 12, 2017
	Section 1 Pages: 1-1 and 1-2. Section 5 Supp. 68 Page: S68-25. Section 5 Pages: 5-2, 5-8.	Approved with NDC-139G0257-020 dated April 5, 2017 under the authority of DOA ref. EASA.21J.005

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22	Section 3 Pages: 3-ii, 3-39, 3-41 and 3-42, 3-42A and 3-42B, 3-97.	Approval No. EASA 10063465 Dated: October 17, 2017
	Section 2 Page: 2-12. Section 5 Page: 5-8. Section 5 Supp. 37 Pages: S37-iii, S37-1 thru S37-4. Section 5 Supp. 67 Pages: S67-1, S67-9 and S67-10. Section 5 Supp. 68 Pages: S68-iii, S68-1, S68-20A and S68-20B. Section 5 Supp. 69 Pages: S69-1, S69-8 and S69-9, S69-26. Section 5 Supp. 70 Pages: S70-1, S70-7 and S70-8. Section 5 Supp. 74 Pages: S74-2, S74-7. Section 5 Supp. 79 Pages: S79-i, S79-iii, S79-1 and S79-2, S79-4, S79-7 thru S79-14. Section 5 Supp. 80 Pages: S80-iii and S80-iv, S80-1 thru S80-13, S80-15, S80-17 thru S80-21. Section 5 Supp. 81 Pages: S81-1, S81-4.	Approval No. EASA 10063521 Dated: October 19, 2017
	Section 5 Supp. 60 Pages: S60-iii, S60-5, S60-11.	Approval No. EASA 10063530 Dated: October 19, 2017
	Section 5 Supp. 86 Pages: S86-iii, S86-4, S86-12.	Approval No. EASA 10063535 Dated: October 19, 2017

REVISION No.	SUBJECT	APPROVAL
22 (cont.)	Section 5 Supp. 58 Pages: S58-i thru S58-iv, S58-1 thru S58-4.	Approved with NDC-139G9750-004 dated October 13, 2017 under the authority of DOA ref. EASA.21J.005
	Section 5 Supp. 73 Pages: S73-i thru S73-iv, S73-1 thru S73-8.	Approved with NDC-139G3441-004 dated October 19, 2017 under the authority of DOA ref. EASA.21J.005
	Section 1 Pages: 1-8, 1-27, 1-33. Section 3 Pages: 3-14, 3-26, 3-32, 3-54. Section 5 Pages: 5-3, 5-6 and 5-7, 5-9, 5-13, 5-15 thru 5-17. Section 5 Supp. 11 Pages: S11-iii and S11-iv, S11-19 thru S11-28. Section 5 Supp. 26 Pages: S26-i, S26-1. Section 5 Supp. 41 Pages: S41-iii and S41-iv, S41-2 thru S41-3, S41-19 thru S41-42. Section 5 Supp. 49 Pages: S49-iii and S49-iv, S49-1 thru S49-3, S49-22 thru S49-38. Section 5 Supp. 84 Page: S84-1. Section 5 Supp. 93 Page: S93-1. Section 7 Pages: 7-iv thru 7-vi, 7-58, 7-92A and 7-92B.	Approved with NDC-139G0257-021 dated October 13, 2017 under the authority of DOA ref. EASA.21J.005
23	Section 5 Pages: 5-11 thru 5-19.	Approval No. EASA 10066106 Dated: July 05, 2018

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23 (cont.)	Section 5 Pages: 5-10, 5-20. Section 5 New Issue Supplement 98.	Approval No. EASA 10066105 Dated: July 05, 2018
	Section 5 Supp. 90 Pages: S90-iv, S90-1 thru S90-3, S90-5, S90-11, S90-21. Section 5 Supp. 97 Pages: S97-iv thru S97-viii, S97-2, S97-5, S97-23, S97-25 thru S97-33, S97-35, S97-37 and S97-38, S97-40 thru S97-74.	Approval No. EASA 10066101 Dated: July 05, 2018
	Section 5 Supp. 83 Pages: S83-i, S83-1 and S83-2, S83-2A and S83-2B.	Approved with NDC-139G3340-009 dated July 05, 2018 under the authority of DOA ref. EASA.21J.005
	Section 5 Supp. 9 Pages: S9-6F, S9-7 thru S9-9.	Approved with NDC-139G9560-004 dated July 05, 2018 under the authority of DOA ref. EASA.21J.005
	Section 1 Page: 1-1. Section 2 Page: 2-22. Section 5 Pages: 5-8 and 5-9. Section 5 Supp. 9 Pages: S9-iii and S9-iv, S9-6, S9-6A, S9-6B, S9-6C, S9-6D, S9-6E. Section 5 Supp. 41 Page: S41-19. Section 5 Supp. 49 Page: S49-22. Section 5 Supp. 58 Pages: S58-1 and S58-2. Section 5 Supp. 71 Page: S71-48. Section 5 Supp. 80 Pages: S80-5, S80-10.	Approved with NDC-139G0257-024 dated July 05, 2018 under the authority of DOA ref. EASA.21J.005

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23 (cont.)	Section 5 Supp. 81 Pages: S81-23, S81-28, S81-30. Section 5 Supp. 84 Pages: S84-5 and S84-6. Section 5 Supp. 97 Pages: S97-14, S97-16, S97-18, S97-21, S97-24. Section 7 Pages: 7-iii thru 7-viii, 7-148 thru 7-162.	
24	Section 5 New Issue Supplement 99.	Approval No. EASA 10068795 Dated: February 15, 2019
	Section 2 Pages: 2-7 and 2-8. Section 5 New Issue Supplement 100.	Approval No. EASA 10068794 EASA 10068796 Dated: February 15, 2019
	Section 5 Supp. 41 Pages: S41-iv, S41-2 and S41-3, S41-15 and S41-16, S41-18B thru S41-18D. Section 5 Supp. 49 Pages: S49-iii and S49-iv, S49-2, S49-17 and S49-18, S49-18A and S49-18B, S49-20B thru S49-20D.	Approval No. EASA 10068172 Dated: December 20, 2018
	Section 2 Page: 2-7. Section 5 Pages: 5-10, 5-12 thru 5-14, 5-16 thru 5-20. Section 5 Supp. 9 Page: S9-6C. Section 5 Supp. 11 Pages: S11-iv, S11-8, S11-10, S11-15. Section 5 Supp. 12 Pages: S12-5 and S12-6. Section 5 Supp. 29 Page: S29-11.	Approved with NDC-139G0257-025 dated July 05, 2018 under the authority of DOA ref. EASA.21J.005

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24 (cont.)	Section 5 Supp. 41 Pages: S41-8, S41-10, S41-15. Section 5 Supp. 43 Page: S43-1. Section 5 Supp. 49 Pages: S49-9, S49-12, S49-17. Section 5 Supp. 67 Pages: S67-24 thru S67-26. Section 5 Supp. 69 Page: S69-22. Section 5 Supp. 70 Page: S70-20. Section 5 Supp. 71 Page: S71-17. Section 5 Supp. 97 Pages: S97-14, S97-21. Section 7 Pages: 7-iii and 7-iv, 7-vi and 7-vii, 7-1, 7-148, 7-162 thru 7-164. Section 9 Pages: 9-128 thru 9-130.	
25	Section 2 Page: 2-28. Section 4 Pages: 4-i, 4-9 thru 4-11. Section 5 Supp. 12 Pages: S12-12, S12-A9, S12-B6, S12-C8, S12-D8, S12-D10D, S12-E10, S12-E12B, S12-F7. Section 5 Supp. 97 Page: S97-12.	Approval No. EASA 10072088 Dated: December 17, 2019
	Section 1 Pages: 1-7, 1-15. Section 2 Pages: 2-i, 2-4, 2-4A and 2-4B. Section 3 Pages: 3-123, 3-130 thru 3-132, 3-135, 3-148 and 3-149, 3-170 and 3-171. Section 4 Pages: 4-3 and 4-4. Section 5 Page: 5-6. Section 5 Supp. 5 Pages: S5-iv and S5-v, S5-3, S5-5, S5-6A and S5-6B, S5-24A and S5-24B. Section 5 Supp. 11 Pages: S11-iii and S11-iv, S11-8, S11-8A and S11-8B, S11-11	Approval No. EASA 10072085 Dated: December 17, 2019

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25 (cont.)	thru S11-18, S11-21 and S11-22, S11-24 and S11-25, S11-34 thru S11-42. Section 5 Supp. 12 Pages: S12-1, S12-3 thru S12-8, S12-8A and S12-8B, S12-9, S12-11. Section 5 Supp. 13 Pages: S13-8, S13-26. Section 5 Supp. 34 Pages: S34-iii thru S34-v, S34-5, S34-24 and S34-25, S34-32, S34-36C. Section 5 Supp. 40 Pages: S40-iii thru S40-vi, S40-5, S40-22 and S40-23, S40-30, S40-33. Section 5 Supp. 41 Pages: S41-iii and S41-iv, S41-11 thru S41-18, S41-37 thru S41-46. Section 5 Supp. 45 Pages: S45-iii, S45-1 thru S45-3. Section 5 Supp. 49 Pages: S49-iii and S49-iv, S49-13 thru S49-20, S49-35 thru S49-42. Section 5 Supp. 50 Pages: S50-1, S50-5, S50-11, S50-21. Section 5 Supp. 59 Page: S59-i. Section 5 Supp. 67 Pages: S67-iii thru S67-v, S67-7 and S67-8, S67-32 and S67-33, S67-40, S67-44C. Section 5 Supp. 68 Page: S68-21.	

REVISION No.	SUBJECT	APPROVAL
25 (cont.)	Section 5 Supp. 69 Pages: S69-iii thru S69-v, S69-6, S69-35 and S69-36, S69-43, S69-47. Section 5 Supp. 70 Pages: S70-iii and S70-iv, S70-6, S70-26 and S70-27, S70-34, S70-37. Section 5 Supp. 76 Pages: S76-5 and S76-6, S76-50. Section 5 Supp. 81 Page: S81-27. Section 5 Supp. 82 Pages: S82-1 and S82-2, S82-10 and S82-11, S82-17. Section 5 Supp. 97 Pages: S97-iii, S97-1, S97-3, S97-5 and S97-6, S97-24.	
	Section 5 Supp. 50 Pages: S50-4 and S50-5, S50-11, S50-13.	Approval No. EASA 10072086 Dated: December 17, 2019
	Intro Pages: I-3 and I-4, I-4A and I-4B. Section 1 Pages: 1-ii, 1-34 and 1-35. Section 2 Pages: 2-ii, 2-40- 2-40A and 2-40B, 2-43 thru 2-46. Section 3 Pages: 3-i, 3-vi and 3-vii , 3-2A and 3-2B, 3-63, 3-68 and 3-69, 3-153, 3-154, 3-154A thru 3-154D, 3-178, 3-181 and 3-182. Section 5 Supp. 34 Pages: S34-36, S34-36A thru S34-36D. Section 5 Supp. 37 Pages: S37-iii, S37-3 thru S37-6. Section 5 Supp. 40 Pages: S40-32A thru S40-32D.	Approval No. EASA 10072089 Dated: December 17, 2019

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25 (cont.)	Section 5 Supp. 67 Pages: S67-44, S67-44A thru S67-44D. Section 5 Supp. 69 Pages: S69-46, S69-46A thru S69-46D. Section 5 Supp. 70 Pages: S70-36A thru S70-36D. Section 5 Supp. 79 Pages: S79-iii, S79-1 and S79-2, S79-4. Section 5 Supp. 80 Complete revision.	
	Section 5 Supp. 90 Page: S90-1.	Approval No. EASA 10072087 Dated: December 17, 2019
	Section 5 Page: 5-2. Section 5 Supp. 17 Pages: S17-i, S17-iii, S17-1 and S17-2, S17-2A and S17-2B.	Approved with NDC-139G2350-009 dated November 14, 2019 under the authority of DOA ref. EASA.21J.005
	Section 5 Pages: 5-8, 5-18. Section 5 Supp. 83 Pages: S83-i thru S83-iv, S83-1 thru S83-14.	Approved with NDC-139G3340-013 dated November 14, 2019 under the authority of DOA ref. EASA.21J.005
	Section 5 Supp. 38 Page: S38-8. Section 7 Pages: 7-v thru 7-vii, 7-97 and 7-98, 7-98A thru 7-98D, 7-110. Section 9 Pages: 9-i, 9-5 and 9-6, 9-128.	Manufacturer's Data
26	Section 1 Page: 1-27. Section 2 Pages: 2-12 thru 2-15, 2-40. Section 3 Page: 3-161. Section 5 Pages: 5-3, 5-7 thru 5-10, 5-13 thru 5-20. Section 5 Supp. 12 Pages: S12-8, S12-11, S12-L6. Section 5 Supp. 37 Pages: S37-1 thru S37-3.	Approval No. EASA 10073661 and 10073662 Dated: June 30, 2020

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26 (cont.)	Section 5 Supp. 60 Pages: S60-1, S60-6. Section 5 Supp. 67 Complete revision. Section 5 Supp. 68 Complete revision. Section 5 Supp. 69 Complete revision. Section 5 Supp. 70 Complete revision. Section 5 Supp. 74 Pages: S74-2, S74-7. Section 5 Supp. 79 Complete revision. Section 5 Supp. 80 Complete revision. Section 5 New Issue Supplements 101 and 102.	Approval No. EASA 10073661 and 10073662 Dated: June 30, 2020
	Section 5 Supp. 81 Complete revision.	Approval No. EASA 10073660 and 10073662 Dated: June 30, 2020
	Section 2 Page: 2-48. Section 5 Supp. 5 Pages: S5-6A, S5-24A. Section 5 Supp. 11 Pages: S11-18A and S11-18B deleted. Section 5 Supp. 13 Pages: S13-iii thru S13-vii, S13-26 thru S13-36, S13-36A thru S13-36D. Section 5 Supp. 79 Page: S79-10. Section 5 Supp. 80 Page: S80-12. Section 5 Supp. 98 Page: S98-38.	Approved with NDC-139G0257-027 dated July 02, 2020 under the authority of DOA ref. EASA.21J.005
27	Section 3 Pages: 3-viii, 3-58, 3-58A and 3-58B. Section 5 Supp. 26 Pages: S26-iii, S26-4 thru S26-8. Section 5 Supp. 33 Pages: S33-iii, S33-3 thru S33-6. Section 5 Supp. 66 Pages: S66-iii, S66-6 thru S66-10.	Approval No. EASA 10076558 Dated: May 26, 2021
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28	Section 5 New Issue Supplement 103. Section 5 Pages: 5-10, 5-20.	Approval No. EASA 10080099 Dated: September 08, 2022
	Section 5 Pages: 5-2 thru 5-4, 5-12 thru 5-19. Section 5 Supp. 21 Complete revision. Section 5 Supp. 14 REMOVED. Section 5 Supp. 13 Page: S13-10. Section 5 Supp. 25 Page: S25-2. Section 5 Supp. 98 Page: S98-19.	Approval No. EASA 10080102 Dated: September 08, 2022
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28 (cont.)	Section 5 Supp. 55 Page: S55-3. Section 5 Supp. 71 Page: S71-16. Section 5 Supp. 81 Page: S81-i. Section 5 Supp. 90 Page: S90-5. Section 5 Supp. 101 Pages: S101-i, S101-5 and S101-6, S101-12 thru S101-15.	
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29	Section 1 Page: 1-29.	Approval No. EASA 10081123 Dated: January 25, 2023
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31	Section 2 Page: 2-35. Section 3 Page: 3-95. Section 5 Supp. 5 Page: S5-10.	Approval No. EASA 10085741 Dated: November 04, 2024
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32	Section 3 Pages: 3-99, 3-115, 3-117, 3-119. Section 5 Supp. 87 Pages: S87-3, S87-11.	Approval No. EASA 10086040 Dated: December 18, 2024
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32 (cont.)	Pages: A-38 thru A-40, B-1 thru B-30. Section 7 Pages: 7-iv thru 7-vii, 7-167 and 7-168.	Manufacturer's Data
33	Section 5 Supp. 38 Pages: S38-5 thru S38-8, S38-15 and S38-16.	Approval No. EASA 10090610 Dated: August 03, 2026
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S4-i and S4-ii	0
S5-i and S5-ii	0
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S7-i thru S7-iv	0
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S12-A3 thru S12-A5	12
S12-A6 thru S12-A8	0
S12-A9	25
S12-A10 and S12-A11	10
S12-A12 thru S12-A16	0
S12-A17	1
S12-A18	0
S12-A19 and S12-A20	12
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S12-A32A and S12-A32B	12
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S12-B4 and S12-B5	0
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S12-B19 thru S12-B21	0
S12-B22	12
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S12-B28A and S12-B28B	12
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S12-B30 thru S12-B32	0
S12-C1	0
S12-C2	3
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S12-C13	13
S12-C14 thru S12-C18	0
S12-C19 and S12-C20	1
S12-C21 and S12-C22	12
S12-C23	0
S12-C24	27
S12-C25 thru S12-C27	0
S12-C28	12
S12-C29	3
S12-C30	0
S12-C31	3
S12-C32	27
S12-D1 and S12-D2	2
S12-D3 and S12-D4	12
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S12-D29	0
S12-D30	27
S12-D31 thru S12-D34	0
S12-D34A and S12-D34B	12
S12-D35	3
S12-D36	27
S12-D37	3
S12-D38	0
S12-D39 thru S12-D56	2
S12-D57 thru S12-D62	12
S12-E1 and S12-E2	2
S12-E3	12

PAGE	REVISION N°
S12-E4 and S12-E5	0
S12-E6	12
S12-E7	0
S12-E8	2
S12-E9	10
S12-E10	25
S12-E11 and S12-E12	31
S12-E12A	10
S12-E12B	25
S12-E12C thru S12-E12E	31
S12-E12F	10
S12-E13 thru S12-E16	0
S12-E17	1
S12-E18	31
S12-E18A and S12-E18B	2
S12-E18C	31
S12-E18D	2
S12-E19	0
S12-E20	27
S12-E21	31
S12-E22 thru S12-E24	0
S12-E24A and S12-E24B	12
S12-E25	3
S12-E26	0
S12-E27	3
S12-E28	0

PAGE	REVISION N°
S12-E29	3
S12-E30	0
S12-E30A and S12-E30B	12
S12-E31	1
S12-E32	0
S12-F1	0
S12-F2 thru S12-F5	12
S12-F6	0
S12-F7	25
S12-F8 and S12-F9	10
S12-F10 thru S12-F13	0
S12-F14	3
S12-F15	0
S12-F16 and S12-F17	12
S12-F18 thru S12-F20	0
S12-F20A and S12-F20B	12
S12-F21 thru S12-F26	0
S12-F26A and S12-F26B	12
S12-F27	3
S12-F28	0
S12-F29	3
S12-F30	0
S12-F31	3
S12-F32	0

PAGE	REVISION N°
S12-F32A and S12-F32B	12
S12-F33 thru S12-F50	0
S12-F51 thru S12-F56	12
S12-G1 thru S12-G4	0
S12-G5	12
S12-G6 and S12-G7	0
S12-G8	10
S12-G8A and S12-G8B	10
S12-G9 thru S12-G15	0
S12-G16	1
S12-G17 thru S12-G19	0
S12-G20 and S12-G21	12
S12-G22 thru S12-G24	0
S12-H1	2
S12-H2	10
S12-H2A and S12-H2B	2
S12-H3	12
S12-H4 and S12-H5	2
S12-H6	10
S12-H7 thru S12-H9	0
S12-H10 thru S12-H12	10

PAGE	REVISION N°
S12-H12A and S12-H12B	10
S12-H13 and S12-H14	0
S12-H15 and S12-H16	1
S12-H17	0
S12-H18	2
S12-H18A thru S12-H18D	2
S12-H19 and S12-H20	0
S12-H21	12
S12-H22	31
S12-H23	18
S12-H24	30
S12-H25 thru S12-H28	0
S12-I1	1
S12-I2	2
S12-I3	33
S12-I4	12
S12-I5	1
S12-I6	12
S12-I7	2
S12-I8	1
S12-I9	10
S12-I10	31
S12-I11	0
S12-I12	1
S12-I13	33
S12-I14 thru S12-I16	1
S12-I17	31

PAGE	REVISION N°
S12-I18	10
S12-I19 thru S12-I22	1
S12-I23 and S12-I24	31
S12-I25	1
S12-I26	2
S12-I26A	31
S12-I26B thru S12-I26D	2
S12-I27	1
S12-I28	31
S12-I29	1
S12-I30	2
S12-I30A	31
S12-I30B thru S12-I30D	2
S12-I31 thru S12-I34	1
S12-I35 and S12-I36	27
S12-I36A	31
S12-I36B	2
S12-I37 thru S12-I44	1
S12-I45 and S12-I46	12
S12-J1 and S12-J2	0
S12-J3	12
S12-J4	0
S12-J5 and S12-J6	10
S12-J7	0

PAGE	REVISION N°
S12-J8	3
S12-J9 thru S12-J11	0
S12-J12 thru S12-J14	12
S12-J15 thru S12-J20	0
S12-K1	0
S12-K2	12
S12-K3	27
S12-K4	12
S12-K5 thru S12-K29	0
S12-K30 thru S12-K36	12
S12-L1	28
S12-L2	12
S12-L3	3
S12-L4 and S12-L5	0
S12-L6	26
S12-L7	12
S12-L8 and S12-L9	0
S12-L10	28
S12-L11	12
S12-L12 thru S12-L14	1
S12-L15	12
S12-L16 and S12-L17	1
S12-L18 thru S12-L20	0
S12-L21 and S12-L22	12

PAGE	REVISION N°
S13-i and S13-ii	0
S13-iii thru S13-vi	27
S13-vii	26
S13-viii	12
S13-1 thru S13-7	0
S13-8	25
S13-9	12
S13-10	28
S13-11 thru S13-19	0
S13-20	7
S13-21 thru S13-25	0
S13-26 thru S13-36	27
S13-36A thru S13-36D	27
S13-37	10
S13-38 thru S13-43	0
S13-44 and S13-45	27
S13-46	0
S13-47	27
S13-48 thru S13-51	0
S13-52 and S13-53	27
S13-54 thru S13-63	0
S13-64 thru S13-67	15

PAGE	REVISION N°
S13-68 and S13-69	16
S13-70 thru S13-76	15
S14-i	28
S14-ii	0
S15-i thru S15-iv	0
S15-1 thru S15-4	0
S16-i	2
S16-ii	0
S16-iii	15
S16-iv	0
S16-1 thru S16-3	2
S16-4	15
S17-i	30
S17-ii	0
S17-iii	30
S17-iv	0
S17-1	30
S17-2	29
S17-2A	30
S17-2B	25
S17-3	15
S17-4	2
S17-5	30
S17-6	15
S18-i thru S18-iv	0
S18-1	27
S18-2 thru S18-4	0

PAGE	REVISION N°
S19-i	18
S19-ii	0
S19-iii	18
S19-iv	0
S19-1 and S19-2	18
S19-3	5
S19-4 thru S19-6	0
S20-i	18
S20-ii thru S20-iv	0
S20-1	18
S20-2	2
S20-3	5
S20-4 thru S20-6	0
S21-i thru S21-iv	28
S21-1 thru S21-13	28
S21-14 and S21-15	30
S21-16 thru S21-18	28
S21-19 thru S21-21	30
S21-22 thru S21-28	28
S21-29 thru S21-34	30
S22-i thru S22-iv	0
S22-1 thru S22-6	0

PAGE	REVISION N°
S23-i and S23-ii	27
S24-i thru S24-iv	0
S24-1	5
S24-2 thru S24-4	0
S25-i and S25-ii	0
S25-iii	2
S25-iv	0
S25-1	0
S25-2	28
S25-3	27
S25-4 thru S25-6	0
S25-7 thru S25-9	2
S25-10 thru S25-14	0
S26-i	22
S26-ii	0
S26-iii	27
S26-iv	0
S26-1	22
S26-2 and S26-3	0
S26-4 thru S26-8	27
S27-i and S27-ii	0
S27-iii	15
S27-iv	0
S27-1 thru S27-3	0

PAGE	REVISION N°
S27-4	15
S28-i	33
S28-ii	17
S28-iii	33
S28-vi	17
S28-1 and S28-2	33
S28-3 thru S28-6	17
S29-i	2
S29-ii and S29-iii	0
S29-iv	2
S29-1	1
S29-2 thru S29-4	2
S29-5	0
S29-6 thru S29-8	2
S29-9 and S29-10	0
S29-11	24
S29-12 thru S29-27	0
S29-28	2
S30-i and S30-ii	0
S30-iii	10
S30-iv	0
S30-1	10
S30-2 thru S30-4	0
S30-4A and S30-4B	10

PAGE	REVISION N°
S30-5 thru S30-8	0
S31-i and S31-ii	0
S31-iii	2
S31-iv	0
S31-1	1
S31-2	0
S31-3	2
S31-4	0
S31-5	2
S31-6	0
S33-i and S33-ii	0
S33-iii	27
S33-iv	0
S33-1 and S33-2	0
S33-3 thru S33-6	27
S34-i	5
S34-ii	0
S34-iii thru S34-v	25
S34-vi	0
S34-1	5
S34-2 thru S34-4	0
S34-5	25
S34-6 thru S34-11	0
S34-12	33
S34-13 thru S34-21	0

PAGE	REVISION N°
S34-22	3
S34-23	0
S34-24 and S34-25	25
S34-26 and S34-27	0
S34-28	10
S34-29 thru S34-31	0
S34-32	25
S34-33 and S34-34	0
S34-35 and S34-36	25
S34-36A thru S34-36D	25
S34-37 thru S34-40	0
S35-i and S35-ii	0
S35-iii	7
S35-iv	0
S35-1 and S35-2	0
S35-3 and S35-4	7
S35-5	0
S35-6	2
S36-i	1
S36-ii thru S36-iv	0
S36-1 thru S36-7	0
S36-8	15
S37-i	5

PAGE	REVISION N°
S37-ii	0
S37-iii	25
S37-iv	0
S37-1	26
S37-2	31
S37-3	26
S37-4 thru S37-6	25
S38-i	2
S38-ii	0
S38-iii	31
S38-iv	33
S38-1	31
S38-2	2
S38-3 and S38-4	31
S38-5 thru S38-8	33
S38-9 thru S38-14	31
S38-15 and S38-16	33
S39-i thru S39-iv	0
S39-1 thru S39-8	0
S40-i	5
S40-ii	0
S40-iii thru S40-vi	25
S40-1 and S40-2	5
S40-3 thru S40-4	0

PAGE	REVISION N°
S40-5	25
S40-6 thru S40-19	0
S40-20	3
S40-21	0
S40-22 and S40-23	25
S40-24 and S40-25	0
S40-26	10
S40-27 thru S40-29	0
S40-30	25
S40-31 and S40-32	0
S40-32A thru S40-32D	25
S40-33	25
S40-34 thru S40-36	0
S41-i and S41-ii	0
S41-iii and S41-iv	27
S41-1	0
S41-2	24
S41-3	28
S41-4 thru S41-6	0
S41-7	28
S41-8	24
S41-9	2
S41-10	24
S41-11 thru S41-18	25

PAGE	REVISION N°
S41-19	23
S41-20 thru S41-28	27
S41-29	22
S41-30	30
S41-31	22
S41-32 thru S41-34	27
S41-35 and S41-36	22
S41-37 thru S41-44	25
S41-45	33
S41-46	25
S42-i thru S42-iv	17
S42-1 thru S42-5	17
S42-6	27
S42-7 thru S42-12	17
S43-i	17
S43-ii	0
S43-iii	31
S43-iv	0
S43-1	24
S43-2	17
S43-3 thru S43-6	7
S43-7	18
S43-8 thru S43-11	31
S43-12	7
S44-i	1

PAGE	REVISION N°
S44-ii thru S44-iv	0
S44-1 thru S44-4	0
S44-5	1
S44-6 thru S44-12	0
S45-i	7
S45-ii	0
S45-iii and S45-iv	28
S45-1 thru S45-4	28
S45-4A and S45-4B	28
S45-5 and S45-6	28
S45-7	13
S45-8	7
S45-9 thru S45-14	28
S46-i thru S46-iv	0
S46-1 thru S46-4	0
S46-5 and S46-6	30
S47-i thru S47-iv	0
S47-1 and S47-2	0
S48-i thru S48-iv	0
S48-1 thru S48-4	0

PAGE	REVISION N°
S49-i and S49-ii	0
S49-iii and S49-iv	25
S49-1	22
S49-2	24
S49-3	28
S49-4 thru S49-7	0
S49-8	28
S49-9	24
S49-10	11
S49-11	2
S49-12	24
S49-13 thru S49-20	25
S49-21	0
S49-22	27
S49-23	22
S49-24 thru S49-29	27
S49-30 and S49-31	22
S49-32	27
S49-33 and S49-34	22
S49-35 thru S49-42	25
S50-i and S50-ii	0
S50-iii	19
S50-iv thru S50-xi	13
S50-xii	12

PAGE	REVISION N°
S50-1	25
S50-2	13
S50-2A	13
S50-2B	12
S50-3	0
S50-4	25
S50-5	27
S50-6	19
S50-6A and S50-6B	19
S50-7	1
S50-8 thru S50-10	0
S50-11	25
S50-12	0
S50-13	25
S50-14 thru S50-17	0
S50-18	12
S50-19 and S50-20	2
S50-20A and S50-20B	2
S50-21	25
S50-22	0
S50-23 and S50-24	4
S50-24A and S50-24B	4
S50-25 thru S50-32	0
S50-32A thru S50-32D	12

PAGE	REVISION N°
S50-33 thru S50-58	0
S50-58A	29
S50-58B thru S50-58J	12
S50-59 thru S50-62	0
S50-63	6
S50-64	0
S50-65	11
S50-66 thru S50-80	0
S50-80A thru S50-80F	12
S50-81 thru S50-83	12
S50-84	27
S50-84A	12
S50-84B	1
S50-85	31
S50-86 thru S50-88	0
S50-89	31
S50-90 thru S50-92	0
S50-93	31
S50-94 thru S50-102	0
S50-103 thru S50-108	31
S50-108A	31
S50-108B thru S50-108F	12
S50-109	3

PAGE	REVISION N°
S50-110 thru S50-112	0
S50-113	3
S50-114	0
S50-115	3
S50-116	0
S50-117	3
S50-118	0
S50-119	1
S50-120	0
S50-121 thru S50-126	1
S50-127 thru S50-132	0
S50-133 and S50-134	31
S50-135 thru S50-138	0
S50-139 thru S50-144	2
S50-145 thru S50-154	12
S50-155	27
S50-156 thru S50-158	12
S51-i and S51-ii	0
S51-iii	2
S51-iv thru S51-vi	0
S51-1	2
S51-2 and S51-3	12
S51-4	10
S51-5	0

PAGE	REVISION N°
S51-6	10
S51-6A	10
S51-6B	2
S51-7 thru S51-16	0
S51-17	10
S51-18 thru S51-46	0
S51-47	6
S51-48 thru S51-50	0
S52-i	28
S52-ii	0
S52-iii	28
S52-iv	0
S52-1 thru S52-4	28
S52-4A and S52-4B	28
S52-5 thru S52-10	28
S53-i thru S53-iv	0
S53-1 thru S53-14	0
S54-i and S54-ii	0
S54-iii	1
S54-iv	0
S54-1	33
S54-2	0
S54-3 thru S54-6	1
S54-7	33

PAGE	REVISION N°
S54-8 thru S54-10	28
S54-11 thru S54-14	1
S55-i thru S55-iv	0
S55-1 and S55-2	0
S55-3	28
S55-4 thru S55-6	0
S56-i	16
S56-ii and S56-iii	3
S56-iv	16
S56-1	16
S56-2 thru S56-5	3
S56-6 and S56-7	16
S56-8	3
S56-9	16
S56-10	3
S56-11 thru S56-14	16
S57-i thru S57-iv	0
S57-1 thru S57-4	0
S58-i thru S58-iv	22
S58-1 and S58-2	23
S58-3 and S58-4	22

PAGE	REVISION N°
S59-i	25
S59-ii thru S59-iv	0
S59-1 and S59-2	0
S59-3	27
S59-4	2
S60-i and S60-ii	0
S60-iii	22
S60-iv	0
S60-1	26
S60-2	29
S60-3 and S60-4	0
S60-5	30
S60-6 thru S60-8	29
S60-9 and S60-10	0
S60-11	22
S60-12	0
S61-i thru S61-iv	0
S61-1 thru S61-5	0
S61-6	2
S62-i thru S62-iv	0
S62-1 thru S62-4	0
S63-i thru S63-iv	0
S63-1 thru S63-4	0

PAGE	REVISION N°
S64-i thru S64-iv	0
S64-1 thru S64-7	0
S64-8	15
S65-i and S65-ii	0
S65-iii	1
S65-iv	0
S65-1	1
S65-2	0
S65-3	1
S65-4	2
S65-5 thru S65-8	1
S66-i and S66-ii	0
S66-iii	27
S66-iv	0
S66-1 and S66-2	0
S66-3	4
S66-4 and S66-5	0
S66-6 thru S66-10	27
S67-i thru S67-vi	26
S67-1	31
S67-2 thru S67-19	26
S67-20	33
S67-21 thru S67-56	26

PAGE	REVISION N°
S68-i thru S68-iv	26
S68-1	31
S68-2 thru S68-30	26
S69-i thru S69-vi	26
S69-1	31
S69-2 thru S69-19	26
S69-20	33
S69-21 thru S69-68	26
S70-i thru S70-vi	26
S70-1	31
S70-2 thru S70-52	26
S71-i and S71-ii	0
S71-iii	17
S71-iv	11
S71-v and S71-vi	9
S71-1 thru S71-6	0
S71-7	6
S71-8	3
S71-9 thru S71-15	0
S71-16	28
S71-17	24
S71-18	2
S71-19	0
S71-20	17

PAGE	REVISION N°
S71-21 thru S71-30	0
S71-31 and S71-32	11
S71-32A and S71-32B	11
S71-33 and S71-34	0
S71-35	7
S71-36	5
S71-37 thru S71-39	0
S71-40	9
S71-40A and S71-40B	9
S71-41	9
S71-42 thru S71-47	0
S71-48	23
S71-49 thru S71-72	0
S72-i thru S72-iv	11
S72-1 thru S72-8	11
S72-9	15
S72-10	11
S73-i thru S73-iv	22
S73-1 thru S73-8	22
S74-i	9
S74-ii	1
S74-iii	33
S74-iv	1

PAGE	REVISION N°
S74-1	9
S74-2	31
S74-3 thru S74-6	1
S74-7	33
S74-8 thru S74-10	1
S75-i thru S75-iv	3
S75-1 thru S75-4	3
S76-i thru S76-vi	6
S76-1	11
S76-2 and S76-3	6
S76-4	16
S76-5 and S76-6	25
S76-7 and S76-8	6
S76-9	16
S76-10 thru S76-14	6
S76-15	11
S76-16 thru S76-49	6
S76-50	25
S76-51 and S76-52	6
S77-i thru S77-iv	3
S77-1 thru S77-5	3
S77-6	27

PAGE	REVISION N°
S77-7	3
S77-8	20
S77-9 thru S77-12	3
S78-i and S78-ii	3
S78-iii	15
S78-iv	3
S78-1 thru S78-6	3
S78-7 thru S78-10	15
S79-i	31
S79-ii thru S79-iv	26
S79-1	31
S79-2 thru S79-6	26
S79-7	31
S79-8	26
S79-9 and S79-10	31
S79-11 thru S79-14	26
S80-i thru S80-iv	26
S80-1 and S80-2	26
S80-3	31
S80-4	26
S80-5	31
S80-6 thru S80-10	26
S80-11	27

PAGE	REVISION N°
S80-12 thru S80-16	26
S80-17	33
S80-18	27
S80-19 thru S80-28	26
S81-i	28
S81-ii thru S81-iv	26
S81-1 and S81-2	26
S81-3	31
S81-4 and S81-5	26
S81-6	27
S81-7 thru S81-38	26
S82-i and S82-ii	5
S82-iii and S82-iv	7
S82-1 and S82-2	25
S82-3 and S82-4	7
S82-4A and S82-4B	7
S82-5 and S82-6	7
S82-7	27
S82-8 and S82-9	5
S82-10	25
S82-11 and S82-12	27

PAGE	REVISION N°
S82-13 thru S82-16	5
S82-17	25
S82-18 and S82-19	7
S82-20 and S82-21	5
S82-22	7
S82-23 and S82-24	5
S82-25	7
S82-26	5
S82-27	27
S82-28	5
S82-29 and S82-30	7
S83-i thru S83-iv	25
S83-1 thru S83-14	25
S84-i and S84-ii	9
S84-iii	15
S84-iv	9
S84-1	22
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INTRODUCTION

GENERAL

It is the responsibility of the flight crew to be familiar with the contents of this manual.

REVISIONS (RE-ISSUES)

This manual is subject to revisions (re-issues) which will be automatically distributed to all holders of the manual. It is the responsibility of the operator to assure that the revisions (re-issues) are incorporated into the manual upon receipt.
At the beginning of the manual there is the ”Record of Revision” table that shows all pages of the manual which have been revised as well as number, subject and approval reference of each revision.

REVISION SYMBOL

Revised text is indicated by a black vertical line on the outer margin of the page, adjacent to the affected text and the revision number is printed in the lower inner margin. The revision symbol identifies the addition of new information, a change of procedure, the correction of an error, or a rewording of the previous information.

TEMPORARY REVISIONS

Temporary Revisions are issued when immediate data is to be included in the manual. The Temporary Revision data can add to or cancel the initial data in the manual. They are numbered progressively for each section of the manual and are printed on blue paper. Temporary Revision pages are not written in the ”Record of Effective Pages”. A complete list of **active** and **inactive** Temporary Revisions is written in the ”Record of Temporary Revisions” page.

AIRCRAFT CONFIGURATION GENERAL

This RFM is valid for the engine model PT6C-67C and the derivative PT6C-67C1 (installed with part numbers 4G7100F00111 & 4G7100F00211).

Mixing of the 2 alternative models is not permitted.

In this RFM any reference to the PT6C-67C also includes the PT6C-67C1 model.

TERMINOLOGY

WARNINGS, CAUTIONS AND NOTES

Warnings, Cautions and Notes are used throughout this manual to emphasize important and critical instructions and are used as follows:

WARNING

An operating procedure, practice, etc., which, if not correctly followed, could result in personal injury or loss of life.

CAUTION

An operating procedure, practice, etc., which, if not strictly observed, could result in damage to, or destruction of, equipment.

Note

An operating procedure, condition, etc., which is essential to highlight.

USE OF PROCEDURAL WORDS

The concept of procedural word usage and intended meaning which has been adhered to in preparing this RFM is as follows:

"**Shall**" or "**Must**" have been used only when application of a procedure is mandatory.
"**Should**" has been used only when application of a procedure is recommended.
"**May**" has been used only when application of a procedure is optional.
"**Will**" has been used only to indicate futurity, never to indicate a mandatory procedure.
"**Condition**" has been used to determine if the item under examination presents external damage which could jeopardize its safe operation.

"**Secure**" has been used to determine if the item under examination is correctly locked, referring to doors and disconnectable items, or correctly positioned and installed.

DEFINITIONS

The level of alertness required by the pilots is a function of the flight regime.

The following definitions are used in the manual:

Fly Attentive - Pilot to maintain close control of the flight path using hands on when required.

Fly Manually - Pilot to control directly the flight path using hands on.

QFE - Atmospheric pressure at aerodrome elevation (or runway threshold).

QNH - Altimeter subscale setting to obtain elevation when on the ground.

Area navigation (RNAV) - A method of navigation which permits aircraft operation on any desired lateral track within the coverage of ground or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Navigation specification - A set of aircraft and aircrew requirements needed to support Performance-based Navigation operations within a defined airspace. There are two kinds of navigation specification:

RNAV specification. A navigation specification based on area navigation that does not include the requirement for on-board performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

RNP (Required Navigation Performance) specification. A navigation specification based on area navigation that includes the requirement for on-board performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 1, RNP APCH.

Performance-based navigation (PBN) - Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

RNAV system - A navigation system (as part of a Flight Management System (FMS)) which permits aircraft operation on any desired lateral track within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Receiver Autonomous Integrity Monitoring (RAIM) - A form of ABAS (Aircraft Based Augmentation System) whereby a GNSS receiver processor determines the integrity of the GNSS navigation signals using only GPS signals. This determination is achieved by a consistency check among redundant pseudo-range measurements.

ABBREVIATION

The use of capital letters in the text, apart from normal grammatical usage, indicates the actual wording of marking of indicators, controls or control positions on the helicopter.
Abbreviations and acronyms used throughout this RFM are defined as follows:

— a.c./AC : Alternating Current

— ACLCD : Active Liquid Crystal Displays

— ADC : Air Data Computer

— ADF : Automatic Direction Finder

— ADLP : Data Link Processor

— ADM : Air Data Module

— ADS : Air Data System

— AEO : All Engines Operative

— A/F : Airframe

— AFCS : Automatic Flight Control System

— AG : Accessory Gearbox

— AGL : Above Ground Level

— AHRS : Attitude Heading Reference System

— ALS : Ambient Light Sensor

— AMSL : Above Mean Sea Level

— AP : AutoPilot

— ATT : Attitude hold

— ATC : Air Traffic Control

— AWG : Aural Warning Generator

— BFO : Beat Frequency Oscillator

— BL : Buttock Line

— BOD : Bottom Of Descent

— BOW : Basic Operating Weight

— CAS : Calibrated Air Speed

— CAT : Category

— C/B : Circuit Breaker

— CCD : Cursor Control Devices

— CCW : Counter Clock Wise

— CCP : Cockpit Control Panel

— CG : Center of Gravity

— CLTV : Collective

— CPI : Crash Position Indicator

— CS : Centistoke

— CVR : Cockpit Voice Recorder

— CW : Clock Wise

— DAU : Data Acquisition Unit

— d.c./DC : Direct Current

— DEOS : Digital Engine Operating System

— DCU : Data Collection Unit

— DFDAU : Digital Flight Data Acquisition Unit

— DGPS : Differential Global Positioning System

— DH : Decision Height

— DICP : Display Instrument Control Panel

— DME : Distance Measuring Equipment

— EAPS : Engine Air Particle Separator

— EASA : European Aviation Safety Agency

— ENAC : Ente Nazionale Aviazione Civile

— ECL : Engine Control Lever

— ECS : Environmental Control System

— ECU : Engine Control Unit

— EDU : Electronic Display Unit

— EEC : Electronic Engine Control

— EFIS : Electronic Flight Instrument System

— EGPWS : Enhanced Ground Proximity Warning System

— ELT : Emergency Locator Transmitter

— EMM : Engine Maintenance Manual

— EOP : Engine Oil Pressure

— EPU : Estimated Position Uncertainty
— ESIS : Electronic Standby Instrument System
— EXT : External
— FAA : Federal Aviation Administration
— FAF : Final Approach Fix
— FCC : Flight Control Circuit
— FCU : Fuel Computer Unit
— FD : Flight Director
— FDR : Flight Data Recorder
— FMCW : Frequency-Modulated Continuous Wave
— FMM : Fuel Management Module
— FMS : Flight Management System
— FOD : Foreign Object Damage
— FOM : Figure of Merit
— FTR : Force Trim Release
— FWD : Forward
— GA : Go-Around
— GC : Guidance Controller
— GI : Ground Idle
— GPS : Global Positioning System
— GS : GroundSpeed
— G/S : GroundSpeed
— GS : Glide Slope
— GW : Gross Weight
— HCB : Heating Control Box

— Hd : Density altitude

— HF : High Frequency

— HIGE : Hover In Ground Effect

— HOGE : Hover Out of Ground Effect

— Hp : Pressure altitude

— HPS : Hydraulic Power Supply

— HSI : Horizontal Situation Indicator

— H-V : Height Velocity

— IAS : Indicated Air Speed

— ICS : Inter Communication System

— IDS : Integrated Display System

— IGB : Intermediate Gear Box

— IFR : Instrumental Flight Rules

— IGE : In Ground Effect

— IGS : Instrument Guidance System

— ILS : Instrument Landing System

— IR : Infrared

— ISA : International Standard Atmosphere

— ITT : Inter Turbine Temperature

— JAR : Joint Aviation Requirements

— KCAS : Knots - Calibrated Air Speed

— KIAS : Knots - Indicated Air Speed

— LAT : Lateral

— LCF : Low Cycle Fatigue

— LDA : Landing Directional Aid

— LG : Landing Gear

— LGCP : Landing Gear Control Panel

— LH : Left Hand

— LOC : Localizer

— LONG : Longitudinal

— LSS : Lightning Sensor System

— MAN : Manual Override System

— MAU : Modular Avionic Unit

— MCDU : Multifunction Control Display Unit

— MCL : Master Caution Light

— MCP : Maximum Continuous Power

— MDA : Minimum Descent Altitude

— MEC : MEChanical

— MFD : Multifunction Flight Display

— MFR : Manufacturer

— MGB : Main Gear Box

— MLG : Main Landing Gear

— MLS : Microwave Landing System

— MPOG : Minimum Pitch On Ground

— M/R : Main Rotor

— MRC : Modular Radio Cabinet

— MWL : Master Warning Light

— NF : Power turbine speed

— NG : Gas generator speed

— NLG : Nose Landing Gear

— NR : Rotor speed

— NVG : Night Vision Goggle

— OAT : Outside Air Temperature

— OEI : One Engine Inoperative

— OGE : Out Of Ground Effect

— OR : Operational Range

— PAX : Passengers

— PCM : Power Control Module

— PCMCIA : Personal Computer Memory Card Interface Association

— PEP : Peak Envelope Power

— PFD : Primary Flight Display

— PI : Power Index

— PLA : Power Lever Angle (throttle)

— PMS : Power Management Switch

— PSU : Passenger Station Unit

— PWR : Power

— RAIM : Receiver Autonomous Integrity Monitor

— RCP : Reconfiguration Control Panel

— RFM : Rotorcraft Flight Manual

— RH : Right Hand

— RICP : Remote Instrument Control Panel

— RNP : Required Navigation Performance

— ROC : Rate Of Climb

— RPM : Revolutions Per Minute

— SAS : Stability Augmentation System

— SID : Standard Instrument Departure

— SOV : Shut-Off Valve

— S/N : Serial Number

— STA : Station

— STAR : Standard Terminal Arrival Route

— TA : Terrain Awareness

— TAD : Terrain/Obstacle Awareness Display

— TAS : True Air Speed

— TAWS : Terrain Awareness and Warning System

— TBD : To Be Defined

— TCAS : Traffic Collision and Alert System

— TOC : Top Of Climb

— TOD : Top Of Descent

— TOP : Take Off Power

— TQ/TRQ : Engine torque

— TRSOV : Tail Rotor Shut Off Valve

— TVC : Temperature Control Valve

— VDR : VHF - Data Radio

— VFR : Visual Flight Rules

— VIDL : VOR/ILS/Data Link

— VMS : Vehicle Monitoring System

— V_{LO} : Maximum landing gear operating speed

— V_{LE} : Maximum landing gear extended speed

— V_{mini} : Minimum airspeed for flight under IFR

— V_{NE} : Never exceed speed

— VOR : Very high frequency Omni-directional Range

— VSI : Vertical Speed Indicator

— V_y : Speed for best rate of climb

— W.A.T. : Weight/Altitude/Temperature

— WGT : Weight

— WOW : Weight On Wheel

— WX : Weather radar

— Xfer : Transfer

— XPDR : Trasponder

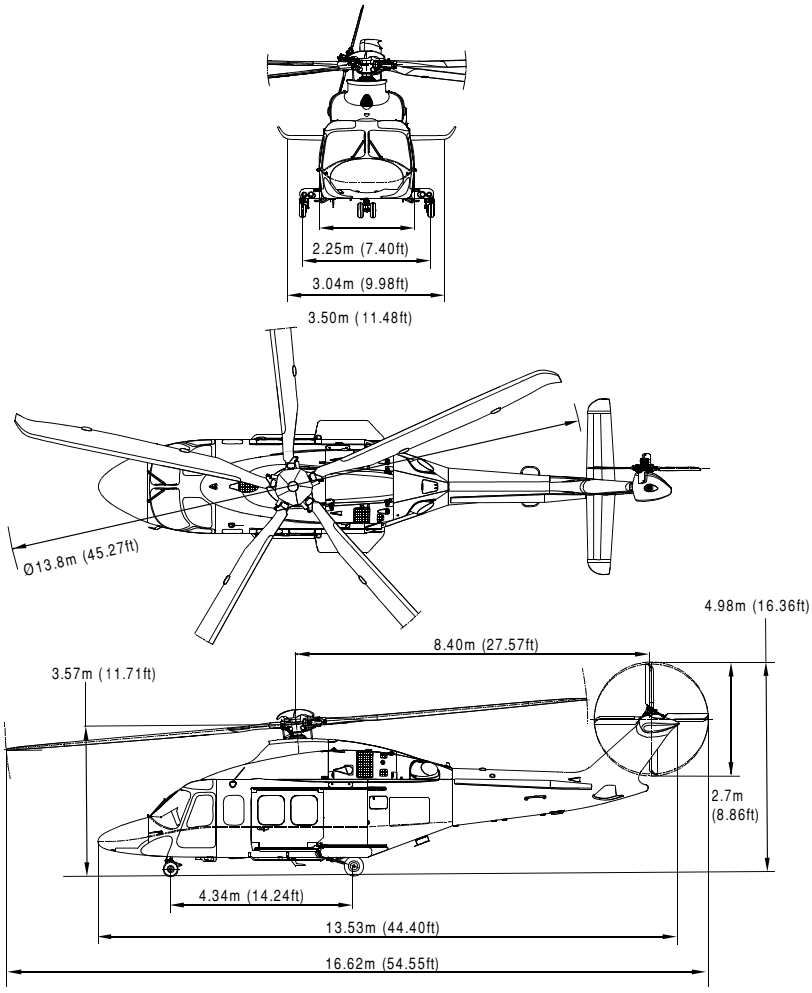

Figure 1-1 Helicopter - Three Views

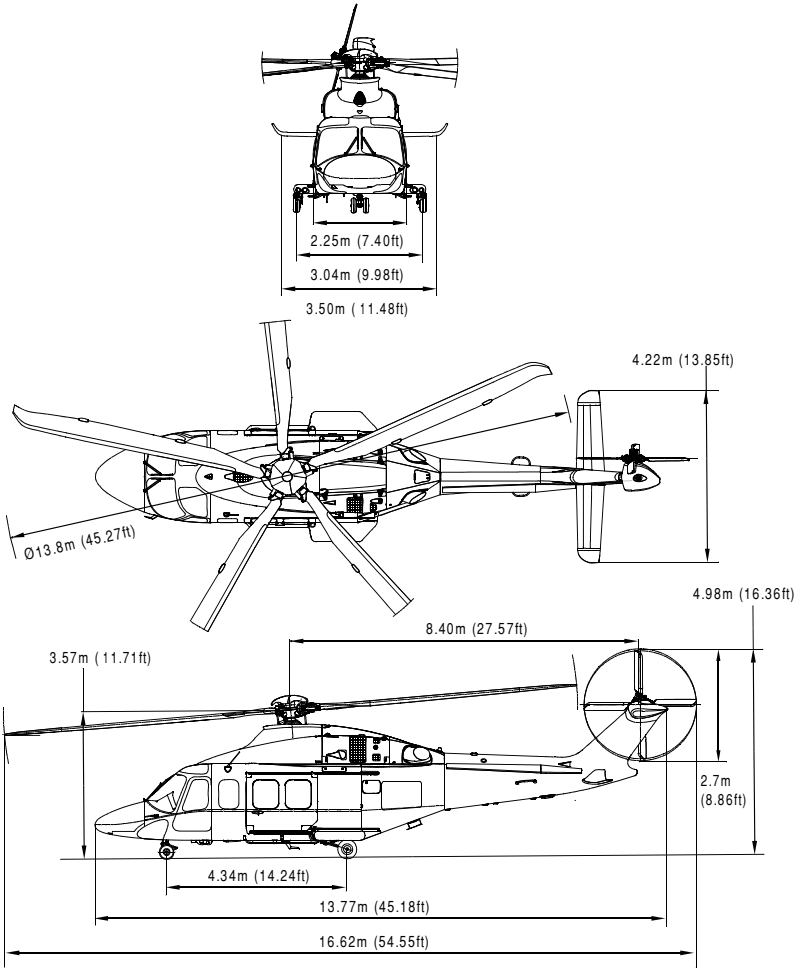

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Figure 1-2 Helicopter - Three Views (Long Nose Version)

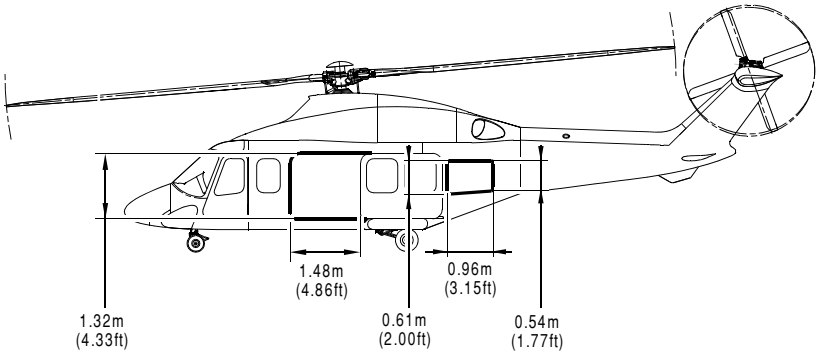

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Figure 1-3 Cabin and Baggage Door Dimensions

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SECTION 1

LIMITATIONS

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SECTION 1

LIMITATIONS

GENERAL

Compliance with Section 1 of this manual is mandatory.

BASIS OF CERTIFICATION

This helicopter is certified by European Aviation Safety Agency (EASA) in accordance with JAR 29 for Large Rotorcraft Category A and B.

TYPES OF OPERATION

The rotorcraft is certified in Category A and B and is eligible for the following kinds of operation when the appropriate instruments and equipment required by the airworthines and/or operating rules are installed and approved and are operable in condition:

— Day and Night VFR

— IFR

— Category A Vertical/Confined Area/Back-Up Operation from Ground level or Elevated heliports (Supplement 12, 50)

— Category A Clear Area and Short Field operation from airport runways (Supplement 12, 50, 90)

— Category A Operation Offshore/Elevated Helidecks (Supplement 12, 50, 97)

— Category B Operation up to 9 passenger seats (Supplement 51)

— Ditching Configurations (Supplement 9, 95)

— Night Vision Goggle Operations (Supplement 60)

— Flight in Limited Icing (Supplement 76)

— Flight in Icing (Supplement 71)

— External Load Operations (Supplement 11,13, 41, 49, 98)

MINIMUM FLIGHT CREW

Visual Flight Rules (VFR) Day - One pilot unless otherwise required by operating rules. Single pilot operation not permitted from left seat.

Visual Flight Rules (VFR) Night and Instrument Flight Rules (IFR) Day/Night - Two pilots.

For VFR Night Single Pilot Operation see Supplement 24.

For IFR Single Pilot Operation see Supplement 22.

NUMBER OF OCCUPANTS

The total number of occupants, including the crew, shall not exceed:

— low density configuration..... 14

— high density configuration.....17

— Each occupant must have a seat and seat belt.

— The low density or high density configuration may have a reduced number of passenger seats installed in cabin. A minimum of 3 seats, in at least one row, must be installed.

— After seat removal or installation the new empty weight and C of G position must be determined and entered into Section 6 to ensure C of G limits are not exceeded.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

WEIGHT

Maximum gross weight for towing or taxi ..... 6450 kg

Maximum gross weight for CAT B take-off/landing ..... 6400 kg

Refer to CAT B W.A.T Limits chart Figure 1-7

Minimum flight/rotor running gross weight ..... 4400 kg

CENTER OF GRAVITY

Longitudinal limits ..... See Figure 1-1 and Figure 1-3

Lateral limits ..... See Figure 1-2 and Figure 1-4

CAUTION

Refer to Section 6 for loading instructions to not exceed maximum allowable.

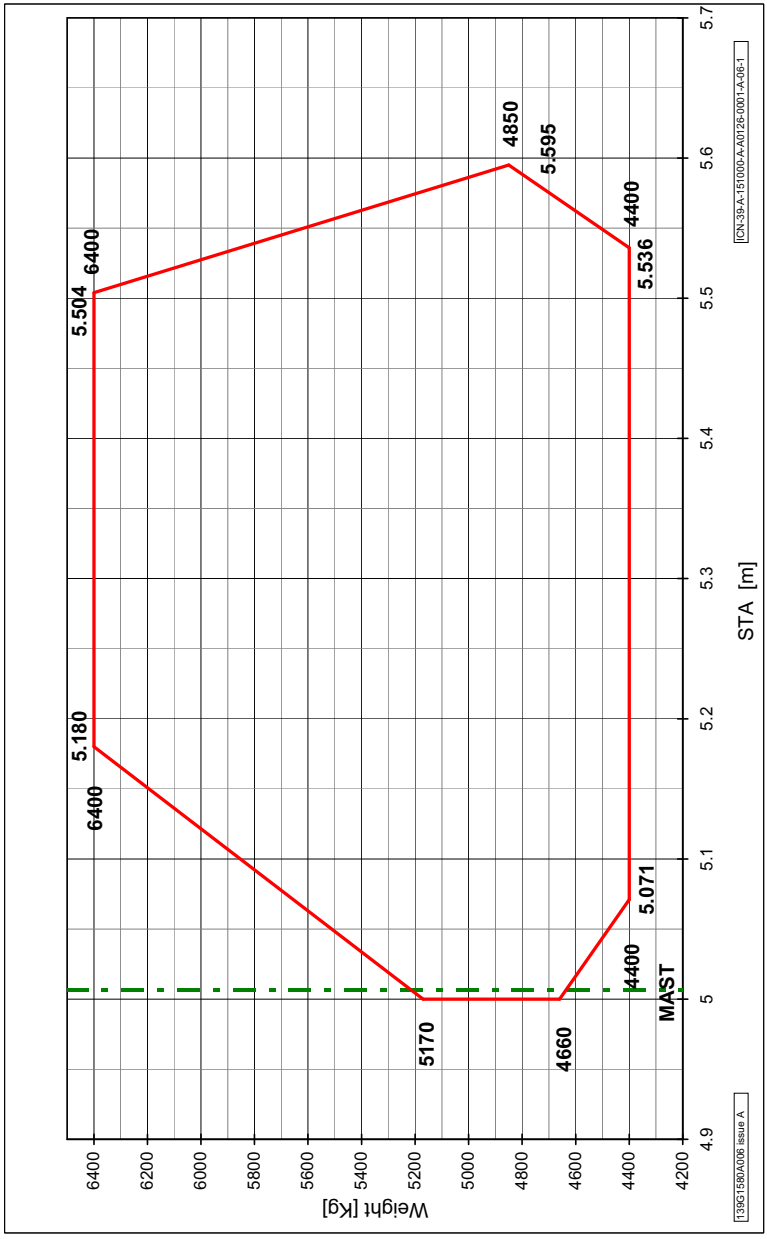

Figure 1-1 Weight and Longitudinal CG Limitations

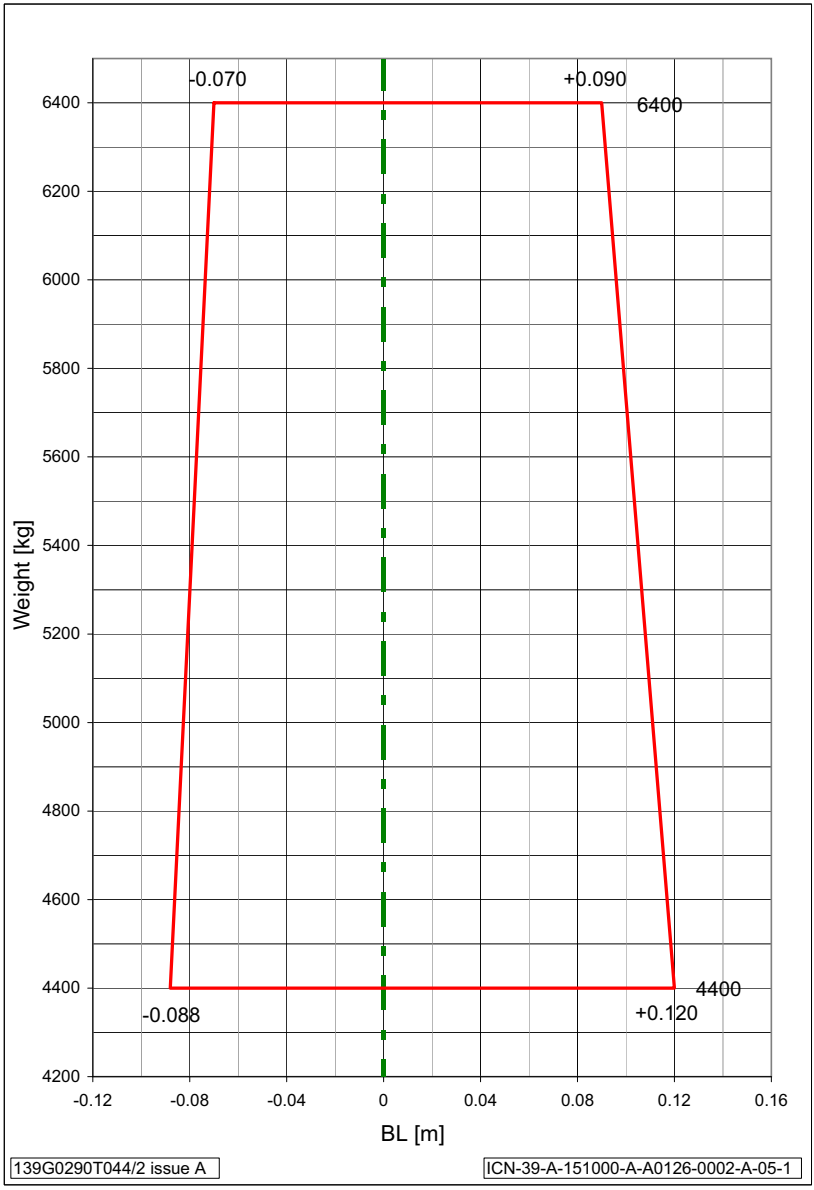

Figure 1-2 Weight and Lateral CG Limitations

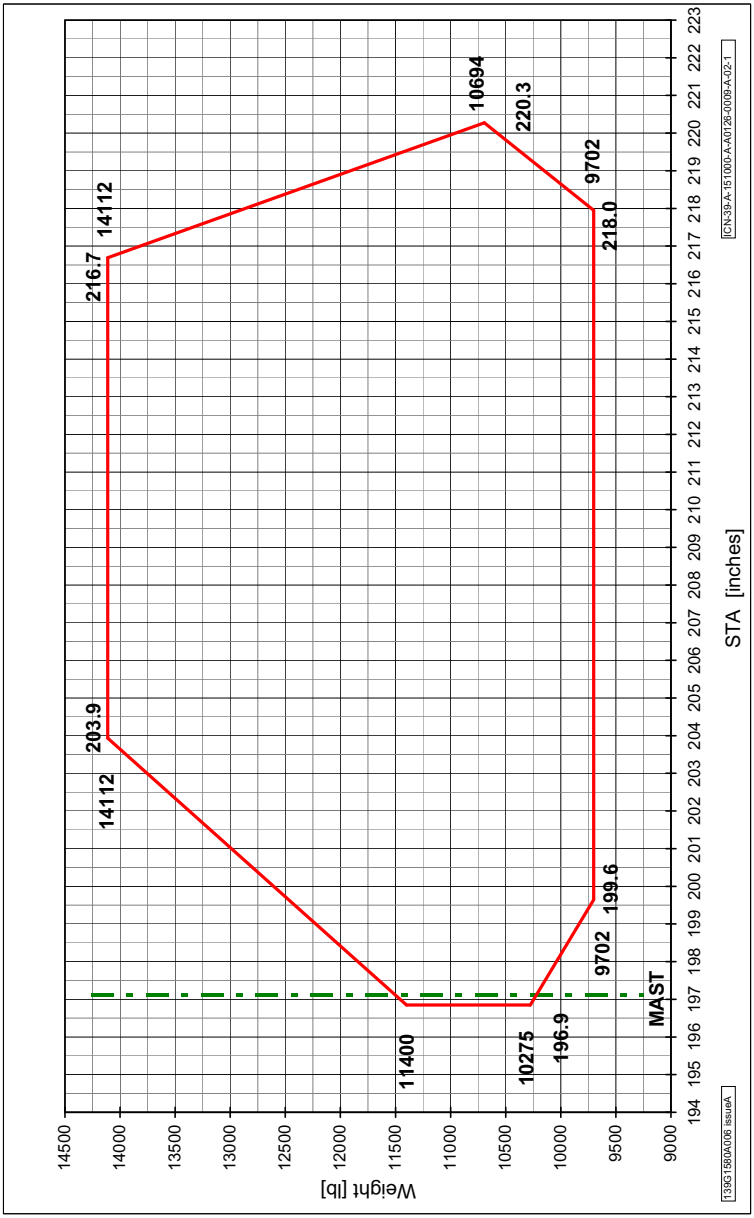

Figure 1-3 Weight and Longitudinal CG Limitations (Imperial Units)

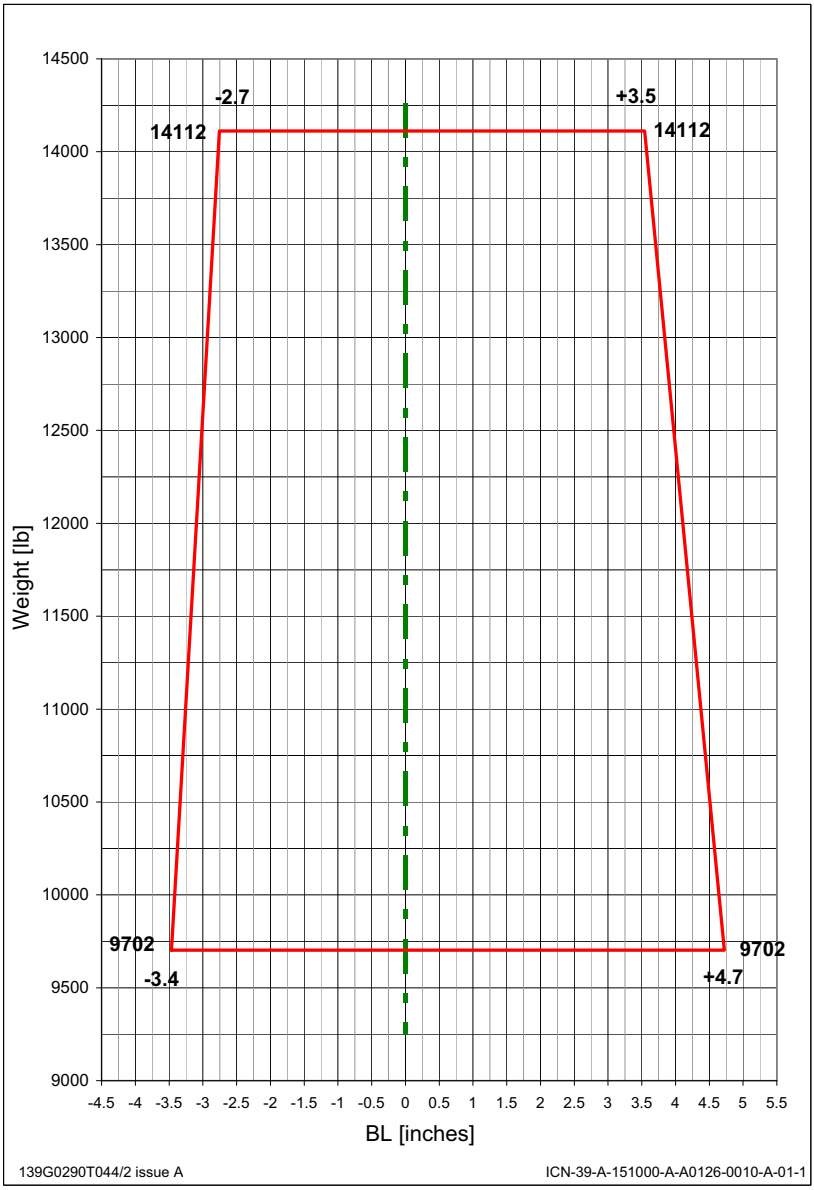

Figure 1-4 Weight and Lateral CG Limitations (Imperial Units)

AIRSPEED LIMITATIONS

Vne (Power ON, OEI/Power OFF) ..... See Figure 1-5

Maximum airspeed with Take-Off Power ..... 90 KIAS

Maximum airspeed with NR at 102% ..... 90 KIAS

Maximum airspeed in sideward or rearward flight ..... See Figure 1-7

Maximum allowable tailwind and crosswind ..... See Figure 1-7

Maximum landing gear operating airspeed (Vlo) ..... 150 KIAS or Vne if less

Maximum landing gear extended airspeed (Vle) ..... 150 KIAS or Vne if less

Minimum airspeed for flight under IFR (Vmini) ..... 50 KIAS

Maximum airspeed for IFR approach..... 150 KIAS

Maximum airspeed for climb with one AP failed ..... 100 KIAS

Maximum rate of climb with one AP failed ..... 1000 fpm

Maximum airspeed with one AP failed..... Vne-27 KIAS

Maximum airspeed for operation of windscreen wipers..... 140 KIAS

Minimum airspeed in autorotation ..... 40 KIAS

Maximum airspeed with right cabin door locked open ..... 100 KIAS

Maximum airspeed with left or both cabin doors locked open 80 KIAS

Maximum airspeed for opening/closing cabin doors ..... 80 KIAS

GROUND SPEED LIMITATIONS

ON PAVED SURFACES

Maximum taxi speed ..... 40 knots
(74 km/hr)
(above 20 knots (36 km/hr) nose wheel must be locked fore and aft)

Maximum for emergency landing speed
(nose wheel locked in fore and aft position) ..... 60 knots
(110 km/hr)

Maximum towing speed ..... 37 km/hr
(23 mph)

ON PREPARED GRASS SURFACES

Maximum taxi speed
(above 10 knots (18 km/hr) nose wheel must be locked fore and aft) ..... 20 knots
(37 km/hr)

Maximum for emergency landing speed
(nose wheel locked fore and aft) ..... 40 knots
(74 km/hr)

WIND SPEED LIMITATIONS FOR ROTOR STARTING AND STOPPING

Maximum wind speed ..... 60 knots
(30 m/s)

Note

During rotor starting and stopping with high crosswind (greater than 30 kts (15 m/s)), lateral cyclic movement up to 50 mm (2 inches) into the direction of the wind may be used to counteract any crosswind rolling tendency at higher rotor speeds.

Note

Actual windspeed values must be recorded in the helicopter log book for all rotor starting and stopping with windspeeds above 33 kts (17 m/s).

ALTITUDE LIMITATIONS

Maximum operating altitude ..... See Figure 1-6

Minimum operating altitude ..... See Figure 1-6

Maximum take-off and landing altitude ..... See Figure 1-6

AMBIENT AIR TEMPERATURE LIMITATIONS (OAT)

Minimum temperature for ground starting ..... -40° C

Maximum ambient air temperature ..... See Figure 1-6

Minimum ambient air temperature ..... See Figure 1-6

ICING LIMITATIONS

Flight into known icing conditions is prohibited.

Flight into freezing rain is prohibited.

CATEGORY B OPERATION LIMITATIONS

The CAT B W.A.T. Limits chart, Figure 1-7, is used to define the maximum take off and landing weight for the given ambient and wind conditions.

(See Flight Planning in Section 2 for examples of using the CAT B W.A.T. Limits chart).

HEIGHT- VELOCITY LIMITATIONS

The Height-Velocity diagram defines, in the event of a single engine failure during take off, landing or other operation near the surface, a combination of airspeed and height above ground from which a safe single engine landing on a smooth, level and hard surface cannot be assured.

CAUTION

Prior to the determination of the H-V envelope the CATEGORY B weight should be defined for the ambient conditions. See Flight Planning in Section 2 for use of the CAT B W.A.T. and H-V envelope charts.

Height Velocity Diagram ..... See Figure 1-8

— If the given ambient conditions are not present in the chart then no H-V avoid area exists.

— If the given ambient conditions and weight intercept are within the green 'NO H-V Area' then no H-V avoid area exists.

— If the given ambient conditions and weight intercept indicate an H-V avoid area then low hover and knee points are fixed and the high hover varies according to the conditions and weight.

CATEGORY B OPERATIONS FOR CABIN CONFIGURATIONS UP TO 9 PAX SEATS

CAT B Operation Limitations refer Supplement 51.

Height Velocity Envelope

For cabin configurations up to 9 PAX seats the Height Velocity diagram is considered performance information and therefore presented in Supplement 51, Section 4 Performance Data.

AIRSPEED LIMITATION

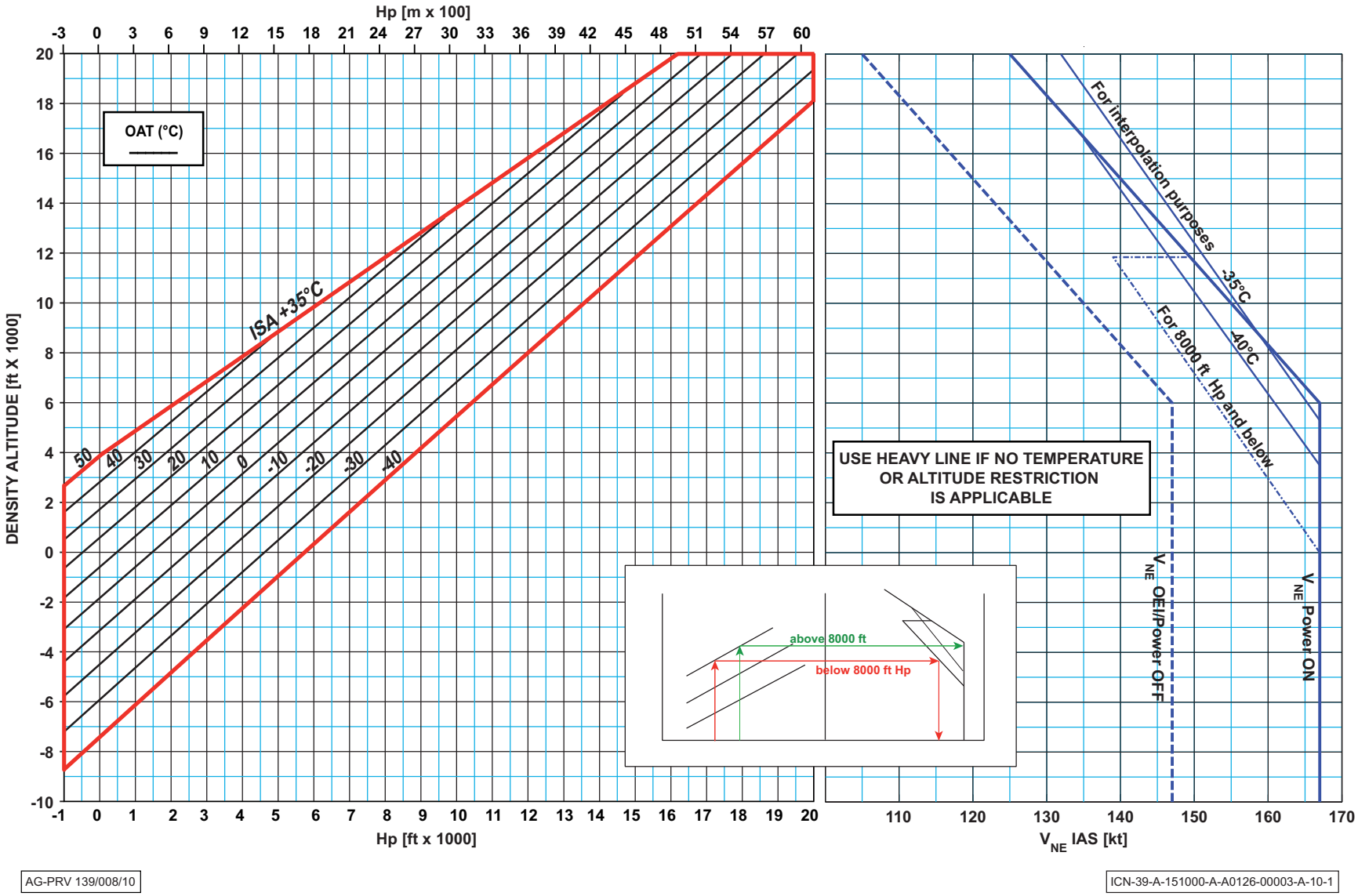

Figure 1-5 Airspeed Envelope (Vne - Power ON, OEI/Power Off)

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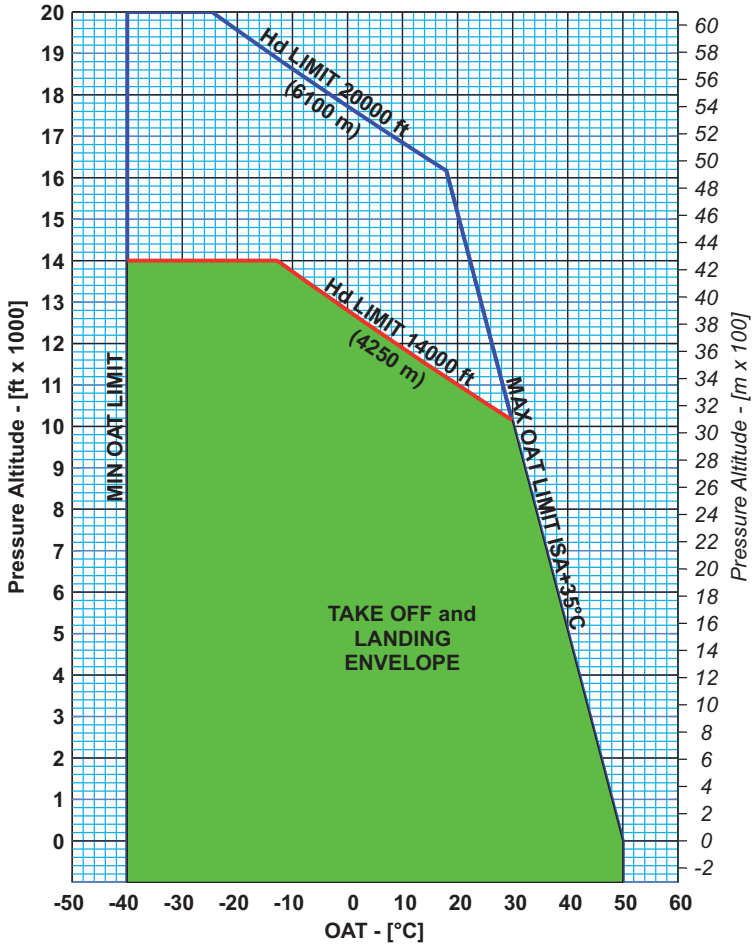

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Figure 1-6 Altitude and OAT Limitations

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WEIGHT-ALTITUDE-TEMPERATURE
for TAKE-OFF, LANDING and IGE MANOEUVRES
RELATIVE WIND AZIMUTH: 10 to 350 deg
Note: no windspeed limitation exists for headwind conditions (wind azimuth ±10deg)
10 or more passengers seats

ROTOR 100%

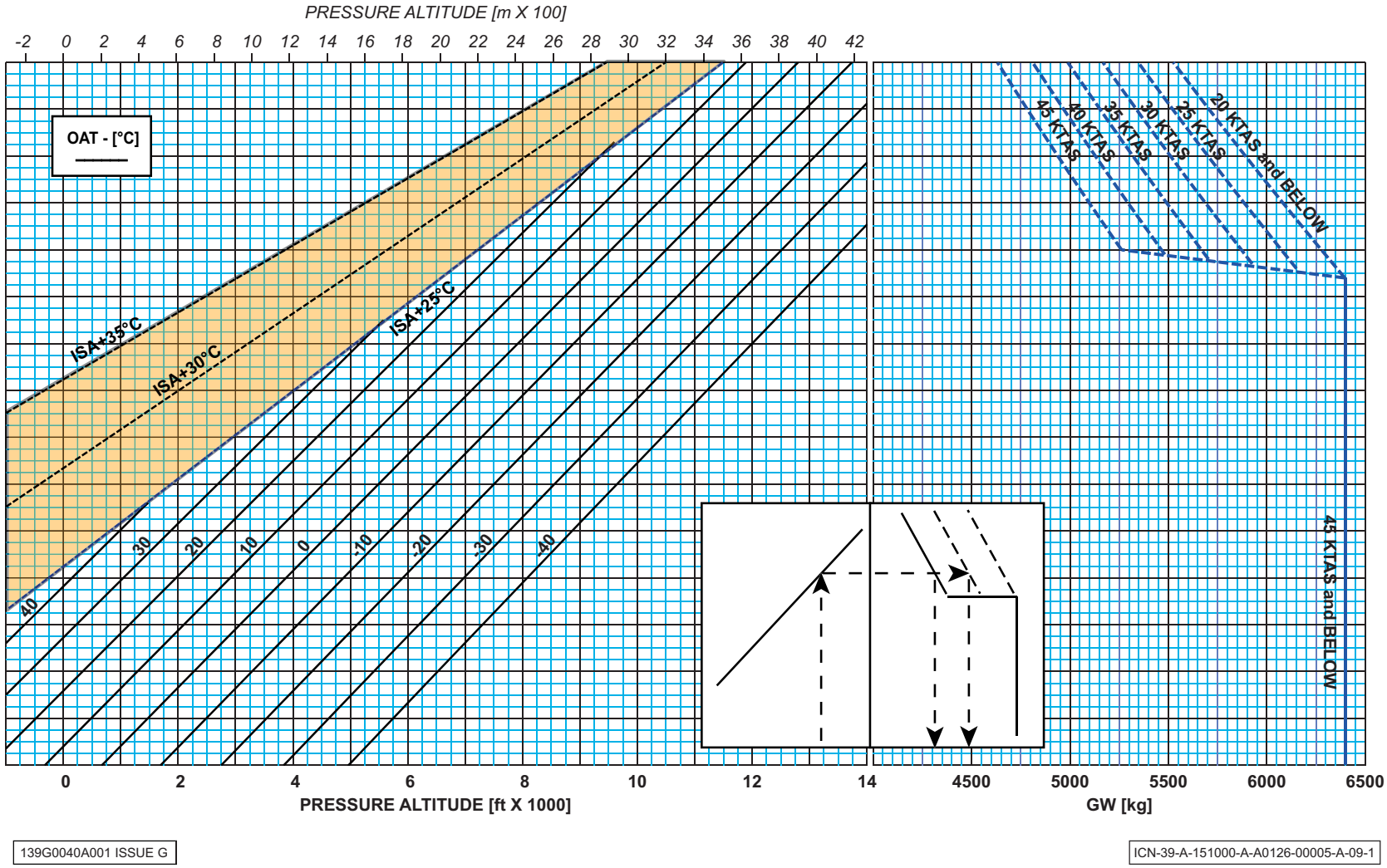

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Figure 1-7 Category B - W.A.T. Limitations

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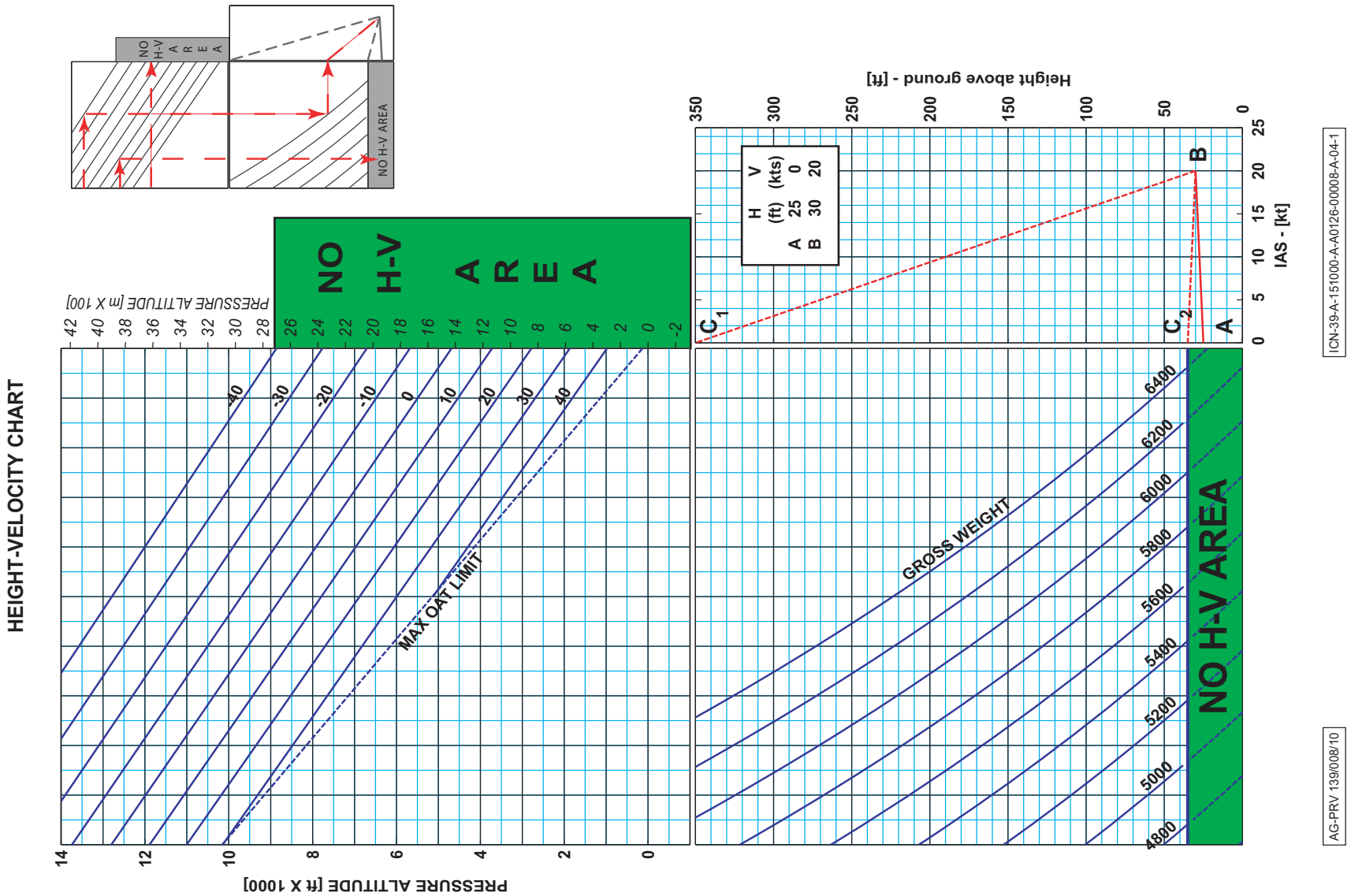

Figure 1-8 Height-Velocity Limitations

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MANOEUVRING LIMITATIONS

Aerobatic manoeuvres are prohibited.

AUTOROTATION LIMITATIONS

Practice autorotative landings are prohibited.

During autorotation the ENG MODE select switch must not be retarded from FLIGHT to IDLE except in an emergency.

SLOPE LIMITATIONS

Sloped Take Off and Landing are limited to the following:

Nose up.....5°

Nose Down .....5°

Left Wing Low .....5°

Right Wing Low.....5°

POWER PLANT (PWC PT6C-67C ENGINE) LIMITATIONS

POWER INDEX INDICATOR (PI %)

All Engines Operating

Maximum Continuous Operation 100

Take Off (5 min) Range ..... 101 to 110

Maximum Take Off 110

Transient (5 seconds) 121

One Engine Inoperative

Maximum Continuous 140

2.5 minutes Range ..... 141 to 160

Maximum 2.5 minute 160

Transient (5 seconds) 176

GAS GENERATOR SPEED (NG %)

All Engines Operating

Minimum for Ground Idle 55.0

Continuous Operation Range ..... 55.1 to 100.0

Maximum Continuous 100.0

Take Off (5 min) range ..... 100.1 to 102.4

Maximum Take Off 102.4

Transient (5 seconds) 107.0

One Engine Inoperative

Continuous Operation range ..... 55.1 to 102.4

Maximum Continuous 102.4

2.5 minute Range..... 102.5 to 106.0

Maximum 2.5 minute 106.0

Transient (5 seconds) 107.0

POWER TURBINE SPEED (NF %)

All Engines Operating

Minimum Transient..... 95

Minimum 98

Continuous Operation Range ..... 98 to 101

Maximum Continuous 101

Cautionary Range (See Supplements 11,12,13,41,49,51)... 101 to 103

Maximum Cautionary (See Supplements 11,12,13,41,49,51)..... 103

Maximum Transient (10 seconds)..... 106

One Engine Inoperative

Minimum Transient..... 85

Minimum Cautionary 90

Cautionary Range (OEI Landing Only) ..... 90 to 97

Minimum Continuous 98

Continuous Operation Range ..... 98 to 101

Cautionary Range (See Supplements 11,12,13,41,49,51)... 101 to 103

Maximum Cautionary (See Supplements 11,12,13,41,49,51)..... 103

Maximum Transient (10 seconds) 106

INTER TURBINE TEMPERATURE (ITT °C OR %)

Engine Starting

Maximum Unlimited..... 869 or 118.2

Transient (2 sec) ..... 1000 or 136.0

All Engines Operating

Maximum Continuous Operation..... 735 or 100

Take Off range..... 736 to 775 or 100.1 to 105.4

Maximum Take Off ..... 775 or 105.4

Transient (5 seconds) ..... 847 or 115.2

One Engine Inoperative

Maximum Continuous Operation..... 775 or 105.4

2.5 minutes Range ..... 776 to 835 or 105.5 to 113.6

Maximum 2.5 minute ..... 835 or 113.6

Transient (5 seconds) ..... 847 or 115.2

OIL TEMPERATURE (ENG OIL °C)

Minimum for engine starting ..... -40

Cautionary Range for Ground Idle ..... -40 to 9

Normal Operation Range ..... 10 to 140

Maximum Normal Operation 140

Cautionary Range for Torque below 60%(30min) ..... 141 to 145

Maximum for torque below 60% (30 min) 145

Transient (1 min) 150

OIL PRESSURE (ENG OIL BAR)

Minimum for ground idle (less than 1 min) 4.2

Cautionary Range for Ground Idle ..... 4.2 to 6.2

Minimum Normal Operation 6.3

Normal Operation Range ..... 6.3 to 8.9

Cautionary Range for engine acceleration at OAT below 0° C .. 9 to 10

Cautionary Range for engine start (5 min) ..... 10.1 to 15.2

Maximum for engine start (5 min) 15.2

STARTER DUTY CYCLE

45 seconds on, 1 minute off.

45 seconds on, 1 minute off

45 seconds on, 30 minutes off

POWER MARGIN TREND MONITORING

Every 50 flight hours record engine power assurance check values for engine power margin trend monitoring purposes.

TRANSMISSIONS LIMITATIONS

TORQUE (TQ %)

All Engines Operative

Maximum Continuous 100

Take Off (5 min) Range ..... 101 to 110

Maximum Take Off (5 min) 110

Transient (5 seconds) 121

One Engine Inoperative

Maximum Continuous 140

2.5 minutes Range ..... 141 to 160

Maximum..... 160

Transient (5 seconds) 176

OIL TEMPERATURE (°C)

Main Gearbox (MGB)

Minimum for starting..... -40

Ground Operation Range..... -40 to 0

Normal Operation Range ..... 1 to 110

Maximum Normal Operation 110

Intermediate Gearbox (IGB)

Minimum for starting..... -40

Ground Operation Range..... -40 to 0

Normal Operation Range ..... 1 to 110

Maximum Normal Operation 110

Tail Rotor Gearbox (TGB)

Minimum for starting ..... -40

Ground Operation Range..... -40 to 0

Normal Operation Range ..... 1 to 110

Maximum Normal Operation 110

OIL PRESSURE (BAR)

Main Gearbox (MGB)

Minimum for idle 2.3

Idle Range ..... 2.3 to 3.0

Normal Operation Range ..... 3.1 to 6.0

Maximum Normal Operation 6.0

ROTOR SPEED LIMITATIONS

POWER-ON (NR%)

All Engines Operating

Minimum Transient 95

Minimum Continuous 98

Continuous Operation Range ..... 98 to 101

Maximum Continuous 101

Cautionary Range (See Supplements 11,12,13,41,49,51) ... 101 to 103

Maximum Cautionary (See Supplements 11,12,13,41,49,51) 103

Maximum Transient (10 seconds) 106

One Engine Inoperative

Minimum Transient 85

Minimum Cautionary 90

Cautionary Range (OEI Landing Only) ..... 90 to 97

Minimum Continuous 98

Continuous Operation Range ..... 98 to 101

Maximum Continuous 101

Cautionary Range (See Supplements 11,12,13,41,49,51) ... 101 to 103

Maximum Cautionary (See Supplements 11,12,13,41,49,51) 103

Maximum Transient (10 seconds) 106

POWER-OFF (NR%)

Minimum Transient..... 90

Minimum Continuous 95

Continuous Operation ..... 95 to 110

Maximum Continuous 110

Maximum Transient..... 116

ENGINE TRAINING MODE LIMITATIONS

Selection of Engine Training Mode (OEI TNG) is permitted only for Category A Training in OEI simulated conditions.

The following must be present on the aircraft for Category A Training operations:

— Service Bulletin P&WC S.B. No. 41020 (Turboshaft Engine Electronic Reprogramming/Replacement Model Application PT6C-67C).

See Supplement 12 PART L for procedures and description of TRAINING MODE function.

CAUTION

Intentional use of actual OEI rating for training is prohibited.

FUEL SYSTEM LIMITATIONS

FUEL PRESSURE (BAR)

Cautionary Range ..... 0.0 to 0.5

Minimum Normal Operation 0.6

Normal Operation Range .....0.6 to 2.1

Maximum 2.1

Note

In suction mode fuel pressure indication is invalid (Fuel pressure display ‘0’ or dashed).

FUEL CAPACITIES

Total Usable ..... 1588 litres

Unusable ..... 20 litres

UNUSABLE FUEL

In coordinated (ball centered) flight ..... 0 kg indicated/

.....(8 kg/10 litres per tank actual)

Hovering in cross winds or sideways flight with sustained roll angles greater than ±15° is prohibited when fuel indication, in either tank, is less than 70 kg.

Cross feeding (tank with pump off, not supplying engines).....
.....maximum 228 kg

Note

During XFEED the unusable fuel level indication will change to grey to indicate the tank can no longer supply fuel.

FUEL FLOW INDICATION

Engine fuel flow shall not be used for fuel planning as the indication is not reliable.

AUTHORIZED FUEL TYPES

The fuels shown in the table below have been authorized for use with the Pratt and Whitney PT6C-67C engines:

AUTHORIZED FUELS

Fuel Type	Applicable Specification
JET A	ASTM D1655
JET A-1	ASTM D1655 NATO Code F-35
JP5	DEF STAN 91-86 AVCAT/FSII MIL-PRF-5624F NATO Code F-44
JP8	DEF STAN 91-87-2002 AVTUR/FSII MIL-T-83133H NATO Code F-34
JP8+100	Aeroshell Performance Additive 101
GOST 10227 RT	GOST 10227-86
GOST 10227 TS-1	GOST 10227-86
No. 3 Jet Fuel	GB 6537-2018
The use of No. 3 Jet Fuel with additives T1502 or T1602 is prohibited	

Note

Any mixture of authorized fuels may be used.

Note

ASTM D 1655, JET A and JET A-1 fuel specification allows the use of Di-Ethylene Glycol Monomethyl Ether (Di-EGME) with the limitations reported in the Engine Maintenance Manual for the purpose of fuel system icing protection.

Note

GOST 10227 TS-1 fuel is considered by Pratt and Whitney to be satisfactory for a maximum 1000 hrs of use (intermittently or continuously) before maintenance action is required. Refer P&WC Maintenance Manual #3045332 Section 72-00-00 for details.

LUBRICANT LIMITATIONS

AUTHORIZED ENGINE OILS

The oils shown in the table below have been authorized for use with the Pratt and Whitney PT6C-67C engines. Any brand approved under the applicable specification may be used.

AUTHORIZED ENGINE OILS

Oil Type	Applicable Specification	Brand Names (For reference only)
Type I (3cs)	PWC 521	BP Turbo Oil 2389 EASTMAN Turbo Oil 2389 Mobil Avrex S Turbo 256
Type II (5cs)	PWC 521	Aero-Shell Turbine Oil 500 Castrol 5000 Mobil Jet Oil II Royco Turbine Oil 500 BP Turbo Oil 2380 EASTMAN Turbo Oil 2380 Turbonycoil 525-2A Turbonycoil 600
Third Generation (5 cs)	PWC 521	Aero Shell Turbine Oil 560 Royco Turbine Oil 560

CAUTION

Mixing of any oils is not recommended and should be limited to oils brands of the same Type/Viscosity. Refer to Engine Maintenance Manual No 3045332 for information.

AUTHORIZED TRANSMISSION OIL

Applicable Specification	Brand Names
MIL PRF23699F DOD-PRF-85734	BP Turbo Oil 2380 EASTMAN Turbo Oil 2380 AeroShell Turbine OIL (ASTO) 555

HYDRAULICS SYSTEM LIMITATIONS

HYDRAULIC FLUID TEMPERATURE (°C)

Minimum for flight control check with electric hydraulic pump ..... -50

Minimum for starting ..... -40

Ground Operation Range..... -40 to -21

Minimum Normal Operation ..... -20

Normal Operating Range ..... -20 to 119

Cautionary Range ..... 120 to 134

Maximum Cautionary 134

HYDRAULIC FLUID PRESSURE (BAR)

Minimum Cautionary 163

Cautionary Range ..... 163 to 179

Normal Operation Range ..... 180 to 225

Cautionary Range ..... 226 to 250

Maximum Cautionary 250

ELECTRICAL HYDRAULIC PUMP

The electrical hydraulic pump is for ground operation only.

AUTHORIZED HYDRAULIC FLUIDS

The hydraulic fluids shown in the table below have been authorized for use in all hydraulic components. Any brand approved under the applicable specifications may be used.

AUTHORIZED HYDRAULIC FLUIDS

Applicable Specification	For Brand Names Refer to:
MIL-PRF-83282	QPL-83282
Alternative: MIL-PRF-5606 (see NOTE below)	QPL-5606

Note

MIL-PRF-5606 can be used for enhanced performance of hydraulic system in low temperature environments below -30° C.

CAUTION

Mixing of hydraulic fluid of different specification is prohibited.

WHEEL BRAKE LIMITATIONS

Maximum running speed for brake application ..... 40 knots (74 km/hr)

Parking on slopes up to 10° is permitted for a maximum of 1 hour.

PITOT HEATING LIMITATIONS

Pitot heating must be switched **ON** for indicated OAT of +4° C or less.

Pitot heating must be switched **OFF** at indicated OAT of +10° C or more.

ELECTRICAL SYSTEM LIMITATIONS

DC GENERATOR LOAD (%)

Normal Operation Range ..... 0 to 100

Cautionary Range (for engine starting only) ..... 101 to 155

Maximum Cautionary 155

(Maximum Cautionary may be exceeded for maximum of 45 seconds for engine start only)

DC GENERATOR MAXIMUM NORMAL OPERATING LOAD (%)

Up to 15000 ft (4570 m) Hp ..... 100 (equivalent 300 A)

Above 15000 ft (4570 m) Hp .....reduce by 13.4 every 1000 ft (300 m)

(see Placards on page 66 or, for aircraft fitted with EPIC S/W Phase 5 or later, Supplement 68)

20000 ft (6100 m) Hp..... 33

MPOG with generator load at 75% or less.....No time limitations

MPOG with generator load greater than 75%.....Max 20 minutes

BATTERY LOAD (A)

Battery Discharge ..... -200 to 0

Battery Charge..... 0 to 200

MAIN AND ESSENTIAL BUS VOLTAGE (V)

Minimum Normal Operation 22

Normal Operation..... 22 to 29

Maximum Normal Operation 29

AUTOMATIC FLIGHT CONTROL SYSTEM LIMITATIONS

Minimum AFCS configuration for IFR flight.....2 AP in ATT mode

Intentional ATT MODE de-selection during IFR flight is prohibited.

AVIONIC LIMITATIONS

ILS MODE LIMITATIONS

The helicopter is certified to carry out CAT 1 ILS approaches up to 7.5 deg glideslope.

Maximum airspeed for glideslope up to 4 degrees ..... 150 KIAS

Maximum airspeed for glideslopes between 4 and 7.5 degrees (Steep Approach) ..... 120 KIAS

CAUTION

During steep approach, take care not to use less than 5% PI.

FMS LIMITATIONS

1. The pilot must verify the currency of the Navigation Data Base (NAV DB) on-board and the coherence of the FMS data with the procedure to be flown.
2. When SBAS GPS are not installed (refer to Supp. 68) or the a/c is out of SBAS coverage or in case of SBAS outages, predictive RAIM (P-RAIM) on destination waypoint shall be checked on MCDU.

Note

The Pilot must not continue an instrument approach inside the Final Approach Fix (FAF), unless the 'APP' advisory is displayed on the PFD.

3. Use of LDA (Landing Directional Aid), SDF (Simplified Directional Facility) and MLS (Microwave Landing System) approaches are not authorized.

MISCELLANEOUS LIMITATIONS

Pilot(s) must not use polarized type sun glasses.

VENTILATION

At MPOG / HIGE / HOGE or with helicopter forward velocity below 25 kts (46 km/hr), operate cockpit fans or open pilot or copilot window.

TORQUE LIMITER FUNCTION

If TORQUE LIMITER is set, max AEO TQ available is 114%/114%.

SYNOPTIC MFD PAGE LIMITATION

In case of MAU1(2) failure, do not refer to the electrical and hydraulic synoptic page. The information presented is not reliable.

HEADSET/HELMET LIMITATIONS

Headset/Helmet type used in the aircraft must be of the same electrical characteristics and authorised by Aircraft Manufacturer.

BAGGAGE COMPARTMENT LIMITATIONS

Maximum baggage compartment load ..... 200 kg (440 lb)

All cargo must be secured with restraint net or other approved means.

Maximum unit load .....300 kg/m^2 (61 lb/sq.ft)

Maximum load height .....600 mm (2 ft)

FLIGHT DISPLAY INSTRUMENT MARKINGS

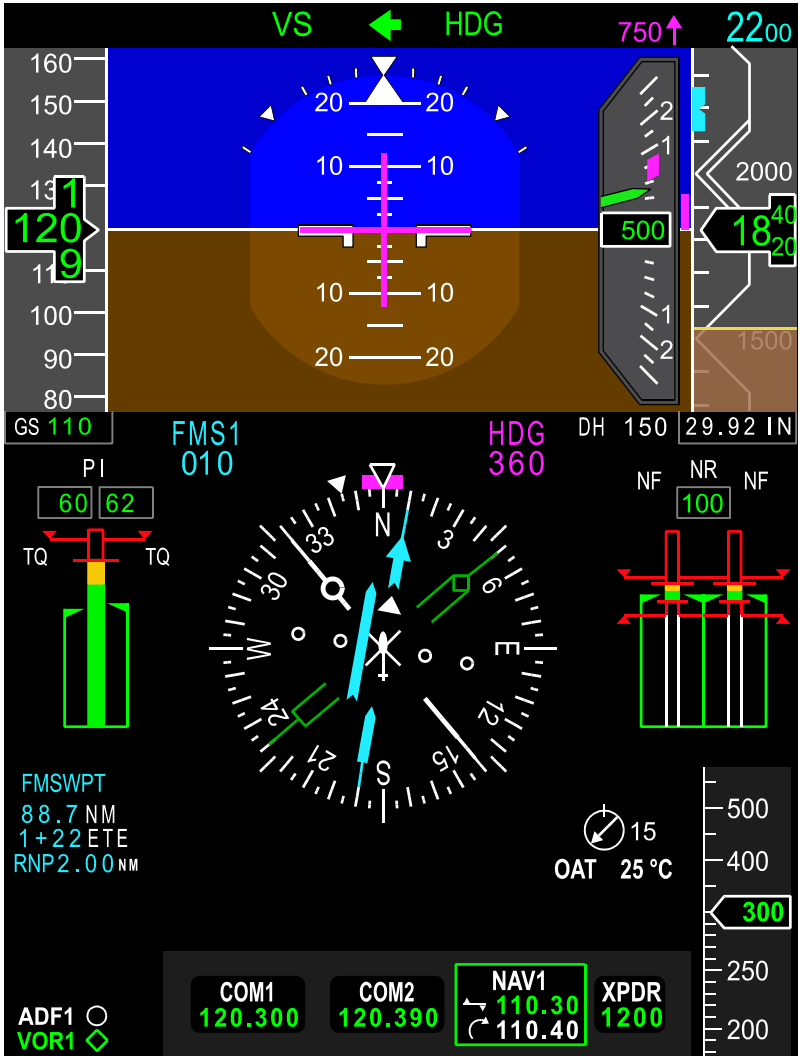

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Figure 1-9 Primary Flight Display

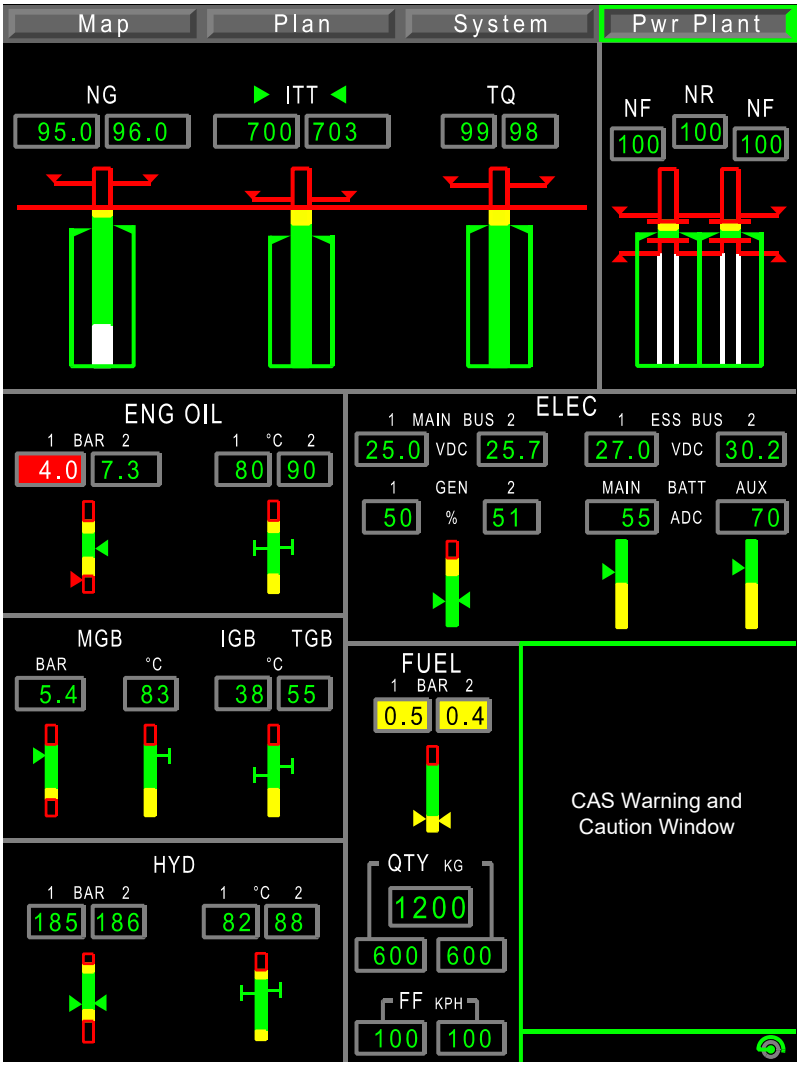

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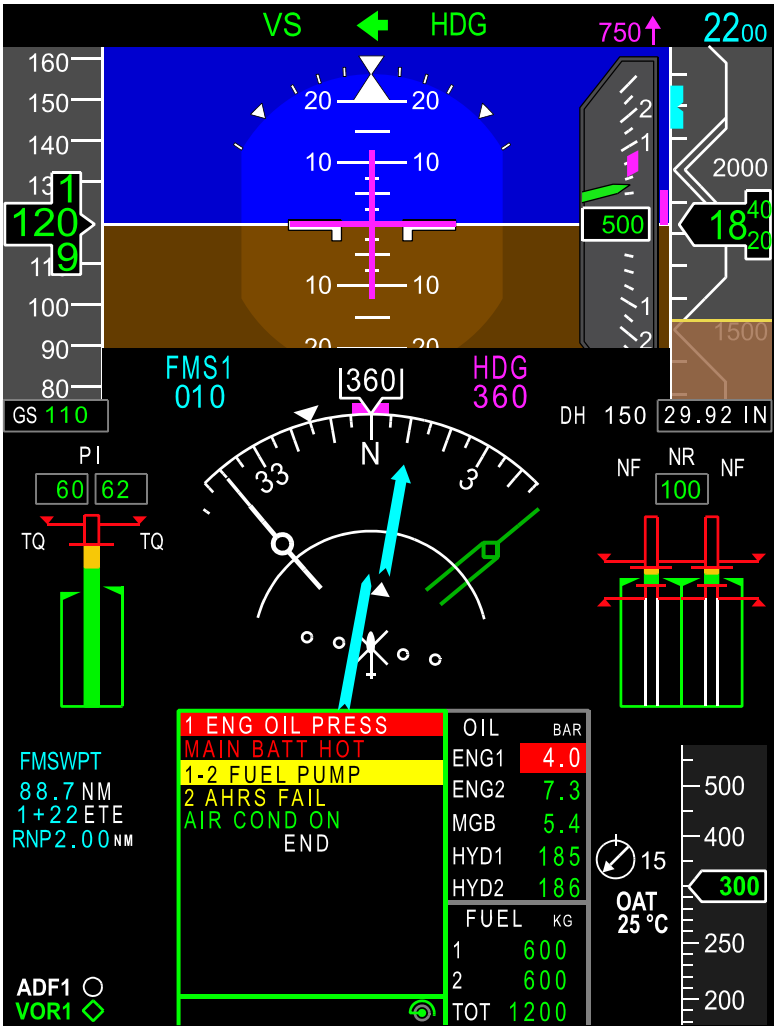
Figure 1-10 Multifunction Flight Display



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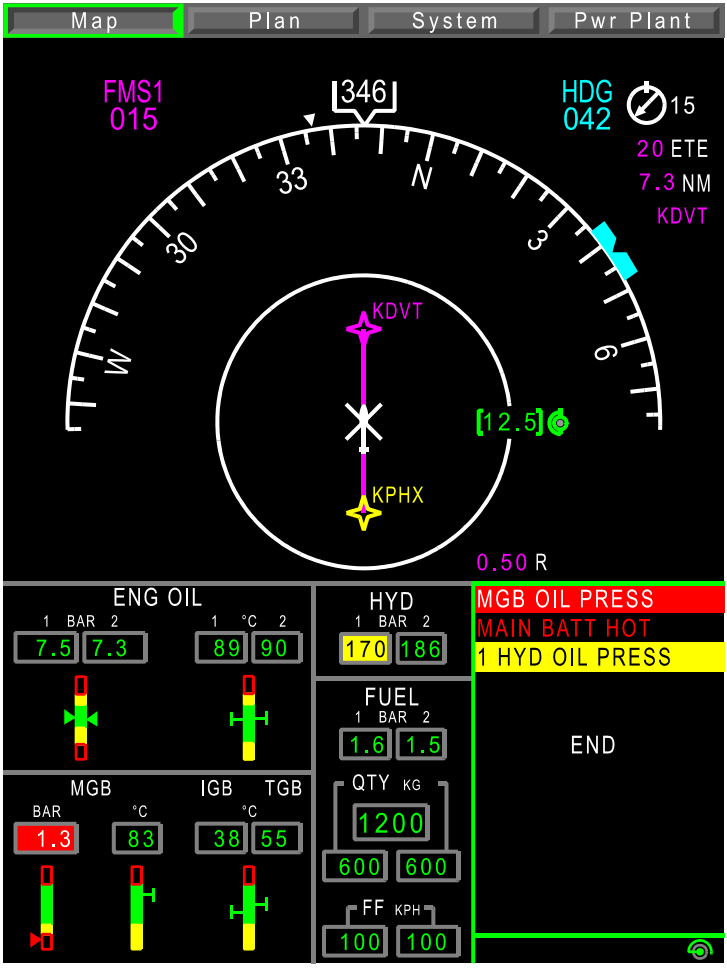
(N°1 ENG OIL PRESSURE, MAIN BATT HOT warnings, 1 & 2 FUEL PUMP, N° 2 AHRS cautions and AIR COND ON advisory messages active in CAS Warning and Caution window)

Figure 1-11 PFD Composite Mode



(MGB OIL PRESSURE and MAIN BATT HOT warnings,
1 HYD OIL PRESS caution active in CAS window)

ICN-39-A-151000-A-00003-00388-A-01-1

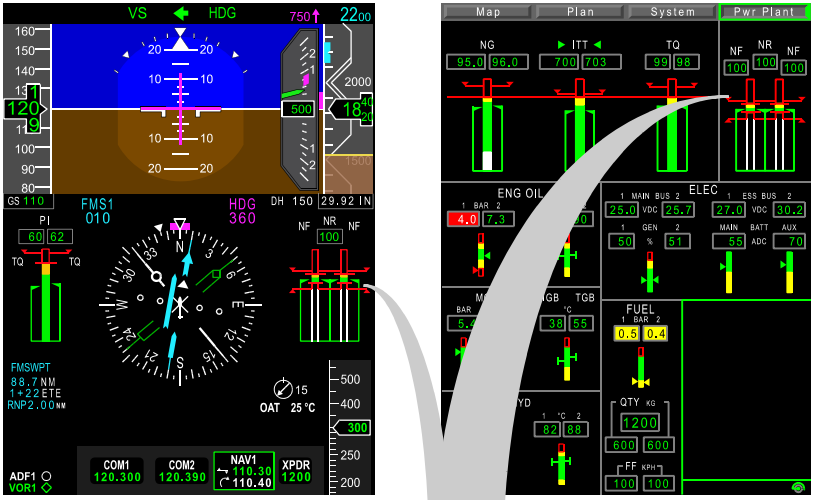
(MGB OIL PRESSURE and MAIN BATT HOT warnings, 1 HYD OIL PRESS caution active in CAS window)

Figure 1-12 MFD Cruise Mode

(MAP secondary PWR PLANT systems display)

PFD/MFD INSTRUMENT MARKINGS

(Primary Flight/Multifunctional Display)



Tone + 'Rotor High -Rotor High' : 104%

Tone + 'Rotor Low -Rotor Low' : 97%

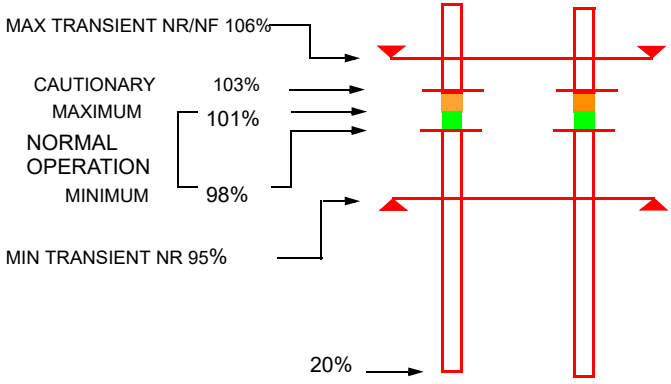
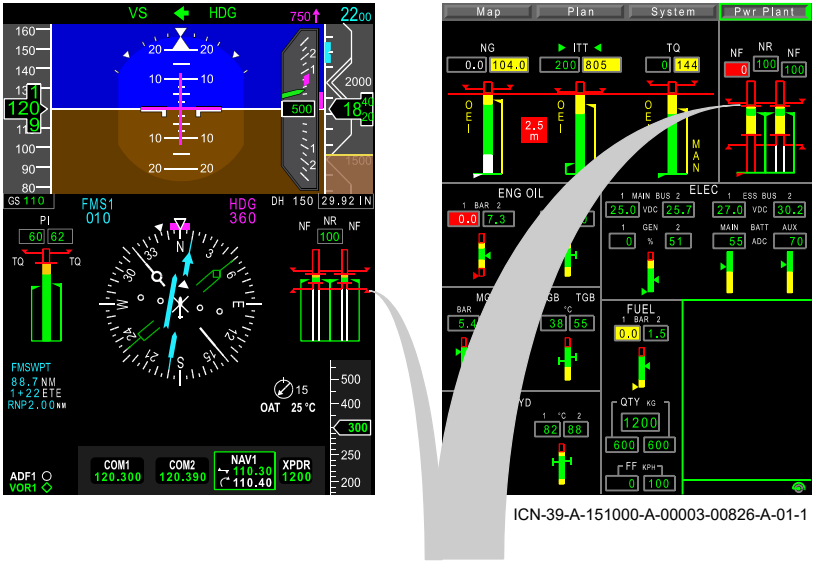


Figure 1-13 Rotor Speed & Power Turbine Speed NR/NF (Power ON)



Tone +'Rotor High -Rotor High' : 104%

Tone + 'Rotor Low -Rotor Low' : 89%

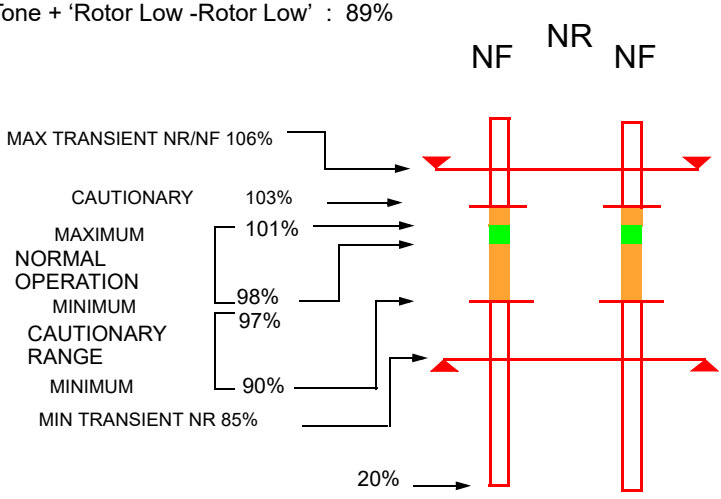
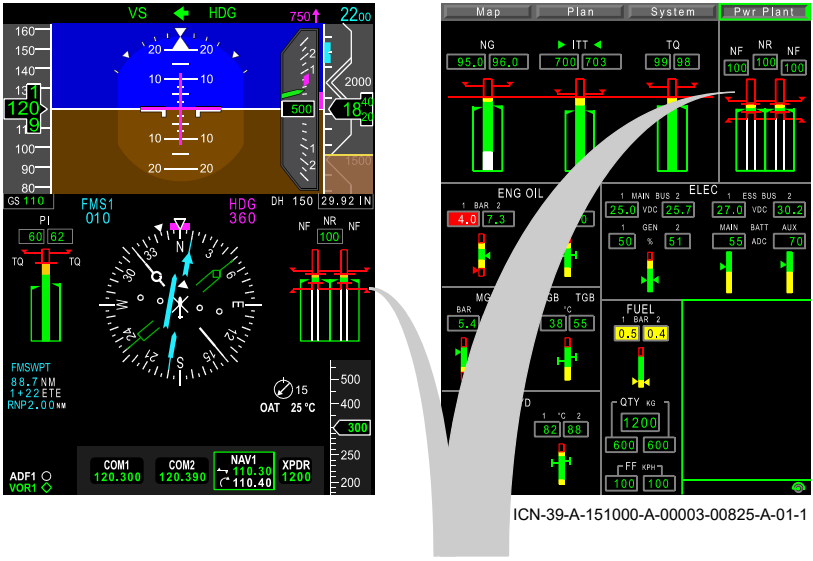


Figure 1-14 Rotor Speed & Power Turbine Speed NR/NF (OEI)



Tone + 'Rotor High -Rotor High' : 111%

Tone + 'Rotor Low -Rotor Low' : 94%

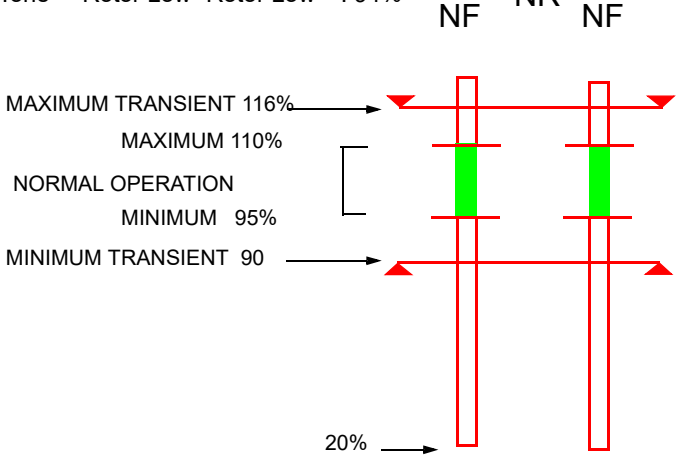
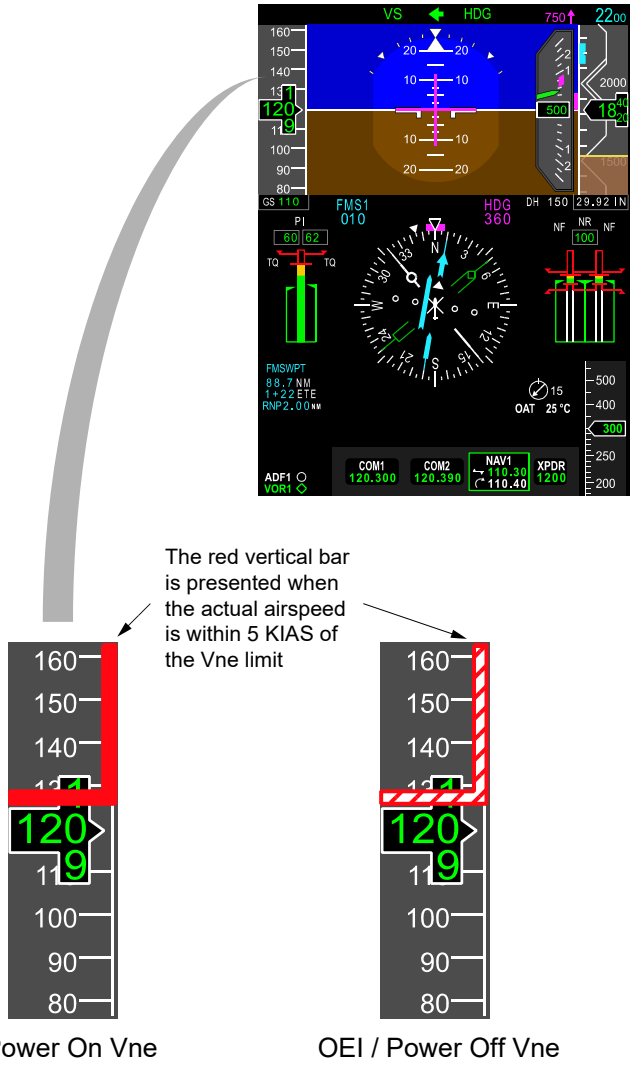


Figure 1-15 Rotor Speed (Power OFF)

PFD INSTRUMENT MARKINGS

(Primary Flight Display)

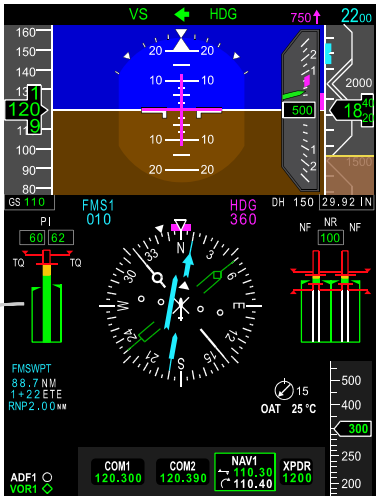


ICN-39-A-151000-A-00003-00827-A-01-1

Figure 1-16 Vne Limit Indication (Power On, OEI/Power Off)

NOTE

The value displayed at the top of the scale represents the actual power, in percent, being used with respect to the power available (100% at MCP AEO)
The legend displayed on top of the scale (TQ, ITT or NG) represents the engine power limiting parameter and is independent for each engine.



ICN-39-A-151000-A-00003-00828-A-01-1

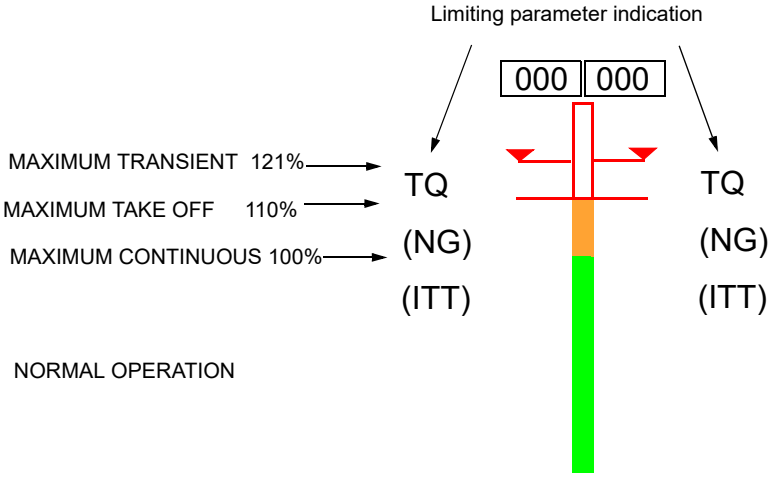
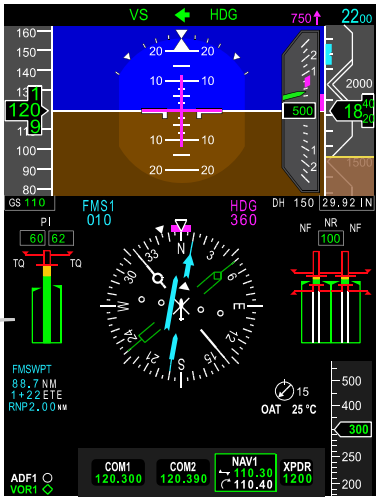


Figure 1-17 Power Index Indicator (AEO)

NOTE

The value displayed at the top of the scale represents the actual power, in percent, being used with respect to the power available (140% at MCP OEI)

The legend displayed on top of the scale (TQ, ITT or NG) represents the engine power limiting parameter and is independent for each engine.



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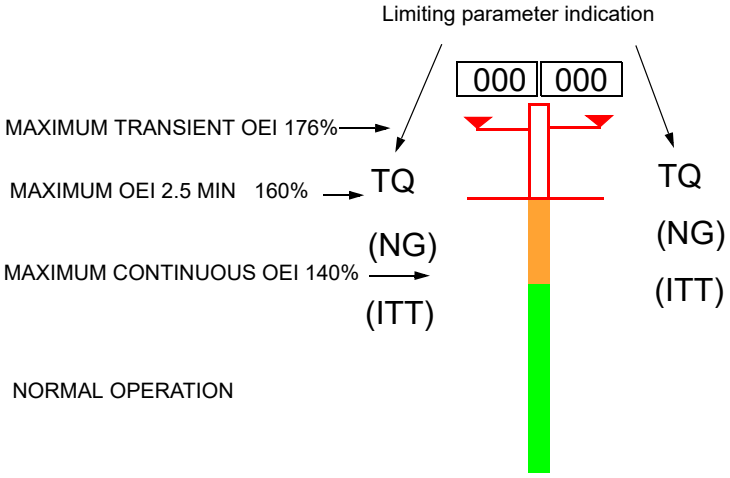
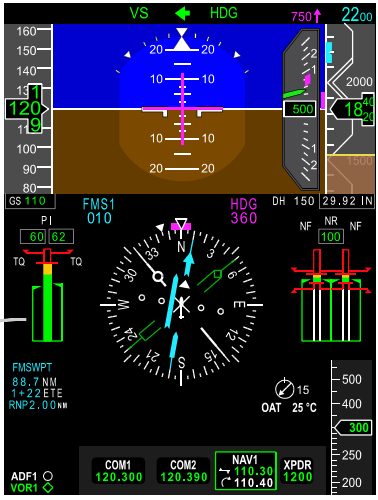


Figure 1-18 Power Index Indicator (OEI)

NOTE

The value displayed at the top of the scale represents the actual power, in percent, being used with respect to the power available (100% at MCP AEO, 140% at MCP OEI)

The legend displayed on top of the scale (TQ, ITT or NG) represents the engine power limiting parameter and is independent for each engine.



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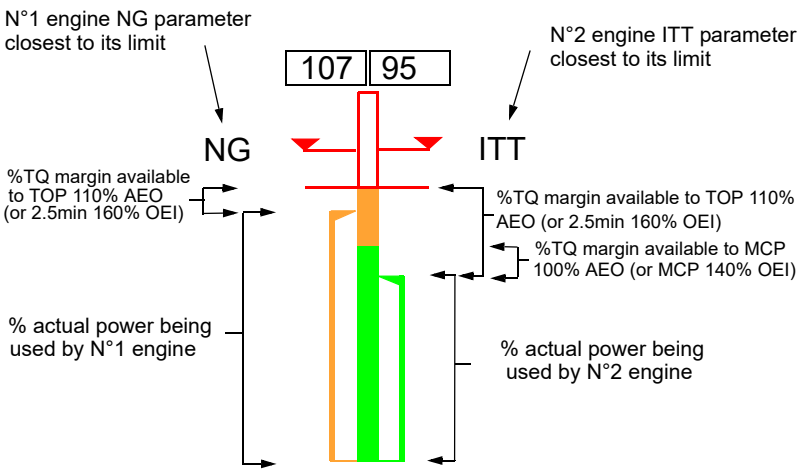
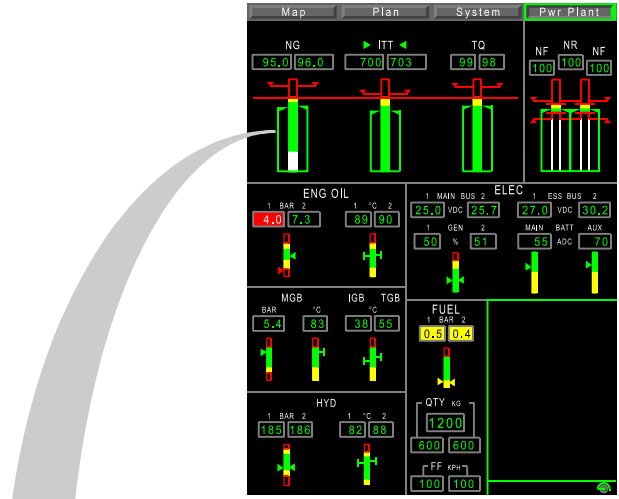


Figure 1-19 Example of Power Index Display

MFD INSTRUMENT MARKINGS

(Multifunctional Flight Display)



ICN-39-A-151000-A-00003-00829-A-01-1

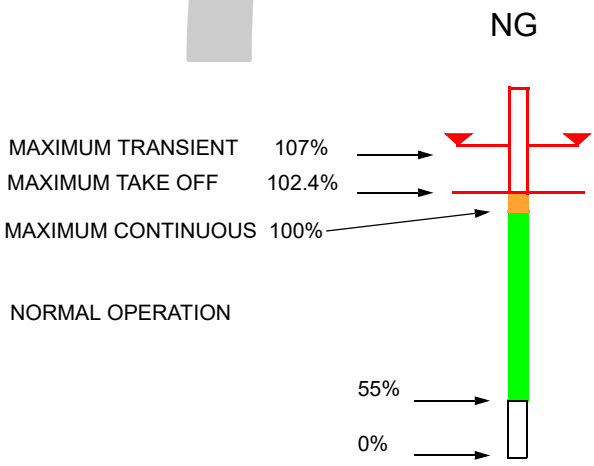
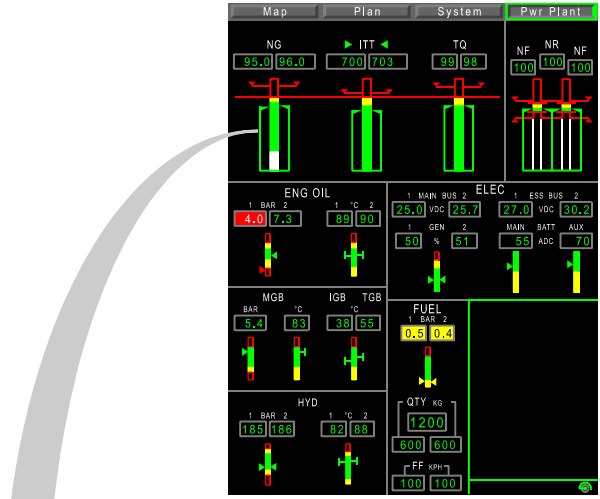
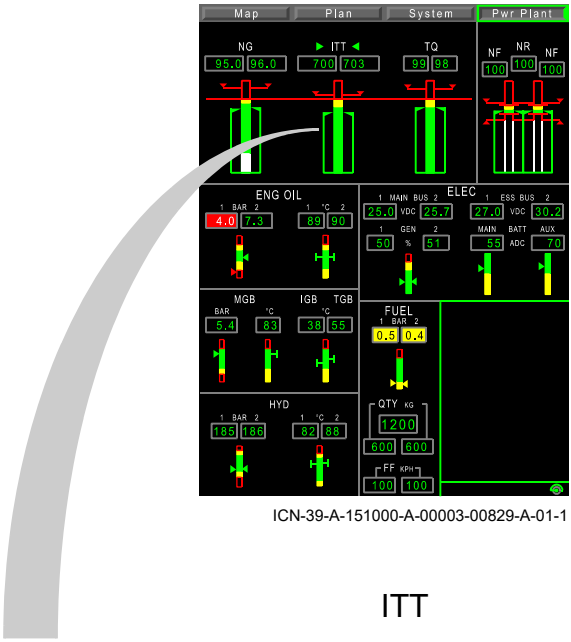


Figure 1-20 Gas Generator Speed (AEO)



ICN-39-A-151000-A-00003-00829-A-01-1

Figure 1-21 Gas Generator Speed (OEI)



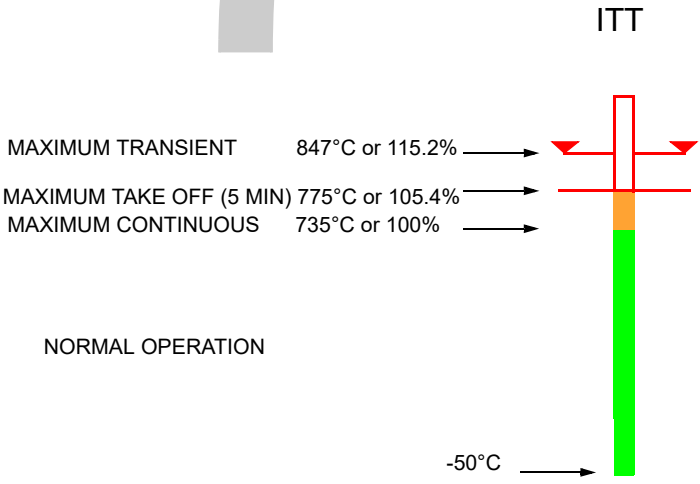
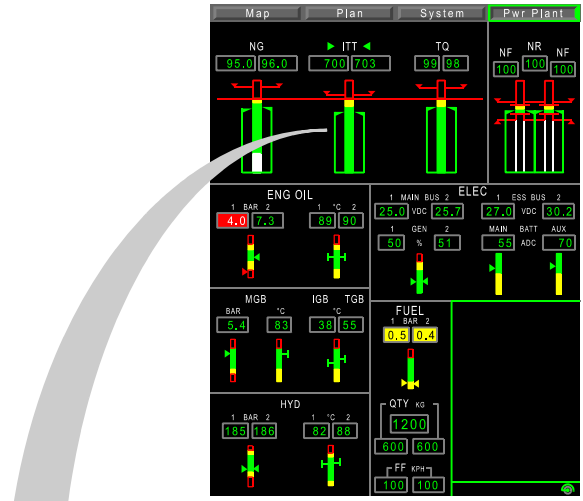


Figure 1-22 Inlet Turbine Temperature (AEO)



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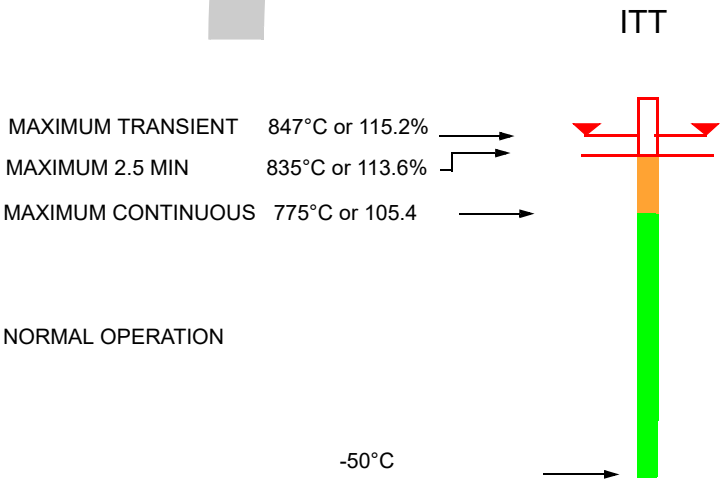
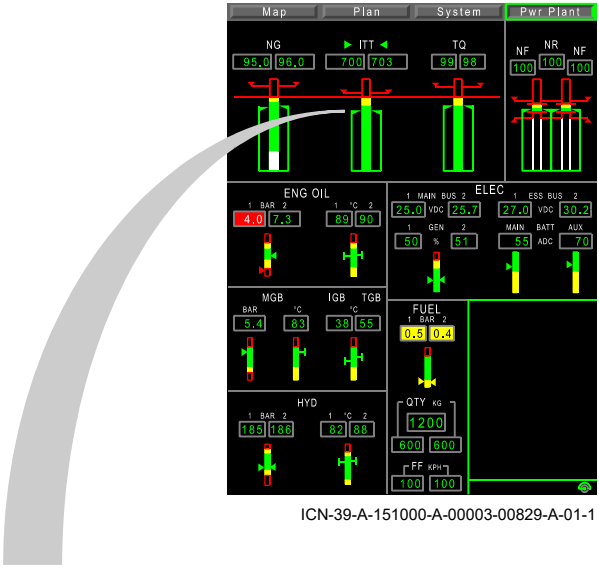


Figure 1-23 Inlet Turbine Temperature (OEI)



ICN-39-A-151000-A-00003-00829-A-01-1

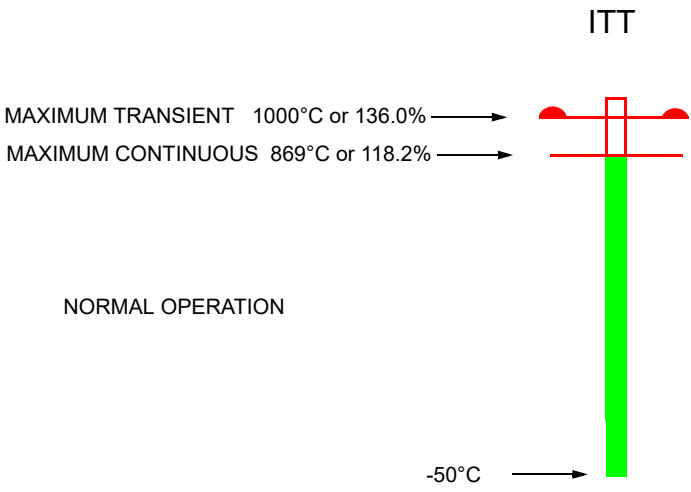
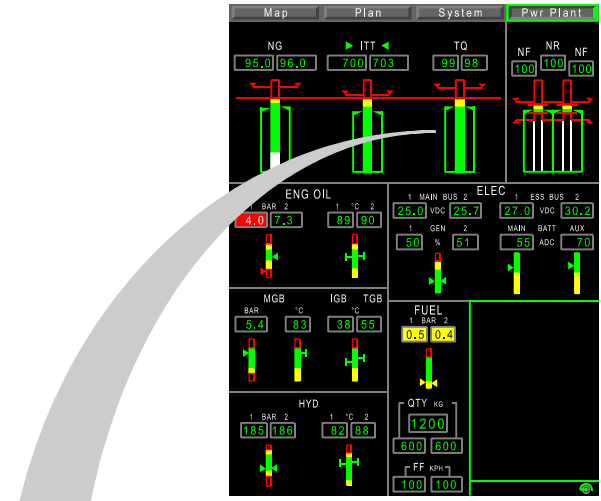
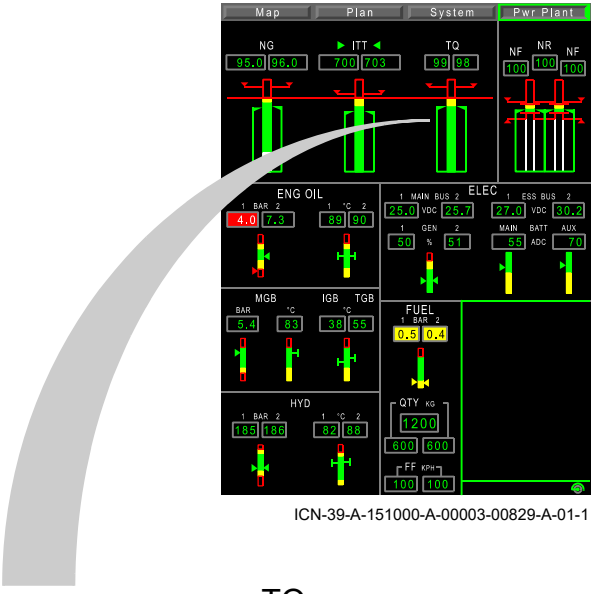


Figure 1-24 Inlet Turbine Temperature (START)



ICN-39-A-151000-A-00003-00829-A-01-1

Figure 1-25 Torque (AEO)



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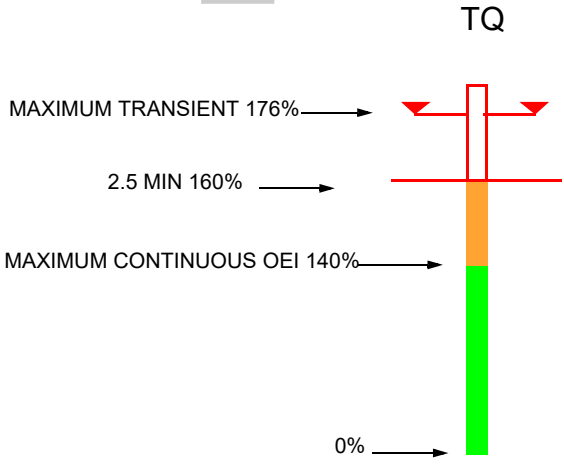
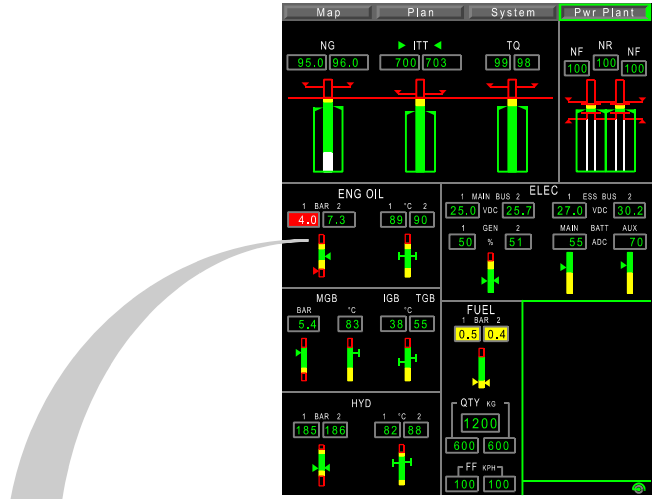


Figure 1-26 Torque (OEI)



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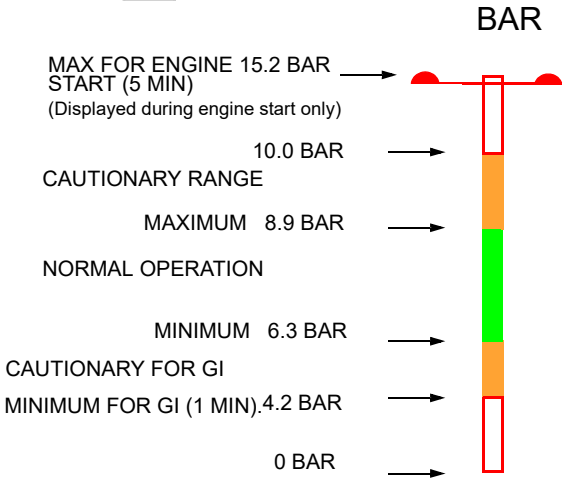
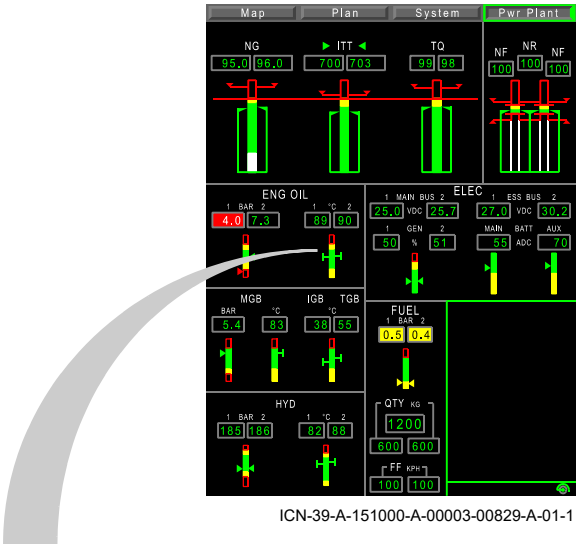


Figure 1-27 Engine Oil Pressure



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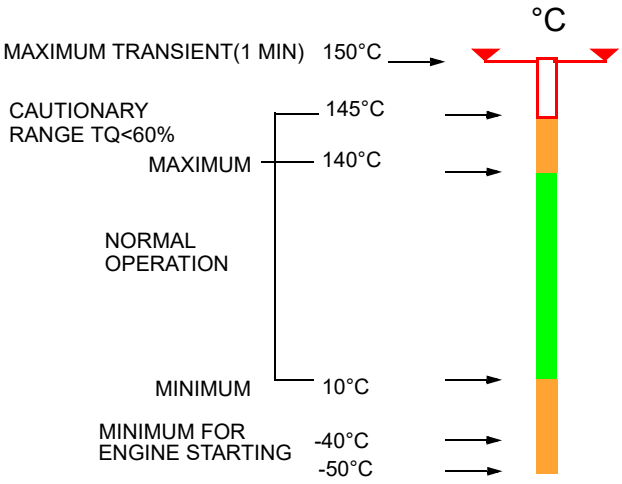
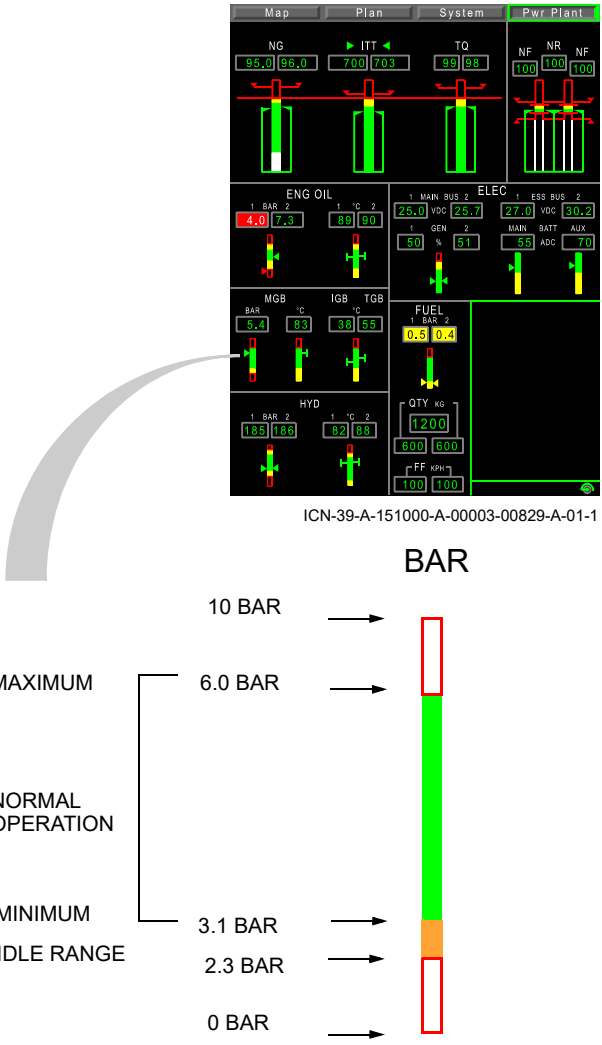
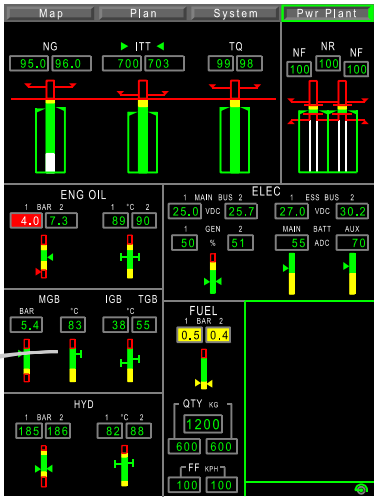


Figure 1-28 Engine Oil Temperature



ICN-39-A-151000-A-00003-00829-A-01-1

Figure 1-29 Main Gearbox Pressure



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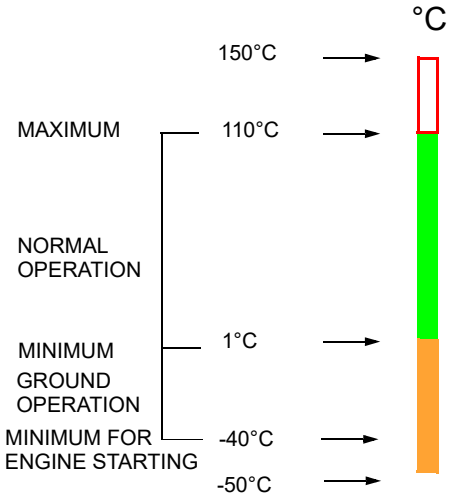
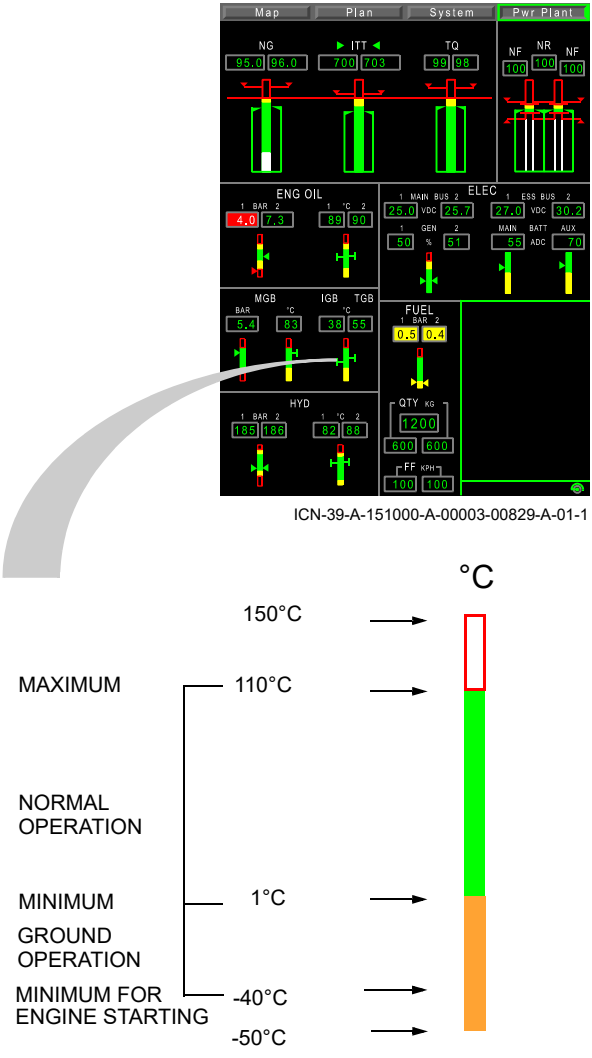


Figure 1-30 Main Gearbox Temperature



ICN-39-A-151000-A-00003-00829-A-01-1

Figure 1-31 Intermediate and Tail Gearbox Temperature

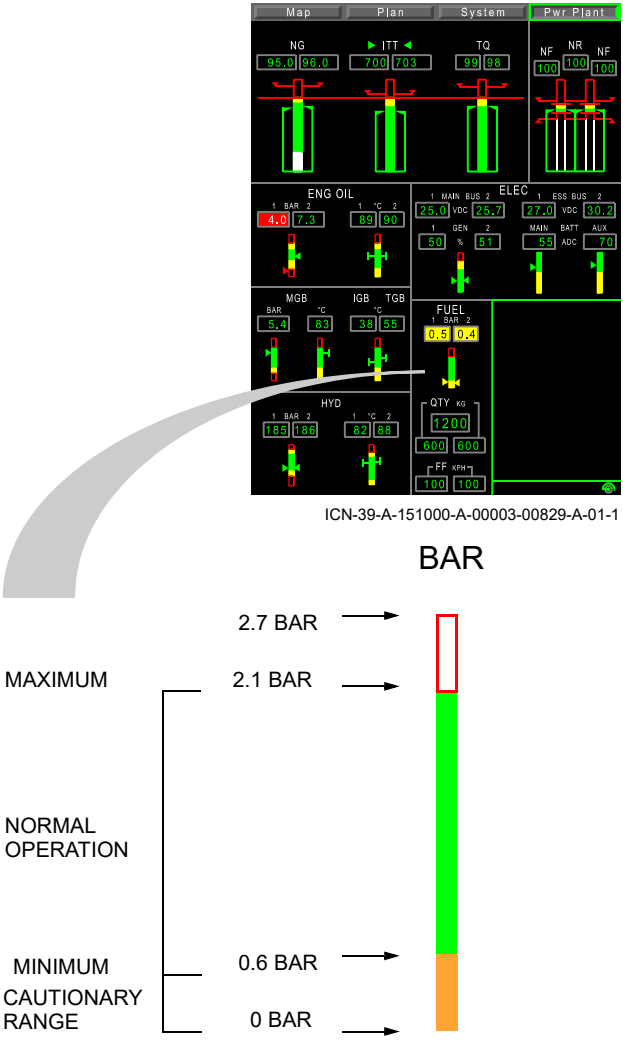
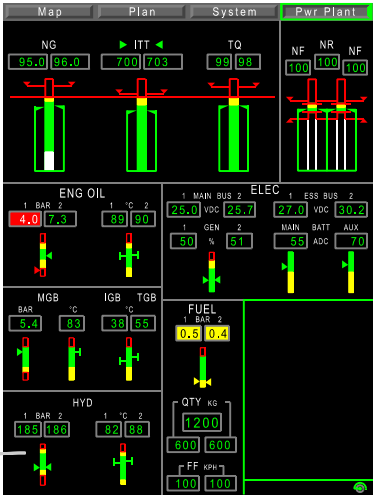


Figure 1-32 Fuel Pressure



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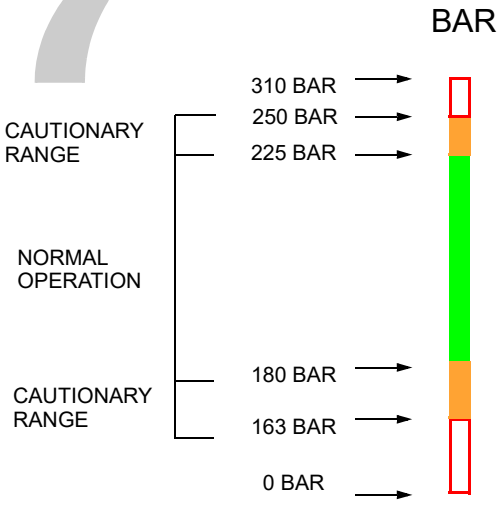
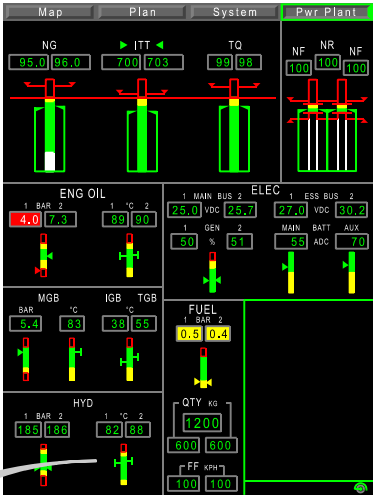


Figure 1-33 Hydraulic System Pressure



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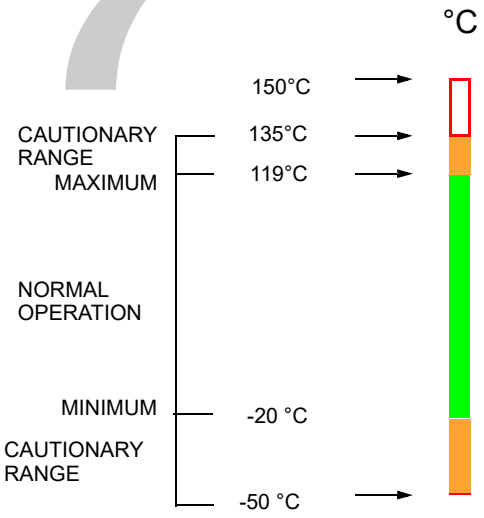
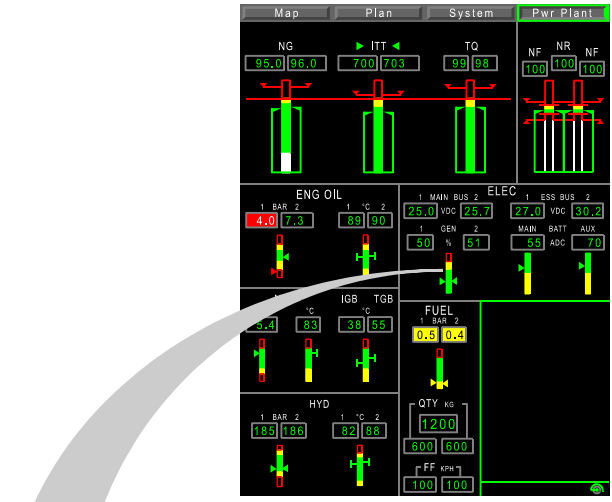


Figure 1-34 Hydraulic System Temperature



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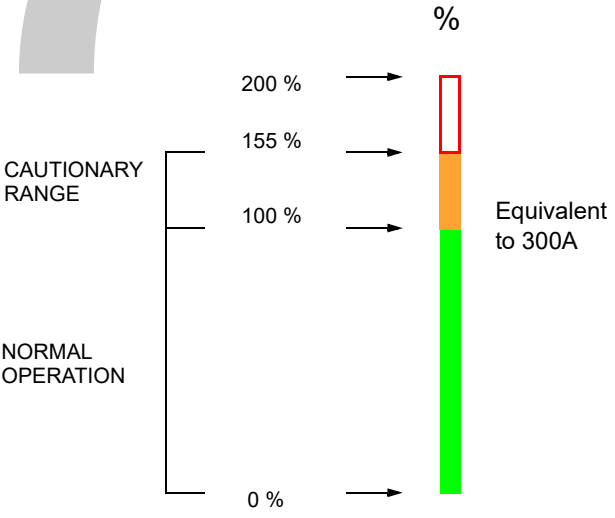
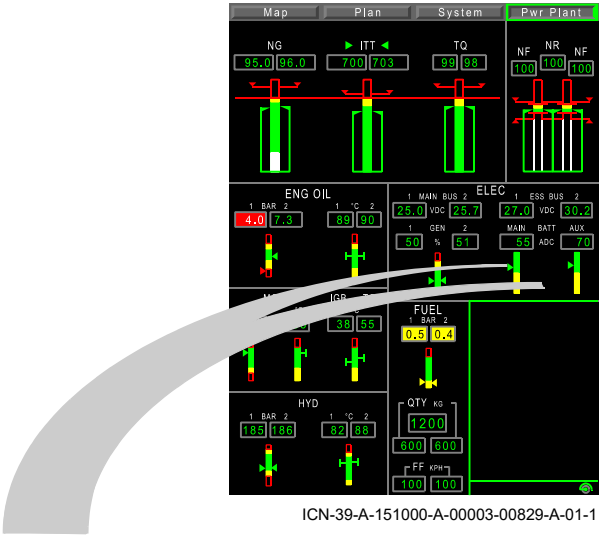


Note

For aircraft fitted with EPIC software Phase 5 or later, see Supplement 68.

Figure 1-35 DC Generator Load



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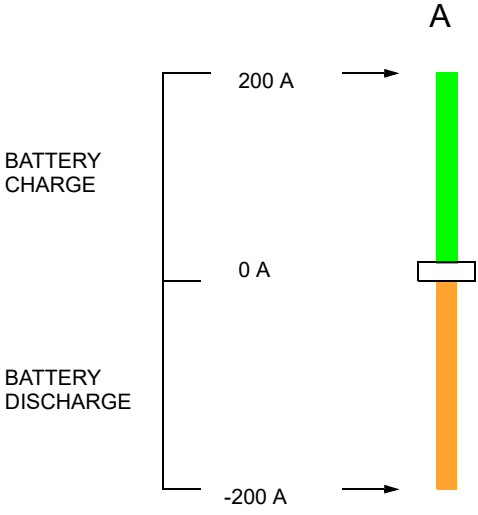
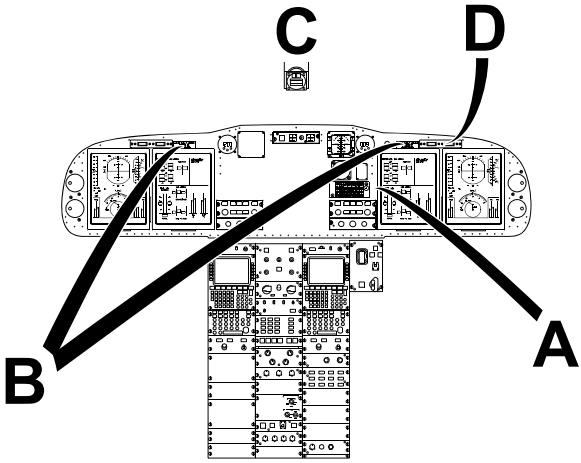


Figure 1-36 Main and Auxiliary Battery Load

PLACARDS



VIEW OF COCKPIT WITH PLACARD POSITIONS

ICN-39-A-151000-A-00003-00830-A-01-1

A

VNE POWER ON AIRSPEED LIMITATION KIAS						
Hp ft / OAT °C	-1000 to SL	4000	8000	10000	15000	20000
50	160	-	-	-	-	-
20	167	157	145	147	128	-
10	167	159	147	151	133	-
0	167	162	150	156	136	-
-10	167	164	154	159	139	-
-25 AND BELOW	167	167	158	165	144	125
VNE OEI/PWR OFF=VNE PWR ON LESS 20 KIAS					V_{LE}/V_{LO}=150 KIAS	

B

APPROVED TYPES OF OPERATION

DAY/NIGHT VFR
DAY/NIGHT IFR

ICING PROHIBITED

C

STANDBY COMPASS CORRECTION CARD

D

NOTE: PLACARD ONLY APPLICABLE FOR EPIC SOFTWARE RELEASE EB7030191-00105 PHASE 4

Maximum Load on each DC GEN

ft Hp	below 15000	16000	17000	18000	19000	20000
GEN LOAD %	100	87	74	60	47	33

WHEN ALTERNATE STATIC PORT IS SELECTED TO ALTN POSITION:

- INSTRUMENT ACCURACY IS MAINTAINED BY CLOSING WINDOWS, VENTS AND TURNING HEATER/ECS OFF
- DECREASE ALTIMETER READING BY 200ft

OVERHEAD PANEL

CAUTION

WHEN OPENING OR CLOSING CABIN DOOR
IN FLIGHT HOLD DOOR HANDLE UNTIL
DOOR IS AT FULL TRAVEL AND LOCKED

Placed near cabin door handle

ALL CARGO MUST BE SECURED
MAX LOAD PER TIE DOWN RING 200KG (440LB)

MAXIMUM LOAD 200KG (440LB)
MAX UNIT LOAD 300KG/M^2 (61LB/SQ.FT)

MAXIMUM CARGO HEIGHT 600mm (2ft)

Baggage compartment

CARGO RESTRAINT NET MUST NOT TOUCH THIS EDGE

Baggage compartment, if 2nd auxiliary
avionic bay P/N 3G5310A28911 installed

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SECTION 2

NORMAL PROCEDURES

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SECTION 2

NORMAL PROCEDURES

GENERAL

The following procedures are the result of extensive flight tests and experience with the AW139 aircraft. They are intended to ensure that the level of safety required by the design and certification process is achieved.

Note

Throughout this Section, checks marked with a large ➡ are required only before the first flight of the day. All other checks are to be carried out before each flight.

Normal and standard conditions are assumed in these procedures. Pertinent data in other sections is referenced where applicable.

The minimum and maximum limits, and the normal and cautionary operating ranges are indicated on the PFD and MFD displays, Refer to Section 1 for details on operating limitations.

Each time an operating limitation is exceeded, an appropriate entry must be made in the log book (helicopter, engine, etc). The entry shall state which limit was exceeded, duration, the extreme value attained, and any additional information essential in determining the maintenance action required.

FLIGHT PLANNING

CATEGORY B WEIGHT AND H-V DETERMINATION

Graphs are presented in Section 1 to determine maximum weight for CAT B Take Off/Landing/IGE manoeuvres (Figure 1-7) and to determine the H-V (Figure 1-8) avoid area diagram.

The order of flight planning is first to determine the CAT B weight for Take Off and Landing at the ambient conditions then to confirm the H-V avoid area diagram applicable for the weight chosen.

Example 1:

Determine the maximum CAT B Take Off weight and H-V Avoid Area for the following ambient conditions:

— Pressure Altitude = 2000 ft

— OAT = +5° C

— Relative Wind Speed = 0 KTAS

Solution:

Using the CAT B W.A.T. Chart Figure 1-7 on the Pressure Altitude axes from 2000 ft move up vertically to intersect 5° C line (interpolated between the 0° C and the 10° C line) move right to intercept the '45 KTAS and below' line (solid line). Drop down vertically from this point to the GW axis for a weight of 6400 kg.

Using the H-V Chart Figure 1-8 the ambient conditions are not present on the chart therefore no H-V avoid area exists for this weight.

Example 2:

Determine the maximum CAT B Take Off weight and H-V Avoid Area for the following ambient conditions:

— Pressure Altitude = 10000 ft

— OAT = +5° C

— Relative Wind Speed = 45 KTAS

Solution:

Using the CAT B W.A.T. Chart Figure 1-7 starting on the Pressure Altitude axes from 10000 ft move up vertically to intersect 5° C line (interpolated between the 0° C and the 10° C line) move right to intercept the 45 KTAS line (dotted line) and drop down vertically to the GW axis for a weight of 5000 kg.

Using the H-V Chart Figure 1-8 on the Pressure Altitude axes from 10000 ft move horizontally to intercept the 5° C line then drop down verticaly to the 5000 kg line. The intercept of the 5000 kg line is below the No H-V threshold of the chart so no H-V avoid area exists for this weight.

Example 3:

Determine the maximum CAT B Take Off weight and H-V Avoid Area for the following ambient conditions:

— Pressure Altitude = 10000 ft

— OAT = +5° C

— Relative Wind Speed = 20 KTAS

Solution:

Using the CAT B W.A.T. Chart Figure 1-7 starting on the Pressure Altitude axes from 10000 ft move up vertically to intersect 5° C line (interpolated between the 0° C and the 10° C line) move right to intercept the 20 KTAS line. Drop down vertically to intercept the GW axis for a weight of 6000 kg.

Using the Height Velocity Chart Figure 1-8 on the Pressure Altitude axes from 10000 ft (3048 m) move horizontally to intercept the 5° C line then drop down verticaly to intercept the 6000 kg line, from this point move right to intercept the C_1-C_2 axes at 235 ft. A line drawn between this point and point B defines the H-V high hover avoid area.

Example 4:

Determine the maximum CAT B Take Off weight and H-V Avoid Area for the following ambient conditions:

— Pressure Altitude = 2700 ft

— OAT = +40 °C

— Relative Wind Speed = 0 KTAS

Solution:

Using the CAT B W.A.T. Chart Figure 1-7 starting on the Pressure Altitude axes from 2700 ft move up vertically to intersect 40 °C line. It can be seen that this puts the point above the ISA +25 °C line and in the shaded section of the graph. The ISA conditions must be calculated.

The ISA condition is calculated using the Density Altitude Chart in Section 4, Figure 4-1. Enter the chart on the Temperature axis from 40 °C move vertically up to the 2700 ft Pressure Altitude line (interpolated between the 2000 ft and 3000 ft). This point is on the ISA +30 °C line so this is the value to be used in the CAT B W.A.T. chart.

Therefore, using the CAT B W.A.T. Chart Figure 1-7 on the Pressure Altitude axes from 2700 ft move up vertically to intersect ISA +30 °C line then move right to intercept the ‘45 KTAS and below’ line (solid line). Drop down vertically from this point to the GW axis for a weight of 6400 kg.

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GROSS WEIGHT AND CENTER OF GRAVITY

Determine both the take-off and estimated landing Gross Weight, Center of Gravity and verify that they are within approved envelope limits. The Weight and Balance, Section 6, and appropriate performance charts, Section 4, must be used to ascertain the weight and balance data as follows:

- Consult Section 6 - Weight and Balance
- Ascertain weight of fuel, oil, payload etc.
- Compute take off and anticipated gross landing weight (Section 4)
- Check helicopter centre of gravity (CG) position
- Confirm that the weight and CG limitations in Section 1 are not exceeded.

COLD WEATHER OPERATION

If the helicopter is to remain parked outside with an OAT at or below -20° C both Main and Auxiliary batteries should be removed and stored in a heated room. Confirm batteries have been installed before flight.

EXTERNAL PRE-FLIGHT CHECKS

DAILY FUEL DRAIN CHECK

Carry out a fuel tank drain check, before the first flight of the day. The check is to be carried out before moving the aircraft and by a trained person. Drain 10 to 20cc from each fuel sump water drain valve by activating the relevant push button. Release the pushbutton, confirm that the fuel is free of water and no fuel is dripping from the aircraft drains.
The term “trained person” refers to a mechanic or pilot who has received sufficient training to perform this task.

GENERAL

The inspection commences at the nose and continues clockwise around the helicopter. During the inspection, check that there are no leaks from overboard drains, that all vents, air intakes, air outlets and fire access points are clear of obstructions, and all access panels and antennas are secure.

Pilot's Pre Flight Check

The following procedure outlines the pilot walk around and interior checks (Figure 2-1).

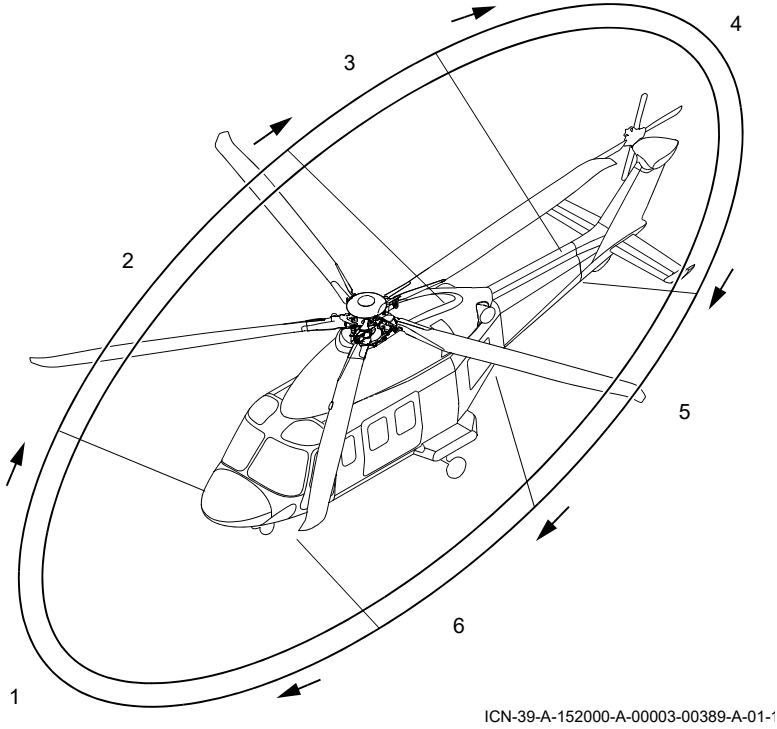

Figure 2-1 Pre-flight Check Sequence

AREA N°1 : Helicopter nose

AREA N°2 : Fuselage - RH side

AREA N°3 : Tail boom - RH side

AREA N°4 : Fin, intermediate/tail gearbox, tail rotor

AREA N°5 : Tail boom LH side

AREA N°6 : Fuselage - LH side

AREA N°7 : Cabin and Cockpit interior

CHECKS

1.	Main and tail rotor tie downs (if present)	— Removed.

AREA N°1 (Helicopter Nose)

2.	Nose exterior	— Condition.
3.	Pitot-Static Probe (Left side)	— Cover removed, condition and un-obstructed.
4.	Left side brake lines in brake pedal area (looking through bottom transparent panel)	— Condition.
5.	Nose landing gear	— Condition, shock strut extension, leaks, tire pressure.
6.	Ventilation air intakes (in landing gear bay)	— Un-obstructed.
7.	Nose compartment access door	— Latched and Secure.
8.	Pitot-Static Probe (Right side)	— Cover removed, condition and obstructions.
9.	Right side brake lines in brake pedal area (looking through bottom transparent panel)	— Condition.

AREA N°2 (Fuselage - Right Hand Side)

10.	Windshield and roof transparent panel	— Condition, cleanliness.
11.	Windscreen wiper ➡	— Condition.
12.	Fuselage exterior	— Condition.
13.	Pilot cockpit door	— Condition, cleanliness, window secure. Check window for presence of cracks.
14.	Passenger cabin door	— Condition, cleanliness, secure.

15. Right side emergency exits ➡	— Verify secure.
16. Main landing gear	— Condition, shock strut extension, leaks, tire pressure.
17. Drains and vent lines ➡	— Free of obstructions.
18. Fuel tank sump area (Right side)	— Confirm no leaks.
19. Baggage compartment, tie down/net	— Condition, cargo (if on board) correctly secure.
20. Baggage door	— Secure. If Baggage door extension kit installed, (P/N 4G5230F00111), confirm key on closed position.
21. Engine area	— Check for fuel and/or oil leaks.
22. Cowling and fairings ➡	— Condition and latched.
23. Air intakes ➡	— Clear and unobstructed.
24. Main rotor components and blades	— General condition.
25. Main rotor damper indicators	— Position.
26. Engine air intake screen ➡	— Cover removed, free of damage and obstruction.
27. Engine cowling	— Secure.
28. Gravity fuel filler cap	— Secure.
29. Engine exhaust ➡	— Cover removed, condition.
30. Fire Bottle discharge indicator	— Green.

AREA N°3 (Tail Boom - Right Hand Side)

31. Tail boom exterior	— Condition.
31a.Tail rotor drive shaft cover	— Secure.

32. Antenna (1) ➡	— Condition.
33. Stabilizer	— Condition and secure.
34. Navigation light ➡	— Condition.

AREA N°4 (Fin, Intermediate and Tail Gearbox, Tail Rotor)

35. Tail fin ➡	— Condition.
36. Intermediate and tail rotor gearbox	— Check for leaks.
37. Tail navigation and anticollision lights	— Condition.
38. Tail rotor hub and blades	— Condition, cleanliness.
39. Tail rotor pitch change mechanism ➡	— Condition.

AREA N°5 (Tail Boom Left Hand Side)

40. Tail boom exterior	— Condition.
41. Stabilizer	— Condition and secure.
42. Navigation light ➡	— Condition.
43. Antenna (1) ➡	— Condition.
44. Tail rotor drive shaft cover	— Secure.

AREA N°6 (Fuselage Left Hand Side)

45. Fuselage exterior	— Condition.
46. Engine exhaust	— Cover removed, condition.
47. Fire Bottle discharge indicator	— Green.
48. Baggage compartment, tie down/net	— Condition, cargo (if on board) correctly secure.
49. Baggage door	— Secure. If Baggage door extension kit installed, (P/N 4G5230F00111), confirm key on closed position.

50. Engine area ➡	— Check for fuel and/or oil leaks.
51. Engine air intake screen ➡	— Cover removed, clear of damage and obstructions.
52. Engine cowling	— Secure.
53. Air intakes ➡	— Clear and unobstructed.
54. Main rotor components and blades	— General condition.
55. Left side emergency exits ➡	— Confirm secure.
56. Drains and vent lines ➡	— Free of obstructions.
57. Fuel tank sump area (Left side)	— Confirm no leaks.
58. Main landing gear	— Condition, shock strut extension, leaks, tire pressure.
59. Passenger cabin door	— Condition, cleanliness, secure.
60. Cowling and fairings ➡	— Condition.
61. Co-pilot cockpit door	— Condition, cleanliness, window secure. Check window for presence of cracks.
62. Windshield and roof transparent panel	— Condition and cleanliness.
63. Windscreen wiper ➡	— Condition.

AREA N°7 (Cabin and Cockpit Interior)

64. Passenger Emergency exits	— Verify secure.
65. Cabin interior	— Equipment and cargo secure.
66. First Aid Kit ➡	— On board.
67. Cabin fire extinguisher ➡	— Secure, charge.
68. Passenger doors	— Closed and secure confirm levers fully down in locked position.

69. Pilot and Copilot safety belt and inertia reel. — Condition.

70. Pilot and Copilot seat — Secure.

71. Pilot and Copilot flight controls ➡ — Condition and secure.

72. Lower and lateral transparent panels — Integrity, cleanliness and no signs of brake fluid.

73. Pilot and Copilot door — Secure.

74. Instruments, panels and circuit breakers — Condition and legibility.

COCKPIT/ENGINE PRE-START CHECKS

SAFETY CHECKS

1.	Pedals and seats	— Adjust.
2.	Seat belt	— Fasten and adjust.
3.	Circuit breakers	— All engaged.
4.	ECL's	— Confirm at FLIGHT.
5.	All switches	— OFF or closed.
6.	ENG 1 and ENG 2 MODE switches	— OFF.
7.	ELT switch on instrument panel	— Confirm ARM.
8.	LDG GEAR lever	— Confirm DOWN.
9.	External Power Unit (if used)	— Connect and switch ON.
10.	Ground support personnel	— Connected (If required).
11.	BATTERY MASTER	— ON.

Note

If External Power not available carry out checks marked with ♦ on BATTERY to conserve battery power. The remaining checks should be completed after the first engine start.

12.	♦ BATTERY MAIN and AUX	— ON.
13.	EXT PWR	— ON (if required).
14.	♦ GEN 1 & 2	— ON.
15.	♦ BUS TIE	— AUTO.
16.	POSITION lights switch	— Confirm functioning then leave as required.
17.	♦ ANTI-COLL lights switch	— ON. (confirm functioning)

18. LT Panel switch	— ON. Confirm emergency lights functioning: cabin (2), sponson (left and right), cockpit door (left and right).
	— OFF or ARM, as required.
19. MFD	— Set SYSTEM page, select SYS CONFIG and verify Top Level System Part Number (EPIC software release) installed: EB 7030191-00105 Phase 4 or EB 7030191-00107 Phase 5 or EB 7030191-00108 Phase 6 or EB 7030191-00109 Phase 6 or EB 7030191-00110 Phase 7 or EB 7030191-00111 Phase 7 or EB 7030191-00112 Phase 7 or EB 7030191-00114 Phase 7 or EB 7030191-00115 Phase 7 or EB 7030191-00117 Phase 7 or EB 7030191-00118 Phase 7 or EB 7030191-00113 Phase 8 or EB 7030191-00120 Phase 8
20. ♦ MFD	— Set powerplant page and check configuration setting.

Note

If MFD/PFD are in composite mode, reset to NORMAL before starting using RCP switches (MFD ONLY-PFD ONLY-NORMAL).

21. ♦ CAS messages	— Check.
22. ♦ MFD	— Check fuel quantity.
23. ♦ LDG GEAR panel	— Check 3 green lights and EMER DOWN switch secure.
23A. ♦ NOSE WHEEL lock	— Confirm LOCK illuminated and/or aircraft suitably chocked.
24. ♦ PARK BRAKE	— Pull and turn handle and press pedals until PARK BRAKE ON advisory illuminates on CAS.
25. ♦ RAD MSTR switch	— As required (GND if battery start).
26. ♦ FORCE TRIM switch	— ON.
27. ♦ CLTV/YAW TRIM switch	— ON.
28. ♦ AWG switch	— As required (REGRADE or INHIBIT position disables “150 FEET” voice message). See Note page 2-48.
29. LD-SH switch	— TORQUE.
30. AFCS	— Confirm not engaged.
31. Cyclic stick	— Centred.
32. Collective lever	— Full down, friction as required.
33. ♦ Flight Controls ➡	— Push ELEC PUMP on HYD panel. Carry out cyclic, collective and yaw pedals full and free check. Utilizing the cyclic position indicator, on PFD, centralize cyclic control by moving in the direction indicated by the yellow arrows to obtain the central circle green. — ELEC HYD PUMP select OFF.

CAUTION

Full and free check should be carried out with slow displacement of the controls and one control at a time in order not to overload the electric pump.

Note

Cyclic position indicator is only presented on the PFD when the aircraft is on the ground and the collective is near its down position (MPOG).

Note

Electric hydraulic pump disengages automatically after 2 minutes.

34. HYD SOV switch — Centred and guarded.

35. ♦ FIRE WARNING TEST push button — Press, on the TEST control panel, BAG and confirm the following visual warnings:
    - MWL illuminate
    - 'BAG FIRE' CAS warning
    - 'BAG' on FIRE EXTING panel

    Audio tone and voice warning ("WARNING WARNING")

    — Press ENG1, confirm the following visual and audio warnings:
    - ENG 1 ECL fire light
    - ENG 1 FIRE on FIRE EXTING panel
    - MWL and MCL illuminate
    - '1 ENG FIRE' , CAS warning
    - '1 FIRE DET', CAS caution
    - Audio tone and voice warning ("ENGINE 1 FIRE")
    - FIRE 1 on ENG CONTROL panel

— Press, ENG2, confirm the following visual and audio warnings:
- ENG 2 ECL fire light
- ENG 2 FIRE on FIRE EXTING panel
- MWL and MCL illuminate
- '2 ENG FIRE' , CAS warning
- '2 FIRE DET', CAS caution
- Audio tone and voice warning ("ENGINE 2 FIRE")
- FIRE on 2 ENG CONTROL panel

36. FUEL pushbutton

— Fuel test starts automatically at electrical power on. Confirm 1(2) FCU TEST FAIL caution not illuminated.

— If further test required press pushbutton and confirm the following:
- 'TEST' replaces 'FUEL' legend on Pilot and Copilot MFD
- 1(2) FCU TEST FAIL caution not illuminated.

37. CHIP DETECTOR pushbutton

— Press ENG 1 pushbutton and confirm CAS caution:

1 ENG CHIP and MCL illuminates.

— Press ENG 2 pushbutton and confirm CAS caution:

2 ENG CHIP and MCL illuminates.

38. AWG TEST pushbutton

— Press, momentarily, on the TEST control panel, AWG. Confirm the AURAL SYSTEM TEST message is heard. If required PRESS and hold pushbutton for 6 seconds and confirm the following aural warnings:

Audio tone and voice warning (”WARNING”)
ROTOR LOW
ENGINE 1 OUT
ENGINE 2 OUT
ENGINE 1 FIRE
ENGINE 2 FIRE

ROTOR HIGH
ENGINE 1 IDLE
ENGINE 2 IDLE
WARNING
AUTOPILOT
AIRSPEED
ALTITUDE
LANDING GEAR
150 FEET
AURAL SYSTEM TEST

39. ♦ OIL LEVEL Pushbutton

— Press MGB pushbutton and confirm CAS caution:

MGB OIL LOW and MCL illuminates.

— Press IGB pushbutton and confirm CAS caution:

IGB OIL LOW and MCL illuminates.

— Press TGB pushbutton and confirm CAS caution:

TGB OIL LOW and MCL illuminates.

40. ♦ LAMP TEST pushbutton➡ — Press and confirm the following illuminate:
    - MWL and MCL Illuminate
    - ENG 1 & 2 FIRE/ARM and BAG on FIRE EXTING panel
    - FIRE lights on ENG CONTROL panel
    - HYD 1 & 2 PRESS/TEMP & ELEC PUMP ON, on HYD panel
    - NOSE/LH/RH red and green lamps, NOSE WHEEL UNLK/LOCK lamps on LDG GEAR panel
    - All green indications on the AUTOPILOT and GUIDANCE CONTROL panel
41. ♦ RPM switch (on collective) — Set 100%.
42. ♦ 1 ENG GOV (on collective) — AUTO.
43. ♦ 2 ENG GOV (on collective) — AUTO.
44. ENG TRIM beep switches (on collective) — Verify operation, then leave the engine control levers in the FLIGHT position.
    ♦ On BATTERY power use a single ‘click’ back and forward to confirm ECL stops in FLIGHT gate.

Note

Each engine trim beep switch controls the respective control lever from MIN to FLIGHT position when in AUTO mode, and from MIN to MAX position when in MANUAL mode.

Note

Both engines control levers should always be operated through the beep switches located on the collective control. They should be operated manually only in case of failure of the remote control (ECL FAIL caution message), or before starting, to position the lever to FLIGHT.

Note

NOSE WHEEL should be LOCKed, yaw pedals centralized and the aircraft suitable chocked to avoid possible aircraft movement during rotor start.

ENGINE STARTING

CAUTION

An engine battery start should not be attempted if the MAIN BUS 1 voltage is below 23V.

ABORTED ENGINE START PROCEDURES

CAUTION

Failure to follow the Abort Procedure may cause damage to the engine.

Engine starting malfunctions are most likely to occur during the engine acceleration cycle to IDLE speed. The list below details the cockpit indications associated with malfunctions and the recommended Abort Procedure. It is important that flight crews be thoroughly familiar with these procedures.

Monitor engine start and if any of the following occur:

— light up is not within 10 seconds of ENG MODE to IDLE

— abnormal noise heard

— ITT increases beyond engine limits (HOT START caution illuminated)

— engine hangs (stagnation in NG below 54%)

— the main rotor has not begun to rotate when the gas generator (NG) reaches 40%

— if engine starter fails to disengage by 49% NG.

shut down engine by:

1. ENG MODE switch — OFF.

   If engine does not shut down then:

   ECL — OFF.

2. FUEL PUMP — OFF.
3. ENG FUEL switch — OFF.

DRY MOTORING PROCEDURE

Following an aborted start shutdown, perform the following procedure allowing a 30 seconds fuel drain period before restarting. The procedure is used to clear internally trapped fuel and vapor:

Note

Observe the starter generator duty cycle limitations during re-start attempts. Refer Section 1.

1.	ENG GOV switch	— AUTO.
2.	ENG MODE switch	— OFF.
3.	ECL	— OFF.
4.	FUEL PUMP switch	— OFF.
5.	ENG FUEL switch	— OFF (fuel valve indicator bar horizontal)
6.	ENGINE IGN circuit breaker (Ringed in WHITE on CB panel)	— out. (Overhead CB panel).
7.	ENG MODE switch	— Select idle as necessary (not more than 45 seconds. Starter Duty Cycle must be respected).

Note 1

To operate the starter it is possible to select ENG GOV switch to MANUAL mode, then push the starter push button on the ECL.

8.	Gas generator (NG)	— Note increasing.
9.	ENG MODE switch	— OFF as necessary.
10.	ENGINE IGN circuit breaker	— In.

NORMAL ENGINE START

Note

During battery start FUEL PUMP 1(2) may illuminate temporarily.

Either engine may be started first and it is recommended that normal engine starts be made using the AUTO mode. For starting procedure in MANUAL mode refer to Section 3.

Note

If engine N°2 is to be started first, set BUS TIE switch to ON and confirm MAIN BUS 2 voltage is not below 23V.

1. ENG 1 FUEL switch — ON - Fuel valve indicator bar vertical.
2. MFD display — Confirm PWR PLANT page.
3. FUEL PUMP 1 switch — ON - 1 FUEL PUMP caution out, check pressure.
4. ENG 1 MODE switch — IDLE.

Note

It is recommended to start the engine to IDLE, if necessary, it is possible to start to FLIGHT by setting the ENG MODE switch directly to FLT.

5. Gas Producer (NG) — Note increasing and START legend displayed.
6. Engine temperature (ITT) — Note increasing and IGN legend displayed.
7. Engine oil pressure — Confirm rising.
8. Engine N°1 starter — Disengaged by 49% NG.
9. Main hydraulic system — When the main rotor begins to rotate, confirm rise in main hydraulic pressure.

— Confirm cyclic control centralized on PFD cyclic indicator.

10. N°1 engine power turbine speed (NF) and rotor speed (NR) — Confirm both stabilized to IDLE speed of 65%±1%.

Note

If the engine was started directly to FLT the NF will stabilise at 100% with rotor speed (NR).

11. Engine and transmission oil — Check pressures and temperatures within limits.

12. ENG 1 MODE switch — FLT.

12A. GEN 1 — Confirm ON (reset if required).

13. ♦ If BATTERY start carried out, complete pre-start checks.

ENGINE 2 START

Note

If required the BUS TIE may be selected to ON to allow continuation of the ENG 2 start in case of EXT PWR failure or ENG/GEN 1 failure during the ENG 2 start cycle.

14. ENG 2 FUEL switch — ON - Fuel valve indicator vertical.

15. FUEL PUMP 2 switch — ON - 2 FUEL PUMP caution out, check pressure.

16. GEN 1 — Check loadmeter in GREEN band (if EXT PWR not used).

17. Repeat above procedure for engine N°2

CAUTION

Ensure second engine engages as the NF reaches FLIGHT condition. A failed engagement is indicated by positive NF value and near zero torque. If this occurs, shut down the non engaged engine first and when engine stopped shut down other engine. If a hard engagement occurs, shut down both engines for maintenance action.

18. Engine and transmission parameters — Check within limits.
19. External power switch — OFF and disconnect external power (if used).
20. GEN 1 and GEN 2 switches — Confirm ON (reset if required).
21. BUS TIE switch — Confirm AUTO.
22. RAD MSTR switch — ON.
23. Clock — Set.
24. Rotor speed — Confirm 100%.

QUICK ENGINE START

This procedure may be carried out on BATTERY or External Power to speed up the Take Off.

1. BUS TIE switch — ON.
2. ENG 1 FUEL switch — ON - Fuel valve indicator vertical.
3. MFD display — Confirm PWR PLANT page.
4. FUEL PUMP 1 switch — ON - Check pressure.
5. ENG 2 FUEL switch — ON - Fuel valve indicator vertical.

6. FUEL PUMP 2 switch — ON - Check pressure.
7. ENG 1 MODE switch — FLT.
8. ENG 2 MODE switch — FLT when N°1 engine NG is above 25%.

CAUTION

Avoid operating the ENG MODE switches simultaneously.

9. Gas Producer (NG) — Note increasing and START legend displayed.
10. Engine temperature (ITT) — Note increasing and IGN legend displayed.
11. Engine oil pressure — Confirm rising.
12. Engine N°1 & N°2 starters — Disengaged by 49% NG.
13. Main hydraulic system — When the main rotor begins to rotate, confirm rise in main hydraulic pressure.
    — Confirm cyclic control centralized on PFD cyclic indicator.
14. N°1 & N°2 engine power turbine speed (NF) — Confirm stabilized at 100%.
15. Engine and transmission oil — Check pressures and temperatures within limits.
16. External power switch — OFF and disconnect external power (if used).
17. GEN 1 and GEN 2 switches — Confirm ON (reset if required).
18. BUS TIE switch — Confirm AUTO.
19. RAD MSTR switch — ON.
20. Clock — Set.

21. Rotor speed — Confirm 100%.

22. VENT switches — As required.

SYSTEM CHECKS

1. MFD PWR PLANT page — Check all parameters within limits.

2. Main Hydraulic — Pressure and temperature within limits. Make small cyclic, collective and pedal movements and confirm hydraulic pressure drop not excessive.

   — Centralize cyclic control on PFD cyclic indicator.

3. Fuel XFEED switch — Select OPEN, confirm bar horizontal.

   — Select NORM, confirm bar vertical.

4. FUEL PUMP 1 — OFF. Note fall in fuel N°1 pressure, 1 FUEL PUMP caution displayed, automatic operation of cross feed valve (bar horizontal), FUEL XFEED advisory displayed on CAS and consequent increase of fuel N°1 pressure.

5. FUEL PUMP 1 — ON. 1 FUEL PUMP caution out, cross feed automatically closed (bar vertical) and FUEL XFEED advisory extinguishes.

6. FUEL PUMP 2	— OFF. Note fall in fuel N°2 pressure, 2 FUEL PUMP caution displayed, automatic operation of cross feed valve (bar horizontal), FUEL XFEED advisory displayed on CAS and consequent increase of fuel N°2 pressure.
7. FUEL PUMP 1	— OFF. Note fall in fuel N°1 pressure, 1 FUEL PUMP caution displayed, cross feed valve still open (bar horizontal), FUEL XFEED advisory still present. Confirm correct engine operation on engine driven suction pumps.
8. Fuel XFEED switch	— Select CLOSED, confirm bar vertical, wait 15 seconds then confirm correct engine operation on engine 1 and 2. Select NORM, confirm bar horizontal.
9. FUEL PUMP 1 & 2	— ON. 1 & 2 FUEL PUMP caution out and cross feed automatically closed (bar vertical) FUEL XFEED advisory extinguished.
10. OEI TNG switch	— Check (if required).
11. MFD page	— Select as required.
12. MCDU	— Set COM and NAV as required.
13. FD panel	— Check in SBY.

14.TEST button on Autopilot controller (If more convenient this check may be carried out previously whilst A/C in IDLE mode)	— Press and follow instruction on MFD AFCS synoptic page. Confirm test completes successfully and no AP messages are displayed on Crew Alert System. Reselect TEST button to return MFD display to NORMAL.
15. ICS panels	— Set as required. Set BKUP volume as required.
16. AHRS, ADS and display reversion switches	— NORM.
17. LT panels	— Set as required.
18. CABIN LT panel	— Set as require.
19. COMPASS switches	— MAG.
20. RAD ALT	— Confirm zero altitude (±5 ft).
21. DH TEST button on remote instrument controller (If more convenient this check may be carried out previously whilst A/C in IDLE mode)	— Press, confirm RAD ALT 100 ft (±10 ft) and 'TEST' message displayed, release, confirm zero altitude (±5 ft).
22. DH selector on remote instrument controller	— Set as required.
23. Altimeters: Pilot, Standby and Copilot	— Set and check.
24. PITOT HEATER 1 & 2	— ON for indicated OAT of +4° C or less.
25. POSITION light switch	— As required.
26. RPM switch	— Set 100%.
27. NR/NF	— Confirm stabilized at 100%.

28. LDG LT & LDG LT2 switches — As required.

29. PARK BRAKE handle — OFF. Check no PARK BRK ON caution message.

30. Warning and Caution messages — Check, as required.

TAXIING

1. AFCS — As required.

2. NOSE WHEEL lock — For ground taxiing confirm:
   - Pedals centred
   - Cyclic centred
   - Collective down

   — Press to UNLK.

3. Collective and cyclic — Increase collective slowly then move the cyclic stick forward moderately to start movement.

4. Pedal brakes — Check operation.

5. Pedal control — As required to select direction.

6. Collective and pedal brakes — To reduce speed and stop, lower collective and apply pedal brakes.

7. Nose wheel lock — Press to LOCK.

Note

If the nose wheel is not aligned forward (UNLK caption flashing) it will self centre and lock as soon as the helicopter lifts off.

CAUTION

Do not use aft cyclic to slow the aircraft. The use of large cyclic displacements in conjunction with low collective can cause main rotor hub and cowling damage.

Note

Turning, whilst taxiing, should be carried out with collective at minimum pitch and cyclic central or as required to compensate for crosswind.

PRE TAKE-OFF CHECKS

1. AFCS — Confirm engaged.
2. MFD — Select PWR PLANT page.
3. PARK BRAKE handle — Released.
4. ENG MODE — Confirm both to FLIGHT.
5. ECL — Confirm both to FLIGHT.
6. TQ LIMiter pushbutton — Push, if required, to enable TQ limiter function (LIMITER ON advisory message).

CAUTION

With TQ LIMiter enabled the AEO engine total torque will be limited to a combined torque value of 228%TQ. OEI engine torque limit will remain at 160%TQ.

7. CAS — Clear/as required.

TAKE OFF

CATEGORY B TAKE OFF

1. Hover — Establish at 5 feet (1.5 m) AGL. Relative wind between 135° and 225° (quartering tail winds) is not recommended.

2.	NOSE WHEEL steering	— Confirm LOCK.
3.	Power checks	— Carry out as required in accordance with IN-FLIGHT POWER CHECKS procedure in Section 4.
4.	Engines/Rotor	— Check TQ/ITT matching and NR 100%.
5.	Warnings and cautions	— Confirm none displayed.
6.	MFD PWR PLANT page	— Check all parameters within normal operating limits and confirm no engine matching abnormalities.
7.	Flight controls	— Check correct functioning.
8.	Collective/Cyclic Control	— Apply cyclic to commence a nose down attitude change of 7°. At approximately half way through the rotation apply collective to increase PI to 5% above the hover PI.
9.	Acceleration and Climb	— Accelerate forward and climb to achieve 50 ft (15 m) above take off surface at 50 KIAS, continue up to 80 KIAS.
10.	Climb	— At 80 KIAS (Vy) adjust attitude to stabilize at Vy and climb smoothly
11.	Power limits	— Observe PI limitations for Take Off power rating.
12.	Landing gear	— UP (by 200 ft (61 m) AGL).

Note

For OAT of -30° C and below undercarriage retraction time may double.

13. NR/NF — Confirm 100%

14. After Take-Off checks — Complete.

15. Power — Adjust, as required, for cruise flight or continued climb.

IN-FLIGHT PROCEDURES

AFTER TAKE-OFF

1. Landing gear — Confirm up.
2. LDG LT & LDG LT2 switches — Confirm OFF.
3. Engine parameters, temperatures and pressures — Normal, temperatures and pressures within limits.
4. LD-SH switch — As required; (TORQUE or TEMP) confirm parameters matched.

Note

The LD-SH switch allows the pilot to maintain engine TORQUE or ITT matched, as required.

5. TQ LIMiter pushbutton — As required.
6. CAS — Clear/as required.

Note

During flight below 1000 ft (300 m) AGL fly attentive.

7. MFD — As required.

CLIMB CHECKS

1. VENT — As required.
2. Radios/Navigation — As required.
3. Autopilot mode — As required.

CRUISE CHECKS

1. Collective — Adjust as necessary to keep engine parameters within limits.
2. LD-SH switch — As required; (TORQUE or TEMP) confirm parameters matched.

Note

The LD-SH switch allows the pilot to maintain engine TORQUE or ITT matched, as required.

Note

If the engines are ITT limited on the PI indicator, and there is a large ITT mismatch, the PI matching can be restored by selecting LD-SH switch to TEMP.

3. FUEL — Every 30 minutes:

   Check quantity, XFEED closed or as required

Note

If fuel consumption is greater than expected see Abnormal Fuel Consumption procedure on page 3-111.

4. Airspeed — Maintain within limits.
5. PITOT HEATER switches — ON for indicated OAT of +4° C or less.
6. Compass — Check all synchronized.

7. Radios/Navigation — As required.
8. Standby instrument — Check airspeed, altimeter and artificial horizon against primary flight display.
9. Autopilot modes — As required.
10. LDG LT & LDG LT2 switches — OFF, if used.
11. MFD — Every flight hour select PWR PLANT page and confirm no engine matching abnormalities.
    — Above 15000 ft (4570 m) the PWR PLANT page should be selected and DC generator load monitored.

PRE-LANDING CHECKS

1. RPM switch — Confirm 100%.
2. NR/NF — Confirm 100%.
3. MFD — Select PWR PLANT page.
4. TQ LIMiter pushbutton — As required.
5. Landing gear lever — DOWN; three green lights on LDG control panel.

Note

For OAT of -30° C and below undercarriage extension time may double.

6. NOSEWHEEL steering — LOCK.
7. LDG LT & LDG LT2 switches — As required.
8. Temperatures and Pressures — Within limits.
9. Fuel — Quantity, XFEED closed unless required.

10. RAD ALT bug — As required.
11. Altimeters: Pilot and Standby, Copilot — Set.
12. PARK BRAKE handle — As required.
13. Cabin — Secure.
14. PITOT HEATER — As required.

Note

• If an ILS approach is required select both NAV's to the same frequency. On STBY instrument (ESIS) select NAV ON and set the course to the final ILS course.
• Recommended airspeed:

Glideslope up to 4 degrees	120 KIAS
Glideslope between 4 and 7.5 degrees	100 KIAS

Note

When a Multi Band Mission Radio (if installed) is transmitting it may cause interference to VOR, ILS, VHF and GPS systems.
Use of the Multi Band Mission Radio should be avoided during instrument approach phase.

APPROACH AND LANDING

CATEGORY B LANDING

1. Pre-landing checks — Complete
2. AWG switch — NORMAL

Note

When descending below 150 ft AGL vocal message 'ONE FIFTY FEET' is activated regardless of the landing gear status. This message is suppressed if AWG switch is set to REGRADE or INHIBIT. See Note page page 2-48.

3. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.

4.	Initial point	— During the approach, reduce airspeed gradually to arrive at a position 200 ft (61 m) above touchdown point with a rate of descent of no more than 500 fpm. Initiate a deceleration to achieve 30 KIAS at 50 ft (15 m). At 50 ft rotate nose up to approximately 20° to decelerate.
5.	Landing	— Continue the decelaration and descent to hover.
6.	MFD PWR PLANT page	— In hover check all parameters within normal operating limits and confirm no engine matching abnormalities
7.	Touch down	— Maximum nose up attitude at touch down 15°. Apply wheel brakes, as required.
8.	NOSE WHEEL lock	— For ground taxiing confirm: • Pedals centred • Cyclic centred • Collective down — Press to UNLK.

POST LANDING AND SHUTDOWN PROCEDURES

POST LANDING CHECKS

1.	AFCS	— As required.
2.	LDG LT & LDG LT2 switches	— OFF (if used).
3.	Position lights	— OFF (if used).

PRE-SHUTDOWN CHECKS

1. PARK BRAKE handle	— Pull and turn handle, PARK BRK PRESS caution illuminates, press pedals until caution extinguishes and PARK BRK ON advisory illuminates.
2. NOSE WHEEL	— Push to LOCK, if required.
3. Collective lever	— MPOG.
4. Cyclic stick	— Centralized, on PFD cyclic indicator.
5. Pedals	— Centered.
6. AFCS	— Confirm disengaged.
7. Avionics	— As required.
8. PITOT HEATER switches	— OFF (if used).
9. External Power	— If required, carry out EXTERNAL POWER connection procedure.

ENGINES AND ROTOR SHUTDOWN

When it is intended to shutdown engines and rotor, carry out the following procedure:

1. ENG 1 and 2 MODE switches — Set to IDLE.

Note

A period of 60 seconds stabilization at IDLE is recommended.

2. BUS TIE switch — ON (for night operations).
3. Fuel PUMP 1 and 2 switches — OFF.
4. ENG 1 and 2 MODE switches — OFF.

CAUTION

During shut down note that:
- NG speed decelerates freely without abnormal noise or rapid run down
- ITT does not rise abnormally.

5. ENG 1 and 2 FUEL valve — OFF 1 & 2 FUEL PUMP caution messages. (Fuel valve indicator bar horizontal).
6. Fuel XFEED switch — CLOSED (indicator bar vertical)
7. Cockpit lights — OFF.
8. ANTI-COL lights — OFF.
9. BUS TIE switch — Confirm AUTO.

CAUTION

Prior to switching electrical power OFF ensure engine NG values are at 0%.

10. BATTERY MASTER and GENerators — OFF.
11. BATTERY MAIN and AUX — OFF.

POST SHUTDOWN CHECKS

Before leaving the aircraft:

— If the helicopter is to be parked for prolonged periods (greater than 1 hour) the wheels should be chocked

— If the helicopter is to be parked on sloping ground the wheels should be chocked as soon as possible

— If the helicopter is to remain outside with an OAT at or below -20° C both Main and Auxiliary batteries should be removed and stored in a heated room.

SLOPING GROUND OPERATION

Note

1(2) WOW FAIL caution may illuminate spuriously during slope Take-Off or Landing procedure.

TAKE OFF PROCEDURE

1. PARK BRAKE applied.
2. Increase collective and move cyclic in a coordinated manner to achieve a lift off.
3. Establish hover above take off surface.
4. Release PARK BRAKE.
5. Take off as required.

LANDING PROCEDURE

1. Establish hover above landing area.
2. PARK BRAKE applied, (PARK BRAKE ON advisory message on CAS).
3. Lower collective to commence vertical descent.

When the wheels contact the ground:

4. Move cyclic and collective in a coordinated manner to achieve the cyclic centralized as the collective reaches MPOG.
5. If taxiing required release PARK BRAKE.

FLIGHT HANDLING

Handling is conventional in normal forward, sideways and rearwards flight manoeuvres. Collective lever forces are light, but may be increased by applying friction.

AUTOROTATIVE DESCENT

1. Smoothly reduce collective to enter autorotation.

2. Adjust collective to give up to 110% NR.

CAUTION

Rotor speed is sensitive in autorotation and large NR changes are produced by changes in normal acceleration (G). Care is needed to avoid exceeding limits.

3. Adjust attitude to obtain approximately 80 KIAS.

4. To recover to powered flight, slowly increase collective pitch until freewheels are joined and at least 10% torque is indicated. Finally, increase power, gently, in not less than 3 seconds, to arrest the rate of descent.

FLIGHT IN SEVERE TURBULENCE

1. All occupants must be seated with seat belts fastened.

2. Slow the aircraft to a comfortable speed.

3. Fly a constant attitude. Do not attempt to correct rapidly changing airspeed indications.

4. Do not make large, rapid collective pitch adjustments.

FLIGHT CONTROLS

CYCLIC TRIMMING

The force trim release button (FTR) on the cyclic stick should be kept depressed during all large stick movements. Upon releasing the trim release button, the attitude hold is restored.

For small attitude adjustments in the hover or in forward flight (± 2 to 3 knots), the system beep trim mode (TRIM) can be used. Operation of the cyclic beep trim switch causes the trim system to change the reference at 3 degrees per second in roll and 2°/sec in pitch or 1°/sec in pitch for airspeed above 120 KIAS. When the new desired attitude is reached, the switch is released.

The trim method most commonly used is a combination of trim release and beep trim.

COLLECTIVE TRIMMING

The “push and hold” collective lever trim release button (FTR) is depressed to disengage the spring feel mechanism which enables the collective to be moved freely. When the button is released, the spring feel is re-datumed to zero force.

YAW TRIMMING

Lateral operation of the collective lever CLTV/YAW 4-way trim switch alters the slip or skid command to either offset a small accelerometer misalignment, or to purposely offset the tail alignment.

Additionally, at speeds above 40-45 KIAS the coordinated turn facility enables the aircraft to carry out a balanced turns, below 60 KIAS the Low Speed Heading hold is active. Feet should not be rested on the pedals if heading hold or turn coordination facilities are required.

FMS AND GPS OPERATION

GENERAL

For complete information about FMS operations, refer to the latest issue of Honeywell AW139 FMS Pilot's Guide that applies to the installed Primus EPIC Software Release.

The AW139 is certified for Navigations Specifications listed in the following table, in accordance with ICAO 9613 PBN manual 4th Ed., AC 90-105A, AC 20-138D change 2 documents, AMC 20-4 and AMC 20-27:

ICAO 9613 PBN manual - Navigation Specification	Flight Phase						
	En-route	Arrival	APPROACH				Dep
			Initial	Intermediate	Final	Missed	
RNAV 5	*5*	*5*	-	-	-	-	-
RNAV 2	*2*	*2*	-	-	-	-	-
RNAV 1	*1*	*1*	*1*	*1*	-	*1*	*1*

Note

Refer to Supplement 79 and 80 for compliance to additional Navigation Specifications (Phase 7 and later).

The EPIC FMS, designed in accordance with requirements of TSO C115b, determines current aircraft position by using a variety of long range and short range navigation sensors.

Based on the position and the flight plan, the FMS generates information to be displayed on the Multifunction Control Display Unit (MCDU) and Electronic Display System (EDS).

Approved FMS sensors for each phase of navigation are as follows:

Flight Phase or Approach Type	Approved Sensors		
	GPS	DME-DME	VOR/DME
Enroute	✔	✔	✔
Departure or Arrival	✔	✔	✔
NDB Approach(*)	✔	✔	
VOR/DME or VOR NDB Approach (*),(**)	✔	✔	✔
GPS Approach (*)	✔		

(*) The FMS determines cross-track error computation to provide lateral path deviation indications and Baro-VNAV to provide vertical path deviation indications. This constitutes Approved Vertical guidance for approach.

BASIC OPERATIONS

PRE-DEPARTURE OPERATIONS

At the power-up of the system, NAV IDENT page is presented on MCDU. Basic pre departure operations are:

— Initialize the position by pressing POS INIT key and loading present position (right keys on POSITION INIT page)

— Press FLT PLAN key (6R) to prompt ACTIVE FLT PLAN page and recall or create a FPL

— Press FPL key and activate the flight plan

— Press PERF pushbutton, enter performance data and confirm (CONFIRM INIT key)

— If required select and activate arrival and departure

— If required insert ALTERNATE data and waypoints

— If required press PATTERNS key (on NAV page) to select and activate holdings, flyovers and other patterns.

Note

The above procedures may be monitored on PLAN page of MCDU.

IN-FLIGHT OPERATIONS

General

ACTIVE FLT PLAN page 1 and PROGRESS page 1 are considered the primary pages of the FMS during flight. Once activated on the ground, the flight plan may be:

— flown directly by the pilot monitoring MAP page on MFD and LNAV/VNAV (VPATH) presentation on PFD

— flown coupled to FD, LNAV only, once LNAV is presented on PFD and FD is engaged.

Departure, climb and cruise

— Set altitude selector at the reference altitude cleared by ATC

— Monitor leg sequencing on MFD (MAP page) and on the MCDU display.

Descent

— Check/activate, if required, approach on destination airport and alternate airport on the flight plan

— Set altitude selector at the reference altitude cleared by ATC

— Start descent, once cleared by ATC, at TOD (Top Of Descent) mark using the rate of descent indicated on MCDU display.

A VPATH will be shown during a descent if:

- a vertical constraint is entered or,
- an approach is activated.

VPATH vertical indicator is presented on the PFD in the same spot and with the same layout as the Glideslope indicator. During PRV operation both vertical indicators are concurrently presented, VPATH pointer is presented on the right of the vertical deviation scale and Glideslope on the left. Within the pointers there will be a letter I for ILS or V for VPATH. (See Figure 2-2)

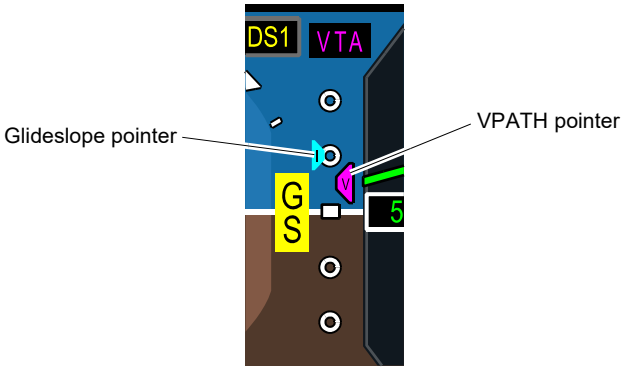

Figure 2-2 VPATH Pointer

WARNING

VPATH indication does not provide obstacle clearance. During VFR flight it is the pilot's responsibility to ensure that the aircraft flight path will be clear of obstacles.

— Monitor leg sequencing on MFD (MAP page) and on the MCDU display.

Approach

— Check published approach plate.

— Set altitude selector to the MDA (ASEL)

— Set DH

— Intercepting VPATH, engage IAS and fly the vertical pointer with the collective.

WARNING

VPATH indication does not provide obstacle clearance unless normal IFR or VFR separation methods are used, for example:
— when under ATC control
— when flying a published approach
— when flying above normal route MSA.

During VFR flight it is the pilot's responsibility to ensure that the aircraft flight path will be clear of obstacles.

CAUTION

When the vertical profile includes two consecutive slopes with different angles, a discontinuity in the vertical indicator may be shown at the transition.

Note

If an ILS approach is selected flying a FMS flight plan, PRV mode must be armed and ILS course set.

— Monitor leg sequencing on MFD (MAP page) and on the MCDU display.

— At MDA/DH take over manually for landing.

— If a missed approach is required press the GA button to activate the Missed Approach sequencing.

AUTOPILOT COUPLED OPERATIONS WITH FLIGHT DIRECTOR

To couple FMS lateral navigation (LNAV) to Flight Director, pilot must:

— Select, on the PFD's, HSI, FMS1 or FMS2 (by pressing LNAV on DICP);

— Press the NAV key on the Flight Director Guidance Controller.

— Engaging the FD to the FMS:

Engaging the FD to the FMS:

Course arrow and FMS 1/2 source indicator on PFD's HSI will turn magenta (from cyan).

— Active leg on MAP page will turn magenta (from cyan)

Note

Vertical Navigation (VNAV) cannot be coupled to FD

Note

ASEL does not capture ALT reference. It can be used only for visual reference. Altitude selector does not influence the vertical navigation but must be initially activated to have NAV vertical presentation.

ADVISORY AND ALERTING ANNUNCIATORS

a) Message (MSG)

MSG is displayed on the PFD (first line below PI indicator, see Figure 2-3). This annunciator is displayed when an alert message is shown in the MCDU scratchpad. The annunciator is removed after the message has been cleared from the scratchpad.

b) Offset (OFST)

OFST is an advisory (**green**) annunciator on the PFD (along side waypoint identifier, see Figure 2-3). The annunciator is displayed when a lateral offset has been entered on the PROGRESS 3 page. The annunciator is removed or turned off when the offset is removed.

c) Approach (APP)

APP is an advisory (**green**) annunciator on the PFD (along side waypoint identifier, see Figure 2-3). The annunciator indicates the FMS is in the approach mode of operation.

In this mode, the HSI deviation sensitivity and FMS tracking gains are increased. The approach annunciator is displayed if ALL of the following conditions are valid:

— The FMS is the selected aircraft navigation source on PFD.

— If no approach, or an ILS, LOC, LOC--BC or LDA approach is selected, the APP annunciator does not light.

— The aircraft position is between 2 NM outside the final approach fix (FAF) and the missed approach point (MAP).

— The DGR annunciator must not be present.

d) RNP Digital Readout (RNP X.X NM)

The RNP digital readout is displayed on the PFD display whenever the FMS is selected as Navigation Source (unless replaced by LPV identifier when in terminal area, see Supplement 80 if applicable). The RNP display indicates that 2 dots deflection in Lateral Deviation/Pointer display within the HSI. The RNP digital readout is cyan when selected FMS is not coupled to the Flight Director, magenta when coupled to the Flight Director, amber when the Total System Error is greater than RNP.

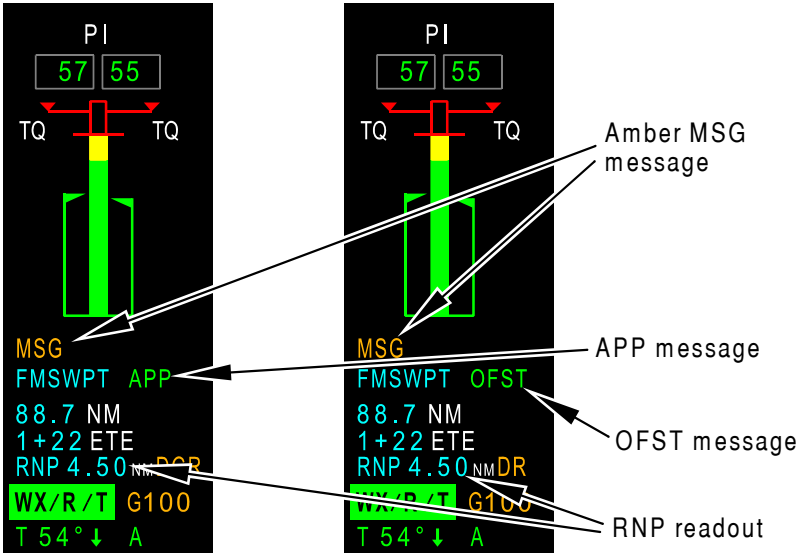

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Figure 2-3 PFD Messages

STANDBY INSTRUMENT OPERATION

Two options are available for the standby instrument, the Goodrich Avionics or the Meggitt Avionics system. Operating procedures are outlined in the appropriate Pilots Guide:

— the Goodrich Avionic System Pilots Guide for the Electronic Standby Instrument System Model GH-3100, latest issue;

— Meggitt Avionics Pilots guide for the Integrated Secondary Flight Display Model EPD40004, latest issue.

ADVISORY CAPTIONS DEFINITIONS

CAS Caption (Green)	System State
CLTV/YAW OFF	Collective yaw coupling OFF
EXT PWR READY	External power connected
EXT PWR ON	External power ON
FORCE TRIM OFF	Cyclic force trim switched OFF
FUEL XFEED	Fuel cross feed open
FWD VENT	Forward vent fan ON
LANDING LT ON	LDG LT switched ON
LDG EMER DOWN	Landing gear lowered using emergency down system
PARK BRK ON	Park brake ON
1(2) PITOT HEAT ON	Pitot heating ON
SEARCH LT ON	LDG LT2 switched ON
TQ LIMITER ON	Engine torque limiter ON
DCL NOT INSTALLED	(Caption present for 5secs) DCL button pressed and function not fitted

ALTA NOT INSTALLED	(Caption present for 5secs) ALTA button pressed and function not fitted
RHT NOT INSTALLED	(Caption present for 5secs) RHT button pressed and function not fitted
HOV NOT INSTALLED	(Caption present for 5secs) HOV button pressed and function not fitted

CAS Caption (White)	**System State**
MAINTENANCE	(Caption only active on ground) Informs that a new Maintenance message is present in the Maintenance Log. No pilot action.
NOSE FAN 1(2) OFF	(Caption only active on ground and from aircraft S/N° 31201 onwards and S/N° 41201 onwards) Informs crew that associated nose bay vent fan has failed. No pilot action.
150 FT AURAL INHIBIT	Informs crew that AWG switch is set to REGRADE or INHIBIT. **Note** Caption only active for aircraft modified with kit P/N 4G2350F01511.

PFD MESSAGES

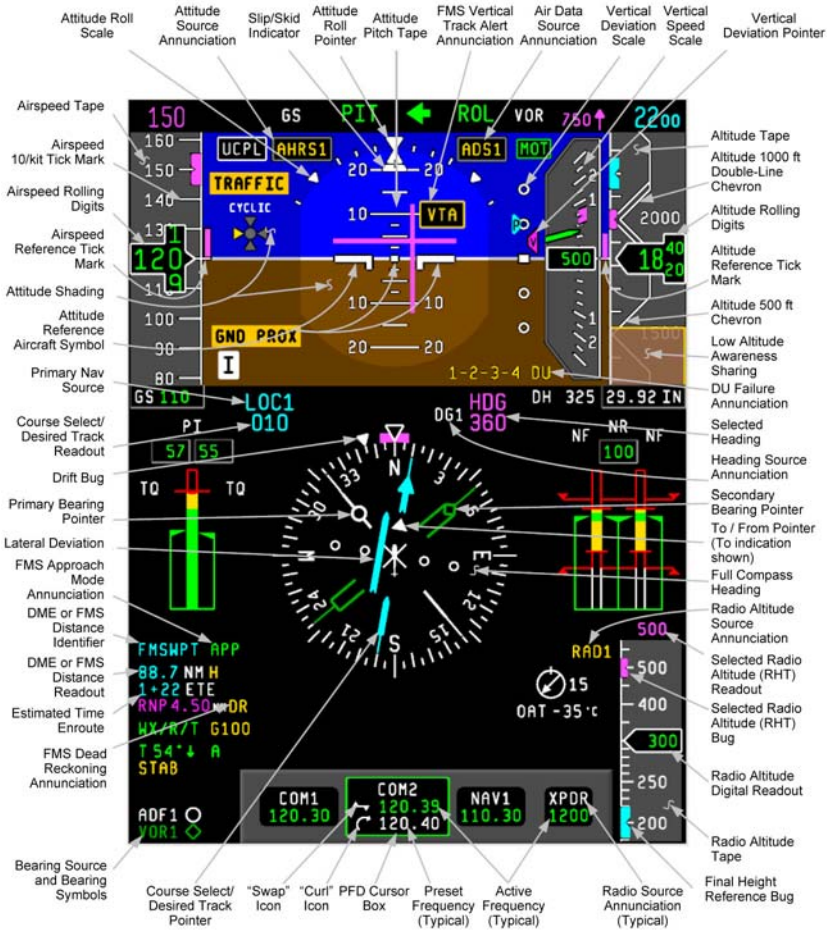

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Figure 2-4 PFD Messages (Compass Mode, miscompare messages steady state colours), for reference only

PFD MESSAGES (CONT)

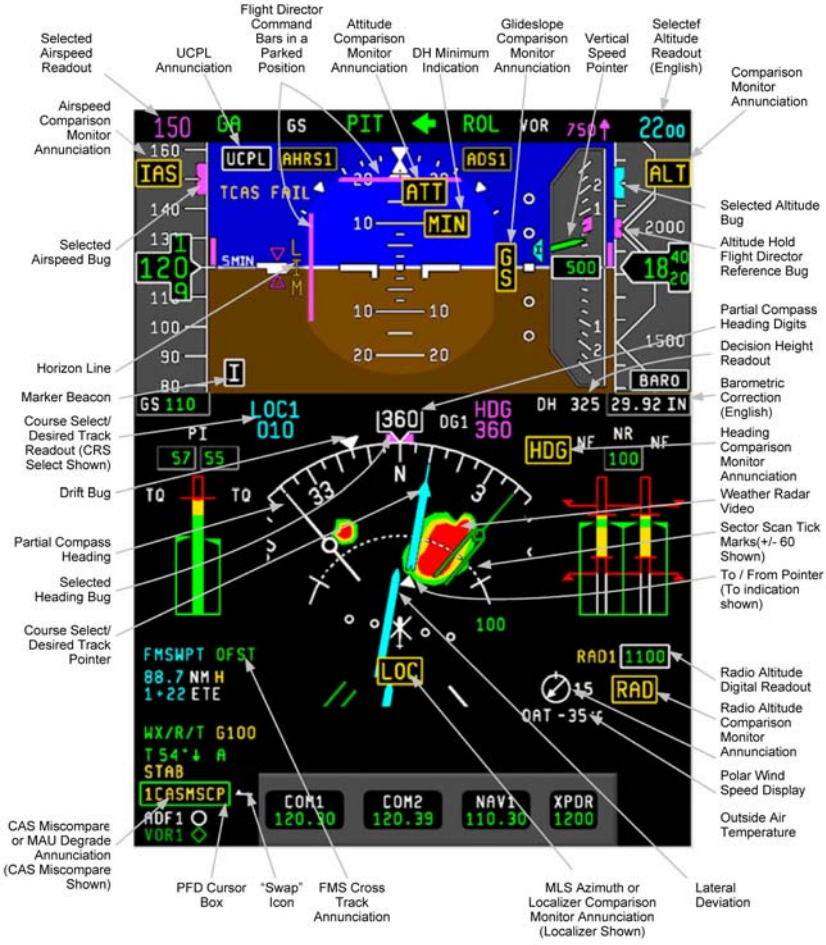

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Figure 2-5 PFD Messages (Arc Mode, miscompare messages steady state colours) for reference only

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EMERGENCY AND MALFUNCTION PROCEDURES

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SECTION 3

EMERGENCY AND MALFUNCTION PROCEDURES

INTRODUCTION

This section contains the procedures that must be performed in the event of an emergency or malfunction. These procedures are based on experience acquired in the operation of helicopters, in general, and on flight tests conducted on this particular helicopter type.

The procedures used in each actual emergency or malfunction must result from consideration of the complete situation. Multiple emergencies or malfunctions may require departure from normal corrective procedures detailed in this section.

All corrective action procedures listed herein assume the pilot gives first priority to aircraft control and safe flight path.

PROCEDURES LOGIC

The majority of the Emergency and Malfunction procedures that follow are presented in the form of logic trees (flow charts). These flow charts have been formulated based on analysis and test of the cockpit indications that would be available to the flight crew following the failures/malfunctions that are included in this section. For complex failures/malfunctions, cockpit indications coupled with the answers to “Yes/No“ type questions (as indicated on the charts) should enable the flight crew to analyse the type of failure/malfunction that has occurred, the branch of the ”tree” that should be followed and the corrective action that should be taken.

In order to analyse some types of failures/malfunctions, answers to “+“, “IF“, “AND“ and “OR“ statements may be required. In these cases, the statements are presented in bold text (“**+“, “IF“, “AND“, “OR**“), as an attention getting device. It is stressed that attention should be paid to this symbology to avoid a mistake in the emergency/malfunction analysis and subsequent incorrect crew action. **Required flow chart crew** actions are typed in bold.

Cautions and Notes, included in the flow charts, that are written across the page are applicable to all the procedure. However, a Caution or Note boxed and under a particular branch of the procedure is only applicable to that branch.

SAFE OEI FLIGHT

In general safe OEI flight is defined to mean (1) a sustainable airspeed of not less than 50 KIAS, (2) the ability to obtain a positive rate of climb at acceptable power levels and (3) an altitude which provides sufficient clearance from the ground/obstacles so that required manoeuvring can be reasonably achieved. At crew discretion, other procedural checks/actions may be carried out while these conditions are being established.

EMERGENCY LANDING GUIDANCE

Throughout this Section, three terms are used to indicate the degree of urgency with which a landing must be effected. In cases where extremely hazardous landing conditions exist such as dense bush, heavy seas or mountainous terrain, the final decision as to the urgency of landing must be made by the pilot.

1. **Land immediately:** — Land at once, even if for example this means ditching or landing in trees. The consequences of continued flight are likely to be more hazardous than those of landing at a site normally considered unsuitable.

2. **Land as soon as possible:** — Do not continue flight for longer than is necessary to achieve a safe and unhurried landing at the nearest site.

3. **Land as soon as practicable:** — Land at the nearest aviation location or, if there is none reasonably close, at a safe landing site selected for subsequent convenience.

MALFUNCTIONS DURING APPROACH GUIDANCE

Discontinue Approach:

Throughout this Section of the Rotorcraft Flight Manual the
- **Discontinue Approach** is reported whenever the capability of the helicopter to continue the approach being flown is lost. The crew actions in the event of failures resulting in - **Discontinue Approach** depend on the operational situation and pre-flight planning should take into account the possibility of the loss of ability to continue the approach, as per normal VFR and IFR planning. Considerations such as the specific kind of abnormal condition experienced, the availability of re-configuration options, alternate approach procedures, the environmental and meteorological conditions, kind of operation, fuel state, alternate availability and any other pertinent elements should be taken into account by the crew to take proper action.

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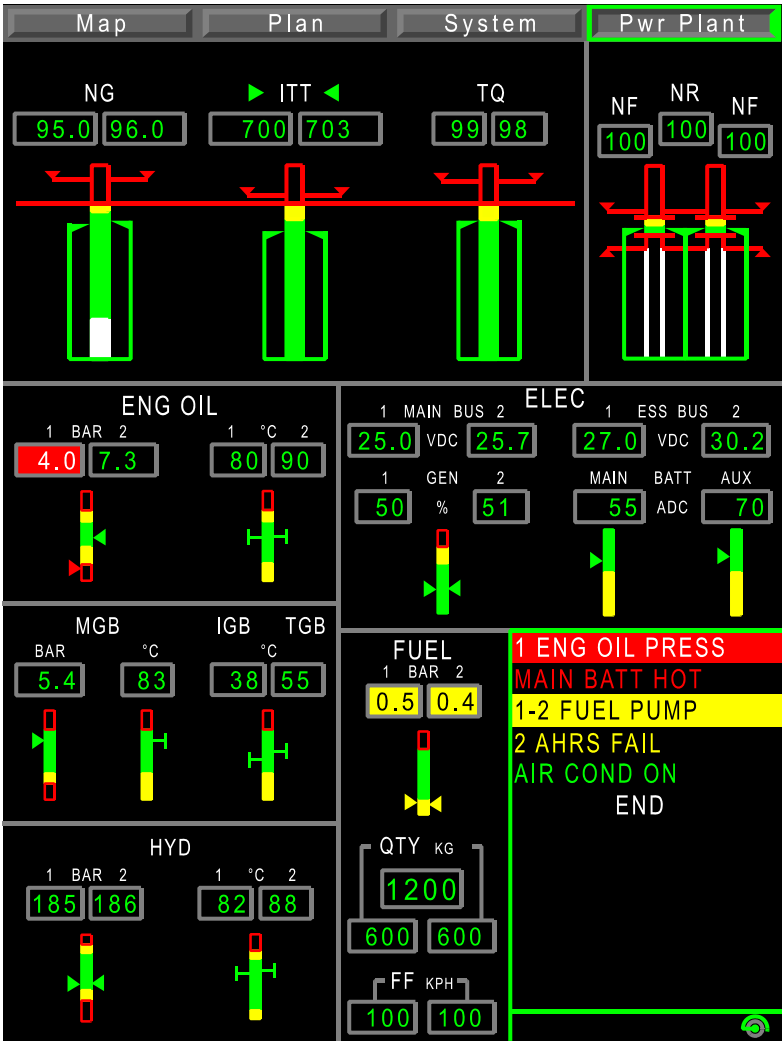

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(ENG 1 OIL PRESSURE, MAIN BATT HOT warnings, 1 & 2 FUEL PUMP 2 AHRS FAIL cautions and AIR COND advisory message active in CAS Warning and Caution window)

Figure 3-1 Crew Alerting System Layout (MFD Page)

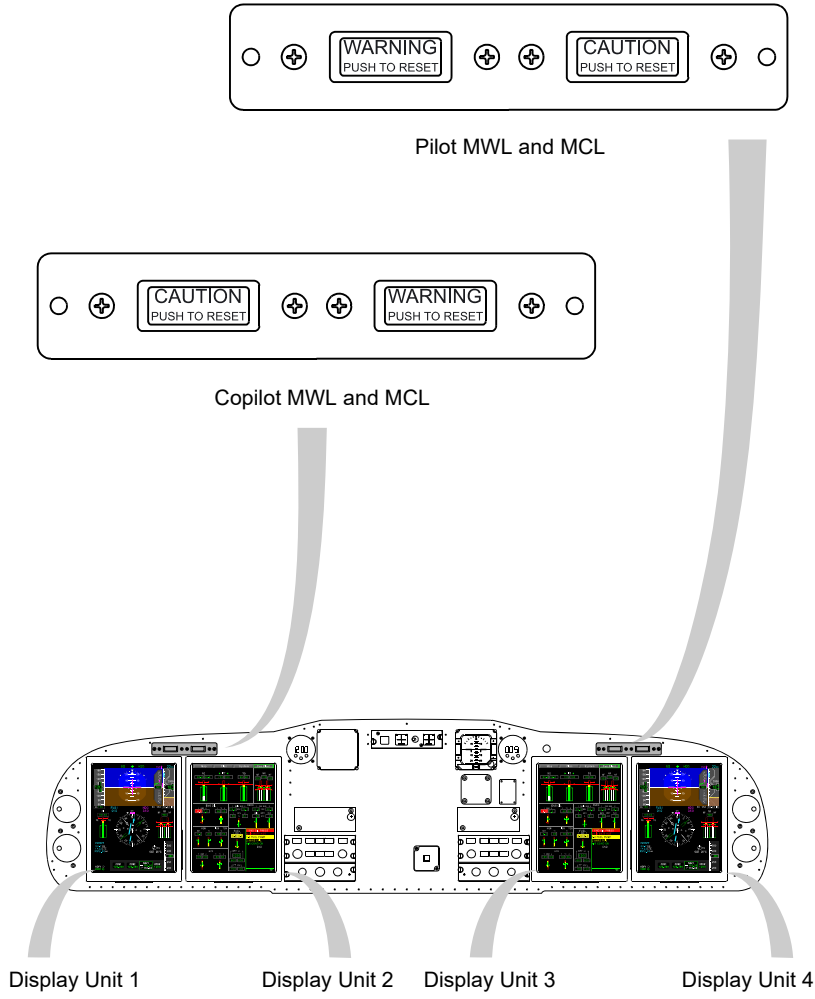

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Figure 3-2 Crew Alerting System MWL and MCL Location, Display Unit Numbering

CREW ALERTING SYSTEM (CAS)

The CAS is a dedicated window on the Multi-Functional Display (MFD). Many of the emergencies described in this section are indicated by the illumination of red CAS warnings with the red Master Warning Light (MWL), while the malfunctions are indicated by an amber CAS cautions with the amber Master Caution Light (MCL).

The red warnings are accompanied by a voice warning and in some cases an audio tone and can be acknowledged by pressing the MWL or the CAS RST button on the collective grip.

The amber Master Caution Light can be acknowledged by pressing the MCL or the CAS RST button on the collective grip.

Green advisory and white status messages are also presented on the CAS system but the display of the messages uses the following prioritization:

Priority 1: Warnings (red)

Priority 2: Cautions (amber)

Priority 3: Advisories (green)

Priority 4: Status messages (white)

USING THE CAS WARNING AND CAUTION SYSTEM

Whenever a warning or caution illuminates, appropriate actions should be taken to deal with the indicated emergency or malfunction. The MWL and/or the MCL must be cancelled when convenient, to reset the light for possible future warnings or cautions.

In this section, the following convention is used:

A WARNING - A CAS RED WARNING

A CAUTION - A CAS AMBER CAUTION

MESSAGE FORMAT

Similar messages seen on the CAS are combined within a single message. For example “1-2” is embedded in the same line of message without the need to have two separate messages as shown below:

1-2 ENG OIL PRESS represents the combined CAS warning displayed when 1 ENG OIL PRESS and 2 ENG OIL PRESS warnings are present consecutively.

1(2) ENG OIL PRESS For this manual, use of the caption notation 1(2) ENG OIL PRESS (for example) is to indicate captions that can apply to more than one component.

1 ENG OIL PRESS

2 ENG OIL PRESS

This notation therefore indicates that a failure involving No. 1 engine oil pressure would be displayed as 1 ENG OIL PRESS and a failure involving No. 2 engine oil pressure would be displayed as 2 ENG OIL PRESS

EMERGENCY PROCEDURES

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CAS WARNING MESSAGES

An active Warning message is displayed as white text on red background at the top of the CAS list, until it is acknowledged with the MWL or the CAS RST button on the collective grip. Then it changes to red text on a black background and the MWL is disactivated.

Warning messages cannot be scrolled off the CAS display area.

The Warning message remains until the cause of the warning is corrected.

The “TABLE OF CAS WARNING MESSAGES” on page 3-11, gives the Master Warning captions, the voice warnings and the corresponding failure.

WARNING PRIORITIES LOGIC

The audio tone and voice warning system priorities are as follows:

1. “ROTOR LOW“
2. “ENGINE OUT“
3. “ENGINE FIRE”
4. “ROTOR HIGH”
5. “ENGINE IDLE”
6. “WARNING“
7. “AUTOPILOT”
8. “AIRSPEED“
9. “LANDING GEAR“
10. “150 FEET“

The system logic will cause a high priority message to interleave with a lower priority message.

AURAL WARNING GENERATOR (AWG) TEST PROCEDURE

Pushing the AWG button on the TEST CONTROL PANEL has the following effects:

— Momentary push - “AURAL SYSTEM TEST” aural message is generated

— 6 second push, all messages and tones are generated in specific priority order

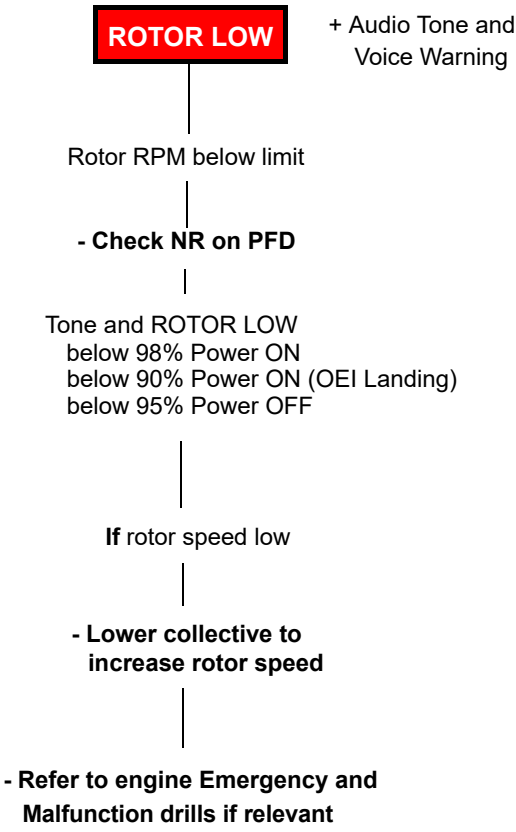
VOICE ONLY MESSAGES

1. “AIRSPEED“ — Vne speed exceeded.
2. “150 FEET” — Aircraft at less than 150 ft RAD ALT height
3. “AUTOPILOT” — Associated with any AP caution message.

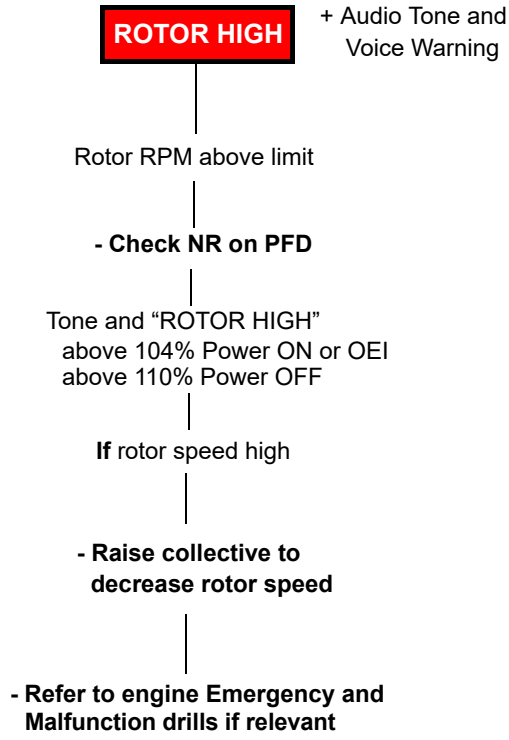
TABLE OF CAS WARNING MESSAGES

CAS Caption	Voice Warning	Audio Tone	Failure/System State
ROTOR LOW Page 3-12	ROTOR LOW	Tone	Rotor speed below 98% (Power ON AEO), Rotor speed below 90% (Power ON OEI), Rotor speed below 95% (Power OFF)
1(2) ENG OUT Page 3-14/3-35	ENGINE 1(2) OUT	Tone	Engine NG below 34.3% or NG rate of change outside predetermined limits.
1(2) ENG FIRE Page 3-25	ENGINE 1(2) FIRE	Tone	Engine bay high temperature, fire or hot gas leak
ROTOR HIGH Page 3-13	ROTOR HIGH	Tone	Rotor speed above 104% (Power ON AEO and OEI) Rotor speed above 110% (Power OFF)
1(2) ENG IDLE Page 3-15	ENGINE 1(2) IDLE	None	Associated engine in IDLE and collective being raised (Triggered on ground only)
1(2) EEC FAIL Page 3-38	WARNING	None	Automatic reversion of associated engine to manual mode
MGB OILPRESS Page 3-40	WARNING	None	Low pressure in MGB lubricating systems (less than 3.1 bar)
MGB OIL TEMP Page 3-42	WARNING	None	Overheating of MGB lubricating system (greater than 109° C)
1(2) ENG OIL PRESS Page 3-37	WARNING	None	Low oil pressure in associated engine (less than 4.2 bar)
1-2 DC GEN Page 3-49	WARNING	None	Failure of both generators
MAIN BATT HOT Page 3-53	WARNING	None	Main battery overheating
AUX BATT HOT Page 3-53	WARNING	None	Auxiliary battery overheating
BAG FIRE Page 3-28	WARNING	None	Smoke detected in baggage bay

ROTOR UNDER-SPEED



ROTOR-OVERSPEED



ENGINE OUT

1(2) ENG OUT + Audio Tone and Voice Warning

Associated engine NG less than 34.3% or rate of change outside predetermined limits

- **Adjust collective as required to maintain NR within limits**
- **Achieve safe OEI flight**

If engine at low power but still running above G.I.

- **Select ENG GOV to MANUAL control**

If manual control effective

- **Continue flight controlling engine power manually**
- **Land as soon as practicable**

If manual control ineffective

- **Carry out ENGINE SHUT DOWN IN AN EMERGENCY procedure** Page 3-35
- **Land as soon as practicable**

If affected engine has flamed out

- **Carry out ENGINE SHUT DOWN IN AN EMERGENCY procedure** Page 3-35
- **Land as soon as practicable**

Consider relight only if cause of flameout known and relight essential. For Engine Restart in Flight procedure see Page 3-89

Note

If possible the torque of the manually controlled engine should be maintained at a torque level 10% below the other engine. (If PI on either/both engines is ITT or NG limited refer to TQ on MFD PWR PLANT page)

ENGINE DRIVE SHAFT FAILURE

Rapid decrease in engine 1(2) TQ to 0 with NF1(2) above NR and/or possible **1(2) OVSPD**

NF approx 110% and/or PI 0%, drive shaft failure on affected engine

- Achieve safe OEI flight

- Carry out ENGINE SHUTDOWN IN AN EMERGENCY procedure
Page 3-35

- Land as soon as practicable

Note

Following engine drive shaft failure, NF may overspeed and reach the NF overspeed trip point (111%).

ENGINE IDLE

1(2) ENG IDLE + Voice Warning

(Warning triggered only with aircraft on ground)

Take Off commenced with associated engine at IDLE
or
Associated engine MODE switch at IDLE and collective not fully down

- Reduce collective to MPOG
- Select engine MODE switch to FLT before TAKE-OFF

ENGINE FAILURE

GENERAL

In the event of partial or complete power failure, establishing a safe flight condition is the prime consideration, until the cause of the failure can be analysed.

Care should be taken in confirming the failed engine prior to commencing engine shutdown as given in the ENGINE SHUTDOWN IN AN EMERGENCY procedure Page 3-35**.**

ENGINE FAILURE RECOGNITION

The following cues will be available to the crew following a single or multiple engine failure:

— Noticeable right sideslip (helicopter nose swinging to the left)

— Illumination of the CAS Warning 1(2) ENG OUT caption

— An audible tone and an ”ENGINE 1(2) OUT” voice warning

— The failed engine PI/torque will split significantly from the operational engine

— Dependent on collective position at the time of the failure, a drop in rotor speed (NR) may occur.

SINGLE ENGINE FAILURE

A single engine failure will result in an increase in PI/torque on the live engine. Depending on collective position and airspeed at the time of the failure, a drop in rotor speed (NR) may occur requiring a collective pitch adjustment in order to maintain rotor speed within the Power On range.

If the execution of the ENGINE FAILURE procedure has resulted in shutting down the engine, consider analyzing the cause of the failure with a view toward re-starting the engine. To attempt the re-start use the **ENGINE RESTART IN FLIGHT** procedure Page 3-89.

SINGLE ENGINE FAILURE IN HOVER (5 TO 10 FT)

1. Collective pitch — Maintain collective pitch setting or lower collective slightly if required to establish descent.
2. Touchdown — Increase collective to cushion landing as touchdown becomes imminent.
3. Landing — After touchdown, centralize cyclic and simultaneously reduce collective to minimum. Apply wheelbrakes as required.

SINGLE ENGINE FAILURE ON TAKE OFF CATEGORY B

If gross weight and flight path permit, takeoff and climb out may be continued. For a rejected take off carry out the following:

1. Collective pitch — Reduce as necessary to maintain rotor RPM if altitude permits
2. Cyclic — Make a partial flare to reduce ground speed. Limit flare to 15° when close to the ground
3. Collective pitch — Apply to cushion touchdown
4. Landing — After touchdown centralize cyclic and simultaneously reduce collective to minimum
5. Brakes — Apply wheel brakes to minimize ground roll.

SINGLE ENGINE FAILURE DURING CRUISE

1. Collective — Adjust as necessary to maintain rotor RPM and torque within limits.

2. Cyclic — Establish Safe OEI flight.

3. Collective — Re-adjust collective to minimize altitude loss by applying up to maximum OEI power.

4. Engine restart — Consider engine re-start if cause of initial failure has been determined and corrected. See **ENGINE RESTART IN FLIGHT** procedure 3-89.

5. Engine — If engine restart fails or no attempt to restart is made carry out the **ENGINE SHUTDOWN IN AN EMERGENCY** procedure 3-35.

SINGLE ENGINE LANDING CATEGORY B

1. Pre-landing checks — Establish normal approach and carry out pre-landing checks.

2. Landing direction — Orientate the aircraft for an approach into the prevailing wind.

3. Initial point — During the approach, reduce airspeed gradually to arrive at a point 200 ft (61 m) above touchdown point with a rate of descent of no more than 500 fpm. Initiate a deceleration to achieve 30 KIAS at 50 ft (15 m). At 50 ft (15 m) rotate nose up to a maximum of 20° to decelerate.

4. Collective — Continue deceleration to running touchdown or hover. Use collective to cushion touchdown. Maximum nose up attitude on touchdown 15°.

5. Landing — After touchdown, centralize cyclic and reduce collective to minimum.

6. Braking — Apply wheel brakes, as required.

DOUBLE ENGINE FAILURE

A sequential or simultaneous failure of both engines will require entry into autorotation.

ENTRY IN AUTOROTATION

Depending on collective pitch and airspeed at the time, a simultaneous engine failure will result in a large and very rapid drop in rotor speed (NR) requiring a large and rapid collective pitch adjustment in order to recover and maintain rotor speed within the Power Off range. It is imperative that these adjustment be made quickly and decisively.

If the failure occurs at considerable height above ground level (AGL), it is possible that sufficient time will be available for attempting an engine re-start (assuming that the cause of the failure can be rapidly analysed). Assuming an average autorotative sink rate of 2500 feet per minute, a minimum AGL height of 3000 to 4000 feet would be required to provide sufficient time to complete the re-start procedures.

If time and conditions permits and no attempt to restart is made, carry out the **ENGINE SHUTDOWN IN AN EMERGENCY** procedure Page 3-35 while the helicopter is manoeuvred toward the landing area.

If sufficient additional time is available to make an engine re-start feasible, use the **ENGINE RESTART IN FLIGHT** procedure Page 3-89.
If ENG 2 is to be started first the BUS TIE switch must be selected to ON.

AUTOROTATIVE LANDING PROCEDURE ON LAND

The procedure which follows outlines the steps required to execute a successful autorotation landing, time permitting, consult the appropriate Emergency Procedure for the additional steps required to deal with a specific type failure.

1. Collective pitch	— Smoothly and rapidly reduce to enter autorotation.
2. Cyclic	— Adjust to obtain autorotation at between 80 KIAS (minimum rate of descent speed) and 100 KIAS (Best range speed).
3. Collective pitch	— Adjust to obtain up to 110% NR.
4. Landing gear	— Extend.
5. Landing site	— Select and manoeuvre into wind.
6. Brief	— Cabin crew and occupants.
7. Radar altimeter	— Verify working.
8. Distress procedure	— Broadcast Mayday (time permitting).
9. Shutdown	— If appropriate and time available carry out **EMERGENCY/ POST CRASH SHUTDOWN** procedure Page 3-36.
10. Cyclic	— At approximately 200 ft (61 m) AGL, initiate a cyclic flare to a maximum 30° nose-up angle.

11. Collective pitch	— Adjust, as required, to maintain NR at 110% maximum during the flare.
12. Cyclic /Collective pitch	— At approximately 35 ft (15 m) AGL, reduce pitch attitude to 10° nose-up and apply collective pitch, as required, to achieve touchdown at approximately 300 feet per minute (fpm) or less.
13. Touchdown speed	— As required by surface characteristics. (Maximum touchdown speed 60 kts on paved surface and 40 kts on grass surface).
14. Collective pitch	— Following touchdown, lower promptly to conserve the remaining rotor speed.
15. Wheel brakes	— Apply as required (land only).
16. Shutdown	— If not carried out previously, execute the **EMERGENCY/ POST CRASH SHUTDOWN** procedure Page 3-36.
17. Evacuate	— Evacuate the aircraft as soon as possible.

AUTOROTATIVE LANDING PROCEDURE ON WATER

The procedure which follows outlines the fundamental steps required to execute a successful ditching. Time permitting, consult the appropriate Emergency procedure for the additional steps required to deal with the specific type failure that prompted the decision to proceed with the ditching process.

WARNING

As considerable error can result from estimation of height over water, the radar altimeter should be used for height cues during descent.

CAUTION

At high touchdown speeds, the rotorcraft may roll and turn to the left after touchdown due to gyroscopic effects if the aircraft is allowed to pitch down rapidly. This will require pilot corrective action.

1. Collective pitch — Smoothly and rapidly reduce to enter autorotation.
2. Cyclic — Adjust to obtain autorotation speed between 80 KIAS (minimum rate of descent speed) and 100 KIAS (Best range speed).
3. Collective pitch — Adjust to obtain up to 110% NR.
4. Landing gear — Confirm UP.

CAUTION

If the landing gear cannot be retracted, ditching with minimum forward speed is recommended.

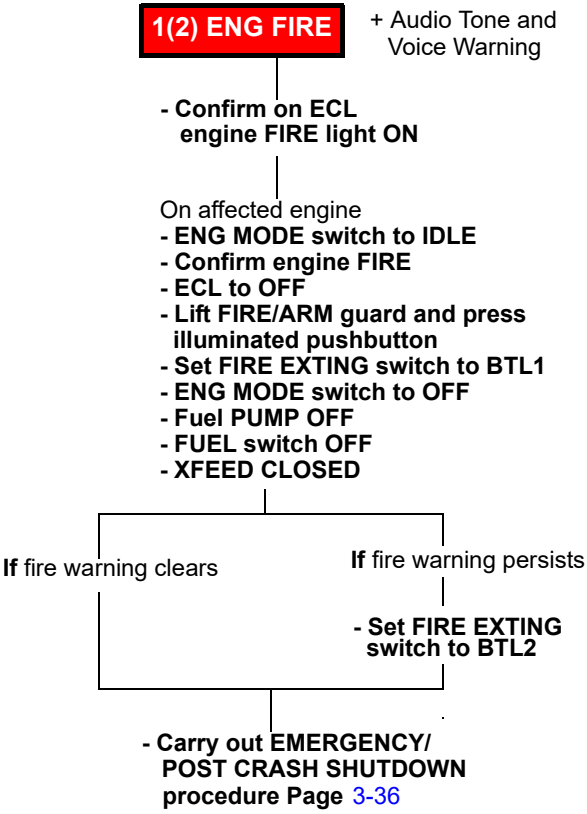
5. Landing direction — Select and manoeuvre into wind.
6. Brief — Cabin crew and occupants.

7. Radar altimeter	— Verify working.
8. Windscreen wipers	— Select FAST.
9. Distress procedure	— Broadcast Mayday (time permitting).
10. Shutdown	— If appropriate and time available carry out **EMERGENCY/ POST CRASH SHUTDOWN** procedure Page 3-36.
11. Flare	— At approximately 200 ft (61 m) AGL, initiate a cyclic flare to a maximum 30° nose-up angle.
12. Collective pitch	— Adjust, as required, to maintain NR at 110% maximum during the flare.
13. Cyclic/Collective pitch	— At approximately 35 ft (15 m) AGL, reduce pitch attitude to 10° nose-up and apply collective pitch, as required, to achieve touchdown at approximately 300 feet per minute (fpm) or less.
14. Waves	— Dependent on sea state, approach into oncoming waves, if possible.
15. Touchdown speed	— Not exceeding 30 kts.
16. Collective pitch	— Following touchdown, lower promptly.
17. Shutdown	— If not carried out previously, execute the **EMERGENCY/ POST CRASH SHUTDOWN** procedure Page 3-36.
18. Evacuation	— Evacuate the aircraft, with survival equipment.

FIRE

In the event of smoke or fire, prepare to land the aircraft without delay while completing the applicable emergency provedures.

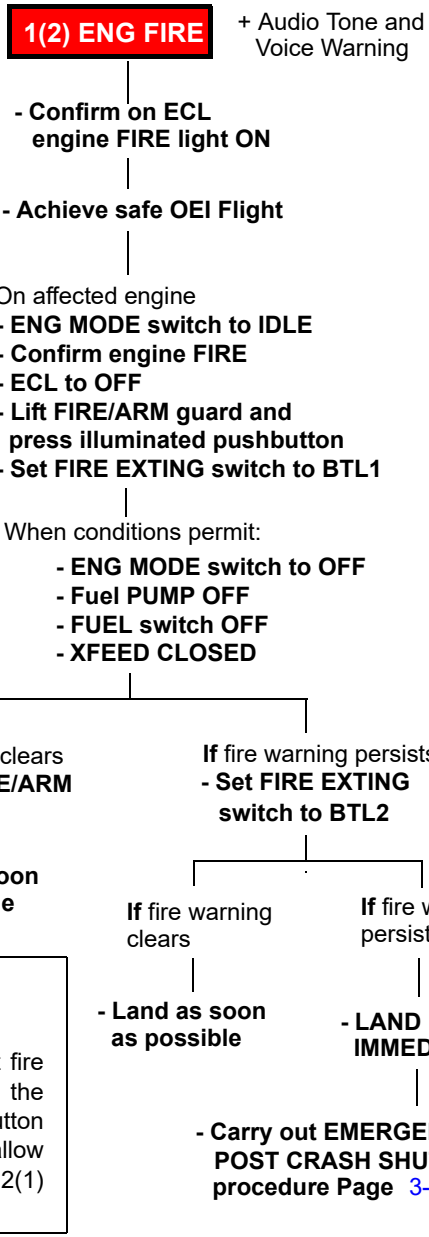
ENGINE BAY FIRE (GROUND)



CAUTION

In case of a subsequent fire in the other engine bay the initial ARM 1(2) pushbutton must be deselected to allow operation of the ARM 2(1) pushbutton.

ENGINE BAY FIRE (FLIGHT)



CAUTION

In case of a subsequent fire in the other engine bay the initial ARM 1(2) pushbutton must be deselected to allow operation of the ARM 2(1) pushbutton.

ENGINE BAY FIRE (FLIGHT) CONTINUED

Note

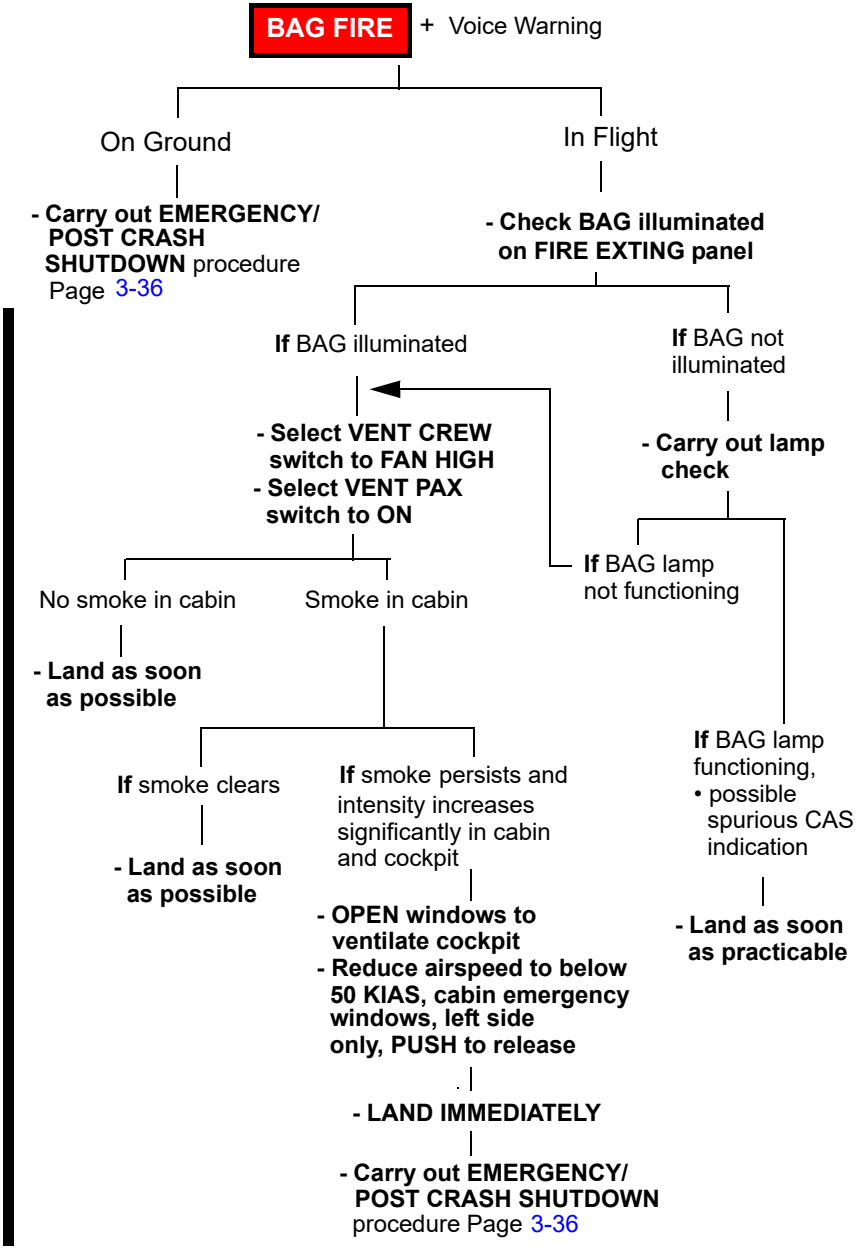
When XFEED is CLOSED the affected engine fuel tank will have a maximum of 228 kg of unusable fuel. If essential, and the pilot is sure the engine fire has been contained, the unusable fuel can be made available by XFEED to OPEN and fuel PUMP ON.

ENGINE EXHAUST FIRE AFTER SHUTDOWN

If there are visible signs of fire in the engine exhaust, possibly accompanied by a rising ITT after shutdown, personnel should not be allowed to exit until the following actions have been carried out:

1. Fire warnings — Confirm not illuminated.
2. ENG GOV switch — Set MAN.
3. ENGINE IGN circuit breaker (Ringed in WHITE on CB panel) — Out.(Overhead CB panel)
4. BUS TIE switch — Select ON (for ENG 2 only).
5. ECL — OFF.
6. ECL starter pushbutton — Push.
7. Gas generator (NG) — Note increasing.
8. ECL starter pushbutton — Push to stop when ITT decrease is noted (not more than 45 seconds. Starter Duty Cycle must be respected).
9. Rotors stopped — Evacuate aircraft.

BAGGAGE BAY FIRE



COCKPIT / CABIN FIRE (GROUND)

No single set of detailed procedures can address all the fire scenarios that are possible. The most urgent action is to get the aircraft shut down and evacuated immediately.

FIRE in cockpit or cabin

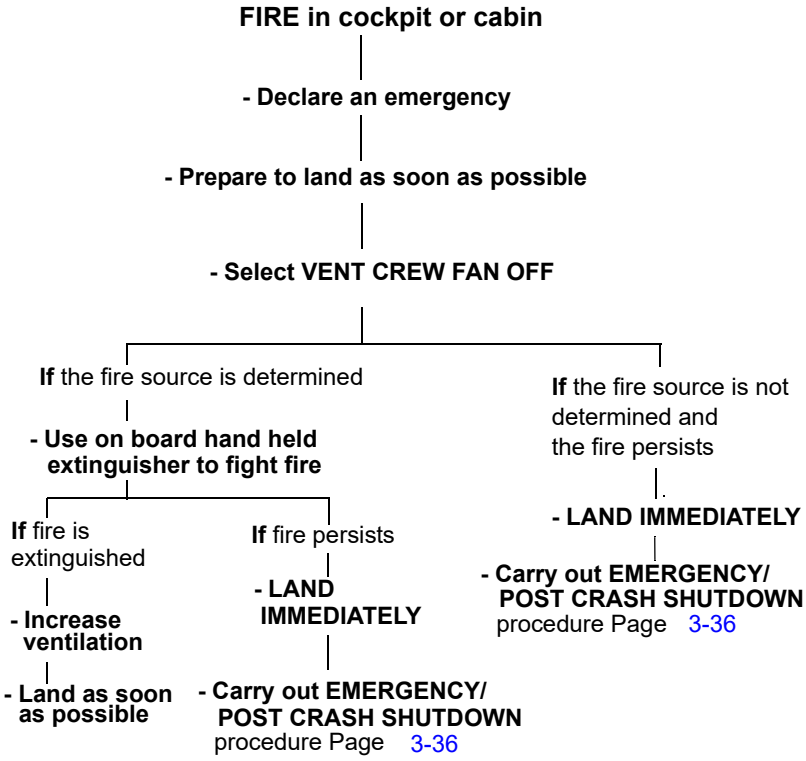
- Declare an emergency

- Carry out EMERGENCY/ POST CRASH SHUTDOWN procedure Page 3-36

- Evacuate aircraft at the earliest opportunity

COCKPIT / CABIN FIRE (FLIGHT)

An in-flight fire has no single set of detailed procedures that can address all the fire scenarios that are possible in flight. The most urgent action is to get the aircraft on the ground as soon as possible with a reasonable degree of safety.



CAUTION

If the fire is not completely extinguished, increased ventilation may aggravate the problem.

ELECTRICAL FIRE/SMOKE (GROUND)

An electrical fire is indicated by a smell of burning insulation and/or acrid smoke. If fire occurs:

Carry out **EMERGENCY/POST CRASH SHUTDOWN** procedure. Page 3-36.

ELECTRICAL FIRE/SMOKE (FLIGHT)

Electrical fires are often indicated by a smell of burning insulation and/or acrid smoke. The most important consideration is to maintain safe flight conditions while investigating the cause. Unnecessary electrical equipment must be switched off while detecting the source of an electrical fire. Unless the source of the smoke or fire can be positively identified (CAS display or C/B panel) and the equipment electrically isolated, carry out procedure detailed on next page.

ELECTRICAL FIRE/SMOKE PROCEDURE (FLIGHT)

- Reduce speed, recommended Vy
- OPEN windows to ventilate cockpit
If operational conditions permit
- Land as soon as possible

- Right pilot select on-side radio/com (N°2)
- Switch pilot UTILITY light ON (for night operation)
- Set MFD to PWR PLANT page to monitor continuously ESS BUS 2 voltage during the complete procedure
- Switch GEN 1 & GEN 2 OFF
- Switch BATTERY MAIN OFF
(Loss of NON-ESS BUS 1 & 2, MAIN 1 & 2)

Note

AP2 and ATT will remain engaged, but relevant green lights on autopilot control panel will be OFF.

WARNING

Actions on the right hand column should be carried out immediately (if smoke clears or not) whenever ESS BUS 2 voltage drops below 22V (yellow range) or fluctuates.

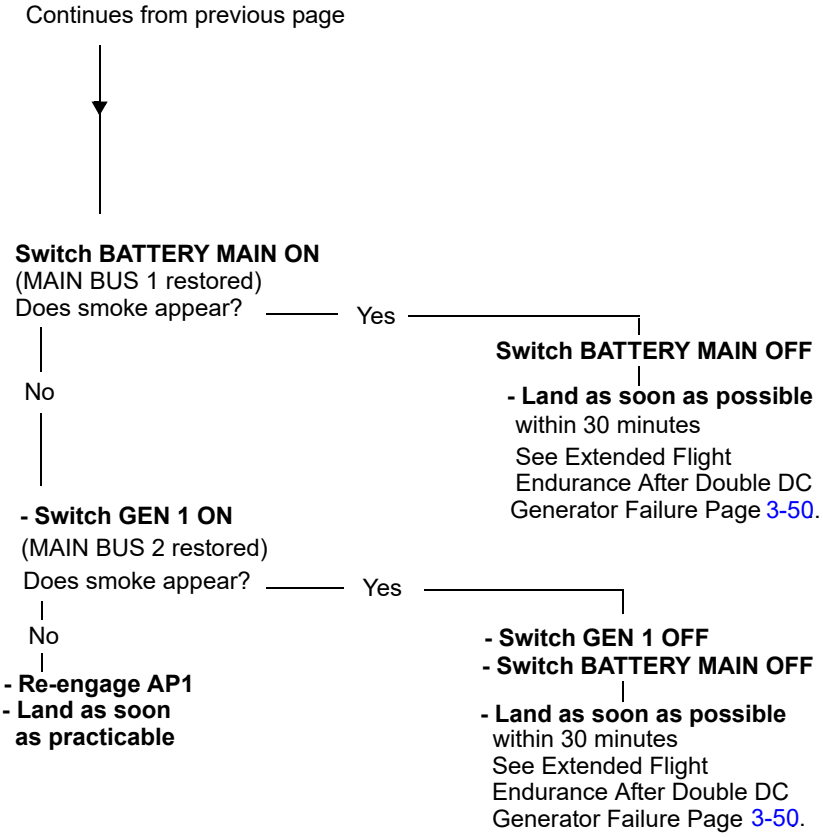
Smoke clears?

Smoke does not clear?

- Switch GEN 1 & 2 ON
- Switch BATTERY MASTER OFF
- Switch BATTERY AUX OFF
- Re-engage AP1
If smoke clears
- Land as soon as practicable
If smoke does not clear
- Land as soon as possible
If smoke and/or fire severe
- LAND IMMEDIATELY
- Carry out EMERGENCY/POST CRASH SHUTDOWN procedure Page 3-36

Procedure continues on next page

ELECTRICAL FIRE/SMOKE PROCEDURE (FLIGHT) Cont.



WHEEL BRAKE FIRE

On Ground

When aircraft is stationary:

1. Shutdown — Carry out **EMERGENCY/POST CRASH SHUTDOWN** procedure Page 3-36.

In Flight

1. Landing gear — Extend.
2. Aircraft — Land as soon as possible.

When aircraft is stationary on the ground:

3. Shutdown — Carry out **EMERGENCY/POST CRASH SHUTDOWN** procedure Page 3-36.

CAUTION

Use of pedal brakes or parking brake may aggravate the fire.

Note

Consider using one of the cabin hand fire extinguishers or other available extinguishers to extinguish the fire.

ENGINE SHUTDOWN IN EMERGENCY

CAUTION

Care should be taken in confirming the failed engine prior to commencing this shutdown procedure.

CAUTION

If there is evidence of combustion after engine shutdown in flight, carry out a dry motoring procedure Page 2-19, as required to extinguish any possible fire.

Following an engine failure/malfunction, establish a safe OEI flight condition. On the failed engine, carry out the following shut down procedures:

1. ENG Mode switch — OFF.

   If engine does not shut down then:

   ECL — OFF.

2. FUEL PUMP switch — OFF, unless required for crossfeed.

3. ENG FUEL switch — OFF, fuel valve indicator horizontal.

4. Fuel contents — Monitor, use crossfeed as required.

EMERGENCY/POST CRASH SHUTDOWN

In the event of an emergency or crash landing, priority must be given to ensuring that personnel are evacuated safely at the most appropriate time. Every effort should be made to carry out the following shutdown procedures immediately:

1. ENG MODE 1 & 2 switches — OFF.

   If engine does not shut down then:

   ECL 1 & 2 — OFF.

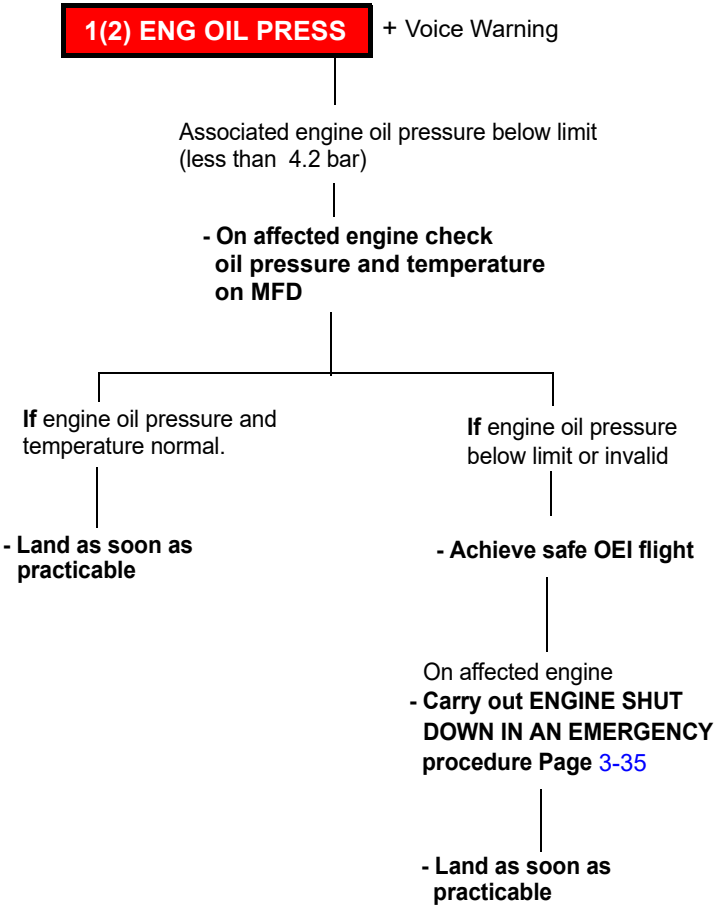
2. FUEL PUMP 1 & 2 switches — OFF.
3. ENG FUEL 1 & 2 switches — OFF.
4. ENG 1 & 2 FIRE ARM pushbuttons — Lift guard and press appropriate pushbutton, if required.
5. ENG EXTING switch — Select BTL 1 and/or 2, if required.

When rotor stopped.

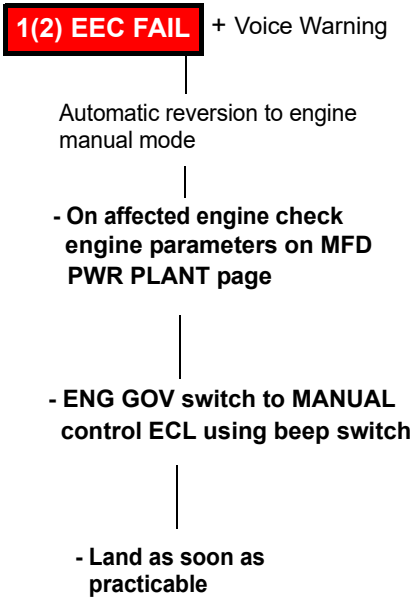
6. GEN 1 & 2 and BATT MASTER switches — OFF (using gang-bar).

ENGINE SYSTEMS

ENGINE OIL PRESSURE LOW



ENGINE EEC FAIL



Note

If possible the torque of the manually controlled engine should be set at a torque level 10% below the other engine. (If PI on either/both engines is ITT or NG limited refer TQ on MFD PWR PLANT page)

TRANSMISSION SYSTEM FAILURES

The most common transmission system (main, intermediate, tailrotor gearbox) failures are of three general types:

— Lubrication system failure (oil pump, ducts, nozzles etc)

— Transmission component failure (gears, bearings, etc)

— Accessory component failure (hydraulic pumps, electrical generators, coolers etc).

The transmissions are monitored with chip detectors, oil pressure and/or oil temperature indicators as well as CAS Warning and Caution messages to inform the pilot of the operating condition of the system. It is probable that one or more of these indications will be present if a mechanical transmission failure is imminent. However, whether these indications are present or not, crew sensory perceptions such as:

— abnormal mechanical noise and/or

— heavy vibration levels and/or

— the odour of hot metal fumes.

all play an important part in diagnosis of impending transmission system failures and assist the pilot in determining what actions are required.

MAIN GEARBOX

OIL PRESSURE LOW

MGB OIL PRESS + Voice Warning

Oil pressure below limits at one or both engine MGB inputs and in MGB oil system. (less than 3.1 bar)

- Check MGB oil pressure on MFD

If oil pressure normal

- Land as soon as practicable

If oil pressure permanently above 1.2 bar (possible single pump failure See Note 1)

- Recommended maximum TQ 70%

- Monitor MGB oil pressure on MFD

- Land as soon as practicable

If oil pressure below 1.2 bar, invalid and/or

1-2 BRG TEMP caution illuminates

- Reduce speed to V_Y

- Land as soon as possible

Note 1

The most likely cause of oil pressure low but remaining above 1.2 bar permanently is a failure of one of the two MGB pumps. Lubrication is provided by the remaining pump to allow continued flight.

Note

If MGB CHIP MAST or MGB CHIP SUMP cautions illuminate when MGB OIL PRESS warning is illuminated the CHIP BURNER must not be activated

OIL PRESSURE LOW (CONTINUED)

Note

- It is acceptable for the MGB OIL PRESS warning to illuminate at GI providing the indicated pressure is above 2 BAR and, at FLT (100%NR), the warning is not illuminated.
- It is acceptable for the MGB OIL PRESS warning to illuminate transiently when accelerating from GI to FLT providing the warning is not illuminated at 100%NR.

OIL TEMPERATURE HIGH

MGB OIL TEMP + Voice Warning

MGB oil temperature above limit (greater than 109 °C)

- Check MGB oil temperature and pressure on MFD

If oil temperature normal

- Continue flight monitoring oil pressure and temperature

If oil temperature high or invalid

- Reduce power (70% TQ max) as soon as operational conditions permit
- Achieve level flight between 90 KIAS and 140 KIAS.

Note

The higher speed is recommended, if possible.

If oil temperature 150 °C or below and MGB oil pressure normal

- Land as soon as practicable

If oil temperature above 150 °C or invalid

- Land as soon as possible

Note

The most probable cause of MGB oil temperature high is a failure of the cooler fan, which is likely to be associated with an abnormal noise from the upper deck.

Note

Once oil temperature exceeds 150 °C the indication changes to '--' .

Note

Oil pressure typically decreases as the oil temperature increases.

MAIN ROTOR CONTROLS BINDING

WARNING

If a binding occurs in the aircraft main rotor control circuit, depending on the severity of the binding, greater forces will be required to operate the controls. A reduction in the available control ranges may result and, in this situation, the low speed flight envelope may be restricted.

If the airspeed is more than 25 KIAS, the aircraft should be landed into the wind as soon as possible using a running landing procedure and a touchdown speed of 25 KIAS.

If the airspeed is less than 25 KIAS, carry out a running landing at the speed at which the binding occurs. If the aircraft is in a hover, land vertically.

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TAIL ROTOR SYSTEM FAILURES

YAW CONTROL DIAGNOSTICS

PEDAL CHARACTERISTICS	POSSIBLE CAUSE	AIRCRAFT MOTION
Free But Ineffective	**TAIL ROTOR DRIVE FAILURE** **TAIL ROTOR CONTROL CIRCUIT FAILURE** Disconnect between pedals and tail rotor servo	Rapid yaw to the right Direction of Yaw depends on airspeed / torque
Partially Effective (Perhaps effective in one direction only or with considerable backlash)	**TAIL ROTOR CONTROL CIRCUIT FAILURE** Disconnect between tail rotor servo output and tail rotor or mechanical disconnect of AFCS Yaw Series Actuator	Direction of Yaw depends on airspeed / torque
Seized (Excessive force required to move pedals)	**TAIL ROTOR CONTROL BINDING**	Aircraft yaws right when raising collective. Aircraft yaws left when lowering collective

TAIL ROTOR DRIVE FAILURE

A tail rotor drive failure will result in a rapid yaw to the right and a loss of yaw control, possibly accompanied by noise or vibration in the tail section. The severity of the initial yaw rate will be determined by the airspeed, altitude, gross weight, center of gravity and torque settings at the time that the failure occurs. The effectiveness of the vertical fin in limiting the yaw rate and yaw angle will depend on the airspeed at the time of the failure, fin effectiveness increasing at higher airspeeds.

The following cues will be present:

— Aircraft yaws rapidly to the right

— Loss of yaw control, pedals free but ineffective

— Possible noise and vibration from the aft fuselage area.

Severe yaw rates will result in large yaw angles within a very short period of time and, depending on the flight conditions at the time of failure, it is possible that yaw angles in excess of 30° will be experienced.

Additionally, very high yaw rates will produce aircraft pitching and rolling making retention of control difficult without the use of large cyclic inputs, which are structurally undesirable. Finally, very high yaw rates will produce disorienting effects on the pilots. Therefore, it is vital that corrective action, as outlined in the following procedures, be taken quickly to prevent post-failure yaw rates from reaching unacceptably high levels.

Failure Cues:

In Hover

— Lower collective to LAND IMMEDIATELY while maintaining attitude and minimizing lateral translation with the cyclic control.

— Retard ENG MODE switch (or ECL's) to OFF if time available.

In Forward Flight

— Lower collective immediately to minimize yaw right

— Establish an airspeed/power/roll angle sufficient to reach a suitable landing site.

— At landing site assess running landing capability.

— If a running landing cannot be carried out with a suitable power and speed, shutdown engines.

— Carry Out Engine Off Landing.

Note

- Land into wind
- Raising or Lowering the collective while maintaining NR within limits may be effective in helping control sideslip. (Increasing collective, nose left)

TAIL ROTOR CONTROL SYSTEM FAILURE

In the event of mechanical failure between tail rotor pedals and tail rotor servo or failure between the tail rotor servo output and the tail rotor, natural aerodynamic forces will cause the tail rotor blades to “float” to a pitch angle of approximately zero thrust, depending on the flight condition at time of failure.

Failure Cues:

— Aircraft Yaws Left or Right

— Loss of Yaw Control, pedals free but ineffective or free and partially effective.

In Low Hover

— Lower collective to LAND IMMEDIATELY while maintaining attitude and minimizing lateral translation with the cyclic control.

If rapid yaw right develops

— Retard ENG MODE switches (or ECL’s) to OFF if time available.

In Forward Flight / High Hover

— Attempt to determine a combination of speed and power to minimize the yaw

— Carry out the following to diagnose the failure:

• Gently and progressively apply left pedal to assess whether the aircraft responds in that direction. Pedal needs to be pushed until a positive response is obtained (it may be necessary to reach full displacement if no response is obtained)

•If aircraft does not respond to the left, consideration should be given before assessing controllability to the right as this may worsen the situation. Gently and progressively apply right pedal to assess whether the aircraft responds in that direction. Pedal needs to be pushed until a positive response is obtained (it may be necessary to reach full displacement if no response is obtained).

If the aircraft does not respond OR responds to right pedal but not to left pedal	If the aircraft does respond to both pedal inputs but is slow to respond, with noticeable backlash
Tail Rotor Pitch set to *zero* thrust **- Set up a rate of descent to align the aircraft nose to the flight path.** **- Reduce speed approaching the touchdown point; a yaw to the right may start to develop. In this case a low speed rotating landing will be required.** **- When the aircraft is rotating at low level, retard ENG MODE switched (or ECL's) to OFF and cushion the final touch down.**	Mechanical disconnect of the AFCS yaw series actuators. The remaining tail rotor pitch available is such that an IGE hover could be possible. However, depending upon the weight, altitude and wind, a power on running landing may be carried out.
Note Wind from the front **Left** quadrant of the a/c may be beneficial.	

TAIL ROTOR CONTROL BINDING

A tail rotor pitch control system binding may be due to a binding in the control linkage to the tail rotor.

Tail rotor pitch control binding is characterized either by a lack of directional response, when a pedal is pushed, or by a locked pedal. If pedals cannot be moved with a moderate amount of force, DO NOT ATTEMPT TO APPLY MAXIMUM EFFORT, since a more serious malfunction could result. The resultant fixed tail rotor pitch will require the selection of a combination of power, airspeed and sideslip in order to maintain controlled, fixed heading flight.

Failure Cues:

— Pedals seized or require excessive force

— Aircraft yaws Left or Right in response to collective changes.

In Low Hover

— Lower collective to LAND IMMEDIATELY while maintaining attitude and minimizing lateral translation with the cyclic control.

Note

- Do not retard ECLs unless a severe right yaw occurs. If tail rotor control binds while hovering, landing can be accomplished with greater safety under controlled, powered flight rather than by shutting down engines and entering autorotation.

In Forward Flight / High Hover

If power is increased from the power level at the time of failure, the aircraft will yaw to the right. If power is decreased, the aircraft will yaw to the left.

— Attempt to determine a combination of speed and power to minimize the yaw.

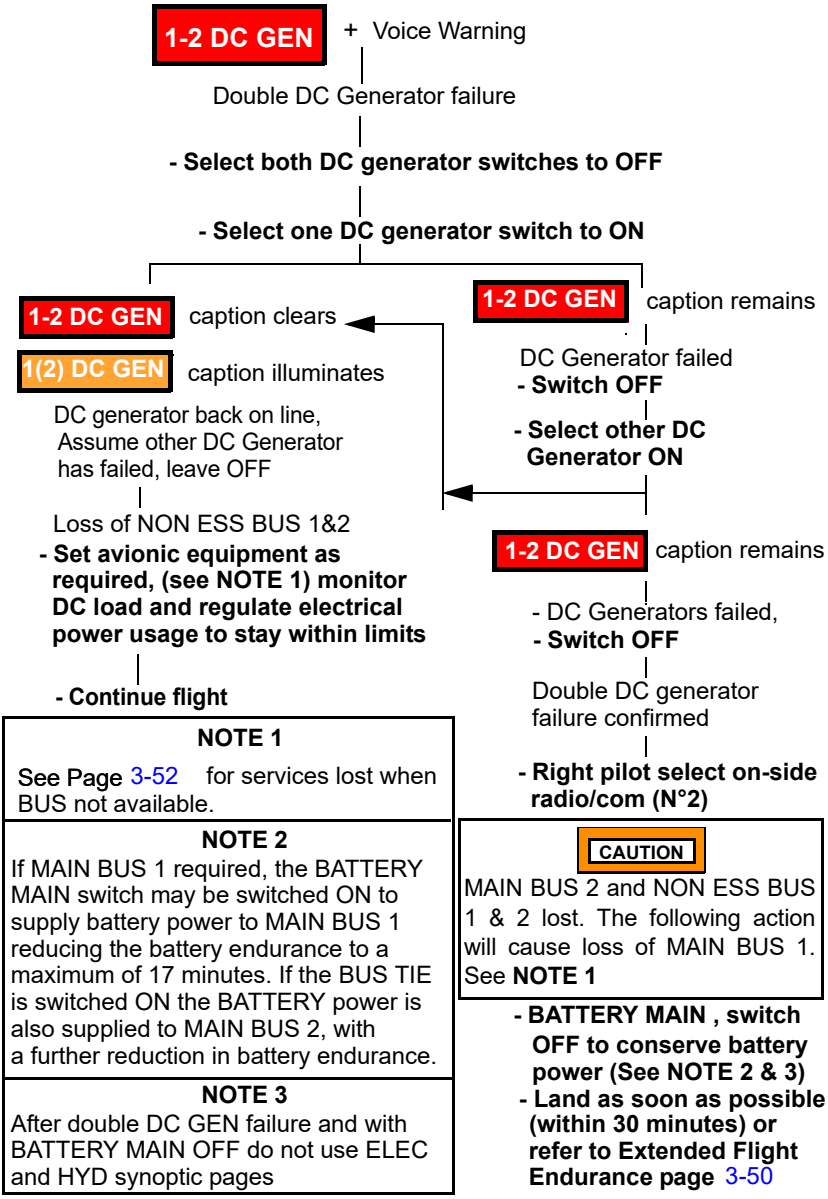
If binding occurred in high power climb or high hover (High Tail Rotor Thrust)	If binding occurred in high power cruise (Moderate Tail Rotor Thrust)	If binding occurred in descent or low power cruise. (Low Tail Rotor Thrust)
- Carry out a high power, low speed approach, keeping the nose to the left. **- Carry out a power-on landing using a speed / power combination which will keep the aircraft nose aligned.** **- On touch down, reduce collective and select ENG MODE switches (or ECLs) to OFF.**	**- During the approach keep the nose to the left.** **- Carry out running landing at an airspeed of approximately 20 knots, raising the collective to straighten the nose.** **- As aircraft touches down, ENG MODE switches (or ECLs) to OFF while slowly lowering the collective.**	**- Set up a rate of descent to align the aircraft nose to the flight path.** **- Reduce speed approaching the touchdown point; a yaw to the right may start to develop. In this case a low speed yawing landing will be required.** **- When the aircraft is yawing at low level, select ENG MODE switches (or ECLs) to OFF and cushion the final touch down.**
Note Wind from the front **Right** quadrant of the a/c will be beneficial.		**Note** Wind from the front **Left** quadrant of the a/c will be beneficial.

CAUTION

Premature reduction of airspeed to low values may result in loss of directional control when increasing collective.

ELECTRICAL SYSTEM

DOUBLE DC GENERATOR FAILURE



NOTE 1

See Page 3-52 for services lost when BUS not available.

NOTE 2

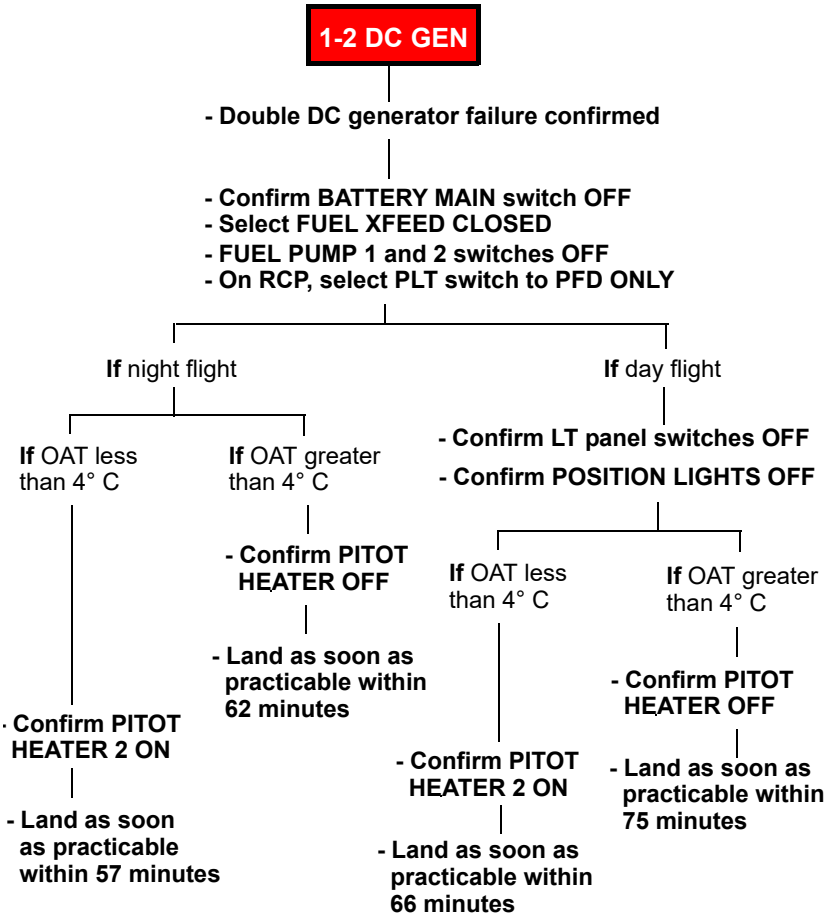
If MAIN BUS 1 required, the BATTERY MAIN switch may be switched ON to supply battery power to MAIN BUS 1 reducing the battery endurance to a maximum of 17 minutes. If the BUS TIE is switched ON the BATTERY power is also supplied to MAIN BUS 2, with a further reduction in battery endurance.

NOTE 3

After double DC GEN failure and with BATTERY MAIN OFF do not use ELEC and HYD synoptic pages

EXTENDED FLIGHT ENDURANCE AFTER DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC Generator Failure procedure has been followed and a double DC generator failure is confirmed.



Note

The battery endurance reported above assumes the pilot operates the VHF2 radio system in transmission for a maximum of 1 minute every 15 minutes.

Note

The LDG LT can be turned on for 3 minutes before landing.

SERVICES AVAILABLE ON ESSENTIAL BUS 1 AND 2

DC ESS BUS 1

BAGGAGE FIRE DETECT
BUS CONTROL 1
EAPS 1
EEC 1
EEC 1 FAIL INDICATION
EMERG LIGHT
EMERG FLOAT CONTROL (MANUAL)
EMERG FLOAT POWER
ENG 1 FIRE DETECTION
ENG 1 FIRE EXTINGUISHER
ENG 1 IGNITER & START
FCU 1
FDR/CVR
FUEL PUMP 1
FUEL SHUT OFF VALVE 1
FORCE TRIM
GCU 2
ENG GOV CONTROL
HYD SYS 1 & SOV 1&2
ICS PLT (PLT ICS IN BKUP MODE)
LANDING LIGHT CONTROL
LANDING LIGHT POWER
LDG GEAR CONTROL
LDG GEAR INDICATION
MAIN BATT CHARGE
MAU 2 (PRI POWER)
MRC 1 (VHF 1)
MRC 2 (XPDR)
NLG STEERING LOCK
PLT MFD
STBY 1 ATT
TAIL POS LIGHT
TRANS CHIP BURNER

DC ESS BUS 2

ADM 2
AUTO FLOAT CONTROL
AUX BATT CHARGE
BUS CONTROL 2
CARGO HOOK EMERG RELEASE
CLOCK PLT
COCKPIT PLT LIGHT
EAPS 2
EEC2
EEC 2 FAIL INDICATION
ELT
ENG 2 FIRE DETECTION
ENG 2 FIRE EXTINGUISHER
ENG 2 IGNITER & START
EXT SPKR CONTROL
FADEC GSE
FCU 2
FUEL PUMP 2
FUEL SHUT OFF VALVE 2
FUEL X FEED
GCU 1
HOIST CUTTER 2
HOIST ICS OPERATOR
HYD SYS 2
INSTRUMENT PANEL ILLUM.
LDG GEAR EMERG DOWN
LINEAR ACTUATOR 2
MAU 2 (AUX POWER)
MRC 2 (NIM2, VHF2, NAV2)
PFD PLT CONTROL
PITOT 2 FAIL INDICATION
PITOT 2 HEAT
PLT PFD
RTR BRK

SERVICES LOST DURING BUS FAILURES

DC MAIN BUS 1

ADM 1
ANTI-COLL LIGHT
CARGO HOOK RELEASE
CLOCK CPLT
COCKPIT CPLT LIGHT
CPLT ICS
(CPLT ICS in back up mode)
CPLT PFD
CSL ILLUM
FD1
HOIST POWER
HOIST CUTTER 1
HOIST CONTROL
HUMS
HYD ELEC PUMP
LINEAR ACTUATOR 1
MAU1 (PRI POWER)
MCDU PLT
MRC 1 (NIM 1, NAV 1)
OVHD PANEL ILLUM
PA
PFD CPLT CONTROL
PITOT 1 FAIL INDICATION
PITOT HEAT 1
RAD ALT 1
UTIL POWER
W/RADAR
XMSN OIL LEVEL SENSOR

DC MAIN BUS 2

AUTO TRIM
BAGGAGE COMPT LIGHT
CABIN LIGHT
COCKPIT/CABIN HEATER
COCKPIT VENT (PLT)
CPLT MFD
DOME LIGHT
FD2
HOIST LIGHT
MAU 1 (AUX POWER)
MCDU CPLT
MRC 2 (ADF & DME)
PLT W/WIPER
PSU
RAD ALT 2
SEARCH LIGHT CONTROL
SEARCH LIGHT POWER
STORM LIGHT
SUN LIGHT CONTROL
VENT CONTROL 2
V/UHF

DC NON ESS BUS 1

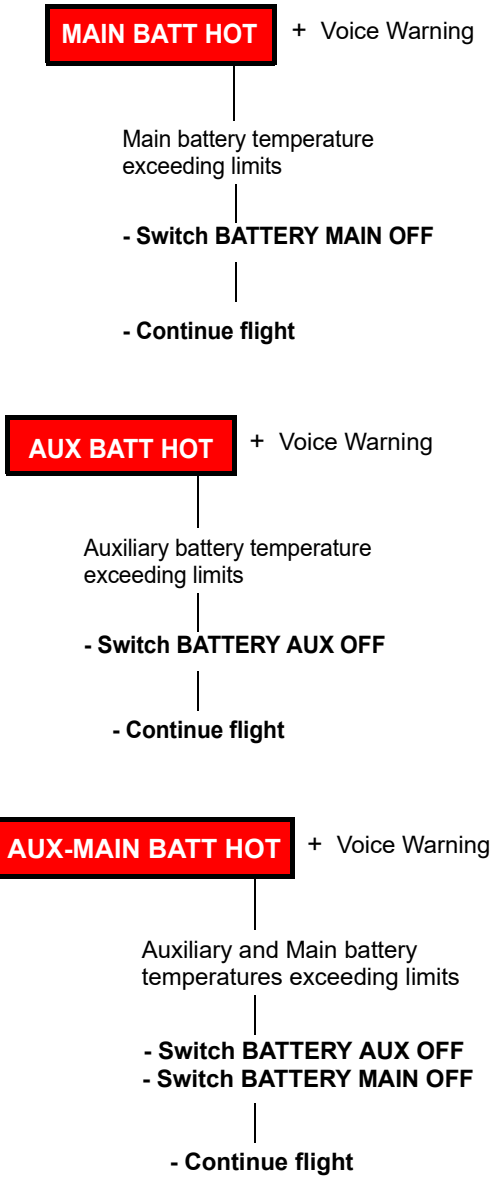
CABIN VENT
COCKPIT VENT (CPLT)
CPLT W/WIPE
ECS (COCKPIT)
FUEL DRAIN VALVE
STEP LIGHT
NOSE BAY FAN 1*

DC NON ESS BUS 2

ECS (CABIN)
EXT/SPKR POWER
NOSE BAY FAN 2*

* NOSE BAY FANS for Long Nose Variant only (function on ground only).

MAIN AND AUXILIARY BATTERY HOT



LANDING GEAR

LANDING GEAR FAILS TO LOCK DOWN

If, after selecting the landing gear DOWN any indicators remain blank or amber, carry out the following:

- **Press LAMP TEST, confirm indicator lights functioning**
- **Reduce airspeed to less than 120 KIAS**
- **Check LDG GEAR NORM pressure (MFD Hydraulic synoptic page)**

If pressure low (amber box)

- **EMER DOWN pushbutton lift guard and press**

If all indicators illuminate green (down and locked)

- **Continue to land**

If any indicators remain blank or amber

- **Attempt to confirm if landing gear is down**

If pressure normal (green box)

- **Carry out the following actions, confirming landing gear indications, after each action:**
- **Check LDG GEAR circuit breakers IN (2)**
- **Cycle LDG GEAR lever, (maximum three times)**
- **EMER DOWN pushbutton lift guard and press**

If all indicators illuminate green (down and locked)

- **Continue to land**

WARNING

If any indicators remain blank or amber (undercarriage not locked down) then the hydraulic pressure in EMER DOWN is sufficient to keep undercarriage extended when rotor speed is above 20% NR. Below 20% NR the landing gear not locked down may collapse.

- **Continue to land**
- **Land vertically on flat hard surface**
- **Do not taxi**

- **Consider evacuating aircraft, supporting aircraft or landing on suitable soft surface prior to shutting down rotor.**

LANDING GEAR FAILS TO LOCK DOWN (CONT)

Note

When the undercarriage has been extended using the EMER DOWN then subsequent retraction is not possible.

Note

When the undercarriage has been extended using the EMER DOWN then, after landing, if taxiing is required the EMER DOWN pushbutton must be de-selected to permit the NOSE WHEEL steering to be unlocked.

Note

For OAT of -30° C and below the undercarriage extension time may double.

LIGHTNING STRIKE

If it is suspected that the rotorcraft has been struck by lightning, verify the state of the following systems for unintended change and confirm their functionality:

— barometric setting and displayed altitude

— selected altitude

— selected navigational aid

— selected course

— selected heading

— selected decision height

— selected radio frequencies (including radio comms transmission check).

STATIC PORT OBSTRUCTION

If erratic readings from the airspeed indicator and altimeter occur, with the STATIC source switch in NORMAL position, proceed as follows:

1. Storm window and vents — Closed.
2. COND/HEATER (if installed) — OFF.
3. STATIC source switch — Remove the guard and select ALTERNATE.
4. Proceed with flight.

This procedure selects an alternate static source utilizing cabin air.

CAUTION

When utilizing the alternate static source, decrease the altimeter reading by 200 ft (61 m).

EMERGENCY EXITS

Figure 3-3, Figure 3-4 and Figure 3-5 show the positions of the aircraft entrances and exits.

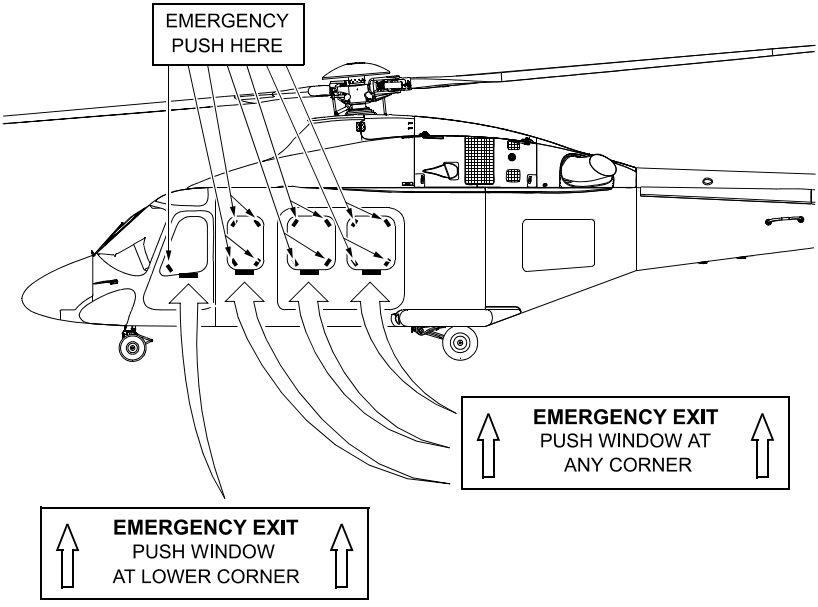


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Figure 3-3 External Markings and Placards

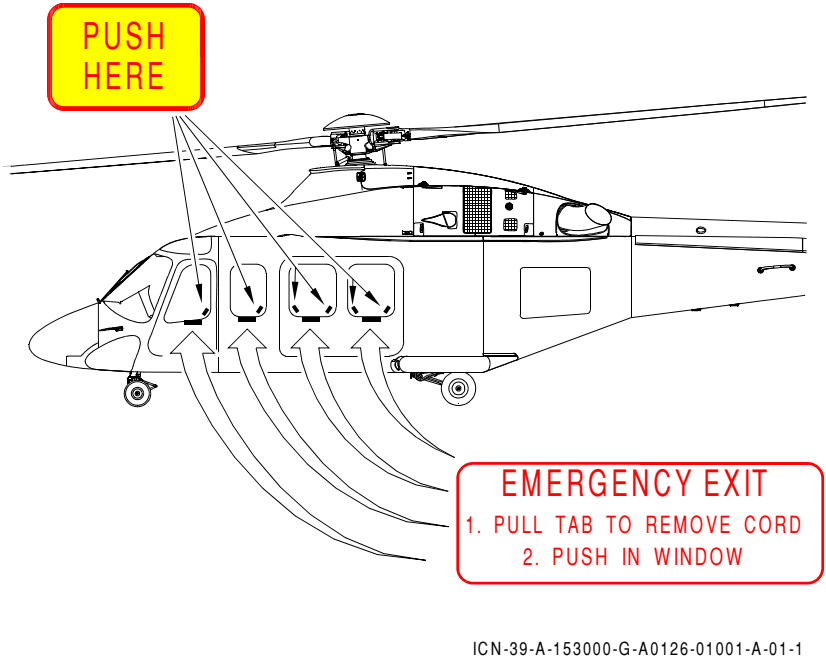

Figure 3-3A Alternative External Markings and Placards

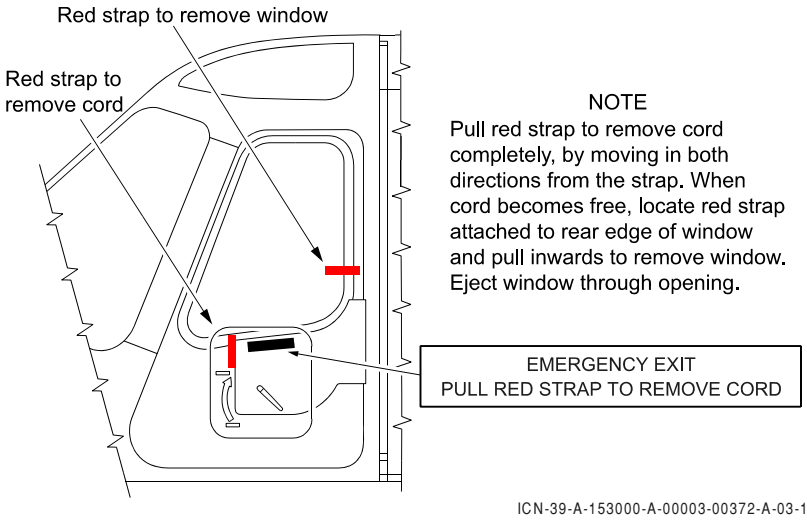

Figure 3-4 Internal Markings and Placards

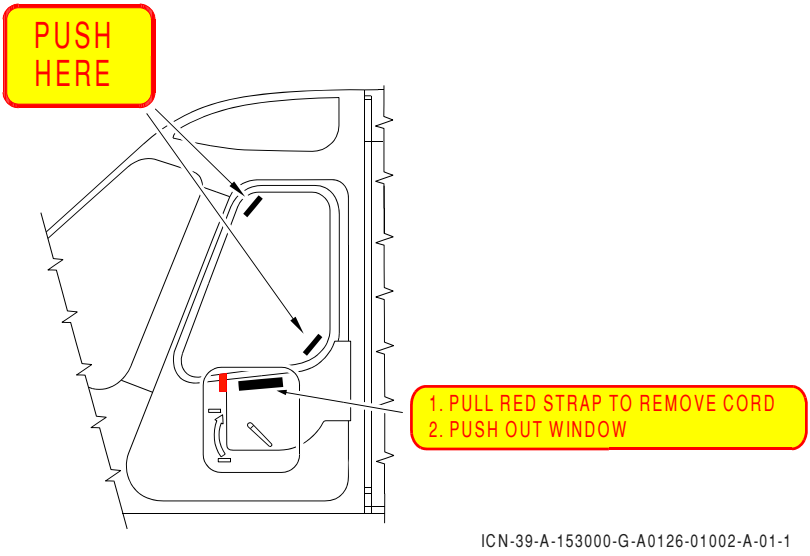

Figure 3-4A Alternative Internal Markings and Placards

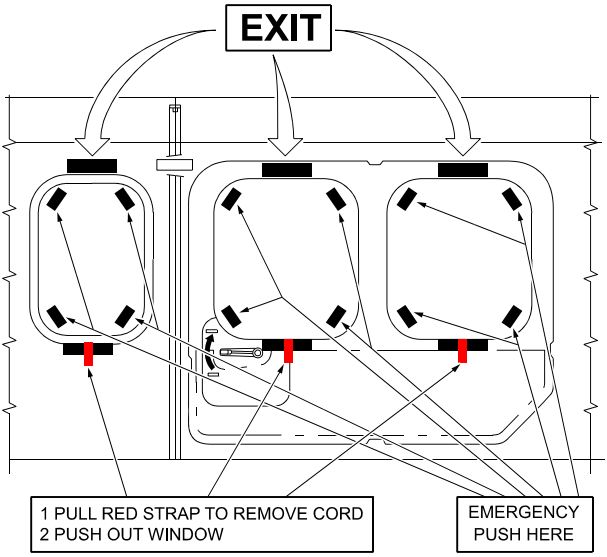

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Figure 3-5 Internal Markings and Placards

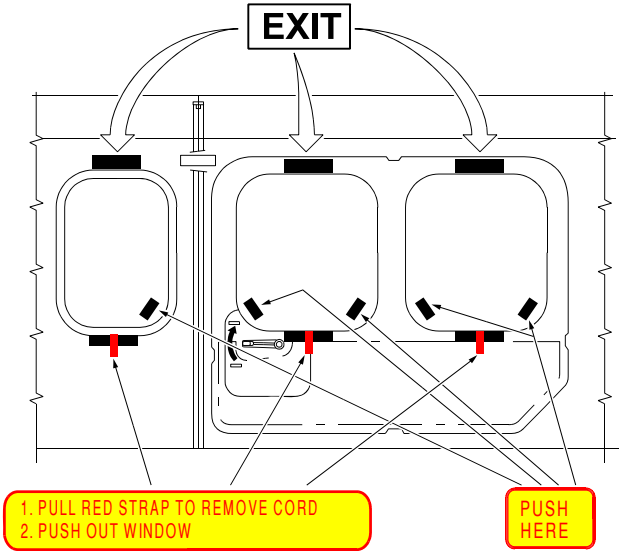

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Figure 3-5A Alternative Internal Markings and Placards

MALFUNCTION PROCEDURES

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CAUTION SYSTEM

Many of the malfunctions described in this section are indicated by the illumination of the amber caution captions on the CAS window and the flashing amber Master Caution Light (MCL). When active the caution is displayed as black text on an amber background. The caution can be acknowledged by pressing the MCL or CAS RST button on the collective grip. It then changes to amber text on a black background and the MCL is deactivated.

The Caution message remains until the cause of the warning is corrected.

CAUTIONS WITH VOICE MESSAGES

— 'LANDING GEAR' voice message, associated with **LANDING GEAR** amber caution, is active when the radio altimeter height is less than 150 feet and undercarriage is retracted.

— 'AUTOPILOT' voice message, associated with any AP amber caution.

TABLE OF CAS CAUTION MESSAGES

CAS Caption	Page	Failure/System State
1(2) ADS FAIL	3-146	Associated ADS failed
AFCS DEGRADED	3-135	AFCS functioning degraded
1(2) AHRS FAIL	3-145	Associated AHRS failed
1(2) AP FAIL	3-130	Associated autopilot failed
1(2) AP OFF	3-131	Associated autopilot switched OFF
1(2) AP TEST ABORT	3-136	AFCS Test procedure aborted (only active on ground)
ATT OFF	3-133	AFCS attitude mode OFF
1(2)(3)(4)(5)(6)(7)(8) AUDIO FAIL	3-155	Associated audio system failed

AUX BATT OFF	3-124	Auxiliary battery off line
AVIONIC FAULT	3-147	Avionic fault
AWG FAIL	3-147	Aural warning generator failed
BAG DOOR	3-159	Baggage door open
BATT OFF LINE	3-126	MAIN battery and/or AUX battery not connected to ESS BUS
1(2) BRG TEMP	3-102	Associated ENG-MGB input bearing over heating
BUS TIE OPEN	3-125	DC MAIN bus tie open
CABIN DOOR	3-159	Cabin door open
CHIP DET TEST	3-106	Drive system chip detect testing system failed
CHIP DET UNIT	3-106	Drive system chip detect unit failed
CHIP MAST FAIL	3-107	Chip detector on main gearbox mast failed
CHIP SUMP FAIL	3-107	Chip detector on main gearbox sump failed
COCKPIT DOOR	3-158	Cockpit door open
CVR FAIL	3-152	Cockpit voice recorder failed
DC BUS FAIL	3-127	DC bus failed
1(2) DC GEN	3-123	Associated generator failed
1(2) DC GEN HOT	3-123	Associated generator overheating
1(2) DCU	3-81	Associated engine control functions degraded
1(2)(3)(4) DU OVHT	3-141	Associated display unit overheating
1(2)(3)(4) DU DEGRADED	3-141	Associated display unit degraded
1(2) ECL FAIL	3-77	Associated engine control lever beep trim failed

1(2) ECL POS	3-78	Associated engine control lever out of flight position.
1(2) EEC DATA	3-80	Associated engine data degraded
EMER LDG PRESS	3-116	Emergency landing gear deployment system pressure low
ENG ANALOG FAILURE	3-98	Engine analogue monitoring systems failed
1(2) ENG CHIP	3-75	Associated engine chip detected
1(2) ENG LIM EXPIRE	3-72	Associated engine exceeded 2.5 min OEI rating.
1(2) ENG MODE SEL	3-78	Associated engine MODE switch failed
1(2) ENG OIL TEMP	3-73	Associated engine oil overtemp (greater than 140° C)
EXT PWR DOOR	3-160	External Power door open
1(2) FCU FAIL	3-112	Associated fuel contents gauging unit failed
1(2) FCU TEST FAIL	3-113	Associated fuel contents gauging unit self test failed (only active on ground)
FDR FAIL	3-152	Flight data recorder failed
1(2) FIRE DET	3-76	Associated fire detect system failed
1(2) FMS FAIL	3-153	Associated FMS failed
1(2) FMS/GPS MSCP	3-154A	Miscompare between associated FMS and GPS position data
FMS/GPS MSCP UNAVL	3-154C	FMS/GPS position comparison function not available
1(2) FUEL FILTER	3-86	Associated fuel filter impending bypass
1(2) FUEL HEATER	3-88	Fuel heater system failed
1(2) FUEL ICING	3-87	Associated fuel temperature less than 5° C

1(2) FUEL LOW	3-109	Associated fuel level less that 92 kg
1(2) FUEL LOW FAIL	3-113	Associated fuel low sensor failed
1(2) FUEL PROBE	3-114	Associated fuel contents probe failed
1(2) FUEL PUMP	3-110	Associated fuel pump failed (less than 0.6 bar)
GPS FAIL	3-154	GPS failed
1(2) HOT START	3-82	Associated engine ITT limits exceeded on engine starting
1(2) HYD MIN	3-118	Associated hydraulic system fluid level low
1(2) HYD OIL PRESS	3-115	Associated hydraulic system pressure low (less than 163 bar)
1(2) HYD OIL TEMP	3-117	Associated hydraulic system over-temp (greater than 134° C)
1(2)(4) HYD PUMP	3-119	Associated hydraulic pump failed
HYD UTIL PRESS	3-116	Utility hydraulic pressure low
IGB CHIP	3-104	Intermediate gearbox chip detected
IGB CHIP FAIL	3-107	Chip detector on intermediate gearbox failed
IGB OIL LOW	3-105	Intermediate gearbox oil level low (only active on ground)
IGB OIL TEMP	3-105	Intermediate gearbox oil overtemp (greater than 109° C)
1(2) ITT LIMITER	3-84	Associated ITT limiter not functioning
1(2) ITT MISCOMPARE	3-97	Discrepancy between EEC and analog value of ITT
LANDING GEAR	3-161	Landing gear retracted and aircraft below 150 ft (46 m) AGL
MAIN BATT OFF	3-127	Main battery off line
1(2) MAU OVHT	3-148	Associated MAU overtemp

1(2) MCDU OVHT	3-150	Associated MCDU overtemp
MGB CHIP MAST	3-100	Main gearbox mast chip detected
MGB CHIP SUMP	3-100	Main gearbox sump chip detected
MGB OIL FILTER	3-101	Main gearbox oil filter in bypass
MGB OIL LOW	3-101	Main gearbox oil level low (only active on ground)
1(2) MGB OIL PRESS	3-103	Associated MGB engine input oil pressure low (less than 3.1 bar)
MISTRIM	3-135	Linear actuators not re-centered by trim
1(2) MRC OVHT	3-156	Modular Radio/NAV unit overheat
1(2) NF MISCOMPARE	3-97	Discrepancy between EEC and analogue value of NF
1(2) NG MISCOMPARE	3-97	Discrepancy between EEC and analog value of NG
NOSE WHL UNLK	3-121	Nose wheel unlocked
NR MISCOMPARE	3-97	Discrepancy between EEC and analogue value of NR
1(2) OVSPD	3-79	Associated engine NF overspeed triggered
1(2) OVSPD DET	3-85	Associated engine overspeed detection system failed
PARK BRK ON	3-122	Park brake on
PARK BRK PRESS	3-122	Park brake system low pressure
1(2) PITOT FAIL	3-142	Associated pitot heating failed
1(2) PITOT HEAT OFF	3-142	Associated pitot heating system switched off and OAT less than 4° C
1(2) P(R)(Y) AP FAIL	3-132	Associated AP Pitch, Roll or Yaw axis failed

1(2) P(R)(Y) AP OFF	3-132	Associated AP Pitch, Roll or Yaw axis OFF
P(R)(Y) TRIM 1(2) FAIL	3-134	Pitch, Roll or Yaw trim system failure
RPM SELECT	3-85	RPM selector switch failed
1(2) SAS DEGRADED	3-135	Associated SAS system degraded
1(2) SERVO	3-120	Associated hydraulic servo actuator in bypass
SYS CONFIG FAIL	3-151	Software or hardware system configuration error (only active on ground)
TGB CHIP	3-104	Tail gearbox chip detected
TGB CHIP FAIL	3-107	Tail gearbox chip detect system failed
TGB OIL LOW	3-105	Tail gearbox oil low (only active on ground)
TGB OIL TEMP	3-106	Tail gearbox oil overtemp (greater than 109° C)
1(2) TQ LIMITER	3-83	Associated engine torque limiter failed
1(2) TQ MISCOMPARE	3-97	Discrepancy between EEC and analogue value of TQ
1(2) TRIM FAIL	3-134	Trim system failed
VALIDATE CONFIG	3-151	Software or hardware configuration needs validation.
VENT FAIL	3-143	Cockpit ventilation fan failed or nose avionic fans failure
VNE MISCOMPARE	3-160	Miscompare between ADS 1 and 2 value of VNE
1(2) VHF COM OVHT	3-155	Associated VHF radio overheat
1(2) WOW FAIL	3-157	Associated Weight On Wheels (WOW) switch failed
XMSN OVTQ	3-99	Main gearbox overtorque

TABLE OF PFD AND MFD MESSAGES

RED Messages

'ATT FAIL'	3-163	Failure of attitude information (on associated side)
'HDG FAIL'	3-164	Failure of heading information (on associated side)
'RAD'	3-165	Failure of Rad Alt height information
'1(2)CASMSCP' on PFD	3-179	MAU 1 (MAU 2) CAS WARNING message list has discrepancies.
Airspeed display tape crossed	3-167	Failure of airspeed information (on associated side)
Vertical speed tape crossed	3-167	Failure of vertical speed information (on associated side)
Altitude display tape crossed	3-167	Failure of altitude information (on associated side)
CAS display crossed	3-168	Failure of CAS warning and caution data

AMBER Messages

'1(2)(3)(4) DU' on attitude indicator	3-172	Display unit graphics symbology malfunction
'2.5m' on side of PI and between NG and ITT indications	3-173	Associated side engine in 2.5 minute rating, message will flash 10"sec before 2.5 min limit expires.
'ADS1(2)' on attitude indicator	3-167	Pilot and Copilot ADS information from the same source. (1-Copilot side 2-Pilot side)
'AHRS1(2)' on attitude indicator	3-163	Pilot and Copilot attitude information from the same source. (1-Copilot side 2-Pilot side)
'ALT' on altitude display tape	3-177	Miscompare between ADS 1 & 2 for altitude information (±150 ft (45 m))

'ATT' on attitude indicator	3-176	Miscompare between AHRS 1 & 2 for Pitch and Roll information (±5° in pitch and ±6° in roll)
DG1(2)	3-164	Pilot and Copilot heading information from the same source. (1-Copilot side 2-Pilot side) and selection of AHRS 1(2)
'DR' on PFD	3-181	FMS in Dead Reckoning
'DGR' on PFD	3-182	FMS operation degraded
'1(2) CASMSCP' on PFD	3-179	MAU 1 (MAU 2) CAS CAUTION message list has discrepancies.
'FAIL' on NF indication	3-175	Failure of NF information
Glideslope vertical display crossed	3-180	Loss of valid glideslope data
'HDG' on attitude indicator	3-176	Miscompare between AHRS 1 & 2 for Heading information (±10° heading)
IAS on airspeed tape	3-177	Miscompare between ADS 1 & 2 airspeed information.(±20 kts)
LOC lateral deviation scale crossed	3-180	Loss of valid LOC lateral deviation data
MAG 1(2)	3-164	Pilot and Copilot heading information from the same source. (1-Copilot side 2-Pilot side) and selection of AHRS 1(2)
'MAN' on side of PI and TQ indications	3-174	Associated side, engine in MANUAL control
1(2) MAU	3-169	Associated MAU degraded
'MIN' on attitude indicator	3-176	Altitude equal or less than decision height (DH)
'LOC/GS' on PFD	3-178	Miscompare between navigation LOC/GS information from NAV 1 and NAV 2.

'OEI' on side of PI, TQ, ITT, NG indications	3-174	Associated engine failed
'PITCH' on attitude indicator	3-176	Miscompare between AHRS 1 & 2 for Pitch information (±5° in pitch)
RAD on RAD ALT display	3-177	Miscompare between MAU 1 & 2 Radio Altimeter altitude information (10 ft+0.625x(rad alt 1+ rad alt 2)
'ROLL' on attitude indicator	3-176	Miscompare between AHRS 1 & 2 for Roll information (±6° in roll)

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ENGINE MALFUNCTIONS

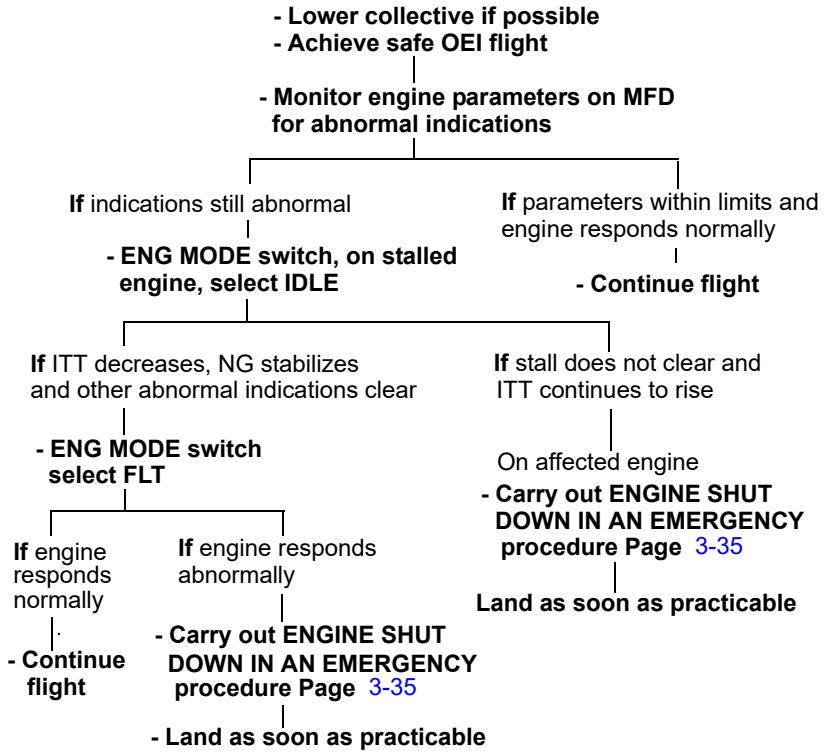
COMPRESSOR STALL

A compressor stall is normally recognized by an abnormal increase of ITT (or abnormal increase in PI indication with ITT as limiting parameter) and may be accompanied by an audible bang or pop and fluctuating NG and TQ (monitored on MFD PWR PLANT page). The compressor stall may be transient or steady.

The degree of compressor stall may be indicated by one or all of the following:

— A rapid increase in PI with ITT as limiting parameter
— Fluctuating NG speed coupled with failure to respond to power demand
— Loud banging or popping noises
— A reduction in torque.

If compressor stall occurs, carry out the following procedure



UNUSUAL ENGINE NOISE

Compressor damage as a result of FOD may increase the engine noise level and is detectable by a high-pitched whining sound. The noise level of the high pitched whine should vary with NG (monitored on MFD PWR PLANT page) and should be significantly higher than the usual engine noise.
If an unusual noise is detected and FOD damage suspected:

1. Attempt to establish which engine has problems by monitoring ITT, NG, Engine Oil Pressure, Engine Oil Temperature
2. Switch affected ENG MODE to IDLE or select sequentially to determine the affected engine
3. On affected engine carry out **ENGINE SHUTDOWN IN EMERGENCY** procedure, page 3-35
4. Land as soon as practicable.

ENGINE LIMIT EXCEEDANCE

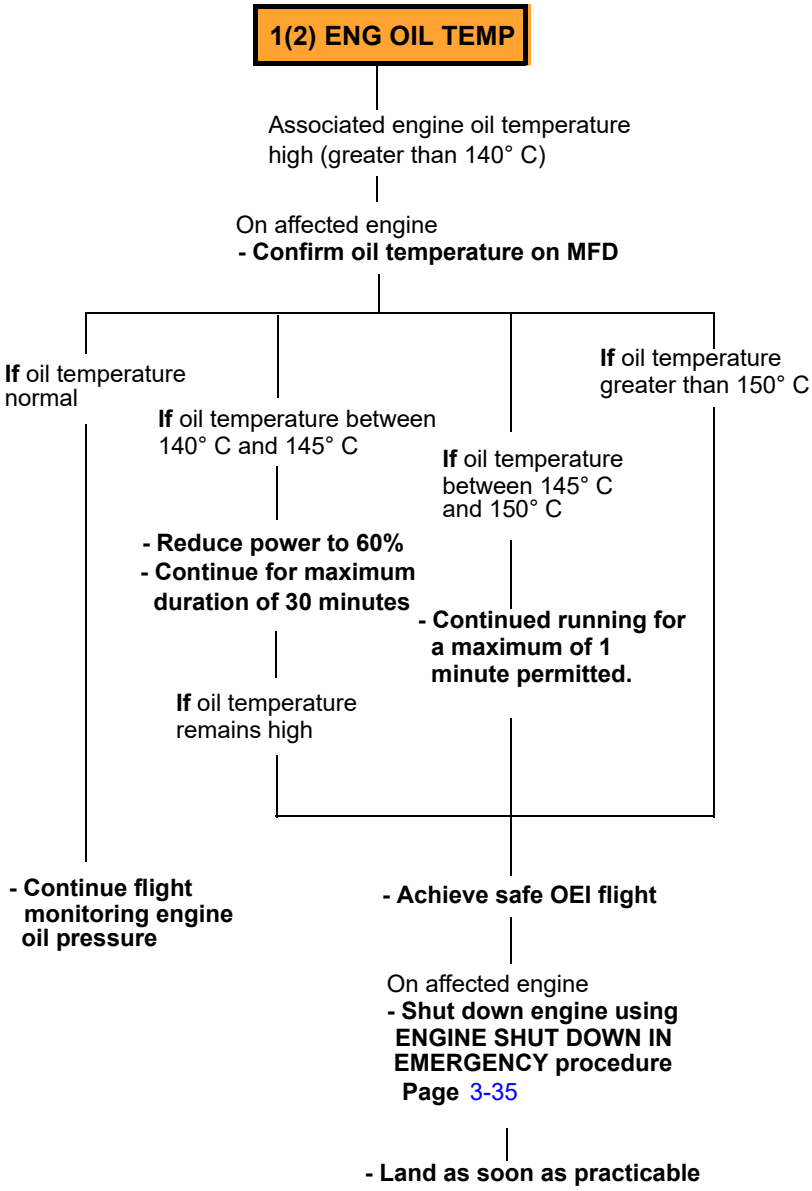
1(2) ENG LIM EXPIRE

Associated engine has exceeded an OEI 2.5 minute rating or Nf limit

- Reduce power to below or within the OEI 2.5 minute rating, as necessary (140%PI on PFD) (140%TQ, 775°C/105.4% ITT, 102.4%NG on MFD) and/or Nf below 103%

- Continue flight respecting engine ratings

ENGINE OIL TEMPERATURE



ENGINE OIL PRESSURE HIGH

If engine oil pressure operates continuously above oil pressure limit carry out the following:

- Continue flight

On affected engine
- Monitor engine parameters on MFD

If oil pressure remains in red or engine parameters erratic

- Achieve safe OEI flight

On affected engine
- Shut down engine using ENGINE SHUT DOWN IN EMERGENCY procedure
Page 3-35

- Land as soon as practicable

If oil pressure remains in amber

- Continue flight

ENGINE CHIP DETECTOR

1(2) ENG CHIP

- Achieve safe OEI flight

- BUS TIE switch ON

On affected engine
- ENG MODE switch to IDLE

If engine indication stable

- Land as soon as practicable

If required, and ENG oil pressures and temperatures normal ENG MODE may be selected to FLT for landing

If any of the following occur:
- engine speed starts to decrease
- engine vibration increases
- engine oil pressure/temperature changes significantly

On affected engine
- Carry out ENGINE SHUTDOWN IN EMERGENCY procedure
Page 3-35

- Land as soon as practicable

ENGINE FIRE DETECTOR SYSTEM

1(2) FIRE DET

Associated engine fire detect system not operational

On affected engine:
- Monitor engine parameters for abnormalities and check for signs of fire

If fire suspected

- Achieve safe OEI flight

On affected engine
- ENG MODE switch to IDLE
- Confirm engine FIRE
- ECL to OFF
- Lift FIRE/ARM guard and press affected engine illuminated pushbutton
- Set FIRE EXTING switch to BTL1

- ENG MODE switch to OFF
- Fuel PUMP OFF
- FUEL switch OFF
- XFEED CLOSED

If signs of fire subside
- Deselect FIRE/ARM pushbutton

- Land as soon as possible

If signs of fire persist

- Set FIRE EXTING switch to BTL2

If signs of fire subside

- Land as soon as possible

If signs of fire persist

- LAND IMMEDIATELY

- Carry out EMERGENCY/ POST CRASH SHUTDOWN procedure Page 3-36

If all parameters normal

Land as soon as practicable

ENGINE CONTROL LEVER

1(2) ECL FAIL

Associated engine ECL remote control beep not functioning

- Continue flight

If engine manual control required this must be carried out using manual lever

Note

If possible the torque of the manually controlled engine should be set at a torque level 10% below the other engine. (If PI on either/both engines is ITT or NG limited refer to TQ on the MFD PWR PLANT page).

ENGINE CONTROL LEVER POSITION

1(2) ECL POS

Associated engine ECL
out of flight position detent
(only active when engine
control in AUTO mode)

- Confirm ECL position and correct.

If caution remains

- Continue flight

On affected engine
- Monitor engine parameters,
Be aware of a possible reduction
in engine response characteristics
and power available

ENGINE MODE SELECT SWITCH

1(2) ENG MODE SEL

Associated engine MODE
SELECT switch failure.

- Continue flight

On affected engine
- On collective grip cycle ENG GOV switch MANUAL then AUTO

If caution remains
- Monitor affected engine parameters being aware that engine may need to be shut down using ECL

ENGINE POWER TURBINE OVERSPEED

1(2) OVSPD

Associated engine in overspeed condition

- Check PI and NF

If PI on both engines fluctuating and NF approx 110%on affected engine probable a 'run up' has occured

- Confirm engine in overspeed condition (CAS caution message)

On affected engine

- ENG GOV switch to MANUAL

- Control ECL using beep switch

- Land as soon as practicable

Note

If possible the torque of the manually controlled engine should be set at a torque level 10% below the other engine. (If PI on either/both engines is ITT or NG limited refer to TQ on the MFD PWR PLANT page)

If NF approx 110% and/or TQ 0% the drive shaft has failed on affected engine

If engine cannot be controlled manually

- Achieve safe OEI flight

- Carry out ENGINE SHUTDOWN IN AN EMERGENCY procedure

Page 3-35

- Land as soon as practicable

Note

Following engine drive shaft failure, NF may overspeed and reach the NF overspeed trip point (111%).

ENGINE ELECTRONIC CONTROL DATA

1(2) EEC DATA

Associated engine EEC system non critical fault

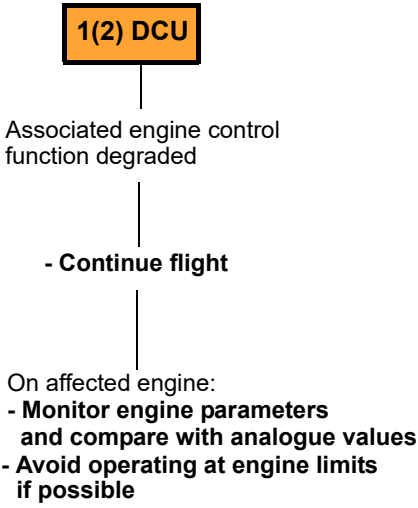
- Continue flight

On affected engine:
- On collective grip cycle ENG GOV switch from AUTO to MANUAL and back to AUTO

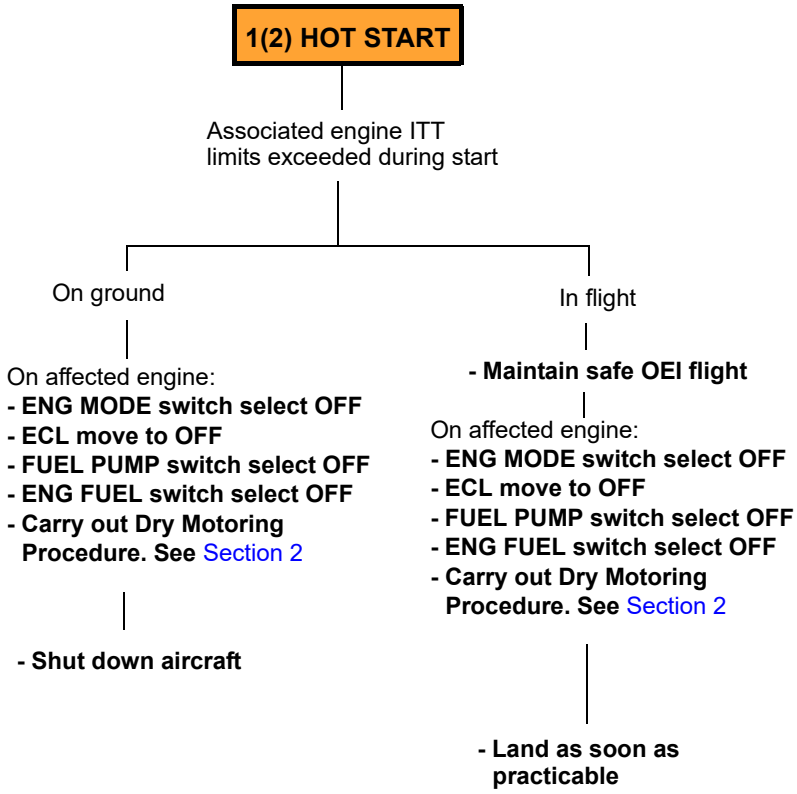
If caution remains

- Confirm engine parameter readings with analogue sensors, avoid operation near engine limits if possible

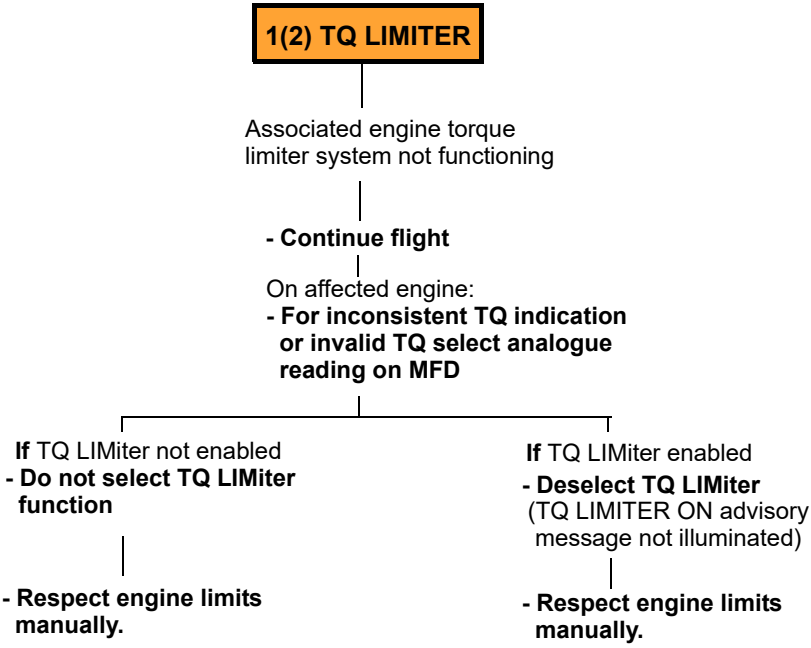
DEGRADATION OF ENGINE CONTROL FUNCTIONS



ENGINE HOT START



TORQUE LIMITER



Note

The analogue sensors are selected from MFD PWR PLANT page, select ANALOG using Cursor Control Device.

INTER TURBINE TEMPERATURE LIMITER

1(2) ITT LIMITER

Associated engine ITT limiter not functioning

- Continue flight

- Set LD-SH switch to TORQUE

On affected engine:

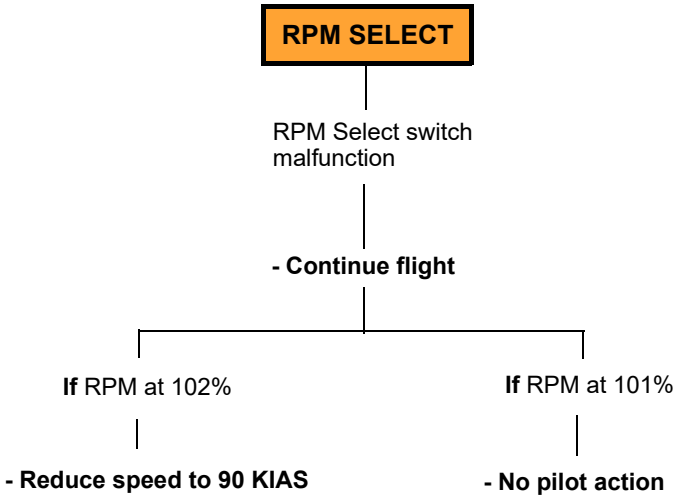
- Select analogue ITT reading on MFD

- Avoid operating near engine limits

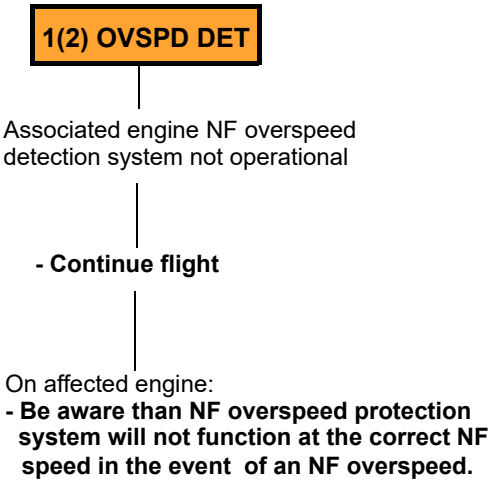
Note

The analogue sensors are selected from MFD PWR PLANT page, select ANALOG using Cursor Control Device.

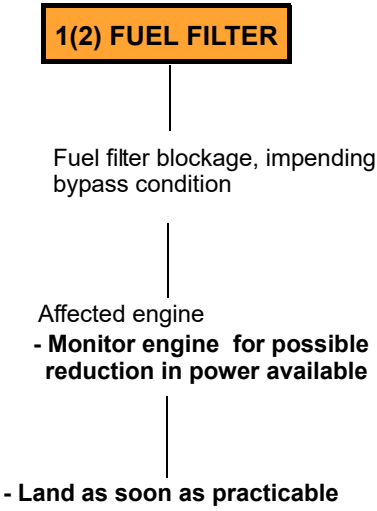
ROTOR SPEED SELECTOR



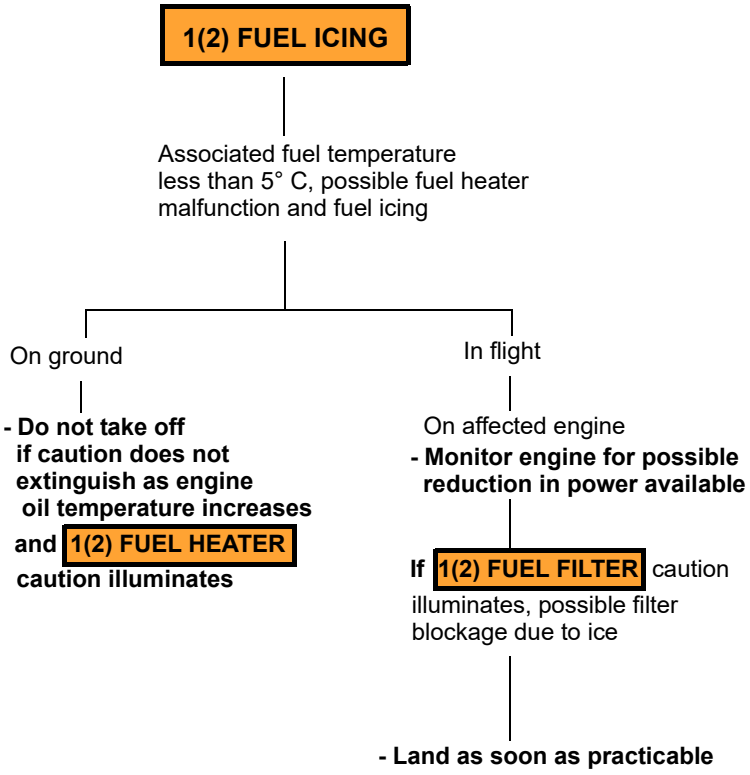
ENGINE POWER TURBINE OVERSPEED DETECT FAILURE



FUEL FILTER BY-PASS



FUEL ICING


1(2) FUEL ICING
Associated fuel temperature less than 5° C, possible fuel heater malfunction and fuel icing
On ground
- Do not take off if caution does not extinguish as engine oil temperature increases and 1(2) FUEL HEATER caution illuminates
In flight
On affected engine
- Monitor engine for possible reduction in power available
If 1(2) FUEL FILTER caution illuminates, possible filter blockage due to ice
- Land as soon as practicable

FUEL HEATER

1(2) FUEL HEATER

Associated fuel temperature greater than 74° C **or** fuel temperature less than 5° C with associated engine oil temperature greater than 82° C.
Possible fuel heater malfunction.
(Caution only active with associated engine running)

- Continue flight

On affected engine
- Monitor engine for possible reduction in power available or 1(2) FUEL ICING caution.

ENGINE RESTART IN FLIGHT PROCEDURE

GENERAL

If an engine flames out/or is shutdown during flight and if there is no indication of a mechanical malfunction or engine fire, the engine may be restarted.

Note

If, after a double engine failure, ENG 2 is to be started first set BUS TIE to ON.

STARTING MALFUNCTIONS AND ASSOCIATED ABORT ACTIONS

Monitor engine start and, if any of the following occur:

— light up is not within 10 seconds of ENG MODE switch to IDLE

— abnormal noise heard

— ITT increases beyond engine limits (HOT START caution illuminated)

— engine hangs (stagnation in NG below 54%)

— engine starter fails to disengage by 49% NG.

Shut down engine by:

1. ENG MODE switch — OFF
2. ECL — OFF
3. FUEL PUMP — OFF
4. ENG FUEL switch — OFF

CAUTION

Failure to follow the appropriate Abort Procedure may cause damage to the engine.

Note

Observe the starter generator duty cycle limitations.

RESTARTING PROCEDURE

CAUTION

During starter activation AP1 may disengage.

1. Airspeed — Less than 120 KIAS.
2. ECL — Confirm FLIGHT.
3. ENG Fuel switch — ON - Fuel valve indicator vertical.
4. FUEL PUMP — ON - FUEL PUMP caution not illuminated, check pressure.
5. MFD display — Confirm PWR PLANT page.
6. ENG MODE switch — Below 15000 ft (4572 m) Hp select IDLE.

   — Above 15000 ft (4572 m) Hp select IDLE when NG at 0%.

Note

It is recommended to start the engine to IDLE, if necessary, it is possible to start to FLIGHT by setting the ENG MODE switch directly to FLT.

7. Gas Producer (NG) — Note increasing and START legend displayed.
8. Engine temperature (ITT) — Note increasing and IGN legend displayed.
9. Engine oil pressure — Confirm rising.
10. Engine starter — Disengaged by 49% NG.
11. Engine power turbine speed (NF) — Confirm stabilized to IDLE speed below 100%.

Note

If the engine was started directly to FLT the NF will stabiles at 100% with rotor speed.

12. ENG MODE switch — FLT.
13. Engine parameters — Confirm within limits and matched with other engine.

ENGINE MANUAL STARTING

If a MANUAL start is necessary carry out the following procedure.

STARTING MALFUNCTIONS AND ASSOCIATED ABORT ACTIONS

Monitor engine start and, if any of the following occur:

— light-up is not within 10 seconds of ECL starter pushbutton engagement

— abnormal noise heard

— ITT increases beyond engine limits (HOT START caution illuminated)

— engine hangs (stagnation in NG below 54%) and NG cannot be accelerated with movement of ECL

— engine starter fails to disengage by 49% NG.

shut down engine by:

1. ECL — OFF position
2. ENG MODE switch — OFF
3. FUEL PUMP — OFF
4. ENG FUEL switch — OFF.

CAUTION

Failure to follow the appropriate Abort Procedure may cause damage to the engine.

Note

Observe the igniter and starter generator duty cycle limitations.

MANUAL ON GROUND START PROCEDURE

Engine manual starting, on the ground, should only be carried out if it is essential to move the aircraft, for example from a helideck to allow access to other aircraft.
It is necessary, however, to have the other engine functioning in AUTO mode to control rotor speed.

The engine functioning in AUTO mode must be started first and stabilized in FLT.

Following an aborted start shutdown, perform a Dry Motoring Procedure before restarting. See Section 2.

1. MFD display — Confirm PWR PLANT page.
2. ECL — OFF on required engine.
3. ENG GOV — MANUAL on required engine (Confirm MAN legend on PI and TQ indicators).
4. ENG Fuel switch — ON - Fuel valve indicator vertical.
5. FUEL PUMP — ON - FUEL PUMP caution not illuminated, check pressure.
6. ENG MODE switch — Select IDLE.

Note

Confirm no engine bleeds are operating (HEATER and/or EAPS OFF, if fitted).

7. ECL starter pushbutton — Push and release, START and IGN legends displayed.
8. Gas Producer (NG) — Note increasing.

9. ECL — Advance to FLIGHT, and beyond if required, when NG greater than 15% and ITT below 200° C (26%).

10. Engine temperature (ITT) — Confirm increasing.

11. Engine oil pressure — Confirm rising.

12. Engine starter — Verify disengaged when NG above 49% and START and IGN legends extinguished.

13. Gas producer (NG) — Confirm stabilized at 68% or above.

Note

If NG hangs below 68%, advance ECL beyond FLIGHT to accelerate to 68% NG then return to FLIGHT.

14. Engine parameters — Confirm within limits.

CAUTION

In manual mode the ECL must be advanced to adjust engine power. This should be carried out using the ECL beep switch. It is recommended that the manual engine be set to a torque 10% lower than the other engine.

MANUAL IN FLIGHT RESTART PROCEDURE

Following an aborted start shutdown, perform a Dry Motoring Procedure before restarting. See Section 2.

CAUTION

During starter activation AP1 may disengage.

1. MFD display — Confirm PWR PLANT page.
2. ECL — OFF on required engine.
3. ENG GOV — MANUAL on required engine (Confirm MAN legend on PI and TQ indicators).
4. ENG Fuel switch — ON - Fuel valve indicator vertical.
5. FUEL PUMP — ON - FUEL PUMP caution not illuminated, check pressure.
6. ENG MODE switch — Below 15000 ft (4572 m) Hp select IDLE when NG below 20%.
   — Above 15000 ft (4572 m) Hp select IDLE when NG at 0%.

Note

Confirm no engine bleeds are operating (HEATER and/or EAPS OFF, if fitted).

7. ECL starter pushbutton — Push and release, START and IGN legends displayed.
8. Gas Producer (NG) — Note increasing.
9. ECL — Advance to FLIGHT and beyond, if required, when NG greater than 15% and ITT below 200° C (26%).
10. Engine temperature (ITT) — Confirm increasing.
11. Engine oil pressure — Confirm rising.

12. Engine starter — Verify disengaged when NG above 49% and START and IGN legends extinguished.

13. Gas producer (NG) — Confirm stabilized at 68% or above.

Note

If NG hangs below 68%, advance ECL beyond FLIGHT to accelerate to 68% NG then return to FLIGHT.

14. Engine parameters — Confirm within limits.

CAUTION

In manual mode the ECL must be advanced to adjust engine power. This should be carried out using the ECL beep switch. It is recommended that the manual engine be set to a torque 10% lower than the other engine.

ENGINE SHUTDOWN USING ECL/MANUAL

If and engine malfunction has occurred but an **Engine Shut Down in Emergency** or **Emergency/Post Crash Shutdown** procedure is not required follow the procedure below to shut down engines after flight:

1. ENG 1 and 2 MODE switches — Set to IDLE.

   If ENG MODE selection is ineffective then:

   ENG GOV switch (on affected engine) — Set MANUAL.

   ECL — Set MIN.

Note

A period of 60 seconds stabilization at IDLE is recommended.

2. BUS TIE switch — ON (for night operations).

3. Fuel PUMP 1 and 2 switches — OFF.

4. ENG 1 and 2 MODE switches — OFF.

   If ENG MODE selection is ineffective then:

   ECL (on affected engine) — OFF.

CAUTION

During shut down note that:
- NG speed decelerates freely without abnormal noise or rapid run down
- ITT does not rise abnormally.

5. ENG 1 and 2 FUEL valve — OFF 1 & 2 FUEL PUMP caution messages. (Fuel valve indicator bar horizontal).
6. Fuel XFEED switch — CLOSED (indicator bar vertical).
7. Cockpit lights — OFF.
8. ANTI-COL lights — OFF.
9. BUS TIE switch — Confirm AUTO.

CAUTION

Prior to switching electrical power OFF ensure engine NG values are at 0%.

10. BATTERY MASTER and GENerators — OFF.
11. BATTERY MAIN and AUX — OFF.

ENGINE AND ROTOR PARAMETERS MISCOMPARE

1(2) NF MISCOMPARE

or

1(2) NG MISCOMPARE

or

1(2) ITT MISCOMPARE

or

1(2) TQ MISCOMPARE

or

NR MISCOMPARE

Associated parameter EEC and analogue backup data comparison discrepancy

- Continue flight

On affected parameter
- Confirm correct value with analogue backup parameter

The MISCOMPARE caution is generated when comparison with backup parameter exceeds the following values:

NF	3%
NG	3%
ITT	50° C
TQ	15% (5%*)
NR	3%

Note

The analogue sensors are selected from MFD PWR PLANT page, menu selection using Cursor Control Device.

Note*

For Primus Epic Software EB7030191-00112 and all previous versions the TQ MISCOMPARE caution may illuminate spuriously due to low comparison threshold value (5%). Check occasionally to confirm that the EEC and analogue parameters are matched when the caution is illuminated.

ENGINE ANALOGUE SENSOR FAILURE

ENG ANALOG FAILURE

Failure of an analogue parameter

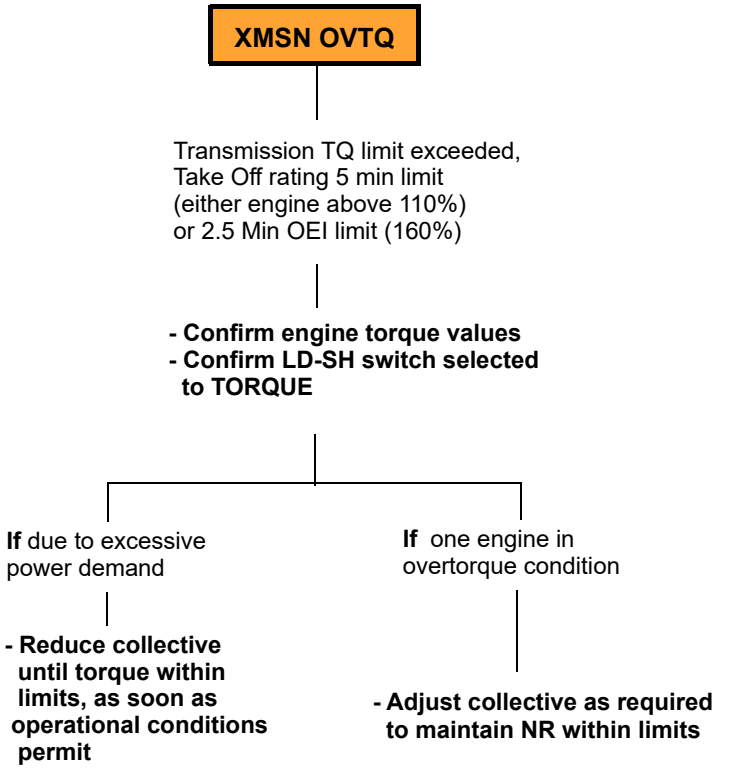
- Continue flight

- Select analogue sensor from MFD PWR PLANT page menu, select ANALOG using Cursor Control Device.
- Note which analogue parameters have failed.
- Deselect ANALOG sensors to return display to digital values

Be aware that the MISCOMPARE caution for the failed parameters will be inoperative

DRIVE SYSTEM

MAIN GEARBOX OVERTORQUE



MAIN GEARBOX CHIP DETECTOR

MGB CHIP MAST

or

MGB CHIP SUMP

- Activate CHIP BURNER
(MISC control panel)
It is permitted to activate the CHIP BURNER up to 3 times to clear a chip

If CHIP caution clears

- Continue flight

If CHIP caution remains

- Reduce power as soon as conditions permit

- Land as soon as practicable

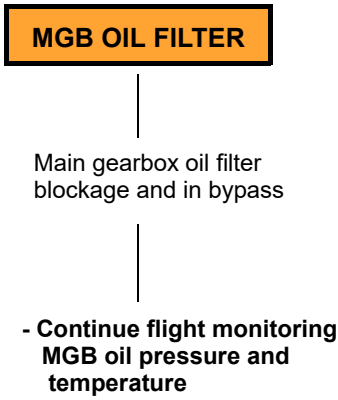
CAUTION

A maximum of 3 chips can be cleared in one flight. On the 4th CHIP caution **Land as soon as practicable.**

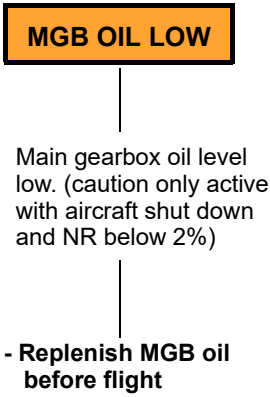
Note

If MGB CHIP MAST or MGB CHIP SUMP cautions illuminate when MGB OIL PRESS warning is illuminated the CHIP BURNER must not be activated.

MAIN GEARBOX OIL FILTER



MAIN GEARBOX OIL LOW



MAIN GEARBOX INPUT BEARING TEMPERATURE

1(2) BRG TEMP

Associated MGB engine input bearing over temperature

- Reduce speed to safe OEI flight

- Land as soon as practicable

If 1(2) MGB OIL PRESS caution illuminates

On affected engine

- Shut down using SHUT DOWN IN EMERGENCY procedure
Page 3-35

- Land as soon as practicable

MAIN GEARBOX INPUT BEARING TEMPERATURE

1(2) MGB OIL PRESS

Associated engine - MGB input oil pressure low, possible blockage in oil duct to engine - MGB input

- Reduce speed to safe OEI flight

- Land as soon as practicable

If **1(2) BRG TEMP** caution illuminates

On affected engine

- Shut down using SHUT DOWN IN EMERGENCY procedure
Page 3-35

- Land as soon as practicable

Note

It is acceptable for the 1(2) MGB OIL PRESS caution to illuminate transiently when accelerating from GI to FLT condition providing the caution is not illuminated at 100%NR.

INTERMEDIATE OR TAIL GEARBOX CHIP DETECTOR

IGB CHIP

or

TGB CHIP

- Activate CHIP BURNER

(MISC control panel)
It is permitted to activate the CHIP BURNER up to 3 times to clear a chip

If CHIP caution clears

- Continue flight

If CHIP caution remains

- Reduce power as soon as conditions permit

- Land as soon as practicable

CAUTION

A maximum of 3 IGB or 3 TGB chips can be cleared in one flight. On the 4th CHIP caution **Land as soon as practicable.**

INTERMEDIATE OR TAIL GEARBOX OIL LOW

IGB OIL LOW

or

TGB OIL LOW

Associated gearbox oil level low. (caution only active with aircraft shut down and NR below 2%)

- Replenish oil before flight

INTERMEDIATE GEARBOX OIL TEMPERATURE HIGH

IGB OIL TEMP

IGB oil temperature above limit (greater than109° C)

- Check IGB oil temperature

If oil temperature normal

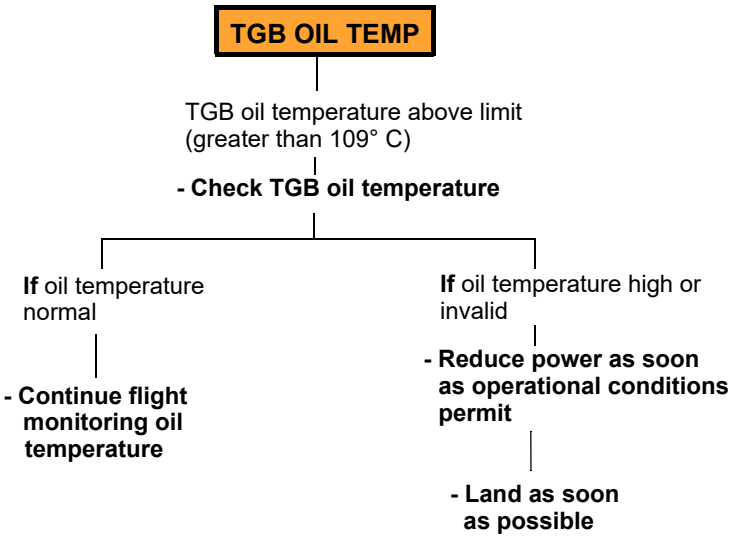
- Continue flight monitoring oil temperature

If oil temperature high or invalid

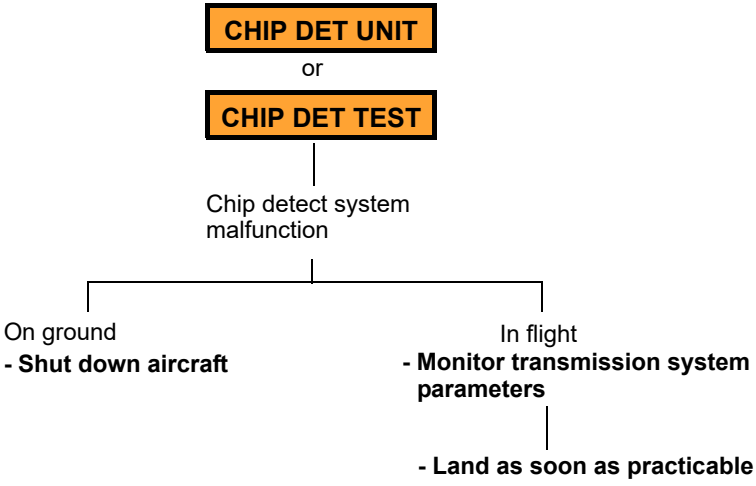
- Reduce power as soon as operational conditions permit

- Land as soon as possible

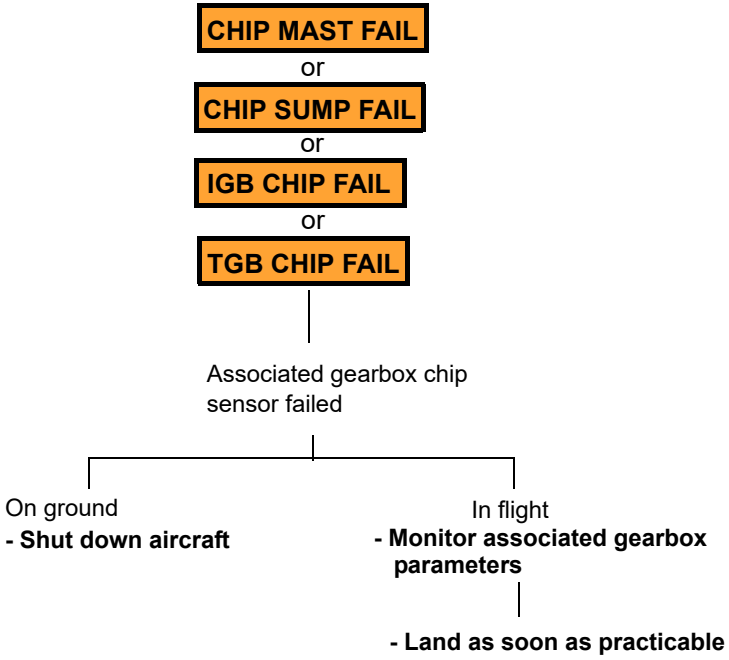
TAIL ROTOR GEARBOX OIL TEMPERATURE HIGH



GEARBOX CHIP DETECT UNIT MALFUNCTION



GEARBOX CHIP DETECTOR SENSOR FAILURE



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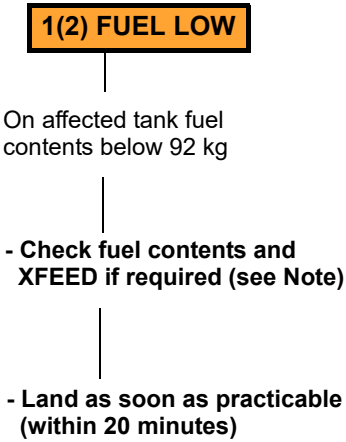
FUEL SYSTEM

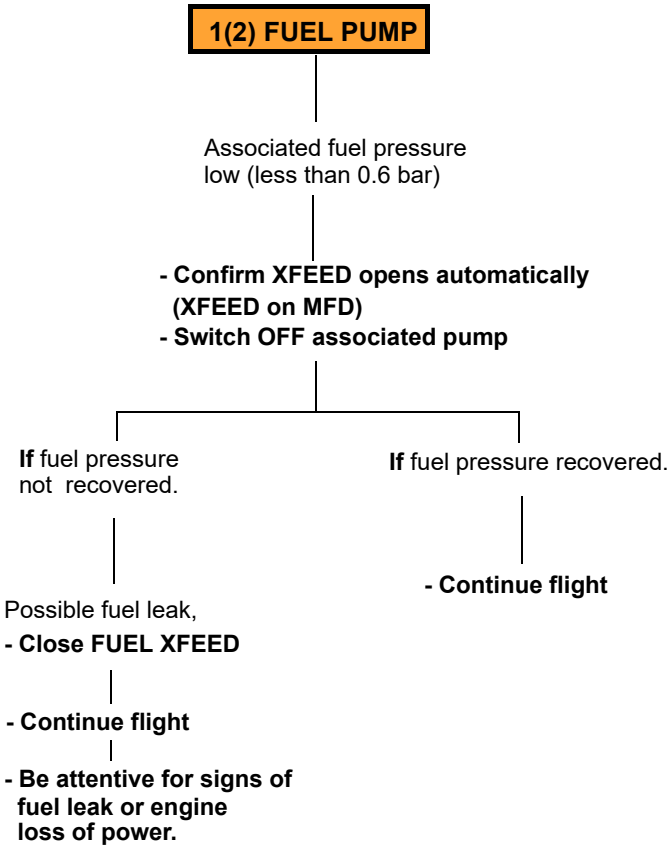
FUEL LOW



Note

If the XFEED is open and a FUEL PUMP is OFF, the tank with FUEL PUMP OFF, not supplying the engines, will have a maximum level of unusable fuel of 228 kg. The unusable fuel level value will change to grey to indicate the tank is no longer supplying fuel.

FUEL PRESSURE LOW



Note

When cross feeding, the tank with pump off, NOT supplying the engines, will have a maximum quantity of unusable fuel of 228 kg. This unusable fuel quantity value will change to grey to indicate the tank can no longer supply fuel.

Close X-FEED to restore the availability of up to 228 kg of fuel (fuel level value returns to green). Engine operation, in suction mode, is assured and FUEL pressure, on MFD, is invalid displaying amber '0' or dashed. Avoid abrupt aircraft manoeuvres.

DOUBLE FUEL PUMP FAILURE

1-2 FUEL PUMP

Fuel pressure low (less than 0.6 bar)
in both fuel systems

- Select XFEED CLOSED
- Switch OFF PUMP 1 and PUMP 2

- Land as soon as practicable

Note

Engine operation, in suction mode, is assured and FUEL pressure, on MFD, is invalid displaying amber '0' or dashed.
Avoid abrupt aircraft manoeuvres.

ABNORMAL FUEL CONSUMPTION

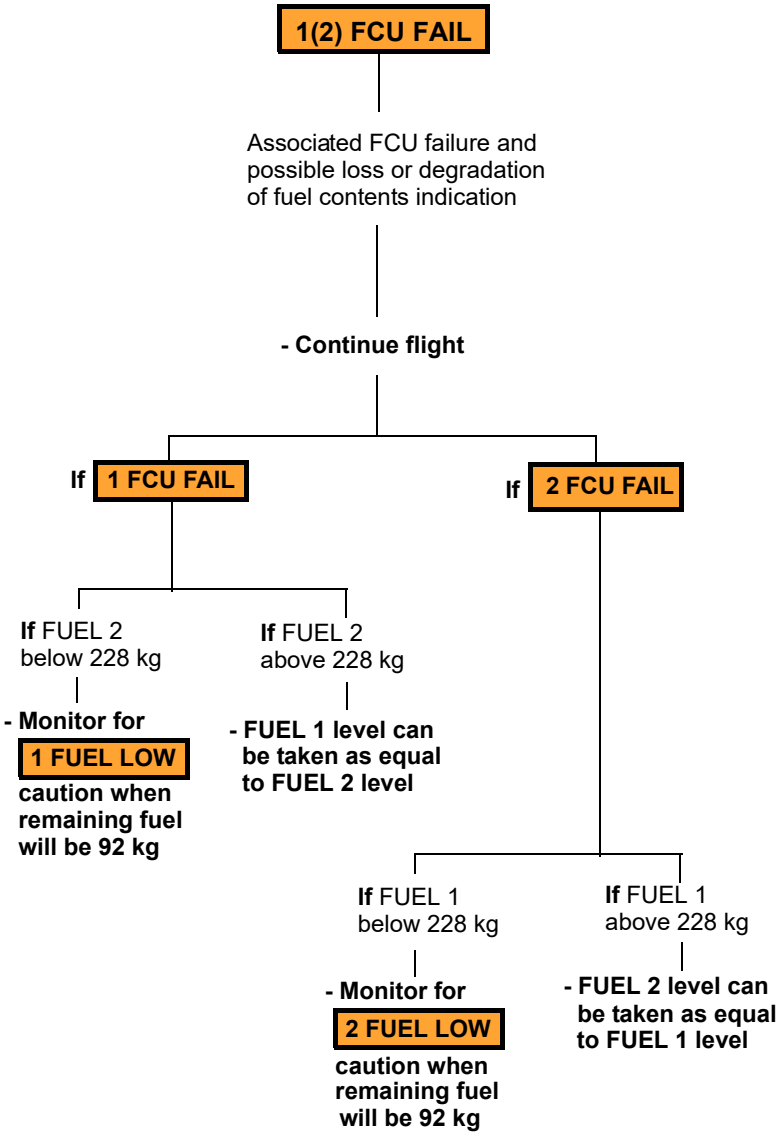
Monitor fuel quantity frequently. If an abnormal fuel consumption is confirmed, a fuel leakage may be present. Therefore, depending on remaining fuel quantity:

- Land as soon as possible

or

- Land as soon as practicable

FUEL CONTENTS GAUGING UNIT FAILURE



FUEL CONTENTS GAUGING UNIT TEST SYSTEM FAILURE

1(2) FCU TEST FAIL

Associated fuel contents unit test system failed
(Only active on ground)

- Shut down aircraft for maintenance action

FUEL LOW SENSOR FAILURE

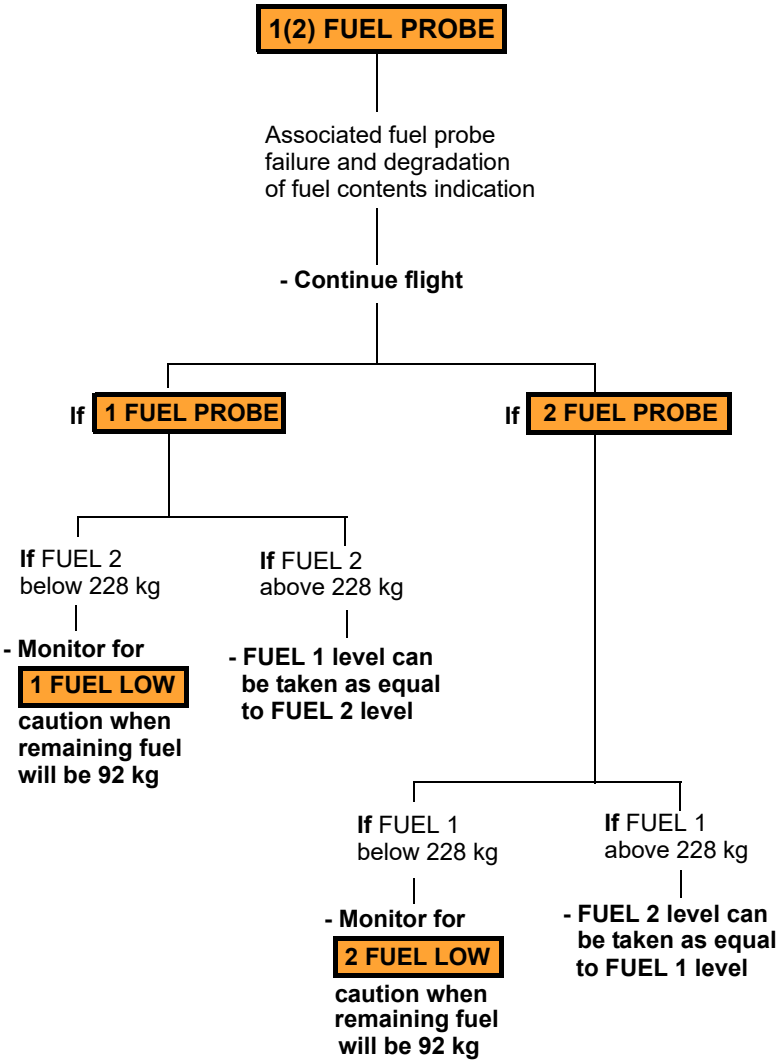
1(2) FUEL LOW FAIL

Associated fuel low sensor failure

- Continue flight

On affected system
- Monitor fuel quantity, low level caution inoperative

FUEL PROBE FAILURE

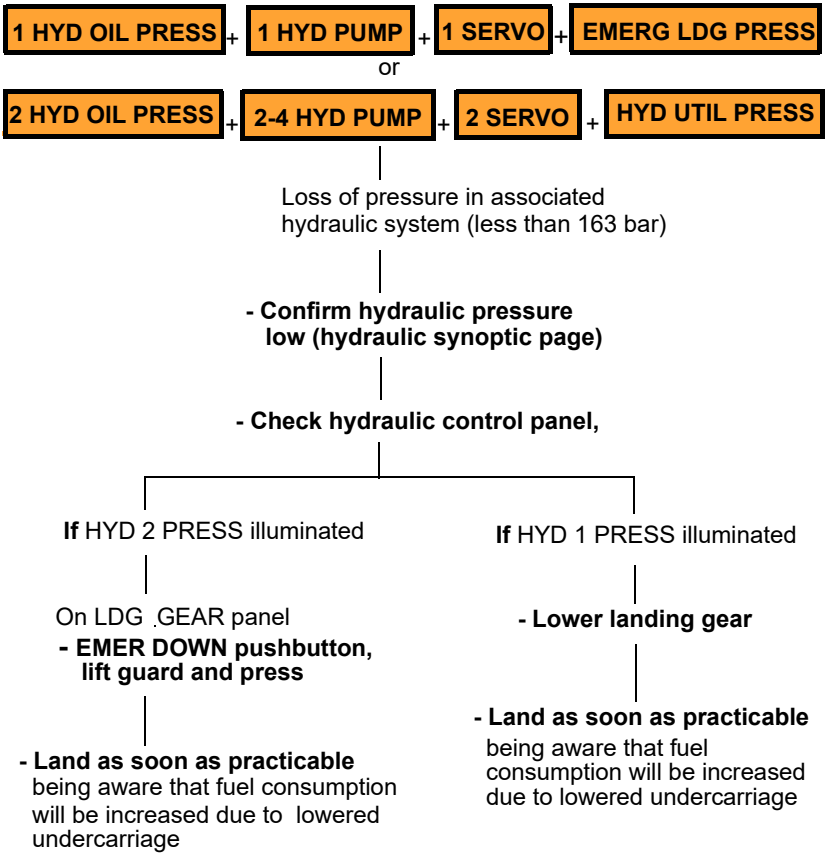


Note

Be aware that aircraft fuel quantity roll angle compensation will not be functioning.

HYDRAULIC SYSTEM

HYDRAULIC PRESSURE LOW



Note

With one hydraulic system operating taxiing manoeuvres should be carried out at 5 kt or less and turns should be carried out carefully.

Note

When EMER DOWN is selected the amber lights will remain illuminated even though the LDG GEAR is down. If the LDG GEAR lever is moved to the DOWN position the lights will extinguish. After landing, if taxiing is required, the EMER DOWN pushbutton must be de-selected to permit the NOSE WHEEL steering to be unlocked.

NORMAL LANDING GEAR PRESSURE LOW

HYD UTIL PRESS

Low pressure in landing gear NORM hydraulic system

- **Confirm low pressure in LDG NORM system. (Hydraulic synoptic page)**

- **Lower LDG GEAR using normal procedure**

If after 15 sec LDG GEAR not locked down

- **EMER DOWN pushbutton, lift guard and press**

- **Continue flight**
being aware that fuel consumption will be increased due to lowered undercarriage

EMERGENCY LANDING GEAR PRESSURE LOW

EMER LDG PRESS

Low pressure in emergency landing gear hydraulic system

- **Confirm low pressure in EMER LDG GEAR system. (hydraulic synotic page)**

- **Lower landing gear using normal procedure**

- **Continue flight**
being aware that fuel consumption will be increased due to lowered undercarriage

HYDRAULIC FLUID OVERHEATING

1(2) HYD OIL TEMP

Associated hydraulic system overheat (greater than 134 °C)

- Confirm hydraulic temperature (hydraulic synoptic page) and HYD control panel

- Lower undercarriage

WARNING

If a **1 (2) SERVO** caution has illuminated previously do **NOT** switch SOV to CLOSE on the **2(1)** Hydraulic system since this will cause loss of control in the affected servo jack.

On affected system

- Switch off system by moving SOV switch to CLOSE on HYD control panel

1(2) HYD OIL PRESS and **1 (2) SERVO** cautions illuminate

- Land as soon as practicable, being aware that fuel consumption will be increased due to lowered undercarriage

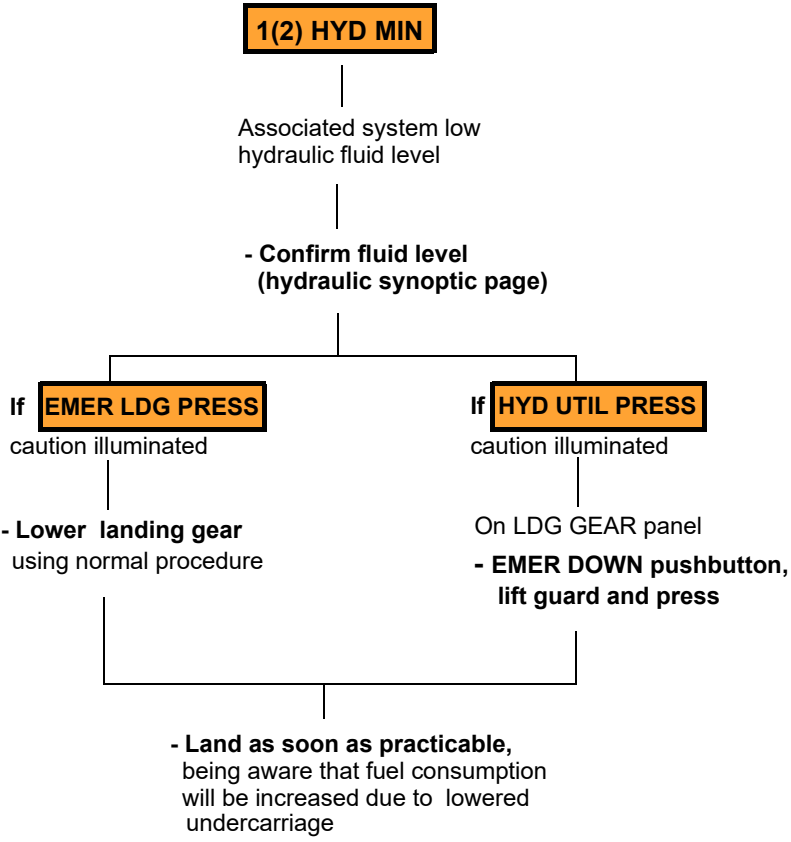
Note

With one hydraulic system SOV shut off, a subsequent drop of pressure in the other system will over-ride the SOV selection and reinstate pressure to the servo's. In these conditions the SOV switch will not be automatically reset.

Note

With one hydraulic system operating taxiing manoeuvres should be carried out at 5 kt or less and turns should be carried out carefully.

HYDRAULIC FLUID LEVEL LOW



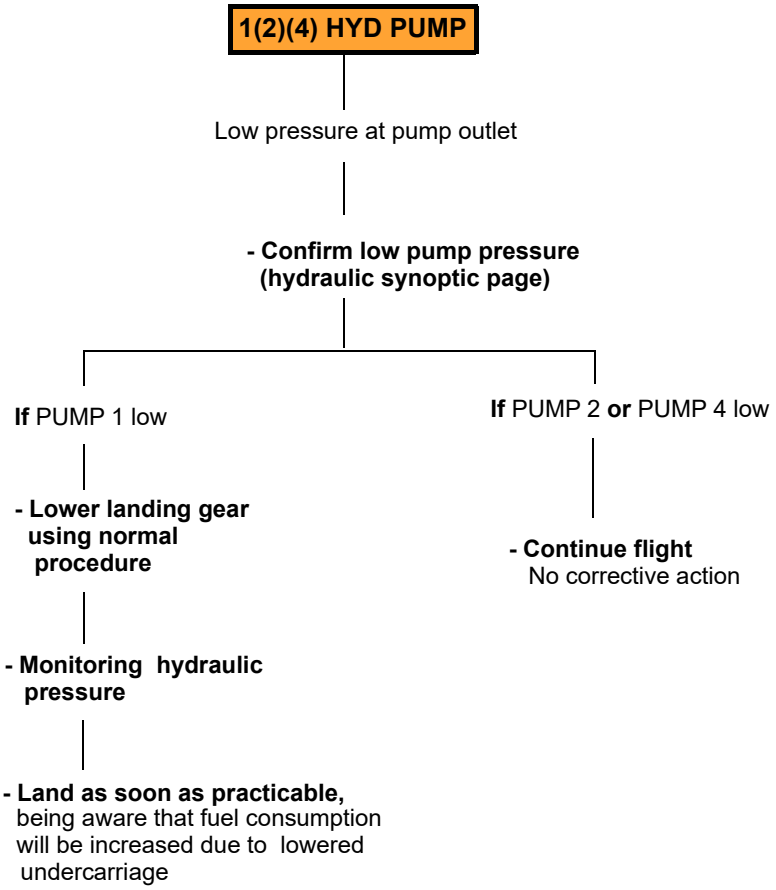
Note

Loss of hydraulic fluid in system No2 will automatically close the Tail Rotor Shut Off Valve (TRSOV). This will be indicated on the hydraulic synoptic page. Once the TRSOV has operated the SOV No1 is inhibited.

Note

When EMER DOWN is selected the amber lights will remain illuminated even though the LDG GEAR is down. If the LDG GEAR lever is moved to the DOWN position the lights will extinguish. After landing, if taxiing is required, the EMER DOWN pushbutton must be de-selected to permit the NOSE WHEEL steering to be unlocked.

HYDRAULIC PUMP 1, 2 OR 4 FAILURE



Note

With one hydraulic system operating taxiing manoeuvres should be carried out at 5 kt or less and turns should be carried out carefully.

MAIN VALVE SEIZURE IN MAIN OR TAIL ROTOR SERVO

1(2) SERVO

Main control valve seizure in one (or more) servo jacks

- Lower landing gear by normal procedure

- Land as soon as practicable being aware that fuel consumption will be increased due to lowered undercarriage

WARNING

Do **NOT** switch SOV to CLOSE on the **UNAFFECTED** system since this will cause loss of control in the affected servo jack.

Note

Loss of hydraulic fluid in system No2 will automatically close the Tail Rotor Shut Off Valve (TRSOV). This will be indicated by a **2 SERVO** caution on the CAS and a TRSOV closed indication on the hydraulic synoptic page. Once the TRSOV has operated the SOV No1 is inhibited.

NOSEWHEEL UNLOCKED (IN FLIGHT)

NOSE WHL UNLK

Nose wheel not locked in fore and aft direction

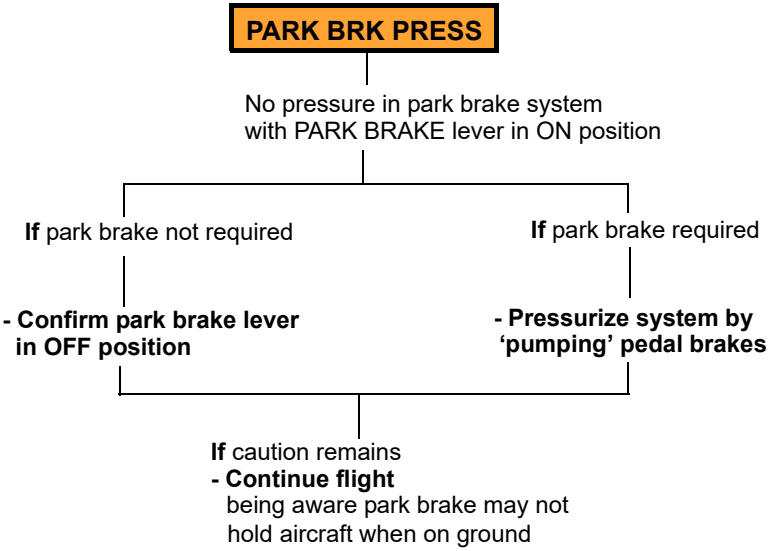
- Cycle NOSE WHEEL switch on LDG GEAR panel

If caution remains
- Do not raise landing gear
- Continue flight
being aware that fuel consumption will be increased due to lowered undercarriage
- Avoid run on landing

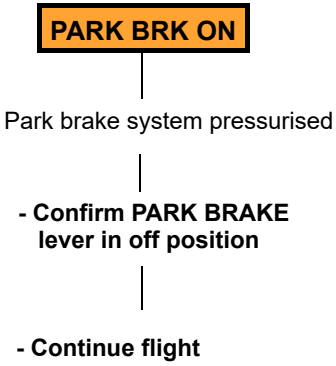
Note

Landing gear retraction inhibited with NOSE WHL UNLK caution illuminated.

PARK BRAKE MALFUNCTION



PARK BRAKE ON



CAUTION

Do not carry out run on landing or taxi as park brake system may be pressurized.

ELECTRICAL

SINGLE DC GENERATOR FAILURE

1(2) DC GEN

Associated DC generator failure

- If **BUS TIE OPEN** caution illuminated
  1(2) GEN load less than 3%
  - **Reset BUS TIE and set ON or increase electrical load on associated MAIN BUS**
  - **Continue flight**

On failed generator
- **OFF then ON**

If caution remains
- **Switch OFF associated generator.**
- **Continue flight**
  power is supplied by remaining generator.
  NON ESS BUS 1 & 2 lost (See Note below)
- **Monitor GEN load on MFD. Reduce electrical load if limit exceeded**

DC GENERATOR OVERHEAT

1(2) DC GEN HOT

Associated DC generator overheat

On affected DC generator
- **Switch OFF generator**
- **Continue flight**
  power is supplied by remaining generator.
  NON ESS BUS 1 & 2 lost (See Note below)

Note

Services lost for DC NON ESS BUS 1 & 2 failure

DC NON ESS BUS 1

CABIN VENT
COCKPIT VENT (CPLT)
CPLT W/WIPE
ECS (COCKPIT)
FUEL DRAIN VALVE
STEP LT
NOSE BAY FAN 1*

DC NON ESS BUS 2

ECS (CABIN)
NOSE BAY FAN 2*

* NOSE BAY FANS for Long Nose Variant only (function on ground only)

MAIN BATTERY OFF

MAIN BATT OFF

Failure of MAIN battery
to MAIN BUS 1

- Confirm BATTERY MAIN switch ON

- Continue flight being aware MAIN BATTERY not being charged

Note

When external power is connected the batteries are automatically disconnected and the MAIN BATT OFF and AUX BATT OFF cautions illuminate.

AUXILIARY BATTERY OFF

AUX BATT OFF

Failure of AUX battery
to MAIN BUS 2

- Confirm BATTERY AUX switch ON

- Continue flight being aware AUX BATTERY not being charged

Note

When external power is connected the batteries are automatically disconnected and the MAIN BATT OFF and AUX BATT OFF cautions illuminate.

BUS TIE OPEN

BUS TIE OPEN

BUS TIE has been requested to close (either manually by pilot selecting BUS TIE switch to ON, or automatically due to a DC GEN failure) but BUS TIE remains OPEN

- Reset BUS TIE and set to ON

If caution remains connection of the MAIN BUS 1 and 2 not functioning.

- Continue flight

CAUTION

A subsequent DC Generator failure will cause loss of associated MAIN BUS as the BUS TIE will remain open.

LOSS OF MAIN AND/OR AUXILIARY BATTERY SUPPLY

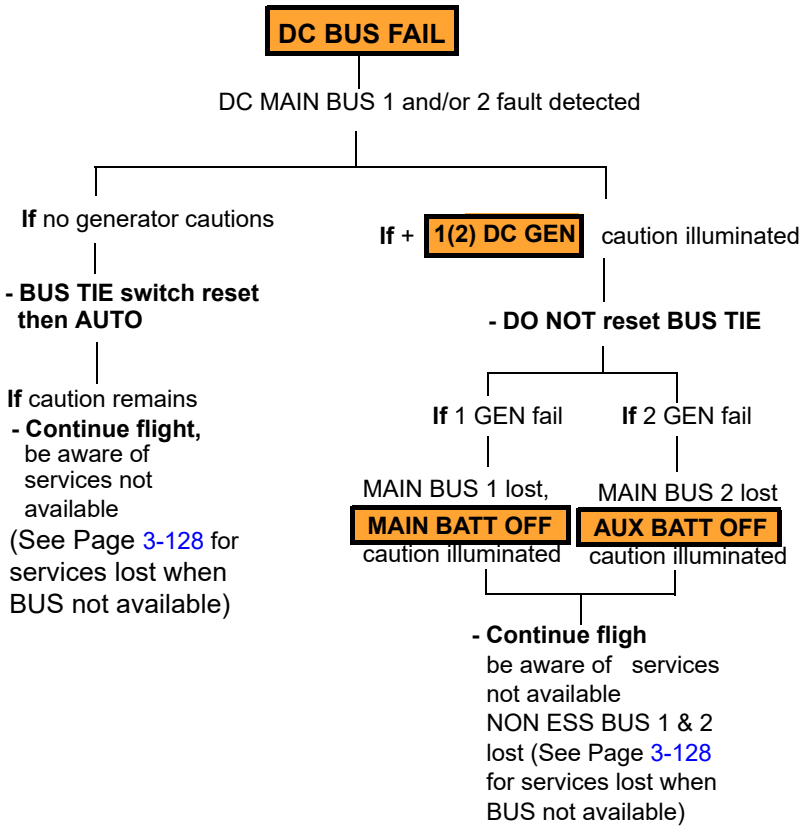
BATT OFF LINE

Failure of MAIN and/or AUX
battery connection to ESS BUS

- Confirm BATTERY MASTER switch ON

- Continue flight being aware MAIN and/or AUX battery not connected to ESS BUS

DC MAIN BUS FAILURE



NOTE

Services lost:

DC MAIN BUS 1

ADM 1
ANTI-COLL LIGHT
CARGO HOOK RELEASE
CLOCK CPLT
COCKPIT CPLT LIGHT
CPLT ICS
(CPLT ICS in back up mode)
CPLT PFD
CSL ILLUM
FD1
HOIST POWER
HOIST CUTTER 1
HOIST CONTROL
HUMS
HYD ELEC PUMP
LINEAR ACTUATOR 1
MAU1 (PRI POWER)
MCDU PLT
MRC 1 (NIM 1, NAV 1)
OVHD PANEL ILLUM
PA
PFD CPLT CONTROL
PITOT 1 FAIL INDICATION
PITOT HEAT 1
RAD ALT 1
UTIL POWER
W/RADAR
XMSN OIL LEVEL SENSOR

Services lost:

DC MAIN BUS 2

AUTO TRIM
BAGGAGE COMPT LIGHT
CABIN LIGHT
COCKPIT/CABIN HEATER
COCKPIT VENT (PLT)
CPLT MFD
DOME LIGHT
FD2
HOIST LIGHT
MAU 1 (AUX POWER)
MCDU CPLT
MRC 2 (ADF & DME)
PLT W/WIPER
PSU
RAD ALT 2
SEARCH LIGHT CONTROL
SEARCH LIGHT POWER
STORM LIGHT
SUN LIGHT CONTROL
VENT CONTROL 2
V/UHF

DC NON ESS BUS 1

CABIN VENT
COCKPIT VENT (CPLT)
CPLT W/WIPE
ECS (COCKPIT)
FUEL DRAIN VALVE
STEP LIGHT
NOSE BAY FAN 1*

DC NON ESS BUS 2

ECS (CABIN)
EXT/SPKR POWER
NOSE BAY FAN 2*

* NOSE BAY FANS for Long Nose Variant only (function on ground only).

AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

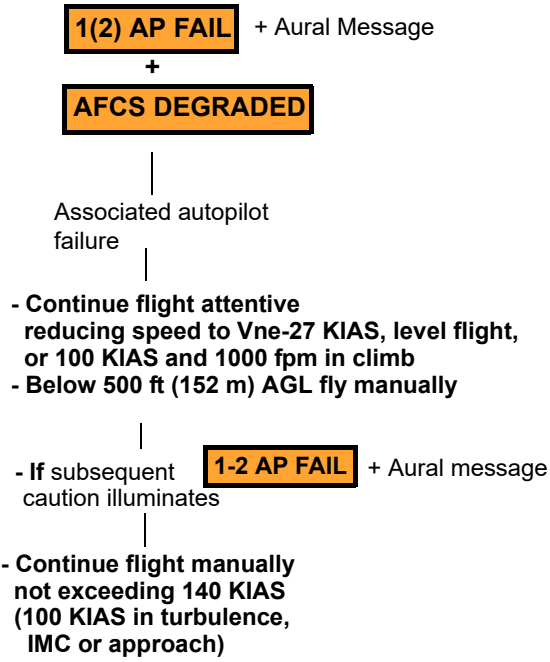
GENERAL

If an AFCS problem is obvious from CAS cautions, failure indications or aircraft response, the Autopilot controller panel should be used to deselect the faulty channel, and the individual behaviour of AP 1 and AP 2 observed.

Illumination of the relevant Autopilot AP channel lights and the display of CAS captions should be used to make a positive diagnosis before, for example, dis-engaging an AFCS channel.

In the event of an un-commanded aircraft disturbance or oscillation, occurring without an AFCS caution, the pilot should selectively dis-engage and re-engage individual channel in order to determine and isolate a potential un-annunciated AFCS fault. This can be achieved through use of the Autopilot AP channel pushbuttons and monitoring of the trim display (Select SYSTEM, FLIGHT CTRL on MFD to display the AFCS synoptic page) and aircraft response.

AUTOPILOT FAIL



AUTOPILOT OFF

1(2) AP OFF + Aural Message

+

AFCS DEGRADED

Associate AP not switched on

On affected AP

- Confirm selected on.

If ON and fault remains

- Continue flight attentive reducing speed to Vne-27 KIAS, level flight, or 100 KIAS and 1000 fpm in climb

- Below 500 ft (152 m) AGL fly manually

- **If** subsequent **1-2 AP OFF** + Aural message caution illuminates

- Continue flight manually not exceeding 140 KIAS (100 KIAS in turbulence, IMC or approach)

AUTOPILOT AXIS OFF

1(2) P(R)(Y) AP OFF + Aural Message

Pitch (Roll)(Yaw) axis of
AP1(2) not engaged

On affected AP

- Disengage and re-engage AP

If fault remains

- Continue flight attentive
- If PITCH axis failed reduce speed to Vne-27 KIAS, level flight, or 100 KIAS and 1000 fpm in climb
- Below 500 ft (152 m) AGL fly manually

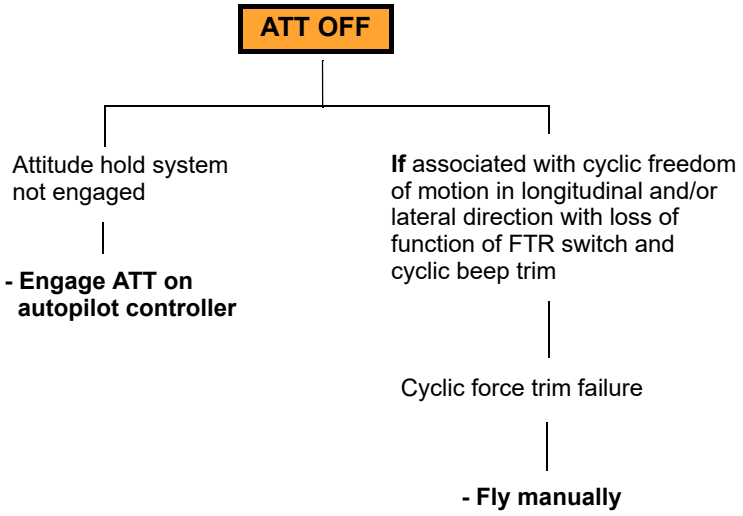
AUTOPILOT AXIS DISENGAGE

1(2) P(R)(Y) AP FAIL + Aural Message

Pitch (Roll)(Yaw) axis of AP1(2)
uncommanded disengagement

- Continue flight attentive
- If PITCH axis failed reduce speed to Vne-27 KIAS, level flight, or 100 KIAS and 1000 fpm in climb
- Below 500 ft (152 m) AGL fly manually

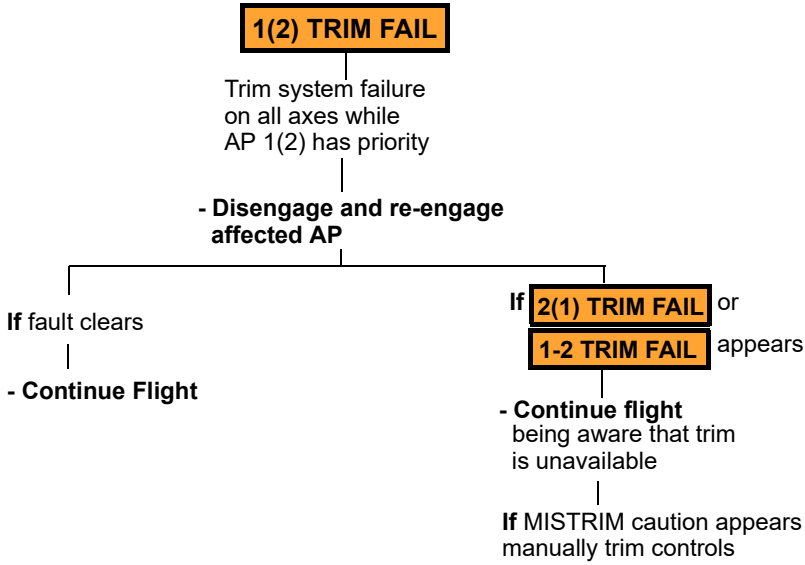
ATTITUDE SYSTEM OFF



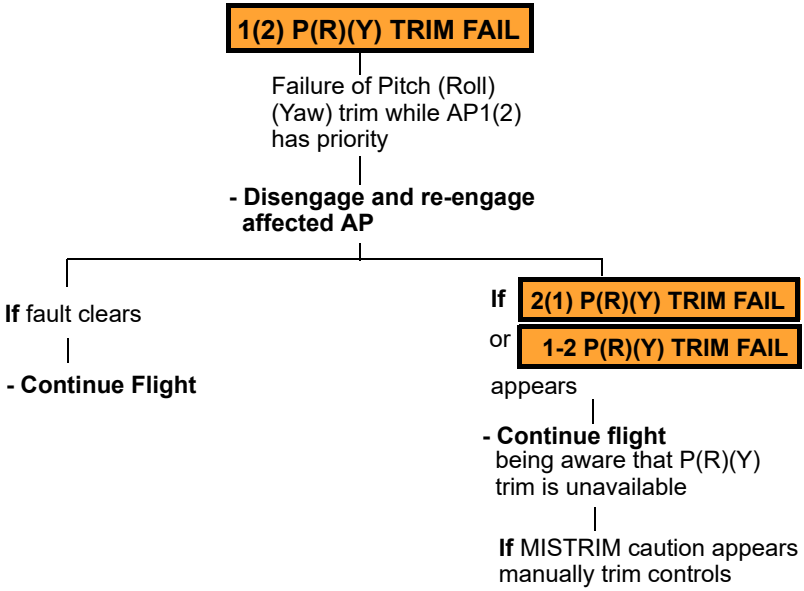
Note

With ATT system not engaged the aircraft flies in SAS mode only (SAS message on PFD).

AFCS TRIM FAILURE



PITCH, ROLL, YAW TRIM FAIL



MISTRIM

MISTRIM

Linear actuators(s) not centered

- Continue flight using FTR button to obtain desired flight condition, and centre linear actuators, being attentive to autopilot functioning.

AFCS DEGRADED

AFCS DEGRADED

AFCS functions degraded

- Continue flight attentive reducing speed to Vne-27 KIAS, level flight, or 100 KIAS and 1000 fpm in climb
- Below 500 ft (152 m) AGL fly manually

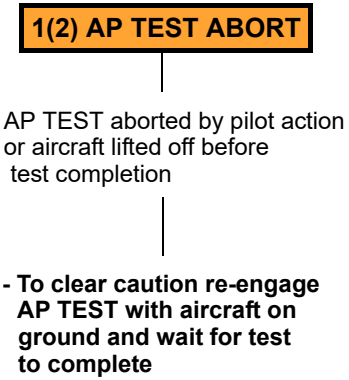
SAS DEGRADED

1(2) SAS DEGRADED

Associated SAS degraded operation

- Continue flight attentive
Expect reduced cyclic sensitivity

AP TEST ABORT



CYCLIC FORCE TRIM OFF OR FAIL

Cyclic force trim switched OFF (FORCE TRIM switch on MISC control panel) or cyclic force trim failure causes a disconnect of the longitudinal and/or lateral clutches and is indicated by the cyclic being free to move in pitch and/or roll axis with loss of functioning of the cyclic trim release (FTR switch) and cyclic beep trim system. The **ATT OFF** caution (SAS message on PFD) may also illuminate.
The cyclic must be used hands-on to prevent it moving from its selected position.

CYCLIC FORCE TRIM RELEASE FAILURE

Cyclic force trim release failure, due to a fault which removes electric power to the clutches of the longitudinal and lateral trim, will result in cyclic longitudinal and lateral clutches becoming permanently engaged. This will require the pilot to fly the aircraft against the cyclic force spring feel to manoeuvre the aircraft, or use the cyclic beep trim, as cyclic FTR button does not function.

COLLECTIVE FORCE TRIM OFF OR FAIL

Collective force trim switched OFF (CLTV/YAW switch on MISC control panel) or collective force trim failure causes a disconnect of the collective clutch and is indicated by the collective being free to move with loss of functioning of the collective trim release (FTR switch).
The collective must be used hands-on to prevent it moving from its selected position or the collective manual friction could be applied as required.

COLLECTIVE FORCE TRIM RELEASE FAILURE

Collective force trim release failure, due to a fault which removes electric power to the clutches of the collective trim, will result in collective clutches becoming permanently engaged. This will require the pilot to fly the aircraft against the collective force spring feel to manoeuvre the aircraft as the collective FTR button does not function.

AFCS QUICK DISCONNECT PROCEDURE

For situations where faults are suspected in the AFCS, but with no CAS cautions illuminated, and the AP functions need to be disengaged, all AP/AFCS functions can be disconnected by pressing the SAS REL button on the cyclic grip.

DISPLAY UNIT MALFUNCTIONS

PRIMARY OR/AND MULTIFUNCTIONAL FLIGHT DISPLAY UNIT FAILURE

Loss of either PFD or MFD will automatically configure remaining display to Composite mode (see following page for failure diagrams)

- **Continue flight using composite mode**

- **If** failed screen becomes intermittent it can be powered down by switching associated RCP switch to functioning display.

  (Switching to PFD ONLY, powers down MFD
  Switching to MFD ONLY, powers down PFD)

Note

If failed screen returns valid, it can be restored by switching associated RCP switch to functioning display and back to NORM.

Note

MFD menu bar not functional if PFD in composite mode and MFD returns valid.

If subsequent loss of display in Composite mode

- **If** Left pilot displays failed and Left pilot flying

  - Right pilot take control of aircraft

- **If** Right pilot displays failed and Right pilot flying

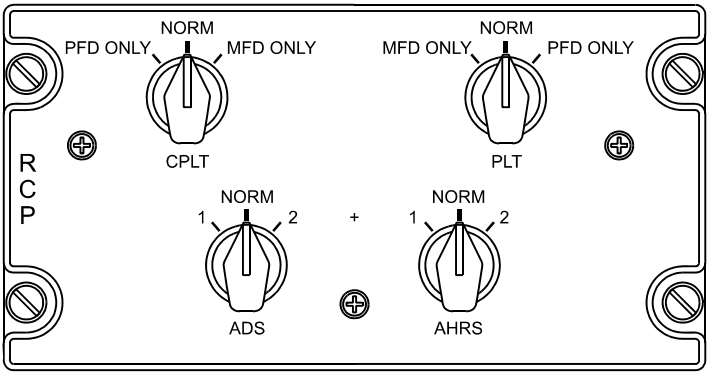
  - **Revert to Standby instrument**

    - **Land as soon as practicable**

Note

When using Standby instrument the correct Vne must be determined from the Vne placard.

Reversion Control Panel



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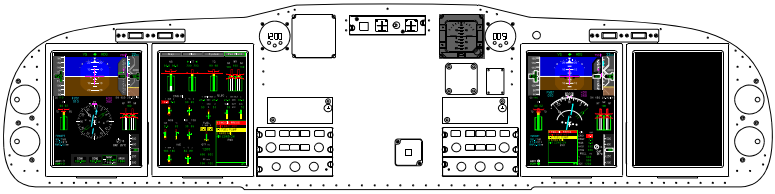
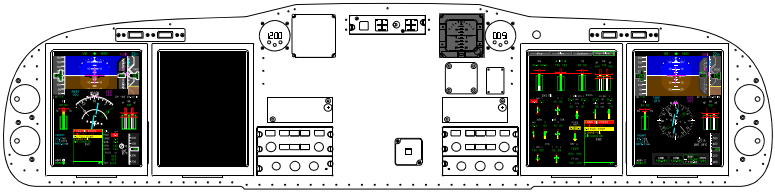
PFD/MFD DISPLAY FAILURES



Failure of Right pilot PFD, automatic reversion of MFD to Composite Mode. Right pilot RCP switch set to MFD ONLY switches PFD OFF.



Failure of Left pilot MFD, automatic reversion of PFD to Composite Mode. Left pilot RCP switch set to PFD ONLY switches MFD OFF.

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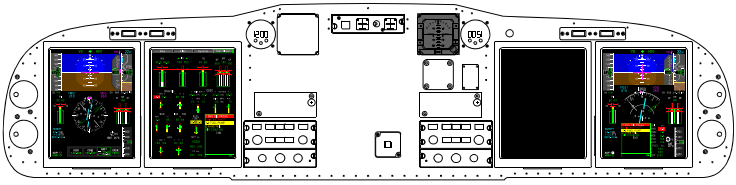
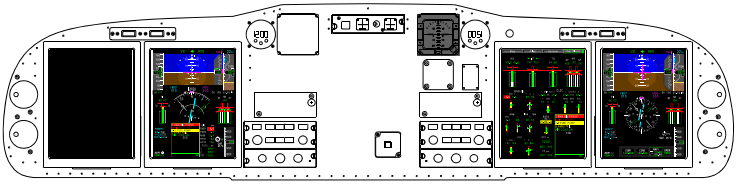
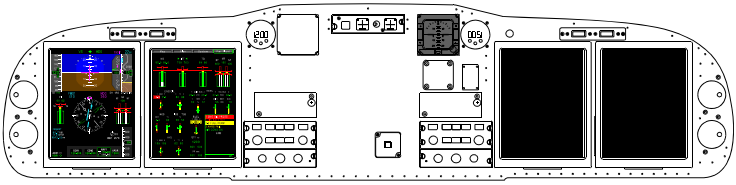


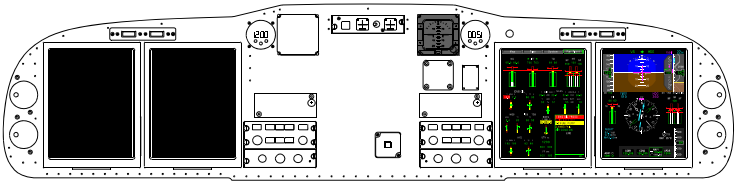
Failure of Right pilot MFD, automatic reversion of PFD to Composite Mode. Right pilot RCP switch set to PFD ONLY switches MFD OFF.



Failure of Left pilot PFD, automatic reversion of MFD to Composite Mode. Left pilot RCP switch set to MFD ONLY switches PFD OFF.



Failure of both Right pilot PFD and MFD.



Failure of both Left pilot PFD and MFD.

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DISPLAY UNIT OVERHEATING

1(2)(3)(4) DU OVHT

Associated display overheat

Expect format to be distorted
or disappear

- Increase cockpit ventilation if possible

If DU fails, the remaining associated display automatically reverts to Composite mode.

DISPLAY UNIT DEGRADED

1(2)(3)(4) DU DEGRADED

+

Possible **1(2)(3)(4) DU** on associated display unit

On associated display unit
possible misleading/loss graphics data.

On Ground

- Shut down aircraft for maintenance action

In flight

- Revert unaffected DU to Composite Mode by switching associated RCP switch to functioning DU

ICE PROTECTION

PITOT HEATER FAILURE

1(2) PITOT FAIL

Associated pitot heater failure

- Exit icing conditions as soon as possible

PITOT HEATER OFF

1(2) PITOT HEAT OFF

Associated pitot heater is selected OFF and OAT below 4° C

- Select associated PITOT HEATER switches ON

ENVIRONMENTAL CONTROL SYSTEM

VENT FAN FAILURE

VENT FAIL

Failure of the CREW vent fan

- Confirm, using Advisory indications, if fan has failed (not illuminated)

On failed vent fan
- Switch OFF
- Open windows if operating below 25 kts, MPOG, HIGE or HOGE

NOSE AVIONIC FANS FAILURE

VENT FAIL + **NOSE FAN 1 OFF** + **NOSE FAN 2 OFF**

(Caution triggered on ground only)

Failure of both nose avionic bay fans

- Shutdown aircraft

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AVIONICS

AHRS FAILURE

1(2) AHRS FAIL
AVIONIC FAULT
1(2) AP FAIL

AFCS DEGRADED
+ Aural message

\+ ATT FAIL HDG FAIL and loss of attitude, heading and slip skid data on Left (Right) PFD

Associated AHRS failure
(and subsequent 1(2) AP failure)

- On RCP move AHRS switch to non failed AHRS

AHRS 2(1) illuminates on attitude indicator to highlight both attitude indicators are using the same source data

- Compare frequently PFD attitude and heading with STANDBY instruments.

ADS FAILURE

1(2) ADS FAIL

+

and loss of:

Airspeed
Altitude
Vertical Speed

data on Left (Right)
PFD indicators

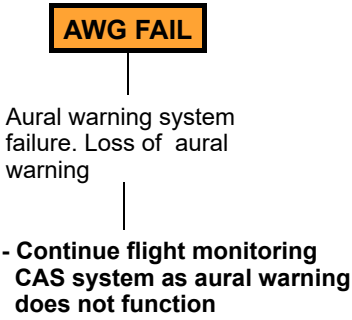
Associated ADS system failure

- On RCP move ADS switch to non failed ADS

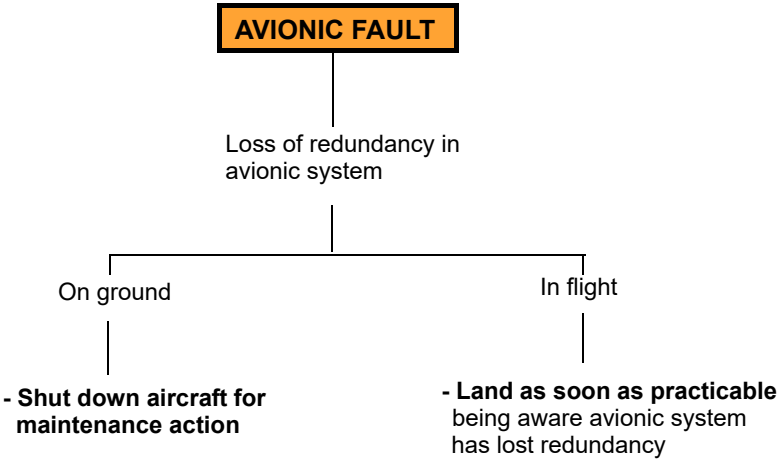
ADS1(2) illuminates on attitude indicator to highlight both air data indicators systems are using the same source data

- Compare frequently PFD data with STANDBY indicator.

AURAL WARNING SYSTEM FAILURE



AVIONIC FAULT



MODULAR AVIONICS UNIT OVERHEAT/FAIL

1(2) MAU OVHT

Associated MAU overheat

If MAU fails be aware of the following:

If **1(2) MAU** message displayed on PFD combined with multiple CAS cautions being generated then MAU 1(2) has failed. Carry out the following essential actions before continuing to the list of cautions:

- **Continue flight attentive**
- **On RCP move ADS switch to non failed ADS**
- **Reduce speed to Vne-27 KIAS, level flight, or 100 KIAS and 1000 fpm in climb**
- **Below 500 ft (152 m) AGL fly manually**
- **Compare frequently PFD data with STANDBY indicator.**

If MAU 1 fails:

1 MAU message displayed on PFD

CAS Messages displayed

AVIONIC FAULT page 3-147
1 AP FAIL page 3-130
AFCS DEGRADED page 3-135
1 ADS FAIL page 3-146
1 FMS FAIL page 3-153
1 PITOT FAIL (only if 1 PITOT HEATER switch OFF) page 3-142
FDR FAIL page 3-152

Procedure continues on next page

MODULAR AVIONICS UNIT OVERHEAT/FAIL CONT

Secondary parameters not valid:

MGB OIL TEMP, MGB OIL PRESS
1 HYD OIL TEMP, 1 HYD OIL PRESS
1 ENG OIL TEMP, 1 ENG OIL PRESS
1 FUEL PUMP, MAIN BUS 2 VOLT
ESS BUS 1 VOLT, DC GEN 1 AMP,
NON ESS BUS 1, AUX BATTERY AMP
Loss of redundancy in backup engine parameters N°1 engine
Loss of redundancy in monitor warning functions N°1
Loss of redundancy of MCDU 1 Primary Radio Control

CAS Cautions NOT Available

1 ENG OIL TEMP
EMERG LDG PRESS
MAIN BATT OFF
EXT PWR DOOR
1 PITOT HEAT OFF
1 WOW FAIL
1 MCDU OVHT
1 MAU OVHT
1 ECL FAIL
1 ECL POS
1 FUEL HEATER
1 FUEL ICING

CAS Advisories NOT Available

LANDING LT ON
EXT PWR READY
FWD VENT

CAUTION

In case of MAU 1 failure, do not use electrical and hydraulic synoptic page information

If MAU 2 fails

2 MAU message displayed on PFD

CAS Messages displayed:

AVIONIC FAULT page 3-147
2 AP FAIL page 3-130
AFCS DEGRADED page 3-135
2 ADS FAIL page 3-146
2 FMS FAIL page 3-153
AWG FAIL page 3-147
GPS FAIL page 3-154
2 PITOT FAIL (only if 2 PITOT HEATER switch OFF) page 3-142

Secondary parameters not valid:

IGB OIL TEMP, TGB OIL TEMP
2 HYD OIL TEMP, 2 HYD OIL PRESS
2 ENG OIL TEMP, 2 ENG OIL PRESS
2 FUEL PUMP, MAIN BUS 1 VOLT
ESS BUS 2 VOLT, DC GEN 2 AMP,
NON ESS BUS 2, MAIN BATTERY AMP
Loss of redundancy in backup engine parameters N°2 engine
Loss of redundancy in monitor warning functions N°2
Loss of redundancy of MCDU 2 Primary Radio Control

Procedure continues on next page

MODULAR AVIONICS UNIT OVERHEAT/FAIL CONT

CAS Cautions NOT Available

2 ENG OIL TEMP
TGB OIL TEMP
IGB OIL TEMP
AUX BATT OFF
2 PITOT HEAT OFF
2 WOW FAIL
2 MCDU OVHT
2 MAU OVHT
2 ECL FAIL
2 ECL POS
2 FUEL HEATER
2 FUEL ICING

CAS Advisories NOT Available

LDG EMER DOWN
EXT PWR ON
PARK BRK ON
SEARCH LT ON

CAUTION

In case of MAU 2 failure, do not use electrical and hydraulic synoptic page information.

MULTIFUNCTION CONTROL DISPLAY UNIT OVERHEATING

1(2) MCDU OVHT

Associated MCDU overheat

Expect keyboard non functioning and/or display to be distorted or disappear

- Increase cockpit ventilation if possible

If MCDU fails
- Use radio tuning function with CCD on PFD

SYSTEM CONFIGURATION FAILURE

SYS CONFIG FAIL

Hardware or sofware configuration problem (displayed on ground only)

- Maintenance action

VALIDATE CONFIGURATION

VALIDATE CONFIG

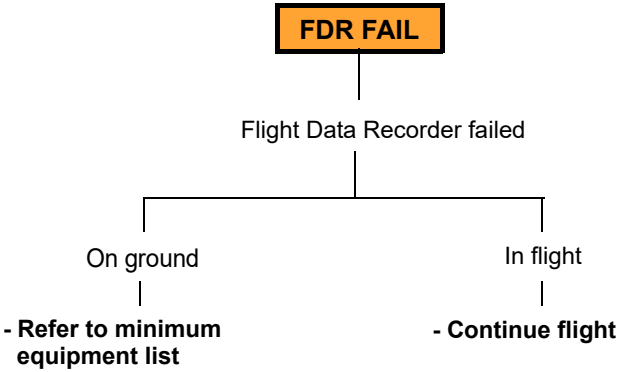
Hardware or software changed, configuratiion validation operation required (displayed on ground only)

- Select SYSTEM on MFD, from drop down menu select SYS CONFIG to display the configuration page. To validate configuration press ENTER on CCD.

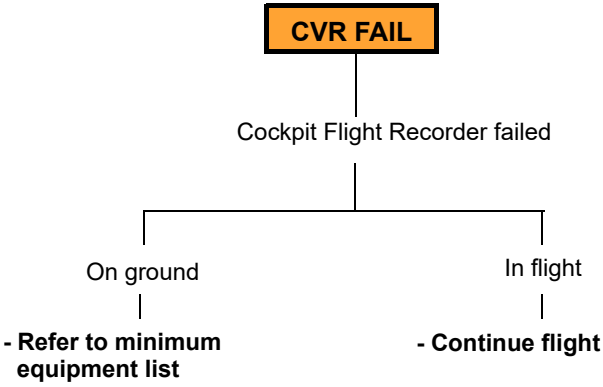
If caution remains

- Maintenance Action

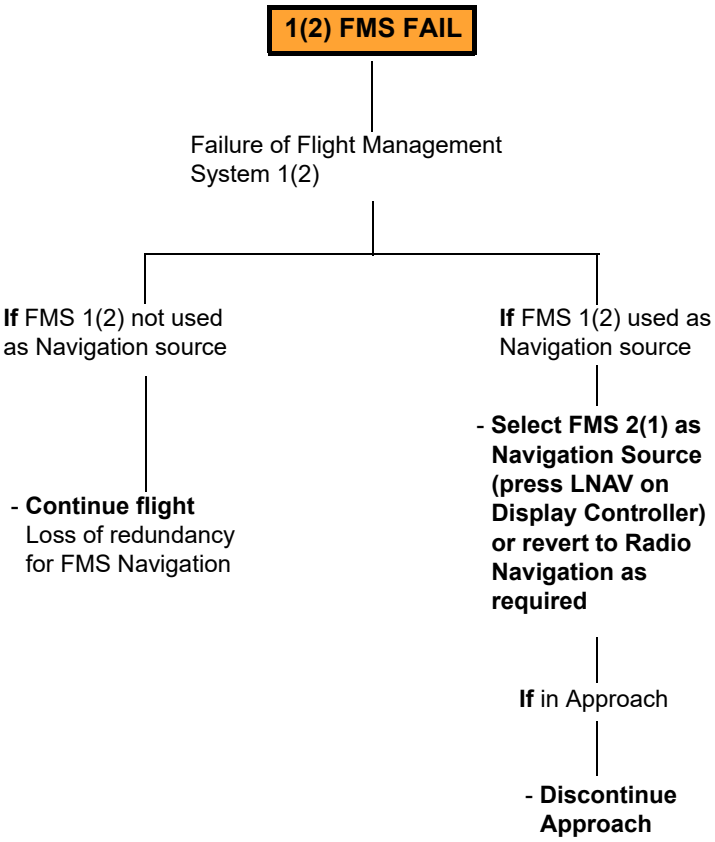
FLIGHT DATA RECORDER FAILURE



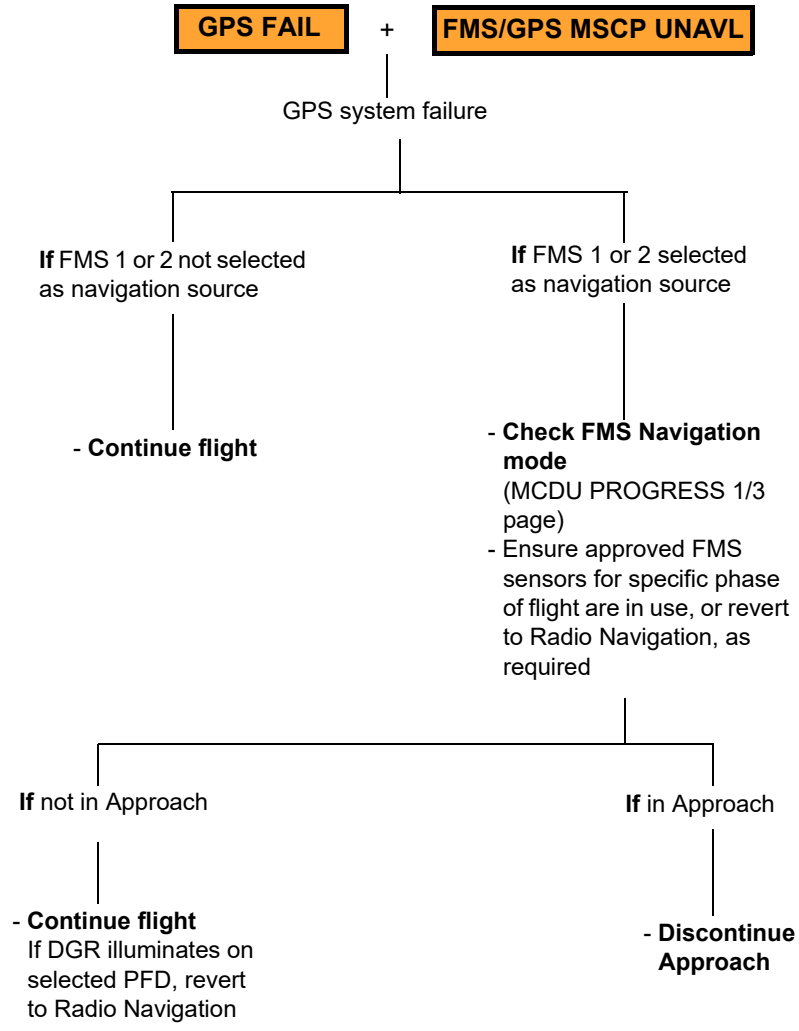
COCKPIT VOICE RECORDER FAILURE



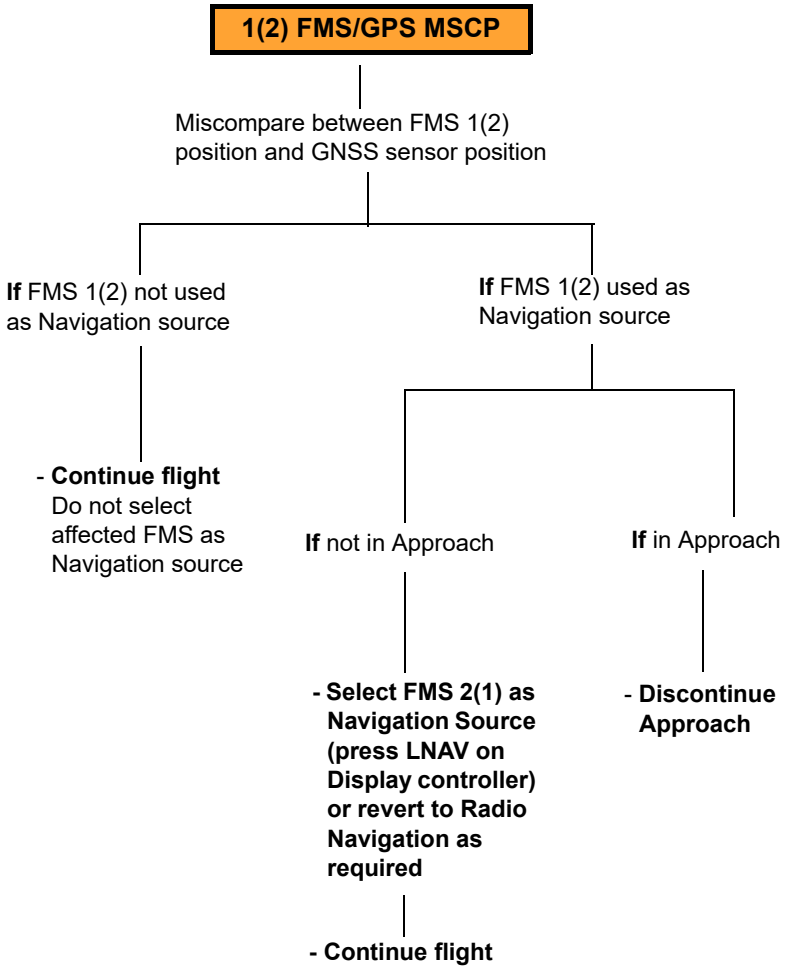
FLIGHT MANAGEMENT SYSTEM FAILURE



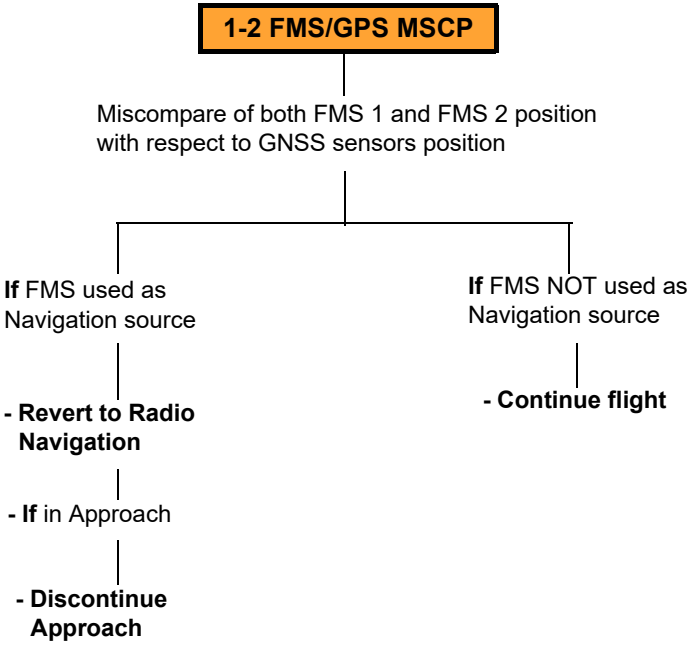
GPS FAIL


GPS FAIL
+
FMS/GPS MSCP UNAVL
GPS system failure
If FMS 1 or 2 not selected as navigation source
If FMS 1 or 2 selected as navigation source
- Continue flight
- Check FMS Navigation mode (MCDU PROGRESS 1/3 page)
- Ensure approved FMS sensors for specific phase of flight are in use, or revert to Radio Navigation, as required
If not in Approach
If in Approach
- Continue flight
If DGR illuminates on selected PFD, revert to Radio Navigation
- Discontinue Approach

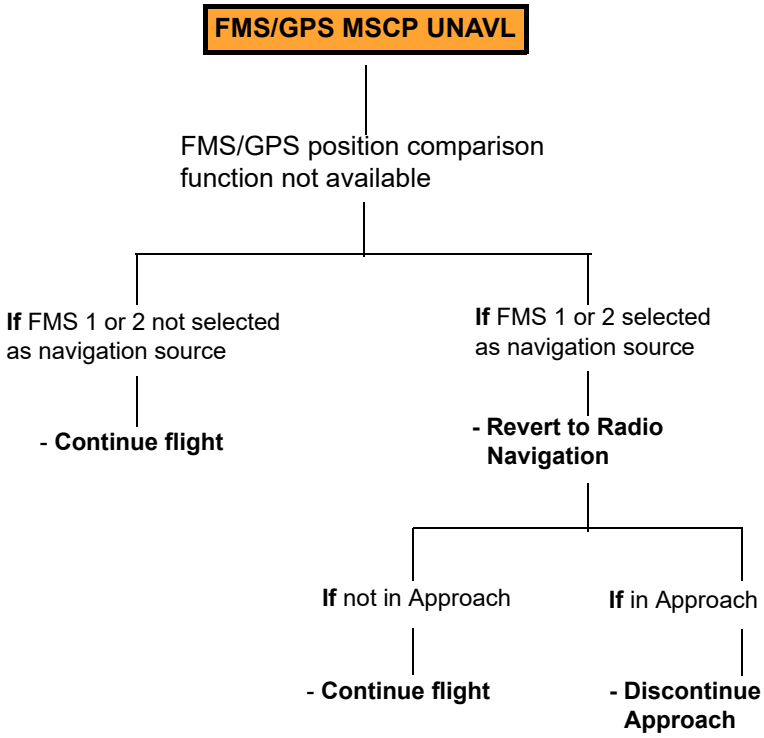
SINGLE FMS/GPS MISCOMPARE



DUAL FMS/GPS MISCOMPARE



FMS/GPS MISCOMPARE UNAVAILABLE



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COMMUNICATION SYSTEM

VHF OVERHEAT

1(2) VHF COM OVHT

Associated radio transmitter overheat

On affected radio

- Minimise operation if possible

AUDIO PANEL FAILURE

1(2)(3)(4)(5)(6)(7)(8) AUDIO FAIL

Associated audio panel system failed

- Revert to back up ICS on audio panel to communicate with crew and transmit on failed side VHF only.

CAUTION

When Audio Panel 1/2 has been reverted to back-up mode audio tones and voice warnings cannot be heard by on side crew.

Note

Audio panel identification: 1-Copilot, 2-Pilot, 3-Hoist Operator, 4-Cabin Operator (if installed), 5-2nd Cabin Operator (if installed), 6-3rd Cabin Operator (if installed), 7-Reserved, 8-Reserved.

MRC OVERHEAT

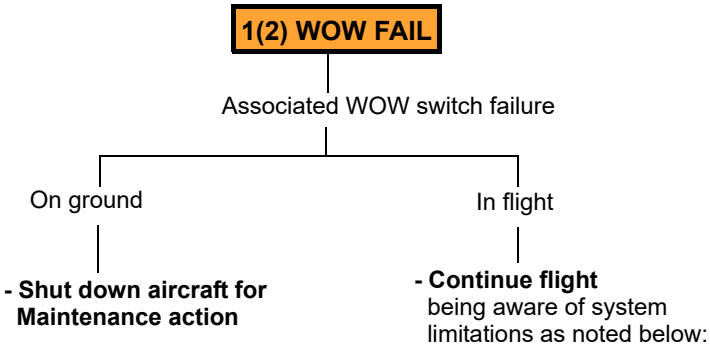
1(2) MRC OVHT

Associated Radio/Nav modular system overheat

- Continue flight
being aware that Radio or Nav system may malfunction.

MISCELLANEOUS

WEIGHT ON WHEELS SWITCH FAILURE



1 WOW FAIL to ground:

1 AHRS TEST function not inhibited in flight

2 WOW FAIL to ground:

2 AHRS TEST function not inhibited in flight

FUEL TEST function not inhibited in flight

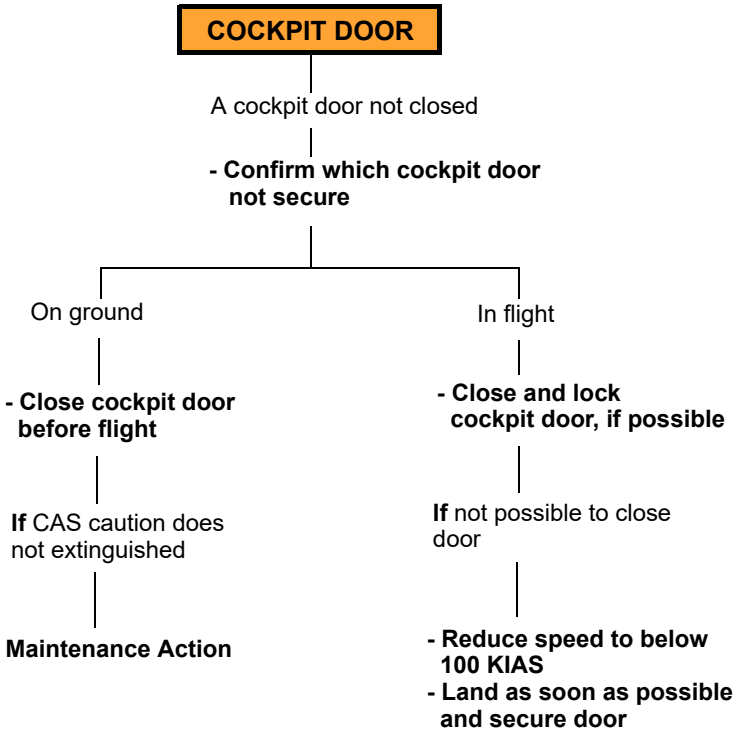
Note

1(2) WOW FAIL caution may illuminate spuriously during slope take-off or landing procedure.

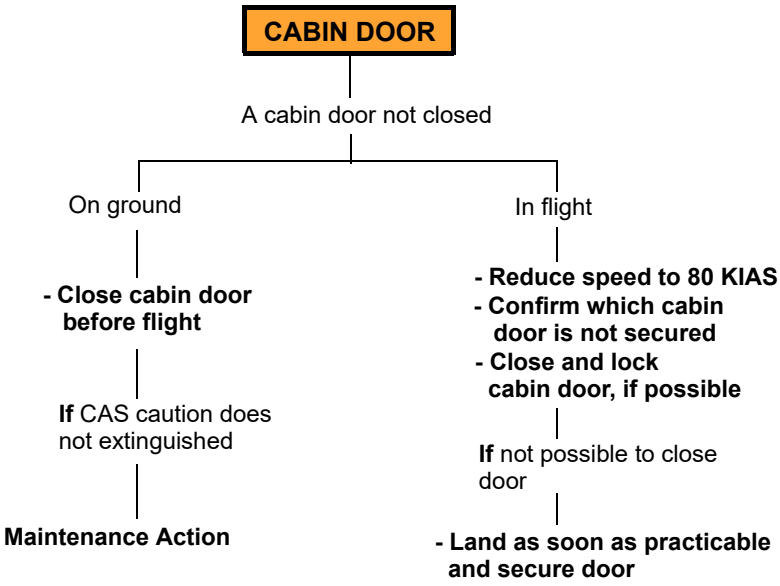
Note

Illumination of the WOW FAIL caution, when the LDG GEAR is DOWN, will cause the LDG GEAR lever to be locked in the down position so subsequent retraction of the landing gear is not possible.

COCKPIT DOOR OPEN



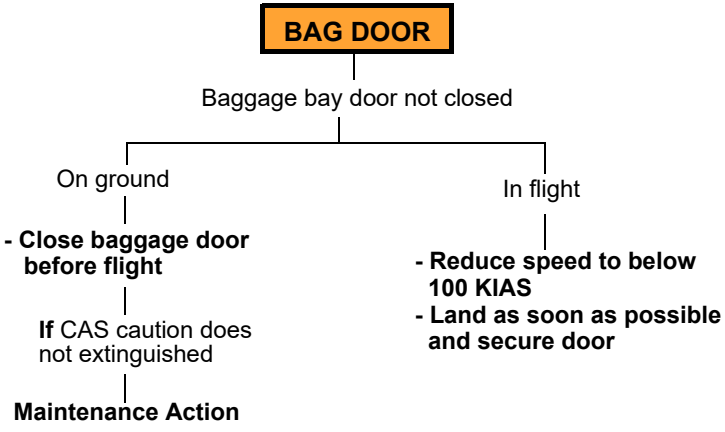
CABIN DOOR OPEN



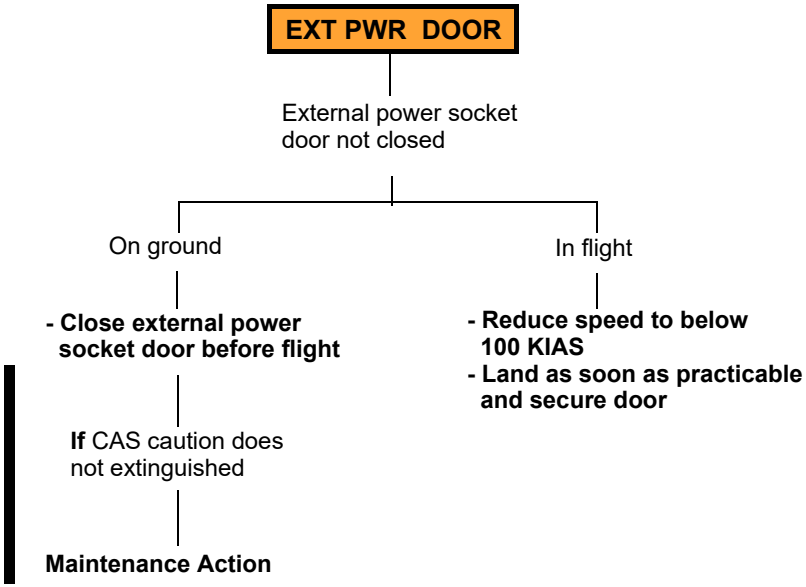
CAUTION

When opening or closing cabin door in flight hold door handle until door is at full travel and locked.

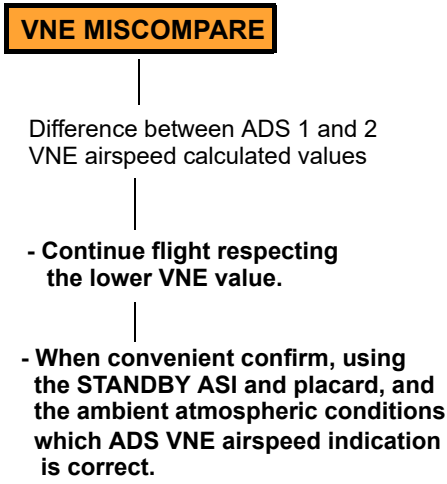
BAGGAGE BAY DOOR OPEN



EXTERNAL POWER SOCKET DOOR OPEN



AIRCRAFT NEVER EXCEED SPEED MISCOMPARE



LANDING GEAR RETRACTED

LANDING GEAR + Voice Warning

Landing gear retracted when aircraft height is less than 150 ft (46 m) AGL
Additionally
For Phase 7 and later, (if option enabled) landing gear retracted when aircraft groundspeed falls below 30 kt.

- Extend landing gear

AIRCRAFT NEVER EXCEED SPEED

Voice warning 'AIRSPEED AIRSPEED' and airspeed indication RED

- Confirm airspeed

- Reduce/maintain speed below Vne

LANDING GEAR FAILS TO RAISE

Landing gear selected up but one or more amber lights remains illuminated

- Confirm landing gear circuit breakers in

- Check DOWN EMERG pushbutton not selected

- Cycle landing gear lever from UP to DOWN and allowing time for the landing gear to lock down and then select UP

If one or more amber lights remain illuminated

- Select landing gear DOWN

- Continue flight
being aware that fuel consumption will be increased due to lowered undercarriage

Note

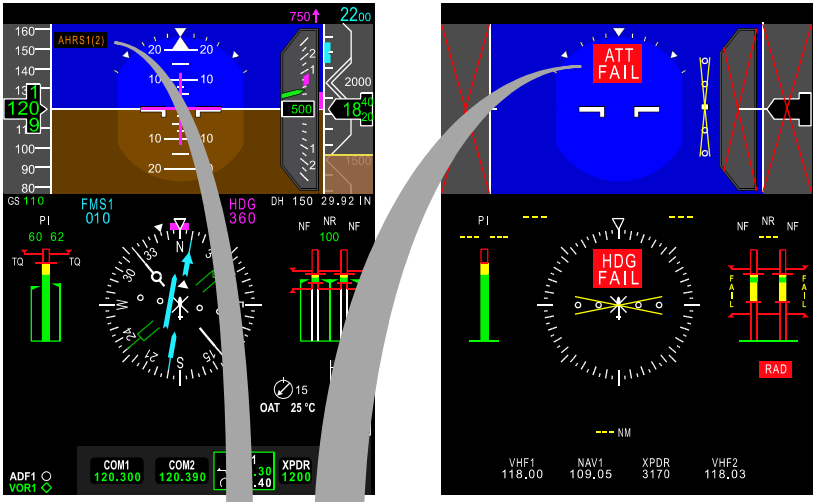
If undercarriage has been extended using the EMER DOWN then subsequent retraction is not possible.

Note

For OAT of -30° C and below undercarriage retraction time may double.

PRIMARY AND MULTIFUNCTIONAL FLIGHT DISPLAY MESSAGES

ATTITUDE DISPLAY FAILURE



ICN-39-A-153000-A-00003-00833-A-01-1

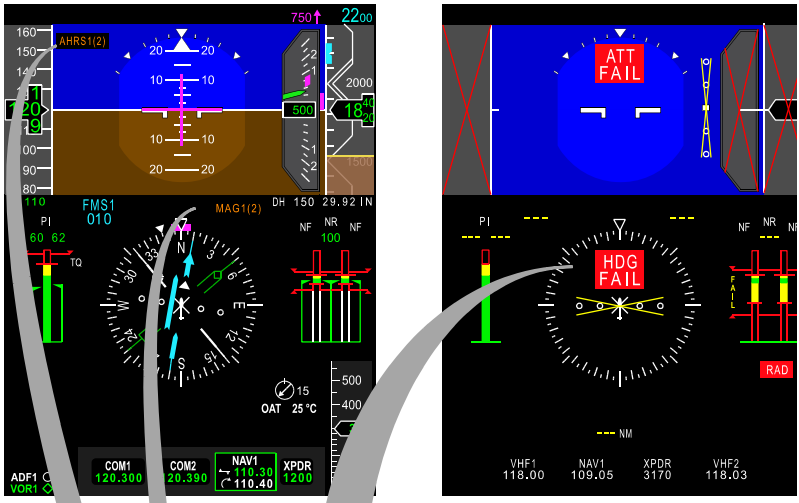
ATT FAIL loss of attitude data and slip skid indicator on associated attitude display

- On RCP move AHRS switch to other AHRS (1 = Copilot side, 2 = Pilot side)

AHRS1(2) illuminates on attitude indicator to highlight both attitude indicators are using the same source data

- Compare frequently PFD attitude with STANDBY attitude indicator.

HEADING DISPLAY FAILURE



ICN-39-A-153000-A-00003-00834-A-01·

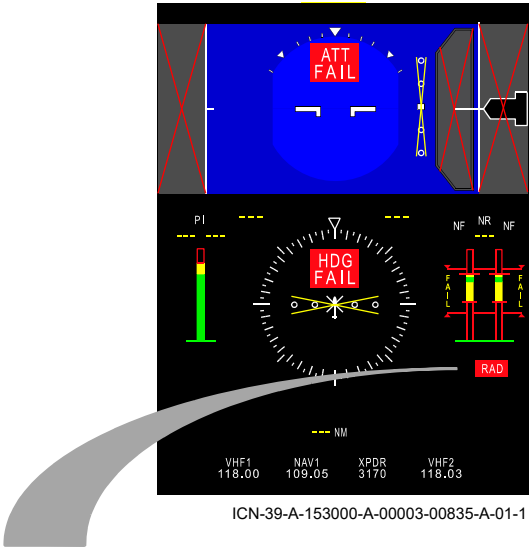
HDG FAIL loss of heading data on associated HSI display

- On RCP move AHRS switch to other AHRS (1 = Copilot side, 2 = Pilot side)

AHRS1(2) + **MAG1(2)** or **DG1(2)** illuminates on PFD to highlight both attitude indicators are using the same source data

- Compare frequently PFD heading with STANDBY Compass.

RAD ALT FAILURE



ICN-39-A-153000-A-00003-00835-A-01-1

RAD and loss of RAD ALT information on PFD

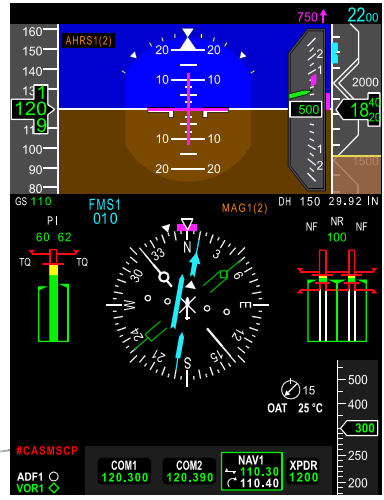
Failure of RAD ALT system

- Continue flight being aware that RAD ALT functioning is lost and MIN message is inactive

CAUTION

When the RAD ALT fails, the 150 ft aural warning message does not function and the LANDING GEAR caution will be displayed if the LDG GEAR is retracted, regardless of height.

CAS WARNING MESSAGE LIST DISCREPANCY



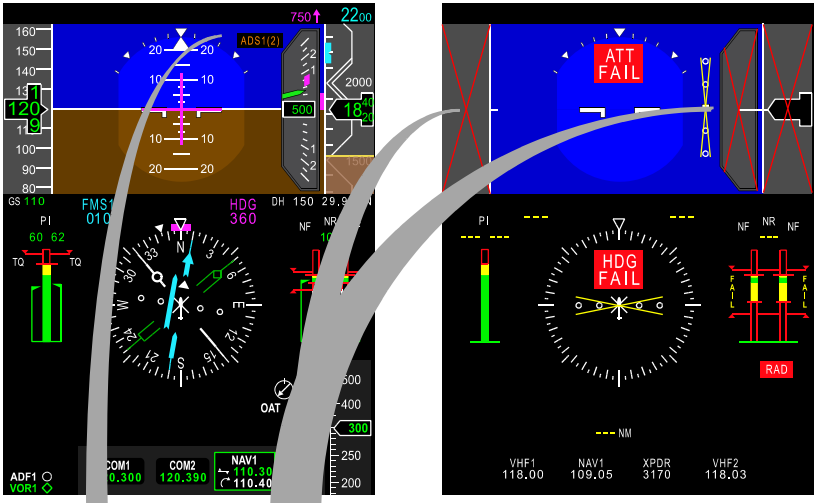
ICN-39-A-153000-A-00003-00836-A-01-1

1(2)CASMSCP on PFD display

MAU 1 (MAU 2) CAS WARNING
message list has discrepencies

- Pilot press “ENTER” key on CCD while symbol is displayed adjacent the caption to toggle between CAS LIST 1 and 2. Confirm which message(s) are giving the ‘MISCOMPARE’

ADS FAILURE



ICN-39-A-153000-A-00003-00837-A-01-1

on affected indicators and
loss of data on:
Airspeed and/or
Altitude and/or
Vertical Speed
displays on PFD

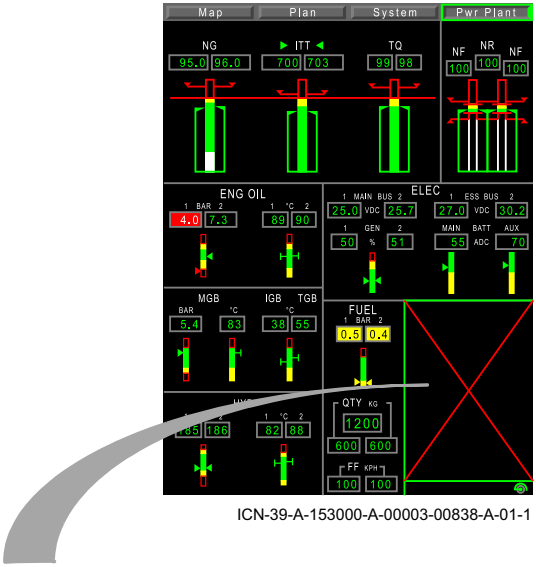
Failure of ADS system

- On RCP move ADS switch to other ADS (1 = Copilot side, 2 = Pilot side)

ADS1(2) illuminates on attitude indicator to highlight both air data indicators systems are using the same source data

- Compare frequently PFD data with STANDBY indicator.

FAILURE OF CAS DATA



ICN-39-A-153000-A-00003-00838-A-01-1

on CAS window and
loss of CAS information

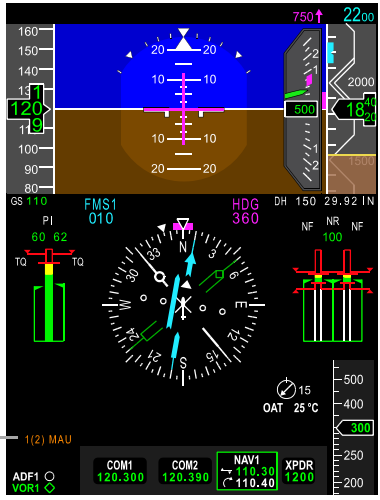
Failure of CAS warning and caution
information

- Land as soon as practicable

MAU MESSAGE ON PFD

CAUTION

In case of MAU 1(2) failure, do not use electrical and hydraulic synoptic page information.



ICN-39-A-153000-A-00003-00839-A-01-1

If **1(2) MAU** message displayed on PFD without multiple CAS cautions being generated

Associated MAU degraded

- No Pilot action

If **1(2) MAU** message combined with multiple CAS cautions being generated then MAU 1(2) has failed, carry out the following essential actions before continuing to the list of cautions:

- Continue flight attentive
- On RCP move ADS switch to non failed ADS
- Reduce speed to Vne-27 KIAS, level flight, or 100 KIAS an 1000 fpm in climb
- Below 500 ft (152 m) AGL fly manually
- Compare frequently PFD data with STANDBY indicator.

Procedure continues on next page

MAU MESSAGE ON PFD (CONT) MAU 1 FAILURE

Continues from previous page

1 MAU failure will be associated with the following CAS cautions:

AVIONIC FAULT page 3-147
1 AP FAIL page 3-130
AFCS DEGRADED page 3-135
1 ADS FAIL page 3-146
1 FMS FAIL page 3-153
1 PITOT FAIL (only if 1 PITOT HEATER switch OFF) page 3-142
FDR FAIL page 3-152

and system parameters not valid (amber dashed):

MGB OIL TEMP, MGB OIL PRESS
1 HYD OIL TEMP, 1 HYD OIL PRESS
1 ENG OIL TEMP, 1 ENG OIL PRESS
1 FUEL PUMP, MAIN BUS 2 VOLT
ESS BUS 1 VOLT, DC GEN 1 AMP,
NON ESS BUS 1, AUX BATTERY AMP
Loss of redundancy in backup engine parameters N°1 engine
Loss of redundancy in monitor warning functions N°1
Loss of redundancy of MCDU 1 Primary Radio Control

CAS Cautions NOT Available

1 ENG OIL TEMP
EMERG LDG PRESS
MAIN BATT OFF
EXT PWR DOOR
1 PITOT HEAT OFF
1 WOW FAIL
1 MCDU OVHT
1 MAU OVHT
1 ECL FAIL
1 ECL POS
1 FUEL HEATER
1 FUEL ICING

CAS Advisories NOT Available

LANDING LT ON
EXT PWR READY
FWD VENT

CAUTION

In case of MAU 1(2) failure, do not use electrical and hydraulic synoptic page information

Procedure continues on next page

MAU MESSAGE ON PFD (CONT) MAU 2 FAILURE

Continues from previous page

2 MAU failure will be associated with the following CAS cautions:

AVIONIC FAULT page 3-147
2 AP FAIL page 3-130
AFCS DEGRADED page 3-135
2 ADS FAIL page 3-146
2 FMS FAIL page 3-153
AWG FAIL page 3-147
GPS FAIL page 3-154
2 PITOT FAIL (only if 2 PITOT HEATER switch OFF) page 3-142

and system parameters not valid (amber dashed):

IGB OIL TEMP, TGB OIL TEMP
2 HYD OIL TEMP, 2 HYD OIL PRESS
2 ENG OIL TEMP, 2 ENG OIL PRESS
2 FUEL PUMP, MAIN BUS 1 VOLT
ESS BUS 2 VOLT, DC GEN 2 AMP,
NON ESS BUS 2, MAIN BATTERY AMP
Loss of redundancy in backup engine parameters N°2 engine
Loss of redundancy in monitor warning functions N°2
Loss of redundancy of MCDU 2 Primary Radio Control

CAS Cautions NOT Available

2 ENG OIL TEMP
TGB OIL TEMP
IGB OIL TEMP
AUX BATT OFF
2 PITOT HEAT OFF
2 WOW FAIL
2 MCDU OVHT
2 MAU OVHT
2 ECL FAIL
2 ECL POS
2 FUEL HEATER
2 FUEL ICING

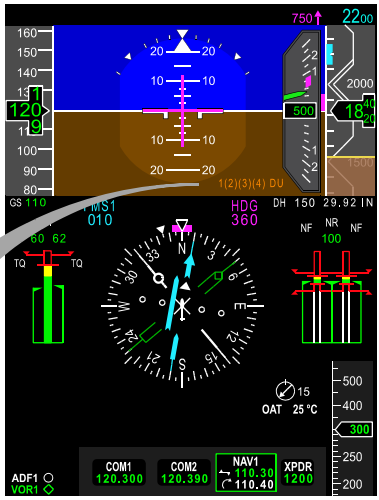
CAS Advisories NOT Available

LDG EMER DOWN
EXT PWR ON
PARK BRK ON
SEARCH LT ON

CAUTION

In case of MAU 1(2) failure, do not use electrical and hydraulic synoptic page information

DISPLAY UNIT GRAPHIC MALFUNCTION



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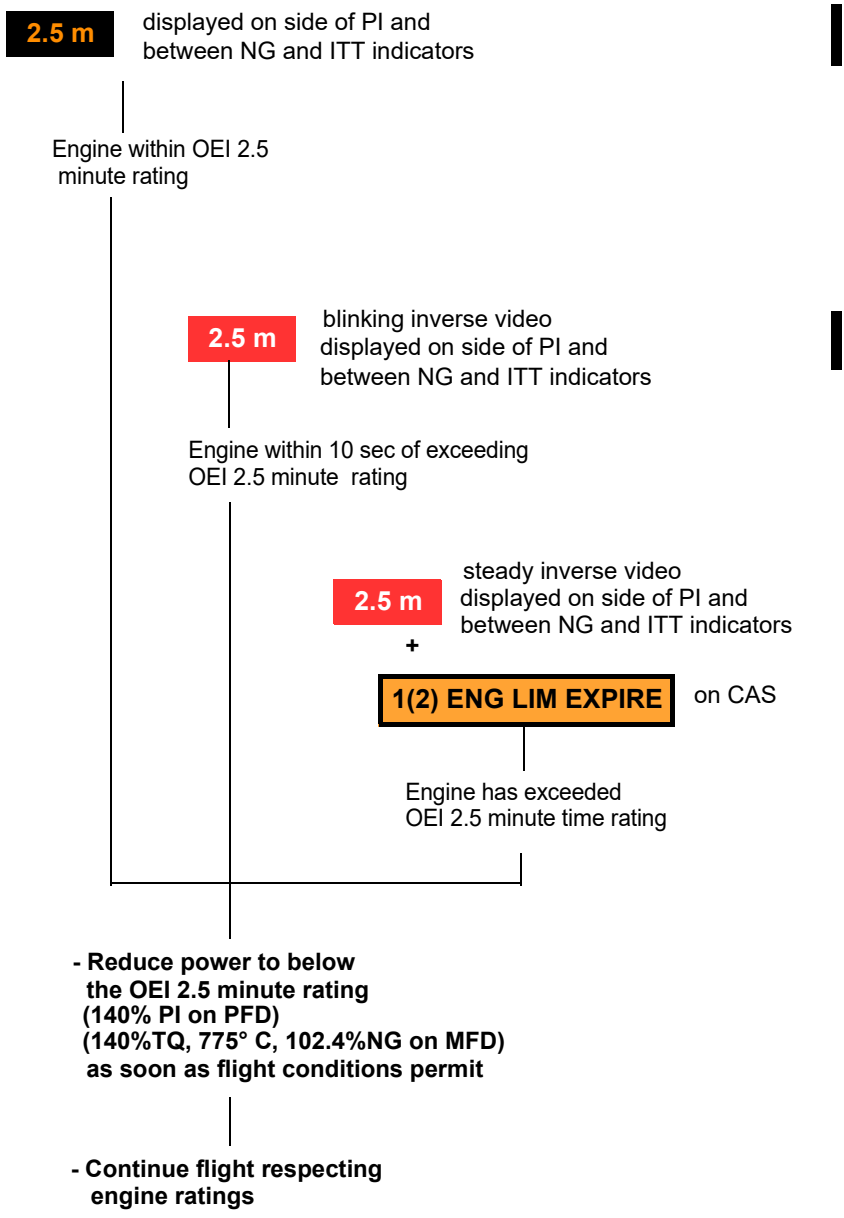
1(2)(3)(4) DU on attitude indicator

On associated display unit
possible misleading/loss of graphics data.

- Revert unaffected DU to Composite Mode by switching associated RCP switch to functioning DU

2.5 MINUTE RATING



ENGINE STATE INDICATION ON PFD AND MFD

OEI

on side of PI, TQ
ITT and NG indicators
of failed engine

Associated engine failed

- Fly aircraft in accordance with OEI operational techniques

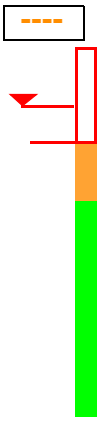
MAN

on side of PI
and TQ indicators

Associated ENG GOV switched
to MANUAL.

Operate engine in manual control using Beep switch on collective. If possible the torque of the manually controlled engine should be set at a torque level 10% below the other engine.

FAILURE OF PI DISPLAY



Loss of digital display

Loss of PI cursor

Failure of associated side EEC **and** analogue data (TQ, ITT, NF)

or

Failure of ADS 1 and 2, (both engine cursors and digital display affected)

- Select PWR PLANT page on MFD

- Continue flight

FAILURE OF NF DISPLAY

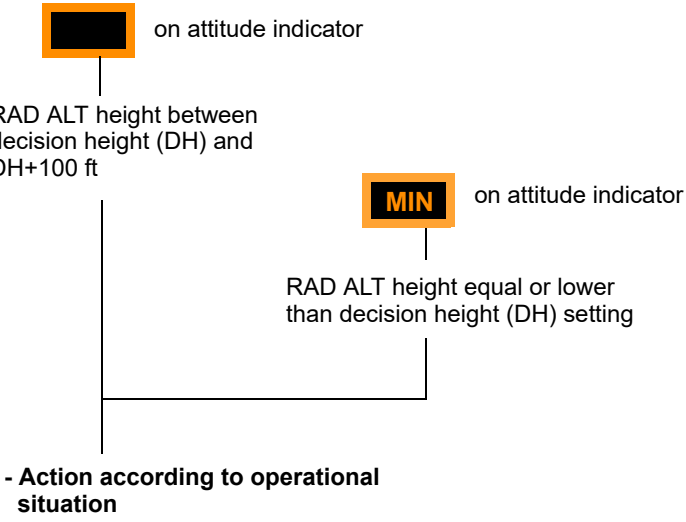


on side of NF indicator

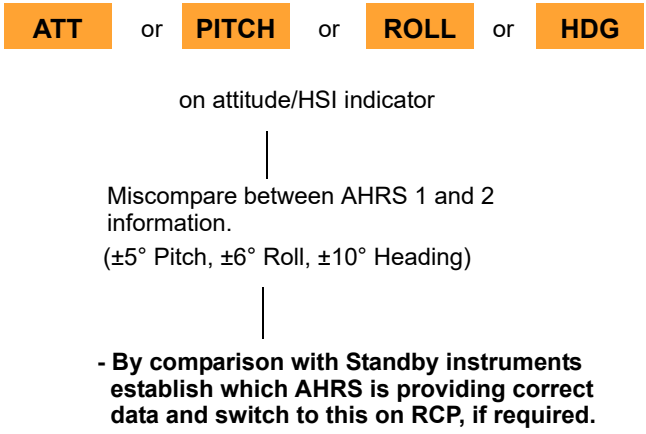
Failure of NF data from EEC and analogue sources on associated engine

- Use other engine parameters to monitor engine.

DECISION HEIGHT CAPTION



AHRS MISCOMPARE



ADS MISCOMPARE

ALT and / or **IAS**

on altitude tape — on airspeed tape

Miscompare between ADS 1 and 2 information.

(±150 ft (±46 m) for ALT, ±20 kts for IAS)

- By comparison with Standby instrument establish which ADS is providing correct data and switch to this on RCP, if required.

RAD ALT MISCOMPARE

RAD on RAD ALT display

Miscompare between MAU 1 and 2 RAD ALT information.

(10 ft+0.0625x(rad1+rad2))

- Compare the Pilot and Copilot RAD ALT indications and/or outside visual references to establish the correct data.

LOC/GS MISCOMPARE

LOC on PFD HSI display

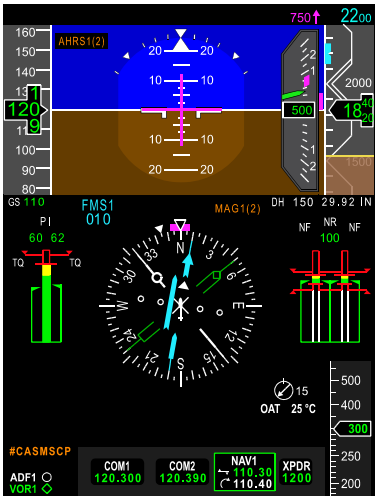
and/or

GS on PFD attitude indicator display

Miscompare between LOC Lateral
and/or Glideslope vertical deviation.

- Discontinue Approach

CAS CAUTION MESSAGE LIST DISCREPANCY



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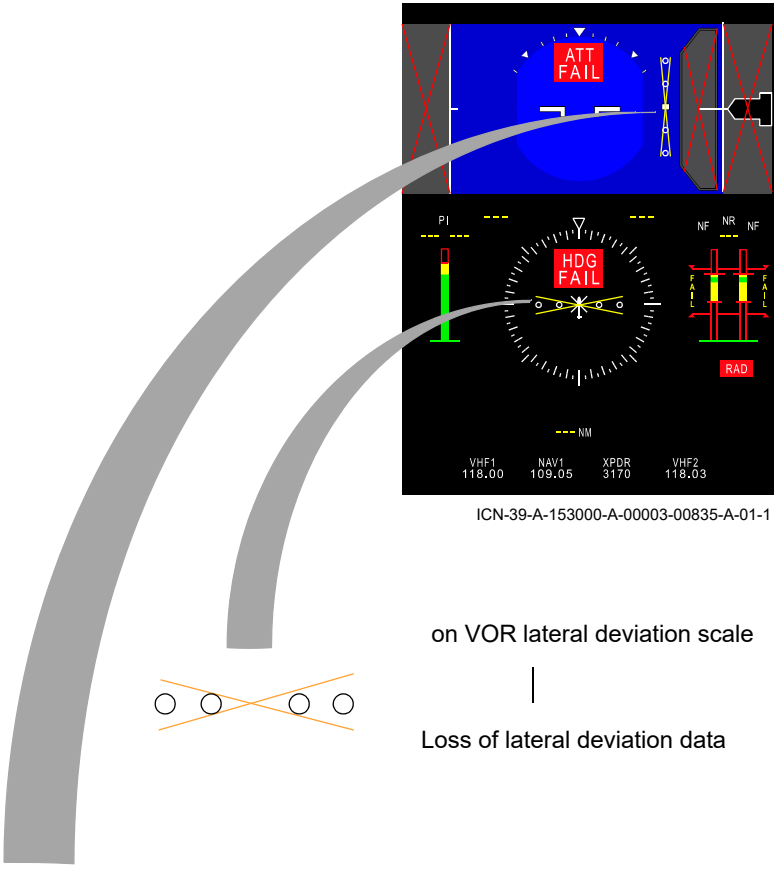
1(2)CASMSCP on PFD display

MAU 1 (MAU 2) CAS CAUTION message list has discrepencies

- Pilot press “ENTER” key on CCD while ▲▼ symbol is displayed adjacent the caption to toggle between CAS LIST 1 and 2. Confirm which message(s) are giving the ‘MISCOMPARE’

LOSS OF GLIDESLOPE OR VOR DATA



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on VOR lateral deviation scale

Loss of lateral deviation data

on glideslope vertical scale

Loss of valid glideslope data

FMS PFD MESSAGES

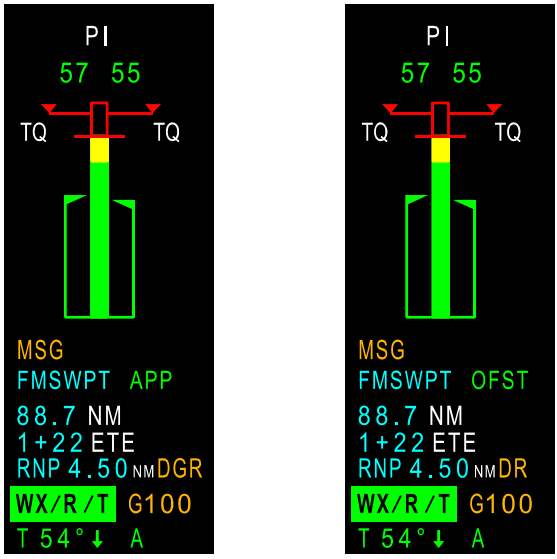

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Figure 3-6FMS PFD Messages

Dead Reckoning (DR)

DR is an alerting (**amber**) annunciator (displayed on PFD see Figure 3-6). This annunciator is displayed when the FMS is Navigation Source and has been operating in the DR mode for longer than 2 minutes. The DR mode is activated following the loss of all other position sensors apart from AHRS (GPS, DME/DME and VOR/DME).

Degraded (DGR) + Amber RNP and MSG on PFD + UNABLE RNP on MCDU

DGR is an alerting (**amber**) annunciator (displayed on PFD see Figure 3-6). This annunciator is displayed when the FMS cannot guarantee the position accuracy for the present phase of flight due to sensor unavailability. Practically the annunciator appears when the EPU (estimated position uncertainty) is greater than RNP (required navigation performance).

UNABLE RNP

If EPU (Estimated Position Uncertainty) show a value greater than the RNP (Required Navigation Performance) required for the current navigation phase (i.e. DGR message) a UNABLE RNP message will appear on the scratch pad and a MSG caption on the PFD.

SECTION 4

PERFORMANCE DATA

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SECTION 4

PERFORMANCE DATA

INTRODUCTION

The performance information presented in this section is based on flight test results and engineering analysis of engine manufacturers specification power for the engine, less installation losses. The data is applicable to the basic helicopter without any optional equipment which would appreciably affect lift, drag or power available. The performance shown is based on (1) adherence to the operational limitations shown in Section 1 of this manual, (2) the use of the procedures described in Sections 2 and 3 of this manual and (3) periodic engine power checks to assure minimum specification engine power output. The performance at a weight lower than the lowest weight shown on any particular graph should be assumed to be no better than that at the lowest weight shown. Performance extrapolation beyond the ranges shown in the graphs is not permitted.

USING THE GRAPHS

The performance information is presented graphically and in the sequence in which it would ordinarily be used. The introduction to each performance item contains an example of graph usage. Additionally, each graph contains a pictogram showing the correct sequence of steps in graph usage. As aircraft performance can be substantially affected by many factors (weight, altitude, temperature, power levels, etc.), careful attention should be paid to the explanatory text accompanying each graph to assure that the correct set of factors is being used.

DENSITY ALTITUDE CHART

Enter the graph at the desired value of Outside Air Temperature (OAT), on the horizontal axis. Proceed vertically until intercepting the desired value of Pressure Altitude. Proceed left to read the resulting Density Altitude (in feet). Proceed right to read the corresponding value of the reciprocal of the square root of the density ratio, which is used to calculate True Airspeed.

Example:

At a Pressure Altitude of 6000 feet and an OAT of +15° C, determine the corresponding Density Altitude.

Solution:

Enter Figure 4-1 at an OAT of +15° C. and proceed vertically until intersecting a Pressure Altitude of 6000 feet (sloping curves). From this point, proceed left to read a Density Altitude of 7400 feet.

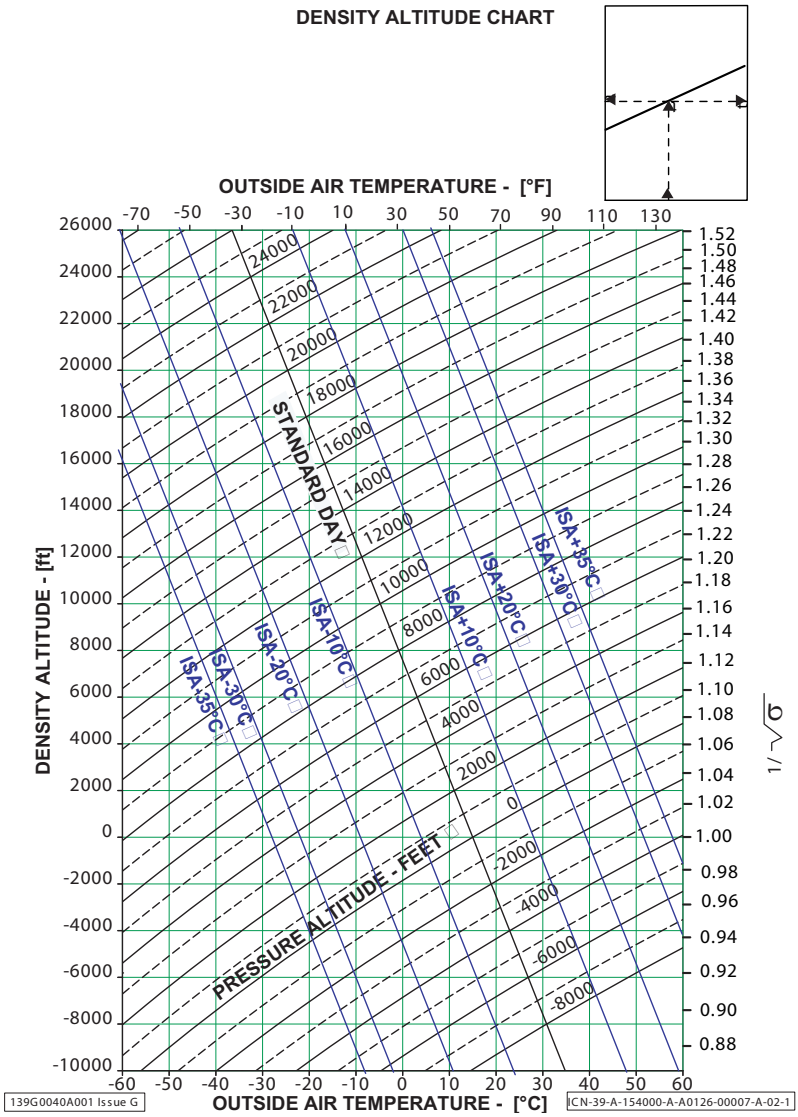

Figure 4-1 Density/Altitude Chart

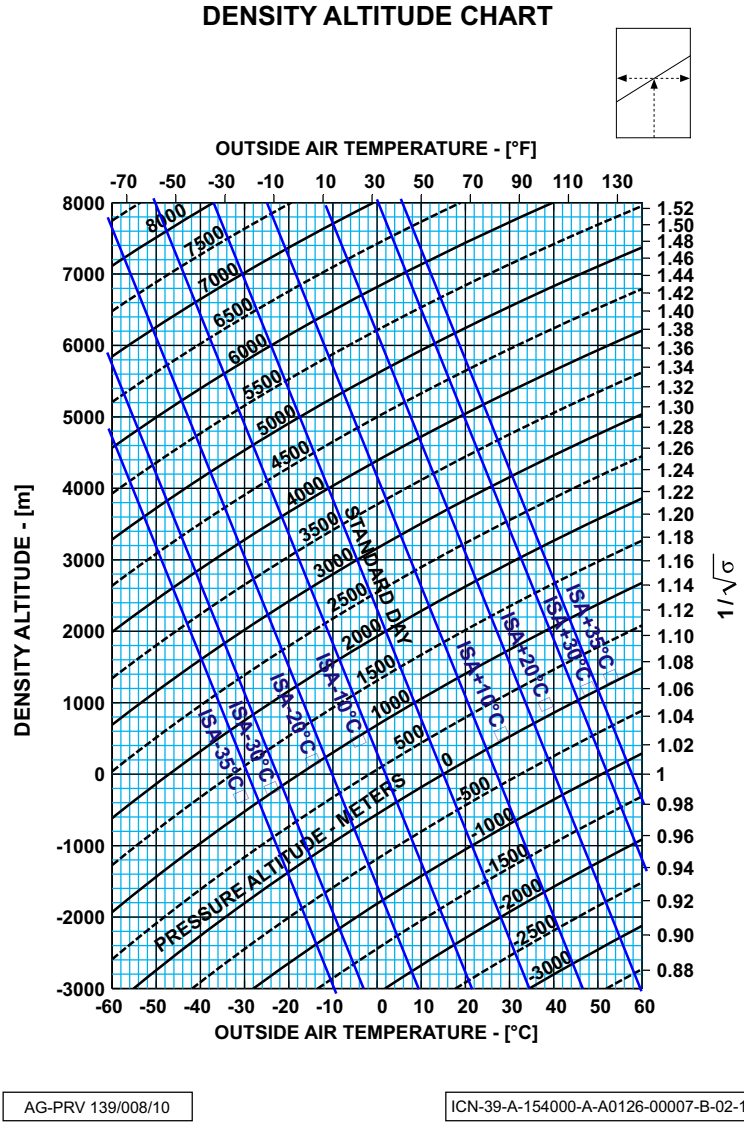

Figure 4-2 Density/Altitude Chart (meters)

CONVERSION FACTORS

This table is self-explanatory. The conversion from Metric System values to Imperial System values, and vice-versa, is given for a number of useful flight parameters.

CONVERSION CHART

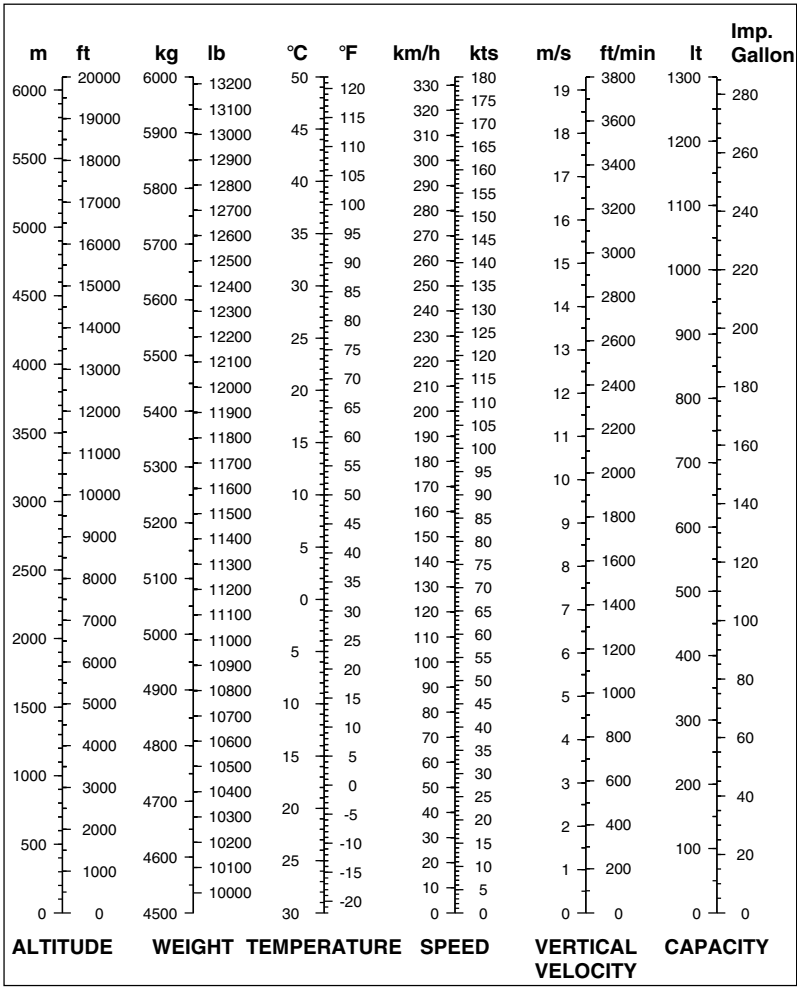

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Figure 4-3 Conversion Chart

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AIRSPEED CALIBRATION

Calibration curves are presented for the pilot's, co-pilot's PFD and standby airspeed indicators. Calibrated airspeed must be used in order to calculate correct values of the True Airspeed.

The size of the error depends on the Indicated Airspeed, itself. Enter the graph, for the appropriate airspeed indicator, with the desired value of Indicated Airspeed, and proceed vertically until intercepting the desired flight regime. Proceed to the left to read the corresponding value of Calibrated Airspeed. Use this value to calculate the corresponding True Airspeed, as required.

Example:

On the Pilot's PFD indicator, for the climb condition, determine the Calibrated Airspeed corresponding to an Indicated Airspeed of 100 knots.

Solution:

Use Figure 4-4. Enter the graph at an Indicated Airspeed of 100 knots and proceed vertically until intersecting the climb curve. Proceed left and read the corresponding Calibrated Airspeed of 103 knots.

AIRSPEED CALIBRATION CURVE
PILOT, COPILOT and STAND-BY Indicators

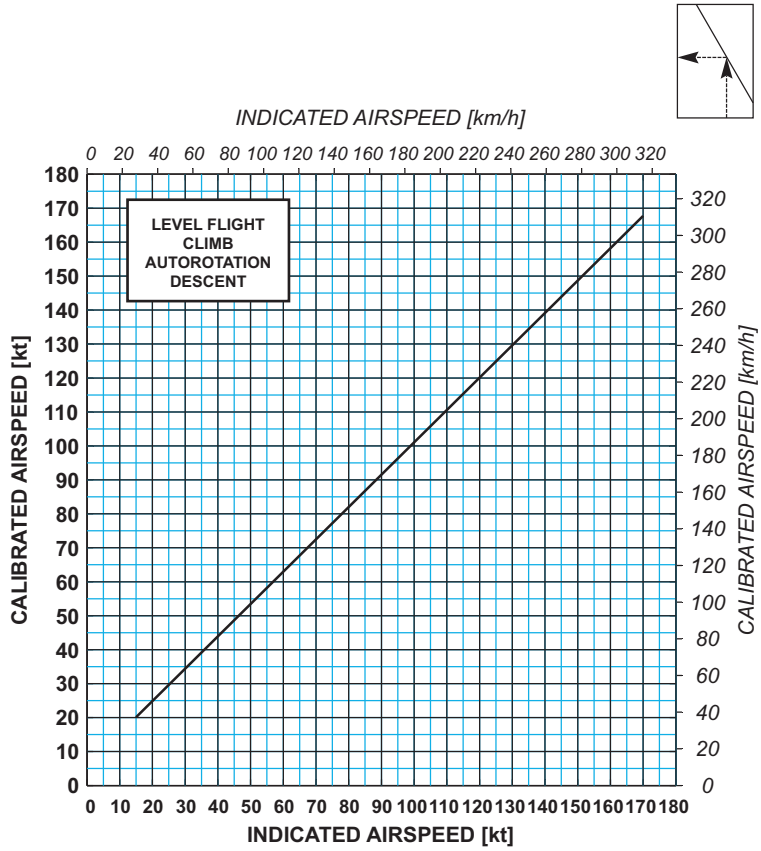

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Figure 4-4 Pilot, Copilot PFD and Standby Indicator Airspeed Calibration Curve

ALTIMETER CORRECTION

The Indicated Altitude shown on the cockpit instruments is within ±30 ft (9 m) altitude error throughout the speed range of the helicopter.

ENGINE POWER CHECKS

The purpose of the Engine Power Assurance Check is to provide a means of monitoring engine health on an on-going basis. A HOVER power assurance check procedure is provided to the operator. The procedure should be used to check if the engine power available is within the limits established for the legitimate use of the Rotorcraft Flight Manual performance.

POWER MARGIN TREND MONITORING

Record engine power assurance check values for engine power margin trend monitoring purposes at flight hour intervals as defined in Section 1 Limitations.

ENGINE POWER ASSURANCE CHECK INTERVALS

Carry out an Engine Power Assurance Check (PAC) every 25 flight hours. If average ITT Power Assurance Margin of the last three PACs is less than 10 °C or average NG Power Assurance Margin of last three PACs is less than 0.5%, Engine Power Assurance Checks are required daily.

HOVER POWER ASSURANCE CHECKS PROCEDURE

The following procedure is used to check engine performance before flight:

CAUTION

Observe all engine and transmission max continuous limits and aircraft operating limits during this check.

1. Position the aircraft into the prevailing wind to minimize hot gas ingestion.

2. Record date, aircraft serial number, aircraft hours, engine serial number and engine hours.

3. Confirm that the AUTO MODE HTR/COND switch is set to OFF and HEATING SOV switches are OFF. (If fitted)

4. Set the barometric pressure to 1013 mb or 29.92 inches.

5. Confirm both the ENG MODE switches at FLT, set BUS TIE switch to ON, select ENG MODE switch of engine NOT being tested to IDLE.

6. With the rotor speed at 100%, set the collective until 'light on wheels' or Hover at 5 feet to obtain a percent torque value within the range shown on the top graph of Figure 4-5, depending on the airfield elevation.

7. Maintain a fixed collective for one minute, then record the following data from the Primary and MultiFunction Display:
   - Pressure Altitude
   - OAT
   - NG
   - TRQ
   - ITT

8. When recording is completed lower collective to MPOG, select ENG MODE switch of engine not being tested to FLT.

9. Repeat steps (1) through (8), for the remaining engine.

10. Select BUS TIE switch to AUTO.

11. On the appropriate figure plot readings for each engine as follows:

    a) Enter the left graph of Figure 4-5, as appropriate, with the recorded torque value. Drop vertically until intercepting the recorded pressure altitude value (interpolate between the curves, as necessary). Move horizontally to intercept the recorded OAT value for ITT and NG. From these points move

up to read the maximum allowable ITT/NG values for the test condition.

b) Compare the maximum allowable ITT and NG values to the recorded ITT and NG values.

c) If the recorded ITT or NG values is less than the maximum allowable ITT or NG value, engine condition is acceptable for flight.

The difference between maximum allowable ITT/NG and recorded ITT/NG is called the Power Assurance Margin (PAM).

d) If the recorded ITT or NG values are greater than the maximum allowable ITT or NG the performance in this RFM may not be achieved. Refer to EMM for required actions.

Example:

A Ground Power Assurance Check on Number 1 engine procedure gave the following recorded results:

— TRQ = 102%

— Pressure Altitude = 5000 ft

— OAT = -10° C

— ITT = 600

— NG = 91

Solution:

Entering the left of the graph at 102% torque, drop down to the Pressure Altitude curve for 5000 ft. Move right to the -10° C OAT curve for Maximum Allowable ITT and Maximum allowable NG. From the -10° C OAT curves move vertically up to an ITT value of 620° C and NG value or 91.5%.

The recorded ITT value of 600° C is less than the maximum allowable (620° C) and the NG value of 91% is less than the maximum allowable (91.5%) so the engine is acceptable for flight.

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POWER ASSURANCE CHECK in HOVER FLIGHT (NR=100%)

HEATER/COND OFF
GENERATOR LOAD TO MINIMUM (BELOW 17%)
SET NR to 100%
TEST ENGINE MODE SWITCH: FLIGHT
OTHER ENGINE MODE SWITCH: IDLE
INCREASE COLLECTIVE UNTIL LIGHT ON WHEELS OR HOVERING AT 5 FEET, NOSE ON WIND. DO NOT EXCEED 775°C ITT OR 102.4% NG OR 105% TQ
STABILIZE POWER 1 MINUTE, THEN RECORD OAT, PRESSURE ALTITUDE, ENGINE TORQUE, ITT AND NG
ENTER CHART AT INDICATED TQ, MOVE DOWN TO INTERSECT PRESSURE ALTITUDE, PROCEED TO THE RIGHT TO INTERSECT OAT,
THEN MOVE UP TO READ VALUES FOR MAXIMUM ALLOWABLE ITT AND NG
IF INDICATED ITT OR NG EXCEEDS MAXIMUM ALLOWABLE, REPEAT CHECK
REPEAT CHECK USING OTHER ENGINE
IF EITHER ENGINE EXCEEDS ALLOWABLE ITT OR NG, PUBLISHED PERFORMANCE MAY NOT BE ACHIEVABLE. REFER TO EMM

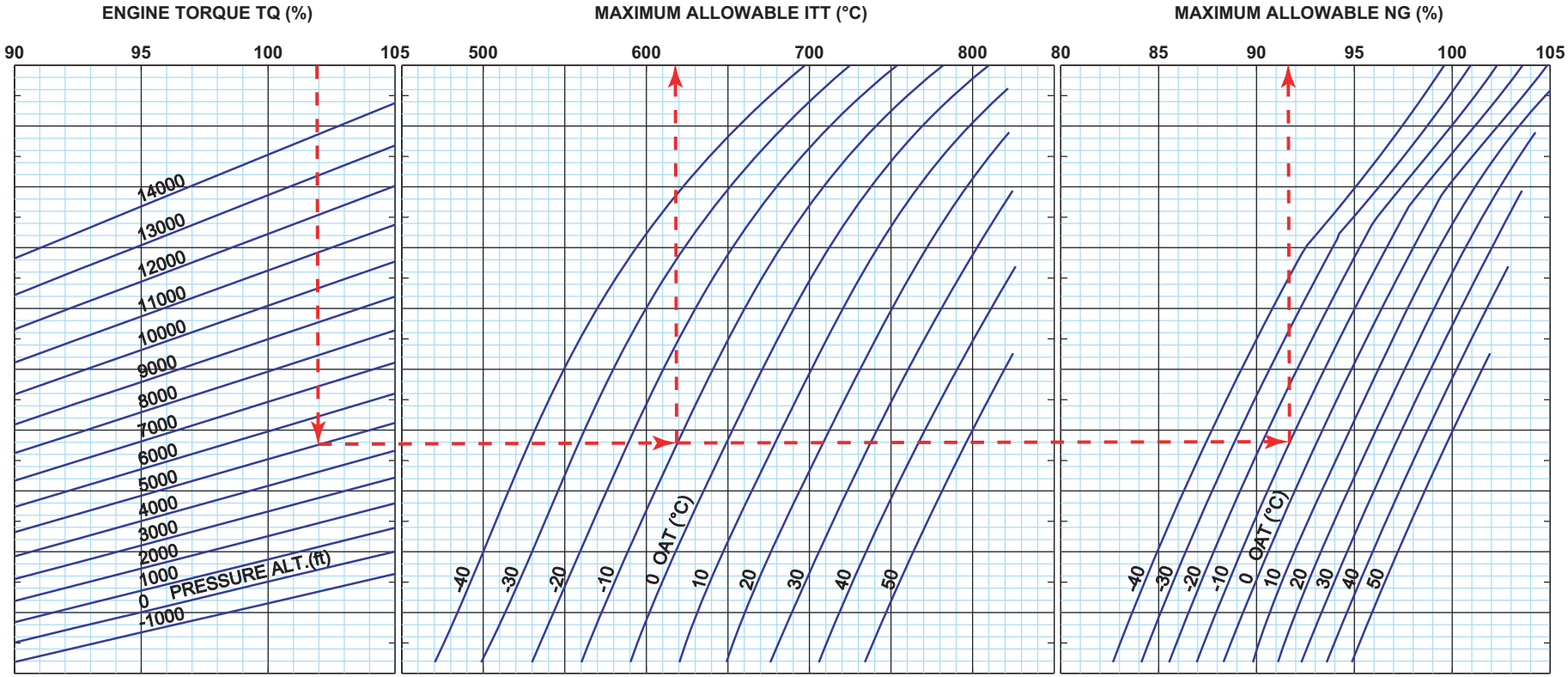

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Figure 4-5 PWC PT6C-67C Hover Power Check Chart

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LOW SPEED MANOUVRES IN QUARTERING FLIGHT

Satisfactory stability and control has been demonstrated for all azimuths shown below for wind speed in accordance with the WAT curve in Figure 4-7.

The critical sector, requiring slightly increased workload, is indicated below.

No limitation exists for headwind conditions (±10°).

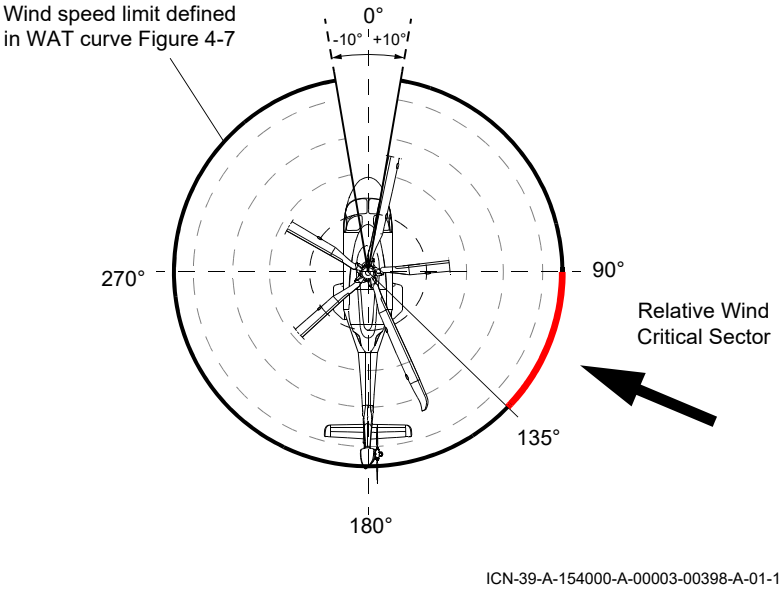

Figure 4-6 Azimuth Envelope Critical Sector

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WEIGHT-ALTITUDE-TEMPERATURE
for TAKE-OFF, LANDING and IGE MANOEUVRES

RELATIVE WIND AZIMUTH: 10 to 350 deg

Note: no windspeed limitation exists for headwind conditions (wind azimuth ±10deg)

ROTOR 100%

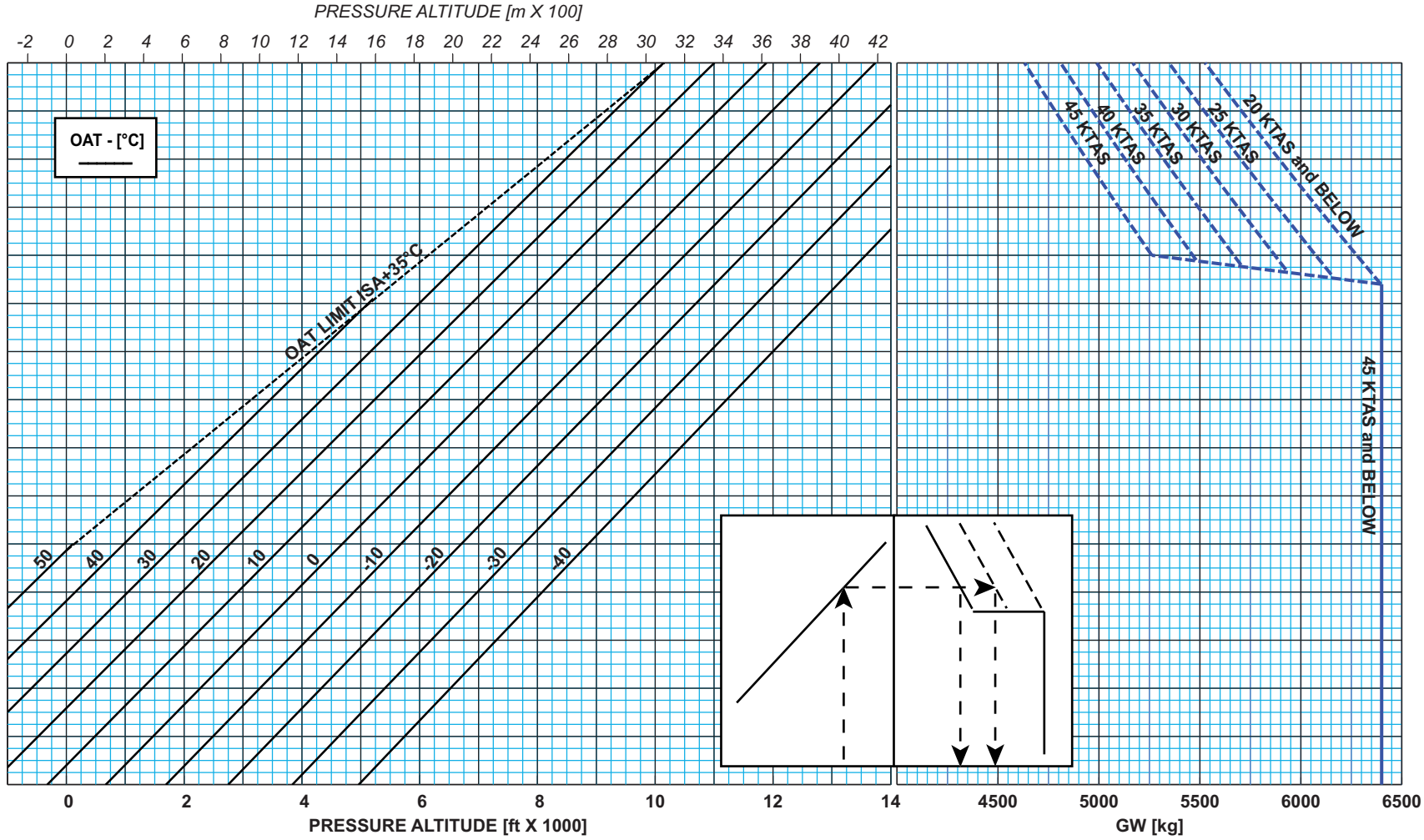

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Figure 4-7 W.A.T. for Low Speed IGE Manoeuvres

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HOVER CEILING

The Hover Ceiling charts define the maximum weights at which an IGE hover (at 5 ft (1.52 m) wheel height) or an OGE hover is possible for varying combinations of Pressure Altitude and OAT with main rotor speed at 100% and zero wind conditions.

Information is presented for All Engines Operating (AEO) at Maximum Continous Power (MCP) and Take Off Power (TOP).

Information is presented for OEI Maximum Continuous power (MCP) and 2.5 minute Power.

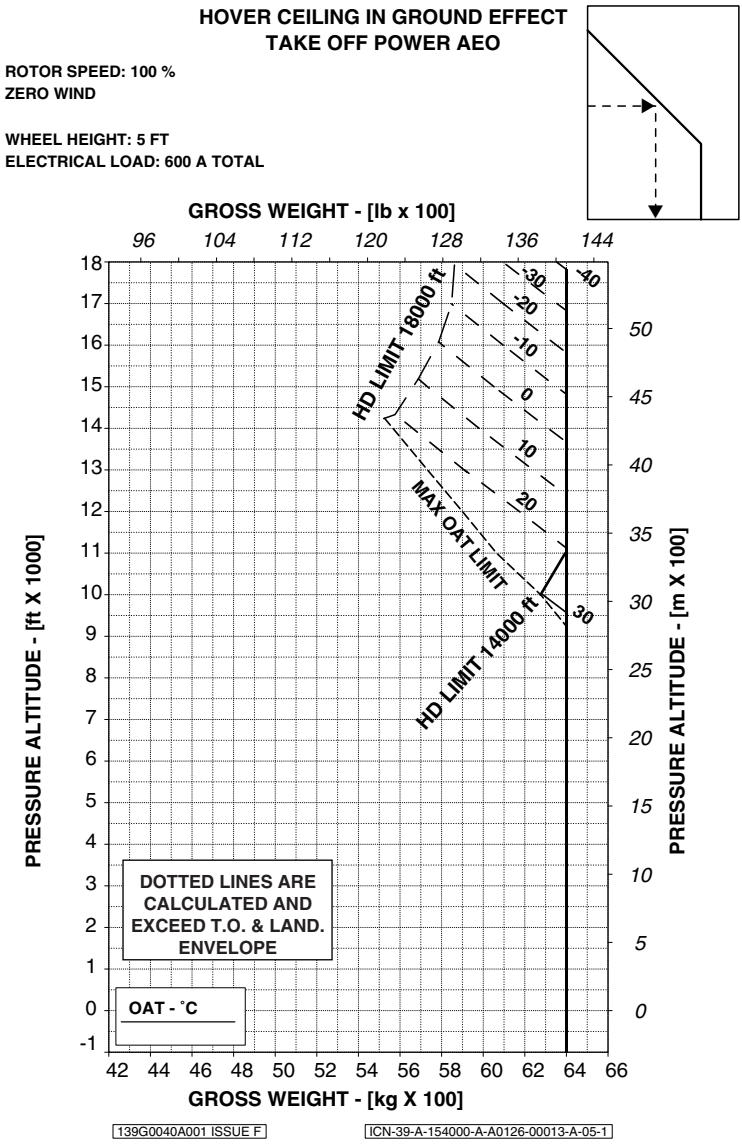

Figure 4-8 Hover Ceiling IGE at TOP

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL

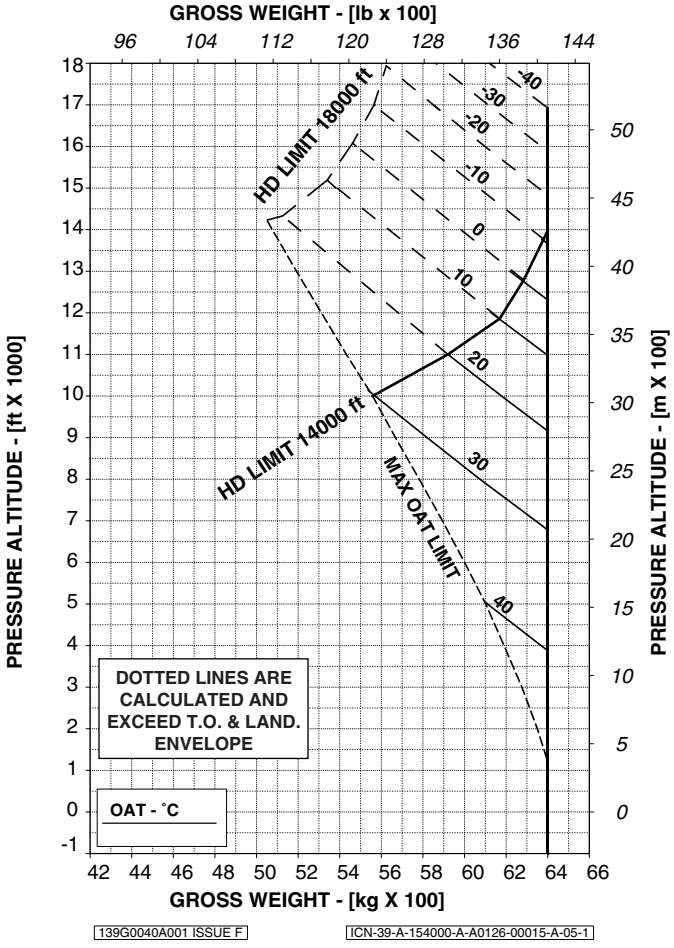

Figure 4-9 Hover Ceiling IGE at MCP

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

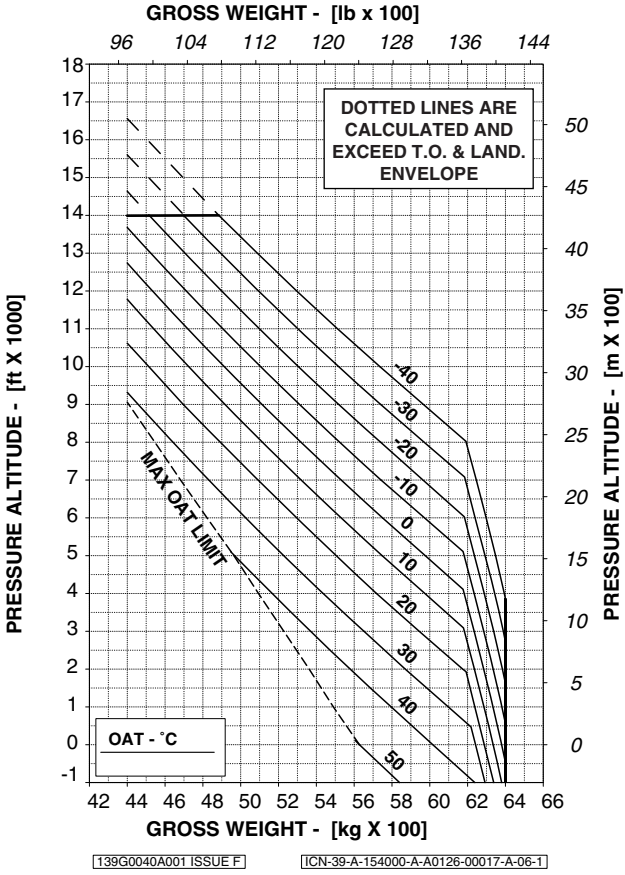

Figure 4-10 Hover Ceiling IGE 2.5 min OEI

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

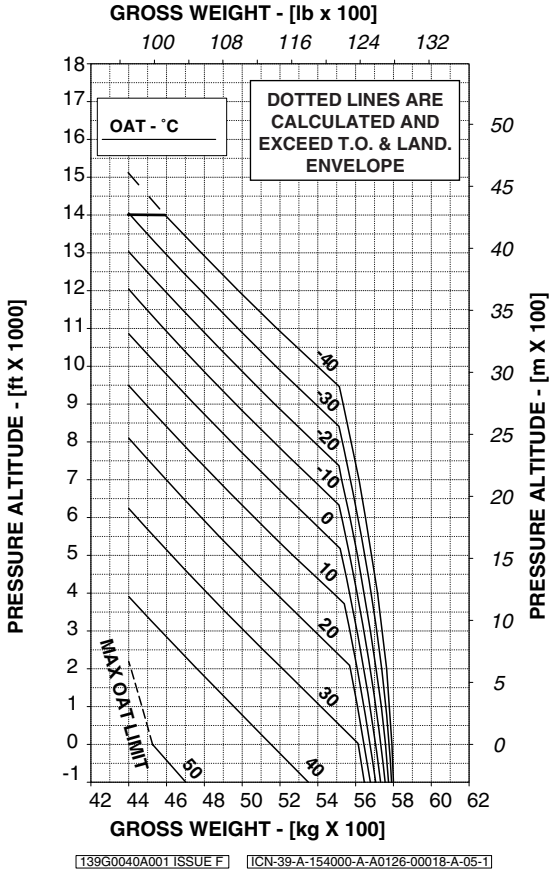

Figure 4-11 Hover Ceiling IGE at MCP OEI

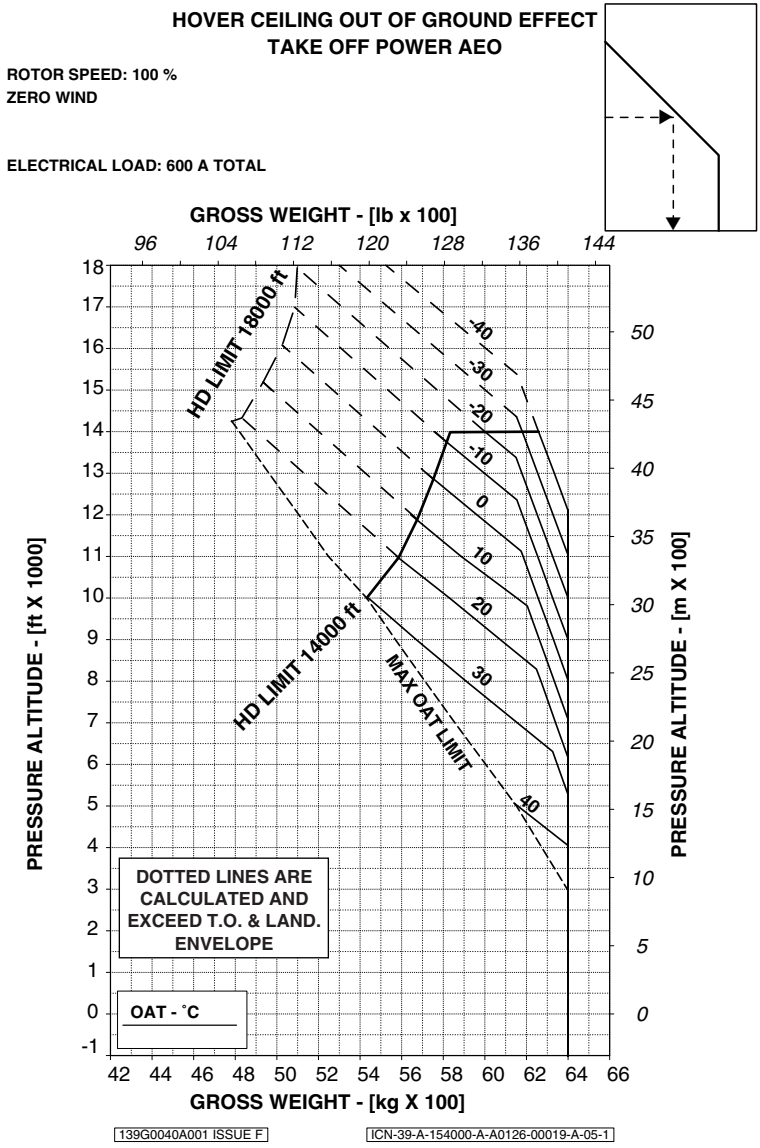

Figure 4-12 Hover Ceiling OGE at TOP

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL

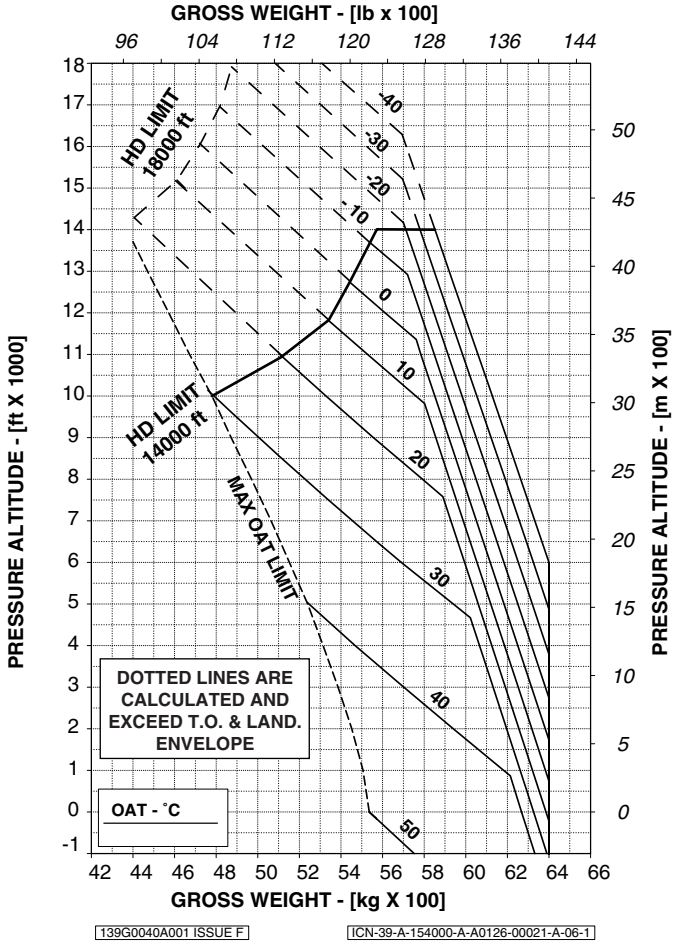

Figure 4-13 Hover Ceiling OGE at MCP

HOVER CEILING OUT OF GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND

ELECTRICAL LOAD: 300 A

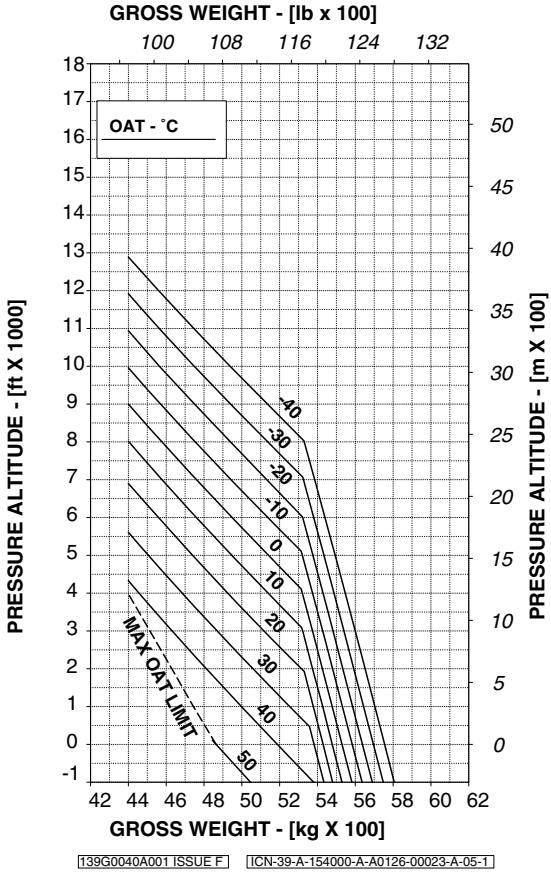

Figure 4-14 Hover Ceiling OGE 2.5 min OEI

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
ZERO WIND

ELECTRICAL LOAD: 300 A

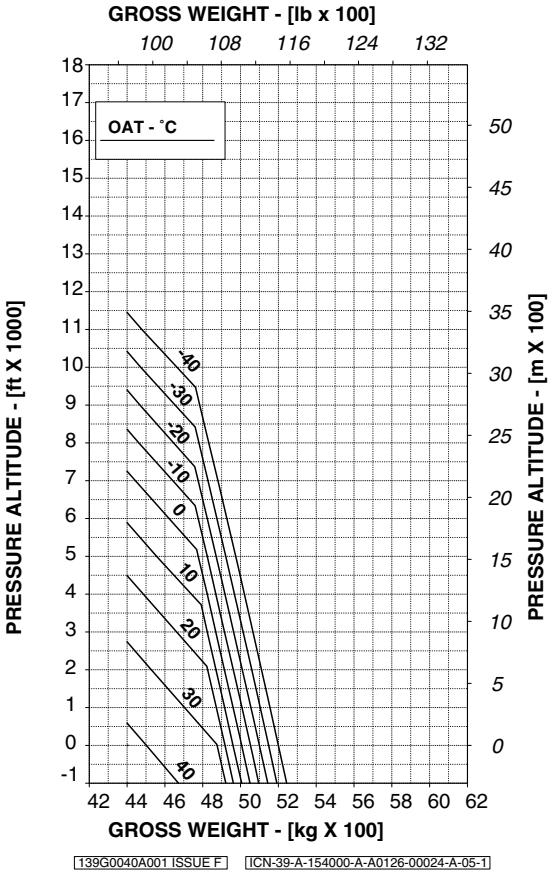

Figure 4-15 Hover Ceiling OGE at MCP OEI

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TAKE-OFF AND LANDING CATEGORY B

The charts are presented for Take Off and Landing Performance.

The Weight-Altitude-Temperature graphs determine the maximum weight allowable for each combination of altitude/temperature for Take Off and Landing.

The Take Off distance chart indicates the distance required for each combination of weight-altitude-temperature to Take Off AEO and reach 50 KIAS at 50 ft (15 m) above the Take Off surface using the procedure in Section 2.

The Landing distance chart indicates the distance required for each combination of weight-altitude-temperature to land OEI from 50 ft (15 m) at 30 KIAS when using the procedure for landing in Section 2. The Landing distance is indicated in two parts, the distance required from 50 ft (15 m) to touchdown and the braking distance after touchdown. The total distance for landing is the summation of the two distances.

Example 1:

The Take Off distance required for the following weight and ambient conditions:

— Aircraft Weight = 5600 kg

— Pressure Altitude = 1000 ft

— OAT = +12° C

Solution:

Using chart Figure 4-16 we see that the aircraft weight and ambient conditions are inside the CAT B WAT curve so flight is permitted. Using chart Figure 4-17 on the Pressure Altitude axis from 1000 ft move up to intersect the +12°C line (interpolated between 10° and 20° lines) move right to intercept the Gross Weight line of 5600 kg and drop vertically to the distance of 264 m.

Example 2:

The Landing distance required for the following weight and ambient conditions:

— Aircraft Weight = 5600 kg

— Pressure Altitude = 6000 ft

— OAT = +12° C

Solution:

Using chart Figure 4-16 we see that the aircraft weight and ambient conditions are inside the CAT B WAT curve so flight is permitted. Using chart Figure 4-18 on the Pressure Altitude axis from 6000 ft move up to intersect the +12°C line (interpolated between 10° and 20° lines), then move right to intercept the Gross Weight lines for Touch Down distance and Braking distance curves. At the Gross weight of 5600 kg drop vertically for Touch Down distance 136 m and Braking Distance 10 m. Summing the two values give a total distance of 146 m.

WEIGHT-ALTITUDE-TEMPERATURE
for TAKE-OFF, LANDING and IGE MANOEUVRES

RELATIVE WIND AZIMUTH: 10 to 350 deg

Note: no windspeed limitation exists for headwind conditions (wind azimuth ±10deg)

ROTOR 100%

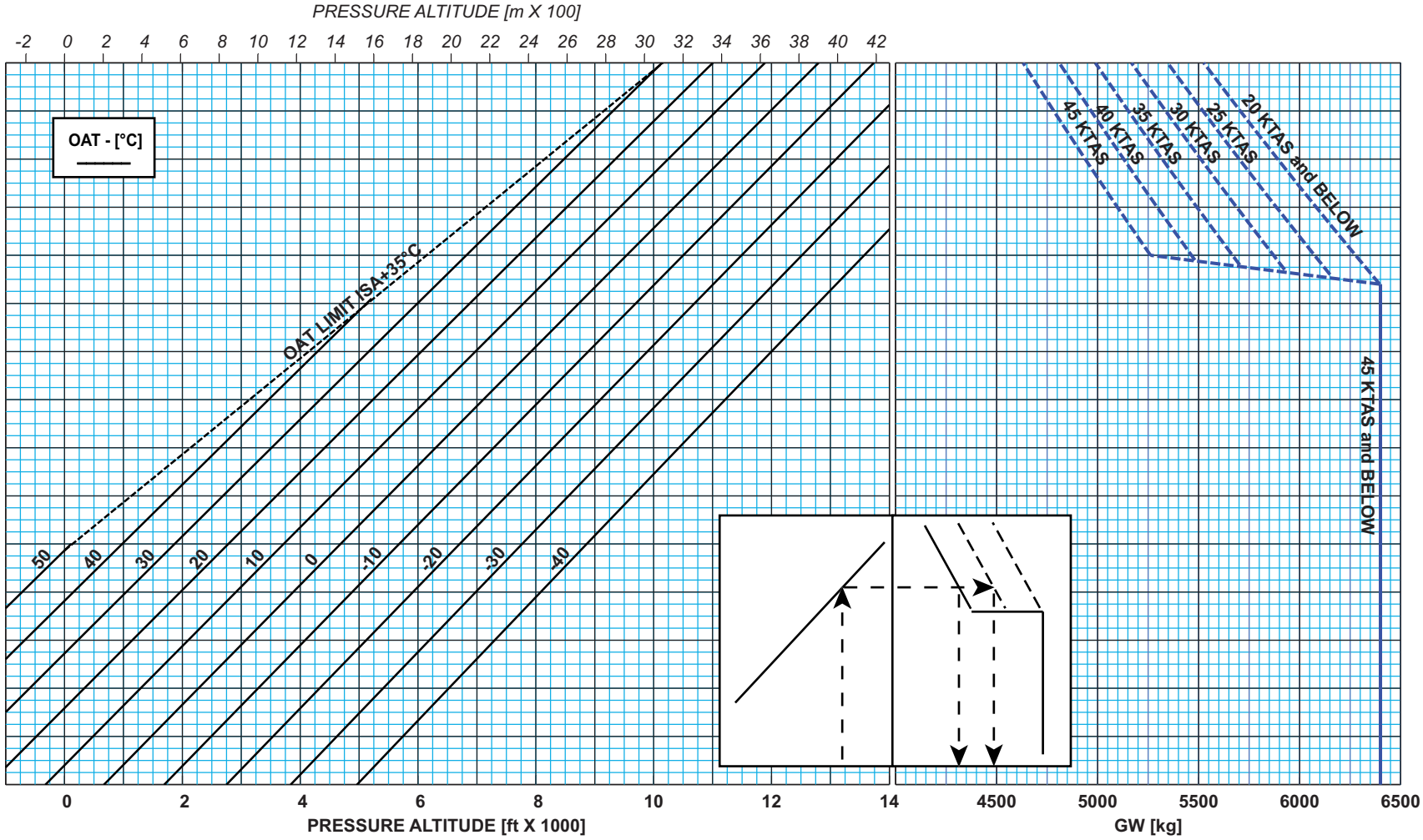

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Figure 4-16 W.A.T. for Normal CAT B Take-Off and Landing

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CAT.B TAKE OFF DISTANCE
OVER 50 ft (15 m) OBSTACLE

ROTOR SPEED: 100%
POWER= H.IGE + 5% TQ per ENGINE
ELECTRICAL LOAD: 600A TOTAL
ZERO WIND

INITIATED FROM H.IGE (5 ft/1.5 m)
V_{50FT}: 50 KIAS

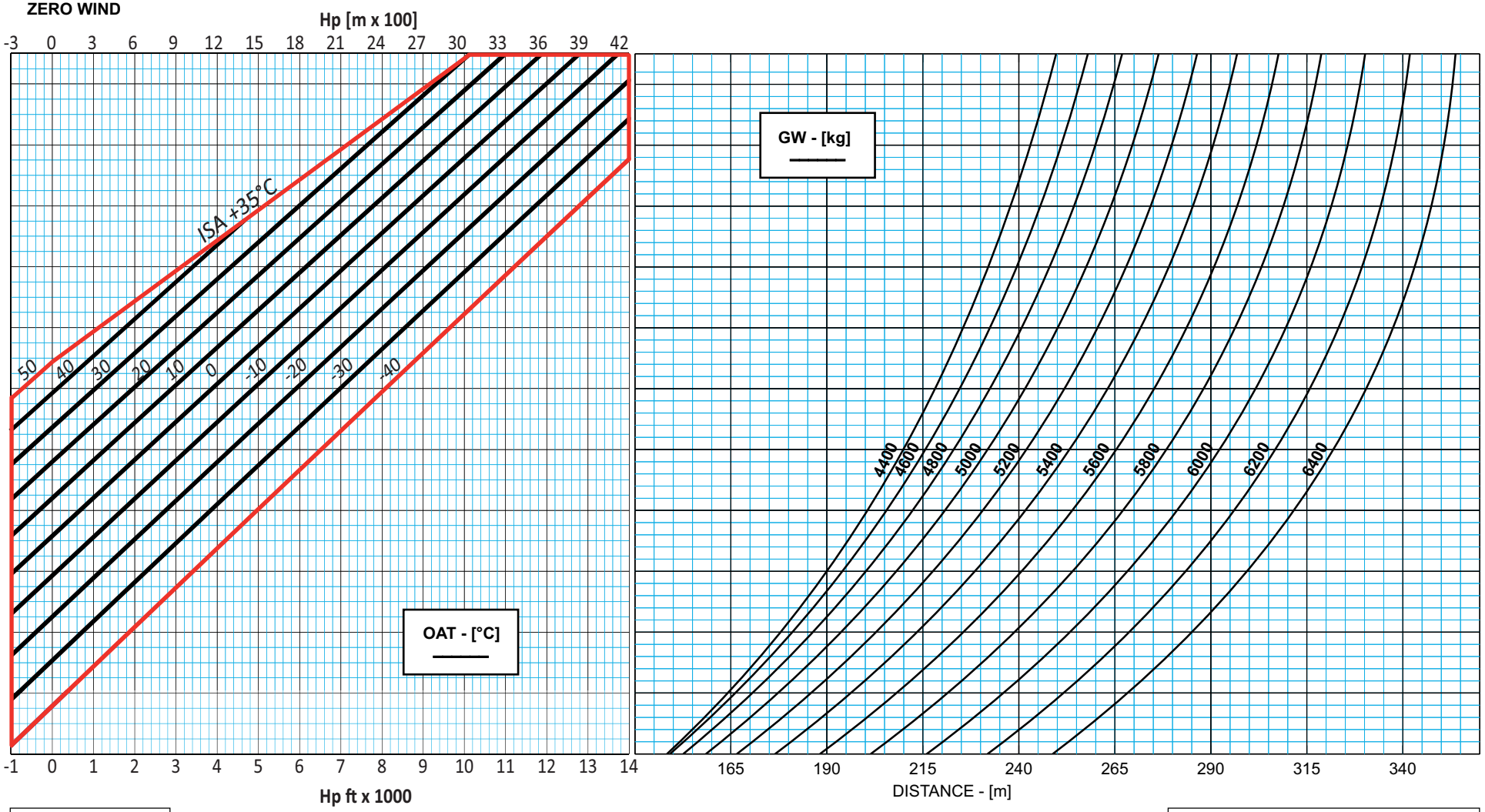

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Figure 4-17 CAT B Take-Off Distance

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CAT.B OEI/AEO LANDING DISTANCE
OVER 50 ft (15 m) OBSTACLE

ROTOR SPEED: 100%
2.5 MIN. OEI / TOP AEO MAXIMUM
ELECTRICAL LOAD: 300A OEI/600A AEO
ZERO WIND

V_{app}: 30 KIAS
RATE OF DESCENT: 500 fpm
SURFACE: HARD, SMOOTH, LEVEL
INOPERATIVE ENGINE SECURED

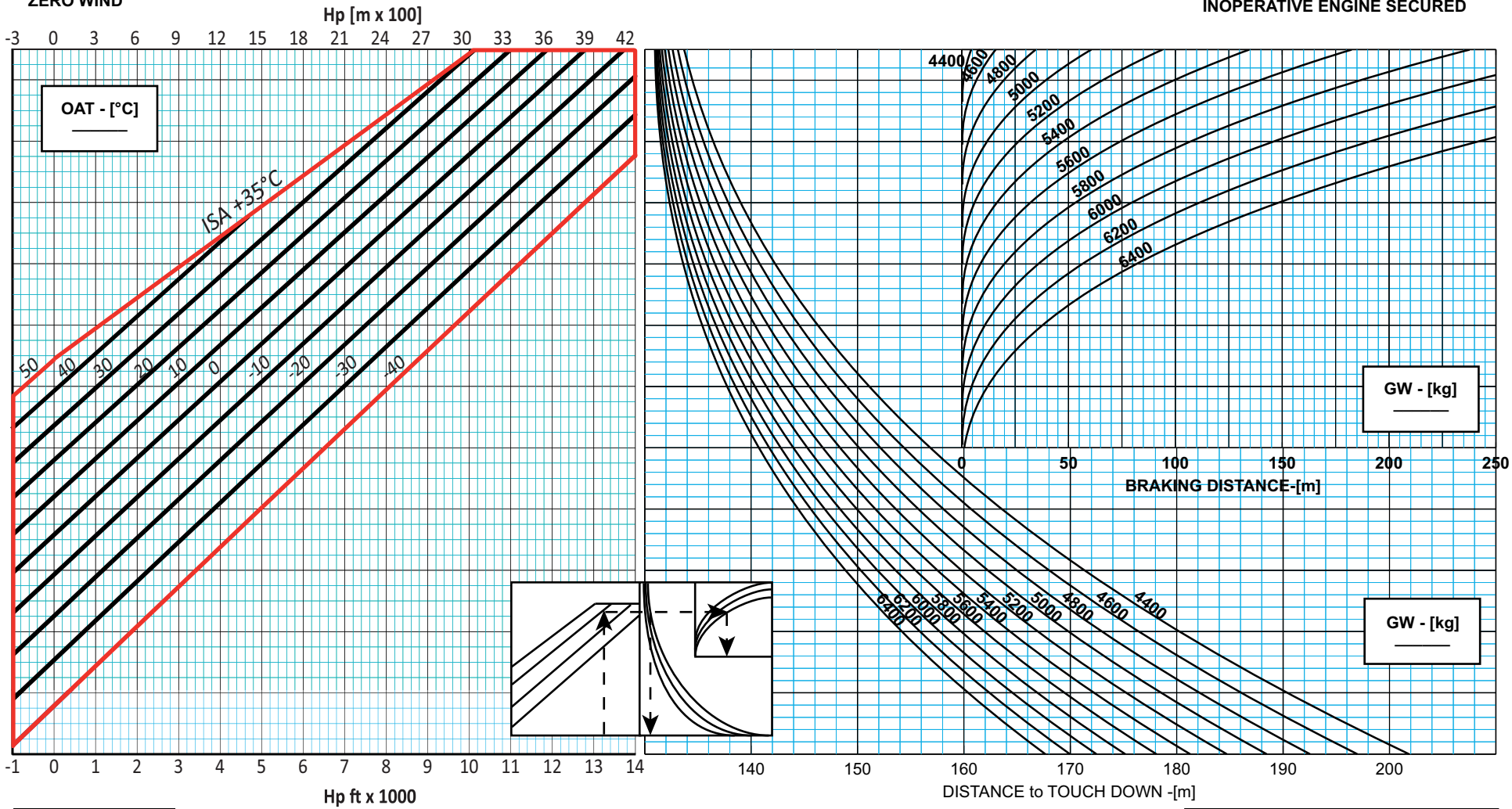

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Figure 4-18 CAT B Landing Distance

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RATE OF CLIMB

The climb performance shown is based on flight test results and covers a range of gross weights from 4400 kg to the Maximum Gross Weight of 6400 kg. Rate of Climb performance is given for All Engines Operating (AEO) case and for the One Engine Inoperative (OEI) case. For the AEO case, rate of climb is given with the engines operating at the Maximum Continuous Power (MCP) Rating limits and at Take Off-Power Rating limits. For the OEI case, rate of climb is given with the engines operating at the Maximum Continuous Power (MCP) Rating limits and 2.5 min rating limit. The datum speed for all rate of climb graphs is 80 KIAS below 10000 ft and 70 KIAS above 10000 ft.

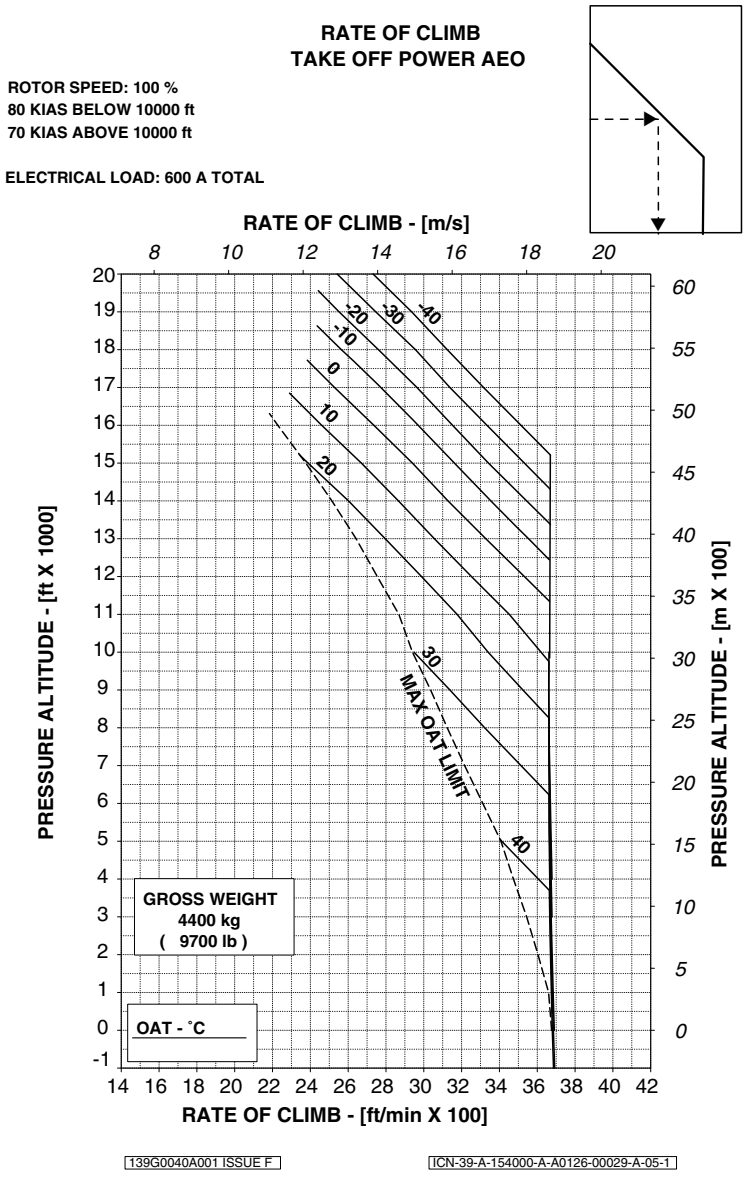

Figure 4-19 ROC at TOP, Gross Weight 4400 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

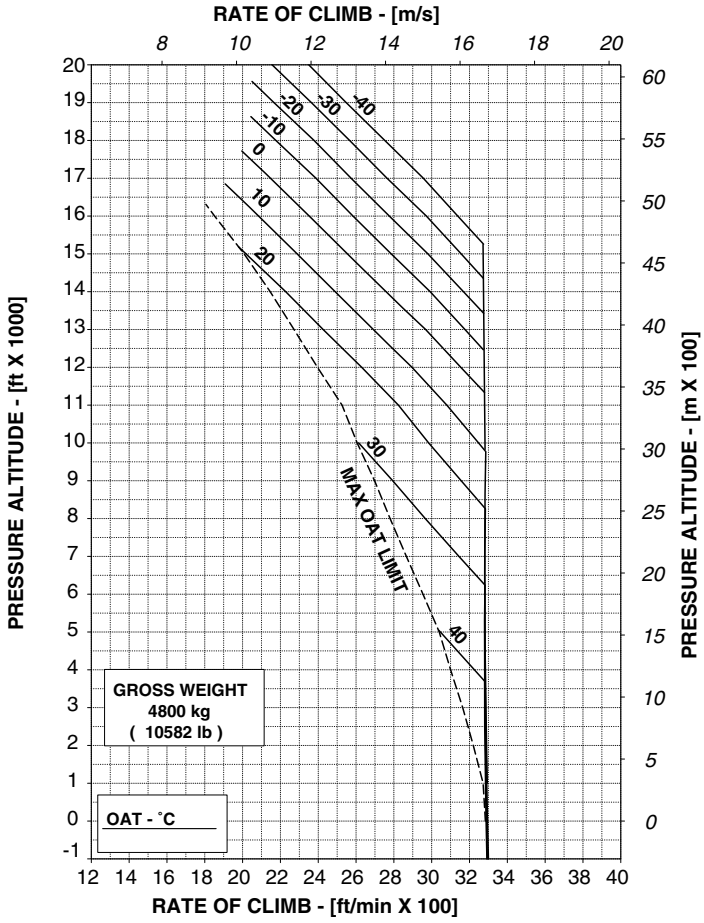

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Figure 4-20 ROC at TOP, Gross Weight 4800 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

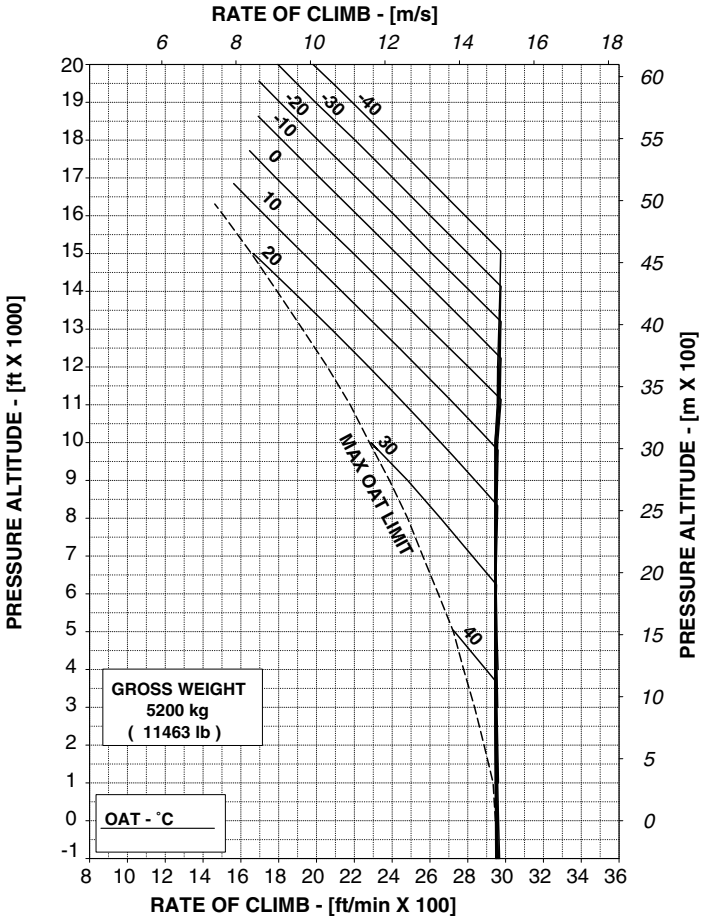

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Figure 4-21 ROC at TOP, Gross Weight 5200 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

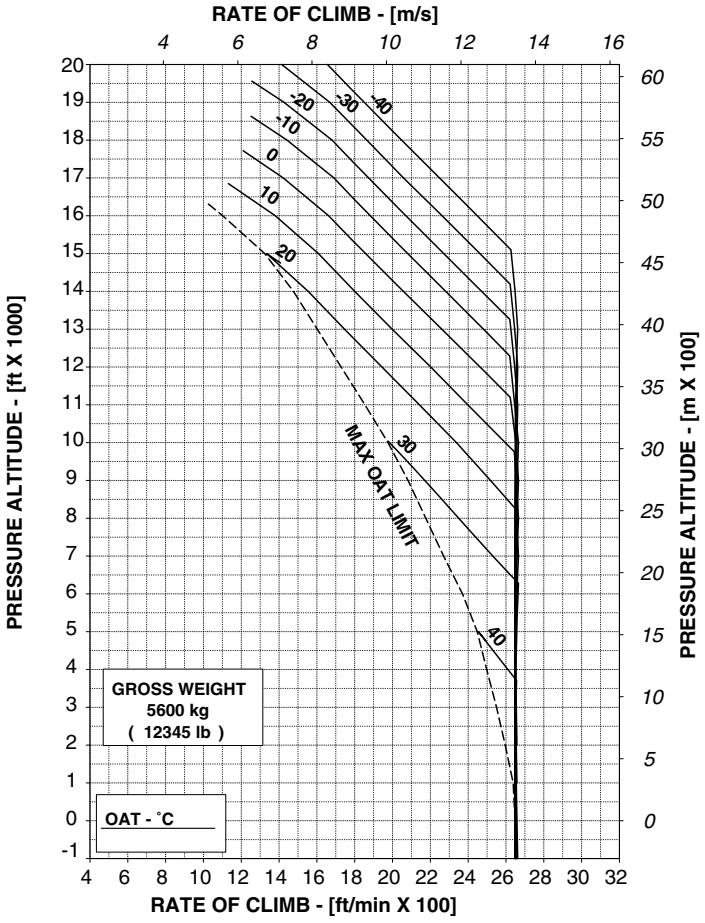

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Figure 4-22 ROC at TOP, Gross Weight 5600 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

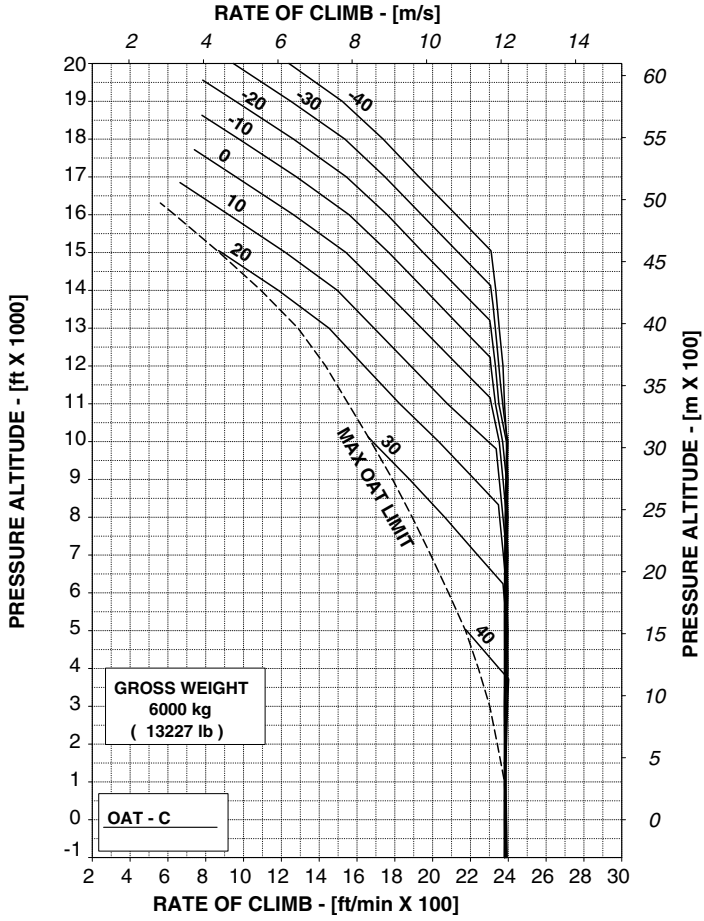

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Figure 4-23 ROC at TOP, Gross Weight 6000 kg

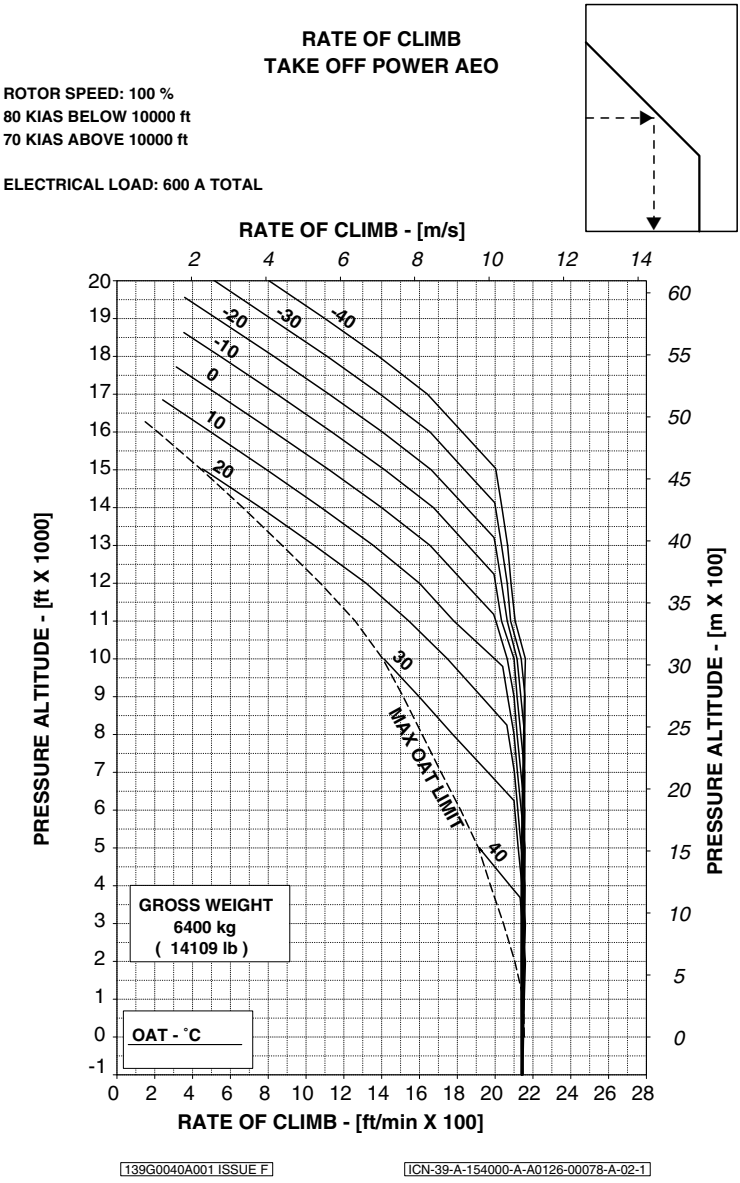

Figure 4-24 ROC at TOP, Gross Weight 6400 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

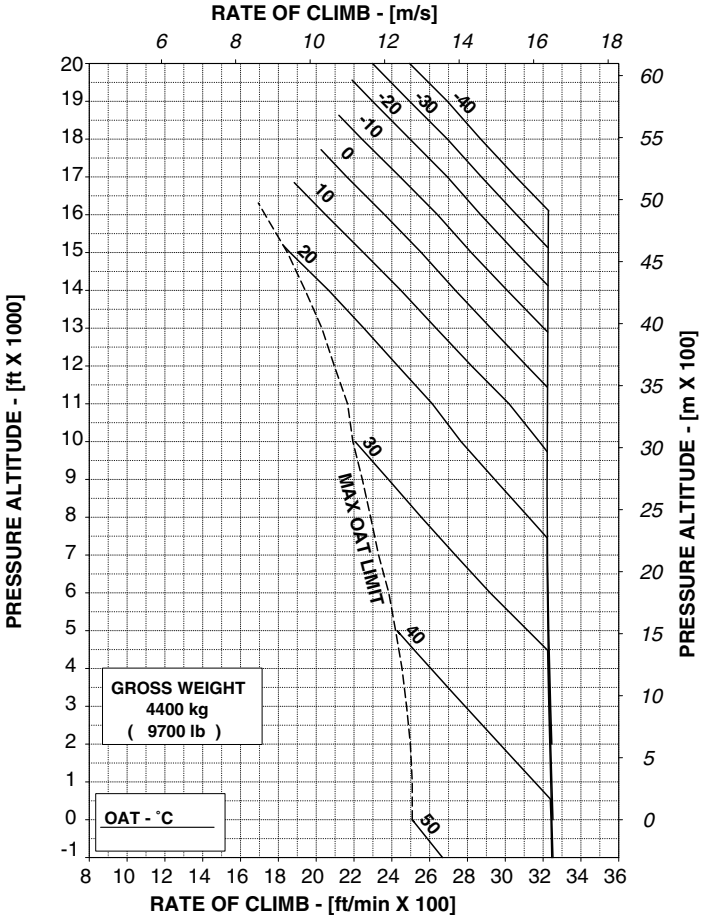

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Figure 4-25 ROC at MCP, Gross Weight 4400 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

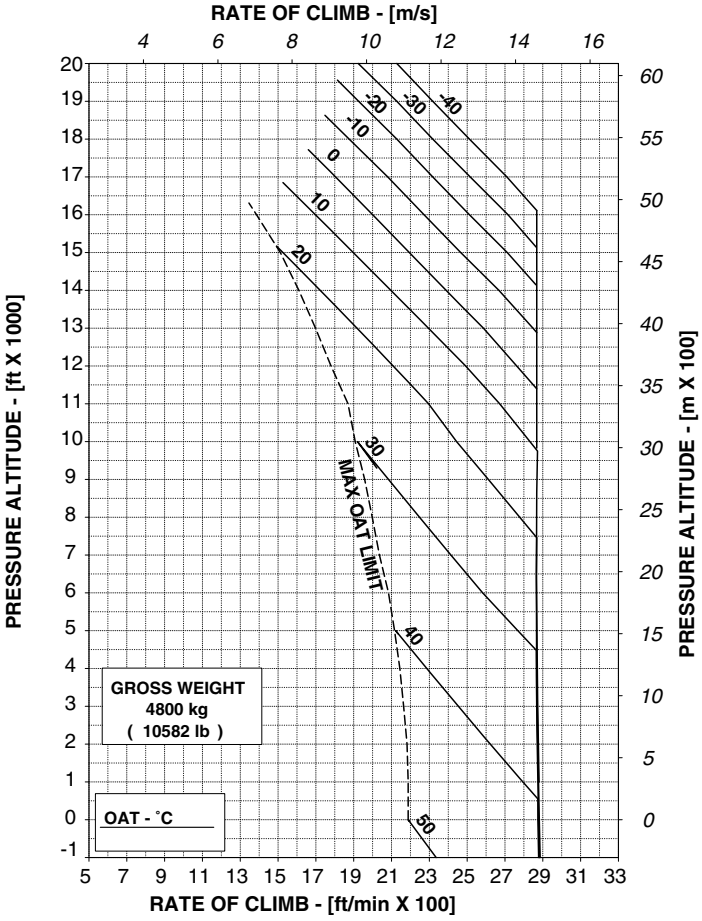

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Figure 4-26 ROC at MCP, Gross Weight 4800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

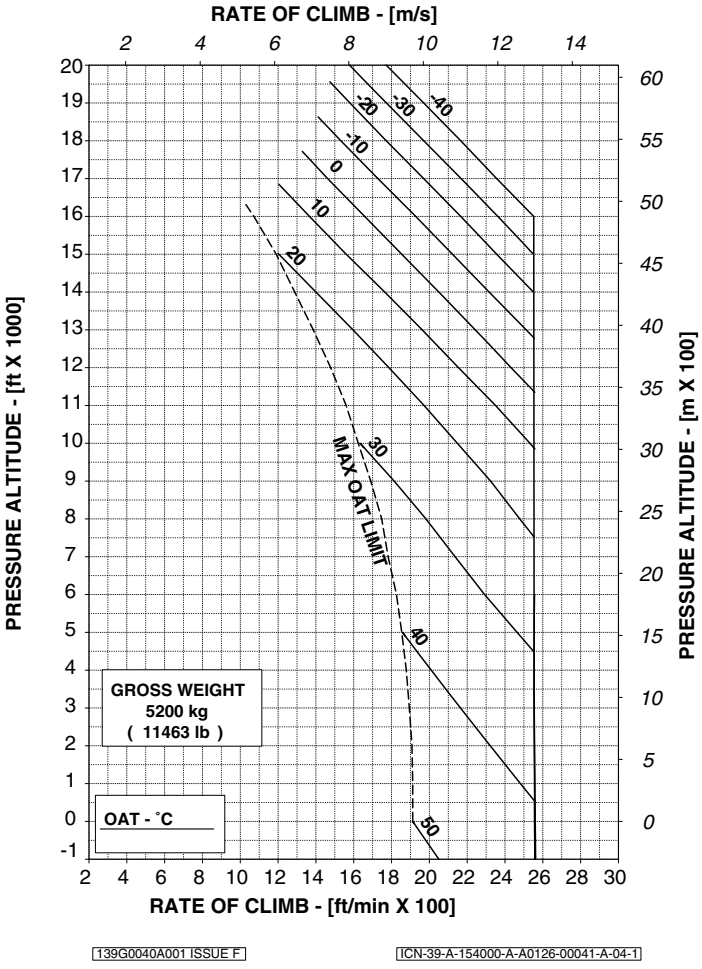

Figure 4-27 ROC at MCP, Gross Weight 5200 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

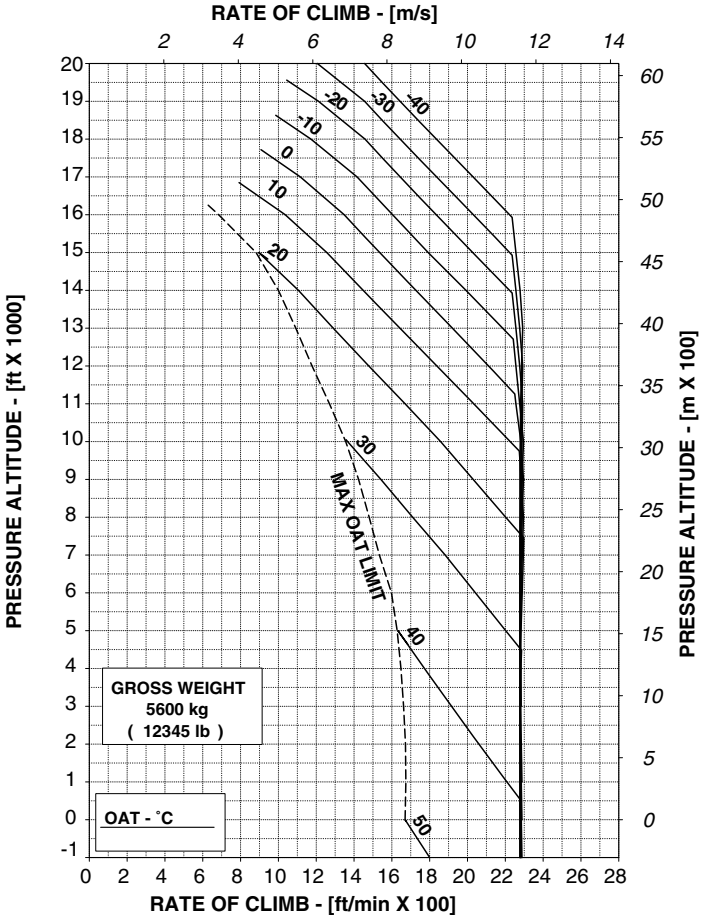

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Figure 4-28 ROC at MCP, Gross Weight 5600 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

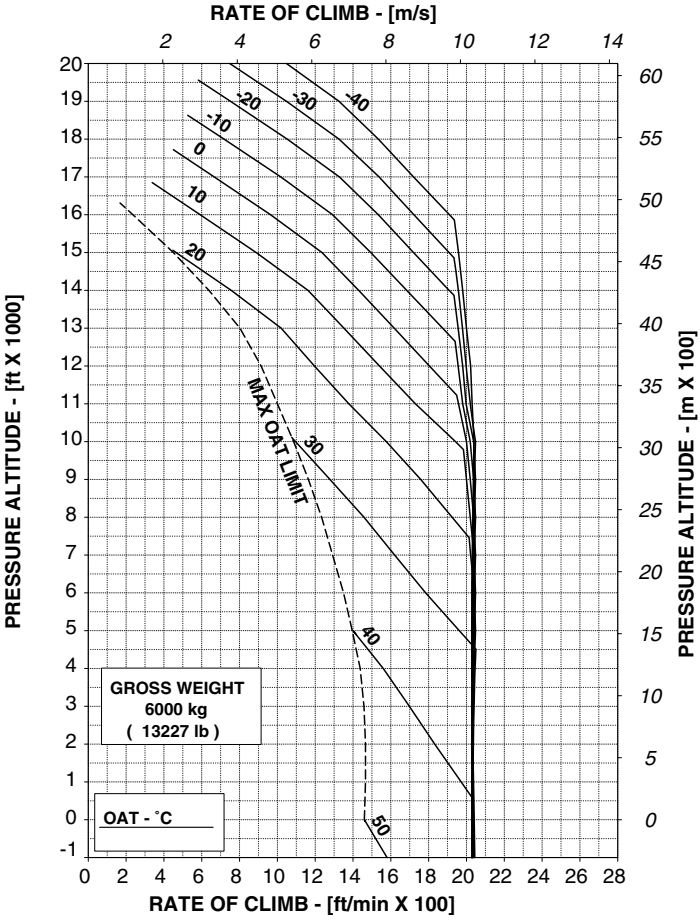

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Figure 4-29 ROC at MCP, Gross Weight 6000 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL

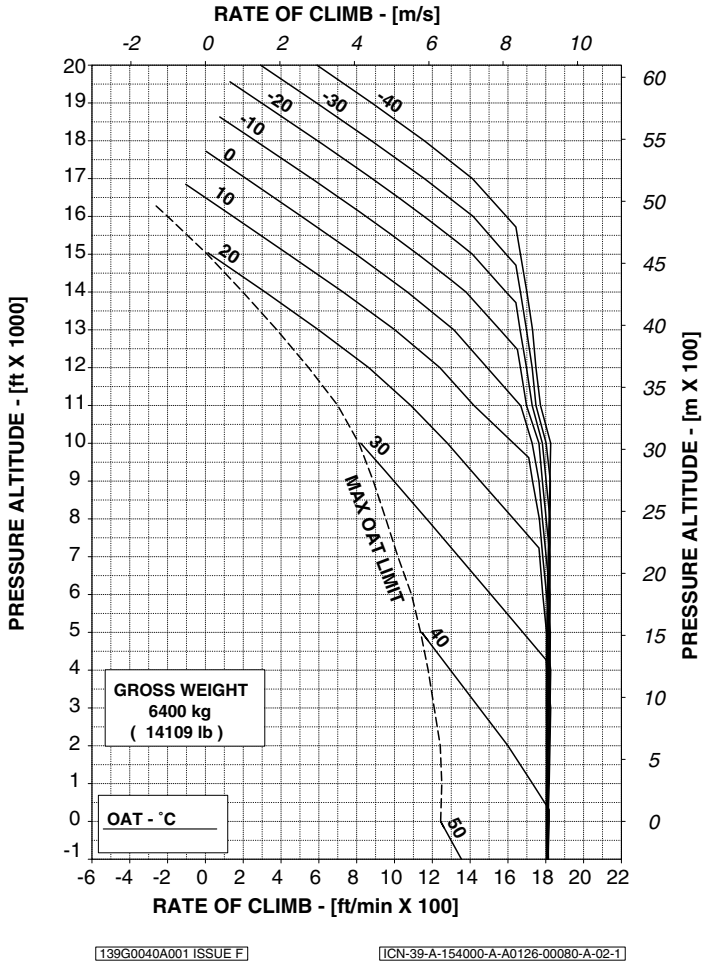

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Figure 4-30 ROC at MCP, Gross Weight 6400 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

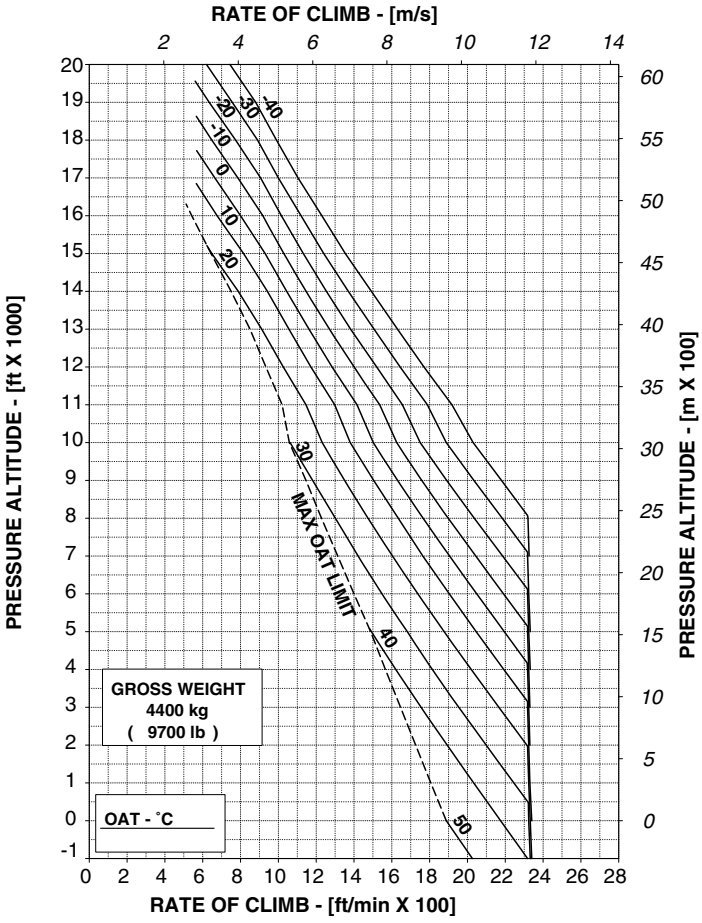

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Figure 4-31 ROC at 2.5min OEI, Gross Weight 4400 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

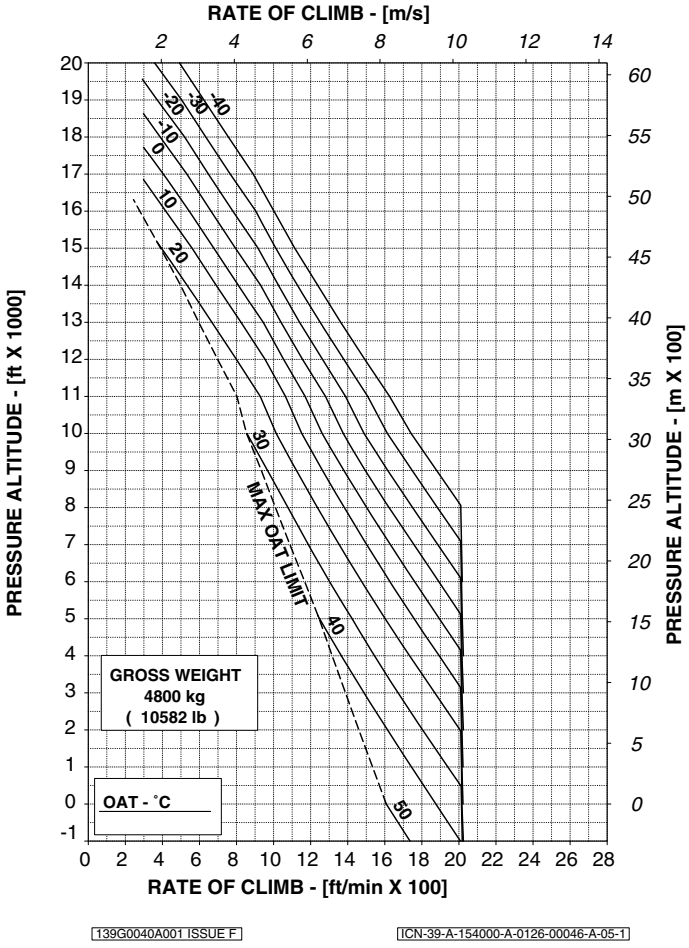

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Figure 4-32 ROC at 2.5min OEI, Gross Weight 4800 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

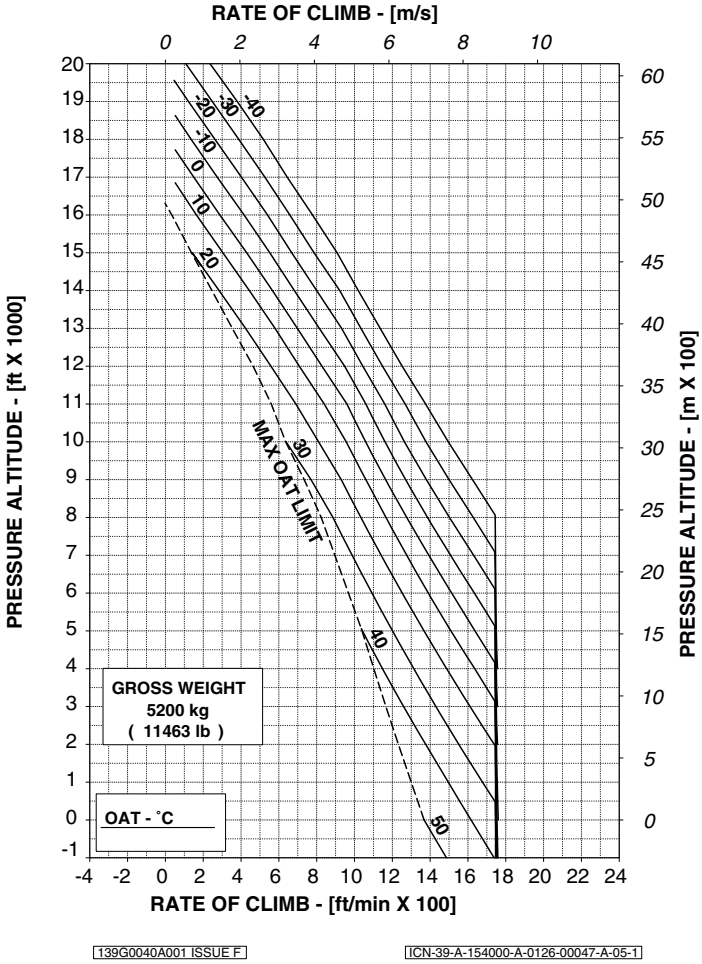

Figure 4-33 ROC at 2.5min OEI, Gross Weight 5200 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

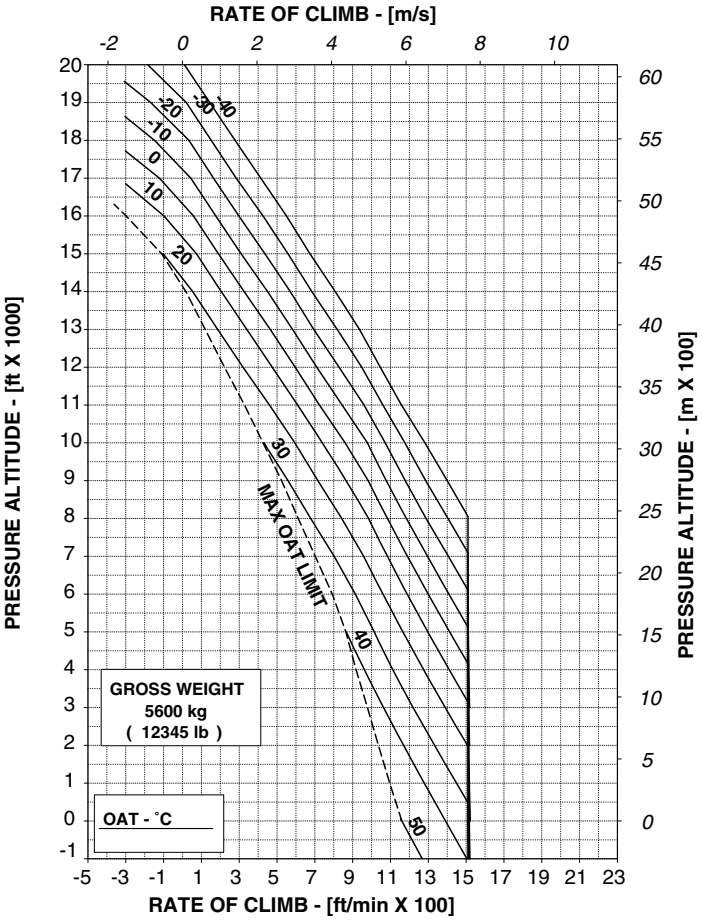

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Figure 4-34 ROC at 2.5min OEI, Gross Weight 5600 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

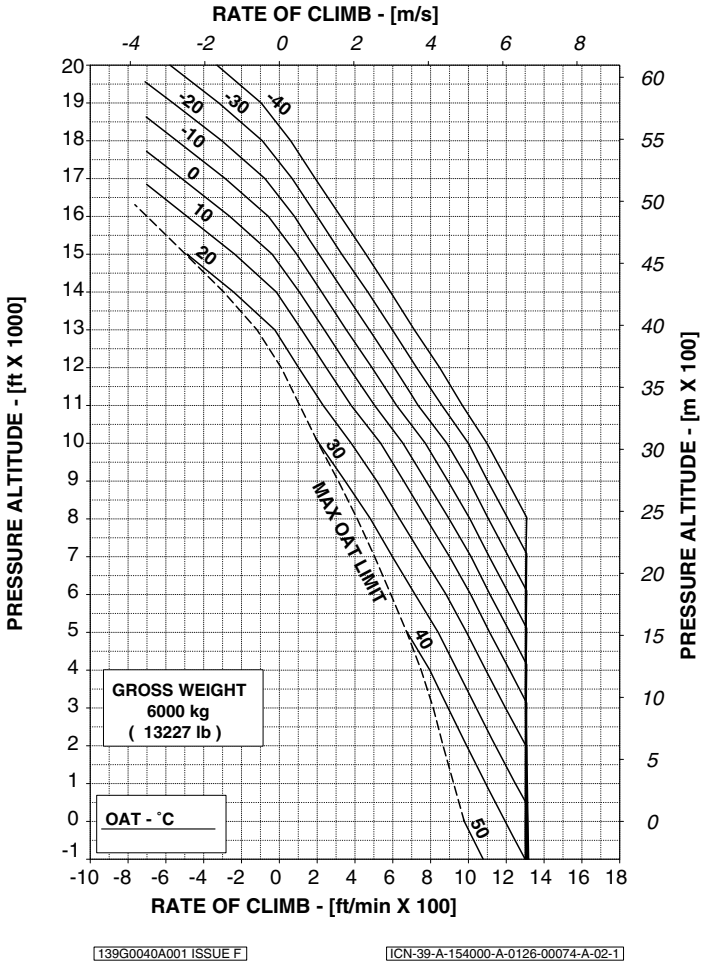

Figure 4-35 ROC at 2.5min OEI, Gross Weight 6000 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

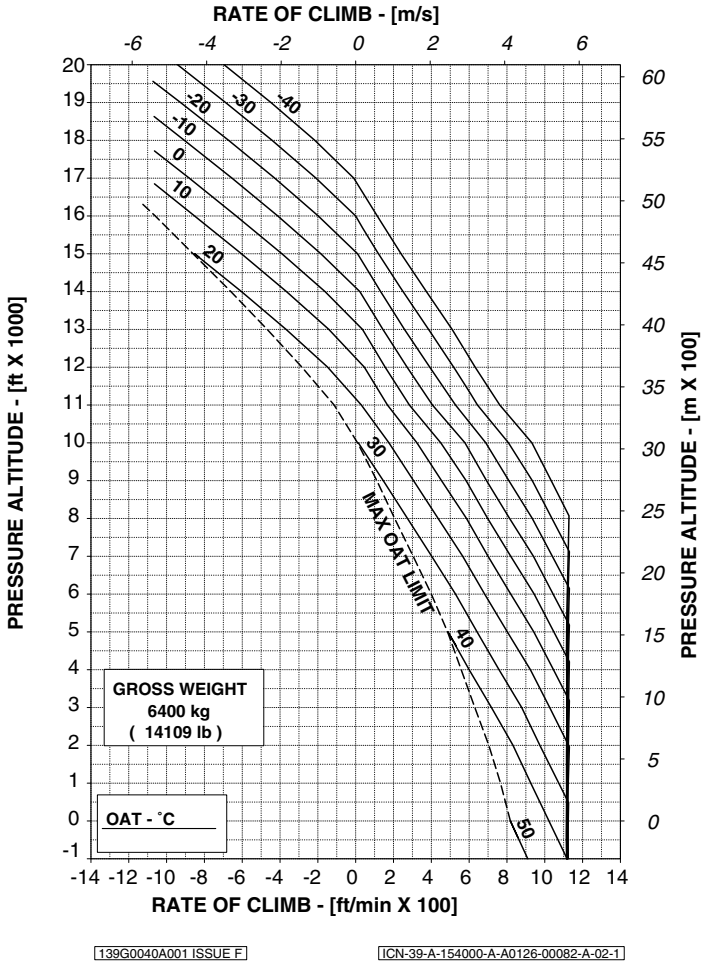

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Figure 4-36 ROC at 2.5min OEI, Gross Weight 6400 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

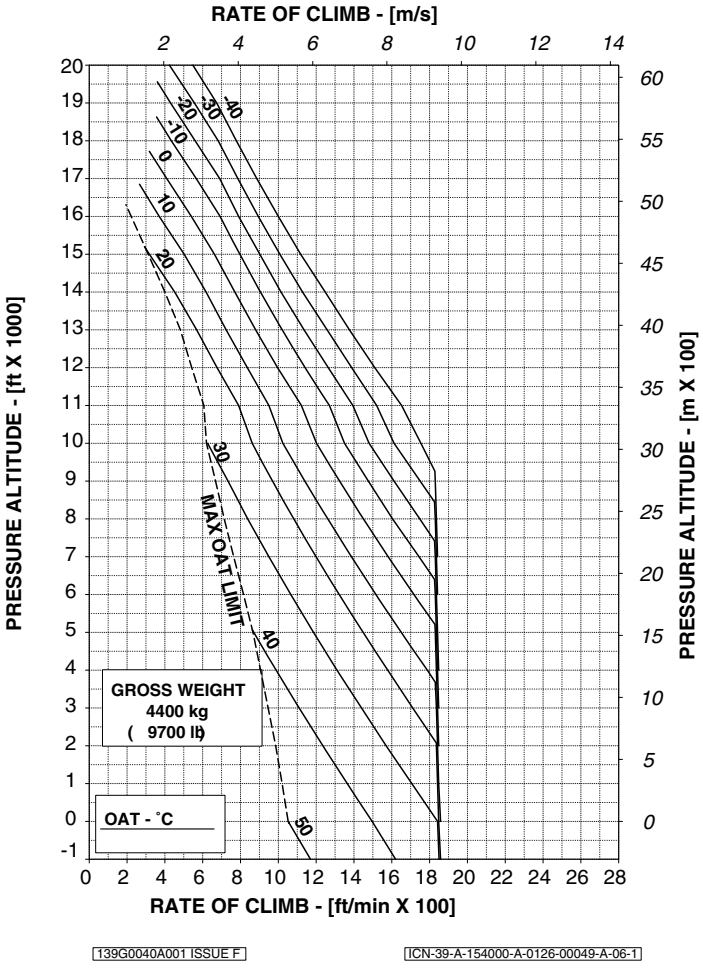

Figure 4-37 ROC at OEI MCP, Gross Weight 4400 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

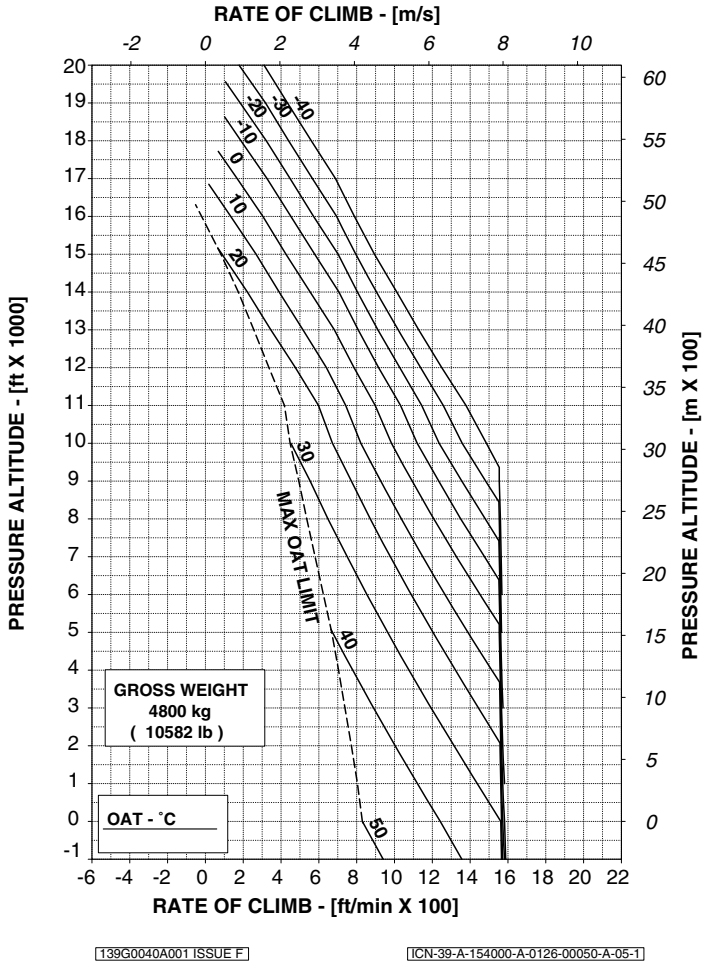

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Figure 4-38 ROC at OEI MCP, Gross Weight 4800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

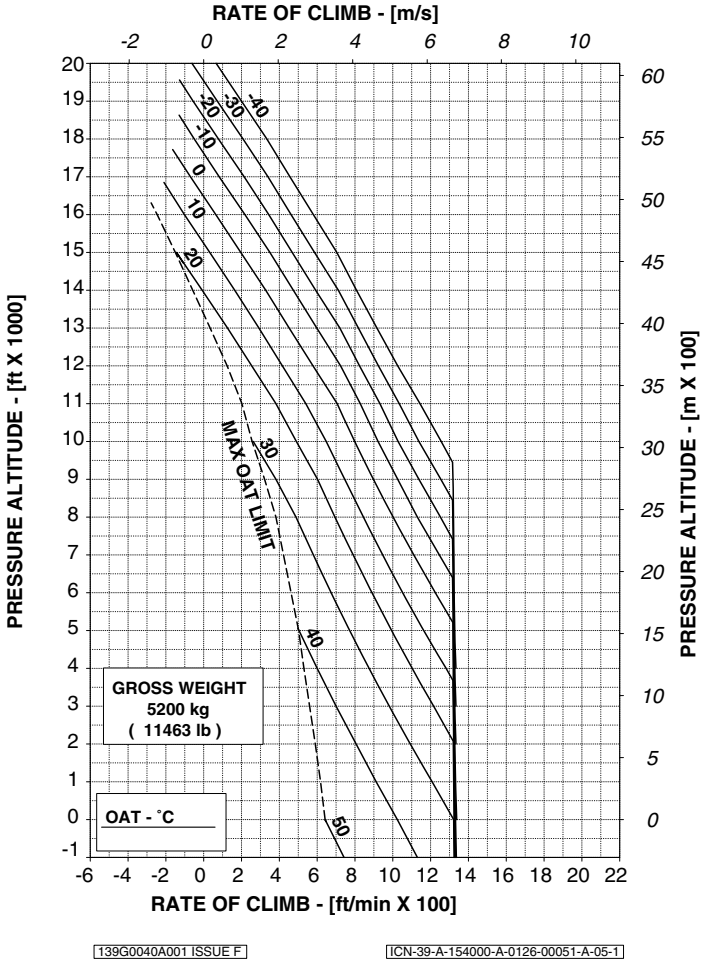

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Figure 4-39 ROC at OEI MCP, Gross Weight 5200 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

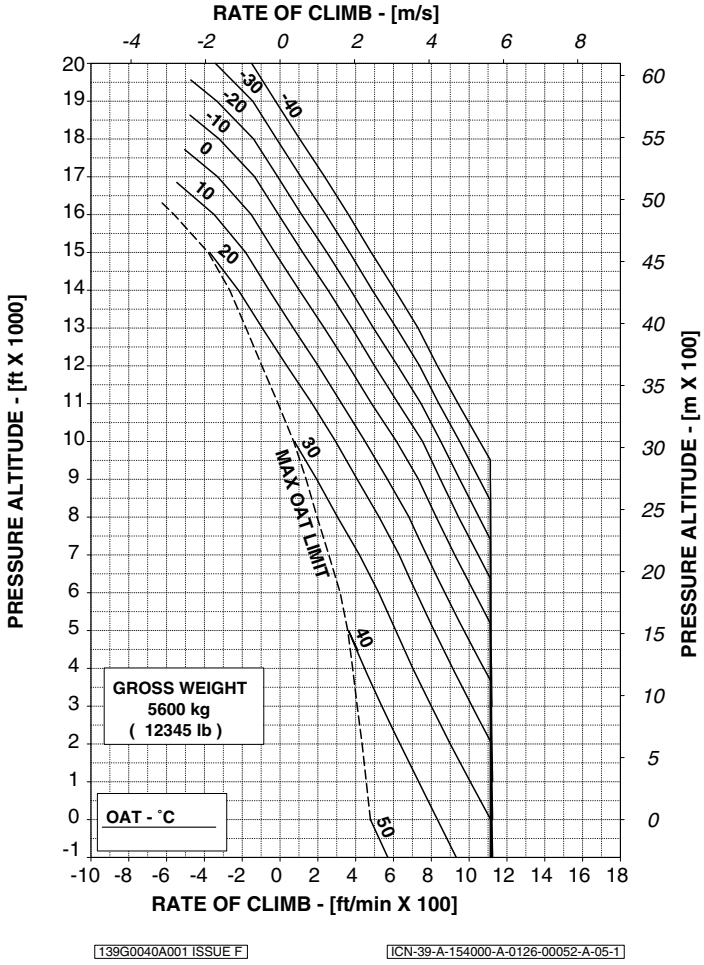

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Figure 4-40 ROC at OEI MCP, Gross Weight 5600 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

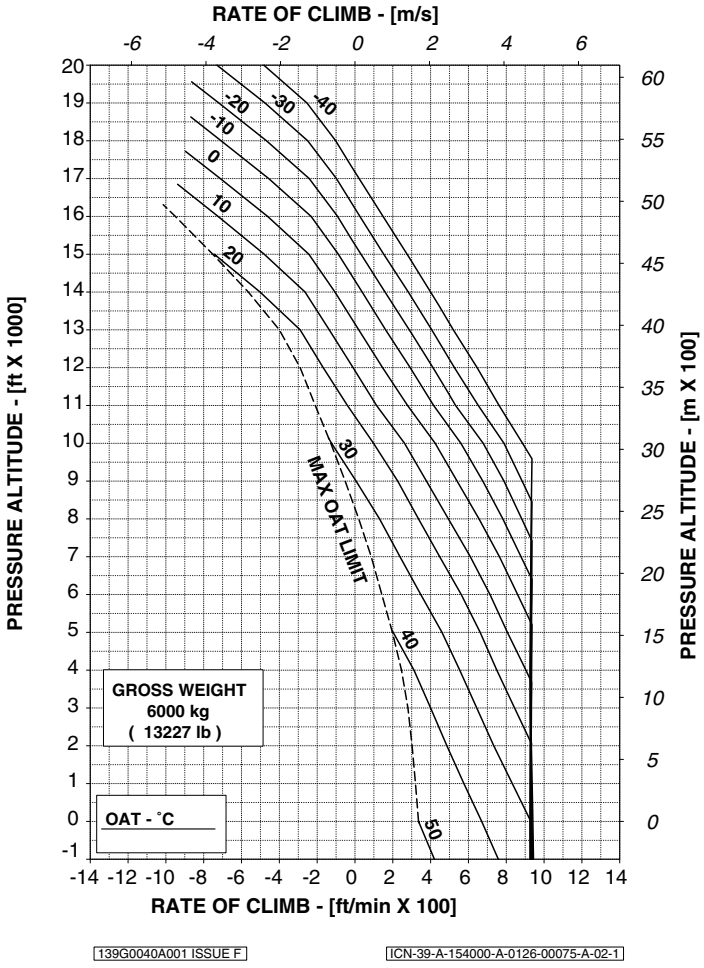

Figure 4-41 ROC at OEI MCP, Gross Weight 6000 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

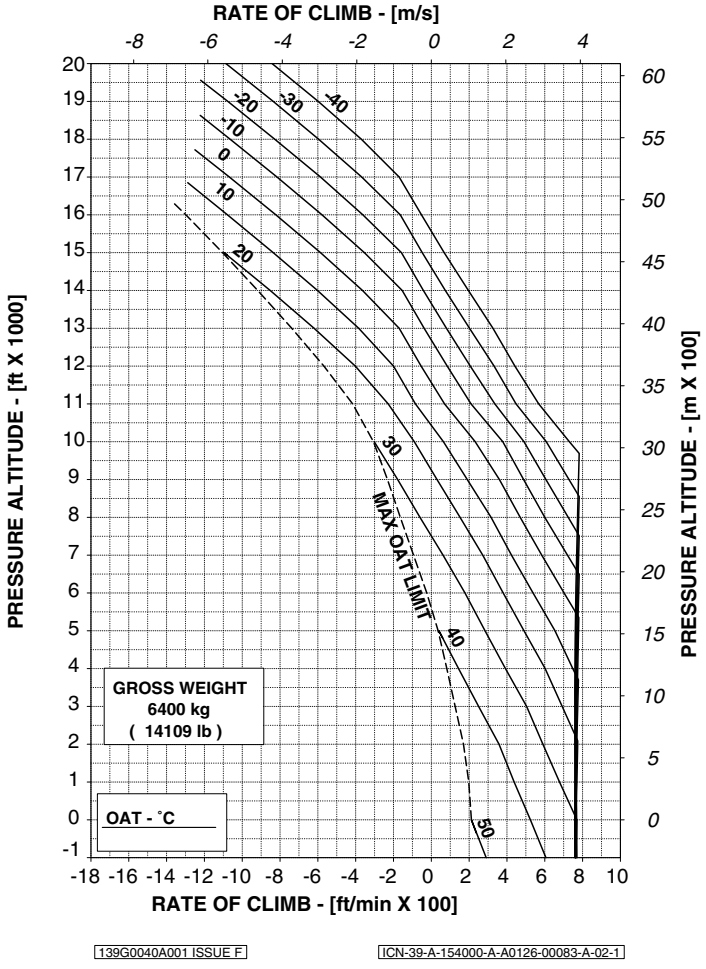

Figure 4-42 ROC at OEI MCP, Gross Weight 6400 kg

SINGLE ENGINE FAILURE IN HOVER OGE FLYAWAY PROCEDURE

The height loss during a single engine failure flyaway for combinations of weight, altitude, temperature and headwind component conditions is shown in Figure 4-43 for weights up to 6400 kg. (For aircraft configured for operation between 6400 kg and 6800 kg see Supplement 50).

The chart does not include any clearance height. If the hover height is greater than the height loss plus the clearance height required (15 ft, (5 m) minimum) then a flyaway capability exists and the Flyaway Procedure should be followed.

The Headwind Component correction incorporated in the graph has already been factored by 50%, no further correction is required.

The height loss is valid for rotor speeds of 100 %NR or 102 %NR and provided the flyaway manoeuvre is initiated within 1 second from engine failure recognition.

Note

If the helicopter weight, at the time of engine failure, is less or equal to the Hover OGE 2.5 min OEI weight an engine failure in the hover will result in no height loss provided that the pilot does not intervene on the flight controls.

FLYAWAY PROCEDURE

1. Collective/Cyclic control — Rotate nose down in 1 second to an attitude of -20°. Recover pitch attitude to 5° nose up in approximately 5 seconds. Maintain this attitude while using the collective to droop the NR to a minimum of 90% NR, if necessary, to arrest the descent.
2. Acceleration — Maintain pitch attitude at 5° nose up and accelerate to V_{TOSS} (40 KIAS).
3. At V_{TOSS} — When the aircraft has achieved V_{TOSS} (40 KIAS) and a positive rate of climb lower collective to recover NR to 100%, continue climb.
4. Climb — Continue climb and accelerate to V_y or as required.

Note

Following the flyaway procedure the height loss indicated on chart Figure 4-42, for given ambient condition and aircraft weight, guarantees that V_{TOSS} (40 KIAS) will be achieved and, after accelerating to V_y, a subsequent minimum Rate Of Climb of 150 fpm is assured.

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HEIGHT LOSS AFTER AN ENGINE FAILURE from HOVER

ROTOR SPEED: 100% or 102%

WIND BENEFIT

Note: the flyaway procedure assures a min ROC of 150 fpm at V_Y with MCP OEI

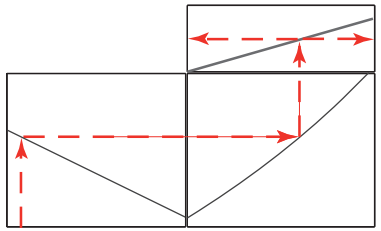

Figure 4-43 Height Loss During Flyaway

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HOVER CEILING OGE 2.5 MIN OEI WITH HEADWIND BENEFIT

The Hover Ceiling charts define the maximum weights at which an OGE hover is possible at 2.5 MIN OEI power rating for varying combinations of Pressure Altitude, OAT, main rotor speed at 102% and incllude the headwind gross weight benefit.

Two charts are presented.

— Figure 4-44. This chart displays the Factored Headwind Benefit and has already been factored by 50%, no further correction is required.

— Figure 4-45. This chart displays the Unfactored Headwind Benefit and the full performance increase resulting from the actual headwind component is applicable.

Note

Unless otherwise authorized by operating regulations, the pilot is not authorized to credit more than 50 percent of the performance increase resulting from the actual headwind component and must reduce performance by 150 percent of the performance decrement resulting from the actual tail wind component.

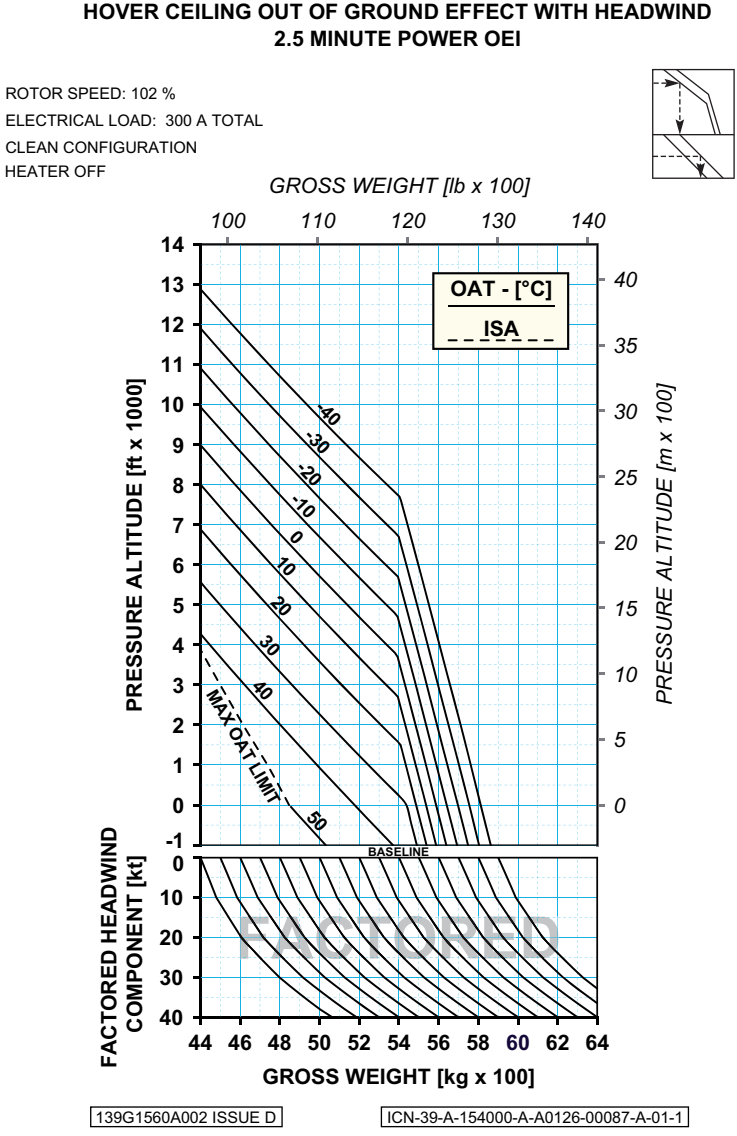

Figure 4-44 Hover Ceiling OGE 2.5 min OEI with Factored Headwind Component

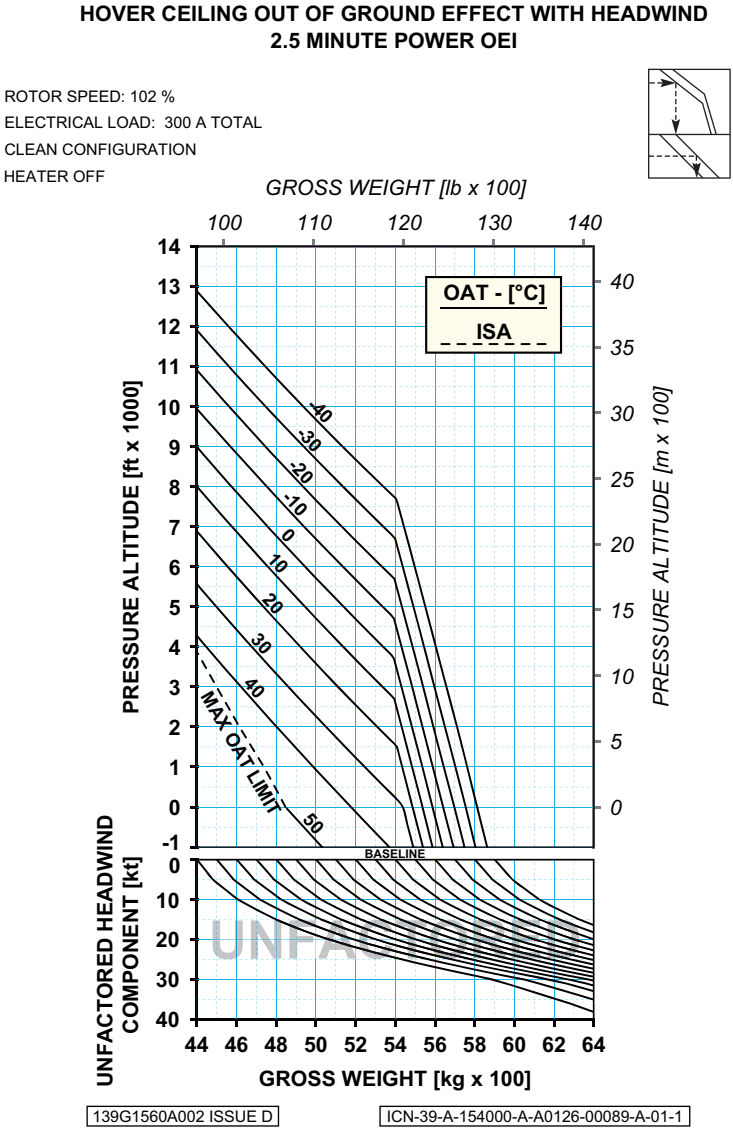

Figure 4-45 Hover Ceiling OGE 2.5 min OEI with Unfactored Headwind Benefit

NOISE CHARACTERISTICS

The following noise levels comply with ICAO Annex 16, Chapter 8, “NOISE requirement” according to TCDSN EASA.R.006.

Model: AW139 Engine Pratt and Whitney PT6C-67C Gross Weight 6400 kg			
Configuration	Level Flyover (Overflight) EPNL (EPNdB)	Take Off EPNL (EPNdB)	Approach EPNL (EPNdB)
Clean aircraft No external kits installed	100% NR	100%NR	100%NR
	89.8	90.5	93.0

See Section 9 for operations at 102% NR.

SECTION 5

OPTIONAL EQUIPMENT SUPPLEMENTS

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SECTION 5

OPTIONAL EQUIPMENT SUPPLEMENTS

INTRODUCTION

This section contains the supplements for the optional equipment installed on the AW139 helicopter.

It is the responsibility of the flight crew to be familiar with the contents of this document.

LIST OF SUPPLEMENTS

The Rotorcraft Flight Manual Supplement for each optional equipment must be carried in the aircraft whenever the optional equipment is installed on the aircraft.

Supplement No.	Name of equipment	P/N
1	Rotor Brake	3G6351F00113
2	Forced Ventilation Kit, Heating Kit, Forced Ventilation and Heating Kit, Air Conditioning System	3G2121F00111 3G2140F00112, 3G2141F00114, 3G2150F00114
3	Removed	N/A
4	Removed	N/A
5	Engine Air Particle Separator (EAPS)	3G7160F00114 3G7160F00115
6	Slope Operation Envelope Extension	3G6220A00432 3G3240V00332

Supplement No.	Name of equipment	P/N
7	VVIP Interior	3G2520F00311 3G2520F00312
8	Radio Equipment Primus HF 1050 Version with Cabin Controller	3G2310F00211 3G2310F00212
9	Ditching Configurations	-
10	Crash Position Indicator with Deployable E.L.T.	3G2560F00311 3G2560F00312 3G2560F00313
11	External Hoist Operations	3G2591F00111 or 3G2591F00112 or 3G2591F00113
12	Category A Operations	-
13	Cargo Hook Operations	3G2592F00111
14	Removed	N/A
15	Auxiliary Fuel Tank	3G281500F00111
16	Radio Equipment V/UHF FLEXCOMM II Second FLEXCOMM II	3G2310F00111 4G2310F01211 3G2310F00711 4G2310F01212
17	External and Internal Public Address System	3G2350F00211 4G2350F00511 4G2350F00611 4G2350F00111 4G2350F02111 4G2350F00512 4G2350F03011 4G2350F02811

Supplement No.	Name of equipment	P/N
18	Second Radar Altimeter RT300	3G3440F00111
19	Snow Skids Kit	3G3271F00111 3G3271F00112
20	Slump Pads Kit	3G3272F00111 3G3272F00112
21	Honeywell Weather Radar Series	3G3441F00112 4G3441F00111 4G3441F00911 4G3441F01011 4G3441F01111
22	IFR Single Pilot Operations	-
23	Removed	N/A
24	VFR Night Single Pilot Operations	-
25	Traffic Advisory System KTA 970	3G3450F00311
26	Hinged Passenger Doors	4G5212F00111 3G5300P00211
27	Skyforce Observer Digital Map System	3G9310F00112
28	EURONAV Digital Map System	4G9310F00111 4G9310F00511 4G9310F00711 4G9310F01011 4G9310F01811
29	SX16 Nightsun Searchlight • IR Filter Removed Kit • FLIR Slaving Kit • Control by LTS PNL Kit	3G3340F00111 • 4G3340F00311 • 4G3340F00711/712 • 4G3340F00911/712 • 4G3340F022XX

Supplement No.	Name of equipment	P/N
30	Operations with Cockpit Doors Removed	-
31	Increased Baggage Compartment Load	3G2550F00113
32	Reserved	-
33	Cabin Bubble Window	4G5620F00111
34	4 Axis Enhanced Flight Director (EPIC Phase 4)	3G2210F00211
35	Heated Windshield System	3G5610F00611
36	SEA FLIR II	4G9350F00111 4G9350F00112 4G9350F00113
37	Second GPS System	4G3450F00611 4G3450F00612 4G3450F00613
38	Cabin Mission Console	4G4620F00411/611 4G4620F00911
39	Cabin Row 1 Forward Facing Seat Configurations	3G2520F00611 3G2520F00711
40	4 Axis Basic Flight Director (EPIC Phase 4)	4G2210F00311
41	Double External Hoist Operations	4G2591F00111
42	Radar Telephonics RDR series and TAS KTA 970	4G3441F00311 4G3441F00511

Supplement No.	Name of equipment	P/N
43	Star Safire Series FLIR	4G9350F00311 4G9350F00611 4G9350F00211 4G9350F01111
44	SX-5 Searchlight	4G3340F00811 4G3340F00812
45	Cabin Configurations with Pole Mounted Seats	-
46	Radio Equipment Chelton DF 935-2 & 935-11	4G3450F00511 4G3450F00711 3G3450F00911
47	Satellite Communication Systems	4G2310F01111 4G2310F01211 4G2310F01311 3G2310F00411 4G4390F00211
48	Powered Parking Brakes	3G3240F00111
49	External Hoist Operations (Goodrich)	4G2591F00211
50	Increased Gross Weight 6800 kg	-
51	Take Off and Landing Altitude Extension (9 Passenger Seat Configuration)	-
52	FLIR WESCAM MX 15 Series	4G9350F00411 4G9350F00412 4G9350F01511 4G9350F0XXXX
53	NightSun II XP Searchlight	4G3340F01311

Supplement No.	Name of equipment	P/N
54	Cabin Compartment Extension • Full Extension • Partial Extension	 4G5340F00111 4G5340F00211
55	Baggage Compartment Extension	4G2550F00111
56	4 Stretcher Cabin Installation	4G2564F00411 4G2564F00412 4G2564F00413/416 4G2564F00414/417 4G2564F00415/418 4G2564F00419
57	Active Vibration Control System	4G1830F00211 4G1830F00111
58	MAX VIZ Series IR Camera	4G9750F00311 4G9750F00312 4G9750F00313
59	Sponson with Reinforced Trailing Edge	4G5339F00111 3G5339A00115 3G5339A05011 3G5339A00116
60	Night Vision Goggle Operations	-
61	Additional Secondary Landing Light	4G3340F01811
62	Radio Equipment Talon V/UHF RT-8108	3G2310F00311 4G2310F01811
63	“Green” Aircraft Configuration	-
64	TALON FLIR	4G9350F00511

Supplement No.	Name of equipment	P/N
65	Cabin Compartment Extension with Longitudinal Auxiliary Fuel Tank	4G2800F00111
66	Cabin Sliding Windows	4G5620F00211 4G5620F00311
67	4 Axis Enhanced Flight Director (EPIC S/W Phase 5 and later)	4G2210F00411
68	EPIC S/W Phase 5 and later Additional Functions	-
69	4 Axis Enhanced FD with SAR Modes (EPIC S/W Phase 5 and later)	4G2210F00111
70	4 Axis Basic Flight Director (EPIC S/W Phase 5 and later)	4G2210F00511
71	Ice Protection System Flight in Icing Conditions	4G3000F00211
72	Ultraforce 350 FLIR	4G9350F00711 4G9350F00712 4G9350F00911
73	Radar Selex Gabbiano Series	4G3441F00211 4G3441F00611
74	Enhanced Landing Light Configuration	4G3360F04411 4G3340F00211 4G3340F02611
75	Baggage Barrier Net Installation	4G2550F00311
76	LIPS	4G3000F00111

Supplement No.	Name of equipment	P/N
77	Goodrich Landing Gear	4G3200F00111 4G3200F00112 4G3200F00113
78	Radio Equipment ADS-B Transmitter	4G3450F01111
79	EPIC Software Phase 7 and later Specific Functions	EB7030191-00110 EB7030191-00111 EB7030191-00112 EB7030191-00113 EB7030191-00114 EB7030191-00115 EB7030191-00117 EB7030191-00118 EB7030191-00120
80	RNP Operations (EPIC Phase 7 and later)	-
81	EGPWS MK XXII	3G3440F00211 3G3440F00212 4G3440F00311 4G3440F00411
82	TCAS II	4G3450F00211
83	TRAKKABEAM Series Searchlight	4G3340F02411 4G3340F02412 4G3340F02413 4G3340F02414 4G3340F03011
84	OPLS	4G9360F00211
85	Batteries in Parallel (Improved Engine Starting) Kit	4G2430F00811

Supplement No.	Name of equipment	P/N
86	Engine Air Inlet Barrier Filter & FOD Screen	4G7160F00111 4G7160F00112
87	ECS ENVIRO	3G2141A00111 3G2141A00112 3G2150F00511 3G2150F00512 4G2150F00711 4G2150F00611 4G2150F00911
88	Radio Equipment Rockwell Collins HF 9000D	4G2310F03511
89	Circular Force Active Vibration Control System	4G1830F00611/12 4G1830F00711/12 4G1830F00411/12 4G1830F00511/12
90	Weight Extension 7000 kg	-
91	Power Line Detector	4G9380F00111
92	LEO III HD FLIR	4G9350F01011
93	MGB Improved Lubrication System	4G6320F00311 4G6320F00312 4G6320F00511
94	Left Hand Controls Removal	4G6700F00311
95	Ditching Configurations (DART Integrated Emergency Flotation and Liferaft Kit)	-
96	Heavy Duty Baggage Compartment	4G2550F00211

Supplement No.	Name of equipment	P/N
97	CAT A Enhanced Offshore Procedure	-
98	Dual Cargo Hook Operations	3G2592F00111 4G2592F00111
99	Cabin Compartment Partial Extension with Baggage Barrier Net	4G5338F00111
100	Baggage Compartment Restraint System	4G5340F00311 4G5230F00111
101	Phase 8 Additional Functions	EB7030191-00113 EB7030191-00120
102	Synthetic Vision System (EPIC Phase 8)	-
103	Cabin Storage Boxes	-
104	VIP Seat Installations	4G2520F29011 4G2520F28911
105	Cabin Tunnel Extension STN 7200	4G5338F00211 4G5338F00311
106	Hight Intensity Strobe Light (HISL)	4G3340F03111

OPTIONAL EQUIPMENT INCOMPATIBILITY/RESTRICTIONS

The following table shows for each Supplement:

- the optional equipments which cannot be installed due to physical or functional incompatibility.
- the optional equipments whose installation is a mandatory requirement or causes restrictions to limitations or performance. Detailed information can be found in the Supplement.
- the aircraft serial number for which the optional equipments can be installed:

  ♦ **installation permitted**

  x installation not permitted

A: Aircraft Serial Nos up to 31200 and from 41001 to 41200

B: Aircraft Serial Nos from 31201 and from 41201

* See Report 139G3360A001 AW139 NVG Compatibitily Reference Handbook for complete list.

** See Report 139G3000A001 AW139 Icing Compatibility Reference Handbook for complete list.

EMI compatibility information can be found in document AW139 EMI Compatibility Reference Handbook Doc N° 139G9850A001 latest issue.

PEDs (Portable Electronic Devices) sensitive equipment that have been assessed and declared as NON-PED tolerant or that have PED tolerance limitations, can be found in document AW139 Non PED Tolerant Reference Handbook, Doc N°139G9850A002 latest issue.

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
1	Rotor Brake	None	None	♦	♦
2	Forced Ventilation Kit, Heating Kit, Forced Ventilation and Heating Kit, Air Conditioning Systems	87	None	♦	♦
3	Not Applicable	N/A	N/A	N/A	N/A
4	Not Applicable	N/A	N/A	N/A	N/A
5	Engine Air Particle Separator (EAPS)	71,76,86	8	♦	♦
6	Slope Operation Envelope Extension	None	77	♦	♦
7	VVIP Interior	38,39,45, 56,60,104	None	♦	♦
8	Radio Equipment Primus HF 1050 Vers with Cabin Controller	88	None	♦ x	♦ ♦
9	Ditching Configurations	100	None	♦	♦
10	Crash Position Indicator with Deployable E.L.T.	None	None	♦	♦
11	External Hoist Operations P/N 3G2591F00111/112 P/N 3G2591F00113	26,41,49	8,19,20, 29,34,44, 53,67,69, 77,83,104	♦ x	♦ ♦
12	CATEGORY A Operations	None	77	♦	♦
13	Cargo Hook Operations	None	8,21,42,73	♦	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
14	Removed				
15	Auxiliary Fuel Tank	54,55,65, 75,99,105	None	♦	♦
16	V/UHF FLEXCOMM II Second FLEXCOMM II	None	None	♦ ♦	♦ ♦
17	External and Internal Public Address System	None	96	♦	♦
18	Second Radar Altimeter RT300	None	None	♦	♦
19	Snow Skids Kit	20,77	6,9,11,25, 29,41,44, 49,53,83,95	♦	♦
20	Slump Pads Kit	19,77	6,9,11,25, 29,41,44, 49,53,83,95	♦	♦
21	Honeywell Weather Radar Series	42,73	None	♦	♦
22	IFR Single Pilot Operations	None	34,40	♦	♦
23	Removed				
24	VFR Night Single Pilot Operations	None	25,42,82	♦	♦
25	Traffic Advisory System KTA 970	42,82	8,16,19, 20,21	♦	♦
26	Hinged Passenger Doors	11,30,38, 39,41,45, 49,56,77	11,41,49	♦	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
27	Skyforce Observer Digital Map System	28	None	♦	♦
28	EURONAV Digital Map System	27	None	♦	♦
29	SX-16 Nightsun Searchlight • IR Filter Removed Kit • FLIR Slaving Kit • Control by LTS PNL Kit	44,53,83	6,11,19,20, 41,49	♦ ♦ ♦ ♦	♦ ♦ ♦ ♦
30	Operations with Cockpit Doors Removed	26,71,76	12	♦	♦
31	Increased Baggage Compartment Load	96,100	54,65,71,75	♦	♦
32	Reserved				
33	Cabin Bubble Window	66	None	♦	♦
34	4 Axis Enhanced Flight Director (EPIC Phase 4)	40,67,68, 69,70,79, 80,82,101, 102	18	♦	♦
35	Heated Windshield System	71,76	2	♦	♦
36	SEA FLIR II	43,52,64, 72,92	None	♦	♦
37	Second GPS System	None	None	♦	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
38	Cabin Mission Console 4G4620F00411/611/911 4G4620F00911 with sliding seat installation	 7,26,45,56 7,26,39,45, 56,99,103, 104,105	 11,41,49, 104 11,41,49	♦	♦
39	Cabin Row 1 Forward Facing Seat Configurations	7,26,45,56	11,38,41,49, 104	♦	♦
40	4 Axis Basic Flight Director (EPIC Phase 4)	34,67,68, 69,70,79, 80,82,101, 102	18	♦	♦
41	Double External Hoist Operations	11,26,49, 77	8,19,20, 29,34,44, 53,67,69, 77,83,104	x	♦
42	Radar Telephonics RDR Series and TAS KTA 970	21,25,73, 82,96	8,16,19, 20	x	♦
43	Star Safire Series FLIR	36,52,64, 72,92	None	x	♦
44	SX-5 Searchlight	29,53,60, 83	6,11,19,20, 41,49	x	♦
45	Cabin Configurations with Pole Mounted Seats	7,26,38, 39,56	54,65,104	♦	♦
46	Radio Equipment Chelton DF 935-2 & 935-11	None	None	♦	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
47	Satellite Communication Systems	None	None	♦	♦
48	Powered Parking Brakes	None	None	♦	♦
49	External Hoist Operations (Goodrich)	11,26,41, 77	8,19,20, 29,34,44, 53,67,69, 83,104	x	♦
50	Increased Gross Weight 6800 kg	None	11,12,19, 20,30,41, 49,77	♦	♦
51	Take Off and Landing Altitude Extension (9 Passenger Seat Configuration)	None	11,41,49,77	♦	♦
52	FLIR WESCAM MX 15 Series	36,43,64, 72,92	None	x	♦
53	NightSun II XP Searchlight	29,44,60, 83	6,11,19,20, 41,49	x	♦
54	Cabin Compartment Extension • Full Extension • Partial Extension	15,55,75, 96,99,100, 105 15,55,65, 75,99,100, 105	31,65,45, 104 104	x ♦	♦ ♦
55	Baggage Compartment Extension	15,54,65, 75,96,99, 100,105	31,54	♦	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
56	4 Stretcher Cabin Installation	7,26,38, 39,45,104	None	♦	♦
57	Active Vibration Control System	77,89	None	♦	♦
58	MAX VIZ Series IR Camera	None	None	x	♦
59	Sponson with Reinforced Trailing Edge	77	None	♦	♦
60	Night Vision Goggle Operations *	7,44,53	None	♦	♦
61	Additional Secondary Landing Light	74,77	None	♦	♦
62	Radio Equipment Talon V/UHF RT-8108	71,76	None	♦	♦
63	“Green” Aircraft Configuration	None	None	♦	♦
64	TALON FLIR	36,43,52, 72,92	None	♦	x
65	Cabin Compartment Extension with Longitudinal Auxiliary Fuel Tank	15,54,55, 75,96,99, 100,105	31,45,54, 104	x	♦
66	Cabin Sliding Windows	33	None	♦	♦
67	4 Axis Enhanced FD (EPIC S/W Phase 5 and later)	34,40,69, 70	18	♦	♦
68	EPIC S/W Phase 5 and later Additional Functions	34,40	11,41,49	♦	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
69	4 Axis Enhanced FD with SAR Modes (EPIC S/W Phase 5 and later)	34,40,67, 70	18	♦	♦
70	4 Axis Basic FD (EPIC S/W Phase 5 and later)	34,40,67, 69	18	♦	♦
71	Ice Protection System** Flight in Icing Conditions	5,30,35, 76,77,86, 96	31,54,65,75	x	♦
72	Ultraforce 350 FLIR	36,43,52, 64,92	None	x	♦
73	Radar Selex Gabbiano Series	21,42,96	None	x	♦
74	Enhanced Landing Light Configuration	61	None	x	♦
75	Baggage Barrier Net Installation	15,54,55, 65,96,99, 100,105	31,71	♦	♦
76	LIPS**	5,30,35, 71,77,86	None	x	♦
77	Goodrich Landing Gear	19,20,26, 41,49,57, 59,61,71, 76,90	6,9,12,50, 51,97	♦	♦
78	Radio Equipment ADS-B Transmitter	None	79	x	♦
79	EPIC Software Phase 7 and later Specific Functions	34,40	78	♦	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
80	RNP Operations (EPIC Phase 7 and later)	None	None	♦	♦
81	EGPWS MK XXII	None	16	♦	♦
82	TCAS II	25,42	19,20	x	♦
83	TRAKKABEAM Series Searchlight	29,44,53	11,19, 20,41,49	x	♦
84	OPLS	None	None	♦	♦
85	Batteries in Parallel (Improved Engine Starting) Kit	None	None	♦	♦
86	Engine Air Inlet Barrier Filter & FOD Screen	5,71,76	12,13,50	x	♦
87	ECS ENVIRO	1	50,51	x	♦
88	Radio Equipment Rockwell Collins HF 9000D	8	None	x	♦
89	Circular Force Active Vibration Control System	57,77	None	x	♦
90	Weight Extension 7000 kg	77	11,12,13, 19,20,30, 34,41,49, 67,69,71,76	♦	♦
91	Power Line Detector	None	None	♦	♦
92	LEO III HD FLIR	36,43,52, 64,8	None	x	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
93	MGB Improved Lubrication System	None	None	♦	♦
94	Left Hand Controls Removal	None	12,76,69	♦	♦
95	Ditching Configurations (DART Integrated Emergency Flotation and Liferaft Kit)	9,100	None	x	♦
96	Heavy Duty Baggage Compartment	31,42,55, 65,71,73, 75,100, 105	17,54	♦	♦
97	CAT A Enhanced Offshore Procedure	None	77	♦	♦
98	Dual Cargo Hook Operations	None	8,21,42,73	♦	♦
99	Cabin Compartment Partial Extension with Baggage Barrier Net	15,54,55, 65,75,105	38,104	x	♦
100	Baggage Compartment Restraint System	9,31,54, 55,65,75, 95,96,105	None	x	♦
101	Phase 8 Additional Functions	34,40	None	♦	♦
102	Synthetic Vision System (EPIC Phase 8)	None	None	♦	♦
103	Cabin Stowage Boxes	None	38,104	♦	♦

Suppl. No.	Name of equipment	Incompati-bility (Supp.)	Restrictions (Supp.)	Serial N° (A)	Serial N° (B)
104	VIP Seat Installations	7,56	11,38,39, 41,45,49, 54,65,99, 103,105	♦	♦
105	Cabin Tunnel Extension STN 7200	15,54,55, 65,75,96, 99,100	38,104	♦	♦
106	Hight Intensity Strobe Light (HISL)	None	None	♦	♦

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 1

ROTOR BRAKE

P/N 3G6351F00113

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SUPPLEMENT 1
ROTOR BRAKE

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GENERAL INFORMATION

Installation of the rotor brake system allows rapid deceleration of the rotor after engine shut down. The rotor brake is also designed to allow for parking the rotor for up to 8 hrs.

The rotor brake control logic only allows Rotor Brake operations with engines shut down as automatic removal of pressure and caliper travel DOWN are activated for any other conditions(ie. one engine in ground idle).

The Rotor Brake, P/N 3G6351F00113, consists of disc type braking, operating lever, tubing and fittings required for the installation. The brake caliper is automatically disengaged from the disc when the engines are running in flight mode. The caliper automatically engages with the disc when the aircraft is on the ground and the engines are shut down.

The rotor brake operation is indicated by activation of the ROTOR BRAKE ON advisory message on the CAS. Malfunctions of the system are indicated by caution messages on the CAS.

SECTION 1 - LIMITATIONS

CENTRE OF GRAVITY LIMITATIONS

After rotor brake installation the new empty weight and CG location must be determined.

No change in CG limitations.

GENERAL

Rotor brake can only be actuated with both engines OFF

Maximum NR for selection to BRAKE position (%)..... 40%

Maximum pressure when in BRAKE position (BAR)..... 62.5

Minimum pressure for lever in BRAKE position (BAR) 40

Note

When in BRAKE position the rotor brake is effective for a maximum of 8 hours.

Minimum pressure allowed after 8hrs in BRAKE position (BAR) 26

PLACARDS

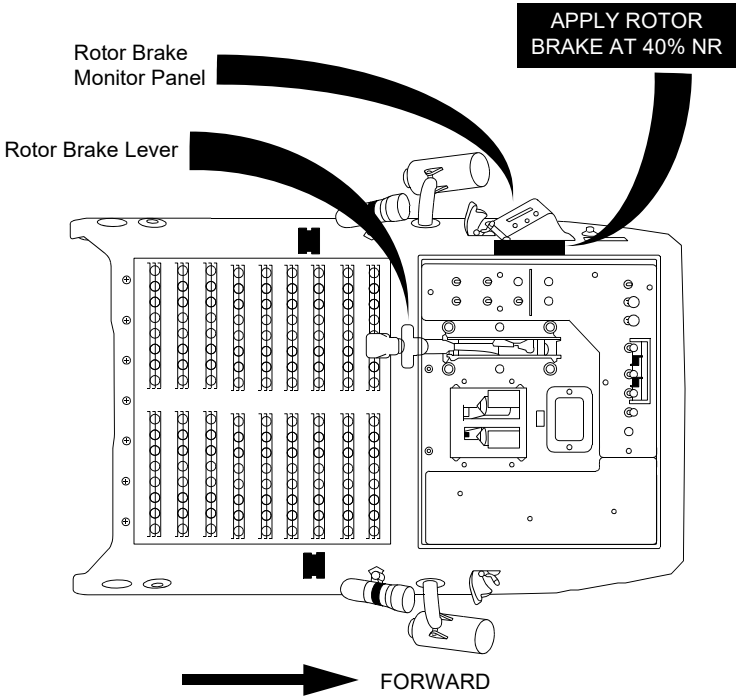

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Figure1-1 Placard position on Overhead Panel (View Looking Upwards)

SECTION 2 - NORMAL PROCEDURES

ENGINE PRE-START CHECK

1. Rotor brake - OFF. ROTOR BRAKE ON advisory extinguished.

CAUTION

The rotor brake must be OFF before engine starting.

SHUTDOWN

1. After engine shutdown — At 40% NR select rotor brake lever to BRAKE position, ROTOR BRK ON advisory illuminates. Confirm no abnormal pressure messages illuminate on brake monitor panel. When rotor stopped move lever to OFF.

   If parking with rotor brake required, cycle rotor brake lever from PUMPING LIMIT mark to BRAKE position as necessary to increase pressure to at least 40 BAR, on digital readout, and leave in BRAKE detent.

Note

Up to 8 hours of parking pressure are guaranteed before re-pressurization of the system.

ADVISORY CAPTION DEFINITION

CAS Caption (Green)	System State
ROTOR BRK ON	Rotor brake selected to BRAKE position

ROTOR BRAKE ADVISORY MESSAGES ON ROTOR BRAKE MONITOR PANEL

CLPR UP	Rotor brake caliper in brake position ready for brake operation.
CLPR DOWN	Rotor brake caliper out of braking position.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY/POST CRASH SHUTDOWN

In the event of an emergency or crash landing, priority must be given to ensuring that personnel are evacuated safely at the most appropriate time. Every effort should be made to carry out the following shutdown procedures immediately:

1. ENG MODE 1 & 2 switches — OFF.

   If engine does not shut down then:

   ECL 1 & 2 — OFF.

2. FUEL PUMP 1 & 2 switches — OFF.
3. ENG FUEL 1 & 2 switches — OFF.
4. ENG 1 & 2 FIRE ARM pushbuttons — Press appropriate pushbutton, if required.
5. ENG EXTING switch — Select BTL 1 and/or 2, if required.
6. Rotor brake — Select BRAKE (Braking from 90% NR permitted in an Emergency).

Note

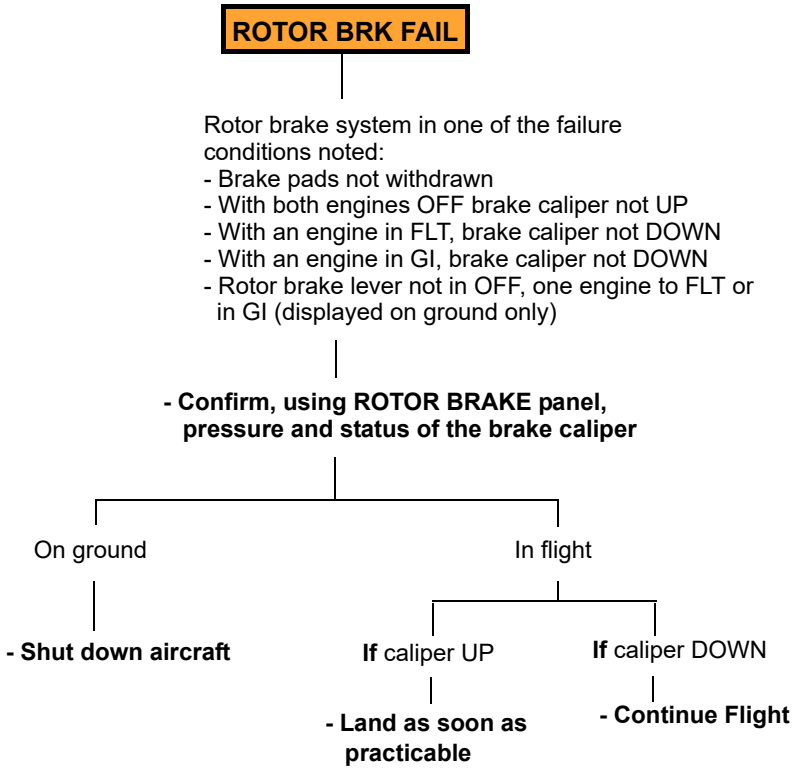
If the undercarriage is not extended the Rotor Brake will not function. In this case use collective to slow rotor, being aware the aircraft may yaw left.

When rotor stopped.

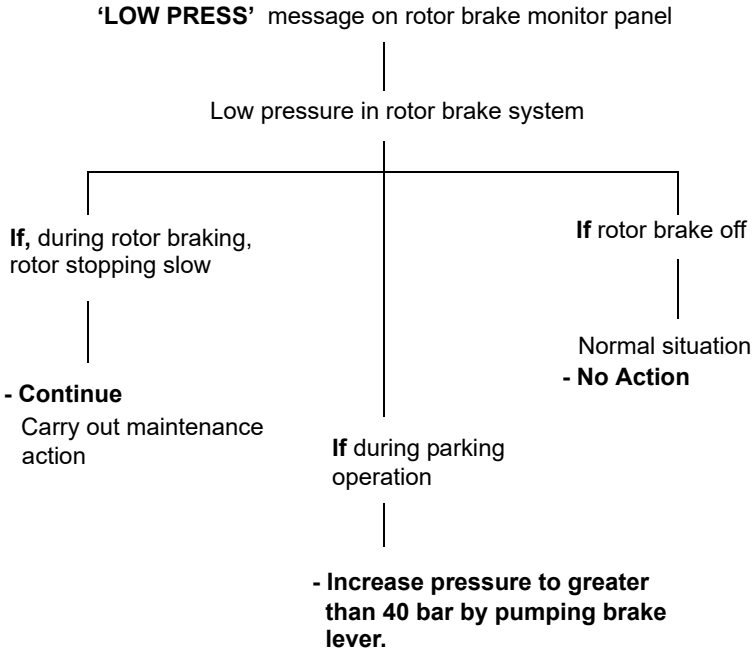
7. GEN 1 & 2 and BATT MASTER switches — OFF(using gang-bar).

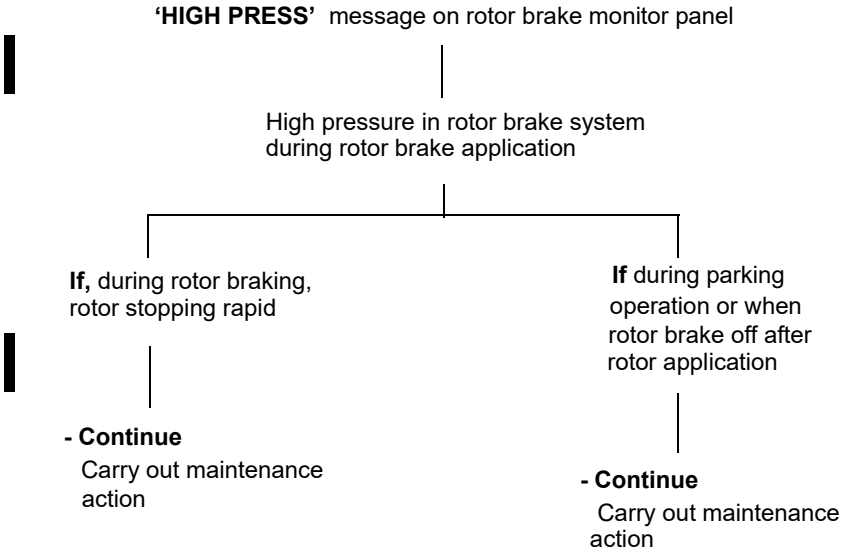
CAS CAUTION MESSAGE

ROTOR BRAKE FAIL



ROTOR BRAKE PRESSURE LIGHTS ON ROTOR BRAKE MONITOR PANEL





SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 2

VENTILATION, HEATING AND AIR CONDITIONING SYSTEMS

P/N 3G2121F00111	Forced Ventilation Kit
P/N 3G2140F00112	Heating Kit
P/N 3G2141F00114	Forced Ventilation and Heating Kit
P/N 3G2150F00114	Air Conditioning Kit

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SUPPLEMENT 2
VENTILATION, HEATING AND AIR CONDITIONING SYSTEMS

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GENERAL INFORMATION

Installation of the various Ventilation, Heating and Air Conditioning System (COND) kits allows for different amounts of automatic or manual control of the temperature environment, independently for cockpit and cabin, dependant on which kits are installed.

Four kits are available:

P/N 3G2121F00111	Forced Ventilation Kit
P/N 3G2140F00112	Heating Kit
P/N 3G2141F00114	Forced Ventilation and Heating Kit
P/N 3G2150F00114	Air Conditioning Kit

The kits consists of additions to the basic aircraft ram air system. Depending on the kits installed some or all of the following items will be present: bleed air shut off valves, pressure and regulating shut off valves, pressure and temperature switches, air conditioning unit, outside air intake and exhaust duct, pilot and passenger area air outlets, connecting ducts and tubing, selector switch and control switches to operate the shut off valves.

The relation between the various kits is as follows:

Forced Ventilation Kit	Basic aircraft ram air system with an additional controllable fan in cabin system. See Figure 1.
Heating Kit	Basic aircraft ram air system with heating control. See Figure 2.
Forced Ventilation and Heating Kit	Basic aircraft ram air system with an additional controllable fan in cabin system and heating control. See Figure 3.
Air Conditioning Kit	Basic aircraft ram air system with an additional controllable fan in cabin system, heating and cooling control. See Figure 4.

Operation of the Heater System is indicated by a HEATER ON advisory message.

Operation of the Air Conditioning System is indicated by a AIR COND ON advisory message.

Malfunction of the HEATER or COND systems are indicated on the CAS by caution messages.

CONTROL PANEL DIAGRAMS

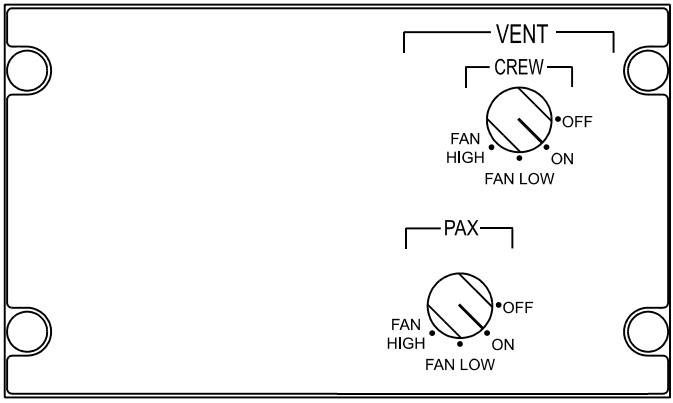

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Figure 1 Forced Ventilation

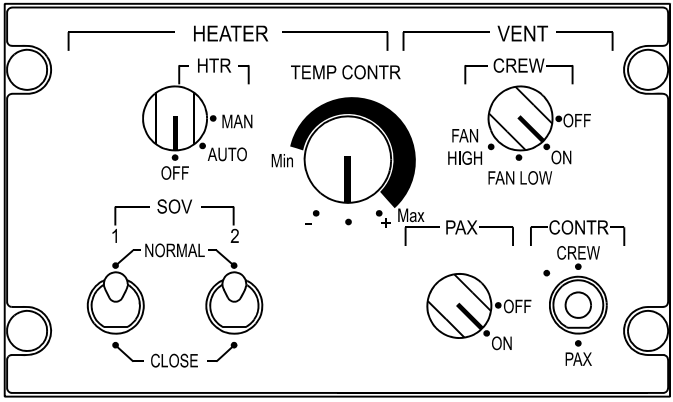

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Figure 2 Heating with Normal Ventilation

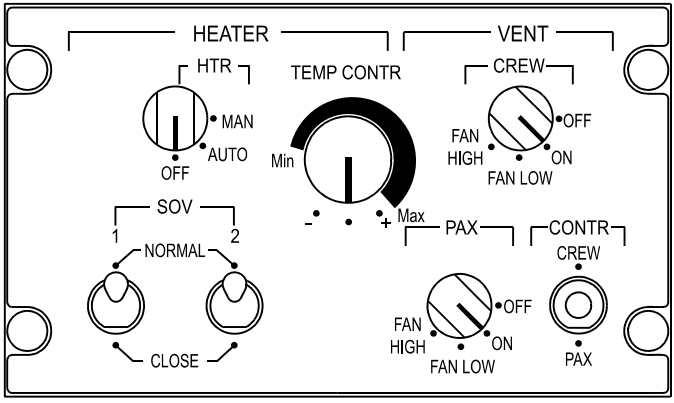

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Figure 3 Heating with Forced Ventilation

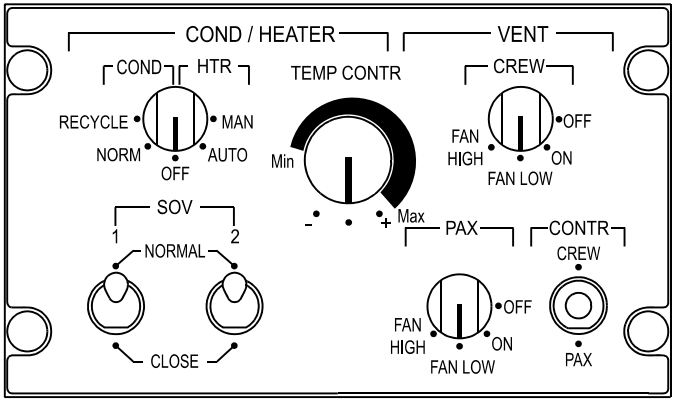

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Figure 4 Air Conditioning (inc Heating and Forced Ventilation)

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTRE OF GRAVITY LIMITATIONS

After environmental control system installation the new empty weight and CG must be determined.

WEIGHT

Refer to CAT B W.A.T Limits chart HEATER ON Figure 1-1 and COND ON Figure 1-2.

CENTRE OF GRAVITY

No change in CG limitations.

AIRSPEED LIMITATIONS

Max airspeed in sideward or rearward flight, HEATER ON .. Figure 1-1

Max allowable tailwind and crosswind HEATER ON..... Figure 1-1

Max airspeed in sideward or rearward flight, COND ON .... Figure 1-2

Max allowable tailwind and crosswind, COND ON ..... Figure 1-2

CATEGORY B OPERATION LIMITATIONS

The CAT B W.A.T. Limits chart HEATER ON Figure 1-1 and COND ON Figure 1-2, are used to define the maximum take off and landing weight for the given ambient and wind conditions.

(See Flight Planning in Basic RFM Section 2 for examples of using the CAT B W.A.T. Limits chart).

HEIGHT- VELOCITY LIMITATIONS

The Height-Velocity diagram defines, in the event of a single engine failure during take off, landing or other operation near the surface, a combination of airspeed and height above ground from which a safe single engine landing on a smooth, level and hard surface cannot be assured.

CAUTION

Prior to the determination of the H-V envelope the CATEGORY B HEATER ON/ COND ON weight should be defined for the ambient conditions. See Flight Planning in Basic RFM Section 2 for use of the CAT B W.A.T. and H-V envelope charts.

Height Velocity Chart HEATER ON.....Figure 1-3

Height Velocity Chart COND ON.....Figure 1-4

— If the given ambient conditions are not present in the chart then no H-V avoid area exists.

— If the given ambient conditions and weight intercept are within the green 'NO H-V Area' then no H-V avoid area exists.

— If the given ambient conditions and weight intercept indicate an H-V avoid area then low hover and knee points are fixed and the high hover varies according to the conditions and weight.

GENERAL

In RECYCLE with helicopter speed below 25 kts, or in MPOG operate cockpit fans or open pilot or copilot window.

AIR CONDITIONING SYSTEM LIMITATIONS

The AIR COND system must be switched OFF for altitudes above 17000 ft (5200 m) Hp.

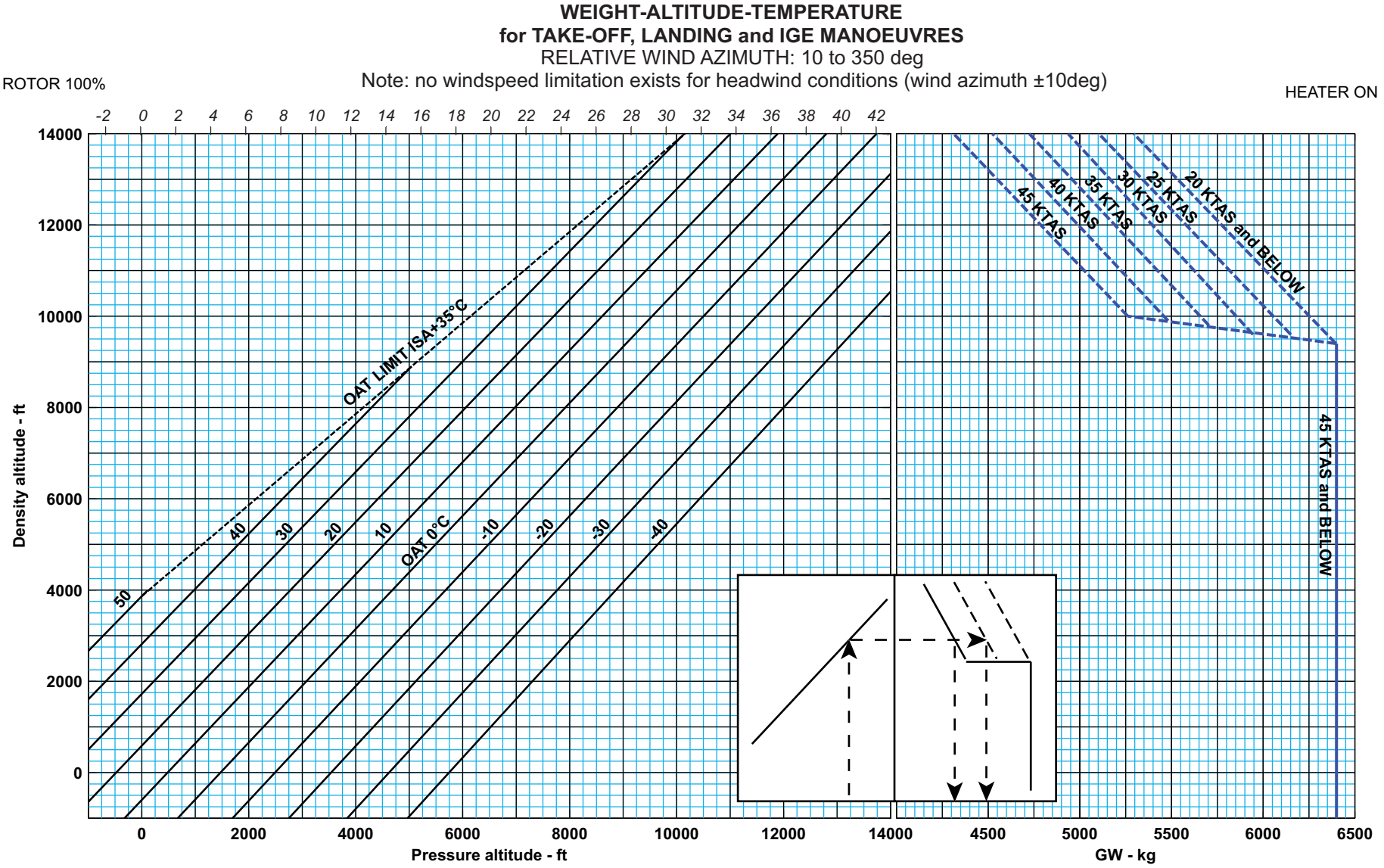

Figure 1-1 Category B WAT Limits Heater ON

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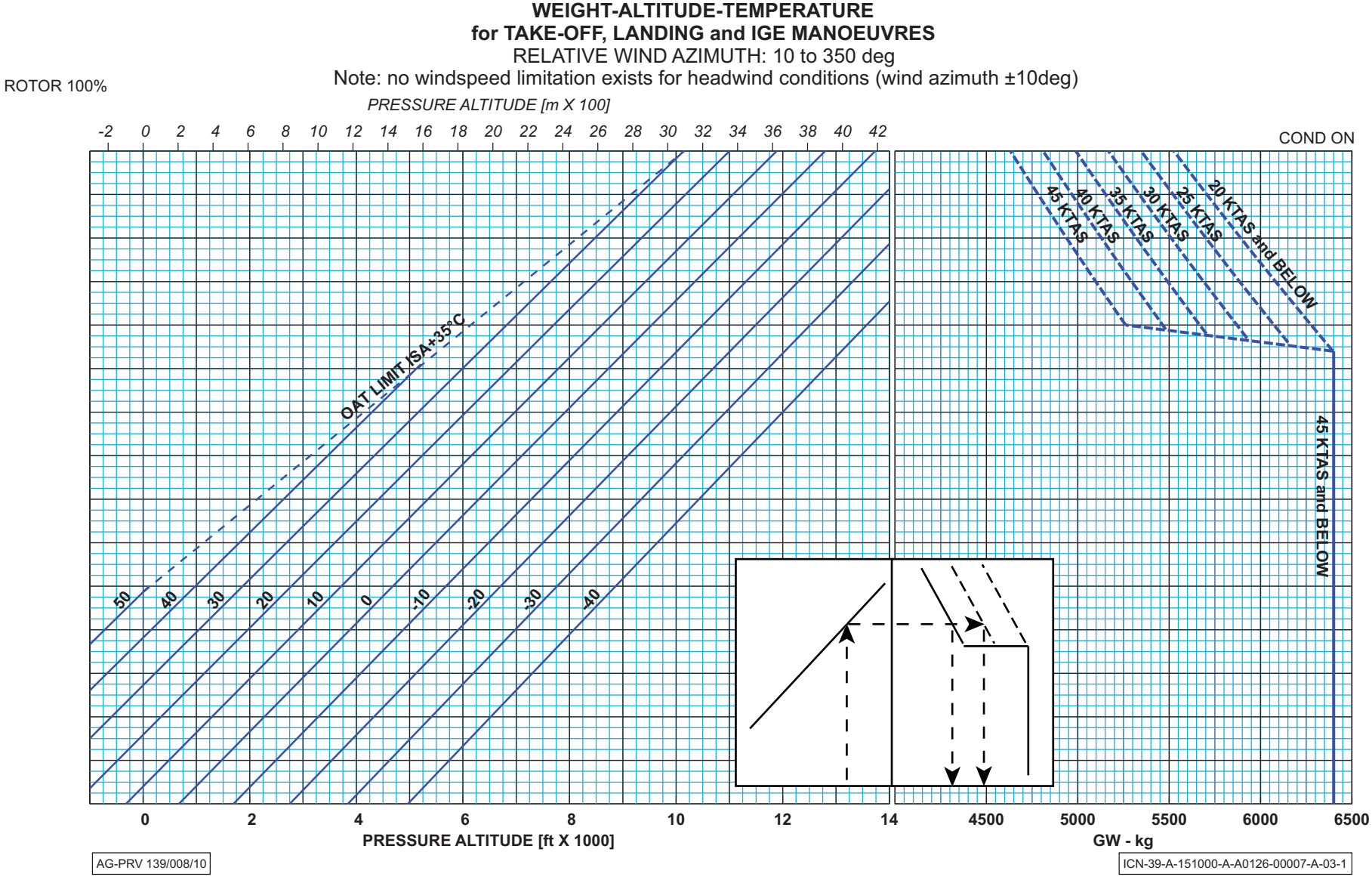

Figure 1-2 Category B WAT Limits COND ON

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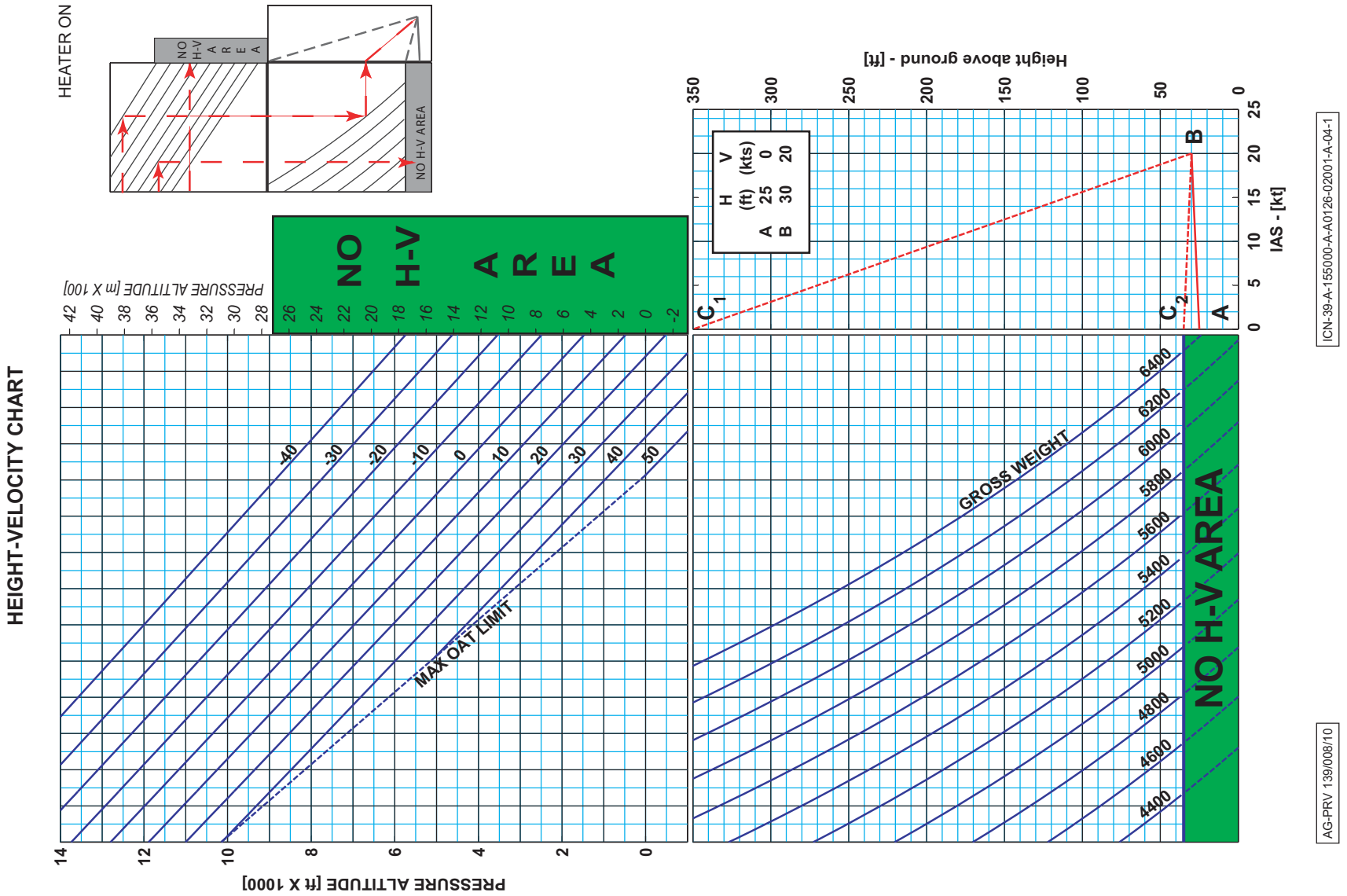

Figure 1-3 Height Velocity Chart HEATER ON

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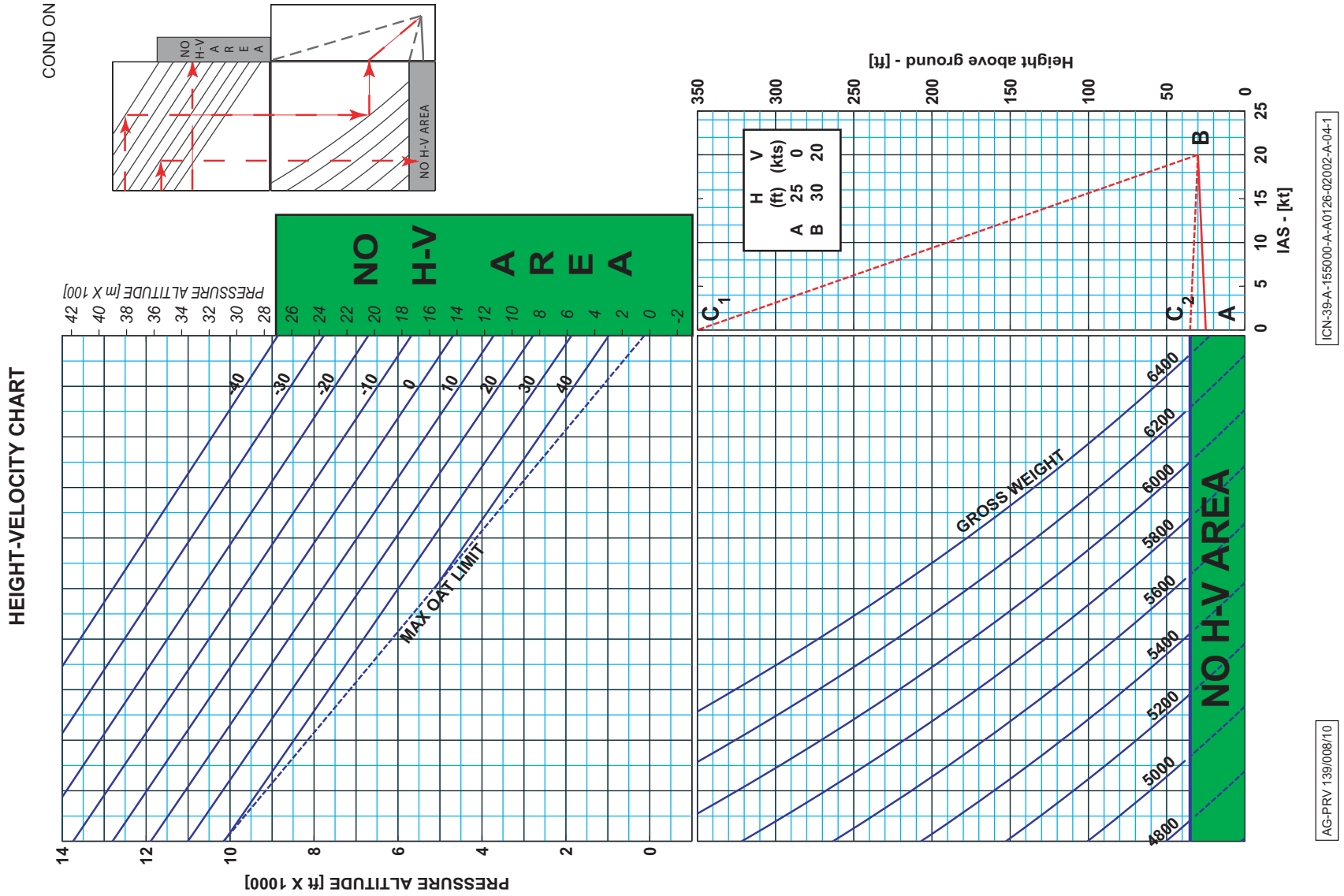

Figure 1-4 Height Velocity Chart COND ON

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SECTION 2 - NORMAL PROCEDURES

ENGINE PRE-START CHECK

COND/HEATER control panel (If fitted)

1. COND/HTR — OFF.
2. HEATER SOV 1 & 2 — Confirm NORMAL.

AFTER START

COND/HEATER control panel (if fitted)

1. COND/HTR mode — As required. (HEATER ON or AIR COND ON advisory illuminates).
2. TEMP CONTR — As required.
3. VENT CREW — As required (VENT advisory illuminates when fan ON).
4. VENT PAX (if fitted) — As required (VENT advisory illuminates when fan ON.
5. VENT CONTR (if cabin control panel fitted) — As required.

DEMISTING COCKPIT TRANSPARENCIES

COND/HEATER control panel (if fitted)

1. COND/HTR — HTR switch to MAN.
2. TEMP CONTR — Select to + and hold for at least 4 seconds.

VENT control panel

3. CREW — Select FAN HIGH and front vents direct towards side windows.

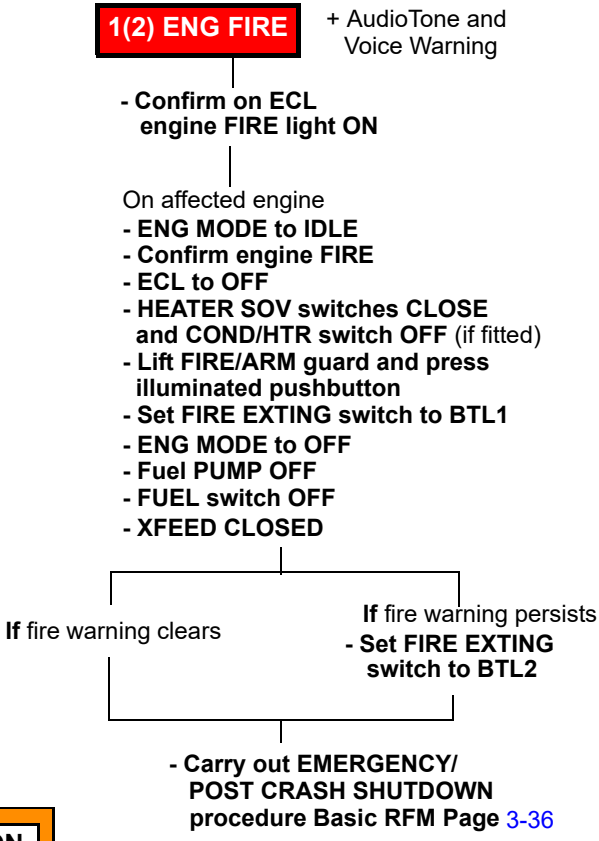
ADVISORY CAPTION DEFINITION

CAS Caption (Green)	System State
AIR COND ON	Air Conditioning system switched ON
AFT VENT ON	Cabin fan switched ON
FWD VENT ON	Cockpit fan switched ON
HEATER ON	Heater switched ON

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

ENGINE BAY FIRE (GROUND)



CAUTION

In case of a subsequent fire in the other engine bay the initial ARM 1(2) pushbutton must be deselected to allow operation of the ARM 2(1) pushbutton.

ENGINE BAY FIRE (FLIGHT)

1(2) ENG FIRE + Audio Tone and Voice Warning

- **Confirm on ECL engine FIRE light ON**

- **Achieve safe OEI Flight**
- **HEATER SOV switches CLOSE and COND/HTR switch OFF** (if fitted)

On affected engine
- **ENG MODE switch to IDLE**
- **Confirm engine FIRE**
- **ECL to OFF**
- **Lift FIRE/ARM guard and press illuminated pushbutton**
- **Set FIRE EXTING switch to BTL1**

When conditions permit:
- **ENG MODE switch to OFF**
- **Fuel PUMP OFF**
- **FUEL switch OFF**
- **XFEED CLOSED**

If fire warning clears
- **Deselect FIRE/ARM pushbutton**
- **Land as soon as possible**

If fire warning persists
- **Set FIRE EXTING switch to BTL2**

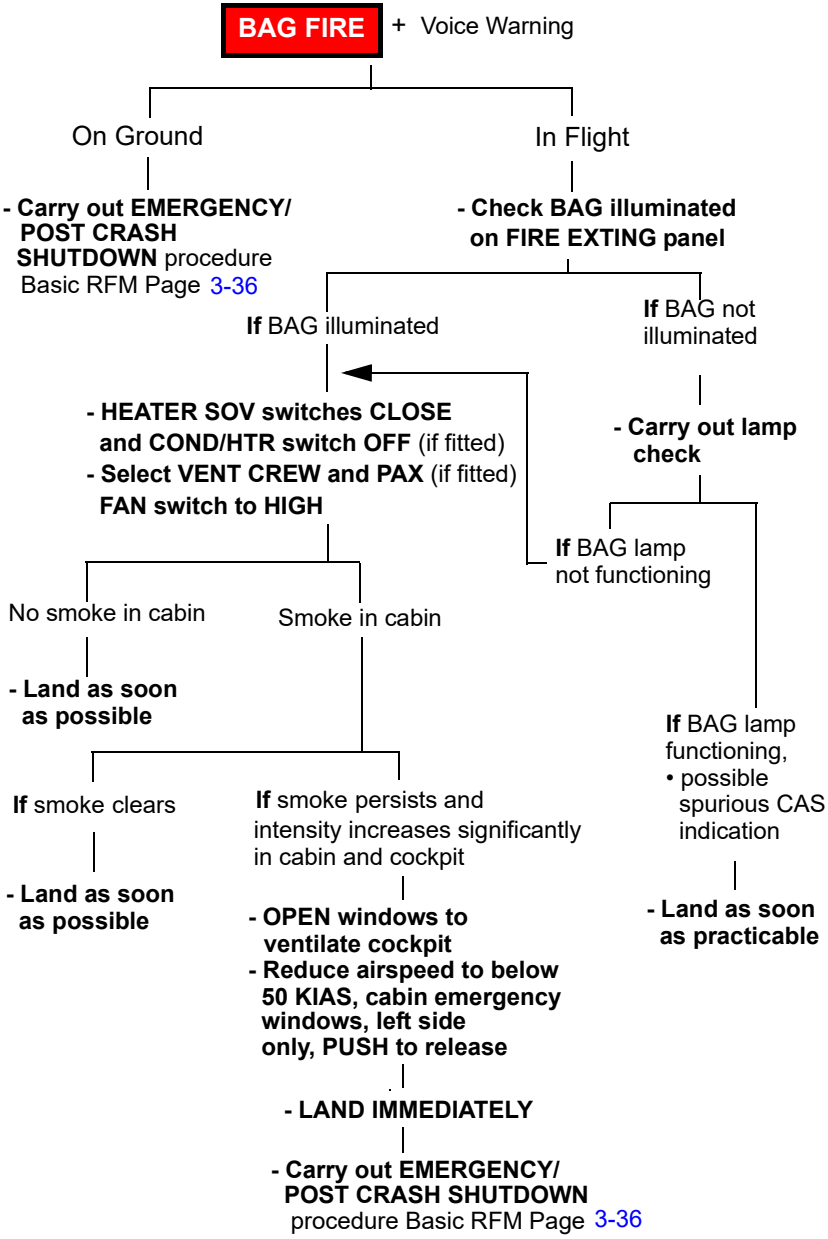
If fire warning clears
- **Land as soon as possible**

If fire warning persists
- **LAND IMMEDIATELY**
- **Carry out EMERGENCY/ POST CRASH SHUTDOWN procedure Basic RFM Page** 3-36

CAUTION

In case of a subsequent fire in the other engine bay the initial ARM 1(2) pushbutton must be deselected to allow operation of the ARM 2(1) pushbutton.

BAGGAGE BAY FIRE



COCKPIT / CABIN FIRE (FLIGHT)

An in-flight fire has no single set of detailed procedures that can address all the fire scenarios that are possible in flight. The most critical action is to get the aircraft on the ground as soon as possible with a reasonable degree of safety.

FIRE in cockpit or cabin

- Declare an emergency

- Prepare to land as soon as possible

- HEATER SOV switches CLOSE
and select COND/HTR OFF (if fitted)
- Select VENT CREW and PAX (if fitted)
FAN switch OFF

If the fire source is determined

- Use on board hand held extinguisher to fight fire

If fire is extinguished

- Increase ventilation

- Land as soon as possible

If fire persists

- LAND IMMEDIATELY

- Carry out EMERGENCY/ POST CRASH SHUTDOWN procedure Basic RFM Page 3-36

If the fire source is not determined and the fire persists

- LAND IMMEDIATELY

- Carry out EMERGENCY/ POST CRASH SHUTDOWN procedure Basic RFM Page 3-36

CAUTION

If the fire is not completely extinguished, increased ventilation may aggravate the problem.

ENGINE FAILURES

For any engine failure or loss of power the following must be carried out:

COND/HEATER control panel (if fitted)

1. HEATER SOV 1 & 2 — CLOSE.

1. COND/HEATER — OFF. (HEATER ON or AIR COND ON advisory message NOT displayed).

MALFUNCTION PROCEDURES

VENT FAN FAILURE

VENT FAIL

Failure of the CREW and/or PAX (if fitted) vent fan

- If necessary confirm, using Advisory indications, which fan has failed (not illuminated)

On failed VENT fan
- Switch OFF
- Open windows if operating below 25 kts, MPOG, HIGE or HOGE and CREW fan failed

HEATER FAILURE

HEATER FAIL

Heater system failure

- Switch HTR to OFF

If HEATER required for demist:

1. HTR — MAN
2. VENT CREW FAN — As required
3. TEMP CONTR — Control temperature manually using ± position on rotary switch.

COND FAILURE

FWD(AFT) COND FAIL

Crew(PAX) conditioner failure

- Switch OFF the COND/HTR and leave for minimum of 4 minutes.
Switch NORM

If system fails again
- Switch OFF

CAUTION

Be aware that failure of a ventilation fan with the COND system operative may cause the COND to fail after several minutes, in which case switch COND to OFF.

SECTION 4 - PERFORMANCE

The Forced Ventilation kit (P/N 3G2121F00111) has no effect on Performance.

The maximum power available with the HEATER or COND operating is less than that available with the systems OFF. The power loss is caused by the engine compressor bleed air used for the heating or the mechanical output from the main transmission for the air conditioning system.

Performance charts with the HEATER system switched ON or the COND system switched ON are provided for All Engine Operating conditions.

During single engine operation the HEATER or COND system must be switched OFF.

The performance of the aircraft with the HEATER or COND system switched OFF is the same as that shown in the basic Rotorcraft Flight Manual.

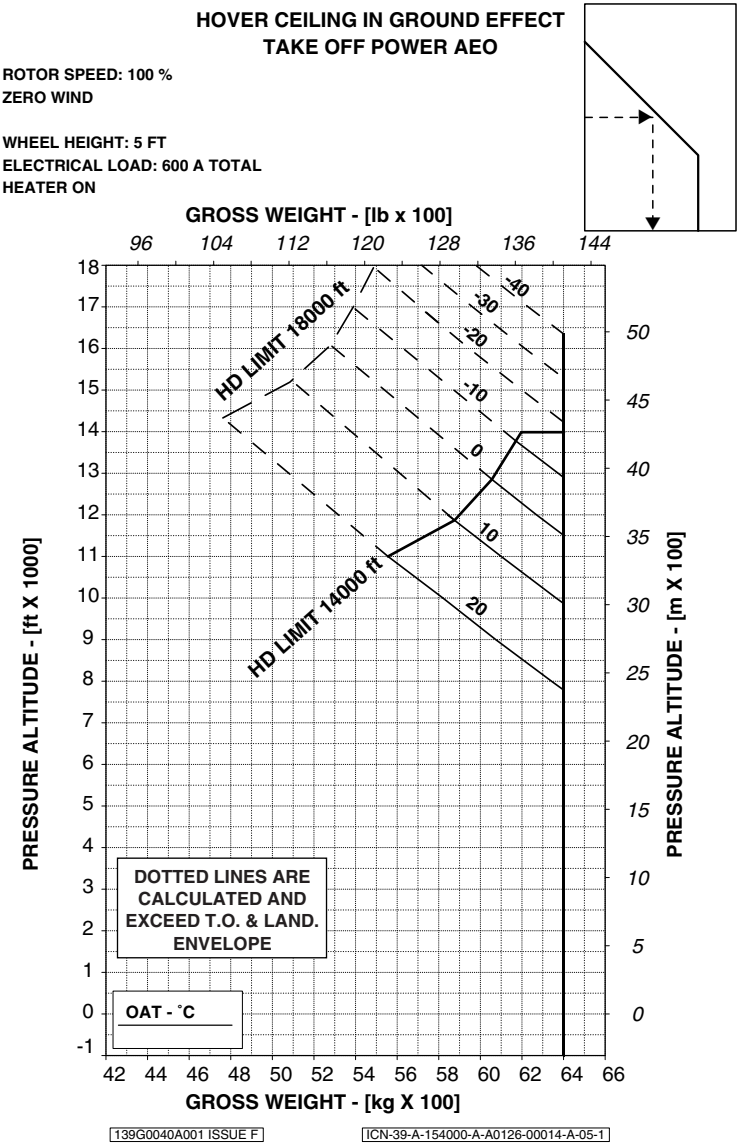


Figure 4-1 Hover Ceiling IGE TOP AEO (Heater ON)

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

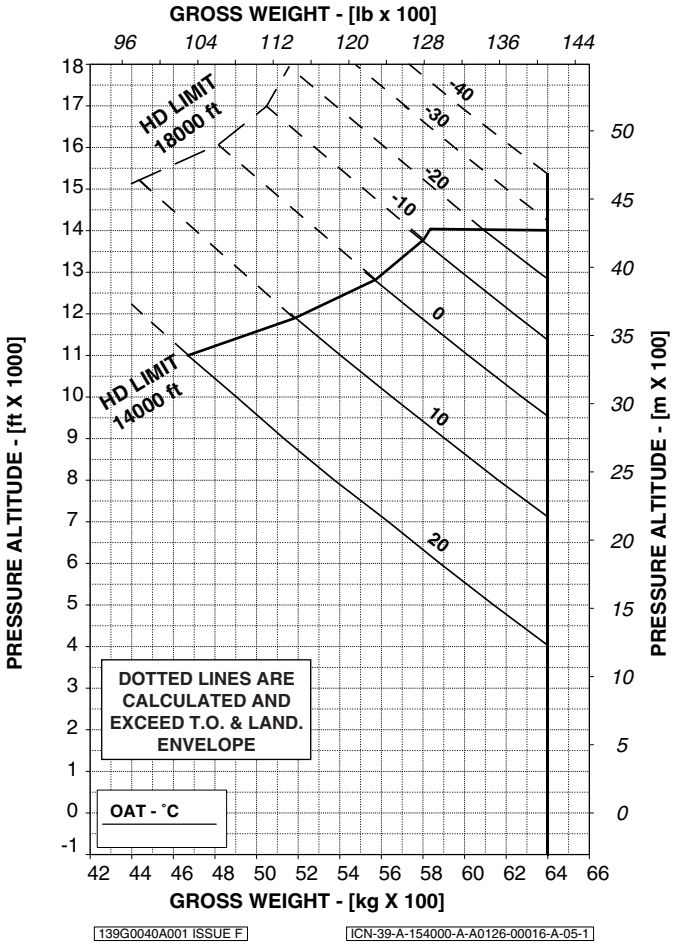


Figure 4-2 Hover Ceiling IGE MCP AEO (Heater ON)

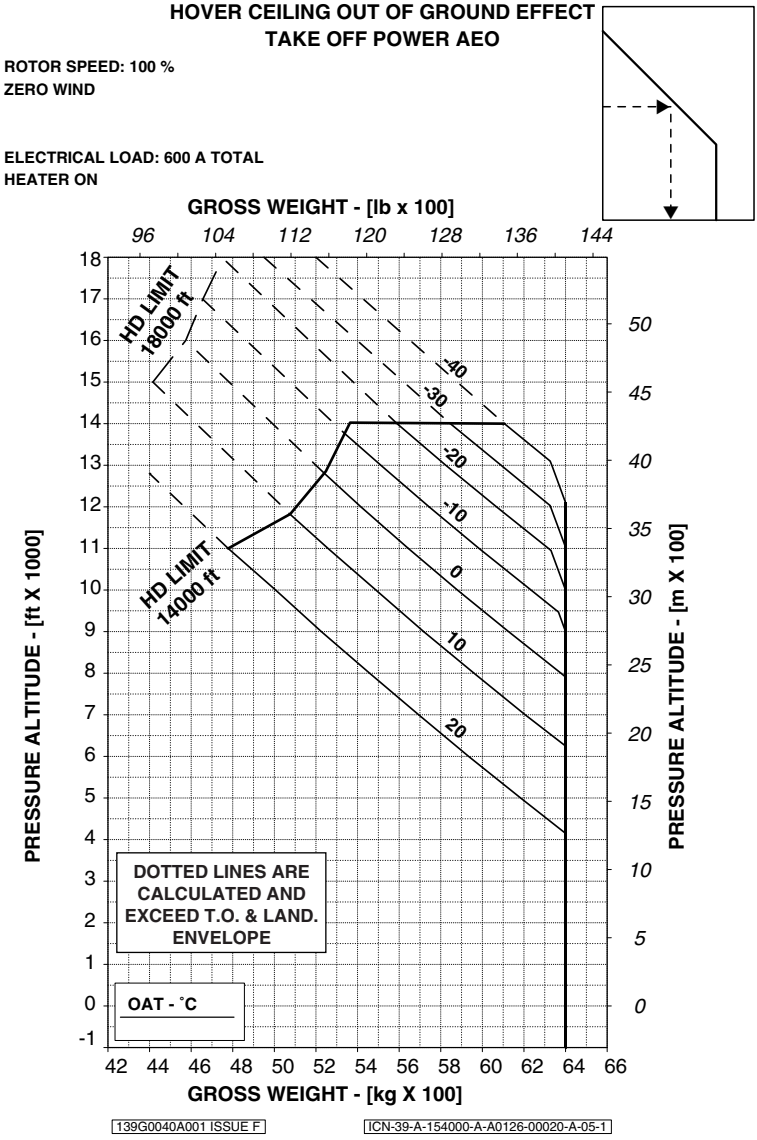


Figure 4-3 Hover Ceiling OGE TOP AEO (Heater ON)

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

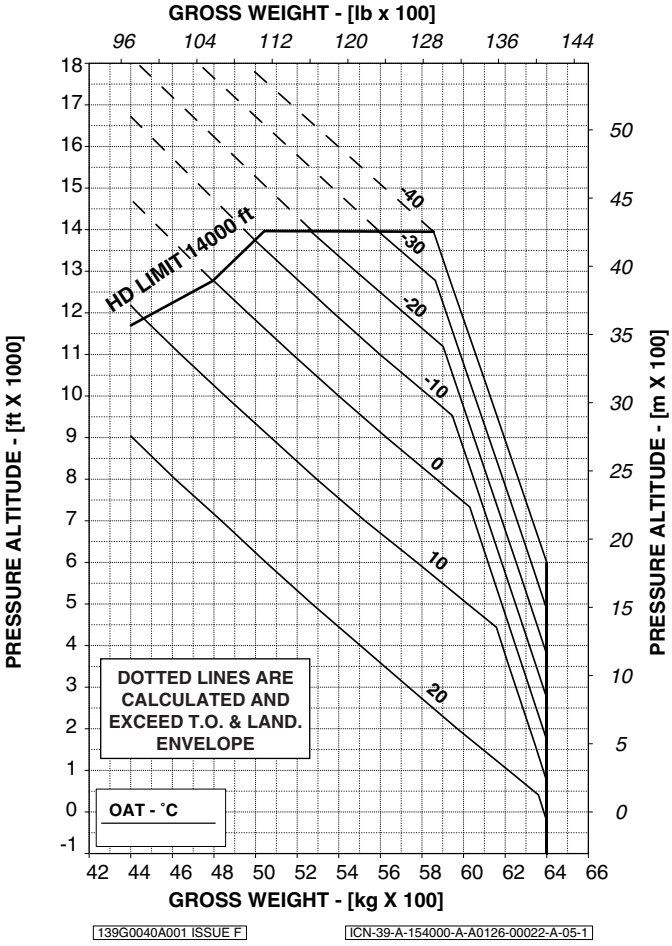


Figure 4-4 Hover Ceiling OGE TOP AEO (Heater ON)

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WEIGHT-ALTITUDE-TEMPERATURE
for TAKE-OFF, LANDING and IGE MANOEUVRES

RELATIVE WIND AZIMUTH: 10 to 350 deg

Note: no windspeed limitation exists for headwind conditions (wind azimuth ±10deg)

ROTOR 100%

HEATER ON

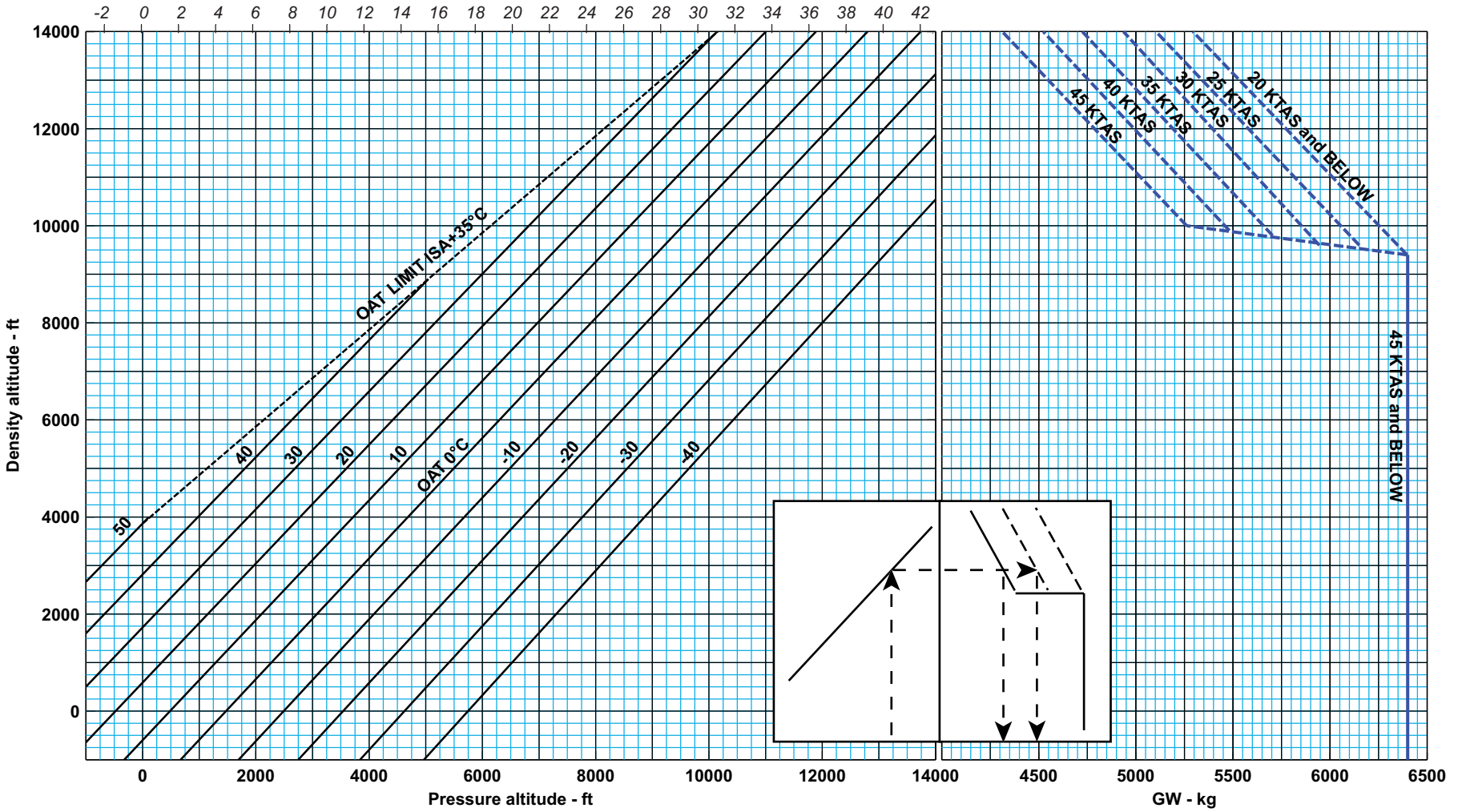

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Figure 4-5 CAT B W.A.T. (Heater ON)

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CAT.B TAKE OFF DISTANCE
OVER 50 ft OBSTACLE

ROTOR SPEED: 100%
POWER= H.IGE + 5% TQ per ENGINE
ELECTRICAL LOAD: 600A TOTAL
ZERO WIND

INITIATED FROM H.IGE (5 ft)
V_{50FT}: 50 KIAS
HEATER ON

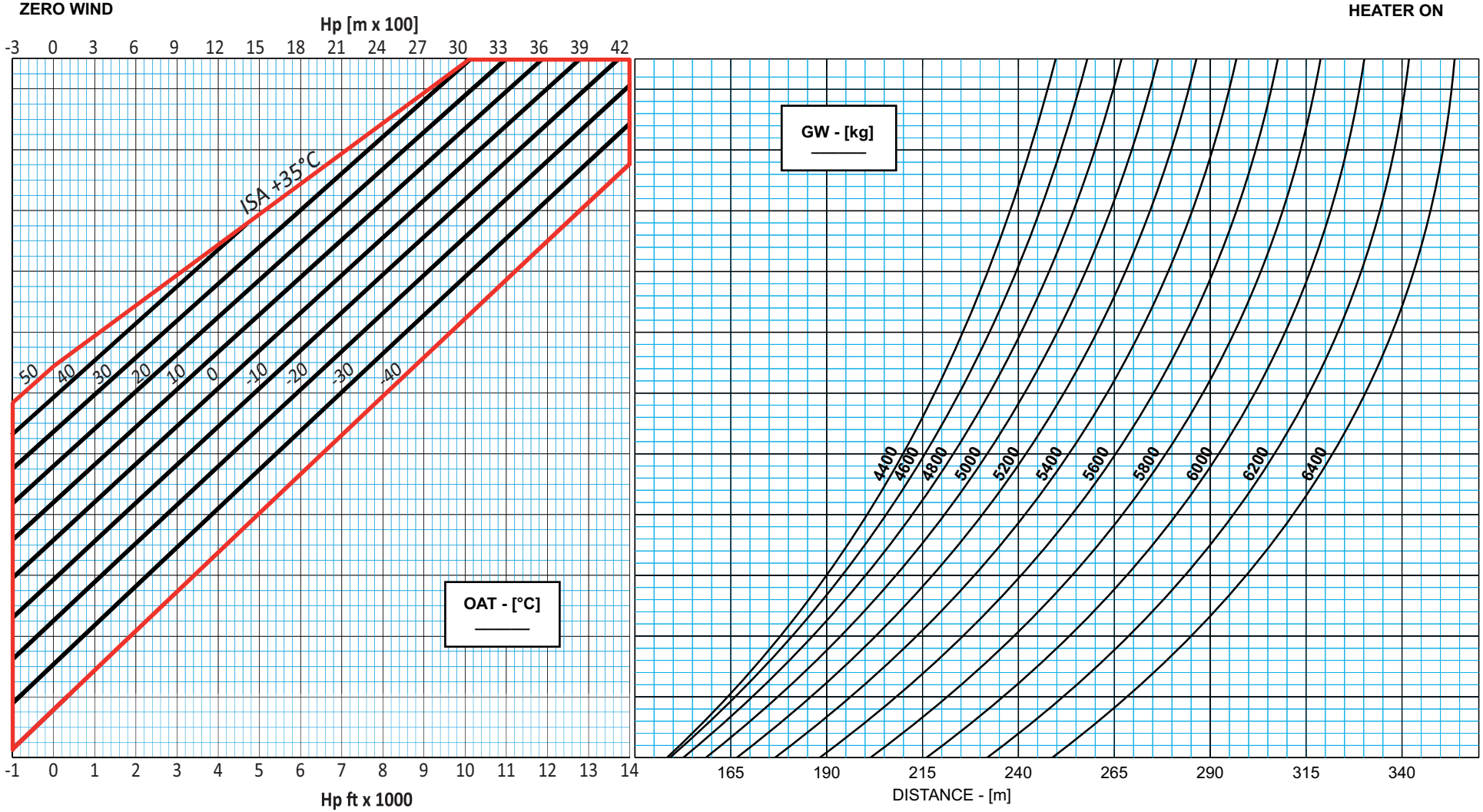

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Figure 4-6 CAT B Take Off Distance (Heater ON)

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CAT.B OEI/AEO LANDING DISTANCE
OVER 50 ft OBSTACLE

ROTOR SPEED: 100%
2.5 MIN. OEI / TOP AEO MAXIMUM
ELECTRICAL LOAD: 300A OEI/600A AEO
ZERO WIND

V_{app}: 30 KIAS
RATE OF DESCENT: 500 fpm
SURFACE: HARD, SMOOTH, LEVEL
INOPERATIVE ENGINE SECURED
HEATER ON

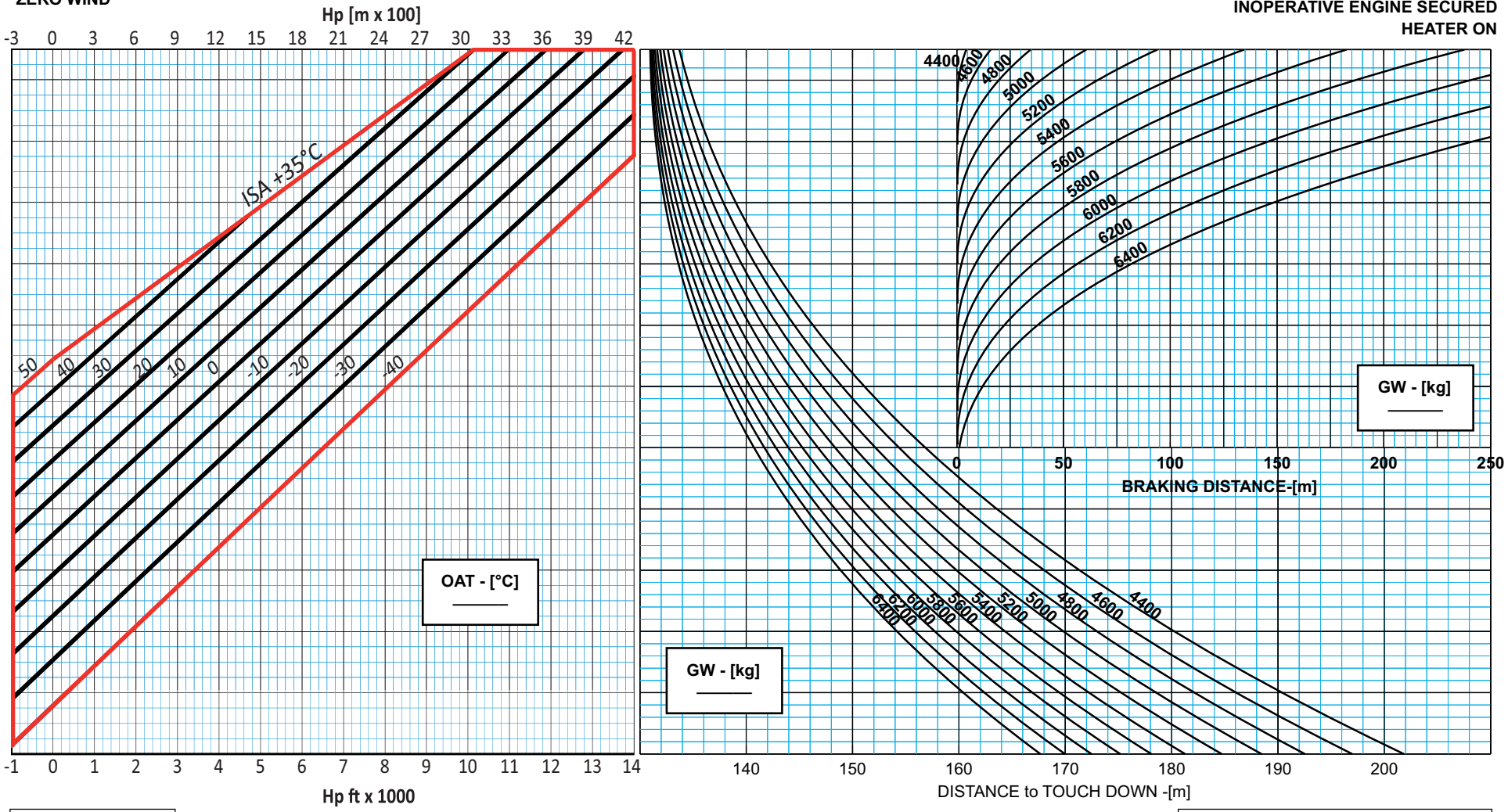

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Figure 4-7 CAT B Landing Distance (Heater ON)

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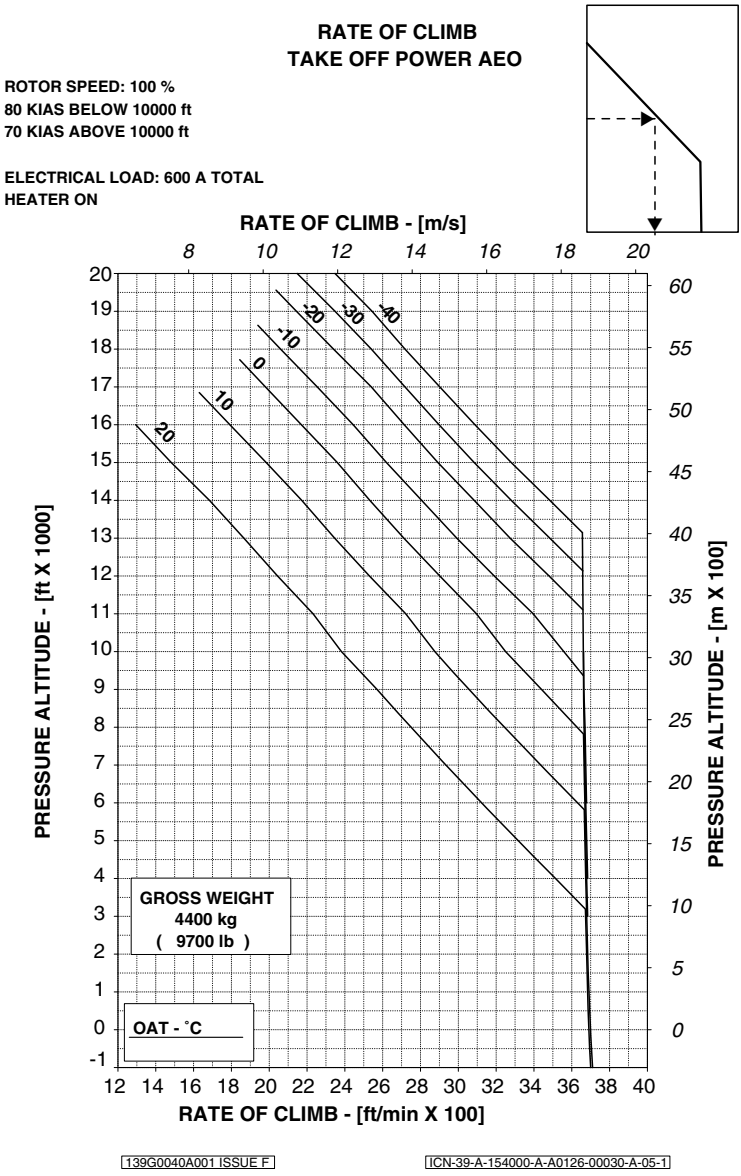

Figure 4-8 ROC TOP AEO Gross Weight 4400 kg (Heater ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAl
HEATER ON

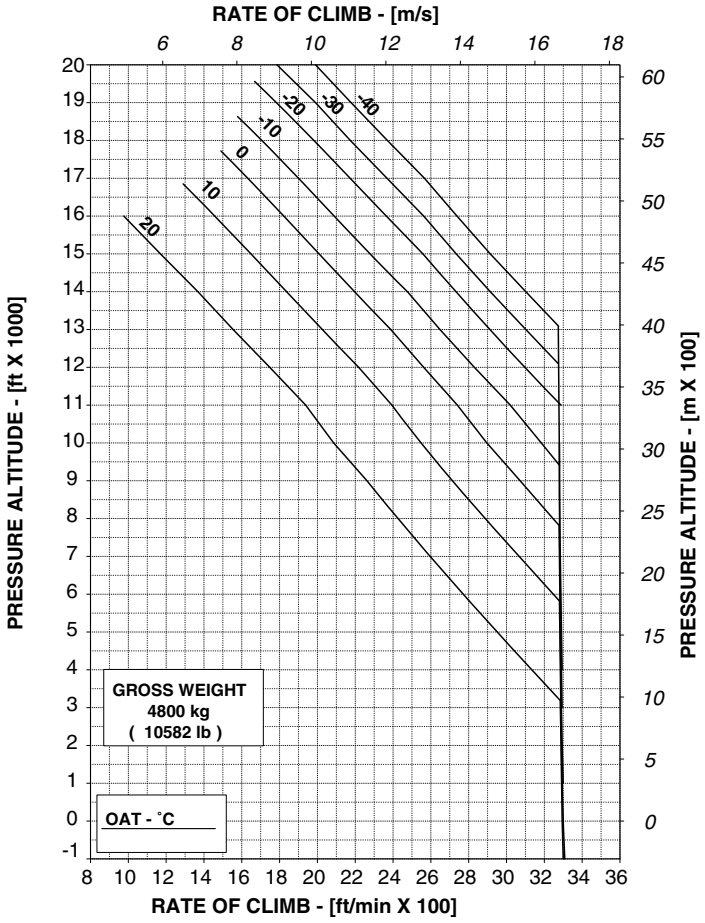

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Figure 4-9 ROC TOP AEO Gross Weight 4800 kg (Heater ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

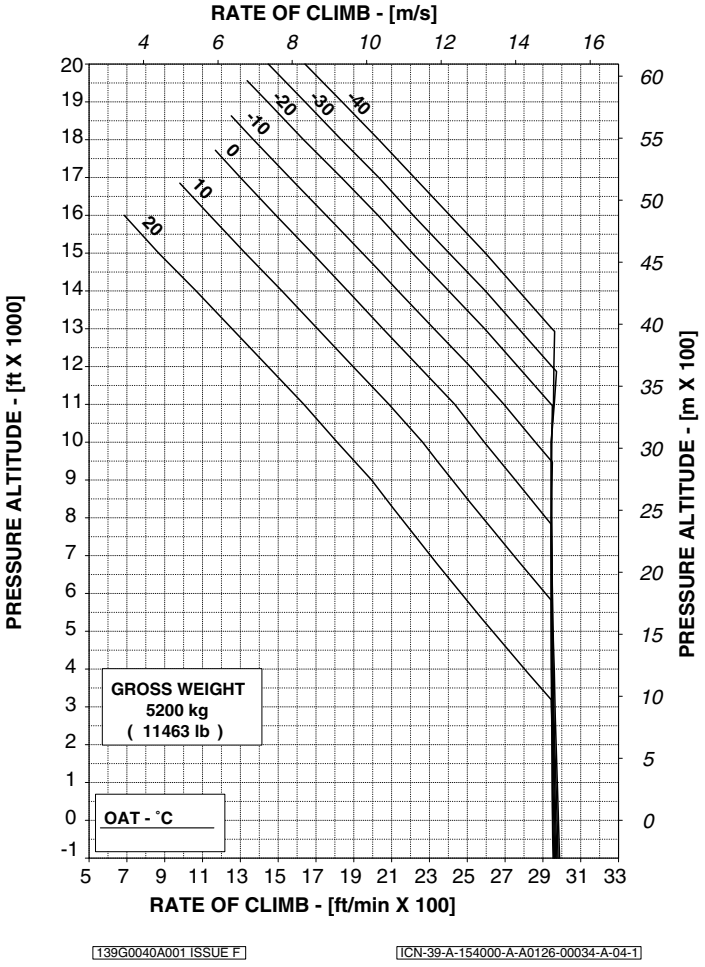

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Figure 4-10 ROC TOP AEO Gross Weight 5200 kg (Heater ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

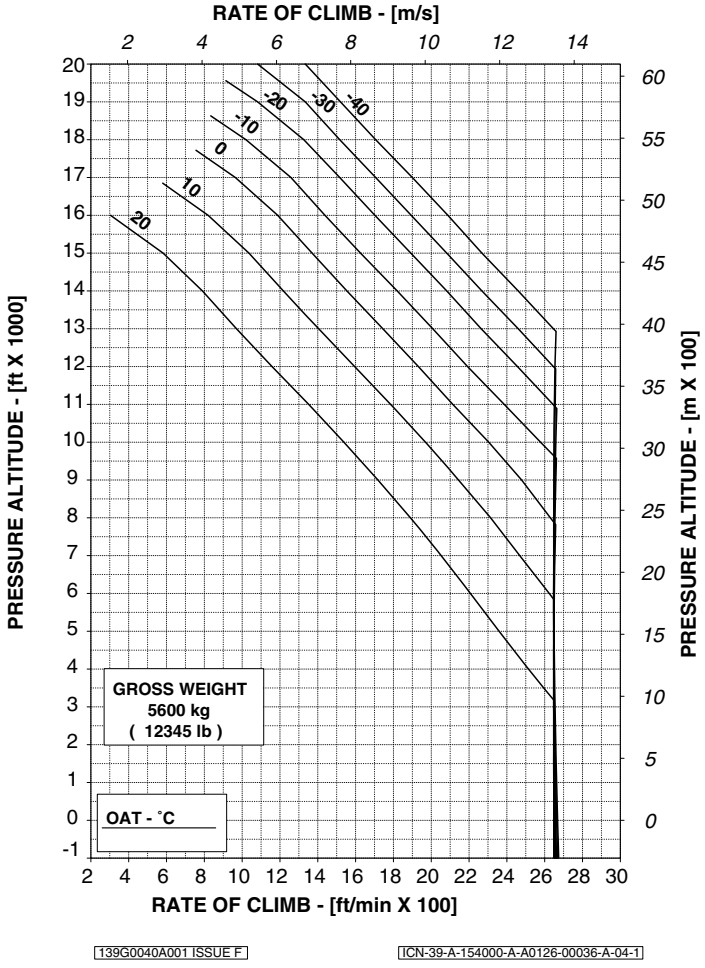

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Figure 4-11 ROC TOP AEO Gross Weight 5600 kg (Heater ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

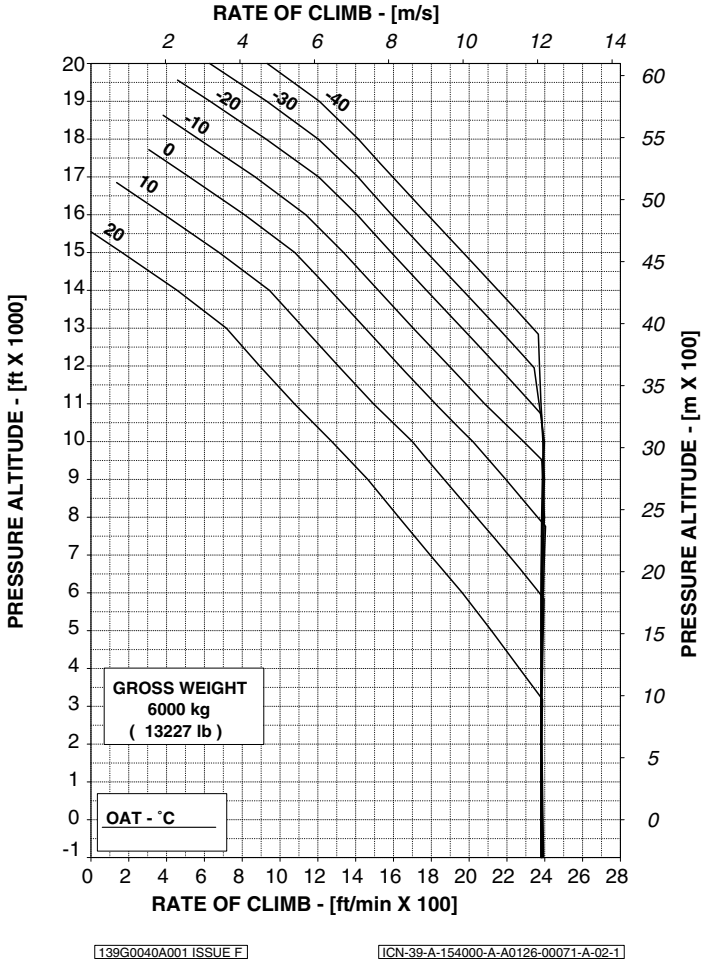

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Figure 4-12 ROC TOP AEO Gross Weight 6000 kg (Heater ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

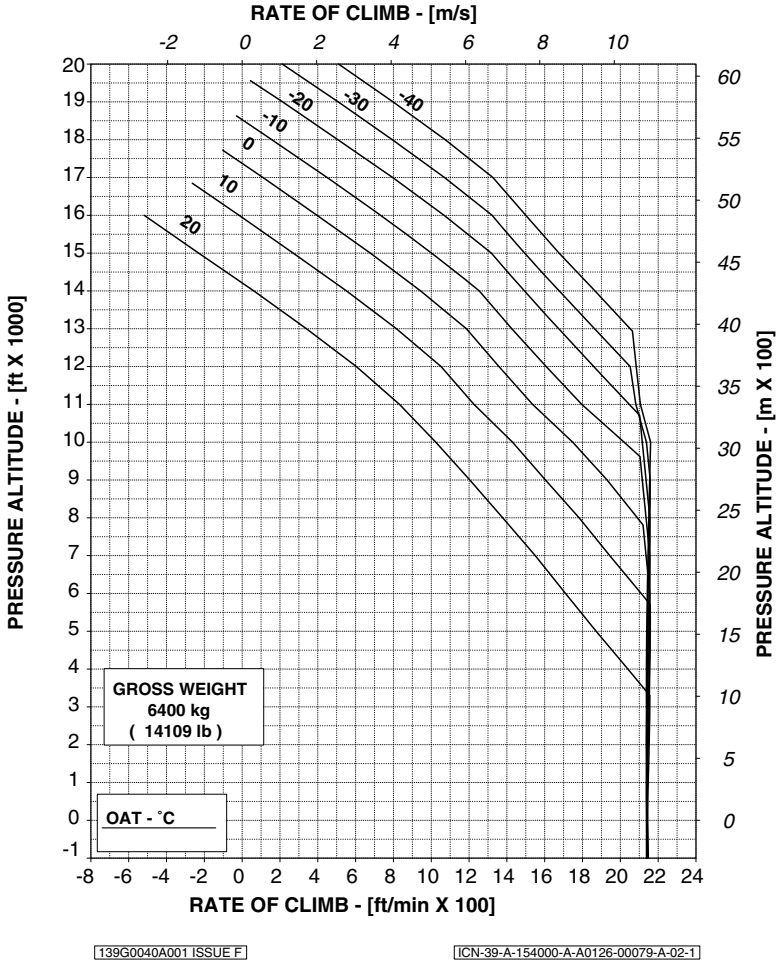

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Figure 4-13 ROC TOP AEO Gross Weight 6400 kg (Heater ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

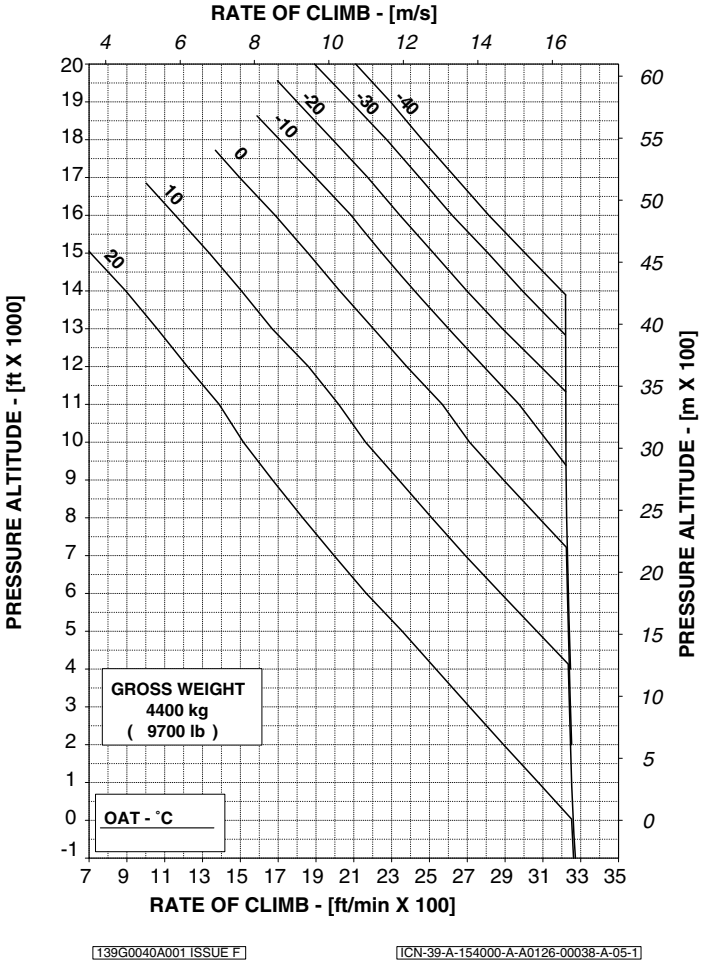

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Figure 4-14 ROC MCP AEO Gross Weight 4400 kg (Heater ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

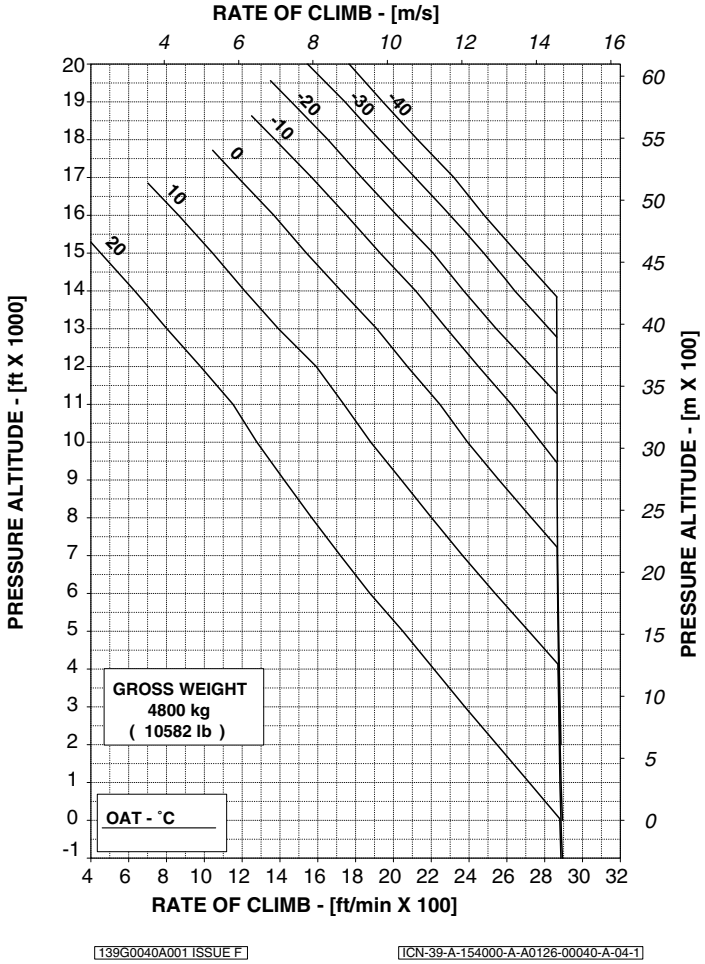

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Figure 4-15 ROC MCP AEO Gross Weight 4800 kg (Heater ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

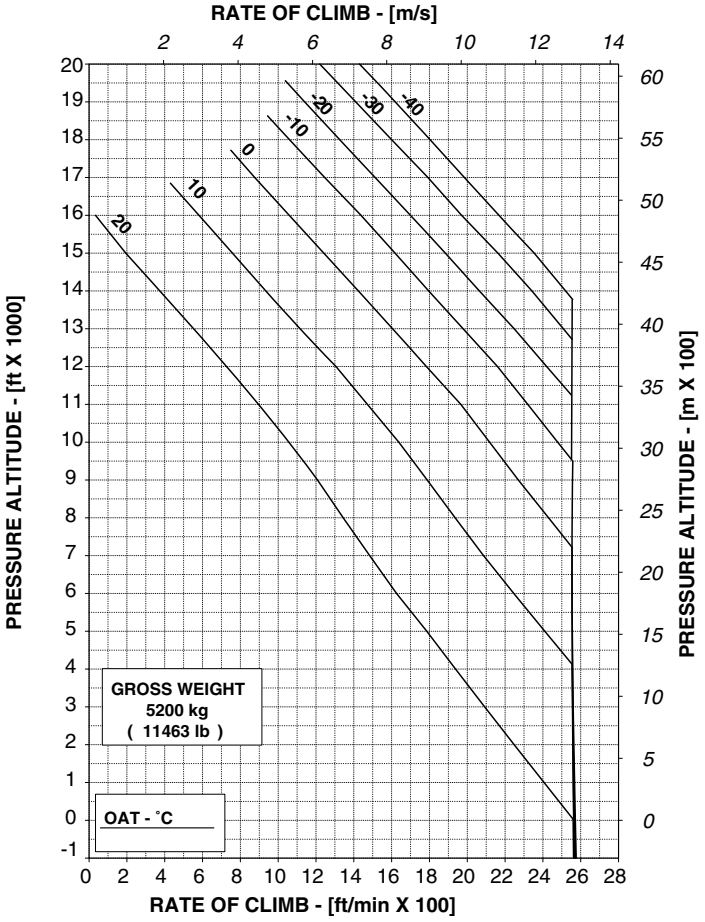

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Figure 4-16 ROC MCP AEO Gross Weight 5200 kg (Heater ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

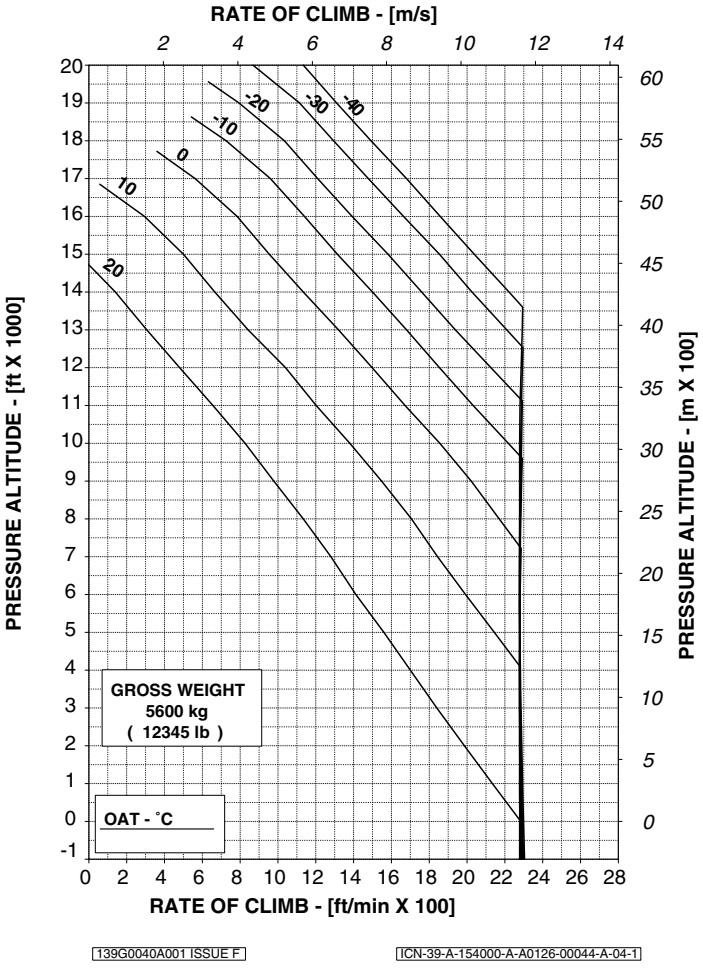

Figure 4-17 ROC MCP AEO Gross Weight 5600 kg (Heater ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

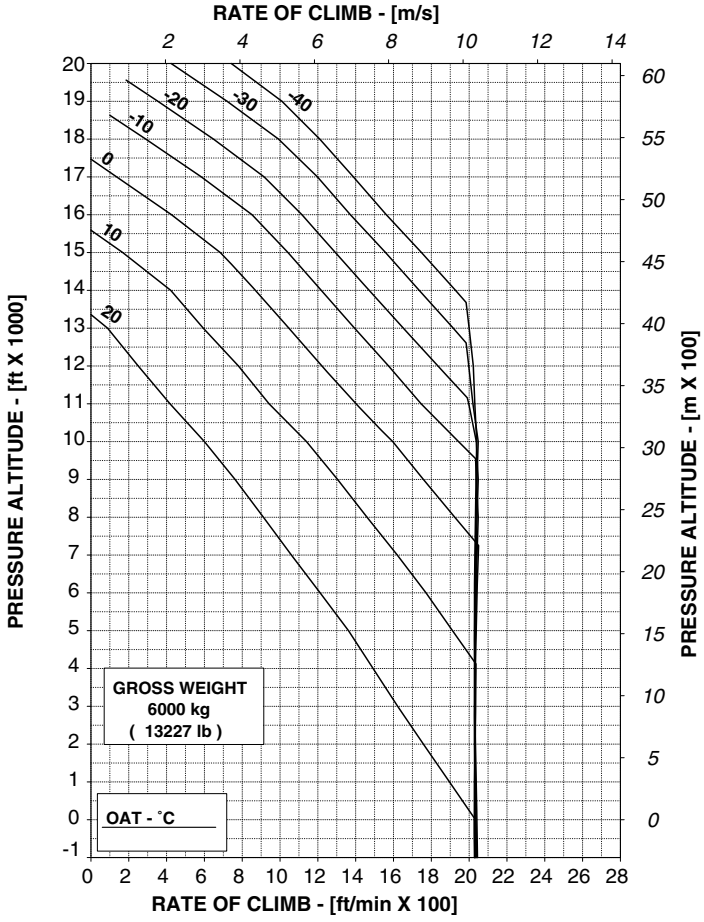

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Figure 4-18 ROC MCP AEO Gross Weight 6000 kg (Heater ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

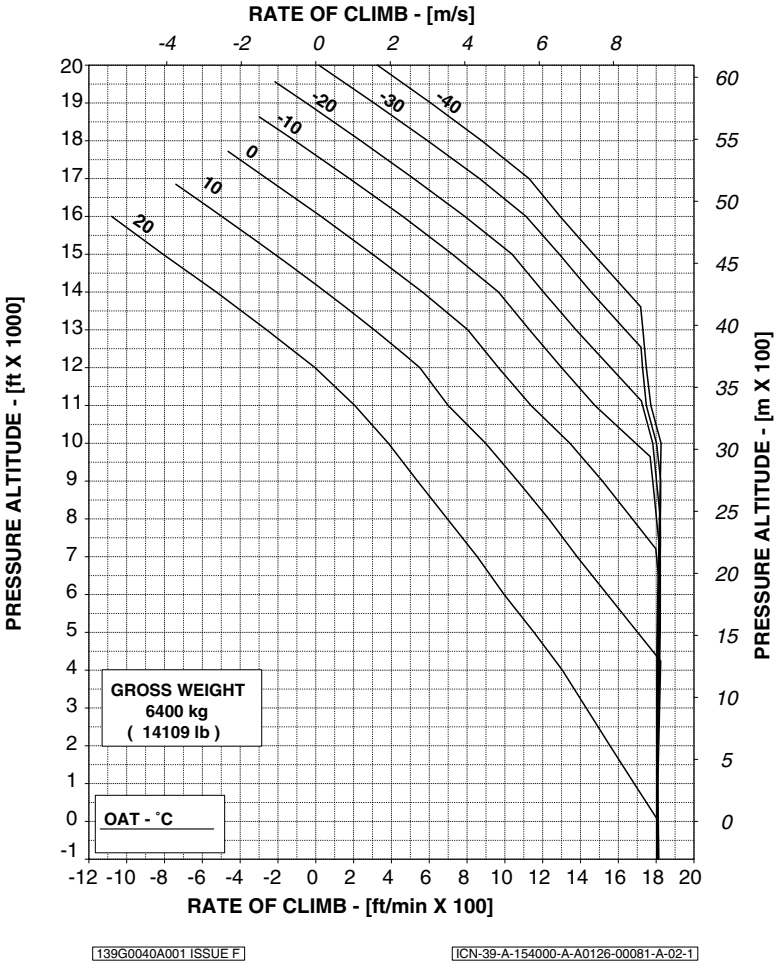

Figure 4-19 ROC MCP AEO Gross Weight 6400 kg (Heater ON)

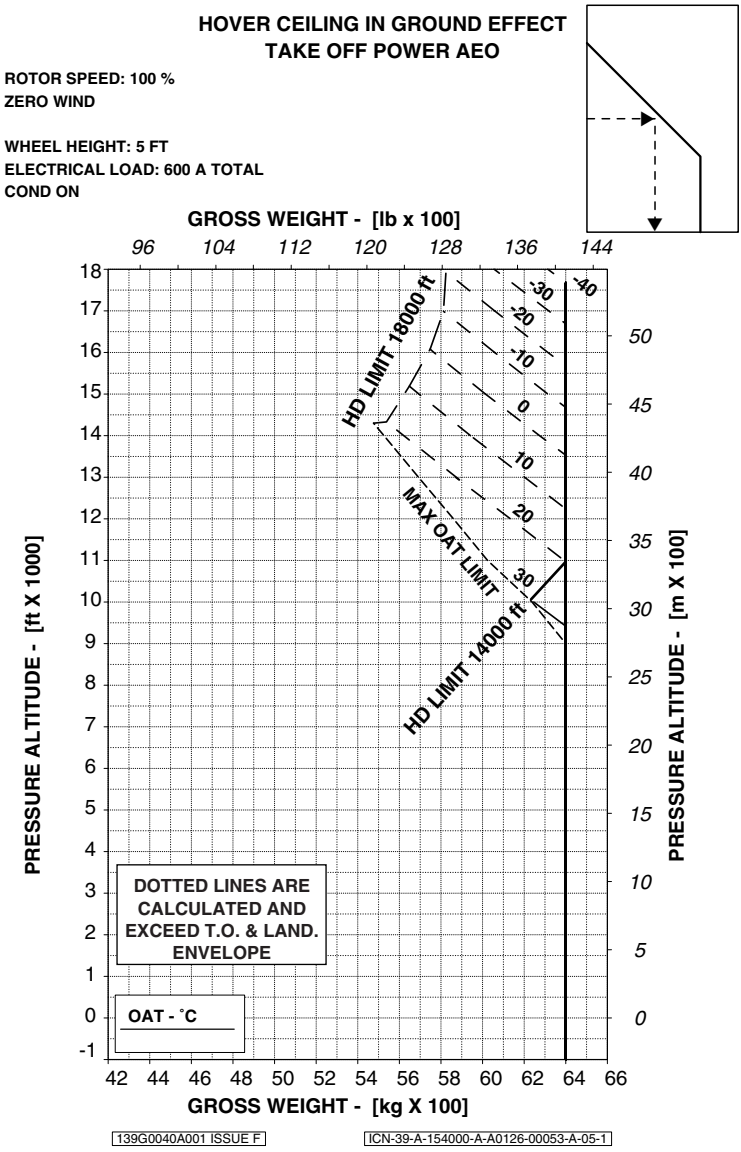

Figure 4-20 Hover Ceiling IGE, TOP, AEO, COND ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
COND ON

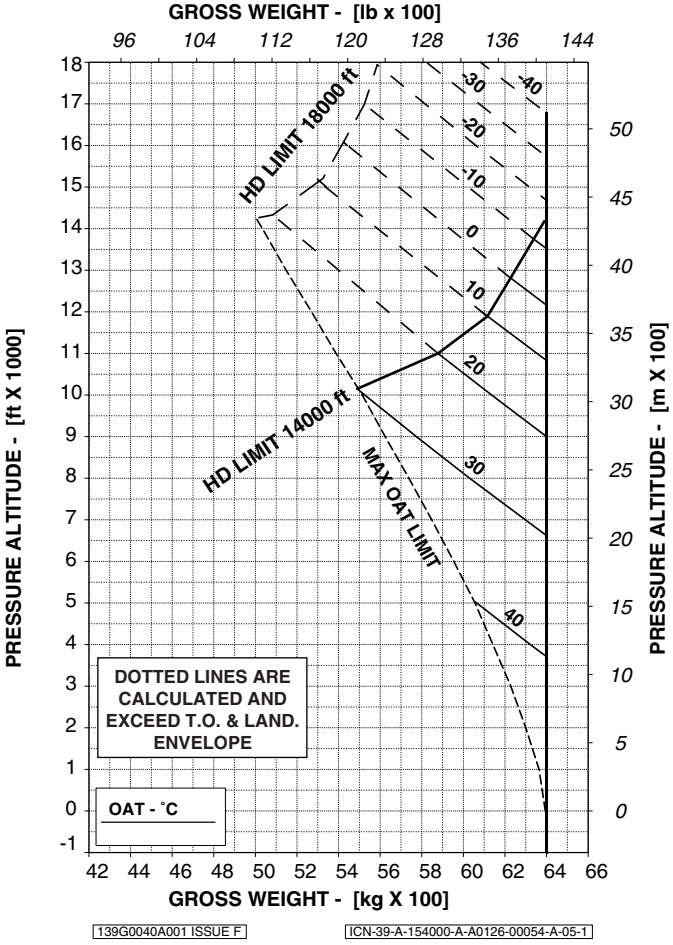

Figure 4-21 Hover Ceiling IGE, MCP, AEO, COND ON

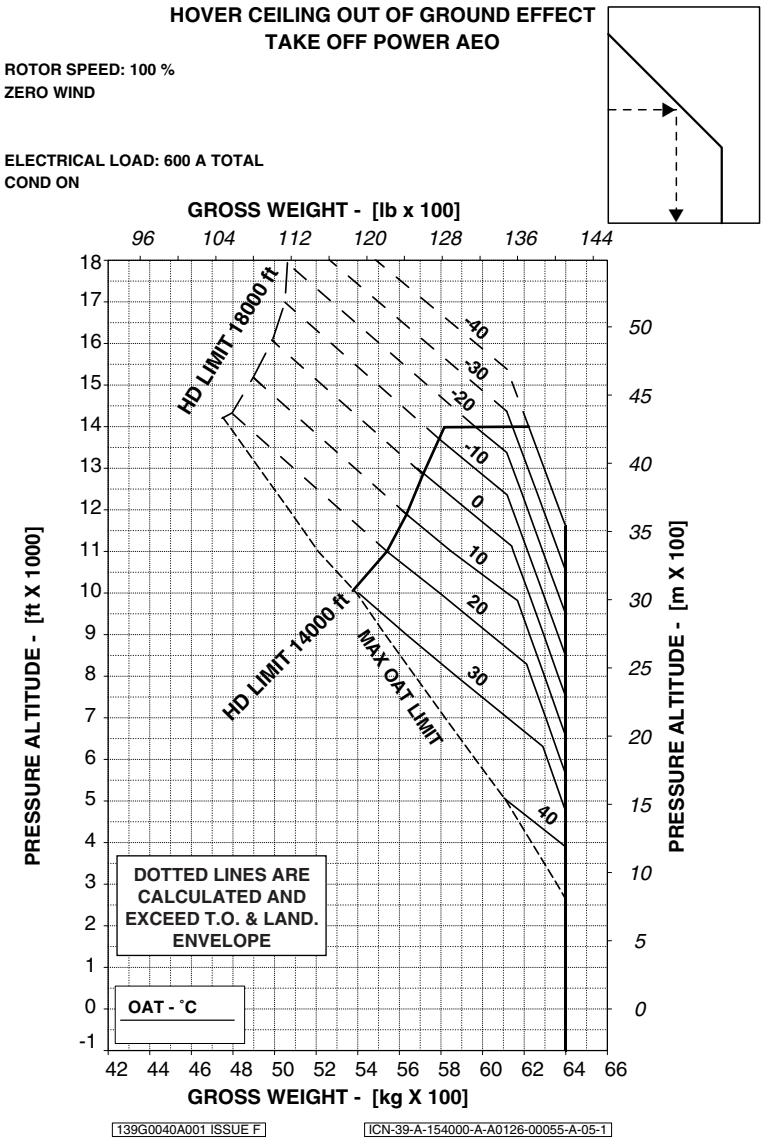

Figure 4-22 Hover Ceiling OGE, TOP, AEO, COND ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL
COND ON

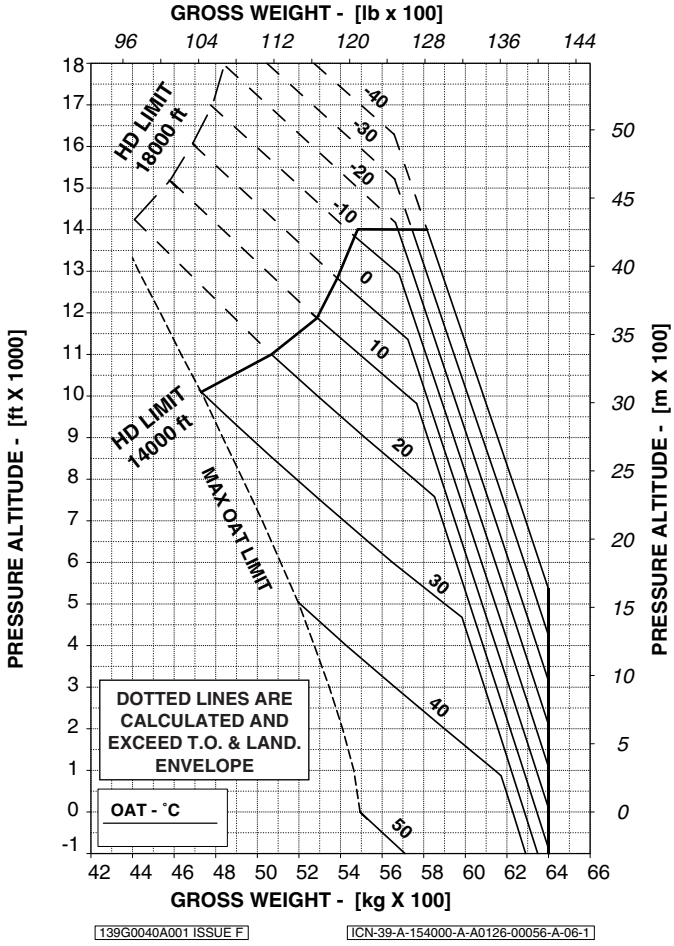

Figure 4-23 Hover Ceiling OGE, MCP, AEO, COND ON

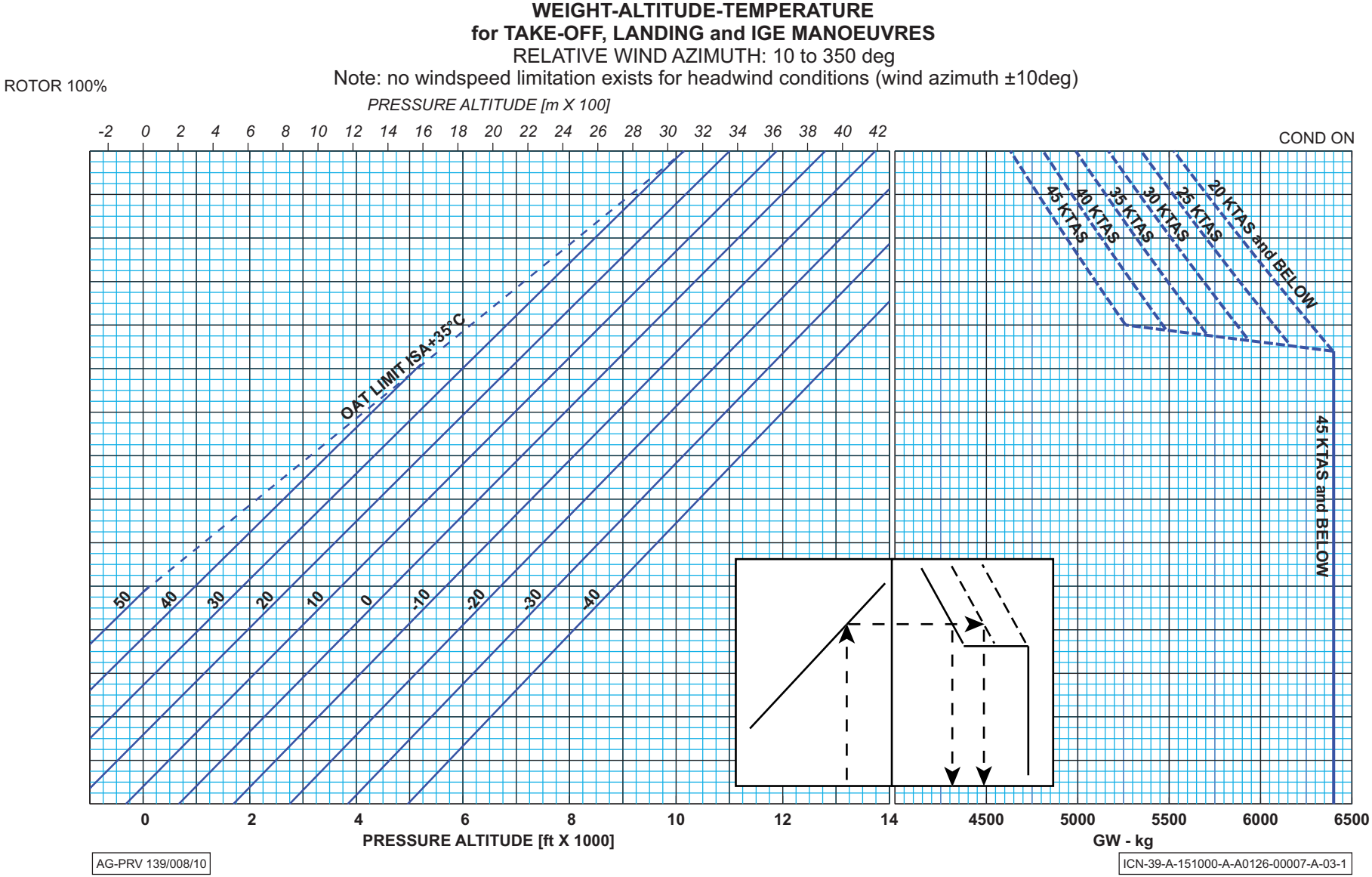

Figure 4-24 CAT B WAT, COND ON

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CAT.B TAKE OFF DISTANCE
OVER 50 ft OBSTACLE

ROTOR SPEED: 100%
POWER= H.IGE + 5% TQ per ENGINE
ELECTRICAL LOAD: 600 A TOTAL
ZERO WIND

INITIATED FROM H.IGE (5 ft)
V_{50FT}: 50 KIAS

COND: ON

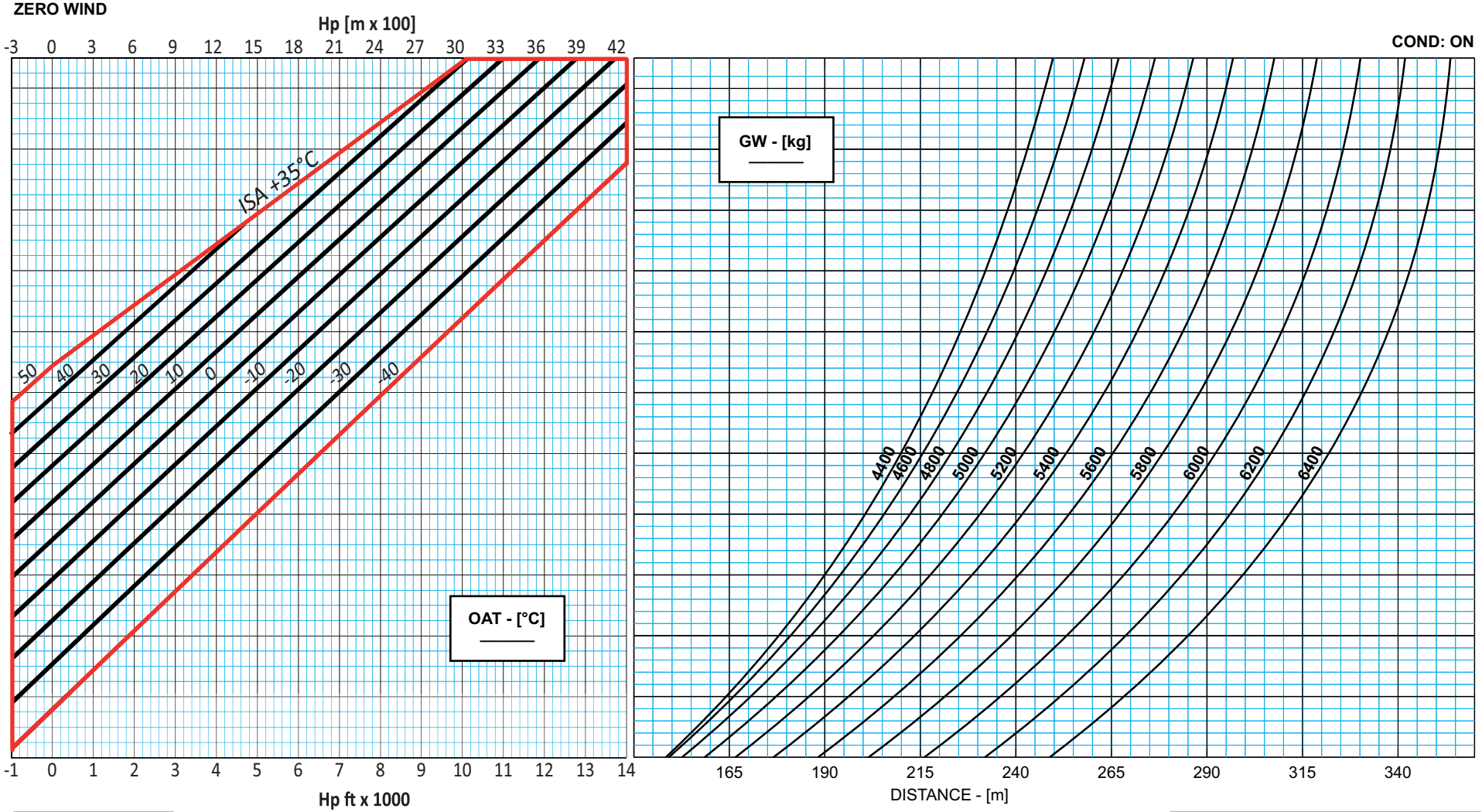

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Figure 4-25 CAT B Take Off Distance COND ON

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CAT.B OEI/AEO LANDING DISTANCE OVER 50 ft OBSTACLE

ROTOR SPEED: 100%
2.5MINUTE OEI MAXIMUM
ELECTRICAL LOAD: 300A OEI/600A AEO
ZERO WIND

V_{app}: 30 KIAS
RATE OF DESCENT: 500 fpm
SURFACE: HARD, SMOOTH, LEVEL
INOPERATIVE ENGINE SECURED
COND ON

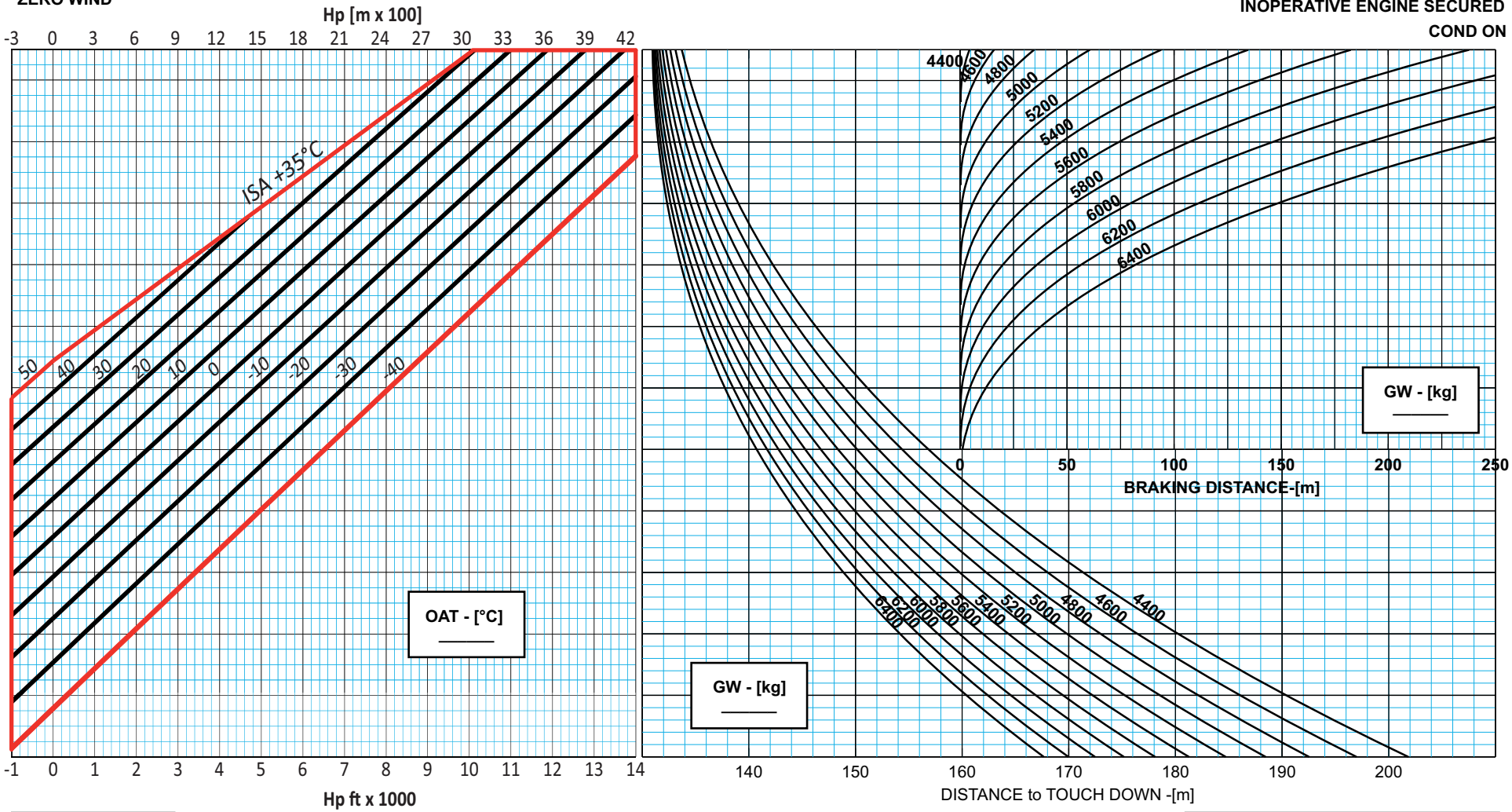

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Figure 4-26 CAT B Landing Distance COND ON

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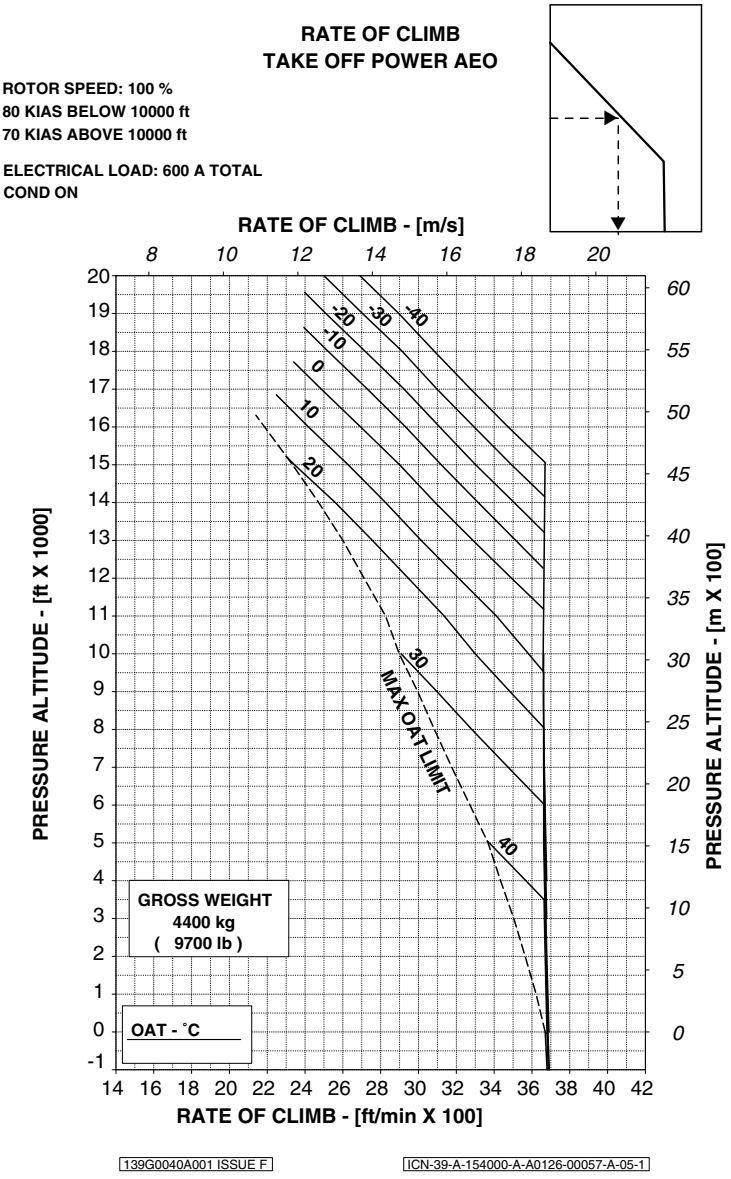

Figure 4-27 ROC TOP, AEO Gross Weight 4400 kg (COND ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

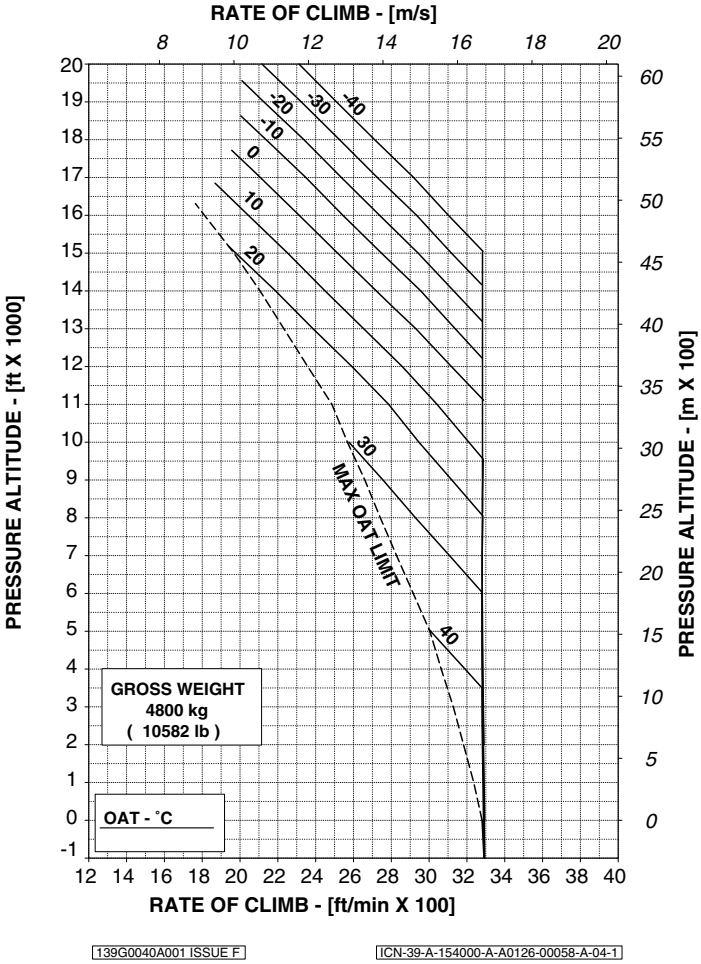

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Figure 4-28 ROC TOP, AEO Gross Weight 4800 kg (COND ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

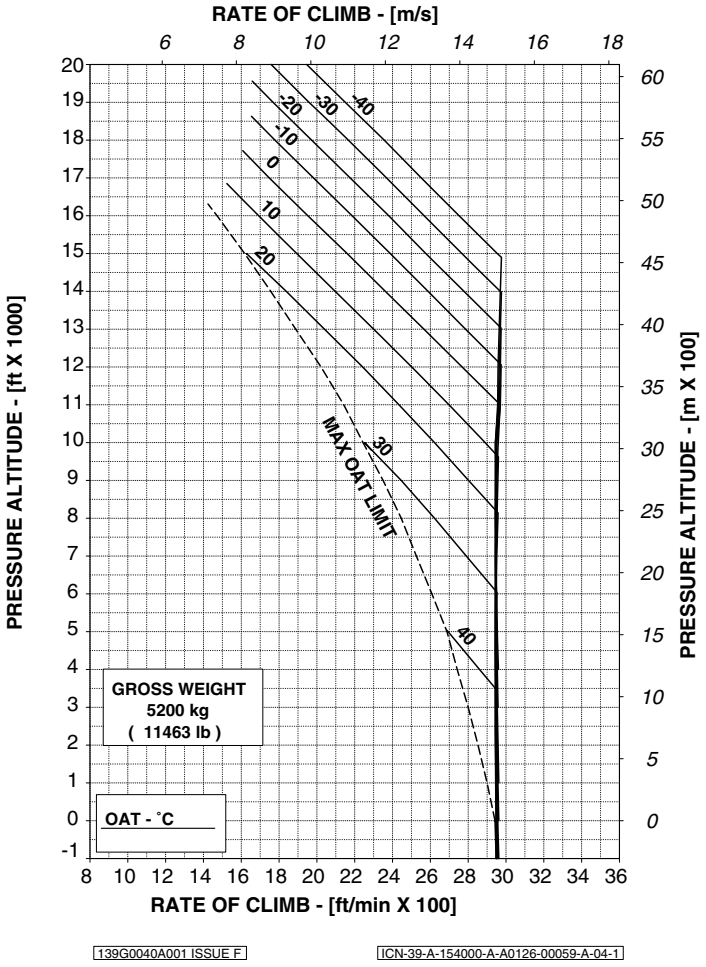

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Figure 4-29 ROC TOP, AEO Gross Weight 5200 kg (COND ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

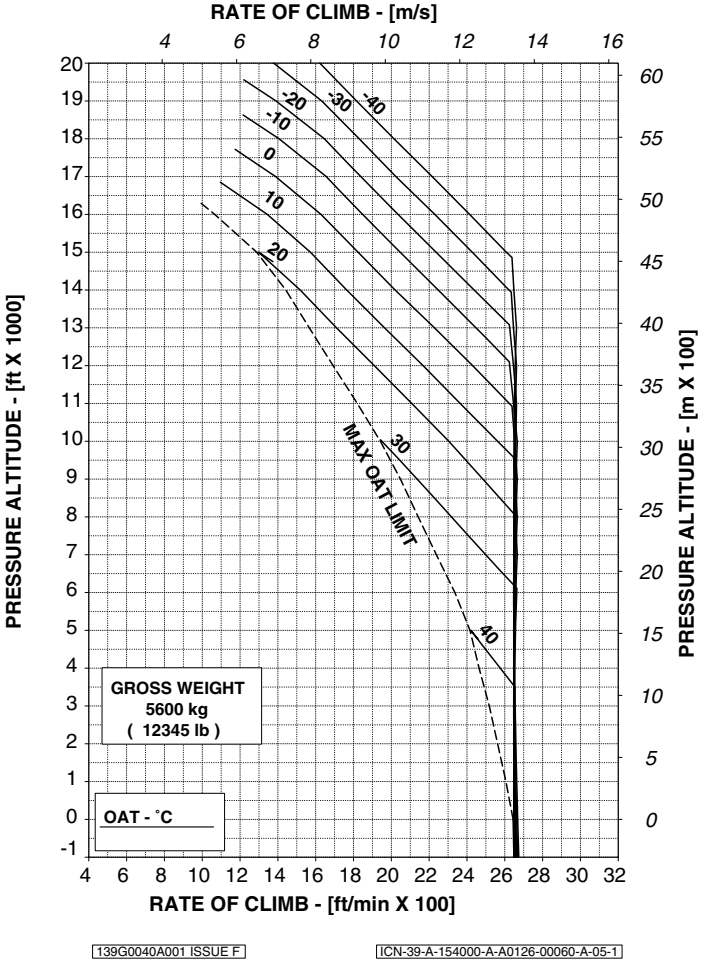

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Figure 4-30 ROC TOP, AEO Gross Weight 5600 kg (COND ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

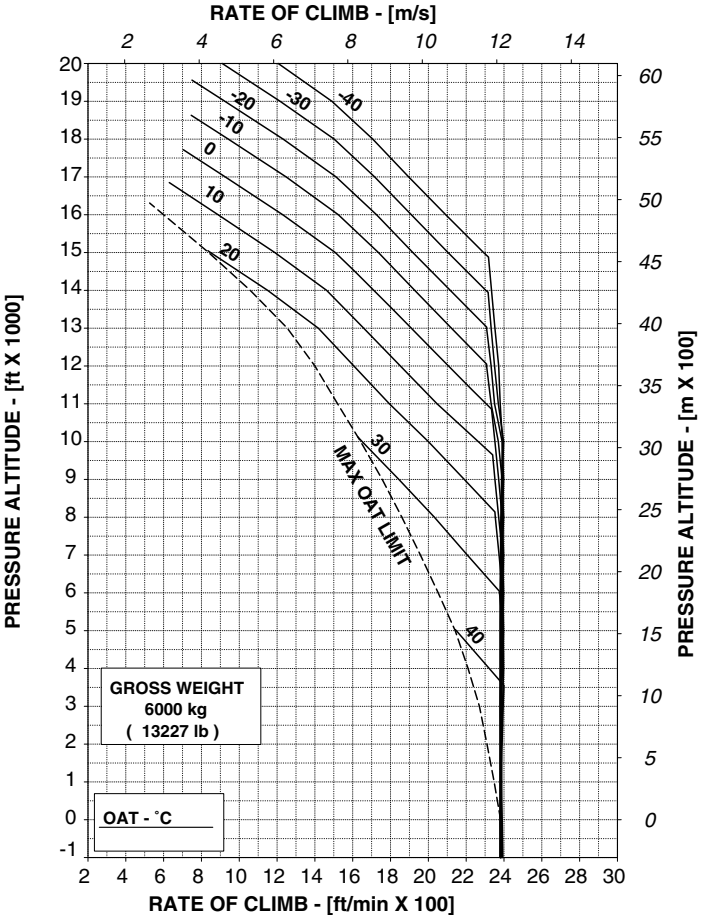

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Figure 4-31 ROC TOP AEO Gross Weight 6000 kg (COND ON)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

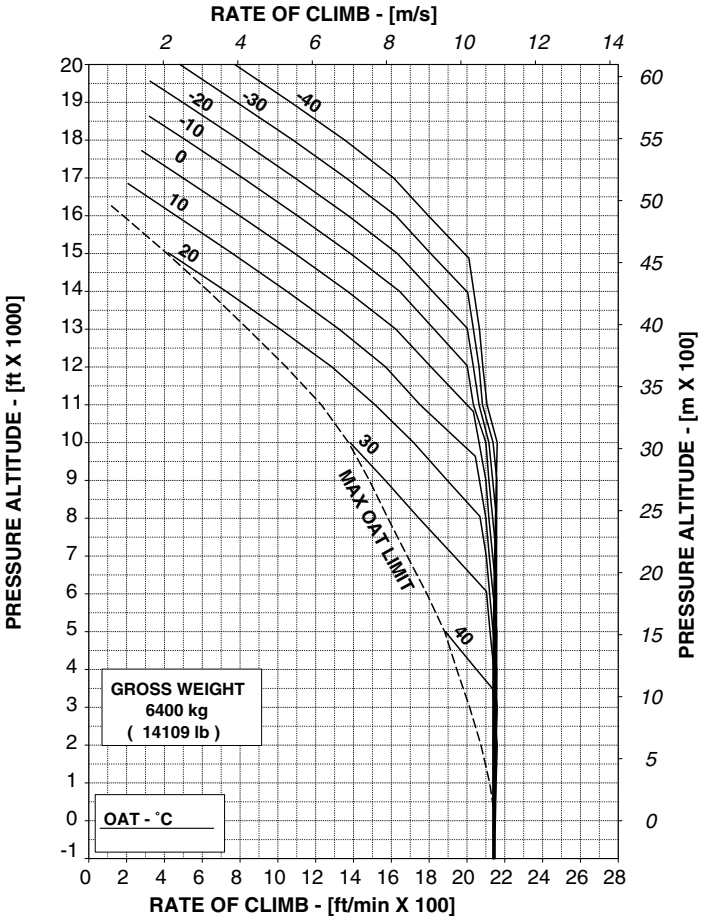

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Figure 4-32 ROC TOP AEO Gross Weight 6400 kg (COND ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

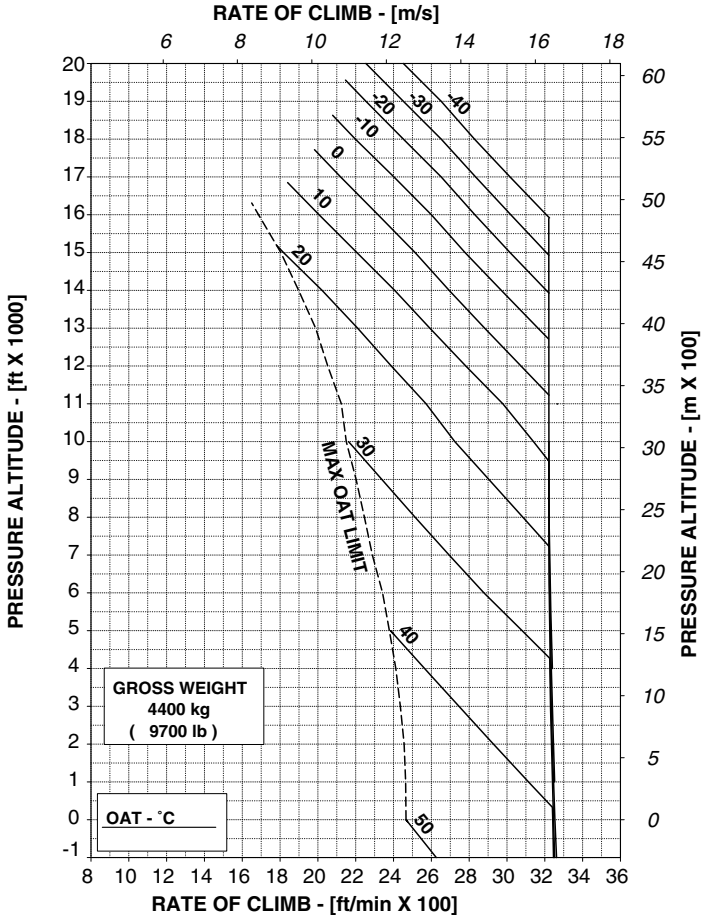

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Figure 4-33 ROC MCP, AEO Gross Weight 4400 kg (COND ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

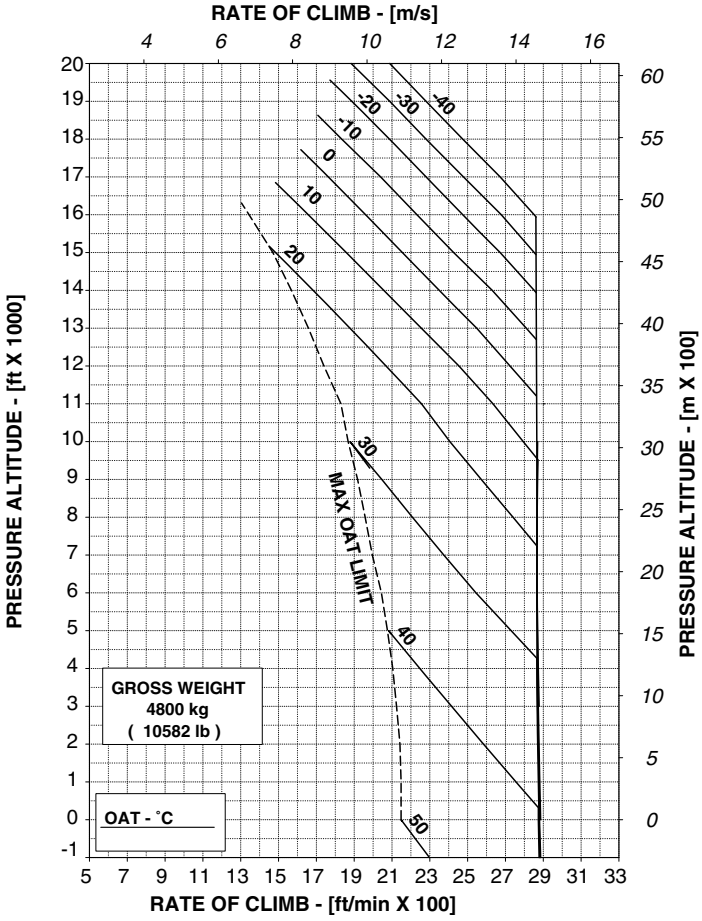

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Figure 4-34 ROC MCP, AEO Gross Weight 4800 kg (COND ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

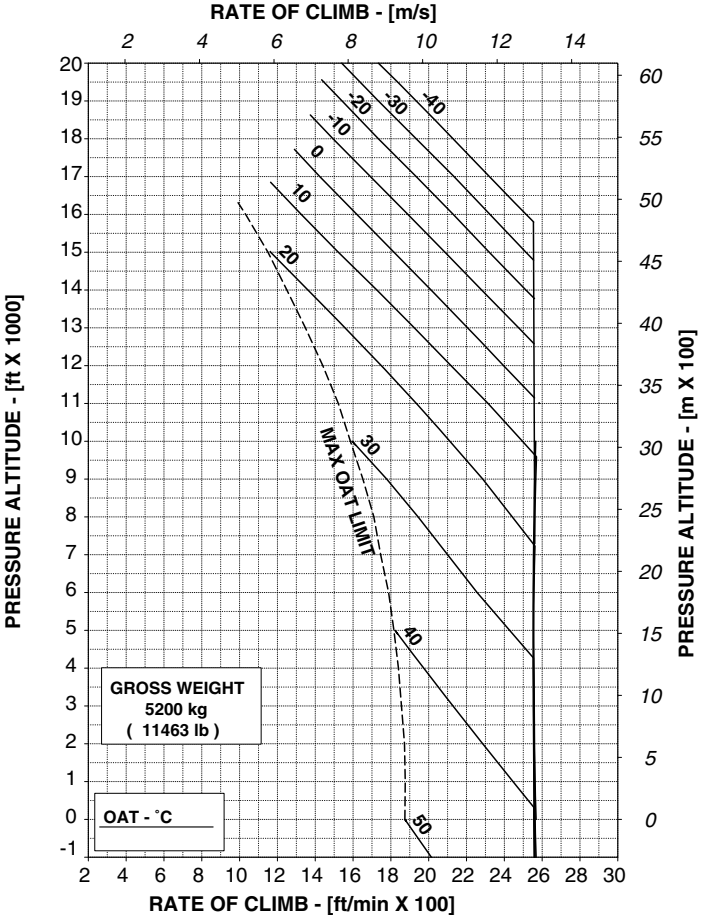

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Figure 4-35 ROC MCP, AEO Gross Weight 5200 kg (COND ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

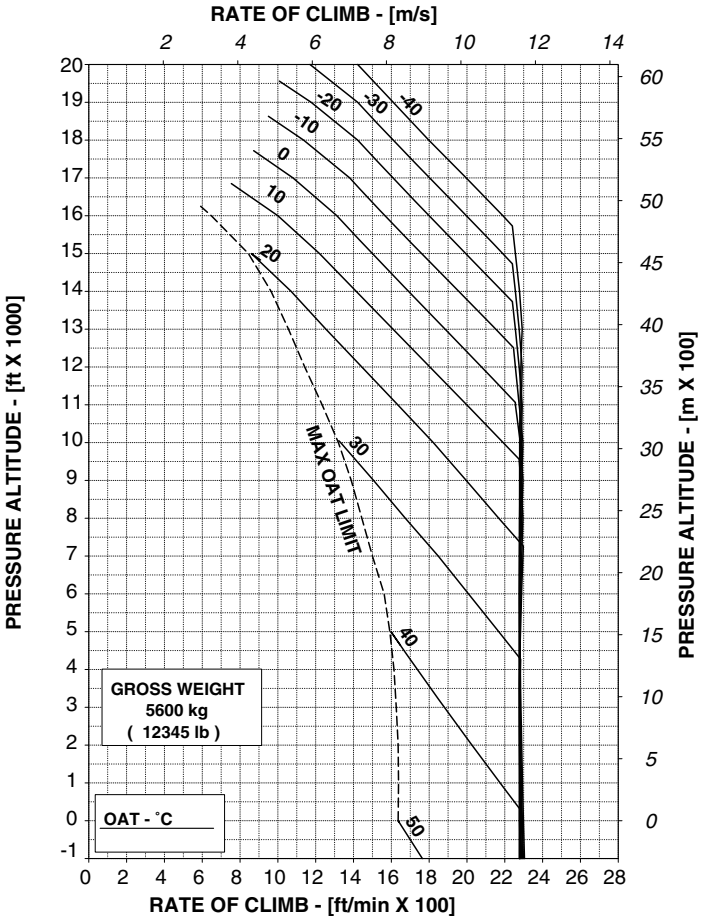

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Figure 4-36 ROC MCP, AEO Gross Weight 5600 kg (COND ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

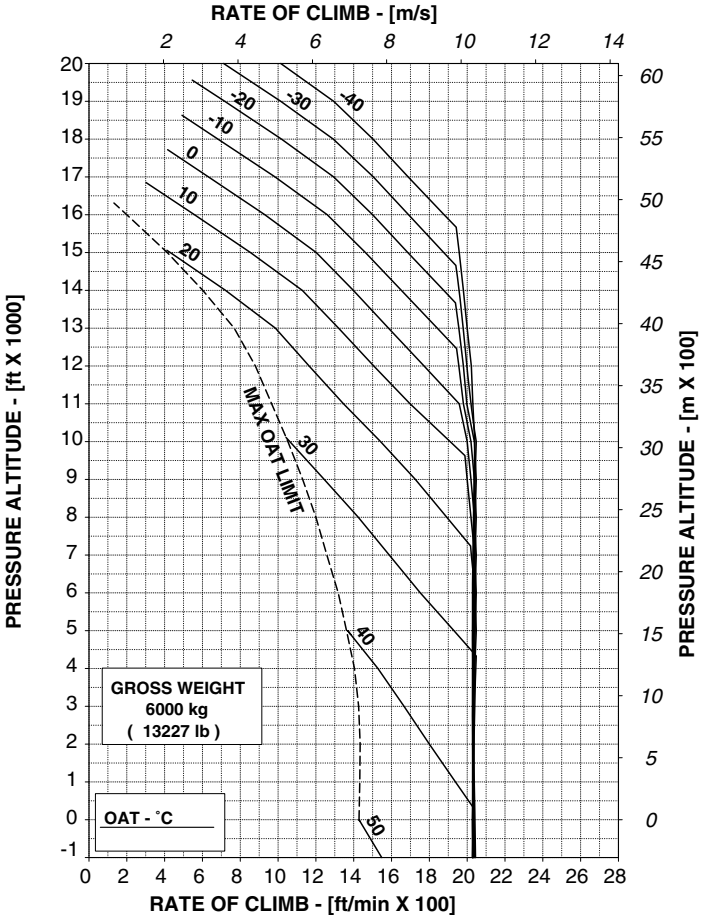

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Figure 4-37 ROC MCP, AEO Gross Weight 6000 kg (COND ON)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
COND ON

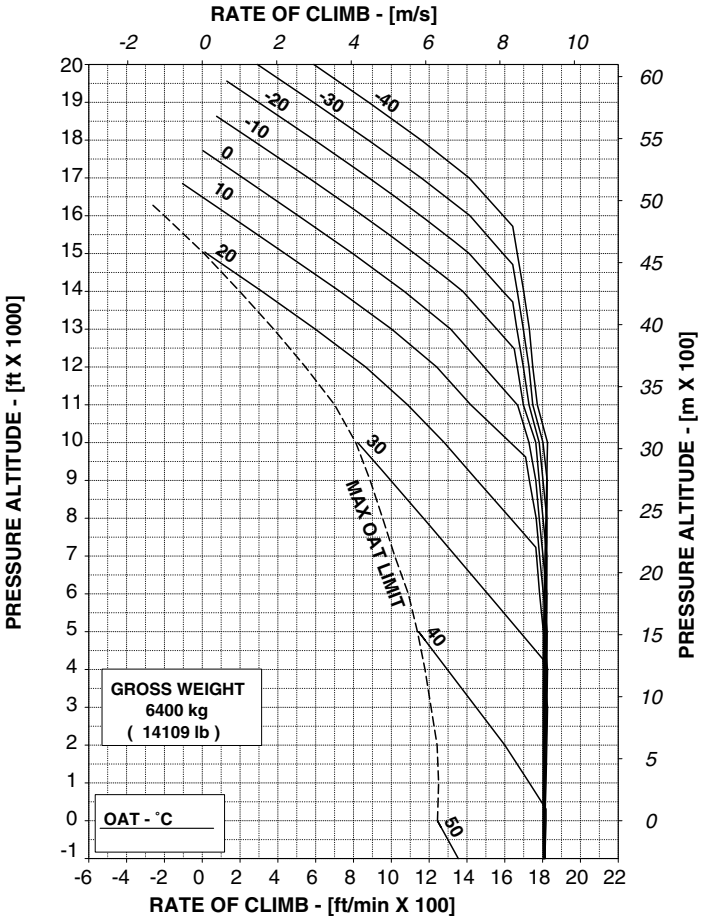

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Figure 4-38 ROC MCP, AEO Gross Weight 6400 kg (COND ON)

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 3

3 AXIS FLIGHT DIRECTOR

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SUPPLEMENT 4

FMS AND GPS

The content of this Supplement has been incorporated into the Basic RFM.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 5

ENGINE AIR PARTICLE SEPARATOR (EAPS)

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P/N 3G7160F00115

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SUPPLEMENT 5
ENGINE AIR PARTICLE SEPARATOR (EAPS)

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Figure 4-82	Hover Ceiling OGE 2.5 min OEI EAPS OFF with Factored Headwind Component	S5-110
Figure 4-83	Hover Ceiling OGE 2.5 min OEI EAPS OFF with Unfactored Headwind Benefit	S5-111

GENERAL INFORMATION

The Engine Air Intake Particle Separator (EAPS) P/N 3G7160F00114 or P/N 3G7160F00115 protects the engine against ingestion of sand, dust and other particles.

The system consists of two (2) particle separators located in front of each engine air intake. Foreign particles are separated by the swirling action of the air passing through the vortex generators contained in the particle separator. The clean air enters the engine air intake, while the foreign particles are directed into a lower chamber by the scavenge flow. From this chamber, the foreign particles are discharged outboard through an ejector activated by the engine bleed-air.
The particle ejector may be activated by the pilot through switches, one for each engine, located on the KITS panel installed in the interseat console. This switch, when selected to ON, activates the bleed air from the engine for the ejection operation. The particle separator can also operate with no bleed-air, switch selected to OFF, however its efficiency is reduced by 50%. In this case, the particles are accumulated in the lower chamber of the ejector, until it is completely full. At this point, no more external particles can be stored or separated, and thus flow directly into the engine intake.

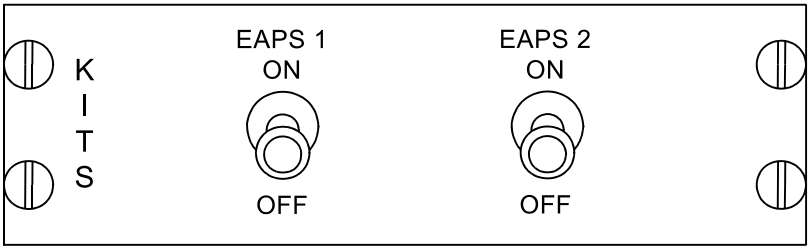

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Figure 1 EAPS Control Panel

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After EAPS installation, the new empty weight and center of gravity position must be determined.

WEIGHT

Refer to CAT B W.A.T Limits chart EAPS OFF/ON Figure 1-1.

CENTRE OF GRAVITY6

No change in CG limitations.

AIRSPEED LIMITATIONS

Max airspeed in sideward or rearward flight
EAPS OFF/ON ..... Figure 1-1 & Figure 1-1A

Max allowable tailwind and crosswind
EAPS OFF/ON.....Figure 1-1 & Figure 1-1A

CATEGORY B OPERATION LIMITATIONS

The CAT B W.A.T. Limits chart for EAPS OFF/ON (with HEATER or COND OFF/ON) Figure 1-1, are used to define the maximum take off and landing weight for the given ambient atmospheric and wind conditions.

(See Flight Planning in Basic RFM Section 2 for examples of using the CAT B W.A.T. Limits chart).

HEIGHT- VELOCITY LIMITATIONS

The Height-Velocity diagram defines, in the event of a single engine failure during take off, landing or other operation near the surface, a combination of airspeed and height above ground from which a safe single engine landing on a smooth, level and hard surface cannot be assured.

CAUTION

Prior to the determination of the H-V envelope the CATEGORY B weight with EAPS OFF/ON, should be defined for the ambient conditions. See Flight Planning in Basic RFM Section 2 for use of the CAT B W.A.T. and H-V envelope charts.

Height Velocity Chart.....Figure 1-2

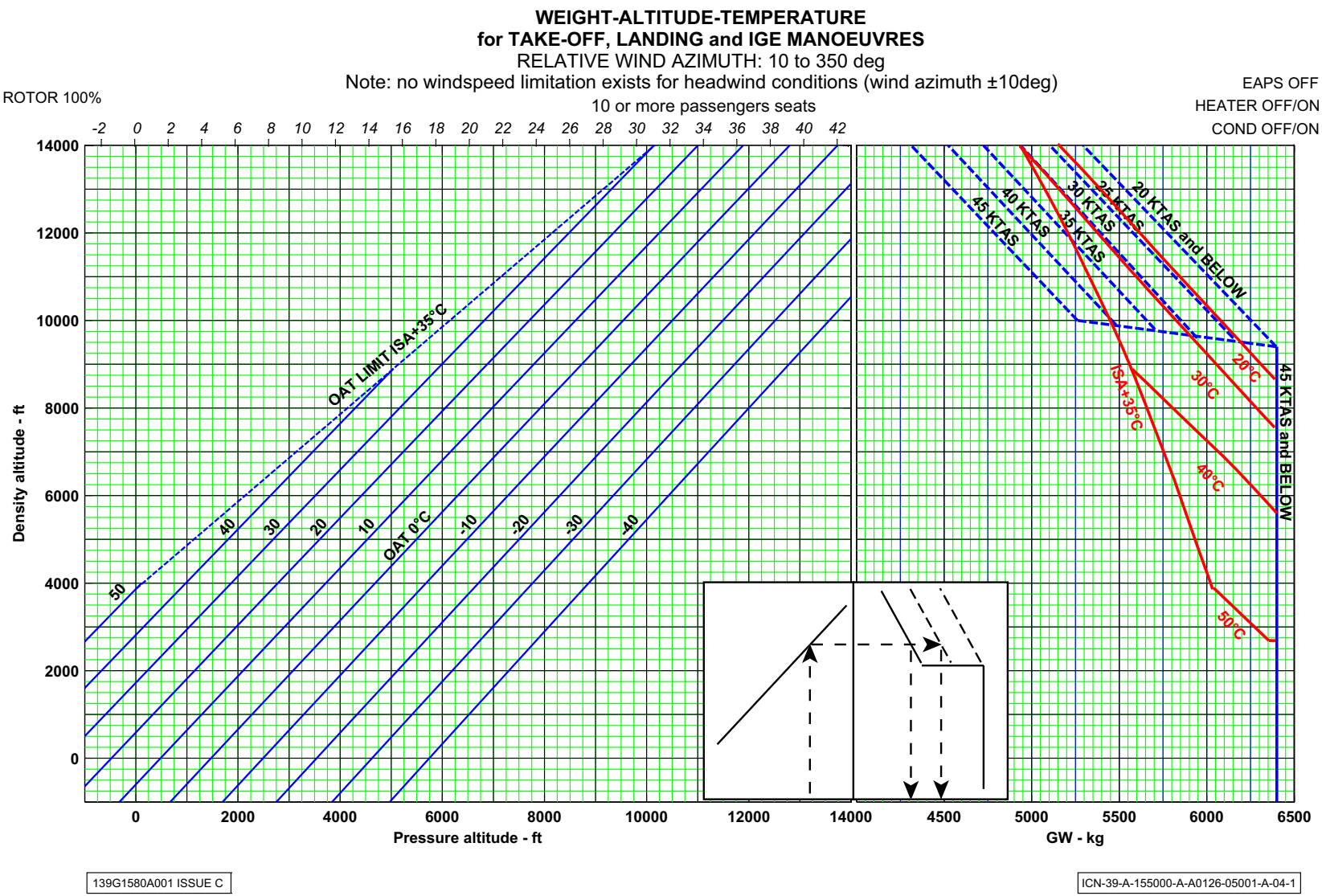

Figure 1-1 CAT B W.A.T. Limits EAPS OFF (with HEATER OR COND OFF/ON)

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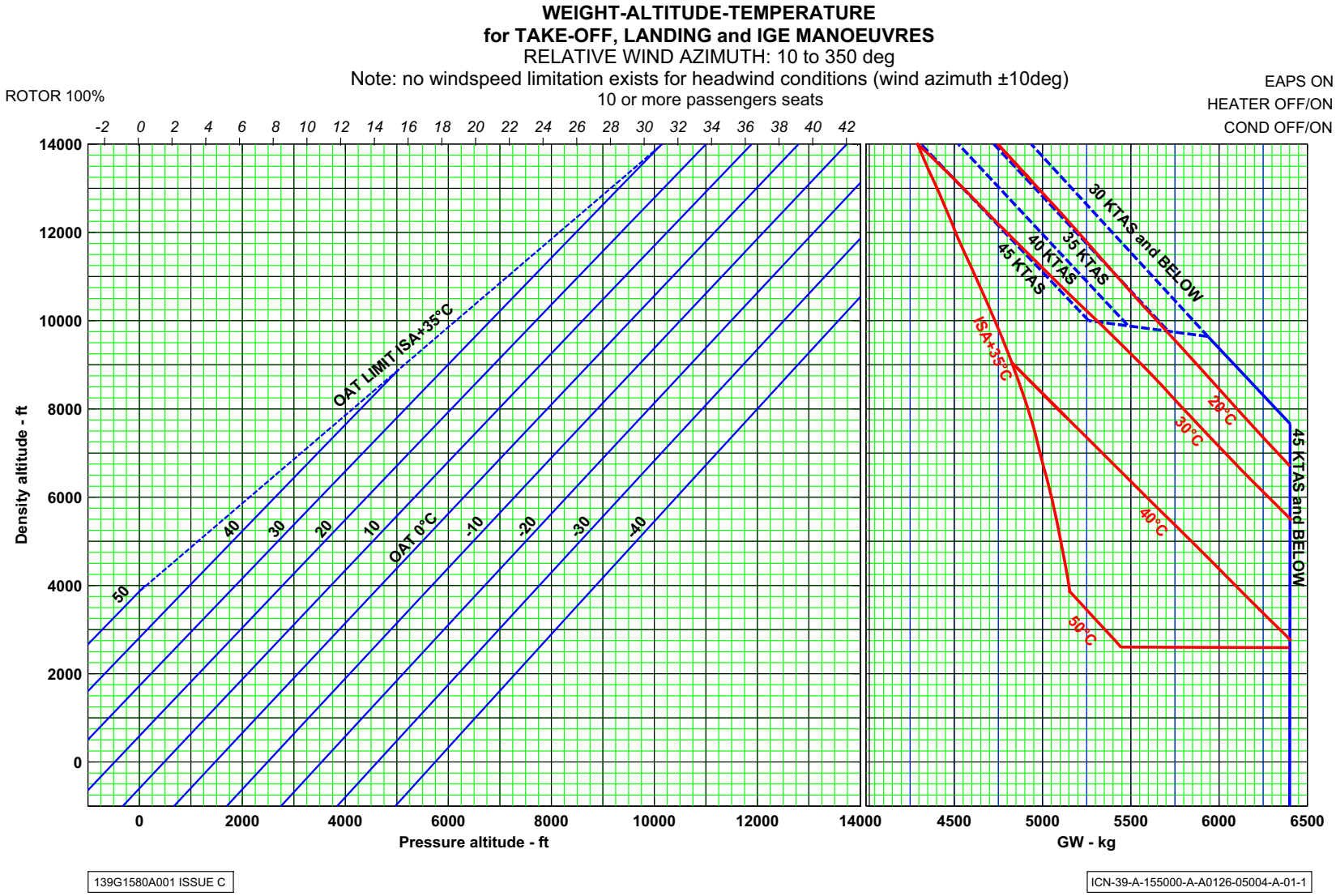

Figure 1-1A CAT B W.A.T. Limits EAPS ON (with HEATER OR COND OFF/ON)

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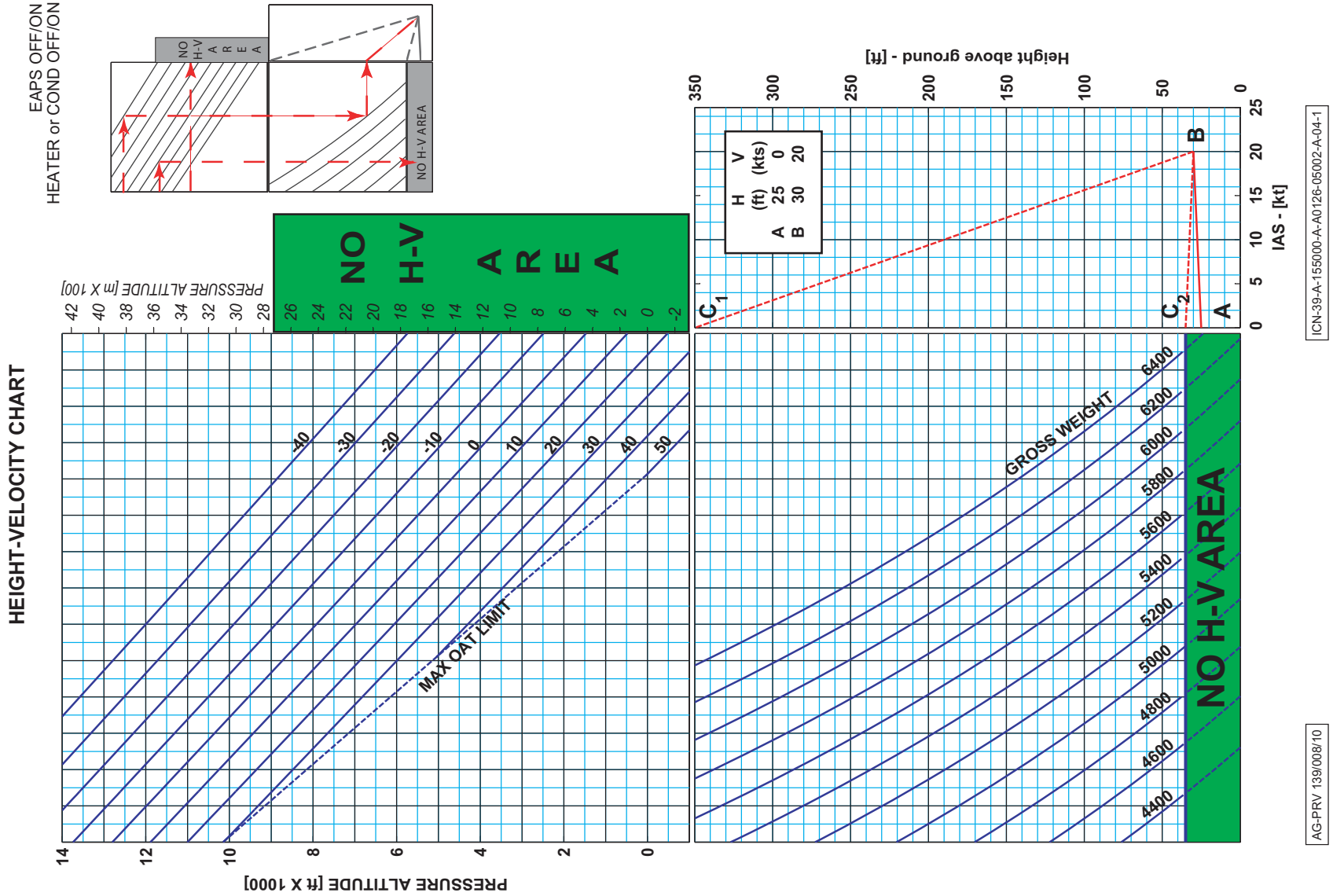

Figure 1-2 Height Velocity Chart EAPS OFF/ON (HEATER or COND OFF/ON)

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SECTION 2 - NORMAL PROCEDURES

PILOT'S PRE-FLIGHT CHECK

AREA N°2 (Fuselage - RH side)

Engine air particle separator EAPS : Integrity; free of foreign matter and/or obstruction.

AREA N°6 (Fuselage - LH side)

Engine air particle separator EAPS : Integrity; free of foreign matter and/or obstruction.

COCKPIT/ENGINE PRE-START CHECKS

EAPS 1 and EAPS 2 switches : ON.

Check that 1 & 2 EAPS ON advisory messages.

EAPS 1 and EAPS 2 switches : OFF.

Check that 1 & 2 EAPS ON advisory messages not displayed.

NORMAL ENGINE START

No change to engine starting procedures

SYSTEM CHECKS

EAPS 1 and EAPS 2 switches : ON. Note ITT increases by approximately 10°C.

Confirm 1 & 2 EAPS ON advisory messages displayed.

On completion of systems check:

EAPS 1 and EAPS 2 switches : As required.

Note

EAPS should be switched ON for aircraft operations in dusty or sandy ambient conditions. When switched OFF the EAPS partical separation efficiency is reduced by 50% or more depending on the quantity of particles collected in the lower chamber of the EAPS.

IN FLIGHT

EAPS 1 and EAPS 2 switches : As required.

APPROACH AND LANDING

EAPS 1 and EAPS 2 switches : As required.

ENGINES AND ROTOR SHUTDOWN

(Before ENG1 and ENG2 MODE switches to OFF)

EAPS 1 and EAPS 2 switches : OFF.

Confirm 1 & 2 EAPS ON advisory messages not illuminated.

Note

A period of 60 seconds stabilization at IDLE is recommended.

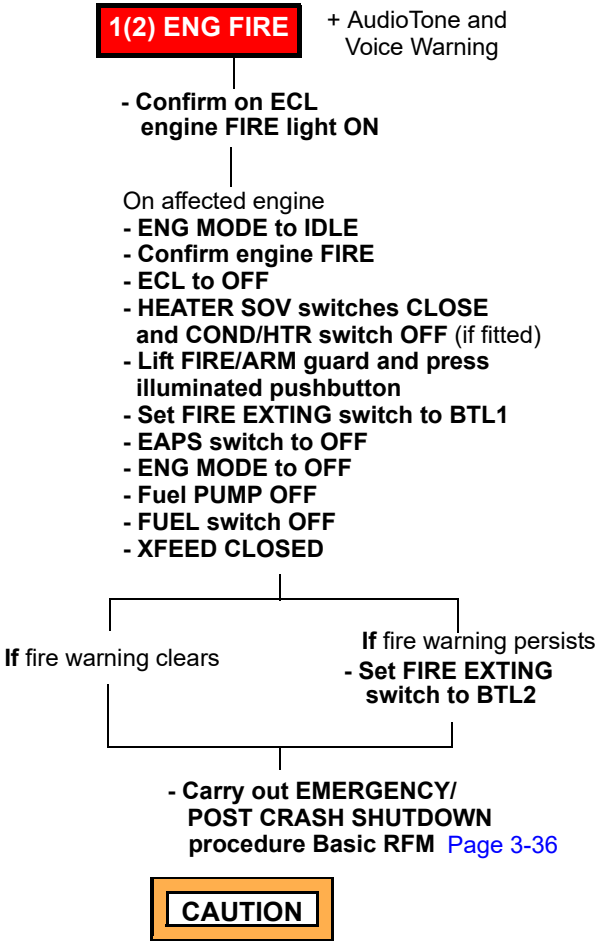
ADVISORY CAPTION DEFINITION

CAS Caption (Green)	System State
1(2) EAPS ON	EAPS switched ON

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

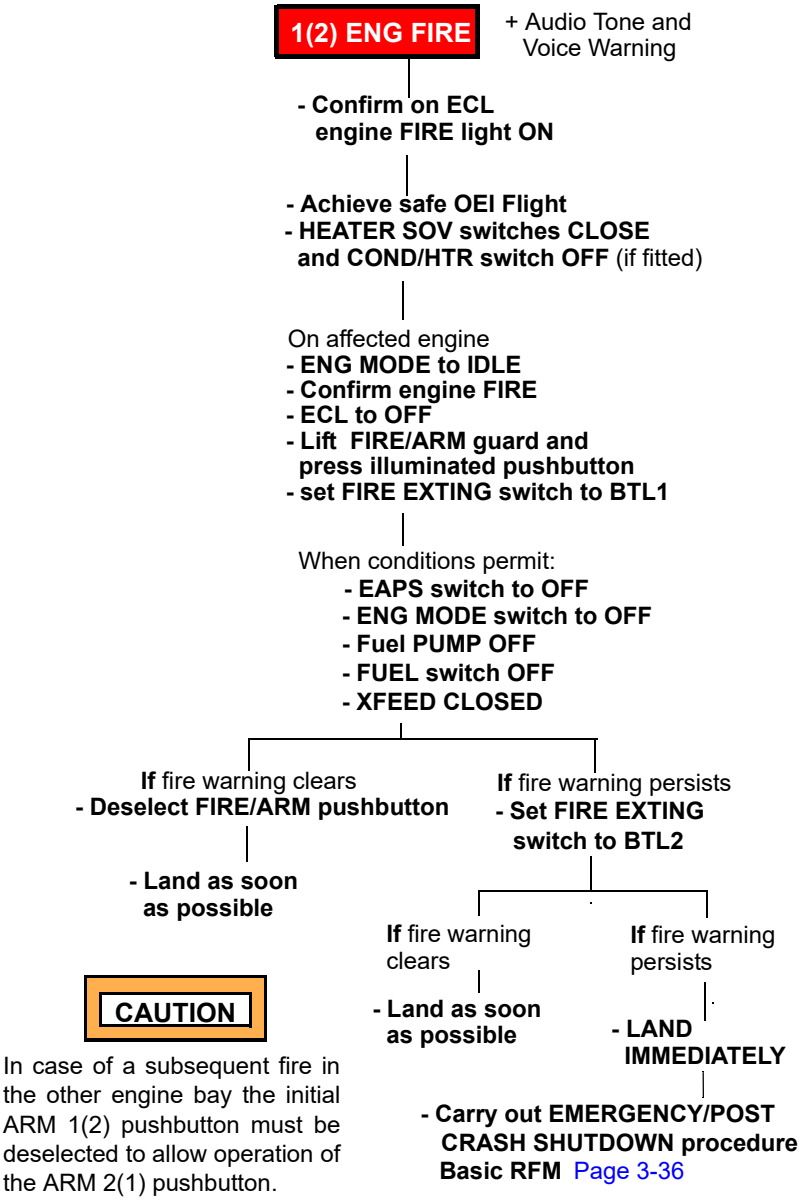
ENGINE BAY FIRE (GROUND)



CAUTION

In case of a subsequent fire in the other engine bay the initial ARM 1(2) pushbutton must be deselected to allow operation of the ARM 2(1) pushbutton.

ENGINE BAY FIRE (FLIGHT)



ENGINE FAILURE

For any engine failure or loss of power the following should be carried out:

1. 1 EAPS switch — OFF.
2. 2 EAPS switch — OFF.

Note

If required by operating conditions, the EAPS of the live engine may remain ON. Helicopter performance is reduced, see Section 4 of this Supplement.

MALFUNCTION PROCEDURES

ENGINE RESTART IN FLIGHT PROCEDURE

GENERAL

If an engine flames out/or is shutdown during flight and if there is no indication of a mechanical malfunction or engine fire, the engine may be restarted.

STARTING MALFUNCTIONS AND ASSOCIATED ABORT ACTIONS

Monitor engine start if any of the following occur:

— If light up is not within 10 seconds of ENG MODE to IDLE

— If abnormal noise heard

— If ITT increases beyond engine limits (HOT START caution illuminated)

— If engine hangs (stagnation in NG below 54%).

Shut down engine by:

1. ENG MODE switch — OFF.
2. ECL — OFF.

3. FUEL PUMP — OFF.

4. ENG FUEL switch — OFF

CAUTION

Failure to follow the appropriate Abort Procedure may cause damage to the engine.

Note

Observe the igniter and starter generator duty cycle limitations.

RESTARTING PROCEDURE

CAUTION

During starter activation AP1 may disengage.

1. Airspeed — Less than 120 KIAS.

2. EAPS switch (on affected engine)— OFF.

3. ENG Fuel switch — ON - Fuel valve indicator vertical.

4. FUEL PUMP — ON - FUEL PUMP caution not illuminated, check pressure.

5. MFD display — Confirm PWR PLANT page.

6. ECL — Confirm in FLT.

7. ENG MODE switch — IDLE.

Note

It is recommended to start the engine to IDLE. If necessary, it is possible to start to FLIGHT by setting the ENG MODE switch directly to FLT.

8. Gas Producer (NG) — Note increasing and START legend displayed.

9. Engine temperature (ITT) — Note increasing and IGN legend displayed.

10. Engine oil pressure — Confirm rising.

11. Engine starter — Disengaged by 49% NG.

12. Engine power turbine speed (NF) — Confirm stabilized to IDLE speed below 100%.

Note

If the engine was started directly to FLT the NF will stabilize at 100% with rotor speed.

13. ENG MODE switch — FLT.

14. Engine parameters — Confirm within limits and matched with other engine.

15. EAPS switch (on affected engine) — As required.

ENGINE MANUAL STARTING

It is recommended that engine start be carried out in AUTO mode when possible. If a MANUAL start is necessary follow the following procedure.

STARTING MALFUNCTIONS AND ASSOCIATED ABORT ACTIONS

Monitor engine start if any of the following occur:

— If light-up is not within 10 seconds of ENG MODE to IDLE

— If abnormal noise heard

— If ITT increases beyond engine limits (HOT START caution illuminated)

— If engine hangs (stagnation in NG below 54%).

Shut down engine by:

1. ECL — OFF
2. ENG MODE — OFF
3. FUEL PUMP — OFF
4. ENG FUEL switch — OFF

CAUTION

Failure to follow the appropriate Abort Procedure may cause damage to the engine.

Note

Observe the igniter and starter generator duty cycle limitations.

MANUAL ON GROUND / IN FLIGHT RESTART PROCEDURE

CAUTION

During starter activation AP1 may disengage.

1. MFD display — Confirm PWR PLANT page.
2. ECL — OFF on required engine.
3. EAPS switch (on affected engine)— OFF.
4. ENG GOV — MANUAL on required engine (Confirm MAN legend on PI and TQ indicators).
5. ENG Fuel switch — ON - Fuel valve indicator vertical.
6. FUEL PUMP — ON - FUEL PUMP caution not illuminated, check pressure.

7. ENG MODE switch — IDLE.

Note

ENGine OUT aural and warning messages activate.

8. ECL starter pushbutton — Push and release.
9. Gas Producer (NG) — Note increasing, START and IGN legends displayed.
10. ENG ECL — Advance to FLIGHT, and beyond if required, when NG greater than 15% and ITT below 200° C (26%).
11. Engine temperature (ITT) — Confirm increasing.
12. Engine oil pressure — Confirm rising.
13. Engine starter — Verify disengaged when NG above 49% and START and IGN legends extinguished.
14. Gas producer (NG) — Confirm stabilized at 68% or above.

Note

If NG hangs below 68%, advance ECL beyond FLIGHT to accelerate to 68% NG then return to FLIGHT.

15. Engine parameters — Confirm within limits.
16. EAPS switch (on affected engine)— As required

CAUTION

In manual mode the ECL must be advanced to adjust engine power. This should be carried out using the ECL beep switch. It is recommended that the manual engine be set to a torque 10% lower that the other engine.

ENGINE AIR PARTICLE SEPARATOR MALFUNCTION

1(2) EAPS PRESS

Malfunction of affected engine bleed air shut-off valve:
- Valve closed with EAPS switch in ON position.

or

- Valve open with EAPS switch in OFF position.

- Continue flight

Be aware that:
If EAPS switched ON, EAPS functioning degraded (particle ejector not active)
If EAPS switched OFF, helicopter performance may not meet EAPS OFF performance charts.(use EAPS ON performance charts)

FLIGHT IN THUNDERSTORM - LIGHTNING STRIKE

Induced current overloads caused by lightning could trip the EAPS circuit breakers. If required, reset EAPS circuit breakers.

SECTION 4 - PERFORMANCE

This section includes the performance data for the AW139 helicopter equipped with particle separators (EAPS) and related to the following configurations:

- helicopter with EAPS OFF or ON

- helicopter with Heating and Air Conditioning Systems.

The presence of the particle separators, even with bleed-air shut-off valve closed (EAPS OFF), causes an increase of power losses due to a pressure reduction at the engine intake.

The increase of power losses is more evident when the bleed air shut-off valve is open (EAPS ON).

Thus, whenever the particle separator is installed, the helicopter performance is reduced when compared to the basic configuration with no particle separators installed.

ENGINE POWER CHECKS

The purpose of the Engine Power Assurance Check is to provide a means of monitoring engine health. A HOVER power assurance check procedure, with EAPS fitted, is provided to the operator. The procedure should be used to check if the engine power available before take-off is within the limits established for the legitimate use of the Rotorcraft Flight Manual performance.

POWER MARGIN TREND MONITORING

A separate trend diagram is required with EAPS fitted.

HOVER POWER CHECKS PROCEDURE

The following procedure is used to check engine performance before flight:

CAUTION

Observe all engine and transmission max continuous limits and aircraft operating limits during this check.

1. Position the aircraft into the prevailing wind to minimize hot gas ingestion.
2. Record date, aircraft serial number, aircraft hours, engine serial number and engine hours.
3. Confirm that the AUTO MODE HTR/COND switch is set to OFF and HEATING SOV switches are OFF (If fitted).
4. EAPS 1 and 2 switches to ON.
5. Set the barometric pressure to 1013 mb or 29.92 inches.
6. Confirm both the ENG MODE switches at FLT, set BUS TIE switch to ON, select ENG MODE switch of engine NOT being tested to IDLE.
7. With the rotor speed at 100%, set the collective until 'light on wheels' or Hover at 5 feet to obtain a percent torque value within the range shown on the top graph of Figure 4-1, depending on the airfield elevation.
8. Maintain a fixed collective for one minute, then record the following data from the Primary and MultiFunction Display:
   - Pressure Altitude
   - OAT
   - NG
   - TRQ
   - ITT

9. When recording is completed lower collective to MPOG, select ENG MODE switch of engine not being tested to FLT.

10. Repeat steps (1) through (8), for the remaining engine.

11. Select BUS TIE switch to AUTO.

12. On the appropriate figure plot readings for each engine as follows:

    a) Enter the left graph of Figure 4-1, as appropriate, with the recorded torque value. Drop vertically until intercepting the recorded pressure altitude value (interpolate between the curves, as necessary). Move horizontally to intercept the recorded OAT value for ITT and NG. From these points move up to read the maximum allowable ITT/NG values for the test condition.

    b) Compare the maximum allowable ITT and NG values to the recorded ITT and NG values.

    c) If the recorded ITT or NG values is less than the maximum allowable ITT or NG value, engine condition is acceptable for flight.

       The difference between maximum allowable ITT/NG and recorded ITT/NG is called the Power Assurance Margin (PAM).

    d) If the recorded ITT or NG values are greater than the maximum allowable ITT or NG the performance in this RFM may not be achieved. Refer to EMM for required actions.

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POWER ASSURANCE CHECK in HOVER FLIGHT (NR=100%)
EAPS INSTALLED

EAPS ON
HEATER/COND OFF
GENERATOR LOAD TO MINIMUM (BELOW 17%)
SET NR to 100%
TEST ENGINE MODE SWITCH: FLIGHT
OTHER ENGINE MODE SWITCH: IDLE
INCREASE COLLECTIVE UNTIL LIGHT ON WHEELS OR HOVERING AT 5 FEET, NOSE ON WIND. DO NOT EXCEED 775°C ITT OR 102.4% NG OR 105% TQ
STABILIZE POWER 1 MINUTE, THEN RECORD OAT, PRESSURE ALTITUDE, ENGINE TORQUE, ITT AND NG
ENTER CHART AT INDICATED TQ, MOVE DOWN TO INTERSECT PRESSURE ALTITUDE, PROCEED TO THE RIGHT TO INTERSECT OAT,
THEN MOVE UP TO READ VALUES FOR MAXIMUM ALLOWABLE ITT AND NG
IF INDICATED ITT OR NG EXCEEDS MAXIMUM ALLOWABLE, REPEAT CHECK
REPEAT CHECK USING OTHER ENGINE
IF EITHER ENGINE EXCEEDS ALLOWABLE ITT OR NG, PUBLISHED PERFORMANCE MAY NOT BE ACHIEVABLE. REFER TO EMM

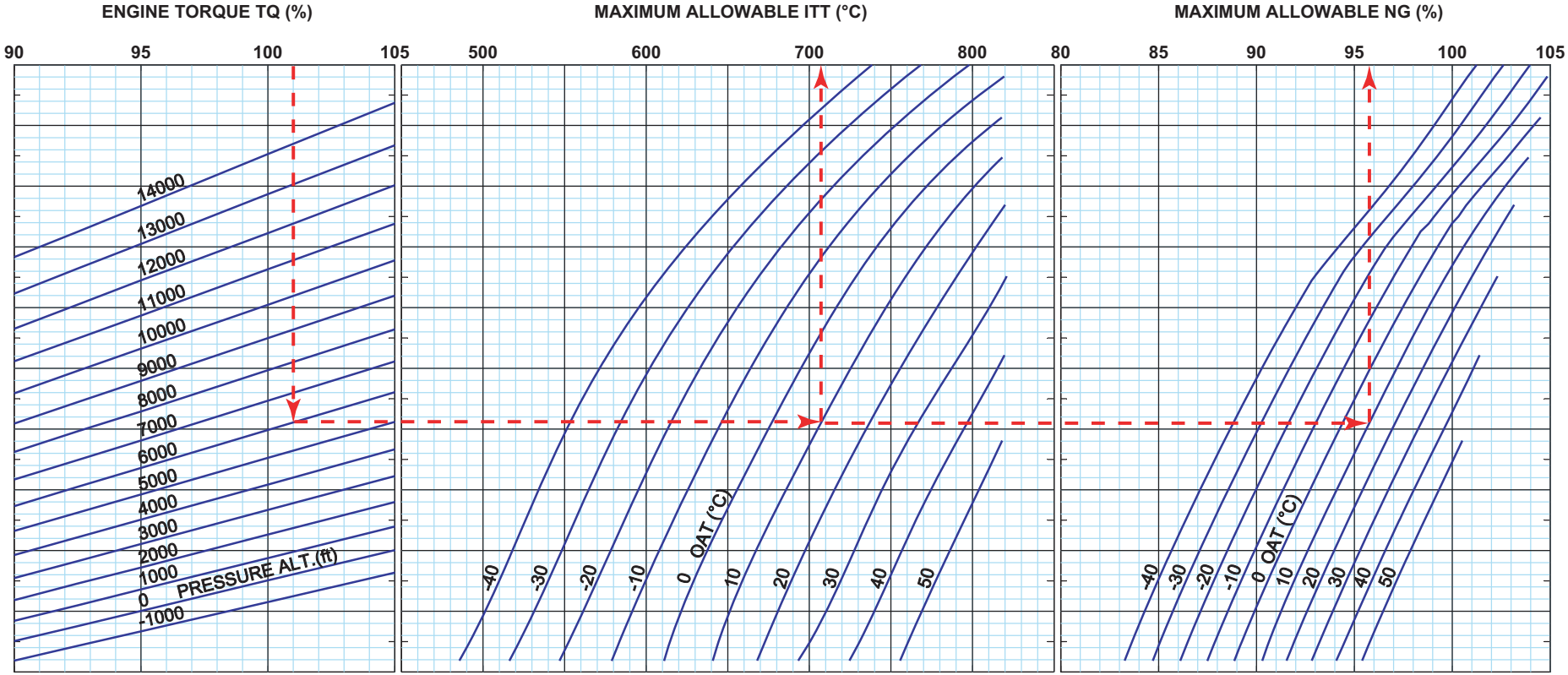

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Figure 4-1 PWC PT&C-67C Hover Power Chart EAPS ON

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CATEGORY B WEIGHT

To determine the CAT B Take Off/Landing/IGE manoeuvres with the EAPS fitted and selected ON or OFF charts are presented in Figure 1-1 & Figure 1-1A. Red lines are presented on the charts for ambient temperatures of 20 °C and above when the EAPS is OFF, 0 °C and above when the EAPS is ON. The red lines represent the conditions where the allowable windspeed is 20 KTAS and below. The red lines must be used if they are intersected before the dotted or solid lines.

Below are examples of how to use the charts.

Example 1:

Determine the maximum CAT B Take Off weight for the following ambient conditions:

— Pressure Altitude = 2000 ft

— OAT = +5 °C

— Relative Wind Speed = 0 KTAS

— EAPS = OFF

Solution:

Using the CAT B W.A.T. Chart Figure 1-1 starting on the Pressure Altitude axes from 2000 ft move up vertically to intersect +5 °C line (interpolated between the 0 °C and 10 °C line) move right to intercept the '45 KTAS and Below' line (solid line). Drop down vertically from this point to the GW axis for a weight of 6400 kg.

Example 2:

Determine the maximum CAT B Take Off weight for the following ambient conditions:

— Pressure Altitude = 2000 ft

— OAT = 40 °C

— Relative Wind Speed = 15 KTAS

— EAPS = OFF

Solution:

Using the CAT B W.A.T. Chart Figure 1-1 starting on the Pressure Altitude axes from 2000 ft move up vertically to intersect 40 °C line. Move right to intercept the 40 °C line (solid red line).
Drop down vertically from this point to the GW axis for a weight of 6250 kg.

Example 3:

Determine the maximum CAT B Take Off weight for the following ambient conditions:

— Pressure Altitude = 9000 ft

— OAT = 25 °C

— Relative Wind Speed = 45 KTAS & 10 KTAS

— EAPS = ON

Solution:

Using the CAT B W.A.T. Chart Figure 1-1A starting on the Pressure Altitude axes from 9000 ft move up vertically to intersect 25 °C line (interpolated between the 20 °C and 30 °C line). Move right:

- Intercept the 45 KTAS (as before the 25 °C red line), drop down vertically from this point to the GW axis for a weight of 4760 kg.
- Continue right to intersect the 25 °C line (Interpolated between the 20 °C and the 30 °C solid red lines). The red lines are used as the temperature is above 20 °C so the windspeedpermitted for the red lines is 20 KTAS and below. Therefore drop down vertically from this point or 25 °C to the GW axis for a weight of 4950 kg for relative wind of 10 KTAS.

HOVER CEILING

The Hover Ceiling charts define the maximum weights at which an IGE hover (at 5 ft wheel height) or an OGE hover is possible for varying combinations of Pressure Altitude and OAT with main rotor speed at 100% and zero wind conditions.

The performance effect of the EAPS is presented for All Engines Operating (AEO) at Maximum Continuous Power (MCP) and Take Off Power (TOP) with the EAPS OFF and ON and the effect of the EAPS with the HEATER ON.

The performance effect of the EAPS is presented for OEI Maximum Continuous Power (MCP) and 2.5 minute Power with EAPS OFF and ON.

Note

With COND ON to achieve the Hover Ceiling for EAPS OFF or ON reduce weight by 50 kg.

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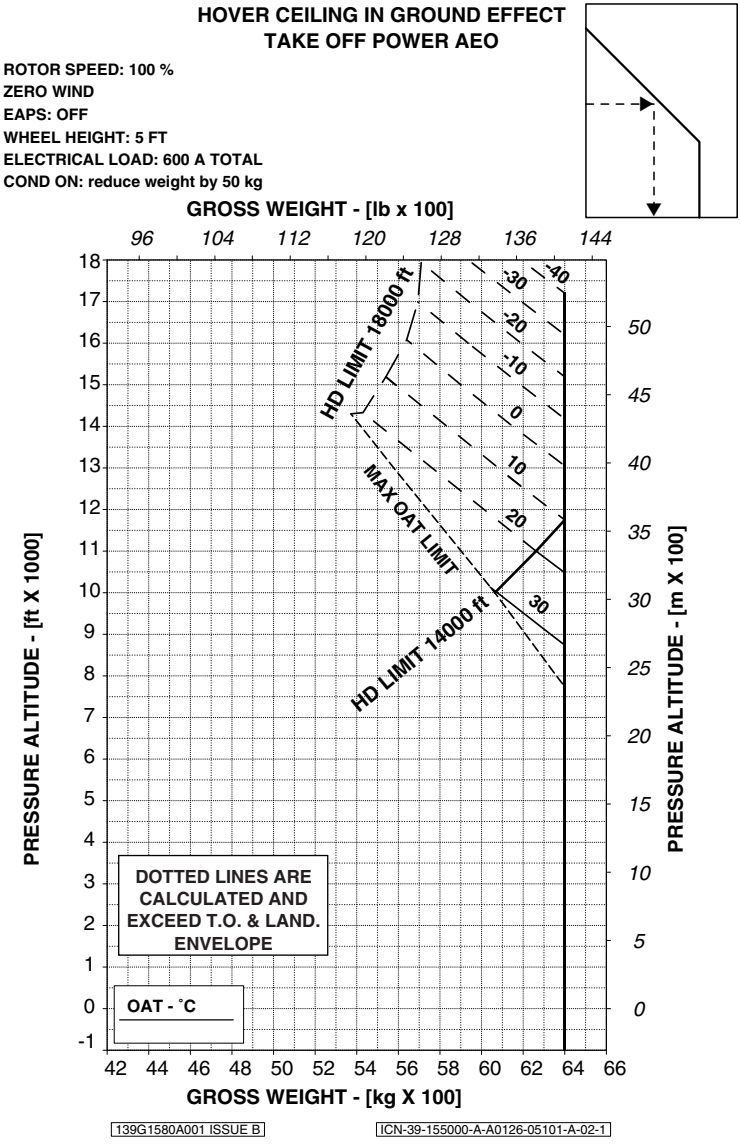

Figure 4-2 Hover Ceiling IGE TOP AEO EAPS OFF

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
EAPS: OFF
COND ON: reduce weight by 50 kg

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL

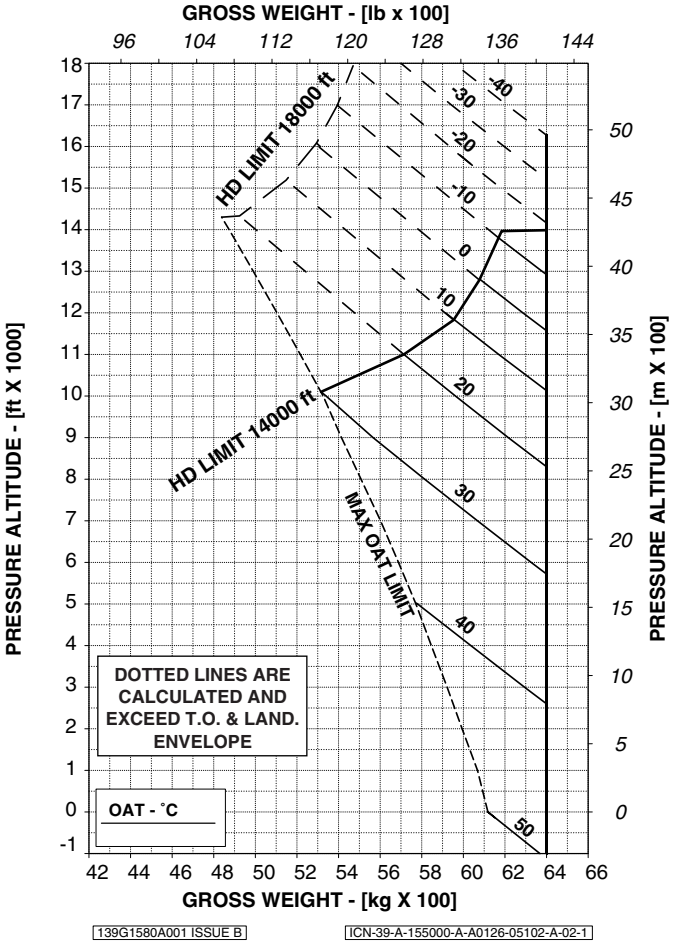

Figure 4-3 Hover Ceiling IGE MCP AEO EAPS OFF

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
EAPS: OFF

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

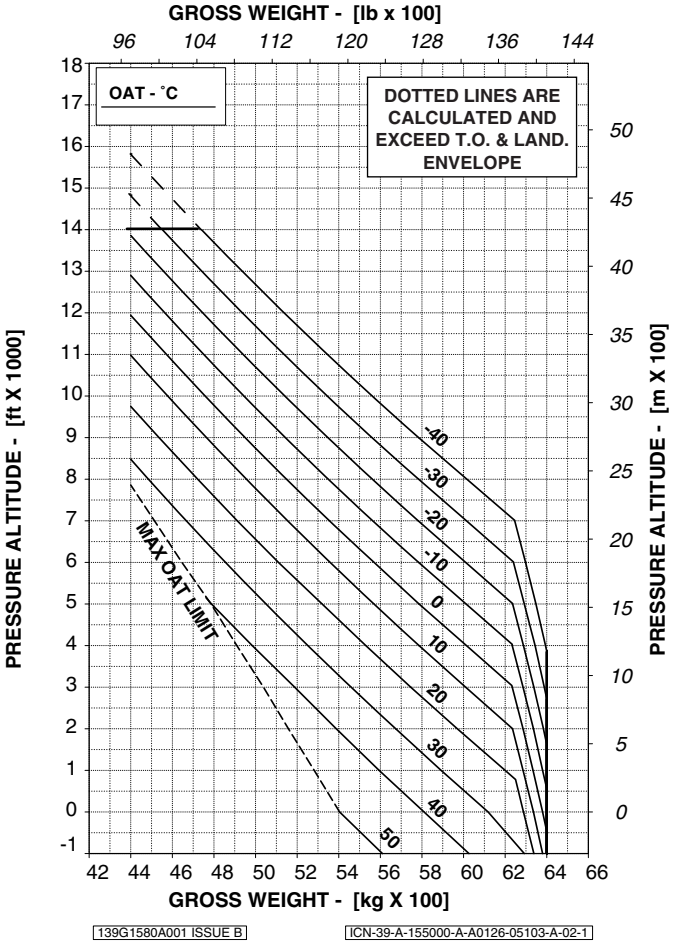

Figure 4-4 Hover Ceiling IGE 2.5min OEI EAPS OFF

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
EAPS: OFF

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

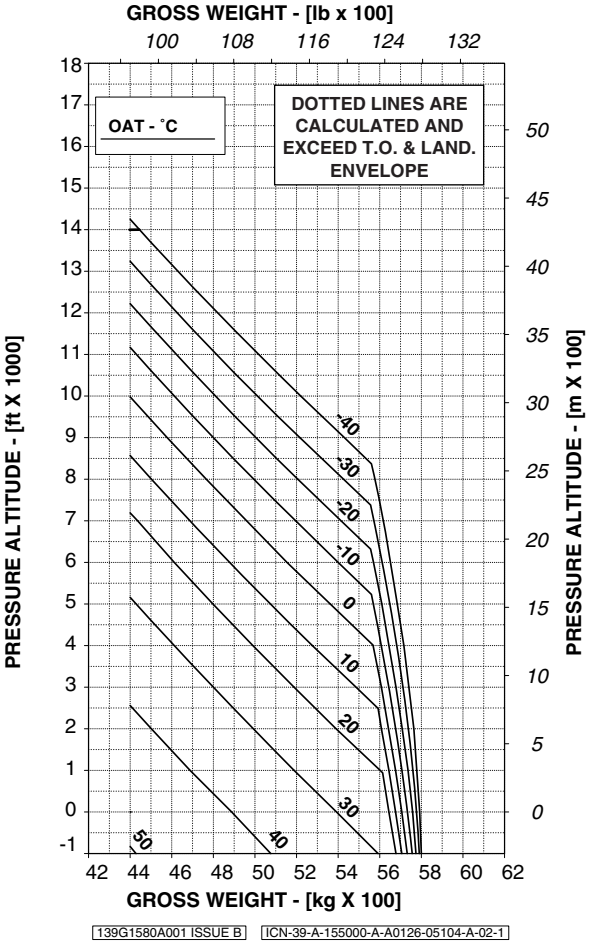

Figure 4-5 Hover Ceiling IGE MCP OEI EAPS OFF

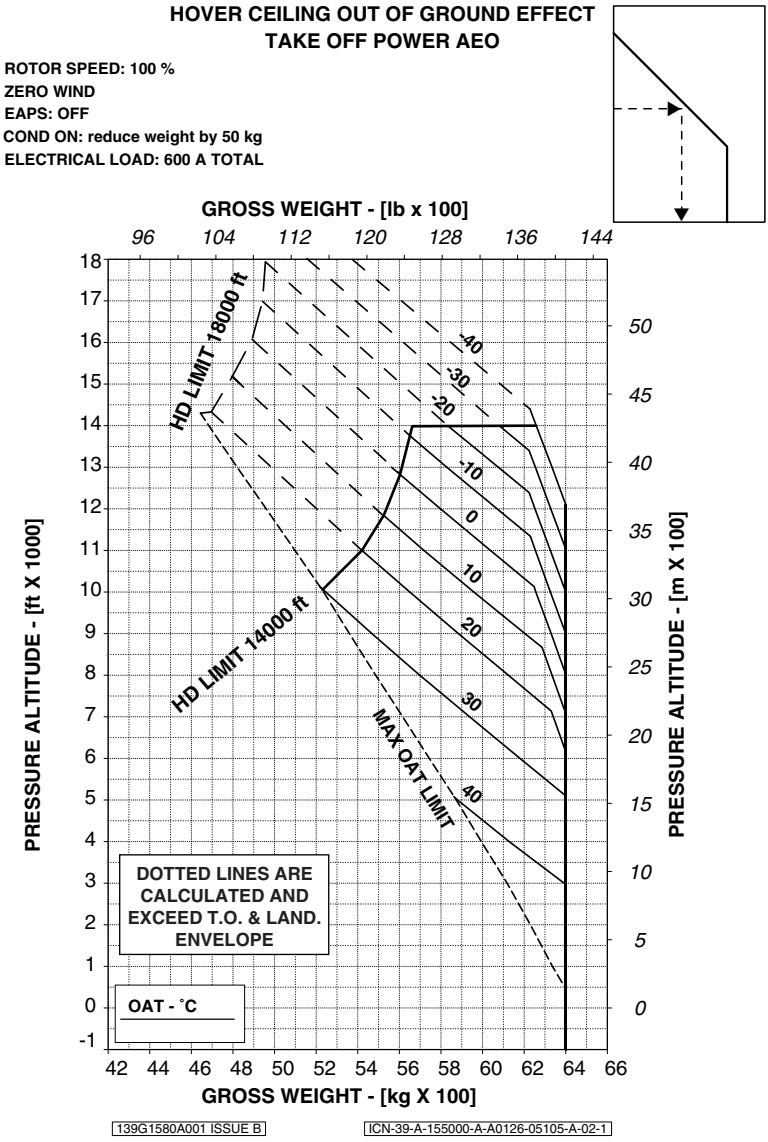

Figure 4-6 Hover Ceiling OGE TOP AEO EAPS OFF

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
EAPS: OFF
COND ON: reduce weight by 50 kg

ELECTRICAL LOAD: 600 A TOTAL

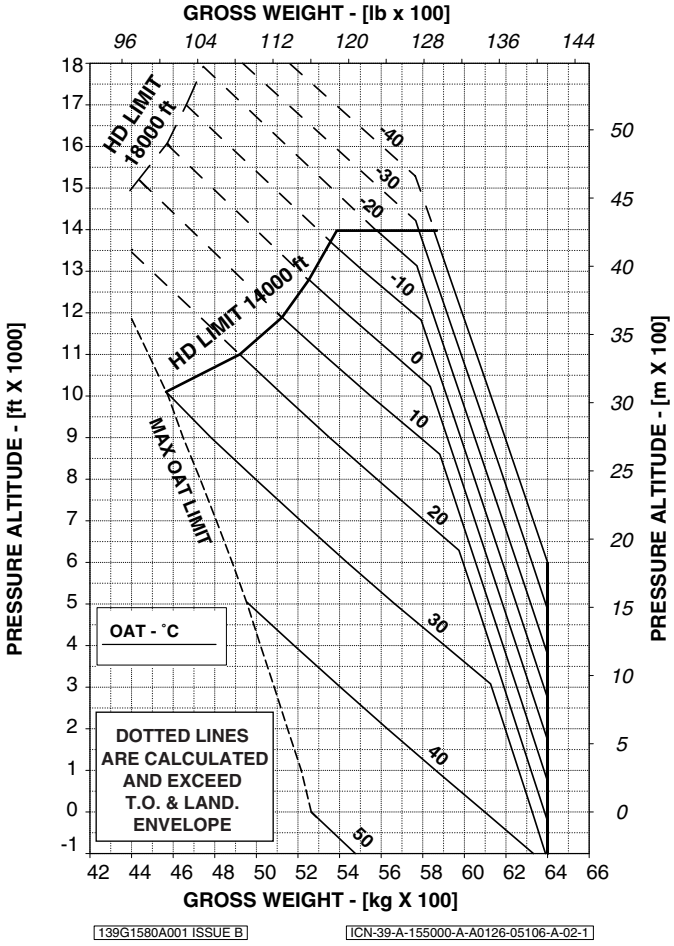

Figure 4-7 Hover Ceiling OGE MCP AEO EAPS OFF

HOVER CEILING OUT OF GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
EAPS: OFF

ELECTRICAL LOAD: 300 A

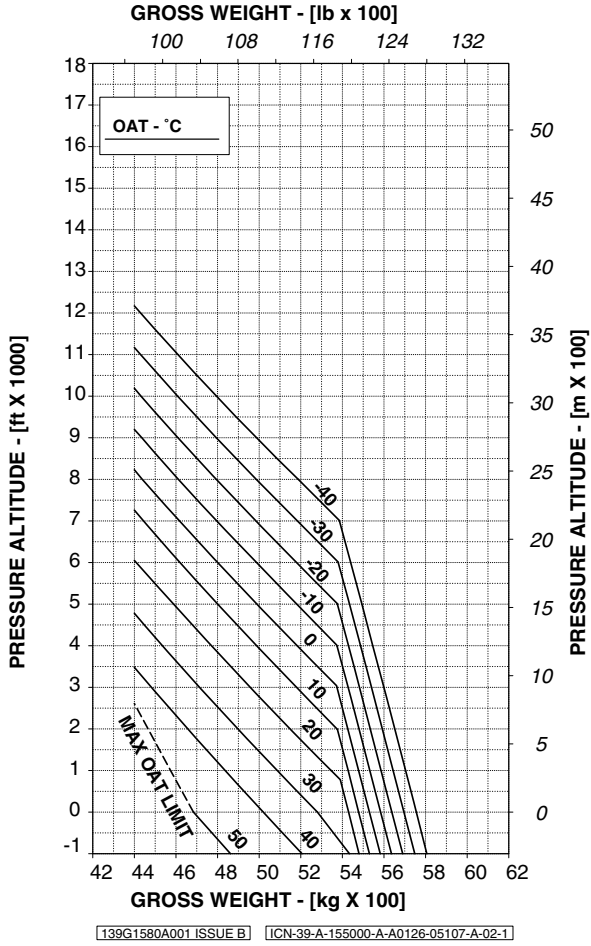

Figure 4-8 Hover Ceiling OGE 2.5min OEI EAPS OFF

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
EAPS: OFF

ELECTRICAL LOAD: 300 A

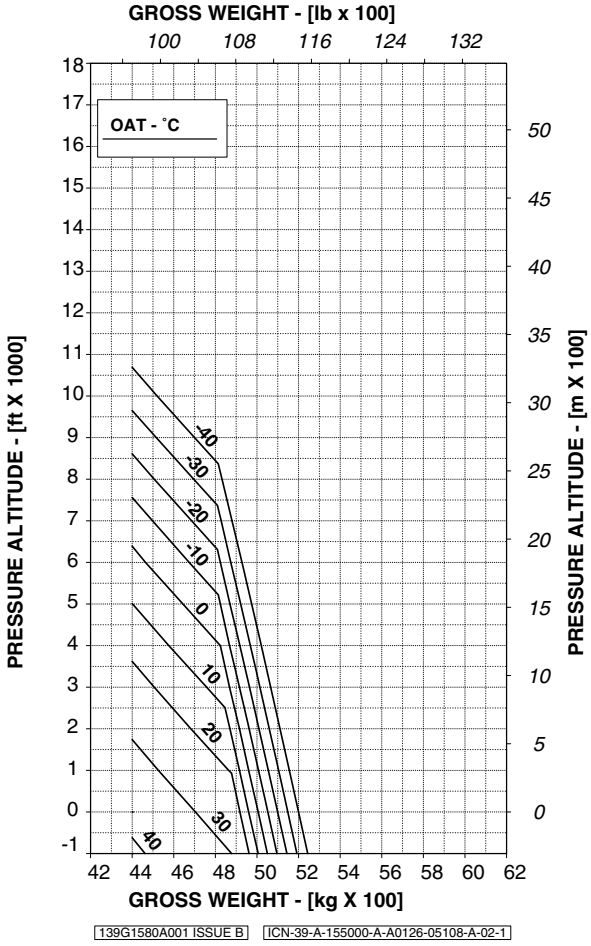

Figure 4-9 Hover Ceiling OGE MCP OEI EAPS OFF

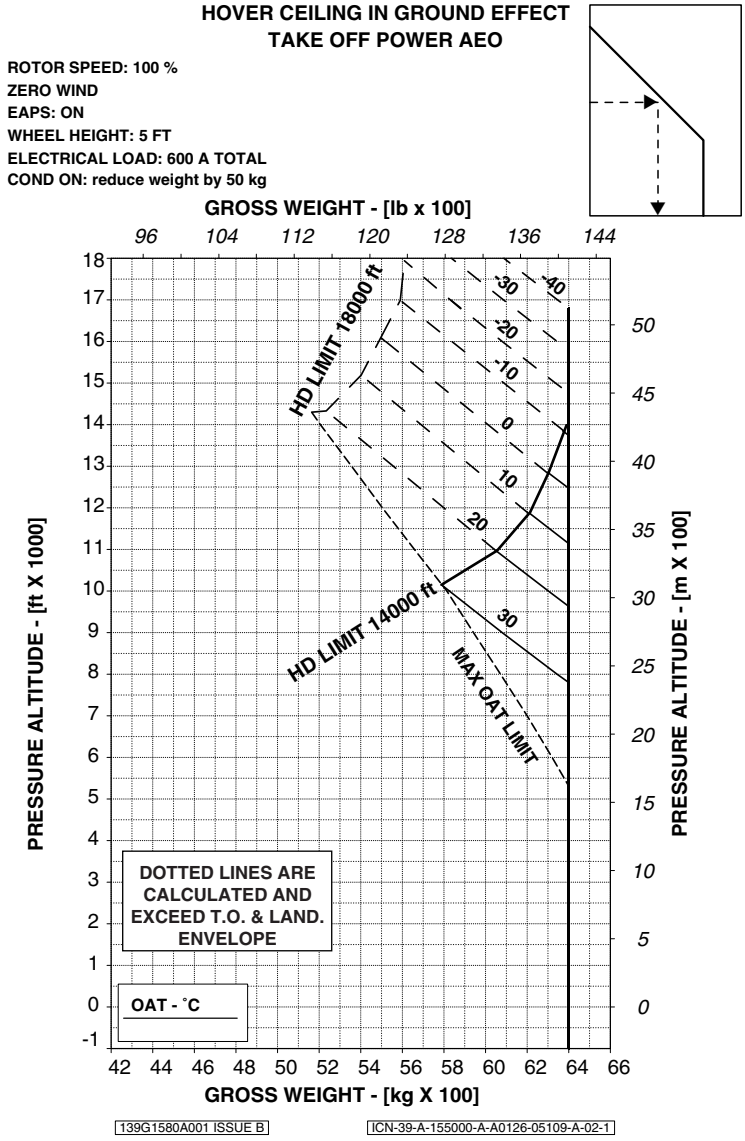

Figure 4-10 Hover Ceiling IGE TOP AEO EAPS ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
EAPS: ON
COND ON: reduce weight by 50 kg

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL

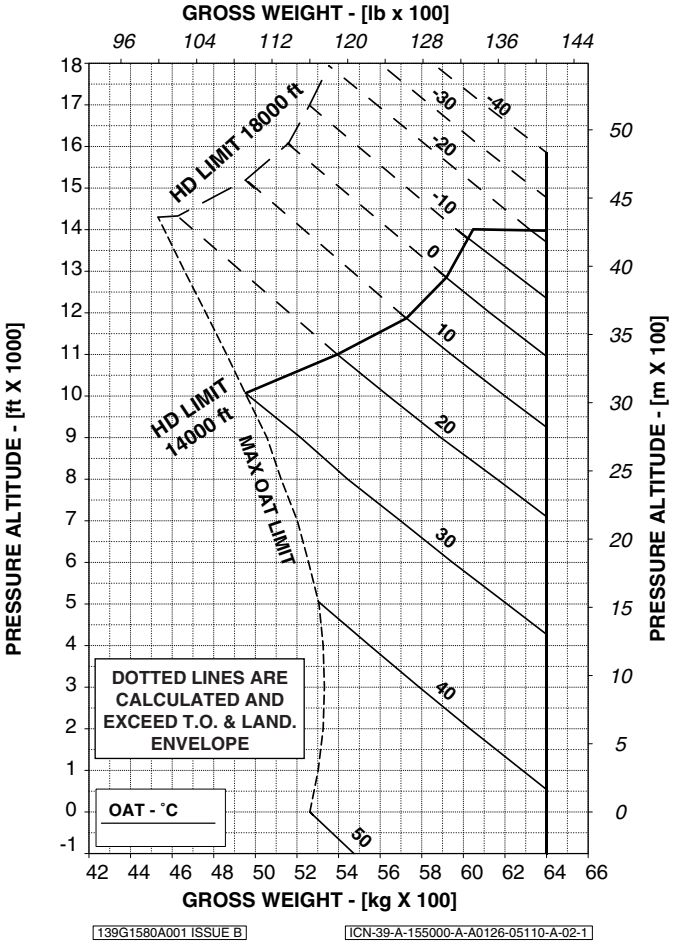

Figure 4-11 Hover Ceiling IGE MCP AEO EAPS ON

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
EAPS: ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

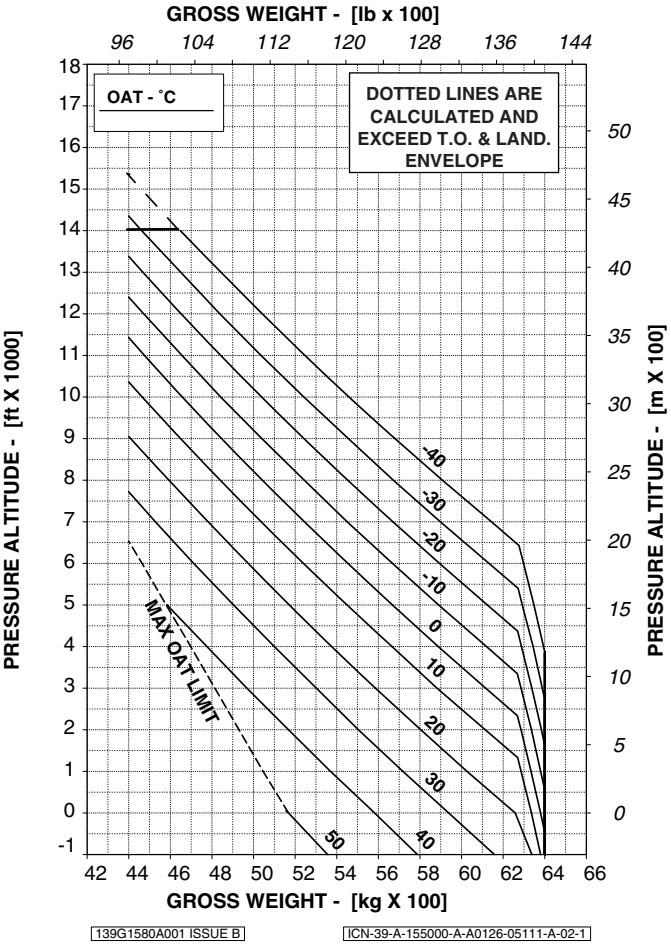

Figure 4-12 Hover Ceiling IGE 2.5min OEI EAPS ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
EAPS: ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

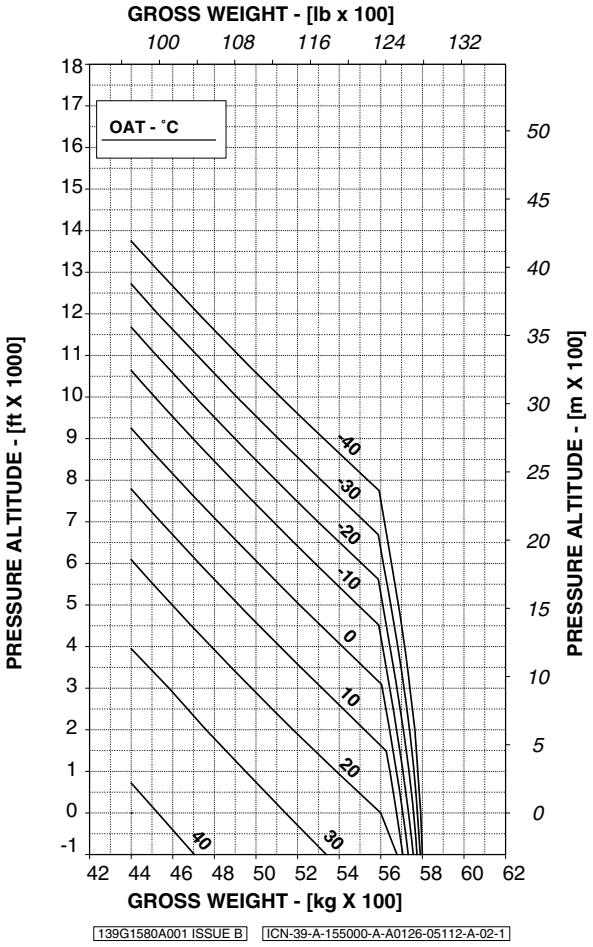

Figure 4-13 Hover Ceiling IGE MCP OEI EAPS ON

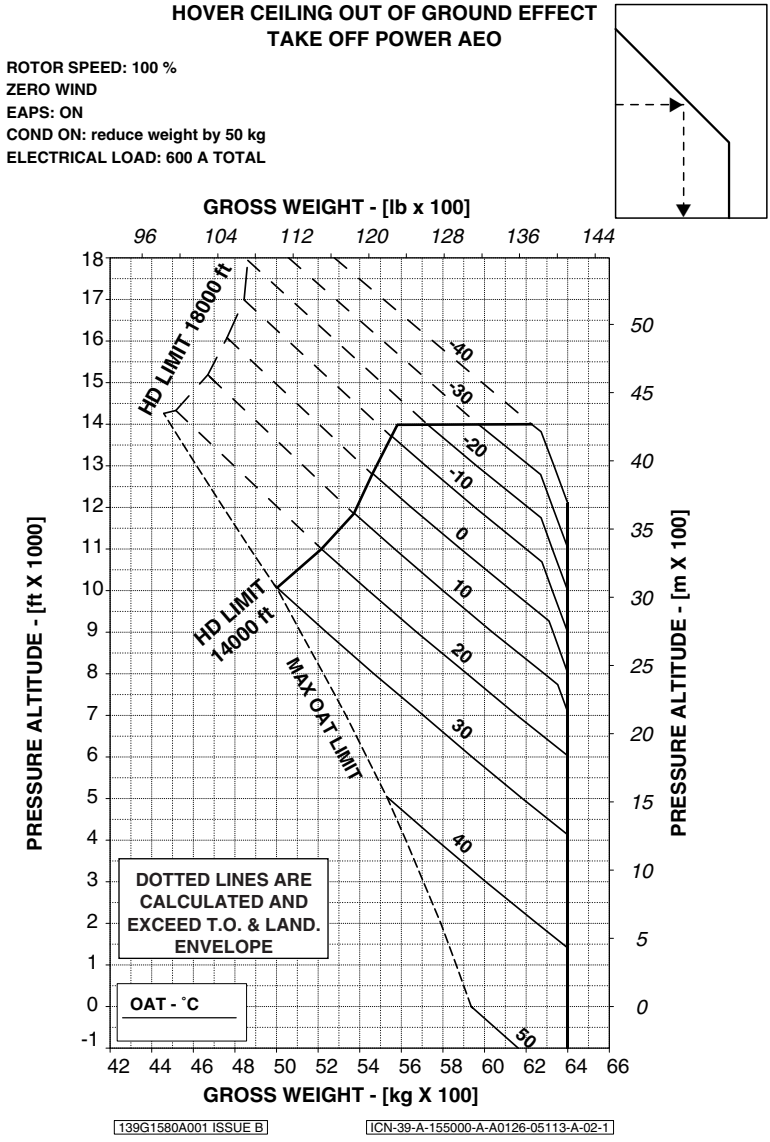

Figure 4-14 Hover Ceiling OGE TOP AEO EAPS ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
EAPS: ON
COND ON: reduce weight by 50 kg

ELECTRICAL LOAD: 600 A TOTAL

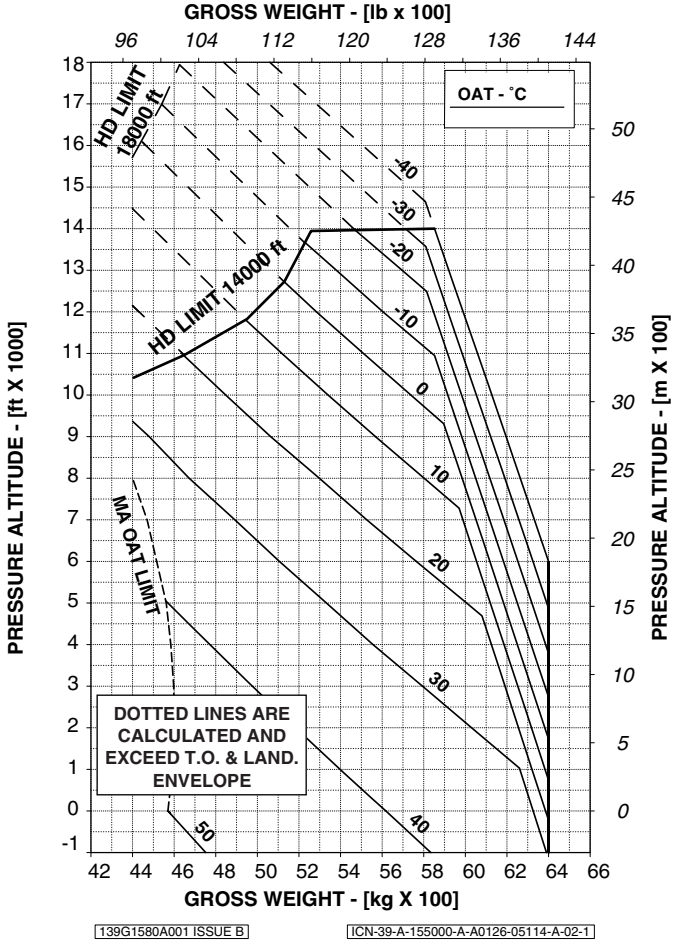

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Figure 4-15 Hover Ceiling OGE MCP AEO EAPS ON

HOVER CEILING OUT OF GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
EAPS: ON

ELECTRICAL LOAD: 300 A

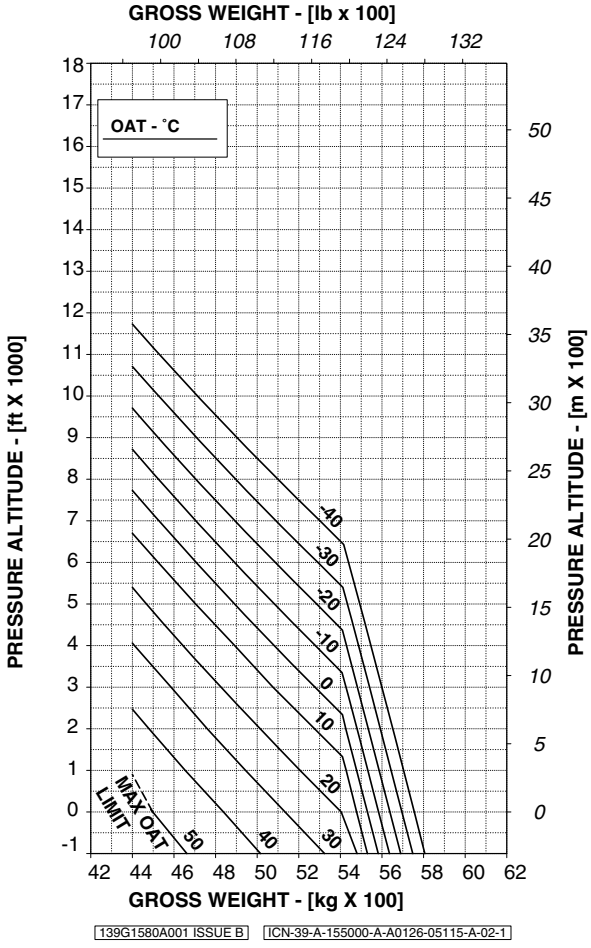

Figure 4-16 Hover Ceiling OGE 2.5min OEI EAPS ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
EAPS: ON

ELECTRICAL LOAD: 300 A

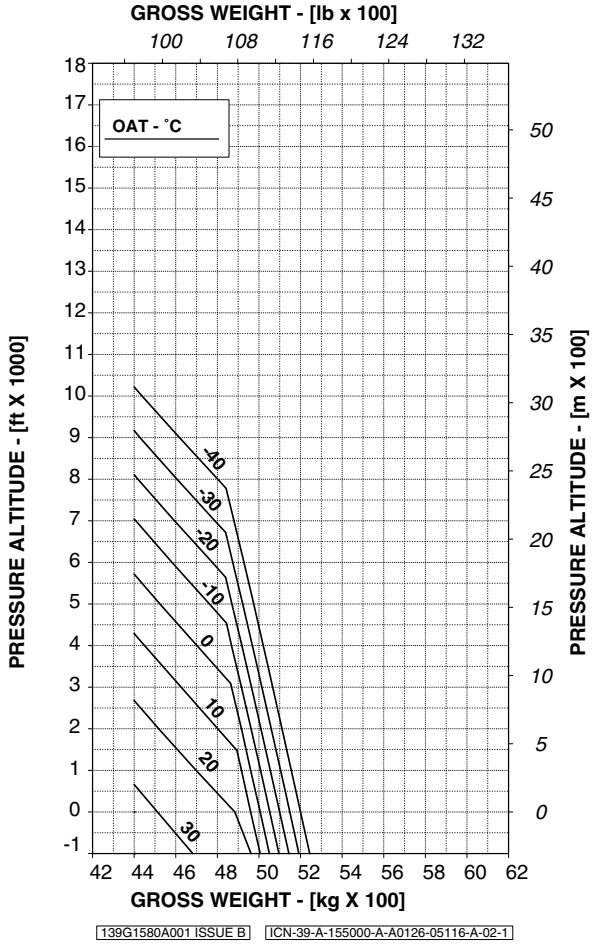

Figure 4-17 Hover Ceiling OGE MCP OEI EAPS ON

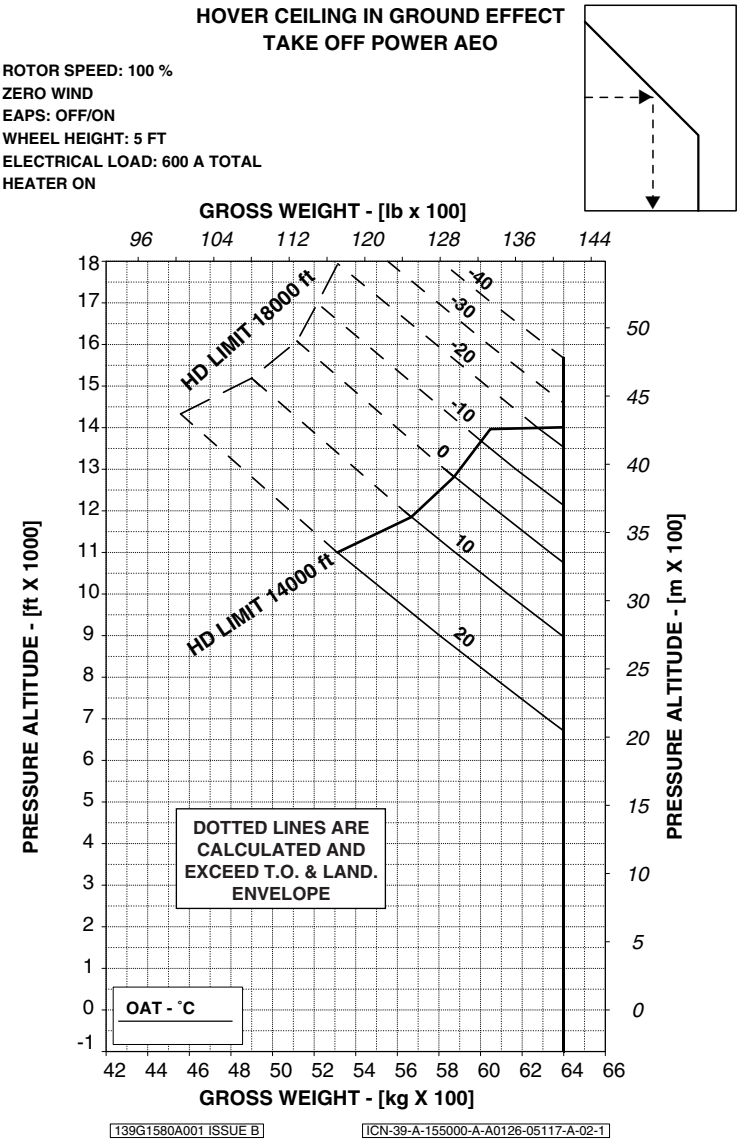

Figure 4-18 Hover Ceiling IGE TOP AEO EAPS OFF/ON Heater ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
EAPS: OFF/ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

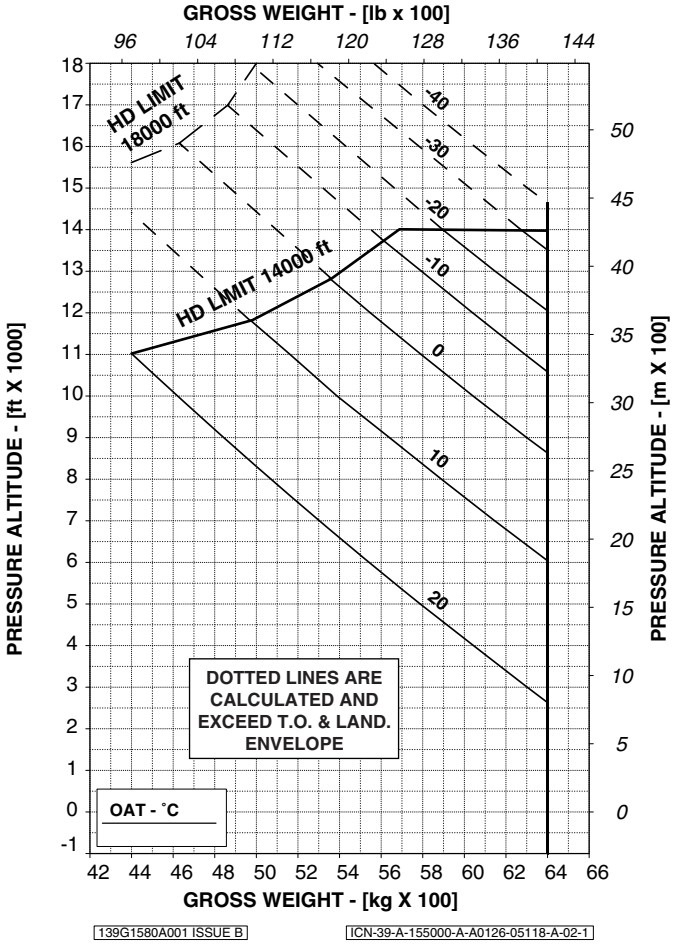

Figure 4-19 Hover Ceiling IGE MCP AEO EAPS OFF/ON Heater ON

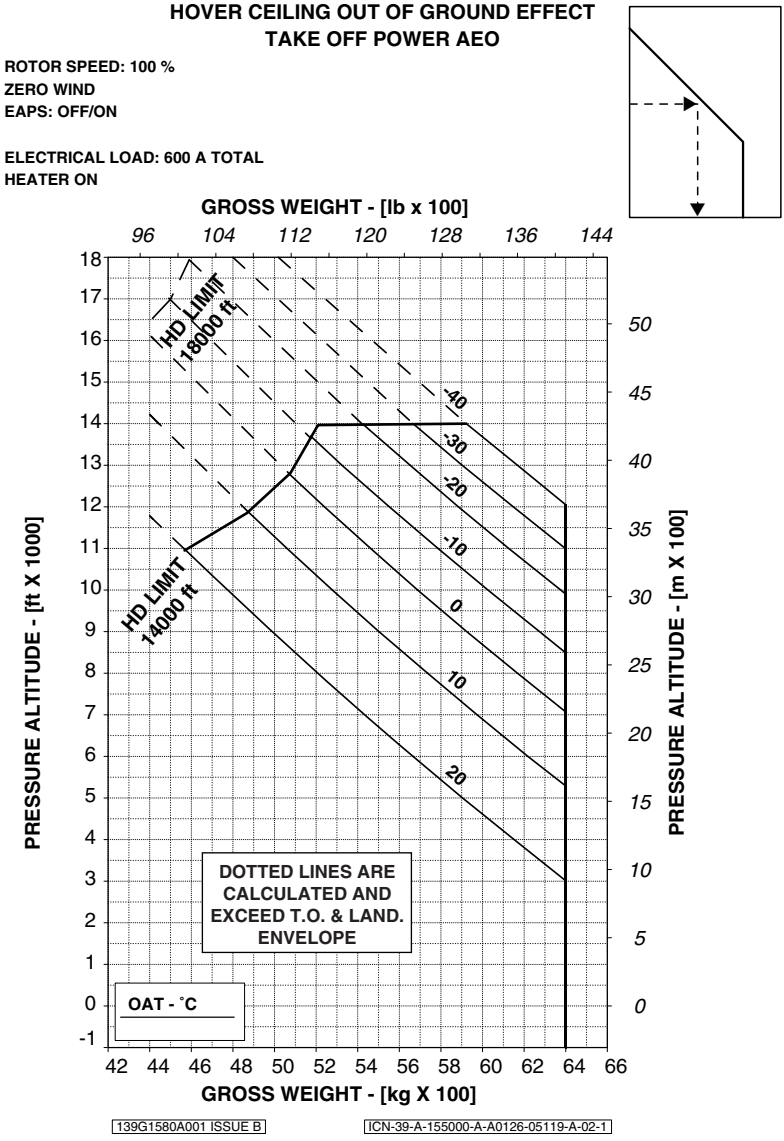

Figure 4-20 Hover Ceiling OGE TOP AEO EAPS OFF/ON Heater ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

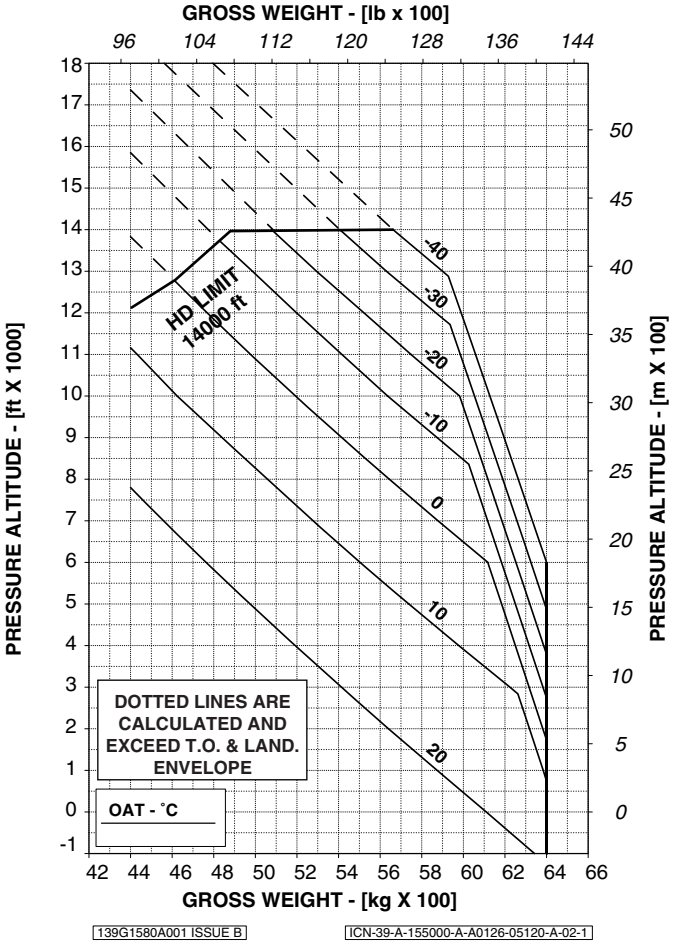

Figure 4-21 Hover Ceiling OGE MCP AEO EAPS OFF/ON Heater ON

RATE OF CLIMB

The effect of the EAPS on Rate of Climb performance is given for All Engines Operating (AEO) case and for the One Engine Inoperative (OEI) case. For the AEO case, rate of climb is given with the engines operating at the Maximum Continuous Power (MCP) and at Take Off Power with EAPS OFF and ON and with HEATER ON.

For the OEI case, Rate of Climb with EAPS OFF and ON is given with the engines operating at the Maximum Continuous Power (MCP) and 2.5 min rating limit.

The performance effect on EAPS OFF or ON ROC charts with COND ON is as follows:

Rate of Climb .....reduce by 50 ft/min

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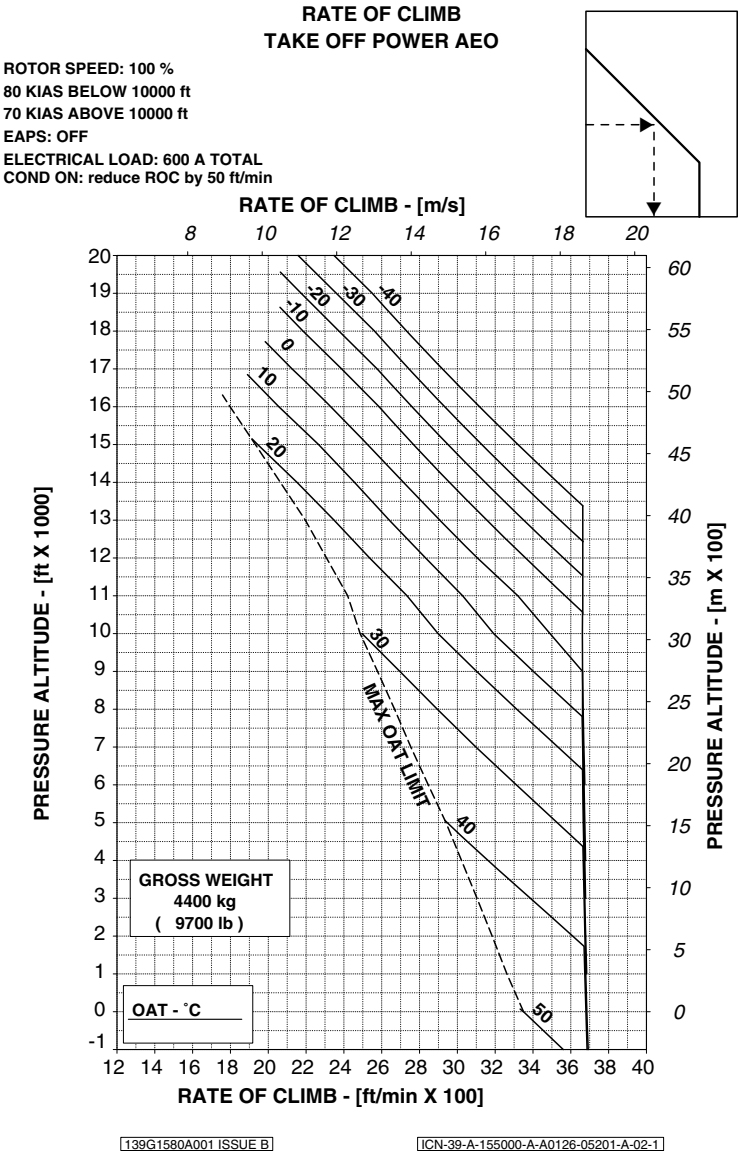

Figure 4-22 ROC TOP AEO Gross Weight 4400 kg EAPS OFF

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

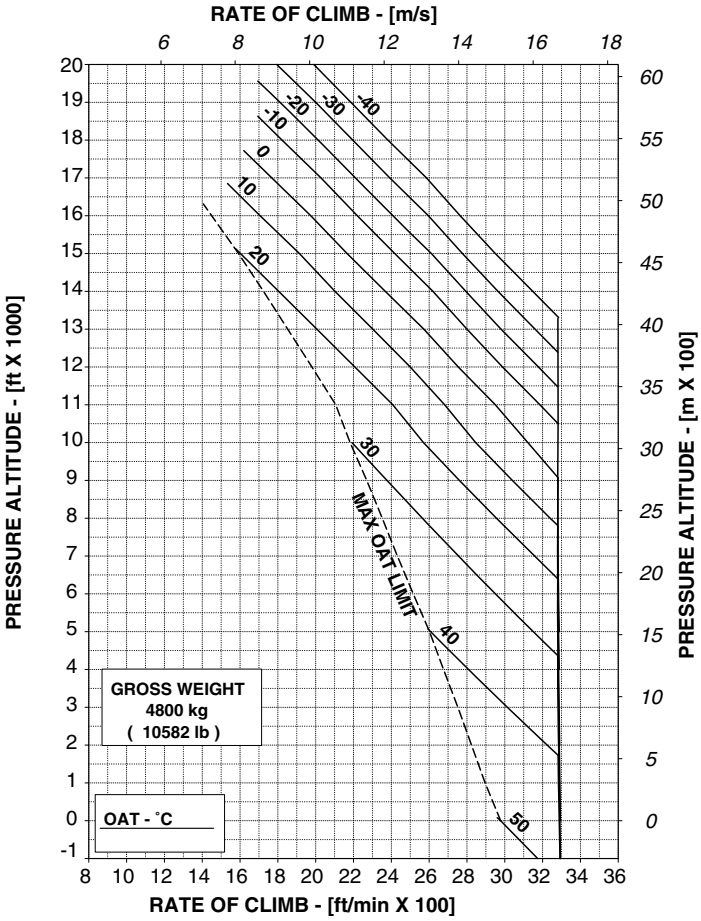

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Figure 4-23 ROC TOP AEO Gross Weight 4800 kg EAPS OFF

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

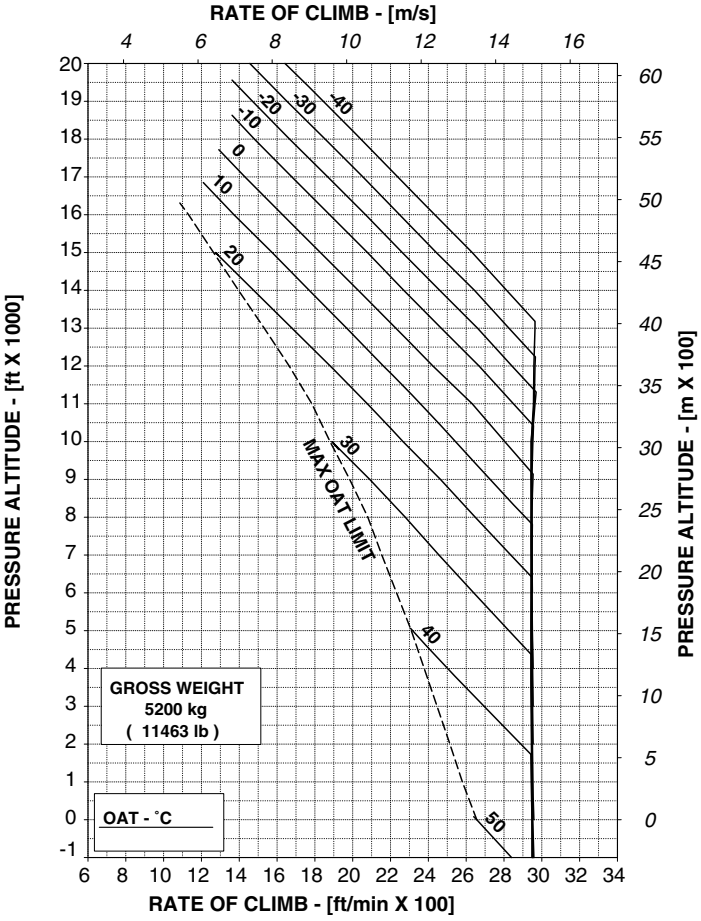

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Figure 4-24 ROC TOP AEO Gross Weight 5200 kg EAPS OFF

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

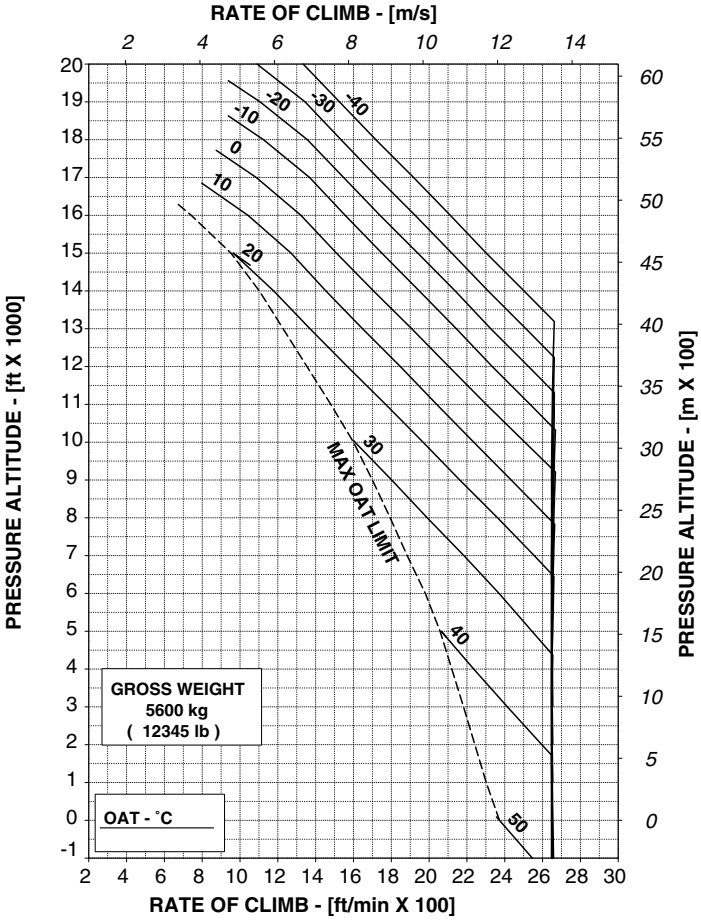

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Figure 4-25 ROC TOP AEO Gross Weight 5600 kg EAPS OFF

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

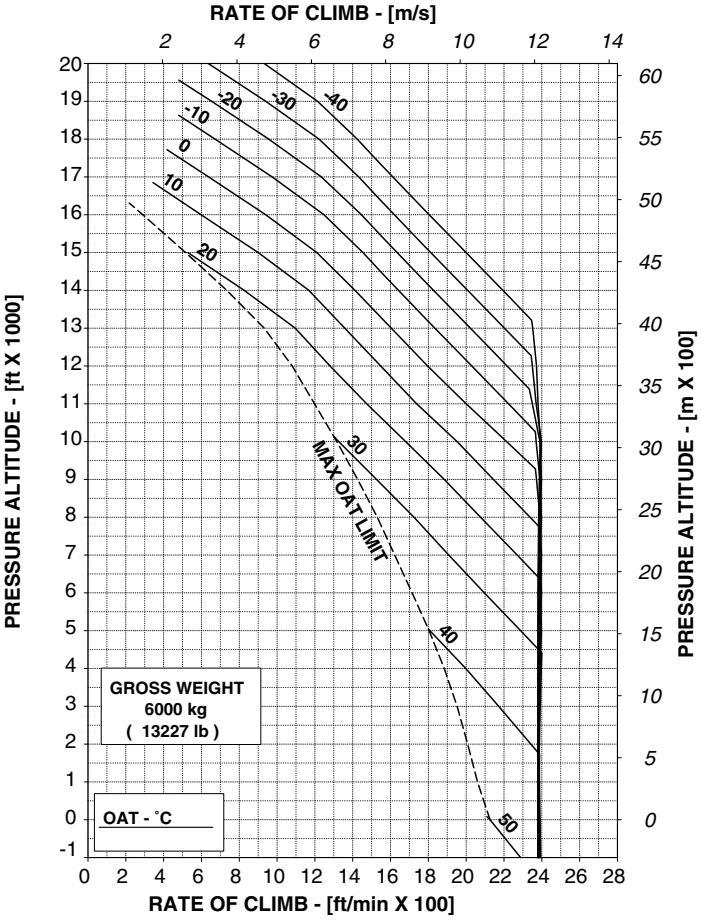

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Figure 4-26 ROC TOP AEO Gross Weight 6000 kg EAPS OFF

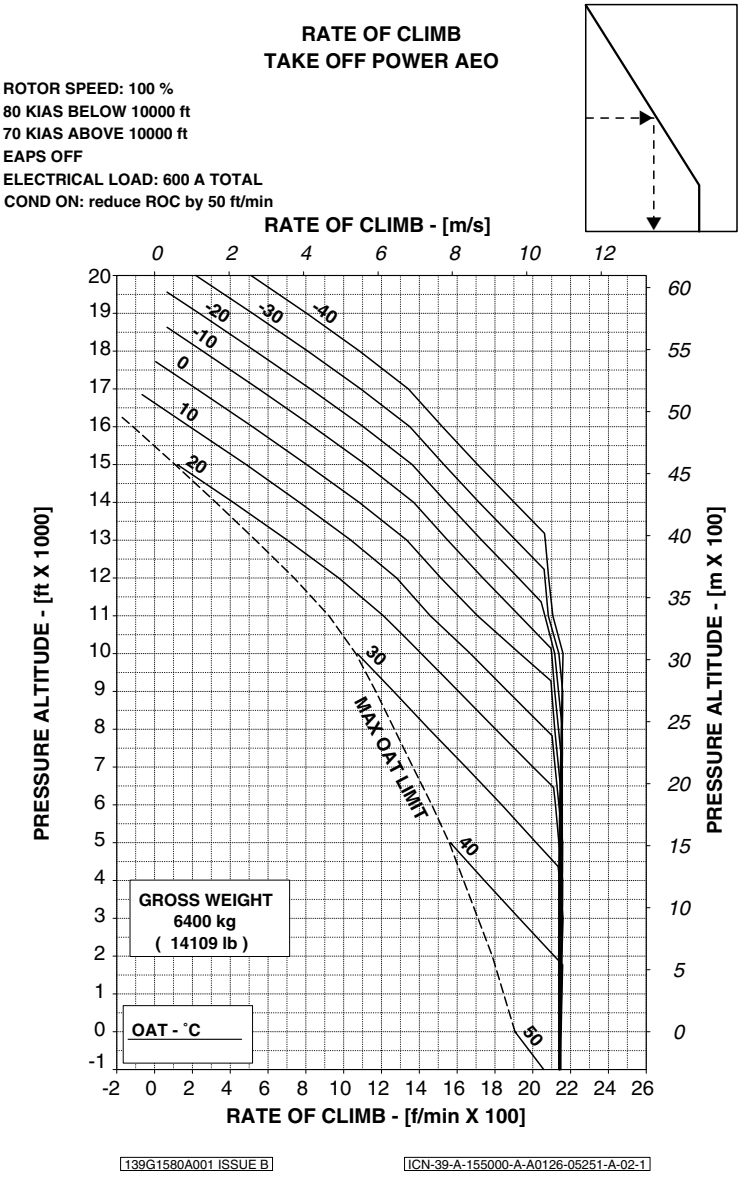

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Figure 4-27 ROC TOP AEO Gross Weight 6400 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

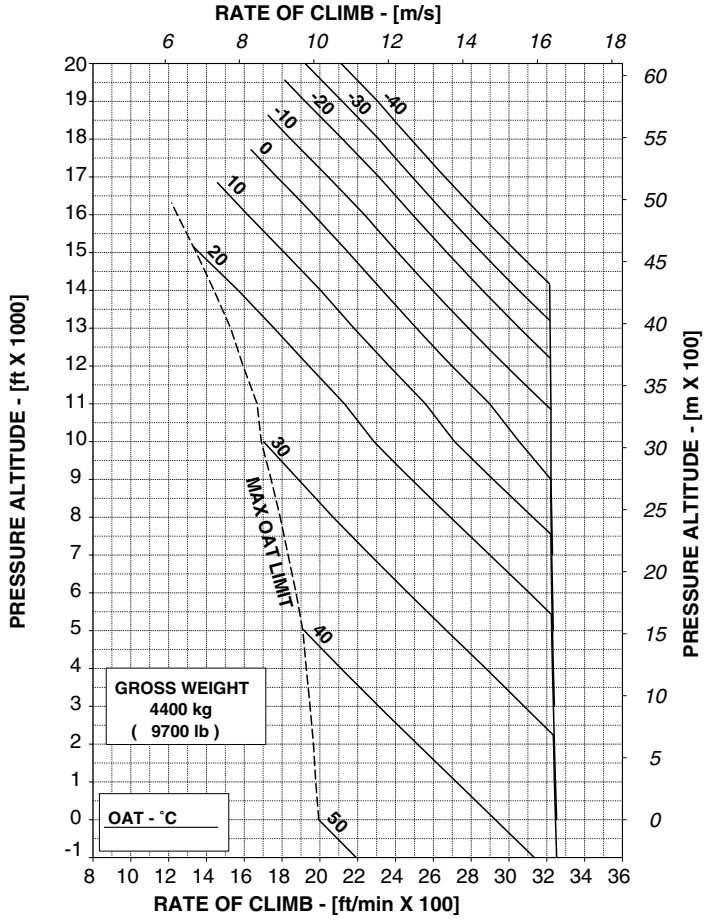

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Figure 4-28 ROC MCP AEO Gross Weight 4400 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

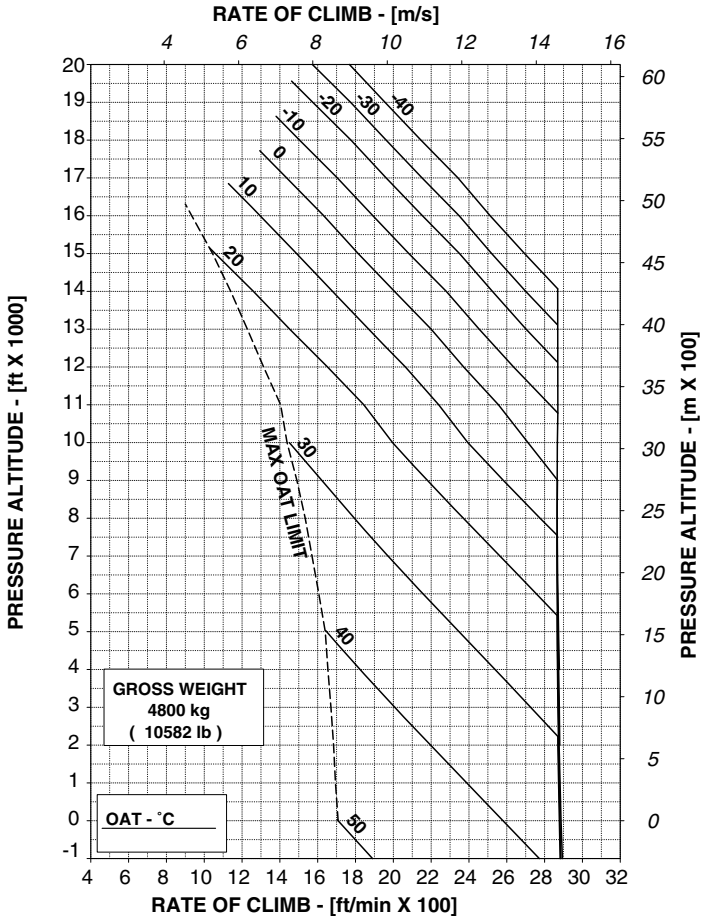

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Figure 4-29 ROC MCP AEO Gross Weight 4800 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

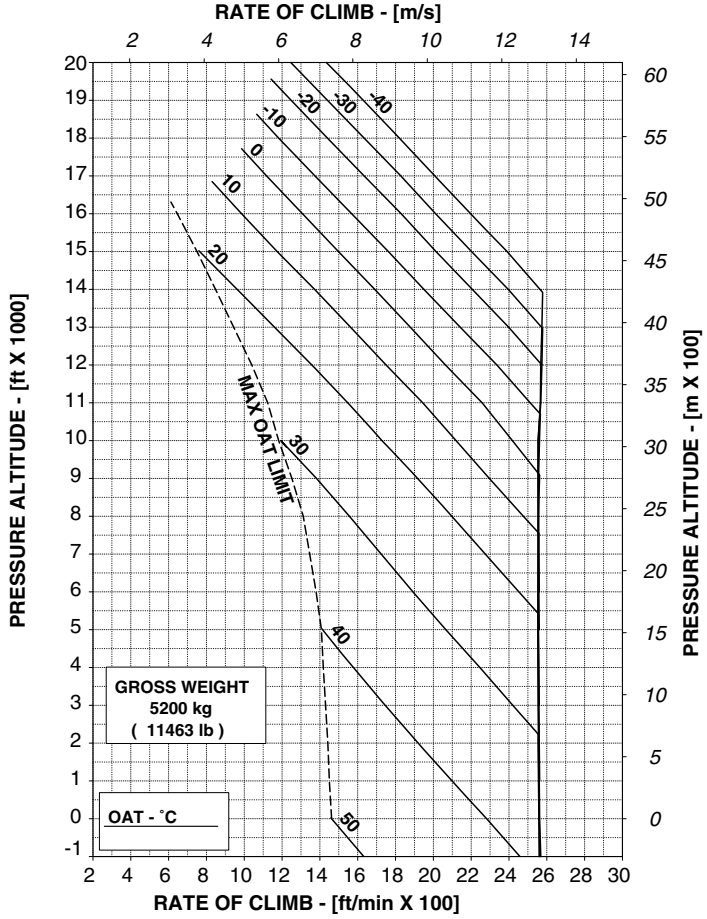

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Figure 4-30 ROC MCP AEO Gross Weight 5200 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

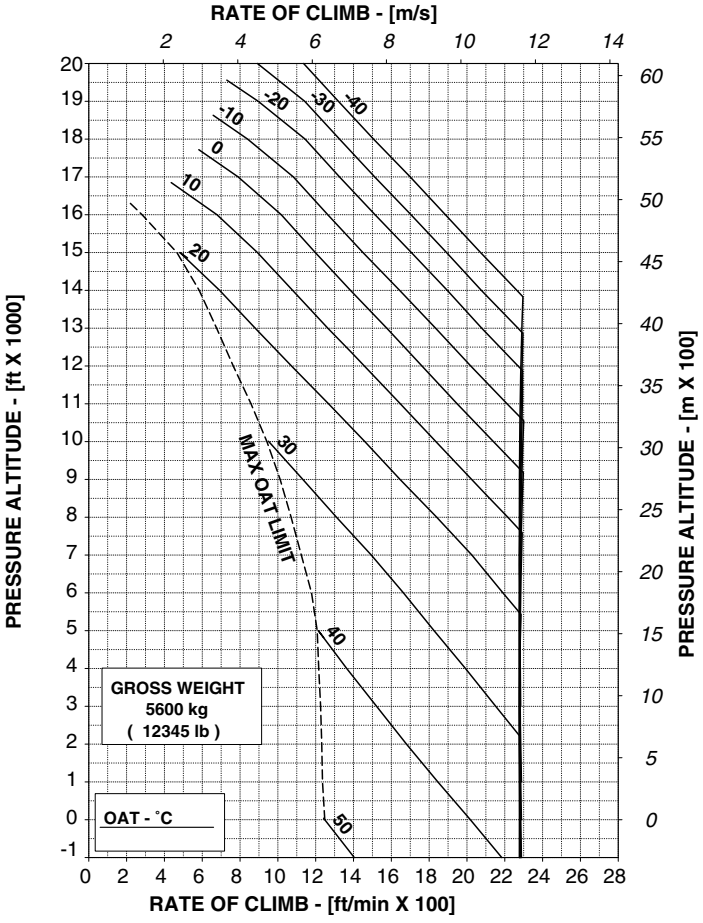

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Figure 4-31 ROC MCP AEO Gross Weight 5600 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL

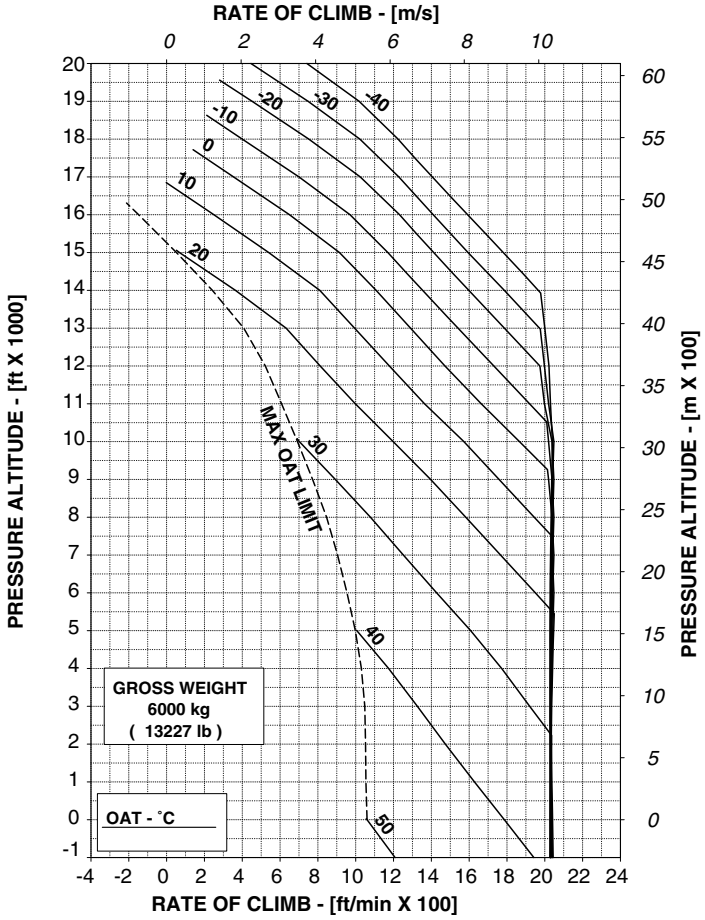

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Figure 4-32 ROC MCP AEO Gross Weight 6000 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS OFF
ELECTRICAL LOAD: 600 A TOTAL

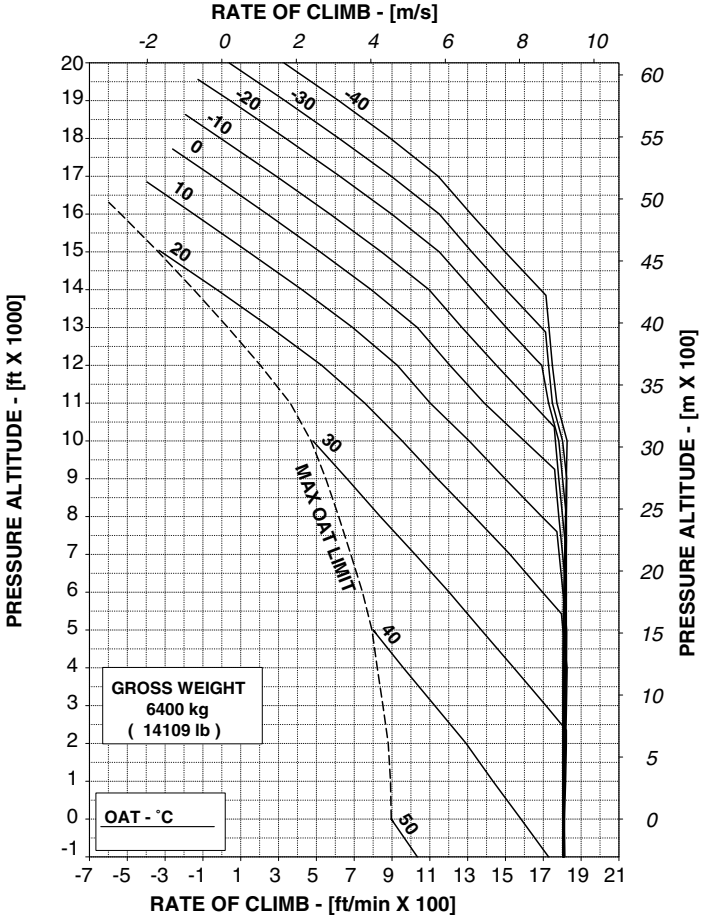

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Figure 4-33 ROC MCP AEO Gross Weight 6400 kg EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

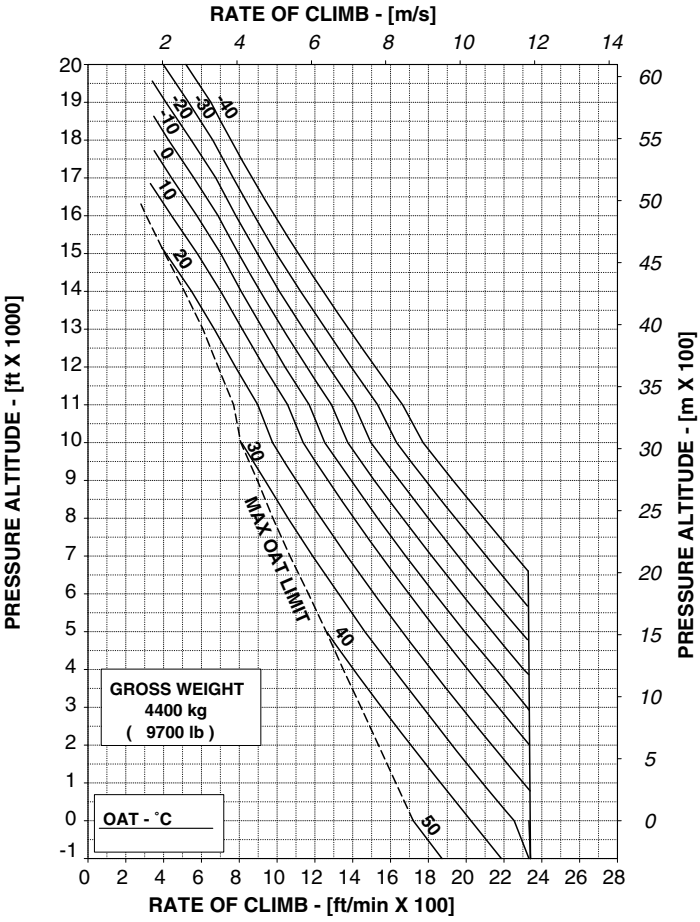

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Figure 4-34 ROC 2.5min OEI Gross Weight 4400 kg EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

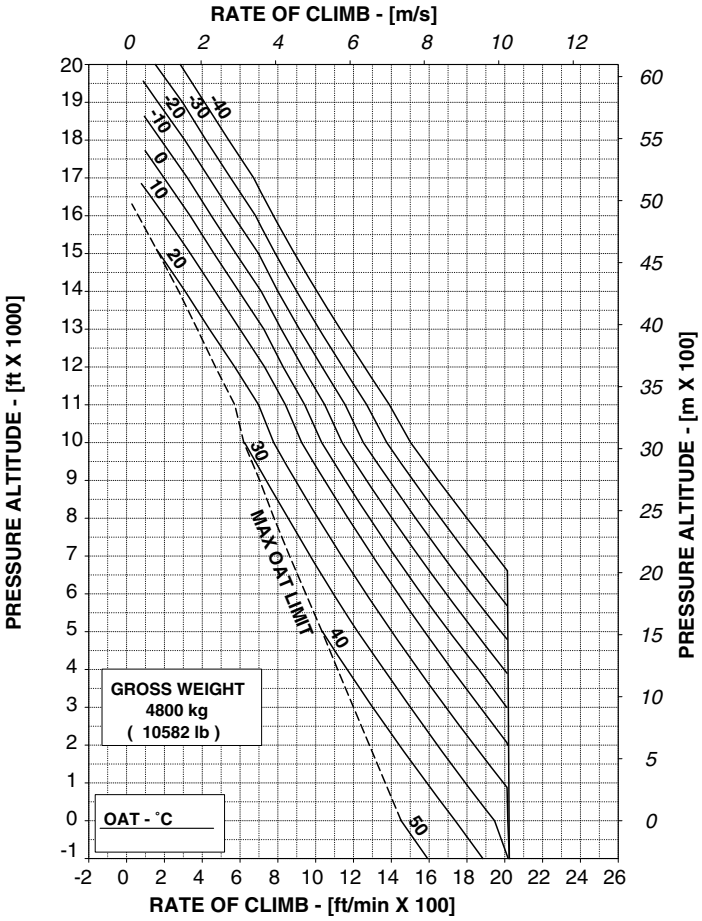

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Figure 4-35 ROC 2.5min OEI Gross Weight 4800 kg EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

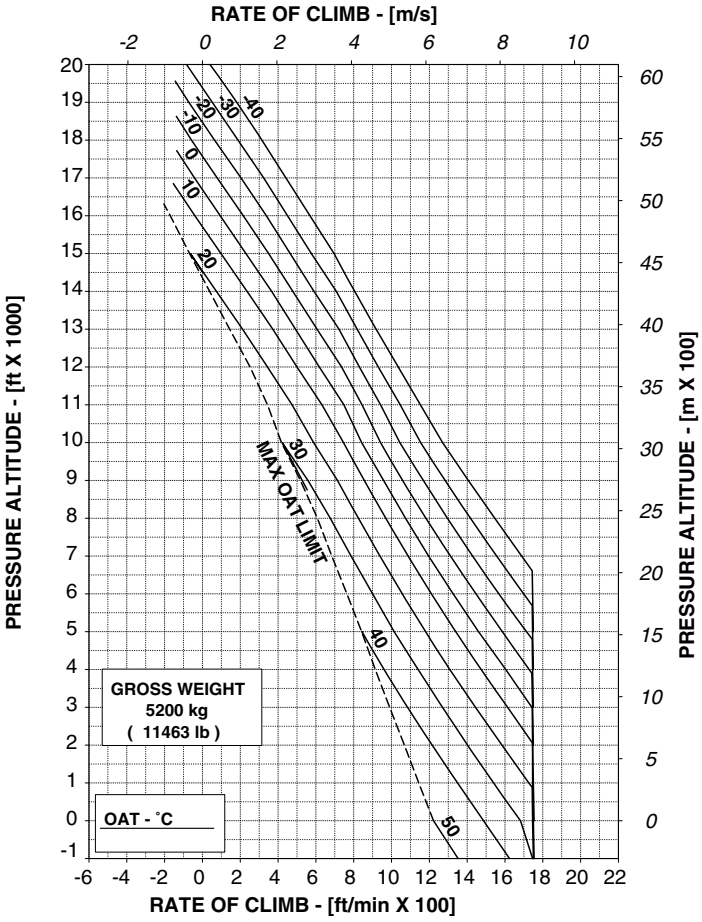

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Figure 4-36 ROC 2.5min OEI Gross Weight 5200 kg EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

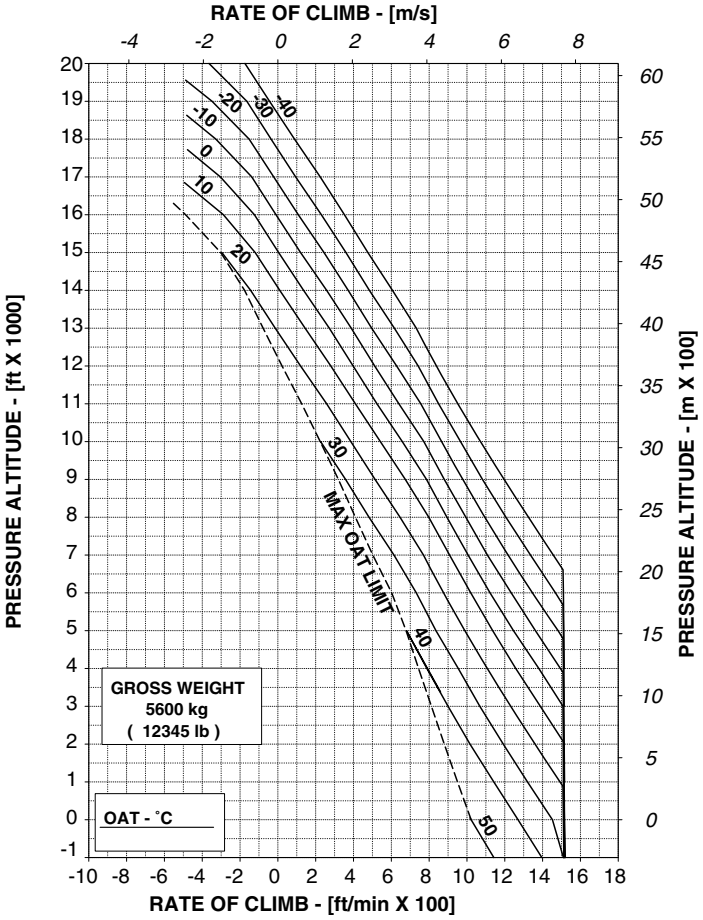

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Figure 4-37 ROC 2.5min OEI Gross Weight 5600 kg EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

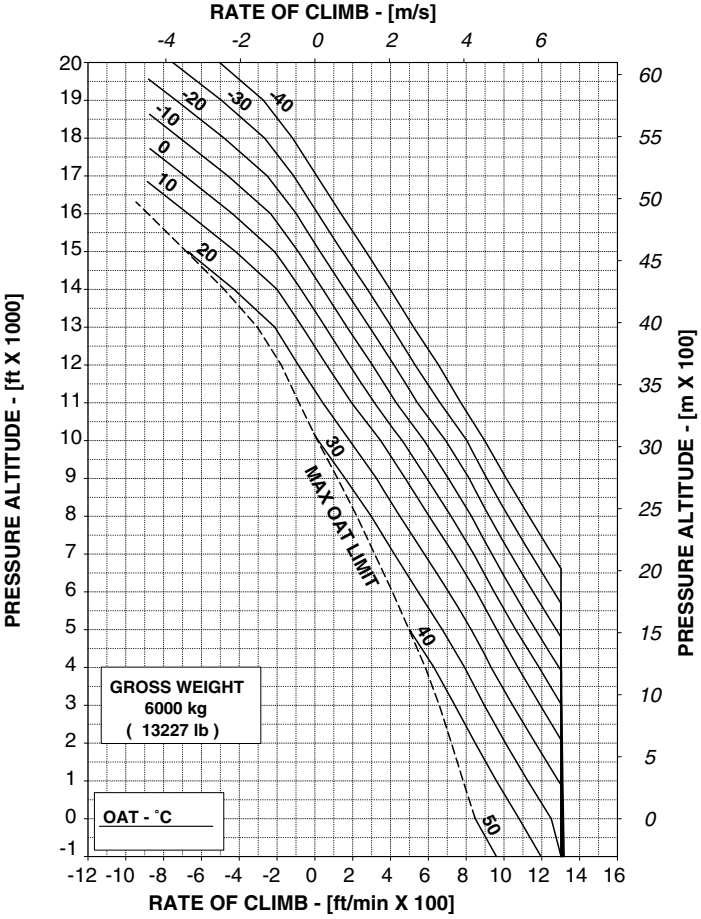

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Figure 4-38 ROC 2.5min OEI Gross Weight 6000 kg EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS OFF
ELECTRICAL LOAD: 300 A

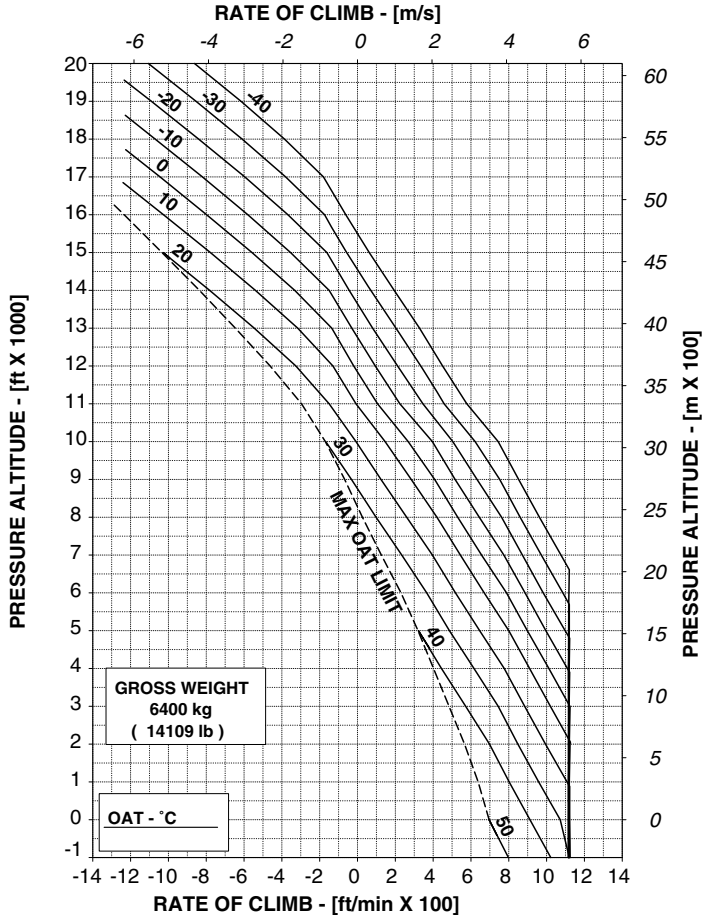

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Figure 4-39 ROC 2.5min OEI Gross Weight 6400 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

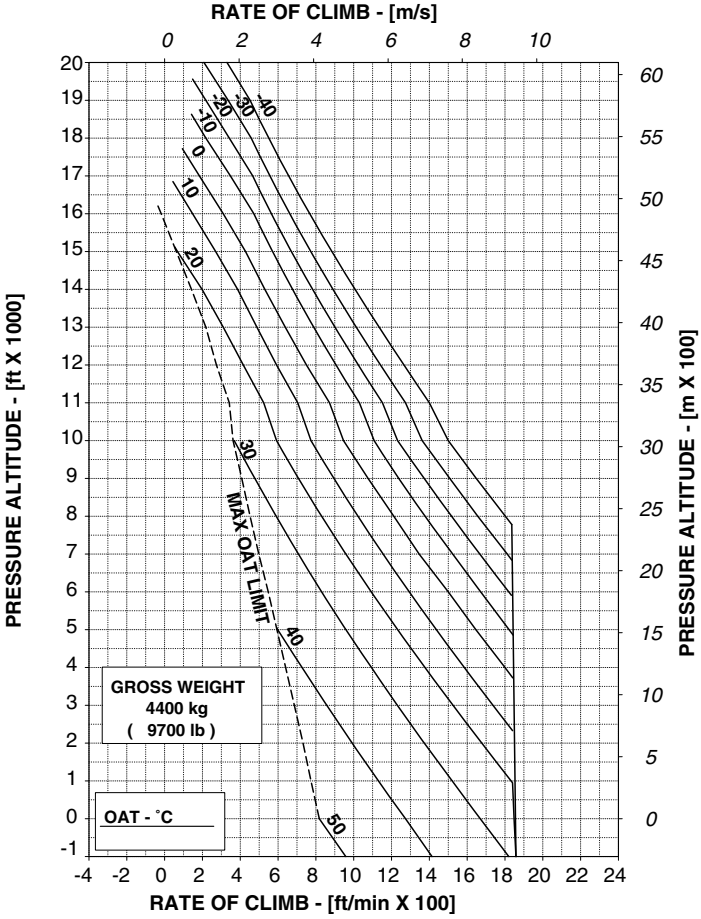

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Figure 4-40 ROC MCP OEI Gross Weight 4400 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

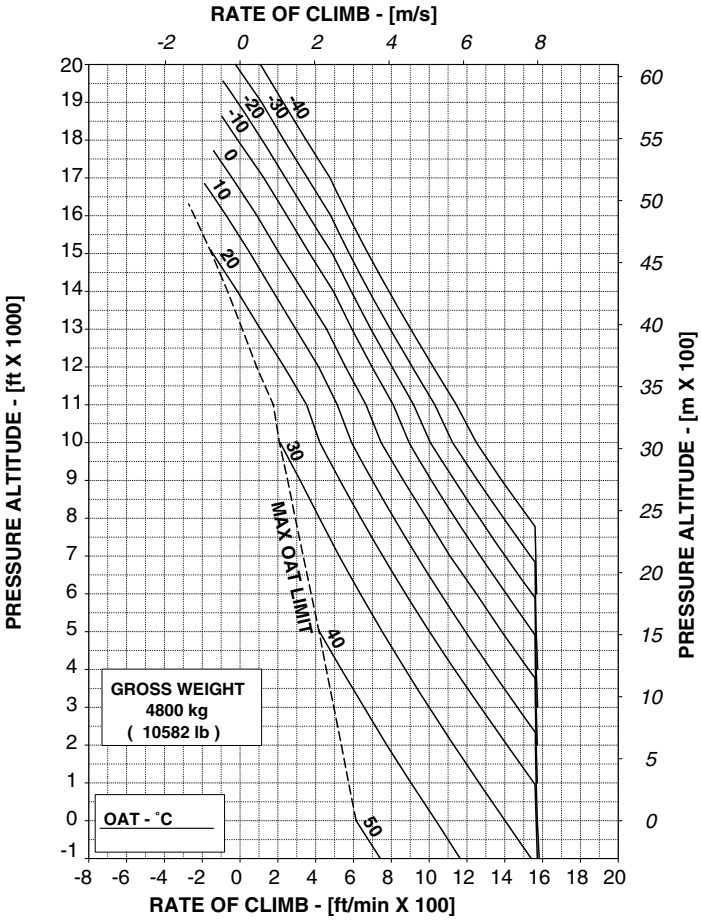

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Figure 4-41 ROC MCP OEI Gross Weight 4800 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

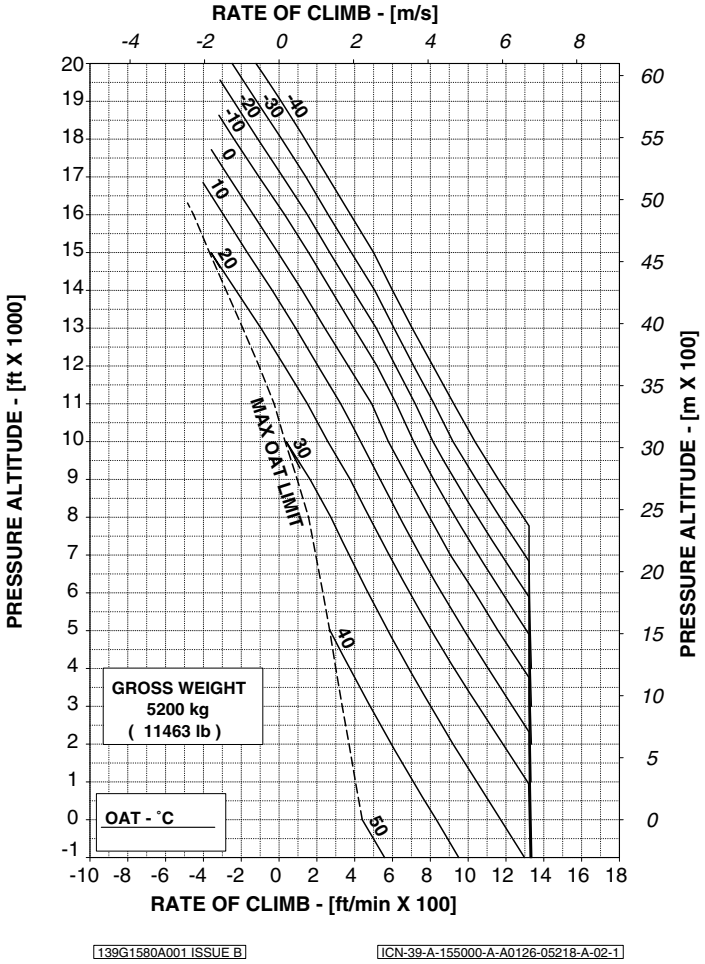

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Figure 4-42 ROC MCP OEI Gross Weight 5200 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

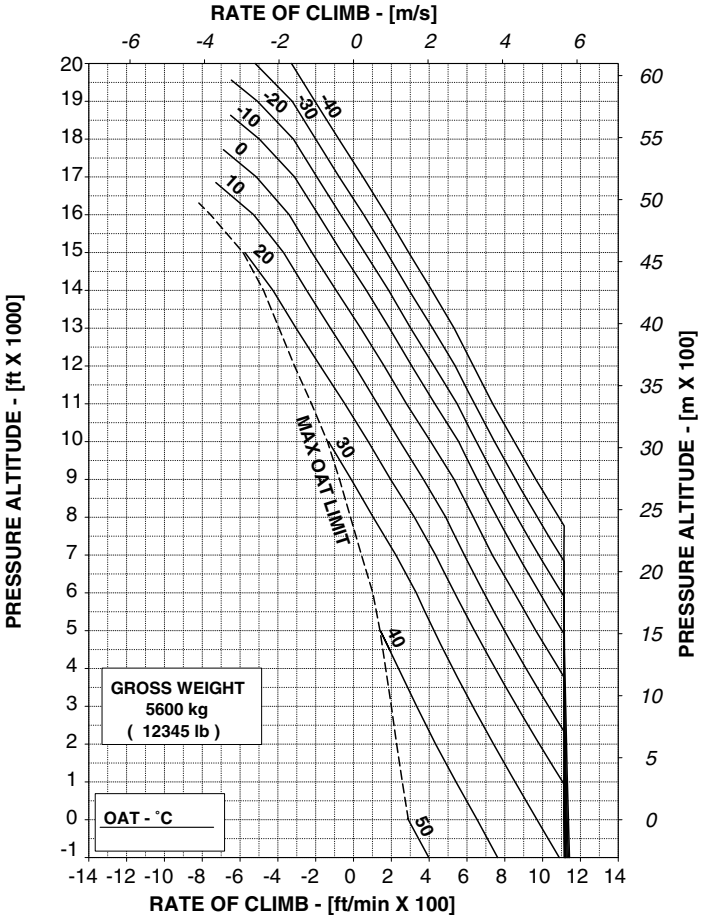

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Figure 4-43 ROC MCP OEI Gross Weight 5600 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF
ELECTRICAL LOAD: 300 A

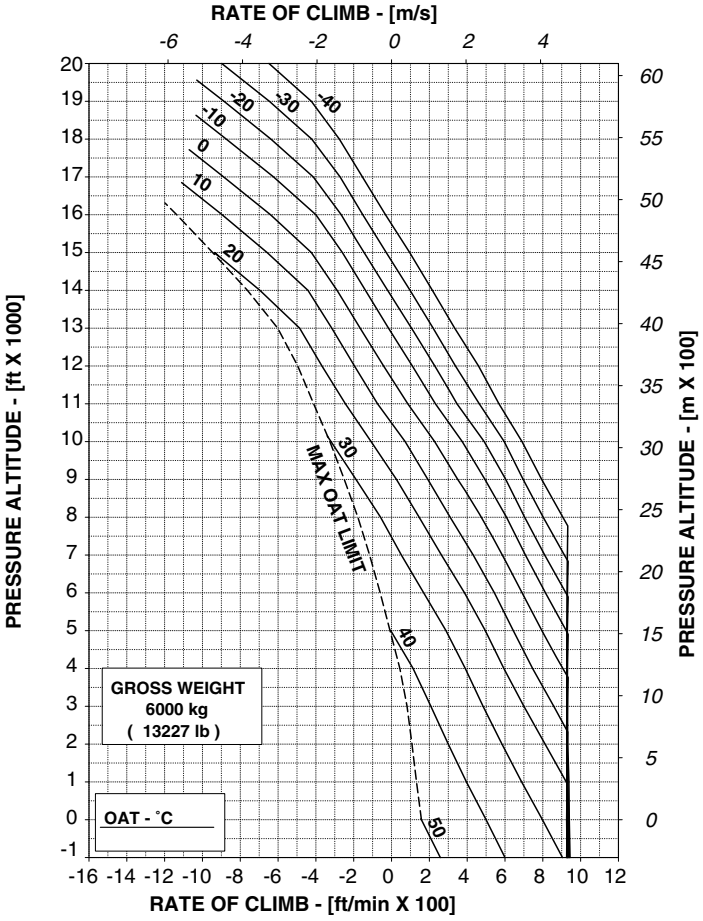

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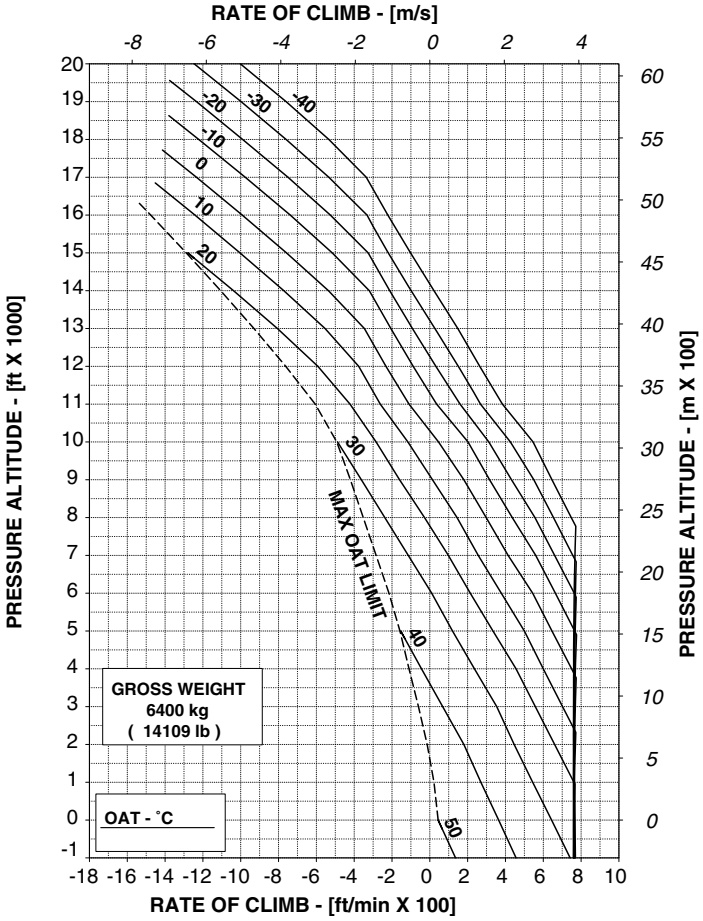
Figure 4-44 ROC MCP OEI Gross Weight 6000 kg EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

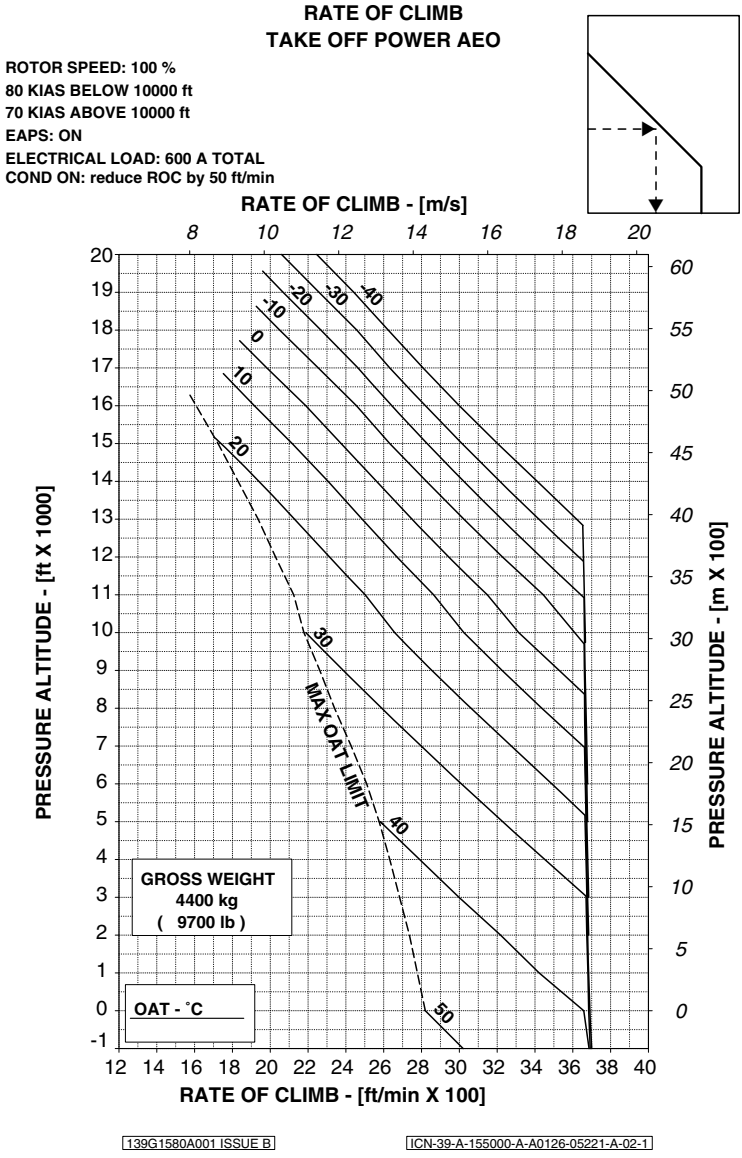
EAPS OFF
ELECTRICAL LOAD: 300 A



139G1580A001 ISSUE B

ICN-39-A-155000-A-A0126-05254-A-02-1

Figure 4-45 ROC MCP OEI Gross Weight 6400 kg EAPS OFF



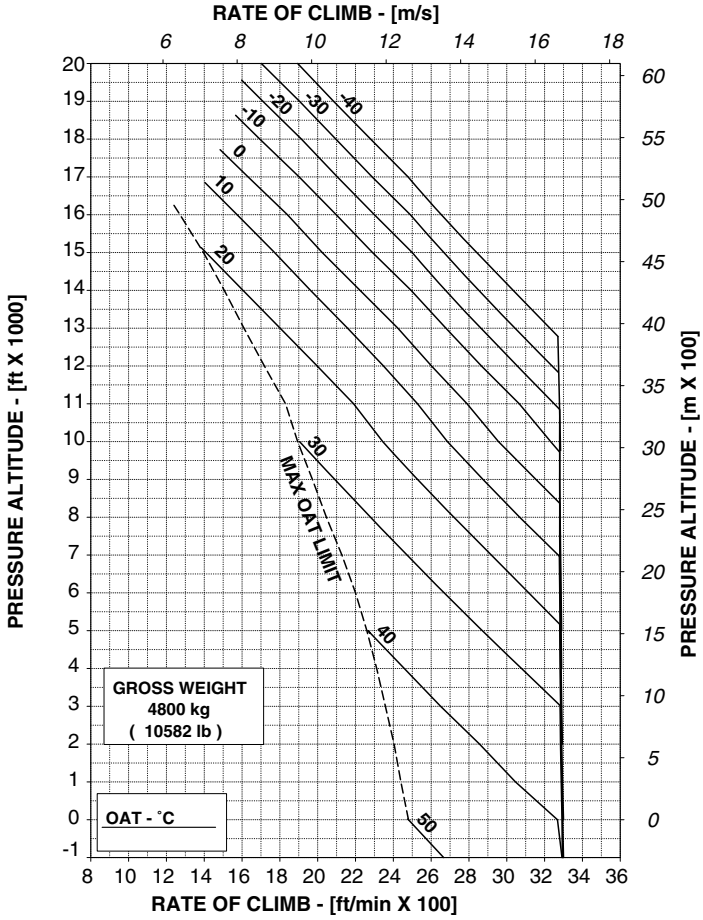
139G1580A001 ISSUE B ICN-39-A-155000-A-A0126-05221-A-02-1

Figure 4-46 ROC TOP AEO Gross Weight 4400 kg EAPS ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



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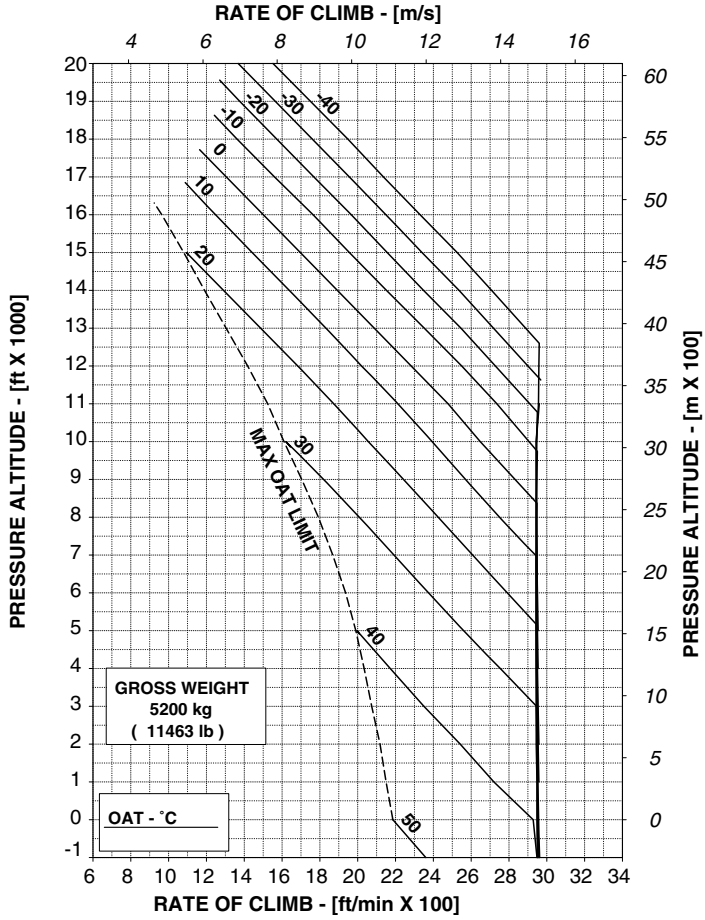
ICN-39-A-155000-A-A0126-05222-A-02-1

Figure 4-47 ROC TOP AEO Gross Weight 4800 kg EAPS ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



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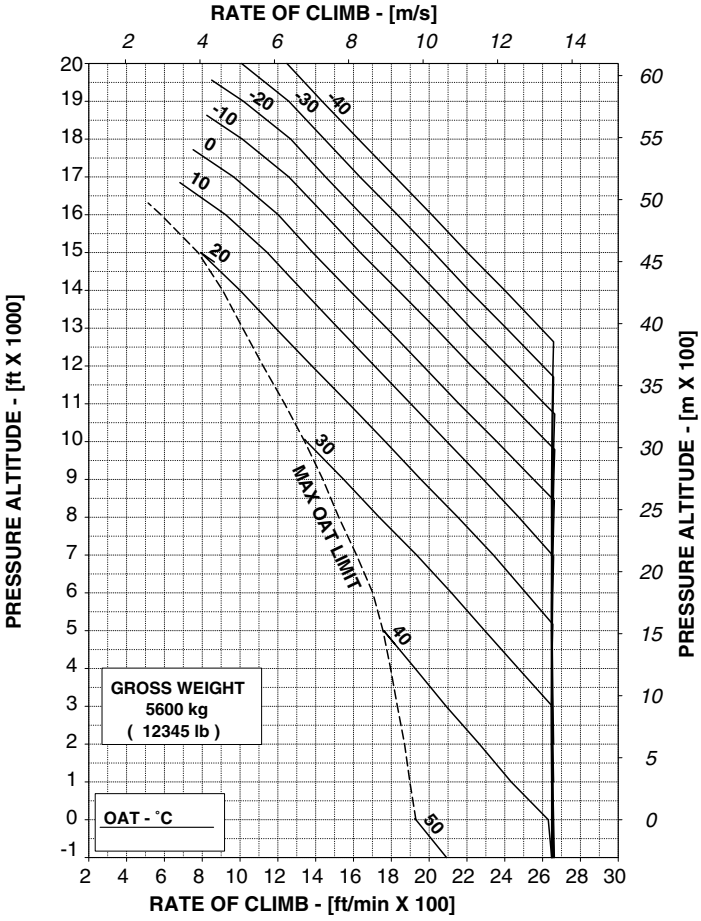
ICN-39-A-155000-A-A0126-05223-A-02-1

Figure 4-48 ROC TOP AEO Gross Weight 5200 kg EAPS ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



139G1580A001 ISSUE B

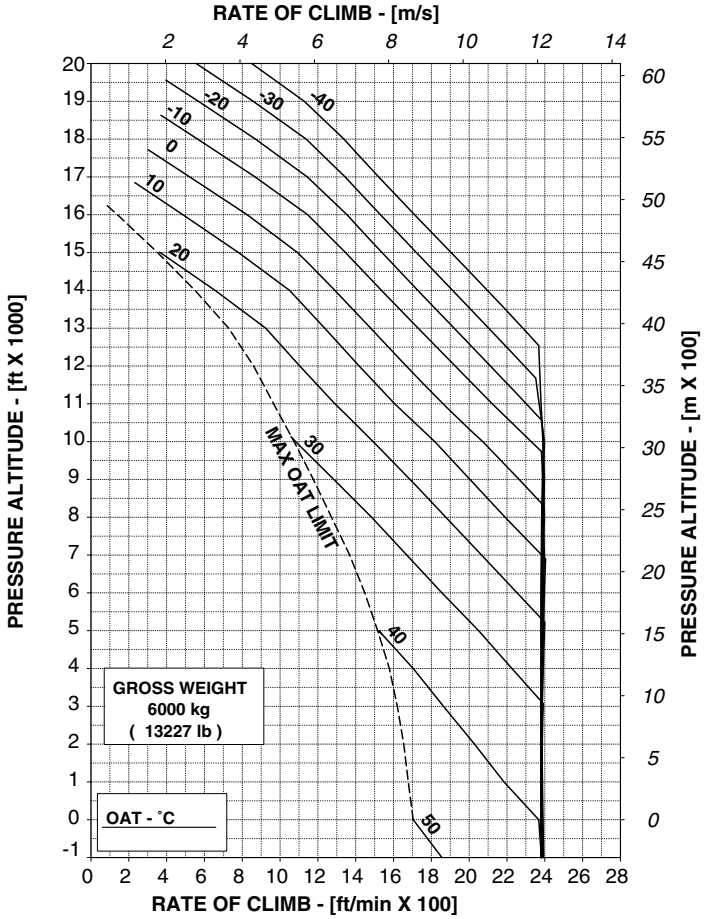
ICN-39-A-155000-A-A0126-05224-A-02-1

Figure 4-49 ROC TOP AEO Gross Weight 5600 kg EAPS ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



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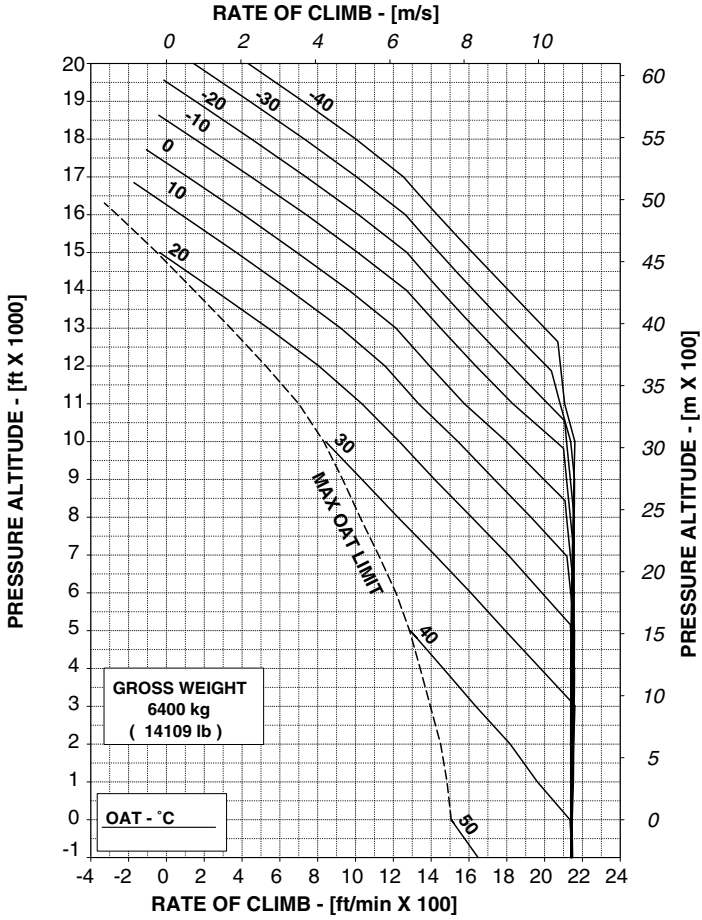
ICN-39-A-155000-A-A0126-05225-A-02-1

Figure 4-50 ROC TOP AEO Gross Weight 6000 kg EAPS ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS ON
ELECTRICAL LOAD: 600 A TOTAL



139G1580A001 ISSUE B

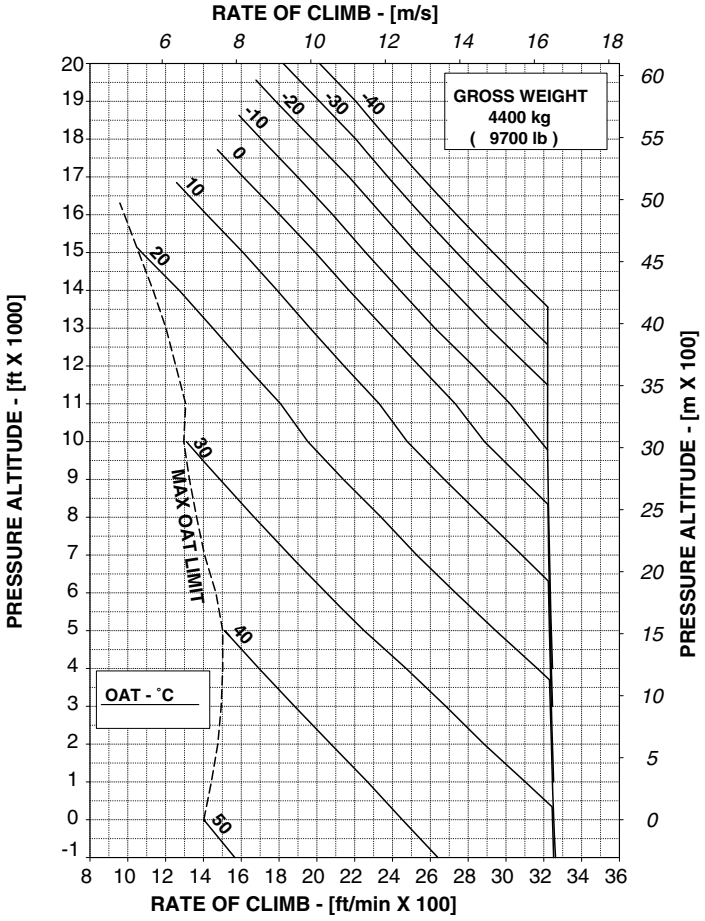
ICN-39-A-155000-A-A0126-05255-A-02-1

Figure 4-51 ROC TOP AEO Gross Weight 6400 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



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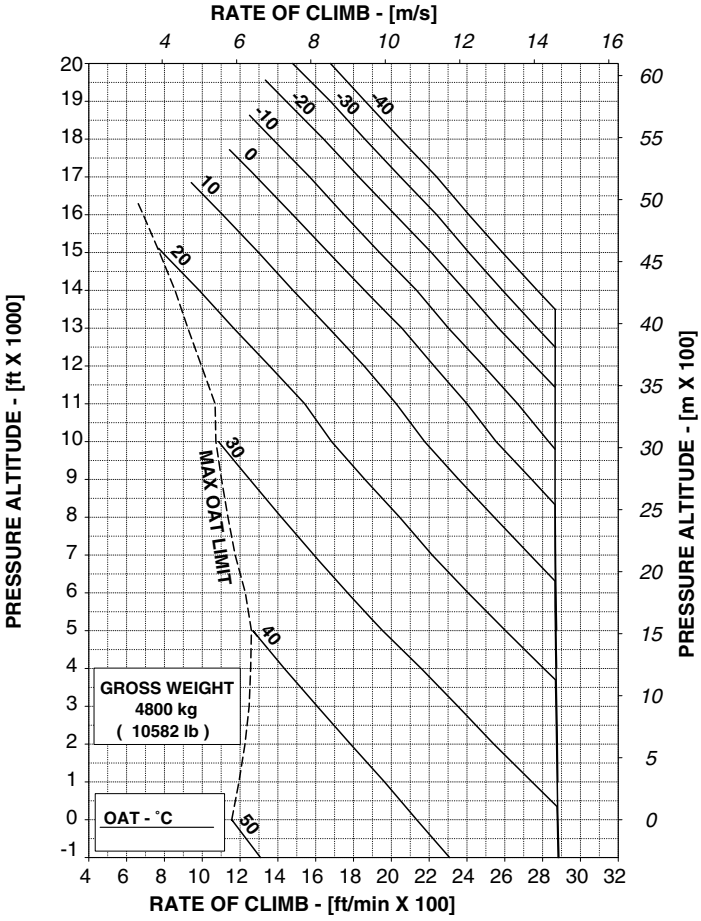
ICN-39-A-155000-A-A0126-05226-A-02-1

Figure 4-52 ROC MCP AEO Gross Weight 4400 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



139G1580A001 ISSUE B

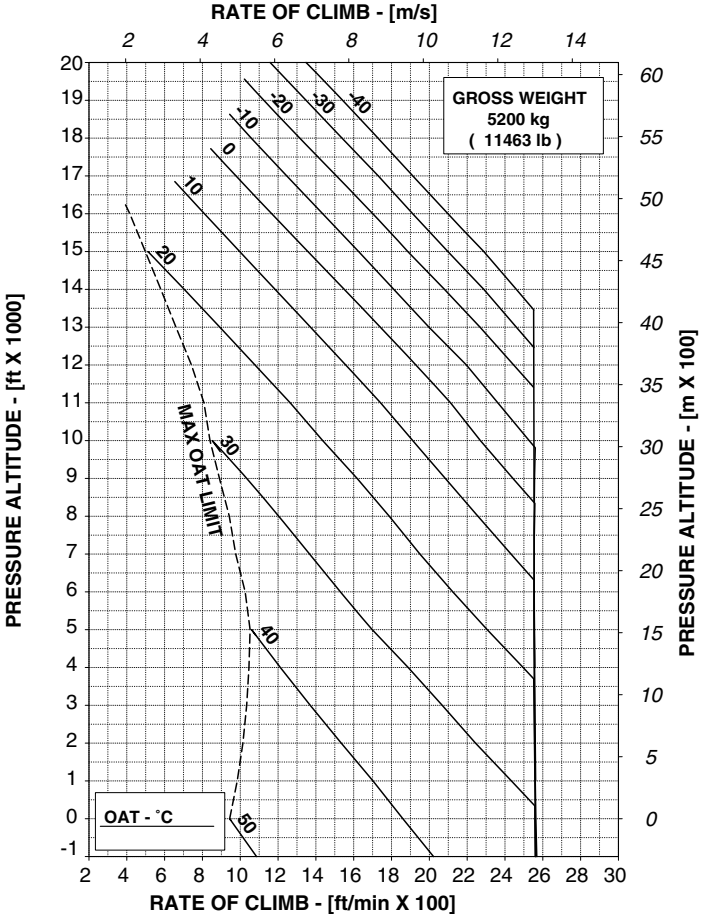
ICN-39-A-155000-A-A0126-05227-A-02-1

Figure 4-53 ROC MCP AEO Gross Weight 4800 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



139G1580A001 ISSUE B

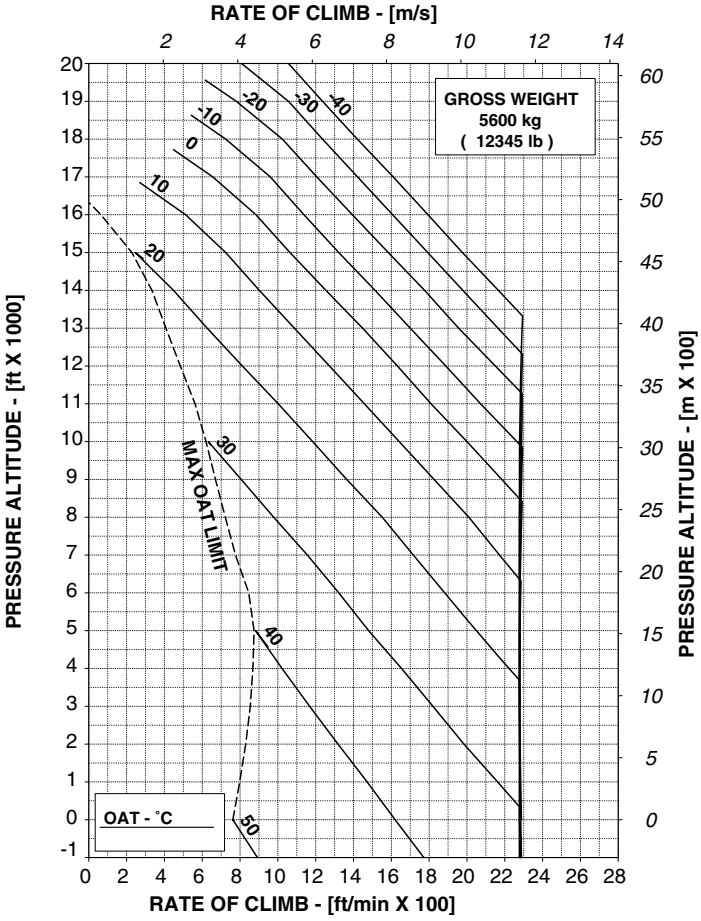
ICN-39-A-155000-A-A0126-05228-A-02-1

Figure 4-54 ROC MCP AEO Gross Weight 5200 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



139G1580A001 ISSUE B

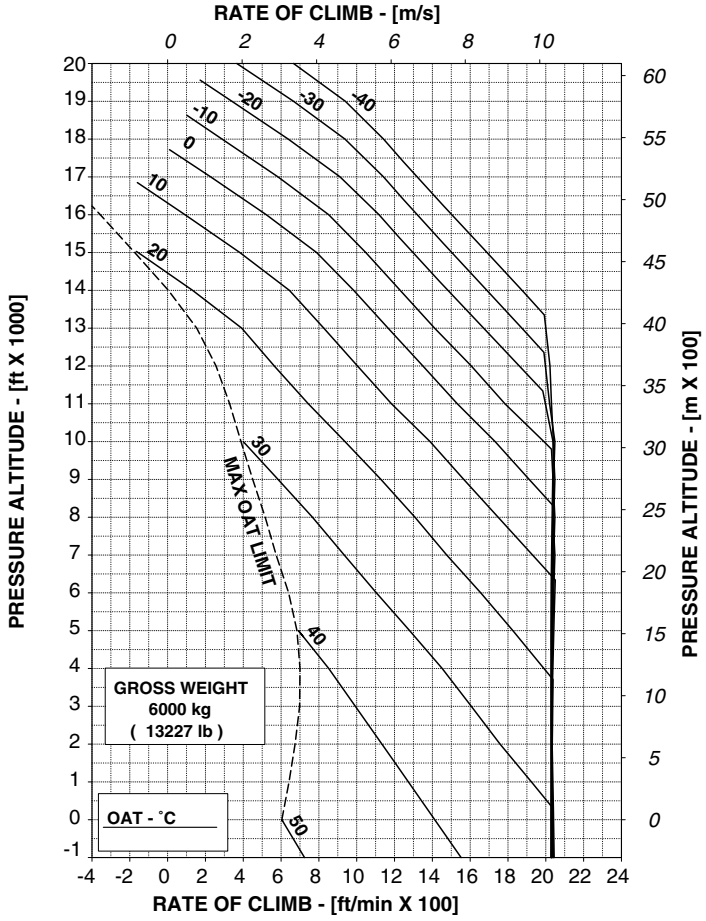
ICN-39-A-155000-A-A0126-05229-A-02-1

Figure 4-55 ROC MCP AEO Gross Weight 5600 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS: ON
ELECTRICAL LOAD: 600 A TOTAL



139G1580A001 ISSUE B

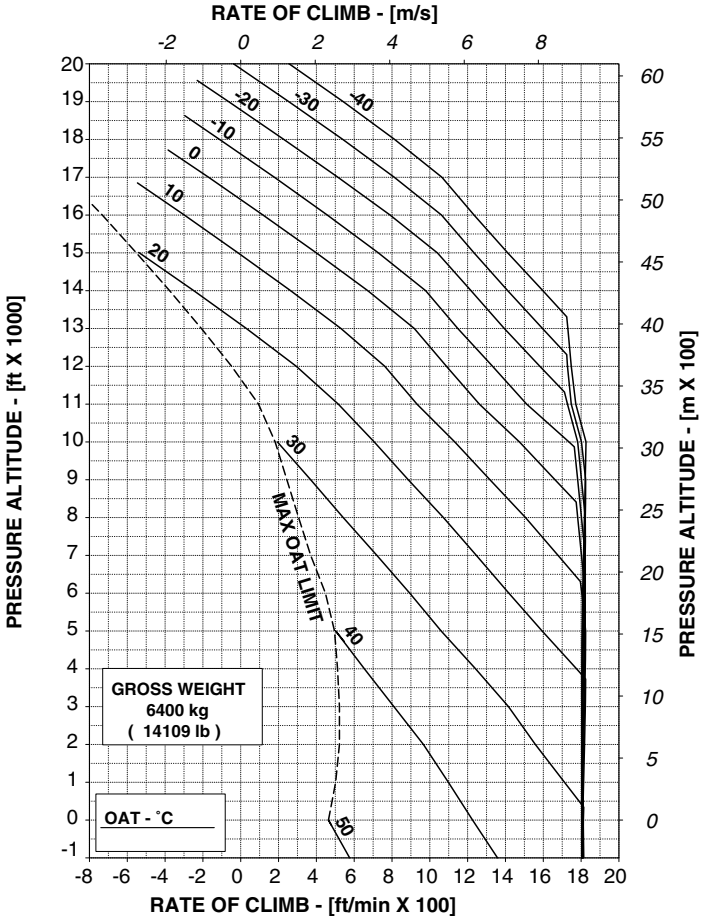
ICN-39-A-155000-A-A0126-05230-A-02-1

Figure 4-56 ROC MCP AEO Gross Weight 6000 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS ON
ELECTRICAL LOAD: 600 A TOTAL



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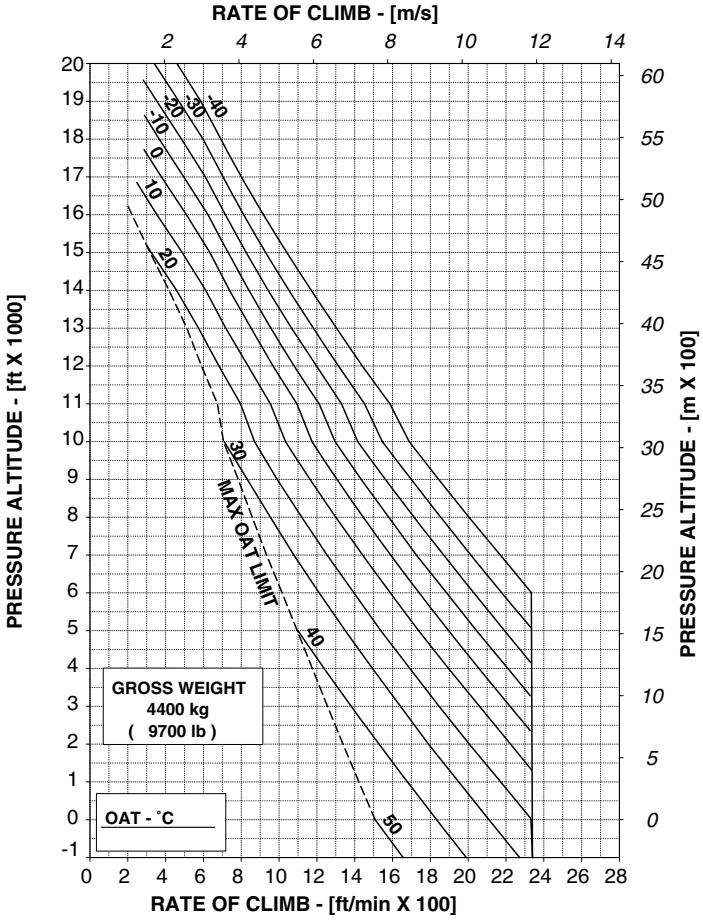
ICN-39-A-155000-A-A0126-05256-A-02-1

Figure 4-57 ROC MCP AEO Gross Weight 6400 kg EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



139G1580A001 ISSUE B

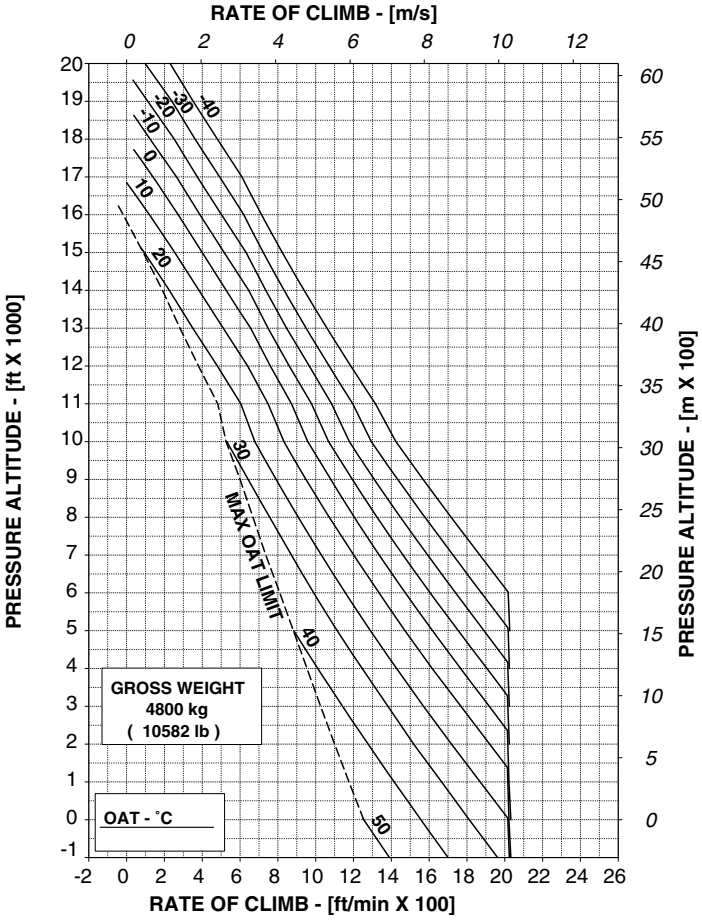
ICN-39-A-155000-A-A0126-05231-A-02-1

Figure 4-58 ROC 2.5min OEI Gross Weight 4400 kg EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



139G1580A001 ISSUE B

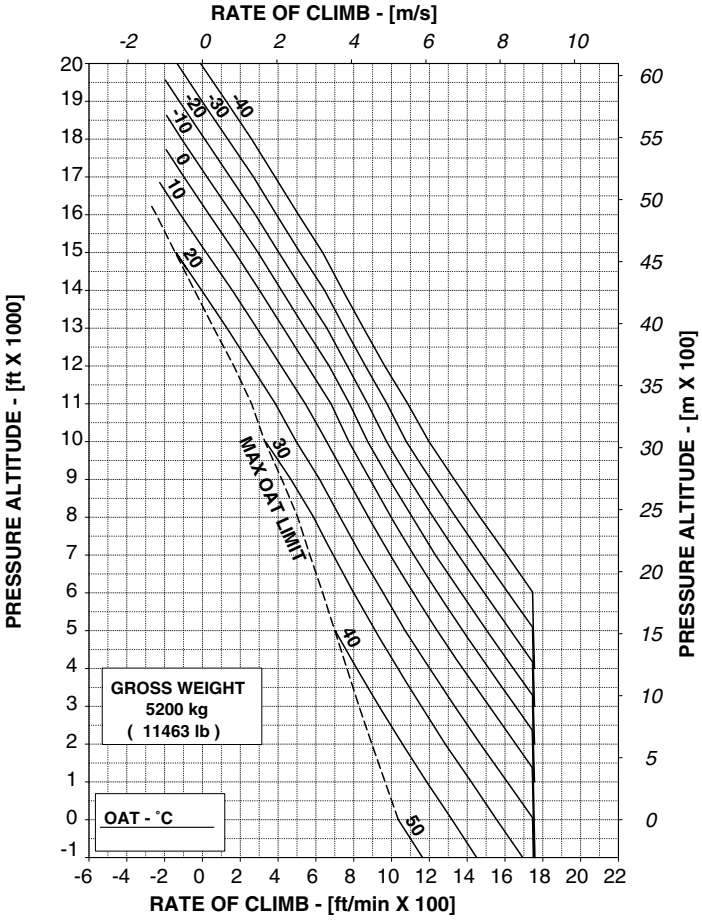
ICN-39-A-155000-A-A0126-05232-A-02-1

Figure 4-59 ROC 2.5min OEI Gross Weight 4800 kg EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



139G1580A001 ISSUE B

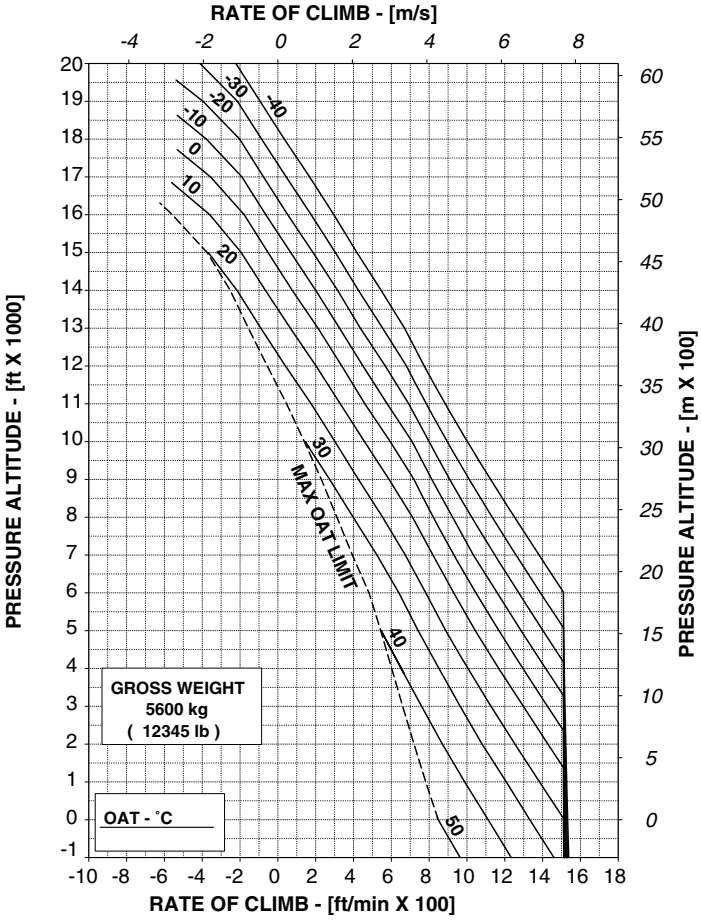
ICN-39-A-155000-A-A0126-05233-A-02-1

Figure 4-60 ROC 2.5min OEI Gross Weight 5200 kg EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



139G1580A001 ISSUE B

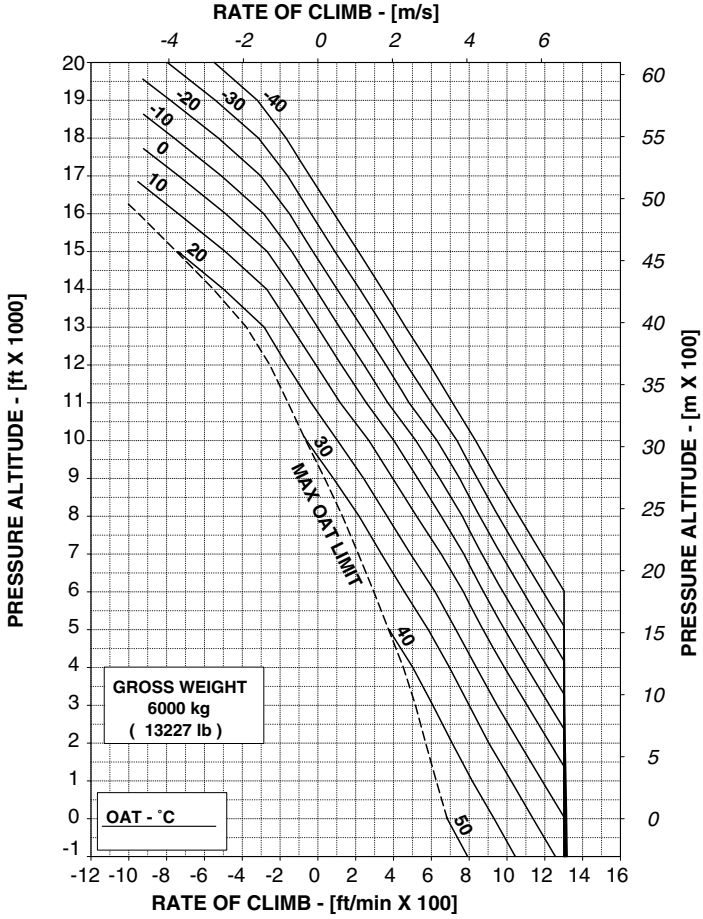
ICN-39-A-155000-A-A0126-05234-A-02-1

Figure 4-61 ROC 2.5min OEI Gross Weight 5600 kg EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



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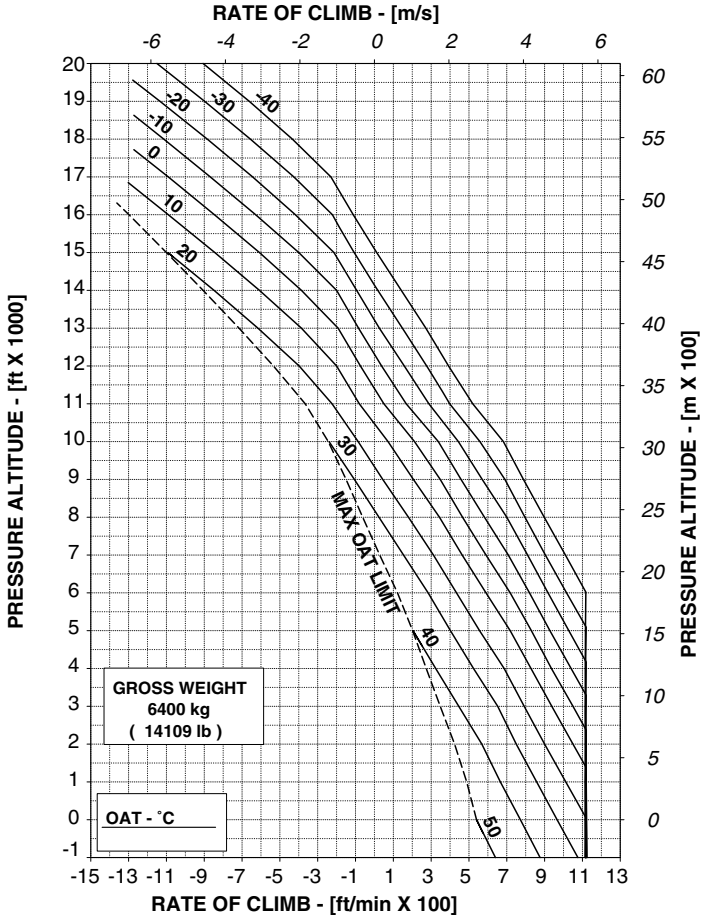
ICN-39-A-155000-A-A0126-05235-A-02-1

Figure 4-62 ROC 2.5min OEI Gross Weight 6000 kg EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS ON
ELECTRICAL LOAD: 300 A



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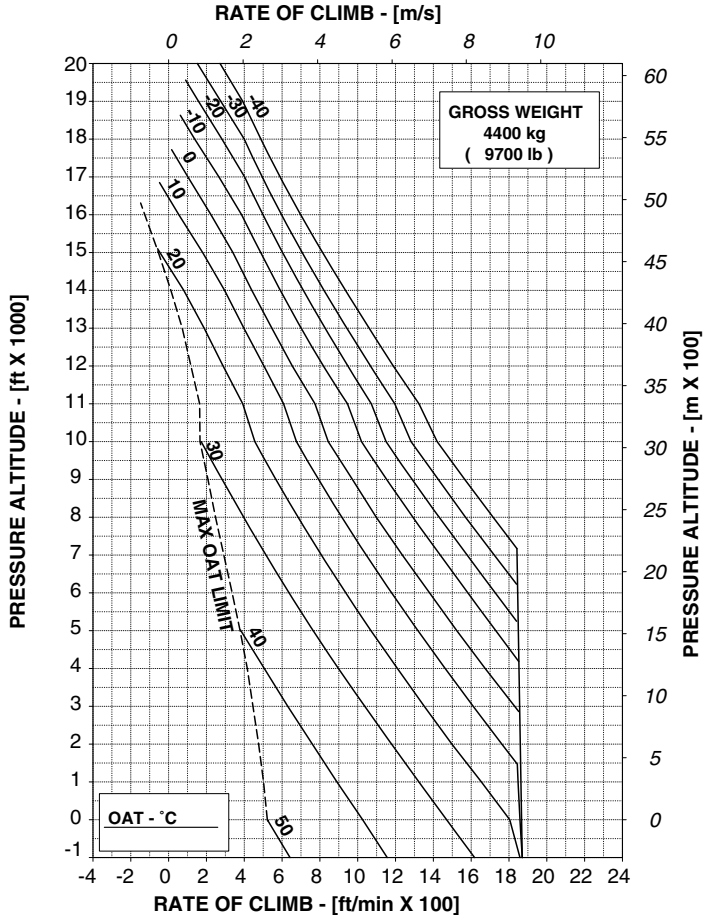
ICN-39-A-155000-A-A0126-05257-A-02-1

Figure 4-63 ROC 2.5min OEI Gross Weight 6400 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



139G1580A001 ISSUE B

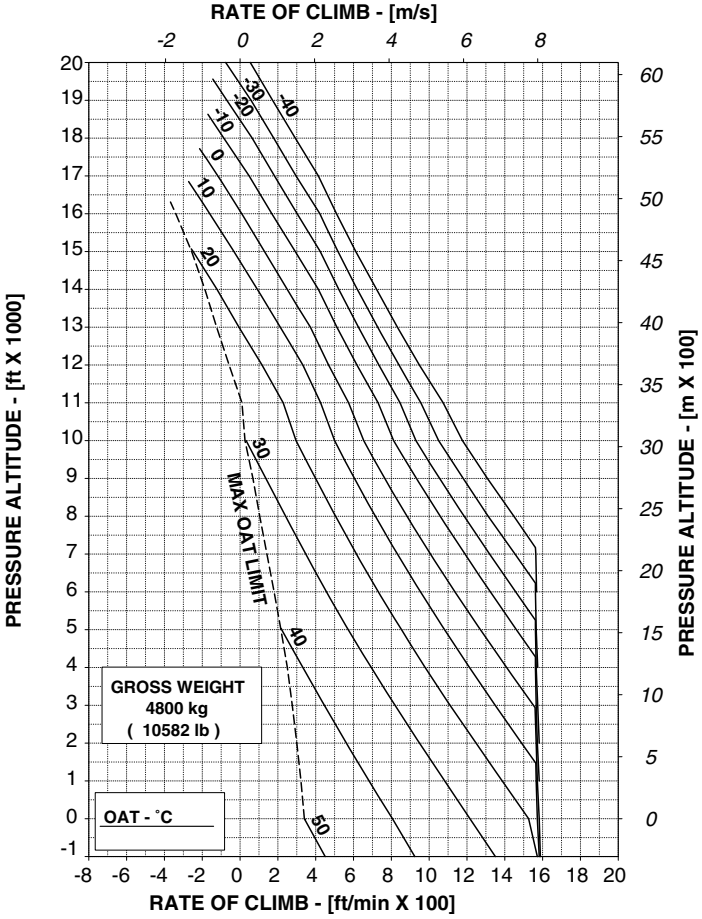
ICN-39-A-155000-A-A0126-05236-A-02-1

Figure 4-64 ROC MCP OEI Gross Weight 4400 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



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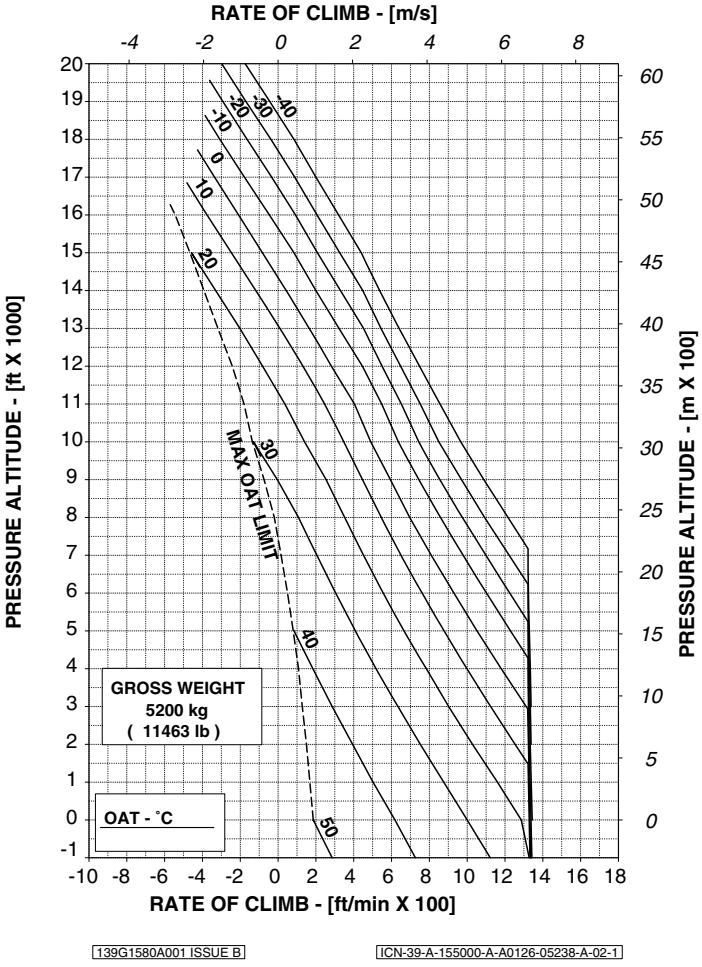
ICN-39-A-155000-A-A0126-05237-A-02-1

Figure 4-65 ROC MCP OEI Gross Weight 4800 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



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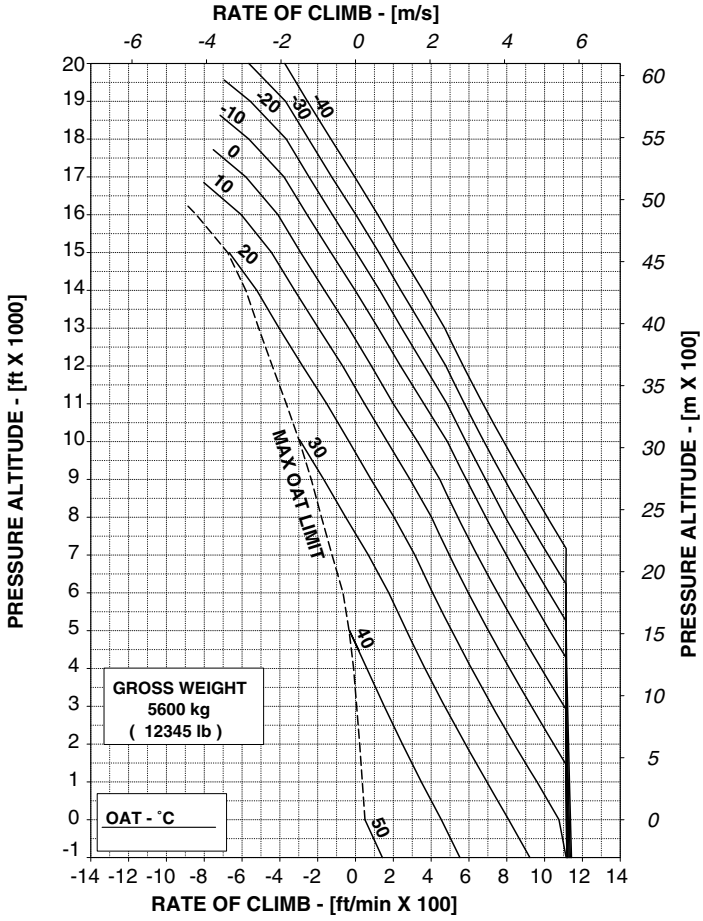
ICN-39-A-155000-A-A0126-05238-A-02-1

Figure 4-66 ROC MCP OEI Gross Weight 5200 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



139G1580A001 ISSUE B

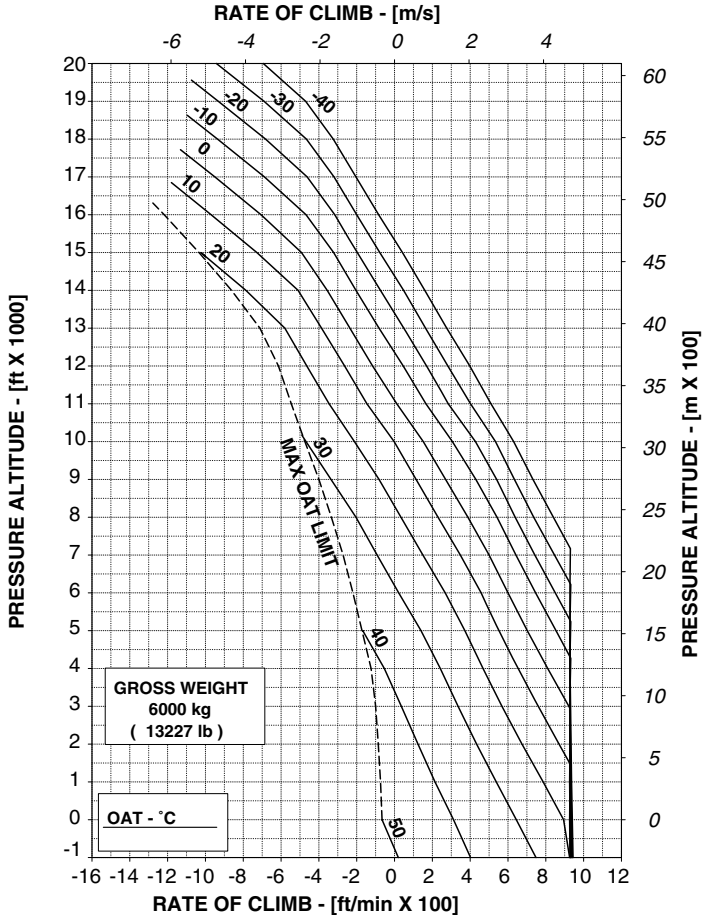
ICN-39-A-155000-A-A0126-05239-A-02-1

Figure 4-67 ROC MCP OEI Gross Weight 5600 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: ON
ELECTRICAL LOAD: 300 A



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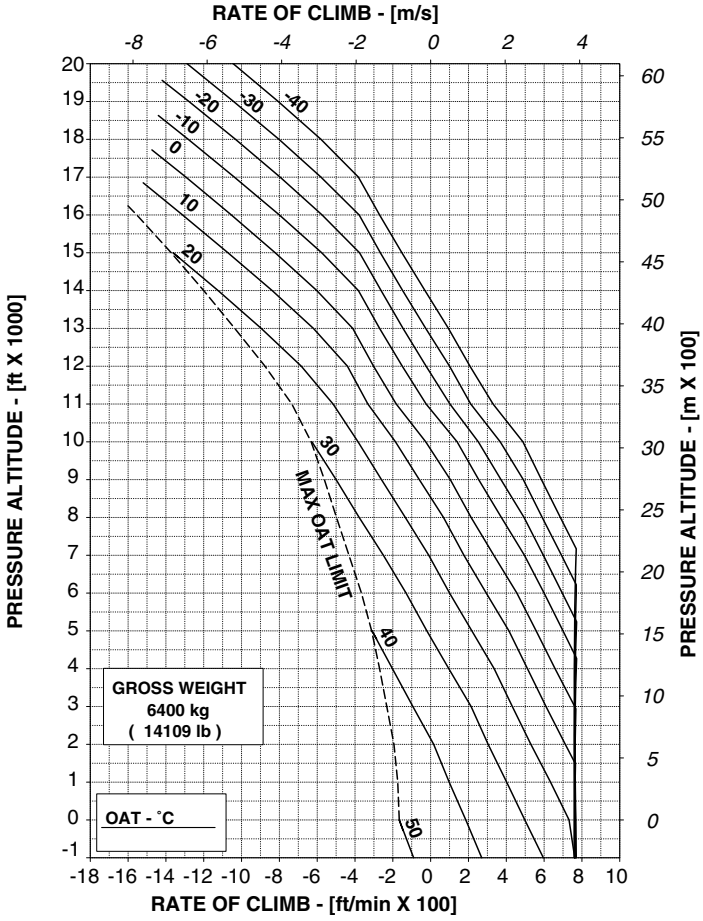
ICN-39-A-155000-A-A0126-05240-A-02-1

Figure 4-68 ROC MCP OEI Gross Weight 6000 kg EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS ON
ELECTRICAL LOAD: 300 A



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ICN-39-A-155000-A-A0126-05258-A-02-1

Figure 4-69 ROC MCP OEI Gross Weight 6400 kg EAPS ON

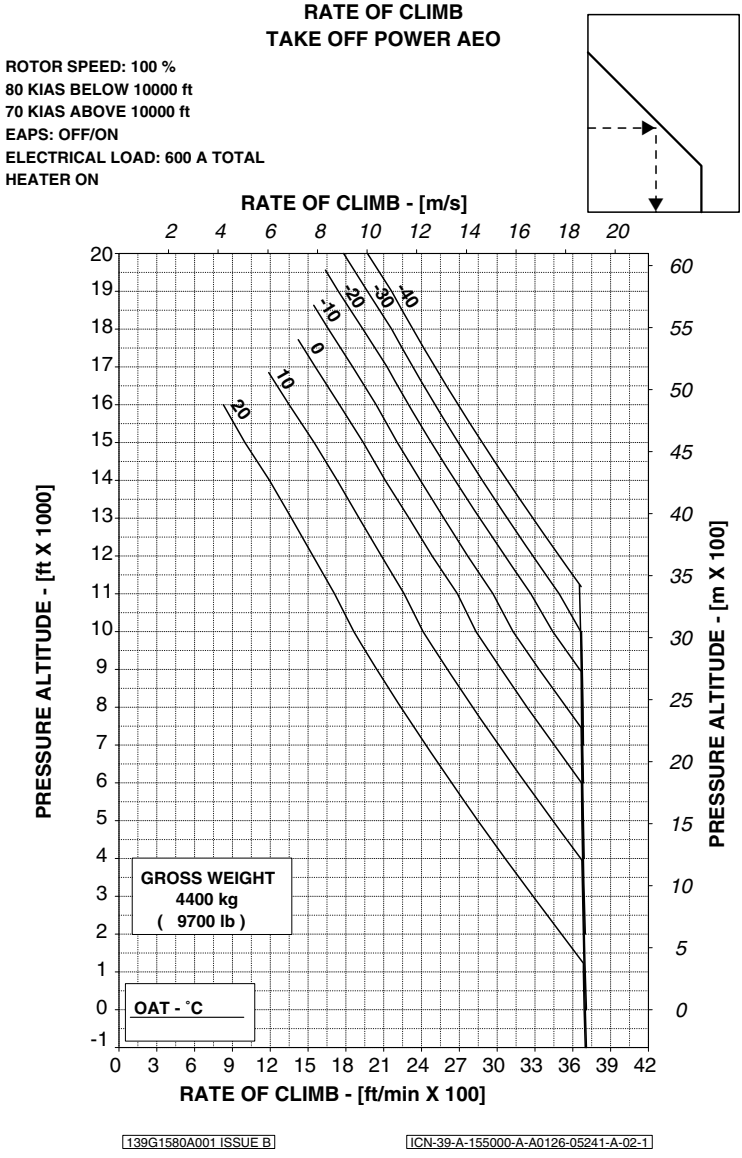
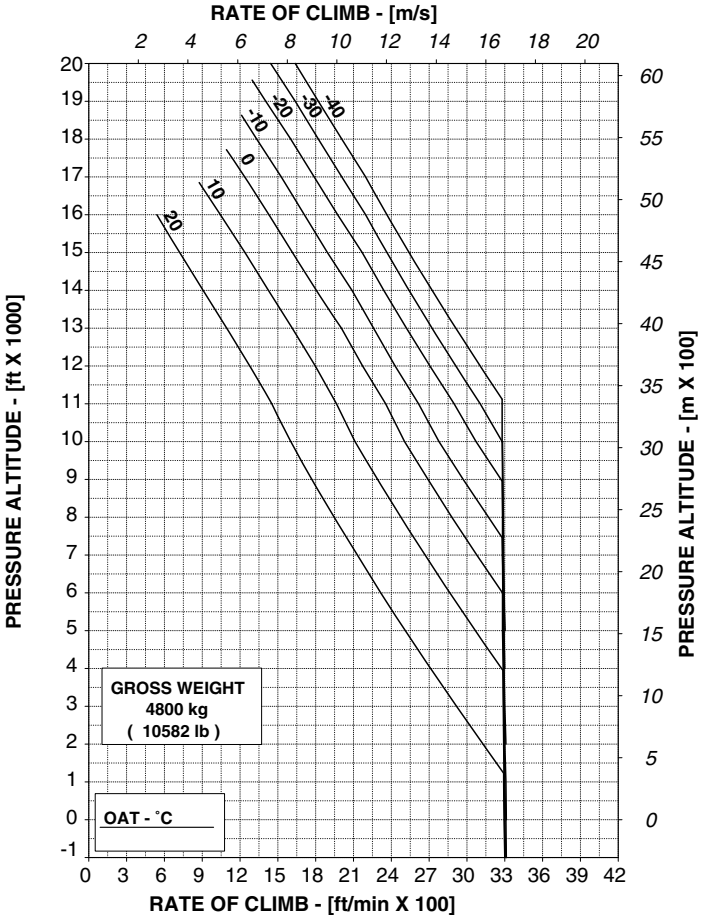


Figure 4-70 ROC TOP AEO Gross Weight 4400 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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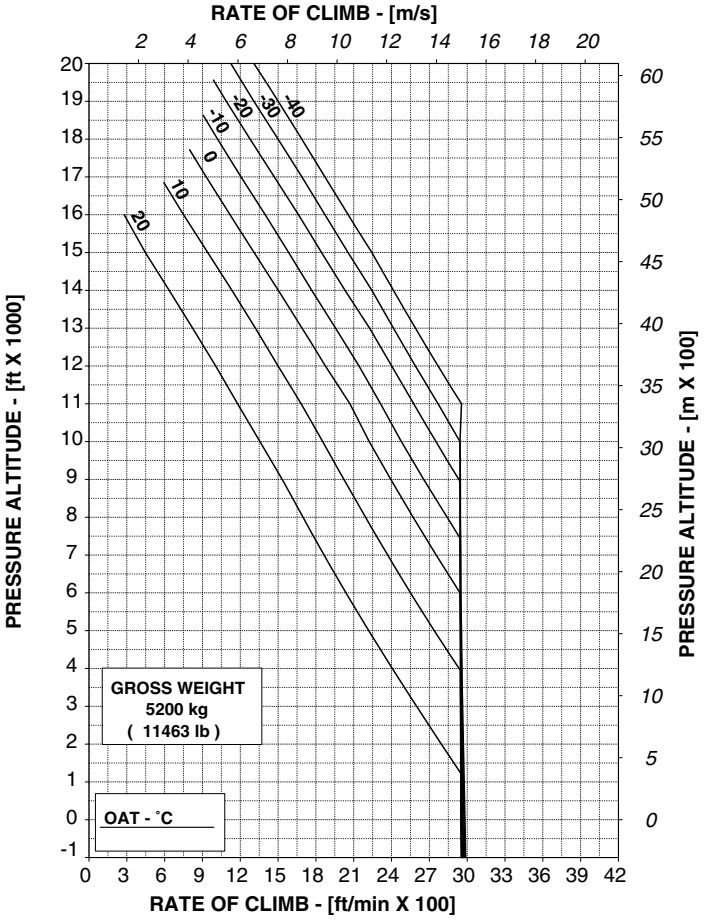
ICN-39-A-155000-A-A0126-05242-A-02-1

Figure 4-71 ROC TOP AEO Gross Weight 4800 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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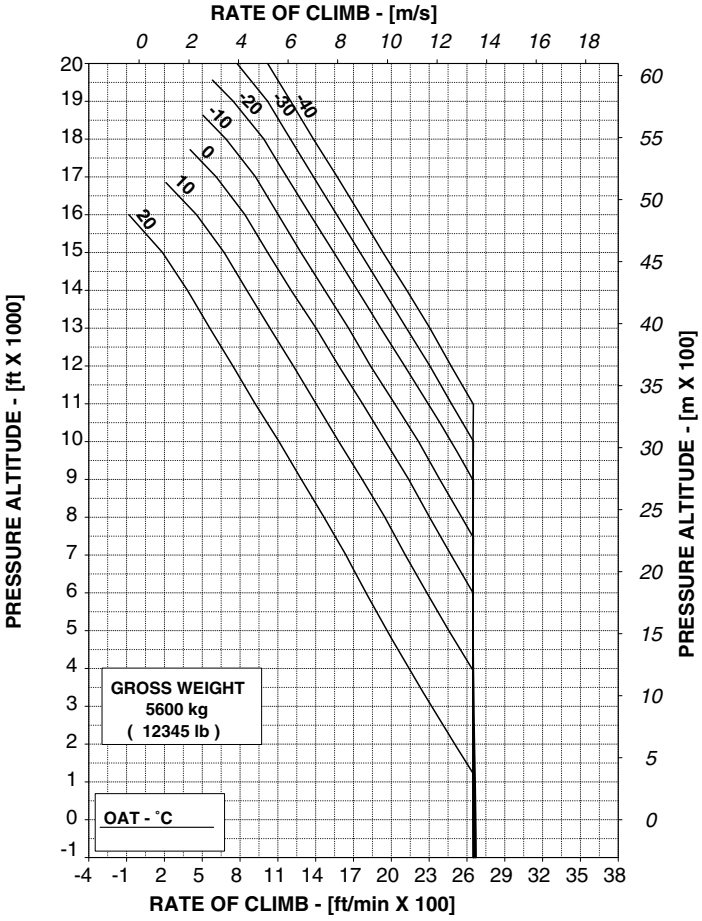
ICN-39-A-155000-A-A0126-05243-A-02-1

Figure 4-72 ROC TOP AEO Gross Weight 5200 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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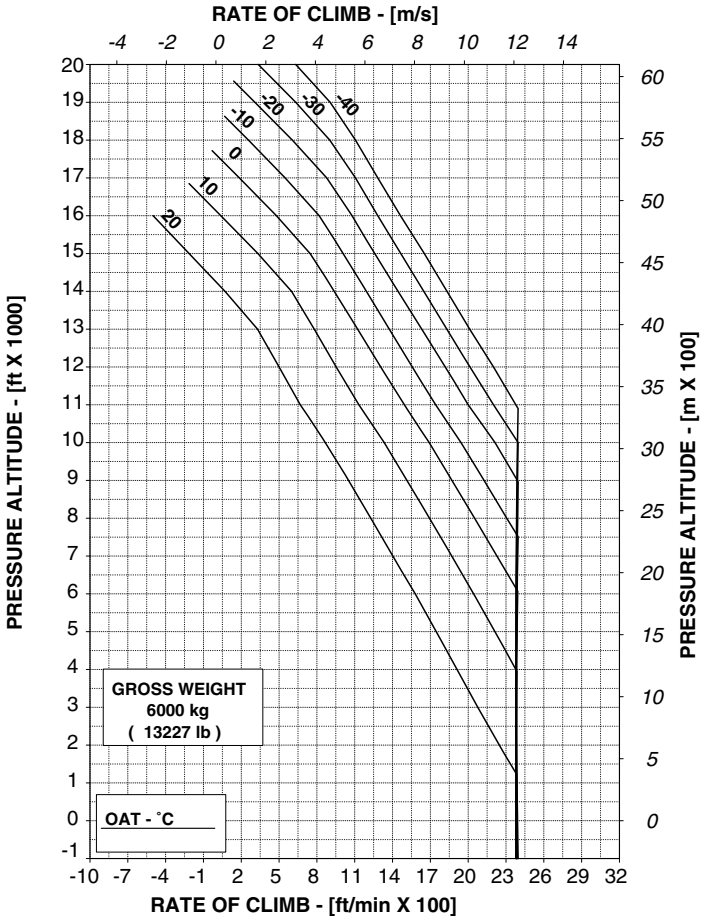
ICN-39-A-155000-A-A0126-05244-A-02-1

Figure 4-73 ROC TOP AEO Gross Weight 5600 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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ICN-39-A-155000-A-A0126-05245-A-02-1

Figure 4-74 ROC TOP AEO Gross Weight 6000 kg EAPS OFF/ON Heater ON

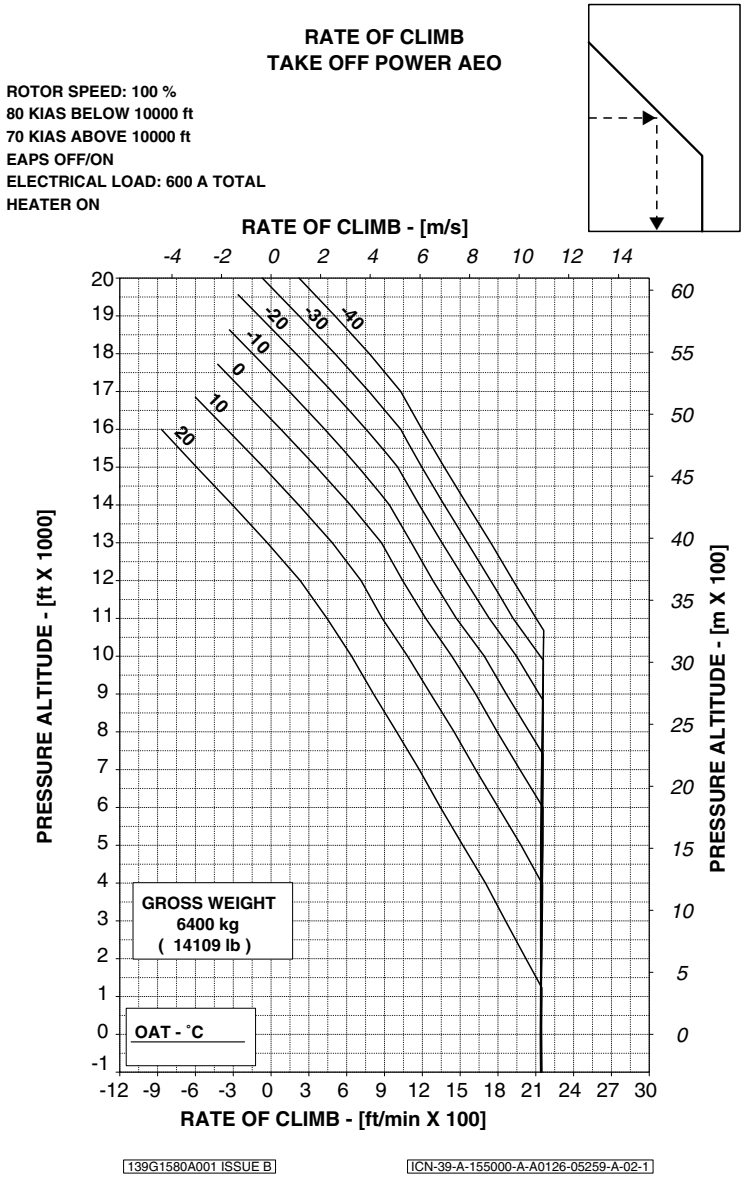
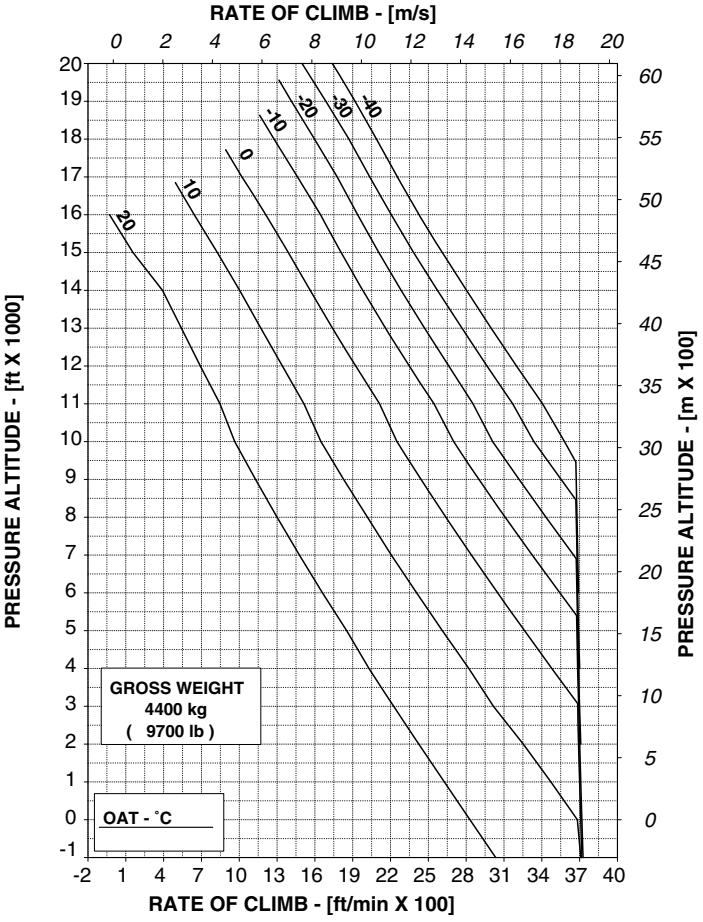


Figure 4-75 ROC TOP AEO Gross Weight 6400 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS ABOVE 10000 ft
70 KIAS BELOW 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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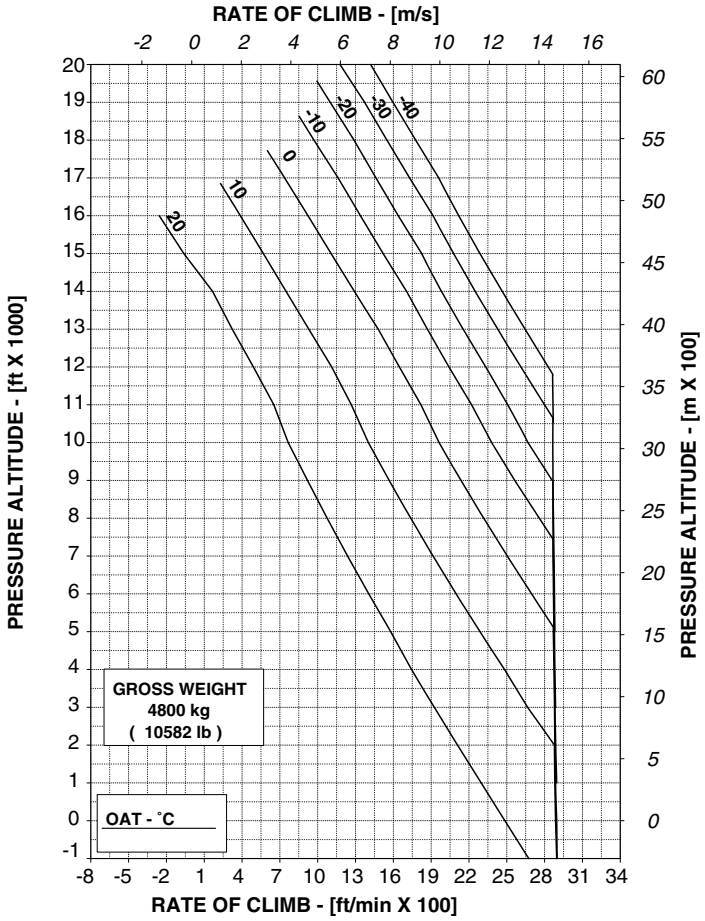
ICN-39-A-155000-A-A0126-05246-A-02-1

Figure 4-76 ROC MCP AEO Gross Weight 4400 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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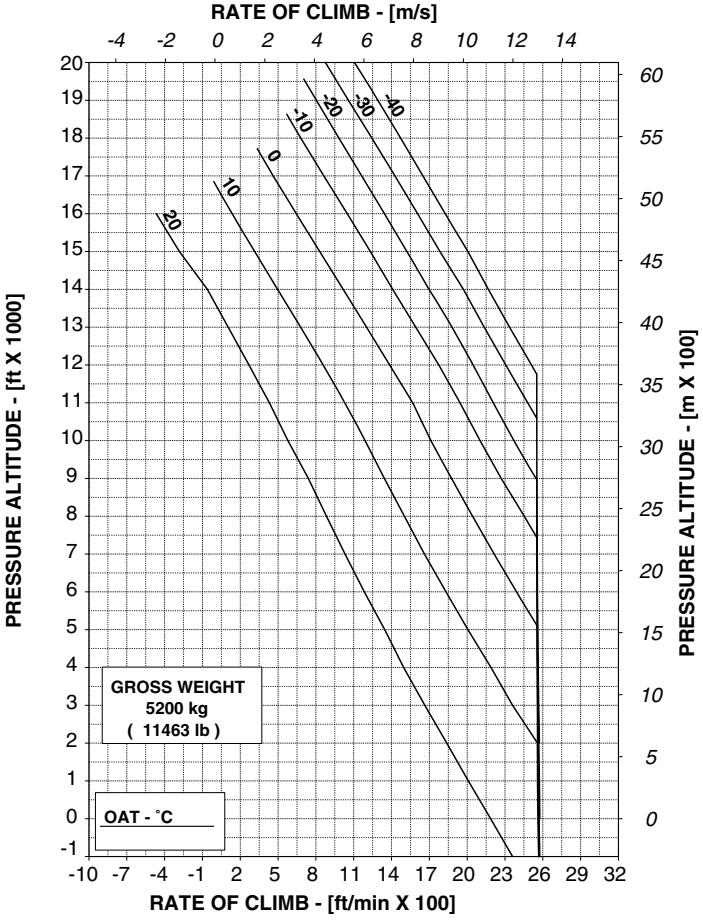
ICN-39-A-155000-A-A0126-05247-A-02-1

Figure 4-77 ROC MCP AEO Gross Weight 4800 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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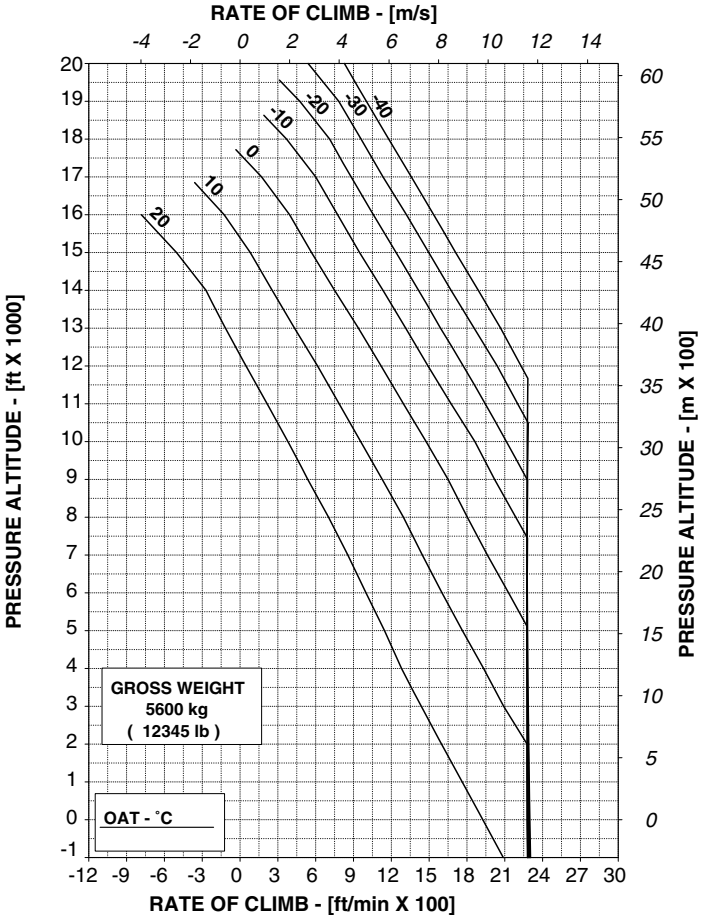
ICN-39-A-155000-A-A0126-05248-A-02-1

Figure 4-78 ROC MCP AEO Gross Weight 5200 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



139G1580A001 ISSUE B

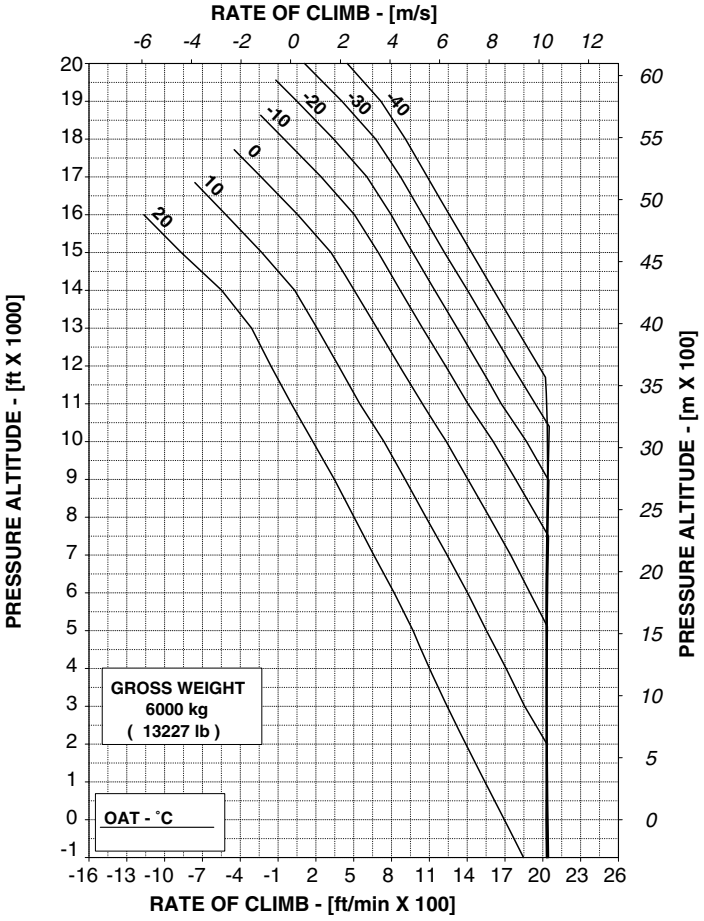
ICN-39-A-155000-A-A0126-05249-A-02-1

Figure 4-79 ROC MCP AEO Gross Weight 5600 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS: OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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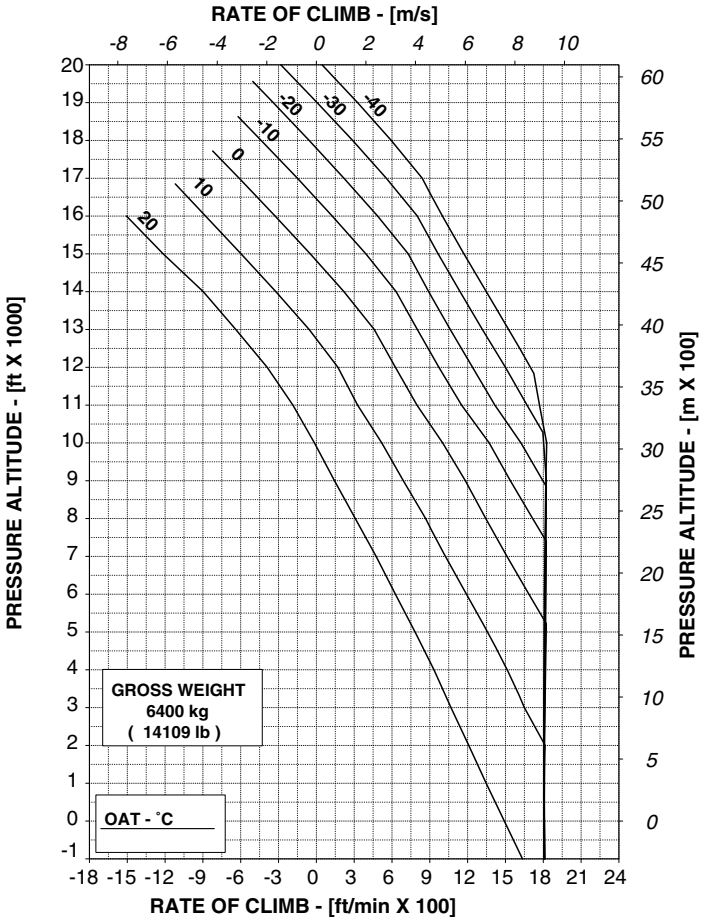
ICN-39-A-155000-A-A0126-05250-A-02-1

Figure 4-80 ROC MCP AEO Gross Weight 6000 kg EAPS OFF/ON Heater ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



139G1580A001 ISSUE B

ICN-39-A-155000-A-A0126-05260-A-02-1

Figure 4-81 ROC MCP AEO Gross Weight 6400 kg EAPS OFF/ON Heater ON

HOVER CEILING OGE 2.5 MIN OEI EAPS OFF WITH HEADWIND BENEFIT

The Hover Ceiling charts EAPS OFF define the maximum weights at which an OGE hover is possible at 2.5 MIN OEI power rating for varying combinations of Pressure Altitude, OAT, main rotor speed at 102% and include the headwind gross weight benefit.

Two charts are presented.

— Figure 4-82. This chart displays the Factored Headwind Benefit and has already been factored by 50% for operations that require the credit for the performance increase resulting from the actual headwind component to be reduced by 50%.

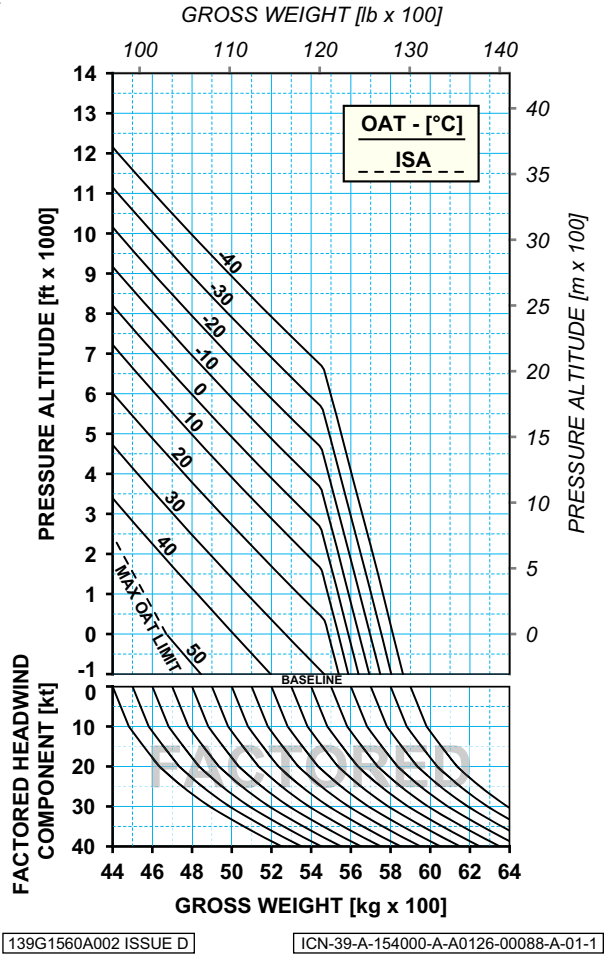
— Figure 4-83. This chart displays the Unfactored Headwind Benefit and the full performance increase resulting from the actual headwind component is applicable.

Note

Unless otherwise authorized by operating regulations, the pilot is not authorized to credit more than 50 percent of the performance increase resulting from the actual headwind component and must reduce performance by 150 percent of the performance decrement resulting from the actual tail wind component.

HOVER CEILING OUT OF GROUND EFFECT WITH HEADWIND
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
ELECTRICAL LOAD: 300 A TOTAL
HEATER OFF
EAPS OFF



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ICN-39-A-154000-A-A0126-00088-A-01-1

Figure 4-82 Hover Ceiling OGE 2.5 min OEI EAPS OFF with Factored Headwind Component

HOVER CEILING OUT OF GROUND EFFECT WITH HEADWIND
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
ELECTRICAL LOAD: 300 A TOTAL
HEATER OFF
EAPS OFF

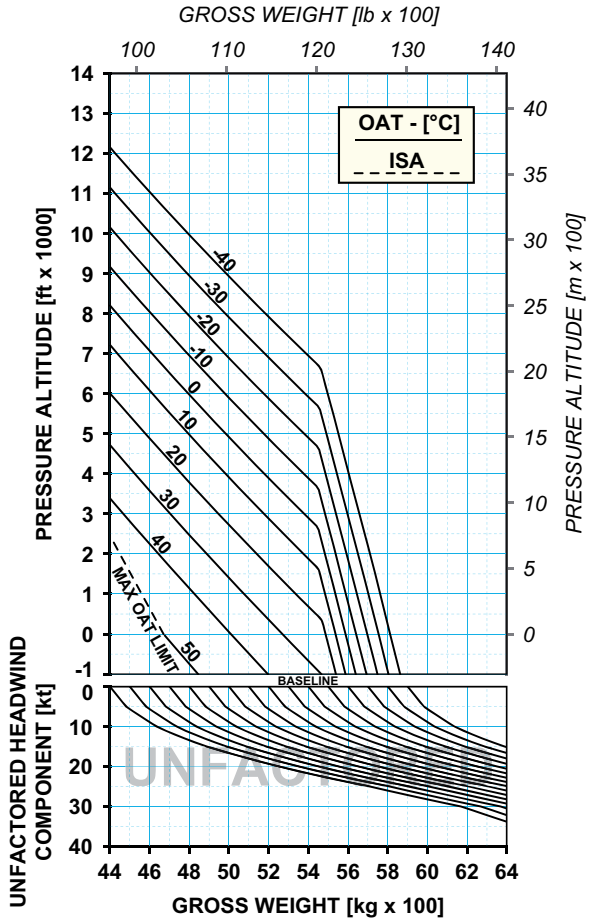

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Figure 4-83 Hover Ceiling OGE 2.5 min OEI EAPS OFF with Unfactored Headwind Benefit

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 6

SLOPE OPERATION ENVELOPE EXTENSION

P/N 3G6220A00432 Sliding Ring

P/N 3G3240V00332 Improved Park Brake

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SUPPLEMENT 6
SLOPE OPERATION ENVELOPE EXTENSION

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GENERAL INFORMATION

Installation of the Sliding Ring Part N° 3G6220A00432 and Improved Park Brake Part N° 3G3240V00332 allows increased slope landing capability of the AW139.

SECTION 1 - LIMITATIONS

CENTRE OF GRAVITY LIMITATIONS

After installation of Sliding Ring and Improve Park Brake the new empty weight and CG location must be determined.

No change in CG limitations

SLOPE LIMITATIONS

Sloped Take Off and Landing are limited to the following:

Nose up.....10°

Nose Down .....10°

Left Wing Low .....10°

Right Wing Low.....10°

CAUTION

When landing nose down on slopes up to 10° attention should be given to have a slope that does not endanger striking the tail of the aircraft. A slope which allows the tail to overhang the top of the slope is recommended.

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SECTION 2 - NORMAL PROCEDURES

SLOPING GROUND OPERATION

Note

1(2) WOW FAIL caution may illuminate spuriously during slope take-off or landing procedure.

TAKE OFF PROCEDURE

1. PARK BRAKE applied.
2. Increase collective and move cyclic in a coordinated manner to achieve a lift off.
3. Establish hover above take off surface.
4. Release PARK BRAKE.
5. Take off as required.

LANDING PROCEDURE

1. Establish hover above landing area.
2. PARK BRAKE applied, (PARK BRAKE ON advisory message on CAS).
3. Lower collective to commence vertical descent.

When the wheels contact the ground:

4. Move cyclic and collective in a coordinated manner to achieve the cyclic centralized as the collective reaches MPOG.
5. If taxiing required release PARK BRAKE.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 7

V.V.I.P. INTERIOR

P/N 3G2520F00311
P/N 3G2520F00312

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SUPPLEMENT 7
V.V.I.P. INTERIOR

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GENERAL INFORMATION

This Section provides information about the V.V.I.P. Cabin Interior P/N 3G2520F00311 and P/N 3G2520F00312. This supplement is also applicable to all succeeding dash numbers (i.e. P/N 3G2520F003XX), which identify minor changes to the interior that do not affect the rotorcraft operations.

Configuration P/N 3G2520F00311

This P/N consists of a basic 6-PAX seat configuration, two different 5-PAX seat configurations may be derived by removing either one of the central seats.

The 4-PAX seat configuration is obtained by removing both central seats from the basic 6-PAX seat configuration.

Configuration P/N 3G2520F00312

This P/N consists of 2 VIP seats in Row 3, in the outboard left and right positions, and 4 standard low density seats in Row 1.

SECTION 1 - LIMITATIONS

NUMBER OF PASSENGERS

Configuration P/N 3G2520F00311

The maximum number of passengers, excluding the flight crew, shall not exceed:

- six
- five, when either one of the central seats is removed
- four, when both central seats are removed.

Configuration P/N 3G2520F00312

The maximum number of passengers, excluding the flight crew, shall not exceed six.

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the V.V.I.P. Interior, the new empty weight and center of gravity position must be determined.

TAKE-OFF AND LANDING

During take-off and landing, and at Pilot's discretion in other phases of the flight, passengers' seats must be in the upright position, locked in the maximum outboard and rearward position, and aligned with the direction of flight.

Table(s) must be in stowed position.

SECTION 2 - NORMAL PROCEDURES

TAKE-OFF AND LANDING

Confirm that passengers' seats are:

- in the upright position
- locked in the maximum outboard and rearward position
- aligned with the direction of flight

and that table(s) is(are) in stowed position.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY LANDING

During emergency landing, and at Pilot's discretion in other phases of the flight, passengers' seats must be in the upright position, locked in the maximum outboard and rearward position, and aligned with the direction of flight.

Table(s) must be in stowed position.

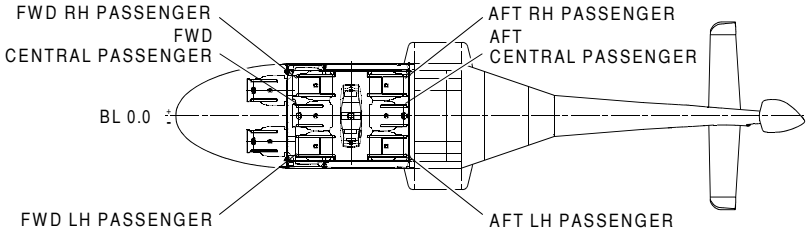
SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

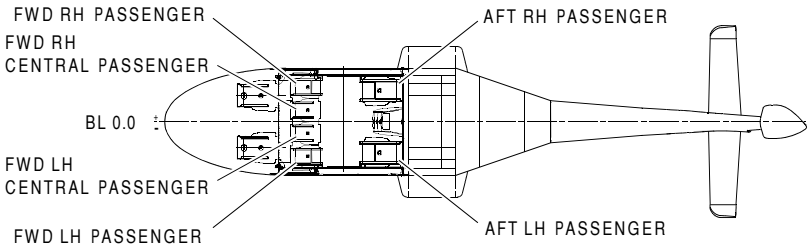
Configuration P/N 3G2520F00311



ICN-39-A-156000-A-A0126-00028-A-01-1

DESCRIPTION	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
FWD RH passenger	3415	635
FWD CENTER passenger	3415	0
FWD LH passenger	3415	-635
AFT RH passenger	5600	635
AFT CENTER passenger	5600	0
AFT LH passenger	5600	-635
Note: These arms are applicable to all seat configurations.		

Configuration P/N 3G2520F00312



ICN-39-A-156000-A-00003-00265-A-01-1

DESCRIPTION	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
FWD 1 RH passenger	3415	737
FWD 1 RH central passenger	3415	254
FWD 1 LH central passenger	3415	-254
FWD 1 LH passenger	3415	-737
AFT RH passenger	5600	635
AFT LH passenger	5600	-635

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 8

RADIO EQUIPMENT PRIMUS HF 1050

P/N 3G2310F00211
P/N 3G2310F00212

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SUPPLEMENT 8
RADIO EQUIPMENT
PRIMUS HF 1050

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GENERAL INFORMATION

The HF 1050 system P/N 3G2310F00211 is used for long distance communication in the frequency range 2.0 to 29.9999 MHz with 100Hz resolution. The radio is a solid state system with 200 watts PEP of output power, supplied by 28VDC and operation is via the MCDU mounted on the interseat console.

The HF 1050 P/N 3G2310F00212 includes the PS440 control panel in the cabin, see Figure 1, permitting control of the radio from the cabin position. Modifications performed on the PS440 are automaticaly updated to the MCDU. However modifications carried out on the MCDU are not transferred to the PS440 display.

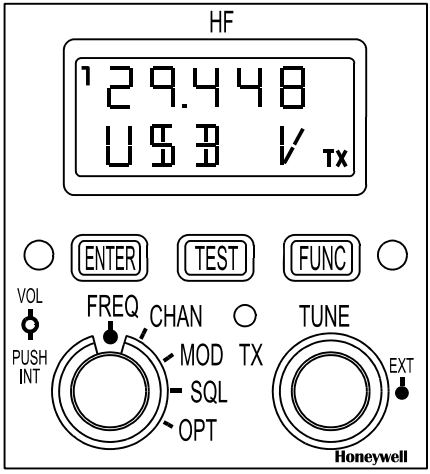

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Figure 1 Optional HF 1050 PS440 Control Panel

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SECTION 1 - LIMITATIONS

CENTRE OF GRAVITY LIMITATIONS

After HF 1050 system installation, the new empty weight and center of gravity location must be determined.

HF 1050 LIMITATION

It is prohibited to transmit on the HF 1050 system during refueling and if personnel are in close proximity to the rotorcraft.

With cabin door open, HF 1050 radio transmissions are prohibited.

When EPIC software Phase 5 is installed (See Supplement 68) the pilot requested self test must not be selected from the MCDU or cabin controller (if installed).

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

AREA N°5 (Tail Boom- Left Hand Side)

1. HF Antenna — Condition and security

IN FLIGHT PROCEDURES

CAUTION

During transmission with the HF 1050, the ADF system becomes unreliable and the VHF1 may be affected by background noise.

Note

For complete HF radio functionality refer to the Honeywell KHF 1050 HF Communications System Pilots Guide, latest issue.

Note

If the PS440 cabin controller is fitted the operator should coordinate HF settings with the cockpit crew before transmitting.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 9

DITCHING CONFIGURATIONS

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SUPPLEMENT 9
DITCHING CONFIGURATIONS

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GENERAL INFORMATION

Ditching Regulations

Demonstration of emergency over water landing capability and bouyancy up to Sea State 4 is required by ditching regulations. However, for this installation Sea State 6 has been demonstrated and approved.

Emergency Flotation and Life Raft System (P/N 3G9560F00111)
Emergency Flotation System (P/N 3G9560F00113/212)
Emergency Life Raft System (P/N 4G2560F00711/00811/01011/01012)

This system comprises of 4 flotation bags, 2 mounted on the lower nose section (left and right hand sides) and two mounted on the lower aft central section (left and right hand side) 2 life rafts mounted outside the helicopter on the upper part of the left and right sponson,

• Life Rafts P/N 4G2560F00711/00811, 11 man (17 man overload)

• Life Rafts P/N 4G2560F01011/01012, 9 man (14 man overload)

The flotation bags are automatically deployed on ditching by water sensors (2 of the four sensors must be activated for flotation inflation) or by manual operation of the guarded FLOAT pushbutton on either the Pilot or Copilot collective grip. (See Figure 3)

For operation of both automatic or manual flotation inflation the OFF/ARMED switch on the FLOATS EMER control panel mounted in the interseat console (pilots side), must be set to ARMED. The control panel also incorporates a self test function for the flotation system. Two panel types are available P/N 3G9560V00553 (Figure 1) and P/N 3G9560V00557 (Figure 2).
The panel P/N 3G9560V00557 (and successive dash numbers) has different labels for the indicator lights (LH SYS and RH SYS) which, with this panel, have additional checking functions for the flotation and FLOAT override pushbutton on the collective grips.

The life raft inflation is activated manually, and independantly, for left or right life raft installation. Two modes of manual deployment are available, one via a remote handle mounted on the Pilot/Copilot forward door frame and the other by a handle mounted externally to the aircraft and directly on the life raft container, under a flap, which is clearly marked (See Figure 4).

Emergency Flotation System P/N 3G9560F00113/212

The Emergency Flotation System is as described above.

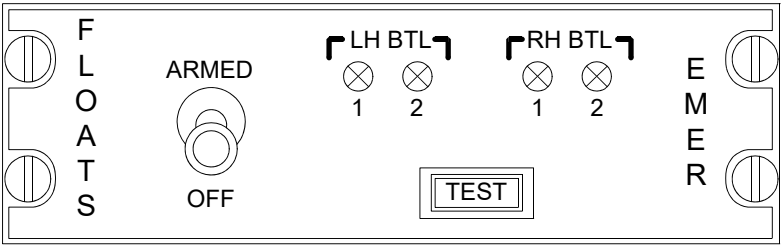

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Figure 1 Emergency Flotation Control Panel P/N 3G9560V00553

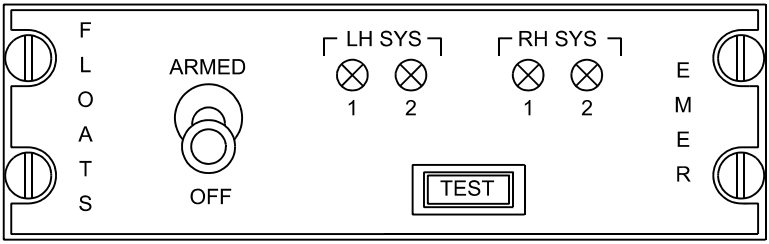

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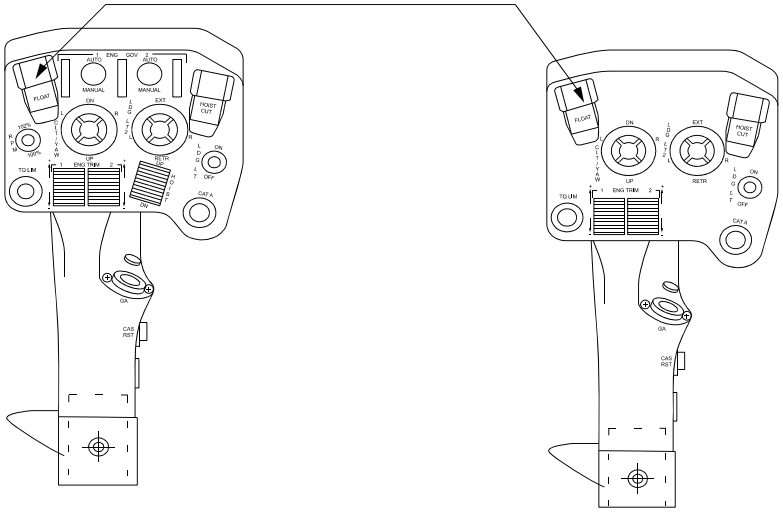
Figure 2 Emergency Flotation Control Panel P/N 3G9560V00557 (and successive dash numbers)



ICN-39-A-155009-A-00003-00405-A-01-1

Figure 3 FLOATS Guarded Pushbutton Switch Positions



ICN-39-A-155009-A-00003-00407-A-01-1

Figure 4 Life Raft, Externally Mounted, Manual Deployment Handle Position (Example for Reference Only)

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SECTION 1 - LIMITATIONS

BASIS OF CERTIFICATION

The Emergency Flotation and Life Raft System is approved for ditching, approved for ditching, up to Sea State 6, in accordance with JAR/FAR 29.

The Emergency Flotation System P/N 3G9560F00113 and 3G9560F00212 are approved for ditching, up to Sea State 6, in accordance with JAR/FAR 29 provided the following approved equipments, in accordance with the National Operation rules, are fitted:

— Life raft(s)
(Life rafts P/N 4G2560F00711/00811/1011/1012 have been approved for use by AW. The use of other life raft installations must be in accordance with JAR/FAR 29 and must be approved)

— When Life rafts P/N 4G2560F01011/01012 are fitted the maximum number of passengers permitted in the cabin is 12.

— Survival type Emergency Locator Transmitter

— Life preservers.

TYPE OF OPERATIONS

For flight over water the helicopter must be operated in accordance with the National Operating rules.

When not required by the National Operating rules the life rafts may be removed.

The approved cabin layouts are detailed in Section 6 of this Supplement and in Section 6 of the Basic RFM and appropriate Supplement.

Note

Removal of the life rafts does not affect the operation of the Emergency Flotation System.

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Emergency Flotation System the new empty weight and center of gravity position must be determined.

No change to weight or CG limitations.

TAKE OFF LIMITATIONS

Take off after ditching is prohibited.

MISCELLANEOUS LIMITATIONS

Flotation System

The Emergency Flotation system shall only be used for ditching.

Flotation bags shall not be inflated in flight.

Figure 1-1 DELETED

Figure 1-2 DELETED

PLACARDS



Mounted in cabin on left hand door frame



Mounted in cabin on right hand door frame

ICN-39-A-155009-G-00001-29023-A-001-01

Figure 1-3 Placards

SECTION 2 - NORMAL PROCEDURES

GENERAL

Flotation Gas Bottle Pressure

For installations that have the flotation gas bottle pressure gauge the gas bottle pressure limitation is related to ambient temperature, one of the following pressure charts will be installed depending on the configuration fitted:

— P/N 3G9560F00111/113 (Aero Sekur):
  - Figure 2-1,
  - Figure 2-2 P/N 304152B (soft flotation covers),
  - Figure 2-3 P/N 304458B (rigid flotation covers)

— P/N 3G9560F00212 (Aerazur) Figure 2-4.

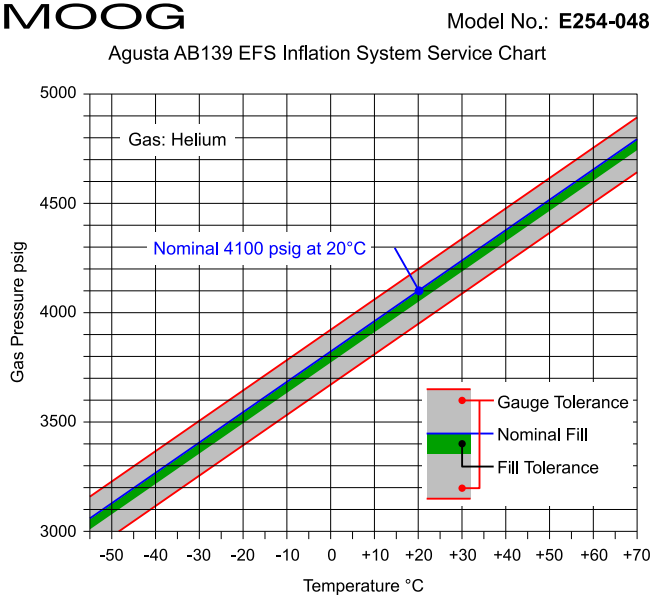
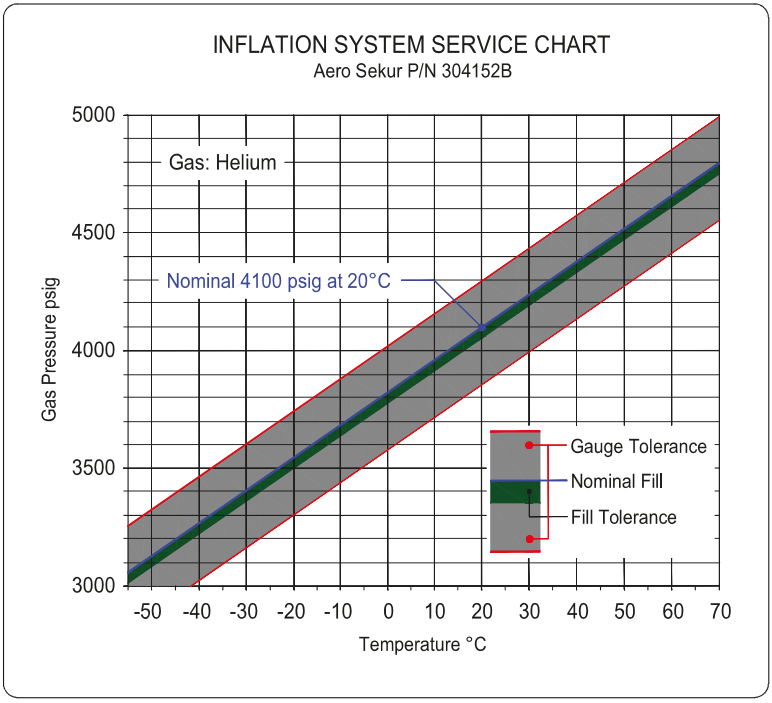
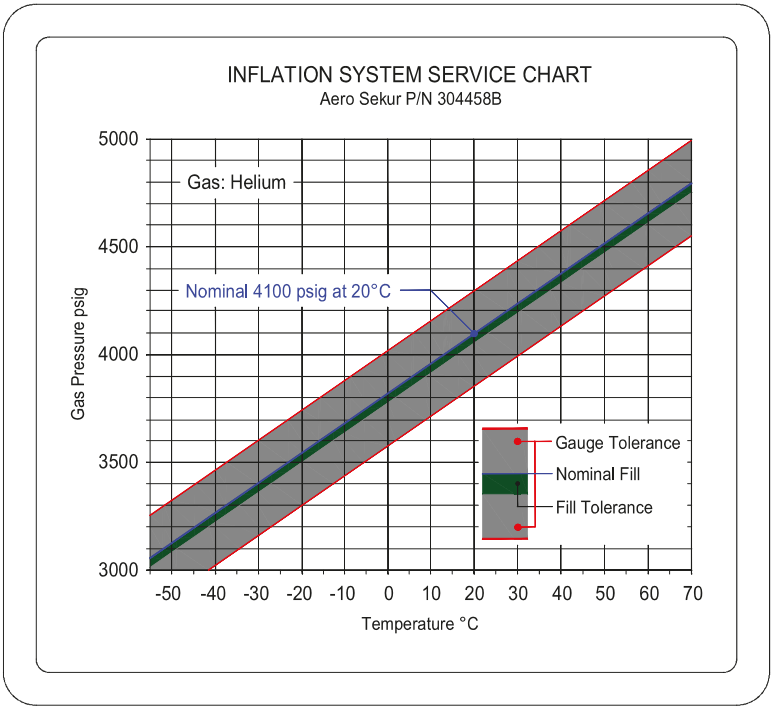


Figure 2-1 Flotation Gas Bottle Pressure Limits
P/N 3G9560F00111/113 (Aero Sekur)



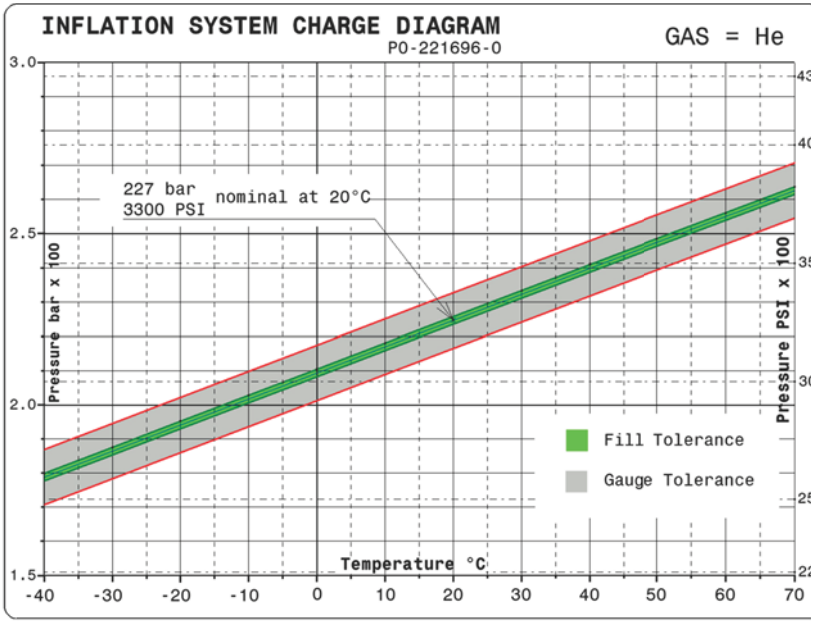
ICN-39-A-155098-G-00001-29057-A-001-01

Figure 2-2 Flotation P/N 3G9560F00111/113 Gas Bottle Pressure Limits P/N 304152B (Aero Sekur)



ICN-39-A-155098-G-00001-29058-A-001-01

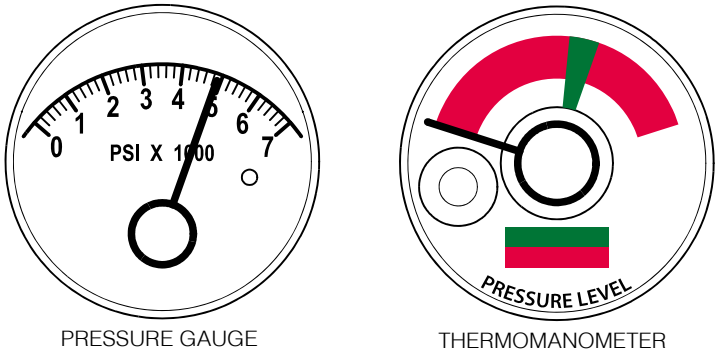
Figure 2-3 Flotation P/N 3G9560F00111/113 Gas Bottle Pressure Limits P/N 304458B (Aero Sekur)



ICN-39-A-155009-G-00001-29022-A-001-0

Figure 2-4 Flotation Gas Bottle Pressure Limits P/N 3G9560F00212 (Aerazur)

For installations that have the Thermomanometer the indicator needle must be in the green arc for a serviceable system. Refer to Figure 2-5.



PRESSURE GAUGE THERMOMANOMETER

ICN-39-A-155009-G-00001-29028-A-001-0

Figure 2-5 Flotation Pressure Guage and Thermomanometer (Examples)

EXTERNAL PRE-FLIGHT CHECK

AREA N°1 (Helicopter Nose)

1. Left and right nose flotation covers	— Condition of bag covers and attachment bolts present. Confirm all Velcro edges closed correctly, paying particular attention to the footstep area.

AREA N°2 (Fuselage – Right Hand Side)

1. Right hand sponson life raft cover flap (if fitted)	— Open flap and verify gas bottle pressure is within limits for ambient conditions. (Inflation diagram can be found on underside of flap).
2. Right hand sponson life raft cover (if fitted)	— Condition and secure.
3. Right hand flotation cover flap	— Open flap and verify gas bottle pressure is within limits for ambient conditions. • For pressure guage installations the inflation diagram can be found on underside of flap. • For thermomanometer installation confirm needle in green arc.
4. Right hand flotation cover	— Condition of cover and attachment bolts present. Confirm all Velcro edges closed correctly.

AREA N°6 (Fuselage – Left Hand Side)

1. Left hand flotation cover flap	— Open flap and verify gas bottle pressure is within limits for ambient conditions.

- For pressure guage installations the inflation diagram can be found on underside of flap.
- For thermomanometer installation confirm needle in green arc.

2. Left hand flotation cover — Condition of cover and attachment bolts present. Confirm all Velcro edges closed correctly.

3. Left hand sponson life raft cover flap (if fitted) — Open flap and verify gas bottle pressure is within limits for ambient conditions. (Inflation diagram can be found on underside of flap).

4. Left hand sponson life raft cover (if fitted) — Condition and secure.

COCKPIT PRE-START CHECKS

CAUTION

The FLOAT override pushbutton guard on the collective grips must not be raised during the following checks.

After BATTERY MASTER ON

EMER FLOATS Panel P/N 3G9560V00553

1. FLOATS EMER TEST pushbutton — Press, confirm the two LH BTL and two RH BTL lights illuminate. Release and confirm lights extuinguish.

CAUTION

If FLOAT ARM caution is illuminated, prior to the following procedure, do not continue as the flotation system has malfunctioned.

CAUTION

During the following test personnel must NOT be close to flotation bags as an internal malfunction of the FLOAT system may cause the flotation to inflate.

2. FLOATS EMER switch — ARMED, confirm FLOAT ARM caution displayed on CAS and flotation system does not inflate. Select switch to OFF.

EMER FLOATS Panel P/N3G9560V00557

1. FLOATS EMER TEST pushbutton — Press, confirm the two LH SYS and two RH SYS lights illuminate. Release and confirm lights extuinguish

CAUTION

If FLOAT ARM caution is illuminated, prior to the following procedure, do not continue as the flotation system has malfunctioned.

CAUTION

During the following test personel must NOT be close to flotation bags as an internal malfunction of the FLOAT system may cause the flotation to inflate.

2. OFF/ARMED switch (FLOATS EMER panel) — ARMED, confirm FLOAT ARM caution displayed on CAS, the LH SYS and RH SYS lights do not illuminate and flotation system does not inflate. Select switch to OFF.

CAUTION

If the LH SYS and RH SYS lights illuminate when the flotation system is in ARMED do not continue as the flotation system has malfunctioned.

PRE-TAKE OFF CHECKS

1. OFF/ARMED switch (FLOATS EMER panel)

   Over land operation — OFF.

   Over water operation — ARMED, FLOAT ARM caution displayed on CAS.

IN FLIGHT PROCEDURES

CAUTION

The FLOAT override pushbutton guard on the collective grips must not be raised unless a manual deployment is deemed necessary after ditching.

1. OFF/ARMED switch (FLOATS EMER panel)

   Over land operation — Confirm OFF.

   Over water operation — Confirm ARMED, FLOAT ARM caution displayed on CAS.

PRE-LANDING CHECKS

1. OFF/ARMED switch (FLOATS EMER panel)

   Over land operation — Confirm OFF.

   Over water operation — Confirm ARMED, FLOAT ARM caution displayed on CAS.

SHUTDOWN PROCEDURES

PRE-SHUTDOWN CHECKS

1. OFF/ARMED switch (FLOATS EMER panel) — OFF, FLOAT ARM caution not displayed on CAS.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

DITCHING

Consideration should be given to the environmental factors, such as wind direction and speed, sea state and engine power available.

Approach and landing should be into wind.

When landing into waves, land head-on to oncoming waves avoiding, if possible, ditching into the face of the wave.

WARNING

As considerable error can result from estimation of height over water, the radar altimeter should be used for height cues during descent.

WARNING

Do not deploy flotation bags in flight. Bags will automatically deploy on water touchdown.

CAUTION

At high touchdown speeds, the rotorcraft may roll and turn to the left after touchdown due to gyroscopic effects. This will require pilot corrective action.

Note

After ditching the rotor brake does not function, even if the undercarriage is extended.

DITCHING PROCEDURES - AEO

1. Pre-ditching checks — Warn crew and passengers to prepare for ditching.
2. OFF/ARMED switch (FLOATS EMER panel) — Confirm ARMED. FLOAT ARM caution displayed on CAS.
3. Landing Gear — Confirm UP.

CAUTION

If the landing gear cannot be retracted, ditching with minimum forward speed is recommended.

4. Lights — At night, switch ON emergency lights and landing light.
5. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.
6. Brief — Cabin crew and occupants.
7. Radar altimeter — Verify working.
8. Windscreen wipers — Select FAST.
9. Distress procedure — Broadcast Mayday.
10. Initial point — During the approach, reduce airspeed gradually to arrive at a position 200 ft (60 m) above touchdown point with a rate of descent of no more than 500 fpm. Initiate a deceleration to achieve 30 kts at 50 ft (15 m). At 50 ft (15 m) rotate nose up to approximately 20° to decelerate.

11. Approach and hover — Continue the deceleration and descent to hover.

12. Touchdown — Enter water cushioning touchdown with collective in a level or slightly nose up attitude (5°). Avoid rearward movement of the helicopter.

13. Flotation bags — Check inflated, if not lift guard and press FLOAT override pushbutton on either Pilot or Copilot collective grip.

14. Collective — Lower collective.

15. Emergency exits — As soon as possible inform crew and passengers to jettison the emergency exits in cockpit and cabin.

16. Engines — Shut down using **ENGINE SHUTDOWN IN EMERGENCY** procedure in Basic RFM page 3-35.

17. Collective — If required gently raise collective to slow rotor.

CAUTION

Collective application will cause the helicopter to yaw left.

When rotors stationary

18. GEN 1 & 2 and BATT MASTER switches — OFF (using gang-bar).

Note

Item 19, below, is only applicable if Life Raft installed (P/N 4G2560F00711/00811/01011/01012)

19. Life Raft deployment handles — Pull Pilot and Copilot deployment handles and confirm life rafts deploy. If life rafts do not deploy, locate through sliding doors emergency exits, flap marked 'LIFE RAFT HANDLE PULL TO INFLATE' on life raft container. Open flap and pull handle to manually inflate rafts.

20. Evacuation — Evacuate the aircraft, with life preservers.

DITCHING PROCEDURES - OEI

In the event of a ditching being required following a single engine failure the approach and ditching should be carried out as follows:

1. Speed — Reduce speed (recommended 80 KIAS.

2. OFF/ARMED switch (FLOATS EMER panel) — Confirm ARMED. FLOAT ARM caution displayed on CAS.

3. Landing Gear — Confirm UP.

CAUTION

If the landing gear cannot be retracted, ditching with minimum forward speed is recommended.

4. Lights — At night switch ON emergency lights and landing light.

5. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.

6. Brief — Cabin crew and occupants.

7. Radar altimeter	— Verify working.
8. Windscreen wipers	— Select FAST.
9. Distress procedure	— Broadcast Mayday.
10. Initial point	— During the approach, reduce airspeed gradually to arrive at a point 200 ft (60 m) above touchdown point with a rate of descent of no more than 500 fpm.
11. Approach	— Initiate a deceleration to achieve 30 kts at 50 ft (15 m). At 50 ft (15 m) rotate nose up to a maximum of 20° to decelerate.
12. Touchdown	— Continue deceleration to attain landing attitude (level or 5° nose up) prior to ditching at the slowest forward speed possible (not exceeding 30 kts). Apply collective to cushion touchdown.
13. Flotation equipment	— Check inflated, if not lift guard and press FLOAT override pushbutton on either Pilot or Copilot collective grip.
14. Collective	— Lower collective.
15. Emergency exits	— As soon as possible inform crew and passengers to jettison the emergency exits in cockpit and cabin.
16. Engines	— Shut down remaining engine using **ENGINE SHUTDOWN IN EMERGENCY** procedure in Basic RFM page 3-35.

17. Collective — If required gently raise collective to slow rotor.

CAUTION

Collective application will cause the helicopter to yaw left.

When rotors stationary.

18. GEN 1 & 2 and BATT MASTER switches — OFF (using gang-bar).

Note

Item 19, below, is only applicable if Life Raft installed (P/N 4G2560F00711/00811/01011/01012).

19. Life Raft deployment handles — Pull Pilot and Copilot deployment handles and confirm life rafts deploy. If life rafts do not deploy, locate through sliding doors emergency exits, flap marked 'LIFE RAFT HANDLE PULL TO INFLATE' on life raft container. Open flap and pull handle to manually inflate rafts.

20. Evacuation — Evacuate the aircraft, with life preservers.

AUTOROTATIVE LANDING PROCEDURE ON WATER

In the event of a ditching being required following a twin engine failure the approach and ditching should be carried out as follows:

1. Collective pitch — Smoothly and rapidly reduce to enter autorotation.
2. Cyclic — Adjust to obtain autorotation speed between 80 KIAS (minimum rate of descent speed) and 100 KIAS (Best range speed).
3. Collective pitch — Adjust to obtain up to 110% NR.
4. OFF/ARMED switch (FLOATS EMER panel) — Confirm ARMED. FLOAT ARM caution displayed on CAS.
5. Landing gear — Confirm UP.

CAUTION

If the landing gear cannot be retracted, ditching with minimum forward speed is recommended.

6. Landing direction — Select and manoeuvre into wind
7. Brief — Cabin crew and occupants.
8. Radar altimeter — Verify working.
9. Windscreen wipers — Select FAST.
10. Distress procedure — Broadcast Mayday (time permitting).
11. Shutdown — If appropriate and time available carry out **ENGINE SHUTDOWN IN EMERGENCY** procedure in Basic RFM page 3-35.

12. Flare	— At approximately 200 feet (60 m) AGL, initiate a cyclic flare to a maximum 30° nose-up angle.
13. Collective pitch	— Adjust, as required, to maintain NR at 110% maximum during the flare.
14. Cyclic/Collective pitch	— At approximately 35 feet (10 m) AGL, reduce pitch attitude to 10° nose-up and apply collective pitch, as required, to achieve touchdown at approximately 300 feet per minute or less.
15. Waves	— Approach into oncoming waves, if possible.
16. Touchdown speed	— Not exceeding 30 kts.
17. Collective pitch	— Following touchdown, lower promptly.
18. Flotation equipment	— Check inflated, if not lift guard and press FLOAT override pushbutton on either Pilot or Copilot collective grip.
19. Emergency exits	— As soon as possible inform crew and passengers to jettison the emergency exits in cockpit and cabin.
20. Collective	— If required gently raise collective to slow rotor.

CAUTION

Collective application will cause the helicopter to yaw left.

When rotors stationary

21. GEN 1 & 2 and BATT MASTER switches — OFF (using gang-bar).

Note

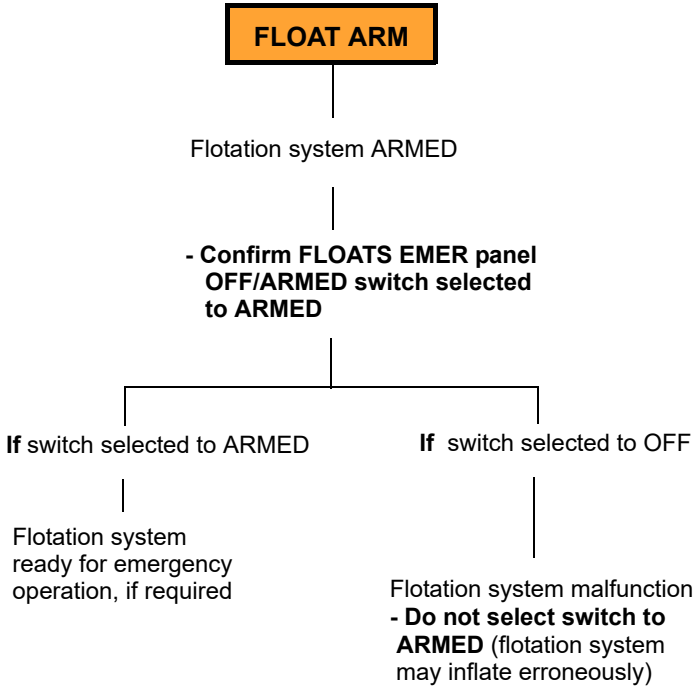
Item 22, below, is only applicable if Life Raft installed (P/N 4G2560F00711/00811/01011/01012).

22. Life raft deployment handles — Pull Pilot and Copilot deployment handles and confirm life rafts deploy. If life rafts do not deploy, locate through sliding doors emergency exits, flap marked 'LIFE RAFT HANDLE PULL TO INFLATE' on life raft container. Open flap and pull handle to manually inflate rafts.

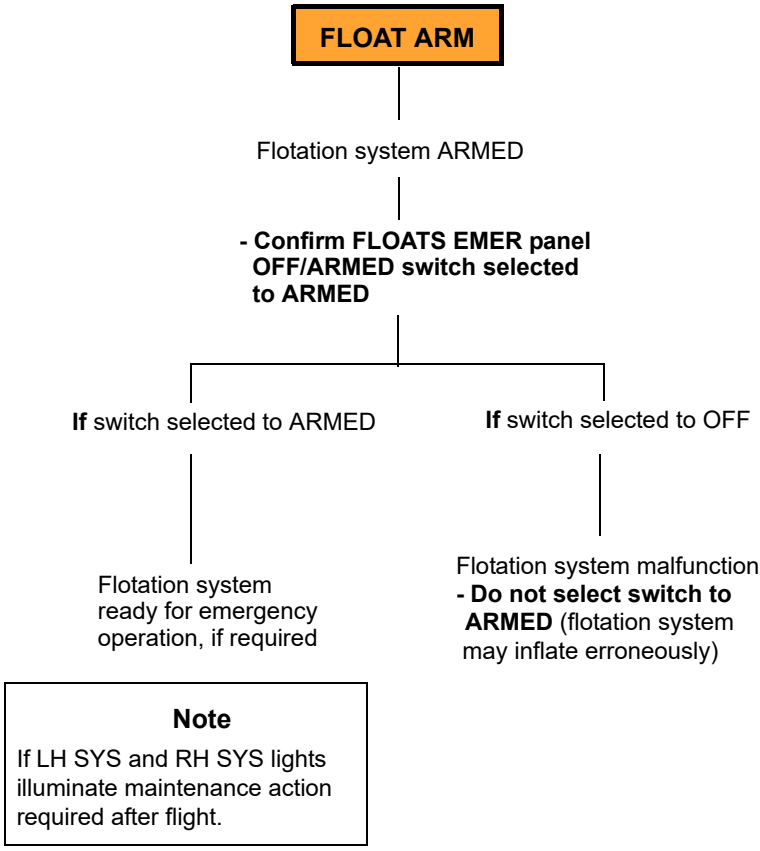
23. Evacuation — Evacuate the aircraft, with life preservers.

MALFUNCTION PROCEDURES

Flotation Arm Caution
EMER FLOATS Panel P/N 3G9560V00553



Flotation Arm Caution
EMER FLOATS Panel P/N 3G9560V00557
(and sucessive dash numbers)



SECTION 4 - PERFORMANCE DATA

No change in aircraft performance when emergency flotation equipment and life rafts are installed.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

APPROVED CABIN LAYOUTS FOR OPERATIONS OVER WATER IN ACCORDANCE WITH POINT CAT.IDE.H.320(A) OF ANNEX IV TO REGULATION (EU) NO 965/2012

Ensure:

— the rotorcraft has one emergency exit, in each side of the rotorcraft cabin, for each unit (or part of unit) of four passenger seats;

— all the emergency controls that need to be operated underwater are marked with the method of operation as well as with yellow and black stripes;

— the following placard is mounted on each emergency exit:



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Figure 6-1 Placard on each emergency exit

It is the Operators responsibility to select the cabin layouts eligible for operations over water in accordance with CAT.IDE.H.320(a) of Annex IV to Regulation (EU) No 965/2012 between those detailed in the Basic RFM and appropriate Supplements, depending on the number of emergency exits installed on each side of the rotorcraft.

Layouts not eligible for operations over water in accordance with CAT.IDE.H.320(a) of Annex IV to Regulation (EU) No 965/2012 are identified as 'High Density'.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 10

CRASH POSITION INDICATOR WITH DEPLOYABLE ELT

P/N 3G2560F00311
P/N 3G2560F00312
P/N 3G2560F00313

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SUPPLEMENT 10
CRASH POSITION INDICATOR WITH DEPLOYABLE ELT

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GENERAL INFORMATION

The Crash Position Indicator (CPI) system is a primary radio location aid to alert Search and Rescue and assist location in the event of an aircraft distress condition.

The Emergency Locator Transmitter (ELT), mounted on the left hand side of the tail cone, consists of a locator beacon containing the transmitter and antenna. The beacon, which can be manually or automatically activated, is deployed from the aircraft in the event of a crash situation, providing full emergency frequency operation at 121.5 MHz and 406.025 MHz.

The CPI system also comprises of a Beacon Release Unit, System Interface Unit, Cockpit Control Panel (mounted in the interseat console, Figure 1), water activated switch and an Aircraft Identification Device.

The ELT automatically activates during a crash or aircraft ditching and transmits the standard swept tone on 121.5 MHz until the battery power is exhausted, which will typically be 48hrs.

The 406.025 MHz transmitter sends an encoded digital message of aircraft position, as received from the GPS/FMS aircraft system via ARINC, and will operate for 24hrs.

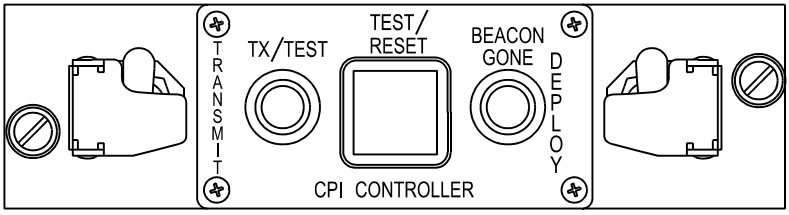

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Figure 1 CPI Control Panel

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SECTION 1 - LIMITATIONS

ELT TEST

The Self Test function of the ELT should not be carried out more frequently than a monthly check.

Operation of the Self Test function should only be carried out after the nearest Air Traffic Control establishment has been notified

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the CPI the new empty weight and center of gravity position must be determined.

No change to weight and center of gravity limitations.

SECTION 2 - NORMAL PROCEDURES

GENERAL

CAUTION

Confirm, prior to carrying out an ELT Self Test function, when the last check was carried out as, if carried out more frequently than a monthly check, battery life will be shortened.

Note

Prior to self test activation the nearest Air Traffic Control establishment should be notified as the distress signals transmitted will be considered as valid.

ELT Self Test	— On CPI CONTROLLER press the TEST/RESET button. Confirm both TX/TEST and BEACON GONE lights illuminate and the TX/TEST light flashes in synchronisation with the audio tone on VHF radio, 121.5 MHz. The lights should then extinguish.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY SITUATIONS

The activation and release of the beacon is automatic for crash conditions or ditching, however, manual operation can be carried out at the Pilot's discretion.

CAUTION

For P/N 3G2560F00311 only, if the CPI Beacon is activated manually the system no longer has the capability of being deployed either manually or automatically. To permit deployment, after manual activation, the TRANSMIT switch must be set to OFF and the guard lowered then the RESET button must be pushed.

Manual Activation of beacon transmission	— On CPI CONTROLLER, lift guard and operate TRANSMIT switch. Confirm TX/TEST light illuminates and audio tone heard.

Note

Transmission may be stopped by moving the TRANSMIT switch to the off position and pressing TEST/RESET button.

Manual Activation of beacon transmission and beacon release	— On cockpit control panel, lift guard and operate DEPLOY switch. Confirm TX/TEST and-BEACON GONE lights illuminate.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 11

EXTERNAL HOIST OPERATIONS

P/N 3G2591F00111

or

P/N 3G2591F00112

or

P/N 3G2591F00113

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SUPPLEMENT 11
EXTERNAL HOIST OPERATIONS

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DEFINITIONS AND ABBREVIATIONS

Abbreviations and acronyms used throughout this Supplement are defined as follows:

— BQRS : Backup Quick Release System

— HEC : Human External Cargo

— HO : Hoist Operator

— NHEC : Non Human External Cargo

— PCDS : Personnel Carrying Device System

— PQRS : Primary Quick Release System.

GENERAL INFORMATION

The Breeze-Eastern external hoist is available in the following configurations:

— P/N 3G2591F00111 Pendant with cable payout in feet

— P/N 3G2591F00112 Pendant with cable payout in meters

— P/N 3G2591F00113 Pendant with cable payout in feet and WTR five position switch.

The hoist is installed on the right side of the cabin (Figure 1). The external hoist kit consists of:

- an electric hoist motor and winch assembly
- a mounting frame
- a hoist light
- a step bar protection on the lower right side of the fuselage
- an electronic control system that allows the pilot to operate the hoist
- an electronic remote pendant that allows the HO to operate the hoist
- a cable payout display for the HO
- a HO-ICS system to allow communication among crew-members

- electrical components, wiring and relative hardware
- a HO safety harness
- an electrical and manual cable cutter for emergency use.

P/N 3G2591F00111 and 112 contain 245 ft (75 m) of usable cable length while P/N 3G2591F00113 contains 295 ft (90 m) of usable cable.

All versions may lower/lift a maximum load of 272 kg (600 lb).

Cargo hoisting and lowering can be controlled by the HO through the remote pendant thumb wheel (Figure 6) which provides variable cable speeds. The maximum cable speed is 45 m/min (150 ft/min) with maximum load. The pilot can also control the operation at a fixed cable speed of 30 m/min (100 ft/min) through the hoist control switch on the collective grip. (Figure 5). Both controls automatically slow down and stop the electric motor at the cable extremes. The Pilot control overrides the HO control.

The hoist is provided with a cable foul protection system which automatically stops the motor if the cable is not correctly wound onto the drum and displays the HOIST CBL FOUL caution message on the MFD.
An electrical cable cutter system (PQRS) is available to the Pilot and Copilot, via a guarded switch on the collective grips (Figure 5) and to the HO, via a guarded switch on the operator HOIST control panel mounted in the cabin (Figure 3).
The hoist kit also comprises a manual cable cutter (BQRS) and a right side cabin door step protection pad to prevent damage to the hoist cable if it contacts the step.
In the event of a failure of the electrical cable cutter system, the cable may be cut with the manual cutter installed under the HO seat or on the cabin ceiling panel or on the floor or on the cabin liner close to the HO seat.

The HO Control panel, Figure 3, is used to control the HO communication with other crew members. With HO-ICS switched to ICS the HO can use either VOX or the PTT trigger on the Pendant to speak on the aircraft intercom. With the switch selected to RADIO the HO can transmit on COM3 or COM4 only, using the Pendant HO PTT trigger.

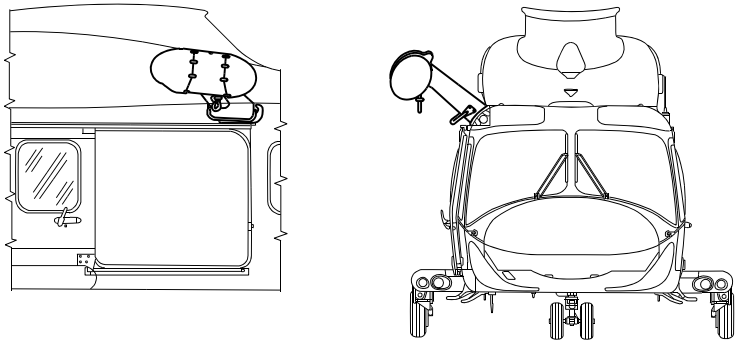

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Figure 1 Hoist Installation

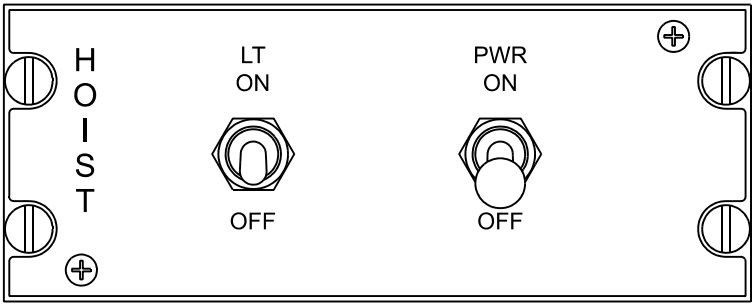

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Figure 2 Pilot Hoist Control Panel

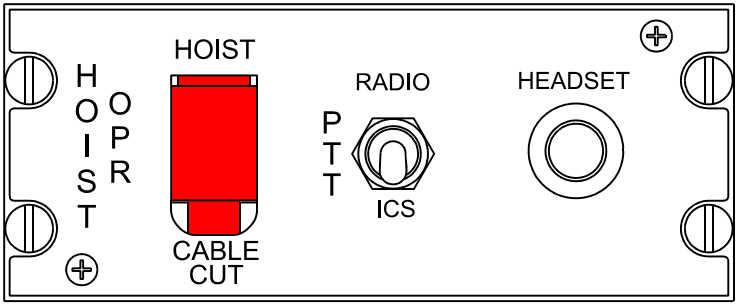

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Figure 3 Hoist Operator Control Panel

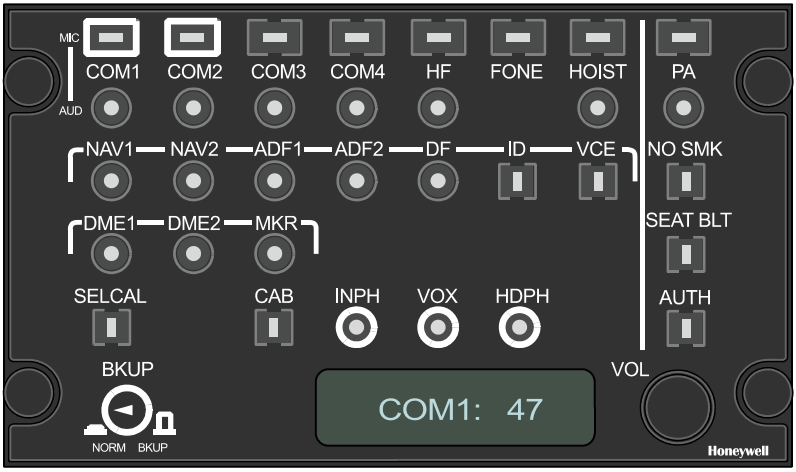

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Figure 4 HO-ICS Control Panel

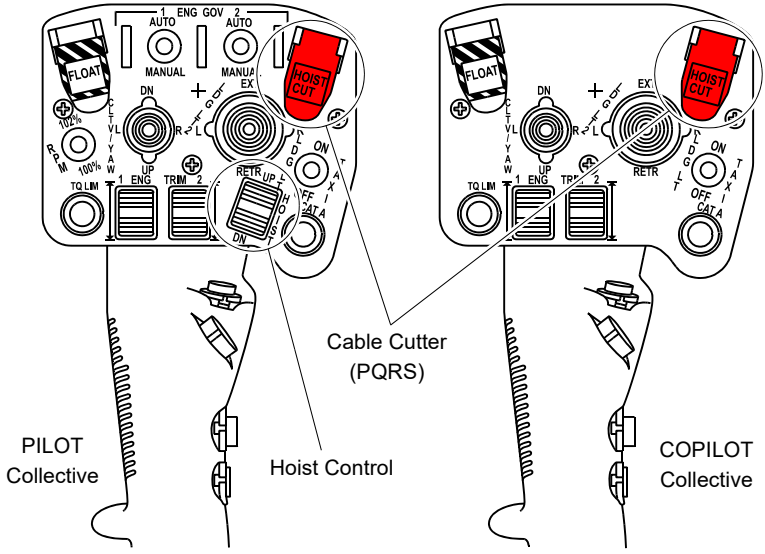

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Figure 5 Pilot and Copilot Collective Hoist Controls

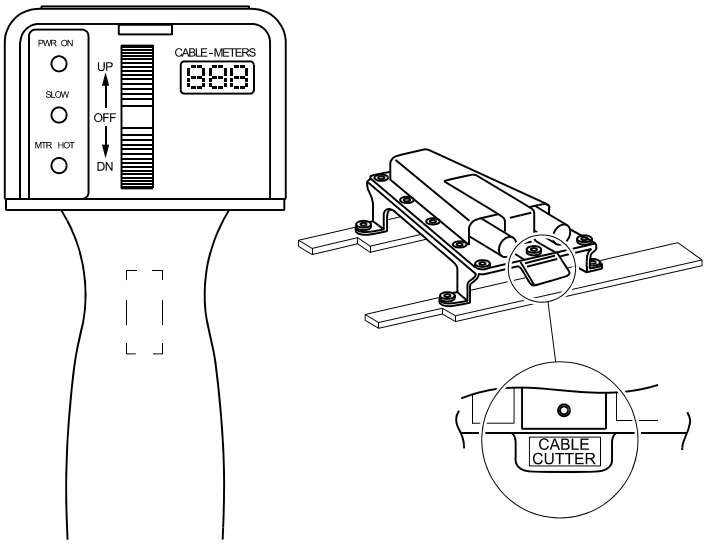

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Figure 6 HO Pendant and HO Manual Cable Cutter (BQRS) (version in meters)

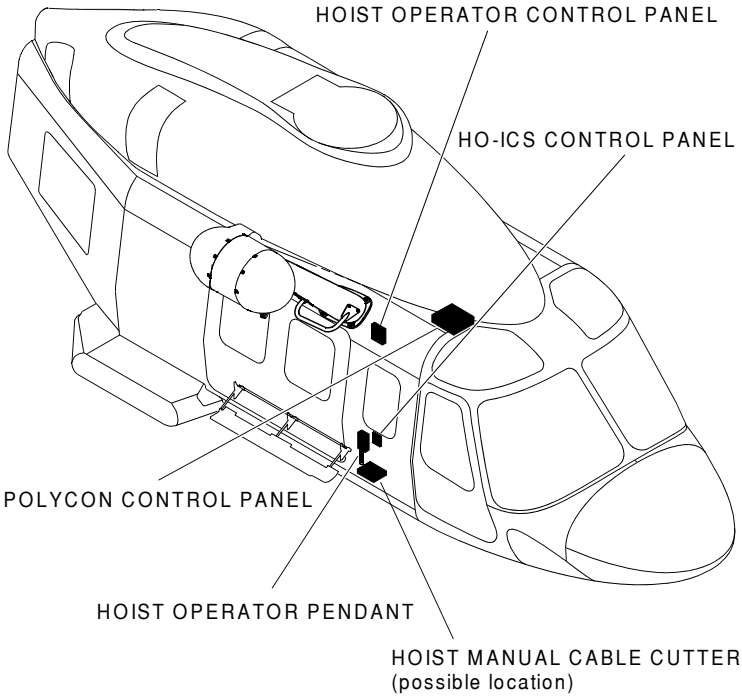

Figure 7 HO Auxiliary Equipment

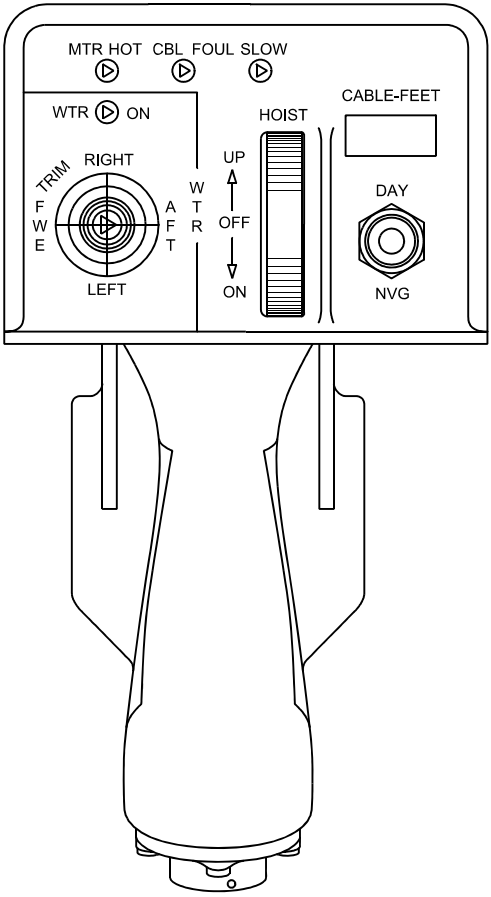

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Figure 8 HO Pendant with WTR switch
P/N 3G2591F00113

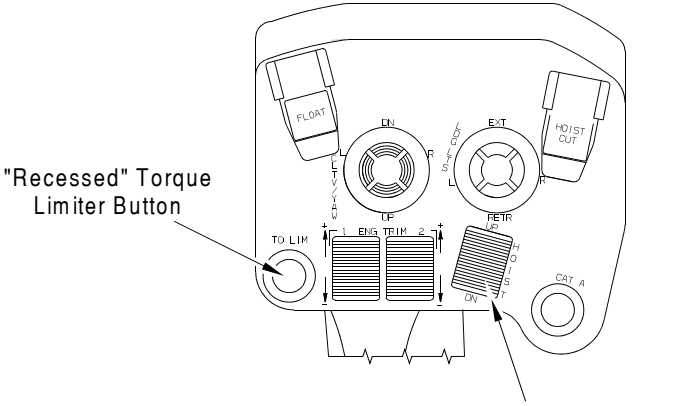
This pendant also includes a Winchman Trim Mode caption and a five position switch to give the HO limited lateral and longitudinal ground-speed control when in HOV Mode and selected by the pilot. This function is only operational if EPIC software Phase 5, or later, and SAR modes are installed. For complete information of this mode see Supplemement 69.

RADIO ICS SYSTEM

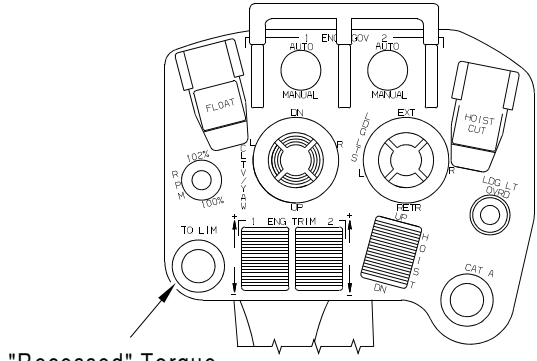
See Section 7 of Basic RFM.

OPTIONAL COLLECTIVE GRIP WITH COPILOT HOIST COMMAND

Optional collective grips, with an addition hoist cable control switch on the copilot grip for control of the hoist cable is available. This kit P/N 4G2591F00511 permits the copilot to control the hoist cable and works in parallel with the pilot control. There is no logic priority towards the pilot or copilot the first to activate the switch takes control. The 2 collectives grips also include a slightly recessed torque limiter button.



Copilot Collective with additional Hoist command



Pilot Collective

ICN-39-A-155011-G-00001-30034-A-001-01

Figure 9 Optional Collective Grips with copilot hoist command

SECTION 1 - LIMITATIONS

GENERAL

With HOIST fitted, but not used, the Limitations stated in the Basic RFM for CAT B operations and in Supplement 12 for CAT A operations are applicable.

The external hoist equipment certification approval does NOT constitute operational approval. Operational approval for external load operation must be granted by the Local Aviation Authority.

The external hoist system meets the certification requirements for HEC.

For compliance with operating rules, the AW139 is certified to CAT A engineering standards.

The HO Pendant and support must be removed when Hoist operations are not envisaged.

During External Hoist operations the number of hoist lifts must be recorded in the helicopter log-book. An External Hoist lift is defined as an unreeling and recovery of the cable with a load attached to the hook. Any operations where a load is applied for half of the operation (i.e. unreeling or recovery) must be considered as one lift.

TYPE OF OPERATION

— The hoist installation is approved for:

Lifting external loads which are jettisonable and which are lifted free of land or water

Lowering/raising NHEC or HEC in areas where landing cannot be carried out, under the following conditions:

•\ Day and Night VFR with ground visual contact.

•\ Right cabin door locked open.

— Operation of the external hoist equipment with HEC requires the use of a Personnel Carrying Device System (PCDS), which must be approved by the Local Aviation Authority. TSO-C167 provides one acceptable means of approval for such systems.

— If the operating rules require one engine inoperative hover performance capability procedures, the maximum weight is defined using the Hover OGE 2.5 min OEI charts.

— For HEC operations an approved Radio-ICS system must be installed and operated in accordance with the applicable Local Operating Regulations.

MINIMUM FLIGHT CREW

One or two pilots (see Basic RFM) and one Hoist Operator (HO).

NUMBER OF OCCUPANTS

In high density configuration the first row of seats must be limited to four.

Hoist Operator Limitations

— The HO shall be familiar with hoist operating procedures.

— The HO must be restrained by a safety harness during all phases of hoist operation and shall wear protective gloves for guiding cable during operation.

— The HO must guide the cable during hoist operation.

— The HO must always have a manual cable cutter (BQRS) available during all phases of hoist operation.

HEC FOR COMPENSATION OPERATING LIMITATIONS

— Transportation of HEC for compensation must be carried out with HEC inside the cabin.

WEIGHT AND CG LIMITATION

After installation of the External Hoist System the new empty weight and center of gravity position must be determined.

Weight

Maximum weight with hoist load ..... 6400 kg

Refer Supplement 50 Increased Gross Weight 6800 kg for limitations at weights above 6400 kg.

Weight for HEC

If the operating rules require one engine inoperative hover performance capability procedures, the maximum weight is defined using the Hover Ceiling OGE, 2.5 min OEI charts for the appropriate systems/helicopter configuration.

Refer Section 4 of this Supplement.

Longitudinal CG Limitations

No Change.

Lateral CG Limitation

Lateral C of G limitations..... Figure 1-1 & Figure 1-2

AIRSPEED LIMITATIONS

Load Lowering or Raising

Hoist operation (load raising or lowering) is permitted with helicopter in stationary hover and up to 80 KIAS in forward flight.

CAUTION

For raising (or lowering) in forward flight ensure hoist hook load is sufficient and/or provide another suitable means to maintain the cable and load clear of aircraft structure, undercarriage (if extended) and enable the HO to keep the cable entering/exiting the hoist mechanism close to vertical.

Load Deployed

Maximum airspeed for flight within ±10 degrees azimuth quadrant ..... See Figure 4-1

Maximum groundspeed for sideways and rearward flight beyond forward ±10 degrees azimuth quadrant..... See Figure 4-1

Maximum windspeed beyond forward ±10 degrees azimuth quadrant ..... See Figure 4-1

HEIGHT-VELOCITY LIMITATIONS

For the purposes of Hoist operations, Local Operating Regulations may permit that the H-V Limitations, given in the Basic RFM, need not be observed as an operating limitation. However, if the aircraft is operated within the H-V area a safe landing, following an engine failure, is not guaranteed.

ENGINE POWER TURBINE (NF %) AND ROTOR (NR %) SPEED LIMITATIONS

All Engines Operating

Approved Range for HOIST operations ..... 101 to 103

Maximum for HOIST operations 103

One Engine Inoperative

Approved Range for Hoist operations ..... 101 to 103

Maximum for HOIST operations 103

Note

Following the failure of the RPM select switch, NR/NF = 102% may also be used in cruise below 90 KIAS.

For all other Engine and Rotor Limitations see Basic RFM.

HOIST LIMITATIONS

Hoist loads may be lowered/raised within the limitations defined in the AIRSPEED LIMITATIONS, Load Lowering or Raising paragraph.

Maximum hoist load ..... 272 kg (600 lb)

Maximum hoist cable length available
P/N 3G2591F00111 & P/N 3G2591F00112 ..... 75 m (245 ft)
P/N 3G2591F00113 ..... 90 m (295 ft)

Maximum aircraft angle for hoist operations:

Pitch angle ..... -9° to +21°

Roll angle ..... ±15°

Take Off and Landing with a suspended load on hoist is prohibited.

MISCELLANEOUS LIMITATIONS

Autopilot Limitations

During hoist operations the Pilot must either:

— fly manually

or

— fly attentive when:

- 4 Axis Enhanced Flight Director is installed (Supplement 34, 67 or 69) and
- HOV and RHT (or ALT) modes are engaged

Primus HF 1050 Radio (Supplement 8)

With the cabin door open, HF 1050 radio transmissions are prohibited.

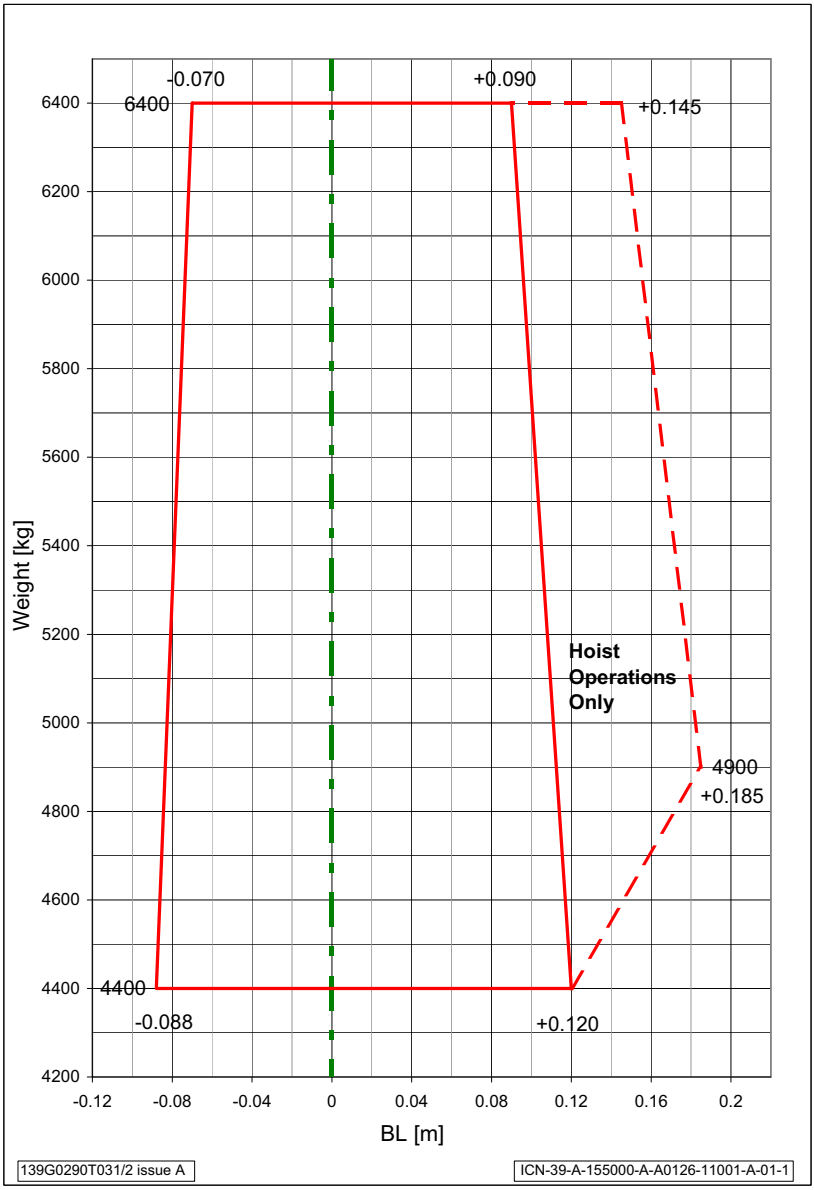


Figure 1-1 Lateral C of G Limitation for Hoist Operation

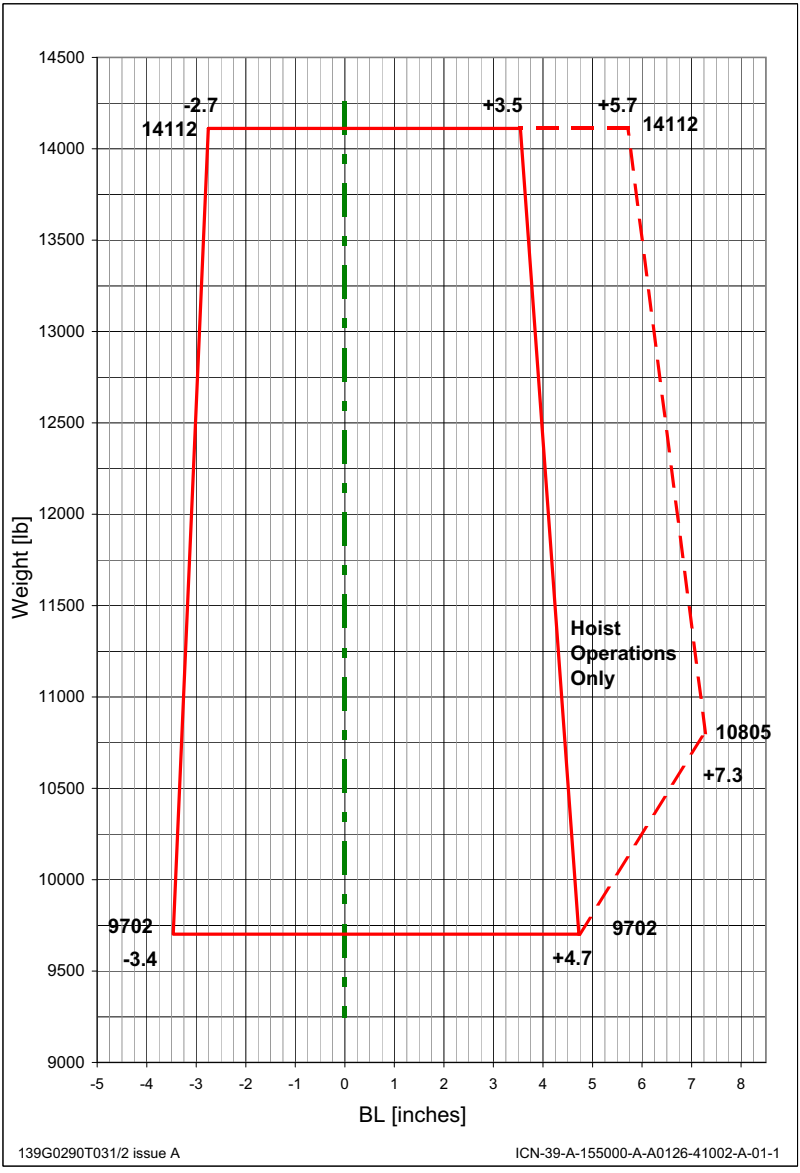


Figure 1-2 Lateral C of G Limitation for Hoist Operation (Imperial Units)

PLACARDS

MAXIMUM HOIST LOAD 272kg (600lb)

A

CAUTION

THE OPERATOR'S HAND MUST BE ON THE CABLE
AT ALL TIMES DURING HOIST OPERATION

B

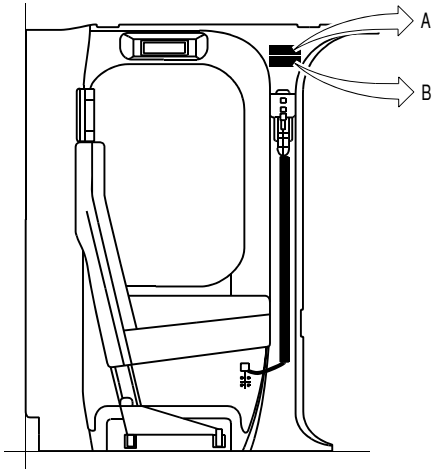


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Figure 1-3 View of Cabin with Placard Positions

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SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

AREA N°2 (Fuselage – Right Hand Side)

1. Hoist, hoist cowling and mounting — Condition, security, oil leaks.
2. Right step protection pad cover — Condition and secure.

CAUTION

Step shall be inspected to ensure the protection is not damaged. Damaged protection may lead to cable failure.

AREA N°7 Cabin and Cockpit Interior

1. HO control panel and ICS control panel — Condition.
2. Hoist control pendant — Present and condition.
3. HO harness, gloves and manual cable cutter — Present and condition.
4. Radio-ICS control panel (HEC operations) — Condition.
5. Radio-ICS portable transceiver unit (HEC operations) — Present and condition.
6. HOIST CUT pushbutton on pilot and copilot collective grip — Guard closed.
7. HOIST CUT pushbutton on HO control panel — Guard closed.

PRE START CHECKS (BEFORE THE FIRST FLIGHT OF THE DAY)

The following checks can be carried out after connection of external DC electrical power. If external DC electrical power is not available carry out these checks during aircraft SYSTEM CHECKS, after engine and rotor start:

WARNING

Illumination of the HOIST CUT ARM caution at any time when the HOIST is selected OFF or ON and all HOIST/CUT guards are down indicates a malfunction of the hoist cable cut system. The hoist is unservicable and must not be selected ON or the guards raised as the hoist cable may be cut.

1. PWR switch on pilot HOIST control panel	— ON, HOIST ON advisory illuminates on CAS Confirm HOIST CUT ARM caution not illuminated on CAS.
2. HO pendant	— Confirm green PWR ON light illuminates. Check built-in-test reading is 888.
3. HOIST CUT guard on pilot collective grip	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
4. HOIST CUT guard on copilot collective grip	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
5. HOIST CABLE CUT guard on HO control panel	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.

6. HO-ICS — Confirm correct operation.

WARNING

Protective gloves must always be worn whenever handling the hoist cable to prevent injury from possible broken cable strands.

CAUTION

Care should be taken to prevent cable damage caused by kinking when handling cable on the ground. The cable should lie onto a clean surface whenever possible.

7. HO pendant cable reel out — Rotate to DN and confirm cable lowering or raising according to thumbwheel selection.
   Confirm correct cable payout counting.

8. HOIST hook — Condition, security, freedom of rotation. Ensure that locking screws, located above hook assembly, are in place and locked by cotter pins (See Figure 2-1).

9. HO pendant cable reel in — UP, confirm hoist automatically stops when cable fully reeled in.
   Confirm zero on cable payout indicator.

Note

When reeling in the cable with no load, apply tension to cable to ensure smooth and even wrapping.

10. Hoist operation from Pilot and copilot (if fitted) collective grip switch — DN, confirm correct operation, UP, confirm hoist automatically stops when cable fully reeled in.

11. Hoist operation from Pilot and copilot (if fitted) collective grip switch — DN or UP and confirm pilot operation over-rides HO thumb wheel selection.

CAUTION

Stow hoist cable by reeling in fully to compress hook bumper. If necessary lower at least 3ft (1m) of cable before reeling in fully. Failure to follow this procedure will damage the cable.

12. Radio-ICS portable transceiver (HEC operations) — Verify transceiver and control box are set on the same frequency and confirm communication between transceiver and crew is satisfactory.
13. PWR switch on pilot HOIST control panel — OFF, HOIST ON advisory not illuminated on CAS
14. DC electrical supply — As required

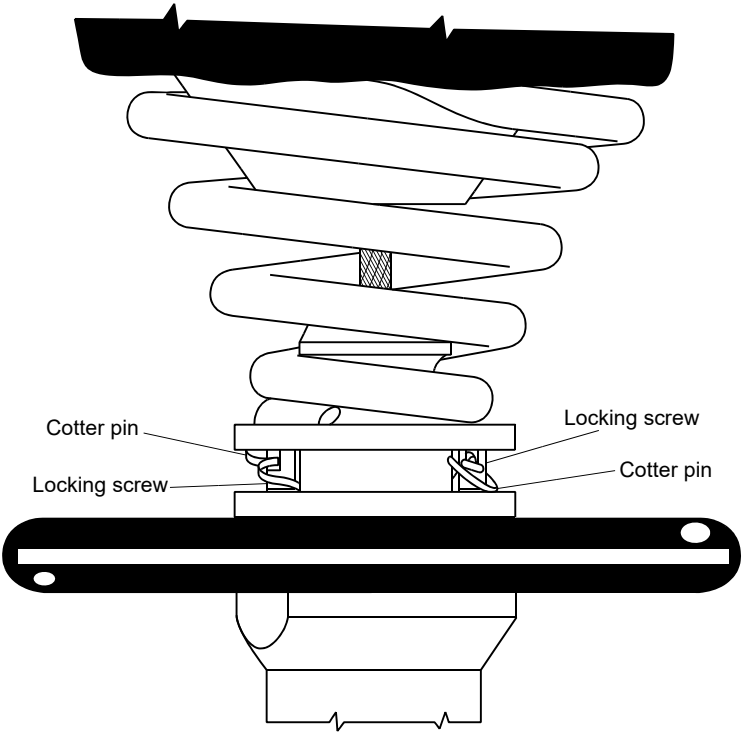

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Figure 2-1 Hook Locking Screws

IN FLIGHT PROCEDURES

Hoist Operating Procedure

1. RPM switch — Set 102%.
2. BUS TIE switch — ON.
3. PWR switch on pilot HOIST control panel — ON, HOIST ON advisory illuminates on CAS.
   Confirm HOIST CUT ARM not illuminated on CAS.

WARNING

HO must be secured to helicopter by an approved safety harness during hoist operation.

4. HOIST LT switch — As required by HO.
5. Position — Establish hover over hoist operation area.
6. Right cabin door — Open and lock.

CAUTION

During hoist operation the HO must maintain his hand on the cable and verify correct cable unwinding and rewinding.

7. HOIST control switch (pilot or copilot, if fitted) or HO thumb wheel — DN as required.
8. Cable speed (HO only) — As required.

Note

As hook nears the down or up limits hoist speed slows automatically and amber SLOW light illuminates on HO pendant.

CAUTION

Static electricity should be discharged by suitable means before ground personnel touch the hook or cable.

CAUTION

Do not allow cable to drag on ground or any other surface which may contaminate or damage the cable or hook.

9. HOIST control switch (pilot or copilot, if fitted) or HO thumb wheel — UP as required.

10. Cable speed (HO only) — As required.

11. Load Recovery — Recover load into cabin whilst hovering or in forward flight below 80 KIAS.

CAUTION

For raising (or lowering) in forward flight ensure hoist hook load is sufficient and/or provide another suitable means to maintain the cable and load clear of aircraft structure, undercarriage (if extended) and enable the HO to keep the cable entering/exiting the hoist mechanism close to vertical.

CAUTION

If load is moved, whilst extended, to a suitable location for recovery ensure adequate clearance is maintained between hoist load and obstacles.

12. Hoist — Confirm cable and hook stowed.

CAUTION

Stow hoist cable by reeling in fully to compress hook bumper. If necessary lower at least 3 ft (1 m) of cable before reeling in fully. Failure to follow this procedure will damage the cable.

13. HOIST LT switch — OFF, if used.

14. Right cabin door — Close.

15. PWR switch on pilot HOIST control panel — OFF, HOIST ON advisory extinguished on CAS.

Note

During hoist operation the HO shall record any shock loading of the cable.

16. BUS TIE switch — AUTO.

17. RPM switch — Set 100%.

LITTER HOISTING

When the use of a litter is essential, every effort should be made to land the helicopter for litter loading. Litter hoisting can be hazardous and should be carried out only when landing is not feasible. In addition to all other procedures contained herein, the following apply to litter hoisting operations.

WARNING

An empty litter suspended from hoist in open position can oscillate uncontrollably in rotor downwash and can fly upward, striking fuselage or tail rotor. If a suitable operational procedure to control the litter is not in place, hoisting of an open empty litter is prohibited.

It is recommended that prior to hoisting or lowering an empty litter, the litter shall be closed and secured with straps, when applicable. Litter should be suspended in a vertical position and sling straps should be drawn tight. Litter sling straps should be adjusted so that litter is 610 to 710 mm (24 to 28 in) below hoist hook.

Note

If litter is suspended too far below hook, litter cannot be loaded into helicopter with hoist hook at upper limit.

CAUTION

When recovering a loaded litter using the hoist it is recommended to use and anti-rotation system in order to avoid the litter spinning.

ADVISORY CAPTION DEFINITION

CAS Caption (Green)	System State
HOIST ON	Hoist power on

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SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ENGINE FAILURE IN HOVER WITH LOAD ON HOIST

See Basic RFM Section 3 for aircraft procedures.

Procedure when OEI hover performance capability is not required

1. Collective pitch — Maintain collective pitch setting or lower to maintain rotor speed.
2. Hoist Load — Raise load and recover into cabin or Emergency Jettison depending on operational conditions and type of load or transition forward (maximum 80 KIAS).

Procedures when OEI hover performance capability is required

Note

Weights defined in weight limitation charts guarantee no rotor droop/height loss in case of an engine failure.

1. Collective pitch — Maintain collective pitch setting. Hover OEI is assured with 2.5min rating.
2. Hoist Load — Raise load and recover into cabin, depending on operational conditions, or transition forward (do not exceed 2.5min rating. Maximum airspeed 80 KIAS).

Note

Time required to raise load from fully extended approximately 2 minutes.

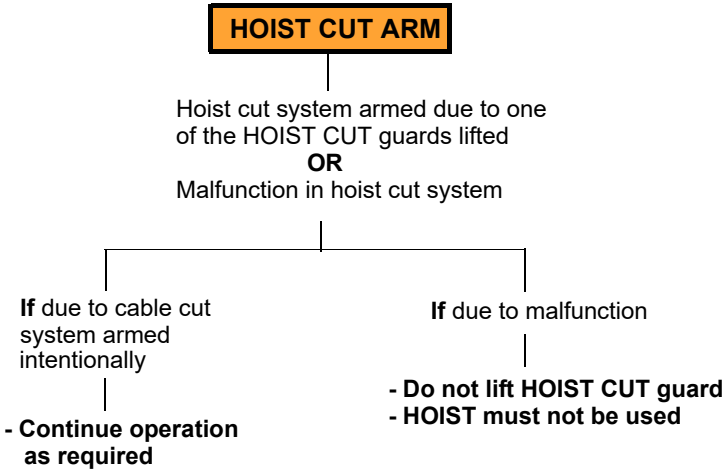
HOIST LOAD JETTISON

The hoist installation is provided with an electrical cable cut system (PQRS) operated by either pilot or copilot or HO. If an emergency condition should require the release of a hoisted load carry out the following:

1. PWR switch on pilot HOIST control panel — Confirm ON, HOIST ON advisory illuminated on CAS.
2. HOIST CUT pushbutton on pilot or copilot collective grip or HO control panel — Lift guard, HOIST CUT ARM caution illuminates on CAS. Press pushbutton.

If the electrical HOIST CUT system fails, cut cable with the manual cable cutters accessible to HO. Cut cable as close to the hoist as possible.

HOIST CUT ARM



HOIST CABLE FOUL

HOIST CBL FOUL

Hoist cable fouled
and hoist inoperative

- Proceed in forward flight with load suspended allowing adequate load clearance over obstacles

At suitable site
- Establish hover and slowly descend to lay load on ground.
- Recover cable on board manually

HOIST MOTOR OVER-TEMPERATURE

The hoist motor over temperature is indicated by an amber MTR HOT light on the HO control pendant. In the event of a motor over temperature, complete the hoist cycle and wait for the motor to cool down (indication on hoist remote control display extinguishes) before resuming the hoist operation.

CAUTION

Prolonged operation of hoist with amber MTR HOT indication on hoist remote control display will result in damaged or “burned out” hoist motor.

DOUBLE GENERATOR FAILURE

See Section 3 Basic RFM for aircraft procedures

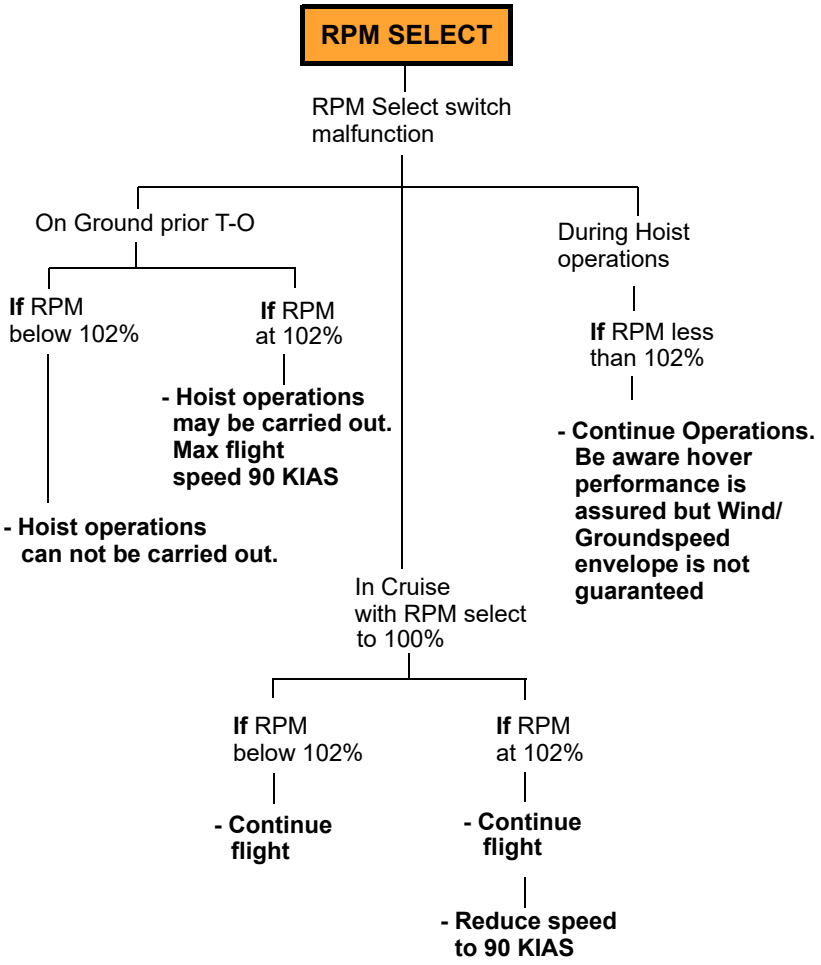
In the case of a double generator failure during hoist operation and if it is essential to recover the load into the cabin, carry out the following:

1. MAIN BATTERY switch — Confirm ON (to supply power to MAIN BUS 1 for hoist power)
2. HOIST operation — Complete recovery cycle
3. MAIN BATTERY switch — OFF or as required according to procedure in Section 3 Basic RFM.

CAUTION

The hoist recovery cycle will reduce the battery endurance time to 10 minutes.

ROTOR SPEED SELECTOR



SECTION 4 - PERFORMANCE DATA

HOVER WEIGHT FOR HOIST OPERATION

HEC Operations Requiring OEI Capability

Weight for HEC, requiring OEI hover performance capability, is Hover Ceiling OGE, 2.5 min OEI chart for the appropriate systems/helicopter configuration:

Clean Intake HEATER OFF/ECS ENVIRO OFF
See Basic RFM ..... Figure 4-14

EAPS Intake EAPS OFF
See RFM Supplement 5 .....Figure 4-8

EAPS Intake EAPS ON
See RFM Supplement 5 .....Figure 4-16

IBF installed HEATER OFF
See RFM Supplement 86 .....Figure 4-8

Note

Weights defined in the above charts guarantee no rotor droop/height loss in case of an engine failure, therefore do not lower collective.

Hover Ceiling

Hover performance of the Basic RFM or Supplement 50 (if applicable) apply.

Low Speed Envelope

— Weight for NHEC/HEC, with manoeuvre envelope as detailed in Figure 4-1, is Hover Ceiling OGE, MCP, AEO chart for the appropriate systems/helicopter configuration:

Clean Intake HEATER OFF/COND OFF
See Basic RFM ..... Figure 4-13

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT
See RFM Supplement 2 ..... Figure 4-4

Clean Intake COND ON/ECS ENVIRO A/C RECYCLE
See RFM Supplement 2 ..... Figure 4-23

Clean intake ECS ENVIRO FULL AUTO
See RFM Supplement 87 ..... Figure 4-9

EAPS Intake EAPS OFF
See RFM Supplement 5 ..... Figure 4-7

EAPS Intake EAPS ON
See RFM Supplement 5 ..... Figure 4-15

EAPS Intake EAPS OFF/ON, HEATER ON
See RFM Supplement 5 ..... Figure 4-21

IBF installed HEATER OFF
See RFM Supplement 86 ..... Figure 4-7

IBF installed HEATER ON
See RFM Supplement 86 ..... Figure 4-13

Note

Weights defined in the above charts guarantee adequate controllability margins for operation within the Wind/Ground/Air speed Azimuth Envelopes Figure 4-1.

— Weight for NHEC/HEC with manoeuvre envelope as detailed in Figure 4-2, is Hover Ceiling OGE, TOP, AEO chart for the appropriate systems/helicopter configuration. The maximum altitude permissable for hoist operations at TOP is 7000 ft Hd:

Clean Intake HEATER OFF/COND OFF
See Basic RFM ..... Figure 4-12

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT
See RFM Supplement 2 ..... Figure 4-3

Clean Intake COND ON/ECS ENVIRO A/C RECYCLE
See RFM Supplement 2 ..... Figure 4-22

Clean Intake ECS ENVIRO FULL AUTO
See RFM Supplement 87.....Figure 4-8

EAPS Intake EAPS OFF
See RFM Supplement 5.....Figure 4-6

EAPS Intake EAPS ON
See RFM Supplement 5.....Figure 4-14

EAPS Intake EAPS OFF/ON, HEATER ON
See RFM Supplement 5.....Figure 4-20

IBF Installed HEATER OFF
See RFM Supplement 86.....Figure 4-6

IBF Installed HEATER ON
See RFM Supplement 86.....Figure 4-12

Note

Operation in Hover OGE at TOP is permitted for a maximum duration of 5 minutes.

Note

Weights defined in the above charts guarantee adequate controllability margins for operation within the Wind/ Ground/Air speed Azimuth Envelopes Figure 4-2.

Note

Be aware that for hover operations using the TOP range and an autopilot height hold mode engaged (RHT or ALT) the PI limiting function will intervene at 106% PI, therefore, it is not recommended to use height hold for these conditions.

PERFORMANCE WITH HOIST INSTALLED

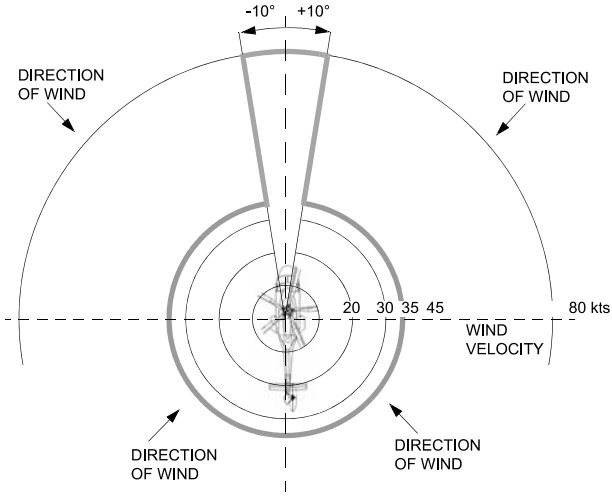
When the External Hoist Kit is installed together with one or more of the following kits:

- Snow skids installation (Supplement 19)
- Slump Pads Installation (Supplement 20)
- Searchlight installation (Supplements 29, 44, 53).

the climb performance is reduced by:

ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

Applicable up to 7000 ft Hd (2100 m Hd)



Applicable from 7000 ft Hd to 14000 ft Hd (2100 m to 4300 m Hd)

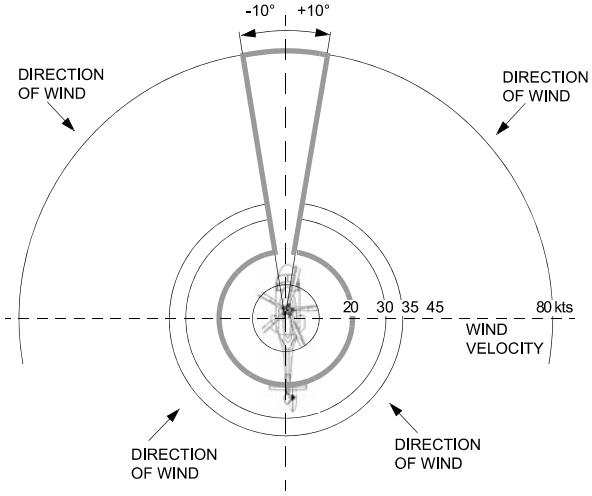


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Figure 4-1 Wind/Ground/Air speed Azimuth Envelopes for Operation at OGE with MCP, AEO

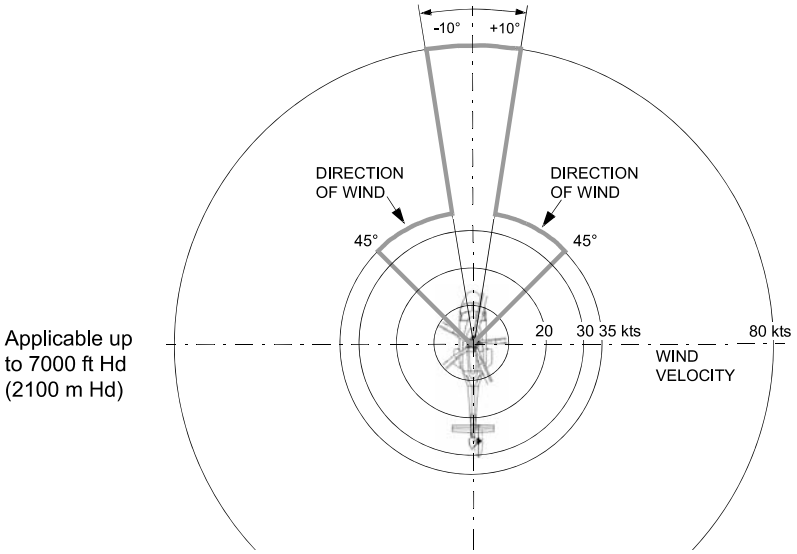

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Figure 4-2 Wind/Ground/Air speed Azimuth Envelopes for Operation at OGE with TOP, AEO

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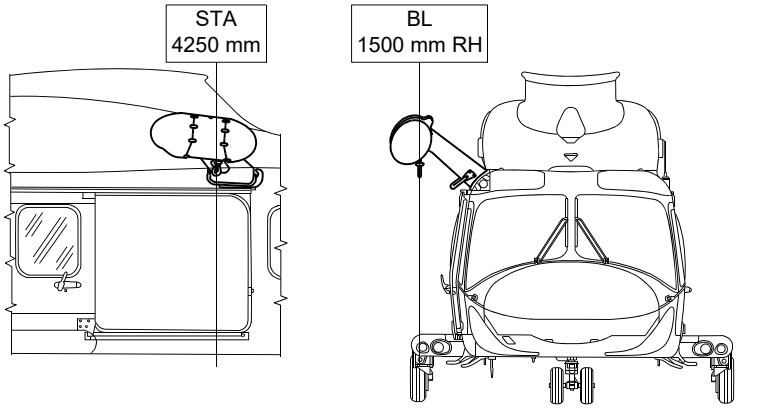
PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

When the HOIST is being operated the following Longitudinal and Lateral Moments for loads attached to HOIST hook must be used in the Weight and Balance Calculations.



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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 12

CATEGORY A OPERATIONS

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SUPPLEMENT 12
CATEGORY A OPERATIONS

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INTRODUCTION

ABBREVIATIONS

— AGL Above Ground Level
— ALS Above Landing Surface
— ATS Above Take Off Surface
— BLDP Below LDP
— BTS Below Take Off Surface
— CTO Continued Take Off
— FATO Final Approach and Take-Off Area
— GS Ground Speed
— IFR Instrument Flight Rules
— LDP Landing Decision Point
— LDP_V Variable Landing Decision Point
— LH Left Hand
— MPOG Minimum Pitch On Ground
— OEI One Engine Inoperative
— PF Pilot Flying
— RH Right Hand
— PNF Pilot Not Flying
— RoD Rate of Descent
— RTO Rejected Take Off
— TDP Take Off Decision Point
— TDP_E Extended Take Off Decision Point
— T-O Take Off
— V_{BLSS} Balked Landing Safety Speed
— V_{TOSS} Take Off Safety Speed
— V_Y Speed for Best Rate of Climb
— VFR Visual Flight Rules
— WAT Weight-Altitude-Temperature

DEFINITIONS

1. Take Off Decision Point (TDP) — The first point. in the Take-Off path from which a CTO capability is assured and the last point from which a RTO is assured, within the rejected take off distance.

2. Landing Decision Point (LDP) — The last point, in the approach landing path, from which it is possible either to land on a predetermined area or accomplish a Balked Landing.

3. Continued Take Off distance — The horizontal distance from the start of the take off procedure to a point at least 35 ft (10 m) ATS where V_{TOSS} and a positive rate of climb are attained following an engine failure at or after TDP.

4. Rejected Take Off distance — The horizontal distance from the start of the take off procedure to a point where the helicopter lands and stops safely following an engine failure prior to TDP.

5. Take-Off path — The path from the point of commencement of the take off procedure to the point at which the helicopter is 1000 ft (300 m) ATS. This is composed of two segments, PATH 1 and PATH 2.

6. PATH 1 — The segment between the end of the CTO distance (or BL distance) to a height of 200 ft (60 m) ATS during an OEI 2.5 min power climb at V_{TOSS} (or V_{BLSS}) and for a minimum ROC of 100 fpm.

7. PATH 2 — The segment between 200 ft (60 m) ATS and 1000 ft (300 m) ATS during an OEI MCP power climb at V_Y and for a minimum ROC of 150 fpm.

8. PATH 1 & PATH 2 (PATH 1 & 2) — The segment between the end of the CTO distance (or BL distance) to a height of 1000 ft (300 m) ATS during an OEI 2.5 min power climb at 60 KIAS for a minimum ROC of 600 fpm.

9. Take Off Safety Speed (V_{TOSS}) or Balked Landing Safety Speed (V_{BLSS}) — The airspeed at which the scheduled climb gradient OEI can be achieved.

10. Landing distance — The horizontal distance required to land and come to a complete stop from a point 50 ft (15 m) ATS.

11. Balked landing distance — The horizontal distance from the LDP to the point at least 35 ft (10 m) ATS where V_{BLSS} and a positive rate of climb are attained following an engine failure before LDP.

12. Back Up distance — The horizontal distance from the start of the Take-Off to the TDP during a Back Up Take-Off procedure.

13. Elevated Heliport — A heliport which is at least 3 m (10 ft) above the surrounding surface.

14. Helideck — A Heliport located on a floating or fixed Offshore structure.

15. Heliport — A defined area of land or structure intended to be used for the arrival and departure of helicopters.

16. FATO — A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced and, includes the rejected take-off area available.

GENERAL INFORMATION

This Supplement defines the procedures and performance for Category A Operations. The Supplement is divided into twelve separate parts as follows:

— **Part A - Ground Level and Elevated Heliport/Helideck Vertical Take-Off Procedures**

— **Part B - Short Field Take Off Procedures**

— **Part C - Ground Level and Elevated Heliport/Helideck Back-Up Take-Off Procedures**

— **Part D - Confined Area Take-Off Procedure**

— **Part E - Offshore Helideck Take-Off Procedure**

— **Part F - Clear Area Take-Off Procedures**

— **Part G - Ground Level and Elevated Heliport/Helideck Landing Procedures**

— **Part H - Confined Area Landing Procedure**

— **Part I - Offshore Helideck Landing Procedure**

— **Part J - Clear Area Landing Procedures**

— **Part K - Common Performance Data (Power Check, PATH 2 Gradient)**

— **Part L - Category A Training Procedures**

Parts A to J have the complete set of Sections specific to the particular procedure, ie. Section 1 - Limitations, Section 2, - Normal Procedures, Section 3 - Emergency and Malfunction Procedures and Section 4 - Performance.

Performance data common to all of the CAT A procedures are included in Part K Common Performance Data. This Part K comprises of Section 4 data in order to reduce duplication of the charts.

Part L has the Category A Training procedures and associated Weight Limitations for training manoeuvres using the engine training mode.

CAT A Operations for Confined Area, Offshore Helideck and Clear Area procedures are permitted at Take-Off and Landing weights up to 6800 kg. See Supplement 50 for WAT limitations and performance information for weights between 6400 kg and 6800 kg.

Aircraft fitted with EPIC Software Phase 5 or later have dedicated CAT A symbology on the PFD for the following procedures: Helipad, Elevated Helipad, Short field and Back Up. See Supplement 68 for details and Supplement 101 for CAT A Pre-Push details.

For limitations, procedures and performance information not contained in this Supplement, consult the basic RFM.

CONSIDERATIONS FOR SELECTION OF CAT A PROCEDURE

Take-Off

The Category A procedures are constructed to allow different Take-off sites to be used.

For a Ground Level or Elevated Heliport/Helideck, without obstacles in the take off flight path, the Vertical procedure with TDP fixed at 35 ft (10 m) can be used.

If, however, there are obstacles in the take off flight path, then the Vertical procedure with an Extended TDP (TDP_E) can possibly be used up to a TDP height of 70 ft (21 m) ATS to obtain the required clearance over the obstacle.

If the maximum TDP_E is not sufficient to clear the obstacle then the Heliport Back Up technique could possibly be used as this has a higher maximum TDP_E of 400 ft (122 m) ATS.

A Short Field Technique, with a vertical climb to a TDP_E up to 400 ft (122 m) AGL, is available if there is sufficient surface to carry out a Rejected Take Off.

A Ground Level or Elevated Heliport Confined Area Technique is available for Take Off from areas that do not have the required clearance in the back up path for the Heliport Back up technique but require a high TDP (up to 400 ft (122 m) ATS) to clear obstacles in the take off profile, and require the ability to carry out a Rejected Take Off back to the take off position.

An Offshore Helideck technique is specific for Elevated Offshore helidecks and the procedure can take the advantage of a drop down profile from the elevated helideck.

A Clear Area Take-Off technique, using a runway, is also available.

Landing

A heliport Landing technique is available with an LDP fixed at 50 ft (15 m) for unobstructed sites, and a Variable LDP (LDP_V) up to 400 ft (122 m) ALS, for sites with obstacles in the Balked Landing profile.

No 'Short Field' landing technique is necessary as the heliport landing technique is also valid for Short Field Take-Off WAT weights.

The Ground Level or Elevated Heliport Confined Area Landing procedure allows a steep approach to the heliport with an LDP up to 400 ft (122 m) ALS to allow clearance of obstacles in the Balked Landing profile.

The Offshore Helideck Landing technique is specific to elevated helideck and permits a landing on the helideck using a approach parallel to the helipad. With this technique a drop down below the level on the helideck can be used during the Balked Landing profile.

A Clear Area technique for operation onto a runway with a fixed LDP is also available.

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GENERAL LIMITATIONS

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SECTION 1
GENERAL LIMITATIONS

The following Limitations are applicable for all CAT A Take Off and Landing Procedures.

AIRCRAFT CONFIGURATION

The following must be present on the aircraft for Category A Training operations:

— **Service Bulletin P&WC S.B. No. 41020 (Turboshaft Engine Electronic Reprogramming/Replacement Model Application PT6C-67C)**

TYPES OF OPERATION

CAT A operations are approved under Day/Night conditions.

CATEGORY A TAKE OFF

Weather conditions must be such that external visual references exist in the FATO area and in the Take-Off distance.

CATEGORY A LANDING

Weather conditions must be such that the approach to LDP is carried out with visual references in the FATO area and in the balked landing area.

CREW LIMITATIONS

CAT A Take-Off and Landing can be carried out from the right or left hand seat.

When Take-Off or Landing is carried out from the left hand seat minimum flight crew is 2 pilots.

HEADWIND GROSS WEIGHT BENEFIT

The Gross Weight Benefit, incorporated into the W.A.T. Charts, presented in this supplement, for Headwind Component has already been factored by 50%. No further weight correction is necessary.

POWERPLANT LIMITATIONS (PWC PT6C-67C ENGINE)

Power Assurance Check

CATEGORY A operations are prohibited if the engines do not meet the power check requirements. Refer to ENGINE POWER ASSURANCE CHECK INTERVALS and procedure in SECTION 4 PAGE 4-9 of Basic RFM and PART K COMMON PERFORMANCE of this Supplement.

Power Turbine Speed (NF %)

All Engines Operating

Minimum Transient 95

Minimum 98

Continuous Operation Range ..... 98 to 101

Maximum Continuous 101

CAT A Cautionary Range, only for Take-Off and Landing below 90 KIAS ..... 101 to 103

Maximum CAT A Cautionary Range 103

Maximum Transient 106

One Engine Inoperative

Minimum Transient 85

Minimum Cautionary 90

Cautionary Range (OEI Landing Only) ..... 90 to 97

Minimum Continuous 98

Continuous Operation Range ..... 98 to 101

CAT A Cautionary Range, only for Take-Off and Landing below 90 KIAS ..... 101 to 103

Maximum CAT A Cautionary Range 103

Maximum Transient (10 seconds) 106

ROTOR SPEED LIMITATIONS

All Engines Operating

Minimum Transient..... 95

Minimum Continuous 98

Continuous Operation Range ..... 98 to 101

Maximum Continuous 101

CAT A Cautionary Range, only for Take-Off and Landing below 90 KIAS.....101 to 103

Maximum CAT A Cautionary Range 103

Maximum Transient..... 106

One Engine Inoperative

Minimum Transient..... 85

Minimum Cautionary 90

Cautionary Range (OEI Landing Only) ..... 90 to 97

Minimum Continuous 98

Continuous Operation Range ..... 98 to 101

Maximum Continuous 101

CAT A Cautionary Range, only for Take-Off and Landing below 90 KIAS..... 101 to 103

Maximum Transient (10 seconds)..... 106

Note

Following the failure of the RPM select switch, NR/NF = 102% may also be used in cruise below 90 KIAS

MISCELLANEOUS LIMITATIONS

HEATER (if fitted) must be switched OFF for Take-Off and Landing.

ECS ENVIRO system (if fitted) the ECS CONTROL switch must not be selected to FULL AUTO or MAN HEAT for Take-Off and Landing.

PART A
GROUND LEVEL AND ELEVATED HELIPORT/HELIDECK VERTICAL TAKE-OFF PROCEDURES

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Part A
Ground Level and Elevated Heliport/ Helideck
Vertical Take-Off Procedures

SECTION 1A - LIMITATIONS

HELIPORT / HELIDECK SIZE

Minimum demonstrated heliport/helideck size .....15 m x 15 m
(50 ft x 50 ft)
or Diameter 15 m (50 ft)

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake..... Figure 4A-3

Weight Limitation, EAPS OFF..... Figure 4A-4

Weight Limitation, EAPS ON..... Figure 4A-5

Weight Limitation, IBF Installed..... Figure 4A-5A

AIRSPEED LIMITATIONS

Take-Off Safety Speed (V_{TOSS}) .....40 KIAS

Best Rate of Climb Speed (V_Y) .....Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)
..... Above 10000 ft Hp 70 KIAS
(Above 3000 m Hp 70 KIAS)

GROUND SPEED LIMITATIONS

Maximum GS with PARK BRAKE ON.....5 kts
(9 km/hr)

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A Take-Off ..... 14000 ft (4270 m) Hp or Hd whichever comes first

Maximum Altitude for CAT A Take-Off with TDP_E ..... 7000 ft (2130 m) Hp or Hd whichever comes first

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s).

Take-Off with tail wind component is prohibited.

SECTION 2A - NORMAL PROCEDURES

TAKE-OFF DECISION POINT HEIGHT (TDP)

TDP ..... 35 ft (10 m) ATS

TDP_E ..... 35 ft to 70 ft ATS
(10 m to 21 m ATS)

CONTINUED TAKE-OFF HEIGHTS

Minimum height during CTO ..... 15 ft or (TDP_E - 20 ft) ATS
(5 m or (TDP_E - 6 m) ATS)

Height at end of CTO distance ..... TDP or TDP_E

Note

Radar Altimeter heights are shown in the flight path profiles.
Refer to Barometric altimeter for Elevated Heliport/Helideck or when obstacles are present in the Take-Off flight path.

TAKE-OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand pilot should monitor engine and rotor parameters.

VERTICAL TAKE-OFF PROCEDURE FOR GROUND LEVEL, ELEVATED HELIPORT/HELIDECK

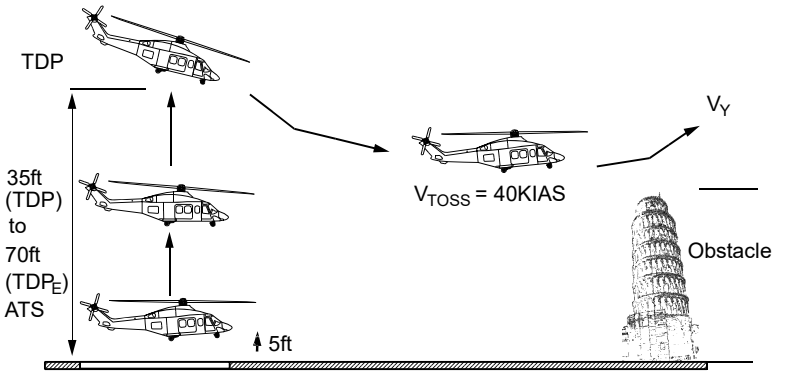

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Figure 2A-1 Take-Off Profile Ground Level, Elevated Heliport/ Helideck

1. LDG LT & LDG LT2 switches — As required.

2. Rotor speed — Set 102% NR.

3. PARK BRAKE — Apply. Confirm PARK BRAKE ON advisory illuminated on CAS.

4. HEATER (if fitted) — Confirm SOV 1 & 2 switches selected to NORMAL.
   Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates.
   Select HTR switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.

ECS ENVIRO (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates. Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
5. Power checks	— Carry out as required in accordance with ENGINE POWER CHECKS procedure in Part K Common Performance.
6. Pilot Altimeter	— Set 0ft, or nearest 1000 ft (300 m) setting to T-O altitude, with collective at MPOG.
7. Hover	— Establish a 5 ft (1.5 m) ATS hover.

Note

In HIGE the indicated altitude, on the altimeters, will be 40 ft to 60 ft (12 m to 18 m) below the setting value. The indicated altitude automatically corrects in the climb.

8. Flight controls	— Check correct functioning.
9. MFD PWR PLANT page	— Check all parameters within normal operating limits.
10. Warnings and Cautions	— Confirm none displayed.
11. PI/NR	— Check PI's matched, NR 102%. Note PI value.

12. Collective/Cyclic Control — Increase PI by 23% above hover value (if 23% is not available, without exceeding Take Off PI, increase to 110%) in 2 seconds, and initiate a vertical climb to TDP while adjusting the pitch attitude to maintain position over the heliport/helideck.

Note

OAT conditions close to 50°C may produce ITT limited PI, in HIGE, above 87% PI. Under these conditions using 110% PI (even though the change in PI is less than 23%) will produce the required power to guarantee the CAT A performance.

13. Take-Off Decision Point (TDP) — At required TDP height rotate nose down to -10° attitude in 1 second. Maintain this attitude for 1 second then recover pitch attitude to 0° to climb and accelerate to V_{TOSS} (40 KIAS). Maintain collective position.

14. Acceleration/Climb — When V_{TOSS} (40 KIAS) is achieved adjust pitch attitude to approximately 5° nose up. Maintain collective position, continue climb and acceleration until V_y..

15. Climb — At V_y adjust attitude to stabilize speed. Continue climb.

16. Landing gear — UP (when reaching V_y but not below 200 ft (60 m) ATS).

17. NR/NF — Select 100% at V_y.

18. After Take-Off checks	— Complete.
19. Power	— Adjust collective to continue climb at V_y, utilizing up to Take-Off power, as required, to 1000 ft (300 m) ATS.
20. At 1000 ft (300 m) ATS	— Adjust collective and cyclic to continue climb at V_y or accelerate to cruise speed as required.
21. HEATER/ECS ENVIRO (if fitted)	— As required.
22. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
23. LDG LT & LDG LT2 switches	— OFF (if used).
24. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

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SECTION 3A - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Take-Off path and assume the pilot gives first priority to aircraft control and to achieve a safe flight path.

For all Take-Off procedures the following shall be observed:

1. Engine failure prior to TDP — Recognition of engine failure prior to the TDP dictates that the Take-Off be rejected

2. Engine failure at or after TDP — Recognition of the failure at or after the TDP dictates that the Take-Off be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

TAKE-OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand pilot should call out rotor speed during the engine failure procedures.

EMERGENCY PROCEDURE FOR SINGLE ENGINE FAILURE DURING TAKE-OFF

SINGLE ENGINE FAILURE RECOGNIZED IN HOVER (5 feet (1.5 m) ATS)

1. Collective — Maintain collective pitch setting or lower collective slightly if required to land.

2. Touchdown	— Increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).
3. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4. Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
5. PARK BRAKE	— As required.

SINGLE ENGINE FAILURE RECOGNIZED IN CLIMB, PRIOR TO TDP (REJECTED TAKE-OFF)

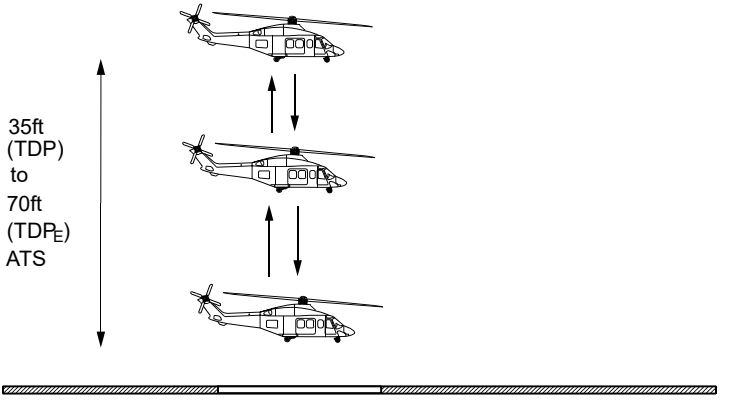

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Figure 3A-1 Ground Level, Elevated Heliport/Helideck Engine Failure before TDP

1. Collective — Adjust collective gently to stop climb and establish descent. Maintain the rotor speed close to 100%NR.
   - When left hand pilot flying, right hand pilot call out rotor speed.

2. Cyclic — Adjust pitch attitude as required to maintain position over the helipad.

3. Touchdown — At approximately 5-10 ft (1.4-3 m) ATS increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).

4. Landing — After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.

5. Engine — On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

6. PARK BRAKE — As required.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER TDP (CONTINUED TAKE-OFF)

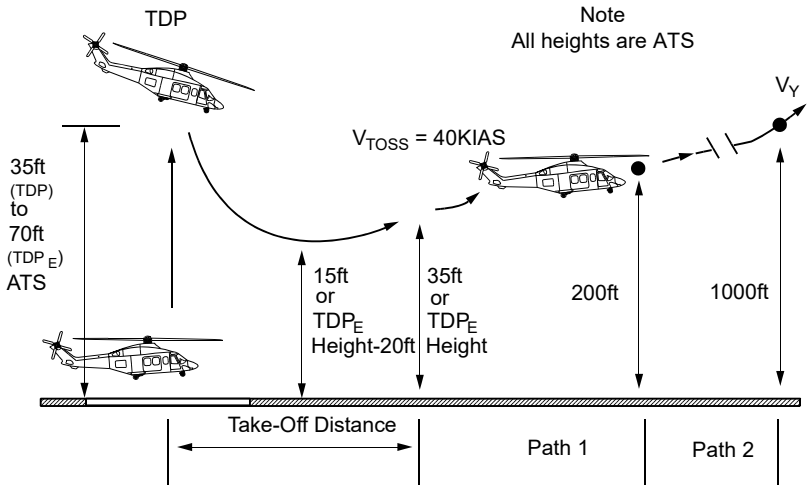

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Figure 3A-2 Ground Level, Elevated Heliport/Helideck Engine Failure at/after TDP

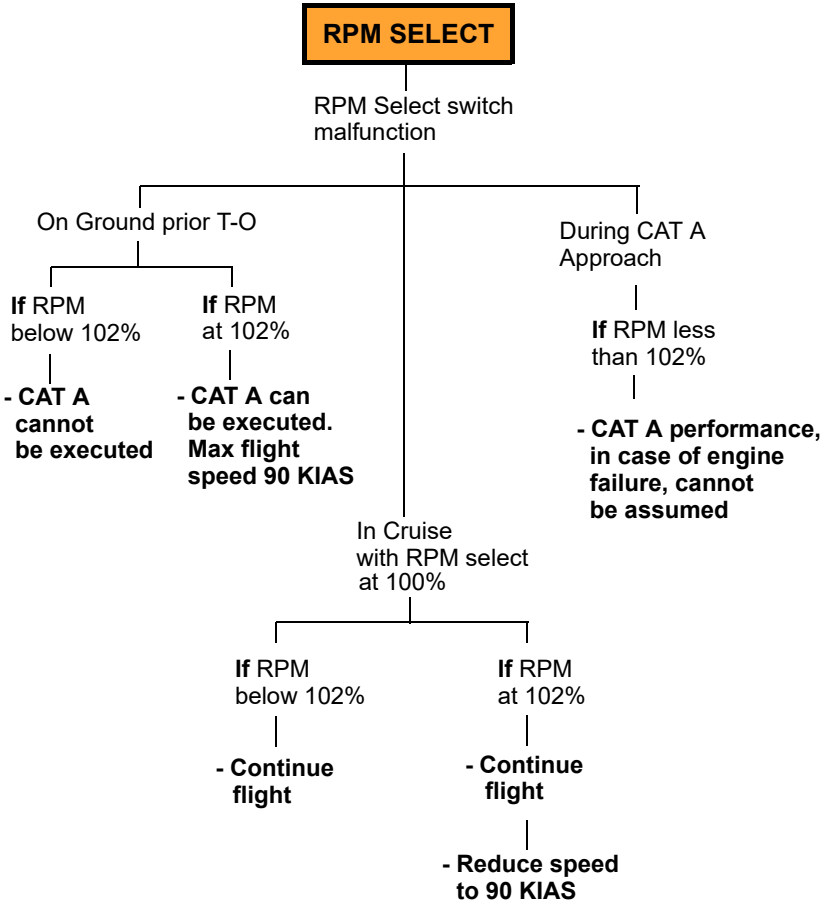
1. Collective/Cyclic control — Rotate nose down to -10° in 1 second. Maintain for 1 second. Then recover pitch attitude to 0° in 1 second. Maintain 0° while using collective to droop NR to minimum of 90% and to set 2.5 min power.
   - When left hand pilot flying, right hand pilot call out rotor speed.

2. Acceleration/climb — Maintain pitch attitude at 0° and continue the acceleration up to V_{TOSS} (40 KIAS).

3. Climb	— When the aircraft achieves V_{TOSS} (40 KIAS) and a positive rate of climb, adjust pitch attitude to approximately 5° nose up and lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) ATS, with 2.5 min power.
4. At 200 ft (60 m) ATS	— Continue climb and accelerate to Vy using 2.5 min power rating. After achieving Vy, continue to 1000 ft ATS reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
5. Landing gear	— UP (when reaching V_y).
6. Rotor Speed	— Select 100% at V_y.
7. At 1000 ft (300 m) ATS	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
8. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
9. MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



SECTION 4A - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind Component computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

The Ground Level and Elevated Heliport, Helideck Vertical Procedure Weight Limitations charts are shown in Figure 4A-3 to Figure 4A-5 and Figure 4A-5A.

CONTINUED TAKE OFF DISTANCE OEI

The Continued Take Off distance is shown in Figure 4A-6 and is valid for a clean intake, EAPS ON and OFF or IBF Installed. This represents the horizontal distance from the start of the Take-Off to a point at least 35 ft (11 m) ATS, or TDP_E height, at V_{TOSS} and positive rate of climb.

The Distance Correction incorporated into the “Heliport CTO Distance OEI” chart for Headwind Component has already been factored by 50%.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power OEI is shown in Figure 4A-8 to Figure 4A-31 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from the end of the CTO distance to a height of 200 ft (60 m) ATS.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

These charts apply from 200 ft ATS to 1000 ft (60 m to 300 m) ATS.

CLIMB PERFORMANCE

Rate Of Climb OEI at V_Y

The ROC, at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS installed.

EXTENDED TDP_E (35 FT TO 70 FT) CALCULATIONS

TDP_E height, necessary to safely clear an obstacle positioned along the Take-Off path, is calculated from known Continued Take-Off distance, distance and height of the obstacle from Take-Off point.

TDP_E FOR OBSTACLE WITHIN CTO DISTANCE

The diagram below demonstrates the process necessary to calculate the TDP_E. A Take-Off procedure with a TDP of 35 ft (11 m) ATS would guarantee a minimum height of 15 ft (5 m) ATS. However, for obstacle clearance this height must be increased by a value dictated by Operational Rules.

If the obstacle is within the CTO distance for the Gross Weight and Ambient conditions then the minimum TDP_E height can be calculated where:

D_{CTO} = Continued Take-Off Distance (ft)

D_O = Distance from Take-Off point to Obstacle (ft)

H_O = Height of Obstacle (ft)

H_C = Required clearance height above Obstacle (ft)

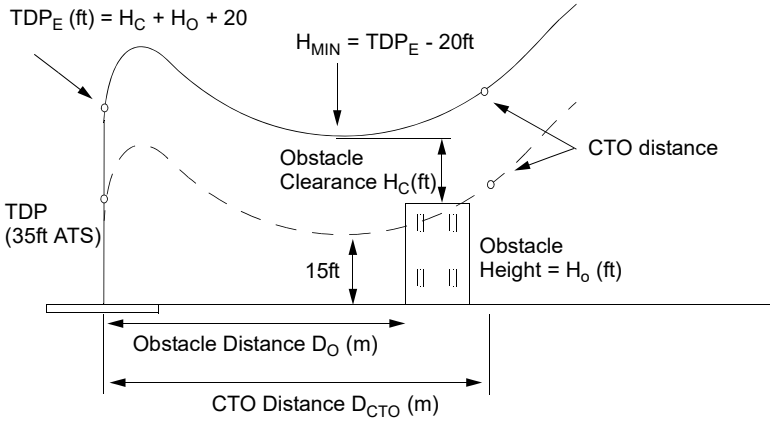


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Figure 4A-1 Example of Obstacle within CTO Distance

For an obstacle within the CTO distance, then D_{CTO} is greater than $D_{O,}$ to calculate TDP_E required:

H_{MIN} = TDP_E - 20 ft = H_O + H_C

TDP_E (ft) = H_C + H_O + 20 (Maximum TDP_E = 70 ft ATS)

If the maximum TDP_E does not allow clearance of the obstacle by the required H_C, the Back-Up procedure, with TDP_E up to 400 ft should be adopted.

TDP_E FOR OBSTACLE AFTER CTO DISTANCE

If the obstacle is after the CTO distance and in the PATH 1 (up to 200 ft ATS), then obstacle clearance can be achieved by a TDP_E or a reduction in Gross Weight (which will increase the PATH 1 climb gradient) or a combination of TDP_E and reduction in Gross Weight. The relative effectiveness of TDP_E or PATH 1 gradient change will depend on the distance of the obstacle.

A number of iteration may be required to optimize the TDP_E and Gross Weight.

The diagram below demonstrates the procedure necessary to calculate the changes where:

D_{CTO} = Continued Take-Off Distance (ft)

D_O = Distance from Take-Off position to Obstacle (ft)

H_O = Height of Obstacle (ft)

H_C = Required clearance height above Obstacle (ft)

H_1 = Height at end of CTO, first iteration

D_1 = First iteration Obstacle distance from end of CTO distance
$D_O - D_{CTO1}$

HGD_1 = (Height gained in 100 ft / 100 ft) x D_1, first iteration

H_2 = Height at end of CTO

D_2 = $D_O - D_{CTO2}$, second iteration

THG = Total height gained (ft)

CGD = PATH 1 OEI climb gradient

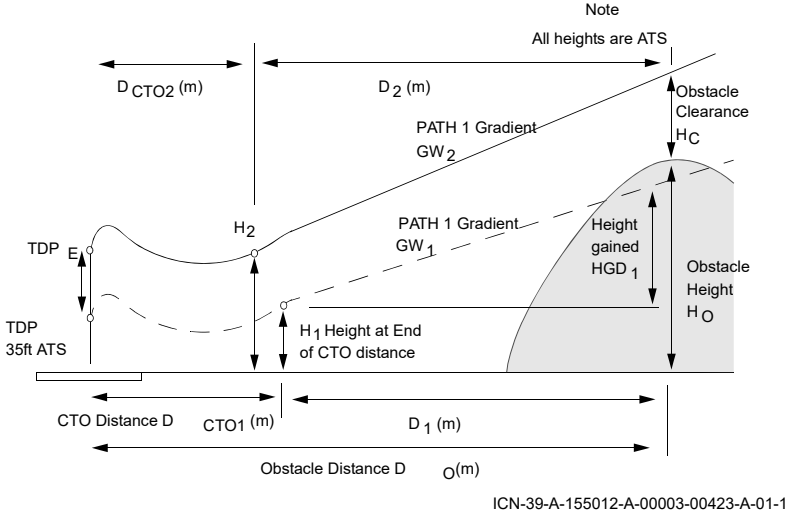

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Figure 4A-2 Example of Obstacle after CTO Distance

First, calculate aircraft height at obstacle distance when using the minimum TDP (35 ft) and the climb gradient for desired Gross Weight (GW_1)

$THG = H_1 + HGD_1$

THG must be equal or greater than **$(H_O + H_C)$**

If **THG** is less than **$(H_o + H_C)$** proceed as follows:

Assume $H_2 = TDP_E$ max (70 ft ATS)

Establish the CGD_1 required to clear the obstacle by H_C as:

$CGD = (H_o + H_c - H_2) \times 100 / D_1$

Establish GW_2, which allows the required CGD, from the 'PATH 1 Gradient' charts (Figure 4A-8 to Figure 4A-25) by entering the charts with Headwind, CGD, Hp & OAT.

Note that the above calculation is conservative because the CTO Distance has remained D_{CTO1} which is associated to GW_1 that is higher that GW_2.

If there is no GW which allows the required CGD, or if the weight is too low, the Back-Up procedure, with TDP_E up to 400 ft, should be adopted.

For obstacles in the PATH 2 then a similar procedure must be carried out for the PATH 2 climb gradient which commences at 200 ft ATS.

EXAMPLES

The following are examples of an Extended TDP calculation for an obstacle within the Continued Take-Off Distance profile.

Note

The examples below use all distances in feet, however, the charts also include distances in meters. Care must be taken when using the charts to ensure the correct units are used.

EXAMPLE 1 - OBSTACLE WITHIN THE CTO DISTANCE

Determine the aircraft Maximum Take-Off Weight and TDP height necessary to clear an obstacle within the CTO distance profile for EAPS OFF configuration.

Data:

— Altitude = 4000 ft Hp

— Temperature = 15° C

— Obstacle Height (H_O) = 13 ft ATS

— Obstacle Distance from Take-Off Point (D_O) = 328 ft (100 m)

— Required Obstacle clearance height (H_C) = 35 ft

— Headwind Component = 10 kts

Solution

Using the Ground and Elevated Heliport Vertical W.A.T. chart, Figure 4A-4, on the Pressure Altitude axis from 4000 ft move right to intercept the 15° C line (interpolated between 10° C and 20° C lines), drop down to the junction of the two graphs. Follow the Headwind Component curves until intercepting the 10 kts line, drop vertically from this point to the Gross Weight axis for a weight of 6200 kg.

Using the Heliport Continued Take-Off Distance chart, Figure 4A-6, on the Pressure Altitude axis from 4000 ft move up to intercept the 15° C line (interpolated between 10 and 20° C lines) move right horizontally to intercept the Gross Weight line at 6200 kg, rise vertically to Distance for a CTO Distance of 1200 ft. Continue horizontally to intercept the Reference Line then rise vertically to the Distance Correction axis for a correction of -20. This is then multiplied by the Headwind Component to get the distance correction -20 x 10 = -200 ft.

Applying this correction D_{CTO} = 1200 - 200 = 1000 ft

D_{CTO} is greater than D_O. The obstacle is confirmed inside the CTO distance and cannot be cleared adopting the TDP = 35 ft. Therefore the TDP_E needs to be defined as follow:

$TDP_E = H_C + H_O + 20$

$TDP_E = 35 + 13 + 20 = 68$ ft

A TDP_E = 68 ft ATS is required to clear the obstacle with a minimum guaranteed clearance of 35 ft.

The TDP_E may also be defined approximately using Figure 4A-7. Calculate the sum of obstacle height H_O and required clearance H_C.

$H_C + H_O = 13 + 35 = 48$ ft

Enter the table Figure 4A-7 to find the height which is closest to, but above, the height calculated of 48 ft. From the Table in the Min height AGL/ATS column find 50 ft and moving left to a TDP_E of 70 ft ATS.

EXAMPLE 2 - OBSTACLE POSITIONED AFTER THE CTO DISTANCE

Determine the aircraft Maximum Take-Off Weight and TDP height necessary to clear an obstacle in the Path 1 profile for a Clean Air Intake.

Data

— Altitude = 4000 ft Hp

— Temperature = 15° C

— Obstacle Height (H_O) = 230 ft ATS

— Obstacle Distance from Take-Off Point (D_O) = 2000 ft (610 m)

— Required Obstacle Clearance height (H_C) = 35 ft

— Headwind Component = 5 kts

Solution

Step 1: Using the W.A.T., Figure 4A-3, on the Pressure Altitude axis from 4000 ft move right to intercept the 15° C line (interpolated between 10° C and 20° C lines), drop down to the junction of

the two graphs. Follow the Headwind Component curves until intercepting the 5 kts line, drop vertically from this point to the Gross Weight axis for a weight of 6200 kg.

Determine H_1 for a TDP of 35 ft using Table, Figure 4A-7. Enter the first column at 35 ft move right to the third column for a value of H_1 = 35 ft.

Using the Heliport CTO Distance chart, Figure 4A-6, on the Pressure Altitude axis from 4000 ft move up to intercept the 15° C line (interpolated between 10 and 20° C lines), move right horizontally to intercept the Gross Weight line at 6200 kg, rise vertically to Distance Correction for a CTO Distance of 1200 ft. Continue horizontally to intercept the Reference Line then rise vertically to the Distance Correction axis for a correction of -20. This is then multiplied by the Headwind Component to get the distance correction -20 x 5 = -100 ft

Applying this correction D_{CTO} = 1200 - 100 = 1100 ft

Calculate the distance from the D_{CTO} to the Obstacle

$D_1 = D_O - D_{CTO1}$

D_1 = 2000 ft - 1100 ft = 900 ft

D_{CTO} is shorter than D_o, the obstacle is confirmed outside the CTO distance.

To calculate the Mean Height Gained in 100 ft Horizontal Distance for a Gross Weight of 6200 kg it is necessary to interpolate between Figure 4A-12 for 6000 kg and Figure 4A-13 for 6400 kg. For 6000 kg chart, on the Pressure Altitude axis for 4000 ft move horizontally to intercept the 15° C line (interpolated between 10° C and 20° C), drop down to baseline and follow the curves. At the intercept with the 5 kts Headwind Component horizontal line drop vertically to obtain a value of 20 ft Mean Height Gained. Repeating the procedure for 6400 kg chart gives 15 ft Mean Height Gained. Interpolating for 6200, (20 ft+15 ft)/2 = 17.5 ft Mean Height Gained in 100 ft of Horizontal Distance rounded to 17 ft.

$$HDG_1 = (\text{Mean Height gained in 100ft}) \times \frac{D_1}{100}$$

$$= 17 \times \frac{900}{100} = 153 \text{ ft}$$

Total Height at obstacle THG = H_1 + HDG_1 = 35 +153 = 188 ft

The difference between the H_O and THG with a TDP (35 ft) is:

THG - H_O = 188 - 230 = - 42 ft

The Take-Off profile produces a trajectory 42 ft below the top of the obstacle.

To give an obstacle clearance H_C = 35 ft the aircraft height at the obstacle distance must be increased by **42 + 35 = 77 ft**.

Therefore the TDP_E would have to be **TDP(35ft) + 77 ft = 35 + 77 = 102 ft**. The maximum TDP_E for this procedure is 70 ft ATS, therefore the obstacle cannot be cleared.

Step 2: To increase the height at the obstacle distance using the maximum TDP_E (70 ft ATS) the Gross Weight may be reduced to increase the height gained during the PATH 1 climb.

Calculate the OEI CGD required to obtain **H = (H_O+H_C) = 265 ft** at the obstacle as follows:

$$CGD = (H - TDP_E) / \frac{(D_O - D_{CTO})}{100}$$

$$= (265\text{-}70) / \frac{(2000 - 1100)}{100} = 22 \text{ ft per 100 ft of horizontal distance}$$

Figure 4A-11, applicable to GW_1 = 5600 kg, Hp = 4000 ft, OAT = 15° C and Headwind Component = 5 kts, gives a CGD_1 = 25 ft for every 100 ft horizontal distance.

Figure 4A-12, applicable to GW_2 = 6000 kg gives, for the same atmospheric conditions CGD_2 = 20 ft for every 100 ft horizontal distance.

The weight, GW, which gives CGD = 22 ft may be obtained by the relationship:

$$GW = \frac{(GW_2 - GW_1)}{(CGD_1 - CGD_2)} \times (CGD_1 - CGD) + GW_1$$

$$= \frac{400}{5} \times 3 + 5600 = 5840 \text{ kg}$$

Therefore for a reduced Gross Weight of 5840 kg and TDP_E of 70 ft the obstacle is cleared with required margin. However, the height at the obstacle must also be checked.

Repeating the procedure with new Gross Weight $GW_1$of 5840 kg, ie:

Confirmation of the Weight Limitation is not required as the Gross Weight is less than the maximum for the ambient conditions.

Using the Table, Figure 4A-7, the H_2 height for a TDP_E of 70 ft gives a height of 70 ft.

Using the Heliport CTO Distance chart, Figure 4A-6, on the Pressure Altitude axis from 4000 ft move up to intercept the 15° C line (interpolated between 10 and 20° C lines) move right horizontally to intercept the Gross Weight line at 5840 kg, rise vertically to Distance axis for a CTO Distance of 1050 ft. Continue horizontally to intercept the Reference Line then rise vertically to the Distance Correction axis for a correction of -19.5, rounded to -20. This is multiplied by the Headwind Component -20 x 5 = -100 ft.

Applying this correction $\mathbf{D_{CTO2} = 1050 - 100 = 950 \text{ ft}}$

$\mathbf{D_2 = D_O - D_{CTO2}}$

= 2000 ft - 950 ft = 1050 ft.

The Mean Height Gained in 100 ft Horizontal Distance required to clear the obstacle corresponding to GW =5840 was 22 ft.

Calculating:

$$HDG_1 = \text{Height gained in 100 ft} \times \frac{D_2}{100}$$

$$= 22 \times \frac{1050}{100} = 231 \text{ ft}$$

Total Height at obstacle THG = H_1 + HDG_1

= 70 +231 = 301 ft

The difference between the obstacle height and aircraft height with a $TDP_{E(70)}$ and Gross Weight of 5840 kg is **301 - 230 = 71 ft.** The aircraft, in OEI, will be 71 ft above the top of the obstacle.

The margin above the obstacle is in excess of the minimum required for this example (35 ft clearance). Further iterations can be made, if required, to optimize the maximum Gross Weight.

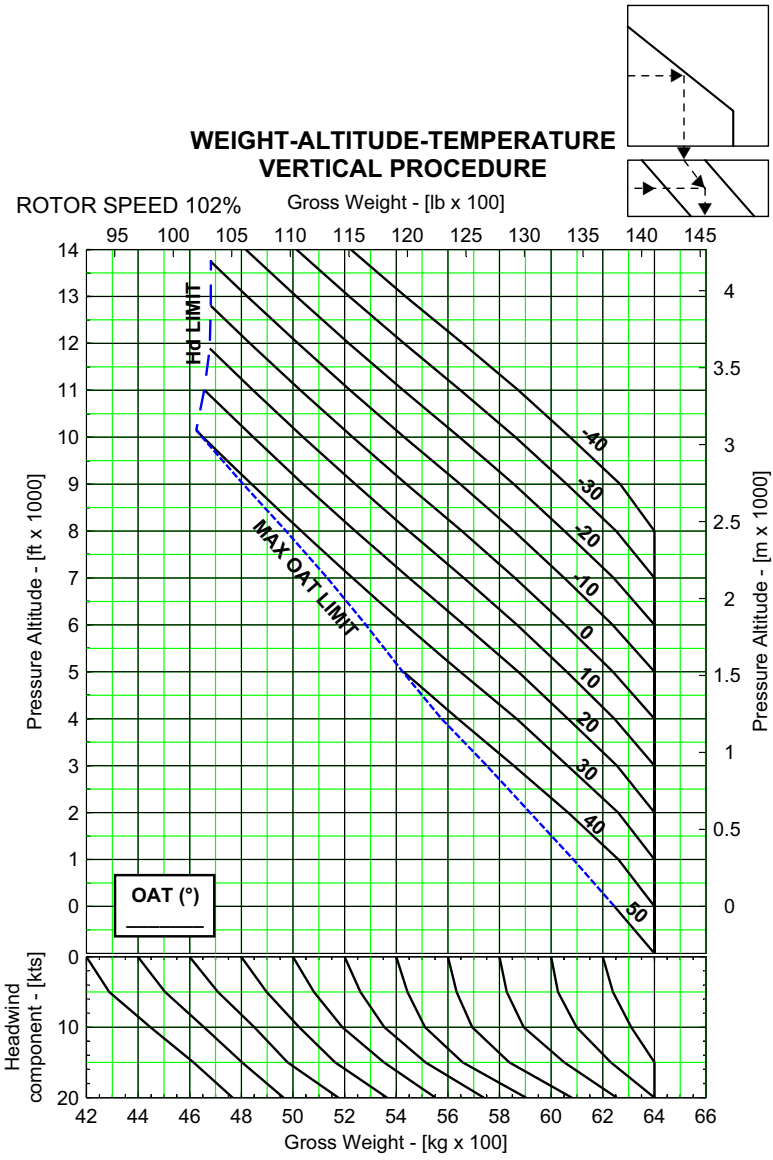

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Figure 4A-3 Ground and Elevated Heliport/Helideck Vertical Procedure Weight Limitations

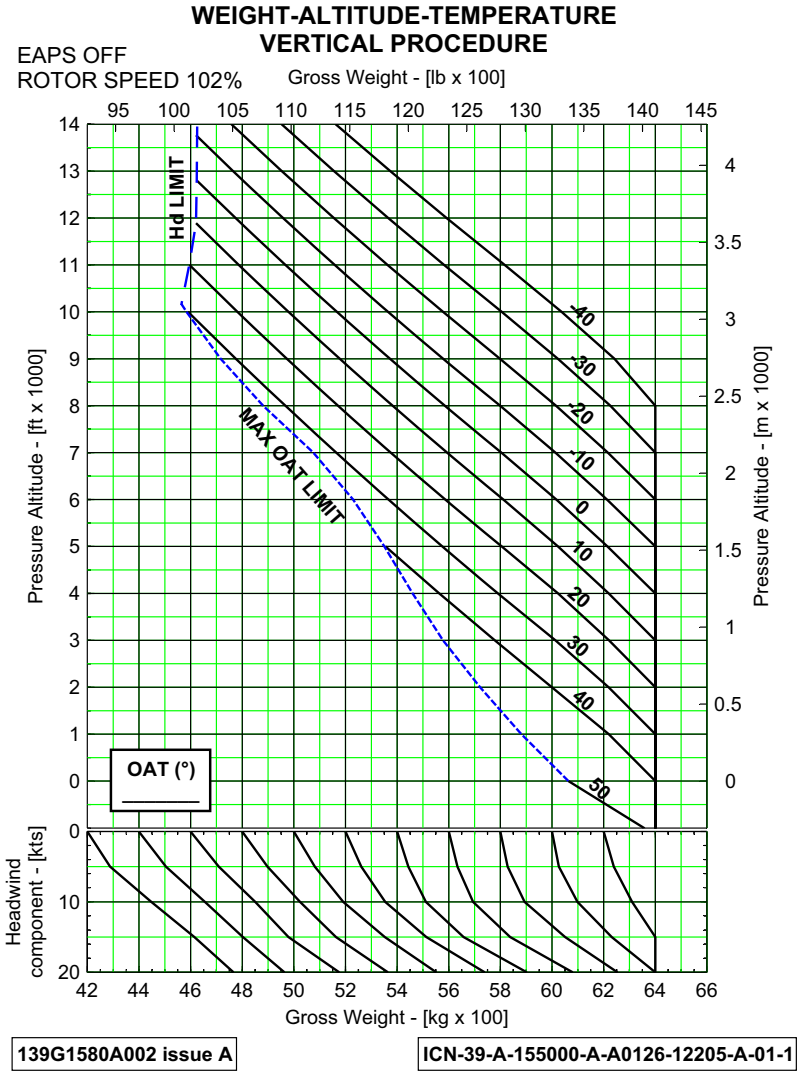

Figure 4A-4 Ground and Elevated Heliport/Helideck Vertical Procedure Weight Limitations, EAPS OFF

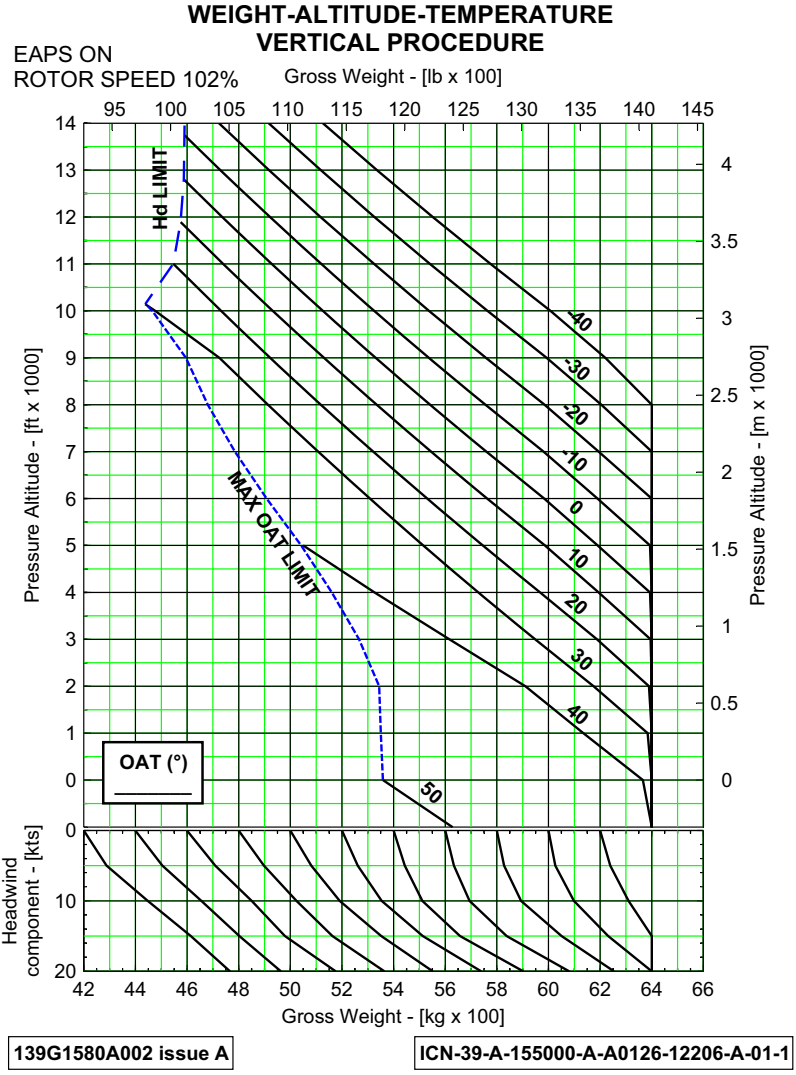

Figure 4A-5 Ground and Elevated Heliport/Helideck Vertical Procedure Weight Limitations, EAPS ON

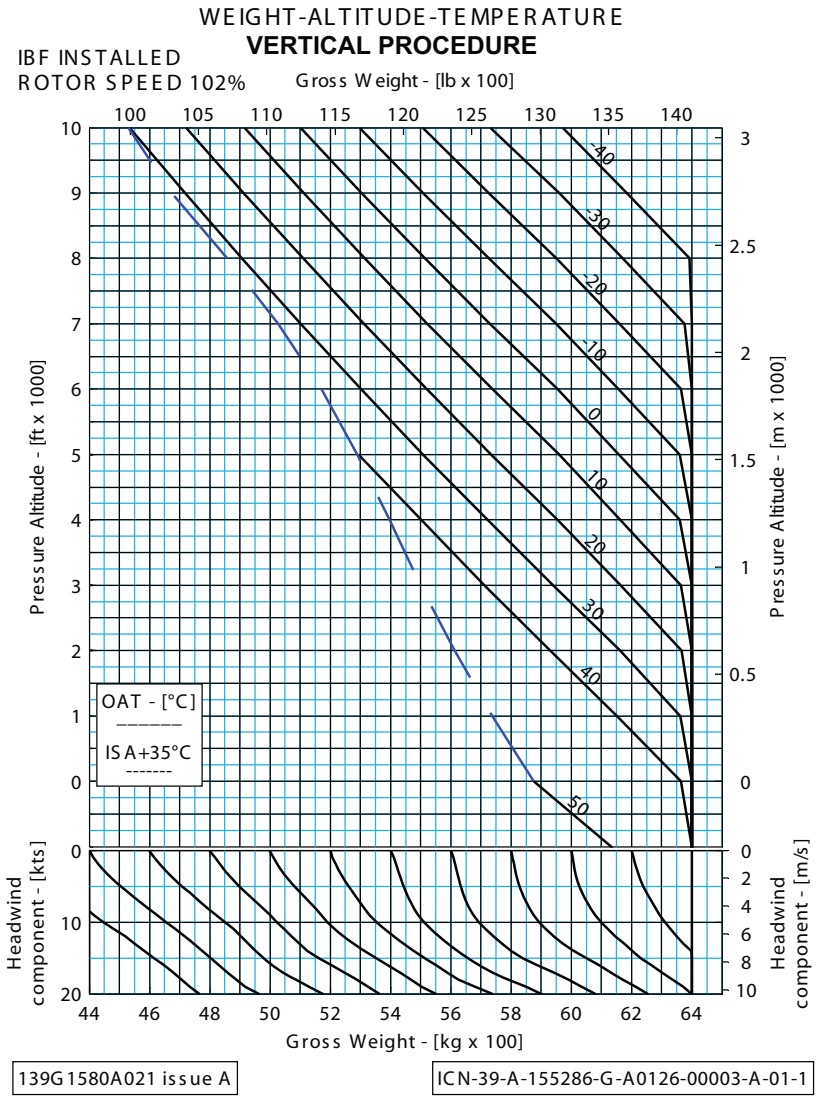

Figure 4A-5A Ground and Elevated Heliport/Helideck Vertical Procedure Weight Limitations, IBF Installed

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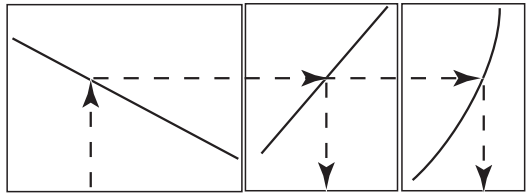
CONTINUED TAKE OFF DISTANCE OEI
VERTICAL PROCEDURE



Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS} 40 KIAS

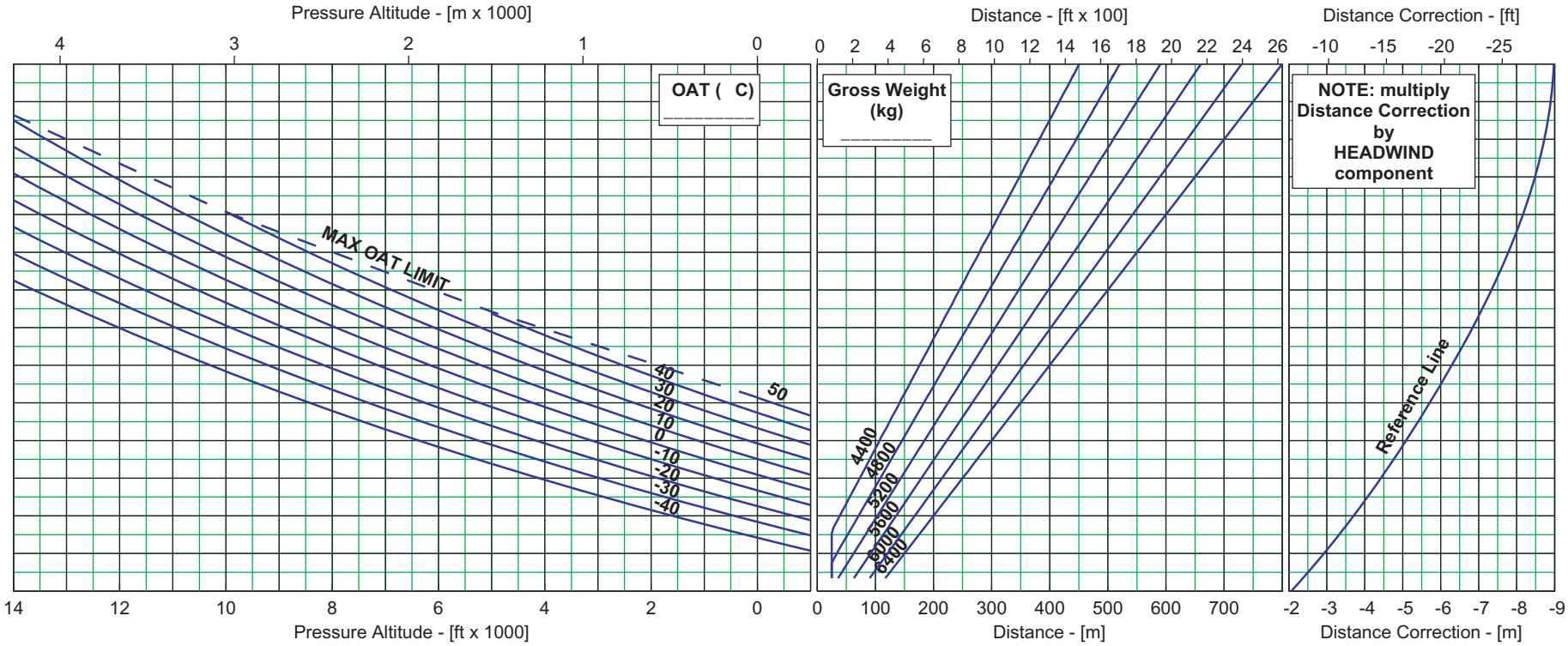


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Figure 4A-6 Heliport CTO Distance OEI

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VERTICAL PROCEDURE with EXTENDED TDP

TDP_E height AGL/ATS		Min height AGL/ATS		Height AGL/ATS at CTO end	
(ft)	(m)	(ft)	(m)	(ft)	(m)
35	11	15	5	35	11
40	12	20	6	40	12
45	14	25	8	45	14
50	15	30	9	50	15
55	17	35	11	55	17
60	18	40	12	60	18
65	20	45	14	65	20
70	21	50	15	70	21

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Figure 4A-7 Vertical Procedure. Typical Height AGL/ATS for CTO OEI

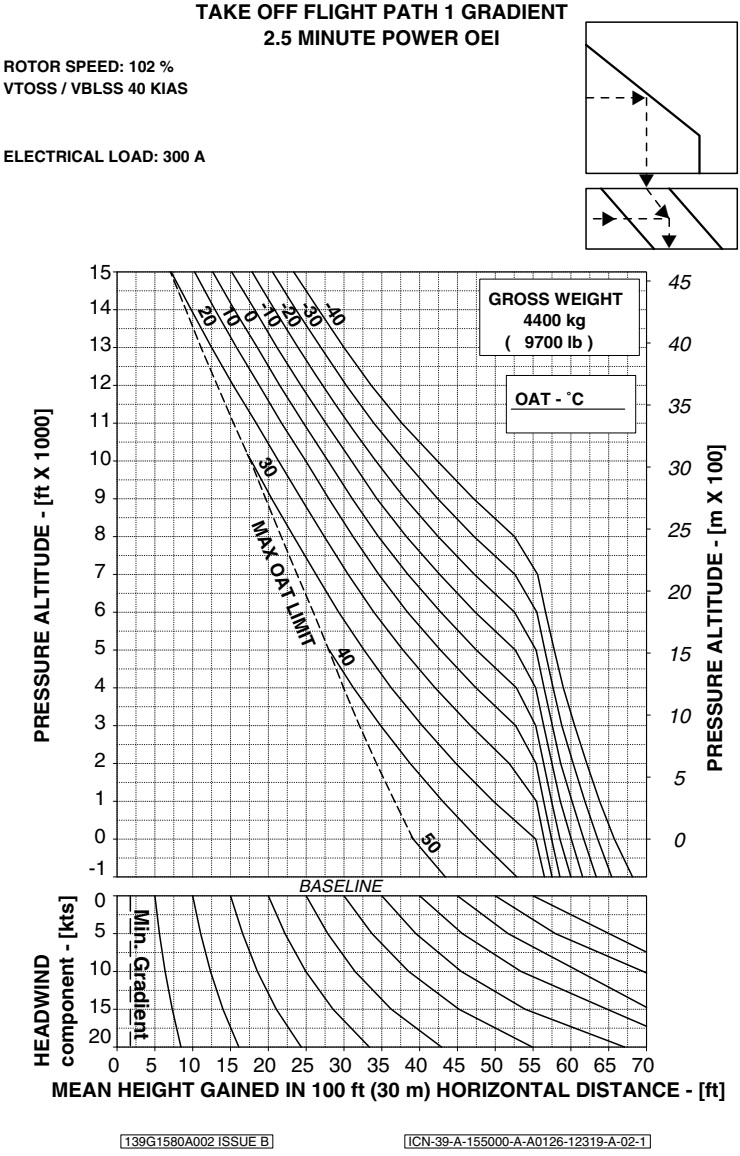

Figure 4A-8 PATH 1 Gradient, Gross Weight 4400 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS

ELECTRICAL LOAD: 300 A

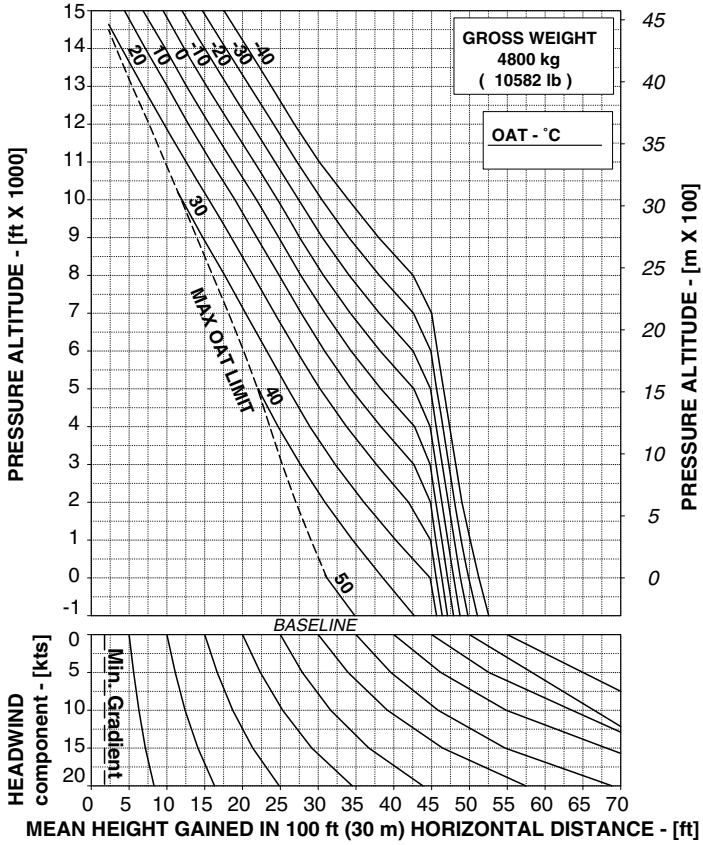

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Figure 4A-9 PATH 1 Gradient, Gross Weight 4800 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS

ELECTRICAL LOAD: 300 A

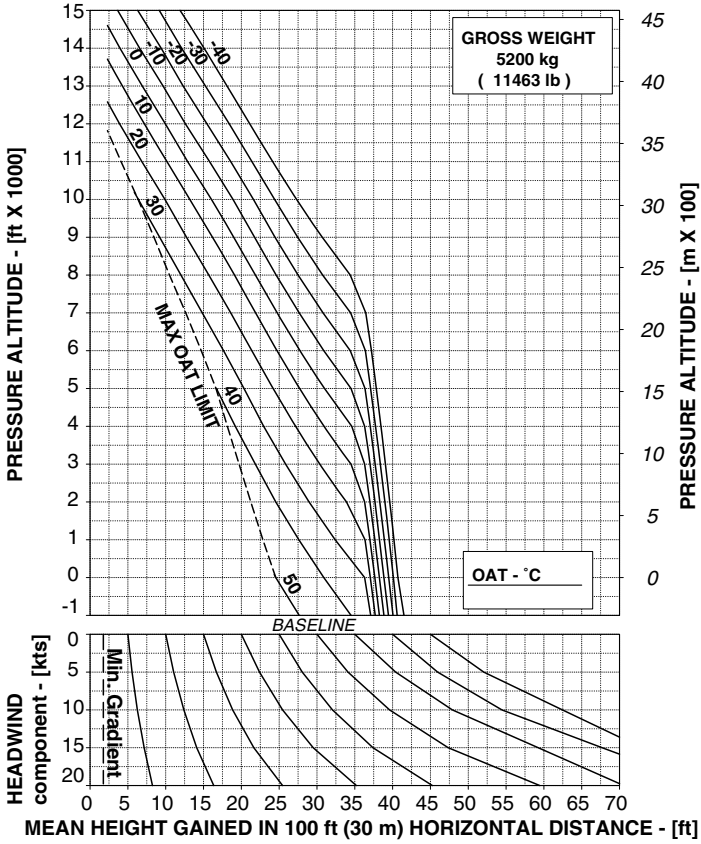

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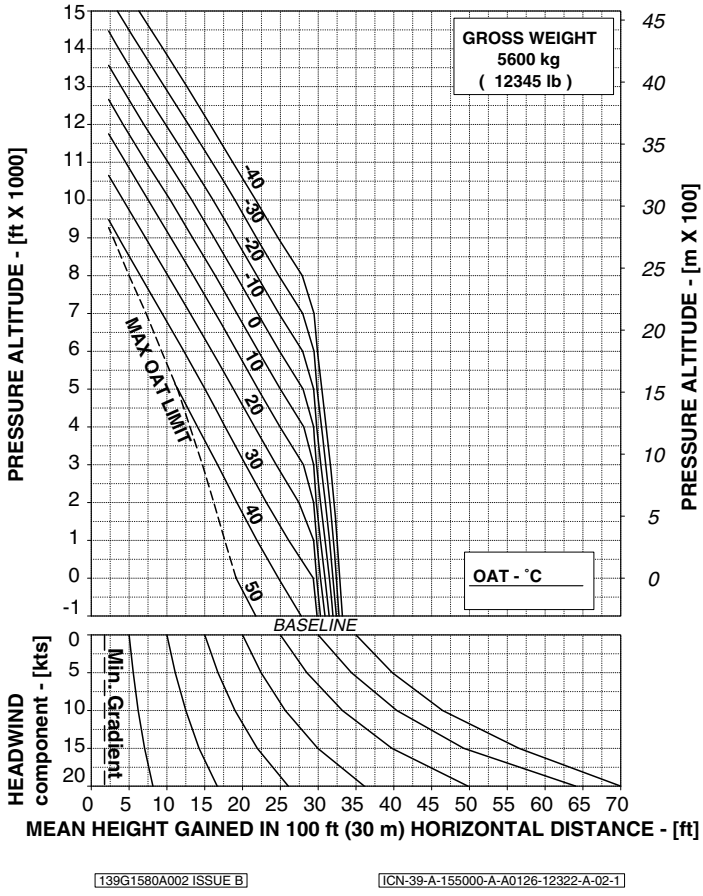
Figure 4A-10 PATH 1 Gradient, Gross Weight 5200 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS

ELECTRICAL LOAD: 300 A



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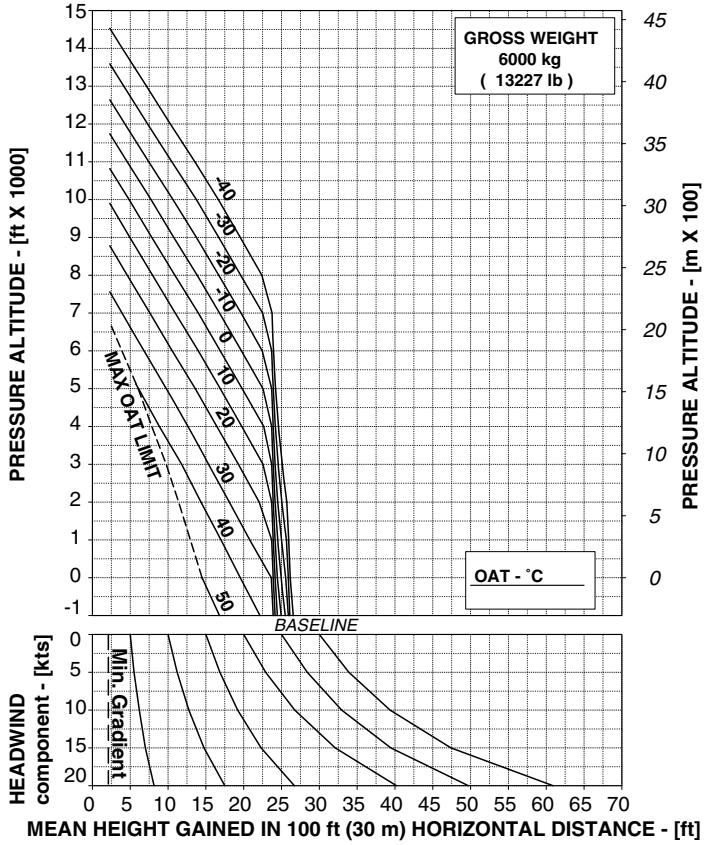
ICN-39-A-155000-A-A0126-12322-A-02-1

Figure 4A-11 PATH 1 Gradient, Gross Weight 5600 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS

ELECTRICAL LOAD: 300 A



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ICN-39-A-155000-A-A0126-12323-A-02-1

Figure 4A-12 PATH 1 Gradient, Gross Weight 6000 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS

ELECTRICAL LOAD: 300 A

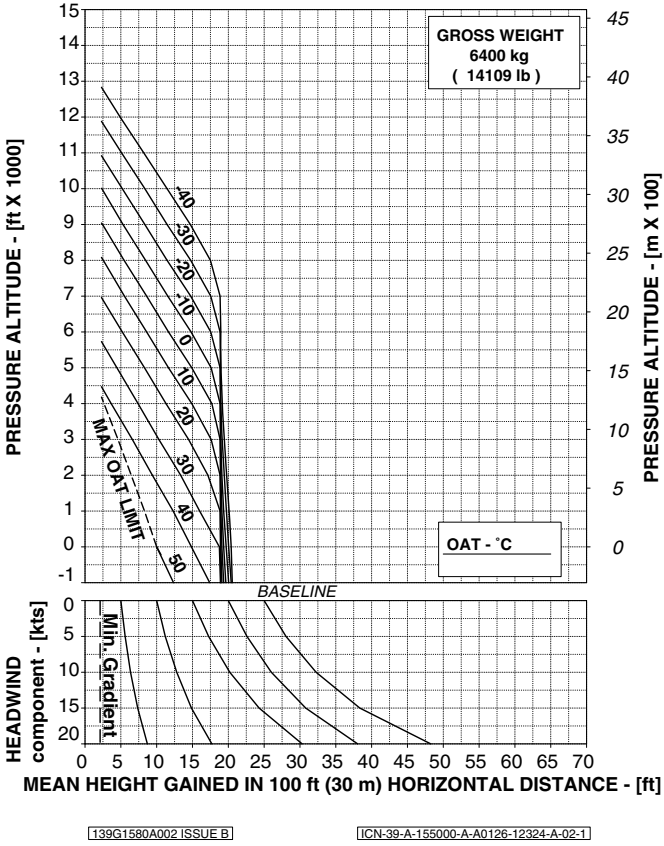

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Figure 4A-13 PATH 1 Gradient, Gross Weight 6400 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A

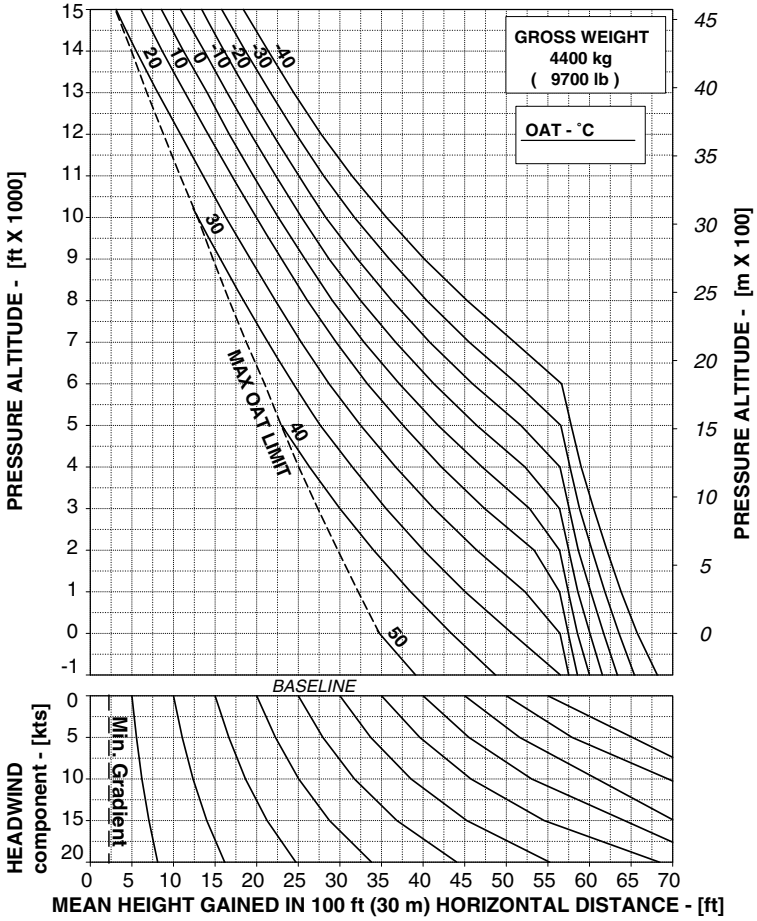

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Figure 4A-14 PATH 1 Gradient, Gross Weight 4400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A TOTAL

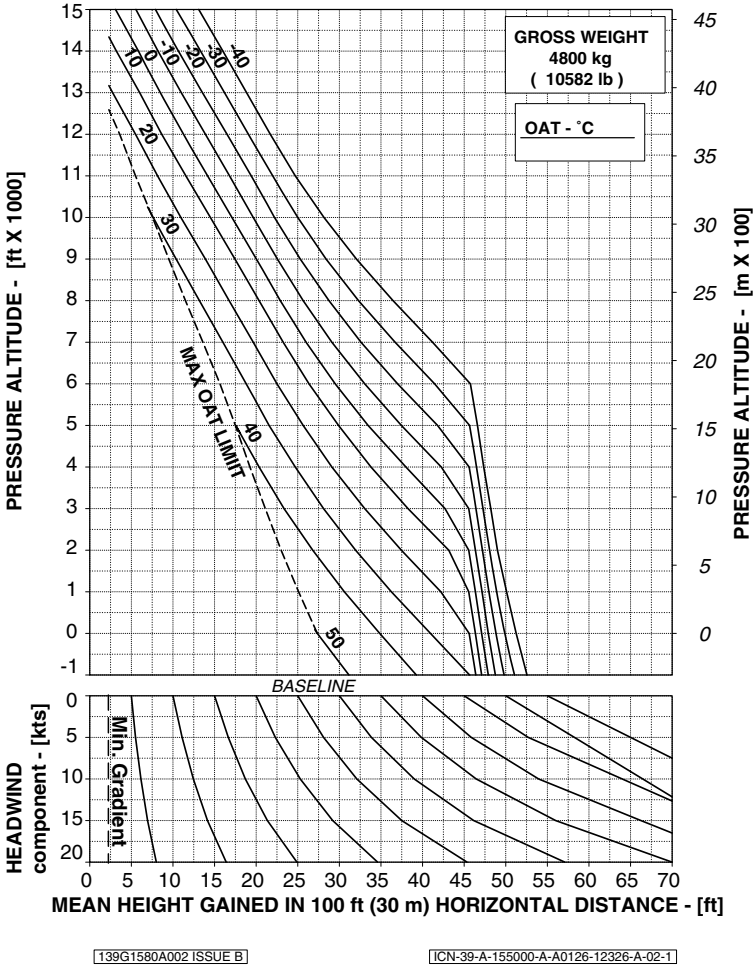

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Figure 4A-15 PATH 1 Gradient, Gross Weight 4800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A TOTAL

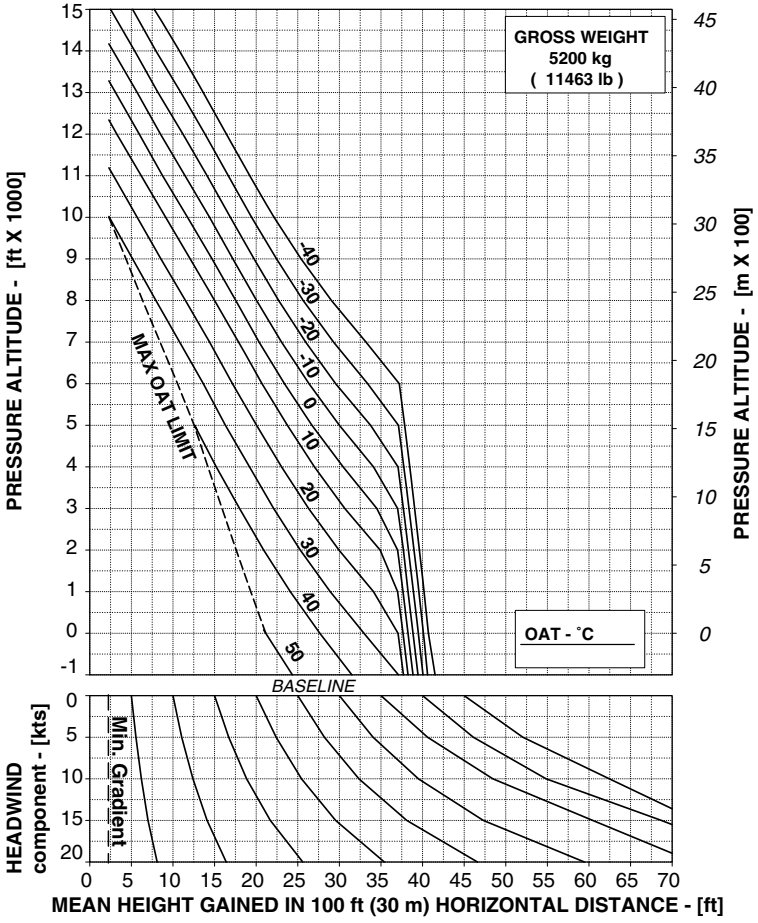

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Figure 4A-16 PATH 1 Gradient, Gross Weight 5200 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A TOTAL

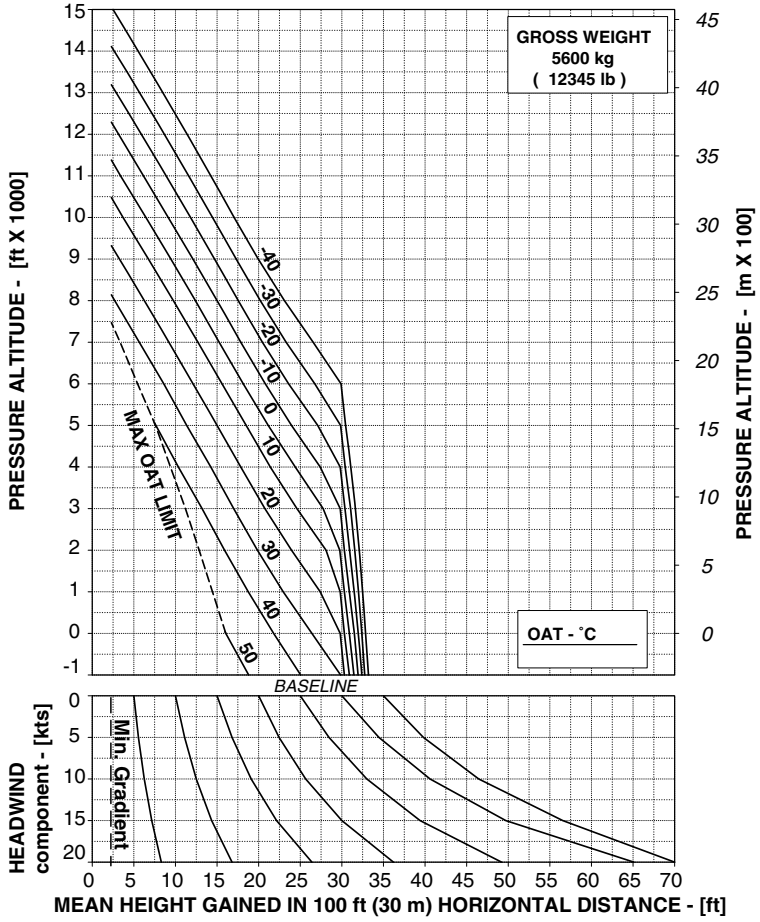

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Figure 4A-17 PATH 1 Gradient, Gross Weight 5600 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A TOTAL

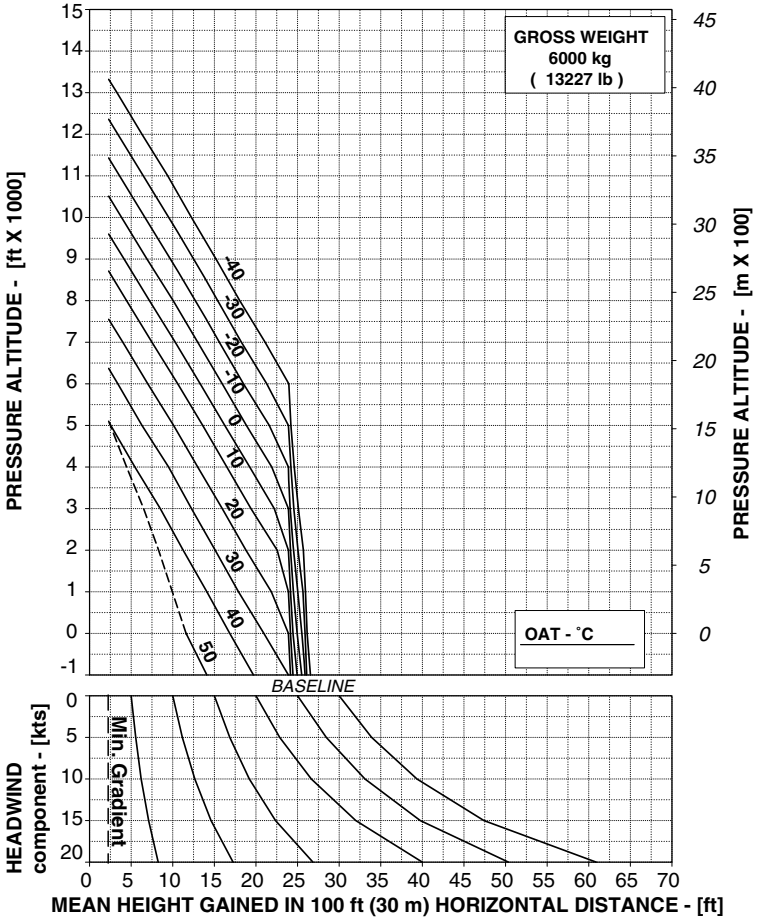

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Figure 4A-18 PATH 1 Gradient, Gross Weight 6000 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A TOTAL

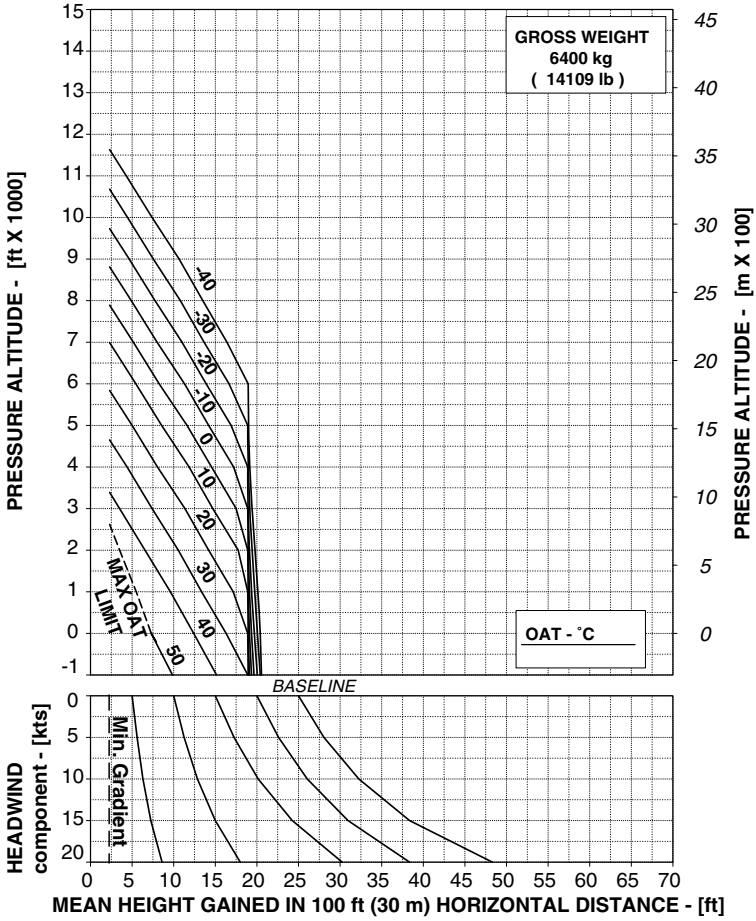

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Figure 4A-19 PATH 1 Gradient, Gross Weight 6400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

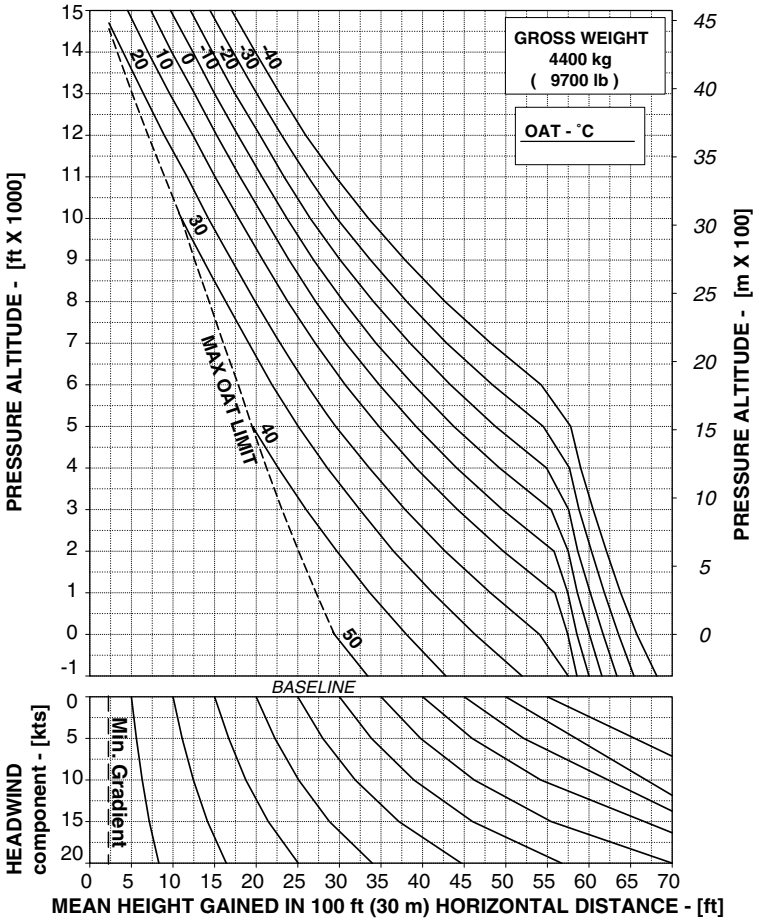

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Figure 4A-20 PATH 1 Gradient, Gross Weight 4400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

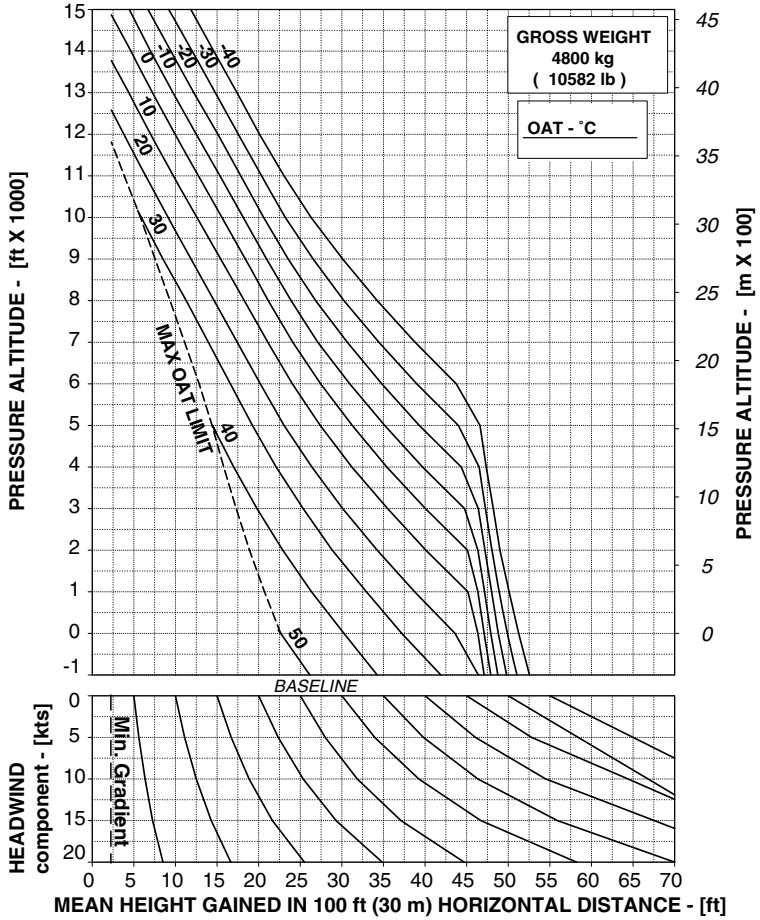

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Figure 4A-21 PATH 1 Gradient, Gross Weight 4800 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

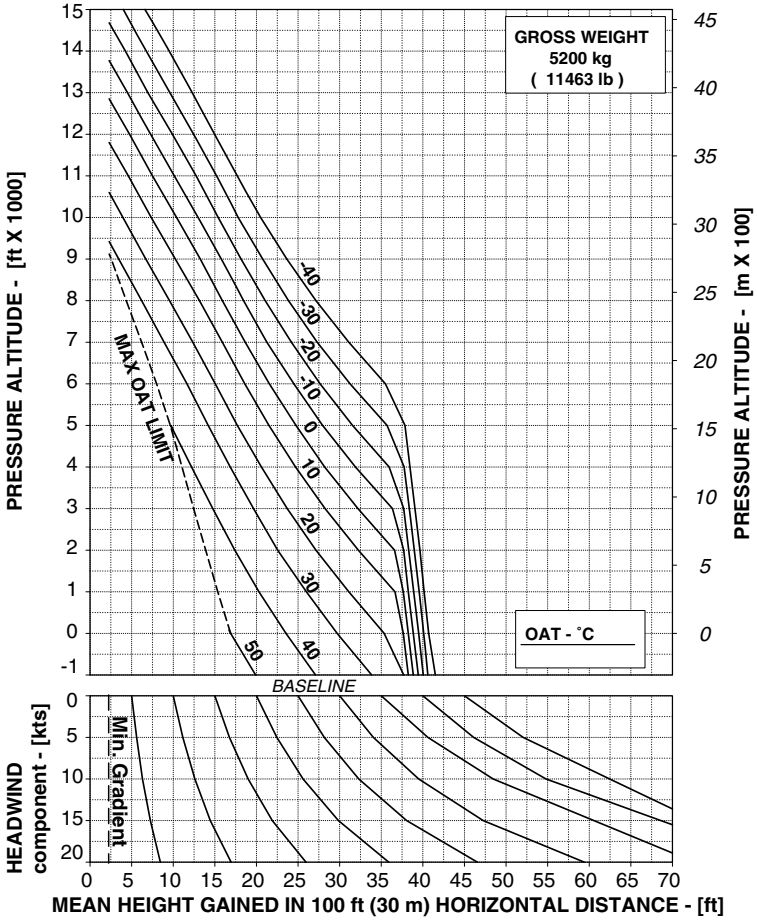

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Figure 4A-22 PATH 1 Gradient, Gross Weight 5200 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

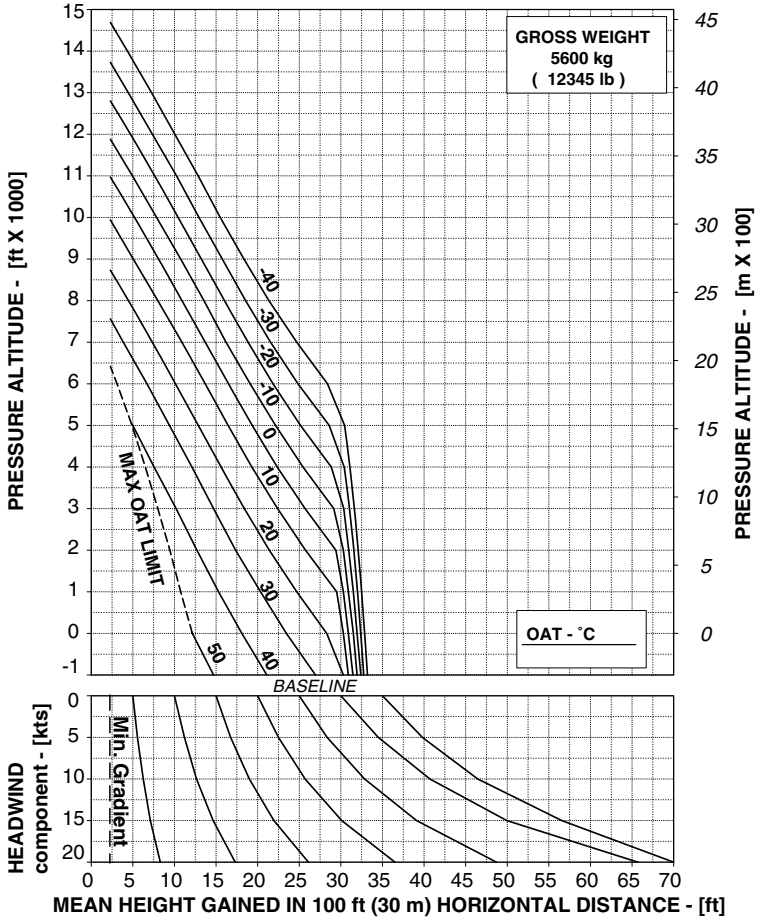

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Figure 4A-23 PATH 1 Gradient, Gross Weight 5600 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

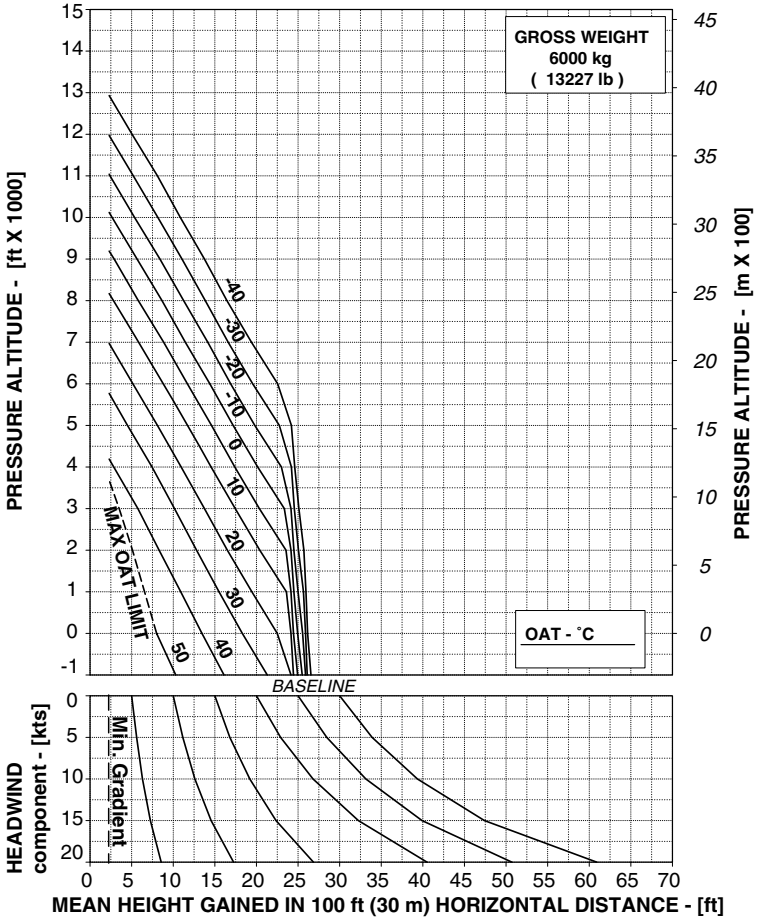

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Figure 4A-24 PATH 1 Gradient, Gross Weight 6000 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 40 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

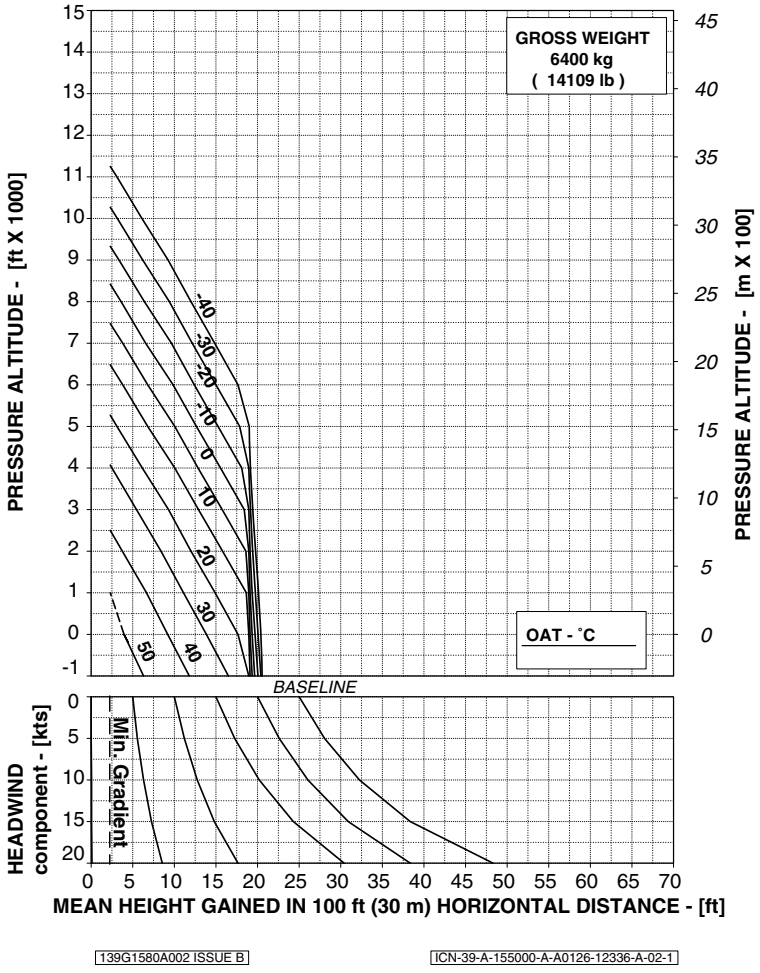

Figure 4A-25 PATH 1 Gradient, Gross Weight 6400 kg, EAPS ON

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TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 40 kts

IBF INSTALLED
ELECTRICAL LOAD: 300 A

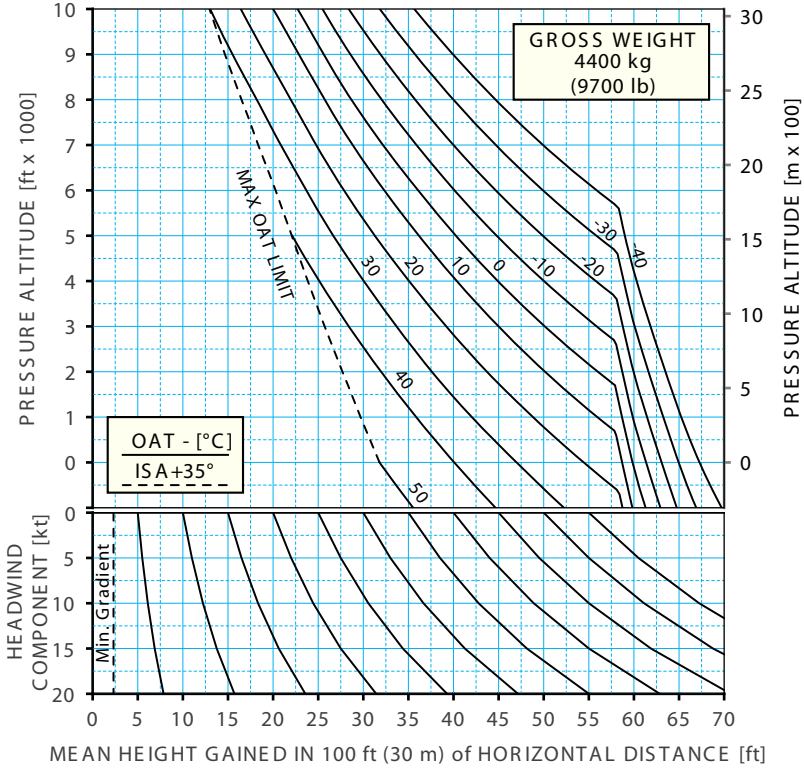

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Figure 4A-26 PATH 1 Gradient, Gross Weight 4400 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 40 kts

IBF INSTALLED
ELECTRICAL LOAD: 300 A

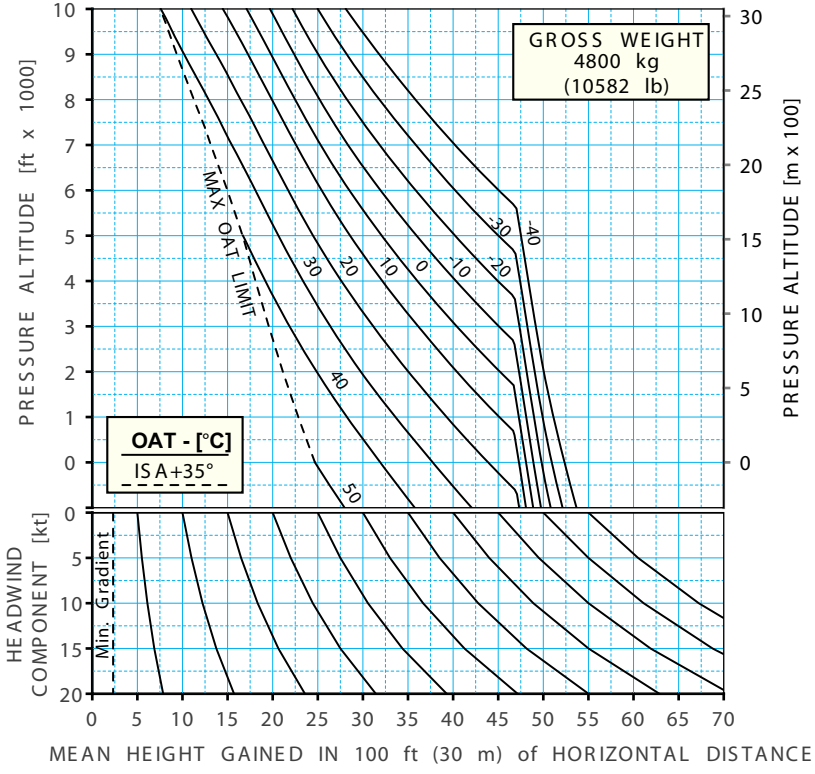

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Figure 4A-27 PATH 1 Gradient, Gross Weight 4800 kg,

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 40 kts

IBF INSTALLED
ELECTRICAL LOAD: 300 A

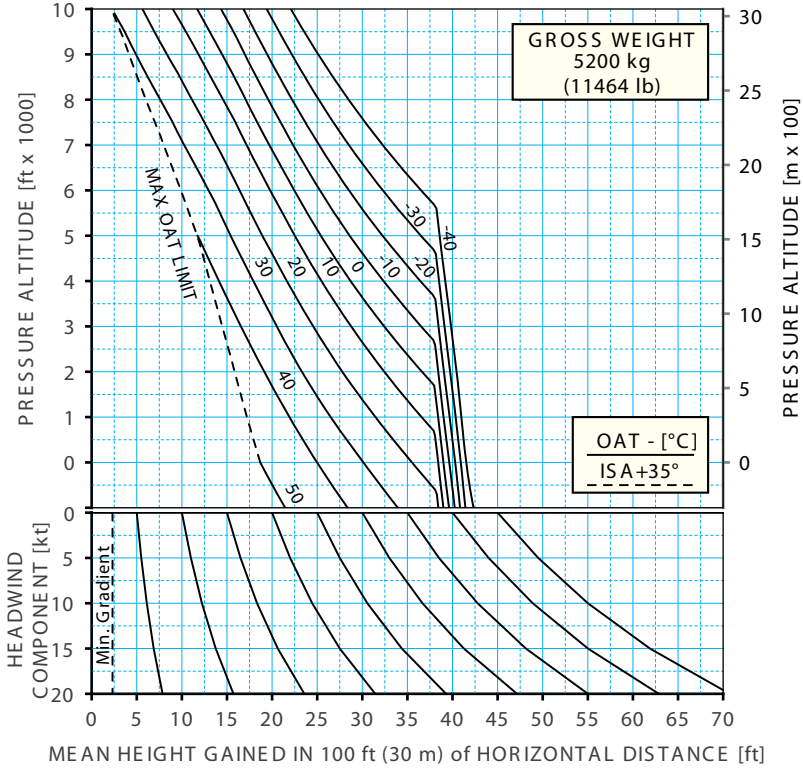

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Figure 4A-28 PATH 1 Gradient, Gross Weight 5200 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 40 kts

IBF INSTALLED
ELECTRICAL LOAD: 300 A

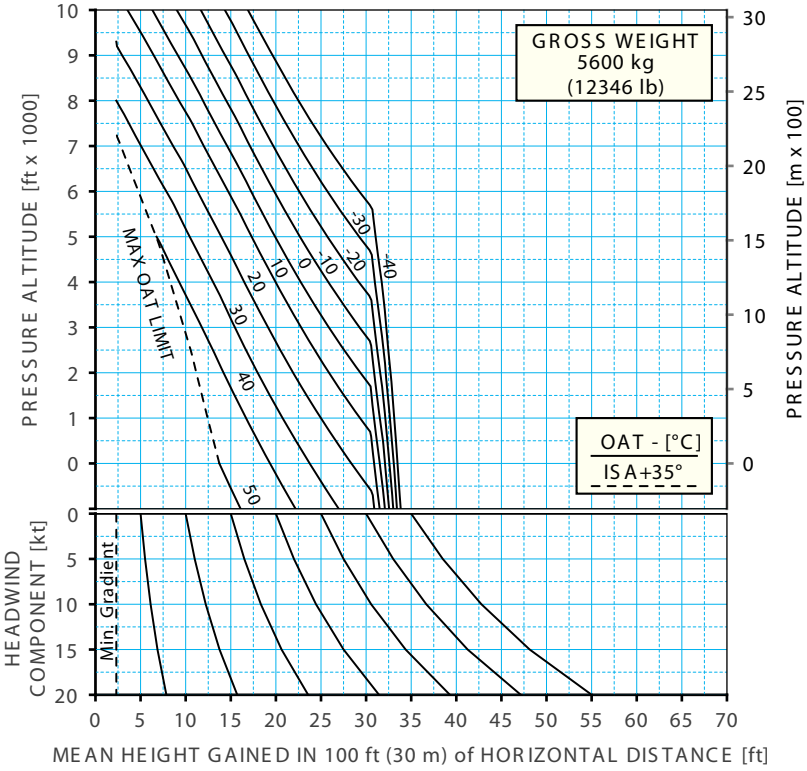

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Figure 4A-29 PATH 1 Gradient, Gross Weight 5600 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 40 kts

IBF INSTALLED
ELECTRICAL LOAD: 300 A

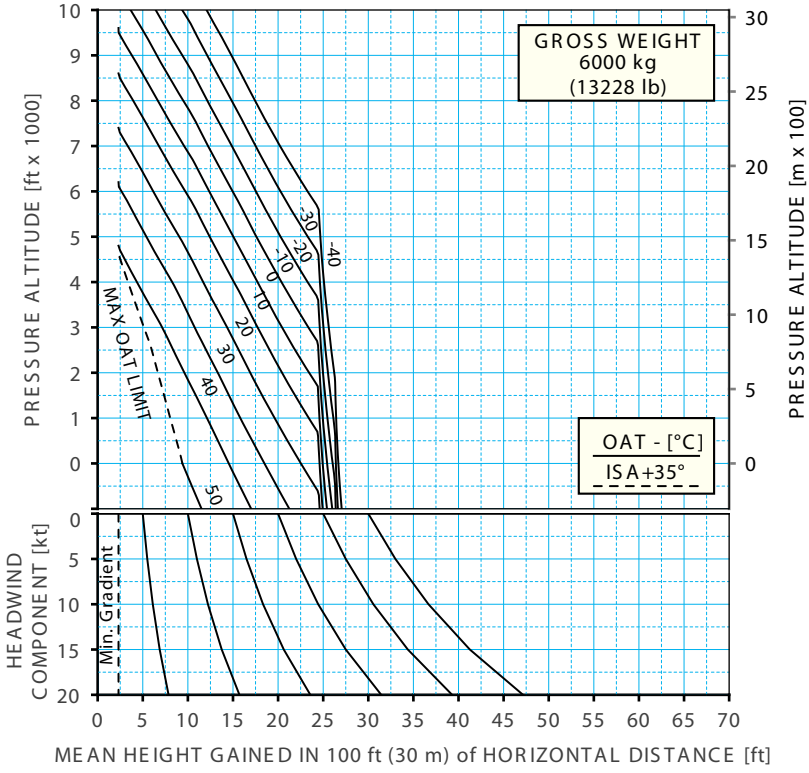

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Figure 4A-30 PATH 1 Gradient, Gross Weight 6000 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 40 kts

IBF INSTALLED
ELECTRICAL LOAD: 300 A

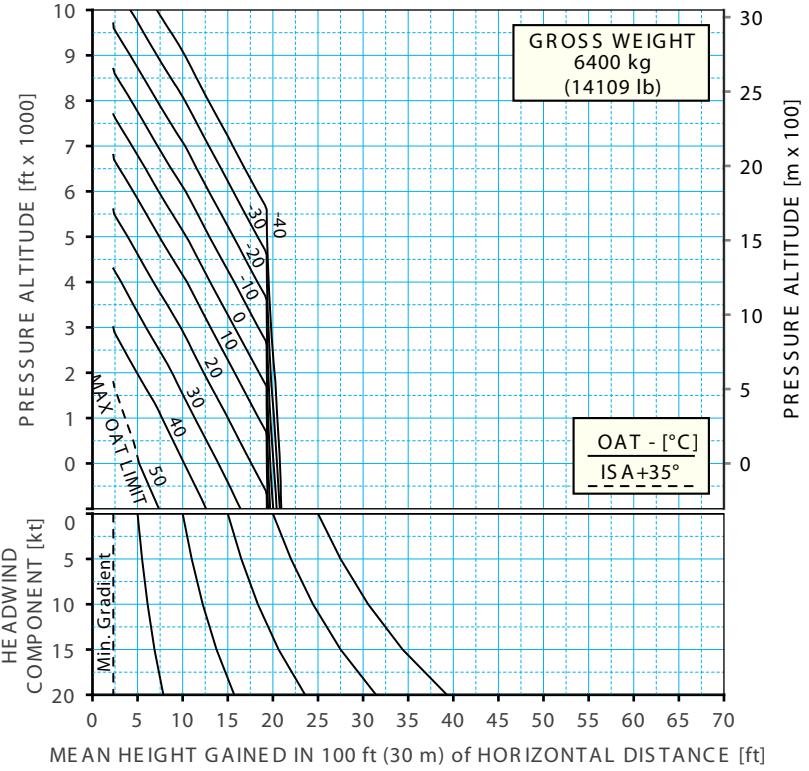

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Figure 4A-31 PATH 1 Gradient, Gross Weight 6400 kg, IBF Installed

PART B
SHORT FIELD TAKE-OFF PROCEDURES

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Part B
Short Field Take-Off Procedures

SECTION 1B - LIMITATIONS

RUNWAY LENGTH

Minimum demonstrated runway length is shown in Figure 4B-4 to Figure 4B-6.

WEIGHT LIMITATIONS

Weight. Limitation, clean engine air intake ..... Figure 4B-1

Weight Limitation, EAPS OFF..... Figure 4B-2

Weight Limitation, EAPS ON..... Figure 4B-3

Weight Limitation, IBF Installed..... Figure 4B-3A

AIRSPEED LIMITATIONS

Take Off Safety Speed (V_{TOSS})..... 40 KIAS

Best Rate of Climb Speed (V_Y) .....Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)

..... Above 10000 ft Hp 70 KIAS
(Above 3000 m Hp 70 KIAS)

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A Take Off..... 14000 ft (4270 m) Hp or Hd whichever comes first

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s).

Take-Off with tail wind component is prohibited.

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SECTION 2B - NORMAL PROCEDURES

TAKE OFF DECISION POINT HEIGHT (TDP)

TDP ..... 35 ft (10 m) AGL

TDP_E ..... 35 ft to 400 ft AGL
(10 m to 122 m AGL)

CONTINUED TAKE-OFF HEIGHTS

Minimum height during CTO ..... TDP or TDP_E less 20 ft (6 m)

Height at end of CTO distance ..... TDP or TDP_E

Note

Radar altimeter heights are shown in the flight path profiles.

TAKE-OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand pilot should monitor engine and rotor parameters.

SHORT FIELD TAKE OFF PROCEDURE

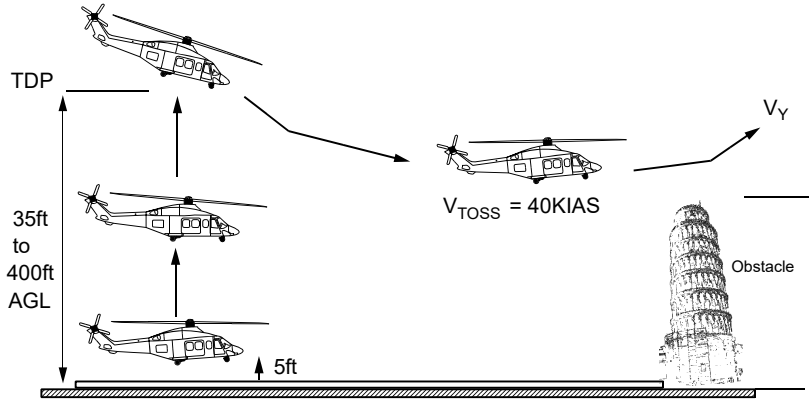

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Figure 2B-1 Take Off Profile Short Field, Variable TDP 35ft to 400ft

1.	LDG LT & LGT LT2 switches	— As required.
2.	Rotor speed	— Set 102% NR.
3.	HEATER (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates. Select HTR switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguishes.
.	ECS ENVIRO (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates. Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
4.	Power checks	— Carry out as required in accordance with ENGINE POWER CHECKS procedure in Section 4K - Performance Data.
5.	Pilot Altimeter	— Set 0ft, or nearest 1000 ft (330 m) setting to T-O altitude, with collective at MPOG.
6	PARK BRAKE	— Confirm released.
7.	Hover	— Establish a 5 ft (1.5 m) AGL hover.

Note

In HIGE the indicated altitude, on the altimeters, will be 40 ft to 60 ft (12 m to 18 m) below the setting value. The indicated altitude automatically corrects in the climb.

8. Flight controls — Check correct functioning.

9. MFD PWR PLANT page — Check all parameters within normal operating limits.

10. Warnings and Cautions — Confirm none displayed.

11. PI/NR — Check PI's matched, NR 102%. Note PI value.

12. Collective/Cyclic Control — Increase PI by 23% above hover value (if 23% is not available, without exceeding Take Off PI, increase to 110%), in 2 seconds, and initiate a vertical climb to TDP while adjusting the pitch attitude to maintain position over the Take Off point.

Note

OAT conditions close to 50° C may produce ITT limited PI, in HIGE, above 87% PI. Under these conditions using 110% PI (even though the change in PI is less than 23%) will produce the required power to guarantee the CAT A performance.

13. Take off Decision Point (TDP) — At required TDP height rotate nose down to -10° attitude in 1 second. Maintain this attitude for 1 second then recover pitch attitude to 0° to climb and accelerate to V_{TOSS} (40 KIAS). Maintain collective position.

14. Acceleration/Climb	— When V_{TOSS} (40 KIAS) is achieved, adjust pitch attitude to approximately 5° nose up. Maintaining collective position, continue climb and acceleration, until V_y.
15. Climb	— At V_y adjust attitude to stabilize speed, continue climb.
16. Landing gear	— UP (when reaching Vy but not below 200 ft (60 m) AGL).
17. NR/NF	— Select 100% at V_y.
18. After Take Off checks	— Complete.
19. Power	— Adjust collective to continue climb at V_y, utilizing up to Take Off power, as required to 1000 ft (300 m) AGL.
20. At 1000 ft (300 m) AGL	— Adjust collective and cyclic to continue climb at V_y or accelerate to cruise speed as required.
21. HEATER/ECS ENVIRO (if fitted)	— As required.
22. LDG LT & LDG LT2 switches	— As required.
23. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

SECTION 3B - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Take-Off path and assume the pilot gives first priority to aircraft control and to achieve a safe flight path.

For all Take-Off procedures the following shall be observed:

1. Engine failure prior to TDP — Recognition of engine failure prior to the TDP dictates that the Take-Off be rejected.

2. Engine failure at or after TDP — Recognition of the failure at or after the TDP dictates that the Take-Off be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

TAKE-OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand pilot should call out rotor speed during the engine failure procedures.

EMERGENCY PROCEDURE FOR SINGLE ENGINE FAILURE DURING TAKE OFF

SINGLE ENGINE FAILURE RECOGNIZED IN HOVER (5 feet (1.5 m) ATS)

1. Collective — Maintain collective pitch setting or lower collective slightly to land.

2. Touchdown — Increase collective to cushion landing as touchdown becomes imminent.

3. Landing — After touchdown, centralize cyclic and simultaneously reduce collective to MPOG. Apply wheel brakes as required.

4. Engine — On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

5. Park Brake — As required.

SINGLE ENGINE FAILURE RECOGNIZED IN CLIMB, PRIOR TO TDP (REJECTED TAKE-OFF)

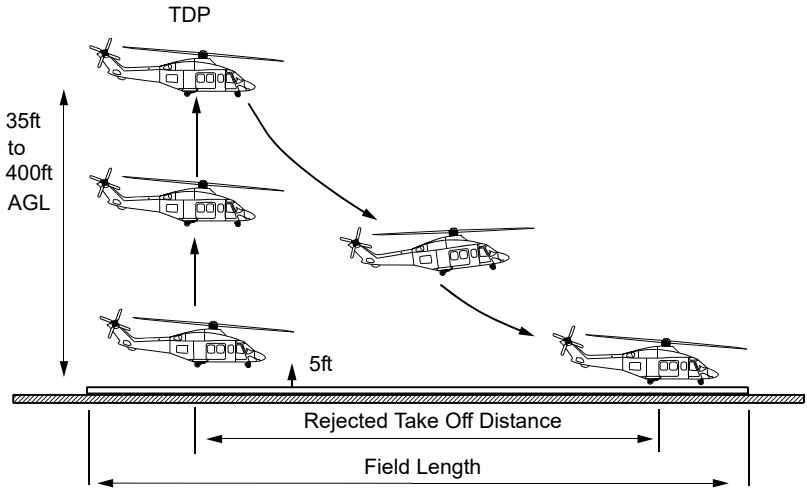

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Figure 3B-1 Short Field Engine Failure before TDP

1. Cyclic/Collective — Rotate nose down to a maximum of -20° to obtain forward speed and commence the descent to the field. Adjust collective to maintain the rotor droop within 90%NR.
   - When left hand pilot flying, right hand pilot call out rotor speed.

2. Cyclic — At 50 ft (15 m) AGL (or approximately 20 ft (6 m) if TDP_E less than 50 ft (15 m) AGL) rotate nose up as necessary (maximum 20°) to decelerate.

3. Touchdown	— Continue deceleration to running touchdown or hover. Use collective to cushion touchdown. Maximum nose up attitude on touchdown 15°.
4. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
5. Braking	— Apply wheel brakes, as required.
6. Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
7. Park Brake	— As required.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER TDP (CONTINUED TAKE-OFF)

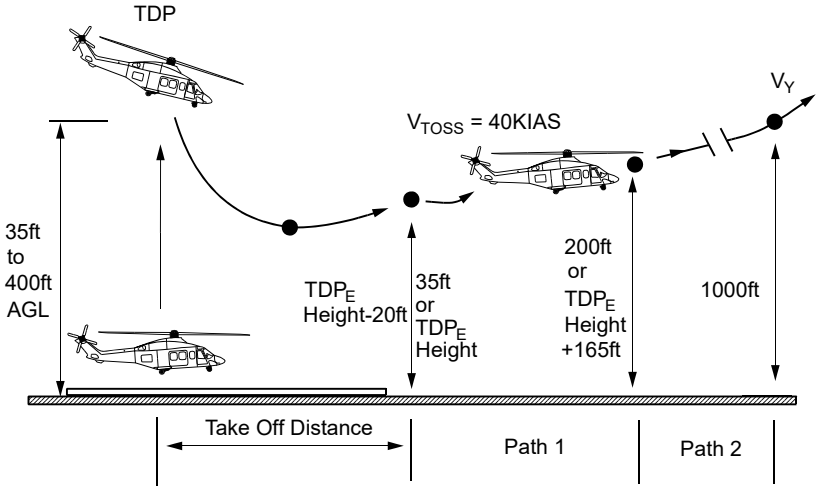


Figure 3B-2 Short Field Engine Failure at/after TDP

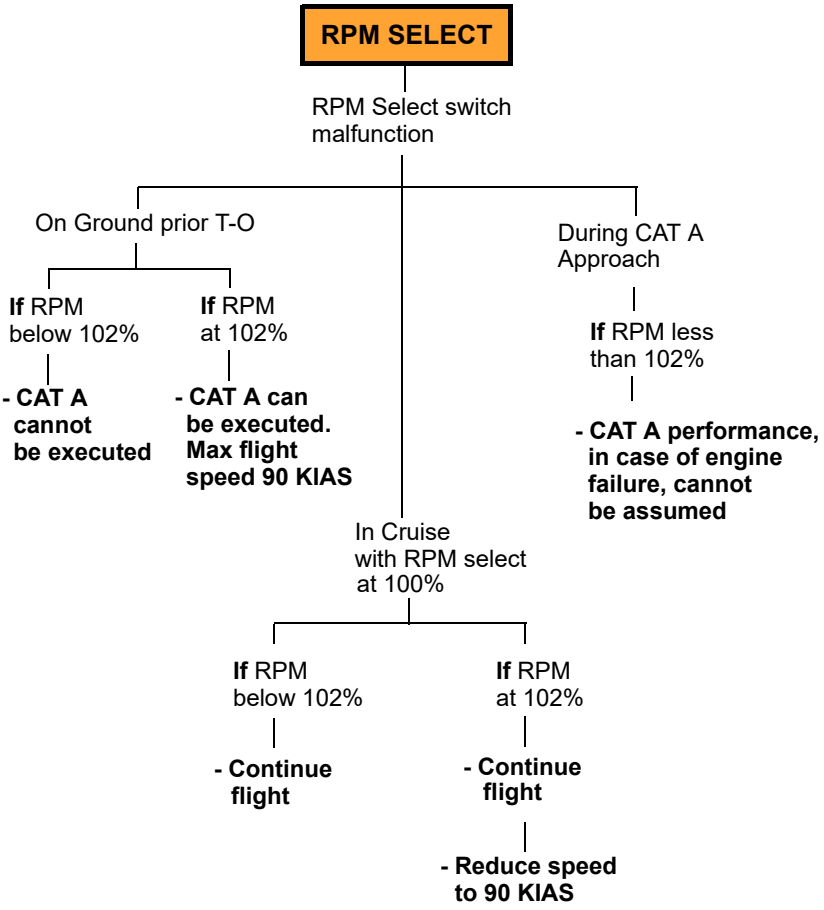
1. Collective/Cyclic — Rotate nose down to -10° in 1 second. Maintain for 1 second. Then recover pitch attitude to 0° in 1 second. Maintain 0° while using collective to droop NR to minimum of 90% and to set 2.5 min power.
   - When left hand pilot flying, right hand pilot call out rotor speed.

2. Acceleration/climb — Maintain pitch attitude at 0° and continue the acceleration up to V_{TOSS} (40 KIAS).

3. Climb	— When the aircraft achieves V_{TOSS} (40 KIAS) and a positive rate of climb, adjust pitch attitude to approximately 5° nose up and lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) (or TDP_E height+165 ft) AGL (or TDP_E height+50 m AGL), with 2.5 min power.
4. At 200 ft (or TDP_E height+165 ft) AGL (60 m (or TDP_E height+50 m) AGL)	— Continue climb and accelerate to Vy using 2.5 min power rating. After achieving Vy, continue to 1000 ft AGL reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
5. Landing gear	— UP (when reaching V_y).
6. Rotor Speed	— Select 100% at V_y.
7. At 1000ft AGL	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
8. MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



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SECTION 4B - PERFORMANCE DATA

WIND EFFECT

For crosswind and headwind component computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

The Short Field Take-Off Procedure Weight Limitations charts are shown in Figure 4B-1 to Figure 4B-3 and Figure 4B-3A.

REJECTED TAKE OFF DISTANCE OEI

The Rejected Take Off distance is shown in Figure 4B-4 to Figure 4B-6 and Figure 4B-6A.

CONTINUED TAKE OFF DISTANCE OEI

The Continued Take Off distance is shown in Figure 4B-7 and is valid for Clean intake, EAPS ON/OFF and IBF Installed.

The Distance Correction incorporated into the “Short Field CTO Distance OEI” chart for Headwind Component has already been factored by 50%.

TAKE OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power OEI is shown in Figure 4A-8 to Figure 4A-31 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from the end of the CTO distance to a height of 200 ft (60 m) or TDP_E height +200 ft (60 m) AGL.

TAKE OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

This chart applies from 200 ft (60 m) or TDP_E height +200 ft to 1000 ft AGL (TDP_E height +60 m to 300 m AGL).

CLIMB PERFORMANCE

Single Engine Rate Of Climb at V_Y

The ROC, at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS or IBF installed.

TAKE OFF CALCULATIONS

For GW, TDP and trajectory computation for obstacle clearance, refer to Section 4A.

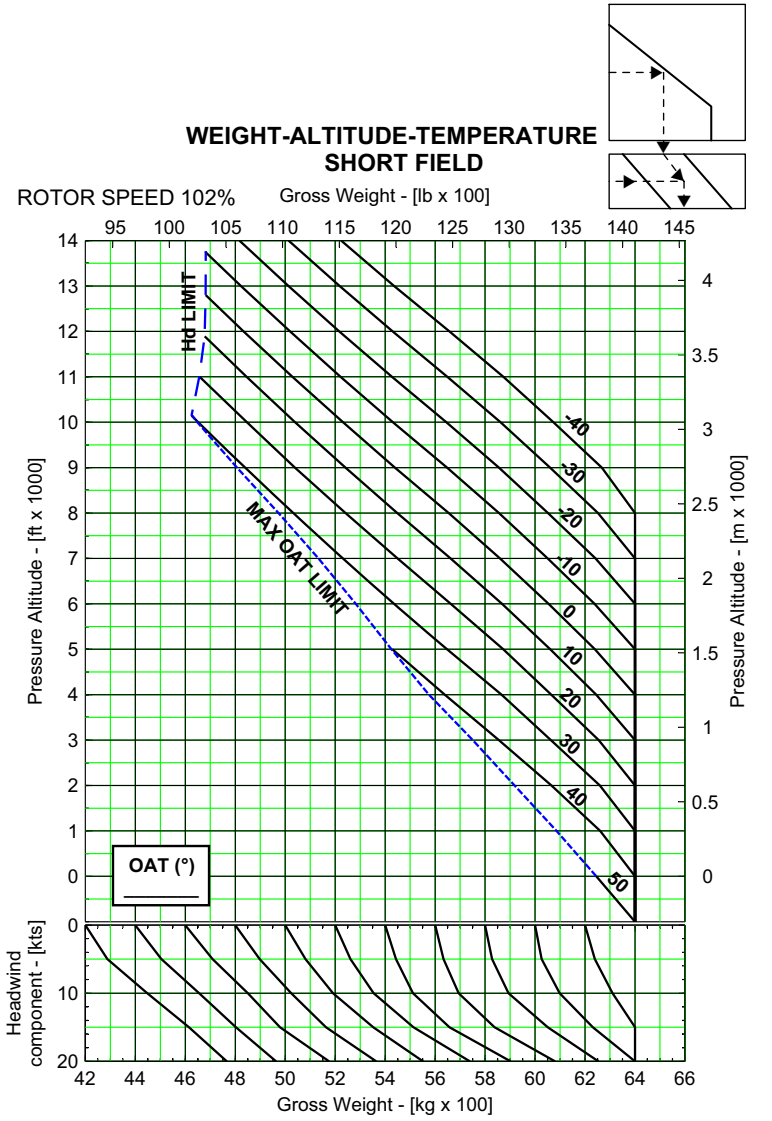

Figure 4B-1 Short Field Procedure Weight Limitations

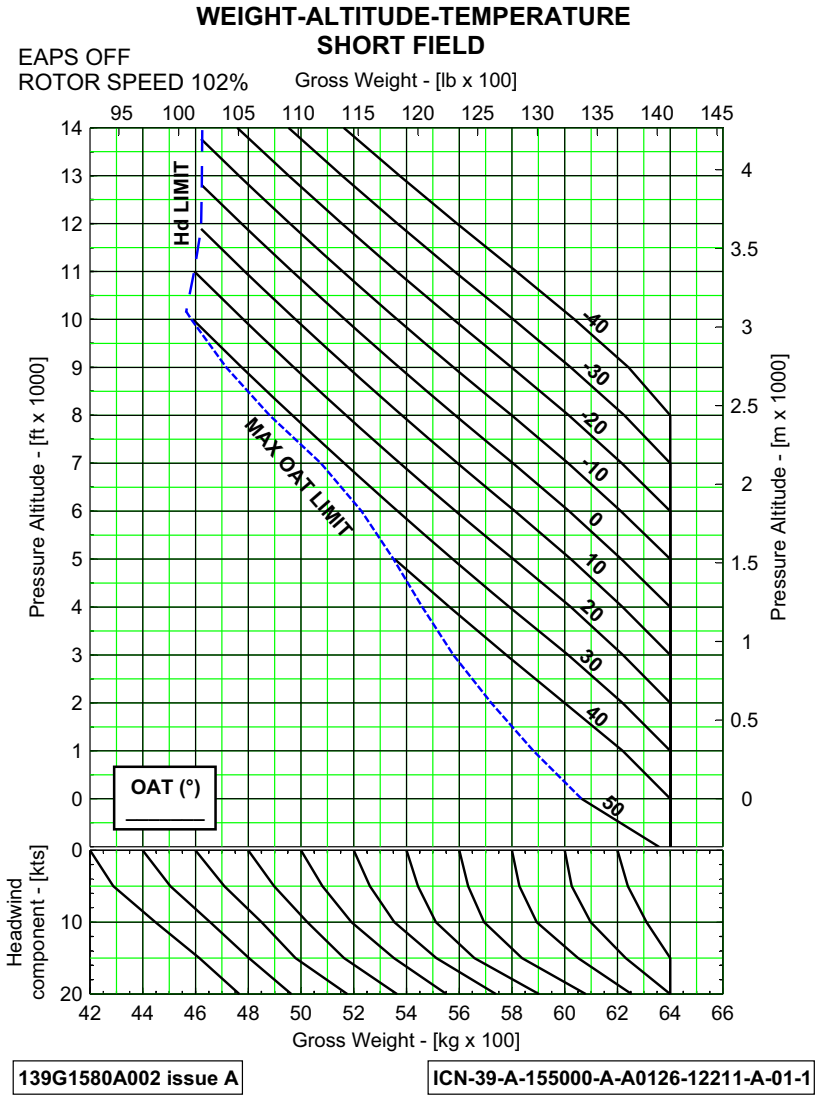

Figure 4B-2 Short Field Procedure Weight Limitations, EAPS OFF

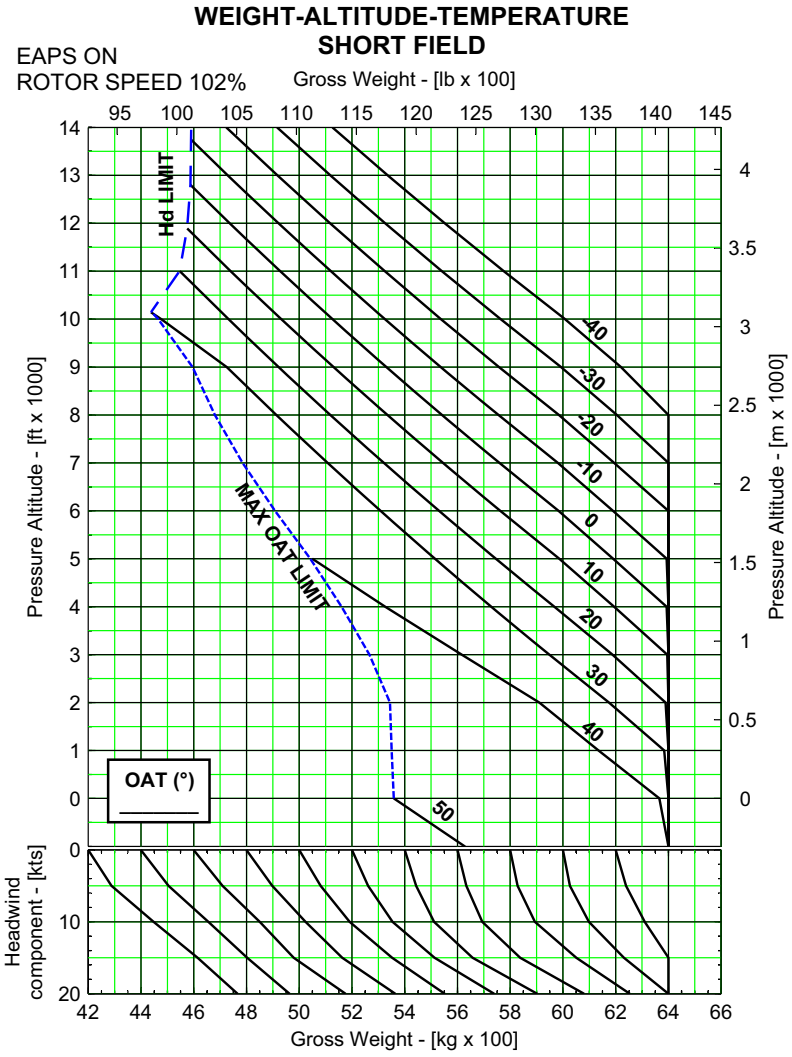

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Figure 4B-3 Short Field Procedure Weight Limitations, EAPS ON

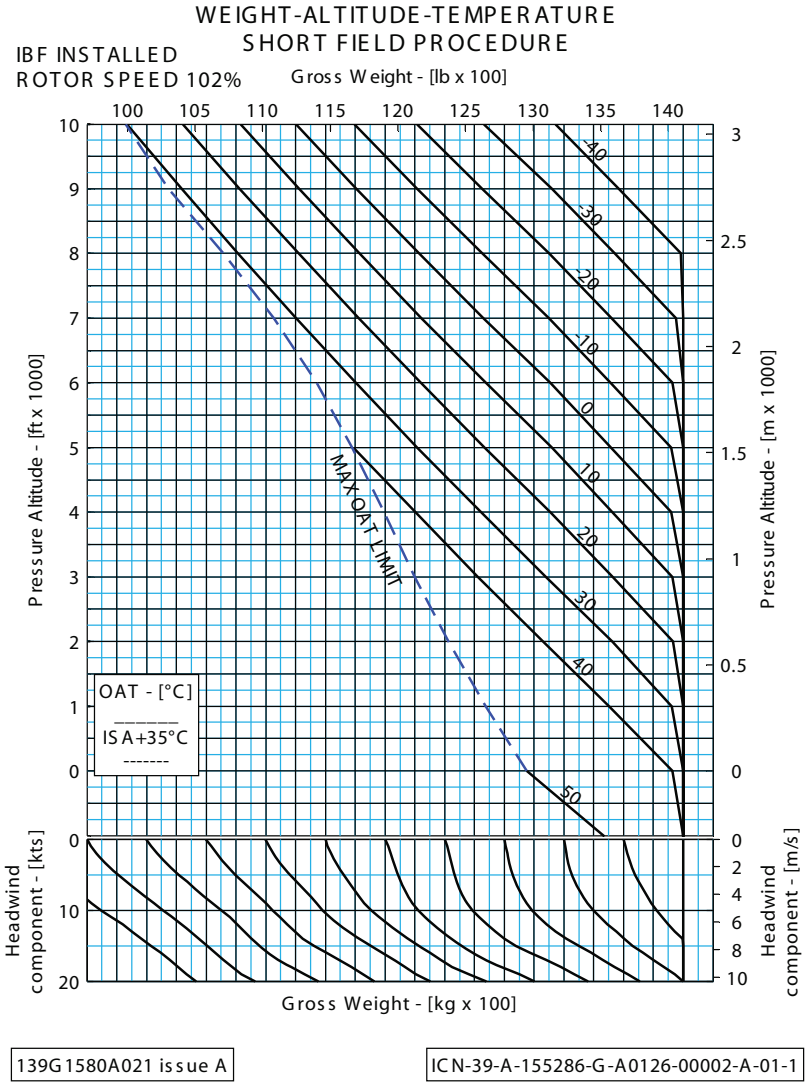

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Figure 4B-3A Figure 4B-3A Short Field Procedure Weight Limitations, IBF Installed

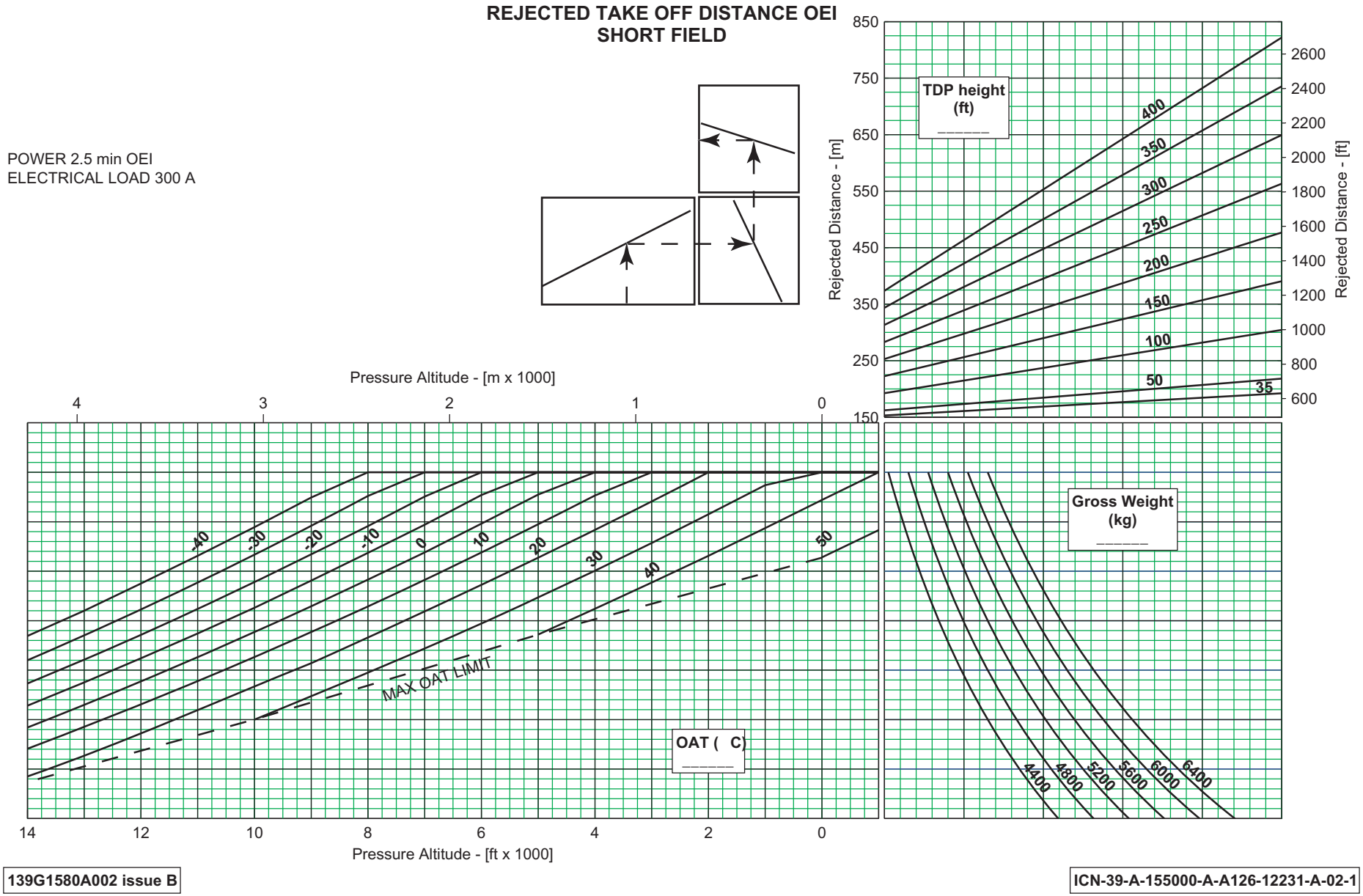

Figure 4B-4 Short Field Procedure RTO Distance

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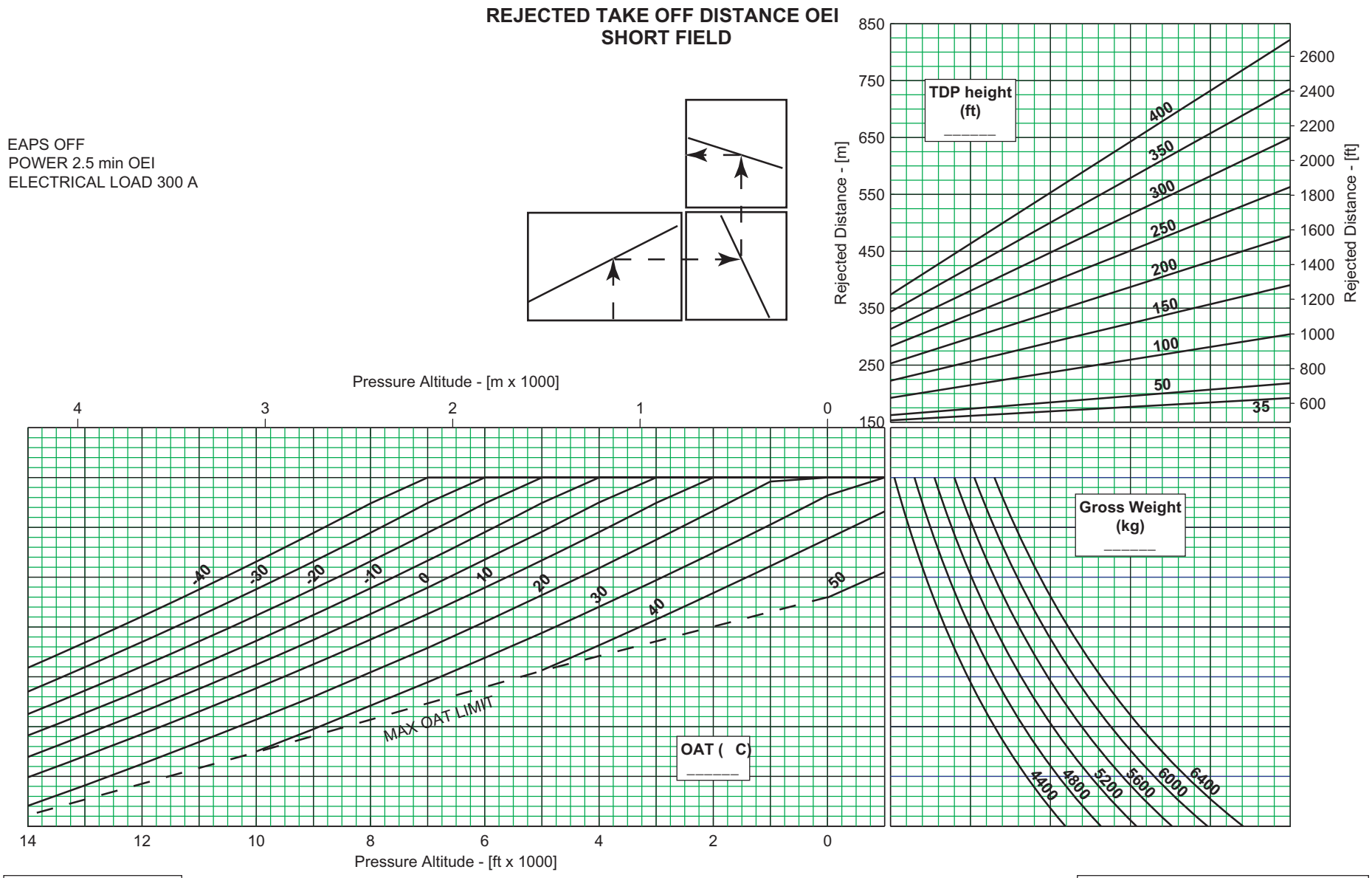

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Figure 4B-5 Short Field Procedure RTO Distance, EAPS OFF

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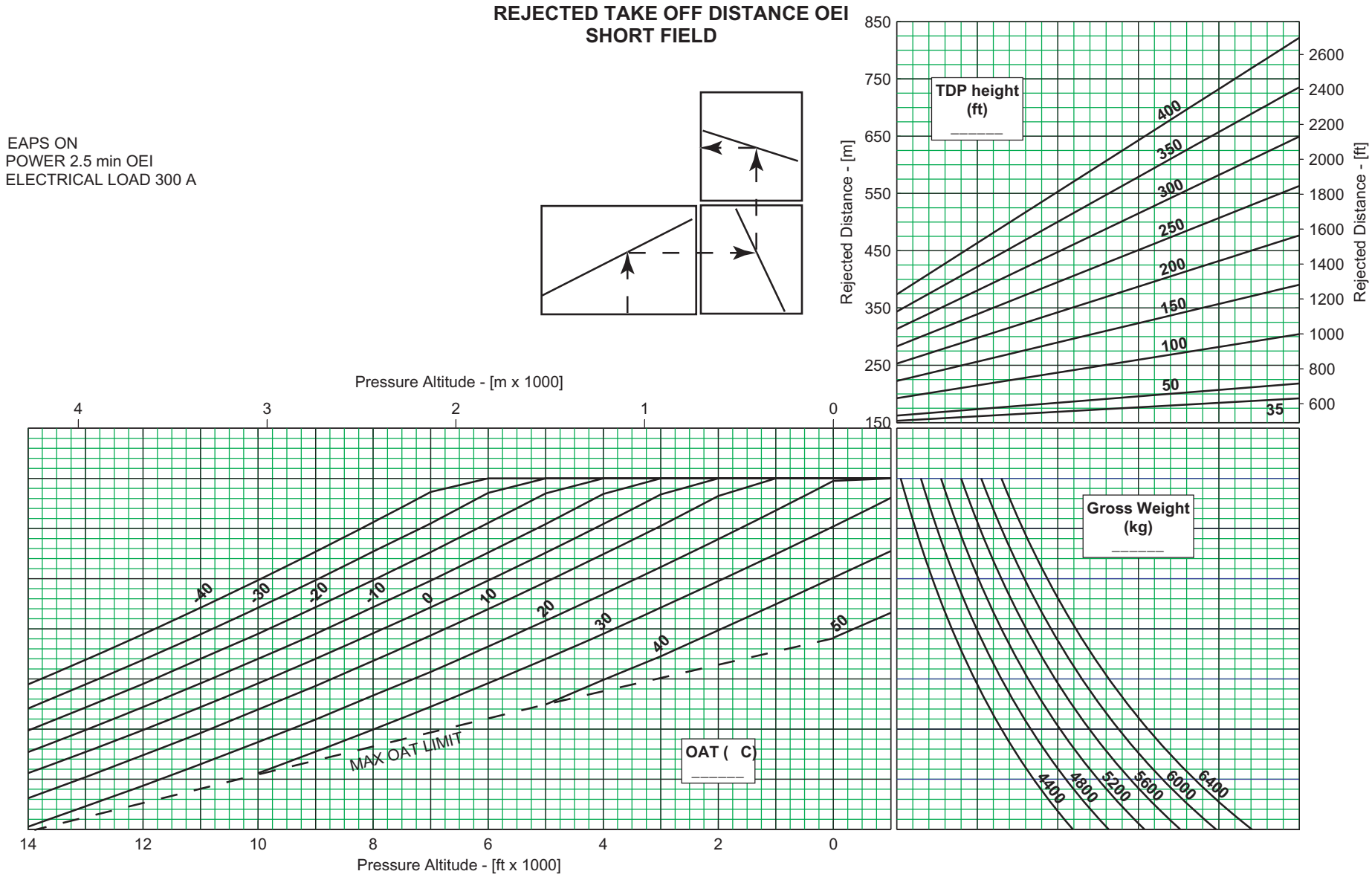

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Figure 4B-6 Short Field Procedure RTO, EAPS ON

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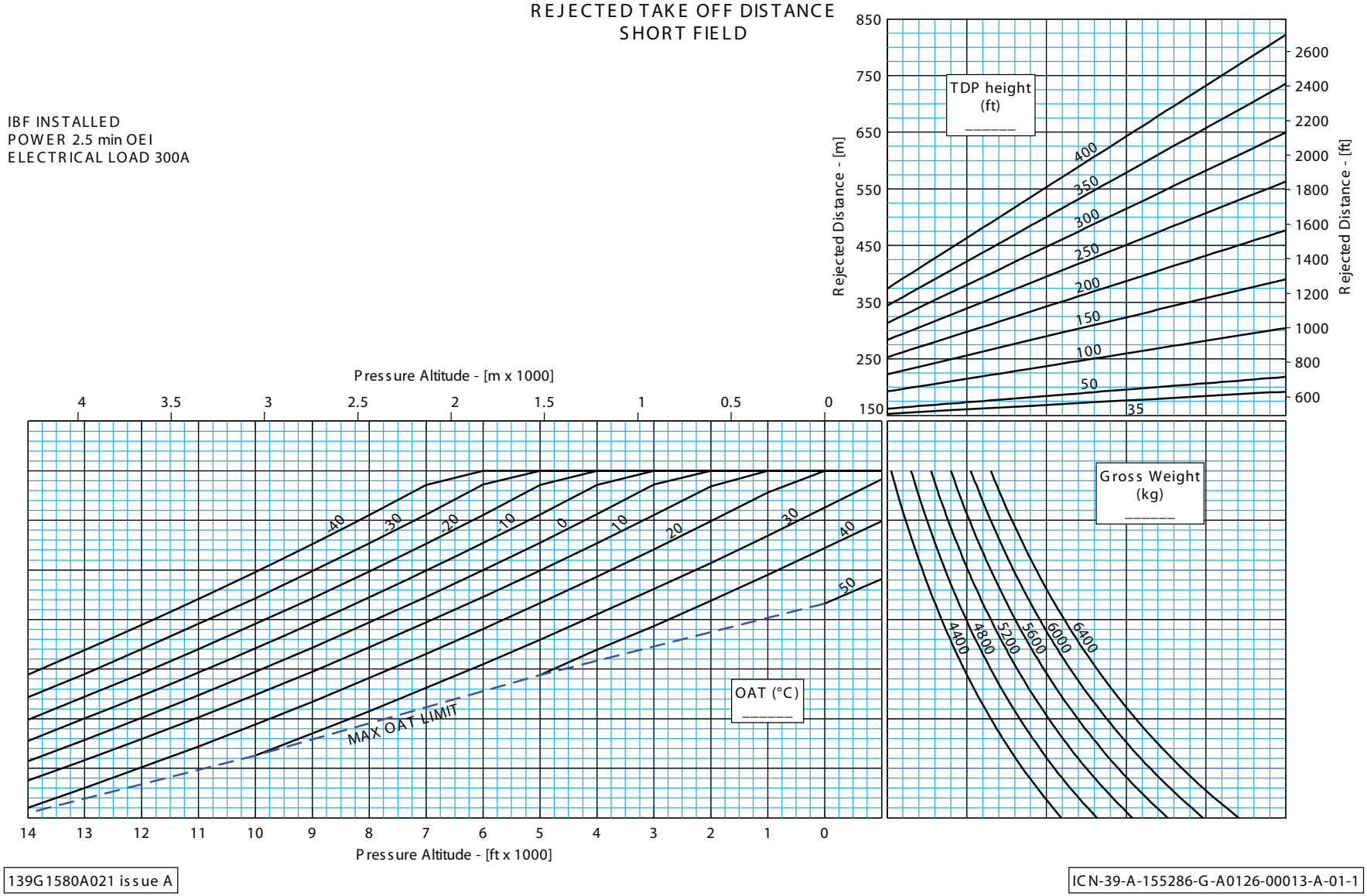

Figure 4B-6A Short Field Procedure RTO, IBF Installed

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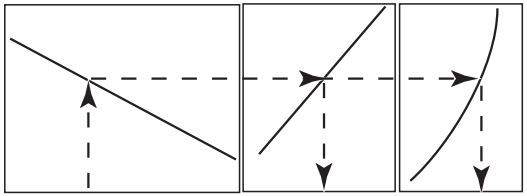
CONTINUED TAKE OFF DISTANCE OEI
SHORT FIELD



Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS} 40 KIAS

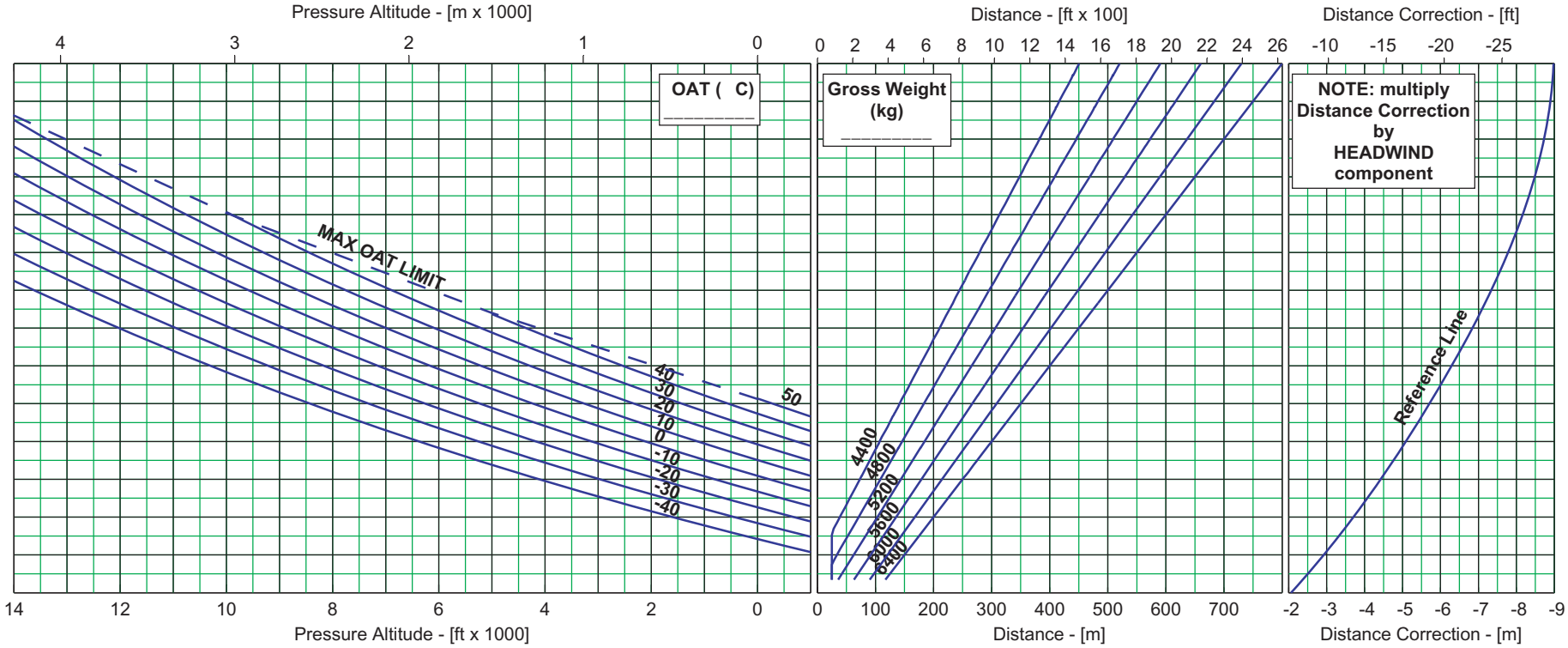


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Figure 4B-7 Short Field Procedure CTO Distance OEI, Clean, EAPS ON/OFF

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SHORT FIELD PROCEDURE with EXTENDED TDP

TDP height AGL		Min height AGL		Height AGL at CTO end	
(ft)	(m)	(ft)	(m)	(ft)	(m)
35	11	15	5	35	11
50	15	30	9	40	12
75	23	55	17	75	23
100	30	80	24	100	30
125	38	105	32	125	38
150	46	130	40	150	46
175	53	155	47	175	53
200	61	180	55	200	61
225	69	205	62	225	69
250	76	230	70	250	76
275	84	255	78	275	84
300	91	280	85	300	91
325	99	305	93	325	99
350	107	330	101	350	107
375	114	355	108	375	114
400	122	380	116	400	122

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Figure 4B-8 Short Field Procedure Typical Heights AGL for CTO OEI

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PART C
GROUND LEVEL AND ELEVATED HELIPORT/HELIDECK BACK UP TAKE-OFF PROCEDURES

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Part C
Ground Level and Elevated Heliport/ Helideck Back Up Take-Off Procedures

SECTION 1C - LIMITATIONS

GROUND LEVEL AND ELEVATED HELIPORT/HELIDECK SIZE

Minimum demonstrated heliport/helideck size ..... 15 m x 15 m
(50 ft x 50 ft)
or Diameter 15 m (50 ft)

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake..... Figure 4C-3

Weight Limitation, EAPS OFF..... Figure 4C-4

Weight Limitation, EAPS ON..... Figure 4C-5

Weight Limitation, IBF Installed.....Figure 4C-5A

AIRSPEED LIMITATIONS

Take-Off Safety Speed (V_{TOSS}) .....40 KIAS

Best Rate of Climb Speed (V_Y) .....Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)
..... Above 10000 ft Hp 70 KIAS
(Above 3000 m Hp 70 KIAS)

GROUND SPEED LIMITATIONS

Maximum GS with PARK BRAKE ON.....5 kts (9 km/hr)

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A
Take-Off and Landing.....14000 ft (4271 m) Hp or Hd

whichever comes first

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s).

Take-Off with tail wind component is prohibited.

SECTION 2C - NORMAL PROCEDURES

TAKE-OFF DECISION POINT (TDP) HEIGHT

TDP_E ..... 85 to 400 ft ATS
(26 m to 122 m ATS)

CONTINUED TAKE-OFF HEIGHTS

Minimum height during CTO .....(TDP_E -70 ft) ATS
(TDP_E -21 m ATS)

Height at end of CTO distance ..... Figure 4C-7

Note

Radar altimeter heights are shown in the flight path profiles.
Refer to Barometric altimeter for Elevated Heliport/ Helideck or when obstacles are present in the Take-Off flight path.

TAKE-OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand pilot should monitor engine and rotor parameters.

BACK UP TAKE-OFF PROCEDURE FOR GROUND LEVEL, ELEVATED HELIPORT/HELIDECK

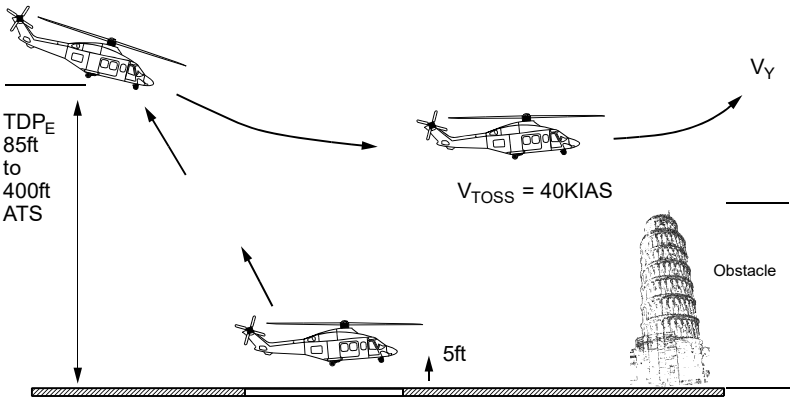

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Figure 2C-1 Take-Off Profile Ground Level, Elevated Heliport/ Helideck

1. LDG LT & LDG LT2 swithces — As required.
2. Rotor speed — Set 102% NR.
3. PARK BRAKE — Apply. Confirm PARK BRAKE ON advisory illuminated on CAS.
4. HEATER (if fitted) — Confirm SOV 1 & 2 switches selected to NORMAL.
   Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates.
   Select HTR switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguishes.

ECS ENVIRO (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates. Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
5. Power checks	— Carry out as required in accordance with ENGINE POWER CHECKS procedure in Part K Common Performance.
6. Pilot Altimeter	— Set 0 ft, or nearest 1000 ft (300 m) setting to T-O altitude, with collective at MPOG.
7. Hover	— Establish a 5 ft (1.5 m) ATS hover.

Note

In HIGE the indicated altitude, on the altimeters, will be 40 ft to 60 ft (12 m to 18 m) below the setting value. The indicated altitude automatically corrects in the climb.

8. Flight controls	— Check correct functioning.
9. MFD PWR PLANT page	— Check all parameters within normal operating limits.
10. Warnings and Cautions	— Confirm none displayed.
11. PI	— Check PI's matched, NR 102%. Note PI value.

12. Collective/Cyclic Control — Increase PI by 23% above hover value (if 23% is not available, without exceeding Take Off PI, increase to 110%) in 2 seconds and initiate a rearwards climb to TDP while maintaining view of heliport/helideck.

Note

OAT conditions close to 50° C may produce ITT limited PI, in HIGE, above 87% PI. Under these conditions using 110% PI (even though the change in PI is less than 23%) will produce the required power to guarantee the CAT A performance.

13. Take-Off Decision Point (TDP) — At required TDP height rotate nose down to -10° attitude in 1 second. Maintain this attitude for 1 second then recover pitch attitude to 0° to climb and accelerate to V_{TOSS} (40 KIAS). Maintain collective position.

14. Acceleration/Climb — When V_{TOSS} (40 KIAS) is achieved, adjust pitch attitude to approximately 5° nose up. Maintaining collective position, continue climb and accelerate to V_y.

15. Climb — At V_y adjust attitude to stabilize speed. Continue climb.

16. Landing gear — UP (when reaching V_y but not below 200 ft (60 m) ATS).

17. NR/NF — Select 100% at V_y.

18. After Take-Off checks — Complete.

19. Power	— Adjust collective to continue climb at V_y, utilizing up to Take-Off power, as required, to 1000 ft (300 m) ATS.
20. At 1000 ft (300 m) ATS	— Adjust collective and cyclic to continue climb at V_y or cruise speed as required.
21. HEATER/ECS ENVIRO (if fitted)	— As required.
22. PARK BRAKE	— Release, confirm PARK BRAKE ON advisory not illuminated.
23. LDG LT & LDG LT2 switches	— OFF, if used.
24. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI performance.



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Figure 2C-2 Heliport Back Up Take-Off - View RH Seat at 5 ft ATS



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Figure 2C-3 Heliport Back Up Take-Off - View RH Seat at 85 ft ATS



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Figure 2C-4 Heliport Back Up Take-Off - View RH Seat at 200ft ATS



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Figure 2C-5 Heliport Back Up Take-Off - View RH Seat at 400ft ATS



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Figure 2C-6 Heliport Back Up Take-Off - View LH Seat at 5 ft ATS



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Figure 2C-7 Heliport Back Up Take-Off - View LH Seat at 85 ft ATS



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Figure 2C-8 Heliport Back Up Take-Off - View LH Seat at 200ft ATS



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Figure 2C-9 Heliport Back Up Take-Off - View LH Seat at 400ft

SECTION 3C - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Take-Off path and assume the pilot gives first priority to aircraft control and to achieve a safe flight path.

For all Take-Off procedures the following shall be observed:

1. Engine failure prior to TDP — Recognition of engine failure prior to the TDP dictates that the Take-Off be rejected

2. Engine failure at or after TDP — Recognition of the failure at or after the TDP dictates that the Take-Off be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

TAKE-OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand pilot should call out rotor speed during the engine failure procedures.

EMERGENCY PROCEDURES FOR SINGLE ENGINE FAILURE DURING TAKE-OFF

SINGLE ENGINE FAILURE RECOGNIZED IN HOVER (5 feet (1.5 m) ATS)

1. Collective — Maintain collective pitch setting or lower collective slightly to land.
2. Touchdown — Increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).
3. Landing — After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4. Engine — On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
5. PARK BRAKE — As required.

SINGLE ENGINE FAILURE RECOGNIZED IN CLIMB, PRIOR TO TDP (REJECTED TAKE-OFF)

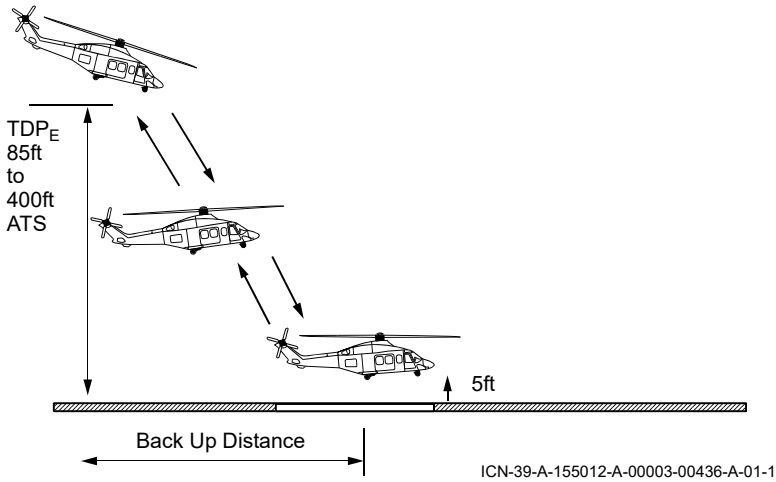

Figure 3C-1 Ground Level, Elevated Heliport/Helideck Engine Failure before TDP ATS

1. Collective — Adjust collective gently to stop climb and establish descent. Maintain rotor speed close to 100%NR.

   •When left hand pilot flying, right hand pilot call out rotor speed.

2. Cyclic — Adjust pitch attitude to -10° nose down to start descent back to the Take-Off position on heliport/helideck.

3. Touchdown — At approximately 5-10 ft (1.5-3 m) ATS increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).

4. Landing — After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.

5. Engine — On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

6. PARK BRAKE — As required.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER TDP (CONTINUED TAKE-OFF)

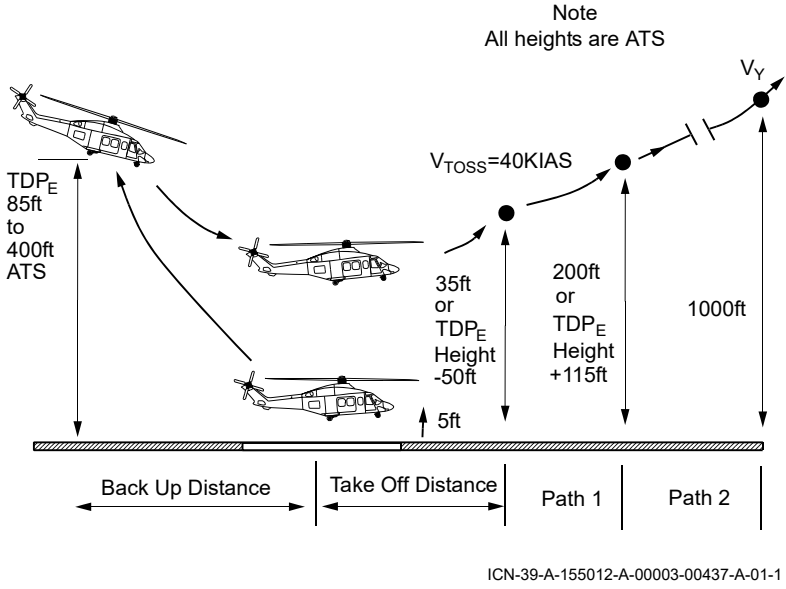

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Figure 3C-2 Ground Level, Elevated Heliport/Helideck Engine Failure at/after TDP

1. Collective/Cyclic control — Rotate nose down to an attitude of -10° in 1 second. Maintain for 1 second. Then recover pitch attitude to 0° in 1 second.

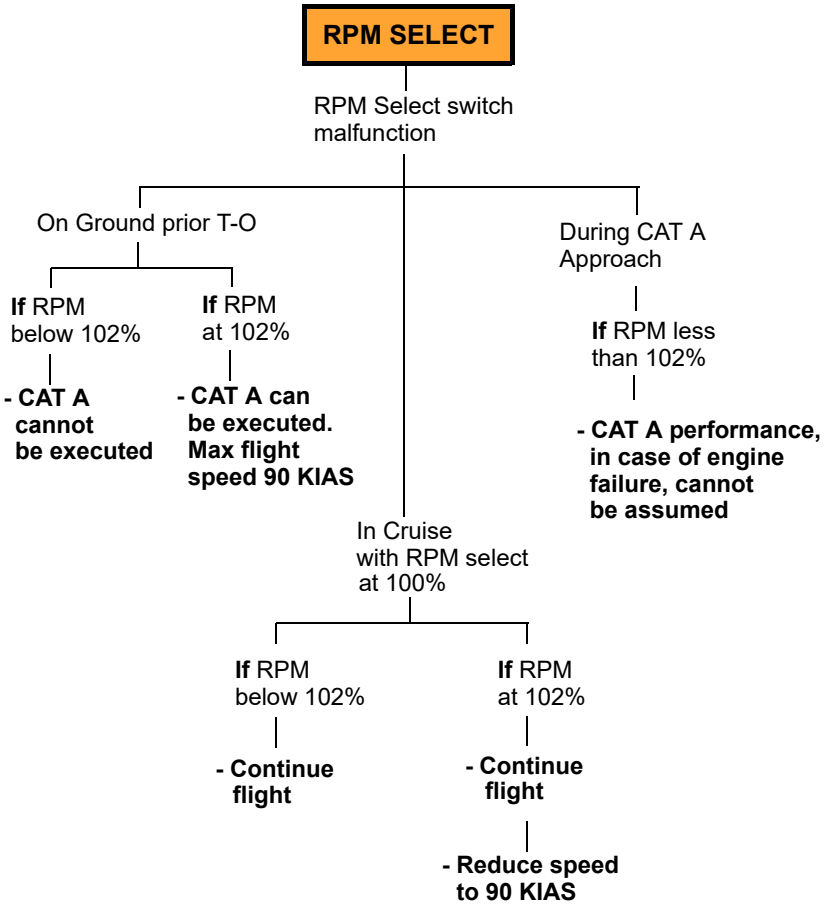
		Maintain 0° while using collective to droop NR to minimum of 90% and set 2.5 min power. •When left hand pilot flying, right hand pilot call out rotor speed.
2.	Acceleration/climb	— Maintain pitch attitude at 0° and continue the acceleration up to V_{TOSS} (40 KIAS).
3.	Climb	— When the aircraft achieves V_{TOSS} (40 KIAS) and a positive rate of climb, adjust pitch attitude to approximately 5° nose up and lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) (or TDP_E height+115 ft) ATS (or TDP_E height+35 m ATS) with 2.5 min power.
4.	At 200 ft (or TDP_E height+115 ft) ATS (60 m (or TDP_E height+35 m) ATS)	— Continue climb and accelerate to Vy using 2.5 min power rating. After achieving Vy, continue to 1000 ft AGL reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
5.	Landing gear	— UP (when reaching V_y).
6.	Rotor speed	— Select 100% at V_y.
7.	At 1000 ft (300 m) ATS	— **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
8.	PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.

9. MFD

— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



SECTION 4C - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind Component computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

The Ground Level, Elevated Heliport/Helideck Back Up Take-Off Procedure Weight Limitation charts are shown in Figure 4C-3 to Figure 4C-5.

HELIPORT BACK UP PROCEDURE - TYPICAL HEIGHTS AND DISTANCES

The relevant heights and distances, as a function of TDP height, are presented in Figure 4C-7.

CONTINUED TAKE-OFF DISTANCE OEI

The Continued Take Off Distance is defined as the difference between the T-O distance from TDP OEI (Figure 4C-6 valid for Clean Intake, EAPS ON/OFF and IBF Installed) and the Back Up distance (Figure 4C-7).

The Distance Correction incorporated into the “Heliport Back Up T-O Distance from TDP OEI” chart, presented in this supplement, for Headwind Component has already been factored by 50%.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power OEI is shown in Figure 4A-8 to Figure 4A-31 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from the end of the CTO distance to a height of 200 ft (60 m) or TDP_E height +200 ft (60 m) ATS.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

These charts apply from 200 ft (60 m) or TDP_E height +200 ft (60 m) ATS to 1000 ft (300 m) ATS.

CLIMB PERFORMANCE

Single Engine Rate Of Climb at V_Y

The ROC at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or from the appropriate Supplement if EAPS or IBF installed.

TDP_E FOR OBSTACLE CLEARANCE

The Figure 4C-1 and Figure 4C-2 demonstrate the process necessary to calculate the TDP_E for an obstacle in the Take Off Profile and to ensure that obstacles in the Back Up profile do not endanger the aircraft if a RTO is required.

D_{CTO} = Continued Take-Off Distance (ft)

D_O = Distance from Take-Off position to Obstacle (ft)

H_{BO} = Height of Obstacle in Back Up Profile (ft)

H_O = Height of Obstacle (ft)

H_C = Required clearance height above Obstacle (ft)

TDP_{MIN} = 85 ft ATS

TDP_E for obstacle inside the CTO distance

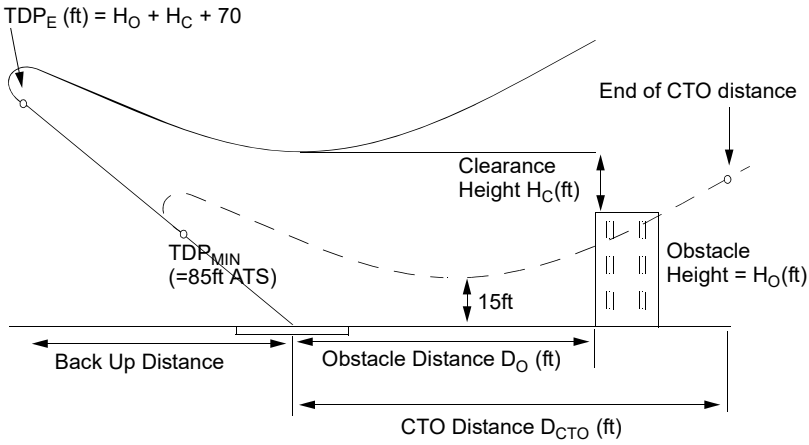


Figure 4C-1 Obstacle in Take-Off Profile

A Back-Up Take-Off procedure with the TDP_{MIN} of 85 ft ATS would guarantee a minimum height of 15 ft ATS.

The TDP_E required to clear an obstacle positioned inside the CTO distance by the required H_C is:

TDP_E (ft) = H_O + H_C + 70 (Maximum TDP_E = 400 ft ATS).

TDP_E For Obstacle Under Back Up Profile

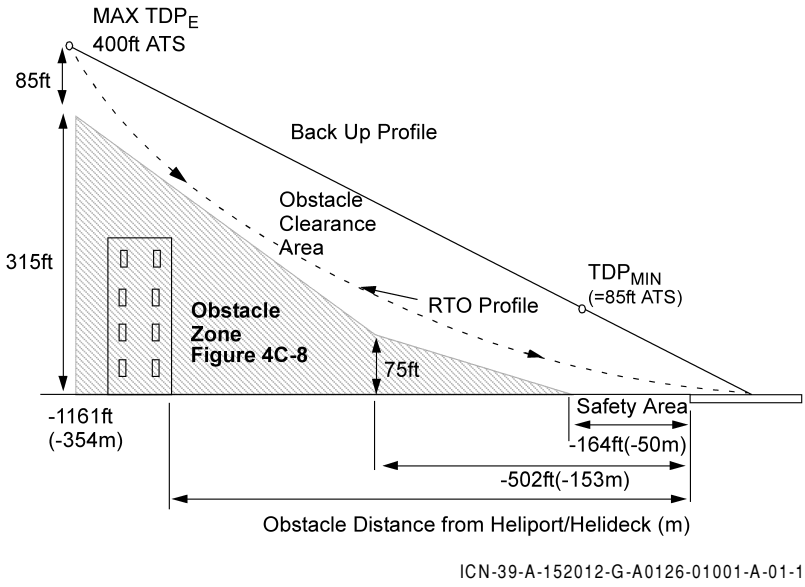


Figure 4C-2 Obstacle in the Back Up Profile

If there are obstacles under the Take-Off Back-Up profile then the obstacle height and position, with respect to the Heliport/Helideck, must be within the Obstacle Zone as defined by the table in Figure 4C-8 which gives a minimum obstacle clearance height of 15 ft from the most rear point of the helicopter. The helicopter is assumed to takeoff with the rotor axis on the centre of the 15 m x 15 m heliport/ helideck. For any other position or alternative size of heliport then an allowance should be made for this alternative position.

If Operating Rules define specific obstacle clearance this must be taken into consideration when defining the TDP_E.

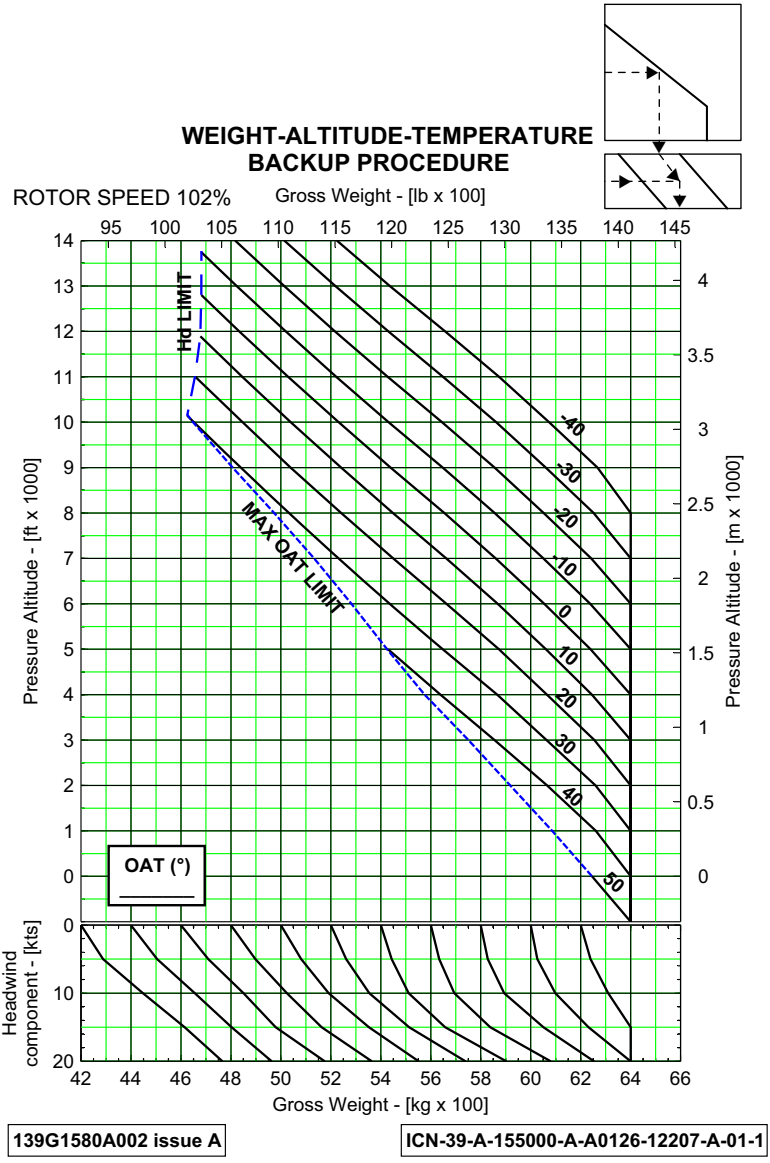


Figure 4C-3 Heliport Back Up Procedure Weight Limitations

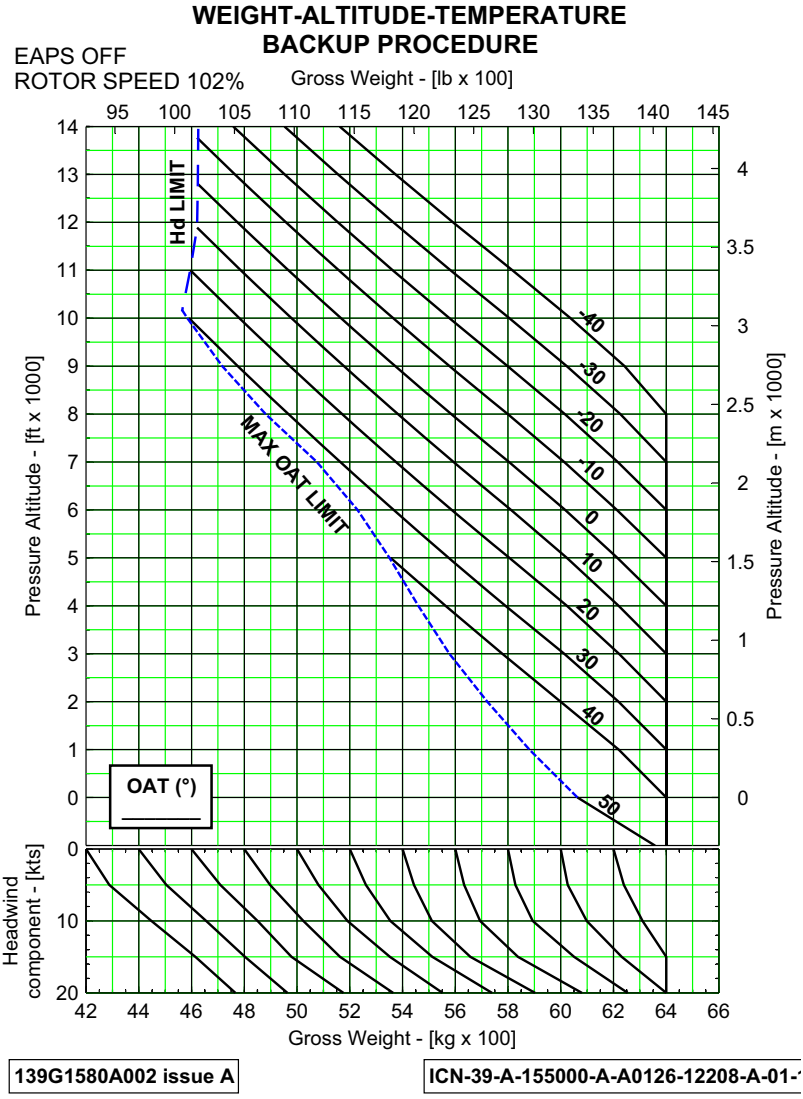


Figure 4C-4 Heliport Back Up Procedure Weight Limitations, EAPS OFF

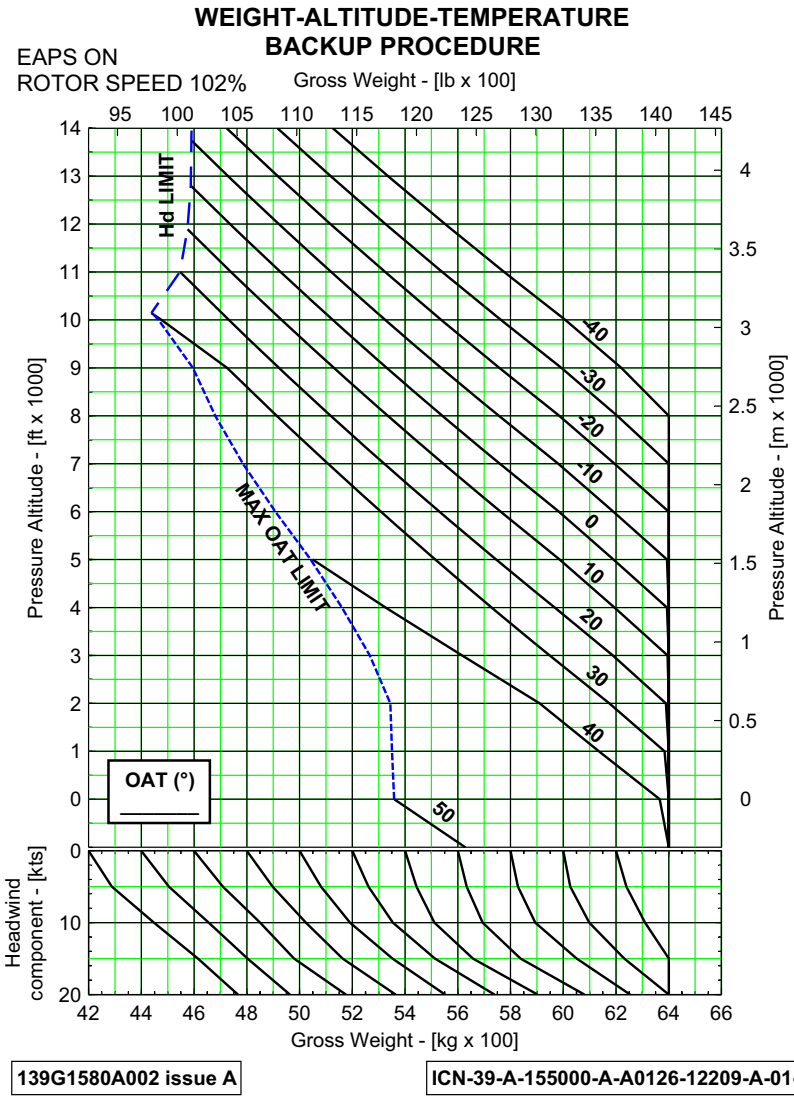


Figure 4C-5 Heliport Back Up Procedure Weight Limitations, EAPS ON

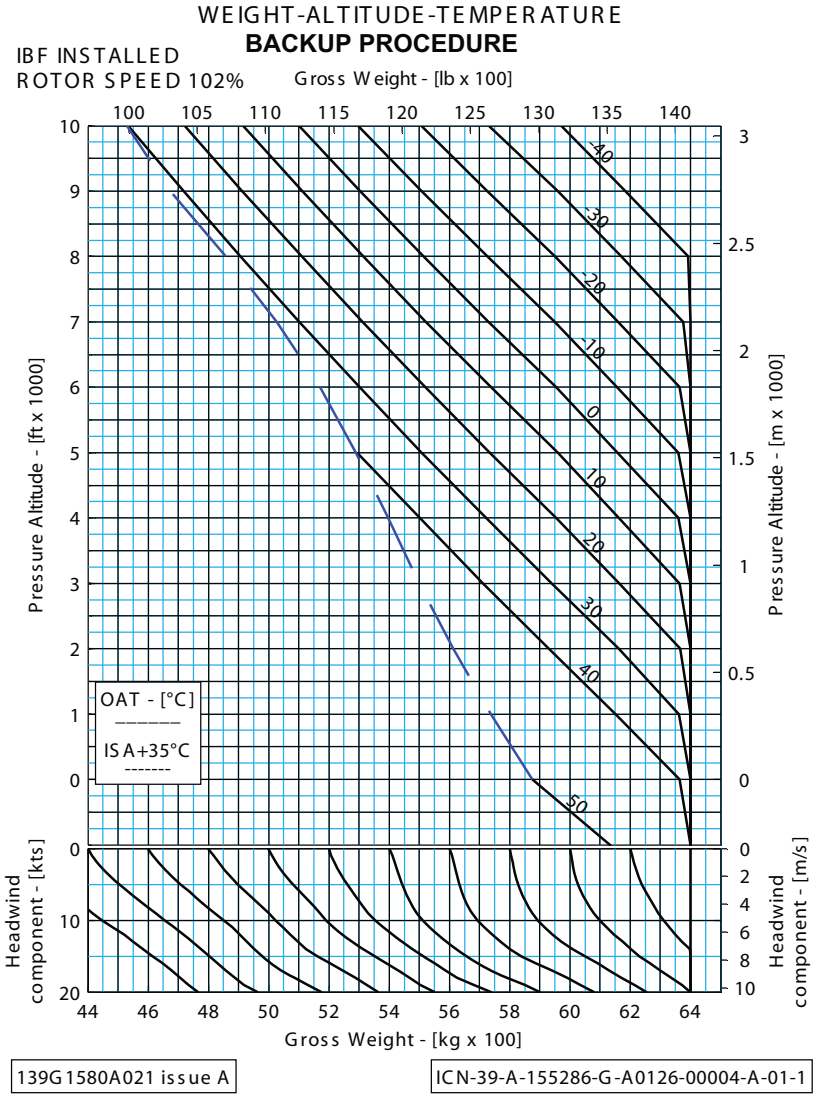
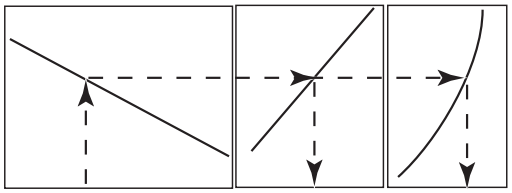


Figure 4C-5A Heliport Back Up Procedure Weight Limitations, IBF Installed

TAKE OFF DISTANCE from TDP OEI
BACKUP PROCEDURE



Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS} 40 KIAS

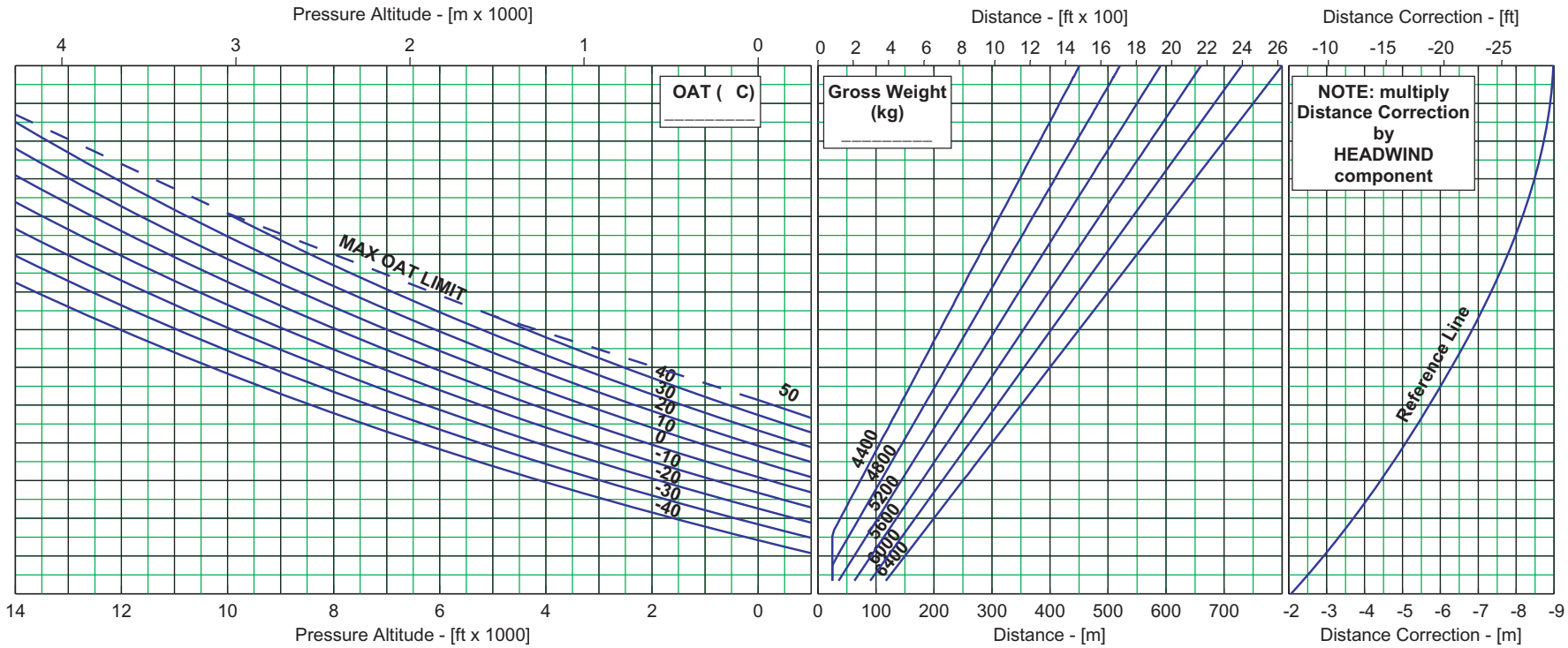


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Figure 4C-6 Heliport Back Up Procedure T-O Distance from TDP OEI, Clean, EAPS ON/OFF
(to be used in association with Figure 4C-7 to calculate CTO distance)

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HELIPORT BACKUP PROCEDURE WITH EXTENDED TDP

TDP height AGL		Min height AGL		Height AGL at CTO end		Back up [1] Distance
(ft)	(m)	(ft)	(m)	(ft)	(m)	(m)
85	26	15	5	35	11	71
100	30	30	9	50	15	84
115	35	45	14	65	20	96
130	40	60	18	80	24	109
145	44	75	23	95	29	121
160	49	90	27	110	34	134
175	53	105	32	125	38	147
190	58	120	37	140	43	159
205	62	135	41	155	47	172
220	67	150	46	170	52	184
235	72	165	50	185	56	197
250	76	180	55	200	61	209
265	81	195	59	215	66	222
280	85	210	64	230	70	234
295	90	225	69	245	75	247
310	94	240	73	260	79	260
325	99	255	78	275	84	272
340	104	270	82	290	88	285
355	108	285	87	305	93	297
370	113	300	91	320	98	310
385	117	315	96	335	102	322
400	122	330	101	350	107	335

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Note [1]

The Back Up distance must be subtracted from the “T-O distance from TDP OEI” (Figure 4C-6) to obtain the CTO distance from the Take-Off point.

Figure 4C-7 Heliport Back Up Procedure Typical Heights and Distances

OBSTACLE DISTANCE IN BACKUP PROFILE

Obstacle Height AGL (ft)	Obstacle Height AGL (m)	Minimum obstacle Distance from Heliport (ft)	Minimum obstacle Distance from Heliport (m)
0	0	-164	-50
15	4.5	-233	-71
30	9	-302	-92
45	13.5	-387	-118
60	18	-440	-134
75	22.5	-502	-153
90	27.5	-545	-166
105	32	-584	-178
120	36.5	-627	-191
135	41	-666	-203
150	45.5	-709	-216
165	50	-748	-228
180	54.5	-791	-241
195	59	-830	-253
210	64	-873	-266
225	68.5	-915	-279
240	73	-955	-291
255	77.5	-997	-304
270	82	-1037	-316
285	86.5	-1079	-329
300	91	-1119	-341
315	96	-1161	-354

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Note

Obstacle distance is with reference to the rear edge of a 15 m x 15 m heliport/helideck.

Figure 4C-8 Minimum Distance for Obstacle in Back Up Profile

PART D
CONFINED AREA TAKE-OFF PROCEDURES

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Part D
Confined Area Take-Off Procedures

SECTION 1D - LIMITATIONS

GROUND OR ELEVATED HELIPORT SIZE

Minimum demonstrated heliport size ..... 20 m x 20 m (65 ftx65 ft)
or Diameter 20 m (65 ft)

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake..... Figure 4D-2

Weight Limitation, EAPS OFF..... Figure 4D-3

Weight Limitation, EAPS ON..... Figure 4D-4

Weight Limitation, IBF Installed.....Figure 4D-6A

AIRSPEED LIMITATIONS

Take-Off Safety Speed (V_{TOSS}) .....40 KIAS

Best Rate of Climb Speed (V_Y) .....Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)
..... Above 10000 ft Hp 70 KIAS
(Above 3000 m Hp 70 KIAS)

GROUND SPEED LIMITATIONS

Maximum GS with PARK BRAKE ON.....5 kts (9 km/hr)

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A Take-Off ..... 10000 ft (3000 m) Hp or Hd
whichever comes first

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s).

Take-Off with tail wind component is prohibited.

SECTION 2D - NORMAL PROCEDURES

GENERAL

The Confined Area Take Off procedure comprises on an offset rearward climb maintaining an angle of 40° to 45° from the aircraft to the centre of the ground level or elevated heliport. This angle is guaranteed provided the heliport center point in maintained in the lower chin window. This aspect is maintained until the TDP is achieved. The TDP can be varied between a minimum of 100 ft (30 m) ATS to a maximum of 400 ft (122 m) ATS depending on the obstacles in the take off flight path. See Figure 2D-3 to Figure 2D-9 for pilot view of helipad at typical Take Off heights and Figure 2D-10 to Figure 2D-16 for typical view when take off is performed from the left hand seat.

Two different techniques are available for the PATH 1 and PATH 2 climb after reaching V_{TOSS}. The standard technique performs the PATH 1 climb maintaining the V_{TOSS} (40 KIAS) speed then at 200 ft accelerating to V_y (80 KIAS) for the PATH 2 climb up to 1000 ft (300 m) ATS.

The alternative technique continues the acceleration, after reaching V_{TOSS} (40 KIAS), straight up to 60 KIAS and the PATH 1 and PATH 2 segment climbs are carried out at 60 KIAS. This second technique has been introduced as it has the following advantages:

- The technique is simpler as it maintains 60 KIAS throught the climb
- The climb condition is easier to maintain
- The IFR minimum airspeed Vmini (50 KIAS) is achieved earlier
- The end of the PATH 2 climb to 1000 ft (300 m) ATS is achieved before expiry of the OEI 2.5m limit and in a shorter time, for engine failure cases.

TAKE-OFF DECISION POINT HEIGHT (TDP)

TDP ..... Min 100 ft to Max 400 ft ATS
(Min 30 m to Max 122 m ATS)

CONTINUED TAKE-OFF HEIGHTS

Minimum height during CTO ..... 15 ft or (TDP - 85 ft) ATS
(5 m or (TDP - 26 m) ATS)

Height at end of CTO distance ..... 35 ft + (TDP-100 ft) ATS
(10 m or (TDP - 30 m) ATS)

Note

Radar Altimeter heights are shown in the flight path profiles.
Refer to Barometric altimeter when obstacles are present in the Take-Off flight path.

TAKE OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand pilot should monitor engine and rotor parameters.

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CONFINED AREA GROUND LEVEL OR ELEVATED HELIPORT

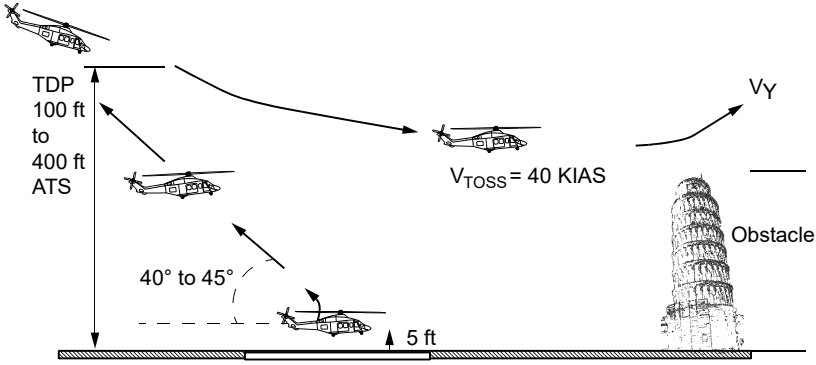

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Figure 2D-1 Take-Off Profile Heliport (Side View)

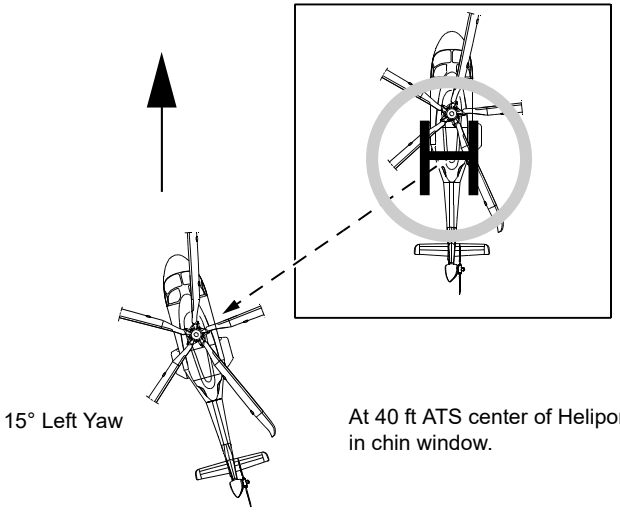

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Figure 2D-2 Take-Off Profile Heliport, PF in RH Seat (Top View)

1. LDG LT & LDG LT2 switches — As required.

2. Rotor speed — Set 102% NR.

3. PARK BRAKE — Apply. Confirm PARK BRAKE ON advisory illuminated on CAS.

4. HEATER (if fitted) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates.
Select HTR switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.

ECS ENVIRO (if fitted) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates.
Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.

5. Power checks — Carry out as required in accordance with ENGINE POWER CHECKS procedure in Section 4K - Performance Data

6. Pilot Altimeter — Set 0 ft, or nearest 1000 ft (300 m) setting to T-O altitude, with collective at MPOG.

7. Hover	— Establish a 5 ft (1.5 m) ATS hover.

Note

In HIGE the indicated altitude, on the altimeters, will be 40 ft to 60 ft (12 m to 18 m) below the setting value. The indicated altitude automatically corrects in the climb.

8. Flight controls	— Check correct functioning.
9. MFD PWR PLANT page	— Check all parameters within normal operating limits.
10. Warnings and Cautions	— Confirm none displayed.
11. PI/NR	— Check PI's matched, NR 102 %. Note PI value.
12. Collective/Cyclic Control	— Increase PI by 10 to 12% above hover value in 2 seconds to initiate a climb, immediately adjusting the attitude to allow slight backwards and left movement with 10 to 15 degrees of left yaw to establish the centre of the heliport in the chin window by 40 ft (12 m) ATS. (Take Off carried out from left hand seat move right and yaw right). After applying initial 10 to 12% PI, continuously and progressively increase PI to achieve the full 23% above hover PI by 40 ft (12 m). From 40 ft (12 m) maintain a constant aspect of the heliport in the chin window until reaching TDP.

Note

OAT conditions close to 50° C or high altitude may produce ITT limited PI, in HIGE, above 87 % PI. Under these conditions using 110% PI (even though the change in PI is less than 23 %) will produce the required power to guarantee the CAT A performance. In this case, appy the initial 12 % PI, as above, and then complete the procedure up to 110 % PI.

13. Take-Off Decision Point (TDP) — At required TDP height maintain collective position, recover the 10-15 degrees of yaw, rotate nose down to -10° attitude in 1 second. Maintain this attitude for 1 second then recover pitch attitude to 0° and maintain to accelerate to V_{TOSS} (40 KIAS). Maintain collective position.

14. Acceleration/Climb — When V_{TOSS} (40 KIAS) is achieved adjust pitch attitude to 5° nose up. Maintain collective position, continue climb and acceleration until V_y.

15. Climb — At V_y adjust attitude to stabilize speed. Continue climb.

16. Landing gear — UP (when reaching V_y but not below 200 ft (60 m) ATS).

17. NR/NF — Select 100% at V_y.

18. Power — Adjust collective to continue climb at V_y, utilizing up to Take-Off power, as required, to 1000 ft (300 m) ATS.

19. After Take-Off checks	— Complete.
20. At 1000 ft (300 m) ATS	— Adjust collective and cyclic to continue climb at V_y or accelerate to cruise speed as required.
21. HEATER/ECS ENVIRO (if fitted)	— As required.
22. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
23. LDG LT & LDG LT2 switches	— OFF (if used).
24. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

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CONFINED AREA GROUND LEVEL OR ELEVATED HELIPORT ALTERNATIVE PROCEDURE (CLIMB AT 60 KIAS)

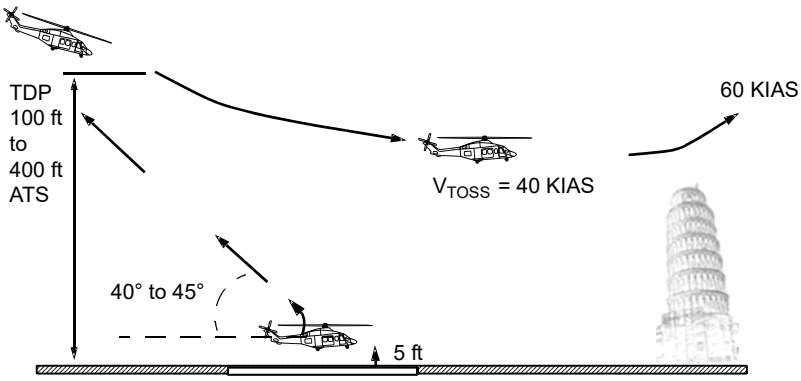

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Figure 2D-2A Take-Off Profile Heliport (Side View)

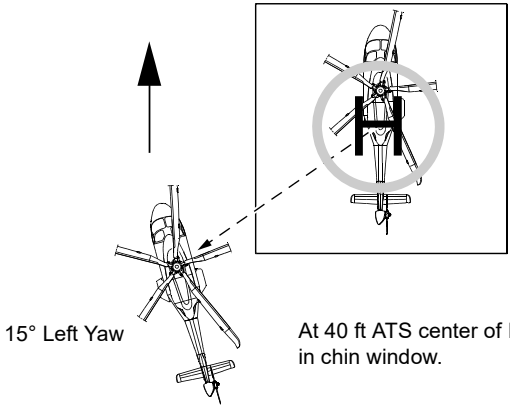

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Figure 2D-2B Take-Off Profile Heliport, PF in RH Seat (Top View)

1.	LDG LT & LDG LT2 switches	— As required.
2.	Rotor speed	— Set 102% NR.
3.	PARK BRAKE	— Apply. Confirm PARK BRAKE ON advisory illuminated on CAS.
4.	HEATER (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates. Select HTR switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
	ECS ENVIRO (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates. Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
5.	Power checks	— Carry out as required in accordance with ENGINE POWER CHECKS procedure in Section 4K - Performance Data.
6.	Pilot Altimeter	— Set 0 ft, or nearest 1000 ft (300 m) setting to T-O altitude, with collective at MPOG.

7. Hover	— Establish a 5 ft (1.5 m) ATS hover.

Note

In HIGE the indicated altitude, on the altimeters, will be 40 ft to 60 ft (12 m to 18 m) below the setting value. The indicated altitude automatically corrects in the climb.

8. Flight controls	— Check correct functioning.
9. MFD PWR PLANT page	— Check all parameters within normal operating limits.
10. Warnings and Cautions	— Confirm none displayed.
11. PI/NR	— Check PI's matched, NR 102 %. Note PI value.
12. Collective/Cyclic Control	— Increase PI by 10 to 12% above hover value in 2 seconds to initiate a climb, immediately adjusting the attitude to allow slight backwards and left movement with 10 to 15 degrees of left yaw to establish the centre of the heliport in the chin window by 40 ft (12 m) ATS. (Take Off carried out from left hand seat move right and yaw right). After applying initial 10 to 12% PI, continuously and progressively increase PI to achieve the full 23% above hover PI by 40 ft (12 m). From 40 ft (12 m) maintain a constant aspect of the heliport in the chin window until reaching TDP.

Note

OAT conditions close to 50° C or high altitude may produce ITT limited PI, in HIGE, above 87 % PI. Under these conditions using 110% PI (even though the change in PI is less than 23 %) will produce the required power to guarantee the CAT A performance. In this case, appy the initial 12 % PI, as above, and then complete the procedure up to 110 % PI.

13. Take-Off Decision Point (TDP) — At required TDP height maintain collective position, recover the 10-15 degrees of yaw, rotate nose down to -10° attitude in 1 second. Maintain this attitude for 1 second then recover pitch attitude to 0° and maintain to accelerate to V_{TOSS} (40 KIAS). Maintain collective position.

14. Acceleration/Climb — When V_{TOSS} (40 KIAS) is achieved continue acceleration to 60 KIAS, adjust pitch attitude to 5° nose up. Maintain collective position.

15. Climb — At 60 KIAS adjust attitude to stabilize speed. Continue climb.

16. Landing gear — UP (when reaching 60 KIAS but not below 200 ft (60 m) ATS).

17. Power — Adjust collective to continue climb at 60 KIAS, utilizing up to Take- Off power, as required, to 1000 ft (300 m) ATS.

18. NR/NF	— Select 100% at 1000 ft (300 m) ATS.
19. After Take-Off checks	— Complete.
20. At 1000 ft (300 m) ATS	— Adjust collective and cyclic to achieve climb at V_y or accelerate to cruise speed as required.
21. HEATER/ECS ENVIRO (if fitted)	— As required.
22. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
23. LDG LT & LDG LT2 switches	— OFF (if used).
24. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI performance.



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Figure 2D-3 Take-Off - View RH Seat HIGE 5 ft ATS



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Figure 2D-4 Take-Off - View RH Seat 40 ft ATS



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Figure 2D-5 Take-Off - View RH Seat 60 ft ATS



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Figure 2D-6 Take-Off - View RH Seat TDP 100 ft ATS



ICN-39-A-155012-A-00003-00707-A-01-1

Figure 2D-7 Take Off - View RH Seat TDP 150 ft ATS



ICN-39-A-155012-A-00003-00708-A-01-1

Figure 2D-8 Take-Off - View RH Seat TDP 200 ft ATS



ICN-39-A-155012-A-00003-00709-A-01-1

Figure 2D-9 Take-Off - View RH Seat TDP 250 ft ATS



ICN-39-A-155012-A-00003-00710-A-01-1

Figure 2D-10 Take-Off - View LH Seat HIGE 5 ft ATS



ICN-39-A-155012-A-00003-00711-A-01-1

Figure 2D-11 Take-Off - View LH Seat 40 ft ATS



ICN-39-A-155012-A-00003-00712-A-01-1

Figure 2D-12 Take-Off - View LH Seat 60 ft ATS



ICN-39-A-155012-A-00003-00713-A-01-1

Figure 2D-13 Take-Off - View LH Seat TDP 100 ft ATS



ICN-39-A-155012-A-00003-00714-A-01-1

Figure 2D-14 Take Off - View LH Seat TDP 150 ft ATS



ICN-39-A-155012-A-00003-00715-A-01-1

Figure 2D-15 Take-Off - View LH Seat TDP 200 ft ATS



ICN-39-A-155012-A-00003-00716-A-01-1

Figure 2D-16 Take-Off - View LH Seat TDP 250 ft ATS

SECTION 3D - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Take-Off path and assume the pilot gives first priority to aircraft control and to achieve a safe flight path.

For all Take-Off procedures the following shall be observed:

1. Engine failure prior to TDP — Recognition of engine failure prior to the TDP dictates that the Take-Off be rejected

2. Engine failure at or after TDP — Recognition of the failure at or after the TDP dictates that the Take-Off be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

TAKE OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand seat pilot should call out rotor speed during the engine failure procedures.

EMERGENCY PROCEDURE FOR SINGLE ENGINE FAILURE DURING TAKE-OFF

SINGLE ENGINE FAILURE RECOGNIZED IN HOVER (5 feet (1.5 m) ATS)

1. Collective	— Maintain collective pitch setting or lower collective slightly if required to land.
2. Touchdown	— Increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).
3. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4. Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
5. PARK BRAKE	— As required.

SINGLE ENGINE FAILURE RECOGNIZED IN CLIMB, PRIOR TO TDP (REJECTED TAKE-OFF)

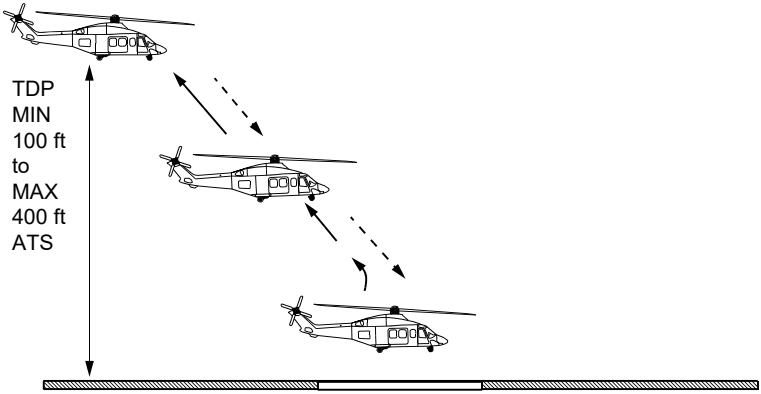

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Figure 3D-1 Confined Area Heliport Engine Failure before TDP

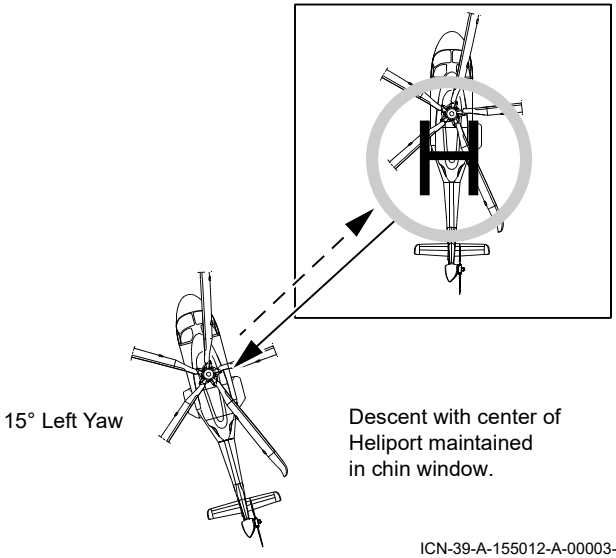

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Figure 3D-2 Confined Area Heliport Engine Failure before TDP, PF in RH Seat

1. Initial action — Initially maintain collective position while applying 2-3 degrees nose down attitude change to commence movement to helipad.

Note

At weight below the W.A.T. limit and for Headwind conditions it may be necessary to lower collective to initiate descent.

2. Descent — As aircraft descends, adjust collective to droop NR to 100 % ±1 %NR. Maintain the helipad position in chin window.
   • When left hand pilot flying, right hand pilot call out rotor speed.

Note

A correctly flown technique will result in a groundspeed of 6 kts to 8 kts during the stabilized descent. Lower groundspeed can result in high rate of descent on landing.

3. Touchdown — At approximately 15 ft (5 m) ATS increase collective to cushion landing as touchdown becomes imminent. Maximum nose up attitude at touchdown, 15 degrees. Maximum allowed GS at touchdown 5 kts (9 km/hr).

4. Landing — After touchdown, lower nose and centralize cyclic and simultaneously reduce collective to MPOG.

5. Engine — On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

6. PARK BRAKE — As required.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER TDP (CONTINUED TAKE-OFF)

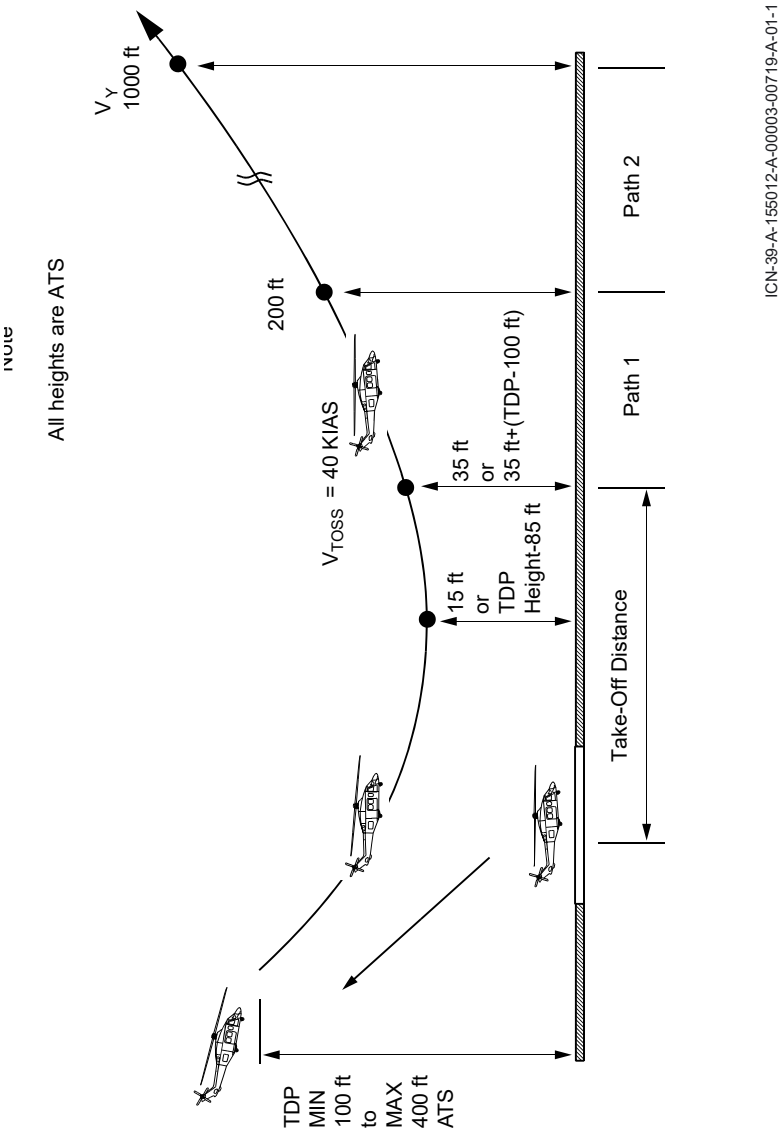

Figure 3D-3 Confined Area Heliport Engine Failure at/after TDP

1. Collective/Cyclic control	— Rotate nose down to -10° in 1 second. Maintain for 1 second. Then recover pitch attitude to 0° in 1 second. Maintain 0° while using collective to droop NR to minimum of 90% and to set 2.5 min power. • When left hand pilot flying, right hand pilot call out rotor speed.
2. Acceleration/climb	— Maintain pitch attitude at 0° and continue the acceleration up to V_{TOSS} (40 KIAS).
3. Climb	— When the aircraft achieves V_{TOSS} (40 KIAS) and a positive rate of climb, adjust pitch attitude to approximately 5° nose up and lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) or TDP height+100 ft ATS (or TDP height+30 m ATS), with 2.5 min power.
4. At 200 ft (60 m) ATS or TDP height +100 ft (TDP height + 30 m)	— Continue climb and accelerate to Vy using 2.5 min power rating. After achieving Vy, continue to 1000 ft AGL reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
5. Landing gear	— UP (when reaching V_y).
6. Rotor Speed	— Select 100% at V_y.
7. At 1000 ft (300 m) ATS	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

8. PARK BRAKE — Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.

9. MFD — During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

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CONTINUED TAKE-OFF FOR ALTERNATIVE PROCEDURE WITH OPTIMISED CLIMB PATH 1 & 2 CLIMB

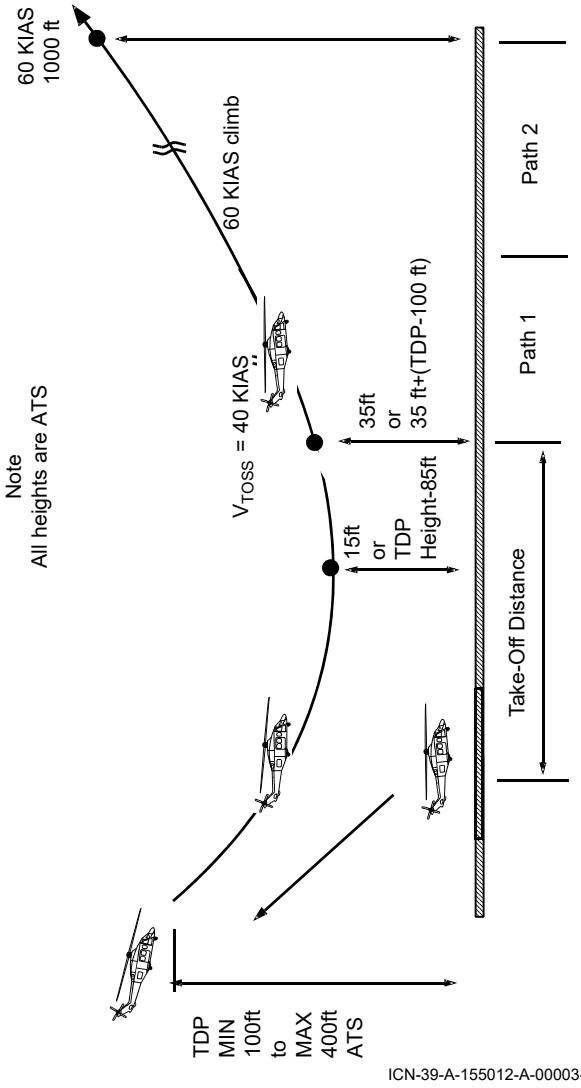


Figure 3D-4 Confined Area Heliport Engine Failure at/after TDP Alternative Procedure

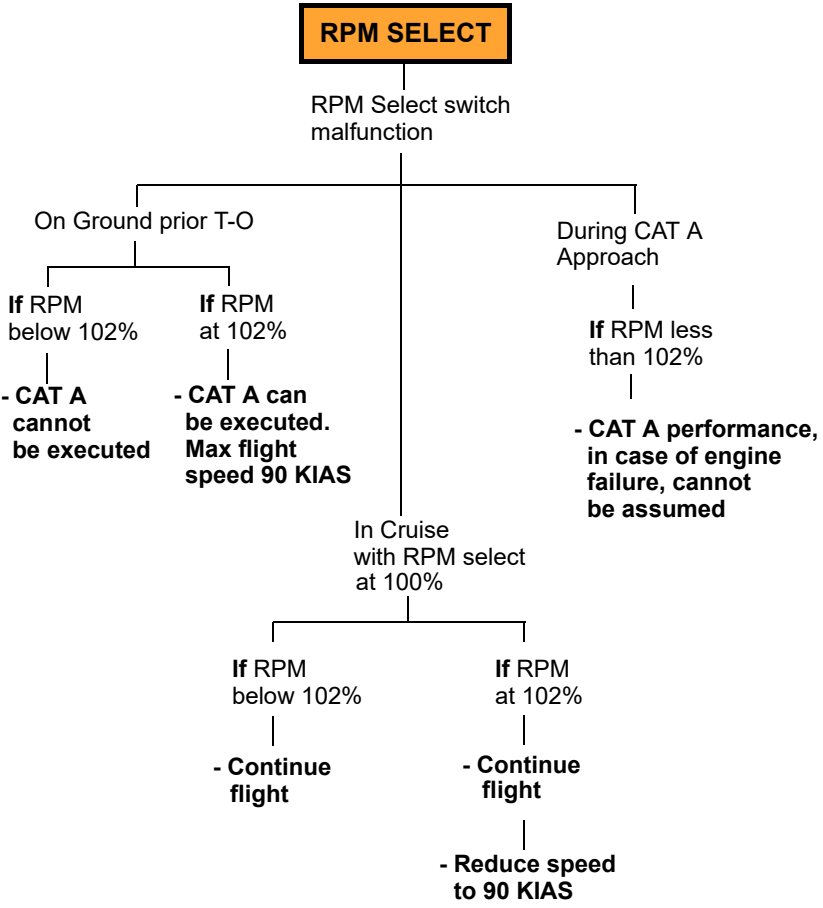
1. Collective/Cyclic control	— Rotate nose down to -10° in 1 second. Maintain for 1 second. Then recover pitch attitude to 0° in 1 second. Maintain 0° while using collective to droop NR to minimum of 90% and to set 2.5 min power. • When left hand pilot flying, right hand pilot call out rotor speed.
2. Acceleration/climb	— Maintain pitch attitude at 0° and continue the acceleration up to VTOSS (40 KIAS).
3. Climb	— When the aircraft achieves VTOSS (40 KIAS) and a positive rate of climb, continue acceleration to 60 KIAS, adjust pitch attitude to approximately 5° nose up and lower collective to recover NR to 102%. Continue climb at 60 KIAS using 2.5 min power rating to 1000 ft (300 m) ATS. At 1000 ft (300 m) ATS accelerate to Vy. Reduce power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
4. Landing gear	— UP (when reaching 60 KIAS but not below 200 ft (60 m) ATS).
5. Rotor Speed	— Select 100% at 1000 ft (300 m) ATS.
6. At 1000 ft (300 m) ATS	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

7. PARK BRAKE — Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.

8. MFD — During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



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SECTION 4D - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind Component computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

The Ground Level and Elevated Heliport Confined Area Procedure Weight Limitations charts are shown in Figure 4D-4 to Figure 4D-6 and Figure 4D-6A.

CONTINUED TAKE OFF DISTANCE OEI

The Continued Take Off distance is defined as the difference between the Take Off OEI distance from TDP shown in Figure 4D-9 (valid for Clean Intake, EAPS ON/OFF and IBF Installed) and the Rearward Climb distance in Figure 4D-7.
The Distance Correction incorporated into the “Confined Area T-O OEI Distance from TDP” chart for Headwind Component has already been factored by 50%.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power OEI is shown in Figure 4A-8 to Figure 4A-31 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.
The charts apply from the end of the CTO distance to a height of 200 ft (60 m) ATS or TDP height +100 ft (30 m).

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.
These charts apply from 200 ft (60 m) ATS or TDP height +100 ft (30 m) to 1000 ft (300 m) ATS.

CLIMB PERFORMANCE

Rate Of Climb OEI at V_Y

The ROC, at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS or IBF installed.

ALTERNATIVE 60 KIAS CLIMB PROCEDURE PATH 1 & 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at 60 KIAS and 2.5 min power OEI is shown in Figure 4D-10 to Figure 4D-33 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

These charts apply from the CTO distance to 1000 ft (300 m) ATS.

TDP CALCULATIONS FOR OBSTACLE CLEARANCE

The Figure 4D-1 and Figure 4D-2 demonstrate the process necessary to calculate the TDP for an obstacle in the Take Off Profile and to ensure that obstacles in the Rearward Climb profile do not endanger the aircraft if a CTO or RTO is required.

D_{CTO} = Continued Take-Off Distance (ft)

D_O = Distance from Take-Off position to Obstacle (ft)

H_{BO} = Height of Obstacle in Rearward Climb Profile (ft)

H_O = Height of Obstacle (ft)

H_C = Required clearance height above Obstacle (ft)

TDP_{MIN} = 100 ft ATS

A Take-Off procedure with the TDP of 100 ft ATS (minimum TDP height permitted) would guarantee a minimum height of 15 ft ATS during a CTO after an engine failure at TDP.

TDP for obstacle inside the CTO distance

The TDP required to clear an obstacle positioned inside the CTO distance by the required H_C is:

TDP (ft) = $H_O + H_C + 85$ (Maximum TDP = 400 ft ATS).

For various TDP heights Figure 4D-7 lists the following typical aircraft distances and heights:

- Minimum height during a Continued Take Off
- Height at the end of the CTO profile
- The aircraft rearward movement from Take Off point
- The lateral displacement from the Take Off point. (outside rotor tip point).

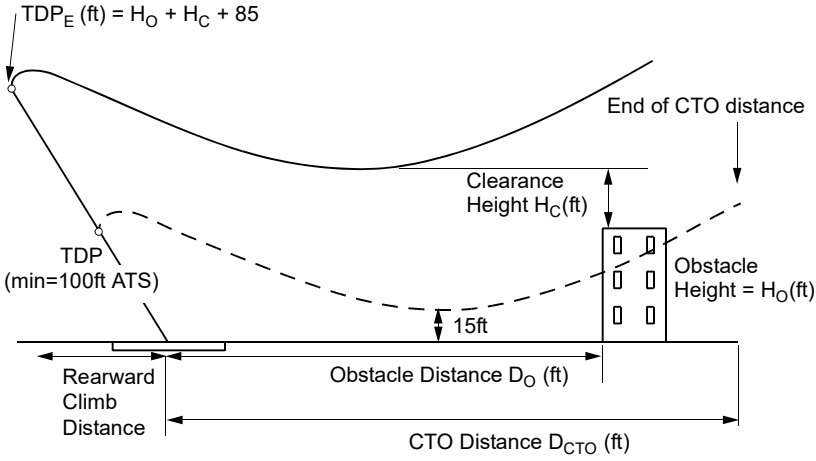

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Figure 4D-1 Obstacle in Take-Off Profile

TDP FOR OBSTACLE UNDER REARWARD CLIMB PROFILE

If there are obstacles under the Rearward Climb profile then the obstacle height and position, with respect to the Heliport, must be within the Obstacle Zone as defined by the table in Figure 4D-8 which includes a minimum obstacle clearance height of 15 ft, from the most rear point of the helicopter. The helicopter is assumed to take-off with the rotor axis on the centre of the 20 m x 20 m heliport. For any other position or alternative size of heliport then an allowance should be made for this alternative position.

If Operating Rules define specific obstacle clearance this must be taken into consideration when defining the TDP.

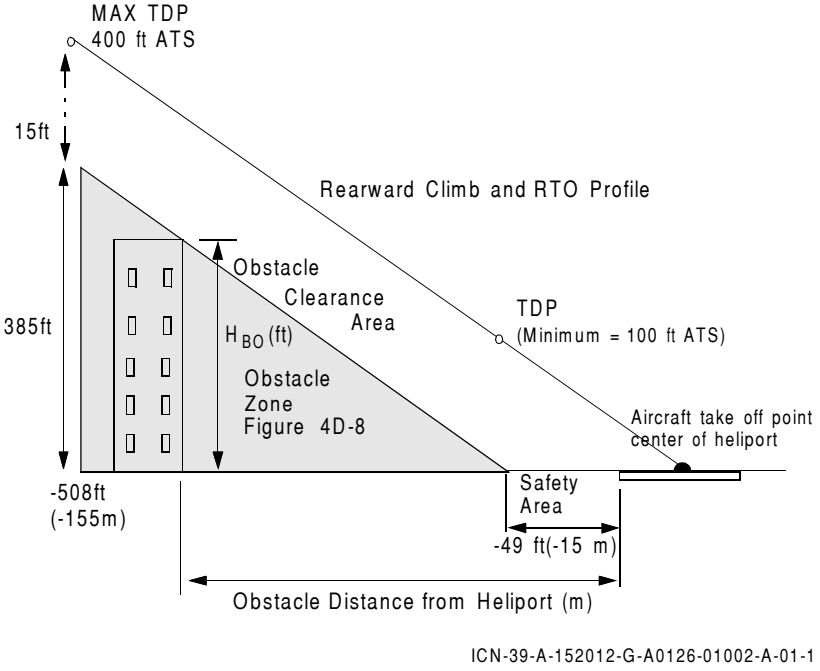


Figure 4D-2 Obstacle in the Back Up Profile

MAXIMUM LATERAL DISPLACEMENT

The Maximum Displacement Outboard (Rotor Tip) detailed in Figure 4D-7 defines, for the range of TDP heights from 100 to 400 ft ATS, the lateral movement of the aircraft from the center of the heliport. It identifies the maximum position of the most outboard rotor tip from the center of the heliport during the reaward climb.

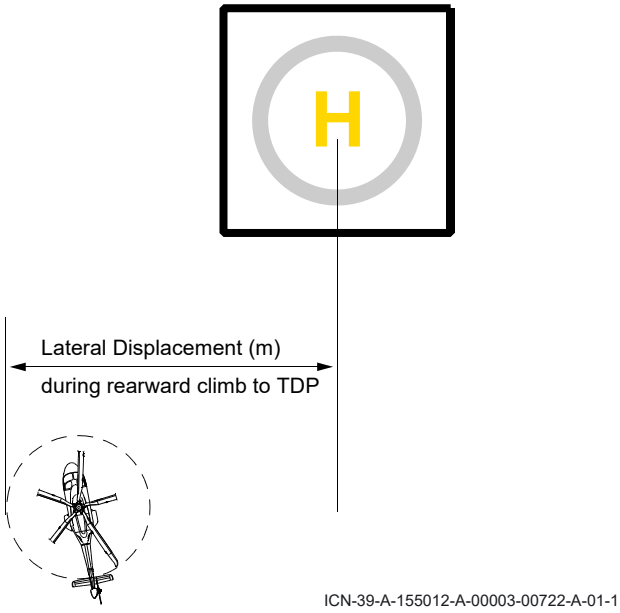
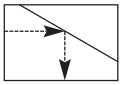


Figure 4D-3 Lateral Displacement Diagram

WEIGHT-ALTITUDE-TEMPERATURE
CONFINED AREA



ROTOR SPEED 102%

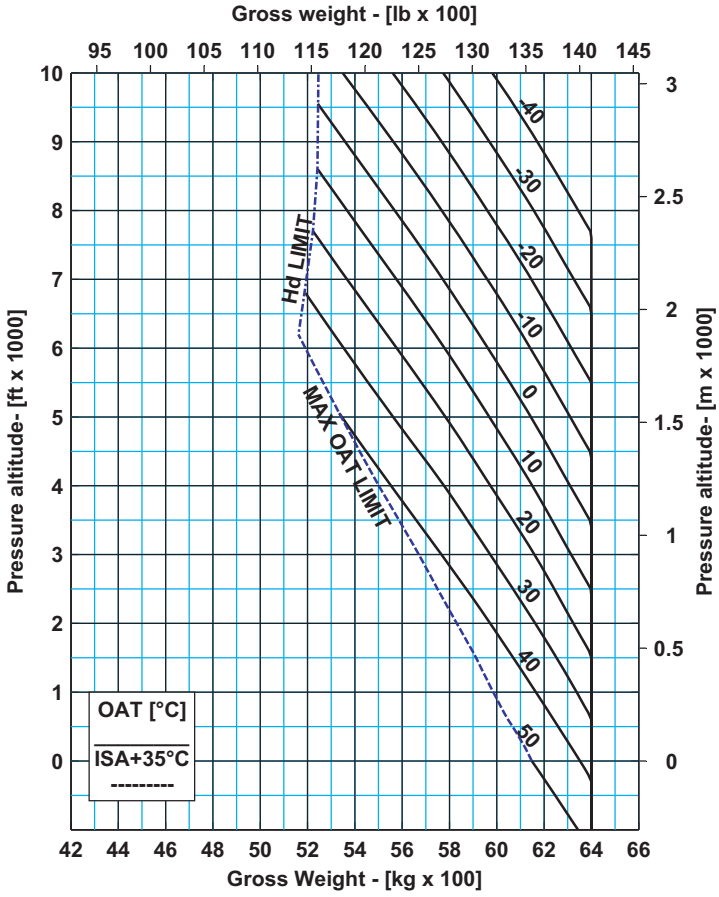


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Figure 4D-4 Confined Area Heliport Procedure Weight Limitations

WEIGHT-ALTITUDE-TEMPERATURE
CONFINED AREA

EAPS OFF
ROTOR SPEED 102%

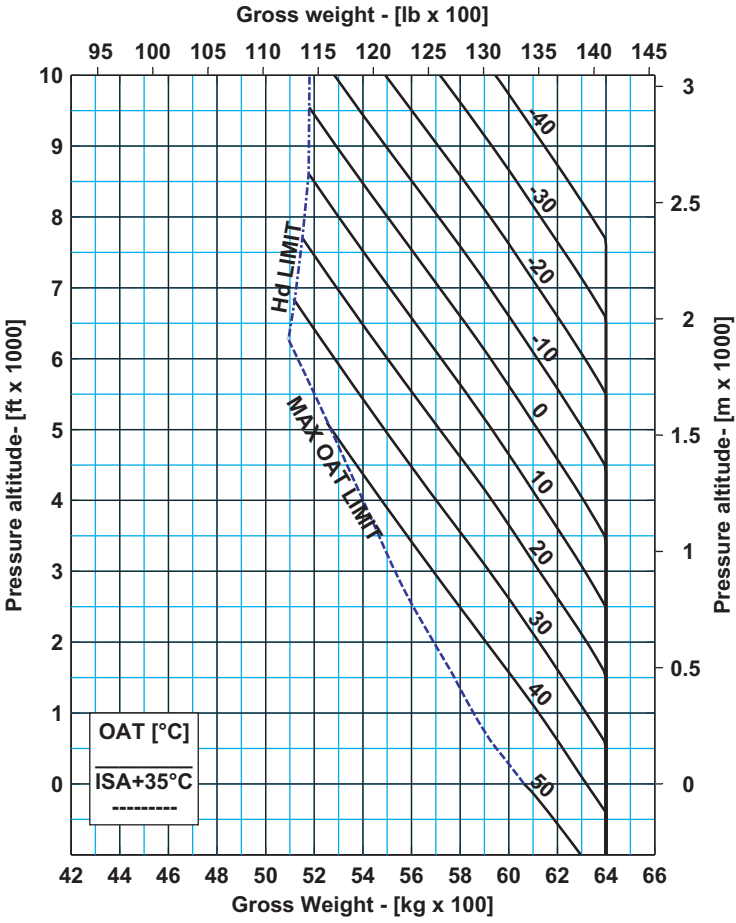

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Figure 4D-5 Confined Area Heliport Procedure Weight Limitations, EAPS OFF

WEIGHT-ALTITUDE-TEMPERATURE
CONFINED AREA

EAPS ON
ROTOR SPEED 102%

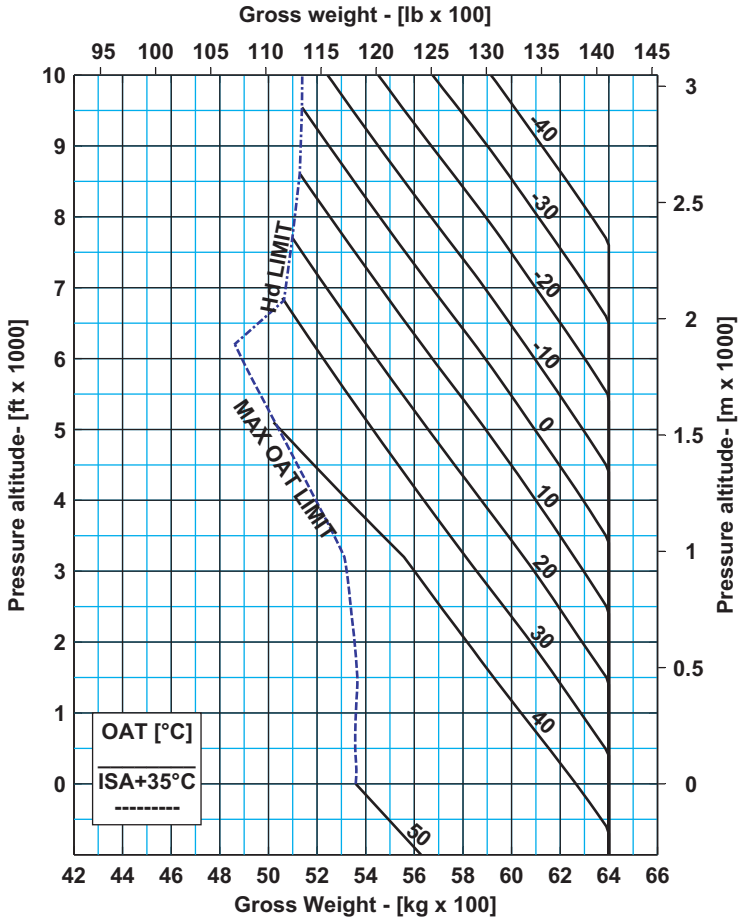

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Figure 4D-6 Confined Area Heliport Procedure Weight Limitations, EAPS ON

WEIGHT-ALTITUDE-TEMPERATURE
CONFINED AREA

IBF INSTALLED
ROTOR SPEED 102%

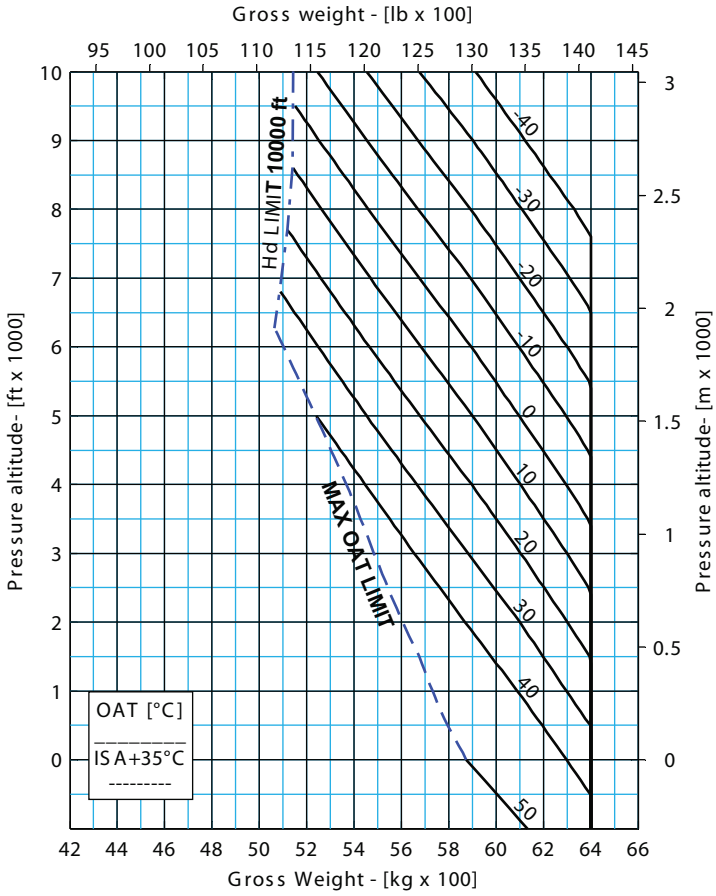

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Figure 4D-6A Confined Area Heliport Procedure Weight Limitations, IBF Installed

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TDP Height AGL		Minimum height AGL		Height at end of CTO		Rearward Climb Distance	Maximum Lateral Displacement (outboard rotor tip)
(ft)	(m)	(ft)	(m)	(ft)	(m)	(m)	(m)
100	30	15	5	35	11	36	15
120	37	35	11	55	17	44	16
140	43	55	17	75	23	51	17
160	49	75	23	95	29	58	18
180	55	95	29	115	35	65	19
200	61	115	35	135	41	73	20
220	67	135	41	155	47	80	21
240	73	155	47	175	53	87	22
260	79	175	53	195	59	94	23
280	85	195	59	215	66	102	24
300	91	215	66	235	72	109	25
320	98	235	72	255	78	116	26
340	104	255	78	275	84	124	27
360	110	275	84	295	90	131	28
380	116	295	90	315	96	138	29
400	122	315	96	335	102	145	30

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Note

The Rearward Climb distance must be subtracted from the “Take Off OEI distance from TDP” (Figure 4D-9) to obtain the CTO distance from the Take-Off point.

Figure 4D-7 Confined Area Typical Heights and Distances

Obstacle height AGL		Minimum obstacle distance from Heliport	
(m)	(ft)	(m)	(ft)
0	0	15	49
5	16	21	69
10	33	27	88
15	49	33	108
20	66	39	127
25	82	45	147
30	98	51	167
35	115	57	186
40	131	63	206
45	148	69	225
50	164	75	245
55	180	81	264
60	197	87	284
65	213	92	303
70	230	98	323
75	246	104	342
80	262	110	362
85	279	116	382
90	295	122	401
95	312	128	421
100	328	134	440
105	344	140	460
110	361	146	479
115	377	152	499
117	385	155	508

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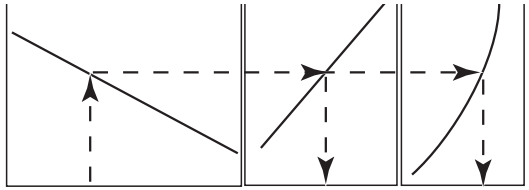
Note

Obstacle distance is with reference to the rear edge of a 20 m x 20 m helipad.

Figure 4D-8 Confined Area Minimum Distance for Obstacle Under Rearward Climb or Approach Path Area

TAKE OFF OEI DISTANCE from TDP
CONFINED AREA



Clear Air Intake / EAPS OFF / EAPS ON
POWE 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS} 40 KIAS

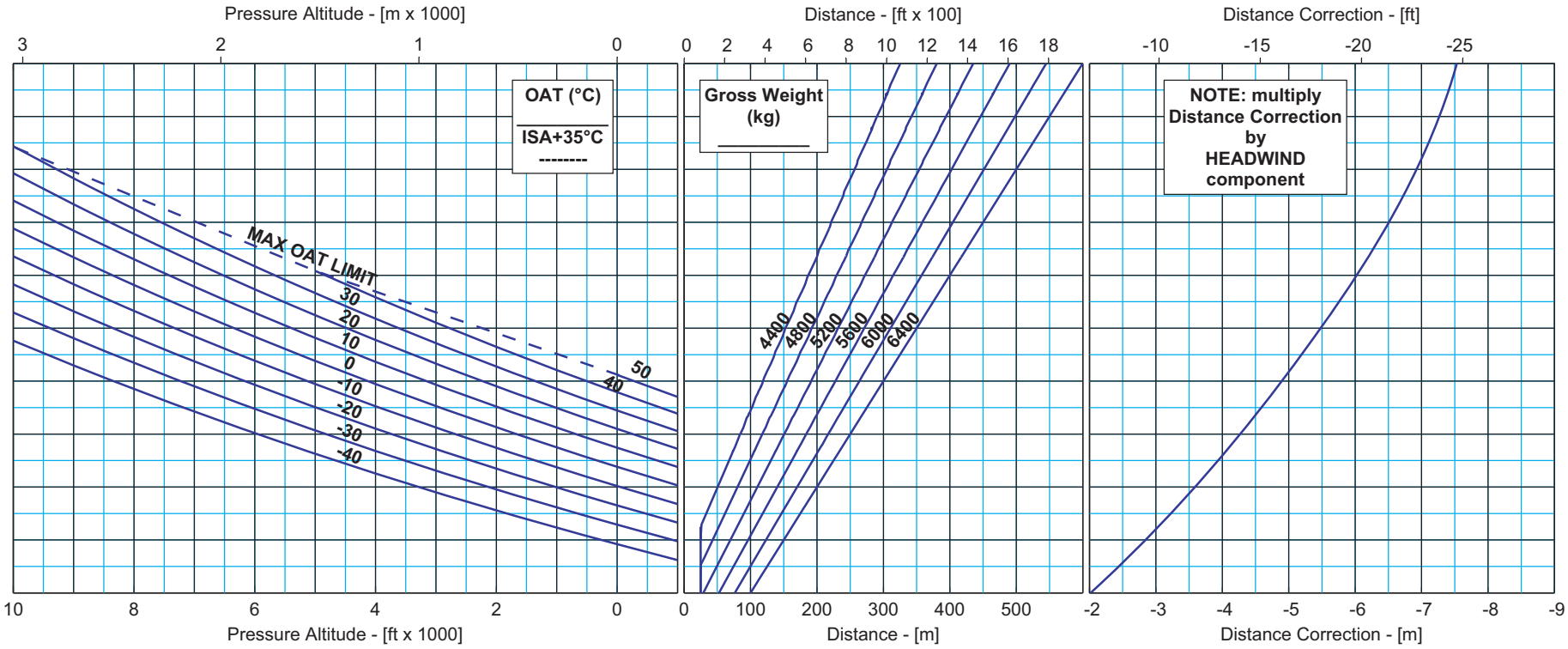


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Figure 4D-9 Confined Area Take-Off OEI Distance from TDP (to be used in association with Figure 4D-7 to calculate CTO distance)

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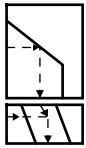
TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
V_{climb}: 60 kts
ELECTRICAL LOAD: 300 A



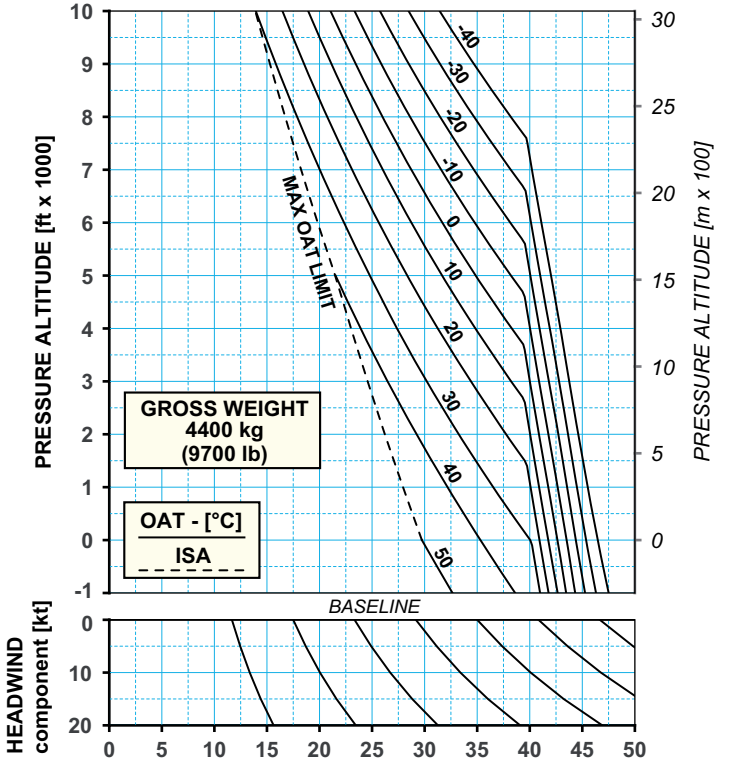


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Figure 4D-10 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 4400 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts

ELECTRICAL LOAD: 300 A

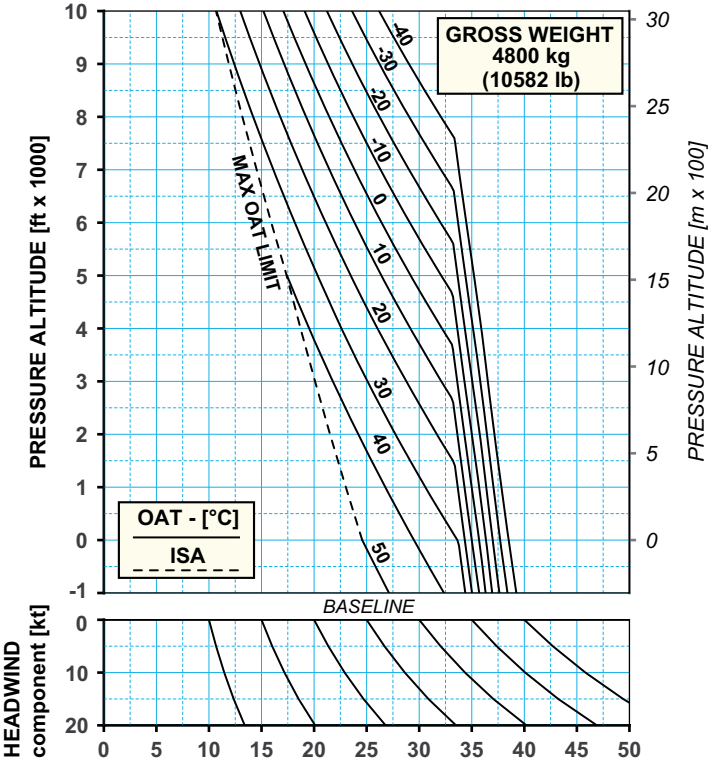

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Figure 4D-11 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 4800 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts

ELECTRICAL LOAD: 300 A

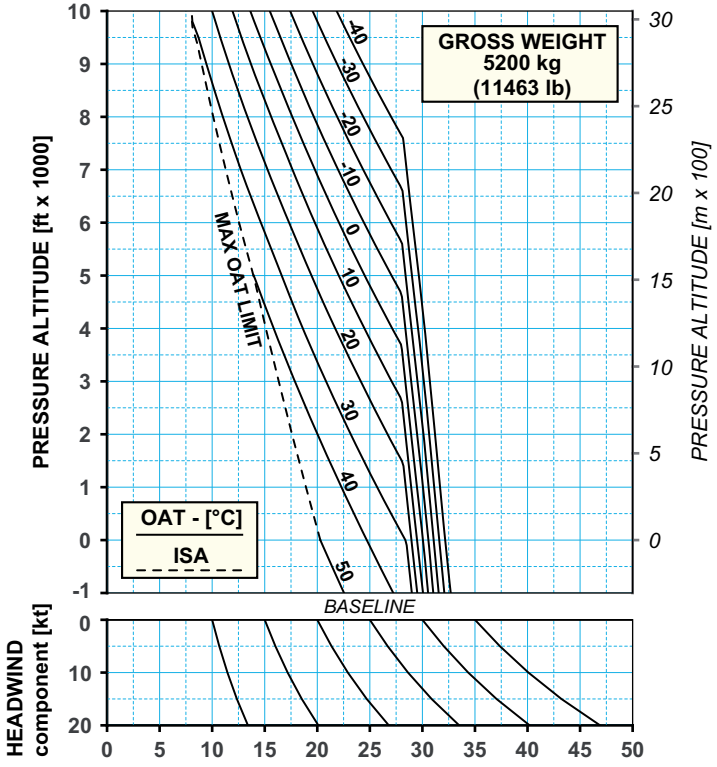

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Figure 4D-12 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 5200 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts

ELECTRICAL LOAD: 300 A

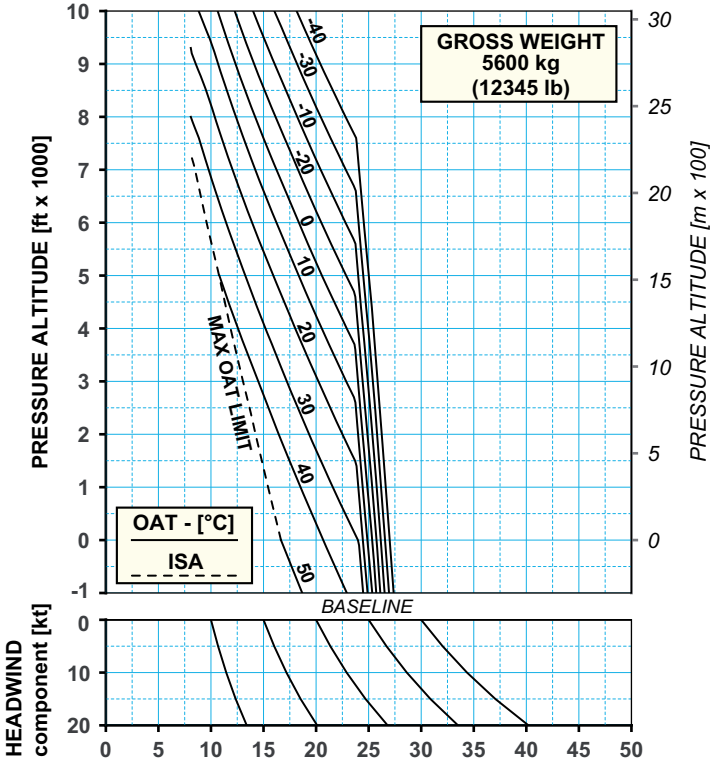

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Figure 4D-13 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 5600 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts

ELECTRICAL LOAD: 300 A

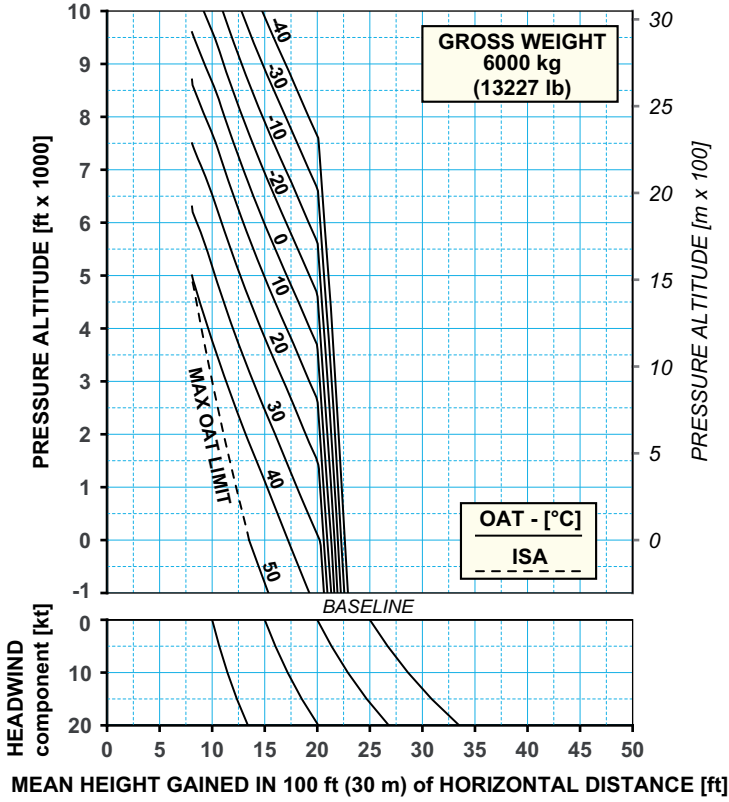

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Figure 4D-14 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6000 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts

ELECTRICAL LOAD: 300 A

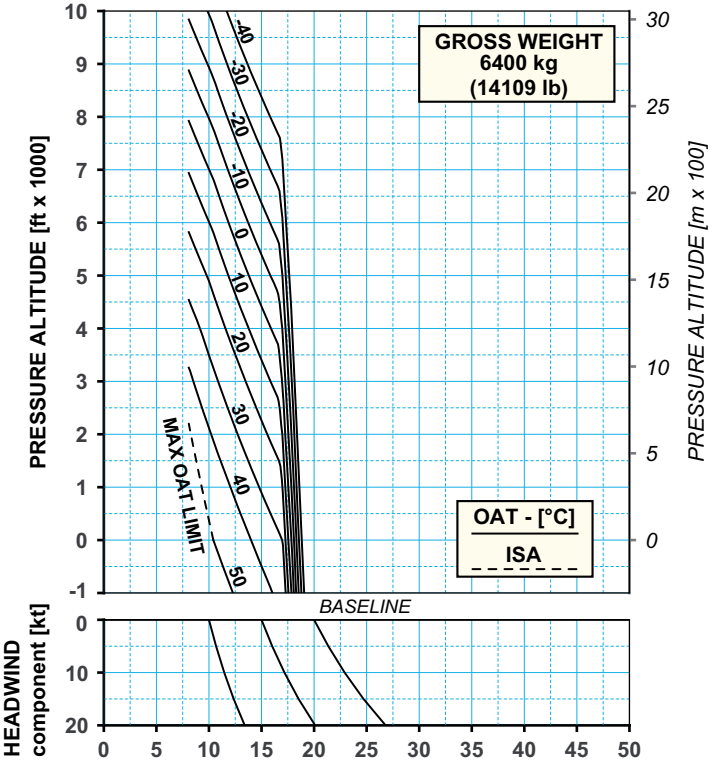

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Figure 4D-15 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6400 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
V_{climb}: 60 kts
EAPS OFF

ELECTRICAL LOAD: 300 A

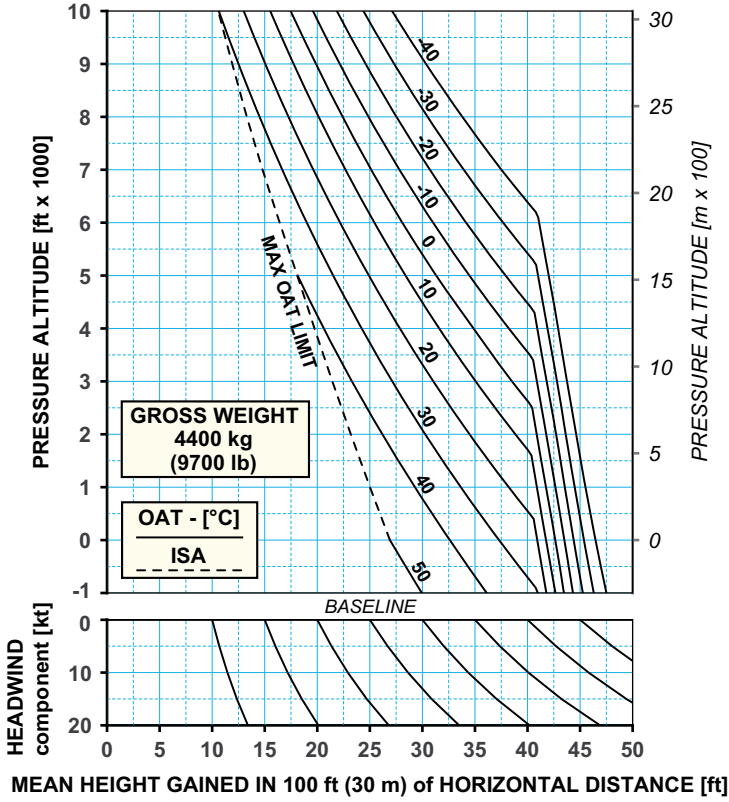

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Figure 4D-16 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 4400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
V_{climb}: 60 kts
EAPS OFF

ELECTRICAL LOAD: 300 A

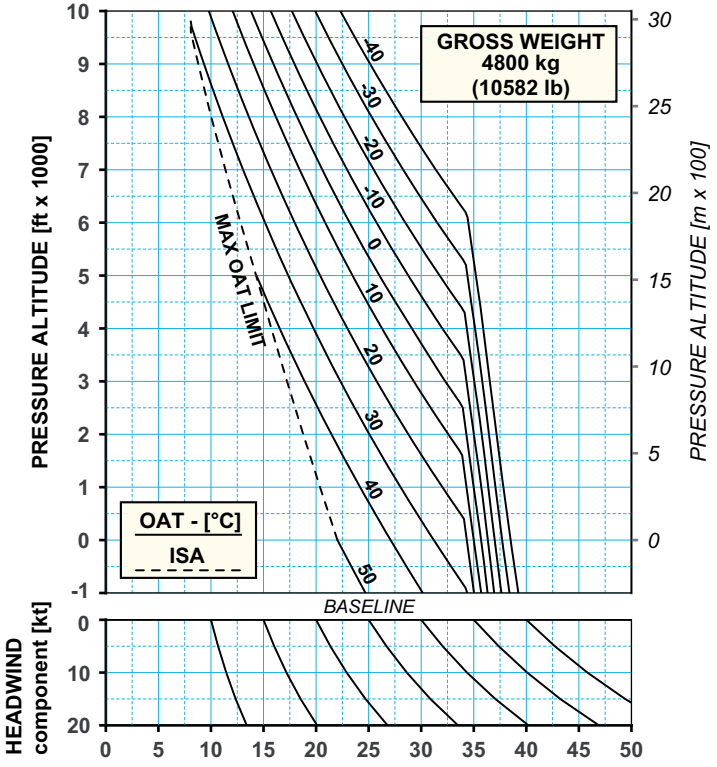

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Figure 4D-17 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 4800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS OFF

ELECTRICAL LOAD: 300 A

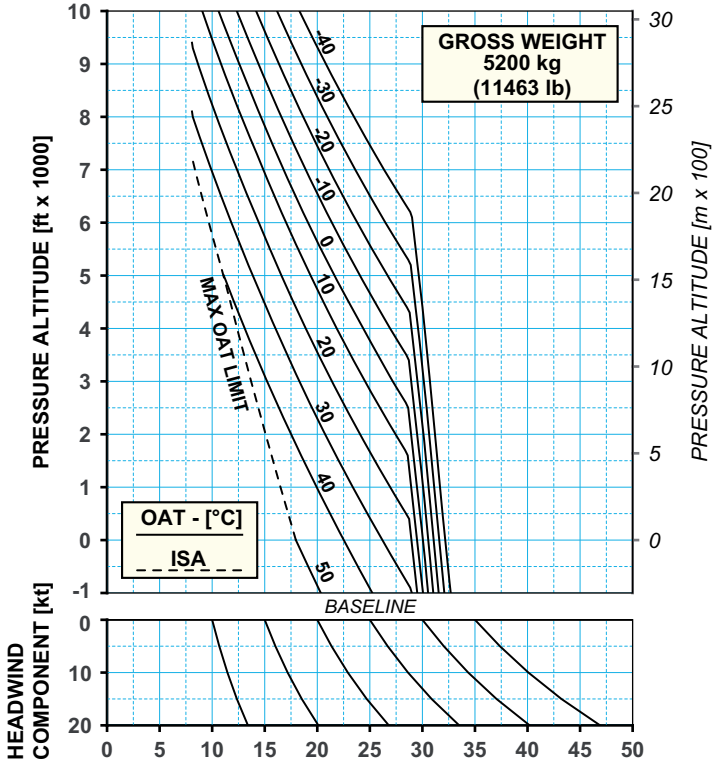

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Figure 4D-18 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 5200 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
V_{climb}: 60 kts
EAPS OFF

ELECTRICAL LOAD: 300 A

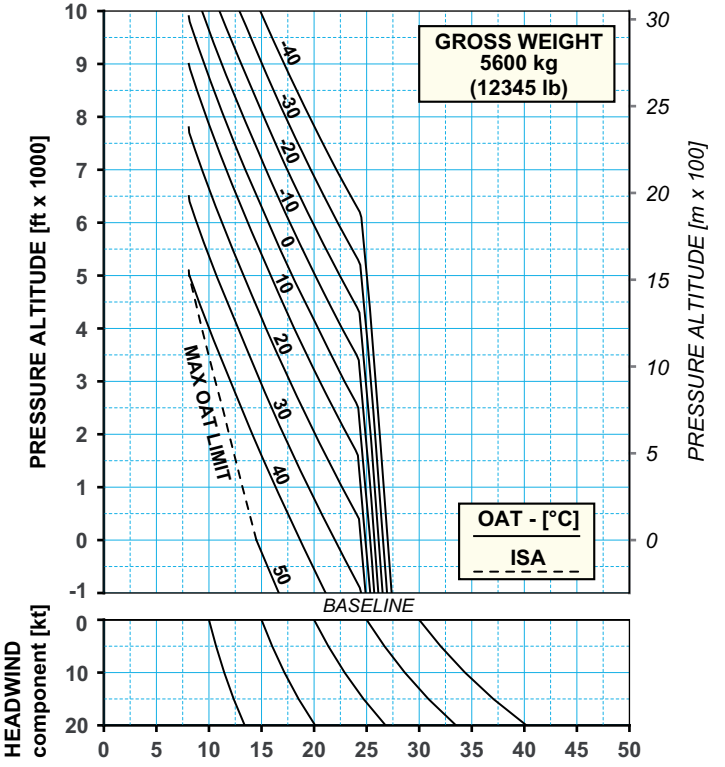

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Figure 4D-19 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 5600 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS OFF

ELECTRICAL LOAD: 300 A

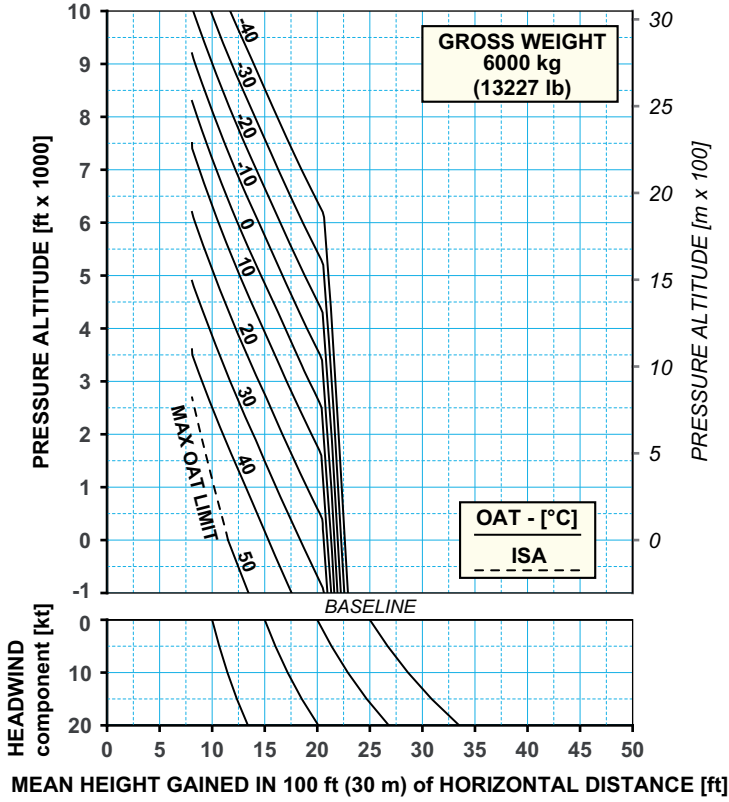

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Figure 4D-20 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6000 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
V_{climb}: 60 kts
EAPS OFF

ELECTRICAL LOAD: 300 A

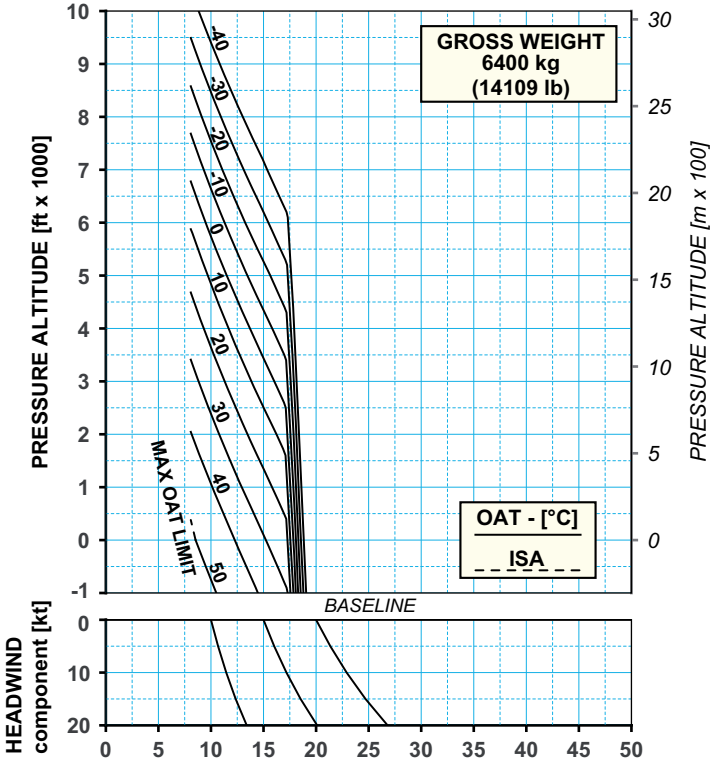

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Figure 4D-21 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS ON

ELECTRICAL LOAD: 300 A

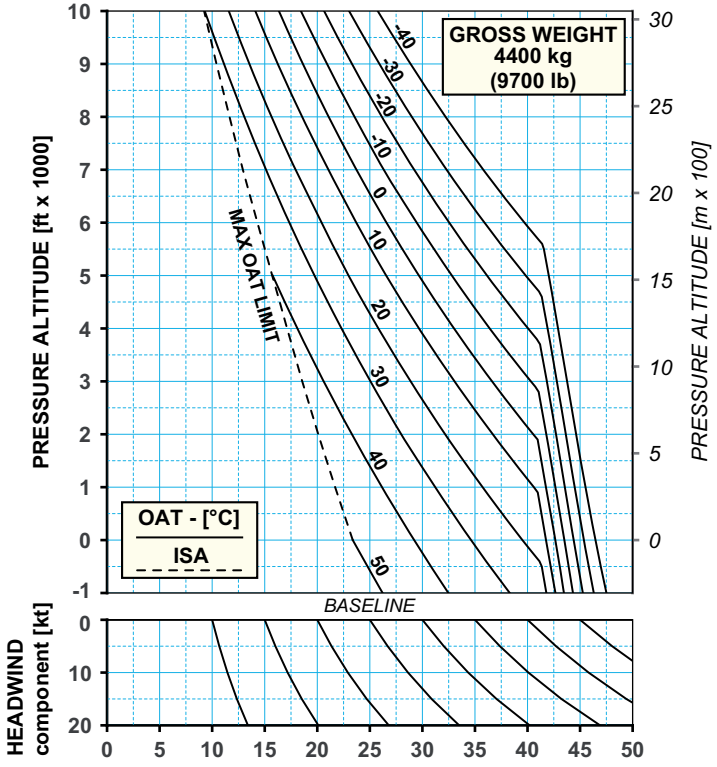

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Figure 4D-22 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 4400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS ON

ELECTRICAL LOAD: 300 A

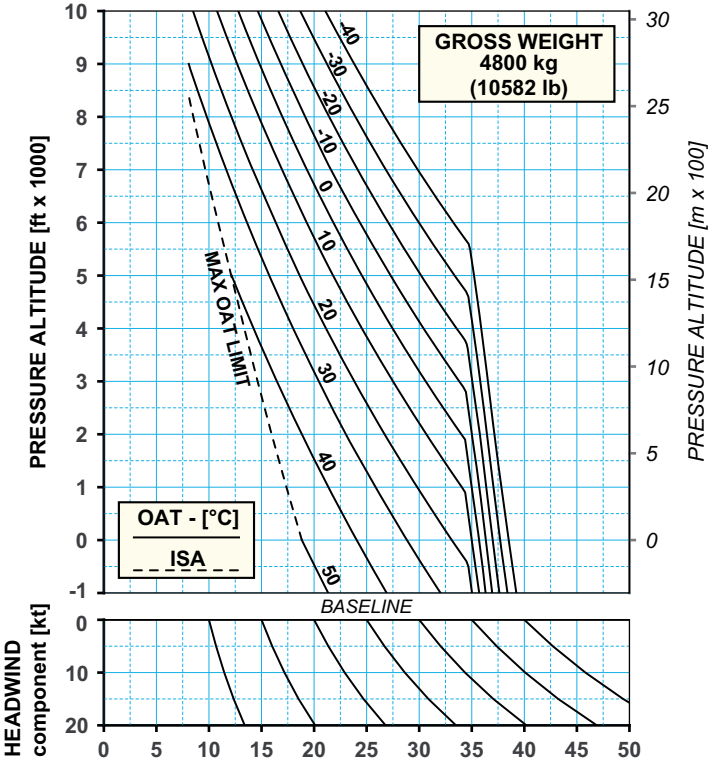

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Figure 4D-23 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 4800 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS ON

ELECTRICAL LOAD: 300 A

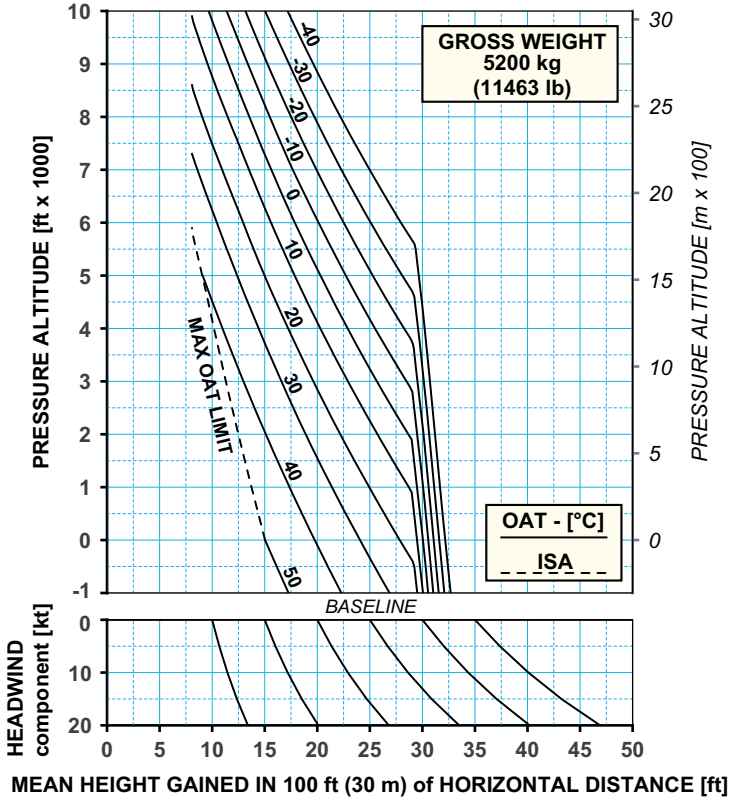

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Figure 4D-24 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 5200 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
V_{climb}: 60 kts
EAPS ON

ELECTRICAL LOAD: 300 A

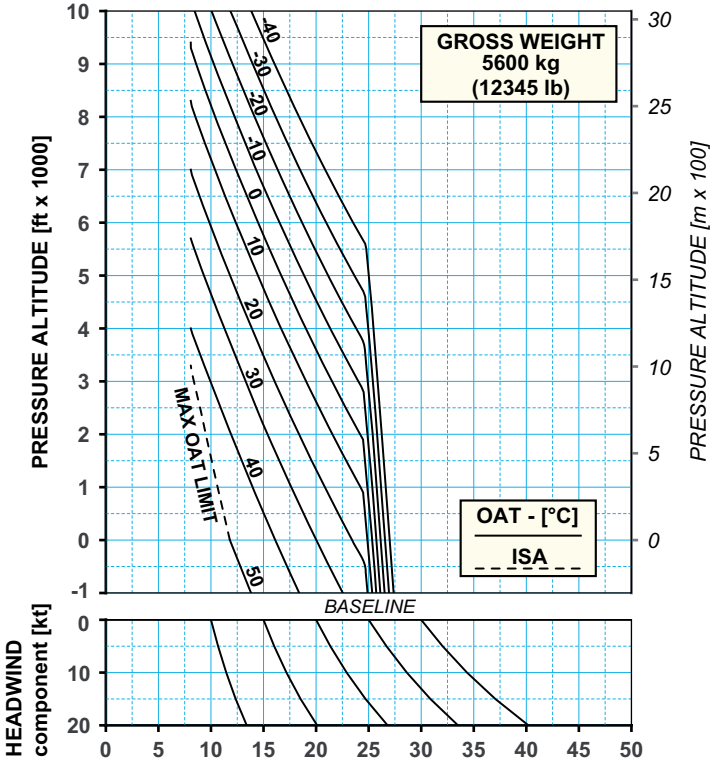

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Figure 4D-25 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 5600 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS ON

ELECTRICAL LOAD: 300 A

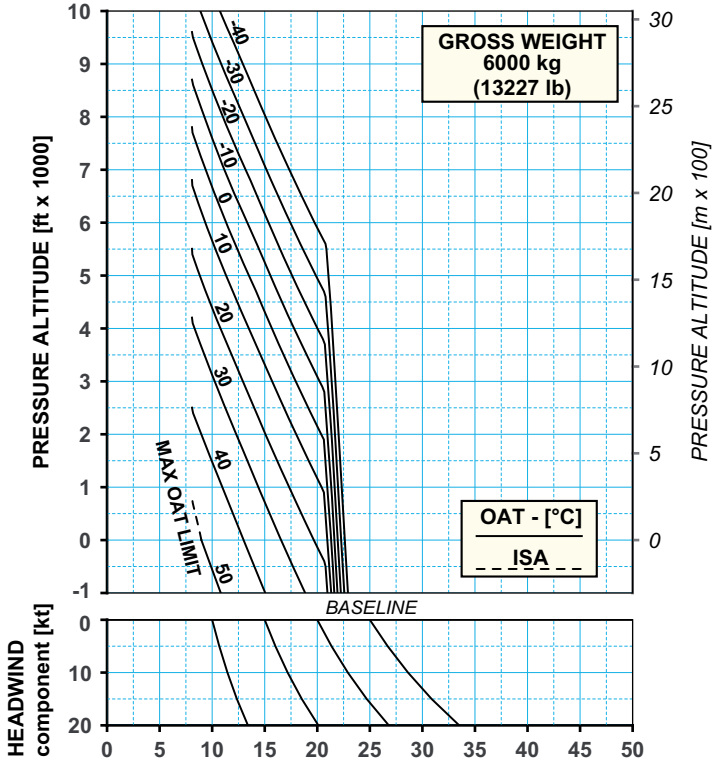

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Figure 4D-26 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6000 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
V_{climb}: 60 kts
EAPS ON

ELECTRICAL LOAD: 300 A

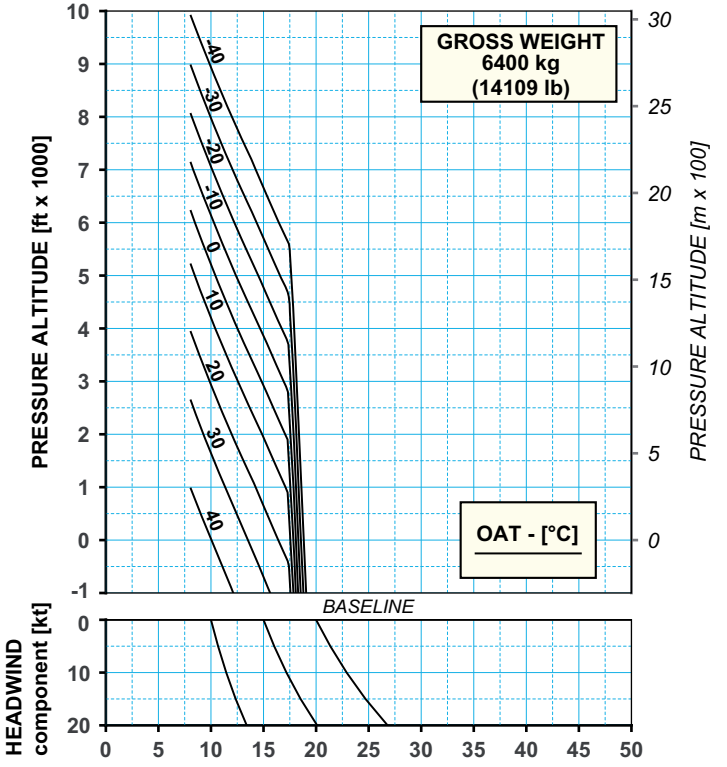

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Figure 4D-27 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vclimb: 60 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

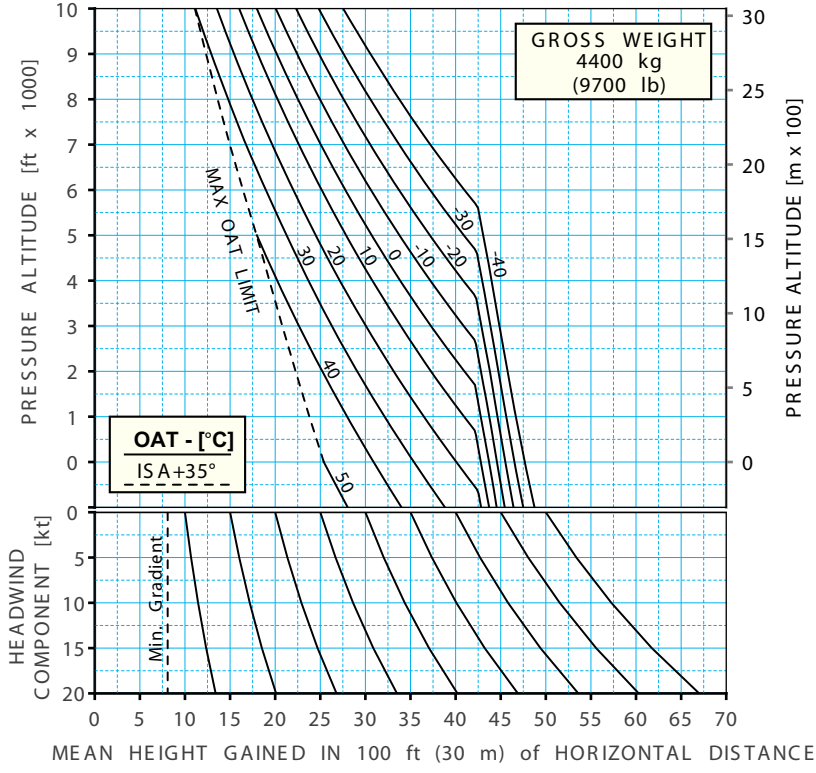

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Figure 4D-28 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 4400 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vclimb: 60 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

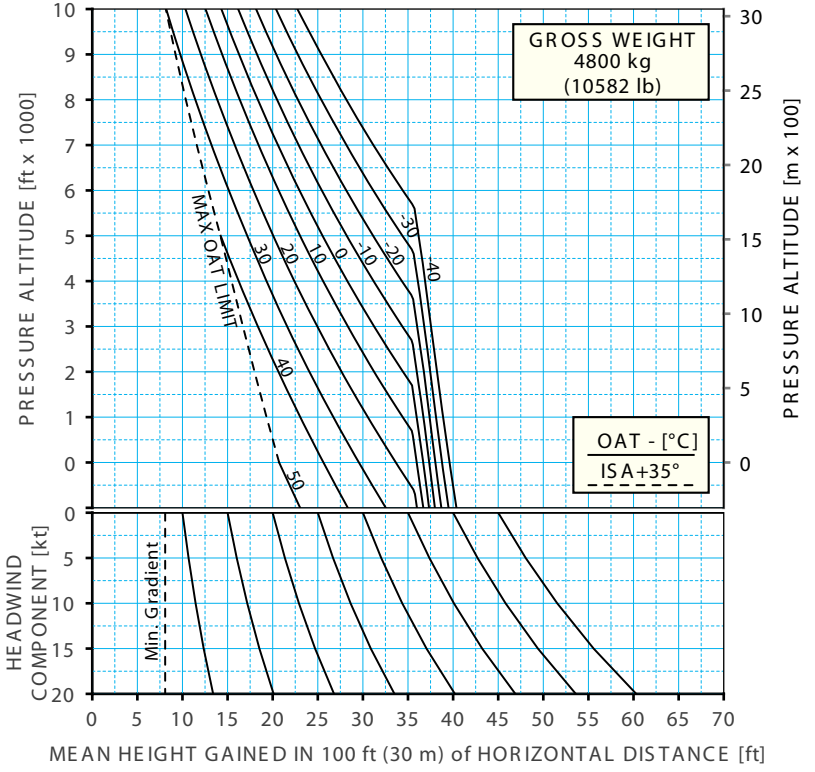

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Figure 4D-29 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 4800 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vclimb: 60 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

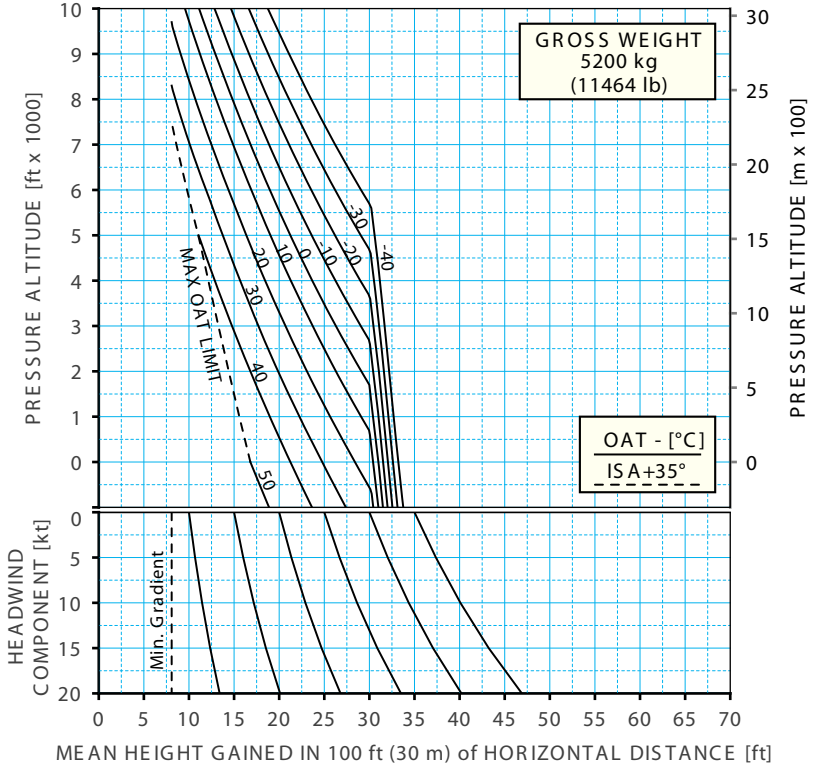

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Figure 4D-30 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 5200 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vclimb: 60 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

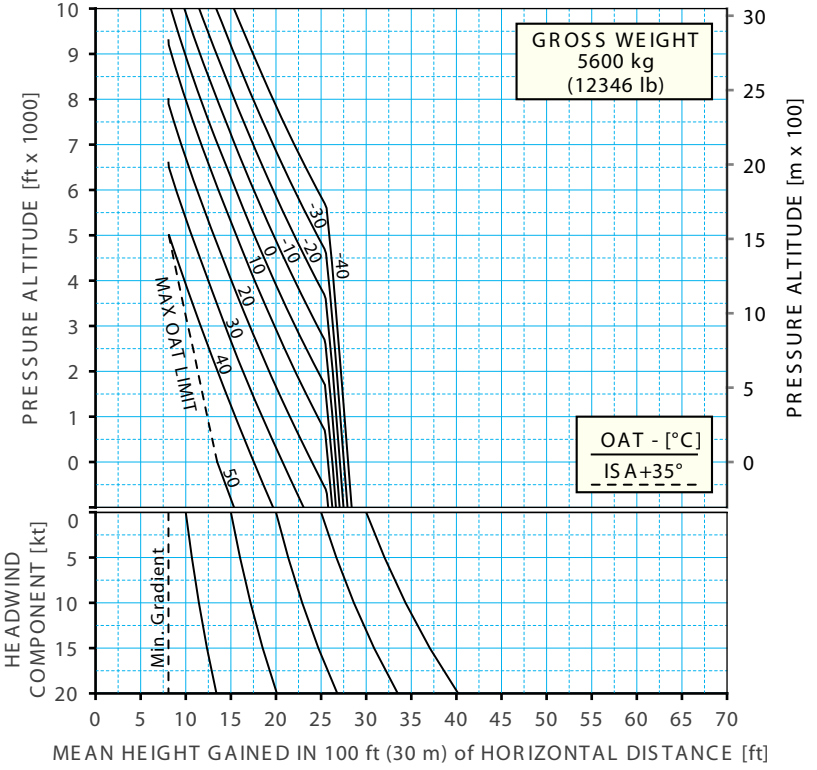

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Figure 4D-31 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 5600 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vclimb: 60 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

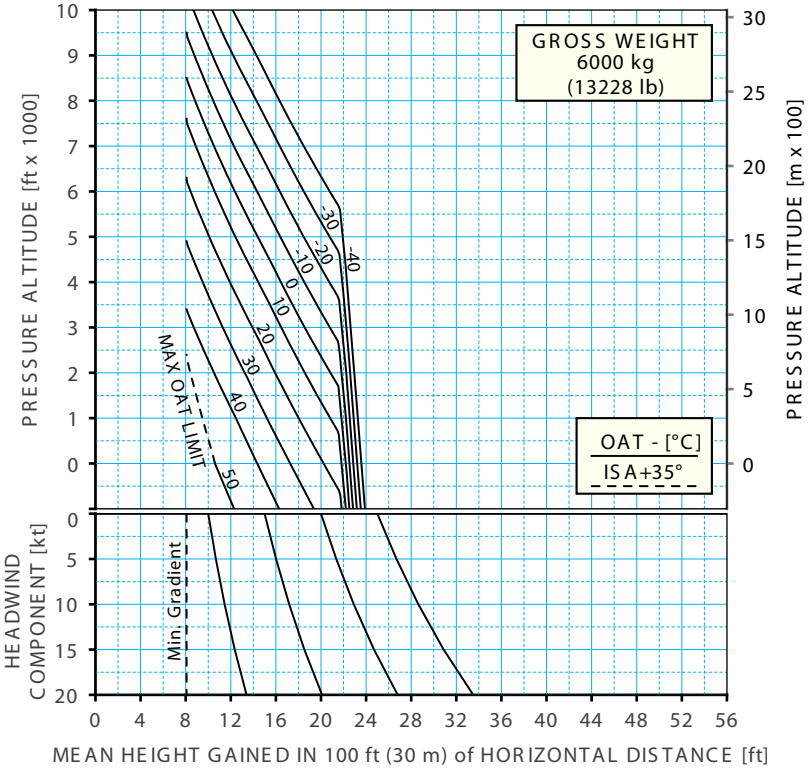

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Figure 4D-32 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6000 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vclimb: 60 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

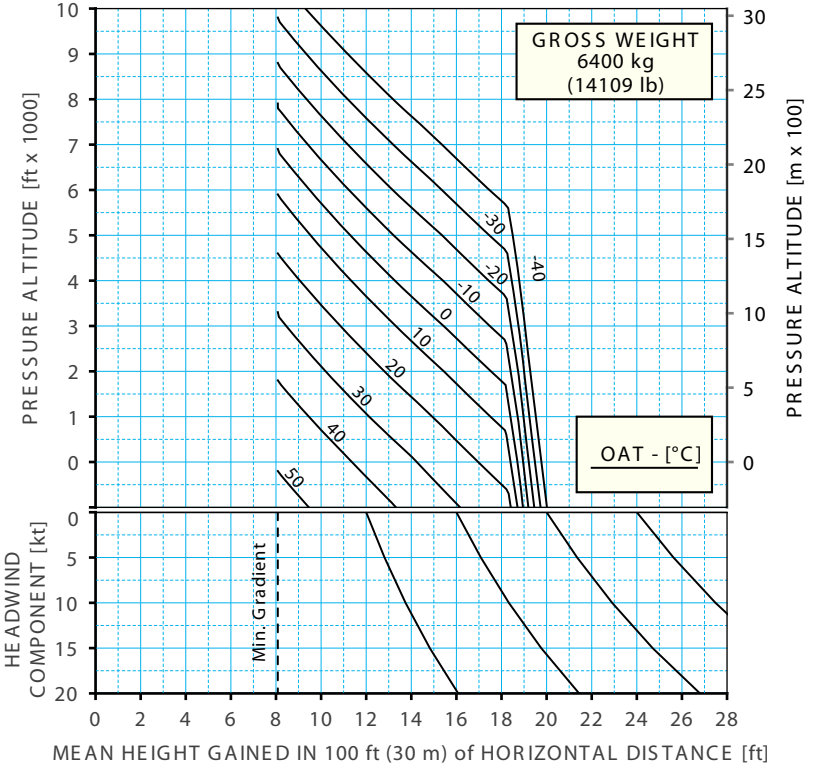

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Figure 4D-33 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6400 kg, IBF Installed

PART E
OFFSHORE HELIDECK
TAKE-OFF PROCEDURE

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Part E
Offshore Helideck
Take-Off Procedure

GENERAL

The technique considers the Pilot Flying (PF) and Pilot Not Flying (PNF) coordinate their activities so that the PNF will monitor the height and call out Take Off Decision Point (TDP), Rotation Point (RP) and, in the case of engine failure, the rotor speed (NR) allowing the PF to concentrate on flying the manoeuvres.

The Offshore Elevated Helideck Take Off is a technique that uses the concept of a TDP height 20 ft (6 m) above the helideck and RP at 30 ft (10 m). An engine failure before TDP means the vertical climb must be stopped and the aircraft rejected back to the helideck (RTO). An engine failure at or after the TDP means the pilot must continue the vertical climb to the RP and proceed for a Continued Take Off (CTO) on one engine (OEI). This Take-Off procedure also assures a large deck edge clearance (always exceeding 15 ft (5 m)) with deck size up to 100 m (330 ft), even when the manoeuvre requires a drop down Below the Take Off Surface (BTS). It is recommended that Take-Off is commenced from the touchdown Positioning Markings (TD/PM) which will also give better visual references.

This technique also assures that, in the case on an engine failure, there is no exposure time to a ditching when operating at the conditions given in the Weight, Altitude, Temperature (WAT) limitations below. If the Take-Off Weight would require a drop down, during a single engine failure, it is assumed that the height of the Elevated Helideck is greater than the Drop Down plus a height clearance margin as required by the Competent Authorities, and that there are no obstacles beyond and below the deck edge.

SECTION 1E - LIMITATIONS

CREW LIMITATIONS

Minimum flight crew is 2 pilots.

HELIDECK SIZE

Minimum demonstrated helideck size ..... Diameter 15 m (50 ft)
or 15 m x 15 m (50 ft x 50 ft)

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake..... Figure 4E-1

Weight Limitation, EAPS OFF ..... Figure 4E-2

Weight Limitation, EAPS ON..... Figure 4E-3

Weight Limitation, IBF Installed..... Figure 4E-3A

AIRSPEED LIMITATIONS

Take-Off Safety Speed (V_{TOSS}).....40 KIAS

Best Rate of Climb Speed (V_Y) ..... Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)

GROUND SPEED LIMITATIONS

Maximum GS with PARK BRAKE ON .....5 kts (9 km/hr)

ALTITUDE LIMITATIONS

Maximum Altitude for
Offshore Helideck CAT A Take-Off .....5000 ft Hp/Hd
(1500 m Hp/Hd)

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s). For cross wind components between 10 kts (5 m/s) and 20 kts (10 m/s) a headwind component of at least 5 kts (5 m/s) is required.

Take-Off with tail wind component is prohibited.

OFFSHORE HELIDECK TAKE OFF PI TARGET VALUE

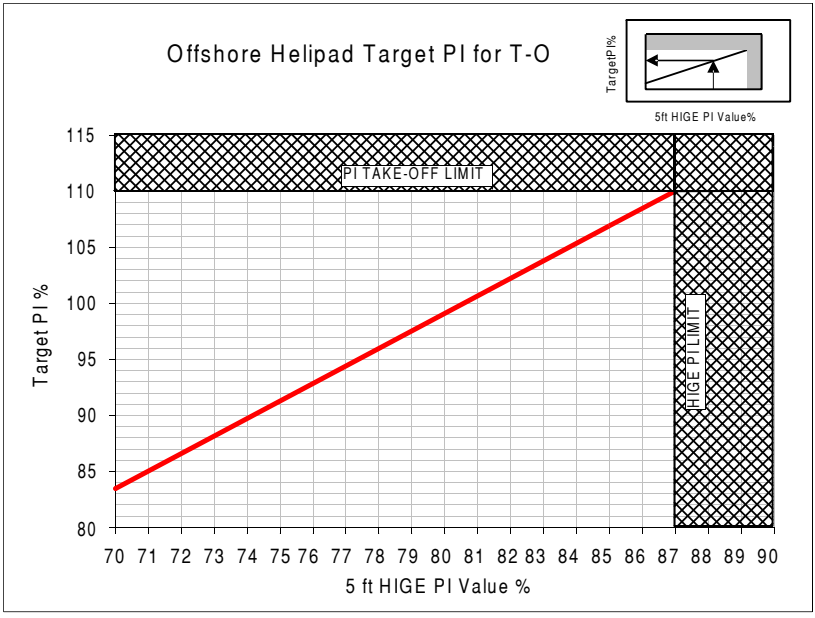

Figure 1E-1 Offshore Helipad Take Off PI Target Values

SECTION 2E - NORMAL PROCEDURES

Two different techniques are available for the PATH 1 and PATH 2 climb after reaching V_{TOSS}. The standard technique performs the PATH 1 climb maintaining the V_{TOSS} (40 KIAS) speed then at 200 ft accelerating to V_y (80 KIAS) for the PATH 2 climb up to 1000 ft (300 m) ATS.

The alternative technique continues the acceleration, after reaching V_{TOSS} (40 KIAS), straight up to 60 KIAS and the PATH 1 and PATH 2 segment climbs are carried out at 60 KIAS. This second technique has been introduced as it has the following advantages:

- The technique is simpler as it maintains 60 KIAS throught the climb
- The climb condition is easier to maintain
- The IFR minimum airspeed Vmini (50 KIAS) is achieved earlier
- The end of the PATH 2 climb to 1000 ft (300 m) ATS is achieved before expiry of the OEI 2.5m limit and in a shorter time, for engine failure cases.

TAKE-OFF DECISION POINT HEIGHT (TDP)

TDP .....20 ft (6 m) ATS

Rotation Point.....30 ft (9 m) ATS

CONTINUED TAKE-OFF DROP DOWN

Maximum drop down BTS during CTO ..... Figure 4E-7

Note

Radar Altimeter heights are shown in the flight path profiles.

Note

Pitch attitudes given in the procedures are absolute values.

TAKE OFF PROCEDURES

For Take-Off the PNF should make TDP, Rotate calls and monitor engine and rotor parameters.

TAKE-OFF OFFSHORE HELIDECK PROCEDURE

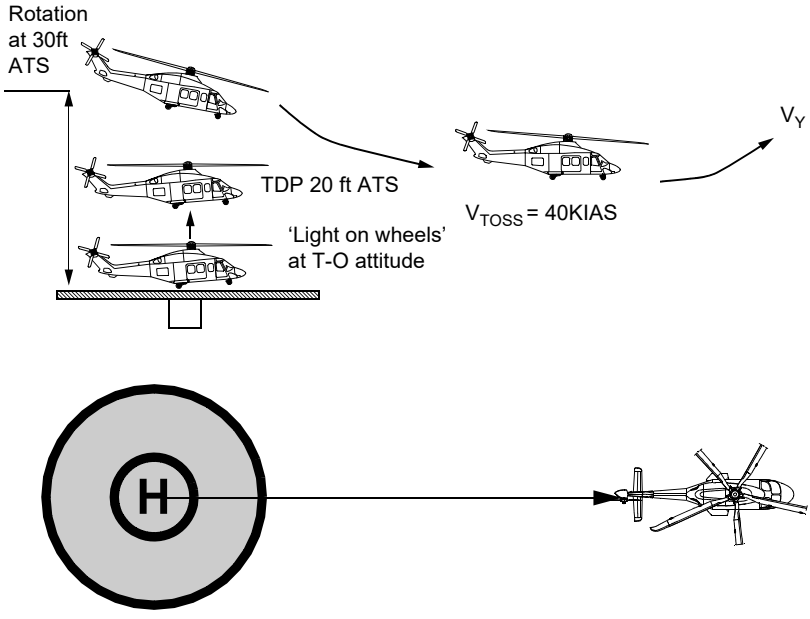

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Figure 2E-1 Take-Off Profile Offshore Helideck

1. LDG LT & LDG LT2 switches — As required.

2. Rotor speed — Set 102% NR.

3. PARK BRAKE — Apply. Confirm PARK BRAKE ON advisory illuminated on CAS.

4. HEATER (if fitted) — Confirm SOV 1 & 2 switches selected to NORMAL.
   Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates.

Select HTR switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.

ECS ENVIRO (if fitted) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates.
Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.

5. Power checks — Carry out as required in accordance with ENGINE POWER CHECKS procedure in Section 4K - Performance Data.

6. Pilot Altimeter — Set 0ft, or nearest 1000 ft (300 m) setting to T-O altitude, with collective at MPOG.

7. Hover IGE — Establish HIGE at 5 ft (1.5 m) ATS and note hovering PI value. From Figure 1E-1 confirm HIGE PI value within limit and note corresponding Target PI value.

Note

In HIGE the indicated altitude, on the altimeters, will be 40 ft to 60 ft (12 m to 18 m) below the setting value. The indicated altitude automatically corrects in the climb.

8. Flight controls — Check correct functioning.

9. MFD PWR PLANT page	— Check all parameters within normal operating limits.
9A. Compass Controller	— Select DG.
10. Warnings and Cautions	— Confirm none displayed.
11. PI/NR	— Check PI's matched, NR 102%.
12. Hover	— Establish a hover where the aircraft is in the take-off attitude and the aircraft is held light on the main wheel(s) (nose wheel up) or at 1 to 2 ft (0.3 m to 0.6 m) hover if more practicable.
13. Collective/Cyclic Control	— Increase PI to Target PI value (from item 7), in 2 seconds, and initiate a vertical climb to TDP while adjusting the pitch attitude to maintain position over the center of helideck.
14. Take-Off Decision Point (TDP)	— PNF calls TDP, continue vertical climb above centre of helideck to 30 ft (9 m) ATS.
15. Rotation	— At 30 ft (9 m) height PNF calls 'ROTATE', rotate nose down to -10° attitude in 1 second. Maintain -10° attitude for 1 second then recover pitch attitude to 0°. Maintain attitude and accelerate to an airspeed of V_{TOSS} (40 KIAS). Maintain collective position.

Note

The absolute pitch attitude values defined in the procedures are not affected by aircraft longitudinal C of G position.

16. Acceleration/Climb	— When V_{TOSS} (40 KIAS) is achieved adjust pitch attitude to approximately 5° nose up. Maintain collective position, continue climb and acceleration until V_y.
17. Climb	— At V_y adjust attitude to stabilize speed. Continue climb.
18. Landing gear	— UP (when reaching V_y but not below 200 ft (60 m) ATS).
19. NR/NF	— Select 100% at V_y.
19A.Compass Controller	— Select MAG.
20. After Take-Off checks	— Complete.
21. Power	— Adjust collective to continue climb at V_y, utilizing up to Take-Off power, as required, to 1000 ft (300 m) ATS or cruise altitude if lower.
22. At 1000ft (300 m) ATS or cruise altitude if lower	— Adjust collective and cyclic to continue climb at V_y or accelerate to cruise speed as required.
23. HEATER/ECS ENVIRO (if fitted)	— As required.
24. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
25. LDG LT & LDG LT2 switches	— OFF (if used).
26. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

TAKE-OFF OFFSHORE HELIDECK ALTERNATIVE PROCEDURE (CLIMB AT 60 KIAS)

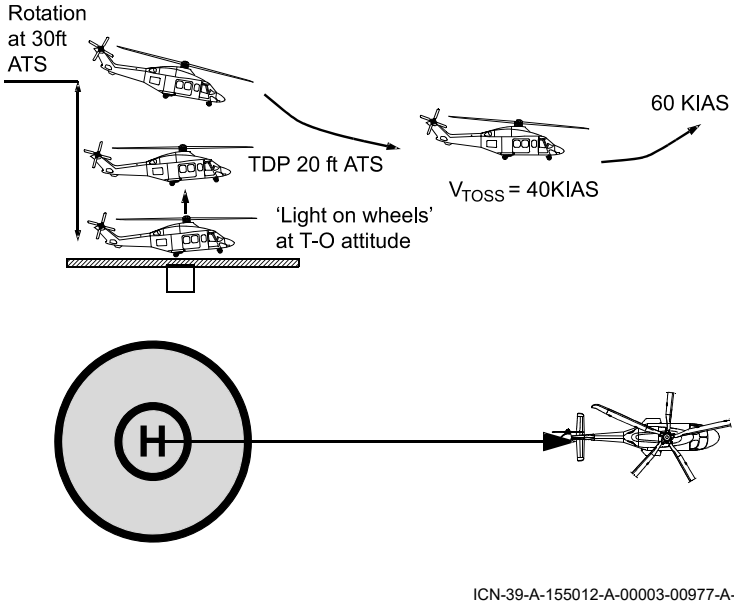

Figure 2E-2 Alternative Take-Off Profile Offshore Helideck

1. LDG LT & LDG LT2 switches — As required.
2. Rotor speed — Set 102% NR.
3. PARK BRAKE — Apply. Confirm PARK BRAKE ON advisory illuminated on CAS.

4. HEATER (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates. Select HTR switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
ECS ENVIRO (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates. Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
5. Power checks	— Carry out as required in accordance with ENGINE POWER CHECKS procedure in Section 4K - Performance Data.
6. Pilot Altimeter	— Set 0ft, or nearest 1000 ft (300 m) setting to T-O altitude, with collective at MPOG.
7. Hover IGE	— Establish HIGE at 5 ft (1.5 m) ATS and note hovering PI value. From Figure 1E-1 confirm HIGE PI value within limit and note corresponding Target PI value.

Note

In HIGE the indicated altitude, on the altimeters, will be 40 ft to 60 ft (12 m to 18 m) below the setting value. The indicated altitude automatically corrects in the climb.

8. Flight controls	— Check correct functioning.
9. MFD PWR PLANT page	— Check all parameters within normal operating limits.
9A. Compass Controller	— Select DG.
10. Warnings and Cautions	— Confirm none displayed.
11. PI/NR	— Check PI's matched, NR 102%.
12. Hover	— Establish a hover where the aircraft is in the take-off attitude and the aircraft is held light on the main wheel(s) (nose wheel up) or at 1 to 2 ft (0.3 m to 0.6 m) hover if more practicable.
13. Collective/Cyclic Control	— Increase PI to Target PI value (from item 7), in 2 seconds, and initiate a vertical climb to TDP while adjusting the pitch attitude to maintain position over the center of helideck.
14. Take-Off Decision Point (TDP)	— PNF calls TDP, continue vertical climb above centre of helideck to 30 ft (9 m) ATS.

15. Rotation	— At 30 ft (9 m) height PNF calls 'ROTATE', rotate nose down to -10° attitude in 1 second. Maintain -10° attitude for 1 second then recover pitch attitude to 0°. Maintain attitude and accelerate to an airspeed of V_{TOSS} (40 KIAS). Maintain collective position.

Note

The absolute pitch attitude values defined in the procedures are not affected by aircraft longitudinal C of G position.

16. Acceleration/Climb	— When V_{TOSS} (40 KIAS) is achieved continue acceleration to 60 KIAS, adjust pitch attitude to approximately 5° nose up. Maintain collective position.
17. Climb	— At 60 KIAS adjust attitude to stabilize speed. Continue climb.
18. Landing gear	— UP (when reaching 60 KIAS but not below 200 ft (60 m) ATS).
19. Power	— Adjust collective to continue climb at 60 KIAS, utilizing up to Take- Off power, as required, to 1000 ft (300 m) ATS or cruise altitude if lower.
20. NR/NF	— Select 100% at 1000 ft (300 m) ATS.
20A.Compass Controller	— Select MAG.
21. After Take-Off checks	— Complete.

22. At 1000ft (300 m) ATS or cruise altitude if lower	— Adjust collective and cyclic to establish climb at V_y or accelerate to cruise speed as required.
23. HEATER/ECS ENVIRO (if fitted)	— As required.
24. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
25. LDG LT & LDG LT2 switches	— OFF (if used).
26. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

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SECTION 3E - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Take-Off path and assume the pilot gives first priority to aircraft control and to achieve a safe flight path.

For the Take-Off procedure the following shall be observed:

1. Engine failure prior to TDP — Recognition of engine failure prior to the TDP dictates that the Take-Off be rejected

2. Engine failure at or after TDP — Recognition of the failure at or after the TDP dictates that the Take-Off be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

TAKE OFF PROCEDURES

For Take-Off the PNF should make TDP, Rotate calls and monitor engine and rotor parameters.

EMERGENCY PROCEDURE FOR SINGLE ENGINE FAILURE DURING TAKE-OFF

SINGLE ENGINE FAILURE RECOGNIZED IN 'LIGHT ON WHEELS' OR HOVER

1. Collective	— Maintain collective pitch setting or lower collective slightly if required to land.
2. Touchdown	— Increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).
3. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4. Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page Page 3-35.
5. PARK BRAKE	— As required.

SINGLE ENGINE FAILURE RECOGNIZED IN CLIMB, PRIOR TO TDP (REJECTED TAKE-OFF)

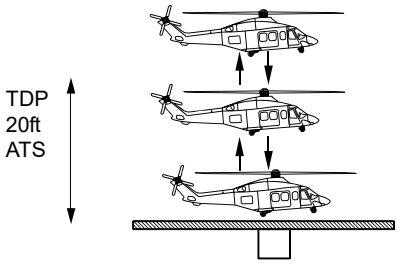

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Figure 3E-1 Offshore Helideck Engine Failure before TDP

1. Collective/Cyclic — Decrease collective to arrest climb and adjusts pitch attitude by 2° to 3° nose down to commence vertical movement toward helideck. Maintain the rotor speed close to 100%NR.
   • PNF monitor and call out rotor speed.

Note

The aircraft will continue to climb after engine failure.

2. Touchdown — At approximately 5-10 ft (1.5-3 m) ATS increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).
3. Landing — After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4. Engine — On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page Page 3-35.
5. PARK BRAKE — As required.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER TDP (CONTINUED TAKE-OFF)

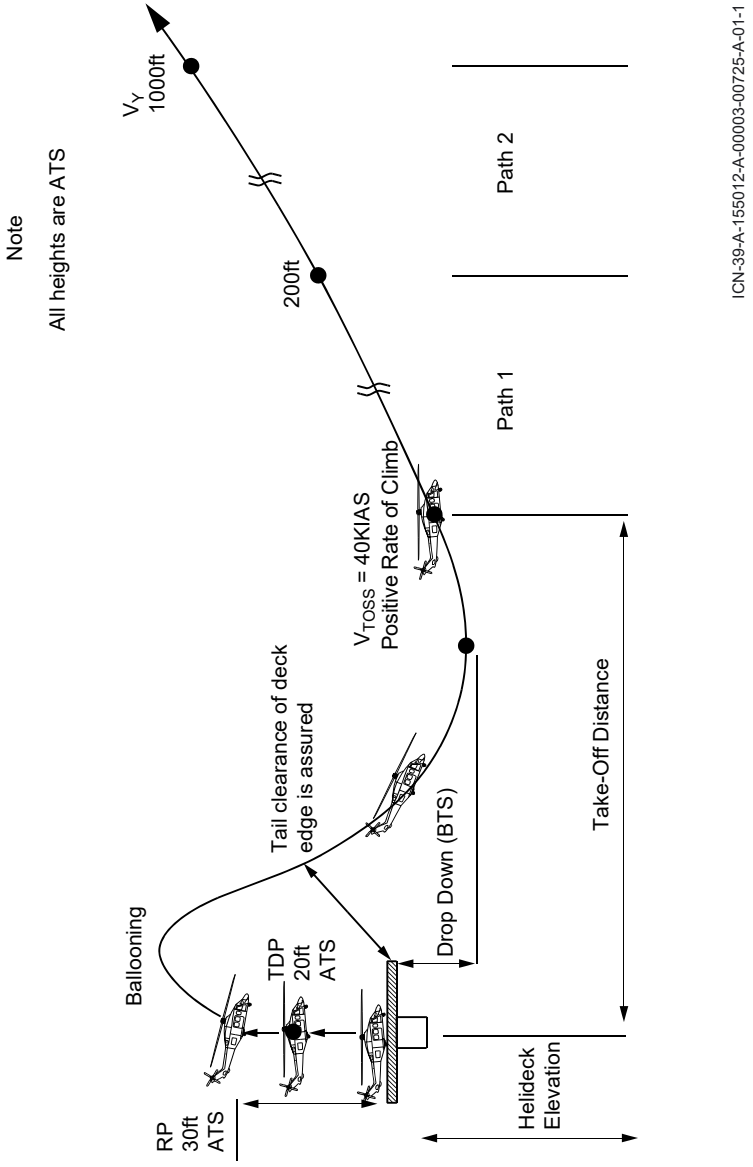

Figure 3E-2 Offshore Helideck Engine Failure at/after TDP

1. Collective control — Maintain collective and continue climb to 30 ft (9 m) ATS.

2. At 30 ft (9 m) ATS cyclic/collective control — Rotate nose down to -10° in 1 second. Maintain -10° for 1 second, then recover pitch attitude to 0°. Use collective to droop NR to minimum of 90% and to set 2.5 min power.
   • PNF calls out rotor speed.

Note

The absolute pitch attitude values defined in the procedures are not affected by aircraft longitudinal C of G position.

3. Acceleration/climb — Maintain pitch attitude at 0° and continue the acceleration up to V_{TOSS} (40 KIAS).

4. Climb — When the aircraft achieves V_{TOSS} (40 KIAS), adjust pitch attitude to approximately 5° nose up and lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) ATS, with 2.5 min power.

5. At 200 ft (60 m) ATS — Continue climb and accelerate to Vy using 2.5 min power rating. After achieving Vy, continue to 1000 ft ATS, or as required, reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.

6. Rotor Speed — Select 100% at V_y.

7. Landing gear	— UP (when reaching V_y).
7A. Compass Controller	— Select MAG.
8. At 1000 ft (300 m) ATS, or cruise altitude if lower	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
9. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
10. MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

CAUTION

Following an engine failure after TDP an OEI Landing, using the Offshore Helideck Level Approach Landing Procedure, is not possible. If a helideck landing is required the Offshore Descending Approach Procedure and WAT weight (maximum 6400 kg) detailed in Part I, should be used.

CONTINUED TAKE OFF FOR ALTERNATIVE PROCEDURE WITH OPTIMISED PATH 1 & 2 CLIMB

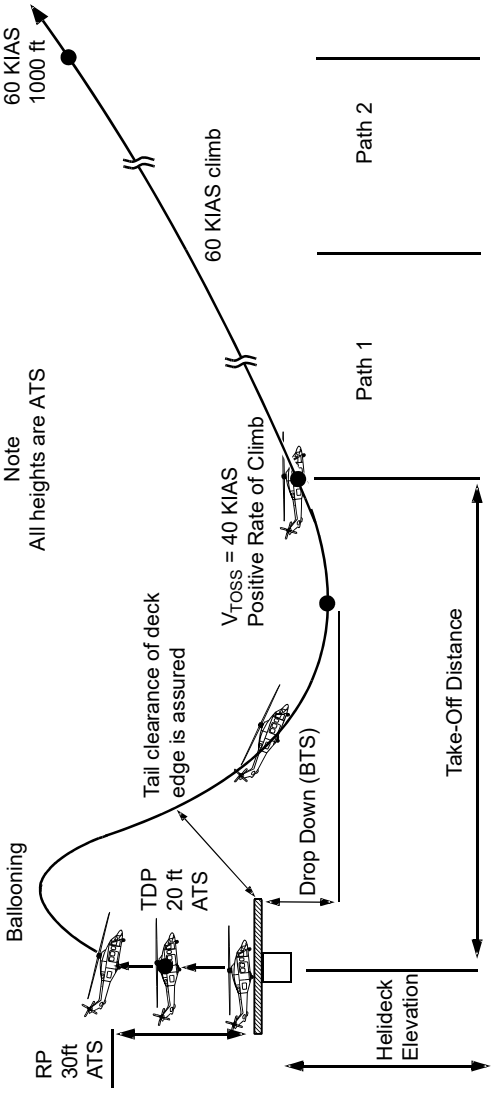

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Figure 3E-3 Offshore Helideck Engine Failure at/after TDP Alternative Procedure

1.	Collective control	— Maintain collective and continue climb to 30 ft (9 m) ATS.
2.	At 30 ft (9 m) ATS cyclic/collective control	— Rotate nose down to -10° in 1 second. Maintain -10° for 1 second, then recover pitch attitude to 0°. Use collective to droop NR to minimum of 90% and to set 2.5 min power. • PNF calls out rotor speed.

Note

The absolute pitch attitude values defined in the procedures are not affected by aircraft longitudinal C of G position.

3.	Acceleration/climb	— Maintain pitch attitude at 0° and continue the acceleration up to VTOSS (40 KIAS).
4.	Climb	— When the aircraft achieves VTOSS (40 KIAS) continue acceleration to 60 KIAS, adjust pitch attitude to approximately 5° nose up and lower collective to recover NR to 102%. Continue climb at 60 KIAS using 2.5 min power rating to 1000 ft (300 m) ATS, or as required. At 1000 ft (300 m) ATS accelerate to Vy. Reduce power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
5.	Landing gear	— UP (when reaching 60 KIAS but not below 200 ft (60 m) ATS).

6. Rotor Speed	— Select 100% at 1000 ft (300 m) ATS.
6A. Compass Controller	— Select MAG.
7. At 1000 ft (300 m) ATS, or cruise altitude if lower	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page Page 3-35.
8. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
9. MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

CAUTION

Following an engine failure after TDP an OEI Landing, using the Offshore Helideck Level Approach Landing Procedure, is not possible. If a helideck landing is required the Offshore Descending Approach Procedure and WAT weight (maximum 6400 kg) detailed in Part I, should be used.

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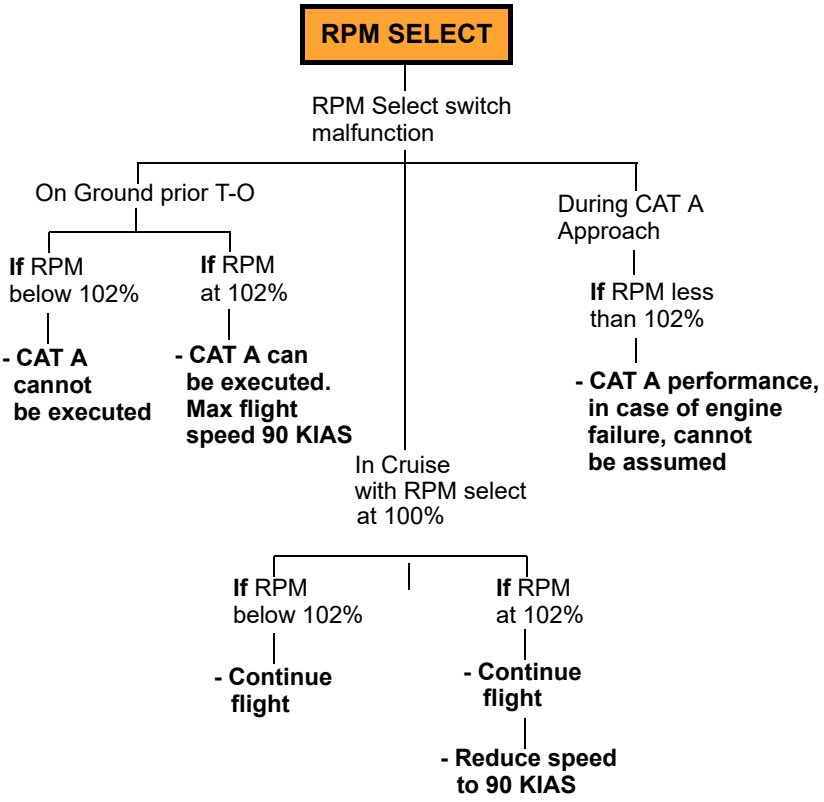
MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



SECTION 4E - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind Component computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

— The Offshore helideck Procedure Weight Limitations charts are shown in Figure 4E-1 to Figure 4E-3A for weights up to 6400 kg. For weight up to 6800 kg see Supplement 50.

— The Gross Weight Benefit, incorporated into the WAT charts for Headwind Component, has already been factored by 50%. No further weight correction is required.

CONTINUED TAKE OFF DISTANCE OEI

The Continued Take Off distance is shown in Figure 4E-4 to Figure 4E-6A. This represents the horizontal distance from the start of the Take-Off to a point at V_{TOSS} and positive rate of climb.

The Distance Correction incorporated into the “Offshore Helideck CTO Distance OEI” chart for Headwind Component has already been factored by 50%.

CONTINUED TAKE-OFF DROP DOWN

Maximum drop down below Take Off Surface (BTS) during Continued Take Off (valid for Clean Intake, EAPS ON/OFF, IBF Installed) ..... Figure 4E-7

The Drop Down Correction incorporated into the “Offshore Helideck Procedure Drop Down BTS for CTO OEI” chart for Headwind Component has already been factored by 50%.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power OEI is shown in Figure 4A-8 to Figure 4A-31 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from the end of the CTO distance to a height of 200 ft (60 m) ATS.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

These charts apply from 200 ft (60 m) ATS to 1000 ft (300 m) ATS.

CLIMB PERFORMANCE

Rate Of Climb OEI at V_Y

The ROC, at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS or IBF installed.

ALTERNATIVE 60 KIAS CLIMB PROCEDURE PATH 1 & 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at 60 KIAS and 2.5 min power OEI is shown in Figure 4D-10 to Figure 4D-33 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

These charts apply from the CTO distance to 1000 ft (300 m) ATS.

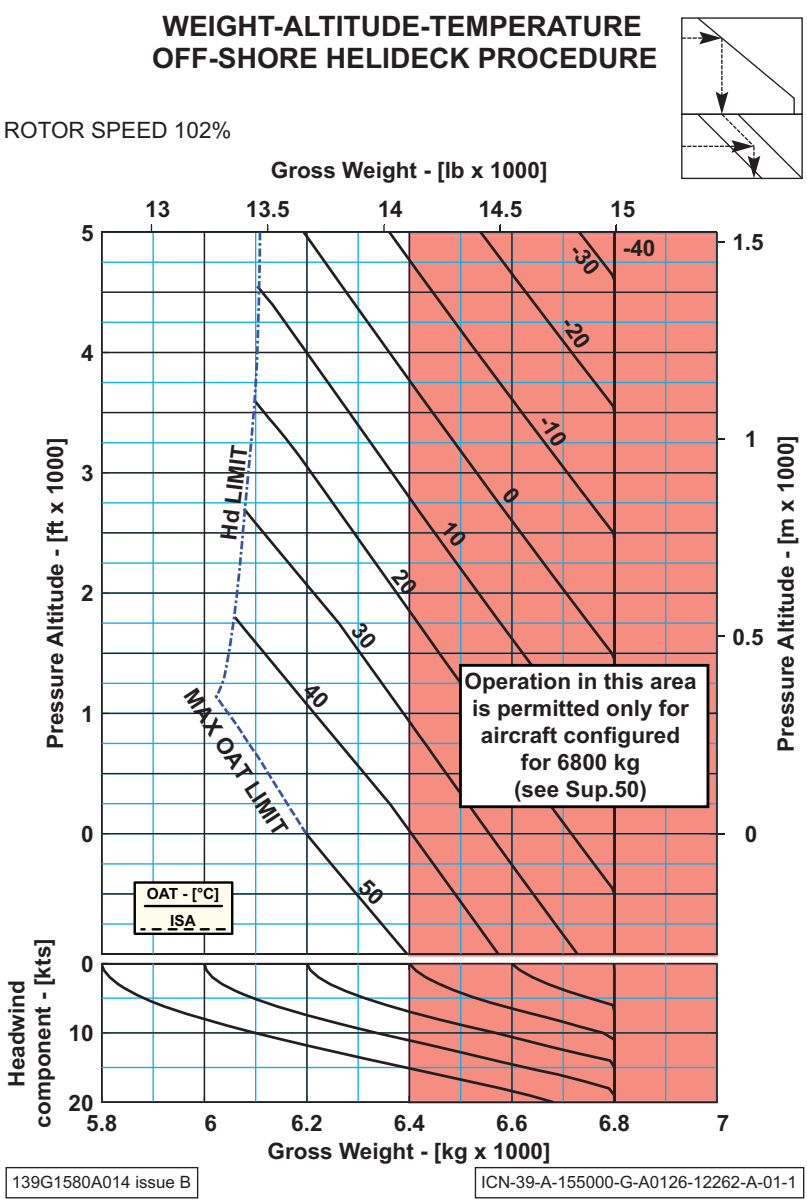


Figure 4E-1 Offshore Helideck Procedure Weight Limitations

WEIGHT-ALTITUDE-TEMPERATURE
OFF-SHORE HELIDECK PROCEDURE

EAPS OFF

ROTOR SPEED 102%

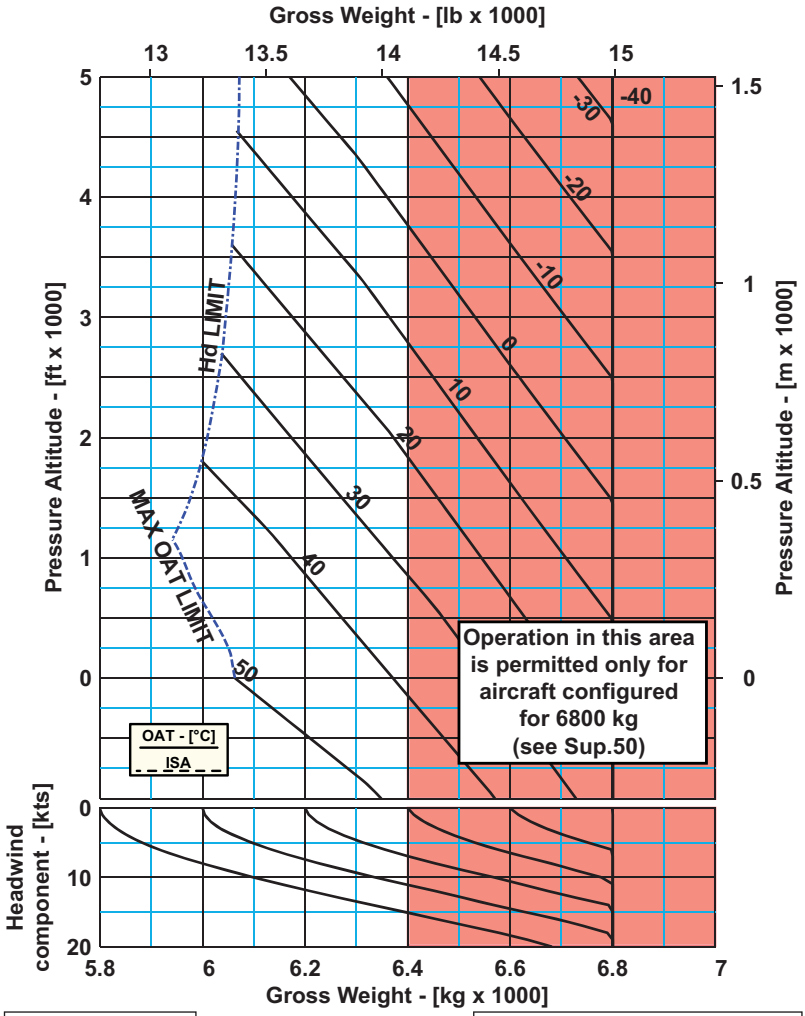


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Figure 4E-2 Offshore Helideck Procedure Weight Limitations, EAPS OFF

WEIGHT-ALTITUDE-TEMPERATURE
OFF-SHORE HELIDECK PROCEDURE

EAPS ON

ROTOR SPEED 102%

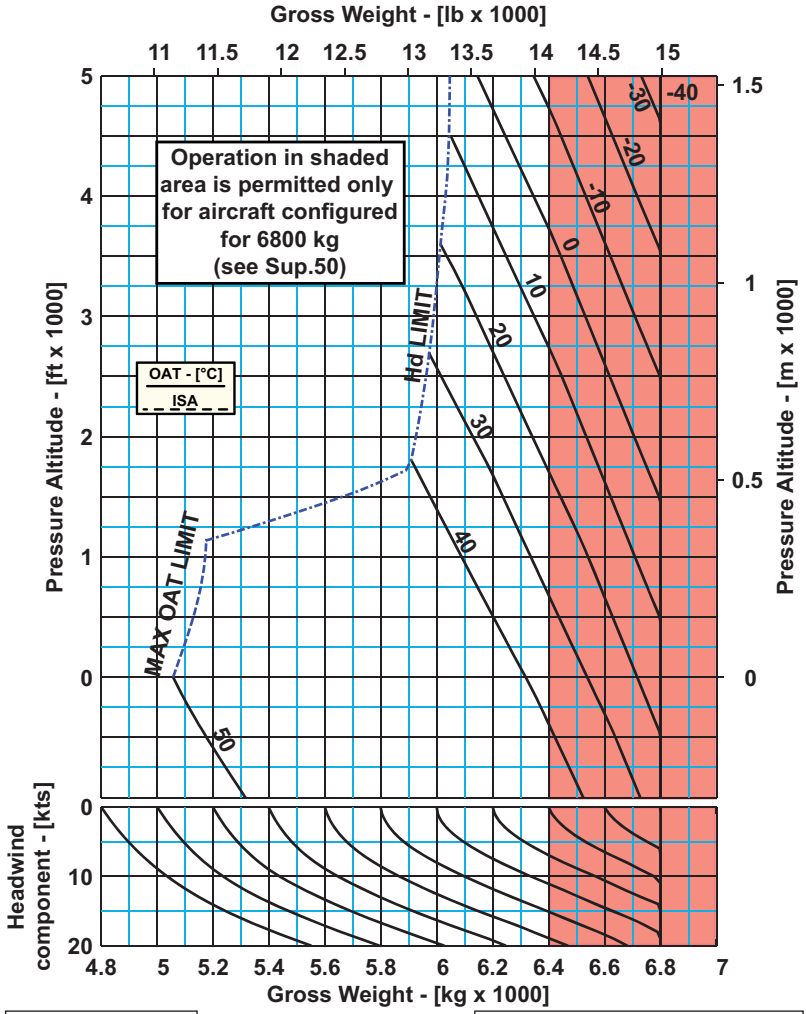

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Figure 4E-3 Offshore Helideck Procedure Weight Limitations, EAPS ON

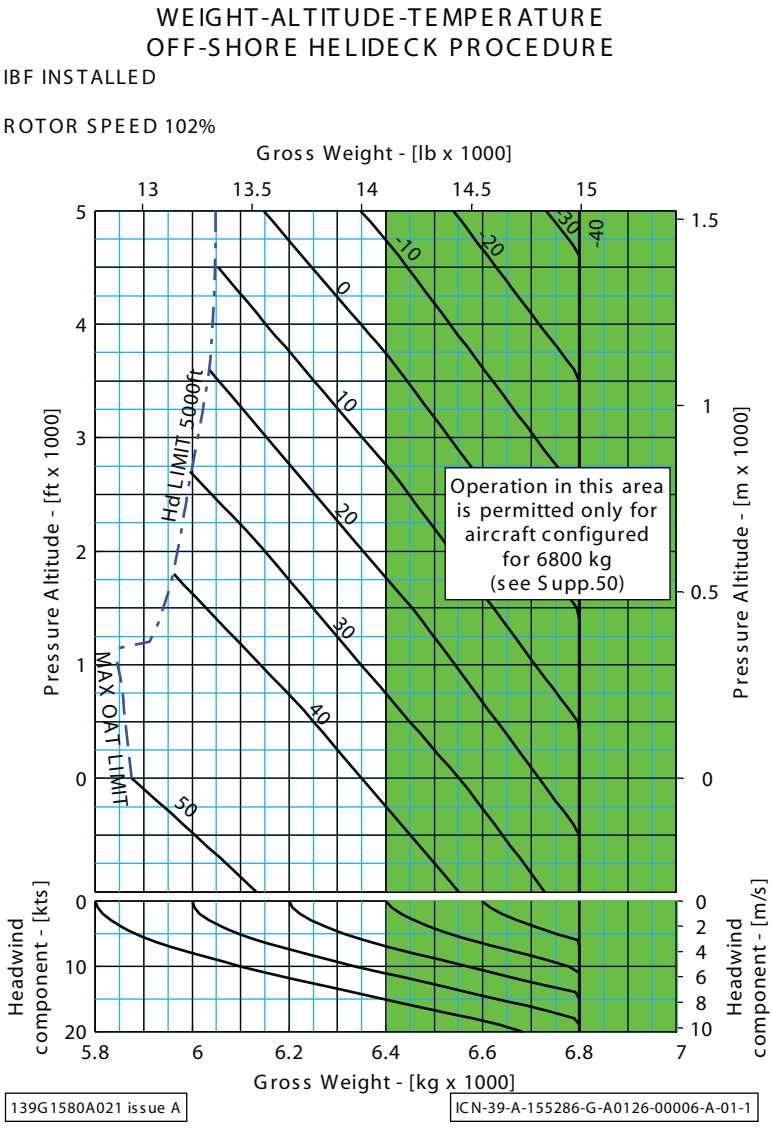

Figure 4E-3A Offshore Helideck Procedure Weight Limitations, IBF Installed

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CONTINUED TAKE OFF DISTANCE OEI
OFF-SHORE HELIDECK PROCEDURE

CLEAN AIR INTAKE
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS}: 40 KIAS

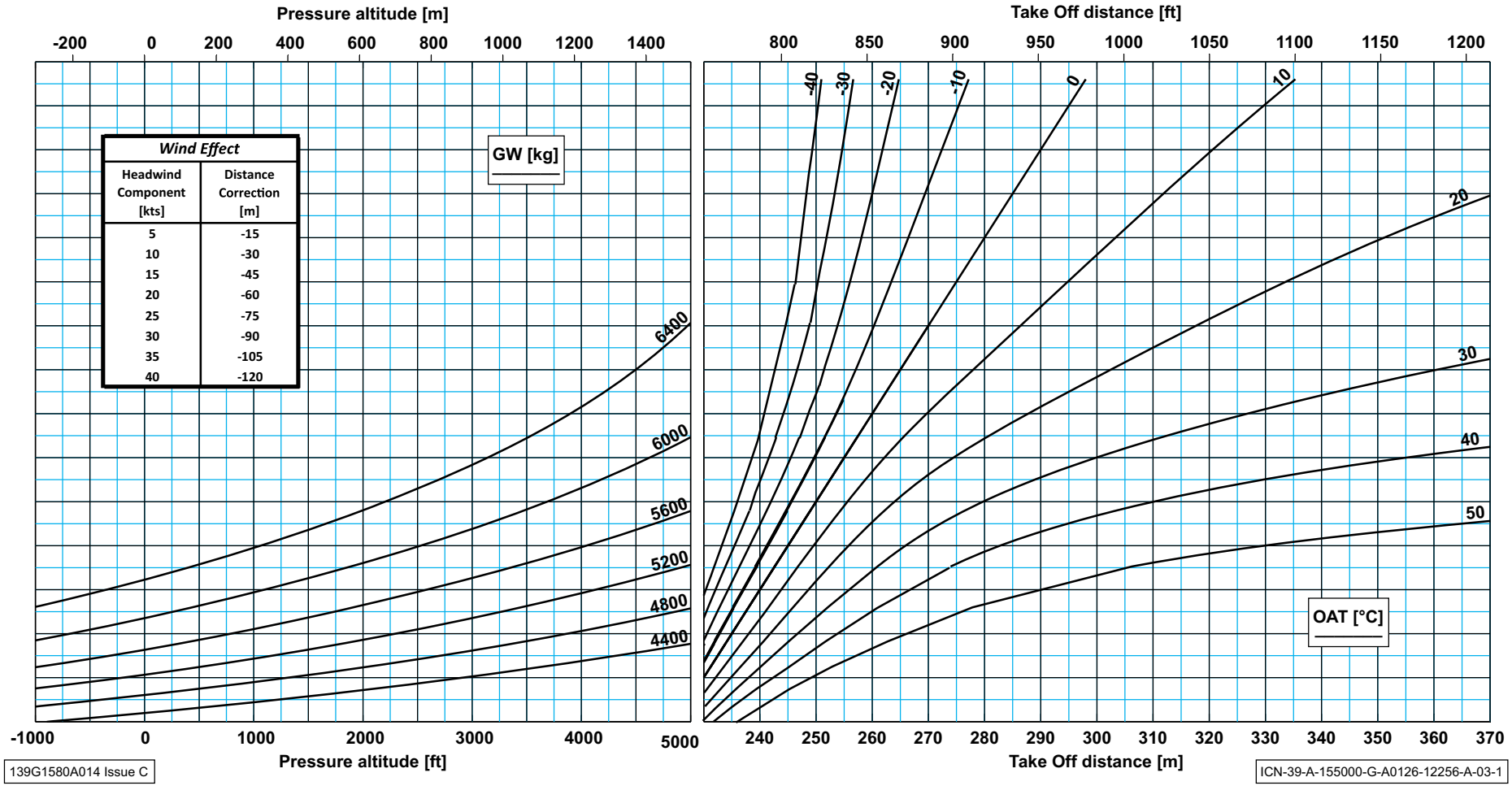

Figure 4E-4 Offshore Helideck CTO Distance OEI

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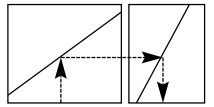
CONTINUED TAKE OFF DISTANCE OEI
OFF-SHORE HELIDECK PROCEDURE

EAPS OFF
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS}: 40 KIAS



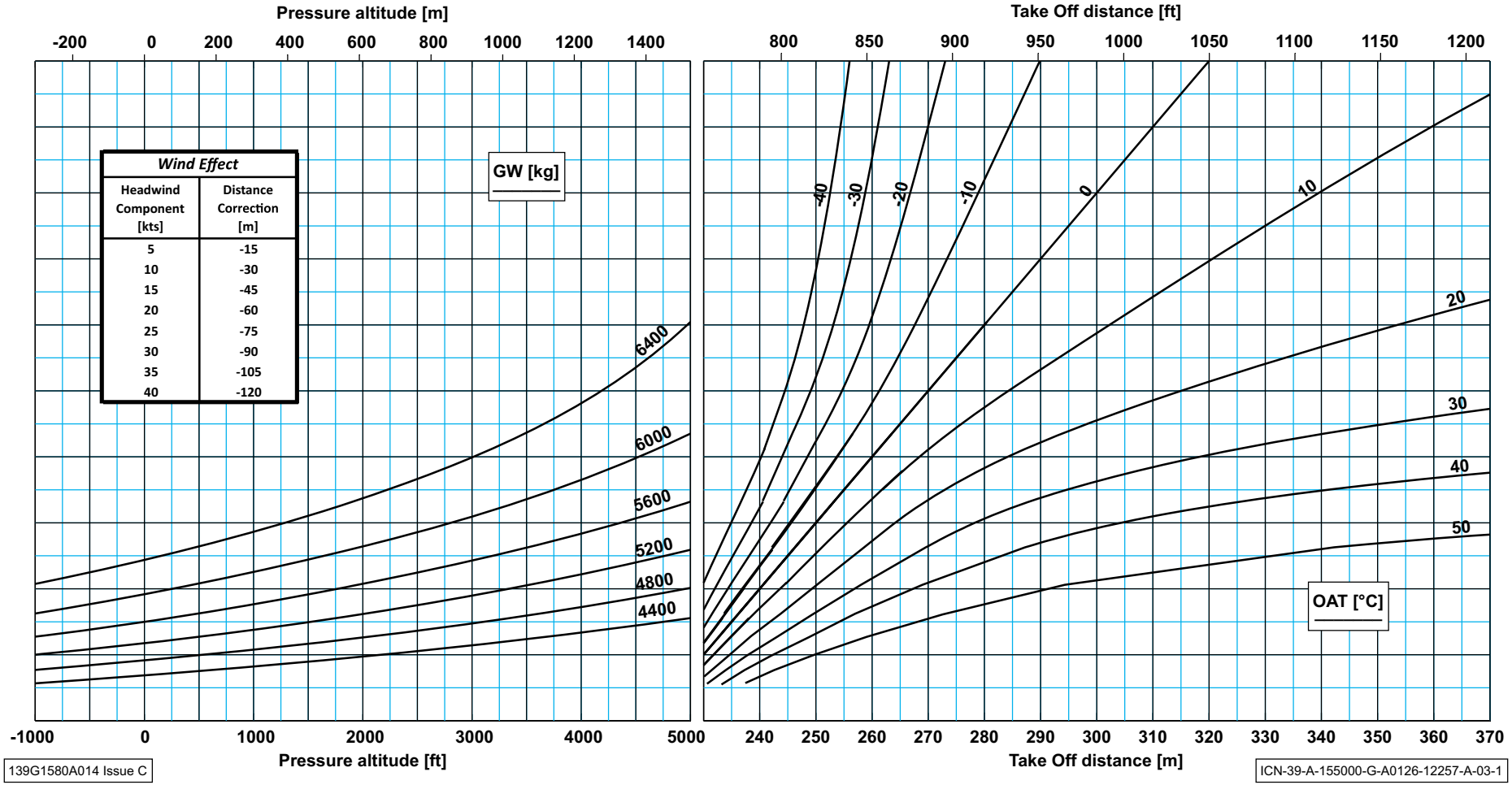


Figure 4E-5 Offshore Helideck CTO Distance OEI EAPS OFF

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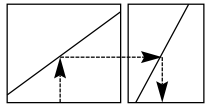
CONTINUED TAKE OFF DISTANCE OEI
OFF-SHORE HELIDECK PROCEDURE

EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS}: 40 KIAS



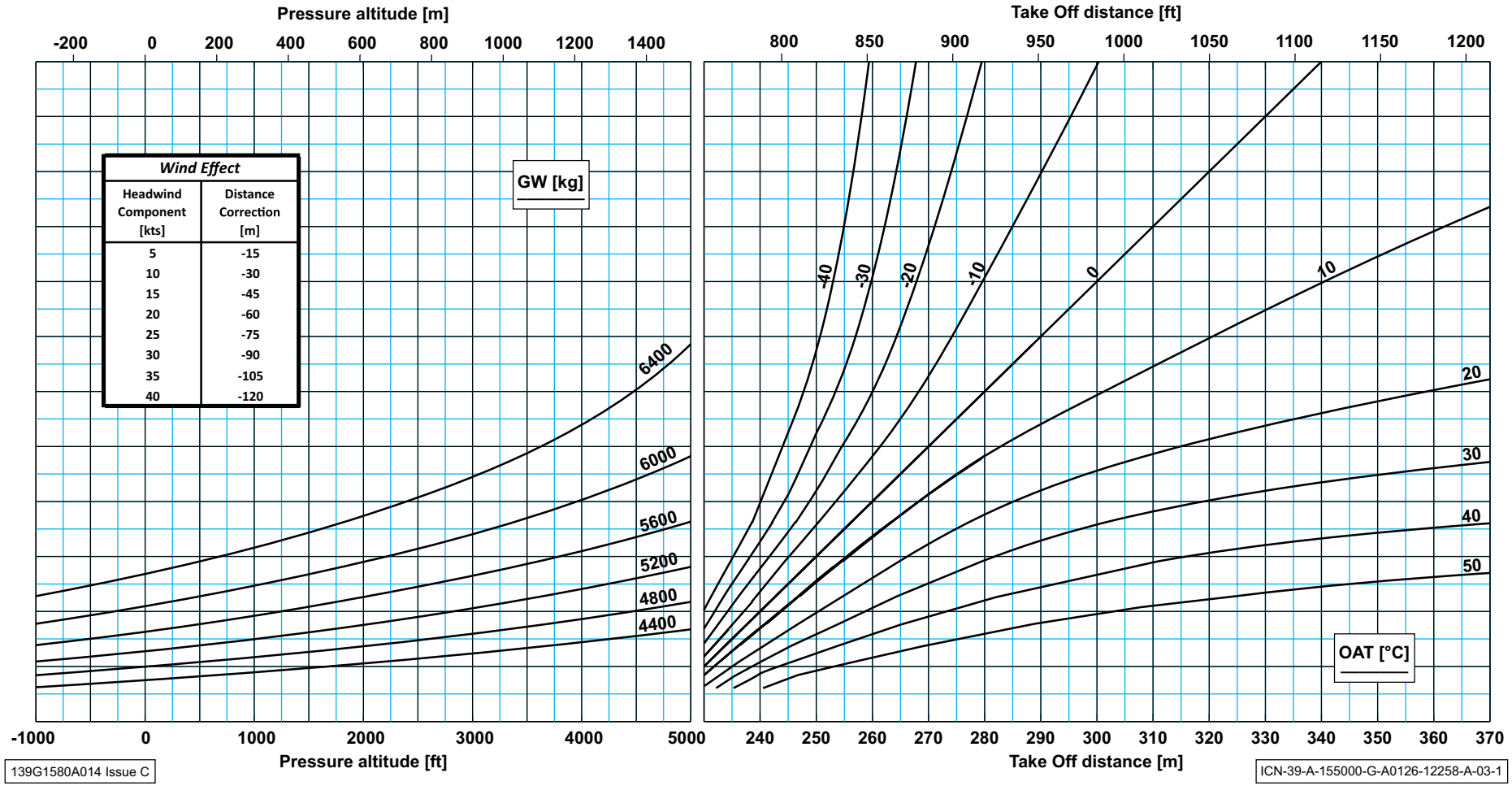


Figure 4E-6 Offshore Helideck CTO Distance OEI EAPS ON

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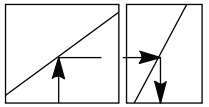
CONTINUED TAKE OFF DISTANCE OEI
OFF-SHORE HELIDECK PROCEDURE

IBF INSTALLED
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS}: 40 KIAS



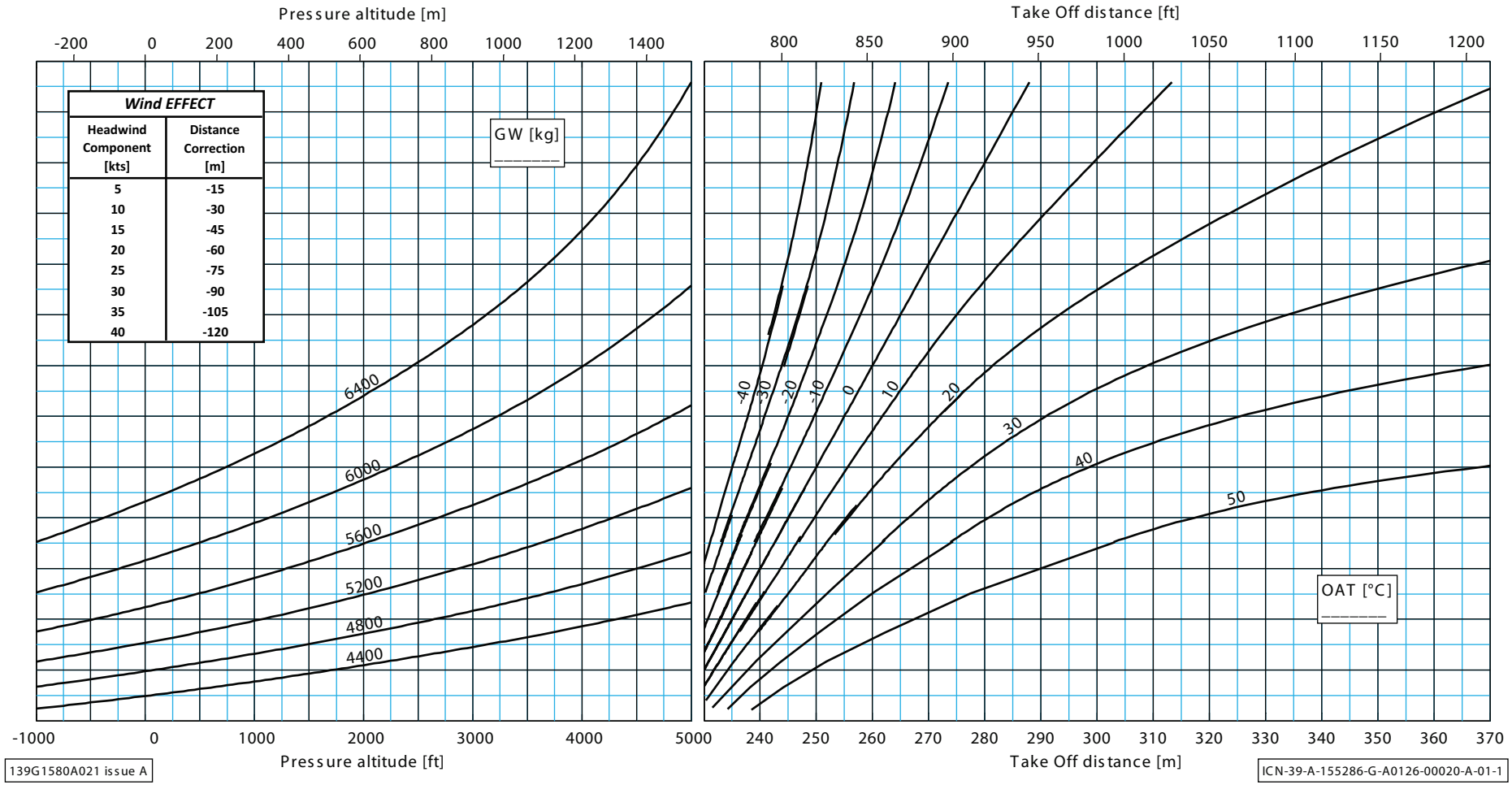


Figure 4E-6A Offshore Helideck CTO Distance, IBF Installed

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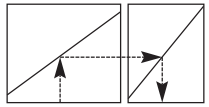
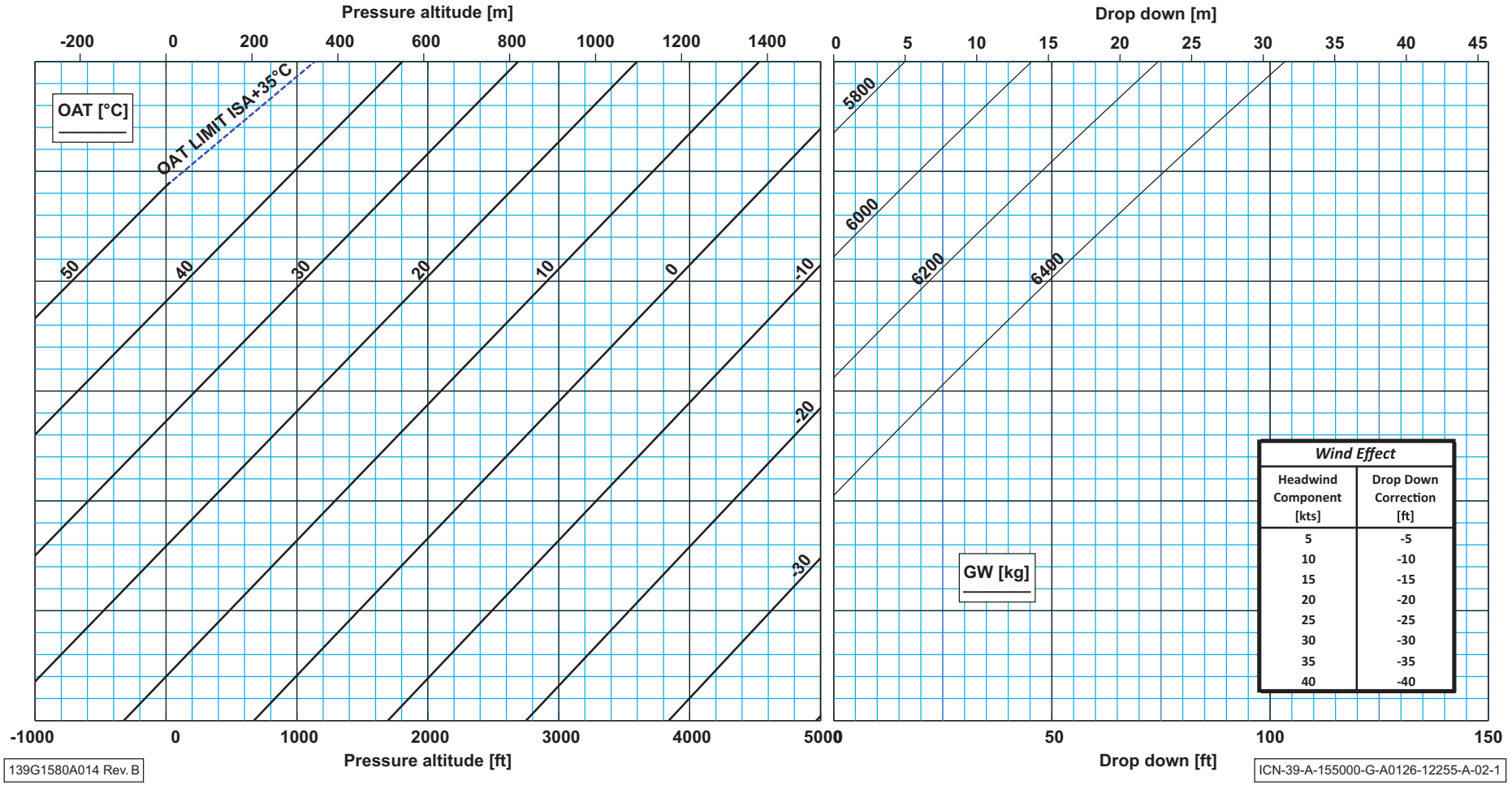
Clear Air Intake/EAPS OFF/EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD: 300A
$V_{TOSS/BLSS}$: 40 KIAS

DROP DOWN
OFF-SHORE HELIDECK PROCEDURE
FOR CONTINUED TAKE-OFF AND BALKED LANDING

NOTE: For Descending Procedure increase DROP DOWN by 15 feet





Wind Effect

Headwind Component [kts]	Drop Down Correction [ft]
5	-5
10	-10
15	-15
20	-20
25	-25
30	-30
35	-35
40	-40

Figure 4E-7 Offshore Helideck Procedure Drop Down Height BTS for CTO OEI

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PART F
CLEAR AREA TAKE-OFF PROCEDURES

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Part F
Clear Area Take-Off Procedures

SECTION 1F - LIMITATIONS

MINIMUM RUNWAY LENGTH

Minimum demonstrated runway length, clean engine air intake ..... Figure 4F-4

Minimum demonstrated runway length, EAPS OFF .....Figure 4F-5

Minimum demonstrated runway length, EAPS ON .....Figure 4F-6

Minimum demonstrated runway length, IBF Installed ..... Figure 4F-6A

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake.....Figure 4F-1

Weight Limitation, EAPS OFF.....Figure 4F-2

Weight Limitation, EAPS ON.....Figure 4F-3

Weight Limitation, IBF Installed..... Figure 4F-3A

AIRSPEED LIMITATIONS

Balked Landing Safety Speed (V_{BLSS}).....50 KIAS

Best Rate of Climb Speed (V_Y) .....Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)
..... Above 10000 ft Hp 70 KIAS
(Above 3000 m Hp 70 KIAS)

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A Landing ..... 14000 ft (4300 m) Hp or Hd whichever comes first

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s).

Take-Off with tail wind component is prohibited.

SECTION 2F - NORMAL PROCEDURES

TAKE-OFF DECISION HEIGHT (TDP)

TDP ..... 30 ft (9 m) AGL

Note

Radio altimeter heights are shown in the flight path profiles.

TAKE OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand pilot should monitor engine and rotor parameters.

CLEAR AREA TAKE-OFF PROCEDURE

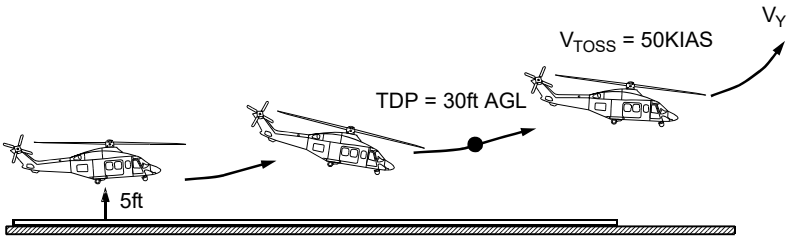

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Figure 2F-1 Take-Off Profile Clear Area

1. LDG LT & LDG LT2 switches — As required.

2. Rotor speed — Set 102% NR.

3.	HEATER (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates. Select HTR switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguishes.
	ECS ENVIRO (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates. Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
4.	Power checks	— Carry out as required in accordance with ENGINE POWER CHECKS procedure in Section 4K - Performance Data
5.	Pilot Altimeter	— Set 0ft, or nearest 1000 ft (300 m) setting to T-O altitude, with collective at MPOG.
6	PARK BRAKE	— Confirm released.
7.	Hover	— Establish a 5 ft (1.5 m) AGL hover.

Note

In HIGE the indicated altitude, on the altimeters, will be 40 ft to 60 ft (12 m to 18 m) below the setting value. The indicated altitude automatically corrects in the climb.

8. Flight controls — Check correct functioning.

9. MFD PWR PLANT page — Check all parameters within normal operating limits.

10. Warnings and Cautions — Confirm none displayed.

11. PI — Check PI's matched, NR 102%. Note PI value.

12. Collective/Cyclic Control — Apply cyclic to commence a nose down attitude change to -5° and maintain. At approximately half way through the rotation apply collective to increase PI by 18% above hover value (if 18% is not available, without exceeding Take Off PI, increase to 110%).

Note

OAT conditions close to 50° C may produce ITT limited PI, in HIGE, above 92% PI. Under these conditions using 110% PI (even though the change in PI is less than 18%) will produce the required power to guarantee the CAT A performance.

13. Take-Off Decision Point (TDP) — At 30 ft (9 m) AGL (TDP) continue acceleration. Verify V_{TOSS} (50 KIAS) already achieved.

14. Acceleration/Climb	— Adjust pitch attitude to approximately 5° nose up and continue climb up to 200 ft (60 m) AGL.
15. Landing gear	— UP (when reaching V_y but not before 200 ft (60 m) AGL).
16. NR/NF	— Select 100% at V_y.
17. Power	— Adjust collective to continue climb at V_y, utilizing up to Take-Off power as required, to 1000 ft (300 m).
18. After Take-Off checks	— Complete.
19. At 1000 ft (300 m) AGL	— Adjust collective and cyclic to continue climb at V_y or cruise speed as required.
20. HEATER/ECS ENVIRO (if fitted)	— As required.
21. LDG LT & LDG LT2 switches	— OFF, if used.
22. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI the performance.

SECTION 3F - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Take-Off path and assume the pilot gives first priority to aircraft control and to achieve a safe flight path.

For all Take-Off procedures the following shall be observed:

1. Engine failure prior to TDP — Recognition of engine failure prior to the TDP dictates that the Take-Off be rejected

2. Engine failure at or after TDP — Recognition of the failure at or after the TDP dictates that the Take-Off be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

TAKE OFF FROM LEFT HAND SEAT

When Take-Off is carried out from the left hand seat the right hand seat pilot should call out rotor speed during the engine failure procedures.

EMERGENCY PROCEDURE FOR SINGLE ENGINE FAILURE DURING TAKE-OFF

SINGLE ENGINE FAILURE RECOGNIZED IN HOVER (5 feet (1.5 m) AGL)

1. Collective	— Maintain collective pitch setting or lower collective slightly if required to land.
2. Touchdown	— Increase collective to cushion landing as touchdown becomes imminent.
3. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG. Apply wheel brakes as required.
4. Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
5. PARK BRAKE	— As required.

SINGLE ENGINE FAILURE RECOGNIZED PRIOR TO TDP (REJECTED TAKE-OFF)

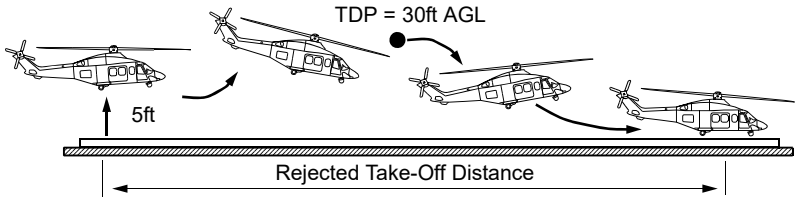

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Figure 3F-1 Clear Area Engine Failure before TDP

1. Collective — Adjust collective to maintain the rotor droop within 90%NR or lower collective slightly, if required, to establish descent.
   • When left hand pilot flying, right hand pilot call out rotor speed.

2. Cyclic — Adjust pitch attitude as required to reduce speed below 30 kts (56 km/hr) GS.

3. Touchdown — At approximately 5-10 ft (1.5-3 m) AGL level aircraft and increase collective to cushion landing as touchdown becomes imminent. Maximum nose up attitude at touchdown 15°.

4. Landing — After touchdown, centralize cyclic and simultaneously reduce collective to MPOG. Apply wheel brakes as required to stop aircraft.

5. Engine — On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

6. PARK BRAKE — As required.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER TDP (CONTINUED TAKE-OFF)

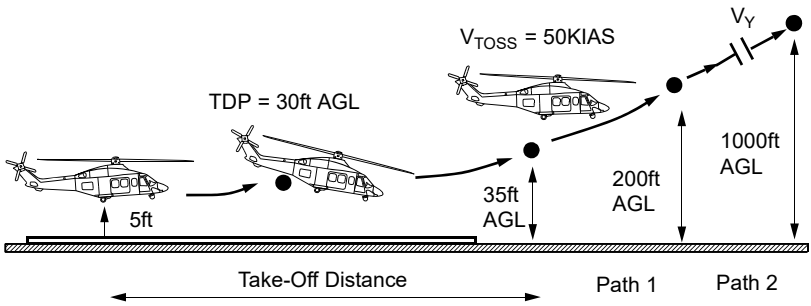

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Figure 3F-2 Clear Area Engine Failure at/after TDP

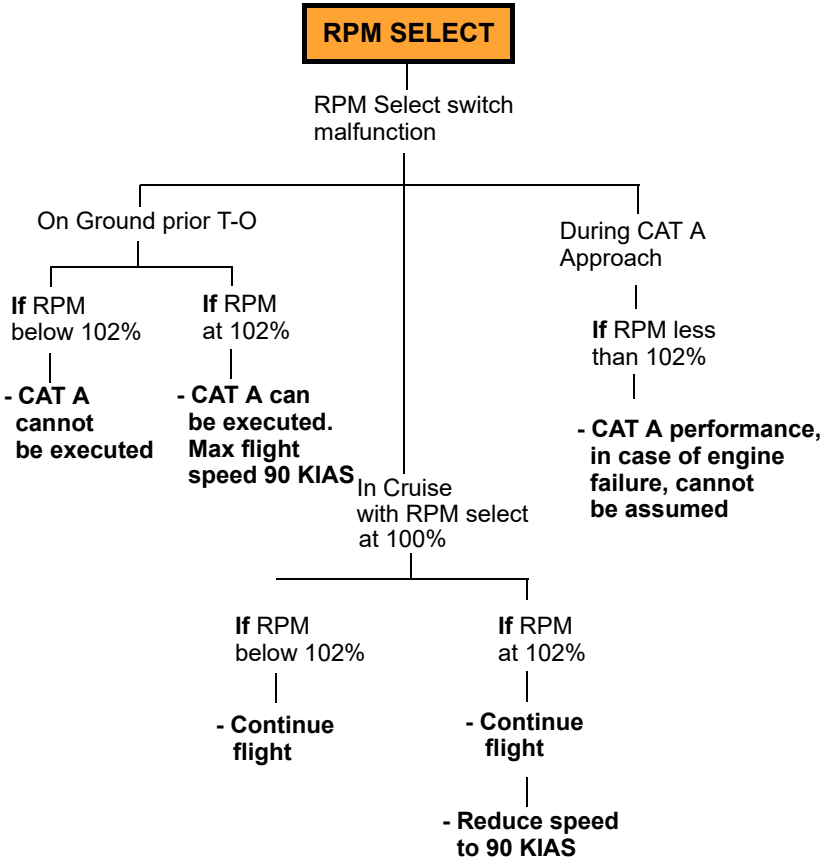
1. Collective/Cyclic — Continue the acceleration using collective to droop NR to minimum of 90% and to set 2.5 min power.
   • When left hand pilot flying, right hand pilot call out rotor speed.

2. Acceleration/Climb — Adjust pitch attitude to 5° nose up and continue acceleration to V_{TOSS} (50 KIAS).

3. Climb	— When the aircraft achieves V_{TOSS} (50 KIAS) and a positive rate of climb lower collective to recover NR to 102%. Continue climb with 2.5 min power to 200 ft (60 m).
4. At 200 ft (60 m) AGL	— Accelerate to Vy and continue climbing at 2.5 min power to 1000 ft AGL. Reduce power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
5. Landing gear	— UP (when reaching V_y).
6. Rotor speed	— Select 100% at V_y.
7. At 1000 ft (300 m) AGL	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
8. MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



SECTION 4F - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind Component computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

The Clear Area Take-Off Procedure Weight Limitation charts are shown in Figure 4F-1 to Figure 4F-3A.

REJECTED TAKE-OFF DISTANCE OEI

The Rejected Take Off Distance is shown in Figure 4F-4 to Figure 4F-6A.

CONTINUED TAKE-OFF DISTANCE OEI

The Continued Take-Off Distance OEI is shown in Figure 4F-7 to Figure 4F-9A.

The Distance Correction incorporated into the “Clear Area CTO Distance OEI” charts, presented in this supplement, for Headwind Component have already been factored by 50%.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power OEI is shown in Figure 4F-10 to Figure 4F-33 for various altitudes, temperatures, weights, air intake configurations.

The charts apply from the end of the CTO distance to a height of 200 ft (60 m) AGL.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration.

The charts apply from 200 ft (60 m) AGL to 1000 ft (300 m) AGL.

CLIMB PERFORMANCE

Single Engine Rate Off Climb at V_Y

The ROC, at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS or IBF installed.

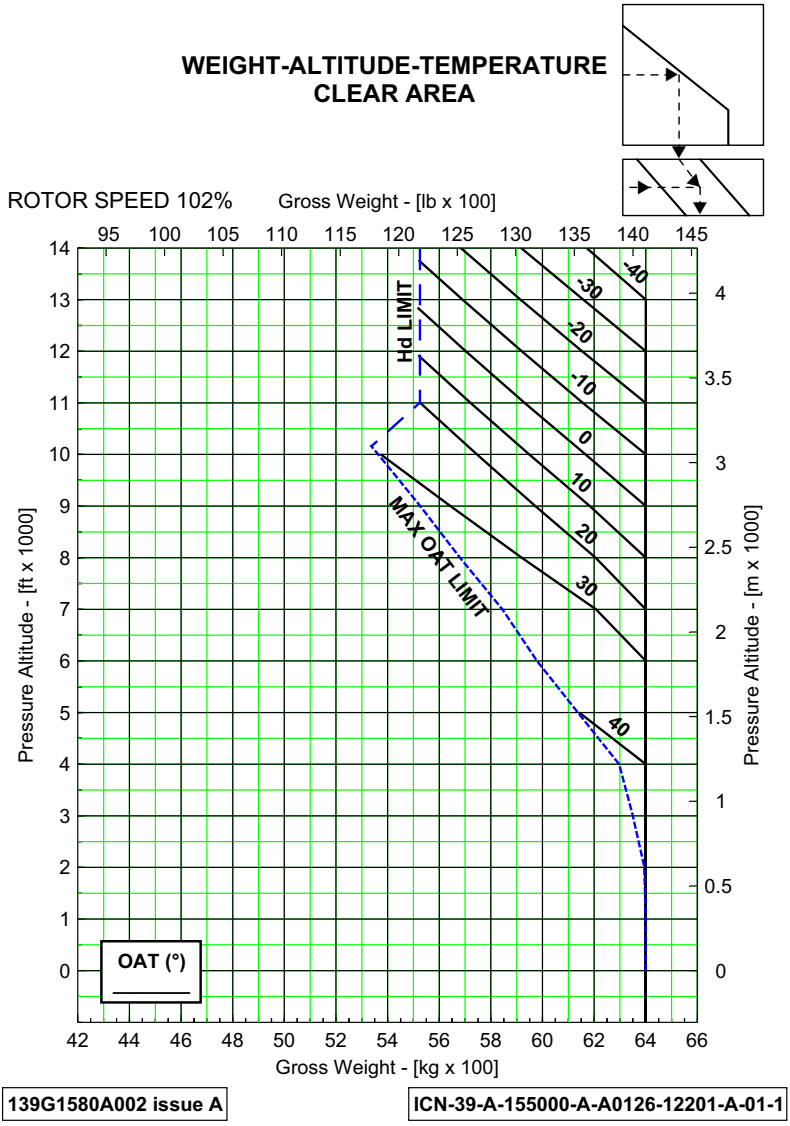


Figure 4F-1 Clear Area Procedure Weight Limitations

WEIGHT-ALTITUDE-TEMPERATURE
CLEAR AREA

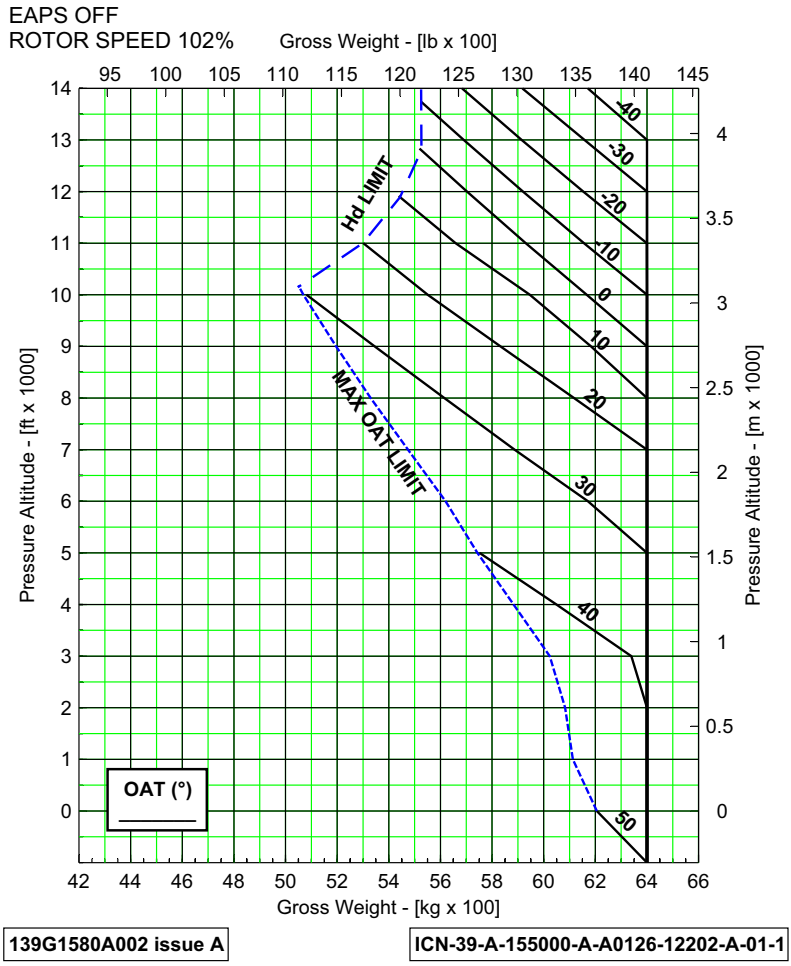


Figure 4F-2 Clear Area Procedure Weight Limitations, EAPS OFF

WEIGHT-ALTITUDE-TEMPERATURE
CLEAR AREA

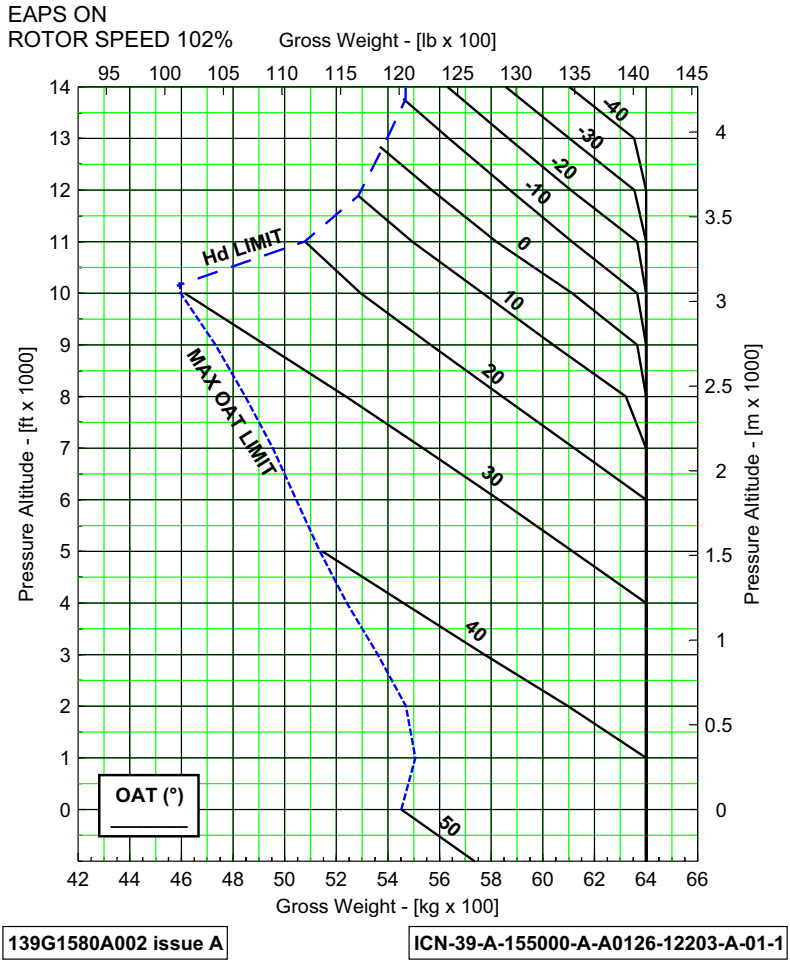


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Figure 4F-3 Clear Area Procedure Weight Limitations, EAPS ON

WEIGHT-ALTITUDE-TEMPERATURE
CLEAR AREA

IBF INSTALLED
ROTOR SPEED 102%

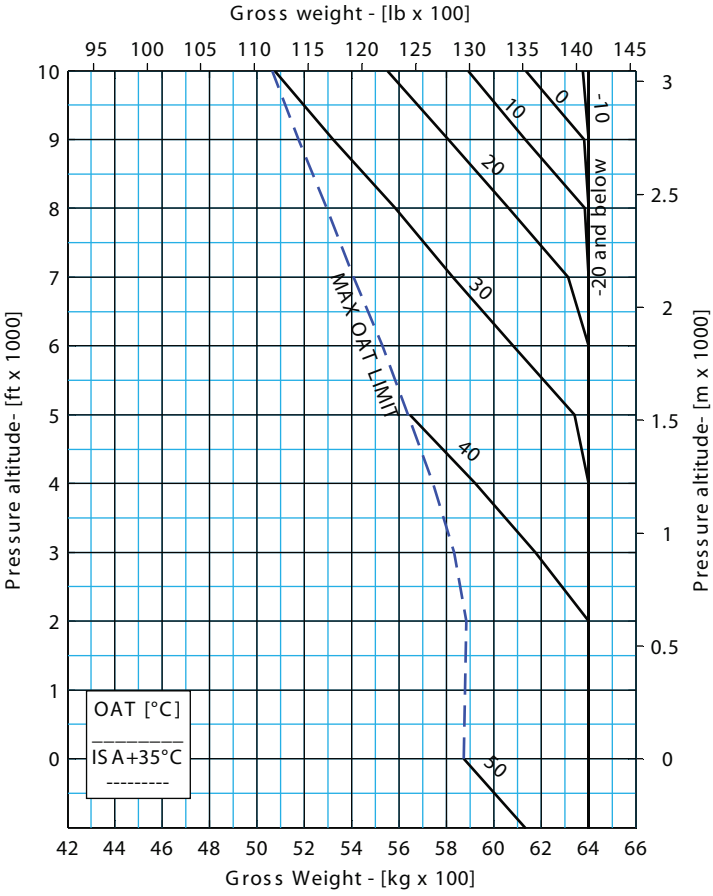

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Figure 4F-3A Clear Area Procedure Weight Limitations, IBF Installed

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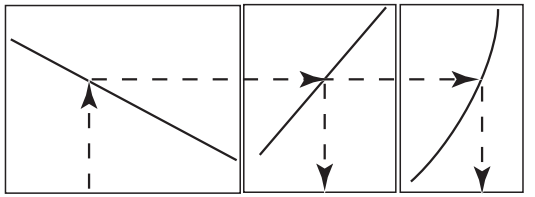
REJECTED TAKE OFF DISTANCE OEI
CLEAR AREA



POWER 2.5 min OEI
ELECTRICAL LOAD 300A

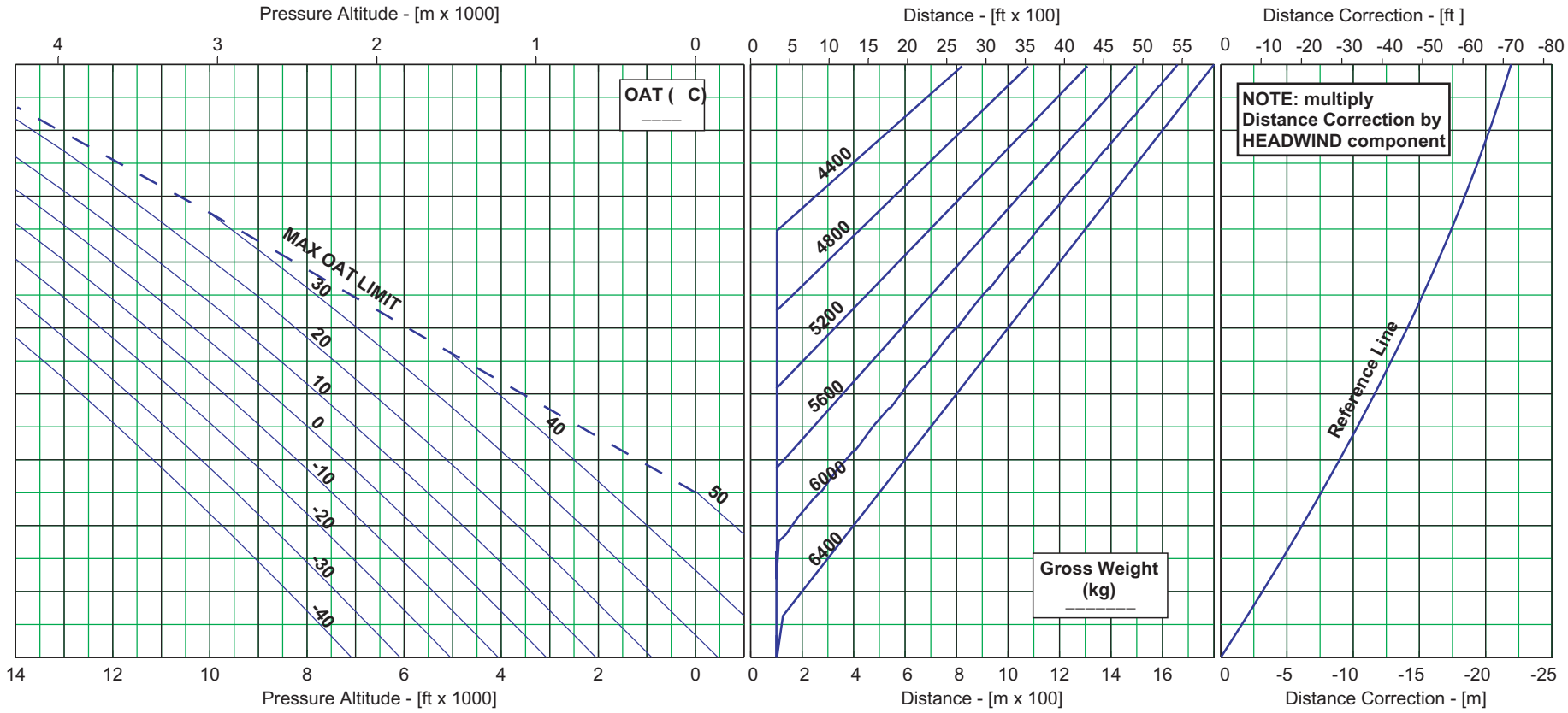


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Figure 4F-4 Clear Area Procedure RTO Distance

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REJECTED TAKE OFF DISTANCE OEI
CLEAR AREA

EAPS OFF
POWER 2.5 min OEI
ELECTRICAL LOAD 300A

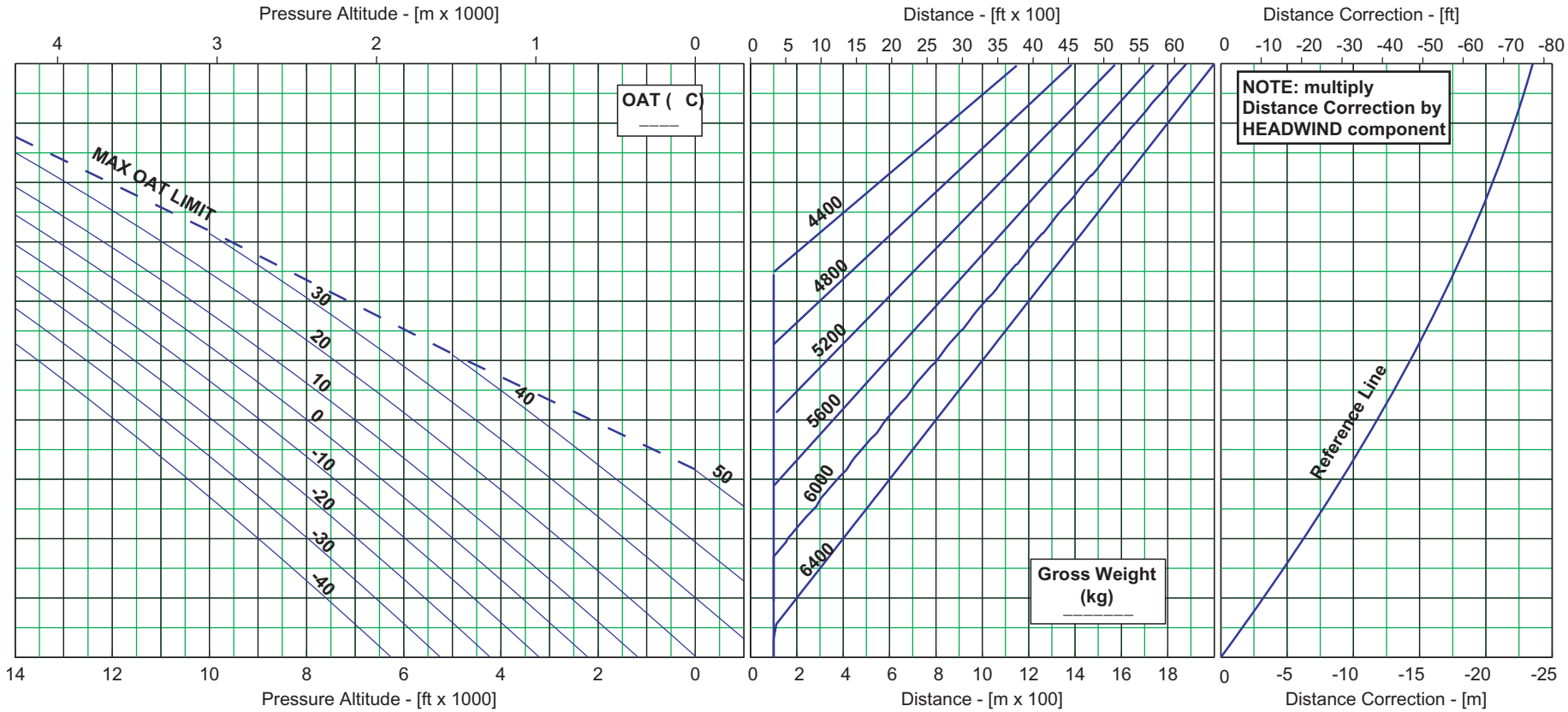

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Figure 4F-5 Clear Area Procedure RTO Distance, EAPS OFF

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REJECTED TAKE OFF DISTANCE OEI
CLEAR AREA

EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300A

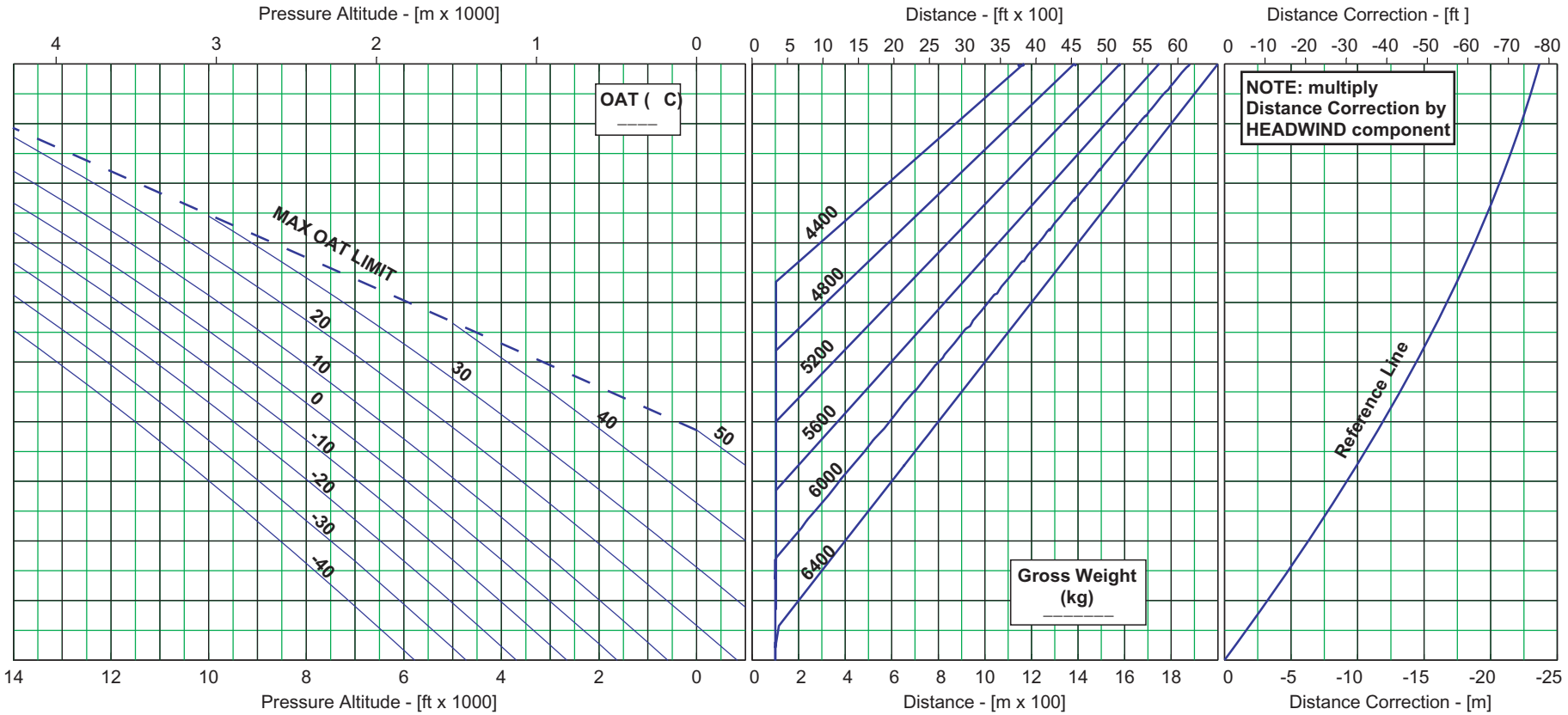

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Figure 4F-6 Clear Area Procedure RTO Distance, EAPS ON

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REJECTED TAKE OFF DISTANCE
CLEAR AREA

IBF INSTALLED
POWER 2.5 min OEI
ELECTRICAL LOAD 300A

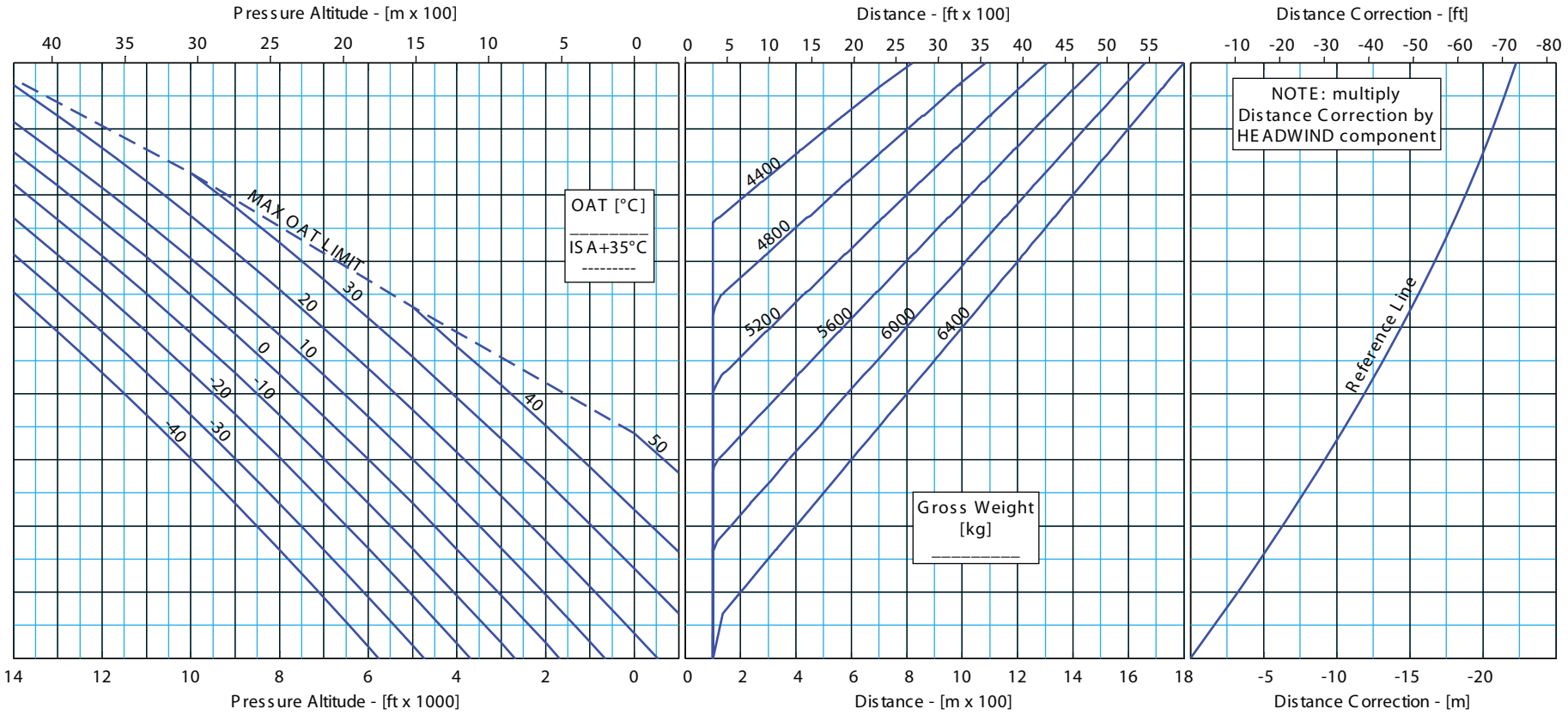

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Figure 4F-6A Clear Area Procedure RTO Distance, IBF Installed

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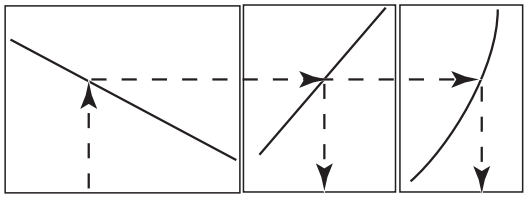
CONTINUED TAKE OFF DISTANCE OEI
CLEAR AREA



POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS} 50 KIAS

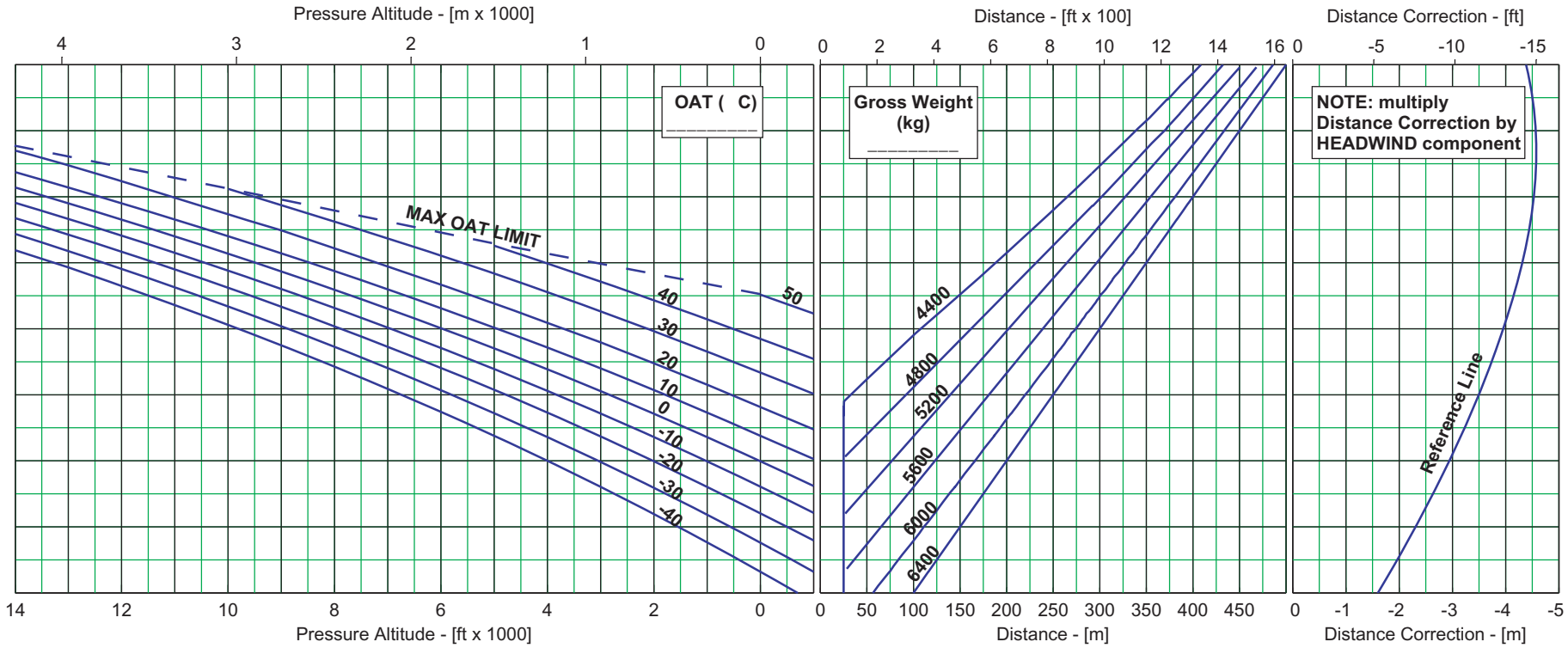


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Figure 4F-7 Clear Area Procedure CTO Distance OEI

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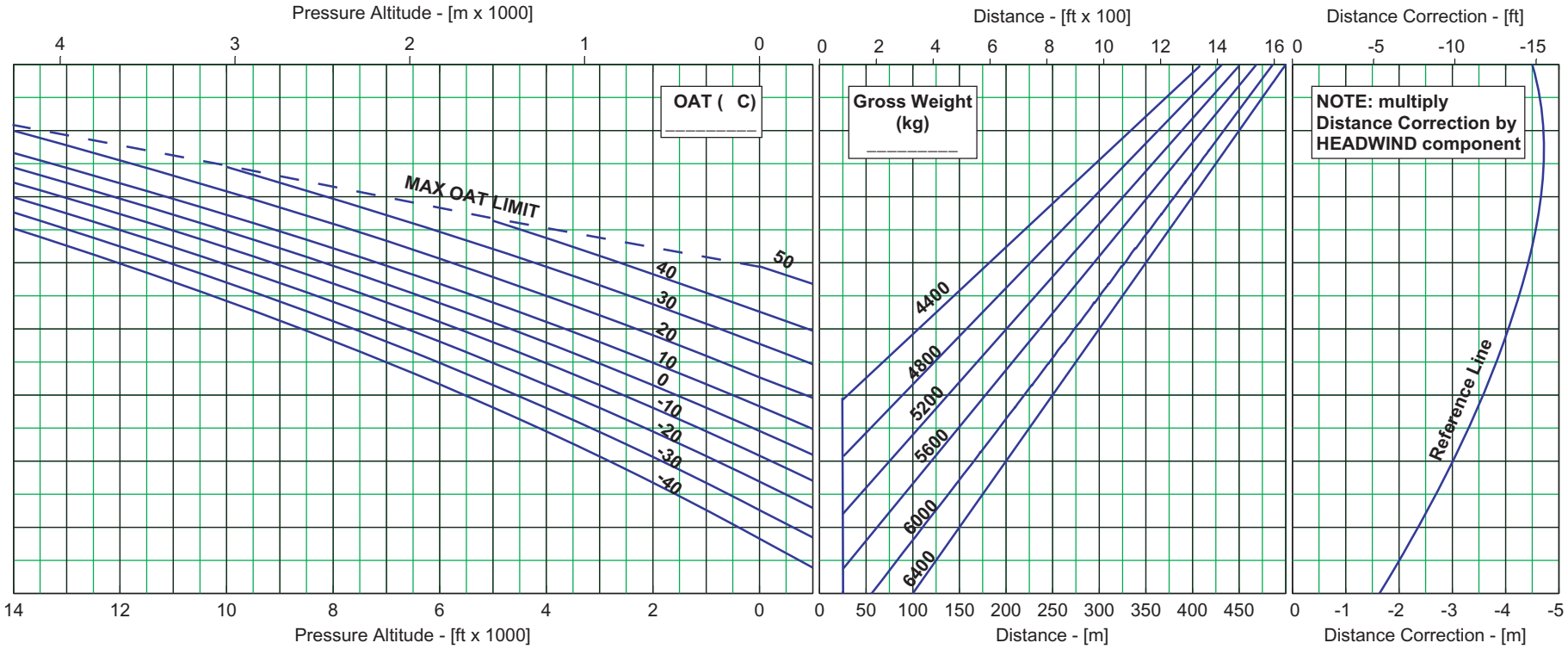
CONTINUED TAKE OFF DISTANCE OEI
CLEAR AREA

EAPS OFF
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS} 50 KIAS



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ICN-39-A-155000-A-A126-12217-A-02-1

Figure 4F-8 Clear Area Procedure CTO Distance OEI, EAPS OFF

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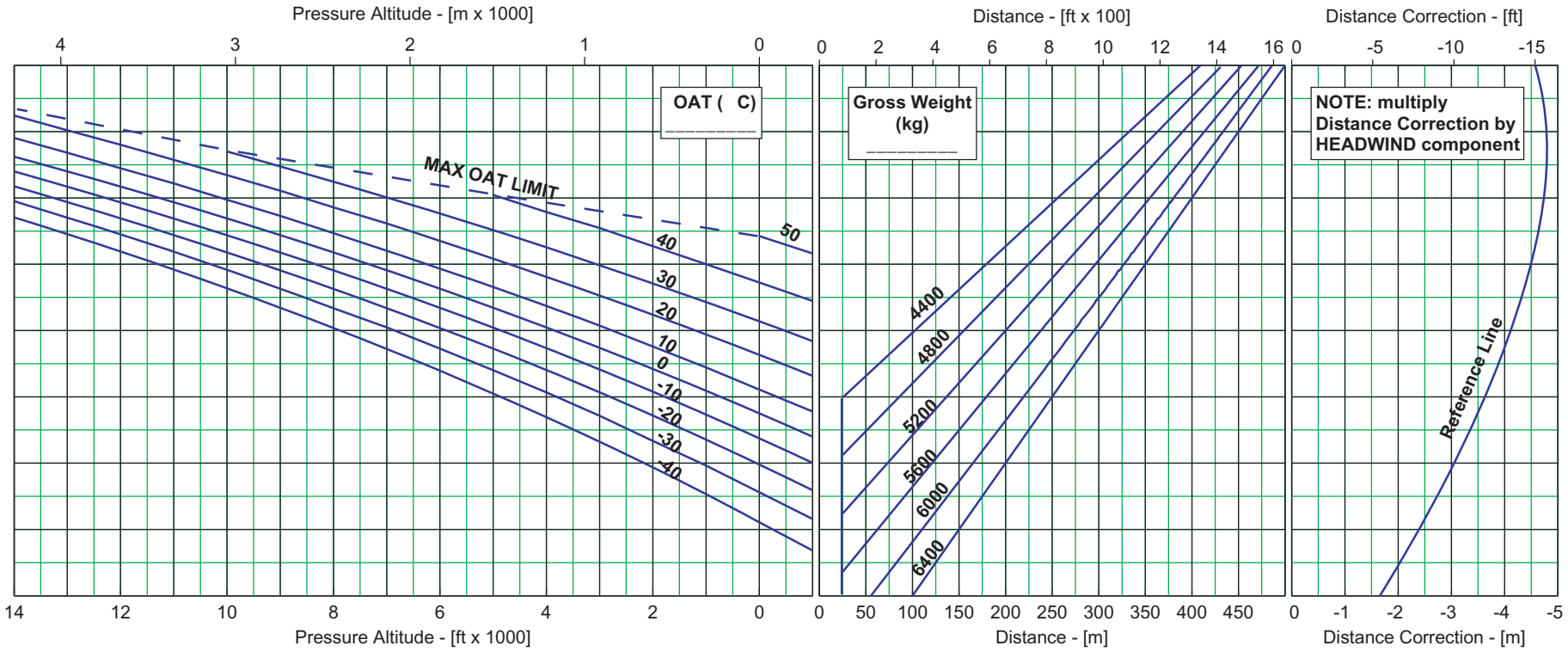
CONTINUED TAKE OFF DISTANCE OEI
CLEAR AREA

EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS} 50 KIAS



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ICN-39-A-155000-A-A126-12218-A-02-1

Figure 4F-9 Clear Area Procedure CTO Distance OEI, EAPS ON

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OEI CONTINUED TAKE OFF DISTANCE
CLEAR AREA

IBF INSTALLED
POWER 2.5 min OEI
ELECTRICAL LOAD 300A

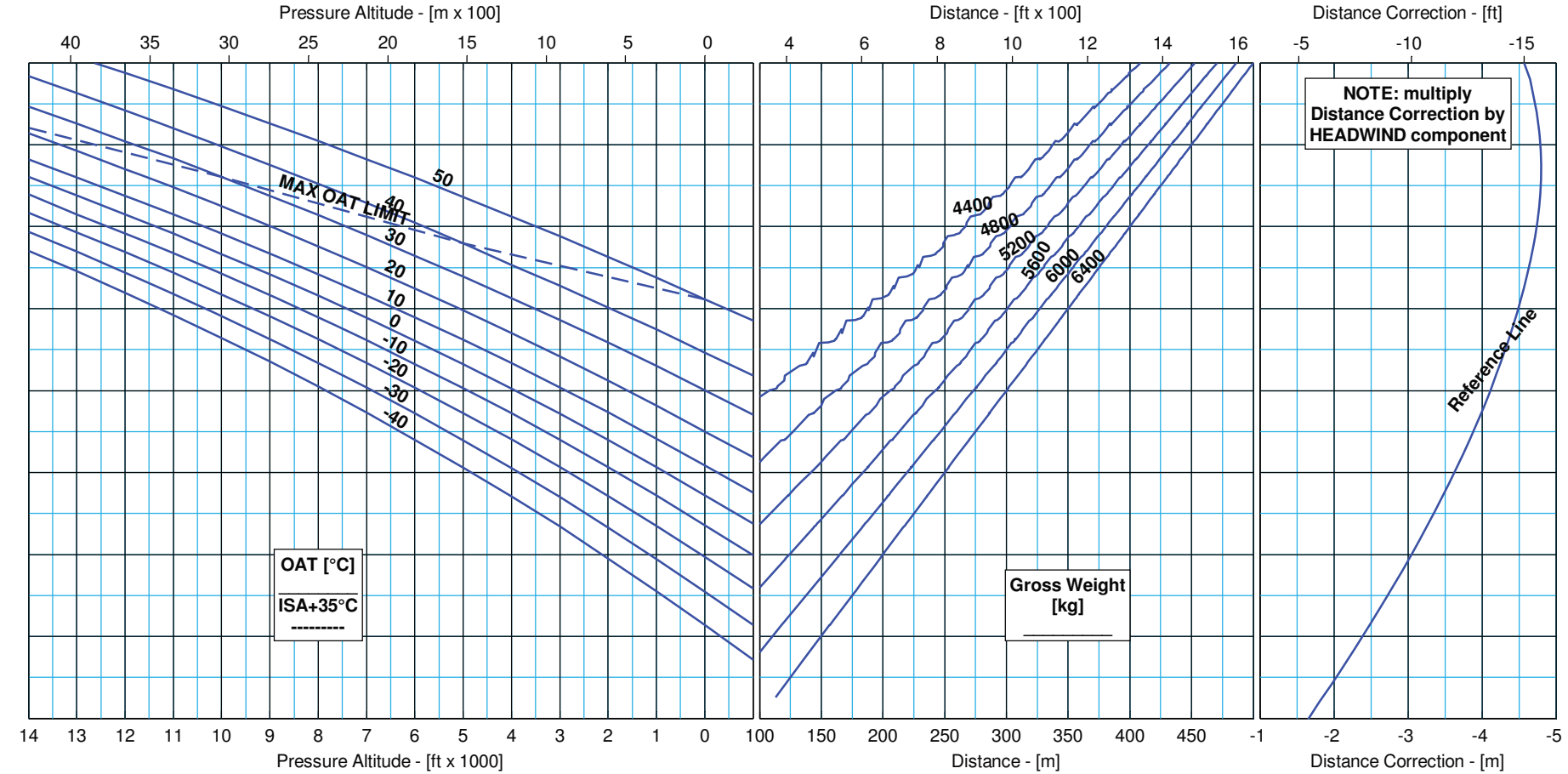

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Figure 4F-9A Clear Area Procedure CTO Distance OEI, IBF Installed

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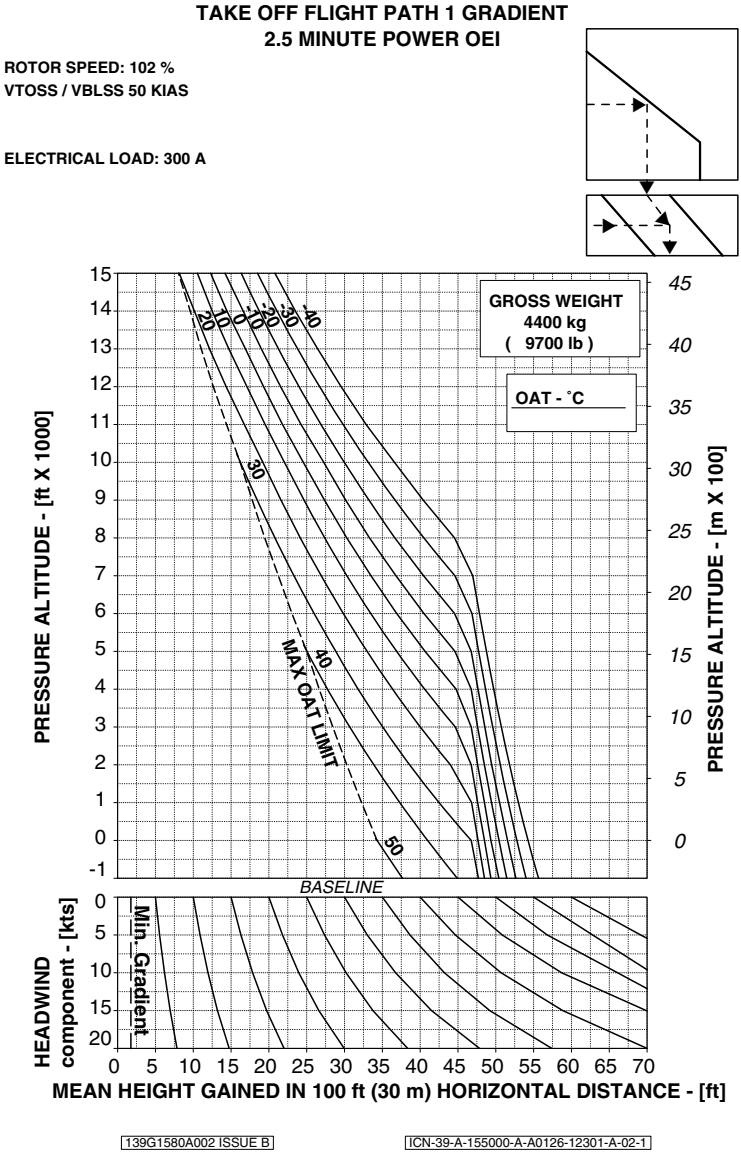

Figure 4F-10 PATH 1 Gradient, Gross Weight 4400 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS

ELECTRICAL LOAD: 300 A

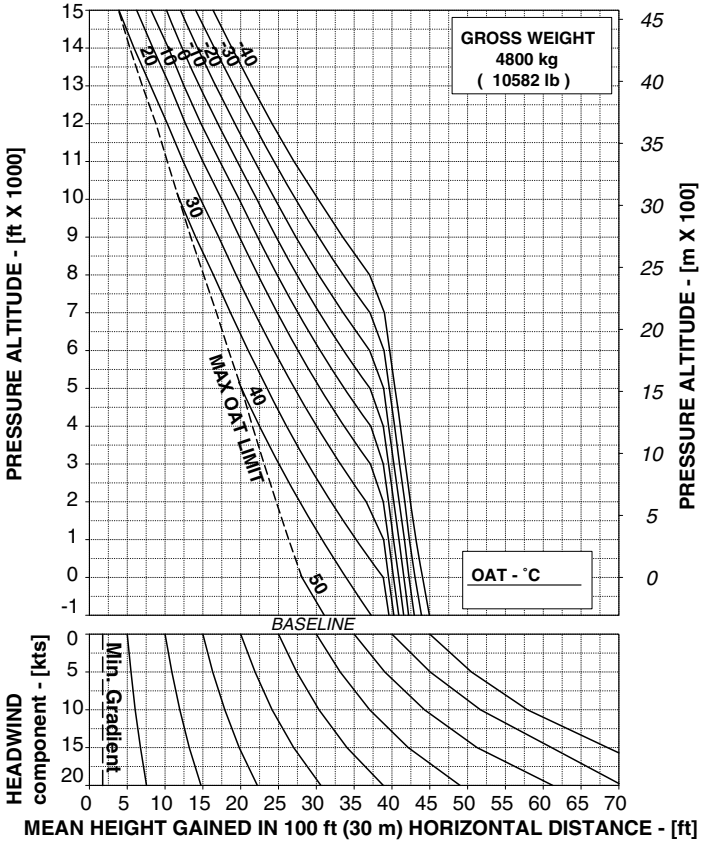

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Figure 4F-11 PATH 1 Gradient, Gross Weight 4800 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS

ELECTRICAL LOAD: 300 A

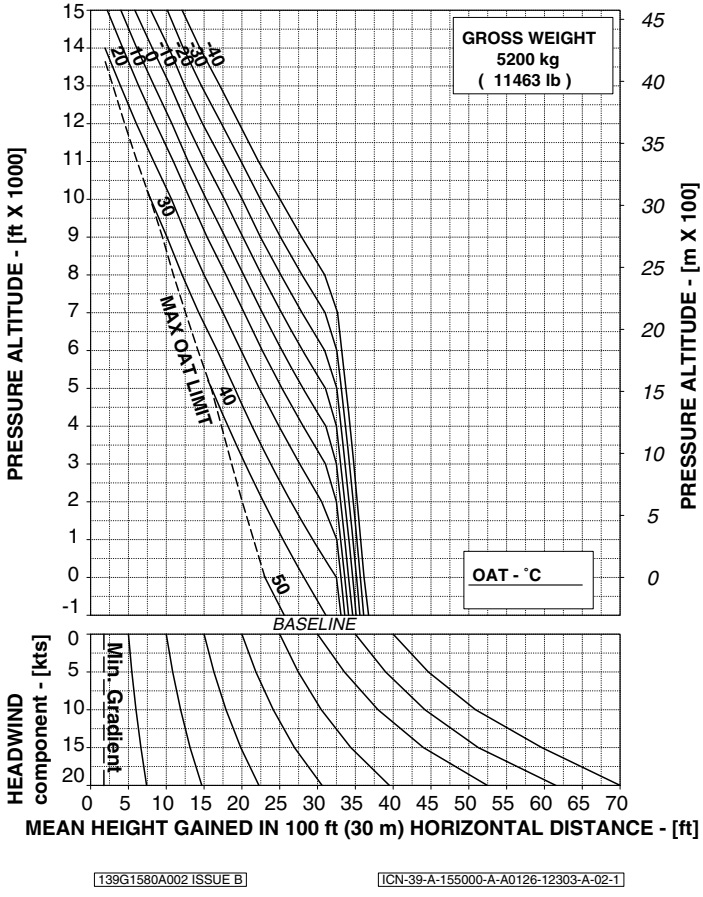

Figure 4F-12 PATH 1 Gradient, Gross Weight 5200 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS

ELECTRICAL LOAD: 300 A

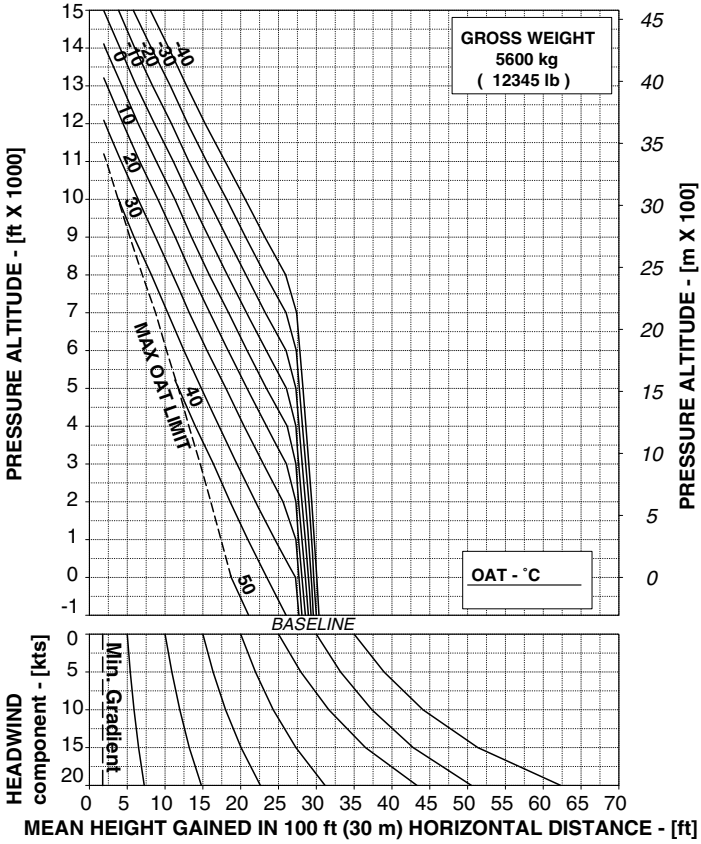

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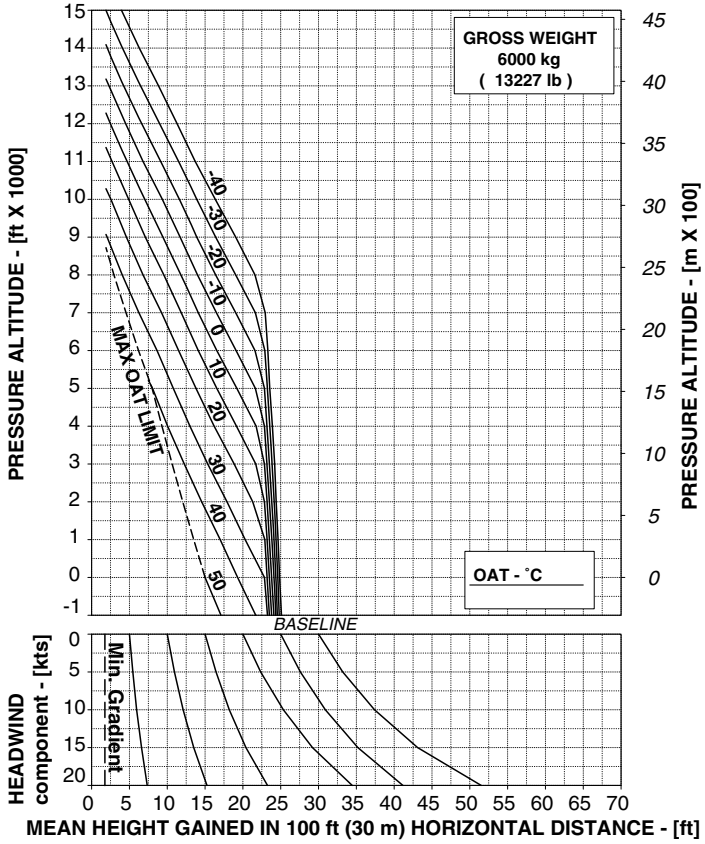
Figure 4F-13 PATH 1 Gradient, Gross Weight 5600 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS

ELECTRICAL LOAD: 300 A



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ICN-39-A-155000-A-A0126-12305-A-02-1

Figure 4F-14 PATH 1 Gradient, Gross Weight 6000 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS

ELECTRICAL LOAD: 300 A

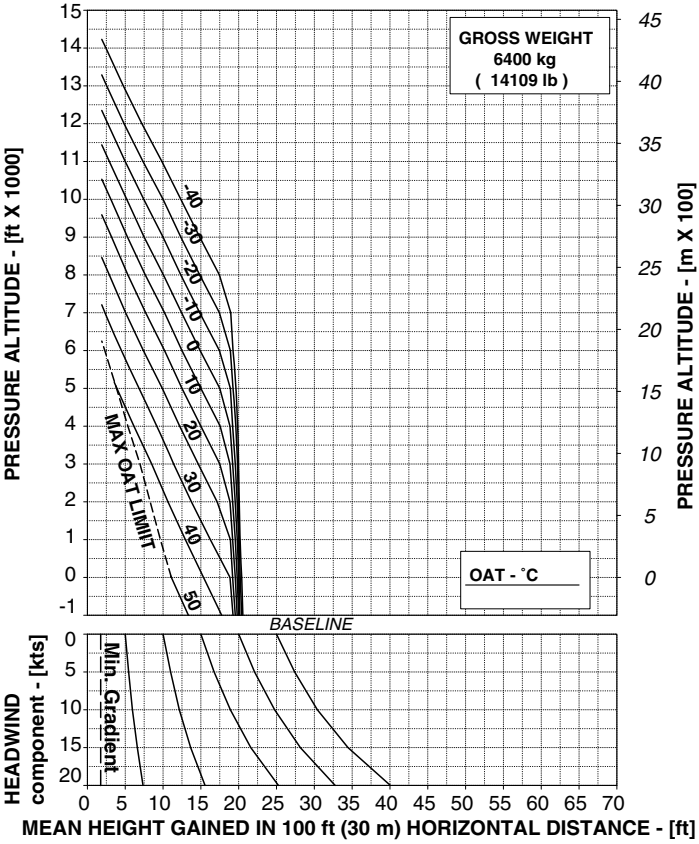

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Figure 4F-15 PATH 1 Gradient, Gross Weight 6400 kg

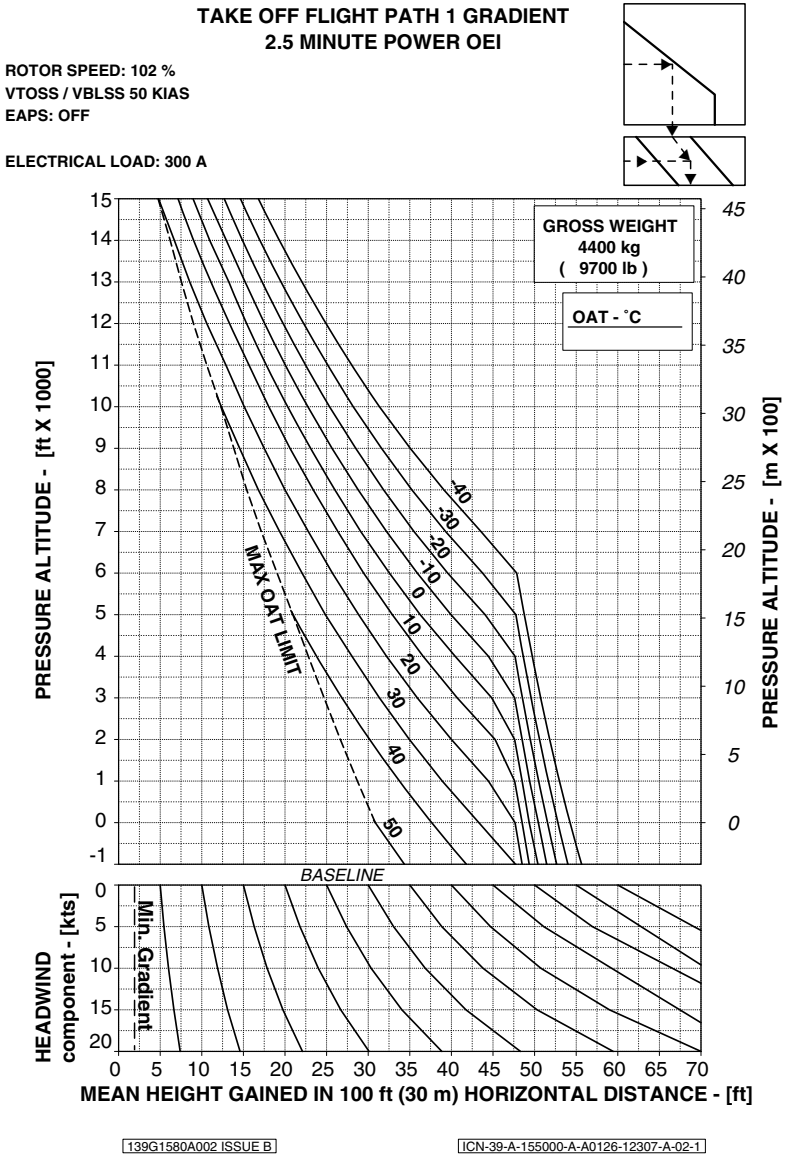

Figure 4F-16 PATH 1 Gradient, Gross Weight 4400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A

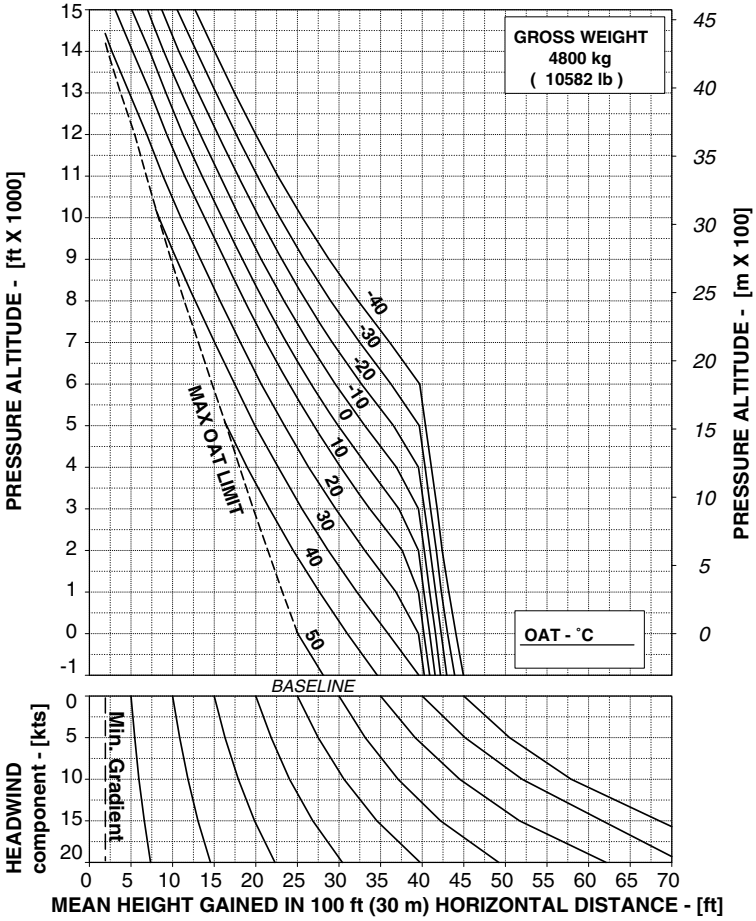

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Figure 4F-17 PATH 1 Gradient, Gross Weight 4800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A

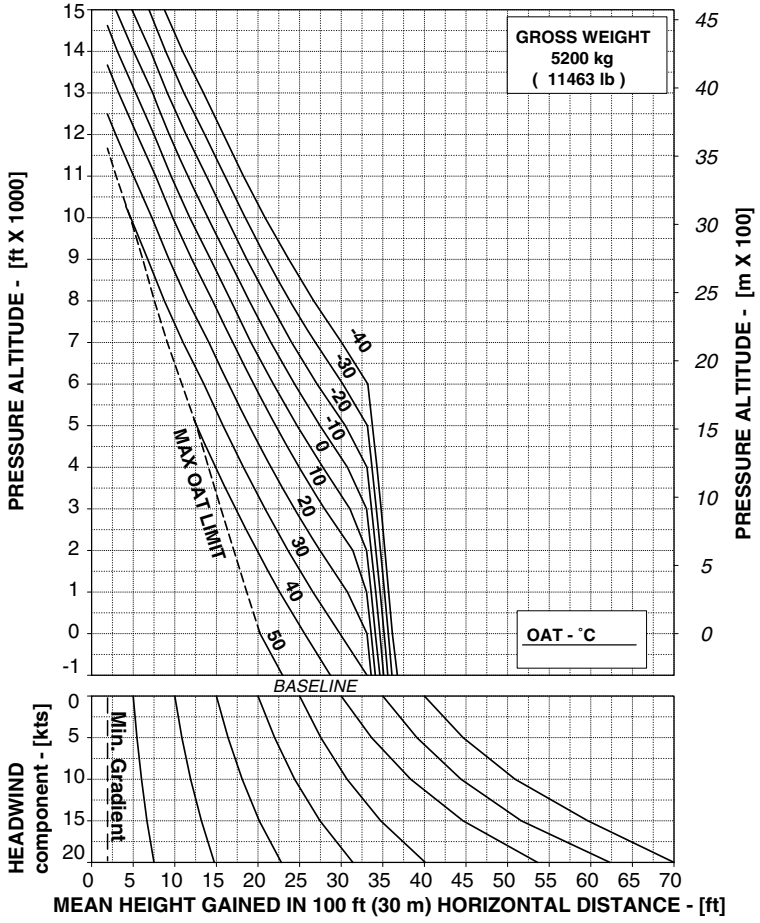

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Figure 4F-18 PATH 1 Gradient, Gross Weight 5200 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS /VBLSS 50 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A

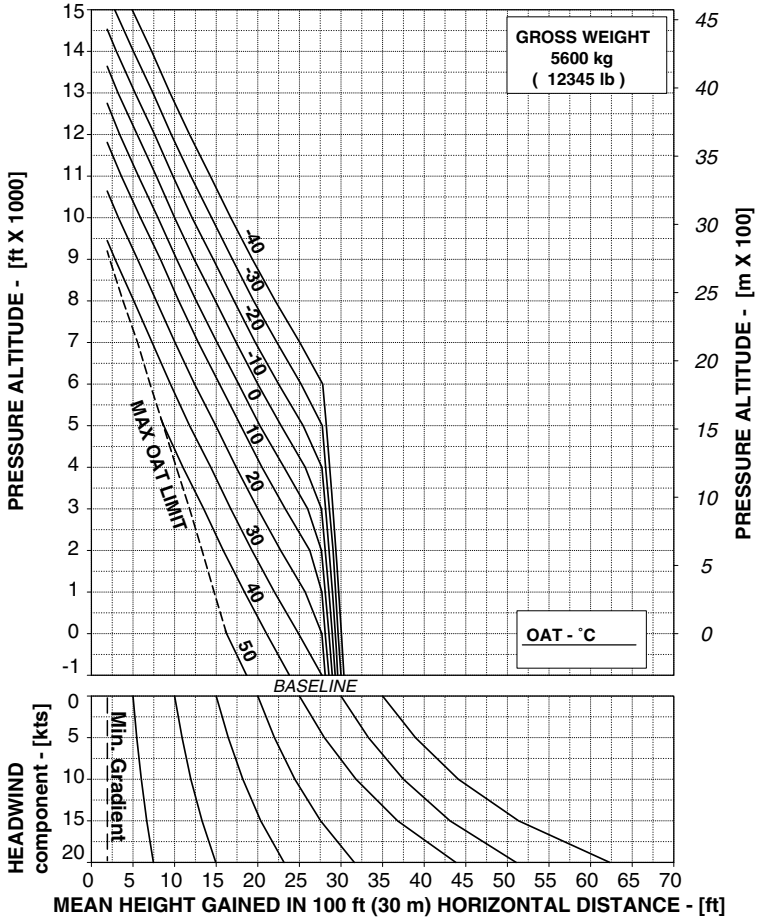

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Figure 4F-19 PATH 1 Gradient, Gross Weight 5600 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A

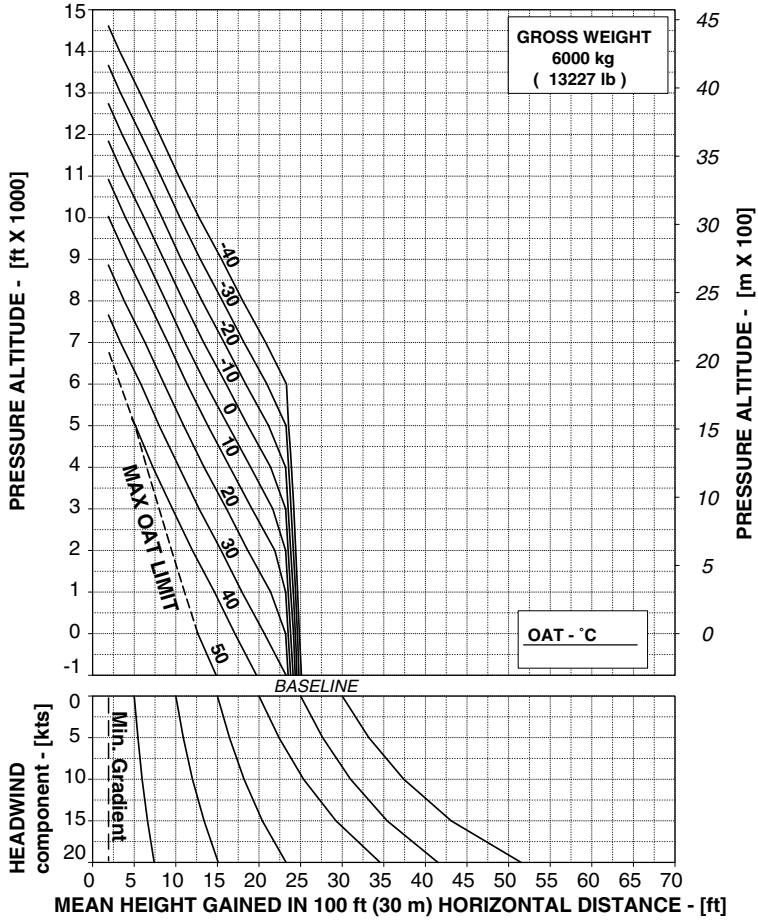

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Figure 4F-20 PATH 1 Gradient, Gross Weight 6000 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A

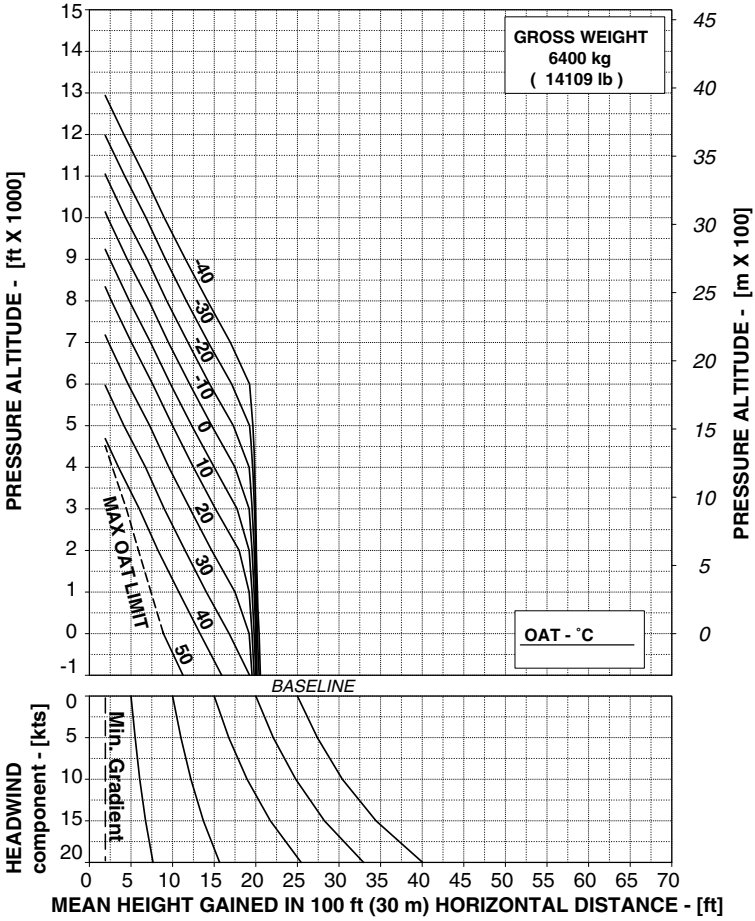

Figure 4F-21 PATH 1 Gradient, Gross Weight 6400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

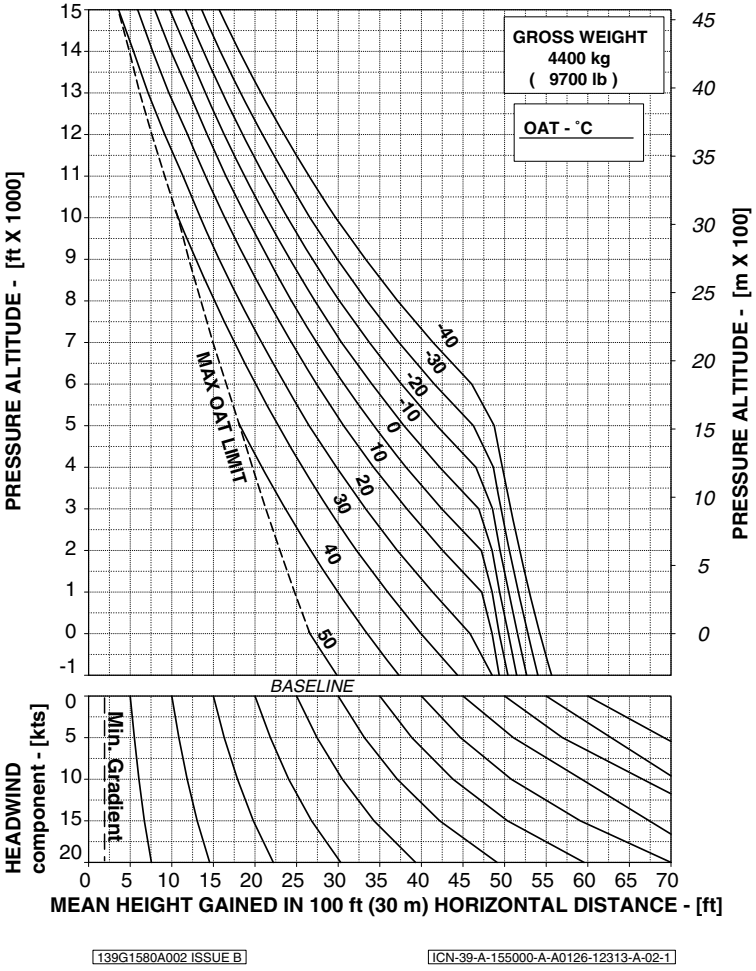

Figure 4F-22 PATH 1 Gradient, Gross Weight 4400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

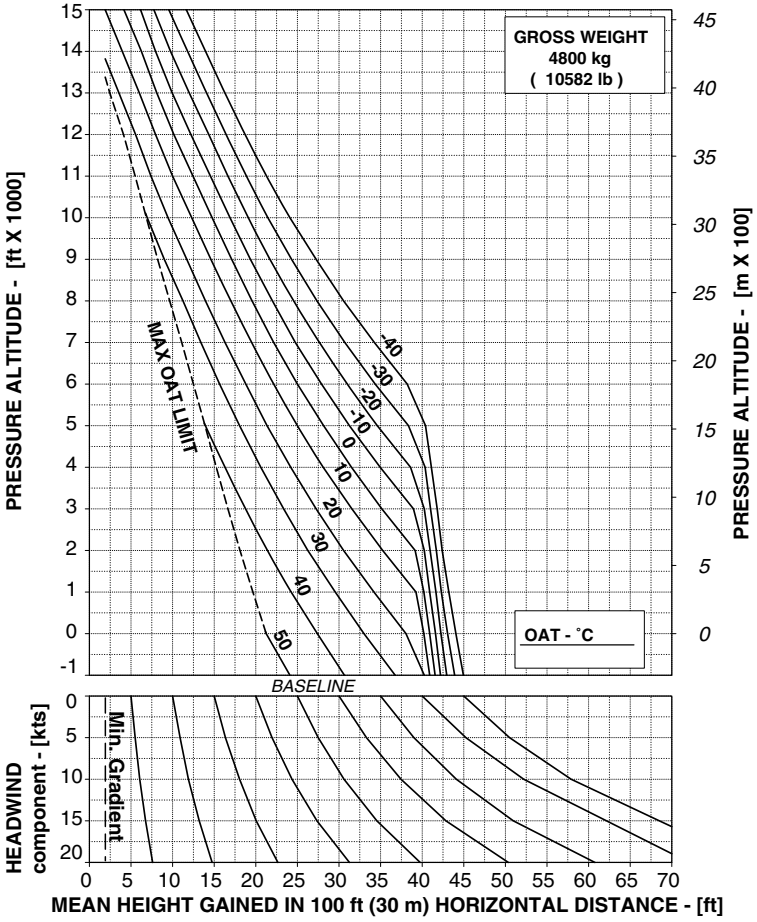

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Figure 4F-23 PATH 1 Gradient, Gross Weight 4400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

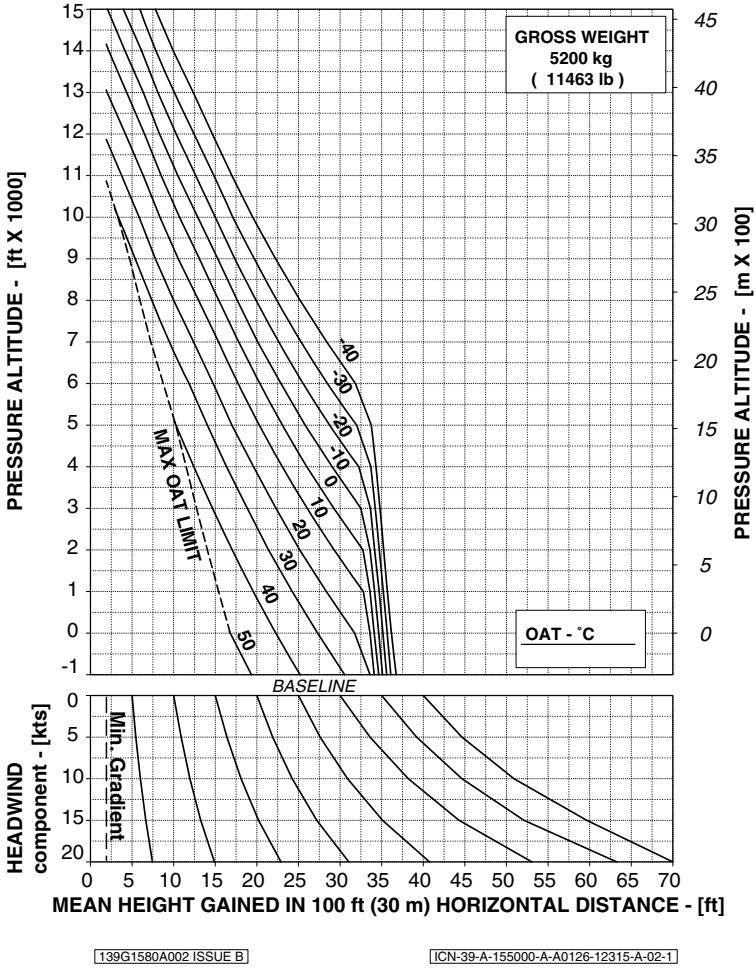

Figure 4F-24 PATH 1 Gradient, Gross Weight 5200 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

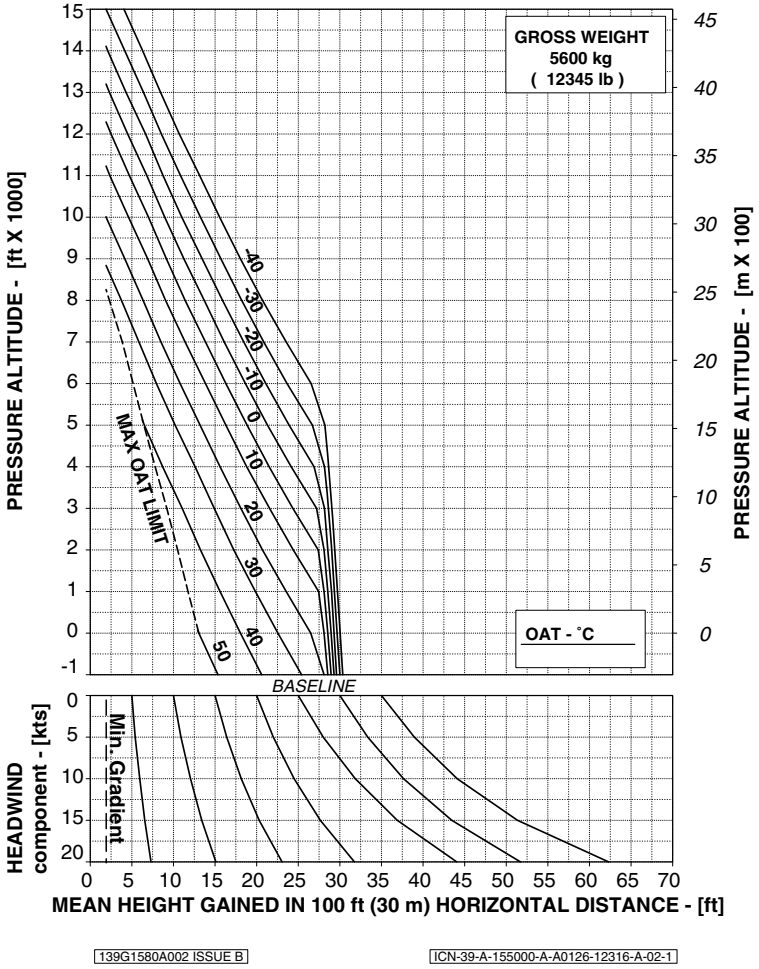

Figure 4F-25 PATH 1 Gradient, Gross Weight 5600 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

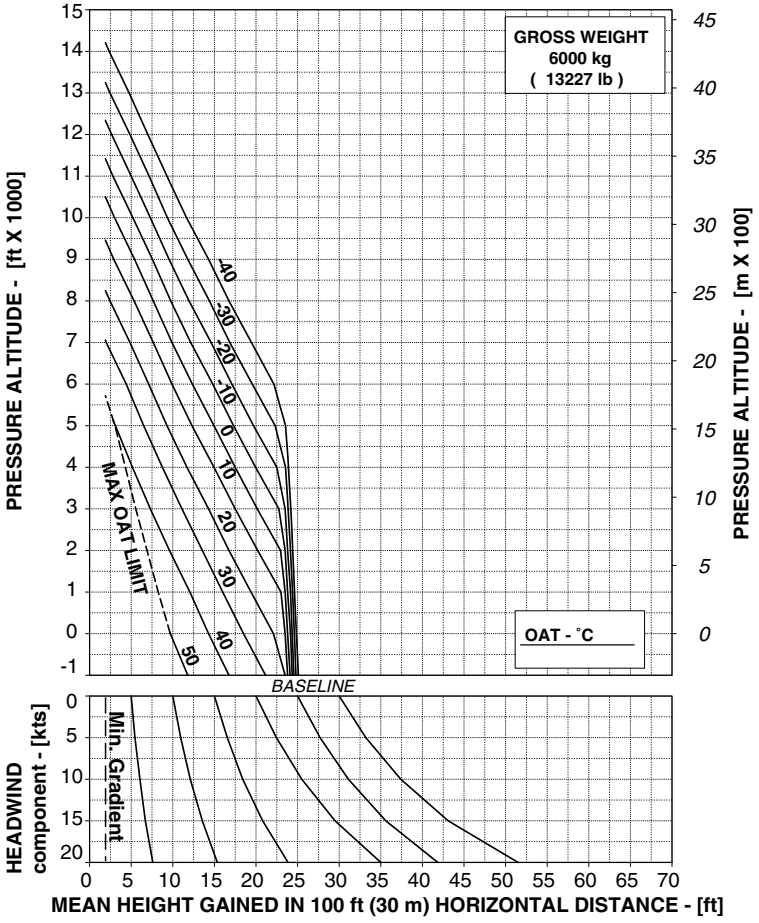

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Figure 4F-26 PATH 1 Gradient, Gross Weight 6000 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
VTOSS / VBLSS 50 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

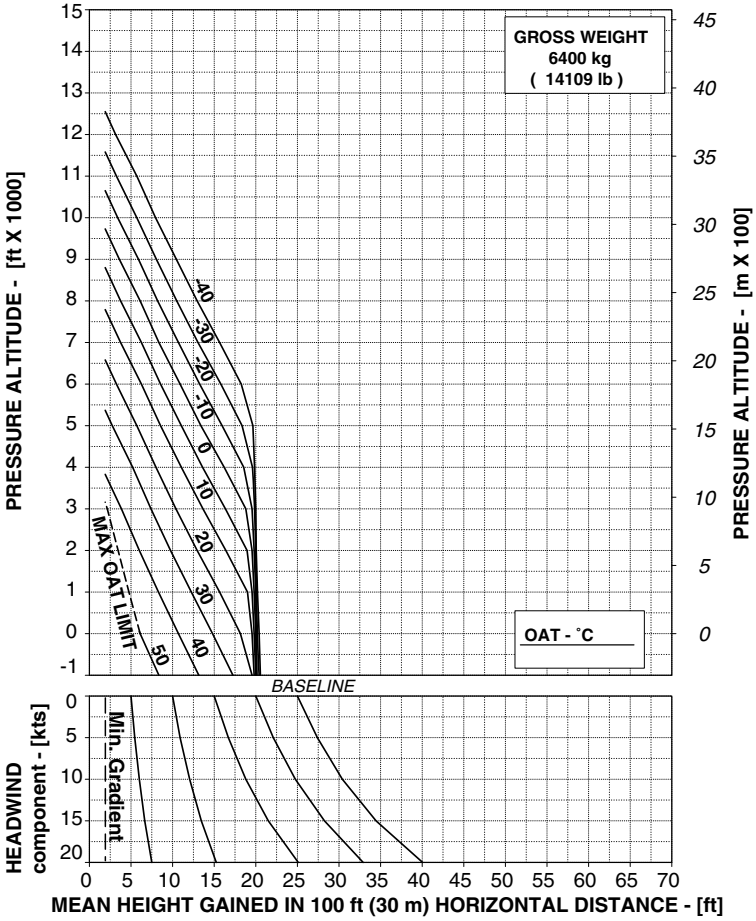

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Figure 4F-27 PATH 1 Gradient, Gross Weight 6400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

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ELECTRICAL LOAD: 300 A

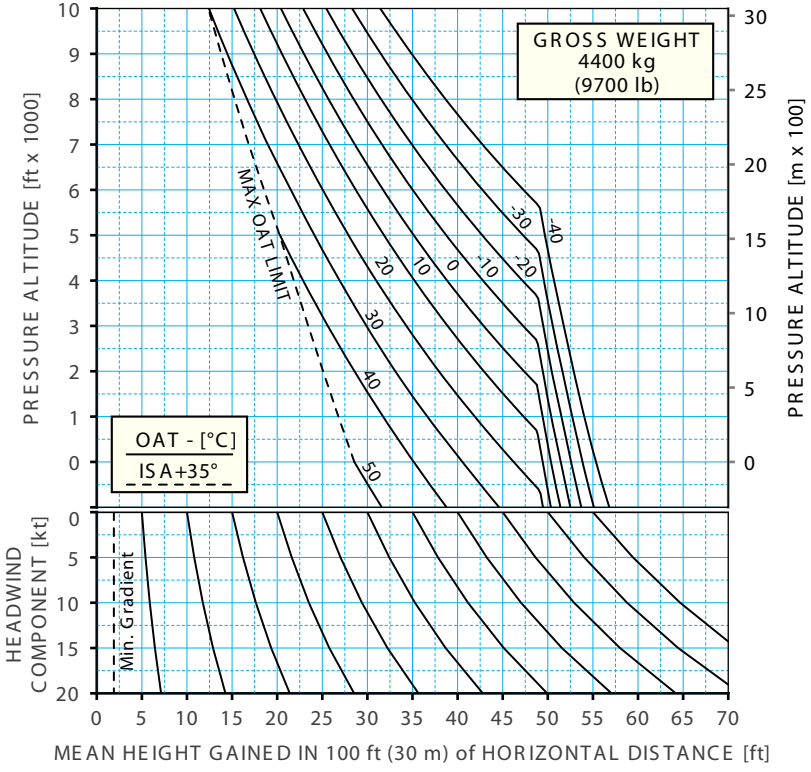

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Figure 4F-28 PATH 1 Gradient, Gross Weight 4400 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

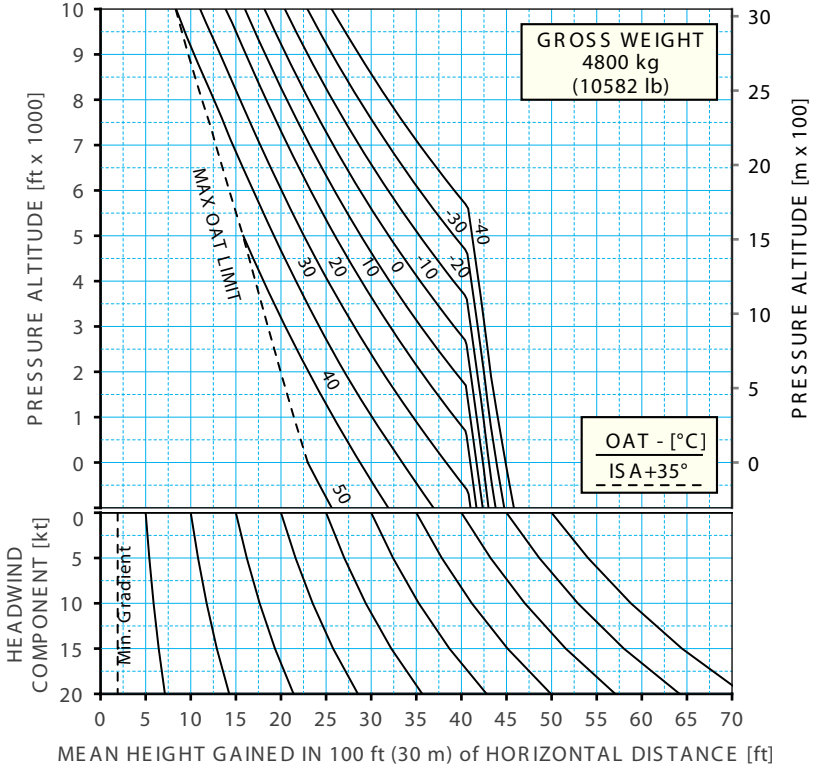

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Figure 4F-29 PATH 1 Gradient, Gross Weight 4800 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

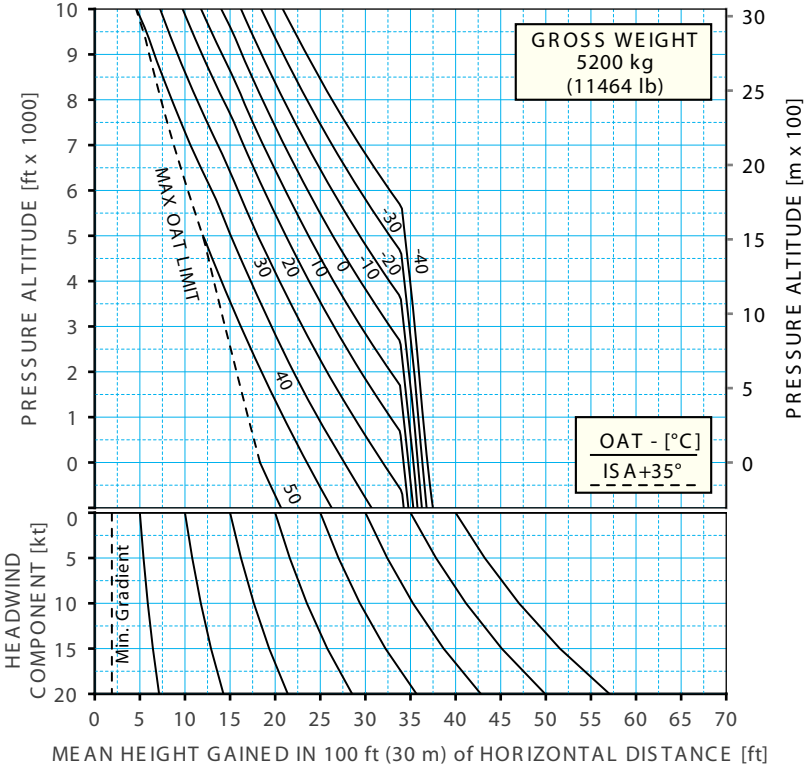

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Figure 4F-30 PATH 1 Gradient, Gross Weight 5200 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

IBF INSTALLED
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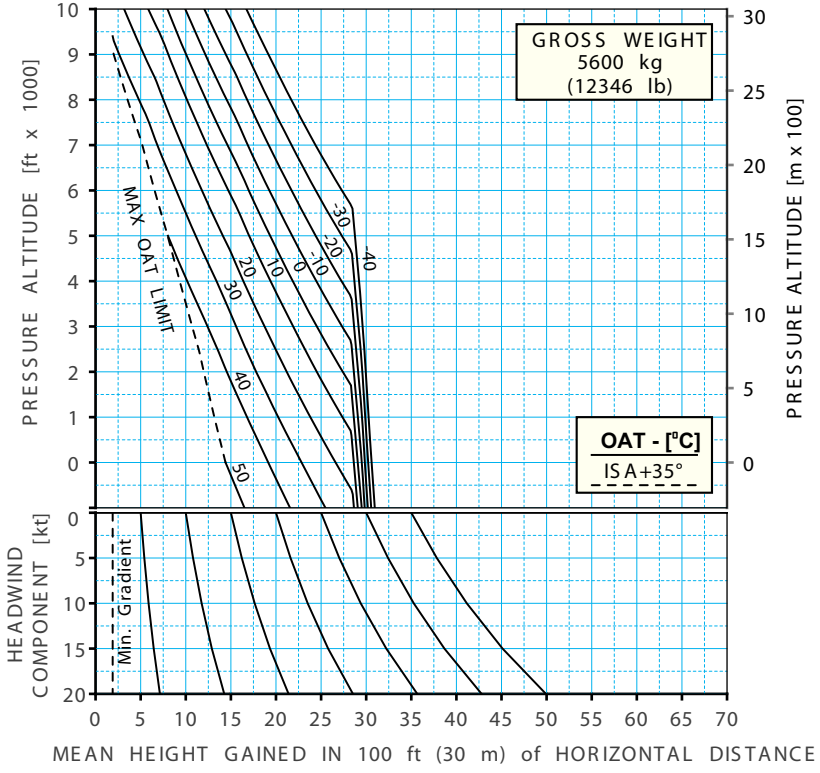

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Figure 4F-31 PATH 1 Gradient, Gross Weight 5600 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

IBF INSTALLE
ELECTRICAL LOAD: 300

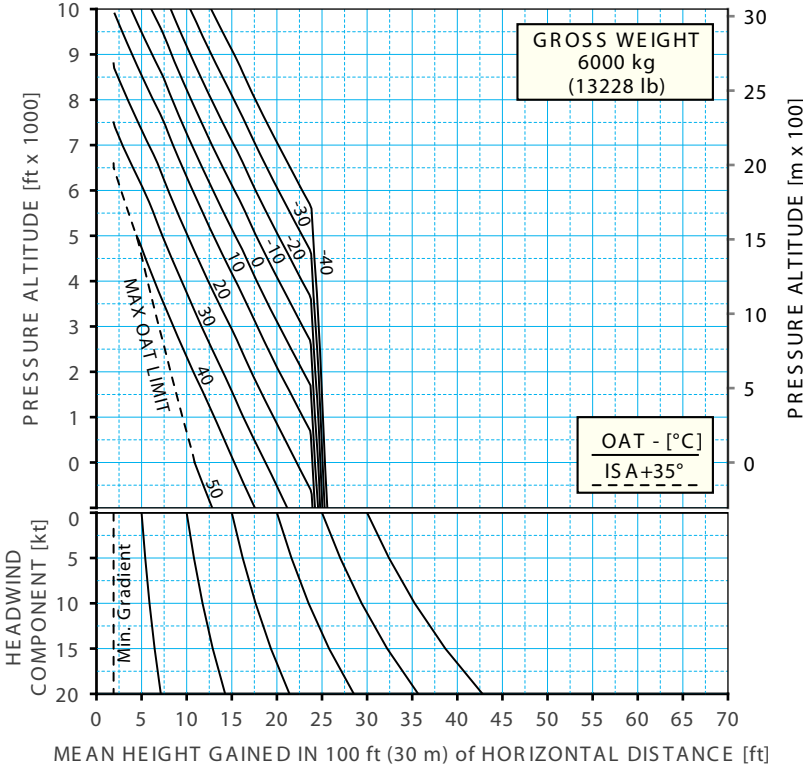

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Figure 4F-32 PATH 1 Gradient, Gross Weight 6000 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

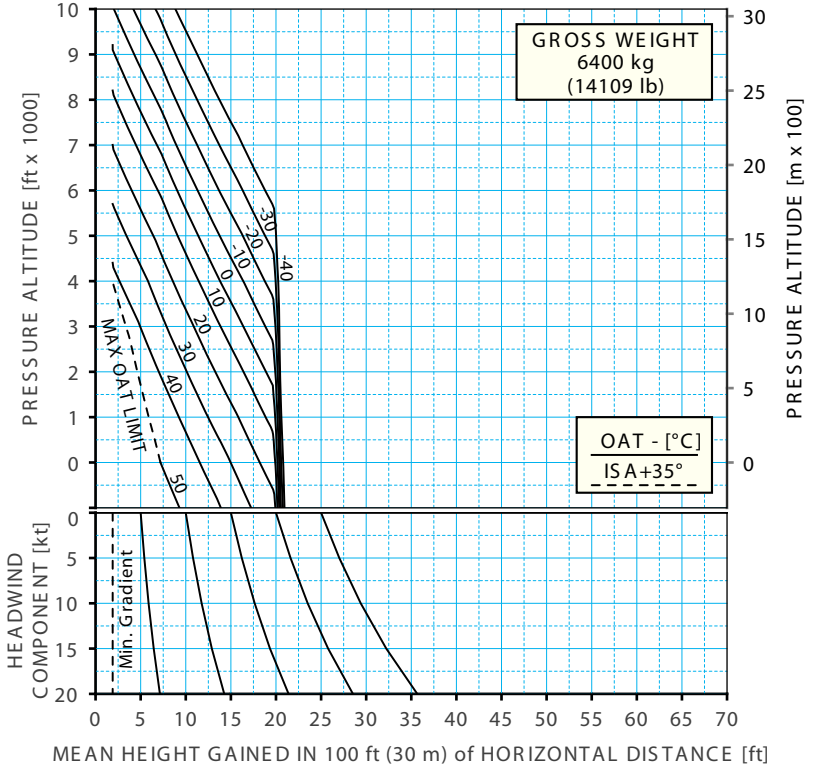

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Figure 4F-33 PATH 1 Gradient, Gross Weight 6400 kg, IBF Installed

PART G
HELIPORT LANDING PROCEDURES

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Part G
Heliport Landing Procedures

SECTION 1G - LIMITATIONS

MINIMUM HELIPORT/HELIDECK SIZE

Minimum demonstrated heliport/helideck size ..... 15 m x 15 m
(50 ft x 50 ft)
or Diameter 15 m (50 ft)

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake..... Figure 4A-3

Weight Limitation, EAPS OFF..... Figure 4A-4

Weight Limitation, EAPS ON..... Figure 4A-5

Weight Limitation, IBF Installed..... Figure 4A-5A

AIRSPEED LIMITATIONS

Balked Landing Safety Speed (V_{BLSS})..... 40 KIAS

Best Rate of Climb Speed (V_Y) .....Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)
..... Above 10000 ft Hp 70 KIAS
(Above 3000 m Hp 70 KIAS)

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A Landing ..... 14000 ft (4300 m) Hp or Hd
whichever comes first

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s).

Landing with tail wind component is prohibited.

SECTION 2G - NORMAL PROCEDURES

LANDING DECISION POINT (LDP)

LDP

Height ..... 50 ft (15 m) ALS

Airspeed ..... 20 KIAS

Rate of Descent ..... Less than 350 ft/min

Variable LDP (LDP_V)

Height ..... 50 ft to 400 ft (15 m to 122 m) ALS

Airspeed ..... 20 KIAS

Rate of Descent ..... Less than 350 ft/min

Note

The Variable LDP (LDP_V) is given to allow avoidance of obstacles, which are along the Balked Landing profile, after the Heliport/Helideck.

Note

Radio altimeter heights are shown in the flight path profiles.
Refer to Barometric altimeter for Elevated Heliport/Helideck or when obstacles are present in the Landing flight path.

LANDING FROM LEFT HAND SEAT

When landing is carried out from the left hand seat the right hand pilot should monitor engine and rotor parameters.

GROUND LEVEL AND ELEVATED HELIPORT/HELIDECK APPROACH AND LANDING PROCEDURE

APPROACH AND LANDING

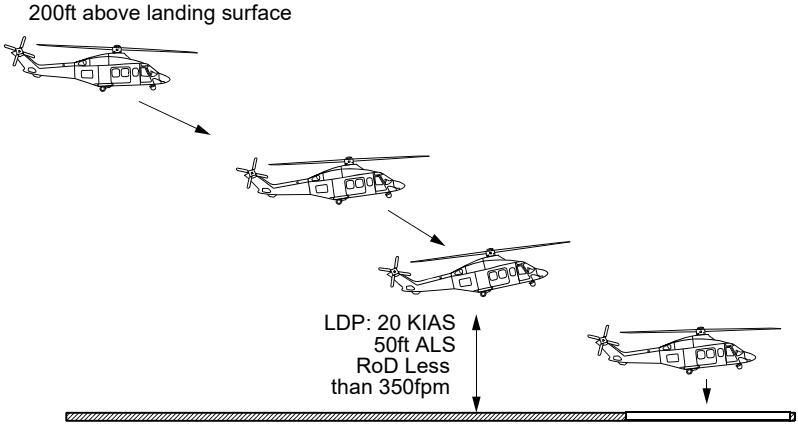

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Figure 2G-1 Normal Landing Profile (Normal LDP)

1. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.

2. Pre-landing checks — Complete.

3. AWG — NORMAL.

Note

When descending below 150 ft Rad Alt height a vocal message ‘ONE FIFTY FEET’ is activated regardless of the landing gear status. This message is suppressed if AWG switch is set to REGRADE.

4. LDG LT and LDG LT2 switches — As required.

5. Pilot Altimeter — Set QNH (landing surface elevation should be known).

6.	HEATER (if used)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select HTR switch to OFF, note ITT decrease and confirm HEATER ON advisory extinguished.
	ECS ENVIRO (if used)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to OFF and, if HEATER ON advisory illuminated, note ITT decrease and confirm HEATER ON advisory extinguished.
7.	Rotor speed	— Set 102%.
8.	PARK BRAKE	— Apply, PARK BRAKE ON advisory message illuminated on CAS.
9.	Initial point	— Establish an approach to pass through 200 ft (60 m) ALS at a rate of descent of no more than 500 fpm. Initiate deceleration to achieve LDP, (50 ft (15 m) ALS) at 20 KIAS and rate of descent less than 350 ft/min. Heliport/ Helideck in sight.
10.	Landing	— Continue the deceleration and descent to a HIGE. Maximum allowed GS at touchdown 5 kts (9 km/hr).
11.	PARK BRAKE	— As required.
12.	LDG LT & LDG LT2 switches	— OFF, if used.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the landing path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

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Figure 2G-2 Landing On Heliport - View RH Seat at LDP (50ft ALS)



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Figure 2G-3 Landing On Heliport - View LH Seat at LDP (50ft ALS)

VARIABLE LDP (LDP_V) APPROACH AND LANDING

VARIABLE LDP (LDPv) APPROACH AND LANDING

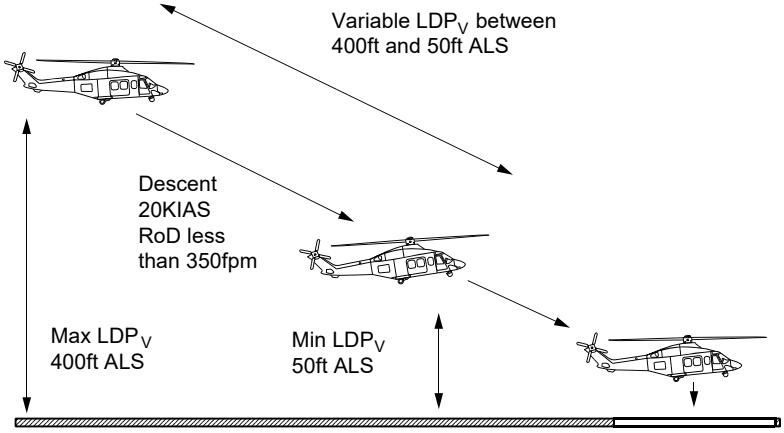

Figure 2G-4 Variable LDP Landing Profile

1. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.

1. Pre-landing checks — Complete.

2. AWG — NORMAL.

Note

When descending below 150 ft Rad Alt height a vocal message 'ONE FIFTY FEET' is activated regardless of the landing gear status. This message is suppressed if AWG switch is set to REGRADE.

3. LDG LT & LGT LT2 switches — As required.

4. Pilot Altimeter — Set QNH (landing surface elevation should be known).

5. HEATER (if used)	— Confirm SOV 1 & 2 to NORMAL. Select HTR switch to OFF, note ITT decrease and confirm HEATER ON advisory extinguished.
6. Rotor speed	— Set 102%.
7. PARK BRAKE	— Apply, PARK BRAKE ON advisory message illuminated on CAS.
8. Initial point	— Establish an approach to pass through 150 ft (45 m) above the chosen LDP_V height at a rate of descent of no more than 500 fpm. Initiate deceleration to achieve LDP_V height at 20 KIAS and rate of descent less than 350 fpm. Maintain the descent to 50 ft (15 m) ALS. Heliport/Helideck in sight.
9. Landing	— At 50 ft (15 m) ALS commence deceleration and descent to HIGE. Maximum GS at touchdown 5 kts (9 km/hr).
10. PARK BRAKE	— As required.
11. LDG LT & LDG LT2 switches	— OFF, if used.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the landing path, to carry out a safe OEI landing or achieve the scheduled OEI performance.



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Figure 2G-5 Landing On Heliport - View RH Seat LDP_V (400 ft ALS)



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Figure 2G-6 Landing On Heliport - View RH Seat LDP_V (200 ft ALS)



ICN-39-A-155012-A-00003-00449-A-01-1

Figure 2G-7 Landing On Heliport - View LH Seat at LDPV (400 ft ALS)



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Figure 2G-8 Landing On Heliport - View LH Seat at LDP_V (200 ft ALS)

SECTION 3G - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Landing path and assume the pilot gives first priority to aircraft control and achieve a safe flight path.

For all Landing procedures the following shall be observed:

1. Engine failure prior to LDP — Recognition of engine failure prior to the LDP permits either a continuation of the approach and an OEI Landing **or** a Balked Landing to be carried out

2. Engine failure at or after LDP — Recognition of engine failure at or after the LDP dictates that the Landing be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

LANDING FROM LEFT HAND SEAT

When landing is carried out from the left hand seat the right hand seat pilot should call out rotor speed during the engine failure procedures.

EMERGENCY PROCEDURES FOR ENGINE FAILURE DURING LANDING APPROACH

SINGLE ENGINE FAILURE DURING LANDING PRIOR TO LDP (BALKED LANDING)

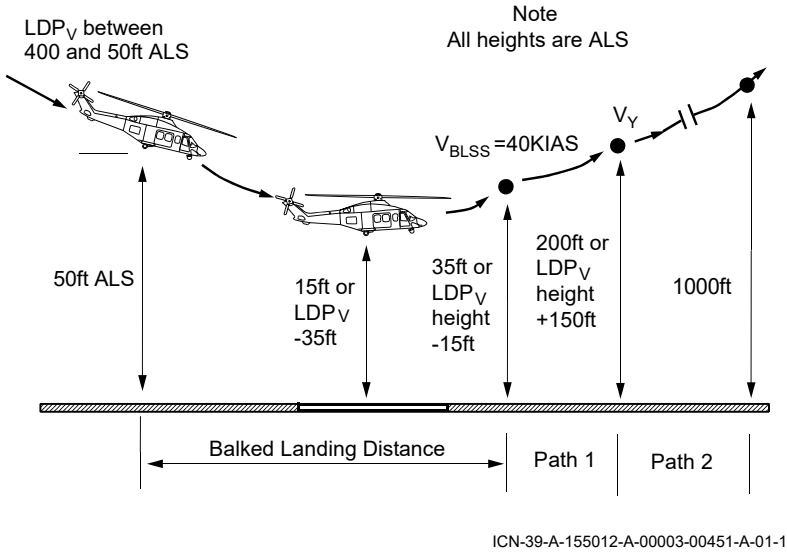


Figure 3G-1 Ground Level, Elevated Heliport/Helideck Engine Failure Prior to LDP

1. Engine failure prior to LDP — Apply collective to control NR droop to a minimum of 90% and adjust pitch attitude to 5° nose up to initiate an acceleration to V_{BLSS} (40 KIAS).
   • When left hand pilot flying, right hand pilot call out rotor speed.

2.	Climb	— When the aircraft achieves V_{BLSS} (40 KIAS) and a positive rate of climb, lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) or LDP_V height+150 ft ALS (LDP_V height+45 m ALS) with 2.5 min power.
3.	At 200 ft (60 m) (or LDP_V height+150 ft) (LDP_V height+45 m)	— Reduce pitch attitude to 2° nose up and accelerate to Vy. After achieving Vy, continue to 1000 ft AGL reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
4.	Landing gear	— UP (when reaching Vy).
5.	Rotor speed	— Select 100% at Vy.
6.	At 1000 ft (300 m) ALS	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
7.	PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
8.	LDG LT & LDG LT2 switches	— OFF, if used.
9.	MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER LDP (OEI LANDING)

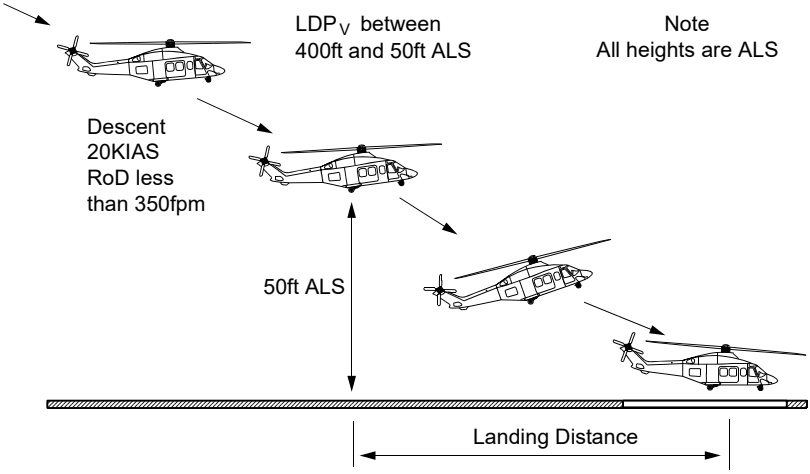


Figure 3G-2 Ground Level, Elevated Heliport/Helideck Engine Failure at/after LDP

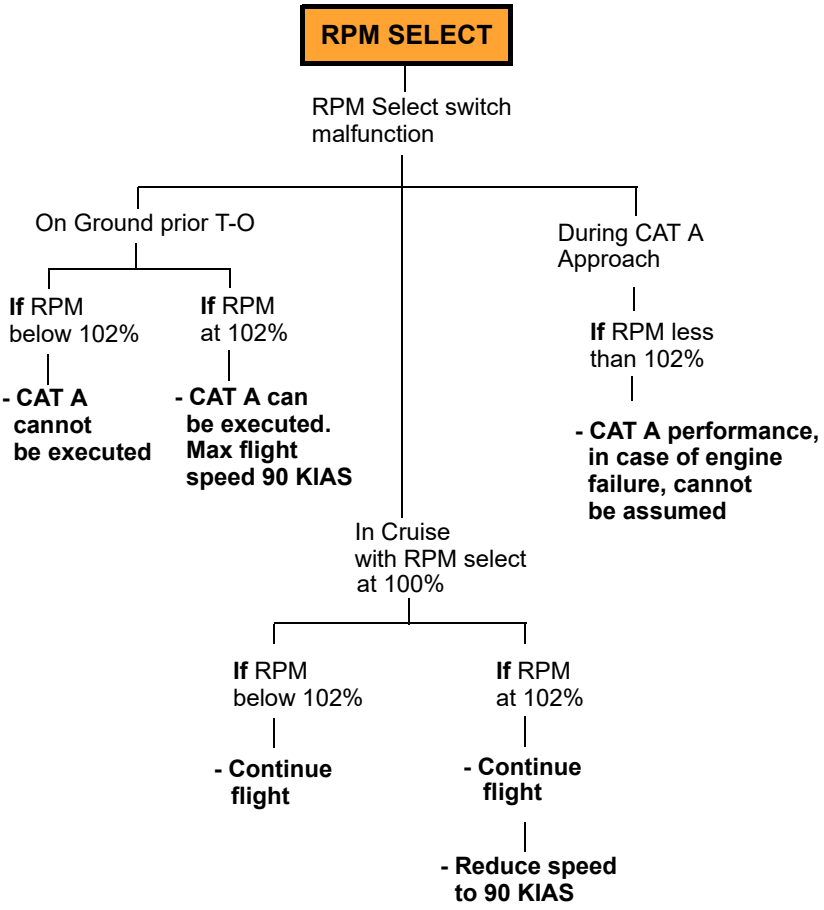
1. Collective/cyclic — Continue the descent. At 50 ft (15 m) ALS increase pitch attitude to reduce speed. Apply collective to reduce rate of descent.
   • When left hand pilot flying, right hand pilot call out rotor speed.

2. Touchdown — At 20 ft (6 m) ALS apply collective to cushion touchdown. Minimum rotor speed 90% NR. Maximum nose up attitude on touchdown 15°. Maximum allowed GS at touchdown 5 kts (9 km/hr).

3. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4. Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
5. PARK BRAKE	— As required.
6. LDG LT & LDG LT2 switches	— OFF, if used.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



SECTION 4G - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

Ground Level, Elevated Heliport/Helideck WAT charts are shown in Figure 4A-3 to Figure 4A-5 and Figure 4A-5A.

LANDING DISTANCE OEI

The horizontal distance from a point 50 ft ALS (15 m) to the landing point is 160 m (525 ft). This distance is applicable to all weights permitted by WAT charts.

BALKED LANDING DISTANCE OEI

The balked landing distance OEI is shown in Figure 4G-2. This figure is applicable to all weights permitted by WAT charts and is valid for a clean intake, EAPS ON and OFF or IBF Installed.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power is shown in Figure 4A-8 to Figure 4A-31 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from the end of the Balked Landing distance to a height of 200 ft (60 m) or LDP_V height +150 ft (45 m) ALS.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from 200 ft (60 m) or LDP_V height +150 ft (45 m) ALS to 1000 ft (300 m) ALS.

CLIMB PERFORMANCE

Single Engine Rate Off Climb at V_Y

The ROC at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS or IBF installed.

HELIPORT/HELIDECK VARIABLE LDP_V (50 ft TO 400 ft) CALCULATIONS

Determination of the LDP_V height necessary to safely clear an obstacle in the Balked Landing profile is calculated from a knowledge of the height of the obstacle.

Note

All heights are given Above Landing Surface (ALS).

LDP_V FOR OBSTACLE IN BALKED LANDING PROFILE

The diagram below demonstrates the process necessary to calculate the LDP_V. A normal landing procedure with a LDP of 50 ft ALS would guarantee a minimum height of 15 ft ALS for a Balked Landing. However, for obstacle clearance, this must be increased by a required clearance.

If the obstacle is within the Balked Landing profile then the minimum LDP_V height can be calculated where:

H_O = Height of Obstacle (ft)

H_C = Required clearance height above Obstacle (ft)

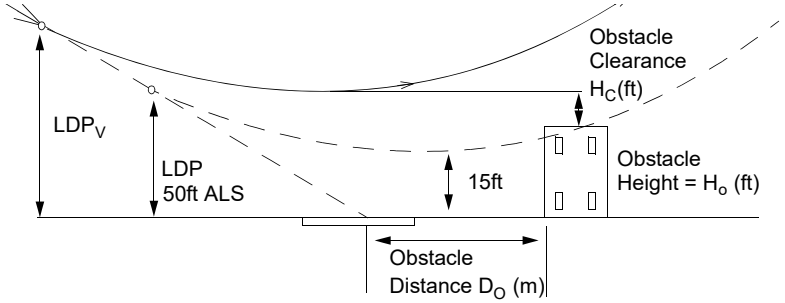


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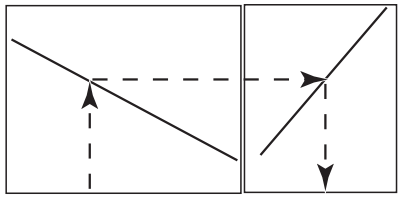
Figure 4G-1 Example of LDP_V with Obstacle in Balked Landing Profile

Variable LDP calculation is:

LDP_V (ft) = H_O + H_C + 35 (Maximum LDP_V = 400 ft ALS)

BALKED LANDING DISTANCE OEI
GROUND or ELEVATED HELIPORT/HELIDECK



Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{LDP} 20 KIAS
RoD <350 ft/min

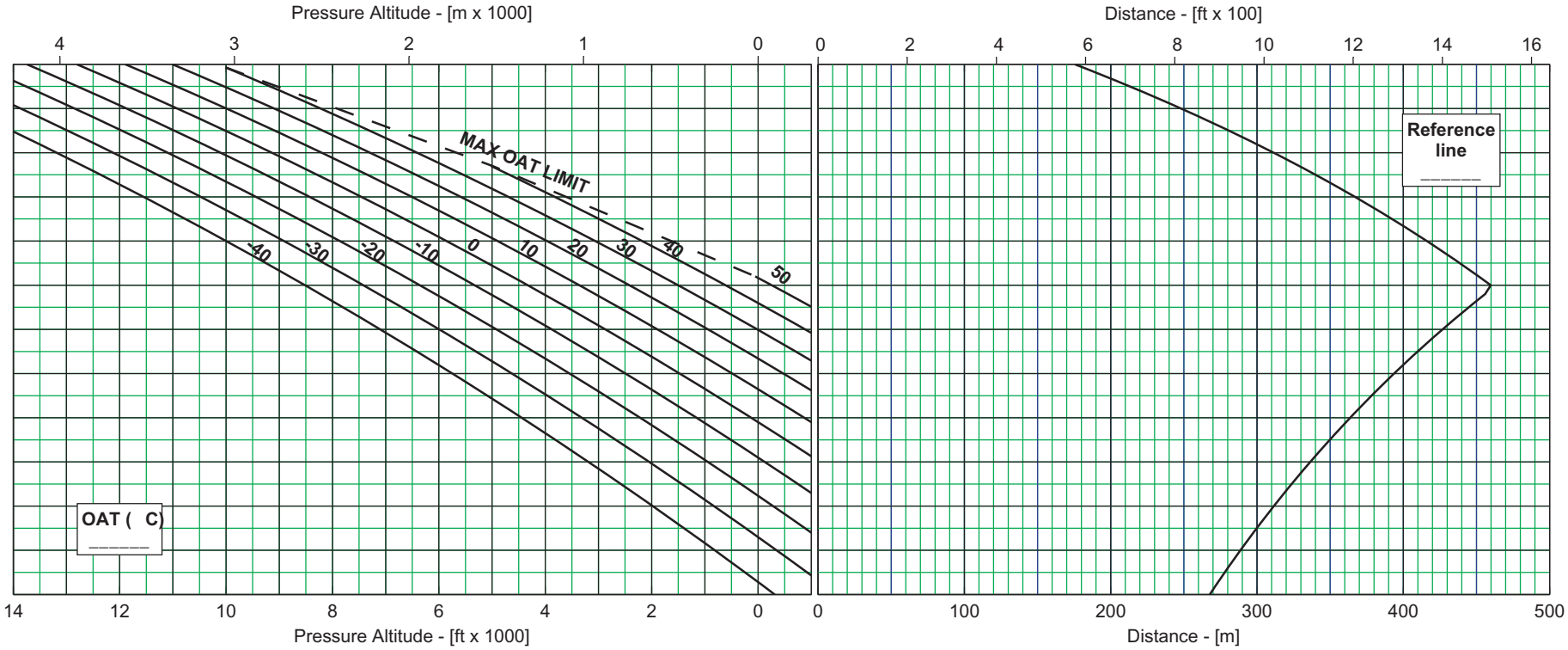


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Figure 4G-2 Heliport Balked Landing Distance

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PART H
CONFINED AREA LANDING PROCEDURES

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Part H
Confined Area Landing Procedures

SECTION 1H - LIMITATIONS

MINIMUM GROUND OR ELEVATED HELIPORT SIZE

Minimum demonstrated heliport size ..... 20 m x 20 m (65 ftx65 ft)
or Diameter 20 m (65 ft)

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake..... Figure 4D-4

Weight Limitation, EAPS OFF..... Figure 4D-5

Weight Limitation, EAPS ON..... Figure 4D-6

Weight Limitation, IBF Installed.....Figure 4D-6A

AIRSPEED LIMITATIONS

Balked Landing Safety Speed (V_{BLSS}).....40 KIAS

Best Rate of Climb Speed (V_Y) .....Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)
..... Above 10000 ft Hp 70 KIAS
(Above 3000 m Hp 70 KIAS)

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A Landing .....10000 ft (4300 m) Hp or Hd
whichever comes first

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s).

Landing with tail wind component is prohibited.

SECTION 2H - NORMAL PROCEDURES

GENERAL

The Confined Area Landing procedure comprises on an offset descent maintaining an angle of 40° to 45° from the aircraft to the centre of the heliport. This angle is guaranteed provided the heliport center point in maintained in the lower chin window. This aspect is maintained from 100 ft (30 m) above the LDP, which can vary between a maximum of 400 ft (122 m) ALS to a minimum of 100 ft (30 m) ALS depending on the obstacles in the Landing and Balked landing flight path.
See Figure 2H-3 and Figure 2H-4 for typical pilot views during landing and Figure 2H-5 and Figure 2H-6 for typical view when flying from the left hand seat.

Two different techniques are available for the PATH 1 and PATH 2 climb after reaching V_{BLSS}. The standard technique performs the PATH 1 climb maintaining the V_{BLSS} (40 KIAS) speed then at 200 ft accelerating to V_y (80 KIAS) for the PATH 2 climb up to 1000 ft (300 m) ATS.

The alternative technique continues the acceleration, after reaching V_{BLSS} (40 KIAS), straight up to 60 KIAS and the PATH 1 and PATH 2 segment climbs are carried out at 60 KIAS. This second technique has been introduced as it has the following advantages:

- The technique is simpler as it maintains 60 KIAS throught the climb
- The climb condition is easier to maintain
- The IFR minimum airspeed Vmini (50 KIAS) is achieved earlier
- The end of the PATH 2 climb to 1000 ft (300 m) ATS is achieved before expiry of the OEI 2.5m limit and in a shorter time, for engine failure cases.

LANDING DECISION POINT (LDP)

LDP

Height..... Max 400 ft to Min 100 ft ALS
(Max 122 m to Min 30 m ALS)

Groundspeed:

- for LDP between 400 ft and 250 ft
  (122 m and 76 m) .....15 to 20 kts
- for LDP below 250 ft to 100 ft
  (76 m to 30 m) .....Defined by height only

Rate of Descent .....400 ft/min to 500 ft/min

Note

When establishing a descent below LDP a correctly flown technique will result in a groundspeed of 6 kts to 8 kts during the stabilized descent. Low groundspeed can result in high rate of descent on landing.

Note

The variable LDP is given to allow avoidance of obstacles, which are along the Landing and Balked Landing profile.

Note

Radio altimeter heights are shown in the flight path profiles.
Refer to Barometric altimeter when obstacles are present in the Landing flight path.

LANDING FROM LEFT HAND SEAT

When landing is carried out from the left hand seat the right hand pilot should monitor engine and rotor parameters.

CONFINED AREA GROUND OR ELEVATED HELIPORT APPROACH AND LANDING PROCEDURE

1. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.

2. Pre-landing checks — Complete.

3. AWG — NORMAL.

Note

When descending below 150 ft Rad Alt height a vocal message 'ONE FIFTY FEET' is activated regardless of the landing gear status. This message is suppressed if AWG switch is set to REGRADE or INHIBIT.

4. LDG LT and LDG LT2 switches — As required.

5. Pilot Altimeter — Set QNH (landing surface elevation should be known).

6. HEATER (if used) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select HTR switch to OFF, note ITT decrease and confirm HEATER ON advisory extinguished.

ECS ENVIRO (if used) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select ECS CONTROL switch to OFF and, if HEATER ON advisory illuminated, note ITT decrease and confirm HEATER ON advisory extinguished.

7. Rotor speed — Set 102%.

8. PARK BRAKE — Apply, PARK BRAKE ON advisory message illuminated on CAS.

LANDING PROFILE, LDP AT OR BELOW 250 ft (76 m)

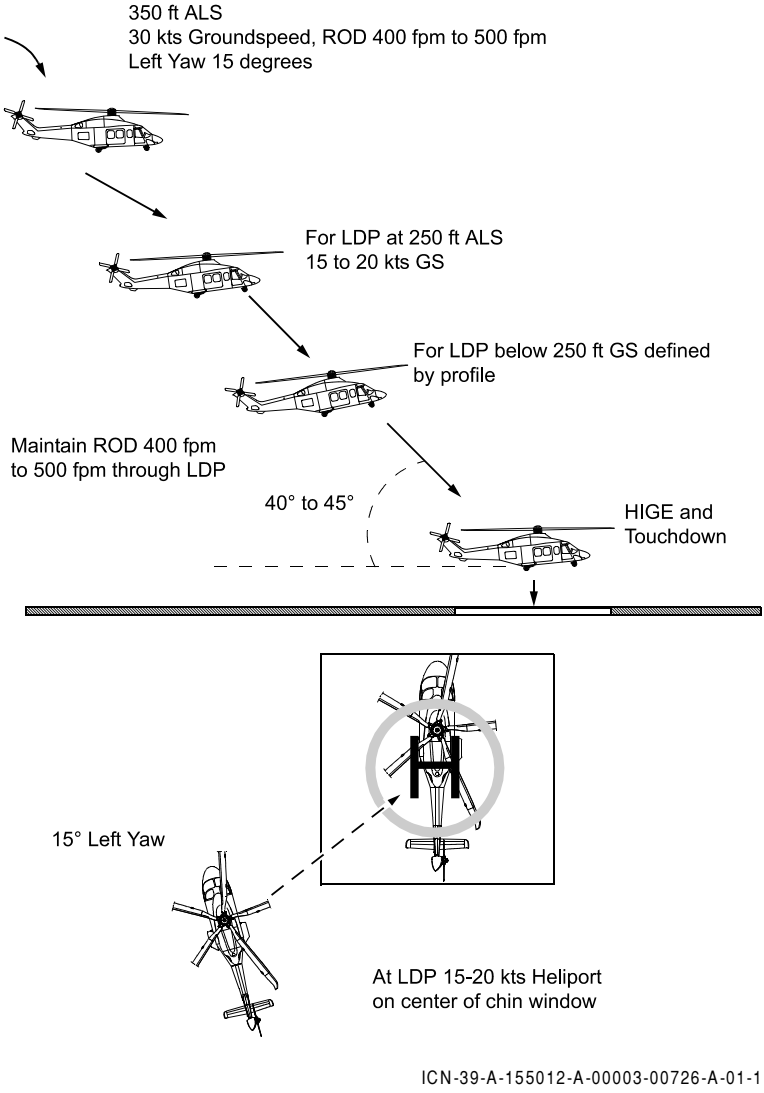

Figure 2H-1 Landing Profile, PF in RH seat, LDP 250 ft and Below

For LDP 250 ft (76 m) ALS and below:

1. Initial point	— Establish an approach to pass through 350 ft (106 m) ALS at a rate of descent of 400 fpm to 500 fpm and 30 kts groundspeed.
2. Aircraft position	— Position helipad in bottom right part of windscreen (Figure 2H-3, Figure 2H-5) with nose yawed left by approximately 15 degrees. • When left hand pilot flying, helipad in bottom left part of windscreen and nose yawed right.
3. Descent	— Progressively reduce airspeed and height to position helipad into centre of chin window at or just before reaching 250 ft (76 m) ALS with 15 to 20 kts (27 to 36 km/hr) groundspeed. (Figure 2H-4, Figure 2H-6)
4. Landing	— Maintain constant flight path aspect to helipad using 400 to 500 fpm rate of descent passing through LDP and continue to a HIGE. Maximum allowed GS at touchdown 5 kts (9 km/hr).
5. PARK BRAKE	— As required.
6. LDG LT & LDG LT2 switches	— OFF, if used.

LANDING PROFILE, LDP ABOVE 250 ft (76 m)

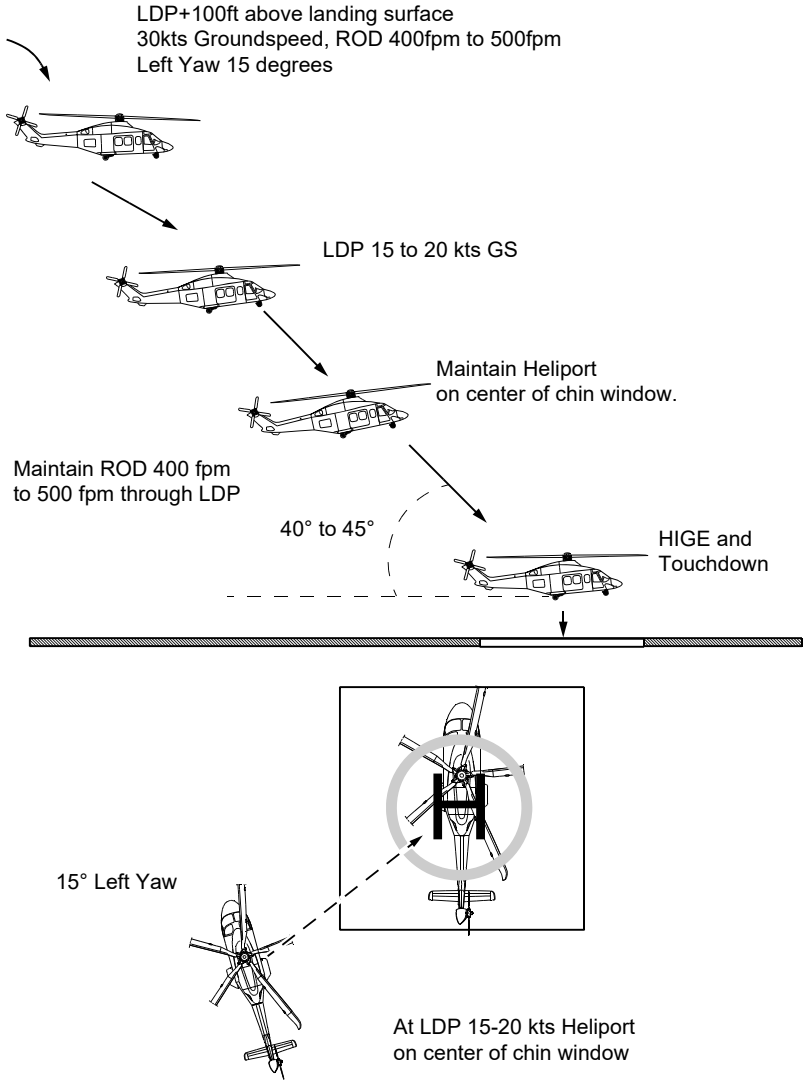

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Figure 2H-2 Landing Profile, LDP Above 250 ft

For LDP above 250 ft (76 m) ALS:

1. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.

2. Pre-landing checks — Complete.

3. AWG — NORMAL.

Note

When descending below 150 ft Rad Alt height a vocal message 'ONE FIFTY FEET' is activated regardless of the landing gear status. This message is suppressed if AWG switch is set to REGRADE.

4. LDG LT and LDG LT2 switches — As required.

5. Pilot Altimeter — Set QNH (landing surface elevation should be known).

6. HEATER (if used) — Confirm SOV 1 & 2 switches selected to NORMAL.
   Select HTR switch to OFF, note ITT decrease and confirm HEATER ON advisory extinguished.

   ECS ENVIRO (if used) — Confirm SOV 1 & 2 switches selected to NORMAL.
   Select ECS CONTROL switch to OFF and, if HEATER ON advisory illuminated, note ITT decrease and confirm HEATER ON advisory extinguished.

7. Rotor speed — Set 102%.

8. PARK BRAKE	— Apply, PARK BRAKE ON advisory message illuminated on CAS.
9. Initial point	— Establish an approach to pass through LDP+100 ft (30 m) ALS at a rate of descent of 400 fpm to 500 fpm and 30 kts (55 km/hr) groundspeed.
10. Aircraft position	— Position helipad in bottom right part of windscreen with nose yawed left by approximately 15 degrees. • When left hand pilot flying, helipad in bottom left part of windscreen and nose yawed right.
11. Descent	— Progressively reduce airspeed and height to position helipad into centre of chin window at or just before reaching LDP with 15 to 20 kts (27 to 36 km/hr) groundspeed (Figure 2H-4, Figure 2H-6).
12. Landing	— Maintain constant flight path aspect to helipad using 400 to 500 fpm rate of descent passing through LDP and continue to a HIGE. Maximum allowed GS at touchdown 5 kts (9 km/hr).

Note

A correctly flown technique will result in a groundspeed of 6 kts to 8 kts during the stabilized descent. Low groundspeed can result in high rate of descent on landing.

13. PARK BRAKE	— As required.

14. LDG LT & LDG LT2 switches — OFF, if used.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the landing path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

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Figure 2H-3 Landing - View RH Seat 350 ft ALS 30 kts



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Figure 2H-4 Landing - View RH Seat at LDP 250 ft ALS



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Figure 2H-5 Landing - View LH Seat 350 ft ALS 30 kts



ICN-39-A-155012-A-00003-00731-A-01-1

Figure 2H-6 Landing - View LH Seat LDP 250 ft ALS

SECTION 3H - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Landing path and assume the pilot gives first priority to aircraft control and achieve a safe flight path.

For all Landing procedures the following shall be observed:

1. Engine failure prior to LDP — Recognition of engine failure prior to the LDP permits either a continuation of the approach and an OEI Landing **or** a Balked Landing to be carried out

2. Engine failure at or after LDP — Recognition of engine failure at or after the LDP dictates that the Landing be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

LANDING FROM LEFT HAND SEAT

When landing is carried out from the left hand seat the right hand seat pilot should call out rotor speed during the engine failure procedures.

EMERGENCY PROCEDURES FOR ENGINE FAILURE DURING LANDING APPROACH

SINGLE ENGINE FAILURE DURING LANDING PRIOR TO LDP (BALKED LANDING)

1. Engine failure prior to LDP	— Apply collective to control NR droop to a minimum of 90% and adjust pitch attitude to 0° to initiate an acceleration to V_{BLSS} (40 KIAS). • When left hand pilot flying, right hand pilot call out rotor speed.
2. Climb	— When the aircraft achieves V_{BLSS} (40 KIAS) and a positive rate of climb, select 5° nose up attitude and progressively lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) or LDP height + 100 ft (30 m) ALS with 2.5 min power.
3. At 200 ft (60 m) ALS (or LDP height + 100 ft (30 m)	— Continue to accelerate aircraft to Vy using 2.5 min power rating. After achieving Vy, continue to 1000 ft AGL reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
4. Landing gear	— UP (when reaching Vy).
5. Rotor speed	— Select 100% at Vy.

6.	At 1000 ft (300 m) ALS	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
7.	PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
8.	LDG LT & LDG LT2 switches	— OFF, if used.
9.	MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

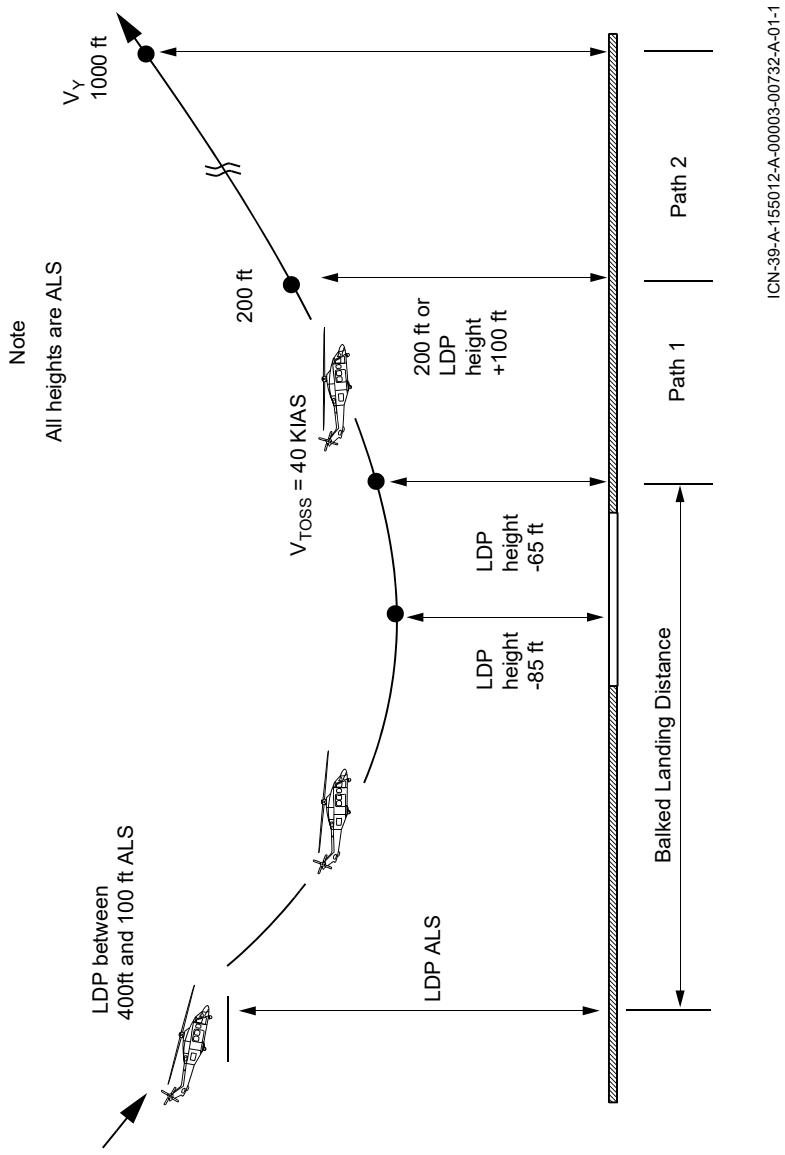

Figure 3H-1 Confined Area Heliport Engine Failure Prior to LDP

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SINGLE ENGINE FAILURE DURING LANDING PRIOR TO LDP ALTERNATIVE PROCEDURE WITH OPTIMISED PATH 1 & 2 CLIMB (BALKED LANDING)

1. Engine failure prior to LDP	— Apply collective to control NR droop to a minimum of 90% and adjust pitch attitude to 0° to initiate an acceleration to V_{BLSS} (40 KIAS). • When left hand pilot flying, right hand pilot call out rotor speed.
2. Climb	— When the aircraft achieves V_{BLSS} (40 KIAS) and a positive rate of climb, continue acceleration to 60 KIAS, select 5° nose up attitude and progressively lower collective to recover NR to 102%. Continue climb at 60 KIAS using 2.5 min power rating to 1000 ft (300 m) ALS. At 1000 ft (300 m) ATS accelerate to Vy. Reduce power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
3. Landing gear	— UP (when reaching 60 KIAS but not below 200 ft (60 m) ALS).
4. Rotor speed	— Select 100% at 1000 ft (300 m) ALS.
5. At 1000 ft (300 m) ALS	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

6. PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
7. LDG LT & LDG LT2 switches	— OFF, if used.
8. MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

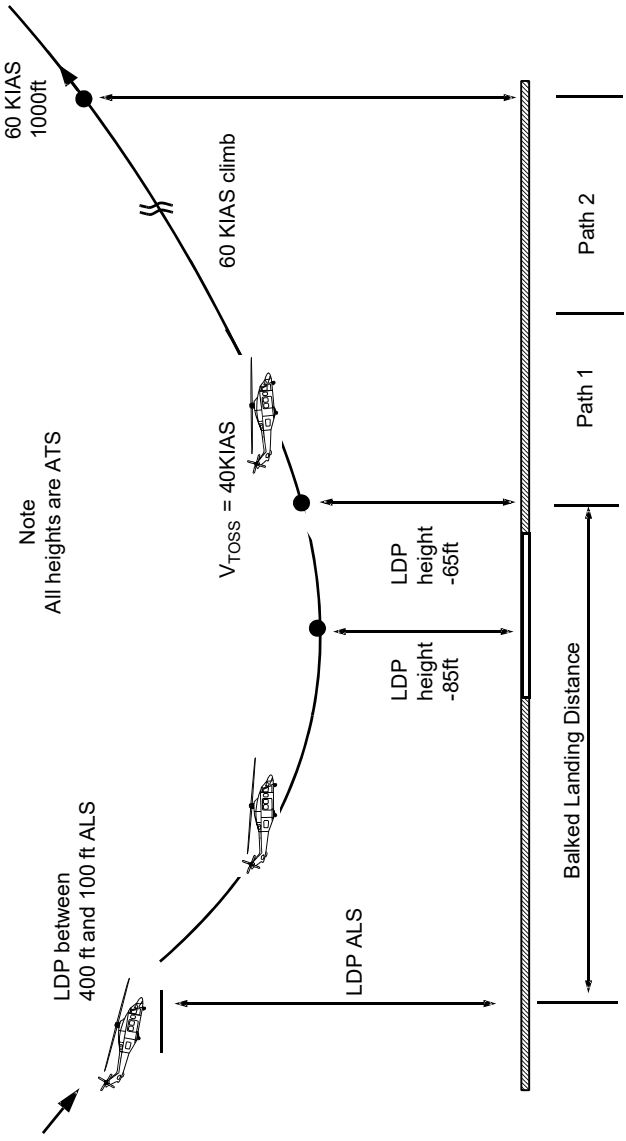

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Figure 3H-1A Confined Area Heliport Engine Failure Prior to LDP Alternative Climb Procedure

OEI APPROACH OR SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER LDP (OEI LANDING)

1. Collective/cyclic	— Continue the descent at 400 to 500 fpm. Use up to 2.5 Min power and maintain NR at 100 % ± 1 %. • When left hand pilot flying, right hand pilot call out rotor speed.
2. Touchdown	— At 15 ft (5 m) ALS apply collective to cushion touchdown. Minimum rotor speed 90% NR. Maximum nose up attitude on touchdown 15°. Maximum allowed GS at touchdown 5 kts (9 km/hr).
3. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4. Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
5. PARK BRAKE	— As required.
6. LDG LT & LDG LT2 switches	— OFF, if used.

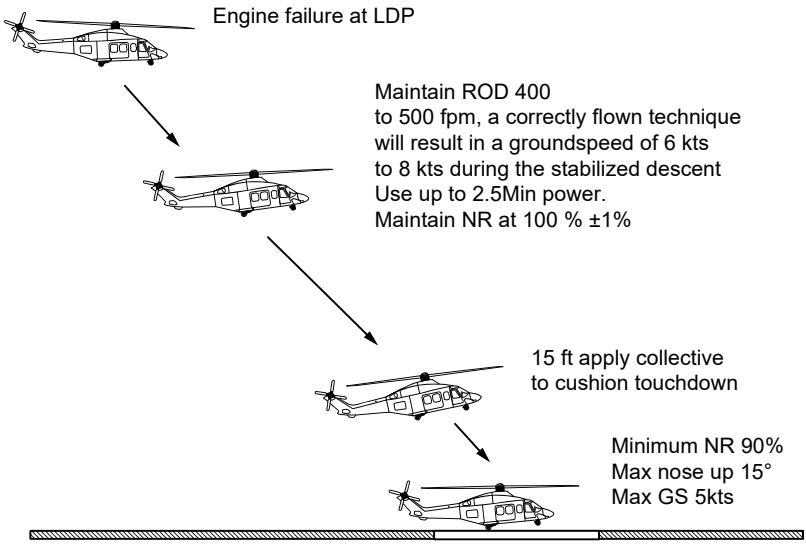

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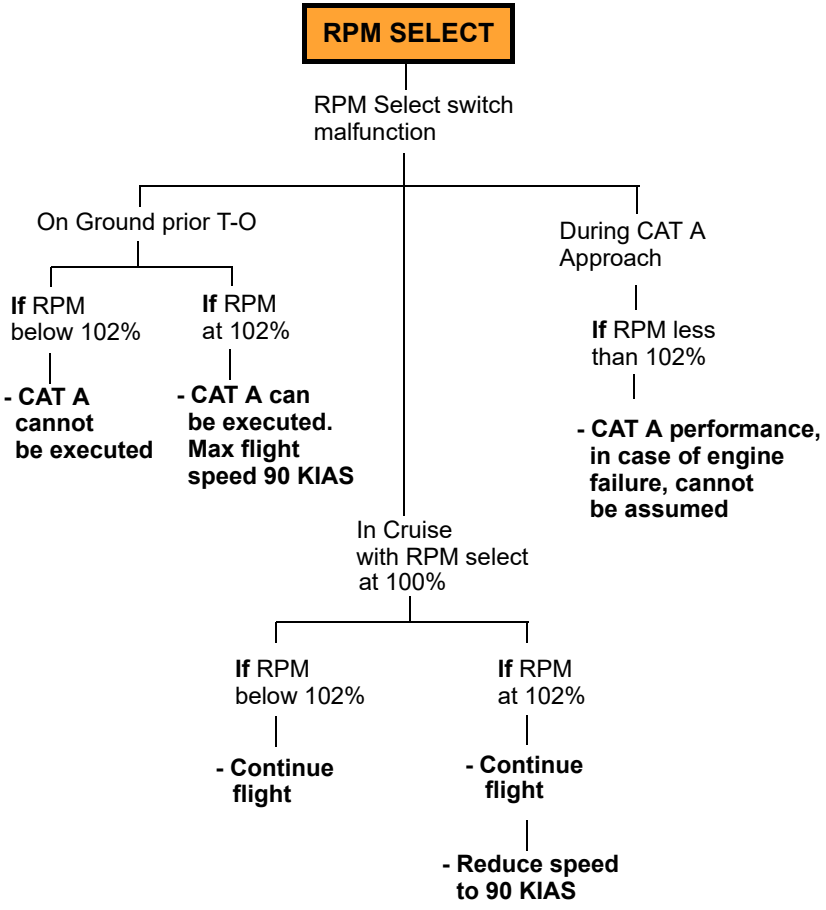
Figure 3H-2 OEI Landing Profile

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



SECTION 4H - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

Confined Area Heliport WAT charts are shown in Figure 4D-4 to Figure 4D-6 and Figure 4D-6A.

LANDING DISTANCE OEI

The horizontal distance from the LDP point to the landing point, applicable to all weights permitted by WAT charts, is given in Figure 4H-3.

BALKED LANDING DISTANCE OEI

The balked landing distance OEI is shown in Figure 4H-4. This figure is applicable to all weights permitted by WAT charts and valid for clean air intake, EAPS ON and OFF and IBF installed.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power is shown in Figure 4A-8 to Figure 4A-31 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from the end of the Balked Landing distance to a height of 200 ft (60 m) or LDP height +100 ft (30 m) ALS.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from 200 ft (60 m) or LDP height +100 ft (30 m) ALS to 1000 ft (300 m) ALS.

CLIMB PERFORMANCE

Single Engine Rate Off Climb at V_Y

The ROC at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS or IBF installed.

ALTERNATIVE 60 KIAS CLIMB PROCEDURE PATH 1 & 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at 60 KIAS and 2.5 min power OEI is shown in Figure 4D-10 to Figure 4D-33 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

These charts apply from the CTO distance to 1000 ft (300 m) ATS.

LDP DETERMINATION

The determination of the LDP height must consider any obstacles in the Balked Landing profile (Figure 4H-1) or the Landing Approach profile (Figure 4H-2). Where obstacles are present in both of these profiles the higher of the LDP values must be taken.

LDP FOR OBSTACLE IN BALKED LANDING PROFILE

The diagram below demonstrates the process necessary to calculate the LDP. A normal landing procedure with a LDP of 100 ft ALS would guarantee a minimum height of 15 ft ALS for a Balked Landing. However, for obstacle clearance, this must be increased by the required clearance.

If the obstacle is within the Balked Landing profile then the minimum LDP height can be calculated where:

H_O = Height of Obstacle (ft)

H_C = Required clearance height above Obstacle (ft)

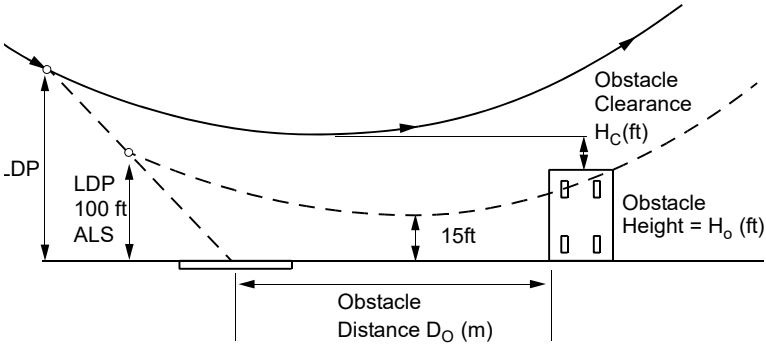


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Figure 4H-1 LDP with Obstacle in Balked Landing Profile

LDP calculation is:

LDP (ft) = H_O + H_C + 85 (Maximum LDP = 400 ft ALS)

LDP For Obstacle Under Landing Approach Profile

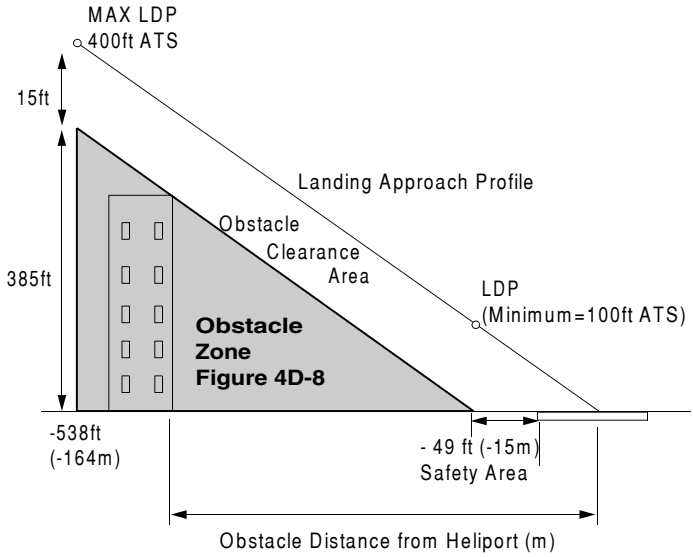

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Figure 4H-2 Obstacle in Approach Profile

The diagram above demonstrates the Landing Approach profile with obstacles under the aircrafts profile from the LDP to the landing point. Obstacle height and position, with respect to the Heliport, must be within the Obstacle Zone as defined by the table in Figure 4D-8, which includes a minimum obstacle clearance height of 15 ft (5 m). The LDP must be chosen, taking into account the Obstacle Zone. If Operating Rules define specific obstacle clearance height more than 15 ft (5 m) then this must also be taken into consideration when defining the LDP.

LDP AGL		LDP - Land distance	
(ft)	(m)	(ft)	(m)
100	30	119	36
120	37	143	44
140	43	167	51
160	49	191	58
180	55	215	66
200	61	238	73
220	67	262	80
240	73	286	87
260	79	310	94
280	85	334	102
300	91	358	109
320	98	381	116
340	104	405	123
360	110	429	131
380	116	453	138
400	122	477	145

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Figure 4H-3 OEI Landing Distance from LDP

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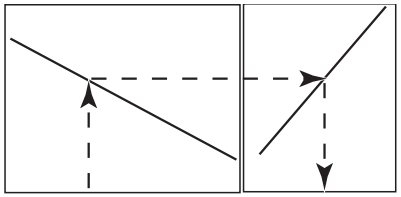
BALKED LANDING DISTANCE OEI
CONFINED AREA



Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{BLSS} 40 KIAS
RoD <350 ft/min

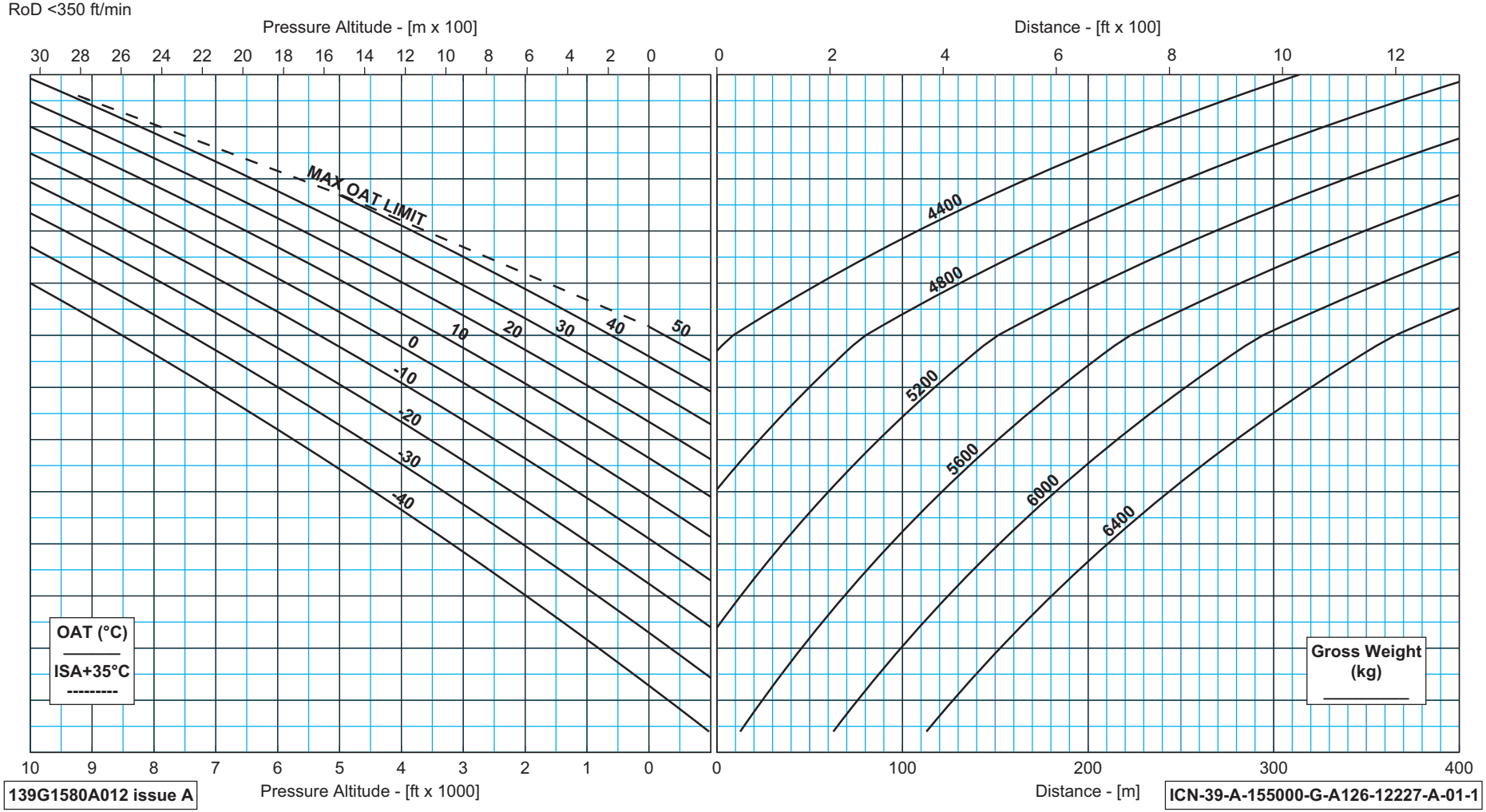


Figure 4H-4 Confined Area Balked Landing Distance

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OFFSHORE HELIDECK LANDING PROCEDURES

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Part I
Offshore Helideck Landing Procedures

GENERAL

Two landing techniques are available for the Offshore Helideck Landing:

a) The **Level Approach Helideck Landing** technique comprises an initial descent then a level approach to the LDP 40 ft (12 m) above and to the left (right) of the Landing Surface at 15 kts. At the LDP the aircraft carries out a 45° lateral translation and descent to the touchdown point (TD/PM). An engine failure at any time before LDP allows a Balked Landing to be carried out which may require a Drop Down below the level of the LDP (BLDP) and helideck during the manoeuvre. As the aircraft in the approach to LDP is always to the left (right) of the helideck then a clear trajectory is available for the Balked Landing trajectory.

b) The **Descending Approach Helideck Landing** technique comprises of a normal approach to an LDP to the side of the helideck starting at a point to achieve LDP at 50 ft above the landing surface with15 kts groundspeed and a ROD of 200 ft/min. An engine failure at any time before LDP allows a Balked Landing to be carried out which may require a Drop Down below the level of the LDP (BLDP) and helideck during the manoeuvre. As the the approach to LDP is always to the side of the helideck a clear trajectory is available for the Balked Landing.

SECTION 1I - LIMITATIONS

MINIMUM HELIDECK SIZE

Minimum demonstrated helideck size ..... Diameter 15 m (50 ft)
or 15 m x 15 m (50 ft x 50 ft)

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake..... Figure 4E-1

Weight Limitation, EAPS OFF ..... Figure 4E-2

Weight Limitation, EAPS ON..... Figure 4E-3

Weight Limitation, IBF Installed.....Figure 4E-3A

AIRSPEED LIMITATIONS

Balked Landing Safety Speed (V_{BLSS}).....40 KIAS

Best Rate of Climb Speed (V_Y) .....80 KIAS

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A Landing .....5000 (1500 m) Hp/Hd

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s). For cross wind components between 10 kts (5 m/s) and 20 kts (10 m/s) a headwind component of at least 5 kts (2.5 m/s) is required.

Landing with tail wind component is prohibited.

SECTION 2I - NORMAL PROCEDURES

Two different techniques are available for the PATH 1 and PATH 2 climb after reaching V_{BLSS}. The standard technique performs the PATH 1 climb maintaining the V_{BLSS} (40 KIAS) speed then at 200 ft accelerating to V_y (80 KIAS) for the PATH 2 climb up to 1000 ft (300 m) ATS.

The alternative technique continues the acceleration, after reaching V_{BLSS} (40 KIAS), straight up to 60 KIAS and the PATH 1 and PATH 2 segment climbs are carried out at 60 KIAS. This second technique has been introduced as it has the following advantages:

- The technique is simpler as it maintains 60 KIAS throught the climb
- The climb condition is easier to maintain
- The IFR minimum airspeed Vmini (50 KIAS) is achieved earlier
- The end of the PATH 2 climb to 1000 ft (300 m) ATS is achieved before expiry of the OEI 2.5m limit and in a shorter time, for engine failure cases.

OFFSHORE HELIDECK LEVEL APPROACH AND LANDING TECHNIQUE

LANDING DECISION POINT (LDP)

LDP

Height..... 40 ft (12 m) ALS

Groundpeed .....15 kts

Rate of Descent ..... 0 ft/min

Note

Radio altimeter heights are shown in the flight path profiles.

LANDING PROCEDURES

For Landing procedures, the PNF should monitor engine and rotor parameters.

OFFSHORE HELIDECK APPROACH AND LANDING PROCEDURE

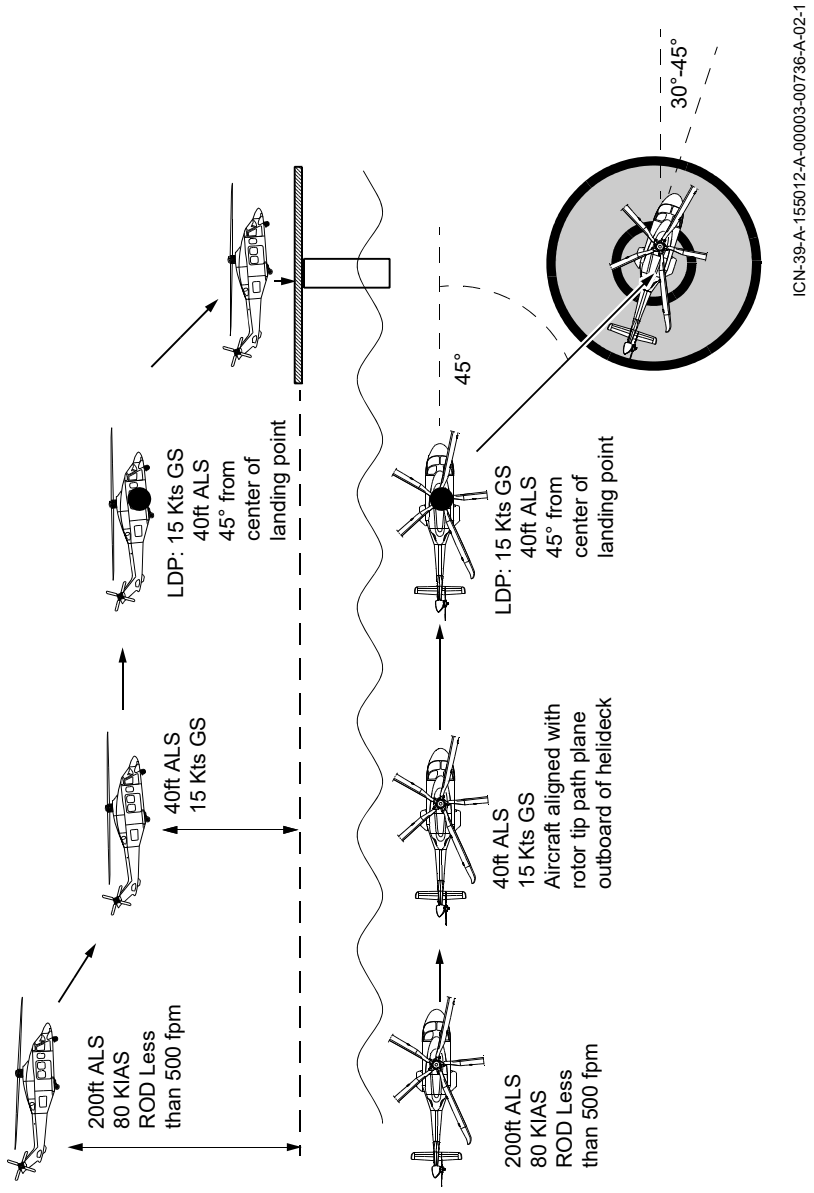

Figure 2I-1 Normal Landing Profile, PF in RH Seat

1. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.

2. Pre-landing checks — Complete.

3. AWG — NORMAL.

Note

When descending below 150 ft Rad Alt height a vocal message 'ONE FIFTY FEET' is activated regardless of the landing gear status. This message is suppressed if AWG switch is set to REGRADE or INHIBIT.

4. LDG LT and LDG LT2 switches — As required.

5. Pilot Altimeter — Set QNH (landing surface elevation should be known).

6. HEATER (if used) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select HTR switch to OFF, note ITT decrease and confirm HEATER ON advisory extinguished.

ECS ENVIRO (if used) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select ECS CONTROL switch to OFF and, if HEATER ON advisory illuminated, note ITT decrease and confirm HEATER ON advisory extinguished.

7. Rotor speed — Set 102%.

8. PARK BRAKE — Apply, PARK BRAKE ON advisory message illuminated on CAS.

8A. Compass Controller — Select DG.

9. Initial point — Establish an approach to pass through 200 ft (60 m) ALS at 80 KIAS and a rate of descent of no more than 500 fpm.

10. Approach — Progressively reduce speed and height to achieve LDP at 15 kts GS and 40 ft (12 m) ALS and approach into wind with the helideck to the side of the PF (See Figure 2I-2). Maintain the rotor tip path plane outboard, but close to the edge of the helideck and the aircraft center line paralell to the edge of the helideck.

Note

If the approach is carried out with helideck to the left of the aircraft PF must be in left hand seat.

11. LDP — Maintain 15 kts groundspeed and 40 ft (12 m) ALS level, the LDP is achieved when the aircraft is at an angle of approximately 45° from the center of the landing point (See to Figure 2I-3).

12. Landing — From the 45° position fly the aircraft forwards, sideways and downwards towards the landing point, decreasing collective slightly. When descending through 30 ft (9 m) ALS reduce nose up attitude to maximum 10° (See Figure 2I-4). Continue to a hover over the helideck.

13. Touchdown	— When over the landing position descend vertically and use collective to cushion touchdown and touch down with 30° to 45° heading offset, if wind speed is less than 10 kts (5 m/s). If wind speed is greater than 10 kts (5 m/s) maintain heading with respect to the heading at LDP. Do not exceed 20 kts (10 m/s) crosswind. Maximum allowed GS at touchdown 5 kts (9 km/hr).
14. PARK BRAKE	— As required.
15. LDG LT & LDG LT2 switches	— OFF, if used.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the landing path, to carry out a safe OEI landing or achieve the scheduled OEI performance.



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Figure 2I-2 Offshore Level Profile Landing On Helideck - View from RH Seat at Start of Level Segment at 40 ft ALS, 15 Kts GS



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Figure 2I-3 Offshore Landing Level Profile Landing On Helideck - View RH Seat at LDP (40 ft ALS)



ICN-39-A-155012-A-00003-00901-A-01-1

Figure 2I-4 Offshore Level Profile Landing On Helideck - View RH after LDP moving towards landing point

OFFSHORE HELIDECK DESCENDING APPROACH AND LANDING TECHNIQUE

LANDING DECISION POINT (LDP)

LDP

Height ..... 50 ft (15 m) ALS
Groundpeed ..... 15 kts
Rate of Descent ..... 200 ft/min

Note

Radio altimeter heights are shown in the flight path profiles.

LANDING PROCEDURES

For Landing procedures, the PNF should monitor engine and rotor parameters.

DESCENDING APPROACH AND LANDING PROCEDURE

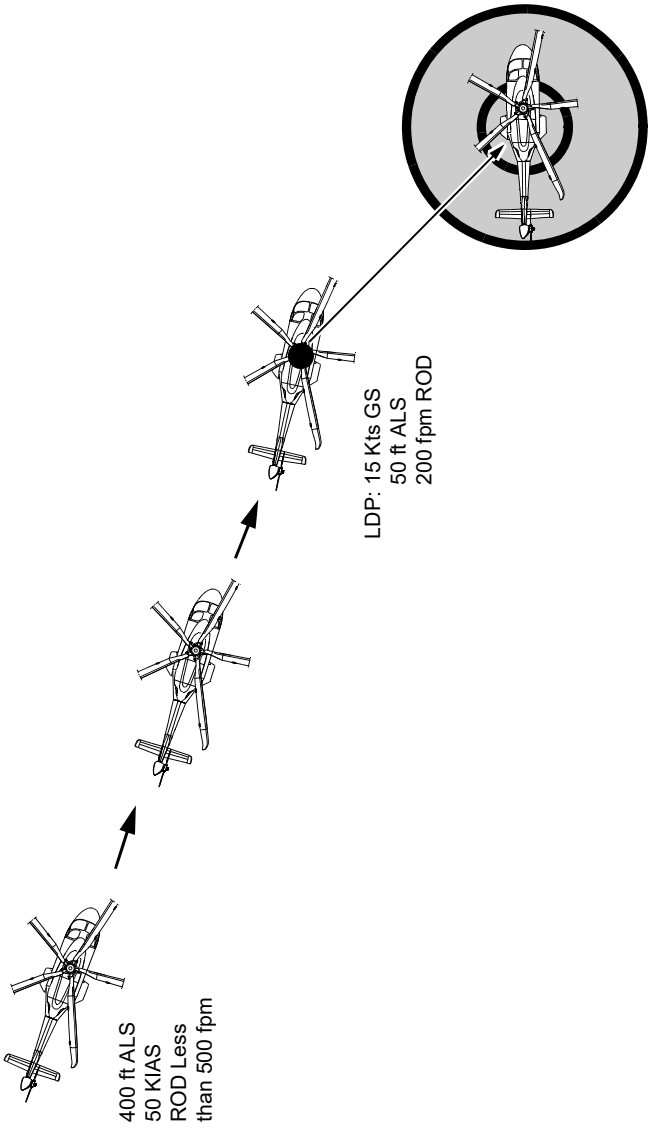

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Figure 2I-5 Normal Landing Descending Approach Profile

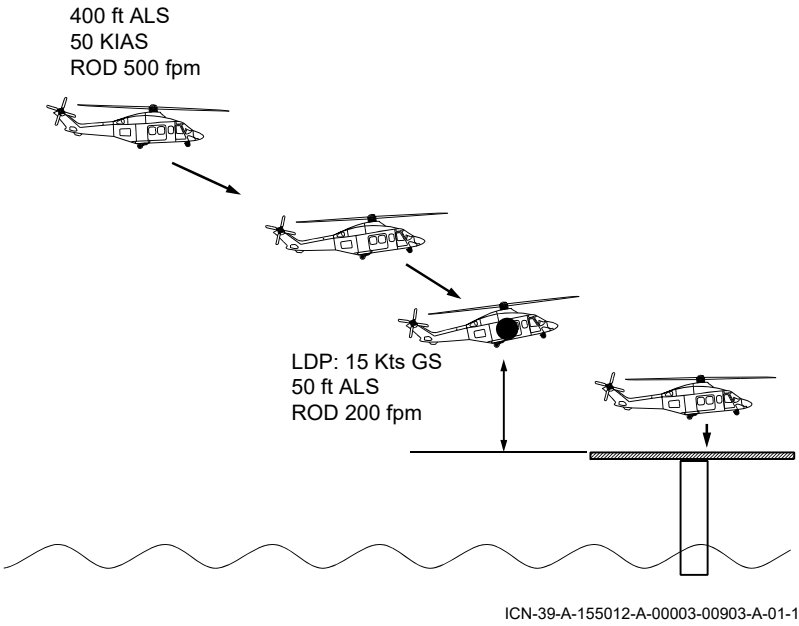

Figure 2I-6 Normal Landing Descending Approach Profile

1. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.

2. Pre-landing checks — Complete.

3. AWG — NORMAL.

Note

When descending below 150 ft Rad Alt height a vocal message 'ONE FIFTY FEET' is activated regardless of the landing gear status. This message is suppressed if AWG switch is set to REGRADE or INHIBIT.

4. LDG LT and LDG LT2 switches — As required.

5.	Pilot Altimeter	— Set QNH (landing surface elevation should be known).
6.	HEATER (if used)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select HTR switch to OFF, note ITT decrease and confirm HEATER ON advisory extinguished.
	ECS ENVIRO (if used)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to OFF and, if HEATER ON advisory illuminated, note ITT decrease and confirm HEATER ON advisory extinguished.
7.	Rotor speed	— Set 102%.
8.	PARK BRAKE	— Apply, PARK BRAKE ON advisory message illuminated on CAS.
8A.	Compass Controller	— Select DG.
9.	Initial point	— Establish an approach to pass through 400 ft (122 m) ALS at 50 KIAS and a rate of descent of 500 fpm or less. Position the helideck in the bottom right hand of windscreen, see Figure 2I-7.
10.	Approach	— Progressively reduce speed and height to achieve LDP at 15 kts GS, 50 ft (15 m) ALS and 200 fpm ROD, approach into wind. Maintain the flight path to keep the helideck in the bottom right of windscreen and the rotor tip path plane out-board, but close to the edge of the helideck.

11. LDP	— The LDP is positioned with the aircraft approximately 45° from the centre of the helideck viewed through the lower part of the windscreen (See Figure 2I-8).
12. Landing	— When passing LDP fly directly to landing position and reduce ROD and speed to achieve HIGE over landing position, with the helideck centre moving progressively from the lower part of the windscreen and through the chin window see Figure 2I-9.
13. Touchdown	— When over the landing position descend vertically and use collective to cushion touchdown. Do not exceed 20 kts (38 km/hr) crosswind. Maximum allowed GS at touchdown 5 kts (9 km/hr).
14. PARK BRAKE	— As required.
15. LDG LT & LDG LT2 switches	— OFF, if used.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the landing path, to carry out a safe OEI landing or achieve the scheduled OEI performance.



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Figure 2I-7 Descending Approach Landing On Helideck - View RH Seat at Initial Point 400 ft ALS, 50 KIAS, 500 fpm ROD



ICN-39-A-155012-A-00003-00905-A-01-1

Figure 2I-8 Descending Approach Landing On Helideck - View RH Seat at LDP (15 kts, 50ft ALS, 200 fpm ROD)



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Figure 2I-9 Descending Approach Landing On Helideck - View RH after LDP descending to landing point



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Figure 2I-10 Descending Approach Landing On Helideck - View LH Seat at Initial Point 400ft ALS, 50 KIAS, 500 fpm ROD



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Figure 2I-11 Descending Approach Landing On Helideck - View LH Seat at LDP (15 kts, 50 ft ALS, 200 fpm ROD)



ICN-39-A-155012-A-00003-00909-A-01-1

Figure 2I-12 Descending Approach Landing On Helideck - View LH Seat after LDP descending to landing point

SECTION 3I - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Landing path and assume the pilot gives first priority to aircraft control and achieve a safe flight path.

For all Landing procedures the following shall be observed:

1. Engine failure prior to LDP — **Level Approach Landing**
   Recognition of engine failure prior to the LDP dictates a Balked Landing be carried out

   Descending Approach Landing
   Recognition of engine failure prior to the LDP permits either a continuation of the approach and an OEI Landing **or** a Balked Landing to be carried out

2. Engine failure at or after LDP — Recognition of engine failure at or after the LDP dictates that the Landing be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

OFFSHORE HELIDECK LEVEL LANDING TECHNIQUE

EMERGENCY PROCEDURES FOR ENGINE FAILURE DURING LANDING APPROACH

SINGLE ENGINE FAILURE DURING LANDING PRIOR TO LDP (BALKED LANDING)

1. Engine failure prior to LDP	— Simultaneously adjust pitch attitude, nose down to 0° to initiate an acceleration to V_{BLSS} (40 KIAS) and apply collective to control NR droop, to a minimum of 90%. • PNF calls out rotor speed.
2. Climb	— When the aircraft achieves V_{BLSS} (40 KIAS) select 5° nose up attitude and lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) ATS with 2.5 min power.
3. At 200 ft (60 m) ALS	— Continue climb and accelerate to Vy using 2.5 min power rating. After achieving Vy, continue to 1000 ft ALS, or as required, reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
4. Landing gear	— UP (when reaching Vy).
5. Rotor speed	— Select 100% at Vy.
5A. Compass Controller	— Select MAG.

6.	At 1000 ft (300 m) ALS or cruise altitude if lower	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
7.	PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
8.	LDG LT & LDG LT2 switches	— OFF, if used.
9.	MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

CAUTION

Following an engine failure before LDP an OEI Landing, using the Offshore Helideck Level Approach Landing Procedure, is not possible. If a helideck landing is required the Offshore Descending Approach Procedure and WAT weight (maximum 6400 kg), detailed in this section, should be used.

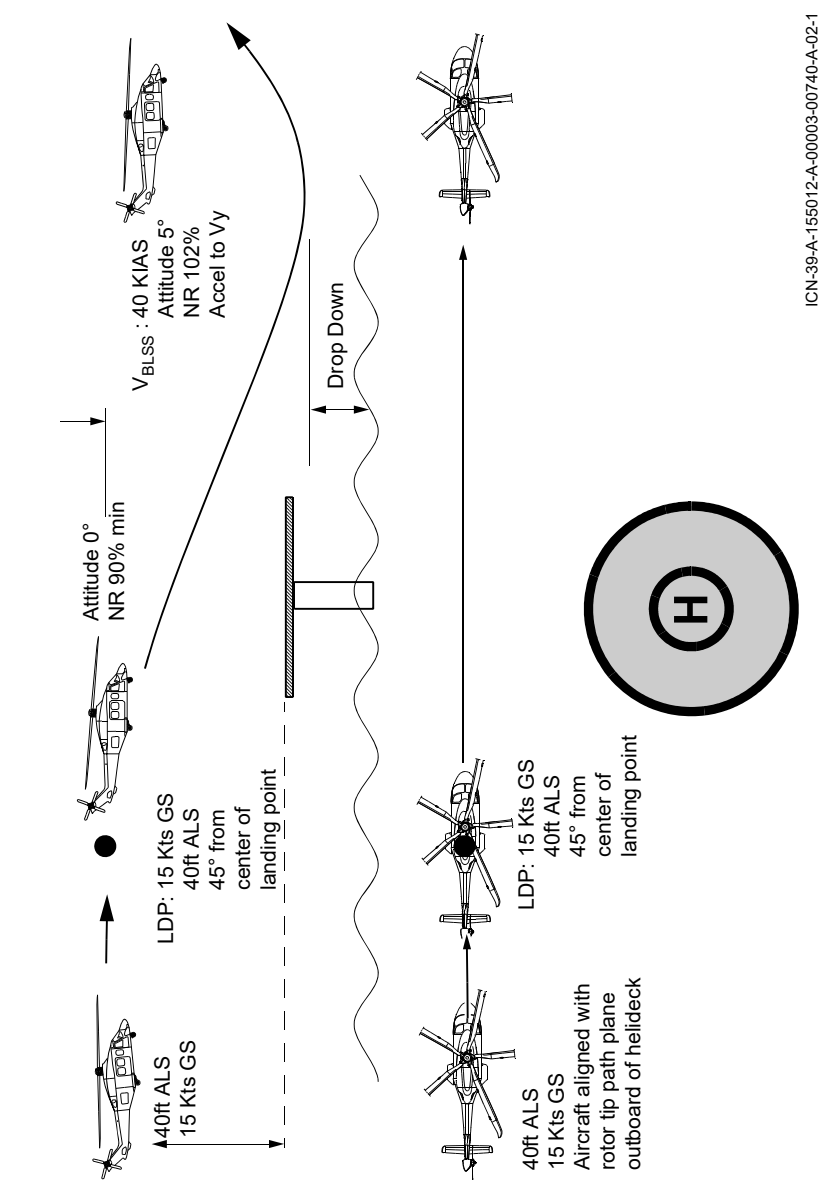

Figure 3I-1 Level Profile Approach Engine Failure Prior to LDP, Balked Landing Profile, PF in RH Seat

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SINGLE ENGINE FAILURE DURING LANDING PRIOR TO LDP ALTERNATIVE PROCEDURE WITH OPTIMISED PATH 1 & 2 CLIMB (BALKED LANDING)

1. Engine failure prior to LDP	— Simultaneously adjust pitch attitude, nose down to 0° to initiate an acceleration to V_{BLSS} (40 KIAS) and apply collective to control NR droop, to a minimum of 90%. • PNF calls out rotor speed.
2. Climb	— When the aircraft achieves V_{BLSS} (40 KIAS) continue acceleration to 60 KIAS, select 5° nose up attitude and lower collective to recover NR to 102%. Continue climb at 60 KIAS using 2.5 min power rating to 1000 ft (300 m) ALS, or as required. At 1000 ft (300 m) ATS accelerate to Vy. Reduce power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
3. Landing gear	— UP (when reaching 60 KIAS but not below 200 ft (60m) ALS.
4. Rotor speed	— Select 100% at 1000 ft (300 m) ALS.
4A. Compass Controller	— Select MAG.
5. At 1000 ft (300 m) ALS or cruise altitude if lower	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

6. PARK BRAKE — Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.

7. LDG LT & LDG LT2 switches — OFF, if used.

8. MFD — During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

CAUTION

Following an engine failure before LDP an OEI Landing, using the Offshore Helideck Level Approach Landing Procedure, is not possible. If a helideck landing is required the Offshore Descending Approach Procedure and WAT weight (maximum 6400 kg), detailed in this section, should be used.

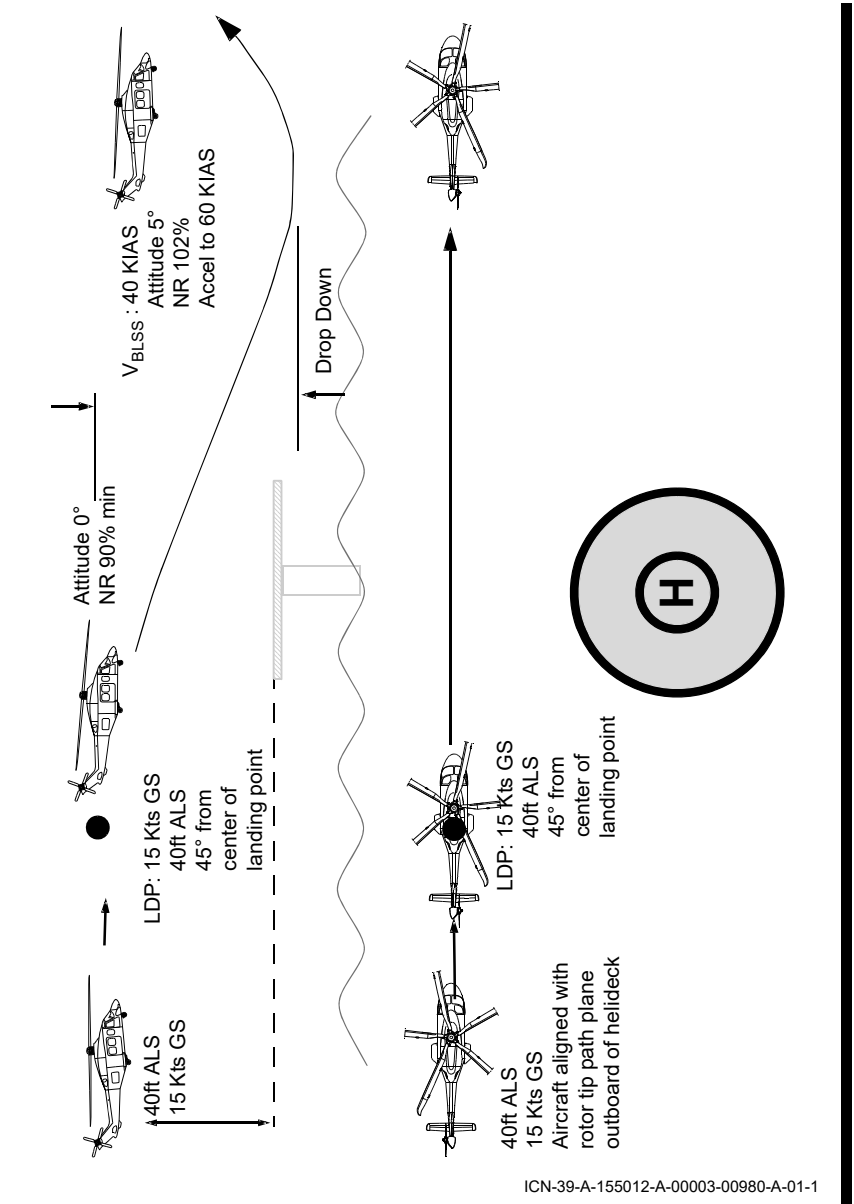

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Figure 3I-1A Level Profile Approach Engine Failure Prior to LDP, Alternative Balked Landing Profile, PF in RH Seat

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER LDP (OEI LANDING)

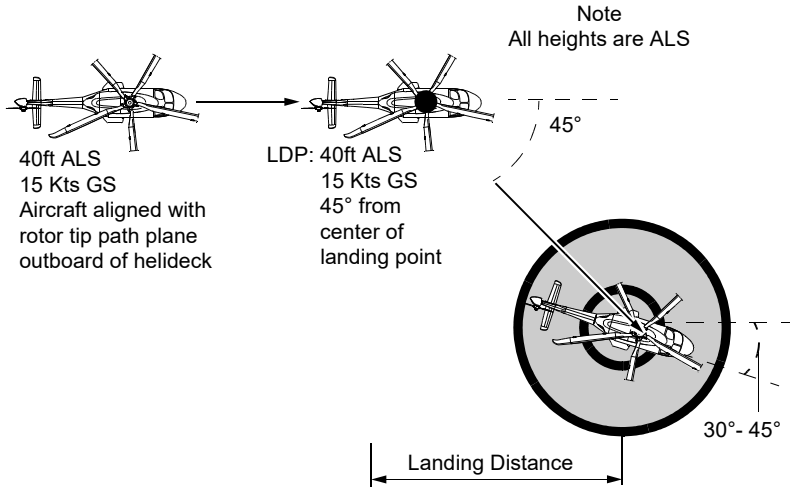

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Figure 3I-2 Level Profile Approach Engine Failure at/after LDP, PF in RH Seat

1. Collective/cyclic

— Fly the aircraft forwards, sideways and downwards towards the landing point, decreasing collective slightly. When descending through 30 ft (9 m) ALS reduce nose up attitude to maximum of 10°. At approximately 15 ft (5 m) ALS apply collective using 2.5 min power, if required, to cushion touchdown and touchdown with 30° to 45° heading offset. Minimum rotor speed 90% NR. Maximum nose up attitude on touchdown 15°. Maximum allowed GS at touchdown 5 kts (9 km/hr).
• PNF calls out rotor speed.

2.	Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
3.	Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
4.	PARK BRAKE	— As required.
5.	LDG LT & LDG LT2 switches	— OFF, if used.

OFFSHORE HELIDECK DESCENDING LANDING TECHNIQUE

EMERGENCY PROCEDURES FOR ENGINE FAILURE DURING LANDING APPROACH

SINGLE ENGINE FAILURE DURING LANDING PRIOR TO LDP (BALKED LANDING)

1. Engine failure prior to LDP	— Simultaneously adjust pitch attitude, nose down to 0° to initiate an acceleration to V_{BLSS} (40 KIAS) and apply collective to control NR droop, to a minimum of 90%, . • PNF calls out rotor speed.
2. Climb	— When the aircraft achieves V_{BLSS} (40 KIAS) select 5° nose up attitude and lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) ATS with 2.5 min power.
3. At 200 ft (60 m) ALS	— Continue climb and accelerate to Vy using 2.5 min power rating. After achieving Vy, continue to 1000 ft ALS, or as required, reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
4. Landing gear	— UP (when reaching Vy).
5. Rotor speed	— Select 100% at Vy.
5A. Compass Controller	— Select MAG.

6.	At 1000 ft (300 m) ALS or cruise altitude if lower	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
7.	PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
8.	LDG LT & LDG LT2 switches	— OFF, if used.
9.	MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

CAUTION

Following an engine failure before LDP an OEI Landing, using the Offshore Helideck Descending Profile Landing Procedure, is possible only for WAT weights up to a maximum of 6400 kg.

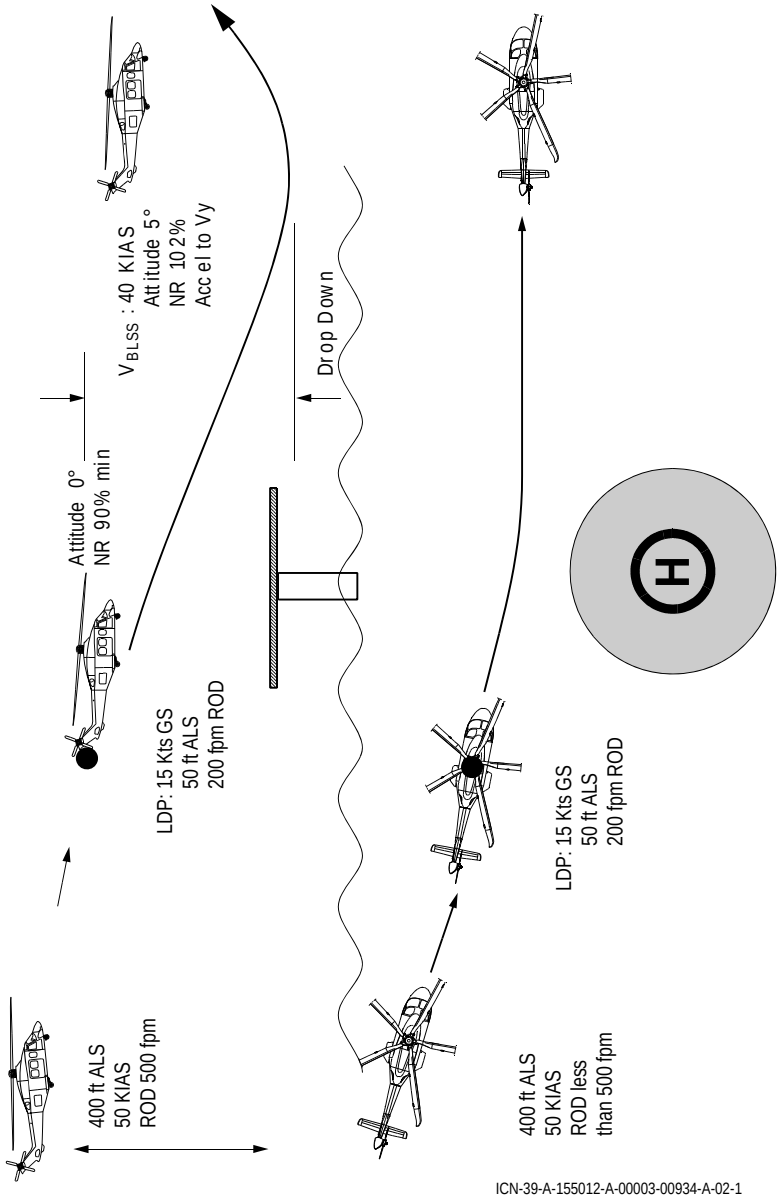

Figure 3I-2 Descending Profile Approach Engine Failure Prior to LDP, Balked Landing Profile

SINGLE ENGINE FAILURE DURING LANDING PRIOR TO LDP ALTERNATIVE PROCEDURE WITH OPTIMISED PATH 1 & 2 CLIMB (BALKED LANDING)

1. Engine failure prior to LDP	— Simultaneously adjust pitch attitude, nose down to 0° to initiate an acceleration to V_{BLSS} (40 KIAS) and apply collective to control NR droop, to a minimum of 90%. • PNF calls out rotor speed.
2. Climb	— When the aircraft achieves V_{BLSS} (40 KIAS) continue acceleration to 60 KIAS. Select 5° nose up attitude and lower collective to recover NR to 102%. Continue climb at 60 KIAS using 2.5 min power to 1000 ft (300 m) ALS, or as required. At 1000 ft (300 m) ATS accelerate to Vy. Reduce power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
3. Landing gear	— UP (when reaching 60 KIAS but not below 200 ft (60 m) ALS)
4. Rotor speed	— Select 100% at 1000 ft (300 m) ALS.
4A. Compass Controller	— Select MAG.
5. At 1000 ft (300 m) ALS or cruise altitude if lower	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.

6. PARK BRAKE — Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.

7. LDG LT & LDG LT2 switches — OFF, if used.

8. MFD — During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

CAUTION

Following an engine failure before LDP an OEI Landing, using the Offshore Helideck Descending Profile Landing Procedure, is possible only for WAT weights up to a maximum of 6400 kg.

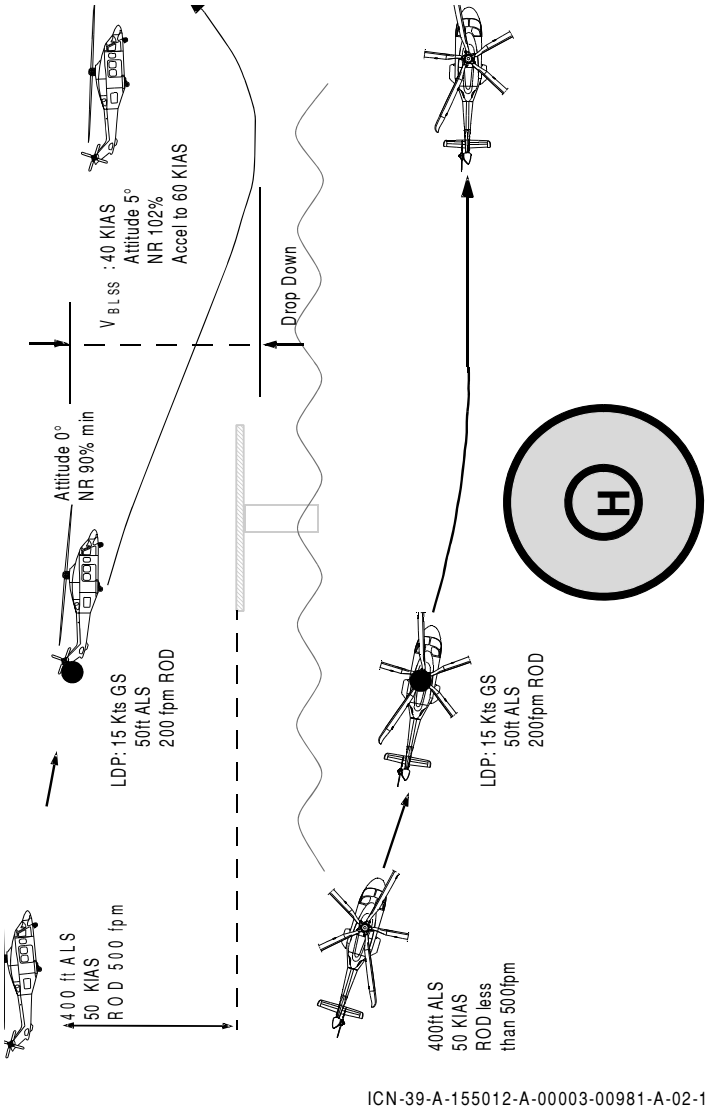

Figure 3I-3A Descending Profile Approach Engine Failure Prior to LDP, Alternative Balked Landing Profile

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SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER LDP (OEI LANDING))

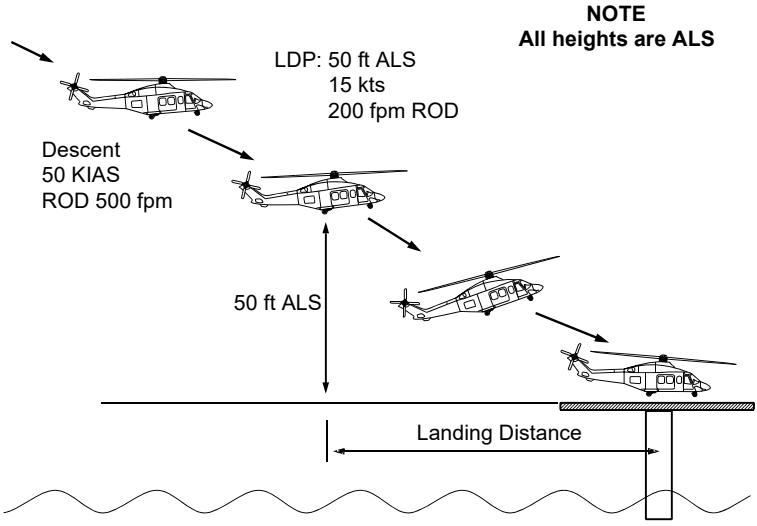

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Figure 3I-4 Descending Profile Approach Engine Failure at/after LDP

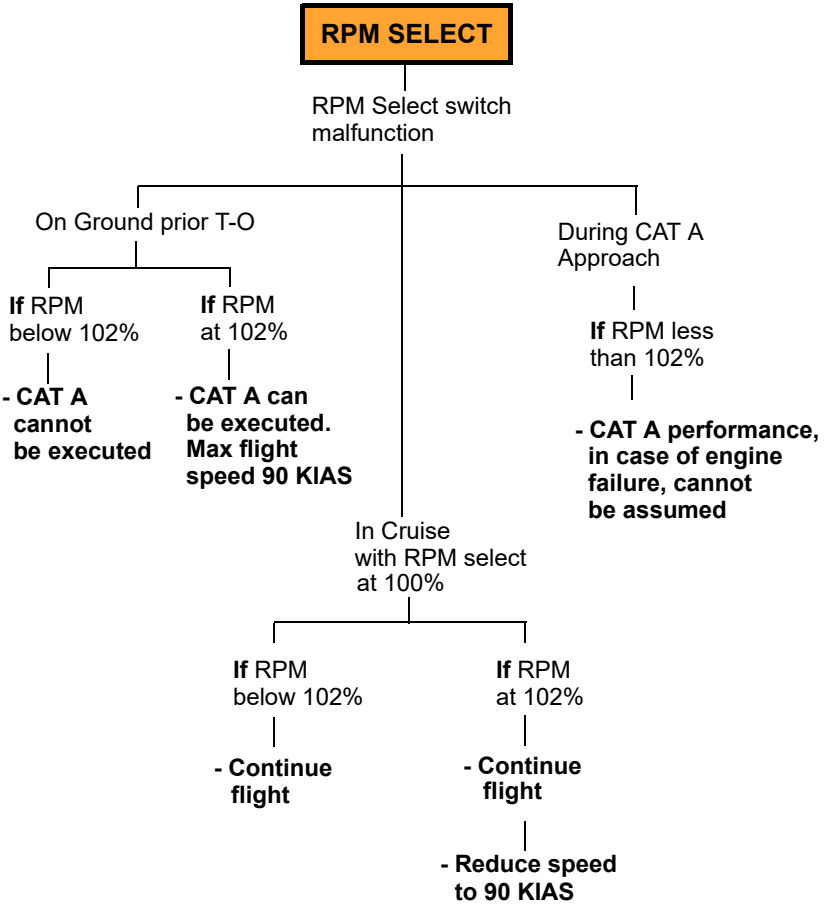
1. Collective/cyclic

— Fly the aircraft forwards and downwards towards the landing point. When descending through 30 ft (9 m) ALS reduce nose up attitude to maximum of 10°. At approximately 15 ft (5 m) ALS apply collective using 2.5min power, if required, to cushion touchdown. Minimum rotor speed 90% NR. Maximum nose up attitude on touchdown 15°. Maximum allowed GS at touchdown 5 kts (9km/hr).
• PNF calls out rotor speed.

2.	Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
3.	Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
4.	PARK BRAKE	— As required.
5.	LDG LT & LDG LT2 switches	— OFF, if used.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



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SECTION 4I - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

— The Offshore helideck Procedure Weight Limitations charts are shown in Figure 4E-1 to Figure 4E-3A for weights up to 6400 kg. For weight up to 6800 kg see Supplement 50.

— The Gross Weight Benefit, incorporated into the WAT charts for Headwind Component, has already been factored by 50%. No further weight correction is required.

BALKED LANDING DISTANCE OEI

The balked landing distance OEI for the Level Approach Landing Profile or Descending Approach Landing Profile is shown in Figure 4I-2 to
Figure 4I-8. These figures are applicable to all weights permitted by WAT charts.

The Balked Landing Distance Correction incorporated into the “Offshore Helideck Balked Lading Distance” chart for Headwind Component has already been factored by 50%.

BALKED LANDING DROP DOWN

Maximum drop down below LDP (BLDP) during Balked Landing for Level Approach Profile ..... Figure 4I-1

Maximum drop down below LDP (BLDP) during Balked Landing for Descending Approach Profile ..... Figure 4I-1
plus 15 ft

The charts are valid for clean air intake, EAPS ON and OFF and IBF installed.

The Drop Down Correction incorporated into the “Offshore Helideck Balked Landing Drop Down Below LDP” chart for Headwind Component has already been factored by 50%.

Note

If the Drop Down value is greater than 40 ft (12 m) for Level Technique or 50 ft (15 m) for Descending Technique, then the aircraft will descend below the level on the helideck.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{TOSS} and 2.5 min power is shown in Figure 4A-8 to Figure 4A-31 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from the end of the Balked Landing distance to a height of 200 ft (60 m) or LDP_V height +150 ft (45 m) ALS.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from 200 ft (60 m) or LDP_V height +150 ft (45 m) ALS to 1000 ft (300 m) ALS.

CLIMB PERFORMANCE

Single Engine Rate Off Climb at V_Y

The ROC at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS or IBF installed.

ALTERNATIVE 60 KIAS CLIMB PROCEDURE PATH 1 & 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at 60 KIAS and 2.5 min power OEI is shown in Figure 4D-10 to Figure 4D-27 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

These charts apply from the CTO distance to 1000 ft (300 m) ATS.

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Clear Air Intake/EAPS OFF/EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD: 300A
$V_{TOSS/BLSS}$: 40 KIAS

DROP DOWN
OFF-SHORE HELIDECK PROCEDURE
FOR CONTINUED TAKE-OFF AND BALKED LANDING

NOTE: For Descending Procedure increase DROP DOWN by 15 feet

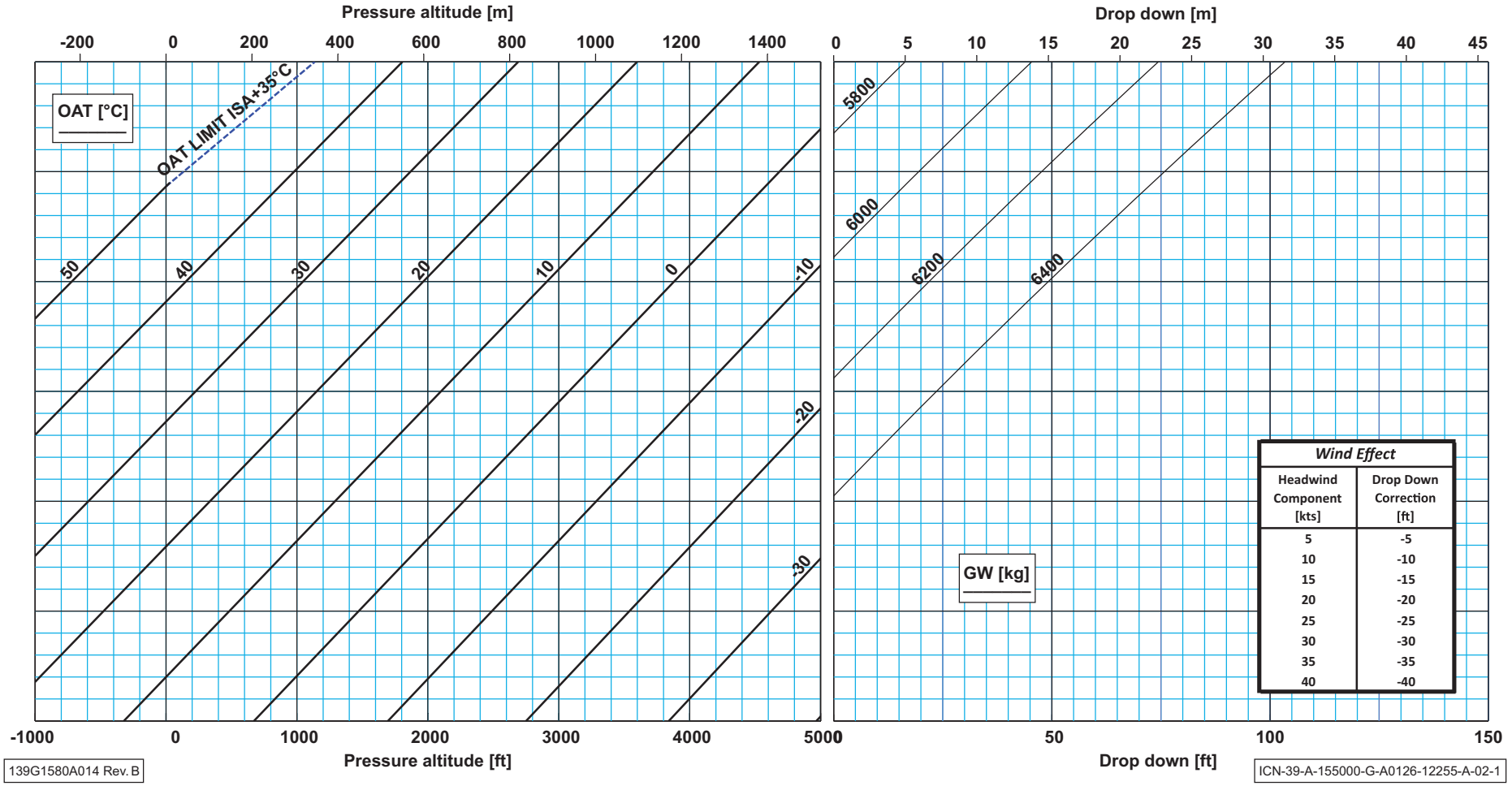

Figure 4I-1 Offshore Helideck Balked Landing Drop Down Below LDP (BLDP)

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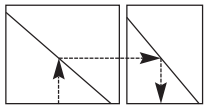
BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

CLEAN AIR INTAKE
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



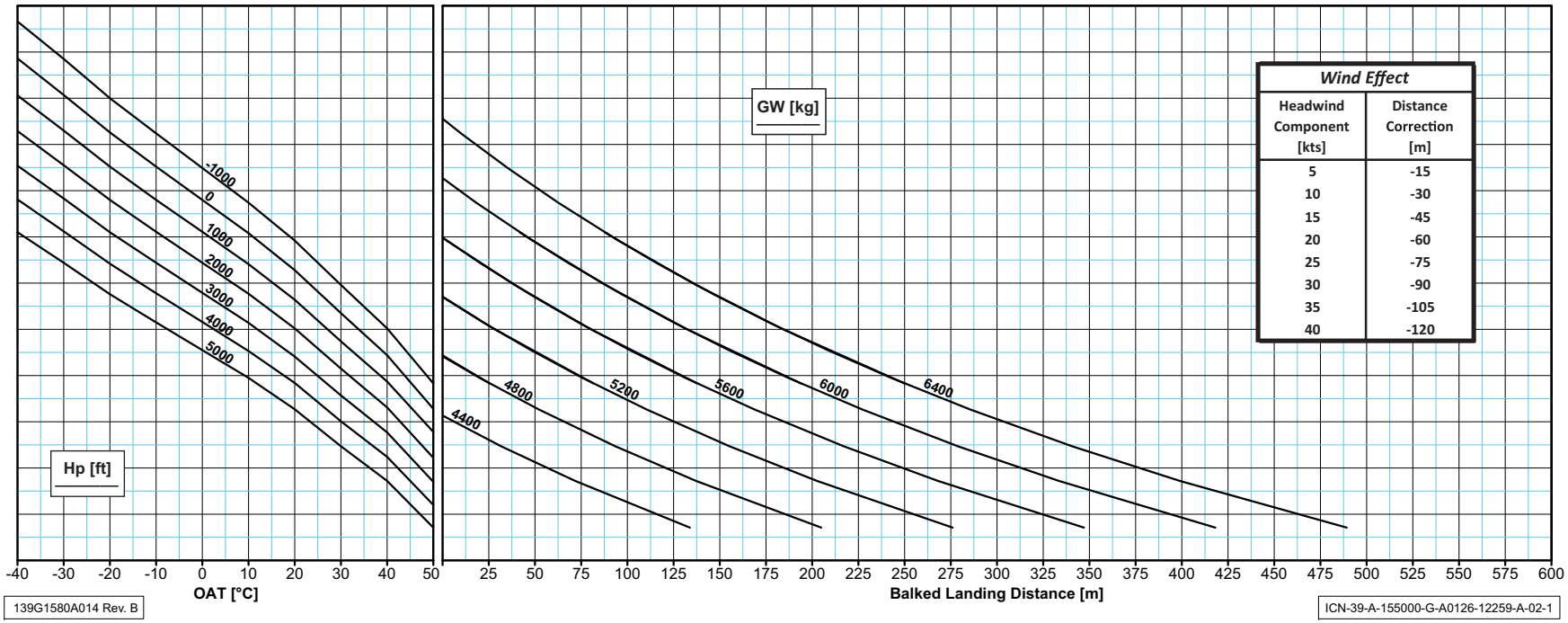
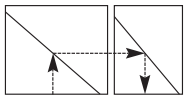


Figure 4I-2 Offshore Helideck Balked Landing Distance

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

CLEAN AIR INTAKE
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



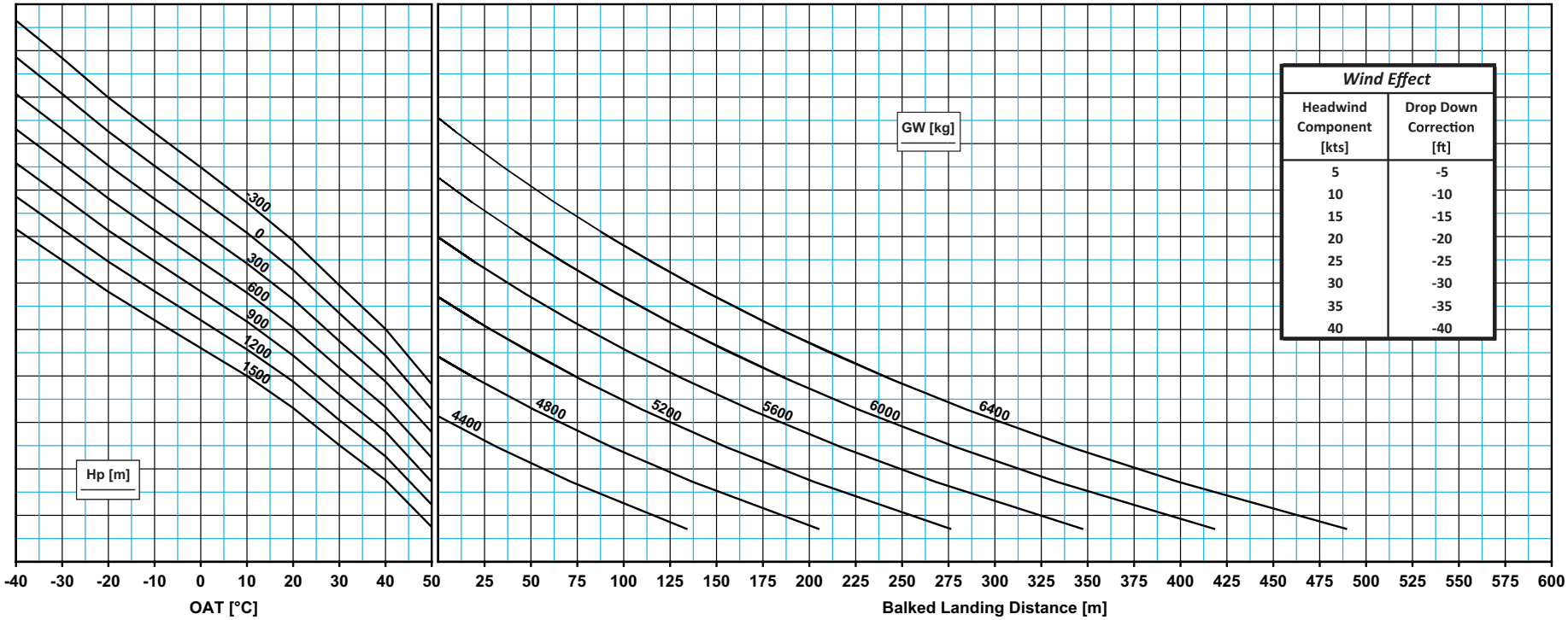


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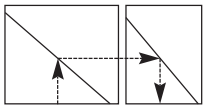
Figure 4I-3 Offshore Helideck Balked Landing Distance (Hp in meters)

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

EAPS OFF
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



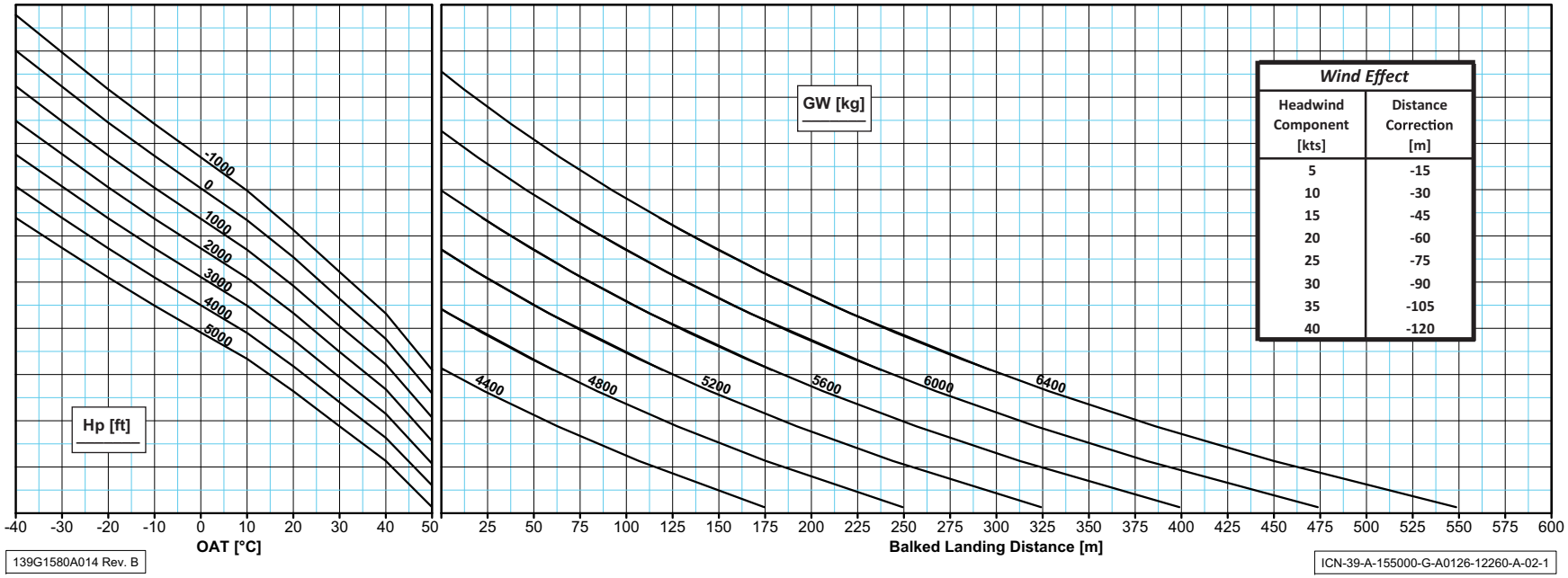
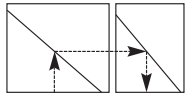


Figure 4I-4 Offshore Helideck Balked Landing Distance EAPS OFF

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

EAPS OFF
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



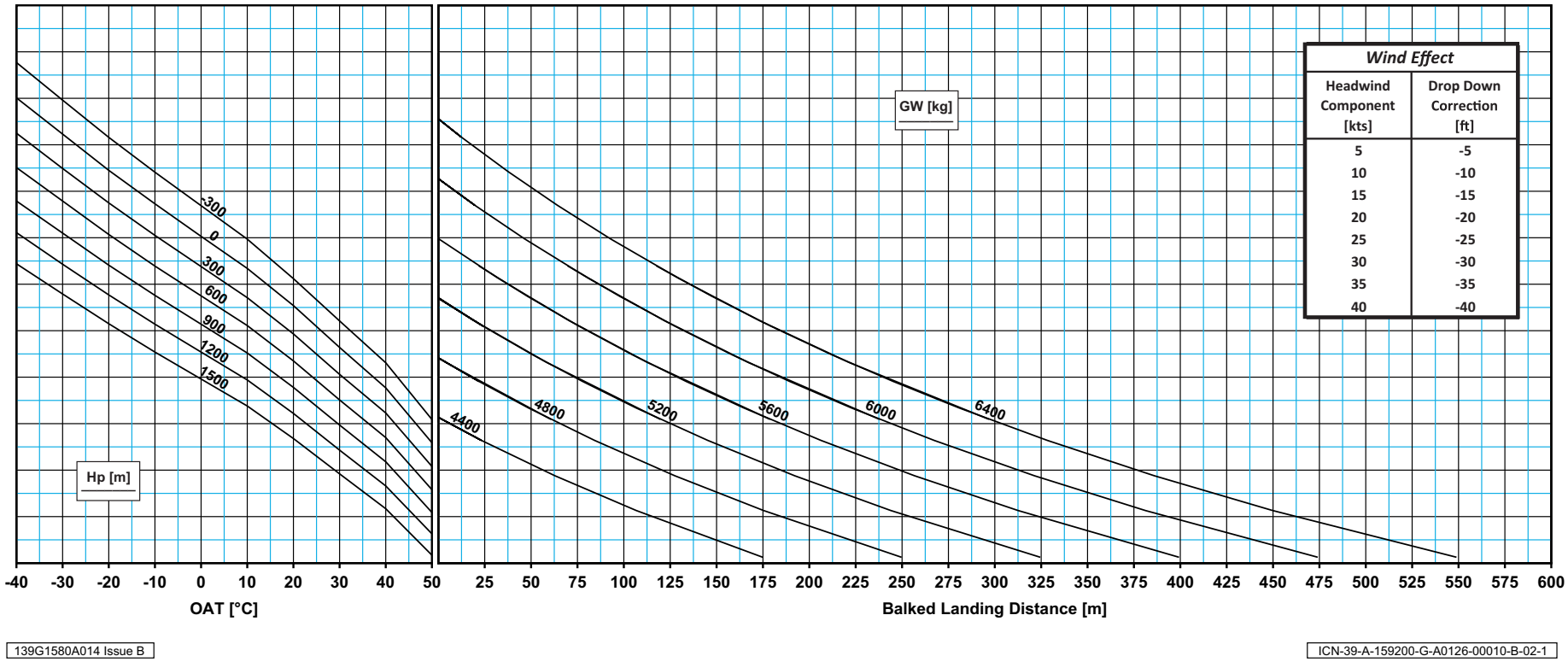


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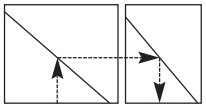
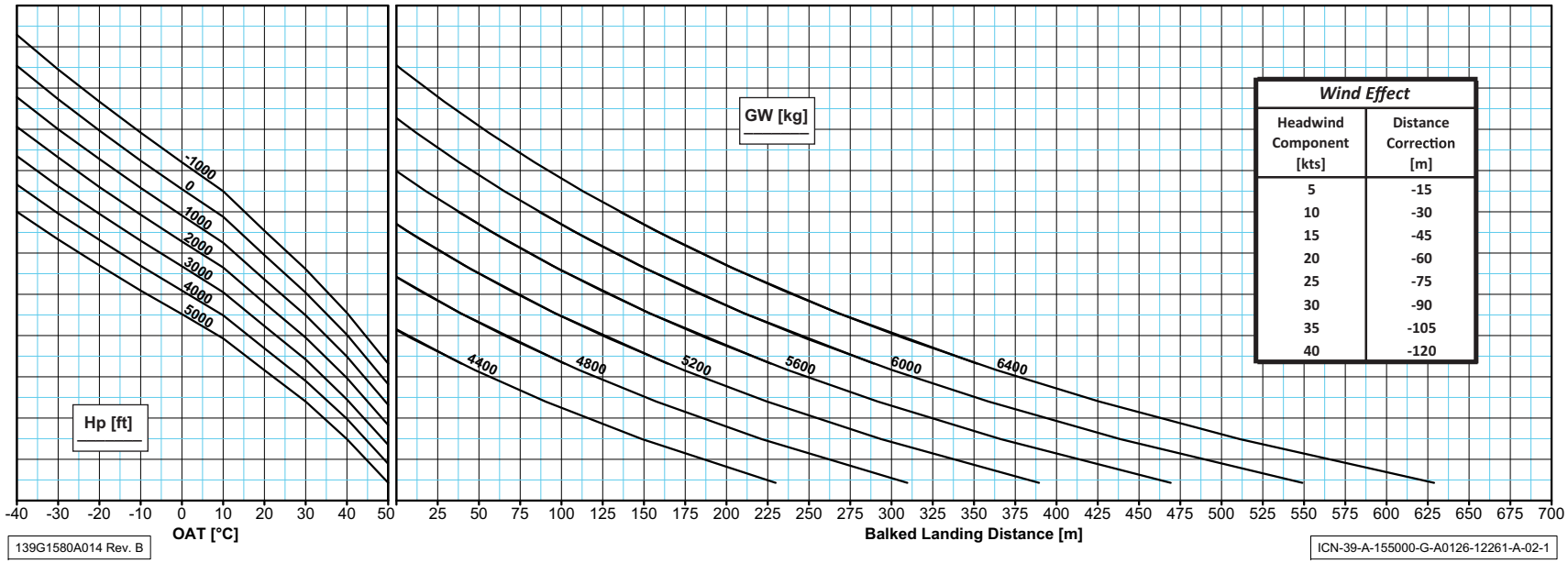
Figure 4I-5 Offshore Helideck Balked Landing Distance EAPS OFF (Hp in meters)

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS





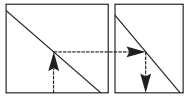
Wind Effect

Headwind Component [kts]	Distance Correction [m]
5	-15
10	-30
15	-45
20	-60
25	-75
30	-90
35	-105
40	-120

Figure 4I-6 Offshore Helideck Balked Landing Distance EAPS ON

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



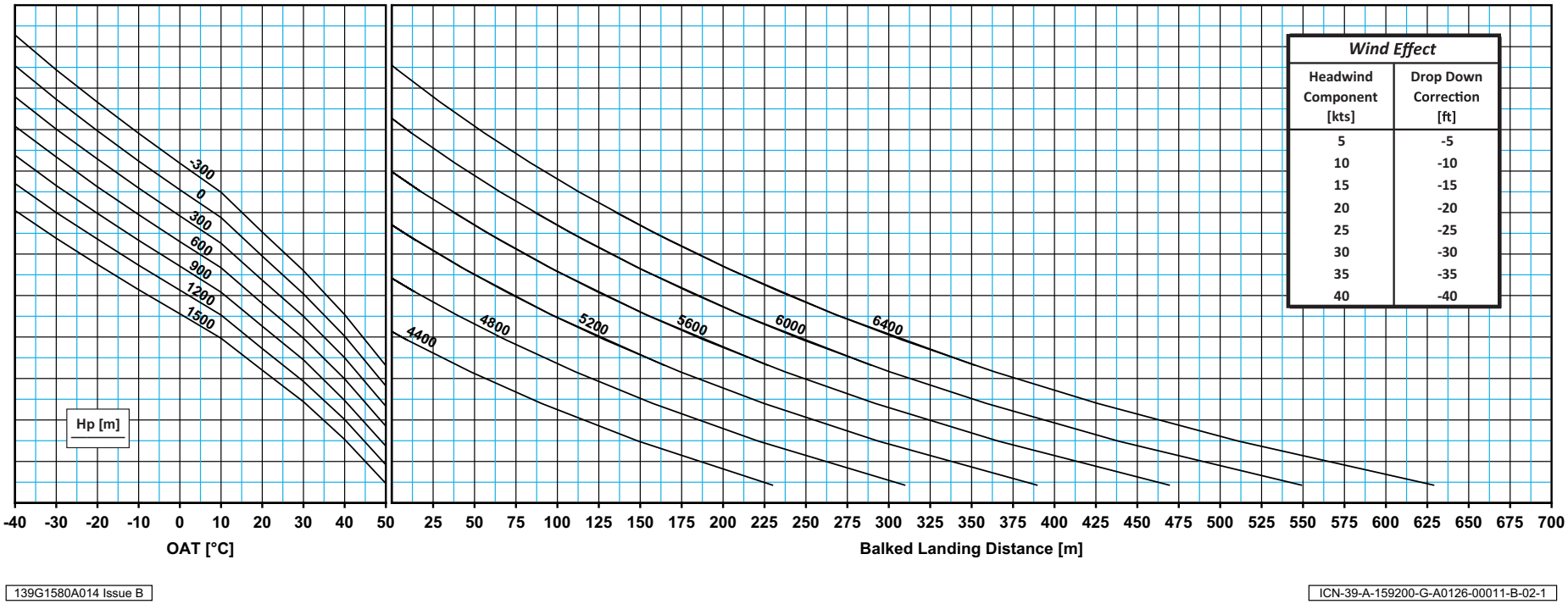


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Figure 4I-7 Offshore Helideck Balked Landing Distance EAPS ON (Hp in meters)

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

IBF INSTALLED
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{BLSS}: 40 KIAS

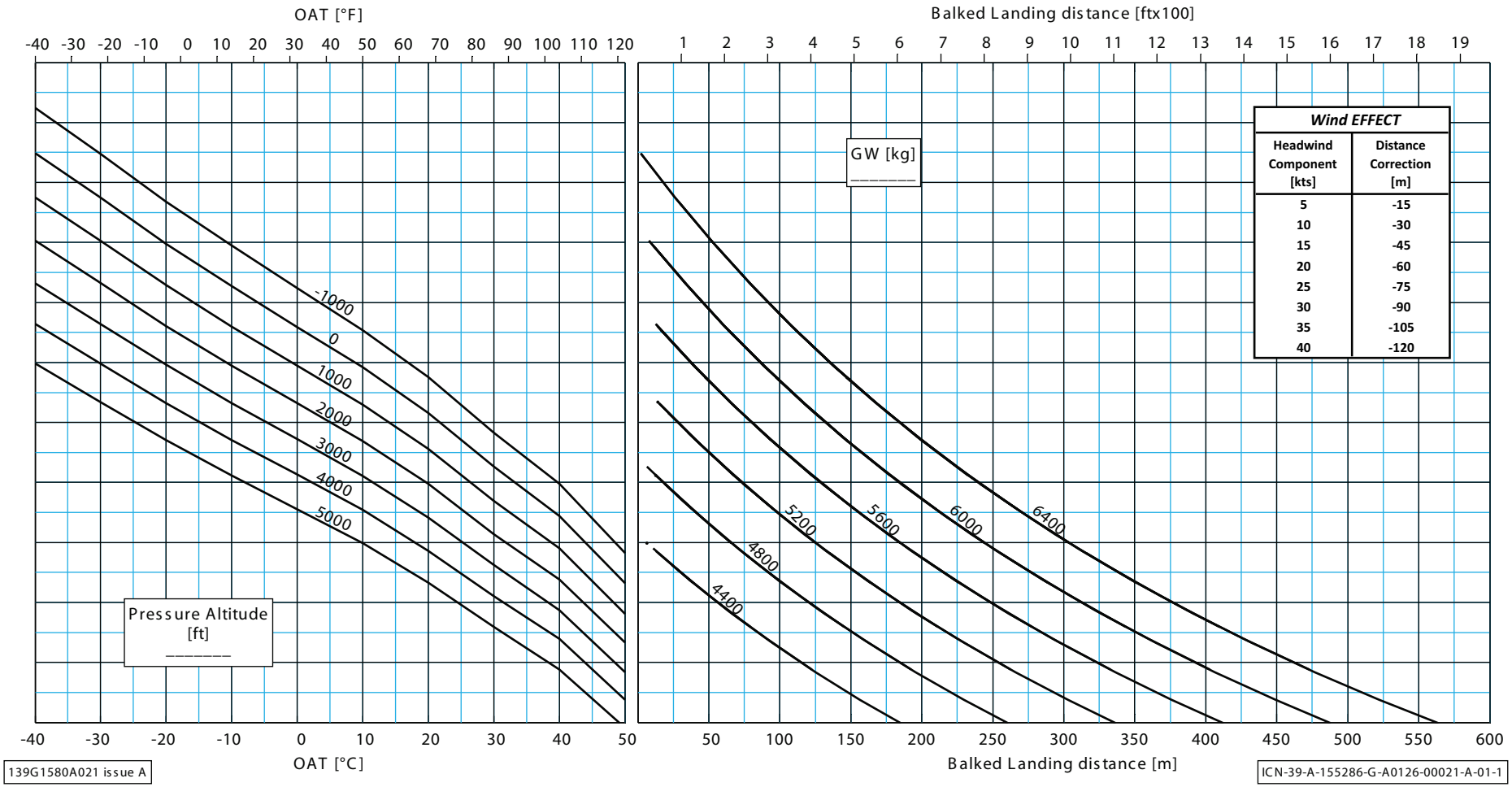

Figure 4I-8 Offshore Helideck Balked Landing Distance, IBF Installed

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PART J
CLEAR AREA LANDING PROCEDURES

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Part J
Clear Area Landing Procedures

SECTION 1J - LIMITATIONS

MINIMUM RUNWAY LENGTH

Minimum demonstrated runway length .... Figure 4J-2/1, Figure 4J-2/2
(Valid fo Clean Air Intake, EAPS ON and OFF and IBF Installed)

WEIGHT LIMITATIONS

Weight Limitation, clean engine air intake.....Figure 4F-1

Weight Limitation, EAPS OFF.....Figure 4F-2

Weight Limitation, EAPS ON.....Figure 4F-3

Weight Limitation, IBF Installed..... Figure 4F-3A

AIRSPEED LIMITATIONS

Balked Landing Safety Speed (V_{BLSS}).....50 KIAS

Best Rate of Climb Speed (V_Y) .....Below 10000 ft Hp 80 KIAS
(Below 3000 m Hp 80 KIAS)
..... Above 10000 ft Hp 70 KIAS
(Above 3000 m Hp 70 KIAS)

ALTITUDE LIMITATIONS

Maximum Altitude for CAT A Landing .....14000 ft (4300 m) Hp or Hd
whichever comes first

WIND LIMITATIONS

Maximum cross wind component must not exceed 20 kts (10 m/s).

Landing with tail wind component is prohibited.

SECTION 2J - NORMAL PROCEDURES

LANDING DECISION POINT (LDP)

Height ..... 50 ft (15 m) AGL

Airspeed .....50 KIAS

Rate of Descent .....Less than 350 ft/min

Note

Radio altimeter heights are shown in the flight path profiles.

LANDING FROM LEFT HAND SEAT

When landing is carried out from the left hand seat the right hand pilot should monitor engine and rotor parameters.

CLEAR AREA APPROACH AND LANDING PROCEDURE

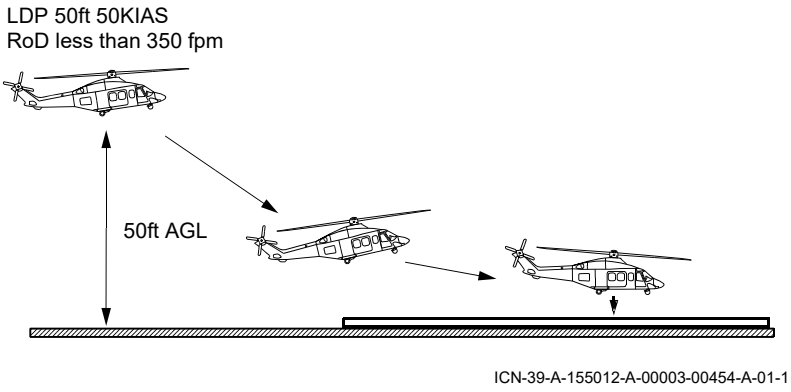

Figure 2J-1 Landing Profile

1. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.
2. Pre-landing checks — Complete.
3. AWG — NORMAL.

Note

When descending below 150 ft Rad Alt height a vocal message 'ONE FIFTY FEET' is activated regardless of the landing gear status. This message is suppressed if AWG switch is set to REGRADE.

4. LDG LT and LDG LT2 switches — As required.

5. Pilot Altimeter — Set QNH (landing surface elevation should be known).

6. HEATER (if used) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select HTR switch to OFF, note ITT decrease and confirm HEATER ON advisory extinguished.

ECS ENVIRO (if used) — Confirm SOV 1 & 2 switches selected to NORMAL.
Select ECS CONTROL switch to OFF and, if HEATER ON advisory illuminated, note ITT decrease and confirm HEATER ON advisory extinguished.

7. Rotor speed — Set 102%.

8. PARK BRAKE — Confirm released.

9. Initial point — Establish an approach to pass through 200 ft (60 m) AGL at a rate of descent of no more than 500 fpm. Initiate deceleration to achieve LDP, (50 ft (15 m) AGL) at 50 KIAS and rate of descent less than 350 ft/min.

10. Landing — Continue the deceleration and descent to a HIGE.

11. PARK BRAKE — As required.

12. LDG LT & LDG LT2 — OFF, if used.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the landing path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

SECTION 3J - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The procedures detailed herein only consider the failure of one engine in the Landing path and assume the pilot gives first priority to aircraft control and achieve a safe flight path.

For all Landing procedures the following shall be observed:

1. Engine failure prior to LDP — Recognition of engine failure prior to the LDP permits either a continuation of the approach and an OEI Landing **or** a Balked Landing to be carried out

2. Engine failure at or after LDP — Recognition of engine failure at or after the LDP dictates that the Landing be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

LANDING FROM LEFT HAND SEAT

When landing is carried out from the left hand seat the right hand seat pilot should call out rotor speed during the engine failure procedures.

EMERGENCY PROCEDURES FOR ENGINE FAILURES DURING LANDING APPROACH

SINGLE ENGINE FAILURE DURING LANDING PRIOR TO LDP (BALKED LANDING)

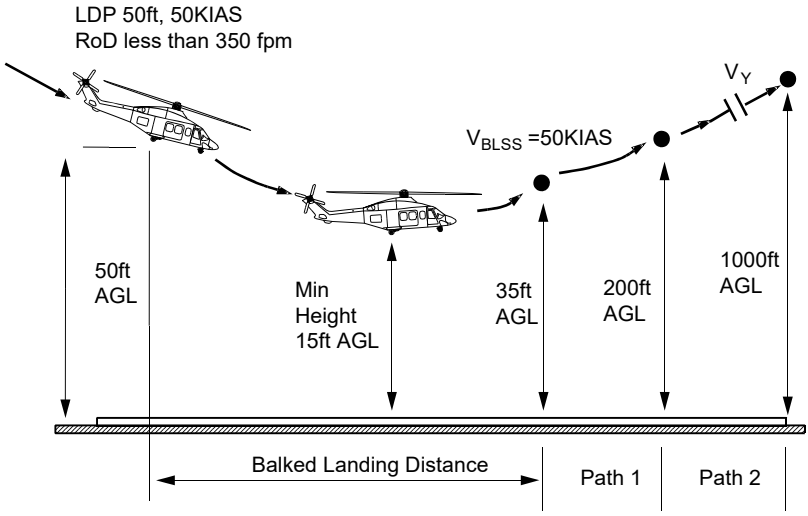

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Figure 3J-1 Clear Area Engine Failure Prior to LDP

1. Engine failure prior to LDP — Apply collective to control NR droop to a minimum of 90% and adjust pitch attitude to 5° nose up to initiate an acceleration to V_{BLSS} (50 KIAS).
   • When left hand pilot flying, right hand pilot call out rotor speed.

2. Climb	— When the aircraft achieves V_{BLSS} (50 KIAS) and a positive rate of climb, lower collective to recover NR to 102%. Continue climb to 200 ft (60 m) AGL with 2.5 min power.
3. At 200 ft (60 m) AGL	— Accelerate aircraft to Vy while climbing. After achieving Vy, continue to 1000 ft ATS reducing power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating.
4. Landing gear	— UP (when reaching V_y).
5. Rotor speed	— Select 100% at V_y.
6. At 1000 ft (300 m) AGL	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
7. LDG LT & LDG LT2 switches	— OFF, if used.
8. MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER LDP (OEI LANDING)

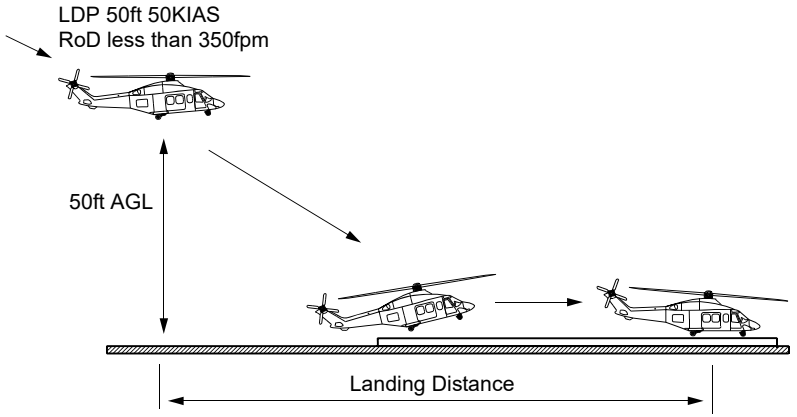

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Figure 3J-2 Clear Area Engine Failure at/after LDP

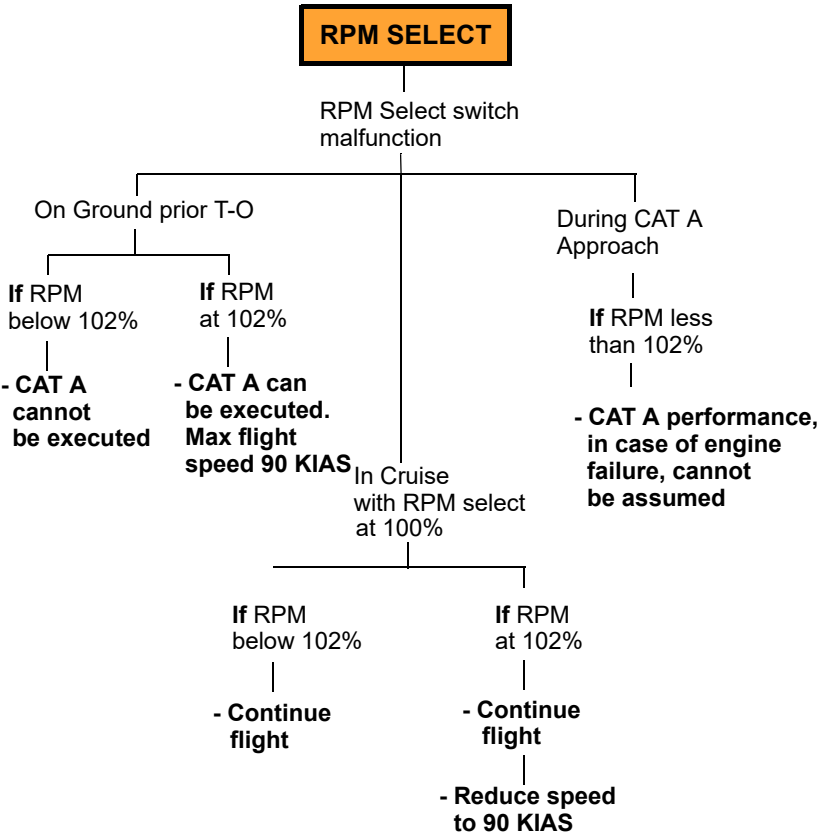
1. Collective/cyclic — Continue to landing point applying collective to control the rotor droop to a minimum or 90%NR and controlling the aircraft pitch attitude to decelerate the helicopter.
   • When left hand pilot flying, right hand pilot call out rotor speed.

2. Touchdown — At 20 ft (6 m) AGL apply collective to cushion the touchdown. At touchdown maximum nose up attitude 15° and maximum GS 30 kts (54 km/hr).

3. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG. Apply wheel brakes as required.
4. Engine	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
5. PARK BRAKE	— As required.
6. LDG LT & LDG LT2	— OFF, if used.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



SECTION 4J - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind components computation refer to Wind Component Chart (Figure 4K-4).

W.A.T. CHARTS

Clear Area WAT charts are shown in Figure 4F-1 to Figure 4F-3A.

LANDING DISTANCE OEI

The landing distance OEI is calculated from the Clear Area Landing Distance for a distance from LDP to touchdown, Figure 4J-2/1, and the braking distance from touchdown to stop, Figure 4J-2/2.

The Landing Distance to touchdown and the Braking Distance are added to give the total Landing Distance.

Example:

The Total Landing Distance distance required for the following weight and ambient conditions:

— Clean Aircraft

— Aircraft Weight = 6000 kg

— Pressure Altitude = 6000 ft

— OAT = +12° C

Solution:

Using chart Figure 4F-1 note that the aircraft weight and ambient conditions and inside the Clear Area W.A.T. curve so landing is permitted. Using chart Figure 4J-2/1, starting at the Pressure Altitude axis for 6000 ft move up to intersect the 12° C line (interpolated between 10° C and 20° C lines) then move right to intersect the 6000 kg line. From the intersect, drop down to the Distance axis and read 400 m.

Using chart Figure 4J-2/2 starting at the OAT axis for 12° C move vertically to intercept the Hp= 6000 ft curve. From the intercept move horizontally to the Gross Weight curve at 6000 kg. At this intercept drop down vertically to Braking Distance axis and read 35 m.

The Landing Distance is then calculated from:

Landing Distance to Touchdown + Braking Distance

= 400 + 35 = 435 m.

BALKED LANDING DISTANCE

The horizontal distance from the LDP to the point at which a minimum of 35 ft (10 m) is attained at V_{BLSS} and a positive OEI rate of climb is shown in Figure 4J-1 and is valid for Clean Air Intake, EAPS ON & OFF and IBF Installed.

TAKE-OFF FLIGHT PATH 1

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_{BLSS} = V_{TOSS} (50 KIAS) and 2.5 min power is shown in Figure 4F-10 to Figure 4F-33 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

The charts apply from the end of the Balked Landing distance to a height of 200 ft (60 m) AGL.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y and MCP OEI is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, air intake configurations and Headwind Component.

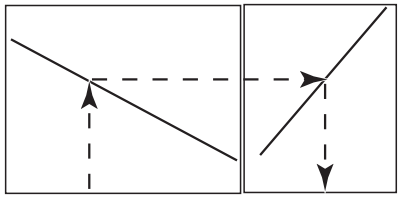
The charts apply from 200 ft (60 m) to 1000 ft (300 m) AGL.

CLIMB PERFORMANCE

Single Engine Rate Off Climb at V_Y

The ROC at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement if EAPS or IBF installed.

BALKED LANDING DISTANCE
CLEAR AREA



Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{LDP} 50 KIAS
RoD <350 ft/min

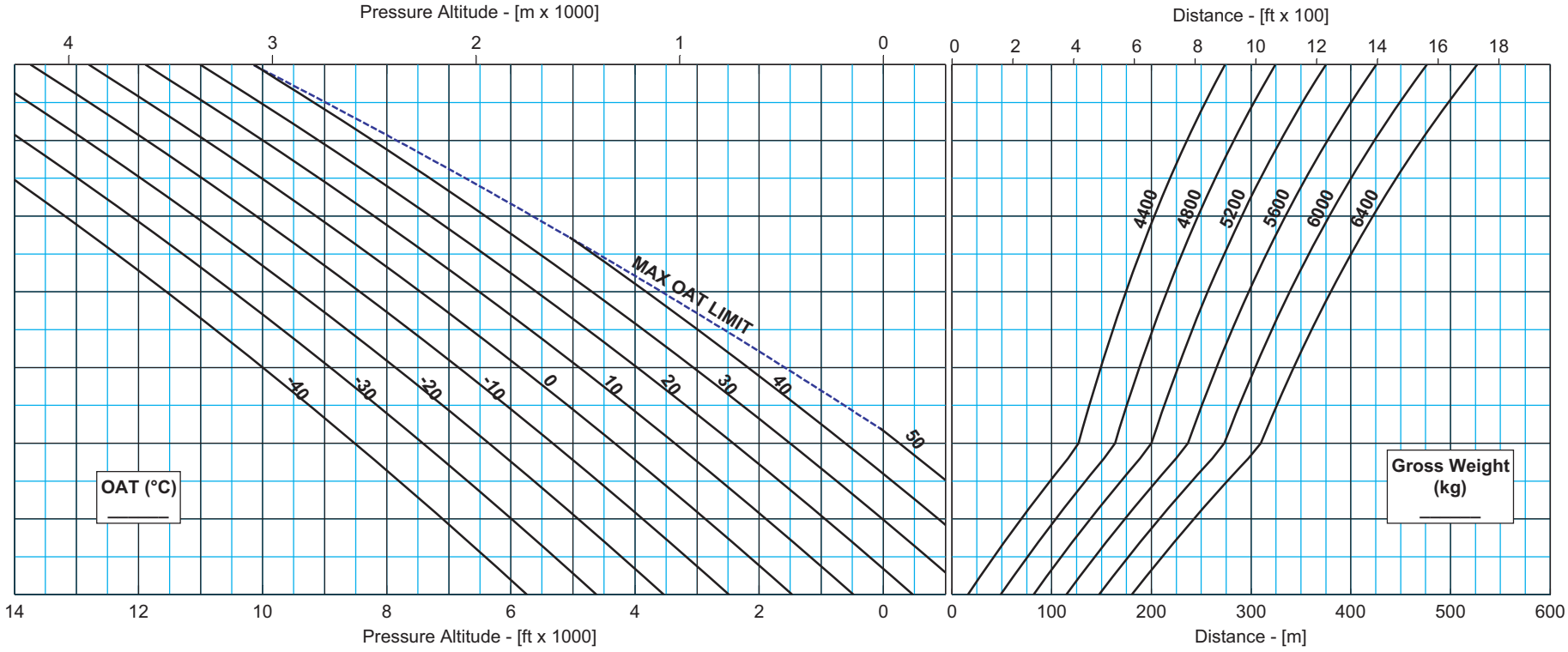


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Figure 4J-1 Clear Area Balked Landing Distance

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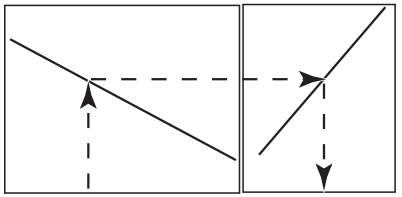
LANDING DISTANCE OEI
CLEAR AREA
from LDP to TOUCHDOWN

Clean Air Intake / EAPS OFF /EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{LDP} 50 KIAS
RoD <350 ft/min



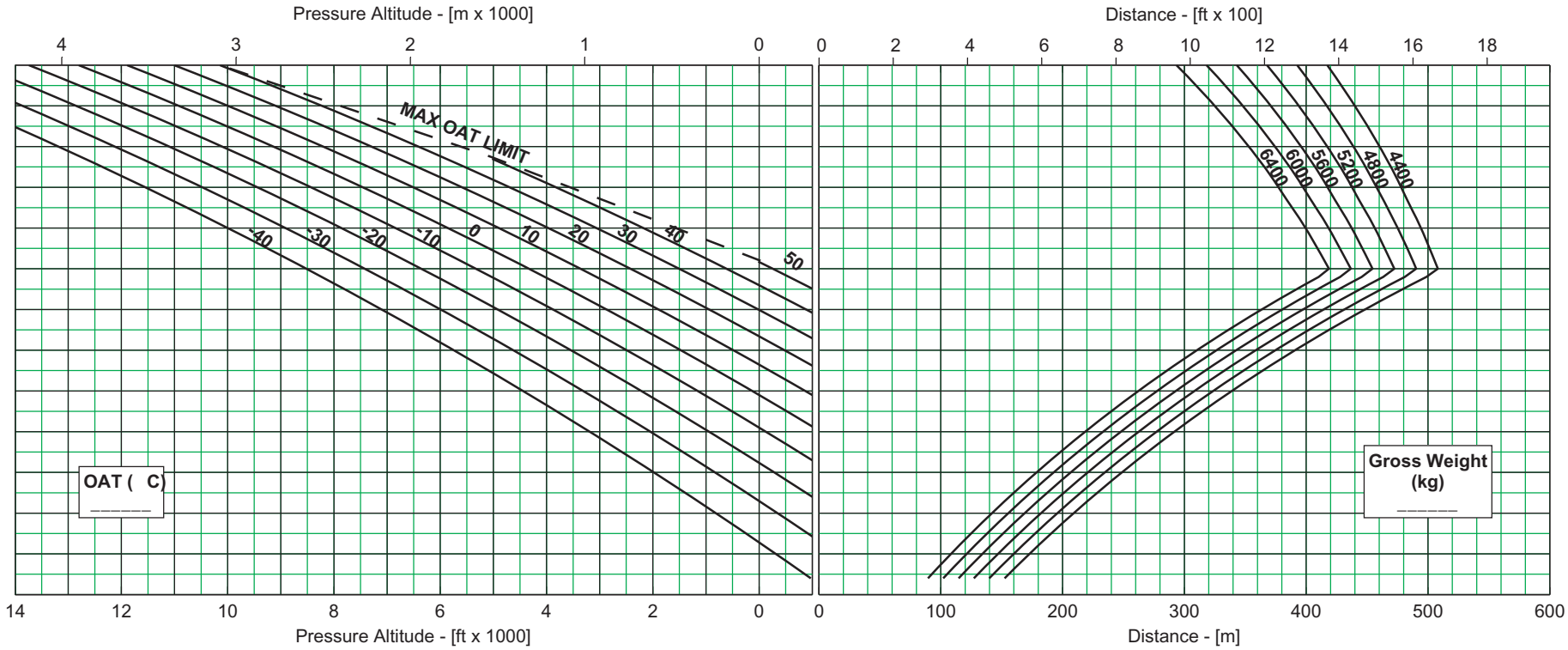


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Figure 4J-2/1 Clear Area Landing Distance OEI

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BRAKING DISTANCE
CLEAR AREA
from TOUCHDOWN to STOP

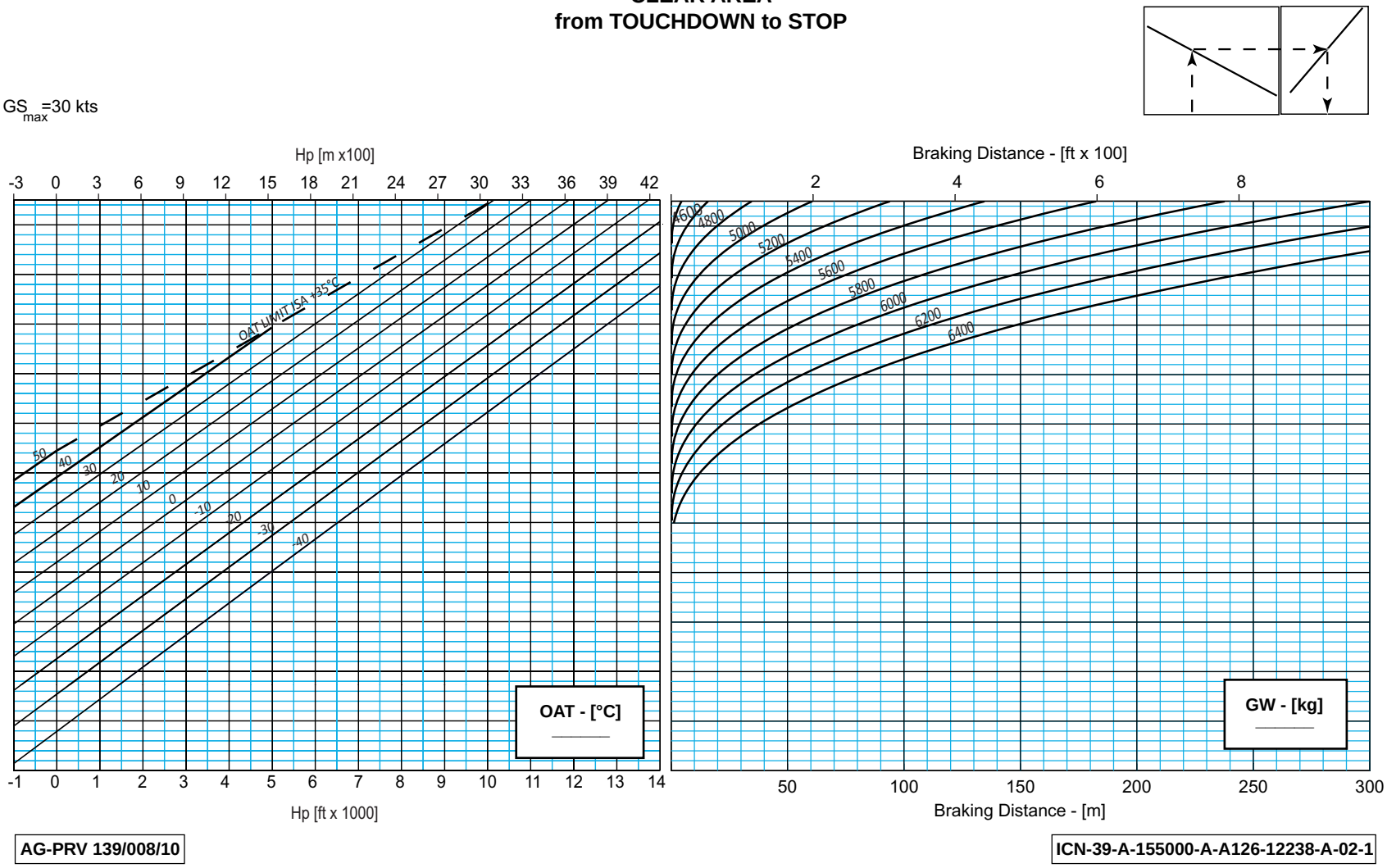

Figure 4J-2/2 Clear Area Landing Distance OEI

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COMMON PERFORMANCE

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Part K
Common Performance

SECTION 4K - PERFORMANCE DATA

This section includes performance data that is common for all CAT A procedures.

ENGINE POWER CHECKS

The purpose of the Engine Power Assurance Check is to provide a means of monitoring engine health. A HOVER power assurance check procedure for the CAT A rotor speed of 102% is provided. The procedure has to be used to check if engine power available is within the limits established for legitimate use of the CAT A Rotorcraft Flight Manual Performance. The charts in Figure 4K-2 and Figure 4K-3 may be used for the Hover Power Assurance check as detailed in Section 4 page 4-9 of the Basic RFM when the check is required to be carried out at a rotor speed of 102%.

WIND EFFECT

For crosswind and headwind components computation refer to Wind Component Chart (Figure 4K-4).

Example

Calculate Headwind and Crosswind component for a reported wind of 25 kts from 35° with respect to the helicopter heading.

Solution

Enter Wind Component Chart Figure 4K-4 at 25 kt on the Reported Wind Speed axis, proceed right following the curved lines to wind relative angle of 35°. At the intercept proceed horizontally right to Headwind Component axis and read 20 kts, from the intercept proceed vertically to Crosswind Component axis and read 14 kts.

TAKE-OFF FLIGHT PATH 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during an OEI climb at V_Y after Take-Off is shown in Figure 4K-5 to Figure 4K-28 for various altitudes, temperatures, weights, EAPS/IBF configurations and Headwind Components.

INFLUENCE OF TURNS DURING PATH 2 CLIMB

The performance data Figure 4K-5 to Figure 4K-28 apply to climbs without any significant bank angle. The following table shows the distance travelled for a 10 degree of heading change and reduction in height gain over a distance of 100 ft (30 m) in the Take-Off flight PATH 2 gradient. (valid for all combinations of gross weight, altitude, OAT and EAPS/IBF configurations).

CAUTION

Do not apply any headwind component correction.

EFFECT OF TURN ON PATH 2

Bank Angle	15°	30°
Gradient correction	-3 ft	-9 ft
Distance travelled for 10° of Heading change	566 ft 172 m	262 ft 80 m

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Figure 4K-1 Effect of Turn on PATH 2

CAUTION

If, after correction, the resullting gradient is less than 2 ft the minimum required climb gradient for PATH 2 (150 ft/min) may not be achieved.

Example

Calculate the following:

- Climb Gradient for straight climb
- Climb Gradient for Bank turn climb of 15° for a total heading change of 35° and the distance travelled from the comencement of the turning point.

Data

— Take Off weight = 5600 kg

— Altitude = 4000 ft Hp

— Temperature = 15° C

— Headwind Component = 10 kts

— Configuration = Clean Air Intake

Solution

- Straight Climb - Using the Take Off Flight PATH 2 Gradient Maximum Continuous Power OEI chart, Figure 4K-8, on the Pressure Altitude axis from 4000 ft move right to intercept the 15° C line (interpolated between 10° C and 20°C). drop down to the junction of the two graphs. Follow the Headwind Component curves until intercepting the 10 kts line, drop vertically from this point to Mean Height Gained in 100 ft of **13 ft**.
- Bank Turn in Climb - Using the Take Off Flight PATH 2 Gradient Maximum Continuous Power OEI chart, Figure 4K-8, on the Pressure Altitude axis from 4000 ft move right to intercept the 15° C line (interpolated between 10° C and 20° C). drop down to the junction of the two graphs. Drop vertically from this point to Mean Height Gained in 100 ft of 11.5 ft. (Headwind Component benefit cannot be applied for turns during PATH 2 climb).

Using the Effect of Turn on PATH 2 Gradient table, Figure 4K-1, from Distance Correction row move right to Bank Angle of 15° read -3 ft. Correcting the Mean Height Gained in 100 ft:

11.5 - 3 = 8.5 ft

To calculate distance covered in 35° of heading change, from Distance Travelled in 10° of Heading Change row move right to Bank Angle of 15° read 566 ft. To get distance in 35° of heading change multiply by 3.5.

566 x 3.5 = 2096 ft

POWER ASSURANCE CHECK in HOVER FLIGHT (NR=102%)

HEATER/COND OFF
GENERATOR LOAD TO MINIMUM (BELOW 17%)
SET NR to 102%
TEST ENGINE MODE SWITCH: FLIGHT
OTHER ENGINE MODE SWITCH: IDLE
INCREASE COLLECTIVE UNTIL LIGHT ON WHEELS OR HOVERING AT 5 FEET, NOSE ON WIND. DO NOT EXCEED 775°C ITT OR 102.4% NG OR 105% TQ
STABILIZE POWER 1 MINUTE, THEN RECORD OAT, PRESSURE ALTITUDE, ENGINE TORQUE, ITT AND NG
ENTER CHART AT INDICATED TQ, MOVE DOWN TO INTERSECT PRESSURE ALTITUDE, PROCEED TO THE RIGHT TO INTERSECT OAT,
THEN MOVE UP TO READ VALUES FOR MAXIMUM ALLOWABLE ITT AND NG
IF INDICATED ITT OR NG EXCEEDS MAXIMUM ALLOWABLE, REPEAT CHECK
REPEAT CHECK USING OTHER ENGINE
IF EITHER ENGINE EXCEEDS ALLOWABLE ITT OR NG, PUBLISHED PERFORMANCE MAY NOT BE ACHIEVABLE. REFER TO EMM

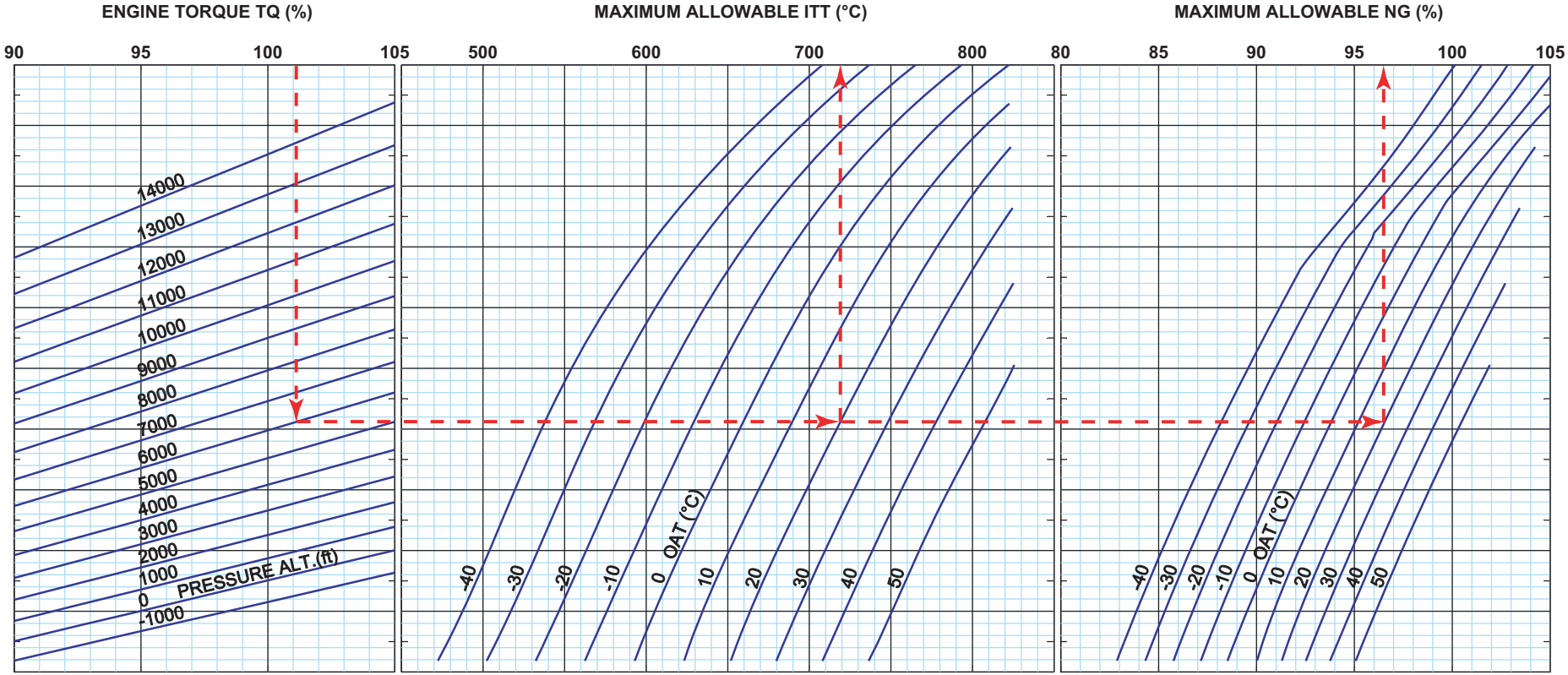

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Figure 4K-2 Power Assurance Check

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POWER ASSURANCE CHECK in HOVER FLIGHT (NR=102%)
EAPS INSTALLED

EAPS ON
HEATER/COND OFF
GENERATOR LOAD TO MINIMUM (BELOW 17%)
SET NR to 102%
TEST ENGINE MODE SWITCH: FLIGHT
OTHER ENGINE MODE SWITCH: IDLE
INCREASE COLLECTIVE UNTIL LIGHT ON WHEELS OR HOVERING AT 5 FEET, NOSE ON WIND. DO NOT EXCEED 775°C ITT OR 102.4% NG OR 105% TQ
STABILIZE POWER 1 MINUTE, THEN RECORD OAT, PRESSURE ALTITUDE, ENGINE TORQUE, ITT AND NG
ENTER CHART AT INDICATED TQ, MOVE DOWN TO INTERSECT PRESSURE ALTITUDE, PROCEED TO THE RIGHT TO INTERSECT OAT,
THEN MOVE UP TO READ VALUES FOR MAXIMUM ALLOWABLE ITT AND NG
IF INDICATED ITT OR NG EXCEEDS MAXIMUM ALLOWABLE, REPEAT CHECK
REPEAT CHECK USING OTHER ENGINE
IF EITHER ENGINE EXCEEDS ALLOWABLE ITT OR NG, PUBLISHED PERFORMANCE MAY NOT BE ACHIEVABLE. REFER TO EMM

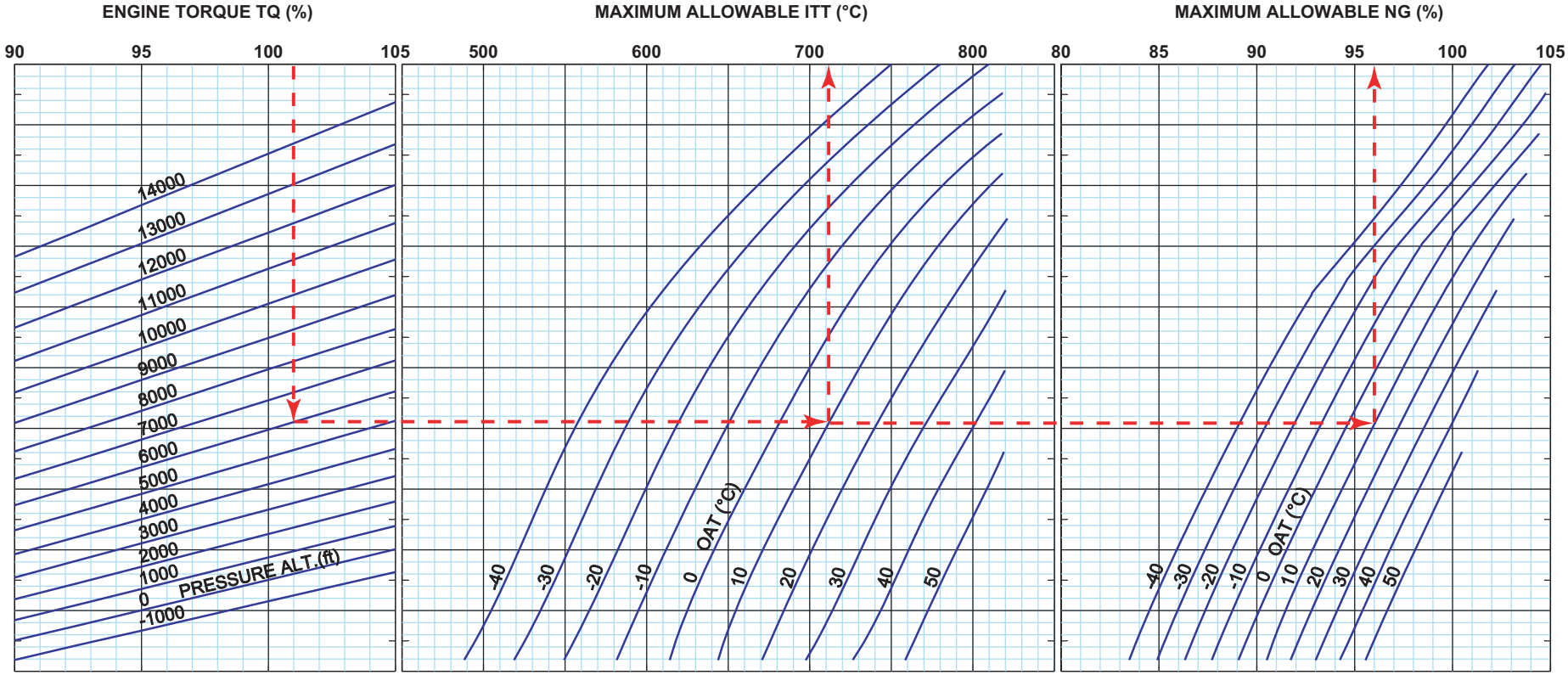

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Figure 4K-3 Power Assurance Check, EAPS ON

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WIND COMPONENT CHART

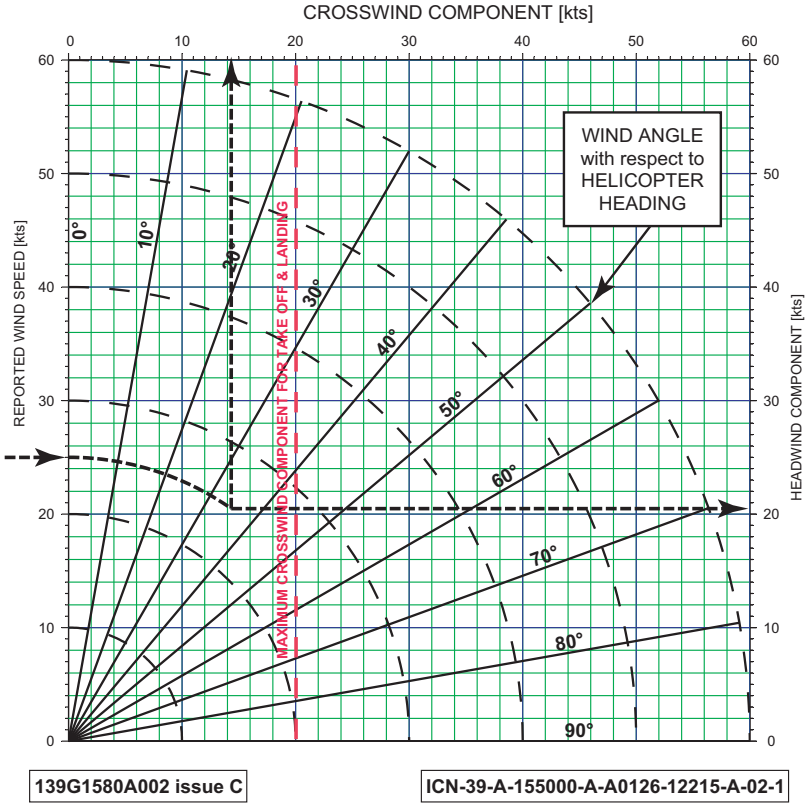

Figure 4K-4 Wind Component Chart

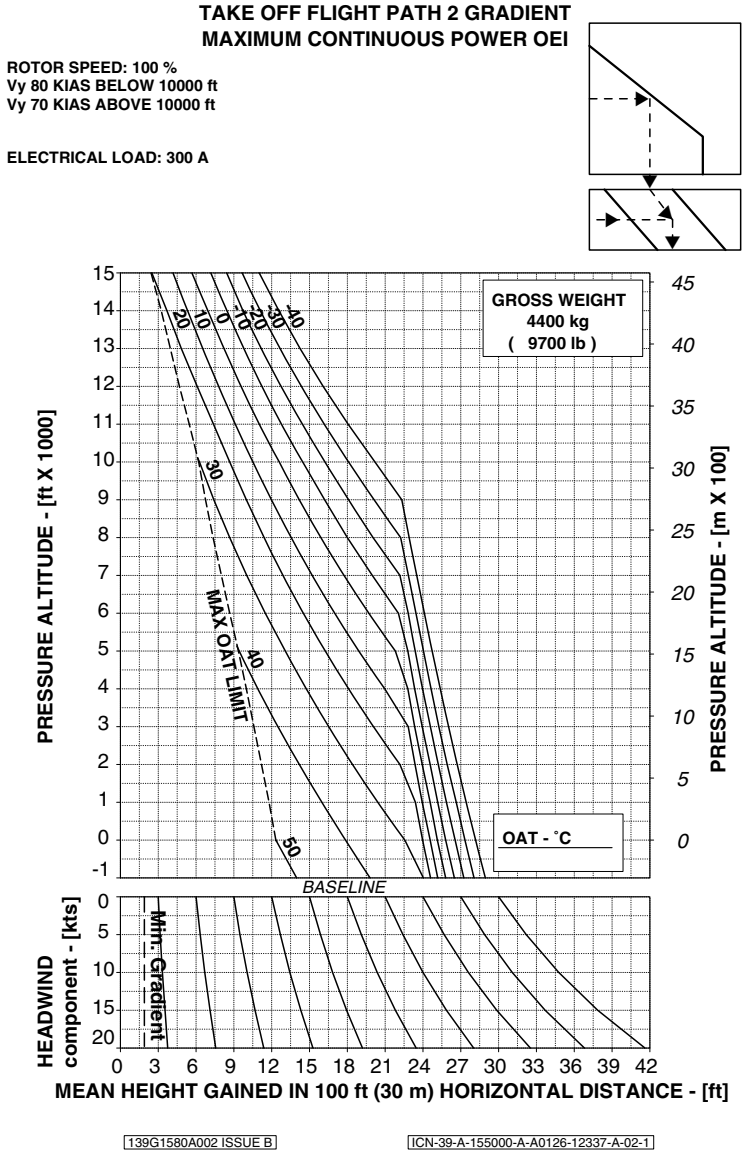

Figure 4K-5 PATH 2 Gradient Gross Weight 4400 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
VY 80 KIAS

ELECTRICAL LOAD: 300 A

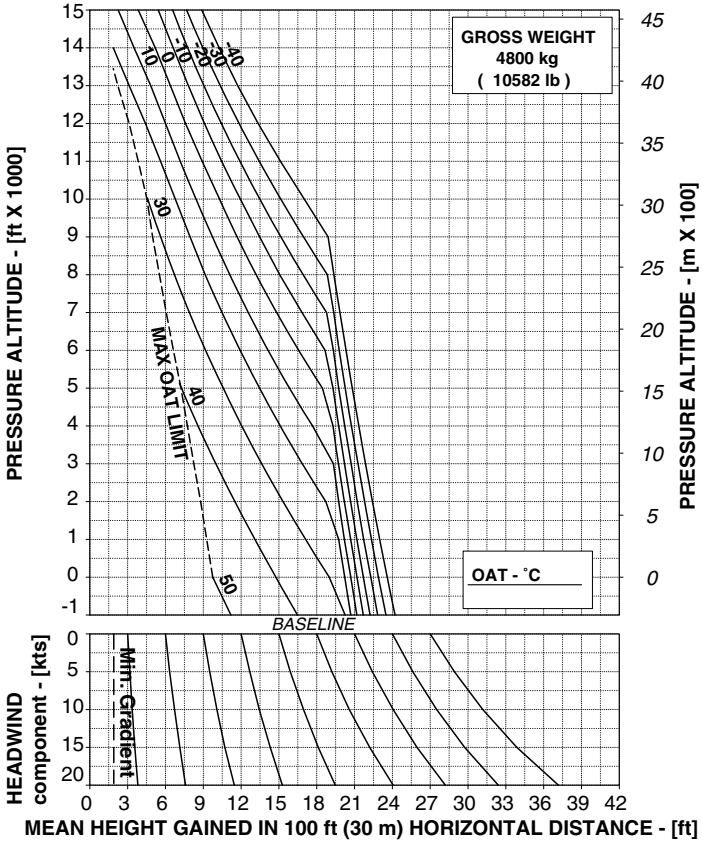

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Figure 4K-6 PATH 2 Gradient Gross Weight 4800 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

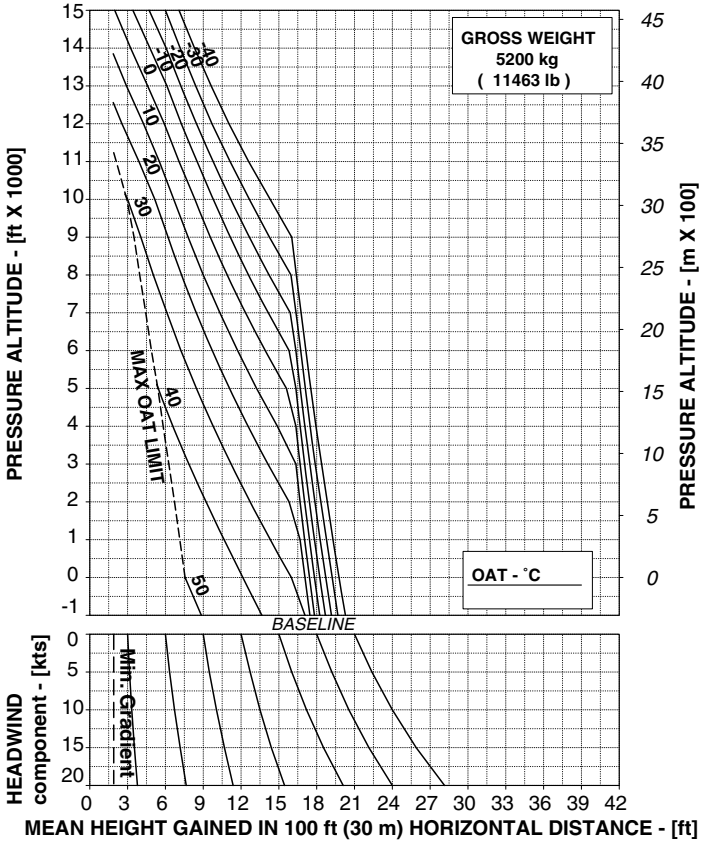

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Figure 4K-7 PATH 2 Gradient Gross Weight 5200 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

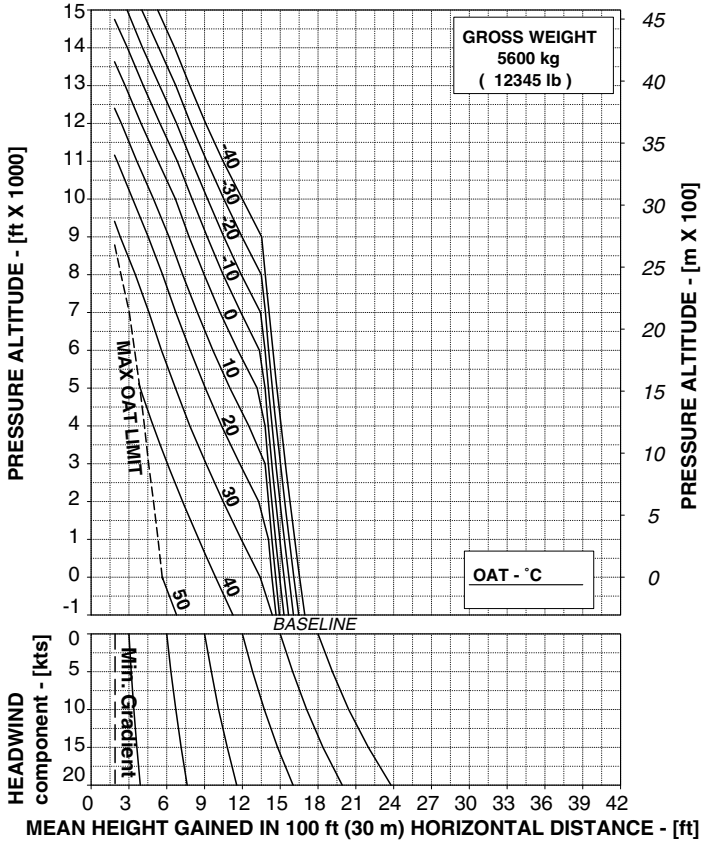

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Figure 4K-8 PATH 2 Gradient Gross Weight 5600 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

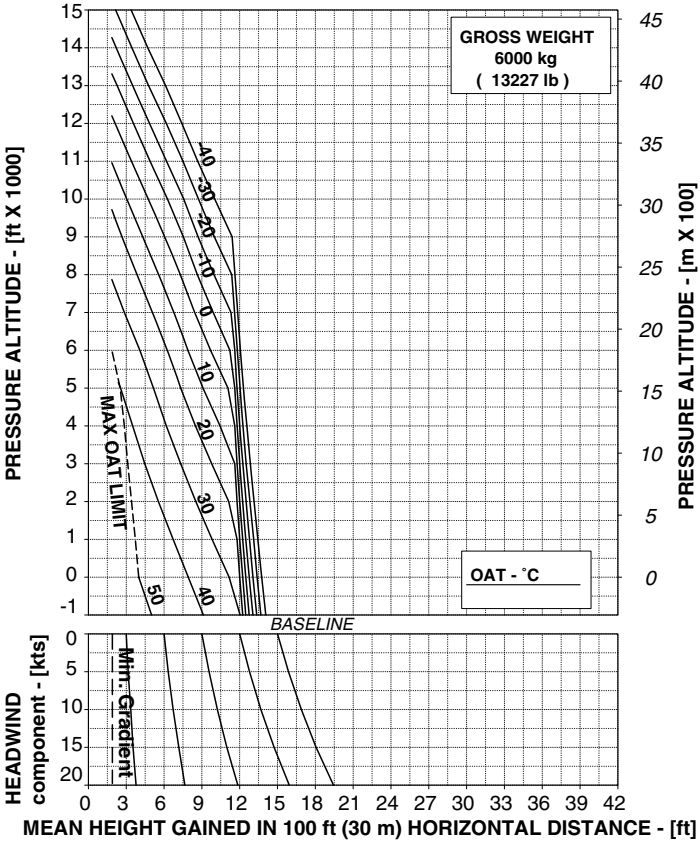

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Figure 4K-9 PATH 2 Gradient Gross Weight 6000 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

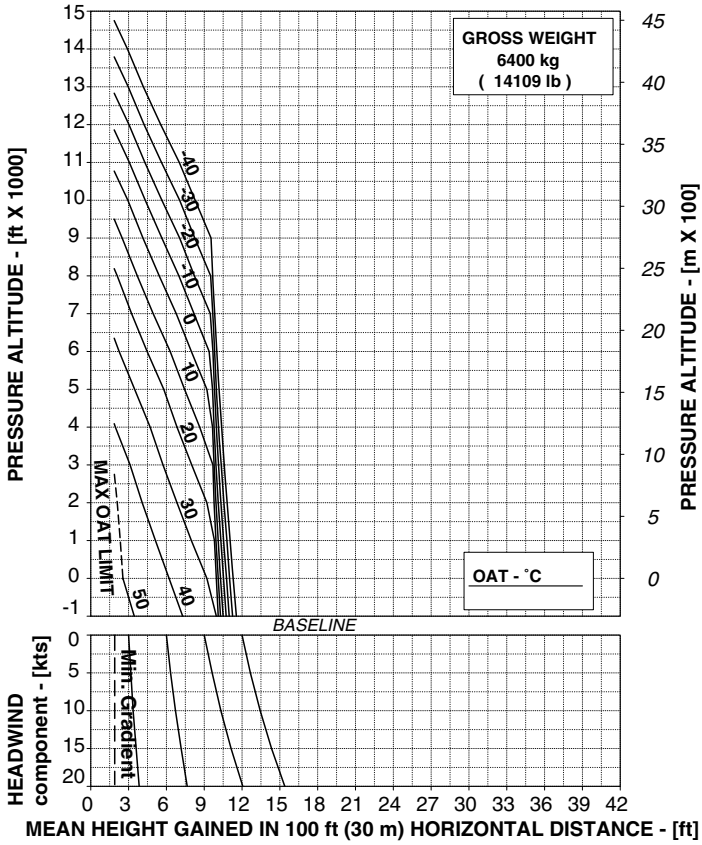

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Figure 4K-10 PATH 2 Gradient Gross Weight 6400 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft
EAPS: OFF

ELECTRICAL LOAD: 300 A

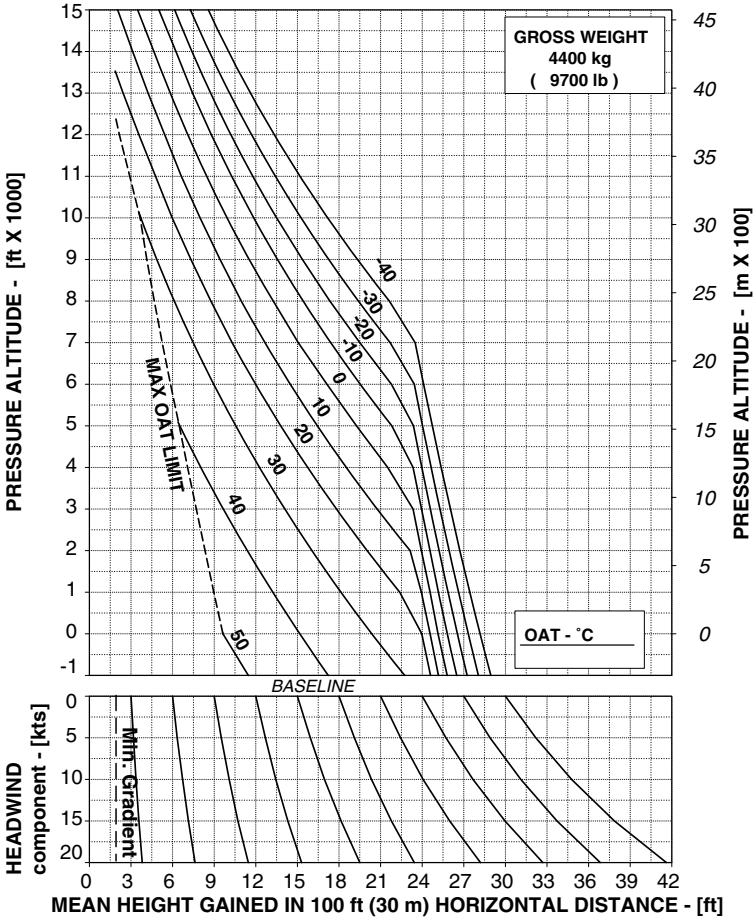

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Figure 4K-11 PATH 2 Gradient Gross Weight 4400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %

Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: OFF

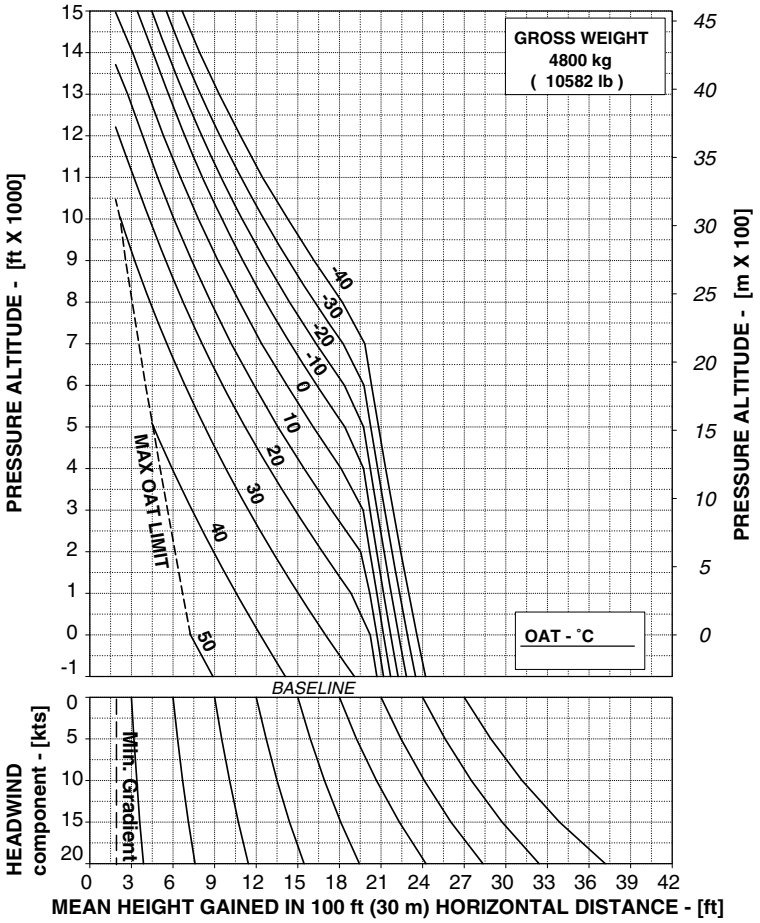

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Figure 4K-12 PATH 2 Gradient Gross Weight 4800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: OFF

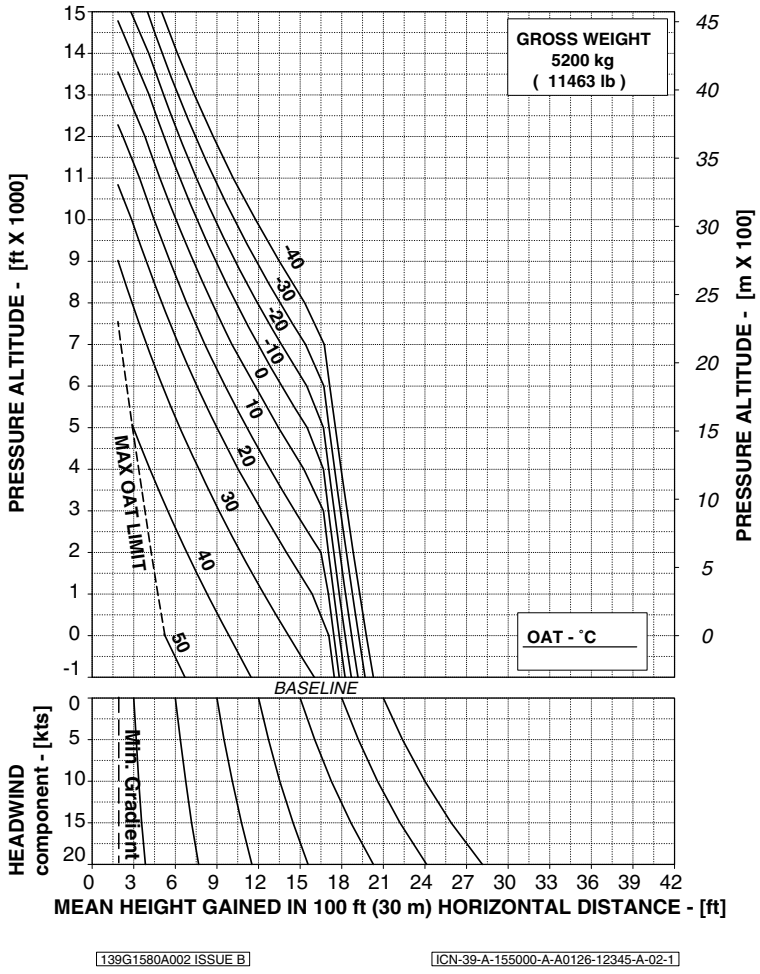

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Figure 4K-13 PATH 2 Gradient Gross Weight 5200 kg, EAPS OFF

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: OFF

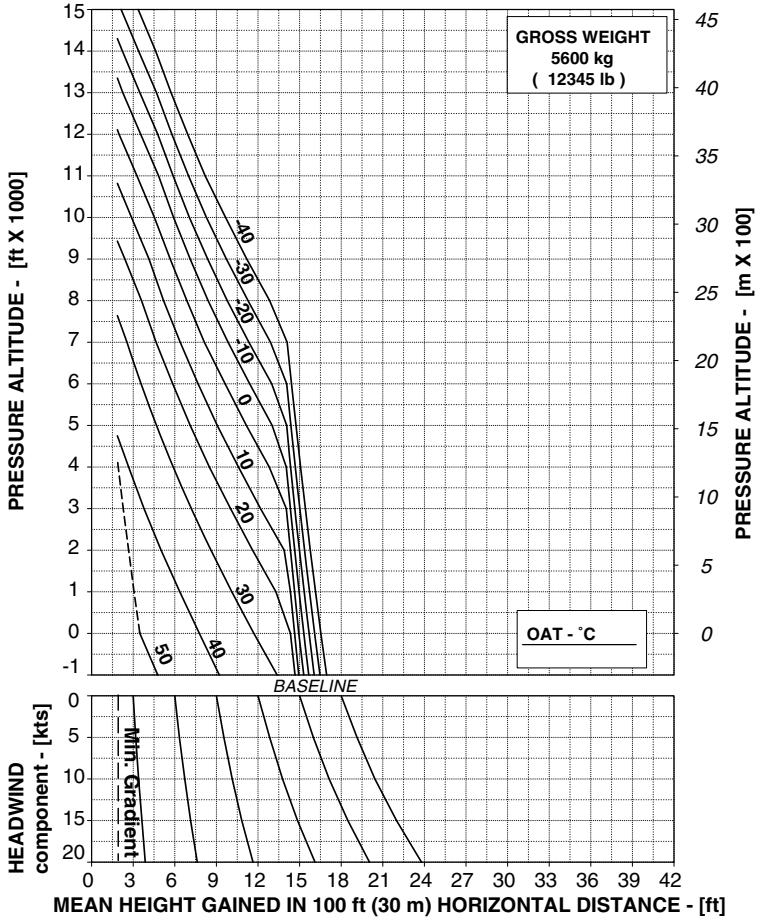

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Figure 4K-14 PATH 2 Gradient Gross Weight 5600 kg, EAPS OFF

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %

Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: OFF

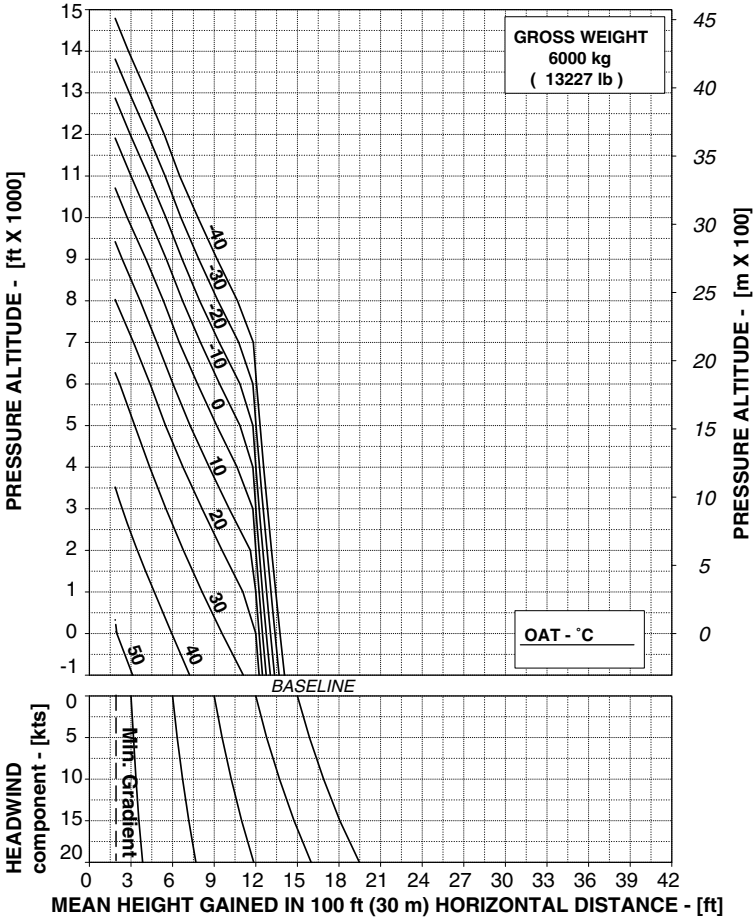

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Figure 4K-15 PATH 2 Gradient Gross Weight 6000 kg, EAPS OFF

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: OFF

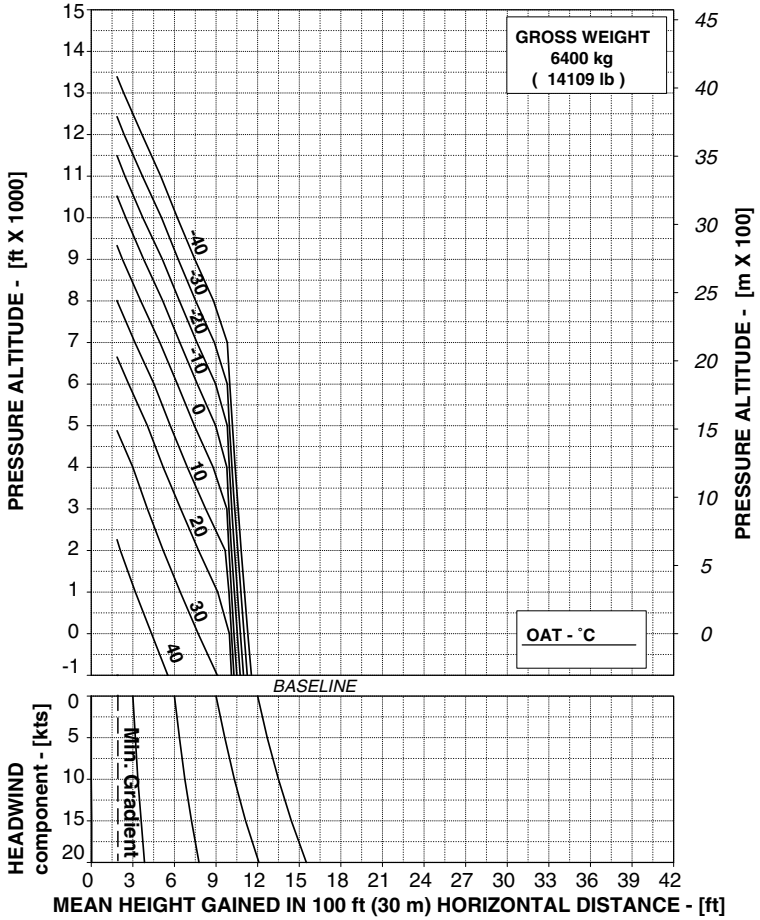

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Figure 4K-16 PATH 2 Gradient Gross Weight 6400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: ON

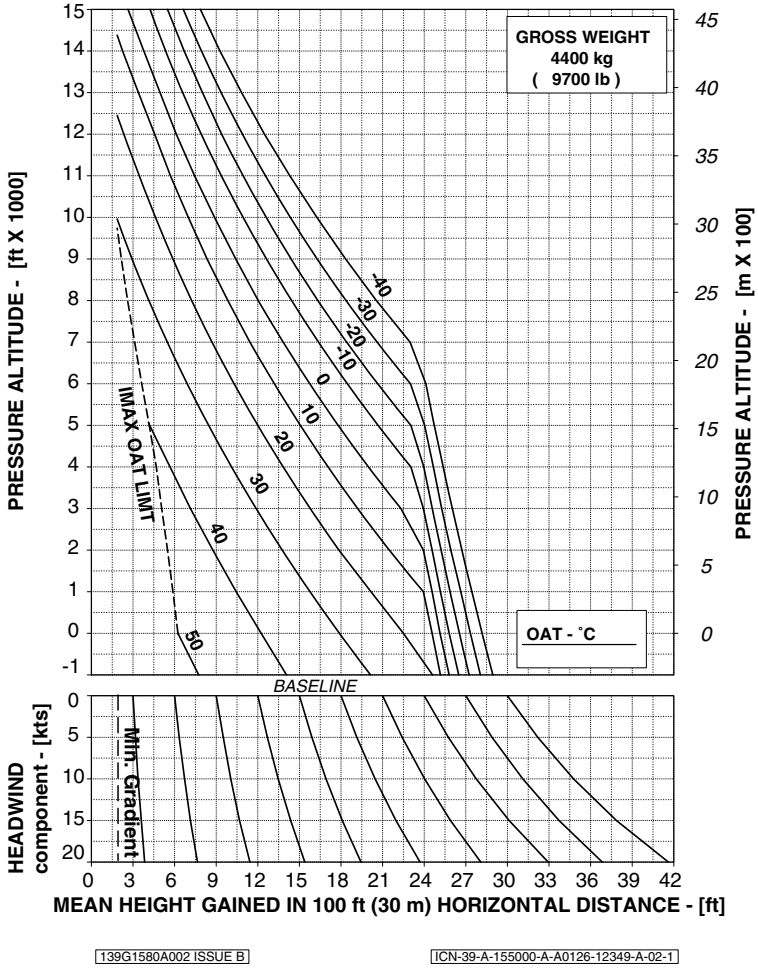

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Figure 4K-17 PATH 2 Gradient Gross Weight 4400 kg, EAPS ON

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: ON

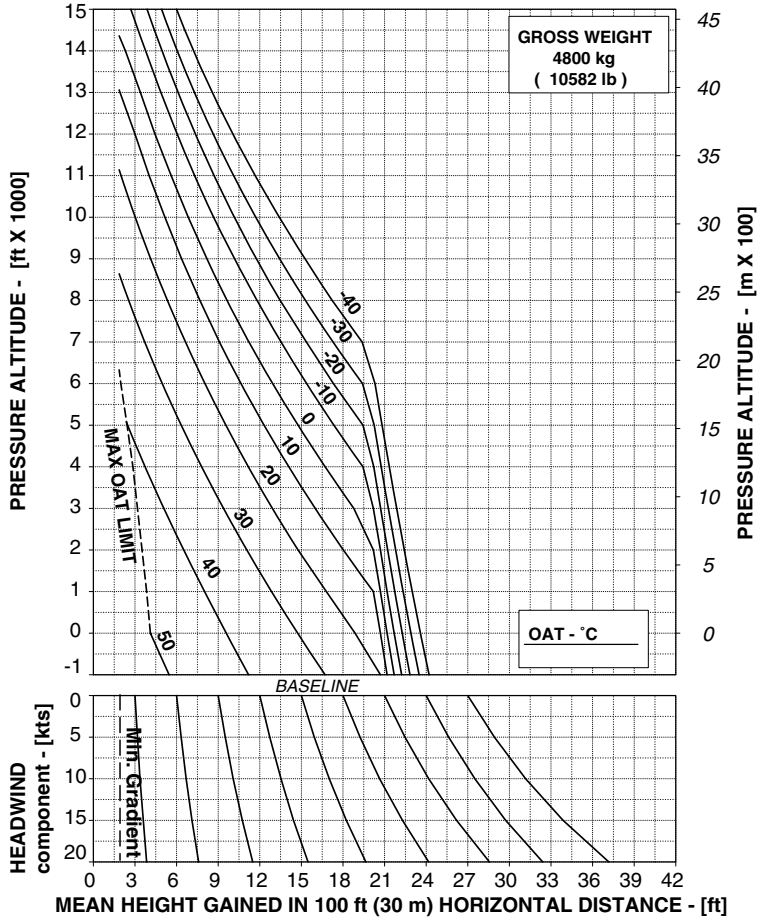

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Figure 4K-18 PATH 2 Gradient Gross Weight 4800 kg, EAPS ON

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: ON

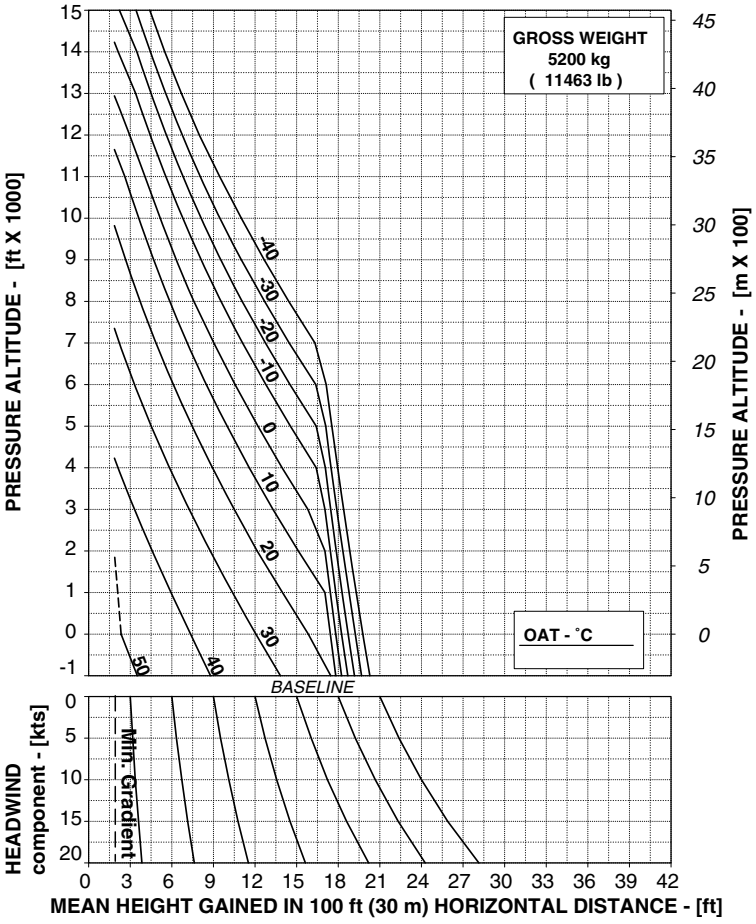

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Figure 4K-19 PATH 2 Gradient Gross Weight 5200 kg, EAPS ON

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: ON

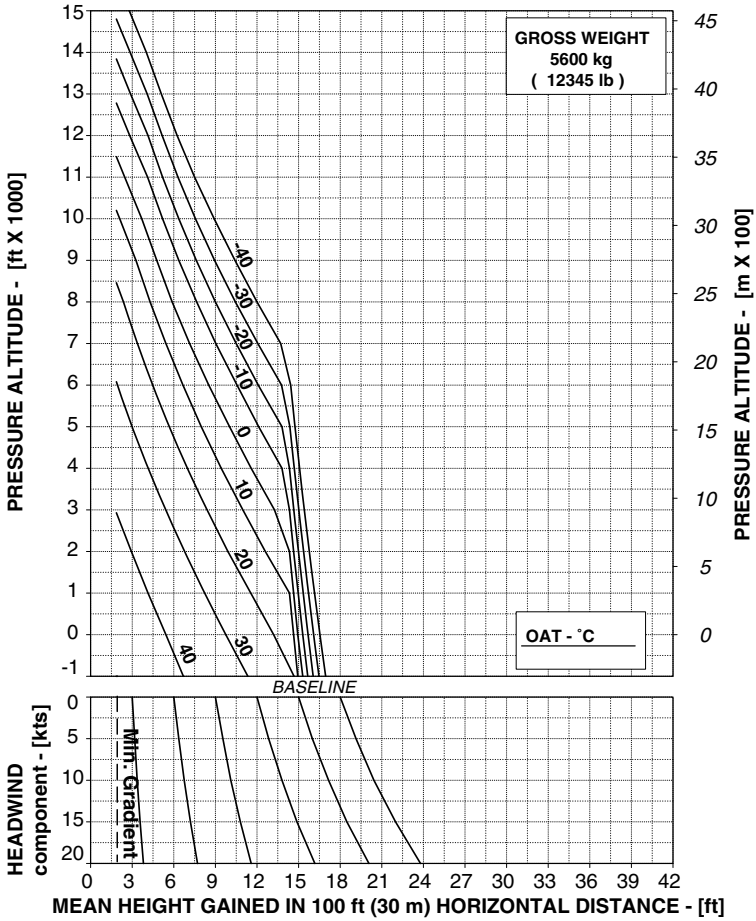

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Figure 4K-20 PATH 2 Gradient Gross Weight 5600 kg, EAPS ON

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: ON

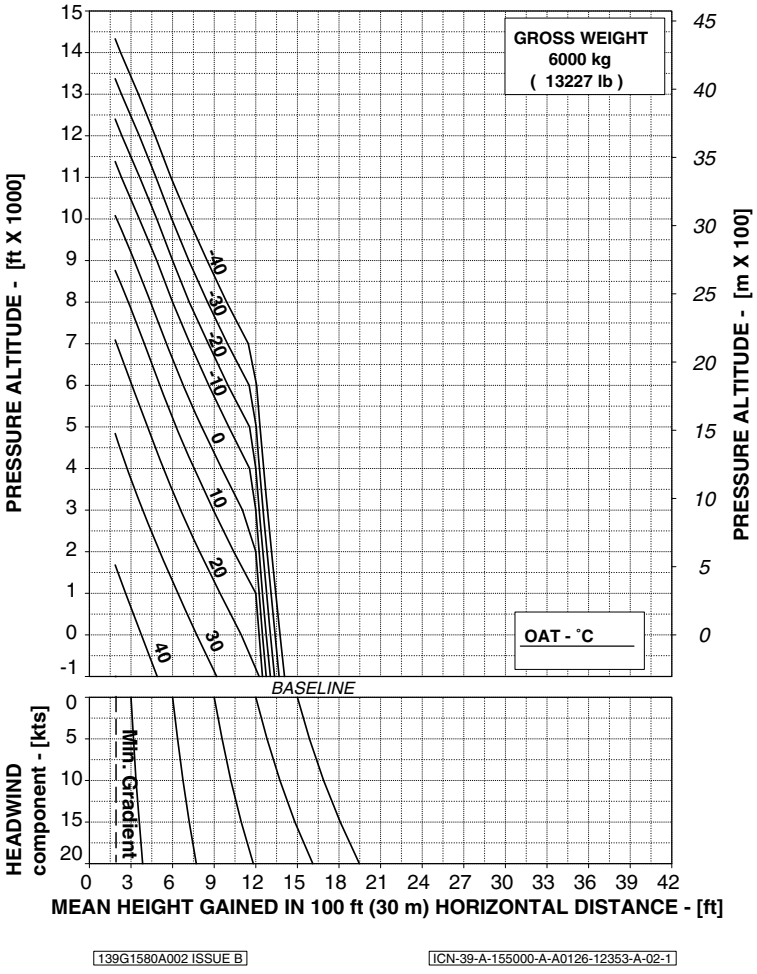

Figure 4K-21 PATH 2 Gradient Gross Weight 6000 kg, EAPS ON

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %

Vy 80 KIAS BELOW 10000 ft
Vy 70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

EAPS: ON

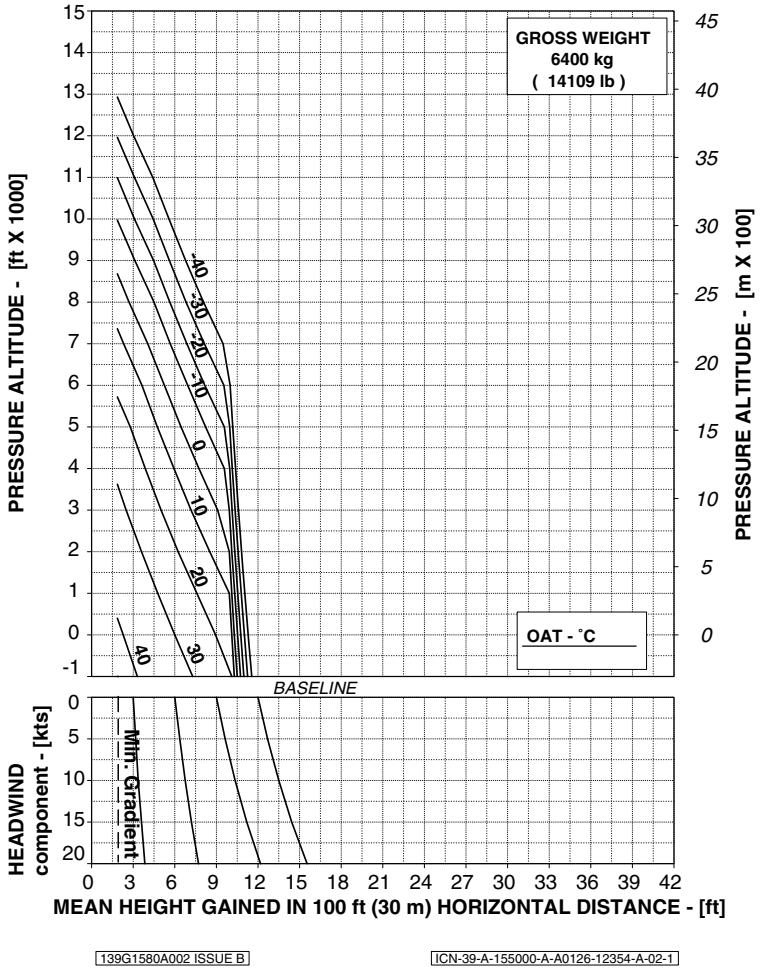

Figure 4K-22 PATH 2 Gradient Gross Weight 6400 kg, EAPS ON

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

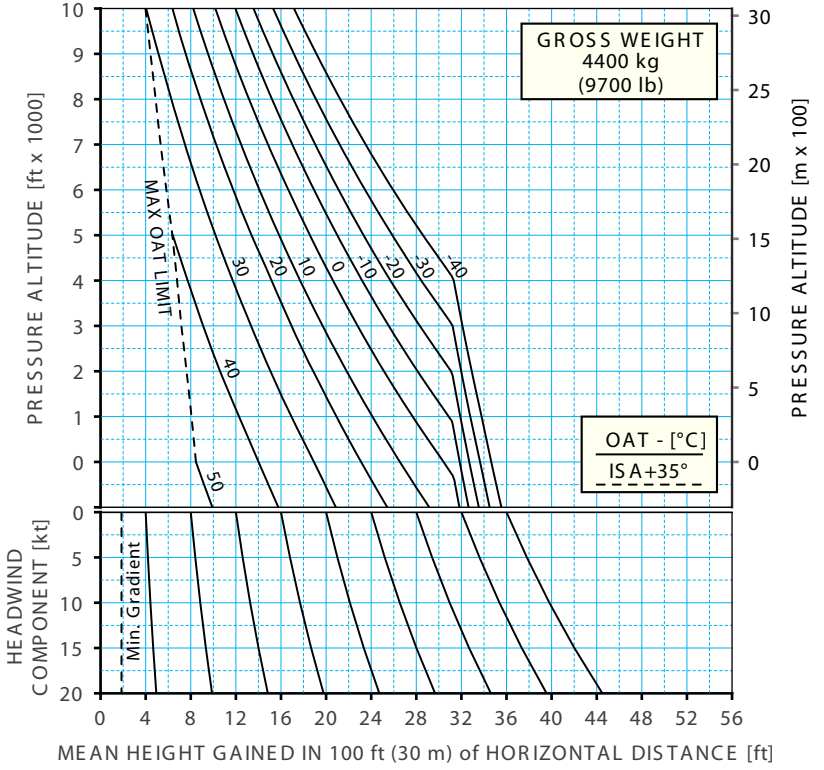

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Figure 4K-23 PATH 2 Gradient Gross Weight 4400 kg, IBF Installed

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

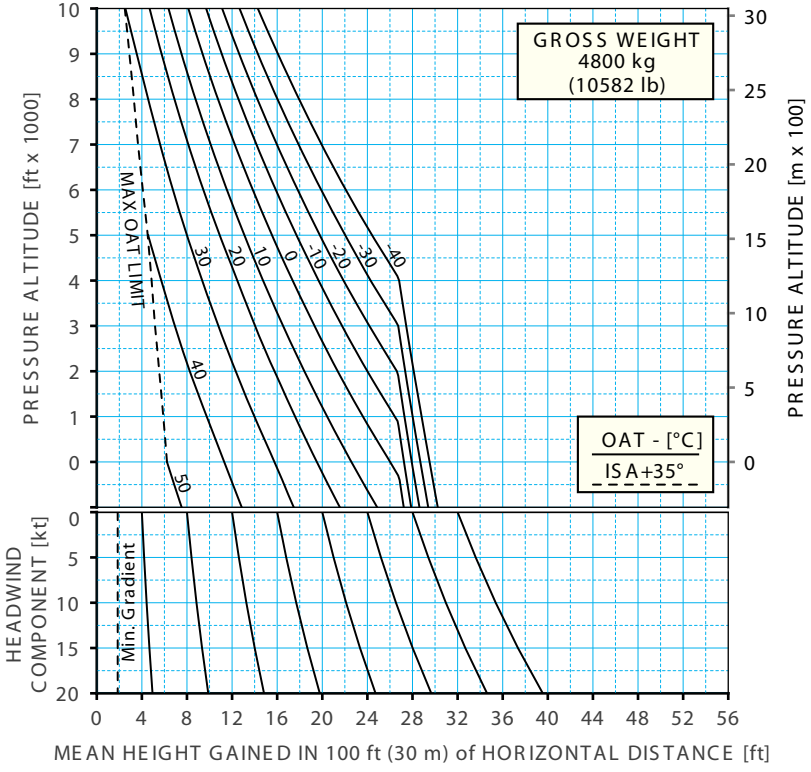

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Figure 4K-24 PATH 2 Gradient Gross Weight 4800 kg, IBF Installed

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

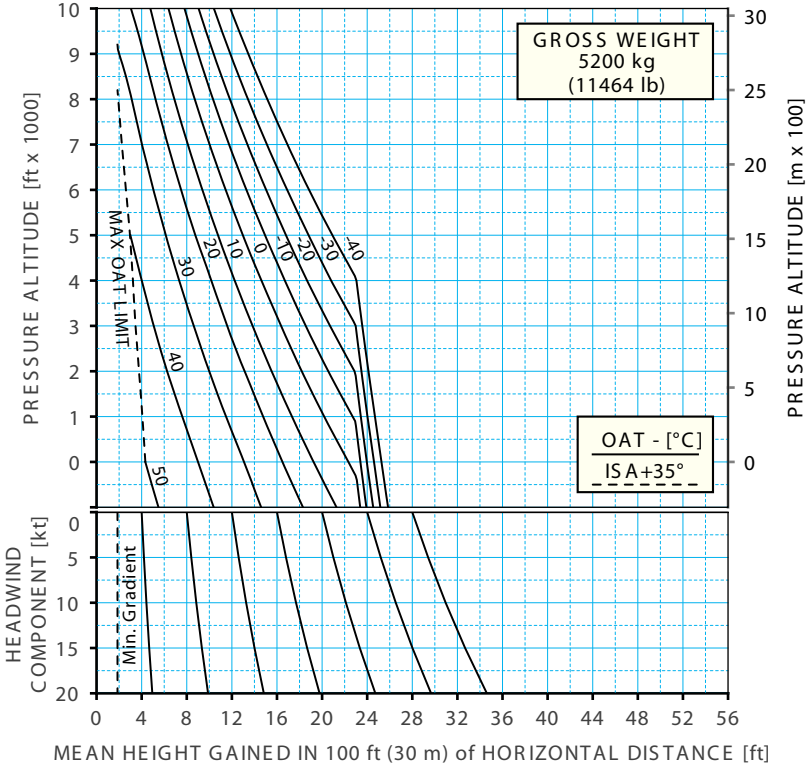

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Figure 4K-25 PATH 2 Gradient Gross Weight 5200 kg, IBF Installed

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

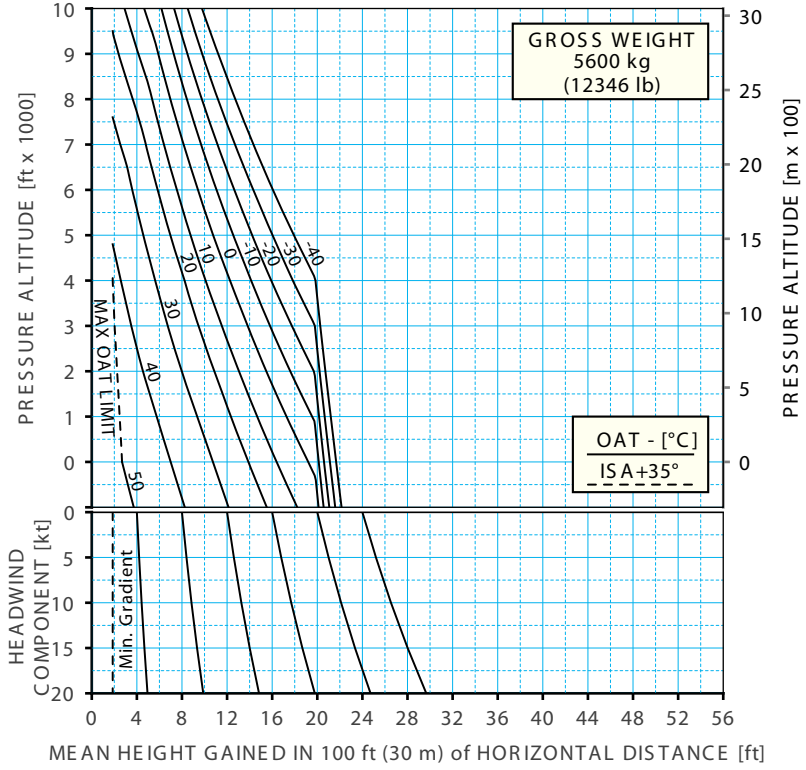

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Figure 4K-26 PATH 2 Gradient Gross Weight 5600 kg, IBF Installed

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

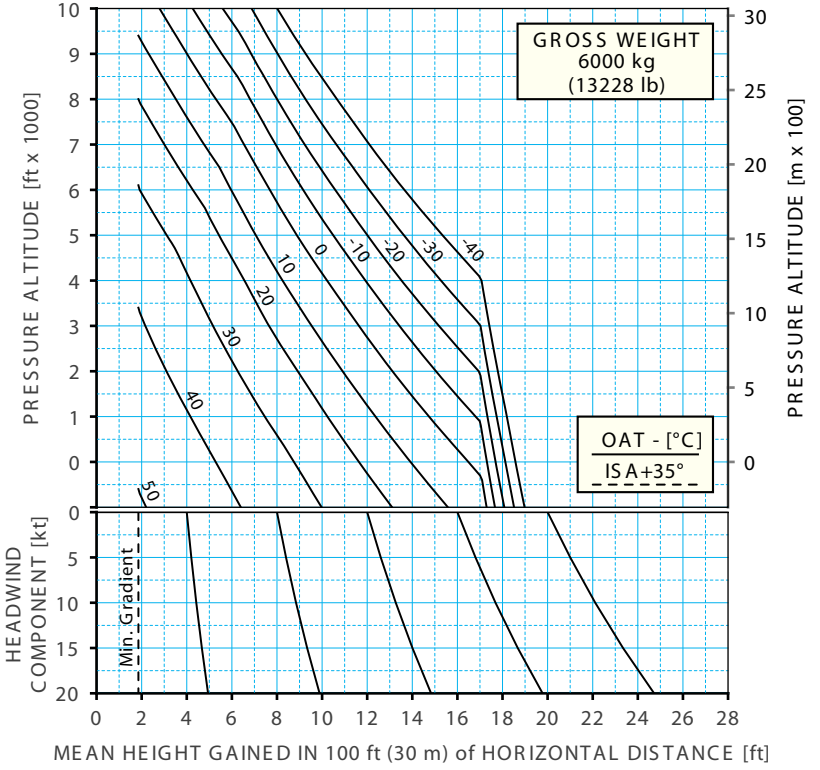

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Figure 4K-27 PATH 2 Gradient Gross Weight 6000 kg, IBF Installed

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

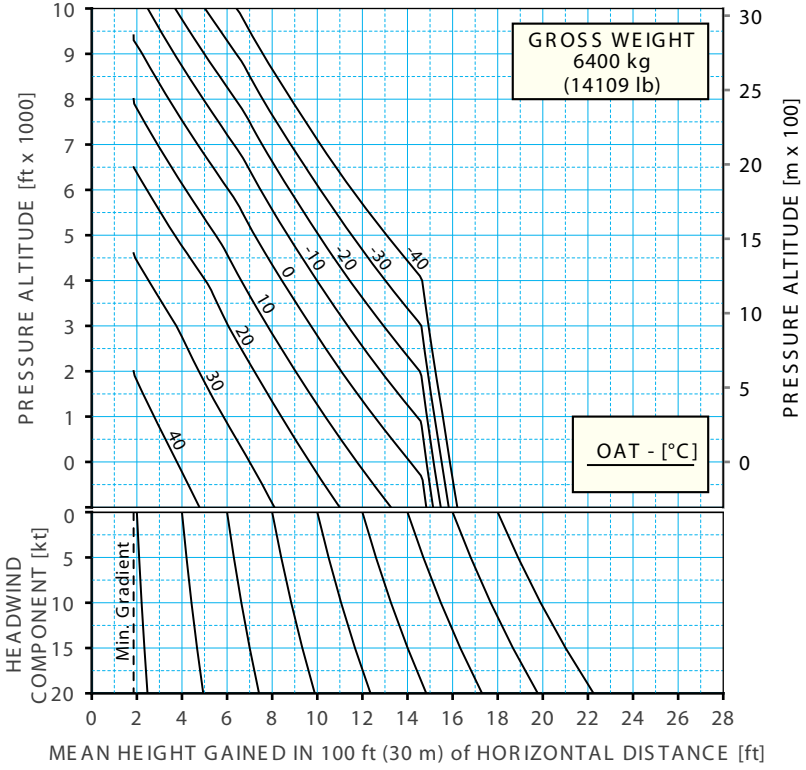

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Figure 4K-28 PATH 2 Gradient Gross Weight 6400 kg, IBF Installed

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PART L
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Part L
Category A Training Procedures

GENERAL

The Category A Training Procedures are supplied to allow Category A Emergency Procedures to be carried out at low Take-Off gross weight and at reduced 'OEI power' in order to conserve engine and transmission life.
To achieve this an engine training mode is incorporated in the engine EEC which simulates an engine failure and the corresponding single engine response and rotor speed characteristics to an engine failure.

Note

To allow the trainee pilot to gain confidence, it is suggested that before the maximum Training Weight is flown, a weight margin is flown during the CAT A technique familiarization/build-up flights (eg. a weight reduction of, say, 200 kg).
A weight margin on the maximum Training Weight is also useful to assess the helicopter performance at lower than maximum CAT A weight.

The Training Mode logic uses twin engine power to simulate an initial 'single engine' transient to 'maximum torque' and rotor droop. Then both engines are used but they are limited to a maximum total PI of 140%. When the Training Mode is activated, the PI and NF displays, on the PFD, are artificially configured to show OEI condition for the engine selected to OEI TNG.

On the Power Plant page of the MFD, the actual engine parameters are displayed while on the NR/NF indicator the coloured ranges are modified, from AEO to OEI, to allow NR/NF droop to 90% as required by the CAT A procedure. When in Training Mode and within the OEI TNG 2.5 min threshold the 2.5 m legend is illuminated along side the PI of the active engine, in amber while within the 2.5 min, flashing inverse red when within 10 sec from expiry and steady red inverse when the limit has been exceeded. With this display the PFD presents the simulated OEI condition while the MFD, for safety reasons, presents the real AEO conditions.

In order to simulate the transient following an engine failure the engine selected to OEI TNG will accelerate to a maximum of 110% torque (MFD display) then reduce to approximately 70% while the 'inoperative' engine will decelerate to a minimum of approximately 25% torque then accelerate to around 70%. (See Figure L-2).

The Training Mode can be selected to ENG #1 or ENG #2 either of which uses the same Training Mode logic but will display, on the PFD PI the engine selected to Training Mode. See Figure L-2.

The PI displays one engine as 'inoperative' and the engine switched to OEI TNG as the sum of the two engine PI.

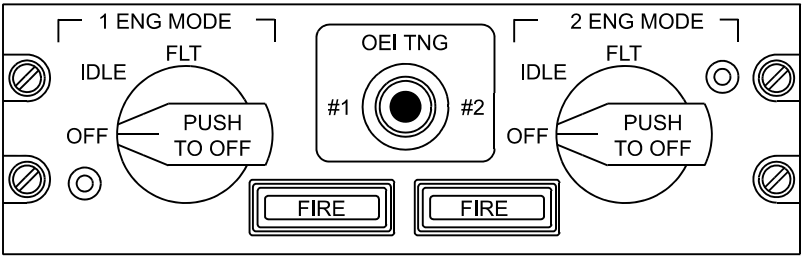

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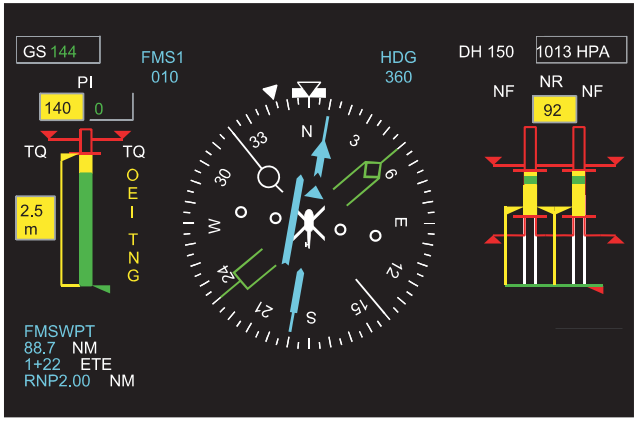
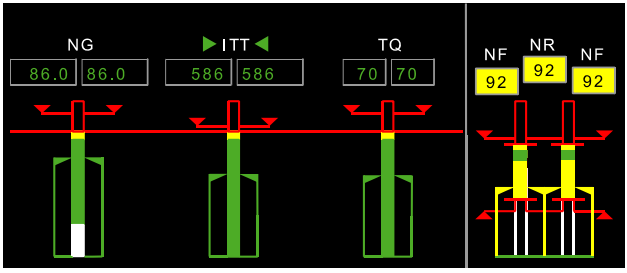
Figure L-1 ENG MODE Panel ad OEI TNG Switch



PFD Display in OEI TNG



MFD Display in OEI TNG

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Figure L-2 ypical PFD and MFD Display when in OEI TNG

SECTION 1L - LIMITATIONS

GENERAL

Apart from Training Weight Limitation presented in this PART 12 all other limitations, when using OEI TNG Mode, remain unchanged and are as presented in the Category A Take Off and Landing procedures in the appropriate PART's of this Supplement:

— Part A - Ground Level and Elevated Heliport/Helideck Vertical Take-Off Procedures

— Part B - Short Field Take Off Procedures

— Part C - Ground Level and Elevated Heliport/Helideck Back-Up Take-Off Procedures

— Part D - Confined Area Take-Off Procedure

— Part F - Clear Area Take Off Procedures

— Part G - Ground Level and Elevated Heliport/Helideck Landing Procedures

— Part H - Confined Area Landing Procedure

— Part J - Clear Area Landing Procedures

— Part K - Common Performance Data (Power Check, V_Y Gradient).

Flight hours carried out in Training Mode must be recorded in helicopter log book.

Aircraft fitted with EPIC Software Phase 5 or later have dedicated CAT A symbology on the PFD for the following procedures: Helipad, Elevated Helipad, Short field and Back Up. See Supplement 68 and Supplement 101 for CAT A Pre-Push details.

WEIGHT LIMITATIONS FOR TRAINING

Heliport/Helideck Weight Limitation,
clean engine air intake ..... Figure 4L-1

Heliport/Helideck Weight Limitationt, EAPS OFF..... Figure 4L-2

Heliport/Helideck Weight Limitation, EAPS ON ..... Figure 4L-3

Heliport/Helideck Weight Limitation, IBF Installed ..... Figure 4L-4

Confined Area Weight Limitation, clean engine air intake... Figure 4L-1

Confined Area Weight Limitation, EAPS OFF..... Figure 4L-2

Confined Area Weight Limitation, EAPS ON..... Figure 4L-3

Confined Area Weight Limitation, IBF Installed..... Figure 4L-4

Clear Area Weight Limitation, clean engine air intake ..... Figure 4L-7

Clear Area Weight Limitation, EAPS OFF..... Figure 4L-8

Clear Area Weight Limitation, EAPS ON ..... Figure 4L-9

Clear Area Weight Limitation, IBF Installed ..... Figure 4L-10

POWER INDEX INDICATOR TRAINING LIMITATIONS (PI%)

One Engine Inoperative

Maximum Continuous 130

2.5 minute Range..... 131-140

Transient (5 seconds) 150

Note

PI limitations used during OEI TNG procedures are simulated limitations.

TORQUE LIMITER FUNCTION

TQ LIM function must be selected ON (TQ LIMITER ON advisory illuminated) to use OEI TNG mode.

SECTION 2L - NORMAL PROCEDURES

GENERAL DATA

The normal procedures for use of the Training Mode are as follows:

— Confirm TORQUE LIMiter activated (Green TQ LIMITER ON advisory illuminated on CAS)

— Select the OEI TNG switch, when required, to ENG #1 (engine 1 is displayed on PI as the engine in OEI condition, engine 2 displays PI = 0 and Nf = 0 on PFD) **or** ENG #2 (engine 2 is displayed on PI as the engine in OEI condition, engine 1 displays PI = 0 and Nf = 0 on PFD).

Note

The OEI TNG will be automatically disactivated for one of the following conditions:

- either engine set to MANUAL MODE
- either engine ENG MODE switch not in FLT position
- NR droop below 87%
- either engine flame out
- either engine detected fault on EEC
- TORQUE LIMiter disactivated.

TAKE-OFF AND LANDING PROCEDURES

The Take-Off and Landing procedure for Training are as detailed in the appropriate part of the Supplement for the procedure being carried out except for Part D Confined Area Take-Off Procedures. See below for details.

CONFINED AREA TAKE-OFF PROCEDURE

The change to the Confined Area Take Off procedure is to reduce the maximum delta PI from 23 % to 18% to give a more realistic climb profile with the reduced weight.

Item 12 of the Collective/Cyclic Control paragraph of the procedure becomes:

1. Collective/Cyclic Control — Increase PI by 10 to 12% above hover value in 2 seconds to initiate a climb, immediately adjusting the attitude to allow slight backwards and left movement with 10 to 15 degrees of left yaw to establish the centre of the heliport/helideck in the chin window by 40 ft (12 m) ATS. (Take Off carried out from for left hand seat move right and yaw right).
   After applying initial 10 to 12% PI, continuously and progressively increase PI to achieve the full **18%** above hover PI by 40 ft (12 m).
   From 40 ft (12 m) maintain a constant aspect of the heliport/helideck in the chin window until reaching TDP.

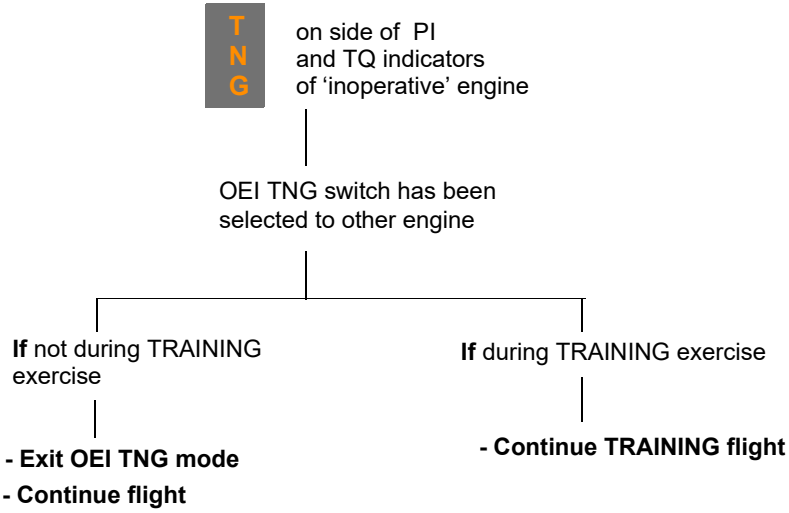
All other procedures remain unchanged.

SECTION 3L - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The corrective action procedures for use during Training are as detailed in the appropriate part of this Supplement for the procedure being carried out.

ENGINE STATE INDICATION ON PFD IN TRAINING MODE



Note

The OEI TNG will be automatically disactivated for one of the following conditions:

- either engine set to MANUAL MODE
- either engine ENG MODE switch not in FLT position
- NR droop below 87%
- either engine flame out
- either engine detected fault on EEC
- TORQUE LIMiter disactivated.

SECTION 4L - PERFORMANCE DATA

The Training Weight Limitation for:

— Heliport/Helideck Vertical, Short Field and Back-Up procedures see Figure 4L-1 to Figure 4L-4

— Confined Area see Figure 4L-1 to Figure 4L-4

— Clear Area see Figure 4L-7 to Figure 4L-10.

Note

The Training Procedures may be carried out up to the end of Take Off Path (i.e. 1000 ft (300 m) ATS) and to the completion of Landing/Balked Landing.
No performance information (distances and Climb Gradients) are provided for the applicable Training WAT weights, therefore the Continued Take OFF, Rejected Take OFF, Continued Landing and Balked Landing distances presented in this supplement are NOT applicable for training procedures.

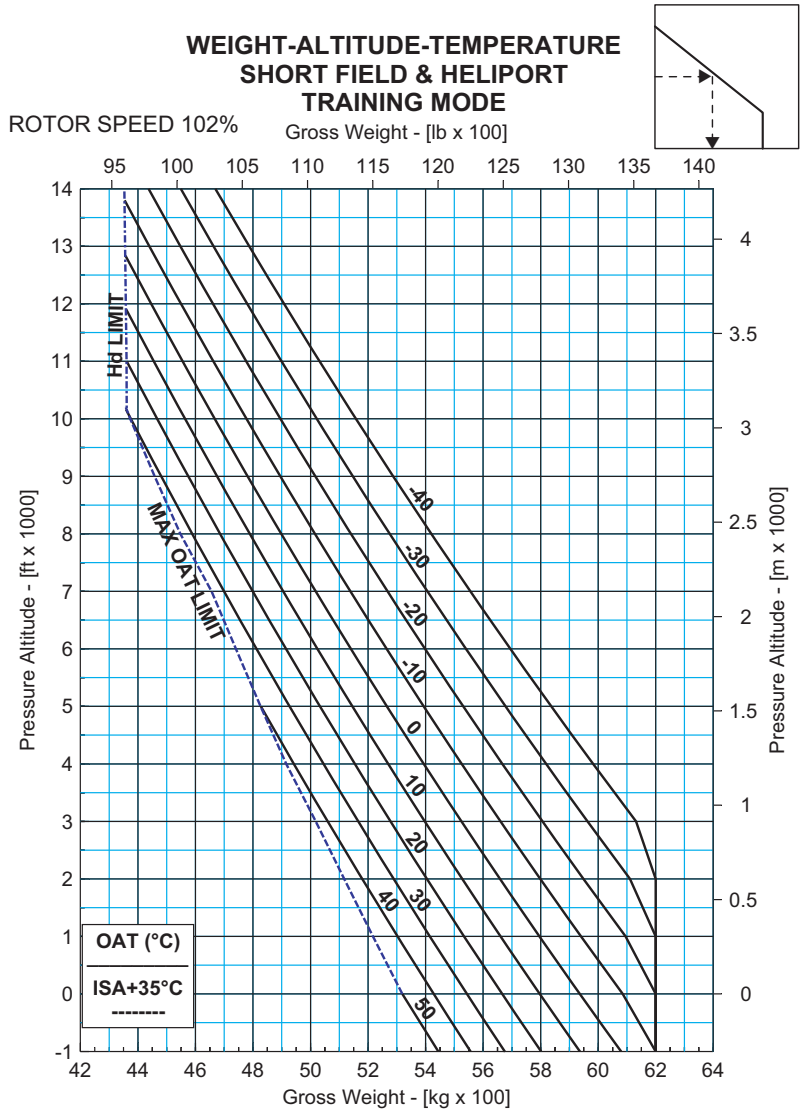


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Figure 4L-1 Ground and Elevated Heliport/Helideck Vertical, Short Field, Backup and Confined Area Procedure Weight Limitations

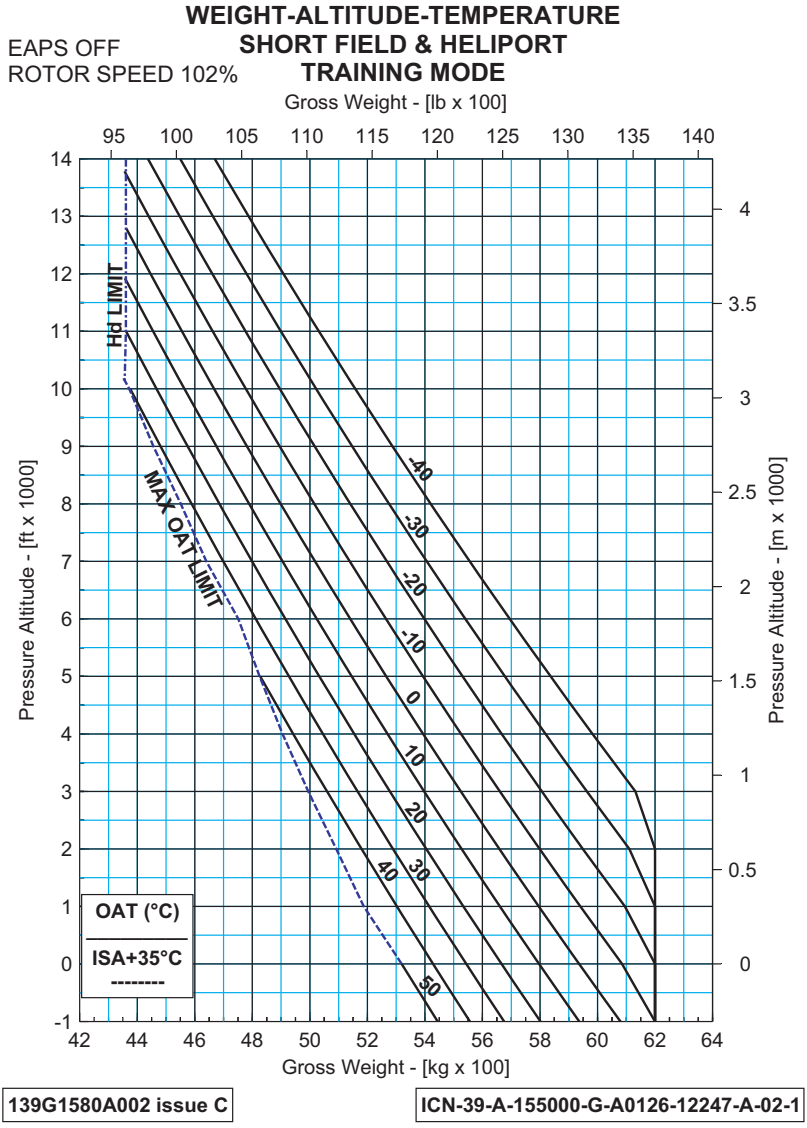


Figure 4L-2 Ground and Elevated Heliport/Helideck Vertical, Short Field, Backup and Confined Area Procedure Weight Limitations, EAPS OFF

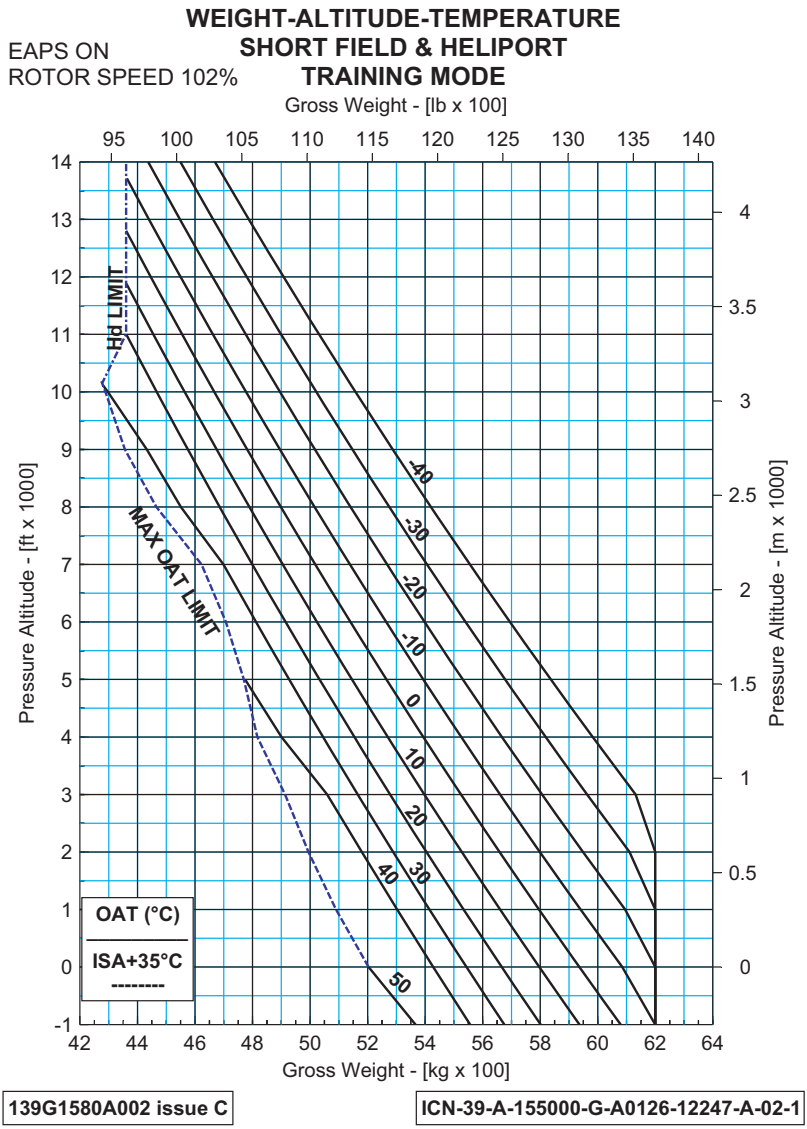


Figure 4L-3 Ground and Elevated Heliport/Helideck Vertical, Short Field, Backup and Confined Area Procedure Weight Limitations, EAPS ON

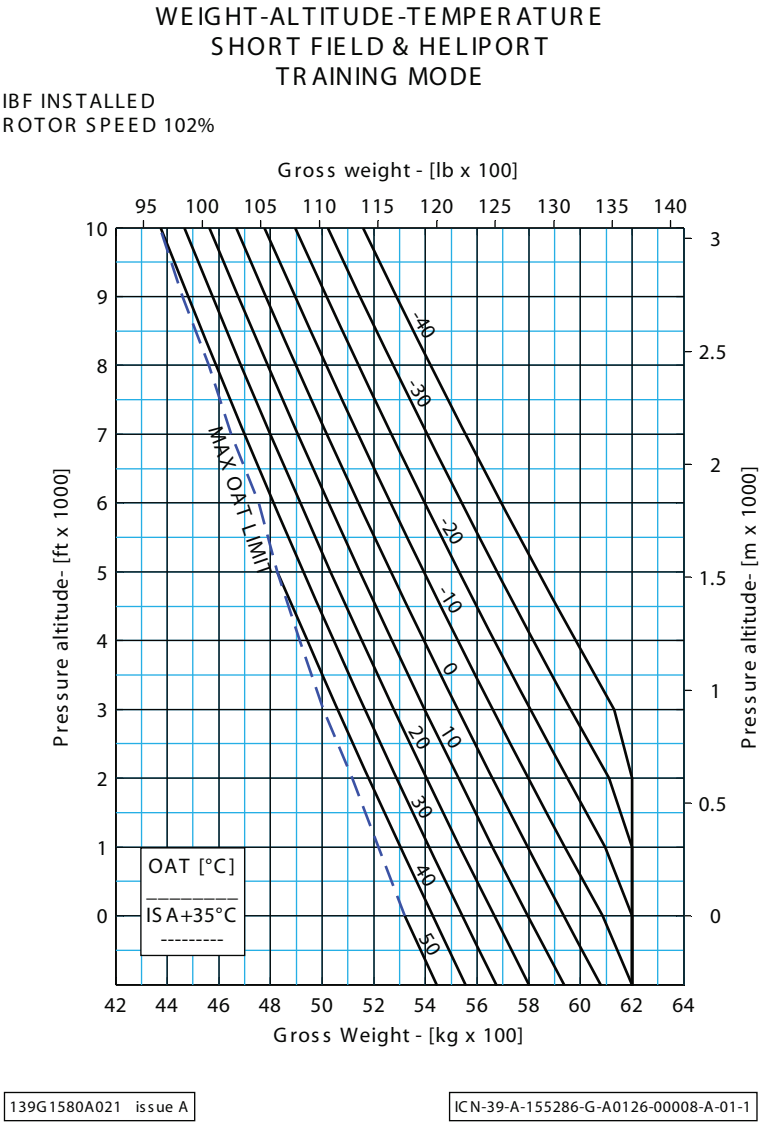
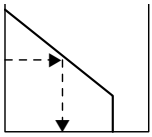


Figure 4L-4 Ground and Elevated Heliport/Helideck Vertical, Short Field, Backup and Confined Area Procedure Weight Limitations, IBF Installed

Figure 4L-5 Removed

Figure 4L-6 Removed



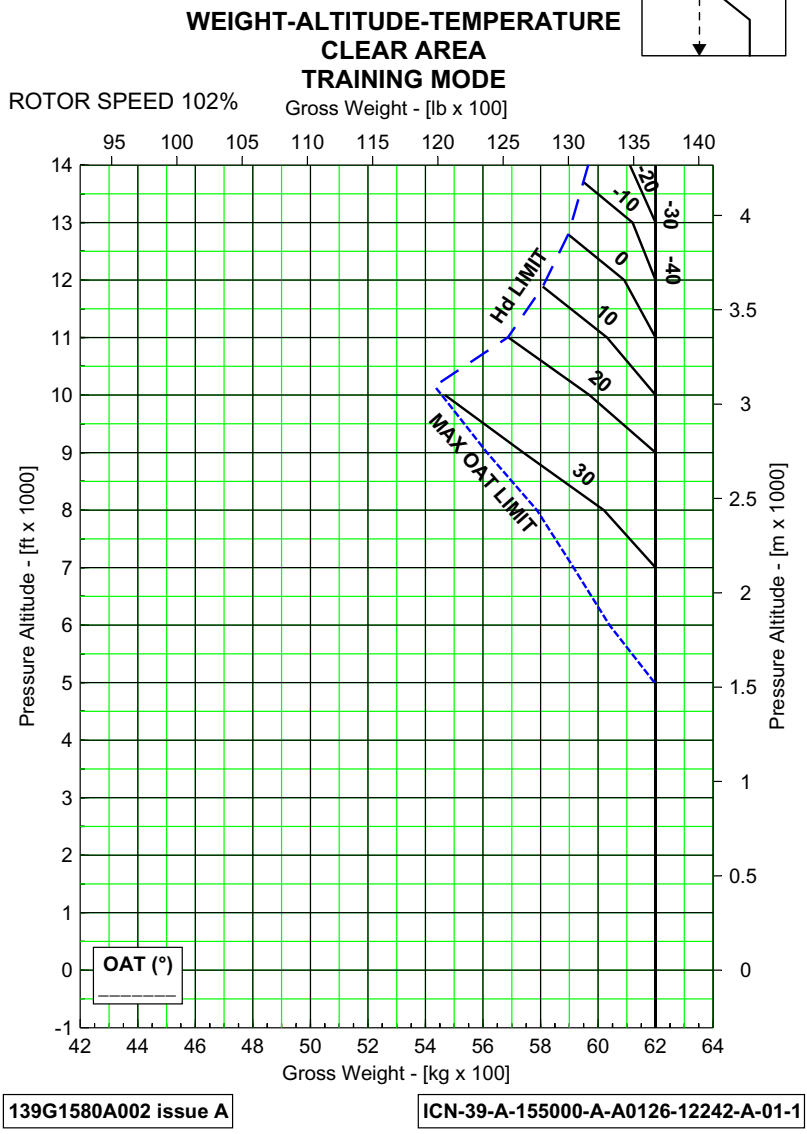


Figure 4L-7 Clear Area Procedure Weight Limitations

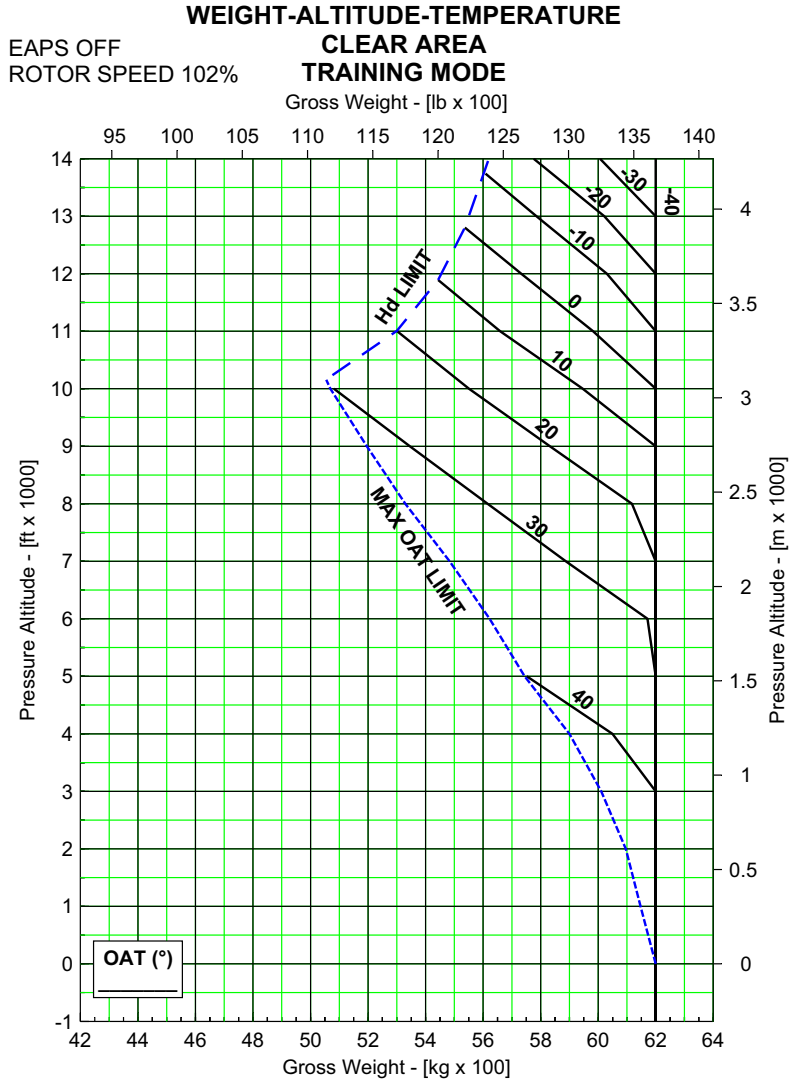


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Figure 4L-8 Clear Area Procedure Weight Limitations, EAPS OFF

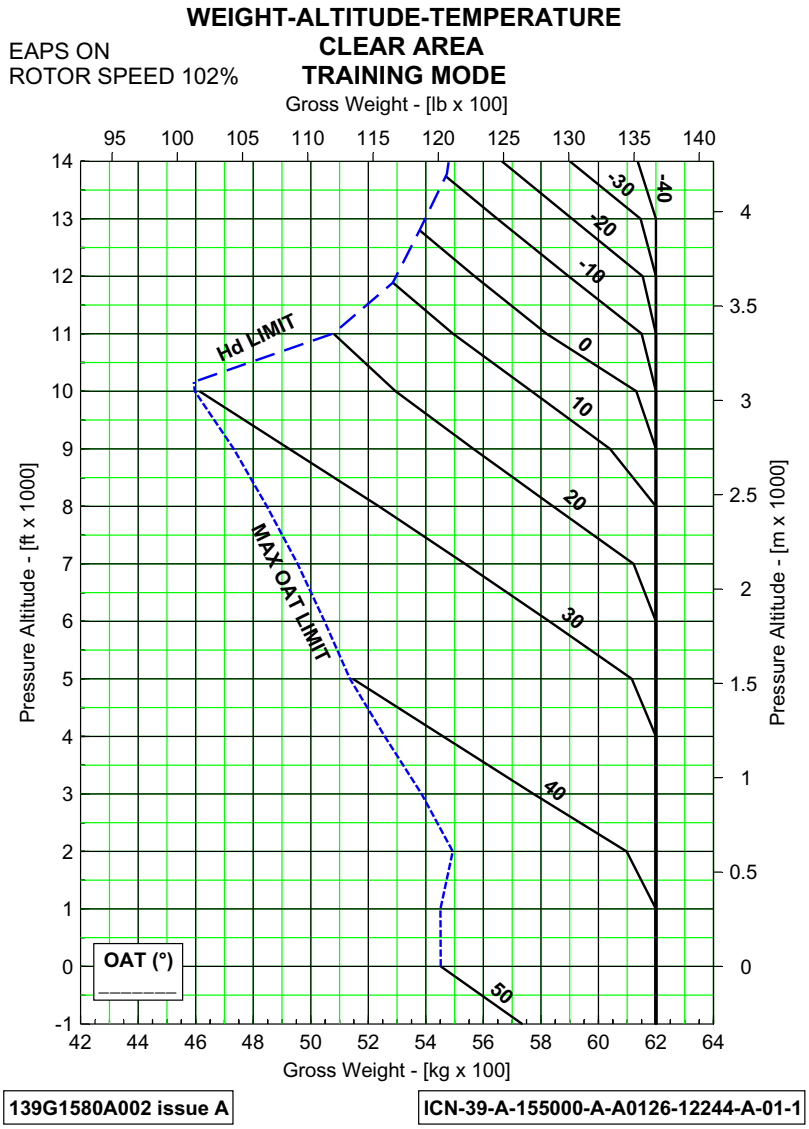

Figure 4L-9 Clear Area Procedure Weight Limitations, EAPS ON

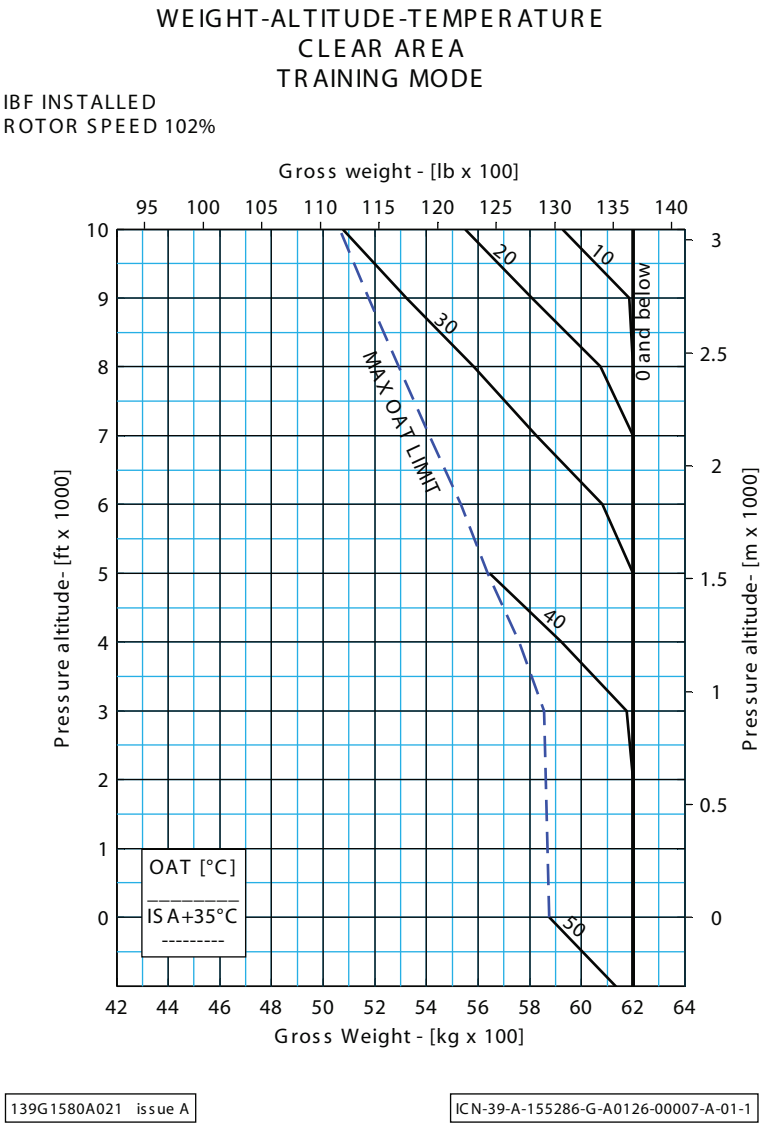

Figure 4L-10 Clear Area Procedure Weight Limitations, IBF Installed

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 13

CARGO HOOK OPERATIONS

P/N 3G2592F00111

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SUPPLEMENT 13
CARGO HOOK OPERATIONS

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DEFINITIONS AND ABBREVIATIONS

Class B rotorcraft-load combinations means one in which the external load is jettisonable and is lifted free of land or water during the rotorcraft operation.

Abbreviations and acronyms used throughout this Supplement are defined as follows:

— BQRS : Backup Quick Release System

— NHEC : Non Human External Cargo

— PQRS : Primary Quick Release System

GENERAL INFORMATION

The cargo hook P/N 3G2592F00111, consists of a support frame assembly, a cargo hook assembly, a HOOK control panel mounted in the interseat console and a hook load indicator mounted in the cockpit.

The normal load release is via a guarded pushbutton on the pilot and copilot cyclic. A secondary manual release system, for operation by ground personnel only, is mounted on the cargo hook. An Emergency Cargo Release (CARGO REL EMER) guarded switch, located on the HOOK control panel in the interseat console, operates an electrical explosive cartridge to release the load.

The system status is indicated by CAS cautions. The HOOK ARM caution illuminates if any of the CARGO REL switch guards are opened. The HOOK OPEN caution illuminates when the cargo hook is open using either cyclic pushbutton or CARGO REL EMERG pushbutton or when opened manually on the ground.

An optional kit of two monitoring cameras (P/N 3G9770F00111) which display images of cargo movement and hook condition on the MFD, and/or the SkyQuest 5th display (if fitted), is available. The monitoring cameras are operated by a switch on the Auxiliary Circuit Breaker Panel (Figure 5).

Other means of cargo monitoring such as mirror(s) or observation by crew member can also be used as an alternative.

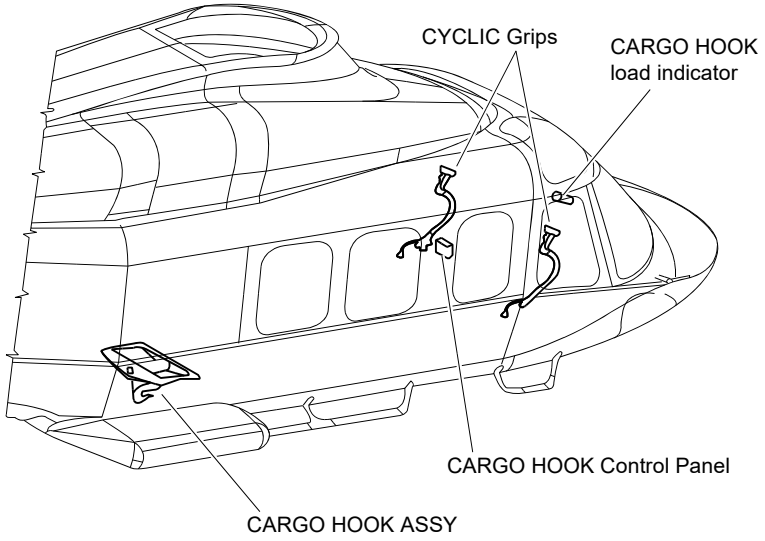

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Figure 1 Cargo Hook Installation

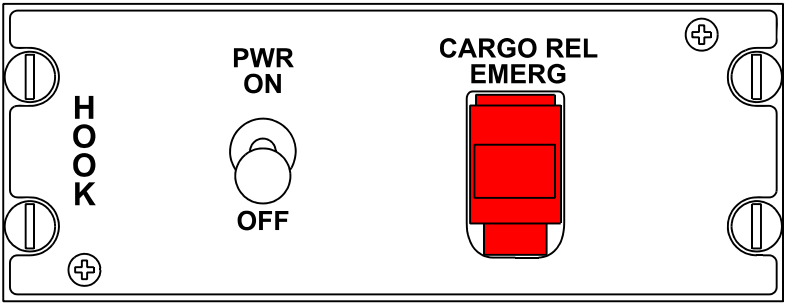

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Figure 2 HOOK Control Panel with CARGO REL EMERG Guarded Pushbutton (BQRS)

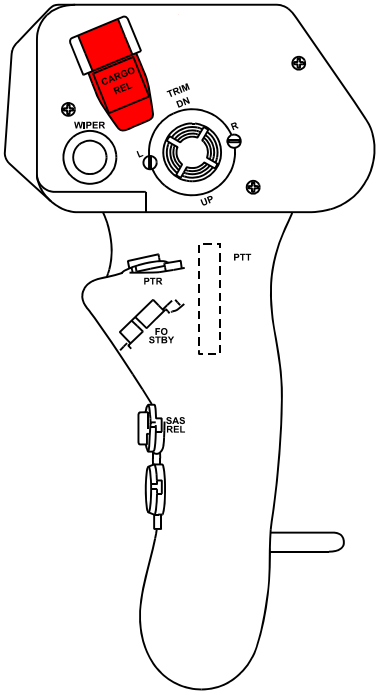

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Figure 3 CARGO REL Guarded Pushbutton on Pilot and Copilot Cyclic (PQRS)

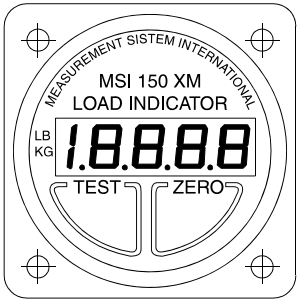

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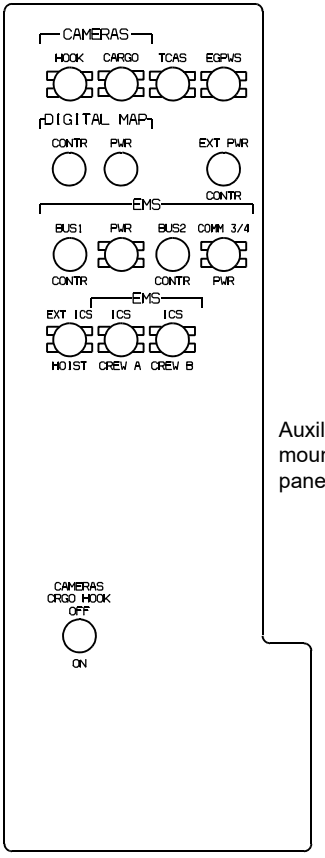
Figure 4 Cargo Hook Load Indicator



Auxiliary circuit breaker panel is mounted on the left of overhead panel

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Figure 5 Auxiliary Circuit Breaker Panel with Cargo Hook Monitoring Cameras Switch

Supplementary Cabin Pendant P/N 4G2520F03611

The supplementary pendant is an optional equipment that may be installed in the cabin to allow normal load release by a crew member in the cabin (See Figure 6). The pendant consists of a guarded push-button labelled CARGO REL which, when installed, duplicates the operation of the cyclic guarded pushbutton. The cyclic CARGO REL operation is unaffected by the installation of the pendant.
The pendant is for use by trained cabin crew.

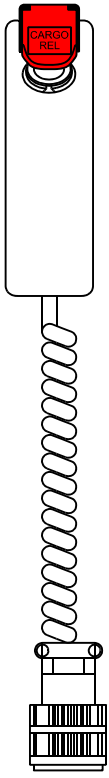

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Figure 6 Cabin Supplementary Pendant

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SECTION 1 - LIMITATIONS

GENERAL

With Cargo Hook fitted, but not used, and hook in stowed position, the Limitations stated in the Basic RFM, for CAT B operations, and in Supplement 12, for CAT A operations, are applicable.

During Cargo Hook operations the number of external load cycles must be recorded in the helicopter log-book.

An external load cycle is defined as every external load lift using the Cargo Hook.

TYPE OF OPERATION

— Cargo Hook operation must be authorized by the Competent Authority in accordance with the applicable National Operating Regulations.

— The Cargo hook installation is approved for NHEC rotorcraft-load combinations (Class B rotorcraft-load combination).

— Cargo hook operation is approved for Day and Night VFR.

MINIMUM FLIGHT CREW

One or two pilots (see Basic RFM) or as required by the applicable National Operating Regulations.

NUMBER OF OCCUPANTS

Only personnel directly involved with the cargo hook operations may be carried on the helicopter.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Cargo Hook System the new empty weight and center of gravity position must be determined.

Weight

Maximum weight with external load ..... 6800 kg

CENTER OF GRAVITY

Longitudinal limit ..... See Figure 1-1 & Figure 1-3

Lateral limit..... See Figure 1-2 & Figure 1-4

AIRSPEED LIMITATIONS WITH EXTERNAL LOAD

V_{MAX} .....90 KIAS

CAUTION

The airspeed with external cargo is limited by controllability. Caution should be exercised, when carrying external cargo, as the handling characteristics may be affected by the size, weight and shape of the cargo load, as well as by the length of the strop between the load and the hook.

Maximum airspeed for flight within ±10 degrees azimuth quadrant..... See Figure 1-6

Maximum groundspeed for sideways and rearwards flight beyond forward ±10 degrees azimuth quadrant ..... See Figure 1-6

Maximum windspeed beyond forward ±10 degrees azimuth quadrant ..... See Figure 1-6

ALTITUDE LIMITATIONS WITH EXTERNAL LOAD

Maximum operating altitude..... See Figure 1-5

Maximum altitude for load pick up and release..... See Figure 1-5

HEIGHT-VELOCITY LIMITATIONS

For the purposes of Cargo Hook operations, National Operating Regulations may permit that the H-V Limitations, given in the Basic RFM, need not be observed. However, if the aircraft is operated within the H-V area a safe landing, following an engine failure, is not guaranteed.

ENGINE POWER TURBINE (NF %) AND ROTOR (NR %) SPEED LIMITATIONS

All Engines Operating

Approved Range for CARGO HOOK operations .....101 to 103

Maximum for CARGO HOOK operations..... 103

Note

100% NR may be used for operations above 50 KIAS.

One Engine Inoperative

Approved Range for CARGO HOOK operations ..... 101 to 103

Maximum for CARGO HOOK operations 103

For all other Engine and Rotor Limitations see Basic RFM.

CARGO HOOK LIMITATIONS

Maximum Load

Maximum load on Cargo Hook..... 2200 kg (4850 lb)

Taxiing

Taxing on grass surfaces with hook extended is prohibited.

MISCELLANEOUS LIMITATIONS

Autopilot Limitations

During Cargo Hook operations the Pilot must fly manually.

Primus HF 1050 Radio (Supplement 8)

During Cargo Hook operations, HF 1050 radio transmissions are prohibited.

Honeywell Weather Radar Series (Supplement 21) and Radar RDR-1500B+ (Supplement 42), Radar Selex Gabbiano T20N (Supplement 73)

During Cargo hook operations, Weather Radar must be in SBY or OFF.

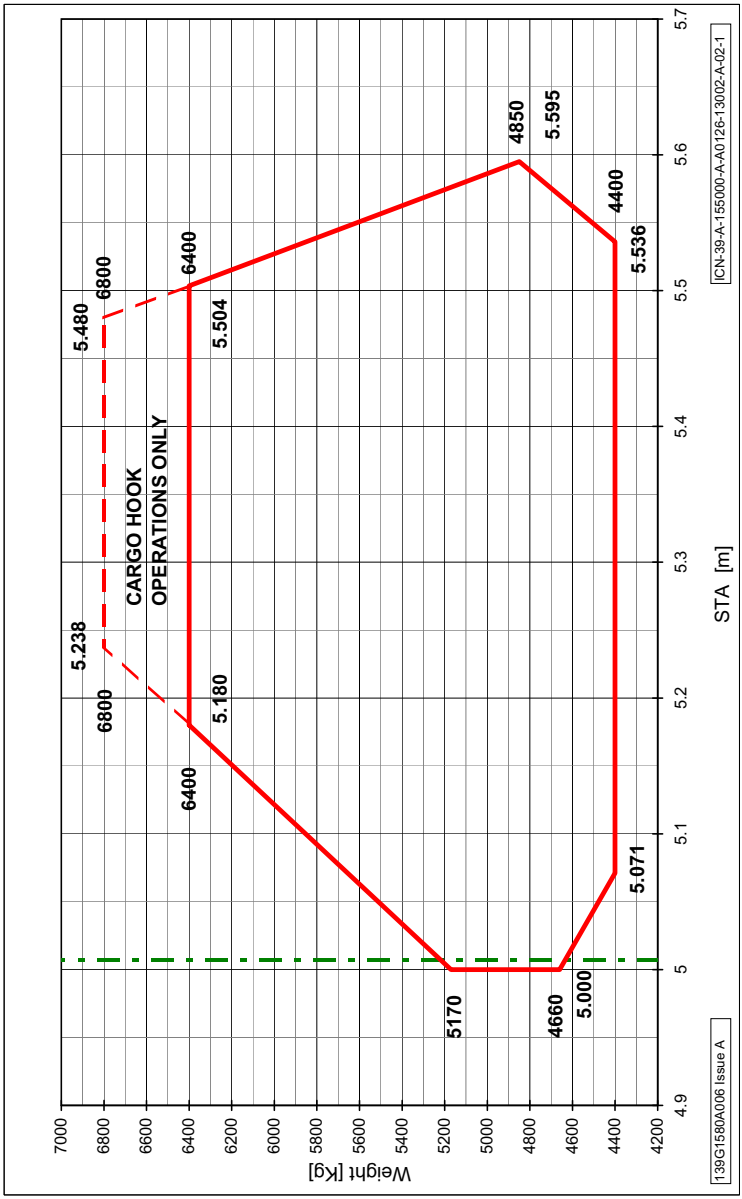

Figure 1-1 Weight and Longitudinal C of G Limitations for Cargo Hook Operations (Metric units)

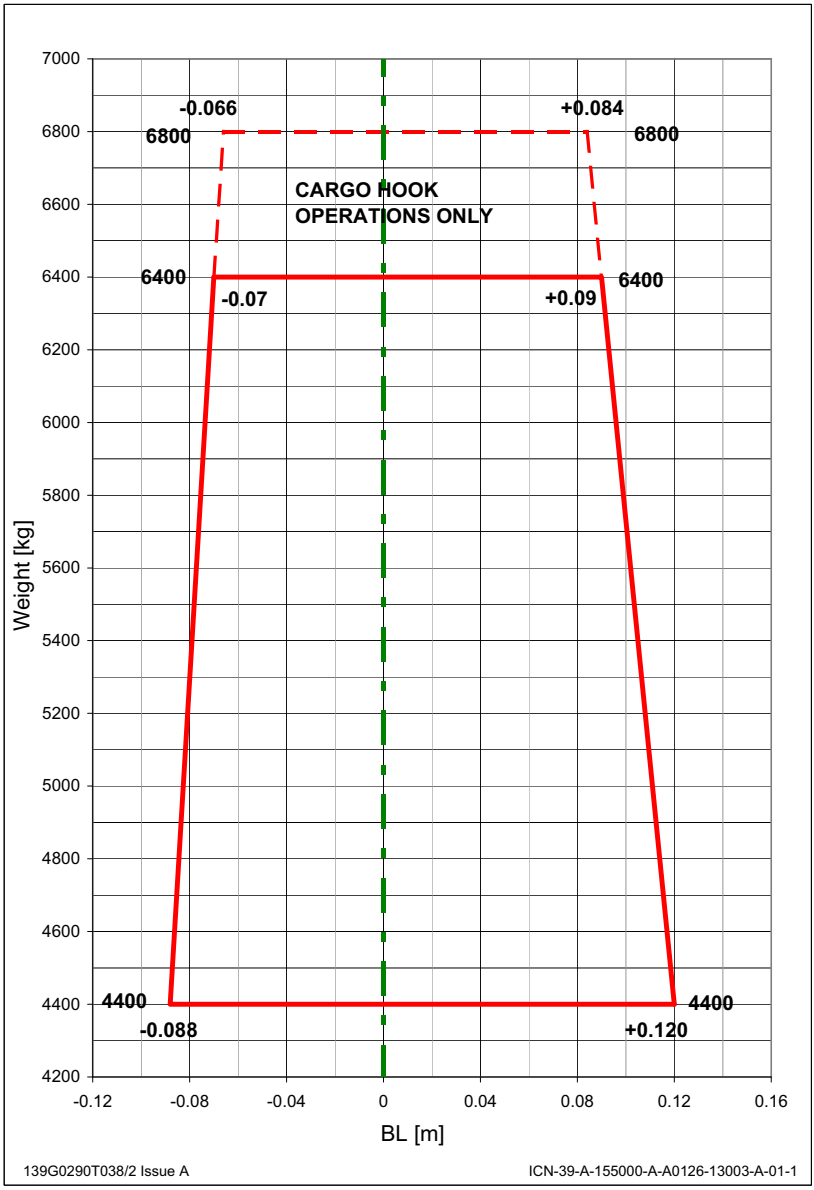

Figure 1-2 Weight and Lateral C of G Limitation for Cargo Hook Operations (Metric units)

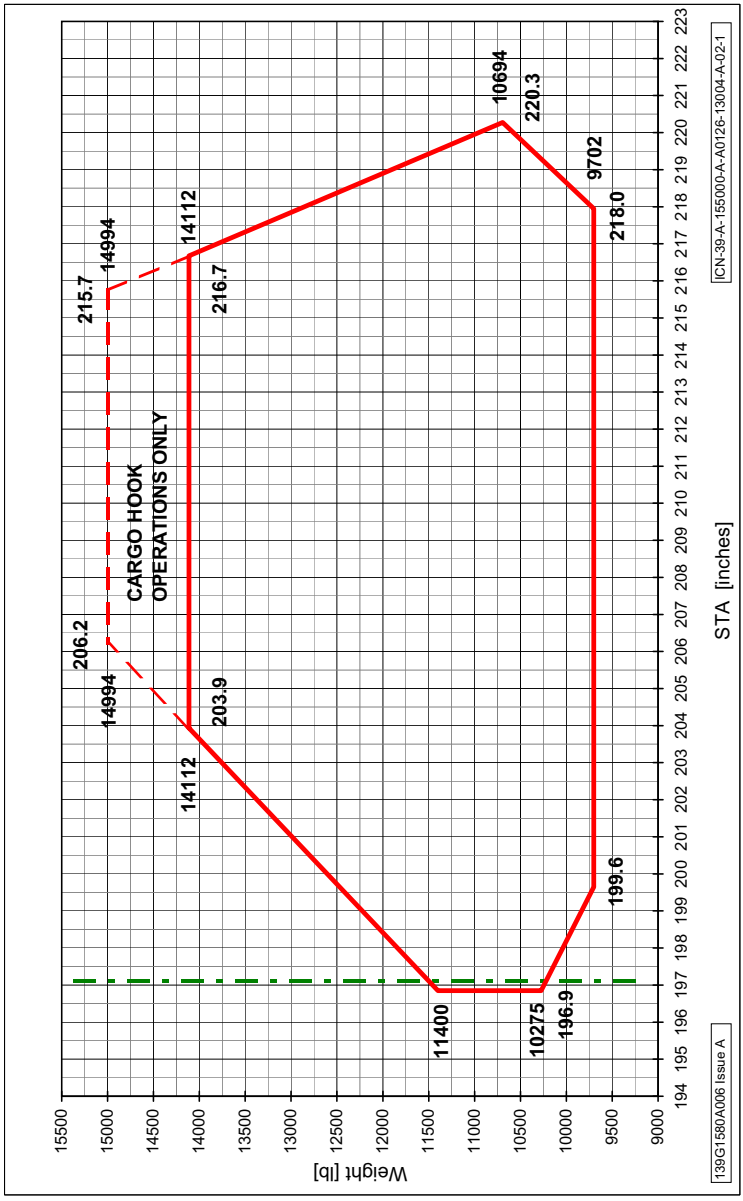

Figure 1-3 Weight and Longitudinal C of G Limitations for Cargo Hook Operations (Imperial units)

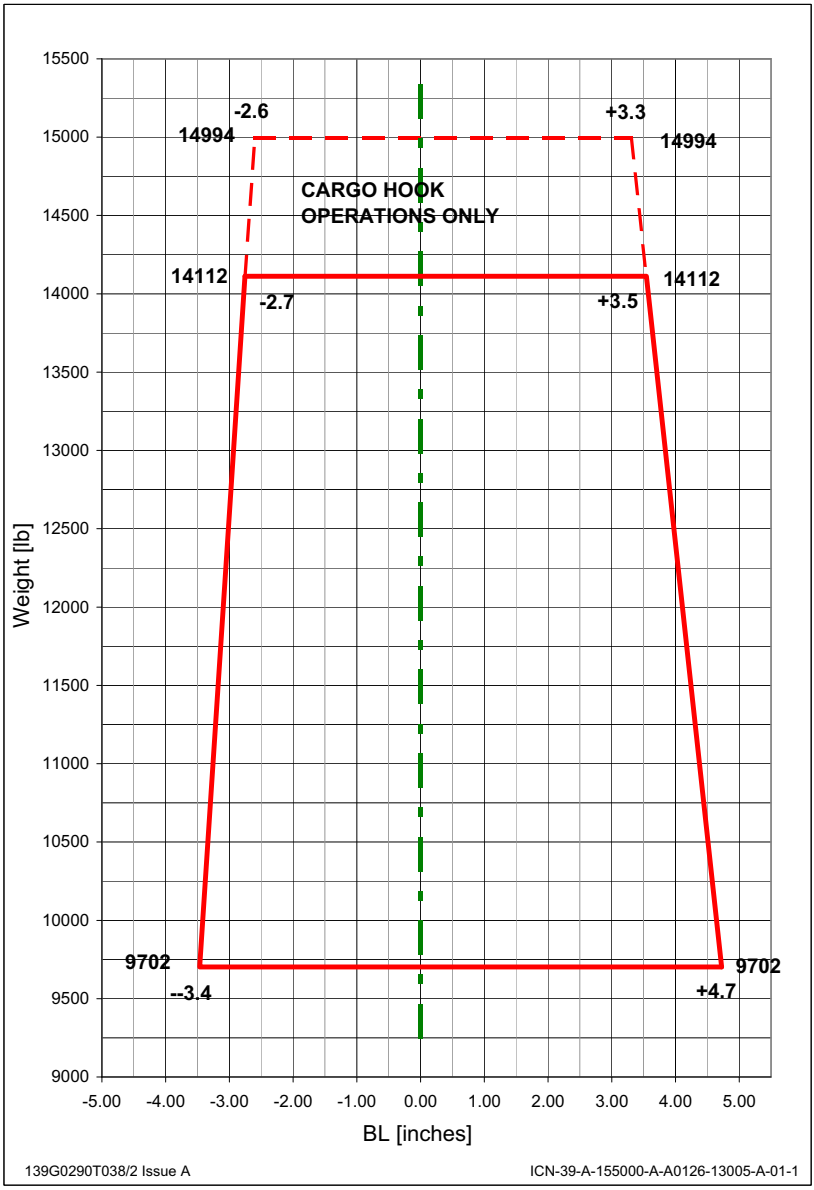

Figure 1-4 Weight and Lateral C of G Limitation for Cargo Hook Operations (Imperial units)

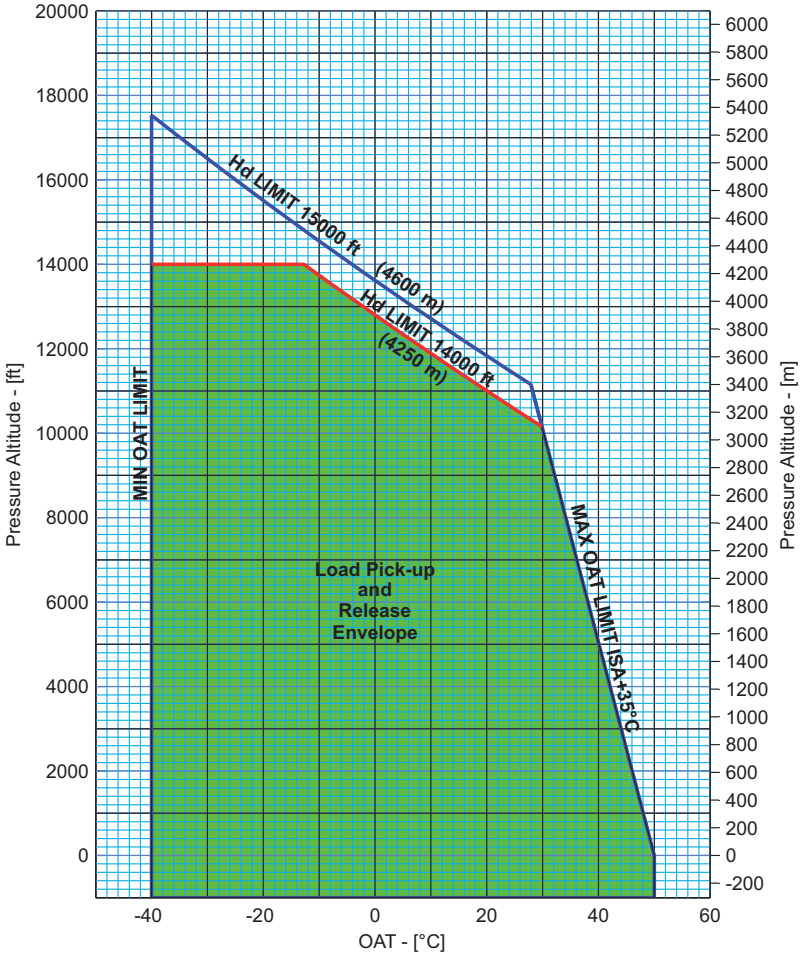

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Figure 1-5 Altitude Limitations for Cargo Hook Operations

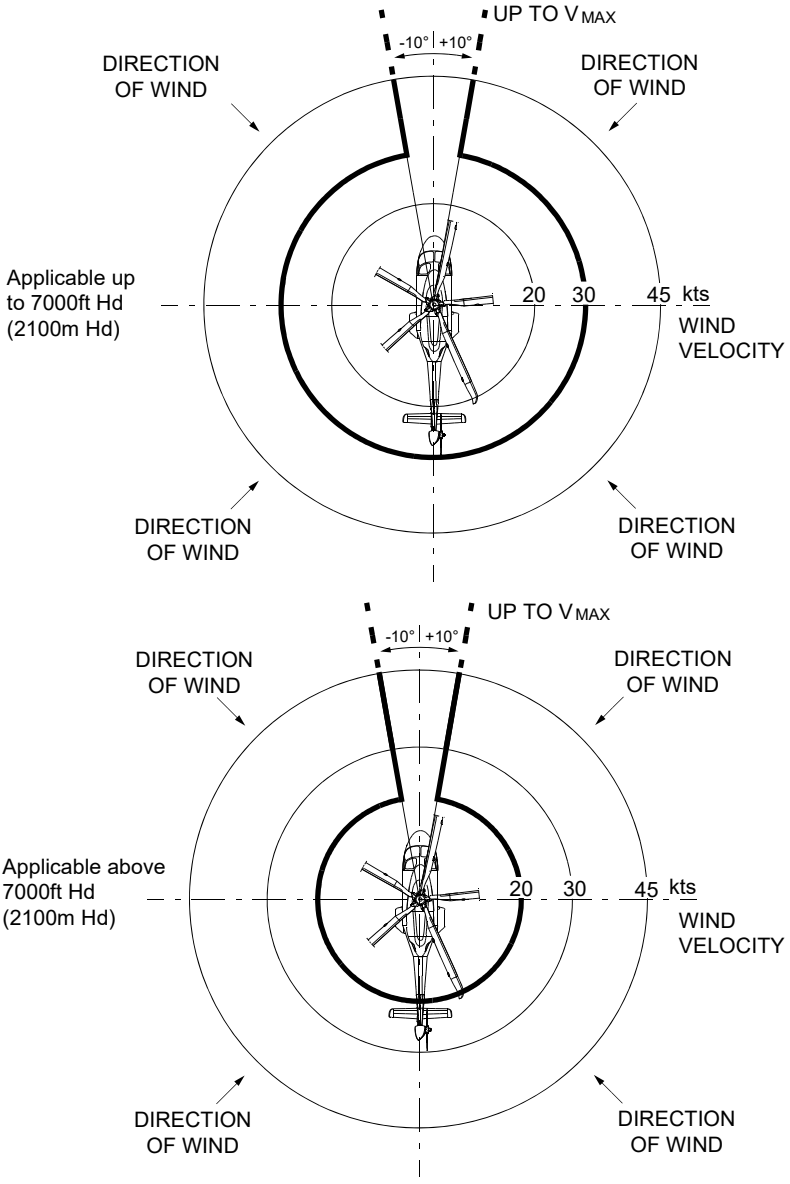

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Figure 1-6 Wind/Ground/Air Speed Azimuth Envelopes

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

AREA N°2 (Fuselage – Right Hand Side)

1. Cargo Hook	— Condition and secure Confirm hook extended for Cargo Hook operations.
2. Cargo and Hook monitoring cameras (2) (if installed)	— Cleanliness of lens and secure.

AREA N°7 (Cabin)

1. Supplementary cabin pendant, if fitted	— Condition and connected.

COCKPIT PRE START CHECKS

1. CARGO REL pushbutton on pilot and copilot cyclic grip and supplementary cabin pendant, if fitted	— Guard closed.
2. CARGO REL EMERG pushbutton on HOOK control panel in interseat console	— Guard closed.

Note

The following checks require a significant electrical consumption and consequent reduction of battery charge. If possible use external power.

After BATTERY MASTER ON:

3. PWR switch on HOOK control panel	— ON.
4. Hook load indicator	— Set to zero (0).

WARNING

If HOOK ARM caution is illuminated the Cargo Hook must not be used.
Do not raise the CARGO REL EMERG pushbutton guard. Emergency release cartridge may fire.

Note

Ground personnel shall assist the pilot during the cargo hook checks. The cargo hook is provided with a spring which keeps it in the closed position, even when the opening system releases the locking device. A force of approximately 5 kg (11 lb) must be applied to the cargo hook to overcome the spring force and open the hook. When the force is removed the hook will close immediately.

5. Manual release handle on cargo hook assembly ➡ — Ground personnel rotate manual release handle. Apply force to open hook and confirm HOOK OPEN caution illuminates on CAS.
   Return manual release handle, remove force and confirm hook closes and HOOK OPEN caution extinguishes.

6. CARGO REL guarded pushbutton on pilot/copilots cyclic grip and supplementary cabin pendant, if fitted ➡ — Lift guard, confirm HOOK ARM caution illuminates on CAS.

7. CARGO REL pushbutton ➡ — Press, apply force and confirm opening of cargo hook and HOOK OPEN caution illuminates on CAS. Release pushbutton and release force, confirm cargo hook returns to closed position and HOOK OPEN caution extinguishes.

8. CARGO REL pushbutton➡ — Close guard, confirm HOOK ARM caution extinguished.

9. CARGO REL EMERG guarded pushbutton on HOOK control panel.➡ — Lift guard, confirm HOOK ARM caution illuminates on CAS. Close guard and confirm caution extinguishes.

10. Cargo monitoring cameras (if installed) — Switch ON (overhead panel) Select VIDEO picture on MFD and confirm functioning. Switch OFF or as required.

11. PWR switch on HOOK control panel — OFF or as required.

CARGO HOOK OPERATING PROCEDURES

General

The following procedure assumes that the load is attached and detached while the helicopter is in the hover. Depending on load type and sling length being used other techniques may also be applicable.

1. RPM switch — Set 102%.

2. Take Off — Take Off and stabilize a hover to allow ground personnel to discharge static electricity from helicopter and attach cargo.

3. MFD PWR PLANT page — Check all parameters within normal operating limits and confirm no engine matching abnormallities.

Note

For cargo attachment to hook refer to Breeze Eastern ‘Cargo Hook System Flight Line Operation and Maintenance Manual’ dated 14th February 2005 or latest revision.

4. Cargo lifting	— Slowly increase collective pitch and ascend vertically to take-up the slack of the cargo sling. Lift cargo vertically from surface and confirm the hook load indicator is within the hook loading limitations.
5. Hover	— Hover to check for satisfactory controllability and power is within limits.
6. Cargo monitoring	— Confirm hook and cargo can be monitored on the MFD (if cameras installed), or by other means.

CAUTION

Allow adequate sling load clearance over obstacles.

Note

TCAS II, if fitted and active, select to TA Only.

7. Forward flight	— Translate into slow forward flight. Confirm the controllability of the helicopter/load combination, and ensure that no undesired or potentially hazardous characteristics are observed.
8. Cruise	— Increase forward speed and select an operational airspeed within the maximum speed limitation, which is suitable for the load being carried.
9. RPM switch	— Above 50 KIAS, as required.

APPROACH AND LANDING

1. RPM switch — Confirm 102%.
2. Hover — Stabilize a hover above cargo touch down area at a height sufficient to keep the load above the ground.

WARNING

If HOOK ARM illuminated raising the CARGO REL guard may release cargo. Raise CARGO REL only when ready to release load.

3. CARGO REL guarded pushbutton on pilot/copilot cyclic grip. — Lift guard, confirm HOOK ARM caution illuminates on CAS.
4. Descent — Descend slowly and vertically to place load on ground.
5. CARGO REL pushbutton — Press, confirm opening of cargo hook and HOOK OPEN caution illuminates on CAS.
   Release pushbutton and confirm HOOK OPEN caution extinguishes.
6. Load Release — Confirm, using monitoring camera (if installed) or by other means, that load has been released.

Note

The cargo will be released when a sufficient load on sling overcomes the spring-force of the hook. In case of non-release of the cargo, the pilot should slowly increase collective pitch to ascend as necessary to load the sling sufficiently to allow load release when the CARGO REL pushbutton on pilot/copilot cyclic grip is pressed.

7. CARGO REL pushbutton — Close guard, confirm HOOK ARM caution extinguished.
8. Cargo monitoring cameras — OFF or as required
9. PWR switch on HOOK control panel — OFF or as required.
10. RPM switch — Set 100%.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

CARGO LOAD JETTISON

The Cargo Load may be jettisoned in flight using the following procedure:

1. PWR switch on HOOK control panel — Confirm ON.

WARNING

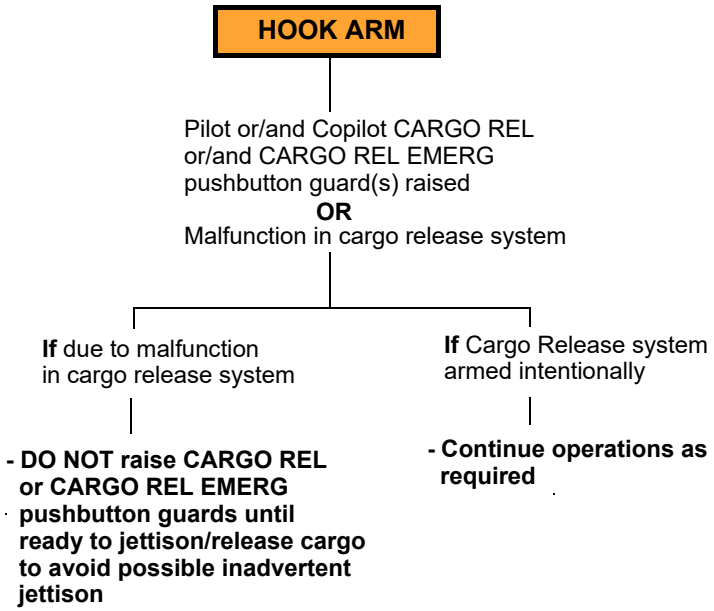
If HOOK ARM illuminated, raising the CARGO REL or CARGO RELEASE EMERG guard may release cargo. Raise guard only when ready to release load.

2. CARGO REL guarded pushbutton on pilot/copilot cyclic — Lift guard, confirm HOOK ARM caution illuminates on CAS.
3. CARGO REL pushbutton — Press, HOOK OPEN caution illuminates on CAS. Confirm cargo load jettisoned.

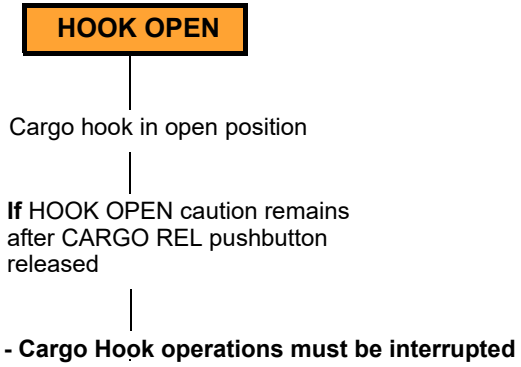
If cargo load is not jettisoned:

4. CARGO REL EMERG guarded pushbutton on HOOK control panel — Lift guard, confirm HOOK ARM caution illuminated on CAS, press pushbutton. Confirm load jettisoned.
5. CARGO REL EMERG pushbuttons — Close guard, confirm HOOK ARM caution extinguished.
6. PWR switch on HOOK control panel — OFF. Cargo Hook operations must be interrupted.

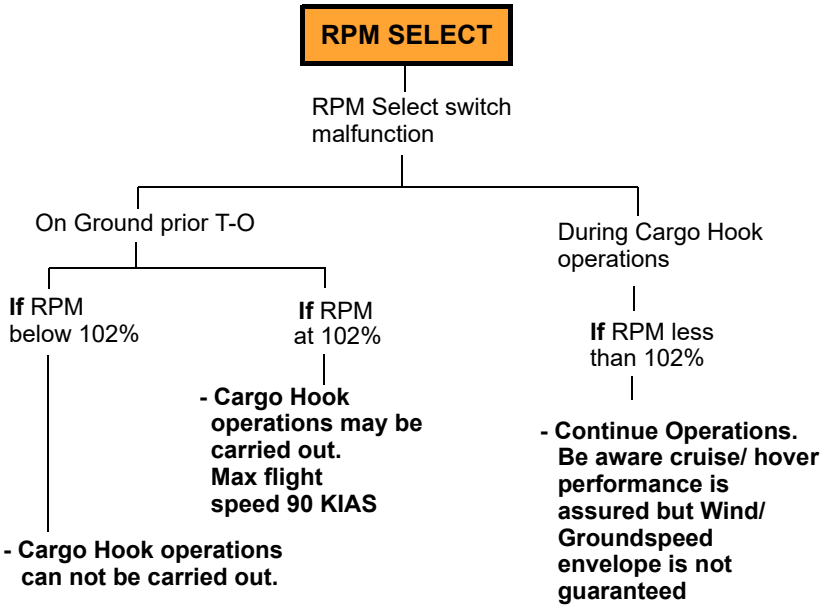
HOOK ARM CAUTION



HOOK OPEN CAUTION



ROTOR SPEED SELECTOR



SECTION 4 - PERFORMANCE DATA

GENERAL

Forward flight and climb performance will be degraded due to the load aerodynamic drag. The level of degradation will depend on load size and shape.

There are no significant load effects on hover performance.

HOVER CEILING

The Hover Ceiling charts define the weights at which an OGE hover, using up to Take Off Power, is possible for varying combinations of Pressure Altitude and OAT:

— For headwind conditions refer Charts Figure 4-1 to Figure 4-7 for the appropriate Intake and Heater configuration with unfactored headwind.
Clean Intake configuration, ECS ENVIRO FULL AUTO.
See Supplement 87.

— For crosswind as detailed in the Wind/Ground/Air Speed Azimuth Envelopes, Figure 1-6, refer Charts Figure 4-8 to Figure 4-10D for appropriate Intake and Heater Configuration

Headwind

“Headwind” in the charts defines a condition of Headwind only (±10 degrees).

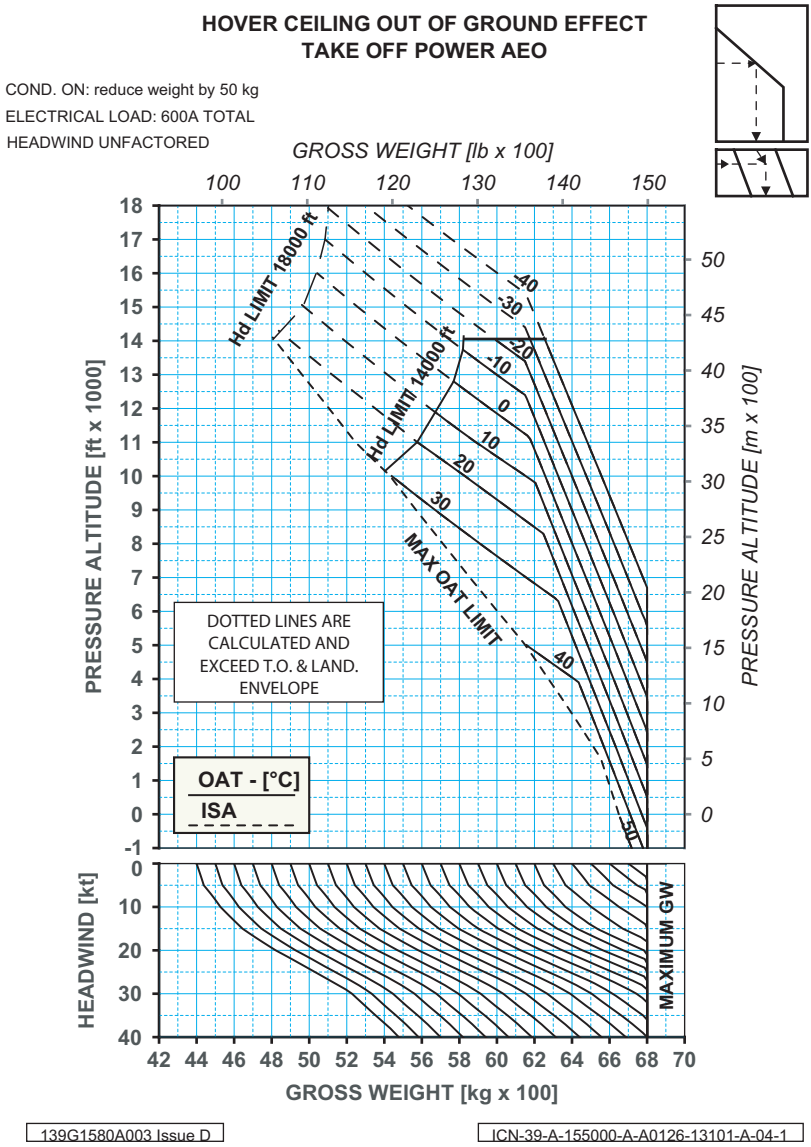


Figure 4-1 Hover Ceiling OGE TOP AEO

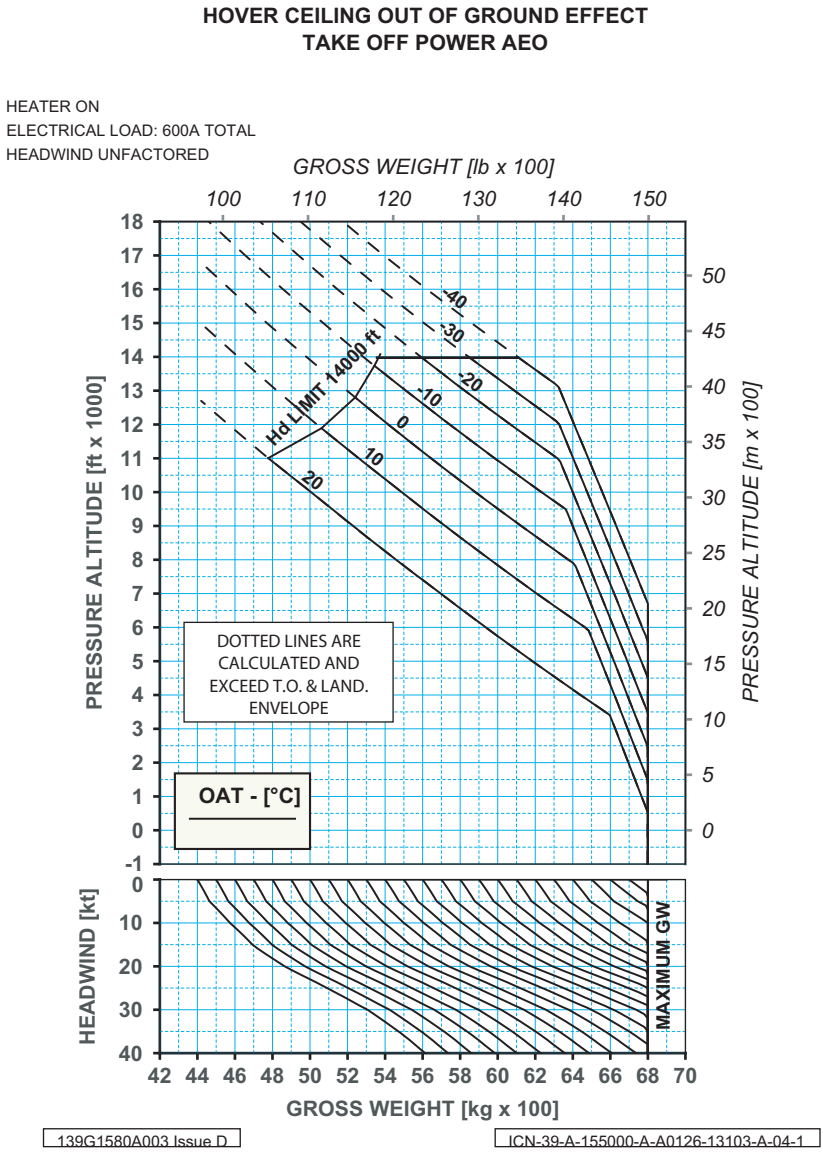


Figure 4-2 Hover Ceiling OGE TOP AEO, HEATER ON

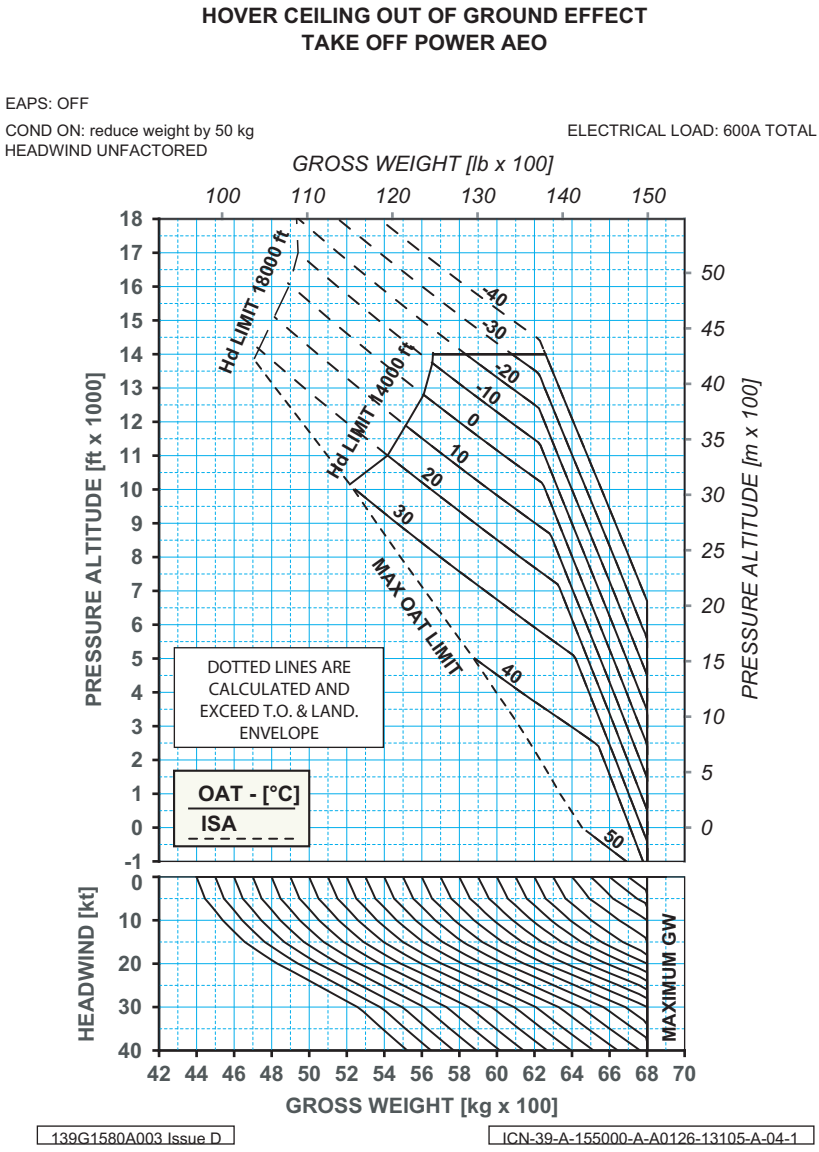


Figure 4-3 Hover Ceiling OGE TOP AEO, EAPS OFF

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

EAPS: ON
COND ON: reduce weight by 50 kg
HEADWIND UNFACTORED

ELECTRICAL LOAD: 600A TOTAL

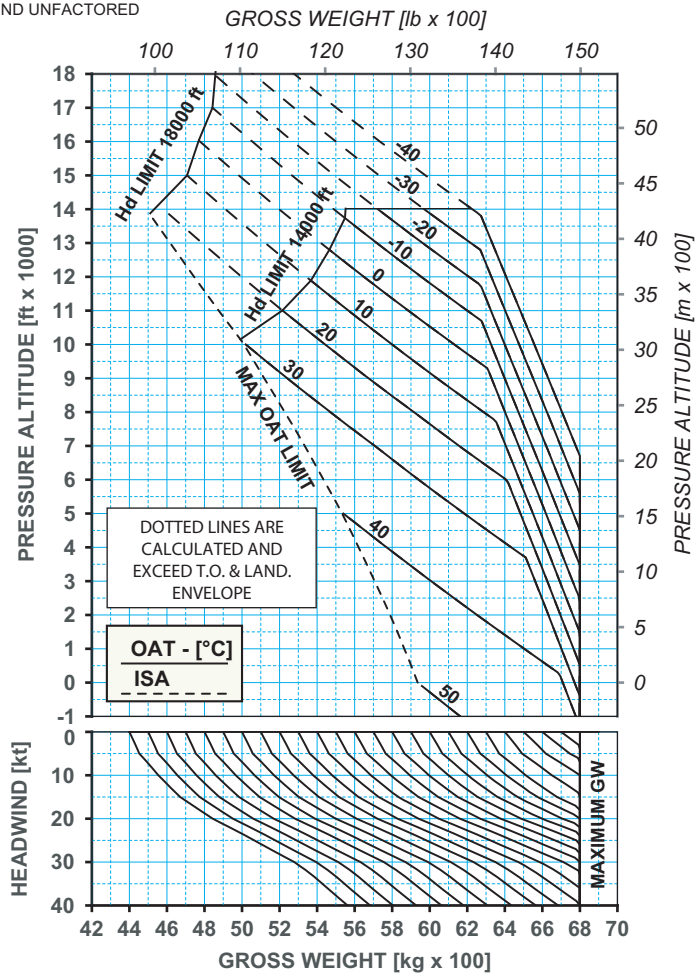


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Figure 4-4 Hover Ceiling OGE TOP AEO, EAPS ON

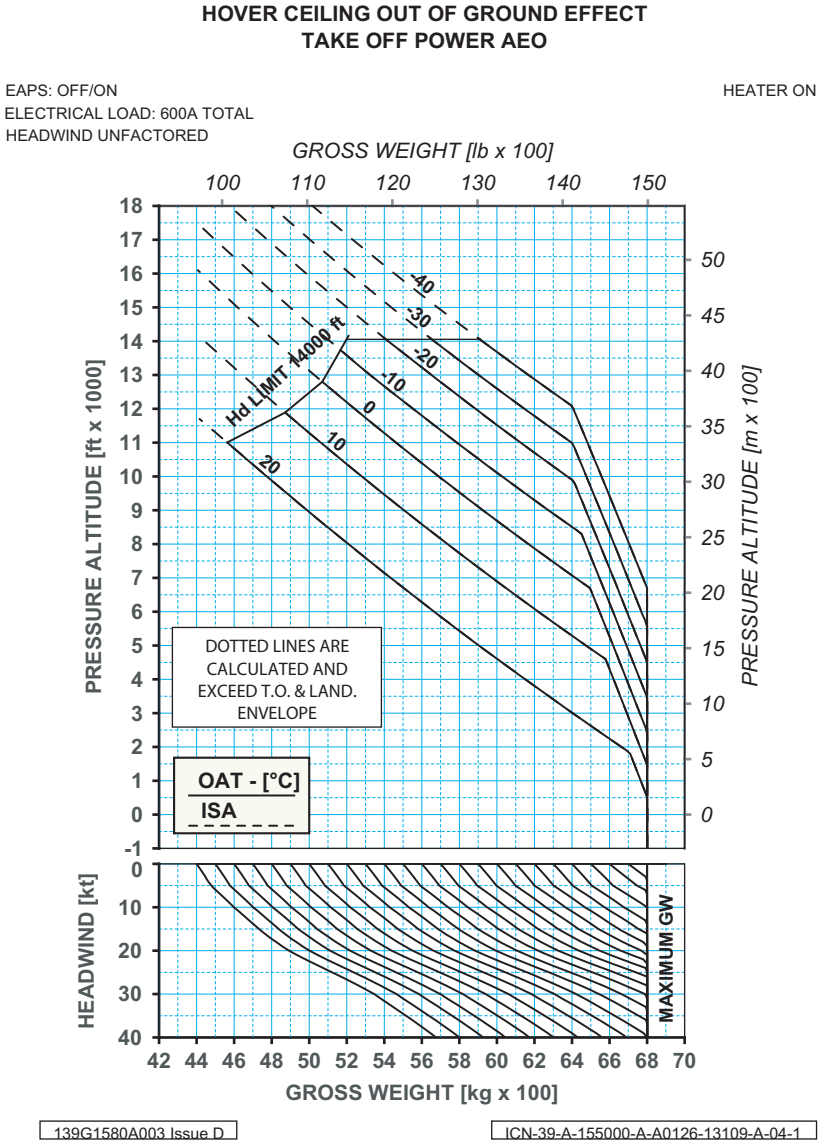

Figure 4-5 Hover Ceiling OGE TOP AEO, EAPS OFF/ON, HEATER ON

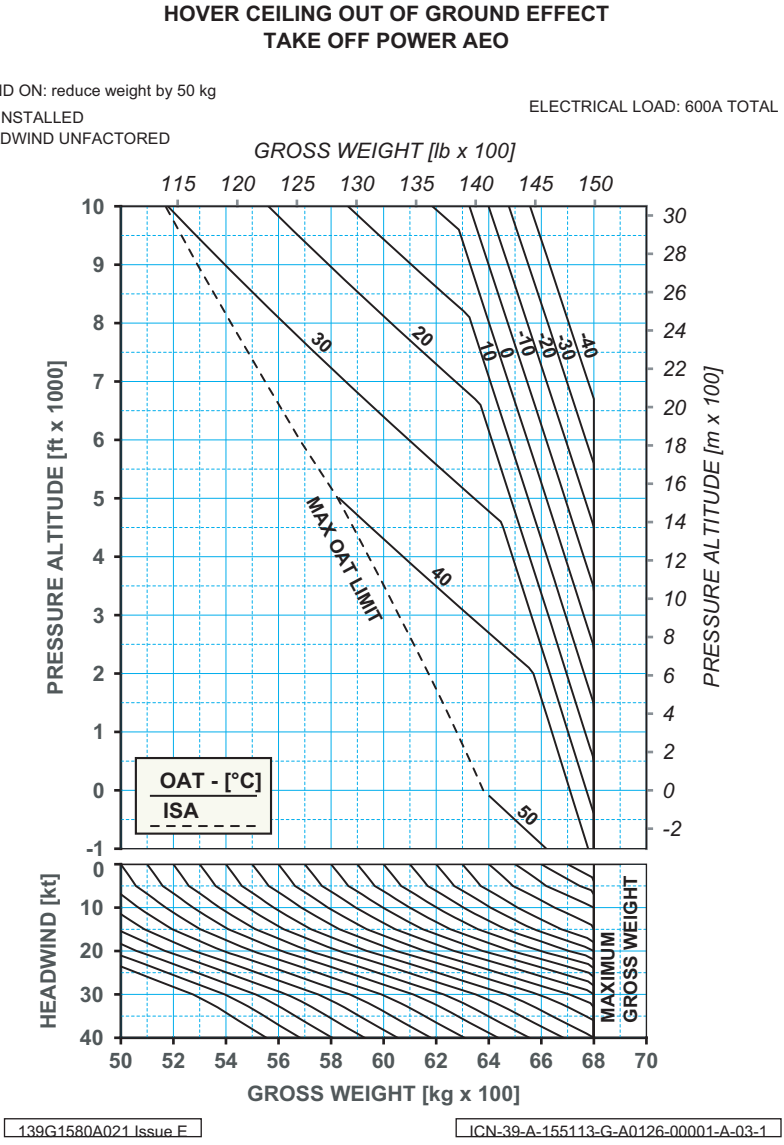

Figure 4-6 Hover Ceiling OGE TOP AEO, IBF Installed

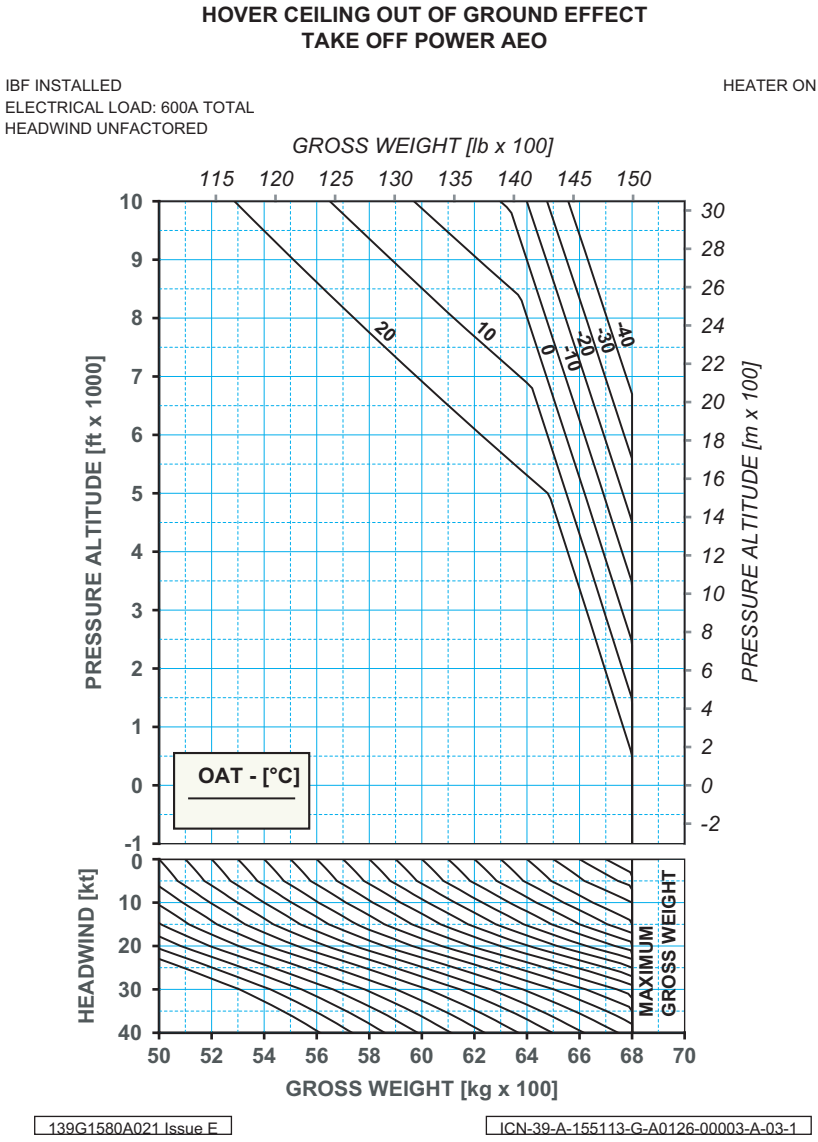

Figure 4-7 Hover Ceiling OGE TOP AEO, IBF Installed, HEATER ON

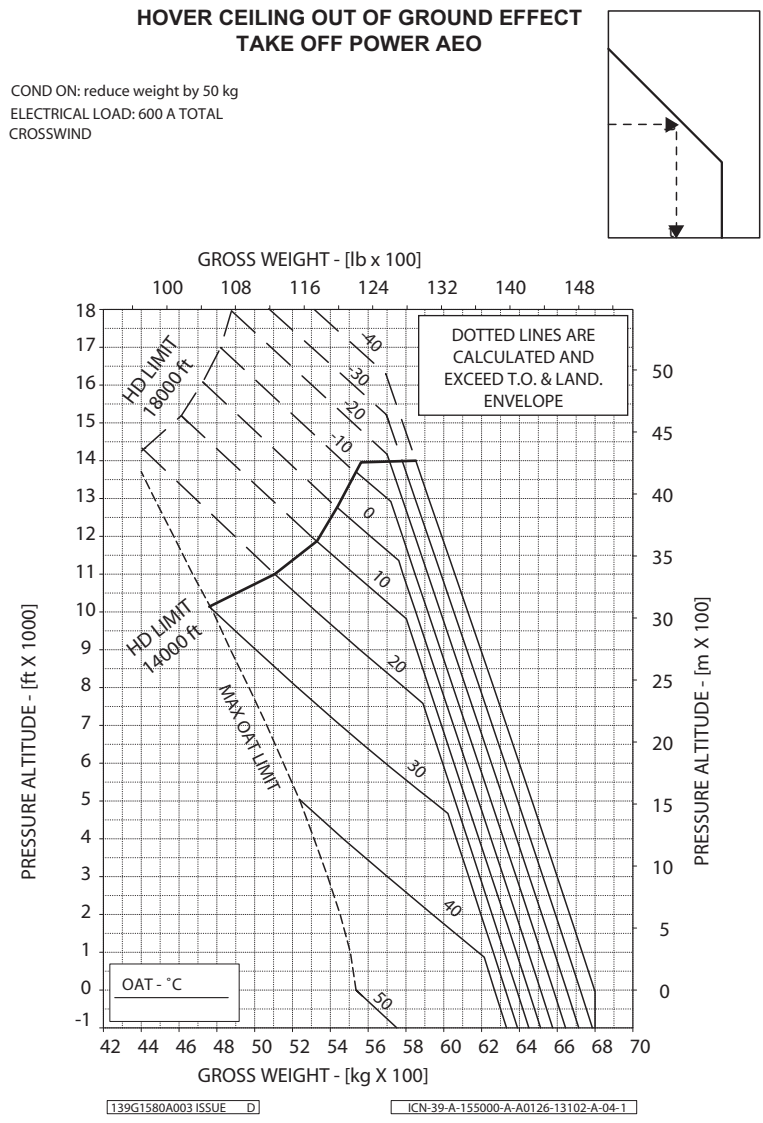

Figure 4-8 Hover Ceiling OGE TOP AEO with Crosswind
(Refer Section 1 Figure 1-6)

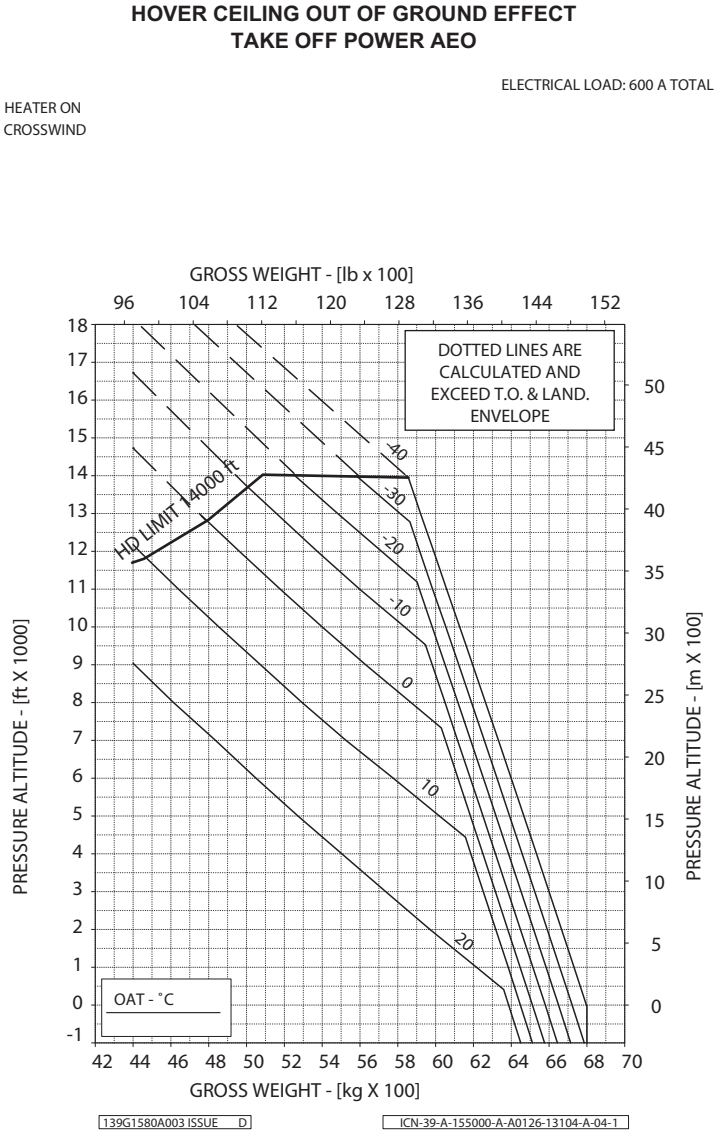

Figure 4-9 Hover Ceiling OGE TOP AEO, HEATER ON with Crosswind (Refer Section 1 Figure 1-6)

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ELECTRICAL LOAD: 600 A TOTAL

EAPS: OFF
COND ON: reduce weight by 50 kg
CROSSWIND

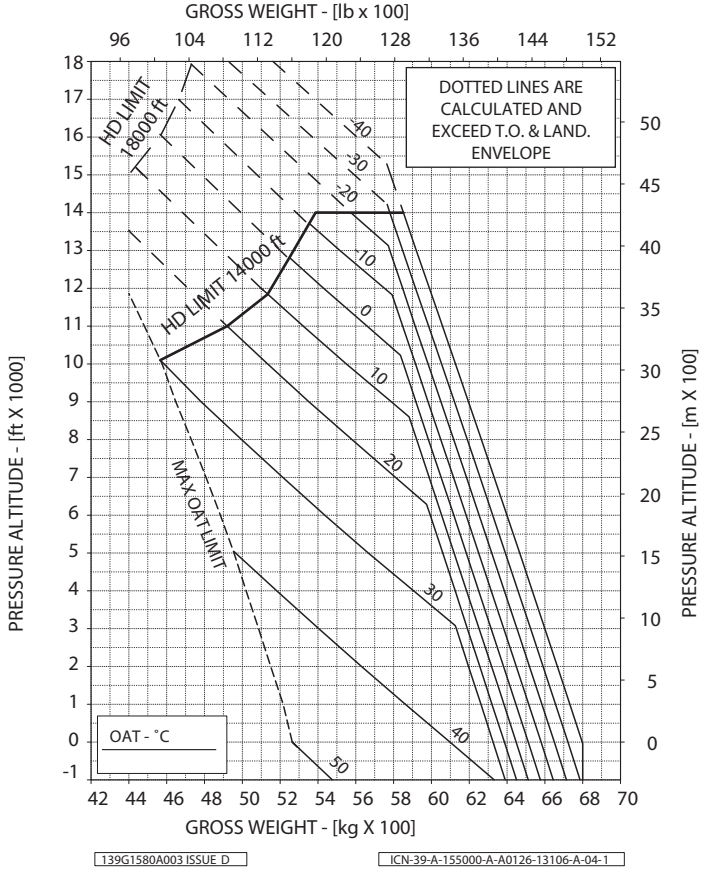

Figure 4-10 Hover Ceiling OGE TOP AEO, EAPS OFF with Crosswind (Refer Section 1 Figure 1-6)

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ELECTRICAL LOAD: 600 A TOTAL

EAPS: ON
COND ON: reduce weight by 50 kg
CROSSWIND

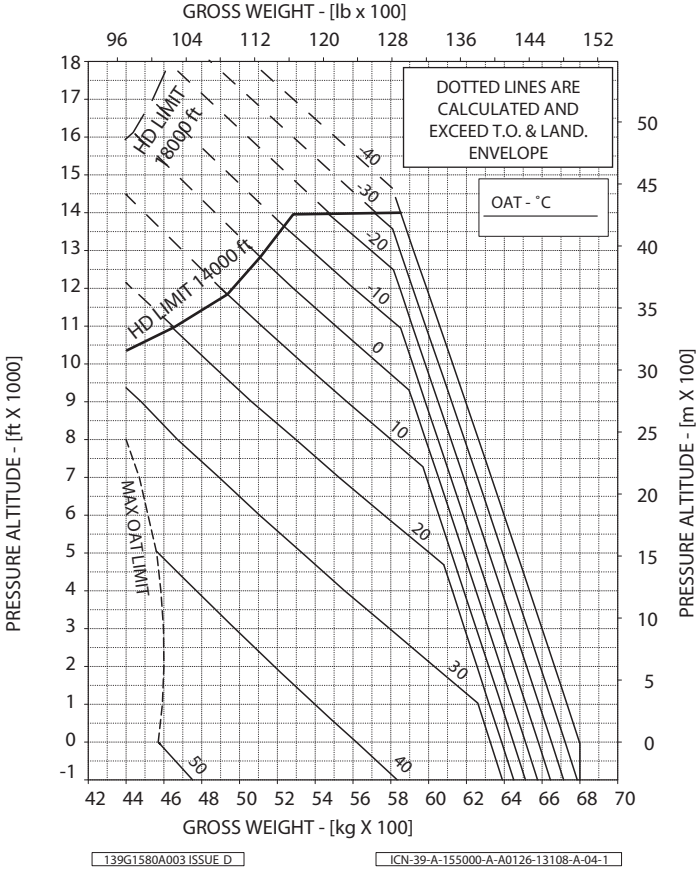

Figure 4-10A Hover Ceiling OGE TOP AEO, EAPS ON with Crosswind (Refer Section 1 Figure 1-6)

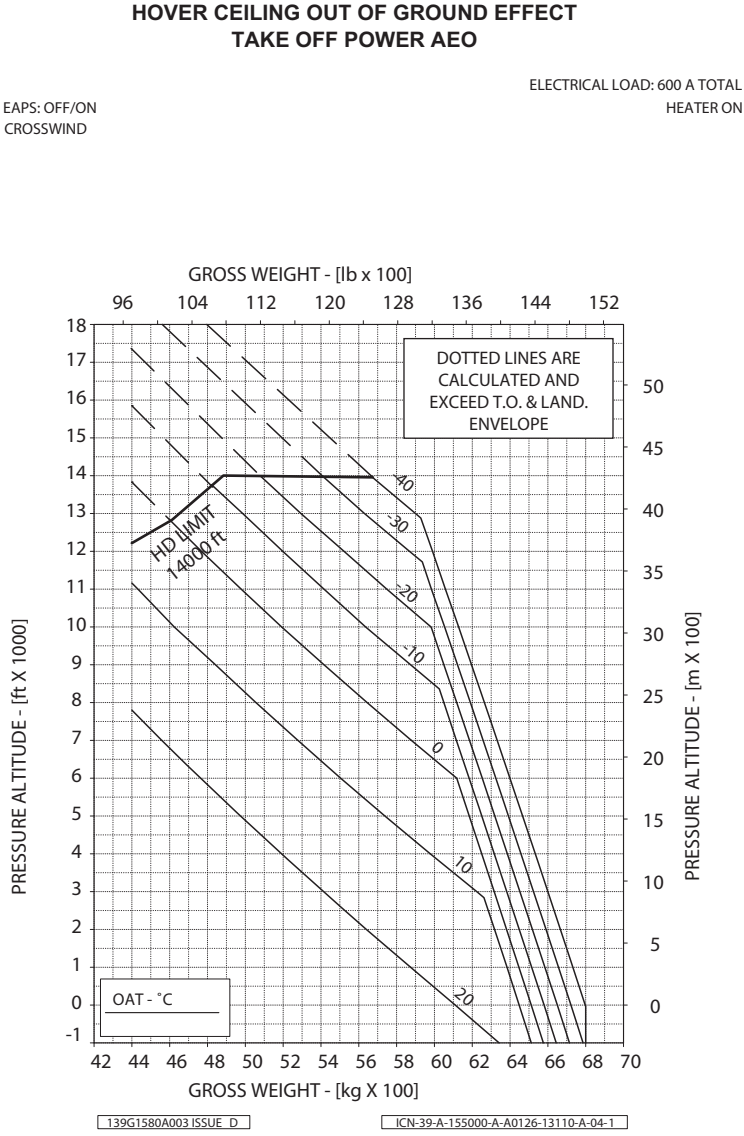

Figure 4-10B Hover Ceiling OGE TOP AEO, EAPS ON/OFF, HEATER ON with Crosswind (Refer Section 1 Figure 1-6)

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ELECTRICAL LOAD: 600 A TOTAL

COND ON: reduce weight by 50 kg
IBF INSTALLED
CROSSWIND

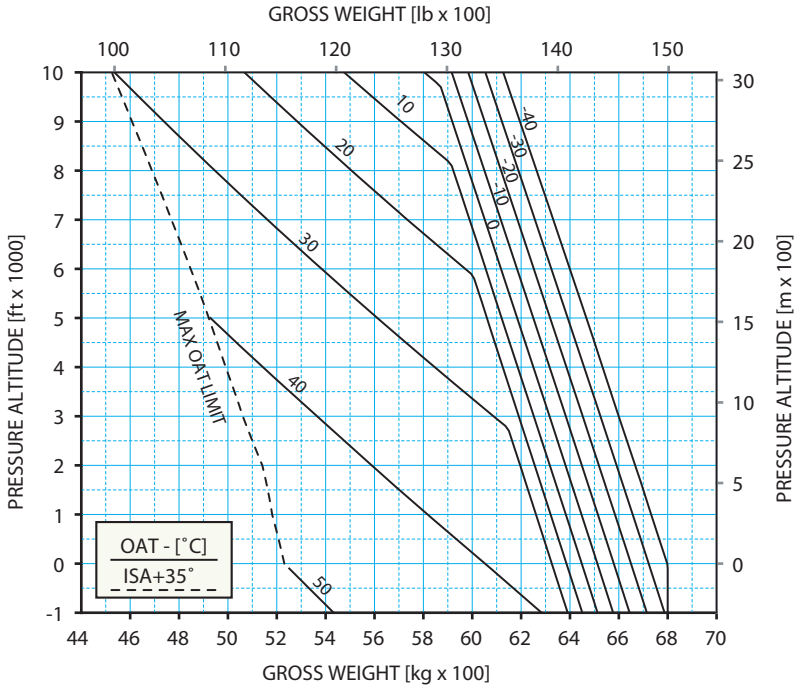

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Figure 4-10C Hover Ceiling OGE TOP AEO, IBF Installed with Crosswind (Refer Section 1 Figure 1-6)

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

IBF INSTALLED
CROSSWIND

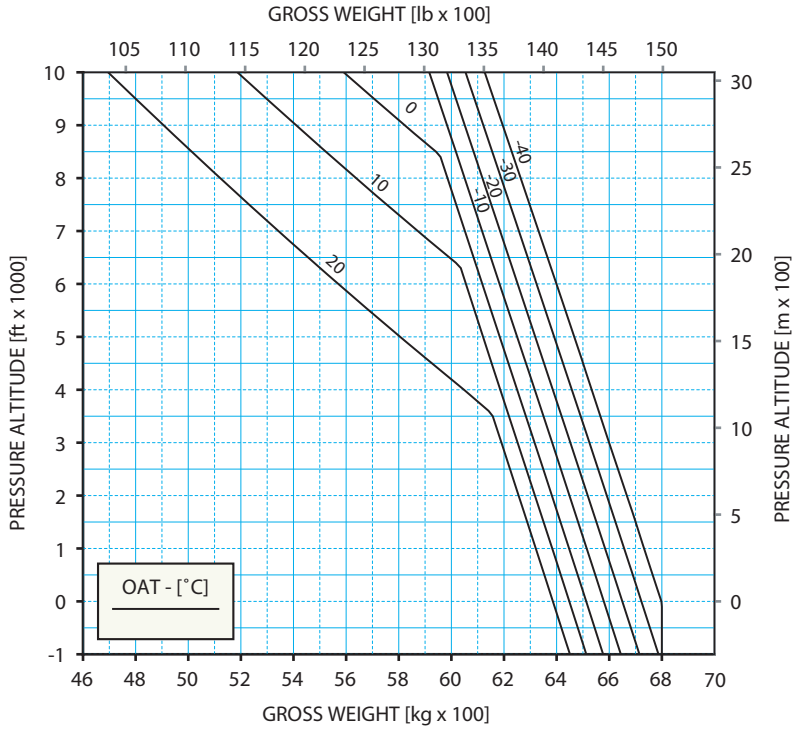

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Figure 4-10D Hover Ceiling OGE TOP AEO, HEATER ON, IBF Installed with Crosswind (Refer Section 1 Figure 1-6)

RATE OF CLIMB

The climb performance shown is based on flight test results and covers a range of gross weights from 6400 kg to the Maximum Gross Weight of 6800 kg. (For gross weights below 6400 kg see Basic RFM Section 4 or appropriate Supplement for aircraft configuration).
The data presented in this Supplement for 6400 kg is identical to the data presented in the Basic RFM or appropriate Supplement and is presented here for interpolation purposes.

Rate of Climb performance is given for All Engines Operating (AEO) case and for the One Engine Inoperative (OEI) case.

For the AEO case, rate of climb is given with the engines operating at the Maximum Continuous Power (MCP) Rating limits and at Take Off Power Rating limits. For the OEI case, rate of climb is given with the engines operating at the 2.5 min rating limit. The datum speed for all rate of climb graphs is 80 KIAS below 10000 ft (3000 m) Hp and 70 KIAS above 10000 ft (3000 m) Hp.

When ECS ENVIRO fitted and in FULL AUTO see Supplement 87 for ROC performance charts.
For ECS ENVIRO operation in MAN HEAT or A/C RECYCLE use HEATER ON/COND ON ROC charts contained in this Supplement.

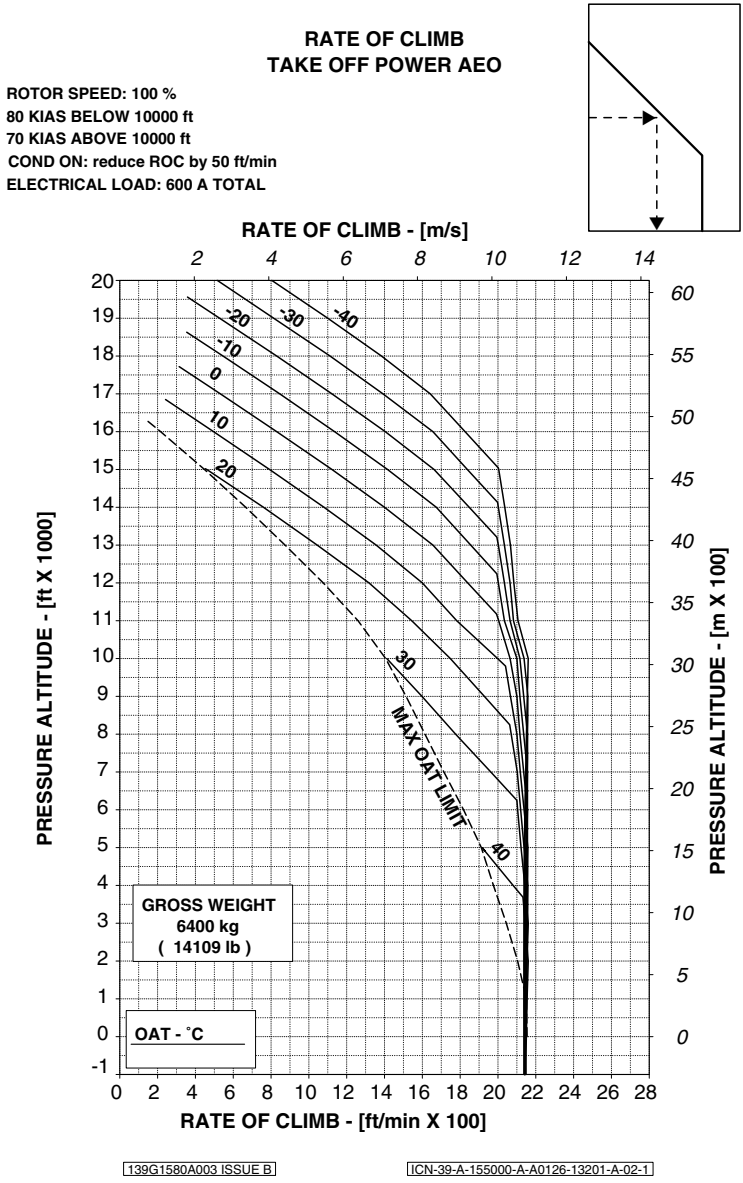

Figure 4-11 ROC TOP AEO Gross Weight 6400 Kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

ELECTRICAL LOAD: 600 A TOTAL

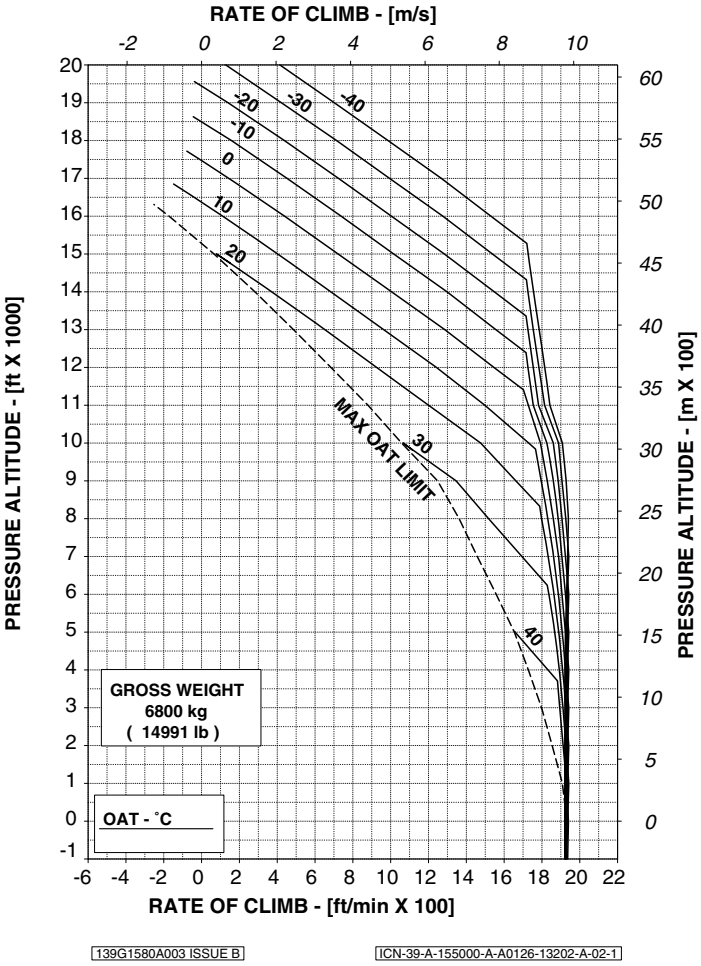

Figure 4-12 ROC TOP AEO Gross Weight 6800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

ELECTRICAL LOAD: 600 A TOTAL

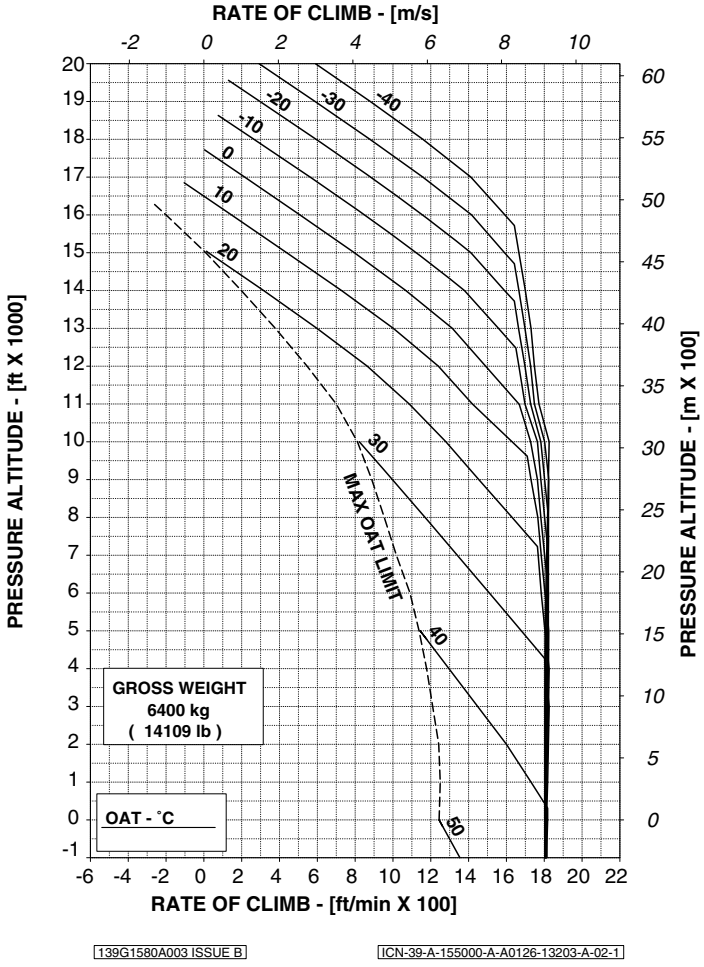

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Figure 4-13 ROC MCP AEO Gross Weight 6400 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

ELECTRICAL LOAD: 600 A TOTAL

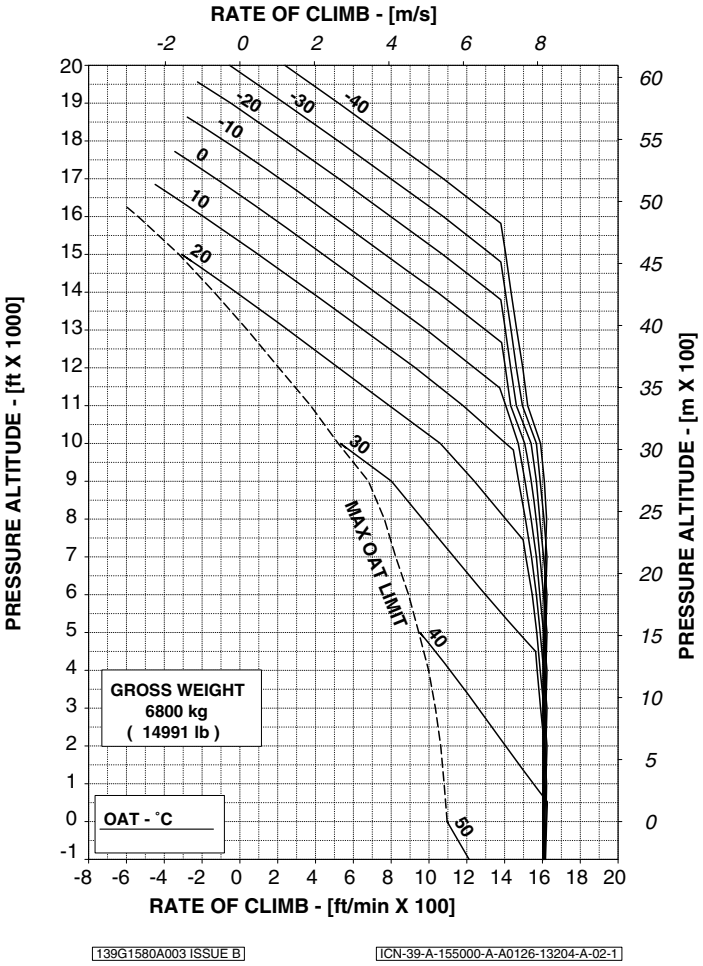

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Figure 4-14 Rate of Climb MCP AEO Gross Weight 6800 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

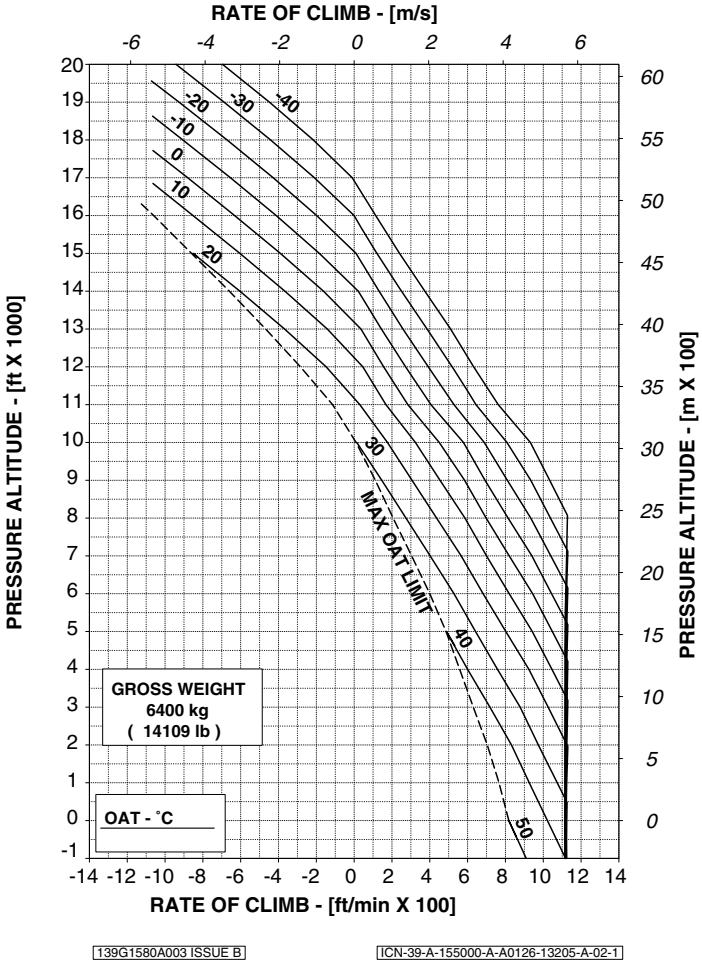

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Figure 4-15 ROC 2.5 Minute Power OEI Gross Weight 6400 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 300 A

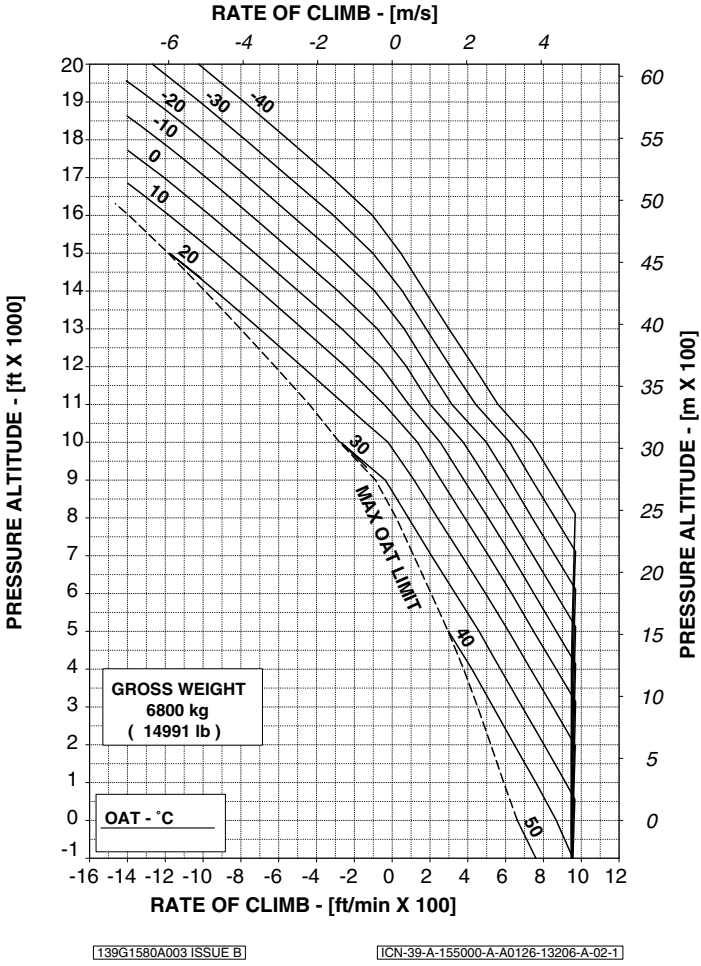

Figure 4-16 ROC 2.5 Minute Power OEI Gross Weight 6800 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

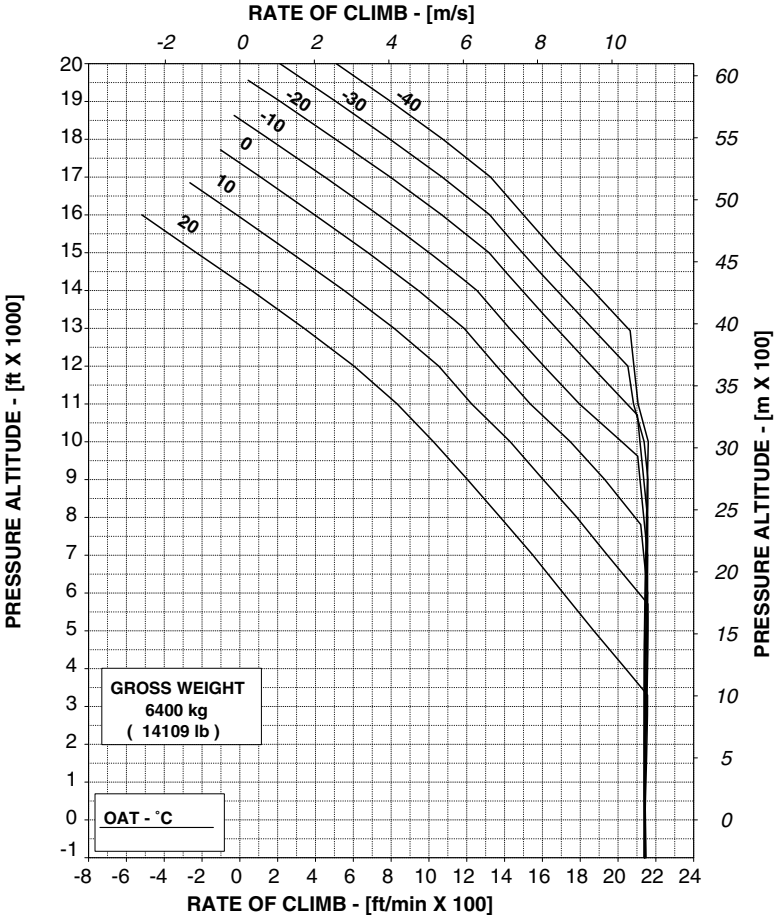

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Figure 4-17 ROC TOP AEO Gross Weight 6400 kg, HEATER ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

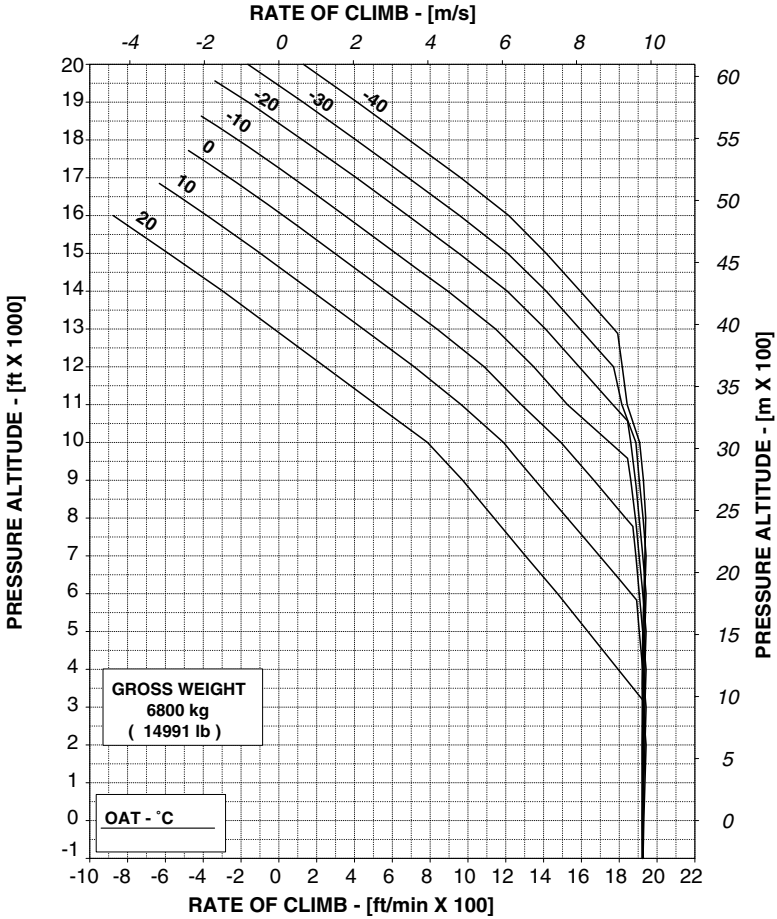

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Figure 4-18 ROC TOP AEO Gross Weight 6800 kg, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

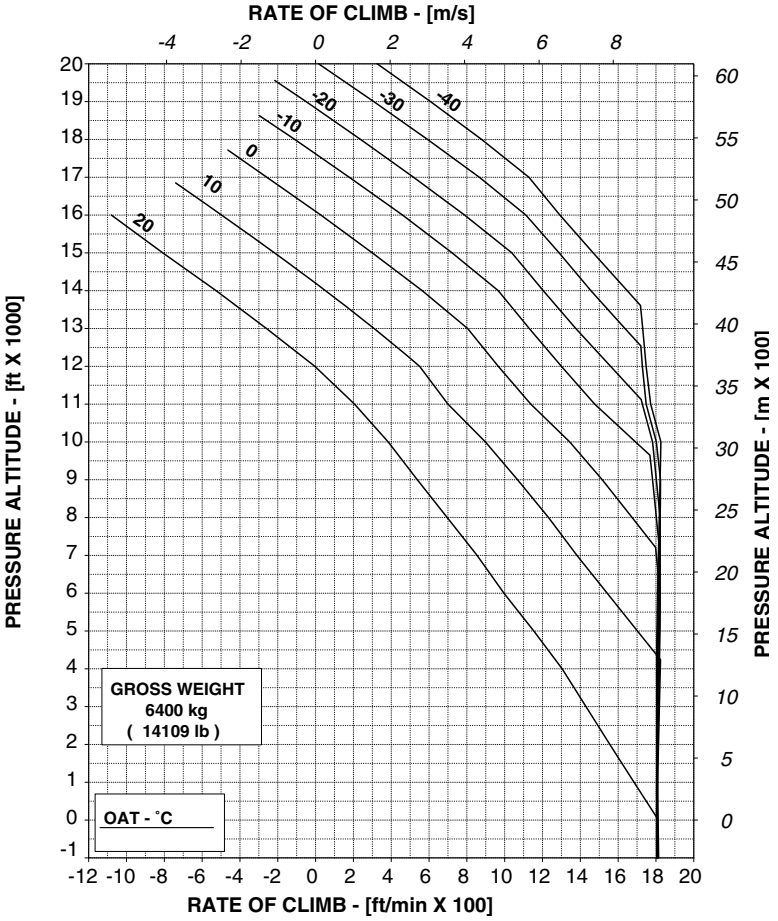

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Figure 4-19 ROC MCP AEO Gross Weight 6400 kg, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

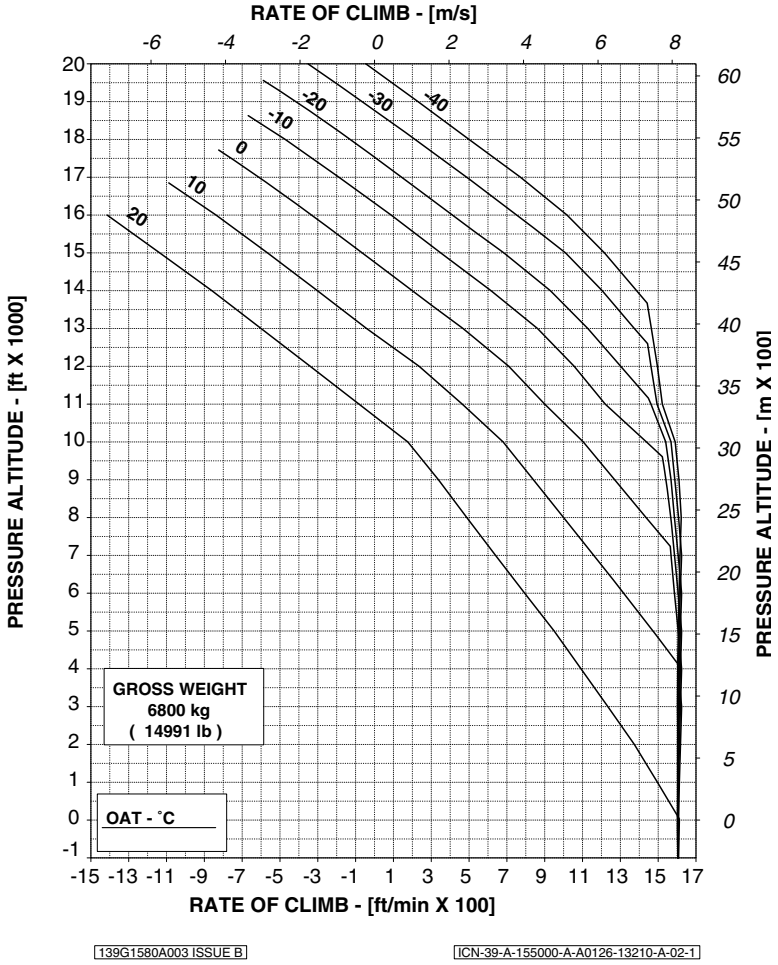

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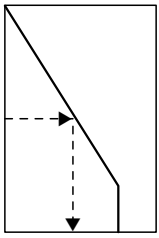
Figure 4-20 ROC MCP AEO Gross Weight 6800 kg, HEATER ON



RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
EAPS OFF
ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min

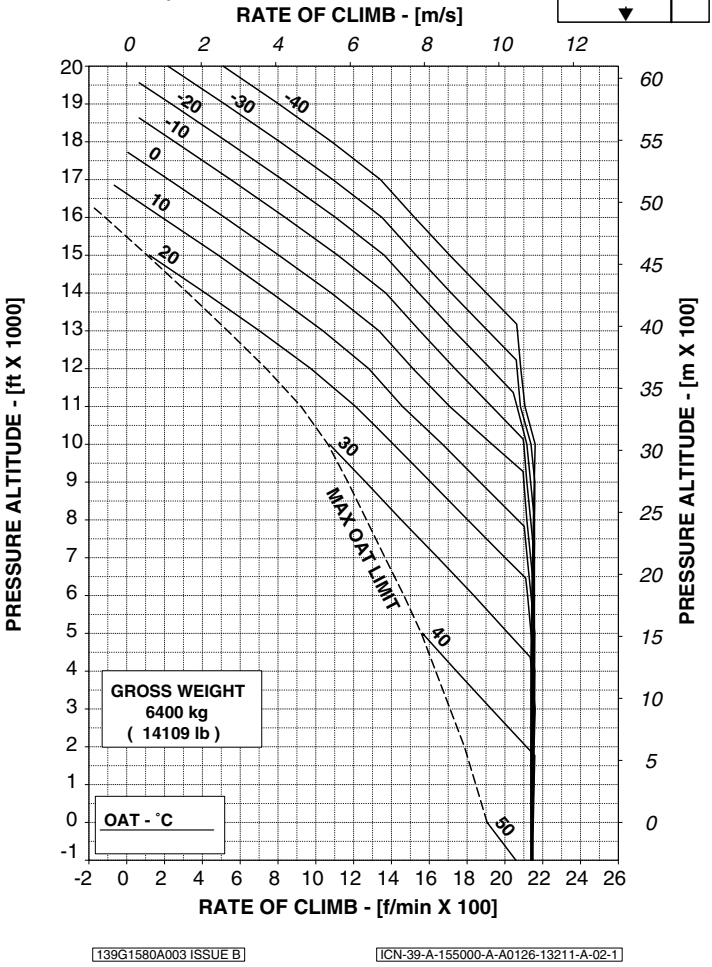


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Figure 4-21 ROC TOP AEO Gross Weight 6400 kg, EAPS OFF

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS OFF
ELECTRICAL LOAD: 600 A TOTAL

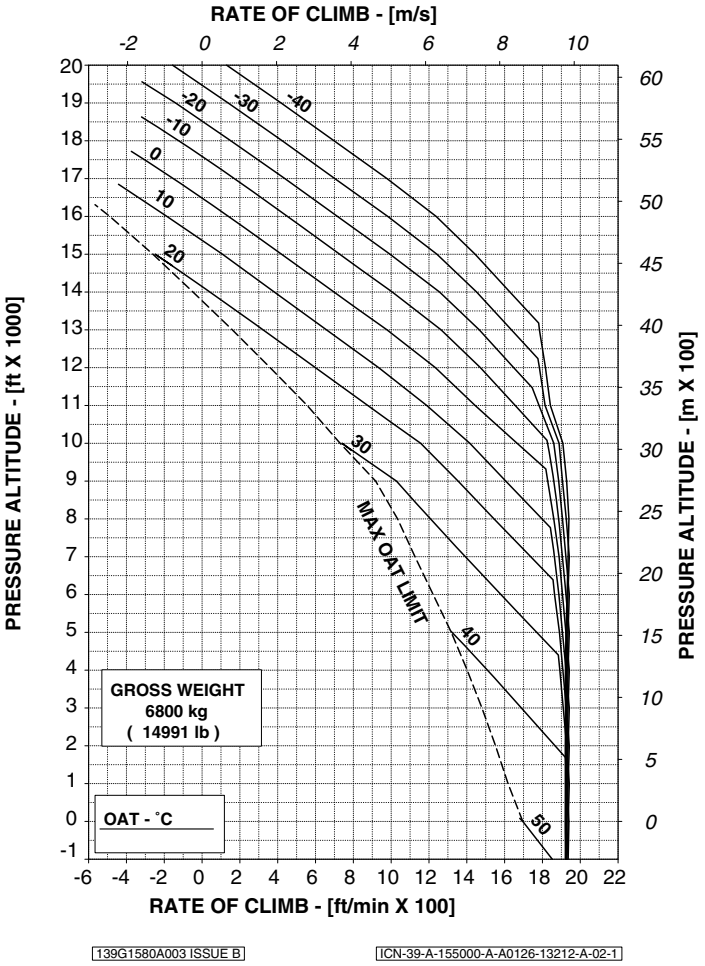

Figure 4-22 ROC TOP AEO Gross Weight 6800 kg, EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS OFF
ELECTRICAL LOAD: 600 A TOTAL

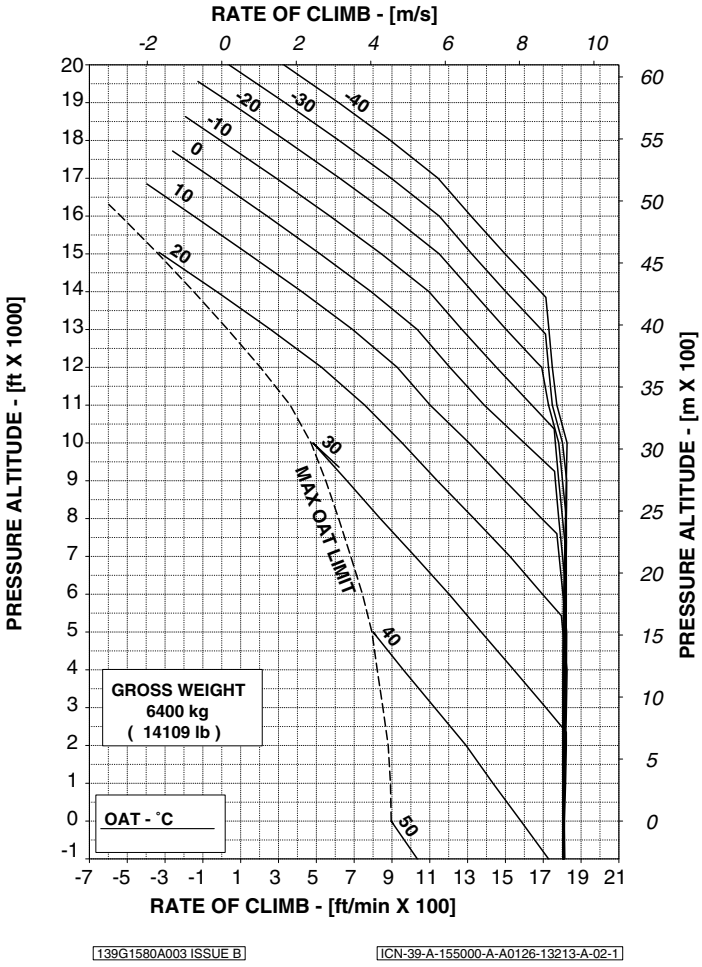

Figure 4-23 ROC MCP AEO Gross Weight 6400 kg, EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS OFF
ELECTRICAL LOAD: 600 A TOTAL

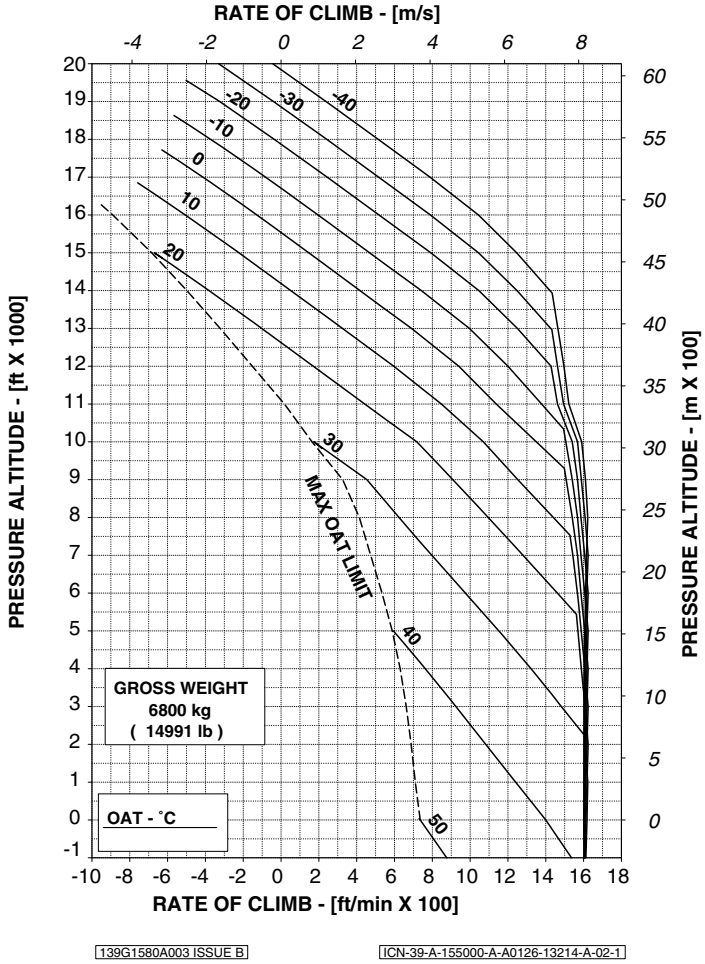

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Figure 4-24 ROC MCP AEO Gross Weight 6800 kg, EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS OFF
ELECTRICAL LOAD: 300 A

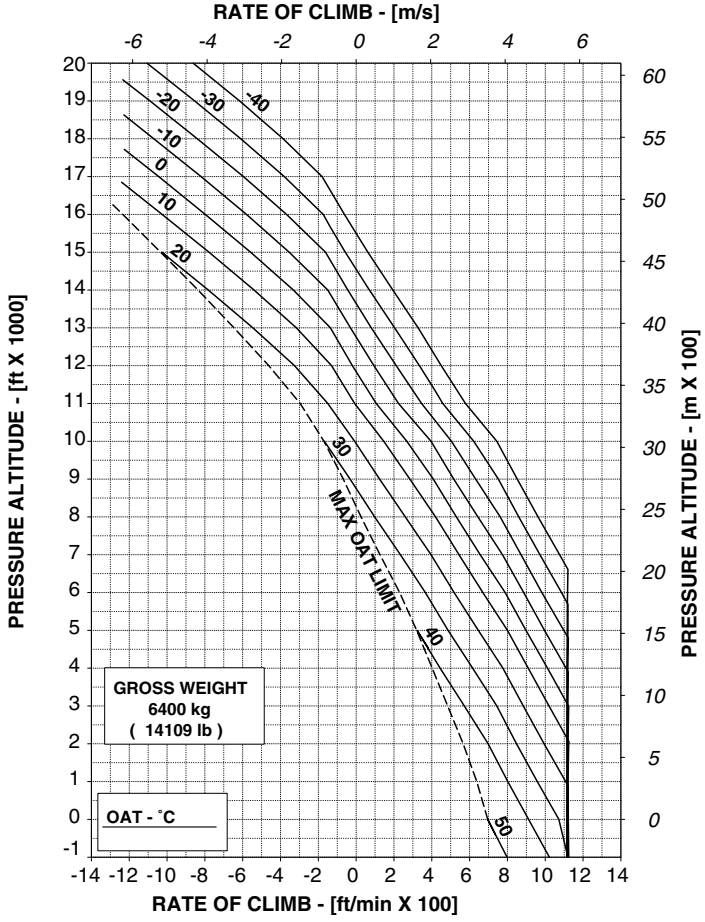

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Figure 4-25 ROC 2.5 Minute Power OEI Gross Weight 6400 kg EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS OFF
ELECTRICAL LOAD: 300 A

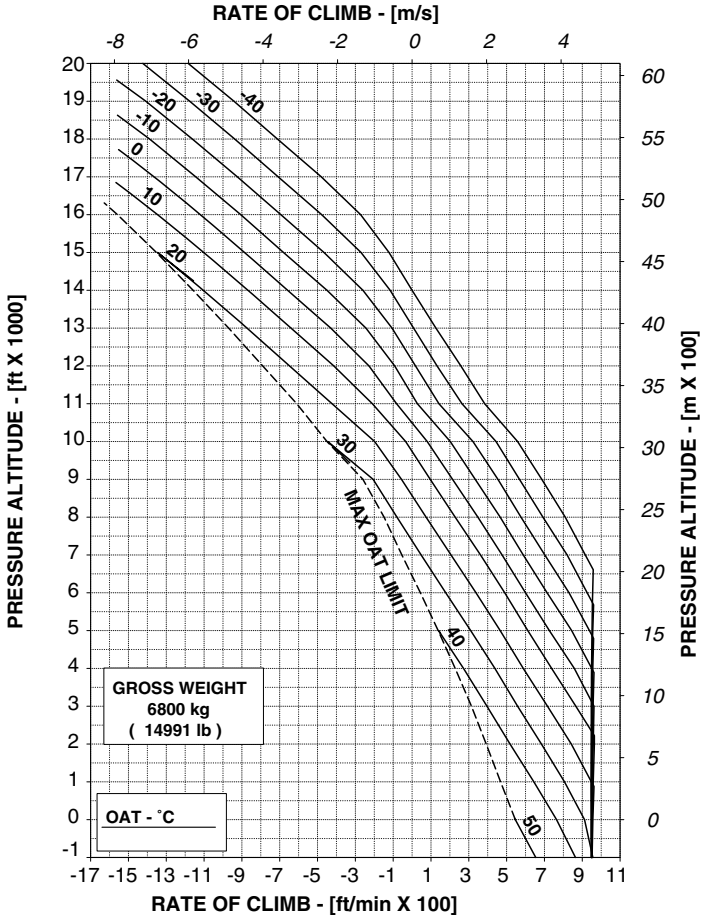

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Figure 4-26 ROC 2.5 Minute Power OEI Gross Weight 6800 kg EAPS OFF

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS ON
ELECTRICAL LOAD: 600 A TOTAL

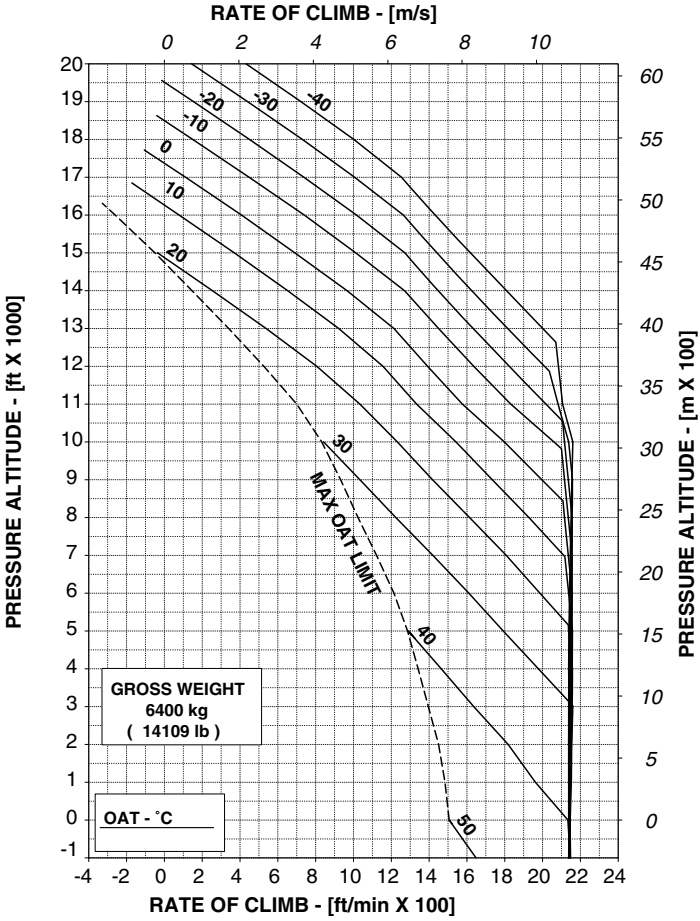

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Figure 4-27 ROC TOP AEO Gross Weight 6400 kg, EAPS ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS ON
ELECTRICAL LOAD: 600 A TOTAL

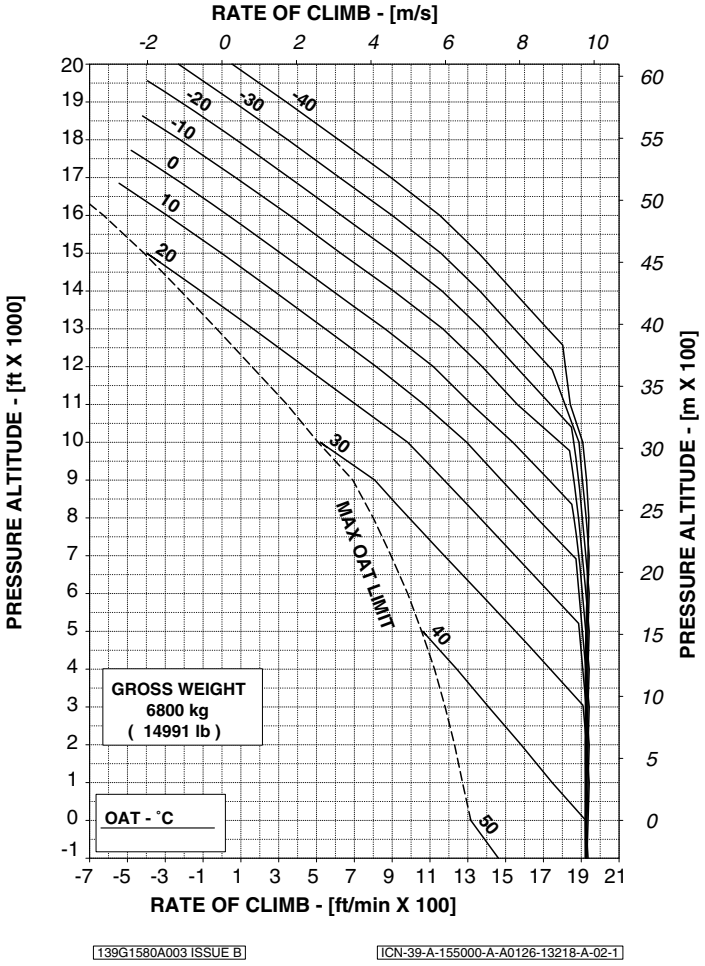

Figure 4-28 ROC TOP AEO Gross Weight 6800 kg, EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS ON
ELECTRICAL LOAD: 600 A TOTAL

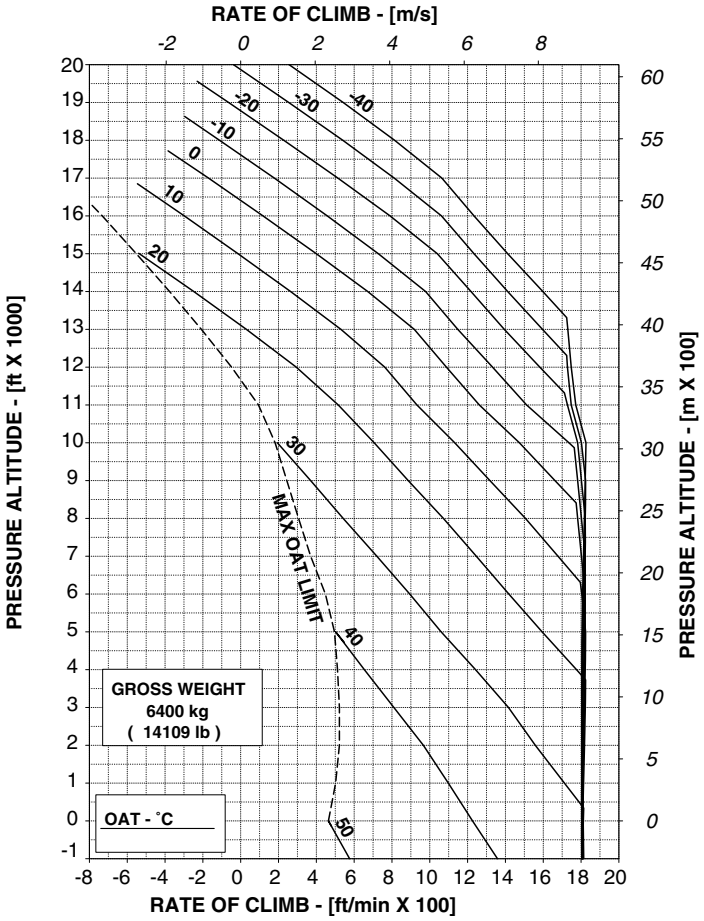

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Figure 4-29 ROC MCP AEO Gross Weight 6400 kg, EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft
COND ON: reduce ROC by 50 ft/min

EAPS ON
ELECTRICAL LOAD: 600 A TOTAL

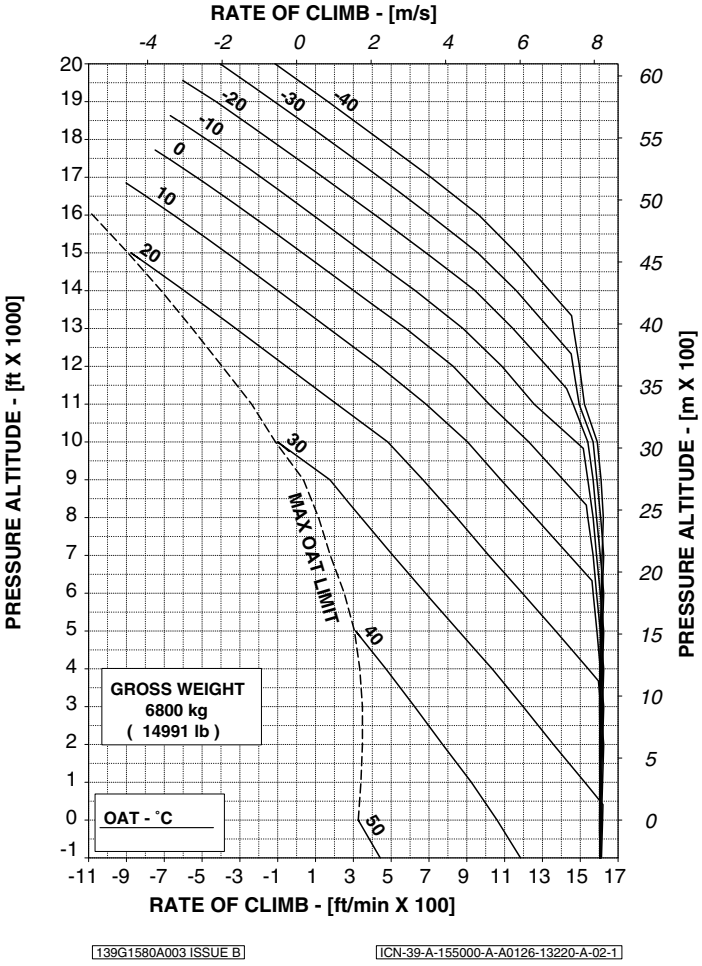

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Figure 4-30 ROC MCP AEO Gross Weight 6800 kg, EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS ON
ELECTRICAL LOAD: 300 A

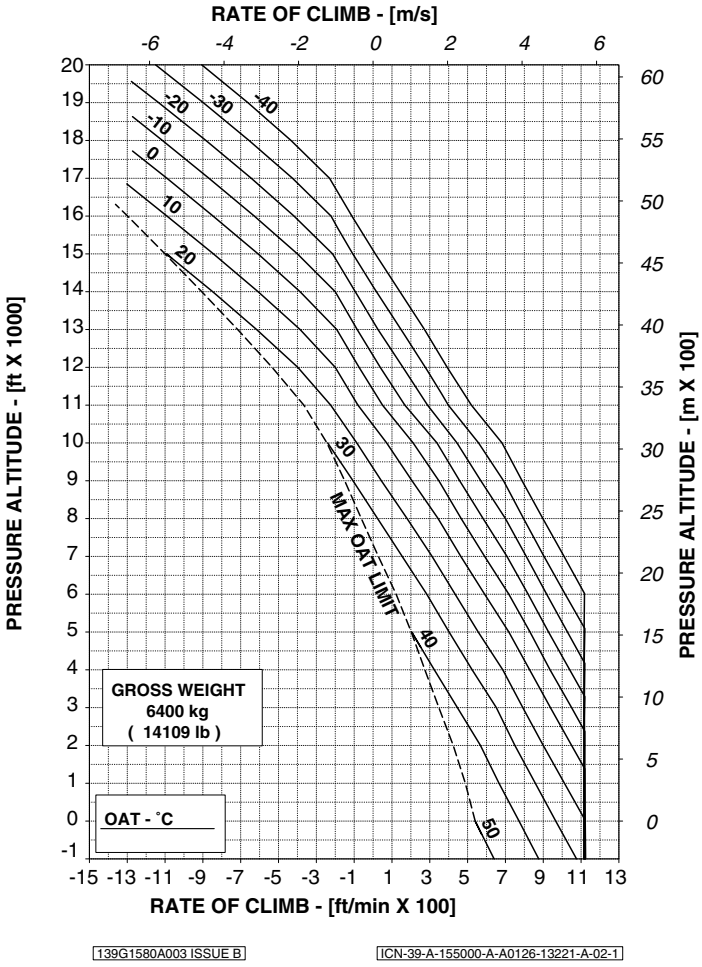

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Figure 4-31 ROC 2.5min OEI Gross Weight 6400 kg, EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS ON
ELECTRICAL LOAD: 300 A

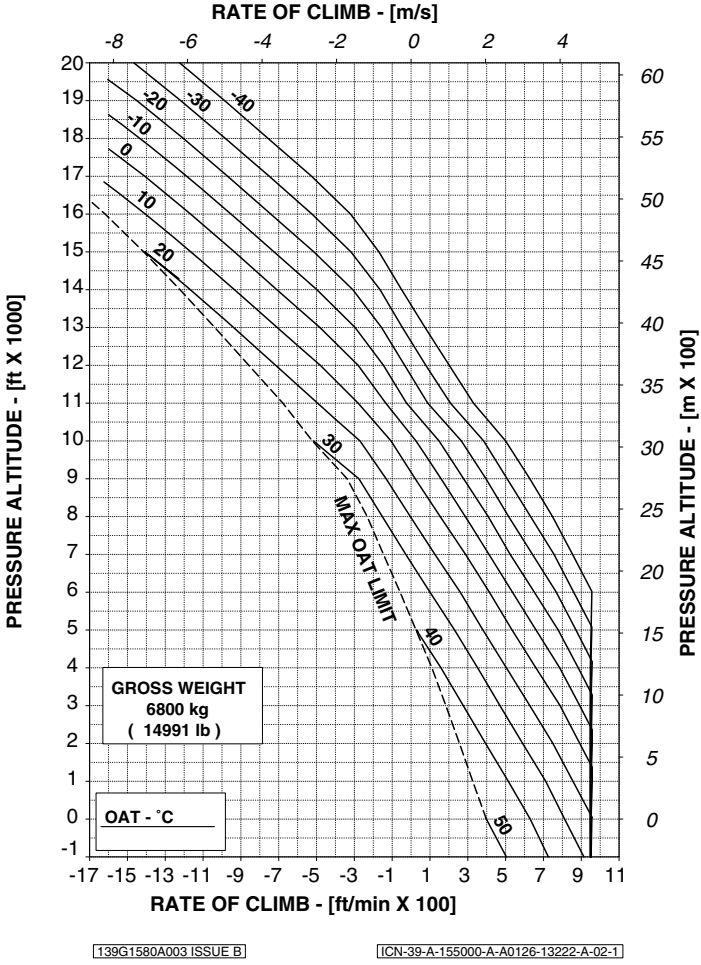

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Figure 4-32 ROC 2.5min OEI Gross Weight 6800 kg, EAPS ON

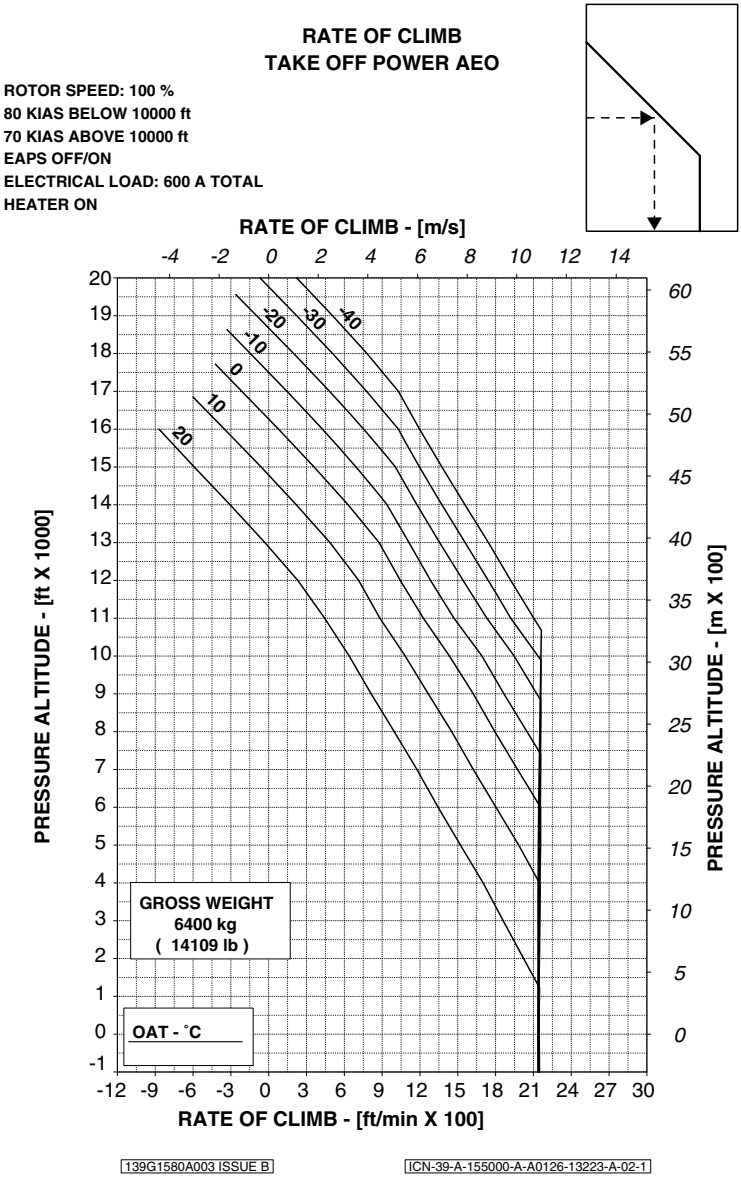

Figure 4-33 ROC TOP AEO Gross Weight 6400 kg, EAPS ON/OFF HEATER ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

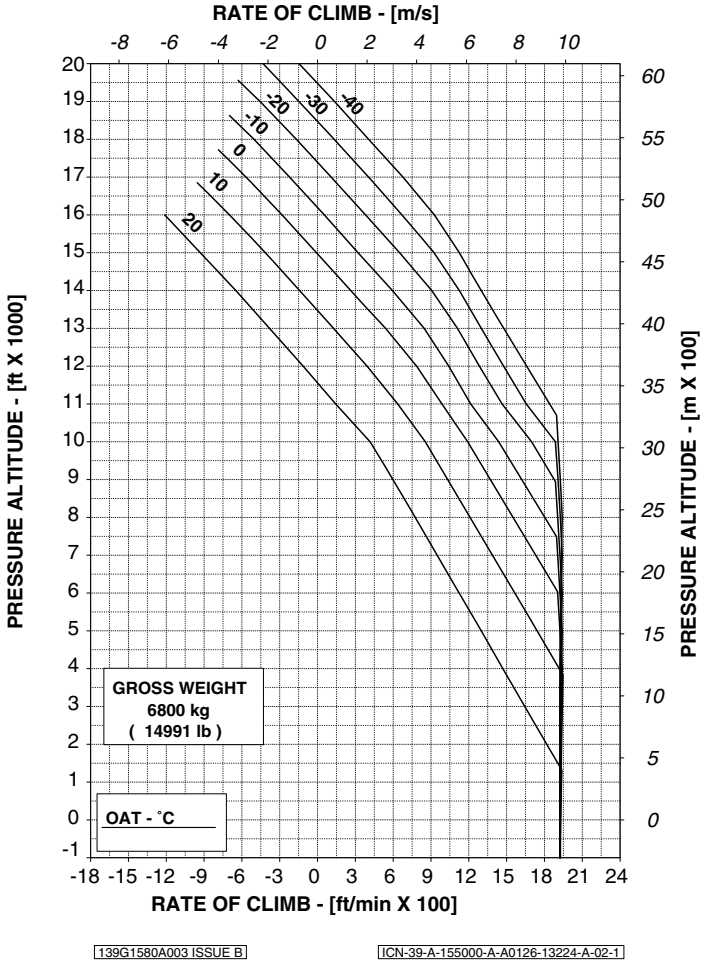

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Figure 4-34 ROC TOP AEO Gross Weight 6800 kg, EAPS ON/OFF HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

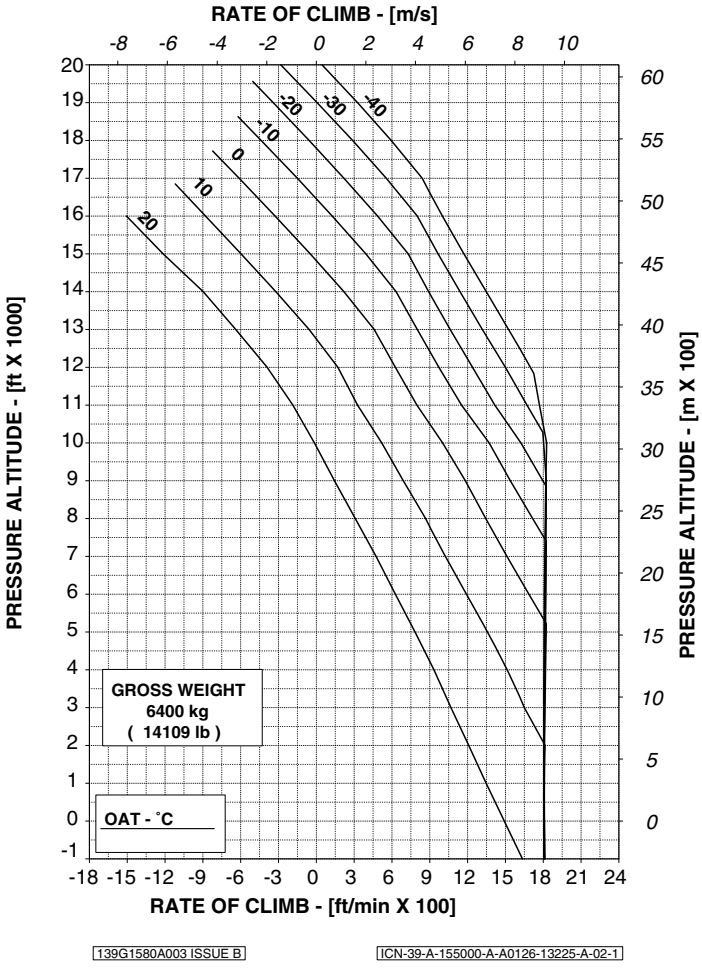

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Figure 4-35 ROC MCP AEO Gross Weight 6400 kg, EAPS ON/OFF HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS BELOW 10000 ft
70 KIAS ABOVE 10000 ft

EAPS OFF/ON
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

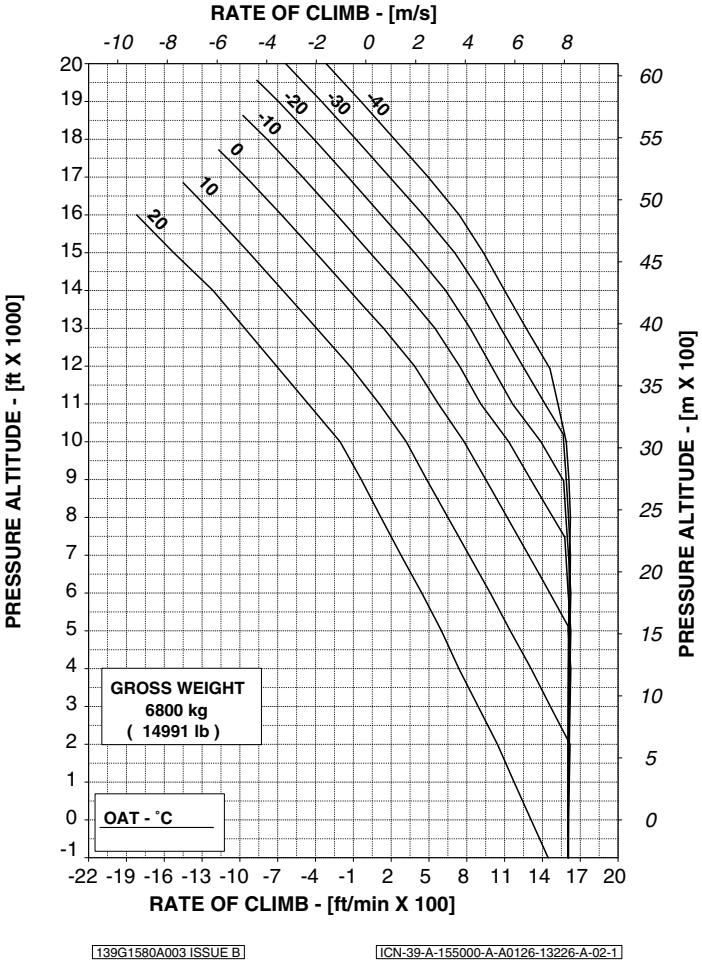

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Figure 4-36 ROC MCP AEO Gross Weight 6800 kg, EAPS ON/OFF HEATER ON

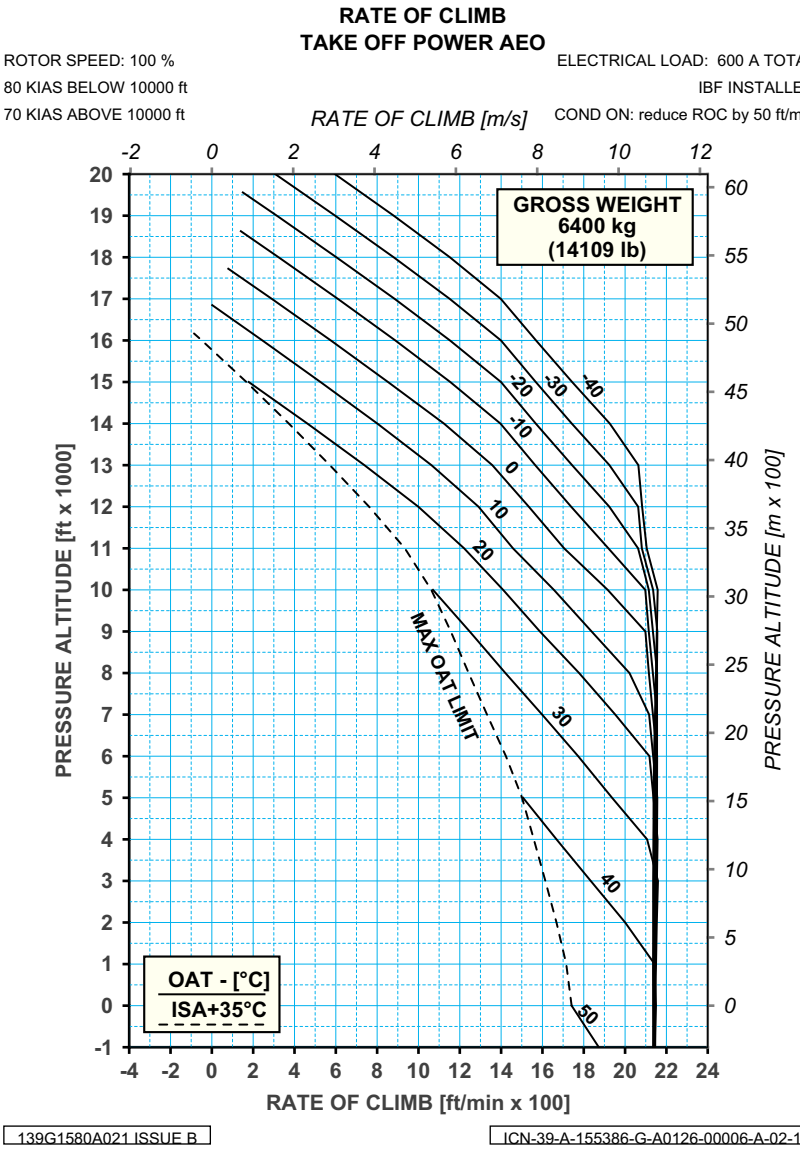

Figure 4-37 ROC TOP AEO Gross Weight 6400 kg, IBF Installed

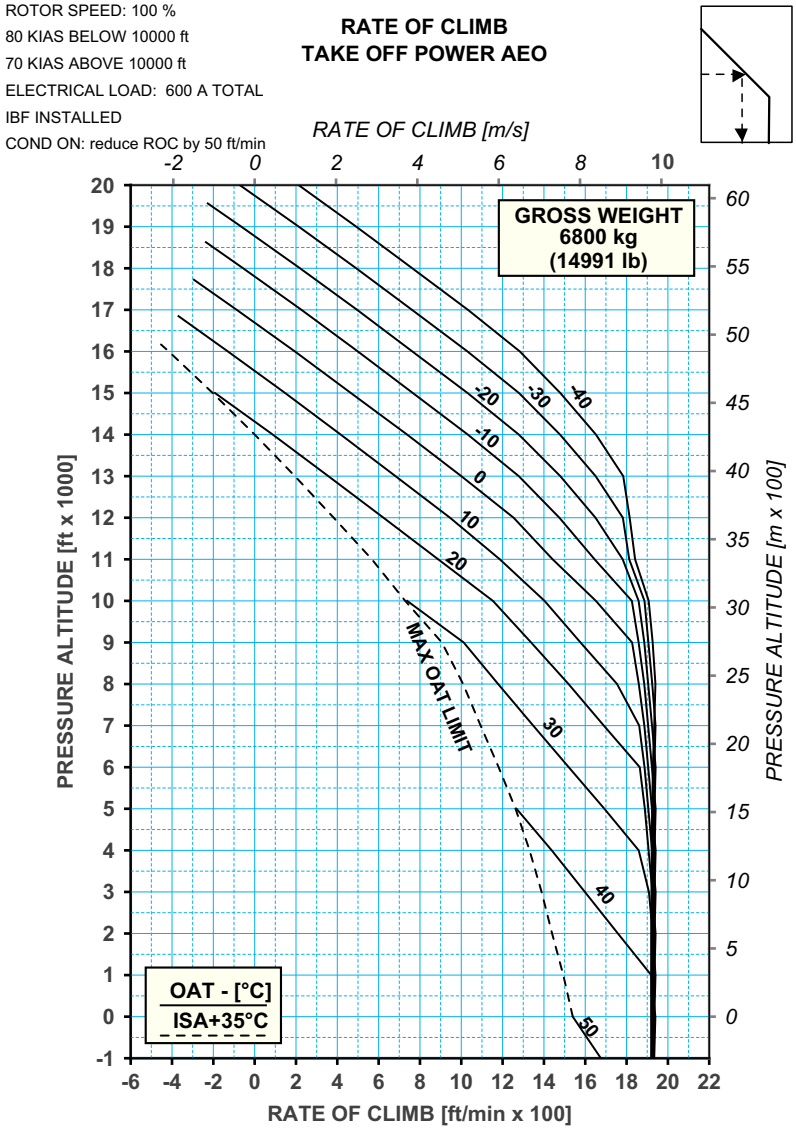

Figure 4-38 ROC TOP AEO Gross Weight 6800 kg, IBF Installed

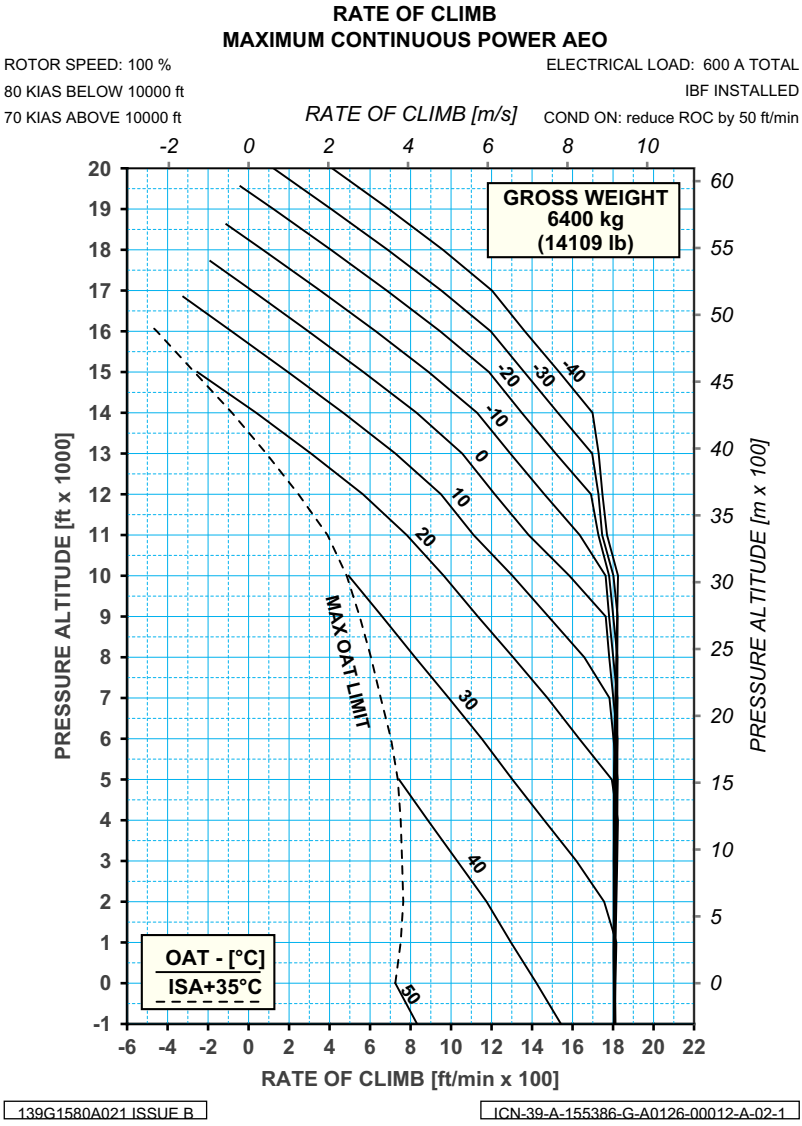

Figure 4-39 ROC MCP AEO Gross Weight 6400 kg, IBF Installed

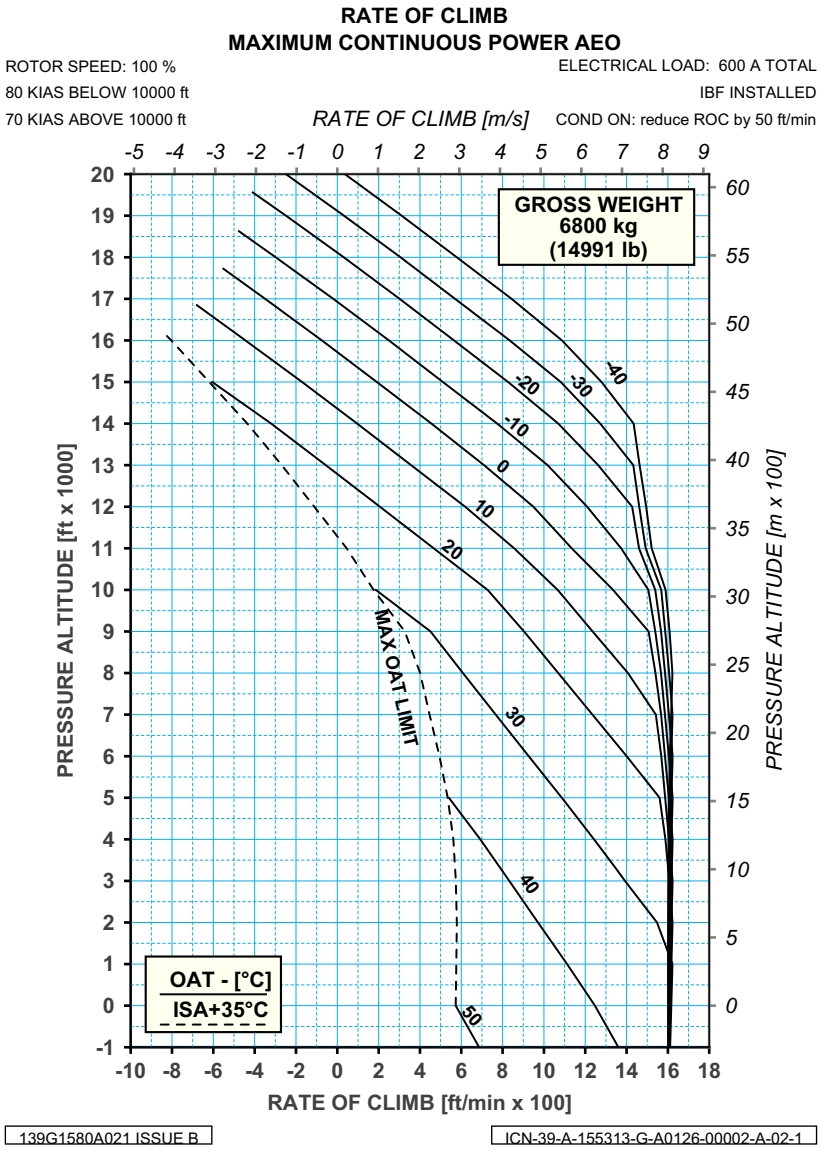

Figure 4-40 ROC MCP AEO Gross Weight 6800 kg, IBF Installed

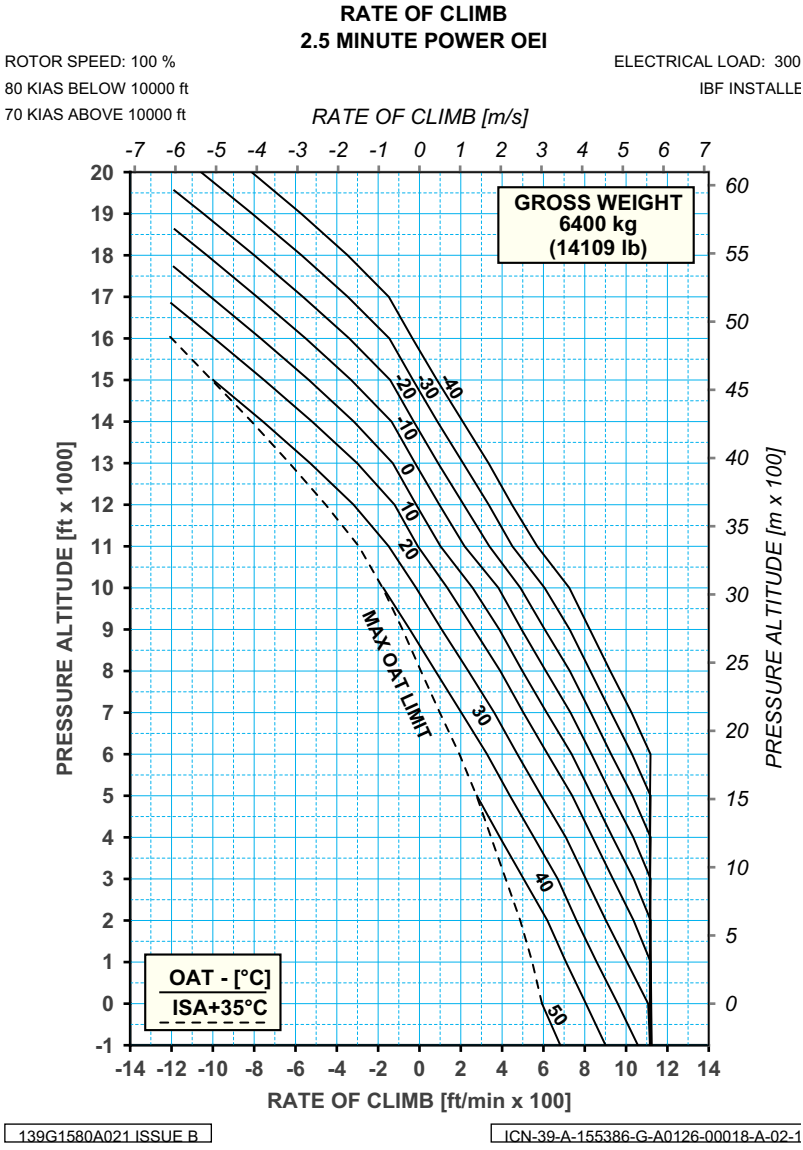

Figure 4-41 ROC 2.5 min OEI Gross Weight 6400 kg, IBF Installed

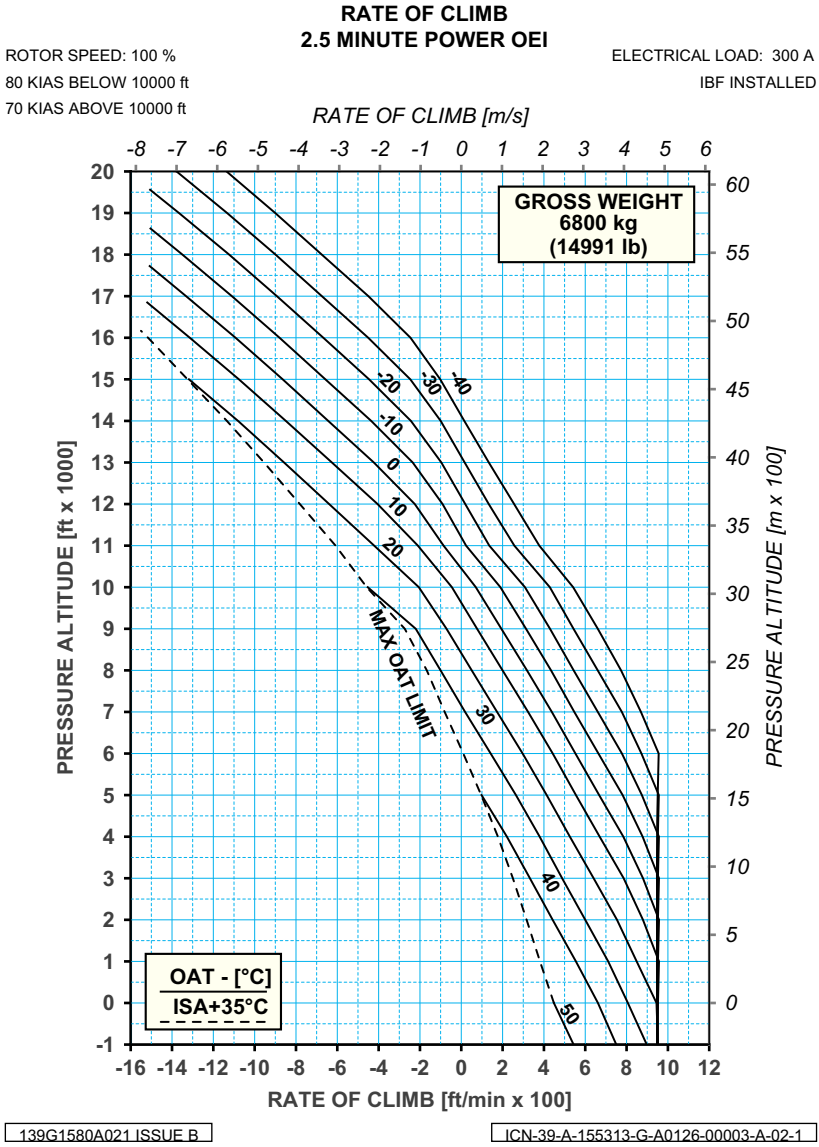

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Figure 4-42 ROC 2.5 min OEI Gross Weight 6800 kg, IBF Installed

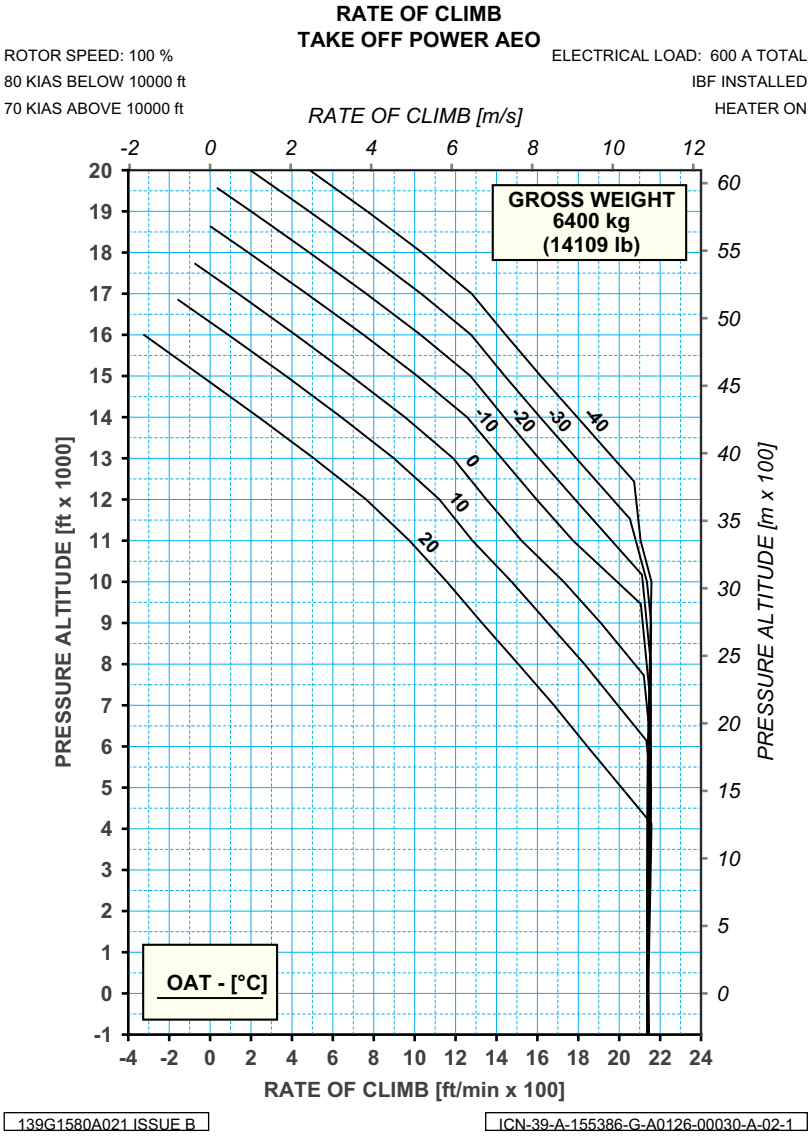

Figure 4-43 ROC TOP AEO Gross Weight 6400 kg, IBF Installed, HEATER ON

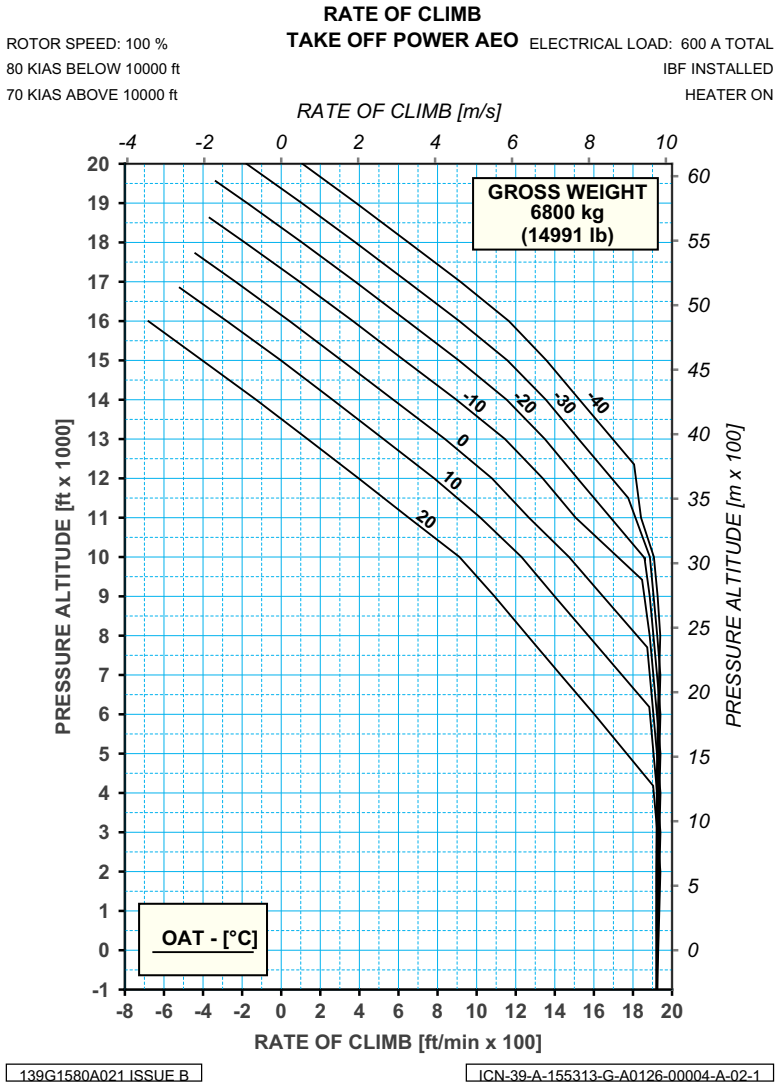

Figure 4-44 ROC TOP AEO Gross Weight 6800 kg, IBF Installed, HEATER ON

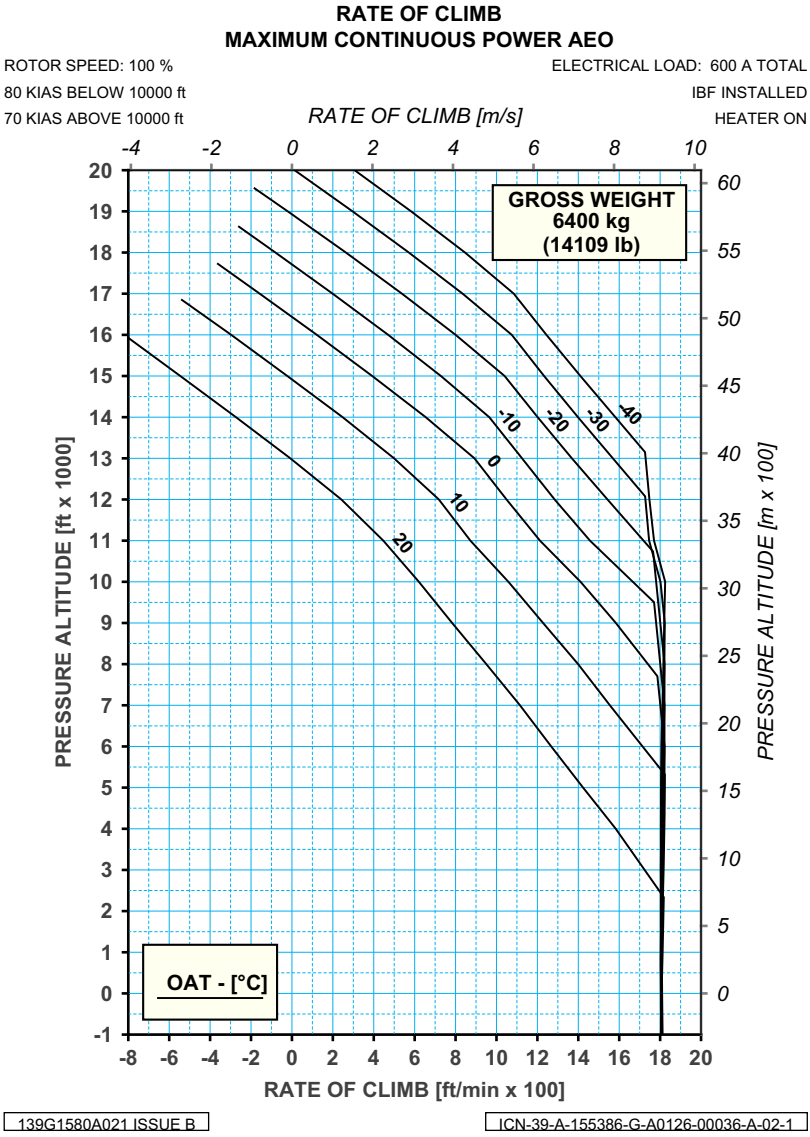

Figure 4-45 ROC MCP AEO Gross Weight 6400 kg, IBF Installed, HEATER ON

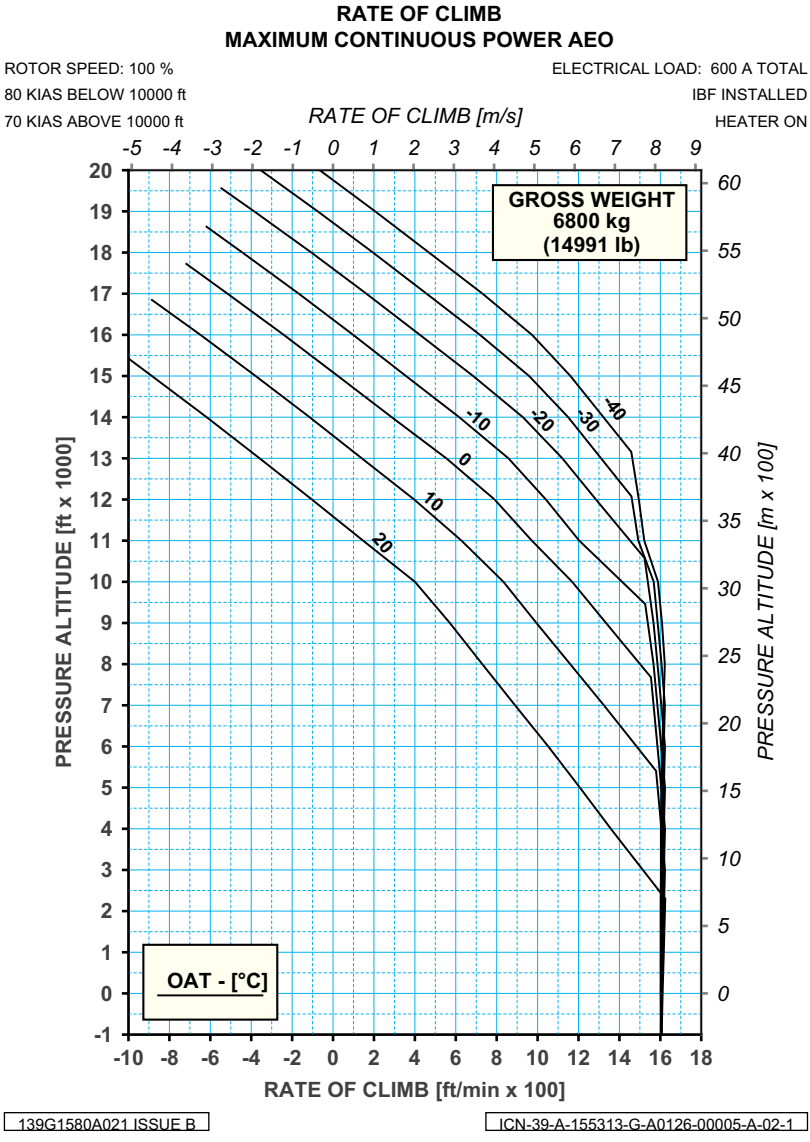

Figure 4-46 ROC MCP AEO Gross Weight 6800 kg, IBF Installed, HEATER ON

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

For CARGO HOOK operations Longitudinal and Lateral Moments of STA 5300 mm, BL 0 mm for loads attached to cargo hook, must be used in the Weight and Balance Calculations.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 14

WEATHER RADAR PRIMUS WX P660

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 15

AUXILIARY FUEL TANK

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SUPPLEMENT 15
AUXILIARY FUEL TANK

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GENERAL INFORMATION

The Auxiliary Fuel Tank is a single additional fuel tank. The tank consists of a fuel cell installed in the bay between the right and left standard fuel tanks. The tank is installed behind the cabin and isolated by bulkheads from the cabin and baggage compartments. (See Figure 1)

The tank is connected to and forms an extension to the main fuel tank through two connectors. It is filled via the main tank and feeds the main tank by gravity. A fuel vent line from the tank is connected to the main tank vent line system and an electrical connection provides Fuel Gauging Control Unit information. The Fuel Gauging System automatically compensates for the additional fuel quantity.

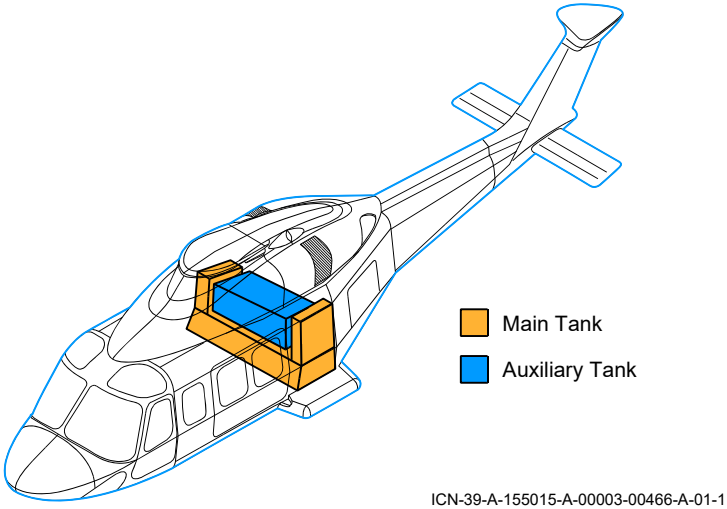

Figure 1 Auxiliary Fuel Tank Position

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Auxiliary Fuel Tank, the new empty weight and center of gravity position must be determined.

No change to weight or CG limitations.

FUEL CAPACITIES

Auxiliary Tank Usable..... 500 litres

Total Usable (Main plus Auxiliary Tanks)..... 2088 litres

Unusable .....No change

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

When the Auxiliary Fuel Tank is installed the following Longitudinal Moments for the Fuel must be used in the Weight and Balance Calculations.

WEIGHT - ARMS AND MOMENTS

LONGITUDINAL MOMENTS

TOTAL FUEL MAIN + AUX TANKS			
Weight (kg)	**L (0,8 kg/L)**	**Arm (mm)**	**Moment (kgm)**
25	31	6208	155,2
50	63	6209	310,5
75	94	6210	465,8
100	125	6210	621,0
125	156	6210	776,3
150	188	6210	931,5
175	219	6210	1086,8
200	250	6210	1242,0
225	281	6210	1397,3
250	313	6210	1552,5
275	344	6210	1707,8
300	375	6210	1863,0
325	406	6210	2018,3
350	438	6211	2173,9
375	469	6211	2329,1
400	500	6211	2484,4
425	531	6211	2639,7
450	563	6211	2795,0
475	594	6211	2950,2
500	625	6212	3106,0
525	656	6212	3261,3
550	688	6212	3416,6
575	719	6212	3571,9
600	750	6213	3727,8
625	781	6213	3883,1
650	813	6214	4039,1
675	844	6214	4194,5
700	875	6214	4349,8
725	906	6215	4505,9
750	938	6215	4661,3
775	969	6216	4817,4
800	1000	6217	4973,6
825	1031	6219	5130,7
850	1063	6220	5287,0
875	1094	6222	5444,3
900	1125	6221	5598,9
925	1156	6221	5754,4
950	1188	6222	5910,9
975	1219	6223	6067,4

LONGITUDINAL MOMENTS (CONT)

TOTAL FUEL MAIN + AUX TANKS			
Weight (kg)	**L (0,8 kg/L)**	**Arm (mm)**	**Moment (kgm)**
1000	1250	6223	6223,0
1025	1281	6224	6379,6
1050	1313	6225	6536,3
1075	1344	6225	6691,9
1100	1375	6226	6848,6
1125	1406	6227	7005,4
1150	1438	6227	7161,1
1175	1469	6227	7316,7
1200	1500	6228	7473,6
1225	1531	6228	7629,3
1250	1563	6229	7786,3
1275	1594	6229	7942,0
1300	1625	6229	8097,7
1325	1656	6230	8254,8
1350	1688	6231	8411,9
1375	1719	6231	85676
1400	1750	6231	8723,4
1425	1781	6232	8880,6
1450	1813	6232	9036,4
1475	1844	6232	91922
1500	1875	6232	9348,0
1525	1906	6233	9505,3
1550	1938	6233	9661,2
1575	1969	6233	9817,0
1600	2000	6234	9974,4
1625	2031	6234	10130,3
1650	2063	6234	10286,1
1670	2088	6234	10413,3

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 16

RADIO EQUIPMENT
V/UHF FLEXCOMM II

P/N 3G2310F00111
P/N 4G2310F01211
P/N 3G2310F00711
P/N 4G2310F01212

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SUPPLEMENT 16
RADIO EQUIPMENT
V/UHF FLEXCOMM II

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GENERAL INFORMATION

The V/UHF Flexcom II is an AM/FM analog/digital radio communication system.The system comprises of the RT-5000 transceiver, control panel and dedicated antenna with antenna tuner unit. An optional version which includes the P25 digital encryption is also available.

Two stand alone installations are available and can be installed either individually or both together. One system is controlled and operated from the cockpit and the other is controlled, operated and heard only by cabin personel (the pilot has no control and cannot access the radio transmission or reception).

The ICS panel is used to access the radio system. Control of the radio is via the Wulfsberg C-5000 Control Panel, either mounted on the left rear of interseat console and/or, for cabin system, on the cabin roof. The control panel incorporates a keypad used to configure the radio and two rotary knobs that control ON/OFF, volume and channel selection. See Figure 1 (or Figure 2 for P25 compatible version).

The Flexcom Radio System covers the frequency range 29.7 to 400 MHz (AM) and 29.7 to 960 MHz (FM).

A second Guard Receiver allows the option to continuously monitor an additional frequency over the range 29.7 to 960 MHz, in addition to the the main Receive/Transmit channels.

The Flexcom Radio Controller can support up to 350 preset channels plus a channel for manual frequency selection. Each channel can be configured for independant transmit and receive frequencies and subaudible tones (CTCSS, DCS, Burst). In addition to a frequency and channel number, each channel can be assigned an alphanumeric identification utilizing up to 8 characters.

A Scan function of selected channels is also incorporated.

A Data Transfer Port is also available for automating system configuration and programming.

For full operational functionality and capability details see Wulfsberg Flexcomm II RT5000 Communication Management Controller and C-5000 Control Head manuals latest issue.

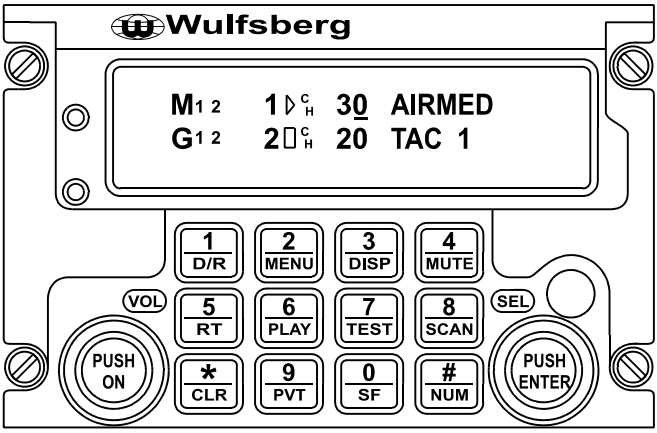

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Figure 1 Flexcom C-5000 Control Panel

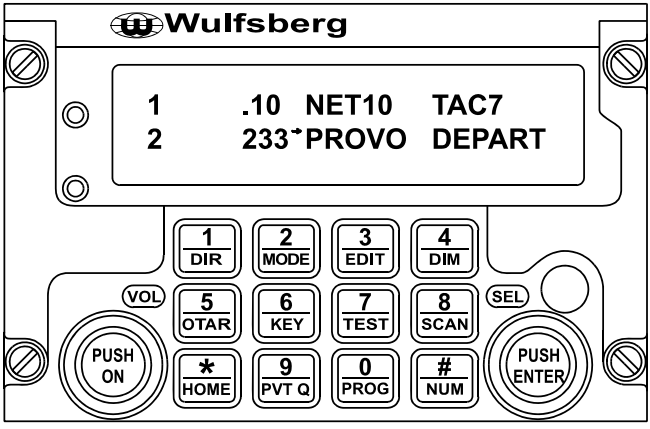

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Figure 2 Flexcom C-5000 CP P25 Compatible

SECTION 1 - LIMITATIONS

TYPE OF OPERATION

The V/UHF Flexcomm II radio, when installed in the cabin, is for mission related communications only.

The V/UHF Flexcomm II radio is considered a secondary radio system and must not be used for radio communications with Air Traffic Control (ATC).

CENTER OF GRAVITY LIMITATIONS

After FLEXCOMM system installation, the new empty weight and CG location must be determined.

FLEXCOMM II RADIO LIMITATIONS

When installed in the cabin the use of the radio must be authorised by the pilot.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE FLIGHT CHECKS

AREA N°6 (Fuselage Left Hand Side)

1. Flexcomm antenna (1) ➡ (cockpit radio) — Condition.

AREA N°3 (Tail Boom Right Hand Side)

2. Flexcomm antenna, between engine exhausts (1) ➡ (cabin radio) — Condition.

Note

For completed functionality details of Flexcom II radio operation refer Wulfsberg C-5000 Communication Management Controller Operator Manual latest revison.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the FLEXCOMM II system is switched OFF.

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 17

EXTERNAL AND INTERNAL PUBLIC ADDRESS SYSTEM

P/N 3G2350F00211
P/N 4G2350F00511
P/N 4G2350F00611
P/N 4G2350F00111
P/N 4G2350F02111
P/N 4G2350F00512
P/N 4G2350F03011
P/N 4G2350F02811

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SUPPLEMENT 17
EXTERNAL AND INTERNAL
PUBLIC ADDRESS SYSTEM

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GENERAL INFORMATION

The External and Internal Public Address System (PA) installation consists of an external loud speaker unit (mounted under the tail cone) and internally mounted speakers. The loud speakers are controlled by the NAT AA21 PA or alternatively the LSC22-003N control panel mounted in the interseat console (See Figure 1). The panel allows selection of internal (INT) or external (EXT) speakers, siren tone (WAIL/YELP), volume control and selection of PA or RADIO re-broadcast (provision only). The panel LSC22-003N has an additional AUX plug to permit external devices to be played and a record setting to record AUX or MIC. The PA control panel is powered continuously when the circuit breaker is in.

The control panel is interfaced with the aircraft ICS AV900 Audio panel (See Figure 3). Pushing the PA button the Pilot/Copilot microphone messages may be broadcast internally or externally.

The system gives an additional internal audio tone when the NO SMOKING and/or FASTEN SEAT BELT signs are activated using the ICS audio panel.

The direction of the loud speaker configuration, under the tail cone, for kit P/N 3G2350F00211, P/N 4G2350F00511, P/N 4G2350F00611, P/N 4G2350F00111, P/N 4G2350F00512 and P/N 4G2350F03011 is vertically downwards with respect to the aircraft BL.

However, for Kit P/N 4G2350F02111 and P/N 4G2350F02811 the speakers are inclined 30° to the right (see Figure 4). This puts ground personnel in the right hand quadrant of the helicopter in the optimum position to hear the speaker communication and allows the pilot to visually see the ground personnel to whom he is addressing.

The PA panels are NVIS green compliant.

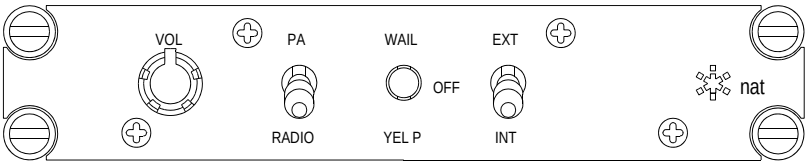

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Figure 1 NAT AA21 PA Control Panel

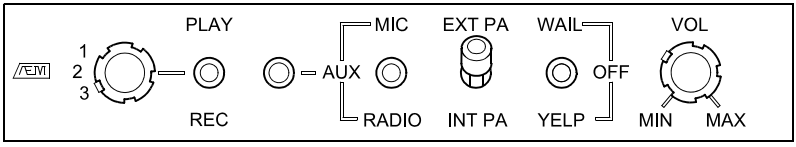

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Figure 2 NAT LSC22-003N PA Control Panel

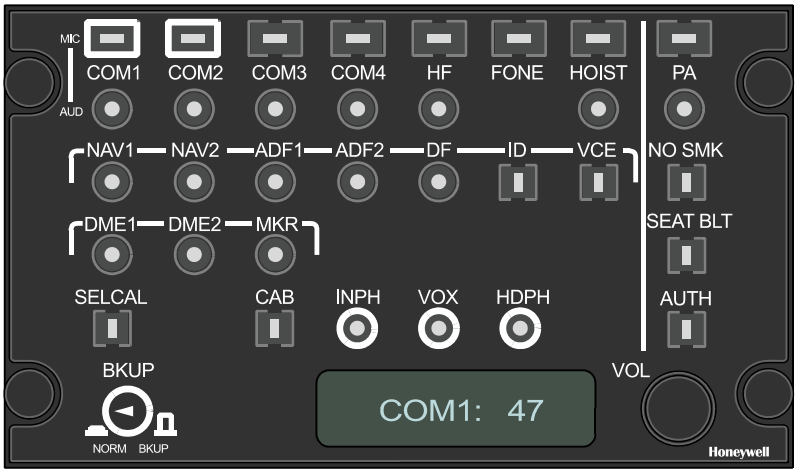

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Figure 3 ICS AV 900 Audio Panel

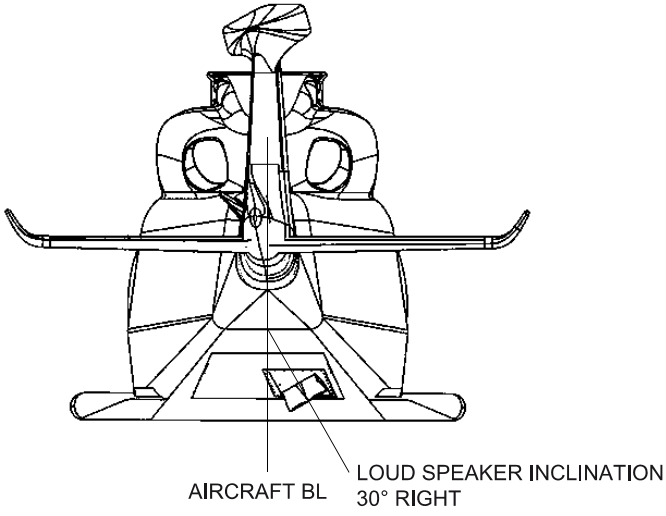

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Figure 4 P/N 4G2350F02111 and 4G2350F02811 Loud Speaker Inclination

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SECTION 1 - LIMITATIONS

WEIGHT AND CG LIMITATIONS

After PA system installation, the new empty weight and CG location must be determined.

EXTERNAL SPEAKER LIMITATIONS

When using the siren YELP/WAIL selection the following Duty Cycle must be respected:

- 1 minute ON, 3 minutes OFF

MISCELLANEOUS LIMITATIONS

PA system, when not in use, must be switched to INT.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECKS

AREA N°3 and 5 (Fuselage Left and Right Hand Side

1. External loud speaker ➡ — Secure.

AREA N°7 (Cabin and Cockpit Interior)

2. PA system C/B (EXT SPKR) — Confirm In.
3. PA control panel EXT/INT switch — Confirm INT selected.
4. MIC PA button on pilot/copilot ICS panel — Confirm off or as required.

IN FLIGHT

PA System Operation (Internal)

1. MFD CAS window — Confirm white status message 'PA OFF' not illuminated.
2. Control panel VOL rotary knob — Select as required.
3. Control panel PA/RADIO switch — Confirm PA selected.

For cabin audio chime with advisory messages

4. NO SMK and SEAT BELT pushbuttons on pilot/copilot ICS panel — Select as required. Confirm light on pushbutton illuminated.

For communication to cabin

5. Control panel EXT/INT switch — Select INT.
6. MIC PA button on pilot/copilot ICS panel — Select. Confirm MIC PA and AUD PA lights illuminated. Adjust sidetone volume as required.

Note

The ICS panel selected to PA will broadcast all communication spoken on that microphone.

When PA system operation is no longer required.

1. MIC PA button on pilot/copilot ICS panel — De-select. Confirm MIC PA and AUD PA lights extinguished.
2. NO SMK and SEAT BELT pushbuttons on pilot/copilot ICS panel — De-select. Confirm lights on pushbuttons extinguished.
3. Control panel EXT/INT switch — Confirm INT.

PA System Operation (External)

1. MFD CAS window — Confirm white status message 'PA OFF' not illuminated.
2. Control panel VOL rotary knob — Select maximum volume when using external speaker.
3. Control panel PA/RADIO switch — Confirm PA selected.

CAUTION

If external loudspeaker operation is required on ground, all ground personnel in the vicinity of helicopter must wear protective hearing equipment.

4. Control panel EXT/INT switch — EXT.

Note

When P/N 4G2350F02111 or P/N 4G2350F02811 are installed a white PA OFF status message is illuminated on the CAS when external speakers are in operation.

5. MIC PA button on pilot/copilot ICS panel — Select. Confirm MIC PA and AUD PA lights illuminated. Adjust sidetone volume as required.

Note

The ICS panel selected to PA will broadcast all communication spoken on that microphone.

6. Control panel WAIL/YELP switch — Select as required.

When PA system operation is no longer required.

1. Control panel WAIL/YELP switch — Select OFF.
2. MIC PA button on pilot/copilot ICS panel — De-select. Confirm MIC PA and AUD PA lights extinguished.
3. Control panel EXT/INT switch — Select INT.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 18

SECOND RADAR ALTIMETER RT300

P/N 3G3440F00111

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SUPPLEMENT 18
SECOND RADAR ALTIMETER

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GENERAL INFORMATION

The Second (2nd) Radar Altimeter is displayed on the right hand side PFD (Pilot) while the basic equipment (1st) is displayed on the left hand side PFD (Copilot).

in case of failure of either equipments both displays are automatically configured to use the serviceable equipment. A label, on both Radar Altimeter scales, informs the flight crew which is the operational equipment and, therefore, that redundancy is lost.

The 2nd equipment is connected to the MAU 2.

SECTION 1 - LIMITATIONS

CENTER OF GRAVITY LIMITATIONS

After 2nd Rad Alt system installation, the new empty weight and CG location must be determined.

SECTION 2 - NORMAL PROCEDURES

SYSTEM CHECKS

Note

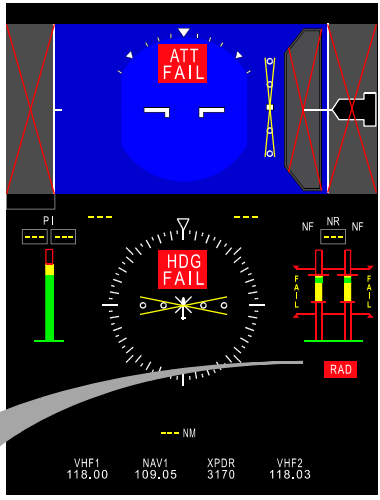
If more convenient checks may be carried out whilst A/C in IDLE mode.

1.	RAD ALT 2	— Confirm zero altitude (±5 ft).
2.	DH TEST button on either remote instrument controller	— Press, confirm RAD ALT 100 ft (±10 ft) and 'TEST' message displayed on Pilot and Copilot PFD's, release, confirm zero altitude (±5 ft).
3.	DH selector on remote instrument controllers	— Set as required independently for Pilot and Copilot.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

PRIMARY AND MULTIFUNCTIONAL FLIGHT DISPLAY MESSAGES

DOUBLE RAD ALT FAILURE



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RAD and loss of both RAD ALT 1 and 2 information on PFD's

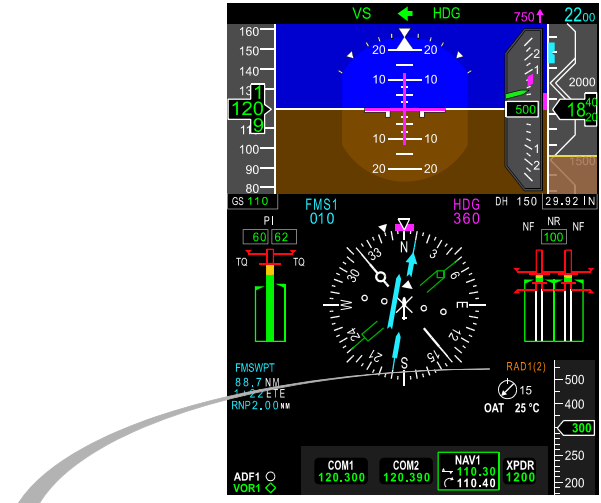
Failure of both RAD ALT systems

- Continue flight being aware that RAD ALT functioning is lost and MIN message is inactive

CAUTION

When both RAD ALT's fail, the 150 ft aural warning message does not function and the LANDING GEAR caution will be displayed if the LDG GEAR is retracted, regardless of height.

SINGLE RAD ALT FAILURE



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RAD1(2) Rad Alt 2 (1) failed. Automatic reconfiguration message illuminates besides Rad Alt display, on both PFD's, to highlight both Rad Alt indicators are using the same source

CAUTION

When either RAD ALT fails, the LANDING GEAR CAS caution and associated audio message activate erroneously when the aircraft is above 150 ft AGL and the LDG GEAR is retracted.

RAD ALT MISCOMPARE

RAD on RAD ALT display

Miscompare between
RAD ALT 1 and 2 information.

- Compare the Pilot and Copilot RAD ALT indications and/or outside visual references to establish the correct data.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 19

SNOW SKIDS KIT

P/N 3G3271F00111
P/N 3G3271F00112

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SUPPLEMENT 19
SNOW SKIDS KIT

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GENERAL INFORMATION

The snow skid installation P/N 3G3271F00111 and P/N 3G3271F00112 (developed to be compatible with landing gear P/N 3G3200F00211) consists of three skids fixed to the axles of the landing gear wheels.

Each skid is held in position by two bungee cords which allow the skid to tilt during landing to adapt to the ground surface. In addition to this each skid is fitted with two safety steel cables which maintain the skid in the correct attitude during flight.

The installation also includes a locking device to prevent operation of the landing gear control lever with snow skids installed.

SECTION 1 - LIMITATIONS

GENERAL

With Snow Skids Kit installed the helicopter may be operated in CAT B or CAT A with the following additional limitations.

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Snow Skids the new empty weight and center of gravity position must be determined.

No change to weight and CG limitations.

AIRSPEED LIMITATION

Maximum airspeed with Snow Skids installed ..... 150 KIAS
or V_{NE} Power ON,
whichever is less

V_{NE} OEI/Power OFF ..... No Change

GROUND SPEED LIMITATIONS

On Paved Surfaces

Maximum taxi speed (with or without snow)..... 10 knots
(18 km/hr)

Maximum speed for emergency landing
(Nose wheel must be locked)

without snow ..... 40 knots
(74 km/hr)

with snow ..... 20 knots
(36 km/hr)

On Prepared Grass Surfaces

Maximum taxi speed (with or without snow)..... 10 knots
(18 km/hr)

Maximum speed for emergency landing
(Nose wheel must be locked)

without snow ..... 30 knots
(56 km/hr)

with snow ..... 10 knots
(18 km/hr)

SLOPE LIMITATIONS

Sloped Take Off and Landing with Snow Skids Installed are limited to:

On snow ..... Basic RFM or
Supplement 6
if installed

On paved surfaces:

Maximum Nose Up or Down ..... Basic RFM or 10°
if Supplement 6 installed

Maximum Left or Right Wing Low ..... 5°

MISCELLANEOUS LIMITATIONS

Flight Over Water

When Snow Skids are installed extended flight over water is prohibited.

Landing Gear

The landing gear must not be retracted when Snow Skids are installed.

Note

A locking device is fitted to the LDG GEAR control panel to prevent LDG GEAR lever operation when snow skids are installed.

TCAS LIMITATIONS

When Snow Skids are fitted the TCAS (Supplement 25 or 82) lower antenna operates in omnidirectional mode. Therefore, when an intruder aircraft is below the helicopter, bearing information is not available.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

Snow Skids General

During snow skids checks special attention should be given to any permanent deformation of the cable supports on the skids.

Accumulated snow or ice should be removed.

AREA N°1 (Helicopter Nose)

1. Snow skid, steel and, elastomeric cables. — Condition and security.

AREA N°2 (Fuselage – Right Hand Side)

1. Right hand snow skid, steel and elastomeric cables. — Condition and security.
2. VHF2 antenna — Condition.

AREA N°6 (Fuselage – Left Hand Side)

1. Left hand snow skid, steel and elastomeric cables. — Condition and security.

AREA N°7 (Cockpit Interior)

1. LDG GEAR panel — Confirm locking device in place and secure.

TAKE OFF

Landing gear : Do NOT operate.

IN FLIGHT PROCEDURES

Landing gear : Do NOT operate.

PRE LANDING CHECKS

Landing gear : Do NOT operate.

OPERATION ON SNOW / ICE COVERED SURFACES

On snow / ice covered surfaces, caution must be used when starting the engines due to the possibility of undemanded yaw and rotation. This effect may occur until the tail rotor reaches its effective RPM.

Caution must be used when taxiing on soft or uneven snow.

Forward touchdown speed must be adapted (reduced) according to the condition of the snow and ground.

CAUTION

The conditions of snow and ground may alter significantly the helicopter handling at landing. For this reason, the forward speed at touchdown must be limited as much as possible.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

LIGHTNING STRIKE

If lightning strike suspected verify visually, if possible, that snow skids have not been damaged. If damage has occured or is suspected land on a suitable hard surface, if possible.

SECTION 4 - PERFORMANCE DATA

No change in aircraft performance when snow skids are installed.

When the Snow Skid Kit is installed together with one or more of the following kits:

- External Hoist installation (Supplements 11, 41, 49)
- Searchlight installation (Supplements 29, 44, 53).

the climb performance is reduced by:

ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 20

SLUMP PADS KIT

P/N 3G3272F00111
P/N 3G3272F00112

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SUPPLEMENT 20
SLUMP PADS KIT

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GENERAL INFORMATION

The slump pads installation P/N 3G3272F00111 and P/N 3G3272F00112 (developed to be compatible with landing gear P/N 3G3200F00211) consists of three pads fixed to the axles of the landing gear wheels.

Each pad is held in position by two bungee cords which allow the pad to tilt during landing to adapt to the ground surface. In addition to this each pad is fitted with two safety steel cables which maintain the pads in the correct attitude during flight.

The installation also includes a locking device to prevent operation of the landing gear control lever with slump pads installed.

SECTION 1 - LIMITATIONS

GENERAL

With Slump Pads Kit installed the helicopter may be operated in CAT B or CAT A with the following additional limitations.

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Slump Pads the new empty weight and center of gravity position must be determined.

No change to weight or CG limitations.

AIRSPEED LIMITATION

Maximum airspeed with Slump Pads installed ..... 150 KIAS or V_{NE} Power ON, whichever is less

V_{NE} OEI/Power OFF ..... No Change

GROUND SPEED LIMITATIONS

On Paved Surfaces

Maximum taxi speed ..... 10 knots
(18 km/hr)

Maximum for emergency landing speed
(Nose wheel must be locked)..... 40 knots
(74 km/hr)

On Prepared Grass Surfaces

Maximum taxi speed ..... 10 knots
(18 km/hr)

Maximum for emergency landing speed
(Nose wheel must be locked)..... 10 knots
(18 km/hr)

On Muddy or Unprepared Surfaces

Taxiing is not permitted.

Emergency Landing should not be carried out with forward touchdown speed.

SLOPE LIMITATIONS

Sloped Take Off and Landing with Slump Pads installed are limited to:

Grass Surfaces ..... Basic RFM or
Supplement 6
if installed

On paved surfaces:

Maximum Nose Up or Down .....Basic RFM or 10°
if Supplement 6 installed

Maximum Left or Right Wing Low ..... 5°

MISCELLANEOUS LIMITATIONS

Flight Over Water

When Slump Pads are installed extended flight over water is prohibited.

Landing Gear

The landing gear must not be retracted when Slump Pads are installed.

Note

A locking device is fitted to the LDG GEAR control panel to prevent LDG GEAR lever operation when slump pads are installed.

TCAS LIMITATIONS

When Slump Pads are fitted the TCAS (Supplement 25 or 82) lower antenna operates in omnidirectional mode. Therefore, when an intruder aircraft is below the helicopter, bearing information is not available.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

Slump Pads General

During slump pads checks special attention should be given to any permanent deformation of the cable supports on the pads.

Accumulated mud or dirt should be removed.

AREA N°1 (Helicopter Nose)

1. Slump pad, steel and, elastomeric cables — Condition and security.

AREA N°2 (Fuselage – Right Hand Side)

1. Right hand slump pad, steel and elastomeric cables — Condition and security.
2. VHF2 antenna — Condition.

AREA N°6 (Fuselage – Left Hand Side)

1. Left hand slump pad, steel and elastomeric cables — Condition and security.

AREA N°7 (Cockpit Interior)

1. LDG GEAR panel — Confirm locking device in place and secure.

TAKE OFF

Landing gear : Do NOT operate.

IN FLIGHT PROCEDURES

Landing gear : Do NOT operate.

PRE LANDING CHECKS

Landing gear : Do NOT operate.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

LIGHTNING STRIKE

If lightning strike suspected verify visually, if possible, that slump pads have not been damaged. If damage has occured or is suspected land on a suitable hard surface, if possible.

SECTION 4 - PERFORMANCE DATA

No change in aircraft performance when slump pads are installed.

When the Slump Pads Kit is installed together with one or more of the following kits:

- External Hoist installation (Supplements 11, 41, 49)
- Searchlight installation (Supplements 29, 44, 53).

the climb performance is reduced by:

ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 21

HONEYWELL WEATHER RADAR SERIES

P/N 3G3441F00112
P/N 4G3441F00111
P/N 4G3441F00911
P/N 4G3441F01011
P/N 4G3441F01111

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SUPPLEMENT 21
HONEYWELL WEATHER RADAR SERIES

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GENERAL INFORMATION

The Honeywell Weather Radar permits the detection and visualization of storm intensity and representation of ground map. The basis of the weather radar system is a 12-inch flat plate antenna with transmitter - receiver unit. The display of weather data and Ground Mapping is selectable on both PFD and MFD displays.

This Supplement covers the various models of the weather radar and the functions that each of the modes incorporate.

— WX P660 (P/N 3G3441F00112)
This radar incorporates the basic function of the radar as described above and is controlled by the panel in Figure 1 mounted in the interseat console.

— WX P701 (4G3441F00111)
This radar incorporates the basic functions of the radar as described above plus interrogation and decoding of ground or airborne X-band beacon transponders. The information can be displayed on the PFD and MFD. The system can also transmit up to six coded pulses to a beacon transponder and decode the beacon returns. The radar is controlled by the panel in Figure 2 and the beacon modes are controlled by the Beacon Controller Figure 3 mounted in the interseat console.

— RDR-7000 (P660 Clone Mode/Real Beam) (P/N 4G3441F00911), This is a direct ‘drop in’ replacement for the P660 radar and identical in function and is controlled by the panel in Figure 1.

— RDR-7000 Vertical Buffer (P/N 4G3441F01011) this radar has the vertical buffer capability, which scans the entire sky ahead and saves the reflectivity in a 3D, or volumetric, buffer. Using attitude, position data and internal database the radar distinguishes between ground and weather returns. The radar is controlled by the panel in Figure 4 mounted in the interseat console.

— RDR-7000 Vertical Buffer with Maritime (P/N 4G3441F01111) this radar has the Vertical Buffer capability (as described above) and Real Beam Ground Mapping (GMAP 2) aiding Offshore Operations with its light-search capability, available for Maritime operations. The radar is controlled by the panel in Figure 5 mounted in the interseat console.

For further information on the radar types and operational modes refer to Section 7 Manufacturer's Data in this Supplement.

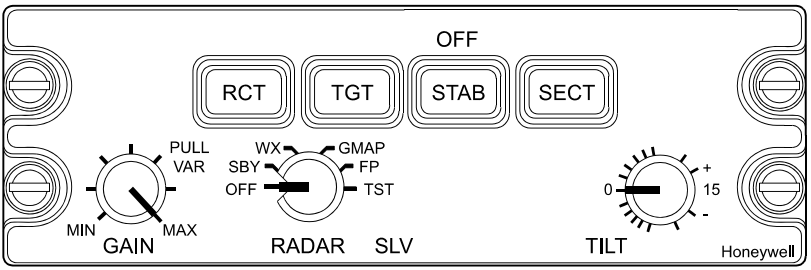

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Figure 1 WX P600 & RDR 7000 (P660 clone mode) Control Panel

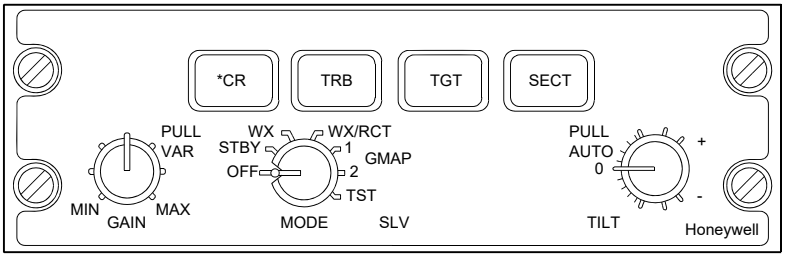

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Figure 2 WX P701 Radar Control Panel

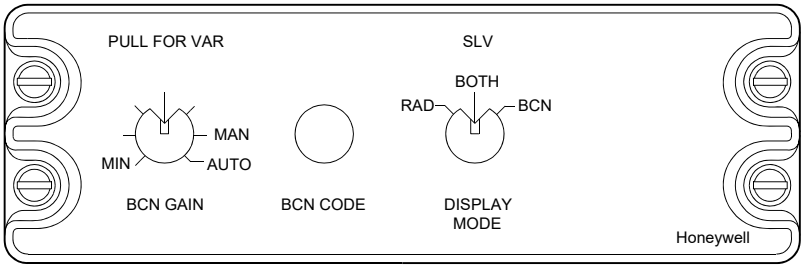

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Figure 3 WX P701 Beacon Control Panel

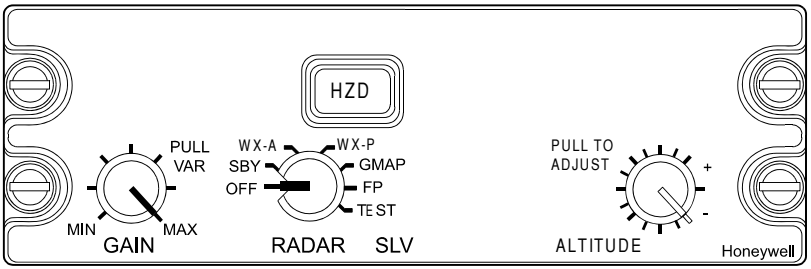

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Figure 4 RDR 7000 Vertical Buffer Configuration Control Panel

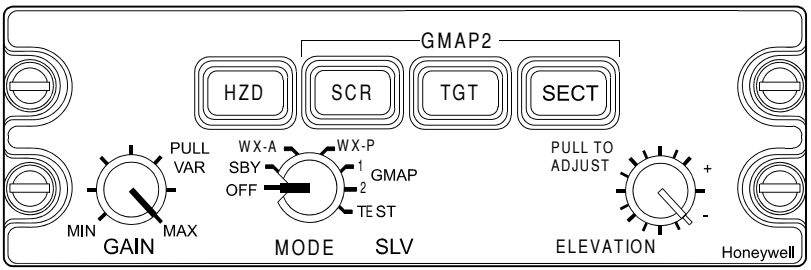

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Figure 5 RDR 7000 Vertical Buffer with Maritime Configuration Control Panel

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SECTION 1 - LIMITATIONS

CENTER OF GRAVITY LIMITATIONS

After weather radar system installation, the new empty weight and center of gravity location must be determined.

RADAR LIMITATIONS

The weather radar must not be used for terrain avoidance.

WX P701 LIMITATION

The BEACON data is not available on the PFD's.

SECTION 2 - NORMAL PROCEDURES

Note

For complete weather radar functionality, refer to Section 7 of this Supplement and to the appropriate Honeywell Weather Radar Pilot's Manual latest issue.

PRE-START CHECKS

1. Weather Radar — OFF.

PRE TAKE/OFF CHECKS

1. Weather Radar — As required.

Note

The weather radar does not transmit when the helicopter is on the ground due to WOW safety interlock.

IN-FLIGHT PROCEDURES

1. Weather Radar — As required.

Note

For radar WX P701 only with BCN GAIN rotary knob in VAR and selected to the AUTO detent the MFD display does not change to 'A' but erroneously remains at 'V'.

Note

For RDR-7000 Vertical Buffer and RDR-7000 Vertical Buffer with Maritime when WX-A, WX-P, GMAP (GMAP1) is selected, the TILT is always AUTOMATIC. The PFD and MFD indication will display "T 0.0° ↓ A".

Note

The default start up range for the weather radar is 50 Nm (25 nm half range ring). If the weather radar starts in the 100 nm range, it must be manually synchronized by changing the range setting. Weather information will not display correctly until synchronization is completed.

PRE-LANDING CHECKS

1. Weather Radar — OFF.

Note

For radar WX P701 only when the radar is set to STBY the Decoded Beacon symbol remains displayed.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the Weather Radar system is switched OFF.

MALFUNCTION PROCEDURES

WEATHER RADAR TRANSMITTING ON GROUND

WX TRANSMITTING

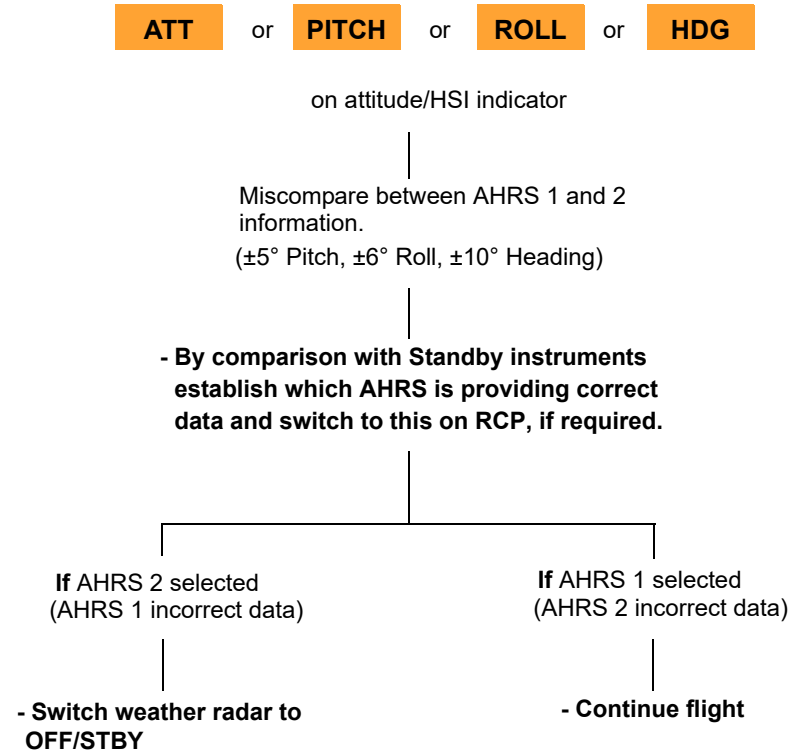
Weather radar transmitting while aircraft on ground due to failure of WOW microswitch

- Switch weather radar to OFF

- Maintenance action

AHRS MISCOMPARE WITH RDR-7000 VERTICAL BUFFER AND RDR VERTICAL BUFFER WITH MARITIME ONLY

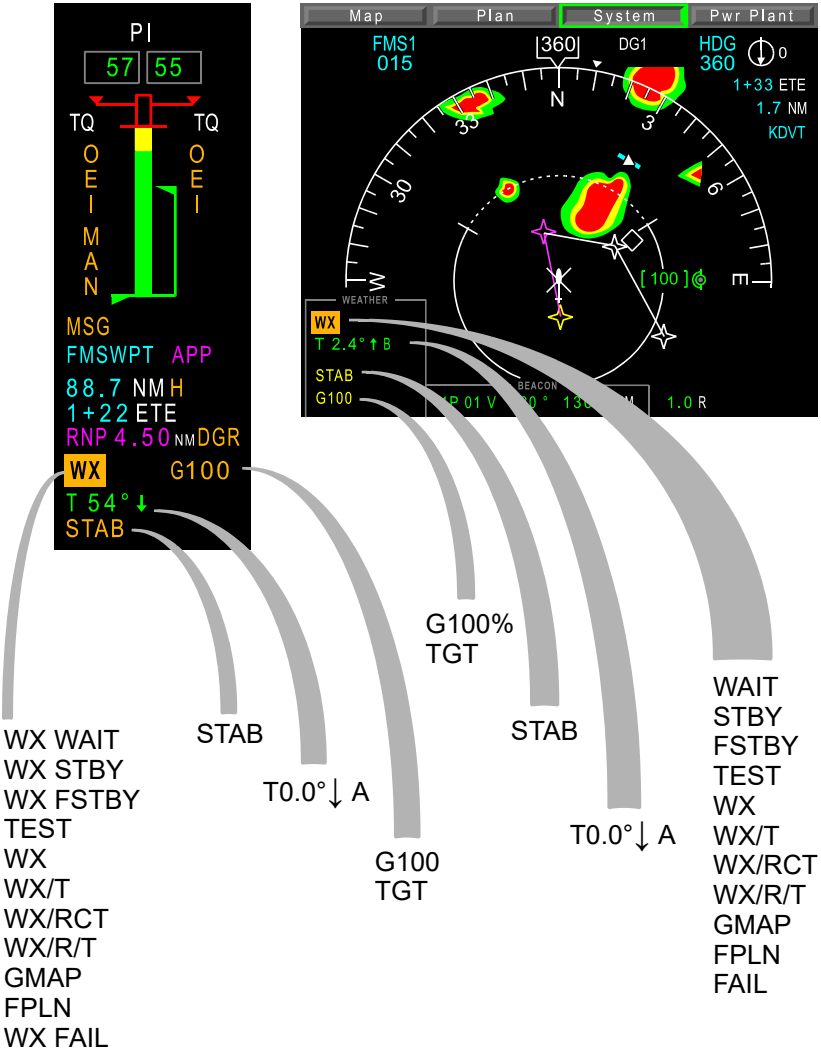
This procedure includes the AHRS MISCOMPARE procedure found in Basic RFM Section 3 and adds the instructions relevant to the weather radar.



Note

AHRS 1 is used by default for antenna stabilization.

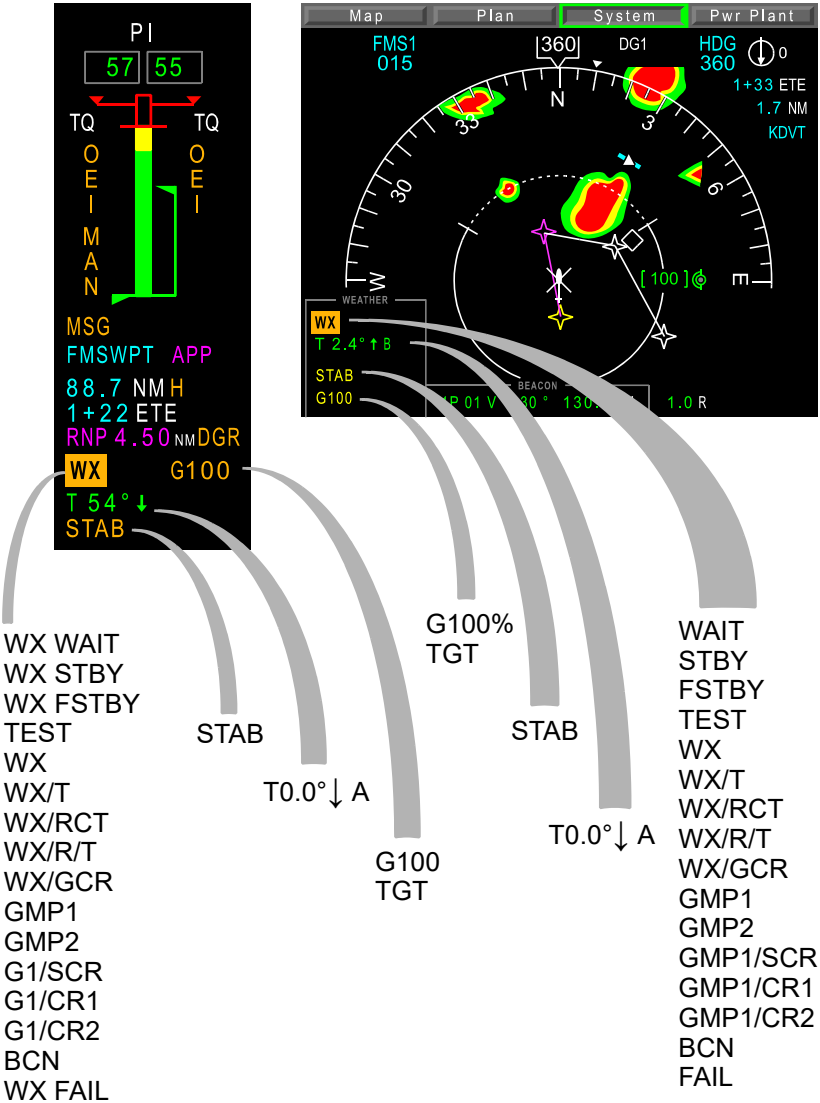
WX P660 P/N 3G3441F00112 AND RDR 7000 (P660 CLONE MODE) P/N 4G3441F00911 PFD AND MFD MESSAGES



Note

Refer to Section 3 Table 1 and Section 7 Table 4 for detailed description of Radar Messages.

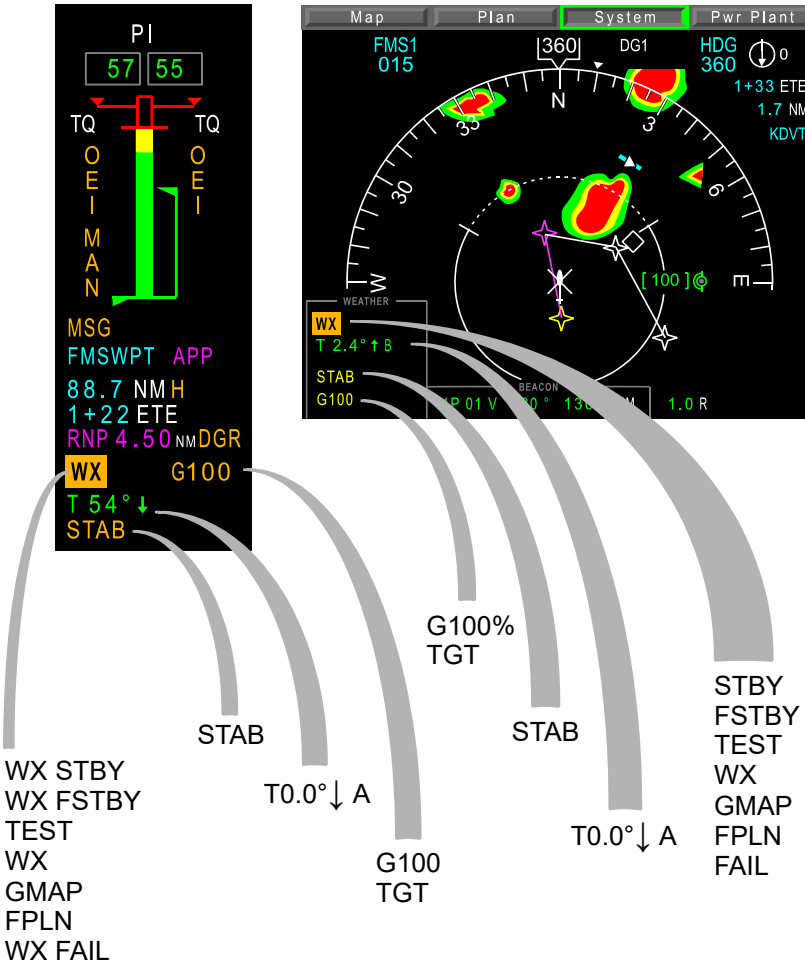
WX P701 P/N 4G3441F00111 PFD AND MFD MESSAGES



Note

Refer to Section 3 Table 1 and Section 7 Table 4 for detailed description of Radar Messages.

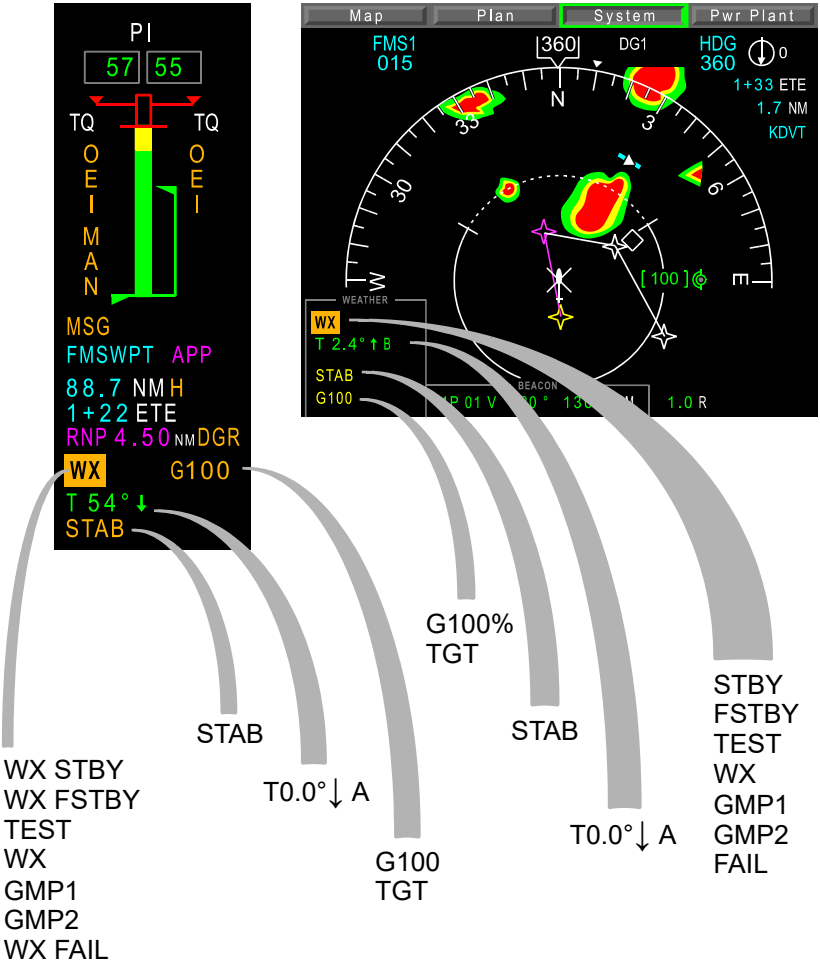
RDR 7000 VERTICAL BUFFER P/N 4G3441F01011, PFD AND MFD MESSAGES



Note

Refer to Section 3 Table 1 and Section 7 Table 4 for detailed description of Radar Messages.

RDR 7000 VERTICAL BUFFER WITH MARITIME P/N 4G3441F01111 PFD AND MFD MESSAGES



Note

Refer to Section 3 Table 1 and Section 7 Table 4 for detailed description of Radar Messages.

RADAR DISPLAY OVERLAY MESSAGES

(RDR 7000 VERTICAL BUFFER AND RDR 7000 VERTICAL BUFFER WITH MARITIME ONLY)



HZD OFF
XX KFt
TGT OFF
SCR

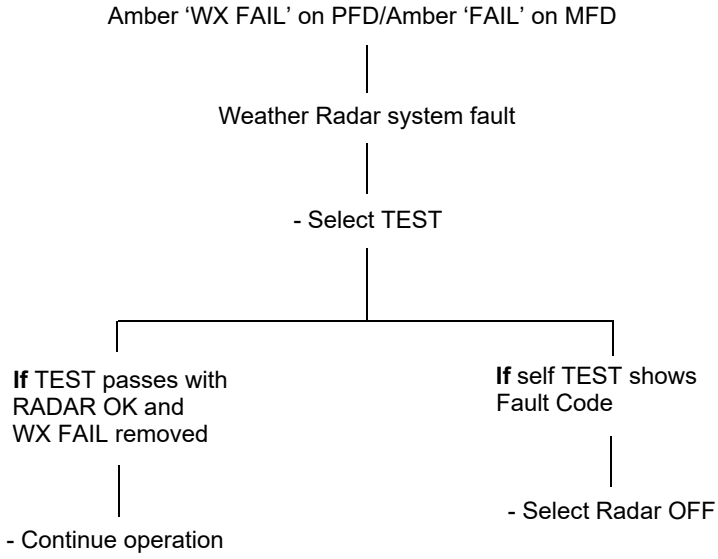
a) HZD mode is selected ON by default (no annunciation)

b) HZD mode is available in WX-A WX-P and WX-MAN only

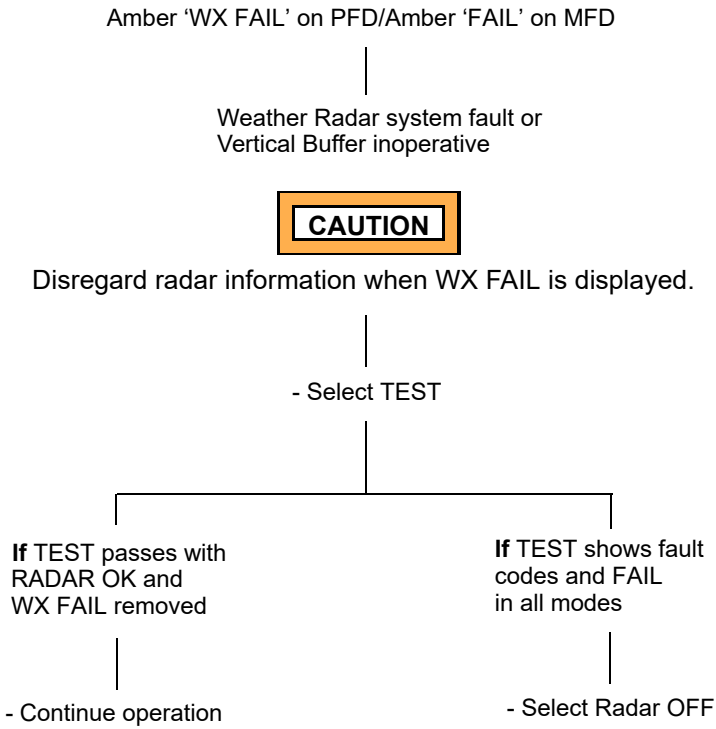
c) XX KFt displays the selected altitude for WX-MAN mode from “00” to “30”

d) TGT OFF (optional) and SCR for RDR-7000 Vertical Buffer + Maritime, in GMAP2 mode only

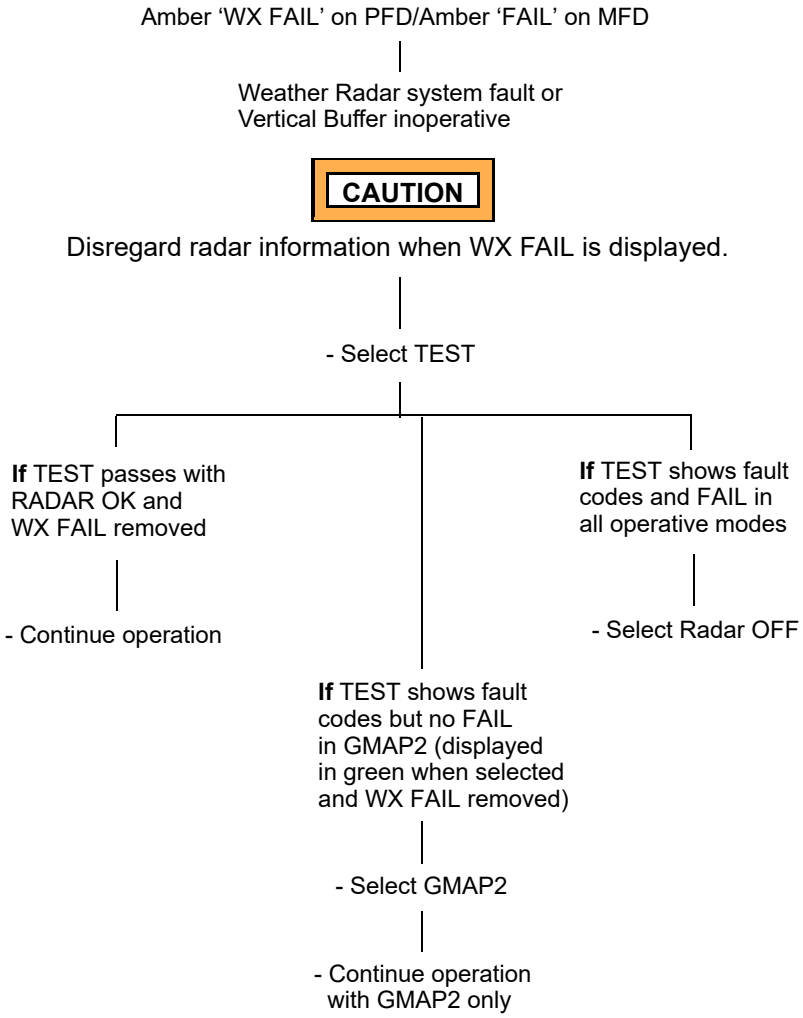
AMBER 'WX FAIL' ON PFD / AMBER 'FAIL' ON MFD P660 P/N 3G3441F00112, P701 P/N 4G3441F00111, RDR 7000 (P660 Clone Mode/Real Beam) P/N 4G3441F00911



RDR 7000 VERTICAL BUFFER P/N 4G3441F01011



RDR 7000 VERTICAL BUFFER WITH MARITIME P/N 4G3441F01111



Note

GMAP2 mode may be used for advisory only to increase situational awareness and not for weather avoidance. Do not use other modes.

AMBER WX PFD / MFD

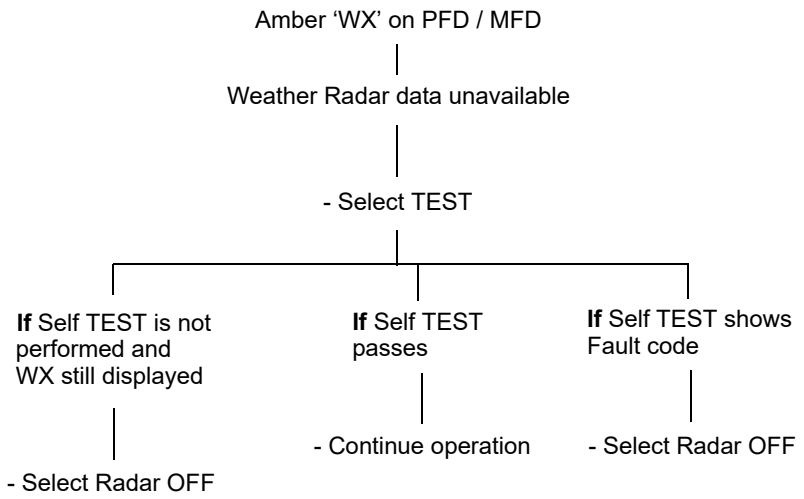


Table 1 Weather Radar Amber Messages

Message	Radar Mode	Description	Required Action	Applicability for Kits				
				P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
On PFD **WX WAIT** **On MFD** **WAIT**	STBY WX GMAP GMAP1/2	Magnetron is warming up	N/A	✔	✔	X	X	X
On PFD **WX** **On MFD** **WX**	OFF STBY WX WX-ALL WX-PATH WX-MAN GMAP GMAP1/2 TEST	Absence of information on Weather Radar Picture Bus, no information displayed on PFD and MFD	Refer to WX Malfunction procedure in Section 3	✔	✔	✔	✔	✔
On PFD **WX FSTBY** **On MFD** **FSTBY**	STBY WX GMAP GMAP1/2	Radar is selected to transmission mode but ground interlock is active (Forced Stand-By), no information displayed on PFD and MFD	N/A	✔	✔	✔	✔	✔
On PFD **WX FAIL** **On MFD** **FAIL**	WX WX-ALL WX-PATH WX-MAN GMAP1/2	Radar system fault	Refer to WX FAIL/ FAIL Malfunction procedure in Section 3	✔	✔	✔	✔	✔
On PFD **WX STBY** **On MFD** **STBY**	STBY	Weather Radar is transmitting and A/C on ground	Switch Radar OFF	X	X	X	✔	✔

Table 1 Weather Radar Amber Messages

Message	Radar Mode	Description	Required Action	Applicability for Kits				
				P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
On PFD WX WX(*) On MFD WX WX(*)	WX WX-ALL WX-PATH WX-MAN	Weather Radar is transmitting and A/C on ground	Switch Radar OFF	✔	✔	✔	✔	✔
On PFD GMAP On MFD GMAP	GMAP	Weather Radar is transmitting and A/C on ground	Switch Radar OFF	✔	X	✔	✔	X
On PFD GMP1 G1/(**) On MFD GMP1 GMP1/(***)	GMAP1	Weather Radar is transmitting and A/C on ground	Switch Radar OFF	X	✔	X	X	X
On PFD GMP2 On MFD GMP2	GMAP2	Weather Radar is transmitting and A/C on ground	Switch Radar OFF	X	✔	X	X	✔
On PFD STAB On MFD STAB	WX GMAP GMAP1/2	Antenna Stabilization is either selected OFF or not available	N/A	✔	✔	✔	✔	✔

Table 1 Weather Radar Amber Messages

Message	Radar Mode	Description	Required Action	Applicability for Kits				
				P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
On PFD **TGT** **On MFD** **TGT**	WX WX-ALL WX-PATH WX-MAN	Weather Ahead target sensed. Severe weather is sensed beyond the current selected range	Adjust Range as required	✔	✔	✔	✔	✔
PFD **GX** **On MFD** **GX%**	WX WX-ALL WX-PATH WX-MAN GMAP	Manual Variable Gain Selected Setting (X from 0% to 100%)	Adjust GAIN as required	✔	X	✔	✔	X
PFD **VGN** **On MFD** **VGN**	WX WX-ALL WX-PATH WX-MAN GMAP1/2	Manual Variable Gain Selected	Adjust GAIN as required	X	✔	X	X	✔

— Messages shown **XXXX** are displayed amber reverse video flashing

— (*) WX/T, WX/RCT, WX/T

— (**) G1/SCR, G1/CR1, G1/CR2

— (***) GMP1/SCR, GMP1/CR1, GMP1/CR2

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SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No change

SECTION 7 - SYSTEM DESCRIPTION

GENERAL INFORMATION

For complete weather radar functionality for WX P660, refer to the Honeywell Primus Epic Integrated Avionics and Flight Control System for the Agusta Westland AW139 Helicopter Pilot's Manual and for the WX P701 Honeywell Primus 700/701 Series Surface Mapping, Beacon and Color Weather Radar Pilot's Manual Honeywell 28-1146-66, Revision 1 or latest issue.

For the RDR 7000 see below and if more information is required refer the Honeywell IntuVue RDR-7000 Real Beam Weather Radar or 3-D Automatic weather Radar Pilots guide, latest issue.

PRIMUS P660

The Primus WX P660 (kit 3G3441F00112) Weather Radar permits the detection and visualization of storm intensity and representation of the ground map on the PFD and MFD, Figure 7-1.

PRIMUS P701

The Primus WX P701 (kit 4G3441F00111) Weather Radar permits the detection and visualization of storm intensity, representation of ground map, interrogation and decoding of ground or airborne X-band beacon transponders.

The information can be displayed on the PFD and MFD Figure 7-1. The system can also transmit up to six coded pulses to a beacon transponder and decode the beacon returns.

RDR 7000

The RDR-7000 Weather radar has different modes of operation, depending on the configuration selected.

— For “P660 Clone Mode / Real Beam” configuration (P/N 4G3441F00911), the radar uses Real Beam scanning (as P660 and P701) Figure 7-1. Tilt selection can be either automatic or controlled by the pilot.

— For “Vertical Buffer” (P/N 4G3441F01011) and “Vertical Buffer with Maritime” (P/N 4G3441F01111), the radar scans the entire sky ahead of the aircraft and saves the resulting reflectivity in a 3-D, or volumetric, buffer (out to 320 nautical miles (nm) and from ground to 60,000 feet (ft)), while using latitude, longitude, heading, and other inputs, to access internal topographical information (store in a terrain database) and better distinguish between ground returns and weather, Figure 7-2. Tilt control is always automatic controlled by the radar.

  To be more consistent with helicopter operation, the displayed radar returns provided for display from the RDR-7000 Vertical Buffer are limited to 30,000 feet.

— For "Vertical Buffer and Maritime (P/N 4G3441F01111), the radar features real beam high resolution ground mapping (GMAP2) with light search capability (Target Overlay), Figure 7-3.

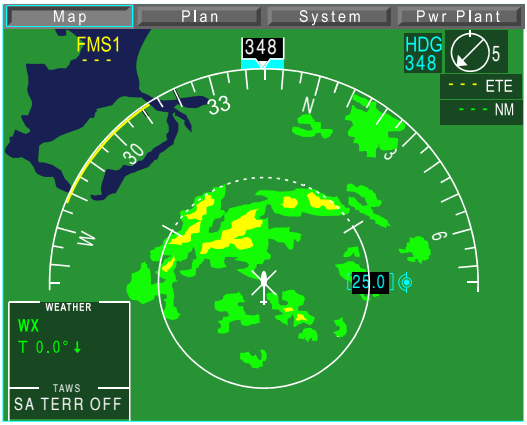

Figure 7-1 WX P660 Clone Mode/Real Beam (Example)

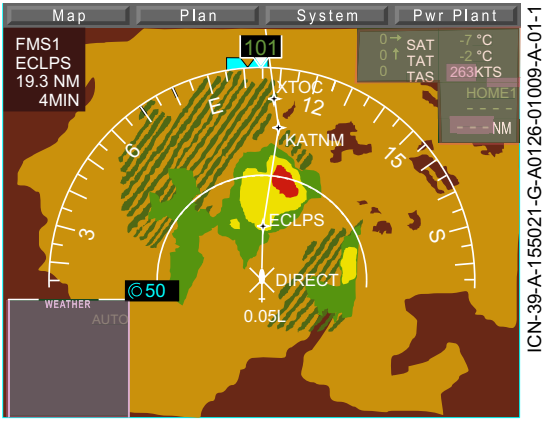

Figure 7-2 WX-ALL mode showing On-Path and Off-Path weather (Example)

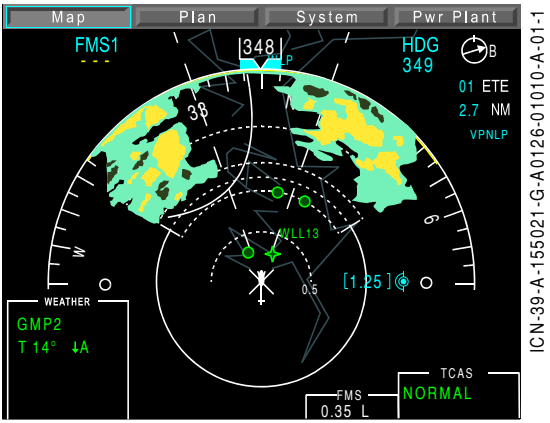

Figure 7-3 Ground Mapping (Example)

WEATHER RADAR INDICATIONS

The visualization of Weather data and Ground Mapping information is provided on Primus EPIC Display Units, on both PFDs and MFDs.

The color coding is reported in following table.

Returns	Colour Coding			
	Weather		Ground Mapping	
Very light or none	Black (1)		Black (1)	
Light	Green		Cyan	
Medium	Yellow		Yellow	
Strong	Red		Magenta	

Table 2 Radar Returns Colour Coding

Note (1)

With Primus Epic Phase 8 installed, very light or non returns are transparent.

OPERATIVE MODES

Refer Table 3 for Radar Operative Mode Selections.

Table 3 Weather Radar Operative Modes

Setting	Description	Applicability for Kits				
		P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
OFF	System OFF.	✓	✓	✓	✓	✓
STBY	Standby mode, the system is operative but not transmitting. In Vertical Buffer and Vertical Buffer + Maritime, the radar starts transmitting to fill the 3-D Vertical buffer (only in flight). No data is visualized on the displays.	✓	✓	✓	✓	✓
FSTBY	Automatic, non-selectable radar mode. On the ground, the radar will not operate as in Forced Standby	✓	✓	✓	✓	✓
TEST	On the ground, the full system self-test is performed. A test pattern is displayed, In air, test pattern, configuration and current fault information are shown, but no actual test is run.	✓	X	✓	✓	✓
FP	Flight Plan Mode. Display cleared of radar data to allow prioritizing the visualization of the flight plan.	✓ Available only with Control Panel P/N7008471-678	✓	✓ Available only with Control Panel P/N7008471-678	✓	X
WX	Weather Mode. Weather displayed out to 320 nm. If the Turbulence and/or REACT features are selected, those will also be shown. The Weather Ahead (TGT) function is active only if armed.	✓	✓	✓	X	X
WX-ALL	Automatic Weather Mode. Both On-Path and Off-Path weather are shown. On-Path weather returns are shown with solid colors while Off-Path weather returns are shown with strip pattern.	X	X	X	✓	✓
WX-PATH	Automatic Weather mode. Only On-Path weather is shown	X	X	X	✓	✓
WX-MAN	Constant Elevation (Weather Analysis mode). Only weather at the selected altitude is shown. The selected altitude slice is manually set by the pilot from using the Manual Altitude/Elevation control knob (pull to enable).	X	X	X	✓	✓

Table 3 Weather Radar Operative Modes

Setting	Description	Applicability for Kits				
		P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
RCT	REACT. Magenta arcs indicate areas where the radar signal has been attenuated. There could be severe weather in that area, even though only mild or no reflectivity is shown	✓	✓	✓	X	X
HZD	Hazard Mode. This Includes REACT and adds Turbulence and Hazard Display. Enabled by default. Turbulence: Turbulence up to 40 or 60 nm and inside the flight path weather envelope will be displayed in magenta with blocky shape. Hazard Display (optional): Predictive Hail and Lightning icons will be displayed to identify areas that have signature characteristics of hail or lightning or both.	X	X	X	✓	✓
TRB	Enables Turbulence detection and display	X	✓	X	X	X
GMAP	Displays Full Coverage Ground Map, to identify prominent terrain features, such as coastlines, lakes, and large built-up urban areas. Only in “Vertical Buffer” and “Vertical Buffer + Maritime” ground mapping is sourced from 3D buffered data.	✓	✓ Labelled GMAP1	✓	✓	✓ Labelled GMAP1
GMAP2	Real Beam Map Mode provides higher resolution, short range capability, and a maritime overlay to indicate vessels on the water.	X	✓	X	X	✓
*CR	In Weather mode selects Ground Clutter Reduction In Ground Mapping 1 mode selects either: - Sea Clutter Reduction - Ground Clutter Reduction 1 - Ground Clutter Reduction 2	X	✓	X	X	X
SCR	Sea Clutter Reduction. Reduces sea clutter from high sea state conditions	X	X	X	X	✓
TGT (1)	Target Overlay (optional), Targets ahead of the aircraft are indicated by green diamonds. Available with GMAP 2 only.	X	X	X	X	✓

Table 3 Weather Radar Operative Modes

Setting	Description	Applicability for Kits				
		P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
TGT (2)	The TGT button is used to “arm” the Weather-Ahead feature. When armed, the area within +/- 7.5 degrees of the aircraft heading, and from 0 to 100 nm ahead of the aircraft is monitored to detect the presence of “red” weather or turbulence. If a target is detected beyond the current display range, it will be indicated on the display with amber flashing reverse video TGT indication in WXR annunciation area.	✓	✓	✓	X WX-Ahead always Active	X WX-Ahead always Active
SECT	In Sector Scan the angle of the antenna sweep is reduced from ± 60 degrees to ± 30 degrees.	✓	✓	✓	X	✓ Only Applicable to GMAP2
VAR	Manual Gain. GAIN control is active in all weather and map modes.	✓	✓	✓	✓	✓
TILT	Tilt Control: Selects the tilt angle of the antenna beam relative to the horizon. For “Vertical Buffer + Maritime” in GMAP2 mode, tilt control is made via ELEVATION knob.	✓	✓	✓	X	X
ELEVATION	Manual Altitude Control: Provide the mean to enable WX-MAN mode and to select the desired altitude, from 0 to 30,000ft. When using Real Beam Ground Mapping (GMAP2), provide the mean for Tilt Control (refer to TILT description).	X	X	X	X	✓
ALTITUDE	Manual Altitude Control: Provide the mean to enable WX-MAN mode and to select the desired altitude, from 0 to 30,000ft	X	X	X	✓	X
STAB	Selecting Stabilization Off results in the antenna stabilizing with respect to the longitudinal axis of the aircraft, rather than with respect to the horizon	✓	✓	✓	X	X
BCN	Relative to the Beacon Controller. The radar operates solely as a beacon radar. It will not display primary radar data for ground mapping or weather modes. The beacon color is cyan.	X	✓	X	X	X

Table 3 Weather Radar Operative Modes

Setting	Description	Applicability for Kits				
		P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
BOTH	Relative to the Beacon Controller. The beacon and primary radar are both operational and all the functions are available at the same time. The beacon target is presented simultaneously with the ground mapping or weather radar. The beacon target's color is cyan in WX mode and green in GMAP1 and GMAP2 mode.	X	✓	X	X	X

Table 4 Advisory (Green) and Status (White) Messages

Message	Radar Mode	Description	Applicability for Kits				
			P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
On PFD WX STBY On MFD STBY	STBY	Radar system in Stand-by, no information displayed on PFD and MFD	✓	✓	✓	✓	✓
TEST	TEST	Self Test pattern is displayed	✓	✓	✓	✓	✓
WX	WX WX-ALL WX-PATH WX-MAN	Weather Mode selected	✓	✓	✓	✓	✓
WX/T	WX	Weather Mode with Turbulence is selected	X	✓	X	X	X
WX/RCT	WX	Weather mode with REACT selected	✓	✓	X	X	X
WX/R/T	WX	Weather mode with Turbulence and REACT selected	X	✓	X	X	X
WX/GCR	WX	Weather mode with Ground Clutter Reduction	X	✓	X	X	X
GMAP	GMAP	Ground mapping selected	✓	X	✓	✓	X
GMAP1	GMAP1	Ground mapping 1 selected	X	✓	X	X	✓
GMAP2	GMAP2	Ground mapping 2 selected	X	✓	X	X	✓
On PFD G1/SCR On MFD GMP1/SCR	GMAP1	Ground mapping 1 with Sea Clutter Reduction selected	X	✓	X	X	X

Table 4 Advisory (Green) and Status (White) Messages

Message	Radar Mode	Description	Applicability for Kits				
			P660 3G3441F00112	P701 4G3441F00111	P660 Clone Mode/Real Beam 4G3441F00911	Vertical Buffer 4G3441F01011	Vertical Buffer + Maritime 4G3441F01111
On PFD G1/CR1 On MFD GMP1/CR1	GMAP1	Ground mapping 1 with Clutter Reduction 1 selected	X	✓	X	X	X
On PFD G1/CR2 On MFD GMP1/CR2	GMAP1	Ground mapping 1 with Clutter Reduction 2 selected	X	✓	X	X	X
BCN	BCN	Beacon Mode selected	X	✓	X	X	X
FPLN	WX	Weather data is hidden to allow clear display of flight plan data	✓ Available only with CP P/N7008471-678	X	✓ Available only with CP P/N7008471-678	✓	X
T X.X°↑↓	WX GMAP GMAP1/2	Manual Tilt selection (x° from 15°↓ to 15°↑). If Auto Tilt is selected annunciation is T 0,0°↓A	✓	✓	✓	X Tilt always automatic	✓ Only for GMAP2
Character Overlay White Messages							
XX Kft	WX-MAN	WX-MAN mode selected Active. Select Altitude for WX-MAN mode (XX from 0 Kft to 30 Kft)	X	X	✓	✓	✓
HZD OFF	WX-ALL WX-PATH WX-MAN	HAZARD MODE selected inactive	X	X	✓	✓	✓
TGT OFF	GMAP2	TARGET OVERLAY selected inactive	X	X	X	X	✓
SCR	GMAP2	SEA CLUTTER REDUCTION selected active	X	X	X	X	✓

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 22

IFR SINGLE PILOT OPERATIONS

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SUPPLEMENT 22
IFR SINGLE PILOT OPERATIONS

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SECTION 1 - LIMITATIONS

GENERAL

All other Limitations as stated in the Basic RFM, for CAT B operations, and Supplement 12, for CAT A operation are applicable.

MINIMUM FLIGHT CREW

— Instrument Flight Rules (IFR) Day/Night - One pilot unless otherwise required by operating rules.

— Single pilot operation not permitted from left hand seat.

REQUIRED EQUIPMENT

— Flight Director (Supplement 34, Supplement 40, Supplement 67, Supplement 69 or Supplement 70).

— Quick Reference Handbook (QRH) Agusta Pub Code 502500033, latest issue.

— Map/QRH holder P/N 4G2510F00111, P/N 4G2510F00113 or equivalent.

FLIGHT DIRECTOR LIMITATIONS

Minimum FD configuration for single pilot IFR flight .....2 FD operative

The Flight Director, when operative and above the Minimum Usage Height, must be in coupled mode.

SECTION 2 - NORMAL PROCEDURES

IN FLIGHT PROCEDURES

1. Autopilot Controller : Confirm CPL.

2. Guidance Controller : Engage FD in accordance to engagement limits and phase of flight

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

AUTOPILOT FAIL

1(2) AP FAIL + Aural Message

+

AFCS DEGRADED

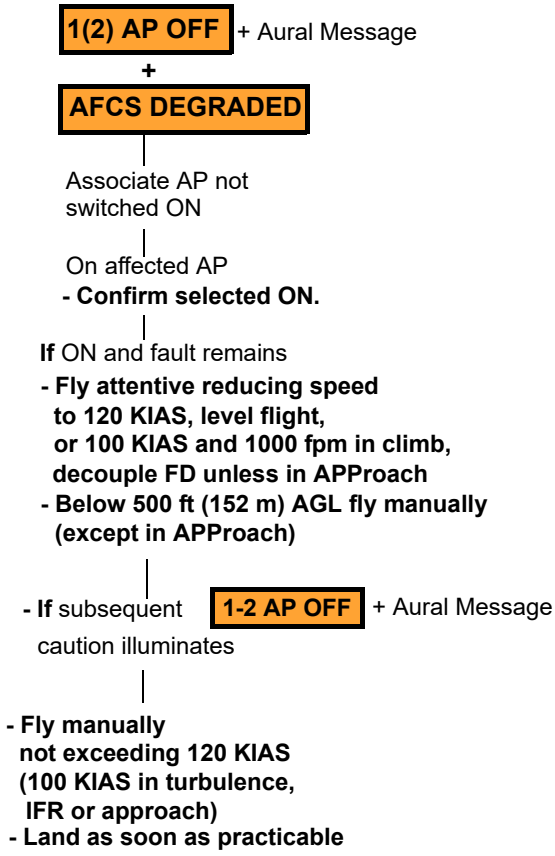
Associated autopilot failure

- Fly attentive reducing speed to 120 KIAS, level flight, or 100 KIAS and 1000 fpm in climb, decouple FD unless in APProach
- Below 500 ft (152 m) AGL fly manually (except in APProach)

- If subsequent caution illuminates **1-2 AP FAIL** + Aural Message

- Fly manually not exceeding 120 KIAS (100 KIAS in turbulence, IMC or approach)
- Land as soon as practicable

AUTOPILOT OFF



DUAL FLIGHT DIRECTOR FAIL

FD FAIL

replaces FD arrow above attitude indicator on PFD

+

loss of flight director bars and information

Both Flight Directors invalid

- Attempt to re engage Flight Director

If indications remain
- Flight Director not available
- Land as soon as practicable

ATTITUDE SYSTEM OFF

ATT OFF

SAS message displayed on PFD

Attitude hold mode not engaged

- Engage ATT on autopilot controller

When associated with cyclic freedom of motion in longitudinal and/or lateral direction with loss of function of FTR switch and cyclic beep trim

Cyclic force trim failure

- Fly manually not exceeding 120 KIAS.
- Disengage Flight Director
- Land as soon as practicable minimizing, if possible, navigation procedures during approach.

Note

With ATT mode not engaged the aircraft flies in SAS mode only (SAS message on PFD).

DISPLAY UNIT FAILURE WITH FLIGHT DIRECTOR ENGAGED

Loss of pilot PFD(MFD), the associated MFD(PFD) will automatically configure to Composite mode maintaining the FD engaged on the same references as the PFD.

- Confirm no chime sound
- Confirm FD green arrow and FD mode green captions are present in Composite mode

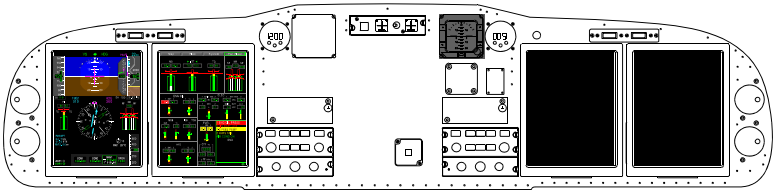
- Continue flight

- If subsequent display in composite mode fails

Flight Director automatically disengages

- Revert to Standby instrument

- Land as soon as practicable



Failure of both Pilot PFD and MFD

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GUIDANCE CONTROL PANEL FAILURE

In case of Guidance Control Panel failure, recognised as non functionality of panel pushbuttons (modes cannot be changed or disengaged using panel), the FD may be disengaged using the cyclic FD STBY button.

Land as soon as practicable, using the FD modes already engaged as required. However, use the cyclic FD STBY button to disengage modes when required. When disengaged FD is no longer available.

SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 23

ENHANCED GROUND PROXIMITY WARNING SYSTEM

This supplement has been removed.

The information of this supplement are integrated into the Supplement 81.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 24

VFR NIGHT SINGLE PILOT OPERATIONS

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SUPPLEMENT 24
VFR NIGHT SINGLE PILOT OPERATIONS

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SECTION 1 - LIMITATIONS

GENERAL

All other Limitations as stated in the Basic RFM, for CAT B operations, and Supplement 12, for CAT A operation are applicable.

MINIMUM FLIGHT CREW

— Visual Flight Rules (VFR) Night - One pilot unless otherwise required by operating rules.

— Single pilot operation not permitted from left hand seat.

REQUIRED EQUIPMENT

— Traffic Advisory System (TCAS) Supplement 25, Supplement 42 or Supplement 82.

— Quick Reference Handbook (QRH) Agusta Pub Code 502500033, latest issue.

— Map/QRH holder P/N 4G2510F00111, P/N 4G2510F00113 or equivalent.

TCAS LIMITATIONS

— TCAS must be operative.

SECTION 2 - NORMAL PROCEDURES

PRE-TAKE OFF CHECKS

1.	QRH (when holder installed on right hand side of instrument panel)	— Confirm stowed

Note

With QRH open, and holder installed on right hand side of instrument panel, forward visibility may be reduced when carrying out rejected take-off or operating in confined areas.

IN FLIGHT PROCEDURES

1. MCDU — Select RADIO page. Check TCAS/XPDR set to TA.

2. MFD — Select as required.

Note

If MFD is not set in MAP page (eg. PWR PLANT) and TCAS is ON, as soon as a traffic alert is generated from the system, the cursor is prompted on MAP soft key. Pressing the ENTER key on CCD control panel, the MAP page is displayed on MFD with traffic information. Moreover a TRAFFIC message is displayed on the PFD on the left side of the ADI and the aural warning TRAFFIC TRAFFIC is generated.

3. QRH — As required.

PRE-LANDING CHECKS

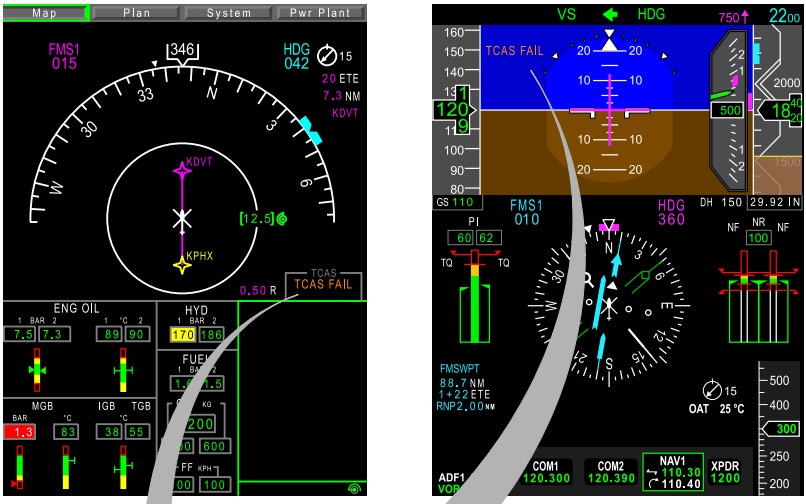
1. QRH (when holder installed on right hand side of instrument panel) — Confirm stowed

Note

With QRH open, and holder installed on right hand side of instrument panel, forward visibility may be reduced when carrying out landing or operating in confined areas.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

TCAS SYSTEM FAILURE



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TCAS FAIL On PFD attitude indicator

\+

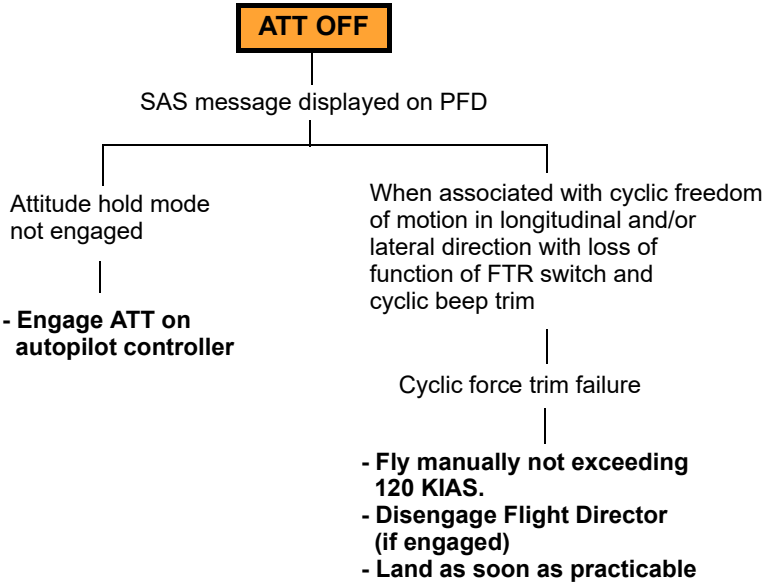
TCAS FAIL On MFD MAP page

TCAS system failure

Traffic information and
Traffic Alarm not available

- Rely on ATC for traffic information

ATTITUDE SYSTEM OFF



Note

With ATT mode not engaged the aircraft flies in SAS mode only (SAS message on PFD).

SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 25

TRAFFIC ADVISORY SYSTEM KTA 970

P/N 3G3450F00311

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SUPPLEMENT 25
TRAFFIC ADVISORY SYSTEM
KTA 970

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GENERAL INFORMATION

The KTA 970 is an onboard traffic advisory system (TCAS I) which monitors a radius of nominal 18 NM around the helicopter by interrogating any intruding aircraft transponder, determining if a potential conflict with other aircraft exists.

This is done by computing the relative range, altitude, bearing and closure rate of other transponder-equipped aircraft with respect to the helicopter.

KTA 970 system warns the flight crew with an aural and visual Traffic Advisory whenever the system detects another transponder equipped aircraft and predicts the intruder to be a threat.

SECTION 1 - LIMITATIONS

TYPE OF OPERATION

The KTA 970 is approved for VFR and IFR operation as an aid to visually acquiring traffic.

WEIGHT AND CG LIMITATIONS

After TCAS system installation, the new empty weight and CG location must be determined.

TCAS SYSTEM LIMITATIONS

— The pilot must manoeuvre the helicopter based only on ATC guidance or positive visual acquisition of the conflicting traffic.

— Intruder Traffic within ±45° of the aft direction and above the helicopter altitude may not be visualized on the TCAS display.

— At distances greater than 5 nautical miles double images of actual intruders may occasionally be seen for a few seconds.

— When the undercarriage is extended the TCAS lower antenna operates in omnidirectional mode. Therefore, when the intruder aircraft is below the helicopter, bearing information is not available.

— The TCAS may not be reliable during Primus HF 1050 radio (Supplement 8) or V/UHF FLEXCOM II radio (Supplement 16) transmissions.

— The TCAS may not be reliable if Honeywell Weather Radar Series (Supplement 21) WX P660 P/N 3G3441F00112 is being used.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

AREA N°1 (Helicopter Nose)

1. TCAS Antenna (Lower) — Condition.

AREA N°6 (Fuselage Left Hand Side)

1. TCAS Antenna (Upper) — Condition.

SYSTEM CHECKS

Note

If more convenient checks may be carried out whilst A/C in IDLE mode.

1. MCDU — Select RADIO page. Check TCAS/XPDR set to TA.
2. MFD page — Select MAP page and activate Traffic visualization.
3. MCDU — Press MENU key.
   Press TEST key.
   Press XPDR/TCAS key.
4. MFD (MAP) page — Verify TCAS TEST amber annunciation inside TCAS status box.
   Traffic test page presented.
   At the end of test sequence confirm aural message “TCAS SYSTEM TEST OK” is heard.
   Verify TCAS OFF white annunciation inside TCAS status box.

5. MFD page — Select as required.

IN FLIGHT PROCEDURES

CAUTION

Do not attempt manoeuvres based only on traffic information shown by TCAS. Information on the display is provided as an aid in visually acquiring traffic, it is not a replacement for ATC instructions and See & Avoid techniques.

AFTER TAKE-OFF

1. MFD PWR PLANT page — Check all parameters within normal operating limitations and confirm no engine matching abnormalities.
2. MCDU — TCAS/XPDR as required.

Note

If MFD is not set in MAP page (eg. PWR PLANT) and TCAS is ON, as soon as a traffic alert is generated from the system, the cursor is prompted on MAP soft key. Pressing the ENTER key on CCD control panel, the MAP page is displayed on MFD with traffic information. Moreover a TRAFFIC message is displayed on the PFD on the left side of the ADI and the aural warning TRAFFIC TRAFFIC is generated.

Note

Use of the TCAS self test function in flight will inhibit normal TCAS operation for up to 8 seconds.

APPROACH AND LANDING

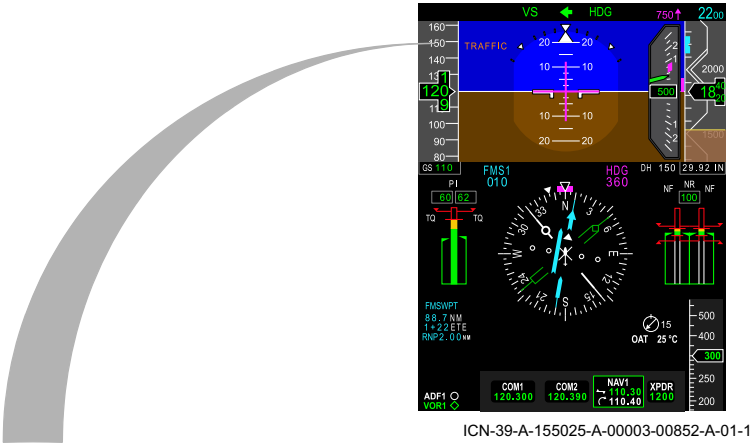
1. MFD PWR PLANT page — Check all parameters within normal operating limitations and confirm no engine matching abnormalities.

POST LANDING AND SHUTDOWN PROCEDURES

PRE-SHUTDOWN CHECKS

1. MCDU — Check TCAS/XPDR set to STBY.

TCAS MESSAGES ON PFD AND MFD



ICN-39-A-155025-A-00003-00852-A-01-1

Aural Warning 'TRAFFIC - TRAFFIC'
+
TRAFFIC Flashing or steady on PFD attitude indicator

|

TRAFFIC ALARM

|

The crew should attempt to gain visual contact with the intruder and be prepared to manoeuvre upon visual acquisition

Note

The TCAS aural warning has the lowest audio priority over the other aural cautions and warnings available on the helicopter.

TCAS OFF On MFD MAP page TCAS window

+

TCAS OFF On PFD attitude indicator

TCAS system OFF



ICN-39-A-155025-A-00003-00853-A-01-1

TCAS TEST On PFD attitude indicator

+

TCAS TEST On MFD MAP page TCAS window

TCAS system functional test

Note

Use of the TCAS self test function in flight will inhibit normal TCAS operation for up to 8 seconds.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

PFD AND MFD DISPLAY MESSAGES

TCAS SYSTEM FAILURE



ICN-39-A-155024-A-00003-00851-A-01-1

TCAS FAIL On PFD attitude indicator

\+

TCAS FAIL On MFD MAP page TCAS window

TCAS system failure

Traffic information and
Traffic Alarm not available

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

INTRODUCTION

TCAS I (Traffic Alert and Collision Avoidance System) is an airborne system used for detecting and tracking traffic near the helicopter. TCAS I includes a TCAS processor, antennas, a traffic display (MFD) and a means to control the system (CCD-MCDU).

The TCAS processor and antennas detect and track other aircraft by interrogating their transponders. Aircrafts detected, tracked, and displayed by TCAS are referred to as Intruders. TCAS analyses the transponder replies to determine range, relative bearing and relative altitude, if the Intruder is reporting altitude. Should the processor determine that a possible collision hazard exists, visual and aural messages advise the crew. The visual advisory is shown by symbols on the traffic display.

Complementing the traffic display, TCAS provides appropriate synthesized voice announcements in the cockpit.

A complete list of traffic symbols and announcements is given in the following paragraphs of this system description.

Note

TCAS is unable to detect any Intruding aircraft without an operating transponder.

Note

TCAS can detect and track aircraft with either an ATCRBS (ATC Radar Beacon System) operating in Mode A or C, or Mode S transponders.

The traffic display shows the Intruding aircraft's position. TCAS identifies the relative threat of each Intruder by using various symbols and colours.

The Intruder's altitude, relative to the helicopter's altitude, is annunciated if the Intruder is reporting altitude. A trend arrow is used to indicate if the Intruder is climbing or descending more than 500 feet per minute.

TCAS traffic information may be displayed on the MFD (MAP presentation with or without radar presentation) and on PFD.

TCAS modes and functions are controlled by the CCD control panel or by MCDU.

A detailed description of controls is given in the Controls and Displays paragraph of this section.

ATC procedures and the "see and avoid concept" will continue to be the primary means of ensuring aircraft separation. However, if communication is lost with ATC, TCAS adds a significant backup for collision avoidance.

TCAS I OPERATION

TCAS I monitors the airspace surrounding the helicopter by interrogating the transponder of the Intruding aircraft. The interrogation reply enables TCAS I to compute the following information about the Intruder:

1. Range between the helicopter and Intruder.
2. Relative bearing to Intruder.
3. Altitude and vertical speed of the Intruder, if Intruder is reporting altitude.
4. Closing rate between the Intruder and the helicopter.

Using this data, TCAS I predicts the time to, and the separation at, the Intruder's Closest Point of Approach (CPA). Should TCAS I predict that certain safe boundaries may be violated, it will issue a Traffic Advisory (TA) to alert the crew that closing traffic is nearby.

TCAS I separates the surrounding airspace into two altitude layers. A different sensitivity threshold level for issuing TAs (traffic advisories) is applied to each altitude layer. Lower altitudes have less sensitive TA threshold levels to prevent unnecessary advisories in the higher traffic densities anticipated at lower flight levels, i.e., terminal areas.

TCAS I has two sensitivity levels (SL), SL A and SL B:

— Sensitivity Level A is set when the helicopter is in-flight below 2,000 feet AGL, or with RAD ALT in fail and landing gear extended.

The following conditions cause TCAS I to generate a TA in sensitivity level A:

- Maintaining the current closing rate, separation of less than 600 feet in altitude between the helicopter and Intruder will occur in 20 seconds
- Separation between the helicopter and Intruder is less than 1200 feet in altitude and less than 0.20 nautical mile range
- NAR (Non-Altitude Reporting) Intruder is within 15 seconds or 0.20 nautical mile range.

— Sensitivity Level B occurs under all other flight conditions and is set when the helicopter is in flight above 2,000 feet AGL, or with RAD ALT in fail and Landing Gear is retracted.

The following conditions cause TCAS I to generate a TA in sensitivity level B:

- Maintaining the current closing rate, separation of less than 800 feet in altitude between the helicopter and Intruder will occur in 30 seconds
- Separation between the helicopter and Intruder is less than 800 feet in altitude and less than 0.55 nautical miles in range
- NAR (Non-Altitude Reporting) Intruder is within 20 seconds or 0.55 nautical mile range.

CHARACTERISTICS

Tracking Range

The typical range tracking volume is pictured as a circle.

The maximum range for TCAS I is 18 nm. However, there are instances when intruders can be seen out to 36 nm. TCAS I can track as many as 45 aircraft and display up to 30 of them.

Tracking Altitude

TCAS I tracks other transponder equipped aircraft that are within a relative altitude of +/-9,000 feet.

Aural inhibits

TCAS I will inhibit the aural annunciation when the helicopter descends below 400 ft AGL, or when the Rad Alt has failed and the Landing Gear is extended.

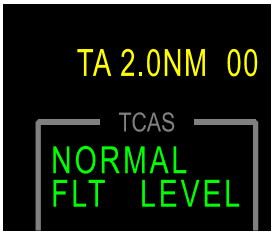
The aural annunciation is enabled when the helicopter climbs above 600 ft AGL.

TCAS I TRAFFIC DISPLAY SYMBOLS

TCAS I will display three different traffic symbols on the traffic display.
The type of symbol selected by TCAS I is based on the Intruder's location and closing rate.
Relative bearing and distance to the Intruder are shown by the position of the Intruder symbol in relation to the helicopter symbol.
The symbols change shape and colour as separation decreases between the helicopter's and Intruder's to represent increasing levels of urgency.
The traffic symbols may also have an associated altitude tag that shows relative altitude in hundreds of feet.
A **+** sign and number above the symbol means the Intruder is above the helicopter altitude.
A **-** sign and number beneath indicates the Intruder is below the helicopter altitude.
A trend arrow appears when the Intruder's vertical rate is 500 feet per minute or greater.
No altitude number or trend arrow will appear beside any Intruder that is Non-Altitude Reporting (NAR).
If TCAS I direction finding techniques fail to locate the azimuth of another aircraft, a no bearing TA message appears on the screen. The intruder aircraft is indicated with two text lines (no symbol display) located above the TCAS status window. The first line is the data for the highest priority no bearing target and the second line is the second

highest priority no bearing target. The data displayed shows:

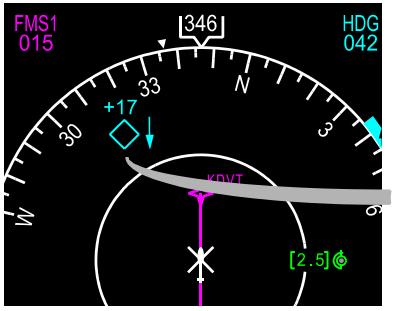
Type-Range ± Relative altitude - ↓↑



ICN-39-A-155025-A-00003-00855-A-01-1

The intruder is 2 NM away and the same altitude

Non-Threat Traffic

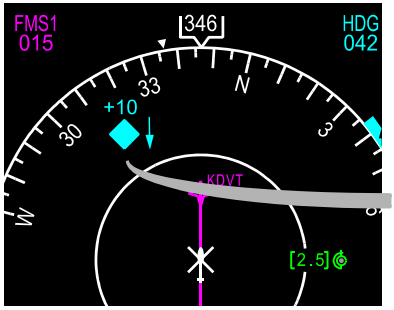


ICN-39-A-155025-A-00003-00856-A-01-1

An open Cyan diamond indicates that the Intruder's relative altitude is greater than ±1200 feet, or its distance is beyond 5 nm range. It is not yet considered a threat.

This traffic is 1700 ft above the helicopter altitude, descending at 500 feet per minute or greater.

Proximity Intruder Traffic



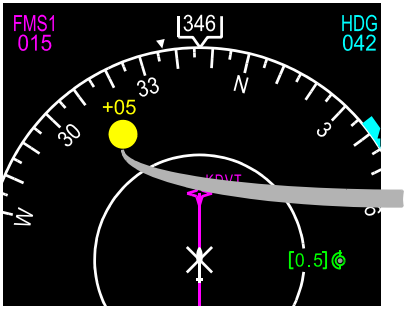
ICN-39-A-155025-A-00003-00857-A-01-1

A filled Cyan diamond indicates that the Intruder aircraft is within ±1200 feet, and within 5 nm range, but is still not consider ed a threat.

This traffic is now 1000 ft above the helicopter and descending at 500 feet per minute or greater.

Traffic Advisory (TA)

A symbol change to a filled yellow circle indicates that the Intruding aircraft is considered to be potentially hazardous. Depending upon TCAS I sensitivity level, TCAS I will display a TA when time to CPA (Closest Point of Approach) is 20 to 30 seconds



ICN-39-A-155025-A-00003-00858-A-01-1

This traffic is 500 ft above the helicopter. An aural warning 'TRAFFIC, TRAFFIC' is generated.

CONTROLS AND DISPLAYS

The TCAS system can be selected to STBY mode or between transponder modes by using the MCDU.

The TCAS/XPDR 2/2 page provides the ability to control the TCAS/transponder and select the current transponder mode.

The TCAS/XPDR 2/2 page is accessed by selecting the "TCAS/XPDR" line key on the Radio Page 1 / 2.

The transponder operating modes on the TCAS/XPDR 2 / 2 page are TA, ALT-ON, ALT-OFF.

1. TA: Traffic Alert with Transponder Mode C operation (TCAS in operating mode).

2. ALT-ON: Transponder in MODE C operation (TCAS in STBY mode).

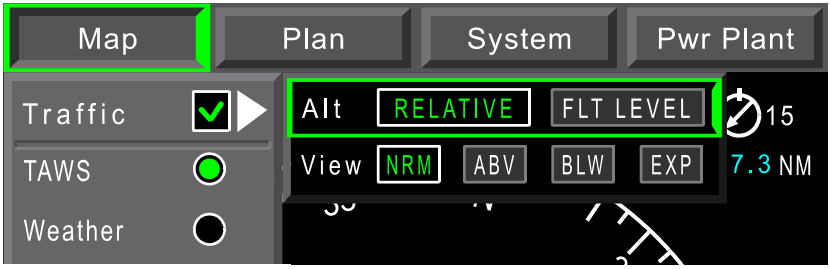
3. ALT-OFF: Transponder in MODE A operation (TCAS in STBY mode).

When TCAS is set to STBY mode the following messages are present:

TCAS OFF on PFD Attitude indicator

TCAS OFF on MFD MAP page, TCAS window

The TCAS visualization functions ✔ can be controlled by CCD on MFD - TRAFFIC subpage



ICN-39-A-155025-A-00003-00859-A-01-1

ALT: toggles the altitude tag between RELATIVE to FLT LEVEL (absolute). Selection of FLT LEVEL replaces Intruder's relative altitude with absolute altitude for 15 seconds.

VIEW: toggles between altitude volume views of NRM-ABV-BLW-EXP. Surveillance volume is that volume of airspace within which other aircrafts with Mode S or ATCRBS transponders are tracked by the helicopter. The display volume is selected by the pilot

NRM: (NORMAL) displays traffic that is between –2700 feet and +2700 feet relative to the helicopter

ABV: (ABOVE) displays traffic that is between –2700 to +9000 feet relative to the helicopter

BLW: (BELOW) displays traffic that is between +2700 to -9000 feet relative to the helicopter

EXP: (EXPANDED) displays traffic that is between +9000 to -9000 feet relative to the helicopter

SELF TEST

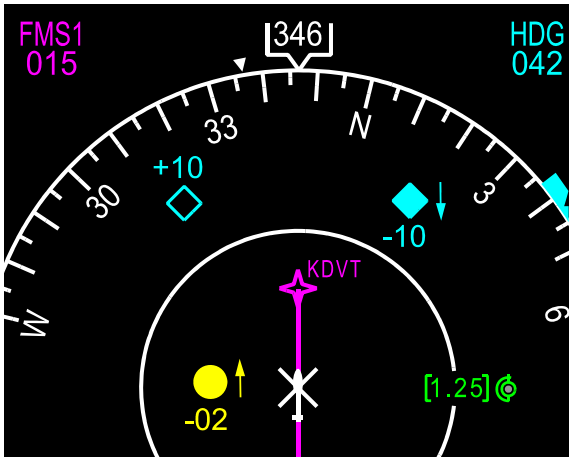
The self-test function of TCAS subsystem can be activated by selecting the XPDR/TCAS line select key on MCDU test page.

The self test determines the operational status of the entire TCAS I system. Once begun, self test continues automatically for approximately eight seconds.

During self test, normal TCAS I operation is inhibited.

The test generates the symbols arranged as shown and automatically selects the 2.5 nm range (half range 1.25) from whatever range was selected prior to the test activation.

The traffic display annunciates the phrase “TCAS TEST”.



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A Traffic Advisory (filled yellow circle) will appear at 9 o’clock, range of 2 miles, 200 feet below and climbing.

Selecting the 5 nm range during the test allows the proximity traffic (filled cyan diamond) to be seen at 1 o’clock, range 3.6 miles, 1000 feet below, descending and Non-Threat traffic (open cyan diamond) to be seen at 11 o’clock, range of 3.6 miles, flying level 1000 feet above.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 26

HINGED PASSENGER DOORS

P/N 4G5212F00111
P/N 3G5300P00211

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SUPPLEMENT 26
HINGED PASSENGER DOORS

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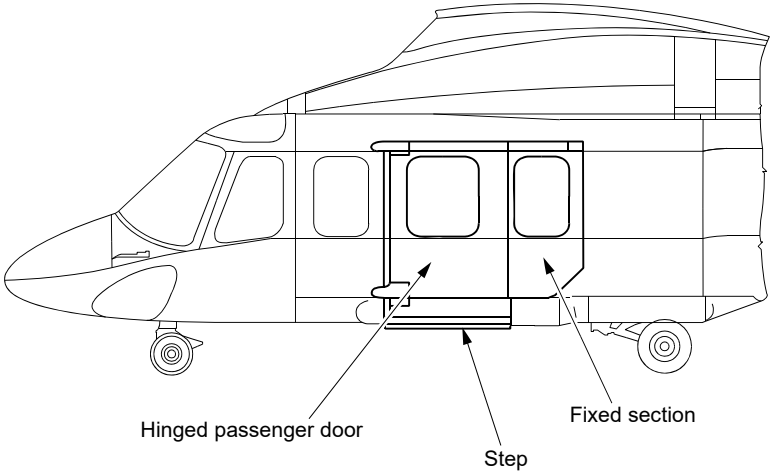
GENERAL INFORMATION

This Supplement provides information about the Hinged Passenger Doors P/N 4G5212F00111 & 3G5300P00211. The installation removes the sliding passenger doors and replaces each sliding door with a door, hinged at STA 3900, and a rearward fixed section. A shortened step is available to accompany the hinged door. (See Figure 1)

The Hinged Passenger Door installation is compatible with the standard seating configurations (low density and high density although 2 seats from the central row, must be removed to give access to the rear most seats) and the VVIP Interior configuration (Supplement 7).



ICN-39-A-155026-A-00003-00474-A-01-1

Figure 1 Hinged Door Configuration

SECTION 1 - LIMITATIONS

NUMBER OF PASSENGERS

The total number of passengers shall not exceed:

- 10 for low density configuration
  (center seat row at STA 4789, must have the outboard seats, left and right, removed)

- 13 for high density configuration
  (center seat row, at STA 4789, must have the outboard seats, left and right, removed).

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Hinged Passenger Door Kit, the new empty weight and center of gravity position must be determined.

HINGED DOOR LIMITATIONS

Flight with either or both the hinged passenger doors removed is prohibited.

MISCELLANEOUS LIMITATIONS

External Hoist Operations (Supplement 11)

External hoist operations cannot be carried out with Hinged Passenger Doors installed.

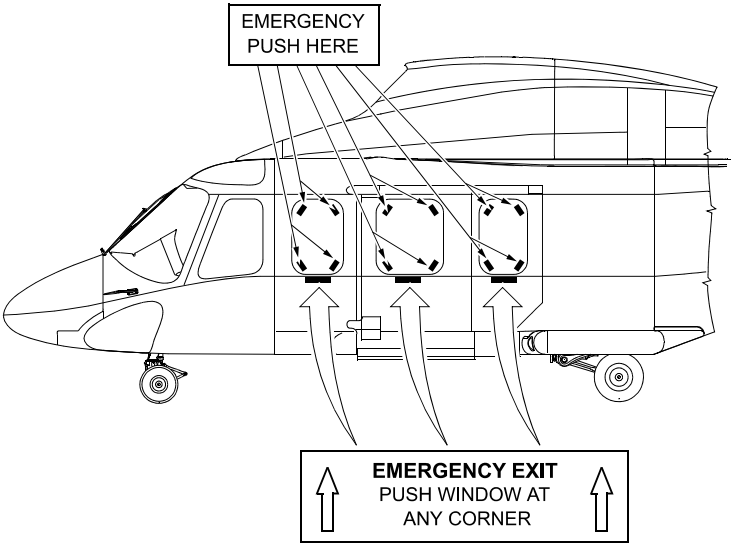
SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY EXITS

Figure 3-1 and Figure 3-2 shows the position of the cabin emergency exits and the external/internal markings and placards.



ICN-39-A-155026-A-00003-00347-A-01-1

Figure 3-1 External Markings and Placards

(Markings and placards identical on left and right side of aircraft)

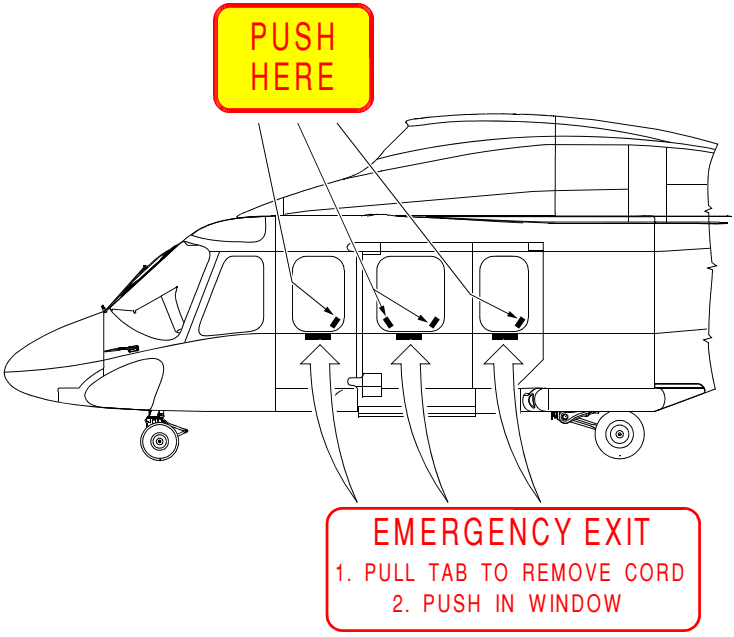
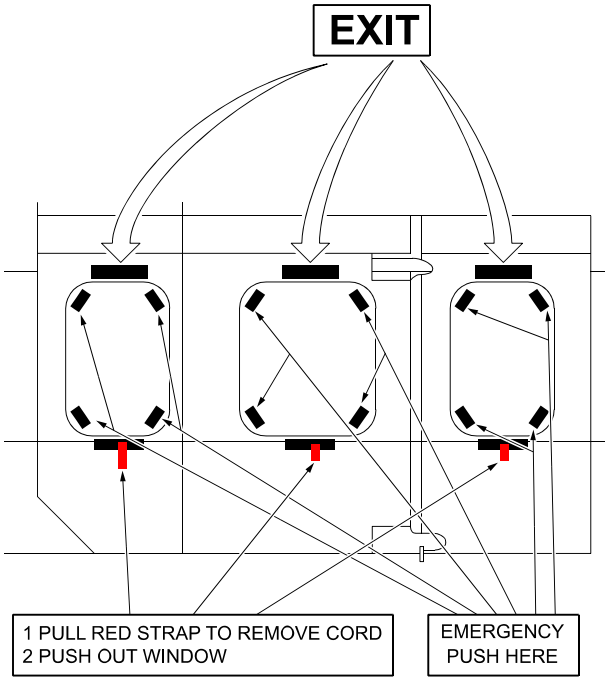


Figure 3-1A Alternative External Markings and Placards
(Markings and placards identical on left and right side of aircraft)



ICN-39-A-155026-A-00003-00348-A-01-1

Figure 3-2 Cabin Internal Markings and Placards
(Markings and placards identical on left and right side of aircraft)

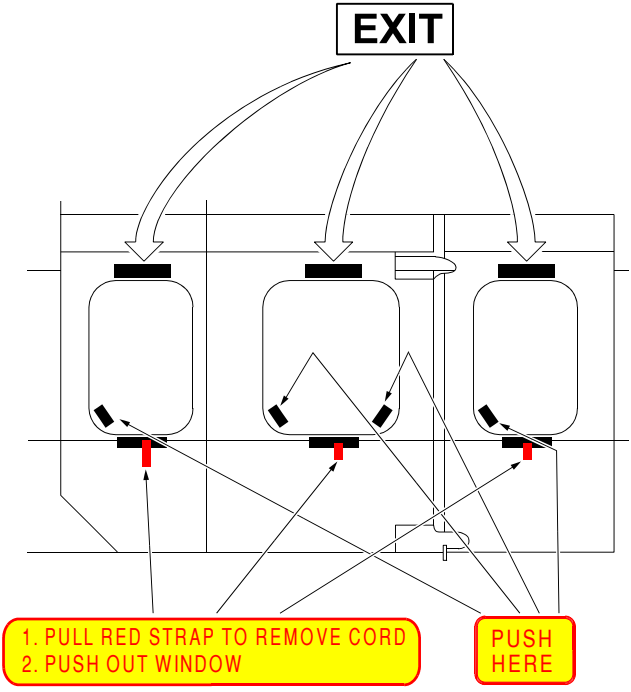


Figure 3-2A Alternative Cabin Internal Markings and Placards
(Markings and placards identical on left and right side of aircraft)

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 27

SKYFORCE OBSERVER DIGITAL MAP SYSTEM

P/N 3G9310F00112

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SUPPLEMENT 27
SKYFORCE OBSERVER
DIGITAL MAP SYSTEM

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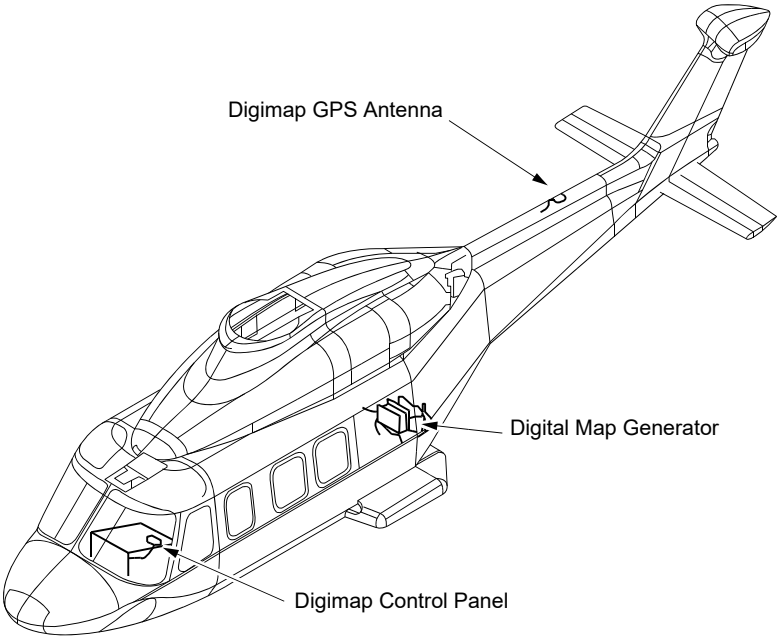
GENERAL INFORMATION

The Skyforce Observer Digital Map system provides a moving map display which can be selected to either MFD, by selecting the 'Digital Map' item on the System Menu, and/or the (central) 5th display (if fitted) by pressing the MAP button on the 5th display. The system interfaces with the on board FMS or its own internal GPS receiver and dedicated antenna which is used as a backup.

The Digital Map system is controlled by a dedicated control panel mounted on the interseat console. This consists of 5 soft keys (repeated on right and left side of the panel for pilot/copilot) and a joystick (Figure 2).

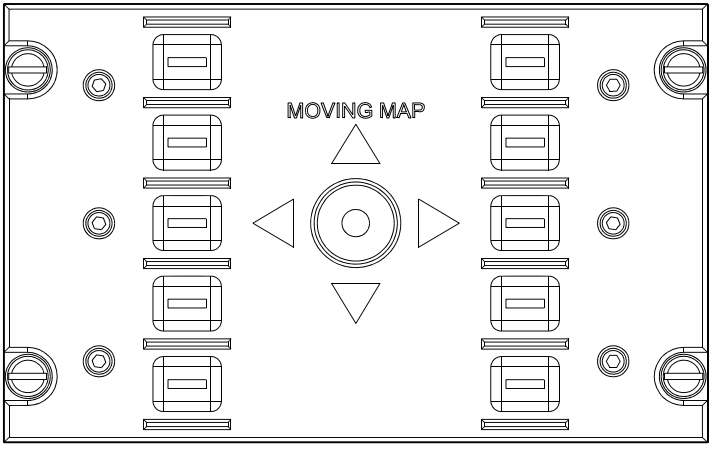
The aircraft icon on the MFD/Central display is in a fixed position and the map display is moved underneath in either a selectable north up or track up orientation.

For full information on the use of the Skyforce Observer Digital Map refer to Observer Pilot's Guide and Operating Manual, Skyforce Doc. N° OB2210-001, latest issue.



ICN-39-A-155027-A-00003-00475-A-01-1

Figure 1 Digimap Installation



ICN-39-A-155027-A-00003-00476-A-01-1

Figure 2 Digi Map Control Panel

SECTION 1 LIMITATIONS

WEIGHT AND CG LIMITATIONS

After Skyforce Observer Digital Map system installation, the new empty weight and CG location must be determined.

DIGITAL MAP LIMITATIONS

— The Digital Map must not be used for navigation.

CAUTION

The Digital Map display is intended to serve as an awareness tool only. The display and database may not provide the accuracy and fidelity on which to base routine navigation decisions and plan routes.

— The full ARINC FMS option must not be selected.

SECTION 2 - NORMAL PROCEDURES

Note

To ensure data input by pilot is retained:
— enter data after engine start
or
after inputing data, with the helicopter powered by external power, turn off Skyforce digimap system before engine start.
— turn off Skyforce digimap system before rotorcraft shutdown.

Note

For complete Digital Map functionality, refer to Observer Pilot's Guide and Operating Manual, Skyforce Doc. N° OB2210-001, latest issue.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the Digital Map system is switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 28

EURONAV DIGITAL MAP SYSTEM

P/N 4G9310F00111
P/N 4G9310F00511
P/N 4G9310F00711
P/N 4G9310F01011
P/N 4G9310F01811

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SUPPLEMENT 28
EURONAV DIGITAL MAP SYSTEM

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GENERAL INFORMATION

The Euroavionics EURONAV IV (P/N 4G9310F00111), EURONAV V (P/N 4G9310F00511) and EURONAV 7 (P/N 4G9310F01011) and EURONAV 7 with RIB box (P/N 4G9310F01811) are Digital Map systems that provided a moving map display which is displayed on the (central) 5th display by pressing the MAP button on the 5th display. When the VMU kit, P/N 4G9310F00611, is installed (not applicable to P/N), the information may be presented on the MFD. Kit P/N 4G9310F01811 still allows information to be displayed on the MFD due to a dedicated RIB box. The system has an interface with the on board FMS for GPS data or, for EURONAV IV and 7, its own internal GPS receiver and dedicated antenna which is used as a backup.

The EURONAV V and 7 are upgraded versions of the EURONAV IV incorporating increased functionality including compatible interfaces for display of Flight Plans, FLIR, AIS Transponder and keyboard operation.

Note

Flight plan data, from the FMS, cannot be viewed on the display for EURONAV IV.

The Digital Map system is controlled by a dedicated control panel mounted in the interseat console which for EURONA IV and V has arrow keys and menu keys to control the display. A Switch Box (installed next to the control panel) or, alternatively for EURONAV V, a USB connector panel (mounted in the rear avionics bay) which is used for uploading certain types of data to the system (Figure 1 & Figure 2). The EURONAV 7 has buttons and a rotary switch to control the display (Figure 3).

The EURONAV V and 7 systems may also be installed in the Mission Console in the cabin (P/N 4G9310F00711). This system digital map generator and control panel are mounted in the mission console and it is controlled by the Mission Systems Operator. The map display is presented on the mission console display but may also be presented on the cockpit MFD or (central) 5th display.

For full information on the use of the EURONAV IV and V refer to Operators and Administrators Manual, latest issue and for the EURONAV 7 the Software Operators Manual, latest issue.

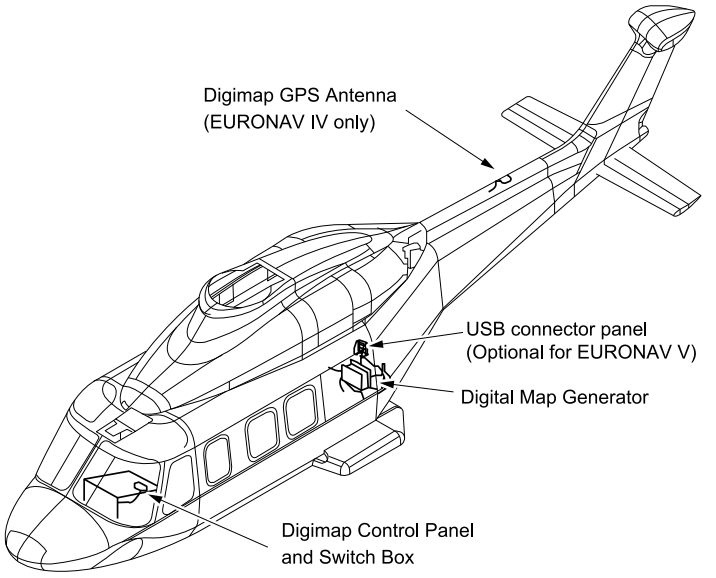

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Figure 1 Digimap Installation (Cockpit Installation)

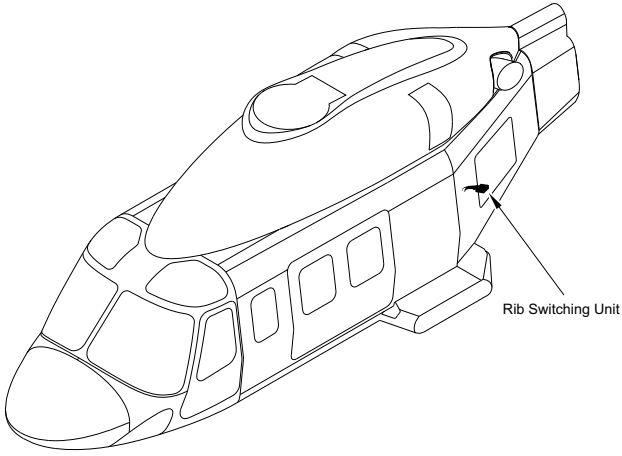

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Figure 1A Rib Box Installation (P/N 4G9310F01811)

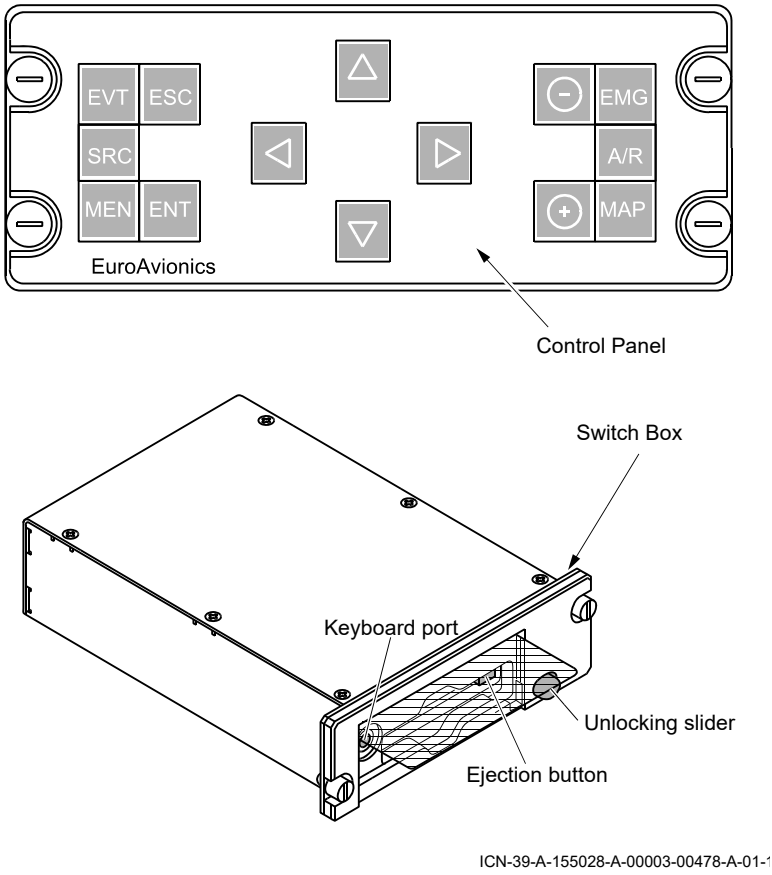

Figure 2 EURONAV IV & V Digital Map Control and Switch Box (if fitted)

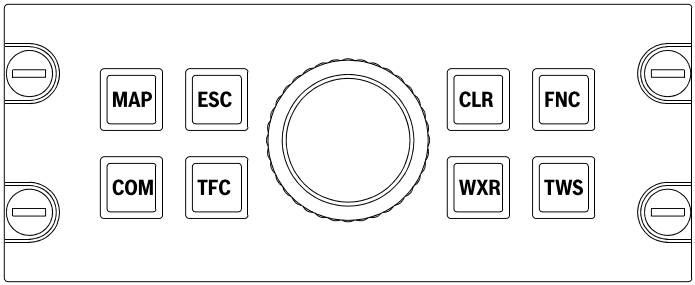

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Figure 3 EURONAV 7 Digital Map Control (if fitted)

SECTION 1 LIMITATIONS

WEIGHT AND CG LIMITATIONS

After EURONAV IV, V or 7 Digital Map system installation, the new empty weight and CG location must be determined.

DIGITAL MAP LIMITATIONS

The EURONAV IV, V or 7 Digital Map must not be used for navigation.

CAUTION

The Digital Map display is intended to serve as an awareness tool only. The display and database may not provide the accuracy and fidelity on which to base routine navigation decisions and plan routes.

SECTION 2 - NORMAL PROCEDURES

Note

To ensure data input is retained:
— enter data after engine start
or
after inputing data, with the helicopter powered by external power, turn off EURONAV digimap system before engine start.
— turn off EURONAV digimap system before rotorcraft shutdown.

Note

For complete EURONAV IV or V Digital Map functionality, refer to EURONAV IV or V Operators and Administrators Manual, latest issue or for the EURONAV 7 the Software Operators Manual, latest issue.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the EURONAV Digital Map system is switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 29

SX-16 NIGHTSUN SEARCHLIGHT

P/N 3G3340F00111
P/N 4G3340F00311
P/N 4G3340F00711
P/N 4G3340F00712
P/N 4G3340F00911
P/N 4G3340F022XX

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SUPPLEMENT 29

SX-16 NIGHTSUN SEARCHLIGHT

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GENERAL INFORMATION

The SX-16 is a high intensity external light source installed on a gimbal support on the left hand side of the helicopter.

The SX-16 is used to provide high intensity external lighting or NVG lighting for reconnaissance operations during night time.

This Supplement gives instruction on different configurations of the SX-16 installation, each allowing a different mode of operation.

The list of applicable part numbers (P/N) and configurations are shown in Section 7 of this Supplement.
The P/N 4G3340F022XX is applicable to all succeeding dash numbers that represent the changes required by the variations of landing light installation with the SX-16 which customise the installation but do not effect the functioning of the system.

SX-16 Controlled by Pendant

The installation consists of the searchlight, infrared filter (IR) which is removable, gimbal support, (Figure 1), a pendant control box (Figure 1 & 2), with stowage (mounted on the rear of the interseat console), and necessary hardware and cabling.

The SX-16 can be directed by operating a 4 way switch on the pendant control box. The SX-16 can illuminate with a white light (IR filter OPEN) or infra-red light (IR filter CLOSE) for use with the NVG's. An IR filter position switch and filter indicator are mounted on the pendant. The IR filter indicator illuminates when the IR filter is closed.

When selected to ON the 4 way (UP/LEFT/DOWN/RT) switch is operational. To illuminate the light the OFF/ON/START switch must be held in the spring loaded START position for not more than 5 seconds. When released the switch returns to the ON position.

The size of the beam is controlled by the FOCUS switch on the pendant.

To turn the light off the switch must be moved to the OFF position.

SX-16 Slaved to the FLIR

Optional SX-16 - FLIR Slaving Kit allows slaving of the searchlight to a FLIR system.

The slaving kit is compatible for both versions of IR Filter installed or not installed. The kit comprises of a revised gimbal unit, a slave control unit and has a revised pendant which uses pushbuttons and includes additional functions. This pendant, see Figure 3, has 2 additional functions compared to the standard pendant. A POWER button (with ON indicator) energizes the SX-16 and automatically raises filter, a LAMP button (with ON indicator) 'starts' the lamp, an IR filter button (with ON indicator when IR filter is down) lowers/raise the IR filter, a FOCUS button to change focus and a 4 way rocker switch to direct the searchlight. The two additional buttons are a SLAVE button (with ON indicator) that slaves the SX-16 spotlight to a FLIR system and a PRESET button that when pressed aligns the searchlight to a preset forward direction.

When the SX-16 is slaved to the FLIR, azimuth and elevation of the searchlight are controlled by the FLIR however FOCUS and IR filter are still controlled by the pendant.

SX-16 Controlled by LTS PNL or SX-16 CP

An optional control panel, labelled LTS PNL (see Figure 4), and installed in the interseat console, allows control of the SX-16 from either the pendant or the LTS PNL panel itself and the Pilot/Copilot collective grip. Different versions of the LTS PNL panel are available, P/N 3G3340V01151 Figure 4, P/N 3G3340V01152 Figure 5, and P/N 3G3340V01551 the difference being that on the -1152 version the CTRL switch is configured slightly differently and on the -1551 the searchlight installation does not include the IR filter.

An optional SX-16 CP panel P/N 3G3340V01153 Figure 8 is also available for configurations without the landing light control switch.

On the LTS PNL or SX-16 CP, selecting the three position CTRL switch to NORM, the SX-16 operation is transferred to the pendant. Selecting the CTRL switch to PLT (pilot) or CPLT (copilot) the pendant is isolated and all operations of the SX-16 are controlled by the LTS PNL or SX-16 CP panel and five way switch on the associated collective grip.

Note

Prior to selecting control from pendant to LTS PNL or vice-versa ensure that the ON/ OFF/START switch and IR FILTER position switch are selected to the same position on both controllers.

From the LTS PNL panel the SX-16 can be started or switched off, by moving the MASTER switch to ON (START) or OFF, and the IR FILTER can be lowered/raised by selecting the FILTER switch to CLOSE (for NVG operations) or OPEN (for white light operations). When the direction control of the SX-16 has been transferred to the Pilot or Copilot collective grip, the movement of the light is achieved through the five way switch normally used for controlling the secondary landing light and labelled LDG LT2 (See Figure 9). Push this switch in the central position changes the focus of the SX-16.

The LTS PNL adds an additional feature to the LDG LT2 (secondary, adjustable, landing light). Whether the SX-16 is controlled either by the pendant (CTRL switch selected to NORM) or by a collective grip (CTRL switch to PLT or CPLT) or OFF the secondary landing light is controlled by the LDG LT2 two position switch on the LTS PNL and the five way switch on both collective grips or that grip not selected to the SX-16. On the LTS PNL, setting the LDG LT2 to UNSTOW provides electrical power to the secondary landing light. Then pushing on the central position of the fiveway switch on either collective grip, or that not selected to the SX-16, the light is activated but remains retracted. The light may be extended, partially or fully, by beeping to EXT on the five way switch and then directed by movement of the five way switch. Pressing again on the central position of the five way switch turns the light off but it remains in the position last set. When required it may be turned on again in the last set position. Moving the LDG LT2 switch on the LTS PNL to STOW position turns off and retracts the lamp.

SX-16 Laser Pointer (P/N 4G9360F00111)

An optional laser pointer, mounted on the SX16 light housing permits the light to be aimed, without having the light operating, provided the operator is viewing the pointer with either the FLIR or NVG goggles.

The system comprises of a laser head mounted onto the SX16 light, a laser control unit, mounted in the cabin roof, and a Laser Interlock Unit (LIU) panel (Figure 10) mounted in the interseat consol.

The laser is a Class 3B device and only eye safe beyond 50 m, therefore the LIU is required for activation of the laser. The rotory selector on the LIU panel, when selected to ARM will operated the laser any-

time the SX-16 system power is selected to ON, whether the light is lit or not. A LED indicator on the LIU panel indicates when the rotary switch is in the ARM position. A WOW interlock stops the laser pointer from operating when the aircraft is on ground.

Note

The replacement of the Laser Pointer detailed in this paragraph is not allowed without the successful completion of the additional verifications reported in the Maintenance Manual.

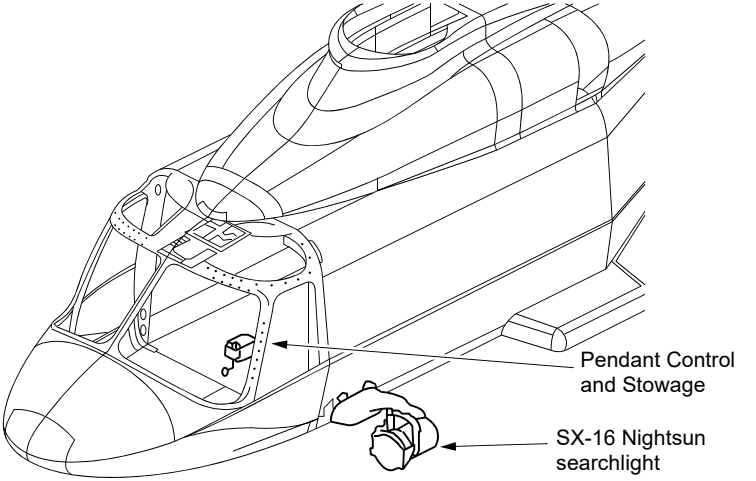

Figure 1 SX-16 Nightsun Searchlight Installation

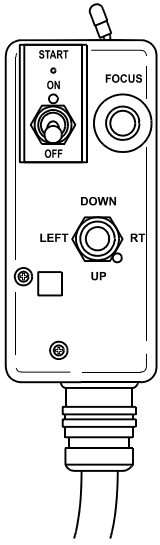

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Figure 2 Pendant Control Box (Standard)

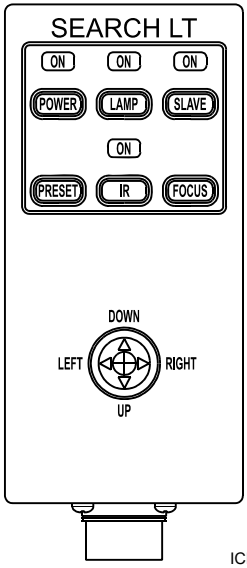

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Figure 3 Pendant with SX-16 FLIR Slaving (Optional)

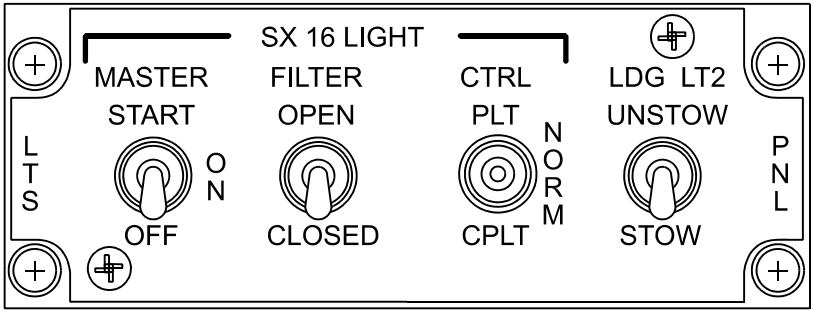

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Figure 4 Interseat LTS PNL Controller P/N 3G3340V01151 (Optional)

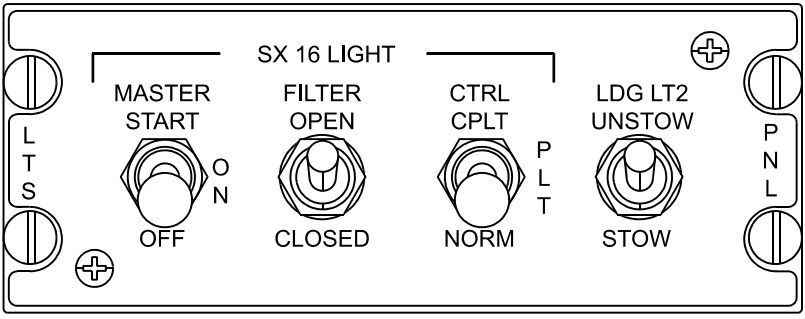

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Figure 5 Interseat LTS PNL Controller P/N 3G3340V01152 (Optional)

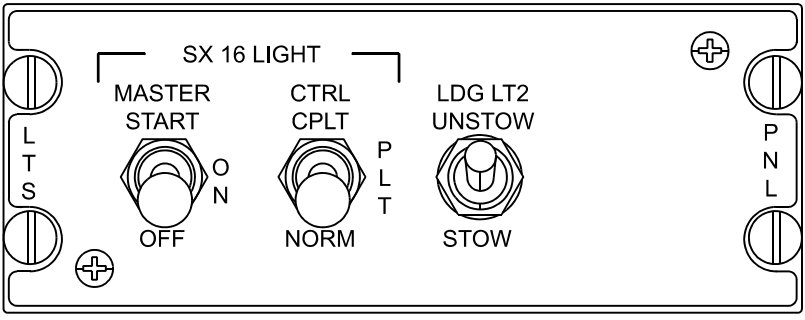

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Figure 6 Interseat LTS PNL Controller P/N 3G3340V01551 (Optional)

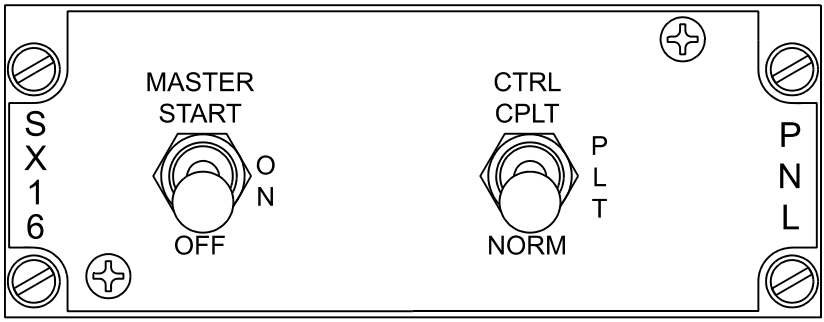

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Figure 7 SX-16 Control Panel P/N 3G3340V01751 (Optional)

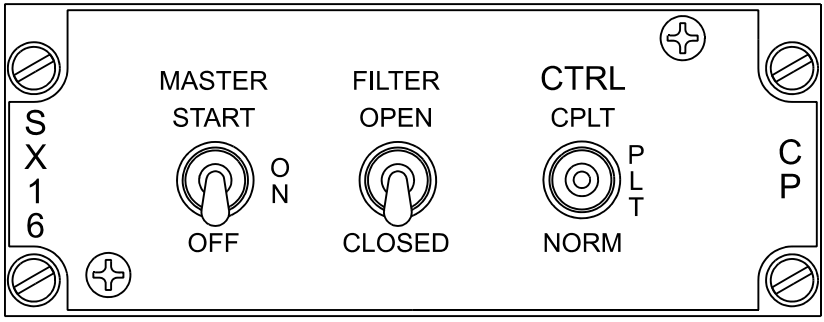

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Figure 8 SX-16 Control Panel P/N 3G3340V01153 (Optional)

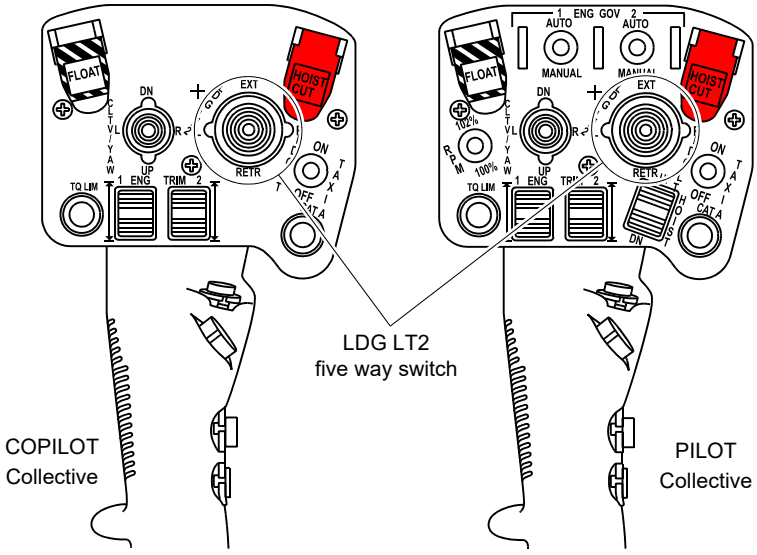

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Figure 9 Collective Grip (Pilot and Copilot)

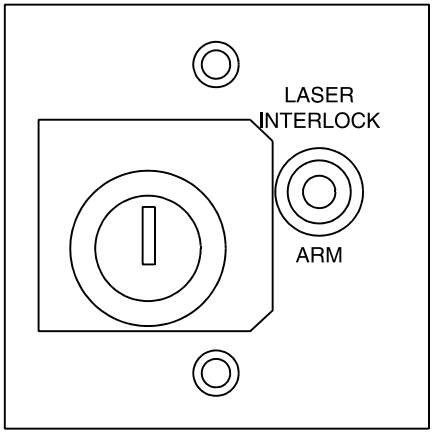

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Figure 10 Laser Interlock Panel (Optional)

SECTION 1 - LIMITATIONS

TYPE OF OPERATION

Operation of the SX-16 is prohibited in IFR.

WEIGHT AND CG LIMITATIONS

After SX-16 installation, the new empty weight and CG location must be determined.

AIRSPEED LIMITATIONS (KIAS)

Maximum airspeed with SX-16 stowed and IR filter in closed position..... $Vne_{Power\ ON}$

Maximum airspeed to move SX-16 and/or IR filter, if fitted ..... 80 KIAS

Maximum airspeed with SX-16 in any position other than stowed ..... $Vne_{Power\ ON}$-40 KIAS

Maximum airspeed with IR filter, if fitted, in any position other than CLOSE..... $Vne_{Power\ ON}$-40 KIAS

SX-16 LIMITATIONS

— When using the pendant controller the SX-16 must be operated from the left hand seat or by cabin crew.

— The SX-16 light must be OFF:

- below 50 ft (15 m) AGL

- in cloud or fog conditions.

— SX-16 must be stowed for landing.
Stowed position:

Elevation ..... Full up (-25 deg or -7 deg)

Azimuth ..... 0 deg

SX-16 ranges limited by mechanical stops, two optional ranges available:

P/N 3G5315A41351

Elevation .....-25 deg to -45deg

Azimuth ..... 45 deg to right, 180 deg to left

P/N 3G5315A41352

Elevation .....-7 deg to -45deg

Azimuth ..... 15 deg to right, 135 deg to left

— Operation for the laser pointer Class 3b device, if fitted, must be authorised by the Competent Authority.

— SX-16 laser pointer must not be armed when personnel are within 170 ft (50 m) of the aircraft.

Taxiing

Taxiing on grass or unprepared surfaces is prohibited.

Slope Operations

Maximum slope for take-off and landing 5° in any direction.

PLACARDS

SX-16 SEARCHLIGHT
DO **NOT** USE BELOW **50**FT AGL OR IN **FOG** CONDITIONS

In View of Pilot

SECTION 2 - NORMAL PROCEDURES

COLD WEATHER OPERATION

If the helicopter is to remain parked outside with an OAT at or below -55° C the SX-16 should be removed and stored in a heated room.

EXTERNAL PRE-FLIGHT CHECKS

AREA N°6 (Fuselage Left Hand Side)

1. SX-16 searchlight ➡	— Secure and wiring properly connected. Check elevation gimbals mounting zones and welds on both sides of SX-16 for condition and integrity. Check lens and IR filter, if fitted, for cleanliness and security. Check IR filter, if fitted, lowered. Check condition of lightning conductor brackets (2) and grounding cable.

AREA N°7 (Cabin and Cockpit Interior)

1. SUN CONTR circuit breaker (overhead console)	— Confirm In.
2. OFF/ON/START switch (on pendant control box and, if fitted, LTS PNL)	— Confirm OFF.
3. IR filter switch (on pendant control box and, if fitted, LTS PNL)	— Confirm in CLOSE position.
4. LIU panel (if fitted)	— Confirmed not in ARM.
5. CTRL switch on LTS PNL, if fitted	— As required.
6. LDG LT2 switch on LTS PNL, if fitted	— UNSTOW.

SX-16 CONTROLLED BY PENDANT WITH/WITHOUT IR FILTER
(P/N 3G3340F00111/4G3340F00311)

SYSTEM CHECK

SX-16 checks

1. LTS PNL, if fitted, CTRL switch	— Set PLT, CPLT or NORM as required.
2. OFF/ON/START switch (on pendant control box or LTS PNL, if fitted)	— Select to ON.
3. UP/LEFT/DOWN/RT switch (on pendant control box or, collective grip 5 way switch, if LTS PNL fitted, and CTRL selected to PLT or CPLT)	— Move control and verify correct movement of searchlight. — Move searchlight to stowed position (elevation full up, azimuth 0 deg).
4. IR filter switch (on pendant control box or LTS PNL, if fitted, and CTRL selected to PLT or CPLT)	— If filter fitted, set to OPEN. Verify IR filter raises and green “IR” advisory indicator not illuminated on the pendant control box.
5. IR filter switch (on pendant control box or LTS PNL, if fitted, and CTRL selected to PLT or CPLT)	— If filter fitted, set to CLOSE Verify IR filter lowers and green “IR” advisory indicator illuminated on the pendant control box.
6. OFF/ON/START switch (on pendant control box or LTS PNL, if fitted)	— Select to OFF or as required.
7. Pendant Control Box	— As required or stow in stowage box on rear of interseat console.

IN FLIGHT

SX-16 OPERATING PROCEDURE

CAUTION

— In flight, do not use SX-16 searchlight below 50 ft (15 m) AGL unless over water.
— In flight, do not ARM laser pointer (if fitted) below 170 ft (50 m) AGL.
— Do not direct the beam towards other aircraft or vehicles to prevent temporary blinding effect.

Note

When operating SX-16 searchlight, magnetic compass indication is not reliable.

Note

When selecting control from pendant to LTS PNL or vice-versa ensure that the ON/OFF/START switch and IR filter position switch are selected to the same position on both controllers.

WHITE LIGHT OPERATIONS

Note

While moving the IR filter, maximum airspeed is 80 KIAS.
With IR filter raised, maximum airspeed is $Vne_{Power\ ON}$-40.

1. LTS PNL, if fitted, CTRL switch — Set PLT, CPLT or NORM as required.
2. OFF/ON/START switch (on pendant control box or LTS PNL, if fitted and CTRL selected to PLT or CPLT) — Select ON.

3. IR filter switch (on pendant control box or LTS PNL, if fitted and CTRL selected to PLT or CPLT)
   — Select OPEN.
   — Green IR advisory indicator not illuminated (pendant only).

4. OFF/ON/START switch (on pendant control box or LTS PNL, if fitted and CTRL selected to PLT or CPLT)
   — Hold in START position until the ignition of the lamp has occurred. Do NOT hold the switch for longer than 5 seconds.

Note

Holding the switch in the START position, after ignition of the lamp, may damage the SX-16.

Note

Only 3 START attempts may be performed. If the SX-16 does not light up after the third attempt (maximum of 5 seconds for each attempt), select the OFF/ON/START switch to OFF.

5. UP/LEFT/DOWN/RT switch (on pendant control box or if LTS PNL fitted and CTRL selected to PLT or CPLT associated collective grip 5 way switch)
   — As required to direct light.

6. FOCUS pushbutton (on pendant control box)
   — As required to focus light beam as desired.

When SX-16 operations completed:

7. Light orientation
   — Light stowed (elevation full up, azimuth 0 deg).

8. IR filter, if fitted
   — Select ON. Confirm filter moves to closed position.

9. ON/OFF/START switch (on pendant control box or LTS PNL, if fitted and used) — Select OFF.

IR LIGHT OPERATIONS

(IR filter must be installed)

Note

While moving the IR filter, maximum airspeed is 80 KIAS.

1. LTS PNL, if fitted, CTRL switch — Set PLT, CPLT or NORM as required.
2. OFF/ON/START switch (on pendant control box or LTS PNL, if fitted and CTRL selected to PLT or CPLT) — Select ON.
3. IR filter switch (on pendant control box or LTS PNL, if fitted and CTRL selected to PLT or CPLT) — Confirm in CLOSE position Confirm green 'IR' advisory indicator illuminated on pendant control box.
4. OFF/ON/START switch (on pendant control box or LTS PNL, if fitted and CTRL selected to PLT or CPLT) — Hold in START position until the ignition of the lamp has occurred. Do NOT hold the switch for longer than 5 seconds.

Note

Holding the switch in the START position, after ignition of the lamp, may damage the SX-16.

Note

Only 3 START attempts may be performed. If the sunlight does not light up after the third attempt (maximum of 5 seconds for each attempt), turn the OFF/ON/START switch to OFF.

5. UP/LEFT/DOWN/RT switch (on pendant control box or if LTS PNL fitted and CTRL selected to PLT or CPLT associated collective grip 5 way switch) — As required to direct light.

6. FOCUS pushbutton (on pendant control box or if LTS PNL fitted and CTRL selected to PLT or CPLT associated collective grip 5 way switch central push position) — As required to focus light beam as desired.

When SX-16 operations completed

7. Light orientation — Light stowed (elevation full up, azimuth 0 deg).
   — Confirm IR filter closed.

8. ON/OFF/START switch (on pendant control box or LTS PNL, if used) — Select OFF.

LASER POINTER OPERATION (P/N 4G9360F00111)

CAUTION

In flight do not ARM laser pointer below 170 ft (50 m) AGL When selected to ARM the laser will be operating any time the SX-16 system power is selected to ON, whether the light is lit or not.

1. LIU panel — Select ARM.

2. OFF/ON/START switch (on pendant control box or LTS PNL, if fitted and CTRL selected to PLT or CPLT) — Select ON.

3. UP/LEFT/DOWN/RT switch (on pendant control box or if LTS PNL fitted and CTRL selected to PLT or CPLT associated collective grip 5 way switch) — As required for laser pointer.

4. SX-16 searchlight operations — As required.

When SX-16 laser pointer operations completed

5. LIU panel — Select off.

APPROACH AND LANDING

CAUTION

— In flight, do not use SX-16 searchlight below 50 ft (15 m) AGL unless over water.
— In flight, do not ARM laser pointer (if fitted) below 170 ft (50 m) AGL.

1. SX-16 light
   — Confirm IR filter closed, if fitted, and light stowed (elevation full up, azimuth 0 deg).
   — Ensure light off before reaching 50 ft (15 m) AGL.
2. LIU panel (if fitted) — Confirmed not in ARM.
3. OFF/ON/START switch (on pendant control box or LTS PNL, if used) — Select OFF.
4. Pendant Control Box — Stow in stowage provided.

CAUTION

When landing on grass or unprepared surfaces be attentive to SX-16 ground clearance.

POST SHUTDOWN CHECKS

If the helicopter is to remain parked outside with an OAT at or below -55° C the SX-16 should be removed and stored in a heated room.

SX-16 WITH FLIR SLAVING KIT

P/N 4G3340F00711

SYSTEM CHECK

SX-16 checks

1. LTS PNL, if fitted, CTRL switch	— Set NORM.
2. POWER switch (on pendant control box)	— Set to ON, confirm filter raises, if fitted, and filter ON light not illuminated.
3. UP/LEFT/DOWN/RT switch (on pendant control box)	— Move control and verify correct movement of searchlight. — Move searchlight to stowed position (elevation full up, azimuth 0 deg).
4. IR filter switch (on pendant control box)	— If filter fitted, Push (IR). Verify IR filter lowers and green “IR” (ON) advisory indicator illuminated on the pendant control box.
5. POWER switch (on pendant control box)	— Select OFF or as required.
6. Pendant Control Box	— As required or stow in stowage box on rear of interseat console.

IN FLIGHT

SX-16 OPERATING PROCEDURE

CAUTION

— In flight, do not use SX-16 searchlight below 50 ft (15 m) AGL unless over water.
— In flight, do not ARM laser pointer (if fitted) below 170 ft (50 m) AGL.
— Do not direct the beam towards other aircraft or vehicles to prevent temporary blinding effect.

Note

When operating SX-16 searchlight, magnetic compass indication is not reliable.

WHITE LIGHT OPERATIONS

Note

While moving the IR filter, maximum airspeed is 80 KIAS.
With IR filter raised, maximum airspeed is $Vne_{Power\ ON}$-40.

1. LTS PNL, if fitted, CTRL switch — Confirm NORM.
2. POWER switch (on pendant control box) — Confirm airspeed below 80 KIAS. Select ON. Confirm filter raises and ON advisory indicator not illuminated.
3. LAMP switch (on pendant control box) — Hold in ON until the ignition of the lamp has occurred. Do NOT hold the switch for longer than 5 seconds.

Note

Holding the switch in the ON position, after ignition of the lamp, may damage the SX-16.

Note

Only 3 START attempts may be performed. If the SX-16 does not light up after the third attempt (maximum of 5 seconds for each attempt), select the POWER switch OFF.

4. UP/LEFT/DOWN/RT switch (on pendant control box) — As required to direct light.

5. FOCUS pushbutton (on pendant control box) — As required to focus light beam as desired.

SLAVING to FLIR

6. SLAVE button on pendant control box — Press to slave SX-16 to FLIR.

When SX-16 operations completed:

7. Light orientation — Light stowed (elevation full up, azimuth 0 deg).

8. IR filter, if fitted — Select ON.
Confirm filter moves to closed position and ON advisory indicator illuminated.

9. POWER switch (on pendant control box) — Select OFF.

IR LIGHT OPERATIONS

(IR filter must be installed)

Note

While moving the IR filter, maximum airspeed is 80 KIAS.

1. POWER switch (on pendant control box) — Confirm airspeed below 80 KIAS. Select ON. Confirm filter raises and ON advisory indicator not illuminated.

2. IR filter switch (on pendant control box) — Select ON position. Confirm green 'IR' ON advisory indicator illuminated on pendant control box.

3. LAMP switch (on pendant control box) — Hold in ON position until the ignition of the lamp has occurred. Do NOT hold the switch for longer than 5 seconds.

Note

Holding the switch in the START position, after ignition of the lamp, may damage the SX-16.

Note

Only 3 START attempts may be performed. If the sunlight does not light up after the third attempt (maximum of 5 seconds for each attempt), select the POWER switch OFF.

4. UP/LEFT/DOWN/RT switch (on pendant control box) — As required to direct light

5. FOCUS pushbutton (on pendant control box) — As required to focus light beam as desired.

If SLAVING to FLIR required and equipment installed

6. SLAVE button on pendant control box — Press to slave SX-16 to FLIR.

When SX-16 operations completed

7. Light orientation
   — Light stowed (elevation full up, azimuth 0 deg).
   — Confirm IR filter closed.
8. POWER switch (on pendant control box) — Select OFF.

APPROACH AND LANDING

CAUTION

— In flight, do not use SX-16 searchlight below 50 ft (15 m) AGL unless over water.
— In flight, do not ARM laser pointer (if fitted) below 170 ft (50 m) AGL.

1. SX-16 light
   — Confirm IR filter closed (ON advisory indicator illuminated), if fitted and light stowed (elevation full up, azimuth 0 deg).
   — Ensure light off before reaching 50 ft (15 m) AGL.
2. POWER switch (on pendant control box) — Select OFF.
3. Pendant Control Box — Stow in stowage provided.

CAUTION

When landing on grass or unprepared surfaces be attentive to SX-16 ground clearance.

POST SHUTDOWN CHECKS

If the helicopter is to remain parked outside with an OAT at or below -55° C the SX-16 should be removed and stored in a heated room.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

DOUBLE DC GENERATOR FAILURE

1. SX-16 (pendant control box) or LTS PNL, if used
   — Close IR filter, if fitted, and stow light (elevation full up, azimuth 0 deg).
   — Set to OFF.

SX-16 SEARCHLIGHT FAILURES

For any failure of the SX-16, or IR filter drive system, attempt to stow SX-16 and move filter, if fitted, to CLOSE but if not possible:

Maximum airspeed with SX-16 in any position other than stowed ..... $Vne_{Power\ ON}$-40 KIAS

Maximum airspeed with IR filter, if fitted, in any position other than CLOSE..... $Vne_{Power\ ON}$-40 KIAS

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SECTION 4 - PERFORMANCE DATA

No change in aircraft performance when SX-16 Searchlight is installed.

When SX-16 is installed together with one or more of the following kits:

- External Hoist installation (Supplements 11, 41, 49)
- Snow skids installation (Supplement 19)
- Slump Pads Installation (Supplement 20).

the climb performance is reduced by:

ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

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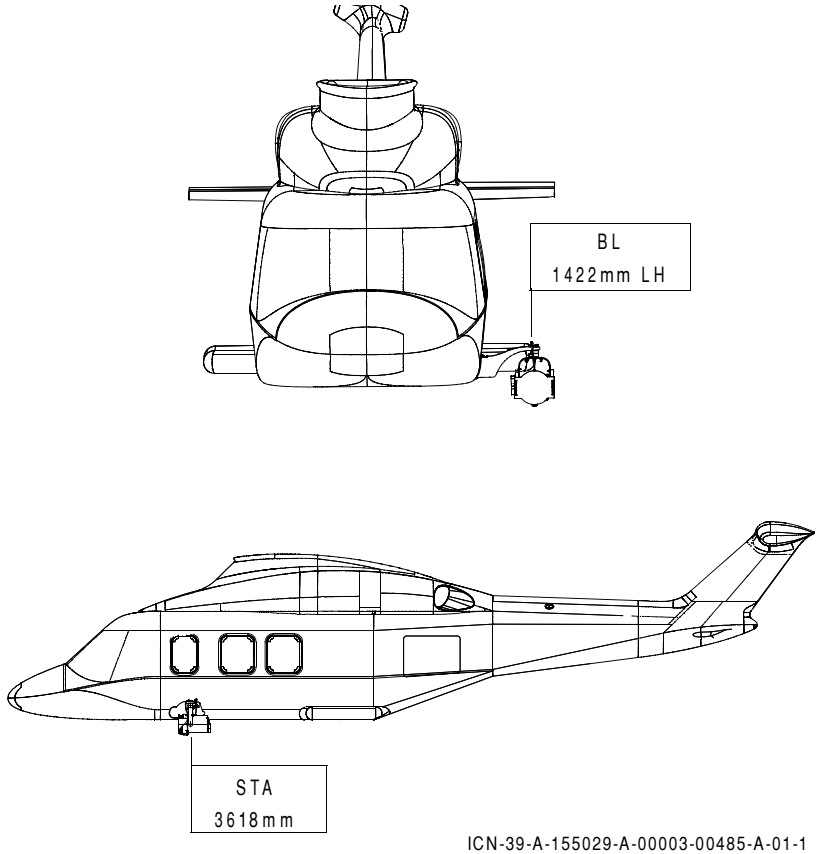
PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

SX-16 Longitudinal and Lateral Moment Arms

When the SX-16 is installed the following Longitudinal and Lateral Moment arms are applicable for the Weight and Balance Calculations



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SECTION 7 - SYSTEM DESCRIPTION

The following table describes the SX-16 combinations of equipment and part numbers:

P/N	Name	IR filter	FLIR slaving	Collective control	Contains provision for NVG operations (for approved configurations,
3G3340F00111	SX-16 Controlled by pendant + IR filter	x	-	-	x
4G3340F00711	SX-16 with SEAFLIR II slaving	x	x	-	x
4G3340F00911	SX-16 collective control interface and LTS PNL	x	-	x	x
4G3340F00712	SX-16 with FLIR Star Safire slaving + IR filter+ collective control and LTS PNL	x	x	x	x
4G3340F00712+ 3G3340A06611	SX-16 with FLIR EOST 46 slaving + collective control	-	x	x	x
3G3306P03211	SX-16 with FLIR slaving and without IR filter	-	x	-	x
3G3306P03311	SX16 with collective control interface (LTS PNL), without IR filter	-	-	x	x
4G3340F00311	SX-16 controlled by pendant, without IR filter	-	-	-	x
4G3340F02211	SX16 with collective control interface (SX16 PNL),without IR filter	-	-	x	-
4G3340F02212	SX16 with collective control interface (SX16 PNL),without IR filter	-	-	x	x
4G3340F02213	SX16 with collective control interface (SX16 PNL),without IR filter	-	x	x	-
4G3340F02214	SX16 with collective control interface (SX16 PNL),without IR filter	-	x	x	x
4G3340F02215	SX16 with collective control interface (SX16 PNL),without IR filter	-	x	x	-
4G3340F02216	SX16 with collective control interface (SX16 PNL),without IR filter	-	x	x	x
4G3340F02217	SX16 with collective control interface (SX16 PNL) + IR filter	x	-	x	-
4G3340F02218	SX16 with collective control interface (SX16 PNL) + IR filter	x	-	x	x
4G3340F02219	SX16 with collective control interface (SX16 PNL) + IR filter	x	-	x	x
4G3340F02220	SX16 with collective control interface (SX16 PNL) + IR filter	x	x	x	-
4G3340F02221	SX16 with collective control interface (SX16 PNL) + IR filter	x	x	x	x
4G3340F02222	SX16 with collective control interface (SX16 PNL) + IR filter	x	x	x	x
4G3340F02223	SX16 with collective control interface (SX16 PNL) + IR filter	x	x	x	-
4G3340F02224	SX16 with collective control interface (SX16 PNL) + IR filter	x	x	x	x
4G3340F02225	SX16 with collective control interface (SX16 PNL) + IR filter	x	x	x	x

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 30

OPERATIONS WITH COCKPIT DOORS REMOVED

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SUPPLEMENT 30
OPERATIONS WITH COCKPIT DOORS REMOVED

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GGENERAL INFORMATION

The Supplement provides information for operations with both the Cockpit Doors removed. With pilot and copilot doors removed at least one of the cabin doors must also be locked open.

SECTION 1 - LIMITATIONS

GENERAL

— Flight with only one cockpit door removed is prohibited.

— With cockpit doors removed flight may only be carried out with either the left or right or both cabin doors locked open.

TYPES OF OPERATION

Operation with Cockpit doors removed is restricted to CAT B, Day/Night VFR.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After removal of the Pilot and Copilot doors, the new empty weight and center of gravity position must be determined.

AIRSPEED LIMITATIONS

Maximum airspeed within ±10 degrees of forward azimuth:

— with right cabin door locked open ..... 100 KIAS

— with left or both cabin doors locked open ..... 80 KIAS

Maximum relative windspeed beyond ±10 degrees of forward azimuth ..... See Figure 1-1 to 1-2

Maximum climb rate ..... 1000 fpm

WINDSPEED LIMITATIONS

Maximum windspeed limitation ..... See Figure 1-3

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WEIGHT-ALTITUDE-TEMPERATURE
for TAKE-OFF, LANDING and IGE MANOEUVRES

RELATIVE WIND AZIMUTH: 10 to 350 deg

Note: no windspeed limitation exists for headwind conditions (wind azimuth ±10deg)

ROTOR 100%

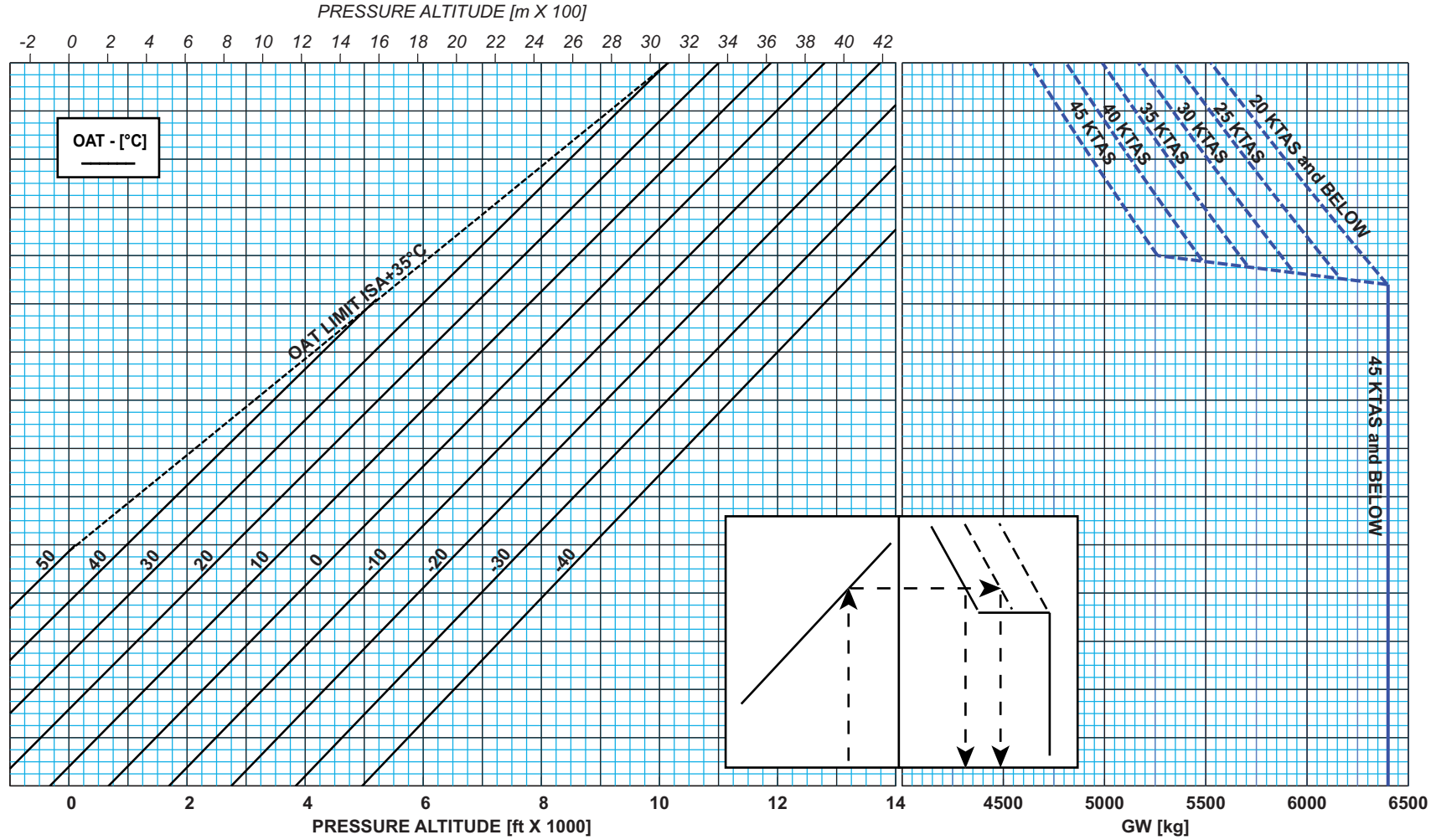

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Figure 1-1 Cockpit Doors Removed CATEGORY B W.A.T. Limits

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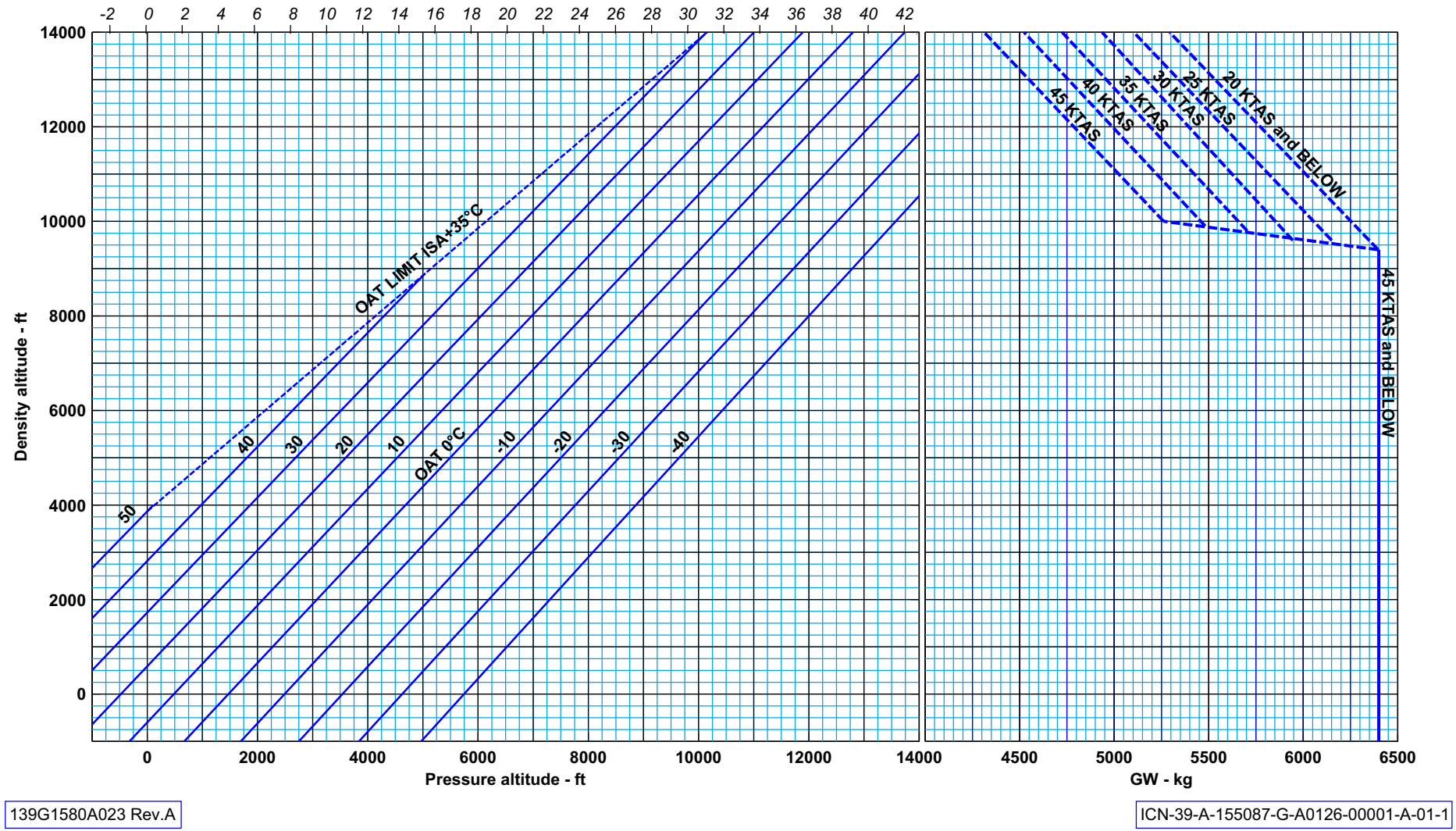

Figure 1-1A Cockpit Doors Removed CATEGORY B W.A.T. Limits, ECS ENVIRO FULL AUTO

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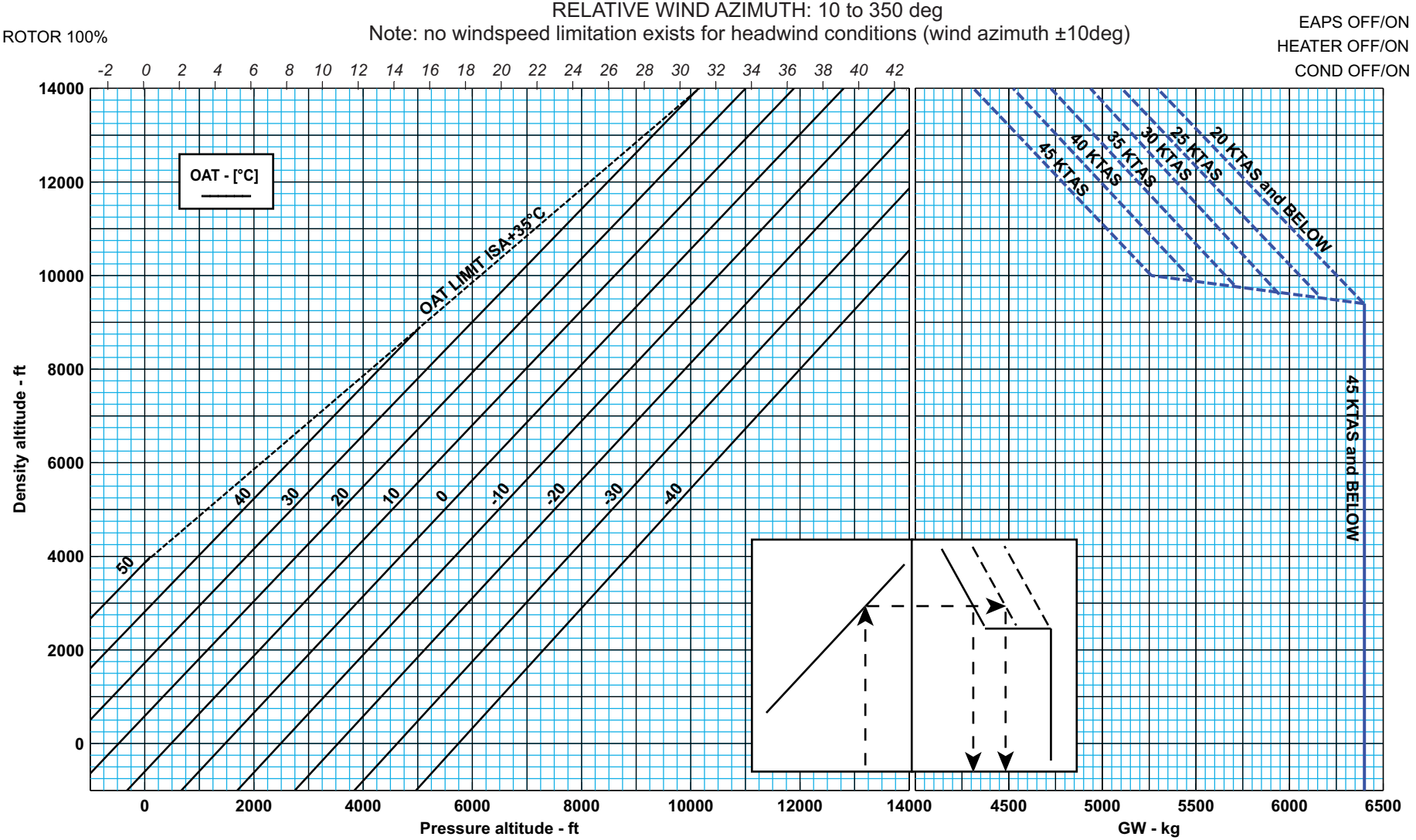

Figure 1-2 Cockpit Doors Removed CATEGORY B W.A.T. Limits, HEATER ON, EAPS ON/OFF

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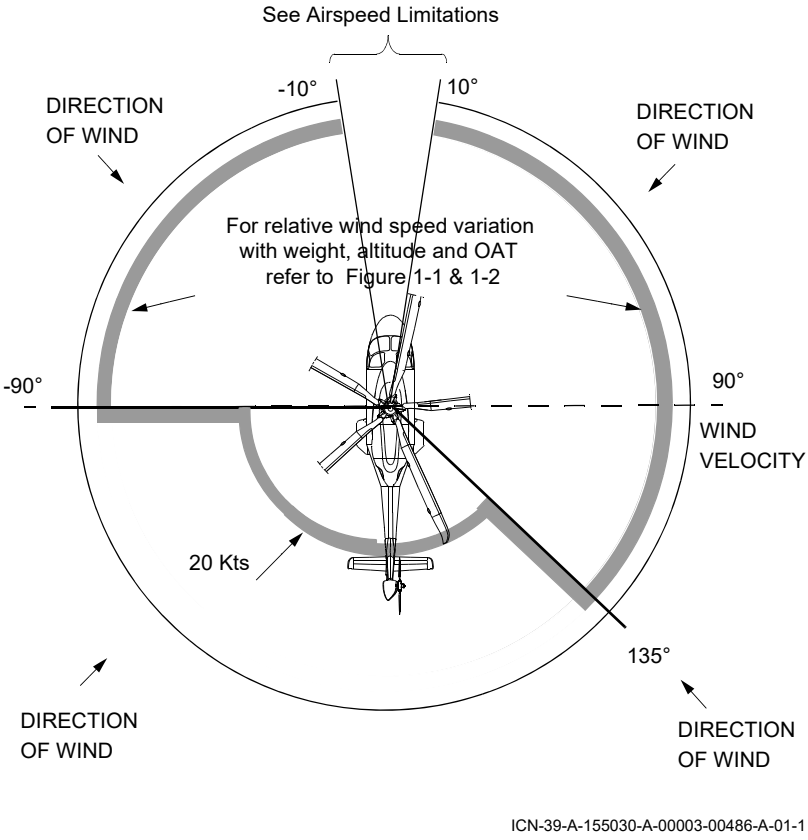

Figure 1-3 Relative Wind Azimuth Limitations

MISCELLANEOUS LIMITATIONS

— Pilot and copilot must wear protective glasses/goggles or helmet with lowered visor.

— Flight in actual or forecast precipitation or thunderstorm conditions is prohibited.

SECTION 2 - NORMAL PROCEDURES

AREA N°7 (CABIN AND COCKPIT INTERIOR)

Confirm all loose articles in cockpit and cabin (ie. maps etc.) are secure.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 31

INCREASED BAGGAGE COMPARTMENT LOAD

P/N 3G2550F00113

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SUPPLEMENT 31
INCREASED BAGGAGE COMPARTMENT LOAD

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GENERAL INFORMATION

The modification P/N 3G2550F00113 consists of increased strength restraint net anchoring system and restraint net for the baggage compartment.

Two configurations are available:
Differing restraint net and securing methods are required for the two configurations:

a) This configuration considers that the whole baggage compartment floor area is available for baggage.
The restraint net P/N 3G2550A00231 may be used to secure a maximum load of 300 kg (660 lb) using the net attachment points and net configuration as shown in Figure 1.

b) This configuration considers that the rear part of the baggage compartment is occupied with equipment and cannot be used. For this configuration the modification P/N 3G5306P30511 must be installed which includes an additional row of net attachment points.
The restraint net P/N 3G2550A03031 may be used to secure a maximum load of 200 kg (440 lb) in the forward part of the baggage bay using net attachment points and net configuration as shown in Figure 2.
If this modification is installed, and equipment has been removed from the rear part of the baggage compartment, the maximum load returns to configuration a) 300 kg.

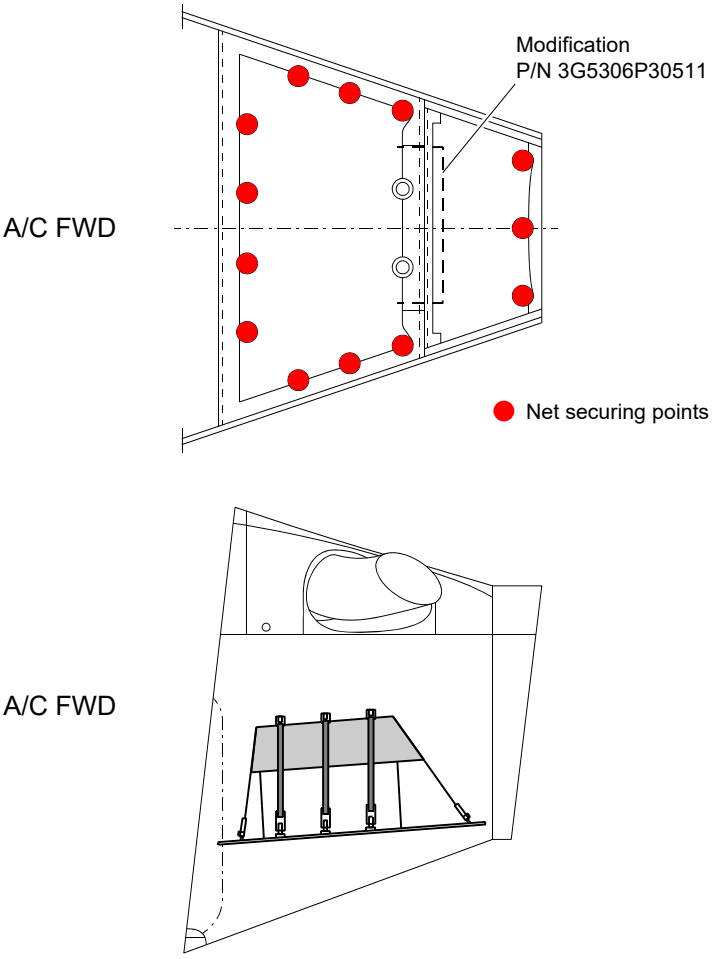

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Figure 1 Cargo Net configuration P/N 3G2550A00231 for maximum load of 300 kg

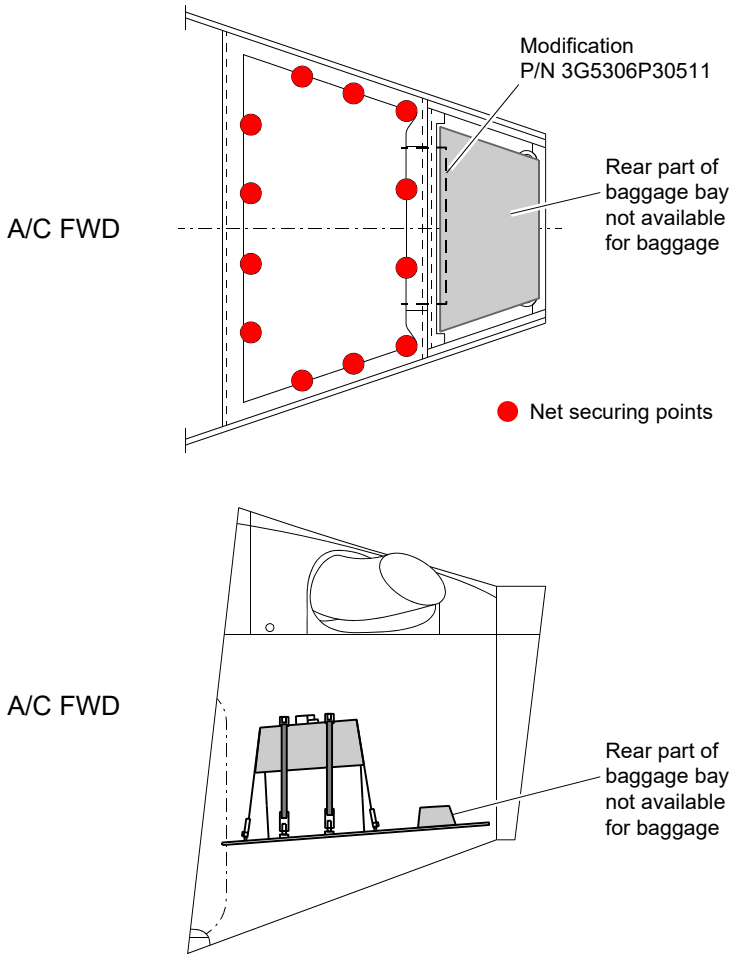

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Figure 2 Cargo Net configuration P/N 3G2550A03031 for maximum load 200 kg

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SECTION 1 - LIMITATIONS

WEIGHT AND CG LIMITATIONS

After installation of this modification, the new empty weight and CG location must be determined.

BAGGAGE COMPARTMENT LIMITATIONS

Maximum load with restraint net P/N 3G2550A00231 300 kg (660 lbs)

When rear part of baggage compartment is occupied with equipment, maximum load with installation P/N 3G5306P30511 and restraint net P/N 3G2550A03031 ..... 200 kg (440 lbs)

Baggage must be secured with restraint net or other approved means.

Maximum unit load ..... 550 kg/m^2 (110 lb/sq.ft)

Maximum load height ..... 600 mm (2 ft)

BAGGAGE COMPARTMENT PLACARDS

ALL CARGO MUST BE SECURED
WITH RESTRAINT NET OR
OTHER APPROVED MEANS

MAXIMUM LOAD FOR RESTRAINT NET

P/N 3G2550A00231	300 KG (660 LB)
P/N 3G2550A03031	200 KG (440 LB)

SEE RFM SUPPLEMENT 31 FOR
RESTRAINT NET ATTACHMENTS
AND CONFIGURATION

MAX UNIT LOAD 550KG/M^2 (110LB/SQ.FT)
MAXIMUM CARGO HEIGHT 600mm (2ft)

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 33

CABIN BUBBLE WINDOW

P/N 4G5620F00111

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SUPPLEMENT 33
CABIN BUBBLE WINDOW

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GENERAL INFORMATION

The Cabin Bubble Window modification installs a bubble window on the left hand and right hand side replacing the cabin forward windows. The bubble window allows increased of view for crew members. See Figure 1. The 2 bubble windows are no longer Emergency Exits.

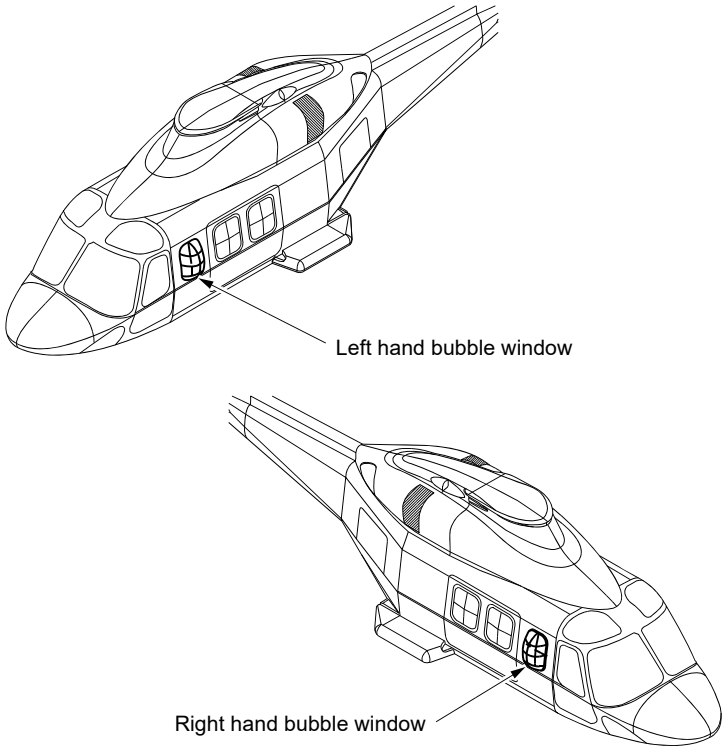

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Figure 1 Left and Right Bubble Windows

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Bubble Windows, the new empty weight and center of gravity position must be determined.

MISCELLANEOUS LIMITATIONS

The Bubble Windows are not designated Emergeny Exits.

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY EXITS

Figure 3-1 and Figure 3-2 shows the position of the cabin emergency exits and the external/internal markings and placards.

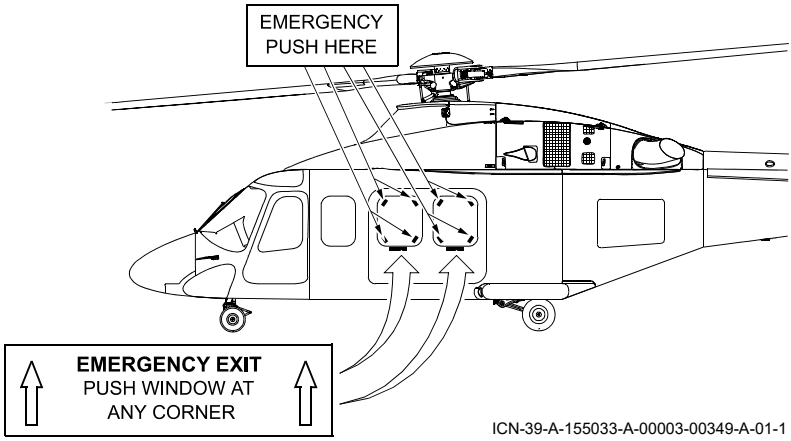

Figure 3-1 External Markings and Placards

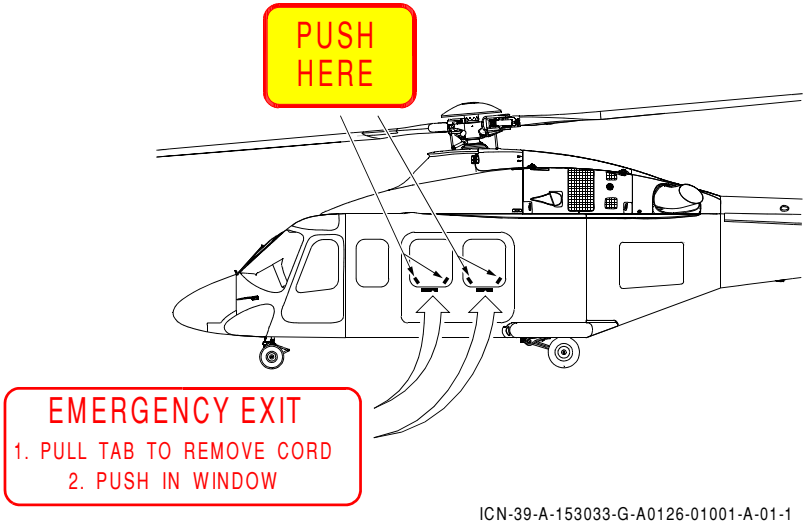

Figure 3-1A Alternative External Markings and Placards

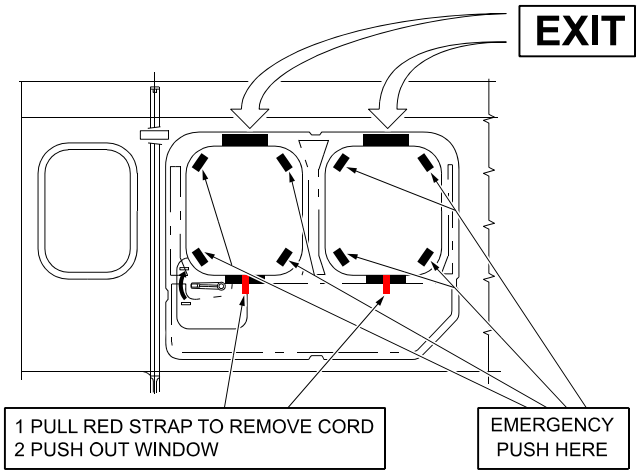

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Figure 3-2 Internal Markings and Placards

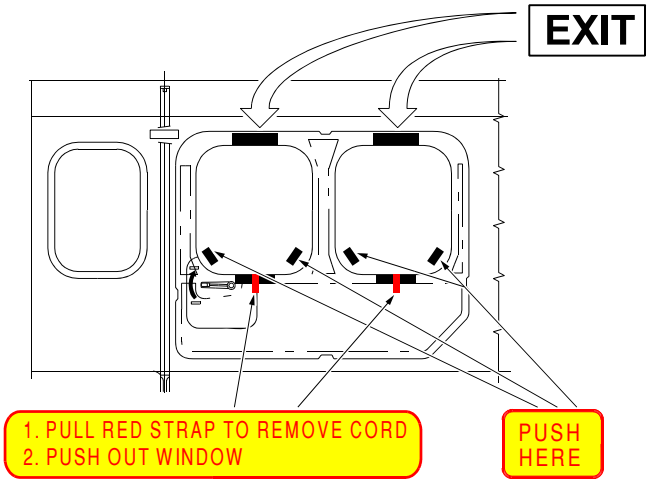

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Figure 3-2A Alternative Internal Markings and Placards

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
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SUPPLEMENT 34

4 AXIS ENHANCED FLIGHT DIRECTOR (EPIC PHASE 4)

P/N 3G2210F00211

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SUPPLEMENT 34
4 AXIS ENHANCED FLIGHT DIRECTOR
(EPIC PHASE 4)

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GENERAL INFORMATION

The 4 Axis Flight Director (FD) provides commands that are normally coupled to the autopilot (AP) for automatic flight path control around the three axis of the aircraft plus collective. At Power Up one of the two FD is automatically selected and configured as Master (priority). At every Power Up the FD selected as Master (priority) is alternated.

The 4 Axis Enhanced Flight Director system requires EPIC Phase 4 (software release EB7030191-00105) and is the complete version of the FD system, it contains all the functions of the 4 Axis Basic Flight Director (Supplement 40) plus the Hover (HOV) mode.

When coupled, both autopilots drive their actuators to satisfy the refernces provided by the priority FD.
When uncoupled the pilot can manually fly the commands.
In either case pitch, roll command bars/collective cue are presented on each PFD, depending on the mode selected.

The FD uses the Navigation source and data reference presented on the selected PFD. The selected PFD is indicated by the green PFD couple arrow which is controlled by the PFD button on the Guidance Controller (See Figure 2). The SAR Guidance Controller (See Figure 3) is for SAR modes, however, the extra pushbuttons are not currently operative. Either Guidance Controller can be used with the 4 Axis Enhanced Flight Director system.

A green couple arrow is also presented on the side of the PFD push-button on the Guidance Controller. When a FD mode is engaged the coupled function is automatically engaged. The FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller (See Figure 1). The coupled function is automatically forced to uncoupled whenever the AP ATT mode is off or becomes inoperative.

Armed and captured FD modes are displayed with messages along the top line of the PFD: Collective and pitch mode messages on the left of the selected PFD arrow and lateral mode on the right. Armed modes are in small white characters and captured or engaged modes are in medium size green characters. When transitioning from no mode to engaged, from armed to captured or change from one mode to another mode the message flashes for 6 seconds then become steady. When changing from captured to no mode the message flashes for 6 seconds then extinguishes.

Armed lateral modes messages are: VOR, VAPP, LOC, BC, LNAV and captured VOR, VAPP, OS, LOC, BC, LNAV, HDG, HOV.

Armed collective modes are: GS, VGP, and captured ALT, GS, VS, GA, ALTA, ALVL, RHT, VGP.
Engaged vertical pitch modes are IAS, HOV, DCL, GA.

A chime sounds whenever either a lateral, vertical (PITCH), or vertical (collective) FD mode changes from its previous state, ie:

— a mode changes from engaged to disengaged or vice-versa

— a mode changes from arm to captured

— a mode changes from coupled to uncoupled.

An aural tone (“bip-bip”) sounds for any change in altitude or radar height mode reference datum.

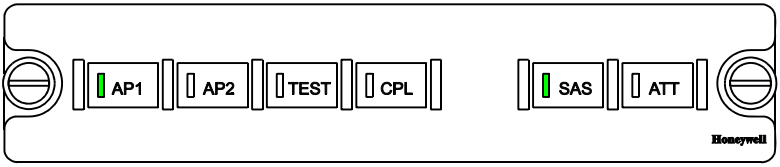

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Figure 1 Autopilot Controller

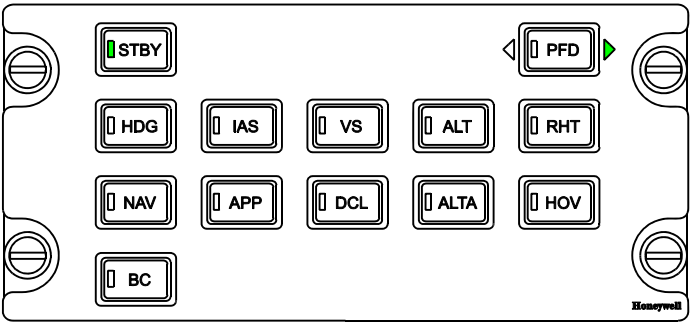

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Figure 2 Guidance Controller

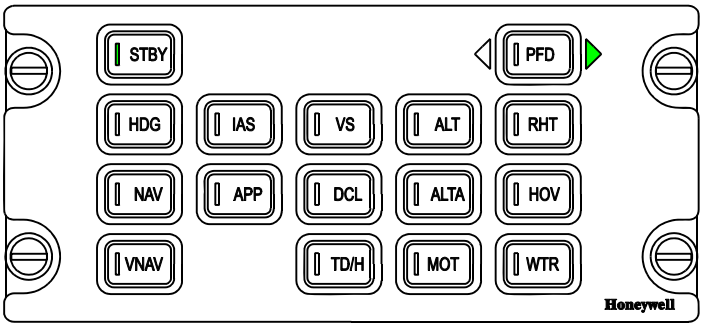

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Figure 3 SAR Guidance Controller

The Flight Director functions available are as follows:

Mode	Function	Control Axis	PFDCaption	
			Arm (white)	Capture (green)
HDG	Heading select	Roll and Yaw	N/A	HDG
ALT	Altitude Hold	Collective	N/A	ALT
IAS	Indicated Airspeed Hold	Pitch	N/A	IAS
NAV	Lateral Navigation	Roll	LNAV/ VOR/ LOC	LNAV/ VOR/ LOC
APP	Lateral Approach	Roll	VAPP LOC VOR	VAPP LOC VOR
	Vertical Approach	Collective	GS VGP	GS VGP

PRV	Preselect VOR-ILS approach while in LNAV	N/A	As for APP	N/A
DCL	ILS Deceleration VGP Deceleration	Pitch	DCL	DCL
BC	Back Course Approach	Roll	BC	BC
ALTA	Altitude Acquire	Collective	N/A	ALTA
VS	Vertical Speed Hold	Collective	N/A	VS
GA	Go-Around	Pitch/ Collective	N/A	GA
VGP	Vertical Glide Path	Collective	VGP	VGP
RHT	Radar Height Hold	Collective	N/A	RHT
HOV	Hover/Velocity Hold	Pitch/Roll	N/A	HOV
OS*	Over Station mode	Roll	N/A	OS
ALVL*	Autolevel mode	Pitch/ Collective	N/A	ALVL
SBY	Clear all FD modes	N/A	N/A	N/A

* Provided automatically

SECTION 1 - LIMITATIONS

WEIGHT LIMITATIONS

— For weights up to 6400 kg see basic RFM,

— For weights between 6400 kg and 6800 kg see Supplement 50,

— For weights between 6800 kg and 7000 kg see Supplement 90.

FLIGHT DIRECTOR MODES LIMITATIONS

• The following FD modes are inoperative on the SAR Guidance Control panel:

— TD/H — MOT — WTR — VNAV

• Collective modes must not be engaged if either or both engines are in MANUAL MODE

• The RHT mode must not be engaged in cruise over land

FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH)

Hold Mode	Airspeed Range	MUH
IAS*	60 KIAS to Vne less 5 KIAS	150 ft AGL or 50 ft AGL during approach
HDG*/NAV*	60 KIAS to Vne	150 ft AGL or 50 ft AGL during approach
ALT	0 KIAS to Vne	300 ft AGL (airspeed greater than 55 KIAS) 50 ft AGL in HOV or airspeed less than 55 KIAS
VS*	60 KIAS to Vne within -1500 fpm and 2000 fpm	150 ft AGL
APP*/BC*/GA*	60 KIAS to Vne	50 ft AGL
DCL*	60 KIAS to Vne	50 ft AGL
ALTA*	60 KIAS to Vne	150 ft AGL

RHT	0 to Vne 15 ft to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV (airspeed less than 55 KIAS)
HOV	Groundspeed — less than 60 kts forward — less than 40 kts lateral or aft with IAS less than 75 KIAS	30 ft AGL

Note*

—Automatic disengagement of these modes below 55 KIAS.

—VS engagement above 2000 fpm or below -1500 fpm will result in the mode returning the aircraft to the maximum rates quoted (2000 fpm or -1500 fpm).

REQUIRED EQUIPMENT

— Second Radar Altimeter RT300 (Supplement 18).

— AHRS P/N 142185-1115 or P/N 145130-1002 (GPS blended).

VOR LIMITATIONS

In case of invalid DME/FMS distance, select:

- VOR APP at ranges below 10 nm (18 km)

- VOR NAV at ranges greater than 10 nm (18 km).

COUPLED ILS APPROACH MODE LIMITATIONS

The helicopter is certified to carry out CAT 1 ILS approaches up to 7.5 deg glideslope.

Maximum recommended Localizer Intercept angle ..... 45 deg ranges greater than 10 nm (18 km)

Maximum recommended Localizer Intercept angle ..... 30 deg ranges less than 10 nm (18 km)

Maximum airspeed for glideslope up to 4 deg ..... 150 KIAS

Maximum airspeed for glideslopes between 4 and 7.5 deg (Steep Approach) ..... 120 KIAS

In case of invalid DME and FMS distance and with both Rad Alt signals invalid an ILS approach must be initiated at a distance of not less than 10 nm (18 km).

VGP LIMITATIONS

When being radar vectored or autonomously flying to the final approach course, the VECTORS approach transition and/or ACT VECTORS function must be used to program the FMS for the approach and the flight crew must ensure that published altitudes are complied with.

SECTION 2 - NORMAL PROCEDURES

FLIGHT DIRECTOR - GENERAL

For full details of FD operation and use see “PRIMUS EPIC Integrated Avionics and Flight Control System for the AW/AB139 Helicopter - Pilot’s Guide” latest revision.

FLIGHT DIRECTOR MODES ENGAGEMENT

The AFCS Flight Director function provides 4 axis guidance modes. Selection of most FD modes is carried out using pushbuttons on the Guidance Controller. HOV mode may also be engaged using the cyclic beep trim centre position (5th position). Each mode may be de-selected by pressing the associated pushbutton on the Guidance Controller. However GA mode may only be engaged by either collective GA button and disengaged by engaging a different mode for pitch and collective axis. All engaged modes may be deselected simultaneously by using the FD STBY button located on the cyclic sticks or the STBY button on the Guidance Controller.

The Guidance Controller pushbuttons include a green annuciator that illuminates when the mode is selected. FD mode annuciations (green when captured and white when armed) also appear on the PFD.

FLIGHT DIRECTOR COUPLED AND UNCOUPLED OPERATIONS

Selecting a FD mode by pressing the pushbutton on the Guidance Controller will couple the FD whenever the AP is in ATT hold. Selecting a FD mode by pressing the pushbutton on the Guidance Controller with the ATT OFF (i.e. SAS or no stabilisation), the FD will be engaged in the uncoupled mode.

During coupled operation the FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller which will cause a white UCPL caption to appear on the PFD.

CAUTION

- Whenever the FD is coupled and the AP reverts to SAS or has a complete loss of autostabilization, the FD will revert to uncoupled mode.
- When the AP reverts to SAS no UCPL caption will appear on the PFD.

With the FD engaged, in coupled or uncoupled mode, the following is displayed:

— Navigation source and reference data in magenta colour on the selected PFD

— Navigation source and reference data in cyan colour on the non selected PFD

— Navigation source in amber on both PFD's when both PFD's have the same navigation data source.

During coupled operation HDG, ALT, IAS, VS, ALTA, RHT, HOV modes may be controlled by either pilot. When engaged in coupled mode, the reference data may be adjusted by using the Display Controller (HDG, ALT SEL), collective beep trim/FTR (ALT, ALTA, VS, RHT) or cyclic beep trim/FTR (IAS, HOV, HDG).

During uncoupled operation changes of reference data for IAS, HDG and HOV modes are carried out by pressing the cyclic FTR button, which updates the reference data to the actual values at the time the button is released. Changes of reference data for ALT, VS and RHT are carried out by the collective beep trim. Collective FTR does not modify the collective modes reference.

For IAS, HDG, RHT and VS on the selected PFD, a magenta digital readout reference datum is displayed above the appropriate flight instrument and a magenta bug at a position corresponding to the selected reference. For ALT, only the magenta bug is displayed permanently while the digital readout is displayed for 5 seconds whenever the reference is modified and the ALTA reference is present.

Whenever a collective mode is engaged (ALT, VS, ALTA, GS, VGP, GA, ALVL, RHT) a collective position cue appears on the PFD beside the ADI. See Figure 2-1.

COLLECTIVE PI LIMITING FUNCTION

During collective coupled operation the collective movement is limited by the following PI values:

— Maximum 97% AEO (95% at altitudes above 10000 ft (3050 m) Hp)

— Maximum 106% AEO for airspeed less than 60 KIAS (5 MIN message displayed beside collective cue, see Figure 2-1)

— Maximum 140% OEI

— Minimum 5% AEO

— Minimum 10% OEI.

When PI limiting function is active and is limiting maximum collective movement, an amber LIM caption is displayed beside the collective cue. See Figure 2-1.

If PI limiting is active with IAS engaged and the required reference for VS, ALTA, RHT, GA, or ALT cannot be achieved the airspeed will automatically reduce as necessary to achieve the collective mode reference. If the collective mode reference cannot be maintained, when the airspeed has reached a minimum of 80 KIAS this airspeed will be maintained and the collective mode reference will be reduced. While the mode reference values cannot be maintained or achieved that mode caption is displayed in amber on the PFD.

CAUTION

If PI limiting is active with ALT/RHT engaged and the reference height cannot be maintained the aural warning “Altitude Altitude” will warn the pilot when the maximum allowed deviation from the reference height has been exceeded.

When flying at high altitude (above 15000 ft (4570 m)) select the Load Share switch to TORQUE (MISC panel) to improve the helicopter manoeuvre during automatic turns.

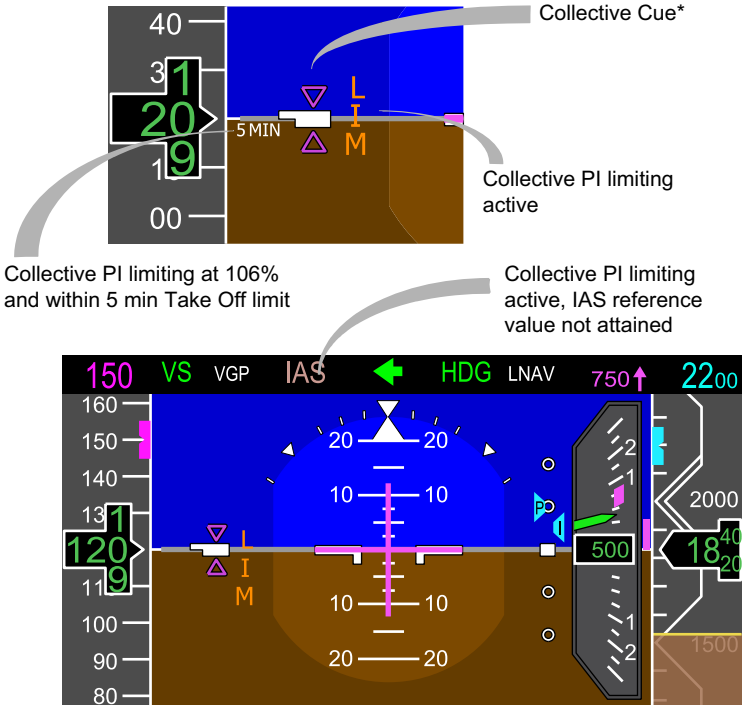

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Figure 2-1 Collective Cue Display

*In UCPL operation when collective cue is below reference arrows collective must be raised and vice-versa.

MODE DESCRIPTIONS

The following descriptions assume the modes are coupled, unless stated otherwise.

HDG Heading Hold Mode. This mode steers the aircraft to the heading reference bug displayed on the PFD. The heading bug can be adjusted using the HEADING knob on the Remote Instrument Controller and can be syncronised with the actual heading by pressing the HEADING knob (PUSH SYNC). The heading reference bug can be syncronized to the actual heading by pressing the cyclic FTR button or modified using the cyclip beep trim switch left or right. In HDG mode turns are performed at standard rate 1 (3 deg/sec).

ALT Barometric Altitude Hold mode. This mode maintains the barometric altitude existing at the time of engagement. The altitude reference is displayed as a set bug on the PFD altitude tape. If the ALT SEL knob has not been previously moved (ie. no ALTA activation) the ALT reference will also be displayed as a magenta digital readout. The altitude reference can be adjusted using the collective beep trim (aft to increase altitude) or by pressing FTR button, flying to desired altitude, and releasing. An audio tone is produced when the altitude reference is changed. The collective PI limiting function is enabled when ALT mode is coupled.

CAUTION

In ALT mode the voice message “Altitude Altitude” is triggered when altitude exceeds the reference altitude by ±150 ft (46 m).

Note

ALT mode can be engaged with HOV mode (as an alternative to the RHT mode), however altitude fluctuations may occur during attitude and headingchanges.

IAS Airspeed Hold mode. This mode maintains the airspeed existing at the time of engagement. When engaged the airspeed reference is displayed as a set bug and a digital readout on the PFD. The airspeed reference bug is adjusted by either using the cyclic beep fore/aft of repositioning the cyclic, with the FTR button depressed, to the required airspeed and releasing FTR button. The airspeed reference is adjustable via the cyclic beep switch between 60 KIAS and Vne less 5 KIAS. If airspeed, at time of engagement, is higher than Vne less 5 KIAS then it is automatically reduced to Vne less 5 KIAS.

ALTA Altitude Acquire Mode. This mode, when engaged with a barometric altitude preselect reference set (through ALT SEL knob), will automatically engage the IAS mode and the aircraft is flown towards the preset altitude. The final altitude reference is displayed as a cyan bug and digital readout above the altitude scale. The vertical speed reference is displayed as a bug and digital readout on the PFD. The preset vertical speeds are +1000 fpm or -750 fpm in the direction of the preset altitude. The vertical speed reference can be changed by either using the collective beep trim (aft to increase) or with collective FTR button depressed, moving to the required vertical speed and releasing. When the preset altitude is achieved the mode will transition to ALT mode and the IAS mode will remain engaged. The collective PI limiting function is enabled when ALTA mode is coupled. When collective PI limiting is active the airspeed is reduced to maintain vertical speed reference.

Note

Engaging ALTA while climbing with a rate of climb greater than 1500 fpm or descending with a rate of descent greater than 1500 fpm, the system may erroneously transition to ALT. The aircraft will, however, reach the selected final altitude.

NAV VOR/LOC/LNAV FD functions. These functions are selected with the NAV pushbutton depending on navigation source selection on the PFD and NAV receiver tuning. Pressing the NAV pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC/LNAV is armed (white caption). At VOR/LOC/LNAV capture HDG will automatically disengage and the helicopter turns to track the selected radial or leg.

APP 1) VOR/ILS Approach FD functions. The VOR non-precision approach or ILS approach functions are selected depending on the NAV receiver tuning when the APP mode button is pushed. Pressing the APP pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC-GS is armed (white caption). At VOR/LOC capture HDG will automatically disengage and the helicopter turns to track the selected radial, VAPP/LOC caption will display on the PFD. For ILS approach-when intercepting the glideslope signal the GS mode is automatically captured and the previous collective mode disengages.

Note

To avoid false localizer captures, APP mode should be armed when the helicopter is flying inbound to the ILS radial.

Note

After pressing APP pushbutton, confirm that LOC label appears as expected

2) FMS approach function (VGP). This can be used when the FMS is the selected NAV source on the selected PFD. This mode produces a non precision approach similar to an ILS approach when using a non localizer based approach from the data base. The glide path is anchored at the BOD with an angle equal to that specified in the data base at the corresponding waypoint. The VGP mode is armed (white caption) by pushing the APP button.

Intercepting the projected glideslope the VGP mode is automatically captured.
In either case within the glideslope bug there will be a letter: I for ILS, P for VGP or V for Vertical Path. See Figure 2-1.
The P letter and bug, when VGP is armed, appears on the left hand side of vertical deviation scale in cyan. When captured the symbol moves to the right hand side of the vertical deviation scale in magenta.

CAUTION

During steep approach without automatic collective control be attentive not to use less than 5% PI.

PRV The PRV mode is a way to preselect ILS or VOR approach functions while FD is still engaged in LNAV.
PRV is selected by pressing the PRV pushbutton on the Display Controller. If the APP pushbutton is pressed the FD will arm LOC and GS or VAPP functions depending on the NAV receiver tuning (ILS or VOR) on the selected PFD. At the capture of the LOC or VAPP functions the FD disengages LNAV and engages LOC-GS or VAPP functions. Selected PRV course will be displayed as thin cyan, while armed, and as normal magenta when captured.

DCL ILS Deceleration Mode. The deceleration mode decreases the aircraft speed from its present speed down to approximately 80 KIAS as the aircraft reaches 200 ft AGL. When the DCL pushbutton is pushed the LOC, GS and DCL modes are armed and the IAS and HDG modes are engaged. After GS capture and at a computed condition for correct approach and deceleration the IAS mode is disengaged and the DCL mode engaged. The airspeed reference bug moves to 80 KIAS and the digital reference is set to 80 KIAS. These values can be adjusted using the cyclic beep trim at which time the IAS mode automatically engages replacing the DCL mode.

BC Back Course Approach Mode. The back course mode is selected when the BC pushbutton, for Guidance Controller or APP pushbutton on SAR Guidance Controller, is pushed. Pressing the pushbutton, HDG is engaged (green caption) and the BC is armed (white caption). At BC capture, HDG is disengaged. When the SAR Guidance Controller is used the BC mode will be engaged when the intercept angle between the front course and the aircraft heading is greater than 105° (otherwise the LOC engages).

CAUTION

The course selected for a BC approach must be the ILS approach front course.

Note

After pressing the APP pushbutton, confirm that BC label appears as expected.

VS Vertical Speed Hold Mode. The vertical speed existing at the time of engagement is held. Vertical speed reference bug and digital readout are adjusted by either using the collective beep or repositioning the collective, with the FTR button depressed, to the required vertical speed and releasing on the desired vertical speed. Collective PI limiting function is enabled when VS mode is coupled.

GA Go Around Mode. The mode may be selected from either collective and will give a 1000 ft/min climb set bug reference on the Vertical Speed tape and an airspeed bug at the airspeed existing when the mode is engaged or 80 KIAS, whichever is greater. Engaging the GA the FD will control airspeed and vertical speed at the commanded values and level the wings. The GA Mode can only be exited by selecting another vertical FD mode (or FD to STBY).

Note

This mode can be used, when the IAS is greater than 60 KIAS, to recover the aircraft from an unusual attitude and initiate a rate of climb.

OS Over Station Mode. When overflying a VOR station, with VOR or VAPP FD functions engaged, the VOR equipment detects the aircraft being within the zone of ambiguity. The VOR deviation signal is removed from the command until the VOR signal has stabilized after passing over station. While over the station, course change may be made by selecting a new course via the Course Selector knob.

ALVL Autolevel Mode. If the APP (LOC/GS or VGP) mode is continued, to below landing minimum, this safety feature is automatically activated at 150 ft (46 m) and an asymptotic flare to a radar height of 50 ft (15 m) will be initiated. The green GS or VGP caption on the PFD will be replaced by ALVL.

CAUTION

In VGP mode the ALVL will activate if the MAP (Missed Approach Point, as shown in the example Approach Chart Figure 3-1) is lower than 150 ft (46 m) AGL.
When MAP is higher than 150 ft (46 m) AGL the VGP mode will disengage at the MAP (preceded, at 100 ft (30 m) above, by a Vertical Track Alert (VTA) caption displayed above the vertical guidance scale on the PFD) and a chime is generated.

RHT Radar Height Hold Mode. This mode maintains the aircraft at the radar height at the time of engagement when the radar altimeter indications are within the threshold limits. A reference bug on the radar altimeter tape and a digital readout above the radar altimeter tape are presented. The reference height can be changed by

depressing the collective FTR switch flying to the required height and releasing the FTR switch or by using the collective beep trim switch (aft to increase). An audio tone is produced when the height reference is changed. The collective PI limiting function is enabled when RHT mode is coupled.

CAUTION

In RHT mode the voice message “Altitude Altitude” is triggered when height exceeds the refererence by a value proportional to the reference height.

HOV Hover/velocity Hold Mode. HOV mode can be engaged by pressing HOV mode on Guidance Controller or the cyclic beep trim centre position (5th position). The HOV mode utilizes the AHRS ground velocities to maintain hover or low speed flying. At engagement of this mode the helicopter groundspeed reference is set to zero and the RHT is automatically engaged if a valid radar altimeter signal is available and within the threshold limits. RHT mode can be subsequently disengaged independently and replaced by ALT if required. A hover symbology with the ground velocity vector bug is also displayed on the HSI. See Figure 2-2. When the mode is engaged, the velocity vector reference can be changed by pressing the cyclic FTR switch, flying to the desired lateral and longitudinal speed and releasing, or by using the cyclic beep trim to move the bug to the desired velocities. If the cyclic beep trim switch is pressed in the centre position (5th position) the longitudinal and lateral velocity references are set to zero.

CAUTION

In ALT mode the voice message “Altitude Altitude” is triggered when altitude exceeds the refererence altitude by ±150 ft (46 m). Therefore, if ALT mode is engaged as an alternative to RHT, at a height below 300 ft (91 m), set DH at a value 10 ft below the reference height in order to have an additional height deviation exceedance cue.

CAUTION

The HOV mode maintains a groundspeed reference therefore pilot must ensure that crosswind and rearwind speed limits are not exceeded (see Section 1 Basic Flight Manual). If wind limits are exceeded directional control may not be maintained.

CAUTION

When HOV mode is engaged above 2000 ft (610 m) AGL the ALT mode does not automatically engage. Therefore the pilot must control collective manually or engage ALT mode.

The hover symbology automatically appears on the PFD when HOV mode is engaged. The display shows the aircraft velocity vector and the reference velocity symbol. See Figure 2-2.

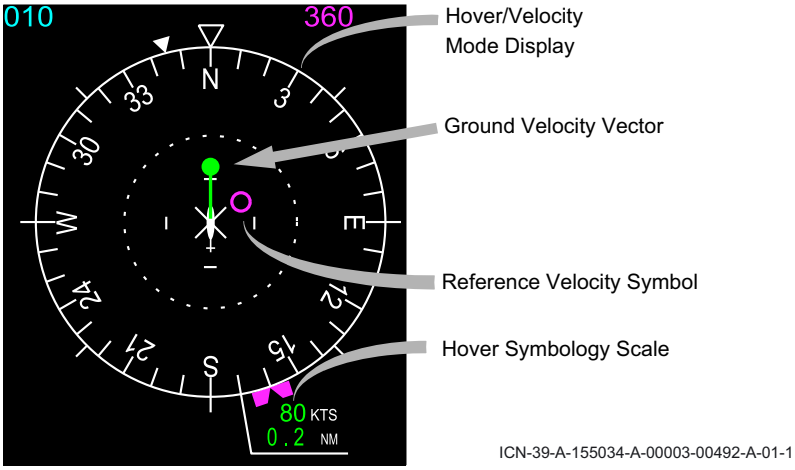

Figure 2-2 HOV Symbology

ADVISORY CAPTIONS

CAS Caption (Green)	System State
MOT NOT INSTALLED	(Caption present for 5 secs in inverse video) MOT button pressed and function not fitted
TD/H NOT INSTALLED	(Caption present for 5 secs in inverse video) TD/H button pressed and function not fitted
VNAV NOT INSTALLED	(Caption present for 5 secs in inverse video) VNAV button pressed and function not fitted
WTR NOT INSTALLED	(Caption present for 5 secs in inverse video) WTR button pressed and function not fitted

PFD MESSAGES

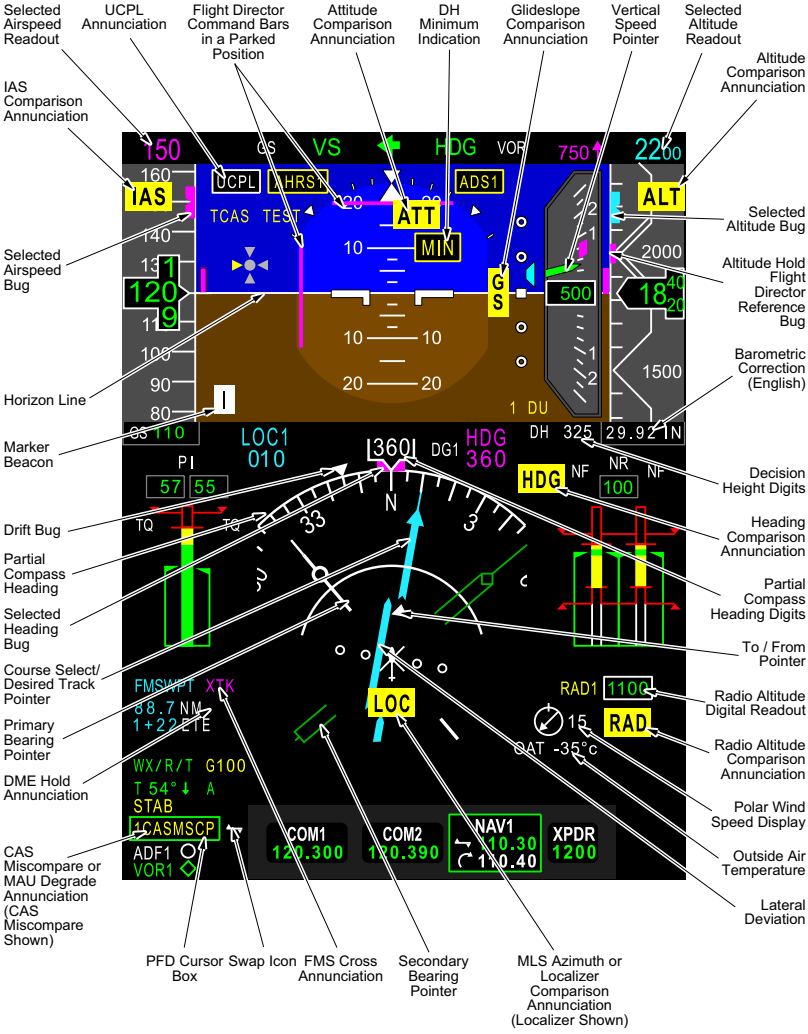

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Figure 2-3 PFD Messages

FMS FUNCTIONAL INCONSISTENCIES WITH EPIC SOFTWARE PHASE 4 INSTALLED

1. The 'Direct-To Recovery' procedure should not be used in any phase of flight.

   Refer to Honeywell Service Information Letter D201001000021 for further information.

2. On certain STAR approaches if the runway is changed during the approach, instead of navigation to the next waypoint the aircraft will navigate to the first waypoint of the STAR.

   Refer to Honeywell Service Information Letter D200909000044 for further information.

3. Approach and/or Star procedures which contain a certain geometry of consecutive AT altitude constraints exhibit a TOD misplacement and premature descent.

   Refer to Honeywell Service Information Letter D201010000078 for further information.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

VOICE ONLY MESSAGES

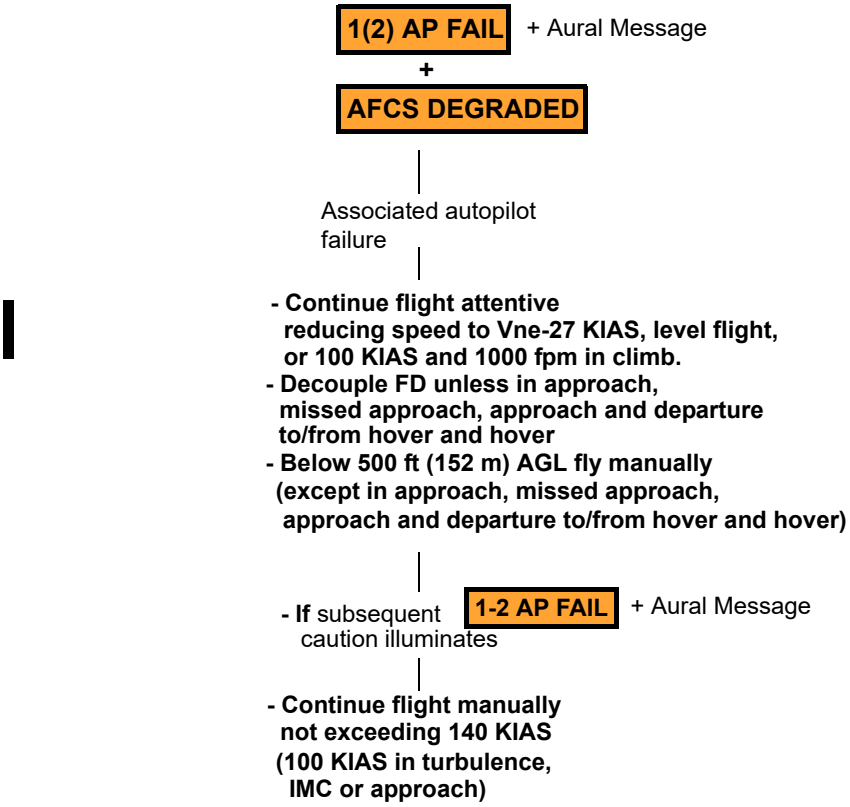
1. “Altitude, Altitude”

Aircraft exceeded the altitude deviation in ALT mode (±150 ft from reference) or in RHT mode by the following:

Reference Height (ft)	Deviation (ft)
30	11
50	15
100	20
150	25
200	30
250	40
500	70
1000	135
1500	200
2000	260

CAS CAUTION MESSAGES

AUTOPILOT FAIL



AUTOPILOT OFF

1(2) AP OFF + Aural Message

+

AFCS DEGRADED

Associate AP not switched ON

On affected AP

- Confirm selected ON.

If fault remains

- Continue flight attentive reducing speed to Vne-27 KIAS, level flight or 100 KIAS and 1000 fpm in climb.

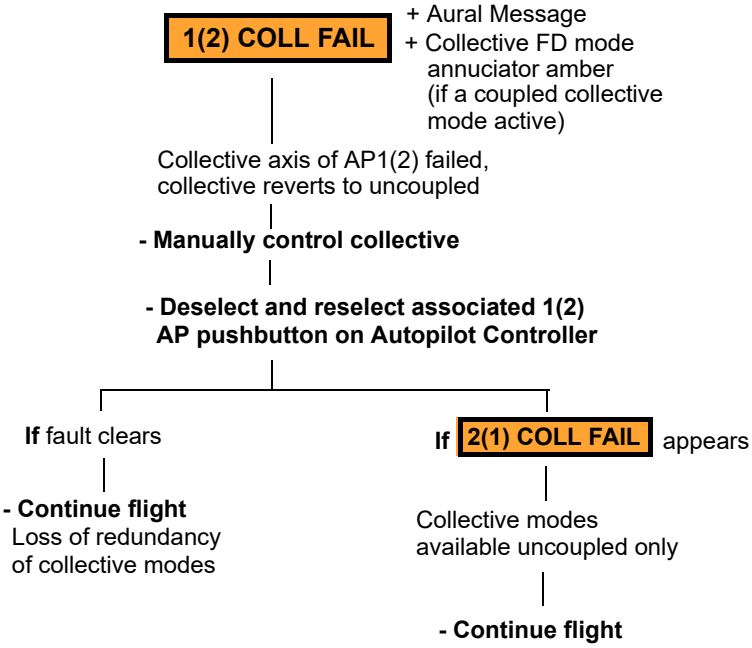
- Decouple FD unless in approach, missed approach, approach and departure to/from hover and hover.

- Below 500 ft (152 m) AGL fly manually (except in approach, missed approach, approach and departure to/from hover and hover)

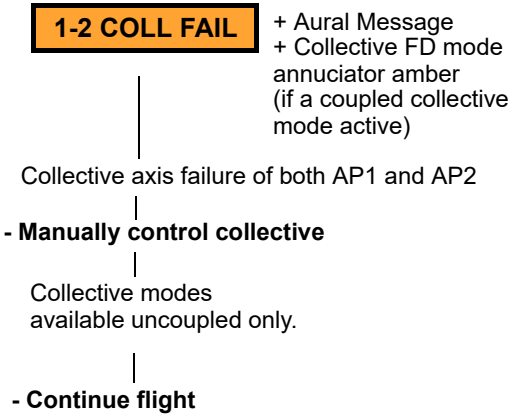
- If subsequent **1-2 AP OFF** + Aural Message caution illuminates

- Continue flight manually not exceeding 140 KIAS (100 KIAS in turbulence, IMC or approach)

SINGLE COLLECTIVE AUTOPILOT FAILURE



DUAL COLLECTIVE AUTOPILOT FAILURE



CYCLIC FORCE TRIM RELEASE FAILURE

Cyclic FTR failure, due to a fault which removes electric power to the clutches of the longitudinal and lateral trim, will result in cyclic longitudinal and lateral clutches becoming permanently engaged. This will require the pilot to fly the aircraft against the cyclic force spring feel to manoeuvre the aircraft, or use the cyclic beep trim, as cyclic FTR button does not function.
In this case it is suggested that a cyclic FD mode (ie IAS) is engaged and the cyclic beep trim used to maintain the required flight condition.

COLLECTIVE FORCE TRIM OFF OR FAIL

When a FD mode is engaged, and coupled, and the collective trim is switched OFF (Miscellaneous Control Panel) or fails, a chime sound is generated, the collective may not maintain its selected position, the CLTV annuciation will illuminate on the top left of the ADI display, and the CLTV/YAW OFF green advisory will illuminate on the CAS window. Collective modes are available uncoupled only.

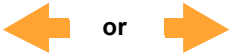
COLLECTIVE FORCE TRIM RELEASE FAILURE

Collective force trim release failure, due to a fault which removes electric power to the clutch of the collective trim will result in the collective clutch becoming permanently engaged. This will require the pilot to fly the aircraft against the collective force spring feel to manoeuvre the aircraft, or use the collective beep trim, as the collective FTR button does not function.
In this case when large collective movements are not required, it is suggested that a collective FD mode (ie ALT) is engaged and the collective beep trim used to maintain the required flight condition.

FLIGHT DIRECTOR FAILURE

No CAS Warning or Caution messages are generated to indicate FD malfunctions. However indication on both PFD displays indicate the state of the flight director system.

FLIGHT DIRECTOR PARAMETER FAILURE



or

replaces green arrow above attitude indicator on PFD

At least one On-side flight director parameter is invalid

- **Confirm which parameter(s) are invalid**
- **Either select functioning cross side parameter on RCP panel or select cross side PFD on Guidance Controller.**

DUAL FLIGHT DIRECTOR FAIL

FD FAIL

replaces FD arrow above attitude indicator on both PFD's

+

loss of flight director bars and information

Both Flight Directors invalid

- **Flight Director not available**

FAILURE OF SELECTED PFD UNIT WITH FLIGHT DIRECTOR ENGAGED

Loss of PFD, the associated MFD will automatically configure to Composite mode maintaining the FD engaged on the same references as the PFD.

- **Confirm no chime sound**
- **Confirm FD green arrow and FD mode green captions are present on MFD in Composite mode**

- **Continue flight**

- **If** subsequent display in composite mode fails FD automatically disengages, with chime

- **If** Copilot displays failed and Left pilot flying

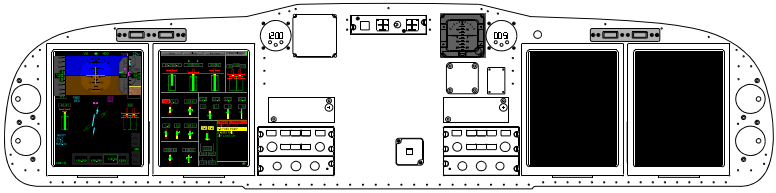
- Right pilot take control of aircraft

FD can be re-engaged (on right pilot side)

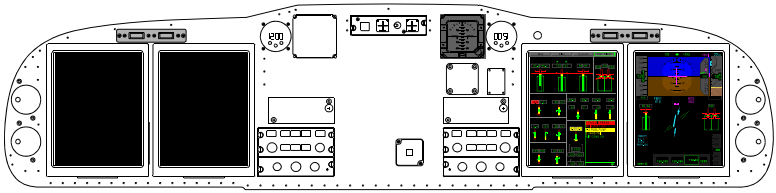
- **If** Pilot displays failed and Right pilot flying

- **Revert to Standby instrument**

- **Land as soon as practicable**



Failure of both Pilot PFD and MFD



Failure of both Copilot PFD and MFD

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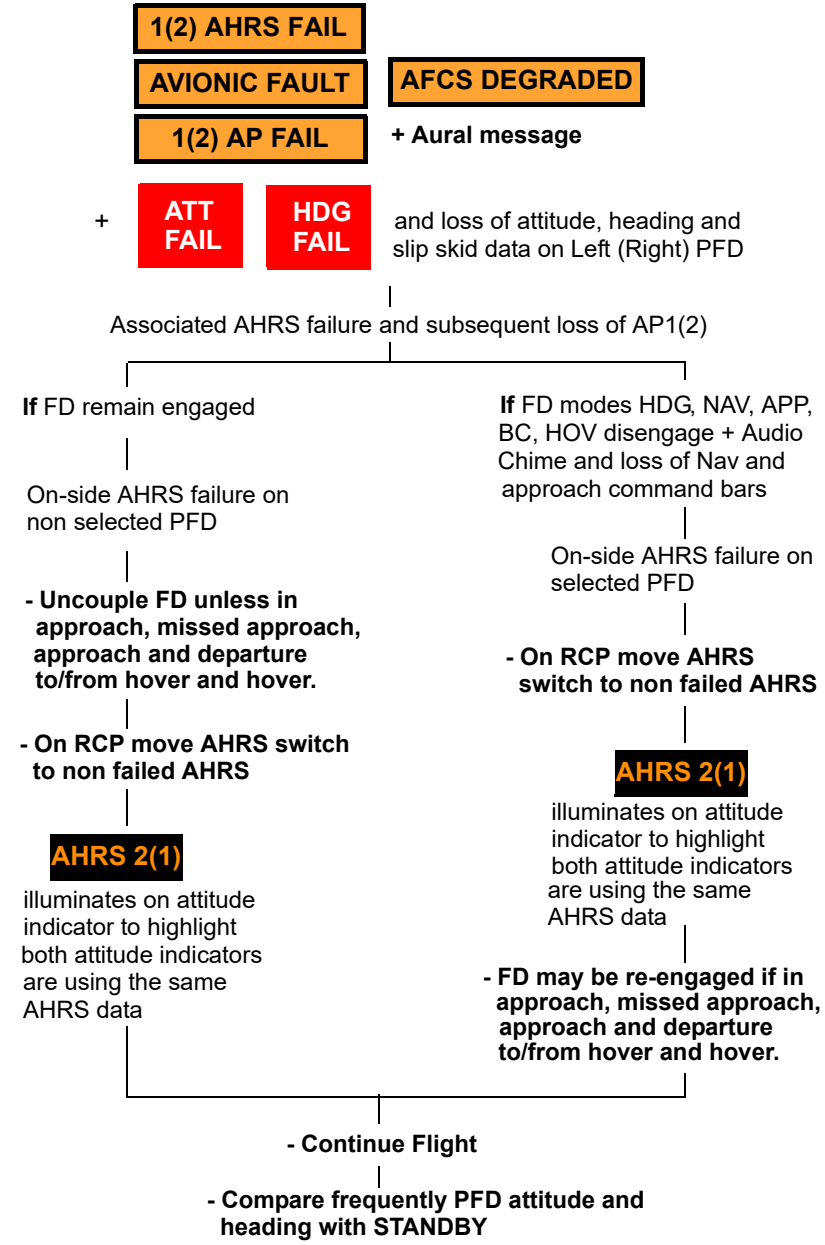
GUIDANCE CONTROL PANEL FAILURE

In case of Guidance Control Panel failure, recognised as non functionality of panel pushbuttons (modes cannot be changed or disengaged using panel), the FD may be disengaged using the cyclic FD STBY button.

Continue flight, using the FD modes already engaged as required. However, use the cyclic FD STBY button to disengage modes when required. When disengaged FD is no longer available.

AHRS FAILURE WITH FD ENGAGED



MAU FAILURE WITH FD ENGAGED

For on-side MAU failure on the selected PFD the FD modes ALT, VS and IAS will disengage, (with a chime for an MAU 1 failure but not for an MAU 2 failure). Follow procedure below for FD action and refer to Section 3 Basic RFM Page 148 for complete MAU failure procedure.

1(2) MAU
+
1(2) ADS FAIL
+
1(2) AP FAIL

PFD message combined with CAS Cautions and disengagement of FD modes ALT, ALTA, IAS, VS + Audio Chime (MAU 1 failure only) and loss of:



- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

Multiple CAS cautions illuminate, but those which affect FD functioning are:
1(2) AP FAIL page 24
1(2) ADS FAIL page 33
AFCS DEGRADED see Basic RFM page 3-135

- Continue flight attentive
- On RCP move ADS switch to non failed ADS
- Reduce speed to Vne-27 KIAS, level flight or 100 KIAS and 1000 fpm in climb
- Below 500 ft (152 m) AGL fly manually

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD data with STANDBY indicator.

ON SIDE ADS FAILURE ON SELECTED PFD WITH FD ENGAGED

Note

For on-side ADS failure on the non selected PFD there is no effect on FD modes. Refer to Section 3 Basic RFM Page 146

1(2) ADS FAIL

+

Disengagement of some FD modes (ALT, ALTA, IAS, VS) + Audio Chime

and loss of:

- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

- On RCP move ADS switch to non failed ADS

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD data with STANDBY indicator.

ATTITUDE SYSTEM OFF

ATT OFF

\+

SAS message displayed on both PFD's

Attitude hold system not engaged

- Engage ATT on autopilot controller

If associated with cyclic freedom of motion in longitudinal and/or lateral direction with loss of function of FTR switch and cyclic beep trim

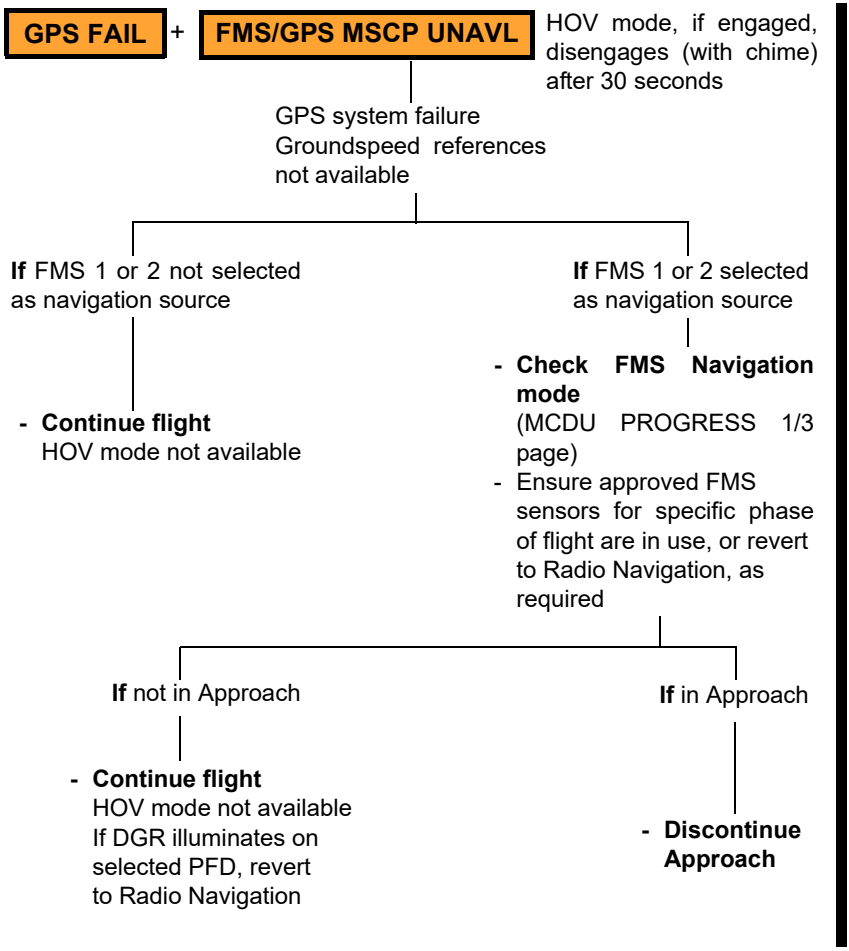
Cyclic force trim failure
Collective FD modes automatically change to uncoupled (with chime)
Cyclic FD modes do not function, cyclic steering bars remain centred

- Fly manually

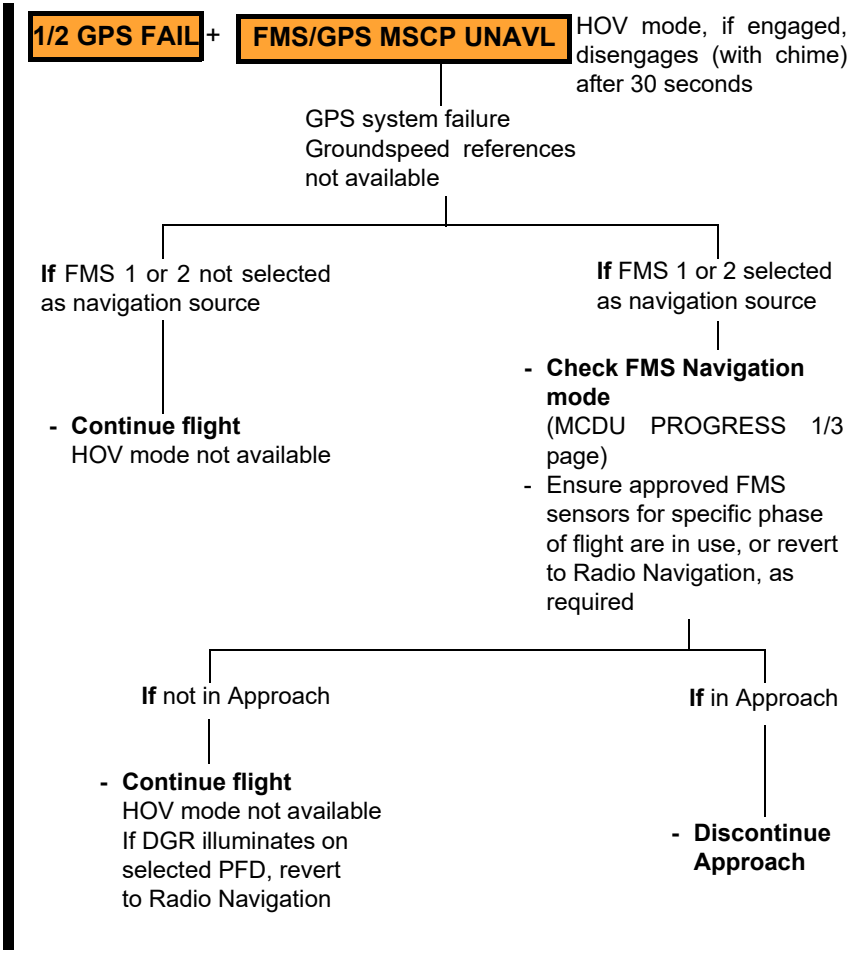
Note

With ATT system not engaged the aircraft flies in SAS mode only.

GPS FAILURE (SINGLE GPS INSTALLATION)



DOUBLE GPS FAILURE (DOUBLE GPS INSTALLATION)



GPS FAILURE (DOUBLE GPS INSTALLATION)

1(2) GPS FAIL

1(2) GPS system failure

Loss of GPS redundancy

- **Continue flight**

FMS FAILURE

1(2) FMS FAIL

Failure of Flight Management System 1(2)

If FMS 1(2) not used as Navigation source

- **Continue flight**
  Loss of redundancy for FMS Navigation

If FMS 1(2) used as Navigation source LNAV, VGP and DCL modes, if engaged, disengage (with chime)

- **Select FMS 2(1) as Navigation Source (press LNAV on Display Controller) or revert to Radio Navigation as required**

If in Approach

- **Discontinue Approach**

PFD MESSAGE

VERTICAL TRACK ALERT CAPTION

VTA

on attitude indicator during VGP mode approach, when within 100 ft above Missed Approach Point (MAP) altitude

The VGP will disengage, with chime, at MAP or transition to AVLV, if still engaged at 150 ft (46 m) AGL

CAUTION

Be aware that:

- ALVL mode will not engage when MAP is above 150 ft (46 m) AGL
- VTA annunciation will not appear when MAP is below 50ft AGL due to engagement of ALVL at 150 ft AGL
- VTA annunciation is not availabe when 'MIN' annunciator is illuminated.

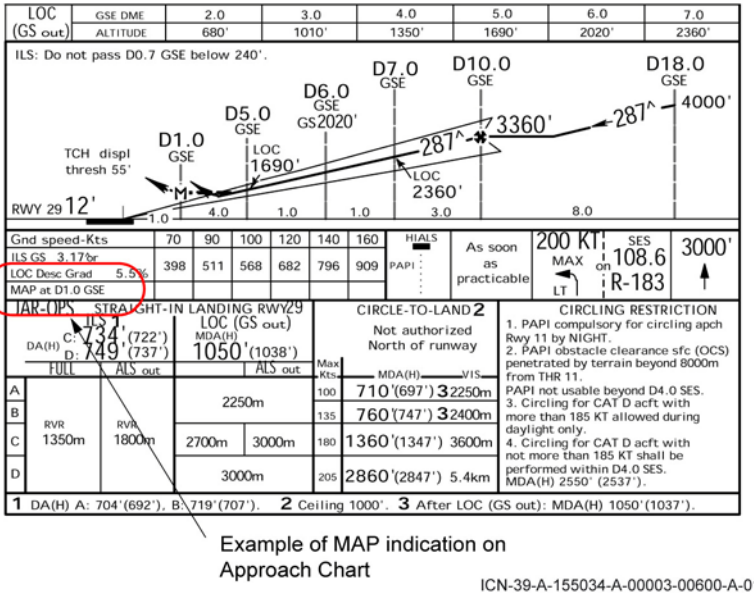


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Figure 3-1 MAP Indication on Approach Chart

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SINGLE RAD ALT FAILURE WITH RHT ENGAGED

RAD1(2) Message beside RAD ALT display.
on both PFD's

Rad Alt 2 (1) failed and automatic reconfiguration to functioning Rad Alt.
Message highlights both Rad Alt indicators are using the same source

- Continue flight attentive
Loss of Rad Alt redundancy
No effect on Rad Alt dependant modes functionality

CAUTION

When either RAD ALT fails, the LANDING GEAR CAS caution and associated audio message activate erroneously when the aircraft is above 150 ft (46 m) AGL and the LDG GEAR is retracted.

DOUBLE RAD ALT FAILURE WITH RHT ENGAGED

RAD

Message replaces RAD ALT height information on both PFD's
RHT disengages with audio chime

Failure of both RAD ALT systems

- Continue flight

- RAD ALT functioning is lost
- RHT mode and ALVL not available
- MIN message is inactive

CAUTION

When both RAD ALT's fail, the 150 ft aural warning message does not function and the LANDING GEAR caution will be displayed if the LDG GEAR is retracted, regardless of height.

RAD ALT MISCOMPARE WITH RHT ENGAGED

RAD

message on RAD ALT display
RHT disengages with audio chime

Miscompare between
RAD ALT 1 and 2 information.

- Compare the Pilot and Copilot RAD ALT indications and/or outside visual references to establish the correct data.

- Continue flight
RHT mode not available
while message displayed

GROUNDSPEED VELOCITY FAIL

VEL FAIL

Message below and to left of compass display
Velocity vector, on hover display, removed
GS digital readout source changes to FMS (F)
HOV Mode disengages, if engaged

Failure of valid velocity data
from both AHRS

- Continue flight
HOV mode not available

SECTION 4 - PERFORMANCE

No change in performance information.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full details of FD operation and use see "PRIMUS EPIC Integrated Avionics and Flight Control System for the AW139 Helicopter - Pilot's Guide" Rev. 1 or later issue.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 35

HEATED WINDSHIELD SYSTEM

P/N 3G5610F00611

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SUPPLEMENT 35
HEATED WINDSHIELD SYSTEM

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GENERAL INFORMATION

The heated windshield system (P/N 3G5610F00611) allows heating of the windscreen to clear mist/frost conditions which could impede visibility for the flight crew. The kit consists of two independent systems, one for the pilot and one for the copilot.

Each system comprises of a control box with in-built inverter (to convert the aircraft 28VDC to 115VAC), a heated windshield unit with 3 temperature sensors (only the center part of the screen is heated) and, mounted on the aux circuit breaker panel, the circuit breakers and ON/OFF switches. See Figure 1.

When switched to ON the associated control box controls the heating of the windshield and temperature sensors within the windshield for any failure conditions. The windscreen heating is automatically switched OFF if any temperature sensor reaches 82° C. The state of the system is indicated to the pilot on the CAS window from signals sent by the controller to the MAU.

The control box also monitors the aircraft VENT fans and, if these are in operation, the windshield heating is automatically switched off (and WSHLD HTR FAIL caution illuminates).

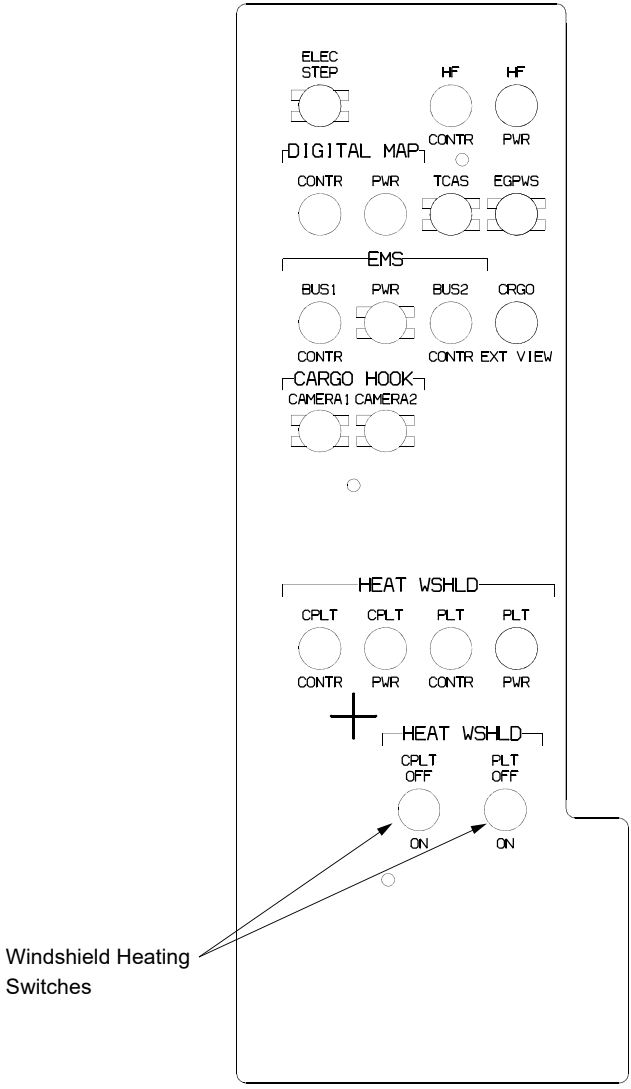

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Figure 1 Aux Circuit Breaker Panel with Windshield Heating Control Switches

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Heated Windshield System, the new empty weight and center of gravity position must be determined.

MISCELLANEOUS LIMITATIONS

WINDSHIELD HEATING LIMITATIONS

— The Windshield Heating will not function when the Air Conditioning System, Supplement 2 is in operation.

— When the Windshield Heating is active the ADF system may be unreliable.

SECTION 2 - NORMAL PROCEDURES

SYSTEM CHECKS

1. HEAT WSHLD switches	— Select PLT and CPLT to ON and confirm green CAS advisory message 1-2 WSHLD HTR ON illuminates. Switch OFF or as required.

IN FLIGHT PROCEDURES

1. HEAT WSHLD switches	— Select PLT and CPLT to ON as required.

PRE-SHUTDOWN CHECK

1. HEAT WSHLD switches	— Select PLT and CPLT to OFF.

ADVISORY CAPTIONS

CAS Caption (Green)	System State
1(2) WSHLD HTR ON	CoPilot (Pilot) windshield heater switched to ON

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

WINDSHIELD HEATER DEGRADED

1(2) WSHLD HTR DEG

Copilot (Pilot) windshield heater degraded operation

- **Continue flight**
- **Cycle associated HEAT WSHD switch**
  If caution remains be aware that the windshield heater system may fail.

WINDSHIELD HEATER FAIL

1(2) WSHLD HTR FAIL

Copilot (Pilot) windshield heater system not functioning

- **Confirm aircraft COND OFF, if installed**
- **Cycle associated HEAT WSHD switch**

If caution remains:

- **Depending on severity of windshield mist/frost consider exiting the weather conditions as soon as possible, turning VENT fans ON and HEATER ON, if installed.**

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 36

SEA FLIR II

P/N 4G9350F00111
P/N 4G9350F00112
P/N 4G9350F00113

The replacement of the equipment detailed in this Supplement is not allowed without the successful completion of the additional verifications reported in the Maintenance Manual.
Changes to the helicopter configuration (i,e, installation of approved equipments) are not allowed without the successful completion of the verifications reported in the Maintenance Manual.

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SUPPLEMENT 36
SEA FLIR II

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GENERAL INFORMATION

The SeaFLIR II is a remote controlled day/night high resolution, infrared (IR) imaging system with colour video.

The system, mounted on nose of the helicopter, consists of a Stabilized Gimbal Assembly (SGA) with IR camera, colour Charged Coupled Device (CCD) camera and optional laser pointer (Figure 1 & Figure 2). A Hand Control Unit (HCU) contains all the controls necessary to operate the FLIR (Figure 4) and a Control Electronics Unit processes the electronics for the system.

The SGA is gyro stabilized and its azimuth and elevation are controlled by the HCU. The SGA can be rotated 360° in both azimuth and elevation and internal rate gyros sense platform motion and vibrations and remove unwanted effects. A de-icing system is installed on the unit and automatically operates via a temperature sensor when ambient conditions below 0° C are encountered.

The IR camera produces images in total darkness or in low visibility or low contrast ambient condition. The CCD camera provides images in visible and low light ambient conditions. A unified zoom feature keeps the magnification of the IR and CCD equal so image magnification change is not evident when switching between IR and CCD images.

The IR and CCD cameras provide video outputs that can be monitored on either pilot or copilot MFD. Either IR or CCD images can be selected independently on pilot and copilot MFD or both images in miniature. If a digital map is installed the copilot and pilot MFD will only display the same source data, either FLIR or digital map.

Overlayed on the FLIR image are graphic symbology of date and time, FLIR logo, elevation and azimuth, other information may be selectable for display.

The optional central 5th display can be used to display either image but only the selected (active) FLIR camera image will be displayed.

The optional Laser Pointer a Class IIIb device, is not eye safe, therefore a Laser Arm Panel, see Figure 3, is installed in the interseat console, which provides an interlock to stop the laser being activated inadvertently. A key is required to make the laser circuit live and ready for activation.

If the SX-16 Search light P/N 4G3340F00711 is installed the search-light may be slaved to the FLIR for night illumination. See Supplement 29 SX-16 Nightsun Searchlight.

For full information on the use of the SeaFLIR II refer to SeaFLIR II Operator's Manual Rev B Document N° 18704-000 or latest issue.

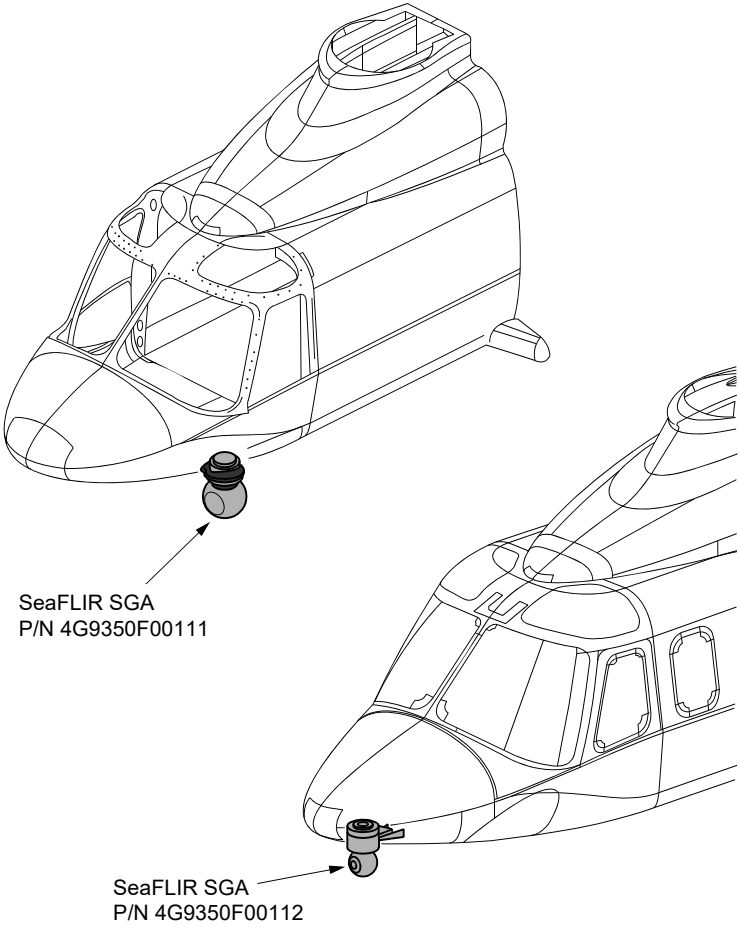

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Figure 1 SeaFLIR Installation

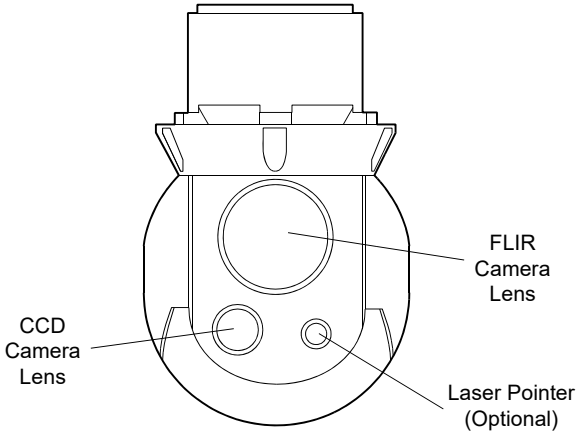

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Figure 2 SeaFLIR Turret

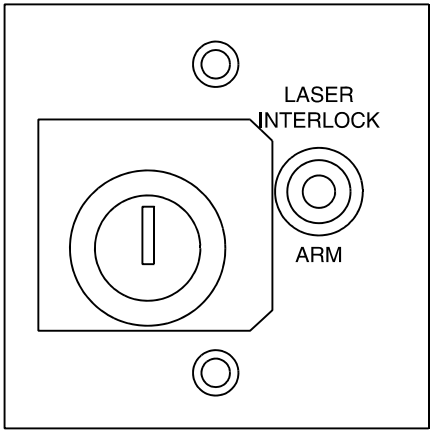

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Figure 3 Optional FLIR Laser Pointer Arm Panel

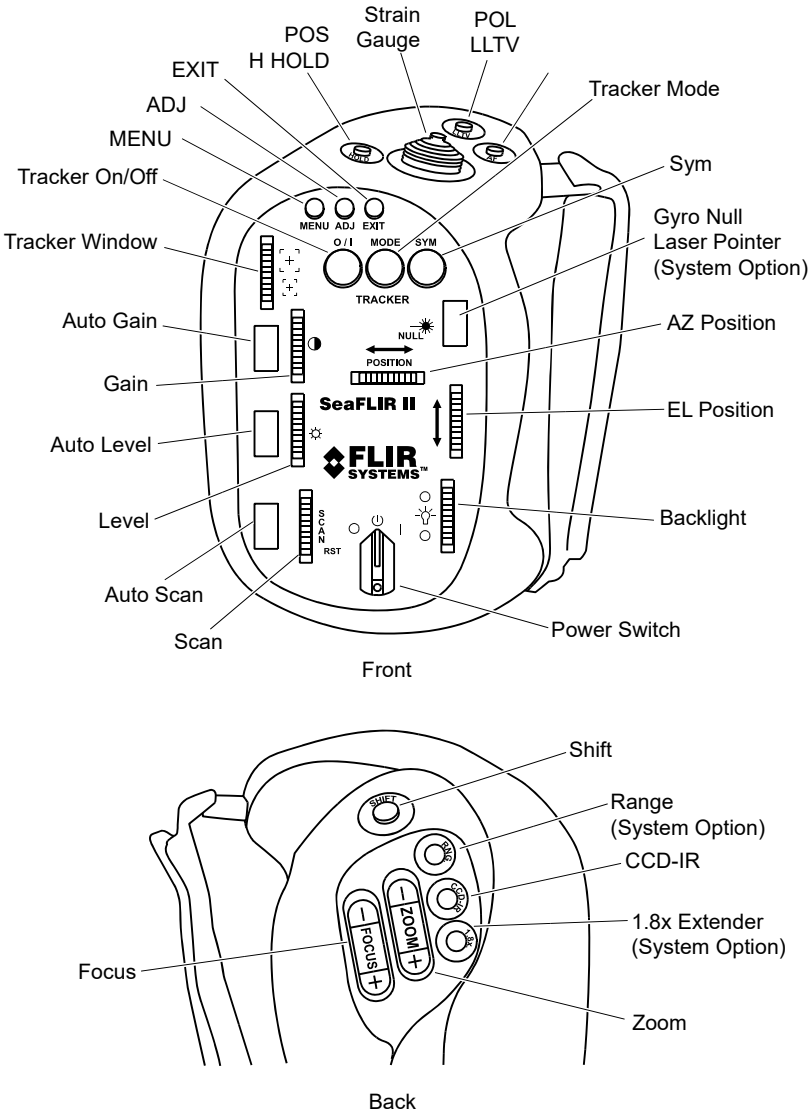

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Figure 4 Hand Control Unit diagram

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the SeaFLIR II kit, the new empty weight and center of gravity position must be determined.

AMBIENT AIR TEMPERATURE LIMITATIONS (OAT)

The FLIR must not be operated in ambient OAT conditions of below -20° C.

SEAFLIR II LIMITATIONS

The FLIR must not be used for navigation.

The FLIR must be operated from the left hand seat or by cabin crew.

Operation of the FLIR laser pointer Class IIIb device, if fitted, must be authorised by the Competent Authority.

The FLIR laser pointer, if fitted, must not be operated when close to personnel.

SECTION 2 - NORMAL PROCEDURES

Note

For full information on the use of the SeaFLIR II refer to SeaFLIR II Operator's Manual Rev. B Document N° 18704-000 or latest issue.

EXTERNAL PRE FLIGHT CHECKS

AREA N°6 (Fuselage - Left Hand Side)

1. SeaFLIR SGA — Secure.
   Check IR and CCD camera lens condition and cleanliness.

AREA N°7 (Cockpit Interior)

1. SeaFLIR HCU — Check present, connected and secure.

ENGINE PRE-START CHECKS

1. SeaFLIR HCU — Confirm system switched OFF.

SYSTEM CHECKS

1. SeaFLIR HCU — Switch system ON.
2. SeaFLIR image — Select image display as required (pilot, copilot MFD, Central 5th display).
   Select IR or CCD camera as required.
3. SeaFLIR HCU — Select standby (to stow FLIR) or OFF as required.

IN FLIGHT

1. SeaFLIR HCU — Switch system ON.

2. SeaFLIR image — Select image display as required. (pilot/copilot MFD by selecting FLIR Cam on MFD system menu, or by selecting FLIR button on Central 5th display, if fitted).
   Select IR or CCD camera as required.

3. SeaFLIR HCU — Control FLIR direction and settings as required.

WARNING

The Laser pointer, if fitted, must not be operated when close to personnel.

4. Laser pointer, if fitted — Select arm panel switch to on and select pointer as required.

5. SLAVE button on SX-16 pendant (if SX-16 installed) — Select as required.

Note

When FLIR is not being used it should be switched either to standby or OFF which stows and protects the FLIR cameras.

PRE LANDING CHECKS

1. SeaFLIR HCU	— Switch system to standby or OFF to stow FLIR cameras. Stow HCU.
2. Laser pointer arm panel, if fitted	— Confirm OFF.

PRE SHUTDOWN CHECKS

1. SeaFLIR HCU	— Confirm FLIR switched OFF and HCU stowed.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the SeaFLIR II system is switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 37

SECOND GPS SYSTEM

P/N 4G3450F00611
P/N 4G3450F00612
P/N 4G3450F00613

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SUPPLEMENT 37
SECOND GPS SYSTEM

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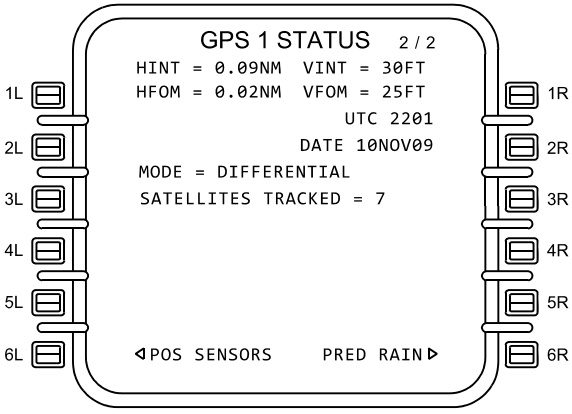
GENERAL INFORMATION

The 2nd GPS system P/N 4G3450F00611/612/613 is a stand alone CMC Electronics receiver and a Sensor Systems active GPS antenna. The system provides a back up facility to the single GPS installed in the PRIMUS EPIC system.

Systems P/N 4G3450F00612/613 include the GNSS receiver P/N 100-601944-311/312 (respectively), which are qualified per TSO C145/C146, and the GPS Antenna P/N S67-1575-145, which is qualified per TSO C190. These kits provide SBAS capability.

When operating under SBAS coverage, the navigation mode displayed on GPS 1 STATUS page of the MCDUs is 'DIFFERENTIAL'. See Figure 1.



ICN-39-A-155037-G-00001-23456-A-001-01

Figure 1 MCDU GPS Status page.

Note

System P/N 4G3450F00612 is compatible with Primus EPIC Phase 5 and subsequent SW releases.
System P/N 4G3450F00613 is compatible with Primus EPIC Phase 7 and later SW only and is required to conduct LPV approaches. It is mandatory with SW EB7030191-00110/00111/00112/00113/00120
(see Supplements 79, 80 & 101).

The 2nd GPS system (identified as GPS 1) interfaces with the MAU's and AHRS1.

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the GPS 1, the new empty weight and center of gravity position must be determined.

GPS LIMITATIONS

For EPIC Phase 4 only the predictive RAIM (PRAIM) is not available on GPS 1.

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

GPS FAIL

1(2) GPS FAIL

1(2) GPS system failure

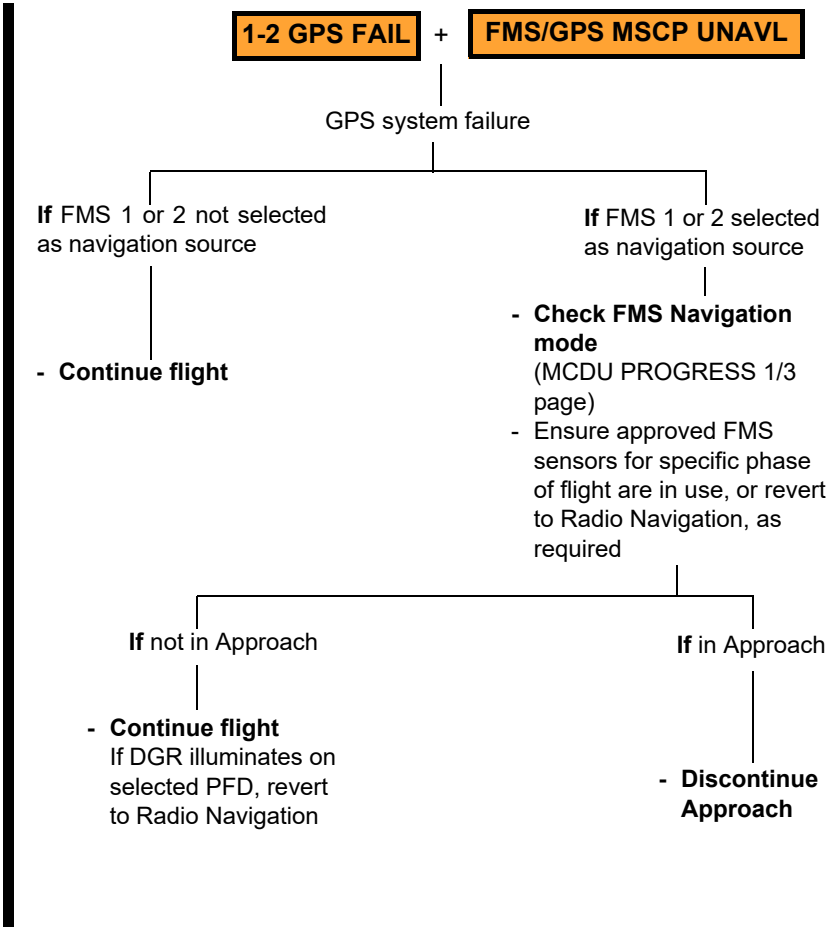
FMS navigation loss
of redundancy

- Continue flight

Note

For EPIC Phase 4 only, predictive RAIM (PRAIM) is not available following GPS 2 failure.

DOUBLE GPS FAILURE



SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 38

CABIN MISSION CONSOLE

P/N 4G4620F00411/611
P/N 4G4620F00911

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SUPPLEMENT 38
CABIN MISSION CONSOLE

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GENERAL INFORMATION

This Supplement covers the internal seating configurations permitted when either Mission Console P/N 4G4620F00411/611 or P/N 4G4620F00911 are installed.

The Mission Console consists of an alloy framework, which supports avionic equipment such as mission display, keyboard etc. and is mounted on the standard cabin seat rails. The Mission Display can be used to monitor FLIR, video and digital map images depending on the installation.

The Mission Console has various versions of the Mission Display and equipment installed however the console frameworks are standard. This supplement also covers successive dash numbers for different versions of the Mission Console i.e. P/N 4G4620F004XX/6XX and P/N 4G4620F009XX which identify minor changes to the display systems or electronic equipment installed in the console and do not affect rotorcraft operations.

The Mission Console is installed on the left hand side of the first seat row (Row 1). The seat for the Mission Console operator is mounted using an additional seat rail fitted at STN 3973 behind the console. See Figure 1 and Figure 2.

This Supplement also covers the installation of an optional sliding seat P/N 4G2520F30011 (in place of the standard operator seat) when the Mission Console P/N 4G4620F00911 is installed. The sliding seat has the ability to slide fore and aft and be locked onto the guide rail in any position. The seat can also be rotated and locked into any azimuth position required.

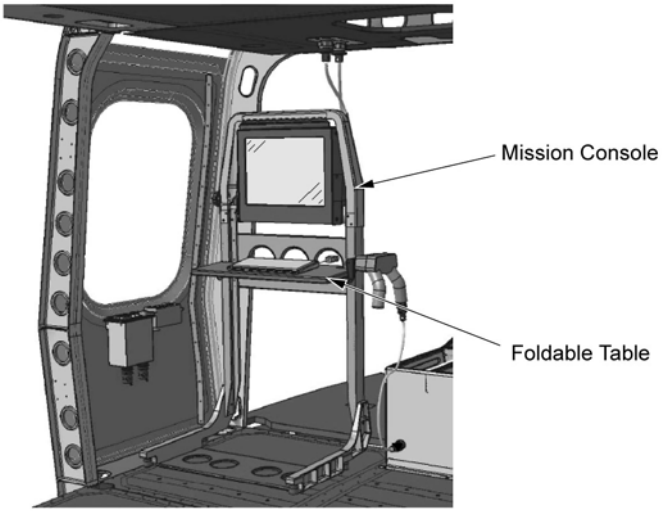

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Figure 1 Mission Console P/N 4G4620F00411/611

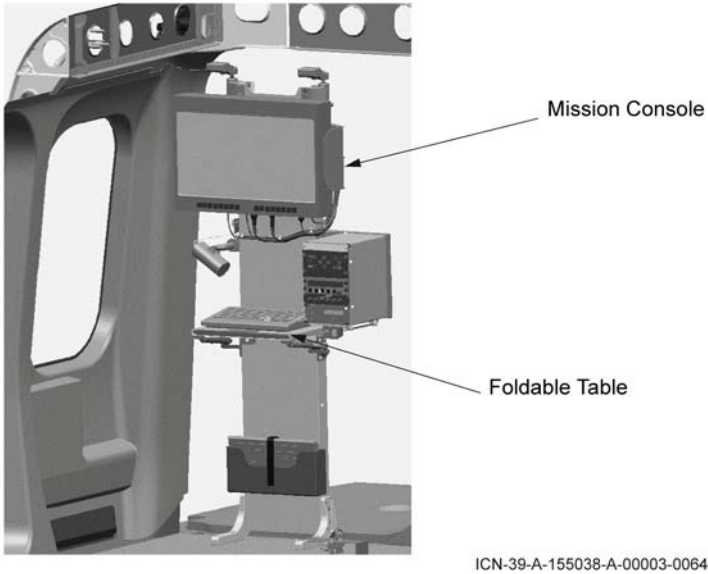

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Figure 2 Mission Console P/N 4G4620F00911

CABIN LAYOUTS WITH MISSION CONSOLE FITTED (FIXED CONSOLE SEAT)

The Row 2 and Row 3 seats are installed as for the basic aircraft configuration for low density or high density seats. Either configuration can be installed with any Row 1 Mission Console configuration and the standard console operator seat. See basic manual for Row 2 and Row 3 seat configurations.

The following cabin configurations are compatible with the Mission Console Installation (Row 2 and Row 3 not presented for clarity):

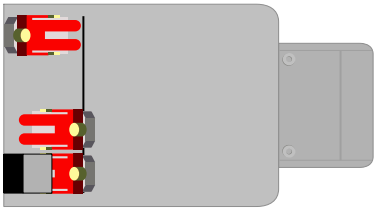

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Figure 3 Mission Console, Low Density seats - 1 aft facing, 1 forward facing P/N 3G2520F00811

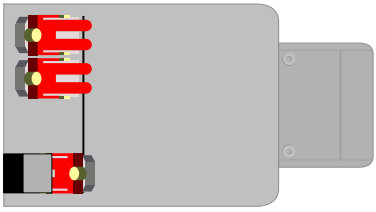

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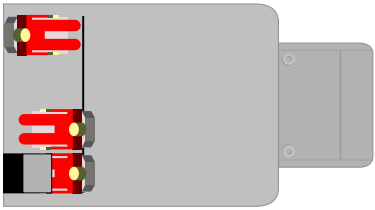
Figure 4 Mission Console - 2 aft facing seats P/N 3G2520F00911/ 4G2520F13114 High Density -812 Low Density



ICN-39-A-155038-A-00003-00863-A-01-1

Figure 5 Mission Console, High Density seats - 1 aft facing, 1 forward facing P/N 3G2520F00912

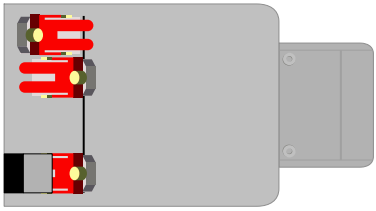


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Figure 6 Mission Console, High Density seats - 1 aft facing, 1 forward facing P/N 3G2520F00913

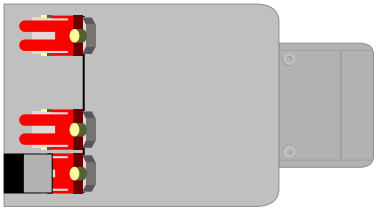

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Figure 7 Mission Console, High Density seats - 2 forward facing P/N 3G2520F00914

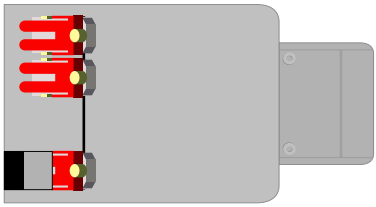

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Figure 8 Mission Console, High Density seats - 2 forward facing P/N 3G2520F00915

CABIN LAYOUTS WITH MISSION CONSOLE FITTED (SLIDING SEAT INSTALLED)

When the console operator sliding seat, P/N 4G2520F30011, is installed a maximum of 2 seats is permitted in Row 2 (in addition to the sliding seat) and a maximum of 5 seats is permitted in Row 3 (Two Row 2 and four Row 3 seats included in diagrams for clarity).

The following optional ROW 1 seat configurations are compatible:

2 Aft Facing seats 4G2520F13114 High Density, -812 Low Density

Row 1 Standard Mission Console operator seat replaced with Mission console operator sliding-swiveling seat P/N 4G2520F30011.

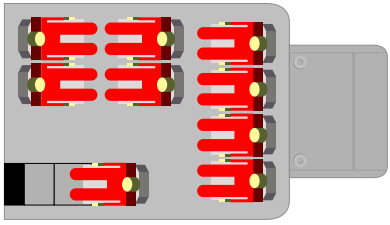

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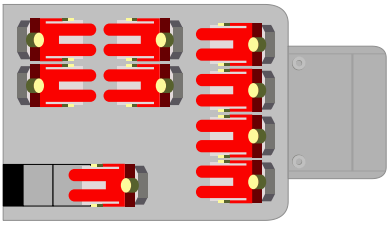
Figure 9 Mission Console with Sliding Seat P/N 4G2520F30011, Optional High/Low Density seats - 2 Aft facing on RHS

2 Aft Facing folding Seats 4G2520F13115, (Refer Supplement 45)

Row 1 Standard Mission Console operator seat replaced with Mission console operator sliding-swiveling seat P/N 4G2520F30011.



ICN-39-A-155038-A-A0126-01007-A-001-01

Figure 10 Mission Console with Sliding Seat P/N 4G2520F30011, Optional Pole Mounted Foldable seats - 2 Aft facing on RHS

See Section 6 of this Supplement for loading information.

This Supplement is also compatible with the installation of the Cabin Bubble Window Installation P/N 4G5620F00111 covered in Supplement 33.

SECTION 1 - LIMITATIONS

NUMBER OF OCCUPANTS

The maximum number of occupants in cabin seat Row 1 with mission console installed, including the Mission Console Operator shall not exceed 3 for low density or for high density seat configurations.

The maximum number of occupants in cabin seat Row 2 with mission console installed, including the Mission Console Operator shall not exceed 3.

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Mission Console and systems the new empty weight and center of gravity position must be determined.

SLIDING SEAT P/N 4G2520F30011 LIMITATIONS

The following apply when the sliding seat is installed:

— A maximum of 2 seats, aft facing, are permitted in Row 1 using the RHS outboard positions only.

— A maximum of 2 seats, forwards facing, are permitted in Row 2 using the RHS outboard positions only.

— Row 3 must have a minimum of 3 seats installed if less than two seats are installed in Row 2 (in addition to the sliding seat).

— During Taxiing, Take-Off, Landing and emergency conditions the sliding seat in front of the mission console must be locked:

  • In forward or aft facing direction

  • In forward facing direction in the most aft position, if less than 3 seats in Row 3 are installed.

MISCELLANEOUS LIMITATIONS

HOIST OPERATIONS

If hoist operations are envisaged then Row 1 right hand seat must be installed at STN 3694 rearward facing for hoist operator.

MISSION CONSOLE SLIDING SEAT PLACARD

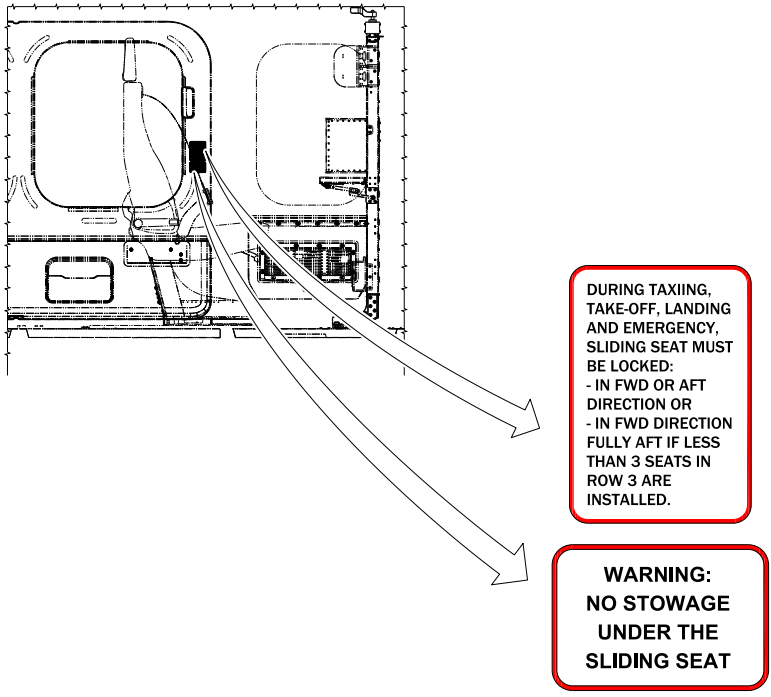


Figure 11 Mission console sliding seat placard

Note

When the sliding seat is installed the placards are placed in view of sliding seat occupant.

SECTION 2 - NORMAL PROCEDURES

PRE TAKE-OFF CHECK

1. Mission Console	— Confirm table closed and secured.
2. Console sliding seat (if installed)	— Confirm locked in forward/aft facing position and secure.

SYSTEM CHECKS

1. Mission Display	— Confirm system switched OFF if Mission Console Operator not on board.

PRE-LANDING CHECKS

1. Mission Console)	— Close table and secure.
2. Console sliding seat (if installed)	— Confirm locked in forward/aft facing position and secure.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the Mission Display equipments are switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

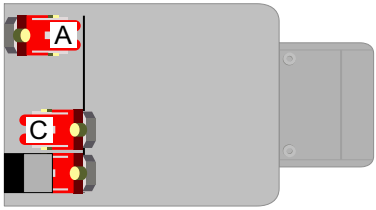
SECTION 6 - WEIGHT AND BALANCE

Note

In accordance with E.A.S.A procedures, the balance data of this Section are not subject to E.A.S.A. approval. However, these informations have been accepted for loading the rotorcraft within approved limits of center of gravity and on maintaining the loading within such limits.

The diagrams and tables below give the Longitudinal and Lateral Moment arms for Row 1 seats which must be used in the weight and balance calculations.

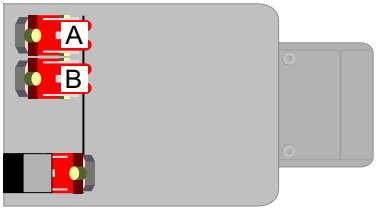
CABIN LAYOUTS WITH MISSION CONSOLE FITTED (FIXED CONSOLE SEAT)



ICN-39-A-155038-A-00003-00867-A-01-1

DESCRIPTION (Low Density Seats)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator	3973	See page S38-14
Row 1 passenger aft facing A	3415	737
Row 1 passenger (forward facing) C	3973	-152

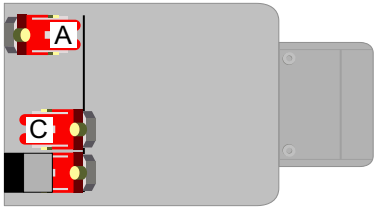
Figure 6-1 Mission Console, Low Density seats - 1 aft facing, 1 forward facing P/N 3G2520F00811



ICN-39-A-155038-A-00003-00868-A-01-1

DESCRIPTION (High or Low Density Seats)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator Fwd (Aft)	3973 (4073)	See page S38-14
Row 1 passenger aft facing A	3415	High Density 813 Low Density 737
Row 1 passenger aft facing B	3415	High Density 406 Low Density 254

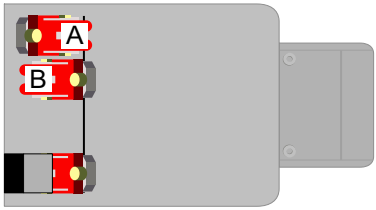
Figure 6-2 Mission Console, 2 aft facing seats - High Density P/N 3G2520F00911/4G2520F13114 Low Density -812



ICN-39-A-155038-A-00003-00869-A-01-1

DESCRIPTION (High Density Seats)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator	3973	See page S38-14
Row 1 passenger aft facing A	3415	813
Row 1 passenger (forward facing) C	3973	-229

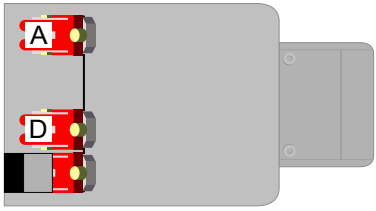
Figure 6-3 Mission Console, High Density seats - 1 aft facing, 1 forward facing P/N 3G2520F00912



ICN-39-A-155038-A-00003-00870-A-01-1

DESCRIPTION (High Density Seats)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator	3973	See page S38-14
Row 1 passenger aft facing A	3415	813
Row 1 passenger (forward facing) B	3973	407

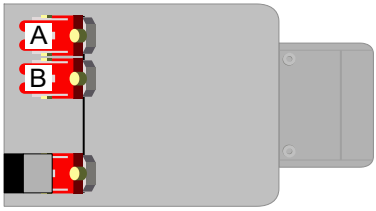
Figure 6-4 Mission Console, High Density seats - 1 aft facing, 1 forward facing P/N 3G2520F00913



ICN-39-A-155038-A-00003-00871-A-01-1

DESCRIPTION (High Density Seats)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator	3973	See page S38-14
Row 1 passenger (forward facing) A	3973	727
Row 1 passenger (forward facing) D	3973	-229

Figure 6-5 Mission Console, High Density seats - 2 forward facing P/N 3G2520F00914



ICN-39-A-155038-A-00003-00872-A-01-1

DESCRIPTION (High Density Seats)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator	3973	See page S38-14
Row 1 passenger (forward facing) A	3973	765
Row 1 passenger (forward facing) B	3973	359

Figure 6-6 Mission Console, High Density seats - 2 forward facing P/N 3G2520F00915

Mission Operator Position

Mission Console P/N 4G4620F00411/611 .....-635 mm

Mission Console P/N 4G4620F00911 .....-506 mm

CABIN LAYOUTS WITH MISSION CONSOLE FITTED (SLIDING SEAT INSTALLED)

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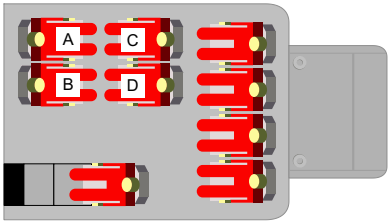
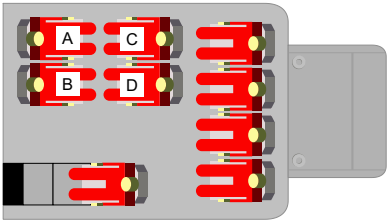


ICN-39-A-155038-A-A0126-01008-A-001-01

DESCRIPTION (Low Density Seats)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator Max Fwd	3820	-519
Mission Console Operator Max Aft	4124	-519
Row 1 passenger (Aft facing) A	3415	High Density 813 Low Density 737
Row 1 passenger (Aft facing) B	3415	High Density 406 Low Density 254
Row 2 passenger C (Forward Facing)	4789	660.0
Row 2 passenger D (Forward Facing)	4789	240.0
Row 3 passengers	Refer Basic RFM	

Figure 6-7 Mission Console sliding seat P/N 4G2520F30011, 2 aft facing seats - High/Low Density



ICN-39-A-155038-A-A0126-01009-A-001-01

DESCRIPTION (Low Density Seats)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator Max Fwd	3820	-519
Mission Console Operator Max Aft	4124	-519
Row 1 passenger A (Aft Facing Folding Seat)	3335	685
Row 1 passenger B (Aft Facing Folding Seat)	3335	330
Row 2 passenger C (Forward Facing)	4789	660.0
Row 2 passenger D (Forward Facing)	4789	240.0
Row 3 passengers	Refer Basic RFM	

Figure 6-8 Mission Console Sliding seat P/N 4G2520F30011, 2 aft facing seats - Pole Mounted Folding

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 39

CABIN ROW 1 FORWARD FACING SEAT CONFIGURATIONS

P/N 3G2520F00611
P/N 3G2520F00711

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SUPPLEMENT 39
CABIN ROW 1 FORWARD FACING SEAT CONFIGURATIONS

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GENERAL INFORMATION

This Supplement covers cabin seating configurations available for Row 1 forward facing seats.This Supplement also cover successive dash numbers for different Row 1 seat configurations
i.e. P/N 3G2520F006XX & 7XX.

The Row 1 forward facing seats are installed on an additional seat rail installed across the cabin at STN 3973. The seat installation allows up to a maximum number forward facing seats in Row 1 of 2 seats of low density configuration or 3 seats of high density configuration.

The Row 2 and Row 3 seats are installed as for the basic aircraft configuration of low density or high density seats. Either configuration can be installed with any Row 1 forward facing seat configuration. See basic manual for Row 2 and Row 3 seat configurations.

The following forward facing seat configurations are permitted (Row 2 and Row 3 are omitted for clarity):

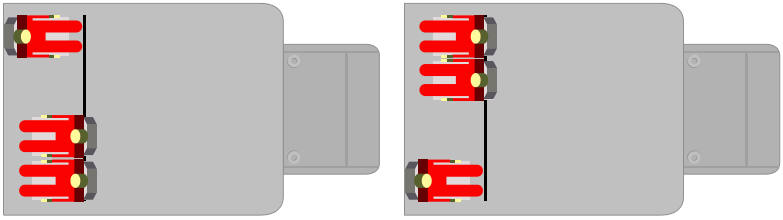

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Figure 1 Low Density Seating P/N 3G2520F00611

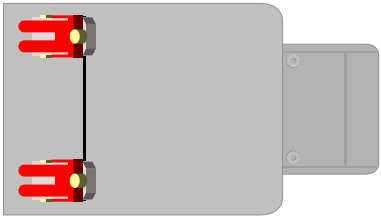

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Figure 2 Low Density Seating P/N 3G2520F00612

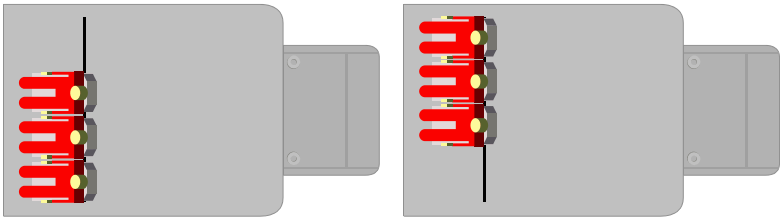

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Figure 3 High Density Seating P/N 3G2520F00711

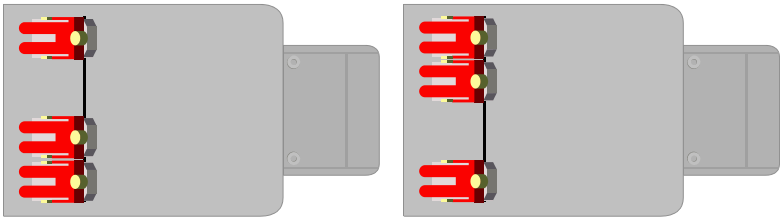

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Figure 4 High Density Seating P/N 3G2520F00712

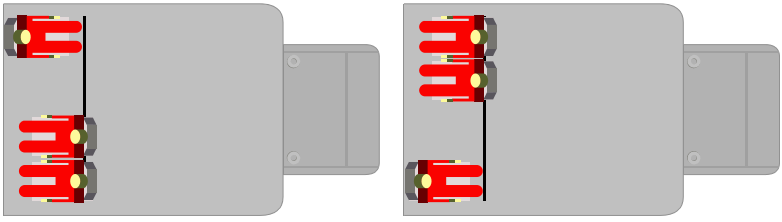

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Figure 5 High Density Seating P/N 3G2520F00713

Note

If Hoist Operations are envisaged the right hand seat must be installed aft facing.

See Section 6 of this Supplement for loading information.

This Supplement is also compatible with the installation of the Cabin Bubble Window Installation P/N 4G5620F00111 covered in Supplement 33.

SECTION 1 - LIMITATIONS

NUMBER OF OCCUPANTS

The maximum number of occupants in cabin Row 1 shall not exceed 3 for low density configuration or high density configuration.

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the forward facing seats the new empty weight and center of gravity position must be determined.

MISCELLANEOUS LIMITATIONS

HOIST OPERATIONS

If hoist operations are envisaged then Row 1 right hand seat must be installed at STN 3694 rearward facing for hoist operator.

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

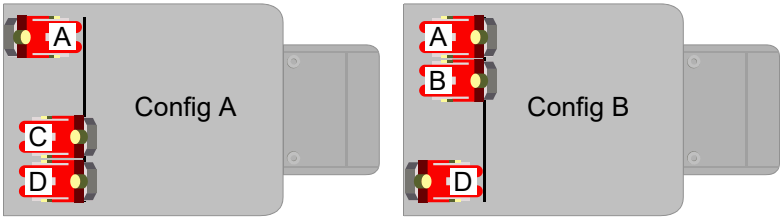
Note

In accordance with E.A.S.A procedures, the balance data of this Section are not subject to E.A.S.A. approval. However, these informations have been accepted for loading the rotorcraft within approved limits of center of gravity and on maintaining the loading within such limits.

The diagrams and tables below give the Longitudinal and Lateral Moment arms for the passenger seats in ROW 1 which must be used in the weight and balance calculations.

For Row 2 and Row 3 positions see Basic RFM.

LOW DENSITY SEATING CONFIGURATIONS



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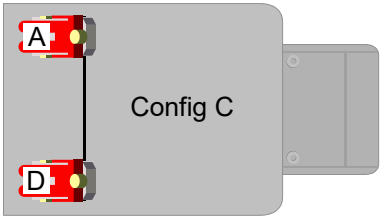
DESCRIPTION (Configuration A)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 1 HO (aft facing) A	3415	737
Row 1 passenger (forward facing) C	3973	-283
Row 1 passenger (forward facing) D	3973	-765

(Configuration B)	(STA) (mm)	(BL) (mm)
Row 1 passenger (forward facing) A	3973	765
Row 1 passenger (forward facing) B	3973	283
Row 1 passenger (aft facing) D	3415	-737

Figure 6-1 Low Density Seating P/N 3G2520F00611



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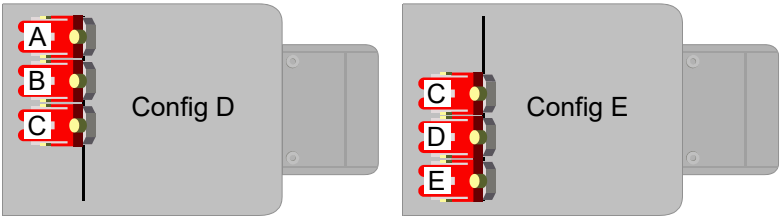
DESCRIPTION (Configuration C)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 1 passenger (forward facing) A	3973	765
Row 1 passenger (forward facing) D	3973	-765

Figure 6-2 Low Density Seating P/N 3G2520F00612

HIGH DENSITY SEATING CONFIGURATIONS



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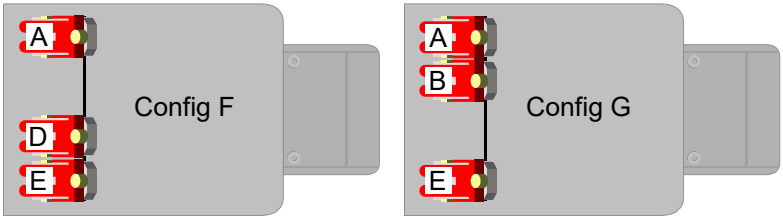
DESCRIPTION (Configuration D)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 1 passenger (forward facing) A	3973	727
Row 1 passenger (forward facing) B	3973	321
Row 1 passenger (forward facing) C	3973	-85

(Configuration E)	(STA) (mm)	(BL) (mm)
Row 1 passenger (forward facing) C	3973	85
Row 1 passenger (forward facing) D	3973	-321
Row 1 passenger (forward facing) E	3973	-727

Figure 6-3 High Density Seating P/N 3G2520F00711



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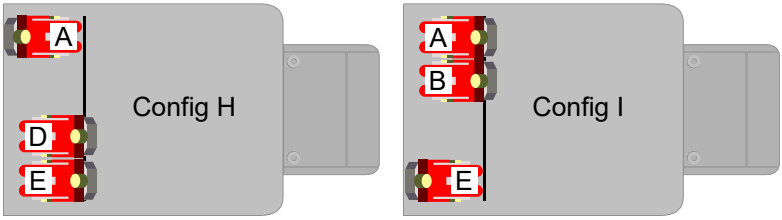
DESCRIPTION (Configuration F)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 1 passenger (forward facing) A	3973	727
Row 1 passenger (forward facing) D	3973	-321
Row 1 passenger (forward facing) E	3973	-727

(Configuration G)	(STA) (mm)	(BL) (mm)
Row 1 passenger (forward facing) A	3973	727
Row 1 passenger (forward facing) B	3973	321
Row 1 passenger (forward facing) E	3973	-727

Figure 6-4 High Density Seating P/N 3G2520F00712



ICN-39-A-155039-A-00003-00889-A-01-1

DESCRIPTION (Configuration H)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 1 passenger (aft facing) A	3415	727
Row 1 passenger (forward facing) D	3973	-321
Row 1 passenger (forward facing) E	3973	-727

(Configuration I)	(STA) (mm)	(BL) (mm)
Row 1 passenger (forward facing) A	3973	727
Row 1 passenger (forward facing) B	3973	321
Row 1 passenger (aft facing) E	3415	-727

Figure 6-5 High Density Seating P/N 3G2520F00713

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 40

4 AXIS BASIC FLIGHT DIRECTOR (EPIC PHASE 4)

P/N 4G2210F00311

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SUPPLEMENT 40
4 AXIS BASIC FLIGHT DIRECTOR
(EPIC PHASE 4)

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GENERAL INFORMATION

The 4 Axis Basic Flight Director (FD) provides commands that are normally coupled to the autopilot (AP) for automatic flight path control around the three axes of the aircraft plus collective. At Power Up one of the two FD is automatically selected and configured as Master (priority). At every Power Up the FD selected as Master (priority) is alternated.

The 4 Axis Basic Flight Director system requires EPIC Phase 4 (software release EB7030191-00105) and is a simplified version of the 4 Axis Enhanced Flight Director system (Supplement 34) in that it does not include Hover Mode (HOV).

When coupled, both autopilots drive the actuators to satisfy the references provided by the priority FD.
When uncoupled the pilot can manually fly the commands.
In either case, pitch, roll command bars/collective cue are presented on each PFD, depending on the mode selected.

The FD uses the Navigation source and data reference presented on the selected PFD. The selected PFD is indicated by the green PFD couple arrow which is controlled by the PFD button on the Guidance Controller (See Figure 2). The SAR Guidance Controller (See Figure 3) is for SAR modes, however, the extra pushbuttons are not operative. Either Guidance Controller can be used with the 4 Axis Basic Flight Director system.

A green couple arrow is also presented on the side of the PFD push-button on the Guidance Controller. When a FD mode is engaged the coupled function is automatically engaged. The FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller (See Figure 1). The coupled function is automatically forced to uncoupled whenever the AP ATT mode is off or becomes inoperative.

Armed and captured FD modes are displayed with messages along the top line of the PFD: Collective and pitch mode messages on the left of the selected PFD arrow and lateral mode on the right. Armed modes are in small white characters and captured or engaged modes are in medium size green characters. When transitioning from no mode to engaged, from armed to captured or change from one mode to another mode the message flashes for 6 seconds then become

steady. When changing from captured to no mode the message flashes for 6 seconds then extinguishes.

Armed lateral modes messages are: VOR, VAPP, LOC, BC, LNAV and captured VOR, VAPP, OS, LOC, BC, LNAV, HDG.
Armed collective modes are: GS, VGP, and captured ALT, GS, VS, GA, ALTA, ALVL, RHT, VGP.
Engaged vertical pitch modes are IAS, DCL, GA.

A chime sounds whenever either a lateral, vertical (pitch), or vertical (collective) FD mode changes from its previous state, ie.

— a mode changes from engaged to disengaged or vice-versa

— a mode changes from arm to captured

— a mode changes from coupled to uncoupled.

An aural tone (“bip-bip”) sounds for any change in altitude or radar height mode reference datum.

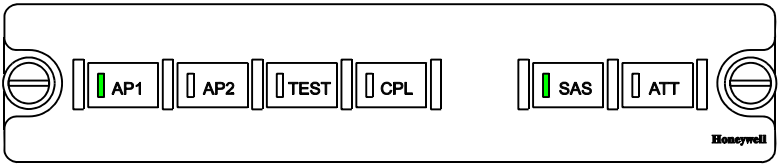

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Figure 1 Autopilot Controller

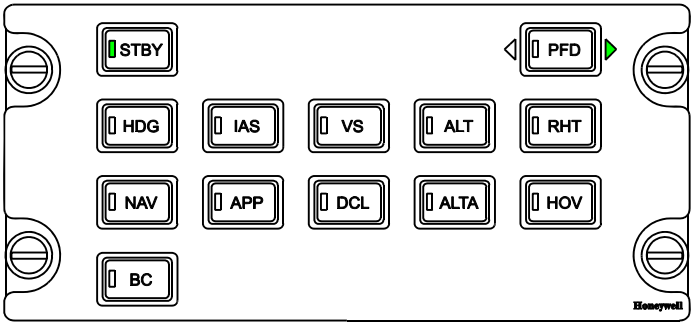

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Figure 2 Guidance Controller

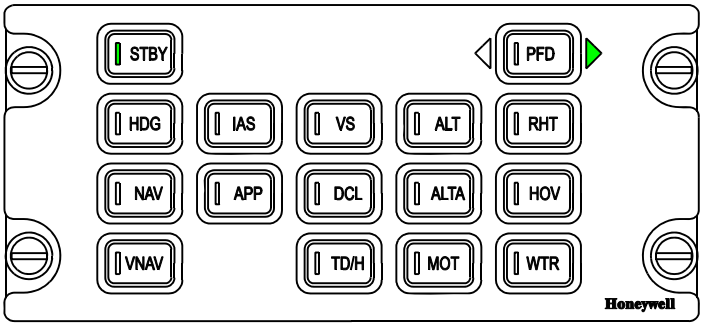

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Figure 3 SAR Guidance Controller

The FD functions available are as follows:

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
HDG	Heading select	Roll and Yaw	N/A	HDG
ALT	Altitude Hold	Collective	N/A	ALT
IAS	Indicated Airspeed Hold	Pitch	N/A	IAS
NAV	Lateral Navigation	Roll	LNAV/ VOR/ LOC	LNAV/ VOR/ LOC
APP	Lateral Approach	Roll	VAPP LOC VOR	VAPP LOC VOR
	Vertical Approach	Collective	GS VGP	GS VGP

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
PRV	Preselect VOR-ILS approach while in LNAV	N/A	As for APP	N/A
DCL	ILS Deceleration VGP Deceleration	Pitch	DCL	DCL
BC	Back Course Approach	Roll	BC	BC
ALTA	Altitude Acquire	Collective	N/A	ALTA
VS	Vertical Speed Hold	Collective	N/A	VS
GA	Go-Around	Pitch/ Collective	N/A	GA
VGP	Vertical Glide Path	Collective	VGP	VGP
RHT	Radar Height Hold	Collective	N/A	RHT
OS*	Over Station mode	Roll	N/A	OS
ALVL*	Autolevel mode	Pitch/ Collective	N/A	ALVL
SBY	Clear all FD modes	N/A	N/A	N/A

* Provided automatically

SECTION 1 - LIMITATIONS

WEIGHT LIMITATIONS

— For weights up to 6400 kg see basic RFM,

— For weights between 6400 kg and 6800 kg see Supplement 50,
For weights between 6800 kg and 7000 kg see Supplement 90.

FLIGHT DIRECTOR MODES LIMITATIONS

- The following FD modes are inoperative on the SAR Guidance Control panel:

  — TD/H — MOT — WTR — VNAV

- Collective modes must not be engaged if either or both engines are in MANUAL MODE
- The RHT mode must not be engaged in cruise over land
- The HOV mode is not available

FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH)

Hold Mode	Applicable Range	MUH
IAS*	60 KIAS to Vne less 5 KIAS	150 ft AGL or 50 ft AGL during approach
HDG*/NAV*	60 KIAS to Vne	150 ft AGL or 50 ft AGL during approach
ALT	0 KIAS to Vne	300 ft AGL (airspeed greater than 55 KIAS) 50 ft AGL (airspeed less than 55 KIAS)
VS*	60 KIAS to Vne within -1500 fpm and 2000 fpm	150 ft AGL
APP*/BC*/GA*	60 KIAS to Vne	50 ft AGL
DCL*	60 KIAS to Vne	50 ft AGL

FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH)

ALTA*	60 KIAS to Vne	150 ft AGL
RHT	0 to Vne 15 ft to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in Hover (airspeed less than 55 KIAS)

Note*

—Automatic disengagement of these modes below 55 KIAS.

—VS engagement above 2000 fpm or below -1500 fpm will result in the mode returning the aircraft to the maximum rates quoted (2000 fpm or -1500 fpm).

REQUIRED EQUIPMENT

Second Radar Altimeter RT300 (Supplement 18).

VOR LIMITATIONS

In case of invalid DME/FMS distance, select:

- VOR APP at ranges below 10 nm (18 km)

- VOR NAV at ranges greater than 10 nm (18 km).

COUPLED ILS APPROACH MODE LIMITATIONS

The helicopter is certified to carry out CAT 1 ILS approaches up to 7.5 deg glideslope.

Maximum recommended Localizer Intercept angle ..... 45 deg
ranges greater than
10 nm (18 km)

Maximum recommended Localizer Intercept angle ..... 30 deg
ranges less than
10 nm (18 km)

Maximum airspeed for glideslope up to 4 deg ..... 150 KIAS

Maximum airspeed for glideslopes between 4 and 7.5 deg (Steep Approach) ..... 120 KIAS

In case of invalid DME and FMS distance and with both Rad Alt signals invalid an ILS approach must be initiated at a distance of not less than 10 nm (18 km).

VGP LIMITATIONS

When being radar vectored or autonomously flying to the final approach course, the VECTORS approach transition and/or ACT VECTORS function must be used to program the FMS for the approach and the flight crew must ensure that published altitudes are complied with.

SECTION 2 - NORMAL PROCEDURES

FLIGHT DIRECTOR - GENERAL

For full details of FD operation and use see “PRIMUS EPIC Integrated Avionics and Flight Control System for the AW/AB139 Helicopter - Pilot’s Guide” latest revision.

FLIGHT DIRECTOR MODES ENGAGEMENT

The AFCS Flight Director function provides 4 axis guidance modes. Selection of most FD modes is carried out using pushbuttons on the Guidance Controller. Each mode may be de-selected by pressing the associated pushbutton on the Guidance Controller. However GA mode may only be engaged by either collective GA button and disengaged by engaging a different mode for pitch and collective axis. All engaged modes may be deselected simultaneously by using the FD STBY button located on the cyclic sticks or the STBY button on the Guidance Controller.

The Guidance Controller pushbuttons include a green annuciator that illuminates when the mode is selected. FD mode annuciations (green when captured and white when armed) also appear on the PFD.

FLIGHT DIRECTOR COUPLED AND UNCOUPLED OPERATIONS

Selecting a FD mode by pressing the pushbutton on the Guidance Controller will couple the FD whenever the AP is in ATT hold. Selecting a FD mode by pressing the pushbutton on the Guidance Controller with the ATT OFF (i.e. SAS or no stabilisation), the FD will be engaged in the uncoupled mode.

During coupled operation the FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller which will cause a white UCPL caption to appear on the PFD.

CAUTION

- Whenever the FD is coupled and the AP reverts to SAS or has a complete loss of autostabilization, the FD will revert to uncoupled mode.
- When the AP reverts to SAS no UCPL caption will appear on the PFD.

With the FD engaged, in coupled or uncoupled mode, the following is displayed:

— Navigation source and reference data in magenta colour on the selected PFD

— Navigation source and reference data in cyan colour on the non selected PFD

— Navigation source in amber on both PFD's when both PFD's have the same navigation data source.

During coupled operation the HDG, ALT, IAS, VS, ALTA, RHT modes may be controlled by either pilot. When engaged in coupled mode, the reference data may be adjusted by using the Display Controller (HDG, ALT SEL), collective beep trim/FTR (ALT, ALTA, VS, RHT) or cyclic beep trim/FTR (IAS, HDG).

During uncoupled operation changes of reference data for IAS and HDG modes are carried out by pressing the cyclic FTR button, which updates the reference data to the actual values at the time the button is released. Changes of reference data for ALT, VS and RHT are carried out by the collective beep trim. Collective FTR does not modify the collective modes reference.

For IAS, HDG, RHT and VS on the selected PFD, a magenta digital readout reference datum is displayed above the appropriate flight instrument and a magenta bug at a position corresponding to the selected reference. For ALT, only the magenta bug is displayed permanently while the digital readout is displayed for 5 seconds whenever the reference is modified and the ALTA reference is present.

Whenever a collective mode is engaged (ALT, VS, ALTA, GS, VGP, GA, ALVL, RHT) a collective position cue appears on the PFD beside the ADI. See Figure 2-1.

COLLECTIVE PI LIMITING FUNCTION

During collective coupled operation the collective movement is limited by the following PI values:

— Maximum 97% AEO (95% at altitudes above 10000 ft (3050 m) Hp)

— Maximum 106% AEO for airspeed less than 60 KIAS (5 MIN message displayed beside collective cue, see Figure 2-1)

— Maximum 140% OEI

— Minimum 5% AEO

— Minimum 10% OEI

When PI limiting function is active and is limiting maximum collective movement, an amber LIM caption is displayed beside the collective cue. See Figure 2-1.

If PI limiting is active with IAS engaged and the required reference for VS, ALTA, RHT, GA, or ALT cannot be achieved the airspeed will automatically reduce as necessary to achieve the collective mode reference. If the collective mode reference cannot be maintained, when the airspeed has reached a minimum of 80 KIAS this airspeed will be maintained and the collective mode reference will be reduced. While the mode reference values cannot be maintained or achieved that mode caption is displayed in amber on the PFD.

CAUTION

If PI limiting is active with ALT/RHT engaged and the reference height cannot be maintained the aural warning “Altitude Altitude” will warn the pilot when the maximum allowed deviation from the reference height has been exceeded.

When flying at high altitude (above 15000 ft (4570 m)) select the Load Share switch to TORQUE (MISC panel) to improve the helicopter manoeuvre during automatic turns.

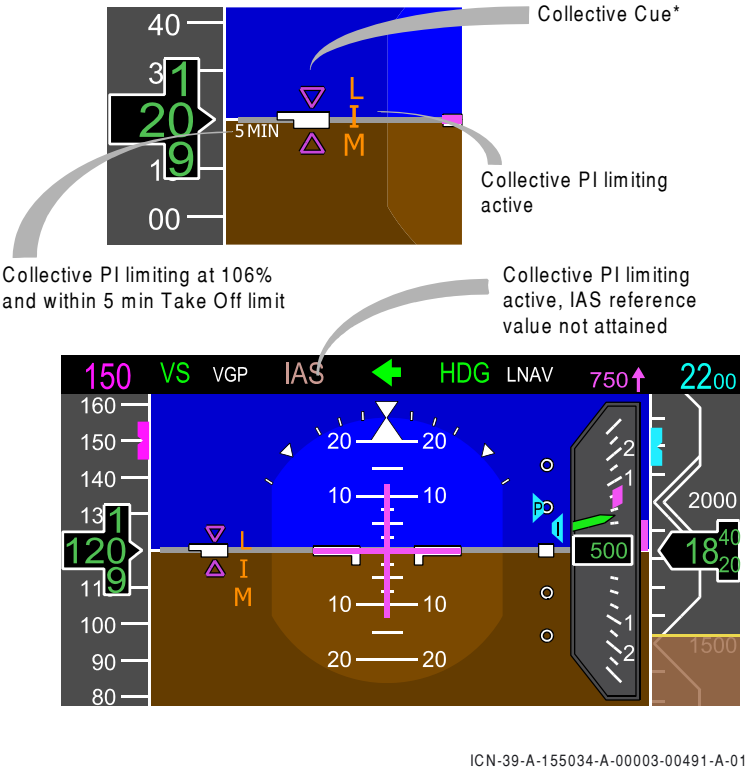

Figure 2-1 Collective Cue Display

* In UCPL operation when collective cue is below reference arrows collective must be raised and vice-versa.

MODE DESCRIPTIONS

The following descriptions assume the modes are coupled, unless stated otherwise.

HDG Heading Hold Mode. This mode steers the aircraft to the heading reference bug displayed on the PFD. The heading bug can be adjusted using the HEADING knob on the Remote Instrument Controller and can be syncronized with the actual heading by pressing the HEADING knob (PUSH SYNC). The heading reference bug can be syncronized to the actual heading by pressing the cyclic FTR button or modified using the cyclic beep trim switch left or right. In HDG mode turns are performed at standard rate 1 (3 deg/sec).

ALT Barometric Altitude Hold Mode. This mode maintains the barometric altitude existing at the time of engagement. The altitude reference is displayed as a set bug on the PFD altitude tape. If the ALT SEL knob has not been previously moved (ie. no ALTA activation) the ALT reference will also be displayed as a magenta digital readout. The altitude reference can be adjusted using the collective beep trim (aft to increase altitude) or by pressing FTR button, flying to desired altitude, and releasing. An audio tone is produced when the altitude reference is changed. The collective PI limiting function is enabled when ALT mode is coupled.

CAUTION

In ALT mode the voice message “Altitude Altitude” is triggered when altitude exceeds the reference altitude by ±150 ft (46 m).

IAS Airspeed Hold Mode. This mode maintains the airspeed existing at the time of engagement. When engaged the airspeed reference is displayed as a set bug and a digital readout on the PFD. The airspeed reference bug is adjusted by either using the cyclic beep fore/aft or reposi-

tioning the cyclic, with the FTR button depressed, to the required airspeed and releasing FTR button. The airspeed reference is adjustable via the cyclic beep switch between 60 KIAS and Vne less 5 KIAS. If airspeed, at time of engagement, is higher than Vne less 5 KIAS then it is automatically reduced to Vne less 5 KIAS.

ALTA Altitude Acquire Mode. This mode, when engaged with a barometric altitude preselect reference set (through ALT SEL knob), will automatically engage the IAS mode and the aircraft is flown towards the preset altitude. The final altitude reference is displayed as a cyan bug and digital readout above the altitude scale. The vertical speed reference is displayed as a bug and digital readout on the PFD. The preset vertical speeds are +1000 fpm or -750 fpm in the direction of the preset altitude. The vertical speed reference can be changed by either using the collective beep trim (aft to increase) or with collective FTR button depressed, moving to the required vertical speed and releasing. When the preset altitude is achieved the mode will transition to ALT mode and the IAS mode will remain engaged. The collective PI limiting function is enabled when ALTA mode is coupled. When collective PI limiting is active the airspeed is reduced to maintain vertical speed reference.

Note

Engaging ALTA while climbing with a rate of climb greater than 1500 fpm or descending with a rate of descent greater than 1500 fpm, the system may erroneously transition to ALT. The aircraft will, however, reach the selected final altitude.

NAV VOR/LOC/LNAV FD functions. These functions are selected with the NAV pushbutton depending on navigation source selection on the PFD and NAV receiver tuning. Pressing the NAV pushbutton, HDG is engaged (green caption) and the present aircraft heading held,

VOR/LOC/LNAV is armed (white caption). At VOR/LOC/LNAV capture HDG will automatically disengage and the helicopter turns to track the selected radial or leg.

APP 1) VOR/ILS Approach FD functions. The VOR non-precision approach or ILS approach functions are selected depending on the NAV receiver tuning when the APP mode button is pushed. Pressing the APP pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC-GS is armed (white caption). At VOR/LOC capture HDG will automatically disengage and the helicopter turns to track the selected radial, VAPP/LOC caption will display on the PFD. For ILS approach when intercepting the glideslope signal the GS mode is automatically captured and the previous collective mode disengages.

Note

To avoid false localizer captures, APP mode should be armed when the helicopter is flying inbound to the ILS radial.

Note

After pressing APP pushbutton, confirm that LOC label appears as expected.

2) FMS approach function (VGP). This can be used when the FMS is the selected NAV source on the selected PFD. This mode produces a non precision approach similar to an ILS approach when using a non localizer based approach from the data base. The glide path is anchored at the BOD with an angle equal to that specified in the data base at the corresponding waypoint. The VGP mode is armed (white caption) by pushing the APP button. Intercepting the projected glideslope the VGP mode is automatically captured.
In either case within the glideslope bug there will be a letter: I for ILS, P for VGP or V for Vertical Path. See Figure 2-1.

The P letter and bug, when VGP is armed, appears on the left hand side of vertical deviation scale in cyan. When captured the symbol moves to the right hand side of the vertical deviation scale in magenta.

CAUTION

During steep approach without automatic collective control be attentive not to use less than 5% PI.

PRV The PRV mode is a way to preselect ILS or VOR approach functions while FD is still engaged in LNAV. PRV is selected by pressing the PRV pushbutton on the Display Controller. If the APP pushbutton is pressed the FD will arm LOC and GS or VAPP functions depending on the NAV receiver tuning (ILS or VOR) on the selected PFD. At the capture of the LOC or VAPP functions the FD disengages LNAV and engages LOC-GS or VAPP functions. Selected PRV course will be displayed as thin cyan, while armed, and as normal magenta when captured.

DCL ILS Deceleration Mode. The deceleration mode decreases the aircraft speed from its present speed down to approximately 80 KIAS as the aircraft reaches 200 ft AGL. When the DCL pushbutton is pushed the LOC, GS and DCL modes are armed and the IAS and HDG modes are engaged. After GS capture and at a computed condition for correct approach and deceleration the IAS mode is disengaged and the DCL mode engaged. The airspeed reference bug moves to 80 KIAS and the digital reference is set to 80 KIAS. These values can be adjusted using the cyclic beep trim at which time the IAS mode automatically engages replacing the DCL mode.

BC Back Course Approach Mode. The back course mode is selected when the BC pushbutton, for Guidance Controller or APP pushbutton on SAR Guidance Controller, is pushed. Pressing the pushbutton, HDG is engaged (green caption) and the BC is armed (white caption). At

BC capture, HDG is disengaged. When the SAR Guidance Controller is used the BC mode will be engaged when the intercept angle between the front course and the aircraft heading is greater than 105° (otherwise the LOC engages).

CAUTION

The course selected for a BC approach must be the ILS approach front course.

Note

After pressing the APP pushbutton, confirm that BC label appears as expected.

VS Vertical Speed Hold Mode. The vertical speed existing at the time of engagement is held. Vertical speed reference bug and digital readout are adjusted by either using the collective beep or repositioning the collective, with the FTR button depressed, to the required vertical speed and releasing on the desired vertical speed. Collective PI limiting function is enabled when VS mode is coupled.

GA Go Around Mode. The mode may be selected from either collective and will give a 1000 ft/min climb set bug reference on the Vertical Speed tape and an airspeed bug at the airspeed existing when the mode is engaged or 80 KIAS, whichever is greater. Engaging the GA the FD will control airspeed and vertical speed at the commanded values and level the wings. The GA Mode can only be exited by selecting another vertical FD mode (or FD to STBY).

Note

This mode can be used, when the IAS is greater than 60 KIAS, to recover the aircraft from an unusual attitude and initiate a rate of climb.

OS Over Station Mode. When overflying a VOR station, with VOR or VAPP FD functions engaged, the VOR equipment detects the aircraft being within the zone of ambiguity. The VOR deviation signal is removed from the command until the VOR signal has stabilized after passing over station. While over the station, course change may be made by selecting a new course via the Course Selector knob.

ALVL Autolevel Mode. If the APP (LOC/GS or VGP) mode is continued, to below landing minimum, this safety feature is automatically activated at 150 ft (46 m) and an asymptotic flare to a radar height of 50 ft (15 m) will be initiated. The green GS or VGP caption on the PFD will be replaced by ALVL.

CAUTION

In VGP mode the ALVL will activate if the MAP (Missed Approach Point, as shown in the example Approach Chart Figure 3-1) is lower than 150 ft (46 m) AGL.
When MAP is higher than 150 ft (46 m) AGL the VGP mode will disengage at the MAP (preceded, at 100 ft (30 m) above, by a Vertical Track Alert (VTA) caption displayed above the vertical guidance scale on the PFD) and a chime is generated.

RHT Radar Height Hold Mode. This mode maintains the aircraft at the radar height at the time of engagement when the radar altimeter indications are within the threshold limits. A reference bug on the radar altimeter tape and a digital readout above the radar altimeter tape are presented. The reference height can be changed by depressing the collective FTR switch flying to the required height and releasing the FTR switch or by using the collective beep trim switch (aft to increase). An audio tone is produced when the height reference is changed. The collective PI limiting function is enabled when RHT mode is coupled.

CAUTION

In RHT mode the voice message “Altitude Altitude” is triggered when height exceeds the reference by a value proportional to the reference height.

ADVISORY CAPTIONS

CAS Caption (Green)	System State
MOT NOT INSTALLED	(Caption present for 5 secs in inverse video) MOT button pressed and function not fitted
TD/H NOT INSTALLED	(Caption present for 5 secs in inverse video) TD/H button pressed and function not fitted
VNAV NOT INSTALLED	(Caption present for 5 secs in inverse video) VNAV button pressed and function not fitted
WTR NOT INSTALLED	(Caption present for 5 secs in inverse video) WTR button pressed and function not fitted

PFD MESSAGES

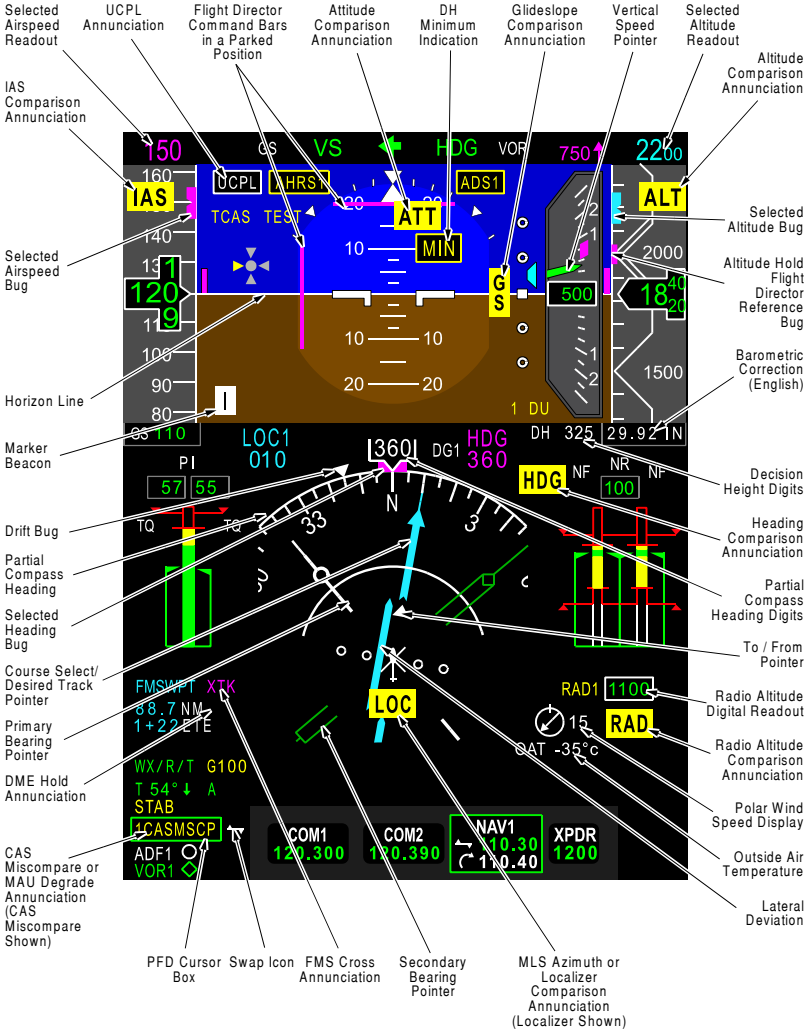

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Figure 2-2 PFD Messages

FMS FUNCTIONAL INCONSISTENCIES WITH EPIC SOFTWARE PHASE 4 INSTALLED

1. The 'Direct-To Recovery' procedure should not be used in any phase of flight.

   Refer to Honeywell Service Information Letter D201001000021 for further information.

2. On certain STAR approaches if the runway is changed during the approach, instead of navigation to the next waypoint the aircraft will navigate to the first waypoint of the STAR.

   Refer to Honeywell Service Information Letter D200909000044 for further information.

3. Approach and/or Star procedures which contain a certain geometry of consecutive AT altitude constraints exhibit a TOD misplacement and premature descent.

   Refer to Honeywell Service Information Letter D201010000078 for further information.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

VOICE ONLY MESSAGES

1. “Altitude, Altitude”

Aircraft exceeded the altitude deviation in ALT mode (±150 ft from reference) or in RHT mode by the following:

Reference Height (ft)	Deviation (ft)
30	11
50	15
100	20
150	25
200	30
250	40
500	70
1000	135
1500	200
2000	260

CAS CAUTION MESSAGES

AUTOPILOT FAIL

1(2) AP FAIL + Aural Message

+

AFCS DEGRADED

Associated autopilot failure

- **Continue flight attentive reducing speed to Vne-27 KIAS, level flight, or 100 KIAS and 1000 fpm in climb.**
- **Decouple FD unless in approach, missed approach, approach and departure to/from hover and hover**
- **Below 500 ft (152 m) AGL fly manually (except in approach, missed approach, approach and departure to/from hover and hover)**

- **If** subsequent caution illuminates **1-2 AP FAIL** + Aural Message

- **Continue flight manually not exceeding 140 KIAS (100 KIAS in turbulence, IMC or approach)**

AUTOPILOT OFF

1(2) AP OFF + Aural Message

+

AFCS DEGRADED

Associate AP not switched ON

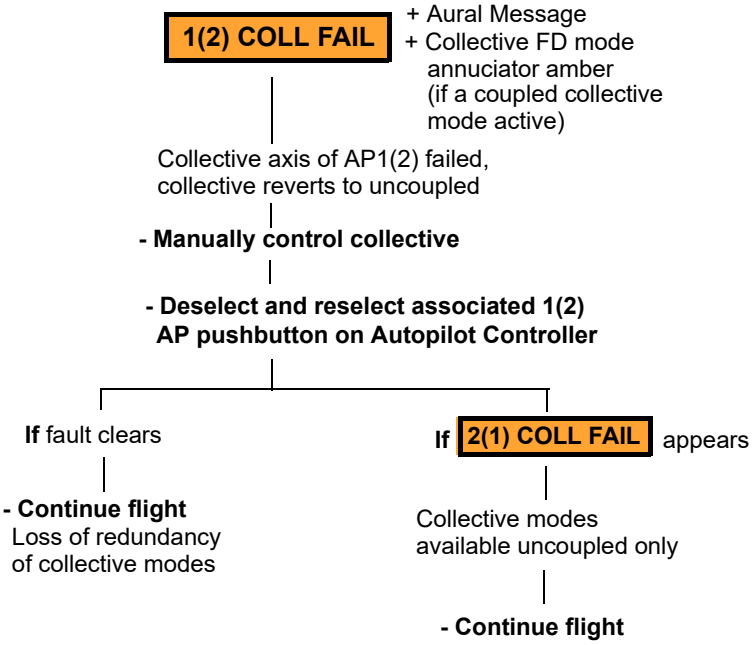
On affected AP
- Confirm selected ON.

If fault remains
- Continue flight attentive reducing speed to Vne-27 KIAS, level flight, or 100 KIAS and 1000 fpm in climb.
- Decouple FD unless in approach, missed approach, approach and departure to/from hover and hover.
- Below 500 ft (152 m) AGL fly manually (except in approach, missed approach, approach and departure to/from hover and hover)

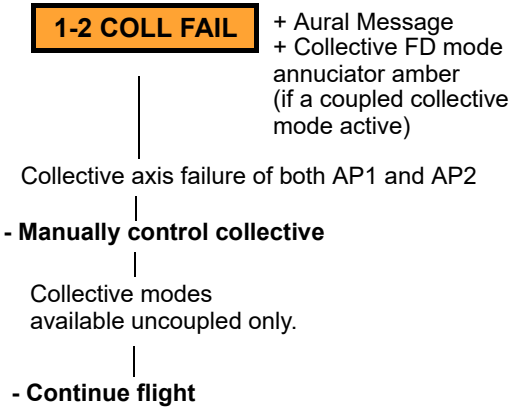
- If subsequent caution illuminates **1-2 AP OFF** + Aural Message

- Continue flight manually not exceeding 140 KIAS (100 KIAS in turbulence, IMC or approach)

SINGLE COLLECTIVE AUTOPILOT FAILURE



DUAL COLLECTIVE AUTOPILOT FAILURE



CYCLIC FORCE TRIM RELEASE FAILURE

Cyclic force trim release failure, due to a fault which removes electric power to the clutches of the longitudinal and lateral trim, will result in cyclic longitudinal and lateral clutches becoming permanently engaged. This will require the pilot to fly the aircraft against the cyclic force spring feel to manoeuvre the aircraft, or use the cyclic beep trim, as cyclic FTR button does not function.
In this case it is suggested that a cyclic FD mode (ie IAS) is engaged and the cyclic beep trim used to maintain the required flight condition.

COLLECTIVE FORCE TRIM OFF OR FAIL

When a FD mode is engaged, and coupled, and the collective trim is switched OFF (Miscellaneous Control Panel) or fails, a chime sound is generated, the collective may not maintain its selected position, the CLTV annuciation will illuminate on the top left of the ADI display, and the CLTV/YAW OFF green advisory will illuminate on the CAS window. Collective modes are available uncoupled only.

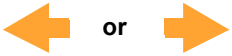
COLLECTIVE FORCE TRIM RELEASE FAILURE

Collective force trim release failure, due to a fault which removes electric power to the clutch of the collective trim will result in the collective clutch becoming permanently engaged. This will require the pilot to fly the aircraft against the collective force spring feel to manoeuvre the aircraft, or use the collective beep trim, as the collective FTR button does not function.
In this case when large collective movements are not required, it is suggested that a collective FD mode (ie ALT) is engaged and the collective beep trim used to maintain the required flight condition.

FLIGHT DIRECTOR FAILURE

No CAS Warning or Caution messages are generated to indicate FD malfunctions. However indication on both PFD displays indicate the state of the flight director system.

FLIGHT DIRECTOR PARAMETER FAILURE



or

replaces green arrow above attitude indicator on PFD

At least one On-side flight director parameter is invalid

- Confirm which parameter(s) are invalid
- Either select functioning cross side parameter on RCP panel or select cross side PFD on Guidance Controller.

DUAL FLIGHT DIRECTOR FAIL

FD FAIL

replaces FD arrow above attitude indicator on both PFD's

+

loss of flight director bars and information

Both Flight Directors invalid

- Flight Director not available

FAILURE OF SELECTED PFD UNIT WITH FLIGHT DIRECTOR ENGAGED

Loss of PFD, the associated MFD will automatically configure to Composite mode maintaining the FD engaged on the same references as the PFD.

- **Confirm no chime sound**
- **Confirm FD green arrow and FD mode green captions are present on MFD in Composite mode**

- **Continue flight**

- **If** subsequent display in composite mode fails FD automatically disengages, with chime

- **If** Copilot displays failed and Left pilot flying

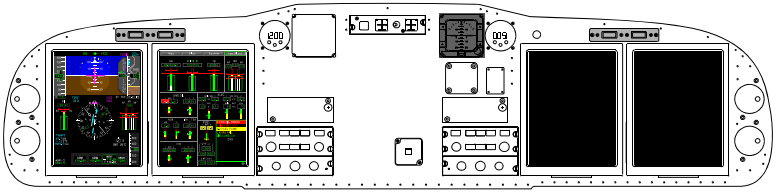
- Right pilot take control of aircraft

FD can be re-engaged (on right pilot side)

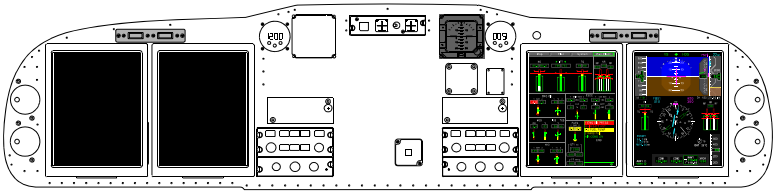
- **If** Pilot displays failed and Right pilot flying

- **Revert to Standby instrument**

- **Land as soon as practicable**



Failure of both Pilot PFD and MFD



Failure of both Copilot PFD and MFD

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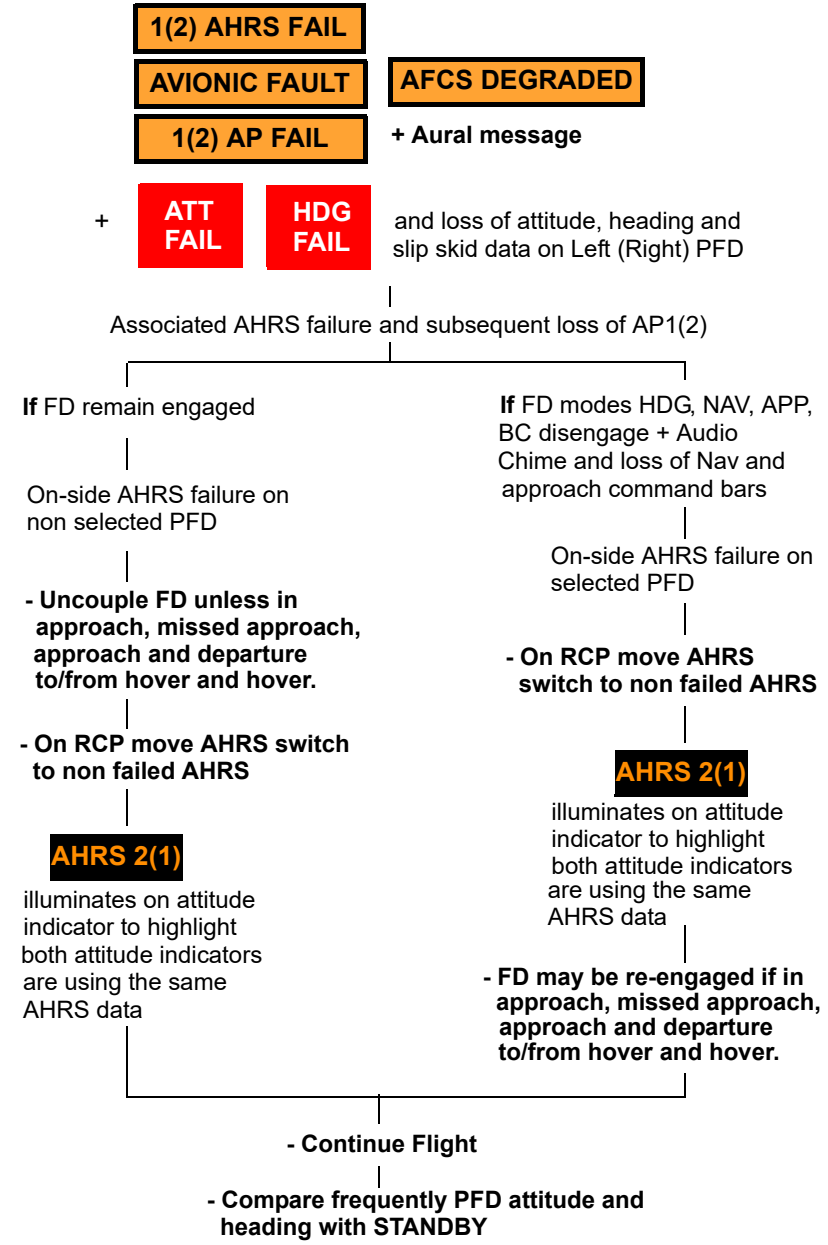
GUIDANCE CONTROL PANEL FAILURE

In case of Guidance Control Panel failure, recognised as non functionality of panel pushbuttons (modes cannot be changed or disengaged using panel), the FD may be disengaged using the cyclic FD STBY button.

Continue flight, using the FD modes already engaged as required. However, use the cyclic FD STBY button to disengage modes when required. When disengaged FD is no longer available.

AHRS FAILURE WITH FD ENGAGED



MAU FAILURE WITH FD ENGAGED

For on-side MAU failure on the selected PFD the FD modes ALT, VS and IAS will disengage, (with a chime for an MAU 1 failure but not for an MAU 2 failure). Follow procedure below for FD action and refer to Section 3 Basic RFM Page 148 for complete MAU failure procedure

1(2) MAU
+
1(2) ADS FAIL
+
1(2) AP FAIL

PFD message combined with CAS Cautions and disengagement of FD modes ALT, ALTA, IAS, VS + Audio Chime (MAU 1 failure only) and loss of:



- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

Multiple CAS cautions illuminate, but those which affect FD functioning are:
1(2) AP FAIL page 22
1(2) ADS FAIL page 31
AFCS DEGRADED see Basic RFM page 3-135

- Continue flight attentive
- On RCP move ADS switch to non failed ADS
- Reduce speed to Vne-27 KIAS, level flight, or 100 KIAS and 1000 fpm in climb
- Below 500 ft (152 m) AGL fly manually

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD data with STANDBY indicator.

ON SIDE ADS FAILURE ON SELECTED PFD WITH FD ENGAGED

Note

For on-side ADS failure on the non selected PFD there is no effect on FD modes. Refer to Section 3 Basic RFM Page 3-146

1(2) ADS FAIL

+

Disengagement of some FD modes (ALT, ALTA, IAS, VS) + Audio Chime

and loss of:

- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

- On RCP move ADS switch to non failed ADS

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD data with STANDBY indicator.

ATTITUDE SYSTEM OFF

ATT OFF

\+

SAS message displayed on both PFD's

Attitude hold system not engaged

- Engage ATT on autopilot controller

If associated with cyclic freedom of motion in longitudinal and/or lateral direction with loss of function of FTR switch and cyclic beep trim

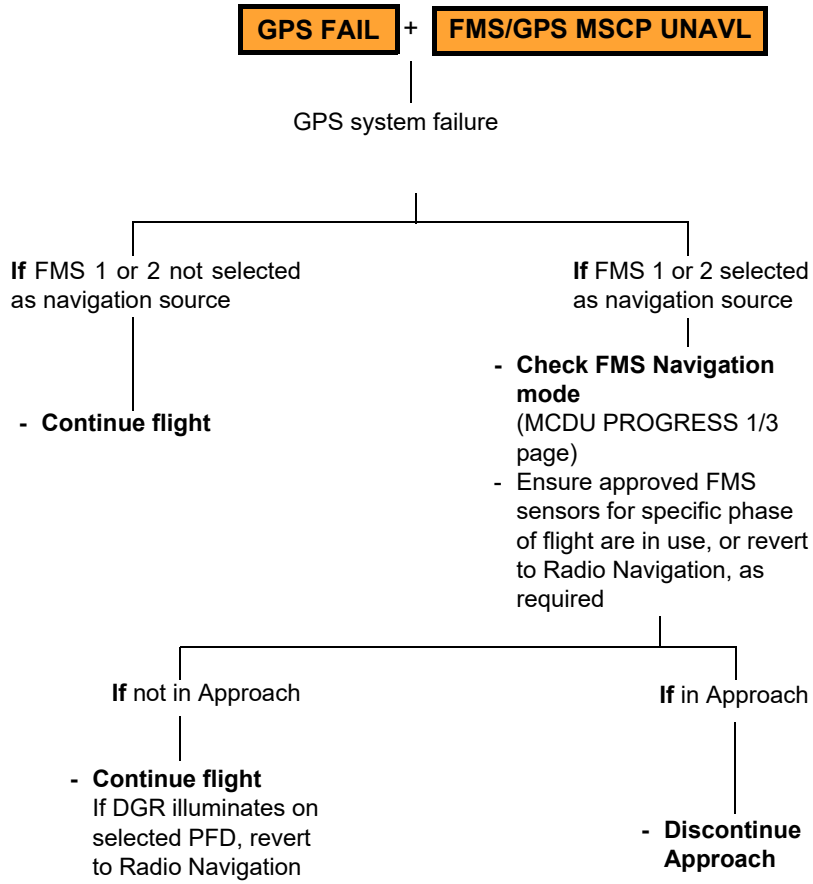
Cyclic force trim failure
Collective FD modes automatically change to uncoupled (with chime)
Cyclic FD modes do not function, cyclic steering bars remain centred

- Fly manually

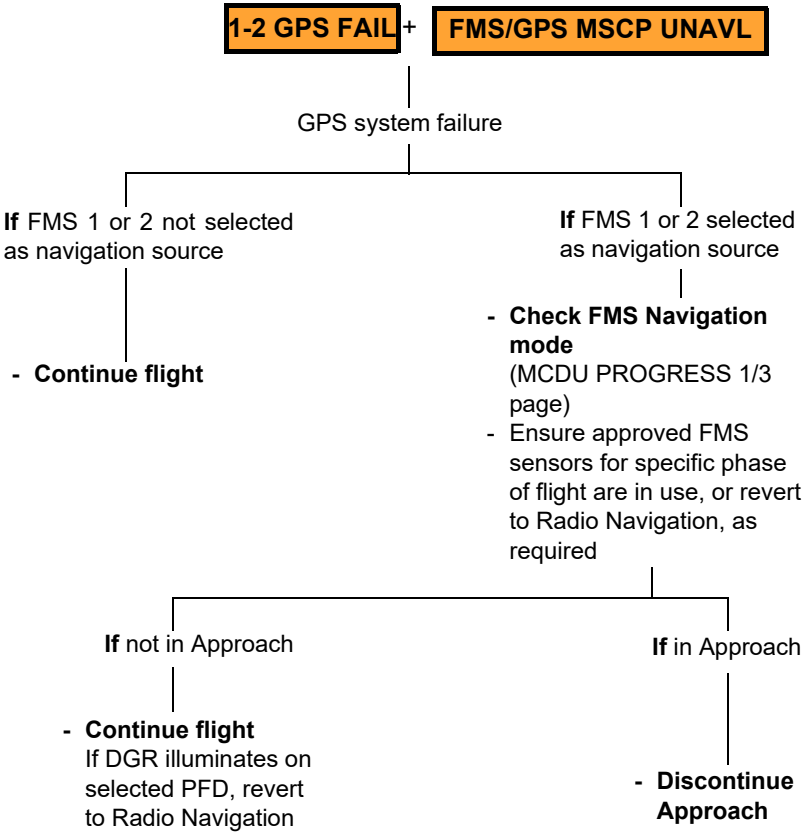
Note

With ATT system not engaged the aircraft flies in SAS mode only.

GPS FAILURE (SINGLE GPS INSTALLATION)



DOUBLE GPS FAILURE (DOUBLE GPS INSTALLATION)



GPS FAILURE (DOUBLE GPS INSTALLATION)

1(2) GPS FAIL

1(2) GPS system failure

Loss of GPS redundancy

- **Continue flight**

FMS FAILURE

1(2) FMS FAIL

Failure of Flight Management System 1(2)

If FMS 1(2) not used as Navigation source

- **Continue flight**
  Loss of redundancy for FMS Navigation

If FMS 1(2) used as Navigation source LNAV, VGP and DCL modes, if engaged, disengage (with chime)

- **Select FMS 2(1) as Navigation Source (press LNAV on Display Controller) or revert to Radio Navigation as required**

If in Approach

- **Discontinue Approach**

PFD MESSAGE

VERTICAL TRACK ALERT CAPTION

VTA

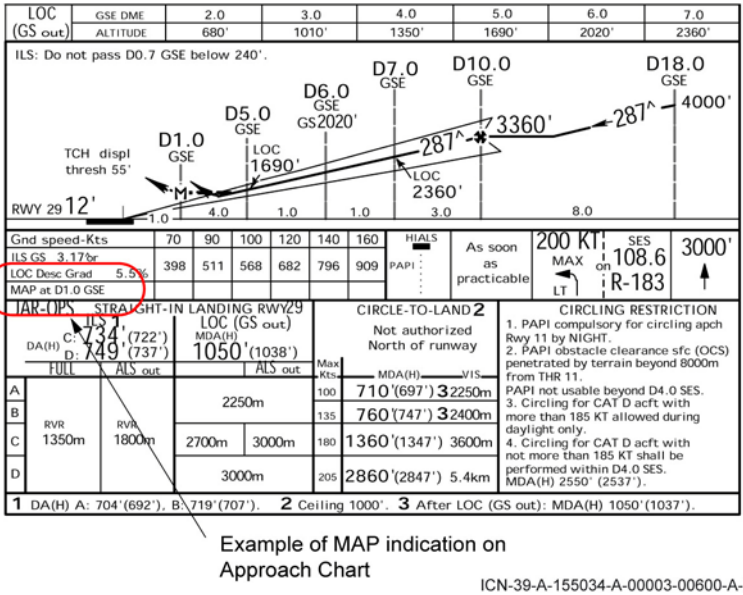
on attitude indicator during VGP mode approach, when within 100 ft above Missed Approach Point (MAP) altitude

The VGP will disengage, with chime, at MAP or transition to AVLV, if still engaged at 150 ft (46 m) AGL

CAUTION

Be aware that:

- ALVL mode will not engage when MAP is above 150 ft (46 m) AGL
- VTA annunciation will not appear when MAP is below 50ft AGL due to engagement of ALVL at 150 ft AG
- VTA annunciation is not availabe when 'MIN' annunciator is illuminated.



Example of MAP indication on Approach Chart

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Figure 3-1 MAP Indication on Approach Chart

SINGLE RAD ALT FAILURE WITH RHT ENGAGED

RAD1(2) Message beside RAD ALT display.
on both PFD's

Rad Alt 2 (1) failed and automatic reconfiguration
to functioning Rad Alt.
Message highlights both Rad Alt
indicators are using the same source

- Continue flight attentive
Loss of Rad Alt redundancy
No effect on RHT functionality

CAUTION

When either RAD ALT fails, the LANDING GEAR CAS caution and associated audio message activate erroneously when the aircraft is above 150 ft (46 m) AGL and the LDG GEAR is retracted.

DOUBLE RAD ALT FAILURE WITH RHT ENGAGED

RAD — Message replaces RAD ALT height information on both PFD's
RHT disengages with audio chime

Failure of both RAD ALT systems

- Continue flight
- RAD ALT functioning is lost
- RHT mode and ALVL not available
- MIN message is inactive

CAUTION

When both RAD ALT's fail, the 150 ft aural warning message does not function and the LANDING GEAR caution will be displayed if the LDG GEAR is retracted, regardless of height.

RAD ALT MISCOMPARE WITH RHT ENGAGED

RAD — message on RAD ALT display
RHT disengages with audio chime

Miscompare between
RAD ALT 1 and 2 information.

- Compare the Pilot and Copilot RAD ALT indications and/or outside visual references to establish correct data.

- Continue flight
RHT mode not available
while message displayed

SECTION 4 - PERFORMANCE

No change in performance information.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full details of FD operation and use see "PRIMUS EPIC Integrated Avionics and Flight Control System for the AW139 Helicopter - Pilot's Guide" Rev. 1 or later issue.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 41

DOUBLE EXTERNAL HOIST OPERATIONS

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SUPPLEMENT 41
DOUBLE EXTERNAL HOIST OPERATIONS

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DEFINITIONS AND ABBREVIATIONS

Abbreviations and acronyms used throughout this Supplement are defined as follows:

— BQRS : Backup Quick Release System

— HEC : Human External Cargo

— HO : Hoist Operator

— NHEC : Non Human External Cargo

— PCDS : Personnel Carrying Device System

— PQRS : Primary Quick Release System

GENERAL INFORMATION

The Goodrich double external hoist P/N 4G2591F00111 consists of two identical hoist units installed, in tandem, onto a common boom and mounting frame on the right side of the cabin (Figure 1 and Figure 2). Each hoist unit has its own dedicated operating pendant. The hoist mounting boom can be rotated electrically to position either the MAIN, the rear hoist, or the SECondary hoist unit into its operating position starting from a stowed position, for minimum drag when hoist operations are not required.

The installation consists of:

- two electric hoist motor and winch assemblies
- an electronic control system that allows the pilot to operate the hoists from the collective grip (See Figure 5)
- a HO control panel which powers and operates the MAIN or the SECondary hoist units as selected
- 2 electronic remote pendants (See Figure 6), one for each hoist unit, that allows the HO to rotate the boom and operate the hoist, as selected on the HO control panel, and display the cable pay-out
- a HO-ICS control panel (See Figure 4) to allow communication among crew-members

- a HO safety harness
- an electrical cable cutter (PQRS), on each hoist unit, and a manual cable cutter (BQRS) for emergency use
- a HO SEARCHLIGHT mounted under the aircraft and driven by a 5 way switch on the HO control panel
- a step bar protection on the lower right side of the fuselage.

Each hoist unit contains:

Hoist Core P/N 3G2591V01532	290 ft (88.4 m) of usable cable.
Hoist Core P/N 3G2591V01531	290 ft (88.4 m) of cable (280 ft (85 m) of which is usable).

The hoist units may lower/lift a maximum load of:

OAT above 0 °C ..... 550 lb (249 kg)

OAT at or below 0 °C ..... 500 lb (227 kg)

The cable payout is shown on the 3 digit display on the pendant. A display format xxx means the cable payout is in feet while yy.y means the cable payout is in meters.

Cargo hoisting and lowering can be controlled by the HO through the remote pendant thumb wheel (Figure 6) which provides variable cable speeds. The cable speed for hoisting is 150 fpm (45 m/min) with maximum load, which increases to 245 fpm (74.4 m/min) with a load of 250 lb (113 kg). The hoist lowering speed maximum is 245 fpm (74.4 m/min). The pilot can also control the operation at a fixed cable speed of 50% of nominal through the hoist control switch on the collective grip. (Figure 5). Both controls automatically slow down at approximately 10 ft from fully out and fully in of the cable and stop the electric motor at the cable extremes. The Pilot hoist control overrides the HO control.

The HO pendant contains indicator lights SLOW/WTR/CABLE/TEMP which initially flash when the system is powered up to confirm correct operation of the lamps. The lights illuminate for conditions of the hoist:

— SLOW - when the cable is automatically slowed when operating within 10 ft from fully in or fully out

— WTR - when the winch trim controller selected (if installed)
— CABLE - when the cable is in a fouled condition and the winch has automatically stopped
— TEMP - when the hoist is in an over temperature condition.

Each hoist is provided with a cable foul protection system which automatically stops the motor if the cable is not correctly wound onto the drum and displays the HOIST CBL FOUL caution message on the MFD.

An electrical cable cutter system (PQRS) is available to the Pilot and Copilot, via a guarded switch on the collective grips (Figure 5) and to the HO, via dedicated guarded switches (MAIN CUT and SEC CUT) on the HO control panel mounted in the cabin (Figure 3).

The hoist kit also comprises a manual cable cutter (BQRS) and a right side cabin door step protection pad to prevent damage to the hoist cable if it contacts the step.

In the event of a failure of the electrical cable cutter system, the cable may be cut with the manual cutter installed under the HO seat or on the cabin ceiling panel or on the floor or on the cabin liner close to the HO seat.

The hoist SEARCHLIGHT is controlled by the LAMP ON/OFF switch and the 5 way switch on the HO control panel. When selected ON the lamp system is supplied with power but the lamp remains off. Pressing the central fifth position on the 5 way switch the lamp illuminates but remains stowed. Moving the 5 way switch to FWD un-stows the lamp, which can then be directed using the switch FWD/R/AFT/L positions. Switching the LAMP switch to OFF turns the lamp off but leaves it extended. Pushing the center position switches the light off (if not already switched off) and stows the light.

The HO audio panel, Figure 4, is used to control the HO communication with other crew members. The HO plugs his headset into the HOIST CONTROL panel HEADSET socket. Then the HO can use either VOX or the PTT trigger, first detent, on the back of the Pendant to speak on the aircraft intercom. The HO can also transmit on COM3 or COM4 using the Pendant HO PTT trigger, second detent.

The pendant also includes a Winchman Trim Mode caption and a five position switch to give the HO limited lateral and longitudinal groundspeed control when in HOV Mode and selected by the pilot. This function is only operational if EPIC software Phase 5 or later and SAR modes are installed. For complete information of this mode see Supplement 69.

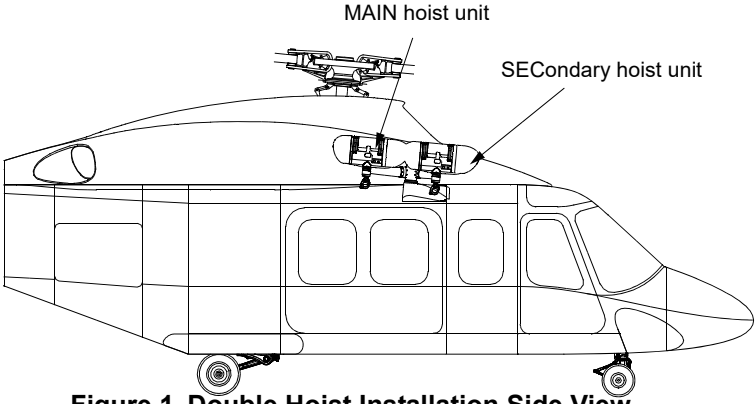

Figure 1 Double Hoist Installation Side View

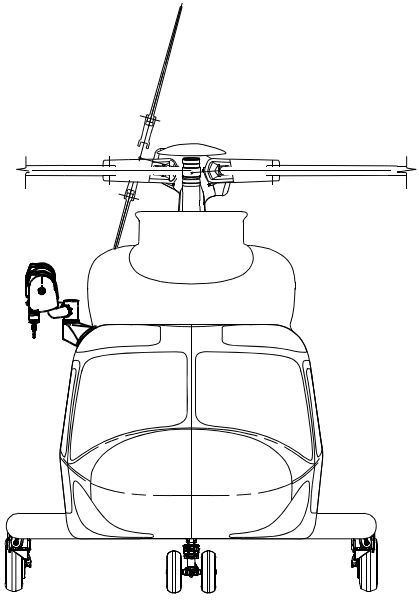

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Figure 2 Double Hoist Installation Front View (Stowed position)

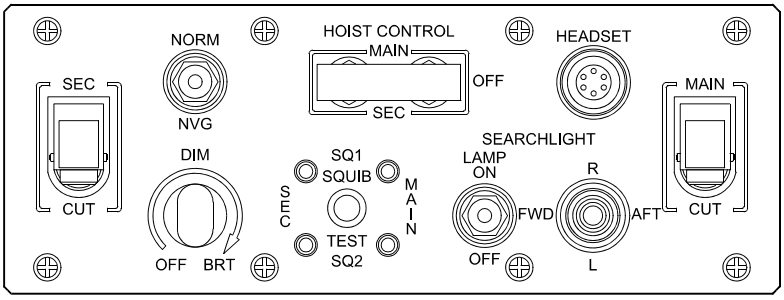

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Figure 3 Hoist Operator Control Panel

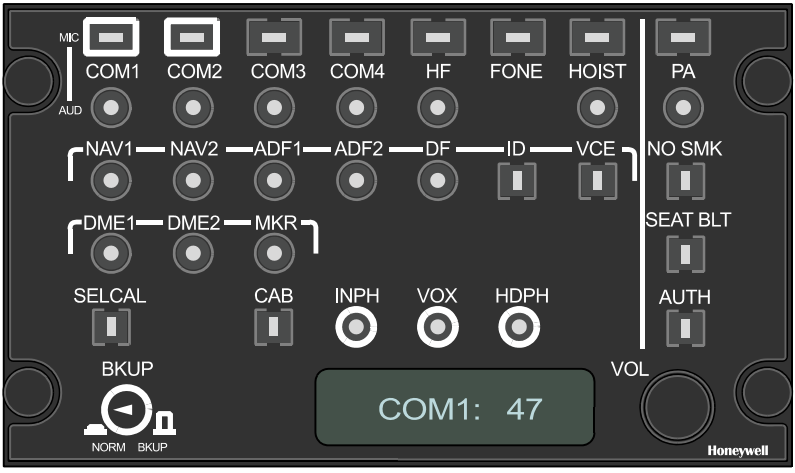

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Figure 4 HO-ICS Control Panel

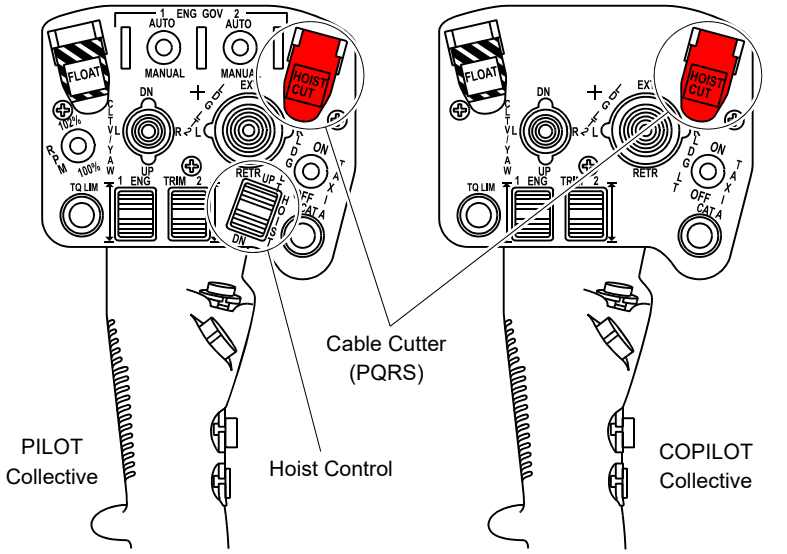

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Figure 5 Pilot and Copilot Collective Hoist Controls

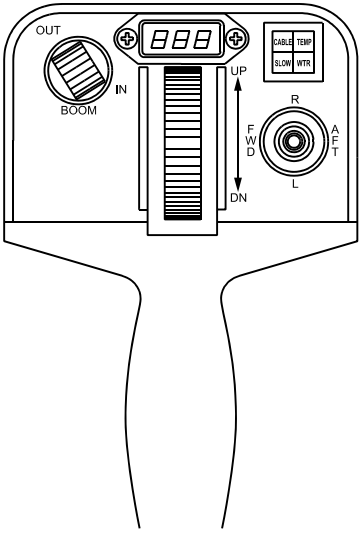

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Figure 6 HO Pendant

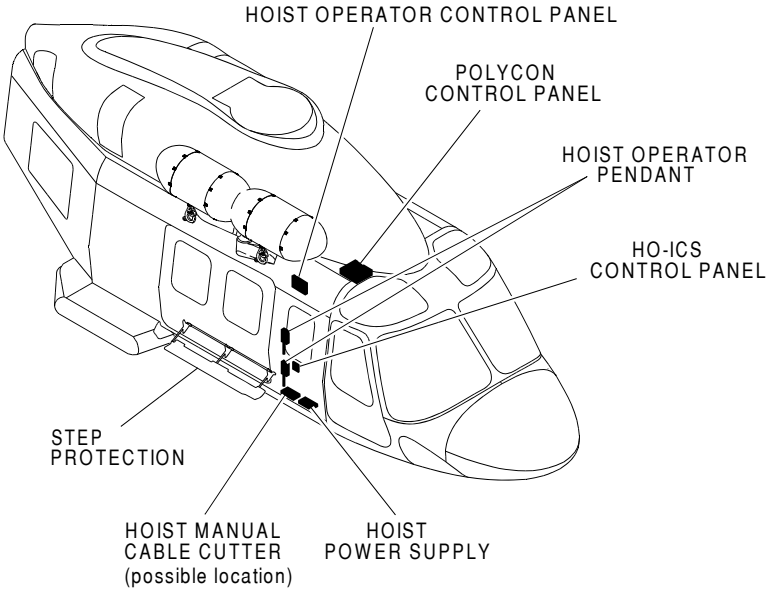

Figure 7 HO Auxiliary Equipment

RADIO ICS SYSTEM

See Section 7 of Basic RFM.

Figure 8 Removed

SECTION 1 - LIMITATIONS

GENERAL

— With HOISTs fitted, but not used, the Limitations stated in the Basic RFM for CAT B operations and in Supplement 12 for CAT A operations are applicable.

— The external hoist equipment certification approval does NOT constitute operational approval. Operational approval for external load operation must be granted by the Local Aviation Authority.

— The external hoist system meets the certification requirements for HEC.

— For compliance with operating rules, the AW139 is certified to CAT A engineering standards.

— The HO Pendants must be removed when Hoist operations are not envisaged.

— During External Hoist operations the number of hoist lifts for each hoist unit must be recorded in the helicopter log-book. An External Hoist lift is defined as an unreeling and recovery of the cable with a load attached to the hook. Any operations where a load is applied for half of the operation (i.e. unreeling or recovery) must be considered as one lift.

TYPE OF OPERATION

— The hoist installation is approved for:

Lifting external loads which are jettisonable and which are lifted free of land or water.

Lowering/raising NHEC or HEC in areas where landing cannot be carried out, under the following conditions:

- Day and Night VFR with ground visual contact
- Right cabin door locked open.

— Operation of the external hoist equipment with HEC requires the use of a Personnel Carrying Device System (PCDS), which must be approved by the Local Aviation Authority. TSO-C167 provides one acceptable means of approval for such systems.

— If the operating rules require one engine inoperative hover performance capability procedures, the maximum weight is defined using the Hover OGE 2.5 min OEI charts.

— For HEC operations an approved Radio-ICS system must be installed and operated in accordance with the applicable Local Operating Regulations.

MINIMUM FLIGHT CREW

One or two pilots (see Basic RFM) and one Hoist Operator (HO).

NUMBER OF OCCUPANTS

In high density configuration the first row of seats must be limited to 4.

Hoist Operator Limitations

— The HO shall be familiar with hoist operating procedures.

— The HO must be restrained by a safety harness during all phases of hoist operation and shall wear protective gloves for guiding cable during operation.

— The HO must guide the cable during hoist operation.

— The HO must always have a manual cable cutter (BQRS) available during all phases of hoist operation.

HEC FOR COMPENSATION OPERATING LIMITATIONS

— Transportation of HEC for compensation must be carried out with HEC inside the cabin.

WEIGHT AND CG LIMITATIONS

After installation of the Double External Hoist System the new empty weight and center of gravity position must be determined.

Weight

Maximum weight with hoist load ..... 6400 kg

Refer Supplement 50 Increased Gross Weight 6800 kg for limitations at weights above 6400 kg.

Weight for HEC

If the operating rules require one engine inoperative hover performance capability procedures, the maximum weight is defined using the Hover Ceiling OGE, 2.5 min OEI charts for the appropriate systems/helicopter configuration.

Refer Section 4 of this Supplement.

Longitudinal CG Limitations

No Change.

Lateral CG Limitation

Lateral C of G limitations..... Figure 1-1 & Figure 1-2

AIRSPEED LIMITATIONS

Load Lowering or Raising

Hoist operation (load raising or lowering) is permitted with helicopter in stationary hover and up to 80 KIAS in forward flight.

CAUTION

For raising (or lowering) in forward flight ensure hoist hook load is sufficient and/or provide another suitable means to maintain the cable and load clear of aircraft structure, undercarriage (if extended) and enable the HO to keep the cable entering/exiting the hoist mechanism close to vertical.

Load Deployed

Maximum airspeed for flight within ±10 degrees azimuth quadrant ..... See Figure 4-1

Maximum groundspeed for sideways and rearward flight beyond forward ±10 degrees azimuth quadrant..... See Figure 4-1

Maximum windspeed beyond forward ±10 degrees azimuth quadrant ..... See Figure 4-1

HEIGHT-VELOCITY LIMITATIONS

For the purposes of Hoist operations, Local Operating Regulations may permit that the H-V Limitations, given in the Basic RFM, need not be observed as an operating limitation. However, if the aircraft is operated within the H-V area a safe landing, following an engine failure, is not guaranteed.

ENGINE POWER TURBINE (NF %) AND ROTOR (NR %) SPEED LIMITATIONS

All Engines Operating

Approved Range for HOIST operations ..... 101 to 103

Maximum for HOIST operations 103

One Engine Inoperative

Approved Range for Hoist operations ..... 101 to 103

Maximum for HOIST operations 103

Note

Following the failure of the RPM select switch, NR/NF = 102% may also be used in cruise below 90 KIAS.

For all other Engine and Rotor Limitations see Basic RFM.

HOIST LIMITATIONS

Hoist loads may be lowered/raised within the limitations defined in the AIRSPEED LIMITATIONS, Load Lowering or Raising paragraph.

Maximum hoist load OAT above 0 °C ..... 550 lb (249 kg)

Maximum hoist load OAT at or below 0 °C ..... 500 lb (227 kg)

Maximum load on hoist ..... 2 persons plus equipment

Maximum load on boom ..... 272 kg (600 lb)

Maximum permissible bank angle with extended cable ..... 20°

WARNING

Exceeding 15° of lateral pendulum angle/helicopter vertical axis can lead to clutch slippage.

CAUTION

Overload clutch is unlikely to function in case of overload.

Hoist Core P/N 3G2591V01532
Maximum hoist cable length usable .....88.4 m (290 ft)

Hoist Core P/N 3G2591V01531
Maximum hoist cable length usable .....85 m (280 ft)

— The primary hoist, the rearward with respect to the helicopter nose, is designated MAIN and the secondary SEC.

— Hoist Core P/N 3G2591V01531 cable must not be deployed beyond 85 m (280 ft) cable payout or activation of the SLOW message on the HO pendant, wichever comes first.

— The MAIN hoist cable must not be left deployed if the SEC hoist is required to be used. When the load has been passed from the MAIN to the SEC hoist the MAIN hoist cable must be manually recovered into the cabin.

— Hoist operations with either MAIN or SEC hoist positioned to its fully IN position is prohibited.

— Take Off and Landing with a suspended load on hoist is prohibited.

MISCELLANEOUS LIMITATIONS

Autopilot Limitations

During hoist operations the Pilot must **either:**

— fly manually

or

— fly attentive when:

- 4 Axis Enhanced Flight Director is installed (Supplement 34, 67 or 69) and
- HOV and RHT (or ALT) modes are engaged.

Primus HF 1050 Radio (Supplement 8)

With the cabin door open, HF 1050 radio transmissions are prohibited.

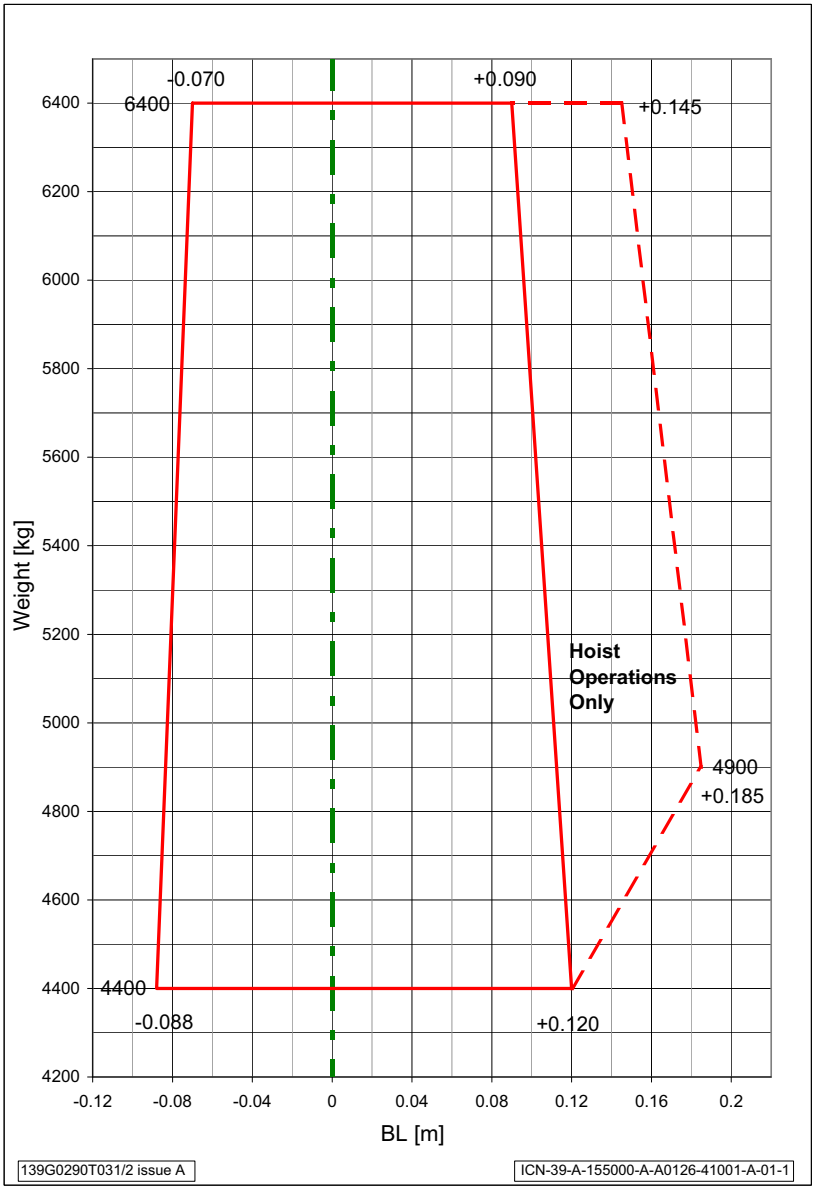

Figure 1-1 Lateral C of G Limitation for Hoist Operation

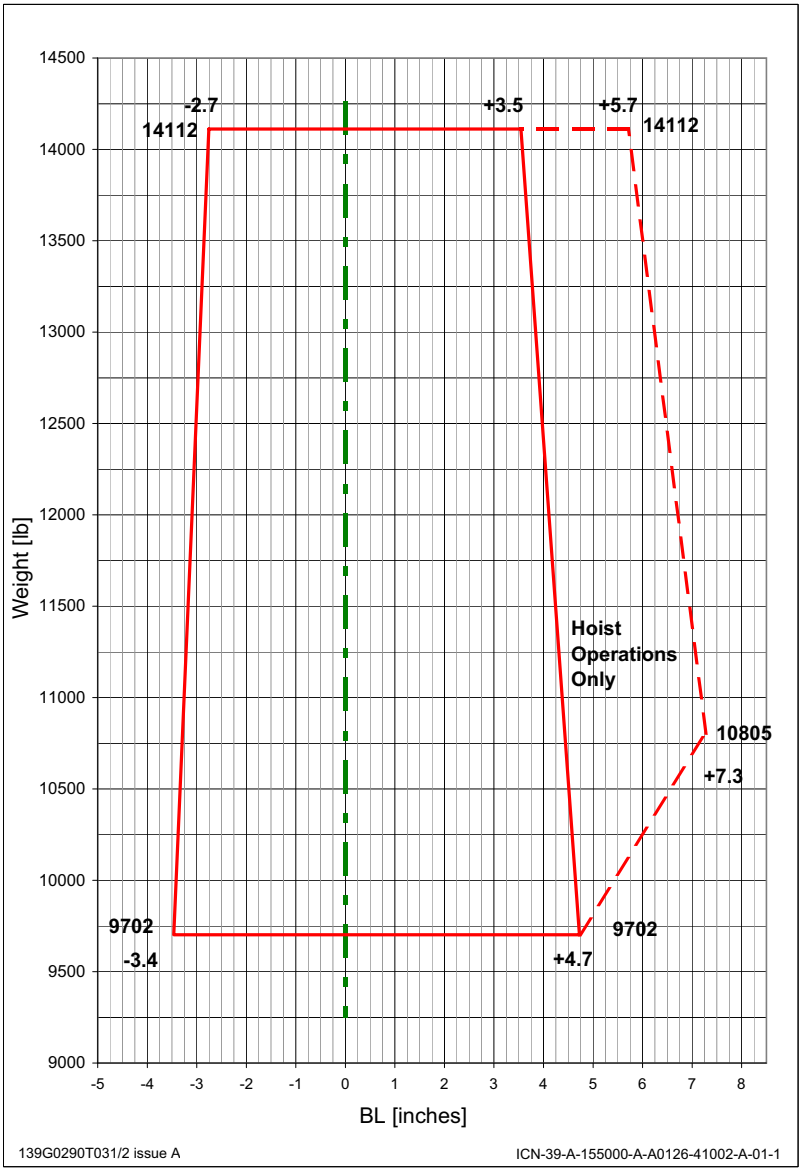

Figure 1-2 Lateral C of G Limitation for Hoist Operation (Imperial Units)

PLACARDS

OAT ABOVE 0°C

- MAXIMUM HOIST LOAD 550 lb [249 kg]

OAT AT OR BELOW 0°C

- MAXIMUM HOIST LOAD 500 lb [227 kg]

MAX LOAD 2 PERSONS + EQUIPMENT

OPERATION WITH EXTENDED CABLE AND LOAD ON THE HOOK:

- MAXIMUM PERMISSIBLE BANK ANGLE IN TURN 20°
- WARNING EXCEEDING 15° OF LATERAL PENDULUM ANGLE /HELICOPTER VERTICAL AXIS CAN LEAD TO CLUTCH SLIPPAGE

CAUTION: OVERLOAD CLUTCH IS UNLIKELY TO FUNCTION IN CASE OF OVERLOAD

A

CAUTION

THE OPERATORS HAND MUST
BE ON THE CABLE AT ALL TIMES
DURING HOIST OPERATION

B

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Figure 1-3 View of Cabin with Placard Positions (sheet 1 of 2)

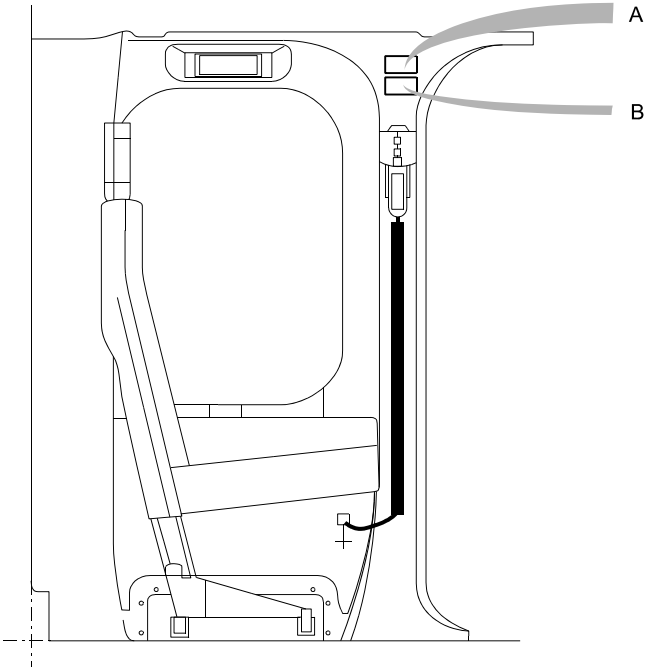

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Figure 1-3 View of Cabin with Placard Positions (sheet 2 of 2)

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

AREA N°2 (Fuselage – Right Hand Side)

1. Hoists, hoist cowlings and mounting — Condition, security, oil leaks.
2. Hoist units electrical cables and connectors — Condition and secure.
3. Hoist boom — Confirm in stowed position.
4. Right step protection pad cover — Condition and secure.
5. Hoist search light — Condition.

CAUTION

Step shall be inspected to ensure the protection is not damaged. Damaged protection may lead to cable failure.

AREA N°7 Cabin and Cockpit Interior

1. HO control panel and ICS control panel — Condition.
2. Hoist control pendant, wiring and connector — MAIN and SECondary present, condition, connector secure.
3. HO harness, gloves and manual cable cutter — Present and condition.
4. Radio-ICS control panel (HEC operations) — Condition.
5. Radio-ICS portable transceiver unit (HEC operations) — Present and condition.
6. HOIST CUT pushbuttons on pilot and copilot collective grips, HO control panel — Guard closed

PRE START CHECKS (BEFORE THE FIRST FLIGHT OF THE DAY)

The following checks may be carried out after connection of external DC electrical power. If external DC electrical power is not available carry out these checks during aircraft SYSTEM CHECKS, after engine and rotor start:

WARNING

If HOIST CUT ARM illuminated with MAIN and SEC HOIST selected OFF the hoist cable cut systems have malfunctioned. The MAIN and SEC hoist are unserviceable and must not be selected ON as the hoist cable may be cut.

1. HOIST CONTROL switch on HO control panel — Select MAIN, HOIST ON advisory illuminates on CAS. Confirm HOIST CUT ARM caution not illuminated on CAS.

1A. Hoist SEARCHLIGHT on HO control panel — Select ON.

WARNING

If HOIST CUT ARM illuminated the MAIN HOIST cable cut system has malfunctioned. The MAIN hoist is unserviceable and must not used. Do not raise the HOIST CUT or MAIN CUT guards as the hoist cable may be cut.

2. SQUIB TEST pushbutton on HO control panel — Push. Confirm the 2 MAIN lights illuminate and CAS HOIST CUT ARM caution illuminates.
Release pushbutton and confirm lights and caution extinguish.

3. HO MAIN pendant — Confirm zero cable payout indication.

4.	HOIST CUT guard on pilot collective grip	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
5.	HOIST CUT guard on copilot collective grip	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
6.	MAIN CUT guard on HO control panel	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
7.	Right cabin door	— Open and locked
8.	HO MAIN pendant	— Move BOOM switch to: • OUT, confirm full movement out of MAIN hoist • IN, confirm movement in to stowed position • IN, confirm full movement in of MAIN hoist • OUT, confirm movement out to stowed position.
9.	HO-ICS	— Confirm correct operation.

WARNING

Protective gloves must always be worn whenever handling the hoist cable to prevent injury from possible broken cable strands.

CAUTION

Care should be taken to prevent cable damage caused by kinking when handling cable on the ground. The cable should lie on to a clean surface whenever possible.

10. HO MAIN pendant thumbwheel	— Rotate to DN, confirm cable lowering according to thumbwheel selection.
11. MAIN HOIST hook	— Condition, security, freedom of rotation.

Note

When reeling in the cable with no load, apply tension to cable to ensure smooth and even wrapping.

12. HO MAIN pendant cable reel in	— Thumbwheel UP, confirm cable raising according to thumbwheel selection and hoist automatically stops when cable fully reeled in. Confirm zero cable payout indication.
13. MAIN Hoist operation from Pilot collective grip switch	— DN, confirm correct operation. UP, confirm correct operation and hoist automatically stops when cable fully reeled in.
14. MAIN Hoist operation from Pilot collective grip switch and HO MAIN pendant	— DN and UP and confirm pilot operation over-rides HO MAIN pendant thrumbwheel selection.

CAUTION

Stow hoist cable by reeling in fully to compress hook bumper. Failure to follow this procedure will damage the cable.

15. HOIST CONTROL switch on HO control panel	— Select OFF. Confirm HOIST ON advisory not illuminated on CAS
16. HOIST CONTROL switch on HO control panel	— Select SEC, HOIST ON advisory illuminates on CAS Confirm HOIST CUT ARM caution not illuminated on CAS

WARNING

If HOIST CUT ARM illuminated the SEC HOIST cable cut system has malfunctioned. The SEC hoist is unserviceable and must not be used. Do not raise the HOIST CUT or SEC CUT guards as the hoist cable may be cut.

17. SQUIB TEST pushbutton on HO control panel	— Push. Confirm the 2 SEC lights illuminate and CAS HOIST CUT ARM caution illuminates. Release pushbutton and confirm lights and caution extinguish.
18. HO SEC pendant	— Confirm zero cable payout indication.
19. HOIST CUT guard on pilot collective grip	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
20. HOIST CUT guard on copilot collective grip	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
21. SEC CUT guard on HO control panel	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
22. HO SEC pendant	— Move BOOM switch to: • OUT, confirm full movement out of SEC hoist • IN, confirm movement in to stowed position • IN, confirm full movement in of SEC hoist

	• OUT, confirm movement out to stowed position.
23. HO SEC pendant thumbwheel	— Rotate to DN and con firm cable lowering according to thumbwheel selection.
24. SEC HOIST hook	— Condition, security, freedom of rotation.
25. HO SEC pendant cable reel in	— Thumbwheel UP, confirm correct operation and hoist automatically stops when cable fully reeled in. Confirm zero on cable payout indication.
26. SEC Hoist operation from Pilot collective grip switch	— DN, confirm correct operation. UP, confirm hoist automatically stops when cable fully reeled in.
27. SEC Hoist operation from Pilot collective grip switch and HO SEC pendant	— DN or UP and confirm pilot operation over-rides HO SEC pendant thumbwheel selection.

CAUTION

Stow hoist cable by reeling in fully to compress hook bumper. Failure to follow this procedure will damage the cable.

28. Radio-ICS portable transceiver (HEC operations)	— Verify transceiver and control box are set on the same frequency and confirm communication between transceiver and crew is satisfactory.
29. Hoist SEARCHLIGHT on HO control panel	— LAMP ON, confirm light functioning by pressing and releasing 5 way switch. Move light using 5 way switch. Switch OFF SEARCHLIGHT by pressing and releasing 5 way switch, select LAMP OFF.

30. Right cabin door — Close or as required.
31. HOIST CONTROL switch on HO control panel — OFF, HOIST ON advisory extinguished on CAS.
32. DC electrical supply — As required.

IN FLIGHT PROCEDURES

Hoist Operating Procedure

1. RPM switch — Set 102%.
2. BUS TIE switch — ON.
3. HOIST CONTROL switch on HO control panel — Select MAIN, HOIST ON advisory illuminates on CAS. Confirm HOIST CUT ARM not illuminated on CAS.

WARNING

HO must be secured to helicopter by an approved safety harness during hoist operation.

4. Hoist SEARCHLIGHT LAMP switch on HO control panel — As required by HO.
5. Position — Establish hover over hoist operation area.

CAUTION

Before opening cabin door the HO must ensure that the cabin is secure, all crew members are secure on their seats and no loose equipment in the cabin.

6. Right cabin door — Open and lock.

CAUTION

During hoist operation the HO must maintain his hand on the cable and verify correct cable unwinding and rewinding.

7. HO MAIN pendant BOOM switch — Select boom OUT position as required.

CAUTION

Hoist Core P/N 3G2591V01531 cable must not be deployed beyond 85 m (280 ft) cable payout or activation of the SLOW message on the HO pendant, whichever comes first.

8. HOIST control switch (pilot) or HO thumb wheel — DN as required.

9. Cable speed (HO only) — As required.

Note

As hook nears the down or up limits hoist speed slows automatically and amber SLOW light illuminates on HO pendant.

CAUTION

Static electricity should be discharged by suitable means before ground personnel touch the hook or cable.

CAUTION

Do not allow cable to drag on ground or any other surface which may contaminate or damage the cable or hook.

10. HOIST control switch (pilot) or HO thumb wheel — UP as required.

11. Cable speed (HO only) — As required.

12. Load Recovery — Recover load into cabin whilst hovering or in forward flight below 80 KIAS.
To help recovery the boom may be rotated to the IN position.

CAUTION

For raising (or lowering) in forward flight ensure hoist hook load is sufficient and/or provide another suitable means to maintain the cable and load clear of aircraft structure, undercarriage (if extended) and enable the HO to keep the cable entering/exiting the hoist mechanism close to vertical.

CAUTION

If load is moved, whilst extended, to a suitable location for recovery, ensure adequate clearance is maintained between hoist load and obstacles.

13. Hoist — Confirm cable and hook stowed

CAUTION

Stow hoist cable by reeling in fully to compress hook bumper. Failure to follow this procedure will damage the cable.

14. HO pendant BOOM switch — As required to move to stowed position.

15. Hoist SEARCHLIGHT (If used) — Push on central position of 5 way switch to turn off and stow light or select LAMP switch to OFF to turn light off unstowed.

16. Right cabin door — Close.

17. HOIST CONTROL switch on HO control panel — OFF, HOIST ON advisory extinguished on CAS.

Note

During hoist operation the HO shall record any shock loading of the cable.

18. BUS TIE switch — AUTO.

19. RPM switch — Set 100%.

LITTER HOISTING

When the use of a litter is essential, every effort should be made to land the helicopter for litter loading. Litter hoisting can be hazardous and should be carried out only when landing is not feasible. In addition to all other procedures contained herein, the following apply to litter hoisting operations.

WARNING

An empty litter suspended from hoist in open position can oscillate uncontrollably in rotor downwash and can fly upward, striking fuselage or tail rotor. If a suitable operational procedure to control the litter is not in place, hoisting of an open empty litter is prohibited.

It is recommended that prior to hoisting or lowering an empty litter, the litter shall be closed and secured with straps, when applicable. Litter should be suspended in a vertical position and sling straps should be drawn tight. Litter sling straps should be adjusted so that litter is 610 to 710 mm (24 to 28 in) below hoist hook.

Note

If litter is suspended too far below hook, litter cannot be loaded into helicopter with hoist hook at upper limit.

CAUTION

When recovering a loaded litter using the hoist it is recommended to use and anti-rotation system in order to avoid the litter spinning.

ADVISORY CAPTION DEFINITION

CAS Caption (Green)	System State
HOIST ON	Hoist power on

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ENGINE FAILURE IN HOVER WITH LOAD ON HOIST

See Basic RFM Section 3 for aircraft procedures.

Procedures when OEI hover performance capability is not required

1. Collective pitch — Maintain collective pitch setting or lower to maintain rotor speed.
2. Hoist Load — Raise load and recover into cabin or Emergency Jettison depending on operational conditions and type of load (NHEC or HEC) or transition forward (maximum 80 KIAS).

Procedures when OEI hover performance capability is required

Note

Weights defined in weight limitation charts guarantee no rotor droop/height loss in case of an engine failure.

1. Collective pitch — Maintain collective pitch setting. Hover OEI is assured with 2.5min rating.
2. Hoist Load — Raise load and recover into cabin.

Note

Time required to raise the maximum load from fully extended approximately 2 minutes.

HOIST LOAD JETTISON

Both hoists are provided with an electrical cable cut system (PQRS) operated by either pilot or copilot or HO. The hoist which is selected by the HOIST CONTROL switch on the HO control panel, is the system active when the pilot or copilot HOIST CUT switch is activated.

If an emergency condition should require the release of a hoisted load carry out the following:

WARNING

The correct hoist selection on the HOIST CONTROL switch must be confirmed before hoist cable cut activation.

1. HOIST CONTROL switch on HO control panel — Confirm MAIN or SECondary, as required.
2. HOIST CUT pushbutton on pilot or copilot collective grip or MAIN CUT (SEC CUT) on HO control panel — Lift guard, HOIST CUT ARM caution illuminates on CAS. Press pushbutton.

If the electrical HOIST CUT system fails, cut cable with the manual cable cutters accessible to HO. Cut cable as close to the hoist as possible.

CHANGE OF HOIST PROCEDURE

CAUTION

Ensure maximum hoist/boom load does not exceed values reported in Section 1 Limitations of this Supplement.

1. HOIST CONTROL switch on HO control panel — Select OFF. Confirm HOIST ON advisory not illuminated on CAS
2. Pendant — Take HO SEC pendant and stow HO MAIN pendant.

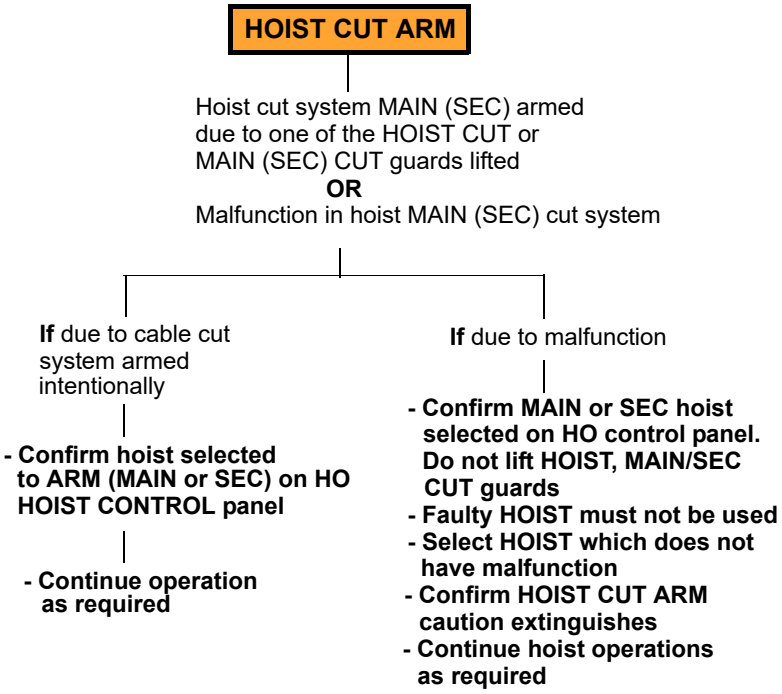
3. HOIST CONTROL switch on HO control panel — Select SEC. HOIST ON advisory illuminates on CAS. Confirm HOIST CUT ARM caution not illuminated on CAS.

4. HO SEC pendant — Confirm zero cable payout indication.
Move BOOM switch to OUT to rotate boom to the operational position.

5. MAIN hoist cable — Recover cable into cabin manually.

6. Hoist operations — Continue hoist operations as required.

HOIST CUT ARM



HOIST CABLE FOUL

HOIST CBL FOUL + CABLE indication light on associated HO pendant

Hoist cable fouled and hoist inoperative

CAUTION

On hoist unit with CABLE indication on its pendant, do not select up/down on that pendant or Pilot collective until the cable misalignment has been corrected, to avoid the risk of possible cable breakage. See Change of Hoist Procedure to use alternative hoist cable.

- Depending on operational situation recover or cut cable then select functioning hoist and continue

or

- Proceed in forward flight with load suspended allowing adequate load clearance over obstacles

At suitable site

- Establish hover and slowly descend to lay load on ground.

- Recover cable on board manually or as required

HOIST OVER-TEMPERATURE

A hoist over temperature is indicated by an amber TEMP light on the HO control pendant. In the event of a hoist over temperature, complete the hoist cycle. Select other hoist and resume the hoist operation as required.

CAUTION

Prolonged operation of hoist with amber TEMP indication on hoist pendant display will result in hoist failure.

Note

When the hoist TEMP light is on, the hoist is automatically slowed in operation

HOIST BOOM MOTOR FAILURE

If the Hoist Boom motor fails the MAIN or SEC hoist may be used provided the hoist used is not in its fully IN position and cable does not interfere with any part of the fuselage. Depending on where the boom is positioned be aware that difficulty may be found in recovering hoist loads into cabin.
If the Boom is in any position, other than the stowed, be aware fuel consumption, during cruise, may be increased.

LIGHTNING STRIKE

The Hoist Core P/N 3G2591V01531 may be inoperative if struck by lightning. This does not apply to Hoist Core P/N 3G2591V01532.

DOUBLE GENERATOR FAILURE

See Section 3 Basic RFM for aircraft procedures.

In the case of a double generator failure during hoist operation and if it is essential to recover the load into the cabin, carry out the following.

Main Hoist in use:

1. MAIN BATTERY switch — Confirm ON (to supply power to MAIN BUS 1 for MAIN hoist power and hoist SEARCH-LIGHT).
2. BUS TIE switch — Select AUTO.
3. HOIST operation — Complete recovery cycle and return hoist to stowed position. Confirm hoist SEARCHLIGHT OFF.
4. MAIN BATTERY switch — OFF or as required according to procedure in Section 3 Basic RFM.

CAUTION

The hoist recovery cycle will reduce the battery endurance time to 10 minutes.

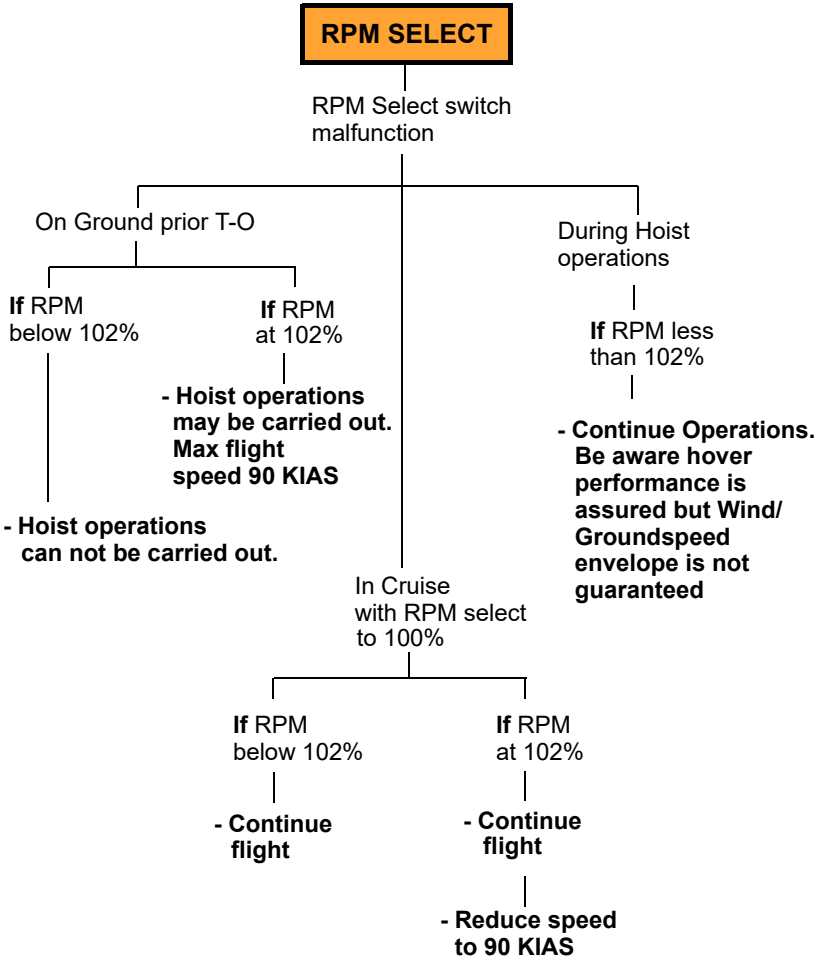
Secondary Hoist in use:

1. MAIN BATTERY switch — Confirm ON.
2. BUS TIE switch — Confirm ON (to supply power to MAIN BUS 2 for SEC hoist power).
3. HOIST operation — Complete recovery cycle and return hoist to stowed position. Confirm hoist SEARCHLIGHT OFF.
4. BUS TIE switch — Select AUTO.
5. MAIN BATTERY switch — OFF or as required according to procedure in Section 3 Basic RFM.

CAUTION

The hoist recovery cycle will reduce the battery endurance time to 10 minutes.

ROTOR SPEED SELECTOR



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SECTION 4 - PERFORMANCE DATA

HOVER WEIGHT FOR HOIST OPERATION

HEC Operations Requiring OEI Capability

Weight for HEC, requiring OEI hover performance capability, is Hover Ceiling OGE, 2.5 min OEI chart for the appropriate systems/helicopter configuration:

Clean Intake HEATER OFF/ECS ENVIRO OFF
See Basic RFM ..... Figure 4-14

EAPS Intake EAPS OFF
See RFM Supplement 5 ..... Figure 4-8

EAPS Intake EAPS ON
See RFM Supplement 5 ..... Figure 4-16

IBF installed HEATER OFF
See RFM Supplement 86 ..... Figure 4-8

Note

Weights defined in the above charts guarantee no rotor droop/height loss in case of an engine failure, therefore do not lower collective.

Hover Ceiling

Hover performance of the Basic RFM or Supplement 50 (if applicable) apply.

Low Speed Envelope

— Weight for NHEC/HEC with manoeuvre envelope as detailed in Figure 4-1, is Hover Ceiling OGE, MCP, AEO chart for the appropriate systems/helicopter configuration:

Clean Intake HEATER OFF/COND OFF
See Basic RFM ..... Figure 4-13

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT
See RFM Supplement 2 ..... Figure 4-4

Clean Intake COND ON/ECS ENVIRO A/C RECYCLE
See RFM Supplement 2 ..... Figure 4-23

Clean Intake ECS ENVIRO FULL AUTO
See RFM Supplement 87 ..... Figure 4-9

EAPS Intake EAPS OFF
See RFM Supplement 5 ..... Figure 4-7

EAPS Intake EAPS ON
See RFM Supplement 5 ..... Figure 4-15

EAPS Intake EAPS OFF/ON, HEATER ON
See RFM Supplement 5 ..... Figure 4-21

IBF installed HEATER OFF
See RFM Supplement 86 ..... Figure 4-7

IBF installed HEATER ON
See RFM Supplement 86 ..... Figure 4-13

Note

Weights defined in the above charts guarantee adequate controllability margins for operation within the Wind/Ground/Air speed Azimuth Envelopes Figure 4-1.

— Weight for NHEC/HEC with manoeuvre envelope as detailed in Figure 4-2, is Hover Ceiling OGE, TOP, AEO chart for the appropriate systems/helicopter configuration. The maximum altitude permissable for hoist operations at TOP is 7000 ft Hd:

Clean Intake HEATER OFF/COND OFF
See Basic RFM ..... Figure 4-12

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT
See RFM Supplement 2 ..... Figure 4-3

Clean Intake COND ON/ECS ENVIRO A/C RECYCLE
See RFM Supplement 2 ..... Figure 4-22

Clean Intake ECS ENVIRO FULL AUTO
See RFM Supplement 87.....Figure 4-8

EAPS Intake EAPS OFF
See RFM Supplement 5 .....Figure 4-6

EAPS Intake EAPS ON
See RFM Supplement 5 .....Figure 4-14

EAPS Intake EAPS OFF/ON, HEATER ON
See RFM Supplement 5 .....Figure 4-20

IBF installed HEATER OFF
See RFM Supplement 86.....Figure 4-6

IBF installed HEATER ON
See RFM Supplement 86.....Figure 4-12

Note

Operation in Hover OGE at TOP is permitted for a maximum duration of 5 minutes.

Note

Weights defined in the above charts guarantee adequate controllability margins for operation within the Wind/ Ground/Air speed Azimuth Envelopes Figure 4-2.

Note

Be aware that for hover operations using the TOP range and an autopilot height hold mode engaged (RHT or ALT) the PI limiting function will intervene at 106% PI, therefore, it is not recommended to use height hold for these conditions.

PERFORMANCE WITH HOIST INSTALLED

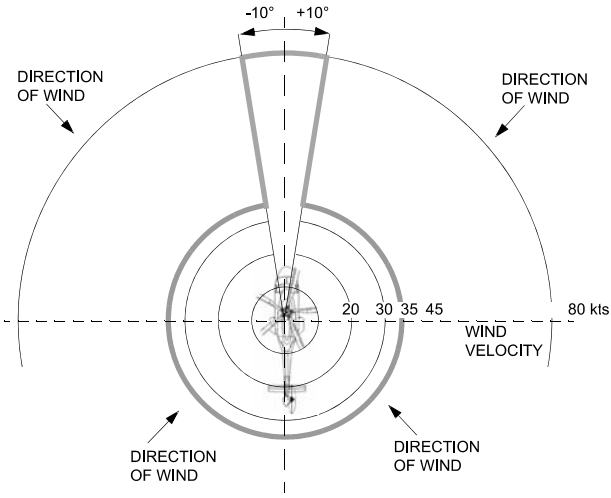
When the Double External Hoist Kit is installed together with one or more of the following kits:

- Snow skids installation (Supplement 19)
- Slump Pads Installation (Supplement 20)
- Searchlight installation (Supplements 29, 44, 53).

the climb performance is reduced by:

ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

Applicable up to 7000 ft Hd (2100 m Hd)



Applicable from 7000 ft Hd to 14000 ft Hd (2100 m to 4300 m Hd)

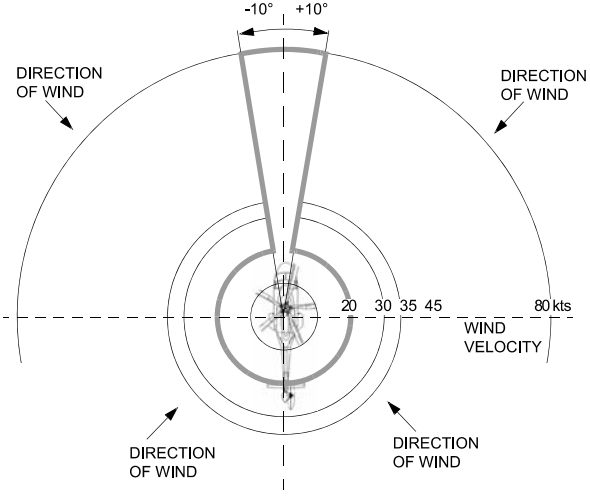


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Figure 4-1 Wind/Ground/Air speed Azimuth Envelopes for Operation at OGE with MCP, AEO

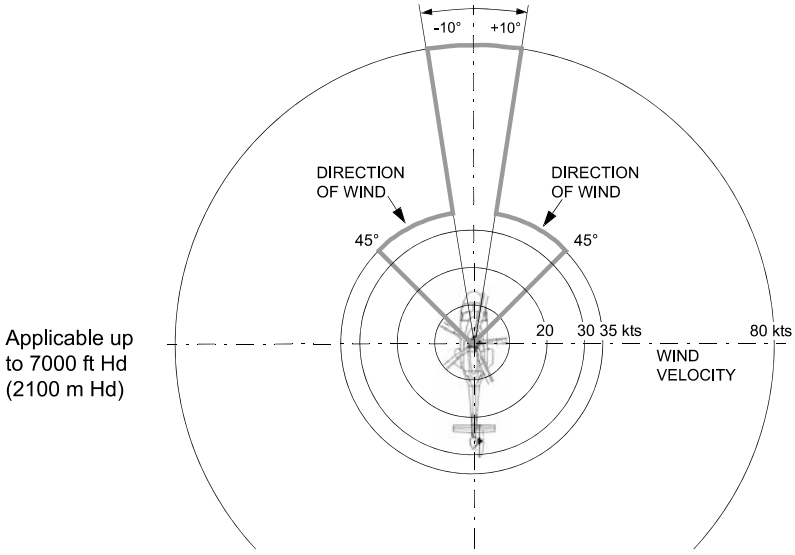
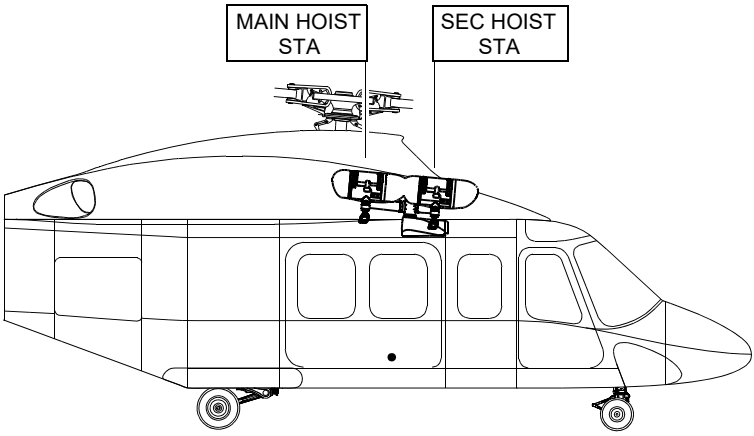


Figure 4-2 Wind/Ground/Air speed Azimuth Envelopes Operation at OGE with TOP, AEO

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

When the HOIST is being operated the following Longitudinal and Lateral Moments for loads attached to HOIST hook must be used in the Weight and Balance Calculations.



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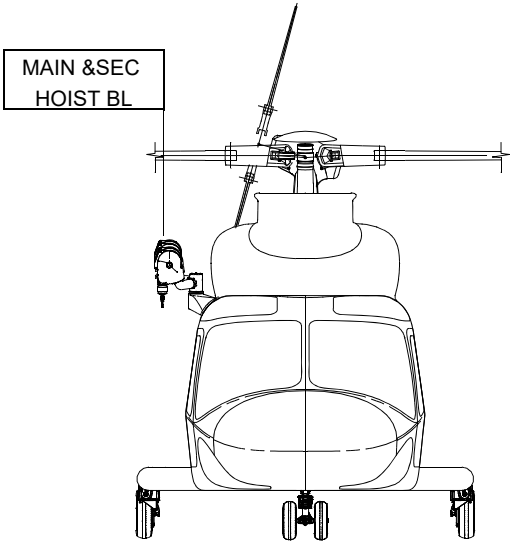

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MAIN and SECondary HOIST POSITIONS

Operational Position	MAIN Hoist		SECondary Hoist	
	STA (mm)	BL (mm)	STA (mm)	BL (mm)
MAIN (Boom out)	4601	1503	-	-
SEC (Boom out)	-	-	3995	1350

SECTION 7 - SYSTEM DESCRIPTION

Optional kits for installation with the Goodrich Double Hoist are:

— Hoist camera P/N 4G9760F0111 which consists of a composite camera mounted onto the hoist body and associated power supply unit and wiring.
An additional variation of the kit 4G9760F0111 is to have a 90° rotated field of view internal camera (P/N 3G9706P01011).

— Hoist HD camera P/N 4G9750F01611 which consists of an HD camera mounted onto the hoist body and associated Video Distribution Module and Video format converter (to convert video from HD to SD) and wiring.

Both kit installation permits the pilot to monitor hoist operations on the MFD, the 5th Display (if installed) and additional displays and the images to be recorded in HD or SD, dependant on the installation requested by the customer.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 42

RADAR TELEPHONICS RDR SERIES AND TAS KTA 970

P/N 4G3441F00311
P/N 4G3441F00511
(SAR Variant)

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SUPPLEMENT 42
RADAR TELEPHONICS RDR SERIES AND TAS KTA 970

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GENERAL INFORMATION

This Supplement gives details of the radar Telephonics RDR-1500B+ P/N 4G3441F00311 (and RDR-1700A P/N 4G3441F00511) and TAS KTA 970. The two kits are reported in one Supplement because the upper antenna of the TAS system and the radar antenna are installed, together within a dedicated nose configuration P/N 3G5240A00117.

RADAR TELEPHONICS RDR SERIES

The Telephonics RDR-1500B+ (and RDR-1700A) Surveillance and Weather radar provides a multi-mode radar capability for maritime missions. The RDR-1500B+ (and RDR-1700A) provides three primary modes of operation:

- Sea surface search and terrain mapping
- Weather avoidance
- Beacon detection (I band transponders only - beacon type SST-181E) and navigation mode.

The information may be displayed on the (central) 5th display by pressing the appropriate button on the 5th display and/or the Mission Console Display, if installed. If the VMU kit P/N 4G9310F00611 is installed, the information may be presented on the MFD.

The weather radar system comprises of a flat plate antenna and drive unit, a receiver/transmitter unit, an interface unit and a radar controller mounted in the interseat console.

The radar controller panel (See Figure 3) allows the selection of all radar modes, radar controls and non-radar modes such as navigation overlays modes and target marker mode. The control panel also contains a joystick for controlling the cursor for target marker and tracker functions.

The RDR-1700A is an updated version of the RDR-1500B+.

For full information on the use of the radar Telephonic RDR-1500B+ (or RDR-1700A) refer to appropriate Telephonic RDR Pilots Guide Latest Issue.

TRAFFIC ADVISORY SYSTEM KTA 970

The KTA 970 is an onboard Traffic Collision Advisory System (TCAS I) which monitors a radius of nominal 18 NM around the helicopter. By interrogating any intruding aircraft transponder, it determines if a potential conflict with other aircraft exists.

This is done by computing the relative range, altitude, bearing and closure rate of other transponder-equipped aircraft with respect to the helicopter.

KTA 970 system warns the flight crew with an aural and visual Traffic Advisory whenever the system detects another transponder equipped aircraft and predicts the intruder to be a threat.

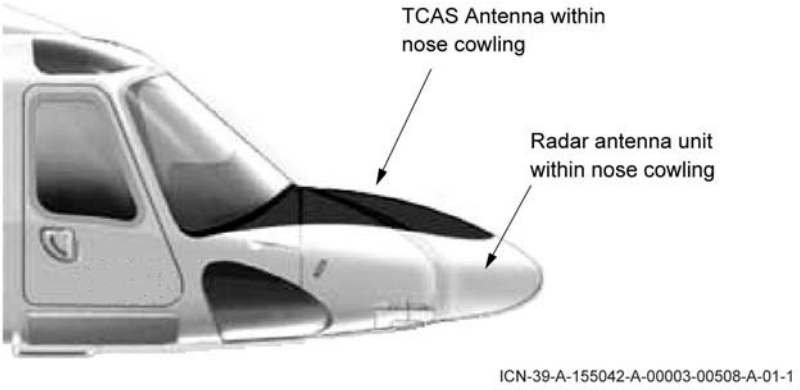

Figure 1 Nose External Configuration

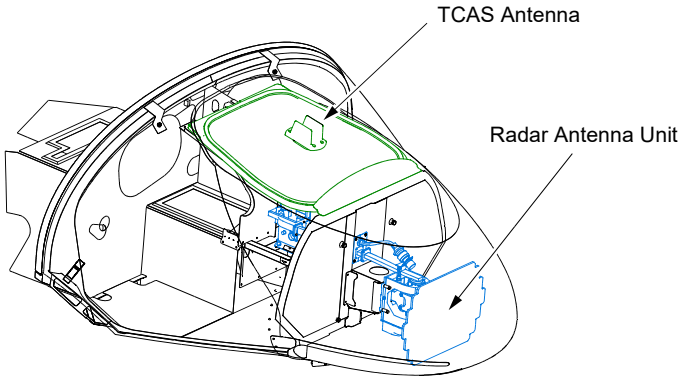

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Figure 2 Nose Internal Configuration

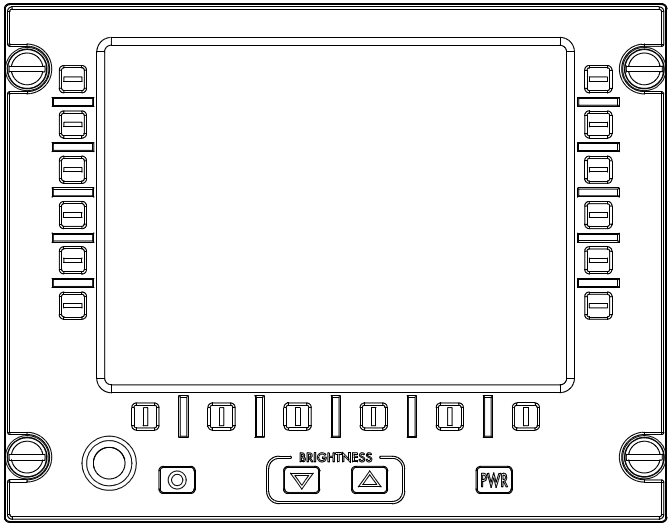

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Figure 3 Radar Telephonics RDR Series Control Panel

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SECTION 1 - LIMITATIONS

TYPE OF OPERATION

The KTA 970 is approved for VFR and IFR operation as an aid to visually acquiring traffic.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Telephonic RDR radar kit and TAS KTA 970, the new empty weight and center of gravity position must be determined.

RADAR RDR SERIES LIMITATIONS

— The radar must not be used for navigation or terrain avoidance.

TCAS KTA 970 SYSTEM LIMITATIONS

— The pilot must manoeuvre the helicopter based only on ATC guidance or positive visual acquisition of the conflicting traffic.

— Intruder Traffic within ±45° of the aft direction and above the helicopter altitude may not be visualized on the TCAS display.

— At distances greater than 5 nautical miles double images of actual intruders may occasionally be seen for a few seconds.

— When the undercarriage is extended the TCAS lower antenna operates in omnidirectional mode. Therefore, when the intruder aircraft is below the helicopter, bearing information is not available.

— The TCAS may not be reliable during Primus HF 1050 radio (Supplement 8) or V/UHF FLEXCOM II radio (Supplement 16) transmissions.

SECTION 2 – NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

1. TCAS Antenna (Lower) — Condition.

PRE-START CHECKS

1. Weather Radar — OFF or SBY.

Note

The weather radar does not transmit when the helicopter is on the ground due to WOW safety interlock.

SYSTEM CHECKS

Note

If more convenient checks may be carried out whilst A/C in IDLE mode.

1. MCDU — Select RADIO page. Check TCAS/XPDR set to TA.
2. MFD page — Select MAP page and activate Traffic visualization.
3. MCDU — Press MENU key
   Press TEST key.
   Press XPDR/TCAS key.
4. MFD (MAP) page — Verify TCAS TEST amber annunciation inside TCAS status box.
   Traffic test page presented.
   At the end of test sequence confirm aural message “TCAS SYSTEM TEST OK” is heard.
   Verify TCAS OFF white annunciation inside TCAS status box.
5. MFD page — Select as required.

AFTER TAKE-OFF

1. MFD PWR PLANT page — Check all parameters within normal operating limitations and confirm no engine matching abnormalities.

2. MCDU — TCAS/XPDR as required.

Note

If MFD is not set in MAP page (eg. PWR PLANT) and TCAS is ON, as soon as a traffic alert is generated from the system, the cursor is prompted on MAP soft key. Pressing the ENTER key on CCD control panel, the MAP page is displayed on MFD with traffic information. Moreover a TRAFFIC message is displayed on the PFD on the left side of the ADI and the aural warning TRAFFIC TRAFFIC is generated.

Note

Use of the TCAS self test function in flight will inhibit normal TCAS operation for up to 8 seconds

IN FLIGHT PROCEDURES

CAUTION

Do not attempt manoeuvres based only on traffic information shown by TCAS. Information on the display is provided as an aid in visually acquiring traffic, it is not a replacement for ATC instructions and See & Avoid techniques.

Note

For complete radar functionality, refer to the Telephonics RDR-1500B+ (or RDR-1700A) Weather Radar Pilot's Guide latest issue.

1. Radar — As required.

PRE-LANDING CHECKS

1. Radar — OFF or SBY.

APPROACH AND LANDING

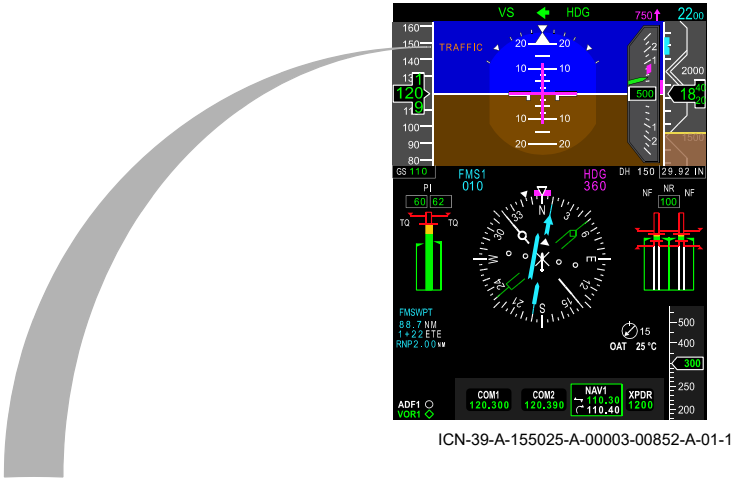
1. MFD PWR PLANT page — Check all parameters within normal operating limitations and confirm no engine matching abnormalities.

POST LANDING AND SHUTDOWN PROCEDURES

PRE-SHUTDOWN CHECKS

1. MCDU — Check TCAS/XPDR set to STBY.

TCAS MESSAGES ON PFD AND MFD



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Aural Warning 'TRAFFIC - TRAFFIC'

+

TRAFFIC Flashing or steady on PFD attitude indicator

|

TRAFFIC ALARM

|

The crew should attempt to gain visual contact with the intruder and be prepared to manoeuvre upon visual acquisition

Note

The TCAS aural warning has the lowest audio priority over the other aural cautions and warnings available on the helicopter.

TCAS OFF On MFD MAP page TCAS window

+

TCAS OFF On PFD attitude indicator

TCAS system OFF



ICN-39-A-155025-A-00003-00853-A-01-1

TCAS TEST On PFD attitude indicator

+

TCAS TEST On MFD MAP page TCAS window

TCAS system functional test

Note

Use of the TCAS self test function in flight will inhibit normal TCAS operation for up to 8 seconds.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the radar Telephonics RDR Radar system is switched OFF.

MALFUNCTION PROCEDURES

WEATHER RADAR TRANSMITTING ON GROUND

1-2 WOW FAIL

On ground, if radar is switched ON and WOW microswitches fail radar will transmit

- Confirm radar switched OFF

PFD AND MFD DISPLAY MESSAGES

TCAS SYSTEM FAILURE



ICN-39-A-155024-A-00003-00851-A-01-1

TCAS FAIL On PFD attitude indicator

\+

TCAS FAIL On MFD MAP page TCAS window

TCAS system failure

Traffic information and
Traffic Alarm not available

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 43

STAR SAFIRE SERIES FLIR

P/N 4G9350F00311
P/N 4G9350F00611
P/N 4G9350F00211
P/N 4G9350F01111

The replacement of the equipment detailed in this Supplement is not allowed without the successful completion of the additional verifications reported in the Maintenance Manual.

Changes to the helicopter configuration (ie. installation of approved equipments) are not allowed without the successful completion of the verifications reported in the Maintenance Manual.

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SUPPLEMENT 43
STAR SAFIRE SERIES FLIR

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GENERAL INFORMATION

The Star Safire series of FLIR systems are a remote controlled day/ night high resolution, infrared (IR) imaging system with colour video. Four systems available:

Star Safire III ..... P/N 4G9350F00311

Star Safire HD ..... P/N 4G9350F00611

Star Safire 380-HD ..... P/N 4G9350F00211

Star Safire SS380-HDC ..... P/N 4G9350F01111

The difference between the 4 types being the type and resolution of the imaging systems and optional FLIR and Laser payloads available.

The system consists of a stabilized Turret-FLIR Unit (TFU), mounted under the nose of the helicopter (Figure 1 & Figure 2), a Central Electronics Unit (CEU) which processes the electronics, (for 380-HD and SS380-HDC the CEU is not required) and a System Control Unit which consists of a Universal Hand Control Unit (UHCU) or 'T' control unit that contains all the controls necessary to operate the FLIR turret and systems. (See Figure 3 & Figure 4). The UHCU handgrip or 'T' unit has a stowage at the rear of the interseat console. The UHCU keyboard can only be used in the cabin.

The TFU is gyro stabilized and its azimuth and elevation, and therefore the FLIR Line Of Sight (LOS), corresponding to the center of the image, can be directed to any position within the Field Of Regard (FOR) which is 30° to -120° in elevation and 360° in azimuth from the forward position.

The FLIR Imager incorporates all the necessary optics, detectors and required electronics to convert the infrared radiation from the medium wave infrared thermal imaging sensor into standard video signals for processing by the CEU (the 380-HD and SS380-HDC model is a digital system and incorporates a short wave infra red SWIR system option). The optional equipment installed within the FLIR include Class 1 Eye Safe Laser Range Finder (ESLRF) and Charged Coupled Device (CCD) cameras.

Optional Laser Pointers/Illuminators may be installed which are Class IIIb and IV devices depending on the model installed and not eye safe.

For Star Safire III, HD and 380-HD the eye safe distances depends on the system installed and are reported in Limitations. Therefore, a Laser Safety Interlock Unit (LIU) (See Figure 5) is fitted in the interseat console incorporating an ARM switch requiring a key to ARM the laser before firing. A WOW interlock ensures the laser is not use when the aircraft is on the ground.

The IR camera has five optical Field of Views (FOV) and produces images in total darkness or in low visibility or low contrast ambient condition. The CCD camera, if fitted, provides images in visible and low light ambient conditions.

The IR and CCD cameras provide video outputs that can be monitored on either pilot or copilot MFD. Either IR or CCD images can be selected independently on pilot and copilot MFD or both images in miniature. If a digital map is installed the copilot and pilot MFD will only display the same source data, either FLIR or digital map.

The optional central 5th display or the Mission Console Display can also be used to display either image.

Overlayed on the FLIR image are graphic symbology and status information in 3 status lines, two above the image and the third below.

If the SX-16 (P/N 4G3340F00711/712) or SX-5 (3G3340F00511) Search light is installed the searchlight may be slaved to the FLIR for night illumination. See appropriate Supplement for Searchlight.

For full information on the use of the Star Safire III, HD, 380-HD and SS380-HDC FLIR refer to the appropriate Star Safire FLIR Thermal Imaging Equipment Operator’s Manual Document, latest revision.



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Figure 1 Star Safire FLIR Turret (Example)

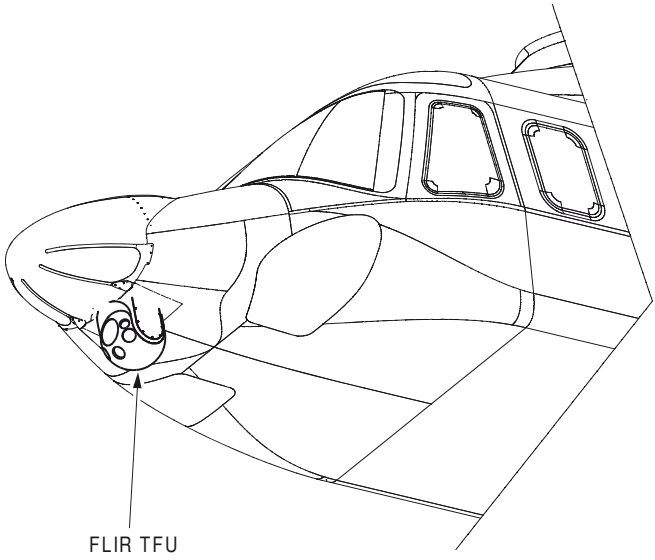

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Figure 2 Star Safire Series FLIR Installation

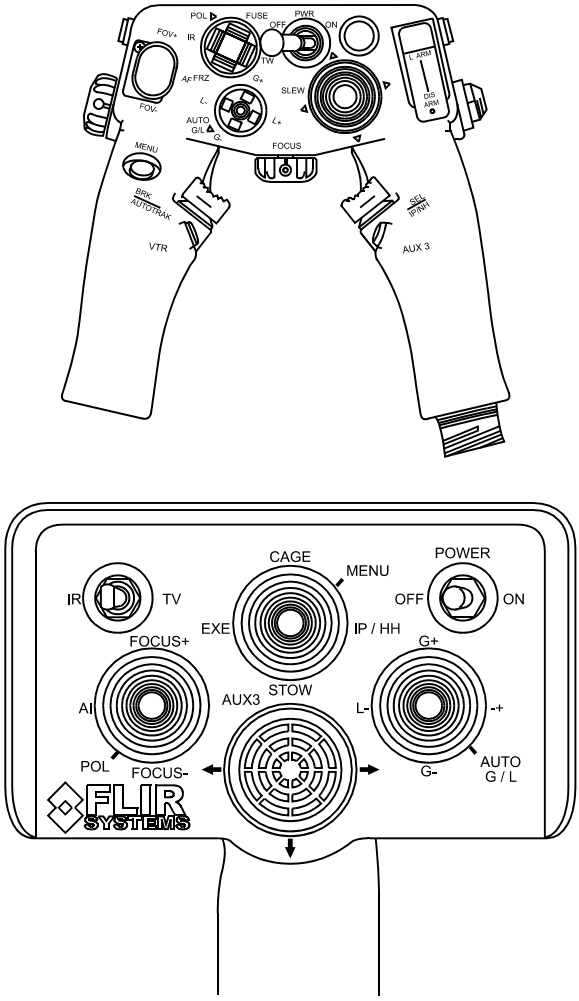

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Figure 3 Universal Hand Control Unit (Handgrip type) and 'T' Type Controller Options

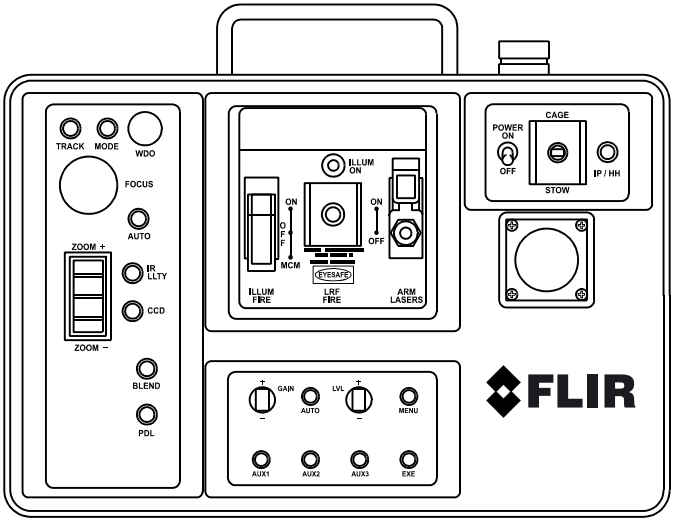

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Figure 4 Universal Hand Control Unit (Keyboard type)

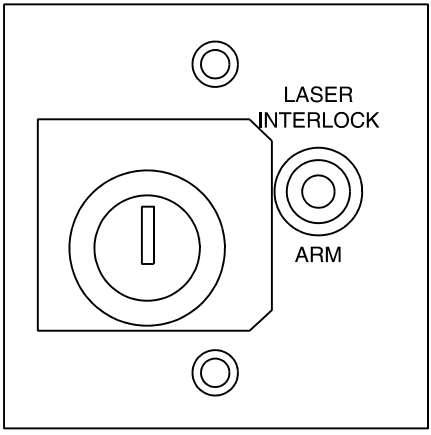

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Figure 5 Optional Laser Safety Interlock Unit (LIU)

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Star Safire Series FLIR kit, the new empty weight and center of gravity position must be determined.

STAR SAFIRE SERIES FLIR LIMITATIONS

The FLIR must not be used for navigation.

The FLIR UHCU handgrip must be operated from the left hand seat or by cabin crew.

The FLIR UHCU keyboard must be operated from the cabin only.

The FLIR ESLRF must not be operated when close to personnel.

STAR SAFIRE III, HD, & 380-HD FLIR LIMITATIONS

Operation of the FLIR laser pointer/illuminator Class IIIb/IV devices, if fitted, must be authorized by the Competent Authority.

The FLIR Laser Illuminator ARM must not be selected ON when personnel are within the following distances from the aircraft:

- 100 mW illuminator Star Saphire III..... 340 m (1116 ft)
- 1 W illuminator Star Saphire HD and 380-HD .....61 m (200 ft)
- 2 W illuminator Star Saphire III, HD and 380-HD .....20 m (66 ft)
- SWIR illuminator Star Saphire 380-HD .....6 m (20 ft)

The FLIR Laser pointer ARM must not be selected ON when personnel are within the following distances of the aircraft:

- 100 mW pointer Star Saphire HD ..... 340 m (1116 ft)
- 100 mW pointer Star Saphire 380-HD ..... 400 m (1310 ft)
- 150 mW pointer Star Saphire 380-HD ..... 390 m (1280 ft)
- 650 mW pointer Star Saphire 380-HD ..... 530 m (1740 ft)

STAR SAFIRE SS380-HDC FLIR LIMITATIONS

Laser Class IIIa/IIIb/IV operation is not EASA approved.

The laser pointer/illuminator is disabled.

SECTION 2 - NORMAL PROCEDURES

Note

For full information on the use of the Star Safire III, HD, 380-HD or 380-HDC FLIR refer to appropriate Star Safire FLIR Thermal Imaging Equipment Operator's Manual Document, latest revision.

EXTERNAL PRE FLIGHT CHECKS

AREA N°1 (Helicopter Nose)

1. Star Safire FLIR TFU — Secure.
   Check IR and CCD camera lens condition and cleanliness.

AREA N°7 (Cockpit/Cabin Interior)

1. Star Safire FLIR UHCU — Check present, connected and secure.

2. LIU ARM switch (if fitted) — Confirm OFF.

ENGINE PRE-START CHECKS

1. Star Safire FLIR UHCU — Confirm system switched OFF.

SYSTEM CHECKS

1. Star Safire FLIR UHCU — Switch system ON (after engine start).

2. Star Safire FLIR image — Select image display as required (pilot, copilot MFD, Central 5th display, Mission console display).
   Select IR or CCD camera as required.

3. Star Safire FLIR UHCU — Stow FLIR or as required.
Stow UHCU or as required.

Note

To prevent potential damage to payload, gymbal and gyro it is recommended that the Star Safire FLIR be kept powered for the duration of the flight including Taxi, Take-Off and Landing.

Note

The turret should be in the STOWED position:
- when not in use,
- during Taxiing, Take Off and Landing,
- before being powered OFF.

IN FLIGHT

1. Star Safire FLIR UHCU — Confirm ON.

2. Star Safire FLIR image — Select image display as required. (pilot/copilot MFD by selecting FLIR Cam on MFD system menu, or Central 5th display or Mission console display, if fitted).
Select IR or CCD camera as required.

3. Star Safire FLIR UHCU — Control FLIR direction and settings as required.

CAUTION

The ESLRF must not be operated when close to personnel.
In flight do not ARM (if fitted):

- Laser illuminator, if personnel are within the minimum safe distances for the laser type as indicated in the Limitations Section of this Supplement.
- Laser pointer, if personnel are within the minimum distances for the laser as indicated in the Limitations section of this Supplement.

4. ESLRF — Activate as required.
5. LIU ARM switch (if fitted) — Select ARM.
6. Laser illuminator/pointer on UHCU (if fitted) — Lift guard, select ARM ON.
7. Laser illuminator/pointer on UHCU (if fitted) — Activate as required, when operations complete select ARM OFF/DISARM.
8. LIU ARM switch (if fitted) — Select OFF.
9. SLAVE button on searchlight pendant (if installed) — Select as required.

Note

When FLIR is not being used it should be stowed to protect the FLIR cameras.

PRE LANDING CHECKS

1. Star Safire FLIR UHCU — Stow FLIR cameras. Stow UHCU.
2. Laser illuminator/pointer ARM switch — Confirm OFF/DISARM and caged.

PRE SHUTDOWN CHECKS

1. Star Safire FLIR UHCU	— Confirm FLIR selected to STOW, select system to OFF (after at least 10 seconds from STOW selection). Confirm UHCU stowed.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the Star Safire FLIR system is switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 44

SX-5 SEARCHLIGHT

P/N 4G3340F00811
P/N 4G3340F00812

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SUPPLEMENT 44
SX-5 SEARCHLIGHT

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GENERAL INFORMATION

The SX-5 Starburst searchlight is a high intensity external light source installed on a gimbal support on the left hand side of the helicopter. It is used to provide high intensity external lighting for reconnaissance operations during night time.

This Supplement gives instruction on the SX-5 installation P/N 4G3340F00811 which includes the Slaving Kit to slave the light to a FLIR.

The installation consists of the SX-5 searchlight, gimbal support, (Figure 1), a slave control unit, a pendant control box (Figure 1), with stowage (mounted on the rear of the interseat console), and necessary hardware and cabling. The pendant, see Figure 2, has a POWER button (with ON indicator) which energizes the SX-5, a LAMP switch which must be held in, for not more than 5 seconds, to light the lamp, a FOCUS button to control the size of the beam, a 4 way rocker switch (UP/LEFT/DOWN/RT) to direct the searchlight, a SLAVE button (with ON indicator) that slaves the SX-5 spotlight to a FLIR system and a PRESET button that when pressed aligns the searchlight to a preset forward direction.

When the SX-5 is slaved to the FLIR, azimuth and elevation of the searchlight are controlled by the FLIR however FOCUS is still controlled by the pendant.

To turn the light off the POWER switch must be selected off.

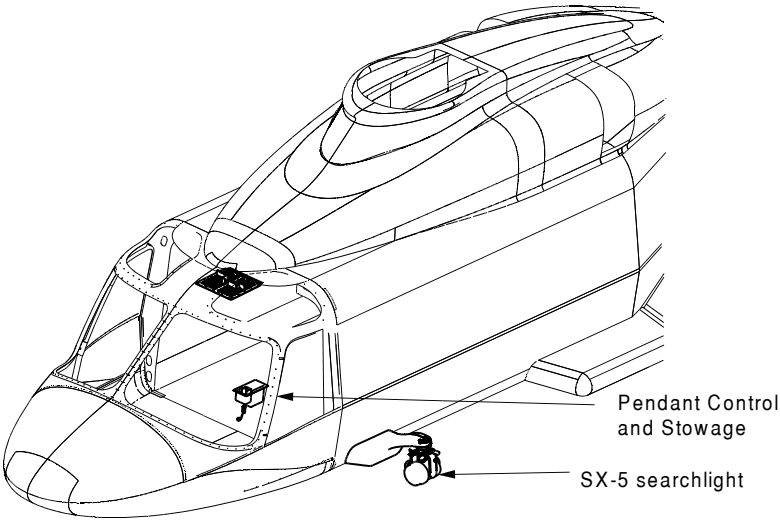

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Figure 1 SX-5 Searchlight Installation

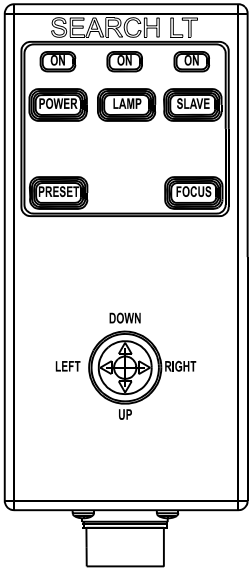

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Figure 2 Pendant with SX-5 FLIR Slaving

SX-5 Controlled by LTS PNL (P/N 4G3340F00812)

An optional control panel, labelled LTS PNL (Figure 3), and installed in the interseat console, allows control of the SX-5 from either the pendant or the LTS PNL panel itself and the Pilot/Copilot collective grip.

On the LTS PNL, selecting the three position CTRL switch to NORM, the SX-5 operation is transferred to the pendant.

Selecting the CTRL switch to PLT (pilot) or CPLT (copilot) the pendant is isolated and all operations of the SX-5 are controlled by the LTS PNL panel and five way switch on the associated collective grip.

From the LTS PNL panel the SX-5 can be started or switched off, by moving the MASTER switch to ON (START) or OFF. When the direction control of the SX-5 has been transferred to the Pilot or Copilot collective grip, the movement of the light is achieved through the five way switch normally used for controlling the secondary landing light and labelled LDG LT2 (See Figure 4). Push this switch in the central position changes the focus of the SX-5.

Note

Prior to selecting control from pendant to LTS PNL or vice-versa ensure that the ON/OFF/START switch is selected to the same setting on both controllers.

The LTS PNL adds an additional feature to the LDG LT2 (secondary, adjustable, landing light). Whether the SX-5 is controlled either by the pendant (CTRL switch selected to NORM) or by a collective grip (CTRL switch to PLT or CPLT) or OFF the secondary landing light is controlled by the LDG LT2 two position switch on the LTS PNL and the five way switch on both collective grips or that grip not selected to the SX-5. On the LTS PNL, setting the LDG LT2 to UNSTOW provides electrical power to the secondary landing light. Then pushing on the central position of the fiveway switch on either collective grip, or that not selected to the SX-5, the light is activated but remains retracted. The light may be extended, partially or fully, by beeping to EXT on the five way switch and then directed by movement of the five way switch. Pressing again on the central position of the five way switch turns the light off but it remains in the position last set. When required it may be turned on again in the last set position. Moving the LDG LT2 switch on the LTS PNL to STOW position turns off and retracts the lamp.

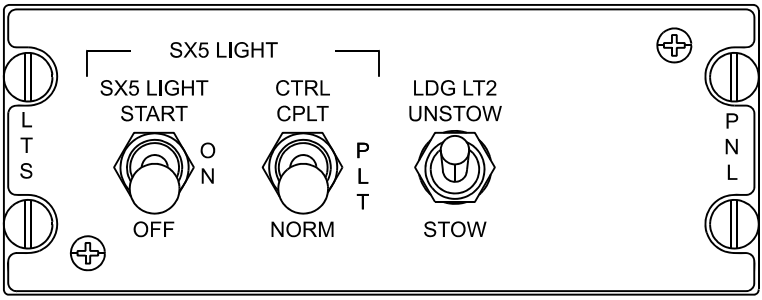

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Figure 3 Interseat LTS PNL Controller (Optional)

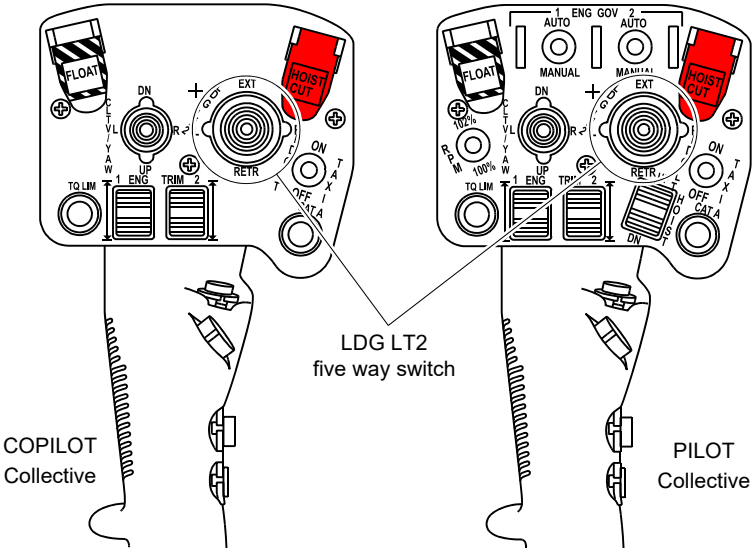

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Figure 4 Collective Grip (Pilot and Copilot)

SECTION 1 - LIMITATIONS

TYPE OF OPERATION

Operation of the SX-5 is prohibited in IFR.

WEIGHT AND CG LIMITATIONS

After SX-5 installation, the new empty weight and CG location must be determined.

AIRSPEED LIMITATIONS (KIAS)

Maximum airspeed with SX-5 stowed ..... $Vne_{Power\ ON}$

Maximum airspeed to move SX-5 ..... 80 KIAS

Maximum airspeed with SX-5 in any position other than stowed ..... $Vne_{Power\ ON}$-40 KIAS

SX-5 LIMITATIONS

— When using the pendant controller the SX-5 must be operated from the left hand seat or by cabin crew.

— The SX-5 light must be OFF:

- below 50 ft (15 m) AGL
- in cloud or fog conditions

— SX-5 must be stowed for landing.
Stowed position:

Elevation ..... +15 deg

Azimuth ..... 0 deg

SX-5 ranges limited by mechanical stops:

Elevation ..... +15 deg to -50 deg

Azimuth ..... 15 deg to right, 180 deg to left

PLACARDS

SX-5 SEARCHLIGHT

DO **NOT** USE BELOW **50**FT AGL OR IN **FOG** CONDITIONS

In View of Pilot

SECTION 2 - NORMAL PROCEDURES

COLD WEATHER OPERATION

If the helicopter is to remain parked outside with an OAT at or below -55° C the SX-5 should be removed and stored in a heated room.

EXTERNAL PRE-FLIGHT CHECKS

AREA N°6 (Fuselage Left Hand Side)

1. SX-5 searchlight ➡	— Secure and wiring properly connected. Check lens for cleanliness and security. Check condition of lightning conductor brackets (2) and grounding cable.

AREA N°7 (Cabin and Cockpit Interior)

1. SUN CONTR circuit breaker (overhead console)	— Confirm In.
2. OFF/ON/START switch (on pendant control box and, if fitted, LTS PNL)	— Confirm OFF.
3. CTRL switch on LTS PNL, if fitted	— As required.
4. LDG LT2 switch on LTS PNL, if fitted	— UNSTOW.

SYSTEM CHECK

SX-5 checks

1. LTS PNL, if fitted, CTRL switch — Set NORM.
2. POWER switch (on pendant control box) — Set to ON.
3. UP/LEFT/DOWN/RT switch (on pendant control box) — Move control and verify correct movement of searchlight.
   — Move searchlight to stowed position (elevation full up, azimuth 0 deg).
4. POWER switch (on pendant control box) — Select OFF or as required.
5. Pendant Control Box — As required or stow in stowage box on rear of interseat console.

IN FLIGHT

SX-5 operating procedure

CAUTION

— In flight, do not use SX-5 searchlight below 50 ft (15 m) AGL.
— Do not direct the beam towards other aircraft or vehicles to prevent temporary blinding effect.

Note

When operating SX-5 searchlight, magnetic compass indication is not reliable.

Note

When selecting control from pendant to LTS PNL or vice-versa ensure that the ON/OFF/START switch is selected to the same setting on both controllers.

1. LTS PNL, if fitted, CTRL switch — Confirm NORM.
2. POWER switch (on pendant control box) — Select ON.
3. LAMP switch (on pendant control box) — Hold in ON until the ignition of the lamp has occurred. Do NOT hold the switch for longer than 5 seconds.

Note

Holding the switch in the ON position, after ignition of the lamp, may damage the SX-5.

Note

Only 3 START attempts may be performed. If the SX-5 does not light up after the third attempt (maximum of 5 seconds for each attempt), select the POWER switch OFF.

4. UP/LEFT/DOWN/RT switch (on pendant control box) — As required to direct light.
5. FOCUS pushbutton (on pendant control box) — As required to focus light beam as desired.

SLAVING to FLIR

6. SLAVE button on pendant control box — Press to slave SX-5 to FLIR.

When SX-5 operations completed:

7. Light orientation — Light stowed (elevation full up, azimuth 0 deg).
8. POWER switch (on pendant control box) — Select OFF.

APPROACH AND LANDING

CAUTION

In flight, do not use SX-5 searchlight below 50 ft (15 m) AGL.

1. SX-5 light	— Confirm light stowed (elevation 0, azimuth 0 deg). — Ensure light off before reaching 50 ft (15 m) AGL.
2. POWER switch (on pendant control box)	— Select OFF.
3. Pendant Control Box	— Stow in stowage provided.

POST SHUTDOWN CHECKS

If the helicopter is to remain parked outside with an OAT at or below -55° C the SX-5 should be removed and stored in a heated room.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

DOUBLE DC GENERATOR FAILURE

1. SX-5 (pendant control box)
   — Stow light (elevation full up, azimuth 0 deg).
   — Set to OFF.

SX-5 SEARCHLIGHT FAILURES

For any failure of the SX-5 attempt to stow but if not possible:

Maximum airspeed with SX-5 in any position other than stowed ..... $Vne_{Power\ ON}$-40 KIAS

SECTION 4 - PERFORMANCE DATA

No change in aircraft performance when SX-5 Searchlight is installed.

When SX-5 is installed together with one or more of the following kits:

- External Hoist installation (Supplements 11, 41, 49)
- Snow skids installation (Supplement 19)
- Slump Pads Installation (Supplement 20).

The climb performance is reduced by:

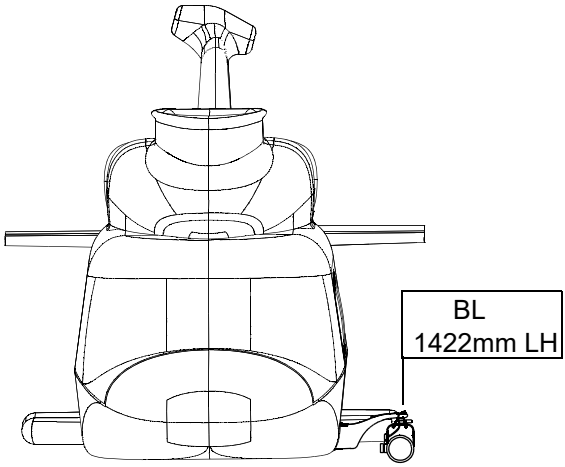
ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

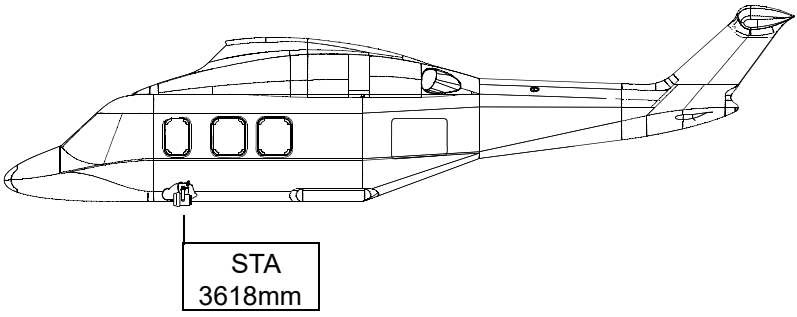
PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

SX-5 LONGITUDINAL AND LATERAL MOMENT ARMS

When the SX-5 is installed the following Longitudinal and Lateral Moment arms are applicable for the Weight and Balance Calculations.





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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 45

CABIN CONFIGURATIONS WITH POLE MOUNTED SEATS

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SUPPLEMENT 45
CABIN CONFIGURATIONS WITH POLE MOUNTED SEATS

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GENERAL INFORMATION

This Supplement covers cabin configurations with pole mounted foldable seats and standard low and high density seating configuration;

Row 1: 2 foldable and 1 seat ..... P/N 4G2520F03011
P/N 4G2520F13113
P/N 4G2520F13115

Row 1: 3 foldable seats..... P/N 4G2520F13112

Row 1: 4 foldable seats.....P/N 4G2520F13111

Row 2: 4 standard seats ..... P/N 4G2520F13211
5 high density seats P/N 4G2520F13212

Row 3: 4 foldable seats..... P/N 4G2520F03111
P/N 4G2520F13311
5 high density seats P/N 4G2520F13316

Alternative Row 2 & 3:
4+4 low density seats..... P/N 4G2520F03211
P/N 4G2520F13312

5+5 high density seats ..... P/N 4G2520F13212
P/N 4G2520F13316

Row 2 5 High Density, Row 3 4 foldable seats ..... P/N 4G2520F13212
P/N 4G2520F13311

The Row 1 configurations for two and three seats are compatible with the Mission Console (Supplement 38) and with the Row 2 low density seat configuration and Alternative Row 2 & Row 3 low density seat configuration.

The Row 3 configuration is compatible with Row 1 configuration and Mission Console.

Row 1 configuration (Row 2 and 3 not presented for clarity)

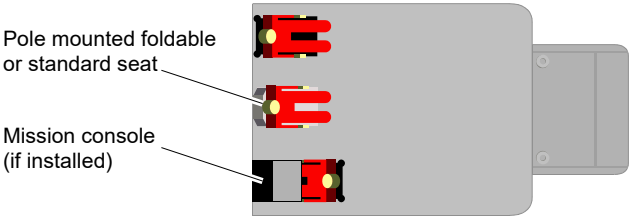

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Figure 1 Row 1 Configuration
P/N 4G2520F03011/13113/13112/13115

3 occupants Including Mission Display operator

- Row 1, Mission display Operator (foldable seat)
- Row 1, aft facing (low density or foldable) seat (mid position)
- Row 1, aft facing foldable seat

Row 1 configuration (Row 2 and 3 not presented for clarity)

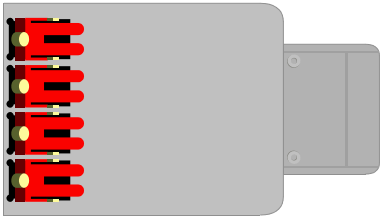

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Figure 2 Row 1 Configuration Foldable Seats
P/N 4G2520F13111

- Maximum 4 passengers facing aft, foldable seats

Row 2 configuration (Row 1 & 3 not presented for clarity)

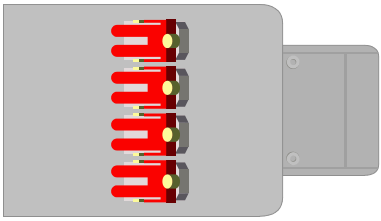

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Figure 3 Row 2 Seating, Low Density Configuration P/N 4G2520F13211

— Maximum 4 passengers facing forward, low density seats.

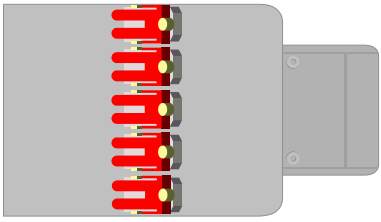

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Figure 3A Row 2 Seating, High Density Configuration P/N 4G2520F13212

— Maximum 5 passengers facing forward, high density seats.

Row 3 configuration (Row 1 not presented for clarity)

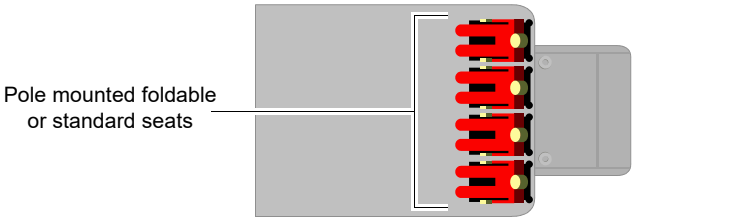

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Figure 4 Row 3 Seating, Foldable and Standard Seats
P/N 4G2520F03111/13311/13312

— Maximum 4 passengers facing forward, foldable seats.

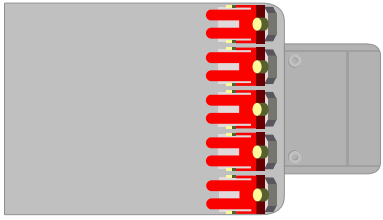

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Figure 4A Row 3 Seating, High Density Seats
P/N 4G2520F13316

— Maximum 5 passengers facing forward, high density seats.

Alternative Row 2 & Row 3 configuration
(Row 1 not presented for clarity)

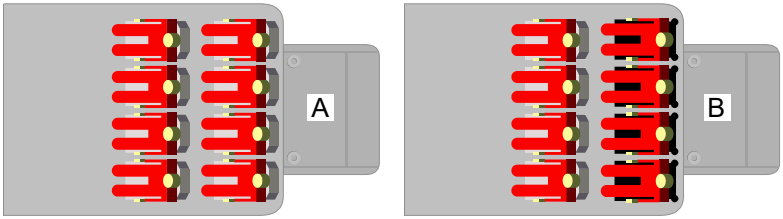

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**Figure 5 Alternative Row 2 & 3 Configuration.
Low Density Configuration (A) or Row 3 replaced with Foldable Seats (B) (P/N 4G2520F03211)**

— Maximum 4 passengers Row 2 low density configuration

— Maximum 4 passengers Row 3, standard low density seats (A) or Row 3 forward facing foldable seats (B)

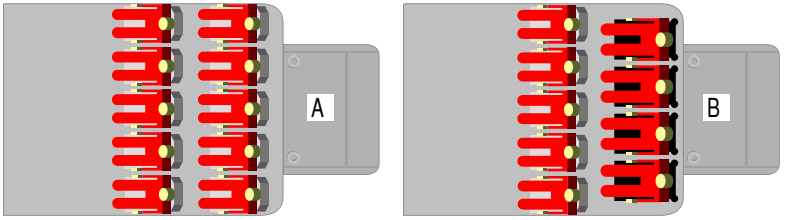

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**Figure 5A Alternative Row 2 & 3 Configuration.
High Density Configuration (A) or Row 3 replaced with
Foldable Seats (B)**

— Maximum 5 passengers Row 2 High density configuration
(P/N 4G2520F13212)

— Maximum 5 passengers Row 3, High density seats (A)
(P/N 4G2520F13316) **or**
Maximum 4 passengers Row 3 forward facing foldable seats (B)
(P/N 4G2520F13311)

SECTION 1 - LIMITATIONS

GENERAL

The following configurations are compatible:

— Row 1, Row 2 and Row 3

— Row 1 and Alternative Row 2 & 3.

NUMBER OF OCCUPANTS

The maximum number of occupants in Row 1 configuration shall not exceed 3 for the 3 seat configuration and 4 occupants for the 4 seat configuration.

The maximum number of occupants in Row 2 configuration shall not exceed:

— 4 for the low density seat configuration

— 5 for the high density seat configuration.

The maximum number of occupants in Row 3 configuration shall not exceed:

— 4 for the low density seat configuration

— 5 for the high density seat configuration.

The maximum number of occupants in Alternative Row 2 & 3 configuration shall not exceed:

— 8 for the low density seat configuration

— 10 for the high density seat configuration Row 2 and 3

— 9 for the high density seat configuration Row 2 with foldable seats (4) in Row 3.

A minimum of 3 seats, in at least one row, must be installed.

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of pole mounted seating configurations the new empty weight and center of gravity position must be determined.

FOLDABLE SEAT LIMITATIONS

When occupants are in foldable seats do not stow equipment or place feet under seats.

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

Note

In accordance with E.A.S.A procedures, the balance data of this Section are not subject to E.A.S.A. approval. However, these informations have been accepted for loading the rotorcraft within approved limits of center of gravity and on maintaining the loading within such limits.

The diagrams and tables below give the Longitudinal and Lateral Moment arms for the passenger Cabin Configurations with pole mounted seats which must be used in the weight and balance calculations.

Any combination of seats positions, as limited by Section 1 of this document, may be used and the weight and balance calculated using the appropriate seat positions from the tables.



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Figure 6-1 Row 1 Configuration (P/N 4G2520F03011/13113/13115, Mission Console presented for clarity)

DESCRIPTION (Row 1 seat configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Mission Console Operator (foldable seat)	4075	-608
Row 1 passenger A (foldable seat)	3335	610
Row 1 passenger B standard seat foldable seat	3381 3335	0

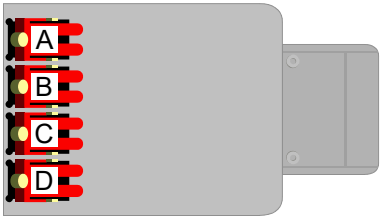

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Figure 6-2 Row 1 Configuration, Foldable Seats (P/N 4G2520F13111)

DESCRIPTION (Row 1 Foldable seat configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 1 passenger A	3335	685
Row 1 passenger B	3335	330
Row 1 passenger C	3335	-330
Row 1 passenger D	3335	-685

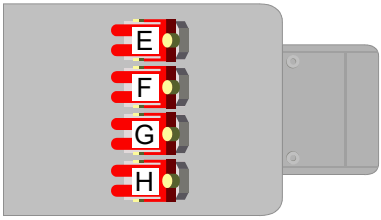

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Figure 6-3 Row 2 Configuration, Low Density Configuration (P/N 4G2520F13211)

DESCRIPTION (Row 2 Low density configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 2 passenger E	4789	720
Row 2 passenger F	4789	240
Row 2 passenger G	4789	-240
Row 2 passenger H	4789	-720

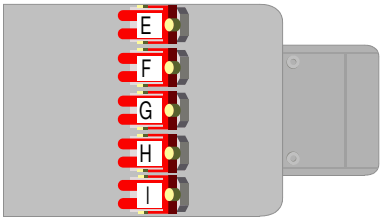

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Figure 6-3A Row 2 Configuration, High Density Configuration (P/N 4G2520F13212)

DESCRIPTION (Row 2 Low density configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 2 passenger E	4789	813
Row 2 passenger F	4789	406
Row 2 passenger G	4789	0
Row 2 passenger H	4789	-406
Row 2 passenger I	4789	-813

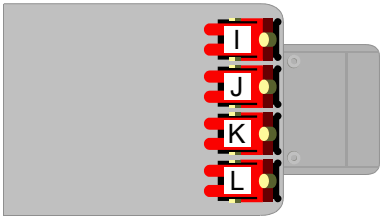

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Figure 6-4 Row 3 Configuration, Foldable and Standard Seats (P/N 4G2520F03111/13311/13312)

DESCRIPTION (Row 3 Foldable seat configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 3 passenger I	5566	690
Row 3 passenger J	5566	330
Row 3 passenger K	5566	-330
Row 3 passenger L	5566	-690

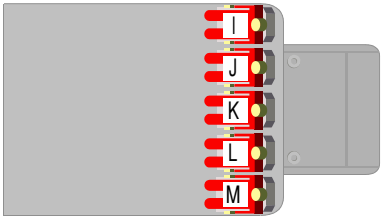

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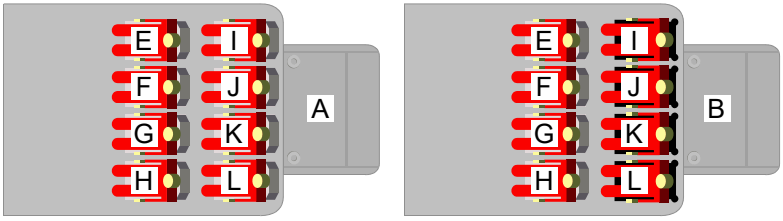
Figure 6-4A Row 3 Configuration, High Density Seats (P/N 4G2520F013316)

DESCRIPTION (Row 3 High density seat configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 3 passenger I	5600	813
Row 3 passenger J	5600	406
Row 3 passenger K	5600	0
Row 3 passenger L	5600	-406
Row 3 passenger M	5600	-813



ICN-39-A-155045-A-00003-00885-A-02-1

Figure 6-5 Alternative Row 2 & 3 Configuration Low Density Configuration (A) or Row 3 Foldable Seats (B) (P/N 4G2520F03211)

DESCRIPTION (Row 2 and 3 Low Density configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 2 passenger E	4733	720
Row 2 passenger F	4733	240
Row 2 passenger G	4733	-240
Row 2 passenger H	4733	-720
Row 3 passenger I (A/B)	5566	690
Row 3 passenger J (A/B)	5566	330

DESCRIPTION (Row 2 and 3 Low Density configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 3 passenger K (A/B)	5566	-330
Row 3 passenger L (A/B)	5566	-690

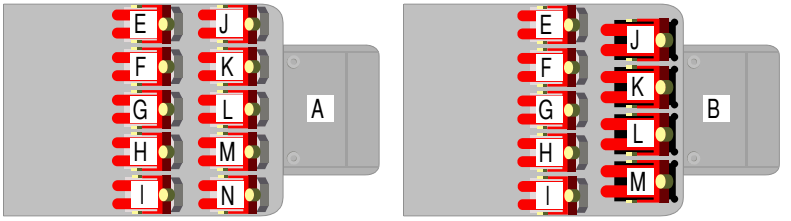


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Figure 6-6 Alternative Row 2 & 3 Configuration
High Density Configuration (A) or Row 3 Foldable Seats (B)
(P/N 4G2520F13212 & P/N 4G2520F13316 or P/N 4G2520F13311)

DESCRIPTION (Row 2 and 3 High Density configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 2 passenger E	4789	813
Row 2 passenger F	4789	406
Row 2 passenger G	4789	0
Row 2 passenger H	4789	-406
Row 2 passenger I	4789	-813
Row 3 passenger J (A)	5600	813
Row 3 passenger K (A)	5600	406
Row 3 passenger L (A)	5600	0
Row 3 passenger M (A)	5600	-406
Row 3 passenger N (A)	5600	-813

DESCRIPTION (Row 2 and 3 High Density configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 3 passenger J (B)	5600	690
Row 3 passenger K (B)	5600	330
Row 3 passenger L (B)	5600	-330
Row 3 passenger M (B)	5600	-690

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 46

RADIO EQUIPMENT
CHELTON DF 935-2 AND 935-11

P/N 3G3450F00911
P/N 4G3450F00511
P/N 4G3450F00711

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SUPPLEMENT 46
RADIO EQUIPMENT
CHELTON DF 935-2 AND 935-11

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GENERAL INFORMATION

The Chelton 935-2 and Chelton 935-11 are stand-alone Tactical Direction Finder (DF) systems.

The P/N 3G3450F00911 system comprises of one receiver/antenna unit (P/N 935-2) and one 715-40 control panel (P/N 715-40-00010) mounted in the interseat console (see Figure 1). The receiver/antenna unit is mounted under the fuselage.

The P/N 4G3450F00511 system comprises of two receiver/antenna units (P/N 935-2) and one 715-40 control panel (P/N 715-40-00010) mounted in the interseat console (see Figure 1). The receiver/antenna units are mounted under the fuselage.

The P/N 4G3450F00711 system comprises of one 935-11 receiver/antenna unit (P/N 935-11) and one 715-40 control panel (P/N 715-40-10010) mounted in the interseat console (see Figure 1). The receiver/antenna unit is mounted under the fuselage. The 935-11 system has a multi beacon capability and also incorporates an On Top Position Indicator (OTPI) mounted in the instrument panel which illuminates when ‘on-top’ of the beacon selected on the MAN Receiver. See Figure 2.

This Supplement also covers successive dash numbers for different versions of the Chelton 935 i.e. P/N 4G3450F00XXX which identify minor changes to the system and do not affect rotorcraft operations.

Each system has an integral synthesized receiver in addition to 5 separate guard receivers to monitor predefined distress frequencies. All 6 receivers take bearings simultaneously, may be separately switched on and off, and may have their individual squelch levels set. Each of the 6 receivers is able to remember and display the last bearing, if the signal is lost, and time from signal loss in seconds. When two receiver/antenna units are installed selection between the units is carried out by a separate switch mounted in the interseat console.

MAN Receiver is tuneable across the frequency range 30 to 470MHz and can store 10 pre-programmed channels for this receiver.

VHF Receiver is the Guard Receiver for VHF Search and rescue frequency (121.5 MHz) and also has an Auxiliary channel programmable between 121.200 MHz and 123.200 MHz.

Marine (MAR) Receiver is the guard receiver for Maritime (MAR) Search and rescue frequency (156.8 MHz) and also has an Auxiliary channel programmable between 155.600 MHz and 158.500 MHz.

UHF Receiver is the guard receiver for UHF search and rescue frequency (243 MHz). The receiver has an Auxiliary channel programmable between 241.200MHz and 245.100 MHz.

DSC Guard Receiver is permanently tuned to 156.525 MHz, this is the GMDSS VHF DSC channel which is capable of receiving and decoding DSC distress messages.

SARSAT Guard Receiver is permanently tuned to 406.025 MHz SARSAT frequency. although the bandwidth is sufficient to receive transmissions on 406.028 MHz. The SARSAT decoded messages display the HEX ID of the Beacon and any GPS position data on the display.

Any one bearing (935-2) or up to 3 bearings (935-11) may be displayed at a time on the dedicated control panel and on the PFD HSI. The bearing displayed is that of the selected radios. While the controller screen for display of the bearing for any receiver is active, the signal-present status for all 5 other receivers can simultaneously be monitored on the same display. The bearing display screen additionally displays the age of the applicable bearing, enabling an operator to see how long-ago (in seconds) the bearing value was valid.

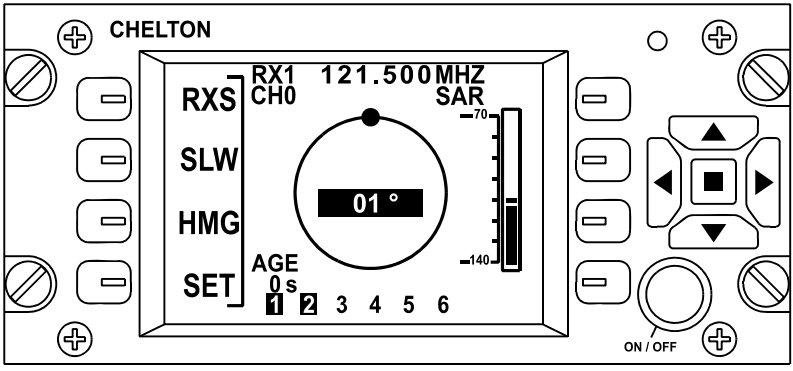

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Figure 1 Chelton 715-40 Control Panel

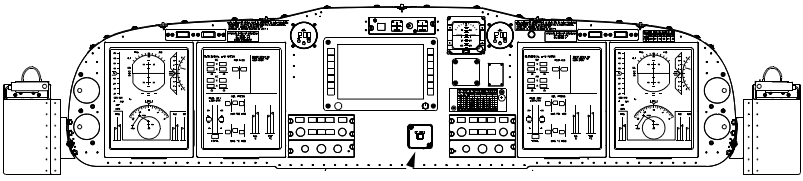

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Figure 2 Chelton 935-11 OTPI position on Instrument Panel

OPERATION MODES

The controller is used to control and display the operational parameters of the six receivers contained in the DF Antenna, as well as provide access to its own set-up parameters. The operation of the system is menu driven via a set of push-button keys and a rotary knob. The system status is displayed using an electro luminescent, graphics display.

There are three basic operational display screens, and several set-up and Decoded Data Information screens. The three basic operational screens that are primarily used in an operation are:

— Receiver Status Screen with Monitoring

— DF Screen with Monitoring

— Homing Screen with Monitoring.

Common features of all screens, other than the start-up screens, is the ‘distress alert’ indicator.

The distress alert indicator is shown as an ‘A’ character in the top-left position of the screen and indicates that a ‘Distress Alert’, has been detected by the DF.

The DF bearing(s) of the active receiver(s) can be displayed on the Pilot or copilot PFD HSI by using the Bearing Select pushbutton on the Display Controller. The analog audio from the DF radio can be heard using the DF pushbutton on the AV-900 audio panel.

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the DF Kit(s), the new empty weight and center of gravity position must be determined.

CHELTON 935-2 & 935-11 DF LIMITATIONS

— The Chelton 935-2 and -11 DF systems must not be operated by the Pilot Flying.

— The DF system may be unreliable during radio transmissions from the passenger cabin.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE FLIGHT CHECKS

AREA N°2 (Fuselage Right Hand Side)

1. Chelton DF antenna (1) or (2) if fitted ➡ — Condition.

IN FLIGHT PROCEDURE

Note

The DF indications may be unreliable and/or the audio may experience interference caused by the FLIR Ultraforce when the DF is on receiver 2 (121.5 MHz), receiver 4 (243.0 MHz) or receiver 1 when tuned to, or near, these frequencies.

Note

For full operation functionality details see ‘Chelton Operation Manual for the 935-2 or 935-11 DF System Comprising 715-40 (2) DF Location and installation Guide Notes’ Doc No 935-2-600 or 935-11-600 latest issue.

Note

If the control panel is used with two antenna/receiver units (935-2 only) the system must be switched OFF before switching between antenna/receiver units.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Secion 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the Chelton 935 DF system is switched OFF.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 47

SATELLITE COMMUNICATION SYSTEMS

P/N 4G2310F01111
P/N 4G2310F01211
P/N 4G2310F01311
P/N 3G2310F00411
P/N 4G4390F00211

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SUPPLEMENT 47
SATELLITE COMMUNICATION SYSTEMS

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GENERAL INFORMATION

This Supplement provides information about the Satellite Communication Systems such as SkyConnect P/N 4G2310F01111, SkyTrac P/N 4G2310F01311, Thuraya P/N 4G2310F01611, SATCOM P/N 3G2310F00411, SATCOM LATITUDE P/N 4G4390F00211 that can be installed. The Supplement is applicable to all succeeding dash numbers P/N 4G2310F0XXX / 3G2310F0XXX, P/N 4G4390F0XXX which identify other Satellite Systems installations.

The satellite communications kit allows the transmitting or receiving of world wide phone calls and the transfer of data using the IRIDIUM LOW EARTH ORBIT satellite network. The systems also contain the options of data transfer, to any point worldwide having internet access, for text messaging and position monitoring using an inbuilt GPS receiver.

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Satellite Communication System, the new empty weight and center of gravity position must be determined.

SATELLITE COMMUNICATION LIMITATIONS

— The satellite communication GPS position data must not be used for navigation.

— The use of the Satellite Communication System by the pilot flying is prohibited, both in transmission and receiving mode to avoid possible overlap with normal radio communications.

— The use of the Satellite Communication system must be authorised by the pilot flying.

— The installation of any Satellite Communication system must be authorized by the competent authority.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE FLIGHT CHECKS

AREA N°4 (Fin, Intermediate and Tail Gearbox, Tail Rotor)

1. Satcom antenna (1) ➡ — Condition.

AREA N°7 (Cabin and Cockpit Interior)

2. Satcom equipment ➡ — Present and condition.

Note

For complete details of Satellite Communication System usage refer to appropriate Operators Guide, latest issue.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 48

POWERED PARKING BRAKES

P/N 3G3240F00111

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SUPPLEMENT 48
POWERED PARKING BRAKES

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GENERAL INFORMATION

The powered parking brake installation consists of an independent integrated hydraulic module, mounted in the nose landing gear bay, which supplies pressure, via a self charging internal accumulator, to the wheel brakes for parking. The system also has the ability to provide emergency symmetric braking (equal hydraulic pressure to both wheel brakes) with a pressure proportional to the displacement applied to the PARK BRAKE lever.

The integrated hydraulic module contains the hydraulic accumulator reservoir, hydraulic pump, metering valves and control lever (which is connected to the cockpit PARK BRAKE handle). The electric pump maintains the accumulator at approx. 60 bar when the helicopter is on ground or when the PARK BRAKE handle is pulled from it's fully down position, provided DC electrical power is available from the MAIN BUS 1.

Operation of the park brake is carried out by pulling the PARK BRAKE handle to its full travel and rotating 90° to lock in the parking position. Park brake pressure is guaranteed for 8 hours with the aircraft shut down and without electrical power. A green advisory PARK BRK ON message is displayed on the CAS when the park brake is applied.

Progressive emergency symmetric wheel braking is carried out by moving the PARK BRAKE handle from its fully down position. The amount of braking pressure supplied to both wheels is regulated by the PARK BRAKE lever position.

When the PARK BRAKE handle is in the fully down position the pilot/copilot wheel brakes and differential wheel braking are unaffected.

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Powered Parking Brake kit, the new empty weight and center of gravity position must be determined.

SECTION 2 - NORMAL PROCEDURES

COCKPIT/ENGINE PRE-START CHECKS

1. PARK BRAKE handle — Pull and turn handle. Confirm PARK BRAKE ON advisory illuminates on CAS.

TAXI/PRE TAKE OFF CHECKS

1. PARK BRAKE handle — OFF. Check no PARK BRK ON caution message.

PRE LANDING CHECKS

1. PARK BRAKE handle — As required.

PRE SHUTDOWN CHECKS

1. PARK BRAKE handle — Pull and turn handle. Confirm PARK BRAKE ON green advisory illuminates on CAS.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

PARK BRAKE MALFUNCTION

PARK BRK PRESS

No pressure in park brake system
with PARK BRAKE handle in ON position

- Confirm PARK BRAKE handle fully up and turned

If caution remains
- Continue flight
being aware park brake may not hold aircraft when on ground. Differential toe braking may not be available

PARK BRAKE ON

PARK BRK ON

Park brake system pressurised

- Confirm PARK BRAKE lever in fully down position

If caution remains
- Continue flight
Do not carry out run on landing or taxi as park brake system may be pressurized

Note

This caution is also displayed when the system is used for emergency braking.

EMERGENCY SYMMETRIC BRAKING

If emergency symmetric braking is required the PARK BRAKE handle should be pulled cautiously to avoid ‘locking’ of the wheels with possible damage to the tyres.

SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 49

EXTERNAL HOIST OPERATIONS (GOODRICH)

P/N 4G2591F00211

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SUPPLEMENT 49
EXTERNAL HOIST OPERATIONS (GOODRICH)

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DEFINITIONS AND ABBREVIATIONS

Abbreviations and acronyms used throughout this Supplement are defined as follows:

— BQRS : Backup Quick Release System

— HEC : Human External Cargo

— HO : Hoist Operator

— NHEC : Non Human External Cargo

— PCDS : Personnel Carrying Device System

— PQRS : Primary Quick Release System.

GENERAL INFORMATION

The Goodrich External Hoist P/N 4G2591F00211 consists of a hoist unit installed onto a boom and mounting frame on the right side of the cabin (Figure 1 and Figure 2). The hoist unit has a dedicated operating pendant. The hoist mounting boom can be rotated electrically to position the hoist unit into its operating position, starting from a stowed position, for minimum drag when hoist operations are not required. The hoist may also be rotated towards the cabin door to assist in recovering loads.

The installation consists of:

- electric hoist motor and winch assembly
- an electronic control system that allows the pilot to operate the hoist from the collective grip (See Figure 6)
- a pilot control panel (See Figure 3)
- a HO control panel (See Figure 4)
- remote pendant (See Figure 7), that allows the HO to rotate the boom and operate the hoist and display the cable payout
- a HO-ICS control panel (See Figure 5) to allow communication among crew-members
- a HO safety harness
- an electrical cable cutter (PQRS) and a manual cable cutter (BQRS) for emergency use

- a HO SEARCHLIGHT mounted under the aircraft and driven by a 5 way switch on the HO control panel
- a step bar protection on the lower right side of the fuselage.

The hoist unit contains:

Hoist Core P/N 3G2591V01532, 290 ft (88.4 m) of usable cable.

Hoist Core P/N 3G2591V01531, 290 ft (88.4 m) of cable (280 ft (85 m) of which is usable).

The hoist units may lower/lift a maximum load of:

OAT above 0°C ..... 550 lb (249 kg)

OAT at or below 0°C ..... 500 lb (227 kg)

The cable payout is shown on the 3 digit display on the pendant. A display format xxx means the cable payout is in feet while yy.y means the cable payout is in meters.

The Pilot Control panel PWR ON/OFF switch is used to turn the hoist ON, then the cargo hoisting and lowering can be controlled by the HO through the remote pendant thumb wheel (Figure 7) which provides variable cable speeds. The cable speed for hoisting is 150 fpm (45 m/min) with maximum load, which increases to 245 fpm (74.4 m/min) with a load of 250 lb (113 kg). The hoist lowering speed maximum is 245 fpm (74.4 m/min). The pilot can also control the operation at a fixed cable speed of 50% of nominal through the hoist control switch on the collective grip (Figure 6). Both controls automatically slow down at approximately 10 ft from fully out and fully in of the cable and stop the electric motor at the cable extremes. The Pilot hoist control overrides the HO control.

The HO pendant contains indicator lights SLOW/WTR/CABLE/TEMP which initially flash when the system is powered up to confirm correct operation of the lamps. The lights illuminate for conditions of the hoist :

— SLOW - when the cable is automatically slowed when operating within 10 ft from fully in or fully out.

— WTR - when the winch trim controller selected (if installed)

— CABLE - when the cable is in a fouled condition and the winch has automatically stopped

— TEMP - when the hoist is in an over temperature condition.

The hoist is provided with a cable foul protection system which automatically stops the motor if the cable is not correctly wound onto the drum and displays the HOIST CBL FOUL caution message on the MFD.

An electrical cable cutter system (PQRS) is available to the Pilot and Copilot, via a guarded switch on the collective grips (Figure 6) and to the HO, via a guarded switch CUT on the HO control panel mounted in the cabin (Figure 4).

The hoist kit also comprises a manual cable cutter (BQRS) and a right side cabin door step protection pad to prevent damage to the hoist cable if it contacts the step.

In the event of a failure of the electrical cable cutter system, the cable may be cut with the manual cutter installed under the HO seat or on the cabin ceiling panel or on the floor or on the cabin liner close to the HO seat.

The hoist SEARCHLIGHT is controlled by the pilot control panel LT switch and the LAMP ON/OFF switch and the 5 way switch on the HO control panel. When the pilot control panel LT switch is selected to ON the HO controller SEARCHLIGHT circuit is powered. Selecting the HO controller LAMP switch ON the lamp system is supplied with power but the lamp remains off. Pressing the central fifth position on the 5 way switch the lamp illuminates but remains stowed. Moving the 5 way switch to FWD un-stows the lamp, which can then be directed using the switch FWD/R/AFT/L positions. Switching the LAMP switch to OFF turns the lamp off but leaves it extended. Pushing the center position switches the light off (if not already switched off) and stows the light.

The HO audio panel, Figure 5, is used to control the HO communication with other crew members. The HO plugs his headset into the HOIST CONTROL panel HEADSET socket. Then the HO can use either VOX or the PTT trigger, first detent, on the back of the Pendant to speak on the aircraft intercom. The HO can also transmit on COM3 or COM4 using the Pendant HO PTT trigger, second detent.

The pendant also includes a Winchman Trim Mode caption and a five position switch to give the HO limited lateral and longitudinal groundspeed control when in HOV Mode and selected by the pilot. This function is only operational if EPIC software Phase 5 or later and SAR modes are installed. For complete information of this mode see Supplement 69.

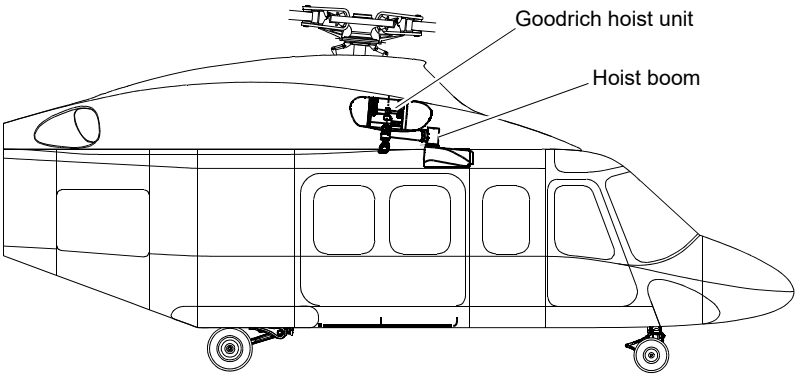

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Figure 1 Hoist Installation Side View

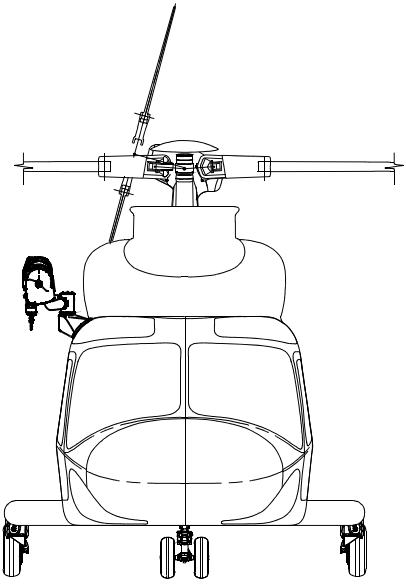

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Figure 2 Hoist Installation Front View (Stowed position)

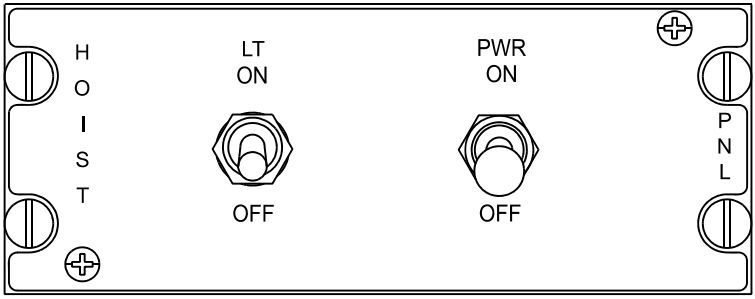

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Figure 3 Pilot Control Panel

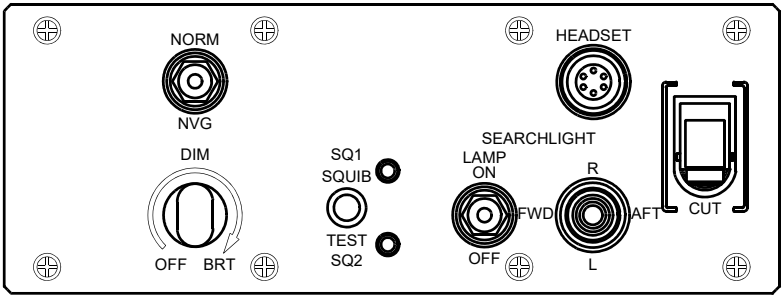

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Figure 4 Hoist Operator Control Panel

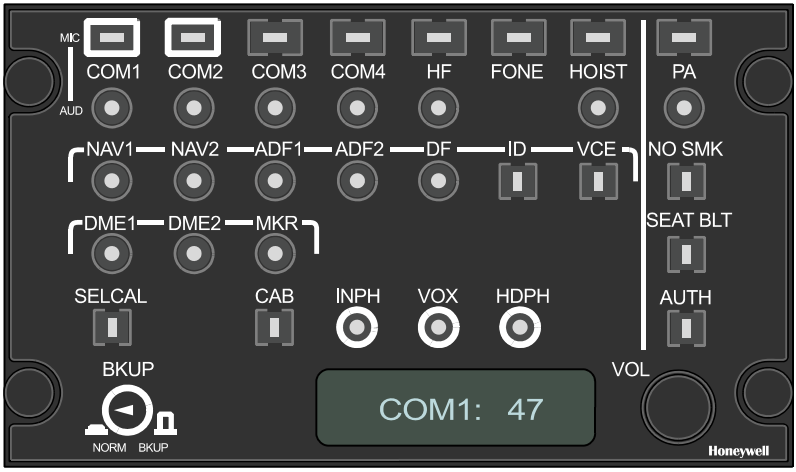

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Figure 5 HO-ICS Control Panel

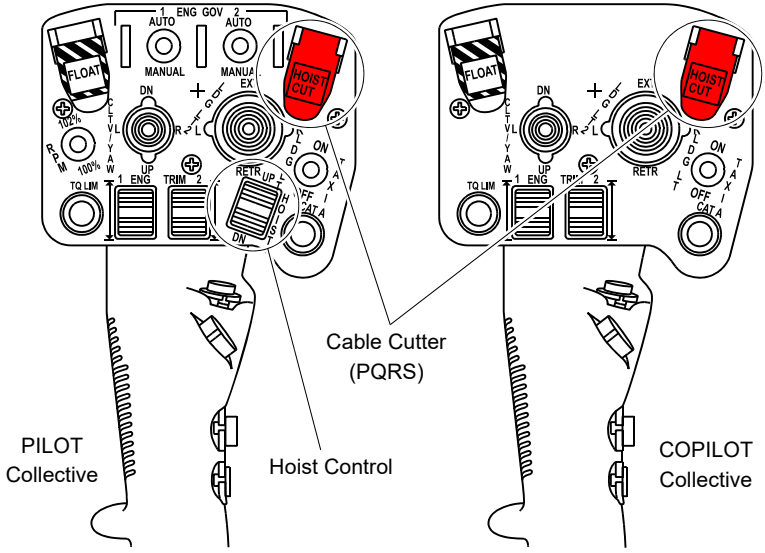

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Figure 6 Pilot and Copilot Collective Hoist Controls

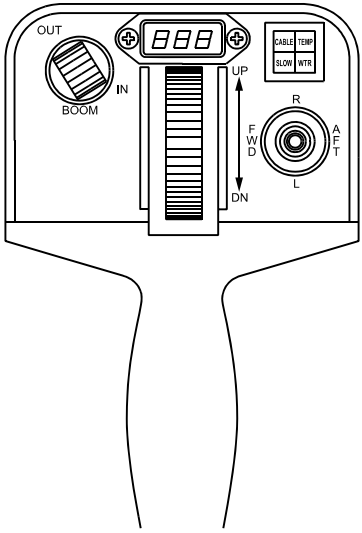

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Figure 7 HO Pendant

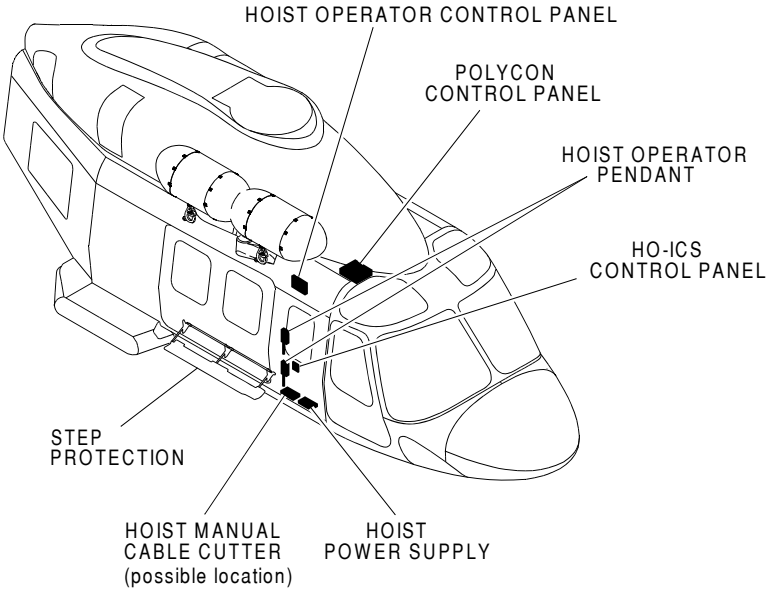

Figure 8 HO Auxiliary Equipment

RADIO ICS SYSTEM

See Section 7 of Basic RFM.

Figure 9 Removed

Hoist Training Panel P/N 3G2591V03251

The Hoist Training Panel is an optional equipment that may be installed in the cabin for Hoist Operator training purposes (Figure 10). The training panel, when installed, can be used to override the normal pendant thumb wheel control of the hoist. This is achieved by moving the thumb wheel on the training panel. The thumb wheel control remains with the training panel until the RESET button is pushed, then the thumb wheel control returns to the normal hoist pendant. All other functions on the normal pendant remain unaffected and the pilot override of the cabin hoist control remains unaffected.

The hoist training panel is intended for use by trained crew members.

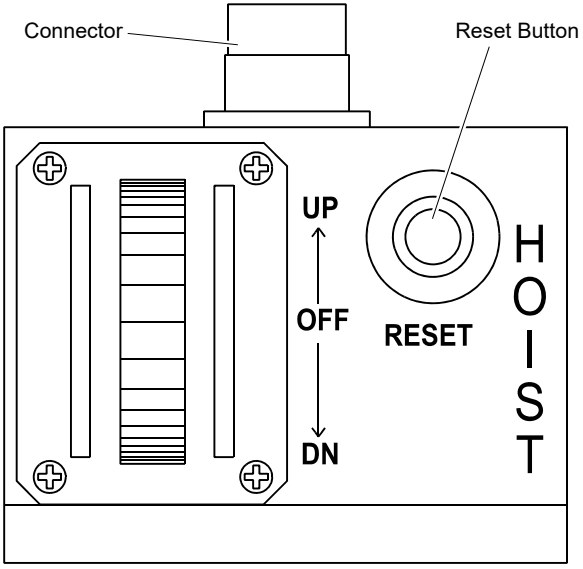

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Figure 10 Hoist Training Panel

SECTION 1 - LIMITATIONS

GENERAL

— With HOIST fitted, but not used, the Limitations stated in the Basic RFM for CAT B operations and in Supplement 12 for CAT A operations are applicable.

— The external hoist equipment certification approval does NOT constitute operational approval. Operational approval for external load operation must be granted by the Local Aviation Authority.

— The external hoist system meets the certification requirements for HEC.

— For compliance with operating rules, the AW139 is certified to CAT A engineering standards.

— The HO Pendants must be removed when Hoist operations are not envisaged.

— During External Hoist operations the number of hoist lifts must be recorded in the helicopter log-book. An External Hoist lift is defined as an unreeling and recovery of the cable with a load attached to the hook. Any operations where a load is applied for half of the operation (i.e. unreeling or recovery) must be considered as one lift.

TYPE OF OPERATION

— The hoist installation is approved for:

Lifting external loads which are jettisonable and which are lifted free of land or water.

Lowering/raising NHEC or HEC in areas where landing cannot be carried out, under the following conditions:

- Day and Night VFR with ground visual contact
- Right cabin door locked open.

— Operation of the external hoist equipment with HEC requires the use of a Personnel Carrying Device System (PCDS), which must be approved by the Local Aviation Authority. TSO-C167 provides one acceptable means of approval for such systems.

— If the operating rules require one engine inoperative hover performance capability procedures, the maximum weight is defined using the Hover OGE 2.5 min OEI charts.

— For HEC operations an approved Radio-ICS system must be installed and operated in accordance with the applicable Local Operating Regulations.

MINIMUM FLIGHT CREW

One or two pilots (see Basic RFM) and one Hoist Operator (HO).

NUMBER OF OCCUPANTS

In high density configuration the first row of seats must be limited to 4.

Hoist Operator Limitations

— The HO shall be familiar with hoist operating procedures.

— The HO must be restrained by a safety harness during all phases of hoist operation and shall wear protective gloves for guiding cable during operation.

— The HO must guide the cable during hoist operation.

— The HO must always have a manual cable cutter (BQRS) available during all phases of hoist operation.

HEC FOR COMPENSATION OPERATING LIMITATIONS

— Transportation of HEC for compensation must be carried out with HEC inside the cabin.

WEIGHT AND CG LIMITATIONS

After installation of the Goodrich Hoist System the new empty weight and center of gravity position must be determined.

Weight

Maximum weight with hoist load ..... 6400 kg

Refer Supplement 50 Increased Gross Weight 6800 kg for limitations at weights above 6400 kg.

Weight for HEC

If the operating rules require one engine inoperative hover performance capability procedures, the maximum weight is defined using the Hover Ceiling OGE, 2.5 min OEI charts for the appropriate systems/helicopter configuration.

Refer Section 4 of this Supplement.

Longitudinal CG Limitations

No change.

Lateral CG Limitation

Lateral C of G limitations..... Figure 1-1 & Figure 1-2

AIRSPEED LIMITATIONS

Load Lowering or Raising

Hoist operation (load raising or lowering) is permitted with helicopter in stationary hover and up to 80 KIAS in forward flight.

CAUTION

For raising (or lowering) in forward flight ensure hoist hook load is sufficient and/or provide another suitable means to maintain the cable and load clear of aircraft structure, undercarriage (if extended) and enable the HO to keep the cable entering/exiting the hoist mechanism close to vertical.

Load Deployed

Maximum airspeed for flight within ±10 degrees azimuth quadrant ..... See Figure 4-1

Maximum groundspeed for sideways and rearward flight beyond forward ±10 degrees azimuth quadrant..... See Figure 4-1

Maximum windspeed beyond forward ±10 degrees azimuth quadrant ..... See Figure 4-1

HEIGHT-VELOCITY LIMITATIONS

For the purposes of Hoist operations, Local Operating Regulations may permit that the H-V Limitations, given in the Basic RFM, need not be observed as an operating limitation. However, if the aircraft is operated within the H-V area a safe landing, following an engine failure, is not guaranteed.

ENGINE POWER TURBINE (NF %) AND ROTOR (NR %) SPEED LIMITATIONS

All Engines Operating

Approved Range for HOIST operations ..... 101 to 103

Maximum for HOIST operations 103

One Engine Inoperative

Approved Range for Hoist operations ..... 101 to 103

Maximum for HOIST operations 103

Note

Following the failure of the RPM select switch, NR/NF = 102% may also be used in cruise below 90 KIAS.

For all other Engine and Rotor Limitations see Basic RFM.

HOIST LIMITATIONS

Hoist loads may be lowered/raised within the limitations defined in the AIRSPEED LIMITATIONS, Load Lowering or Raising paragraph.

Maximum hoist load OAT above 0 °C ..... 550 lb (249 kg)

Maximum hoist load OAT at or below 0 °C ..... 500 lb (227 kg)

Maximum load on hoist ..... 2 persons plus equipment

Maximum permissible bank angle with extended cable ..... 20°

WARNING

Exceeding 15° of lateral pendulum angle/helicopter vertical axis can lead to clutch slippage.

CAUTION

Overload clutch is unlikely to function in case of overload.

Hoist Core P/N 3G2591V01532
Maximum hoist cable length usable .....88.4 m (290 ft)

Hoist Core P/N 3G2591V01531
Maximum hoist cable length usable .....85 m (280 ft)

— Hoist Core P/N 3G2591V01531 cable must not be deployed beyond 85 m (280 ft) cable payout or activation of the SLOW message on the HO pendant, whichever comes first.

— Hoist operations with the hoist positioned to its fully IN position is prohibited.

— Take Off and Landing with a suspended load on hoist is prohibited.

MISCELLANEOUS LIMITATIONS

Autopilot Limitations

During hoist operations the Pilot must **either:**

— fly manually

or

— fly attentive when:

- 4 Axis Enhanced Flight Director is installed (Supplement 34, 67 or 69) and
- HOV and RHT (or ALT) modes are engaged.

Primus HF 1050 Radio (Supplement 8)

With the cabin door open, HF 1050 radio transmissions are prohibited.

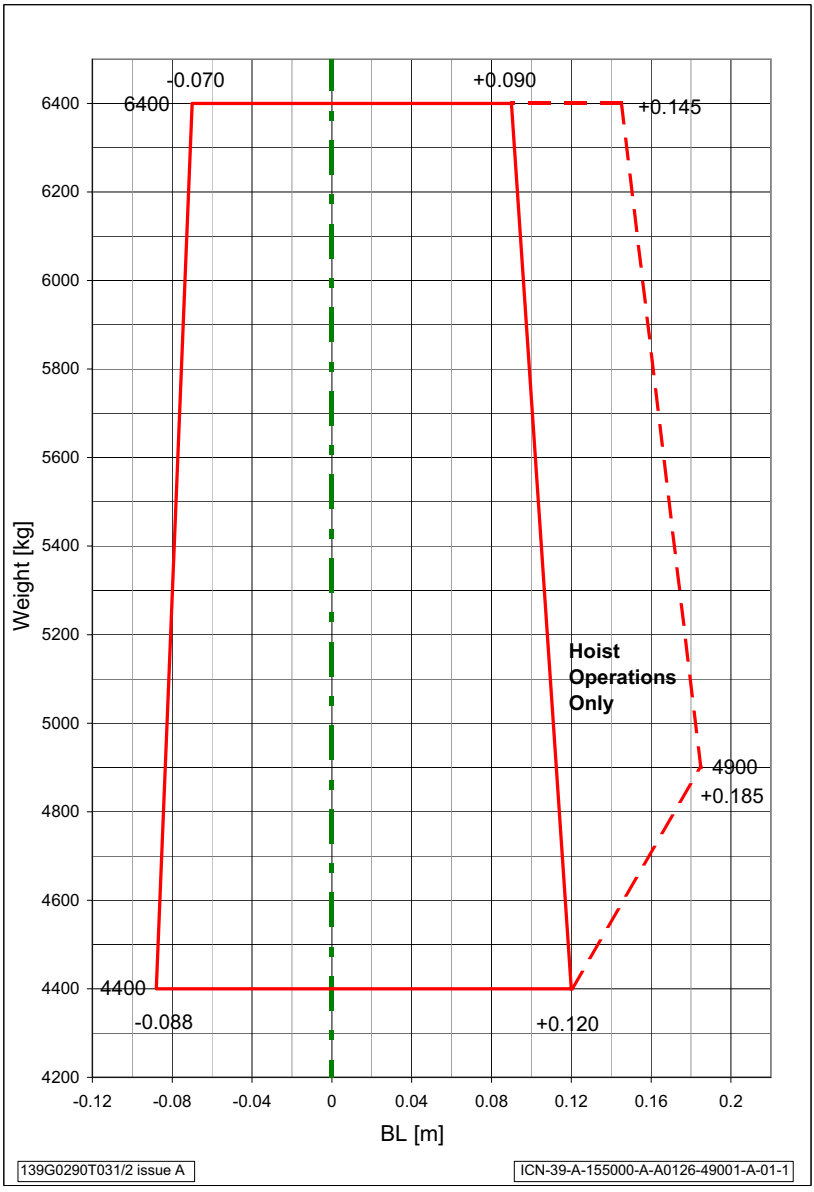

Figure 1-1 Lateral C of G Limitation for Hoist Operation

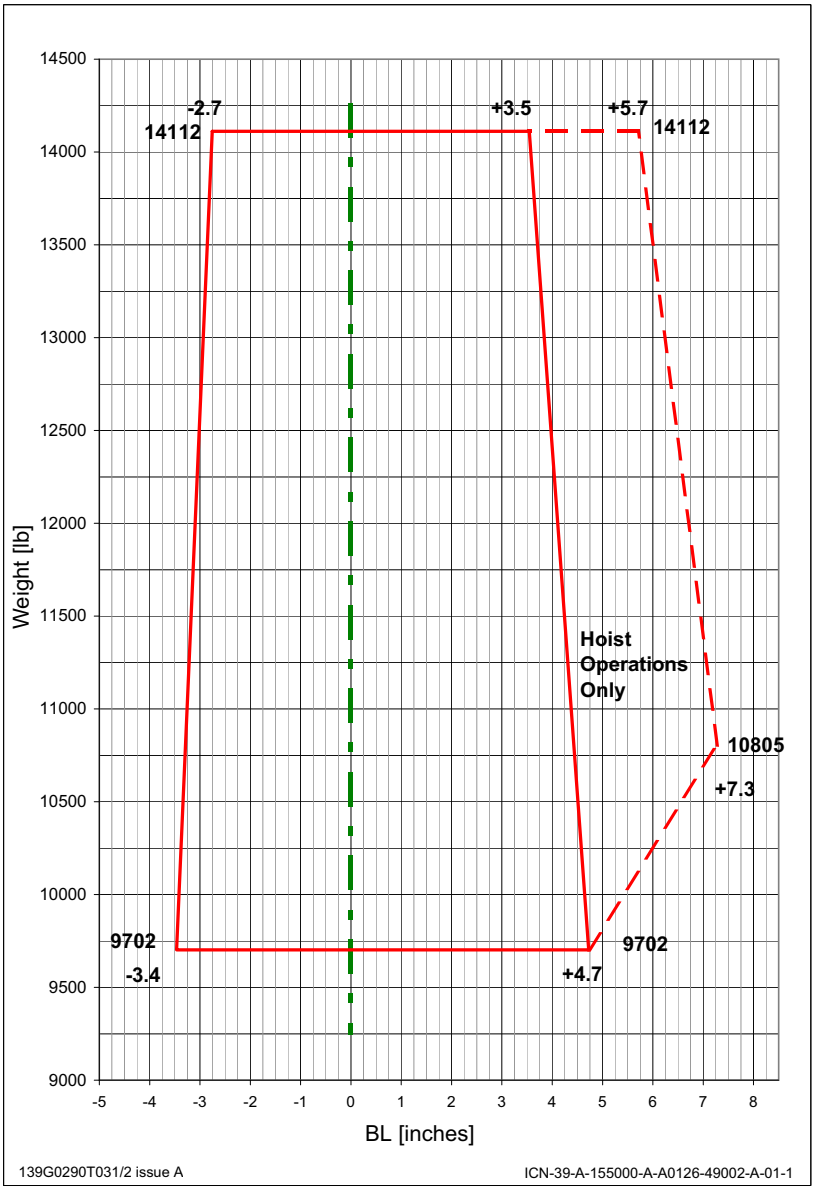

Figure 1-2 Lateral C of G Limitation for Hoist Operation (Imperial Units)

PLACARDS

OAT ABOVE 0°C
- MAXIMUM HOIST LOAD 550 lb [249 kg]

OAT AT OR BELOW 0°C
- MAXIMUM HOIST LOAD 500 lb [227 kg]

MAX LOAD 2 PERSONS + EQUIPMENT

OPERATION WITH EXTENDED CABLE AND LOAD ON THE HOOK:
- MAXIMUM PERMISSIBLE BANK ANGLE IN TURN 20°
- WARNING EXCEEDING 15° OF LATERAL PENDULUM ANGLE /HELICOPTER VERTICAL AXIS CAN LEAD TO CLUTCH SLIPPAGE

CAUTION: OVERLOAD CLUTCH IS UNLIKELY TO FUNCTION IN CASE OF OVERLOAD

A

CAUTION

THE OPERATORS HAND MUST
BE ON THE CABLE AT ALL TIMES
DURING HOIST OPERATION

B

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Figure 1-3 View of Cabin with Placard Positions (sheet 1 of 2)

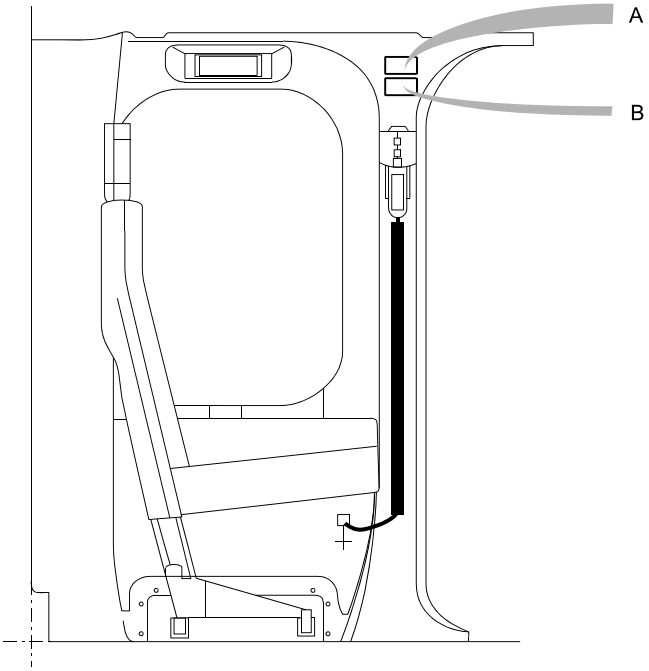

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Figure 1-3 View of Cabin with Placard Positions (sheet 2 of 2)

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

AREA N°2 (Fuselage – Right Hand Side)

1. Hoist, hoist cowlings and mounting — Condition, security, oil leaks.
2. Hoist unit electrical cables and connectors — Condition and secure.
3. Hoist boom — Confirm in stowed position.
4. Right step protection pad cover — Condition and secure.
5. Hoist search light — Condition.

CAUTION

Step shall be inspected to ensure the protection is not damaged. Damaged protection may lead to cable failure.

AREA N°7 Cabin and Cockpit Interior

1. Pilot Hoist Control panel — Condition.
2. HO control panel and ICS control panel — Condition.
3. Hoist control pendant and cabin training panel, if fitted, wiring and connectors — Present, condition, connector secure.
4. HO harness, gloves and manual cable cutter — Present and condition.
5. Radio-ICS control panel (HEC operations) — Condition.
6. Radio-ICS portable transceiver unit (HEC operations) — Present and condition.

7. HOIST CUT pushbuttons on pilot and copilot collective grips, HO control panel	— Guard closed.

PRE START CHECKS (BEFORE THE FIRST FLIGHT OF THE DAY)

The following checks should be carried out after connection of external DC electrical power. If external DC electrical power is not available carry out these checks during aircraft SYSTEM CHECKS, after engine and rotor start:

WARNING

Illumination of the HOIST CUT ARM caution at any time when the HOIST is selected OFF or ON and all HOIST/CUT guards are down indicates a malfunction of the hoist cable cut system. The hoist is unserviceable and must not be selected ON or the guards raised as the hoist cable may be cut.

1. PWR switch on Pilot HOIST control panel	— Select ON, HOIST ON advisory illuminates on CAS. Confirm HOIST CUT ARM caution not illuminated on CAS.
1A. LT switch on Pilot HOIST control panel	— Select ON.
2. SQUIB TEST pushbutton on HO control panel	— Push. Confirm the 2 lights illuminate and CAS HOIST CUT ARM caution illuminates. Release pushbutton and confirm lights and caution extinguish.
3. HO pendant	— Confirm zero cable payout indication.
4. HOIST CUT guard on pilot collective grip	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.

5.	HOIST CUT guard on copilot collective grip	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
6.	CUT guard on HO control panel	— Raise guard, confirm HOIST CUT ARM caution illuminates on CAS. Close guard confirm HOIST CUT ARM caution extinguished.
7.	Right cabin door	— Open and locked.
8.	HO pendant	— Move BOOM switch to: • OUT, confirm full movement out of hoist • IN, confirm movement in to stowed position • IN, confirm full movement in of hoist • OUT, confirm movement out to stowed position.
9.	HO-ICS	— Confirm correct operation.

WARNING

Protective gloves must always be worn whenever handling the hoist cable to prevent injury from possible broken cable strands.

CAUTION

Care should be taken to prevent cable damage caused by kinking when handling cable on the ground. The cable should lie onto a clean surface whenever possible.

10. HO pendant thumbwheel — Rotate to DN and confirm cable lowering according to thumbwheel selection.

11. HOIST hook — Condition, security, freedom of rotation.

Note

When reeling in the cable with no load, apply tension to cable to ensure smooth and even wrapping.

12. HO pendant cable reel in — Thumbwheel UP, confirm cable raising according to thumbwheel selection and hoist automatically stops when cable fully reeled in.
Confirm zero cable payout indication.

13. Hoist operation from cabin training panel, if fitted — DN and UP and confirm operation over-rides HO thumb wheel selection. Press RESET to return control to HO pendant.

14. Hoist operation from Pilot collective grip switch — DN, confirm correct operation. UP, confirm correct operation and hoist automatically stops when cable fully reeled in.

15. Hoist operation from Pilot collective grip switch, HO pendant and cabin training panel, if fitted — DN and UP and confirm pilot operation over-rides HO pendant and training panel, if fitted, thumbwheel selection.

CAUTION

Stow hoist cable by reeling in fully to compress hook bumper. Failure to follow this procedure will damage the cable.

16. Radio-ICS portable transceiver (HEC operations) — Verify transceiver and control box are set on the same frequency and confirm communication between transceiver and crew is satisfactory.

17. Hoist SEARCHLIGHT on HO control panel — LAMP ON, confirm light functioning by pressing and releasing 5 way switch. Move light using 5 way switch. Switch OFF SEARCHLIGHT by pressing and releasing 5 way switch, select LAMP OFF.

18. Right cabin door — Close or as required.

19. LT switch on Pilot HOIST control panel — Select OFF.

20. PWR switch on Pilot HOIST control panel — Select OFF. Confirm HOIST ON advisory not illuminated on CAS

21. DC electrical supply — As required.

IN FLIGHT PROCEDURES

Hoist Operating Procedure

1. RPM switch — Set 102%.

2. BUS TIE switch — ON.

3. PWR switch on Pilot HOIST control panel — Select ON, HOIST ON advisory illuminates on CAS. Confirm HOIST CUT ARM not illuminated on CAS.

WARNING

HO must be secured to helicopter by an approved safety harness during hoist operation.

4. LT switch on Pilot HOIST control panel — Select ON if night operations are envisaged.

5. Hoist SEARCHLIGHT LAMP switch on HO control panel — As required by HO.

6. Position — Establish hover over hoist operation area.

CAUTION

Before opening cabin door the HO must ensure that the cabin is secure, all crew members are secure on their seats and no loose equipment in the cabin.

7. Right cabin door — Open and lock.

CAUTION

During hoist operation the HO must maintain his hand on the cable and verify correct cable unwinding and rewinding.

8. HO pendant BOOM switch — Select boom OUT position as required.

CAUTION

Hoist Core P/N 3G2591V01531 cable must not be deployed beyond 85 m (280 ft) cable payout or activation of the SLOW message on the HO pendant, whichever comes first.

9. HOIST control switch (pilot) or HO thumb wheel — DN as required.

10. Cable speed (HO only) — As required.

Note

As hook nears the down or up limits hoist speed slows automatically and amber SLOW light illuminates on HO pendant.

CAUTION

Static electricity should be discharged by suitable means before ground personnel touch the hook or cable.

CAUTION

Do not allow cable to drag on ground or any other surface which may contaminate or damage the cable or hook.

11. HOIST control switch (pilot) or HO thumb wheel — UP as required.

12. Cable speed (HO only) — As required.

13. Load Recovery — Recover load into cabin whilst hovering or in forward flight below 80 KIAS.
To help recovery the boom may be rotated to the IN position.

CAUTION

For raising (or lowering) in forward flight ensure hoist hook load is sufficient and/or provide another suitable means to maintain the cable and load clear of aircraft structure, undercarriage (if extended) and enable the HO to keep the cable entering/exiting the hoist mechanism close to vertical.

CAUTION

If load is moved, whilst extended, to a suitable location for recovery, ensure adequate clearance is maintained between hoist load and obstacles.

14. Hoist — Confirm cable and hook stowed

CAUTION

Stow hoist cable by reeling in fully to compress hook bumper. Failure to follow this procedure will damage the cable.

15. HO pendant BOOM switch — As required to move to stowed position.

16. Hoist SEARCHLIGHT (If used) — Push on central position of 5 way switch to turn off and stow light or select LAMP switch to OFF to turn light off unstowed.

17. Right cabin door — Close.

18. LT switch on Pilot HOIST control panel — Select OFF, if used.

19. PWR switch on Pilot HOIST control panel — OFF, HOIST ON advisory extinguished on CAS.

Note

During hoist operation the HO shall record any shock loading of the cable.

20. BUS TIE switch — AUTO.

21. RPM switch — Set 100%.

LITTER HOISTING

When the use of a litter is essential, every effort should be made to land the helicopter for litter loading. Litter hoisting can be hazardous and should be carried out only when landing is not feasible. In addition to all other procedures contained herein, the following apply to litter hoisting operations.

WARNING

An empty litter suspended from hoist in open position can oscillate uncontrollably in rotor downwash and can fly upward, striking fuselage or tail rotor. If a suitable operational procedure to control the litter is not in place, hoisting of an open empty litter is prohibited.

It is recommended that prior to hoisting or lowering an empty litter, the litter shall be closed and secured with straps, when applicable. Litter should be suspended in a vertical position and sling straps should be drawn tight. Litter sling straps should be adjusted so that litter is 610 to 710 mm (24 to 28 in) below hoist hook.

Note

If litter is suspended too far below hook, litter cannot be loaded into helicopter with hoist hook at upper limit.

CAUTION

When recovering a loaded litter using the hoist it is recommended to use and anti-rotation system in order to avoid the litter spinning.

ADVISORY CAPTION DEFINITION

CAS Caption (Green)	System State
HOIST ON	Hoist power on

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ENGINE FAILURE IN HOVER WITH LOAD ON HOIST

See Basic RFM Section 3 for aircraft procedures.

Procedures when OEI hover performance capability is not required

1. Collective pitch — Maintain collective pitch setting or lower to maintain rotor speed.

2. Hoist Load — Raise load and recover into cabin or Emergency Jettison depending on operational conditions and type of load (NHEC or HEC) or transition forward (maximum 80 KIAS).

Procedures when OEI hover performance capability is required

Note

Weights defined in weight limitation charts guarantee no rotor droop/height loss in case of an engine failure.

1. Collective pitch — Maintain collective pitch setting. Hover OEI is assured with 2.5 min rating.

2. Hoist Load — Raise load and recover into cabin.

Note

Time required to raise the maximum load from fully extended approximately 2 minutes.

HOIST LOAD JETTISON

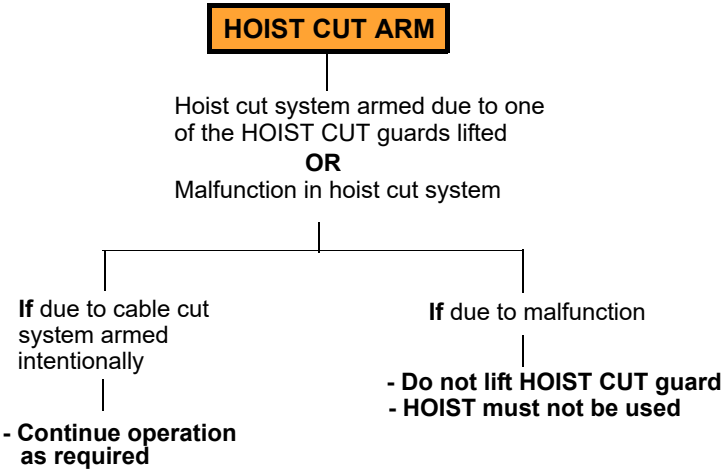
The hoist is provided with an electrical cable cut system (PQRS) operated by either pilot or copilot or HO. If an emergency condition should require the release of a hoisted load carry out the following:

1. PWR switch on Pilot HOIST control panel — Confirm ON, HOIST ON advisory illuminated on CAS.

2. HOIST CUT pushbutton on pilot or copilot collective grip or HO control panel — Lift guard, HOIST CUT ARM caution illuminates on CAS. Press pushbutton.

If the electrical HOIST CUT system fails, cut cable with the manual cable cutters accessible to HO. Cut cable as close to the hoist as possible.

HOIST CUT ARM



HOIST CABLE FOUL

HOIST CBL FOUL + CABLE indication light on HO pendant

Hoist cable fouled
and hoist inoperative

CAUTION

Do not select up/down on the HO pendant or Pilot collective until the cable misalignment has been corrected, to avoid the risk of possible cable breakage.

- **Proceed in forward flight with load suspended allowing adequate load clearance over obstacles**

At suitable site
- **Establish hover and slowly descend to lay load on ground.**
- **Recover cable on board manually**

HOIST OVER-TEMPERATURE

A hoist over temperature is indicated by an amber TEMP light on the HO control pendant. In the event of a hoist over temperature, complete the hoist cycle. Wait for system to cool down (indication on HO control pendant extinguishes) before resuming operation.

CAUTION

Prolonged operation of hoist with amber TEMP indication on hoist pendant display will result in hoist failure.

Note

When the hoist TEMP light is on, the hoist is automatically slowed in operation.

HOIST BOOM MOTOR FAILURE

If the Hoist Boom motor fails the hoist may be used providing the hoist is not in its fully IN position and cable does not interfere with any part of the fuselage. Depending on where the boom is positioned be aware that difficulty may be found in recovering hoist loads into cabin.

If the Boom is in any position, other than the stowed, be aware fuel consumption, during cruise, may be increased.

LIGHTNING STRIKE

The hoist unit P/N 3G2591V01531 may be inoperative if struck by lightning. This does not apply to Hoist Core P/N 3G259V01532.

DOUBLE GENERATOR FAILURE

See Section 3 Basic RFM for aircraft procedures.

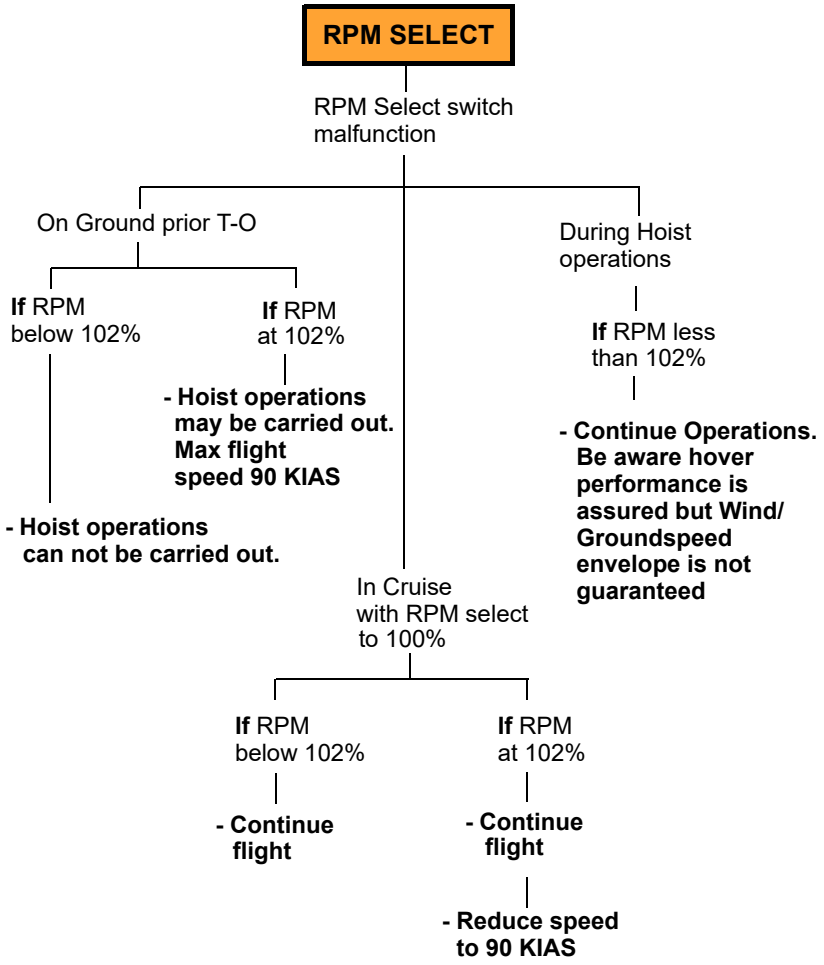
In the case of a double generator failure during hoist operation and if it is essential to recover the load into the cabin, carry out the following:

1. MAIN BATTERY switch — Confirm ON (to supply power to MAIN BUS 1 for hoist power and hoist SEARCHLIGHT).
2. BUS TIE switch — Select AUTO.
3. HOIST operation — Complete recovery cycle and return hoist to stowed position. Confirm hoist SEARCHLIGHT OFF.
4. MAIN BATTERY switch — OFF or as required according to procedure in Section 3 Basic RFM.

CAUTION

The hoist recovery cycle will reduce the battery endurance time to 10 minutes.

ROTOR SPEED SELECTOR



SECTION 4 - PERFORMANCE DATA

HOVER WEIGHT FOR HOIST OPERATION

HEC Operations Requiring OEI Capability

Weight for HEC, requiring OEI hover performance capability, is Hover Ceiling OGE, 2.5 min OEI chart for the appropriate systems/helicopter configuration:

Clean Intake HEATER OFF
See Basic RFM ..... Figure 4-14

EAPS Intake EAPS OFF
See RFM Supplement 5 ..... Figure 4-8

EAPS Intake EAPS ON

See RFM Supplement 5 ..... Figure 4-16

IBF installed HEATER OFF
See RFM Supplement 86 ..... Figure 4-8

Note

Weights defined in the above charts guarantee no rotor droop/height loss in case of an engine failure, therefore do not lower collective.

Hover Ceiling

Hover performance of the Basic RFM or Supplement 50 (if applicable) apply.

Low Speed Envelope

— Weight for NHEC/HEC, with manoeuvre envelope as detailed in Figure 4-1, is Hover Ceiling OGE, MCP, AEO chart for the appropriate systems/helicopter configuration:

Clean Intake HEATER OFF/COND OFF
See Basic RFM ..... Figure 4-13

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT
See RFM Supplement 2 ..... Figure 4-4

Clean Intake COND ON/ECS ENVIRO A/C RECYCLE
See RFM Supplement 2 ..... Figure 4-23

Clean Intake ECS ENVIRO FULL AUTO
See RFM Supplement 87 ..... Figure 4-9

EAPS Intake EAPS OFF
See RFM Supplement 5 ..... Figure 4-7

EAPS Intake EAPS ON
See RFM Supplement 5 ..... Figure 4-15

EAPS Intake EAPS OFF/ON, HEATER ON
See RFM Supplement 5 ..... Figure 4-21

IBF installed HEATER OFF
See RFM Supplement 86 ..... Figure 4-7

IBF installed HEATER ON
See RFM Supplement 86 ..... Figure 4-13

Note

Weights defined in the above charts guarantee adequate controllability margins for operation within the Wind/Ground/Air speed Azimuth Envelopes Figure 4-1.

— Weight for NHEC/HEC with manoeuvre envelope as detailed in Figure 4-2, is Hover Ceiling OGE, TOP, AEO chart for the appropriate systems/helicopter configuration. The maximum altitude permissable for hoist operations at TOP is 7000 ft Hd:

Clean Intake HEATER OFF/COND OFF
See Basic RFM ..... Figure 4-12

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT
See RFM Supplement 2 ..... Figure 4-3

Clean Intake COND ON/ECS ENVIRO A/C RECYCLE
See RFM Supplement 2 ..... Figure 4-22

Clean Intake ECS ENVIRO FULL AUTO
See RFM Supplement 87.....Figure 4-8

EAPS Intake EAPS OFF
See RFM Supplement 5.....Figure 4-6

EAPS Intake EAPS ON
See RFM Supplement 5.....Figure 4-14

EAPS Intake EAPS OFF/ON, HEATER ON
See RFM Supplement 5.....Figure 4-20

IBF installed HEATER OFF
See RFM Supplement 86.....Figure 4-6

IBF installed HEATER ON
See RFM Supplement 86.....Figure 4-12

Note

Operation in Hover OGE at TOP is permitted for a maximum duration of 5 minutes.

Note

Weights defined in the above charts guarantee adequate controllability margins for operation within the Wind/ Ground/Air speed Azimuth Envelopes Figure 4-2.

Note

Be aware that for hover operations using the TOP range and an autopilot height hold mode engaged (RHT or ALT) the PI limiting function will intervene at 106% PI, therefore, it is not recommended to use height hold for these conditions.

PERFORMANCE WITH HOIST INSTALLED

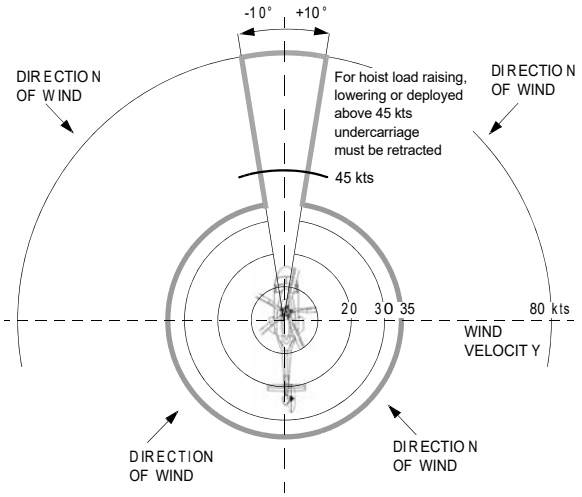
When the External Hoist Kit is installed together with one or more of the following kits:

- Snow skids installation (Supplement 19)
- Slump Pads Installation (Supplement 20)
- Searchlight installation (Supplement 29, 44, 53).

the climb performance is reduced by:

ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

Applicable up to 7000 ft Hd (2100 m Hd)



Applicable from 7000 ft Hd to 14000 ft Hd (2100 m to 4300 m Hd)

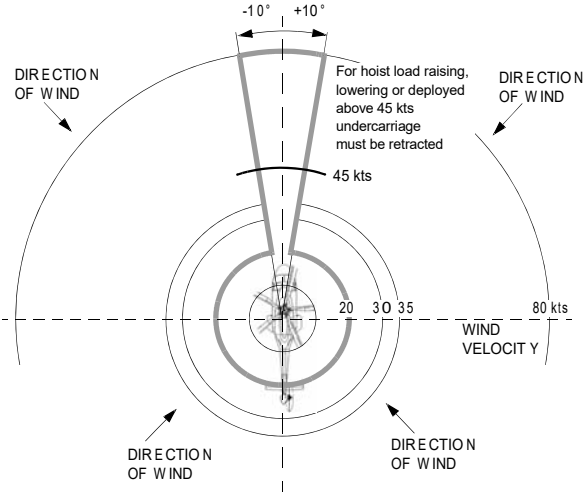


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Figure 4-1 Wind/Ground/Air speed Azimuth Envelopes for Operation at OGE with MCP, AEO

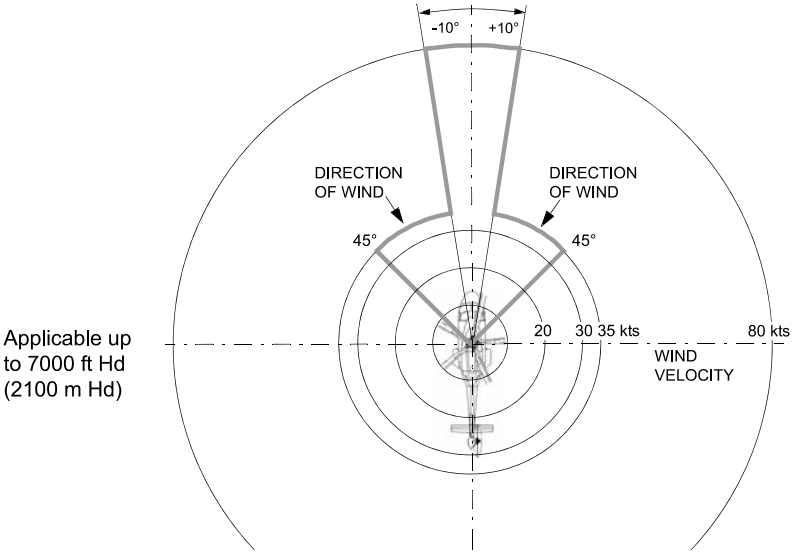
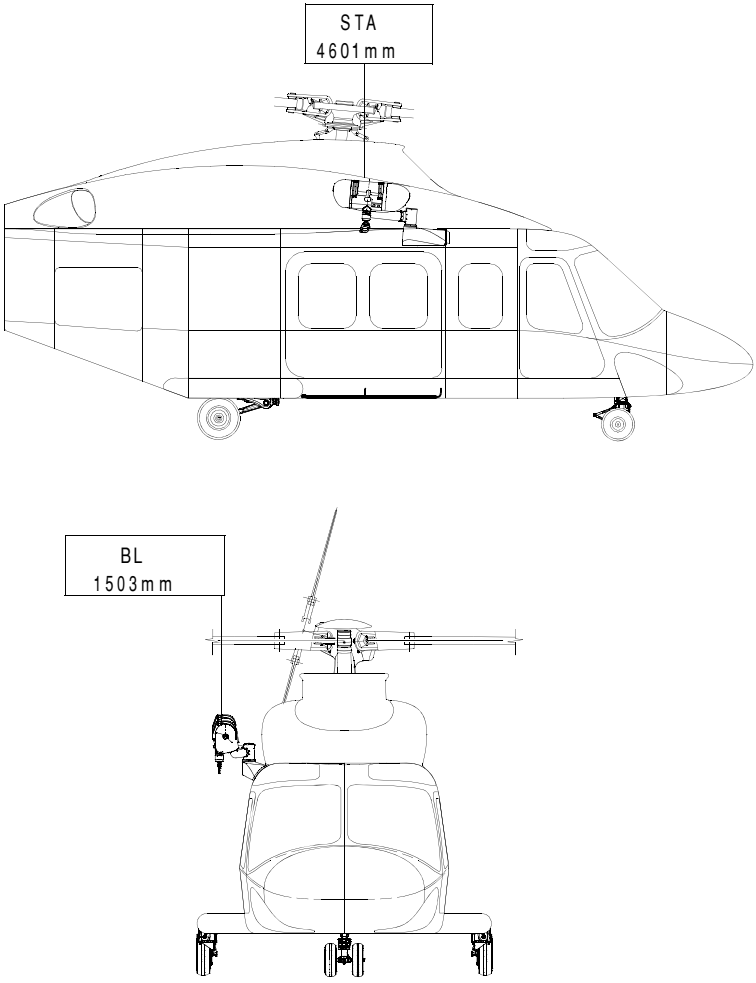


Figure 4-2 Wind/Ground/Air speed Azimuth Envelopes Operation at OGE with TOP, AEO

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

When the HOIST is in its operational position the following Longitudinal and Lateral positions for loads attached to HOIST hook must be used in the Weight and Balance Calculations.



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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 50

INCREASED GROSS WEIGHT 6800 KG

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SUPPLEMENT 50
INCREASED GROSS WEIGHT 6800 KG

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GENERAL INFORMATION

This Supplement details the changes to the Basic RFM, to operate the aircraft with an increased Gross Weight up to 6800 kg. This information is valid for all weights in excess of the Basic RFM weight limit of 6400 kg.

SECTION 1 - LIMITATIONS

GENERAL

For Limitations not included in this Supplement see Basic RFM, Supplement 12 Category A Operations (Confined Area, Offshore Helideck or Clear Area Procedures), Supplement 69 4 Axis Enhanced Flight Director with SAR Modes or Supplements for Hoist Operations.

If the aircraft weight, at any time, exceeds 6400 kg the entire flight duration and all Take-Offs / Landings must be recorded as flight operations above 6400 kg in the helicopter log-book.

AIRCRAFT CONFIGURATION

One of the following must be present on the aircraft for operation between 6400 kg and 6800 kg:

— Kit Increased Gross Weight 6800 kg P/N 4G0000F00111.

— Kit Increased Gross Weight 7000 kg P/N 4G0000F00311.

— Kit Enhanced Landing Gear P/N 3G3200F00211.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

WEIGHT

Maximum gross weight for towing..... 6450 kg

Maximum gross weight for taxiing..... 6800 kg

Maximum gross weight for CAT B Take-Off / Landing ..... 6800 kg

Weight limitations CAT B W.A.T. ..... Figure 4-1

Weight limitations CAT B W.A.T. EAPS OFF..... Figure 4-2

Weight limitations CAT B W.A.T. EAPS ON ..... Figure 4-3

Weight limitations CAT B W.A.T. IBF Installed ..... Figure 4-9A

Maximum gross weight for CAT A Take-Off and Landing
(Clear Area, Confined Area, Offshore Helideck) ..... 6800 kg

Weight Limitations CAT A Take-Off and Landing
Clear Area Procedure ..... Figure 4-1

Weight Limitations CAT A Take-Off and Landing
Clear Area Procedure EAPS OFF..... Figure 4-2

Weight Limitations CAT A Take-Off and Landing
Clear Area Procedure EAPS ON ..... Figure 4-3

Weight Limitations CAT A Take-Off and Landing
Clear Area Procedure IBF Installed ..... . Figure 4-9A

Weight Limitations CAT A Take-Off and Landing
Confined Area Procedure ..... Figure 4-4

Weight Limitations CAT A Take-Off and Landing
Confined Area Procedure EAPS OFF..... Figure 4-5

Weight Limitations CAT A Take-Off and Landing
Confined Area Procedure EAPS ON..... Figure 4-6

Weight Limitations CAT A Take-Off and Landing
Confined Area Procedure IBF Installed..... . Figure 4-9B

Weight Limitations CAT A Take-Off and Landing
Offshore Helipad Procedure ..... Figure 4-7

Weight Limitations CAT A Take-Off and Landing
Offshore Helipad Procedure EAPS OFF ..... Figure 4-8

Weight Limitations CAT A Take-Off and Landing
Offshore Helipad Procedure EAPS ON..... Figure 4-9

Weight Limitations CAT A Take-Off and Landing
Offshore Helipad Procedure IBF Installed..... . Figure 4-9C

Maximum weight for Hoist Operations (lowering/raising NHEC and HEC in areas where landing cannot be carried out) is Hover Ceiling OGE, MCP, AEO charts for the appropriate system/helicopter configuration:

Clean Intake COND ON/OFF ..... Figure 4-16

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT ..... Figure 4-20

Clean Intake config, ECS ENVIRO FULL AUTO ...See Supplement 87

EAPS Intake EAPS OFF ..... Figure 4-25

EAPS Intake EAPS ON ..... Figure 4-30

EAPS Intake EAPS ON/OFF, HEATER ON ..... Figure 4-34

IBF Intake Installed ..... Figure 4-34E

IBF Intake Installed, HEATER ON ..... Figure 4-34I

Maximum weight for NHEC/HEC with manoeuvre envelope as detailed in Figure 1-10, is Hover Ceiling OGE, TOP, AEO chart for the appropriate systems/helicopter configuration. The maximum altitude permissible for hoist operations at TOP is 7000 ft Hd:

Clean Intake HEATER OFF, COND OFF/ON ..... Figure 4-15

Clean Intake HEATER ON ..... Figure 4-19

EAPS Intake EAPS OFF ..... Figure 4-24

EAPS Intake EAPS ON ..... Figure 4-29

EAPS Intake EAPS OFF/ON, HEATER ON ..... Figure 4-33

IBF Intake Installed ..... Figure 4-34D

IBF Intake Installed, HEATER ON ..... Figure 4-34H

Note

Operation in Hover OGE at TOP is permitted for a maximum duration of 5 minutes.

Note

Weights defined in the above charts guarantee adequate controllability margins for operation within the Wind/ Ground/Air speed Azimuth Envelopes Figure 1-10.

Note

Be aware that for hover operations using the TOP range and an autopilot height hold mode engaged (RHT or ALT) the PI limiting function will intervene at 106% PI, therefore, it is not recommended to use height hold for these conditions.

CENTRE OF GRAVITY

Longitudinal limitations..... Figure 1-1 & Figure 1-3

Lateral limitations (inc. Hoist Operations) ..... Figure 1-2 & Figure 1-4

CAUTION

Refer to Basic RFM Section 6 for loading instructions to not exceed maximum allowable.

AIRSPEED LIMITATIONS

Vne(Power ON, OEI/Power OFF) ..... Figure 1-5

Maximum airspeed in sideward or rearward flight .....Figure 1-10

Maximum allowable tailwind and crosswind .....Figure 1-10

CATEGORY A AIRSPEED LIMITATIONS

Maximum crosswind for Take Off and Landing CAT A
Clear Area and Confined Area Procedure .....20 kts
(10 m/s)

Maximum crosswind for Take Off and Landing CAT A
Offshore procedure .....20 kts
(10 m/s)

For cross wind components between 10 kts and 20 kts (5 m/s and 10 m/s) a headwind component of at least 5 kts (2.5 m/s) is required.

Take-Off with tail wind component is prohibited.

GROUND SPEED LIMITATIONS

On Paved Surfaces

Maximum taxi speed ..... 20 knots (37 km/hr)

Maximum for emergency landing speed
(nose wheel locked in fore and aft position)..... 60 knots (110 km/hr)

On Prepared Grass Surfaces

Taxiing on grass surfaces is prohibited.

ALTITUDE LIMITATIONS

Maximum operating altitude ..... 8000 ft (2400 m) Hp
or 11000 ft (3350 m) Hd
whichever comes first

Maximum Altitude for CAT B, CAT A Clear Area and
Confined Area Take Off and Landing ..... 8000 ft (2400 m) Hp or Hd
whichever comes first

Maximum Altitude for CAT A Offshore
Helideck Take Off and Landing ..... 5000 ft (1500 m) Hp or Hd
whichever comes first

Minimum operating altitude ..... Figure 1-6

Maximum take-off and landing altitude..... Figure 1-6

AMBIENT AIR TEMPERATURE LIMITATIONS (OAT)

Minimum temperature for ground starting ..... -30° C

If Landing Gear P/N 3G3200F00211 or P/N 4G0000F00311
fitted ..... -40° C

Maximum ambient air temperature ..... Figure 1-6

Minimum ambient air temperature ..... Figure 1-6

Note

Where data at -40°C is not presented refer to -30°C lines on the charts.

COLD WEATHER OPERATION

Aircraft fitted with P/N 3G3200F00211 or P/N 4G0000F00311 are cleared for operation down to -40°C. If the helicopter is to be operated with an OAT at or below -30°C, ensure that the flight logbook records that the nitrogen pressure on the NLG and MLG is appropriate and in accordance with Maintenance Manual.

CATEGORY A OPERATION LIMITATIONS

Weight

The CAT A W.A.T. charts for Clear Area (Figure 4-1, Figure 4-2, Figure 4-3, Figure 4-9A), Confined Area (Figure 4-4, Figure 4-5, Figure 4-6, Figure 4-9B) or Offshore Helideck (Figure 4-7, Figure 4-8, Figure 4-9, Figure 4-9C) T-O and Landing procedure, are used to define the maximum take off and landing weight for the given ambient condition.

Offshore Helideck Size

Minimum demonstrated helideck size for Take-Off and Landing for weights between 6400 kg and 6800 kg ..... Diameter 15 m (50 ft) or 15 m x 15 m (50 ft x 50 ft)

CATEGORY B OPERATION LIMITATIONS

The CAT B W.A.T. charts, Figure 4-1, Figure 4-2, Figure 4-3, Figure 4-9A are used to define the maximum take off and landing weight for the given ambient conditions. Figure 4-10 defines the maximum wind speed compatible with the W.A.T. charts.

HEIGHT-VELOCITY DIAGRAM

Height Velocity Diagram..... See Figure 1-7

Height Velocity Diagram EAPS ..... See Figure 1-8

Height Velocity Diagram IBF Intake Installed ..... See Figure 1-8A

Height Velocity Diagram with ECS ENVIRO fitted .See Supplement 87

SLOPE LIMITATIONS

Sloped Take Off and Landing are limited to the following:

Nose up .....10°
Nose down .....10°
Left wing low .....10°
Right wing low .....10°

CAUTION

When landing nose down on slopes up to 10° attention should be given to have a slope that does not endanger striking the tail of the aircraft. A slope which allows the tail to overhang the top of the slope is recommended.

WHEEL BRAKE LIMITATIONS

Maximum running speed for brake application .....40 knots (74 km/hr)

Parking on slopes up to 10° is permitted for a maximum of 1 hour.

HOIST OPERATIONS LIMITATIONS

Hoist operations (see Supplements 11, 41 or 49) are approved for weights between 6400 and 6800 kg with the following limitations:

Load Lowering or Raising

Hoist operation (load raising or lowering) is permitted with helicopter in stationary hover and up to 80 KIAS in forward flight.

Load Deployed

Maximum airspeed for flight within ±10 degrees azimuth quadrant ..... 80 kts

Maximum groundspeed for sideways and rearward flight beyond forward ±10 degrees azimuth quadrant.....Figure 1-9

Maximum windspeed beyond forward ±10 degrees azimuth quadrant .....Figure 1-9

DITCHING CONFIGURATIONS LIMITATIONS

Ditching Configurations (see Supplement 9) are approved for weights up to 6800 kg.

SNOW SKIDS/SLUMP PADS LIMITATIONS

Operations with Snow Skids (Supplement 19) or Slump Pads (Supplement 20) are prohibited at weights above 6400 kg.

OPERATIONS WITH COCKPIT DOORS REMOVED LIMITATIONS

Operations with Cockpit Doors Removed (Supplement 30) are prohibited at weights above 6400 kg.

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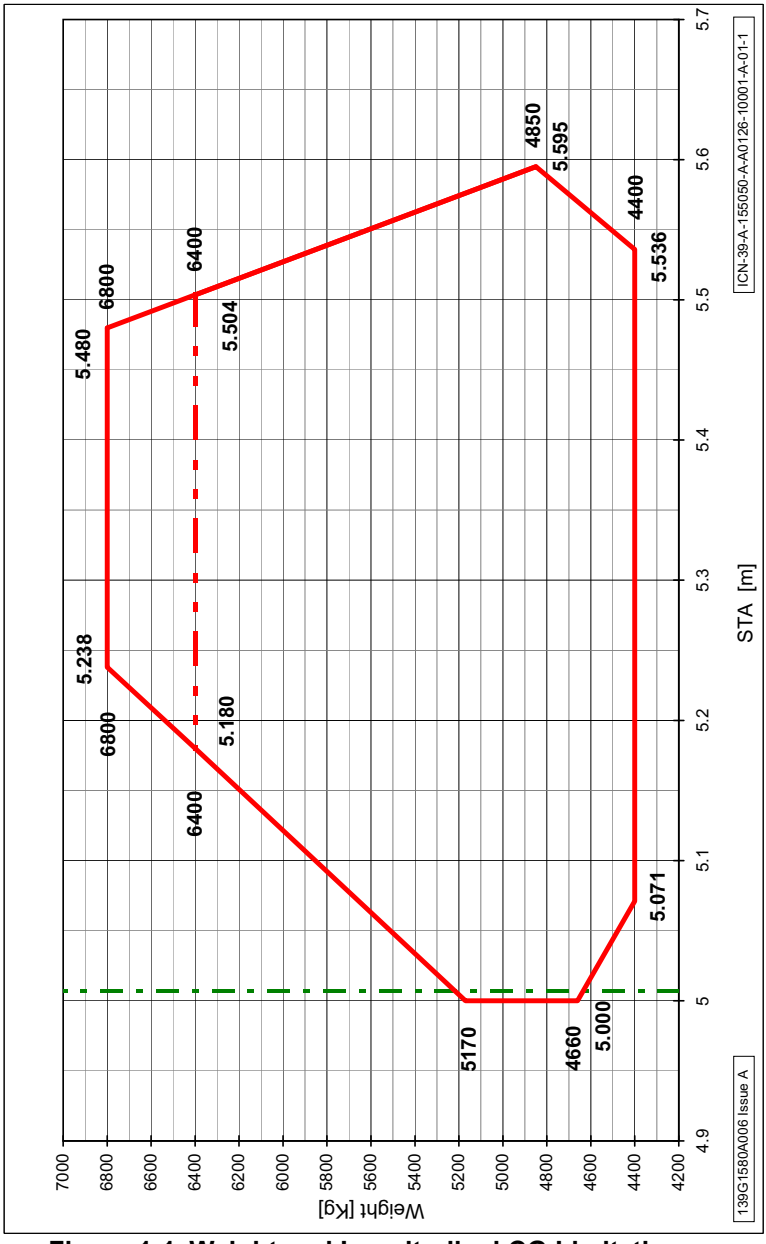

Figure 1-1 Weight and Longitudinal CG Limitations

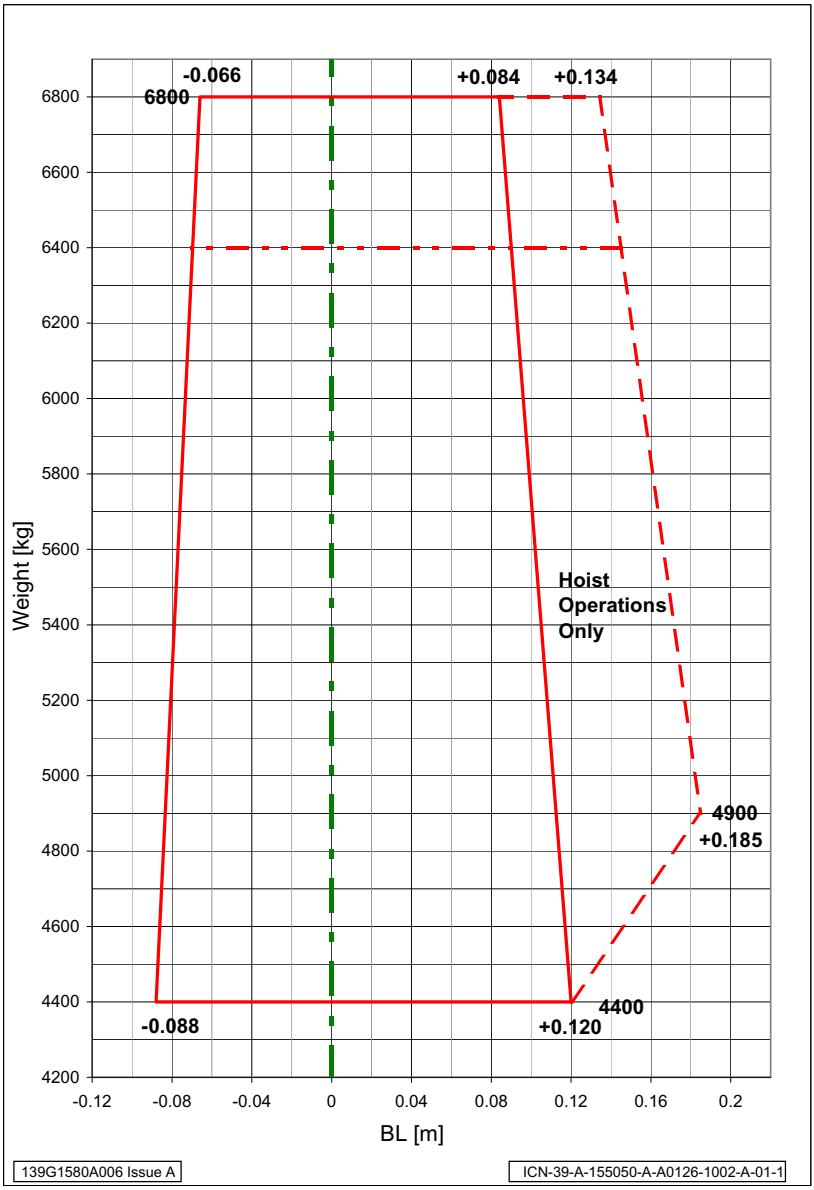

Figure 1-2 Weight and Lateral CG Limitations

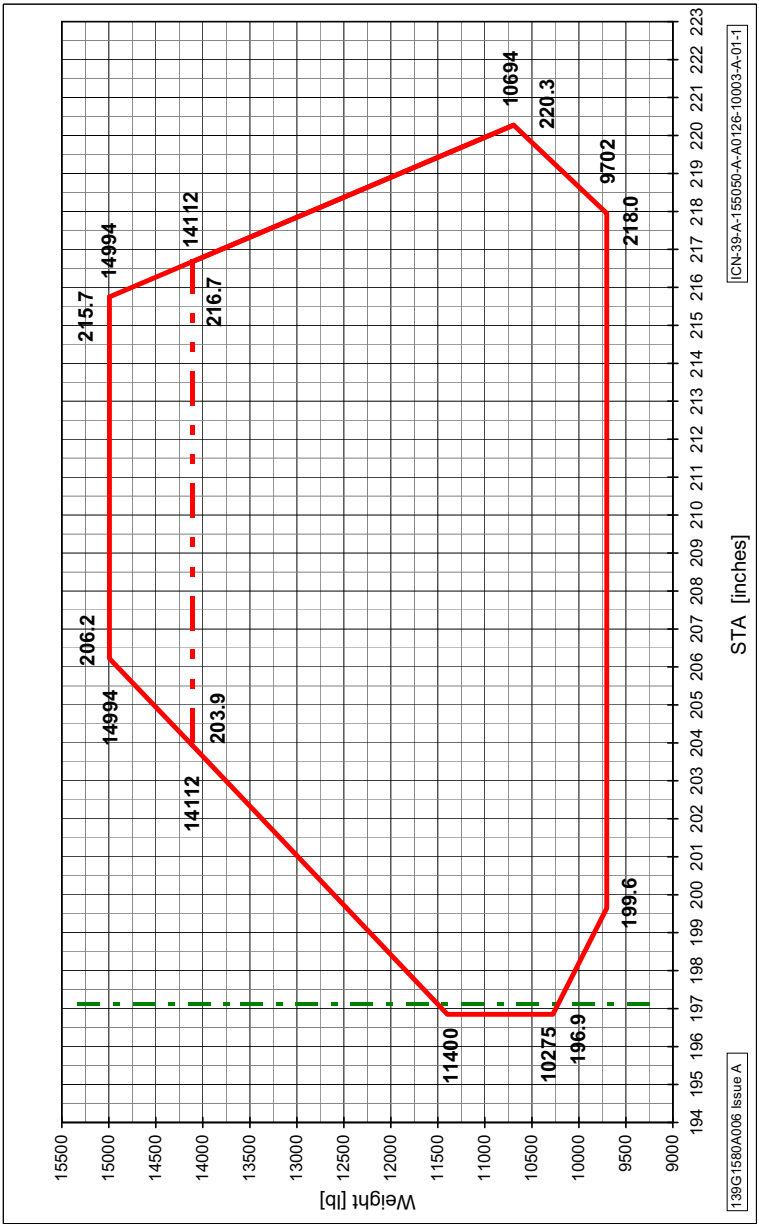

Figure 1-3 Weight and Longitudinal CG Limitations (Imperial Units)

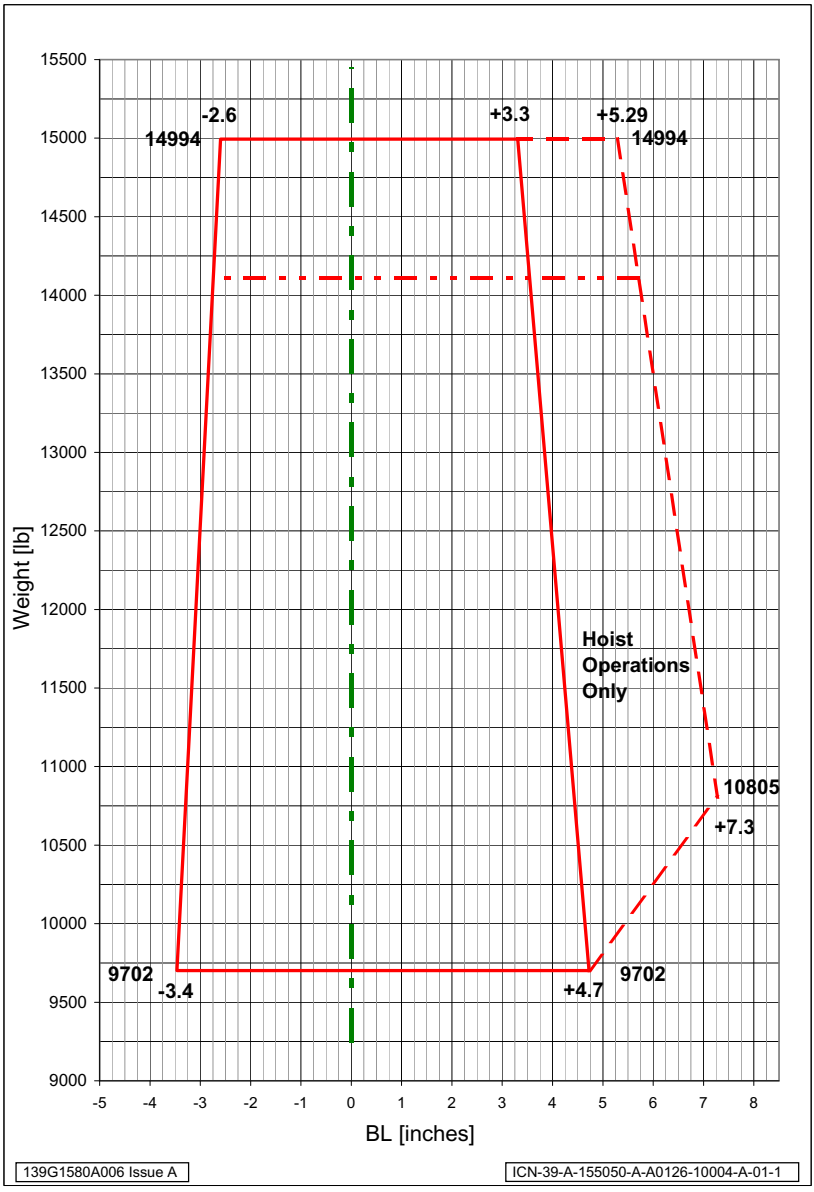

Figure 1-4 Weight and Lateral CG Limitations (Imperial Units)

AIRSPEED LIMITATION

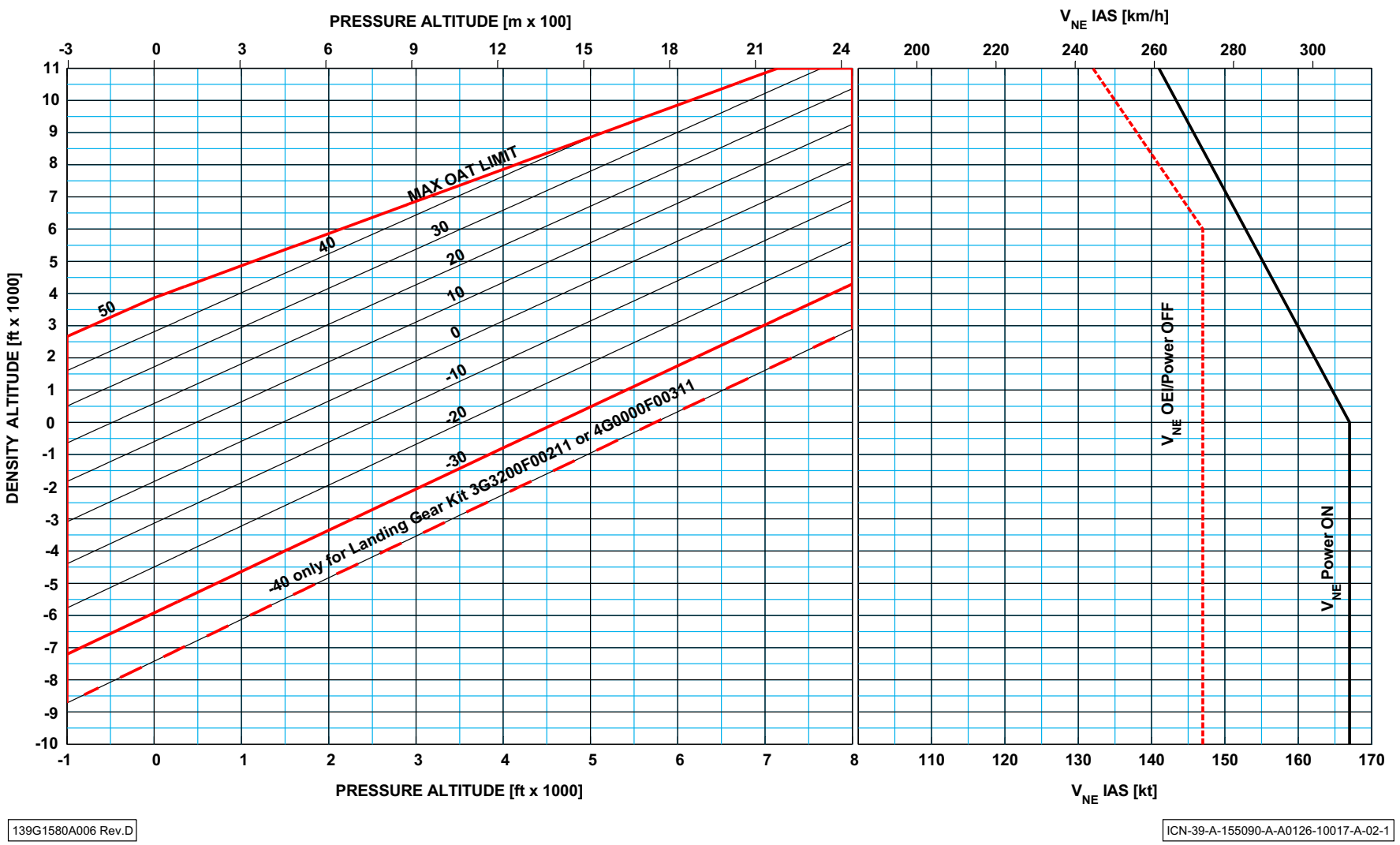

Figure 1-5 Airspeed Envelope (Vne-Power On, OEI/Power Off)

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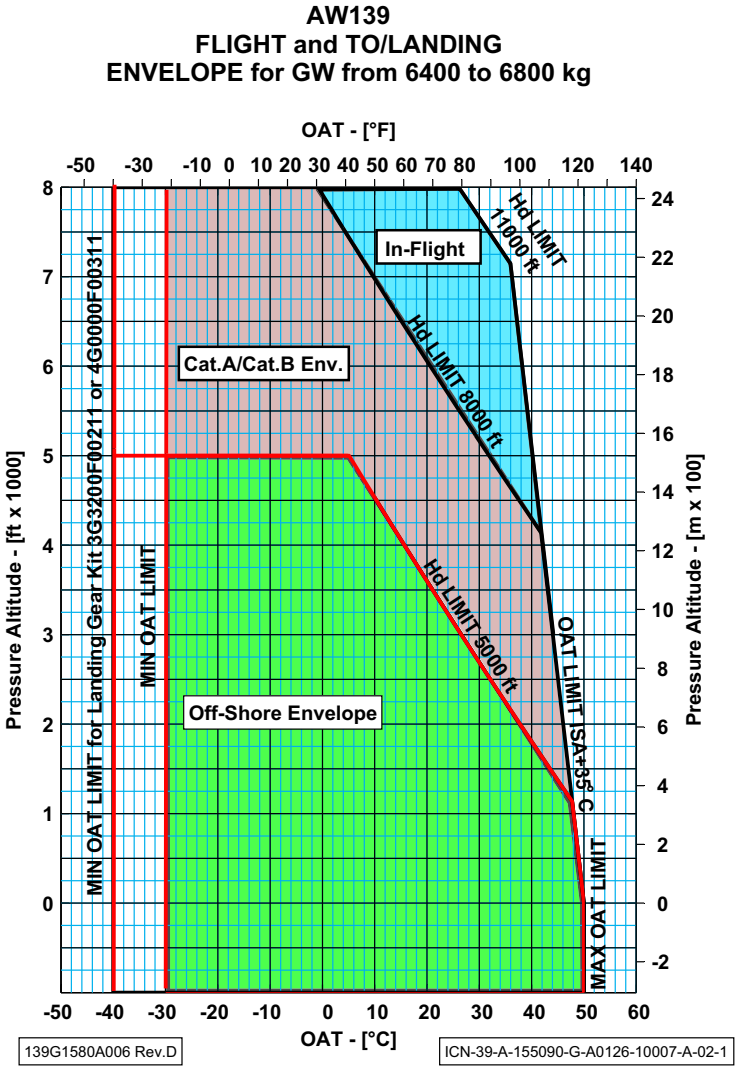

Figure 1-6 CAT A Take Off/Landing Altitude and OAT Limitations

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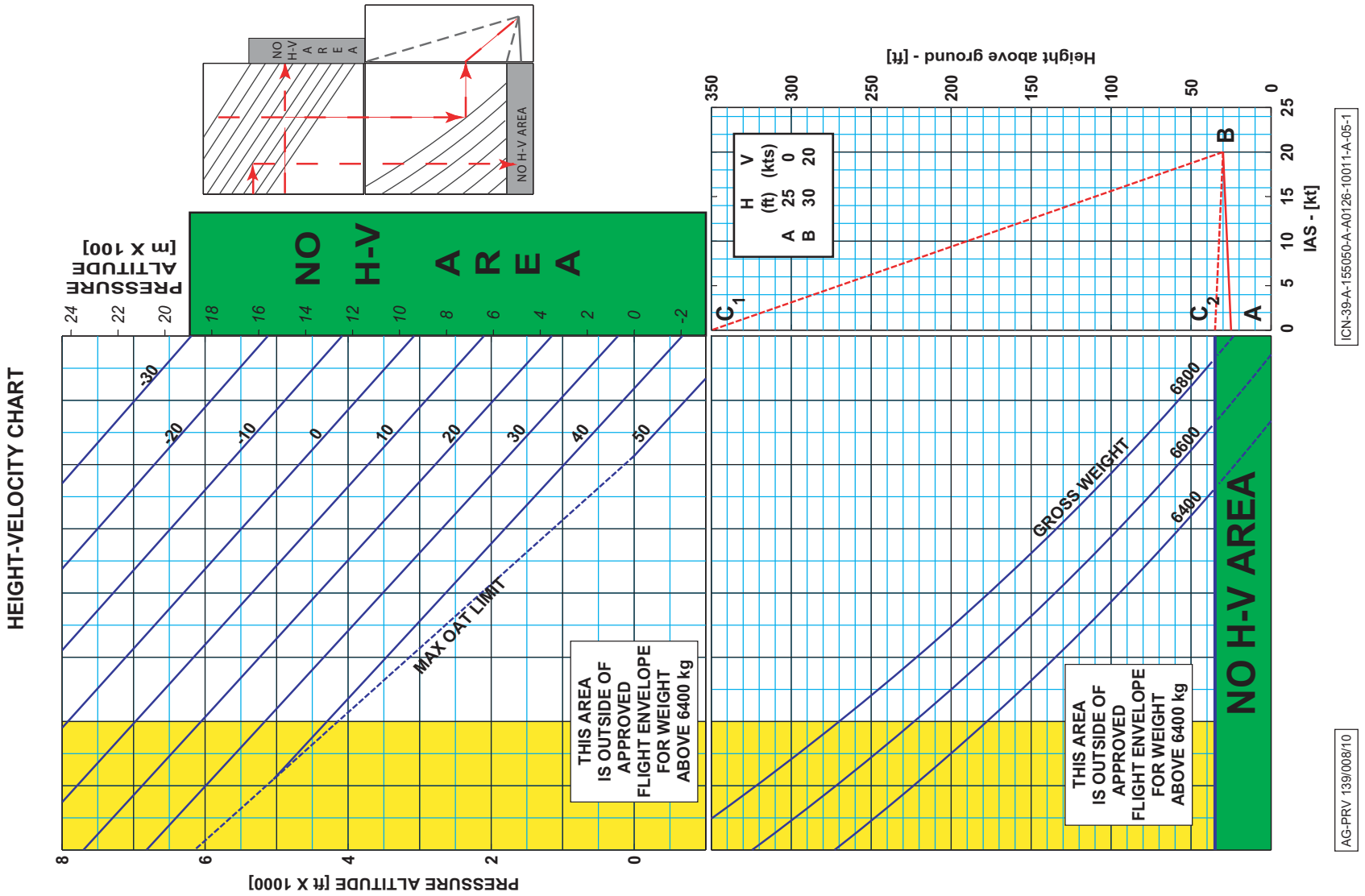

Figure 1-7 Height-Velocity Limitations

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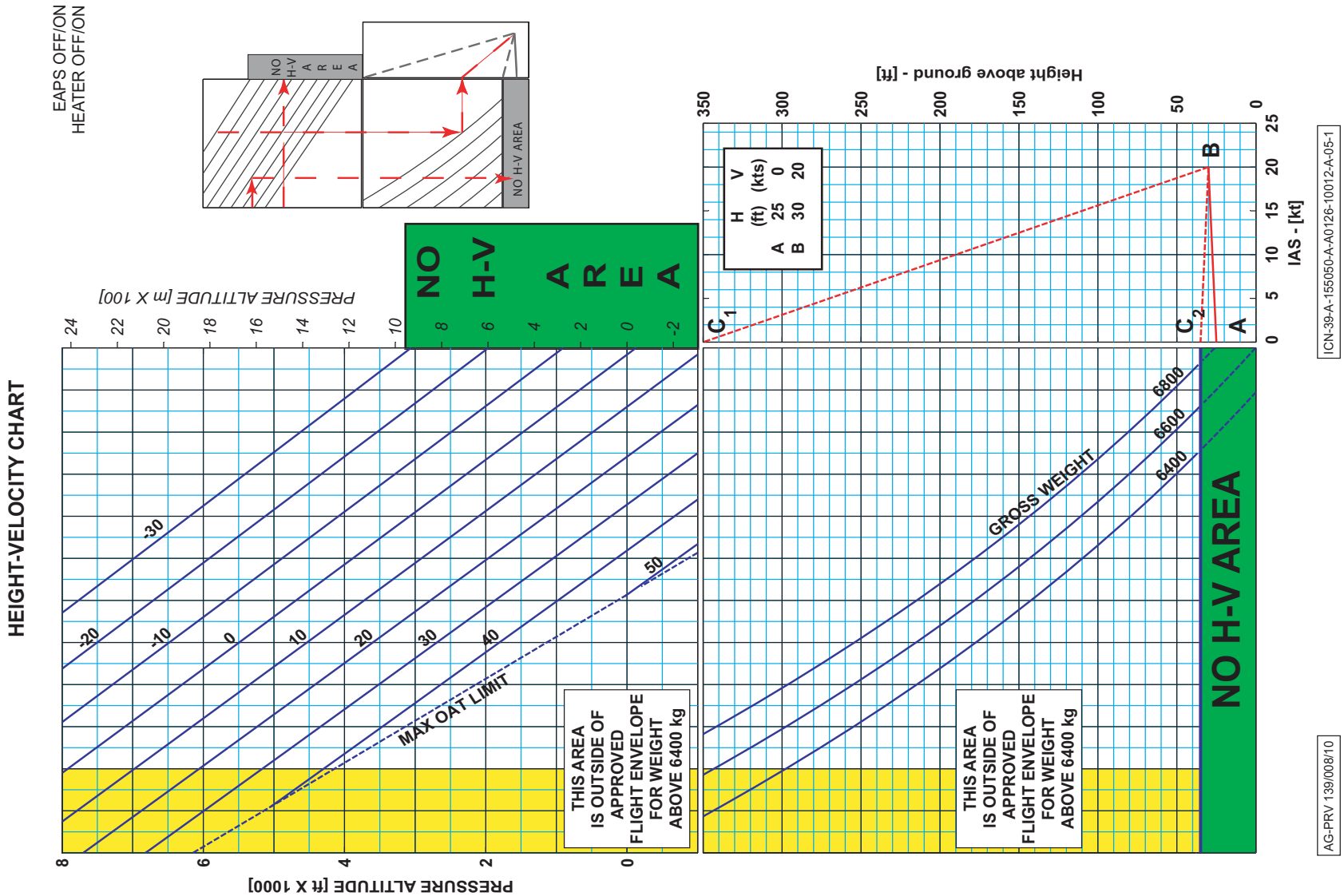


Figure 1-8 H-V Limitations, EAPS/HEATER ON or OFF

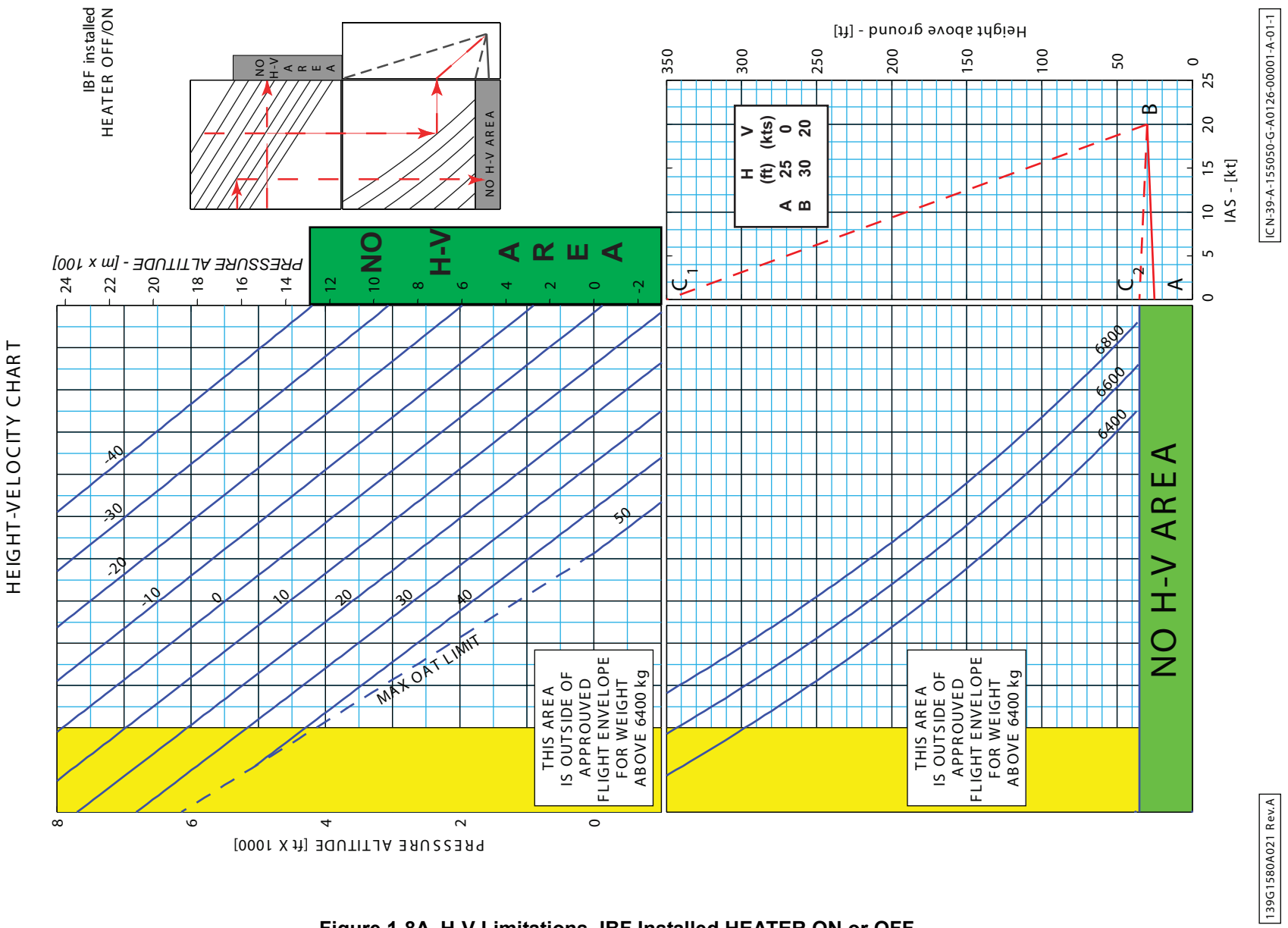
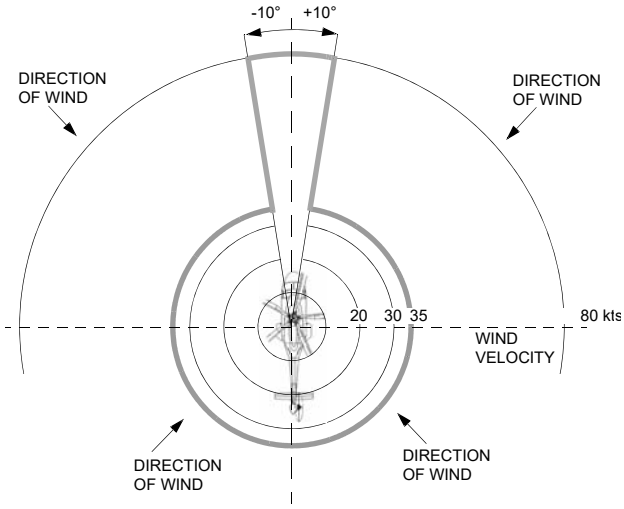


Figure 1-8A H-V Limitations, IBF Installed HEATER ON or OFF

Applicable up to 7000 ft Hd (2100 m Hd)



Applicable from 7000 ft Hd to 8000 ft Hd (2100 m to 2400 m Hd)

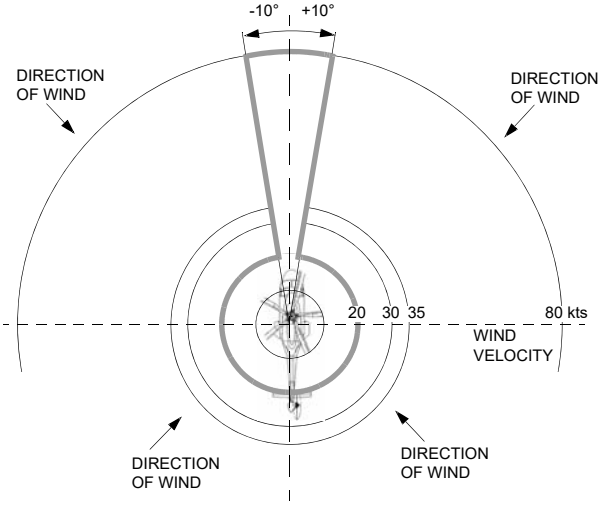


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Figure 1-9 Wind/Ground/Air Speed Azimuth Envelopes for Hoist Operations in Hover OGE with MCP, AEO

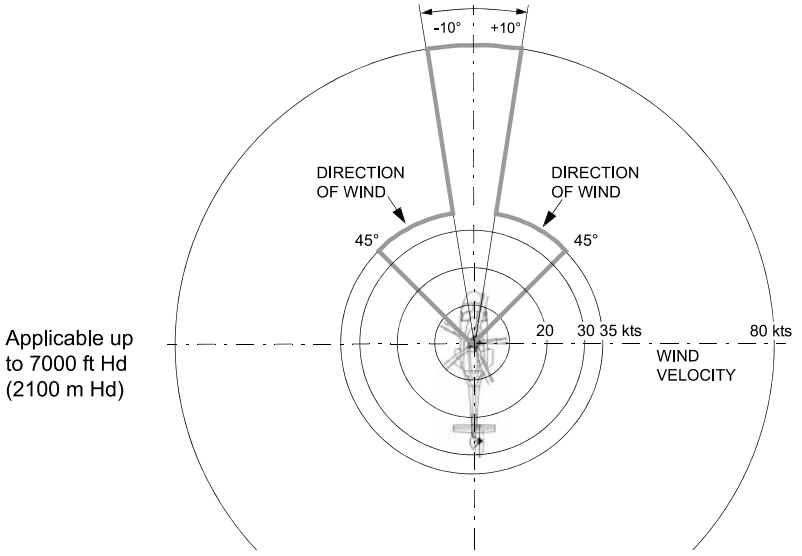

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Figure 1-10 Wind/Ground/Air speed Azimuth Envelopes Operation at OGE with TOP, AEO

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

AUTOROTATIVE LANDING PROCEDURE ON LAND

The procedure which follows outlines the steps required to execute a successful autorotation landing, time permitting, consult the appropriate Emergency Procedure for the additional steps required to deal with a specific type failure.

1.	Collective pitch	— Smoothly and rapidly reduce to enter autorotation.
2.	Cyclic	— Adjust to obtain autorotation at between 80 KIAS (minimum rate of descent speed) and 100 KIAS (Best range speed).
3.	Collective pitch	— Adjust to obtain up to 110% NR.
4.	Landing gear	— Extend.
5.	Landing site	— Select and manoeuvre into wind.
6.	Brief	— Cabin crew and occupants.
7.	Radar altimeter	— Verify working.
8.	Distress procedure	— Broadcast Mayday (time permitting).
9.	Shutdown	— If appropriate and time available carry out **EMERGENCY/ POST CRASH SHUTDOWN** procedure Page 3-36.

10. Cyclic	— At approximately 200 ft (61 m) AGL, initiate a cyclic flare to a maximum 30° nose-up angle.
11. Collective pitch	— Adjust, as required, to maintain NR at 110% maximum during the flare.
12. Cyclic /Collective pitch	— At approximately 35 ft (15 m) AGL, reduce pitch attitude to 10° nose-up and apply collective pitch, as required, to achieve touchdown at approximately 300 feet per minute (fpm) or less.
13. Touchdown speed	— As required by surface characteristics. (Maximum touchdown speed 40 kts on paved surface, avoid grass surfaces if possible, if not 20 kts on grass surfaces).
14. Collective pitch	— Following touchdown, lower promptly to conserve the remaining rotor speed.
15. Wheel brakes	— Apply as required (land only).
16. Shutdown	— If not carried out previously, execute the **EMERGENCY/ POST CRASH SHUTDOWN** procedure Page 3-36.
17. Evacuate	— Evacuate the aircraft as soon as possible.

SECTION 4 - PERFORMANCE DATA

ENHANCED LANDING GEAR

Aircraft fitted with P/N 3G3200F00211 or P/N 4G0000F00311 are cleared for operation down to -40°C. Where regulatory performance at -40°C is not presented refer to -30°C lines on the performance charts for performance information.

LOW SPEED MANOEUVRES IGE

Satisfactory stability and control has been demonstrated for all azimuths in accordance with the Figure 4-10.

HOVER CEILING

The Hover Ceiling charts define the maximum weights at which an IGE hover (at 5 ft wheel height) or an OGE hover is possible for varying combinations of Pressure Altitude and OAT with main rotor speed at 100% and zero wind conditions.

Information is presented for All Engines Operating (AEO) at Maximum Continuous Power (MCP) and Take Off Power (TOP).

See Figure 4-12 to Figure 4-34.

When ECS ENVIRO fitted and in FULL AUTO see Supplement 87 for Hover performance charts.
For ECS ENVIRO operation in MAN HEAT or A/C RECYCLE use HEATER ON/COND ON Hover charts contained in this Supplement.

TAKE OFF AND LANDING CATEGORY B

The Weight Limitation charts for CAT B operations, between 6400 and 6800 kg are shown in Figure 4-1 to Figure 4-3 and Figure 4-9A.

Category B Take Off Distance and Landing Distance charts, Figure 4-35 and Figure 4-36.

CATEGORY A W.A.T. CHARTS

The Weight Limitation charts for CAT A Clear Area, Confined Area, Offshore Helideck Procedures, between 6400 and 6800 kg are shown in Figure 4-1 to Figure 4-9.

W.A.T. CHART EXAMPLES FOR WEIGHTS ABOVE 6400 KG

Example 1

Determine the maximum take-off weight permitted for the following ambient conditions:

— Aircraft = Clean Intake

— Pressure Altitude = 4500 ft

— OAT = 25° C

Solution:

Using chart Figure 4-1 enter the graph at a pressure altitude of 4500 ft and proceed horizontally to intersect the 25° C point, determined by interpolating between the 20° C line and 30° C line. From this point drop down vertically to a weight of 6730 kg which represent the maximum Take-Off weight for CAT A Clear Area or CAT B Take Off procedure.

Example 2

Determine the maximum take-off weight permitted for the following ambient conditions:

— Aircraft = Clean Intake

— Pressure Altitude = 6000 ft

— OAT = 25° C

Solution:

Using chart Figure 4-1 enter the graph at a pressure altitude of 6000 ft and proceed horizontally. It can be seen however that the 25° C point, determined by interpolating between the 20° C line and the extrapolated 30° C line, produces an intersection point outside of the Hd limit line therefore Take-Off in these ambient conditions is not permitted.

Example 3

Determine the maximum take-off weight permitted for the following ambient conditions:

— Aircraft = Clean Intake

— Pressure Altitude = 3500 ft

— OAT = 10° C

Solution:

Using chart Figure 4-1 enter the graph at a pressure altitude of 3500 ft and proceed horizontally. It can be seen that the 10° C point would be to the right of the maximum take off weight line, therefore maximum Take-Off weight is 6800 kg for CAT A Clear Area or CAT B Take Off procedure.

Example 4

Determine the maximum take-off weight permitted for the following ambient conditions:

— Aircraft = Clean Intake

— Pressure Altitude = 2500 ft

— OAT = 40° C

Solution:

Using chart Figure 4-1 enter the graph at a pressure altitude of 2500 ft and proceed horizontally to intersect the 40° C line. From this point drop down vertically to a weight of 6780 kg which represent the maximum Take-Off weight for CAT A Clear Area or CAT B Take Off procedure.

SINGLE ENGINE FAILURE IN HOVER OGE FLYAWAY PROCEDURE

The height loss during a single engine failure flyaway for combinations of weight, altitude and temperature conditions is shown in Figure 4-37 for weights between 6400 kg and 6800 kg. See Basic RFM Section 4 for details of procedures.

Note

Following the flyaway procedure the height loss indicated on chart Figure 4-37, for given ambient condition and aircraft weight, guarantees that V_{TOSS} (40 KIAS) will be achieved and, after accelerating to V_y, a subsequent minimum Rate Of Climb of 150 fpm is assured.

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WEIGHT-ALTITUDE-TEMPERATURE

EAPS NOT INSTALLED
Cat.A NR=102%
Cat.B NR=100%

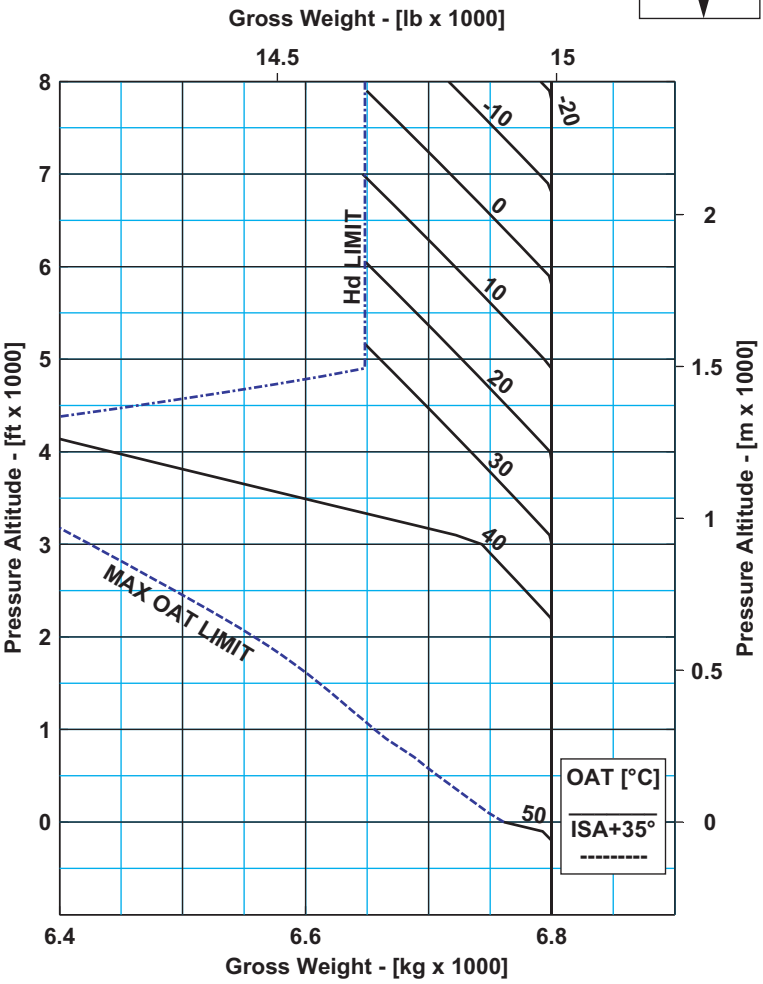

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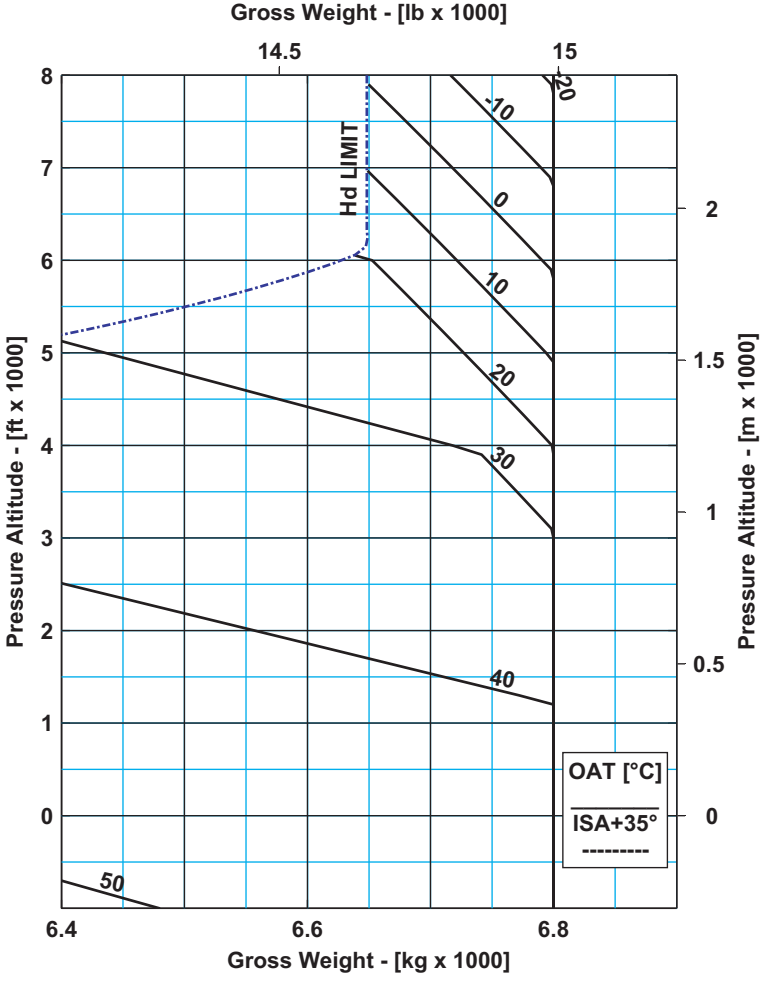
Figure 4-1 Weight Limitations for CAT A Clear Area and CAT B Procedures

WEIGHT-ALTITUDE-TEMPERATURE

EAPS OFF
Cat.A NR=102%
Cat.B NR=100%



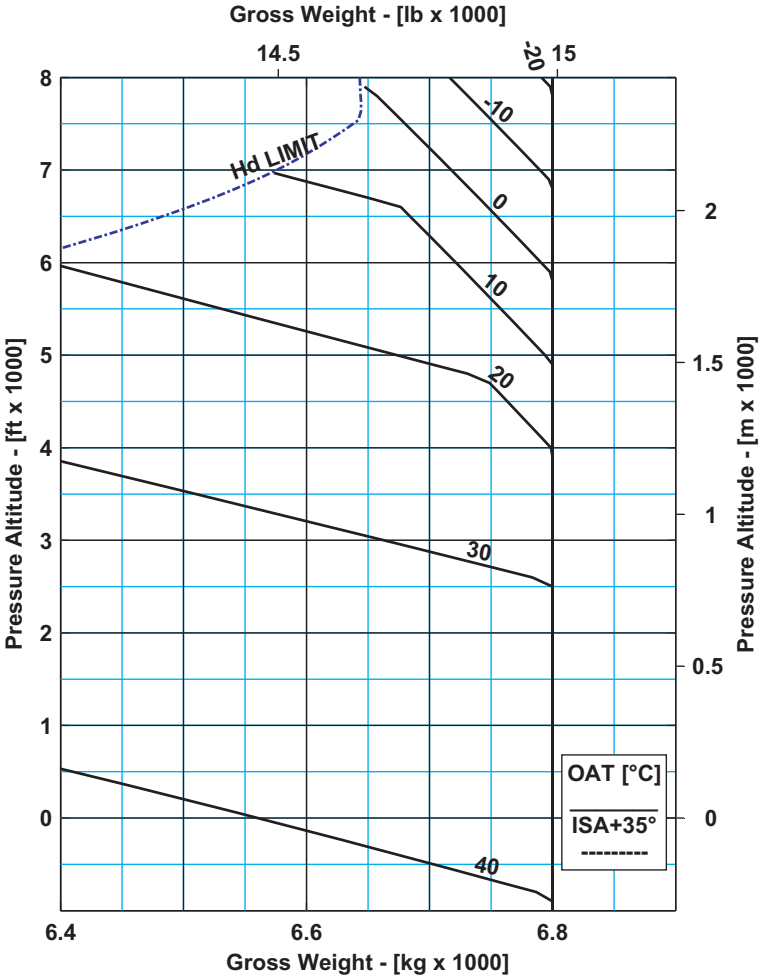
139G1580A006 issue C

ICN-39-A-155050-A-A0126-10008-A-03-1

Figure 4-2 Weight Limitations for CAT A Clear Area and CAT B Procedures, EAPS OFF

WEIGHT-ALTITUDE-TEMPERATURE

EAPS ON
Cat.A NR=102%
Cat.B NR=100%



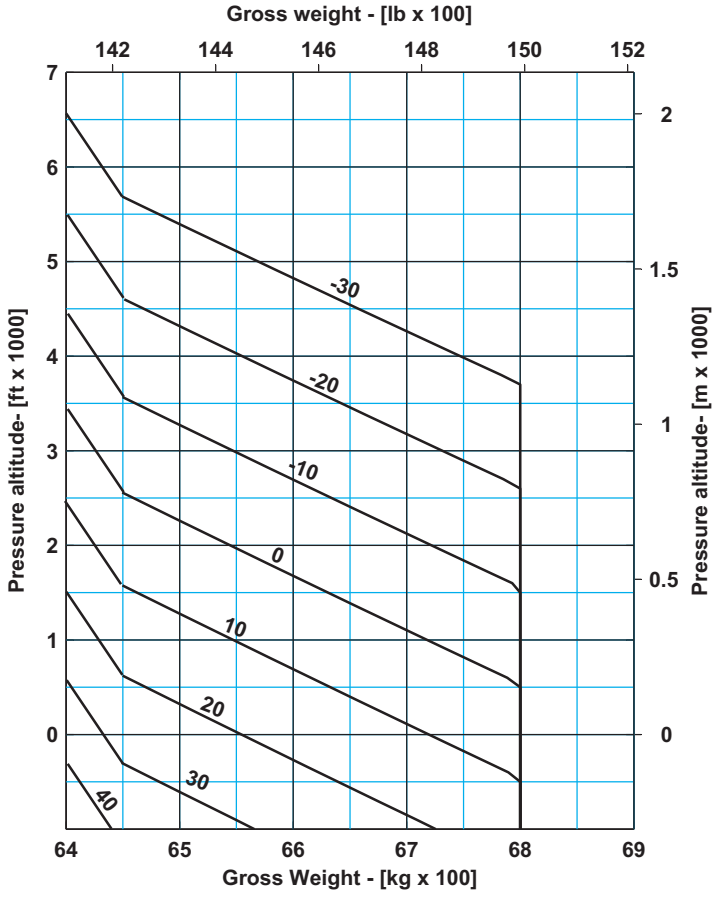
139G1580A006 issue C

ICN-39-A-155050-A-A0126-10009-A-03-1

Figure 4-3 Weight Limitations for CAT A Clear Area and CAT B Procedure, EAPS ON

WEIGHT-ALTITUDE-TEMPERATURE
CONFINED AREA

ROTOR SPEED 102%



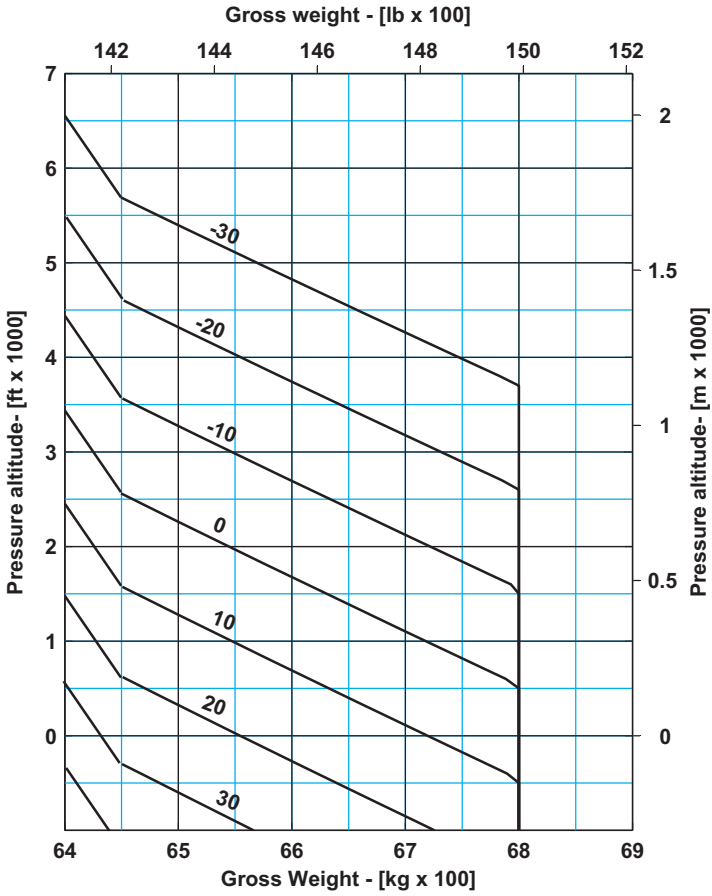
139G1580A012 issue A

ICN-39-A-155050-G-A0126-10014-A-01-1

Figure 4-4 Weight Limitations for CAT A Confined Area Procedure

WEIGHT-ALTITUDE-TEMPERATURE
CONFINED AREA

EAPS OFF
ROTOR SPEED 102%



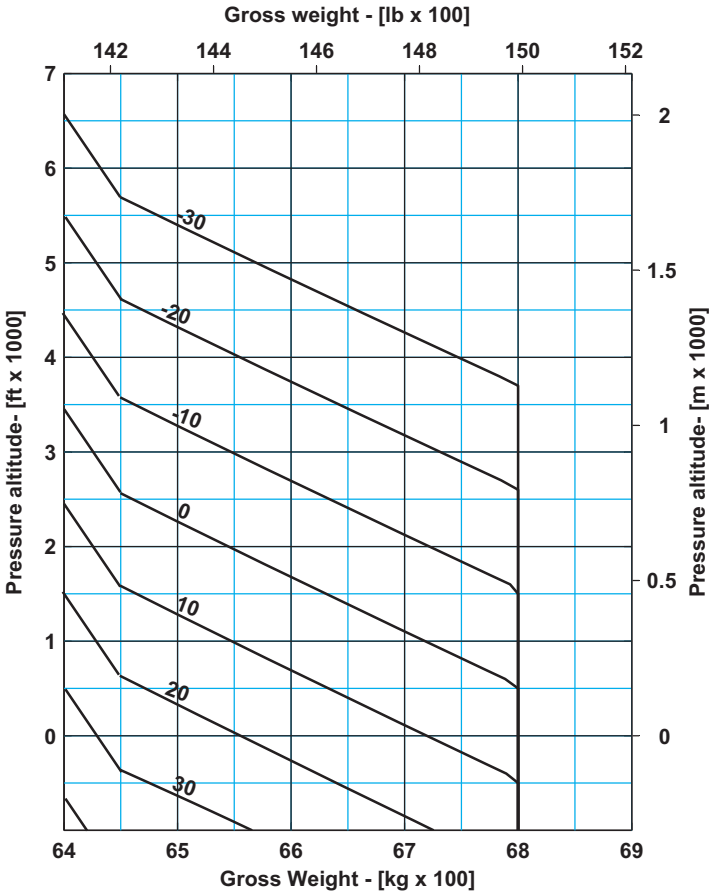
139G1580A012 issue A

ICN-39-A-155050-G-A0126-10015-A-01-1

Figure 4-5 Weight Limitations for CAT A Confined Area Procedure, EAPS OFF

WEIGHT-ALTITUDE-TEMPERATURE
CONFINED AREA

EAPS ON
ROTOR SPEED 102%

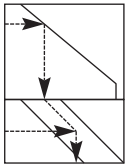


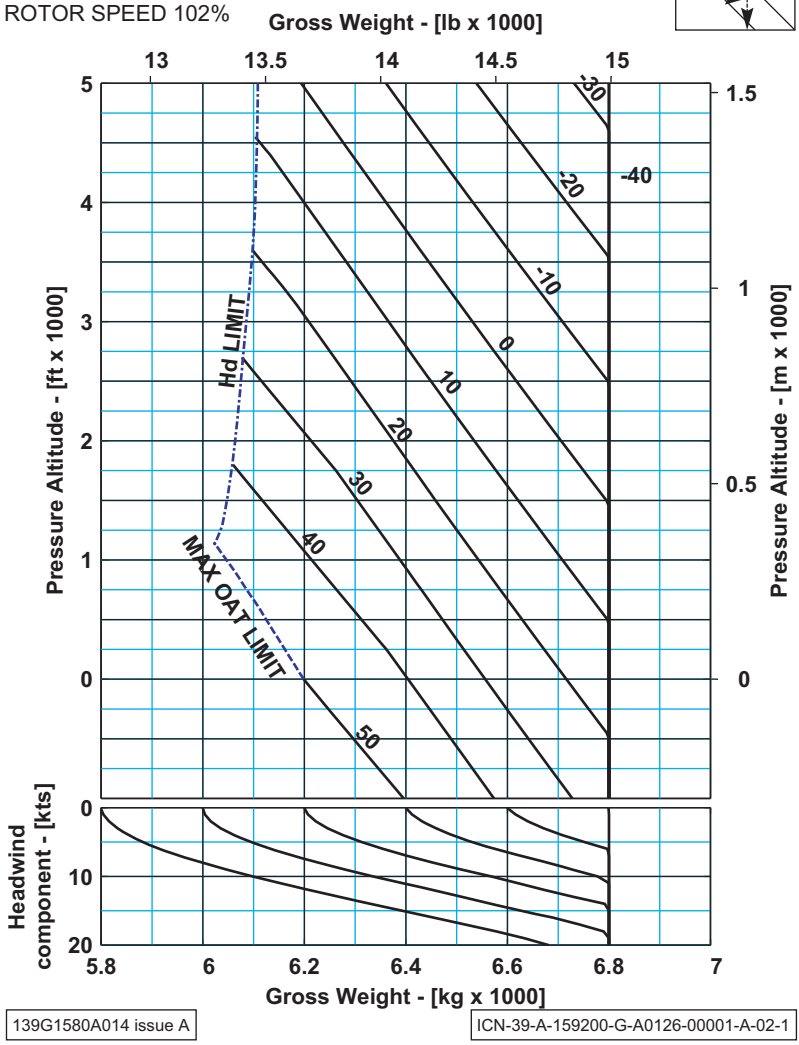
139G1580A012 issue A

ICN-39-A-155050-G-A0126-10016-A-01-1

Figure 4-6 Weight Limitations for CAT A Confined Area Procedure, EAPS ON

WEIGHT-ALTITUDE-TEMPERATURE
OFF-SHORE HELIDECK PROCEDURE





139G1580A014 issue A

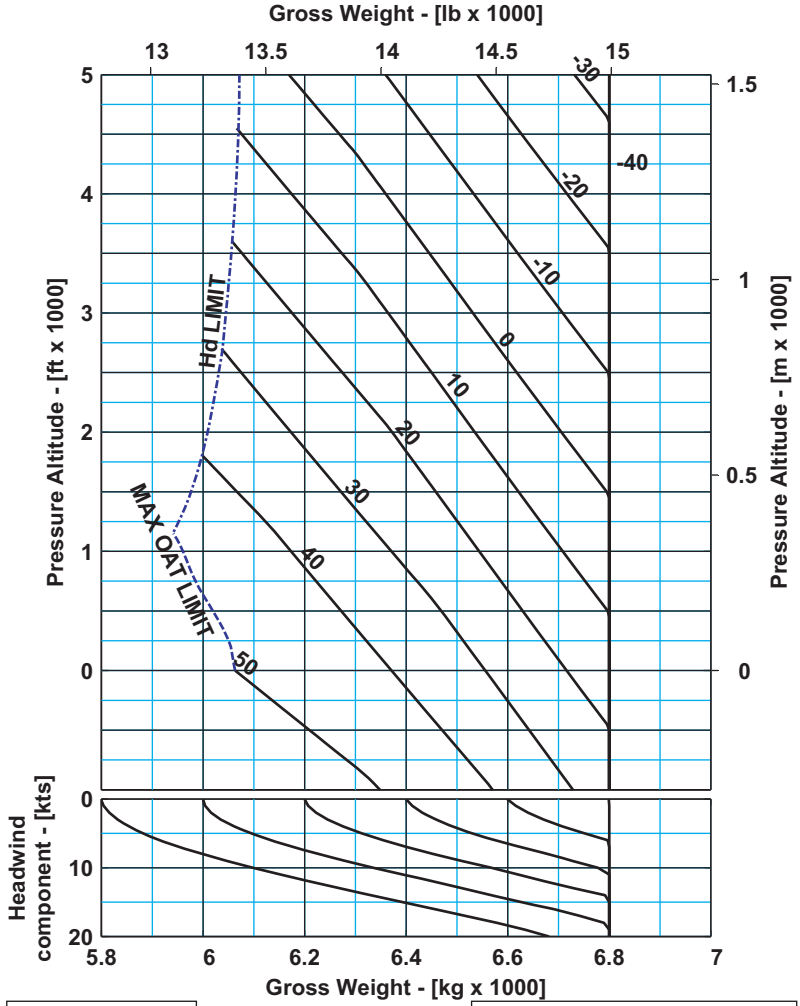
ICN-39-A-159200-G-A0126-00001-A-02-1

Figure 4-7 Weight Limitations for CAT A Offshore Helideck Procedure

WEIGHT-ALTITUDE-TEMPERATURE
OFF-SHORE HELIDECK PROCEDURE

EAPS OFF

ROTOR SPEED 102%



139G1580A014 issue A

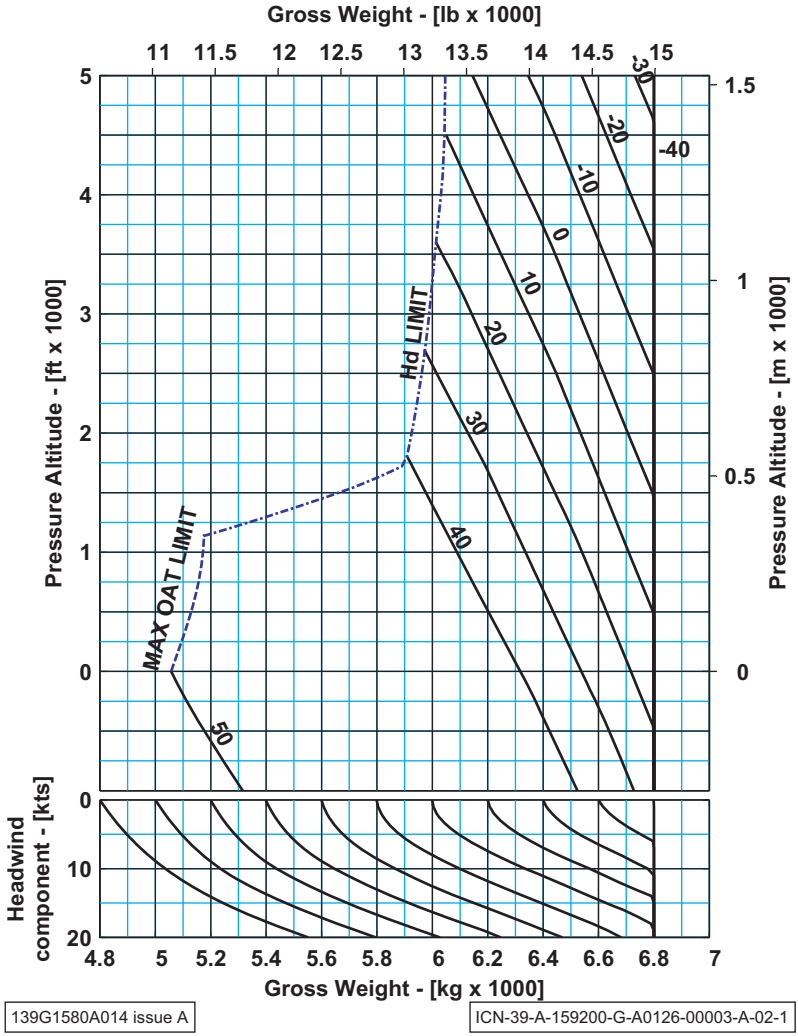
ICN-39-A-159200-G-A0126-00002-A-02-1

Figure 4-8 Weight Limitations for CAT A Offshore Helideck Procedure

WEIGHT-ALTITUDE-TEMPERATURE
OFF-SHORE HELIDECK PROCEDURE

EAPS ON

ROTOR SPEED 102%



139G1580A014 issue A

ICN-39-A-159200-G-A0126-00003-A-02-1

Figure 4-9 Weight Limitations for CAT A Offshore Helideck Procedure, EAPS ON

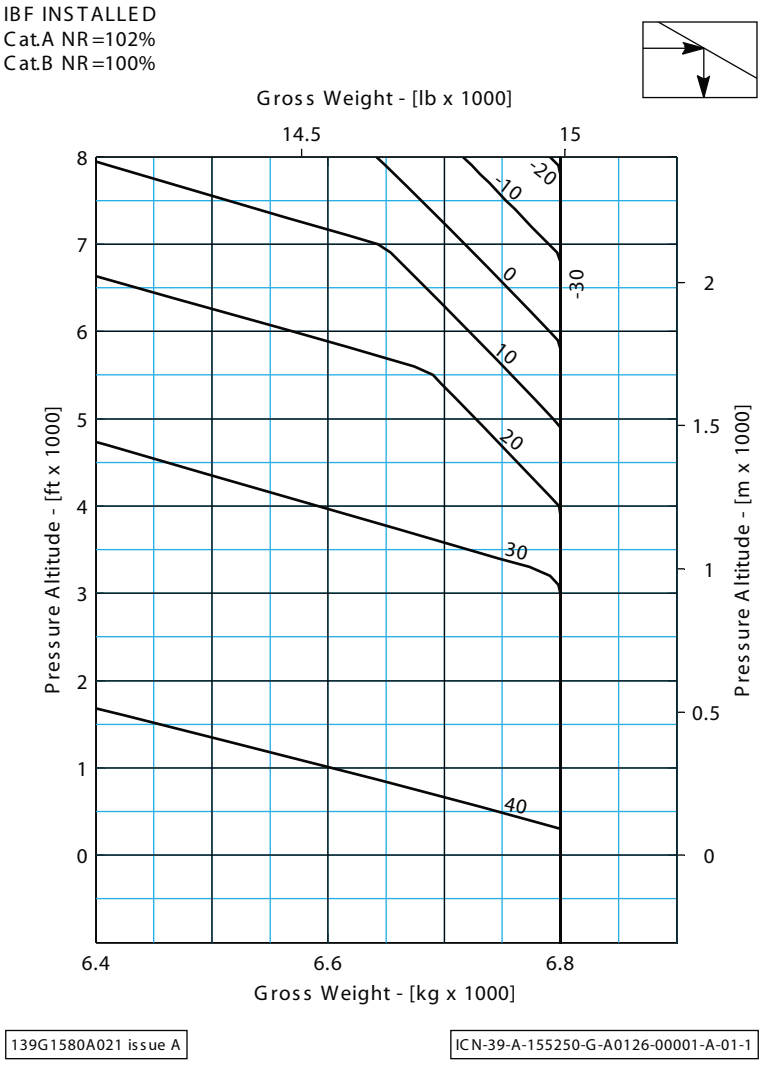
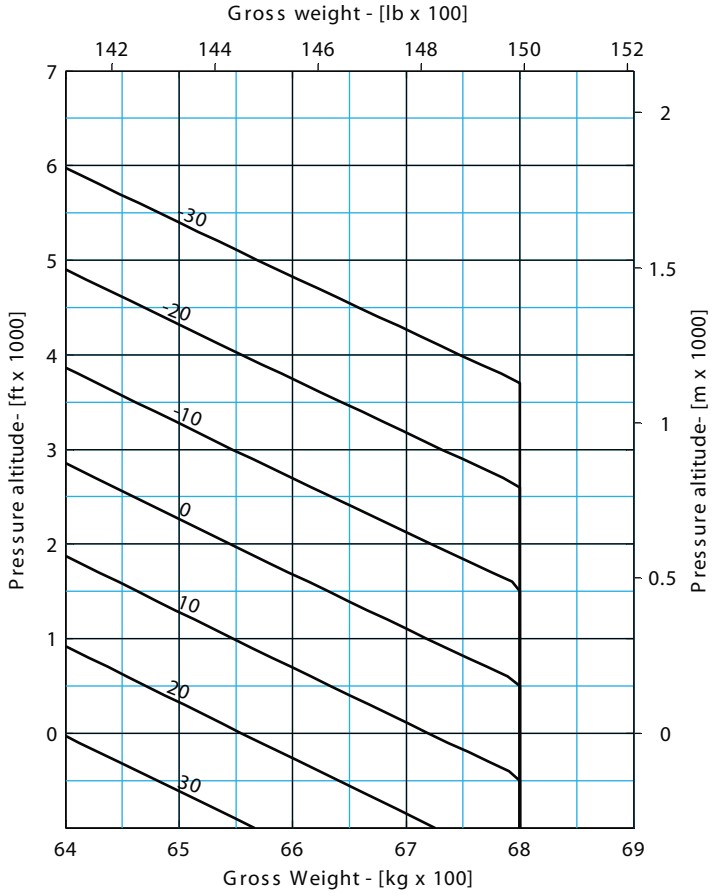


Figure 4-9A Weight Limitations for CAT A Clear Area and CAT B Procedure, IBF Installed

WEIGHT-ALTITUDE-TEMPERATURE
CONFINED AREA

IBF INSTALLED
ROTOR SPEED 102%



139G1580A021 issue A

ICN-39-A-155250-G-A0126-00002-A-01-1

Figure 4-9B Weight Limitations for CAT A Confined Area Procedure, IBF Installed

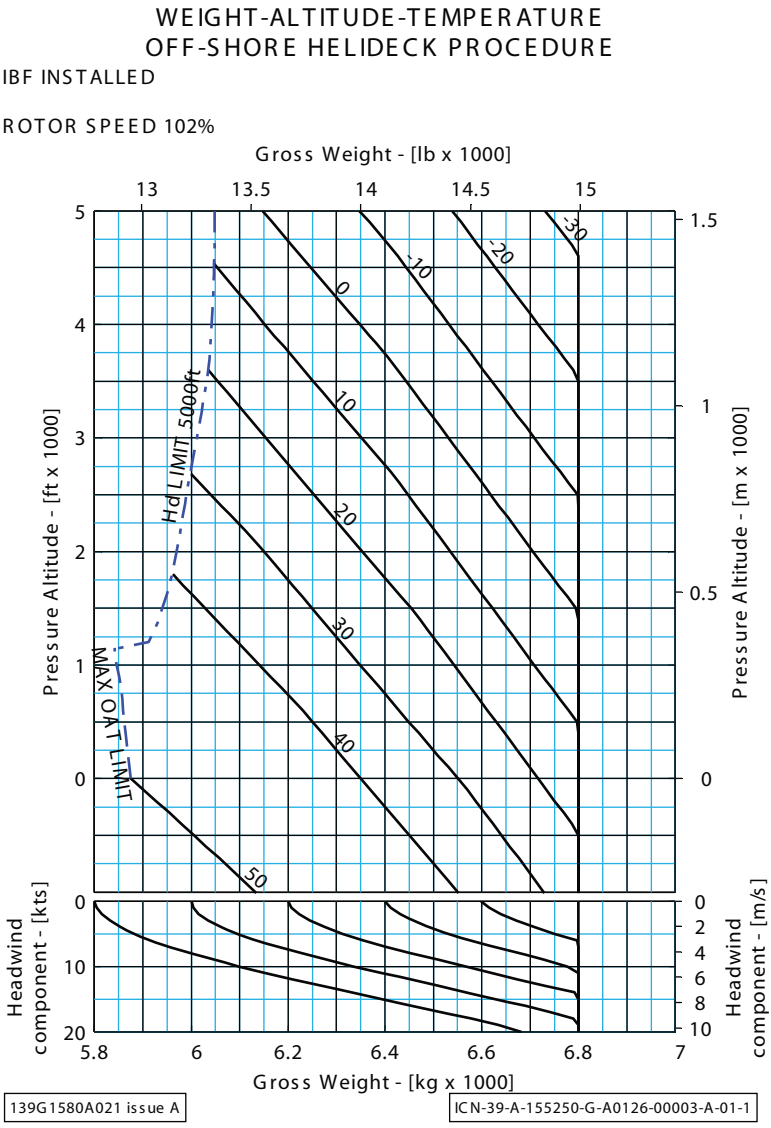


Figure 4-9C Weight Limitations for CAT A Offshore Helideck Procedure, IBF Installed

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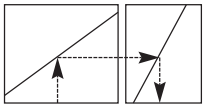
CONTROLLABILITY ENVELOPE



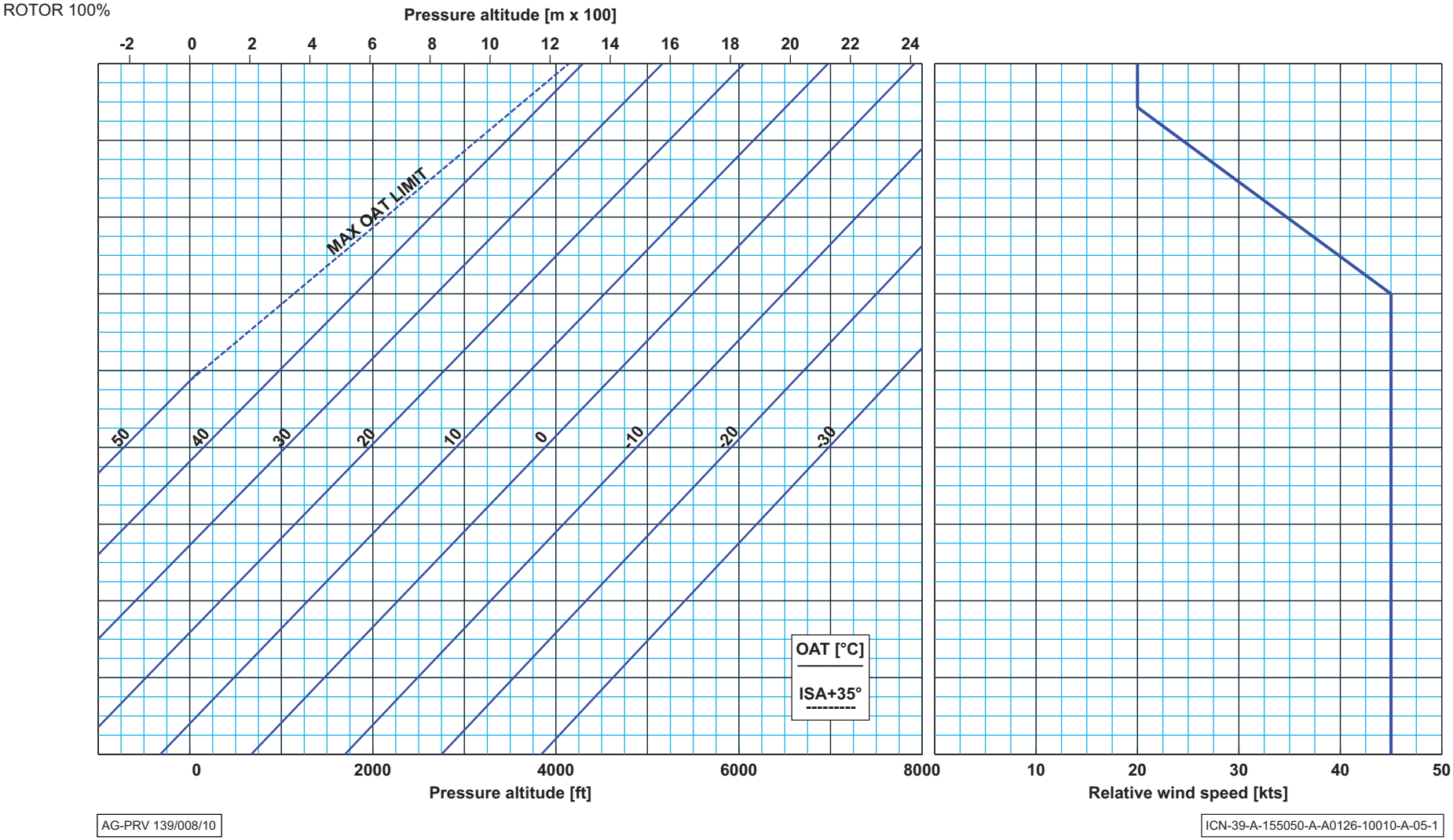


Figure 4-10 Controllability Envelope for Low Speed IGE Manoeuvres

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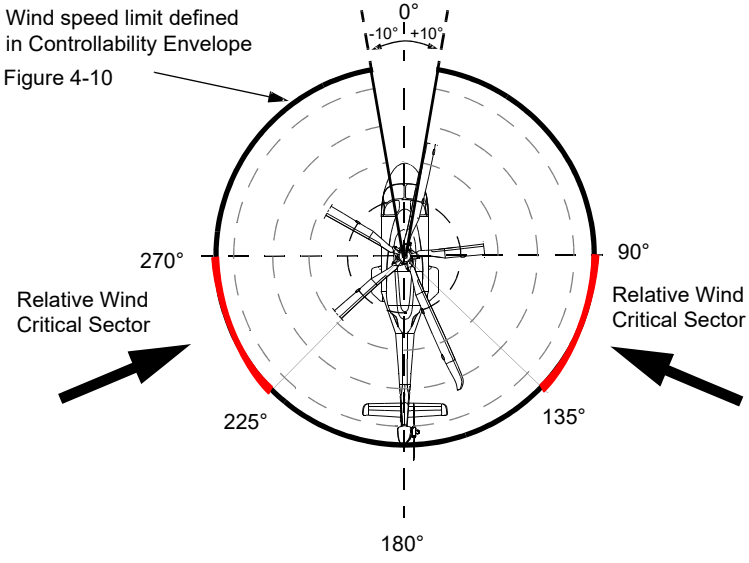
LOW SPEED MANOEUVRES IN QUARTERING FLIGHT IGE

Satisfactory stability and control has been demonstrated for all azimuths shown below, Figure 4-11, for wind speed in accordance with the Controllability Envelope in Figure 4-10.
The critical sectors, requiring slightly increased workload, are indicated below. The sector 225°/270° is critical for high altitude/high temperature. An increase in PI may be observed, which will remain within limits. However if it is required to exit the condition, it is sufficient to modify the heading by 20-30°.
The sector 90°/135° is critical for pedal margin.

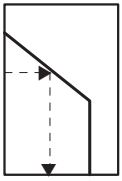
No limitation exists for headwind conditions (±10°).



ICN-39-A-155050-A-00003-00524-A-01-1

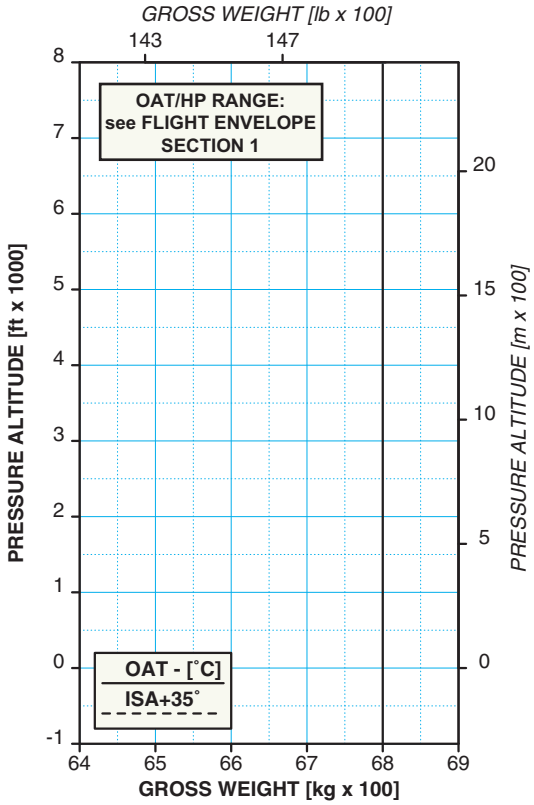
Figure 4-11 Azimuth Envelope Critical Sector

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO



ROTOR SPEED:100%
ZERO WIND

WHEEL HEIGHT:5 FT
ELECTRICAL LOAD: 600 A TOTAL
COND. ON: reduce weight by 50 kg



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ICN-39-A-155150-A-A0126-40001-A-01-1

Figure 4-12 Hover Ceiling IGE at TOP

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED:100%
ZERO WIND
COND. ON: reduce weight by 50 kg

ELECTRICAL LOAD: 600 A TOTAL
WHEEL HEIGHT: 5 FT

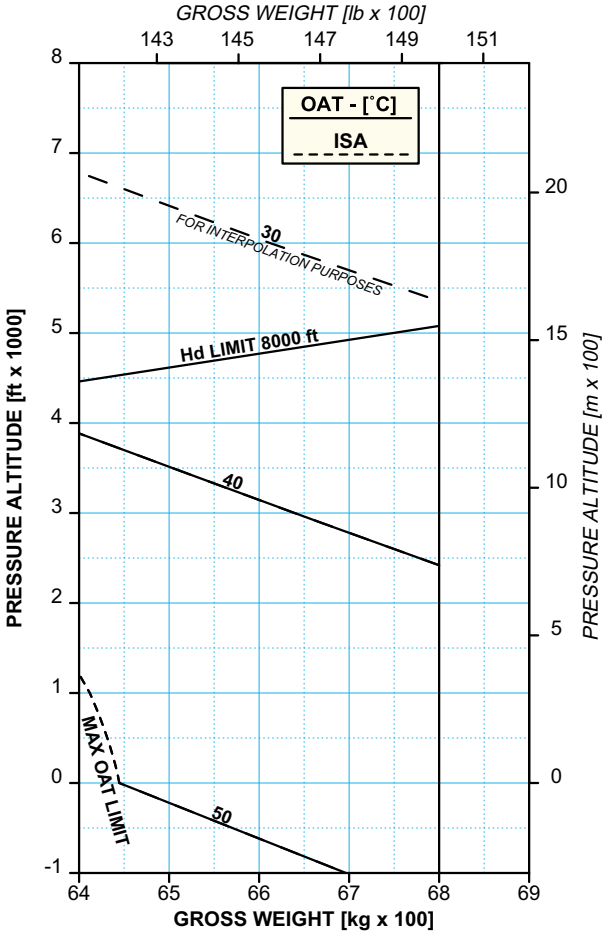

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Figure 4-13 Hover Ceiling IGE at MCP

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100.0 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

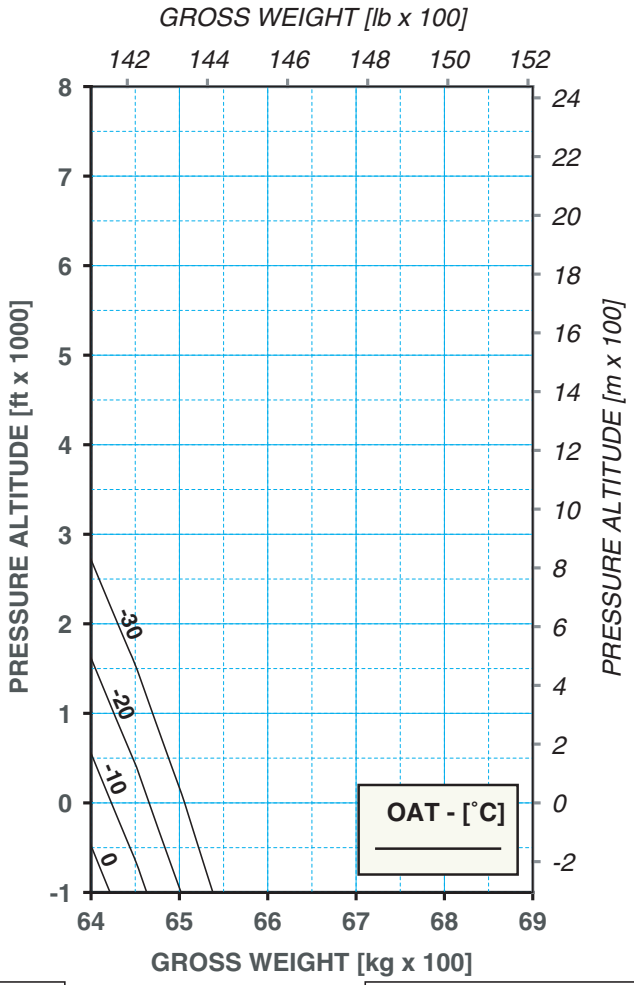

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Figure 4-14 Hover Ceiling IGE at 2.5min OEI

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100.0 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL

COND. ON: reduce weight by 50 kg

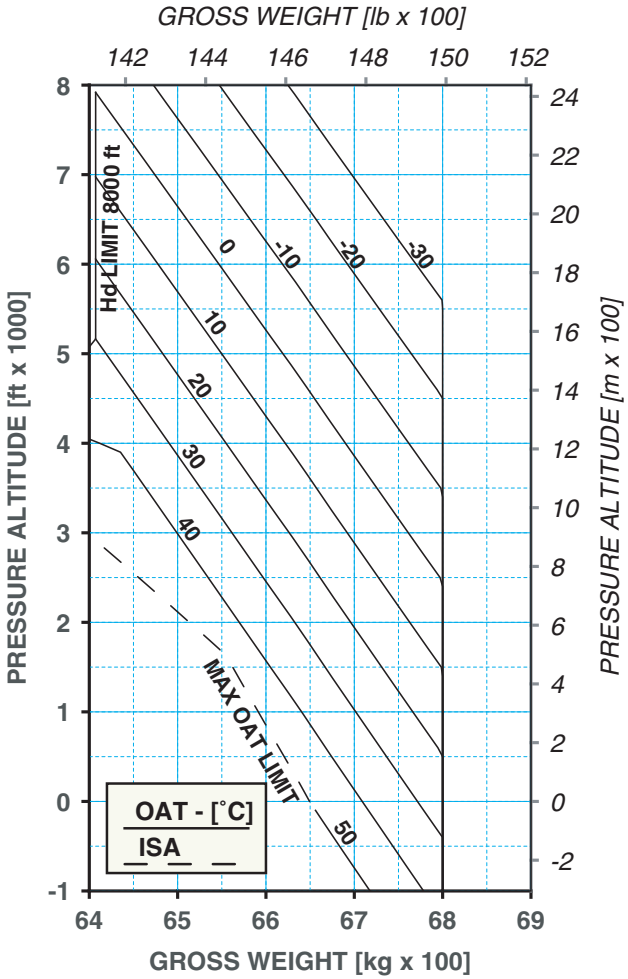

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Figure 4-15 Hover Ceiling OGE at TOP

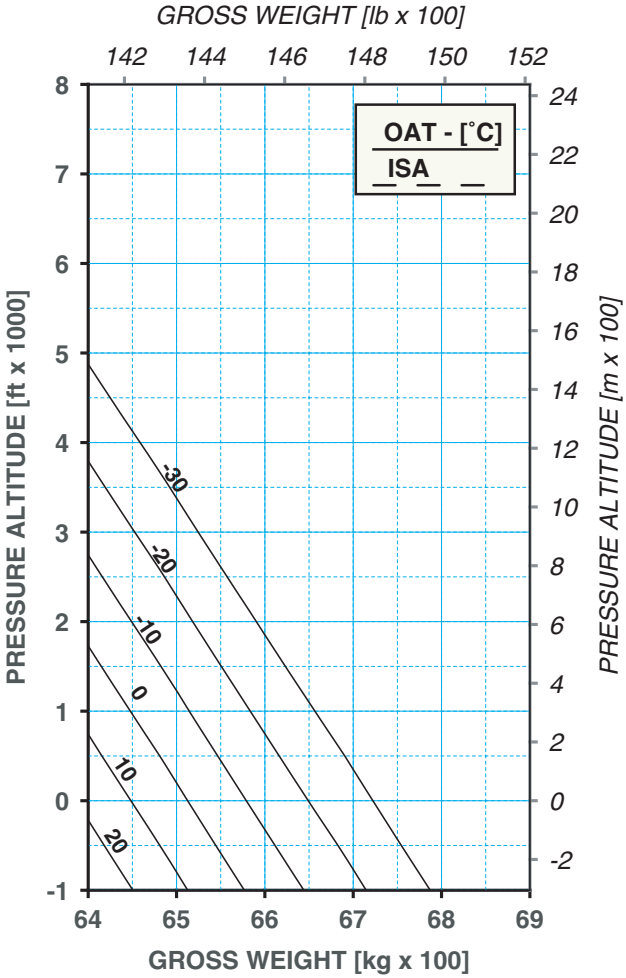
HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100.0 %

ELECTRICAL LOAD: 600 A TOTAL

ZERO WIND

COND. ON: reduce weight by 50 kg



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ICN-39-A-155150-A-A0126-40022-A-02-1

Figure 4-16 Hover Ceiling OGE at MCP

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED:100%
ZERO WIND

WHEEL HEIGHT:5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

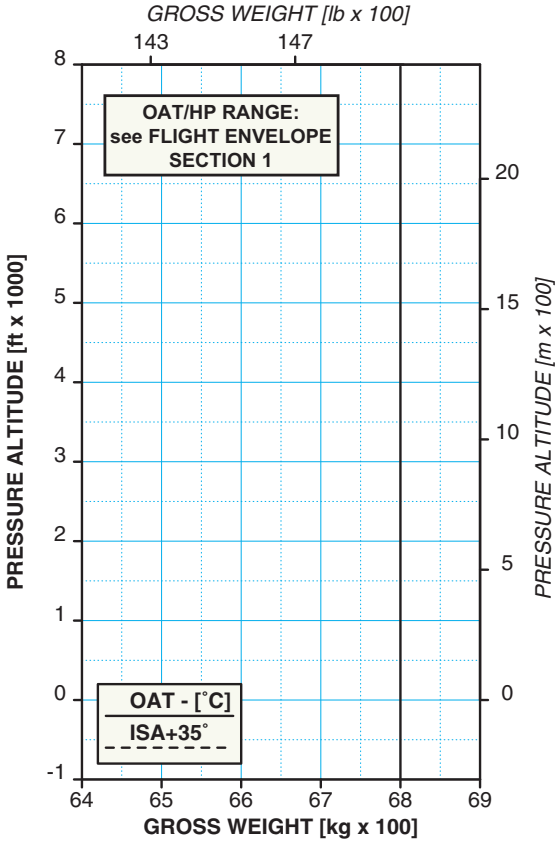

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Figure 4-17 Hover Ceiling IGE at TOP, HEATER ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED:100%
ZERO WIND

WHEEL HEIGHT:5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER: ON

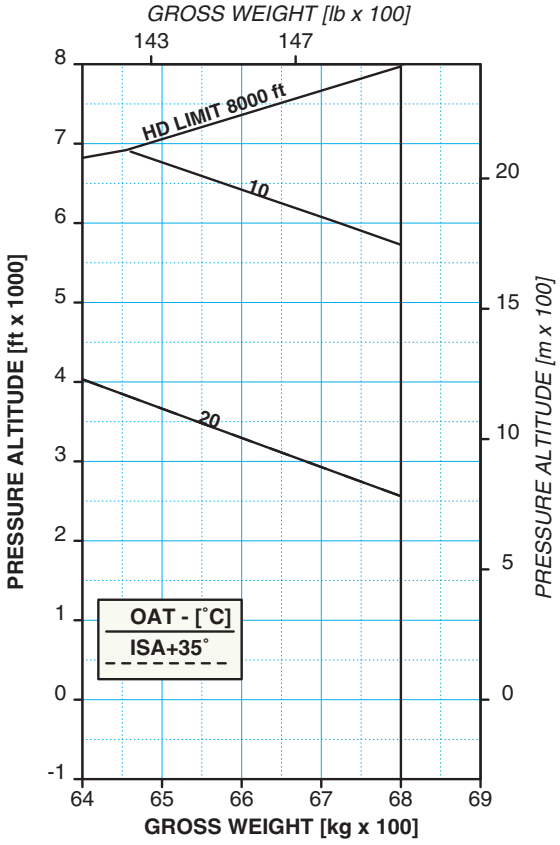

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Figure 4-18 Hover Ceiling IGE at MCP, HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100.0 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL
HEATER: ON

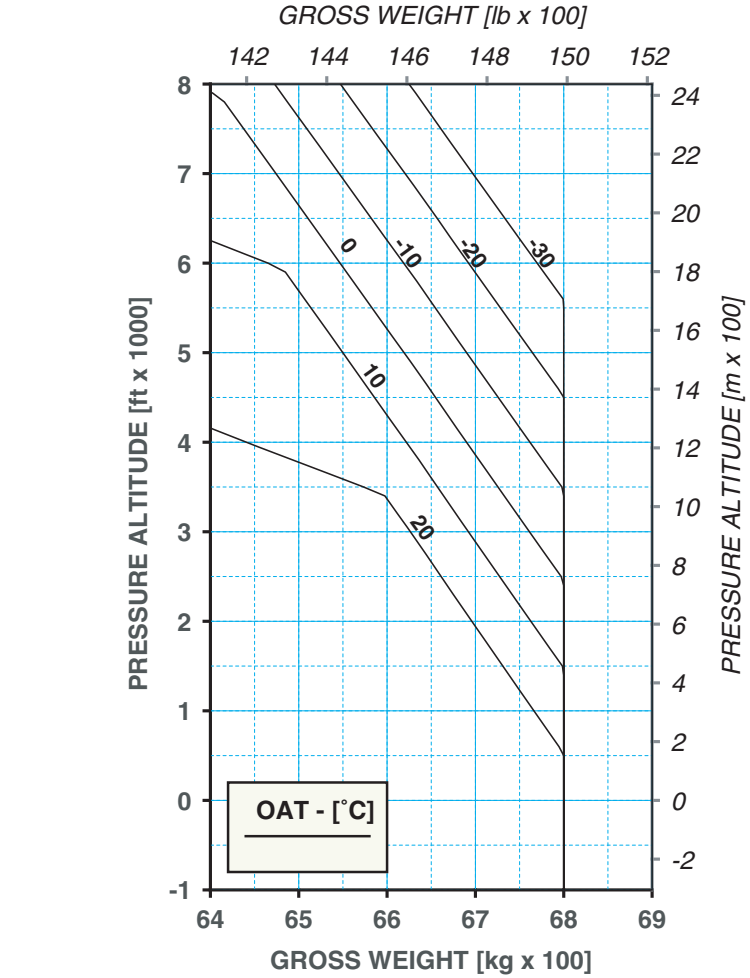

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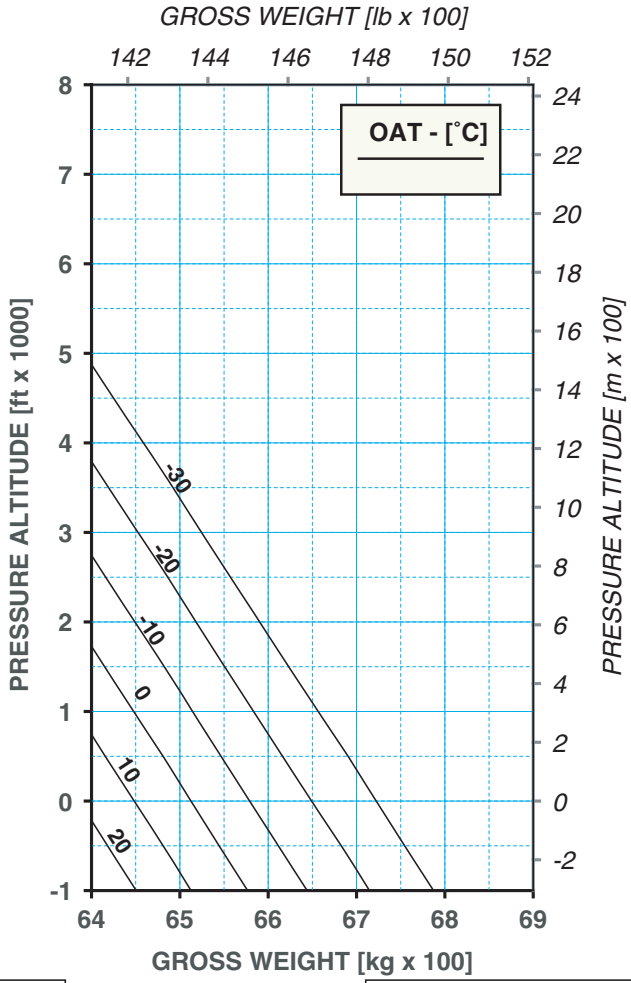
Figure 4-19 Hover Ceiling OGE at TOP, HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100.0 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL
HEATER: ON



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ICN-39-A-155150-A-A0126-40023-A-02-1

Figure 4-20 Hover Ceiling OGE at MCP, HEATER ON

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED:100%
ZERO WIND
EAPS: OFF
COND. ON: reduce weight by 50 kg

WHEEL HEIGHT:5 FT
ELECTRICAL LOAD: 600 A TOTAL

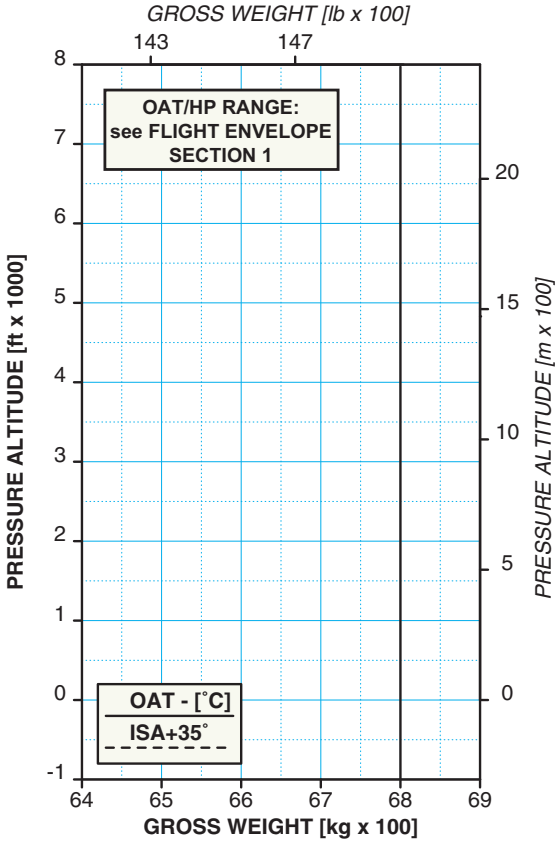

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Figure 4-21 Hover Ceiling IGE at TOP, EAPS OFF

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED:100%
ZERO WIND
EAPS: OFF

WHEEL HEIGHT:5 FT
ELECTRICAL LOAD: 600 A TOTAL
COND. ON: reduce weight by 50 kg

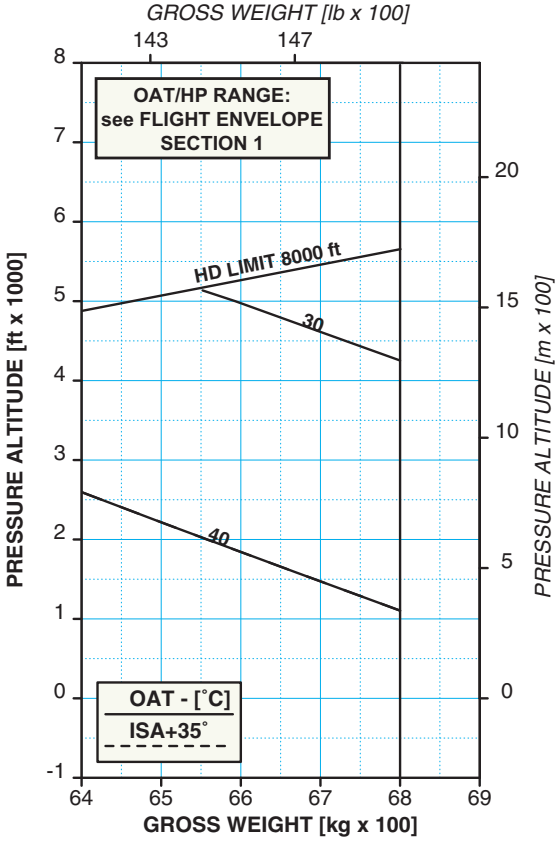

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Figure 4-22 Hover Ceiling IGE at MCP, EAPS OFF

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100.0 %
ZERO WIND
EAPS: OFF

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

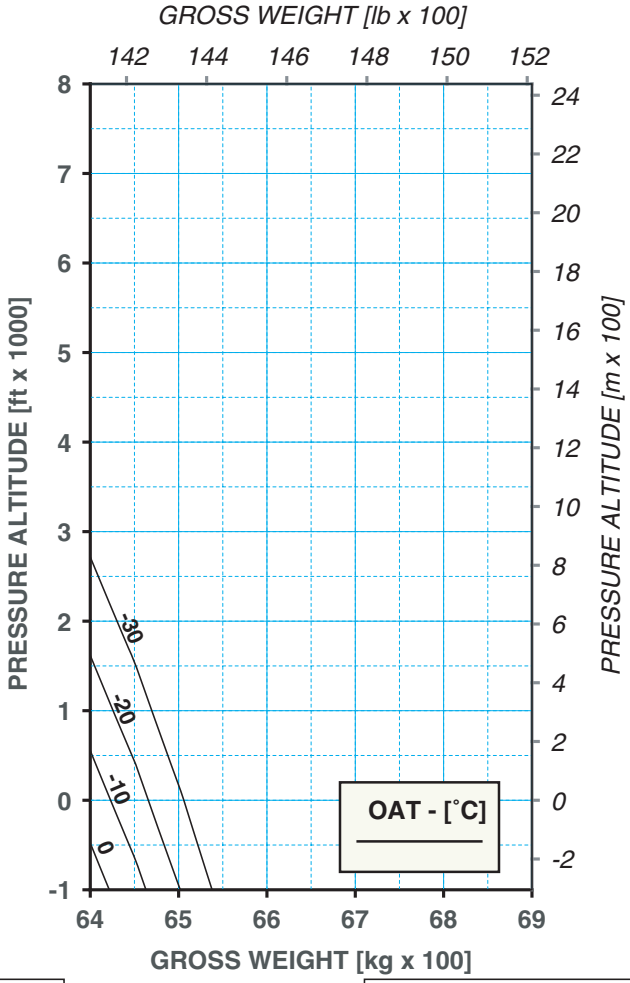

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Figure 4-23 Hover Ceiling IGE at 2.5 min OEI, EAPS OFF

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

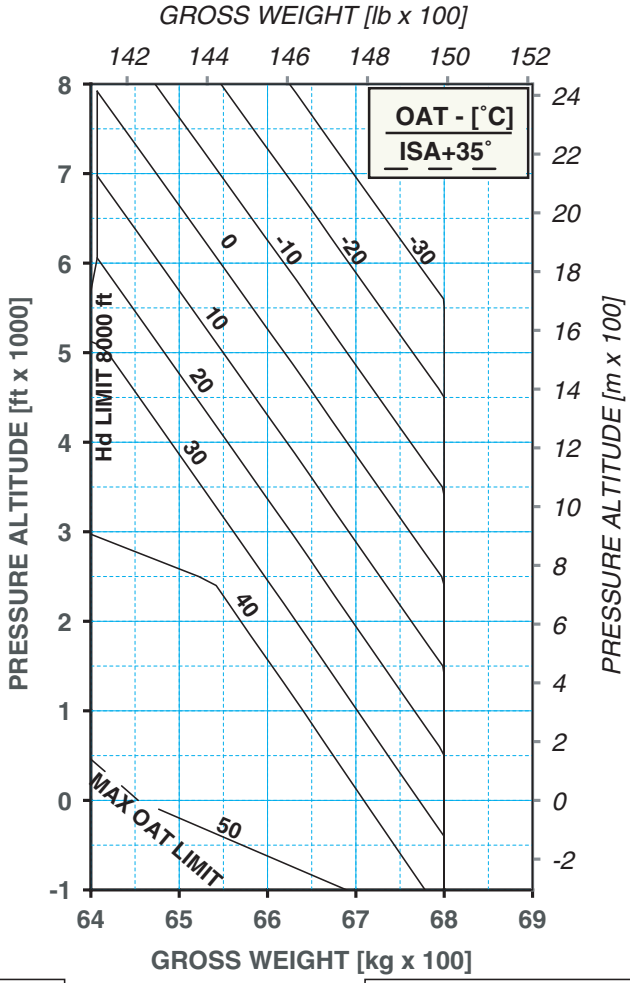
ROTOR SPEED: 100.0 %

ELECTRICAL LOAD: 600 A TOTAL

ZERO WIND

EAPS: OFF

COND. ON: reduce weight by 50 kg



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ICN-39-A-155150-A-A0126-40019-A-03-1

Figure 4-24 Hover Ceiling OGE at TOP, EAPS OFF

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

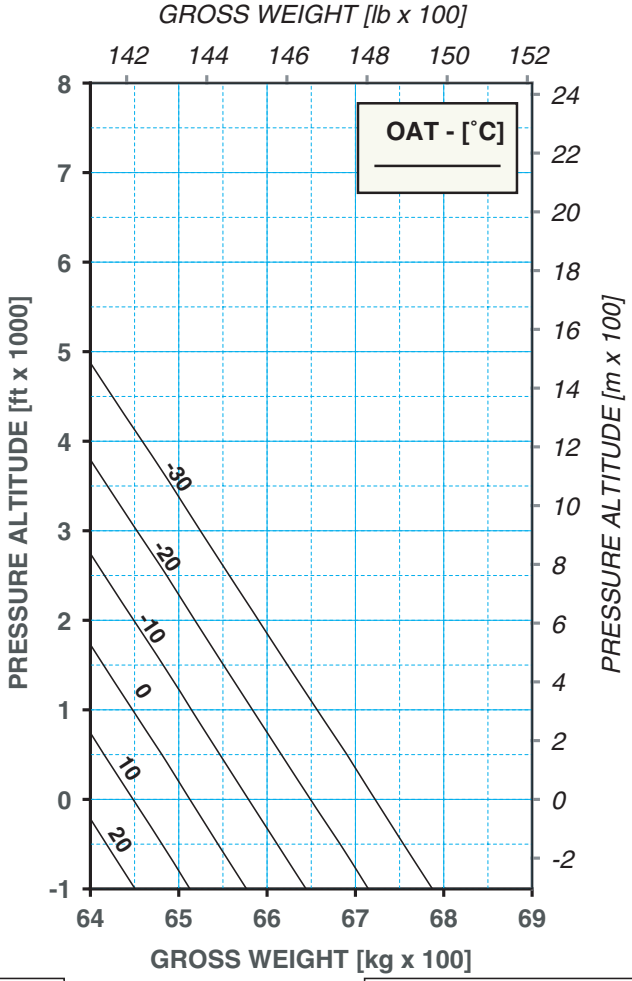
ROTOR SPEED: 100.0 %

ELECTRICAL LOAD: 600 A TOTAL

ZERO WIND

EAPS: OFF

COND. ON: reduce weight by 50 kg



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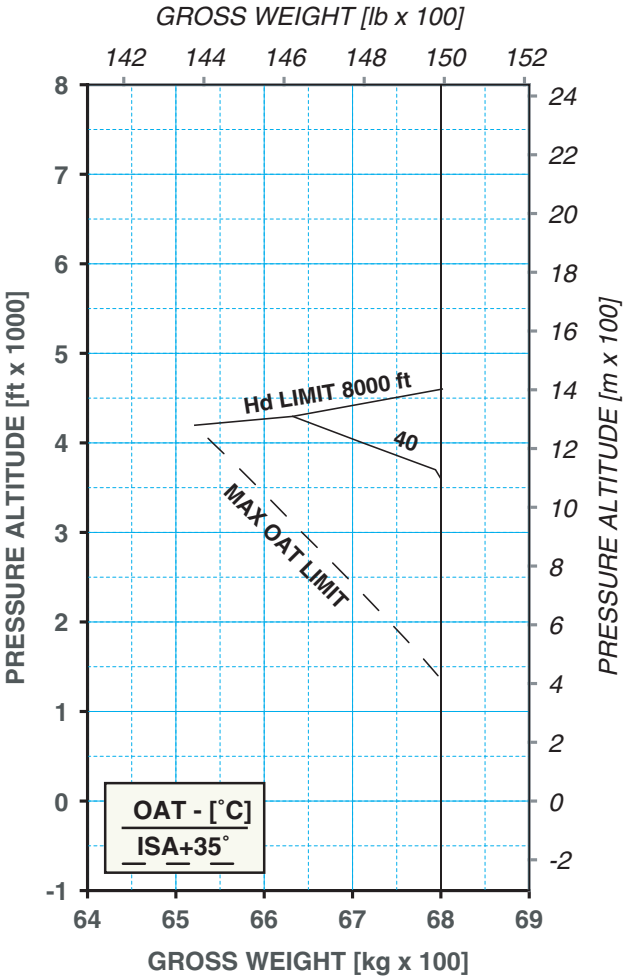
ICN-39-A-155150-A-A0126-40024-A-02-1

Figure 4-25 Hover Ceiling OGE at MCP, EAPS OFF

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100.0 %
ZERO WIND
EAPS: ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
COND. ON: reduce weight by 50 kg



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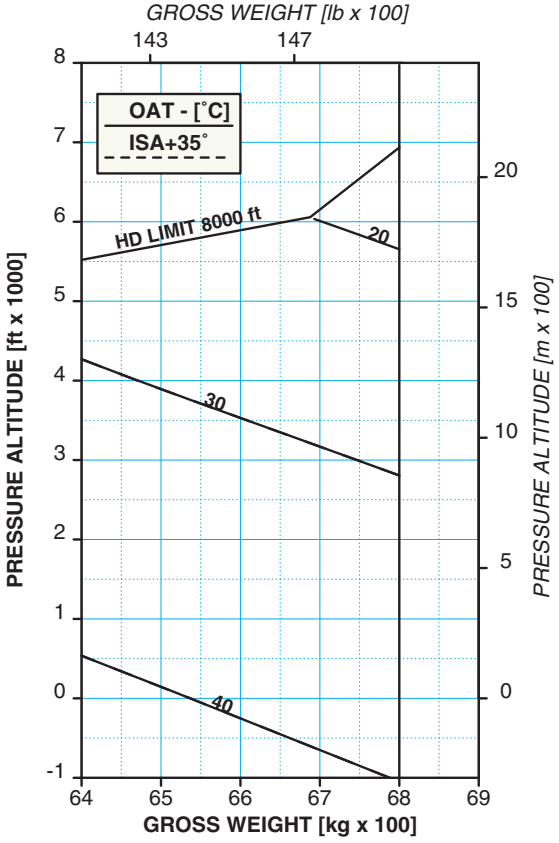
ICN-39-A-155150-A-A0126-40004-A-03-1

Figure 4-26 Hover Ceiling IGE at TOP, EAPS ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED:100%
ZERO WIND
EAPS: ON
COND. ON: reduce weight by 50 kg

WHEEL HEIGHT:5 FT
ELECTRICAL LOAD: 600 A TOTAL



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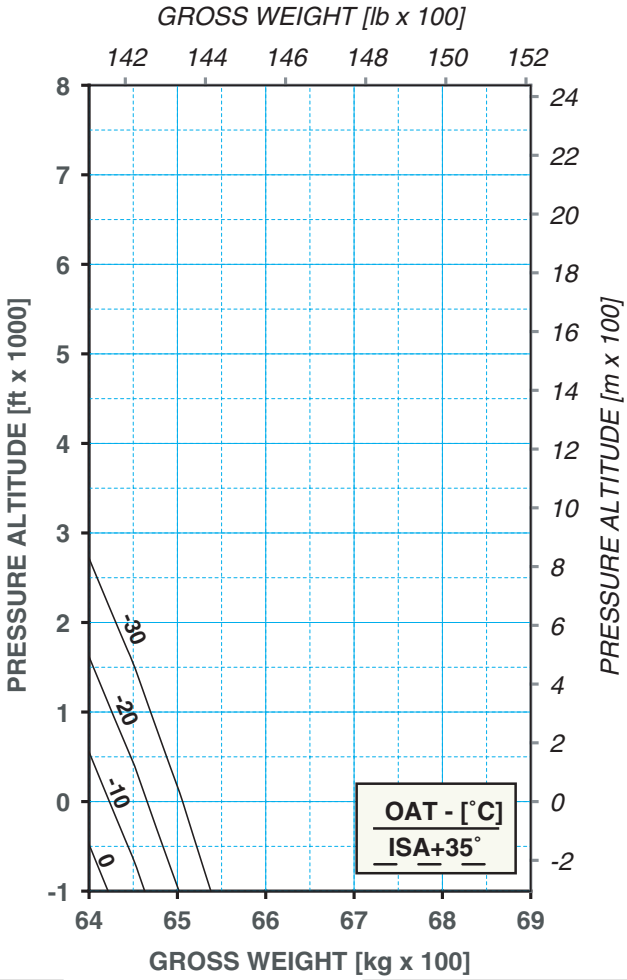
ICN-39-A-155150-A-A0126-40009-A-01-1

Figure 4-27 Hover Ceiling IGE at MCP, EAPS ON

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100.0 %
ZERO WIND
EAPS: ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A



139G1580A006 rev.C

ICN-39-A-155150-A-A0126-40013-A-02-1

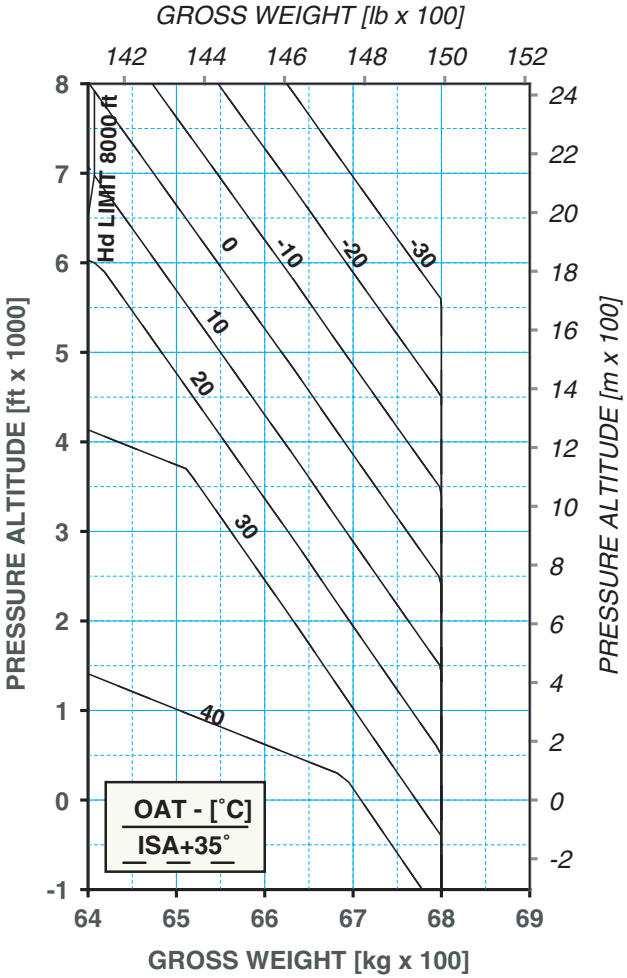
Figure 4-28 Hover Ceiling IGE at 2.5 min OEI, EAPS ON

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100.0 %
ZERO WIND
EAPS: ON

ELECTRICAL LOAD: 600 A TOTAL

COND. ON: reduce weight by 50 kg



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ICN-39-A-155150-A-A0126-40020-A-02-1

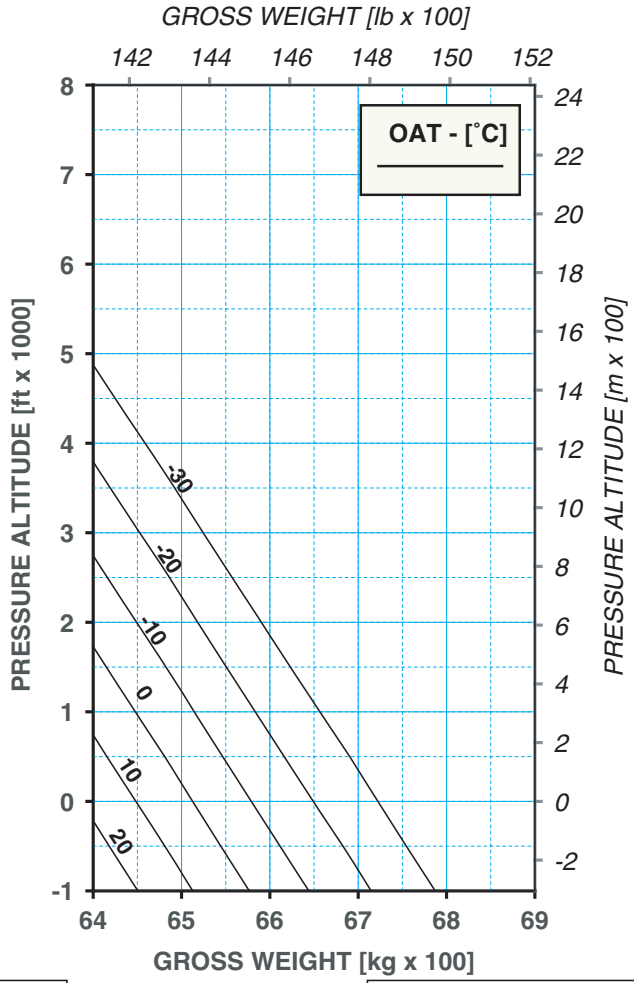
Figure 4-29 Hover Ceiling OGE at TOP, EAPS ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100.0 %
ZERO WIND
EAPS: ON

ELECTRICAL LOAD: 600 A TOTAL

COND. ON: reduce weight by 50 kg



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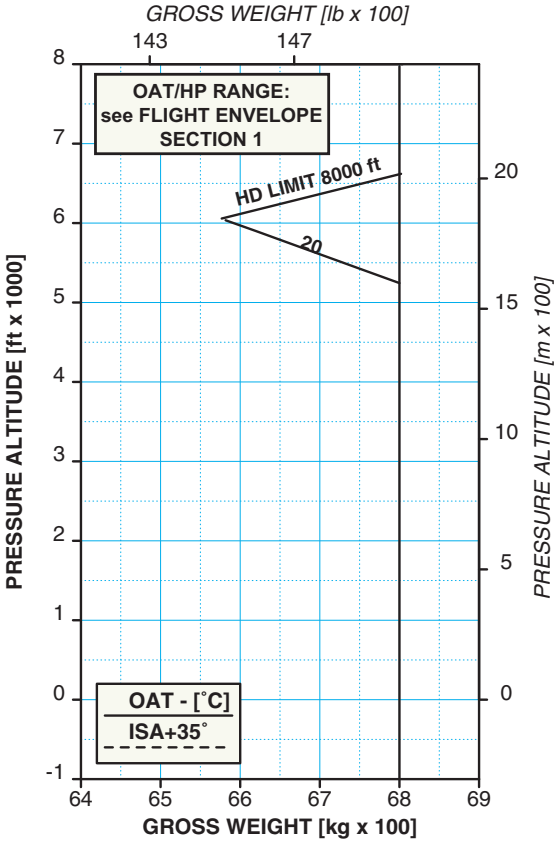
ICN-39-A-155150-A-A0126-40025-A-02-1

Figure 4-30 Hover Ceiling OGE at MCP, EAPS ON

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED:100%
ZERO WIND
EAPS: OFF/ON

WHEEL HEIGHT:5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER: ON



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ICN-39-A-155150-A-A0126-40005-A-01-1

Figure 4-31 Hover Ceiling IGE at TOP, EAPS OFF/ON HEATER ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED:100%
ZERO WIND
EAPS: OFF/ON

WHEEL HEIGHT:5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER: ON

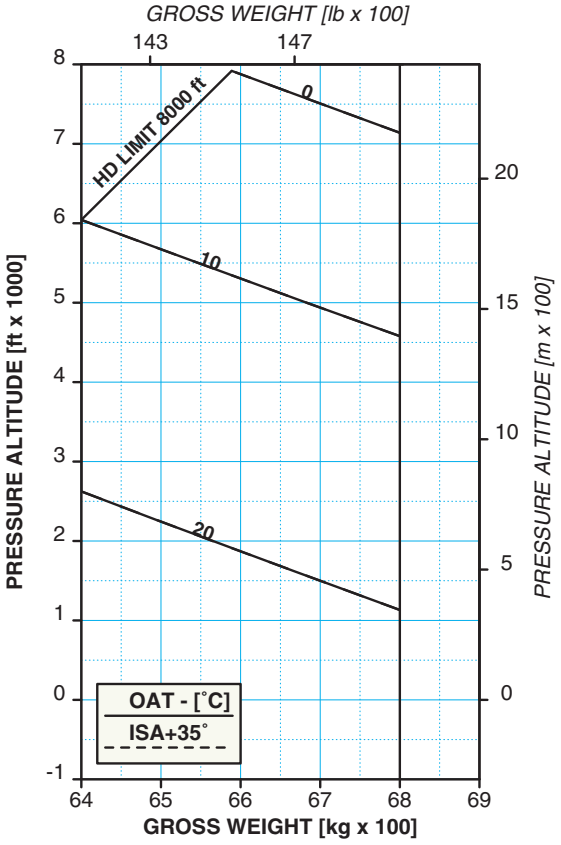

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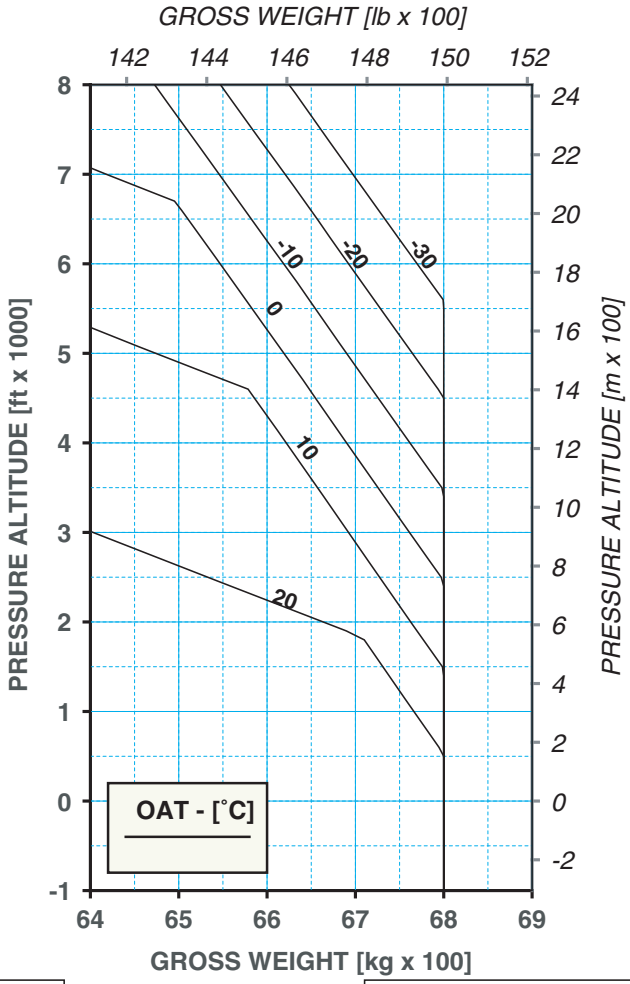
Figure 4-32 Hover Ceiling IGE at MCP, EAPS OFF/ON HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100.0 %
ZERO WIND
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER: ON



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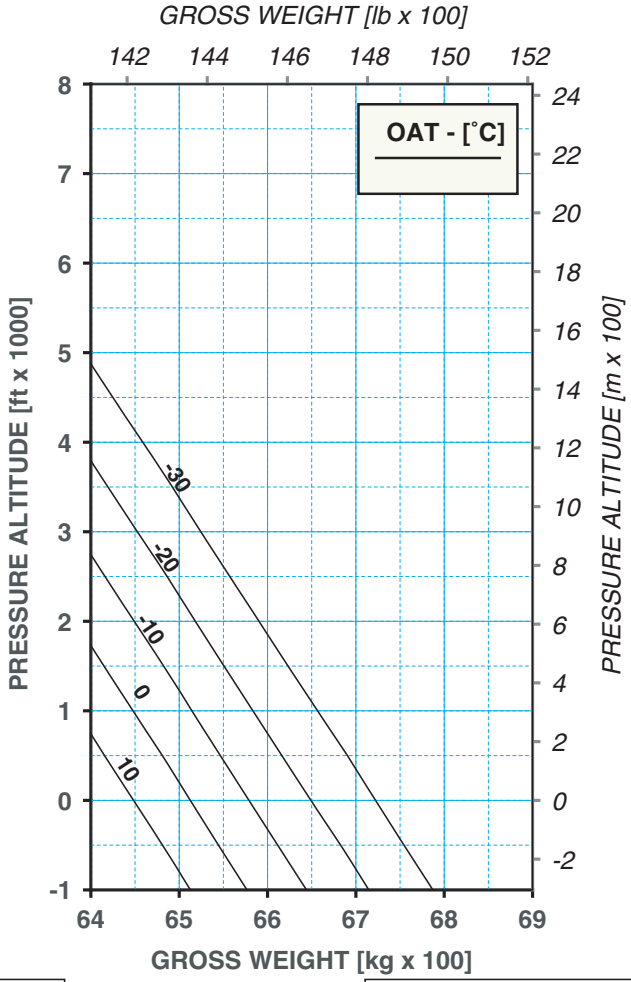
ICN-39-A-155150-A-A0126-40021-A-02-1

Figure 4-33 Hover Ceiling OGE at TOP, EAPS OFF/ON HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100.0 %
ZERO WIND
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER: ON



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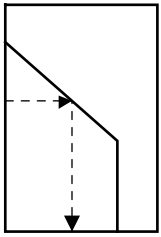
ICN-39-A-155150-A-A0126-40026-A-02-1

Figure 4-34 Hover Ceiling OGE at MCP, EAPS OFF/ON HEATER ON

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO



ROTOR SPEED: 100 %

ZERO WIND
IBF INSTALLED
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL

COND ON: reduce weight by 50 kg

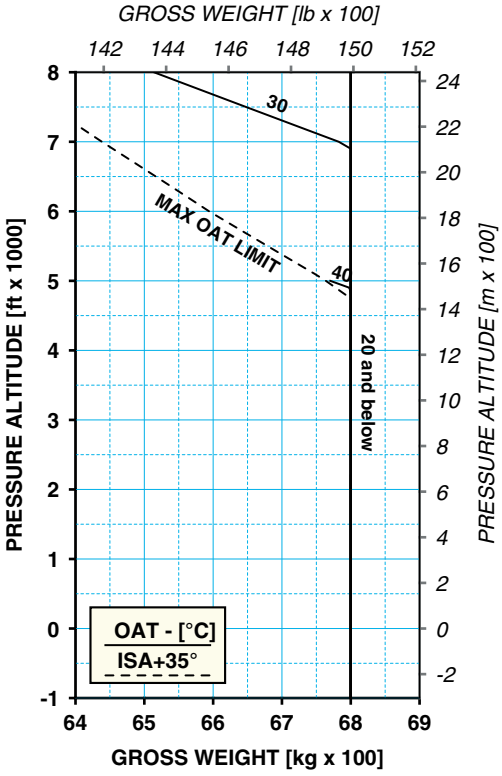


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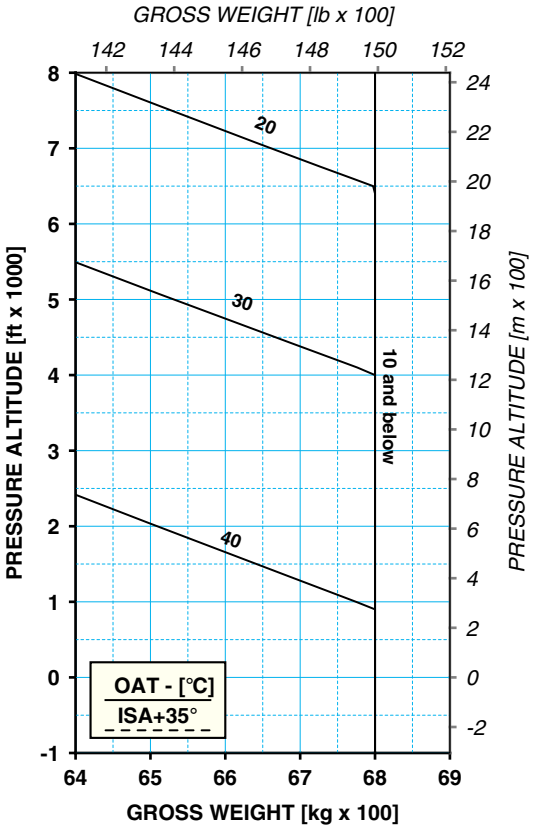
Figure 4-34A Hover Ceiling IGE at TOP, IBF Installed

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
COND ON: reduce weight by 50 kg
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
WHEEL HEIGHT: 5 FT



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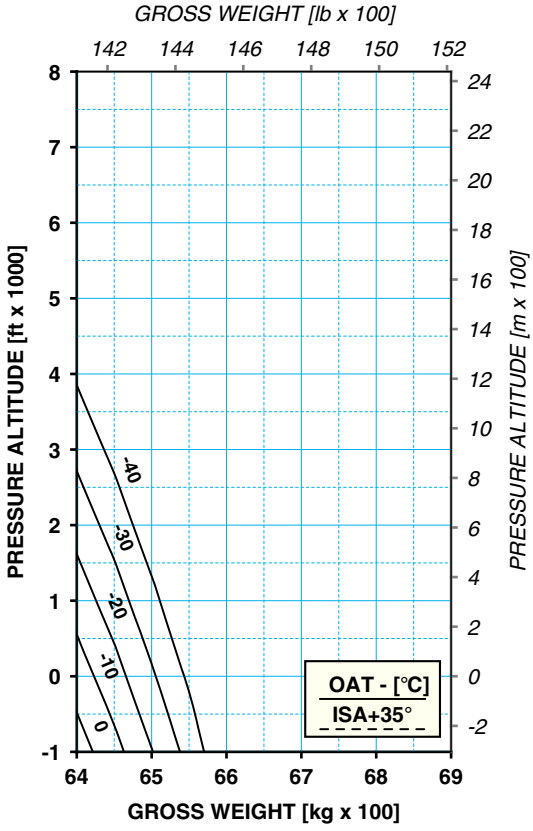
ICN-39-A-155150-G-A0126-00002-A-01-1

Figure 4-34B Hover Ceiling IGE at MCP, IBF Installed

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A TOTAL



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ICN-39-A-155150-G-A0126-00003-A-01-1

Figure 4-34C Hover Ceiling IGE at 2.5 min OEI, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

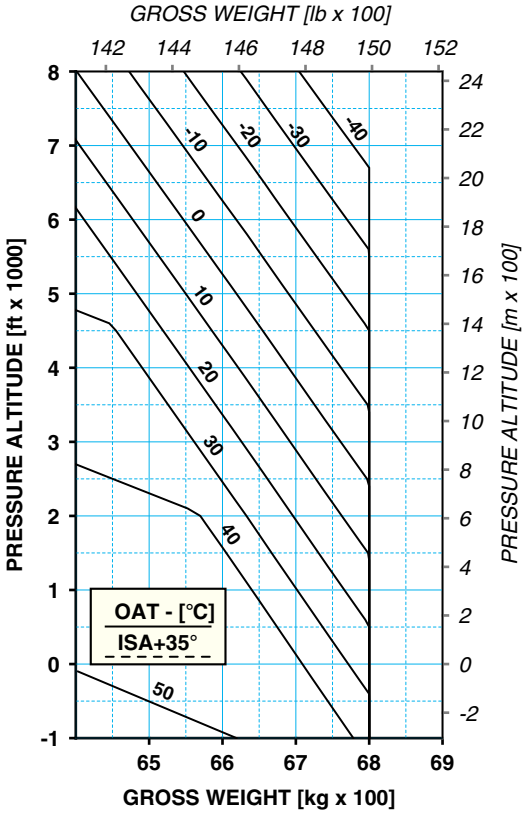

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Figure 4-34D Hover Ceiling OGE at TOP, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

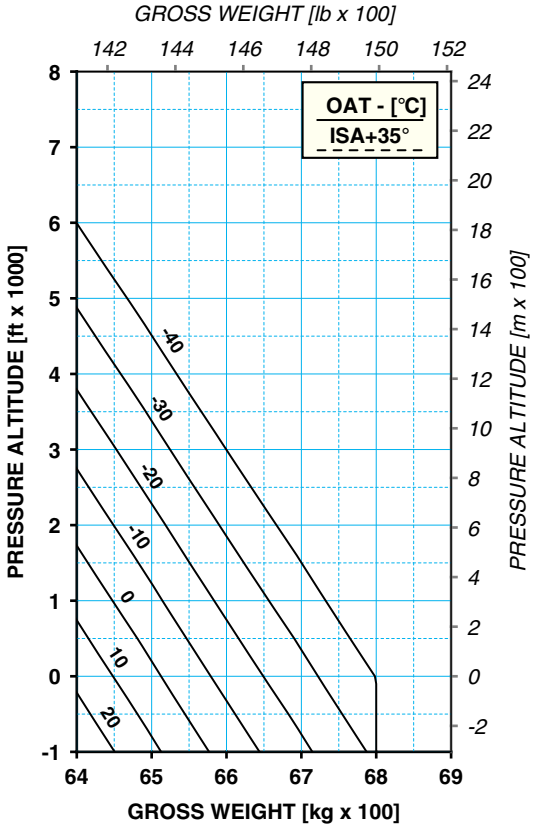

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Figure 4-34E Hover Ceiling OGE at MCP, IBF Installed

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

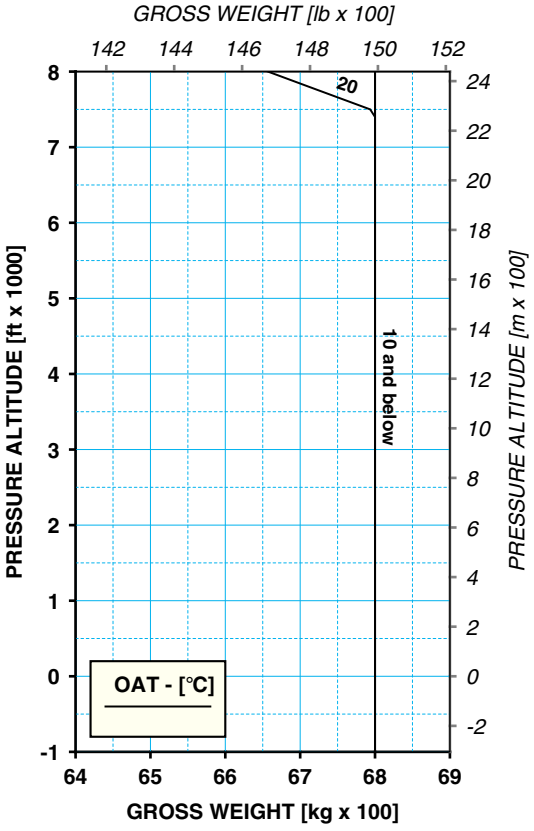

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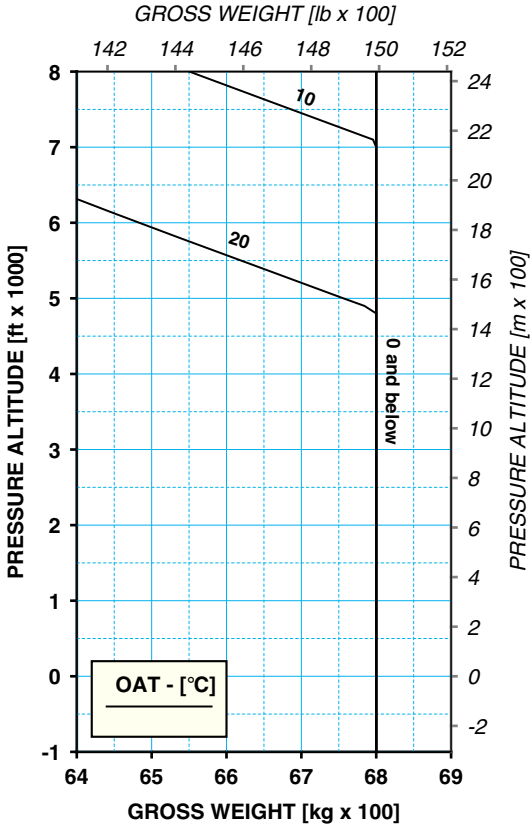
Figure 4-34F Hover Ceiling IGE at TOP, IBF Installed, Heater ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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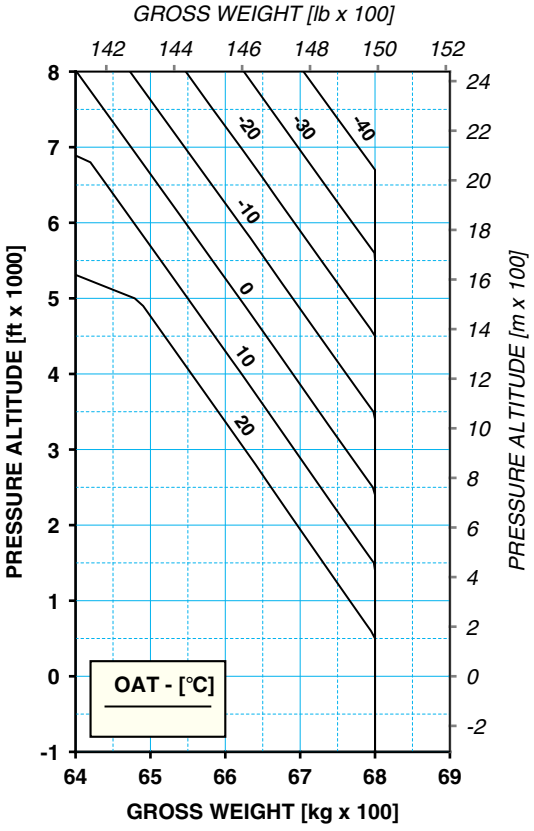
ICN-39-A-155150-G-A0126-00007-A-01-1

Figure 4-34G Hover Ceiling IGE at MCP, IBF Installed, HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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ICN-39-A-155150-G-A0126-00008-A-01-1

Figure 4-34H Hover Ceiling OGE at TOP, IBF Installed, HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

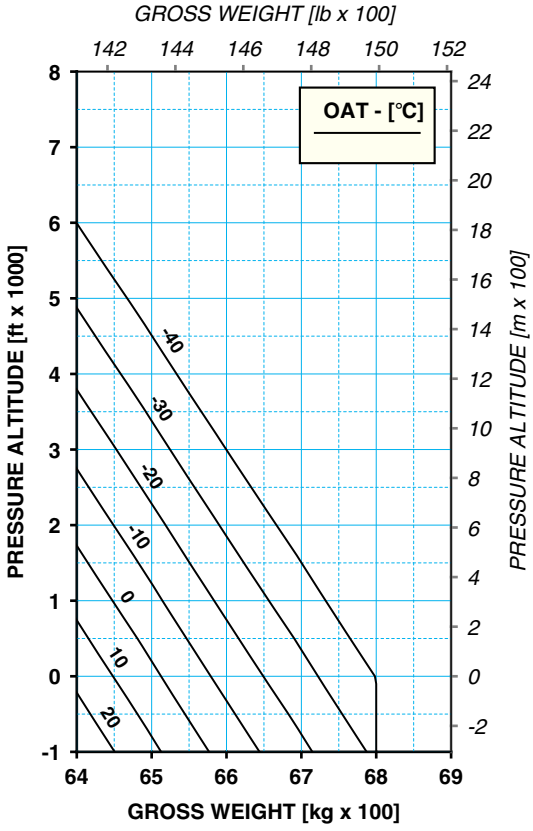

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Figure 4-34l Hover Ceiling OGE at MCP, IBF Installed, HEATER ON

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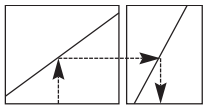
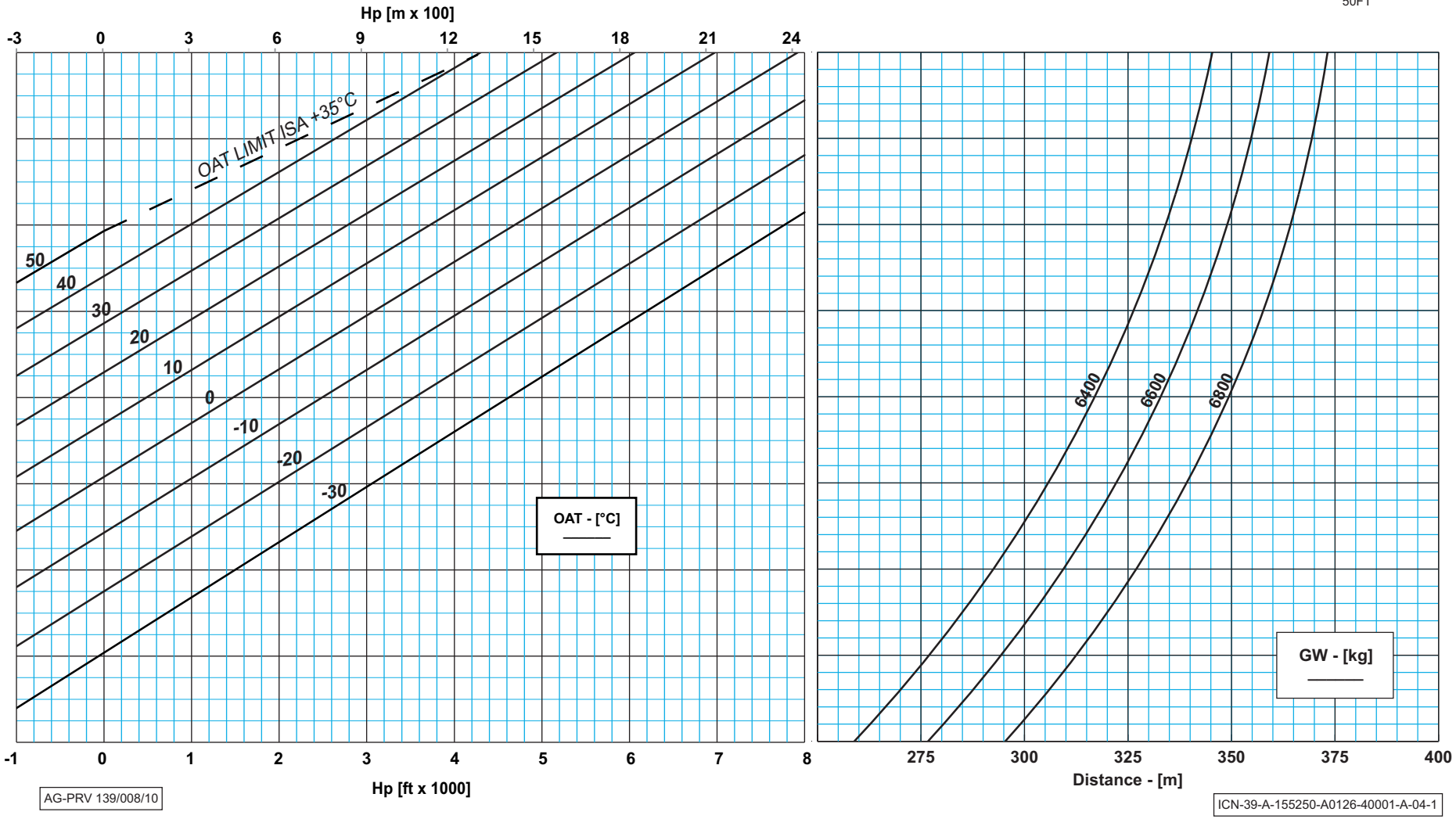
CAT.B TAKE OFF DISTANCE over 50ft OBSTACLE

ROTOR SPEED: 100%
POWER= H.IGE + 5% TQ PER ENGINE
ELECTRICAL LOAD: 600A TOTAL
ZERO WIND



INITIATED FROM H.IGE (5 FT)
V_{50FT}: 50 KIAS



AG-PRV 139/008/10

ICN-39-A-155250-A0126-40001-A-04-1

Figure 4-35 CAT B Take-Off Distance

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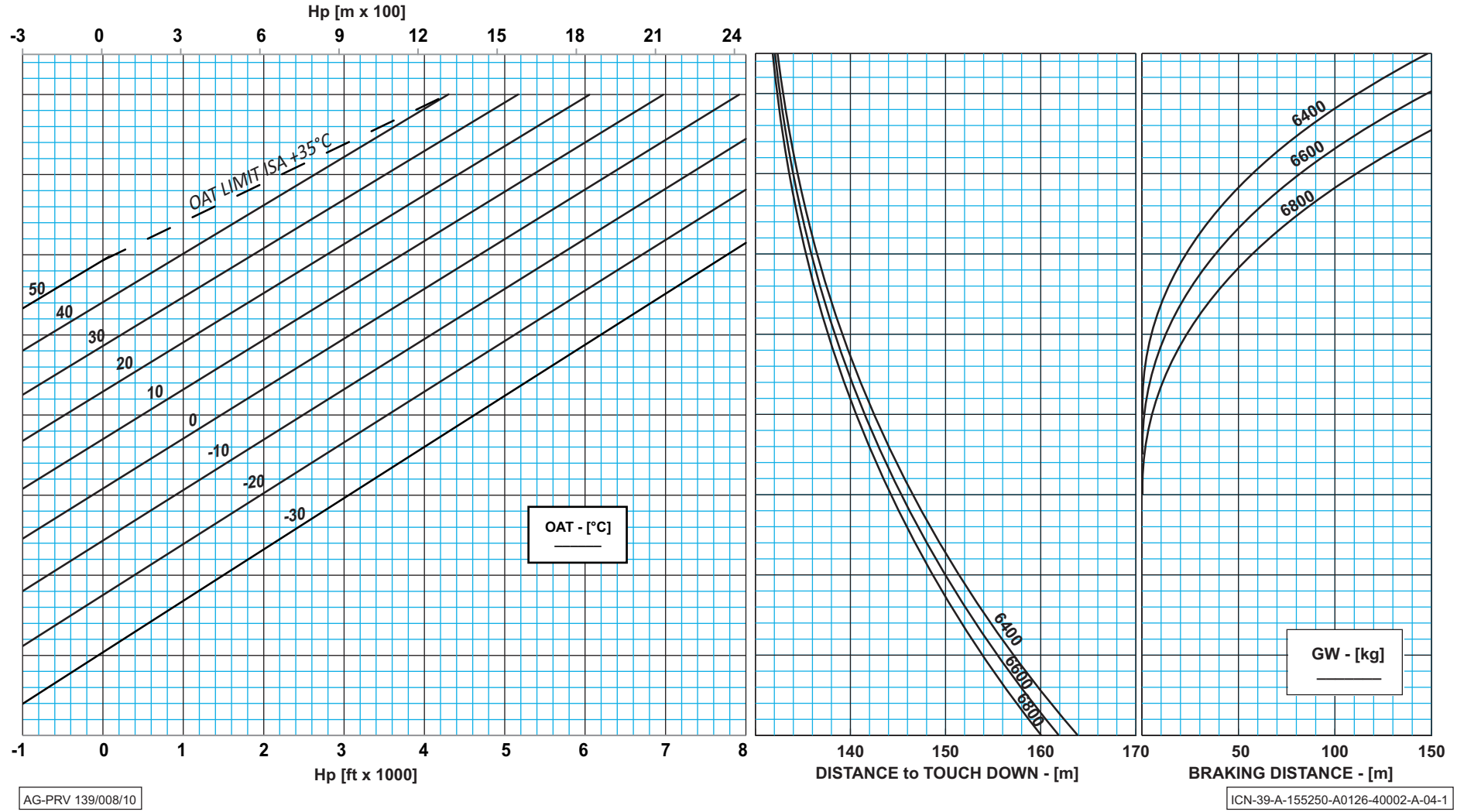
CAT.B OEI/AEO LANDING DISTANCE
OVER 50 ft OBSTACLE

ROTOR SPEED: 100%
2.5MIN. OEI/TOP AEO MAXIMUM
ELECTRICAL LOAD: 300A OEI/600A AEO
ZERO WIND

V_{app}: 30 KIAS
RATE OF DESCENT: 500 fpm
SURFACE: HARD, SMOOTH, LEVEL
INOPERATIVE ENGINE SECURED



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ICN-39-A-155250-A0126-40002-A-04-1

Figure 4-36 CAT B Landing Distance

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HEIGHT LOSS AFTER AN ENGINE FAILURE from HOVER

ROTOR SPEED: 100% or 102%

WIND BENEFIT

Note: the flyaway procedure assures a min ROC of 150 fpm at V_y with MCP OEI

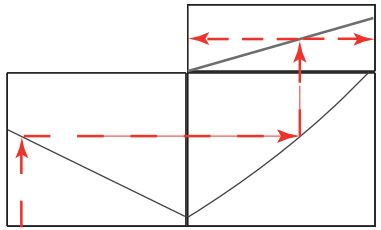

Figure 4-37 Height Loss During Flyaway Weights from 6400 kg to 6800 kg

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RATE OF CLIMB

The climb performance shown is based on flight test results and covers a range of gross weights from 6400 kg to the Maximum Gross Weight of 6800 kg. (For gross weights of 6400 kg and below see Basic RFM Section 4 or appropriate Supplement for aircraft configuration). The data presented in the Basic RFM or appropriate Supplement for 6400 kg must be referred to for interpolation purposes.

Rate of Climb performance is given for All Engines Operating (AEO) case and for the One Engine Inoperative (OEI) case.

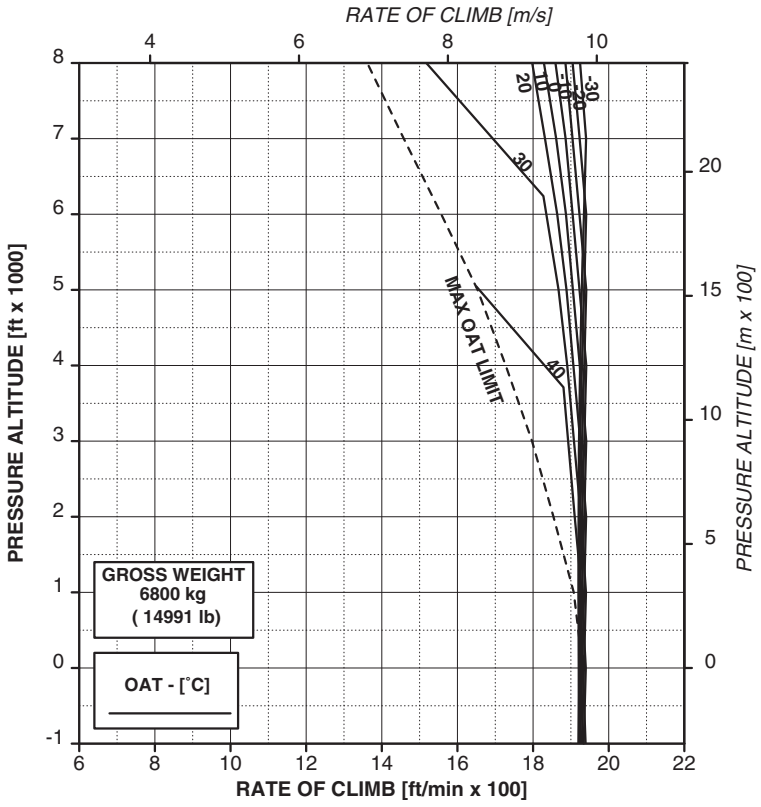
For the AEO case, rate of climb is given with the engines operating at the Maximum Continuous Power (MCP) Rating limits and at Take Off Power Rating limits. For the OEI case, rate of climb is given with the engines operating at the 2.5 min rating limit. The datum speed for all rate of climb graphs presented is 80 KIAS.

When ECS ENVIRO fitted and in FULL AUTO see Supplement 87 for ROC performance charts.
For ECS ENVIRO operation in MAN HEAT or A/C RECYCLE use HEATER ON/COND ON ROC charts contained in this Supplement.

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



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ICN-39-A-155350-A-A0126-40001-A-03-1

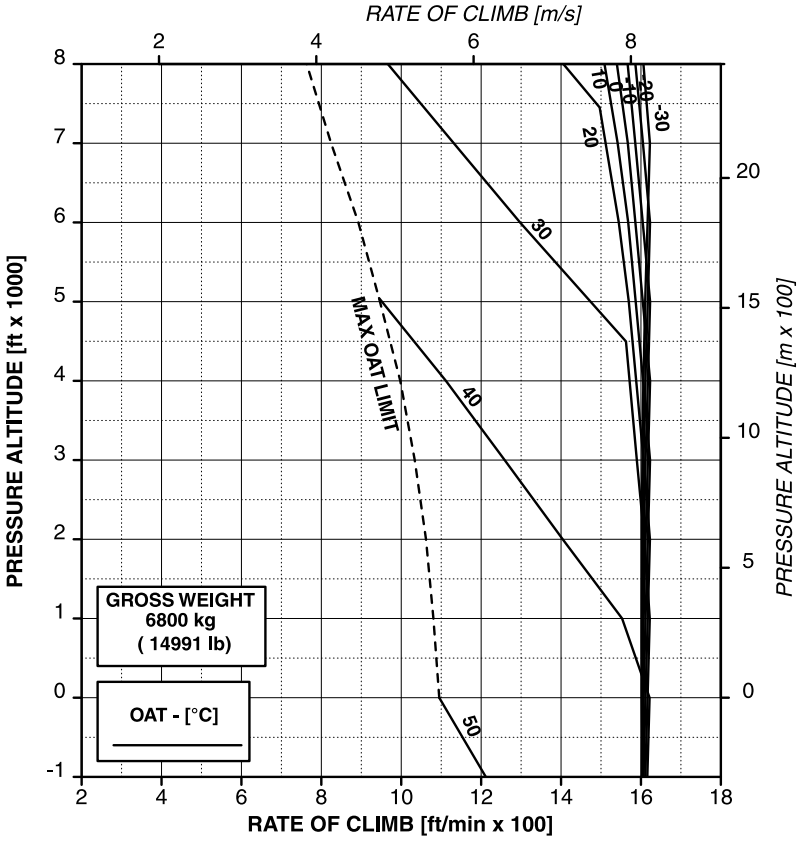
Figure 4-38 ROC TOP AEO Gross Weight 6800 kg

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



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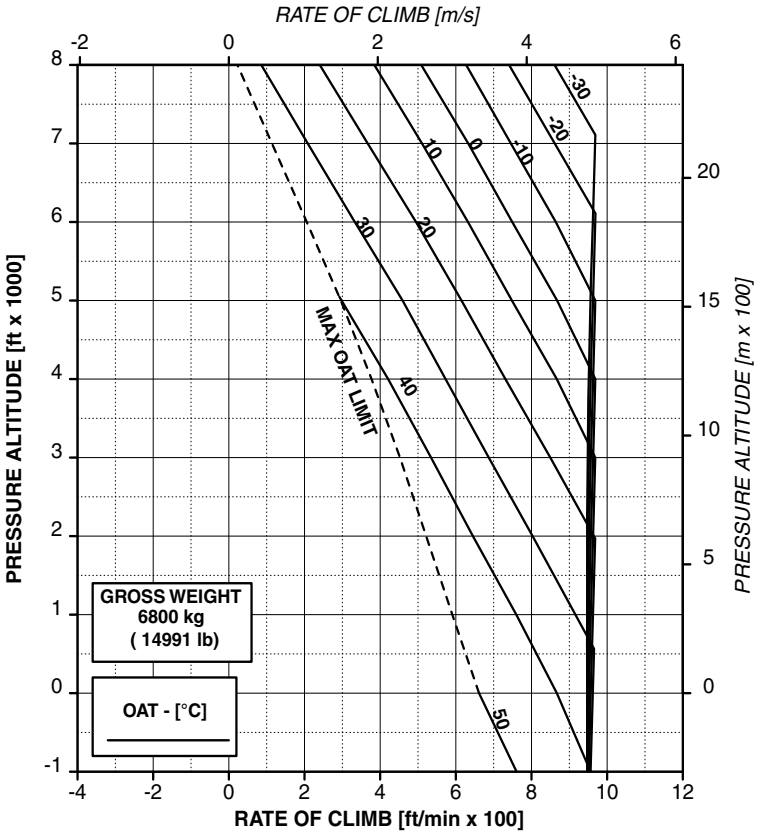
ICN-39-A-155350-A-A0126-40006-A-03-1

Figure 4-39 ROC MCP AEO Gross Weight 6800 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A



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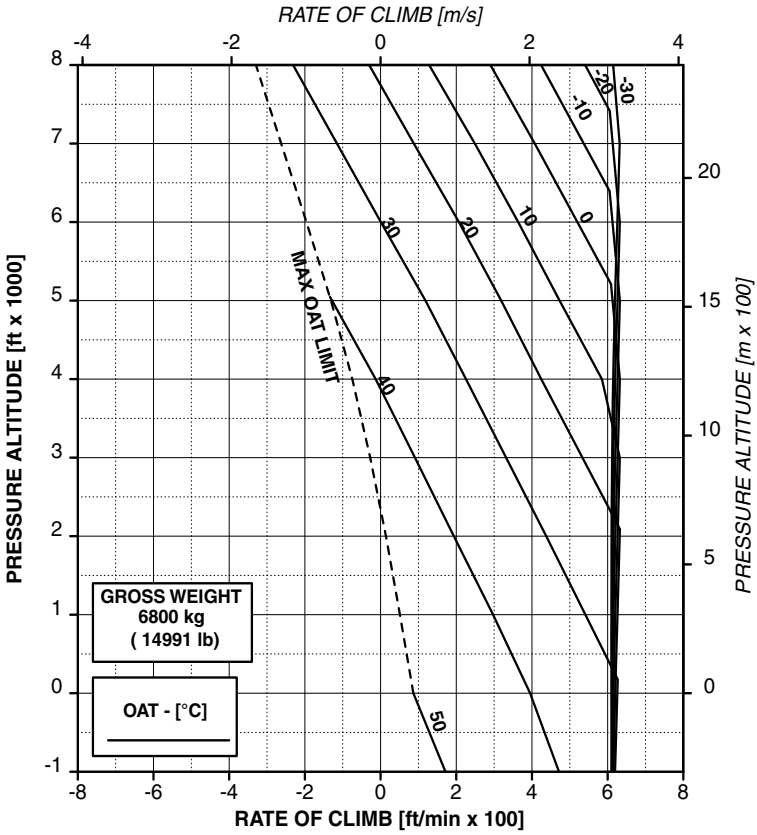
ICN-39-A-155350-A-A0126-40011-A-03-1

Figure 4-40 ROC 2.5 Minute Power OEI Gross Weight 6800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A



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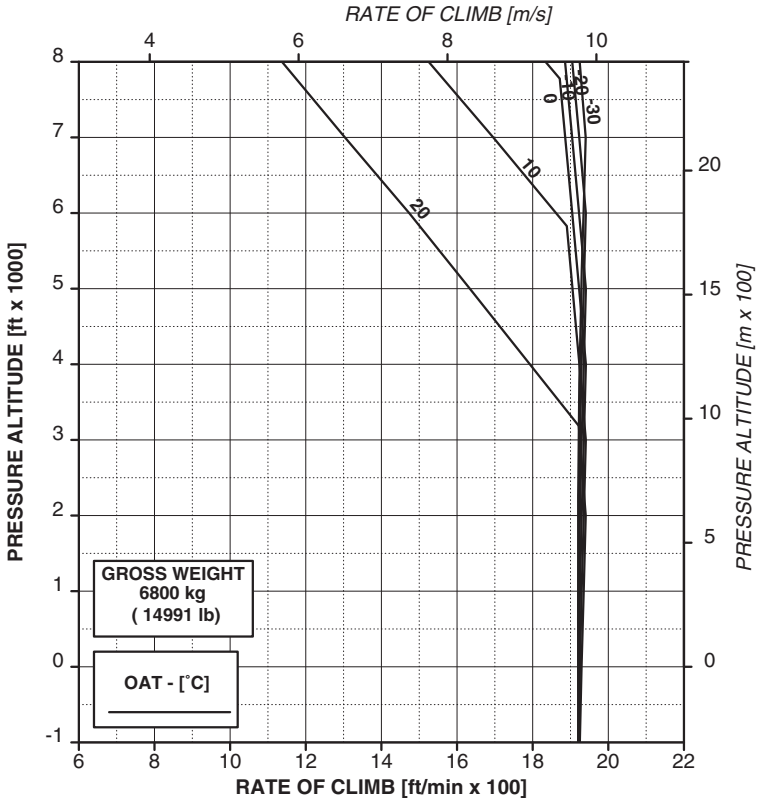
ICN-39-A-155350-A-A0126-40014-A-03-1

Figure 4-41 ROC MCP OEI Gross Weight 6800 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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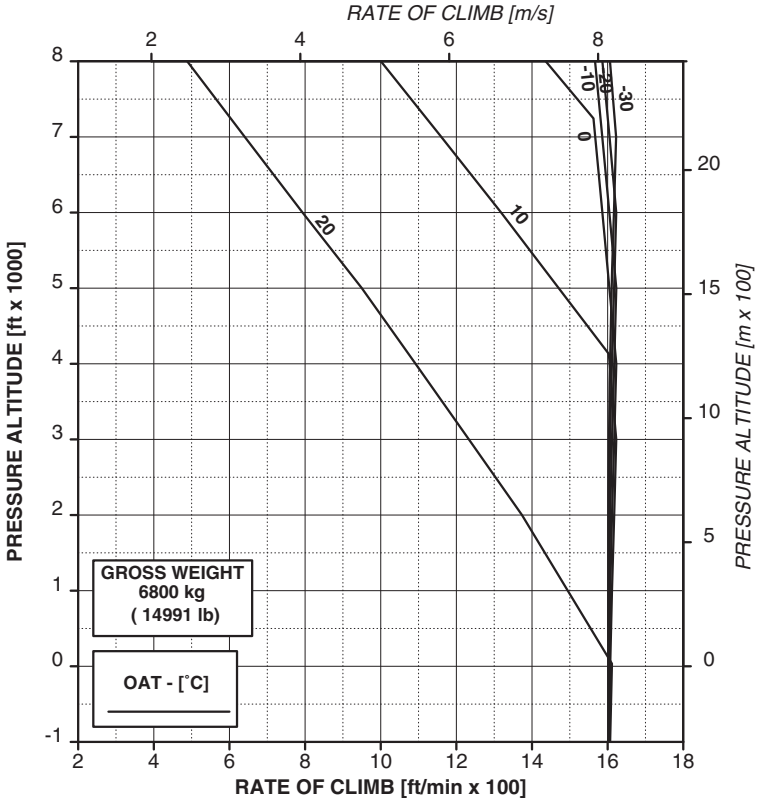
ICN-39-A-155350-A-A0126-40002-A-01-1

Figure 4-42 ROC TOP AEO, HEATER ON, Gross Weight 6800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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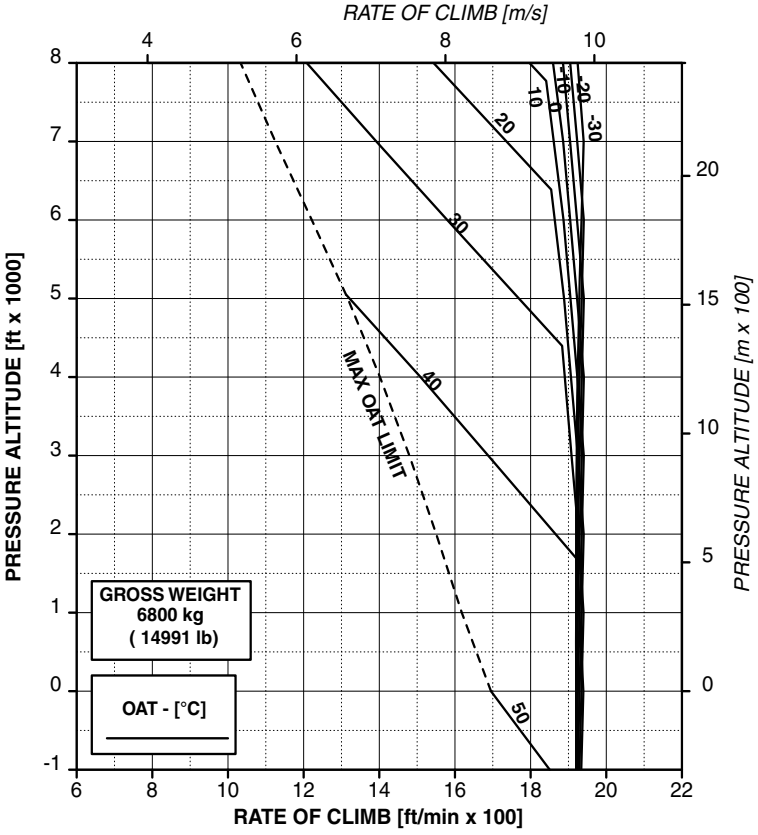
ICN-39-A-155350-A-A0126-40007-A-01-1

Figure 4-43 ROC MCP AEO, HEATER ON, Gross Weight 6800 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



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ICN-39-A-155350-A-A0126-40003-A-03-1

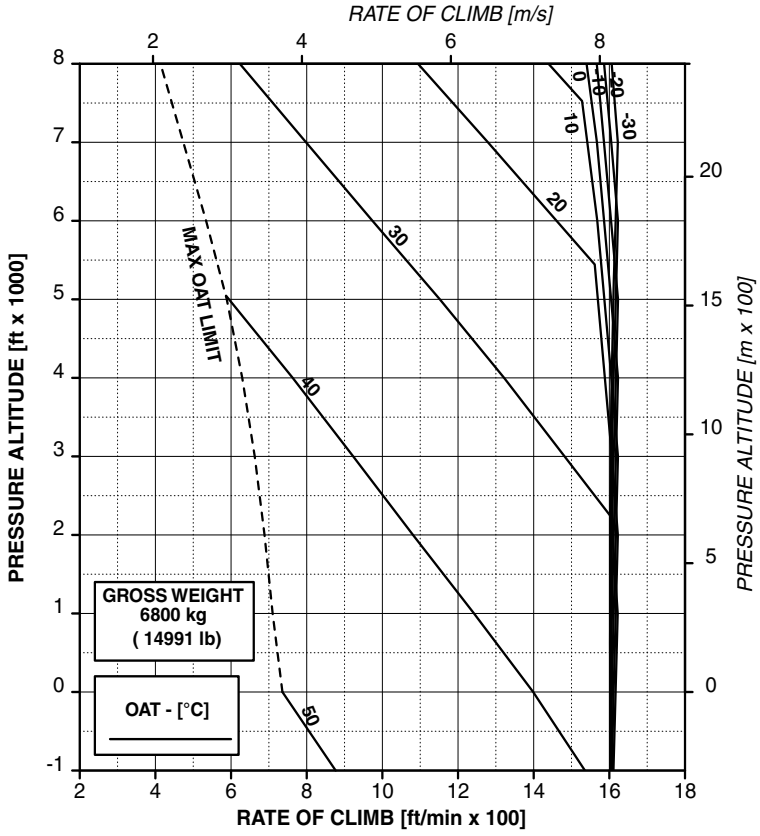
Figure 4-44 ROC TOP AEO, EAPS OFF, Gross Weight 6800 kg

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



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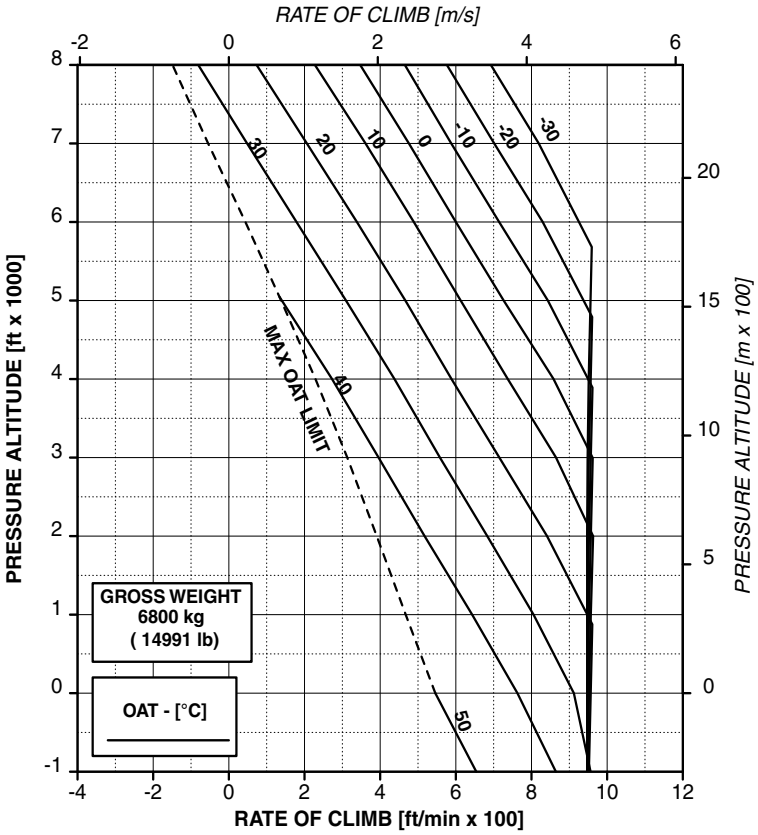
ICN-39-A-155350-A-A0126-40008-A-03-1

Figure 4-45 ROC MCP AEO, EAPS OFF, Gross Weight 6800 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A



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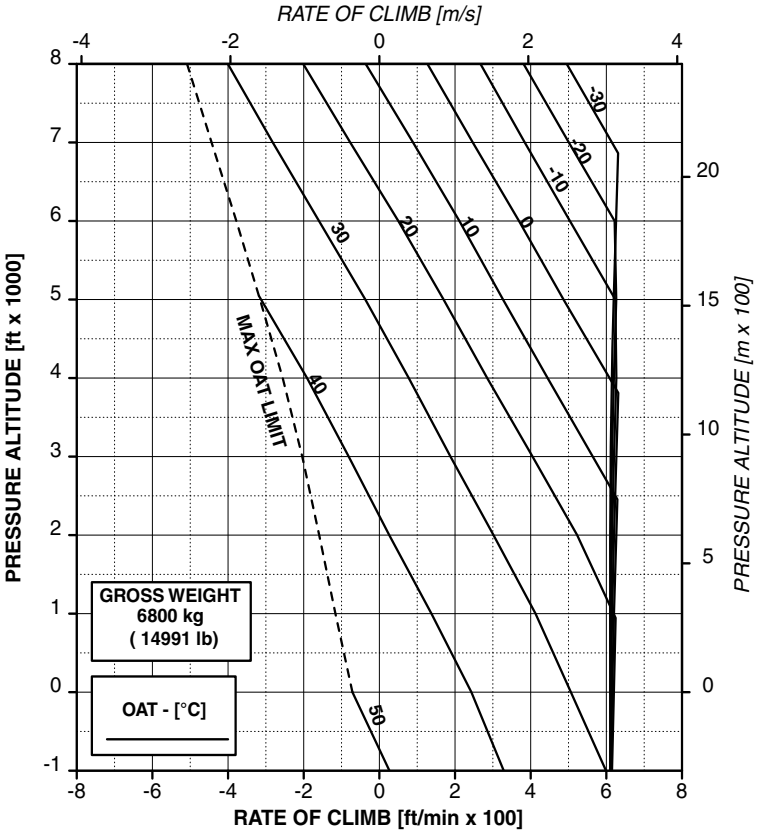
ICN-39-A-155350-A-A0126-40012-A-03-1

Figure 4-46 ROC 2.5 Min Power OEI EAPS OFF, GW 6800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A



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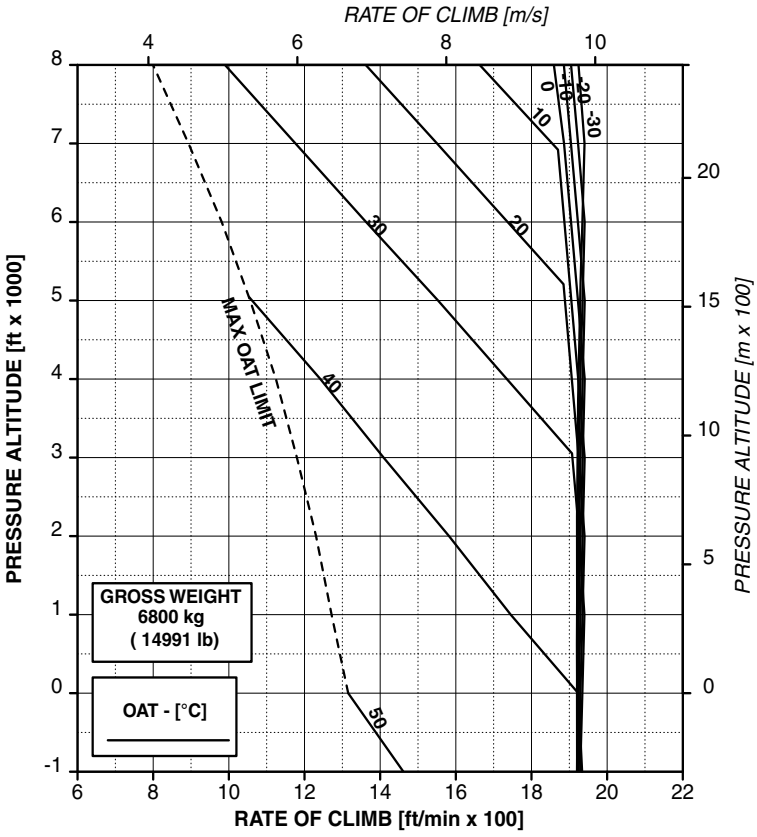
ICN-39-A-155350-A-A0126-40015-A-03-1

Figure 4-47 ROC MCP OEI EAPS OFF, GW 6800 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



139G1580A006 ISSUE C

ICN-39-A-155350-A-A0126-40004-A-03-1

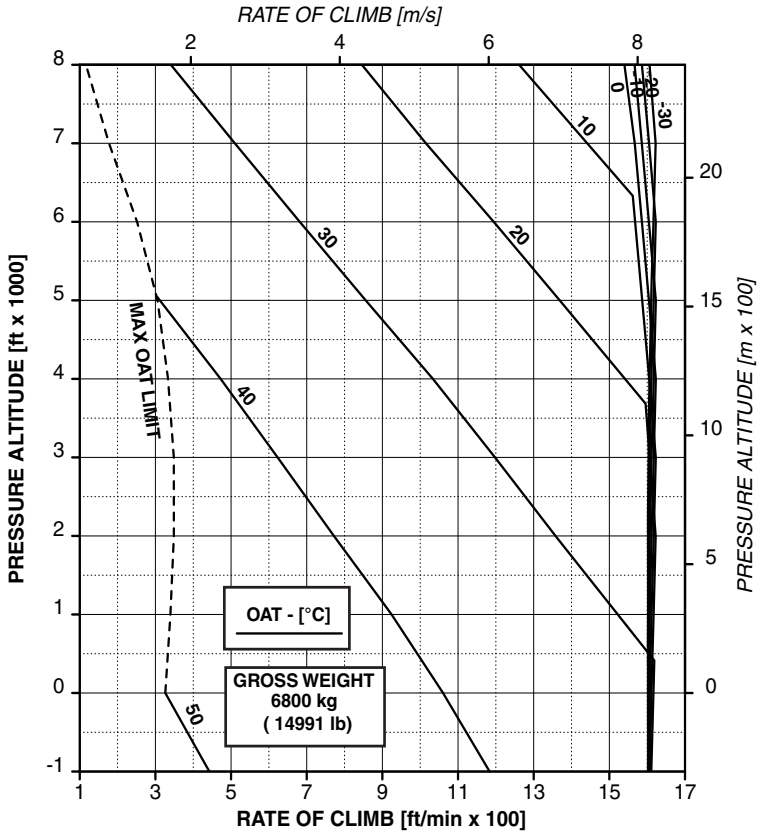
Figure 4-48 ROC TOP AEO, EAPS ON, Gross Weight 6800 kg

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



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ICN-39-A-155350-A-A0126-40009-A-03-1

Figure 4-49 ROC MCP AEO, EAPS ON, Gross Weight 6800 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

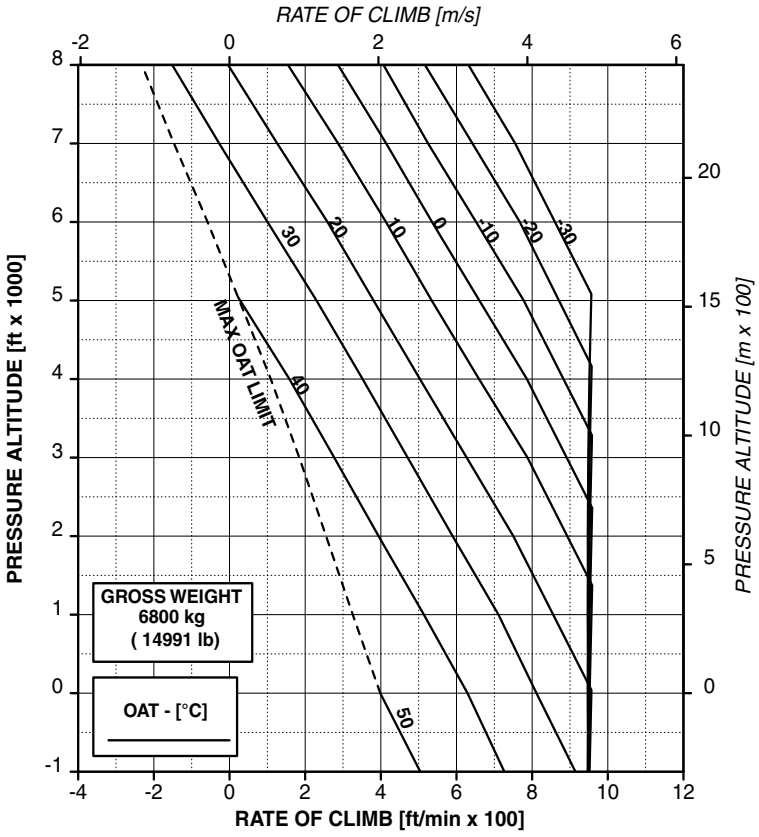

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Figure 4-50 ROC 2.5 Min Power OEI EAPS ON, GW 6800 kg

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

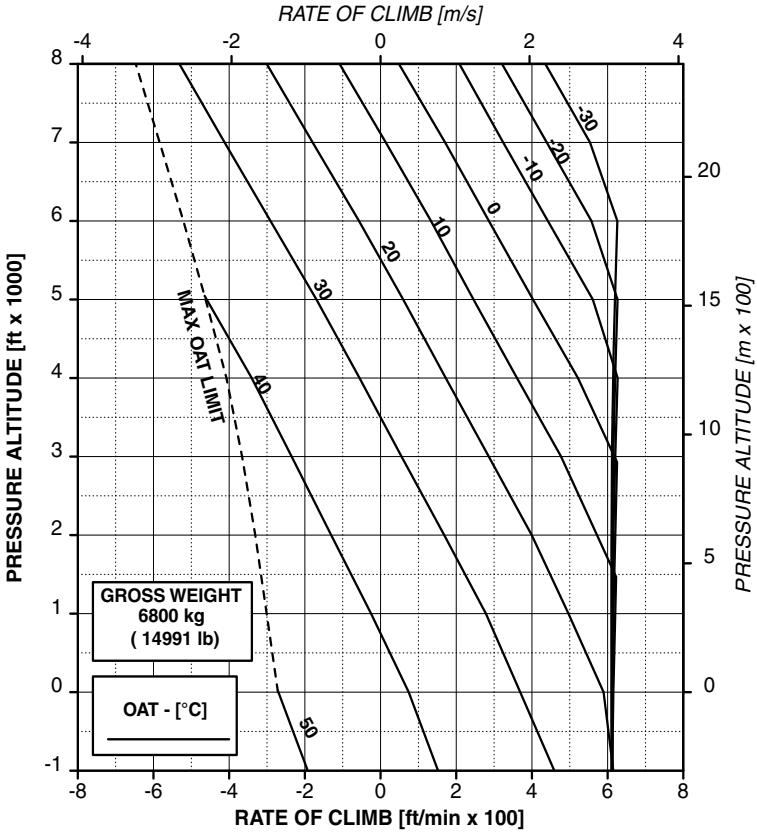

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Figure 4-51 ROC MCP OEI EAPS ON, GW 6800 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

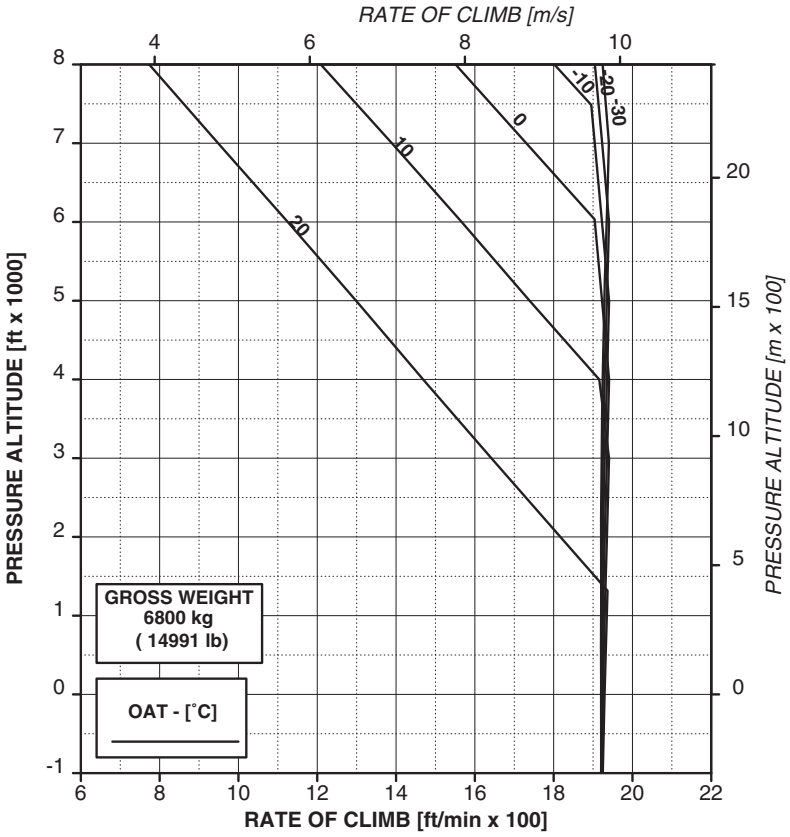

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Figure 4-52 ROC TOP, EAPS OFF/ON, HEATER ON, GW 6800 kg

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

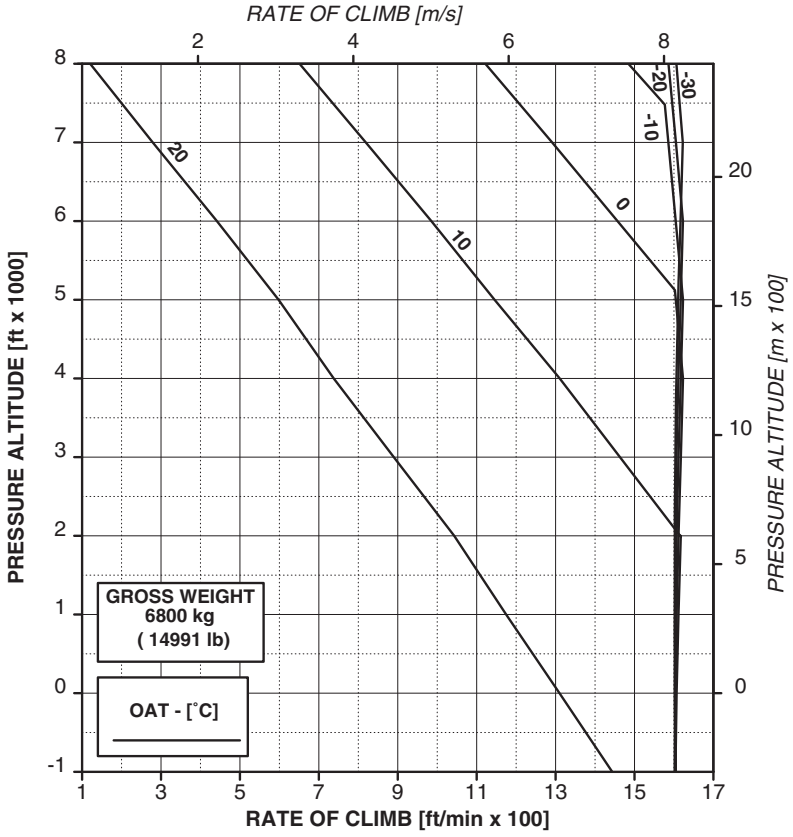

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Figure 4-53 ROC MCP, EAPS OFF/ON, HEATER ON, GW 6800 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KTS
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
COND ON: ROC by 50 ft/min

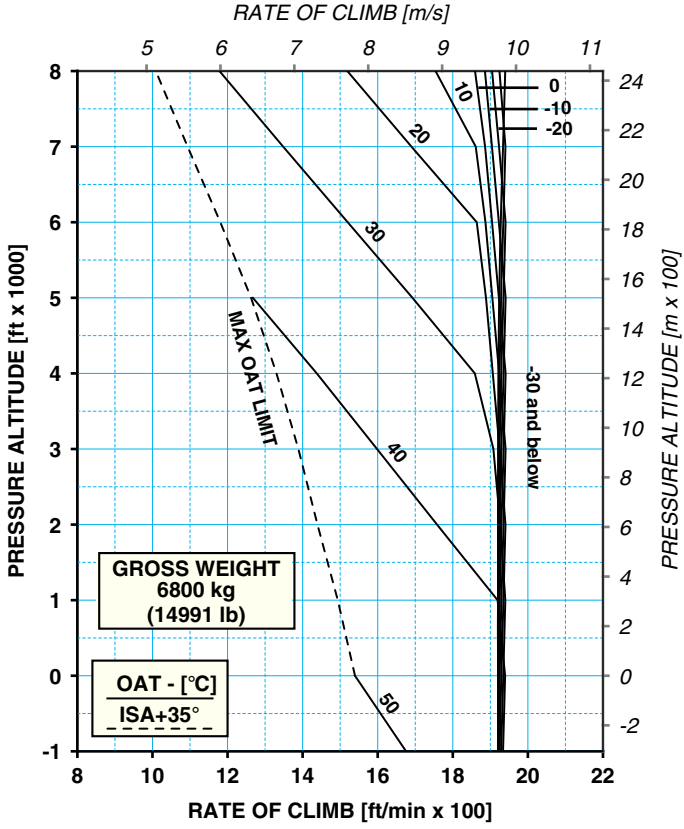

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Figure 4-53A ROC TOP, IBF Installed, GW 6800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy. 80 KIAS
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min

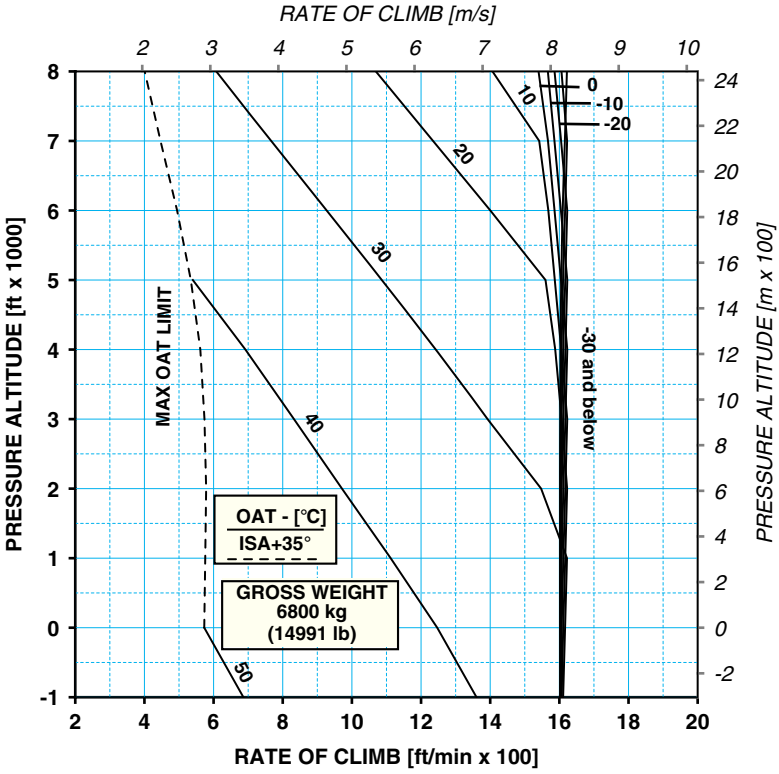

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Figure 4-53B ROC MCP, IBF Installed, GW 6800 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
IBF INSTALLED

ELECTRICAL LOAD: 300 A TOTAL

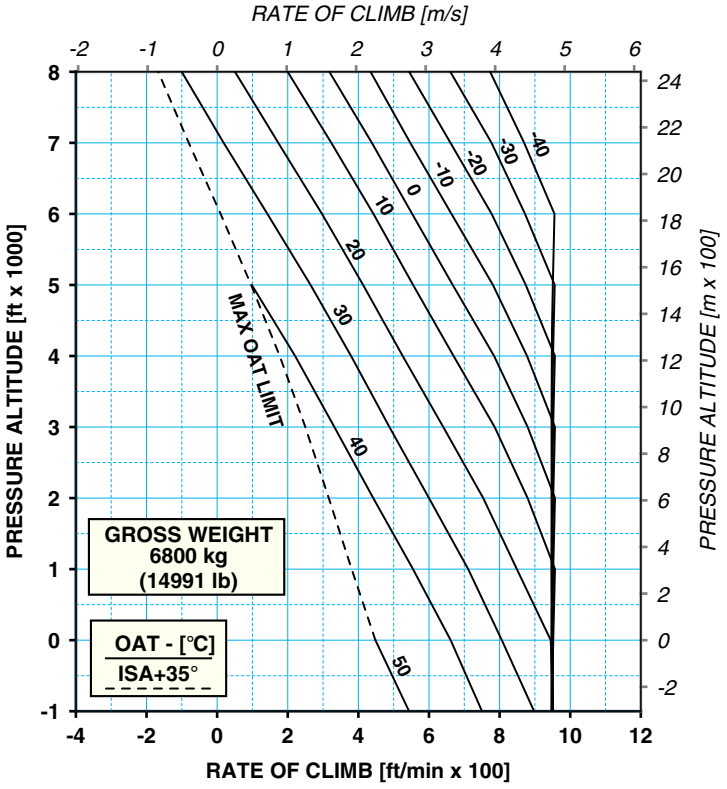

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Figure 4-53C ROC 2.5 min OEI, IBF Installed, GW 6800 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

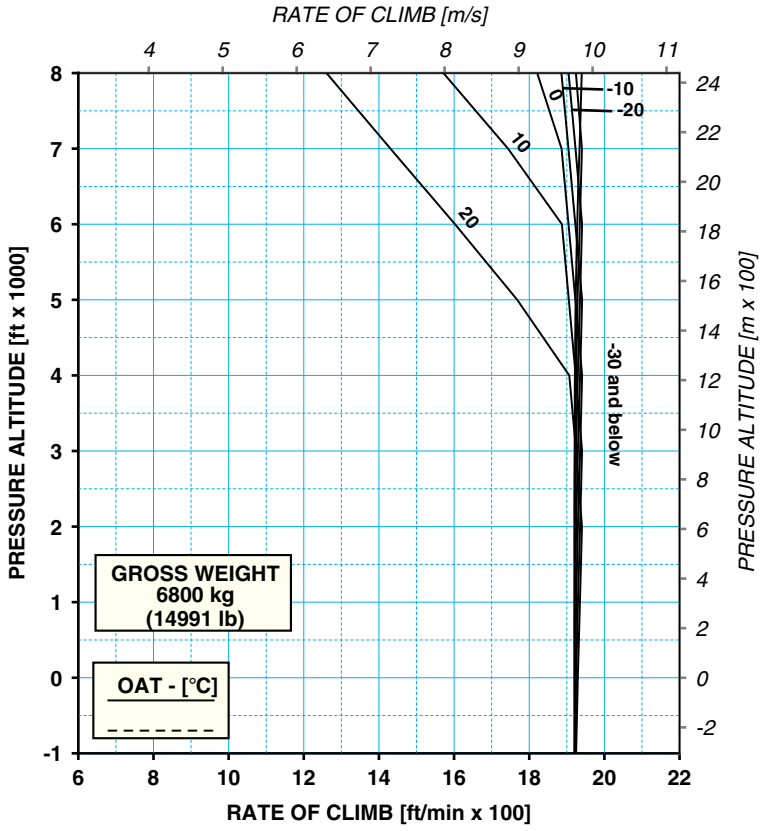

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Figure 4-53D ROC TOP, IBF Installed, GW 6800 kg, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy:80 KTS
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min
HEATER ON

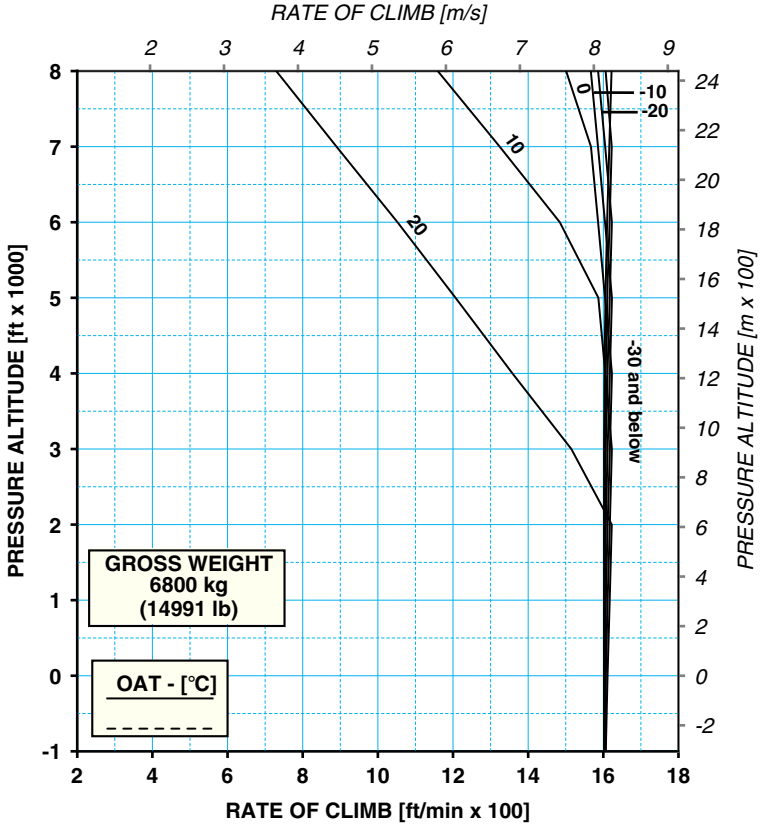

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Figure 4-53E ROC MCP, IBF Installed, GW 6800 kg, HEATER ON

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CAT A CLEAR AREA TAKE OFF AND LANDING DISTANCES, PATH 1 CLIMB GRADIENTS

W.A.T. Charts

Clear Area Procedure Weight Limitations Figure 4-1 to Figure 4-3 and Figure 4-9A.

Rejected Take Off Distance OEI

Rejected Take Off Distance OEI Clear Area Procedure
..... Figure 4-54, Figure 4-56, Figure 4-58, Figure 4-68A

Continued Take Off Distance OEI

Continued Take Off Distance OEI Clear Area
..... Figure 4-55, Figure 4-57, Figure 4-59, Figure 4-68B

Landing Distances

Clear Area Landing Distance OEI
(Clean Intake, EAPS or IBF) ..... Figure 4-60 & Figure 4-61

Clear Area Balked Landing Distance OEI (Clean Intake,
EAPS or IBF)..... Figure 4-62

Take Off Flight Path 1

Mean height Gained in 100 ft (30 m) Horizontal Distance

Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS Figure 4-63, Figure 4-64
Figure 4-65, Figure 4-66
Figure 4-67, Figure 4-68
Figure 4-68C, Figure 4-68D

Take Off Flight Path 2

Mean height Gained in 100 ft (30 m) Horizontal Distance

Clear Area Procedure ..... Figure 4-87, Figure 4-88
Figure 4-89, Figure 4-90
Figure 4-91, Figure 4-92
Figure 4-103, Figure 4-104

CAT A CONFINED AREA TAKE OFF AND LANDING DISTANCES

W.A.T. Charts

Confined Area Procedure Weight Limitations
.....Figure 4-4 to Figure 4-6, Figure 4-9B

Continued Take Off Distance OEI

Continued Take Off Distance OEI Confined Area
(Clean Intake, EAPS or IBF) .....Figure 4-69

Balked Landing Distances

Confined Area Balked Landing Distance OEI
(Clean Intake, EAPS or IBF) .....Figure 4-70

Take Off Flight Path 1

Mean height Gained in 100 ft (30 m) Horizontal Distance

V_{TOSS}/V_{BLSS} 40 KIAS ..... Figure 4-81, Figure 4-82
Figure 4-83, Figure 4-84
Figure 4-85, Figure 4-86
Figure 4-101, Figure 4-102

Take Off Flight Path 2

Mean height Gained in 100 ft (30 m) Horizontal Distance

..... Figure 4-87, Figure 4-88
Figure 4-89, Figure 4-90
Figure 4-91, Figure 4-92
Figure 4-103, Figure 4-104

CAT A OFFSHORE HELIDECK TAKE OFF AND LANDING DISTANCES

W.A.T. Charts

Offshore Helideck Procedure Weight Limitations
..... Figure 4-7 to Figure 4-9, Figure 4-9C

The Gross Weight Benefit, incorporated into the WAT charts for Headwind Component, has already been factored by 50%. No further weight correction is required.

Continued Take Off Distance OEI

Continued Take Off Distance OEI Offshore Helideck
.....Figure 4-71 to Figure 4-73, Figure 4-99

The Distance Correction incorporated into the chart for Headwind Component has already been factored by 50%.

Drop Down For CTO (BTS)

Drop Down BTS .....Figure 4-74

The Drop Down Correction incorporated into the chart for Headwind Component has already been factored by 50%.

Balked Landing Distances

Offshore Helideck Balked
Landing Distance OEI .....Figure 4-75 to Figure 4-79, Figure 4-99

The Distance Correction incorporated into the chart for Headwind Component has already been factored by 50%.

Balked Landing Drop Down

Drop Down Below LDP (BLDP) for Level Approach ..... Figure 4-74

Drop Down Below LDP (BLDP) for Descending Approach
.....Figure 4-74
plus 15 ft

The Drop Down Correction incorporated into the chart for Headwind Component has already been factored by 50%.

Take Off Flight Path 1

Mean height Gained in 100 ft (30 m) Horizontal Distance

V_{TOSS}/V_{BLSS} 40 KIAS..... Figure 4-81, Figure 4-82
Figure 4-83, Figure 4-84
Figure 4-85, Figure 4-86
Figure 4-101, Figure 4-102

Take Off Flight Path 2

Mean height Gained in 100 ft (30 m) Horizontal Distance

V_Y 80 KIAS..... Figure 4-87, Figure 4-88
Figure 4-89, Figure 4-90
Figure 4-91, Figure 4-92
Figure 4-103, Figure 4-104

Take Off Flight Path 1 & 2

Mean height Gained in 100 ft (30 m) Horizontal Distance

V_{CLIMB} 60 KIAS..... Figure 4-93, Figure 4-94
Figure 4-95, Figure 4-96
Figure 4-97, Figure 4-98
Figure 4-105, Figure 4-106

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REJECTED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A

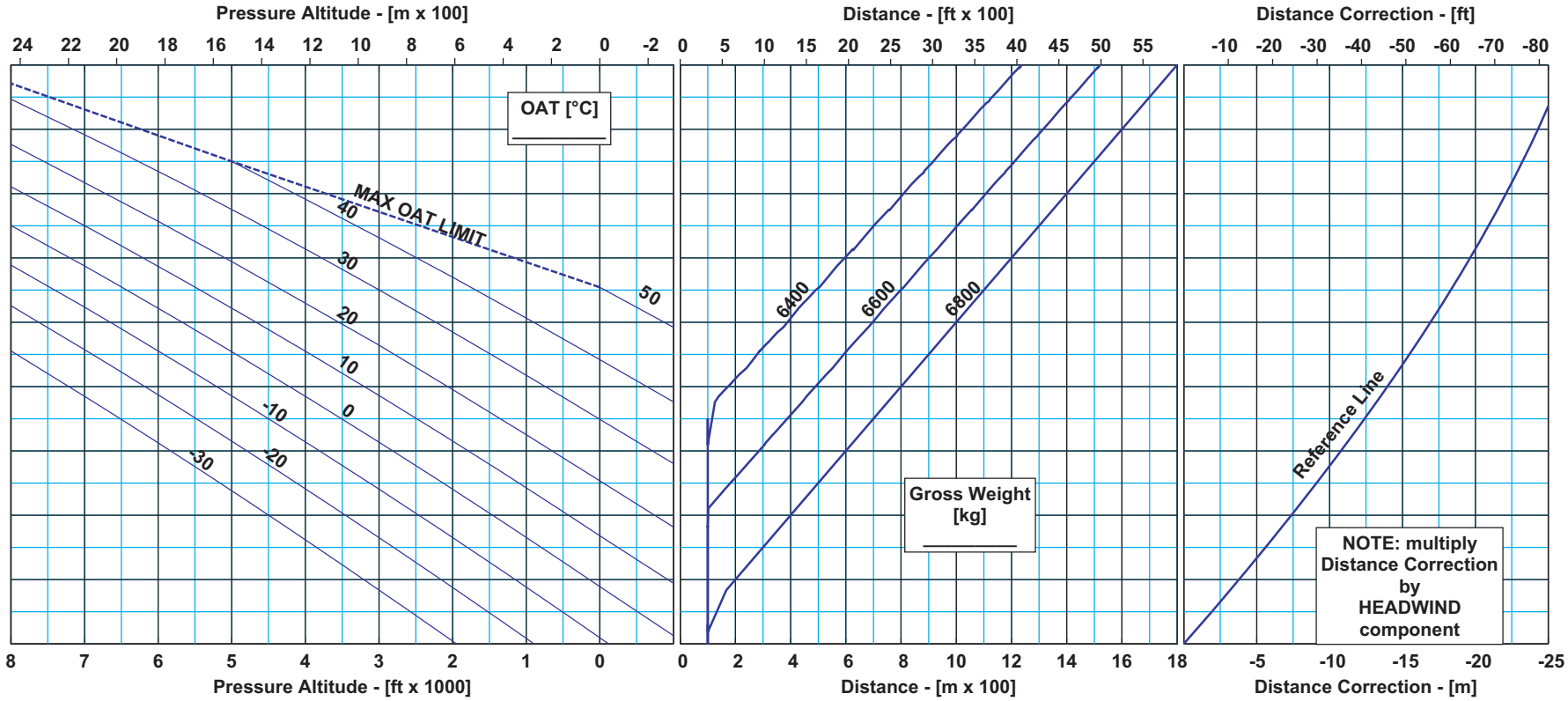

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Figure 4-54 Rejected Take Off Distance OEI Clear Area

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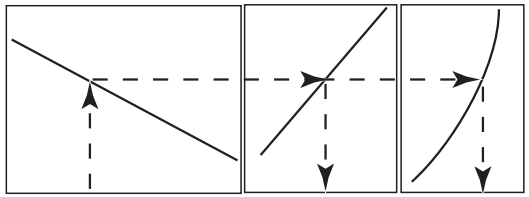
OEI CONTINUED TAKE OFF DISTANCE CLEAR AREA



POWER 2.5 min OEI
ELECTRICAL LOAD 300A

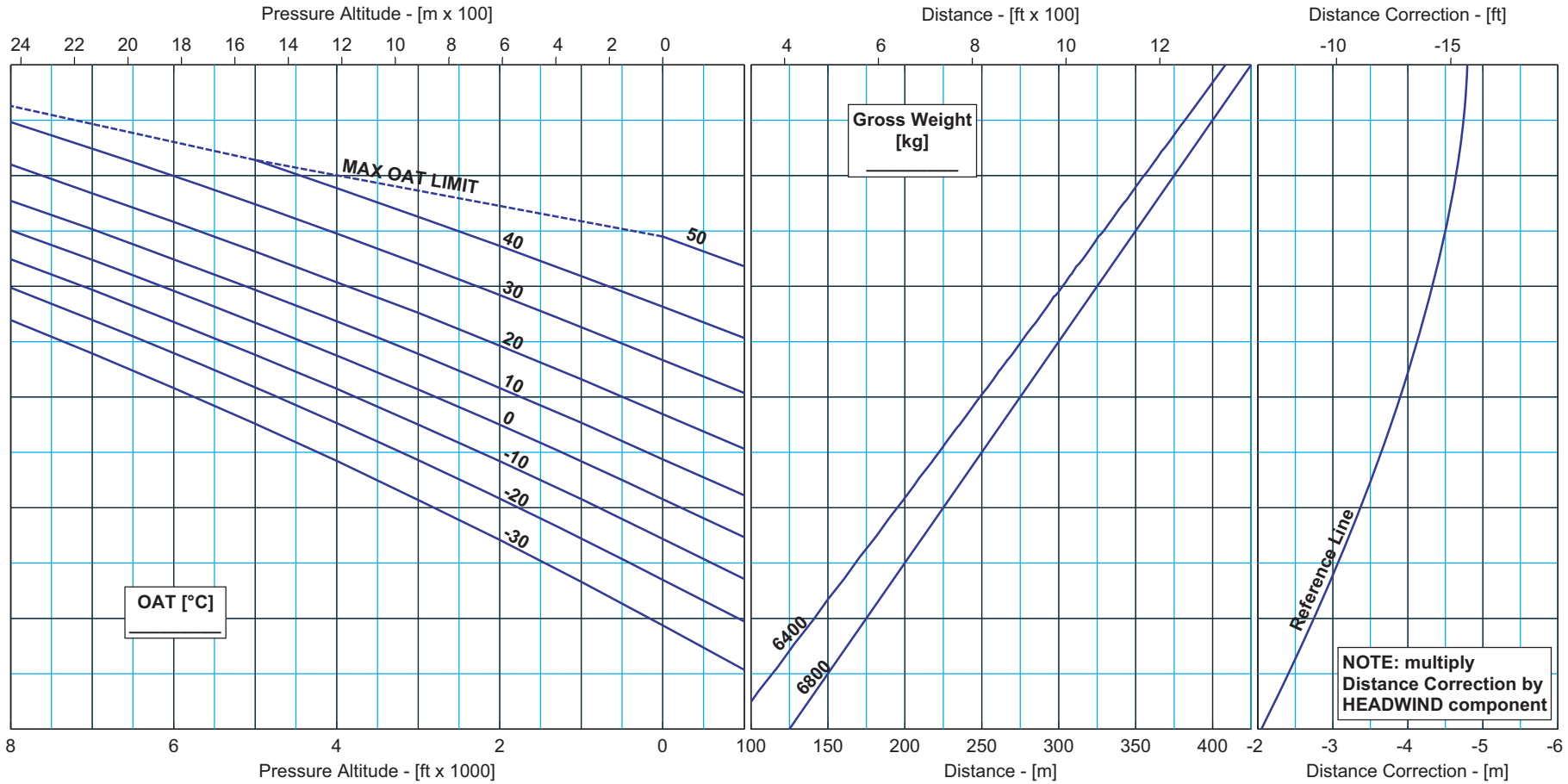


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Figure 4-55 Continued Take Off Distance OEI Clear Area Procedure

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REJECTED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
EAPS OFF

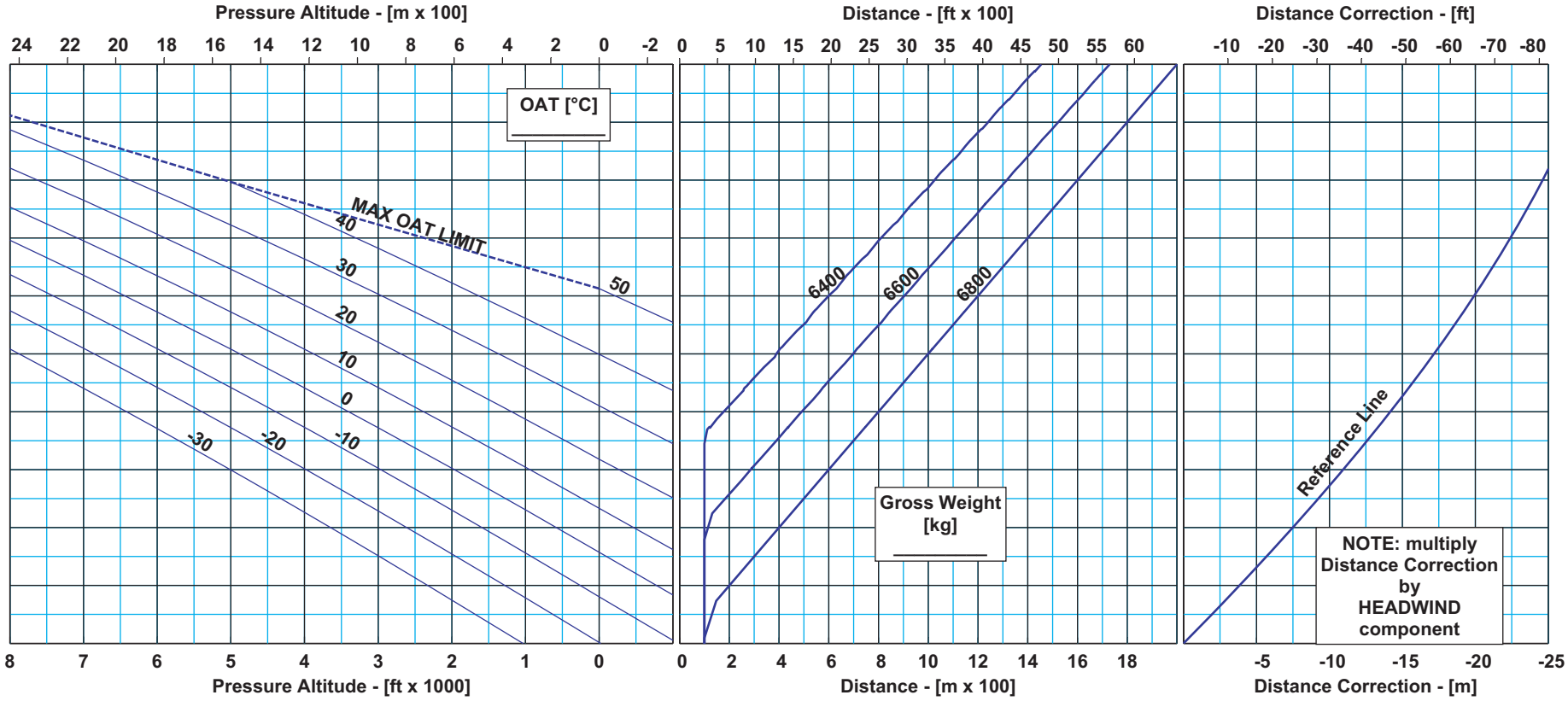

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Figure 4-56 Rejected Take Off Distance OEI Clear Area, EAPS OFF

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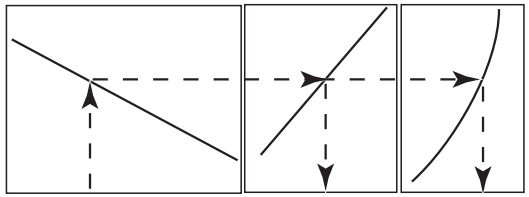
OEI CONTINUED TAKE OFF DISTANCE
CLEAR AREA



POWER 2.5 min OEI
ELECTRICAL LOAD 300A
EAPS OFF

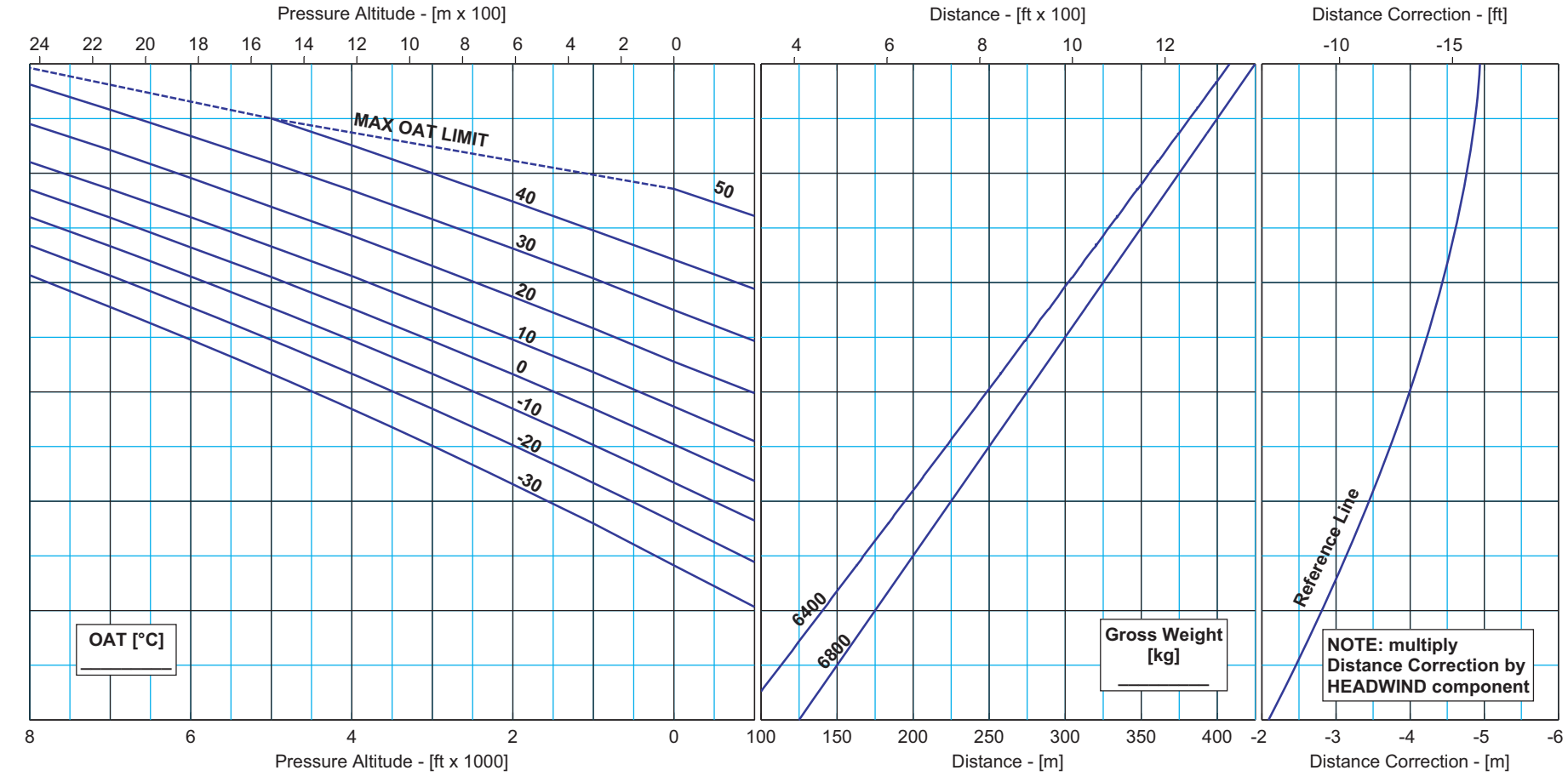


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Figure 4-57 CTO Distance OEI Clear Area Procedure, EAPS OFF

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REJECTED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
EAPS ON

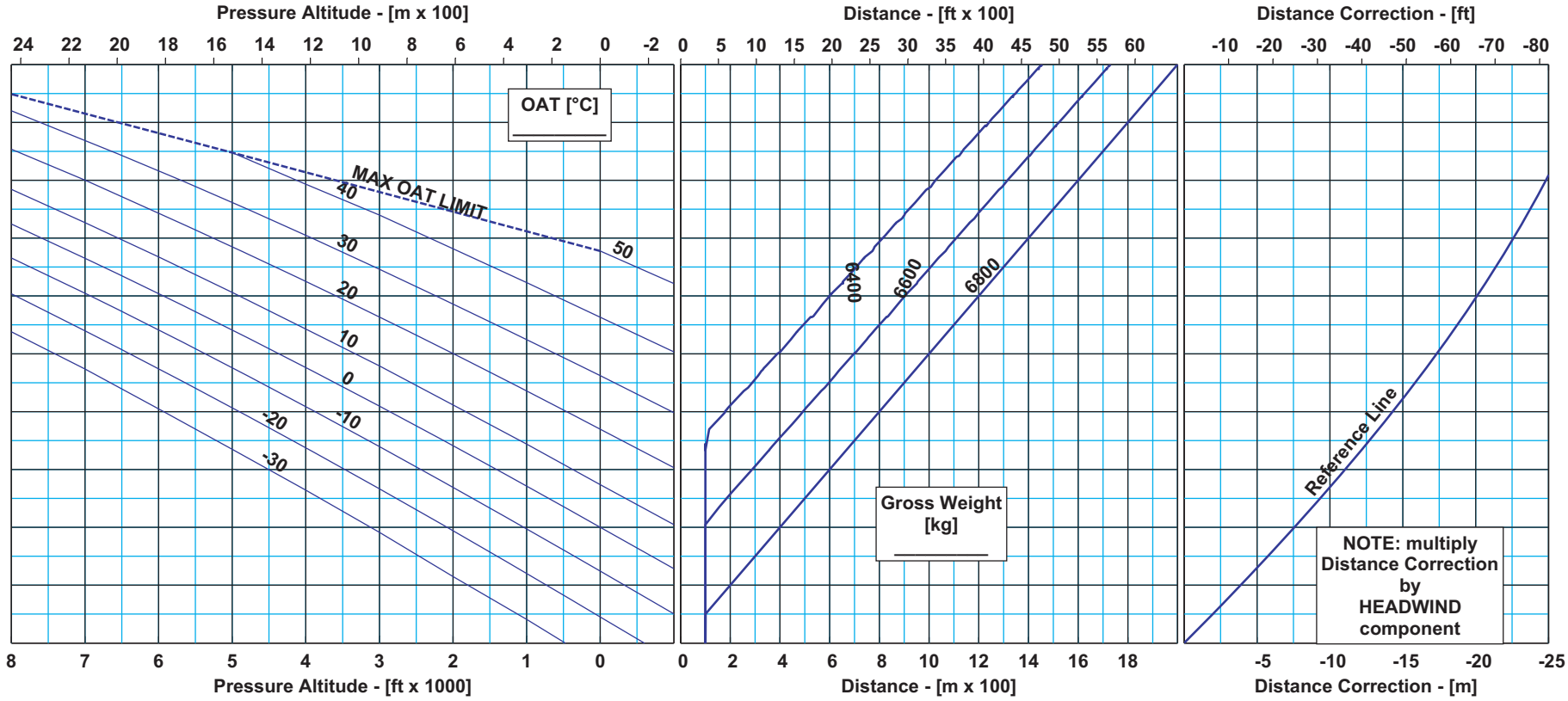

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Figure 4-58 Rejected Take Off Distance OEI Clear Area, EAPS ON

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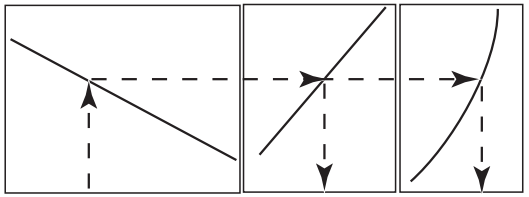
OEI CONTINUED TAKE OFF DISTANCE
CLEAR AREA



POWER 2.5 min OEI
ELECTRICAL LOAD 300A
EAPS ON

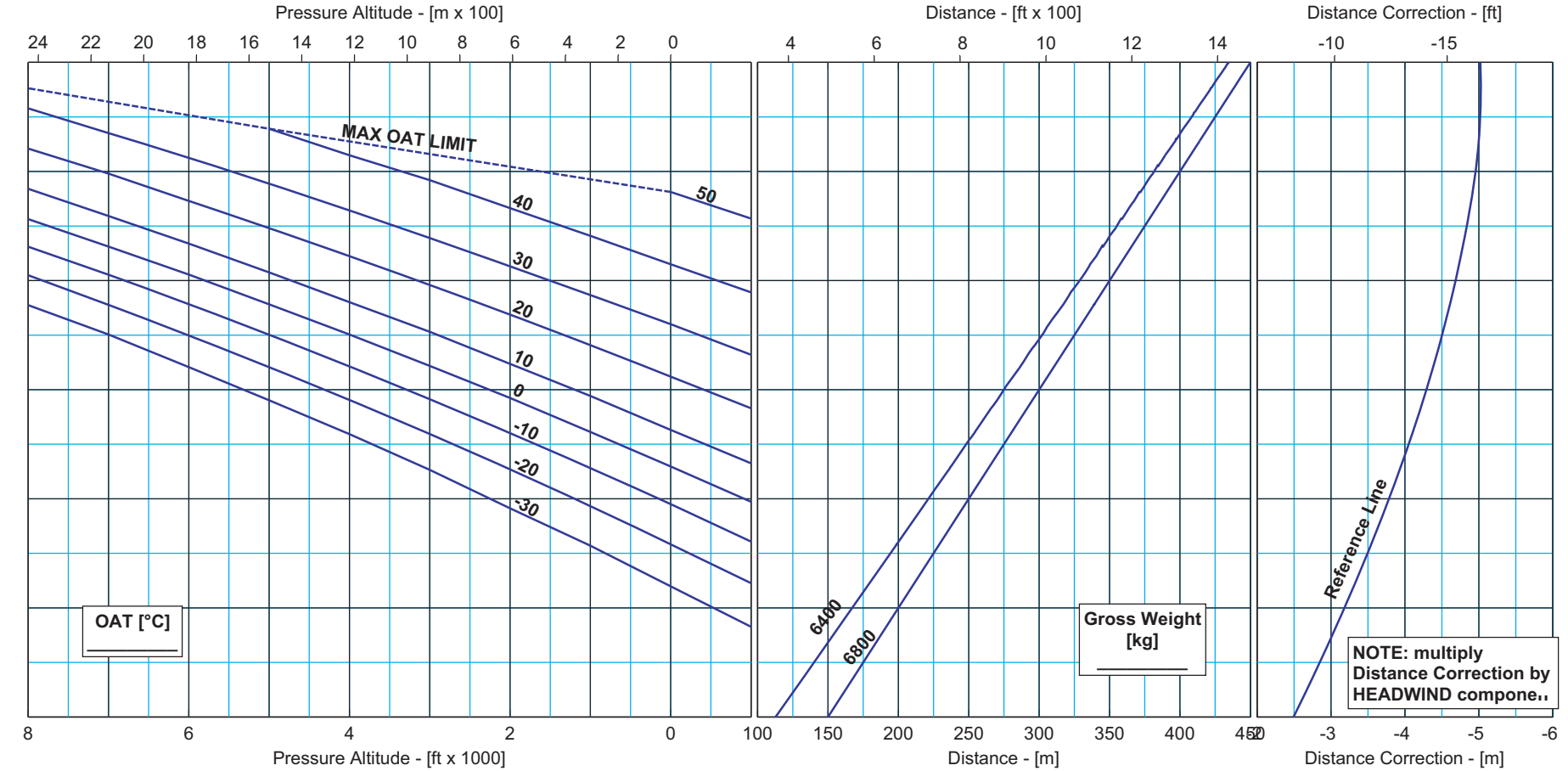


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Figure 4-59 CTO Distance OEI Clear Area Procedure, EAPS ON

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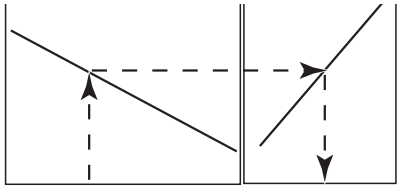
LANDING DISTANCE OEI
CLEAR AREA
from LDP to TOUCHDOWN



Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{LDP} 50 KIAS
RoD <350 ft/min

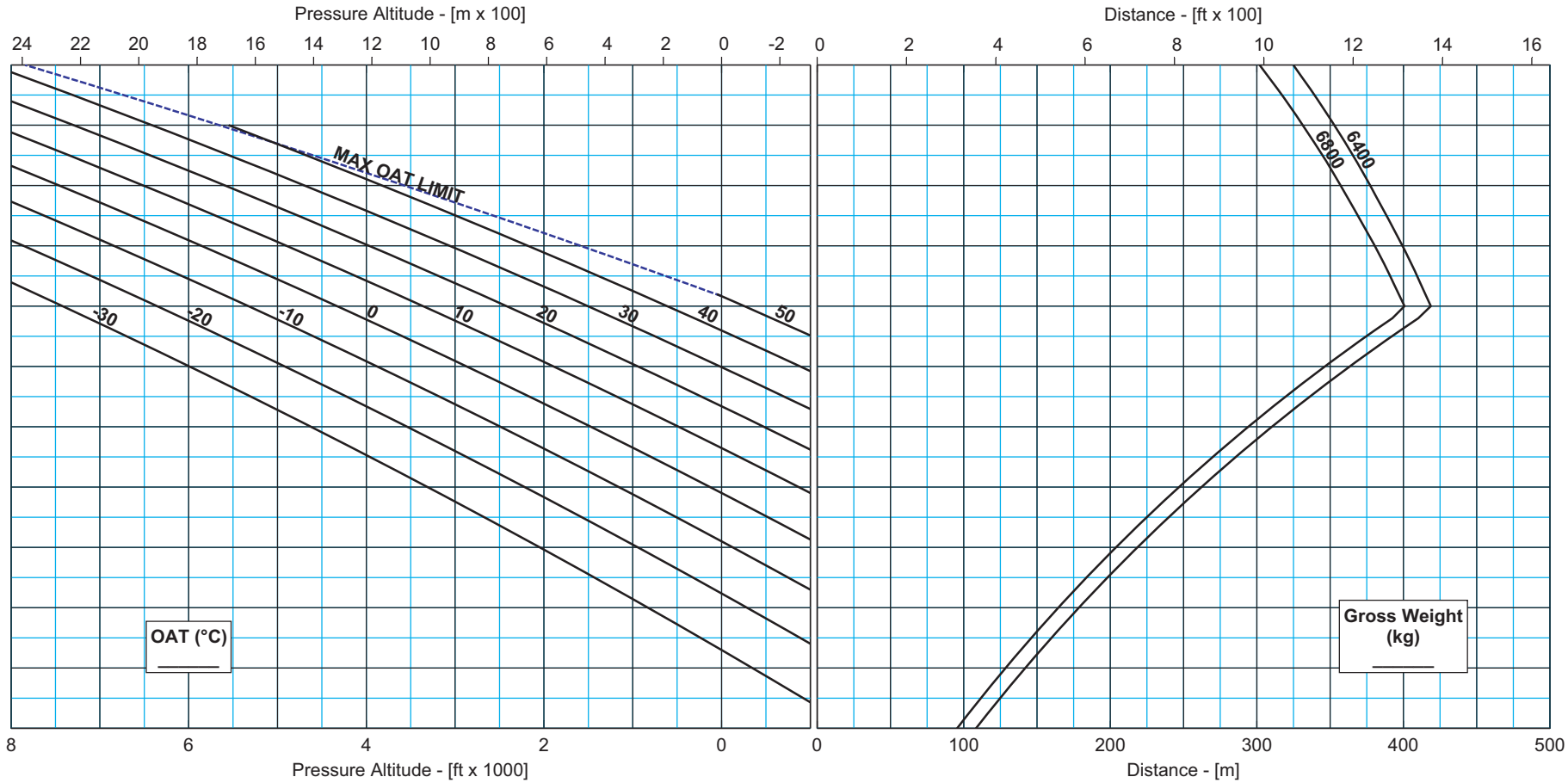


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Figure 4-60 Clear Area Landing Distance OEI

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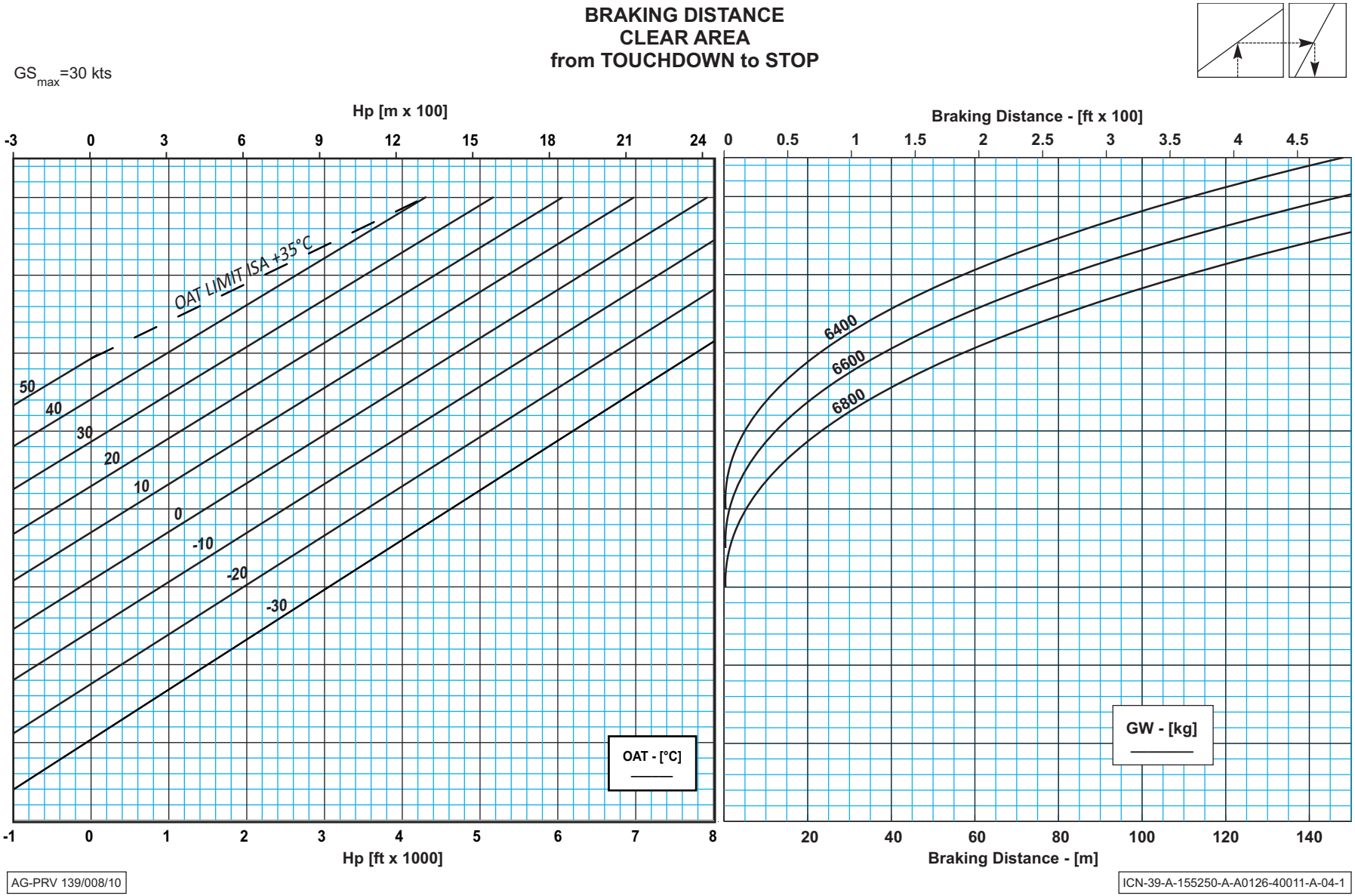

Figure 4-61 Braking Distance Clear Area

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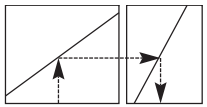
BALKED LANDING DISTANCE
CLEAR AREA

Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{LDP} 50 KIAS
RoD <350 ft/min



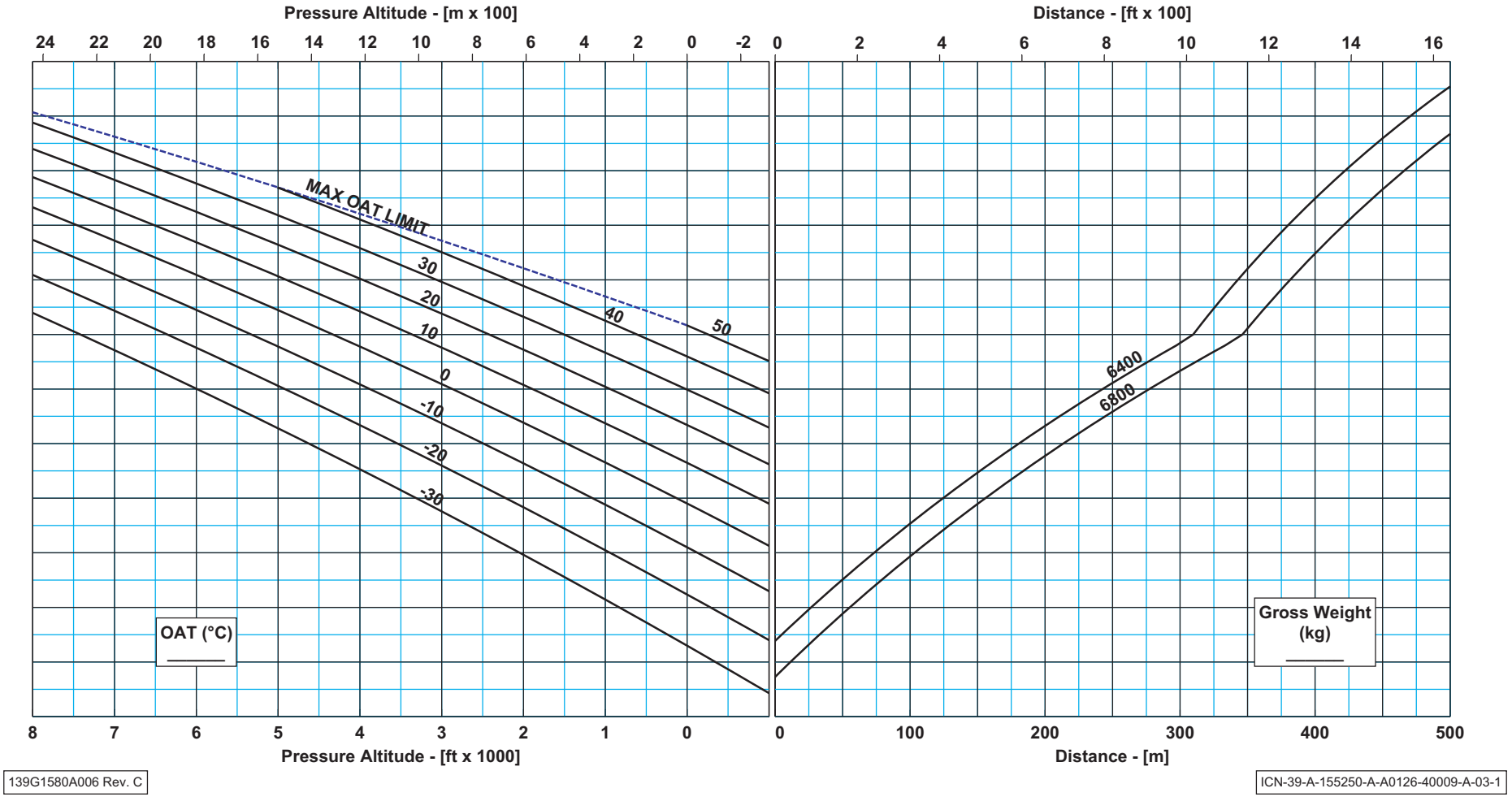


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Figure 4-62 Clear Area Balked Landing Distance OEI

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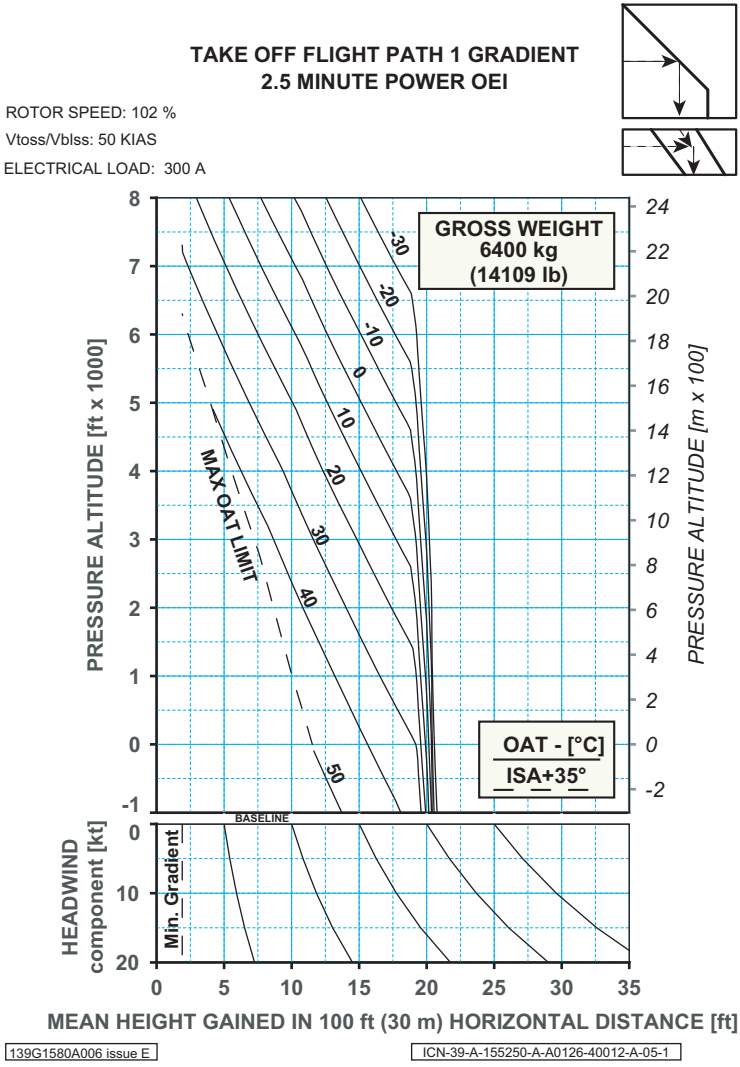

Figure 4-63 PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 6400 kg

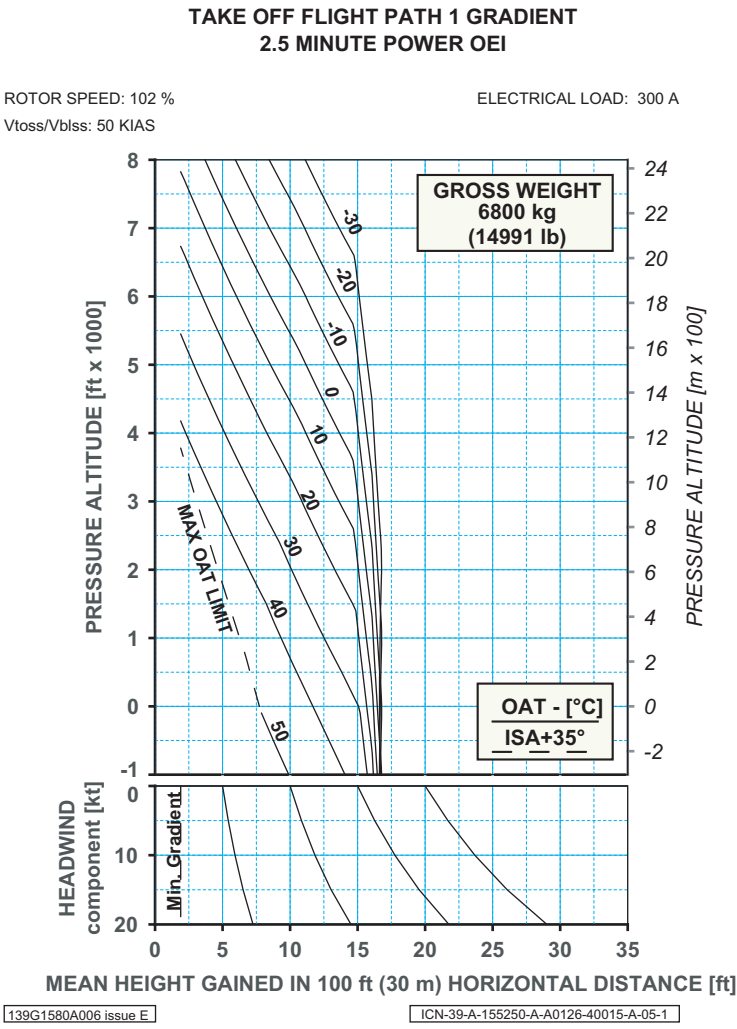

Figure 4-64 PATH 1 Gradient Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 6800 kg

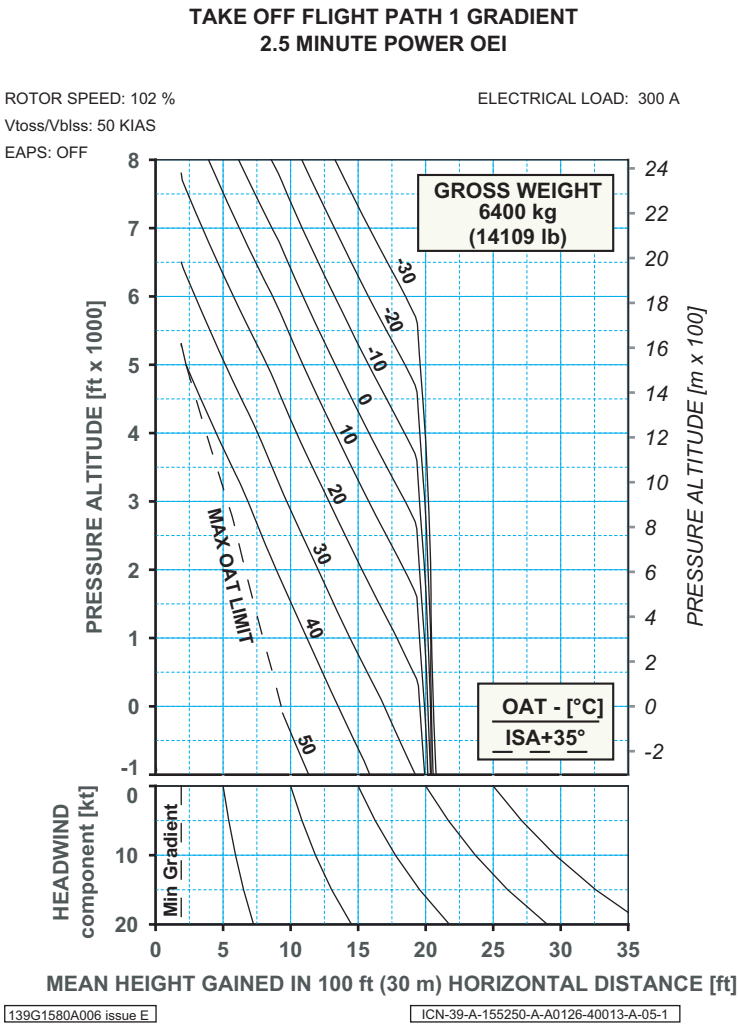

Figure 4-65 PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, EAPS OFF, GW 6400 kg

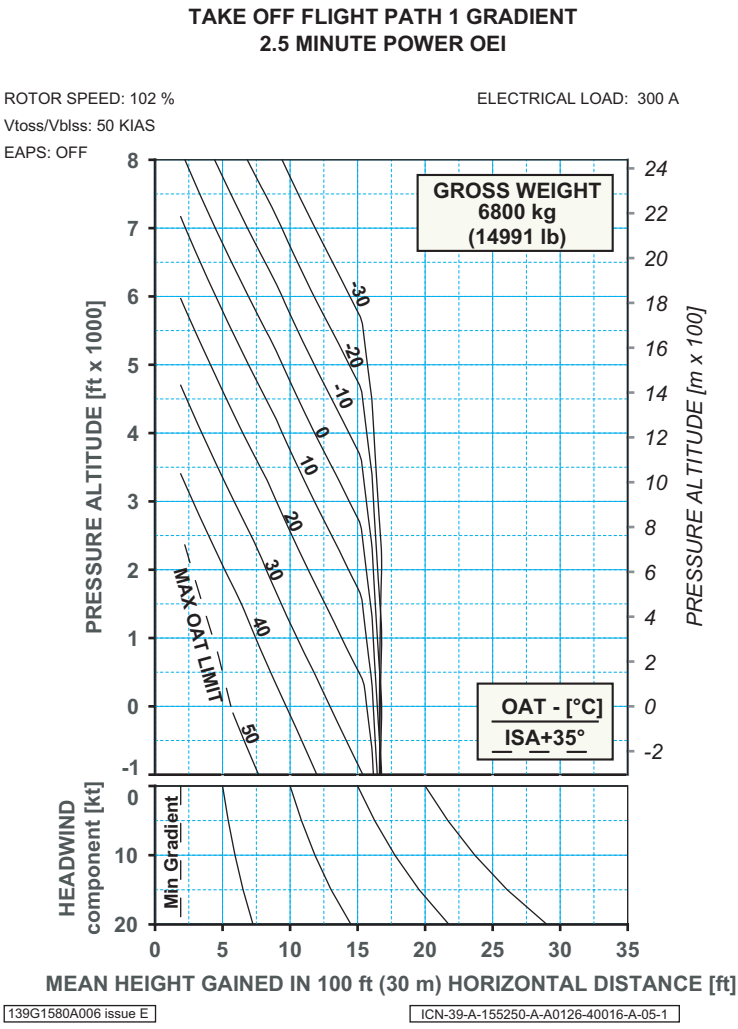

Figure 4-66 PATH 1 Gradient Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, EAPS OFF, GW 6800 kg

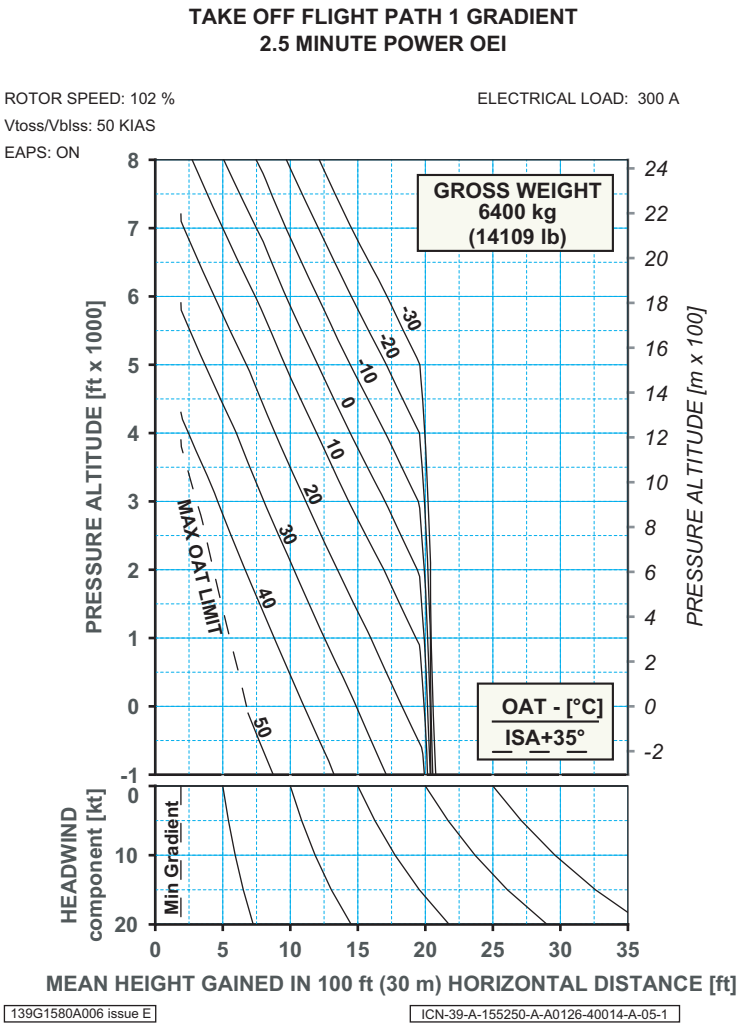

Figure 4-67 PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, EAPS ON, GW 6400 kg

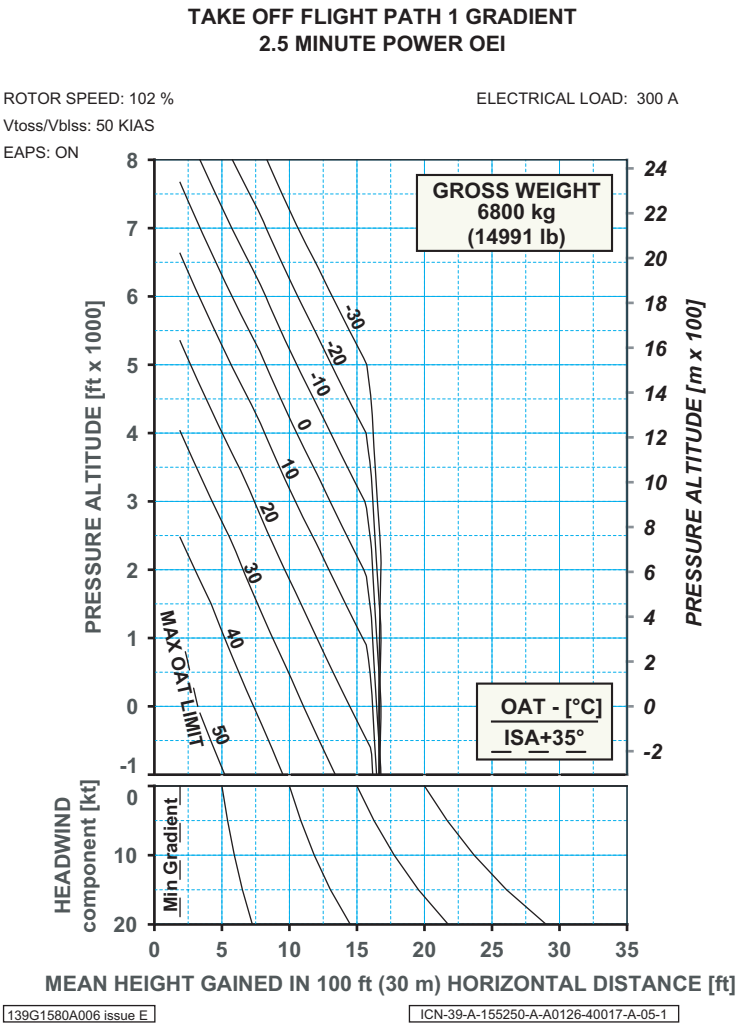

Figure 4-68 PATH 1 Gradient Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, EAPS ON, GW 6800 kg

REJECTED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
IBF Installed

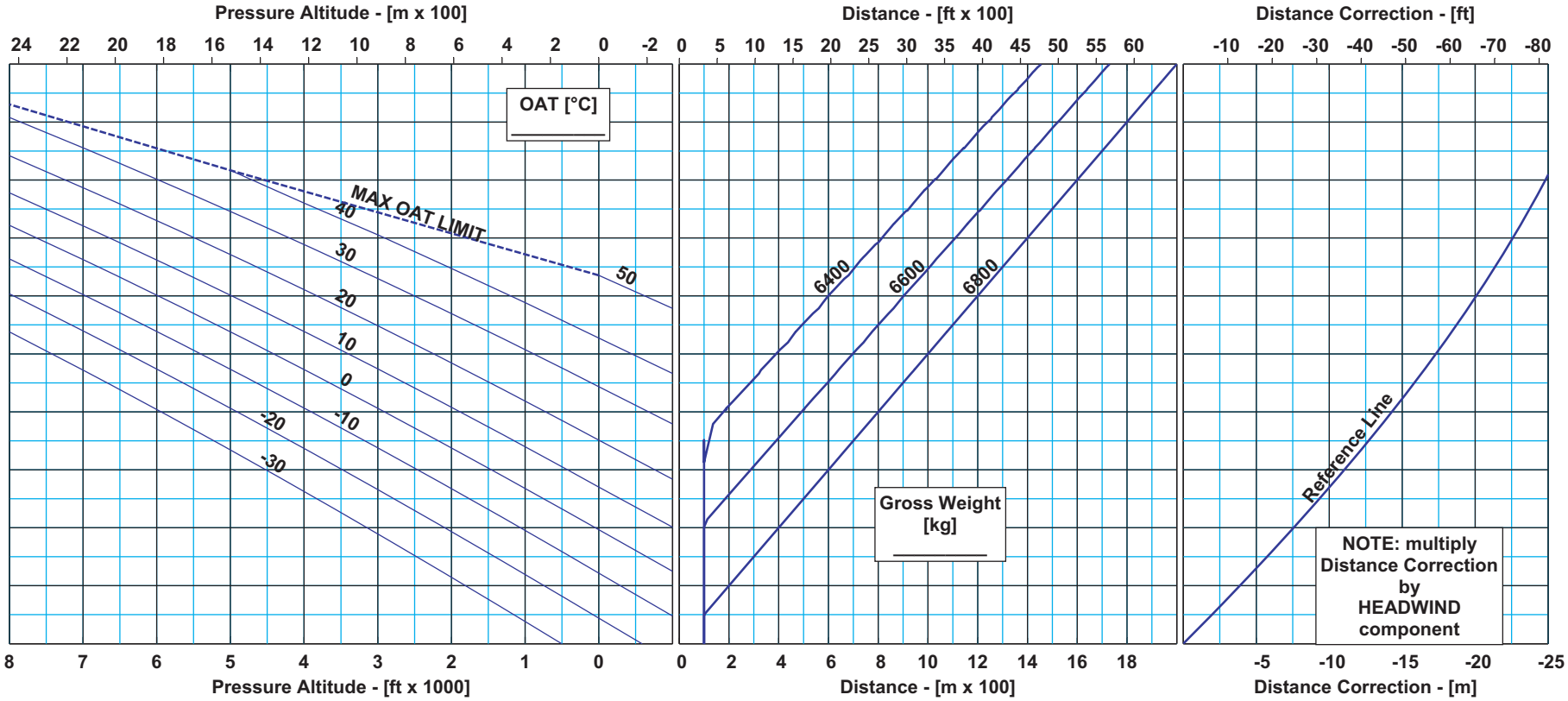

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Figure 4-68A Rejected Take Off Distance OEI Clear Area, IBF Installed

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OEI CONTINUED TAKE OFF DISTANCE
CLEAR AREA

IBF INSTALLED
POWER 2.5 min OEI
ELECTRICAL LOAD 300A

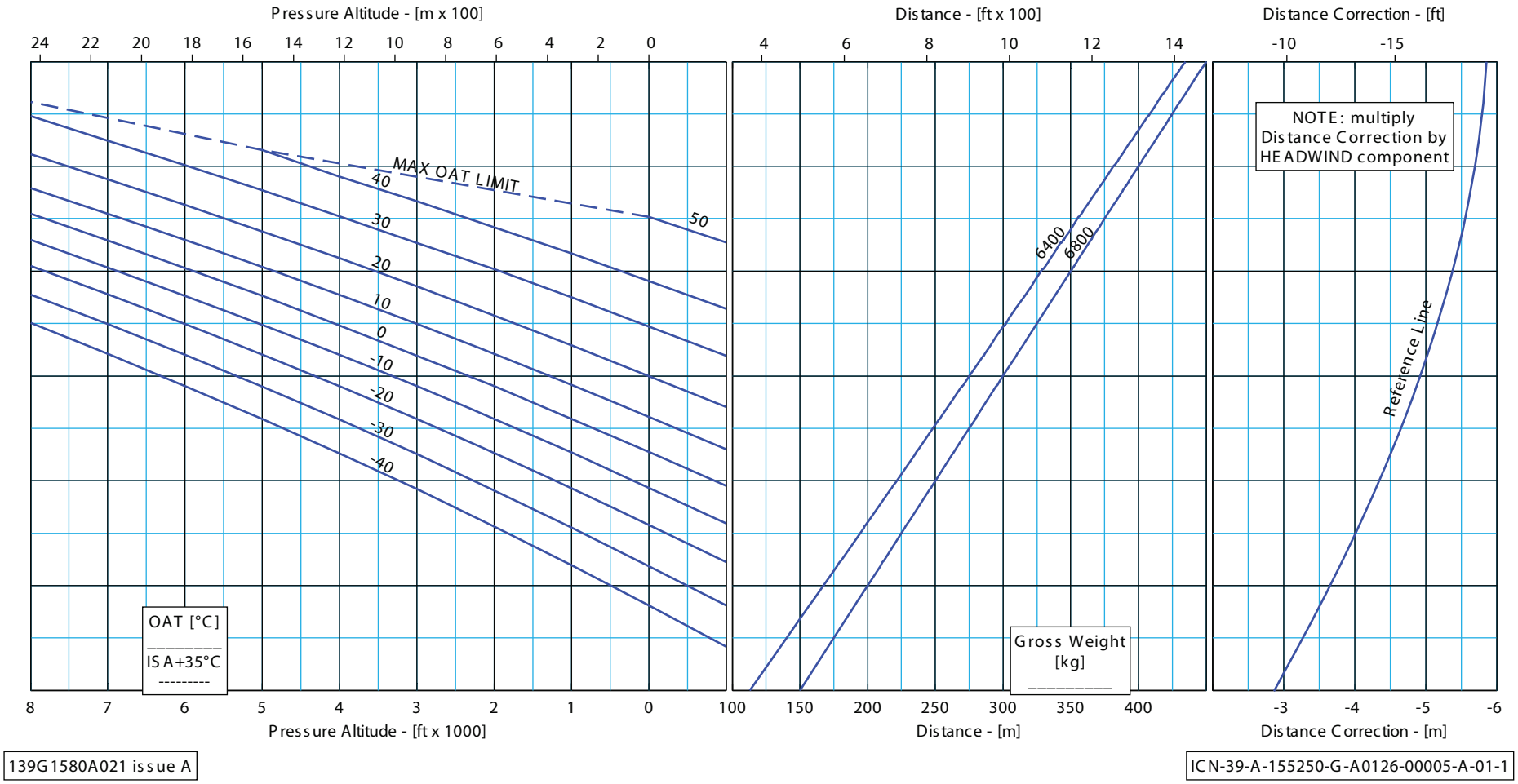

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Figure 4-68B Continued Take Off Distance OEI Clear Area, IBF Installed

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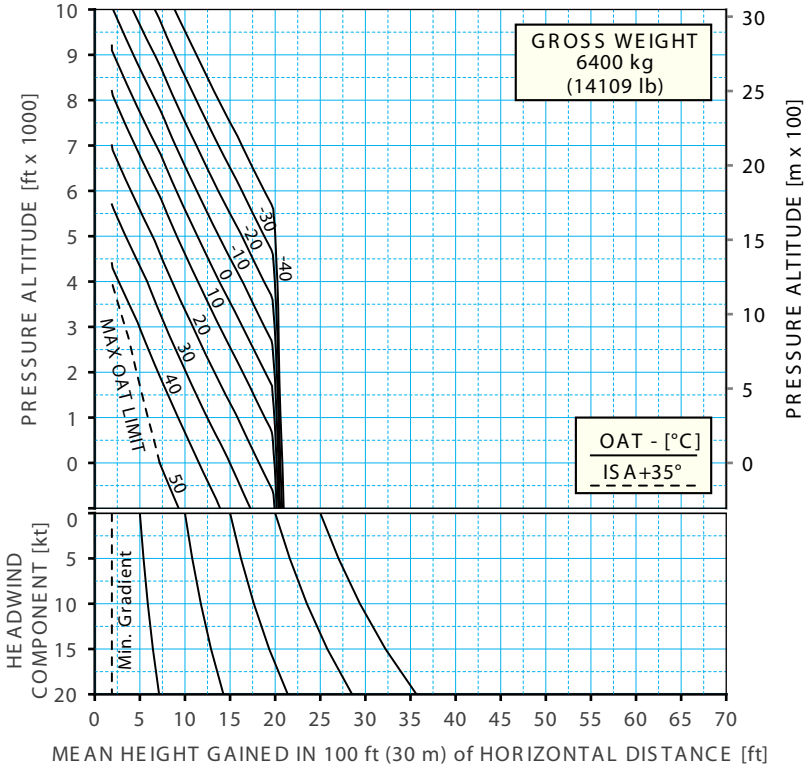
TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A



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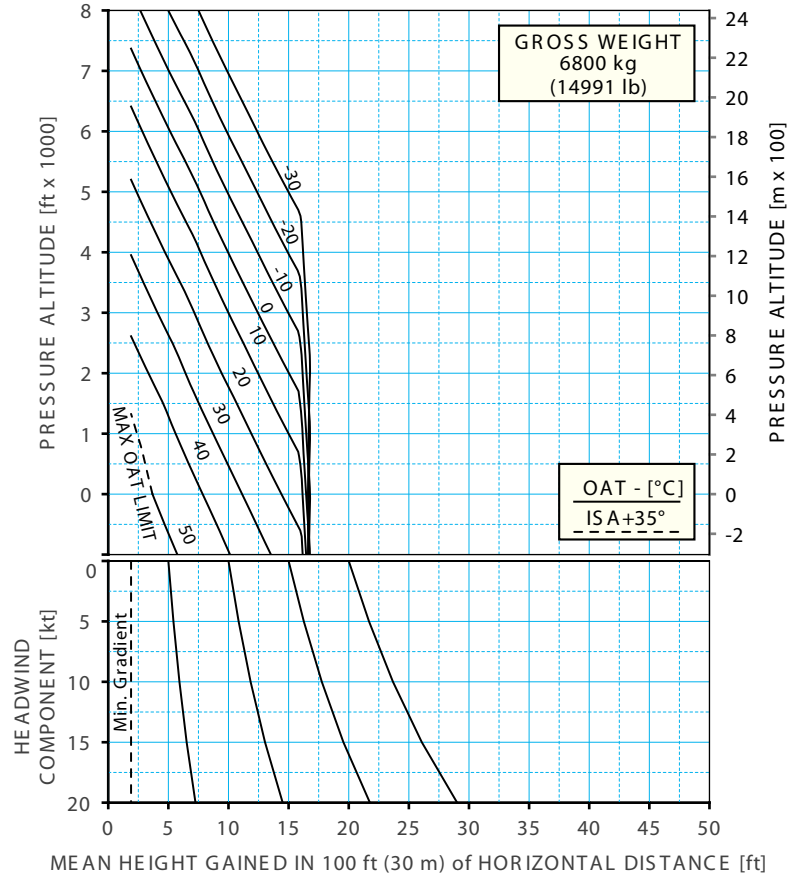
ICN-39-A-155286-G-A0126-00034-A-01-1

Figure 4-68C PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 6400 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A



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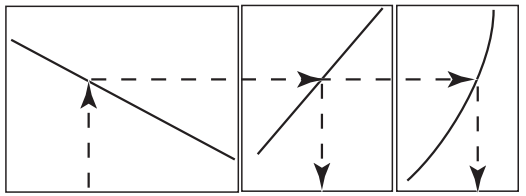
ICN-39-A-155250-G-A0126-00013-A-01-1

Figure 4-68D PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 6800 kg

TAKE OFF OEI DISTANCE from TDP
CONFINED AREA



Clear Air Intake / EAPS OFF / EAPS ON
POWE 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS} 40 KIAS

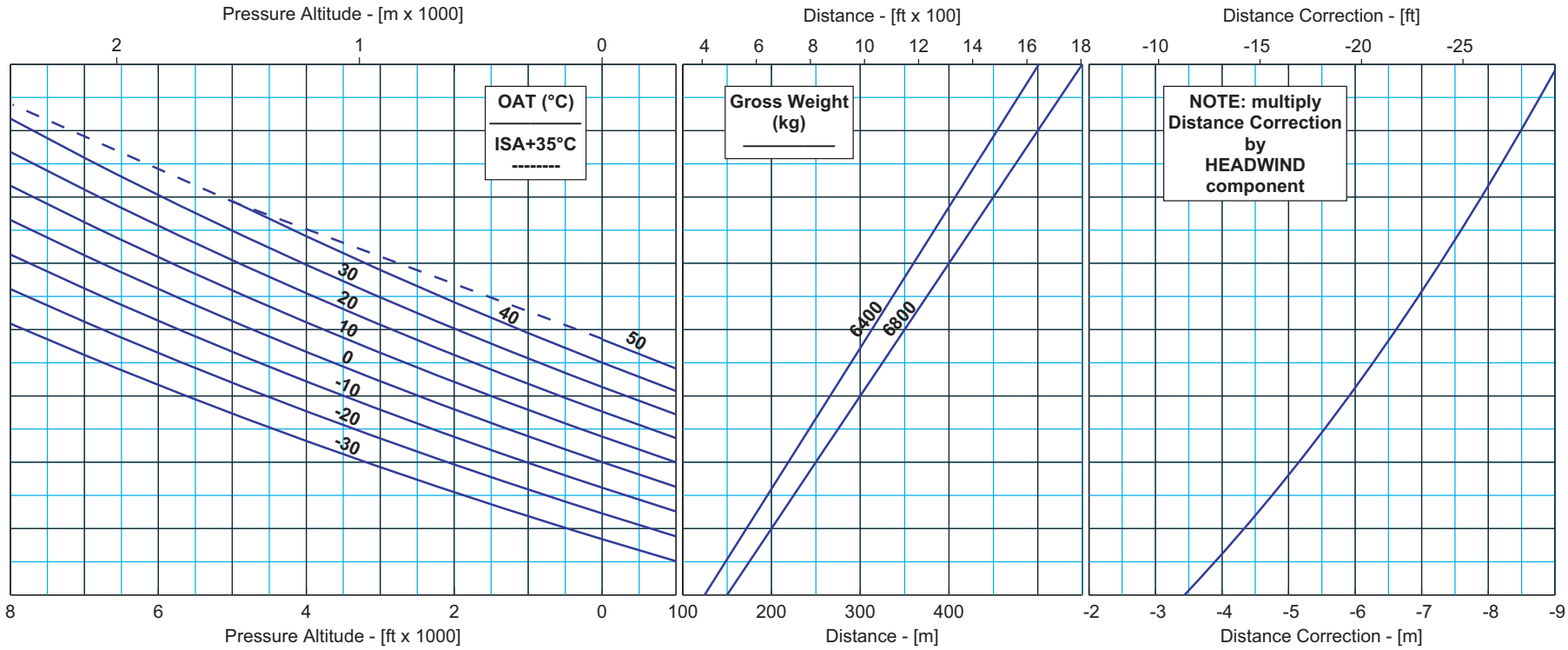


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Figure 4-69 Confined Area Take-Off OEI Distance from TDP (to be used with rearward climb distance to calculate CTO distance)

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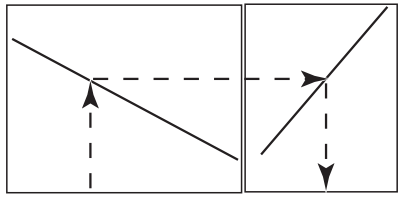
BALKED LANDING DISTANCE OEI
CONFINED AREA



Clean Air Intake / EAPS OFF / EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{BLSS} 40 KIAS
RoD <350 ft/min

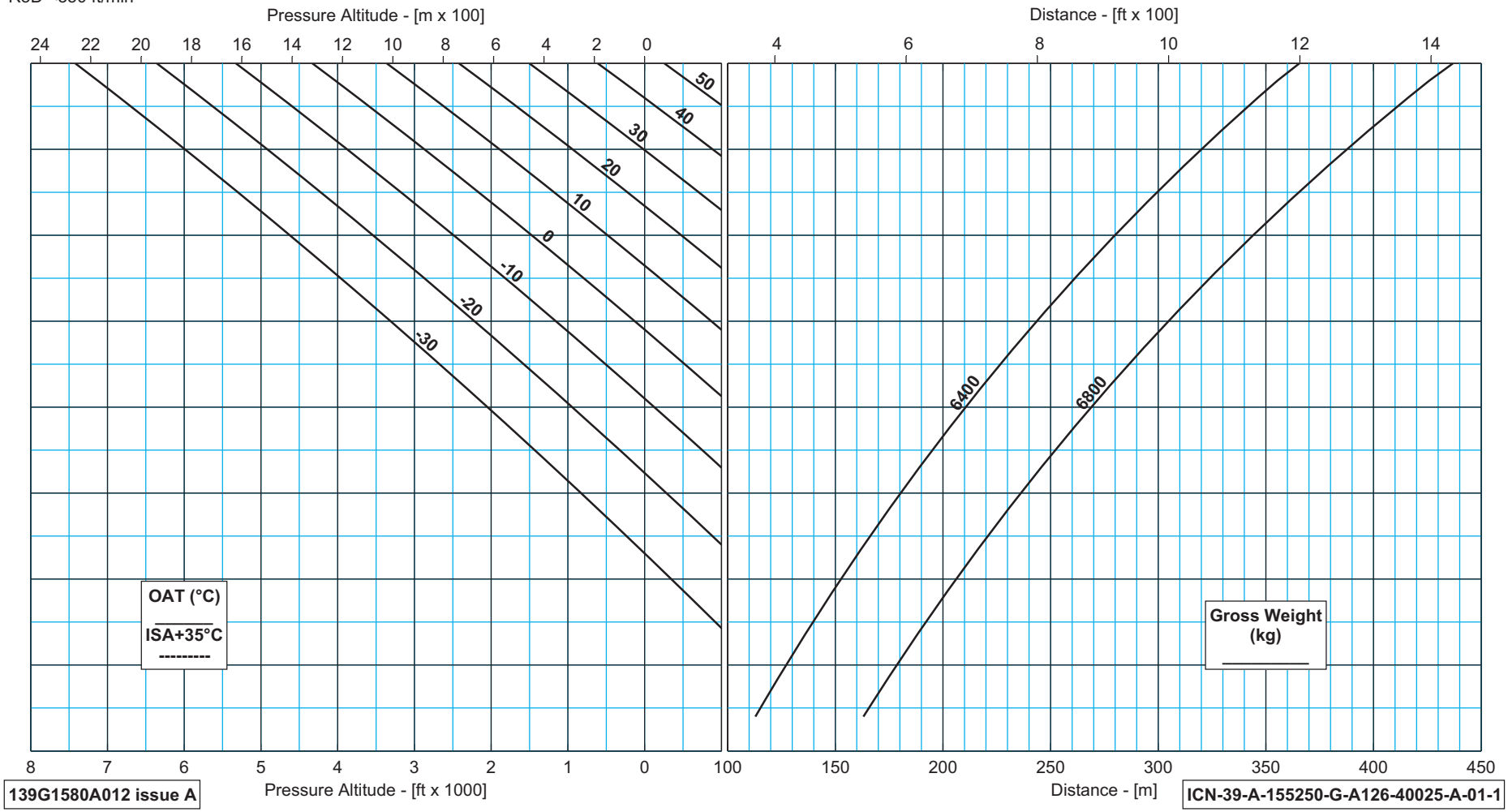


Figure 4-70 Confined Area Procedure Balked Landing Distance

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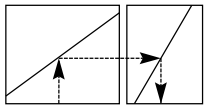
CONTINUED TAKE OFF DISTANCE OEI
OFF-SHORE HELIDECK PROCEDURE

CLEAN AIR INTAKE
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS}: 40 KIAS



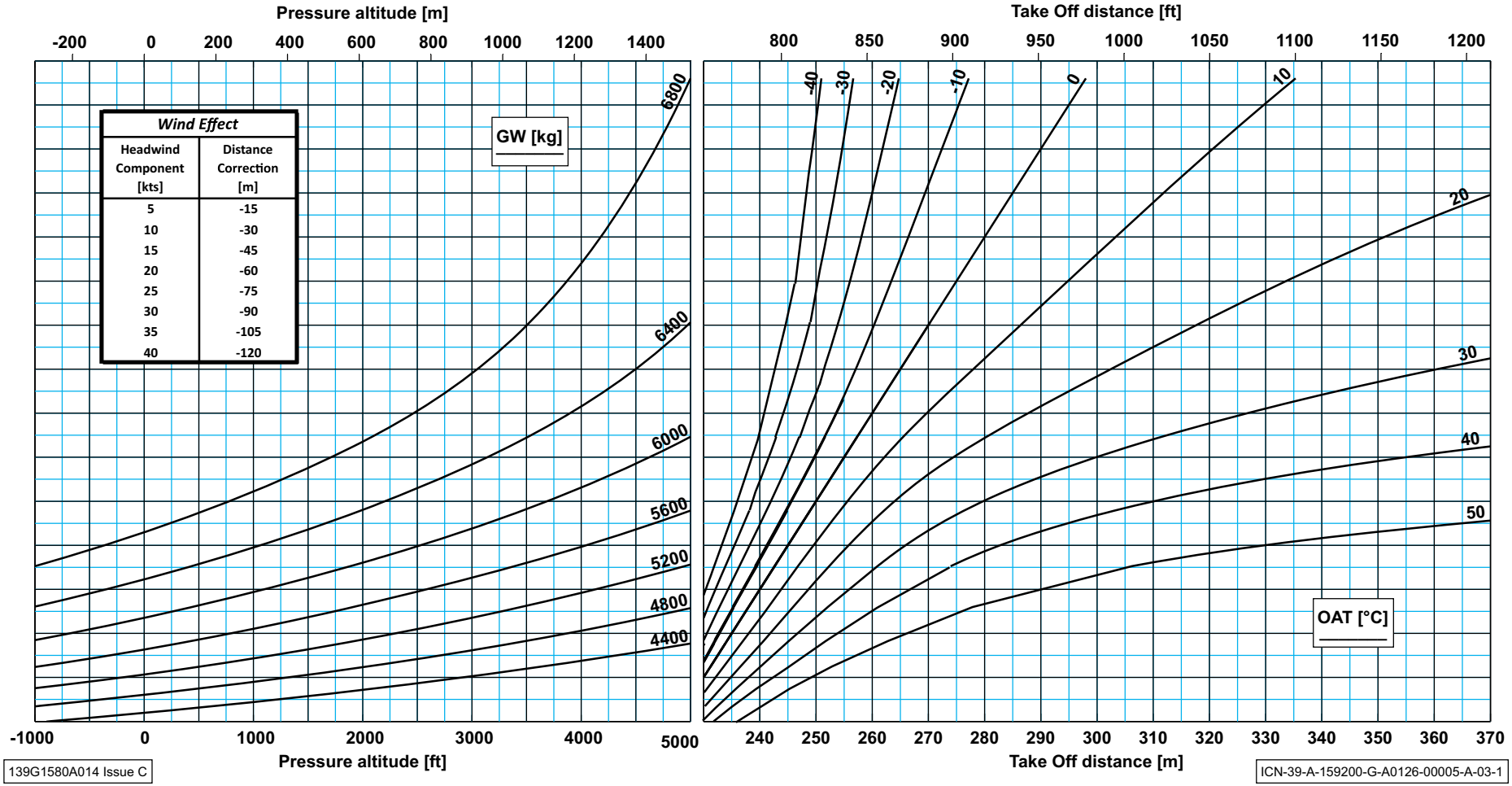


Figure 4-71 Offshore Helideck Procedure CTO Distance OEI

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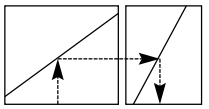
CONTINUED TAKE OFF DISTANCE OEI
OFF-SHORE HELIDECK PROCEDURE

EAPS OFF
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS}: 40 KIAS



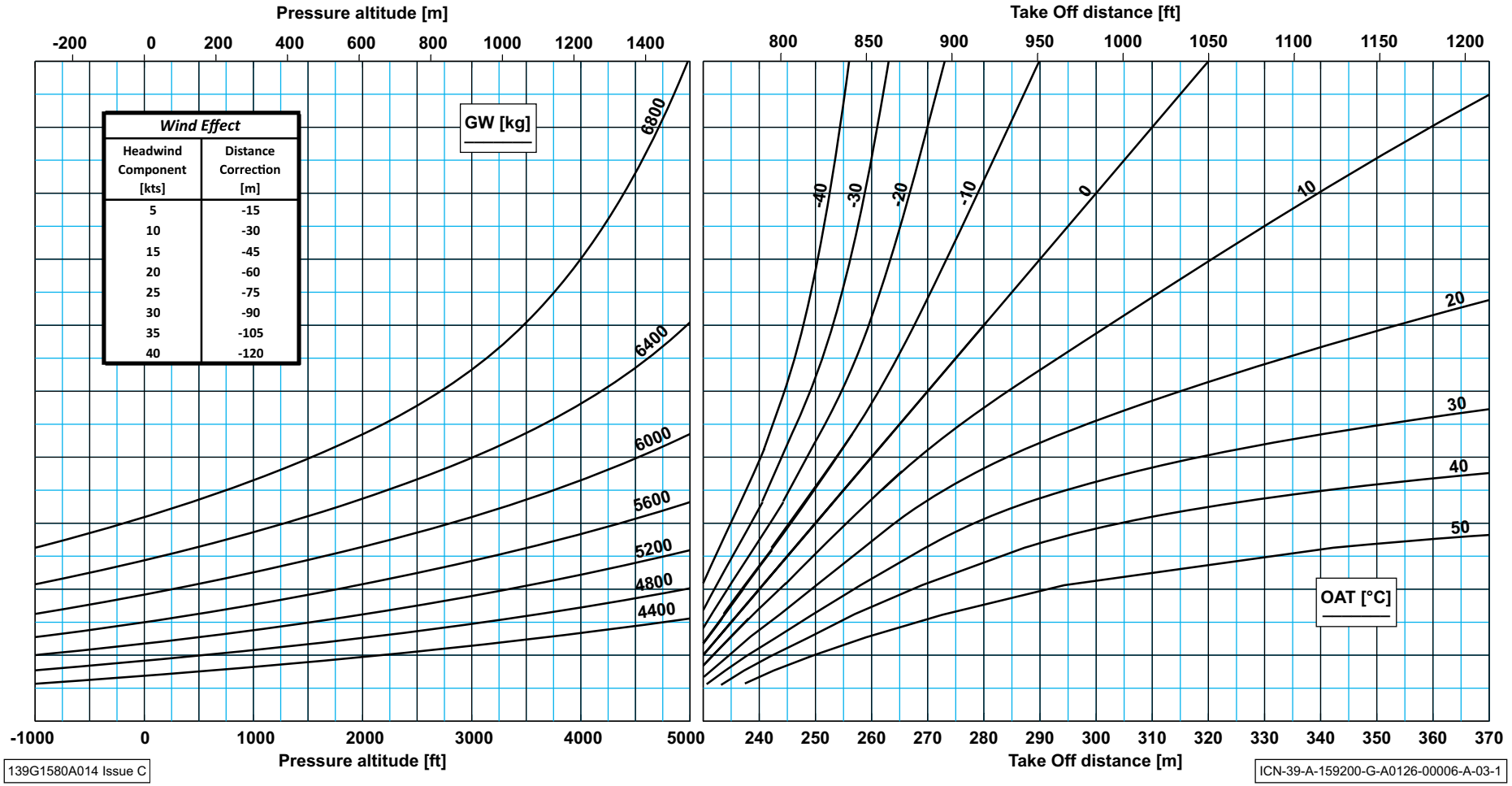


Figure 4-72 Offshore Helideck Procedure CTO Distance OEI, EAPS OFF

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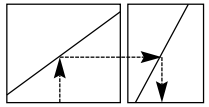
CONTINUED TAKE OFF DISTANCE OEI
OFF-SHORE HELIDECK PROCEDURE

EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS}: 40 KIAS



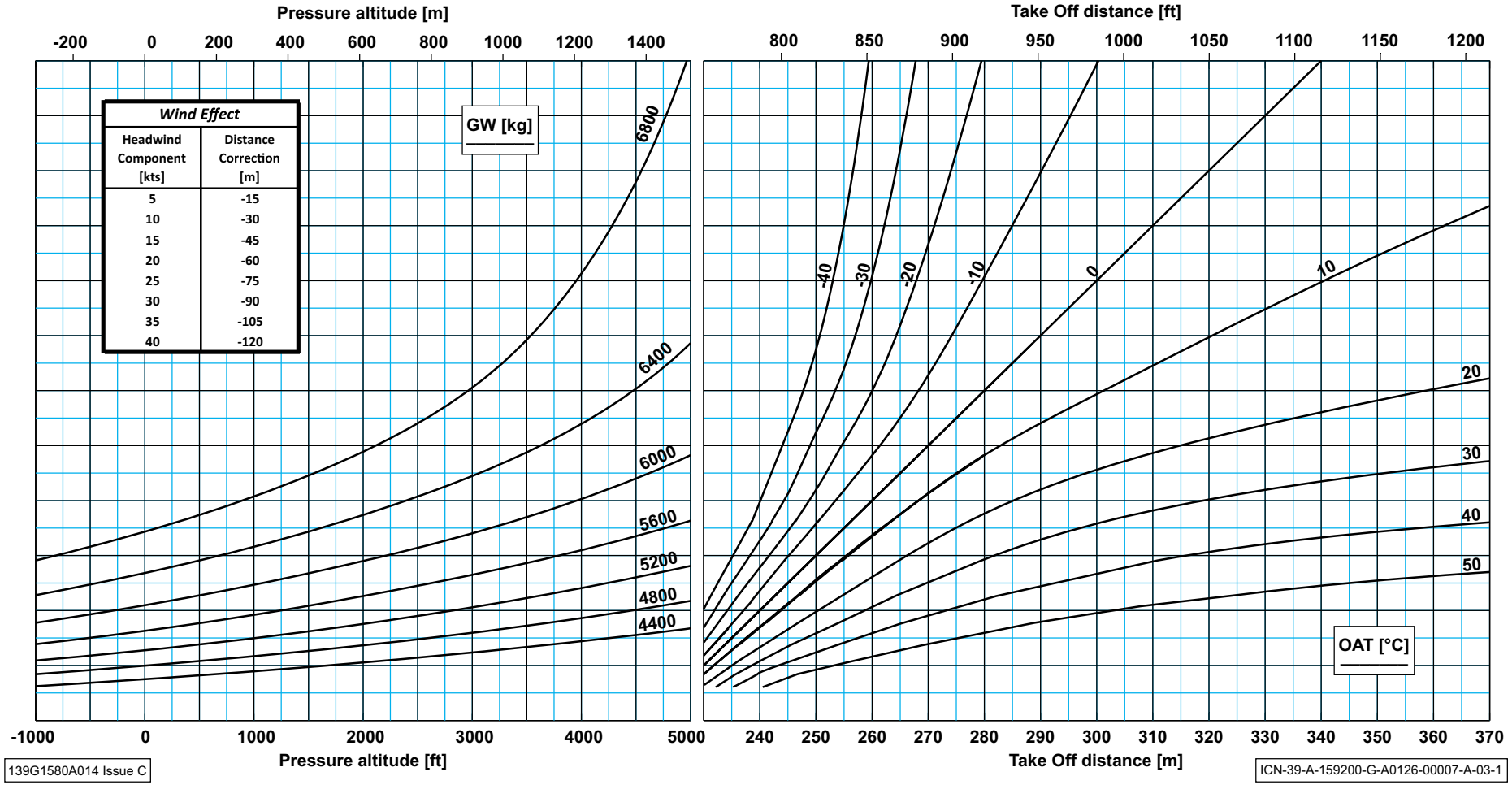


Figure 4-73 Offshore Helideck Procedure CTO Distance OEI, EAPS ON

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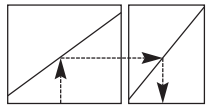
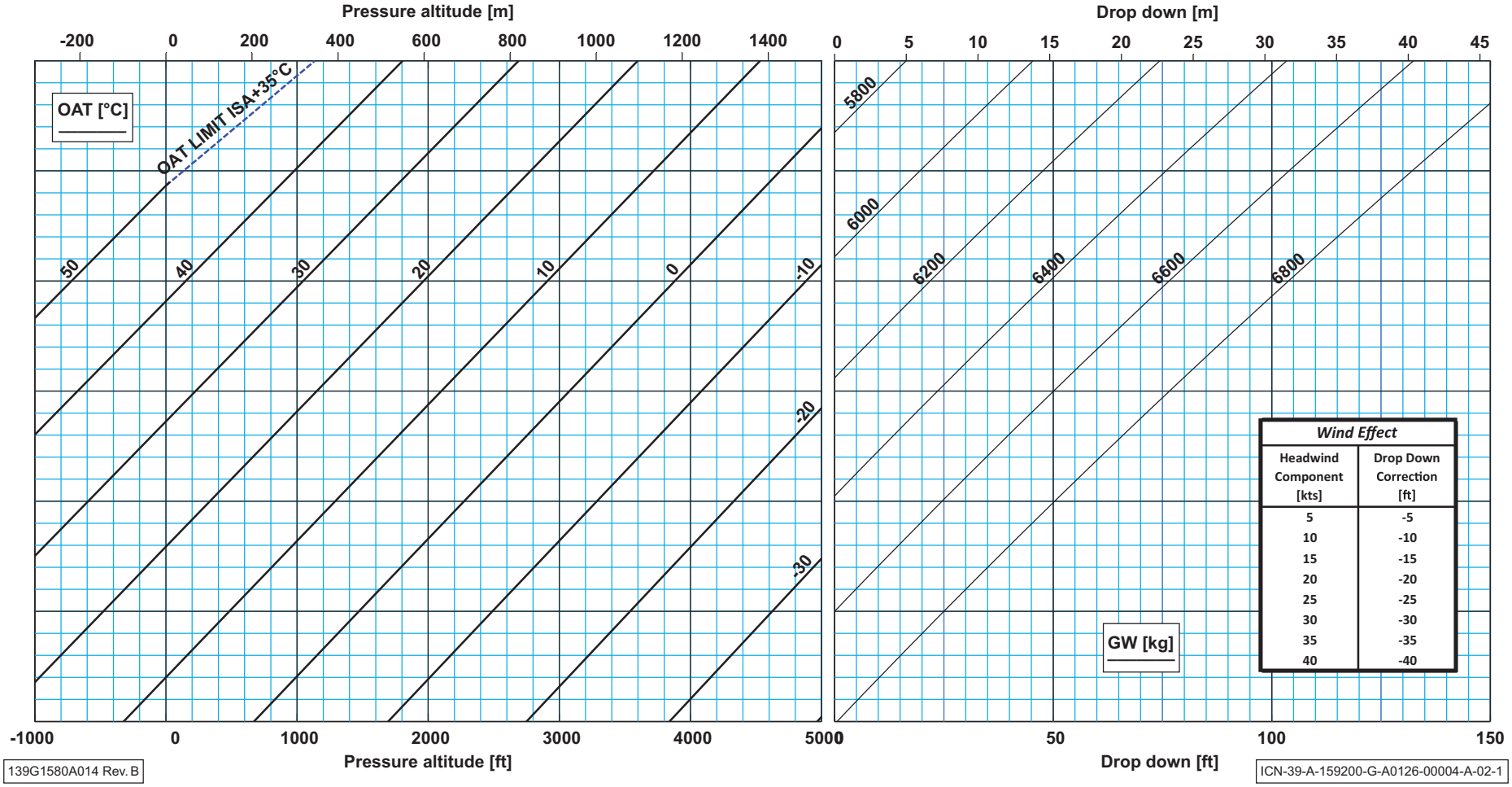
Clear Air Intake/EAPS OFF/EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD: 300A
$V_{TOSS/BLSS}$: 40 KIAS

DROP DOWN
OFF-SHORE HELIDECK PROCEDURE
FOR CONTINUED TAKE-OFF AND BALKED LANDING

NOTE: For Descending Procedure increase DROP DOWN by 15 feet





Wind Effect

Headwind Component [kts]	Drop Down Correction [ft]
5	-5
10	-10
15	-15
20	-20
25	-25
30	-30
35	-35
40	-40

Figure 4-74 Offshore Helideck Procedure Drop Down for CTO (BTS) and Balked Landing (BLDP)

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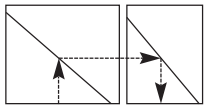
BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

CLEAN AIR INTAKE
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



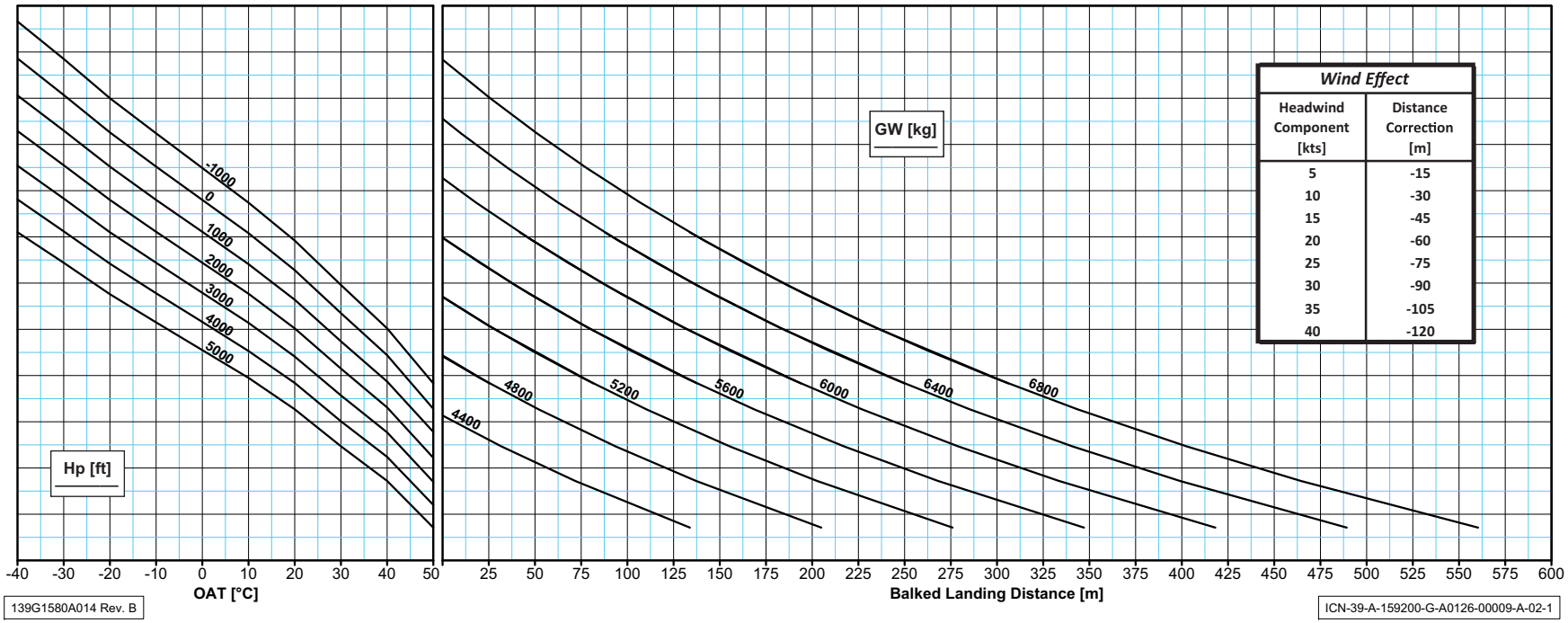
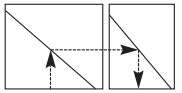
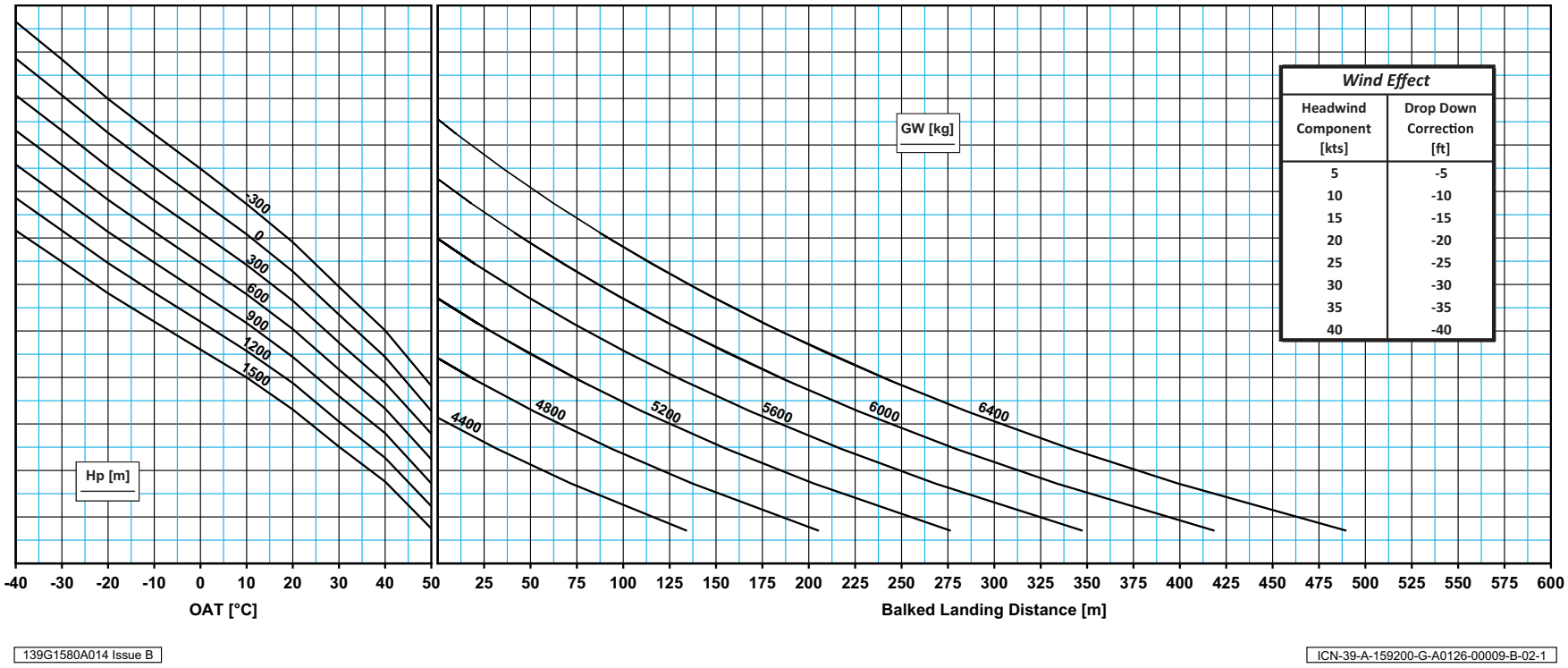


Figure 4-75 Offshore Helideck Procedure Balked Landing Distance

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

CLEAN AIR INTAKE
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS





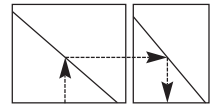
Wind Effect

Headwind Component [kts]	Drop Down Correction [ft]
5	-5
10	-10
15	-15
20	-20
25	-25
30	-30
35	-35
40	-40

Figure 4-76 Offshore Helideck Procedure Balked Landing Distance (Hp in meters)

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

EAPS OFF
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



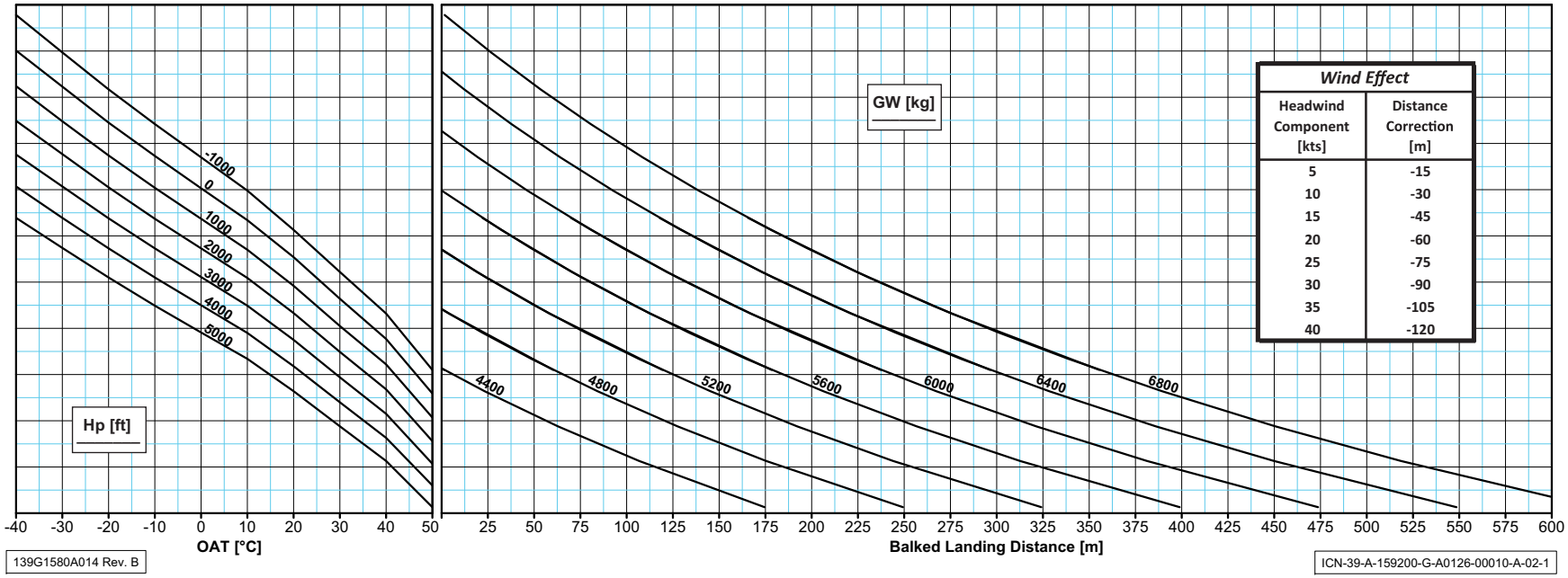
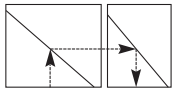
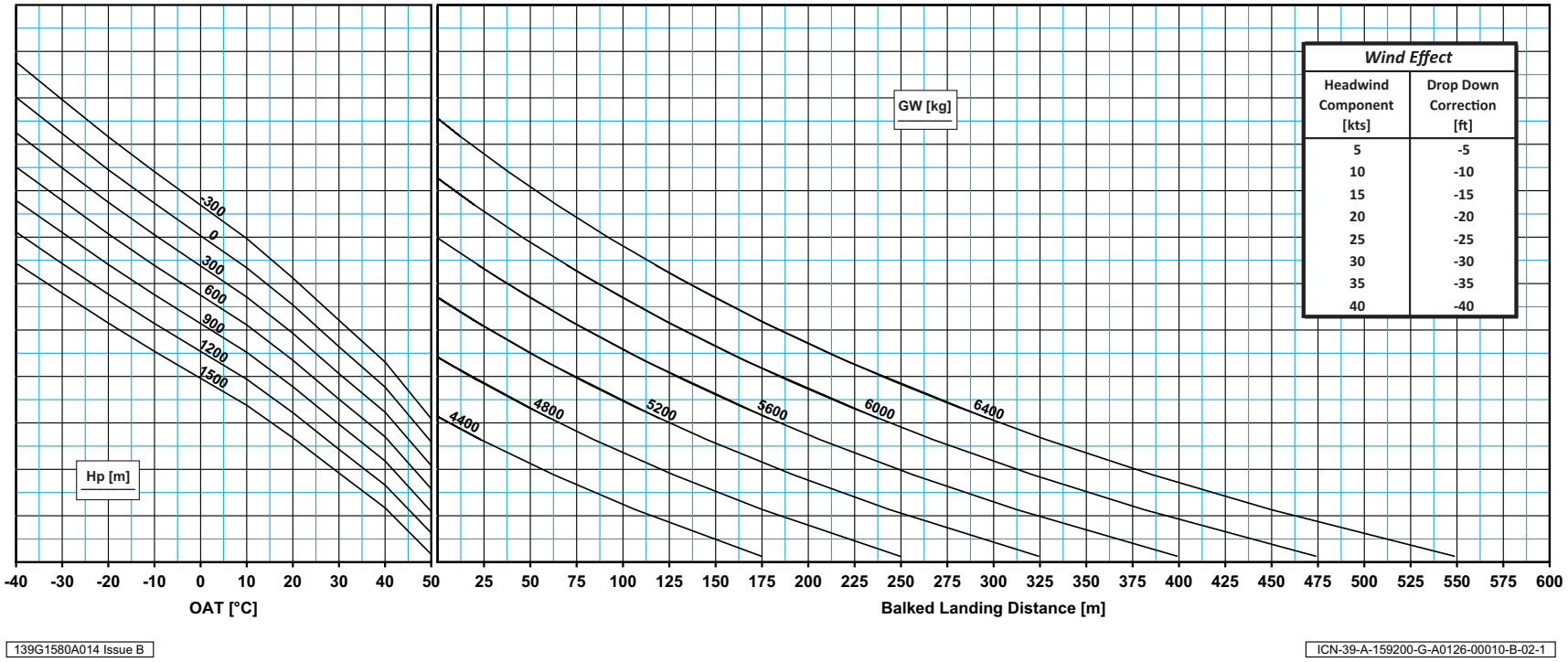


Figure 4-77 Offshore Helideck Procedure Balked Landing Distance, EAPS OFF

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

EAPS OFF
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



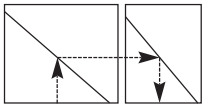


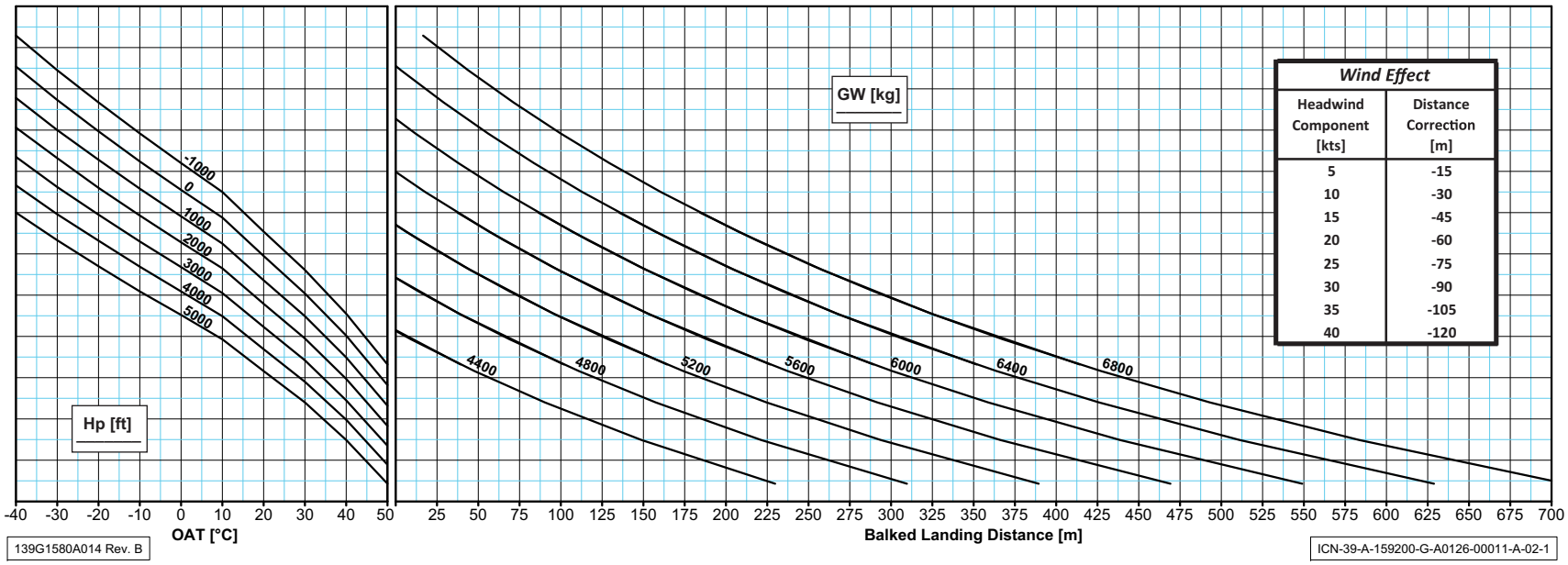
Wind Effect	
Headwind Component [kts]	Drop Down Correction [ft]
5	-5
10	-10
15	-15
20	-20
25	-25
30	-30
35	-35
40	-40

Figure 4-78 Offshore Helideck Procedure Balked Landing Distance, EAPS OFF (Hp in meters)

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS





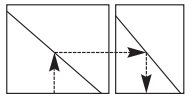
Wind Effect

Headwind Component [kts]	Distance Correction [m]
5	-15
10	-30
15	-45
20	-60
25	-75
30	-90
35	-105
40	-120

Figure 4-79 Offshore Helideck Procedure Balked Landing Distance, EAPS ON

BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

EAPS ON
POWER 2.5 min OEI
ELECTRICAL LOAD: 300 A
V_{BLSS}: 40 KIAS



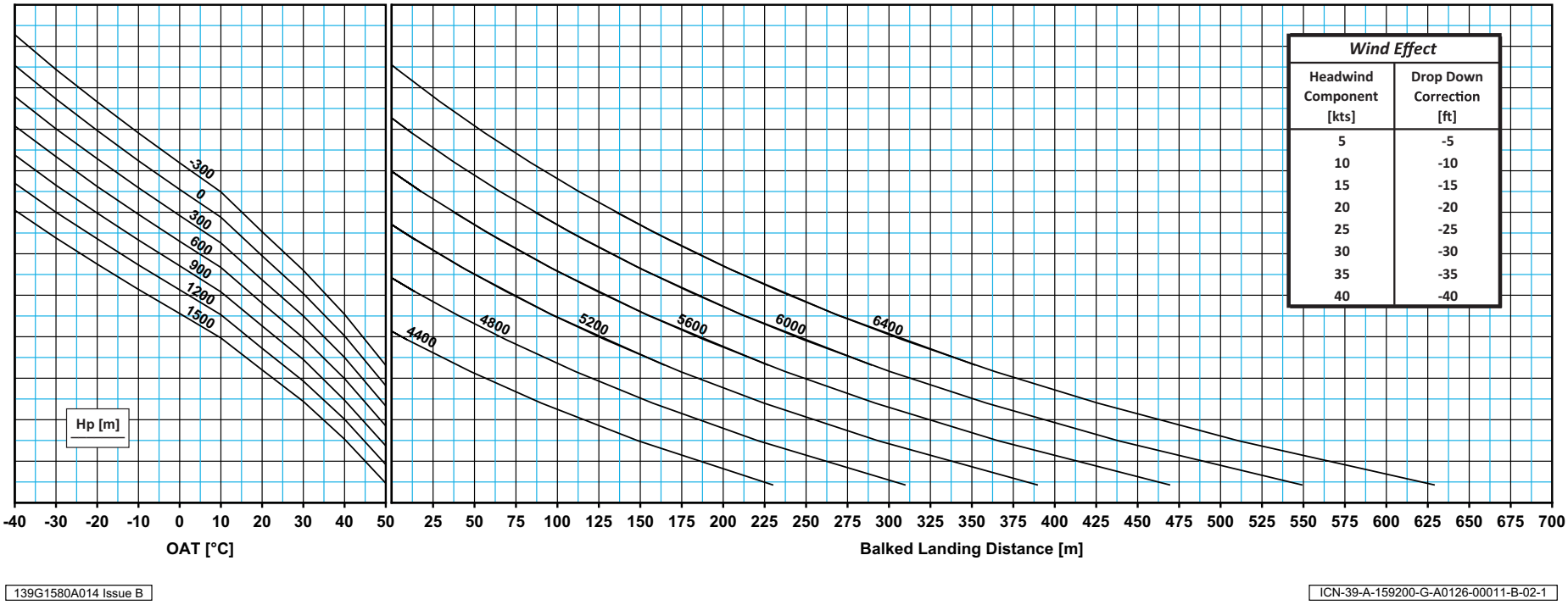


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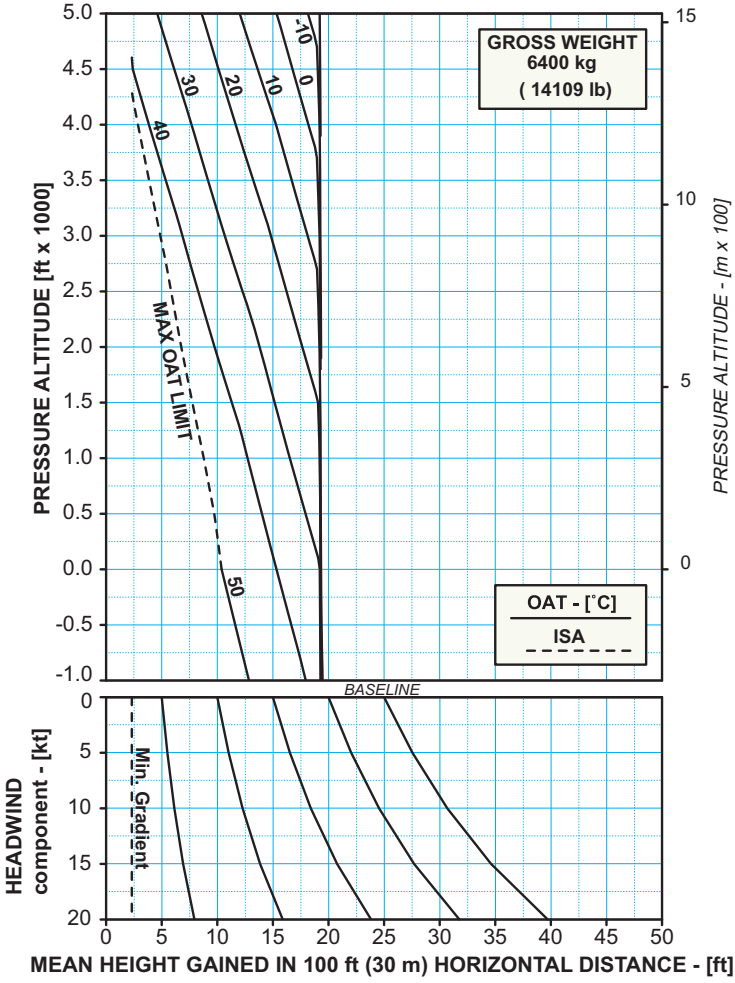
Figure 4-80 Offshore Helideck Procedure Balked Landing Distance, EAPS ON (Hp in meters)

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
V_{toss}/V_{blss} 40 KIAS

ELECTRICAL LOAD: 300 A



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ICN-39-A-159200-G-A0126-00015-A-01-1

Figure 4-81 PATH 1 Gradient, V_{TOSS}/V_{BLSS} 40 KIAS, GW 6400 kg

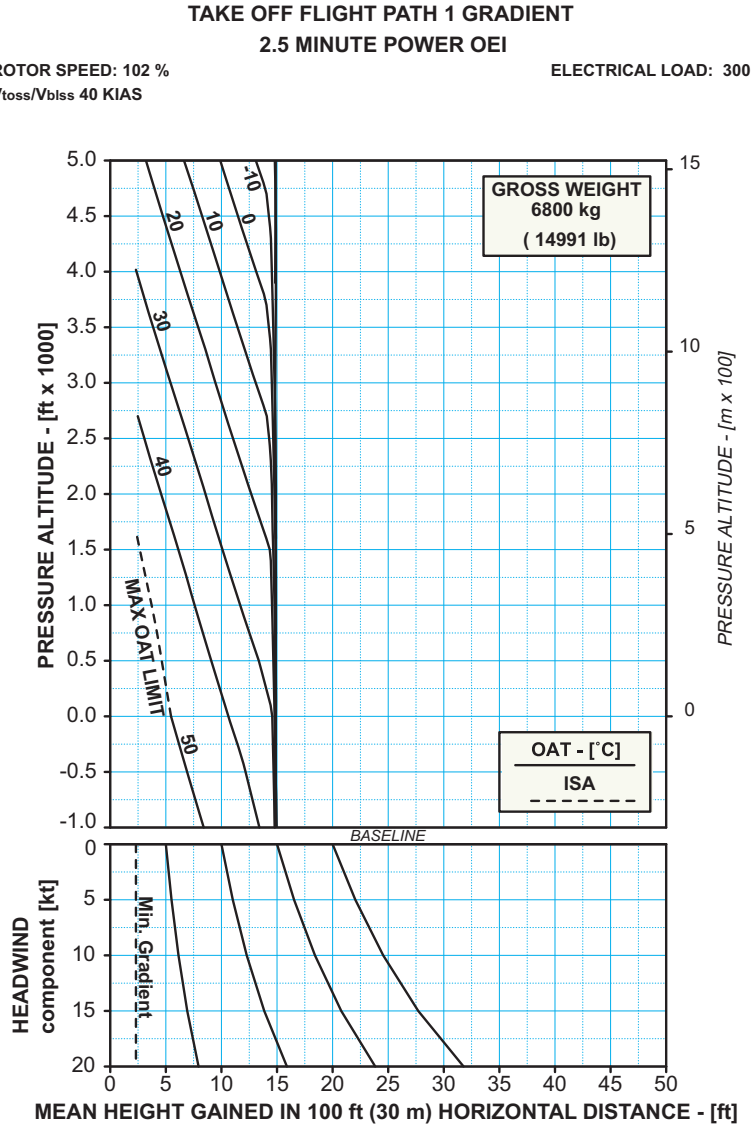

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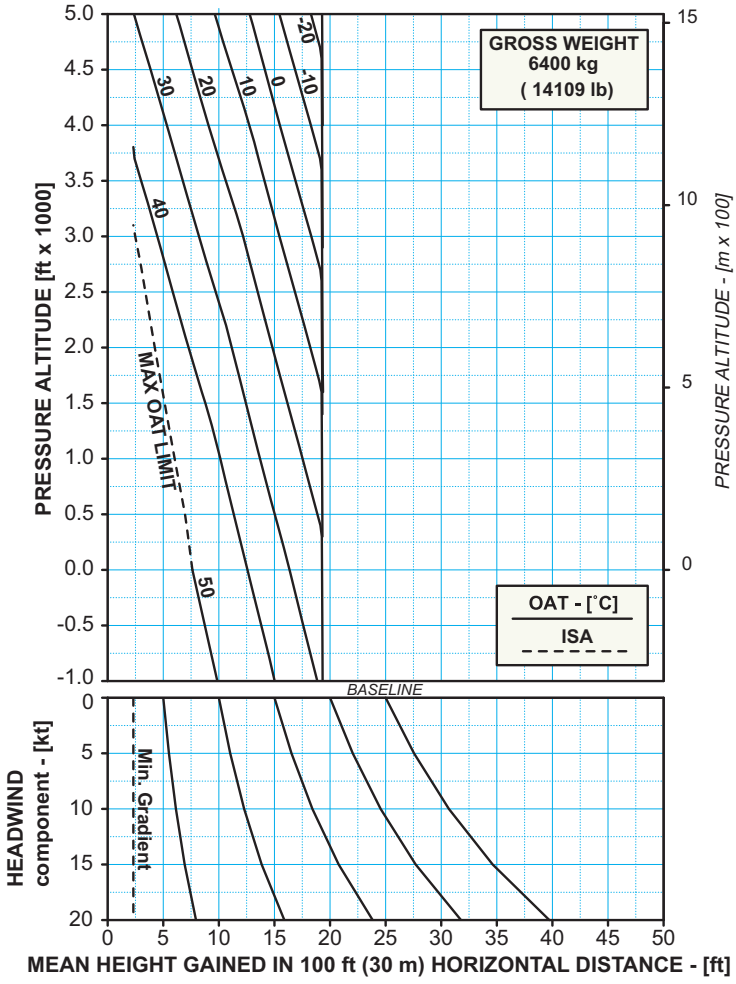
Figure 4-82 PATH 1 Gradient, V_{TOSS}/V_{BLSS} 40 KIAS, GW 6800 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss 40 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A



139G1580A014 Rev.A

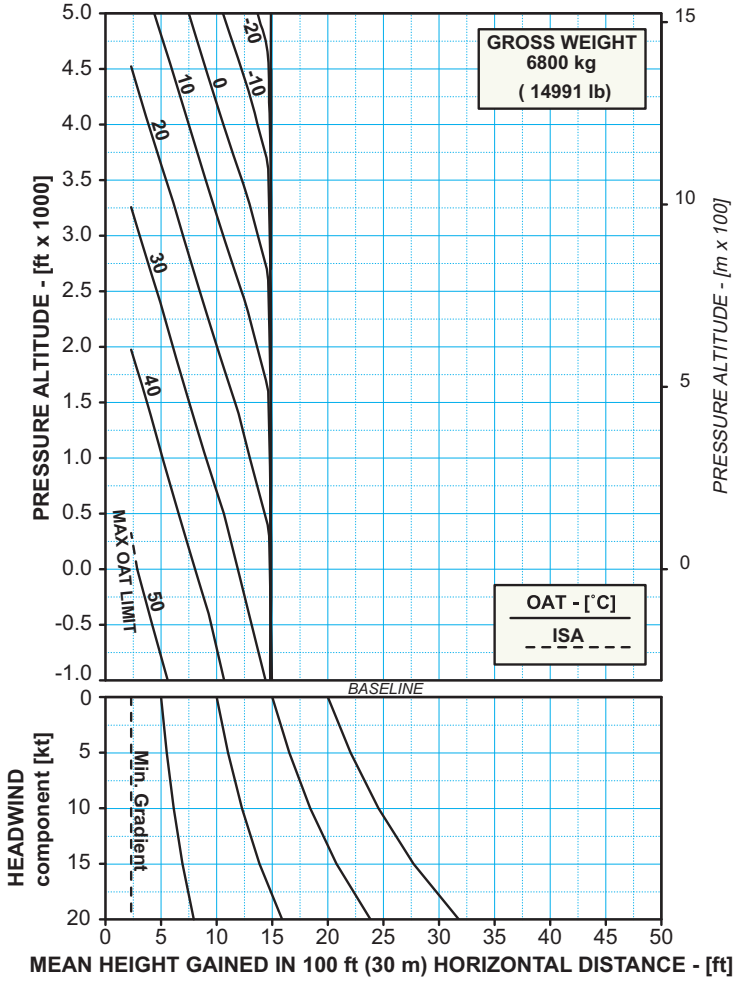
ICN-39-A-159200-G-A0126-00016-A-01-1

Figure 4-83 PATH 1 Gradient, V_{TOSS}/V_{BLSS} 40 KIAS, EAPS OFF
GW 6400 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
V_{toss}/V_{blss} 40 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A



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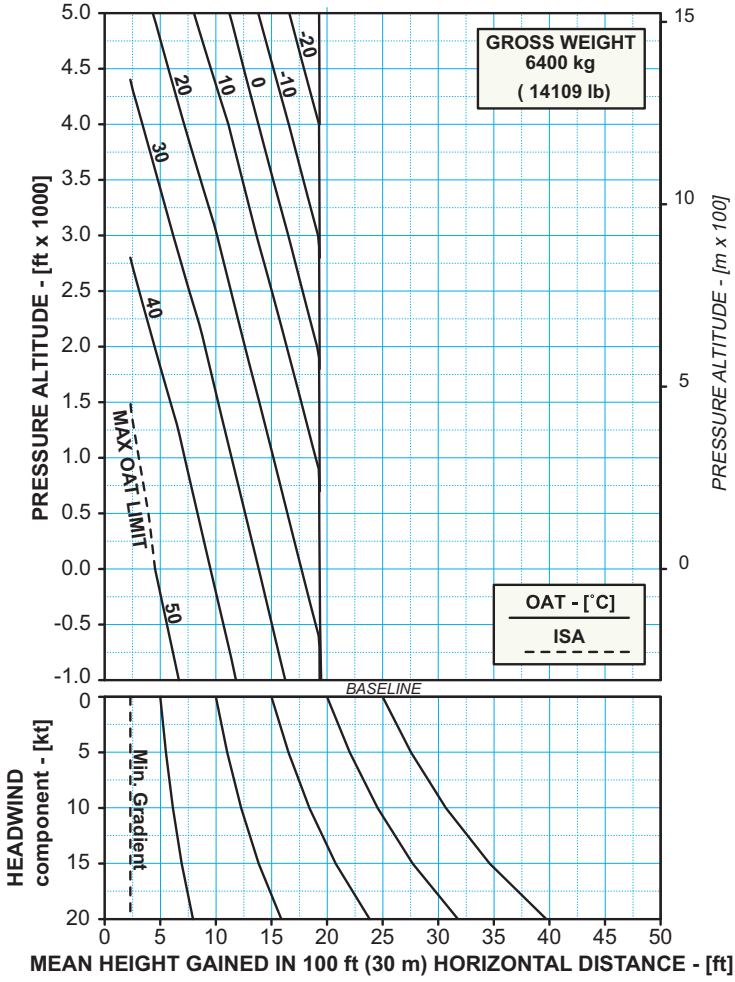
ICN-39-A-159200-G-A0126-00013-A-01-1

Figure 4-84 PATH 1 Gradient, V_{TOSS}/V_{BLSS} 40 KIAS, EAPS OFF, GW 6800 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss 40 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A



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ICN-39-A-159200-G-A0126-00017-A-01-1

Figure 4-85 PATH 1 Gradient, V_{TOSS}/V_{BLSS} 40 KIAS, EAPS ON GW 6400 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss 40 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

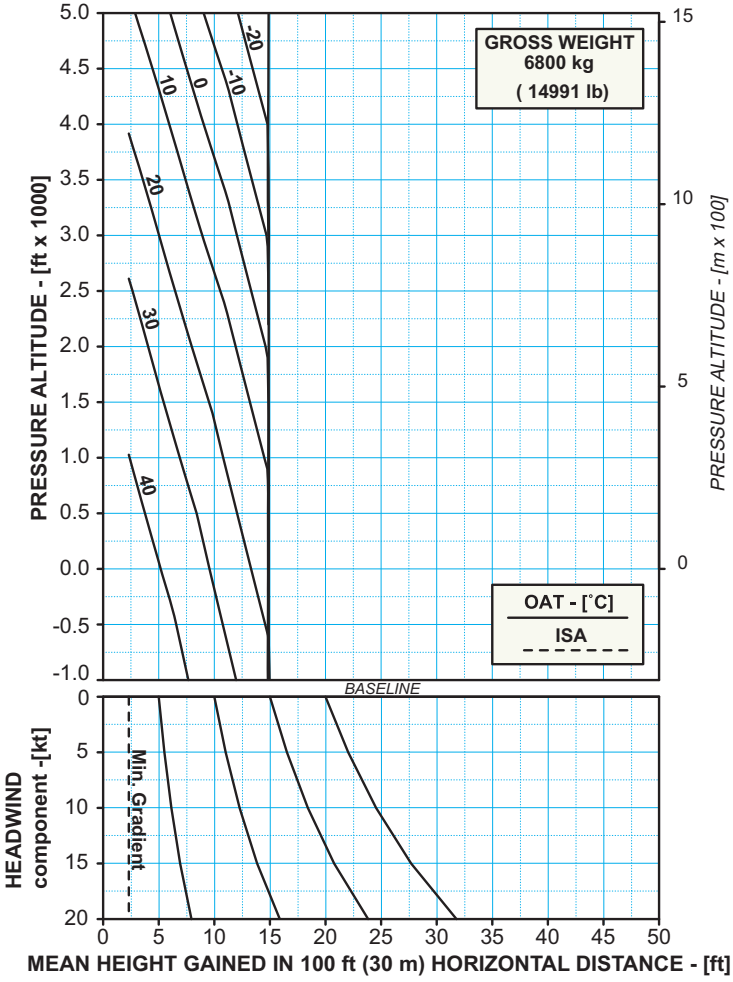

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Figure 4-86 PATH 1 Gradient, V_{TOSS}/V_{BLSS} 40 KIAS, EAPS ON, GW 6800 kg

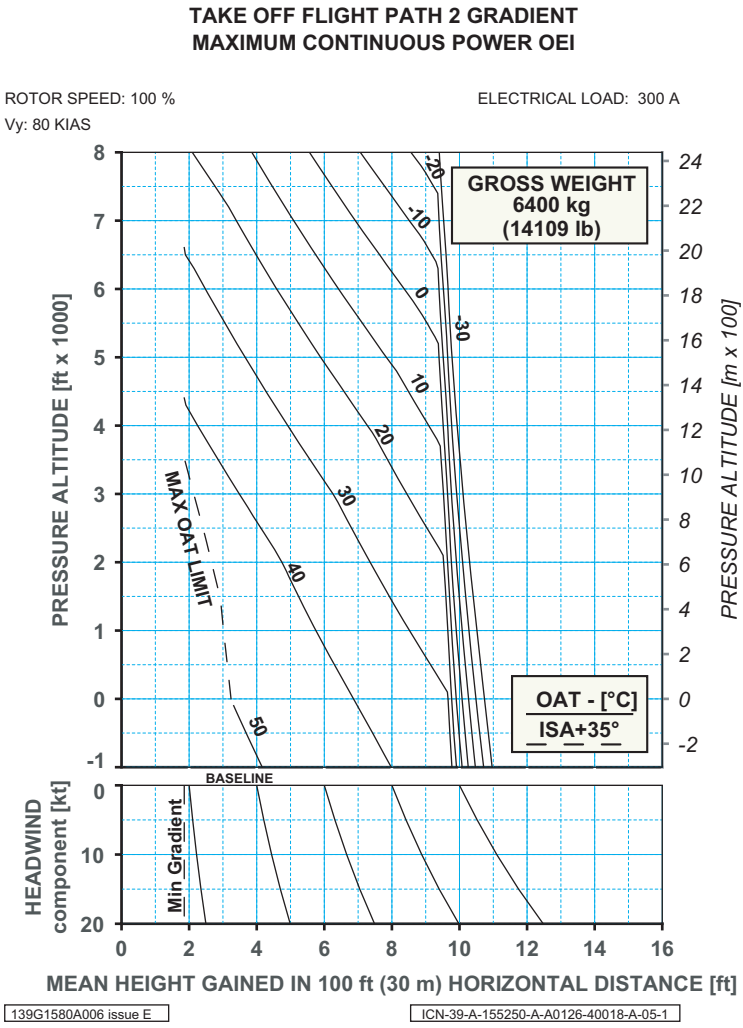

Figure 4-87 PATH 2 Gradient, GW 6400 kg

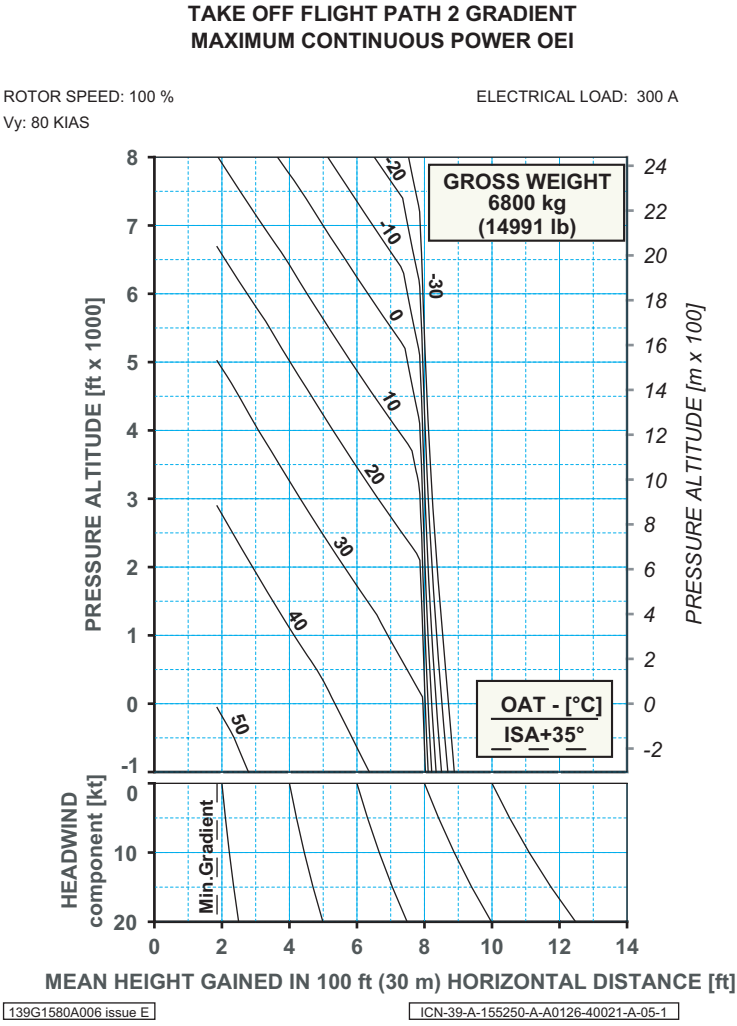

Figure 4-88 PATH 2 Gradient, GW 6800 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A TOTAL

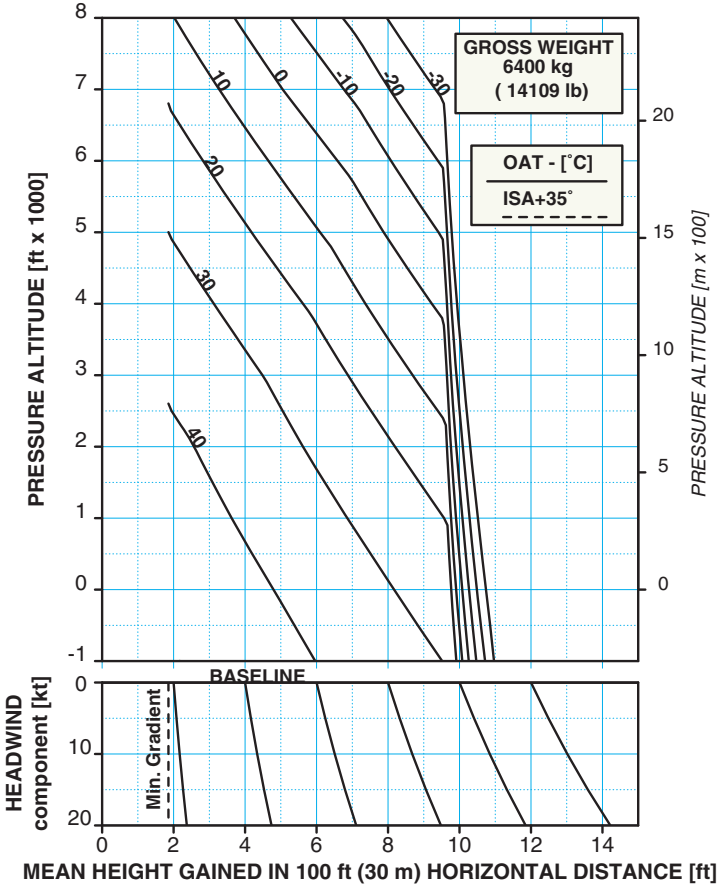

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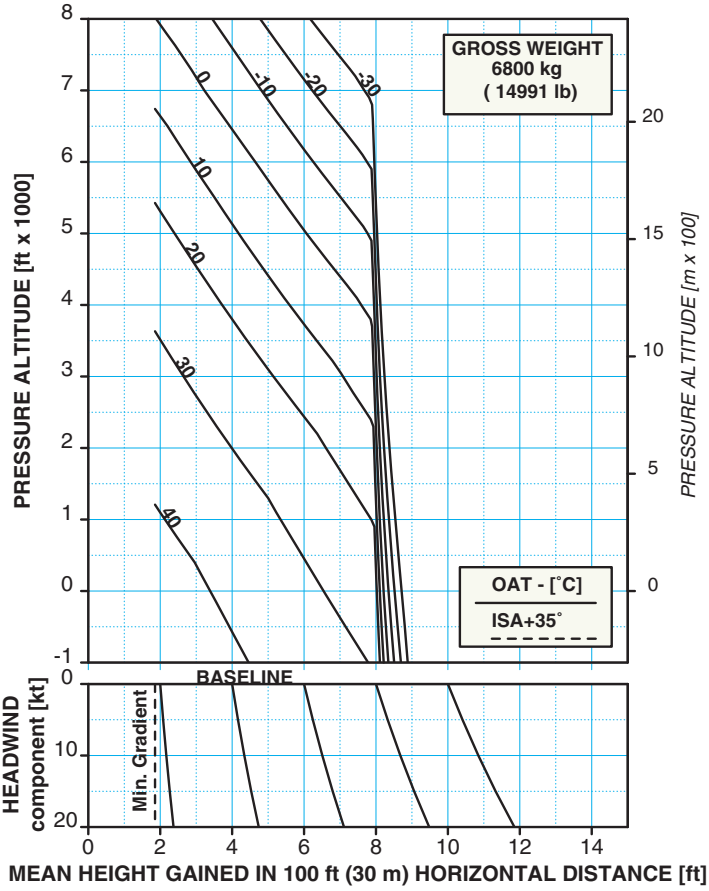
Figure 4-89 PATH 2 Gradient, EAPS OFF, GW 6400 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A TOTAL



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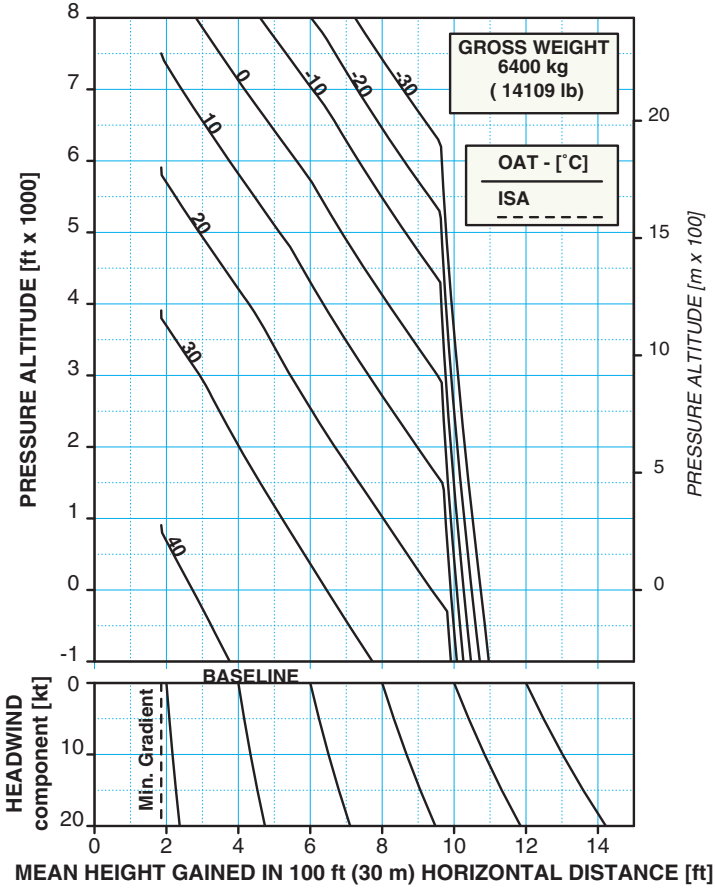
ICN-39-A-155250-A-A0126-40022-A-01-1

Figure 4-90 PATH 2 Gradient, EAPS OFF GW 6800 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A TOTAL



139G1580A006 issue A

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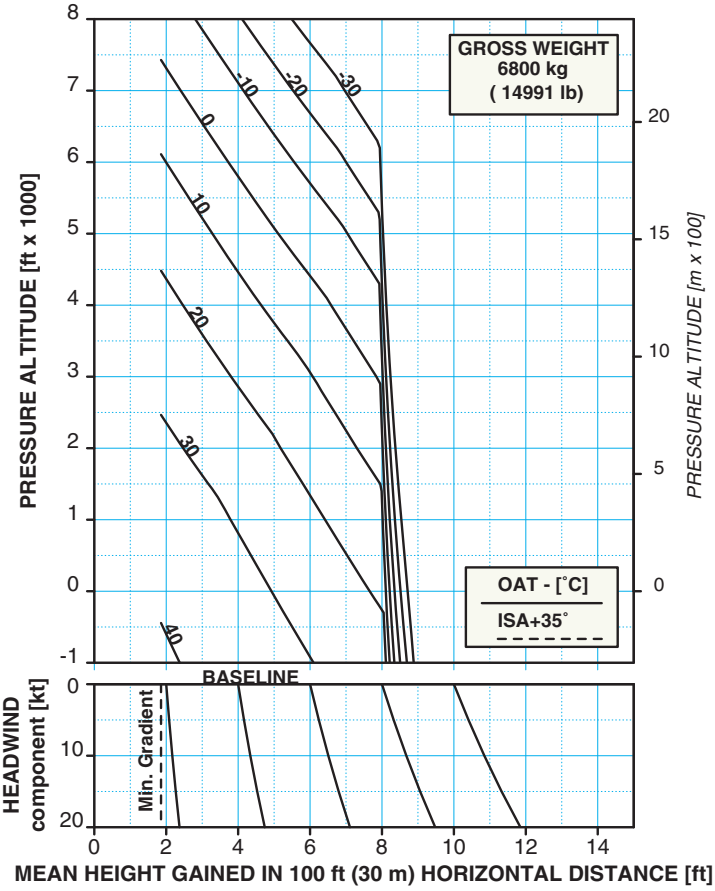
Figure 4-91 PATH 2 Gradient, EAPS ON, GW 6400 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A TOTAL



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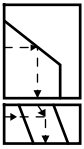
ICN-39-A-155250-A-A0126-40023-A-01-1

Figure 4-92 PATH 2 Gradient, EAPS ON, GW 6800 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
V_{climb}: 60 kts
ELECTRICAL LOAD: 300 A



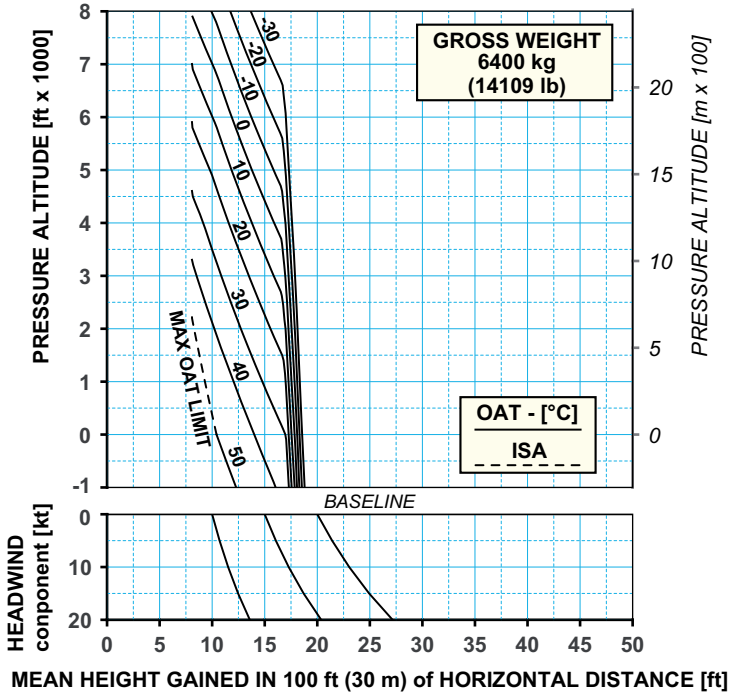


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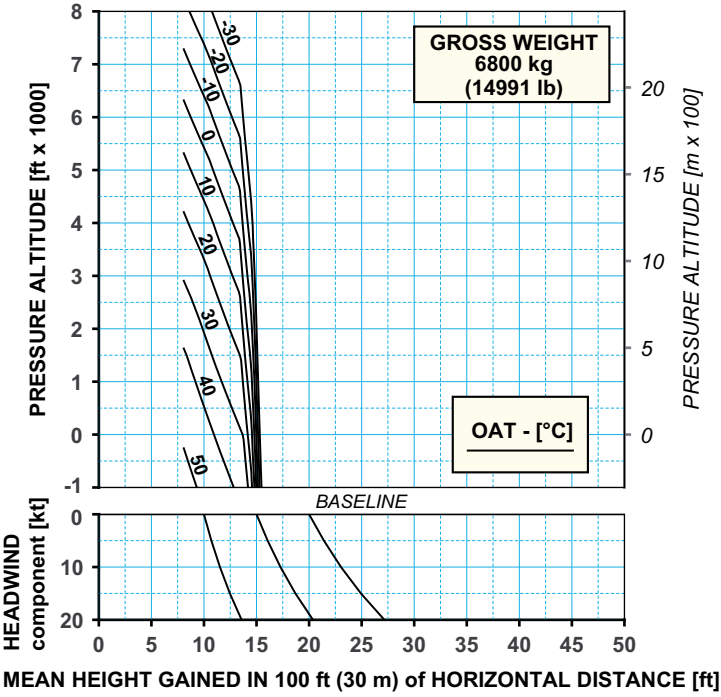
Figure 4-93 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6400 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts

ELECTRICAL LOAD: 300 A



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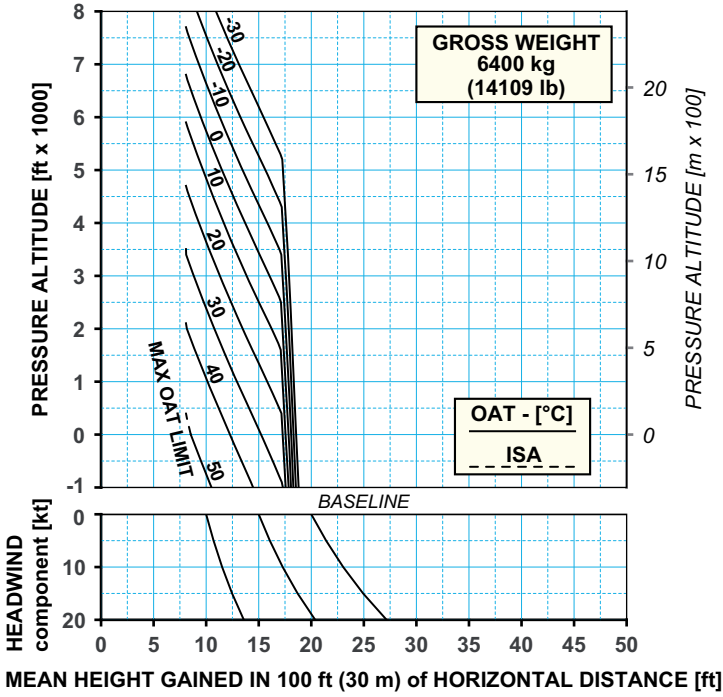
ICN-39-A-155250-A-A0126-40029-A-01-1

Figure 4-94 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6800 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS OFF

ELECTRICAL LOAD: 300 A



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ICN-39-A-155250-A-A0126-40027-A-01-1

Figure 4-95 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS OFF

ELECTRICAL LOAD: 300 A

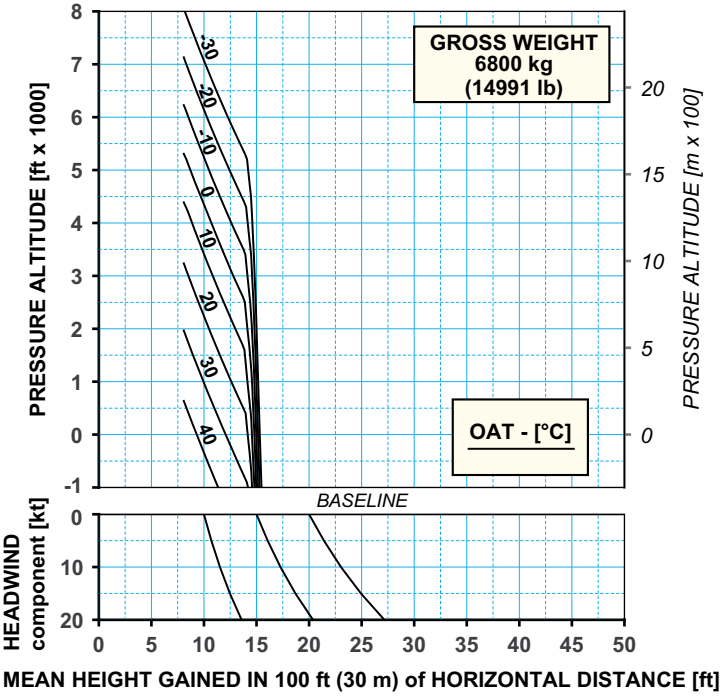

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Figure 4-96 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS ON

ELECTRICAL LOAD: 300 A

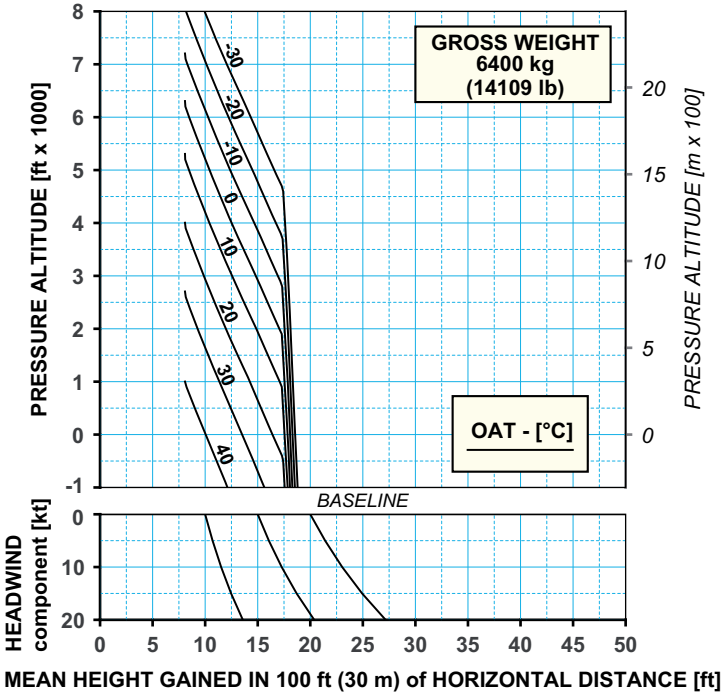

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Figure 4-97 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

NR: 102 %
Vclimb: 60 kts
EAPS ON

ELECTRICAL LOAD: 300 A

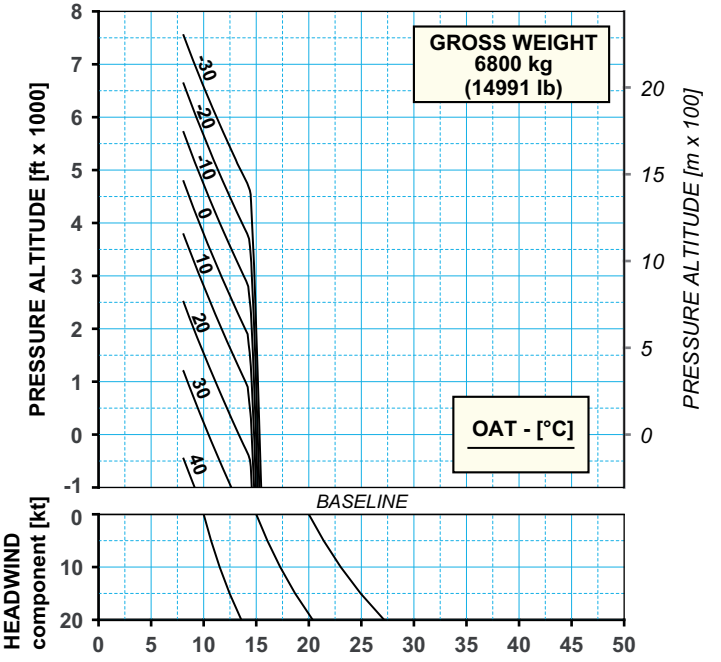

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Figure 4-98 Alternative 60 KIAS PATH 1 & 2 Gradient, GW 6800 kg, EAPS ON

CONTINUED TAKE OFF DISTANCE OEI
OFF-SHORE HELIDECK PROCEDURE

IBF INSTALLED
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{TOSS}: 40 KIAS

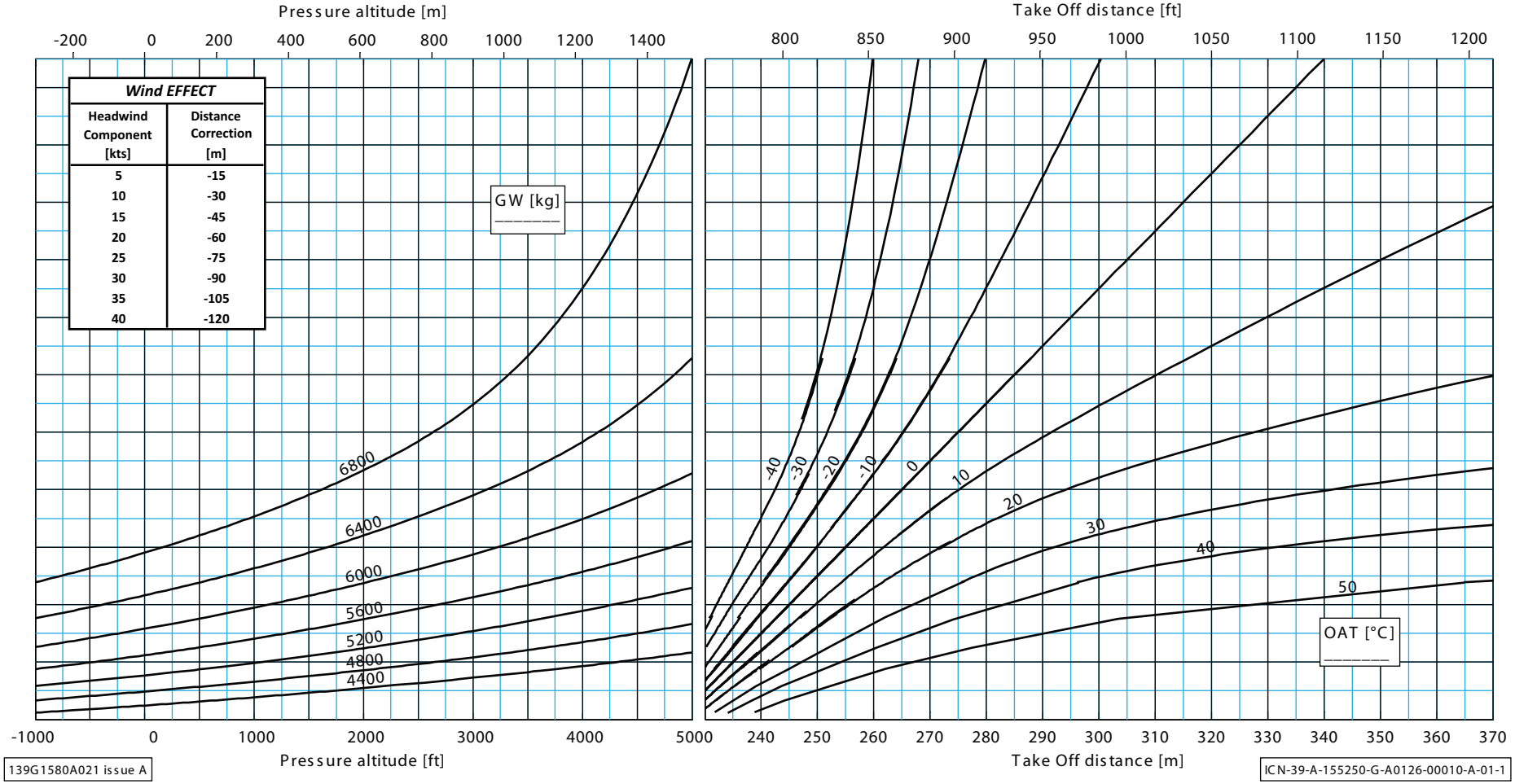

Figure 4-99 Offshore Helideck Procedure CTO Distance, IBF Installed

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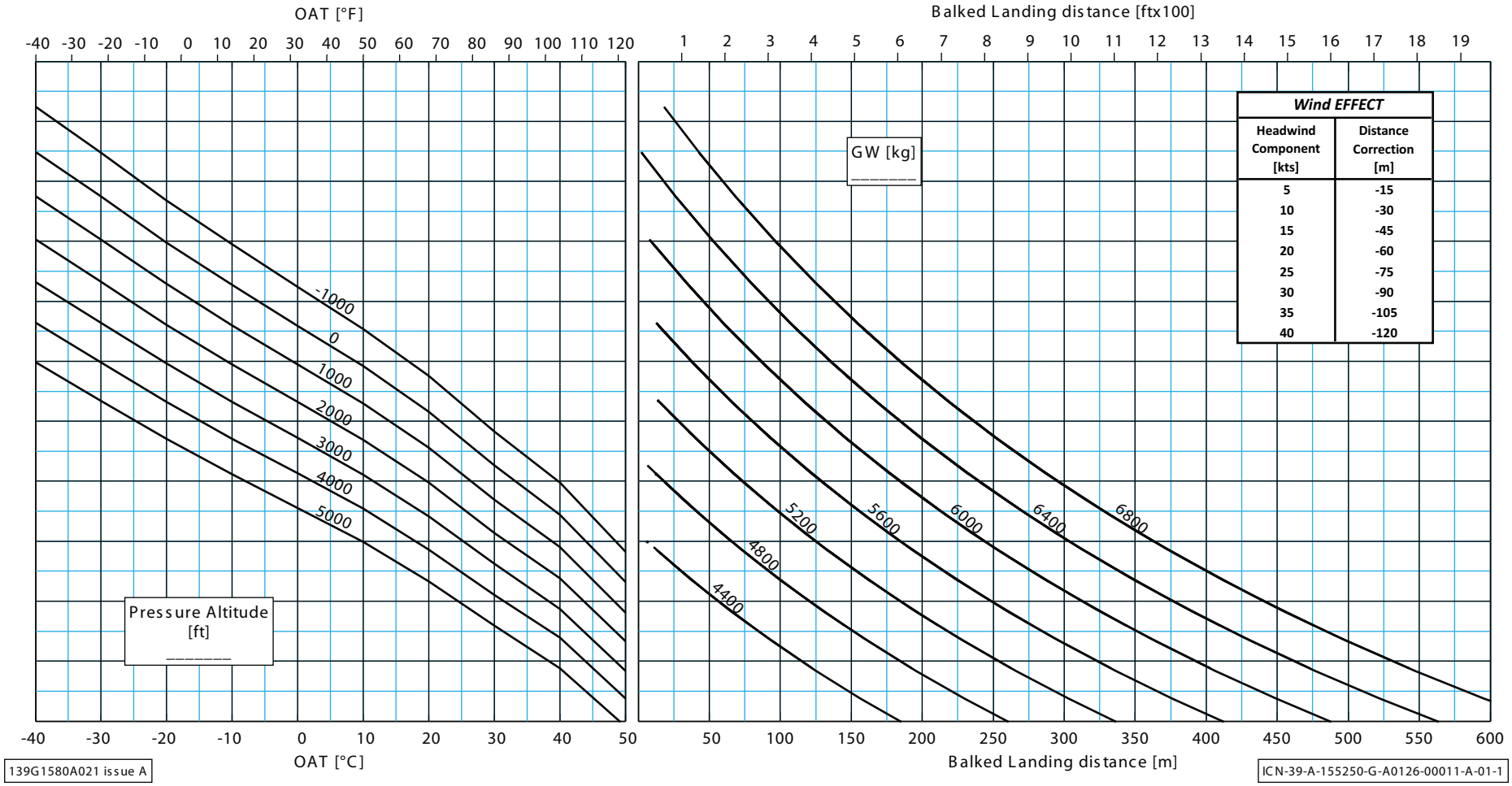
BALKED LANDING DISTANCE
OFF-SHORE HELIDECK PROCEDURE

IBF INSTALLED
POWER 2.5 min OEI
ELECTRICAL LOAD 300A
V_{BLSS}: 40 KIAS



Wind EFFECT

Headwind Component [kts]	Distance Correction [m]
5	-15
10	-30
15	-45
20	-60
25	-75
30	-90
35	-105
40	-120

Figure 4-100 Offshore Helideck Procedure Balked Landing Distance, IBF Installed

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TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 40 kts

IBF INSTALLED
ELECTRICAL LOAD: 300 A

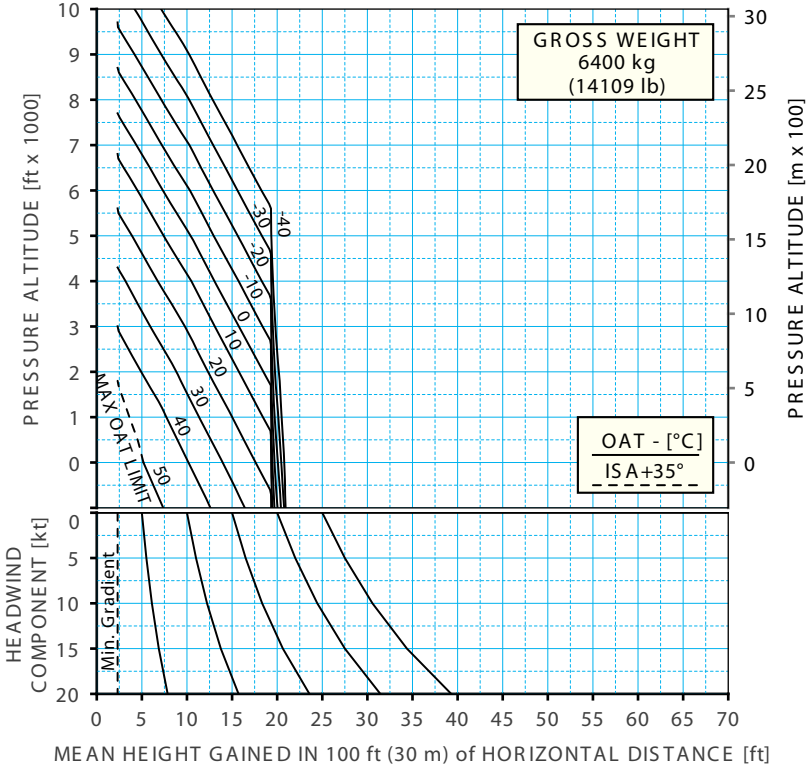

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Figure 4-101 PATH 1 Gradient, V_{TOSS}/V_{BLSS} 40 KIAS, IBF Installed, GW 6400 kg

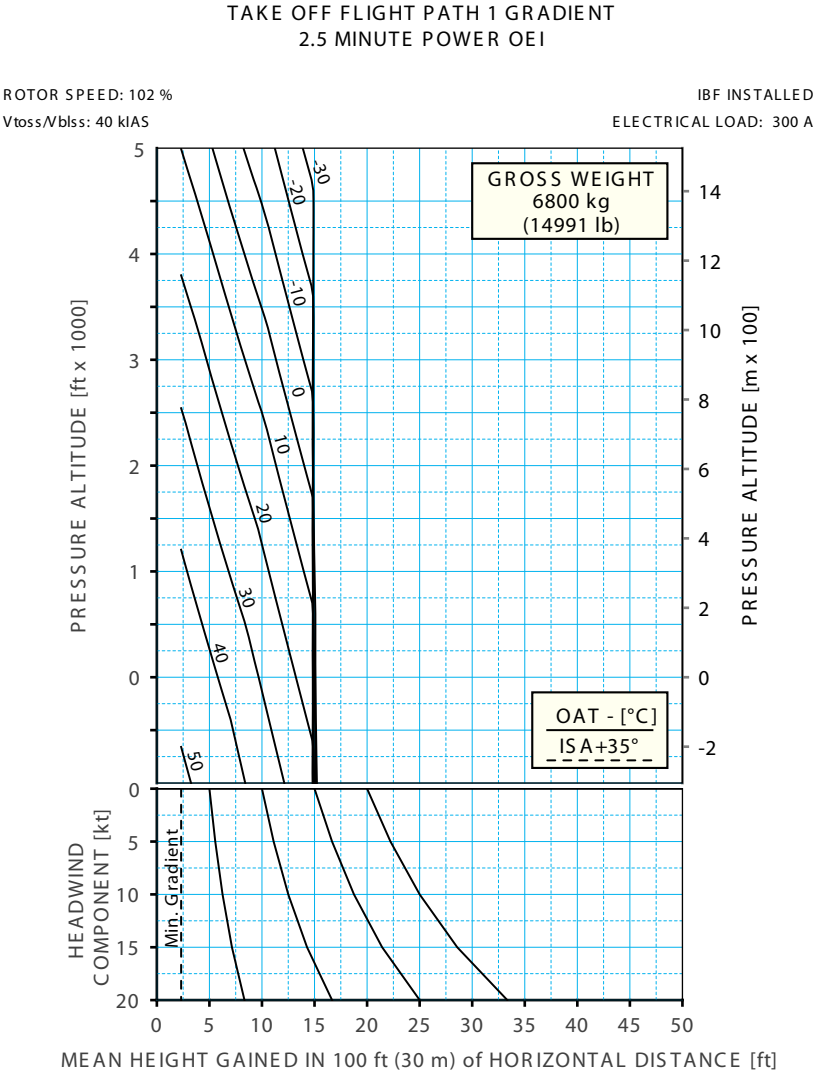

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Figure 4-102 PATH 1 Gradient, V_{TOSS}/V_{BLSS} 40 KIAS, IBF Installed, GW 6800 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

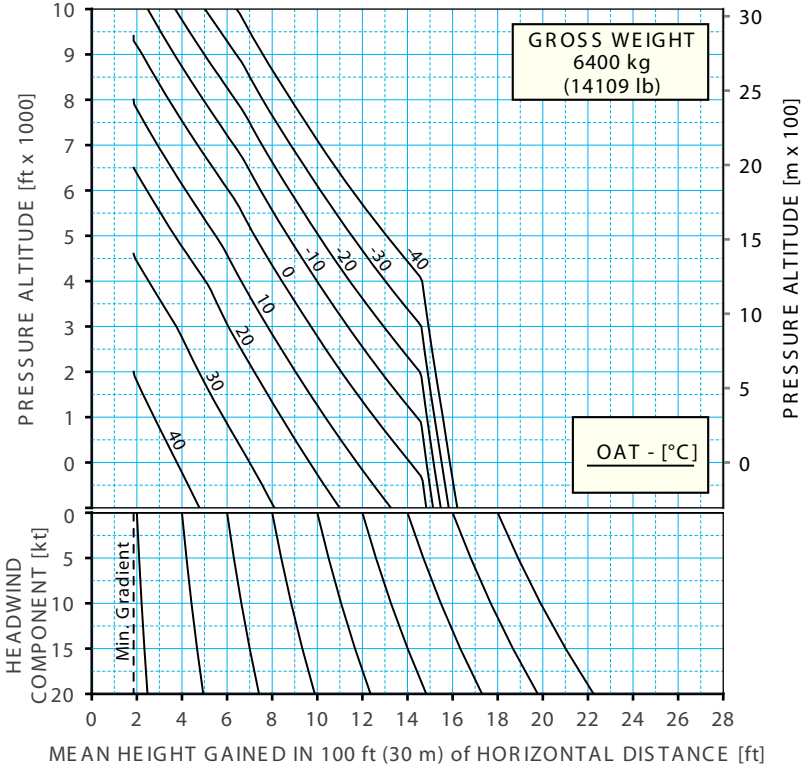

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Figure 4-103 PATH 2 Gradient, IBF Installed, GW 6400 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

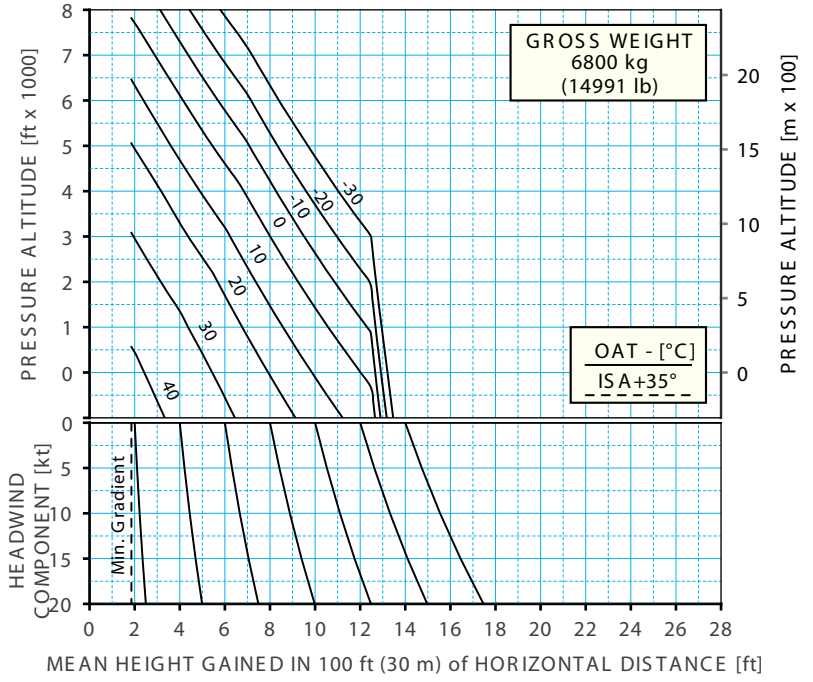

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Figure 4-104 PATH 2 Gradient, IBF Installed, GW 6800 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vclimb: 60 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

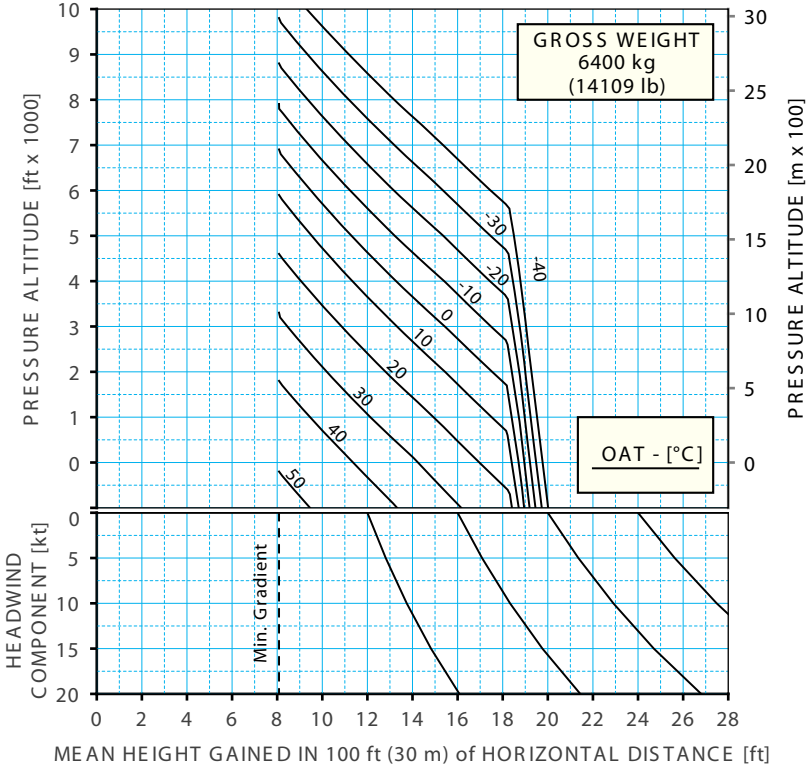

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Figure 4-105 Alternative 60 KIAS PATH 1 & 2 Gradient, IBF Installed, GW 6400 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vclimb: 60 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

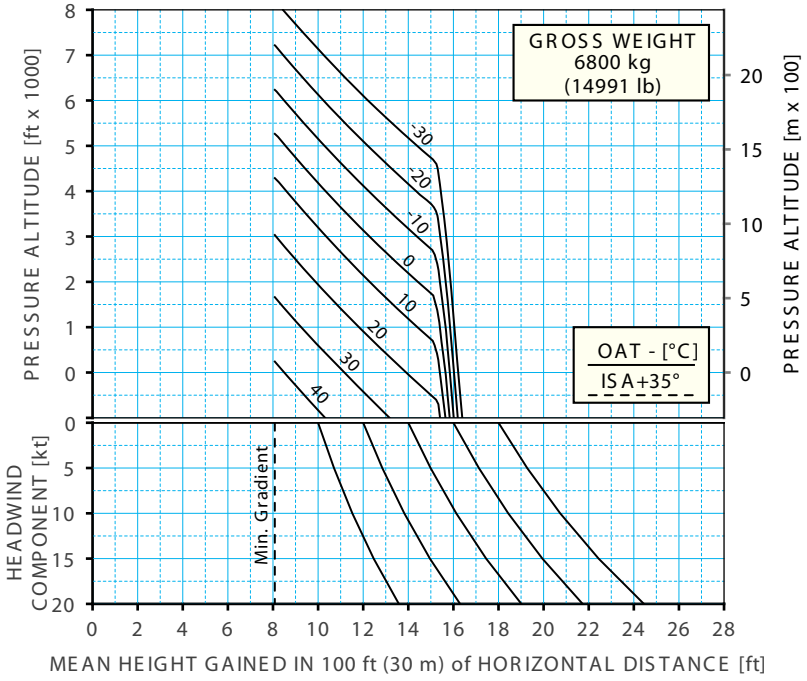

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Figure 4-106 Alternative 60 KIAS PATH 1 & 2 Gradient, IBF Installed, GW 6800 kg

NOISE CHARACTERISTICS

The following noise levels comply with ICAO Annex 16, Chapter 8, “NOISE requirement” according to TCDSN EASA.R.006.

Model: AW139 Engine Pratt and Whitney PT6C-67C Gross Weight 6800 kg			
Configuration	Level Flyover (Overflight) EPNL (EPNdB)	Take Off EPNL (EPNdB)	Approach EPNL (EPNdB)
Clean aircraft No external kits installed	100% NR	100%NR	100%NR
	90.7	90.3	94.1

See Section 9 for operations at 102% NR.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 51

TAKE-OFF AND LANDING ALTITUDE EXTENSION (NINE PASSENGER SEAT CONFIGURATION)

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SUPPLEMENT 51
TAKE-OFF AND LANDING ALTITUDE EXTENSION
(NINE PASSENGER SEAT CONFIGURATION)

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GENERAL INFORMATION

This Supplement details the changes, as permitted by the special provisions detailed in FAR AC29-1587 Amendment 29-24, to the Basic RFM Limitations and Performance section to operate the aircraft with any cabin configuration that has 9, or less, passenger seats.

This configuration permits:

— The maximum allowable operating altitude for CAT B Take-Off and Landing to be extended to 19000 ft Hp/Hd

— The maximum Take Off and Landing weight to be based on the Hover Ceiling IGE at TOP chart with zero wind

— The H-V to be considered as performance information.

This configuration can allow a higher hover weight for operational situations where relative crosswind or tailwind controllability is **not** required. The higher weights allowed are therefore applicable when operations can be carried out with either zero wind or with a headwind within ± 10 degrees of the nose (no sideways or backwards flight capability).

Information is also provided to allow the operator to select lower weights that will give a desired cross or tail wind controllability capability appropriate to the intended operational case

An operator with a helicopter configured with 9, or less, passenger seats and who does not want to take advantage of the envelope expansion detailed in this Supplement should refer to the Basic RFM for CAT B, CAT A (Supplement 12) or Increased Gross Weight 6800 kg (Supplement 50).

SECTION 1 - LIMITATIONS

GENERAL

For Limitations not included in this Supplement see Basic RFM.

AIRCRAFT CONFIGURATION

The increased tail rotor pitch angle modification P/N 4G6722F00111 must be installed.

NUMBER OF OCCUPANTS

The total number of occupants in passenger cabin shall not exceed 9

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the 9, or less, passenger seat configuration, the new empty weight and CG location must be determined.

WEIGHT

Maximum gross weight for take-off and landing..... 6400 kg

For CAT B Take-Off and Landing see Hover Ceiling IGE TOP charts:

Hover Ceiling IGE at TOP ..... Figure 4-6

Hover Ceiling IGE at TOP, HEATER ON/ECS ENVIRO MAN HEAT ..... Figure 4-12

Hover Ceiling IGE at TOP, ECS ENVIRO FULL AUTO ..... See Supplement 87

Hover Ceiling IGE at TOP, IBF Installed..... See Supplement 86

Hover Ceiling IGE at TOP EAPS OFF .....Figure 4-16

Hover Ceiling IGE at TOP EAPS ON .....Figure 4-22

Hover Ceiling IGE at TOP EAPS ON/OFF HEATER ON ....Figure 4-27

CAUTION

The IGE TOP hover ceiling charts, referenced above, show performance in zero wind conditions. The maximum hover weight to maintain heading controllability may be reduced considerably for crosswind or tailwind above zero kts. Refer to CAT B Low Speed IGE Manoeuvres Envelope in Section 4 of this Supplement (See Figure 4-4, Figure 4-5) or Supplement 86 if the IBF is installed, to define maximum weight for the cross/tail wind heading controllability required.

ALTITUDE LIMITATIONS

Maximum operating altitude ..... Figure 1-2

Minimum operating altitude ..... Figure 1-2

Maximum take-off and landing altitude ..... Figure 1-2

HEIGHT-VELOCITY DIAGRAM

For the configuration defined in this Supplement the H-V diagram is considered Performance information and therefore presented in Section 4 Performance Data.

ROTOR SPEED LIMITATIONS

Hover and low speed operations above 14000 ft (4300 m) Hp/Hd must be carried out with rotor speed set to 102 %.

HOIST OPERATION LIMITATIONS

Hoist operations (Supplements 11, 41, 49) are permitted above 14000 ft (4300 m) Hp/Hd.

Only NHEC/HEC (not requiring CAT A) operations are permitted.

Maximum weight is Hover Ceiling OGE, MCP, AEO chart for the appropriate systems/helicopter configuration:

Clean Intake ..... Figure 4-11

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT ..... Figure 4-15

Clean Intake ECS ENVIRO FULL AUTO ..... See Supplement 87

EAPS Intake EAPS OFF ..... Figure 4-21

EAPS Intake EAPS ON ..... Figure 4-26

EAPS Intake EAPS OFF/ON, HEATER ON ..... Figure 4-30

See Figure 1-1 for airspeed/wind limitations above 14000 ft (4300 m) Hp/Hd. (For altitudes below 14000 ft (4300 m) Hp/Hd refer to Supplement 11, 41, 49)

Note

The OGE, MCP hover ceiling charts, referenced above, show performance in zero wind conditions. At these weights manoeuvre controllability is assured up to 17 kts in any direction.

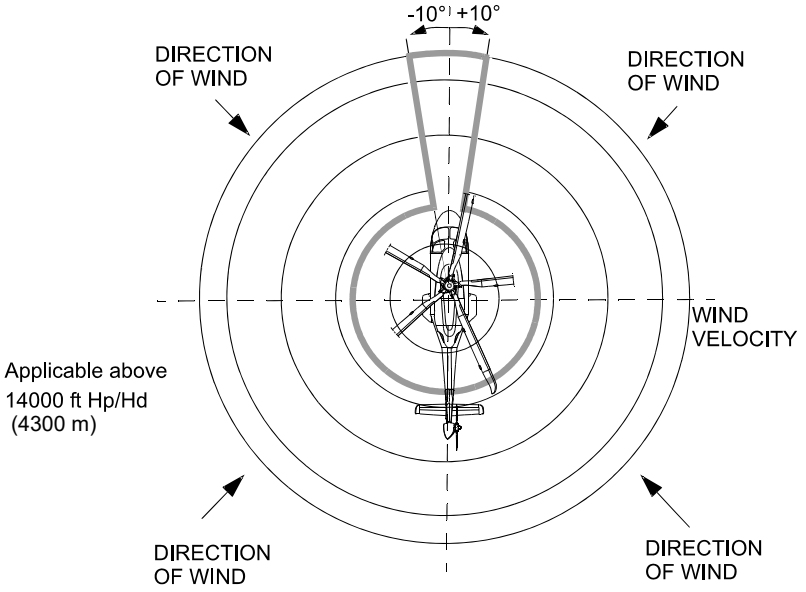

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Figure 1-1 Wind/Ground/Air speed Azimuth Envelope

TAKE-OFF/LANDING ENVELOPE

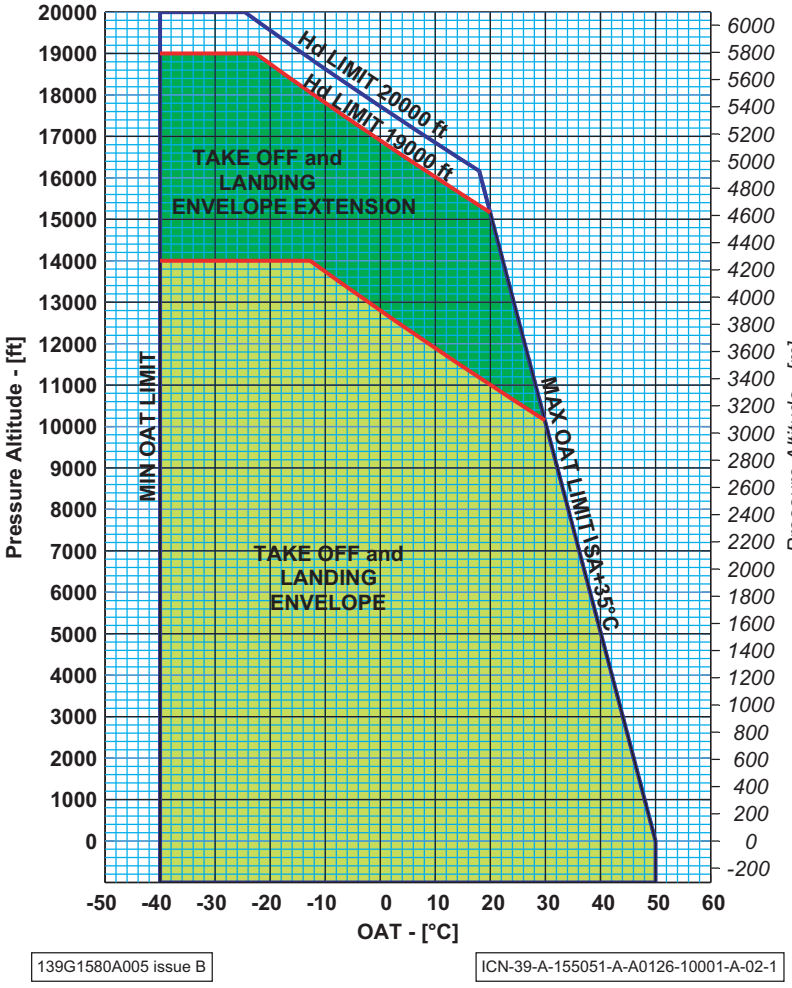

Figure 1-2 Altitude and OAT Limitations

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

FLIGHT PLANNING

Hover ceiling OGE and IGE weight should be determined for the ambient conditions, according to operational requirements.

— If IGE operations can be carried out with either zero wind or with a headwind within ± 10 degrees of the nose (no sideways or backwards flight capability) the IGE hover ceiling charts may be used.

— If IGE cross wind or tail wind capability is required the weight specified in charts Figure 4-4 or Figure 4-5 for the wind conditions desired should be used. When ECS ENVIRO fitted and in FULL AUTO see Supplement 87 for performance charts.
For ECS ENVIRO operation in MAN HEAT or A/C RECYCLE use HEATER ON/COND ON performance charts contained in this Supplement.

— The hover ceiling OGE charts assure a cross or tail wind capability of 17 kts.

The H-V avoid area diagram should be confirmed for the weight chosen. It is recommended for safe operation that the lowest weight be used.

HEIGHT- VELOCITY DIAGRAM

The Height-Velocity diagram defines, in the event of a single engine failure during take off, landing or other operation near the surface, a combination of airspeed and height above ground from which a safe single engine landing on a smooth, level and hard surface cannot be assured.

Height Velocity Diagram..... Figure 4-1

Height Velocity Diagram EAPS/HEATER ON or OFF ..... Figure 4-2

Height Velocity Diagram ECS ENVIRO
FULL AUTO .....See Supplement 87

— If the given ambient conditions are not present in the chart then no H-V avoid area exists.

— If the given ambient conditions and weight intercept are within the green ‘NO H-V Area’ then no H-V avoid area exists.

— If the given ambient conditions and weight intercept indicate an H-V avoid area then low hover and knee points are fixed and the high hover varies according to the conditions and weight.

— Data presented for density altitudes above 14000 ft (4300 m) have been calculated analytically.

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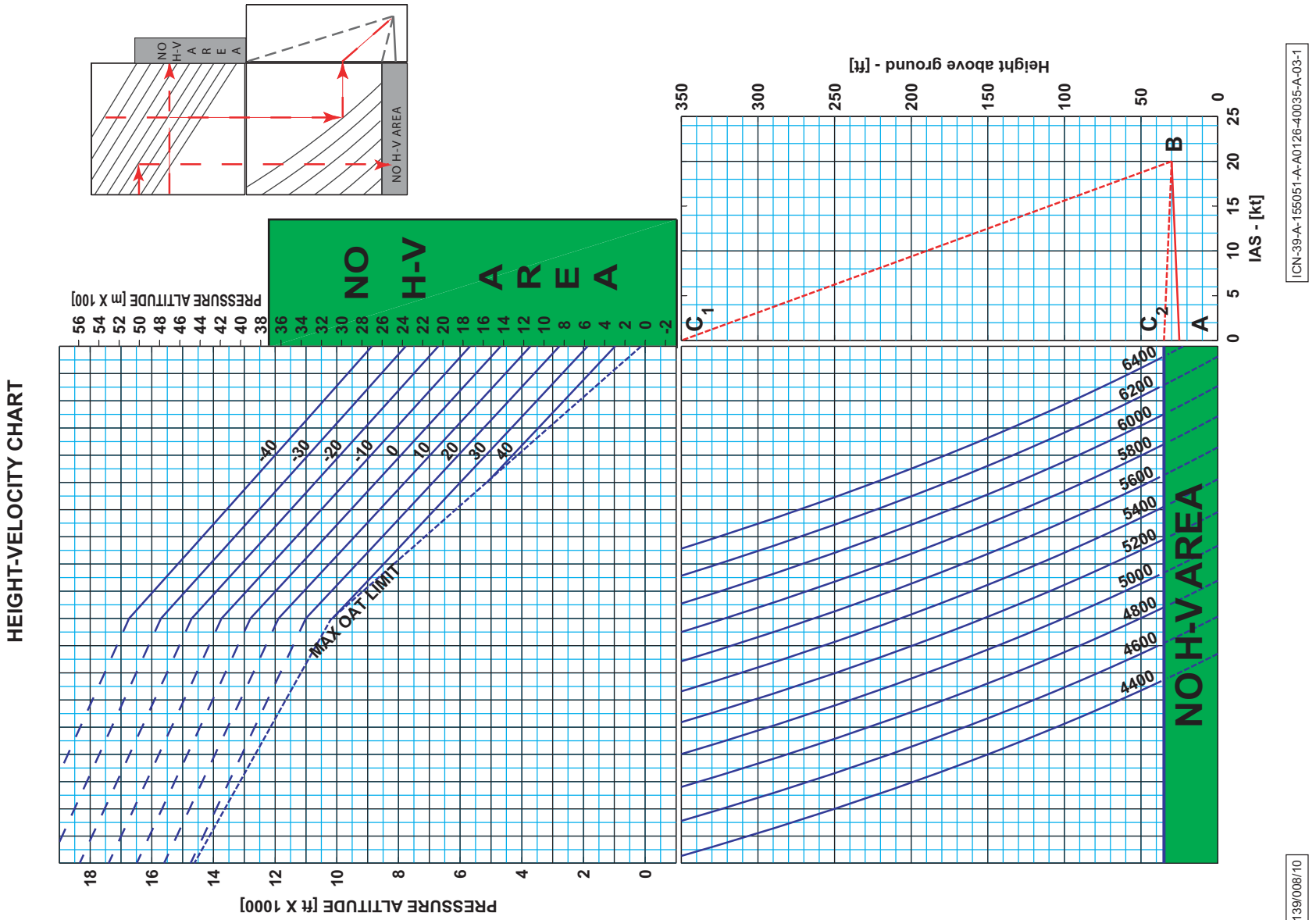

Figure 4-1 Height Velocity Limitations

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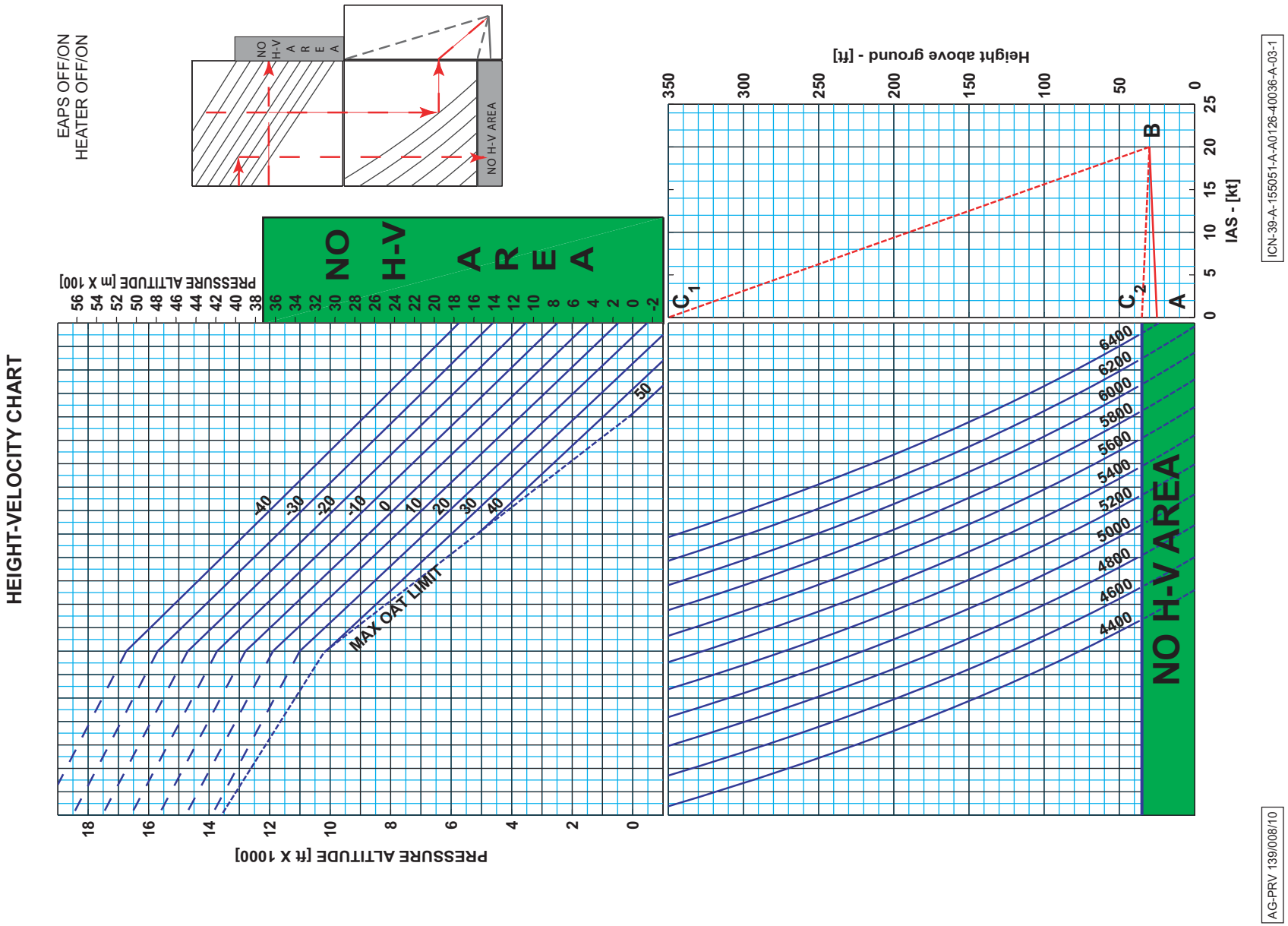

Figure 4-2 Height Velocity Limitations, EAPS/Heater ON or OFF

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LOW SPEED MANOEUVRES IN QUARTERING FLIGHT IGE

Satisfactory stability and control has been demonstrated for all azimuths shown below, Figure 4-3, for wind speed in accordance with the Controllability Envelope in Figure 4-4 and Figure 4-5.
The critical sectors, requiring slightly increased workload, are indicated below. The sector 225°/270° is critical for high altitude/high temperature. An increase in PI may be observed, which will remain within limits. However if it is required to exit the condition, it is sufficient to modify the heading by 20-30°.
The sector 90°/135° is critical for pedal margin.

No limitation exists for headwind conditions (±10°).

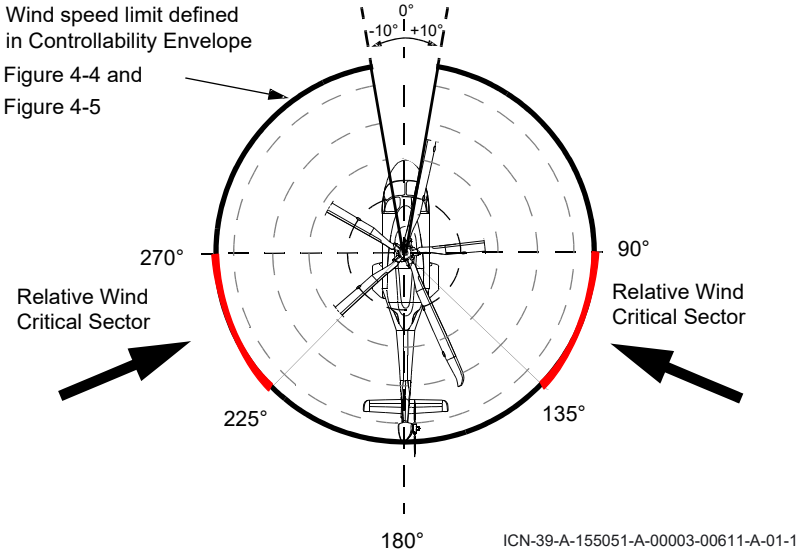

Figure 4-3 Azimuth Envelope Critical Sector

LOW SPEED MANOEUVRES IN QUARTERING FLIGHT OGE

The weights defined by the Hover Ceiling Charts OGE MCP also permits adequate controllability up to 17 kts (9 m/s) wind, without exceeding the TOP limits.

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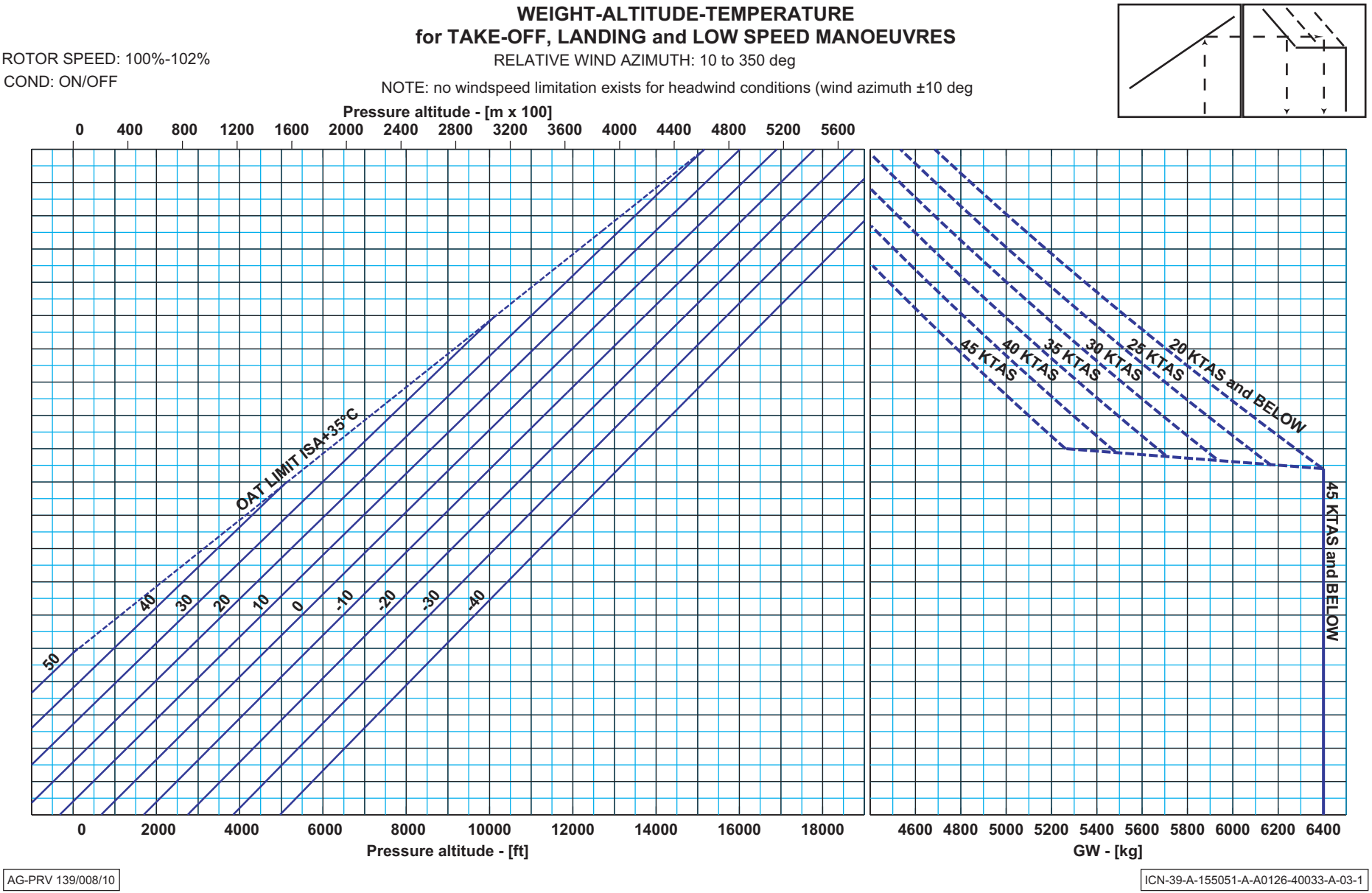

Figure 4-4 CAT B Low Speed IGE Manoeuvres Envelope

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WEIGHT-ALTITUDE-TEMPERATURE
for TAKE-OFF, LANDING and LOW SPEED MANOEUVRES

ROTOR SPEED: 100%-102%

RELATIVE WIND AZIMUTH: 10 to 350 deg

NOTE: no windspeed limitation exists for headwind conditions (wind azimuth ±10 deg

Heater: ON
or
EAPS: OFF/ON, HEATER: OFF/ON,COND: OFF/ON

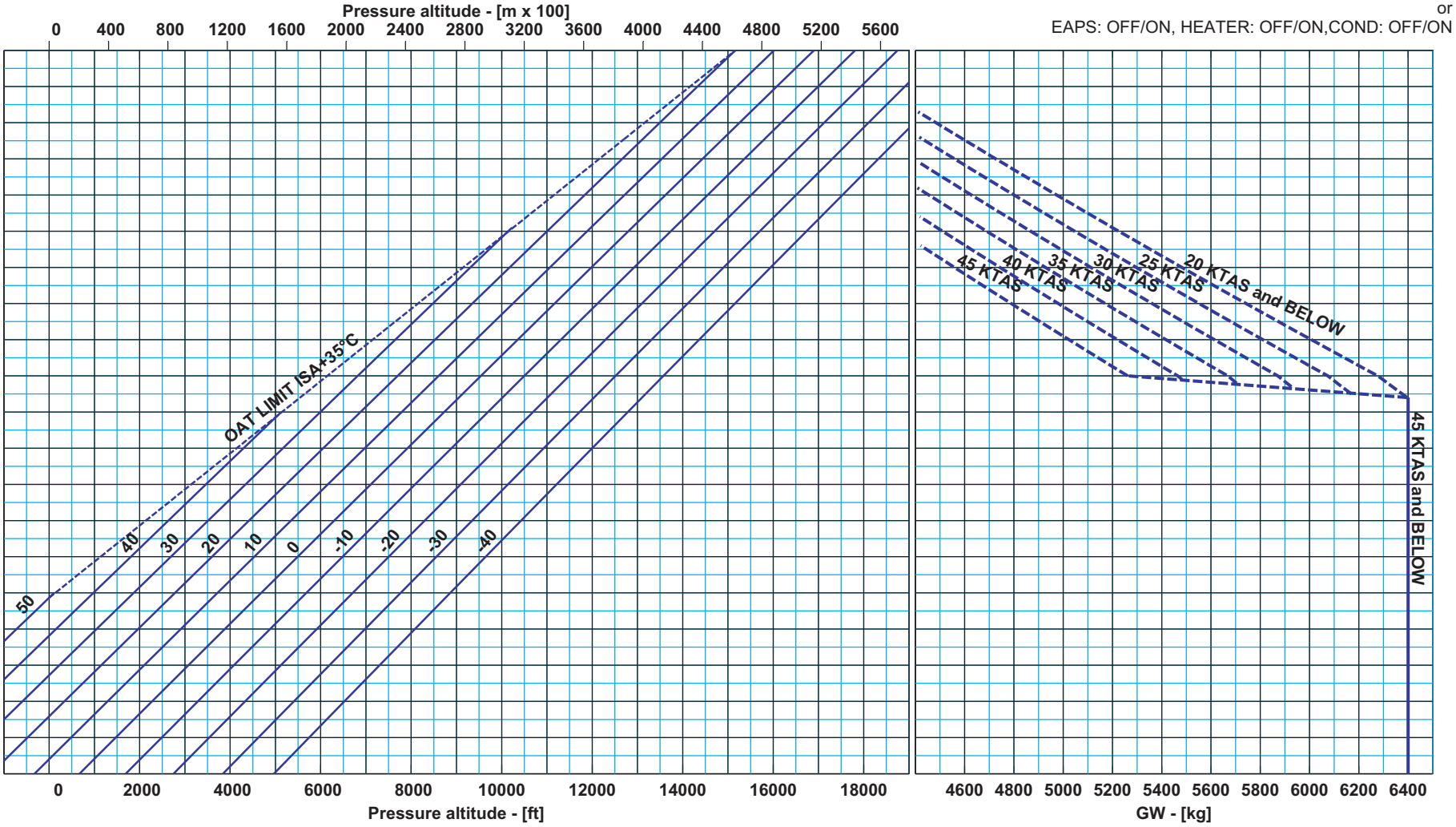

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Figure 4-5 CAT B Low Speed IGE Manoeuvres Envelope EAPS ON

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HOVER CEILING

The Hover Ceiling charts define the maximum weights at which an IGE hover (at 5 ft wheel height) or an OGE hover is possible for varying combinations of Pressure Altitude and OAT with main rotor speed at 100% or 102% above 14000 ft and zero wind conditions.

Information is presented for All Engines Operating (AEO) at Maximum Continuos Power (MCP) and Take Off Power (TOP).

Information is presented for OEI Maximum Continuous power (MCP) and 2.5 minute power.

See Basic RFM Section 4 Performance for Hover Ceiling Charts not included in this Supplement.

When ECS ENVIRO fitted and in FULL AUTO see Supplement 87 for Hover performance charts.
For ECS ENVIRO operation in MAN HEAT or A/C RECYCLE use HEATER ON/COND ON Hover charts contained in this Supplement.

HOVER FLYAWAY HEIGHT LOSS

The height loss following an engine failure in an OGE hover up to 19000 ft Hp/Hd is shown in the flyaway chart, Figure 4-33, for combinations of weight, altitude and temperature conditions. See Basic RFM Section 4 for details of procedures.

Note

Following the flyaway procedure the height loss indicated on chart Figure 4-33, for given ambient condition and aircraft weight, guarantees that V_{TOSS} (40 KIAS) will be achieved and, after accelerating to V_y, a subsequent minimum Rate Of Climb of 150 fpm is assured.

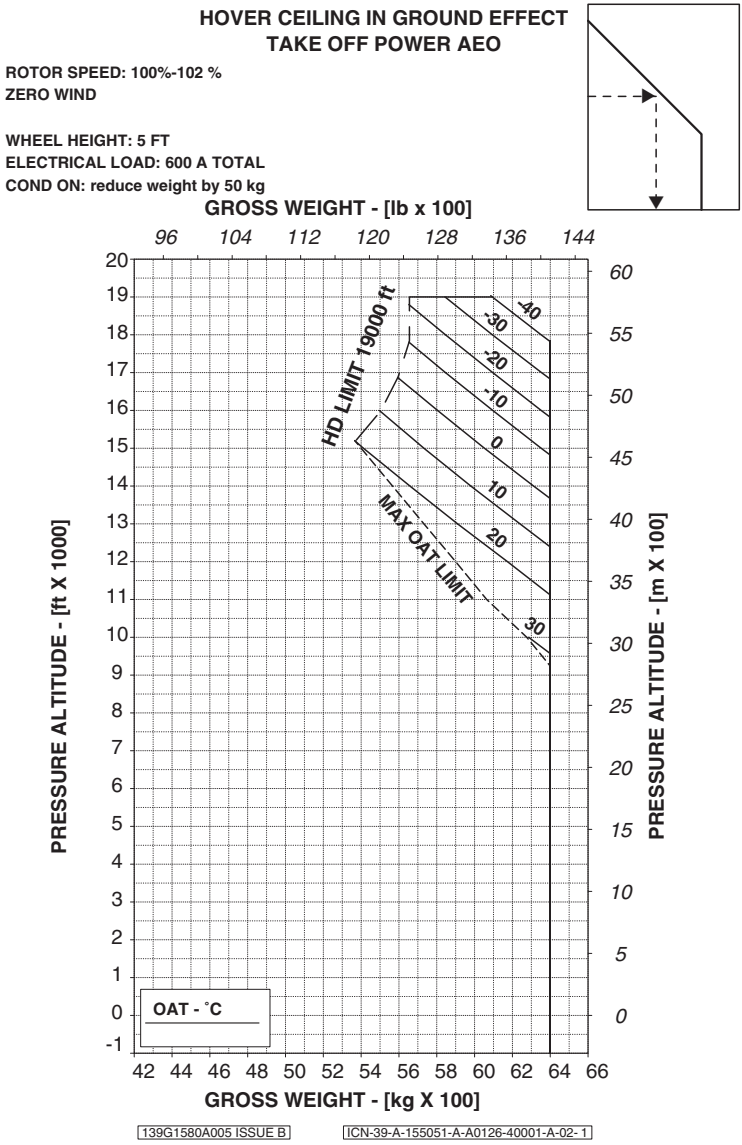


Figure 4-6 Hover Ceiling IGE at TOP

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

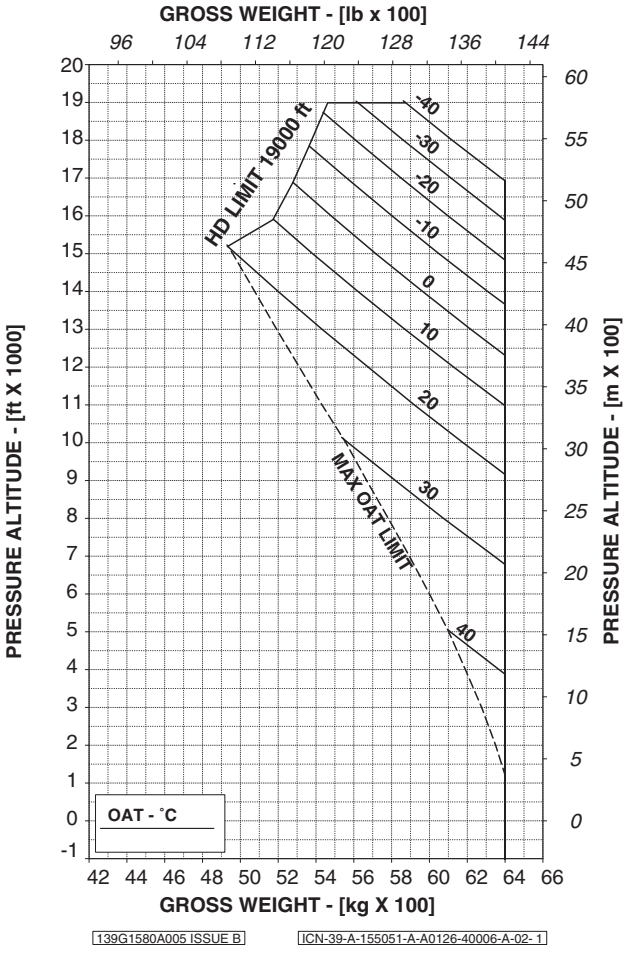


Figure 4-7 Hover Ceiling IGE at MCP

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%-102 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

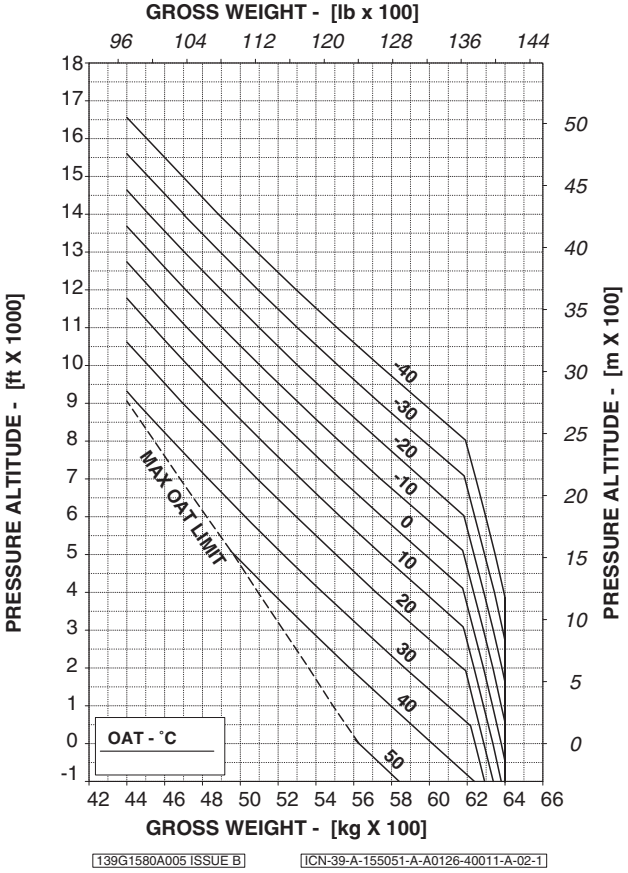


Figure 4-8 Hover Ceiling IGE at 2.5min OEI

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100%-102 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

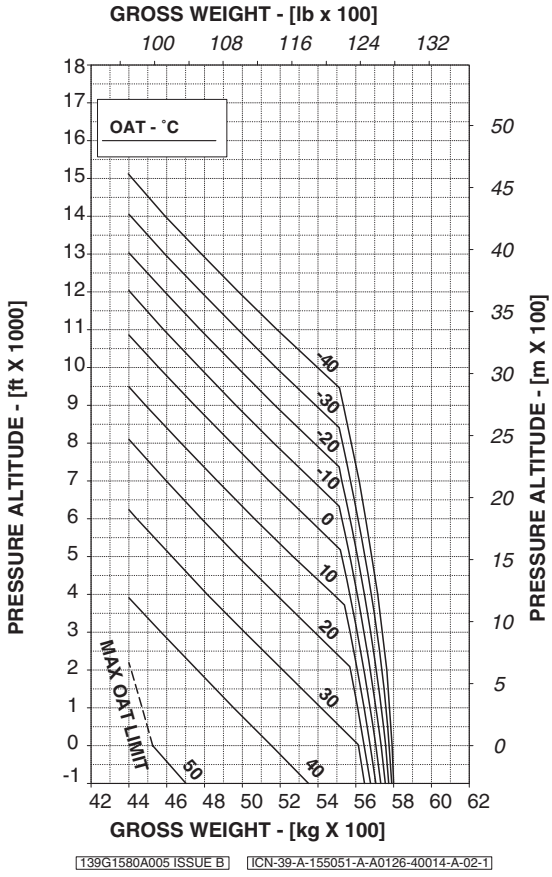


Figure 4-9 Hover Ceiling IGE at MCP OEI

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

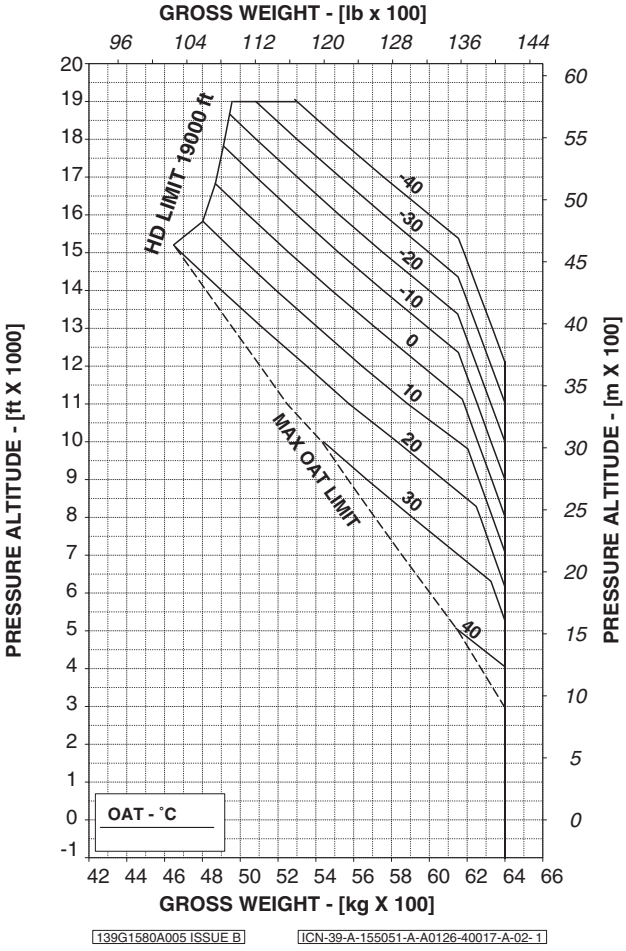


Figure 4-10 Hover Ceiling OGE at TOP

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

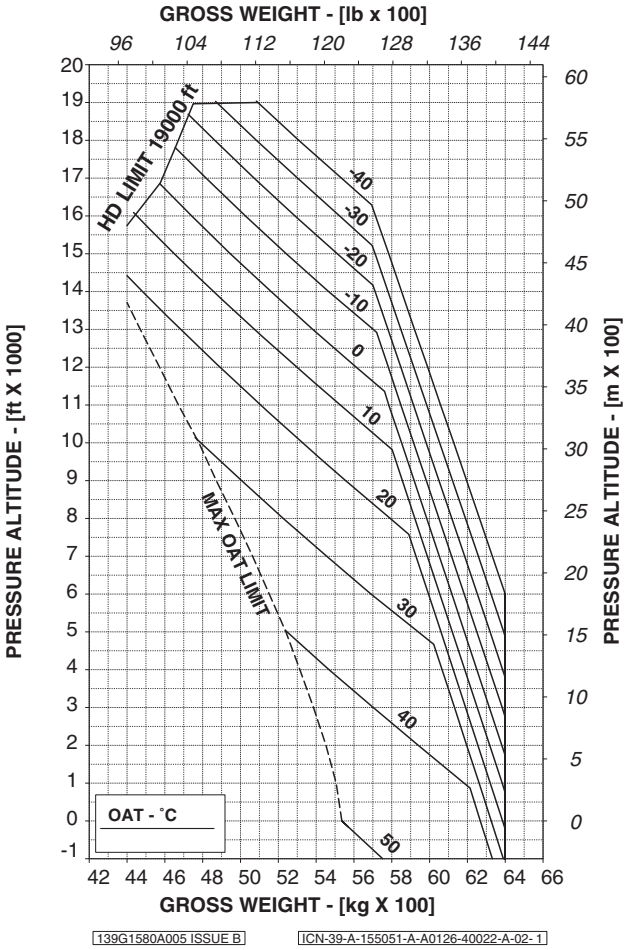


Figure 4-11 Hover Ceiling OGE at MCP

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

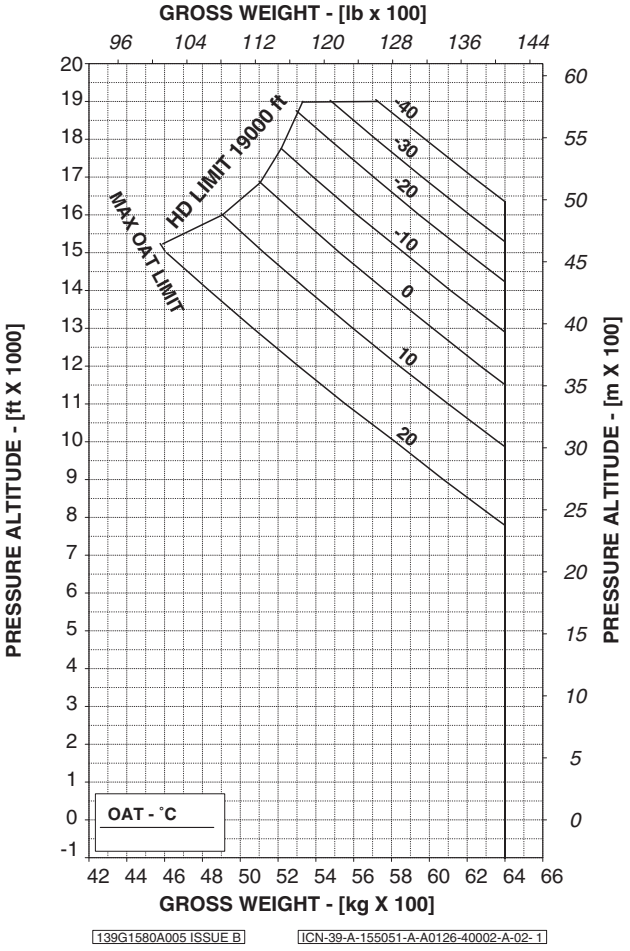


Figure 4-12 Hover Ceiling IGE at TOP HEATER ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

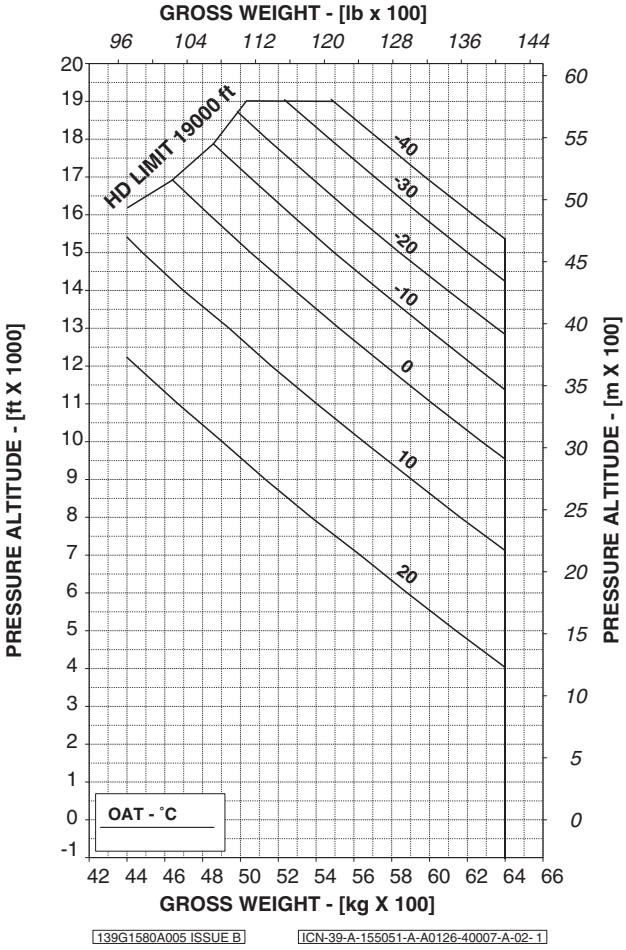


Figure 4-13 Hover Ceiling IGE at MCP HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

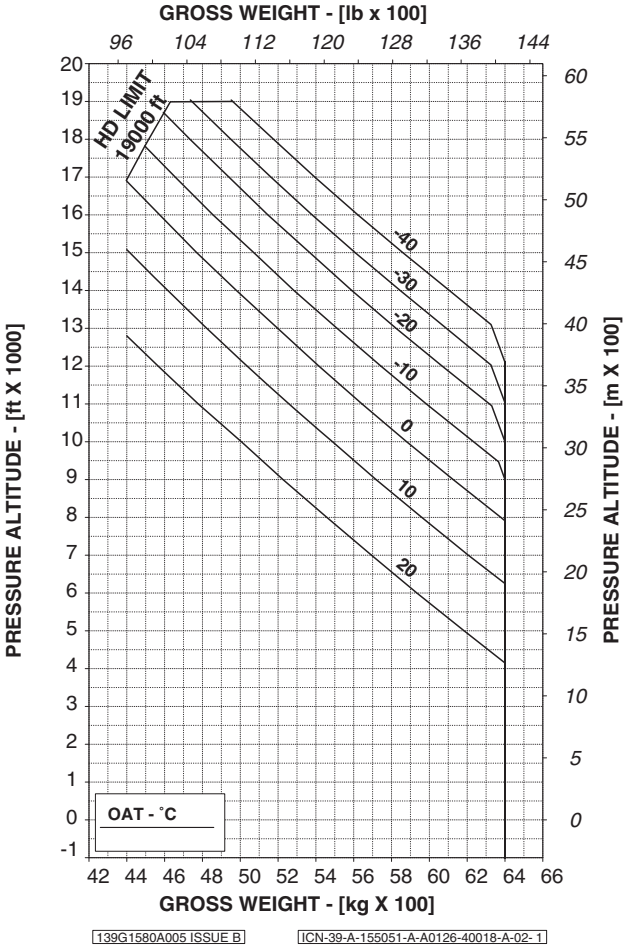


Figure 4-14 Hover Ceiling OGE at TOP HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

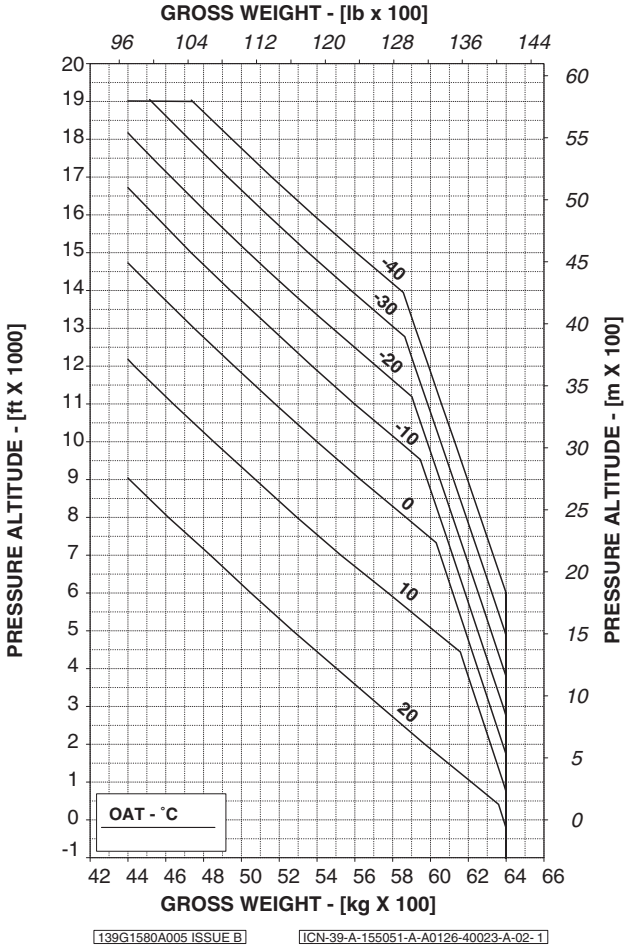


Figure 4-15 Hover Ceiling OGE at MCP HEATER ON

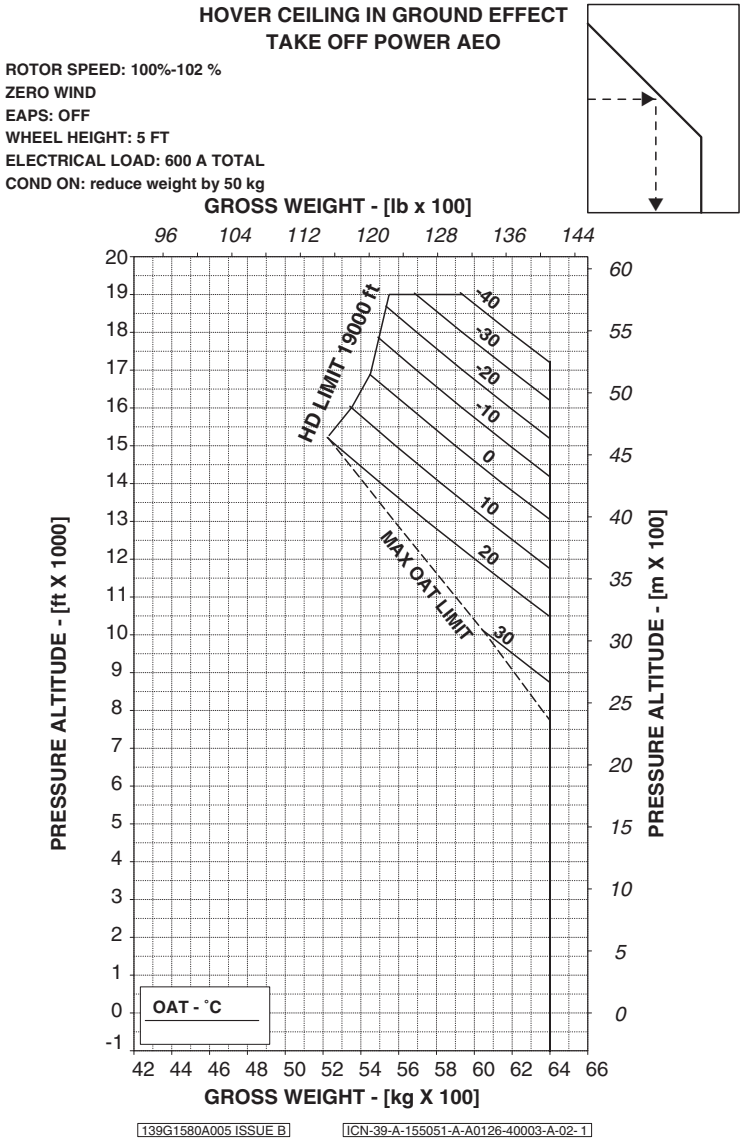


Figure 4-16 Hover Ceiling IGE at TOP EAPS OFF

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

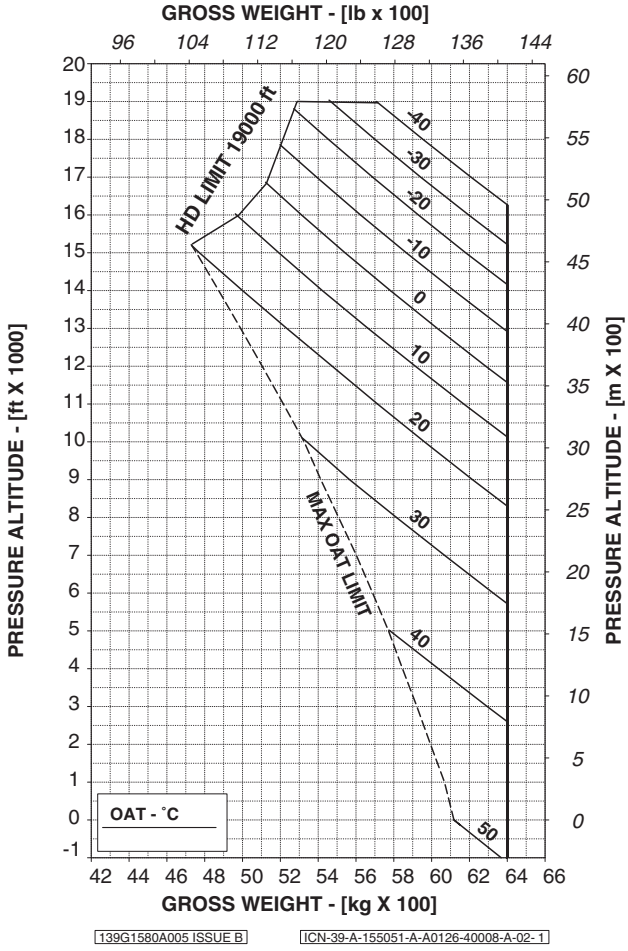


Figure 4-17 Hover Ceiling IGE at MCP EAPS OFF

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

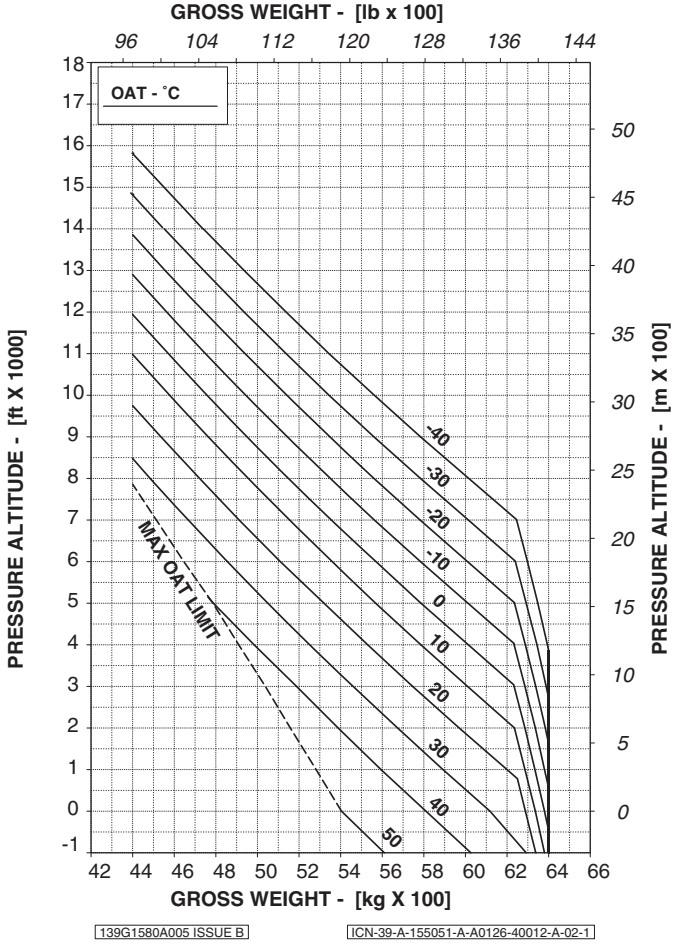


Figure 4-18 Hover Ceiling IGE at 2.5 min OEI EAPS OFF

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

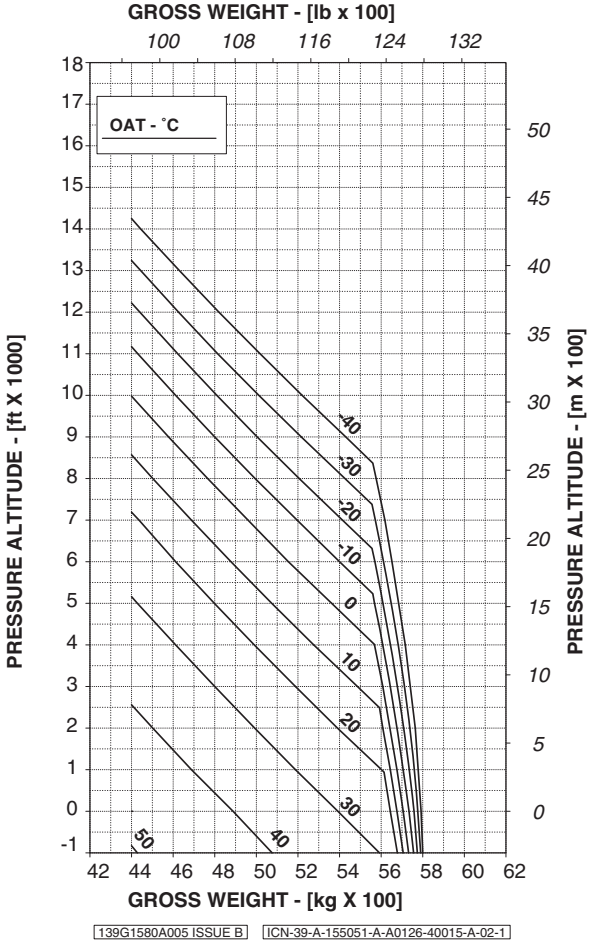


Figure 4-19 Hover Ceiling IGE at MCP OEI EAPS OFF

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

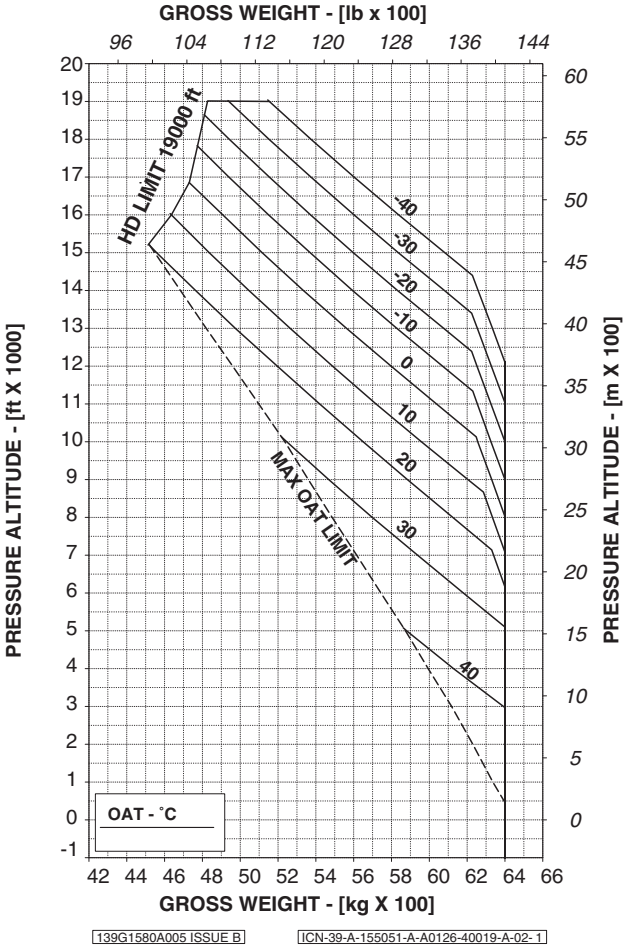


Figure 4-20 Hover Ceiling OGE at TOP EAPS OFF

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

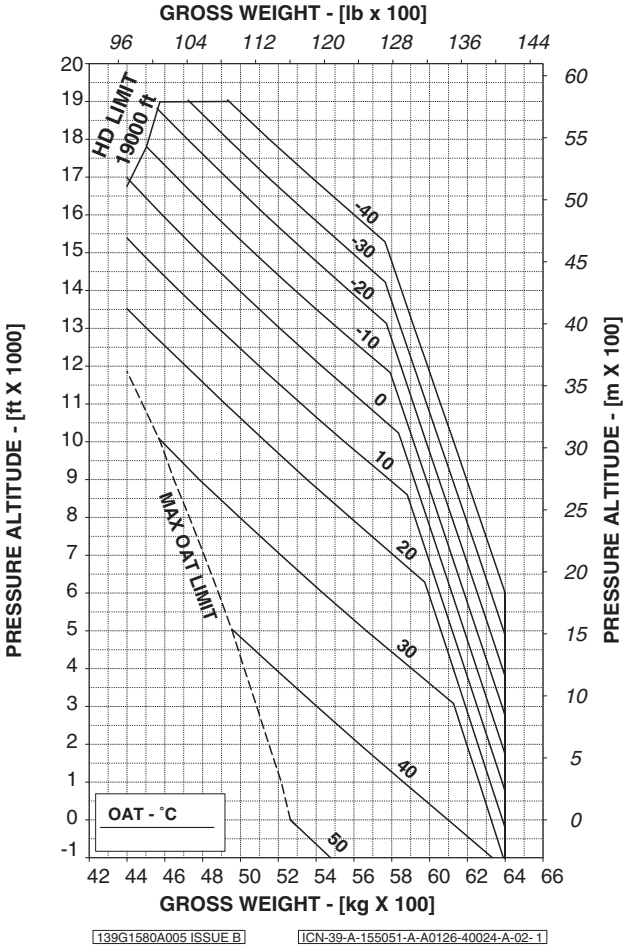


Figure 4-21 Hover Ceiling OGE at MCP EAPS OFF

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

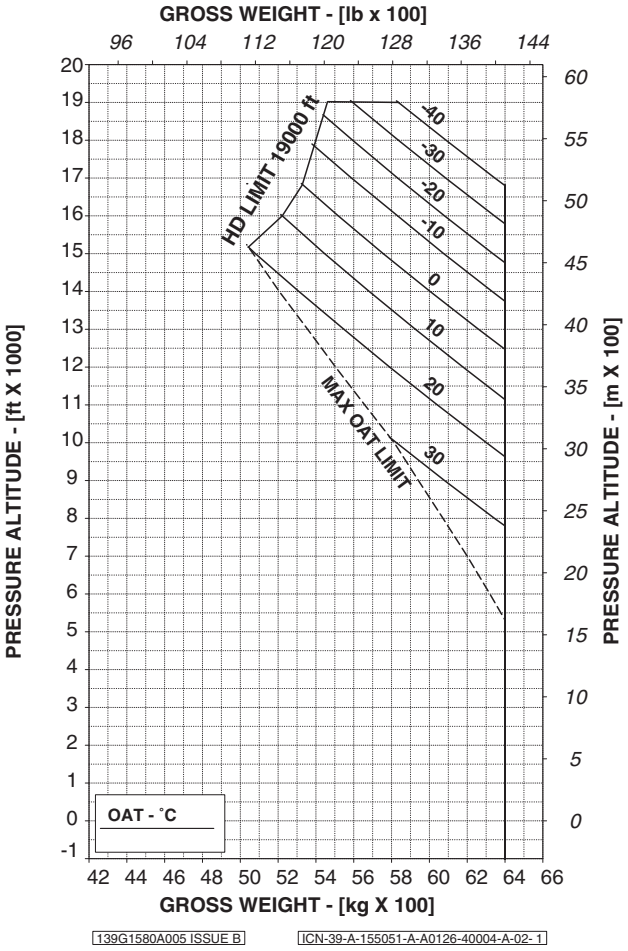


Figure 4-22 Hover Ceiling IGE at TOP EAPS ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

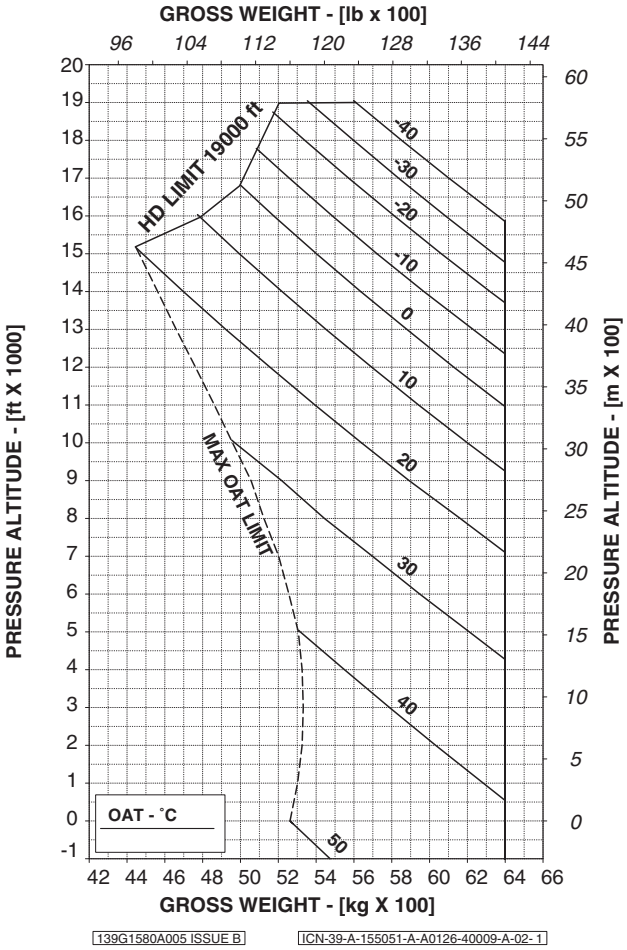


Figure 4-23 Hover Ceiling IGE at MCP EAPS ON

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A

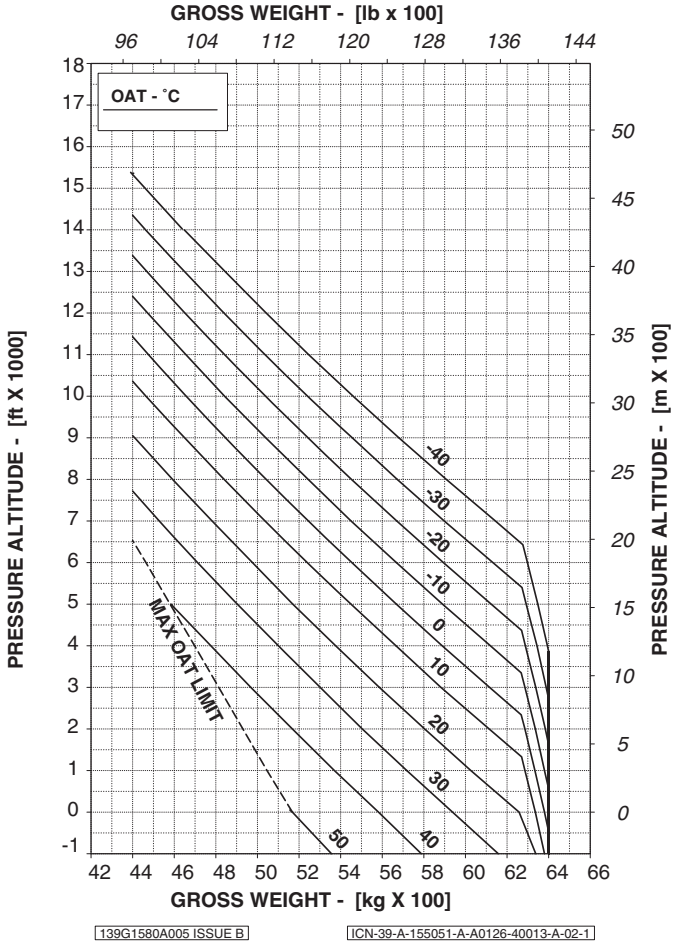


Figure 4-24 Hover Ceiling IGE at 2.5 min OEI EAPS ON

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: ON

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

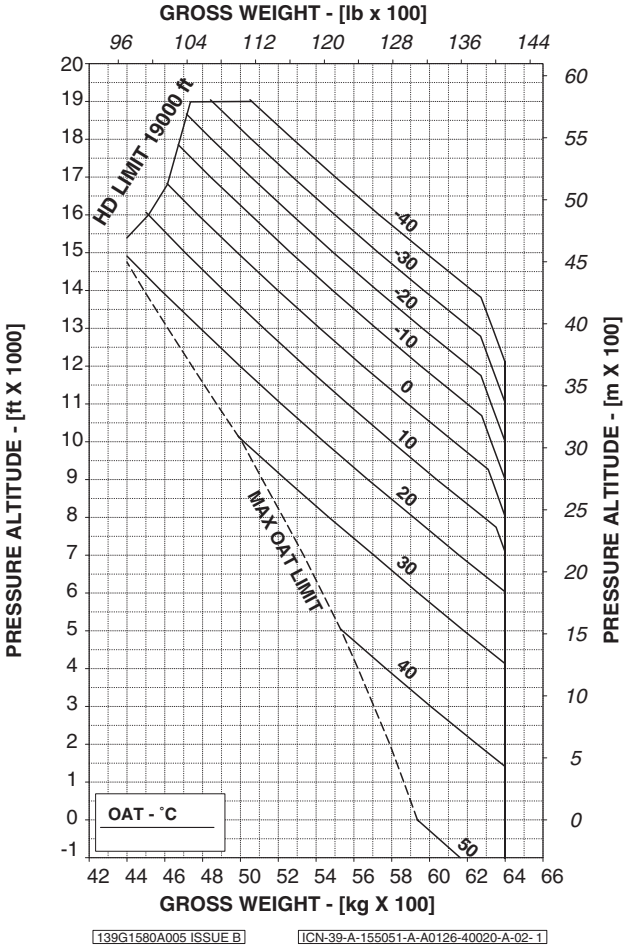


Figure 4-25 Hover Ceiling OGE at TOP EAPS ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: ON

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce weight by 50 kg

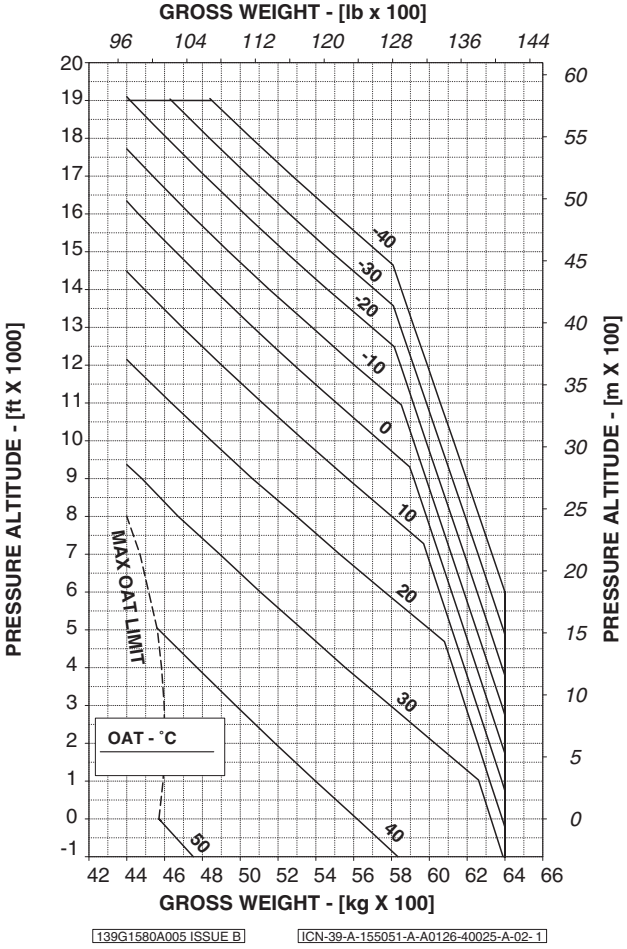


Figure 4-26 Hover Ceiling OGE at MCP EAPS ON

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF/ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

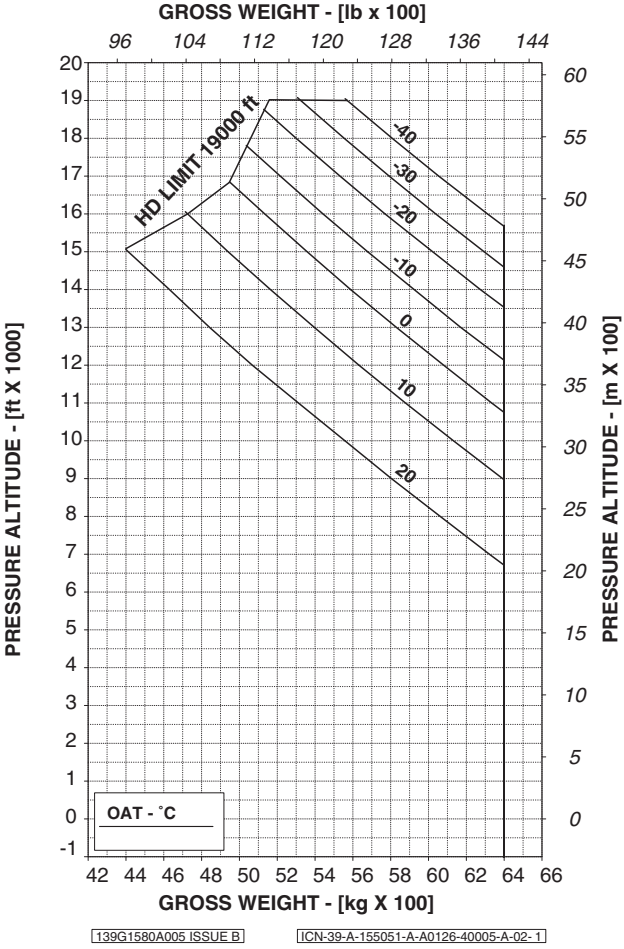


Figure 4-27 Hover Ceiling IGE at TOP EAPS ON/OFF HEATER ON

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF/ON

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

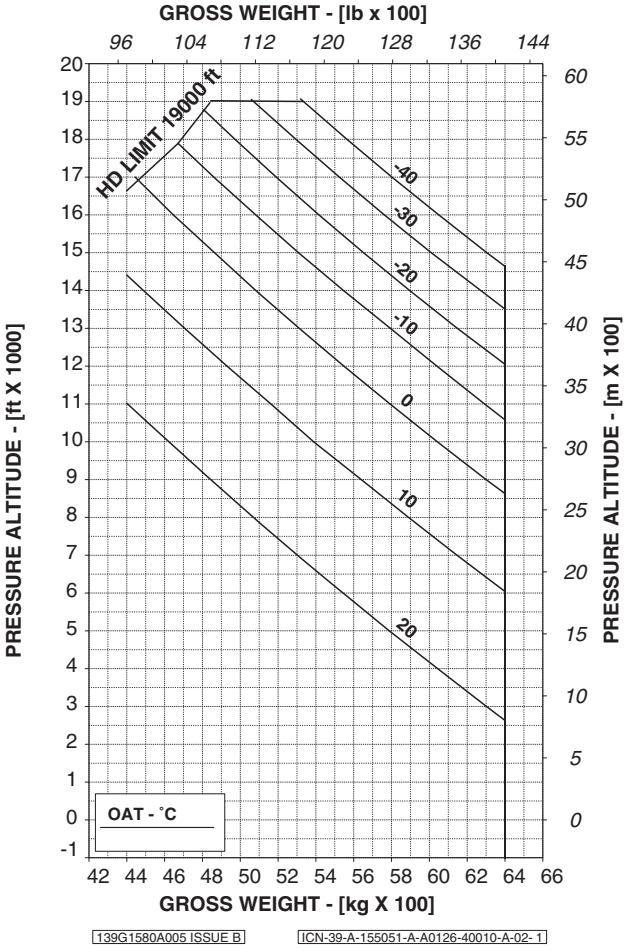


Figure 4-28 Hover Ceiling IGE at MCP EAPS ON/OFF HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

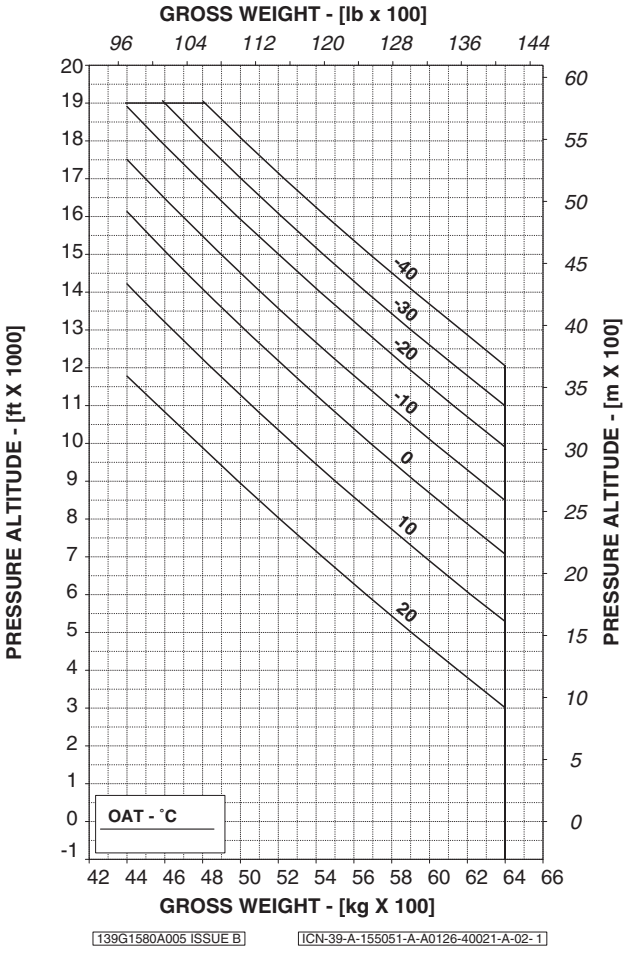


Figure 4-29 Hover Ceiling OGE at TOP EAPS ON/OFF HEATER ON

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%-102 %
ZERO WIND
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

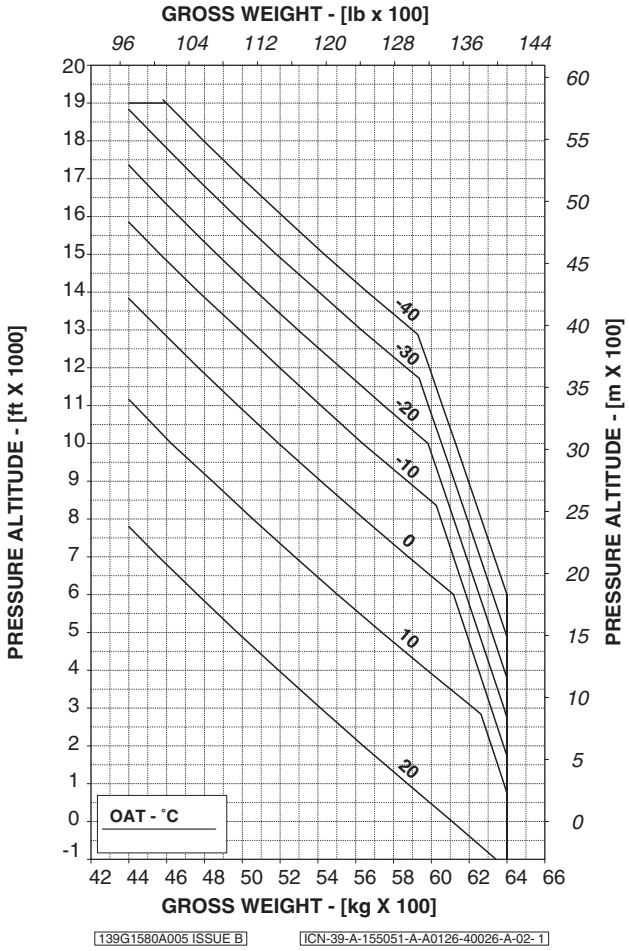
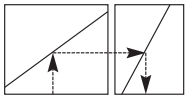


Figure 4-30 Hover Ceiling OGE at MCP EAPS ON/OFF HEATER ON

CAT.B TAKE OFF DISTANCE
OVER 50 ft OBSTACLE

ROTOR SPEED: 100%-102%
POWER= H.IGE + 5% TQ PER ENGINE
ELECTRICAL LOAD: 600A TOTAL
ZERO WIND



INITIATED FROM H.IGE (5 FT)
V_{50FT}: 50 KIAS

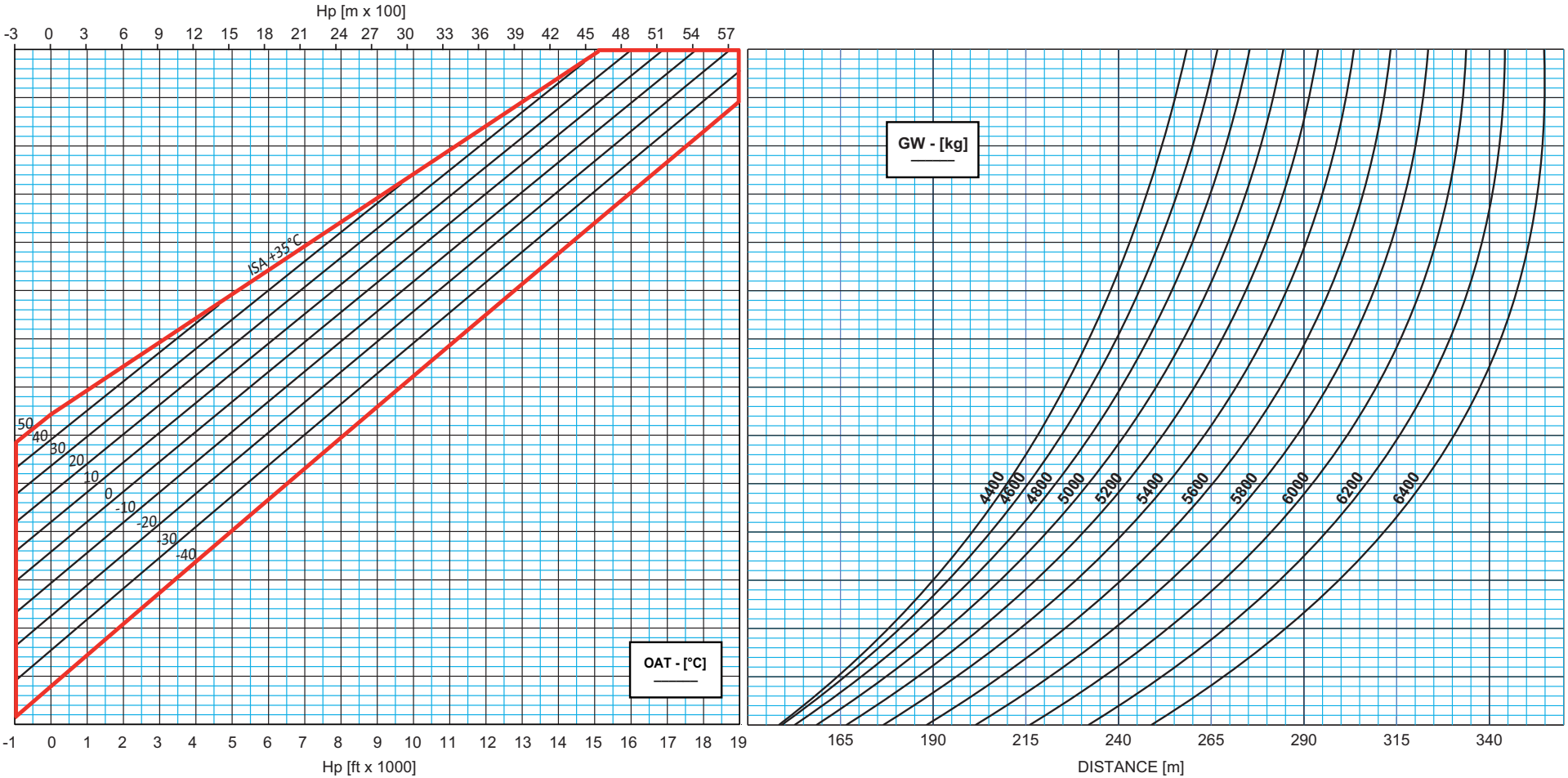


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Figure 4-31 CAT B Take Off Distance

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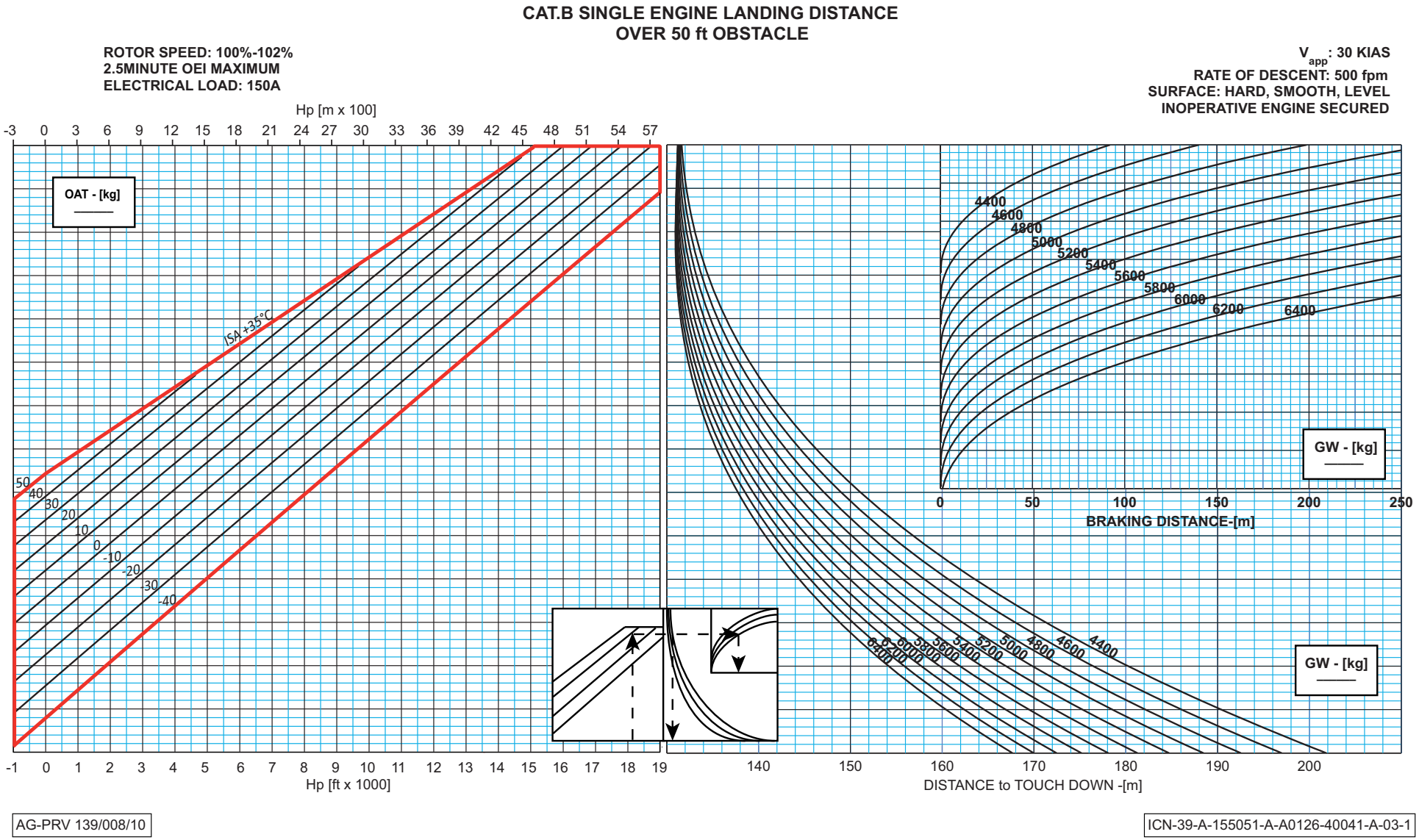

Figure 4-32 CAT B Landing Distance

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HEIGHT LOSS AFTER AN ENGINE FAILURE from HOVER

ROTOR SPEED: 100% or 102%

WIND BENEFIT

Note: the flyaway procedure assures a min ROC of 150 fpm at V_Y with MCP OEI

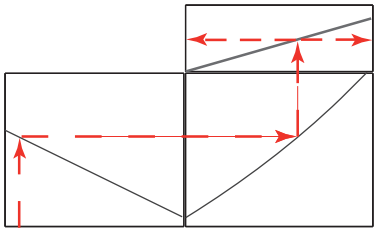

Figure 4-33 Hover OGE Flyaway Height Loss

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

Refer to the weight and balance section applicable for the cabin configuration installed.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 52

WESCAM MX-15 SERIES FLIR

P/N 4G9350F00411
P/N 4G9350F00412
P/N 4G9350F01511
P/N 4G9350F0XXXX

The replacement of the equipment detailed in this Supplement is not allowed without the successful completion of the additional verifications reported in the Maintenance Manual.

Changes to the helicopter configuration (ie. installation of approved equipments) are not allowed without the successful completion of the verifications reported in the Maintenance Manual.

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SUPPLEMENT 52
WESCAM MX-15 SERIES FLIR

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GENERAL INFORMATION

The Wescam MX-15 Series FLIR P/N 4G9350F00411/412/01511 is a remote controlled day/night high resolution, infrared (IR) imaging system with colour video.

This Supplement also covers successive dash numbers for different versions of the Wescam MX-15 i.e. P/N 4G9350F0XXXX which identify minor changes to the system and do not affect rotorcraft operations.

The system consists of a stabilized turret, mounted under the nose of the helicopter (Figure 1 & Figure 2), which contains all the hardware and software functions and a Controller that contains all the controls necessary to operate the turret and systems including to turn ON the system and to STOW the FLIR when not required. (See Figure 4, Figure 5 & Figure 6). The controller is supplied wth a stowage at the rear of the interseat console.

The turret is gyro stabilized and its azimuth and elevation, and therefore the FLIR Line Of Sight (LOS), corresponding to the center of the image, can be directed to any position using the 4 way rocker switch on the hand controller.

The turret has a modular payload that contains various combinations of cameras and laser options such as an Electro-Optic Wide (EOW) daylight camera with zoom function, an Electro-Optic Narrow (EON) daylight/low light camera with fixed focal length lens, the FLIR thermal camera with zoom, Eye Safe Laser Range Finder (ESLRF) and Laser Illuminator.

The FLIR camera produces images in total darkness or in low visibility or low contrast ambient condition. The EON camera, provides colour images in visible and monochrome images in low light ambient conditions and the EOW is a colour daylight camera.

The optional Laser Illuminator a Class IV device, is not eye safe, therefore, when installed, a Laser Safety Interlock Unit (LIU), see Figure 3, is installed in the interseat console, which provides an interlock to stop the laser being activated inadvertently. A key is required to make the laser circuit live and ready for activation.

The cameras provide video outputs that can be monitored on either pilot or copilot MFD. The same image from one camera will be

displayed on pilot and copilot display. Either the IR camera or the video camera can be selected, as required on pilot and/or copilot display. The image may also be presented in miniature. If a digital map is installed the copilot and pilot MFD will only display the same source data, either FLIR or digital map.

The optional SkyQuest central 5th display (P/N 4G4630F00111) or the Mission Console Display can also be used to display either image.

Overlayed on the FLIR image are graphic symbology which give graphical aiming and steering orientation, system alerts or warning messages and status information about turret or sensors. The options menus, as controlled by the relevant buttons on the Controller installed (See Figure 6 and Figure 7), are also visualized on the display.

For full information on the use of the Wescam MX-15 Series FLIR refer to Wescam MX-15 Series FLIR Operator's Manual Document, latest revision.

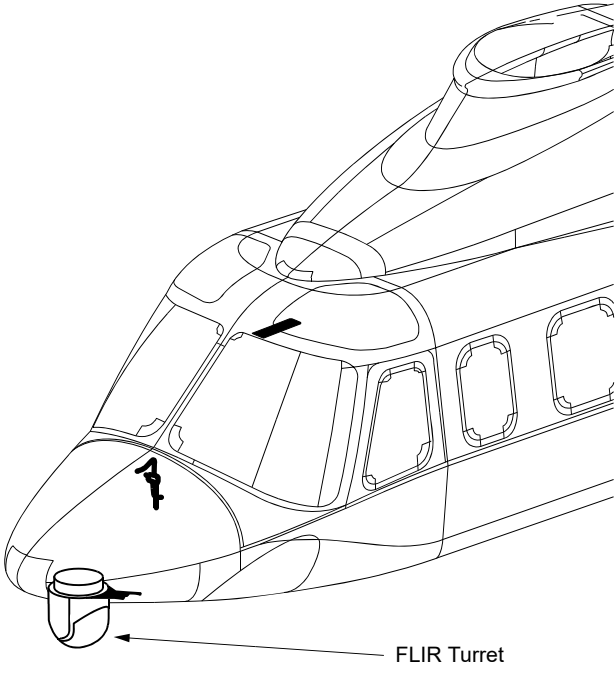

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Figure 1 Wescam MX-15 Series FLIR Installation



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Figure 2 Wescam MX-15 Series FLIR Turret

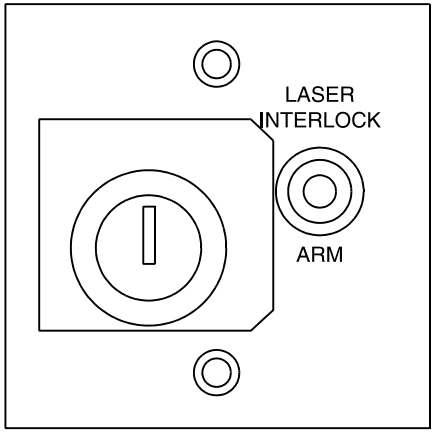

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Figure 3 Optional Laser Safety Interlock Unit (LIU)

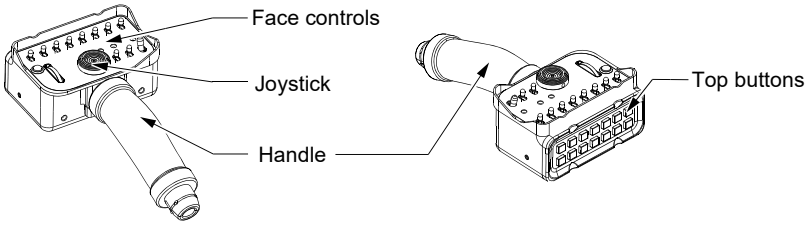

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Figure 4 Hand Control Unit (Example)

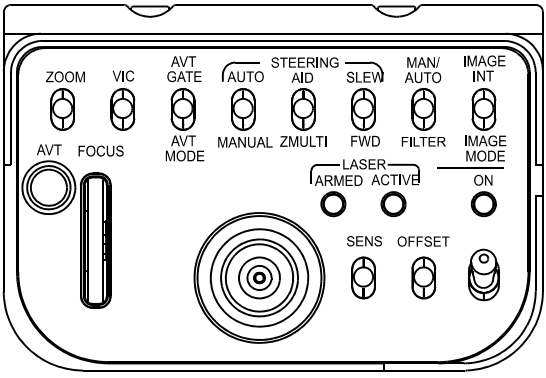

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Figure 5 Hand Control Unit Face Controls (Example)

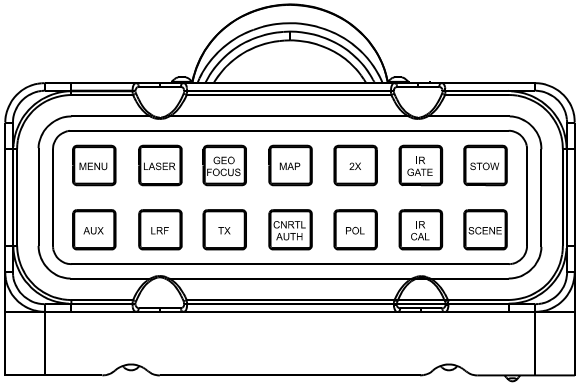

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Figure 6 Hand Control Unit Top Buttons (Example)

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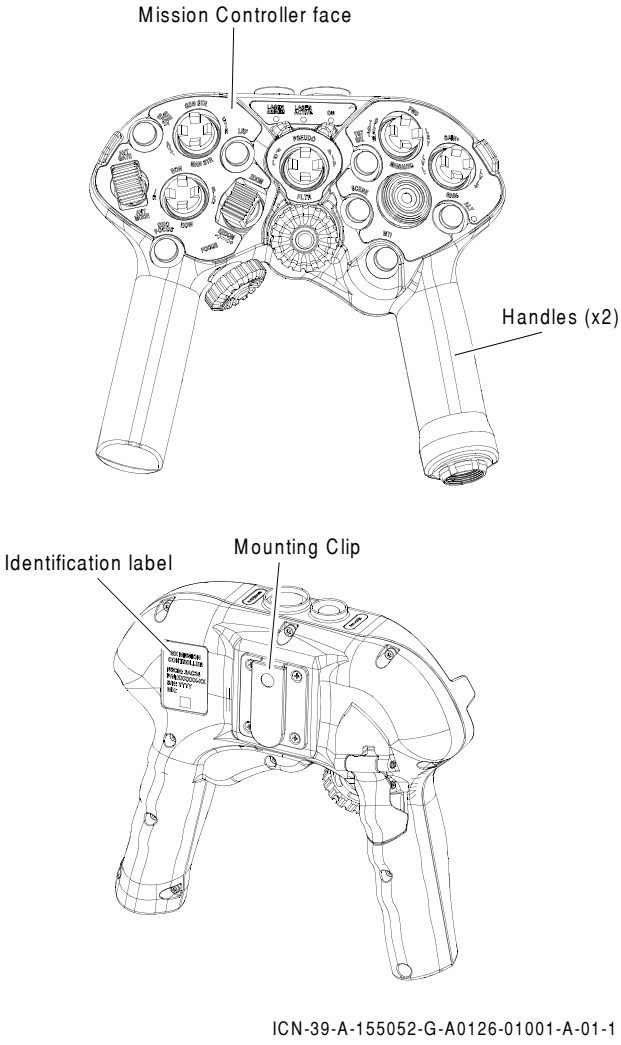

Figure 7 Double Hand Control Unit (DHCU), Example

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Wescam MX-15 Series FLIR kit, the new empty weight and center of gravity position must be determined.

WESCAM MX-15 SERIES FLIR LIMITATIONS

The FLIR must not be used for navigation.

The FLIR must be operated from the left hand seat or by cabin crew.

The FLIR ESLRF must not be operated when close to personnel.

Operation of the FLIR laser pointer Class IV device, if fitted, must be authorised by the Competent Authority.

The FLIR Laser Illuminator, if fitted, must not be set to ARM when personnel are within 300 m.

SECTION 2 - NORMAL PROCEDURES

Note

For full information on the use of the L3 Wescam MX-15 Series FLIR refer to Wescam MX-15 Series FLIR Operator's Manual Document, latest revision.

EXTERNAL PRE FLIGHT CHECKS

AREA N°1 (Helicopter Nose)

1. FLIR Turret	— Secure. Check IR and video camera lens condition and cleanliness.

AREA N°7 (Cockpit Interior)

1. FLIR Hand Controller	— Check present, connected and secure.

ENGINE PRE-START CHECKS

1. FLIR Hand Controller	— Confirm system switched OFF.
2. Laser safety Interlock (LIU) (if fitted)	— Confirm selected OFF.

SYSTEM CHECKS

1. FLIR Hand Controller	— Switch system ON (indicator illuminates).
2. FLIR image	— Select image display as required (pilot, copilot MFD, Central 5th display, Mission console display). Select IR or video camera as required.
3. FLIR Hand Controller	— Push STOW button to stow FLIR, switch OFF, or as required. Stow Hand Controller or as required.

IN FLIGHT

1. FLIR Hand Controller	— Switch system ON (indicator illuminates).
2. FLIR image	— Select image display as required (pilot/copilot MFD by selecting FLIR Cam on MFD system menu, or Central 5th display or Mission console display, if fitted). Select IR or video camera as required.
3. FLIR Hand Controller	— Control FLIR direction and settings as required.

CAUTION

The ESLRF must not be operated when close to personnel. The Laser Illuminator, if fitted, must not be set to ARM when personnel are within 300 m (985 ft).

4. ESLRF — Activate as required.

5. Laser illuminator, if fitted — Select LIU switch to ARM and select illuminator as required, when operation complete select LIU to OFF.

Note

When FLIR is not being used it should be stowed to protect the FLIR cameras.

PRE LANDING CHECKS

1. FLIR Hand Controller — Press STOW to stow FLIR, switch system OFF. Stow hand controller.

PRE SHUTDOWN CHECKS

1. FLIR Hand Controller — Confirm FLIR switched OFF and hand controller stowed.

2. Laser safety Interlock (LIU) (if fitted) — Confirm OFF.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the Wescam MX-15 Series FLIR system is switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual. For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 53

NIGHTSUN II XP SEARCHLIGHT

P/N 4G3340F01311

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SUPPLEMENT 53
NIGHTSUN II XP SEARCHLIGHT

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GENERAL INFORMATION

The Nightsun II XP P/N 4G3340F01311 is a high intensity external light source installed on a gimbal support on the left hand side of the helicopter. It is used to provide high intensity external lighting for reconnaissance operations during night time.

The installation consists of a searchlight with fairing, gimbal support, (Figure 1), a pendant control box (Figure 1 & 3), with stowage (mounted on the rear of the interseat console), and necessary hardware and cabling.

To supply power to the system the SUN LT AUX SYS switch on the auxiliary CB panel (see Figure 4) is selected to ON. When the POWER switch on the pendant control box is selected to ON (the SYS indicator light illuminates) the 4 way rocker switch and all control box switches and indicators are operational. To illuminate the light the LAMP switch must selected to the ON position.

The searchlight can be directed by operating the 4 way rocker switch on the pendant control box.

The size of the beam is controlled by the FOCUS ± switch on the pendant.

The CAGE/STOW switch when the switch is pressed to STOW the searchlight moves to a pre programmed stowed position and all the switches on the control box are inactive apart from th POWER ON/OFF switch.

When the switch is selected to CAGE the searchlight moves to a pre programmed position and keeps the control switches active.

To restore functionality from the CAGE or STOW position the switch must be reselected to CAGE or STOW.

The system also allows slaving of the searchlight to a FLIR system. When the searchlight is slaved to the FLIR (CALIB /LINK switch selected to LINK with indicator light), azimuth and elevation of the searchlight are controlled by the FLIR however FOCUS is still controlled by the pendant.

To turn the searchlight off select the LAMP switch to OFF, the POWER switch to OFF, after the light has been selected to STOW then the SUN LT AUX SYS switch to OFF.

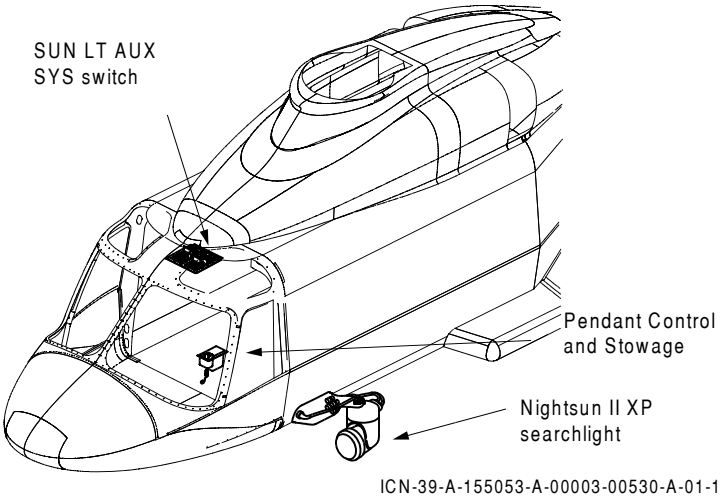

Figure 1 Nightsun II XP Searchlight Installation



Figure 2 Nightsun II XP Searchlight

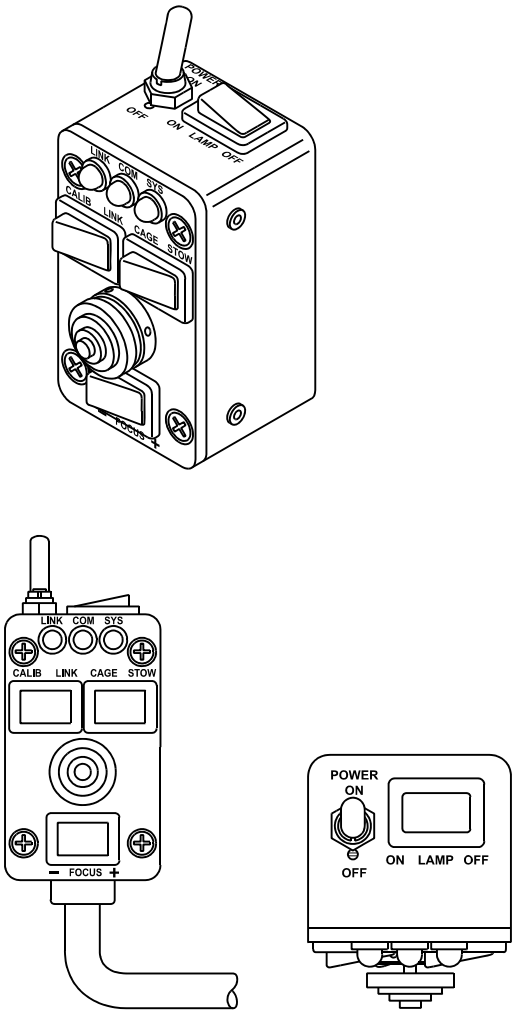

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Figure 3 Pendant Control Box

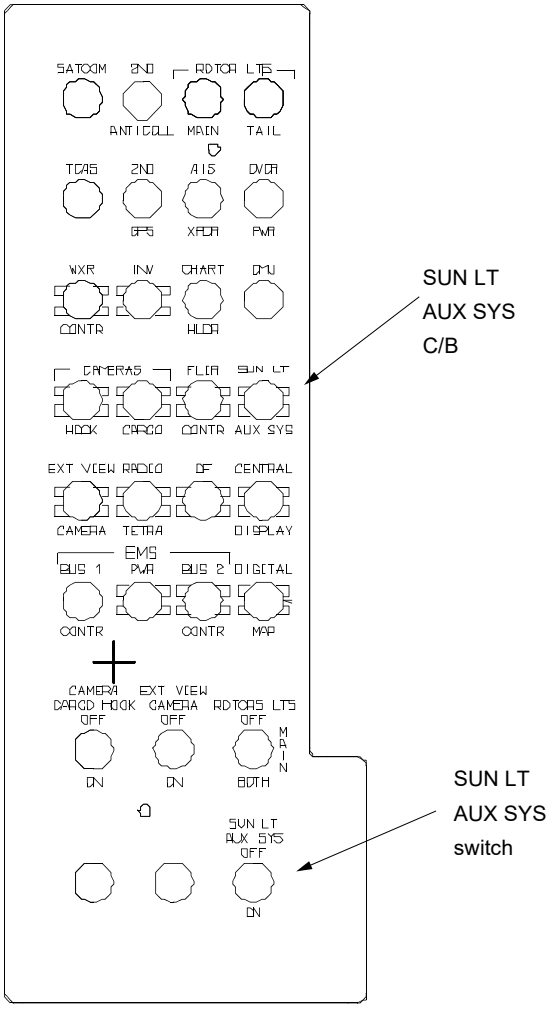

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Figure 4 Nightsun II XP Switch and C/B position on Auxiliary CB Panel

SECTION 1 - LIMITATIONS

TYPE OF OPERATION

Operation of the Nightsun II XP searchlight is prohibited in IFR.

WEIGHT AND CG LIMITATIONS

After Nightsun II XP searchlight installation, the new empty weight and CG location must be determined.

AIRSPEED LIMITATIONS (KIAS)

Maximum airspeed with Nightsun II XP searchlight stowed ..... $Vne_{Power\ ON}$

Maximum airspeed to move Nightsun II XP searchlight ..... 80 KIAS

Maximum airspeed with Nightsun II XP searchlight in any position other than stowed ..... $Vne_{Power\ ON}$-40 KIAS

NIGHTSUN II XP SEARCHLIGHT LIMITATIONS

— The Nightsun II XP searchlight must be operated from the left hand seat or by cabin crew.

— The Nightsun II XP searchlight light must be OFF:

- below 50 ft (15 m) AGL unless over water
- in cloud or fog conditions.

— The Nightsun II XP searchlight must be stowed for landing.
Stowed position:

Elevation .....-19 deg (Full up)

Azimuth ..... 0 deg

Nightsun II XP searchlight ranges limited by mechanical stops:

Elevation .....-19 deg to -74deg

Azimuth ..... 15 deg to right, 165 deg to left

Taxiing

Taxiing on grass or unprepared surfaces is prohibited.

Slope Operations

Maximum slope for take-off and landing 5° in any direction.

PLACARDS

NIGHTSUN II XP SEARCHLIGHT DO **NOT** USE BELOW **50**FT AGL OR IN **FOG** CONDITIONS

In View of Pilot

SECTION 2 - NORMAL PROCEDURES

COLD WEATHER OPERATION

If the helicopter is to remain parked outside with an OAT at or below -55° C the Nightsun II XP searchlight should be removed and stored in a heated room.

EXTERNAL PRE-FLIGHT CHECKS

AREA N°6 (Fuselage Left Hand Side)

1. Nightsun II XP searchlight ➡ — Secure and wiring properly connected.

   Check lens for cleanliness and security.

   Check condition of grounding cable.

AREA N°7 (Cabin and Cockpit Interior)

1. SUN LT AUX SYS circuit breaker (Auxiliary CB panel) — Confirm In.
2. SUN LT AUX SYS switch (Auxiliary C/B panel) — Confirm OFF.
3. POWER ON/OFF switch (on pendant control box) — Confirm OFF.

SYSTEM CHECKS

Nightsun II XP checks

1. SUN LT AUX SYS switch (Auxiliary C/B panel) — Select ON.
2. POWER ON/OFF switch (on pendant control box) — Select to ON (indicator light illuminates).
3. 4 way rocker switch (on pendant control box) — Move control and verify correct movement of searchlight.
4. CAGE/STOW switch (on pendant control box) — Select STOW position.
5. POWER ON/OFF switch (on pendant control box) — Select to OFF or as required.
6. Pendant Control Box — As required or stow in stowage box on rear of interseat console.
7. SUN LT AUX SYS switch (Auxiliary C/B panel) — Select OFF.

IN FLIGHT

CAUTION

— In flight, do not use Nightsun II XP searchlight below 50 ft (15 m) AGL unless over water.
— Do not direct the beam towards other aircraft or vehicles to prevent temporary blinding effect.

Note

When operating Nightsun II XP searchlight, magnetic compass indication is not reliable.

1. SUN LT AUX SYS switch (Auxiliary C/B panel) — Select ON.
2. POWER ON/OFF switch (on pendant control box) — Select ON (indicator light illuminates).
3. LAMP ON/OFF switch (on pendant control box) — Select ON (indicator light illuminates).
4. 4 way rocker switch (on pendant control box) — As required to direct light.
5. FOCUS switch (on pendant control box) — As required to focus light beam as desired.

CAUTION

If left hand pilot is the pilot flying and the searchlight is directed fully up and right, glare may be present in the left hand pilot door window.

SLAVING to FLIR

6. CALIB/LINK switch (on pendant control box) — Select LINK to slave Nightsun II XP searchlight to FLIR (indicator light illuminates).

When Nightsun II XP searchlight operations completed:

7. LAMP switch (on pendant control box) — Select OFF (indicator light extinguishes).
8. STOW/LOCK switch (on pendant control box) — Select stow position (indicator light illuminates).
9. POWER OFF/ON switch (on pendant control box) — Select OFF.
10. SUN LT AUX SYS switch (Auxiliary C/B panel) — Select OFF.

APPROACH AND LANDING

CAUTION

In flight, do not use Nightsun II XP searchlight below 50 ft (15 m) AGL unless over water.

1. Nightsun II XP searchlight	— Confirm light stowed. — Ensure light off before reaching 50 ft AGL
2. POWER ON/OFF switch (on pendant control box)	— Confirm OFF.
3. Pendant Control Box	— Stow in stowage provided.
4. SUN LT AUX SYS switch (Auxiliary C/B panel)	— Confirm OFF.

CAUTION

When landing on grass or unprepared surfaces be attentive to Nightsun II XP searchlight ground clearance.

POST SHUTDOWN CHECKS

If the helicopter is to remain parked outside with an OAT at or below -55° C the Nightsun II XP searchlight should be removed and stored in a heated room.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

DOUBLE DC GENERATOR FAILURE

1. Nightsun II XP searchlight (pendant control box)
   — Stow light.
   — Select POWER switch to OFF.
2. SUN LT AUX SYS switch (Auxiliary C/B panel)
   — Select OFF.

NIGHTSUN II XP SEARCHLIGHT FAILURES

For any failure of the Nightsun II XP searchlight attempt to stow Nightsun II XP searchlight but if not possible:

Maximum airspeed with Nightsun II XP searchlight in any position other than stowed .... $Vne_{Power\ ON}$-40 KIAS

SECTION 4 - PERFORMANCE DATA

No change in aircraft performance when Nightsun II XP Searchlight is installed.

When Nightsun II XP searchlight is installed together with one or more of the following kits:

- External Hoist installation (Supplement 11, 41, 49)
- Snow skids installation (Supplement 19)
- Slump Pads Installation (Supplement 20).

the climb performance is reduced by:

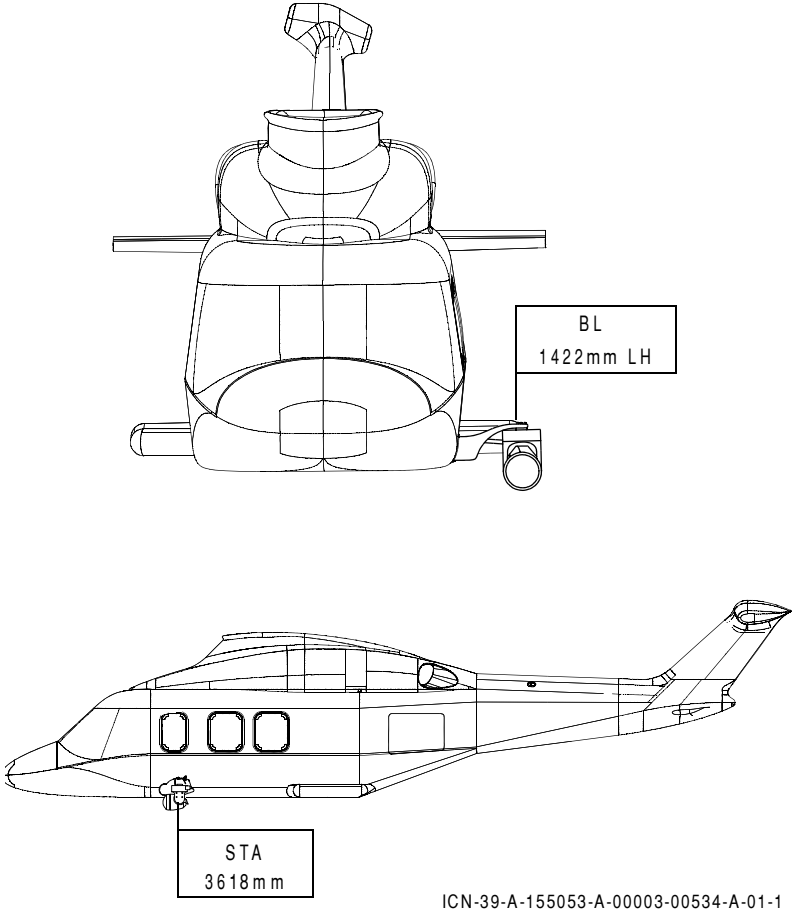
ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

LONGITUDINAL AND LATERAL MOMENT ARMS

When the Nightsun II XP searchlight is installed the following Longitudinal and Lateral Moment arms are applicable for the Weight and Balance Calculations



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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 54

CABIN COMPARTMENT EXTENSION

P/N 4G5340F00111
P/N 4G5340F00211

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SUPPLEMENT 54
CABIN COMPARTMENT EXTENSION

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GENERAL INFORMATION

This Supplement covers the Partial Cabin compartment Extension (tunnel above/between fuel tanks) and the Full Cabin Extension (through the tunnel area and into the former baggage compartment). The installation allows crew access into these areas as required.

Partial Cabin Extension P/N 4G5340F00211

The modification consists of the removal of the cabin rear dividing panel from STN 5700mm, the installation of a new panel at STN 6700 mm and floor panel, mounted in the tunnel, with tie down rings and restraint nets etc.

The new area exposed allows the space above/between the main fuel tanks to be used as a storage area. Two Loading Areas with tie down rings are available and both may be used. See Figure 1.

Mounted on the side walls of the tunnel are two rails which can be used to attach items.

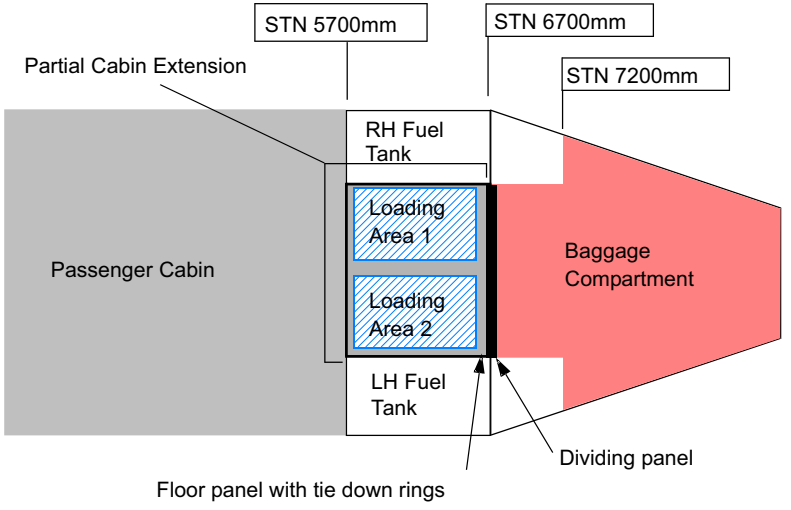

Figure 1 Partial Cabin Extension

Full Cabin Extension P/N 4G5340F00111

The modification consists of the removal of the cabin rear dividing panel from STN 5700 mm which effectively extends the cabin through the tunnel into the former baggage compartment area. A floor panel is mounted in the tunnel, with tie down rings and restraint nets etc. The floor panel is divided into two Loading Areas with tie down rings. Only one Loading Area may be used at a time the other must be left open to allow access to Loading Area 3. See Figure 2.

Mounted on the side walls of the tunnel are two rails which can be used to attach items.

An additional Hand Held Fire Extinguisher is placed in reach of cabin attendant.

The lighting in Loading Area 3 is controlled by the CABIN LT panel.

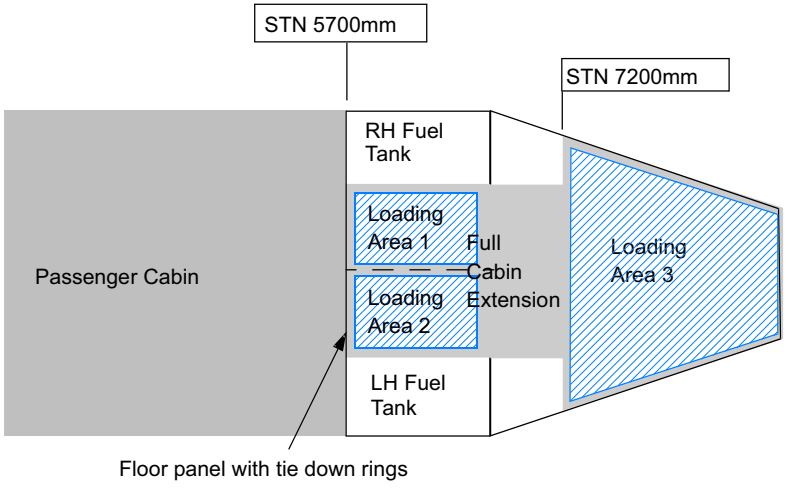

Figure 2 Full Cabin Extension

Two configurations are available for Loading Area 3 and differing restraint net and securing methods are required:

a) This configuration considers that the whole baggage compartment floor area is available for baggage.
The restraint net P/N 3G2550A00231 may be used to secure a maximum load of 300 kg (660 lb) using the net attachment points and net configuration as shown in Figure 3.

b) This configuration considers that the rear part of the baggage compartment is occupied with equipment and cannot be used.
For this configuration the modification P/N 3G5306P30512 must be installed which includes an additional row of net attachment points.
The restraint net P/N 3G2550A03031 may be used to secure a maximum load of 160 kg (350 lb) in the forward part of the baggage bay using net attachment points and net configuration as shown in Figure 4.
If this modification is installed, and equipment has been removed from the rear part of the baggage compartment, the maximum load returns to configuration a) 300 kg.

Note

This modification includes the Loading Area 3 modifications in Supplement 31.

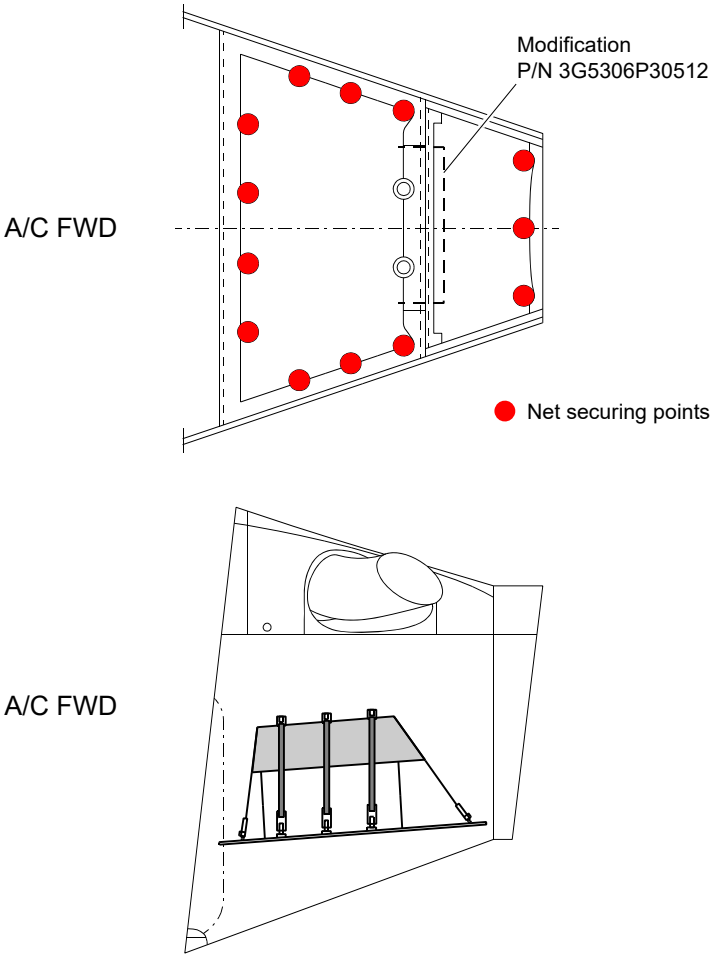

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Figure 3 Cargo Net configuration P/N 3G2550A00231 for maximum load of 300 kg

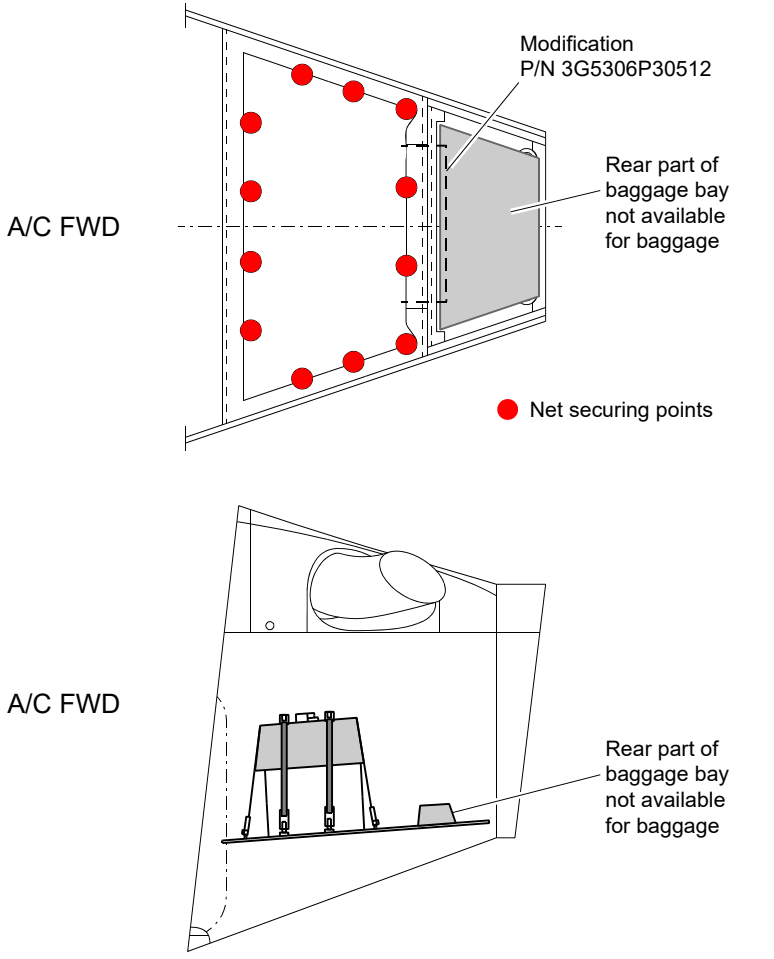

Figure 4 Cargo Net configuration P/N 3G2550A03031 for maximum load 160 kg

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Partial or Full Cabin Extension modifications, the new empty weight and center of gravity position must be determined.

MISCELLANEOUS LIMITATIONS

PARTIAL CABIN EXTENSION LIMITATIONS

— Access to partial cabin extension tunnel must be kept unobstructed.

— Maximum load in Loading Area 1 and 2 .....50 kg + 50 kg (110 lb + 110 lb)

Note

Both Loading Area 1 and 2 may be used simultaneously.

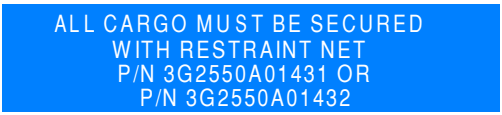
— Maximum unit load..... 215 kg/m^2 (44 lb/sq.ft).

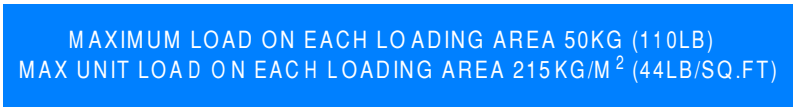
— Maximum load height..... 600 mm (2 ft).

— All cargo in Loading Area 1 or 2 must be secured by restraint net P/N 3G2550A01431 or P/N 3G2550A01432.

— It is prohibited to attach any mass on the rail without the use of an E.A.S.A. approved restraint system.
Any restraint system must comply with the following:
Maximum total load on rails 20 kg (44 lb).
Load C.G. arm must not exceed 100 mm (0.33 ft) from rail.
Both rails must be used to secure items.

PARTIAL CABIN EXTENSION PLACARDS









Placed in Partial Cabin Extension Tunnel

FULL CABIN EXTENSION LIMITATIONS

— A suitably trained cabin attendant must be present, seated in a position for easy access to the cabin extension area. Unobstructed space through cabin must not be less than 508 mm (1 ft 8 in) wide.

— An additional Hand Held Fire Extinguisher must be installed in reach of the Cabin Attendant.

— Only the carriage of personal items and mission specific equipment (e.g. S.A.R.) are permitted.

— Maximum load in Loading Area 1 or 2 .....50 kg (110 lb).

Note

Either Loading Area 1 or 2 may be used but not both simultaneously.

— Maximum unit load in Loading Area 1 or 2 215 kg/m^2 (44 lb/sq.ft).

— Maximum load height in Loading Area 1 or 2 ..... 600 mm (2 ft).

— All cargo in Loading Area 1 or 2 must be secured by restraint net P/N 3G2550A01431 or P/N 3G2550A01432.

— It is prohibited to attach any mass on the rail without the use of an E.A.S.A. approved restraint system.
Any restraint system must comply with the following:
Maximum total load on rails 20 kg (44 lb).
Load C.G. arm must not exceed 100 mm (0.33 ft) from rail.
Both rails must be used to secure items.

— Maximum load in Loading Area 3 restraint net P/N 3G2550A00231..... 300kg (660lb)

— When rear part of baggage compartment is occupied with equipment, maximum load with installation P/N 3G5306P30512 and restraint net P/N 3G2550A03031 .....160 kg (350 lbs)

— Maximum unit load in Loading Area 3 ..... 550kg/m^2 (110lb/sq.ft)

— Maximum load height in Loading Area 3 ..... 350 mm (1.2 ft).

FULL CABIN EXTENSION PLACARDS

ALL CARGO MUST BE SECURED
WITH RESTRAINT NET
P/N 3G2550A01431 OR
P/N 3G2550A01432

MAXIMUM LOAD ON EACH LOADING AREA 50KG (110LB)
MAX UNIT LOAD ON EACH LOADING AREA 215KG/M^2 (44LB/SQ.FT)

MAXIMUM CARGO HEIGHT 600mm (2ft)

MAXIMUM TOTAL LOAD ON RAILS 20KG (44LB)
LOAD C.G. ARM MUST NOT EXCEED 100mm (0.33ft) FROM RAIL
USE BOTH RAILS TO SECURE ITEMS

MINIMUM UNOBSTRUCTED SPACE HALF
TUNNEL WIDTH AND FULL HEIGHT

Placed in Full Cabin Extension Tunnel

ALL CARGO MUST BE SECURED
WITH RESTRAINT NET OR
OTHER APPROVED MEANS

MAXIMUM LOAD FOR RESTRAINT NET

P/N 3G2550A00231	300 KG (660 LB)
P/N 3G2550A03031	160 KG (350 LB)

SEE RFM SUPPLEMENT 54 FOR
RESTRAINT NET ATTACHMENTS
AND CONFIGURATION

MAX UNIT LOAD 550KG/M^2 (110LB/SQ.FT)
MAXIMUM CARGO HEIGHT 350mm (1.2ft)

Placed in Loading Area 3

SECTION 2 - NORMAL PROCEDURES

PRE TAKE-OFF CHECK

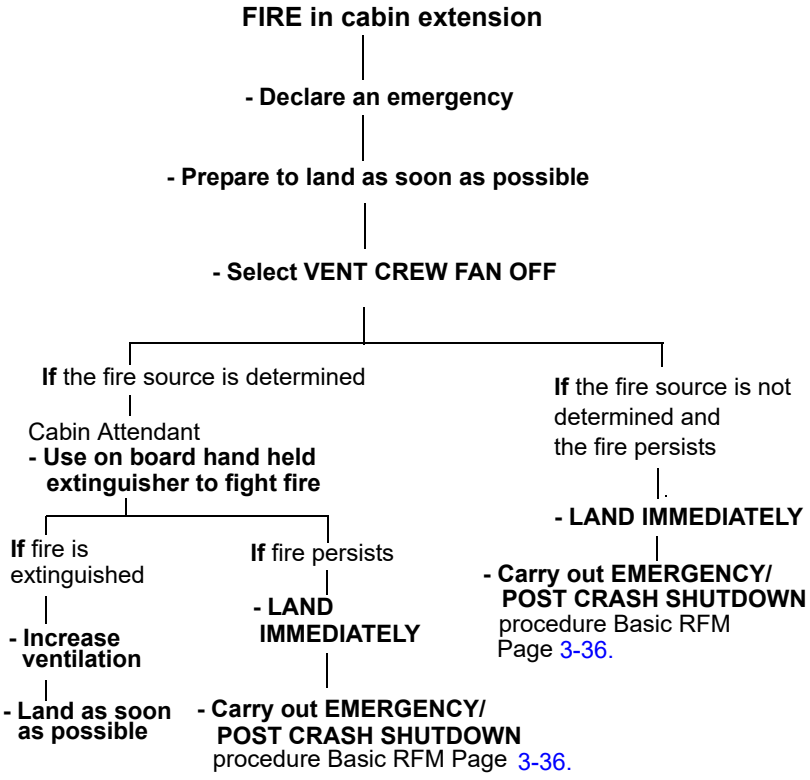
1. Cabin — Confirm all items secure.

2. Hand Held Fire Extinguisher (Full Cabin Extension only) — Confirm present and condition.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

CABIN EXTENSION FIRE (FLIGHT)

An in-flight fire has no single set of detailed procedures that can address all the fire scenarios that are possible in flight. The most urgent action is to get the aircraft on the ground as soon as possible with a reasonable degree of safety.



SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

The diagrams and tables below give the Longitudinal and Lateral positions for baggage in the zone between the fuel tanks.

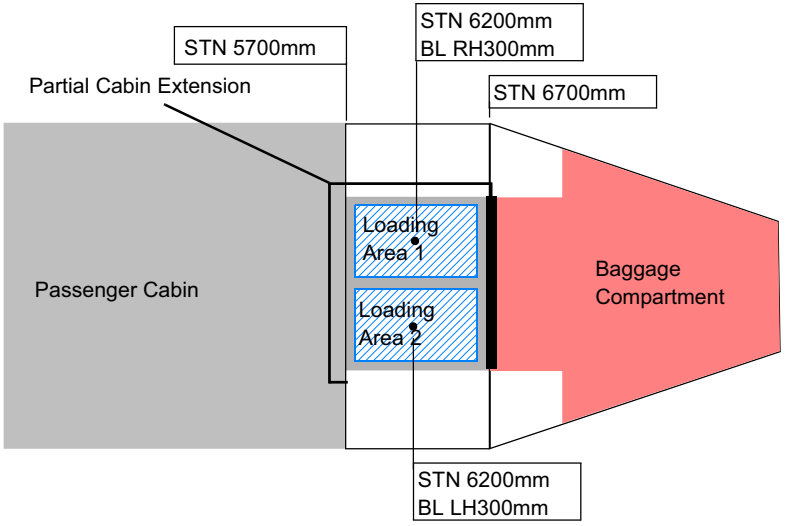


Figure 6-1 Longitudinal and Lateral Position for Partial Cabin Extension

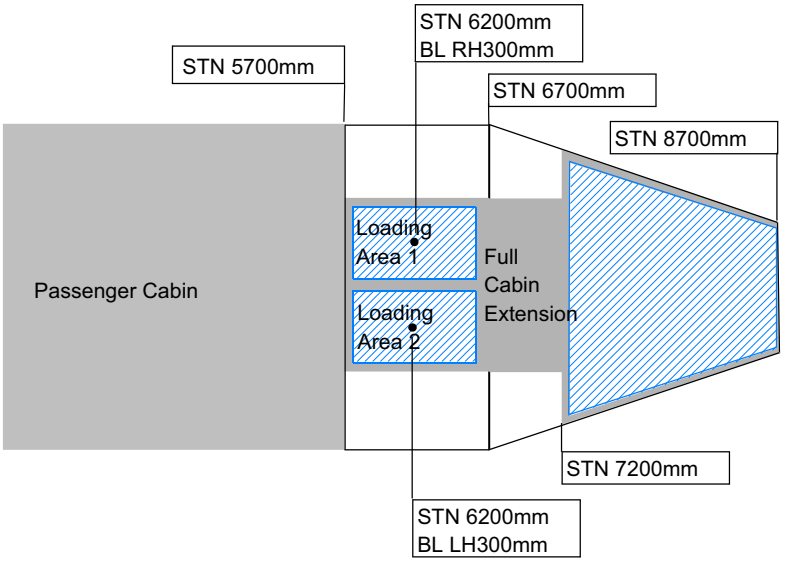


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Figure 6-2 Longitudinal and Lateral Position for Full Cabin Extension

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 55

BAGGAGE COMPARTMENT EXTENSION

P/N 4G2550F00111

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SUPPLEMENT 55
BAGGAGE COMPARTMENT EXTENSION

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GENERAL INFORMATION

This modification consists of the installation of a floor panel between STN 5700 mm and 6700, mounted in the space between the fuel tanks, with tie down rings for restraint nets etc. For aircraft with the avionics bays at the rear the avionic bay walls are reinforced to prevent possible damage when loading baggage.

The new area allows the space above/between the main fuel tanks to be used as an additional baggage storage area.

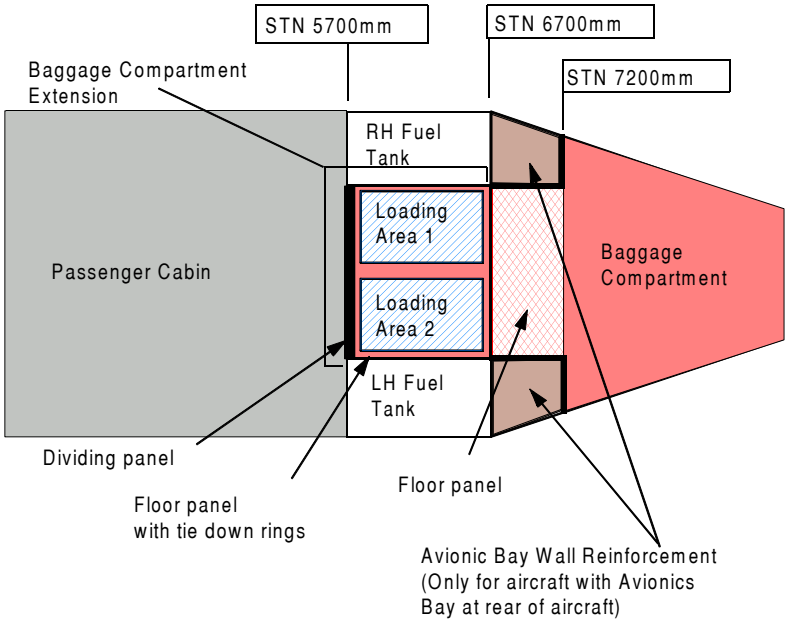

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Figure 1 Baggage Compartment Extension

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Baggage Compartment Extension modifications, the new empty weight and center of gravity position must be determined.

MISCELLANEOUS LIMITATIONS

BAGGAGE COMPARTMENT EXTENSION LIMITATIONS

— Maximum load in Loading Area 1 and 2 .... 50+50 kg (110+110 lb).

Note

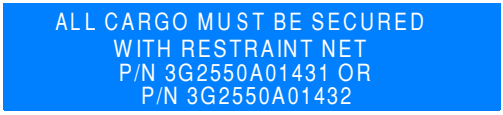
Both Loading Area 1 and 2 may be used simultaneously.

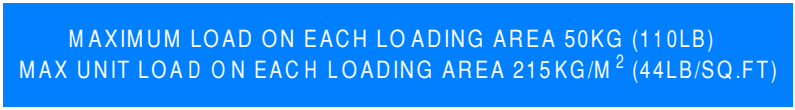
— Maximum unit load ..... 215 kg/m^2 (44 lb/sq.ft).

— Baggage extension maximum load height..... 600 mm (2 ft).

— Baggage in Loading Area 1 and 2 must be secured by restraint net P/N 3G2550A01431 or P/N 3G2550A01432.

PLACARDS







Placed in Baggage Compartment Extension

SECTION 2 - NORMAL PROCEDURES

PRE TAKE-OFF CHECK

1. Baggage — Confirm all baggage secure.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

The diagrams and tables below give the Longitudinal positions for baggage in the zone between the fuel tanks.

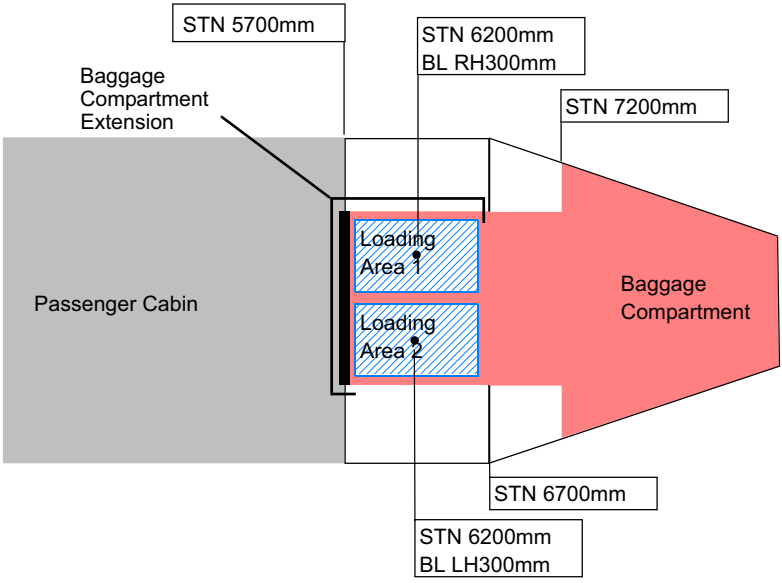


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Figure 6-1 Longitudinal STN for Baggage Compartment Extension

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 56

STRETCHER INSTALLATION

P/N 4G2564F00411
P/N 4G2564F00412
P/N 4G2564F00413/416
P/N 4G2564F00414/417
P/N 4G2564F00415/418
P/N 4G2564F00419

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SUPPLEMENT 56
STRETCHER INSTALLATION

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GENERAL INFORMATION

The Stretcher Installations kit permits up to 4 stretchers and up to 5 seats to be installed in the cabin. The configurations available depend on the internal sound proofing liners installed on the aircraft (soft or rigid liners) as this dictates the installations positions available for the high density seats.

The installation consists of a stretcher support frame, either for up to 4 stretchers (2 lower and 2 upper) or a low mounted frame for up to 2 stretchers. The frame is mounted on the cabin floor longitudinally in the cabin.

The Aerolite stretchers are mounted on the stretcher support frame panels and secured by means of locating pins and a locking handle.

The following configurations are available:

- P/N 4G2564F00411 up to 4 stretchers (2 lower and 2 upper) with up to 5 seats (aircraft with cabin rigid liners)
- P/N 4G2564F00412 up to 4 stretchers (2 lower and 2 upper) with up to 4 seats (aircraft with cabin rigid liners)
- P/N 4G2564F00413/416 up to 4 stretchers (2 lower and 2 upper) with 2 seats (aircraft with cabin soft liners)
- P/N 4G2564F00414/417 up to 2 stretchers with up to 4 seats
- P/N 4G2564F00415/418 one stretcher and up to 5 seats
- P/N 4G2564F00419 up to 4 stretchers (2 lower and 2 upper) with 4 seats (aircraft with cabin soft liners)

The seats positions available depend on the stretcher frame type, typical installations are illustrated in Figure 1 to Figure 9.

Note

The 2 dash numbers 413/416, 414/417, 415/418 represent the same configuration, however, for second number the stretcher support frame is mounted 10 cm further rearward, on dedicated rails, to allow for the longer interseat console installation (interseat console P/N 3G2510F00112 for reference only).

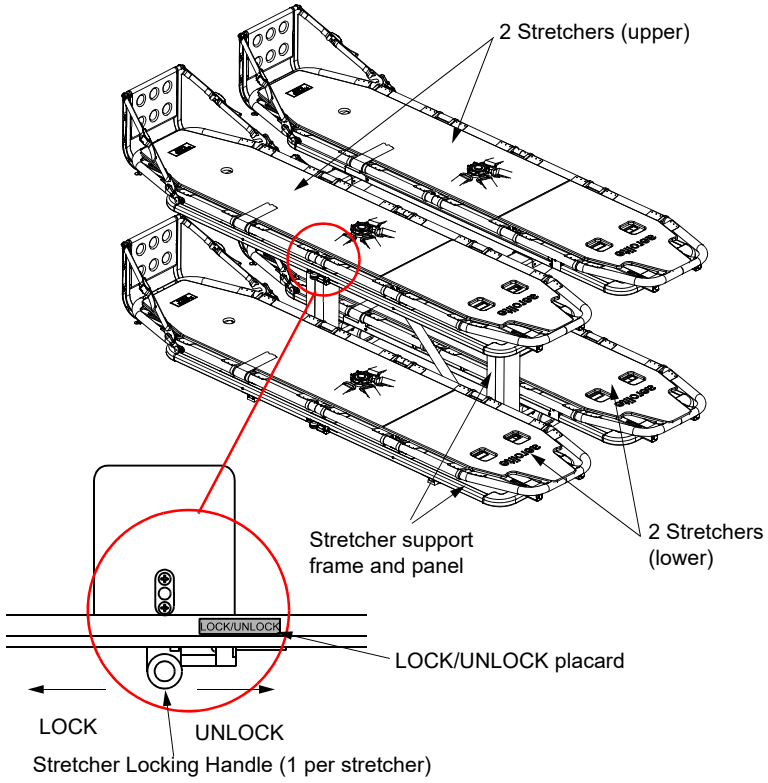

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Figure 1 Stretcher Support Frame and Four Stretchers (for Reference)

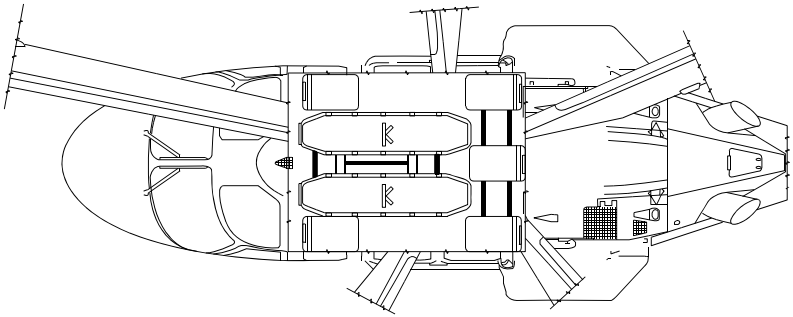

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Figure 2 Four Stretcher Installation with 5 Seats in Cabin, Rigid Liners (Top View) P/N 4G2564F00411

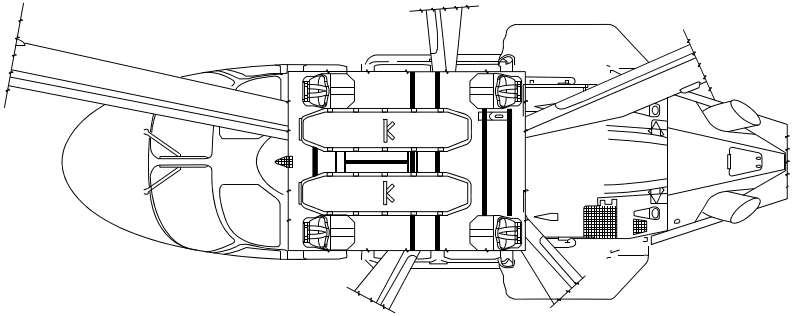

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Figure 3 Four Stretcher Installation with 4 Seats in Cabin, Rigid Liners (Top View) P/N 4G2564F00412

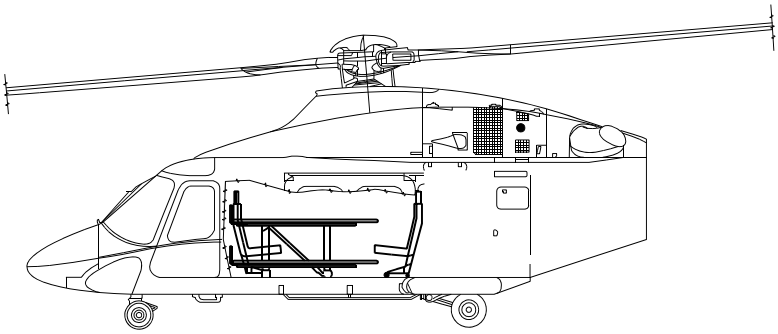

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Figure 4 Four Stretcher Installation (View from Left Hand Side) P/N 4G2564F00411/412

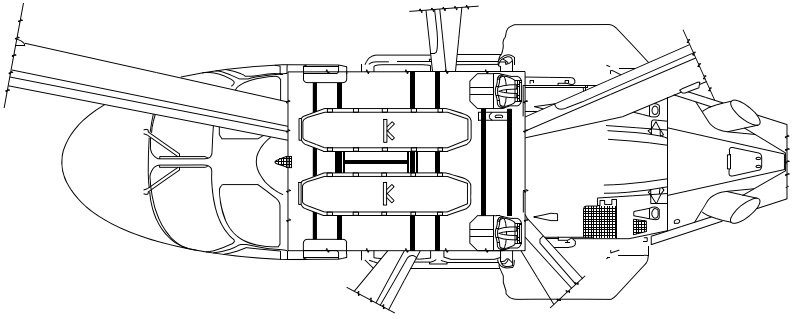

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Figure 5 Four Stretchers Installation with 2 seats, Cabin Soft Liners P/N 4G2564F00413/416 (Top View)

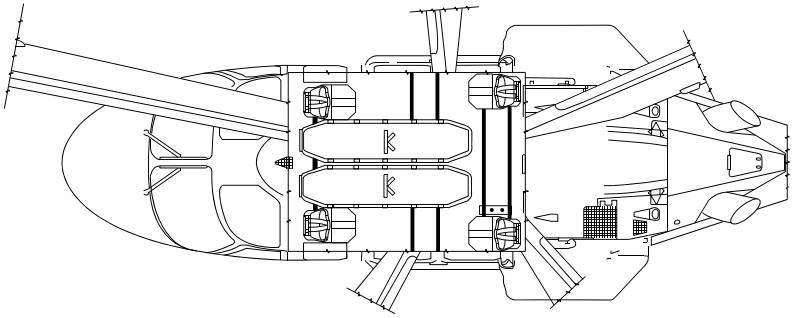

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Figure 6 Two Stretcher Installation with 4 Seats in Cabin, Soft Liners P/N 4G2564F00414/417 (Top View)

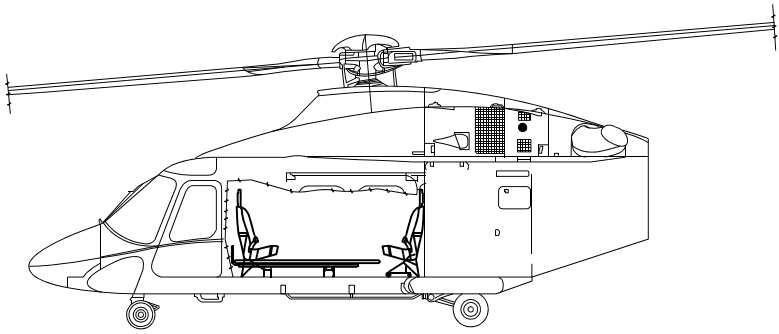

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Figure 7 Two Stretcher Installation (View from Left Hand Side)

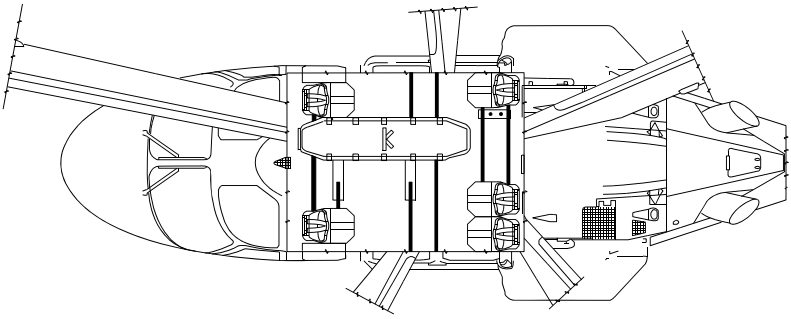

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Figure 8 Single Stretcher Installation with 5 seats in Cabin, Soft Liners P/N 4G2564F00415/418 (Top View)

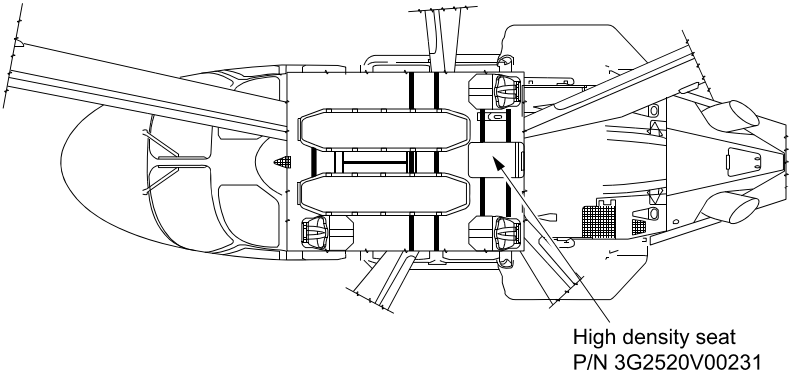

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Figure 9 Four Stretcher Installation with 4 seats in Cabin, Soft Liners P/N 4G2564F00419 (Top View)

SECTION 1 - LIMITATIONS

NUMBER OF CABIN OCCUPANTS

- P/N 4G2564F00411 maximum 4 stretchers occupants (1 per stretcher) with up to 5 passenger/attendants in seats.
- P/N 4G2564F00412 maximum 4 stretchers occupants (1 per stretcher) with up to 4 passenger/attendants in seats.
- P/N 4G2564F00413/416 maximum 4 stretchers occupants (1 per stretcher) with up to 2 passenger /attendants in seats.
- P/N 4G2564F00414/417 Maximum 2 stretchers occupants (1 per stretcher) with up to 4 passenger /attendants in seats.
- P/N 4G2564F00415/418 one stretcher occupant with up to 5 passenger /attendants in seats.
- P/N 4G2564F00419 maximum 4 stretcher occupants with up to 4 passenger /attendants in seats.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the 4 Stretcher Installation, the new empty weight and center of gravity position must be determined.

STRETCHER LIMITATIONS

— the upper stretchers must be occupied before the lower stretchers.

— with one or two stretcher occupants a minimum of one attendant is required.

— with more than 2 stretcher occupants a minimum of 2 attendants are required.

SECTION 2 - NORMAL PROCEDURES

AREA N°7 (Cabin and Cockpit Interior)

1. Stretcher support frame — Verify secure.
2. Stretchers and occupants (if present) — Stretchers secure and occupants restraint belts secure.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY EXITS WITH STRETCHERS

Depending on the situation it is recommended that the upper stretcher occupants are evacuated first (secured to the stretcher, if required) followed by the lower stretcher occupants without the stretcher.

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

The diagrams and tables below give the Longitudinal and Lateral Moment arms for the stretcher and seat installations which must be used in the weight and balance calculations.

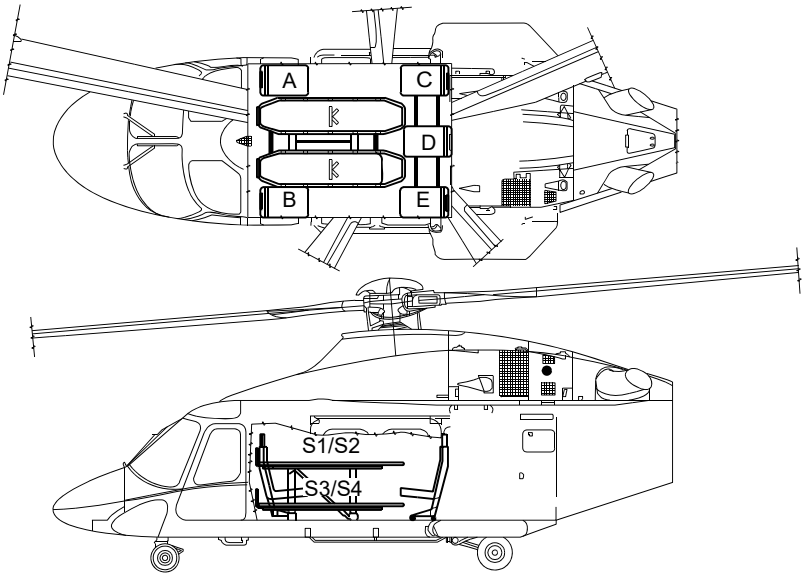

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Figure 6-1 Generic Diagram of Seats and 4 Stretcher Positions (Rigid and Soft Liners) P/N 4G2564F00411/412/413/416/419

P/N 4G2564F00411/412 (Cabin Rigid Liners)		
DESCRIPTION	**ARMS**	
	Longitudinal (STA) (mm)	**Lateral (BL) (mm)**
Stretcher upper right **S1**	4198	368
Stretcher upper left **S2**	4198	-368
Stretcher lower right **S3**	4198	343
Stretcher lower left **S4**	4198	-343
Row 1 RH seat **A**	3449	813
Row 1 LH seat **B**	3449	-813
Row 3 RH seat **C**	5600	813
Row 3 CTR seat **D** (P/N 4G2564F00411 only)	5600	0
Row 3 LH seat **E**	5600	-813

P/N 4G2564F00413/416 (Cabin Soft Liners)		
DESCRIPTION	**ARMS**	
	Longitudinal (STA) (mm)	**Lateral (BL) (mm)**
Stretcher upper right **S1**	(P/N /413) 4198 (P/N /416) 4298	368
Stretcher upper left **S2**	(P/N /413) 4198 (P/N /416) 4298	-368
Stretcher lower right **S3**	(P/N /413) 4198 (P/N /416) 4298	246
Stretcher lower left **S4**	(P/N /413) 4198 (P/N /416) 4298	-246
Row 3 RH seat **C**	5600	813
Row 3 LH seat **E**	5600	-813

P/N 4G2564F00419 (Cabin Soft Liners)		
DESCRIPTION	**ARMS**	
	Longitudinal (STA) (mm)	**Lateral (BL) (mm)**
Stretcher upper right **S1**	4198	368
Stretcher upper left **S2**	4198	-368
Stretcher lower right **S3**	4198	246
Stretcher lower left **S4**	4198	-246
Row 1 LH seat **B**	3449	-813
Row 3 RH seat **C**	5600	813
Row 3 CTR seat **D** (High Density seat P/N 3G2520V00231)	5600	0
Row 3 LH seat **E**	5600	-813

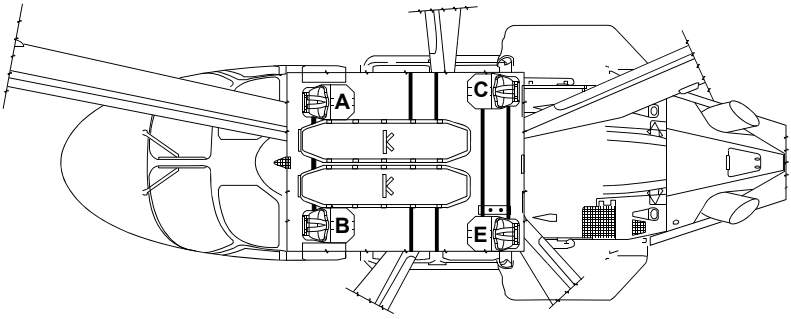

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Figure 6-2 Seat and 2 Stretcher Positions (Cabin Soft Liners) P/N 4G2564F00414/417

P/N 4G2564F00414/417 (Cabin Soft Liner)		
DESCRIPTION	**ARMS**	
	Longitudinal (STA) (mm)	**Lateral (BL) (mm)**
Stretcher lower right	(P/N /414) 4198 (P/N /417) 4298	246
Stretcher lower left	(P/N /414) 4198 (P/N /417) 4298	-246
Row 1 RH seat **A**	3449	703
Row 1 LH seat **B**	3449	-703
Row 3 RH seat **C**	5600	813
Row 3 LH seat **E**	5600	-813

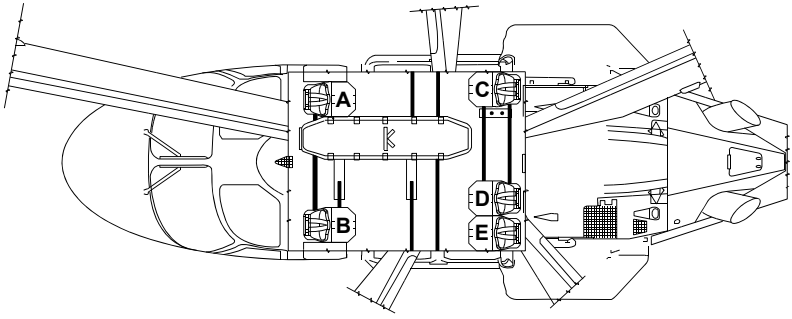

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Figure 6-3 Seat and Single Stretcher Positions (Cabin Soft Liners) P/N 4G2564F00415/418

P/N 4G2564F00415/418 (Cabin Soft Liners)		
DESCRIPTION	**ARMS**	
	Longitudinal (STA) (mm)	**Lateral (BL) (mm)**
Stretcher (RH)	(P/N /415) 4198 (P/N /418) 4298	246
Row 1 RH seat **A**	3449	703
Row 1 LH seat **B**	3449	-703
Row 3 RH seat **C**	5600	813
Row 3 LH seat **D**	5600	-406
Row 3 LH seat **E**	5600	-813

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 57

ACTIVE VIBRATION CONTROL SYSTEM

P/N 4G1830F00211
P/N 4G1830F00111

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SUPPLEMENT 57
ACTIVE VIBRATION CONTROL SYSTEM

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GENERAL INFORMATION

The Active Vibration Control System (AVCS) P/N 4G1830F00211 / P/N 4G1830F00111 is designed to reduce the 5R vibration levels experienced in the cockpit and cabin. The system comprises of 4 Resonant Dynamic Actuator units mounted under the cabin and cockpit floor, accelerometers mounted at a series of key positions on the fuselage, rotor speed signal, an electronic integrated control unit (ICU) and a control panel, mounted in the interseat panel.

The system takes signals from the vibration accelerometers which are processed by the ICU and are sent to the actuators to minimise the vibrations.

The control panel (Figure 1) consists of an OFF/ON switch with power indicator, a built in TEST pushbutton, 2 system status messages, one for DEGRaded operation and one for system FAIL and a maintenance port (MTN PORT) to connect maintenance and trouble shooting equipment.

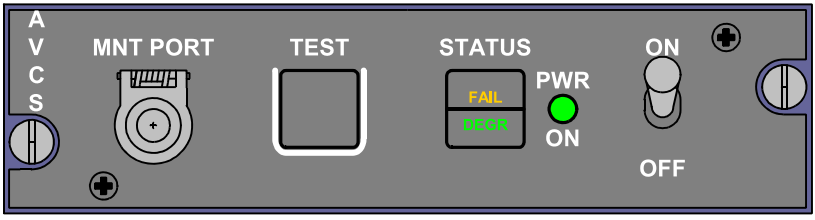

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Figure 1 AVCS Control Panel

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the AVCS kit, the new empty weight and center of gravity position must be determined.

SECTION 2 - NORMAL PROCEDURES

COCKPIT/ENGINE PRE-START CHECKS

1. AVCS control panel power switch	— Confirm OFF.

SYSTEM CHECKS

1. AVCS control panel power switch	— Select ON (with NR at 100%) Confirm PWR ON indicator illuminates.
2. AVCS control panel TEST pushbutton	— Push and hold for at least 1 second. Confirm no messages illuminate

PRE-SHUTDOWN CHECKS

1. AVCS control panel power switch	— Select OFF (with NR at 100%). Confirm PWR ON indicator extinguishes.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM FAILURE

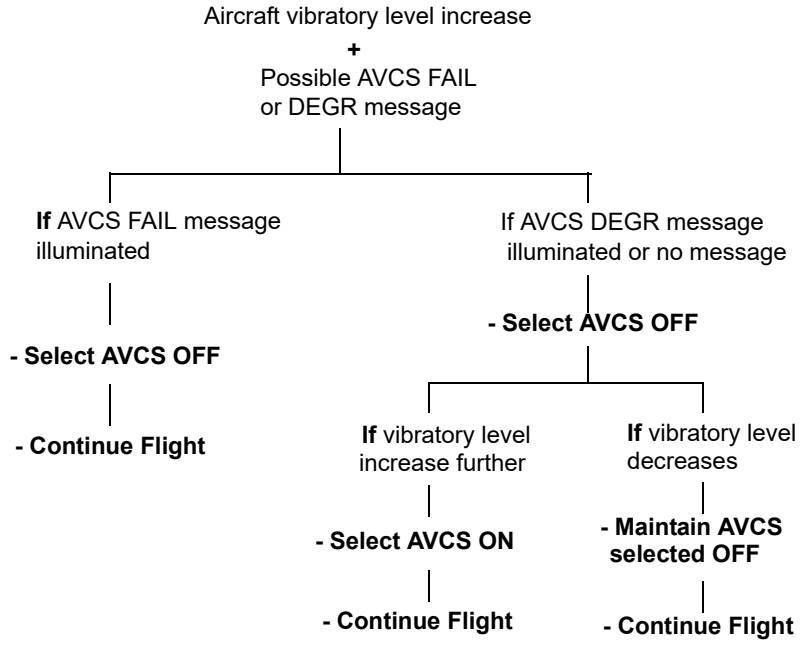
After failure of the DC Non Essential (NON ESS) bus the AVCS system is automatically switched off. An increase in aircraft vibration level may be experienced.

AVCS FAILURE

On Ground

If, at POWER ON of the system, a FAIL or DGR status message illuminates on the controller, press the TEST pushbutton to initiate a test of the system. If, after the TEST has completed, the malfunction remains, switch system OFF. Continue flight or as required.

In Flight



SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 58

MAX VIZ SERIES IR CAMERA

P/N 4G9750F00311
P/N 4G9750F00312
P/N 4G9750F00313

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MAX VIZ SERIES IR CAMERA

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GENERAL INFORMATION

The MAX VIZ Series IR Camera system provides an IR external image forward of the helicopter which may be displayed on the MFD and/or central (5th) display or other displays depending on the customer requirements for the system. The IR external image is a visual aid in conditions of reduced visibility.

The system consists of Long Wave Infrared camera mounted either on top of the cockpit roof EVS 1500 Part No. 4G9750F00311 (Figure 1) or under the aircraft nose, below the pilots seat, EVS 1500 Part No. 4G9750F00312 or EVS 2300 Part No 4G9750F00313 (Figure 2) facing forward, a power supply with processing electronics and necessary cabling.

The power supply is integrated with the processing electronics and necessary cabling for the EVS 2300 Part No 4G9750F00313.

The IR camera circuit breaker and the system ON/OFF switch are located on the Auxiliary Circuit Breaker panel. When switched ON and selected on MFD and/or the central (5th) display a video test pattern is displayed for approximately 5 seconds followed by an OK message. After approximately 20 seconds from power on an IR image is presented on the display. When switched ON the IR camera carries out an automatic recalibration of the IR sensor every 4 minutes. This recalibration is noted by a 1 second blanking of the screen with the message CAL displayed. Depending on customization this calibration can be inhibited when the NUC switch, on the overhead Auxiliary Circuit Breaker Panel, is set to NUC OFF selection.

The EVS display may be presented as full size on the VIDEO page of the MFD and/or central (5th) display. By selecting the WFOV/NFOV switch, located on the overhead Auxiliary Circuit Breaker panel, it is possible to choose from Narrow or Wide field of view. When the system is OFF, the switch position is set to WFOV. On the MAX VIZ EVS 2300 system P/N 4G9750F00313, Narrow or Wide field of view selection affects both the IR and Color Images.

The brightness and contrast can be adjusted on the 5th display as required.

The camera is automatically anti-iced with its own internal heaters when the camera is ON.

For full information on the use of the MAX VIZ IR Camera system refer to appropriate Max Viz Information Manual latest revision.

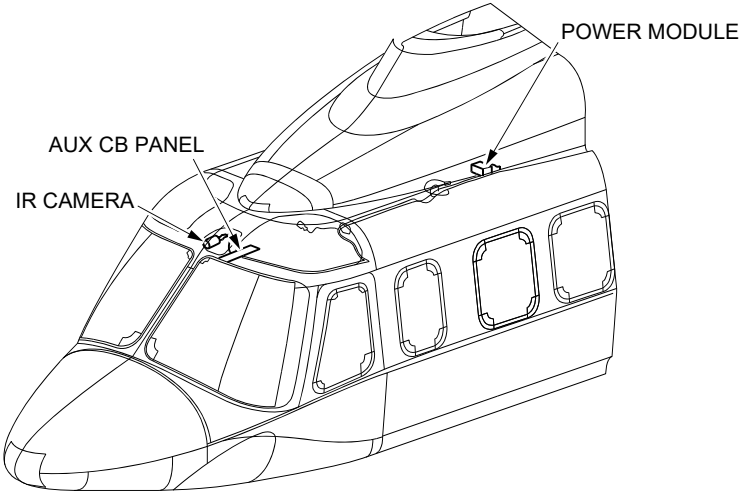

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Figure 1 MAX VIZ EVS-1500 IR Camera Installation on Cockpit Roof and Wiring Part No 4G9750F00311

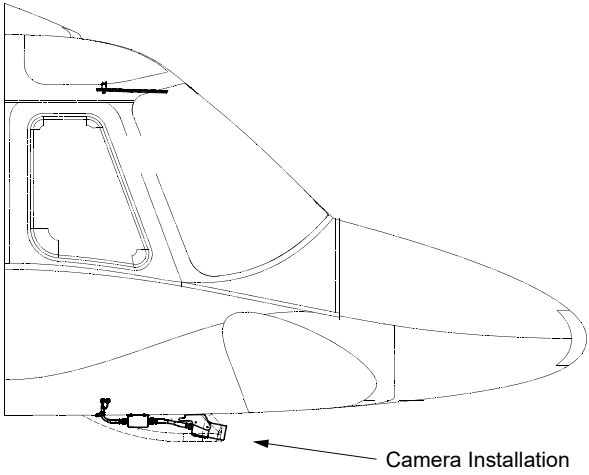

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Figure 2 MAX VIZ EVS-1500 Part No 4G9750F00312 or EVS 2300 Part No 4G9750F00313 IR Camera Installation Under Cockpit

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the MAX VIZ IR Camera kit, the new empty weight and center of gravity position must be determined.

EVS SERIES IR CAMERA LIMITATIONS

The MAX VIZ IR Camera image must not be used for take-off, landing or navigation.

CAUTION

The MAX VIZ IR camera is intended to serve as an obstacle awareness tool only. The display may not provide the accuracy and fidelity on which to base take off, landing and navigation decisions.

SECTION 2 - NORMAL PROCEDURES

Note

For full information on the use of the MAX VIZ IR Camera system refer to appropriate Information Manual latest revision.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the MAX VIZ IR Camera system is switched OFF.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 59

SPONSON WITH REINFORCED TRAILING EDGE

P/N 4G5339F00111
P/N 3G5339A00115
P/N 3G5339A05011
P/N 3G5339A00116

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SUPPLEMENT 59
SPONSON WITH REINFORCED TRAILING EDGE

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GENERAL INFORMATION

The Sponson with Reinforced Trailing Edge introduces a strengthened area to the left and right sponson allowing this area to be used as a step. This may be used to give improved access for unlatching and latching the engine bay doors for Pre Flight inspections.

The reinforced area is shown in Figure 1.

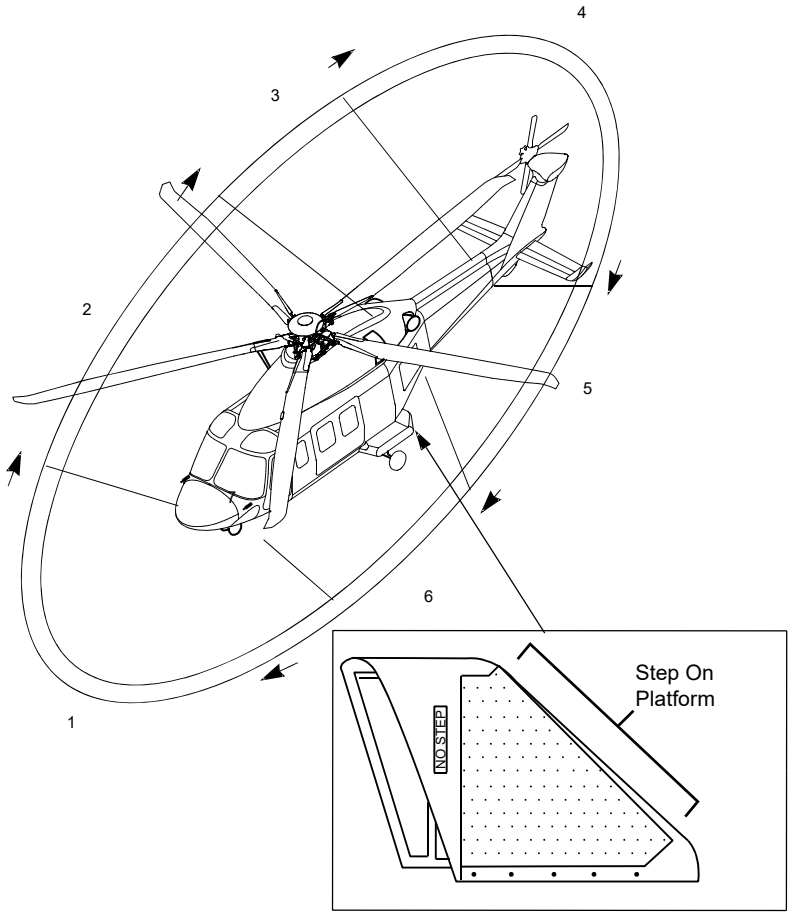

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Figure 1 Left and Right Sponson with Reinforced Trailing Edge

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Sponson with Reinforced Trailing Edge, the new empty weight and center of gravity position must be determined.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECKS

AREA N°2 (Fuselage - Right Hand Side)

1. Engine bay door ➡ — Open using the sponson Step On platform to aid un-latching and opening of bay door.
2. Engine oil level ➡ — Confirm within limits.
3. Engine oil filter ➡ — Confirm red ‘pop out’ oil filter bypass indicator engaged.
4. Engine bay door ➡ — Close and secure latches using sponson Step On platform to aid closing and latching of bay door.

AREA N°6 (Fuselage - Left Hand Side)

1. Engine bay door ➡ — Open using the sponson Step On platform to aid un-latching and opening of bay door.
2. Engine oil level ➡ — Confirm within limits.
3. Engine oil filter ➡ — Confirm red ‘pop out’ oil filter bypass indicator engaged.
4. Engine bay door ➡ — Close and secure latches using sponson Step On platform to aid closing and latching of bay door.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 60

NIGHT VISION GOGGLE OPERATIONS

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SUPPLEMENT 60
NIGHT VISION GOGGLE OPERATIONS

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DEFINITIONS AND ABBREVIATIONS

Abbreviations and acronyms used throughout this Supplement are defined as follows:

— IR : Infra Red

— NVG : Night Vision Goggles

— NVIS : Night Vision Imaging System

GENERAL INFORMATION

For NVG operations the NVIS compatible lighting systems, P/N 4G3360F00111 and EPIC software Phase 4, or subsequent, are required. The NVIS compatible lighting consists of internal and external lighting modifications to make the aircraft compatible for the use with NVG systems.

The aircraft configuration involving internal/external emitting/reflecting equipment approved for use with NVG is described in the Report 139G3360A001 AW139 NVG COMPATIBILITY REFERENCE HANDBOOK. Any internal/external emitting/reflecting equipment and NVG types not defined in the above AW report does not permit NVG Operations.

Internal Lighting

The NVIS compatible cockpit and cabin installation consists of compatible controller panels and lighting. See Document 139G3360A001 AW139 NVG COMPATIBILITY REFERENCE HANDBOOK.

The cockpit lights are controlled by the standard instrument LT panel (Figure 4) and display DIM panel (Figure 3) and the NVG LT panel (Figure 1), all mounted in the interseat console. The NVG LT panel includes the MODE NVG/NORM switch which is used to select the brightness of the displays. When selected to NORM full brightness is available, via the standard dimmers, for the displays, instruments and master warning/caution panels. When NVG is selected the displays maximum brightness is limited to a prefixed level, however, full brightness is available for the instruments and brightness may still be adjusted by the standard dimmers. The master warning/caution lights are reduced to the fixed night operation brightness level.

The cockpit dome light (flood light) is also controlled from the standard LT panel and is a white NVG compatible light.

The cabin lights, controlled by the CABIN dimmer on the NVG LT panel. If white, non NVG compatible, lights are mounted in the cabin roof they are automatically switched OFF when the MODE switch on the LT panel is selected to NVG. If NVG compatible lights are mounted they remain ON and their brightness may be adjusted.

The STORM ON/OFF switch on the NVG LT panel, controls the cockpit STORM lights, which are non NVG compatible and are mounted on the overhead panel. When the NVG LT panel MODE switch is selected to NVG these lights are made inoperative independent of the position of the STORM switch.

The EMERG light ON/ARM/OFF gated switch controls the cabin and external emergency lights (an EMERG light pushbutton is also available in the cabin, Figure 2). These are non NVG compatible and function regardless of the position of the MODE switch. In ARM position the emergency lights come on only when the aircraft electrical power is removed.

The cockpit utility lights are NVG compatible.

Additionally a cockpit cabin dividing curtain or panel may be installed to prevent inadvertent entry of non NVG compatible light from the cabin, (See 139G3360A001 AW139 NVG COMPATIBILITY REFERENCE HANDBOOK). An equivalent curtain, which prevent light leakage from the cabin to the cockpit, approved by the competent authority, may be installed.

External Lighting

The NVIS compatible external lighting consists of:

— An anti-collision light which is NVIS friendly normal light

— Position lights which are NVIS friendly normal light

— Secondary landing light (searchlight) with selectable normal (white light) and IR light options.

External lights are controlled by the standard EXTERNAL LIGHTS overhead panel.

In NORMAL or NVG MODE the anticollision (ACOLL) and position (POSLT) lights, when switched ON, operate with visible light but are NVIS compatible. In NORMAL MODE the landing lights, when switched ON using either collective switch, operate in non NVIS compatible white light mode. The secondary landing light (LDG LT2) only can be switched to IR using the SRCH/LDG switch WHITE/IR selection located in the overhead DC Generation and Distribution panel. In NVG MODE the landing light (LDG LT) is automatically switched OFF, the LDG LT2 remains available and selectable to white non NVIS compatible or IR by the WHITE/IR selector.

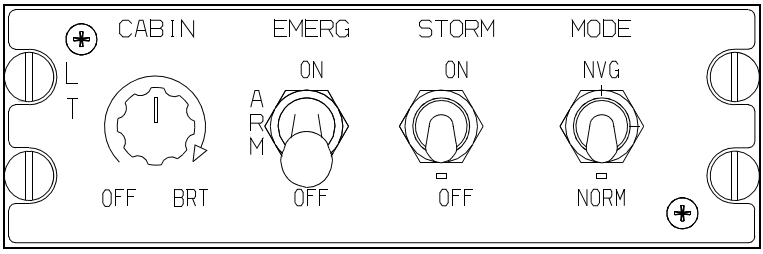

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Figure 1 Internal NVG LT Lighting Control Panel

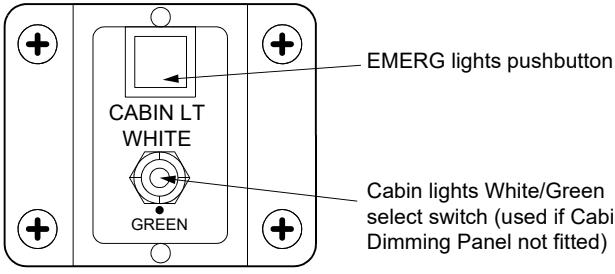

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Figure 2 Cabin EMERG Lights Pushbutton

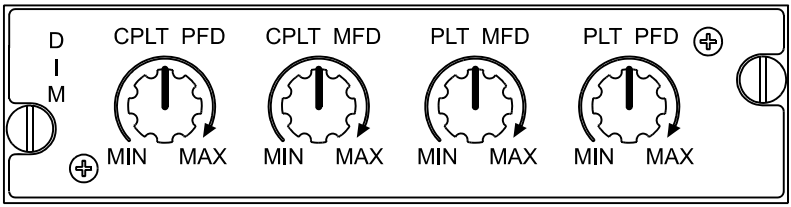

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Figure 3 Display Dimmer Panel

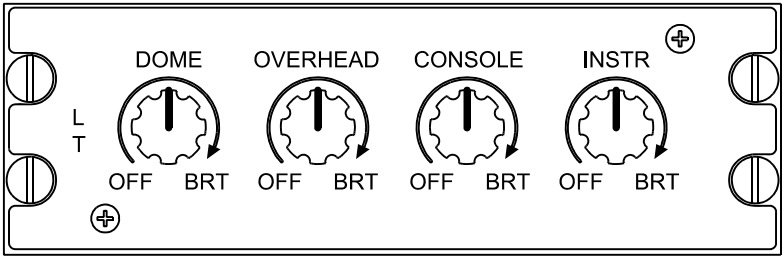

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Figure 4 Lights Dimmer Panel

SECTION 1 - LIMITATIONS

GENERAL

Any change to the aircraft configuration involving light emitting or reflective equipment or NVG model types not included in document 139G3360A001 AW139 NVG COMPATIBILITY REFERENCE HANDBOOK makes the aircraft NOT NVG COMPATIBLE and NVG operations are not permitted.

TYPE OF OPERATION

— The Operator must receive NVG operations approval by the Competent Authority in accordance with the applicable National Operating Regulations.

MINIMUM FLIGHT CREW

For two pilot operations both pilots must be equipped with the same type of NVGs (Green phosphor or white phosphor, mixing of phosphor screen is not permitted).

For Single pilot operations (see Supplement 24 or Supplement 32 FAA Only):

— an additional, trained, crew member must be equipped with and use the same phosphor screen of NVGs as the pilot during take-off and landing, on unimproved sites, to assist in obstacle identification and clearance.

— an additional crew member using NVG's is not required during Take Off and Landing on improved sites and when the aircraft is above 300 ft AGL and in cruise.

All crew members must be familiar with NVG operating procedures and, if using NVGs they must be of the same phosphor screen as the pilot's.

WEIGHT AND CG LIMITATIONS

After NVIS compatible internal and external lighting installation, the new empty weight and CG location must be determined.

NVG OPERATION LIMITATIONS

The following required equipment must be in proper working order for NVG operations:

— Aviator's Night Vision Goggles as specified in 139G3360A001 AW139 NVG COMPATIBILITY REFERENCE HANDBOOK.

— Helmet with NVG mount suitable for NVG Model being used.

— Cockpit/Cabin dividing curtain or functionally equivalent and approved by the competent authority, if required. Refer 139G3360A001 AW139 NVG COMPATIBILITY REFERENCE HANDBOOK for details.

— EPIC software release Phase 4 or subsequent.

PLACARDS

NVG OPERATIONS
PERMITTED

Installed on the instrument panel when the aircraft configuration complies with document 139G3360A001

NVG OPERATIONS
NOT PERMITTED

Installed on the instrument panel when the configuration of NVG compatible aircraft has been modified with components not defined in document 139G3360A001

SECTION 2 - NORMAL PROCEDURES

PRE FLIGHT CHECKS

AREA N°2 (Fuselage - Right Hand Side)

1. Windshield and roof transparent panels — Condition, cleanliness, free of scratches.

AREA N°6 (Fuselage - Left Hand Side)

1. Windshield and roof transparent panels — Condition, cleanliness, free of scratches.

AREA N°7 (Cabin and Cockpit Interior)

1. Lower and lateral transparent panels — Condition, cleanliness, free of scratches and no signs of brake fluid.
2. NVIS internal and external lighting panels (interseat console) — Present, select as required.

Note

Chart Holder Kit P/N 4G2510F00112 (if installed) place in stowed position.

3. Cockpit/Cabin dividing curtain (if installed) — Present, condition, correctly installed.
4. NVGs and NVG helmet mount — Present, condition.

SYSTEM CHECKS

1. NVGs — Adjust as required, check primary and spare battery power indicator not illuminated.
2. NVIS internal lighting — Select MODE to NVG on LT panel.
   Check for compatibility and leakage.
   Adjust dimmers as required.
3. NVIS external lighting — Select as required, check for compatibility.
4. Cockpit/Cabin dividing curtain (if installed) — As required.

Note

Any equipments that may be moved, to allow its operation from the cockpit or by crew member in the cabin, should not disturb the dividing curtain functionality creating light leakage from the cabin to the cockpit.

5. NVIS lighting — Select MODE switch NORM/NVG as required.

IN FLIGHT

Note

Prior to selecting MODE switch to NVG advise cabin occupants that NVG operations are being selected and cabin lights will be extinguished.

1. Cockpit/Cabin dividing curtain (if installed) — Check curtain closed.
2. MODE switch on LT panel — Select NVG as required.
3. NVIS lighting internal — Adjust as required.
4. NVIS external lighting — Select as required.

Note

Transition from NVG operations to non NVG operations (and vice versa) should be carried out during a non critical phase of flight and by one crew member at a time.

Note

Prior to selecting MODE switch to NORMAL advise cabin occupants that non NVG operations are being selected and cabin lights will be illuminated.

PRE-LANDING CHECKS

Note

If NVG landing is required do not use LDG LT. Use LDG LT 2 selected to WHITE or IR, as required.

POST SHUT DOWN CHECKS

Record NVG battery operational times in NVG Battery Record.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

If aircraft emergencies or malfunctions occur during NVG operations the pilot must first maintain control of the aircraft and then initiate the RFM procedure for the emergency or malfunction. The pilots decision to continue NVG operations should be based on the emergency or malfunction situation.

NVG MALFUNCTIONS

Two Pilot Operations

Partial failure of right (left) pilot NVGs and right (left) pilot flying

- Left (right) pilot take control of aircraft

- Continue operations or transition to unaided flight as required

Complete failure of right (left) pilot NVG and right (left) pilot flying

- Left (right) pilot take control of aircraft

- Transition to unaided flight

Single Pilot Operation

Partial or complete
failure of NVGs

- Transition to unaided flight

NVIS LIGHTING MALFUNCTION

Discontinue NVG use if the malfunction degrades the NVIS compatibility.

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 61

ADDITIONAL SECONDARY LANDING LIGHT

P/N 4G3340F01811

or

P/N 4G3340F01812

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SUPPLEMENT 61
ADDITIONAL SECONDARY LANDING LIGHT

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GENERAL INFORMATION

The additional secondary landing light (RH LDG LT2) installation P/N 4G3340F01811 (NVG Compatible) or P/N 4G3340F01812 (Non NVG Compatible), introduces an additional secondary landing light (search-light) which is an identical unit as the standard LH LDG LT2 but mounted under the aircraft on the right hand side (See Figure 1).

The control of the two secondary landing lights is via the LT control panel installed in the interseat console (See Figure 2 or Figure 4) and the standard five way switch mounted on each collective.
(See Figure 3).

When the SELECT switch on the LT panel is set to NONE neither of the two LDG LT2 can be operated. When selected to RH, (and the UNSTOW STOW/OFF switch is in STOW/OFF position the RH LDG LT2 remains stowed and unpowered and a white status message RH LDG LT2 SEL illuminates on the CAS. Selecting the UNSTOW STOW/OFF switch to UNSTOW the RH light remains stowed but is powered. By pressing the five way switch, on either collective, in the central position the RH light is turned on, the green advisory message SEARCH LT ON illuminates on the CAS and the RH ON indicator light on the LT panel illuminates. The light remains stowed until the collective five way switch is moved to EXT which extends the light. The light may then be directed left (L) or right (R) and down (RETR) or up (EXT) by pushing on the beep switch. Pressing the central position again turns the light off but leaves it extended. With the light switched off it is not possible to move the light. At any time selecting the RH UNSTOW STOW/OFF switch to STOW/OFF will stow and switch off (if on) the light.

The same procedure is used for the LH LDG LT2 secondary landing light mounted on the left hand side.

A further characteristic of the system is that if one secondary landing light is extended and on, then the LT panel SELECT switch is selected to the other LDG LT2 this second light may then be switched on, extended and moved as required by the five position switch on either collective. The first light will then remain on, and in the last set position, giving increased illumination. Both lights may then be controlled one at a time by selecting the SELECT switch.

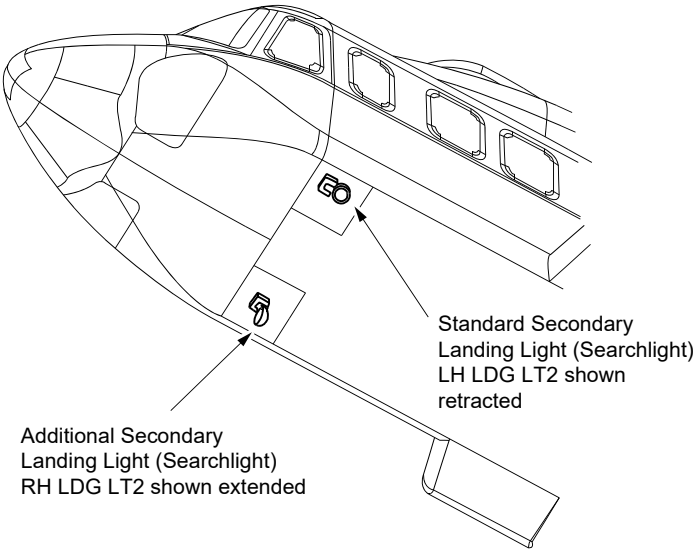

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Figure 1 Additional Secondary Landing Light (Searchlight)

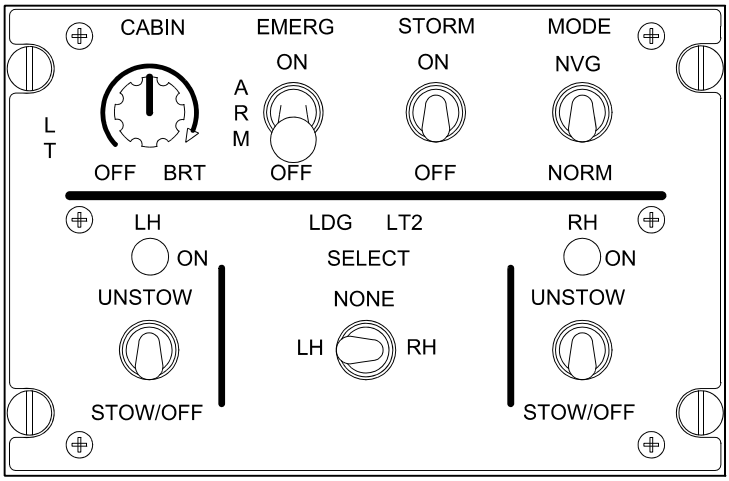

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Figure 2 LT Panel with Additional Secondary Landing Light Control (NVG Compatible Version)

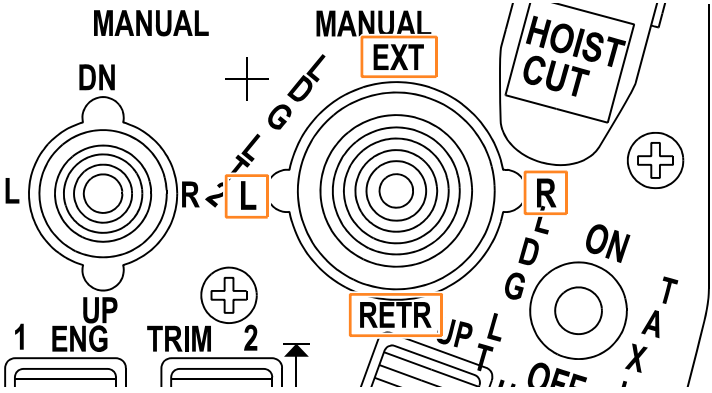

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Figure 3 Collective LDG LT2 5 Position Switch

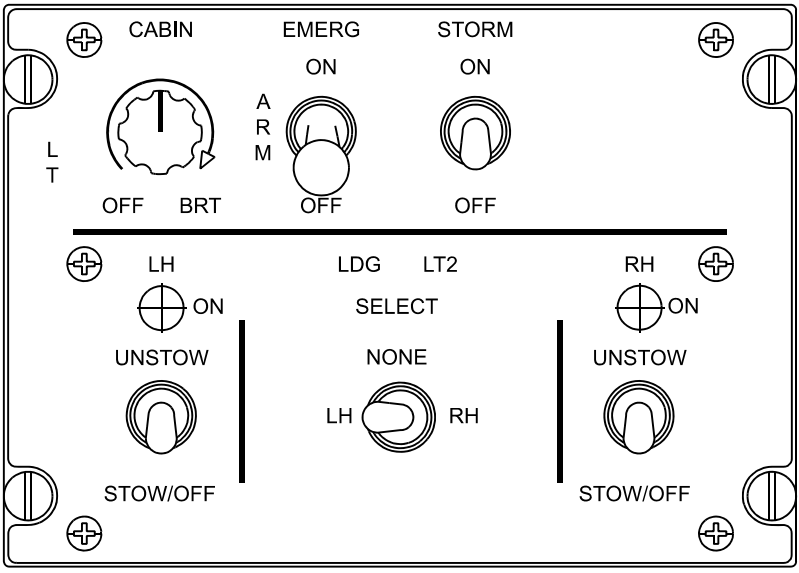

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Figure 4 LT Panel with Additional Secondary Landing Light Control (Non NVG Compatible Version)

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Additional Secondary Landing Light, the new empty weight and center of gravity position must be determined.

SECTION 2 - NORMAL PROCEDURES

CAS Caption (Green)	System State
SEARCH LT ON	LDG LT2 switched ON

CAS Caption (White)	System State
LH LDG LT2 SEL	Left Hand LDG LT2 selected
RH LDG LT2 SEL	Right Hand LDG LT2 selected

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

Services Lost During Bus Failures

DC MAIN BUS 2

SEARCH LIGHT CONTROL (RH LDG LT 2)
SEARCH LIGHT POWER (RH LDG LT 2)

DC NON ESS BUS 1

SEARCH LIGHT CONTROL (LH LDG LT 2)
SEARCH LIGHT POWER (LH LDG LT 2)

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 62

RADIO EQUIPMENT
V/UHF TALON RT-8108

P/N 3G2310F00311
P/N 4G2310F01811

The replacement of the equipment detailed in this Supplement is not allowed without the successful completion of the additional verifications reported in the Maintenance Manual.

Changes to the helicopter configuration (i.e. installation of approved equipments) are not allowed without the successful completion of the verifications reported in the Maintenance Manual.

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SUPPLEMENT 62
RADIO EQUIPMENT
V/UHF TALON RT-8108

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GENERAL INFORMATION

The V/UHF TALON RT-8108 is an AM/FM analog/digital radio communication system.The system comprises of the RT-8108 transceiver, the RCU-8150 control panel and dedicated antenna with Logic Converter Unit.

The ICS panel is used to access the radio system, either COM 3 or COM 4 depending on the configuration. Control of the radio is via the TALON RCU-8150 Control Panel, mounted in the interseat console. The control panel incorporates the controls used to switch the radio ON/OFF, configure the radio frequecies or carry out a BIT check. See Figure 1.

The TALON Radio System provides AM and FM electronic counter-countermeasure (ECCM) modes HAVE QUICK, HAVE QUICK II and TALON. The tranceiver also provides the capability for combinations of secure, jamresistent or non-jam resistent, and voice or data communications. The RT-8108 can tune 25-kHz channels in 2.5 kHz increments over the frequency range 30.000 to 399.9925 MHz (AM), and can transmit and receive voice on 8.33kHz channels in the ATC band 118.000 to 136.975, using non ECCM mode.

The RT-8108 inhibits transmissions from 108.000 to 117.9975 MHz, in non-ECCM modes of operation.

The Talon Radio can support up to 250 preset channels including ECCM channels, two Guard Receiver Frequencies (121.5 MHz/243.0 MHz) and 57 permanently stored Maritime channels.

For completed details of V/UHF TALON Radio refer TALON VHF/UHF/EP Communications System RT-8108, Operators Guide Doc No 523-0806336-002117, latest issue.

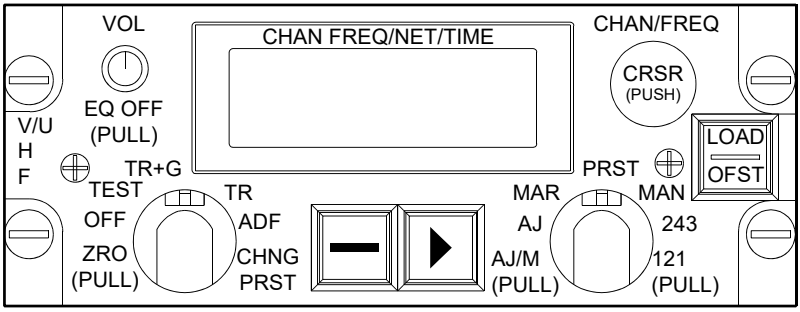

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Figure 1 TALON RCU-8150 Control Panel

SECTION 1 - LIMITATIONS

TYPE OF OPERATION

The V/UHF TALON radio, when installed in the cabin, is for mission related communications only.

The V/UHF TALON radio is considered a secondary radio system and must not be used for radio communications with Air Traffic Control (ATC).

CENTER OF GRAVITY LIMITATIONS

After TALON system installation, the new empty weight and CG location must be determined.

TALON RADIO LIMITATIONS

Use of the radio must be authorised by the pilot in command.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE FLIGHT CHECKS

AREA N°6 (Fuselage Left Hand Side)

1. TALON antenna (1)➡ — Condition.

IN FLIGHT

CAUTION

During TALON RT-8108 transmissions:

- interference may be experienced on the ATC radios
- VOR signals may be lost when the radio frequency is half of the VOR frequency.

Note

For complete details of TALON radio refer TALON VHF/ UHF/EP Communications System RT-8108, Operators Guide Doc No 523-0806336-002117, latest issue.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 63

"GREEN" AIRCRAFT CONFIGURATION

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SUPPLEMENT 63
"GREEN" AIRCRAFT CONFIGURATION

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GENERAL INFORMATION

The "Green Aircraft" configuration is defined as an interim before aircraft completion and is defined in the General Arrangement Drawing N° 3G0000F00111. It includes the following non conformities:

a) The helicopter may not be painted externally

b) Passenger seats not installed

c) Interior cabin arrangement (soundproofing, upholstery, etc.), not installed

d) Interior and exterior cabin markings, Emergency Lights and speakers not installed

e) Interior cabin Fire Extinguisher not installed.

The equipment listed in items c) to e) may be partially installed.

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SECTION 1 - LIMITATIONS

MINIMUM FLIGHT CREW

See Basic RFM.

NUMBER OF OCCUPANTS

No occupants are permitted in the cabin.

WEIGHT AND CENTER OF GRAVITY LIMITATION

In the 'Green' configuration, the empty weight and center of gravity position must be determined.

BAGGAGE COMPARTMENT LIMITATIONS

No baggage is permitted in the baggage compartment.

PLACARDS



Baggage Compartment

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 64

TALON FLIR

P/N 4G9350F00511

The replacement of the equipment detailed in this Supplement is not allowed without the successful completion of the additional verifications reported in the Maintenance Manual.

Changes to the helicopter configuration (i.e. installation of approved equipments) are not allowed without the successful completion of the verifications reported in the Maintenance Manual.

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TALON FLIR
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GENERAL INFORMATION

The Talon FLIR P/N 4G9350F00511 is a remote controlled day/night high resolution, infrared (IR) imaging system with colour video.

The system consists of a Turret Sensor Unit (TSU) with IR camera, colour Charged Coupled Device (CCD) camera, laser range finder and optional laser pointer mounted on the left hand side of the helicopter (Figure 1 & Figure 2). A Joystick Control Unit (JCU) mounted in the interseat console and operated from the right hand seat, contains all the controls necessary to operate the FLIR (Figure 4) and a Control Electronics Unit (CEU) which processes the electronics for the system.

The TSU is gyro stabilized and its azimuth and elevation are controlled by the JCU. The TSU can be rotated 360° in both azimuth and elevation and internal rate gyros sense platform motion and vibrations and remove unwanted effects. The TSU has an automated anti-ice system that engages at temperatures below 0° C.

The IR camera produces images in total darkness or in low visibility or low contrast ambient condition. The IR camera has a selectable 1.8X optical extender to increase stand off capability. The CCD camera provides images in visible and low light ambient conditions.

The eye safe laser range finder (ESLRF) is a Class 1 device.

The IR and CCD cameras provide video outputs that can be monitored on either pilot or copilot MFD. Either IR or CCD images can be selected independently on pilot and copilot MFD or both images in miniature. If a digital map is installed the copilot and pilot MFD will only display the same source data, either FLIR or digital map.

The optional central 5th display can be used to display either image but only the selected (active) FLIR camera image will be displayed.

The optional Laser Pointer is eye unsafe Class 3b device. When installed a series of 4 safety interlocks including a Laser Safety Switch (Figure 3) must be met which provides an interlock to stop the laser being activated inadvertently.

For full information on the use of the Talon FLIR refer to Talon Imaging Systems Operator’s Manual P/N 23393-000 Rev 1 or latest issue.

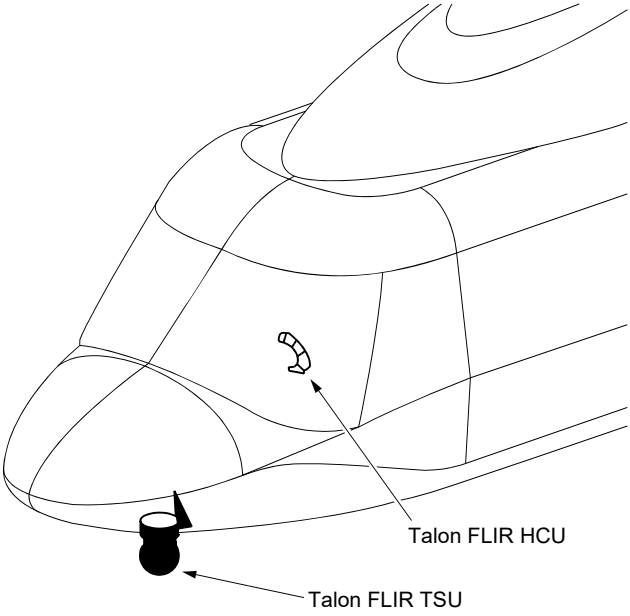

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Figure 1 Talon FLIR Installation

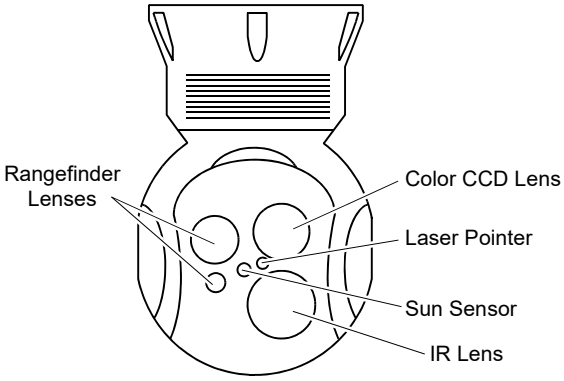

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Figure 2 Talon FLIR Turret (TSU)

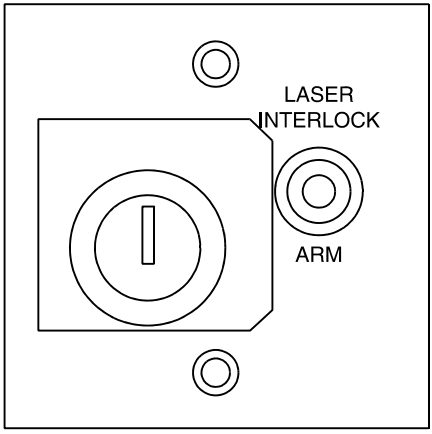

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Figure 3 Optional FLIR Laser Pointer Arm Panel

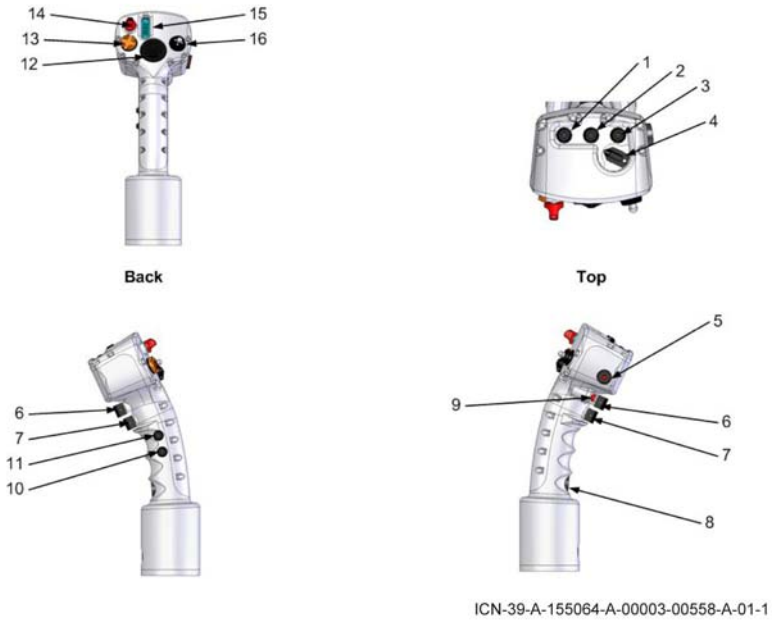

Figure 4 Hand Control Unit diagram

No	Function	No	Function
1	MENU	11	TRK O/I
2	SEL	12	STRAIN GUAGE
3	EXIT	13	GAIN (UP)
4	OFF (LEFT)		TRK MODE (LEFT)
	CAGE (LEFT CENTER)		DISPLAY (RIGHT)
	STANDBY (RIGHT CENTER		LEVEL (DOWN)
	OPERATE (RIGHT)	14	GAIN (UP)
5	PTR		LEVEL (CENTER)
6	ZOOM		TRK WDW (DOWN)
7	FOCUS	15	ADJUST
8	IR / VIS	16	SHIFT (UP)
9	RNG		POS / HHOLD (LEFT)
10	1.8X / NULL		SCAN // RBH (RIGHT)
			POL / CAL (DOWN)

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Talon FLIR kit, the new empty weight and center of gravity position must be determined.

TALON FLIR LIMITATIONS

The FLIR must not be used for navigation.

The FLIR must be operated from the left hand seat or by Operator in cabin.

Operation of the FLIR laser pointer Class 3b device, if fitted, must be authorised be the Competent Authority.

The FLIR laser pointer, if fitted, must not be operated when close to personnel, marine life or animals.

The ESLRF must not be operated when close to personnel.

SECTION 2 - NORMAL PROCEDURES

Note

For full information on the use of the Talon FLIR refer to Talon Imaging Systems Operator's Manual P/N 23393-000 Rev 1 or latest issue.

EXTERNAL PRE FLIGHT CHECKS

AREA N°6 (Fuselage - Left Hand Side)

1. Talon FLIR TSU	— Secure. Check IR and CCD camera lens condition and cleanliness.

AREA N°7 (Cockpit Interior)

1. Talon FLIR JCU	— Check present, connected and secure.

ENGINE PRE-START CHECKS

1. Talon FLIR JCU — Confirm system switched OFF.

SYSTEM CHECKS

1. Talon FLIR JCU — Switch system ON.

2. Talon FLIR image — Select image display as required (pilot, copilot MFD, Central 5th display).
   Select IR or CCD camera as required.

3. Talon FLIR JCU — Select standby (to stow FLIR) or OFF as required.
   Stow HCU or as required.

IN FLIGHT

1. Talon FLIR JCU — Switch system ON.

2. Talon FLIR image — Select image display as required. (pilot/copilot MFD by selecting FLIR Cam on MFD system menu, or by selecting FLIR button on Central 5th display, if fitted).
   Select IR or CCD camera as required.

3. Talon FLIR JCU — Control FLIR direction and settings as required.

Note

During flight between 30 and 40 KIAS the Talon FLIR image may be degraded.

CAUTION

The ESLRF should not be operated close to personnel.

4. ESLRF — Select range finder as required.

WARNING

The Laser pointer, if fitted, must not be operated when close to personnel, animals or marine life.

5. Laser pointer, if fitted — Select arm panel switch to on and select pointer as required.

Note

When FLIR is not being used it should be switched either to standby or OFF which stows and protects the FLIR cameras.

PRE LANDING CHECKS

1. Talon FLIR JCU — Switch system to standby or OFF to stow FLIR cameras.

2. Laser pointer arm panel, if fitted — Confirm off.

PRE SHUTDOWN CHECKS

1. Talon FLIR JCU — Confirm FLIR switched OFF and JCU stowed.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the Talon FLIR system is switched OFF.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 65

CABIN COMPARTMENT EXTENSION WITH LONGITUDINAL AUXILIARY FUEL TANK

P/N 4G2800F00111

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SUPPLEMENT 65
CABIN COMPARTMENT EXTENSION WITH LONGITUDINAL AUXILIARY FUEL TANK

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GENERAL INFORMATION

The Longitudinal Auxiliary Fuel Tank is a single additional fuel tank. The tank consists of a fuel cell installed on the left hand side of the bay above the standard fuel tanks. (See Figure 1)

The tank is connected to the left hand part of the main fuel tank and forms an extension to the main fuel tank through one connector. It is filled via the main tank and feeds the main tank by gravity. A fuel vent line from the tank is connected to the main tank vent line system and an electrical connection provides Fuel Gauging Control Unit information. The Fuel Gauging System automatically compensates for the additional fuel quantity.

The Longitudinal Auxiliary Fuel Tank is compatible with Supplement 54 Cabin Compartment Extension, however, only the Full Cabin Extension P/N 4G5340F00111 may be utilised, with the following restrictions (See Figure 2):

• No floor panel mounted in the tunnel

• Loading Area 1 and 2 cannot be used for loads

• Rails on the tunnel walls are not fitted.

For Full Cabin Extension procedures not covered in this supplement see Supplement 54 Cabin Compartment Extension.

Note

The Loading Area 3 modifications in this Supplement are identical to the modifications described in Supplement 54. For the Loading Area 3 configurations and restraint net P/N refer to Supplement 54.

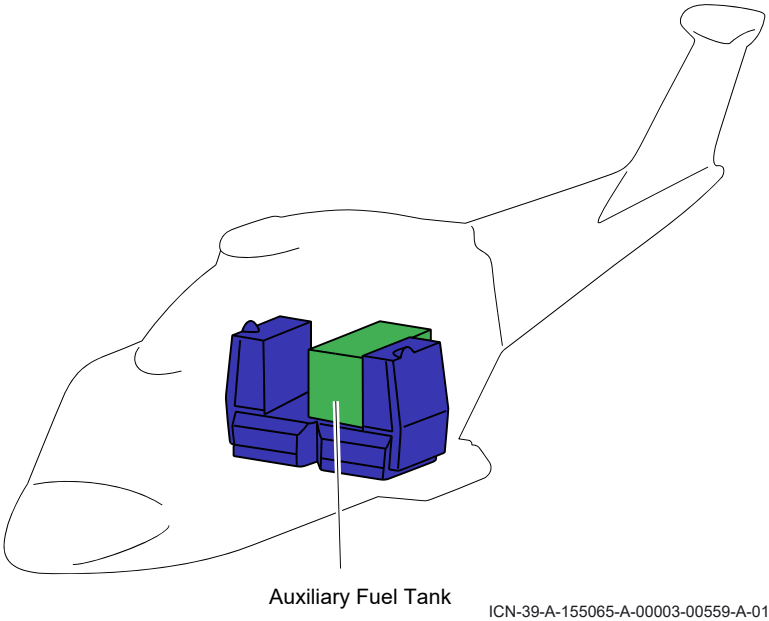

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Figure 1 Auxiliary Fuel Tank Position

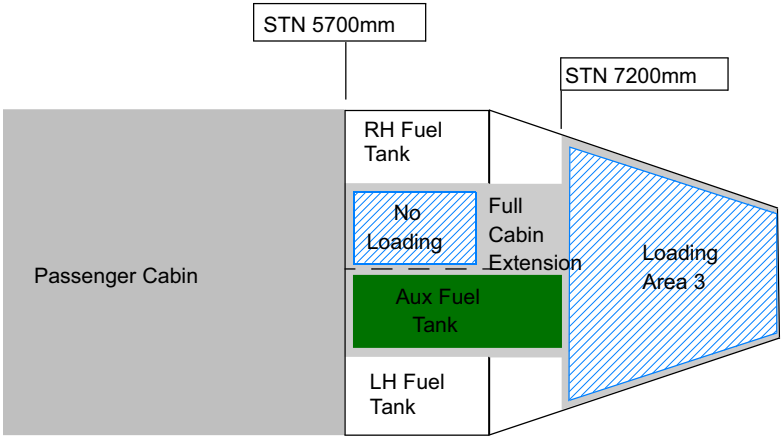

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Figure 2 Full Cabin Extension Modifications for Aux Tank

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Longitudinal Auxiliary Fuel Tank, the new empty weight and center of gravity position must be determined.

No change to weight or CG limitations.

FUEL CAPACITIES

Auxiliary Tank Usable.....500 litres

Total Usable (Main plus Auxiliary Tanks) .....2088 litres

Unusable .....No change

LONGITUDINAL AUXILIARY FUEL TANK LIMITATIONS

The following supplements cannot be installed when the Longitudinal Auxiliary Fuel Tank is fitted:

• Supplement 15 Auxiliary Fuel Tank

• Supplement 55 Baggage Compartment Extension.

FULL CABIN EXTENSION LIMITATIONS

— No items or loads may be loaded in the area above the fuel tank.

— A suitably trained cabin attendant must be present, seated in a position for easy access to the cabin extension area. Unobstructed space through cabin must not be less than 508 mm (1 ft 8 in) wide.

— The tunnel must be kept unobstructed.

— An additional Hand Held Fire Extinguisher must be installed in reach of the Cabin Attendant.

— Maximum load in Loading Area 3 restraint net P/N 3G2550A00231..... 300 kg (660 lb)

— When rear part of baggage compartment is occupied with equipment, maximum load with installation P/N 3G5306P30512 and restraint net P/N 3G2550A03031 ..... 160 kg (350 lbs)

— Maximum unit load in Loading Area 3..... 550 kg/m^2 (110lb/sq.ft)

— Maximum load height in Loading Area 3.....350 mm (1.2 ft)

FULL CABIN EXTENSION PLACARDS

ALL CARGO MUST BE SECURED
WITH RESTRAINT NET OR
OTHER APPROVED MEANS

MAXIMUM LOAD FOR RESTRAINT NET
P/N 3G2550A00231 300 KG (660 LB)
P/N 3G2550A03031 160 KG (350 LB)

SEE RFM SUPPLEMENT 54 FOR
RESTRAINT NET ATTACHMENTS
AND CONFIGURATION

MAX UNIT LOAD 550KG/M^2 (110LB/SQ.FT)
MAXIMUM CARGO HEIGHT 350mm (1.2ft)

Placed in Loading Area 3

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

When the Longitudinal Auxiliary Fuel Tank is installed the following Longitudinal and Lateral Moments for the Fuel must be used in the Weight and Balance Calculations.

WEIGHT - ARMS AND MOMENTS

LONGITUDINAL AND LATERAL MOMENTS

TOTAL FUEL MAIN + LONGITUDINAL AUX TANKS					
Weight (kg)	**L (0,8 kg/L)**	**Arm (STA) (mm)**	**Longitudinal Moment (kgm)**	**Arm (BL) (mm)**	**Lateral Moment (kgm)**
25	31	6208	155,2	0	0,0
50	63	6209	310,5	0	0,0
75	94	6210	465,8	0	0,0
100	125	6210	621,0	0	0,0
125	156	6210	776,3	0	0,0
150	188	6210	931,5	0	0,0
175	219	6210	1086,8	0	0,0
200	250	6210	1242,0	0	0,0
225	281	6210	1397,3	0	0,0
250	313	6210	1552,5	0	0,0
275	344	6210	1707,8	0	0,0
300	375	6210	1863,0	0	0,0
325	406	6210	2018,3	0	0,0
350	438	6211	2173,9	0	0,0
375	469	6211	2329,1	0	0,0
400	500	6211	2484,4	0	0,0
425	531	6211	2639,7	0	0,0
450	563	6211	2795,0	0	0,0
475	594	6211	2950,2	0	0,0
500	625	6212	3106,0	0	0,0
525	656	6212	3261,3	0	0,0
550	688	6212	3416,6	0	0,0
575	719	6212	3571,9	0	0,0
600	750	6213	3727,8	0	0,0
625	781	6213	3883,1	0	0,0
650	813	6214	4039,1	0	0,0
675	844	6214	4194,5	0	0,0
700	875	6214	4349,8	0	0,0

LONGITUDINAL AND LATERAL MOMENTS (CONT)

TOTAL FUEL MAIN + LONGITUDINAL AUX TANKS					
Weight (kg)	L (0,8 kg/L)	Arm (STA) (mm)	Longitudinal Moment (kgm)	Arm (BL) (mm)	Lateral Moment (kgm)
725	906	6215	4505,9	0	0,0
750	938	6215	4661,3	0	0,0
775	969	6216	4817,4	0	0,0
800	1000	6217	4973,6	0	0,0
825	1031	6217	5129,0	-1	-0,8
850	1063	6219	5286,2	-1	-0,9
875	1094	6221	5443,4	-2	-1,8
900	1125	6223	5600,7	-4	-3,6
925	1156	6224	5757,2	-8	-7,4
950	1188	6226	5914,7	-10	-9,5
975	1219	6229	6073,3	-14	-13,7
1000	1250	6233	6233,0	-16	-16,0
1025	1281	6235	6390,9	-20	-20,5
1050	1313	6239	6551,0	-22	-23,1
1075	1344	6242	6710,2	-25	-26,9
1100	1375	6244	6868,4	-27	-29,7
1125	1406	6247	7027,9	-30	-33,8
1150	1438	6250	7187,5	-33	-38,0
1175	1469	6253	7347,3	-36	-42,3
1200	1500	6255	7506,0	-38	-45,6
1225	1531	6258	7666,1	-40	-49,0
1250	1563	6260	7825,0	-42	-52,5
1275	1594	6262	7984,1	-44	-56,1
1300	1625	6264	8143,2	-46	-59,8
1325	1656	6266	8302,5	-48	-63,6
1350	1688	6268	8461,8	-50	-67,5
1375	1719	6270	8621,3	-52	-71,5
1400	1750	6272	8780,8	-54	-75,6
1425	1781	6274	8940,5	-55	-78,4
1450	1813	6275	9098,8	-57	-82,7
1475	1844	6277	9258,6	-59	-87,0
1500	1875	6278	9417,0	-60	-90,0
1525	1906	6280	9577,0	-62	-94,6
1550	1938	6281	9735,6	-64	-99,2
1575	1969	6282	9894,2	-65	-102,4
1600	2000	6284	10054,4	-66	-105,6
1625	2031	6286	10214,8	-68	-110,5
1650	2063	6287	10373,6	-69	-113,9
1675	2094	6289	10534,1	-71	-118,9
1700	2125	6290	10693,0	-72	-122,4

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 66

CABIN SLIDING WINDOWS

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SUPPLEMENT 66
CABIN SLIDING WINDOWS

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GENERAL INFORMATION

This supplement provides information for the cabin configured with two vertically sliding windows.

The sliding windows replace the forward passenger windows on the left and right hand side of the aircraft. The windows, when unlocked, can be opened vertically downward and when up (closed) they can be locked in the closed position.

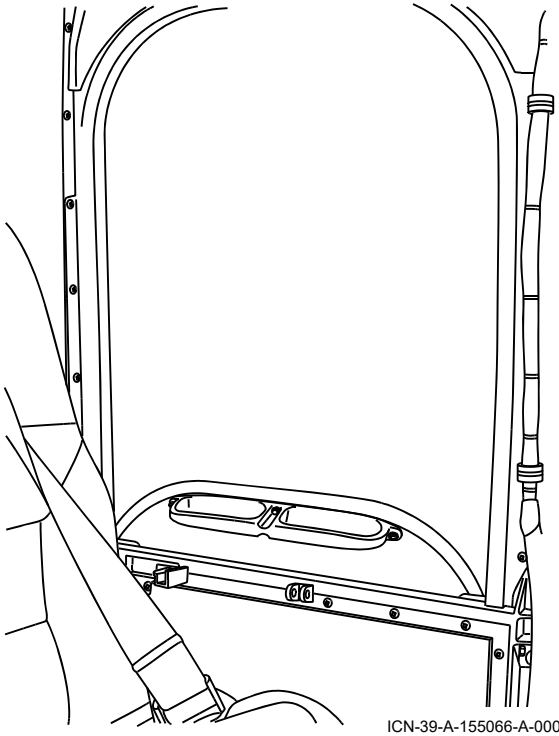

Figure 1 Cabin Sliding Window in Open Position

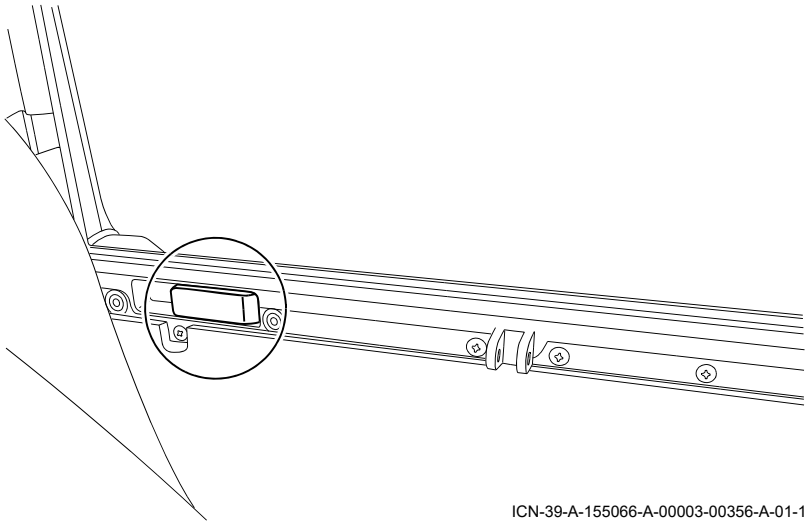

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Figure 2 Sliding Window Locking Mechanism in Locked Position

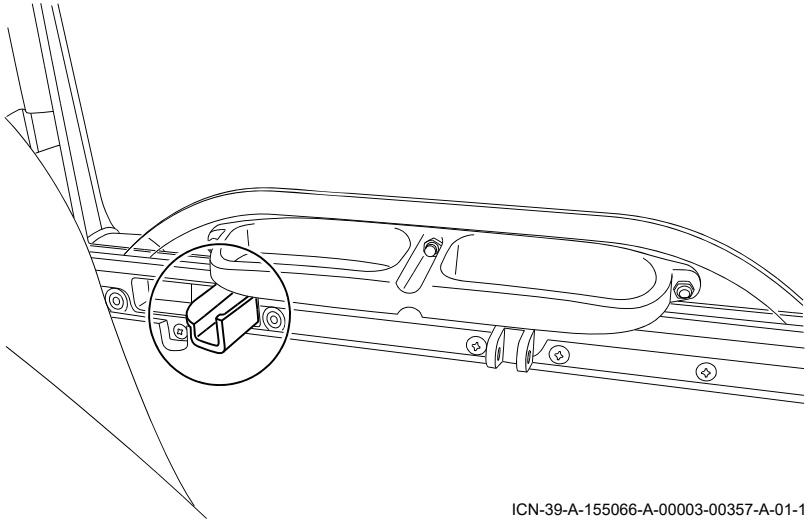

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Figure 3 Sliding Window Locking Mechanism in Unlocked Position

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the two sliding windows, the new empty weight and center of gravity position must be determined.

No change to weight or C of G limitations.

SLIDING WINDOW LIMITATIONS

Maximum airspeed for opening/closing sliding windows ..... 140 KIAS

Maximum airspeed with one or both sliding windows open ... 140 KIAS

The sliding window must be either locked closed, when not in use, or fully down when open.

CAUTION

The two sliding windows are not classed as Emergency Exits as they cannot be pushed out.

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SECTION 2 - NORMAL PROCEDURES

PRE FLIGHT CHECKS

AREA N°7 (Cabin Interior)

1. Cabin sliding windows (2) — Condition cleanliness, secure, locked closed or as required.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY EXITS

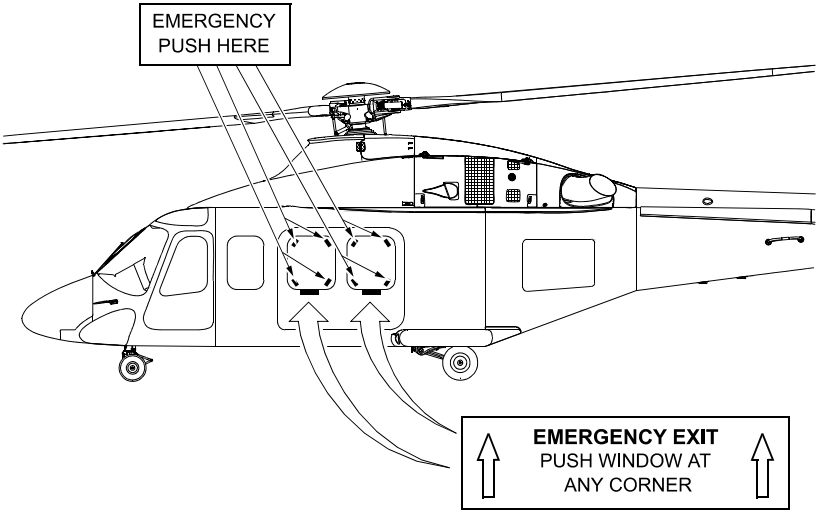

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Figure 3-1 Cabin External Markings and Placards

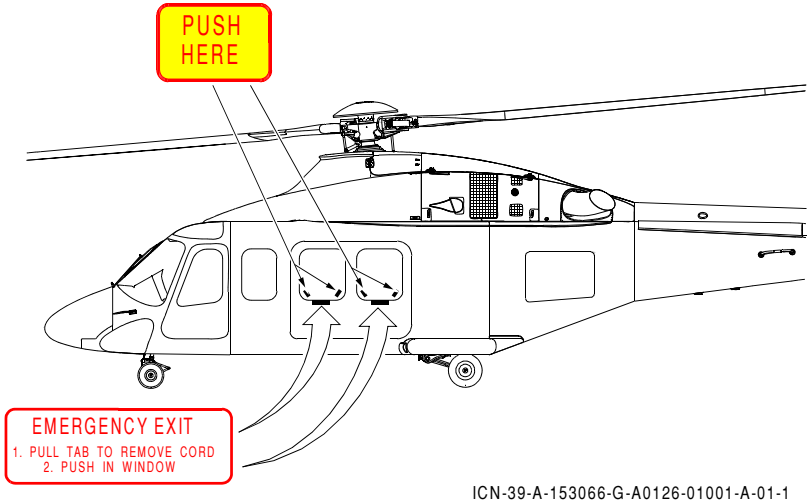

Figure 3-1A Alternative Cabin External Markings and Placards

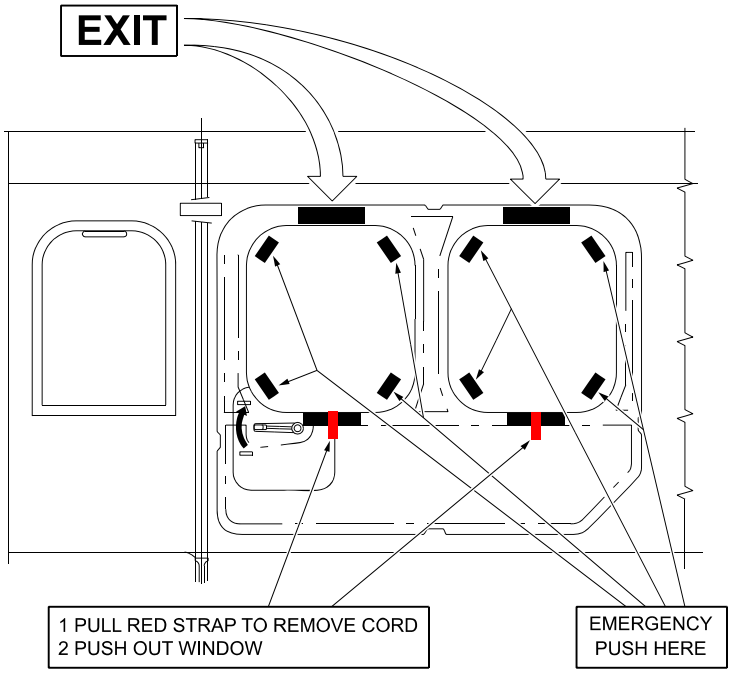

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Figure 3-2 Cabin Internal Markings and Placards

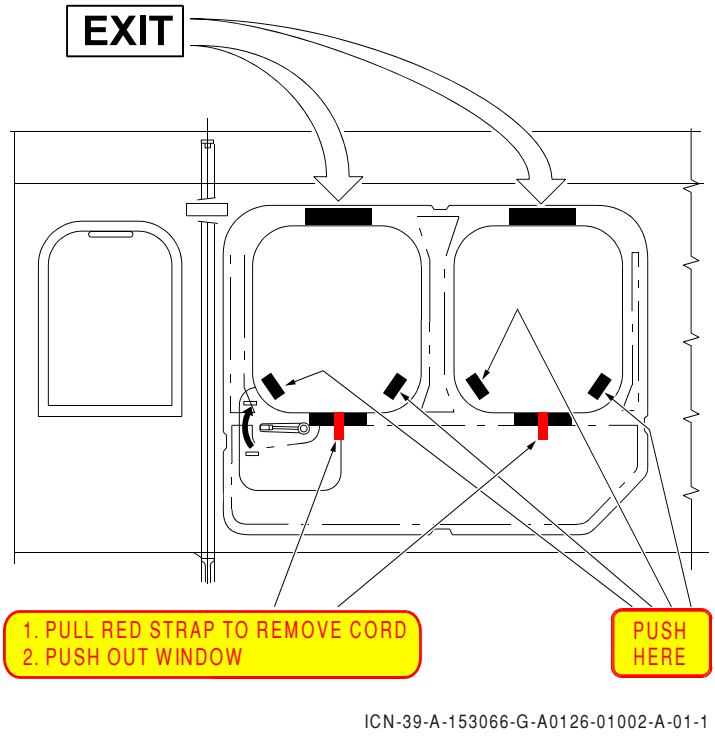

Figure 3-2A Alternative Cabin Internal Markings and Placards

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 67

4 AXIS ENHANCED FLIGHT DIRECTOR (EPIC SOFTWARE PHASE 5 AND LATER)

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SUPPLEMENT 67
4 AXIS ENHANCED FLIGHT DIRECTOR (EPIC SOFTWARE PHASE 5 AND LATER)

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GENERAL INFORMATION

The 4 Axis Enhanced Flight Director (FD) provides commands that are normally coupled to the autopilot (AP) for automatic flight path control around the three axes of the aircraft plus collective. At Power Up one of the two FD is automatically selected and configured as Master (priority). At every Power Up the FD selected as Master (priority) is alternated.

The 4 Axis Enhanced Flight Director requires either EPIC Phase 5, (software release EB7030191-00107) or Phase 6 (software release EB7030191-00108 & 109) or Phase 7 (software release EB7030191-00110/00111/00112/00114/00115/00117/00118) or Phase 8 (software release EB7030191-00113/00120). The system contains all the functions of the 4 Axis Enhanced Flight Director and in addition the improvements of the Phase 5 and later software.

When coupled, both autopilots drive the actuators to satisfy the references provided by the priority FD.
When uncoupled the pilot can manually fly the commands.
In either case, pitch, roll command bars/collective cue are presented on each PFD, depending on the mode selected.

The FD uses the Navigation source and data reference presented on the selected PFD. The selected PFD is indicated by the green PFD couple arrow which is controlled by the PFD button on the Guidance Controller (See Figure 2). The SAR Guidance Controller (See Figure 3) is an alternative controller and has SAR mode buttons, however, the extra pushbuttons are not active. Either Guidance Controller can be used with the 4 Axis Enhanced Flight Director system Phase 5. (For Phase 5 and later installation that includes SAR mode functions see Supplement 69).

A green couple arrow is also presented on the side of the PFD pushbutton on the Guidance Controller. When a FD mode is engaged the coupled function is automatically engaged. The FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller (See Figure 1). The coupled function is automatically forced to uncoupled whenever the AP ATT mode is off or becomes inoperative.

Armed and captured FD modes are displayed with messages along the top line of the PFD: Collective and pitch mode messages on the left of the selected PFD arrow and lateral mode on the right. Armed

modes are in small white characters and captured or engaged modes are in medium size green characters. When transitioning from no mode to engaged, from armed to captured or change from one mode to another mode the message flashes for 6 seconds then become steady. When changing from captured to no mode the message flashes for 6 seconds then extinguishes.

Armed lateral modes messages are: VOR, VAPP, LOC, BC, LNAV and captured VOR, VAPP, OS, LOC, BC, LNAV, HDG, HOV.

Armed collective modes are: GS, VGP, VRT (Phase 8 and later) and captured ALT, GS, VS, GA, ALTA, ALVL, RHT, VGP, TU, VRT (Phase 8 and later).
Engaged vertical pitch modes are IAS, HOV, DCL, GA, TU.

A chime sounds whenever either a lateral, vertical (pitch), or vertical (collective) FD mode changes from its previous state, i.e.:

— a mode changes from engaged to disengaged or vice-versa

— a mode changes from arm to captured

— a mode changes from coupled to uncoupled.

An aural tone (“bip-bip”) sounds for any change in altitude or radar height mode reference datum.

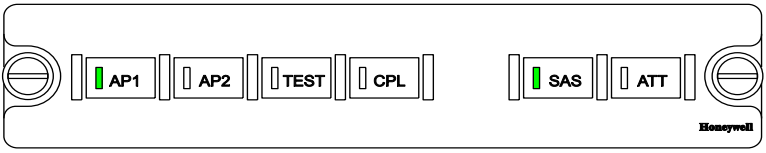

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Figure 1 Autopilot Controller

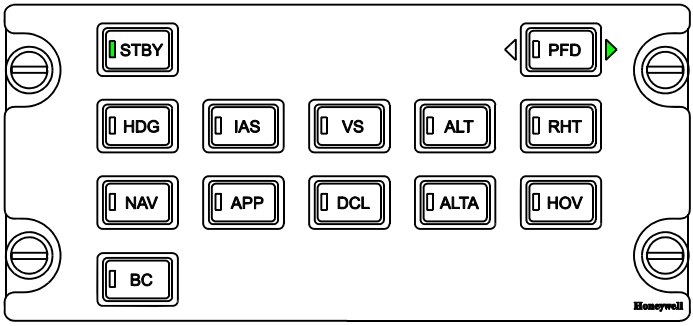

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Figure 2 Guidance Controller

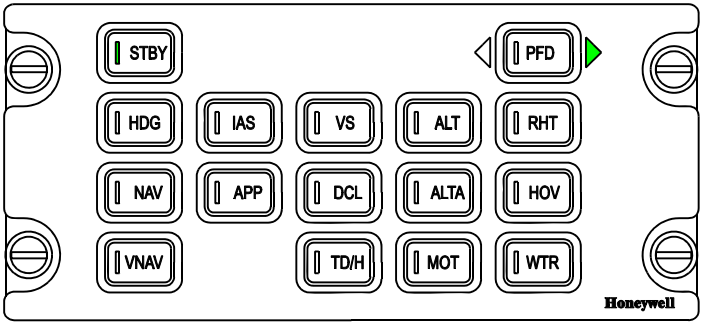

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Figure 3 SAR Guidance Controller

The FD functions available are as follows:

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
HDG	Heading select	Roll and Yaw	N/A	HDG
ALT	Altitude Hold	Collective	N/A	ALT
IAS	Indicated Airspeed Hold	Pitch	N/A	IAS
NAV	Lateral Navigation	Roll	LNAV/ VOR/ LOC	LNAV/ VOR/ LOC
APP	Lateral Approach	Roll	VAPP LOC VOR	VAPP LOC VOR
	Vertical Approach	Collective	GS VGP	GS VGP
PRV	Preselect VOR-ILS approach while in LNAV	N/A	As for APP	N/A
DCL	ILS Deceleration VGP Deceleration	Pitch	DCL	DCL
BC	Back Course Approach	Roll	BC	BC
ALTA	Altitude Acquire	Collective	N/A	ALTA
VS	Vertical Speed Hold	Collective	N/A	VS
GA	Go-Around/	Pitch/ Collective	N/A	GA
VGP	Vertical Glide Path	Collective	VGP	VGP

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
VRT**	Vertical Glide Path with Rad Alt Level Segment	Collective	VRT	VRT
RHT	Radar Height Hold	Collective	N/A	RHT
HOV	Hover/Velocity Hold	Pitch/Roll	N/A	HOV
OS*	Over Station mode	Roll	N/A	OS
ALVL*	Autolevel mode	Pitch/ Collective	N/A	ALVL
TU	Transition Up	Pitch/Roll/ Collective	N/A	TU
SBY	Clear all FD modes	N/A	N/A	N/A

* Provided automatically.

** Phase 8 and later and if Custom Approach with Level Segment enabled in option file.

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SECTION 1 - LIMITATIONS

WEIGHT LIMITATIONS

— For weights up to 6400 kg see basic RFM.

— For weights between 6400 kg and 6800 kg see Supplement 50.

— For weights between 6800 kg and 7000 kg see Supplement 90.

FLIGHT DIRECTOR MODES LIMITATIONS

• The following FD modes are inoperative on the SAR Guidance Control panel:

— TD/H — MOT — WTR — VNAV

• Collective modes must not be engaged if either or both engines are in MANUAL MODE

• The RHT and TU modes can only be engaged over flat surfaces which are clear of obstructions.

PHASE 5 AND 6 FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH)

Hold Mode	Applicable Range	MUH
IAS*	60 KIAS to Vne less 5 KIAS	150 ft AGL or 50 ft AGL during approach
HDG*/NAV*	60 KIAS to Vne	150 ft AGL or 50 ft AGL during approach
ALT	0 KIAS to Vne	300 ft AGL (airspeed greater than 55 KIAS) 50 ft AGL in HOV or airspeed less than 55 KIAS
VS*	60 KIAS to Vne within -1500 fpm and 2000 fpm	150 ft AGL
APP*/BC*	60 KIAS to Vne	50 ft AGL

Hold Mode	Applicable Range	MUH
GA*	60 KIAS to Vne 0 to 2000 ft AGL	N/A
DCL*	60 KIAS to Vne	50 ft AGL
ALTA*	60 KIAS to Vne	150 ft AGL
RHT	0 KIAS to Vne 15 ft to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV or airspeed less than 55 KIAS)
HOV	Groundspeed — less than 60 kt forward — less than 40 kt lateral or aft with IAS less than 75 KIAS	30 ft AGL
TU	0 KIAS to 60 KIAS 0 to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV (airspeed less than 55 KIAS)

Note*

— Automatic disengagement of these modes below 55 KIAS with audio chime.

— VS engagement above 2000 fpm or below -1500 fpm will result in the mode returning the aircraft to the maximum rates quoted (2000 fpm or -1500 fpm).

PHASE 7 AND LATER FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH)

Hold Mode	Applicable Range	MUH
IAS*1	60 KIAS to Vne less 5 KIAS 50 KIAS to Vne less 5 KIAS during approach see Note**	150 ft AGL or 50 ft AGL during approach
HDG*1/NAV*1	60 KIAS to Vne less 5 KIAS 50 KIAS to Vne less 5 KIAS during approach see Note**	150 ft AGL or 50 ft AGL during approach
ALT	0 KIAS to Vne	300 ft AGL (airspeed greater than 55 KIAS) 50 ft AGL in HOV or airspeed less than 55 KIAS
VS*2	60 KIAS to Vne within -1500 fpm and 2000 fpm	150 ft AGL
APP*2/BC*2	60 KIAS to Vne	50 ft AGL
APP*1 (VGP)	50 KIAS to Vne	50 ft AGL
APP*1 (VRT) **Note*****	50 KIAS to Vne 150 ft to 2400 ft AGL	150 ft AGL
GA*1	41 KIAS to Vne	N/A
DCL*1	50 KIAS to Vne	50 ft AGL
ALTA*2	60 KIAS to Vne	150 ft AGL
RHT	0 KIAS to Vne 15 ft to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV or airspeed less than 55 KIAS)
HOV	Groundspeed — less than 60 kt forward — less than 40 kt lateral or aft with IAS less than 75 KIAS	30 ft AGL

Hold Mode	Applicable Range	MUH
TU	0 KIAS to 41 KIAS 0 to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV (airspeed less than 55 KIAS)

Note*

— [1] Automatic disengagement of these modes below 41 KIAS with audio chime

— [2] Automatic disengagement of these modes below 55 KIAS with audio chime.

Note**

Use of IAS, HDG and LNAV modes below 60 KIAS is only for Flight Director operations associated with RNP APCH and Custom approaches.
Selecting IAS mode speed to less than 55 KIAS will result in normal automatic disengagement of APP, ALTA & VS modes at 55KIAS and loss of associated collective safety function.

Note***

Phase 8 and later and when Custom Approach with Level Segment enabled in option file.

Note

At GA automatic LNAV arming is allowed down to 41 KIAS.

REQUIRED EQUIPMENT

— Second Radar Altimeter RT300 (Supplement 18).

— AHRS P/N 142185-1115 or P/N 145130-1002 (GPS blended) Both AHRS must be of the same part number.

VOR LIMITATIONS

In case of invalid DME/FMS distance, select:

- VOR APP at ranges below 10 nm (18 km)
- VOR NAV at ranges greater than 10 nm (18 km).

COUPLED ILS APPROACH MODE LIMITATIONS

The helicopter is certified to carry out CAT 1 ILS approaches up to 7.5 deg glideslope.

Maximum recommended Localizer Intercept angle ..... 45 deg ranges greater than 10 nm (18 km)

Maximum recommended Localizer Intercept angle ..... 30 deg ranges less than 10 nm (18 km)

Maximum airspeed for glideslope up to 4 deg ..... 150 KIAS

Maximum airspeed for glideslopes between 4 and 7.5 deg (Steep Approach) ..... 120 KIAS

In case of invalid DME and FMS distance and with both Rad Alt signals invalid an ILS approach must be initiated at a distance of not less than 10 nm (18 km).

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SECTION 2 - NORMAL PROCEDURES

FLIGHT DIRECTOR - GENERAL

For full details of FD operation and use see “PRIMUS EPIC Integrated Avionics and Flight Control System for the AW/AB139 Helicopter - Pilot’s Guide” latest issue and FMS Pilot’s Guide latest issue.

FLIGHT DIRECTOR MODES ENGAGEMENT

The AFCS Flight Director function provides 4 axis guidance modes. Selection of most FD modes is carried out using pushbuttons on the Guidance Controller. HOV mode may also be engaged using the cyclic beep trim centre position (5th position). Each mode may be de-selected by pressing the associated pushbutton on the Guidance Controller. However GA and TU modes may only be engaged by either collective GA button and disengaged by engaging a different mode for pitch and collective axis. All engaged modes may be deselected simultaneously by using the FD STBY button located on the cyclic sticks or the STBY button on the Guidance Controller.

The Guidance Controller pushbuttons include a green annuciator that illuminates when the mode is selected. FD mode annuciations (green when captured and white when armed) also appear on the PFD.

FLIGHT DIRECTOR COUPLED AND UNCOUPLED OPERATIONS

Selecting a FD mode by pressing the pushbutton on the Guidance Controller will couple the FD whenever the AP is in ATT hold. Selecting a FD mode by pressing the pushbutton on the Guidance Controller with the ATT OFF (i.e. SAS or no stabilisation), the FD will be engaged in the uncoupled mode.

During coupled operation the FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller which will cause a white UCPL caption to appear on the PFD.

CAUTION

- Whenever the FD is coupled and the AP reverts to SAS or has a complete loss of autostabilization, the FD will revert to uncoupled mode.
- When the AP reverts to SAS no UCPL caption will appear on the PFD.

With the FD engaged, in coupled or uncoupled mode, the following is displayed:

— Navigation source and reference data in magenta colour on the selected PFD

— Navigation source and reference data in cyan colour on the non selected PFD

— Navigation source in amber on both PFD's when both PFD's have the same navigation data source.

During coupled operation the HDG, ALT, IAS, VS, ALTA, RHT, HOV, TU, VRT modes may be controlled by either pilot. When engaged in coupled mode, the reference data may be adjusted by using the Display Controller (HDG, ALT SEL), collective beep trim/FTR (ALT, ALTA, VS, RHT, TU, VRT) or cyclic beep trim/FTR (IAS, HOV, HDG, TU).

During uncoupled operation changes of reference data for IAS, HDG and HOV modes are carried out by pressing the cyclic FTR button, which updates the reference data to the actual values at the time the button is released. Changes of reference data for ALT, VS and RHT are carried out by the collective beep trim. Collective FTR does not modify the collective modes reference.

For IAS, HDG, RHT and VS on the selected PFD, a magenta digital readout reference datum is displayed above the appropriate flight instrument and a magenta bug at a position corresponding to the selected reference. For ALT, only the magenta bug is displayed permanently while the digital readout is displayed for 5 seconds whenever the reference is modified and the ALTA reference is present.

Whenever a collective mode is engaged (ALT, VS, ALTA, GS, VGP, GA, ALVL, RHT, TU) a collective position cue appears on the PFD beside the ADI. There are some collective FD modes (e.g. RHT, VRT, etc.) based upon RadAlt. When one of them is engaged, a magenta bug is displayed on the Rad Alt tape and the radalt readout is displayed in magenta. See Figure 2-1 (S/W Phase 5, 6 & 7) and Figure 2-2 & Figure 2-3 (S/W Phase 8 and later).

COLLECTIVE PI LIMITING FUNCTION

During collective coupled operation the collective movement is limited by the following PI values:

— Maximum 97% AEO (95% at altitudes above 10000 ft (3050 m) Hp)

— Maximum 106% AEO for airspeed less than 60 KIAS (5 MIN message displayed beside collective cue, see Figure 2-1)

— Maximum 140% OEI

— Minimum 5% AEO

— Minimum 10% OEI.

When PI limiting function is active and is limiting maximum collective movement, an amber LIM caption is displayed beside the collective cue. See Figure 2-1.

If PI limiting is active with IAS engaged and the required reference for VS, ALTA, RHT, GA, or ALT cannot be achieved the airspeed will automatically reduce as necessary to achieve the collective mode reference. If the collective mode reference cannot be maintained, when the airspeed has reached a minimum of 80 KIAS this airspeed will be maintained and the collective mode reference will be reduced. While the mode reference values cannot be maintained or achieved that mode caption is displayed in amber on the PFD.

CAUTION

If PI limiting is active with ALT/RHT engaged and the reference height cannot be maintained the aural warning “Altitude Altitude” will warn the pilot when the maximum allowed deviation from the reference height has been exceeded.

When flying at high altitude (above 15000 ft (4570 m)) select the Load Share switch to TORQUE (MISC panel) to improve the helicopter manoeuvre during automatic turns.

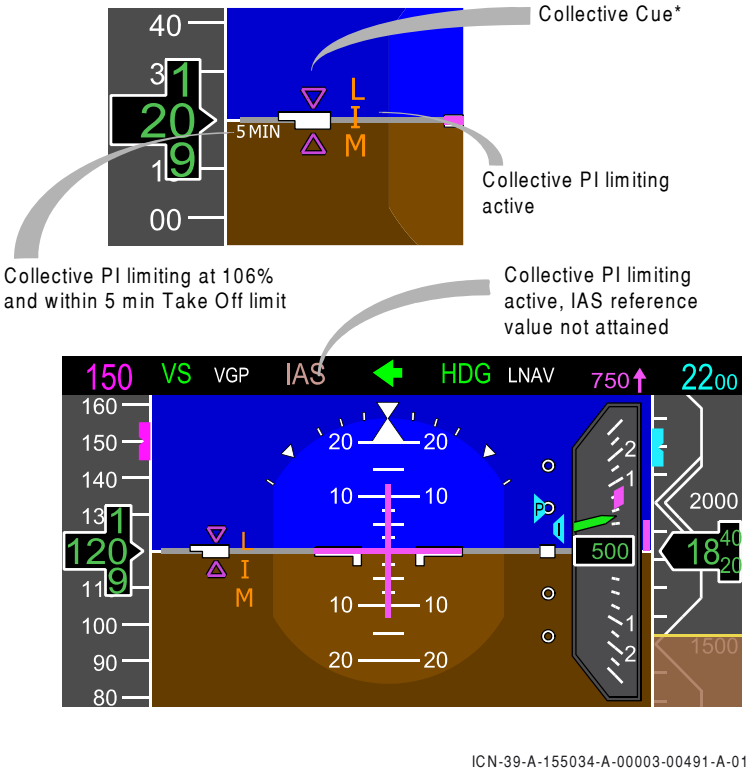

Figure 2-1 Collective Cue Display (Software Phase 5, 6 and 7)

* In UCPL operation when collective cue is below reference arrows collective must be raised and vice-versa.

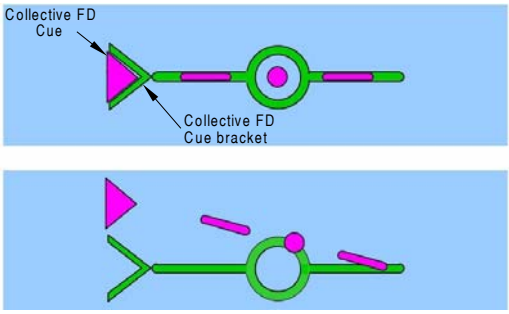

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Figure 2-2 Collective Cue Display Path Mode (Software Phase 8 and later)

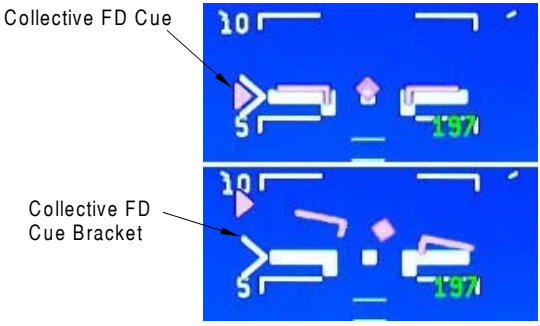

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Figure 2-3 Collective Cue Display Pitch Mode (Software Phase 8 and later)

* In UCPL operation when collective cue is below reference arrows collective must be raised and vice-versa.

SAFETY FLY-UP FUNCTIONALITY WHEN FD MODES ENGAGED

The Fly-Up Collective Safety Function is a height protection function which is always active when at least one Rad Alt is valid. The function is activated when any collective FD mode is engaged and coupled and the Safety Height is passed. When the function is activated the aircraft is automatically flown back up to the Safety Height. The Safety Height is a function of the Rad Alt Reference (or a fixed height for Barometric modes) and depends on the actual collective mode engaged.

Further to the Safety Height there is also an Ultimate Fly-Up Limit, a fixed height (not adjustable) which, if passed, will automatically cause the aircraft to fly back up to this height or the Safety Height, if higher.

The following table gives the Safety Height Rad Alt limits and Ultimate Fly-Up Limit for the different collective modes:

Hold Mode	Applicable Range	Safety Height (ft AGL)	Ultimate Fly - Up Limit (ft AGL)
VS	All conditions	150 ft	150 ft
ALTA	All conditions	150 ft	150 ft
ALT	Airspeed less than 55 KIAS or HOV All other conditions	35 ft 150 ft	35 ft 150 ft
RHT	Airspeed less than 55 KIAS, HOV All other conditions	Variable *	15 ft 75 ft
Phase 8 and later and when Custom Approach with Level Segment enabled in option file			
APP (VRT)	All conditions	Variable *	75 ft

* Safety Height = Rad Alt Reference - (7+1/8xRad Alt Reference)

When the collective Fly Up safety function is activated, due to an height excursion below the Safety Height or Ultimate Fly-Up limit, the aural message 'ALTITUDE ALTITUDE' is triggered and a HTLM message is displayed on the PFD on the top left of the attitude indicator. When the collective is automatically driven up, it is normally limited by the PI limiting function. Should the relevant MUH limits be exceeded the PI limits will be moved up as follows:

— Maximum 121% AEO for airspeeds below 60 KIAS

— Maximum 176% OEI for airspeeds below 60 KIAS

— Maximum 110% AEO for airspeeds above 60 KIAS

— Maximum 160% OEI for airspeeds above 60 KIAS.

CAUTION

When voice message "Altitude Altitude" is triggered with a HTLM message then the aircraft has descended below the safety height. Ensure separation from terrain visually or, if not possible, establish a positive rate of climb to a safe height.

CAUTION

(Applicable only for Phase 5 or 6)

When descending over terrain, with a collective mode engaged and after a continuous descent of at least 2500 ft, at approximately 2500 ft Rad Alt height, the Fly Up safety function may erroneously intervene and increase the PI to above the MCP level. This condition should be controlled manually with the collective to maintain the PI within the MCP limits until the HTLM message on the PFD extinguishes.

MODE DESCRIPTIONS

The following descriptions assume the modes are coupled, unless stated otherwise.

HDG Heading Hold Mode. This mode steers the aircraft to the heading reference bug displayed on the PFD. The heading bug can be adjusted using the HEADING knob on the Remote Instrument Controller and can be synchronized with the actual heading by pressing the HEADING knob (PUSH SYNC). The heading reference bug can be synchronized to the actual heading by pressing the cyclic FTR button or modified using the cyclic beep trim switch left or right. In HDG mode turns are performed at standard rate 1 (3 deg/sec.).

ALT Barometric Altitude Hold Mode. This mode maintains the barometric altitude existing at the time of engagement. The altitude reference is displayed as a set bug on the PFD altitude tape. If the ALT SEL knob has not been previously moved (i.e. no ALTA activation) the ALT reference will also be displayed as a magenta digital readout. The altitude reference can be adjusted using the collective beep trim (aft to increase altitude) or by pressing FTR button, flying to desired altitude, and releasing. An audio tone is produced when the altitude reference is changed. The collective PI limiting function is enabled when ALT mode is coupled.

CAUTION

In ALT mode the voice message “Altitude Altitude” is triggered when altitude exceeds the reference altitude by ±150 ft (46 m).

Note

ALT mode can be engaged with HOV mode (as an alternative to the RHT mode), however altitude fluctuations may occur during attitude and heading changes.

IAS Airspeed Hold Mode. This mode maintains the airspeed existing at the time of engagement. When engaged the airspeed reference is displayed as a set bug and a digital readout on the PFD. The airspeed reference bug is adjusted by either using the cyclic beep fore/aft or repositioning the cyclic, with the FTR button depressed, to the required airspeed and releasing FTR button. The airspeed reference is adjustable via the cyclic beep switch between 50 KIAS (60 KIAS for Phase 5 and 6) and Vne less 5 KIAS. If airspeed, at time of engagement, is higher than Vne less 5 KIAS then it is automatically reduced to Vne less 5 KIAS.

ALTA Altitude Acquire Mode. This mode, when engaged with a barometric altitude preselect reference set (through ALT SEL knob), will automatically engage the IAS mode and the aircraft is flown towards the preset altitude. The final altitude reference is displayed as a cyan bug and digital readout above the altitude scale. The vertical speed reference is displayed as a bug and digital readout on the PFD. The preset vertical speeds are +1000 fpm or -750 fpm in the direction of the preset altitude. The vertical speed reference can be changed by either using the collective beep trim (aft to increase) or with collective FTR button depressed, moving to the required vertical speed and releasing. When the preset altitude is achieved the mode will transition to ALT mode and the IAS mode will remain engaged. The collective PI limiting function is enabled when ALTA mode is coupled. When collective PI limiting is active the airspeed is reduced to maintain vertical speed reference.

Note

(Applicable only for Phase 5 or 6)

Engaging ALTA while climbing with a rate of climb greater than 1500 fpm or descending with a rate of descent greater than 1500 fpm, the system may erroneously transition to ALT. The aircraft will, however, reach the selected final altitude.

NAV VOR/LOC/LNAV FD functions. These functions are selected with the NAV pushbutton depending on navigation source selection on the PFD and NAV receiver tuning. Pressing the NAV pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC/LNAV is armed (white caption). At VOR/LOC/LNAV capture HDG will automatically disengage and the helicopter turns to track the selected radial or leg. The NAV function is also used to fly the FMS Search Patterns.

APP 1) VOR/ILS Approach FD functions. The VOR non-precision approach or ILS approach functions are selected depending on the NAV receiver tuning when the APP mode button is pushed. Pressing the APP pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC-GS is armed (white caption). At VOR/LOC capture HDG will automatically disengage and the helicopter turns to track the selected radial, VAPP/LOC caption will display on the PFD. For ILS approach when intercepting the glideslope signal the GS mode is automatically captured and the previous collective mode disengages.

Note

To avoid false localizer captures, APP mode should be armed when the helicopter is flying inbound to the ILS radial.

2) FMS approach function (VGP).
This can be used when the FMS is the selected NAV source on the selected PFD and an approach from Navigation Database or a Custom Approach without a Final Level Segment (Phase 8 and later) is loaded into the flight plan.
The mode produces a vertical guidance based upon the vertical deviation between current aircraft barometric altitude and FMS glidepath. The glide path is anchored at the Bottom of Descent (BOD) with the glide path angle stored in the data base at the corresponding waypoint or, for Custom Approach without a Final Level Segment

(Phase 8 and later). The VGP mode is armed (white caption) by pushing the APP or DCL button. Intercepting the projected glidepath, the VGP mode is automatically captured.

3) FMS approach for Custom Approach with Level Segment (VRT).
This can be used when the FMS is the selected NAV source on the selected PFD and a Custom Approach with a Final Level Segment (Phase 8 only) is loaded into the flight plan. The mode produces a vertical guidance based upon the vertical deviation between current aircraft barometric altitude and FMS glidepath. The glide path is anchored at the Bottom of Descent (BOD) with 4 degree slope. The VRT mode will automatically transition to RHT mode at BOD sequencing or approaching the final height reference selected by the pilot during approach settings, whichever occurs first. The RHT reference can be changed by using the collective beep trim switch (aft to increase). Changing the RHT reference will not alter the FMS glide path, but alter the height at which the aircraft will level - off after VRT mode transitions to RHT mode. The VRT mode is armed (white caption) by pushing the APP or DCL button, while below 2400 ft AGL. Intercepting the projected glidepath, the VRT mode is automatically captured. Flying above 2500 ft AGL will result in VRT mode disarming or disengagement.

In either case (ILS, VGP,VRT) within the vertical deviation bug there will be a letter: I for ILS, P for VGP or VRT and V for Vertical Path. See Figure 2-1. The P letter and bug, when VGP or VRT is armed, appears on the left hand side of vertical deviation scale in cyan. When captured the symbol moves to the right hand side of the vertical deviation scale in magenta.

CAUTION

During steep approach without automatic collective control be attentive not to use less than 5% PI.

PRV

The PRV mode is a way to preselect ILS or VOR approach functions while FD is still engaged in LNAV.
PRV is selected by pressing the PRV pushbutton on the Display Controller. If the APP pushbutton is pressed the FD will arm LOC and GS or VAPP functions depending on the NAV receiver tuning (ILS or VOR) on the selected PFD. At the capture of the LOC or VAPP functions the FD disengages LNAV and engages LOC-GS or VAPP functions. Selected PRV course will be displayed as thin cyan, while armed, and as normal magenta when captured.

DCL

1) ILS Deceleration Mode. The deceleration mode decreases the aircraft speed from its present speed down to approximately 80 KIAS at a height not below 200 ft AGL. When the DCL pushbutton is pushed the LOC, GS and DCL modes are armed and the IAS and HDG modes are engaged. After GS capture and at a computed condition for correct approach and deceleration the IAS mode is disengaged and the DCL mode engaged. The airspeed reference bug moves to 80 KIAS and the digital reference is set to 80 KIAS. These values can be adjusted using the cyclic beep trim at which time the IAS mode automatically engages replacing the DCL mode.

2) VGP/VRT Deceleration Mode.
When the DCL pushbutton is pushed, during a VGP or VRT approach, if the present speed is greater than the FMS target speed (Ref MCDU PERF INIT page 2/3) the DCL mode engages and the aircraft decelerates to the FMS target speed. If, however, the speed is less or equal to the FMS target speed, the DCL mode arms.
At the Initial Distance the DCL mode, if not already engaged, engages and the aircraft starts to decelerate to the initial speed. At the appropriate distance the aircraft

will start to decelerate to achieve the final speed at the final distance from the MAP. For Phase 5 and 6 only the DCL mode must be engaged within 10 NM from the missed approach point.
The initial and final speed targets and distances are provided and can be modified in:
MCDU PERF INDEX - APPRCH SPD page 1/2
or:
MCDU PERF INIT page 2/3 - APP/GA SPD page 1/2
or:
MCDU PROGRESS page 2/3 - VNAV DATA page - APPRCH SPD page 1/2 for Approaches from the Navigation Database.

Note

APPRCH SPD MCDU page is not applicable for Custom Approaches.

The initial and final speed targets and distances for Custom Approaches, Phase 8 and later, are provided and can be modified in:
MCDU CST APPR EDIT / CST APPR SPEEDS pages for Custom Approaches.

BC Back Course Approach Mode. The back course mode is selected when the BC pushbutton, for Guidance Controller or APP pushbutton on SAR Guidance Controller, is pushed. Pressing the pushbutton, HDG is engaged (green caption) and the BC is armed (white caption). At BC capture, HDG is disengaged. When the SAR Guidance Controller is used the BC mode will be engaged when the intercept angle between the front course and the aircraft heading is greater than 105° (otherwise the LOC engages).

CAUTION

The course selected for a BC approach must be the ILS approach front course.

VS Vertical Speed Hold Mode. The vertical speed existing at the time of engagement is held. Vertical speed reference bug and digital readout are adjusted by either using the collective beep or repositioning the collective, with the FTR button depressed, to the required vertical speed and releasing on the desired vertical speed. Collective PI limiting function is enabled when VS mode is coupled.

GA 1) Go Around Mode. The mode may be selected from either collective GA pushbutton and will give, when the conditions for a GA are met i.e. airspeed greater than 41 KIAS (60 KIAS for Phase 5 and 6), a 1000 ft/min. climb, with the reference bug set on the Vertical Speed tape and the airspeed reference bug on the airspeed tape at the airspeed existing when the mode is engaged or 70 KIAS (80 KIAS for Phase 5 and 6), whichever is greater. Engaging the GA the FD will control airspeed and vertical speed at the commanded values and level the wings. At the GA engagement the LNAV arms and if a missed approach procedure is selected, LNAV automatically engages. (Automatic arming and engagement of LNAV not applicable for Phase 5 and 6). The GA Mode can only be exited by selecting another vertical FD mode (or FD to STBY).

2) Transition Up Mode. The mode may be selected from either collective GA pushbutton and will give, when the conditions for a TU are met i.e. airspeed less than 41 KIAS (60 KIAS for Phase 5 and 6), a climb up to the set bug reference height of 200 ft AGL on the Rad Alt and the set bug airspeed of 80 KIAS. Engaging the TU the FD will zero lateral or negative groundspeed and initiate an acceleration to 60 KIAS. At 60 KIAS the HDG will engage and transition will occur at a climb rate of 200 fpm (groundspeed between 0 and 25 kts) or 750 fpm (groundspeed between 25 and 60 kts), maintained until reaching the reference value 200 ft when the RHT is automatically engaged. The aircraft then accelerates to the airspeed reference of 80 KIAS and the IAS mode is engaged. The reference height can be modified by the

collective beep switch and the airspeed by the cyclic beep switch. The TU Mode can be exited by selecting another vertical FD mode (or FD to STBY).

OS Over Station Mode. When overflying a VOR station, with VOR or VAPP FD functions engaged, the VOR equipment detects the aircraft being within the zone of ambiguity. The VOR deviation signal is removed from the command until the VOR signal has stabilized after passing over station. While over the station, course change may be made by selecting a new course via the Course Selector knob.

ALVL Autolevel Mode. If the APP (LOC/GS or VGP) mode is continued, to below landing minimum, this safety feature is automatically activated at 150 ft (46 m) and an asymptotic flare to a Rad Alt height of 50 ft (15 m) will be initiated. The green GS or VGP caption on the PFD will be replaced by ALVL.

CAUTION

In VGP mode the ALVL will activate if the MAP (Missed Approach Point, as shown in the example Approach Chart Figure 3-2) is lower than 150 ft (46 m) AGL.
For Phase 5, 6 & 7:
When MAP is higher than 150 ft (46 m) AGL the VGP mode will disengage at the MAP and a chime is generated (preceded, at 100 ft (30 m) above, by a Vertical Track Alert (VTA) caption displayed above the vertical guidance scale on the PFD).
For Phase 8 and later:
When MAP is higher than 150 ft (46 m) AGL the VGP mode will disengage at the MAP and a chime is generated (preceded, at 200 ft (60 m) above, by a Vertical Track Alert (VTA) caption displayed above the vertical guidance scale on the PFD).

RHT Radar Height Hold Mode. This mode maintains the aircraft at the radar height at the time of engagement when the radar altimeter indications are within the threshold limits. A reference bug on the radar altimeter tape and a digital readout above the radar altimeter tape are presented. The reference height can be changed by depressing the collective FTR switch flying to the required height and releasing the FTR switch or by using the collective beep trim switch (aft to increase). An audio tone is produced when the height reference is changed. The collective PI limiting function is enabled when RHT mode is coupled.

HOV Hover/velocity Hold Mode. HOV mode can be engaged by pressing HOV mode on Guidance Controller or the cyclic beep trim centre position (5th position). The HOV mode utilizes the AHRS ground velocities to maintain hover or low speed flying. At engagement of this mode the helicopter groundspeed reference is set to zero and the RHT is automatically engaged if a valid radar altimeter signal is available and within the threshold limits. RHT mode can be subsequently disengaged independently and replaced by ALT if required. A hover symbology with the ground velocity vector bug is also displayed on the HSI. See Figure 2-4. When the mode is engaged, the velocity vector reference can be changed by pressing the cyclic FTR switch, flying to the desired lateral and longitudinal speed and releasing, or by using the cyclic beep trim to move the bug to the desired velocities. If the cyclic beep trim switch is pressed in the centre position (5th position) the longitudinal and lateral velocity references are set to zero.

CAUTION

The HOV mode maintains a groundspeed reference therefore pilot must ensure that crosswind and rearwind speed limits are not exceeded (see Section 1 Basic Flight Manual). If wind limits are exceeded directional control may not be maintained.

CAUTION

When HOV mode is engaged above 2000 ft (610 m) AGL the ALT mode does not automatically engage. Therefore the pilot must control collective manually or engage ALT mode.

The hover symbology automatically appears on the PFD when HOV mode is engaged. The display shows the aircraft velocity vector and the reference velocity symbol. See Figure 2-4.

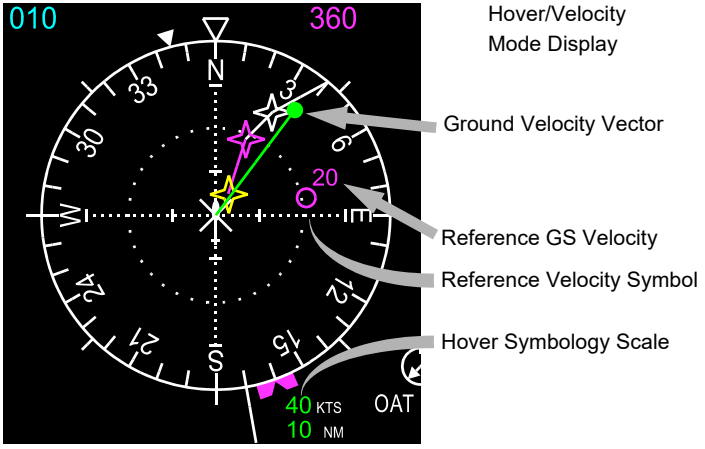

Figure 2-4 HOV Symbology

FMS SEARCH PATTERNS

SAR type search patterns are available in the FMS which, when inserted in a flight plan using the MCDU, are displayed on the MFD and can be flown using the NAV function. The following search patterns are available:

— Expanding Square

— Sector

— Creeping Ladder

— Parallel.

For FMS SAR search patterns see Supplement 68.

ADVISORY CAPTIONS

CAS Caption (Green)	System State
MOT NOT INSTALLED	(Caption present for 5 secs in inverse video) MOT button pressed and function not fitted
TD/H NOT INSTALLED	(Caption present for 5 secs in inverse video) TD/H button pressed and function not fitted
VNAV NOT INSTALLED	(Caption present for 5 secs in inverse video) VNAV button pressed and function not fitted
WTR NOT INSTALLED	(Caption present for 5 secs in inverse video) WTR button pressed and function not fitted

PFD DISPLAY

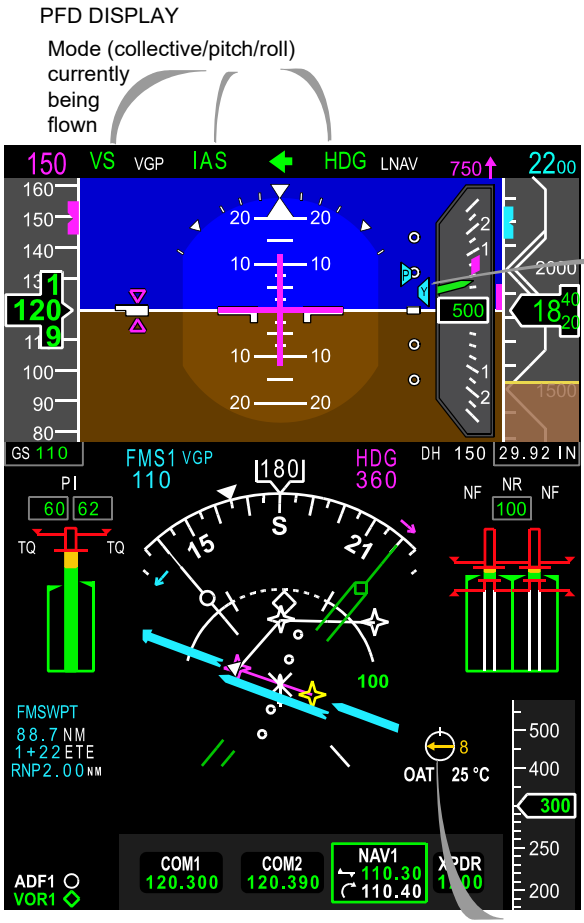

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Figure 2-5 PFD Display

FMS FUNCTIONAL INCONSISTENCIES ONLY FOR EPIC SOFTWARE PHASE 5 OR PHASE 6 INSTALLED

1. When the destination runway/helipad is changed, without an arrival or approach entered, and the runway/helipad is the TO waypoint, the FMS incorrectly places the runway/helipad behind the helicopter, shows it as the FROM waypoint, disengages LNAV (if engaged) and the deviation bar is shown as INVALID.
   Recommended corrective action if problem scenario encountered:

   • Perform 'Direct To' to destination runway/helideck

   • Select desired runway/helipad and activate

   • Re-engage LNAV mode.

   Refer to Honeywell Service Information Letter D201002000030 for further information.

   Problem not present for software version EB7030191-00109 (Phase 6.5)

2. The 'Direct-To Recovery' procedure should not be used in any phase of flight.

   Refer to Honeywell Service Information Letter D201001000021 for further information.

3. Approach and/or Star procedures which contain a certain geometry of consecutive AT altitude constraints exhibit a TOD misplacement and premature descent.

   Refer to Honeywell Service Information Letter D201010000078 for further information.

   Problem not present for software version EB7030191-00109 (Phase 6.5)

4. Software version EB7030191-00109 (Phase 6.5) only, Activating vectors during an FMS approach may result in below-glide path VGP indications at the FAF. The crew should monitor VGP indications during glide path capture and execute a missed approach if VGP indications are not consistent with normal glide path capture.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

VOICE ONLY MESSAGES

1. "Altitude, Altitude" and associated HTLM message on the PFD

— Collective modes engaged and aircraft ground clearance below Safety Height with subsequent Fly-Up intervention.

— For Rad Alt dependant modes the Reference Height and Safety Height values are as follows.

Reference Height (ft)	Safety Height (ft)
30	19
50	36
100	80
150	124
200	168
250	211
500	430
1000	868
1500	1305
2000	1743

2. "Altitude, Altitude"

— Aircraft exceeded the altitude deviation in ALT mode ±150 ft (46 m) from reference.

3. "LOW SPEED LOW SPEED"

— Aircraft below 55 KIAS and a FD mode has automatically disengaged (chime sound generated).

CAS CAUTION MESSAGES

AUTOPILOT FAIL

1(2) AP FAIL + Aural Message

+

AFCS DEGRADED

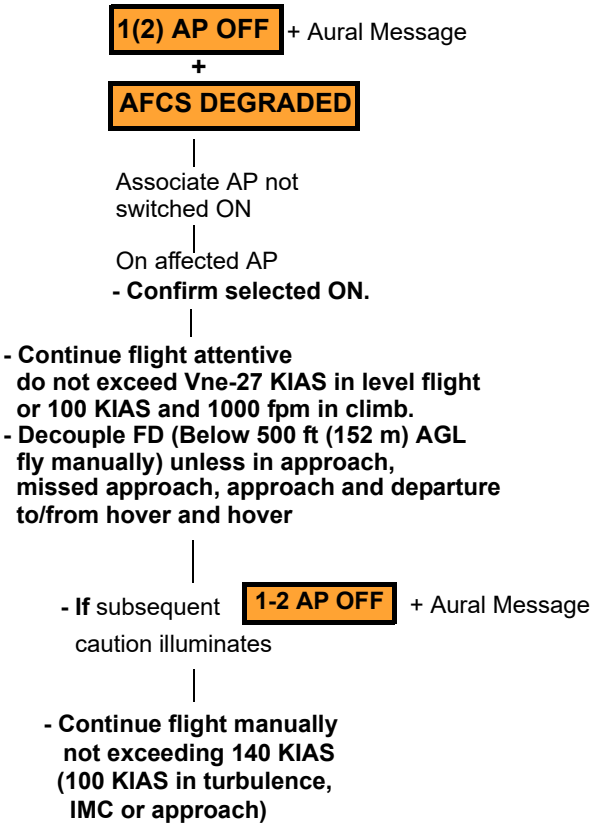
Associated autopilot failure

- Continue flight attentive
do not exceed Vne-27 KIAS in level flight
or 100 KIAS and 1000 fpm in climb.
- Decouple FD (Below 500 ft (152 m) AGL
fly manually) unless in approach,
missed approach, approach and departure
to/from hover and hover

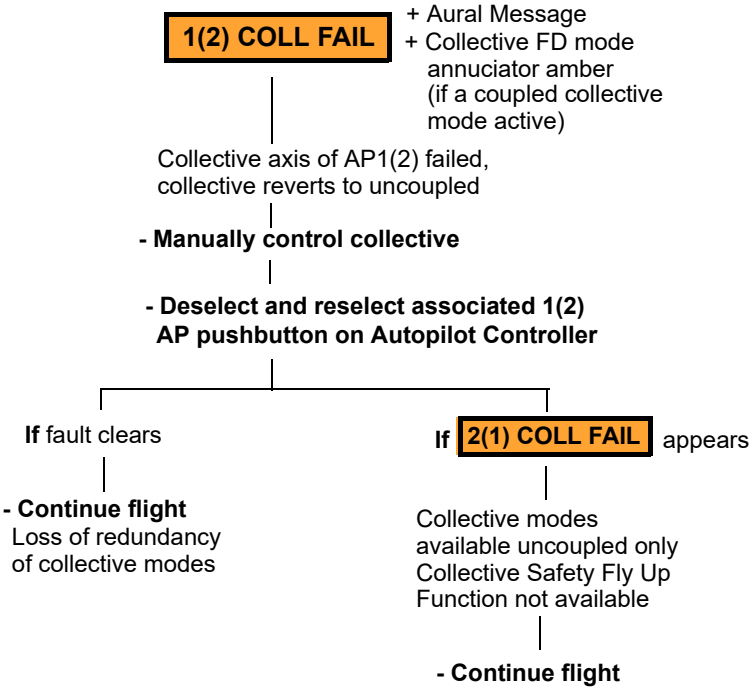
- If subsequent caution illuminates **1-2 AP FAIL** + Aural Message

- Continue flight manually
not exceeding 140 KIAS
(100 KIAS in turbulence,
IMC or approach)

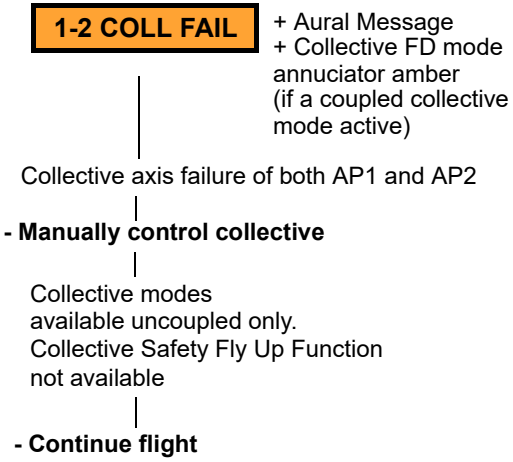
AUTOPILOT OFF



SINGLE COLLECTIVE AUTOPILOT FAILURE



DUAL COLLECTIVE AUTOPILOT FAILURE



CYCLIC FORCE TRIM RELEASE FAILURE

Cyclic FTR failure, due to a fault which removes electric power to the clutches of the longitudinal and lateral trim, will result in cyclic longitudinal and lateral clutches becoming permanently engaged. This will require the pilot to fly the aircraft against the cyclic force spring feel to manoeuvre the aircraft, or use the cyclic beep trim, as cyclic FTR button does not function.
In this case it is suggested that a cyclic FD mode (i.e. IAS) is engaged and the cyclic beep trim used to maintain the required flight condition.

COLLECTIVE FORCE TRIM OFF OR FAIL

When a FD mode is engaged, and coupled, and the collective trim is switched OFF (Miscellaneous Control Panel) or fails, a chime sound is generated, the collective may not maintain its selected position, the CLTV annunciation will illuminate on the top left of the ADI display, and the CLTV/YAW OFF green advisory will illuminate on the CAS window. Collective modes are available uncoupled only.

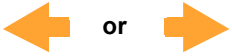
COLLECTIVE FORCE TRIM RELEASE FAILURE

Collective force trim release failure, due to a fault which removes electric power to the clutch of the collective trim will result in the collective clutch becoming permanently engaged. This will require the pilot to fly the aircraft against the collective force spring feel to manoeuvre the aircraft, or use the collective beep trim, as the collective FTR button does not function.
In this case when large collective movements are not required, it is suggested that a collective FD mode (i.e. ALT) is engaged and the collective beep trim used to maintain the required flight condition.

FLIGHT DIRECTOR FAILURE

No CAS Warning or Caution messages are generated to indicate FD malfunctions. However indication on both PFD displays indicate the state of the flight director system.

FLIGHT DIRECTOR PARAMETER FAILURE



or

replaces green arrow above attitude indicator on PFD

At least one On-side flight director parameter is invalid

- Confirm which parameter(s) are invalid
- Either select functioning cross side parameter on RCP panel or select cross side PFD on Guidance Controller.

DUAL FLIGHT DIRECTOR FAIL

FD FAIL

replaces FD arrow above attitude indicator on both PFD's

+

loss of flight director bars and information

Both Flight Directors invalid

- Flight Director not available

FAILURE OF SELECTED PFD UNIT WITH FLIGHT DIRECTOR ENGAGED

Loss of PFD, the associated MFD will automatically configure to Composite mode maintaining the FD engaged on the same references as the PFD.

- **Confirm no chime sound**
- **Confirm FD green arrow and FD mode green captions are present on MFD in Composite mode**

- **Continue flight**

- **If** subsequent display in composite mode fails
  FD automatically disengages, with chime

- **If** Copilot displays failed and Left pilot flying

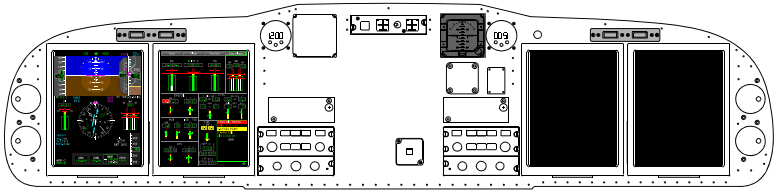
- **Right pilot take control of aircraft**

FD can be re-engaged (on right pilot side)

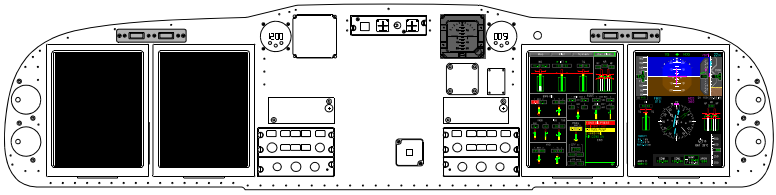
- **If** Pilot displays failed and Right pilot flying

- **Revert to Standby instrument**

- **Land as soon as practicable**



Failure of both Pilot PFD and MFD



Failure of both Copilot PFD and MFD

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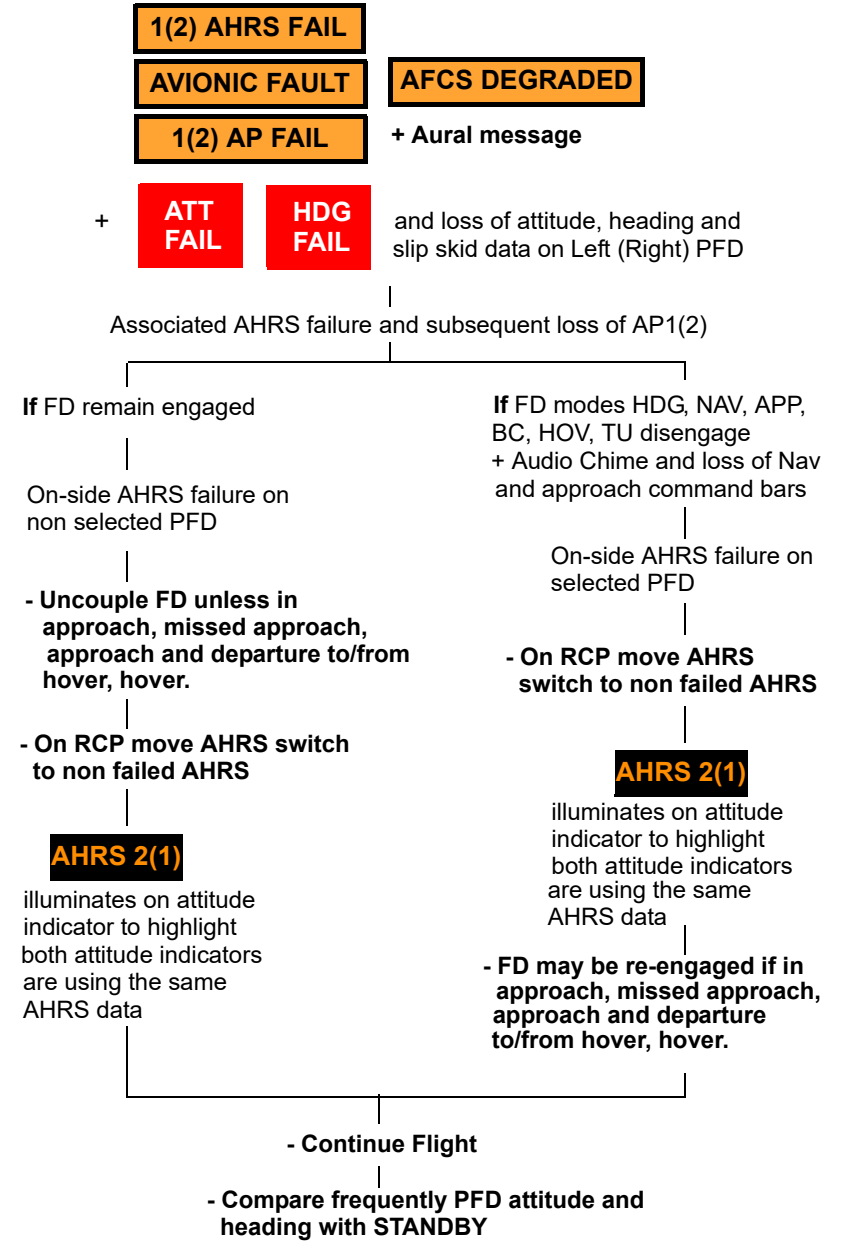
Figure 3-1 Failure of both PFD and MFD

GUIDANCE CONTROL PANEL FAILURE

In case of Guidance Control Panel failure, recognized as non functionality of panel pushbuttons (modes cannot be changed or disengaged using panel), the FD may be disengaged using the cyclic FD STBY button.

Continue flight, using the FD modes already engaged as required. However, use the cyclic FD STBY button to disengage modes when required. When disengaged FD is no longer available.

AHRS FAILURE WITH FD ENGAGED



MAU FAILURE WITH FD ENGAGED

For on-side MAU failure on the selected PFD the FD modes ALT, VS and IAS will disengage, (with a chime for an MAU 1 failure but not for an MAU 2 failure). Follow procedure below for FD action and refer to Section 3 Basic RFM Page 3-148 for complete MAU failure procedure.

1(2) MAU
+
1(2) ADS FAIL
+
1(2) AP FAIL

PFD message combined with CAS Cautions and disengagement of FD modes ALT, ALTA, IAS, VS + Audio Chime (MAU 1 failure only) and loss of:



- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

Multiple CAS cautions illuminate, but those which affect FD functioning are:
1(2) AP FAIL page 34
1(2) ADS FAIL page 43
AFCS DEGRADED see Basic RFM page 3-135

- Continue flight attentive
- On RCP move ADS switch to non failed ADS
- Do not exceed Vne-27 KIAS in level flight or 100 KIAS and 1000 fpm in climb
- Below 500 ft (152 m) AGL fly manually

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD data with STANDBY indicator.

ON SIDE ADS FAILURE ON SELECTED PFD WITH FD ENGAGED

Note

For on-side ADS failure on the non selected PFD there is no effect on FD modes. Refer to Section 3 Basic RFM Page 3-146

1(2) ADS FAIL

+

Disengagement of some FD modes (ALT, ALTA, IAS, VS) + Audio Chime

and loss of:

- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

- On RCP move ADS switch to non failed ADS

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD data with STANDBY indicator.

ATTITUDE SYSTEM OFF

ATT OFF

\+

SAS message displayed on both PFD's

Attitude hold system not engaged

- **Engage ATT on autopilot controller**

If associated with cyclic freedom of motion in longitudinal and/or lateral direction with loss of function of FTR switch and cyclic beep trim

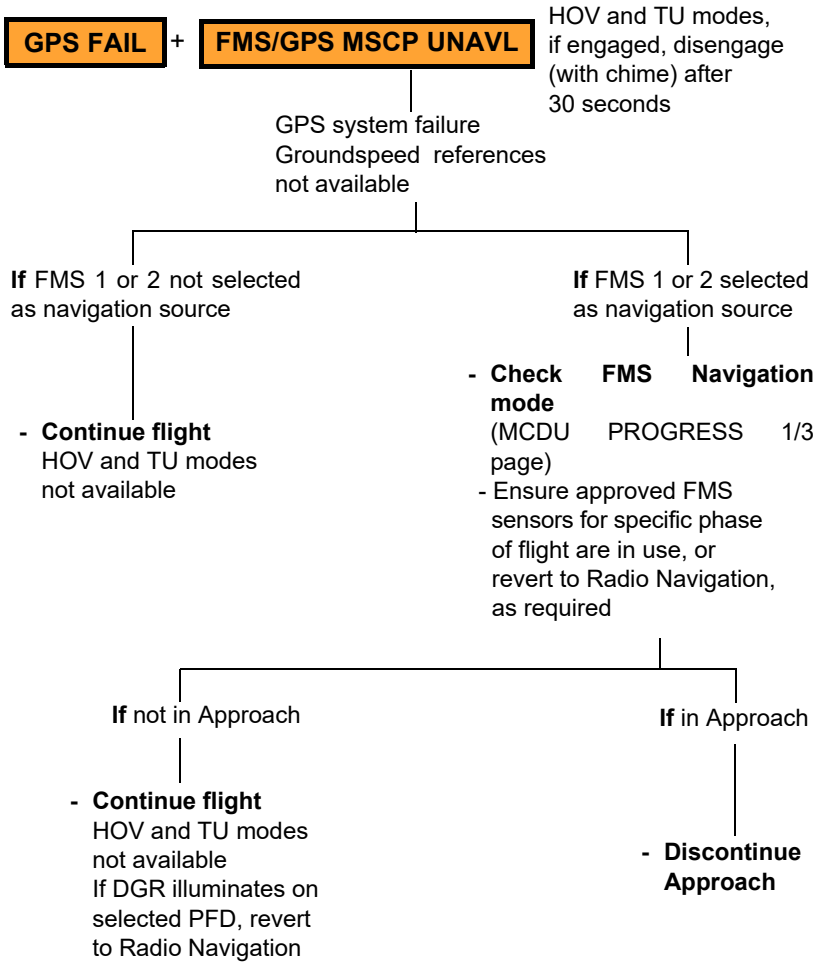
Cyclic force trim failure
Collective FD modes automatically change to uncoupled (with chime)
Cyclic FD modes do not function, cyclic steering bars remain centred

- **Fly manually**

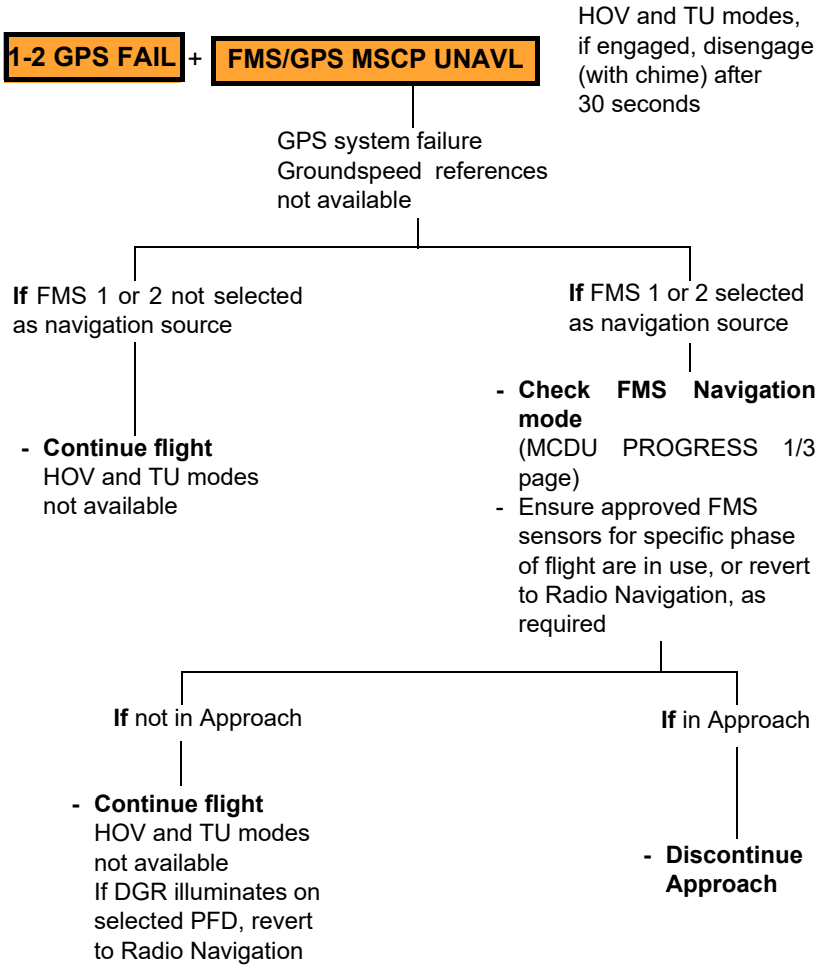
Note

With ATT system not engaged the aircraft flies in SAS mode only.

GPS FAILURE (SINGLE GPS INSTALLATION)



DOUBLE GPS FAILURE (DOUBLE GPS INSTALLATION)



GPS FAILURE (DOUBLE GPS INSTALLATION)

1(2) GPS FAIL

1(2) GPS system failure

Loss of GPS redundancy

- **Continue flight**

FMS FAILURE

1(2) FMS FAIL

Failure of Flight Management System 1(2)

If FMS 1(2) not used as Navigation source

- **Continue flight**
  Loss of redundancy for FMS Navigation

If FMS 1(2) used as Navigation source LNAV, VGP, VRT and DCL modes, if engaged, disengage (with chime)

- **Select FMS 2(1) as Navigation Source (press LNAV on Display Controller) or revert to Radio Navigation as required**

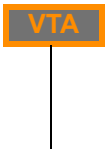
If in Approach

- **Discontinue Approach**

PFD MESSAGE

VERTICAL TRACK ALERT CAPTION:

FOR PHASE 5, 6 AND 7



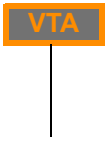
on attitude indicator during VGP mode approach, when within 100 ft above Missed Approach Point (MAP) altitude

The VGP will disengage, with chime, at MAP or transition to AVLV, if still engaged at 150 ft (46 m) AGL

CAUTION

- ALVL mode will not engage when MAP is above 150 ft (46 m) AGL
- VTA annunciation will not appear when MAP is below 50ft AGL due to engagement of ALVL at 150 ft AGL
- VTA annunciation is not available when 'MIN' annunciator is illuminated.

PHASE 8 AND LATER



on attitude indicator during VGP mode approach, when within 200 ft above Missed Approach Point (MAP) altitude

The VGP will disengage, with chime, at MAP or transition to AVLV, if still engaged at 150 ft (46 m) AGL

CAUTION

- ALVL mode will not engage when MAP is above 150 ft (46 m) AGL
- VTA annunciation is not available when 'MIN' annunciator is illuminated.

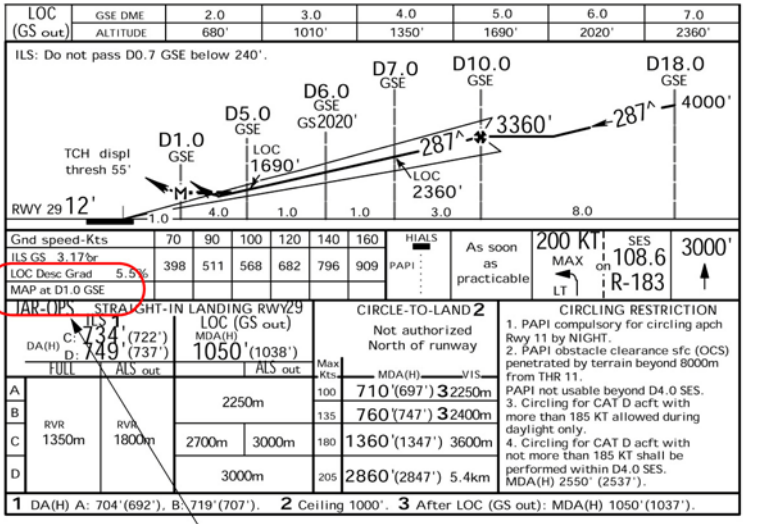


Figure 3-2 MAP Indication on Approach Chart

SINGLE RAD ALT FAILURE WITH RHT MODE ENGAGED

RAD1(2) Message beside RAD ALT display.
on both PFD's

Rad Alt 2 (1) failed and automatic reconfiguration to functioning Rad Alt.
Message highlights both Rad Alt indicators are using the same source

- Continue flight attentive
Loss of Rad Alt redundancy
No effect on RHT ALT dependant modes functionality

CAUTION

When either RAD ALT fails, the LANDING GEAR CAS caution and associated audio message may activate erroneously when the aircraft is above 150 ft (46 m) AGL and the LDG GEAR is retracted.

DOUBLE RAD ALT FAILURE WITH RHT MODE ENGAGED

RAD

Message replaces RAD ALT height information on both PFD's
RHT, TU and VRT modes disengage with audio chime (if engaged)

Failure of both RAD ALT systems

- Continue flight

- RAD ALT functioning is lost
- RHT, VRT, TU modes and ALVL not available
- Safety Fly Up function not available
- MIN message is inactive
- 'CHECK HEIGHT' aural warning inactive

Note

If RHT mode engaged ALT will automatically engage 5 seconds after RAD failure indication.

CAUTION

When both RAD ALT's fail, the 150 ft aural warning message does not function and the LANDING GEAR caution will be displayed if the LDG GEAR is retracted, regardless of height.

RAD ALT MISCOMPARE WITH RHT MODE ENGAGED

RAD message on RAD ALT display
RHT, TU and VRT modes disengage
with audio chime (if engaged)

Miscompare between
RAD ALT 1 and 2 information.

- Compare the Pilot and Copilot RAD ALT indications and/or outside visual references to establish the correct data.

- Continue flight
RHT, VRT, TU modes and Safety Fly-Up function not available while message displayed

Note

If RHT mode engaged ALT will automatically engage 5 seconds after RHT disengages.

GROUNDSPEED VELOCITY FAIL

VEL FAIL Message below and to left of compass display
Velocity vector, on hover display, removed
HOV Mode disengages, if engaged

Failure of valid velocity data
from both AHRS

- Continue flight
HOV mode not available

GROUNDSPEED VELOCITY MISCOMPARE

VEL

Message below and to left of compass display

Miscompare between AHRS 1 & 2 velocity data (greater than 2 kts) when groundspeed below 20 kts

- Compare PFD indications

- Continue flight

If fault on coupled side AHRS aircraft may be affected by drift in HOV mode

HEIGHT LIMIT CAPTION

HTLM

Message left of attitude indicator on both PFD's

Aircraft passed Safety Height and/or Ultimate Fly Up Limit. Safety Fly-Up function activated, if any collective mode engaged and coupled

- Monitor height
- Ensure separation from terrain visually or, if not possible, establish a positive rate of climb to a safe height

SECTION 4 - PERFORMANCE DATA

No change in performance information.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full details of FD Modes operation and use see "PRIMUS EPIC Integrated Avionics and Flight Control System for the AW139 Helicopter - Pilot's Guide" latest issue and "FMS Pilots Guide" latest issue.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 68

EPIC SOFTWARE PHASE 5 AND LATER ADDITIONAL FUNCTIONS

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SUPPLEMENT 68
EPIC SOFTWARE PHASE 5 AND LATER ADDITIONAL FUNCTIONS

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GENERAL INFORMATION

The following functions are introduced and operational with the installation of EPIC Phase 5 (software release EB7030191-00107) or Phase 6 (software release EB7030191-00108 & 109) or Phase 7 (software release EB7030191-00110/00111/00112/00114/00115/00117/00118) or Phase 8 (software release EB7030191-00113/00120).

New FMS Functions

— SAR Search Patterns (Optional, but included with Supplement 69)

— Helicopter Performance pages.

New Basic Display Functions

— CAS caution ‘GEN OVLD’ added and generator load display modified.

— Aural ‘Check Height’ and ‘Low Speed’ alerts.

— OAT sensor miscompare indication.

— AHRS G/S velocity miscompare indication.

— Wind indication.

— CAT A symbology indications on PFD’s.

Optional Functions

— Support of SBAS GNSS Receivers.

FMS NEW FUNCTIONS

SAR SEARCH PATTERNS

— SAR type Search Patterns are available in the FMS which, when inserted in a flight plan using the MCDU, are displayed on the MFD. The following Search Patterns are available (in brackets are the legends on the MCDU):

- Expanding Square (SQUARE)
- Sector (SECTOR)
- Creeping Ladder (LADDER)
- Parallel (PARALLEL).

— Search Pattern selection and activation are performed on the MCDU starting from the PATTERNS page, see Figure 1, that can be accessed from NAV INDEX.
When SEARCH is selected, the active (or stored) Flight Plan page is shown. At this point, inserting SEARCH on a valid waypoint the SEARCH PATTERNS page is presented, see Figure 2, and the selection of the required Search Pattern can be carried out.
Once a Search Pattern has been defined it can be flown automatically by coupling to the FD. To fly the Search Pattern coupled select NAV on the Guidance Controller. See Supplement 69.

— A search pattern is calculated from parameters input into the MCDU and/or default values (which can be modified). The search pattern waypoints are also entered into the Active Flight Plan depending on the type of pattern selected:

- Search pattern approach waypoints are named SPAPx
- The initial fix or Start Position is named SPSTx
- The last waypoint in search pattern is named SPEXx
- Each search pattern in the Active Flight Plan uses matching numbers (x=1, x=2 x=3 etc.) for approach, start position and exit waypoints

- Waypoints between the SAR start and exit waypoints are numbered sequentially i.e. SP001, SP002 etc.

— When flying a Search Pattern, the Search Pattern parameters can be modified on the appropriate search pattern page. Any parameter modified will take effect from the end of the current leg.

Note

Leg modification of Search Pattern parameters shall be entered during the second half of the leg.

— A search pattern can be suspended at anytime by pressing PPOS SUSP on the ACTIVE FLT PLAN page. The Search Pattern may be resumed by pressing RESUME, on the ACTIVE FLT PALN page, which will continue the Search Pattern after the aircraft has returned to the previously suspended point.

— When flying a Search Pattern, if MOT is pressed the Search Pattern is suspended. It may be resumed by pressing RESUME at the end of the MOT.

Note

CHECK SAR SPEED will appear on MCDU scratchpad (with no MSG on PFD) any time actual IAS is more than 5 KIAS with respect to the IAS selected within the SAR Pattern Page.

Note

The search pattern airspeed should be adjusted as required to guarantee that the pattern is flown correctly, based on pattern geometry, taking into account the wind direction and speed.

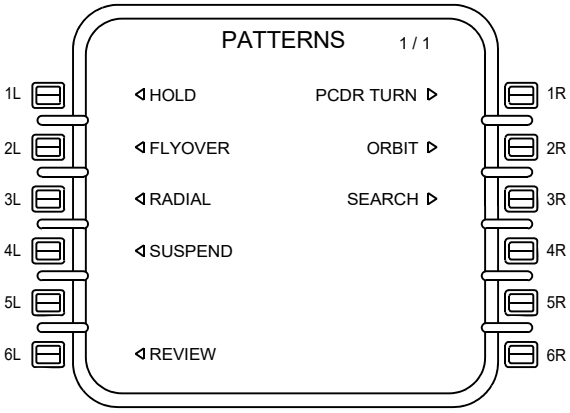


Figure 1 MCDU Patterns Page

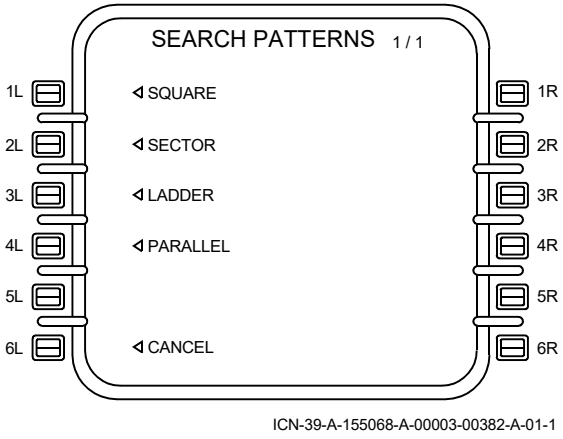
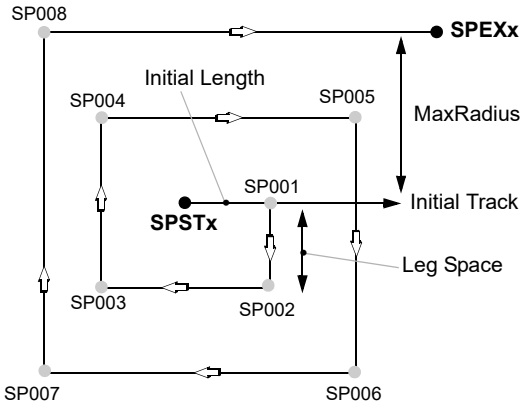


Figure 2 MCDU Search Patterns Page

Expanding Square Search



The parameters required to construct the search plan are:

- 1L - Start Position (SPSTx)
- 2L - Turn Direction (Default: Right)
- 2R - Initial Track
- 3L - Leg Space (Nm - minimum value 0.5 Nm and 0.2 NM Phase 8 only)
- 3R - Initial Leg Length (Nm)
- 4L - Speed (Default 90 KIAS - minimum 60 kt)
- 4R - Maximum Radius (Nm)

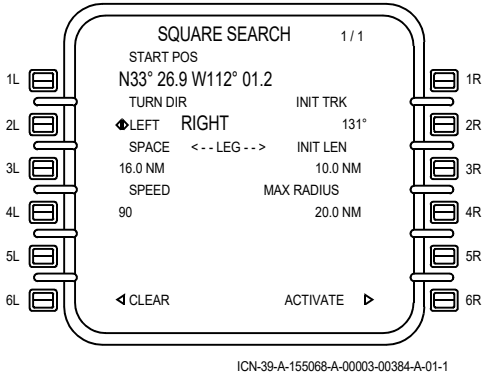


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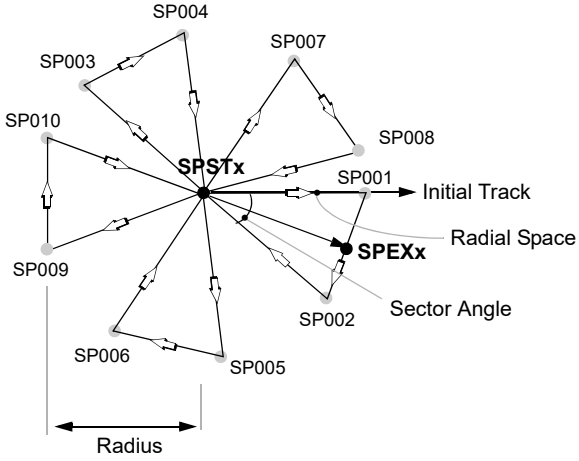
Figure 3 MCDU Expanding Square Search Page

Sector Search



The parameters required to construct the search plan are:

- 1L - Start Position (SPSTx)
- 2L - Turn Direction (Default: Right)
- 2R - Initial Track
- 3L - Radial Space (Nm - minimum value 0.5 Nm)
- 3R - Sector Angle (from 1 to 60 degrees)
- 4L - Speed (Default 90 KIAS - minimum 60 KIAS)
- 4R - Pattern Radius (Nm)

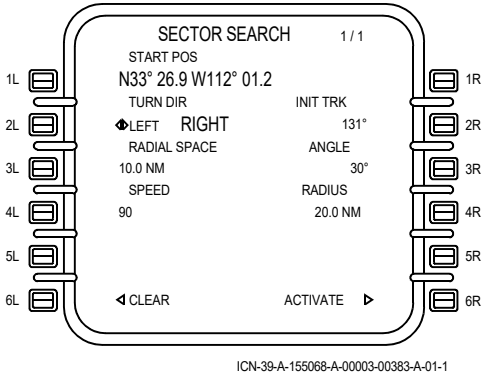
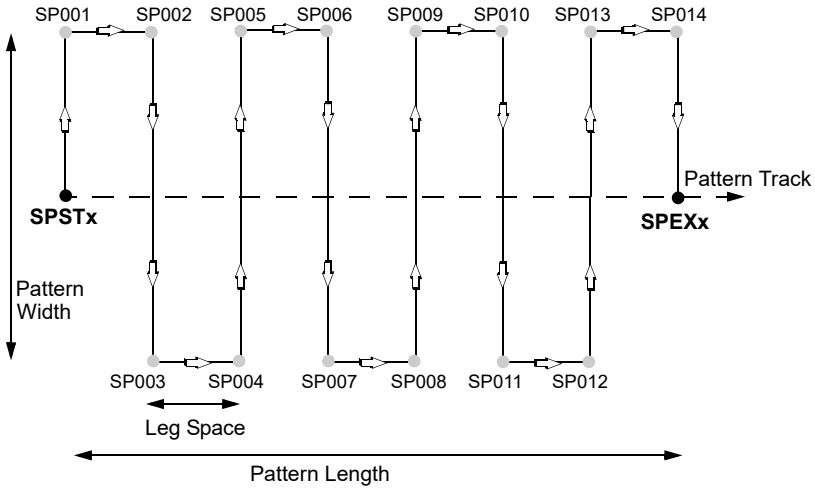


Figure 4 MCDU Sector Search Page

Creeping Ladder Search



The parameters required to construct the search plan are:

- 1L - Start Position (SPSTx)
- 2L - Turn Direction (Default: Right)
- 2R - Pattern Track
- 3L - Leg Space (Nm)
- 3R - Pattern Width (Nm - minimum 0.5 Nm and 0.2 NM Phase 8 only)
- 4L - Speed (Default 90 KIAS - minimum value 60 KIAS)
- 4R - Pattern Length (Nm)

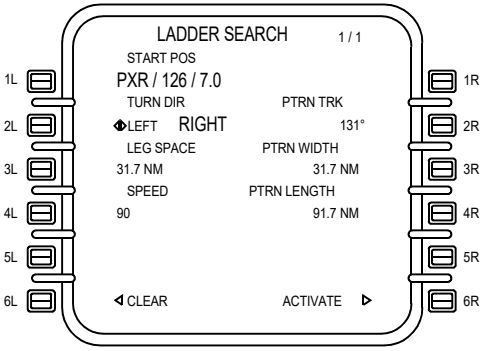


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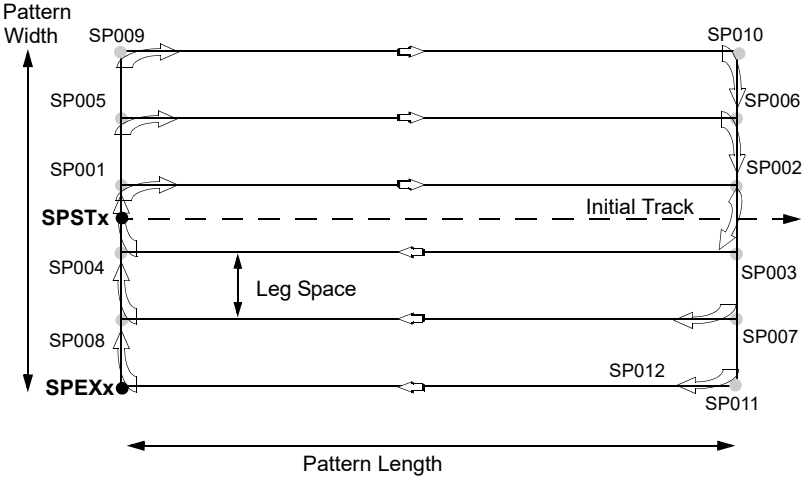
Figure 5 MCDU Ladder Search Page

Parallel Pattern Search



The parameters required to construct search plan are:

- 1L - Start Position (SPSTx)
- 2L - Turn Direction (Default: Right)
- 2R - Initial Track
- 3L - Leg Space (Nm - minimum value 0.5 Nm)
- 3R - Pattern Width (Nm)
- 4L - Speed (Default 90 KIAS - minimum value 60 KIAS)
- 4R - Pattern Length (Nm)

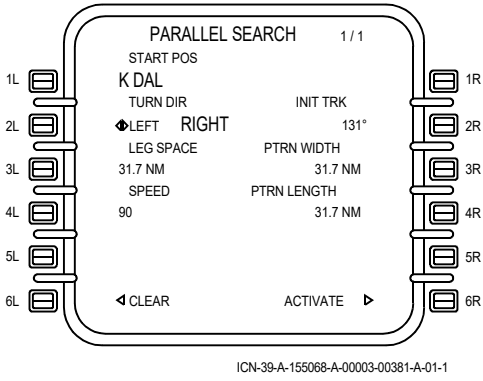


Figure 6 MCDU Parallel Search Page

PERFORMANCE PAGES

For full information of performance data available refer to FMS Pilots Guide latest issue. If any conflict exists between the FMS performance data and that presented in the RFM, the RFM shall take precedence.

The following information is available in the MCDU performance pages:

— PERFORMANCE INIT page 3/3 is used to initialize aircraft weight, according to the actual configuration (See Figure 7). Weight data are in kg.

PERFORMANCE INIT page comprised of:

- BOW and Basic CG
- Fuel Gauge - by default this is the actual fuel
- STR F/A - Stretcher weight (if installed) - fore and aft
- PILOTS - Total weight of pilot and co-pilot
- ROW 1/2/3 - Passenger weight, divided in 3 rows of seats
- Baggage - Total weight of baggage
- HOIST/HOOK - Load on hoist (if used)
  Load on cargo hook (if used)

If GROSS WEIGHT is outside the authorized value, a dedicated message will appear on the scratch pad:

“BELOW GROSS WEIGHT” aircraft weight less than 4400 kg

“CHECK GROSS WEIGHT” aircraft weight greater than 6400 kg*

“EXCEEDS MAX GROSS WEIGHT” aircraft weight greater than 6800 kg (PERF INIT not allowed)

Or when Weight Extension 7000 kg (Supplement 90) installed:

“EXCEEDS MAX GROSS WEIGHT” aircraft weight greater than 7000 kg (PERF INIT not allowed)

* For Operations above 6400 kg see Supplement 50 and 90 as appropriate.

— The GROSS WEIGHT data is the value used for performance computation in pages PERF DATA 1,2 & 3.

— PERF DATA pages 1/4 and 2/4 (Figure 8 & Figure 9) gives information on aircraft performance.

- Hover (Hover capability - Hover Ceiling - Height Velocity high hover point - Flyaway capability and associated height loss).
- Level flight (Best Range and Best Endurance information - page 1/4, Current Range and Current endurance - page 2/4).

Data for Hover Ceiling are assuming MCP rating and data for HV are assuming OEI 2.5 min rating.

- No fuel reserve is calculated.
- PALT/OAT values of pressure altitude and OAT may be the actual (digits in small font) or pilot entered (digits in large font). According to these values the system calculates the corresponding density altitude (DENS ALT).

Values are presented in inverse video when:

- Hover ceiling density altitude is lower than calculated (actual or pilot entered) density altitude
- HT LOSS value is higher than actual aircraft height.

Note

When the Pressure Altitude value is less than 0 ft Best Range and Best Endurance values are not available.

— PERF DATA page 3/4 (Figure 10) gives information on aircraft CAT A performance capability.
Data presented is, for different profiles, the CAT A ceiling expressed in density altitude for the current or pilot selected GW.
Values are presented in inverse video if the ceiling is less than the DENS ALT value.

— PERF DATA page 4/4 (Figure 11) displays the status of the configuration for those components that can affect aircraft performance. Performance data in pages 1/4, 2/4, 3/4 are relative to the status shown on page 4/4.

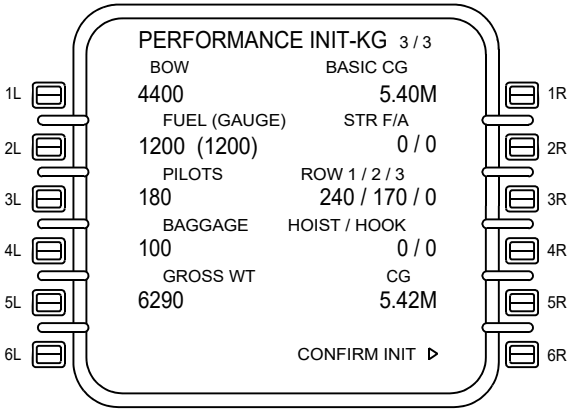


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Figure 7 MCDU Performance Init Page 3/3

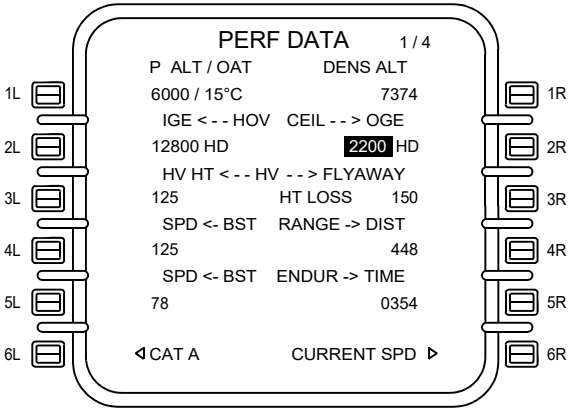

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Figure 8 MCDU Performance Page 1/4

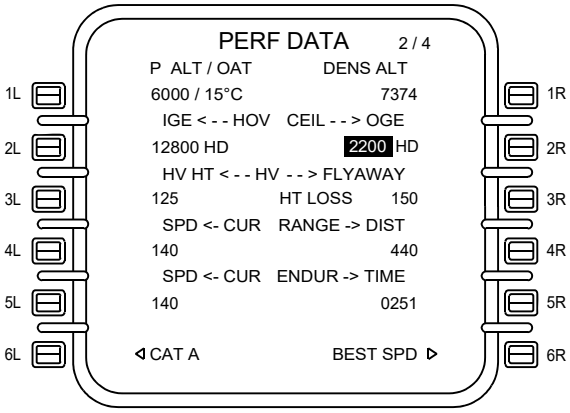

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Figure 9 MCDU Performance Page 2/4

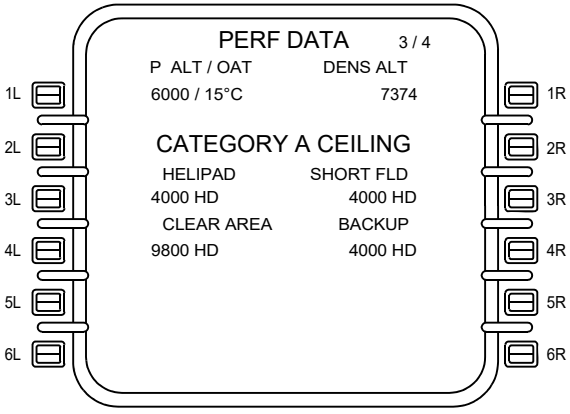

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Figure 10 MCDU Performance Page 3/4

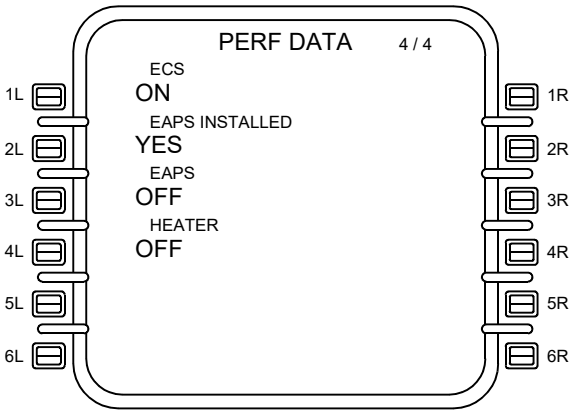

Figure 11 MCDU Performance Page 4/4

NEW BASIC DISPLAY FUNCTIONS

'GEN OVLD' CAS CAUTION AND GENERATOR DISPLAY

A generator overload CAS caution has been added, 1(2) GEN OVLD for overload conditions of the generators.

The MFD generator load display has been modified to indicate the linear reduction in the permitted maximum loads for altitudes between 15000 ft Hp and 20000 ft Hp.

AURAL 'CHECK HEIGHT' ALERT

An Aural message 'CHECK HEIGHT CHECK HEIGHT' associated with a MIN message in the attitude area of the PFD is generated when the Radio Altitude is less than or equal to the DH set on the selected PFD. The PFD message will still be presented, even after AWG system failure and consequent loss of aural warnings.

Note

If the FD fails (amber FD FAIL on PFD) the DH selected on the RH pilot's PFD is taken as the CHECK HEIGHT reference.

Note

The Aural message is heard again if the aircraft has climbed at least 20 ft above the selected DH then subsequently descends below the DH.

AURAL 'LOW SPEED' ALERT

An Aural message 'LOW SPEED LOW SPEED' is generated when the FD mode has automatically disengaged (announced by a chime) due to the IAS dropping below the minimum speed for the applicable speed range.

OAT SENSOR MISCOMPARE INDICATION

When a temperature difference of 6° C or greater is being experienced between the two OAT systems the OAT indication changes to amber. The OAT indication is the average between the two OAT sensors.

When the difference returns to below 6 °C the OAT indication reverts back to white.

VELOCITY (GS) MISCOMPARE

A velocity miscompare indication **VEL** has been added to inform the pilot that the velocity output from the two AHRS differs by 2 kts, or more, for groundspeed below 20 kts.

WIND INDICATION SYMBOLOGY

The wind symbology has been modified to change to amber when the wind value has been frozen due to the TAS being less than 40 kts or for a period of six minutes if, crossing 40 kts, the roll attitude was greater than 3°.



Wind Indicator
Direction is TRUE heading.
Indication turns amber when wind value is frozen due to TAS less than 40 kts or for a period of six minutes if, crossing 40 kts, the roll attitude was greater than 3°.

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Figure 12 Wind Indication Symbology

CAT A SYMBOLOGY INDICATIONS ON PFD

CAT A symbology can be presented on the PFD to aid the pilot when performing CAT A published Take-Off and Landing manoeuvres. The symbology is displayed when the NR is set to 102% and the collective CAT A pushbutton is pressed.

— Take-Off symbology is presented when the aircraft is on the ground. Subsequent pressing of the CAT A pushbutton toggles through the following TAKE OFF profiles:

• Ground Level Heliport	HELIPAD
• Short Field	SHORT FIELD
• Clear Area	CLEAR AREA
• Elevated Heliport/Helideck	ELEV HELIPAD
• Ground Level and Elevated Heliport/Helideck Back-Up	BKUP HELIPAD

The selected profile label is displayed above the radio/nav frequency panel on the PFD. See Figure 13.

— Landing symbology is presented when the aircraft is in flight above 400 ft AGL. Subsequent pressing of the CAT a pushbutton toggles between the following LANDING profiles:

• Ground Level Heliport	HELIPAD
• Short Field	SHORT FIELD
• Clear Area	CLEAR AREA
• Elevated Heliport/Helideck	ELEV HELIPAD

The selected profile label is displayed above the radio/nav frequency panel on the PFD. See Figure 13.

If an engine failure occurs, and a Balked Landing procedure is required, the collective CAT A pushbutton may be pressed, to activate the balked landing symbology, (prior to commencing the balked landing procedure).

Take-Off Symbology - Vertical Profile

The Take-Off profiles indicated on the PFD are to be used with the following Supplement 12 CAT A Operation PARTs:

— HELIPAD - PART A - Ground Level and Elevated Heliport/Helideck Vertical Take Off Procedure

— SHORT FIELD - PART B - Shortf Field Take Off Procedures

— ELEV HELIPAD - PART A - Ground Level and Elevated Heli port/Helideck Vertical Take Off Procedure

— BKUP HELIPAD - PART C Ground Level and Elevated Heliport/ Helideck Back-Up Procedure

When on the ground after selection of any vertical Take-Off profile the TDP height magenta bug is presented on the Rad Alt tape at the default value of 35 ft (85 ft for BKUP HELIPAD). This value should be modified, as required, for the profile being carried out using the DH rotary knob.

CAUTION

The ELEV HELIPAD displays a default TDP value of 20 ft which is lower than the PART A - Ground Level and Elevated Heliport/Helideck Vertical Take Off Procedure TDP minimum so requires adjustment.

Once airborne in a 5 ft HIGE pressing the CAT A pushbutton acquires the actual PI value and hover pitch attitude. The Target PI (HIGE PI+Delta PI), with a magenta bug on the PI scale, and the hover attitude, with a magenta bar on the attitude indicator, are presented. The T-O may then be started by increasing PI to the indicated bug position while climbing vertically. When the indicated TDP value is achieved an audio warning “TDP TDP” is generated and the magenta pitch attitude line moves to 10° nose down in 1”, it maintains the attitude for 1” then moves back to 0° in 1”. The V_{TOSS} magenta bug is indicated on the IAS tape and when this is achieved, the pitch attitude magenta line moves to 5° nose up. After achieving Vy all the magenta Take-Off bugs disappear.

Note

If the aircraft pitch does not reach 10° nose down, within 3 seconds of the TDP aural warning, a 'CHECK PITCH' message is displayed on the attitude indicator and a CHECK PITCH' aural warning is generated.

Take-Off Symbology - Clear Area Profile

The Take-Off profile indicated on the PFD is to be used with the following Supplement 12 CAT A Operation PART:

— CLEAR AREA - PART F - Clear Area Take Off Procedure

After selection of the Take-Off profile for the Clear Area the TDP height magenta bug is presented on the Rad Alt tape at 30 ft. When in a 5 ft HIGE pressing the CAT A pushbutton acquires the actual PI value and hover pitch attitude. The Target PI (HIGE PI+Delta PI) with a magenta bug on the PI scale, a magenta bar at 5° nose down on the pitch attitude indicator and the TDP are then presented. The T-O may be started by moving the aircraft pitch to the magenta line then increasing PI to the indicated bug position to transition forward. When the indicated TDP is achieved the magenta pitch attitude line moves to 5° nose up and airspeed bug of 50 KIAS is presented on the IAS tape. After achieving Vy all the magenta Take-Off bugs disappear.

Note

If the aircraft pitch does not reach -5° nose down, within 3 seconds of the TDP aural warning, a 'CHECK PITCH' message is displayed on the attitude indicator and a CHECK PITCH' aural warning is generated.

Note

Take-Off symbology for all profiles (PI bug, labels and pitch reference line) will be removed when the aircraft reaches a height 200 ft greater than the TDP, while the IAS bug will be removed when crossing Vy.

Note

If, during a CTO manoeuvre after an engine failure, the aircraft height descends below TDP the pitch reference line will disappear.

Landing Symbology

The Landing profiles indicated on the PFD are to be used with the following Supplement 12 CAT A Operation PARTs:

— HELIPAD - PART G - Ground Level and Elevated Heliport/Helideck Landing Procedure

— SHORT FIELD - PART G - Ground Level and Elevated Heliport/Helideck Landing Procedure

— CLEAR AREA - PART J Clear Area Landing Procedure

— ELEV HELIPAD - PART G - Ground Level and Elevated Heliport/Helideck Landing Procedure

After selection of the CAT A Landing profile the LDP height magenta bug is displayed on the Rad Alt, and can be modified within its limits using the DH rotary knob (except for Clear Area). The Vertical descent speed target magenta bug on the VSI and the target airspeed magenta bug on the IAS tape are then displayed.

If a Balked Landing is required, then pressing the CAT A pushbutton will present the V_{BLSS} magenta bug on the IAS tape and the pitch attitude magenta line (the pilot may follow the movement with the pitch attitude of the aircraft) at 5° nose up which then reduces to 2° nose up at 200 ft (or LDP_V height + 150 ft). After achieving Vy all the magenta Balked Landing bugs disappear.

Note

If, during Balked Landing manoeuvre, aircraft height descends below LDP, IAS bug will disappear.

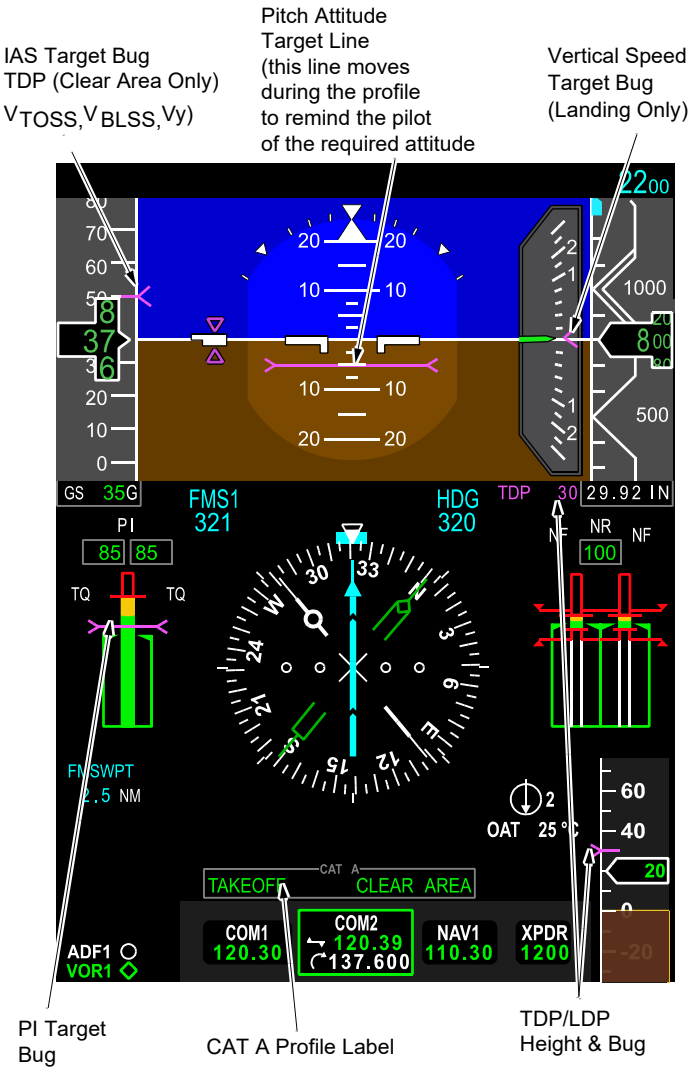

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Figure 13 CAT A PFD Symbology

OPTIONAL FUNCTIONS

SBAS GNSS Receivers

SBAS GPS kits 3G3450F00112/113 or P/N 3G3450F00412/413 (long nose variant) can be installed as an option. They include the GNSS receivers P/N 245-604067-100/101 (respectively), which are qualified per TSO C145/C146, and the GPS Antenna P/N S67-1575-145, which is qualified per TSO C190. These kits provide SBAS capability.

A second GNSS SBAS receiver is also supported (see Supplement 37).

When operating under SBAS coverage, the navigation mode displayed on GPS 1 (or 2) STATUS page of the MCDUs is 'DIFFERENTIAL'.

Note

System P/N 3G3450F00112/412 is compatible with Primus EPIC Phase 5 and subsequent SW releases. System P/N 3G3450F00113/413 is compatible with Primus EPIC Phase 7 and later SW only and is required to conduct LPV approaches. It is mandatory with SW EB7030191-00110/00111/00112 (see Supplements 79,80 & 101).

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTRE OF GRAVITY LIMITATIONS

— For weights up to 6400 kg see basic RFM.

— For weights between 6400 kg and 6800 kg see Supplement 50.

— For weights between 6800 kg and 7000 kg see Supplement 90.

CAT A SYMBOLOGY LIMITATIONS

The CAT A symbology is for pilot information only. The pilot must know the intended Take Off and Landing procedures and relevant parameters. In case the symbology provides erroneous indication the procedures defined in Supplement 12 must be observed.

FMS PERFORMANCE LIMITATIONS

FMS performance data is for pilot information only. If any conflict exists between the FMS performance and that presented in the RFM, the RFM shall take precedence.

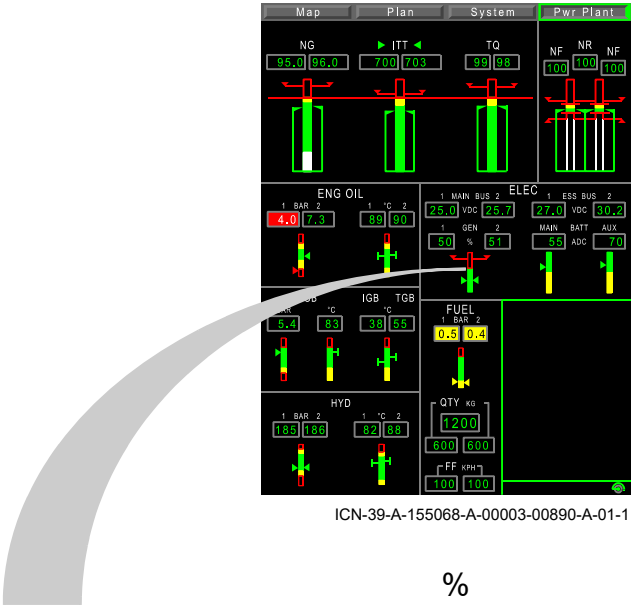

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Figure 1-1 DC Generator Load

SECTION 2 - NORMAL PROCEDURES

PRE START CHECKS

1. AWG TEST pushbutton	— If required, confirm additional aural warnings: LOW SPEED CHECK PITCH TDP LDP CHECK HEIGHT

FMS FUNCTIONAL INCONSISTENCIES ONLY FOR EPIC SOFTWARE PHASE 5 OR PHASE 6 INSTALLED

Note

For complete FMS operations, refer to the Honeywell Flight Management System (FMS) Pilot Manual for the AW 139.

— With dual DME configuration (aircraft personality module (APM) setting), DME station identifiers may possibly become blank on the very high frequency omni-directional radio range VOR/DME MCDU page 1. However, the station frequency and distance to the station are still displayed. The station frequency can be used to look up the station identifier on NAV1 page to find the DME identifiers that are blanked on the VOR/DME page1.

— When an orbit is defined on the TO waypoint and the orbit defined is more than 4 NM from the current aircraft position, estimated time enroute (ETE) calculated is incorrect. The pilot is to verify accuracy of the ETE based on aircraft speed and distance to the orbit.

— When:

• a manual navigation performance (RNP) is entered, or
• the default ARRIVAL RNP (1R on the RNP page)

is greater than the approach RNP, on the RNP page, and

• the last waypoint of the arrival flight phase is deleted

the scratchpad message PILOT RNP CANCEL NEXT WP is not displayed.

— The electronic display system (EDS) deviation sensitivity is increased to the appropriate approach deviation scale factor when the aircraft position is 3 NM outside the final approach fix (FAF) instead of 2 NM from FAF.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

CAS MESSAGES

GENERATOR OVERLOAD

1(2) GEN OVLD

Associated Generator 1(2)
in overload condition
(in red band for more than 45 seconds)

- Reduce electrical load on associated generator to within green range

- Continue flight

VOICE ONLY MESSAGES

1. “CHECK HEIGHT
CHECK HEIGHT”

— Aircraft at or below the selected RAD ALT DH height (associated with MIN message on selected PFD).

PFD MESSAGES

OAT SENSOR MISCOMPARE

OAT ## °C — OAT displayed in amber on PFD

Miscompare between the two Outside Air Temperature probes is 6 °C or greater

- **Continue flight**
  Use OAT standby instrument

VELOCITY G/S MISCOMPARE

VEL — Message below and to left of compass display

Miscompare between AHRS 1 & 2 GS data (2 kts or greater) when groundspeed below 20 kts

- **Compare PFD indications**

- **Continue flight**
  If fault is on coupled side AHRS aircraft may be affected by drift in HOV mode

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full details of FMS operation and use see FMS Pilot's guide latest issue.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 69

4 AXIS ENHANCED FLIGHT DIRECTOR WITH SAR MODES (EPIC SOFTWARE PHASE 5 AND LATER)

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SUPPLEMENT 69
4 AXIS ENHANCED FLIGHT DIRECTOR WITH SAR MODES (EPIC SOFTWARE PHASE 5 AND LATER)

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GENERAL INFORMATION

The 4 Axis Enhanced Flight Director (FD) provides commands that are normally coupled to the autopilot (AP) for automatic flight path control around the three axes of the aircraft plus collective. At Power Up one of the two FD is automatically selected and configured as Master (priority). At every Power Up the FD selected as Master (priority) is alternated.

The 4 Axis Enhanced Flight Director with SAR Modes system is the complete version of the FD system and requires either EPIC Phase 5, (software release EB7030191-00107) or Phase 6 (software release EB7030191-00108 & 109) or Phase 7 (software release EB7030191-00110/00111/00112/00114/00115/00117/00118) or Phase 8 (software release EB7030191-00113/00120). The system contains all the functions of the 4 Axis Enhanced Flight Director, SAR modes and in addition the improvements of the Phase 5 and later software.

When coupled, both autopilots drive the actuators to satisfy the references provided by the priority FD.
When uncoupled the pilot can manually fly the commands.
In either case, pitch, roll command bars/collective cue are presented on each PFD, depending on the mode selected.

The FD uses the Navigation source and data reference presented on the selected PFD. The selected PFD is indicated by the green PFD couple arrow which is controlled by the PFD button on the SAR Guidance Controller (See Figure 2).

A green couple arrow is also presented on the side of the PFD pushbutton on the Guidance Controller. When a FD mode is engaged the coupled function is automatically engaged. The FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller (See Figure 1). The coupled function is automatically forced to uncoupled whenever the AP ATT mode is off or becomes inoperative.

Armed and captured FD modes are displayed with messages along the top line of the PFD: Collective and pitch mode messages on the left of the selected PFD arrow and lateral mode on the right. Armed modes are in small white characters and captured or engaged modes are in medium size green characters. When transitioning from no mode to engaged, from armed to captured or change from one mode to another mode the message flashes for 6 seconds then become

steady. When changing from captured to no mode the message flashes for 6 seconds then extinguishes.

Armed lateral modes messages are: VOR, VAPP, LOC, BC, LNAV and captured VOR, VAPP, OS, LOC, BC, LNAV, HDG, HOV, WTR.

Armed collective modes are: GS, VGP, VRT (Phase 8 and later) and captured ALT, GS, VS, GA, ALTA, ALVL, RHT, VGP, TD, TDH, TU, VRHT, VPTH, PTH, VRT (Phase 8 and later).
Engaged vertical pitch modes are IAS, HOV, DCL, GA, TD, TDH, TU, VIAS, WTR.

A chime sounds whenever either a lateral, vertical (pitch), or vertical (collective) FD mode changes from its previous state, i.e.

— a mode changes from engaged to disengaged or vice-versa

— a mode changes from arm to captured

— a mode changes from coupled to uncoupled.

An aural tone (“bip-bip”) sounds for any change in altitude or radar height mode reference datum.

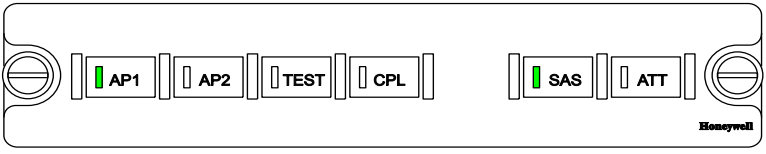

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Figure 1 Autopilot Controller

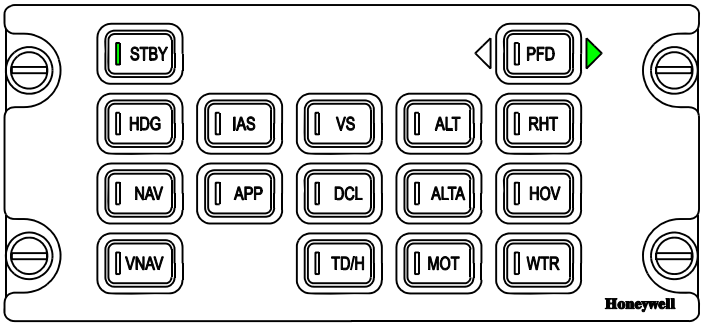

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Figure 2 SAR Guidance Controller

The FD functions available are as follows:

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
HDG	Heading select	Roll and Yaw	N/A	HDG
ALT	Altitude Hold	Collective	N/A	ALT
IAS	Indicated Airspeed Hold	Pitch	N/A	IAS
NAV	Lateral Navigation	Roll	LNAV/ VOR/ LOC	LNAV/ VOR/ LOC
APP	Lateral Approach	Roll	VAPP LOC VOR	VAPP LOC VOR
	Vertical Approach	Collective	GS VGP	GS VGP

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
PRV	Preselect VOR-ILS approach while in LNAV	N/A	As for APP	N/A
DCL	ILS Deceleration VGP Deceleration	Pitch	DCL	DCL
BC	Back Course Approach	Roll	BC	BC
ALTA	Altitude Acquire	Collective	N/A	ALTA
VS	Vertical Speed Hold	Collective	N/A	VS
GA	Go-Around/	Pitch/ Collective	N/A	GA
VGP	Vertical Glide Path	Collective	VGP	VGP
VRT***	Vertical Glide Path with Rad Alt Level Segment	Collective	VRT	VRT
RHT	Radar Height Hold	Collective	N/A	RHT
HOV	Hover/Velocity Hold	Pitch/Roll	N/A	HOV
OS*	Over Station mode	Roll	N/A	OS
ALVL*	Autolevel mode	Pitch/ Collective	N/A	ALVL
TD	Transition Down	Pitch/ Collective	N/A	TD
TDH	Transition to Hover	Pitch/Roll Collective	N/A	TDH
TU	Transition Up	Pitch/Roll/ Collective	N/A	TU

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
MOT	Mark On Target	Pitch/Roll/ Collective	N/A	MOT**
WTR	Winchman Trim	Pitch/Roll	N/A	WTR
SBY	Clear all FD modes	N/A	N/A	N/A

* Provided automatically.

** The MOT caption is displayed in a dedicated PFD field during the entire MOT sequence. Differing captions are displayed on the relevant axis (collective, pitch, roll) in addition to the dedicated MOT captions (VRHT, VPTH, PTH, VIAS, DCL) in accordance with which phase of the MOT approach is in execution.

*** Phase 8 and later and if Custom Approach with Level Segment enabled in option file.

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SECTION 1 - LIMITATIONS

MINIMUM FLIGHT CREW

— For Search and Rescue Operations (SAR) - Two Pilots.

— For other operations refer to Basic RFM or relevant Supplements.

WEIGHT LIMITATIONS

— For weights up to 6400 kg see Basic RFM.

— For weights between 6400 kg and 6800 kg see Supplement 50.

— For weights between 6800 kg and 7000 kg see Supplement 90.

FLIGHT DIRECTOR MODES LIMITATIONS

• The VNAV FD mode is inoperative on the SAR Guidance Control panel.

• Collective modes must not be engaged if either or both engines are in MANUAL MODE.

• The RHT, TD, TDH, TU, MOT, WTR can only be engaged over flat surfaces which are clear of obstructions.

PHASE 5 AND 6 FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH)

Hold Mode	Applicable Range	MUH
IAS*	60 KIAS to Vne less 5 KIAS	150 ft AGL or 50 ft AGL during approach
HDG*/NAV*	60 KIAS to Vne	150 ft AGL or 50 ft AGL during approach
ALT	0 KIAS to Vne	300 ft AGL (airspeed greater than 55 KIAS) 50 ft AGL in HOV or airspeed less than 55 KIAS
VS*	60 KIAS to Vne within -1500 fpm and 2000 fpm	150 ft AGL

Hold Mode	Applicable Range	MUH
APP*/BC*	60 KIAS to Vne	50 ft AGL
GA*	60 KIAS to Vne 0 to 2000 ft AGL	N/A
DCL*	60 KIAS to Vne	50 ft AGL
ALTA*	60 KIAS to Vne	150 ft AGL
RHT	0 KIAS to Vne 15 ft to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV or airspeed less than 55 KIAS)
HOV	Groundspeed — less than 60 kts forward — less than 40 kts lateral or aft with IAS less than 75 KIAS	30 ft AGL
TD	60 KIAS to Vne 135 ft to 2000 ft AGL	150 ft AGL
TDH	0 KIAS to 90 KIAS 50 ft to 300 ft AGL	50 ft AGL
TU	0 KIAS to 60 KIAS 0 to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV (airspeed less than 55 KIAS)
MOT	0 KIAS to Vne 50 ft to 2000 ft AGL	PTH - 50 ft AGL VPTH - 250 ft AGL VRHT - 150 ft AGL DCL - 50 ft AGL
WTR	HOV Mode engaged	30 ft AGL

For operations on the sea the MUH must be increased by one half the maximum reported/observed wave height.

Note*

— Automatic disengagement of these modes below 55 KIAS with audio chime.

— VS engagement above 2000 fpm or below -1500 fpm will result in the mode returning the aircraft to the maximum rates quoted (2000 fpm or -1500 fpm).

PHASE 7 AND LATER FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH))

Hold Mode	Applicable Range	MUH
IAS*1	60 KIAS to Vne less 5 KIAS 50 KIAS to Vne less 5 KIAS during approach see Note**	150 ft AGL or 50 ft AGL during approach
HDG*1/NAV*1	60 KIAS to Vne less 5 KIAS 50 KIAS to Vne less 5 KIAS during approach see Note**	150 ft AGL or 50 ft AGL during approach
ALT	0 KIAS to Vne	300 ft AGL (airspeed greater than 55 KIAS) 50 ft AGL in HOV or airspeed less than 55 KIAS
VS*2	60 KIAS to Vne within -1500 fpm and 2000 fpm	150 ft AGL
APP*2/BC*2	60 KIAS to Vne	50 ft AGL
APP*1 (VGP)	50 KIAS to Vne	50 ft AGL
APP*1 (VRT) Note* **	50 KIAS to Vne 150 ft to 2400 ft AGL	150 ft AGL
GA*1	41 KIAS to Vne	N/A
DCL*1	50 KIAS to Vne	50 ft AGL
ALTA*2	60 KIAS to Vne	150 ft AGL
RHT	0 KIAS to Vne 15 ft to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV or airspeed less than 55 KIAS)

Hold Mode	Applicable Range	MUH
HOV	Groundspeed — less than 60 kts forward — less than 40 kts lateral or aft with IAS less than 75 KIAS	30 ft AGL
TD[*2]	60 KIAS to Vne 135 ft to 2000 ft AGL	150 ft AGL
TDH	0 KIAS to 90 KIAS 50 ft to 300 ft AGL	50 ft AGL
TU	0 KIAS to 41 KIAS 0 to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV (airspeed less than 55 KIAS)
MOT	0 KIAS to Vne 50 ft to 2000 ft AGL	PTH - 50 ft AGL VPTH - 250 ft AGL VRHT - 150 ft AGL DCL - 50 ft AGL
WTR	HOV Mode engaged	30 ft AGL

For operations on the sea the MUH must be increased by one half the maximum reported/observed wave height.

Note*

— [1] Automatic disengagement of these modes below 41 KIAS with audio chime

— [2] Automatic disengagement of these modes below 55 KIAS with audio chime.

Note**

Use of IAS, HDG and LNAV modes below 60 KIAS is only for Flight Director operations associated with RNP APCH and Custom approaches.
Selecting IAS mode speed to less than 55 KIAS will result in normal automatic disengagement of APP, ALTA VS & TD modes at 55KIAS and loss of associated collective safety function.

Note***

Phase 8 and later and when Custom Approach with Level segment enabled in option file.

Note

At GA automatic LNAV arming is allowed down to 41 KIAS.

REQUIRED EQUIPMENT

— Second Radar Altimeter RT300 (Supplement 18).

— AHRS P/N 142185-1115 or P/N 145130-1002 (GPS blended). Both AHRS must be of the same part number.

SAR LIMITATIONS

Flight below 50 KIAS (Vmini) in IMC is only permitted when coupled to a SAR mode.

VOR LIMITATIONS

In case of invalid DME/FMS distance, select:

- VOR APP at ranges below 10 nm (18 km)

- VOR NAV at ranges greater than 10 nm (18 km).

COUPLED ILS APPROACH MODE LIMITATIONS

The helicopter is certified to carry out CAT 1 ILS approaches up to 7.5 deg glideslope.

Maximum recommended Localizer Intercept angle ..... 45 deg
ranges greater than
10 nm (18 km)

Maximum recommended Localizer Intercept angle ..... 30 deg
ranges less than
10 nm (18 km)

Maximum airspeed for glideslope up to 4 deg ..... 150 KIAS

Maximum airspeed for glideslopes between 4 and 7.5 deg
(Steep Approach) ..... 120 KIAS

In case of invalid DME and FMS distance and with both Rad Alt signals invalid an ILS approach must be initiated at a distance of not less than 10 nm (18 km).

SECTION 2 - NORMAL PROCEDURES

FLIGHT DIRECTOR - GENERAL

For full details of FD operation and use see “PRIMUS EPIC Integrated Avionics and Flight Control System for the AW/AB139 Helicopter - Pilot’s Guide” latest issue and FMS Pilot’s Guide latest issue.

FLIGHT DIRECTOR MODES ENGAGEMENT

The AFCS Flight Director function provides 4 axis guidance modes. Selection of most FD modes is carried out using pushbuttons on the Guidance Controller. HOV mode may also be engaged using the cyclic beep trim centre position (5th position). Each mode may be de-selected by pressing the associated pushbutton on the Guidance Controller. However GA and TU modes may only be engaged by either collective GA button and disengaged by engaging a different mode for pitch and collective axis. All engaged modes may be deselected simultaneously by using the FD STBY button located on the cyclic sticks or the STBY button on the Guidance Controller.

The Guidance Controller pushbuttons include a green annuciator that illuminates when the mode is selected. FD mode annuciations (green when captured and white when armed) also appear on the PFD.

FLIGHT DIRECTOR COUPLED AND UNCOUPLED OPERATIONS

Selecting a FD mode by pressing the pushbutton on the Guidance Controller will couple the FD whenever the AP is in ATT hold. Selecting a FD mode by pressing the pushbutton on the Guidance Controller with the ATT OFF (i.e. SAS or no stabilisation), the FD will be engaged in the uncoupled mode.

During coupled operation the FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller which will cause a white UCPL caption to appear on the PFD.

CAUTION

- Whenever the FD is coupled and the AP reverts to SAS or has a complete loss of autostabilization, the FD will revert to uncoupled mode.
- When the AP reverts to SAS no UCPL caption will appear on the PFD.

With the FD engaged, in coupled or uncoupled mode, the following is displayed:

— Navigation source and reference data in magenta colour on the selected PFD

— Navigation source and reference data in cyan colour on the non selected PFD

— Navigation source in amber on both PFD's when both PFD's have the same navigation data source.

During coupled operation the HDG, ALT, IAS, VS, ALTA, RHT, HOV, TD, TDH, TU, MOT, VRT modes may be controlled by either pilot. When engaged in coupled mode, the reference data may be adjusted by using the Display Controller (HDG, ALT SEL), collective beep trim/FTR (ALT, ALTA, VS, RHT, TD, TDH, TU, VRT) or cyclic beep trim/FTR (IAS, HOV, HDG, TD, TDH,TU). See Mode Description for details.

During uncoupled operation changes of reference data for IAS, HDG and HOV modes are carried out by pressing the cyclic FTR button, which updates the reference data to the actual values at the time the button is released. Changes of reference data for ALT, VS and RHT are carried out by the collective beep trim. Collective FTR does not modify the collective modes reference.

For IAS, HDG, RHT and VS on the selected PFD, a magenta digital readout reference datum is displayed above the appropriate flight instrument and a magenta bug at a position corresponding to the selected reference. For ALT, only the magenta bug is displayed permanently while the digital readout is displayed for 5 seconds whenever the reference is modified and the ALTA reference is present.

Whenever a collective mode is engaged a collective position cue appears on the PFD beside the ADI. There are some collective FD modes (e.g. RHT, VRT etc.) based upon RadAlt. When one of them is engaged, a magenta bug is displayed on the RadAlt tape and the radalt readout is displayed in magenta. See Figure 2-1 (S/W Phase 5, 6 & 7) and Figure 2-2 (S/W Phase 8 and later).

SAR OPERATIONS

— Satisfactory operation of the SAR modes has been demonstrated up to 40 kts wind speed (20 kts tail wind) and wave heights up to 5.5 m (18 ft).

— Before performing a MOT pattern, confirm that the FMS PERF INIT function on the MCDU has been initialized.

— When performing a MOT, both PFD barometric altimeters should be set to the same baro-altimeter setting.

COLLECTIVE PI LIMITING FUNCTION

During collective coupled operation the collective movement is limited by the following PI values:

— Maximum 97% AEO (95% at altitudes above 10000 ft (3050 m) Hp)

— Maximum 106% AEO for airspeed less than 60 KIAS (5 MIN message displayed beside collective cue, see Figure 2-1)

— Maximum 140% OEI

— Minimum 5% AEO

— Minimum 10% OEI.

When PI limiting function is active and is limiting maximum collective movement, an amber LIM caption is displayed beside the collective cue. See Figure 2-1.

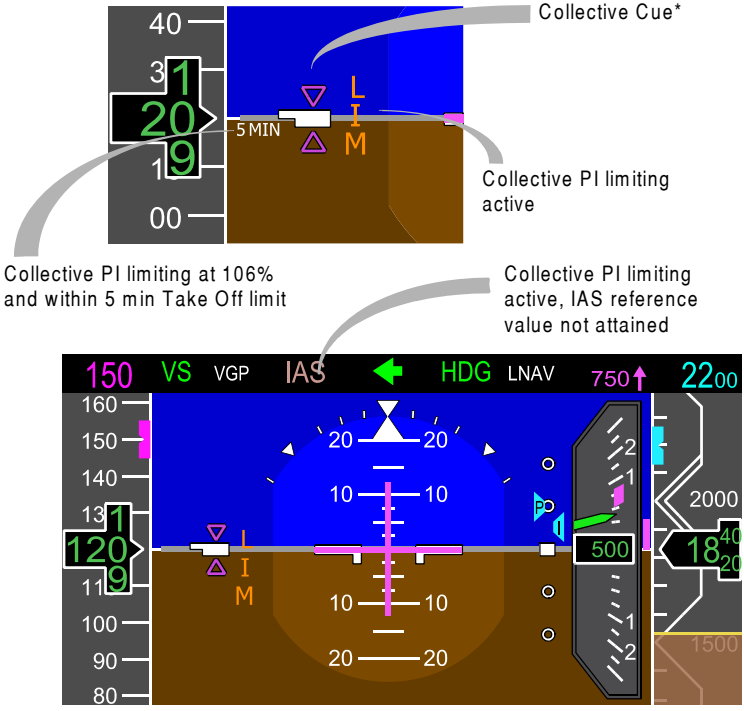
If PI limiting is active with IAS engaged and the required reference for VS, ALTA, RHT, GA, or ALT cannot be achieved the airspeed will automatically reduce as necessary to achieve the collective mode reference. If the collective mode reference cannot be maintained, when the airspeed has reached a minimum of 80 KIAS this airspeed will be maintained and the collective mode reference will be reduced.

While the mode reference values cannot be maintained or achieved that mode caption is displayed in amber on the PFD.

CAUTION

If PI limiting is active with ALT/RHT engaged and the reference height cannot be maintained the aural warning “Altitude Altitude” will warn the pilot when the maximum allowed deviation from the reference height has been exceeded.

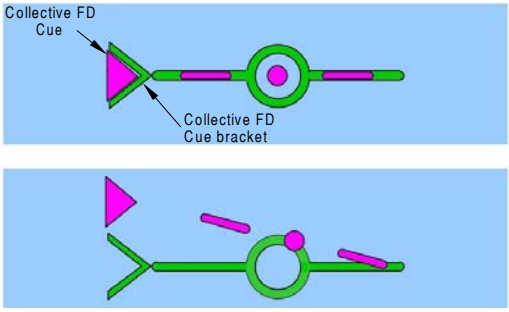
When flying at high altitude (above 15000 ft (4570 m)) select the Load Share switch to TORQUE (MISC panel) to improve the helicopter manoeuvre during automatic turns.



ICN-39-A-155034-A-00003-00491-A-01-1

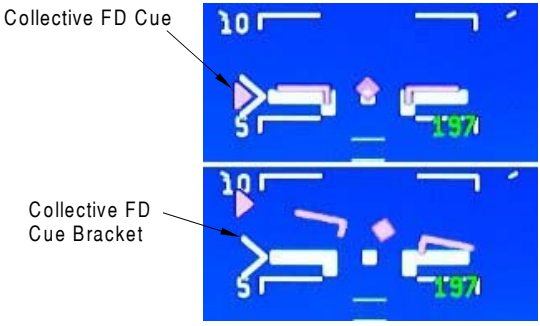
Figure 2-1 Collective Cue Display (Software Phase 5, 6 and 7)

* In UCPL operation when collective cue is below reference arrows collective must be raised and vice-versa.



ICN-39-A-155069-G-A0126-01001-A-01-1

Figure 2-2 Collective Cue Display Path Mode (Software Phase 8 and later)



ICN-39-A-155069-G-A0126-01002-A-01-1

Figure 2-3 Collective Cue Display Pitch Mode (Software Phase 8 and later)

* In UCPL operation when collective cue is below reference arrows collective must be raised and vice-versa.

SAFETY FLY-UP FUNCTIONALITY WHEN FD MODES ENGAGED

The Fly-Up Collective Safety Function is a height protection function which is always active when at least one Rad Alt is valid. The function is activated when any collective FD mode is engaged and coupled and the Safety Height is passed. When the function is activated the aircraft is automatically flown back up to the Safety Height. The Safety Height is a function of the Rad Alt Reference (or a fixed height for Barometric modes) and depends on the actual collective mode engaged.

Further to the Safety Height there is also an Ultimate Fly-Up Limit, a fixed height (not adjustable) which, if passed, will automatically cause the aircraft to fly back up to this height or the Safety Height, if higher.

The following table gives the Safety Height Rad Alt limits and Ultimate Fly-Up Limit for the different collective modes:

Hold Mode	Applicable Range	Safety Height (ft AGL)	Ultimate Fly - Up Limit (ft AGL)
VS	All conditions	150 ft	150 ft
ALTA	All conditions	150 ft	150 ft
ALT	Airspeed less than 55 KIAS or HOV All other conditions	35 ft 150 ft	35 ft 150 ft
MOT	All conditions	Variable *	35 ft
RHT	Airspeed less than 55 KIAS, HOV or MOT-DCL or TDH-Pitch All other conditions	Variable *	15 ft 75 ft
TDH	All conditions	Variable *	35 ft
TD	All conditions	Variable *	75 ft
VPTH	All conditions	Variable *	150 ft
Phase 8 and later and when Custom Approach with Level Segment enabled in option file			
APP(VRT)	All conditions	Variable *	75 ft

* Safety Height = Rad Alt Reference - (7+1/8xRad Alt Reference)

When the collective Fly Up safety function is activated, due to an height excursion below the Safety Height or Ultimate Fly-Up limit, the aural message 'ALTITUDE ALTITUDE' is triggered and a HTLM message is displayed on the PFD on the top left of the attitude indicator. When the collective is automatically driven up, it is normally limited by the PI limiting function. Should the relevant MUH limits be exceeded the PI limits will be moved up as follows:

— Maximum 121% AEO for airspeeds below 60 KIAS

— Maximum 176% OEI for airspeeds below 60 KIAS

— Maximum 110% AEO for airspeeds above 60 KIAS

— Maximum 160% OEI for airspeeds above 60 KIAS.

The aural 'ALTITUDE ALTITUDE' and HTLM message will also be generated if flying uncoupled.

CAUTION

When voice message "Altitude Altitude" is triggered with a HTLM message then the aircraft has descended below the safety height. Ensure separation from terrain visually or, if not possible, establish a positive rate of climb to a safe height.

CAUTION

(Applicable only for Phase 5 or 6)

When descending over terrain, with a collective mode engaged and after a continuous descent of at least 2500 ft, at approximately 2500 ft Rad Alt height, the Fly Up safety function may erroneously intervene and increase the PI to above the MCP level. This condition should be controlled manually with the collective to maintain the PI within the MCP limits until the HTLM message on the PFD extinguishes.

MODE DESCRIPTIONS

The following descriptions assume the modes are coupled, unless stated otherwise.

HDG Heading Hold Mode. This mode steers the aircraft to the heading reference bug displayed on the PFD. The heading bug can be adjusted using the HEADING knob on the Remote Instrument Controller and can be syncronized with the actual heading by pressing the HEADING knob (PUSH SYNC). The heading reference bug can be syncronized to the actual heading by pressing the cyclic FTR button or modified using the cyclic beep trim switch left or right. In HDG mode turns are performed at standard rate 1 (3 deg/sec).

ALT Barometric Altitude Hold Mode. This mode maintains the barometric altitude existing at the time of engagement. The altitude reference is displayed as a set bug on the PFD altitude tape. If the ALT SEL knob has not been previously moved (ie. no ALTA activation) the ALT reference will also be displayed as a magenta digital readout. The altitude reference can be adjusted using the collective beep trim (aft to increase altitude) or by pressing FTR button, flying to desired altitude, and releasing. An audio tone is produced when the altitude reference is changed. The collective PI limiting function is enabled when ALT mode is coupled.

CAUTION

In ALT mode the voice message “Altitude Altitude” is triggered when altitude exceeds the reference altitude by ±150 ft (46 m).

Note

ALT mode can be engaged with HOV mode (as an alternative to the RHT mode), however altitude fluctuations may occur during attitude and heading changes.

IAS Airspeed Hold Mode. This mode maintains the airspeed existing at the time of engagement. When engaged the airspeed reference is displayed as a set bug and a digital readout on the PFD. The airspeed reference bug is adjusted by either using the cyclic beep fore/aft or repositioning the cyclic, with the FTR button depressed, to the required airspeed and releasing FTR button. The airspeed reference is adjustable via the cyclic beep switch between 50 KIAS (60 KIAS for Phase 5 and 6) and Vne less 5 KIAS. If airspeed, at time of engagement, is higher than Vne less 5 KIAS then it is automatically reduced to Vne less 5 KIAS.

ALTA Altitude Acquire Mode. This mode, when engaged with a barometric altitude preselect reference set (through ALT SEL knob), will automatically engage the IAS mode and the aircraft is flown towards the preset altitude. The final altitude reference is displayed as a cyan bug and digital readout above the altitude scale. The vertical speed reference is displayed as a bug and digital readout on the PFD. The preset vertical speeds are +1000 fpm or -750 fpm in the direction of the preset altitude. The vertical speed reference can be changed by either using the collective beep trim (aft to increase) or with collective FTR button depressed, moving to the required vertical speed and releasing. When the preset altitude is achieved the mode will transition to ALT mode and the IAS mode will remain engaged. The collective PI limiting function is enabled when ALTA mode is coupled. When collective PI limiting is active the airspeed is reduced to maintain vertical speed reference.

Note

(Applicable only for Phase 5 or 6)

Engaging ALTA while climbing with a rate of climb greater than 1500 fpm or descending with a rate of descent greater than 1500 fpm, the system may erroneously transition to ALT. The aircraft will, however, reach the selected final altitude.

NAV VOR/LOC/LNAV FD functions. These functions are selected with the NAV pushbutton depending on navigation source selection on the PFD and NAV receiver tuning. Pressing the NAV pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC/LNAV is armed (white caption). At VOR/LOC/LNAV capture HDG will automatically disengage and the helicopter turns to track the selected radial or leg. The NAV function is also used to fly the FMS Search Patterns.

APP 1) VOR/ILS Approach FD functions. The VOR non-precision approach or ILS approach functions are selected depending on the NAV receiver tuning when the APP mode button is pushed. Pressing the APP pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC-GS is armed (white caption). At VOR/LOC capture HDG will automatically disengage and the helicopter turns to track the selected radial, VAPP/LOC caption will display on the PFD. For ILS approach when intercepting the glideslope signal the GS mode is automatically captured and the previous collective mode disengages.

Note

To avoid false localizer captures, APP mode should be armed when the helicopter is flying inbound to the ILS radial.

2) FMS approach function (VGP).
This can be used when the FMS is the selected NAV source on the selected PFD and an approach from Navigation Database or a Custom Approach without a Final Level Segment (Phase 8 and later) is loaded into the flight plan.
The mode produces a vertical guidance based upon the vertical deviation between current aircraft barometric altitude and FMS glidepath. The glide path is anchored at the Bottom of Descent (BOD) with the glide path angle stored in the data base at the corresponding waypoint or, for Custom Approach without a Final Level Segment

(Phase 8 and later). The VGP mode is armed (white caption) by pushing the APP or DCL button. Intercepting the projected glidepath, the VGP mode is automatically captured.

3) FMS approach for Custom Approach with Level Segment (VRT).
This can be used when the FMS is the selected NAV source on the selected PFD and a Custom Approach with a Final Level Segment (Phase 8 only) is loaded into the flight plan. The mode produces a vertical guidance based upon the vertical deviation between current aircraft barometric altitude and FMS glidepath. The glide path is anchored at the Bottom of Descent (BOD) with 4 degree slope. The VRT mode will automatically transition to RHT mode at BOD sequencing or approaching the final height reference selected by the pilot during approach settings, whichever occurs first. The RHT reference can be changed by using the collective beep trim switch (aft to increase). Changing the RHT reference will not alter the FMS glide path, but alter the height at which the aircraft will level - off after VRT mode transitions to RHT mode.The VRT mode is armed (white caption) by pushing the APP or DCL button, while below 2400 ft AGL. Intercepting the projected glidepath, the VRT mode is automatically captured. Flying above 2500 ft AGL will result in VRT mode disarming or disengagement.
In either case (ILS, VGP, VRT) within the vertical deviation bug there will be a letter: I for ILS, P for VGP or VRT and V for Vertical Path.
See Figure 2-1. The P letter and bug, when VGP or VRT is armed, appears on the left hand side of vertical deviation scale in cyan. When captured the symbol moves to the right hand side of the vertical deviation scale in magenta.

CAUTION

During steep approach without automatic collective control be attentive not to use less than 5% PI.

PRV The PRV mode is a way to preselect ILS or VOR approach functions while FD is still engaged in LNAV.
PRV is selected by pressing the PRV pushbutton on the Display Controller. If the APP pushbutton is pressed the FD will arm LOC and GS or VAPP functions depending on the NAV receiver tuning (ILS or VOR) on the selected PFD. At the capture of the LOC or VAPP functions the FD disengages LNAV and engages LOC-GS or VAPP functions. Selected PRV course will be displayed as thin cyan, while armed, and as normal magenta when captured.

DCL 1) ILS Deceleration Mode. The deceleration mode decreases the aircraft speed from its present speed down to approximately 80 KIAS at a height not below 200 ft AGL. When the DCL pushbutton is pushed the LOC, GS and DCL modes are armed and the IAS and HDG modes are engaged. After GS capture and at a computed condition for correct approach and deceleration the IAS mode is disengaged and the DCL mode engaged. The airspeed reference bug moves to 80 KIAS and the digital reference is set to 80 KIAS. These values can be adjusted using the cyclic beep trim at which time the IAS mode automatically engages replacing the DCL mode.

2) VGP/VRT Deceleration Mode.
When the DCL pushbutton is pushed, during a VGP or VRT approach, if the present speed is greater than the FMS target speed (Ref MCDU PERF INIT page 2/3) the DCL mode engages and the aircraft decelerates to the FMS target speed. If, however, the speed is less or equal to the FMS target speed, the DCL mode arms.
At the Initial Distance the DCL mode, if not already engaged, engages and the aircraft starts to decelerate to the initial speed. At the appropriate distance the aircraft will start to decelerate to achieve the final speed at the final distance from the MAP. For Phase 5 and 6 only the DCL mode must be engaged within 10 NM from the missed approach point. The initial and final speed targets and distances are provided and can be modified in:

MCDU PERF INDEX - APPRCH SPD page 1/2
or:
MCDU PERF INIT page 2/3 - APP/GA SPD page 1/2
or:
MCDU PROGRESS page 2/3 - VNAV DATA page - APPRCH SPD page 1/2 for Approaches from the Navigation Database.

Note

APPRCH SPD MCDU page is not applicable for Custom Approaches.

The initial and final speed targets and distances for Custom Approaches, Phase 8 and later, are provided and can be modified in:
MCDU CST APPR EDIT / CST APPR SPEEDS pages for Custom Approaches.

BC Back Course Approach Mode. This may be used when the localizer is the selected NAV on the selected PFD. The back course mode is selected when the APP pushbutton is pushed. Pressing the pushbutton, HDG is engaged (green caption) and the BC is armed (white caption). At BC capture, HDG is disengaged. The BC mode will be engaged when the intercept angle between the front course and the aircraft heading is greater than 105° (otherwise the LOC engages).

CAUTION

The course selected for a BC approach must be the ILS approach front course.

VS Vertical Speed Hold Mode. The vertical speed existing at the time of engagement is held. Vertical speed reference bug and digital readout are adjusted by either using the collective beep or repositioning the collective, with the FTR button depressed, to the required vertical speed and releasing on the desired vertical speed. Collective PI limiting function is enabled when VS mode is coupled.

GA 1) Go Around Mode. The mode may be selected from either collective GA pushbutton and will give, when the conditions for a GA are met i.e. airspeed greater than 41 KIAS (60 KIAS for Phase 5 and 6), a 1000 ft/min climb, with the reference bug set on the Vertical Speed tape and the airspeed reference bug on the airspeed tape at the airspeed existing when the mode is engaged or 70 KIAS (80 KIAS for Phase 5 and 6), whichever is greater. Engaging the GA the FD will control airspeed and vertical speed at the commanded values and level the wings. At the GA engagement the LNAV arms and, if a missed approach procedure is selected, LNAV automatically engages. (Automatic arming and engagement of LNAV not applicable for Phase 5 and 6). The GA Mode can only be exited by selecting another vertical FD mode (or FD to STBY).

2) Transition Up Mode. The mode may be selected from either collective GA pushbutton and will give, when the conditions for a TU are met i.e. airspeed less than 41 KIAS (60 KIAS for Phase 5 and 6) or one of the following modes TD, TDH, MOT, WTR or HOV is engaged, a climb up to the set bug reference height of 200 ft AGL on the Rad Alt and the set bug airspeed of 80 KIAS. Engaging the TU the FD will zero lateral or negative groundspeed and initiate an acceleration to 60 KIAS. At 60 KIAS the HDG will engage and transition will occur at a climb rate of 200 fpm (groundspeed between 0 and 25 kts) or 750 fpm (groundspeed between 25 and 60 kts), maintained until reaching the reference value 200 ft when the RHT is automatically engaged. The aircraft then accelerates to the airspeed reference of 80 KIAS and the IAS mode is engaged. The reference height can be modified by the collective beep switch and the airspeed by the cyclic beep switch. The TU Mode can be exited by selecting another vertical FD mode (or FD to STBY).

OS Over Station Mode. When overflying a VOR station, with VOR or VAPP FD functions engaged, the VOR equipment detects the aircraft being within the zone of ambiguity. The VOR deviation signal is removed from the command until the VOR signal has stabilized after passing over station. While over the station, course change may be made by selecting a new course via the Course Selector knob.

ALVL Autolevel Mode. If the APP (LOC/GS or VGP) mode is continued, to below landing minimum, this safety feature is automatically activated at 150 ft (46 m) and an asymptotic flare to a Rad Alt height of 50 ft (15 m) will be initiated. The green GS or VGP caption on the PFD will be replaced by ALVL.

CAUTION

In VGP mode the ALVL function will activate when MAP (missed approach point, as shown in the example Approach Chart Figure 3-2) is lower than 150 ft (46 m) AGL.
For Phase 5, 6 & 7:
When MAP is higher than 150 ft (46 m) AGL the VGP mode will disengage at the MAP and a chime is generated (preceded, at 100 ft (30 m) above, by a Vertical Track Alert (VTA) caption displayed above the vertical guidance scale on the PFD).
For Phase 8 and later:
When MAP is higher than 150 ft (46 m) AGL the VGP mode will disengage at the MAP and a chime is generated (preceded, at 200 ft (60 m) above, by a Vertical Track Alert (VTA) caption displayed above the vertical guidance scale on the PFD).

RHT Radar Height Hold Mode. This mode maintains the aircraft at the radar height at the time of engagement when the radar altimeter indications are within the threshold limits. A reference bug on the radar altimeter tape and a digital readout above the radar altimeter tape are presented. The reference height can be changed by depressing the collective FTR switch flying to the required height and releasing the FTR switch or by using the collective beep trim switch (aft to increase). An audio tone is produced when the height reference is changed. The collective PI limiting function is enabled when RHT mode is coupled.

HOV Hover/velocity Hold Mode. HOV mode can be engaged by pressing HOV mode on Guidance Controller or the cyclic beep trim centre position (5th position). The HOV mode utilizes the AHRS ground velocities to maintain hover or low speed flying. At engagement of this mode the helicopter groundspeed reference is set to zero and the RHT is automatically engaged if a valid radar altimeter signal is available and within the threshold limits. RHT mode can be subsequently disengaged independently and replaced by ALT if required. A hover symbology with the ground velocity vector bug is also displayed on the HSI. See Figure 2-4. When the mode is engaged, the velocity vector reference can be changed by pressing the cyclic FTR switch, flying to the desired lateral and longitudinal speed and releasing, or by using the cyclic beep trim to move the bug to the desired velocities. If the cyclic beep trim switch is pressed in the centre position (5th position) the longitudinal and lateral velocity references are set to zero.

CAUTION

The HOV mode maintains a groundspeed reference therefore pilot must ensure that crosswind and rearwind speed limits are not exceeded (see Section 1 Basic Flight Manual). If wind limits are exceeded directional control may not be maintained.

CAUTION

When HOV mode is engaged above 2000 ft (610 m) AGL the ALT mode does not automatically engage. Therefore the pilot must control collective manually or engage ALT mode.

The hover symbology automatically appears on the PFD when HOV mode is engaged. The display shows the aircraft velocity vector and the reference velocity symbol. See Figure 2-4.

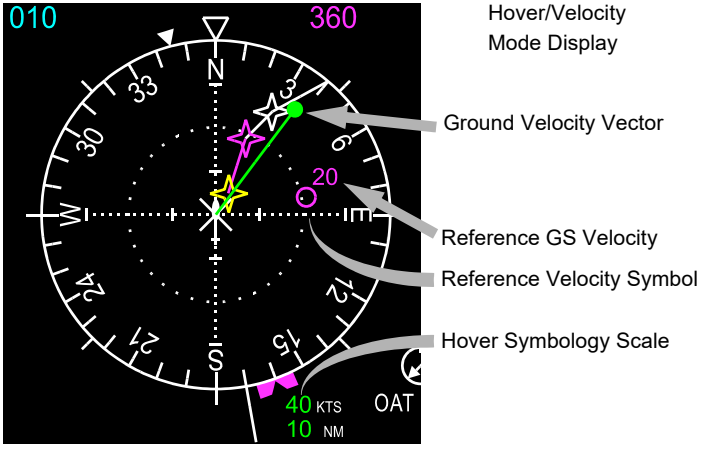


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Figure 2-4 HOV Symbology

TD/H 1) Transition Down Mode. This mode, when selected and the conditions for TD are met (height between 300 ft and 2050 ft, airspeed greater than 60 KIAS), transitions the aircraft from the current flight condition down to 200 ft AGL and 80 KIAS level flight. Pressing the TD/H button the FD will initiate a descent and deceleration to achieve airspeed reference of 80 KIAS and a height reference of 200 ft AGL. When reaching the reference speed and height the IAS and RHT modes automatically engage.

Pressing the collective FTR button prior to 200 ft will engage RHT mode at the actual height the button is pushed. Pressing the cyclic FTR button prior to 80 KIAS will engage IAS at the actual airspeed the button is pushed. The TD Mode can be exited by pressing the TD/H pushbutton or by selecting another vertical FD mode (or FD to STBY).

2) Transition Down to Hover Mode. This mode, when selected and the conditions for TDH are met (height between 50 ft and 300 ft, airspeed below 90 KIAS), transitions the aircraft from the current flight condition down to 50 ft AGL hover with 0 kts groundspeed. Pressing the TD/H button will initiate a descent and deceleration to achieve the final hover conditions. When reaching the reference height and groundspeed the RHT and HOV modes automatically engage. Pressing the collective FTR button prior to 50 ft will engage RHT mode at the actual height the button is pushed. Pressing the cyclic FTR button before reaching 60 KIAS will engage IAS at the actual airspeed the button is pushed. Pressing the cyclic FTR button at or below 60 KIAS will engage HOV at the actual groundspeed the button is pushed.

CAUTION

With Phase 7 S/W Release -00110/00111/00112 installed, when airspeed is above 60 KIAS, pressing the IAS button or cyclic FTR button while TDH is engaged will engage IAS mode on the pitch axis, and subsequently the TDH mode on the collective axis will disengage. After pressing the IAS button or cyclic FTR button during TDH operation, confirm the flight director mode engagement status in all axes.

The TD/H Mode can only be exited by pressing the TD/H pushbutton or selecting another FD mode (or FD to STBY).

Note

When the TD/H mode is selected the CAS caution and audio message 'LANDING GEAR' is inhibited.

MOT Mark On Target Mode. This mode, when selected, marks the current position as a waypoint then manoeuvres the aircraft with a downwind leg, then an up wind turn to establish hover at 0 kts groundspeed, 50 ft (15 m) AGL in a position 150 ft (46 m) to the left and 150 ft (46 m) downwind of the marked waypoint.

The MOT sequence is divided in three basic phases:

- Approach to FHAF ((Final Hover Approach Fix)
  First phase after MOT engagement, during which the aircraft, following FMS commands, will be headed into the wind at the FHAF.
  FHAF is a point located approximately 0.8 nautical miles (1.5 km) downwind from the target waypoint. Aircraft height at FHAF is approximately 250 ft AGL, with a target speed of 60 kt GS.

- Approach to Final Hover Fix
  Second phase, to acquire the hover waypoint from FHAF, aircraft will descend following a 3 degree slope vertical path.

- Approach to Final Target
  Final phase, with pilot taking the aircraft from hover waypoint to the target location.

During the approach to hover:

- The final hover reference height can be modified by the collective beep switch. After Final Hover Approach Fix (FHAF) pressing the collective FTR button the final hover height synchronizes to the actual height with RHT engagement.

- After the FHAF the reference groundspeed can be modified laterally and longitudinally by pressing the cyclic FTR button to synchronize to the actual ground-speed and to engage HOV.

When reaching the reference height and groundspeed the RHT and HOV modes automatically engage. The MOT Mode can only be exited by pushing the MOT pushbutton or selecting another vertical FD mode (or FD to STBY).

The manoeuvres carried out are different dependant on the entry conditions when the MOT button is pressed. During the sequence of manoeuvres the collective mode VRHT message indicates the level flight phase to intercept the vertical path, if required, when the aircraft starts to descend. The message changes to VPTH when on the 3° slope to the FHAF. The message changes to PTH for the last portion of the descent after the FHAF. If the aircraft is flying above the 3° slope at MOT engagement the collective axis will directly engage the VPTH. On the pitch axis the message VIAS appears anytime before the FHAF, indicating the aircraft is reducing the IAS, if necessary, to obtain 60 kts groundspeed at the FHAF. At the FHAF the message changes to DCL indicating the aircraft is decelerating from 60 kts groundspeed to 0 kts groundspeed.
A vertical path indicator, in magenta, is presented on the PFD to the right of the GS deviation scale (See Figure 2-5). This pointer is centered when the aircraft is following the 3° path to the hover point.
Roll mode LNAV will be presented on the PFD.

Note

When the MOT mode is selected the CAS caution and audio message ‘LANDING GEAR’ is inhibited.

WTR Winchman Trim Mode. This mode, (available in HOV Mode only) when selected by the pilot, displays a WTR message on the PFD and permits the Hoist Operator (HO) to control the aircraft hover lateral and longitudinal groundspeed using the hoist pendant five position switch. Groundspeeds up to a maximum of 10 kts, from the value established by the pilot in HOV mode, can be controlled by the HO. The five position switch allows the HO to

control the aircraft fore - aft and lateral groundspeed. When the switch is moved towards the FWD label the aircraft moves forward, when moved towards L the aircraft translates laterally to the left and conversely R for translation right and AFT for rearward motion. Pushing the centre position of the five position switch the HO can reset his groundspeed corrections. Pilot input will over-ride HO input at any time. The WTR Mode can be exited by pressing the WTR pushbutton or selecting another vertical FD mode (or FD to STBY).

FMS SEARCH PATTERNS

SAR type search patterns are available in the FMS which, when inserted in a flight plan using the MCDU, are displayed on the MFD and can be flown using the NAV function. The following search patterns are available:

— Expanding Square

— Sector

— Creeping Ladder

— Parallel.

For FMS SAR search patterns see Supplement 68.

ADVISORY CAPTIONS

CAS Caption (Green)	System State
VNAV NOT INSTALLED	(Caption present for 5 secs in inverse video) VNAV button pressed and function not fitted

PFD DISPLAY

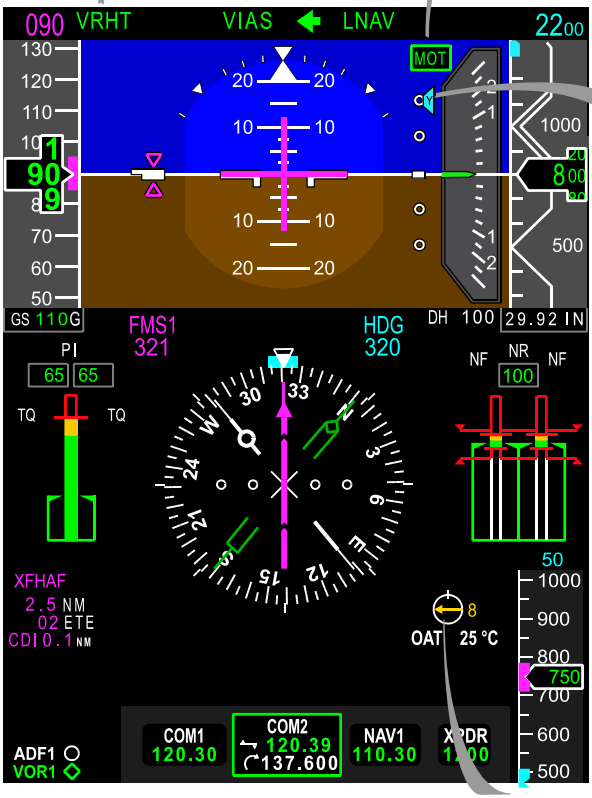

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Figure 2-5 PFD Display

FMS FUNCTIONAL INCONSISTENCIES ONLY FOR EPIC SOFTWARE PHASE 5 OR PHASE 6 INSTALLED

1. When the destination runway/helipad is changed, without an arrival or approach entered, and the runway/helipad is the TO waypoint, the FMS incorrectly places the runway/helipad behind the helicopter, shows it as the FROM waypoint, disengages LNAV (if engaged) and the deviation bar is shown as INVALID.
   Recommended corrective action if problem scenario encountered:

   • Perform 'Direct To' to destination runway/helideck

   • Select desired runway/helipad and activate

   • Re-engage LNAV mode.

   Refer to Honeywell Service Information Letter D201002000030 for further information.

   Problem not present for software version EB7030191-00109 (Phase 6.5)

2. The 'Direct-To Recovery' procedure should not be used in any phase of flight.

   Refer to Honeywell Service Information Letter D201001000021 for further information.

3. Approach and/or Star procedures which contain a certain geommetry of consecutive AT altitude constraints exhibit TOD misplacement and premature descent.

   Refer to Honeywell Service Information Letter D201010000078 for further information.

   Problem not present for software version EB7030191-00109 (Phase 6.5)

4. Software version EB7030191-00109 (Phase 6.5) only, Activating vectors during an FMS approach may result in below-glide path VGP indications at the FAF. The crew should monitor VGP indications during glide path capture and execute a missed approach if VGP indications are not consistent with normal glide path capture."

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SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

VOICE ONLY MESSAGES

1. "Altitude, Altitude" and associated HTLM message on the PFD

— Collective modes engaged and aircraft ground clearance below Safety Height with subsequent Fly-Up intervention.

— For Rad Alt dependant modes the Reference Height and Safety Height values are as follows.

Reference Height (ft)	Safety Height (ft)
30	19
50	36
100	80
150	124
200	168
250	211
500	430
1000	868
1500	1305
2000	1743

2. "Altitude, Altitude"

— Aircraft exceeded the altitude deviation in ALT mode ±150 ft (46 m) from reference.

3. "LOW SPEED LOW SPEED"

— Aircraft below 55 KIAS and a FD mode has automatically disengaged (chime sound generated).

SINGLE ENGINE FAILURE IN HOVER

GENERAL

The height loss during a single engine failure flyaway from hover for combinations of weight, altitude and temperature conditions is shown in Figure 4-1 for weights up to 6400 kg and Figure 4-2 for aircraft configured for operation between 6400 kg and 6800 kg (See Supplement 50). The chart does not include any ground clearance height. If the hover height is greater than the height loss plus the ground clearance height required (15 ft (5 m) minimum) then a flyaway capability exists and the Flyaway Procedure should be followed. The height loss is valid provided the flyaway manoeuvre is initiated within 1 second from engine failure recognition.
If a flyaway capability does not exist the landing/ditching procedure should be followed.

Note

If the helicopter weight, at the time of engine failure, is less or equal to the Hover OGE 2.5 min OEI weight, an engine failure in the hover will result in no height loss provided that the pilot does not intervene on the flight controls.

FLYAWAY PROCEDURE

1. Collective/Cyclic control — Rotate nose down in 1 second to an attitude of -20°. Recover pitch attitude to 5° nose up in approximately 5 seconds. Maintain this attitude while using the collective to droop the NR to a minimum of 90% NR, if necessary, to arrest the descent.

2. Acceleration — Maintain pitch attitude at 5° nose up and accelerate to V_{TOSS} (40 KIAS).

3. Climb — When the aircraft has achieved V_{TOSS} (40 KIAS) and a positive rate of climb lower collective to recover initial hover NR to continue climb.

LANDING/DITCHING PROCEDURE

1. Collective/Cyclic control — Rotate nose down in 1 second to an attitude of no more than -20° while decreasing collective to maintain NR at 100%.

Note

The nose down rotation should be commensurate with hover height. An engine failure at low height will not allow a large pitch attitude change prior to water/ground impact. Engine failures at higher hover heights will permit greater pitch attitude change to gain airspeed energy that is subsequently used during the flare.

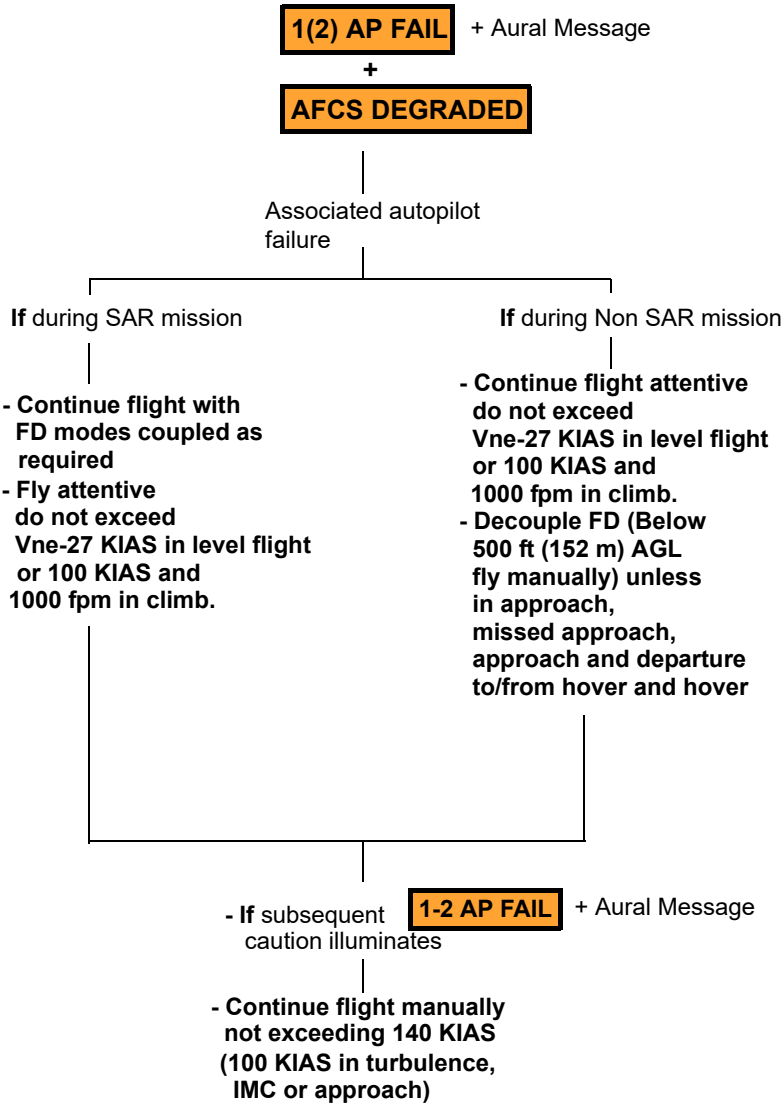
2. Cyclic — At 50 ft (15 m) AGL rotate nose up as necessary (maximum 20°) to decelerate.

3. Approach/ Touchdown — Continue deceleration to attain landing attitude (level or 5° nose up) prior to touchdown or ditching at the slowest forward speed possible. Use collective to cushion touchdown.

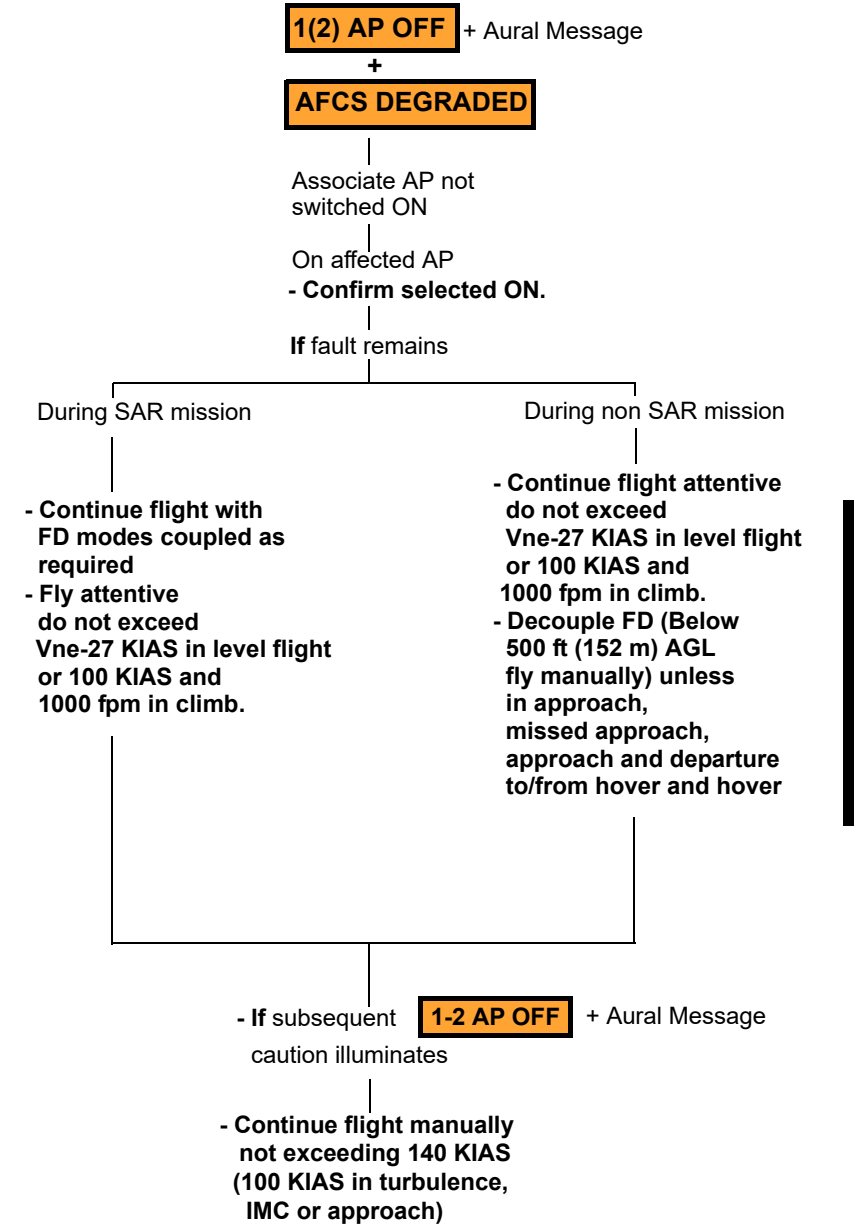
4. Landing/Ditching — After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
Apply brakes as required for ground landing or initiate the Ditching Procedure described in Supplement 9.

CAS CAUTION MESSAGES

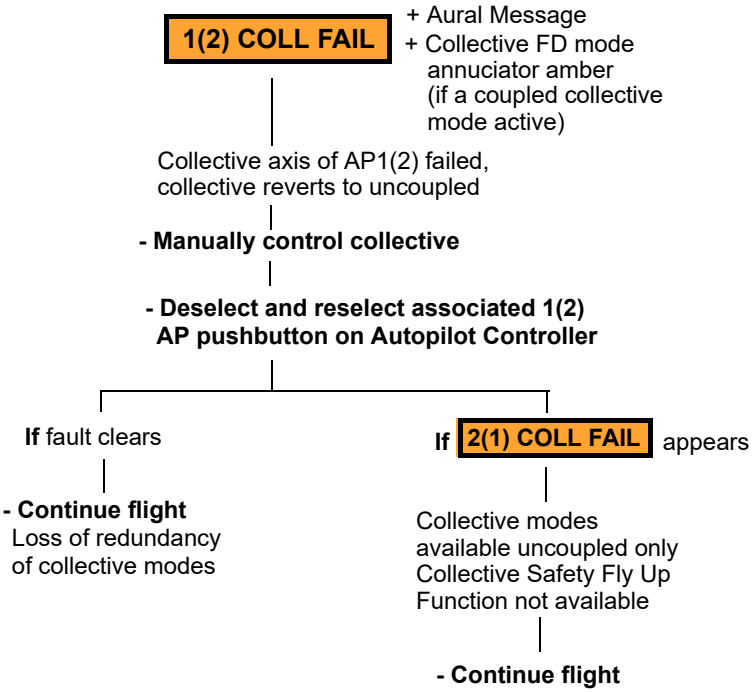
AUTOPILOT FAIL



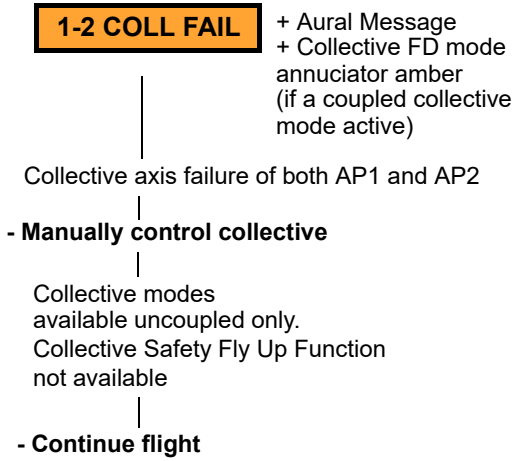
AUTOPILOT OFF



SINGLE COLLECTIVE AUTOPILOT FAILURE



DUAL COLLECTIVE AUTOPILOT FAILURE



CYCLIC FORCE TRIM RELEASE FAILURE

Cyclic FTR button failure, due to a fault which removes electric power to the clutches of the longitudinal and lateral trim, will result in cyclic longitudinal and lateral clutches becoming permanently engaged. This will require the pilot to fly the aircraft against the cyclic force spring feel to manoeuvre the aircraft, or use the cyclic beep trim, as cyclic FTR button does not function.
In this case it is suggested that a cyclic FD mode (i.e. IAS) is engaged and the cyclic beep trim used to maintain the required flight condition. Coupled SAR mode operations are not affected.

COLLECTIVE FORCE TRIM OFF OR FAIL

When a FD mode is engaged, and coupled, and the collective trim is switched OFF (Miscellaneous Control Panel) or fails, a chime sound is generated, the collective may not maintain its selected position, the CLTV annuciation will illuminate on the top left of the ADI display, and the CLTV/YAW OFF green advisory will illuminate on the CAS window. Collective modes are available uncoupled only.

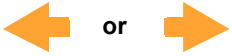
COLLECTIVE FORCE TRIM RELEASE FAILURE

Collective force trim release failure, due to a fault which removes electric power to the clutch of the collective trim will result in the collective clutch becoming permanently engaged. This will require the pilot to fly the aircraft against the collective force spring feel to manoeuvre the aircraft, or use the collective beep trim, as the collective FTR button does not function.
In this case when large collective movements are not required, it is suggested that a collective FD mode (i.e. ALT) is engaged and the collective beep trim used to maintain the required flight condition. Coupled SAR mode operations are not affected.

FLIGHT DIRECTOR FAILURE

No CAS Warning or Caution messages are generated to indicate FD malfunctions. However indication on both PFD displays indicate the state of the flight director system.

FLIGHT DIRECTOR PARAMETER FAILURE



or

replaces green arrow above attitude indicator on PFD

At least one On-side flight director parameter is invalid

- Confirm which parameter(s) are invalid
- Either select functioning cross side parameter on RCP panel or select cross side PFD on Guidance Controller.

DUAL FLIGHT DIRECTOR FAIL

FD FAIL

replaces FD arrow above attitude indicator on both PFD's

\+ loss of flight director bars and information

Both Flight Directors invalid

- Flight Director not available

FAILURE OF SELECTED PFD UNIT WITH FLIGHT DIRECTOR ENGAGED

Loss of PFD, the associated MFD will automatically configure to Composite mode maintaining the FD engaged on the same references as the PFD.

- **Confirm no chime sound**
- **Confirm FD green arrow and FD mode green captions are present on MFD in Composite mode**

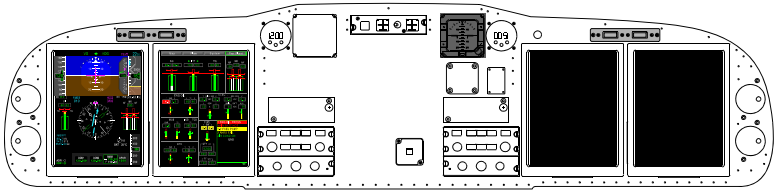
- **Continue flight**

- **If** subsequent display in composite mode fails FD automatically disengages, with chime

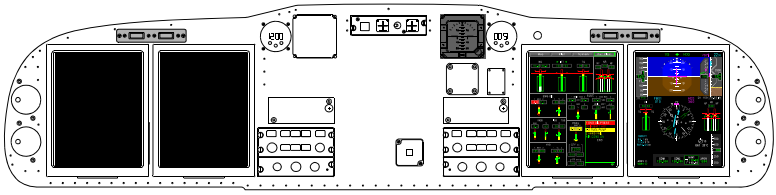
- **If** Copilot displays failed and Left pilot flying
  - **Right pilot take control of aircraft**
    - FD can be re-engaged (on right pilot side)

- **If** Pilot displays failed and Right pilot flying
  - **If** during SAR mission
    - **Left Pilot take control of aircraft**
      - FD can be re-engaged (on left pilot side)
  - **If** single pilot
    - **Revert to Standby instrument**
      - **Land as soon as practicable**

FAILURE OF SELECTED PFD UNIT WITH FLIGHT DIRECTOR ENGAGED (CONT)



Failure of both Pilot PFD and MFD



Failure of both Copilot PFD and MFD

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Figure 3-1 Failure of both PFD and MFD

GUIDANCE CONTROL PANEL FAILURE

In case of Guidance Control Panel failure, recognized as non functionality of panel pushbuttons (modes cannot be changed or disengaged using panel), the FD may be disengaged using the cyclic FD STBY button.

Continue flight, using the FD modes already engaged as required. However, use the cyclic FD STBY button to disengage modes when required. When disengaged FD is no longer available.

AHRS FAILURE WITH FD ENGAGED

1(2) AHRS FAIL
AVIONIC FAULT
1(2) AP FAIL

AFCS DEGRADED
+ Aural message

\+ **ATT FAIL** **HDG FAIL** and loss of attitude, heading and slip skid data on Left (Right) PFD

Associated AHRS failure and subsequent loss of AP1(2)

If FD remain engaged

On-side AHRS failure on non selected PFD

- Uncouple FD unless in approach, missed approach, approach and departure to/from hover, hover and SAR mission

- On RCP move AHRS switch to non failed AHRS

AHRS 2(1) illuminates on attitude indicator to highlight both attitude indicators are using the same AHRS data

If FD modes HDG, NAV, APP, BC, HOV, SAR disengage + Audio Chime and loss of Nav and approach command bars

On-side AHRS failure on selected PFD

- On RCP move AHRS switch to non failed AHRS

AHRS 2(1) illuminates on attitude indicator to highlight both attitude indicators are using the same AHRS data

- FD may be re-engaged if in approach, missed approach, approach and departure to/from hover, hover and SAR mission

- Continue Flight

- Compare frequently PFD attitude and heading with STANDBY

MAU FAILURE WITH FD ENGAGED

For on-side MAU failure on the selected PFD the FD modes ALT, VS MAU 2 failure). Follow procedure below for FD action and refer to and IAS will disengage, (with a chime for an MAU 1 failure but not for an Section 3 Basic RFM Page 148 or complete MAU failure procedure.

1(2) MAU
+
1(2) ADS FAIL
+
1(2) AP FAIL

PFD message combined with CAS Cautions and disengagement of FD modes ALT, ALTA, IAS, VS + Audio Chime (MAU 1 failure only) and loss of:



- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

Multiple CAS cautions illuminate, but those which affect FD functioning are:
1(2) AP FAIL page 40
1(2) ADS FAIL page 49
AFCS DEGRADED see Basic RFM page 3-135

- Continue flight attentive
- On RCP move ADS switch to non failed ADS
- Do not exceed Vne-27 KIAS in level flight or 100 KIAS and 1000 fpm in climb
- Below 500 ft (152 m) AGL fly manually

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD data with STANDBY indicator.

ON SIDE ADS FAILURE ON SELECTED PFD WITH FD ENGAGED

Note

For on-side ADS failure on the non selected PFD there is no effect on FD modes. Refer to Section 3 Basic RFM Page 3-146

1(2) ADS FAIL

+

Disengagement of some FD modes (ALT, ALTA, IAS, VS) + Audio Chime

and loss of:

- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

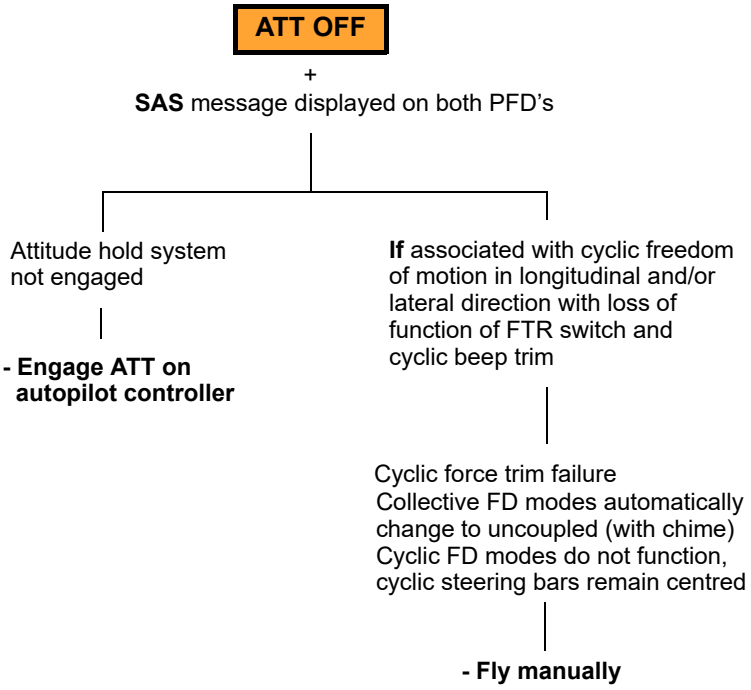
- On RCP move ADS switch to non failed ADS

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD IAS data with STANDBY indicator.

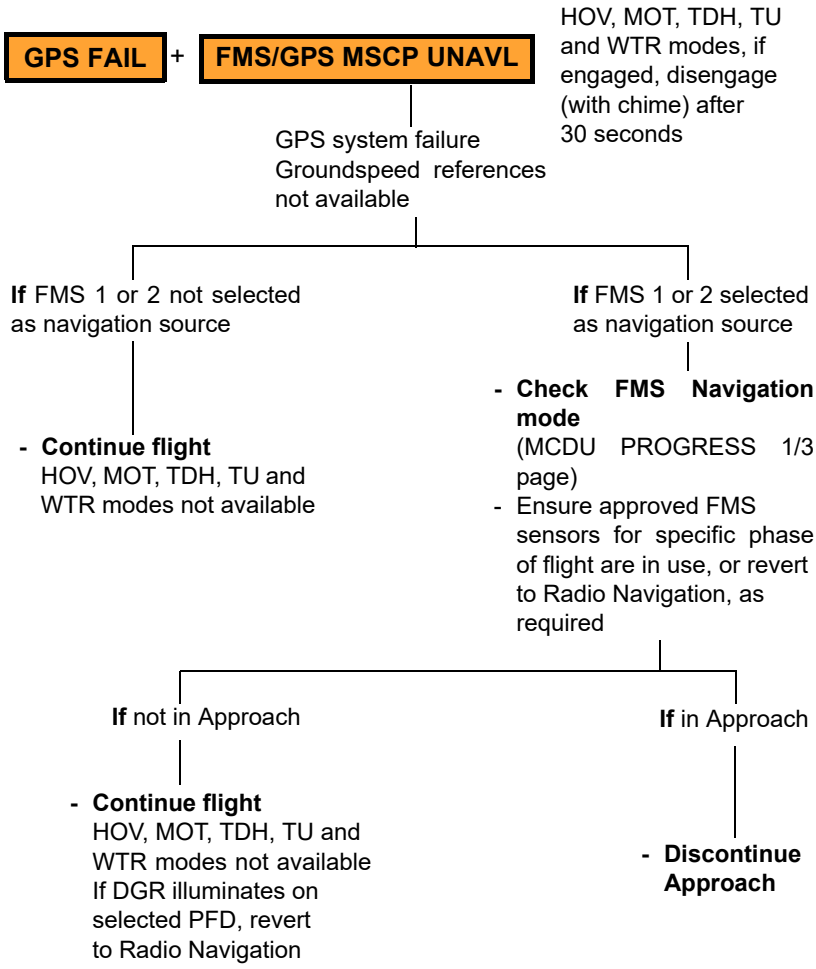
ATTITUDE SYSTEM OFF



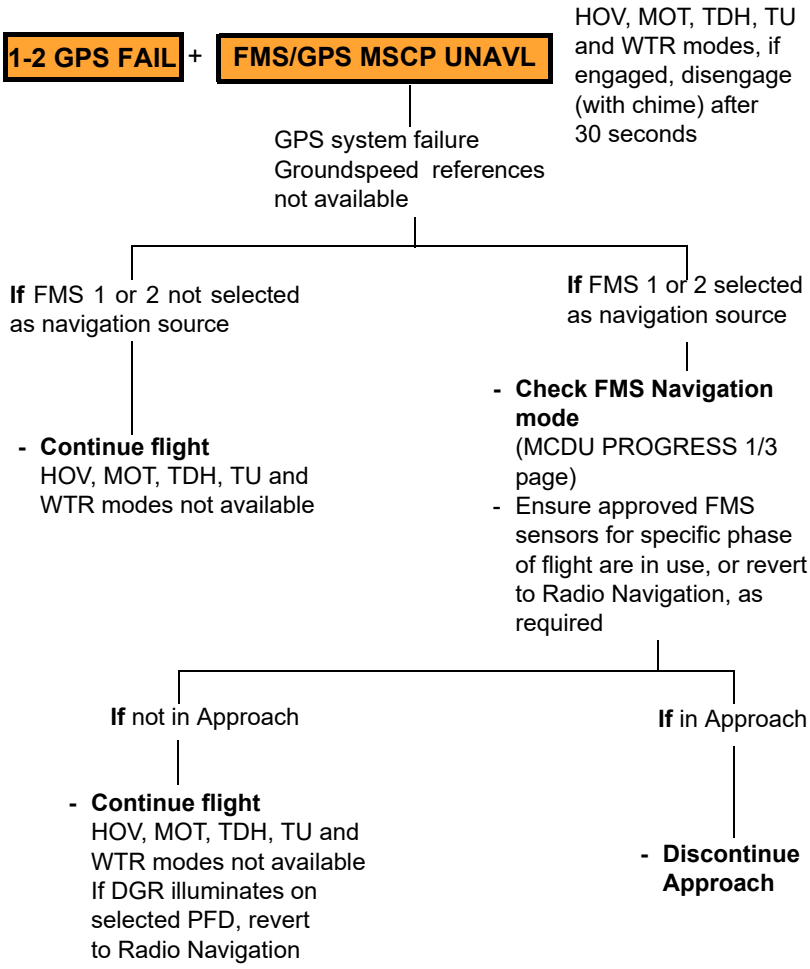
Note

With ATT system not engaged the aircraft flies in SAS mode only.

GPS FAILURE (SINGLE GPS INSTALLATION)



DOUBLE GPS FAILURE (DOUBLE GPS INSTALLATION)



GPS FAILURE (DOUBLE GPS INSTALLATION)

1(2) GPS FAIL

1(2) GPS system failure

Loss of GPS redundancy

- **Continue flight**

FMS FAILURE

1(2) FMS FAIL

Failure of Flight Management System 1(2)

If FMS 1(2) not used as Navigation source

- **Continue flight**
  Loss of redundancy for FMS Navigation

If FMS 1(2) used as Navigation source
LNAV, VGP, VRT, DCL and MOT modes, if engaged, disengage (with chime)

- **Select FMS 2(1) as Navigation Source (press LNAV on Display Controller) or revert to Radio Navigation as required**

If in Approach

- **Discontinue Approach**

PFD MESSAGE
VERTICAL TRACK ALERT CAPTION:
FOR PHASE 5, 6 & 7



on attitude indicator during VGP mode approach, when within 100 ft above Missed Approach Point (MAP) altitude

The VGP will disengage, with chime, at MAP or transition to AVLV, if still engaged at 150 ft (46 m) AGL.

CAUTION

- ALVL mode will not engage when MAP is above 150 ft (46 m) AGL
- VTA annunciation will not appear when MAP is below 50ft AGL due to engagement of ALVL at 150 ft AGL
- VTA annunciation is not available when 'MIN' annunciator is illuminated.

PHASE 8 AND LATER



on attitude indicator during VGP mode approach, when within 200 ft above Missed Approach Point (MAP) altitude

The VGP will disengage, with chime, at MAP or transition to AVLV, if still engaged at 150 ft (46 m) AGL.

CAUTION

- ALVL mode will not engage when MAP is above 150 ft (46 m) AGL
- VTA annunciation is not available when 'MIN' annunciator is illuminated.

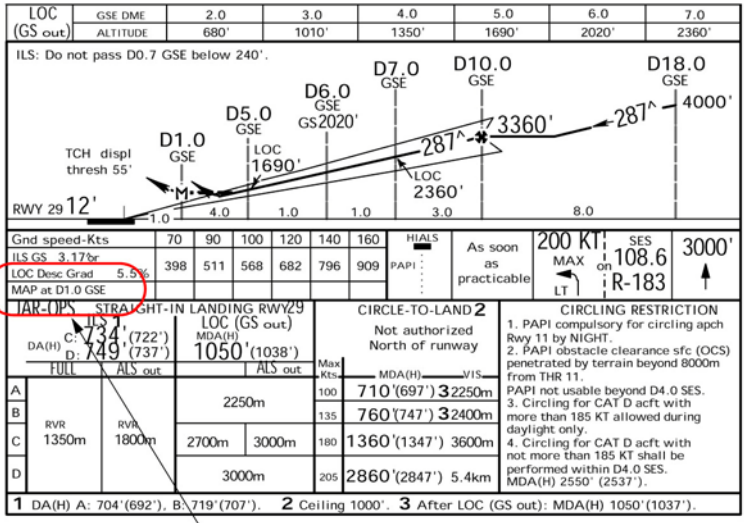


Figure 3-2 MAP Indication on Approach Chart

SINGLE RAD ALT FAILURE WITH RHT OR SAR MODES ENGAGED

RAD1(2) Message beside RAD ALT display. on both PFD's

Rad Alt 2 (1) failed and automatic reconfiguration to functioning Rad Alt.
Message highlights both Rad Alt indicators are using the same source

- Continue flight attentive
Loss of Rad Alt redundancy
No effect on Rad Alt dependant modes functionality

CAUTION

When either RAD ALT fails, the LANDING GEAR CAS caution and associated audio message may activate erroneously when the aircraft is above 150 ft (46 m) AGL and the LDG GEAR is retracted.

DOUBLE RAD ALT FAILURE WITH RHT OR SAR MODES ENGAGED

RAD

Message replaces RAD ALT height information on both PFD's
RHT, VRT and SAR modes disengages with audio chime (if engaged)

Failure of both RAD ALT systems

- Continue flight

- RAD ALT functioning is lost
- RHT, TDH, TD, TU, MOT, VRT modes and ALVL not available
- Collective Safety Fly Up function not available
- MIN message is inactive
- 'CHECK HEIGHT' aural warning inactive

Note

If RHT mode engaged, ALT will automatically engage 5 seconds after RAD failure indication.

CAUTION

When both RAD ALT's fail, the 150 ft aural warning message does not function and the LANDING GEAR caution will be displayed if the LDG GEAR is retracted, regardless of height.

RAD ALT MISCOMPARE WITH RHT OR SAR MODES ENGAGED

RAD message on RAD ALT display
RHT, VRT and SAR modes disengage with audio chime (if engaged)

Miscompare between RAD ALT 1 and 2 information.

- **Compare the Pilot and Copilot RAD ALT indications and/or outside visual references to establish the correct data.**

- **Continue flight**
  RHT, TDH, TD, TU, MOT, VRT modes and Safety Fly-Up function not available while message displayed

Note

If RHT mode engaged ALT will automatically engage 5 seconds after RAD miscompare indication.

GROUNDSPEED VELOCITY FAIL

VEL FAIL Message below and to left of compass display
Velocity vector, on hover display, removed
GS digital readout source changes to FMS (F)
HOV and SAR Mode (except TD) disengage, if engaged

Failure of valid velocity data from both AHRS

- **Continue flight**
  HOV and SAR modes (except TD) not available

GROUNDSPEED VELOCITY MISCOMPARE

VEL

Message below and to left of compass display

Miscompare between AHRS 1 & 2 velocity data (greater than 2 kts) when groundspeed below 20 kts

- Compare PFD indications

- Continue flight
If fault on coupled side AHRS aircraft may be affected by drift in HOV or SAR modes

HEIGHT LIMIT CAPTION

HTLM

Message left of attitude indicator on both PFD's

Aircraft passed Safety Height and/or Ultimate Fly Up Limit.
Safety Fly-Up function activated, if any collective mode engaged and coupled

- Monitor height
- Ensure separation from terrain visually or, if not possible, establish a positive rate of climb to a safe height

SECTION 4 - PERFORMANCE DATA

HOVER CEILING OGE

For Hover Ceiling OGE OEI MCP and 2.5 min refer to Section 4 Basic Manual or appropriate Supplement for aircraft configuration.

FLYAWAY PERFORMANCE

The Flyaway chart defines the height loss which will occur during a flyaway manoeuvre from the hover condition to level flight after a single engine failure in a zero wind hover. The height loss is given for varying combinations of weight, initial hover Pressure Altitude, OAT and the main rotor speed at 100%NR or 102%. The chart does not include any clearance height which must be added (minimum 15 ft) to the height loss.
The height loss is valid provided the flyaway manoeuvre is initiated within 1 second from engine failure recognition.

See Basic RFM Section 4 PERFORMANCE DATA for details of procedures.

Note

Following the flyaway procedure the height loss indicated on chart Figure 4-1 and Figure 4-2, for ambient condition and aircraft weight, guarantees that V_{TOSS} (40 KIAS) will be achieved and, after accelerating to V_y a subsequent minimum Rate Of Climb of 150 fpm is assured.

Note

If the helicopter weight, at the time of engine failure, is less or equal to the Hover OGE 2.5 min OEI weight, an engine failure in the hover will result in no height loss provided that the pilot does not intervene on the flight controls.

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HEIGHT LOSS AFTER AN ENGINE FAILURE from HOVER

ROTOR SPEED: 100% or 102%

WIND BENEFIT

Note: the flyaway procedure assures a min ROC of 150 fpm at V_y with MCP OEI

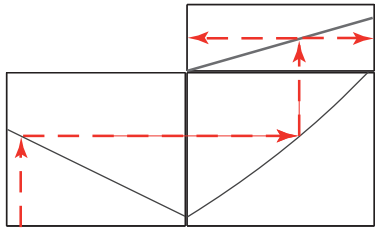

Figure 4-1 Height Loss During Flyaway for Weights up to 6400 kg

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HEIGHT LOSS AFTER AN ENGINE FAILURE from HOVER

ROTOR SPEED: 100% or 102%

WIND BENEFIT

Note: the flyaway procedure assures a min ROC of 150 fpm at V_y with MCP OEI

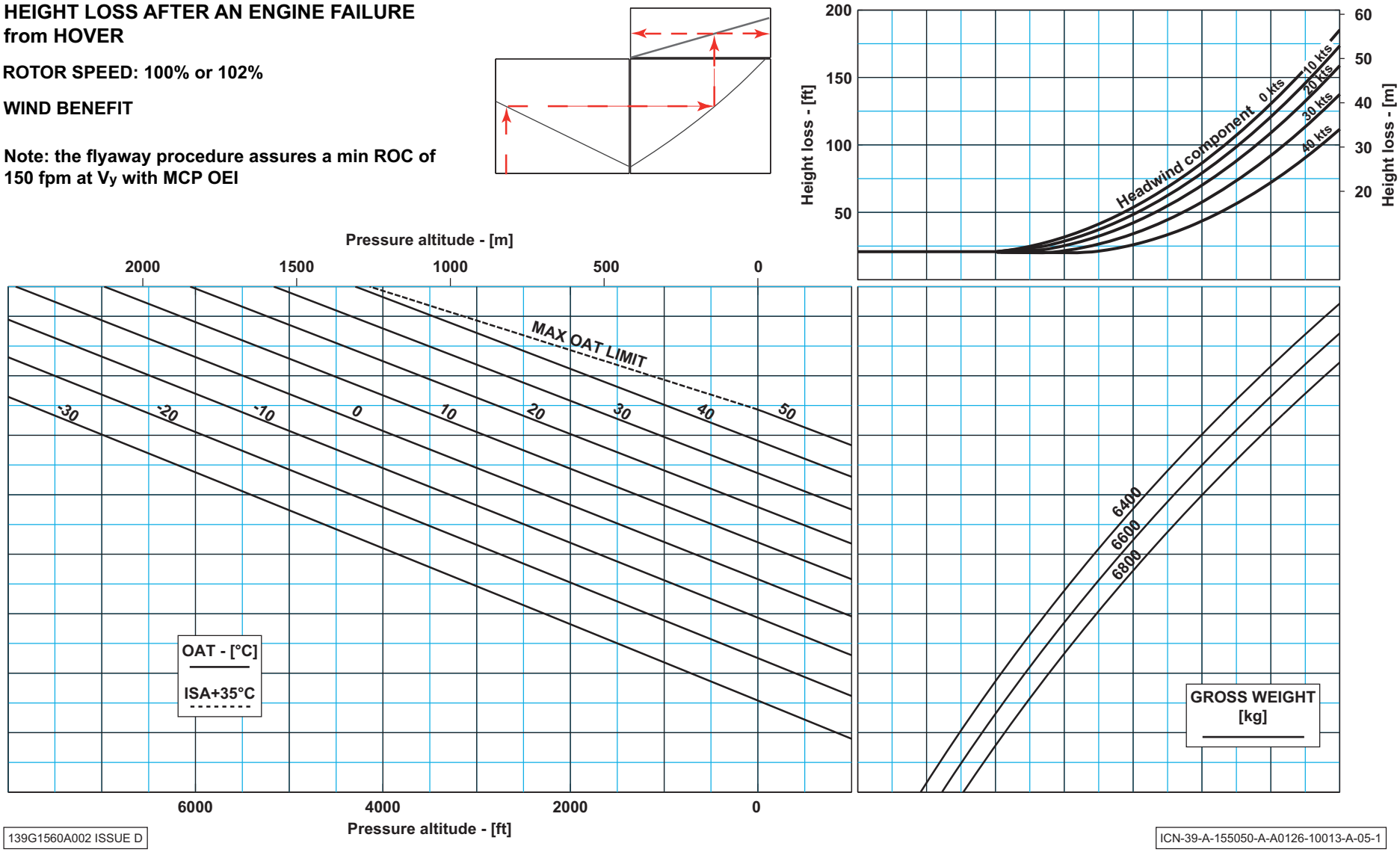

Figure 4-2 Height Loss During Flyaway for Weights from 6400 kg to 6800 kg

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full details of FD and SAR Mode operation and use see "PRIMUS EPIC Integrated Avionics and Flight Control System for the AW139 Helicopter - Pilot's Guide" latest issue and "FMS Pilot's Guide" latest issue.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 70

4 AXIS BASIC FLIGHT DIRECTOR (EPIC SOFTWARE PHASE 5 AND LATER)

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SUPPLEMENT 70
4 AXIS BASIC FLIGHT DIRECTOR (EPIC SOFTWARE PHASE 5 AND LATER)

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GENERAL INFORMATION

The 4 Axis Basic Flight Director (FD) provides commands that are normally coupled to the autopilot (AP) for automatic flight path control around the three axes of the aircraft plus collective. At Power Up one of the two FD is automatically selected and configured as Master (priority). At every Power Up the FD selected as Master (priority) is alternated.

The 4 Axis Basic Flight Director system is a simplified version of the 4 Axis Enhanced Flight Director system (Supplement 67) as it does not include Hover Mode (HOV) or TU modes. The system requires Phase 5 (software release EB7030191-00107) or Phase 6 (software release EB7030191-00108 & 109) or Phase 7 (software release EB7030191-00110/00111/00112/00114/00115/00117/00118) or Phase 8 (software release EB7030191-00113/00120).

When coupled, both autopilots drive the actuators to satisfy the references provided by the priority FD.
When uncoupled the pilot can manually fly the commands.
In either case, pitch, roll command bars/collective cue are presented on each PFD, depending on the mode selected.

The FD uses the Navigation source and data reference presented on the selected PFD. The selected PFD is indicated by the green PFD couple arrow which is controlled by the PFD button on the Guidance Controller (See Figure 2). The SAR Guidance Controller (See Figure 3) is an alternative controller and has SAR mode buttons, however, the extra pushbuttons are not active. Either Guidance Controller can be used with the 4 Axis Enhanced Flight Director system Phase 5,6,7 & 8. (For Phase 5 and later installations that includes SAR mode functions see Supplement 69).

A green couple arrow is also presented on the side of the PFD pushbutton on the Guidance Controller. When a FD mode is engaged the coupled function is automatically engaged. The FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller (See Figure 1). The coupled function is automatically forced to uncoupled whenever the AP ATT mode is off or becomes inoperative.

Armed and captured FD modes are displayed with messages along the top line of the PFD: Collective and pitch mode messages on the left of the selected PFD arrow and lateral mode on the right. Armed

modes are in small white characters and captured or engaged modes are in medium size green characters. When transitioning from no mode to engaged, from armed to captured or change from one mode to another mode the message flashes for 6 seconds then become steady. When changing from captured to no mode the message flashes for 6 seconds then extinguishes.

Armed lateral modes messages are: VOR, VAPP, LOC, BC, LNAV and captured VOR, VAPP, OS, LOC, BC, LNAV, HDG.
Armed collective modes are: GS, VGP, VRT (Phase 8 and later) and captured ALT, GS, VS, GA, ALTA, ALVL, RHT, VGP, VRT (Phase 8 and later).
Engaged vertical pitch modes are IAS, DCL, GA.

A chime sounds whenever either a lateral, vertical (pitch), or vertical (collective) FD mode changes from its previous state, i.e.

— a mode changes from engaged to disengaged or vice-versa

— a mode changes from arm to captured

— a mode changes from coupled to uncoupled.

An aural tone (“bip-bip”) sounds for any change in altitude or radar height mode reference datum.

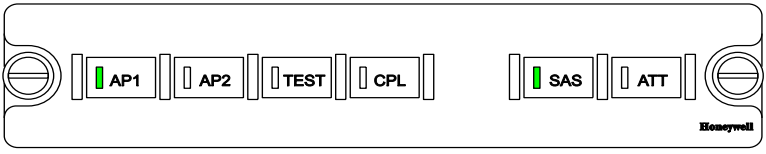

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Figure 1 Autopilot Controller

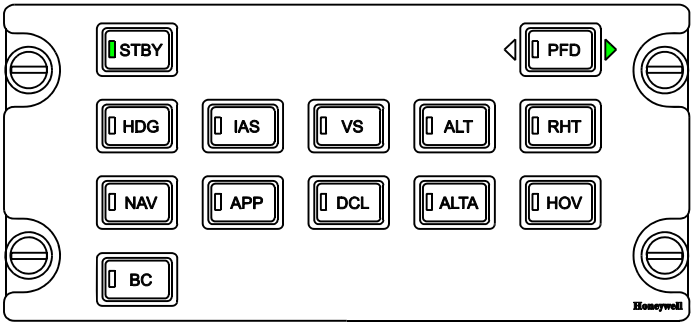

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Figure 2 Guidance Controller

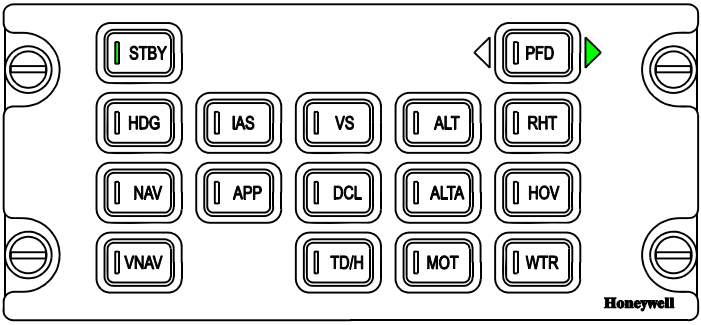

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Figure 3 SAR Guidance Controller

The FD functions available are as follows:

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
HDG	Heading select	Roll and Yaw	N/A	HDG
ALT	Altitude Hold	Collective	N/A	ALT
IAS	Indicated Airspeed Hold	Pitch	N/A	IAS
NAV	Lateral Navigation	Roll	LNAV/ VOR/ LOC	LNAV/ VOR/ LOC
APP	Lateral Approach	Roll	VAPP LOC VOR	VAPP LOC VOR
	Vertical Approach	Collective	GS VGP	GS VGP
PRV	Preselect VOR-ILS approach while in LNAV	N/A	As for APP	N/A
DCL	ILS Deceleration VGP Deceleration	Pitch	DCL	DCL
BC	Back Course Approach	Roll	BC	BC
ALTA	Altitude Acquire	Collective	N/A	ALTA
VS	Vertical Speed Hold	Collective	N/A	VS
GA	Go-Around	Pitch/ Collective	N/A	GA
VGP	Vertical Glide Path	Collective	VGP	VGP

Mode	Function	Control Axis	PFD Caption	
			Arm (white)	Capture (green)
VRT**	Vertical Glide Path with Rad Alt Level Segment	Collective	VRT	VRT
RHT	Radar Height Hold	Collective	N/A	RHT
OS*	Over Station mode	Roll	N/A	OS
ALVL*	Autolevel mode	Pitch/ Collective	N/A	ALVL
SBY	Clear all FD modes	N/A	N/A	N/A

* Provided automatically.

** Phase 8 and later and if Custom Approach with Level Segment enabled in option file.

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SECTION 1 - LIMITATIONS

WEIGHT LIMITATIONS

— For weights up to 6400 kg see basic RFM.

— For weights between 6400 kg and 6800 kg see Supplement 50.

— For weights between 6800 kg and 7000 kg see Supplement 90.

FLIGHT DIRECTOR MODES LIMITATIONS

- The following FD modes are inoperative on the SAR Guidance Control panel:

  — TD/H — MOT — WTR — VNAV

- Collective modes must not be engaged if either or both engines are in MANUAL MODE.
- The RHT mode can only be engaged over flat surfaces which are clear of obstacles.
- The HOV mode is not available.

PHASE 5 AND 6 FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH)

Hold Mode	Applicable Range	MUH
IAS*	60 KIAS to Vne less 5 KIAS	150 ft AGL or 50 ft AGL during approach
HDG*/NAV*	60 KIAS to Vne	150 ft AGL or 50 ft AGL during approach
ALT	0 KIAS to Vne	300 ft AGL (airspeed greater than 55 KIAS) 50 ft AGL (airspeed less than 55 KIAS)
VS*	60 KIAS to Vne within -1500 fpm and 2000 fpm	150 ft AGL
APP*/BC*/GA*	60 KIAS to Vne	50 ft AGL
DCL*	60 KIAS to Vne	50 ft AGL
ALTA*	60 KIAS to Vne	150 ft AGL

RHT	0 KIAS to Vne 15 ft to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in Hover (airspeed less than 55 KIAS)

Note*

— Automatic disengagement of these modes below 55 KIAS with audio chime.

— VS engagement above 2000 fpm or below -1500 fpm will result in the mode returning the aircraft to the maximum rates quoted (2000 fpm or -1500 fpm).

PHASE 7 AND LATER FLIGHT DIRECTOR MODES ENGAGEMENT LIMITS AND MINIMUM USE HEIGHT (MUH)

Hold Mode	Applicable Range	MUH
IAS*1	60 KIAS to Vne less 5 KIAS 50 KIAS to Vne less 5 KIAS during approach see Note**	150 ft AGL or 50 ft AGL during approach
HDG*1/NAV*1	60 KIAS to Vne less 5 KIAS 50 KIAS to Vne less 5 KIAS during approach see Note**	150 ft AGL or 50 ft AGL during approach
ALT	0 KIAS to Vne	300 ft AGL (airspeed greater than 55 KIAS) 50 ft AGL in HOV or airspeed less than 55 KIAS
VS*2	60 KIAS to Vne within -1500 fpm and 2000 fpm	150 ft AGL
APP*2/BC*2	60 KIAS to Vne	50 ft AGL
APP*1 (VGP)	50 KIAS to Vne	50 ft AGL
APP*1 (VRT) Note* **	50 KIAS to Vne 150 ft to 2400 ft AGL	150 ft AGL
GA*1	41 KIAS to Vne	N/A
DCL*1	50 KIAS to Vne	50 ft AGL
ALTA*2	60 KIAS to Vne	150 ft AGL

Hold Mode	Applicable Range	MUH
RHT	0 KIAS to Vne 15 ft to 2000 ft AGL	150 ft AGL (airspeed greater than 55 KIAS) 30 ft AGL in HOV or airspeed less than 55 KIAS)

Note*

— [1] Automatic disengagement of these modes below 41 KIAS with audio chime.

— [2] Automatic disengagement of these modes below 55 KIAS with audio chime.

Note**

Use of IAS, HDG and LNAV modes below 60 KIAS is only for Flight Director operations associated with RNP APCH and Custom approaches.
Selecting IAS mode speed to less than 55 KIAS will result in normal automatic disengagement of APP, ALTA & VS modes at 55 KIAS and loss of associated collective safety function.

Note***

Phase 8 and later and when Custom Approach with Level Segment enabled in option file.

Note

At GA automatic LNAV arming is allowed down to 41 KIAS.

REQUIRED EQUIPMENT

Second Radar Altimeter RT300 (Supplement 18).

VOR LIMITATIONS

In case of invalid DME/FMS distance, select:

- VOR APP at ranges below 10 nm (18 km)

- VOR NAV at ranges greater than 10 nm (18 km).

COUPLED ILS APPROACH MODE LIMITATIONS

The helicopter is certified to carry out CAT 1 ILS approaches up to 7.5 deg glideslope.

Maximum recommended Localizer Intercept angle ..... 45 deg

ranges greater than 10 nm (18 km)

Maximum recommended Localizer Intercept angle ..... 30 deg

ranges less than 10 nm (18 km)

Maximum airspeed for glideslope up to 4 deg ..... 150 KIAS

Maximum airspeed for glideslopes between 4 and 7.5 deg (Steep Approach) ..... 120 KIAS

In case of invalid DME and FMS distance and with both Rad Alt signals invalid an ILS approach must be initiated at a distance of not less than 10 nm (18 km).

SECTION 2 - NORMAL PROCEDURES

FLIGHT DIRECTOR - GENERAL

For full details of FD operation and use see “PRIMUS EPIC Integrated Avionics and Flight Control System for the AW/AB139 Helicopter - Pilot’s Guide” latest issue and FMS Pilot’s Guide latest issue.

FLIGHT DIRECTOR MODES ENGAGEMENT

The AFCS Flight Director function provides 4 axis guidance modes. Selection of most FD modes is carried out using pushbuttons on the Guidance Controller. Each mode may be de-selected by pressing the associated pushbutton on the Guidance Controller. However GA mode may only be engaged by either collective GA button and disengaged by engaging a different mode for pitch and collective axis. All engaged modes may be deselected simultaneously by using the FD STBY button located on the cyclic sticks or the STBY button on the Guidance Controller.
The Guidance Controller pushbuttons include a green annuciator that illuminates when the mode is selected. FD mode annuciations (green when captured and white when armed) also appear on the PFD.

FLIGHT DIRECTOR COUPLED AND UNCOUPLED OPERATIONS

Selecting a FD mode by pressing the pushbutton on the Guidance Controller will couple the FD whenever the AP is in ATT hold. Selecting a FD mode by pressing the pushbutton on the Guidance Controller with the ATT OFF (i.e. SAS or no stabilisation), the FD will be engaged in the uncoupled mode.

During coupled operation the FD may be uncoupled by pressing the CPL pushbutton on the Autopilot Controller which will cause a white UCPL caption to appear on the PFD.

CAUTION

- Whenever the FD is coupled and the AP reverts to SAS or has a complete loss of autostabilization, the FD will revert to uncoupled mode.
- When the AP reverts to SAS no UCPL caption will appear on the PFD.

With the FD engaged, in coupled or uncoupled mode, the following is displayed:

— Navigation source and reference data in magenta colour on the selected PFD

— Navigation source and reference data in cyan colour on the non selected PFD

— Navigation source in amber on both PFD's when both PFD's have the same navigation data source.

During coupled operation the HDG, ALT, IAS, VS, ALTA, RHT, VRT modes may be controlled by either pilot. When engaged in coupled mode, the reference data may be adjusted by using the Display Controller (HDG, ALT SEL), collective beep trim/FTR (ALT, ALTA, VS, RHT, VRT) or cyclic beep trim/FTR (IAS, HDG).

During uncoupled operation changes of reference data for IAS and HDG modes are carried out by pressing the cyclic FTR button, which updates the reference data to the actual values at the time the button is released. Changes of reference data for ALT, VS and RHT are carried out by the collective beep trim. Collective FTR does not modify the collective modes reference.

For IAS, HDG, RHT and VS on the selected PFD, a magenta digital readout reference datum is displayed above the appropriate flight instrument and a magenta bug at a position corresponding to the selected reference. For ALT, only the magenta bug is displayed permanently while the digital readout is displayed for 5 seconds whenever the reference is modified and the ALTA reference is present.

Whenever a collective mode is engaged (ALT, VS, ALTA, GS, VGP, GA, ALVL, RHT) a collective position cue appears on the PFD beside

the ADI. There are some collective FD modes (e.g. RHT, VRT, etc.) based upon RadAlt. When one of them is engaged, a magenta bug is displayed on the Rad Alt tape and the radalt readout is displayed in magenta. See Figure 2-1 (S/W Phase 5, 6 & 7) and Figure 2-2 & Figure 2-3 (S/W Phase 8 and later).

COLLECTIVE PI LIMITING FUNCTION

During collective coupled operation the collective movement is limited by the following PI values:

— Maximum 97% AEO (95% at altitudes above 10000 ft (3050 m) Hp)

— Maximum 106% AEO for airspeed less than 60 KIAS (5 MIN message displayed beside collective cue, see Figure 2-1)

— Maximum 140% OEI

— Minimum 5% AEO

— Minimum 10% OEI.

When PI limiting function is active and is limiting maximum collective movement, an amber LIM caption is displayed beside the collective cue. See Figure 2-1.

If PI limiting is active with IAS engaged and the required reference for VS, ALTA, RHT, GA, or ALT cannot be achieved the airspeed will automatically reduce as necessary to achieve the collective mode reference. If the collective mode reference cannot be maintained, when the airspeed has reached a minimum of 80 KIAS this airspeed will be maintained and the collective mode reference will be reduced. While the mode reference values cannot be maintained or achieved that mode caption is displayed in amber on the PFD.

CAUTION

If PI limiting is active with ALT/RHT engaged and the reference height cannot be maintained the aural warning “Altitude Altitude” will warn the pilot when the maximum allowed deviation from the reference height has been exceeded.

When flying at high altitude (above 15000 ft (4570 m)) select the Load Share switch to TORQUE (MISC panel) to improve the helicopter manoeuvre during automatic turns.

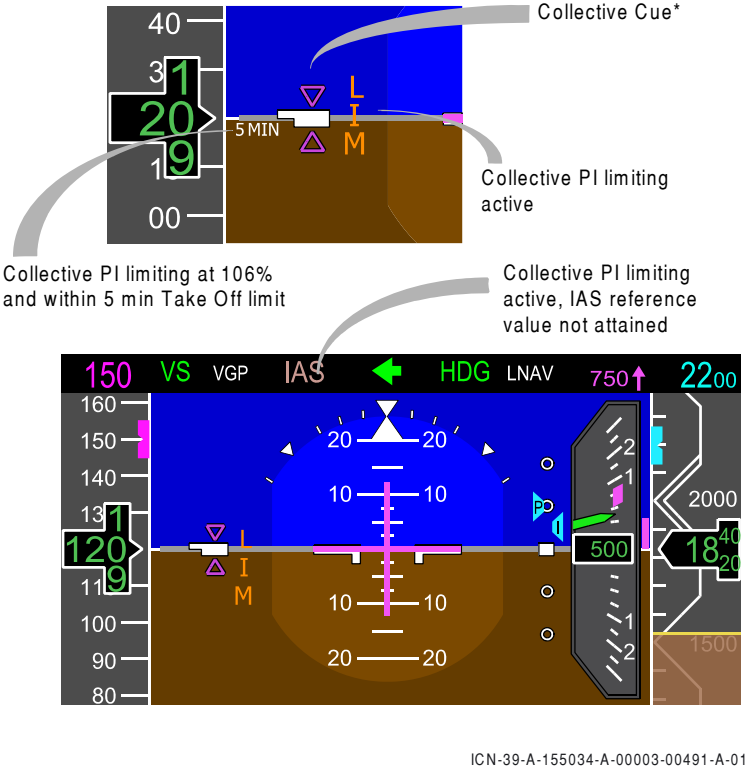

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Figure 2-1 Collective Cue Display (Software Phase 5, 6 and 7)

* In UCPL operation when collective cue is below reference arrows collective must be raised and vice-versa.

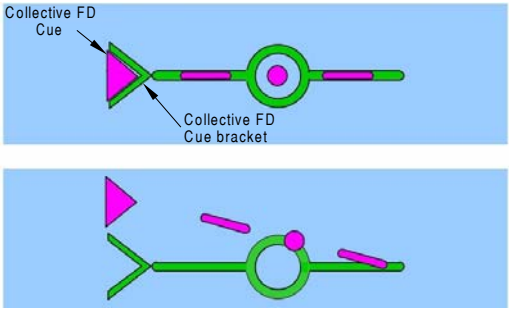

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Figure 2-2 Collective Cue Display Path Mode (Software Phase 8 and later)

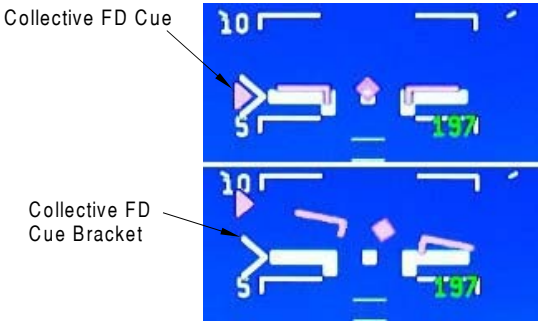

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Figure 2-3 Collective Cue Display Pitch Mode (Software Phase 8 and later)

* In UCPL operation when collective cue is below reference arrows collective must be raised and vice-versa.

SAFETY FLY-UP FUNCTIONALITY WHEN FD MODES ENGAGED

The Fly-Up Collective Safety Function is a height protection function which is always active when at least one Rad Alt is valid. The function is activated when any collective FD mode is engaged and coupled and the Safety Height is passed. When the function is activated the aircraft is automatically flown back up to the Safety Height. The Safety Height is a function of the Rad Alt Reference (or a fixed height for Barometric modes) and depends on the actual collective mode engaged.

Further to the Safety Height there is also an Ultimate Fly-Up Limit, a fixed height (not adjustable) which, if passed, will automatically cause the aircraft to fly back up to this height or the Safety Height, if higher.

The following table gives the Safety Height Rad Alt limits and Ultimate Fly-Up Limit for the different collective modes:

Hold Mode	Applicable Range	Safety Height (ft AGL)	Ultimate Fly - Up Limit (ft AGL)
VS	All conditions	150 ft	150 ft
ALTA	All conditions	150 ft	150 ft
ALT	Airspeed less than 55 KIAS or HOV All other conditions	35 ft 150 ft	35 ft 150 ft
RHT	Airspeed less than 55 KIAS All other conditions	Variable *	15 ft 75 ft
Phase 8 and later and when Custom Approach with Level Segment enabled in option file			
APP(VRT)	All conditions	Variable *	75 ft

* Safety Height = Rad Alt Reference - (7+1/8xRad Alt Reference)

When the collective Fly Up safety function is activated, due to an height excursion below the Safety Height or Ultimate Fly-Up limit, the aural message 'ALTITUDE ALTITUDE' is triggered and a HTLM message is displayed on the PFD on the top left of the attitude indicator. When the collective is automatically driven up, it is normally limited by the PI limiting function. Should the relevant MUH limits be exceeded the PI limits will be moved up as follows:

— Maximum 121% AEO for airspeeds below 60 KIAS

— Maximum 176% OEI for airspeeds below 60 KIAS

— Maximum 110% AEO for airspeeds above 60 KIAS

— Maximum 160% OEI for airspeeds above 60 KIAS.

CAUTION

When voice message "Altitude Altitude" is triggered with a HTLM message then the aircraft has descended below the safety height. Ensure separation from terrain visually or, if not possible, establish a positive rate of climb to a safe height.

CAUTION

(Applicable only for Phase 5 or 6)

When descending over terrain, with a collective mode engaged and after a continuous descent of at least 2500 ft, at approximately 2500 ft Rad Alt height, the Fly Up safety function may erroneously intervene and increase the PI to above the MCP level. This condition should be controlled manually with the collective to maintain the PI within the MCP limits until the HTLM message on the PFD extinguishes.

MODE DESCRIPTIONS

The following descriptions assume the modes are coupled, unless stated otherwise.

HDG Heading Hold Mode. This mode steers the aircraft to the heading reference bug displayed on the PFD. The heading bug can be adjusted using the HEADING knob on the Remote Instrument Controller and can be synchronized with the actual heading by pressing the HEADING knob (PUSH SYNC). The heading reference bug can be synchronized to the actual heading by pressing the cyclic FTR button or modified using the cyclic beep trim switch left or right. In HDG mode turns are performed at standard rate 1 (3 deg/sec).

ALT Barometric Altitude Hold Mode. This mode maintains the barometric altitude existing at the time of engagement. The altitude reference is displayed as a set bug on the PFD altitude tape. If the ALT SEL knob has not been previously moved (i.e. no ALTA activation) the ALT reference will also be displayed as a magenta digital readout. The altitude reference can be adjusted using the collective beep trim (aft to increase altitude) or by pressing FTR button, flying to desired altitude, and releasing. An audio tone is produced when the altitude reference is changed. The collective PI limiting function is enabled when ALT mode is coupled.

CAUTION

In ALT mode the voice message “Altitude Altitude” is triggered when altitude exceeds the reference altitude by ±150 ft (46 m).

IAS Airspeed Hold Mode. This mode maintains the airspeed existing at the time of engagement. When engaged the airspeed reference is displayed as a set bug and a digital readout on the PFD. The airspeed reference bug is adjusted by either using the cyclic beep fore/aft or

repositioning the cyclic, with the FTR button depressed, to the required airspeed and releasing FTR button. The airspeed reference is adjustable via the cyclic beep switch between 50 KIAS (60 KIAS for Phase 5 and 6) and Vne less 5 KIAS. If airspeed, at time of engagement, is higher than Vne less 5 KIAS then it is automatically reduced to Vne less 5 KIAS.

ALTA Altitude Acquire Mode. This mode, when engaged with a barometric altitude preselect reference set (through ALT SEL knob), will automatically engage the IAS mode and the aircraft is flown towards the preset altitude. The final altitude reference is displayed as a cyan bug and digital readout above the altitude scale. The vertical speed reference is displayed as a bug and digital readout on the PFD. The preset vertical speeds are +1000 fpm or -750 fpm in the direction of the preset altitude. The vertical speed reference can be changed by either using the collective beep trim (aft to increase) or with collective FTR button depressed, moving to the required vertical speed and releasing. When the preset altitude is achieved the mode will transition to ALT mode and the IAS mode will remain engaged. The collective PI limiting function is enabled when ALTA mode is coupled. When collective PI limiting is active the airspeed is reduced to maintain vertical speed reference.

Note

(Applicable only for Phase 5 or 6)

Engaging ALTA while climbing with a rate of climb greater than 1500 fpm or descending with a rate of descent greater than 1500 fpm, the system may erroneously transition to ALT. The aircraft will, however, reach the selected final altitude.

NAV VOR/LOC/LNAV FD functions. These functions are selected with the NAV pushbutton depending on navigation source selection on the PFD and NAV receiver tuning. Pressing the NAV pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC/LNAV is armed (white caption). At VOR/LOC/LNAV capture HDG will automatically disengage and the helicopter turns to track the selected radial or leg. The NAV function is also used to fly the FMS Search Patterns.

APP 1) VOR/ILS Approach FD functions. The VOR non-precision approach or ILS approach functions are selected depending on the NAV receiver tuning when the APP mode button is pushed. Pressing the APP pushbutton, HDG is engaged (green caption) and the present aircraft heading held, VOR/LOC-GS is armed (white caption). At VOR/LOC capture HDG will automatically disengage and the helicopter turns to track the selected radial, VAPP/LOC caption will display on the PFD. For ILS approach when intercepting the glideslope signal the GS mode is automatically captured and the previous collective mode disengages.

Note

To avoid false localizer captures, APP mode should be armed when the helicopter is flying inbound to the ILS radial.

2) FMS approach function (VGP).
This can be used when the FMS is the selected NAV source on the selected PFD and an approach from Navigation Database or a Custom Approach without a Final Level Segment (Phase 8 and later) is loaded into the flight plan.
The mode produces a vertical guidance based upon the vertical deviation between current aircraft barometric altitude and FMS glidepath. The glide path is anchored at the Bottom of Descent (BOD) with the glide path angle stored in the data base at the corresponding waypoint or,

for Custom Approach without a Final Level Segment (Phase 8 and later), the VGP mode is armed (white caption) by pushing the APP or DCL button. Intercepting the projected glidepath, the VGP mode is automatically captured.

3) FMS approach for Custom Approach with Level Segment (VRT).
This can be used when the FMS is the selected NAV source on the selected PFD and a Custom Approach with a Final Level Segment (Phase 8 only) is loaded into the flight plan. The mode produces a vertical guidance based upon the vertical deviation between current aircraft barometric altitude and FMS glidepath. The glide path is anchored at the Bottom of Descent (BOD) with 4 degree slope. The VRT mode will automatically transition to RHT mode at BOD sequencing or approaching the final height reference selected by the pilot during approach settings, whichever occurs first. The RHT reference can be changed by using the collective beep trim switch (aft to increase). Changing the RHT reference will not alter the FMS glide path, but alter the height at which the aircraft will level - off after VRT mode transitions to RHT mode.The VRT mode is armed (white caption) by pushing the APP or DCL button, while below 2400 ft AGL. Intercepting the projected glidepath, the VRT mode is automatically captured.Flying above 2500 ft AGL will result in VRT mode disarming or disengagement.

In either case (ILS, VGP, VRT) within the vertical deviation bug there will be a letter: I for ILS, P for VGP or VRT and V for Vertical Path. See Figure 2-1. The P letter and bug, when VGP or VRT is armed, appears on the left hand side of vertical deviation scale in cyan. When captured the symbol moves to the right hand side of the vertical deviation scale in magenta.

CAUTION

During steep approach without automatic collective control be attentive not to use less than 5% PI.

PRV The PRV mode is a way to preselect ILS or VOR approach functions while FD is still engaged in LNAV.
PRV is selected by pressing the PRV pushbutton on the Display Controller. If the APP pushbutton is pressed the FD will arm LOC and GS or VAPP functions depending on the NAV receiver tuning (ILS or VOR) on the selected PFD. At the capture of the LOC or VAPP functions the FD disengages LNAV and engages LOC-GS or VAPP functions. Selected PRV course will be displayed as thin cyan, while armed, and as normal magenta when captured.

DCL 1) ILS Deceleration Mode. The deceleration mode decreases the aircraft speed from its present speed down to approximately 80 KIAS as the aircraft reaches 200 ft AGL. When the DCL pushbutton is pushed the LOC, GS and DCL modes are armed and the IAS and HDG modes are engaged. After GS capture and at a computed condition for correct approach and deceleration the IAS mode is disengaged and the DCL mode engaged. The airspeed reference bug moves to 80 KIAS and the digital reference is set to 80 KIAS. These values can be adjusted using the cyclic beep trim at which time the IAS mode automatically engages replacing the DCL mode.

2) VGP/VRT Deceleration Mode.
When the DCL pushbutton is pushed, during a VGP or VRT approach, if the present speed is greater than the FMS target speed (Ref MCDU PERF INIT page 2/3) the DCL mode engages and the aircraft decelerates to the FMS target speed. If, however, the speed is less or equal to the FMS target speed, the DCL mode arms.
At the Initial Distance the DCL mode, if not already engaged, engages and the aircraft starts to decelerate to

the initial speed. At the appropriate distance the aircraft will start to decelerate to achieve the final speed at the final distance from the MAP. For Phase 5 and 6 only the DCL mode must be engaged within 10 NM from the missed approach point. The initial and final speed targets and distances are provided and can be modified in:
MCDU PERF INDEX - APPRCH SPD page 1/2
or:
MCDU PERF INIT page 2/3 - APP/GA SPD page 1/2
or:
MCDU PROGRESS page 2/3 - VNAV DATA page - APPRCH SPD page 1/2 for Approaches from the Navigation Database.

Note

APPRCH SPD MCDU page is not applicable for Custom Approaches.

The initial and final speed targets and distances for Custom Approaches, Phase 8 and later, are provided and can be modified in:
MCDU CST APPR EDIT / CST APPR SPEEDS pages for Custom Approaches.

BC Back Course Approach Mode. The back course mode is selected when the BC pushbutton, for Guidance Controller or APP pushbutton on SAR Guidance Controller, is pushed. Pressing the pushbutton, HDG is engaged (green caption) and the BC is armed (white caption). At BC capture, HDG is disengaged. When the SAR Guidance Controller is used the BC mode will be engaged when the intercept angle between the front course and the aircraft heading is greater than 105° (otherwise the LOC engages).

CAUTION

The course selected for a BC approach must be the ILS approach course of the front runway.

VS Vertical Speed Hold Mode. The vertical speed existing at the time of engagement is held. Vertical speed reference bug and digital readout are adjusted by either using the collective beep or repositioning the collective, with the FTR button depressed, to the required vertical speed and releasing on the desired vertical speed. Collective PI limiting function is enabled when VS mode is coupled.

GA Go Around Mode. The mode may be selected from either collective GA pushbutton and will give, when the conditions for a GA are met i.e. airspeed greater than 41 KIAS (60 KIAS for Phase 5 and 6), a 1000 ft/min climb set bug reference on the Vertical Speed tape and an airspeed bug at the airspeed existing when the mode is engaged or 70 KIAS (80 KIAS for Phase 5 and 6), whichever is greater. Engaging the GA the FD will control airspeed and vertical speed at the commanded values and level the wings. At the GA engagement the LNAV arms and if a missed approach procedure is selected, LNAV automatically engages. (Automatic arming and engagement of LNAV not applicable for Phase 5 and 6). The GA Mode can only be exited by selecting another vertical FD mode (or FD to STBY).

OS Over Station Mode. When overflying a VOR station, with VOR or VAPP FD functions engaged, the VOR equipment detects the aircraft being within the zone of ambiguity. The VOR deviation signal is removed from the command until the VOR signal has stabilized after passing over station. While over the station, course change may be made by selecting a new course via the Course Selector knob.

ALVL Autolevel Mode. If the APP (LOC/GS or VGP) mode is continued, to below landing minimum, this safety feature is automatically activated at 150 ft (46 m) and an asymptotic flare to a radar height of 50 ft (15 m) will be initiated. The green GS or VGP caption on the PFD will be replaced by ALVL.

CAUTION

In VGP mode the ALVL will activate if the MAP (Missed Approach Point as shown in the example Approach Chart Figure 3-2) is lower than 150 ft (46 m) AGL.
For Phase 5, 6 & 7:
When MAP is higher than 150 ft (46 m) AGL the VGP mode will disengage at the MAP and a chime is generated (preceded, at 100 ft (30 m) above, by a Vertical Track Alert (VTA) caption displayed above the vertical guidance scale on the PFD).
For Phase 8 and later:
When MAP is higher than 150 ft (46 m) AGL the VGP mode will disengage at the MAP and a chime is generated (preceded, at 200 ft (60 m) above, by a Vertical Track Alert (VTA) caption displayed above the vertical guidance scale on the PFD).

RHT Radar Height Hold Mode. This mode maintains the aircraft at the radar height at the time of engagement when the radar altimeter indications are within the threshold limits. A reference bug on the radar altimeter tape and a digital readout above the radar altimeter tape are presented. The reference height can be changed by depressing the collective FTR switch flying to the required height and releasing the FTR switch or by using the collective beep trim switch (aft to increase). An audio tone is produced when the height reference is changed. The collective PI limiting function is enabled when RHT mode is coupled.

CAUTION

In RHT mode the voice message “Altitude Altitude” is triggered when height exceeds the reference by a value proportional to the reference height.

FMS SEARCH PATTERNS

SAR type search patterns are available in the FMS which, when inserted in a flight plan using the MCDU, are displayed on the MFD and can be flown using the NAV function. The following search patterns are available:

— Expanding Square

— Sector

— Creeping Ladder

— Parallel.

For FMS SAR search patterns see Supplement 68.

ADVISORY CAPTIONS

CAS Caption (Green)	System State
MOT NOT INSTALLED	(Caption present for 5 secs in inverse video) MOT button pressed and function not fitted
TD/H NOT INSTALLED	(Caption present for 5 secs in inverse video) TD/H button pressed and function not fitted
VNAV NOT INSTALLED	(Caption present for 5 secs in inverse video) VNAV button pressed and function not fitted
WTR NOT INSTALLED	(Caption present for 5 secs in inverse video) WTR button pressed and function not fitted

PFD DISPLAY

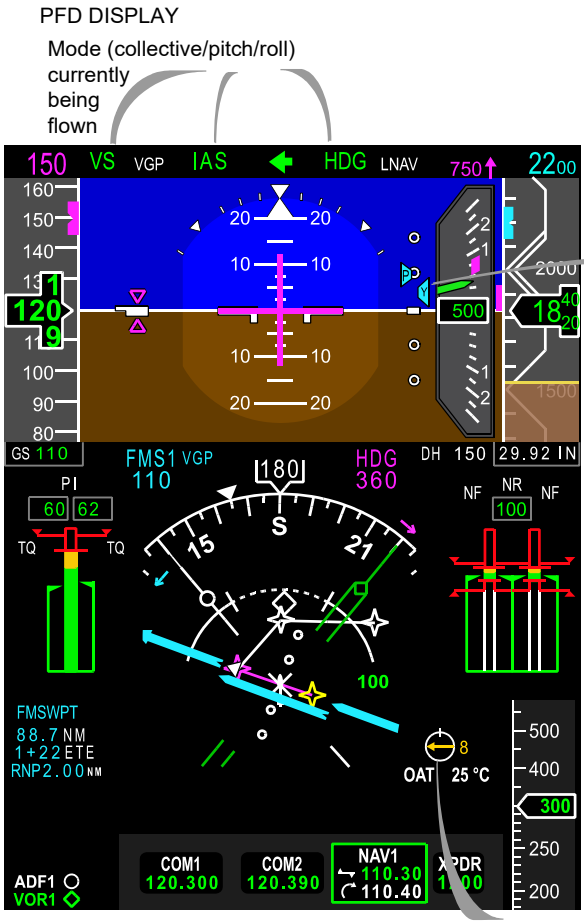

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Figure 2-4 PFD Messages

FMS FUNCTIONAL INCONSISTENCIES ONLY FOR EPIC SOFTWARE PHASE 5 OR PHASE 6 INSTALLED

1. When the destination runway/helipad is changed, without an arrival or approach entered, and the runway/helipad is the TO waypoint, the FMS incorrectly places the runway/helipad behind the helicopter, shows it as the FROM waypoint, disengages LNAV (if engaged) and the deviation bar is shown as INVALID.
   Recommended corrective action if problem scenario encountered:

   • Perform 'Direct To' to destination runway/helideck

   • Select desired runway/helipad and activate

   • Re-engage LNAV mode

   Refer to Honeywell Service Information Letter D201002000030 for further information.

   Problem not present for software version EB7030191-00109 (Phase 6.5)

2. The 'Direct-To Recovery' procedure should not be used in any phase of flight.

   Refer to Honeywell Service Information Letter D201001000021 for further information.

3. Approach and/or Star procedures which contain a certain geometry of consecutive AT altitude constraints exhibit a TOD misplacement and premature descent.

   Refer to Honeywell Service Information Letter D201010000078 for further information.

   Problem not present for software version EB7030191-00109 (Phase 6.5)

4. Software version EB7030191-00109 (Phase 6.5) only, Activating vectors during an FMS approach may result in below-glide path VGP indications at the FAF. The crew should monitor VGP indications during glide path capture and execute a missed approach if VGP indications are not consistent with normal glide path capture."

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

VOICE ONLY MESSAGES

1. "Altitude, Altitude" and associated HTLM message on the PFD

— Collective modes engaged and aircraft ground clearance below Safety Height with subsequent Fly-Up intervention.

— For Rad Alt dependant modes the Reference Height and Safety Height values are as follows.

Reference Height (ft)	Safety Height (ft)
30	19
50	36
100	80
150	124
200	168
250	211
500	430
1000	868
1500	1305
2000	1743

2. "Altitude, Altitude"

— Aircraft exceeded the altitude deviation in ALT mode ±150 ft (46 m) from reference.

3. "LOW SPEED LOW SPEED"

— Aircraft below 55 KIAS and a FD mode has automatically disengaged (chime sound generated).

CAS CAUTION MESSAGES

AUTOPILOT FAIL

1(2) AP FAIL + Aural Message

+

AFCS DEGRADED

Associated autopilot failure

- Continue flight attentive
do not exceed Vne-27 KIAS in level flight
or 100 KIAS and 1000 fpm in climb.
- Decouple FD (Below 500 ft (152 m) AGL
fly manually) unless in approach,
missed approach, approach and departure
to/from hover and hover

- If subsequent caution illuminates **1-2 AP FAIL** + Aural Message

- Continue flight manually
not exceeding 140 KIAS
(100 KIAS in turbulence,
IMC or approach)

AUTOPILOT OFF

1(2) AP OFF + Aural Message

+

AFCS DEGRADED

Associate AP not switched ON

On affected AP

- Confirm selected ON.

If fault remains

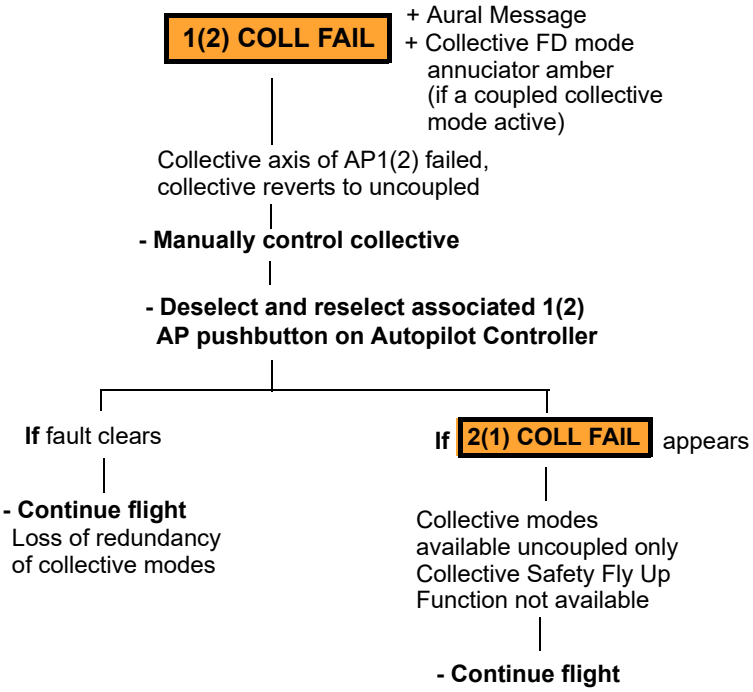
- Continue flight attentive
do not exceed Vne-27 KIAS in level flight or 100 KIAS and 1000 fpm in climb.

- Decouple FD (Below 500 ft (152 m) AGL fly manually) unless in approach, missed approach, approach and departure to/from hover and hover

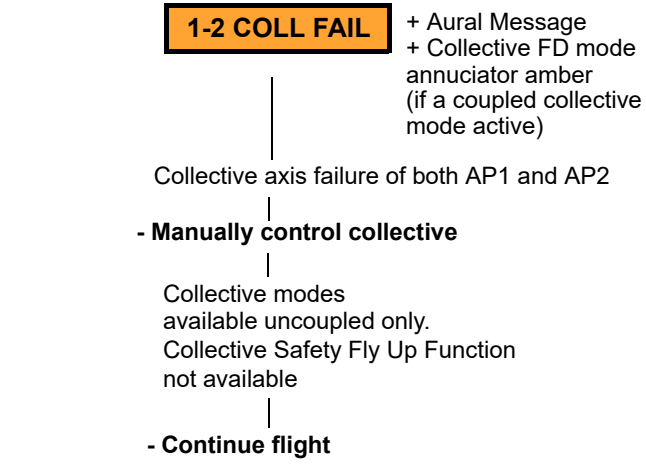
- If subsequent caution illuminates **1-2 AP OFF** + Aural Message

- Continue flight manually not exceeding 140 KIAS (100 KIAS in turbulence, IMC or approach)

SINGLE COLLECTIVE AUTOPILOT FAILURE



DUAL COLLECTIVE AUTOPILOT FAILURE



CYCLIC FORCE TRIM RELEASE FAILURE

Cyclic FTR failure, due to a fault which removes electric power to the clutches of the longitudinal and lateral trim, will result in cyclic longitudinal and lateral clutches becoming permanently engaged. This will require the pilot to fly the aircraft against the cyclic force spring feel to manoeuvre the aircraft, or use the cyclic beep trim, as cyclic FTR button does not function.
In this case it is suggested that a cyclic FD mode (i.e. IAS) is engaged and the cyclic beep trim used to maintain the required flight condition.

COLLECTIVE FORCE TRIM OFF OR FAIL

When a FD mode is engaged, and coupled, and the collective trim is switched OFF (Miscellaneous Control Panel) or fails, a chime sound is generated, the collective may not maintain its selected position, the CLTV annunciation will illuminate on the top left of the ADI display, and the CLTV/YAW OFF green advisory will illuminate on the CAS window. Collective modes are available uncoupled only.

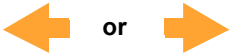
COLLECTIVE FORCE TRIM RELEASE FAILURE

Collective force trim release failure, due to a fault which removes electric power to the clutch of the collective trim will result in the collective clutch becoming permanently engaged. This will require the pilot to fly the aircraft against the collective force spring feel to manoeuvre the aircraft, or use the collective beep trim, as the collective FTR button does not function.
In this case when large collective movements are not required, it is suggested that a collective FD mode (i.e. ALT) is engaged and the collective beep trim used to maintain the required flight condition.

FLIGHT DIRECTOR FAILURE

No CAS Warning or Caution messages are generated to indicate FD malfunctions. However indication on both PFD displays indicate the state of the flight director system.

FLIGHT DIRECTOR PARAMETER FAILURE



or

replaces green arrow above attitude indicator on PFD

At least one On-side flight director parameter is invalid

- Confirm which parameter(s) are invalid
- Either select functioning cross side parameter on RCP panel or select cross side PFD on Guidance Controller.

DUAL FLIGHT DIRECTOR FAIL

FD FAIL

replaces FD arrow above attitude indicator on both PFD's

+

loss of flight director bars and information

Both Flight Directors invalid

- Flight Director not available

FAILURE OF SELECTED PFD UNIT WITH FLIGHT DIRECTOR ENGAGED

Loss of PFD, the associated MFD will automatically configure to Composite mode maintaining the FD engaged on the same references as the PFD.

- **Confirm no chime sound**
- **Confirm FD green arrow and FD mode green captions are present on MFD in Composite mode**

- **Continue flight**

- **If** subsequent display in composite mode fails
  FD automatically disengages, with chime

- **If** Copilot displays failed and Left pilot flying

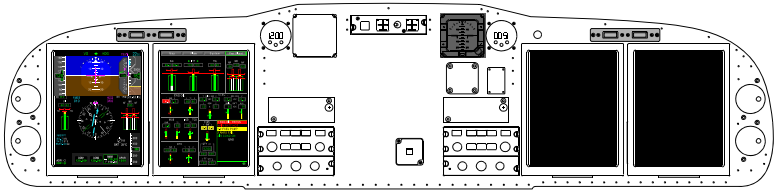
- Right pilot take control of aircraft

FD can be re-engaged

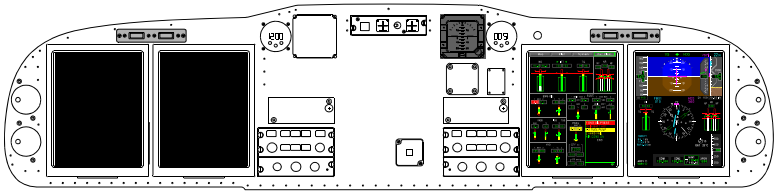
- **If** Pilot displays failed and Right pilot flying

- **Revert to Standby instrument**

- **Land as soon as practicable**



Failure of both Pilot PFD and MFD



Failure of both Copilot PFD and MFD

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Figure 3-1 Failure of both PFD and MFD

GUIDANCE CONTROL PANEL FAILURE

In case of Guidance Control Panel failure, recognised as non functionality of panel pushbuttons (modes cannot be changed or disengaged using panel), the FD may be disengaged using the cyclic FD STBY button.

Continue flight, using the FD modes already engaged as required. However, use the cyclic FD STBY button to disengage modes when required. When disengaged FD is no longer available.

AHRS FAILURE WITH FD ENGAGED

1(2) AHRS FAIL

AVIONIC FAULT — **AFCS DEGRADED**

1(2) AP FAIL — **+ Aural message**

\+ **ATT FAIL** **HDG FAIL** and loss of attitude, heading and slip skid data on Left (Right) PFD

Associated AHRS failure and subsequent loss of AP1(2)

If FD remain engaged

On-side AHRS failure on non selected PFD

- Uncouple FD unless in approach, missed approach, approach and departure to/from hover and hover.

- On RCP move AHRS switch to non failed AHRS

AHRS 2(1)

illuminates on attitude indicator to highlight both attitude indicators are using the same AHRS data

If FD modes HDG, NAV, APP, BC disengage + Audio Chime and loss of Nav and approach command bars

On-side AHRS failure on selected PFD

- On RCP move AHRS switch to non failed AHRS

AHRS 2(1)

illuminates on attitude indicator to highlight both attitude indicators are using the same AHRS data

- FD may be re-engaged if in approach, missed approach, approach and departure to/from hover and hover.

- Continue Flight

- Compare frequently PFD attitude and heading with STANDBY

MAU FAILURE WITH FD ENGAGED

For on-side MAU failure on the selected PFD the FD modes ALT, VS and IAS will disengage, (with a chime for an MAU 1 failure but not for an MAU 2 failure). Follow procedure below for FD action and refer to Section 3 Basic RFM 148 for complete MAU failure procedure.

1(2) MAU
+
1(2) ADS FAIL
+
1(2) AP FAIL

PFD message combined with CAS Cautions and disengagement of FD modes ALT, ALTA, IAS, VS + Audio Chime (MAU 1 failure only) and loss of:



- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

Multiple CAS cautions illuminate, but those which affect FD functioning are:
1(2) AP FAIL page 30
1(2) ADS FAIL page 39
AFCS DEGRADED see Basic RFM page 3-135

- **Continue flight attentive**
- **On RCP move ADS switch to non failed ADS**
- **Do not exceed Vne-27 KIAS in level flight or 100 KIAS and 1000 fpm in climb**
- **Below 500 ft (152 m) AGL fly manually**

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- **Re-engage FD modes as required**

- **Compare frequently PFD data with STANDBY indicator.**

ON SIDE ADS FAILURE ON SELECTED PFD WITH FD ENGAGED

Note

For on-side ADS failure on the non selected PFD there is no effect on FD modes. Refer to Section 3 Basic RFM Page 3-146

1(2) ADS FAIL

+

Disengagement of some FD modes (ALT, ALTA, IAS, VS) + Audio Chime

and loss of:

- Airspeed
- Altitude
- Vertical Speed

Data on Left (Right) PFD indicators

- On RCP move ADS switch to non failed ADS

ADS1(2) illuminates on both attitude indicator to highlight PFD's are using the same air data source

- Re-engage FD modes as required

- Compare frequently PFD data with STANDBY indicator.

ATTITUDE SYSTEM OFF

ATT OFF

\+

SAS message displayed on both PFD's

Attitude hold system not engaged

- Engage ATT on autopilot controller

If associated with cyclic freedom of motion in longitudinal and/or lateral direction with loss of function of FTR switch and cyclic beep trim

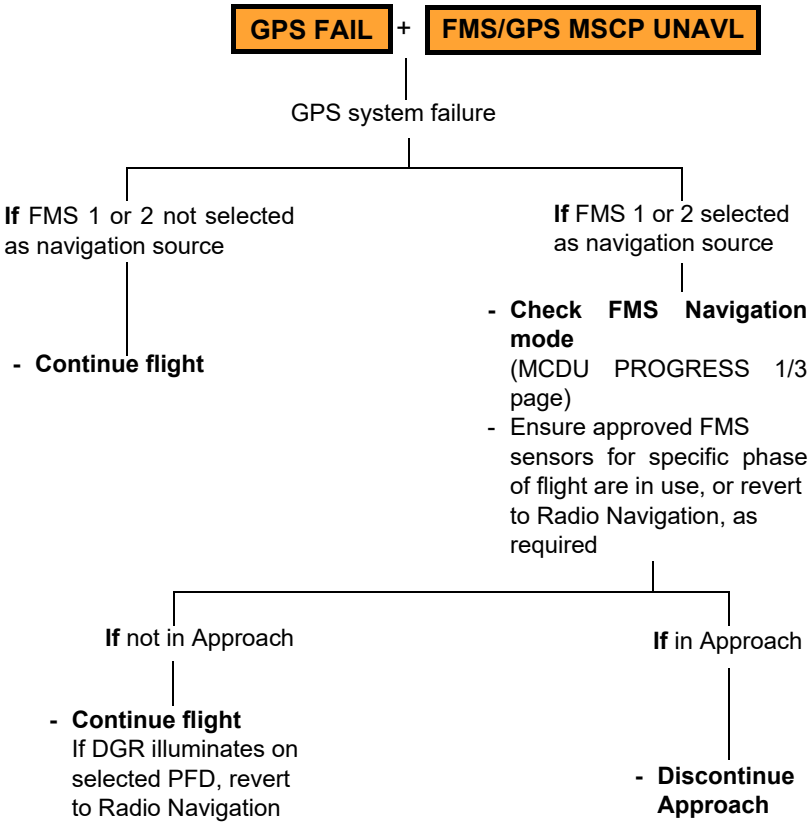
Cyclic force trim failure
Collective FD modes automatically change to uncoupled (with chime)
Cyclic FD modes do not function, cyclic steering bars remain centred

- Fly manually

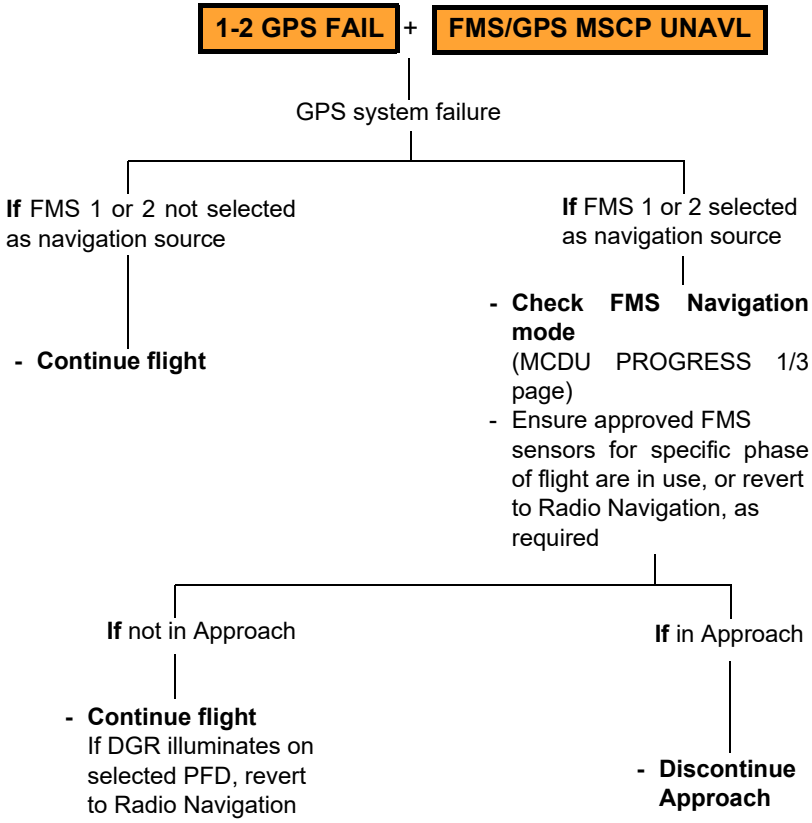
Note

With ATT system not engaged the aircraft flies in SAS mode only.

GPS FAILURE (SINGLE GPS INSTALLATION)



DOUBLE GPS FAILURE (DOUBLE GPS INSTALLATION)



GPS FAILURE (DOUBLE GPS INSTALLATION)

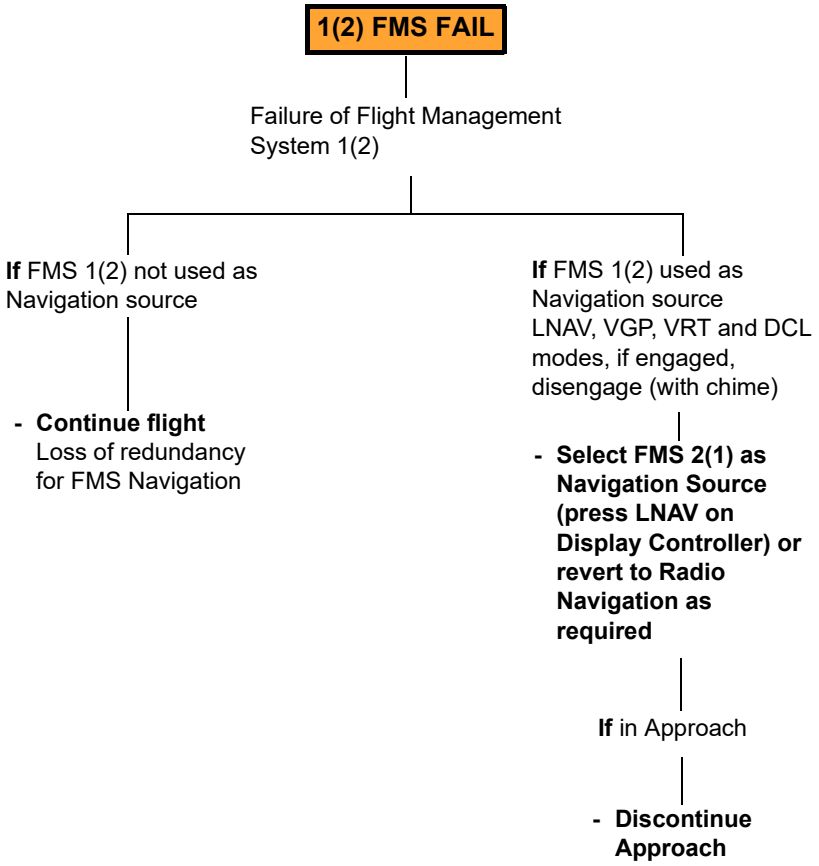
1(2) GPS FAIL

1(2) GPS system failure

Loss of GPS redundancy

- **Continue flight**

FMS FAILURE


1(2) FMS FAIL
Failure of Flight Management System 1(2)
If FMS 1(2) not used as Navigation source
- Continue flight
Loss of redundancy for FMS Navigation
If FMS 1(2) used as Navigation source
LNAV, VGP, VRT and DCL modes, if engaged, disengage (with chime)
- Select FMS 2(1) as Navigation Source (press LNAV on Display Controller) or revert to Radio Navigation as required
If in Approach
- Discontinue Approach

PFD MESSAGE
VERTICAL TRACK ALERT CAPTION:
FOR PHASE 5, 6 & 7



on attitude indicator during VGP mode approach, when within 100 ft above Missed Approach Point (MAP) altitude

The VGP will disengage, with chime, at MAP or transition to AVLV, if still engaged at 150 ft (46 m) AGL

CAUTION

- ALVL mode will not engage when MAP is above 150 ft (46 m) AGL
- VTA annunciation will not appear when MAP is below 50ft AGL due to engagement of ALVL at 150 ft AGL
- VTA annunciation is not available when 'MIN' annunciator is illuminated.

PHASE 8 AND LATER



on attitude indicator during VGP mode approach, when within 200 ft above Missed Approach Point (MAP) altitude

The VGP will disengage, with chime, at MAP or transition to AVLV, if still engaged at 150 ft (46 m) AGL

CAUTION

- ALVL mode will not engage when MAP is above 150 ft (46 m) AGL
- VTA annunciation is not available when 'MIN' annunciator is illuminated.

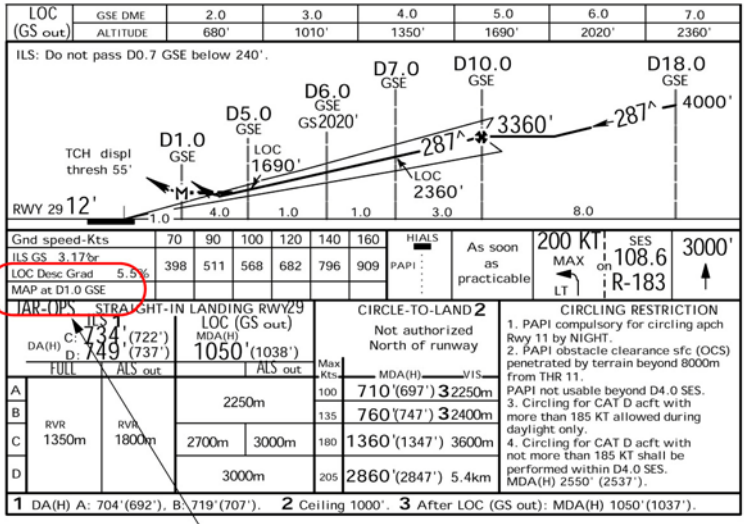


Figure 3-2 MAP Indication on Approach Chart

SINGLE RAD ALT FAILURE WITH RHT ENGAGED

RAD1(2) Message beside RAD ALT display.
on both PFD's

Rad Alt 2 (1) failed and automatic reconfiguration to functioning Rad Alt.
Message highlights both Rad Alt indicators are using the same source

- Continue flight attentive
Loss of Rad Alt redundancy
No effect on RHT functionality

CAUTION

When either RAD ALT fails, the LANDING GEAR CAS caution and associated audio message may activate erroneously when the aircraft is above 150 ft (46 m) AGL and the LDG GEAR is retracted.

DOUBLE RAD ALT FAILURE WITH RHT ENGAGED

RAD

Message replaces RAD ALT height information on both PFD's
RHT and VRT modes disengage with audio chime (if engaged)

Failure of both RAD ALT systems

- Continue flight

- RAD ALT functioning is lost
- RHT, VRT modes and ALVL not available
- Collective Safety Fly Up function not available
- MIN message is inactive
- 'CHECK HEIGHT' aural warning inactive

Note

If RHT mode engaged, ALT will automatically engage 5 seconds after RAD failure indication.

CAUTION

When both RAD ALT's fail, the 150 ft aural warning message does not function and the LANDING GEAR caution will be displayed if the LDG GEAR is retracted, regardless of height.

RAD ALT MISCOMPARE WITH RHT ENGAGED

RAD message on RAD ALT display
RHT, VRT disengage with audio chime (if engaged)

Miscompare between
RAD ALT 1 and 2 information.

- Compare the Pilot and Copilot RAD ALT indications and/or outside visual references to establish the correct data

- Continue flight
RHT, VRT modes and Safety Fly-Up function function not available while message displayed

HEIGHT LIMIT CAPTION

HTLM Message left of attitude indicator on both PFD's

Aircraft passed Safety Height
and/or Ultimate Fly Up Limit.
Safety Fly-Up function activated, if any collective mode engaged and coupled

- Monitor height
- Ensure separaton from terrain visually or, if not possible, establish a positive rate of climb to safe height

SECTION 4 - PERFORMANCE DATA

No change in performance information.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full details of FD operation and use see "PRIMUS EPIC Integrated Avionics and Flight Control System for the AW139 Helicopter - Pilot's Guide" latest issue and "FMS Pilot's Guide" latest issue.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 71

ICE PROTECTION SYSTEM (IPS)

P/N 4G3000F00211

FLIGHT IN ICING CONDITIONS

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SUPPLEMENT 71
ICE PROTECTION SYSTEM (IPS)
FLIGHT IN ICING CONDITIONS
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DEFINITIONS AND ABBREVIATIONS

— AC BUS : AC Bus Line

— AC GEN : Alternate Current Generator

— ATRU : Automatic Transformer Rectifier Unit

— AUW : All Up Weight

— ICB : IPS Control Box

— ID : Ice Detector

— IPS : Ice Protection System

— LWC : Liquid Water Content

— MRLD : Main Rotor Lower Distributor

— MR : Main Rotor

— MRUD : Main Rotor Upper Distributor

— MVD : Median Volumetric Droplet diameter

— SLD : Supercooled Large Droplets

— TR : Tail Rotor

— TRD : Tail Rotor Distributor

— TRLB : Tail Rotor Lighting Box

— V_{NE} Icing : Maximum Operating Speed in Icing Conditions

— W/S : WindShield

GENERAL INFORMATION

The IPS is designed to allow full icing operations by automatically de-icing MR blades and anti-icing TR blades. The functioning of the system is controlled automatically (with two independent Channels A and B) in relation to the severity of the icing conditions encountered at any time. An additional cockpit indicating panel shows the status of the IPS and additional IPS Master Warning and Caution lights (Figure 3) are provided for both pilot and co-pilot positions.

Main Rotor Ice Protection is provided by electrical heating of the MR blades (sequential heating of six leading edge zones along the blade span). Tail Rotor Ice Protection is provided by continuous heating of the leading edge of the four blades.

Electrical power is provided by two Main Gearbox mounted AC generators. Electrical power to the blades is controlled by a control box and distributed through distribution boxes and slip rings. Atmospheric information is provided to the control box by Outside Air Temperature Sensors and Ice Detectors sensors (Liquid Water Content - LWC). The Ice Detectors and windshield heating are active at all times with the IPS ON.

The MR de-icing system works in AUTO by allowing a small amount of ice to accrete on each leading edge zone and then sequential heating of each zone causes the ice to be shed. It is normal, therefore, to see an increase in torque required that will cycle up and down in accordance with the heating cycles. Part of the torque increase (2 – 3%) is due to the power required by the AC generators which also supply the TR anti-ice function when the IPS is set to AUTO mode.

The torque variation, due to ice, can be expected to be around 5 ÷ 15%, depending on OAT, LWC, and Water Droplet size (Mean Volumetric Diameter - MVD) when the system is working in icing conditions. Higher torque increase may be experienced in more severe icing conditions (higher LWC, larger MVD), but such conditions do not occur frequently in the atmosphere.

No rotor unbalance is to be expected as a consequence of ice shed, because of the symmetric 5 MR blades heating and the continuous TR blades heating.

Ice shedding from the MR will be experienced during system functioning in ice and this can occasionally be seen and heard, with small pieces of ice striking the windscreens.

With the IPS selected ON and in AUTO mode on the overhead panel (See Figure 1), an encounter with ice is indicated by the ICING caution illumination on the MFD CAS, when OAT is less than +4°C and LWC values being shown on the IPS Panel ICE SEVERITY window (See Figure 2). Icing is also indicated by a build up of ice on visible aircraft structure, e.g. unheated area of windscreens, wiper arms, SLD marker.

The SLD marker is a composite sphere, installed on the right side of the fuselage, in view of the pilot through the lateral screen. It is designed to help the pilot visually detect if SLD conditions are encountered. The sphere has a black central circle with yellow and red rings around it. Ice accretion can be easily seen on the black marker.

A MANUAL mode is provided, selectable by the pilot, that overrides the normal control system and applies the maximum possible heating to the MR blades.

Different types of ice will form on the aircraft depending on the icing conditions. The main types of ice are Glaze and Rime. Glaze ice is clear and will tend to form at higher sub-zero temperatures (0°C to -5°C) and is more likely with higher LWC and larger droplets. This type of ice can generate high drag increase to occur due to the shape that forms. Rime ice is white and opaque and tends to form at lower temperatures with smaller droplets. Rime ice forms in a more streamlined shape and causes a smaller increase in aircraft drag. It is possible to have a mixture of both, which is know as Glime or Mixed Ice.

Flight in Freezing Rain or Freezing Drizzle is not permitted because it is not covered by the current Airworthiness Rules for any type of aircraft. Freezing Rain and Drizzle (also known as Supercooled Large Droplets - SLD) consists of supercooled water droplets of sizes greater than the EASA/FAA CS/Part 29 Appendix C, atmospheric definition used for Certification. These conditions, although rare, have a serious effect on any aircraft's performance. Pilots must use normal operational planning and techniques to avoid flight in these conditions. If encountered inadvertently, the conditions must be vacated immediately.

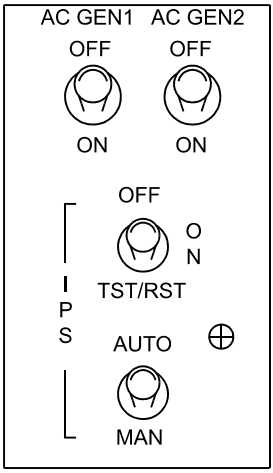

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Figure 1 IPS Switches on Overhead Panel

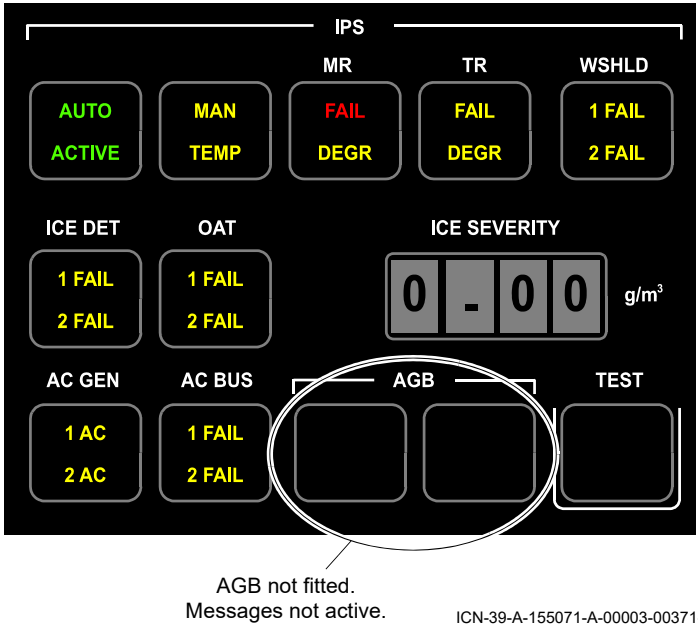

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Figure 2 IPS Panel

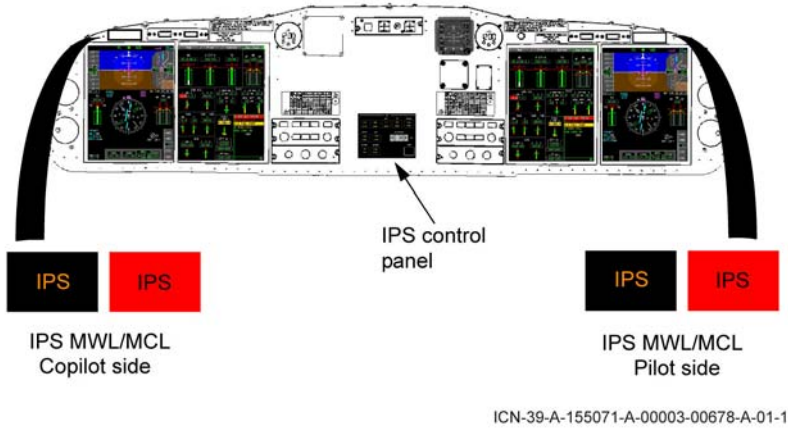

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Figure 3 IPS Warning and Caution Panel Position

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SECTION 1 LIMITATIONS

GENERAL

All other Limitations as stated in RFM for VFR/IFR operations, Supplement 22
Single Pilot IFR, Supplement 24 for VFR Night Single Pilot Operations, Supplement 12 for Category A Operations and Supplement 50 for Increased Gross Weight 6800 kg are applicable.

Operations in Icing Conditions are only permitted if the helicopter configuration is in accordance with the document 139G3000A001 AW139 Icing Compatibility Reference Handbook. Any change to the aircraft configuration which effect icing and not included in this document, makes the aircraft NOT ICING COMPATIBLE and operations in Icing conditions are not permitted.

TYPE OF OPERATIONS

Instrument Flight Rules (IFR) Day/Night in known icing conditions

REQUIRED EQUIPMENT

For Operations in Icing conditions the following are to be installed:

— Ice Protection System P/N 4G3000F00211

— Primus EPIC SW release 5.6 or higher versions.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the IPS Kit, the new empty weight and center of gravity position must be determined.

Category A Weight Limitations

For Category A Operations, Supplement 12 and 50, weight limitations and procedures remain unchanged in icing conditions.

AIRSPEED LIMITATIONS

V_{NE} Icing ..... Figure 1-1
Maximum airspeed in icing conditions with IPS failed ..... 80 KIAS

CAUTION

With the IPS failed the icing condition must be vacated as soon as possible. See relevant Emergency Procedure in Section 3 of this Supplement.

ALTITUDE AND TEMPERATURE LIMITATIONS

Altitude and temperature limitations for icing conditions .....Figure 1-2

MISCELLANEOUS LIMITATIONS

Rate Of Descent

Maximum Rate of descent in icing conditions ..... 1000 fpm (or after icing encountered if ice is still present on the aircraft)

Freezing Rain / Freezing Drizzle / Supercooled Large Droplets (SLD)

Flight in known Freezing Rain, Freezing Drizzle or SLD conditions is prohibited.

In case of an encounter with Freezing Rain, Freezing Drizzle or SLD conditions, take immediate action to vacate the flight conditions.

BAGGAGE BAY LIMITATION

Refer to the appropriate Supplement for configuration installed:

— Supplement 31 Increased Baggage Compartment Load P/N 3G2550F00113;

— Supplement 54 Full Cabin Extension P/N 4G5340F00111;

— Supplement 65 Cabin Compartment Extension with Longitudinal Auxiliary Fuel Tank P/N 4G2800F00111;

— Supplement 75 Baggage Barrier Net Installation P/N 4G2550F00311.

AIRSPEED LIMITATION FOR ICING CONDITIONS

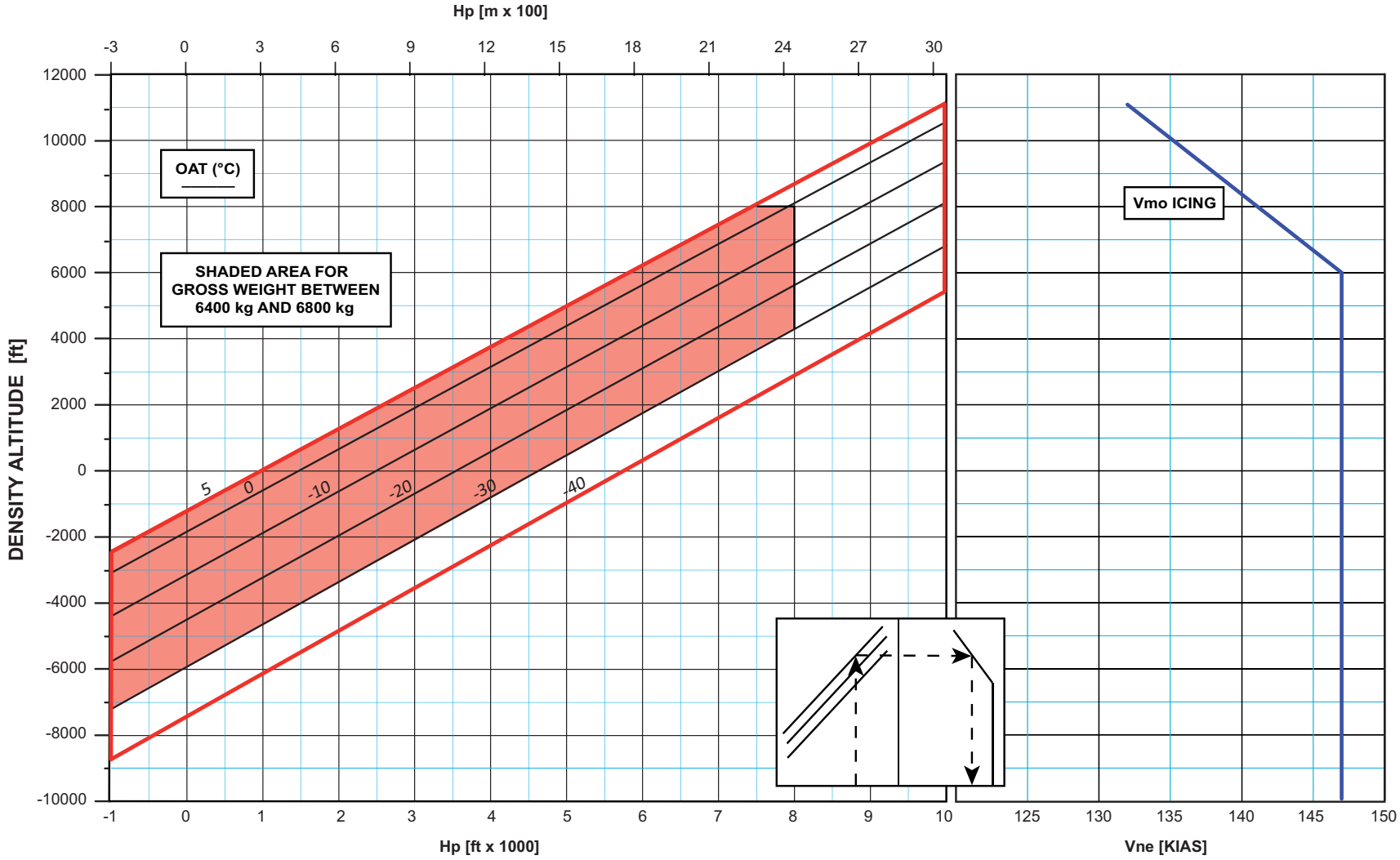

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Figure 1-1 Airspeed Limitations for Icing Conditions

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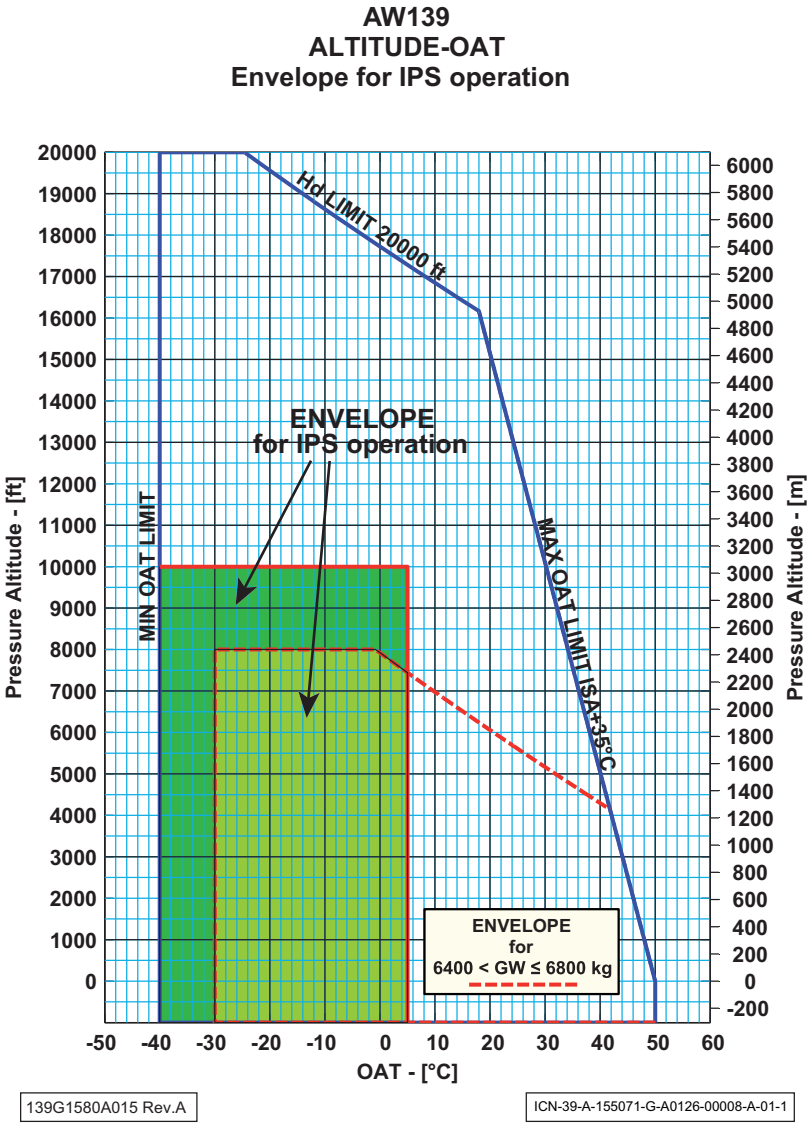
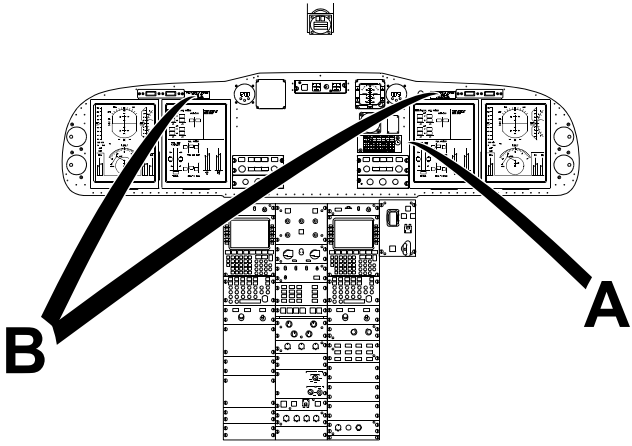


Figure 1-2 Altitude Temperature Limitations for IPS Operation

PLACARDS



VIEW OF COCKPIT WITH PLACARD POSITIONS

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A

VNE POWER ON AIRSPEED LIMITATION KIAS						
Hp ft / OAT °C	-1000 to SL	4000	8000	10000	15000	20000
50	160	-	-	-	-	-
20	167	157	145	147	128	-
10	167	159	147	151	133	-
0	167	162	150	156	136	-
-10	167	164	154	159	139	-
-25 AND BELOW	167	167	158	165	144	125
VNE OEI/PWR OFF=VNE PWR ON LESS 20 KIAS					V_{LE}/V_{LO}=150 KIAS	
VNE ICING = VNE PWR ON LESS 20 KIAS						

B

APPROVED TYPES OF OPERATION
• DAY/NIGHT VFR
• DAY/NIGHT IFR IN ICING CONDITIONS
• FLT IN FREEZING RN/DZ OR SLD PROHIBITED

Installed on the instrument panel when the aircraft configuration complies with document 139G3000A001

APPROVED TYPES OF OPERATION

DAY/NIGHT VFR
DAY/NIGHT IFR

ICING PROHIBITED

Installed on the instrument panel when the configuration of IPS does not comply with document 139G3000A001

SECTION 2 - NORMAL PROCEDURES

GENERAL

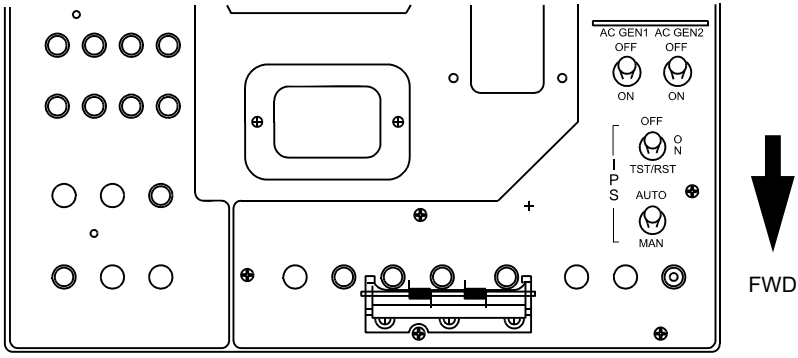

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Figure 2-1 AC Gen and IPS Switches on Overhead DC Generator Panel

When known icing conditions are expected to be encountered during the planned flight, periodically check OAT indications in the cockpit (PFD & OAT back-up sensor).

Pilot shall check AC GEN1 and AC GEN2 are ON, switch the IPS ON, and IPS AUTO/MAN switch is in AUTO mode, when at least one of the following are present:

- ICING Caution is displayed on MFD.
- 1 PITOT HEAT OFF and/or 2 PITOT HEAT OFF caution is displayed on MFD.
- OAT is +4° C or less on one of the OAT indications in the cockpit.

Note

The following natural visual cues shall also be taken in account:

- Ice accretion on SLD marker is detected
- Ice accretion on windshield and/or windshield wipers is detected.
- Conditions of visible moisture are encountered.

LIST OF ADVISORIES ON IPS PANEL

Caption (Green)	Condition
	Displayed when the IPS system is set to AUTO and WSHLD 1 and 2 and ICE DETECT 1 and 2 are heated.
	Displayed when the system is set to ON and blades are heated.

EXTERIOR CHECKS

1. Ice detectors — Condition.
2. OAT sensors — Condition.
3. MR IPS cables and harnesses — Condition and security.
4. TR IPS cables and harnesses — Condition and security.
5. MR & TR blades — Check free of ice and snow.
6. Engine Intakes — Check free of ice and snow, and for any possible accumulations inside the intake screens.
7. All fuselage upper surfaces — Check free of ice, slush and snow.

CAUTION

A/C should not be started until free of ice.
The applicable de-ice procedure is detailed in the Maintenance Manual.

BEFORE ENGINES START

1. AC GEN1 & AC GEN2 — Check OFF.
2. IPS ON/OFF switch — Check OFF.
3. IPS AUTO/MAN switch — Check AUTO.

CAUTION

When no ice is expected along the route the IPS and AC GEN 1 & 2 switches should be set to OFF and the IPS ground test is not required.

AFTER ENGINES START

1.	NR	— Confirm 100%.
2.	AC GEN1 & AC GEN2 switches	— Select both ON simultaneously, (within 2 seconds of each other).
3.	IPS ON/OFF switch	— Select ON.
4.	IPS AUTO/MAN switch	— Check AUTO.
5.	IPS Panel	— Check “0.00” displayed on ICE SEVERITY window. Status caption “AUTO” illuminated (approximately 5 seconds after selecting ON).
6.	IPS Panel	— 15 seconds after IPS ON/OFF switch selected ON, press TEST and confirm: • all captions on panel, IPS MWL/MCL, ICING and MCL illuminate twice. • audio ‘WARNING WARNING’ is heard twice. • ICE SEVERITY display shows ####.
7.	IPS Panel	— Confirm no cautions. The test is completed, after approximately 12 seconds, when green AUTO is displayed and ICE SEVERITY display shows “**0.00**“.
8.	IPS ON/OFF switch	— Select TST/RST and release to initiate test , confirm: “**TEST**“ is displayed on IPS panel, for approximately 25 seconds.

Note

If the TST/RST is selected within 3 minutes of selecting the IPS ON spurious ICE DET FAIL cautions may appear. In this case wait 2 minutes and repeat the TST/RST selection.

9. IPS Panel — Confirm no cautions. The test is completed when green AUTO is displayed and ICE SEVERITY display shows "**0.00**".

Note

Monitor IPS panel during test. If any of the following error codes replace TEST in the ICE SEVERITY window at the end of the test, the IPS is unserviceable:

CH A
CH B
BOUT

Do not commence flight in icing.

A **CHK** code indicates a loss of redundancy, flight in icing may be commenced.

PRE-TAKE OFF CHECKS

1. AC GEN 1& AC GEN 2 switches — As required.
2. IPS ON/OFF switch — As required.
3. IPS AUTO/MAN switch — Check AUTO.

Note

If operating in an icing environment on ground (i.e. freezing fog) select MAN mode momentary, for a 90 second cycle, prior to Take-Off

IN FLIGHT PROCEDURES

Note

When OAT is 4° C or below and/or icing conditions are expected along the flight route and/or when visible moisture condition are encountered and/or ice accretion is detected during flight, select AC GEN1 & AC GEN2 ON, IPS ON/OFF switch ON, and IPS AUTO/MAN switch AUTO.

1. AC GEN1 & AC GEN2 switches — As required.
2. IPS ON/OFF switch — As required.
3. IPS AUTO/MAN switch — Check AUTO.

Note

With the IPS system selected ON and in AUTO mode, entering icing conditions will result in illumination of the “ICING” caution for 5 seconds on the CAS. The indication of “ICE SEVERITY” and the “ACTIVE” status caption will illuminate on the IPS panel

Note

When entering icing conditions a maximum airspeed of 120 KIAS is recommended until the severity of the icing conditions is established.

Note

In cruise when ALT and IAS modes are engaged, if PI limiting is active the airspeed will automatically reduce to maintain altitude.

Note

The maximum power increase that the pilot could expect is 15% PI.

Note

Monitoring PI variation, IAS, OAT, LWC, ice accretion type (on visible structure and SLD Marker), amount of water streaming on the heated windscreen will all give good cues to the severity of the icing conditions.

Note

In case of delayed IPS activation due to system failures or misleading indications, if PI indications remain high in AUTO mode, set to MAN mode until PI indications return to normal values.

APPROACH

PRE-LANDING CHECKS

1. At 1000 ft AGL — If icing conditions are present IPS AUTO/MAN switch select AUTO - MAN - AUTO.

Note

A momentary selection of MAN mode will ensure a complete MR blade heating cycle of 90 seconds.

2. AC GEN1 & AC GEN2 switches — As required.
3. IPS ON/OFF switch — As required.
4. IPS AUTO/MAN switch — Confirm AUTO.

POST LANDING CHECKS

1. IPS ON/OFF switch — Select OFF.
2. IPS AUTO/MAN switch — Confirm AUTO.
3. AC GEN1 & AC GEN2 switches — Select OFF.

CAUTION

Following flight in icing conditions, the pilot should warn personnel outside the A/C and/or crew members and passengers disembarking of the possibility of shed ice from the rotors and/or other parts of the helicopter, which could be hazardous. Personnel should remain clear of the aircraft until the rotors have stopped.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The IPS is designed to maintain the maximum functionality in the event of failures. In some cases, failures will simply be a loss of system redundancy, in other cases some loss of rotor heating capability will occur.

Failures are of four main groups:

- Main Rotor Critical Zone Heating Failures
- Main Rotor Non-Critical Zone Heating Failures
- Tail Rotor heating failures
- Sensor Failures.

The IPS Critical Zones are the three main rotor blade leading edge zones, which are heated by dual power supplies and have duplicated control systems. Failure of any of these zones causes the MR FAIL warning to be displayed on the IPS panel and this indicates a complete loss of main rotor heating (Critical and Non Critical Zones). In case of MR FAIL (critical zone failure) also the TR heating is lost. In these cases, depending on the severity of the icing conditions, torque and vibration can increase quickly resulting in the need to vacate icing conditions as soon as possible.

The IPS Non-Critical Zones are the three main rotor blade zones aft of the leading edge critical zones. These zones are less likely to experience significant ice accretions and their failure results in the MR DEGRADE caution to be displayed on the IPS panel. Depending on the severity of the icing conditions, torque and vibration can increase. The need to vacate icing conditions may be less urgent, but should be considered as the consequence of subsequent failures is more severe (loss of redundancy). The non-critical zones have single power supply and single control systems.

The Tail Rotor heating is connected in pairs of opposing blades so it is possible to have either pair of blades suffering a loss of heating, or all four blades together. In the first case TR DEGRADE amber caution is given, while in the second case the TR FAIL amber caution, both are

displayed on the IPS panel. Loss of TR heating is not critical, but can result in a noticeable increase in TR vibration due to asymmetric shedding of ice accumulations (normally after prolonged flight in icing). These vibrations are not damaging to the aircraft and continued flight in icing is possible. After TR heating failure in icing, the vibration can increase even after having left icing conditions, due to the natural shedding that occurs resulting in TR imbalance.

Loss of 1 ICE DET sensor and/or 1 OAT sensor is only a loss of system redundancy with no effect on system functionality.

A double OAT sensor failure will also cause a loss of both ICE DET sensors.

In the event of double sensor failures, the IPS uses default values (0.8 g/m^3 LWC for double ice detector failure and/or -12° C for double OAT sensor failure), in which case the IPS cycling may not match the actual atmospheric conditions. This can result in a larger than normal MR blade ice accretion if the LWC is higher or air temperature lower than the default value, giving higher PI rise and possible larger PI cycles due to less than normal heating for the actual conditions. Conversely, if the air temperature is higher, or the LWC lower than the default values, greater than normal ice melting due to more than normal heating for the actual conditions can cause water to re-freeze at the rear edge of the heated area. This is 'run-back' ice and can cause a steady (non-cycling) increase in PI values. Resetting of the IPS in case of a double ICE DET and/or double OAT and/or double WSHLD sensor failure can be beneficial to recover the system functionality.

If exceptionally severe icing conditions are encountered (including SLD) with or without failures, speed can be reduced to 80 KIAS and up to 110% PI used until the severity of the conditions reduces or icing is vacated.

IPS Manual Mode is provided. Selecting MAN mode overrides the normal control system and applies maximum heating to the MR. MAN mode is used during some failure drills and is available for use if the icing conditions indicate the need for more MR heating than provided by the system in AUTO mode. Care should be taken in using MAN mode as excessive heating for long periods can result in runback ice.

There are two phenomenons, related to the MR blades that can be, in some cases, experienced when flying in ice: “high accretion of ice” and “runback ice”.

The first may occur when the IPS is functioning in “default” mode, using OAT and/or LWC default values and these give a heating schedule, compared with the outside ice conditions, that is not completely deicing the MR blades (less heating) and ice could accrete on the MR blades

The second one could be related to the failure of the “non critical” zones or to the selection of the MAN mode or when the default values give heating schedule higher than the ambient conditions require.

In this case the system is heating not the entire blade zones, but only the “nose” ones or it is heating too much.

This situation leads to a overheating of the blades so ice is not broken and shed but melted, and water travels back on the blade until it freezes again on the cold zones of the blade downstream, giving a steadily PI rise.

Both cases will give a steady increase in PI, sometime associated with asymmetrical shedding and increase in vibrations (i.e. instruments difficult to read).

The pilot should be aware that, in case of default mode functioning of IPS, he has to closely monitor PI, OAT, A/C vibrations and SLD marker, which is to be monitored to understand the type of ice encountered.

Switching OFF then ON the IPS the electrical power is removed for about 15 seconds. During this period all the de-icing functions are not available. If flying in ice the parts of the helicopter not heated will continue to accumulate ice.

All failures that can affect the IPS trigger either the IPS red Master Warning Light (IPS MWL) or the IPS amber Master Caution lights (IPS MCL) See Figure 3-1. These 2 additional attention getters are positioned on the instrument panel beside the main MWL, MCL in front of the pilot and copilot positions.

When either IPS MWL or IPS MCL are turned ON, a specific Warning or Caution caption is activated on the IPS.

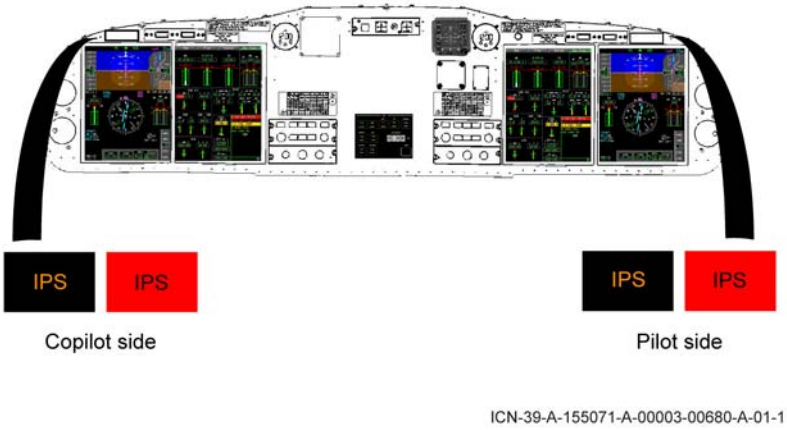


Figure 3-1 IPS Master Warning and Caution Lights

Note

Pilot reaction to CAS Master Warning/Caution lights shall have priority over IPS Master Warning/Caution lights.

PILOT ACTIONS IN CASE OF SEVERE ICE ENCOUNTERS

Severe icing conditions are indicated by some or all of the following:

- High PI rise (>30% above normal for flight condition)
- Steady increase in base PI with heating cycles
- High LWC (>1.5 g/m^3)
- Heavy amounts of water streaming across windscreens
- Evidence of SLD (ice forming on sides of aircraft, SLD Marker)
- Increase in vibration
- Tendency for significant speed loss.

Actions:

- Reduce speed to 80 KIAS
- Select 102% NR
- Use up to 110% PI
- Check for system failures
- Select MAN
  - if PI reduces Select AUTO, and use MANUAL to reduce subsequent PI rise.
  - if PI does not reduce, or rises steadily, select AUTO and do not select MAN again (possible runback ice)
- Change altitude – severe ice conditions are usually near the top of the clouds
- Consider vacating icing conditions if severity does not reduce

TABLE OF CAS CAUTIONS

CAS Caption on MFD	Page	Failure/System State
ICING	30	Displayed when: IPS set to OFF and OAT less than or equal to +4° C. – **OR -** Displayed for 5 seconds when the IPS system set to ON and ice detected from at least one Ice detector.

TABLE OF IPS PANEL CAPTIONS

Caption	Page	Audio Tone	Condition
	31	Tone	Displayed when the MR de-ice system has “failed”.
	32	None	Displayed when the MR de-ice system is degraded.
	31 36	None	Displayed when the TR anti-ice system is “failed”.

Caption	Page	Audio Tone	Condition
	36	None	Displayed when the TR anti-ice system is degraded.
	37 38 40	None	AC GEN1 (45 KVA) is off-line when selected ON.
	39 41	None	AC GEN2 (25 KVA) is off-line when selected ON.
	32	None	Both AC GEN1 (45 KVA) and AC GEN2 (25 KVA) are off-line when selected ON.
	33 40 41	None	Associated AC BUS off-line when the associated GEN is selected ON.
	41 42	None	Associated Ice Detector sensor failed

Caption	Page	Audio Tone	Condition
	43 44	None	Associated OAT is not available to IPS
	45	None	Associated Windshield heating element failed. (#1Copilot, #2 Pilot)
	47	None	Displayed when the system is set to MAN (LWC = 1.5 g/m³, OAT = -23° C).
	46	None	Displayed when the IPS is set to MAN and the OAT is > +4° C.
For loss of DC MAIN BUS 1 refer to page 33			

Ice Severity Indicator Display			
—,— —	48	None	Displayed when both ICE DETECTORS's have failed.
BOUT	48	None	Displayed when ICB Ch.B failed.
CH A	48	None	Displayed when panel channel A failed.
CH B	48	None	Displayed when panel channel B failed.

Caption	Page	Audio Tone	Condition
CHK	48	None	Loss of redundancy on W/S and/or TR temperature sensors.
DATA	50	None	Displayed when ICB is not transmitting data to the IPS panel.

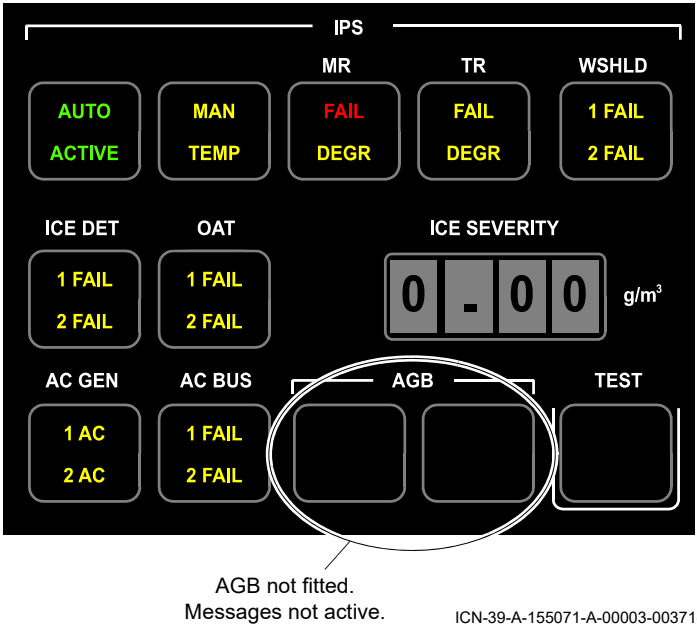
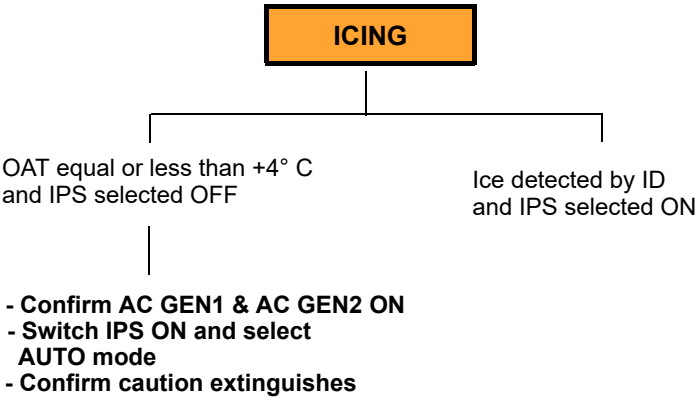


Figure 3-2 IPS Panel

CAS CAUTION (ON MFD)

ICING CONDITIONS



IPS PANEL – WARNINGS AND CAUTIONS

MAIN AND TAIL ROTOR HEATING FAILURE



+



+ aural message
"Warning – Warning"

Loss of MR heating and TR heating

- **If** 1 AC & 2 AC generator messages displayed refer to procedure on page S71-32A

- **If** 1 AC & 2 AC generator messages NOT displayed

CAUTION

Do NOT attempt a system TST/RST or select OFF/ON

- **Reduce speed to 80 KIAS**
- **Vacate the icing condition as soon as possible.** Aircraft may experience ani increase in vibrations.
- **Monitor PI, A/C vibrations. Maintain 80 KIAS until clear evidence indicates all ice accretions have been shed from MR and TR blades**

MAIN ROTOR HEATING DEGRADED



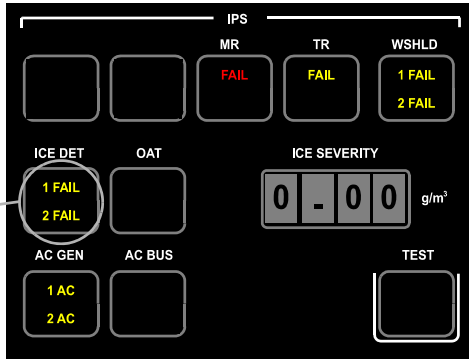
Loss of MR non critical zones heating

CAUTION

Do NOT attempt a system TST/RST or select OFF/ON

- **Vacate the icing condition as soon as practicable**
  Aircraft may experience an increase in MR 1xRev vibrations
- **Monitor PI, A/C vibrations and SLD marker**

DOUBLE AC GENERATOR FAILURE



\+

Aural message "Warning – Warning"

Double AC GEN failure

- **AC GEN 1 & 2 switches, select OFF then ON**
- **Switch the IPS to OFF, wait approximately 2 seconds, then to ON.**

If cautions extinguishes

- **Continue flight**

If cautions remain illuminated

- **Switch IPS OFF**
- **Switch AC GEN 1 & 2 OFF**
- **Reduce speed to 80 KIAS**
- **Vacate the icing condition as soon as possible**
- **Monitor PI, A/C vibrations. Maintain 80 KIAS until clear evidence indicates all ice accretions have been shed from MR and TR blades**

If



remains

- **Switch AC GEN 1 OFF**
- **Vacate the icing condition as soon as practicable**

If



remains

- **Switch AC GEN 2 OFF**
- **Continue flight** (Loss of IPS redundancy)

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DOUBLE DC GENERATOR FAILURE

The following assumes the DC BUS FAIL procedures, presented in Section 3 of the Basic Manual, have been followed and MAIN BUS 1 is confirmed as lost:



Loss of system redundancy

- Continue flight

SERVICES AVAILABLE ON ESSENTIAL BUS 1 AND 2 (IPS CONFIGURATION))

DC ESS BUS 1

BAGGAGE FIRE DETECT
BUS CONTROL 1
EAPS 1
EEC 1
EEC 1 FAIL INDICATION
EMERG LIGHT
EMERG FLOAT CONTROL (MANUAL)
EMERG FLOAT POWER
ENG 1 FIRE DETECTION
ENG 1 FIRE EXTINGUISHER
ENG 1 IGNITER & START
FCU 1
FDR/CVR
FUEL PUMP 1
FUEL SHUT OFF VALVE 1
FORCE TRIM
GCU 2
ENG GOV CONTROL
HYD SYS 1 & SOV 1&2
ICS PLT (PLT ICS IN BKUP MODE)
LANDING LIGHT CONTROL
LANDING LIGHT POWER
LDG GEAR CONTROL
LDG GEAR INDICATION
MAIN BATT CHARGE
MAU 2 (PRI POWER)
MRC 1 (VHF 1)
MRC 2 (XPDR)
NLG STEERING LOCK
PLT MFD
STBY 1 ATT
TAIL POS LIGHT
TRANS CHIP BURNER

DC ESS BUS 2

ADM 2
AUTO FLOAT CONTROL
AUX BATT CHARGE
BUS CONTROL 2
CARGO HOOK EMERG RELEASE
CLOCK PLT
COCKPIT PLT LIGHT
EAPS 2
EEC2
EEC 2 FAIL INDICATION
ELT
ENG 2 FIRE DETECTION
ENG 2 FIRE EXTINGUISHER
ENG 2 IGNITER & START
EXT SPKR CONTROL
FADEC GSE
FCU 2
FUEL PUMP 2
FUEL SHUT OFF VALVE 2
FUEL X FEED
GCU 1
HOIST CUTTER 2
HOIST ICS OPERATOR
HYD SYS 2
INSTRUMENT PANEL ILLUM.
LDG GEAR EMERG DOWN
LINEAR ACTUATOR 2
MAU 2 (AUX POWER)
MRC 2 (NIM2, VHF2, NAV2)
PFD PLT CONTROL
PITOT 2 FAIL INDICATION
PITOT 2 HEAT
PLT PFD
RTR BRK

On IPS C/B panel

TRD CH-A CONTROL
MRLD CH-A CONTROL
ICB CH-A CONTROL
IPS CKPT PNL CH-A
WSHLD PLT CONTROL
ICE DET 2 CONTROL
GCU 1 POWER

SERVICES LOST DURING BUS FAILURES (IPS CONFIGURATION)

DC MAIN BUS 1

ADM 1
ANTI-COLL LIGHT
CARGO HOOK RELEASE
CLOCK CPLT
COCKPIT CPLT LIGHT
CPLT ICS
(CPLT ICS in back up mode)
CPLT PFD
CSL ILLUM
FD1
HOIST POWER
HOIST CUTTER 1
HOIST CONTROL
HUMS
HYD ELEC PUMP
LINEAR ACTUATOR 1
MAU1 (PRI POWER)
MCDU PLT
MRC 1 (NIM 1, NAV 1)
OVHD PANEL ILLUM
PA
PFD CPLT CONTROL
PITOT 1 FAIL INDICATION
PITOT HEAT 1
RAD ALT 1
UTIL POWER
W/RADAR
XMSN OIL LEVEL SENSOR

On IPS C/B panel

TRD CH-B CONTROL
MRLD CH-B CONTROL
ICB CH-B CONTROL
IPS CKPT PNL CH-B
WSHLD CPLT CONTROL
ICE DET 1 CONTROL
GCU 2 POWER

DC MAIN BUS 2

AUTO TRIM
BAGGAGE COMPT LIGHT
CABIN LIGHT
COCKPIT/CABIN HEATER
COCKPIT VENT (PLT)
CPLT MFD
DOME LIGHT
FD2
HOIST LIGHT
MAU 1 (AUX POWER)
MCDU CPLT
MRC 2 (ADF & DME)
PLT W/WIPER
PSU
RAD ALT 2
SEARCH LIGHT CONTROL
SEARCH LIGHT POWER
STORM LIGHT
SUN LIGHT CONTROL
VENT CONTROL 2
V/UHF

DC NON ESS BUS 1

CABIN VENT
COCKPIT VENT (CPLT)
CPLT W/WIPE
ECS (COCKPIT)
FUEL DRAIN VALVE
STEP LIGHT
NOSE BAY FAN 1*

DC NON ESS BUS 2

ECS (CABIN)
EXT/SPKR POWER
NOSE BAY FAN 1*

* NOSE BAY FANS for Long Nose Variant only (function on ground only).

TAIL ROTOR HEATING DEGRADED



Loss of TR blade pair heating

CAUTION

Do NOT attempt a system TST/RST or select OFF/ON

- **Continue flight**
  Aircraft may experience an increase in TR 1xRev vibrations.
- **Monitor PI, A/C vibrations and SLD marker.**

TAIL ROTOR HEATING FAILURE



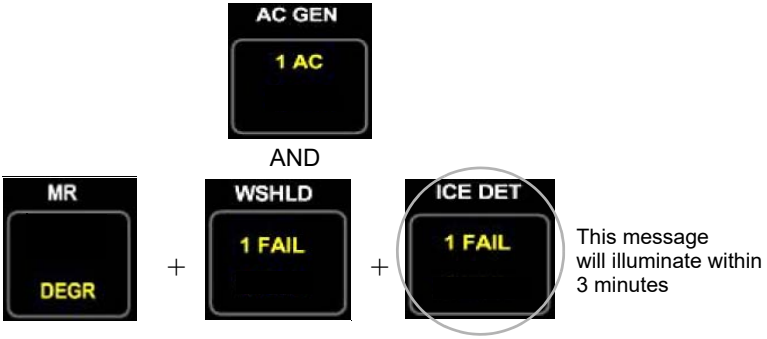
Loss of TR blades heating.

CAUTION

Do NOT attempt a system TST/RST or select OFF/ON

- **Vacate the icing condition as soon as practicable**
  Aircraft may experience an increase in vibrations
- **Monitor PI, A/C vibrations and SLD marker**

AC GENERATOR 1 FAILURE



AC GEN 1 failure

- AC GEN 1 switch, select OFF then ON
- Switch the IPS to OFF, wait approximately 2 seconds, then to ON.

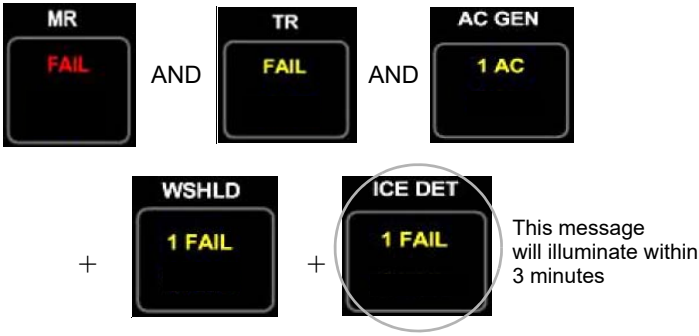
If cautions extinguishes

- Continue flight

If cautions remain illuminated

- Switch AC GEN 1 OFF
- Vacate the icing condition as soon as practicable

AC GENERATOR 1 FAILURE AFTER "BOUT" DISPLAYED



Aural message "Warning – Warning"

AC GEN 1 failure after "BOUT" displayed

- **AC GEN 1 switch, select OFF then ON**
- **Switch IPS to OFF, wait approximately 2 seconds, then ON**

If warning / cautions extinguish

- **Vacate the icing condition as soon as practicable**

If warning / cautions remain illuminated

- **Switch IPS OFF**
- **Switch AC GEN 1 & 2 OFF**
- **Reduce speed to 80 KIAS**
- **Vacate the icing condition as soon as possible**
- **Monitor PI, A/C vibrations. Maintain 80 KIAS until clear evidence indicates all ice accretions have been shed from MR and TR blades**

AC GENERATOR 2 FAILURE



AC GEN 2 failure

When conditions permit

- **AC GEN2 switch, select OFF then ON**
- **Switch the IPS to OFF, wait approximately 2 seconds, then ON.**

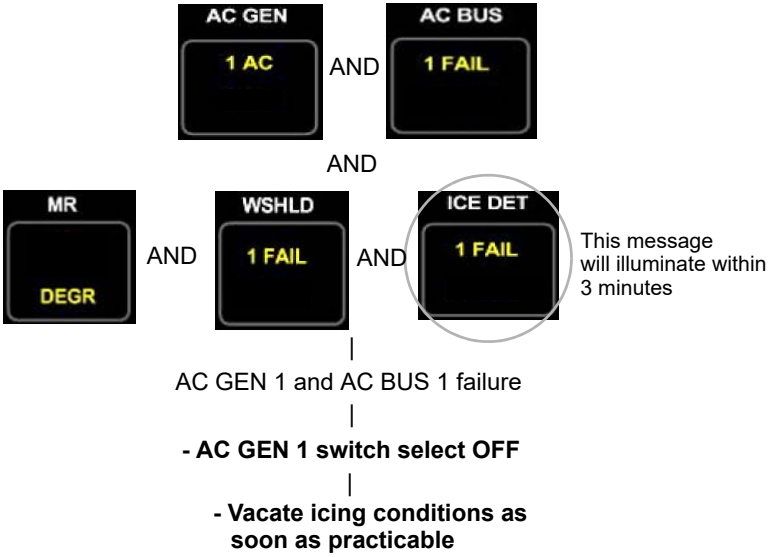
If caution extinguishes

- **Continue flight**

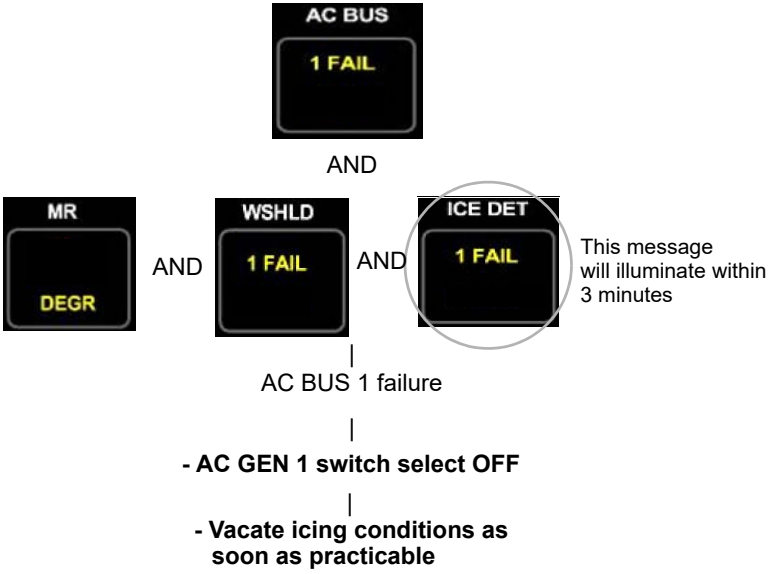
If caution remains illuminated

- **Switch AC GEN 2 OFF**
- **Continue flight**
  (Loss of IPS redundancy)

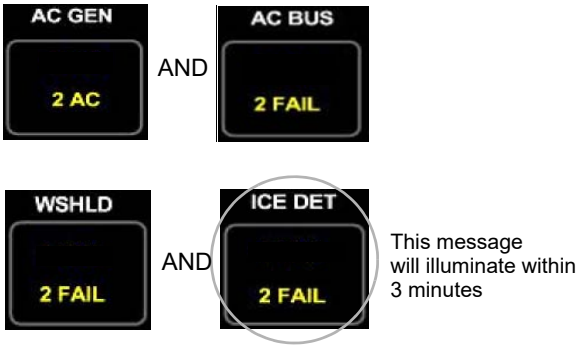
AC GENERATOR 1 AND AC BUS 1 FAILURE



AC BUS 1 FAILURE



AC GENERATOR 2 AND AC BUS 2 FAILURE



AC GEN 2 and AC BUS 2 failure

|

- AC GEN 2 switch select OFF

|

- Continue flight
(Loss of IPS redundancy)

AC BUS 2 FAILURE



AC BUS 2 failure

|

- AC GEN 2 switch select OFF

|

- Continue flight
(Loss of IPS redundancy)

AC SHED BUS 1 FAILURE



AC SHED BUS 1 failure
(ATRU 1 lost)

- Vacate icing conditions as soon as practicable
(Loss of ATRU redundancy
Loss of non critical zones)

AC SHED BUS 2 FAILURE



AC SHED BUS 2 failure
(ATRU 2 lost)

- Continue flight
(Loss of ATRU redundancy)

SINGLE ICE DETECTOR FAILURE



Ice Detector N°1 failed

- Continue flight

or



Ice Detector N°2 failed

- Continue flight

DOUBLE ICE DETECTOR FAILURE



\+ —,— — displayed on IPS ICE SEVERITY window

Both Ice Detectors failed

- Switch IPS to OFF, wait approximately 2 seconds then switch ON

If cautions do not extinguish
the system continues to function
using a default LWC value of 0.8 g/m³

- Continue flight, monitoring the SLD marker for type of ice being encountered and A/C vibrations. Consider use of IPS MAN mode
page 47

If PI and A/C vibrations return to normal values

- Select IPS AUTO/MAN switch to AUTO mode

- Consider whether to vacate icing conditions.

SINGLE OAT SENSOR FAILURE



or



OAT N°1 signal failure to IPS

- Continue flight

OAT N°2 signal failure to IPS

- Continue flight

DOUBLE OAT SENSOR FAILURE



AND



\+ —,— — displayed on IPS ICE SEVERITY window

Failure of both OAT signals to IPS and consequent loss of Ice Detectors

- Switch IPS to OFF, wait approximately 2 seconds then switch ON

If cautions do not extinguish the system continues to function using a default OAT of -12° C and LWC of 0.8 g/m^3

- Continue flight, monitoring OAT on Standby instrument and SLD accretion for type of ice being accreted and A/C vibrations. Consider use of IPS MAN mode **page 47**

If PI and A/C vibrations return to normal values

- Select IPS AUTO/MAN switch to AUTO mode

- Consider whether to vacate icing conditions

SINGLE WINDSHIELD HEATER FAILURE



or



Copilot windshield heater failure

- Continue flight

Pilot windshield heater failure

- Continue flight

DOUBLE WINDSHIELD HEATER FAILURE



Pilot and copilot windshield heater failure

- Switch IPS to OFF, wait approximately 2 seconds then switch ON

If cautions do not extinguish

- Continue flight
Exit icing conditions if visibility through windscreen unacceptable. If forward visibility severly degraded, consider opening the storm window to enhance vision for landing

IPS TEMP CAPTION



IPS mode switched to MAN
and OAT greater than +4° C

- Check if the ambient conditions require the IPS MAN mode
If not, switch IPS to AUTO or OFF

- If message extinguishes

- Continue flight

- If message remains

- Switch IPS OFF
- Switch AC GEN 1 & 2 OFF

- Continue flight
- Operation in icing conditions is not permitted

CAUTION

Use of IPS in Manual mode above +4° C could damage the blades.

USE OF IPS MAN MODE



IPS mode switched to MAN

- Continue flight

CAUTION

Use of IPS in Manual mode above +4° C could damage the blades.

CAUTION

Pilot should be aware that a prolonged use of IPS in Manual Mode can cause “runback ice”, which can give steady torque rise. In this case reduce speed to 80 KIAS and vacate icing condition as soon as possible.
Monitor PI, A/C vibrations, OAT and SLD marker.

Note

Use of MAN mode sets the fixed values of LWC to 1.5 g/m^3 and OAT to -23° C, causing a continuous heating of the MR blades

IPS PANEL FAILURE MESSAGES

The IPS panel ICE SEVERITY window can display the following error codes, either during the system pre-flight test or in flight.

On Ground

CHK ..... - Flight in icing may be commenced
(Loss of redundancy of W/S and/or
TR blades temperature sensors)

CH A - Panel Ch.A failure .....- Do not commence
flight in icing

CH B - Panel Ch.B failure .....- Do not commence
flight in icing

BOUT .....- Do not commence
flight in icing

—,— — .....- Do not commence
flight in icing

In Flight

CHK .....- Continue flight
(Loss of redundancy of W/S and/or
TR blades temperature sensors)
See NOTE below

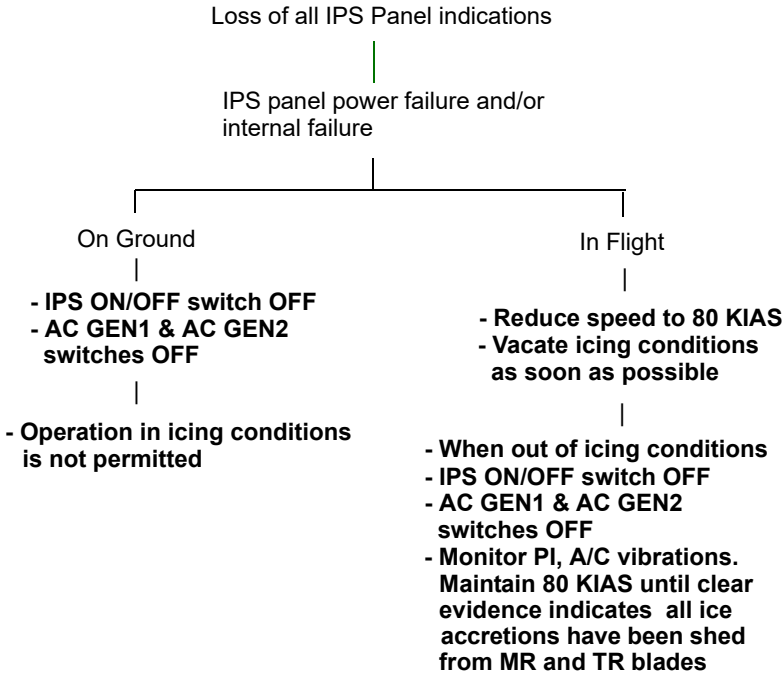
BOUT .....- Continue flight
(Loss of IPS redundancy)
See NOTE below

—,— — .....See page 42

Note

In flight they are displayed only in non-icing conditions for a limited time (20 secs) after the ICB IBIT function, if initiated by the crew.

IPS PANEL FAILURE



ICB DATA FAILURE



IPS panel not receiving data from ICB

- Switch IPS to OFF, wait approximately 2 seconds then switch ON

If caution does not extinguish

On Ground

- IPS ON/OFF switch OFF
- AC GEN1 & AC GEN2 switches OFF

- Operation in icing conditions is not permitted

In Flight

- Reduce speed to 80 KIAS
- Vacate icing conditions as soon as possible

- When out of icing conditions
- IPS ON/OFF switch OFF
- AC GEN1 & AC GEN2 switches OFF
- Monitor PI, A/C vibrations. Maintain 80 KIAS until clear evidence indicates all ice accretions have been shed from MR and TR blades

SECTION 4 - PERFORMANCE

RATE OF CLIMB REDUCTION IN ICING CONDITIONS

ICE PROTECTION SYSTEM	
	RATE OF CLIMB
IPS ON + ICING CONDITIONS	GW < 5200 kg » -800 ft/min 5200 ≤ GW ≤ 6000 kg » -700 ft/min 6000 ≤ GW ≤ 6800 kg » -600 ft/min

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ICN-39-A-155071-G-A0126-00009-A-01-1

Figure 4-1 Performance Reduction in Icing Conditions

Note

The table above is valid for both AEO and OEI conditions.

Note

Fuel consumption (See Basic RFM Section 9) will be increased by a maximum of 55 kg/hr when the aircraft is operating with IPS on, in icing condition and with ice accretion on the aircraft.

CATEGORY A TAKE-OFF FLIGHT PATH 2 GRADIENT

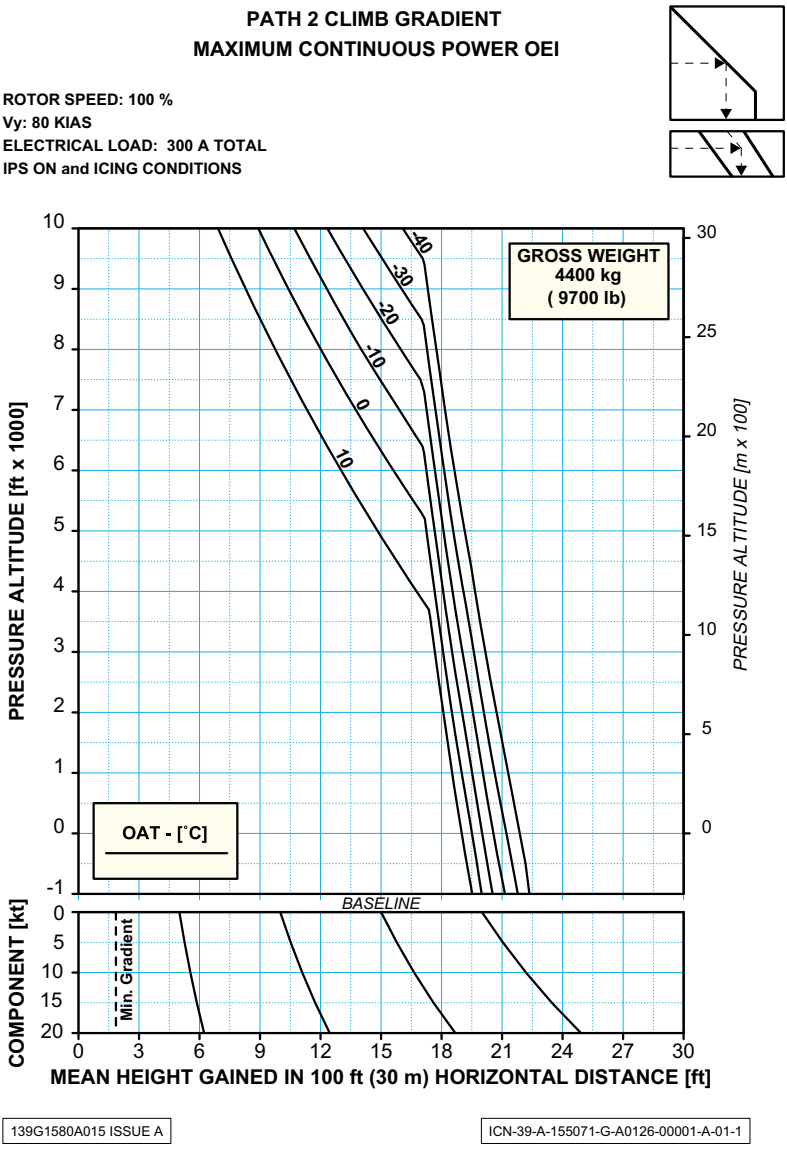

Figure 4-2 PATH 2 Gradient Gross Weight 4400 kg

PATH 2 CLIMB GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 300 A TOTAL
IPS ON and ICING CONDITIONS

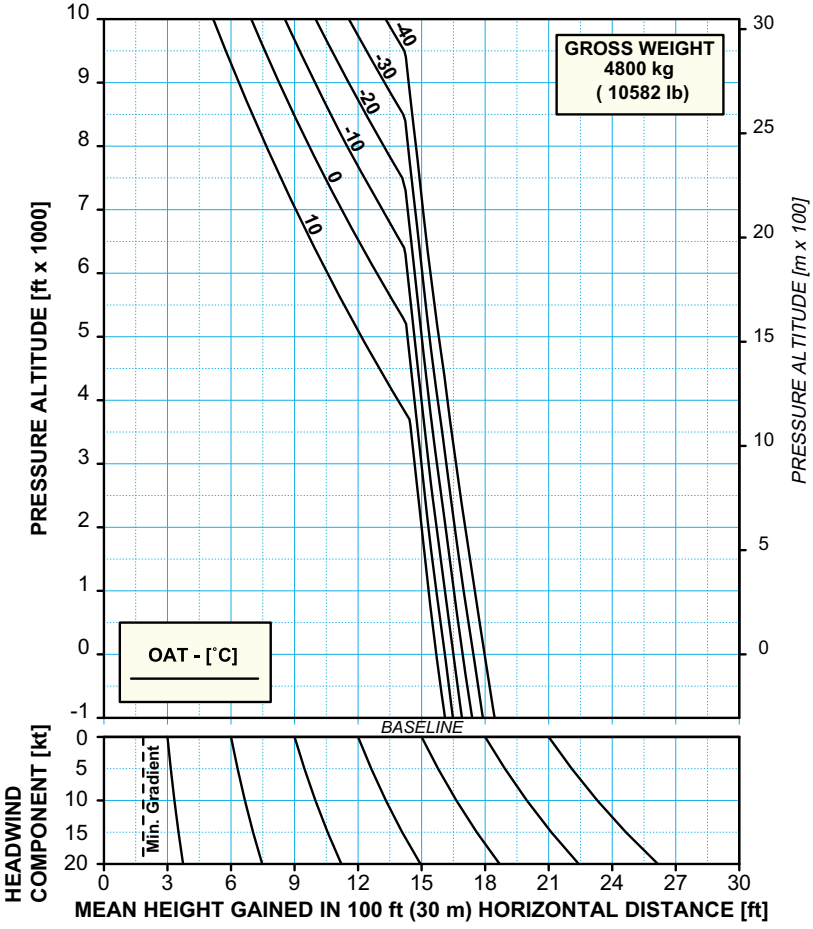

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Figure 4-3 PATH 2 Gradient Gross Weight 4800 kg

PATH 2 CLIMB GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 300 A TOTAL
IPS ON and ICING CONDITIONS

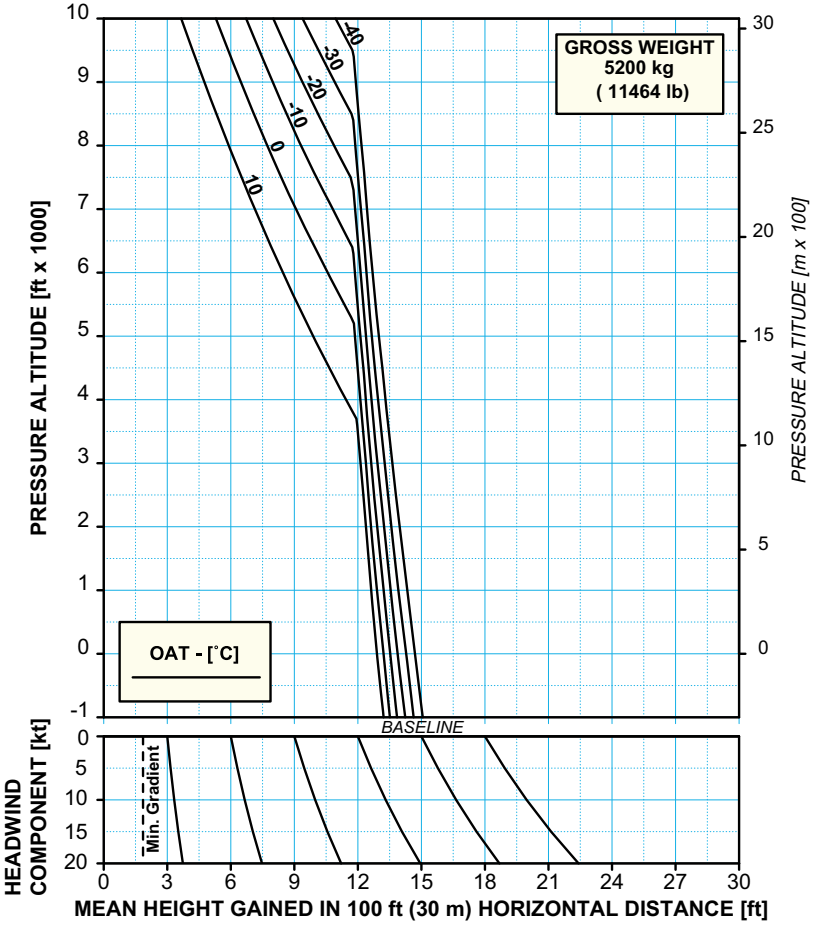

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Figure 4-4 PATH 2 Gradient Gross Weight 5200 kg

PATH 2 CLIMB GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 300 A TOTAL
IPS ON and ICING CONDITIONS

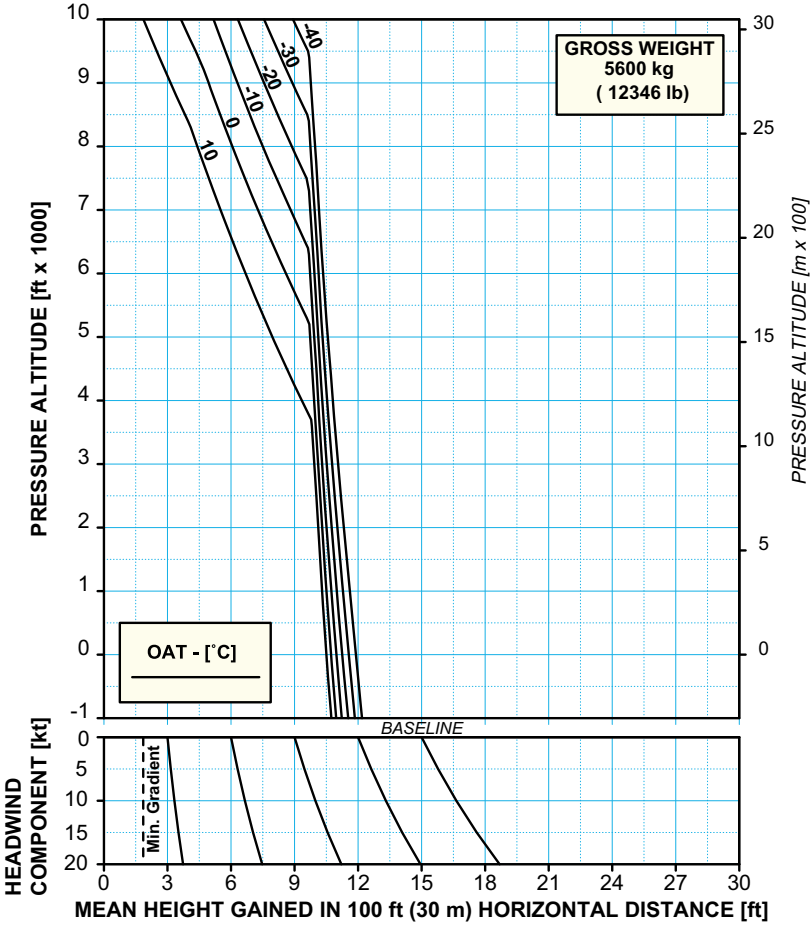

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Figure 4-5 PATH 2 Gradient Gross Weight 5600 kg

PATH 2 CLIMB GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 300 A TOTAL
IPS ON and ICING CONDITIONS

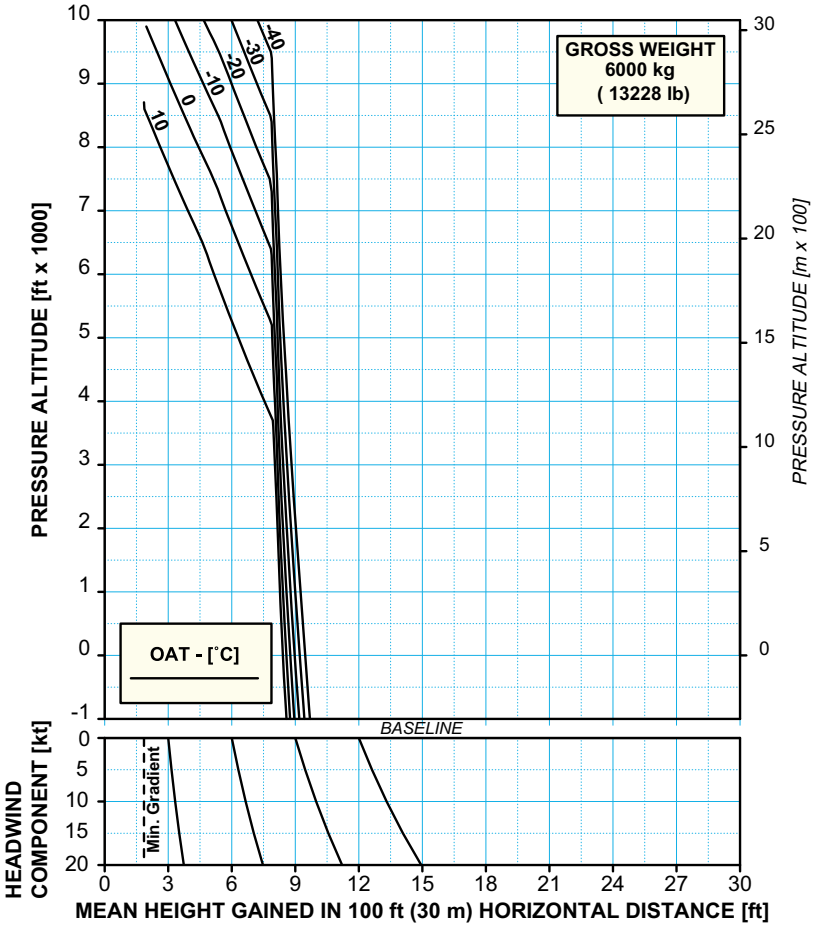

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Figure 4-6 PATH 2 Gradient Gross Weight 6000 kg

PATH 2 CLIMB GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 300 A TOTAL
IPS ON and ICING CONDITIONS

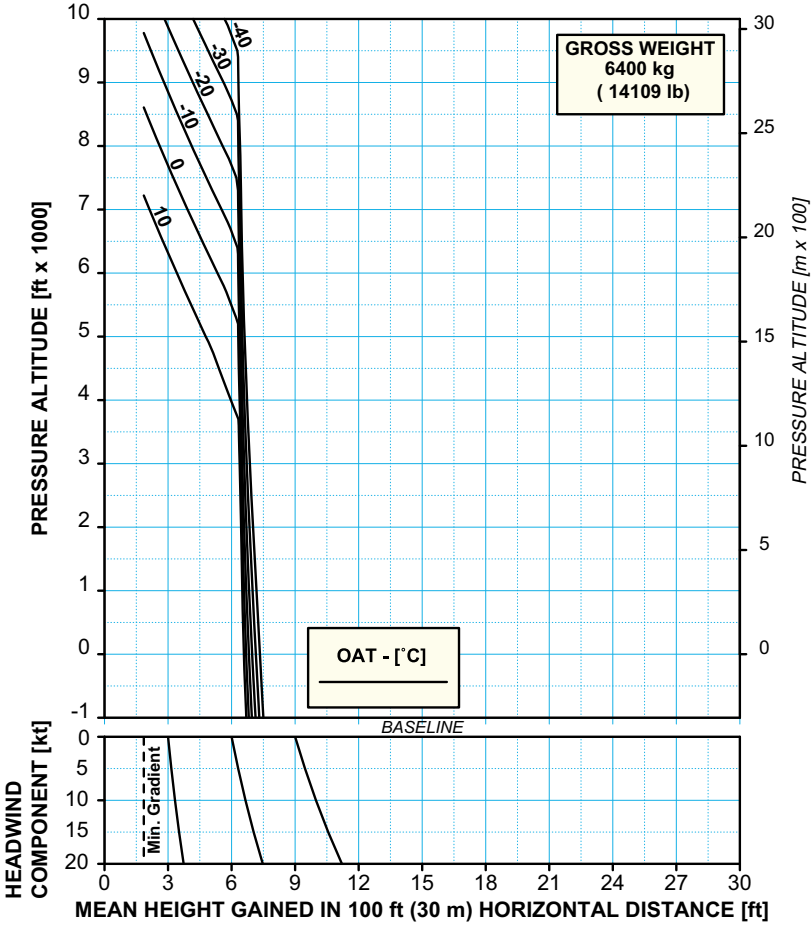

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Figure 4-7 PATH 2 Gradient Gross Weight 6400 kg

PATH 2 CLIMB GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 300 A TOTAL
IPS ON and ICING CONDITIONS

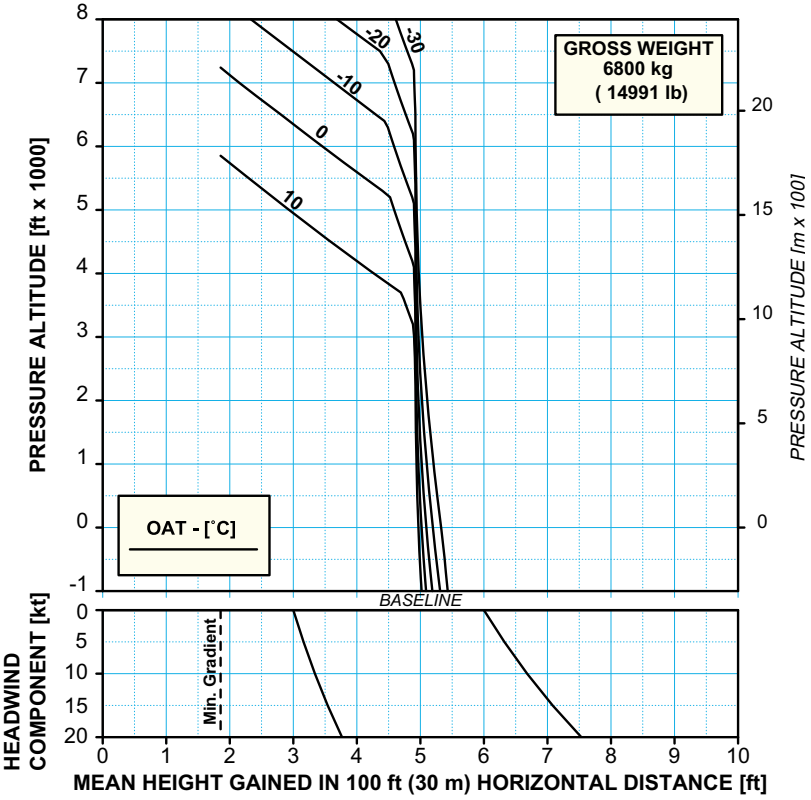

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Figure 4-8 PATH 2 Gradient Gross Weight 6800 kg

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

The Ice Protection System (IPS) is composed of:

- Main Rotor blade de-ice protection, cyclical heating the leading edge zone of each blade to remove the ice that accretes
- Tail Rotor blades anti-ice protection, continuous heating the leading edge of each blade, not allowing ice accretion
- Windshield anti-ice protection, continuous heating the frontal part of the pilot and copilot screens, not allowing ice accretion
- Engine intakes passive protection, allowing proper airflow to engines even in case of ice accretion
- Heating power management and distribution by dual channel boxes
- Ice detectors for ice severity evaluation
- Two AC generators
- Additional Intake passive protections: ECS, cabin ventilation and AC GEN generators
- The system has some control boxes, ICB, MRUD, MRLD and TRD, with two control channels (ch.A & ch.B).

Figure 7-1 is a schematic drawing of the components of the entire system.

The 270VDC power for the blades heating and the 115V/400Hz AC power for the windshield heating is generated by two alternators (one 45 KVA and one 25 KVA) fitted on the MGB.

The AC power is transmitted directly to the windshields, while for the blades it is converted to DC by two Auto Transformer Rectifier Unit (ATRU) fitted in the RH rear avionic bay.

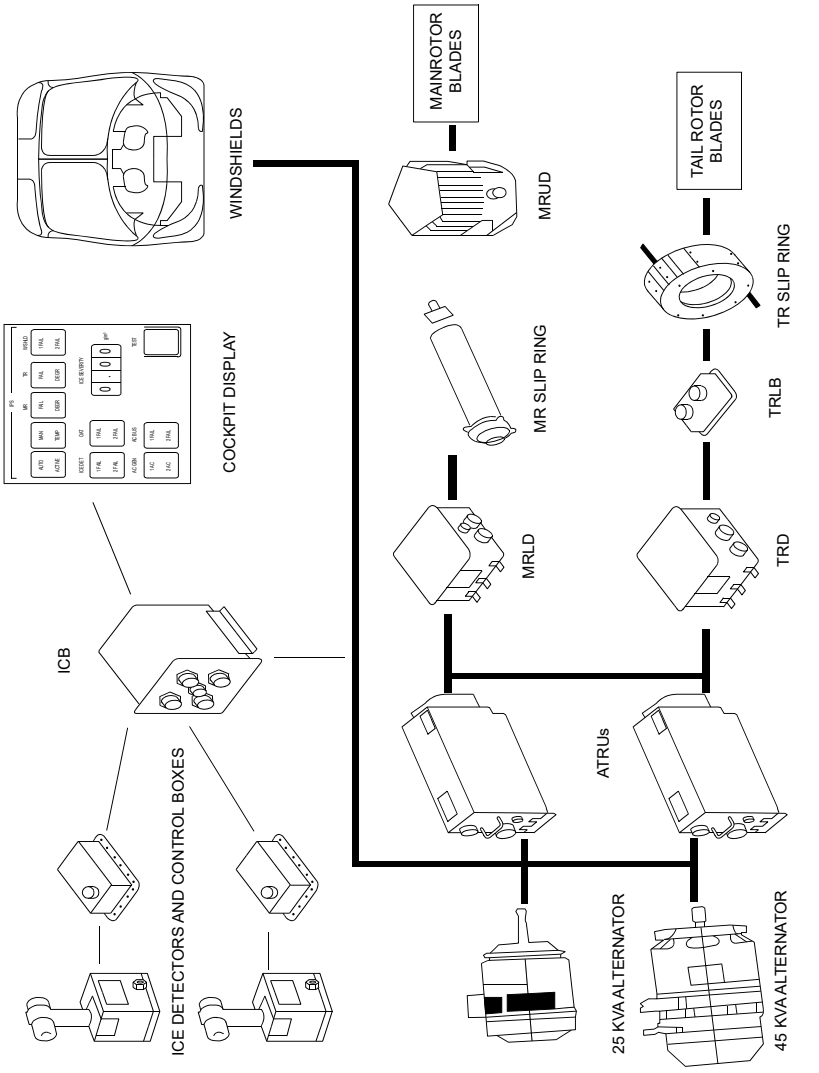

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Figure 7-1 Ice Protection System Components

MAIN ROTOR BLADES HEATING

The DC power for MR blades from ATRUs passes through

- the MR Lower Distributor (MRLD) fitted in the rear baggage compartment and controlling the power ON/OFF
- the MR slip ring fitted in the MR mast passing power from fixed to rotating parts
- the MR Upper Distributor (MRUD) fitted in the beanie, where the power is switched sequentially to each of the six zones of each blade leading edge.

The blades are heated by metallic nets embedded inside the blade structure below the anti-erosion shields.

In each blade there are 6 spanwise zones activated in sequence to allow proper ice shedding (see Figure 7-2).

When a blade zone is heated, the same zone of the other blades are heated in the same way, to avoid asymmetric shedding on blades leading to vibration and unbalance.

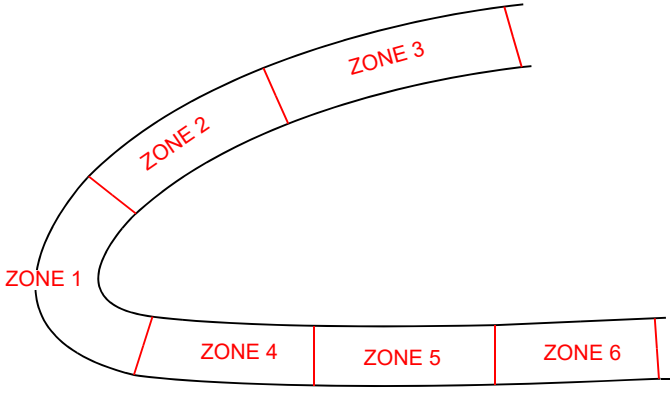

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Figure 7-2 Main Rotor Blade Heated Zones

TR BLADES HEATING

The DC power for TR blades from ATRUs passes through

- the TR Distributor (TRD) fitted in the rear baggage compartment and controlling the power ON/OFF
- the TR Lightning Box (TRLB) fitted in the tail and stopping the current surge in case of lightning strike
- the TR slip ring fitted in the tail rotor passing power from fixed to rotating parts.

The TR blades are heated by metallic nets embedded inside the blade structure below the anti-erosion shields. On the TR blades there is no division in zones, all the blade is continuously heated.

WINDSHIELD HEATING

Pilot and co-pilot windshields have the central area heated with an electrical conductive transparent film (See Figure 7-3).

Sensors embedded in each windscreen monitor the temperature to avoid overheating.

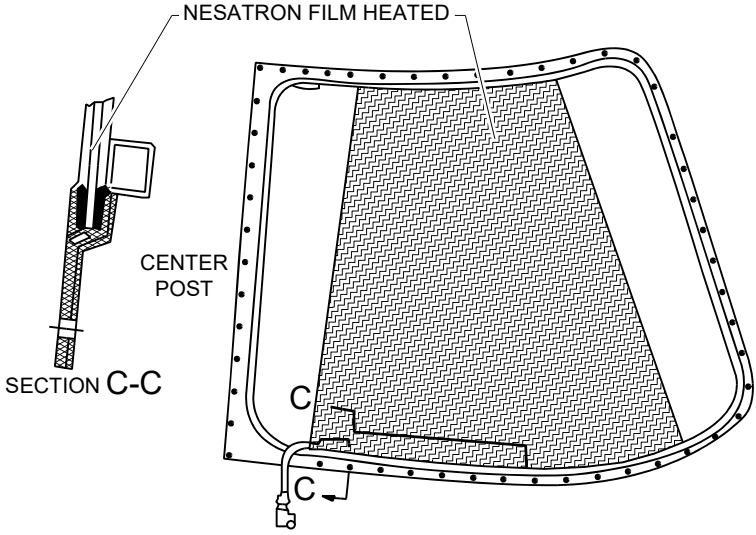

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Figure 7-3 Windscreen Heating Zone

ENGINE INTAKE PROTECTION

Each main engine intake and each auxiliary engine intake is protected by an external screen with rear by-pass; ice is allowed to accrete on the screen while the air can enter the engines through the rear by-passes (See Figure 7-4).

Additionally each engine is protected from ice FOD by its annular screen at the compressor entry.

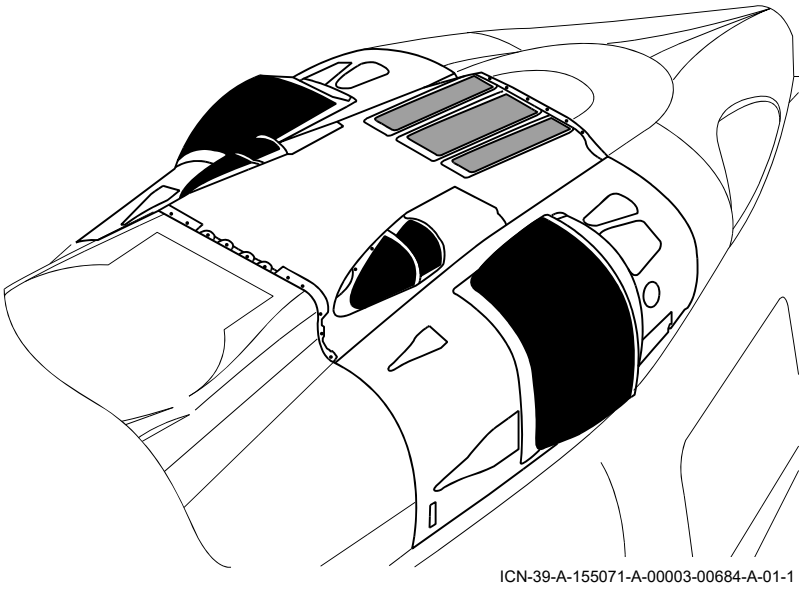

Figure 7-4 Engine Intakes Protection

SYSTEM MANAGEMENT

The system is managed by an IPS Control Box (ICB) fitted in the rear of the baggage compartment, controlling the power distribution and cycling based on the data received from:

- the two ice detectors
- the two OAT sensors
- the two pitot probes
- the temperature sensors fitted in the windshields and in each TR blade.

The system status signals are displayed on a dedicated panel, fitted in the central zone of the cockpit (See Figure 7-5), with dedicated Master Warning and Caution lights in front of both pilot and copilot.

The system functioning is selected by the four switches on the overhead panel, pilot side (See Figure 7-6).

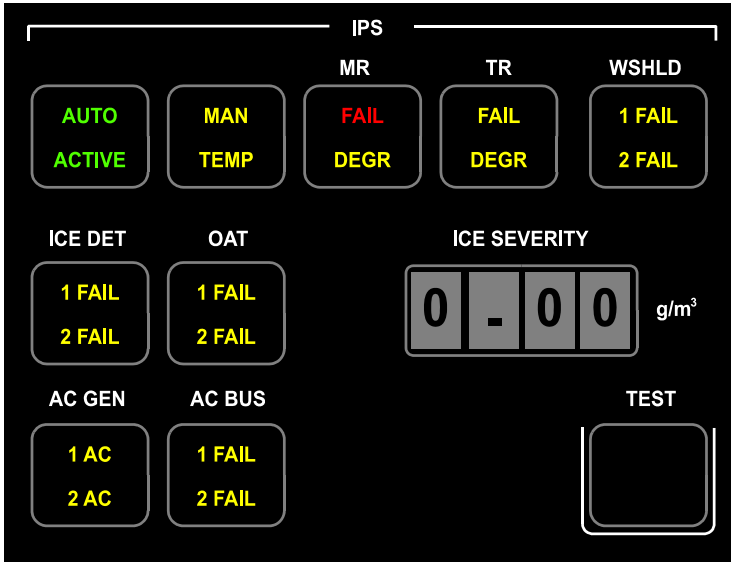

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Figure 7-5 IPS Cockpit Panel

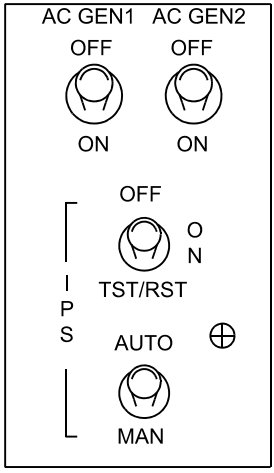

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Figure 7-6 IPS Switches on Overhead Panel

ICE DETECTORS

The two ice detector measuring heads are fitted on the fuselage above the pilots doors (See Figure 7-7), while their control boxes are fitted in the cabin roof.

Each measuring head receives bleed air from the engines through dedicated piping to allow proper airflow to the sensors even in case of low speed or hover (using bleed air for suction of external air).

Ice detectors measure ice severity (Liquid Water Content, LWC, in g/m^3) based on the speed of obscuration of three optical sensors when ice accretes on a vertical bar exposed to the airflow.

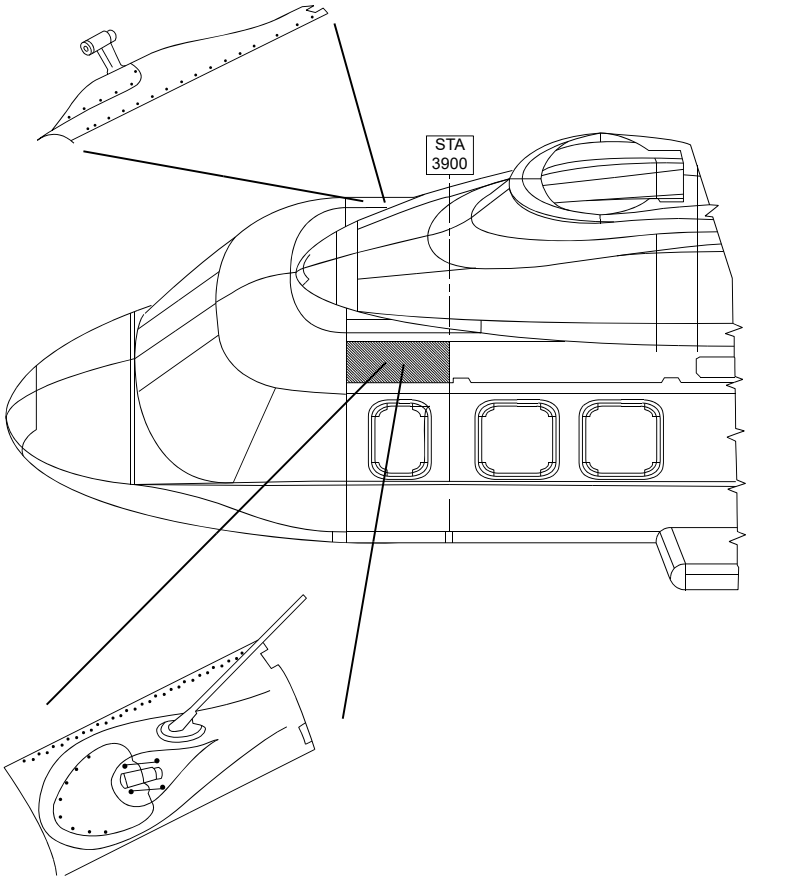

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Figure 7-7 Ice Detector Positions

SLD MARKER

This feature is installed on the pilot side and it is designed to help the pilot to detect if SLD conditions are encountered, when the red marker is completely covered with ice.

The SLD marker is a composite sphere (See Figure 7-8), installed with a support on the right side of the fuselage, positioned where the pilot can promptly determine ice accretion on it by simply looking outside the lateral screen. The sphere is provided with a black circle, a yellow and a red ring. The ice accretes on the different zones, depending on the MVD. The black circle (near the stagnation point) and yellow ring are relevant to the conditions of the icing envelopes. When ice starts to accrete on the yellow ring (far from the stagnation point, therefore indicating ice accretion with increasing droplet size) a significant (but still not critical) PI increase is expected.

Ice accretion on the red zone is an indication of icing conditions outside the certification envelopes for which the IPS is designed to operate. The SLD marker is presently not de-iced, therefore its suitability to detect SLD conditions could be impaired by an excessive accretion of ice on the sphere.

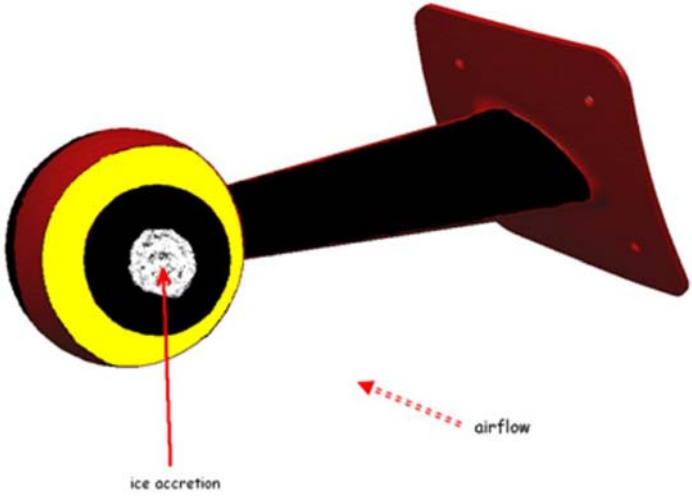

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Figure 7-8 SLD Marker

IPS UTILITY C/B PANEL

The C/B panel is installed on the cabin wall over the copilot seat (See Figure 7-9)

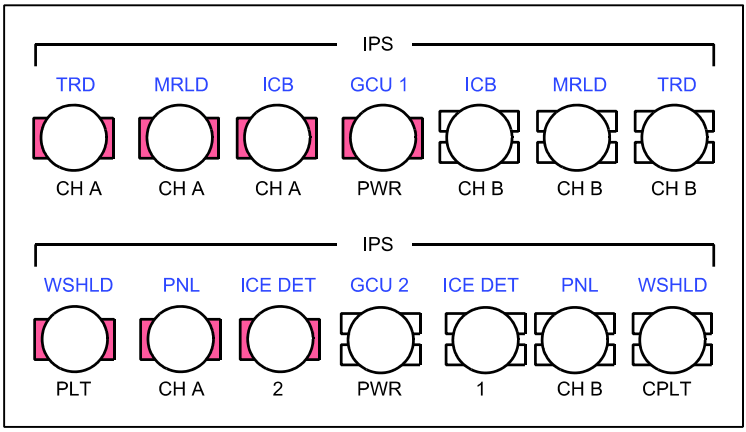

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Figure 7-9 IPS C/B Panel

IPS FUNCTIONING MODES

IPS TST/RST function is inhibited in icing conditions. The test duration is approximately 30 seconds, following an ON/OFF switching the time for system activation is approximately 15 seconds.

AUTO:

This is the normal mode of IPS (IPS switched ON and in AUTO mode).The system is heating TR blades, windshields and ice detectors to anti-ice them.

It processes also LWC and OAT data to compute the ON/OFF time to heat and deice the six MR blades zones in turn. In this mode MR and TR blades are heated when the LWC value is detected.

MANUAL:

When the IPS is set to MAN mode, the IPS is always heating the TR blades, windshields and ice detectors but is heating the six MR blades zones in turn without any rest time at the end of the MR blade heating cycle.

In this case the IPS is working by automatically setting OAT = -23° C and
LWC = 1.5 g/m³.

DEFAULT OAT AND LWC VALUES

In case of both OAT and/or LWC sensors failure, the IPS is functioning by automatically setting these data to default values of -12° C and 0.8 g/m³, respectively.

SYSTEM CONTROL AND CAUTION/WARNING/ADVISORY LOGIC

The ICB controls the system through 4 different “chains”:

1. **ICB-MRLD-MRUD chain** (MR heating control)

   If Ch A of one of the 3 boxes (whichever) fails, all the 3 boxes’ Ch A are lost.

   If Ch B of one of the 3 boxes (whichever) fails, all the 3 boxes’ Ch B are lost.

2. **ICB-TRD chain** (TR heating control)

   If ICB Ch A fails, also TRD Ch A fails.

   If TRD Ch A fails, ICB Ch A **does not** fail (therefore a TR failure does not cause the loss of also the MR).

3. **ICB-W/S chain** (W/S heating control)

   If ICB Ch A fails, W/S2 (pilot) is lost.

   If ICB Ch B fails, W/S1 (copilot) is lost

   The windshields anti-icing is started as soon as the IPS is switched ON, not when LWC is detected. This is to give the crew the additional possibility to de-mist the screens when the helicopter is out of the clouds.

4. **ICB-cockpit panel** (System status to flight crew)

The ICB Ch A and Ch B are independent from the cockpit panel Ch A and Ch B.

Failure of the panel's Ch A/B are managed with advisory "CH A" and "CH B" in the ICE SEVERITY window, while loss of ICB Ch A + Ch B communication to display, are managed with the advisory "DATA".

The "CHK" indication is displayed for failure of 1 or 2 temperature sensors inside one of the windshields (the 3rd sensor is available for the system, so there is no impact on the windshields heating) or in case of loss of the temperature sensor inside one of the two opposite TR blades (the opposite blade's sensor is used instead, so there is no impact on the TR heating).

The "BOUT" indication is raised in case of loss of the control boxes' Ch B while the Ch A is controlling the system (there is no impact on the IPS operation, only loss of redundancy in case of subsequent failure of Ch A).

"CHK" and "BOUT" indications may be displayed continously, if one of the relevant conditions is met, only with the helicopter on ground. In flight they are displayed only in non-icing conditions for a limited time (20'') after the ICB IBIT function, if initiated by the crew. The indications of the loss of the status panel channels can be displayed only on ground.

When both ice detectors' LWC values are correctly read by the ICB, the current ice severity displayed by the panel is the maximum of the two. If one of the two is not valid, only the remaining value is displayed. If both the two LWC values are not received, the message "**—.— —**" is displayed.

OAT values from the two helicopter sensors are received by ICB and for system management the lower of the two is always considered. In case of failure of one of the sensors, the value from the other is used.

For failures of both the OAT sensors and/or both the ice detectors, or if the ICB doesn't receive the OAT and/or the LWC data, with the mode switch to AUTO the ICB automatically passes to the "default mode" of operation, where intermediate fixed values of OAT and/or LWC are used (OAT = -12° C and LWC = 0.8 g/m^3).

For failure of both the OAT sensors, the ice detectors will fail as they use OAT value for LWC calculation.

In normal conditions the controls are

ICB Ch A	ICB Ch B
W/S 2 (RH pilot)	W/S 1 (LH Pilot)
MR heating	
TR heating	
Ice detect. 1/2	

In case of ICB Ch A failure, the ICB Ch B controls

- W/S 1 (LH pilot)
- MR heating (only critical zones, i.e. degraded condition)
- TR heating
- Ice detect. 1/2

In case of ICB Ch B failure, the ICB Ch A controls

- W/S 2 (RH pilot)
- MR heating
- TR heating
- Ice detect.1/2

AC POWER DISTRIBUTION

The 45 KVA generator is the primary source for the rotors heating. In normal operation it supplies the entire power required by the MR and TR blades. The power required by the ice detectors and the wind-shields is shared between the generators: the 45 KVA AC Generator supplies the co-pilot side, while the 25 KVA Generator supplies the pilot side.

If, during the normal operation of the system, a failure on the 25 KVA AC generator occurs, the entire power required by the IPS is supplied by the 45 KVA AC gen.

For a failure of the 45 KVA generator the system automatically starts to operate in low power mode, with the secondary AC gen supplying only the MR critical zones, the TR blades, the pilot W/S and the pilot ice detector.

AC Generators

During normal functioning of the system the two AC GEN provide power to the following parts of the IPS system:

AC GEN 1 (45 KVA)
ICE DET 1 (LH)
W/S 1 (LH pilot)
MR blades
critical zones (1, 2 & 4)
non critical zones (3, 5 & 6)
TR blades

Following an AC GEN 1 failure the AC GEN 2 provides power to:

ICE DET 2 (RH)
WI/S 2 (RH pilot)
MR blades critical zones (1, 2 & 4)
TR blades

AC GEN 2 (25 KVA)
ICE DET 2 (RH)
W/S 2 (RH pilot)

Following AC GEN 2 failure the AC GEN 1 provides power to all IPS components

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 72

ULTRAFORCE SERIES FLIR

P/N 4G9350F00711
P/N 4G9350F00712
P/N 4G9350F00911

The replacement of the equipment detailed in this Supplement is not allowed without the successful completion of the additional verifications reported in the Maintenance Manual.

Changes to the helicopter configuration (ie. installation of approved equipments) are not allowed without the successful completion of the verifications reported in the Maintenance Manual.

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SUPPLEMENT 72
ULTRAFORCE SERIES FLIR

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GENERAL INFORMATION

The Ultraforce 350, 350 EP (Enhanced Performance) and 350HD (High Definition) FLIR system is a remote controlled day/night high resolution, infrared (IR) imaging system and a TV (CCD) camera with colour video.

The system consists of a stabilized Turret-FLIR Unit (TCU), mounted under the nose of the helicopter (Figure 1 & Figure 3), and a Hand Control Unit (HCU) that contains all the controls necessary to operate the FLIR turret and systems. (See Figure 4 & Figure 5). The HCU handgrip has a stowage at the rear of the interseat console.

The TCU is gyro stabilized. Its azimuth and elevation, therefore the FLIR Line Of Sight (LOS) corresponding to the center of the image, can be directed to any position within the Field Of Regard (FOR) which is +20° to -120° in elevation and 360° in azimuth from the forward position.

The FLIR Imager incorporates all the necessary optics, detectors and required electronics to convert the infrared radiation from the medium wave infrared thermal imaging sensor into standard video signals which are processed within the TCU for display.

The IR and TV (CCD) and optional Spotter Scope camera provide video outputs that can be monitored on either pilot or copilot MFD. Either IR or CCD images can be selected independently on pilot and copilot MFD or both images in miniature. If a digital map is installed the copilot and pilot MFD will only display the same source data, either FLIR or digital map.

The optional central 5th display or a cabin display can also be used to display either image.

Additional optional equipment available on certain models of the Ultrafore 350 are the laser range finder (Class 1 eye safe) ESLRF, the laser pointer and laser illuminator both Class IIIb and not eye safe. The Ultrafore 350 laser Class IIIb devices, if fitted, are electrically disabled. When laser operations are authorised, a Laser Interlock Unit (LIU), Figure 6, is fitted in the interseat console incorporating an ARM switch requiring a key to ARM the laser before firing. A WOW interlock ensures the laser is not used when the aircraft is on the ground.

For full information on the use of the Ultraforce 350 FLIR refer to the Ultraforce 350, 350EP or 350HD FLIR Owners Manual, latest revision.

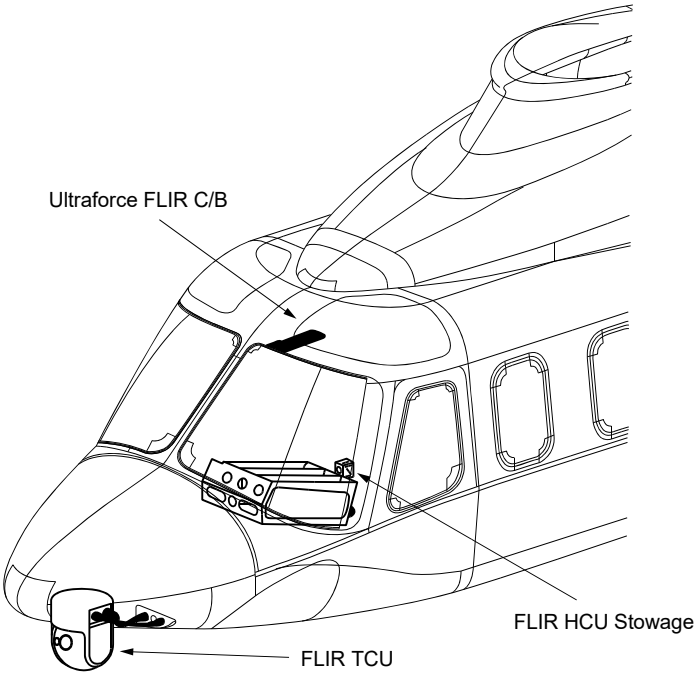

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Figure 1 Ultraforce 350 FLIR Installation

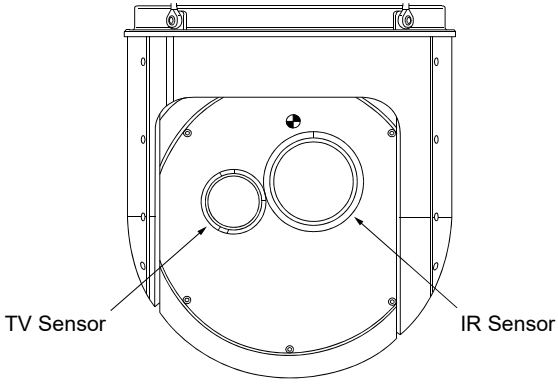

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Figure 2 Ultraforce 350 FLIR Turret

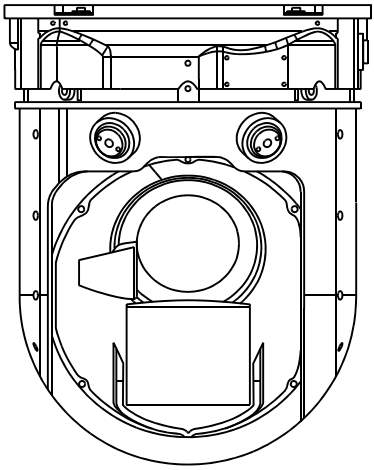

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Figure 3 Ultraforce 350EP FLIR Turret

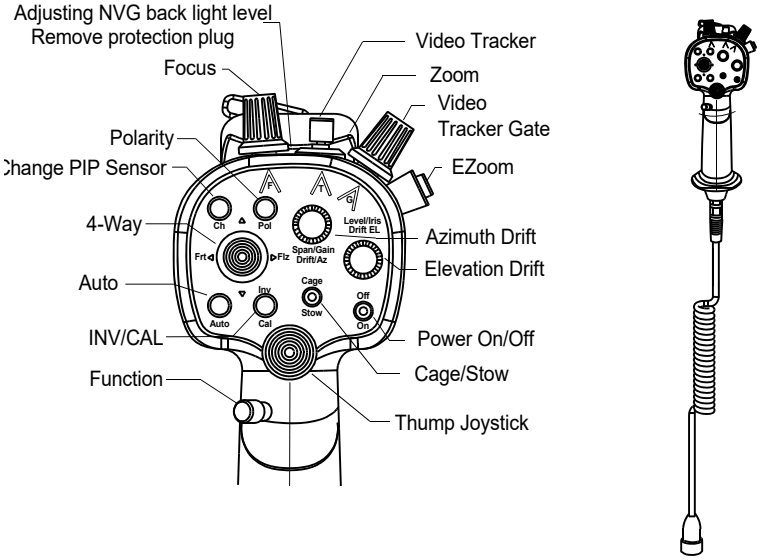

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Figure 4 Ultraforce 350 FLIR Hand Control Unit

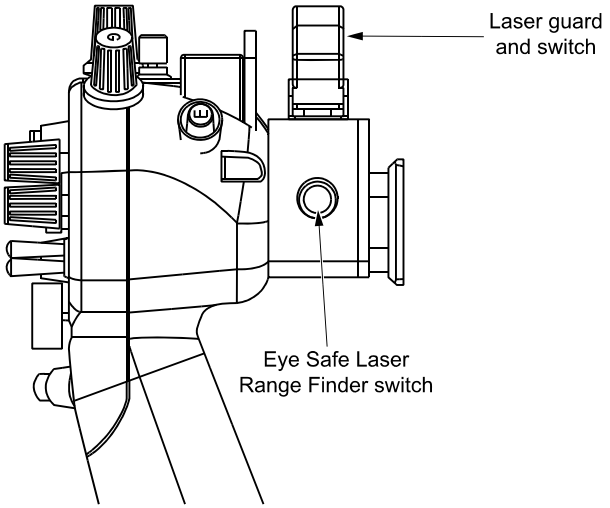

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Figure 5 Ultraforce 350 FLIR Hand Control Unit Side View

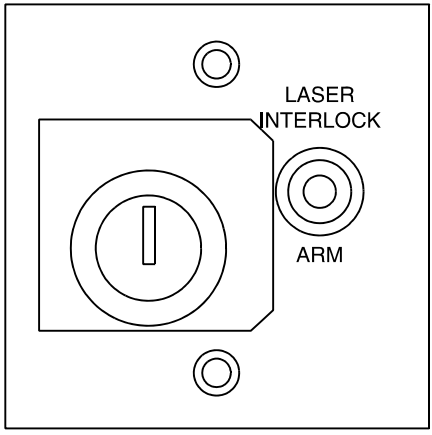

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Figure 6 Ultraforce 350 FLIR Laser Safety Interlock Unit (LIU)

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Ultraforce Series FLIR kit, the new empty weight and center of gravity position must be determined.

ULTRAFORCE SERIES FLIR LIMITATIONS

Maximum airspeed for operating Ultraforce system ..... 140 KIAS

The FLIR must not be used for navigation.

The FLIR HCU handgrip must be operated from the left hand seat or by cabin crew.

The FLIR ESLRF must not be operated close to personnel.

Laser Class IIIa/IIIb/IV operation is not EASA approved.

Operation of the FLIR Laser Pointer/Illuminator Class IIIa/IIIb/IV devices, if fitted, must be authorised by the Competent Authority.

The FLIR Laser Pointer and Laser Illuminator LIU must not be selected to ARM when personnel are within the following distances from the aircraft:

- Laser Pointer ..... 800 m (2600 ft)
- Laser Illuminator ..... 400 m (1300 ft)

The lasers must not at any time be aimed directly against personnel or targets containing personnel.

SECTION 2 - NORMAL PROCEDURES

Note

For full information on the use of the Ultraforce FLIR refer to he appropriate Ultraforce FLIR Owners Manual Document, latest revision.

EXTERNAL PRE FLIGHT CHECKS

AREA N°1 (Helicopter Nose)

1. Ultraforce FLIR TCU	— Secure. Confirm free movement of turret then leave in STOW position. Check indications on desiccator breathers and indicator. Check IR and CCD camera lens condition and cleanliness. Confirm laser safety filter, if fitted, is removed.

AREA N°7 (Cockpit/Cabin Interior)

1. Ultraforce FLIR HCU	— Check present, connected and secure.
2. LIU ARM switch (if fitted)	— Confirm off.

ENGINE PRE-START CHECKS

1. Ultraforce FLIR HCU	— Confirm system switched OFF.

SYSTEM CHECKS

1. Ultraforce FLIR HCU	— Switch system ON.
2. Ultraforce FLIR image	— Select image display as required (pilot, copilot MFD, Central 5th display, Mission console display). Select IR or CCD camera as required.
3. Ultraforce FLIR HCU	— Stow FLIR and switch OFF, or as required. Stow HCU or as required.

IN FLIGHT

1. Ultraforce FLIR HCU	— Switch system ON (when airspeed below 140 KIAS).
2. Ultraforce FLIR image	— Select image display as required (pilot/copilot MFD by selecting FLIR Cam on MFD system menu, or Central 5th display or Mission console display, if fitted). Select IR or CCD camera as required.
3. Ultraforce FLIR HCU	— Control FLIR direction and settings as required.

CAUTION

The ESLR must not be operated close to personnel. In flight the LIU (if fitted) must not be set to ARM when personnel are within the minimum safe distances for the type of laser as indicated in the Limitations Section of this Supplement. The lasers must not at any time be aimed directly against personnel or targets containing personnel.

4. ESLRF (if fitted) — Activate as required.

5. Laser Illuminator/pointer (if fitted) — Lift laser switch guard on HCU, select toggle switch to mid position.

6. LIU ARM switch (if fitted) — Select ARM.

7. Laser Illuminator/Pointer (if fitted) — Activate as required, when operations complete select toggle switch to first position, close guard and select LIU ARM switch off.

Note

When FLIR is not being used it should be stowed to protect the FLIR cameras.

PRE LANDING CHECKS

1. Ultraforce FLIR HCU — Stow FLIR cameras and switch system OFF. Stow HCU.

PRE SHUTDOWN CHECKS

1. Ultraforce FLIR HCU — Confirm FLIR switched OFF and HCU stowed.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the Ultraforce FLIR system is switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 73

RADAR SELEX GABBIANO SERIES

P/N 4G3441F00211
P/N 4G3441F00611

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SUPPLEMENT 73
RADAR SELEX GABBIANO SERIES

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GENERAL INFORMATION

This Supplement gives details of the radar Selex-Galileo Gabbiano T20N (P/N 4G3441F00211) and TS20N (P/N 4G3441F00611) Surveillance and Weather Radar.

The Gabbiano T20N and TS20N Surveillance and Weather radar provides a multi-mode radar capability for maritime missions. The following air to surface modes of operation are available:

- Sea surface search for maritime surveillance
- ISAR (Inverse Search and Rescue)
- Track While Scan
- Strip SAR (Search and Rescue)
- Spot SAR (Search and Rescue)
- Weather
- Ground mapping
- Beacon.

The radar system comprises of a flat plate antenna and drive unit, a receiver exciter processor, a transmitter front end unit, and a radar control panel mounted in the interseat console (See Figure 1).

The radar control panel (See Figure 2) allows the selection of all radar modes, radar controls and non-radar modes such as navigation overlays modes and target marker mode. The control panel also contains a joystick for controlling the cursor for target marker and tracker functions.

The information may be displayed on the MFD's or (central) 5th display (if fitted) by pressing the appropriate button on the 5th display.

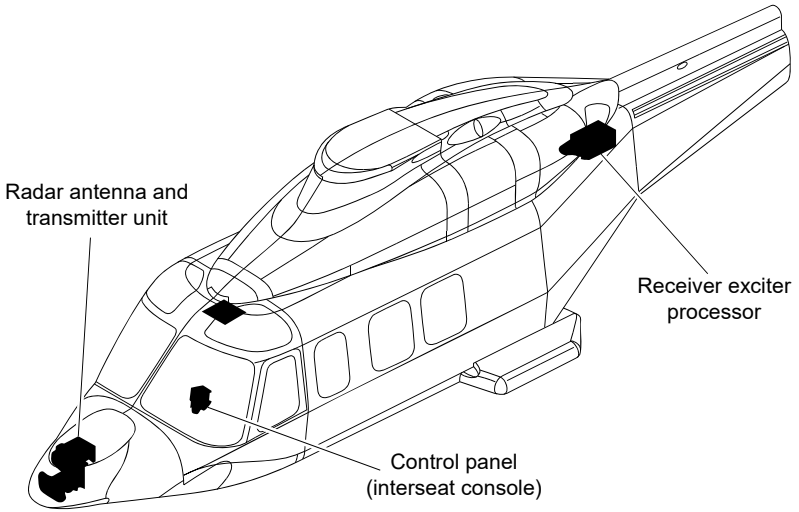

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Figure 1 Selex Gabbiano Installation

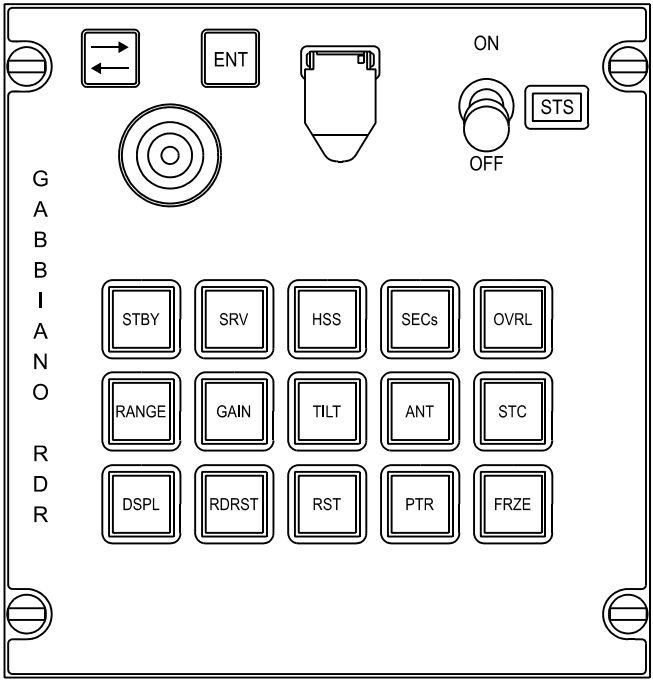

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Figure 2 Selex Gabbiano T20N Radar Control Panel

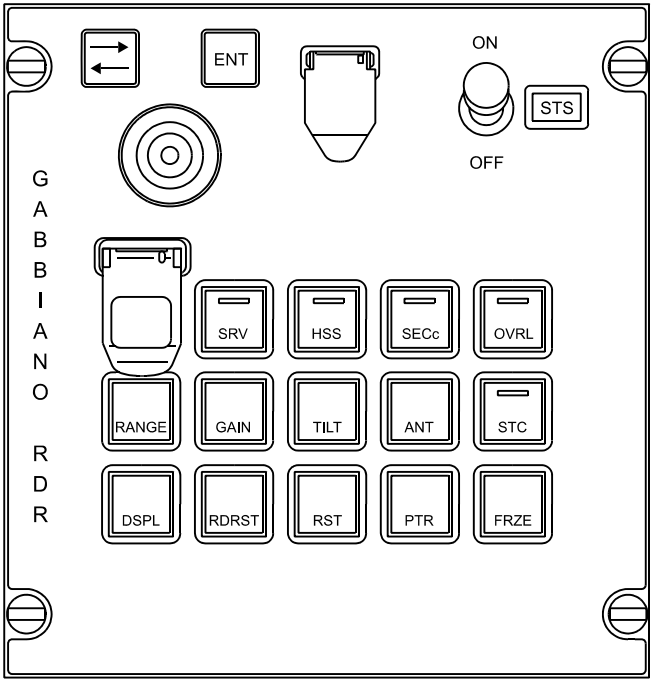

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Figure 3 Selex Gabbiano TS20N Radar Control Panel

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the SELEX GABBIANO radar kit the new empty weight and center of gravity position must be determined.

RADAR SELEX GABBIANO SERIES LIMITATIONS

The radar must not be used for navigation, or weather/terrain avoidance.

SECTION 2 – NORMAL PROCEDURES

PRE-START CHECKS

1. Weather Radar switch — Confirm OFF.

SYSTEM CHECKS

1. Weather Radar switch — ON, after BIT checks complete confirm STS caption not illuminated.

2. Weather Radar — As required, OFF or STBY.

Note

The weather radar does not transmit when the helicopter is on the ground due to WOW safety interlock, however, during the Power Up Built In Test (PBIT) it is recommended that personel are not within a radius of 17 m (55 ft) from the nose of the aircraft.

IN FLIGHT PROCEDURES

1. Radar — As required.

PRE-LANDING CHECKS

1. Radar — OFF or STBY.

GABBIANO RADAR DISCREPANCIES (T20N P/N 4G3441F00211 ONLY)

The following radar functional discrepancies have been noted:

- To ensure the radar control panel button operations are registered by the radar system, the pushbuttons must be held depressed for at least half a second
- Beacon mode detection ranges. The maximum range demonsttrated are as follows:

  a) SART. Less than 5 NM

  b) SST-181E (two pulse). Less than 10 NM.

  The DO-172 six pulse beacon has not been tested.

  To improve beacon detection stability it is recommended to reduce antenna scan to ±30°.

- During operation of Radar in weather mode the STS caption on the control panel may illuminate sporadically. This is not an indication of a system malfunction
- In HSS mode the TWS function is inoperative
- In SRV Mode if a TWS track is lost temporarily it may not be automatically recovered by the radar
- Care should be taken when entering a SEGMENTED STRIP SAR to ensure a segment greater than 0 is entered or the radar may fail requiring the radar system to be re-started.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC Generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the radar SELEX GABBIANO system is switched OFF.

MALFUNCTION PROCEDURES

RADAR TRANSMITTING ON GROUND

1-2 WOW FAIL + **RADAR TX ON**

On ground, radar is switched ON and WOW microswitches failed so radar is transmitting

- Switch radar to OFF

SECTION 4 - PERFORMANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 74

ENHANCED LANDING LIGHT CONFIGURATION

P/N 4G3360F04411
P/N 4G3340F00211
P/N 4G3340F02611

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SUPPLEMENT 74
ENHANCED LANDING LIGHT CONFIGURATION

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GENERAL INFORMATION

The Enhanced Landing Light Configuration, installed as standard on aircraft from S/N 31400 onwards and S/N 41300 onwards with kit P/N 4G3340F00211 (Non NVG Compatible) and variant P/N 4G3360F04411/4G3340F02611(NVG Compatible), introduces 2 steerable landing lights mounted under the aircraft on the right and left hand side of the aircraft nose (See Figure 1). These replace the original Taxi/Landing lights mounted on the LH and RH sponsons.

The normal control of the two landing lights is via the LT control panel installed in the interseat console (See Figure 2 or Figure 3) and the standard five way switch mounted on each collective grip.
(See Figure 4).

When the LDG LTS SELECT rotary switch on the LT panel is set to NORM the right hand and left hand landing lights are controlled independently by their respective side collective 5 way switch, i.e RH collective switch controls only the RH light and LH collective switch controls only the LH light.

Selecting the RH UNSTOW STOW/OFF switch to UNSTOW the RH landing light remains stowed but is powered. By pressing the five way switch on the RH collective in the central position, the light is turned on, the green advisory message LANDING LT ON (for RH landing light) illuminates on the CAS and the RH ON green indicator light on the LT panel illuminates. The light remains stowed until the collective five way switch is moved to EXT which extends the light. The light may then be directed left (L) or right (R) and down (RETR) or up (EXT) by pushing on the beep switch. Pressing the central position again turns the light OFF but leaves it extended. With the light switched OFF it is not possible to move the light. At any time selecting the RH UNSTOW STOW/OFF switch to STOW/OFF will stow and switch OFF (if on) the RH light.

This logic is duplicated for the LH light with the LH collective grip 5 way switch. When the LH landing light is ON a green advisory SEARCH LT ON illuminates on the CAS.

Both landing lights can be operated independently of each other.

When the LDG LTS SELECT rotary switch on the LT panel is set to RH, either collective 5 way switch can be used to control just the RH light, the collective switches operate in parallel. When the switch is

selected to LH then either collective 5 way switch can be used to control the LH light. If one landing light is extended and ON then selecting the other light with the LDG LTS SELECT rotary switch will leave the first light extended, illuminated and at the last selected position while the other light may be controlled by either collective 5 way switch.

When the LDG LTS SELECT switch on the LT panel is set to NONE then neither of the landing lights can be controlled by either collective 5 way switchs. However if either or both the lights are extended and on they will remain illuminated and at the last selected position.

A further feature of this configuration is a Landing Light Over-ride (LDG LT OVRD) pushbutton, on the pilot collective only, and recessed into the grip to avoid inadvertent activation. This pushbutton allows the pilot to control the LH landing light if there is a failure of the RH landing light and the LT panel selector switch and/or a failure of the pilot collective 5 way switch. The LH UNSTOW STOW/OFF must be selected to UNSTOW then by pressing the LDG LT OVRD pushbutton the LH landing light illuminates and remains STOWED. (RH light will remain illuminated if already illuminated). The pilot collective 5 way switch can then be used to extend and steer the LH landing light (the copilot collective 5 way switch is also active to steer the LH light). The LH landing light should be turned OFF by selecting the LH UNSTOW STOW/OFF switch to STOW.

The RH landing light is powered by the DC ESS BUS 1 and the LH landing light by the DC MAIN BUS 2.

Note

When PRIMUS EPIC software version EB7030191-00110/00111/00112/00113/00114/00115/00117/00118/00120 is installed the CAS advisory messages are LANDING LT LH ON and LANDING LT RH ON.

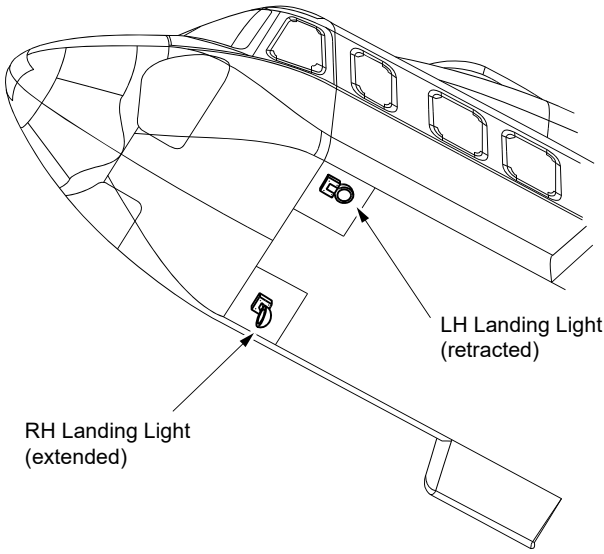

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Figure 1 Enhanced Landing Light Positions

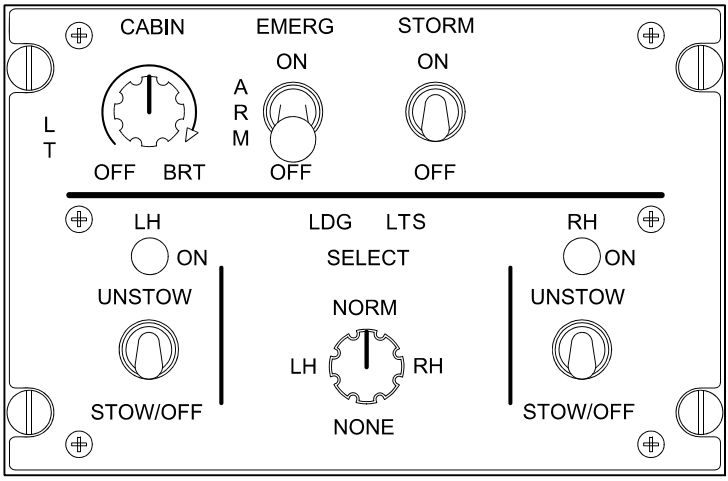

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Figure 2 LT Enhanced Landing Light Control Panel Non NVG Compatible Version (3G3300V00354)

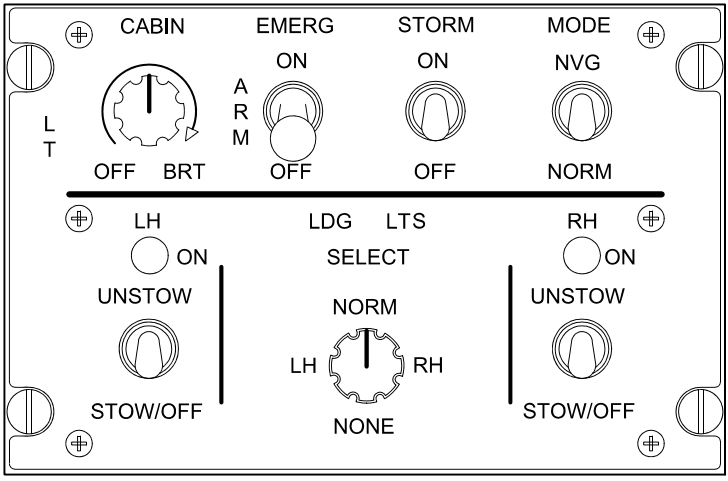

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Figure 3 LT Enhanced Landing Light Control Panel NVG Compatible Version (3G3300V00353)

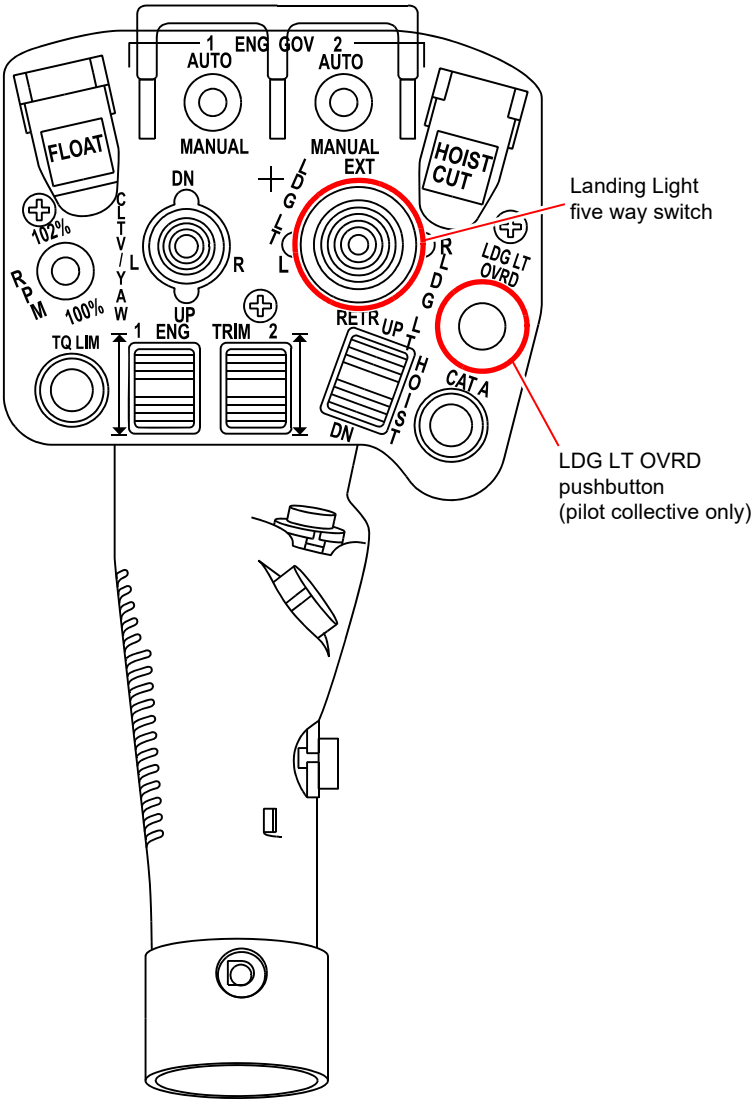

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Figure 4 Collective with Enhanced Landing Light Switches

SECTION 1 - LIMITATIONS

No Change.

SECTION 2 - NORMAL PROCEDURES

ENGINE PRE-START CHECKS

1. LAMP TEST pushbutton — Press and confirm green LH and RH indicators on LT panel illuminate.

SYSTEM CHECKS
(if night operations are envisaged)

1. LT panel — Set as required.

2. RH LDG LT & LH LDG LT — Confirm functioning then select as required.

Note

If single pilot night operations are envisaged it is recommended to leave the LT panel LH landing light UNSTOW STOW/OFF switch on UNSTOW.

AFTER TAKE OFF

1. LT panel — Landing lights as required or OFF, select STOW/OFF or UNSTOW as required.

CRUISE CHECKS

Note

When the landing light is operative, the ADF bearing may be unreliable and ADF audio may be disturbed.

PRE LANDING CHECKS

1. RH LDG LT & LH LDG LT — Select as required.

Note

For single pilot night operations it is recommended to leave the LT panel LH landing light UNSTOW STOW/OFF switch on UNSTOW.

POST LANDING CHECKS

1. RH LDG LT & LH LDG LT — Select LH and RH UNSTOW STOW/OFF switches to STOW/OFF on LT panel (if used).

CAS Caption (Green)	System State
LANDING LT ON	RH LDG LT switched ON
SEARCH LT ON	LH LDG LT switched ON

When PRIMUS EPIC software EB7030191-00110/00111/00112/00113/00114/00115/00117/00118/00120 is installed the advisory messages become:

LANDING LT RH ON	RH LDG LT switched ON
LANDING LT LH ON	LH LDG LT switched ON

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

RH Landing Light Failures

RH landing light illumination and/or steering system failure

- Select LDG LTS SELECT rotary to LH
- Confirm LH light UNSTOW STOW/OFF switch select to UNSTOW
Use pilot collective grip 5 way switch to control LH light

- If LH light does not respond
(Failure of LDG LTS SELECT rotary switch)

- Push LDG LT OVRD pushbutton on pilot collective grip
LH light illuminates
(RH light, if illuminated, remains ON)

- Control LH landing light with pilot collective grip 5 way switch

- If LH light does not extend
(Failure of pilot collective grip 5 way switch)
- LH landing light must be used in stowed position

Note

To return LDG LT OVRD function to LT panel operation select LH UNSTOW STOW/OFF switch to STOW/OFF position.

Services Lost During Bus Failures

DC MAIN BUS 2

LH LANDING CONTROL
LH LANDING LIGHT POWER

SECTION 4 - PERFORMANCE

No Change.

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 75

BAGGAGE BARRIER NET INSTALLATION

P/N 4G2550F00311

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SUPPLEMENT 75
BAGGAGE BARRIER NET INSTALLATION

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GENERAL INFORMATION

The modification P/N 4G2550F00311 consists of the installation of attachment points and a barrier net which divides the baggage bay from the space between the fuel tanks at STN 6700mm, see Figure 1. This modification can only be installed on aircraft that already have Supplement 31 Increase Baggage Compartment Load modifications installed.

With this modification installed the maximum baggage load and height limits are increased with respect to the Basic RFM. The securing of the baggage, within the baggage bay, can be by restraint net or other approved means.

When the Baggage Barrier Net is not installed the baggage bay limitation return to those described in Supplement 31.

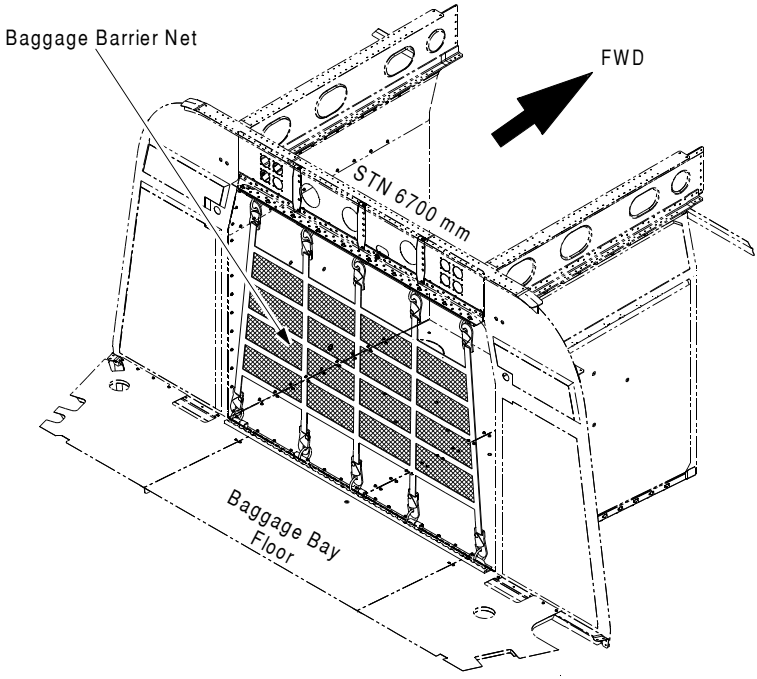

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Figure 1 Baggage Barrier Net Installation

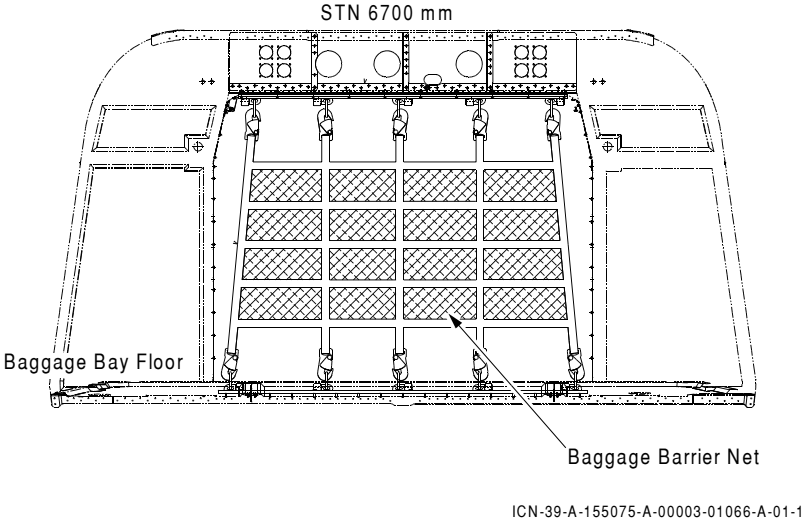

Figure 2 Baggage Barrier Net View Looking Forward

SECTION 1 - LIMITATIONS

GENERAL

When the Baggage Barrier Net is installed the following limitations are valid. If the baggage barrier net is removed the baggage limitation revert to those specified in Supplement 31 Increased Baggage Compartment Load and the baggage bay placards must be selected accordingly.

WEIGHT AND CG LIMITATIONS

After installation of this modification, the new empty weight and CG location must be determined.

BAGGAGE COMPARTMENT LIMITATIONS

Maximum load with barrier net fitted:

Without Ice Protection System equipment (FIPS Supp 71, P/N 4G3000F00211) in rear part of baggage compartment ..... 300 kg (660 lb)

With Ice Protection System equipment (FIPS Supp 71, P/N 4G3000F00211) in rear part of baggage compartment ..... 200 kg (440 lb)

Baggage must be secured with restraint net or other approved means.

Maximum unit load ..... 550 kg/m^2 (110 lb/sq.ft)

Maximum load height with barrier net fitted ..... 750 mm (2.5 ft)

Note

It is the Operator's responsibility to check that any objects stowed in the baggage bay could not pass through the net openings.

BAGGAGE COMPARTMENT PLACARDS WHEN BAGGAGE BARRIER NET INSTALLED

ALL CARGO MUST BE SECURED
WITH RESTRAINT NET OR
OTHER APPROVED MEANS

BAGGAGE COMPARTMENT PLACARDS (CONT)

MAXIMUM LOAD WITH BARRIER NET 3G2550L01831:
NO IPS EQUIPMENT INSTALLED 300 KG (660 LB)
WITH IPS EQUIPMENT INSTALLED 200 KG (440LB)

MAX UNIT LOAD 550 KG/M^2 (110 LB/SQ.FT)
MAXIMUM CARGO HEIGHT WITH BARRIER NET 750 MM (2.5 FT)

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 76

LIMITED ICE PROTECTION SYSTEM (LIPS)

P/N 4G3000F00111

FLIGHT IN LIMITED ICING

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SUPPLEMENT 76
LIMITED ICE PROTECTION SYSTEM (LIPS)
FLIGHT IN LIMITED ICING

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DEFINITIONS AND ABBREVIATIONS

— AC BUS : AC Bus Line
— AC GEN : Alternating Current Generator
— AUW : All Up Weight
— DZ : DriZzle
— ICB : LIPS Control Box
— ID : Ice Detector
— LIPS : Limited Ice Protection System
— LWC : Liquid Water Content
— MR : Main Rotor
— MVD : Median Volumetric Droplet diameter
— RN : RaiN
— SLD : Supercooled Large Droplets
— TR : Tail Rotor
— V_{NE} Icing : Maximum Operating Speed in Icing Conditions
— W/S : WindShield

GENERAL INFORMATION

LIMITED ICING CLEARANCE AND ICING GENERAL

The Limited Ice Protection System (LIPS) permits flight into icing within a limited envelope of icing conditions without blade de-icing provided that the operational capability to descend into non-icing conditions is available throughout the intended route. The ability to escape from icing conditions is required because of the possibility of encountering ambient conditions more severe than those permitted for continuos operation. For this purpose, the LIPS Limitations include a requirement for a 500 ft band of positive temperature air always to be available above the Minimum Safe Altitude (MSA) for the route being flown.

Continuous operation is possible within a defined severity of ambient icing conditions and time limited operation is permitted in defined conditions of greater severity. The purpose of the time limited area is to allow the crew to take action to reduce the severity of the conditions being encountered, usually by descending to allow natural de-icing of the aircraft. The crew are provided with methods to monitor the icing severity and the effect on the aircraft.

The severity of the ice in icing conditions depends on the temperature and liquid water content (LWC). Different types of ice will form on the aircraft depending on the icing conditions. The main types of ice are Glaze and Rime. Glaze ice is clear and will tend to form at higher subzero temperatures (0°C to -5°C) and is more likely with higher LWC and larger droplets. This type of ice can generate high drag increase to occur due to the shape that forms. Rime ice is white and opaque and tends to form at lower temperatures with smaller droplets. Rime ice forms in a more streamlined shape and causes a smaller increase in aircraft drag. It is possible to have a mixture of both, which is known as Glime or Mixed Ice.

The PI variation, due to ice, can be expected to be around 5 ÷ 20%, depending on OAT, LWC, and Water Droplet size (Mean Volumetric Diameter - MVD). Higher torque increase may be experienced in more severe icing conditions (higher LWC, larger MVD), but such conditions do not occur frequently in the atmosphere. Cloud formations that are know to contain high levels of icing, such as large vertical clouds, should be avoided.

Ice shedding from the MR will be experienced and this can be associated with vibrations or seen and heard, with small pieces of ice striking the windscreens.

Flight in Freezing Rain or Freezing Drizzle is not permitted as it is not covered by the current Airworthiness Rules for any type of aircraft. Freezing Rain and Drizzle (also known as Supercooled Large Droplets - SLD) consists of supercooled water droplets of sizes greater than the EASA/FAA Part 29 Appendix C, atmospheric definition used for Certification. These conditions, although rare, have a serious effect on any aircraft's performance.

Pilots must use normal operational planning and techniques to avoid flight in these conditions. If encountered inadvertently, the conditions must be vacated immediately.

LIPS FUNCTIONALITY

The LIPS system comprises of the following equipments:

— Cockpit indicating ICE CONDITION panel indicating the LWC value and the TIME IN ICE (Figure 2 and Figure 3)

— Limited Ice Protection System (LIPS) control box

— 2 Ice detectors and their associated processing units

— Heated Windscreens

— Main Gearbox mounted AC generator to supply electric power via a control box and distribution box to the heated windscreens

— LIPS System control panel on overhead panel (See Figure 1)

— SLD Marker installed on the right side of the fuselage, in view of the pilot through the lateral screen.

The LIPS control box has two independent channels (A and B) which receive the signals of OAT (from aircraft basic sensors via MAU) and the two ice detectors and determines the severity of the icing condition. The value of the LWC, temperature and time have specific maximum limits which have been determined for the 'Limited Icing' envelope. The exposure and severity of the icing is indicated to the pilot by CAS cautions, advisory messages and on the indicating panel

the LWC and “Time-In Ice” values. Icing is also indicated by a build up of ice on aircraft structure visible to the pilot, e.g. unheated area of windscreens, wiper arms, SLD marker.

For any exceedance indicated by the system the action is to vacate the icing conditions as soon as possible.

The “Limited Icing” conditions approved and incorporated in the LIPS logic on the AW139 are presented in Figure 4. Ambient OAT and LWC combination define 4 distinct zone when entering into the icing environment:

No-Ice Zone (Blue) - For any OAT above +0°C and any LWC value no icing can be expected on the aircraft.

No-Limit Zone (Green) - For OAT between +0°C and -6°C and LWC greater than zero and below 0.4 g/m^3 any icing that may be present is not detrimental to aircraft operation so this zone can be flown into with no time limits.

Time-Limited Zone (Yellow) - For OAT between +0°C and -6°C with LWC value between 0.4 g/m^3 and 0.5 g/m^3 and OAT between -6°C and -9°C and LWC values above 0.0 g/m^3 and up to 0.5 g/m^3 icing will be present and will accrete. The maximum continuous time or total cumulative time in this zone is 5 minutes before the conditions must be vacated.

Vacate Zone (Amber) - For OAT below +0°C and down to -9°C with LWC values of greater than 0.5 g/m^3 or OAT below -9 °C and any LWC greater than 0.0 g/m^3 ice accretion can be rapid and the conditions must me vacated.

VACATING THE ICING ENVIRONMENT

Vacating the icing environment, due to expire of the maximum “TIME LIMITED ZONE” of 5 minutes or entry into the “VACATE ZONE” requires the aircraft to manoeuvre into a less severe ambient OAT and LWC icing zone.

When vacating into the “NO-ICE ZONE” ice shedding will take place and after a period of 30 seconds in this zone the aircraft should be clear of ice and it is possible to re-enter the “TIME LIMITED ZONE”, if required.

When vacating into the “NO-LIMIT ZONE” there is no ice shedding but no increase in ice accumulation so these ambient conditions can be maintained with no time limit, however, re-entry into the “TIME LIMITED ZONE” is only permitted if a total time of 5 minutes in the “TIME LIMITED ZONE” has not occurred.

LIPS OPERATION

With the LIPS selected OFF and a temperature below +4°C the CAS 1-2 ICE DET OFF caution will illuminate, to indicate the system is off and icing conditions are being approached. Selecting the ICE DET switch ON, on the overhead panel activates the system, the AC GEN and WSHLD switches must also be selected ON (if not already selected ON) which will illuminate the green 1-2 WSHLD HTR ON advisory.

An ice encounter is indicated by the amber CAS ICE CONDITION caution and green ICE advisory illumination depending on the severity of the icing condition encountered.

Entry into the NO-LIMIT ZONE (Figure 2) causes the ICE CONDITION caution to illuminate for 5 seconds and the green ICE advisory illuminates. The LWC value is displayed on the panel but the time in ice condition does not increment as there is no time limit in this zone.

Entry into the “TIME-LIMITED ZONE” causes the ICE CONDITION caution to illuminate continuously (the ICE advisory extinguishes, if illuminated). The LWC value is displayed on the panel and the time in ice condition display increments as the maximum permitted time in this zone is 5 minutes. On expiry of the 5 minutes continuous time or total cumulative time in this zone the ICE LIMIT caution illuminates indicating to the pilot the icing conditions must be vacated.

To clear the ICE LIMIT caution the aircraft must enter the “NO-ICE ZONE. To reset the “TIME IN ICE counter to 0:0 a period of 30 seconds or more in the “NO ICE ZONE” (above 0 °C) is necessary.

Entry into the “VACATE ZONE” causes the ICE CONDITION and ICE LIMIT cautions to illuminate immediately indicating to the pilot the icing conditions must be vacated. When the aircraft is back in one of the reduced icing zones the caution extinguishes.

When vacating the icing zone if the aircraft enters the “NO LIMIT ZONE” the “TIME IN ICING” count stops and remains at the value when the zone was entered whether the entry into the NO-LIMIT ZONE was due to expiry of the time limit or not. If the time limit has not expired further excursions into the TIME LIMITED ZONE are permitted up to the maximum time allowed (5 minutes).

If the “NO-ICE ZONE” conditions are entered the time remains at the value when the zone was entered until a continuous time of 30 seconds has expired (allowing the ice to shed) then the “TIME IN ICE” is reset to zero.

Due to the tolerances of the OAT and ICE sensors and the LIPS algorithms used the cautions may illuminate when the values of OAT and LWC observed are in a different zone to that being indicated by the caution system. The LIPS operation is conservative, however, the caution procedures should be followed regardless of the indication of OAT and LWC and taking into consideration the other associated indication of icing.

As part of the LIPS system an SLD marker is installed on the right side of the fuselage, in view of the pilot through the lateral screen. The SLD marker is a composite sphere designed to help the pilot visually detect if SLD conditions are encountered. The sphere has a black central circle with yellow and red rings around it. Ice accretion can be easily seen on the black marker.

See Section 7 of this Supplement for detailed system information.

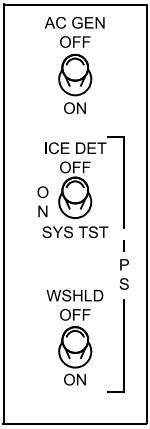

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Figure 1 LIPS and AC GEN Switches on Overhead Panel



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Figure 2 LIPS ICE CONDITIONS Panel

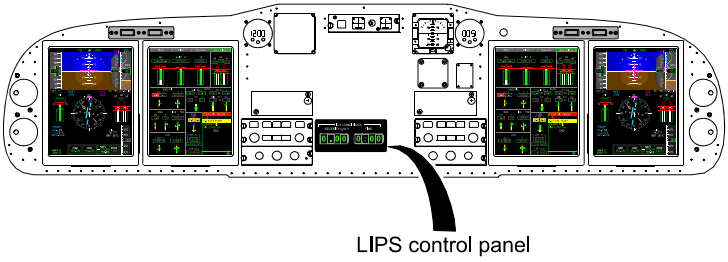

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Figure 3 LIPS Panel Position

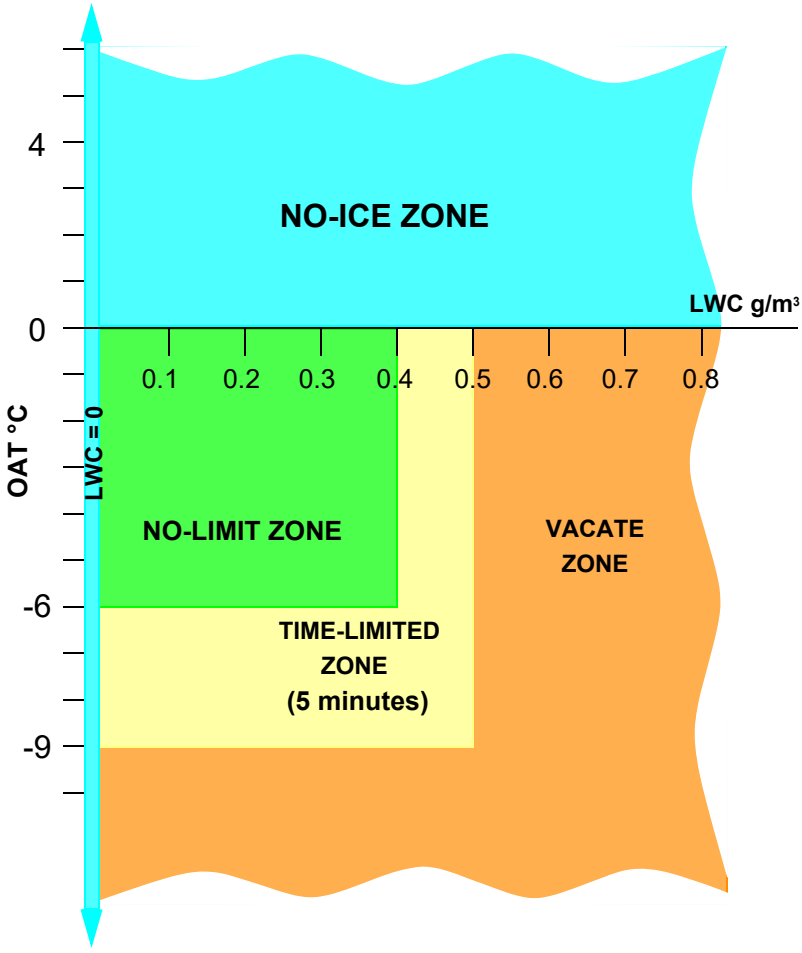


Figure 4 ICING zones for conditions with LWC above 0.0 g/m^3

SECTION 1 - LIMITATIONS

GENERAL

All other Limitations as stated in RFM for VFR/IFR operations, Supplement 22 Single Pilot IFR, Supplement 24 for VFR Night Single Pilot Operations, Supplement 12 for Category A Operations and Supplement 50 for Increased Gross Weight 6800 kg are applicable.

Operations in Limited Icing Conditions are only permitted if the helicopter configuration is in accordance with the document 139G3000A001 AW139 Icing Compatibility Reference Handbook. Any change to the aircraft configuration which effect icing and not included in this document, makes the aircraft NOT LIMITED ICING COMPATIBLE and operations in Limited Icing conditions are not permitted.

The LIPS equipment certification approval does NOT constitute operational approval. Operational approval for Limited Icing conditions must be granted by the Local Aviation Authority.

Any flight where Limited Icing conditions are encountered must be recorded in the helicopter log-book.

TYPE OF OPERATIONS

Limited icing assumes that the aircraft has the ability to vacate the icing conditions, at any time, with the availability of a band of positive air temperature of at least 500 ft height into which the aircraft can descend to de-ice naturally.

MINIMUM FLIGHT CREW

Limited Ice conditions - Two pilots

REQUIRED EQUIPMENT

— For Operations in Limited Icing conditions LIPS is to be installed (P/N: 4G3000F00111 “Kit Limited Ice Protection System”).

— Primus Epic system SW release 5.6 or higher versions.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the LIPS Kit, the new empty weight and center of gravity position must be determined.

AIRSPEED LIMITATIONS

V_{NE} Icing .....Figure 1-2

ALTITUDE AND TEMPERATURE LIMITATIONS

Altitude and temperature limitations for icing conditions .....Figure 1-3

MISCELLANEOUS LIMITATIONS

Rate Of Descent

Maximum Rate of descent in icing conditions ..... 1000 fpm
(or after icing encountered if ice is still present on the aircraft)

Time in Limited ICE

Maximum Time in Limited Ice (Intermittent) ..... 5 minutes
(Figure 1-1 Yellow Zone)

Freezing Rain / Freezing Drizzle / Supercooled Large Droplets (SLD)

Flight in known Freezing Rain, Freezing Drizzle or SLD conditions is prohibited.

In case of an encounter with Freezing Rain, Freezing Drizzle or SLD conditions, take immediate action to vacate the icing conditions.

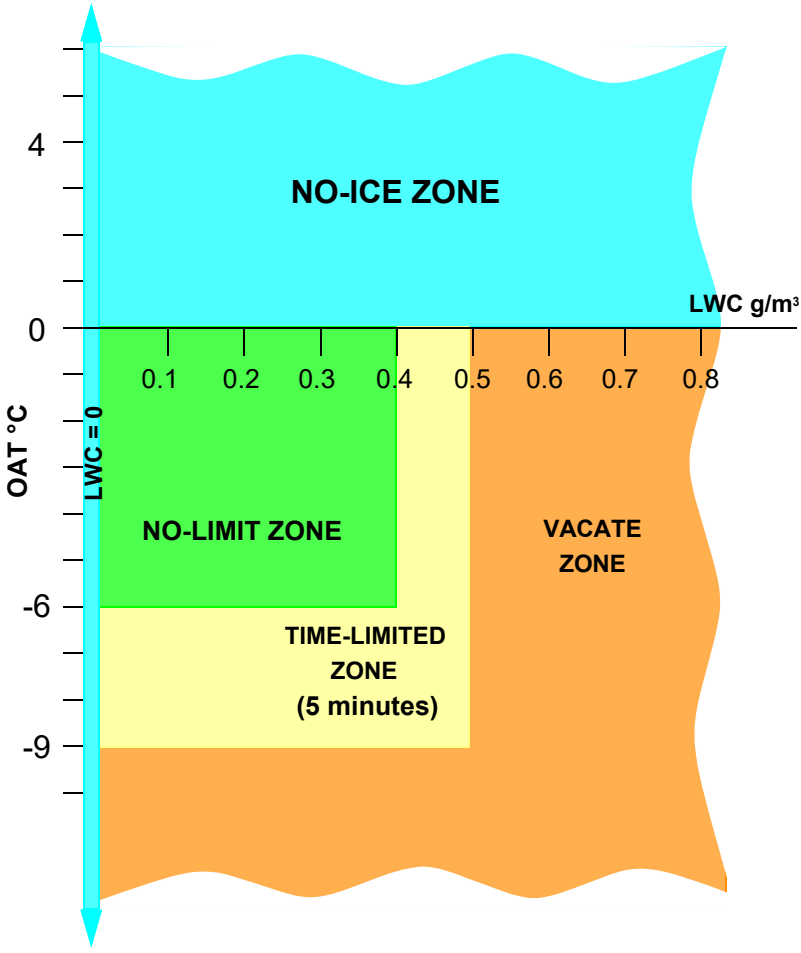


Figure 1-1 ICING zones for conditions with LWC above 0.0 g/m^3

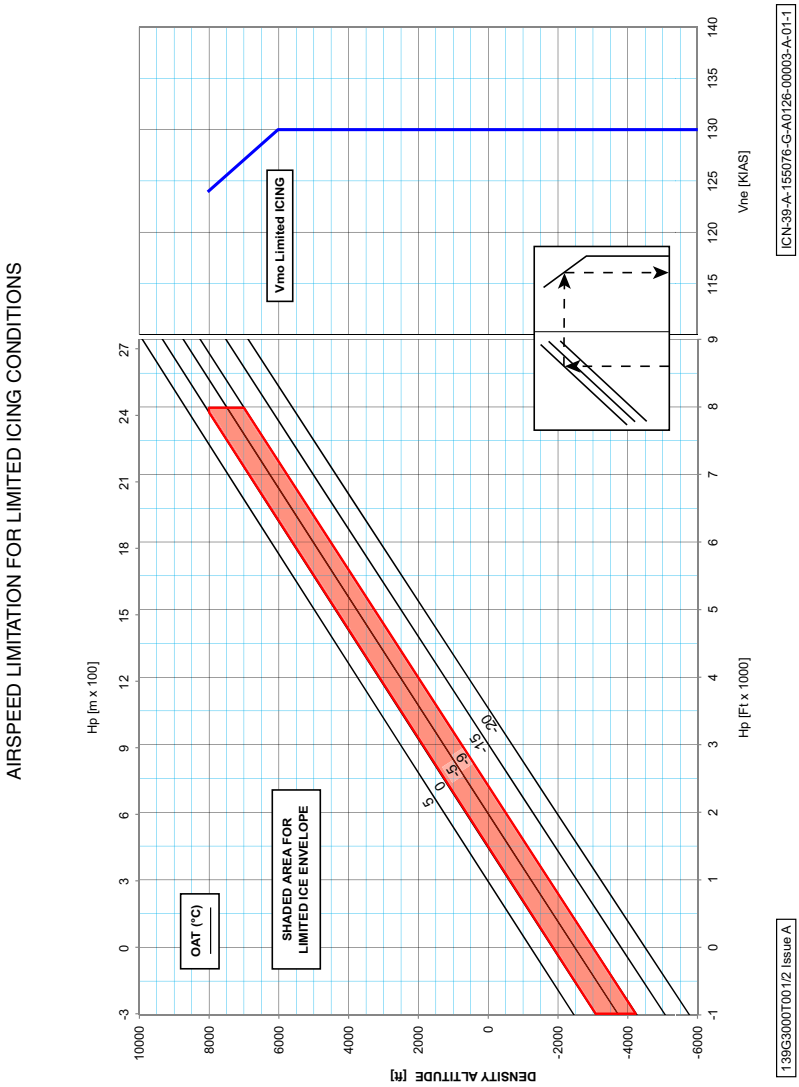


Figure 1-2 Airspeed Limitations for Limited Icing Conditions

AW139
ALTITUDE-OAT
Envelope for Limited ICING condition

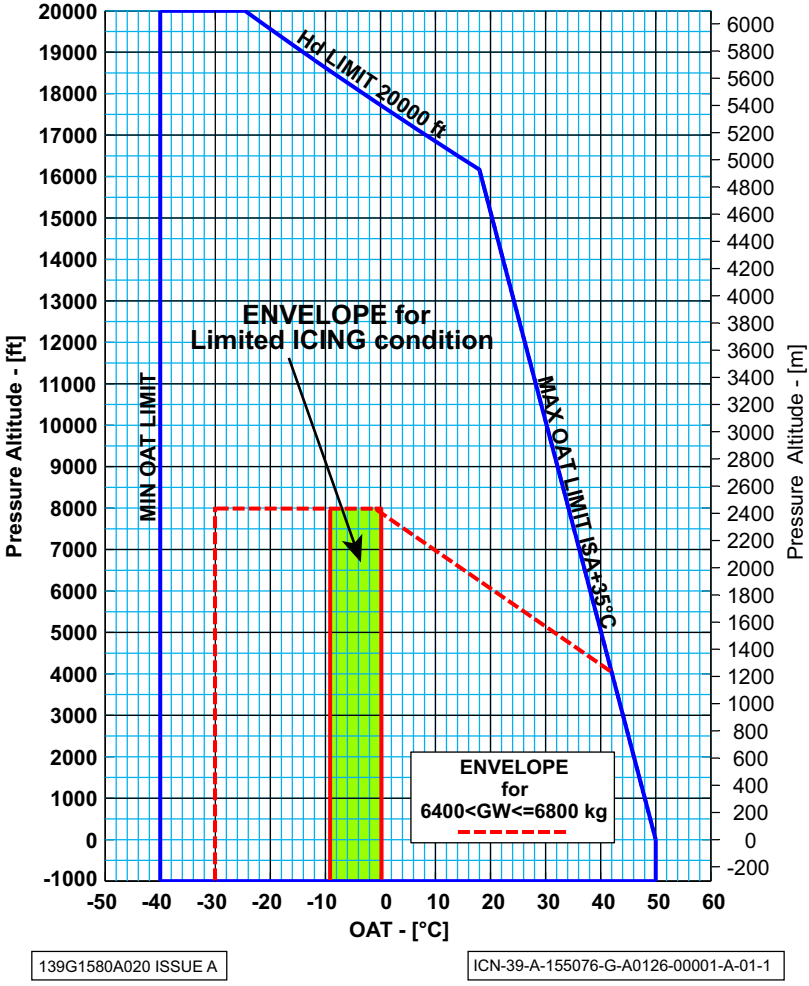
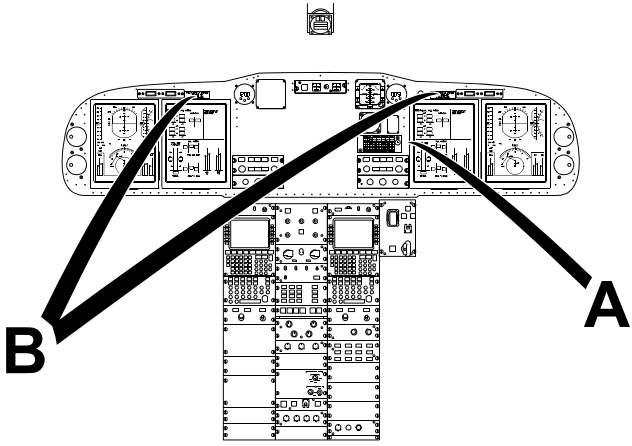


Figure 1-3 Altitude Temperature Limitations for LIPS Operation

PLACARDS



VIEW OF COCKPIT WITH PLACARD POSITIONS

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A

VNE POWER ON AIRSPEED LIMITATION KIAS						
Hp ft / OAT °C	-1000 to SL	4000	8000	10000	15000	20000
50	160	-	-	-	-	-
20	167	157	145	147	128	-
10	167	159	147	151	133	-
0	167	162	150	156	136	-
-10	167	164	154	159	139	-
-25 AND BELOW	167	167	158	165	144	125
VNE OEI/PWR OFF=VNE PWR ON LESS 20 KIAS					V_{LE}/V_{LO}=150 KIAS	
VNE LIMITED ICING = VNE PWR ON LESS 37 KIAS						

B

APPROVED TYPES OF OPERATION
VFR (DAY/NIGHT) / IFR
LIMITED ICING CONDITIONS
FLT IN FREEZING RN/DZ/SLD PROHIBITED

Installed on the instrument panel when the aircraft configuration complies with document 139G3000A001

APPROVED TYPES OF OPERATION

DAY/NIGHT VFR
DAY/NIGHT IFR

ICING PROHIBITED

Installed on the instrument panel when the configuration does not comply with document 139G3000A001

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SECTION 2 - NORMAL PROCEDURES

GENERAL

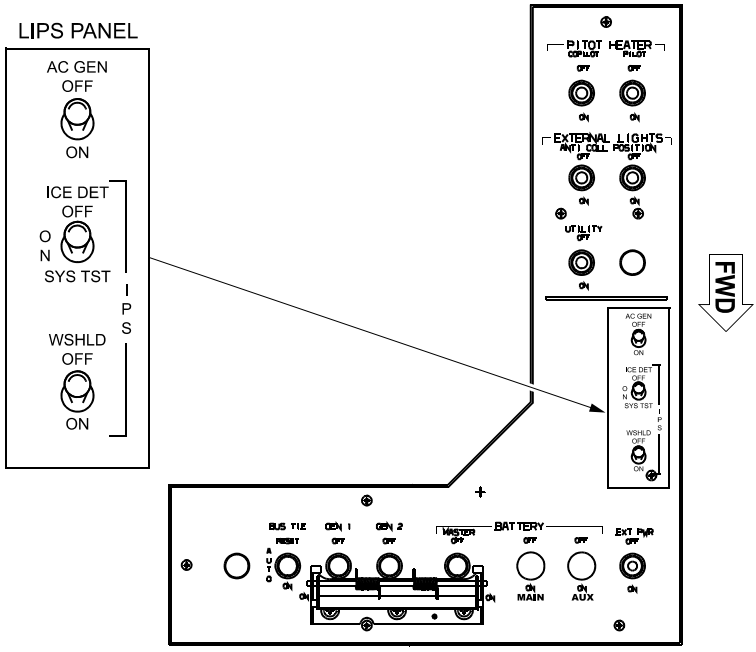

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Figure 2-1 AC GEN and LIPS Switches on Overhead Panel

When known icing conditions are expected to be encountered during the planned flight, periodically check OAT indications in the cockpit (PFD & OAT back-up sensor).

Pilot shall check AC GEN is ON, switch the PITOT HEAT, WSHLD and ICE DET to ON, when at least one of the following are present:

- 1-2 ICE DET OFF caution is displayed on CAS.
- 1 PITOT HEAT OFF and/or 2 PITOT HEAT OFF caution is displayed on CAS.
- OAT is +4°C or less on one of the OAT indications in the cockpit (PFD and/or Standby).

Note

The following natural visual cues shall also be taken into account:

- Ice accretion on SLD marker is detected
- Ice accretion on windshield and/or windshield wipers is detected.
- Conditions of visible moisture are encountered.

LIST OF CAS ADVISORIES

Caption (Green)	Condition
ICE	Displayed when at least one of the Ice Detectors detects LWC which is displayed on the ICE SEVERITY window of the LIPS panel.
1 WSHLD HTR ON	Displayed when Windshield 1 is heated by the LIPS system.
2 WSHLD HTR ON	Displayed when Windshield 2 is heated by the LIPS system.

LIPS PANEL MESSAGES

The LIPS panel SEVERITY and TIME window can display the following error codes, either during the system pre-flight test or in flight. (SEVERITY windows displays ice detector messages and TIME window displays windshield messages). They are displayed with ascending priority order as shown in the following list.

SEVERITY window	TIME window	System Status
###	###	LIPS panel test in progress
IPS	TEST	LIPS system test in progress
PNL	FAIL	LIPS panel failed
-.--		Both ice detectors failed
	---	All four IPS control box channels failed
WARM/UP		Ice detectors in warm up phase
	CHA/ FAIL	Loss of system Channel A, loss of redundancy (Displayed on ground only)
	CHB/ FAIL	Loss of system Channel B, loss of redundancy (Displayed on ground only)
MNT1		ICE DET 1, Maintenance Required (Displayed on ground only)
	MNT1	Loss of one sensor in windshield 1 (copilot) (Displayed on ground only)
MNT2		ICE DET 2, Maintenance Required (Displayed on ground only)
	MNT2	Loss of one sensor in windshield 2 (pilot) (Displayed on ground only)
MNT1/ MNT2		ICE DET 1 & 2 Maintenance Required (Displayed on ground only)
	MNT1/ MNT2	Loss of one sensor in windshield 1 & 2 (Displayed on ground only)

EXTERIOR CHECKS

1. Ice detectors — Condition
2. OAT sensors — Condition
3. SLD Marker — Condition
4. Engine Intakes — Check free of ice and snow, and for any possible accumulations inside the intake screens
5. All fuselage upper surfaces — Check free of ice, slush and snow

CAUTION

A/C should not be started until free of ice. The applicable de-ice procedure is detailed in the Maintenance Manual.

Note

At aircraft power electrical power on, the LIPS panel carries out automatically the "LAMP TEST", #### ### is shown on the display

BEFORE ENGINES START

1. AC GEN switch — Check OFF
2. ICE DET switch — Check OFF
3. WSHLD switch — Check OFF

Note

When no ice is expected along the route the AC GEN, WSHLD & ICE DET switches should be set to OFF.

AFTER ENGINES START

1.	NR	— Confirm 100%
2.	AC GEN switch	— Select ON
3.	ICE DET switch	— Select ON
4.	WSHLD switch	— Select ON
5.	LIPS Panel	— Check “**0:00**” displayed on TIME IN ICE and “**0.00**” on ICE SEVERITY window.
6.	LIPS Panel switch	— 15 seconds after AC GEN switch selected ON, select and hold the ICE DET ON/OFF/SYS TST switch to SYS TEST and confirm the LIPS panel “IPS TEST” is displayed and the following cautions illuminate: 2 ICE DET FAIL 1 ICE DET FAIL IPS FAIL ICE CONDITION ICE LIMIT . The test is completed, after approximately 5 seconds, ICE SEVERITY and TIME in ICE display “**0.00**“. & “**0:00**” again

PRE-TAKE OFF CHECKS

1.	AC GEN switch	— As required
2.	ICE DET switch	— As required
3.	WSHLD switch	— As required

IN FLIGHT PROCEDURES

When OAT is 4 °C or below and/or icing conditions are expected along the flight route and/or when visible moisture condition are encountered and/or ice accretion is detected during flight:

1. AC GEN switch — ON
2. ICE DET switch — ON
3. WSHLD switch — ON

With the LIPS system selected ON, entering icing conditions will cause illumination of the ICE CONDITION caution on the CAS and indication of “TIME IN ICE” and “ICE SEVERITY”. If the ambient conditions are within the NO-LIMIT ZONE the caution illuminates for 5 seconds only and the green ICE advisory illuminates.

When entering icing conditions a maximum airspeed of 120 KIAS is recommended until the severity of the icing conditions is established.

In cruise when ALT and IAS modes are engaged, if PI limiting is active the airspeed will automatically reduce to maintain altitude.

CAUTION

A power increase can be expected in icing conditions and should be carefully monitored by the pilot. The icing conditions should be vacated as soon as possible if excessive power increase or unacceptable or vibration are noted.

Note

Monitoring PI variation, IAS, OAT, LWC, ice accretion type (on visible structure and SLD Marker), amount of water streaming on the heated windscreen will all give good cues to the severity of the icing conditions.

APPROACH

PRE-LANDING CHECKS

1. AC GEN switch — As required
2. ICE DET switch — As required
3. WSHLD switch — As required

BEFORE ENGINES SHUT DOWN

1. WSHLD switch — Select OFF
2. ICE DET switch — Check OFF
3. AC GEN switch — Select OFF

CAUTION

Following flight in icing conditions, the pilot should warn personnel outside the A/C and/or crew members and passengers disembarking of the possibility of shedding ice from the rotors and/or other parts of the helicopter, which could be hazardous. Personnel should remain clear of the aircraft until the rotors have stopped.

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SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The LIPS is designed to maintain the maximum functionality in the event of failures. In some cases, failures will simply be a loss of sensor redundancy, in other cases some loss of sensor readings.

Loss of one ICE DET sensor and/or one OAT sensor is only a loss of system redundancy with no effect on system functionality.

A double OAT sensor failure will also cause a loss of both ICE DET sensors.

Cautions AC GEN FAIL and/or AC BUS FAIL will suppress 1-2 ICE DET FAIL and/or 1-2 WSHLD FAIL.

Selecting the LIPS ICE DET switch OFF then ON in case of a double ICE DET and/or double OAT and/or double WSHLD sensor failure can be beneficial to recover the system functionality.

If exceptionally severe icing conditions are encountered (including SLD) with or without failures, speed should be reduced to 80 KIAS and up to 110% PI used and the icing conditions vacated.

The pilot should be aware that, in case of general default mode functioning of LIPS, the PI, OAT, A/C vibrations and SLD marker should be closely monitor to understand the type of ice encountered.

PILOT ACTIONS IN CASE OF SEVERE ICE ENCOUNTERS

Severe icing conditions are indicated by some or all of the following:

- High PI rise (>30% above normal for flight condition)
- High LWC (>1.5 g/m^3)
- Heavy amounts of water streaming across windscreens
- Evidence of SLD (ice forming on sides of aircraft, SLD Marker)
- Increase in vibration
- Tendency for significant speed loss

Actions:

- Reduce speed to 80 KIAS
- Select 102% NR
- Use up to 110% PI
- Check for system failures
- Vacating icing conditions immediately

TABLE OF CAS CAUTIONS

CAS Caption on MFD	Page	Failure/System State
IPS FAIL	30	Displayed when the LIPS system has failed. (LIPS control box or OAT 1 & 2 data to ICB is lost)
ICE LIMIT	29	Displayed when TIME in ICE limit (5 minutes) is reached in flight or flight into icing VACATE ZONE.
ICE CONDITION	29	Displayed for 5 seconds when in the NO-LIMIT ZONE and displayed continuously when in the TIME LIMITED and VACATE ZONES.
1-2 ICE DET OFF	33	Displayed when ICE DET switch is selected OFF and OAT less than or equal to +4C
1 ICE DET FAIL	33	Displayed when Ice Detector 1 has failed
2 ICE DET FAIL	33	Displayed when Ice Detector 2 has failed
1-2 ICE DET FAIL	34	Displayed when Ice Detector 1 & 2 have failed
1 WSHLD HTR FAIL	34	Displayed when W/S 1 heating has failed
2 WSHLD HTR FAIL	34	Displayed when W/S 2 heating has failed
1-2 WSHLD HTR FAIL	35	Displayed when W/S 1 & 2 heating has failed and/or LIPS ICB failed
1 WSHLD HTR DEGR	36	Displayed when one or two W/S 1 temperature sensors are failed

2 WSHLD HTR DEGR	36	Displayed when one or two W/S 2 temperature sensors are failed
1-2 WSHLD HTR DEGR	36	Displayed when one or two W/S 1 & 2 temperature sensors are failed
AC GEN	30	Displayed when AC Generator has failed
AC GEN BUS	31	Displayed when AC GEN BUS has failed



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Figure 3-1 LIPS Panel (Example)

CAS CAUTION (ON MFD)

ICING CONDITION

ICE CONDITION

When caution illuminated continuously
Time limited icing zone entered

- Continue flight monitoring
TIME IN ICE, PI values, SLD marker and aircraft vibrations.
Prepare to change flight condition to reduce ice severity or vacate icing

TIME LIMIT IN ICE

ICE LIMIT + **ICE CONDITION**

Maximum Time in Limited Ice reached
or flight in the 'VACATE ZONE'

- When cautions remains illuminated
Manoeuvre to a reduced icing condition or vacate icing as soon as possible

LIPS SYSTEM FAIL

IPS FAIL

LIPS control box has failed,
AC power not available to LIPS or
OAT 1 and 2 data to ICB are lost

- Vacate the icing condition as soon as possible

AC GENERATOR FAILURE

AC GEN

AND

IPS FAIL

AC GEN failure
(No AC power available to LIPS)

- AC GEN switch, select OFF then ON

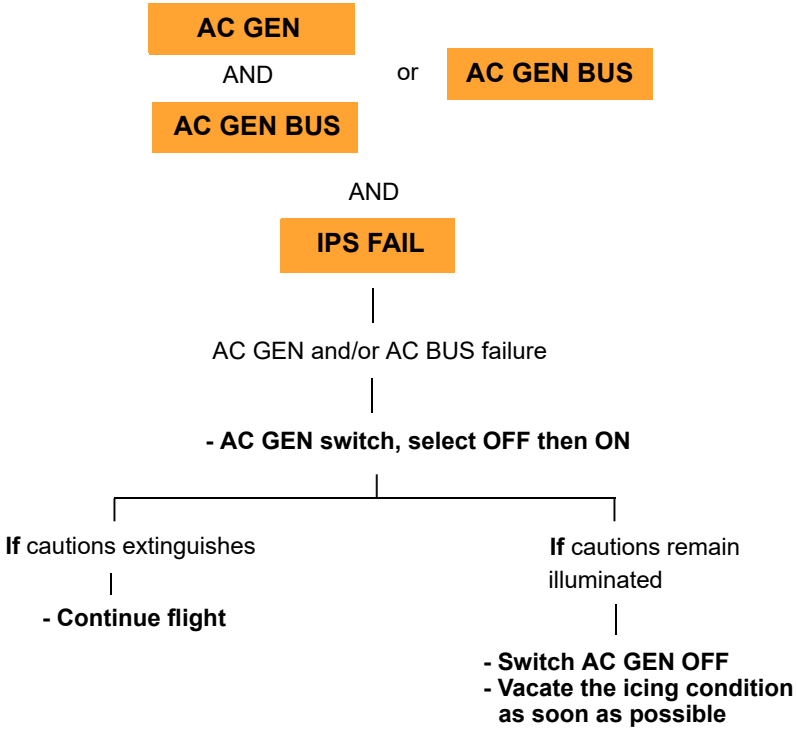
If cautions extinguishes

- Continue flight

If cautions remain illuminated

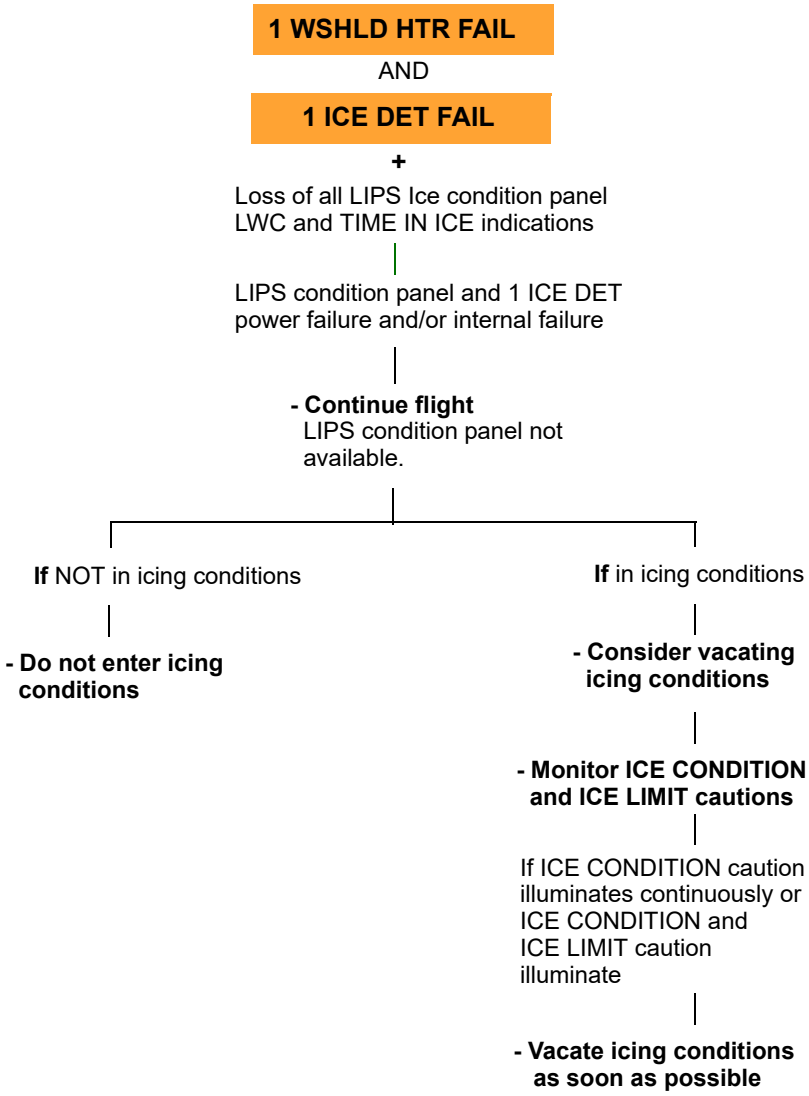
- Switch AC GEN OFF
- Vacate the icing condition as soon as possible

AC GENERATOR AND AC BUS FAILURE OR AC BUS FAILURE



DOUBLE DC GENERATOR FAILURE

The following assumes the DC BUS FAIL procedures, presented in Section 3 of the Basic Manual, have been followed and MAIN BUS 1 is confirmed as lost:



ICE DETECTORS OFF

1-2 ICE DET OFF

Both Ice Detectors OFF with OAT less than or equal to +4°C

- Switch ICE DET ON
- Switch AC GEN ON
- Switch WSHLD ON

If cautions extinguish

- Continue flight

If cautions remain illuminated

- Do NOT enter icing conditions or
- Vacate icing conditions as soon as possible

SINGLE ICE DETECTOR FAILURE

1 ICE DET FAIL

Ice Detector N°1 failed

- Continue flight

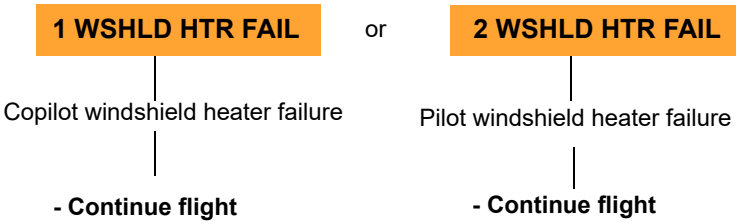
or

2 ICE DET FAIL

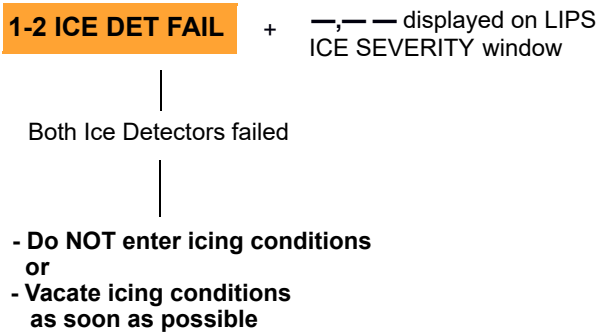
Ice Detector N°2 failed

- Continue flight

SINGLE WINDSHIELD HEATER FAILURE



DOUBLE ICE DETECTOR FAILURE



DOUBLE WINDSHIELD HEATER FAILURE

1-2 WSHLD HTR FAIL

Pilot and copilot windshield heater failure or
LIPS ICB communication failure

Note

Be aware when the SYS TEST is activated the TIME IN ICE indication is reset. Take note of the TIME IN ICE indication prior to selecting SYS TEST.

- Select and hold the ICE DET ON/ OFF/SYS TST switch to SYS TEST, confirm following cautions illuminate:
2 ICE DET FAIL
1 ICE DET FAIL
IPS FAIL
ICE CONDITION
ICE LIMIT

If cautions do not illuminate

LIPS failure

- Vacate icing conditions as soon as possible

If cautions illuminate

- Continue flight
Confirm, by touching windshields they are being heated.
Vacate icing conditions if visibility through windscreen unacceptable or ICE LIMIT caution illuminates

SINGLE WINDSHIELD HEATER DEGRADED

1 WSHLD HTR DEGR

Copilot windshield heater degraded

- Continue flight

or

2 WSHLD HTR DEGR

Pilot windshield heater degraded

- Continue flight

DOUBLE WINDSHIELD HEATER DEGRADED

1-2 WSHLD HTR DEGR

Pilot and copilot windshield heater degraded

- Continue flight
Vacate icing conditions if visibility through windscreen unacceptable. If forward visibility severly degraded, consider opening the storm window to enhance vision for landing

SECTION 4 - PERFORMANCE

RATE OF CLIMB REDUCTION IN LIMITED ICING CONDITIONS

LIMITED ICE PERFORMANCE

	MAXIMUM EXPECTED RATE OF CLIMB PENALTY
NO-LIMIT ZONE	GW < 5400 kg » ***-800 ft/min*** 5400 ≤ GW < 6400 kg » ***-700 ft/min*** 6400 ≤ GW ≤ 6800 kg » ***-600 ft/min***
TIME-LIMITED ZONE	GW < 5400 kg » ***-1500 ft/min*** 5400 ≤ GW < 6400 kg » ***-1200 ft/min*** 6400 ≤ GW ≤ 6800 kg » ***-1050 ft/min***

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Figure 4-1 Performance Reduction in Limited Icing Conditions

Note

The table above is valid for both AEO and OEI conditions and considers the maximum icing accretion that would be expected in the zone.

Note

Fuel consumption (See Basic RFM Section 9) will be increased by a maximum of 55 kg/hr. when the aircraft is operating with LIPS ON, in the “No-Limit Zone” icing conditions. This value will may increase during time in the “Time Limited Zone” depending on the severity of the icing whilst in that zone.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

The Limited Ice Protection System (LIPS) is composed of:

- Windshield anti-ice protection, continuous heating the frontal part of the pilot and copilot screens, not allowing ice accretion.
- Engine intakes passive protection, allowing proper airflow to engines even in case of ice accretion
- Heating power management and distribution by dual channel boxes
- Ice detectors for ice severity evaluation.
- One AC generator
- Additional Intake passive protections: ECS, cabin ventilation and AC GEN generator.
- The system has one control box: ICB, with two control channels (ch.A & ch.B).

Figure 7-1 is a schematic drawing of the components of the entire system and Figure 7-2 is the LIPS block diagram.

The 115V/400Hz AC power for the windshield heating is generated by one alternator (25KVA) fitted on the MGB.

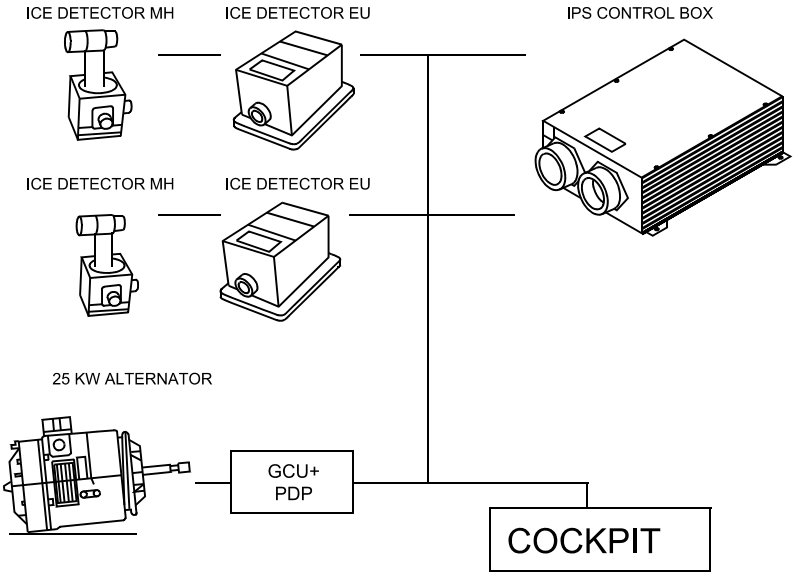

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Figure 7-1 Limited Ice Protection System Components

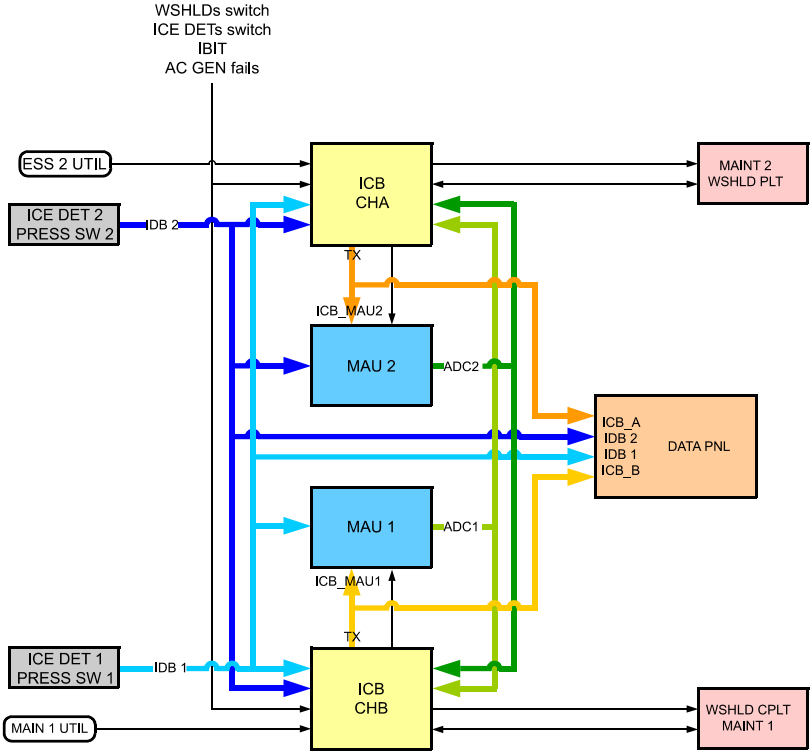

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Figure 7-2 LIPS Block Diagram

WINDSHIELD HEATING

Pilot and co-pilot windshields have the central area heated with an electrical conductive transparent film (See Figure 7-3).

Sensors embedded in each windscreen monitor the temperature to avoid overheating.

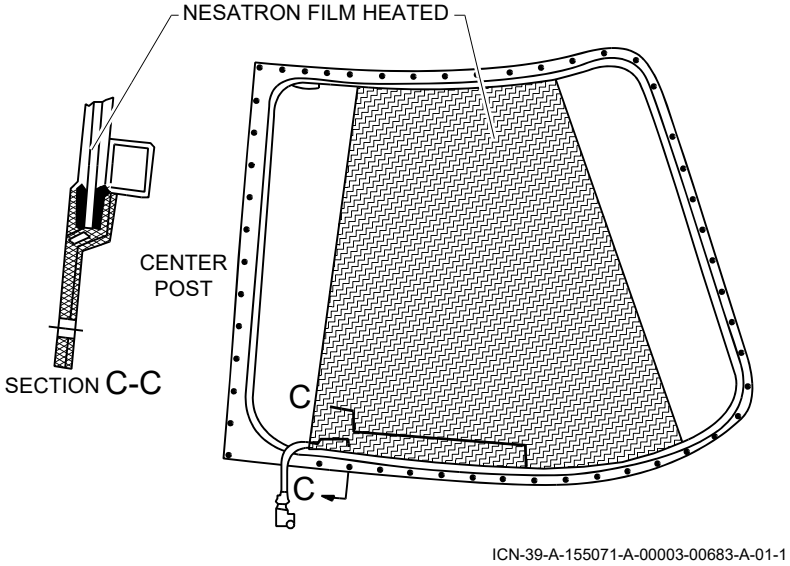

Figure 7-3 Windscreen Heating Zone

ENGINE INTAKE PROTECTION

Each main engine intake and each auxiliary engine intake is protected by an external screen with rear by-pass; ice is allowed to accrete on the screen while the air can enter the engines through the rear by-passes (See Figure 7-4).

Additionally each engine is protected from ice FOD by its annular screen at the compressor entry.

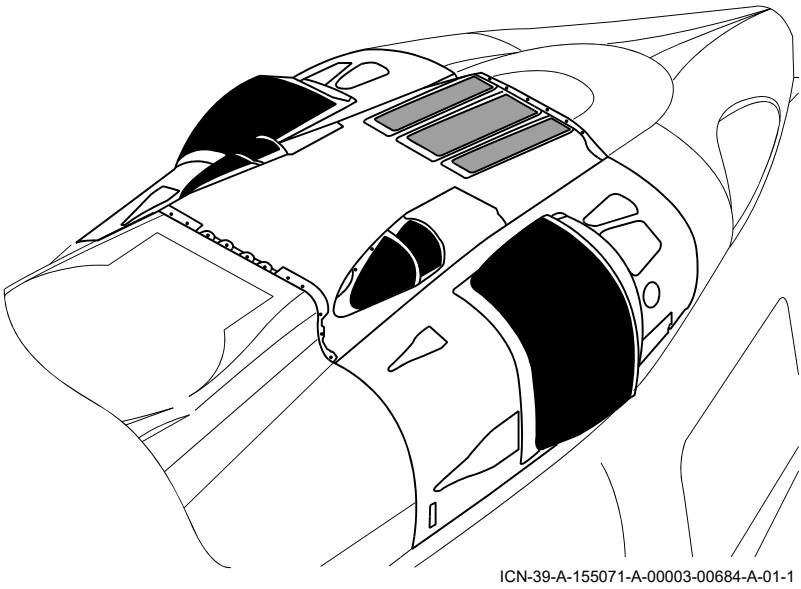

Figure 7-4 Engine Intakes Protection

SYSTEM MANAGEMENT

The system is managed by an LIPS Control Box (ICB) fitted in the rear of the baggage compartment, controlling the power distribution based on the data received from:

- the two ice detectors
- the two OAT sensors
- the temperature sensors fitted in the windshields.

On LIPS panel the LWC value along with TIME IN ICE are displayed on a dedicated panel, fitted in the central zone of the cockpit (See Figure 7-5).

The system functioning is selected by the three switches on the overhead panel, pilot side (See Figure 7-6).

TIME IN ICE is computed by the system with the higher LWC value given by the two ID and the lower OAT value measured by the two aircraft sensors.

Due to this configuration it may occur that the PFD OAT indication is in the “Continuous” LIPS area and the LIPS logic is displaying the “Intermittent area on the CAS list.



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Figure 7-5 LIPS Cockpit Panel

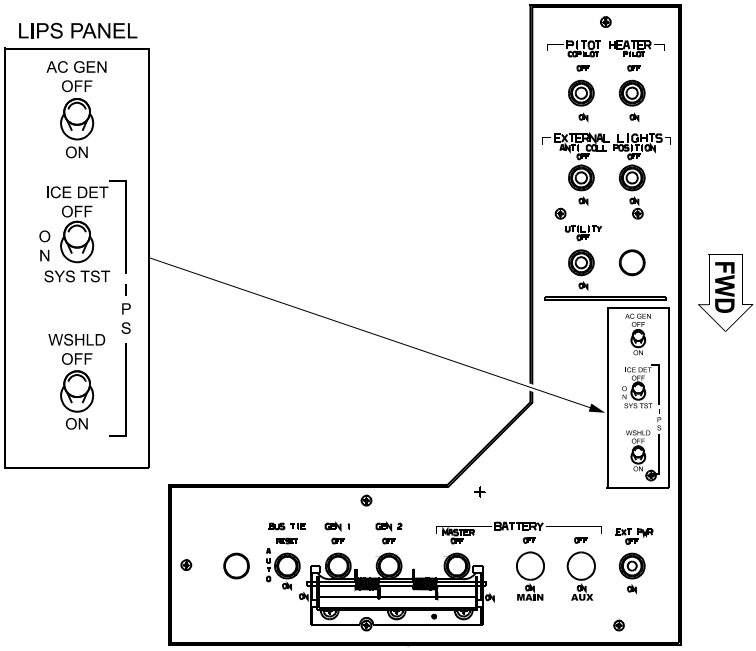

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Figure 7-6 LIPS Switches on Overhead Panel

ICE DETECTORS

The two ice detector measuring heads are fitted on the fuselage above the pilots doors (See Figure 7-7), while their control boxes are fitted in the cabin roof.

Each measuring head receives bleed air from the engines through dedicated piping to allow proper airflow to the sensors even in case of low speed or hover (using bleed air for suction of external air).

Ice detectors measure ice severity (Liquid Water Content, LWC, in g/m^3) based on the speed of obscuration of three optical sensors when ice accretes on a vertical bar exposed to the airflow.

The system logic uses the higher value given by the two ID's to display the actual LWC value on the LIPS cockpit panel and to compute the parameter "TIME IN ICE", also displayed on the LIPS cockpit panel.

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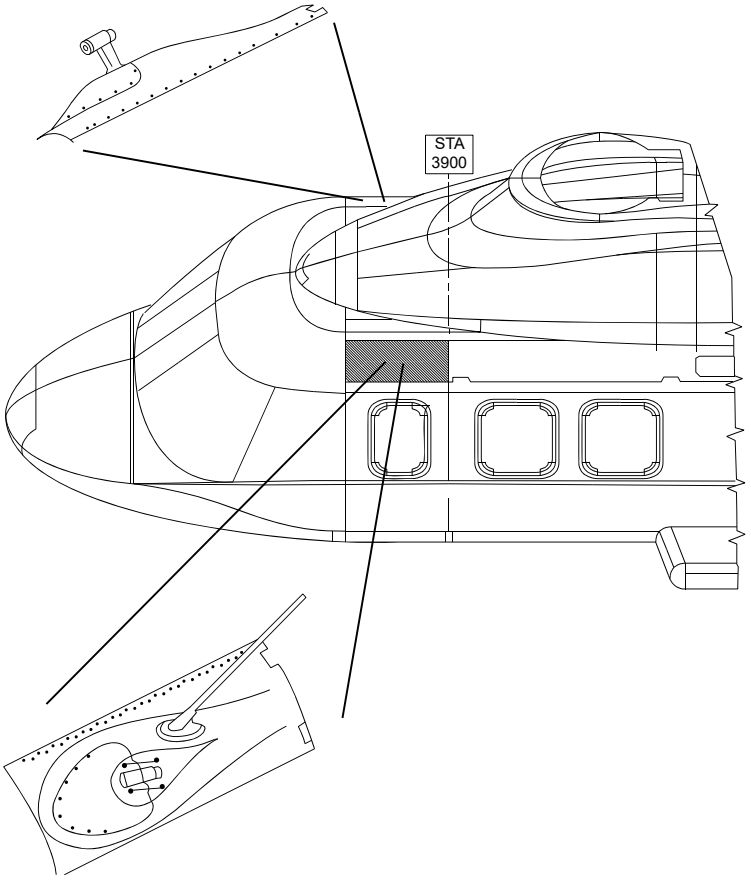

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Figure 7-7 Ice Detector Positions

SLD MARKER

This feature is installed on the pilot side and it is designed to help the pilot to detect if SLD conditions are encountered, when the red marker is completely covered with ice.

The SLD marker is a composite sphere (See Figure 7-8), installed with a support on the right side of the fuselage, positioned where the pilot can promptly determine ice accretion on it by simply looking outside the lateral screen. The sphere is provided with circular bands having three different colours: the ice accretes on the different zones, depending on the MVD. The black and yellow zone (near the stagnation point) are relevant to the conditions of the icing envelopes. When ice starts to accrete on the yellow zone (away from the stagnation point, therefore registering ice accretion only when MVD is high) a significant (but still not critical) PI increase is expected.

Ice accretion on the red zone is an indication of icing conditions outside the certification envelopes for which the LIPS is designed to operate. The SLD marker is presently not de-iced, therefore its suitability to detect SLD conditions and is limited by excessive accretion of ice on the sphere.

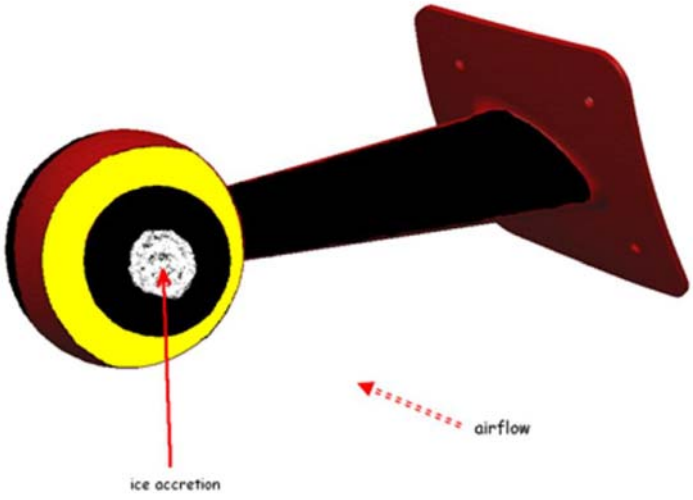

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Figure 7-8 SLD Marker

LIPS UTILITY C/B PANEL

The C/B panel is installed on the cabin wall over the copilot seat (See Figure 7-9).

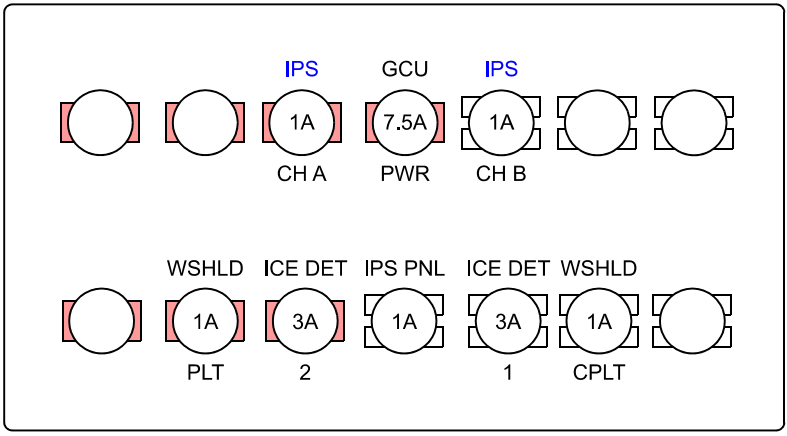

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Figure 7-9 LIPS C/B Panel

LIPS TEST MODE

LIPS SYS/TST function test duration is approximately 5 seconds, following an ON/OFF switching the time for system activation is approximately 15 seconds.

SYSTEM CONTROL AND CAUTION/ADVISORY LOGIC

The ICB controls the system through 2 different “chains”:

1. **ICB-W/S chain** (W/S heating control)

   If ICB Ch A fails, W/S2 (pilot) is lost;

   If ICB Ch B fails, W/S1 (copilot) is lost.

   The windshields anti-icing is started as soon as the LIPS is switched ON, not when LWC is detected. This is to give the crew the additional option to de-mist the screens when the helicopter is out of the clouds.

2. **ICB-cockpit panel** (System status to flight crew)

The LIPS ICB has two independent, redundant channels (CH A & CH B) that work in parallel. The ICB manages power to the two heated windshields, CH A controls the pilot windshield (WSHLD 2) and CH B the copilot windshield (WSHLD 1).

The ICB CH A and CH B are independent from the cockpit panel channel.

The operation of the windshield heating is via the WSHLD ON/OFF switch mounted in the overhead panel. AC power to the windshield heating elements is regulated by values from the temperature sensors, fitted within the windshields, which are used to turn the power on and off to maintain the temperature of the windshield between 35°C and 52°C. An overheat threshold of 82°C is used by the ICB to shut down the relevant windshield heating if the value is reached or superseded. If one of the three temperature sensors fails the ICB uses the remaining sensors to control the power. If a second sensor fails the ICB indicates a DEGRADED status and uses the remaining sensor to control the temperature. In the event of failure of all the three sensors the ICB indicates a FAIL status and shuts down the relevant windscreen.

The ICB has two ARINC429 input lines (high speed) for the two ICE DETECTOR signals. The ICB compares the LWC worst value (MAX) to the predefined limits and signals and alarm if the limit has been exceeded. A failure of one ice detector causes the ICB to use just the values from the other ice detector.

A further two ARINC429 lines (low speed) are used to receive the OAT values from each MAU (ADC 1 and 2), the system uses the lower of the two.

The LIPS panel SEVERITY and TIME window can display error codes, either during the system pre-flight test or in flight. See list on page 19.

The LIPS "ICE LIMIT" and "TIME IN ICE" logic starts from a positive LWC and OAT below +4°C to initiate actions.

If LWC is above 0.0 g/m^3 and up to 0.4 g/m^3 with an OAT above -6°C there is no time limit for flying in these condition (green zone: NO-LIMIT ZONE “Continuous” limited ice). CAS caution message ICE CONDITION displayed for 5 seconds and ICE green advisory illuminates.

For LWC values between 0.4 g/m^3 and 0.5 g/m^3 and OAT up to -9°C or for LWC greater than 0.0 g/m^3 and up to 0.4 g/m^3 with OAT between -6 and -9°C the time in ice is limited to 5 minutes (yellow area - TIME LIMITED ZONE “Intermittent” limited ice). CAS caution message ICE CONDITION displayed. The "TIME IN ICE" starts to count, when it reaches 5 minutes of continuous flight in this zone the CAS caution ICE LIMIT is displayed. To clear the ICE LIMIT caution generated by the 5 minute time limit the aircraft must enter the “NO-ICE ZONE”. There is some hysteresis around the zone limit threshholds depending on the LWC and OAT values encountered but this logic is managed within the LIPS system.

If the flight in “TIME LIMITED ZONE” icing condition returns from the yellow zone to green or blue the "TIME IN ICE" counter is frozen and continues counting again if the yellow or red zones are re-entered. After a minimum of 30 seconds in the blue zone as indicated in Figure 4 the “TIME IN ICE” is reset to 0:0. There is some hysteresis around the zone limit threshholds depending on the LWC and OAT values encountered but this logic is managed within the LIPS system.

Therefore, it may occur that the PFD OAT indication is in the “Continuous” LIPS area and the LIPS logic is displaying the “Intermittent” area on the CAS list.

For conditions with LWC greater than 0.5 g/m^3 (at any OAT below +0 °C) or for any value of LWC greater than 0.0 g/m^3 but with OAT below -9°C the flight in that zone is to be avoided (amber area - “VACATE ZONE”). The CAS caution ICE CONDITION and ICE LIMIT illumi-

nated immediately, see Figure 4. When the “VACATE ZONE” has been vacated the ICE LIMIT caution will extinguish.

In normal conditions the controls are:

ICB Ch A	ICB Ch B
W/S 2 (RH pilot)	W/S 1 (LH Pilot)
Ice detect. 1/2	Ice Detect 1/2

In case of ICB Ch A failure, the ICB Ch B controls:

W/S 1 (LH pilot)

Ice detect. 1/2

In case of ICB Ch B failure, the ICB Ch A controls:

W/S 2 (RH pilot)

Ice detect.1/2

AC POWER DISTRIBUTION

The power required by the ice detectors and the windshields is supplied by the 25 KVA Generator mounted on the MGB.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 77

GOODRICH LANDING GEAR

P/N 4G3200F00111
P/N 4G3200F00112
P/N 4G3200F00113

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SUPPLEMENT 77
GOODRICH LANDING GEAR

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GENERAL INFORMATION

The Goodrich Landing Gear is available as an option to substitute the standard Liebherr Landing Gear.

The Goodrich Landing Gear provides the aircraft with more ground clearance and improves taxiing characteristics on rough ground at weights up to 6800kg.

The installation of this landing gear includes a different sponson design, due to the different mounting, geometry and retraction mechanism of the landing gear. The landing gear control panel, in the cockpit, is supplied by a different manufacturer, however, it is identical, externally and functionally, to the standad landing gear control panel.

Due to the different sponson design the Life Raft installation (Ditching Configurations Supplement 9) has also been modified to be compatible with the new sponson (P/N 4G2560F00711). The life rafts are mounted vertically, however, functionality has not changed.

The Emergency Flotation System P/N 3G9560F00113 may be installed with the Goodrich Landing Gear. (Ditching Configurations Supplement 9).

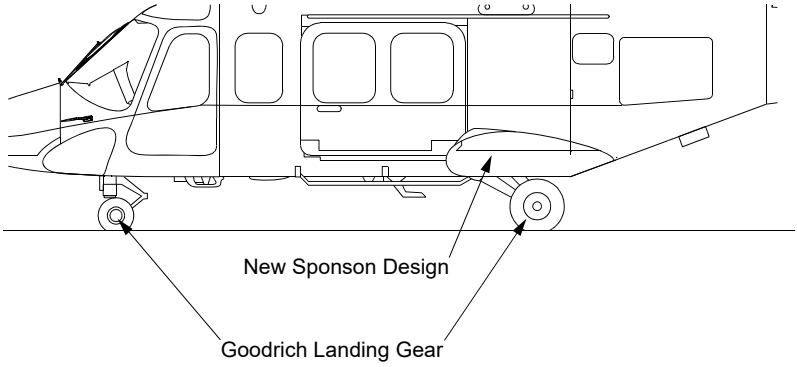

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Figure 1 Goodrich Landing Gear Installation Side View

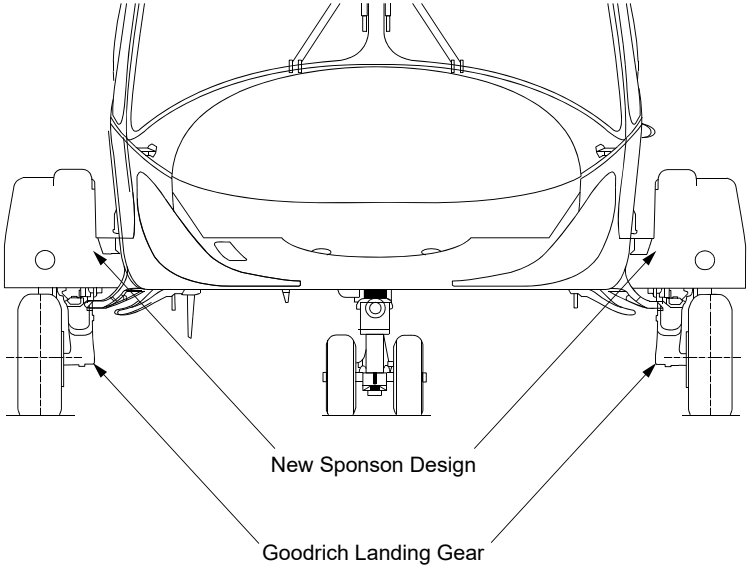

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Figure 2 Goodrich Landing Gear Installation Front View

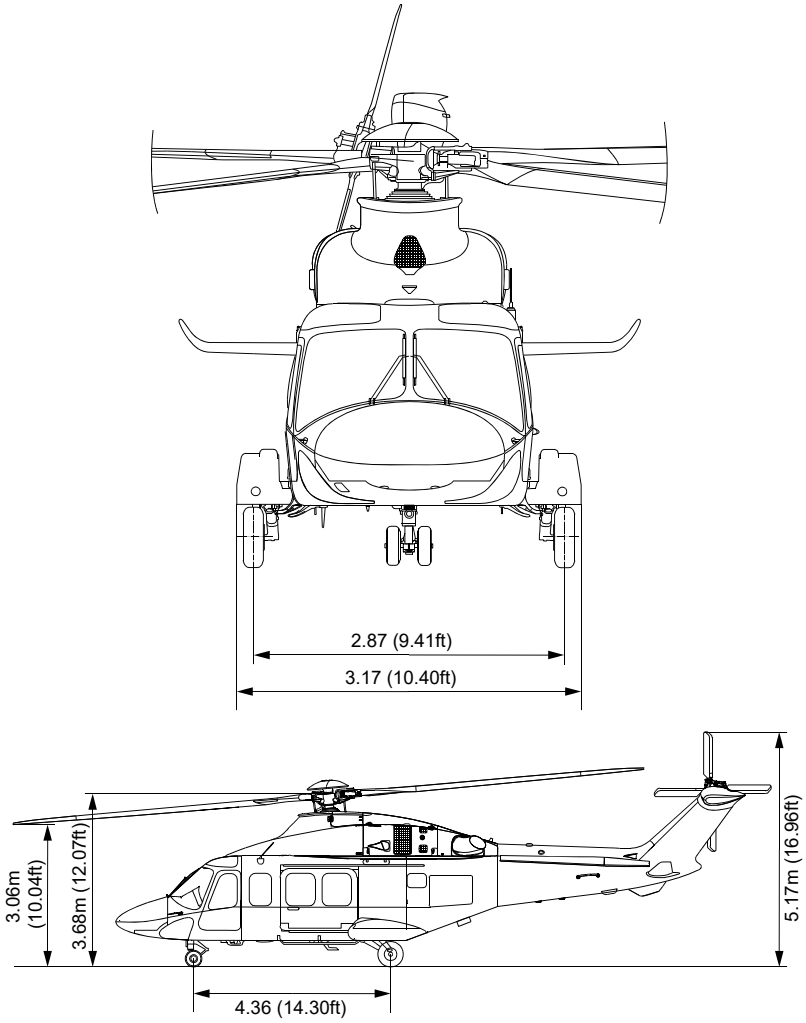

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Figure 3 Changes to Aircraft Dimensions with Goodrich Landing Gear

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SECTION 1 - LIMITATIONS

For limitations not included in this Supplement see Basic RFM, Supplement 6 Slope Landing, Supplement 9 Ditching Configurations, Supplement 12 CAT A Operations, Supplement 50 Increased Gross Weight 6800kg and Supplement 51 Take Off and Landing Altitude Extension.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Goodrich Landing Gear the new empty weight and center of gravity position must be determined.

WEIGHT

Maximum Gross weight for towing ..... 6450 kg

Maximum Gross Weight for taxiing ..... 6800 kg

Maximum Gross weight for CAT B Take Off / Landing..... 6800 kg

Maximum Gross weight for CAT A Take Off / Landing
(Clear Area only)..... 6800 kg

GROUND SPEED LIMITATIONS

On Paved Surfaces

Maximum taxi speed .....40 knots
(74 km/hr)
(above 20 knots (36km/hr) nose wheel must be locked fore and aft)

Maximum for emergency landing speed
(nose wheel locked in fore and aft position .....60 knots
(110 km/hr)

On Prepared Grass Surfaces

Maximum taxi speed
(above 10 knots (18 km/hr) nose wheel must be locked fore and aft) .....20 knots
(37 km/hr)

Maximum for emergency landing speed
(nose wheel locked fore and aft) ..... 40 knots
(74 km/hr)

ALTITUDE LIMITATIONS

Maximum operating altitude weight up to 6400 kg .... 20000 ft (6100 m)

Maximum operating altitude for weights between 6400 kg 6800 kg ..... 8000 ft (2400 m)

Minimum operating altitude .....Figure 1-1

Maximum Take Off and Landing Altitude .....Figure 1-1

AMBIENT AIR TEMPERATURE LIMITATIONS

Minimum temperature for ground starting ..... -40° C

Maximum ambient air temperature .....Figure 1-1

Minimum ambient Air Temperature .....Figure 1-1

Maximum ambient temperature for Take-Off and Landing at weights between 6400 kg & 6800 kg) (Supplement 50).....Figure 1-6

Maximum ambient temperature for Take-Off and Landing Envelope Extension (Supplement 51) .....Figure 1-2

SLOPE LIMITATION

Sloped Take Off and Landing are limited to the following, provided the build standard as defined in Supplement 6 Slope Operation Envelope Extension is incorporated:

Nose up.....10°

Nose Down.....10°

Left Wing Low .....10°

Right Wing Low .....10°

HYDRAULIC SYSTEM LIMITATIONS

The only hydraulic fluid authorised for use with the Goodrich Landing Gear is as follows:

AUTHORIZED HYDRAULIC FLUIDS

Applicable Specification	Brand Names (For reference only)
MIL-PRF-83282	AEROSHELL FLUID 31
MIL-PRF-5606	AEROSHELL FLUID 41

CATEGORY A LIMITATIONS

Only Category A Clear Area and Clear Area Training procedure may be carried out with the Goodrich Landing Gear. All other Category A procedures are prohibited.

SNOW SKIDS/SLUMP PADS LIMITATIONS

Snow Skids Kit (Supplement 19) or Slump Pad Kits (Supplement 20) can not be installed on the Goodrich Landing Gear.

TAKE-OFF/LANDING ENVELOPE

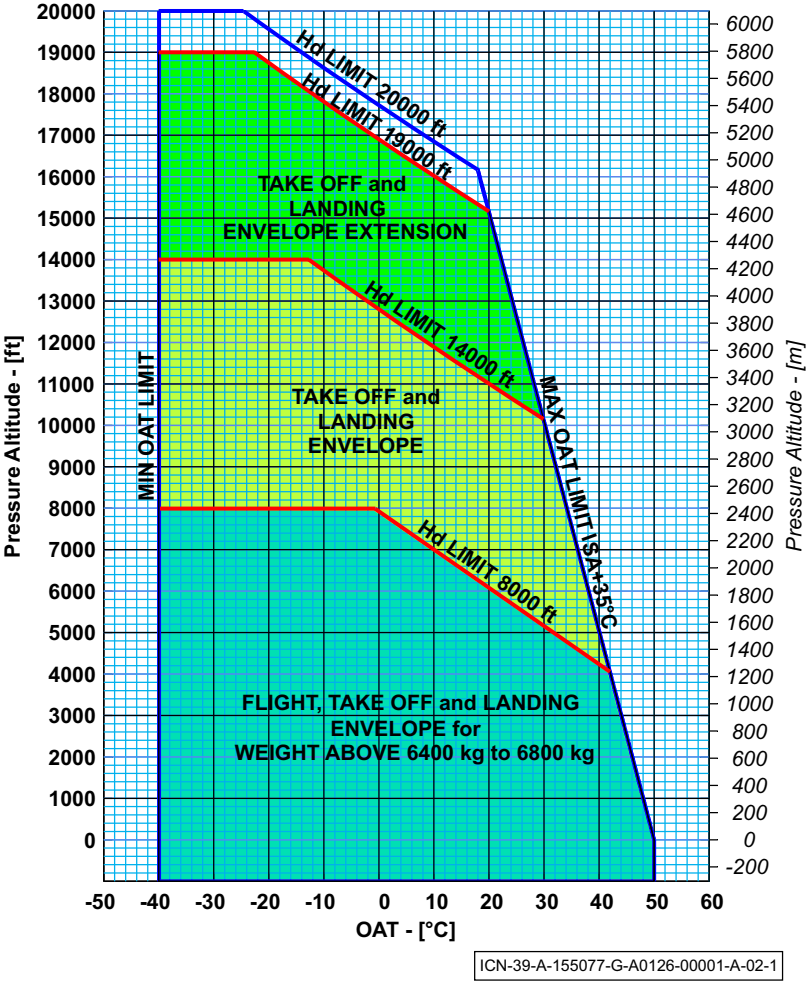

Figure 1-1 Altitude and OAT Limitations

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No change in aircraft performance when the Goodrich Landing Gear is installed, refer to Basic RFM for AEO and OEI Hover charts.

When the Goodrich Landing Gear is installed together with one or more of the following kits:

- Hoist (Breeze Supplement 11, Goodrich Supplement 41, 49)
- Searchlight installation (Supplement 29, 44, 53).

the climb performance is reduced by:

ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 78

RADIO EQUIPMENT
ADS-B TRANSMITTER

P/N 4G3450F01111

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SUPPLEMENT 78
RADIO EQUIPMENT
ADS-B TRANSMITTER

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GENERAL INFORMATION

The FreeFlight Systems FDL-978-TX Universal Access Transceiver (UAT) Automatic Dependent Surveillance - Broadcast (ADS-B) Out Transmitter is a 978 Mhz class B1 transmitter which broadcasts periodically (once per second) the aircraft position, speed and other flight information. This information may can be displayed to an ATC and other aircraft which have suitable equipment. The equipment satisfies the DO-282B MOPS and the TSO-C154c requirements for UAT ADS-B class B1 and B1S equipment and has been shown to meet the equipment requirements of 14CFR §91.227.

The system comprises of a Front Panel Controller TC-978 mounted in the cockpit interseat console (See Figure 1), the FDL-978-TX Transmitter mounted in the baggage compartment, two antennae installed on the top and bottom of the tail and all associated wiring.

The system is connected to the aircraft systems for GPS position, altitude, airspeed and other aircraft parameters which are configured in the installation.

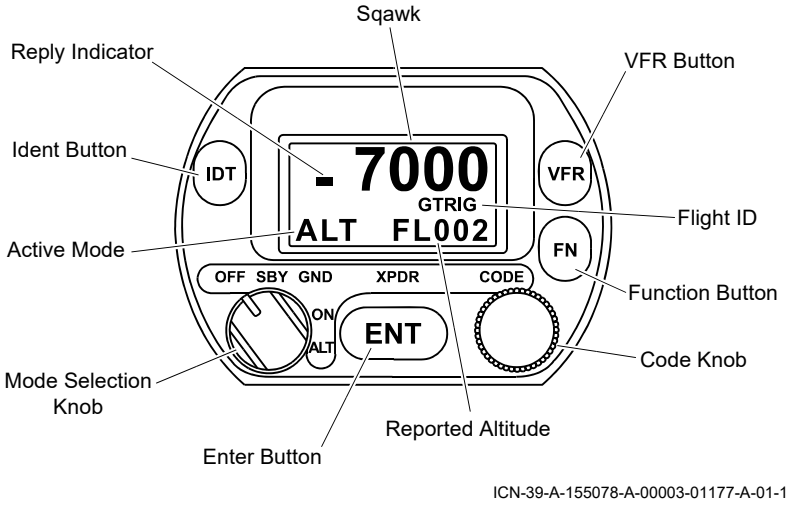

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Figure 1 TC-978 Front Panel Controller

Control panel operation is shown below for full information on the use of the FDL-978-TX ADS-B Transmitter refer to FreeFlight Systems FDL-978-TX ADS-B Transmitter Pilot Guide/User Manual 86961 Rev A or latest revision.

Mode Selection Knob Functions

OFF	Power is removed from the FDL-978-TX.
SBY	The FDL-978-TX is on but will not transmit any ADS-B messages.
GND	The FDL-978-TX is placed in Airborne Transmission Mode or automatically switches between Airborne and Ground Mode with WOW switch and the aircraft velocity meets the criteria described in DO-282B for the specific aircraft configuration. Pressure altitude is displayed.
ON	The FDL-978-TX is placed in Airborne Transmission Mode or automatically switches between Airborne and Ground Mode with WOW switch and the aircraft velocity meets the criteria described in DO-282B for the specific aircraft configuration. Pressure altitude reporting is suppressed.
ALT	The FDL-978-TX is placed in Airborne Transmission Mode or automatically switches between Airborne and Ground Mode with WOW switch and the aircraft velocity meets the criteria described in DO-282B for the specific aircraft configuration. Pressure altitude is reported.

Push Buttons

IDT	Press the IDT button when ATC instructs you to “Ident” or “Squawk Ident”.
FN	Pressing the FN button provides access to changing the Call Sign/ Flight ID. You may either directly rotate the code knob or press the key and the first character of the flight ID will be highlighted. Use the rotary code knob to select your choice of alpha-numeric characters. Press again and the cursor moves to the next character. You must present each time all the way through the 8 characters to save your Call Sign/ Flight ID change. Pressing the button again allows the pilot to view the present position being transmitted. Pressing the button a third time allows the pilot to view the FDL-978-TX WARNINGS.

VFR	Pressing the VFR button sets the ADS-B to the pre-programmed conspicuity code and VFR Flight ID. Pressing the button again restores the previous squawk code and Flight ID.
ENT	The ENT button enters a digit in the code selector.

Code Selector Knob

The right hand knob is used to set squawk codes and the Flight ID. The FN button selects which will be updated. Turning the knob will highlight the first digit on the display, and the digit can be changed as required. Press the ENT button to advance to the next digit. When ENT is pressed on the last digit, the new squawk code or Flight ID will replace the previous value. If the code entry is not completed within 7 seconds the changes are ignored and the previous code restored.

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the FreeFlight ADS-B Kit, the new empty weight and center of gravity position must be determined.

UAT LIMITATIONS

The UAT Call Sign/Flight ID must correspond to the aircraft call sign, entered on the flight plan or, if no flight plan active, the aircraft registration and correspond with the aircraft basic transponder code.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE FLIGHT CHECK

AREA N°3 & 5 (Tail Boom)

1. ADS-B antennae (2)	— Condition and security of upper and lower antenna.

SYSTEM CHECKS

1. ADS-B TC-978 controller mode select knob	— Select ALT (or as required) and after completion of the Power On Self Test confirm no fault messages present. Select Call Sign/Flight ID and SQUAWK CODE as required. Ensure ALT (GRD or ON if required) is selected prior to commencing taxiing.

IN FLIGHT PROCEDURES

CAUTION

The UAT Call Sign/Flight ID must correspond with the aircraft basic transponder (XPDR) code.

Note

The ADS-B transmitter transmits data parameters from the pilots side MAU 2 only. If, for any reason, the FD arrow is pointing to the copilot side, and a miscompare message is displayed, either select the ADS-B transmitter to STBY or OFF or return the FD arrow to the pilot side.

Note

The ADS-B TC-978 controller should be selected to ALT mode for the entire duration of the flight including ground manouvres, however, if required for operational reasons GRD or ON can be selected.

Note

For full information on the use of the FDL-978-TX ADS-B Transmitter refer to FreeFlight Systems FDL-978-TX ADS-B Transmitter Pilot Guide/User Manual 86961 Rev A or latest revision.

Note

Use of sunglasses may cause difficulty in reading the TC-978 Front Panel Controller.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure confirmed.

CAUTION

Ensure that the ADS-B Transmitter is switched OFF.

UAT TRANSPONDER FAILURE

If the transponder detects a critical internal failure the screen will indicate FAULT with a brief statement of the problem. No ADS-B messages will be transmitted when a fault has been detected.

Ensure adequate procedures are followed in case of a UAT Transponder failure.

SECTION 4 - PERFORMANCE

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 79

EPIC SOFTWARE PHASE 7 AND LATER SPECIFIC FUNCTIONS

S/W EB7030191 - 00110
S/W EB7030191 - 00111
S/W EB7030191 - 00112
S/W EB7030191 - 00114
S/W EB7030191 - 00115
S/W EB7030191 - 00117
S/W EB7030191 - 00118
S/W EB7030191 - 00113
S/W EB7030191 - 00120

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SUPPLEMENT 79
EPIC SOFTWARE PHASE 7 AND LATER SPECIFIC FUNCTIONS

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GENERAL INFORMATION

The following functions are introduced and operational with the installation of EPIC Phase 7 software EB7030191 - 00110/00111/00112/00114/00115/00117/00118 and EPIC Phase 8 software EB7030191 - 00113/00120.

New AFCS Functions

— Automatic LNAV engagement at Go-Around.

New EDS Functions

— Expanded Lateral Deviation Scale with EPU winglet and aural alert for RNP AR APCH approaches.

— TCAS II Capability (covered by Supplement 82).

— EGPWS -30 capability (covered by Supplement 81).

— Full time DME display.

New FMS Functions

— Auto-close flight plan implemented

— Compliance with the following Navigation Specification, in accordance with PBN Manual ICAO doc. 9613 Ed. 4th:

- RNP 2,
- RNP 1,
- RNP 0.3 all phases of flight,
- RNP APCH approaches (LPV, LNAV/VNAV, LNAV minima),
- RNP AR APCH (0.3 NM in final approach segment, 1.0 NM in Missed Approach).
  Covered by Supplement 80.

New EPIC Functions

— ADS-B Out (compliant with DO-260B).

— Optional additional Landing Gear Alert logic for Offshore customers.

— New CAS Advisory messages for Enhanced Landing Light Configuration Supplement 74.

— Collective servo drive capability incorporated for aircraft maintenance ground use only.

NEW PHASE 7 FUNCTIONS

RNP Navigation Specification Compliance

The Phase 7 and later Primus EPIC software is certified for operations in accordance with RNP Navigation Specifications per PBN Manual ICAO doc. 9613 as described in Supplement 80.

RNP Approach Indications

As an aid for RNP AR APCH approaches, an expanded lateral deviation scale is added on the PFD below the ADI, refer Supplement 80 for further details.

Automatic LNAV engagement at Go-Around

The Phase 7 and later software has implemented a change to the Go Around mode. The GA mode engagement has been modified to include an automatic engagement of LNAV mode.

To allow steeper and safer steep approach, when activated from speed below 70 KIAS, the GA will automatically acquire an IAS reference airspeed of 70 KIAS, instead of the previously implemented 80 KIAS. Furthermore the minimum engagement speed is reduced to 41 KIAS (See Supplements 67, 69, 70 as appropriate for full details).

TCAS II Capability

The EPIC Phase 7 and later software supports the TCAS II requirements for the display parameters.

For full details of the TCAS II see Supplement 82, if applicable.

EGPWS -30 and later capability

The EPIC Phase 7 and later software supports the improvements in the EGPWS-30 installation with the inclusion of the OFFSHORE and SAR modes, Non ILS Mode 5 “EXCESSIVE descent below Glideslope” alerts, new “TAIL TOO LOW” curves to reduce nuisance activation during landing and modification of HDOP/VDOP thresholds.

The modifications are only active if the EGPWS-30 and later is installed, for full details of the EGPWS see Supplement 81, if applicable.

Full Time DME Display

The Phase 7 and later software displays the DME Ident and distance, in NM from the associated NavAid, continuously on the bottom left corner of each PFD. This display appears as long as a valid DME frequency has been tuned, regardless of the selected NAV source.



ICN-39-A-155079-G-A0126-01001-A-01-1

Figure 1 Full Time DME Display on PFD

Auto-Close Flight Plan

During the creation of a new Flight Plan, on the MCDU, the plan will automatically close using the destination waypoint entered by the pilot as the last waypoint on the Flight Plan.

NEW EPIC FUNCTIONS

ADS-B Out

The EPIC Phase 7 and later system incorporates the new optional XS-858B XPDR, which supports the ADS-B Out (Automatic Dependant Surveillance - Broadcast Out) function. The ADS-B Out transponder operates at 1090 Mhz and broadcasts periodically (once per second) the aircraft position, speed and other flight information. This information can be displayed to an ATC and other aircraft which have suitable equipment. The equipment satisfies the AMC 20-24, TSO C166b, RTCA/DO-260B, FAA AC 20-165.

The ADS-B Out transponder (if fitted) transmits the following data supplied by the on board systems and GNSS:

— ADS Pressure Altitude,

— ADS Altitude Rate,

— AHRS Vertical Speed,

— ADS Airspeed,

— AHRS Magnetic Heading,

— AHRS True Heading,

— GPS Sensor Status,

— GPS Latitude - Longitude,

— Aut.Horiz/Vert. Integ Level,

— Horizontal and Vertical Pos FOM,

— N/S and E/W velocity,

— Vertical velocity,

— Horizontal and Vertical Vel. FOM,

— GPS Height.

The control of the ADS-B transponder and IDENT operation is via the MCDU Radio pages.

Operation and procedures for the ADS-B Transponder can be found in the Honeywell EPIC Pilot’s Manual latest issue.

Optional Additional Landing Gear Alert Message

Specifically for offshore customers an additional logic to trigger the 'Landing Gear' caution and aural message, when approaching an oil rig, for example, is available to be selected in the configuration at the customers request.

The reason for this additional logic is to prevent late alerting when the helicopter is already above the oil rig with the landing gear still retracted. The logic activates the "LANDING GEAR" caution in the CAS list and the LANDING GEAR aural when the aircraft is decelerating below 30 kts GS and the landing gear is retracted, independently from height. When selected this logic activates additionally and independently to the 150 ft AGL threshold which remains unchanged.

New CAS Advisory Messages

The Phase 7 and later software includes two new CAS green advisory messages that are for use with the Enhanced Landing Light Configuration (Supplement 74). This landing light configuration is installed, as standard, on aircraft from S/N 31400 onwards and S/N 41300 onwards. The new advisory messages are LANDING LT RH ON and LANDING LT LH ON that correspond to the LDG LTS panel and collective switch labels.

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SECTION 1 - LIMITATIONS

GENERAL

For Limitations not presented in this Supplement see Basic RFM or appropriate Supplements.
The Flight Director Supplements valid for the EPIC Phase 7 software EB7030191 - 00110/00111/00112/00114/00115/00117/0018 and EPIC Phase 8 EB7030191 - 00113/00120 are Supplements 67, 69 and 70 depending on the aircraft configuration. See the appropriate Supplement for limitations not covered in this document.

The installation of the ADS-B Out system has been shown to meet the equipment requirements of 14CFR §91.227 and AMC 20-24.

REQUIRED EQUIPMENT

— Upgraded XS-858B transponder
(only for optional ADS-B Out)

PHASE 7 AND LATER CHANGES TO FD MODE LIMITATIONS

FD Modes Engagement Limits and Minimum Use Height (MUH)

(See Supplements 67, 69 or 70 as appropriate)

Hold Mode	Applicable Range	MUH
IAS*	60 KIAS to Vne less 5 KIAS 50 KIAS to Vne less 5 KIAS during approach see Note**	150 ft AGL or 50 ft AGL during approach
HDG*/NAV*	60 KIAS to Vne less 5 KIAS 50 KIAS to Vne less 5 KIAS during approach see Note**	150 ft AGL or 50 ft AGL during approach
GA*	41 KIAS to Vne	N/A
APP* (VGP)	50 KIAS to Vne	50 ft AGL
APP* (VRT) Note* **	50 KIAS to Vne 150 ft to 2400 ft AGL	50 ft AGL
DCL*	50 KIAS to Vne	50 ft AGL

Note*

— Automatic disengagement of these modes below 41 KIAS with audio chime.

Note**

Use of IAS, HDG and LNAV modes below 60 KIAS is only for Flight Director operations associated with RNP APCH and Customer approaches.
Selecting IAS mode speed to less than 55 KIAS will result in normal automatic disengagement of APP, ALTA & VS modes at 55 KIAS and loss of associated collective safety function.

Note***

Phase 8 and later and when Custom Approach with Level Segment enabled in option file.

Note

At GA automatic LNAV arming is allowed down to 41 KIAS.

ADS-B OUT LIMITATIONS

The optional ADS-B Out transponder cannot be installed together with a stand-alone ADS-B Out UAT transponder.

SECTION 2 - NORMAL PROCEDURES

PRE START CHECKS

1. MFD — Set SYSTEM page, select SYS CONFIG and verify Top Level System Part Number (EPIC software release) installed: EB 7030191-00110 Phase 7.
   or
   EB 7030191-00111 Phase 7
   or
   EB 7030191-00112 Phase 7
   or
   EB 7030191-00114 Phase 7
   or
   EB 7030191-00115 Phase 7
   or
   EB 7030191-00117 Phase 7
   or
   EB 7030191-00118 Phase 7
   or
   EB 7030191-00113 Phase 8
   or
   EB 7030191-00120 Phase 8.

SYSTEM CHECKS

1. ADS-B TEST page on MCDU (if fitted) — On TCAS/XPDR page 1/2 select TEST ON and confirm 'TEST' message displays followed by 'PASS' to indicate test has completed satisfactorily.
2. ADS-B selection on MCDU RADIO page 1 (if fitted) — Select Call Sign/Flight ID and SQUAWK CODE as required.

Note

For Phase 7 software only, change the transponder code using the XPDR/TCAS MCDU radio page. If changed using the PFD and CCD the ADS-B Out will be turned off.

GA MODE DESCRIPTION

The GA mode may be selected from either collective GA pushbutton and will give, when the conditions for a GA are met ie. airspeed greater than 41 KIAS, a 1000 ft/min climb, with the reference bug set on the Vertical Speed Tape and the airspeed reference bug on the AirSpeed Tape at either the airspeed existing when the mode is engaged (if engagement above 70 KIAS) or 70 KIAS for engagement speeds below 70 KIAS (See Supplements 67, 69 or 70 as appropriate).

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ADS-B TRANSPONDER FAILURE

Malfunction of the ADS-B Transponder (if fitted) will be indicated by an amber MSG annunciation on the PFD and one of the following white messages in the MCDU Scratchpad:

'ADS-B UNAVAILABLE'	— When the ADS-B transponder is selected ON, but is not transmitting due to data not available or the ADS-B transponder has failed.
'ADS-B MODE CHANGE FAIL'	— When the ADS-B is selected to ON or to OFF and the transponder data is valid but the transponder fails to change/ respond or the system is trying to transfer from an ADS-B enabled transponder to a non ADS-B enabled transponder.

In case of an ADS-B Transponder failure contact ATC and refer to the applicable operating procedures.

SECTION 4 - PERFORMANCE DATA

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 80

RNP OPERATIONS (EPIC PHASE 7 AND LATER)

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SUPPLEMENT 80
RNP OPERATIONS (EPIC PHASE 7 AND LATER)

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GENERAL INFORMATION

This supplement details the certified capabilities of the AW139, when equipped with Primus EPIC Phase 7 and later, to operate RNP Navigation Specifications listed in following Table 1, in accordance with ICAO 9613 PBN manual Ed. 4th, AMC 20-26, AMC 20-27, AMC 20-28, AC 90-105A, AC 20-138D change 2 and AC 90-101A:

ICAO 9613 Ed. 4th PBN manual - Navigation Specification	Flight Phase						
	En-route	Arrival	APPROACH				Dep
			Initial	Intermediate	Final	Missed	
RNP 2	2	-	-	-	-	-	-
RNP 1	1	1	1	1	-	1	1
RNP APCH LNAV & LNAV/VNAV minima	-	-	1	1	0.3	1	-
RNP APH LPV minima	-	-	1	1	Angular	1	-
RNP AR APCH RNP 0,3 NM minima (*)	-	-	0.3	0.3	0.3	1	-
RNP 0,3	0.3	0.3	0.3	0.3	-	0.3	0.3

Table 1 Navigation Specification

(*) Procedures with RNP lower than 0.3 NM in the approach segment or 1.0 NM in the missed approach are not authorized.
The AW139 complies with requirements of AC 20-138D change 2 for RNP operations with RF (Radius to Fix) legs when used in association with RNP 1, RNP0.3, RNP APCH and RNP (AR) APCH Navigation Specifications. The RF capability can be used during terminal procedures, including approaches.

Note

RNP AR APCH 0.3/MA 1.0 certification approval does NOT constitute operational approval.

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SECTION 1 - LIMITATIONS

For Limitations not presented in this Supplement see Basic RFM or appropriate Supplement.

RNP APCH approaches with LP minima are not supported.

REQUIRED EQUIPMENT

— PRIMUS EPIC Phase 7 and later with software EB7030191 - 00110/00111/00112/00114/00115/00117/00118 and /00113/00120 (Phase 8).

— For LPV Approaches, RNP AR APCH Approaches and RNP 0.3 only:

- SBAS GPS kits P/N 3G3450F00113 or P/N 3G3450F00413
- 2nd SBAS GPS kits P/N 4G3450F00613

TYPE OF OPERATION

RNP operations are approved under Day/Night VFR and Day/Night IFR operation.

GLIDE SLOPE LIMITATIONS

Maximum Glideslope angle for LPV approaches ..... 9°

Maximum Glideslope angle for RNP AR APCH, LNAV/VNAV and LNAV approaches ..... 8.3°

AIRSPEED AND ALTITUDE LIMITATIONS FOR APPROACHES

Minimum APP mode engagement airspeed for RNP APCH approach procedures ..... 50 KIAS

Maximum ROD while approaching the MAP ..... 1000 fpm

Minimum DA(H) for RNP AR APCH, LNAV/VNAV and LNAV approaches ..... 250 ft

Minimum DA(H) for LPV approaches ..... 200 ft

Note

The airspeed at the FAF and MAP, as indicated on the the Approach Plate being used, must not be exceeded.

Note

Use of IAS mode is recommended with RNP APCH and RNP AR APCH approaches below 60 KIAS.

AUTOMATIC FLIGHT CONTROL SYSTEM LIMITATIONS

RNP operations must be flown using the default Flight Director coupled mode or by following raw data. Use of Flight Director in uncoupled mode for RNP operations is not approved.

For RNP APCH approaches with a glide slope angle greater than 7.5 degrees the final approach segment (from FAF to MAP) must be flown with AFCS approach modes coupled. In case a failure occurs after the FAF, causing the FD to decouple, the pilot must discontinue the current approach.

RNP procedures including RF legs must be flown with LNAV Flight Director mode coupled. In case a failure occurs, causing the FD to decouple, the pilot must discontinue the current procedure.

FLIGHT MANAGEMENT SYSTEM LIMITATIONS

Use of FMS offset function during RNP 0.3 operations is forbidden.

SECTION 2 - NORMAL PROCEDURES

PRE START CHECKS

1. MFD — Set SYSTEM page, select SYS CONFIG and verify Top Level System Part Number (EPIC software release) installed: EB 7030191-00110/ 00111/00112/00113/00114/ 00115/00117/00118/00120.

RNP 1, RNP 2, RNP 0.3 PROCEDURE (for departure, en-route, arrival)

For normal procedures associated with RNP 1, RNP 2 and RNP 0.3 in the departure, en-route and arrival phases of flight refer to the basic RFM.

CAUTION

Phase 7 software cannot automatically retrieve the 0.3 NM RNP value from Navigation Database for airways. For Phase 7 only the start of a RNP 0.3 airway, the crew shall manually enter 0.3 as RNP value by accessing the PROGRESS 2/3 RNP MCDU page. Following the manual entry, current RNP value shall be checked on PFD or PROGRESS 1/3 MCDU page.

LPV APPROACH PROCEDURE

Prior to reach the FAF (Final Approach Fix)

1. PFD/MCDU — Once the approach has been activated verify:
   - Advisory message "LPV" (White/Green) displayed on PFD
   - LPV Approach Reference Path Identifier (lower left on PFD) corresponds to Approach Plate information
   - DA(H) set accordingly Approach chart
   - PERF INIT executed.

Note

If the pilot decides to fly the lateral and vertical deviations displayed manually (glideslope lower than 7.5°), then neither LNAV nor VGP should be engaged. A mix of LNAV engagement and hands-on flying the vertical deviation, with no VGP engagement, should not be used for LPV approaches.

2. MCDU — If deceleration profile is required verify/set the INITIAL and FINAL speeds and relative distances with respect to the MAP waypoint.

3. Guidance controller panel — If Flight Director coupled guidance is required, press APP or DCL pushbutton to arm LNAV & VGP Confirm DCL armed or engaged if DCL mode selected.

4. Altimeters — Verify QNH at destination.

5. Landing path	—	Adjust speed to comply with the Approach Plate. Perform APPROACH AND LANDING PROCEDURE as per basic Rotorcraft Flight Manual.
6. Pre Landing check	—	Complete.

During FAS

1. PFD	—	Once APP displayed in green, verify the "LPV" annunciation turns green. If coupled Flight Director is used, verify the automatic transition on lateral axis from LNAV mode to NLOC mode.
2. AFCS	—	If coupled Flight Director is used, confirm: • NGS mode engaged as required • IAS or DCL mode engaged, if required. For airspeed below 60 KIAS engage IAS mode.
3. Airspeed	—	Adjust as required to maintain ROD less than 1000 fpm, while approaching the MAP.

Note

The approach airspeed should account for head or tail winds to ensure a ROD of 1000 fpm is not exceeded while approaching the MAP.

Before or at the DA(H)

1. Cyclic — If the required visual references are acquired, press STBY pushbutton to disengage AFCS Flight Director modes (if engaged) and fly manually to landing point.

If at DA(H) the required Visual References to continue the approach have not been attained perform the Missed Approach procedure (MA).

Missed Approach Procedure

1. Collective — Press GA pushbutton.
   Confirm LNAV engages and remains engaged.

CAUTION

GA mode does not target altitude constraints, therefore the pilot must manage altitude according to the published missed approach procedure.

2. Once a positive Rate of Climb is established, — Continue Go Around checks, as required.

RNP AR APCH AND RNP APCH (LNAV AND LNAV/VNAV MINIMA) APPROACH PROCEDURE

Within Terminal Area

1. MCDU — If deceleration profile is required verify/set the INITIAL and FINAL speeds and relative distances with respect to the MAP waypoint.

2. Guidance controller	— If Flight Director coupled guidance is required, press APP or DCL pushbutton to arm LNAV & VGP modes. Confirm DCL armed or engaged if DCL mode selected.

At IAF (Initial Approach Fix)

1. PFD	— After sequencing the IAF point check the Lateral Deviation indicator on the HSI.
2. Altimeters	— Verify QNH/QFE, crosscheck pilot and copilot (or STBY) altimeters agree within ±100 ft.

Note

If the altimeter crosscheck fails then the procedure must not be continued.

3. Landing path	— Adjust the speed to comply with the Approach Plate. Perform APPROACH AND LANDING PROCEDURE as per basic Rotorcraft Flight Manual.

Prior to the FAF

1. PFD	— Check APP green advisory message displayed (lower left on PFD) and “P” displayed in vertical deviation bug.
2. Lateral Deviation	— Confirm lateral deviation on HSI is within RNP limit and “DGR” message is not displayed, otherwise discontinue the current procedure.

Note

During RNP AR APCH approach, if the aural message “RNP RNP” is activated (the expanded lateral deviation indicator on ADI turns amber), then discontinue approach.

During FAS

1. AFCS — If coupled Flight Director is used, confirm:
   - VGP mode engaged as required
   - IAS or DCL mode engaged, if required. For airspeed below 60 KIAS engage IAS mode.
2. Airspeed — Adjust as required to maintain ROD less than 1000 fpm, while approaching the MAP.

Note

The approach airspeed should account for head or tail winds to ensure a ROD of 1000 fpm is not exceeded while approaching the MAP.

Before or at the DA(H)

1. Cyclic — If the required visual references are attained press STBY pushbutton to disengage AFCS Flight Director modes (if engaged) and fly manually to landing point.

If at DA(H) the required Visual References to continue the approach have not been attained perform the Missed Approach procedure (MA).

Missed Approach Procedure

1. Collective — Press GA pushbutton.

CAUTION

GA mode does not target altitude constraints, therefore the pilot must manage altitude according to the published missed approach procedure.

2. Once a positive Rate of Climb is established — Continue Go Around checks as required.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The following malfunction procedures are intended to integrate those of the basic RFM and, if a Flight Director is used, those of the applicable Supplement installed 67, 69 or 70.

The following malfunction procedures are to be used only during RNP Operations.

In the specific case of loss of GNSS Navigation information the FMS system reverts to the remaining navigation sensors, which are not allowed for use during RNP Operations.

Even when using non-GNSS sensors or in degraded mode (EPU higher than RNP), the FMS continues to provide navigational position, groundspeed, and ground track information. The procedure waypoints still remain displayed in the PFD.

CAS MESSAGES

GPS FAIL (SINGLE GPS INSTALLATION)

GPS FAIL + **FMS/GPS MSCP UNAVL**

\+ possible **DGR** message on PFD

GPS system failure
FMS reverts to alternative navigation sensors

Loss of RNP capability

- **Discontinue the current RNP procedure and notify ATC of the loss of RNP capability**

SINGLE GPS FAIL (DUAL GPS INSTALLATION)

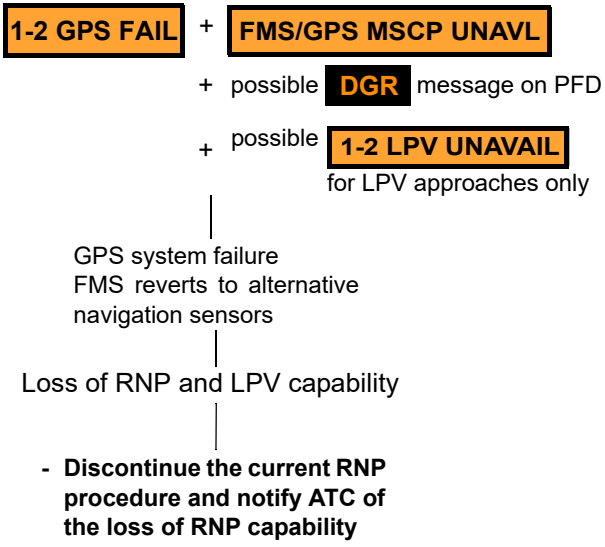
1(2) GPS FAIL

Single GPS system failure

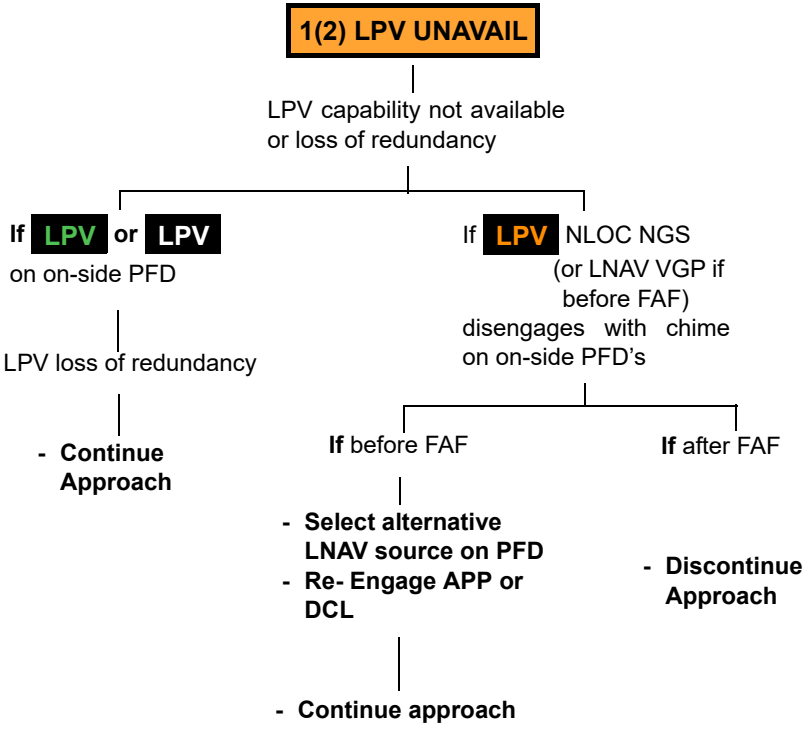
Loss of GPS redundancy

- **Continue flight**

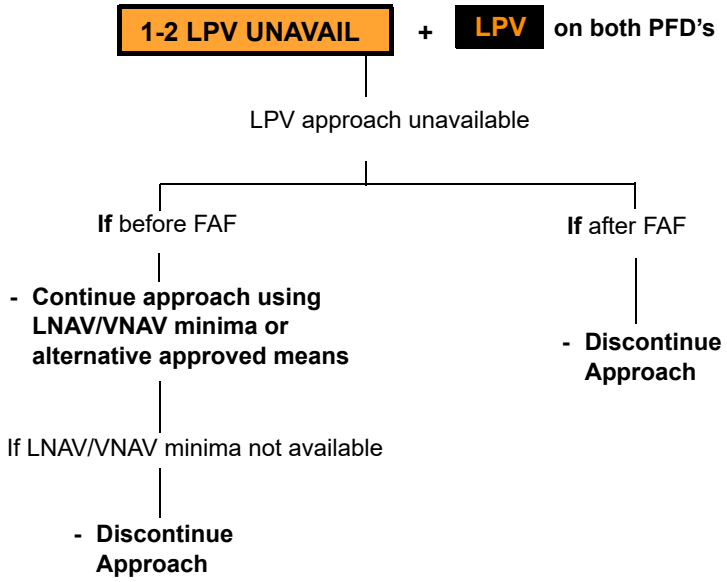
DOUBLE GPS FAIL (DUAL GPS INSTALLATION)



SINGLE LPV UNAVAILABLE CAUTION



DOUBLE LPV UNAVAILABLE CAUTION



FD FAIL DURING RNP APCH APPROACH

FD FAIL replaces FD arrow above attitude indicator on both PFD's

+

Loss of flight director cue information

Both Flight Directors invalid and NOT available

If FD engagement mandatory
(i.e. LPV with Glide Path Angle greater than 7.5°, or RNP procedure with RF, or approaches with IAS lower than 60 KIAS

- **Discontinue the current procedure**

If FD engagement not mandatory

- **Continue Approach**

PFD AND MCDU MESSAGES

DEGRADED (DGR) ON PFD

DGR will cause disengagement of following modes if engaged: VGP/ VRT and DCL (with chime).

VGP UNAVAILABLE (MCDU SCRATCHPAD MSG)

This is an alerting system message indicating vertical glide path (VGP) is not available.

APP (or DCL) button was pushed but arming criteria were not met.

SECTION 4 - PERFORMANCE DATA

No change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full details of the EPIC FMS operation and use see EPIC and FMS Pilot's guide latest issue.

ABBREVIATIONS AND DEFINITIONS

Abbreviations and Acronyms used throughout this Supplement are defined as follows:

— APV : APproach with Vertical guidance
— APCH : APproaCH
— AR : Authorization Required
— BOD : Bottom Of Descent
— DA(H) : Decision Altitude (Height)
— FAS : Final Approach Segment
— FPAP : Flight Path Alignment Point
— FTP : Fictitious Threshold Point
— GNSS : Global Navigation Satellite System
— GPA : Glide Path Angle
— GPS : Global Positioning System
— LPV : Localizer Performance with Vertical guidance
— LNAV : Lateral NAVigation
— LTP : Landing Threshold Point
— MAP : Missed Approach Point
— MSA : Minimum Safe Altitude
— NLOC : Navigation LOCalizer
— NGS : Navigation Glide Slope
— PINS :Point IN Space

— RF :Radius to Fix
— RNAV :aRea NAVigation
— RNP :Required Navigation Performance
— ROD : Rate Of Descent
— SBAS :Satellite Based Augmentation System
— TOD :Top Of Descent
— VNAV :Vertical NAVigation
— VGP :Vertical Glide Path

1. Go Around — Is the automatic procedure following the activation of GA pushbutton.
2. Published Missed Approach Procedures — Is the missed approach procedure presented in the approach plate chart and loaded into the FMS navigation database.

GENERAL INFORMATION

RNP AR APCH Operational approval must be requested by Aircraft Operator (AO) and granted by the local Competent Authority. A Flight Operational Safety Assessment (FOSA) methodology is used.
The FOSA must account for the fact that a loss of GNSS reception (in case of loss of GNSS satellites view or dual GNSS receiver failure) has, as a consequence, the loss of RNAV and RNP capabilities.
In case of loss of RNP capability during RNP AR operations, the flight crew must discontinue the approach, unless the pilot has runway visual references in sight.

In this case, the relevant and specific contingency procedures (assessed in the FOSA) must be applied to terminate the RNP navigation and revert to conventional navigation or apply specific ATC instructions.

For all navigation specification listed in Table 1, except for LPV approaches, the FMS (selected as Navigation Source) computes lateral path deviation/guidance by using available sensors for position computation. The lateral deviation computed by FMS is used as input for LNAV Flight Director Mode.

For approaches with LNAV, LNAV/VNAV and RNP 0.3 minima/MA 1.0, FMS uses baro VNAV to compute vertical path deviation/guidance. The vertical deviation computed by FMS is used as input for VGP flight director mode.

For the specific case of LPV approaches, lateral and vertical deviation/ guidance are directly computed by GPS, based upon the FAS data block defining the approach path. These deviations are used as input of NLOC / NGS flight director modes, respectively.

Intercept of the final approach segment may be performed either flying an approach transition or through vectoring.

The following table provides, as reference, the ROD (Rate Of Descent) for varying Ground Speed (GS) and Glide Path Angle (GPA):

GPA (deg)	GROUNDSPEED (kts)	ROD (fpm)
4	141	1000
4.5	125	1000
5	113	1000
5.5	103	1000
6	94	1000
6.5	87	1000
7	80	1000
7.5	75	1000
7.5	68	900
7.5	60	800
7.5	53	700
8	70	1000
8	60	850
8	50	710
9	62	1000
9	50	800

Table 7-1 ROD/GS/GPA

For information the AW139 has been demonstrated to be capable of performing any procedure that meets the following design criteria when flying with AFCS coupled at sea level:

— Minimum turn radius:..... 0.2 NM

— Minimum initial, intermediate and final approach segments length:..... .0.5 NM

— Maximum intercept angle for the turn to final:..... 45 Degrees

— Maximum descent gradient during initial and intermediate segment:..... 1000 ft/NM

LPV ANNUNCIATION

When an approach contains LPV line of minima, this is indicated in the MCDU ARRIVAL page under the RNAV MIN prompt.

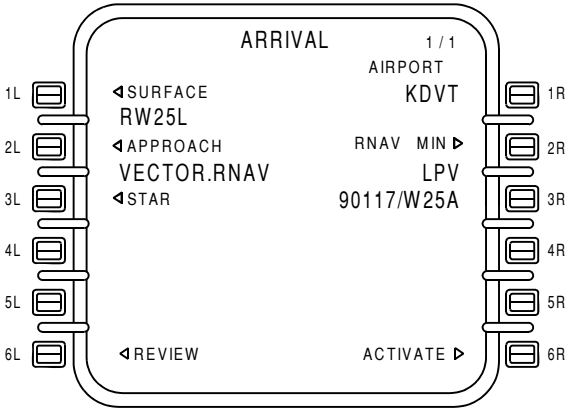


Figure 7-1 MCDU ARRIVAL page

Selecting RNAV min prompt permits the pilot to choose different approach minima types, when available. When defined, LPV is the default.

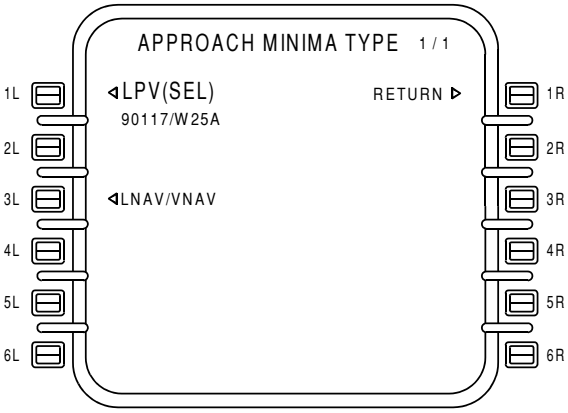


Figure 7-2 MCDU APPROACH minima type page

Note

The flight crew shall avoid selecting an approach minimum that is not clearly stated on the approach chart, despite the FMS allowing selection multiple minima types. Refer to Honeywell publication D201710000025.

When a LPV approach is selected, a LPV annunciator is displayed on the top right of the attitude display.

This annunciator is:

- WHITE when the LPV is armed, meaning that it has been loaded without any failure and the aircraft is in the Terminal Area
- GREEN when LPV is active, meaning that pseudo-NLOC mode angular deviation is active
- AMBER when LPV is not available or a loss of redundancy for LPV function has occurred.

The LPV annunciator complements the lateral and vertical deviations display. The vertical deviation bug has a 'L' to indicate it refers to a LPV approach.

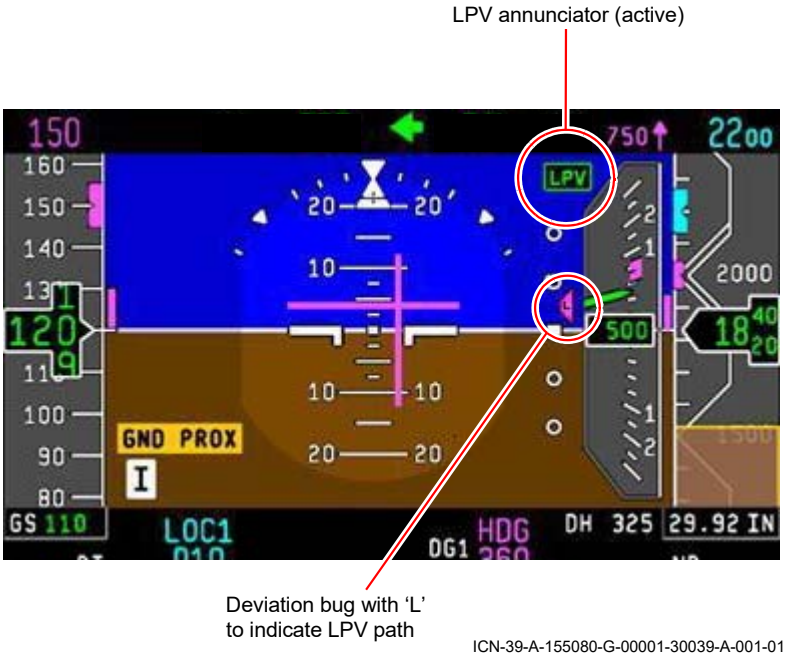


Figure 7-3 LPV vertical deviation display on PFD

The LPV approach identifier is displayed close to the ADI when a LPV approach is loaded and the aircraft is in the terminal area.



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Figure 7-4 LPV Identifier and APP Green Advisory on PFD

RNP AR APCH ANNUNCIATION

For RNP AR APCH approaches the MCDU ARRIVAL indicate the RNP value under the RNAV MIN prompt.

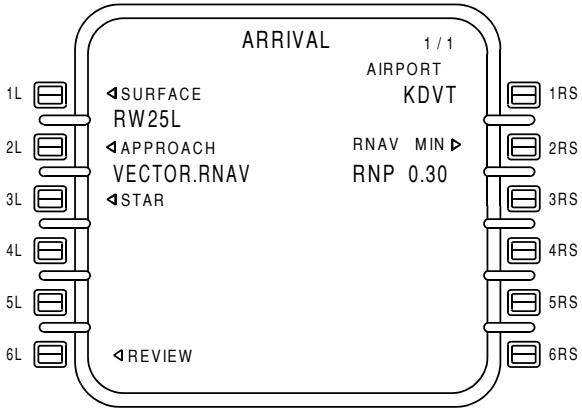

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Figure 7-5 MCDU ARRIVAL page

As an aid to the pilot for RNP AR APCH approaches, an expanded lateral deviation scale is added on PFD below the ADI.

The scale is displayed in the approach and missed approach (except for holdings) phases of RNP AR APCH approaches. The lateral deviation pointer is scaled as a function of FMS RNP, such that the full scale deflection is equal to the active RNP value. The winglets starting at the center of the triangle pointer are sized according to the current EPU.

When within RNP limit, the lateral deviation pointer with winglet is displayed in cyan for non-coupled side and in magenta for coupled side.

When the lateral deviation pointer with winglet exceeds the RNP value, it will be displayed in amber and flash initially. Correspondingly a “RNP RNP” aural alert will be played.



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Figure 7-6 Expanded Lateral Deviation Scale with pointer and EPU winglets

Loss of valid FMS data result in the lateral deviation pointer and scale being replaced by an amber **X**.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 81

ENHANCED GROUND PROXIMITY WARNING SYSTEM MK XXII

-024 (P/N 3G3440F00211)
-026 (P/N 3G3440F00211)
-030 (P/N 3G3440F00212)
-034 (P/N 4G3440F00311)
-036 (P/N 4G3440F00411)

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SUPPLEMENT 81
ENHANCED GROUND PROXIMITY WARNING SYSTEM MK XXII

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GENERAL INFORMATION

The Honeywell MK XXII EGPWS is an optional system providing Ground Proximity Warning and Terrain Awareness functions. Five software version of the EGPWS are available -024, -026, -030, -034 and -036.

The basic functionalities are identical for all version of the Primus EPIC, however, additional functionalities are available depending of the EGPWS version and EPIC Phase software installed.

Refer to Table 1 for details of software differences.

The EGPWS provides the pilot with the following Basic functionalities:

— Terrain and obstacle awareness display

— Voice alerts/warnings/call outs

— Visual Caution and Warning messages.

This information is provided through two independent functions:

1. Ground Proximity Warning System (GPWS)

   This function is based primarily on the vertical separation of the helicopter with terrain. It uses altitude and altitude rates/terrain closure rates to alert to insufficient terrain clearance. There are six operating modes:

   Mode 1: Excessive Descent Rate

   Mode 2. Excessive Terrain Closure Rate

   Mode 3: Descent after Take-Off
   Additional for -036 only:
   Mode 3B, Loss of Airspeed after Take-Off

   Mode 4: Unsafe terrain clearance

   Mode 4A: Cruise and approach with landing gear up

   Mode 4B: Cruise and approach with landing gear down

   Mode 4C: Take-Off with landing gear up.

   Mode 5: Descent Below Glideslope

Mode 6: Advisory alerts for Excessive Bank Angle, Tail Too Low, and Altitude call outs in Autorotation.

2. Terrain Awareness Display and “Look Ahead” alerting and warning.

   This function uses information from the GPS and other sources on the aircraft to calculate horizontal position and vertical altitude. This data provides a three dimensional position for the aircraft. This position is then compared to the terrain database and if a conflict with terrain or a known obstacle is imminent the system provides an alert.

The MK XXII-030,-034,-036 versions when installed with EPIC Phase 7 also includes dedicated options (selectable on system installation), Offshore mode and SAR mode.

The EGPWS is compliant with TSO C194.

EGPWS FUNCTIONALITY

The following table summarises the functional differences between the PRIMUS EPIC software version and the EGPWS software version combinations.

Table 1 EGPWS vs PRIMUS EPIC Phase Software

EPIC Phase Software	EGPWS VERSION MK XXII			
	-024, -026	-030,	-034	-036
Phase 4, 5, 6 EB 7030191-00105 EB 7030191-00107 EB 7030191-00108 EB 7030191-00109	Basic EGPWS Functions	Basic EGPWS Functions	Basic EGPWS Functions	Basic EGPWS Functions plus 1) Introduction of Mode 3B 2) Mode 1 & 3A inhibited in OEI (less than 60 KIAS)
Phase 7 EB 7030191-00110 EB 7030191-00111 EB 7030191-00112 EB 7030191-00114 EB 7030191-00115 EB 7030191-00117 EB 7030191-00118	Not Compatible	Basic EGPWS Functions plus optional SAR and Offshore modes	Basic EGPWS Functions plus optional SAR and Offshore modes	Basic EGPWS Functions, optional SAR and Offshore modes plus 1) Offshore Mode 1, 3A, 4A & 4B & envelopes modified 2) Introduction of Mode 3B 3) Mode 1 & 3A inhibited in OEI
Phase 8 EB 7030191-00113 EB 7030191-00120	Not Compatible	Not Compatible	Basic EGPWS Functions plus optional Offshore and SAR modes 1) modifications to PFD and MFD annunciations 2) Changes to Situational Awareness colouring 3) SVS colouring changes in case of TAWS alert.	Basic EGPWS Functions plus optional Offshore and SA modes including those of -034 Phase 8 plus 1) Offshore Mode 1, 3A, 4A, 4B & envelopes modified 2) Introduction of Mode 3B 3) Mode 1 & 3A inhibited in OEI

SECTION 1 - LIMITATIONS

WEIGHT AND CG LIMITATIONS

After EGPWS system installation, the new empty weight and CG location must be determined.

BUILD STANDARD

For EGPWS functionalities and compatibilities with PRIMUS EPIC software release, refer to Table 1.

EGPWS LIMITATIONS

— EGPWS must not be used for navigation.

CAUTION

The Terrain and Obstacle display is intended to serve as a terrain and obstacle awareness tool only. The display and database may not provide the accuracy and fidelity on which to base routine navigation decisions and plan routes to avoid terrain or obstacles.

— Customised EGPWS modes (LOW ALT, SAR, OFFSHORE) shall not be selected when carrying out conventional, approved IFR procedures.

Note

LOW ALT, SAR and OFFSHORE EGPWS Modes are intended to be used during these specialised operations. They de-sensitise the basic EGPWS envelope so are not appropriate for use in the conventional IFR infrastructure. They should only be selected as required during the appropriate specialised operation, to avoid nuisance warnings.

EGPWS DATA BASE LIMITATIONS

The database needs to be approved by the Competent Authority.

— The database provides information on terrain and obstacles (higher than 100 ft AGL). Power lines/wires are not included.

SECTION 2 - NORMAL PROCEDURES

Note

Refer Section 7 of this Supplement for detail of EGPWS system operation.

SYSTEM CHECKS

Note

If more convenient checks may be carried out whilst A/C in IDLE mode.

1.	TAWS self test on MCDU TEST page	— Confirm TAWS FAIL and TERR N/A (or TAWS N/A) not displayed on PFD. — Select TAWS display on MFD MAP page and PFD HSI.
2.	TAWS PFD and MFD display	— Set as required.
3.	TAWS map range	— Set as required by rotating the CCD knob.
4.	TAWS functions	— Set as required on MCDU MENU / TAWS page.

Note

Use of EGPWS OFFSHORE mode is recommended for offshore operations, when available.
Use of EGPWS SAR mode is recommended for SAR operations, when available.

IN FLIGHT

1. TAWS PFD and MFD display — Set as required.
2. TAWS map range — Set as required by rotating the CCD knob.
3. TAWS functions — Set as required on MCDU MENU / TAWS page.
4. Terrain or Obstacle Awareness Caution alert occurs in flight — Verify aircraft flight path and correct as necessary.

Note

On CCD press ENTER to display EGPWS 2D display on map page, if required.

5. Terrain or Obstacle Awareness Warning alert occurs in flight — Immediately initiate evasive manoeuvre.

Note

For all EPIC Phases up to and including Phase 7 the highest and lowest terrain elevation, displayed in the left corner of the PFD/MFD, are calculated Geometric Altitude. The values represent the true height level (AMSL) in hundredths of feet.

Note

EPIC Phase 8 the Geometric Altitude is used to compute vertical separation from terrain, determining the SA terrain colour displayed on the PFD HSI and MFD MAP/PLAN pages (the terrain elevation values are not displayed).

APPROACH AND LANDING CHECKS

1. TAWS PFD and MFD display — Set as required.
2. TAWS map range — Set as required by rotating the CCD knob.
3. TAWS functions — Set as required on MCDU MENU / TAWS page.

ADVISORY CAPTIONS DEFINITIONS

CAS Caption (Green)	System State
TAWS AUDIO MUTE	EGPWS audio mute mode activated (Mode resets after 5 minutes)
TAWS GS CANCEL	EGPWS Glideslope warning mode cancelled
TAWS LOW ALT	EGPWS low altitude mode selected.

The following selections are available when EPIC Phase 7 or Phase 8 is installed (and the corresponding options are enabled at system installation):

TAWS SAR MODE	EGPWS SAR Mode selected
TAWS OFFSHORE MODE	EGPWS OFFSHORE Mode selected.

EGPWS VOICE MESSAGES AND ASSOCIATED CAPTIONS ON PFD ATTITUDE DISPLAY

Note

Aural messages from the helicopter caution and warning system, if generated simultaneously with an EGPWS message, will be heard simultaneously. However the two aural messages are easily distinguishable from each other.

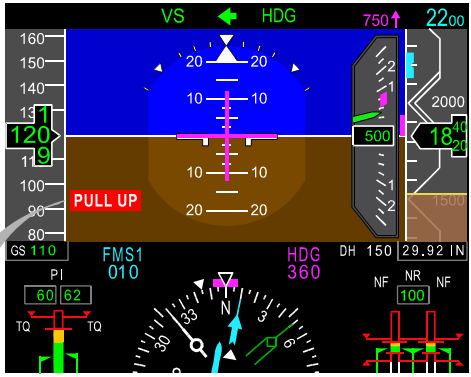
Priority	Aural Message	Red Caption	Amber Caption
1	PULL UP	PULL UP	—
2	TERRAIN TERRAIN	—	GND PROX
3	WARNING TERRAIN	PULL UP	—
4	WARNING OBSTACLE	PULL UP	—
5	TERRAIN	—	GND PROX
6	CAUTION TERRAIN	—	GND PROX
7	CAUTION OBSTACLE	—	GND PROX
8	TOO LOW TERRAIN	—	GND PROX
9	TOO LOW GEAR (only for -024/-026 & -036 in Offshore mode-only)	—	GND PROX
10	SINKRATE	—	GND PROX
11	DON'T SINK	—	GND PROX
12	GLIDESLOPE	—	GND PROX
13	CHECK AIRSPEED (-036 only)	—	GND PROX
14	BANK ANGLE	—	—
15	TAIL TOO LOW	—	—
16	BE ALERT TERRAIN INOP	—	—

In Autorotation

In autorotation the above voice messages and captions are replaced by:

Altitude (ft)	Aural Message	Red Caption	Amber Caption
400	TOO LOW GEAR	—	GND PROX
200	TWO HUNDRED	—	—
100	ONE HUNDRED	—	—
80	EIGHTY	—	—
60	SIXTY	—	—
40	FORTY	—	—
20	TWENTY	—	—
10	TEN	—	—

EGPWS PFD MESSAGES



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TAWS Status Mode Messages:

Red messages:	Amber messages:
PULL UP*	GROUND PROX**
	TAWS TEST

*** Message flash red reverse video for 6 seconds then become steady.**

**** Message flash amber reverse video for 6 seconds then become steady.**

Terrain Mode Messages:
Up to and including EPIC Phase 7:
TERRAIN: Green message
RNG ERROR: White message
TAWS INHIB: White message

EPIC Phase 8:
TAWS: Green message
TAWS INHIBIT: White message
SA TERR OFF: White message



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SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

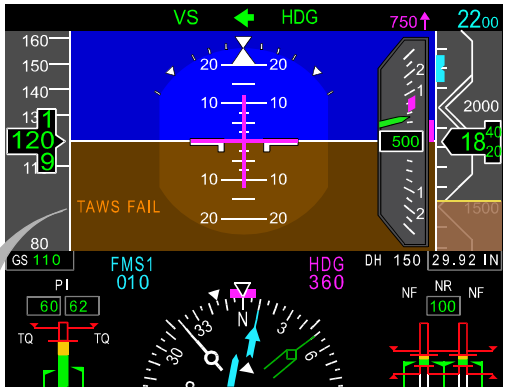
Note

In case of two simultaneous Cautions or Warnings TAWS always take priority over POWER PLANT arming the MAP soft key on the MFD.

Note

Aural messages from the helicopter caution and warning system, if generated simultaneously with an EGPWS message, will be heard simultaneously. However the two aural messages are easily distinguishable from each other.

EGPWS FAILURE MESSAGES ON PFD



TAWS Status Mode Messages:

Amber messages:

TAWS FAIL
TERR INOP (TAWS INOP, PHASE 8 ONLY)
GPWS INOP

Terrain Mode Messages:

TERR N/A: Amber message
(TAWS N/A, PHASE 8 ONLY)



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EGPWS FAILURE CONDITIONS

BE ALERT TERRAIN INOP	Audio alert and amber TERR N/A (TAWS N/A - Phase 8) message on lower left PFD HSI display and MFD MAP page status window. Terrain display not available.
GPWS INOP	Amber message on PFD attitude indicator. Ground Proximity Warning System inoperative.
TAWS FAIL	Amber message on PFD attitude display and MFD MAP page status window. Loss of valid TAWS information.
TERR	Amber message on PFD HSI half range ring MFD MAP page half range ring. Loss of terrain video data.
TERR INOP (TAWS INOP - Phase 8)	Amber message on PFD attitude display and MFD MAP page status window. Terrain awareness function is inoperative.
TERR N/A (TAWS N/A - Phase 8)	Amber message on lower left PFD HSI display and MFD MAP page status window and an audio alert BE ALERT TERRAIN INOP. Terrain display not available due to loss of valid satellite information.

Note

For failure conditions of the TAWS, Terrain and Obstacle Avoidance Indications and alerts are not available or not reliable.

Note

For Phase 8 only, whenever an invalid FMS is the NAV source on PFD, SA Terrain will not be displayed on that side. Selection of a different and valid NAV source will restore SA Terrain.

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

GENERAL INFORMATION

ABBREVIATIONS AND DEFINITIONS

Abbreviations and definitions used throughout this Supplement are defined as follows:

— AMSL : Above Mean Sea Level

— EGPWS : Enhanced Ground Proximity Warning System

— PCMCIA : Personal Computer Memory Card Interface Association

— TA : Terrain Awareness

— TAD : Terrain/Obstacle Awareness Display

— TAWS : Terrain Awareness and Warning System

— Low Altitude: Operations below 500 ft AGL

— Obstacle : A human made structure, higher than 100 ft AGL

— Offshore : Operations Offshore

— SA : Situational Awareness

— SAR : Operations SAR

The Honeywell MK XXII EGPWS provides the pilot with following outputs:

Terrain/Obstacle Awareness Display (TAD)

Voice Alerts/Warnings/Callouts

Visual Cautions/Warnings.

This information is provided through two independent functions:

1. Ground Proximity Warning System (GPWS) (Voice/Visual alert and callouts only)
2. Terrain Awareness Display with “Look-Ahead” Alerting and Warning.

The EGPWS (GPWS and TAWS) uses information from the GPS and other sources on the aircraft to calculate horizontal position and vertical altitude. In particular the system merges barometric pressure, Radio Altitude and a GPS derived altitude into a so-called “Geometric Altitude” to provide more accurate altitude information less susceptible to errors induced by pilot (altimeter settings), cold temperature or malfunctions in altimeters systems.

GROUND PROXIMITY WARNING SYSTEM

The ground proximity system is based primarily on the vertical separation of the helicopter with the terrain. It uses radio and barometric altitude to determine altitude rates/terrain closure rates to alert for insufficient terrain clearance. There are 6 modes:

Mode 1: Excessive Descent Rate

Mode 2: Excessive Terrain Closure Rate

Mode 3: Descent after take-off / Loss of Airspeed after Take-Off

Mode 4: Unsafe terrain clearance

Mode 5: Descent below Glideslope

Mode 6: Advisory Alerts for the following functions

- Excessive bank angle
- Tail too low
- Altitude call-outs in autorotation

MODE 1: Excessive Rate of Descent

For excessive rate of descent a voice alert “SINK RATE” will be heard and the amber caution caption ‘GND PROX’ will appear on the ADI. If the helicopter continues the high rate of descent the same voice alert will be repeated at an increasing frequency. Should the helicopter penetrate the defined warning boundary, the voice alert “PULL UP” will be heard continuously and the red warning message “PULL UP” will appear on the ADI.

When -036 installed and OFFSHORE selected the Mode 1 boundaries are modified.

When -036 installed Mode 1 alerts are disabled during Take-Off, in Autorotation and for the LOW ALT and SAR mode.

When -036 installed the Mode 1 alerts are disabled when in OEI conditions.

MODE 2: Excessive terrain closure rate

When the helicopter is closing with the terrain at an excessive rate (descending, level flight or even climb) the aural message “TERRAIN TERRAIN” is generated and the amber caution “GND PROX” is shown on the ADI. If the helicopter continues to penetrate the defined envelope the aural message “PULL UP” is repeated continuously and the red warning “PULL UP” is shown on the ADI.

The envelope is de-sensitized for three situations (called Mode 2B):

1 Landing gear is down

2 Aircraft is performing ILS approach

3 within 60 seconds after take-off.

The aural warning “TERRAIN” and a visual alert amber message “GND PROX” is displayed on the ADI, and remains until the defined envelope is exited. During autorotation, for the LOW ALT, SAR and OFFSHORE Modes the Mode 2 alerts are disabled.

MODE 3: Loss of Altitude After Take-Off

This function provides alerts when the aircraft loses significant altitude during Take-Off or Go-Around and the landing gear has been selected up, or when the airspeed exceeds 50 KIAS. The alert boundary depends on the elapsed time since Take-Off and the amount of altitude loss. If the boundary is violated an aural warning ‘DON’T SINK’ is generated with the visual message “GND PROX” on the ADI, which remains until a positive rate of climb is established.

This function is inhibited in LOW ALT mode when above 100 ft AGL.

For version -036 this mode is modified and subdivided into two forms:

Mode 3A: Loss of altitude after take-off (inhibited in OEI).
If OFFSHORE mode selected then Mode 3A only active for 60 seconds after Take-Off

Mode 3B: Excessive loss of airspeed after Take-off (inhibited in LOW ALT mode).
If OFFSHORE mode selected then Mode 3B only active for 60 seconds after Take-Off.

Mode 3B has an aural 'CHECK AIRSPEED' caution when the aircraft airspeed reduced below 55 kt after Take-Off and having attained 60 kt. The caution remains active until the airspeed exceeds 60 kt or 60 seconds has expired.

MODE 4: Unsafe Terrain Clearance.

This function provides alerts for insufficient terrain clearance with respect to phase of flight and speed. This mode is subdivided in three forms:

Mode 4A: Cruise and approach with landing gear up

Mode 4B: Cruise and approach with landing gear down

Mode 4C: Take-Off with landing gear up.

Mode 4A • For -024 and -026, below 150 ft radio altitude aural "TOO LOW GEAR", below 100 KIAS and "TOO LOW TERRAIN" above 100 KIAS. (in Low Alt mode only "TOO LOW GEAR" below 100 ft and 60 KIAS)
• For -030 and -034, below 150 ft radio altitude "TOO LOW TERRAIN" above 60 KIAS (in Low Alt Inhibit)
• For -036, below 150 ft radio altitude only "TOO LOW TERRAIN" above 60 KIAS (in Low Alt Inhibit)
(in OFSH when below 350 ft, "TOO LOW GEAR" below 100 KIAS and "TOO LOW TERRAIN" above 100 KIAS).

Mode 4B has an aural 'TOO LOW TERRAIN' caution for speeds above 120 KIAS and altitudes below 100 ft AGL. For speeds between 120 KIAS and 80 KIAS this boundary reduces from 100 to 10 ft AGL.
When -036 installed and OFFSHORE mode selected the Mode 4B boundaries are modified.

Mode 4C provides an aural 'TOO LOW TERRAIN' when the radio altitude enters the minimum terrain clearance value, landing gear up or airspeed greater than 50 KIAS.

For the SAR mode the Mode 4 alerts are disabled.

MODE 5: Excessive glideslope deviation

This function provides two levels of audio alerting when the aircraft flight path descends below the Glideslope beam on front course ILS approaches or LPV approaches (for -030 and later). The first alert is generated when the aircraft descends more than 1.3 dots below the beam. An audio 'GLIDESLOPE' caution is generated with approximately half volume compared to the other alerts. When the aircraft descends below 300 ft (radio altimeter) and with greater than 2 dots deviation the audio 'GLIDESLOPE' caution is generated with standard volume level.

MODE 6: Advisory Alerts

The following Advisory Alerts are configured:

1 Excessive Bank Angle. An audio alert 'BANK ANGLE' is generated for exceedances of the the bank angle boundary. The boundary between 10 ft and 50 ft AGL is 30° of bank which then slopes up to 45° of bank at 500 feet AGL. The slope steepens to 55° at 1000 feet AGL, then remains constant at 55°.

2 Excessive Pitch angle (Tail Strike). An audio alert 'TAIL TOO LOW' is generated for exceedences of the boundary that starts at 15° of aircraft pitch-up at 3 feet AGL and slopes up to 48.5° pitch-up at 50 feet AGL.

3 Autorotation call-outs and generated when the aircraft is in autorotation at the following radio altimeter heights: '200', '100', '80', '60', '40', '20', '10'.

TERRAIN AWARENESS FUNCTIONS

The Mk XXII computer uses following aircraft inputs:

Radio Altitude

Roll and Pitch Attitude

Baro Altitude and Vertical Speed

Ground Speed and track

Localizer and Glide Slope

Engine torque

Airspeed and OAT

GPS signal quality

Gear position and Weight on Wheels

Magnetic Heading

Display range

to determine the aircraft's 3-D position and create a safe envelope forward of its flight path. The envelope is then compared with a terrain and obstacle database to generate warnings and cautions when these boundaries are violated.

For all EPIC Phases up to and including Phase 7:

The Terrain Awareness Display depicts the terrain in front of the aircraft as variable density dot patterns in green, yellow and red. When terrain awareness alerts are generated, the threatening terrain is painted solid yellow or red. The display includes numerical values of minimum and maximum elevation of the displayed terrain.

For EPIC Phase 8:

EGPWS provides Situational Awareness (or SA Terrain) and 5-level wide terrain colouring depending on vertical separation of the aircraft with respect to the terrain.

The definition of the five levels comes with 5 different colours of the 2D Absolute terrain, both on PFD HSI (Arc Compass) and on MFD INAV pages (Map and Plan).

TERRAIN DISPLAY

For all EPIC Phases up to and including Phase 7:

The Terrain Display presented on the PFD and MFD uses the colours, green, yellow and red, to indicate the following:

Green: terrain/obstacles are at least 250 ft below the aircraft altitude and there is a safe terrain/obstacle clearance.

Yellow: terrain is from 250 ft below to 500 ft above the aircraft altitude. The helicopter may not have a safe terrain clearance.

Red: terrain is at least 500 ft above the helicopter altitude. The helicopter does not have safe terrain clearance and may not be able to escape this terrain.

The figure below shows the Terrain Display colour patterns.

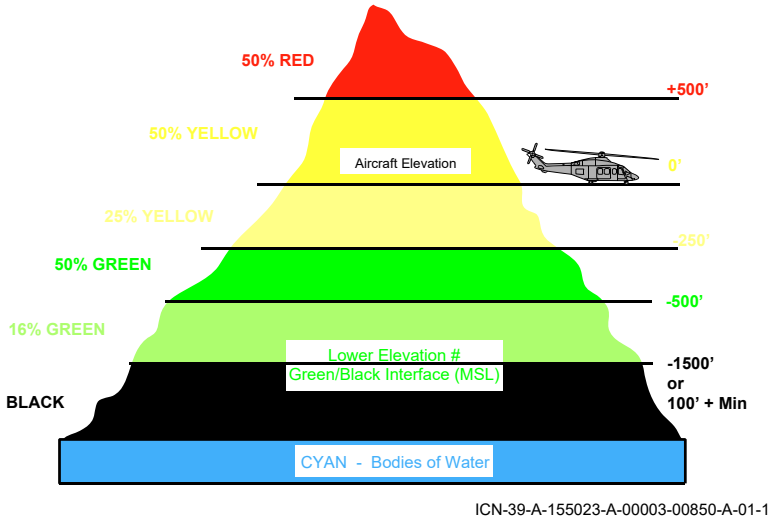

Figure 7-1 Terrain Display Colours

Below the terrain display on the MFD, the highest and lowest displayed terrain elevation is shown numerically on the MFD and on the left of the HSI.

For EPIC Phase 8 only:

Altitude Level	Description	Colour
Level 1	Terrain more than 500 ft above aircraft altitude	Red high density
Level 2	Terrain between 0 ft and 500 ft above aircraft altitude	Yellow high density
Level 3	Terrain that is between 250 ft below and 0 ft above aircraft altitude	Yellow low density
Level 4	Terrain that is between 500 ft below and 250 ft below aircraft altitude	Green high density
Level 5	Terrain that is between 500 ft below and 1500 ft below aircraft altitude	Green low density

Terrain which is lower than 1500 ft below the aircraft altitude, is not coloured by SA Terrain, hence remains as Absolute Terrain.

SYSTEM OPERATIONS

The system is powered continously and during normal flight operations it remains essentially silent and, if selected on the PFD HSI or/and MFD MAP page, the terrain colour display will be present.

EGPWS SELF TEST FUNCTION

The following procedure can be used to initiate the self test function for determining a serviceable system:

— Select TAWS display on MFD MAP page and PFD HSI.

— Select TAWS self test ON and confirm the following:

- TAWS TEST message displayed on PFD and MFD.
- TERR N/A (or TAWS N/A) message displayed momentarily on PFD.
- TAWS LOW ALT advisory displayed momentarily on CAS.
- TAWS AUDIO MUTE and TAWS GS CANCEL advisories display momentarily on CAS.
- GLIDESLOPE and PULL UP audio messages heard by pilot and copilot.
- Terrain Display Self Test pattern displayed on MFD and PFD or for EPIC Phase 8 with -034 or -036 SA Terrain on PFD and MFD terrain colour brightness changes from low to high.
- WARNING! TERRAIN audio message is heard by pilot and copilot.

— On conclusion of the test confirm Terrain Self Test pattern is turned off and no TAWS messages remain.

EGPWS DISPLAY OPTIONS

— On the MFD:
For all EPIC Phases up to Phase 7 the drop down menu is used to select the TAWS.
For EPIC Phase 8 for MAP or PLAN drop down menu, after selecting TERRAIN there is a sub menu SA TERRAIN which permits the selection of the colour representation of the terrain (default selection is ON).

— On the PFD, the WX/TERR button on the display controller allows the display of weather radar (if installed) or TAWS in arc compass mode with the following sequence when operating with up to and including EPIC Phase 7 software:

WX/TERR data OFF ⇒ WX data ON ⇒ TERR data ON ⇒ WX/TERR data OFF

For EPIC Phase 8 the SA TERR (Situational Awareness Terrain) is also available:

WX/TERR data OFF ⇒ WX data ON ⇒ TERR data ON & SA TERR ⇒ TERR data ON ⇒ WX/TERR data OFF.

— The WX and TAWS display are mutually exclusive on the same PFD or MFD display.

— If the MAP page is selected but the Terrain Awareness or Situational Awareness Display display are not activated from the drop down menu, the Terrain Awareness/Situational Awareness display will be selected, automatically, when an EGPWS caution or warning activates.

— When the MAP page is not selected on the MFD, it will automatically arm and the operator needs only to acknowledge by pushing ENTER on the CCD to visualize the TA display.

Should the aircraft fly into danger where a conflict with terrain or a known obstacle is imminent, the EGPWS will provide a combination of aural alerts, annunciator lights and colour display to the pilot.

Moreover the system also provides visual and audio alerts and warnings for the ground proximity Modes 1 to 6.

For Phase 7 and previous versions:

When MFD Plan, System or Pwr Plant page is selected and a TAWS alert occurs, the MAP soft key is automatically armed to allow quick access to the MAP page. Pressing the ENTER button on the CCD will cause the MAP page to display on MFD, the TAWS to be automatically selected for display and full range to be set to 5 NM (2.5 NM if TAWS is in Low Altitude Mode).

For Phase 8:

When MFD System or Pwr Plant page is selected and a TAWS alert occurs, the MAP soft key is automatically armed to allow quick access to the MAP page. Pressing the ENTER button on the CCD will cause the MAP page to display on MFD, the TAWS to be automatically selected for display and full range to be set to 5 NM.

When MFD Plan page is selected and a TAWS alert occurs, the MAP page is automatically displayed, the TAWS is selected for display and full range to be set to 5 NM.

Additionally, if TAWS is selected on HSI, the HSI full range is automatically set to 5 NM.

FMS flight plan routing may be overlaid on the terrain display on MFD and PFD.

The range of the map is in nautical miles (nm) and is displayed on the half range ring. The total range is double and is selected by rotating the SET knob on the CCD panel (from 2.5 nm to 150 nm).

The altitude upon which the terrain map and the terrain awareness algorithms are based is a calculated Geometric Altitude and NOT a corrected barometric altitude. It represents the true height above mean sea level (MSL) and serves as the reference altitude for colour coding of the terrain display and terrain alerting system.



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Figure 7-2 Display Instrument Control Panel

Terrain Awareness and 'Look-Ahead' Alerting

When the "Look-Ahead" function detects a terrain or obstacle threat approximately 30 seconds ahead of the helicopter, the voice alert "Caution Terrain, Caution Terrain" (or "Caution Obstacle, Caution Obstacle") is given and the threat area is painted solid yellow on the terrain display. Should the helicopter flight path continue toward the threat area, the alert message will be repeated approximately every 7 seconds. If the helicopter path approaches to within approximately 20 seconds of the threat area, the voice message turns to "Warning Terrain, Warning Terrain" (or "Warning Obstacle, Warning Obstacle") and will be given continuously while the threat area will be shown in a bright, solid red colour.

The system uses the turn rate and direction to predict the aircraft flight path. Forward speed is also used to modify the look-ahead envelope. Below 100 knots the envelope is reduced until it is completely inhibited below 70 knots.

The control of the various functions of the EGPWS is via a dedicated page (TAWS) under the MENU button on the MCDU.

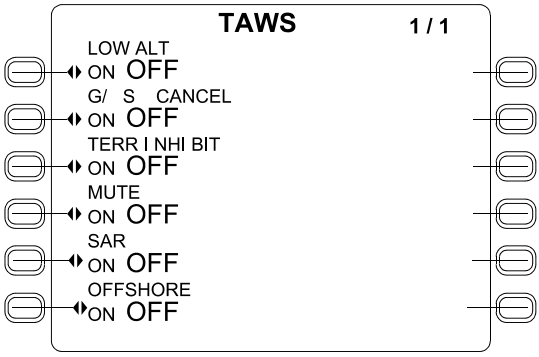

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Figure 7-3 MCDU TAWS page EPIC Phase 4 to 7 (SAR and OFFSHORE (Phase 7 only) options enabled)

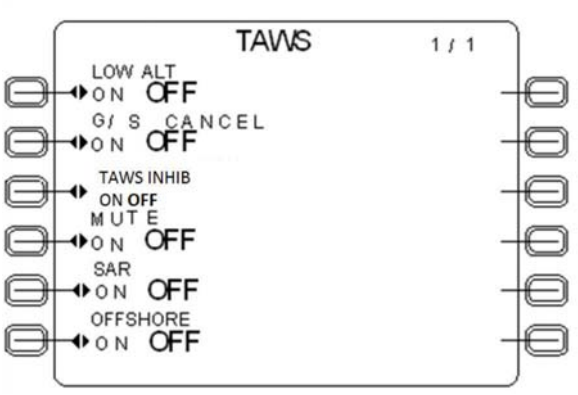

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Figure 7-4 MCDU TAWS page EPIC Phase 8 (SAR and OFFSHORE options enabled)

1. LOW ALT: This function is intended for low altitude VFR operations (to minimize nuisance).
   The selection of this mode is mutually exclusive to the selection of NORMAL, OFFSHORE and SAR modes.

   a. Mode 1 ‘SINK RATE’ and ‘PULL UP’ and Mode 2 ‘TERRAIN TERRAIN’ and ‘PULL UP’ are inhibited.

   b. Mode 3 ‘DON’T SINK’ alerts are inhibited over 100 ft.

   c. Mode 4:
   - with version -024 and -026 the ‘TOO LOW TERRAIN’ boundaries are reduced. The maximum altitude is reduced from 150 to 100 feet.
   - with version -030, 034 and -036 is inhibited.

   d. Mode 5 and Mode 6 are unaffected.

   e. TA caution and warning boundaries are reduced from:
   Caution 26 ± 5 sec to 25 ± 5 sec,
   Warning 18 ± 5 sec to 15 ± 5 sec.

A green CAS advisory message TAWS LOW ALT is displayed.

2. G/S cancel: This function is intended to prevent unnecessary GLIDESLOPE alert when the aircraft is receiving an active ILS signal while not performing an ILS approach. The mode re-arms when:

   a. The helicopter climbs above 2000 ft AGL

   b. The helicopter descends below 50 ft AGL

   c. A different NAV frequency is tuned.

   A green advisory CAS message TAWS GS CANCEL is displayed.

3. TERR INHIBIT (TAWS INHIBIT): This function inhibits all visual and aural cautions and warnings related to the TA Look-Ahead function. A status message TAWS INHIB is displayed in white on the PFD.
   The terrain display remains operational on the PFD and MFD MAP page (also PLAN page with Phase 8 only).

4. MUTE: This function inhibits all EGPWS (TA and GPWS) aural alerts for five minutes except for Advisory Alerts (MODE 6 'BANK ANGLE', 'TAIL TOO LOW' and the autorotation altitude call-outs). A green advisory CAS message TAWS AUDIO MUTE is displayed.
   The terrain and obstacle audio alerts are restored immediately by deselecting MUTE.

5. OFFSHORE mode (Phase 7 and 8 only): This mode can be selected for Offshore operations and modifies the forward looking Terrain Awareness boundaries to reduce nuisance alerts. Sea level bodies of water are displayed blue unless a Terrain Alert occurs. Mode 2 'TERRAIN TERRAIN' is inhibited.
   For -036 only the boundaries are modified for safety.
   The selection of this mode is mutually exclusive to the selection of NORMAL, LOW ALTITUDE and SAR modes.

6. SAR mode (Phase 7 and 8 only): This mode can be selected for SAR operations and modifies the forward looking boundaries. Sea level bodies of water are normally represented cyan (or blue in Ph8). While flying low over water, if the vertical separation between the aircraft and the sea is in ranges represented in Figure 7-1 the water is represented colored depending on the vertical separation value (green, amber, red etc.).
From -030 and later, if SAR and OFFSHORE mode are active, the bodies of water are represented cyan (or blue in Ph8) even if the vertical separation falls in ranges corresponding to green, amber, red).

   Mode 1 ‘SINK RATE’, Mode 2 ‘TERRAIN TERRAIN’ are inhibited.
   With version -030, 034 and -036 the Mode 4 TOO LOW TERRAIN is inhibited.
   The selection of this mode is mutually exclusive to the selection of NORMAL, LOW ALTITUDE and OFFSHORE modes.

EGPWS DESCRIPTION OF ALERTS AND INDICATIONS

PULL UP	Audio alert and red PULL UP message on attitude indicator. Aircraft has entered the predetermined 'hard' threshold for either Excessive Descent Rate or Excessive Terrain Closure Rate.
TERRAIN TERRAIN	Audio alert with amber GND PROX message on attitude indicator. Aircraft has entered the predetermined 'soft' threshold for Excessive Terrain Closure Rate. The thresholds are 'de-sensitized' for either landing gear down, ILS Approach or within 60 seconds after take-off.
WARNING TERRAIN	Audio alert and red PULL UP message on attitude indicator. Aircraft has entered the 'hard' threshold for the Terrain Awareness Mode.
WARNING OBSTACLE	Audio alert and red PULL UP message on attitude indicator. Aircraft has entered the 'hard' threshold for the Obstacle Awareness Mode.
TERRAIN	Audio alert and amber GND PROX message on attitude indicator. Aircraft has entered the 'soft' threshold for the Excessive Terrain Closure Rate. The thresholds are 'de-sensitized' for either landing gear down, ILS Approach or within 60 seconds after take-off.
CAUTION TERRAIN	Audio alert and amber GND PROX message on attitude indicator. Aircraft has entered the 'soft' threshold for the Terrain Awareness Mode.
CAUTION OBSTACLE	Audio alert and amber GND PROX message on attitude indicator. Aircraft has entered the 'soft' threshold for the Obstacle Awareness Mode.

TOO LOW TERRAIN	Audio alert and amber GND PROX message on attitude indicator. Aircraft has entered the threshold for insufficient terrain clearance. The threshold value changes depending on the phase of flight.
TOO LOW GEAR (only for -024/-026 and -036 in Offshore mode)	Audio alert and amber GND PROX message on attitude indicator. Aircraft has entered the threshold for insufficient terrain clearance with LANDING GEAR up. The threshold value changes depending on the phase of flight.
SINKRATE	Audio alert and amber GND PROX message on attitude indicator. Aircraft has entered the predetermined 'soft' threshold for Excessive Descent Rate.
CHECK AIRSPEED (version -036 only)	Audio alert message. Aircraft airspeed reduces below 55 KIAS after reaching 60 KIAS during Take-Off.
DON'T SINK	Audio alert and amber GND PROX message on attitude indicator. Aircraft has entered the predetermined threshold for Altitude Loss after Take-Off or during a missed approach.
GLIDESLOPE	Audio alert and amber GND PROX message on attitude indicator. Aircraft has entered the predetermined 'soft/hard' threshold for Below Glideslope.
BANK ANGLE	Audio alert. Aircraft has entered the predetermined threshold for Excessive Bank Angle.
TAIL TOO LOW	Audio alert. Aircraft has entered the predetermined threshold for Tail Strike Warning.
RNG ERROR (Phase 4,5,6 and 7 only)	White message on lower left PFD HSI display and MFD MAP page status window. Miscompare between MFD range and TAWS range.

TAWS AUDIO MUTE	Green CAS advisory message. Timed (5 minutes) audio inhibit function engaged via MCDU TAWS page.
TAWS INHIB	White message on lower left PFD HSI display and MFD MAP page status window. TAWS INHIB function engaged via MCDU TAWS page, terrain and obstacle alerts inhibited.
TAWS LOW ALT	Green advisory CAS message. LOW ALT function engaged via MCDU TAWS page. Warning boundaries reduce for flight at low altitude.
TAWS TEST	Amber message on PFD attitude display and MFD MAP page status window. TAWS test engaged from MCDU test page.
TERRAIN (TAWS - Phase 8 only)	Green message on lower left PFD HSI display and MFD MAP page status window. Indicates terrain display is selected.

The following indications are available when EPIC Phase 7 or Phase 8 is installed (and the options are enabled at system installation):

TAWS SAR MODE	Green advisory CAS message. SAR mode function engaged via MCDU TAWS page. Forward looking boundaries modified, Mode1 and Mode 4 alerts disabled. Sea Surface is displayed blue unless a Terrain Alert occurs
TAWS OFFSHORE MODE	Green advisory CAS message. OFFSHORE mode function engaged via MCDU TAWS page. Forward looking boundaries modified to reduce nuisance alerts. Sea Surface is displayed blue unless a Terrain Alert occurs. With -036 only, Mode 1 and 3A are inhibited in OEI.

The following indications are available when EPIC Phase 8 is installed:

SA TERR OFF	White CAS message. Situational Awareness Terrain not available or not selected for display.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 82

TRAFFIC ADVISORY SYSTEM II (TCAS II) TPA 100B

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SUPPLEMENT 82
TRAFFIC ADVISORY SYSTEM II
(TCAS II) TPA 100B

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GENERAL INFORMATION

The TPA 100B is an onboard Traffic Alert and Collision Avoidance System (TCAS II) which monitors a radius of nominal 14 NM around the helicopter by interrogating any intruding aircraft transponder and determining if a potential conflict with other aircraft exists.

The system comprises of a TCAS II processor installed in the aft avionic bay and two directional antennas one mounted on the top surface within the nose radome and the second rear antenna is mounted under the rear part of the aircraft belly. The system is interfaced and controlled by the PRIMUS EPIC software version 7 or later.

The TCAS II system interrogates ICAO compliant transponders of aircraft in the vicinity and based on replies received computes the relative range, altitude (if included in the reply message), bearing and closure rate of other transponder equipped aircraft with respect to the helicopter. The TCAS II calculates the time to reach the Closest Point of Approach (CPA) with the intruder, this time value is the main parameter for issuing alerts. If the transponder replies from nearby aircraft includes their altitude, the TCAS II computes the time to reach co-altitude.

TCAS II issues two types of alerts:

— TAs (Traffic Advisory) to assist the visual search for the intruder aircraft and prepare the pilot for a potential RA,

— RAs (Resolution Advisory) to define manoeuvres that will either increase or maintain the existing vertical separation from the intruder aircraft. When the intruder aircraft is also fitted with TCAS II, both TCAS II systems coordinate their RAs through the Mode S data link to ensure that complementary resolution senses are selected.

RESOLUTION ADVISORY MANOUVRES

The pilot action on activation of a Resolution Advisory is to initiate immediately a climb or descent as dictated by the TCAS II Resolution Advisory. The technique to achieve the requested climb or descend rate will be dependant on the initial flight conditions such as airspeed, altitude, weight, AFCS modes engaged etc.

On activation of a RA the pilot should not initiate banking manoeuvres but attempt to fly the aircraft in accordance with the indication displayed on the VSI.

Note

To manoeuvre the aircraft for compliance with a RA the cyclic and collective FTR buttons should be pressed and, if FD modes are engaged, held pressed throughout the entire manoeuvring phase to maintain the IAS and Vertical mode bugs synchronized with the actual airspeed and altitude.

When a ‘CLIMB’ Resolution Advisory is generated initiate immediately a climb to achieve the rate of climb as dictated by the TCAS II.
The following airspeed and power considerations should be taken into account:

— If airspeed is above 80 KIAS initiate climb using cyclic to reduce airspeed towards but not below 80 KIAS, whilst simultaneously applying MCP 100% PI, or TOP 110% PI when below 90 KIAS, using collective.

— If airspeed is 80 KIAS or below initiate climb using collective to apply TOP 110% PI whilst allowing IAS to increase towards but not above 80 KIAS.

— If the required climb rate cannot be achieved, maintain the maximum achievable within the aircraft limits.

— Following the ‘CLEAR OF CONFLICT’ advisory, the aircraft should be returned promptly to the applicable clearance unless otherwise directed by ATC.

When a ‘DESCENT’ Resolution Advisory is generated then:

— initiate immediately a descent to achieve the rate of descent as dictated by the TCAS II using collective to decrease the torque setting as required, but not entering into autorotation (minimum 10% PI).

— If the required descent rate cannot be achieved, maintain the maximum descent rate respecting the aircraft limits.

— Following the ‘CLEAR OF CONFLICT’ advisory, the aircraft should be returned promptly to the applicable clearance unless otherwise directed by ATC.

The TCAS II continues to monitor the flight paths of conflicting aircraft following an RA. If the aircraft flight paths are different from those required, the TCAS II can issue a new RA to maximize separation. If this occurs follow the revised RA.

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SECTION 1 - LIMITATIONS

TYPE OF OPERATION

The TPA 100B is approved for VFR and IFR operation as an aid to visually acquiring traffic and indicates the vertical manoeuvre necessary to avoid conflicting traffic.

WEIGHT AND CG LIMITATIONS

After TCAS II system installation, the new empty weight and CG location must be determined.

TCAS II SYSTEM LIMITATIONS

— The pilot must not manoeuvre the helicopter based only on Traffic Advisory (TA) or on information displayed on the traffic display.

— The pilot is authorized to deviate from the current ATC clearance to comply with a TCAS II Resolution Advisory (RA).

— The pilot is not authorized to exceed aircraft flight envelope limits based on Resolution Advisory (RA) alarms.

— When the undercarriage is extended the TCAS II lower antenna operates in omnidirectional mode. Therefore, when the intruder aircraft is below the helicopter, bearing information is not available.

— TCAS II must be selected to TA ONLY mode during underslung load operations.

— The following inhibits are active:

INHIBIT	PARAMETERS
Increase Descent RA	Inhibited below 1650 ft AGL while climbing and inhibited below 1450 ft AGL while descending
Descend RA	Inhibited below 1200 ft AGL while climbing and inhibited below 1000 ft AGL while descending

INHIBIT	PARAMETERS
TA Voice Messages	Inhibited below 400 ft AGL while descending and inhibited below 600 ft AGL while climbing
RAs	Inhibited below 1100 ft AGL while climbing, and inhibited below 900 ft AGL while descending. (TCAS II automatically reverts to TA only)
Self-Test	Inhibited when airborne
Increase Climb	Always Inhibited
Advisory Priority	Automatically reverts to TA only when higher priority advisories (such as GPWS/TAWS) occur

SECTION 2 - NORMAL PROCEDURES

GENERAL

The following aural messages *(and manoeuvres required)* are heard with the TCAS II system:

	Phrase
1	'Traffic, Traffic' *(Threat aircraft is approaching and the pilot should try to acquire visually and prepare for possible manoeuvre)*
2	'Climb, Climb' *(Climb at the rate depicted by the green (fly to) arc on VSI nominally between 1500 and 2000 fpm*)
3	'Descend, Descend ' *(Descend at the rate depicted by the green (fly to) arc on the VSI nominally between 1500 and 2000 fpm)*
4	'Monitor Vertical Speed' *(Ensure that vertical speed is out of the red arc on VSI ,until RA is completed)*
5	'Climb, Crossing Climb, Climb, Crossing Climb' *(Climb at the rate depicted by the green (fly to) arc on VSI nominally between 1500 and 2000 fpm. Safe separation will be best achieved by climbing through the threats flight path)*
6	'Descend, Crossing Descend, Descend, Crossing Descend' *(Descend at the rate depicted by the green (fly to) arc on the VSI nominally between 1500 and 2000 fpm. Safe separation will be best achieved by descending through the threats flight path)*
7	'Maintain Vertical Speed, Maintain' *(Continue the existing climb or descent rate, or other vertical speed, as depicted by the green (fly to) arc on VSI)*
8	'Maintain Vertical Speed, Crossing Maintain' *(Continue the existing climb or descent rate, or other vertical speed, as depicted by the green (fly to) arc on VSI. Safe separation will be best achieved by not altering the existing vertical speed and climbing or descending through the threats flight path)*

	Phrase
9	'Level Off, Level Off' *(Reduce rate of climb or descent to achieve level flight)*
10	'Clear Of Conflict' *(Range is increasing, and separation is adequate. Return to the applicable ATC clearance, unless otherwise directed by ATC)*
11	'Climb – Climb Now, Climb – Climb Now' *(Climb at the rate depicted by the green (fly to) arc on VSI nominally between 1500 and 2000 fpm. Received after 'DESCEND' resolution advisory and indicates a reversal in direction is required to achieve safe vertical separation from a manoeuvering threat aircraft*)
12	'Descend – Descend Now, Descend – Descend Now' *(Descend at the rate depicted by the green (fly to) arc on the VSI nominally between 1500 and 2000 fpm. Received after a 'CLIMB' resolution advisory and indicates a reversal in direction is required to achieve safe vertical separation from a manouvering threat aircraft)*
13	'Increase Descent, Increase Descent' *(descend at the rate depicted by the green (fly to) arc on the VSI, nominally between 2500 and 3000 fpm. Received after 'DESCEND' resolution advisory and indicates additional descent rate is required to achieve safe separation from manoeuuvring aircraft)*

EXTERNAL PRE-FLIGHT CHECK

AREA N°1 (Helicopter Nose)

1. TCAS II Antenna (Upper) — Condition.

AREA N°3 (Helicopter Fuselage - Right Hand Side)

1. TCAS II Antenna (Lower) — Condition.

SYSTEM CHECKS

Note

If more convenient checks may be carried out whilst A/C in IDLE mode.

1.	MCDU	— Select RADIO page. Check TCAS/XPDR set to TA/RA as required.
2.	MFD page	— Select MAP page and activate Traffic visualization. Select range to 2.5 NM.
3.	MCDU	— On TCAS/XPDR page press TEST key .
4.	MFD (MAP) page	— Verify TCAS TEST amber annunciation inside TCAS status box. Traffic test page presented. At the end of test sequence confirm aural message “TCAS SYSTEM TEST OK” is heard. Verify TCAS status box is as selected.
5.	MFD page	— Select as required.

IN FLIGHT PROCEDURES

CAUTION

Do not attempt manoeuvres based only on Traffic Advisory (TA) information shown by TCAS II. Information on the display is provided as an aid in visually acquiring traffic, it is not a replacement for ATC instructions and See & Avoid techniques.

CAUTION

Resolution Advisory (RA) indications should be complied with promptly even if it deviates from the current ATC clearance. Reporting of the RA and actions should also be communicated to the ATC as soon as operational conditions permit.

TCAS II TA ONLY MODE

Switch the TCAS II in TA ONLY mode when flying the following operating conditions:

— To preclude un-necessary RA's when intentionally operating near other aircraft such as closely spaced parallel runways etc.

— With One Engine Inoperative (OEI).

Note

When the conditions for selecting TA ONLY have been removed the TCAS II should be selected to TA/RA mode again.

AFTER TAKE-OFF

1. MFD PWR PLANT page — Check all parameters within normal operating limitations and confirm no engine matching abnormalities.

2. MCDU — TCAS/XPDR, TA/RA selection as required.

Note

If MFD is not set in MAP page (eg. PWR PLANT) and TCAS II is ON, as soon as a TA or RA is generated from the system, the cursor is prompted on MAP soft key. Pressing the ENTER key on CCD control panel, the MAP page is displayed on MFD with traffic information. Moreover a TRAFFIC message is displayed on the PFD on the left side of the ADI (amber for TA and red for RA) and an aural warning is generated.

Note

Use of the TCAS II self test function in flight is inhibited.

APPROACH AND LANDING

1. MFD PWR PLANT page — Check all parameters within normal operating limitations and confirm no engine matching abnormalities.

POST LANDING AND SHUTDOWN PROCEDURES

PRE-SHUTDOWN CHECKS

1. MCDU — Check TCAS/XPDR set to STBY.

TCAS II RA MESSAGES ON PFD AND MFD



Aural warning and climb/descent action annotated on VSI (depending on aircraft manoeuvre required)

+

TRAFFIC

Flashing then steady red on PFD attitude indicator

|

Resolution Advisory alarm

|

The crew should attempt to manoeuvre the aircraft to fly within the GREEN areas indicated on the VS indicator, whilst respecting aircraft limits.

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CAUTION

The TCAS II may request climb or descent actions which would exceed aircraft limitation or put the aircraft in undesirable conditions (i.e. autorotation). The pilot should achieve a maximum climb or descent rate applicable for the aircraft condition and maintain this until the conflict is clear or an alternative manoeuvre is requested.

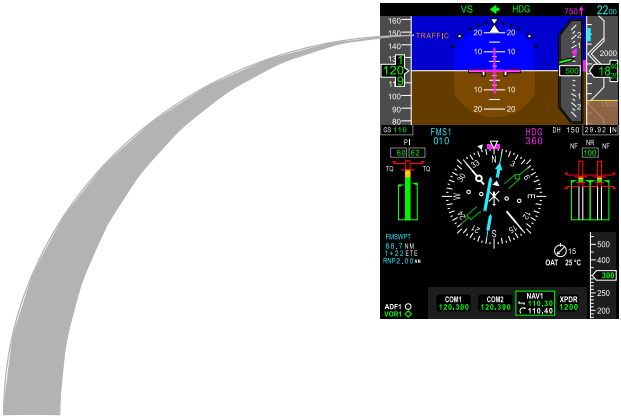
CAUTION

The Pilot must maintain situational awareness of conflicting and proximity traffic. Maintain frequent visual scan and continue to communicate as necessary and as appropriate with ATC.

Note

The TA and CAS Warning voice messages may play together if appropriate conditions are met. Differing voice tones make the aural messages distinguishable.
RA voice messages are inhibited for EGPWS voice annunciations (Supplement 81, if fitted).

TCAS II TA MESSAGES ON PFD AND MFD



Aural Warning 'TRAFFIC - TRAFFIC'

+

TRAFFIC Flashing then steady amber on PFD attitude indicator

|

TRAFFIC ALARM

|

The crew should attempt to gain visual contact with the intruder and be prepared to manoeuvre upon visual acquisition or if a RA is issued.

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Note

The TA/RA and CAS Warning voice messages may play together if appropriate conditions are met. Differing voice tones make the aural messages distinguishable.
RA voice messages are inhibited for EGPWS voice annunciations (Supplement 81, if fitted).

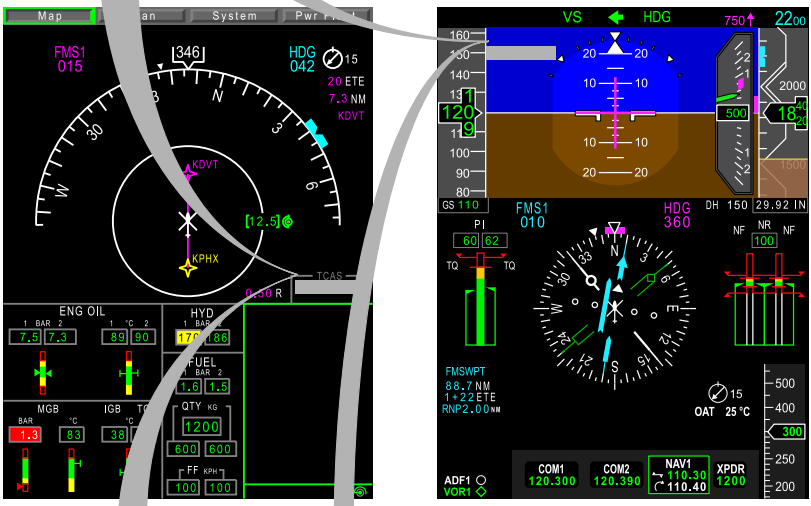
TCAS II OFF MESSAGES ON PFD AND MFD

TCAS OFF On MFD MAP page TCAS window

+

TCAS OFF On PFD attitude indicator

TCAS II system OFF



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TCAS TEST On PFD attitude indicator

+

TCAS TEST On MFD MAP page TCAS window

TCAS II system functional test

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

PFD AND MFD DISPLAY MESSAGES

TCAS II SYSTEM FAILURE



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TCAS FAIL On PFD attitude indicator

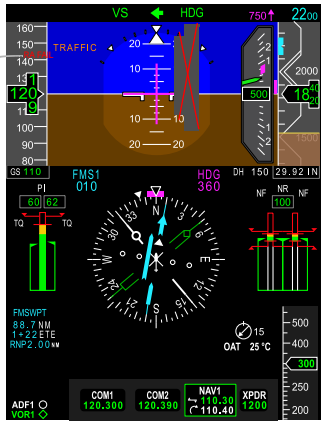
\+

TCAS FAIL On MFD MAP page TCAS window

TCAS system failure

Traffic information,
TA and RA not available

RA FAIL MESSAGES ON PFD



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RA FAIL

+

Loss of VSI indications
on PFD attitude indicator

TCAS loss of RA audio and visual cues
due to loss of vertical speed information

- Select alternative ADS source on PFD

If message remains

- Attempt to gain visual contact with the intruder and be prepared to manoeuvre aircraft upon visual acquisition

SECTION 4 - PERFORMANCE

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

INTRODUCTION

TCAS II (Traffic Alert and Collision Avoidance System) is an airborne system used for detecting and tracking traffic near the helicopter. TCAS II includes a TCAS II processor, antennas, a traffic display (MFD) and a means to control the system (CCD-MCDU).

The TCAS II system interrogates ICAO compliant transponders of aircraft in the vicinity and based on replies received computes the relative range, altitude (if included in the reply message), bearing and closure rate of other transponder equipped aircraft with respect to the helicopter. The TCAS II calculates the time to reach the Closest Point of Approach (CPA) with the intruder, this time value is the main parameter for issuing alerts. If the transponder replies from nearby aircraft includes their altitude, the TCAS II computes the time to reach co-altitude.

TCAS II issues two types of alerts:

— TAs (Traffic Advisory) to assist the visual search for the intruder aircraft and prepare the pilot for a potential RA,

— RAs (Resolution Advisory) to define manoeuvres that will either increase or maintain the existing vertical separation from the intruder aircraft. When the intruder aircraft is also fitted with TCAS II, both TCAS II systems coordinate their RAs through the Mode S data link to ensure that complementary resolution senses are selected

The vertical RAs given are calculated and given against intruder aircraft that report altitude data in their transponder messages while, for non altitude reporting (NAR) aircraft only TAs are given.

When TA-RA mode selected, the operating Sensitivity Level (SL) is automatically selected via inputs from the aircraft's radar or pressure altimeter. SL2 will be selected when the TCAS aircraft is below 1,000 feet above ground level (AGL) (±100 feet) as determined by the RAD ALT input, in SL2, RAs are inhibited and only TAs will be issued. See Figure 7-1.

Figure 7-1 TCAS II Sensitivity Level

Own Altitude (ft)	SL	Tau (seconds)		DMOD (nm)		Altitude Threshold (ft)	
		TA	RA	TA	RA	TA	RA(ALIM)
<1000	2	20	N/A	0.30	N/A	850	N/A
1000-2350	3	25	15	0.33	0.20	850	300
2350-5000	4	30	20	0.48	0.35	850	300
5000-10000	5	40	25	0.75	0.55	850	350
10000-20000	6	45	30	1.00	0.80	850	400

The TCAS II system warns the flight crew with an aural and visual TAs and RAs whenever the system detects another transponder equipped aircraft and predicts the intruder to be a threat.

The TCAS II system is controlled my means of the MCDU TCAS/ XPDR pages. The system automatically goes into standby when power is applied.

When TCAS II is set to STBY mode the following messages are present:

TCAS OFF on PFD Attitude indicator

TCAS OFF on MFD MAP page, TCAS window

The MCDU TCAS/XPDR 1/2 page is used to control the self test initiation, Transponder selection and Altitude and IDENT functions, see Figure 7-1.

The TCAS/XPDR 2/2 page provides the ability to control the TCAS II selection of TA/RA or TA mode and select the current transponder mode.

The TCAS/XPDR 2/2 page is accessed by selecting the “TCAS/XPDR” line key on the Radio Page 1 / 2.

The transponder operating modes on the TCAS/XPDR 2 / 2 page are TA/RA, TA, ALT-ON, ALT-OFF. See Figure 7-3.

1. TA/RA: Resolution Alert with Transponder Mode S operation. (TCAS II in operating mode).

2. TA: Traffic Alert with Transponder Mode C operation. (TCAS II in operating mode).

3. ALT-ON: Transponder in MODE C operation (TCAS in STBY mode).

4. ALT-OFF: Transponder in MODE A operation (TCAS in STBY mode).



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Figure 7-2 MCDU TCAS/XPDR Page 1



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Figure 7-3 MCDU TCAS/XPDR Page 2

A complete list of traffic symbols and announcements is given in the following paragraphs of this system description.

Note

TCAS II is unable to detect any Intruding aircraft without an operating transponder.

Note

TCAS II can detect and track aircraft with either an ATCRBS (ATC Radar Beacon System) operating in Mode A or C, or Mode S transponders.

The TAs are displayed on the MFDs map page to warn the flight crew to the position of nearby aircraft threats and possible threats. The selection of the display is by means of MFDs MAP menu and using the CCD panels the TCAS II traffic information can be selected for display, in addition also the TCAS II configuration Menu can be selected and used. See Figure 7-4. TCAS traffic information may be displayed on the MFD (MAP presentation with or without radar presentation) and on PFD.

The TCAS visualization functions ✔ can be controlled by CCD on MFD - TRAFFIC subpage.

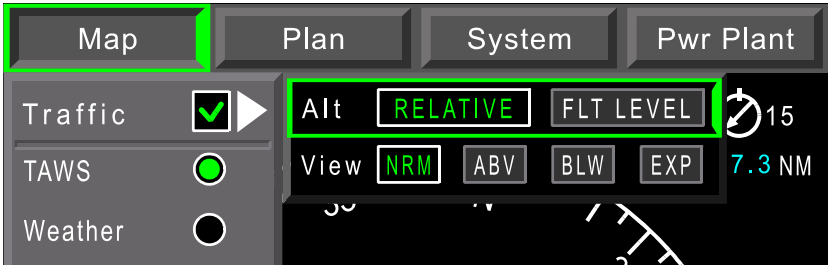

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Figure 7-4 MFD MAP Menu

ALT: toggles the altitude tag between RELATIVE to FLT LEVEL (absolute). Selection of FLT LEVEL replaces Intruder's relative altitude with absolute altitude for 15 seconds.

VIEW: toggles between altitude volume views of NRM-ABV-BLW-EXP. Surveillance volume is that volume of airspace within which other aircrafts with Mode S or ATCRBS transponders are tracked by the helicopter. The display volume is selected by the pilot.

NRM: (NORMAL) displays traffic that is between –2700 feet and +2700 feet relative to the helicopter.

ABV: (ABOVE) displays traffic that is between –2700 to +9000 feet relative to the helicopter.

BLW: (BELOW) displays traffic that is between +2700 to -9000 feet relative to the helicopter.

EXP: (EXPANDED) displays traffic that is between +9000 to -9000 feet relative to the helicopter.

TRAFFIC ADVISORY DISPLAY

The TCAS II displays an intruder aircraft symbol on the traffic advisory display. The symbol position on the display shows relative range and bearing of the intruder. The symbols shape and colours, provided by TCAS II system, identifies the category of the intruder as nonthreat (OT), Proximity (PT), Traffic Advisory (TA) or Resolution Advisory (RA), as shown in Figure 7-5. If the intruder is reporting altitude, intruder relative altitude is shown on the display near the threat traffic symbol. The relative altitude data tag consist of two digits indicating hundreds of feet with the same color as the corresponding traffic symbol.

The symbols change shape and colour as separation decreases between the helicopter's and Intruder's to represent increasing levels of urgency.

The traffic symbols may also have an associated altitude tag that shows relative altitude in hundreds of feet.

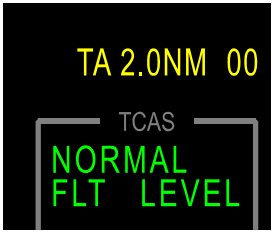
A **+** sign and number above the symbol means the Intruder is above the helicopter altitude.

A - sign and number beneath indicates the Intruder is below the helicopter altitude.
A trend arrow appears when the Intruder's vertical rate is 500 feet per minute or greater.
No altitude number or trend arrow will appear beside any Intruder that is Non-Altitude Reporting (NAR).

The TCAS II system monitors the vertical speed of traffic in own aircraft's vicinity and filters the traffic into traffic with vertical speeds greater than or equal to 500 FPM, and traffic with vertical speeds less than 500 FPM. Traffic with vertical speeds greater than or equal to 500 FPM have a vertical arrow pointing down for descending '↓' and up for climbing traffic, located directly to the right '↑', and with the same color as the corresponding traffic symbol.

If TCAS II direction finding techniques fail to locate the azimuth of another aircraft, a no bearing TA message appears on the screen. The intruder aircraft is indicated with two text lines (no symbol display) located above the TCAS status window. The first line is the data for the highest priority no bearing target and the second line is the second highest priority no bearing target. The data displayed shows:

Type-Range ± Relative altitude - ↓↑



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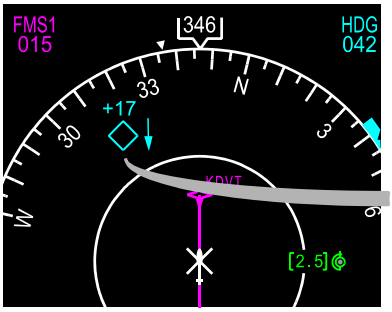
The intruder is 2 NM away and the same altitude

Non-Threat Traffic

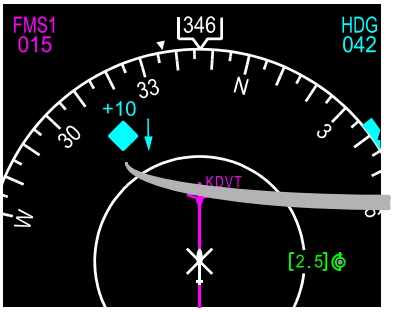


ICN-39-A-155025-A-00003-00856-A-01-1

An open Cyan diamond indicates that the Intruder's relative altitude is greater than ±1200 feet, or its distance is beyond 5 nm range. It is not yet considered a threat.

This traffic is 1700 ft above the helicopter altitude, descending at 500 feet per minute or greater.

Proximity Intruder Traffic



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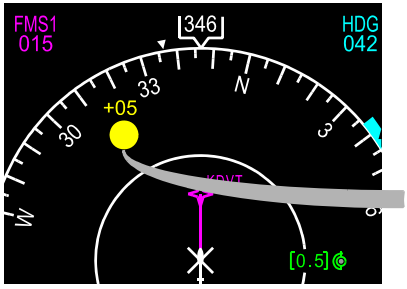
A filled Cyan diamond indicates that the Intruder aircraft is within ±1200 feet, and within 5 nm range, but is still not consider ed a threat.

This traffic is now 1000 ft above the helicopter and descending at 500 feet per minute or greater.

Traffic Advisory (TA)

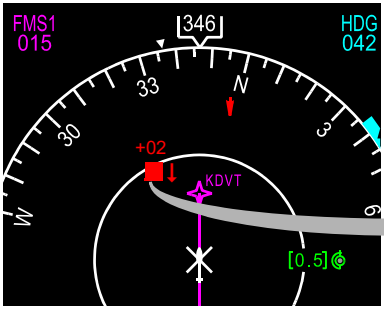
A symbol change to a filled yellow circle indicates that the Intruding aircraft is considered to be potentially hazardous. Depending upon TCAS II sensitivity level, TCAS II will display a TA when time to CPA (Closest Point of Approach) is 20 to 48 seconds



This traffic is 500 ft above the helicopter. An aural warning 'TRAFFIC, TRAFFIC' is generated.

Resolution Advisory (RA)

A symbol change to a filled red square indicates that the Intruding aircraft is hazardous.
The TCAS II will issue a RA with vertical indications on the VSI to fly to and an audio warning to avert the conflict when the CPA (Closest Point of Approach) is 15 to 35 seconds.



This traffic is 200 ft above the helicopter. An aural and visual warning to manoeuvre the aircraft is generated.

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The TCAS II system is able to display also the Flight Level (absolute altitude), of the intruder aircraft, in place of the relative altitude, when selected from the MAP drop down menu. The absolute altitude is calculate by adding the relative altitude provided by the intruder TCAS II to own aircraft's barometric altitude. Absolute altitude consists of three digits indicating hundreds of feet. Absolute altitude is replaced with relative altitude after 15 seconds or whenever a TA or RA condition is encountered. When absolute altitude is selected, a green annunciation "FLT LEVEL" is located in the MFDs TCAS status window. In the event that a TA or RA target is encountered, that does not have a bearing available for display, the information for that target is displayed in two text lines above the TCAS status window. The first line will contain data for the highest priority no bearing target and the second line will contain data for the second highest priority no bearing target.

When a TA or RA advisory is issued from TCAS II and TCAS II information is not selected to be displayed on the MFD display, the TCAS II will be automatically enabled for display on the MFD map and pilot or copilot can display TCAS II information by simply pressing enter on Display Cursor control panel.



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Figure 7-5 MFD TCAS II Display

RESOLUTION ADVISORY DISPLAY

The RAs are shown superimposed on the vertical Speed indication on the PFDs, see Figure 7-6. The RA visual advisory provides the pilot with information on the vertical speed to fly, or avoid, in order to resolve a potential conflict. The RA advisory on the vertical speed tape is depicted with red and green bands to indicate the vertical speeds to be avoided (red) and the desired vertical speed to be flown (green) and the Vertical speed digital readout is deleted. In addition, a TRAFFIC text is shown in the upper left corner of the attitude sphere during TA and RA condition, in amber (TA) or red (RA) colours dependent on the advisory type. RED and AMBER TRAFFIC annunciation share the same location on PFD. In the event that both an amber and a red "TRAFFIC" annunciation are present, the red "TRAFFIC" is displayed. This position is also used to display the “TA ONLY” annunciation when the altitude is below 1000 ft an RA is not allowed or when the Pilots has selected TA only mode.

To assist the pilot to follow the manoeuvres required and to minimize crews errors, the Green fly-to bands are twice as wide (left to right) as red avoidance zones, in addition the VS pointer changes from green to red whenever it is pointing to a TCAS II red avoidance zone and viceversa.

.



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Figure 7-6 RA Vertical Speed Display

AURAL ANNOUNCEMENTS

The TCAS II issues TA or RA aural message alarms on the ICS when the display TAs or RAs are present. The aural messages have the same priority as CAS warnings and are played together if the appropriate conditions are met, however due to differing voice tones the messages are distinguishable, while the TAs or RAs aural messages are inhibited for EGPWS aural annunciations (Supplement 81, if fitted).

The following aural messages are incorporated in the TCAS II system:

	Phrase
1	'Traffic, Traffic' *(Threat aircraft is approaching and the pilot should try to acquire visually and prepare for possible manoeuvre)*
2	'Climb, Climb' *(Climb at the rate depicted by the green (fly to) arc on VSI nominaly between 1500 and 2000 fpm*)
3	'Descend, Descend ' *(Descend at the rate depicted by the green (fly to) arc on the VSI nominally between 1500 and 2000 fpm)*
4	'Monitor Vertical Speed' *(Ensure that vertical speed is out of the red arc on VSI ,until RA is completed)*
5	'Climb, Crossing Climb, Climb, Crossing Climb' *(Climb at the rate depicted by the green (fly to) arc on VSI nominaly between 1500 and 2000 fpm. Safe separation will be best achieved by climbing through the threats flight path)*
6	'Descend, Crossing Descend, Descend, Crossing Descend' *(Descend at the rate depicted by the green (fly to) arc on the VSI nominally between 1500 and 2000 fpm. Safe separation will be best achieved by descending through the threats flight path)*
7	'Maintain Vertical Speed, Maintain' *(Continue the existing climb or descent rate, or other vertical speed, as depicted by the green (fly to) arc on VSI)*
8	'Maintain Vertical Speed, Crossing Maintain' *(Continue the existing climb or descent rate, or other vertical speed, as depicted by the green (fly to) arc on VSI. Safe separation will be best achieved by not altering the existing vertical speed and climbing or descending through the threats flight path)*
9	'Level Off, Level Off' *(Reduce rate of climb or descent to achieve level flight)*

	Phrase
10	'Clear Of Conflict' *(Range is increasing , and separation is adequate. Expeditiously return to the applicable ATC clearance, unless otherwise directed by ATC)*
11	'Climb – Climb Now, Climb – Climb Now' *(Climb at the rate depicted by the green (fly to) arc on VSI nominaly between 1500 and 2000 fpm. Recieved after 'DESCEND' resolution advisory and indicates a reversal in direction is required to achieve safe vertical separation from a manoeuvering threat aircraft*)
12	'Descend – Descend Now, Descend – Descend Now' *(Descend at the rate depicted by the green (fly to) arc on the VSI nominally between 1500 and 2000 fpm. Received after a 'CLIMB' resolution advisory and indicates a reversal in direction is required to achieve safe vertical separation from a manouvering threat aircraft)*
13	'Increase Descent, Increase Descent' *(descend at the rate depicted by the green (fly to) arc on the VSI, nominally between 2500 and 3000 fpm. Received after 'DESCEND' resolution advisory and indicates additional descent rate is required to achieve safe separation from manoeuuvring aircraft)*

For certain flight regimes where there is a high density of aircraft such as around airports the aural messages are inhibited. The following aural inhibits are active:

Aural Inhibits	PARAMETERS
Increase Descent RA	Inhibited below 1650 ft AGL while climbing and inhibited below 1450 ft AGL while descending
Descend RA	Inhibited below 1200 ft AGL while climbing and inhibited below 1000 ft AGL while descending
TA Voice Messages	Inhibited below 400 ft AGL while descending and inhibited below 600 ft AGL while climbing

SELF TEST

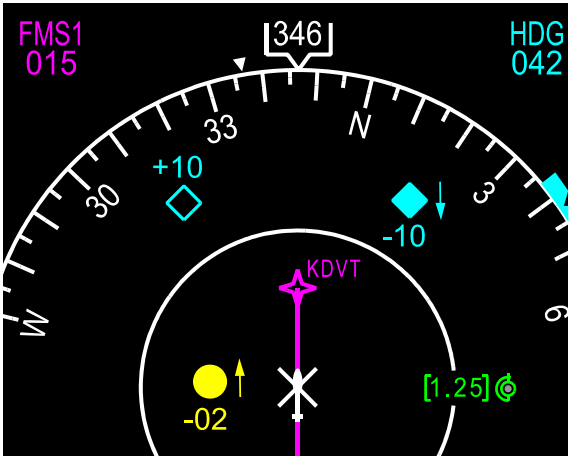
The self-test function of TCAS II subsystem can be activated by selecting the XPDR/TCAS page on the MCDU then selecting the TEST line select key. A 'TEST' caption illuminates in the ACTIVE field of the MCDU page.

The self test determines the operational status of the entire TCAS II system. Once begun, self test continues automatically for approximately eight seconds.

During self test, normal TCAS II operation is inhibited.

For the test a range of 2.5 nm (half range 1.25) should be selected and the test generates the symbols arranged as shown.

The traffic display annunciates the phrase "TCAS TEST".



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A Resolution Advisory (filled red square) wil appear at 3 o'clock, range 2 miles 1000 feet below flying level.

A Traffic Advisory (filled yellow circle) will appear at 9 o'clock, range of 2 miles, 200 feet below and climbing.

Selecting the 5 nm range (half range 2.5) during the test allows the proximity traffic (filled cyan diamond) to be seen at 1 o'clock, range 3.6 miles, 200 feet above, descending and Non-Threat traffic (open cyan diamond) to be seen at 11 o'clock, range of 3.6 miles, flying level 1000 feet above.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 83

TRAKKABEAM SERIES SEARCHLIGHT

P/N 4G3340F02411
P/N 4G3340F02412
P/N 4G3340F02413
P/N 4G3340F02414
P/N 4G3340F03011

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SUPPLEMENT 83
TRAKKABEAM SERIES
SEARCHLIGHT

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GENERAL INFORMATION

The Trakkabeam series of searchlight are high intensity external light source installed on a gimbal support on the left hand side of the helicopter. It is used to provide high intensity external lighting for reconnaissance operations during night time operations.

This Supplement gives instruction on the Trakkabeam series including the A800 searchlight installation P/N 4G3340F02411 and 4G3340F02413 (non NVG) and P/N 4G3340F02412 and 4G3340F02414 (NVG), and the TLX version P/N 4G3340F03011, both of which include the capability to slave the searchlight operation to a FLIR.

The searchlight ranges of movements are shown below:

P/N 4G3340F02411 and P/N 4G3340F02412:

Elevation .....-26 deg to -120 deg

Azimuth ..... 180 deg to right, 180 deg to left

P/N 4G3340F02413, P/N 4G3340F02414 and P/N 4G3340F03011:

Elevation .....-142 deg to 0 deg

Azimuth ..... 1 deg to right, 151 deg to left

The installation consists of the searchlight with a 800W lamp, gimbal support (Figure 1), a Power Conditioning Interface Unit (PCIU), a Cockpit Controller (Figure 2 to Figure 4), Pendant Grip Controller (Figure 5) and all necessary hardware and cabling.

The searchlight unit has an integrated optical filter system which provides the option for different light beam filter colours including infra-red depending on customer requirements. The filters are easily selectable during flight via the cockpit and pendant controllers.

The PCIU is the central power and control hub for the entire system, aircraft power supply (28VDC) is converted and distributed to each item in the system. The PCIU performs all gimbal position control, filter selection, light zoom and lamp on/off control and provides an interface to the cockpit control unit, hand controller and interfacing for FLIR slaving capability.

The Cockpit Controller unit includes all switches for searchlight power ON/OFF, function selection and provides displays to indicate filter

number and current system status. The controller does not have a joystick for light direction (except the TLX version), however, inputs are available for light azimuth and elevation control by collective landing light 5 way switch inputs.

The Pendant Grip Controller also provides switches for searchlight power ON/OFF, function selection and provides displays to indicate filter number and current system status. The Pendant Controller also includes a joystick to control the light azimuth and elevation. Selection of the Pendant Grip Controller to operate the system is via the Cockpit controller.

TRAKKABEAM OPERATION

On the cockpit controller selecting the SYS (PWR) switch to ON the system performs Power-On-Self-Test (POST). This should take around 12 seconds, however, if the gimbal has not been stowed previously before power down or the searchlight hit the mechanical stops during the previous flight, it will take 60 seconds. Upon completion of the POST, the searchlight will travel to the STOW position and the STOW light will flash while the searchlight is moving then steady when it is in the STOW position. The searchlight will only respond to the DEPLOY command when in the STOW position, no other buttons will function. Depressing the DEPLOY switch will move and point the searchlight in a preset direction ready for turning the lamp ON. When in DEPLOY, all of the control functions become active. To start the lamp the ARM switch, on the cockpit controller, must be selected ON then by depressing the Lamp ON/OFF button the lamp illuminates and extinguished by depressing the Lamp ON/OFF switch again.

The searchlight filter may be selected prior to starting the lamp or any time after the lamp has been ignited. The filter is changed by depress the FILTER SEL switch until the display shows the desired position number and then select the FILTER ENT switch to activate.

During the POST process, the filter wheel will rotate to the preset HOME position (normally white light position).

Moving the ZOOM switch a wider beam or a narrow beam can be selected.

The searchlight is directed by either the pilot or copilot collective joystick as selected by the PILOT/COPILOT/CREW switch on the controller or, for the TLX version, the joystick on the cockpit controller. Moving the joystick to the left or right for azimuth control and up or down for elevation control. The azimuth and elevation speed increases as the joystick is moved further to it maximum deflection. When CREW is selected the control is handed over to the Pendant Controller which has similar functioning buttons and a joystick to control searchlight direction.

Selecting the SLAVE mode the searchlight will track the movement of the host equipment e.g. FLIR (if installed). When operating in the SLAVE mode, the system will still respond to all the manual controls while the joystick control is used to adjust for parallax error and align the searchlight beam to the FLIR target if required.

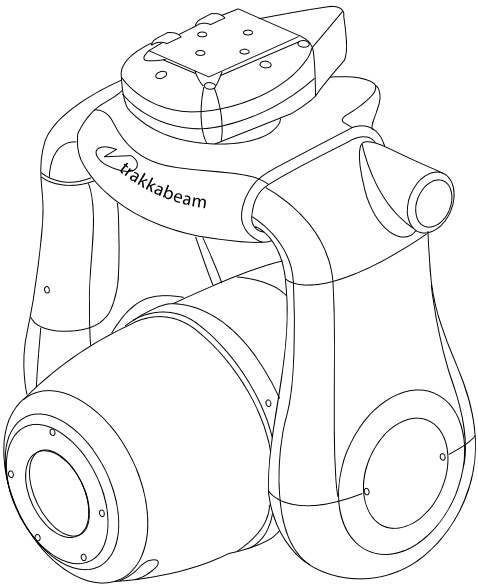

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Figure 1 Trakkabeam Searchlight and Gimbal (for reference only)

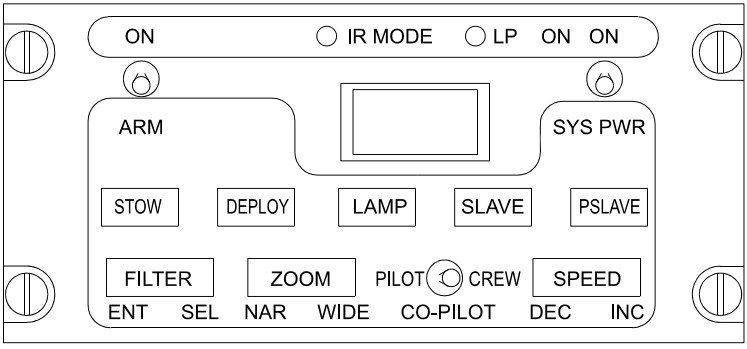

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Figure 2 A800 Cockpit Controller (for reference only)

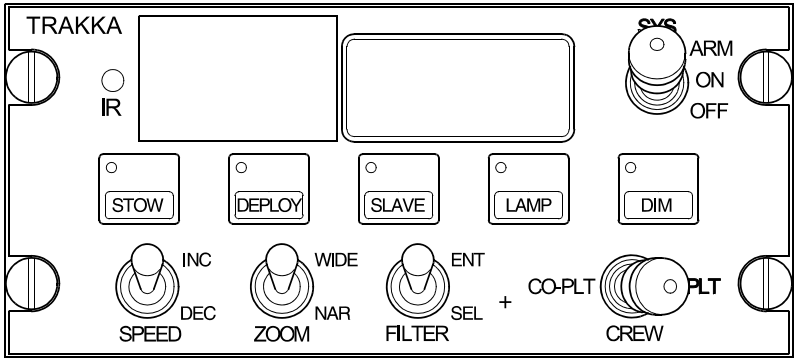

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Figure 3 A800 Alternative Cockpit Controller (for reference only)

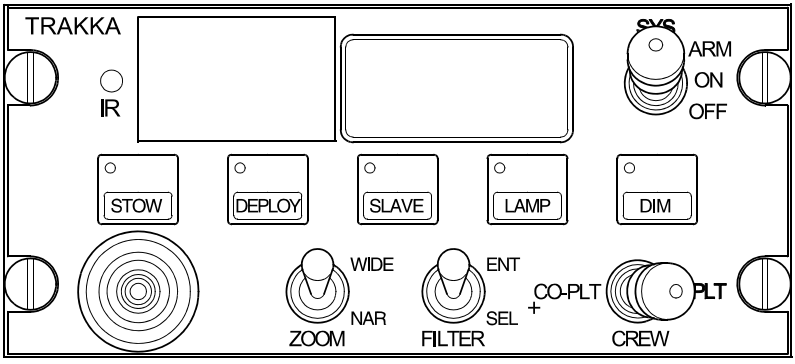

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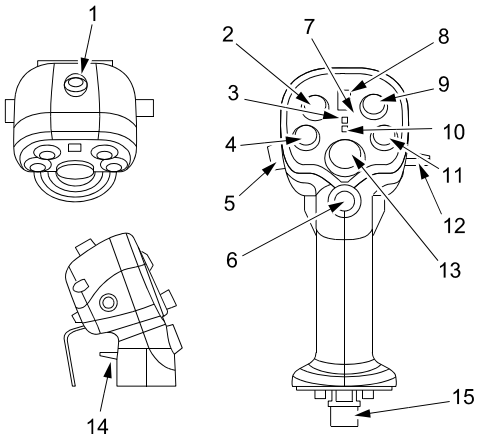
Figure 4 TLX Cockpit Controller (for reference only)



1	Pilot / Observer (Port 1 only)
2	Camera / Slave
3	Lamp ON (LED indicator)
4	Deploy
5	System Power ON / OFF
6	Lamp ON / OFF
7	CAM LED
8	Seven Segment Display
9	LED Dim
10	Unit Status
11	Stow
12	Filter Select / Engage
13	Joystick
14	Zoom Toggle Switch
15	Input Connector

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Figure 5 A800 Pendant Controller

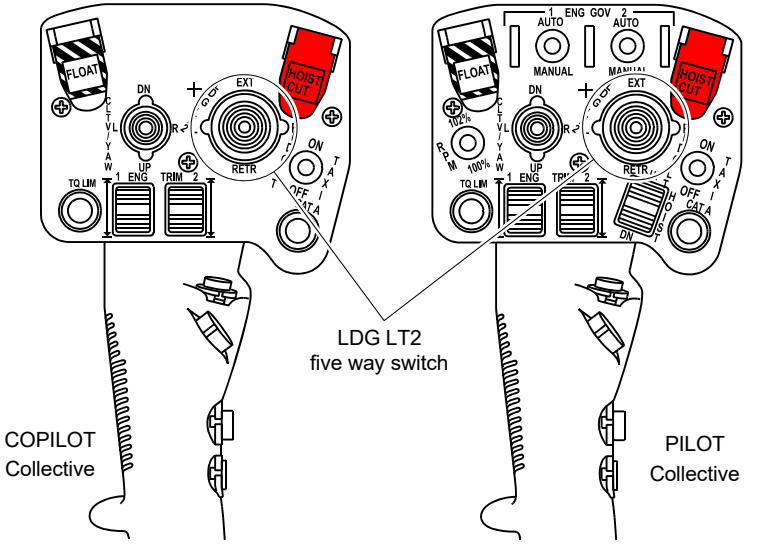

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Figure 6 Collective Grip (Pilot and Copilot)

SECTION 1 - LIMITATIONS

TYPE OF OPERATION

Operation of the Trakkabeam searchlight is prohibited in IFR.

WEIGHT AND CG LIMITATIONS

After Trakkabeam searchlight installation, the new empty weight and CG location must be determined.

AIRSPEED LIMITATIONS (KIAS)

Maximum airspeed with searchlight stowed .....$Vne_{Power\ ON}$

Maximum airspeed to move searchlight searchlight ..... 140 KIAS

TRAKKABEAM LIMITATIONS

— The searchlight light must be OFF:

- below 50 ft (15 m) AGL
- in cloud or fog conditions

— The searchlight must be in the STOW position for Take Off and Landing.

PLACARDS

TRAKKABEAM A800 SEARCHLIGHT

DO **NOT** USE BELOW **50**FT AGL OR IN **FOG** CONDITIONS

In View of Pilot (for reference only)

SECTION 2 - NORMAL PROCEDURES

Note

For full information on the Trakkabeam searchlight operation refer INSTALLATION AND OPERATION MANUAL, ATA Ref 33-45-00 latest issue.

EXTERNAL PRE-FLIGHT CHECKS

AREA N°6 (Fuselage Left Hand Side)

1. Searchlight ➡	— Secure and wiring properly connected. Check lens for cleanliness and security.

AREA N°7 (Cabin and Cockpit Interior)

1. Searchlight circuit breaker (overhead console)	— Confirm In.
2. SYS (PWR) switch (on pendant controller (if fitted) and cockpit controller)	— Confirm OFF.

SYSTEM CHECK

Trakkabeam checks

1. SYS (PWR) switch (on cockpit controller)	— Set to ON, check POST process completes successfully and STOW light illuminates steady.

Note

Normal POST process should take 12 seconds, however, if the searchlight was powered down before STOW selected, or the mechanical limit stops were impacted by the searchlight (e.g. due to turbulent flight), during the previous operation this check will take longer.

2. DEPLOY switch — Select and confirm DEPLOY light steady.
3. UP/LEFT/DOWN/RT on joystick (collective or pendant controller as selected, or controller panel for TLX version) — Move control and verify correct movement of searchlight.
4. STOW switch (on cockpit controller or pendant controller) — Select to stow searchlight, confirm STOW light steady.
5. Pendant Controller (if used) — As required or stow in stowage box on rear of interseat console.

Note

Prior to Take-Off the searchlight SYS (PWR) should be ON and the STOW position selected.

IN FLIGHT

Trakkabeam searchlight procedure

CAUTION

— In flight, do not use searchlight below 50 ft (15 m) AGL.
— Do not direct the beam towards other aircraft or vehicles to prevent temporary blinding effect.

Note

When operating searchlight, magnetic compass indication is not reliable.

Note

SYS (PWR) select to ON, if carried out in flight, must be done at an airspeed below 40 KIAS to allow the POST process to complete satisfactorily.

1. Searchlight PWR switch — Confirm ON.
2. DEPLOY switch — Select and confirm DEPLOY light steady.
3. ARM switch — Select ON.
4. LAMP — Select ON.
5. Cockpit controller — Select Pilot /Copilot/Crew as required.
6. UP/LEFT/DOWN/RT switch (selected joystick) — As required to direct light.
7. FILTER and ZOOM buttons — As required to filter and zoom light beam as desired.

SLAVING to FLIR

8. SLAVE button — Press to slave searchlight to FLIR.

When searchlight operations completed:

9. LAMP switch — Select to switch lamp OFF.
10. STOW switch — Select to STOW searchlight.
11. ARM — Select OFF.

Note

If the STOW switch is selected with the lamp illuminated the lamp will extinguish automatically before moving to the STOW position.

Note

If the searchlight is not expected to be used for an extended length of time, the system should be selected to STOW.

APPROACH AND LANDING

CAUTION

In flight, do not use searchlight below 50 ft (15 m AGL.

1. Searchlight	— Confirm STOW selected, STOW light steady.
	— Ensure light off before reaching 50 ft (15 m) AGL.
2. Pendant Control (if used)	— Stow in stowage provided.

Note

Prior to landing or when the searchlight is not expected to be used for an extended length of time, the system should be selected to STOW.

POST SHUTDOWN CHECKS

1. Searchlight	— Confirm STOW selected.
2. SYS (PWR) switch	— Select OFF.

Note

Prior to selecting SYS PWR to OFF the lamp should be selected OFF or STOW selected for a minimum of 2 minutes.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

DOUBLE DC GENERATOR FAILURE

1. Searchlight	— Select STOW and confirm stow light steady.
	— Set to SYS (PWR) to OFF.

SECTION 4 - PERFORMANCE

No change in aircraft performance when Trakkabeam searchlight is installed.

When Trakkabeam searchlight is installed together with one or more of the following kits:

- External Hoist installation (Supplements 11,41,49)
- Snow skids installation (Supplement 19)
- Slump Pads Installation (Supplement 20).

The climb performance is reduced by:

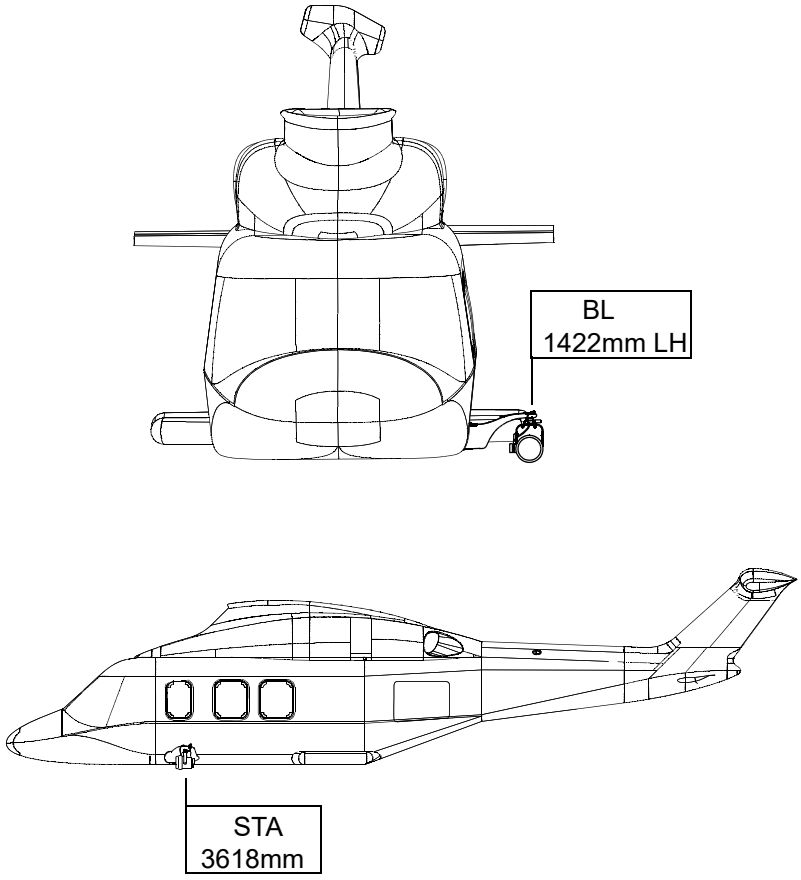
ROC from Basic RFM/Supplement Charts	ROC Reduction (ft/min)
Less than 1500 ft/min	0
Between 1500 and 2500 ft/min	100
Above 2500 ft/min	200

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

LONGITUDINAL AND LATERAL MOMENT ARMS

When the searchlight is installed the following Longitudinal and Lateral Moment arms are applicable for the Weight and Balance Calculations.



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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 84

OBSTACLE PROXIMITY LIDAR SYSTEM

P/N 4G9360F00211

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SUPPLEMENT 84

OBSTACLE PROXIMITY LIDAR SYSTEM

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GENERAL INFORMATION

The Obstacle Proximity LiDAR System (OPLS) presents to the pilot a visual and audio indication of obstacle distances around the aircraft while in hovering or low speed flight.

The system comprises of three Laser Imaging Detection and Ranging Units (LiDAR) mounted around the aircraft transmission cowling below the rotor head, a processing unit and audio/video adapters mounted in the rear avionics bay, a control panel mounted in the interseat console (see Figure 2) and all necessary hardware and cabling (see Figure 1).

The LiDAR units generate digital distance profiles of the surrounding environment using a low-power, eye safe laser beam and receiver. The distance information from the three overlapping beams are digitally mixed in the processors to produce a 360° obstacle coverage, in the plane of the sensor units, around the helicopter, see Figure 3 for sensor footprint (Note: no obstacles above or below the plane or the sensor units is detected).

The information from the processor can then be displayed on the MFD or central 5th display (depending on customization) using a helicopter plan view representation with the obstacle profile on a polar grid with range captions. The critical (minimum) distance to the nearest obstacle is indicated by a colour coded radial line and the distance given at the top of the display. Three colour bands are used for indicating criticality, Green (safe), Yellow (caution) and Red (critical), see Figure 4. In addition to the colour coded indication an audio tone is also heard in the intercom which increases in frequency as the distance decreases. An audio annunciation is heard passing from Green to Yellow “APPROACHING” and from Yellow to Red “CHECK DISTANCE” zones.

The OPLS Controller (Figure 2) is used to switch the system ON and OFF and gives an indication of system status OFF/STBY/ON/ERROR.

The audio tone and annunciations can also be selected to MUTE with an indication when in MUTE. The MUTE function can be selected when in the yellow band by either pressing the MUTE button on the panel or the CAS RST button on the collective. (The MUTE function does not activate if selected whilst in the Green or Red band).

To reactivate the audio the MUTE button on the panel must be pressed. When the audio is in MUTE and the Red band is entered the audio is automatically reactivated.

The OPLS obstacle display is selected on the MFD using the cursor control device selecting the SYSTEM VIDEO selection.

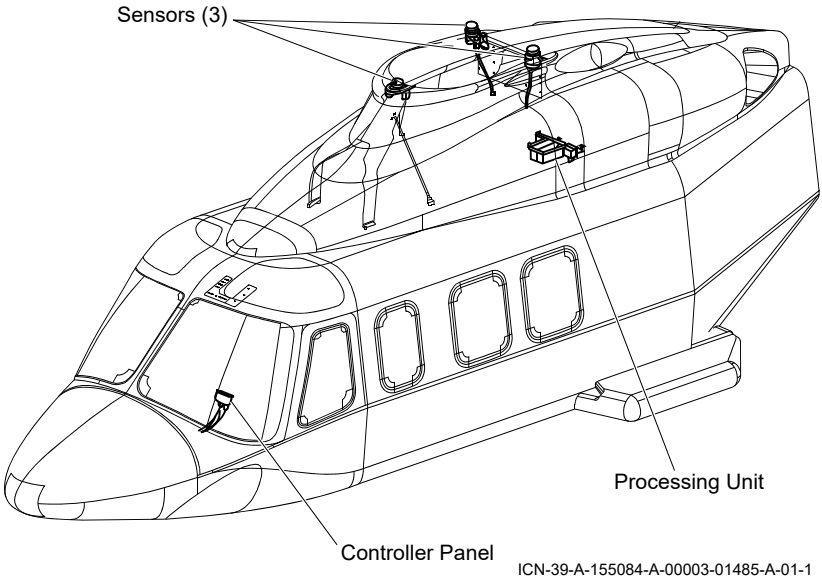

Figure 1 LiDAR Installation

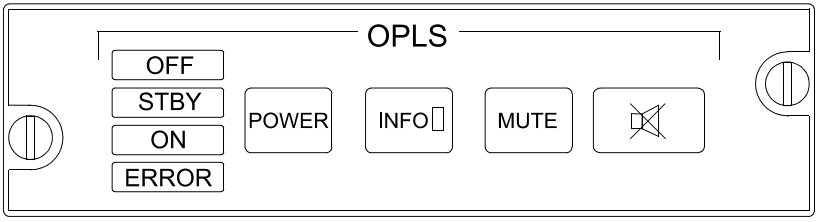

Figure 2 OPLS Controller Panel

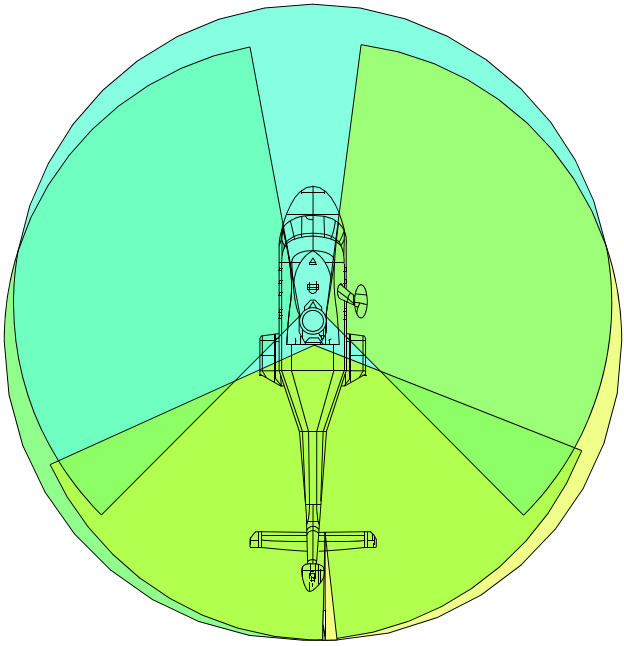

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Figure 3 LiDAR Sensor Footprint in LiDAR Sensor Plane

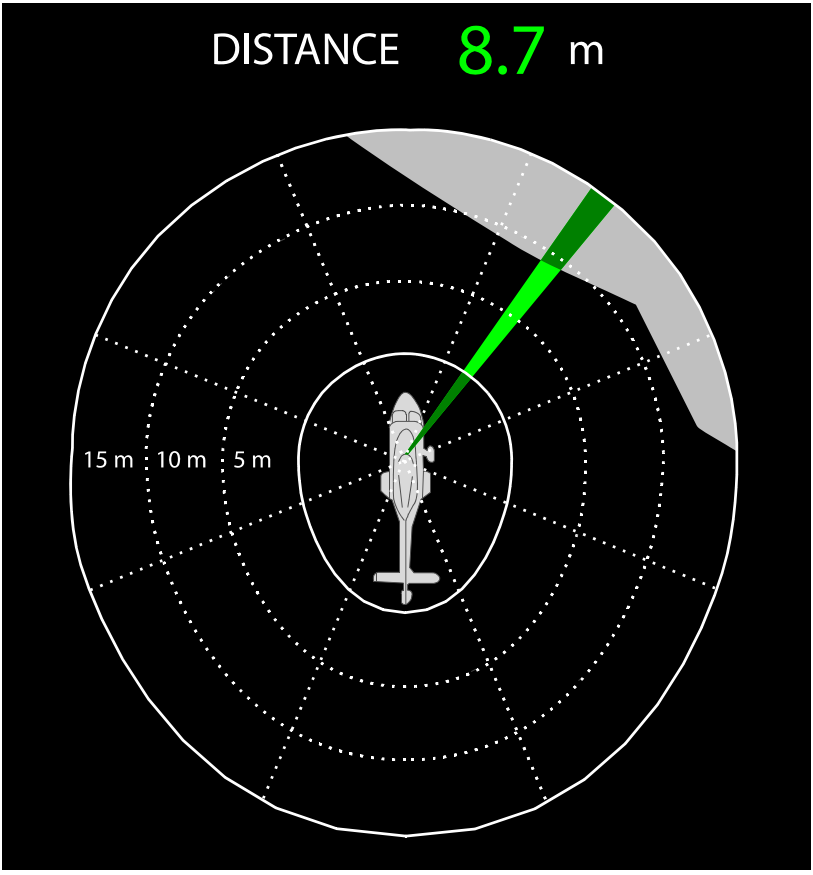

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Figure 4 OPLS Display

SECTION 1 - LIMITATIONS

WEIGHT AND CG LIMITATIONS

After OPLS installation, the new empty weight and CG location must be determined.

OPLS LIMITATIONS

The OPLS display is intended to serve as a Hover and Low Speed obstacle awareness tool only. The primary means for avoid obstacles must be “see and avoid” techniques.
The OPLS display symbology must only be used as a pilot aid as the display may not provide the accuracy and fidelity on which to base Take-Off, Landing or any in-flight manoeuvre.

SECTION 2 - NORMAL PROCEDURES

SYSTEM CHECKS

1.	OPLS panel POWER button	— Push to select on, confirm amber OFF indicator extinguishes and amber STBY illuminates temporarily during the BIT then the green ON illuminates.
2.	OPLS Display	— Select, using the cursor control device, SYSTEM and VIDEO for the OPLS to display and confirm display representative to conditions around the helicopter.
3.	OPLS panel MUTE button	— Select as required.

IN FLIGHT

During taxiing, hover or hovering manouvres as required:

CAUTION

The OPLS is able to detect obstacles made in any material, however, it may not detect large glass surfaces. Fog, mist, rain, cloud or snow may generate spurious signals or adversely affect OPLS distance information.

1. OPLS panel — Confirm green ON light illuminated and ERROR light extinguished.
2. MFD Display — Select using the curser control device, SYSTEM and VIDEO to display the OPLS.
3. OPLS panel MUTE button or CAS RST. — Select as required to MUTE audio.

CAUTION

The OPLS system display indicates the obstacles in the plane of the LiDAR sensor units and no information above or below this plane is measured.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure confirmed.

CAUTION

Ensure the OPLS is switched OFF.

OPLS SYSTEM FAILURE

Any failure of the OPLS system will cause the OPLS display to be removed and replaced by a red cross, the audio will be deactivated and the ERROR message will illuminate on the OPLS control panel.

SECTION 4 - PERFORMANCE

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 85

BATTERIES IN PARALLEL (IMPROVED ENGINE STARTING) KIT

P/N 4G2430F00811

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SUPPLEMENT 85
BATTERIES IN PARALLEL (IMPROVED ENGINE STARTING) KIT

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GENERAL INFORMATION

The Batteries in Parallel (Improved Engine Starting) Kit P/N 4G2430F00811 introduces an improvement to engine starting on battery by connecting the MAIN and AUXILIARY batteries in parallel during the engine starting phase for battery only starts and when the aircraft is on the ground. Starting from External power or generator assisted cross-start from the opposite engine started generator are unchanged.

The installation of this kit also requires the 44 Ah Main Battery P/N 4G2430F00512 and the 27 Ah Auxiliary Battery P/N 4G2430F00114 to be installed.

The kit comprises of a relay in the Electrical Power Generation and Distribution System that is activated by the ENG MODE switch. When either ENG MODE switch is selected to GI or FLT the relay is closed connecting the two batteries in parallel for the engine starting phase. When closed the relay activates the BATT OFF LINE caution to indicate to the pilot that the relay has closed and the batteries are connected in parallel for the starting. The system also includes two DC/DC converters that guarantee uninterrupted power to the ESSential busses during the start sequence.

After the engine start phase has completed the relay is automatically opened separating the batteries, extinguishing the BATT OFF LINE caution and the power to the ESSential busses are provided by the aircraft primary connections.

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Batteries in Parallel (Improved Engine Starting) Kit, the new empty weight and center of gravity position must be determined.

SECTION 2 - NORMAL PROCEDURES

Note

During engine starting on Battery only the BATT OFF LINE caution will display during the engine start phase to indicate batteries are connected in parallel.

BATTERY ENGINE START

Note

During battery start FUEL PUMP 1(2) may illuminate temporarily.

Either engine may be started first and it is recommended that normal engine starts be made using the AUTO mode. For starting procedure in MANUAL mode refer to Section 3.

Note

If engine N°2 is to be started first, set BUS TIE switch to ON and confirm MAIN BUS 2 voltage is not below 23V.

1. ENG # FUEL switch — ON - Fuel valve indicator bar vertical.
2. MFD display — Confirm PWR PLANT page.
3. FUEL PUMP # switch — ON - # FUEL PUMP caution out, check pressure.
4. ENG # MODE switch — IDLE.

Note

It is recommended to start the engine to IDLE, if necessary, it is possible to start to FLIGHT by setting the ENG MODE switch directly to FLT.

5. CAS display — Confirm BATT OFF LINE caution illuminates.

CAUTION

If caution not illuminated engine may not start correctly.

6. Gas Producer (NG) — Note increasing and START legend displayed.
7. Engine temperature (ITT) — Note increasing and IGN legend displayed.
8. Engine oil pressure — Confirm rising.
9. Engine N°# starter — Disengaged by 49% NG.
10. Main hydraulic system — When the main rotor begins to rotate, confirm rise in main hydraulic pressure.
    — Confirm cyclic control centralized on PFD cyclic indicator.
11. N°# engine power turbine speed (NF) and rotor speed (NR) — Confirm both stabilized to IDLE speed of 65%±1%.

Note

If the engine was started directly to FLT the NF will stabilize at 100% with rotor speed (NR).

12. Engine and transmission oil — Check pressures and temperatures within limits.

13. ENG # MODE switch — FLT.
14. GEN # — Confirm ON (reset if required).
15. CAS display — Confirm BATT OFF LINE caution extinguishes.
16. Continue start with other engine see Basic RFM Section 2.

QUICK ENGINE START

1. BUS TIE switch — ON.
2. ENG 1 FUEL switch — ON - Fuel valve indicator vertical.
3. MFD display — Confirm PWR PLANT page.
4. FUEL PUMP 1 switch — ON - Check pressure.
5. ENG 2 FUEL switch — ON - Fuel valve indicator vertical.
6. FUEL PUMP 2 switch — ON - Check pressure.
7. ENG 1 MODE switch — FLT.
8. CAS display — Confirm BATT OFF LINE caution illuminates.

CAUTION

If BATT OFF LINE caution not illuminated engines may not start correctly.

9. ENG 2 MODE switch — FLT when N°1 engine NG is above 25%.

CAUTION

Avoid operating the ENG MODE switches simultaneously.

10. Gas Producer (NG)	— Note increasing and START legend displayed.
11. Engine temperature (ITT)	— Note increasing and IGN legend displayed.
12. Engine oil pressure	— Confirm rising.
13. Engine N°1 & N°2 starters	— Disengaged by 49% NG.
14. Main hydraulic system	— When the main rotor begins to rotate, confirm rise in main hydraulic pressure. — Confirm cyclic control centralized on PFD cyclic indicator.
15. N°1 & N°2 engine power turbine speed (NF)	— Confirm stabilized at 100%.
16. Engine and transmission oil	— Check pressures and temperatures within limits.
17. GEN 1 and GEN 2 switches	— Confirm ON (reset if required)
18. BUS TIE switch	— Confirm AUTO.
19. CAS display	— Confirm BATT OFF LINE caution extinguished.
20. RAD MSTR switch	— ON.
21. Clock	— Set.
22. Rotor speed	— Confirm 100%.
23. VENT switches	— As required.

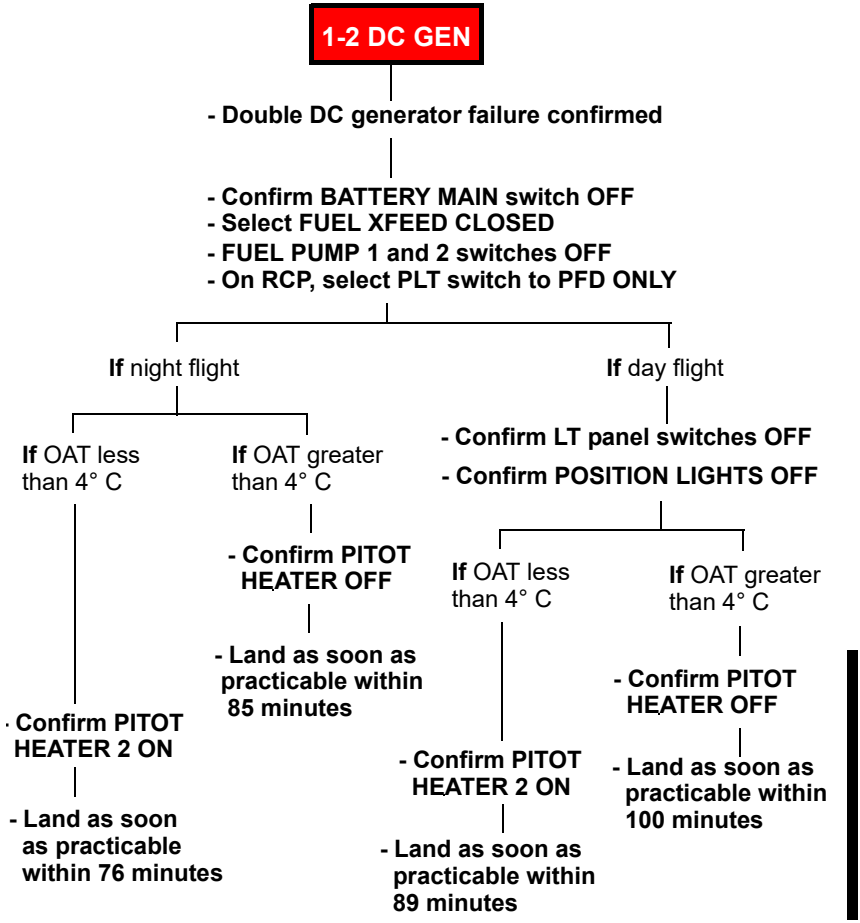
24. Continue start see Basic RFM Section 2.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

With the Batteries in Parallel kit installed the following Emergency and Malfunction procedure replace those in the Basic RFM.

EXTENDED FLIGHT ENDURANCE AFTER DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC Generator Failure procedure has been followed and a double DC generator failure is confirmed.



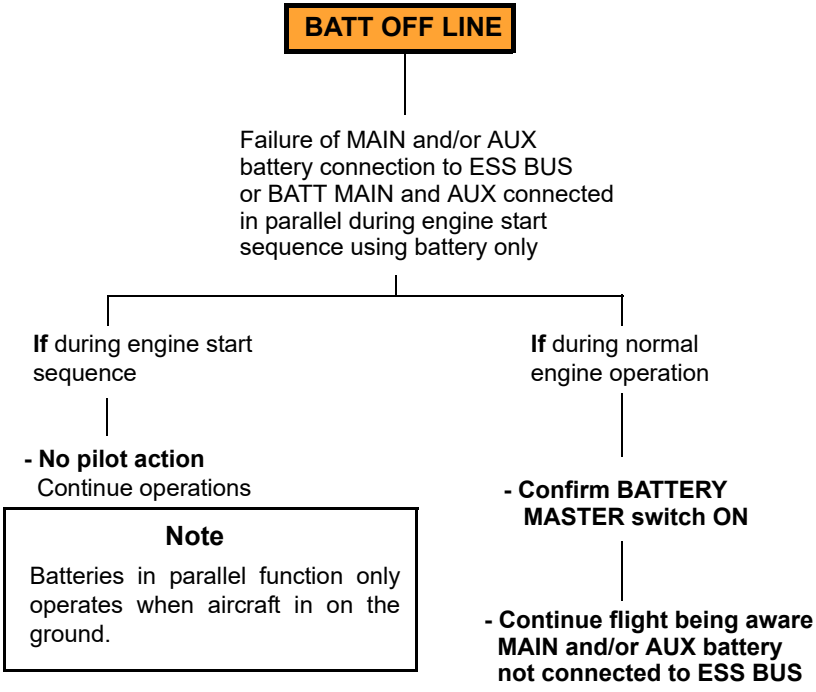
Note

The battery endurance reported above assumes the pilot operates the VHF2 radio system in transmission for a maximum of 1 minute every 15 minutes.

Note

The LDG LT can be turned on for 3 minutes before landing.

LOSS OF MAIN AND/OR AUXILIARY BATTERY SUPPLY



SECTION 4 - PERFORMANCE

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 86

ENGINE AIR INLET BARRIER FILTER & FOD SCREEN

P/N 4G7160F00111
P/N 4G7160F00112

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SUPPLEMENT 86
ENGINE AIR INLET BARRIER FILTER & FOD SCREEN

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GENERAL INFORMATION

The Engine Air Inlet Barrier Filter (IBF) P/N 4G7160F00111 protects the engine against ingestion of sand, dust and other particles.

The system consists of two (2) filter assemblies, one mounted onto each engine cowling (Figure 1) and an IBF Control Panel (Figure 2) mounted in the interseat console to allows the pilot to test the filter system and manually activate the Bypass Doors.

The filter assemblies consists and upper and lower filter made of a multi-layered gauze between stainless steel screens. The gauze is saturated with a specially formulated oil which traps the dust/dirt particles but allows the air to pass through with a low pressure drop. The pressure drop across the screens is monitored by a pressure probe and when it reaches a predetermined value, due to the filters being clogged with dust/dirt, then this is indicated to the pilot by an '1(2) EAPS PRESS' caution on the CAS. A By-Pass door can then be manually operated by the pilot from the cockpit control panel which illuminates the '1(2) EAPS ON' CAS green advisory to highlight to the pilot the By-pass door is open.

The gauze filters can subsequently be removed and cleaned to restore filtering capability. A Filter Maintenance Aid is also incorporated into the installation which registers the highest pressure drop across the filters during the last flight to aid maintenance of the filters and permit cleaning in a timely manner.

If dusty/dirty conditions are not envisaged then the filters can removed and a FOD screen mounted 4G7160F00112.

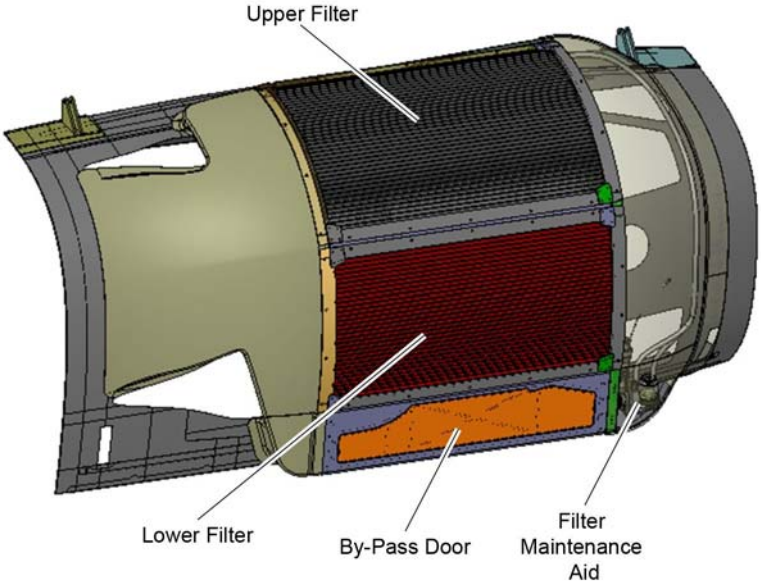

Figure 1 IBF Filter Installation (Right Hand Side)

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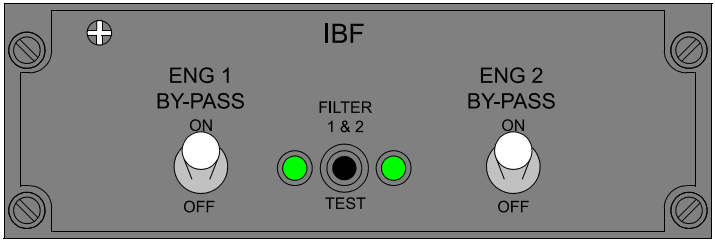

Figure 2 IBF Control Panel

SECTION 1 - LIMITATIONS

GENERAL

For limitations and performance not found in this Supplement refer to Supplement 13 Cargo Hook Operations, Supplement 12 Category A Operations or Supplement 50 Increased Gross Weight 6800kg.

WEIGHT AND CG LIMITATIONS

After Engine Inlet Barrier Filter system installation, the new empty weight and CG location must be determined.

WEIGHT

Refer to CAT B W.A.T Limits chart IBF Installed..... Figure 1-2

CENTRE OF GRAVITY

No change in CG limitations.

AIRSPEED LIMITATIONS

Max airspeed in sideward or rearward flight, IBF Installed..... Figure 1-2

Max allowable tailwind and crosswind IBF Installed .....Figure 1-2

ALTITUDE LIMITATIONS

Maximum operating altitude.....Figure 1-1

Minimum operating altitude.....Figure 1-1

Maximum Take-Off and Landing altitude .....Figure 1-1

CATEGORY B OPERATION LIMITATIONS

The CAT B W.A.T. Limits chart for IBF Installed or in By-Pass (with HEATER or COND OFF/ON) Figure 1-2, are used to define the maximum take off and landing weight for the given ambient atmospheric and wind conditions.

(See Flight Planning in Basic RFM Section 2 for examples of using the CAT B W.A.T. Limits chart).

HEIGHT- VELOCITY LIMITATIONS

The Height-Velocity diagram defines, in the event of a single engine failure during take off, landing or other operation near the surface, a combination of airspeed and height above ground from which a safe single engine landing on a smooth, level and hard surface cannot be assured.

CAUTION

Prior to the determination of the H-V envelope the CATEGORY B weight with IBF Installed, should be defined for the ambient conditions. See Flight Planning in Basic RFM Section 2 for use of the CAT B W.A.T. and H-V envelope charts.

Height Velocity Chart IBF Installed or in By-Pass .....Figure 1-3

IBF LIMITATIONS

No mixing of Filter and FOD screens is permitted.

FOD SCREEN LIMITATIONS

When the FOD screens are installed the aircraft flight envelope and performance returns to the Basic RFM or applicable Supplement.

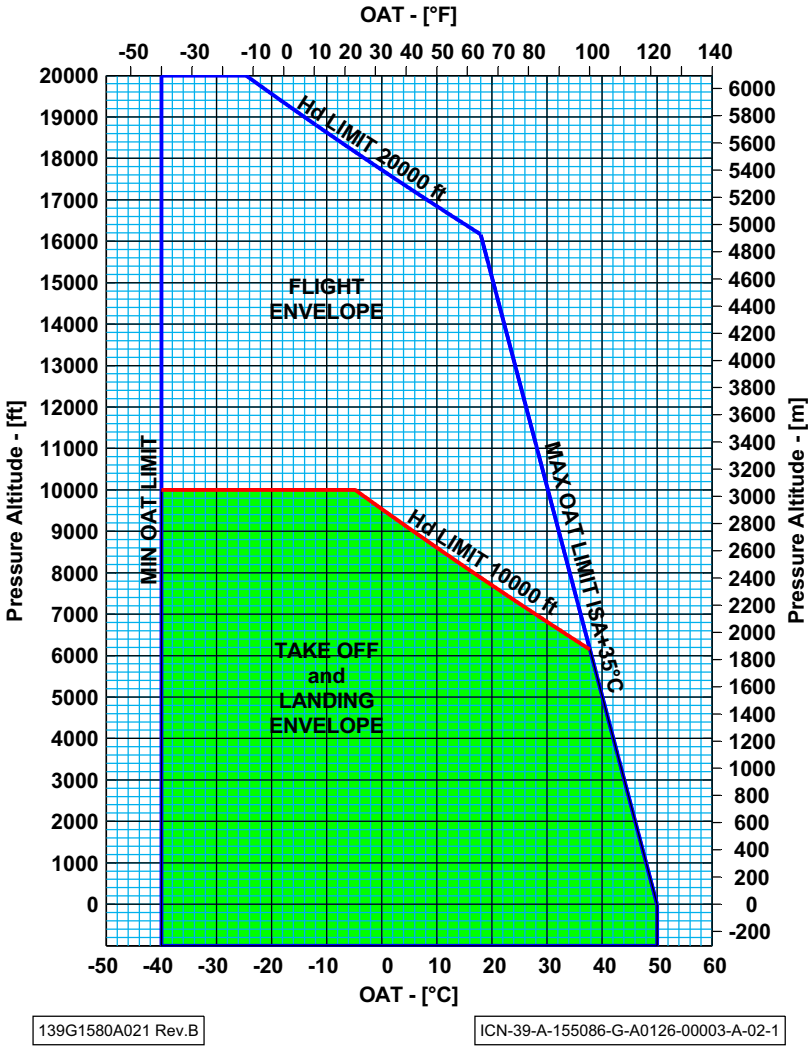

Figure 1-1 Altitude and OAT Limitations IBF Installed

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WEIGHT-ALTITUDE-TEMPERATURE
for TAKE-OFF, LANDING and IGE MANOEUVRES
RELATIVE WIND AZIMUTH: 10 to 350 deg
Note: no windspeed limitation exists for headwind conditions (wind azimuth ±10deg)

ROTOR 100%

IBF Installed
Heater OFF/ON
Cond OFF/ON

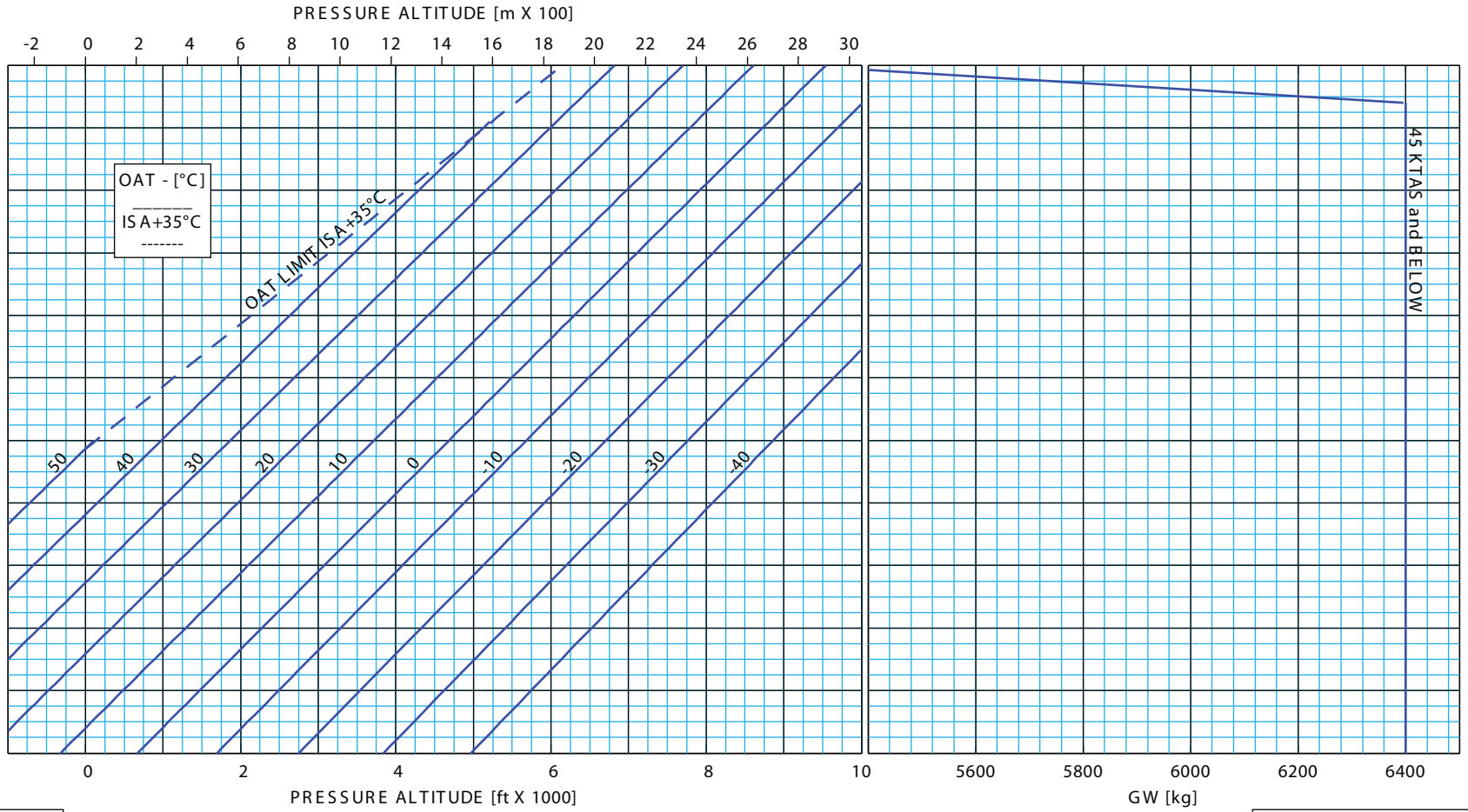

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Figure 1-2 CAT B W.A.T. Limits IBF Installed (with HEATER or COND OFF/ON)

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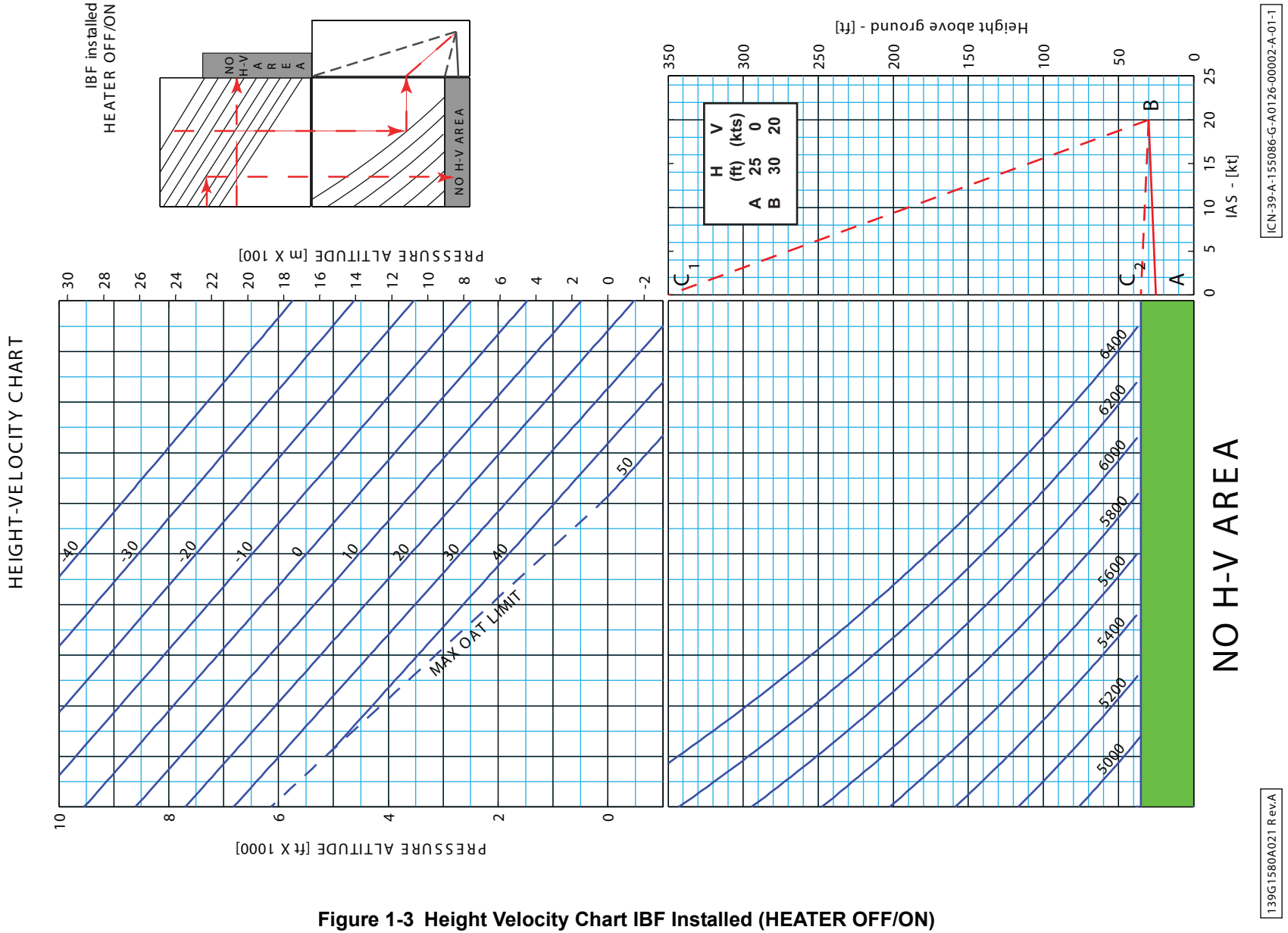

Figure 1-3 Height Velocity Chart IBF Installed (HEATER OFF/ON)

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SECTION 2 - NORMAL PROCEDURES

PRE FLIGHT CHECKS

AREA N°2 (FUSELAGE - RIGHT HAND SIDE)

1. IBF Intake — Cover removed, condition of upper and lower filters.
   Confirm intakes clear of any obstuctions and By-Pass door closed.
   Confirm Filter Maintenance Aid not in the red zone.

AREA N°6 (FUSELAGE - LEFT HAND SIDE)

1. IBF Intake — Cover removed, condition of upper and lower filters.
   Confirm intakes clear of any obstuctions and By-Pass door closed.
   Confirm Filter Maintenance Aid not in the red zone.

PRE-START CHECKS)

1. IBF panel — Confirm ENG 1 & 2 BY-PASS door switches selected to OFF.
   Press TEST button and confirm FILTER 1 & 2 indicator light illuminate and 1-2 EAPS ON advisory illuminates on CAS.

2. IBF panel ➡ — Select ENG 1 and 2 BY-PASS switches to ON.
   Confirrm by-pass dooors open and 1-2 EAPS ON advisory illuminates. Select OFF and confirm doors close and 1-2 EAPS ON advisory extinguishes.

AFTER-START CHECK

1. IBF indications — Confirm ENG 1 & 2 EAPS PRESS caution not illuminated.

IN FLIGHT

Note

If PI or ITT or NG indications appear unusual, check engine ITT and if high or unstable, for the flight condition, select IBF BY-PASS to ON.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

IBF BLOCKAGE

1(2) EAPS PRESS

Excessive pressure drop across IBF filter due to clogging

- Select associate BY-PASS switch to ON

1(2) EAPS ON

advisory illuminates

Note

1(2) EAPS ON advisory indicates that the By-Pass door is OPEN

- Continue flight

Be aware that the air entering the engines is no longer filtered

SECTION 4 - PERFORMANCE

This section includes the performance data for the AW139 helicopter equipped with Inlet Barrier Filter and with Heating and Air Conditioning Systems.

The presence of the IBF causes an increase of power losses due to a pressure reduction at the engine intake.

Thus, whenever the IBF is installed, the helicopter performance is reduced when compared to the basic configuration with no particle separators installed.

This performance is also valid when the IBF is installed and selected to By-Pass.

The performace provided considers the most penalizing condition.

ENGINE POWER CHECKS

The purpose of the Engine Power Assurance Check is to provide a means of monitoring engine health. A HOVER power assurance check procedure, with the IBF fitted, is provided to the operator. The procedure should be used to check if the engine power available before take-off is within the limits established for the legitimate use of the Rotorcraft Flight Manual performance.

POWER MARGIN TREND MONITORING

A separate trend diagram is required with IBF fitted.

Fuel Consumption

When the IBF is installed the fuel consumption may increased up to 3.5% for the same torque value compared to the Basic aircraft or appropriate Supplement.

- IBF installed/By Pass closed
- HEATER/COND OFF
- GENERATOR LOAD TO MINIMUM
- SET NR to 100%
- TEST ENGINE MODE SWITCH: FLIGHT
- OTHER ENGINE MODE SWITCH: IDLE
- INCREASE COLLECTIVE UNTIL LIGHT ON WHEELS OR HOVERING AT 5 FEET, NOSE ON WIND. DO NOT EXCEED 775°C ITT OR 102.4% NG OR 105% TQ
- STABILIZE POWER 1 MINUTE, THEN RECORD OAT, PRESSURE ALTITUDE, ENGINE TORQUE, ITT AND NG
- ENTER CHART AT INDICATED TQ, MOVE DOWN TO INTERSECT PRESSURE ALTITUDE, PROCEED TO THE RIGHT TO INTERSECT OAT, THEN MOVE UP TO READ VALUES FOR MAXIMUM ALLOWABLE ITT AND NG
- IF INDICATED ITT OR NG EXCEEDS MAXIMUM ALLOWABLE, REPEAT CHECK
- REPEAT CHECK USING OTHER ENGINE
- IF EITHER ENGINE EXCEEDS ALLOWABLE ITT OR NG, PUBLISHED PERFORMANCE MAY NOT BE ACHIEVABLE. REFER TO EMM

POWER ASSURANCE CHECK in HOVER FLIGHT (NR=100%)
IBF INSTALLED

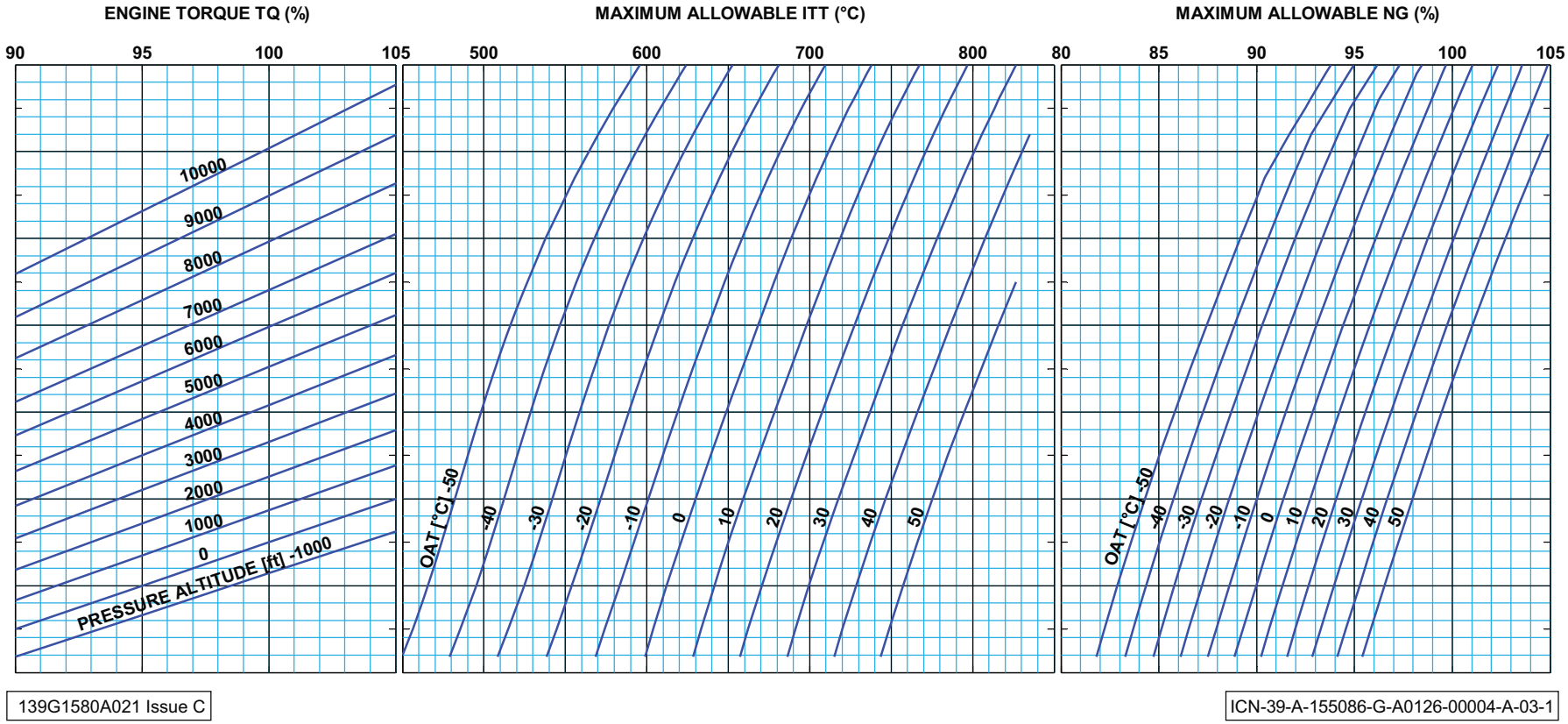

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Figure 4-1 Power Assurance Chart IBF Installed (100% NR)

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- IBF installed/By Pass closed
- HEATER/COND OFF
- GENERATOR LOAD TO MINIMUM
- SET NR to 102%
- TEST ENGINE MODE SWITCH: FLIGHT
- OTHER ENGINE MODE SWITCH: IDLE
- INCREASE COLLECTIVE UNTIL LIGHT ON WHEELS OR HOVERING AT 5 FEET, NOSE ON WIND. DO NOT EXCEED 775€C ITT OR 102.4% NG OR 105% TQ
- STABILIZE POWER 1 MINUTE, THEN RECORD OAT, PRESSURE ALTITUDE, ENGINE TORQUE, ITT AND NG
- ENTER CHART AT INDICATED TQ, MOVE DOWN TO INTERSECT PRESSURE ALTITUDE, PROCEED TO THE RIGHT TO INTERSECT OAT, THEN MOVE UP TO READ VALUES FOR MAXIMUM ALLOWABLE ITT AND NG
- IF INDICATED ITT OR NG EXCEEDS MAXIMUM ALLOWABLE, REPEAT CHECK
- REPEAT CHECK USING OTHER ENGINE
- IF EITHER ENGINE EXCEEDS ALLOWABLE ITT OR NG, PUBLISHED PERFORMANCE MAY NOT BE ACHIEVABLE. REFER TO EMM

POWER ASSURANCE CHECK in HOVER FLIGHT (NR=102%)
IBF INSTALLED

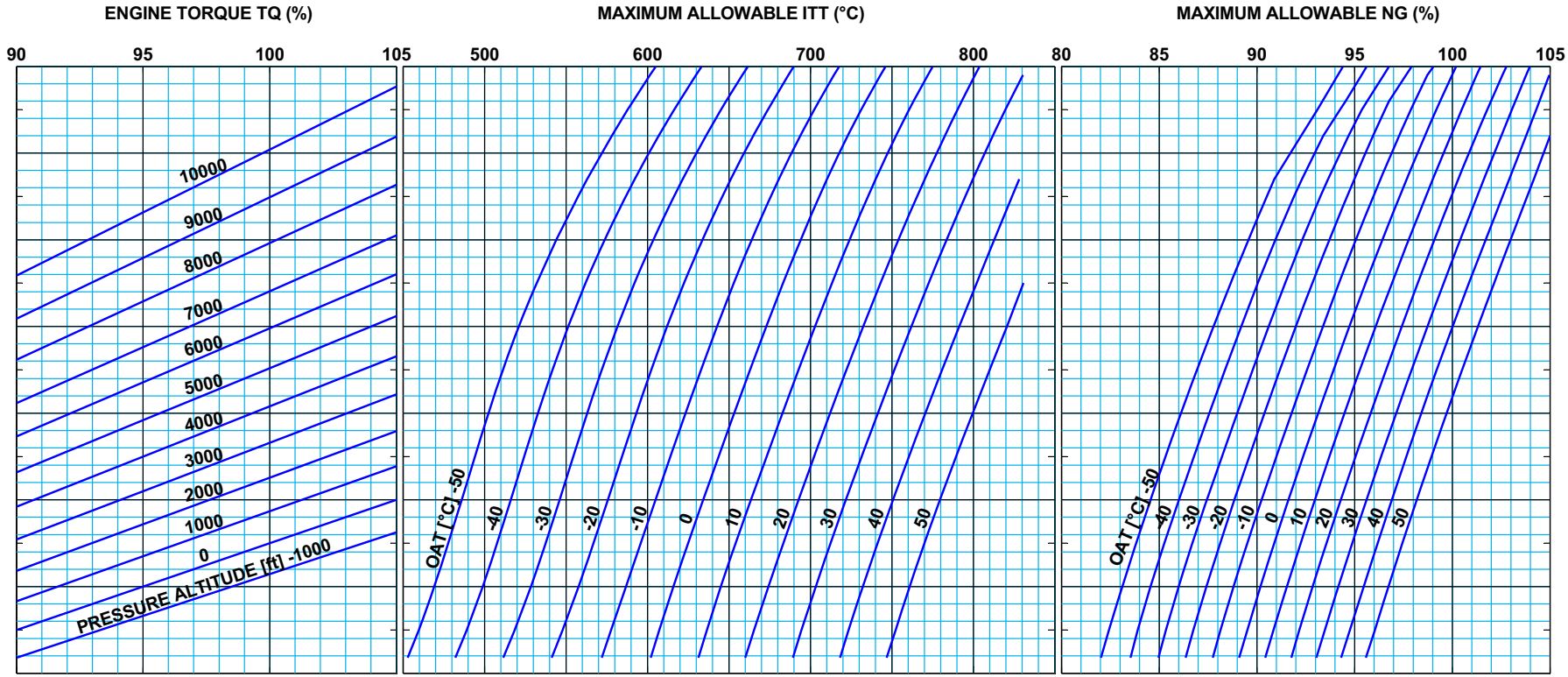

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Figure 4-1A Power Assurance Chart IBF Installed (102% NR)

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HOVER CEILING

The Hover Ceiling charts define the maximum weights at which an IGE hover (at 5 ft wheel height) or an OGE hover is possible for varying combinations of Pressure Altitude and OAT with main rotor speed at 100% and zero wind conditions.

The performance effect of the IBF is presented for All Engines Operating (AEO) at Maximum Continuous Power (MCP) and Take Off Power (TOP) with the HEATER OFF and ON.

The performance effect with the IBF installed is presented for OEI Maximum Continuous Power (MCP) and 2.5 minute Power.

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED
COND ON: reduce weight by 50 kg

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL

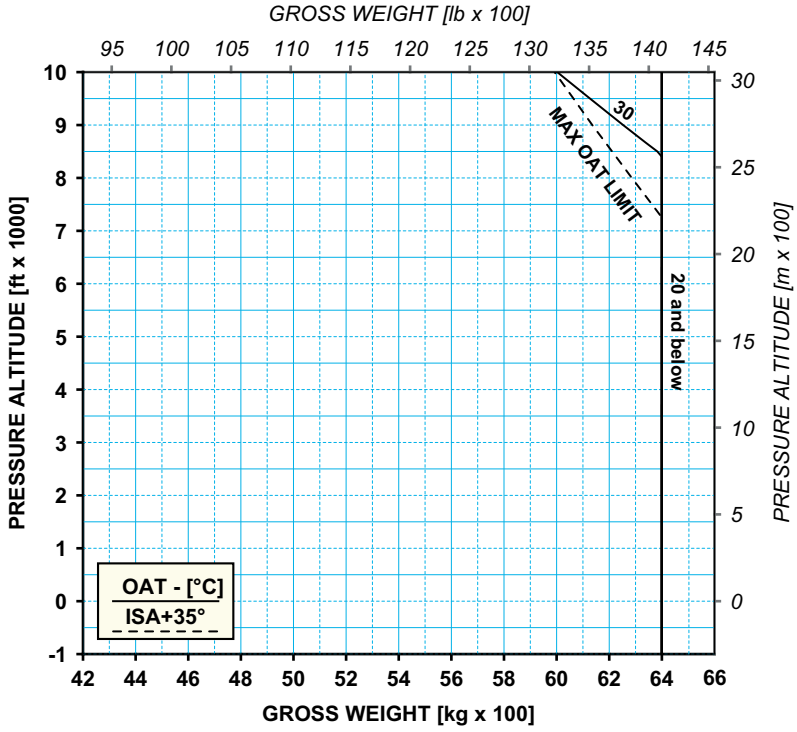

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Figure 4-2 Hover Ceiling IGE TOP AEO, IBF Installed

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED
COND ON: reduce weight by 50 kg

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL

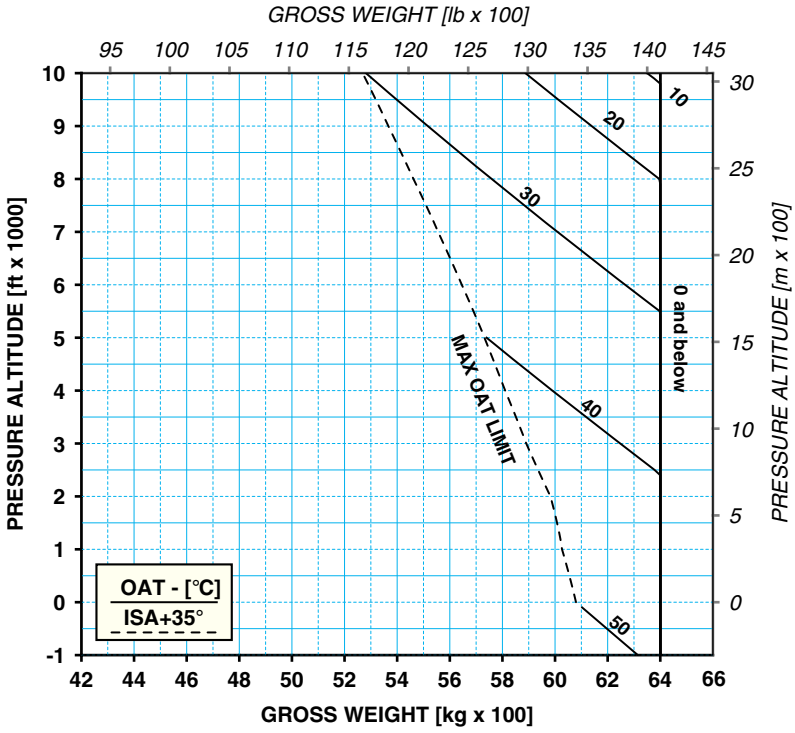

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Figure 4-3 Hover Ceiling IGE MCP AEO, IBF Installed

HOVER CEILING IN GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A TOTAL

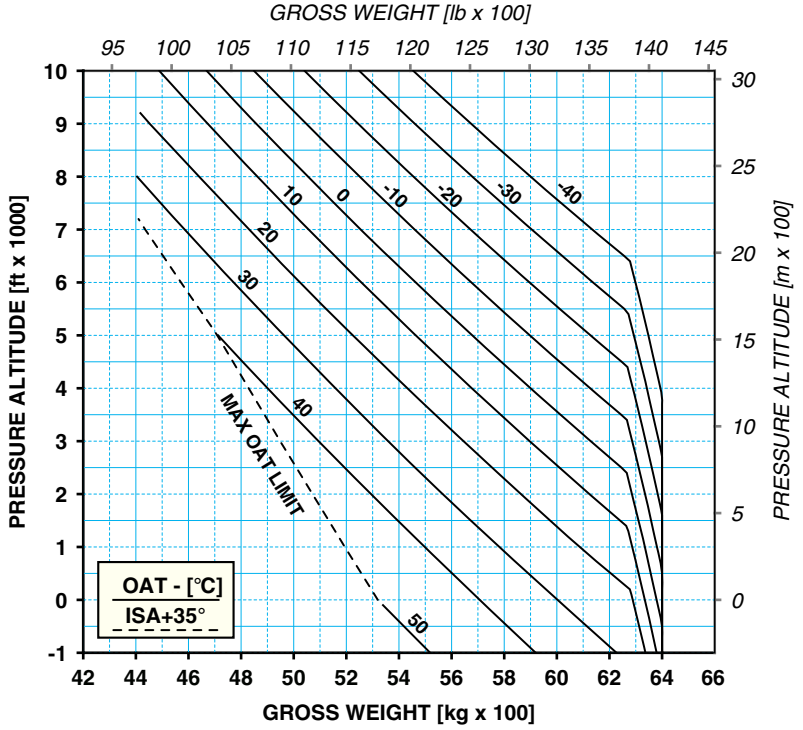

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Figure 4-4 Hover Ceiling IGE 2.5min OEI, IBF Installed

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 300 A TOTAL

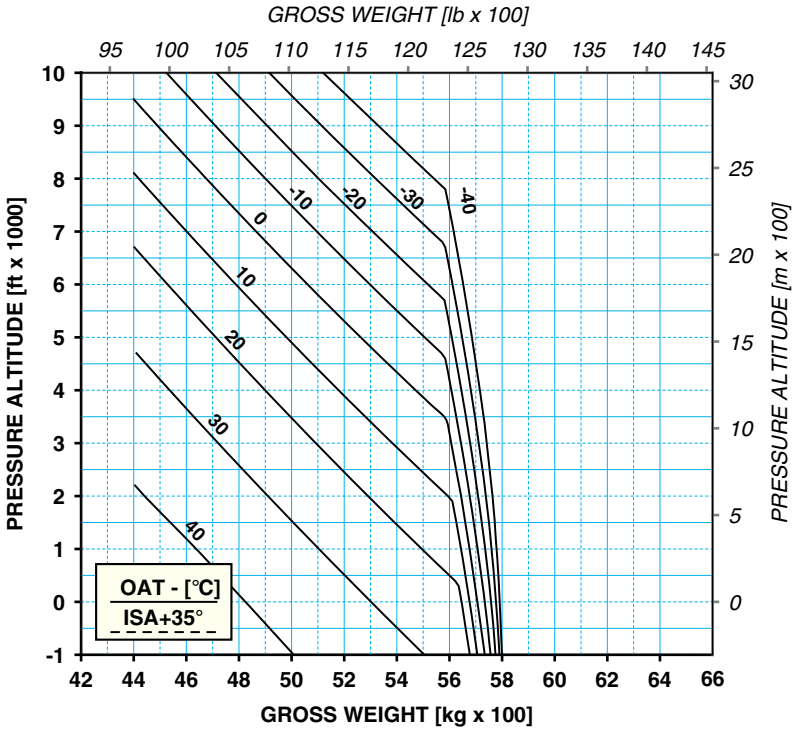

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Figure 4-5 Hover Ceiling IGE MCP OEI, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED
COND ON: reduce weight by 50 kg

WHEEL HEIGHT: 100 FT
ELECTRICAL LOAD: 600 A TOTAL

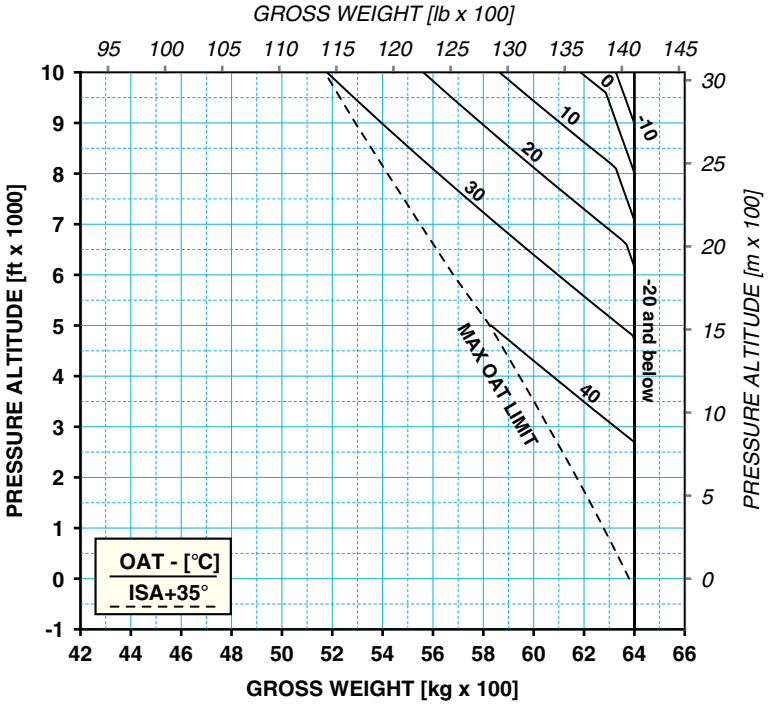

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Figure 4-6 Hover Ceiling OGE TOP AEO, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED
COND ON: reduce weight by 50 kg

WHEEL HEIGHT: 100 FT
ELECTRICAL LOAD: 600 A TOTAL

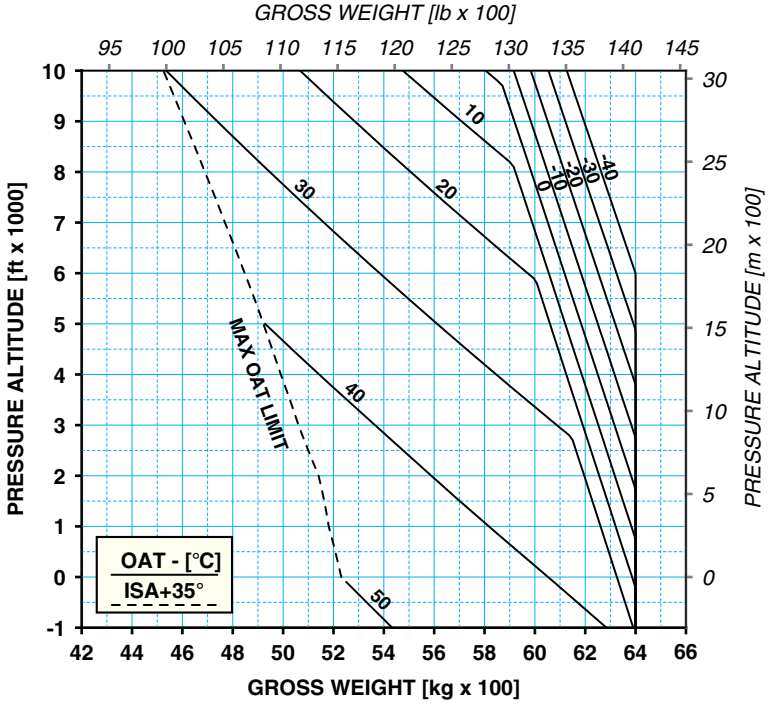

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Figure 4-7 Hover Ceiling OGE MCP AEO, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

WHEEL HEIGHT: 100 FT
ELECTRICAL LOAD: 300 A TOTAL

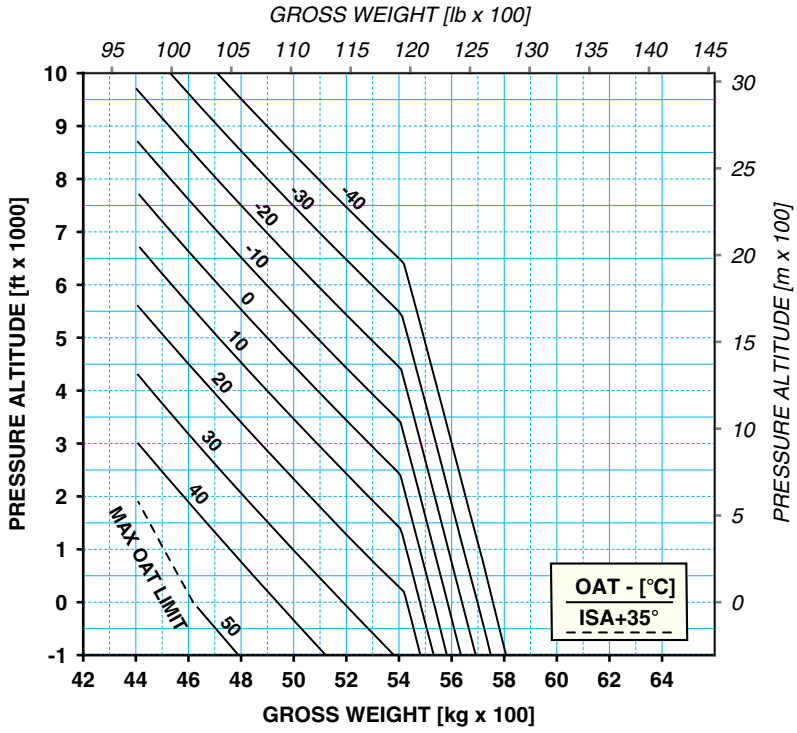

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Figure 4-8 Hover Ceiling OGE 2.5min OEI, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

WHEEL HEIGHT: 100 FT
ELECTRICAL LOAD: 300 A TOTAL

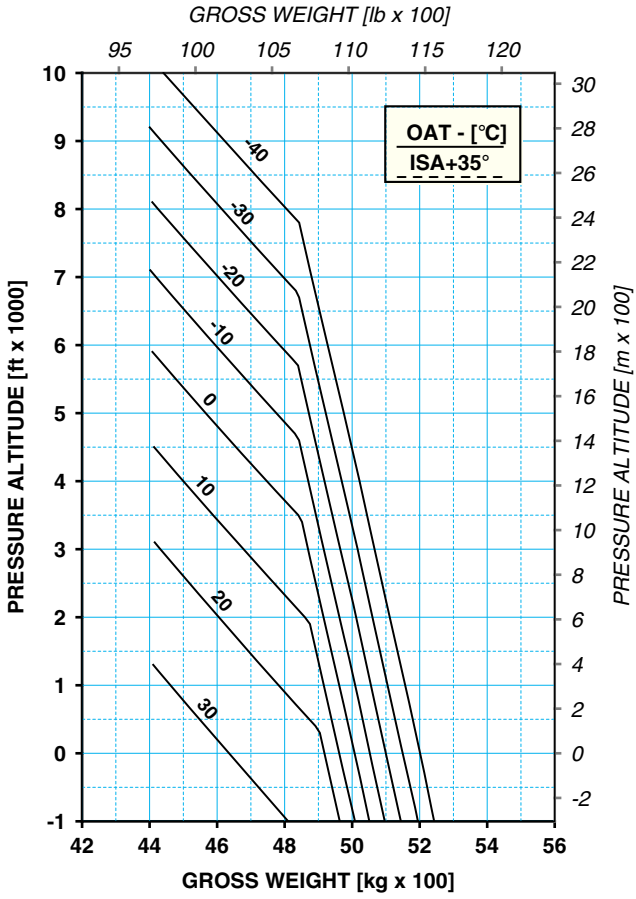

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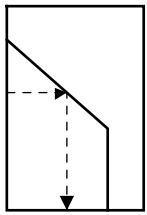
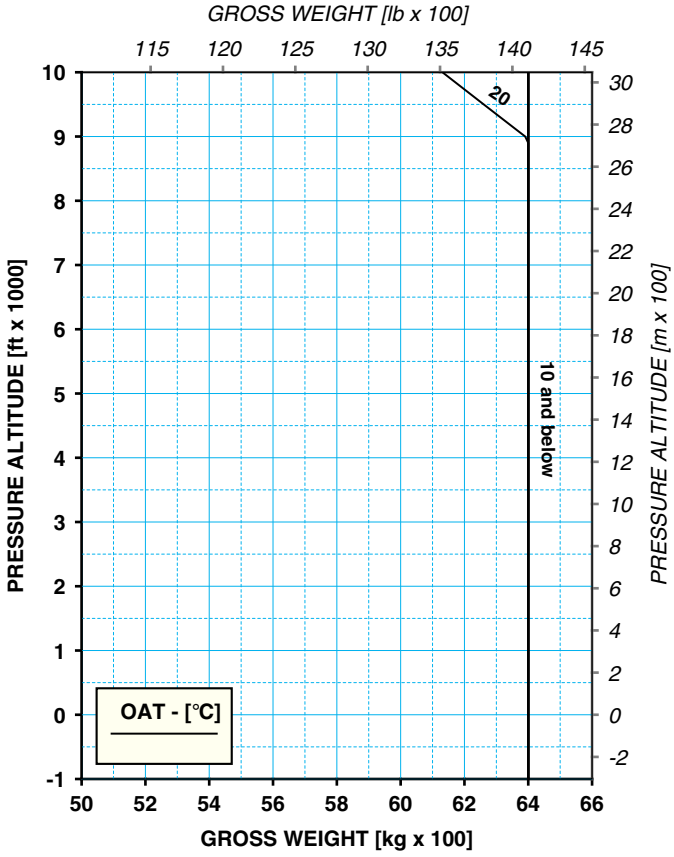
Figure 4-9 Hover Ceiling OGE MCP OEI, IBF Installed

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO



ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED
WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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ICN-39-A-155186-G-A0126-00009-A-01-1

Figure 4-10 Hover Ceiling IGE TOP AEO Heater ON, IBF Installed

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

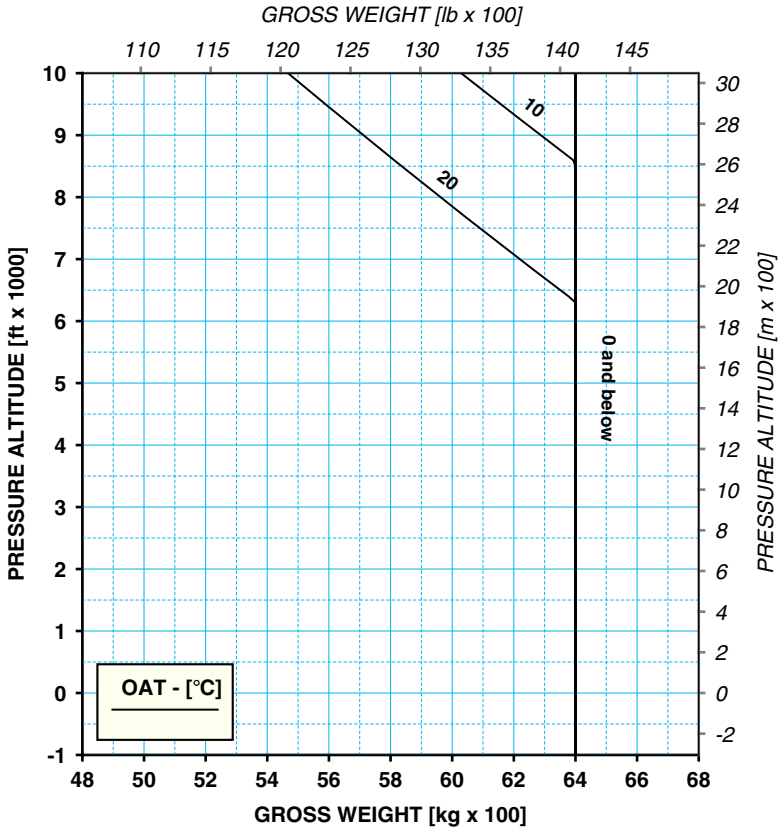

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Figure 4-11 Hover Ceiling IGE MCP AEO Heater ON, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

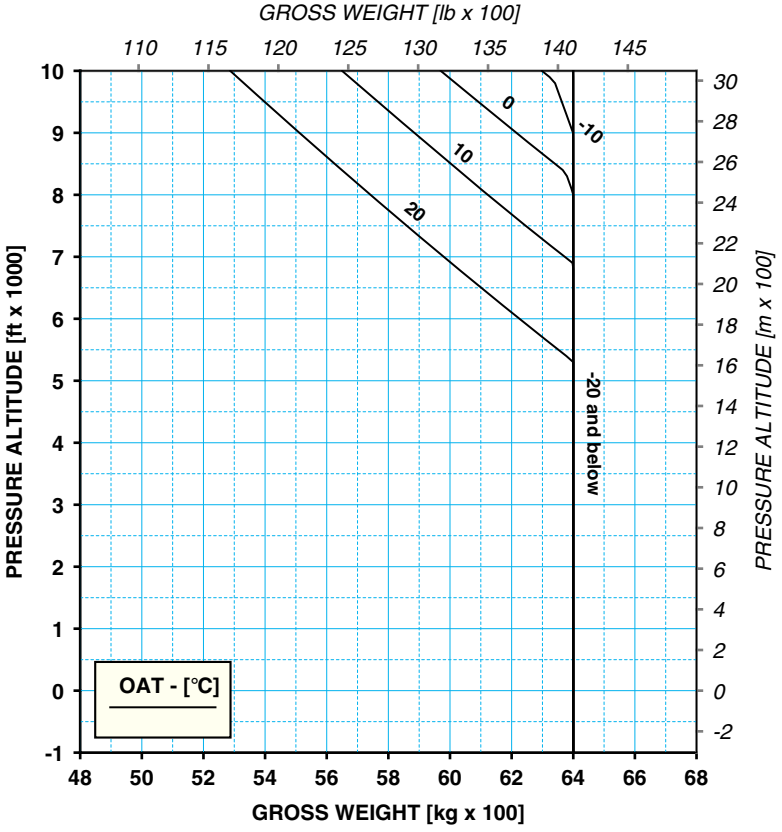

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Figure 4-12 Hover Ceiling OGE TOP AEO Heater ON, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

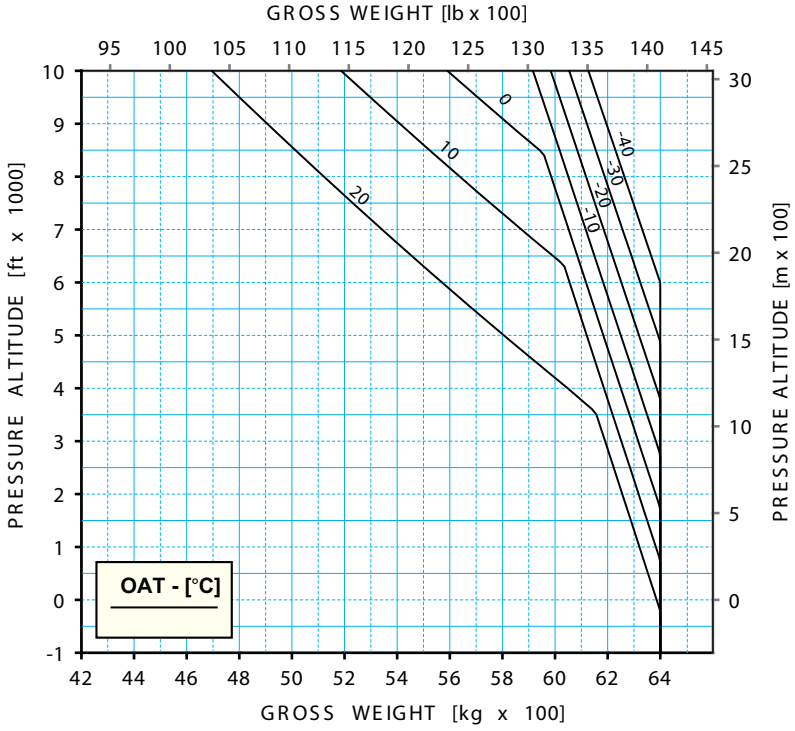

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Figure 4-13 Hover Ceiling OGE MCP AEO Heater ON, IBF Installed

HOVER CEILING OUT OF GROUND EFFECT WITH HEADWIND
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
ELECTRICAL LOAD: 300 A TOTAL
HEATER OFF
IBF INSTALLED

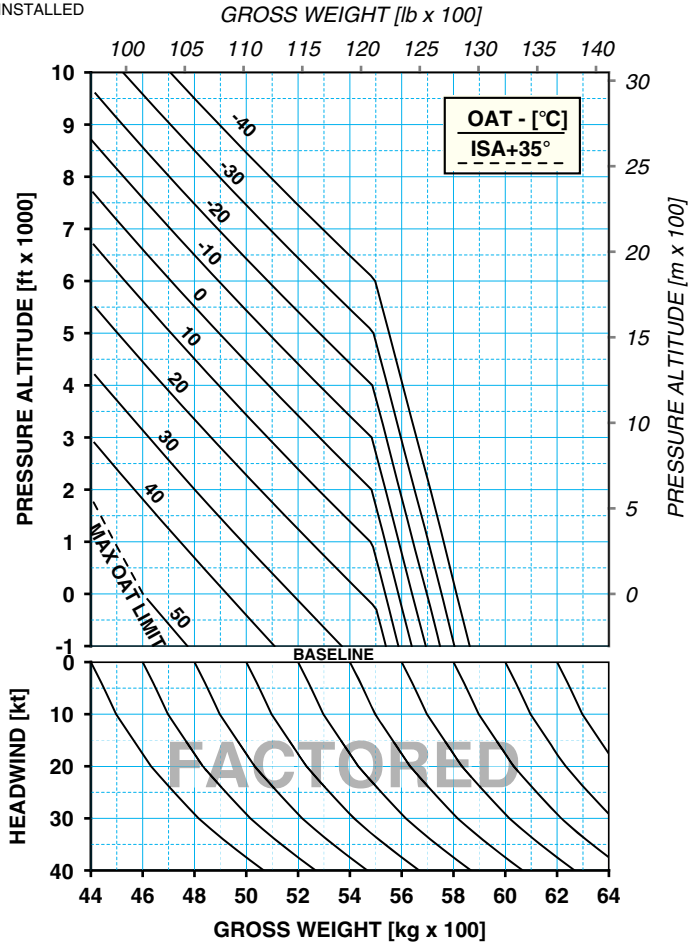

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Figure 4-14 Hover Ceiling OGE 2.5min OEI IBF Installed, Factored Headwind

HOVER CEILING OUT OF GROUND EFFECT WITH HEADWIND
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
ELECTRICAL LOAD: 300 A TOTAL
HEATER OFF
IBF INSTALLED

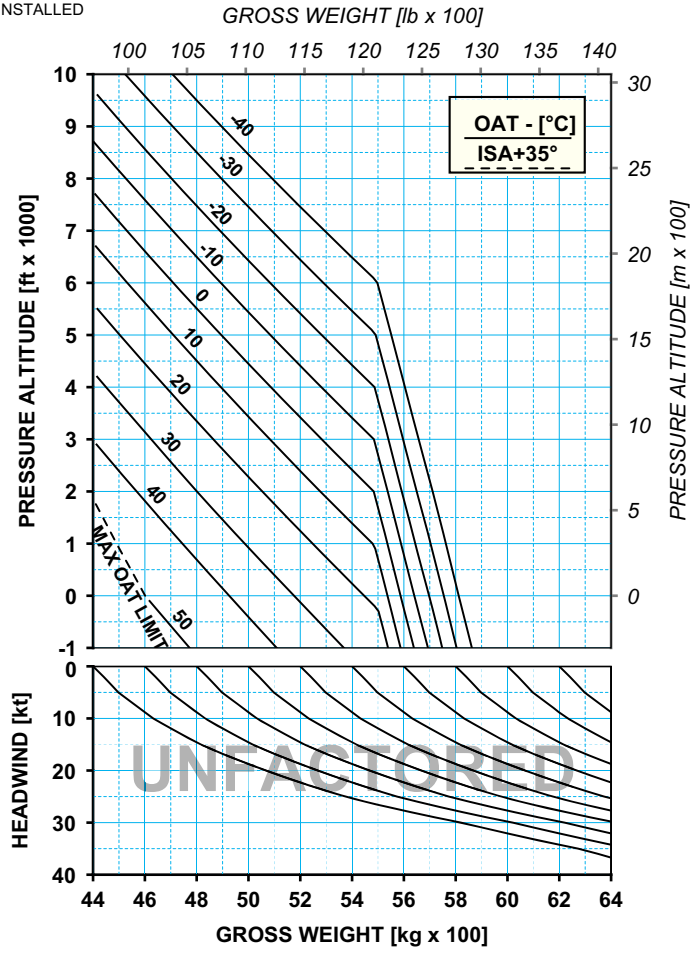

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Figure 4-15 Hover Ceiling OGE 2.5min OEI IBF Installed, Unfactored Headwind

RATE OF CLIMB

The effect of the IBF installed on Rate of Climb performance is given for All Engines Operating (AEO) case and for the One Engine Inoperative (OEI) case. For the AEO case, rate of climb is given with the engines operating at the Maximum Continuous Power (MCP) and at Take Off Power and with HEATER ON.

For the OEI case, Rate of Climb with IBF installed is given with the engines operating at the Maximum Continuous Power (MCP) and 2.5 min rating limit.

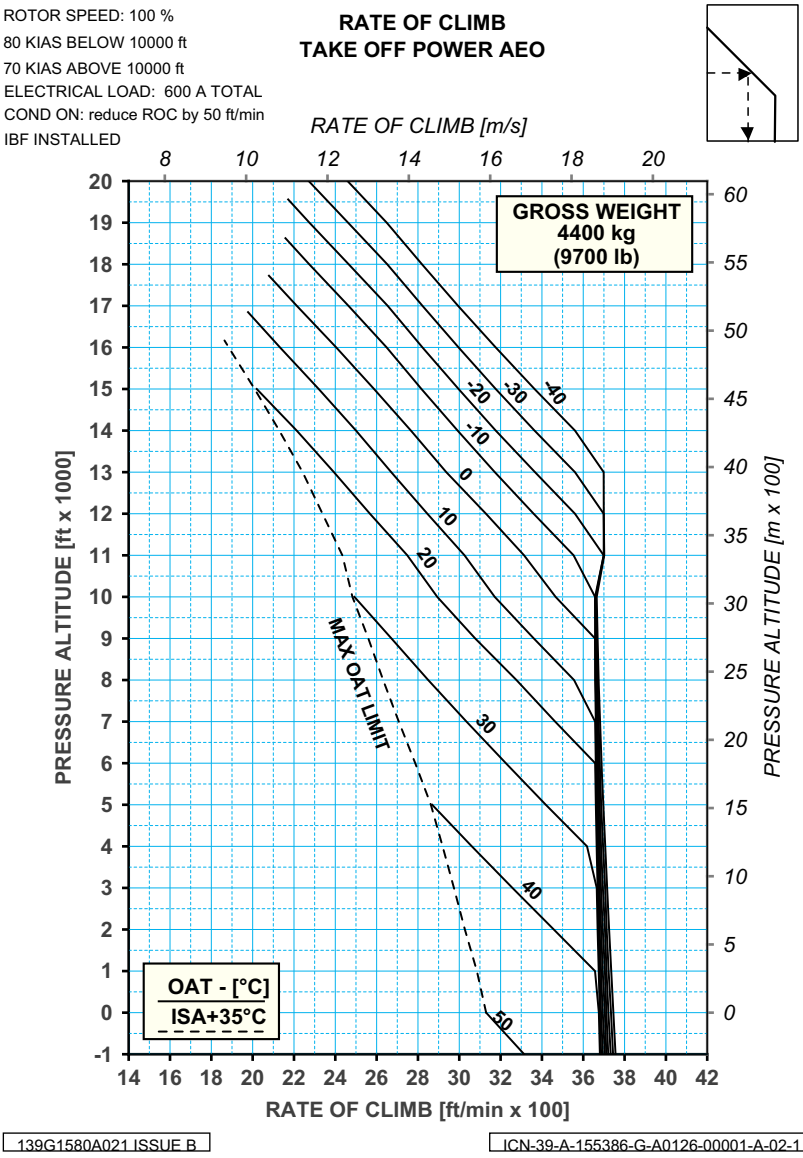

Figure 4-16 ROC TOP AEO Gross Weight 4400 kg, IBF Installed

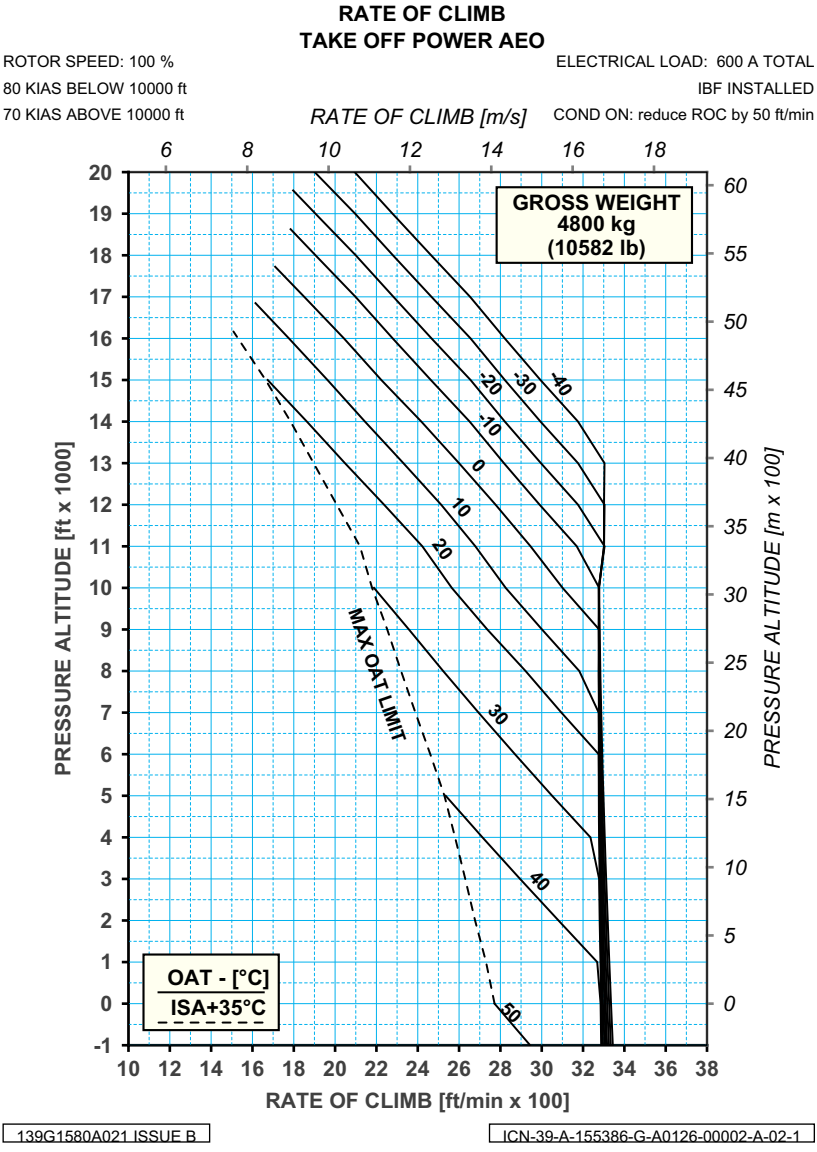

Figure 4-17 ROC TOP AEO Gross Weight 4800 kg, IBF Installed

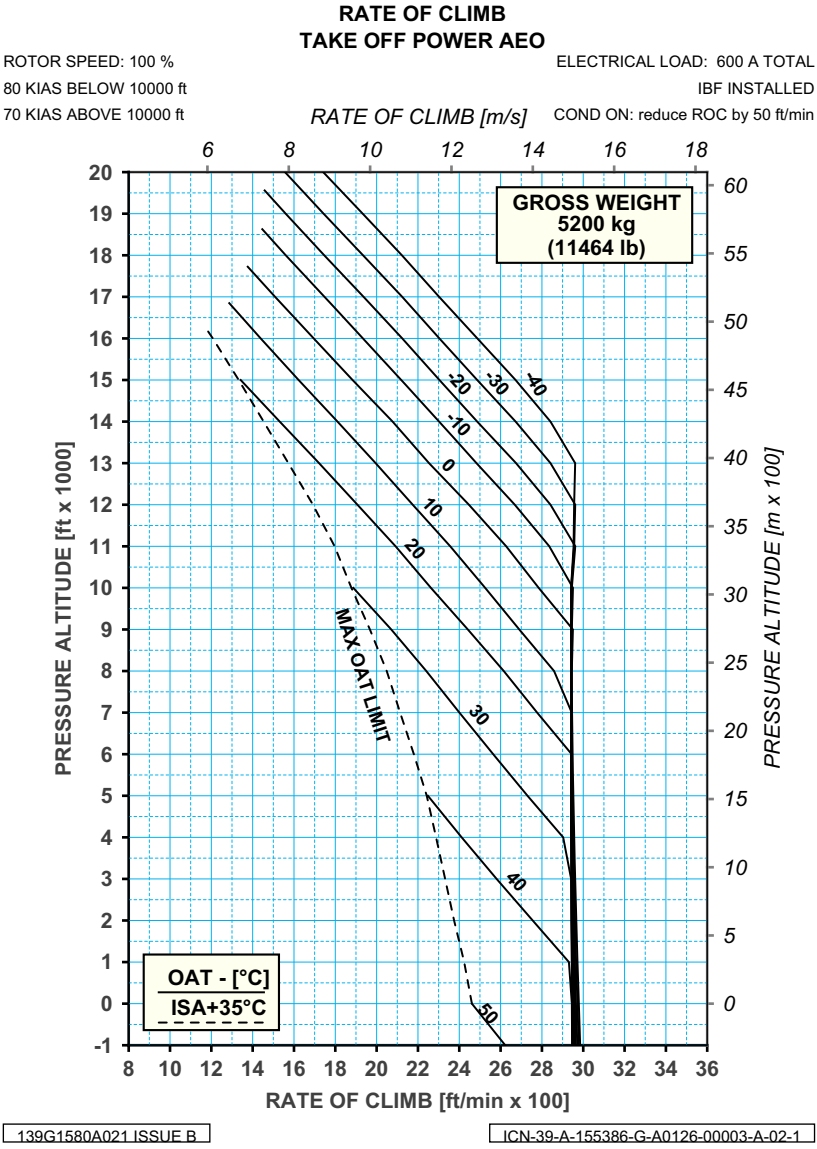

Figure 4-18 ROC TOP AEO Gross Weight 5200 kg, IBF Installed

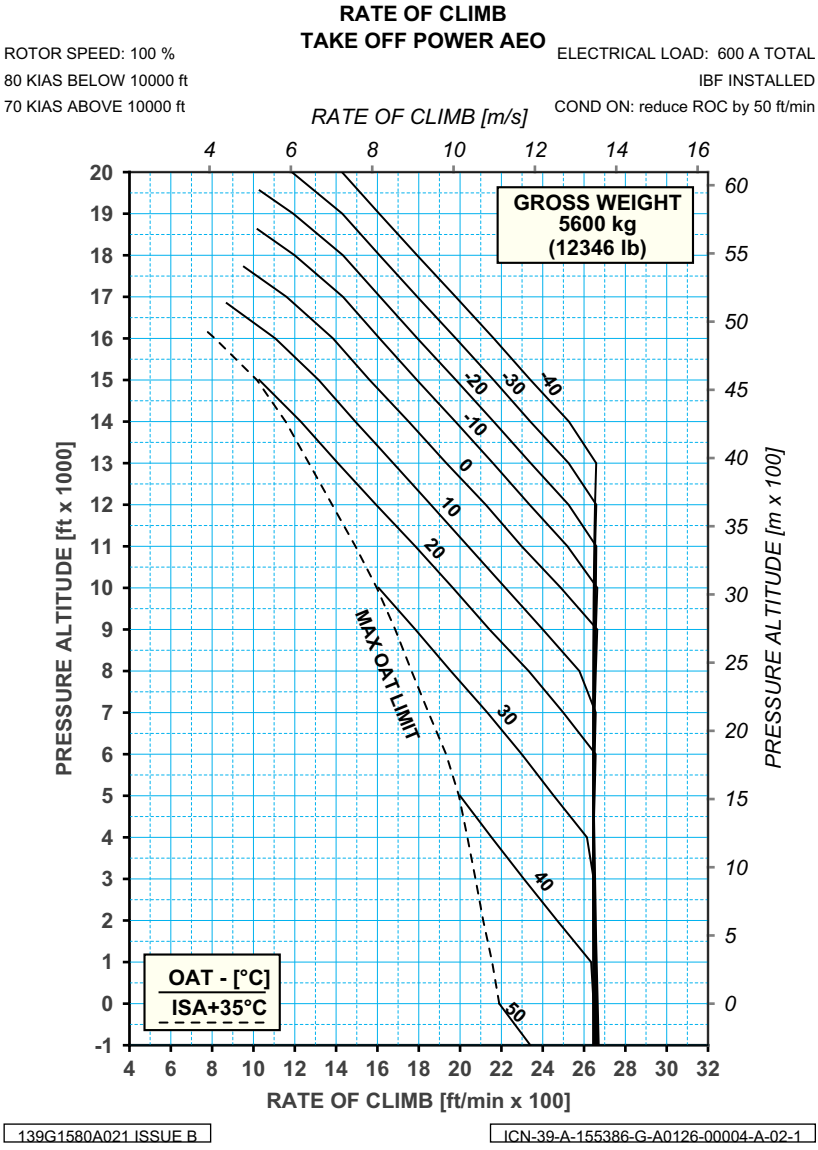

Figure 4-19 ROC TOP AEO Gross Weight 5600 kg, IBF Installed

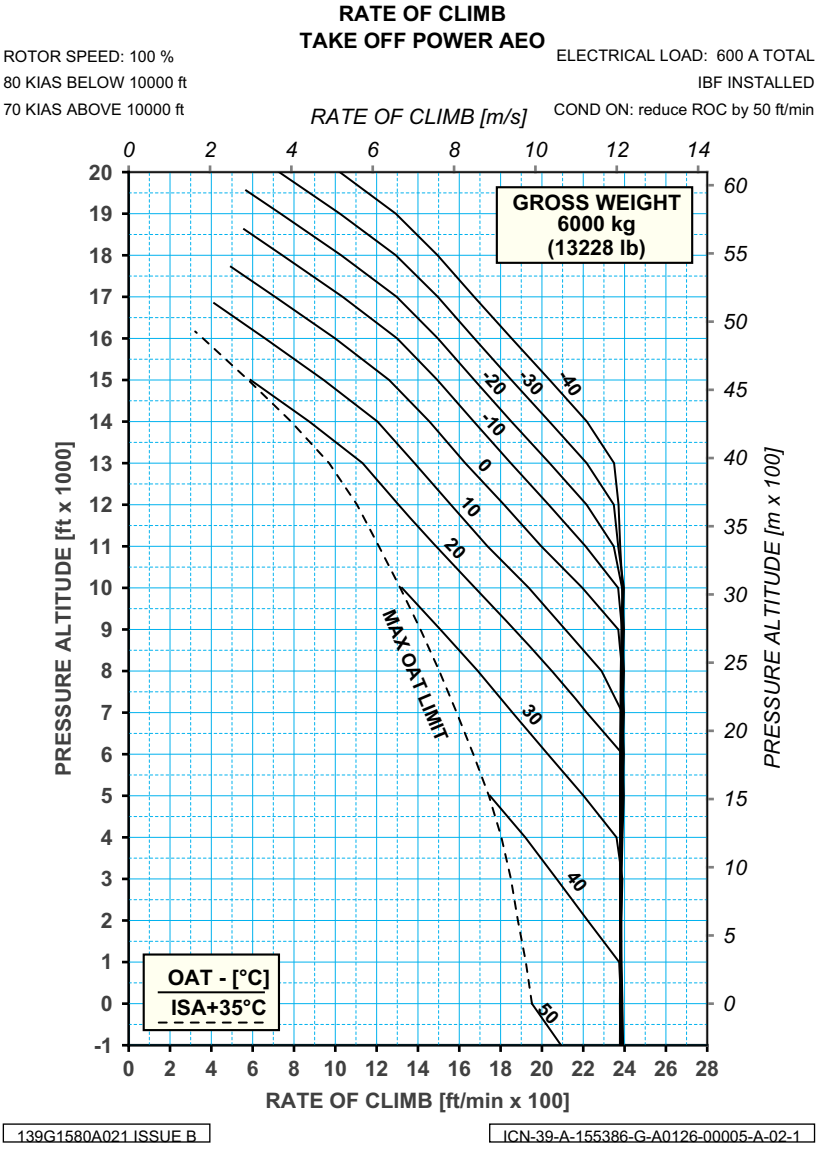

Figure 4-20 ROC TOP AEO Gross Weight 6000 kg, IBF Installed

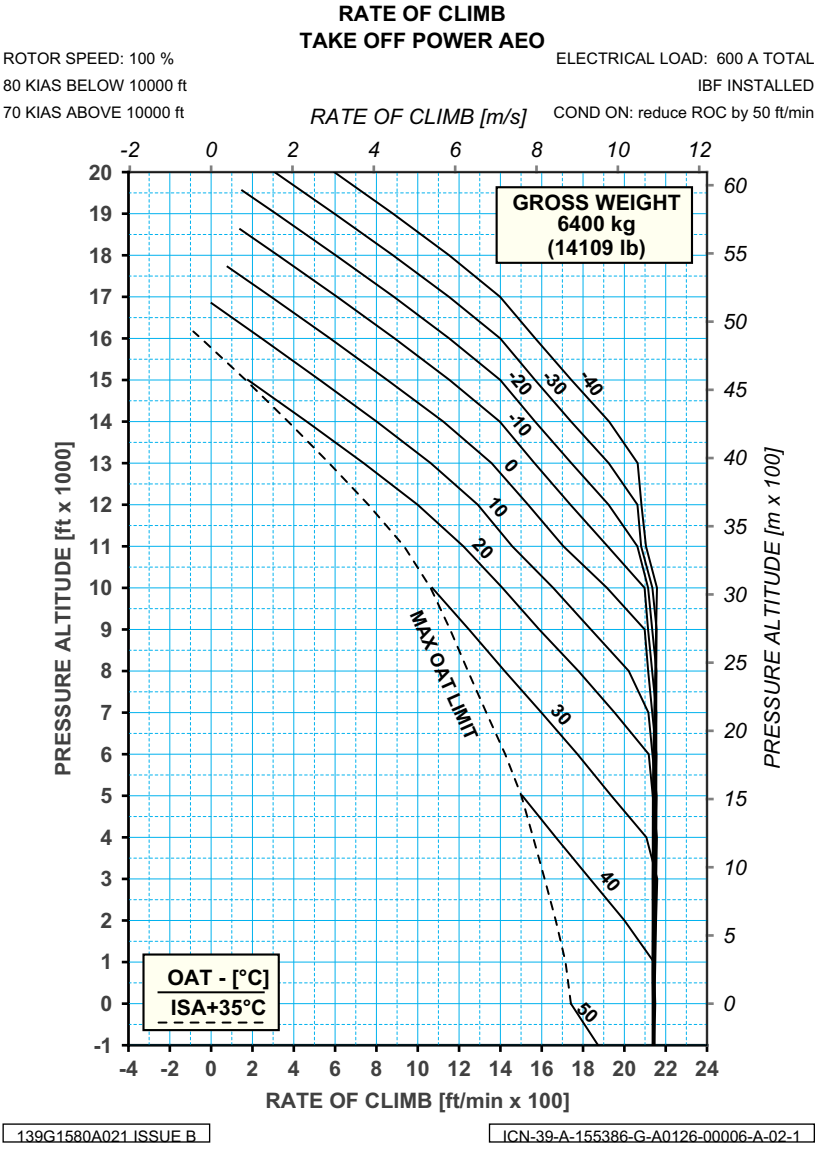

Figure 4-21 ROC TOP AEO Gross Weight 6400 kg, IBF Installed

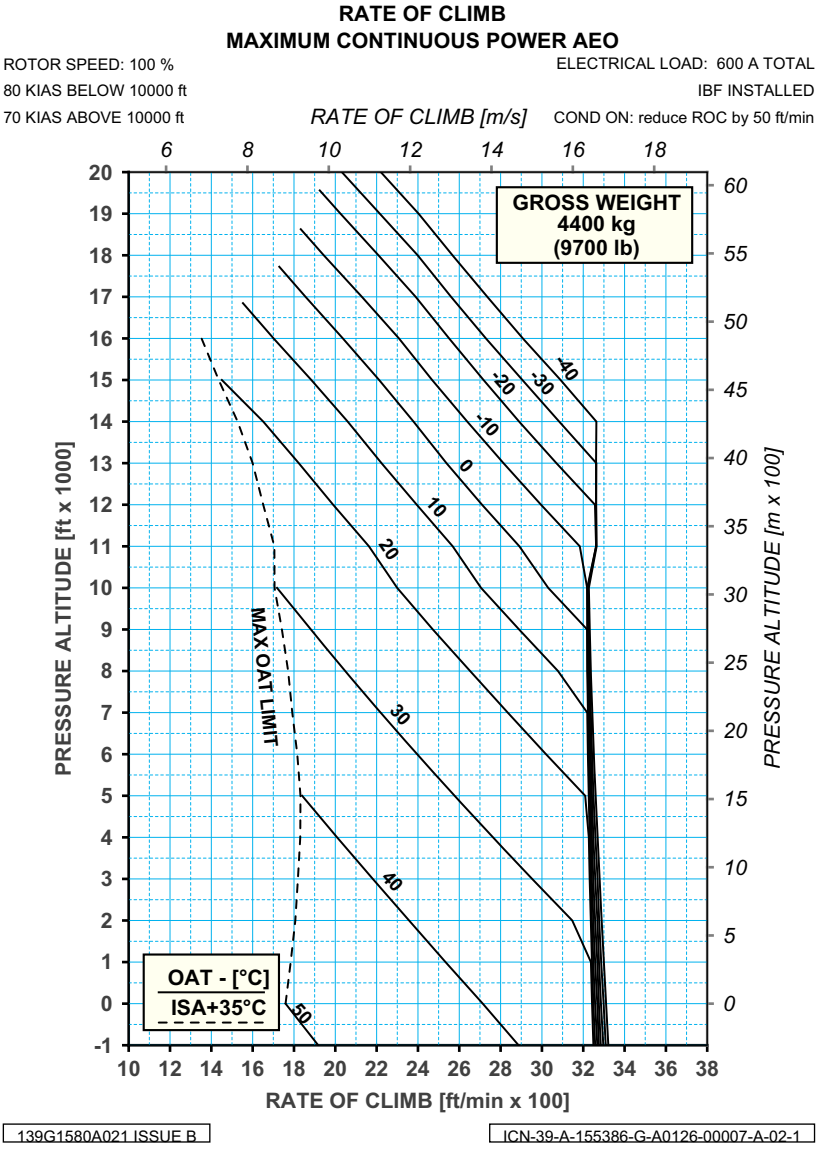

Figure 4-22 ROC MCP AEO Gross Weight 4400 kg, IBF Installed

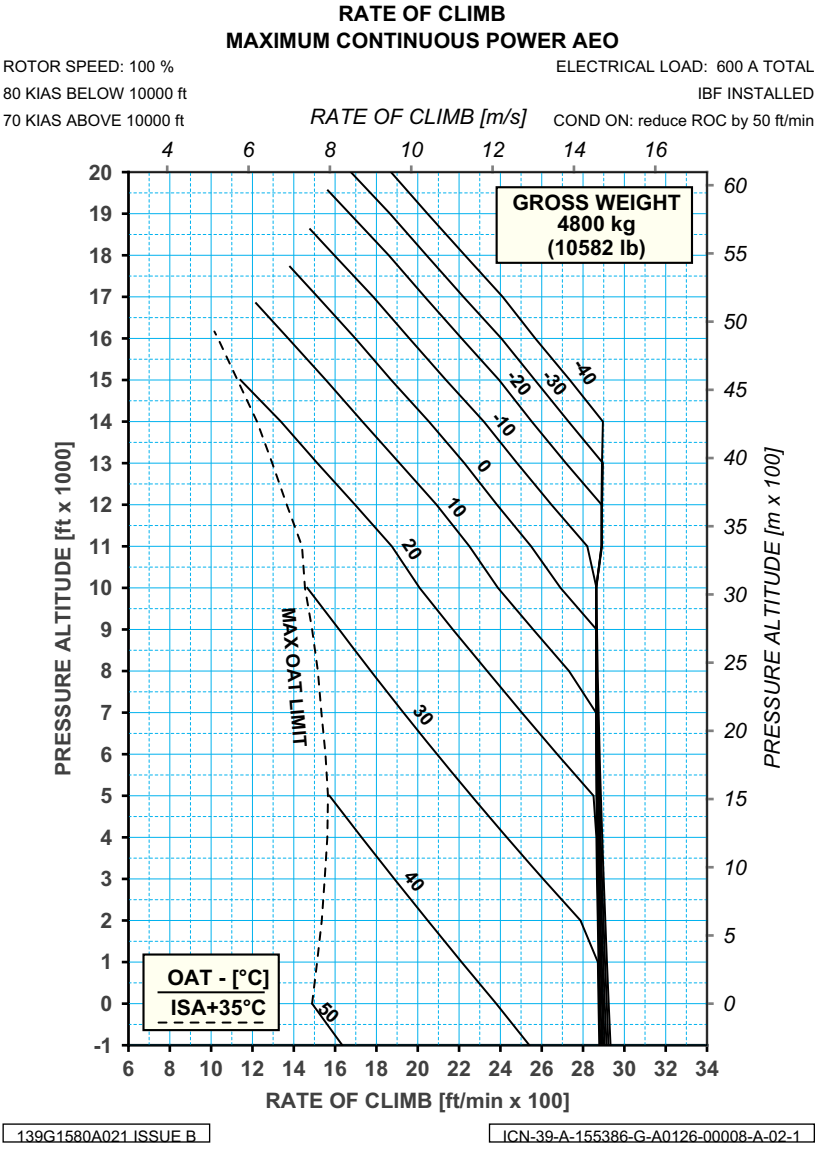

Figure 4-23 ROC MCP AEO Gross Weight 4800 kg, IBF Installed

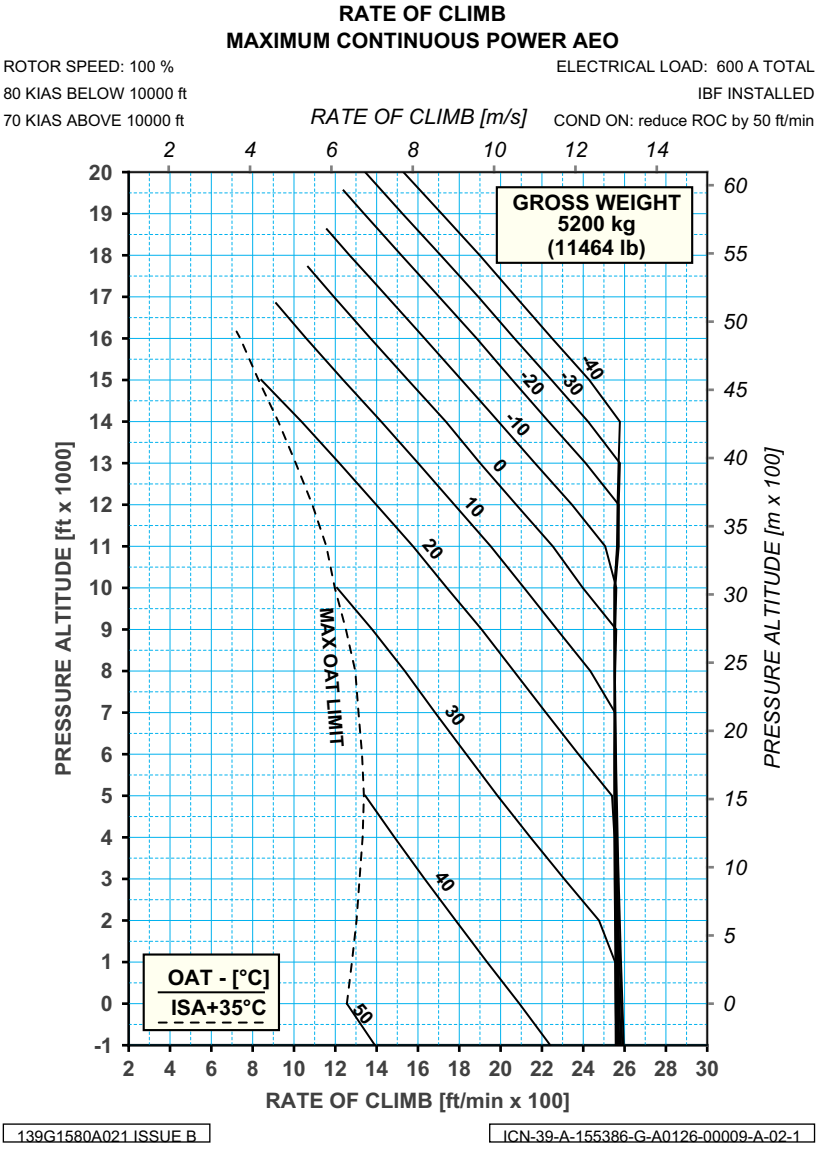

Figure 4-24 ROC MCP AEO Gross Weight 5200 kg, IBF Installed

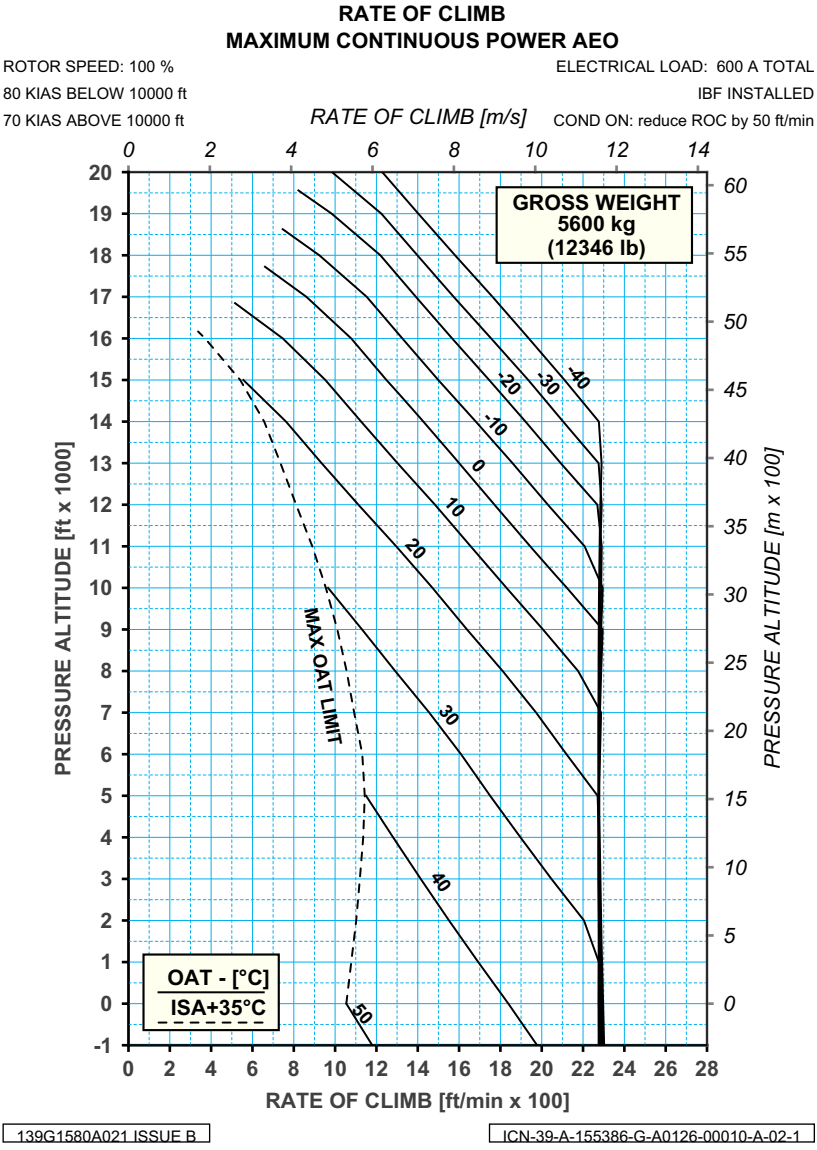

Figure 4-25 ROC MCP AEO Gross Weight 5600 kg, IBF Installed

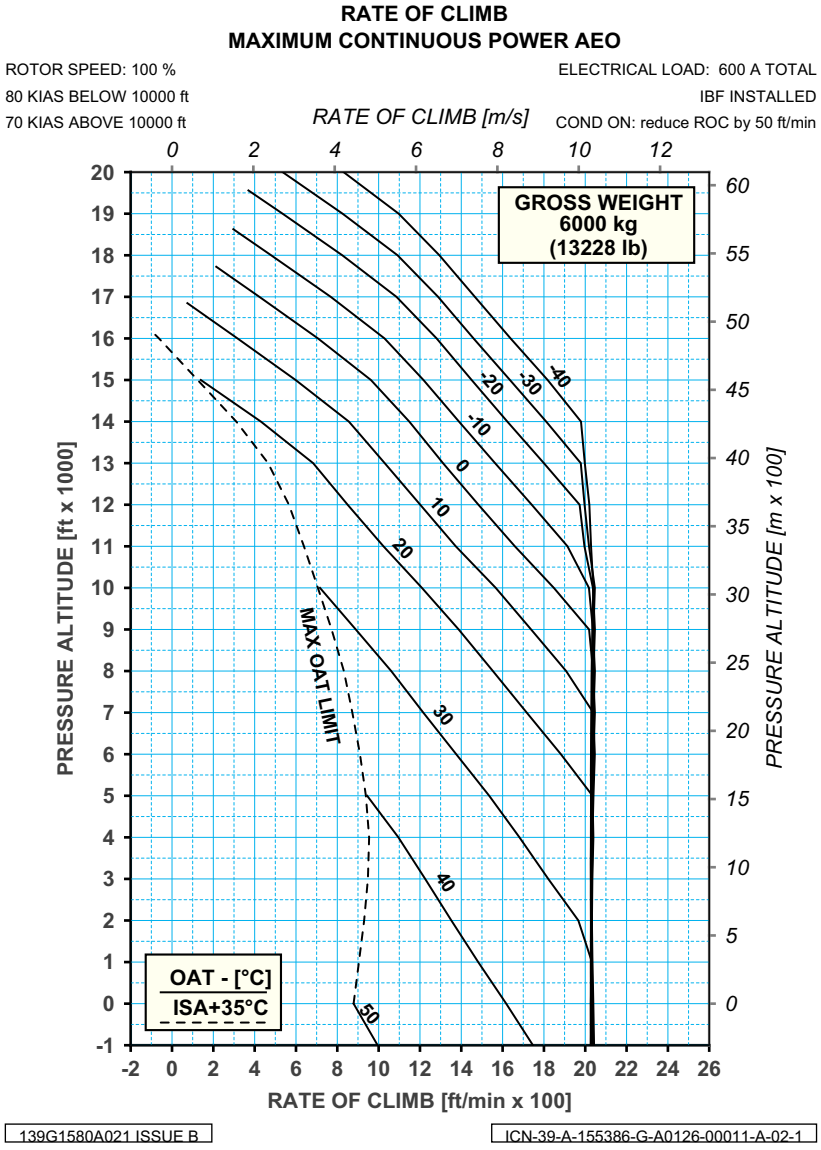

Figure 4-26 ROC MCP AEO Gross Weight 6000 kg, IBF Installed

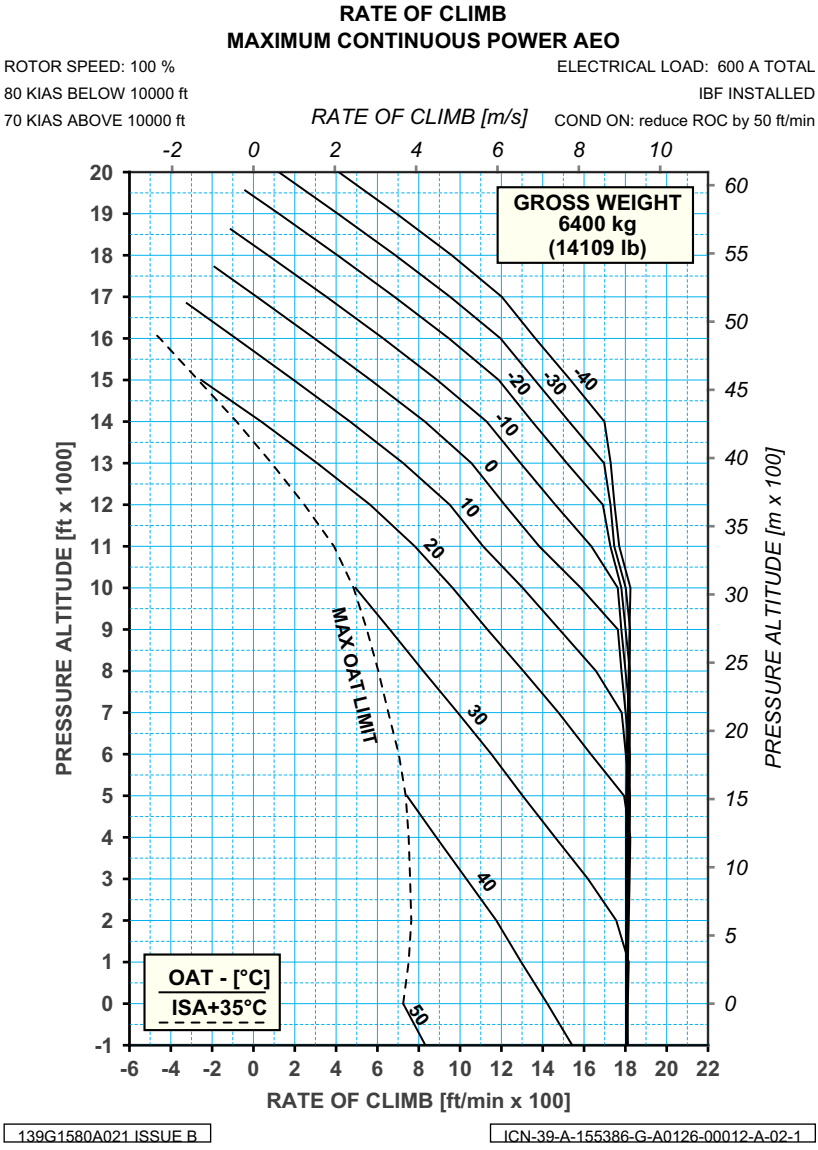

Figure 4-27 ROC MCP AEO Gross Weight 6400 kg, IBF Installed

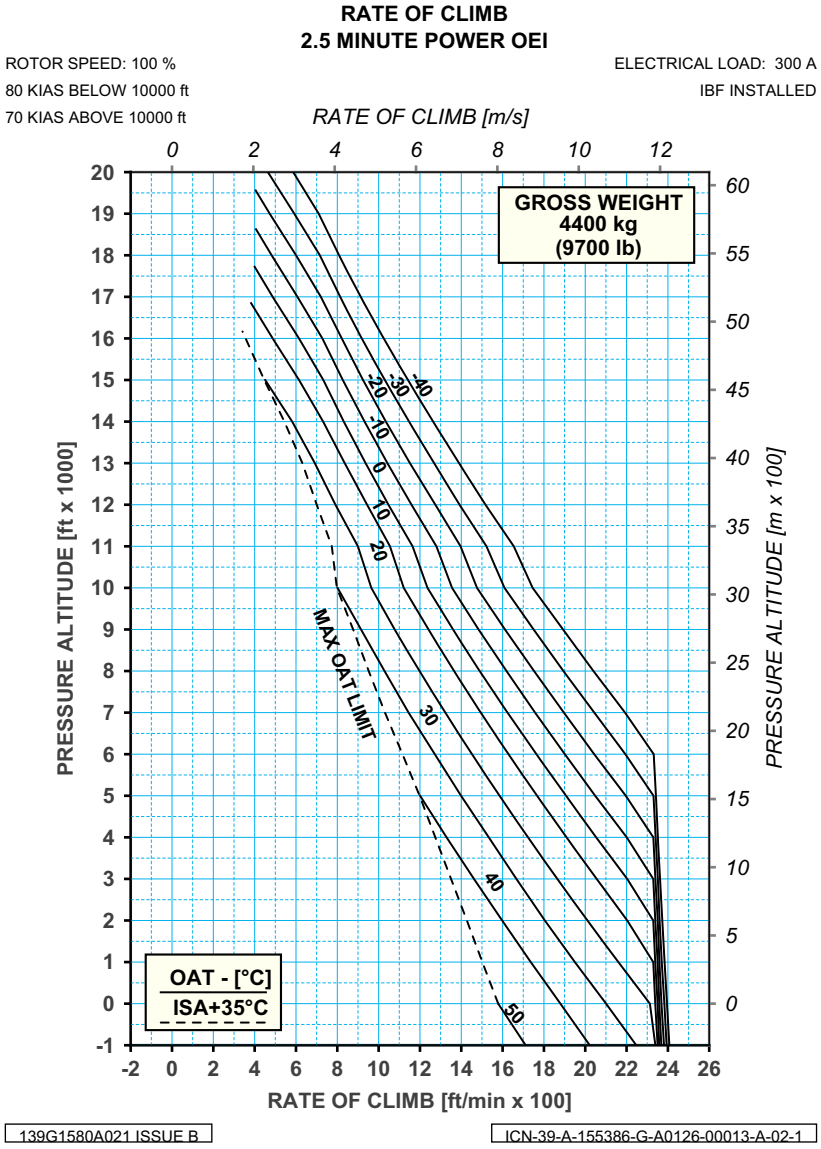

Figure 4-28 ROC 2.5min OEI Gross Weight 4400 kg, IBF Installed

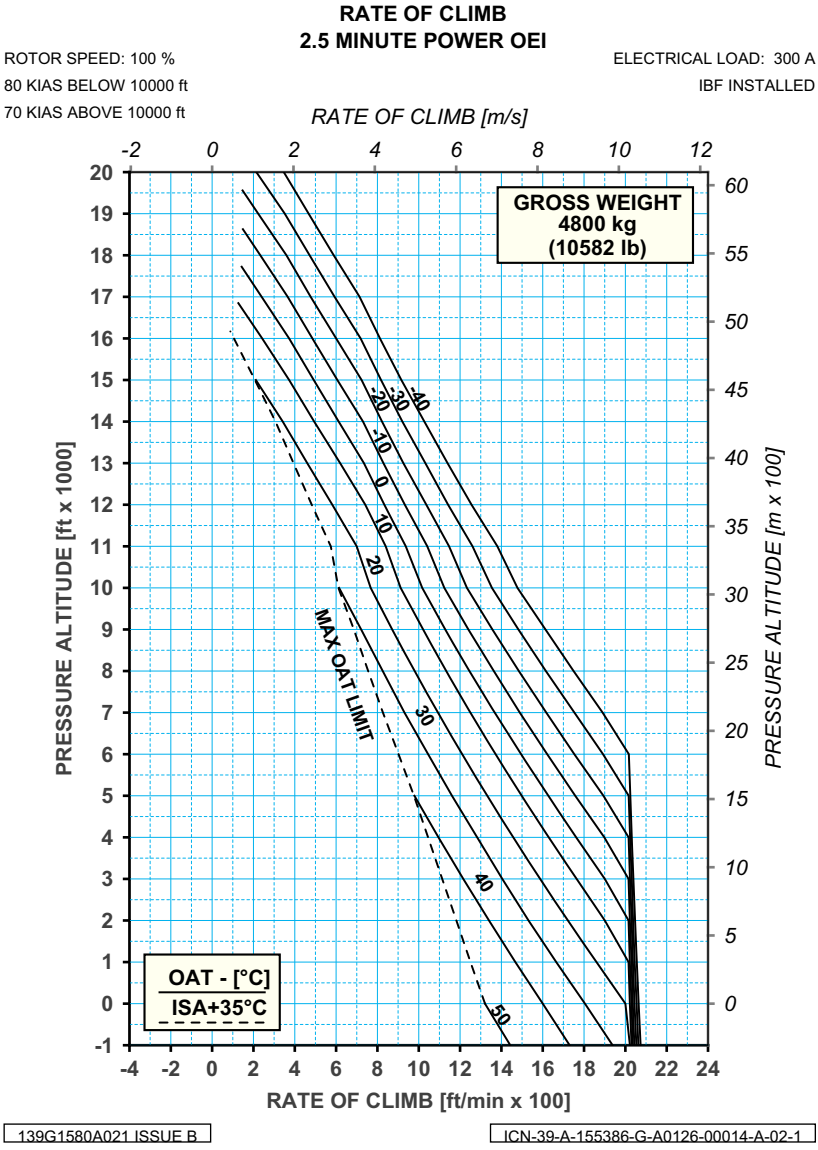

Figure 4-29 ROC 2.5min OEI Gross Weight 4800 kg, IBF Installed

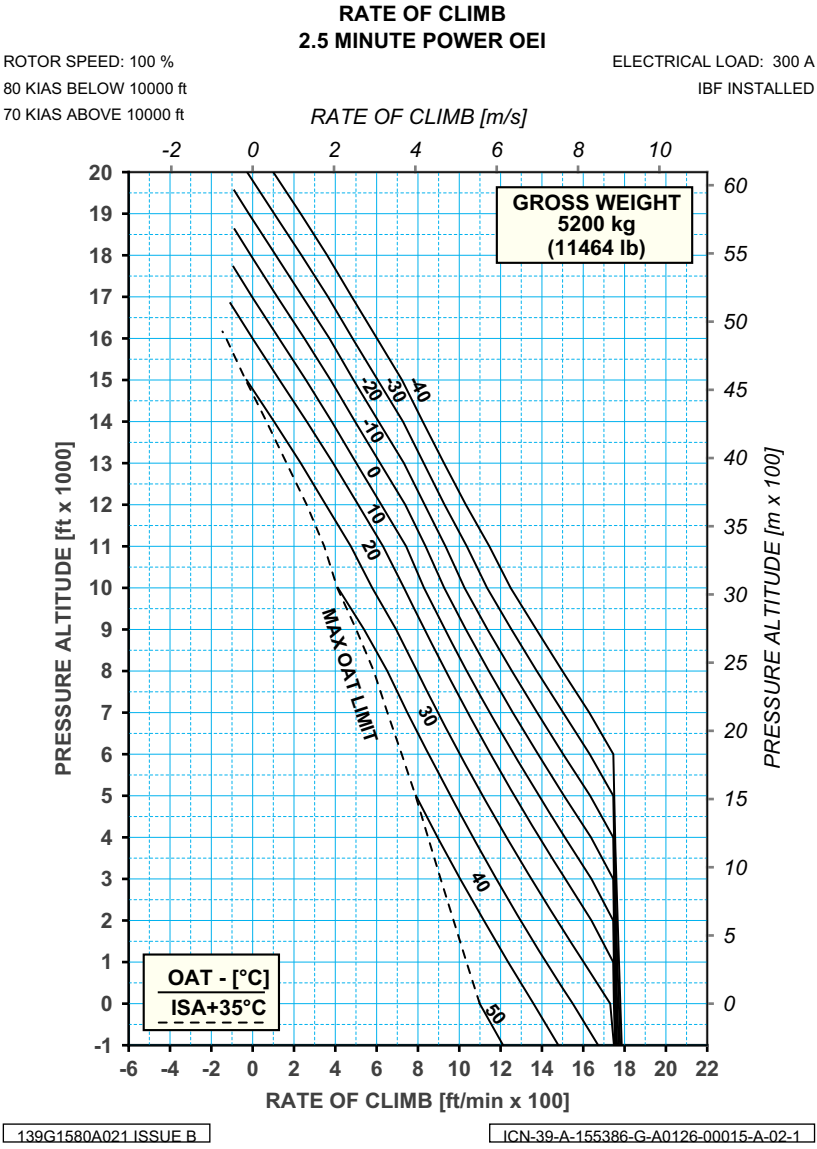

Figure 4-30 ROC 2.5min OEI Gross Weight 5200 kg, IBF Installed

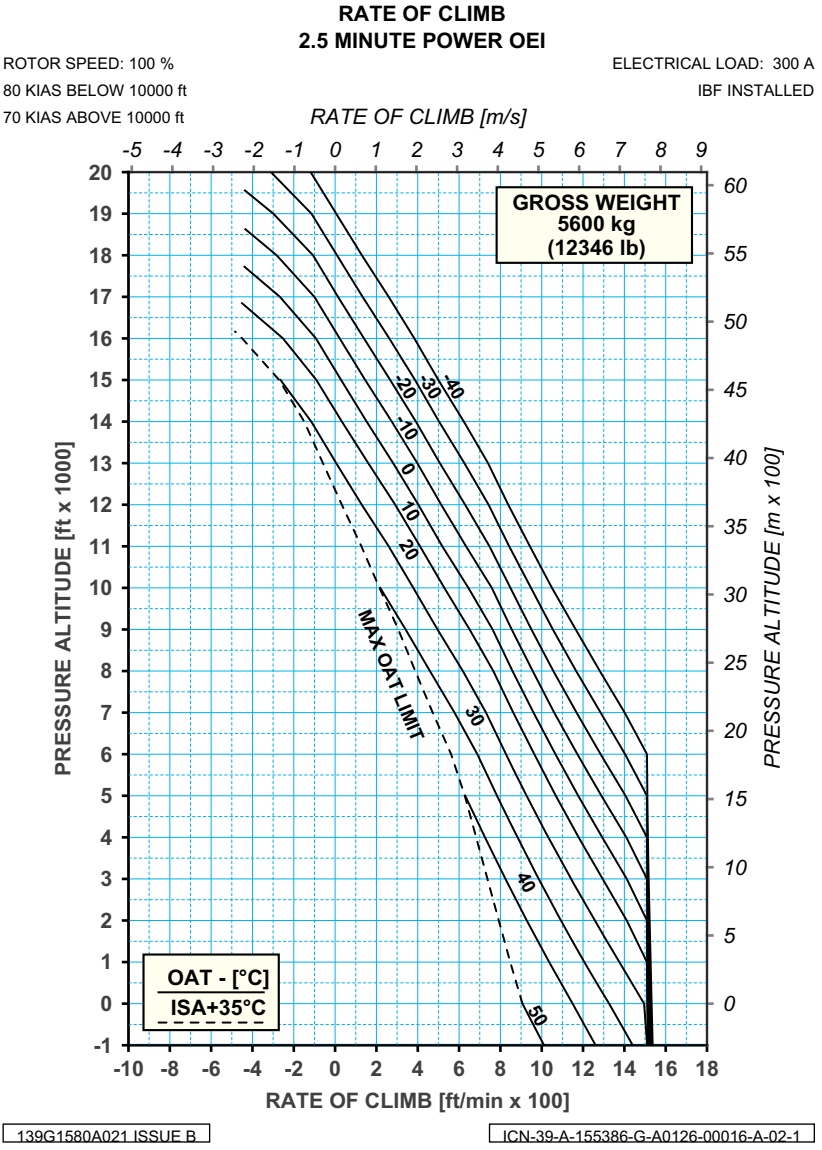

Figure 4-31 ROC 2.5min OEI Gross Weight 5600 kg, IBF Installed

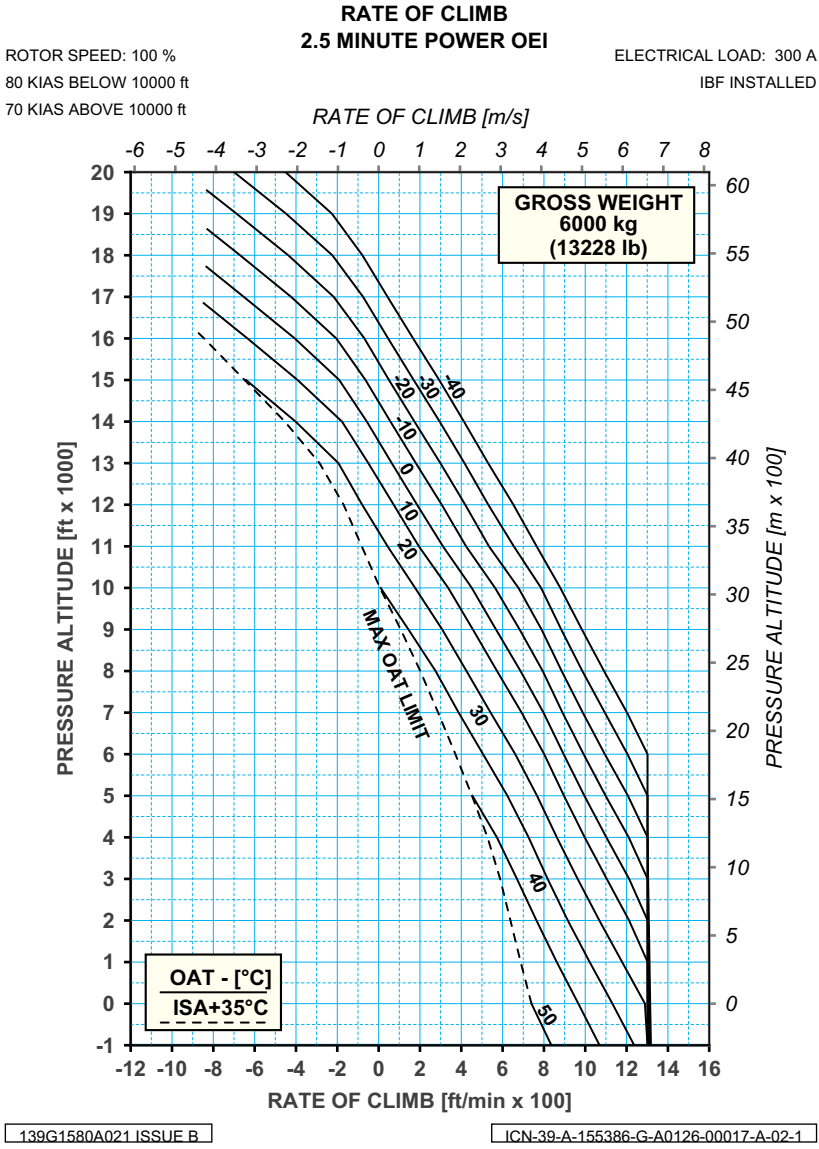

Figure 4-32 ROC 2.5min OEI Gross Weight 6000 kg, IBF Installed

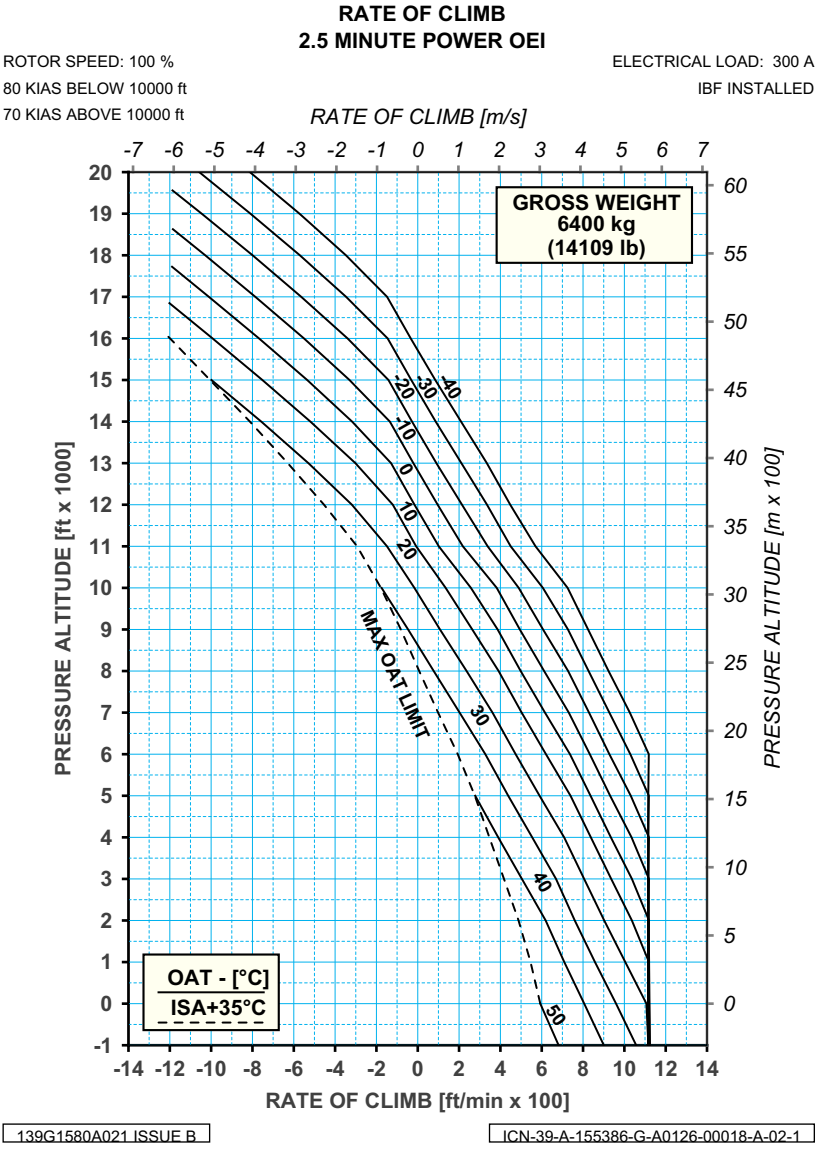

Figure 4-33 ROC 2.5min OEI Gross Weight 6400 kg, IBF Installed

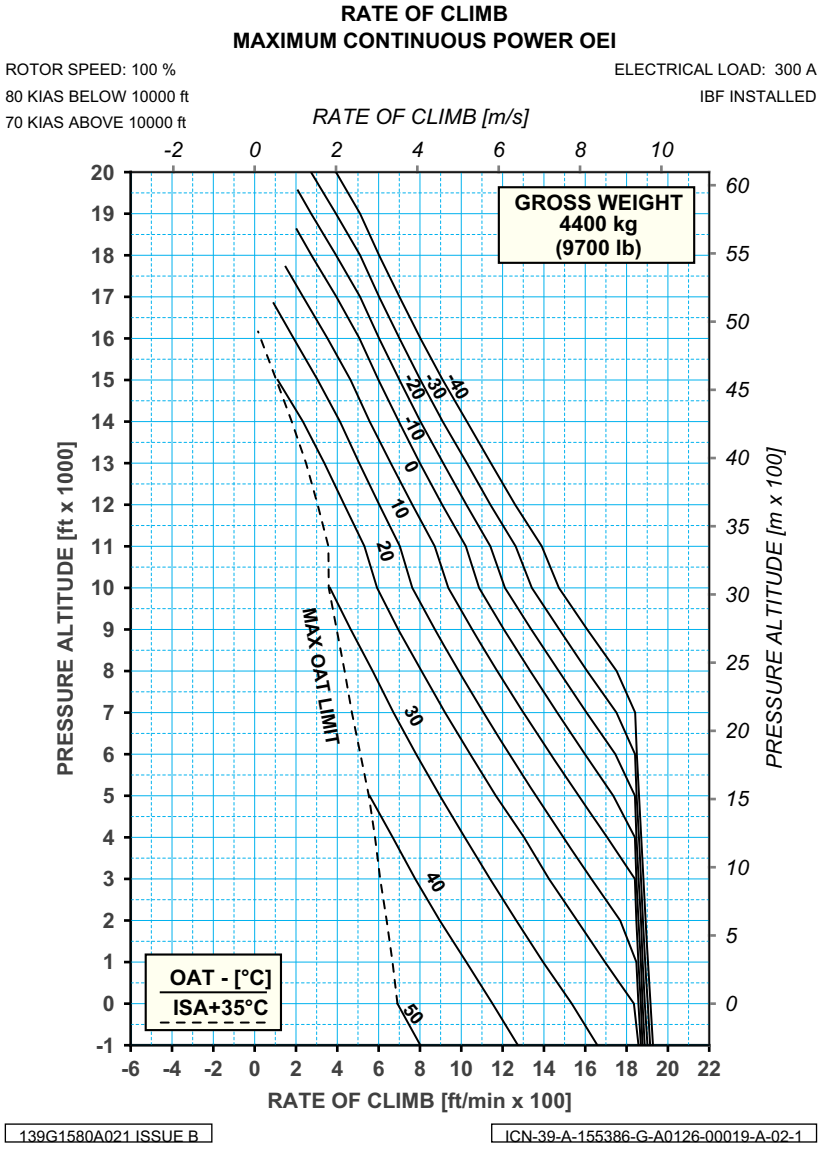

Figure 4-34 ROC MCP OEI Gross Weight 4400 kg, IBF Installed

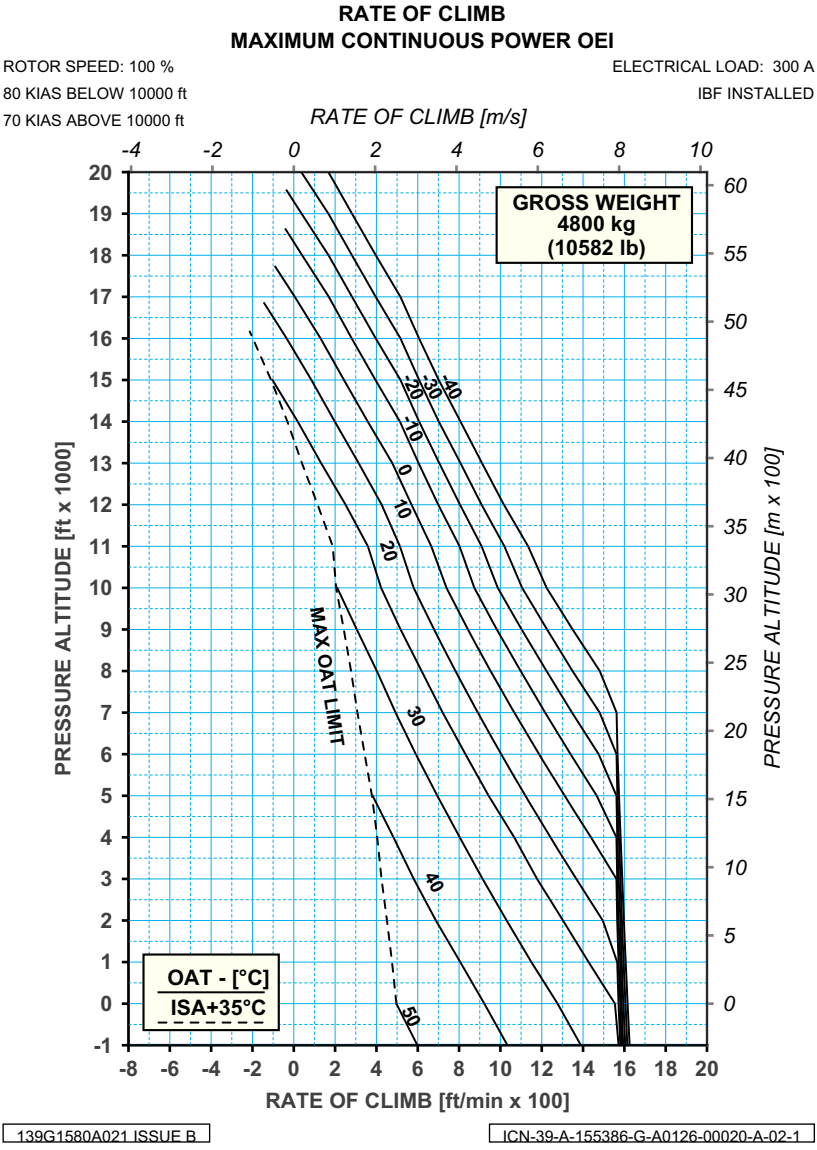

Figure 4-35 ROC MCP OEI Gross Weight 4800 kg, IBF Installed

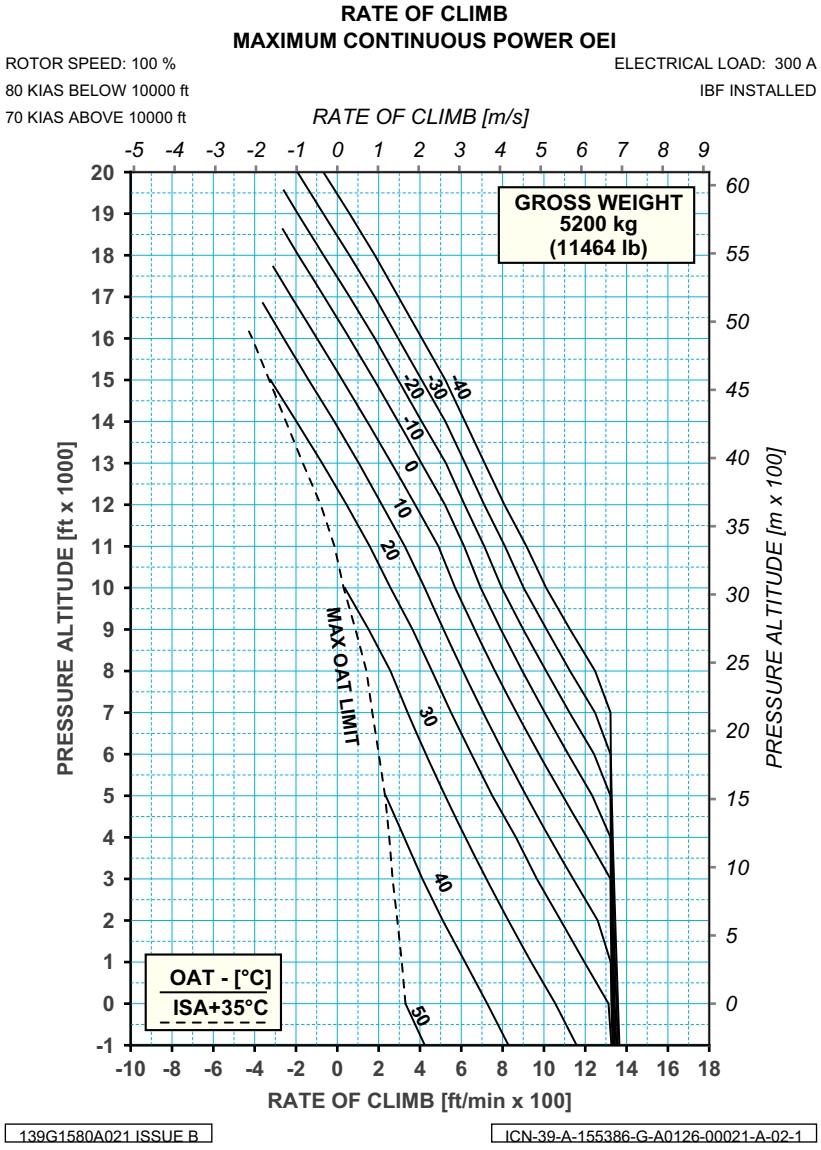

Figure 4-36 ROC MCP OEI Gross Weight 5200 kg, IBF Installed

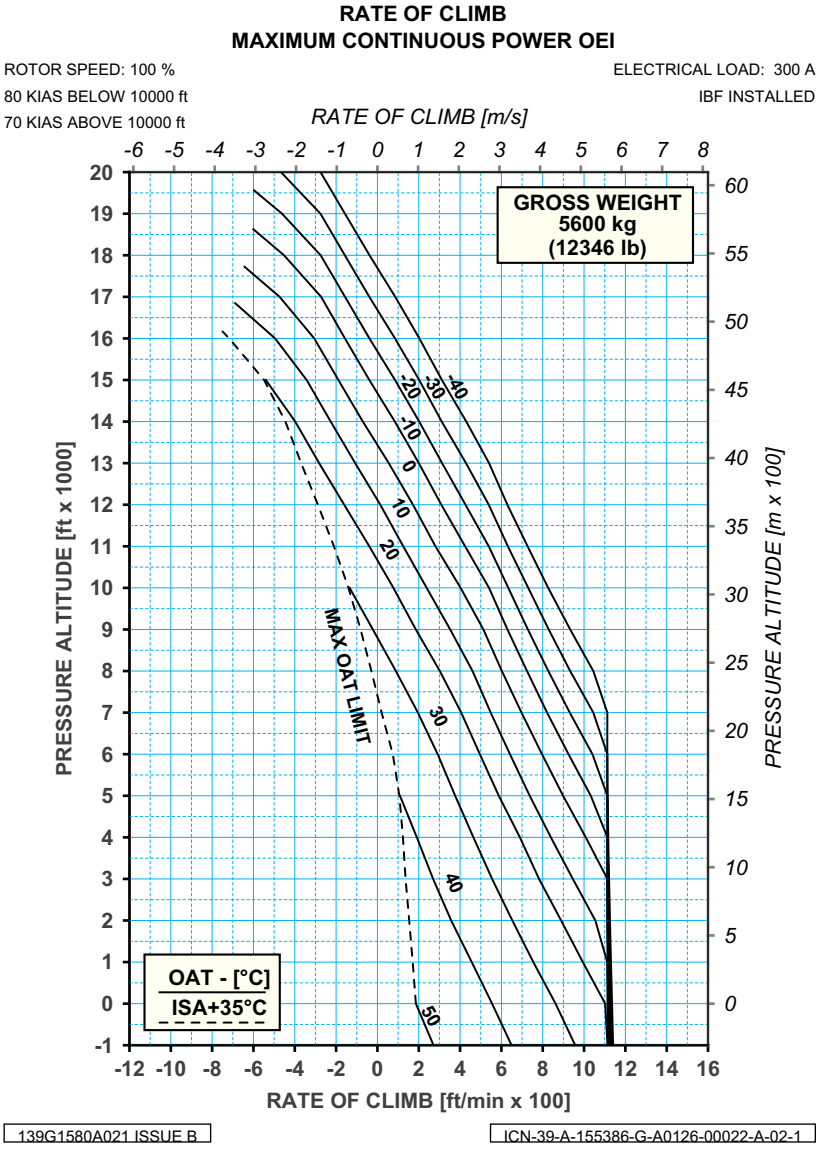

Figure 4-37 ROC MCP OEI Gross Weight 5600 kg, IBF Installed

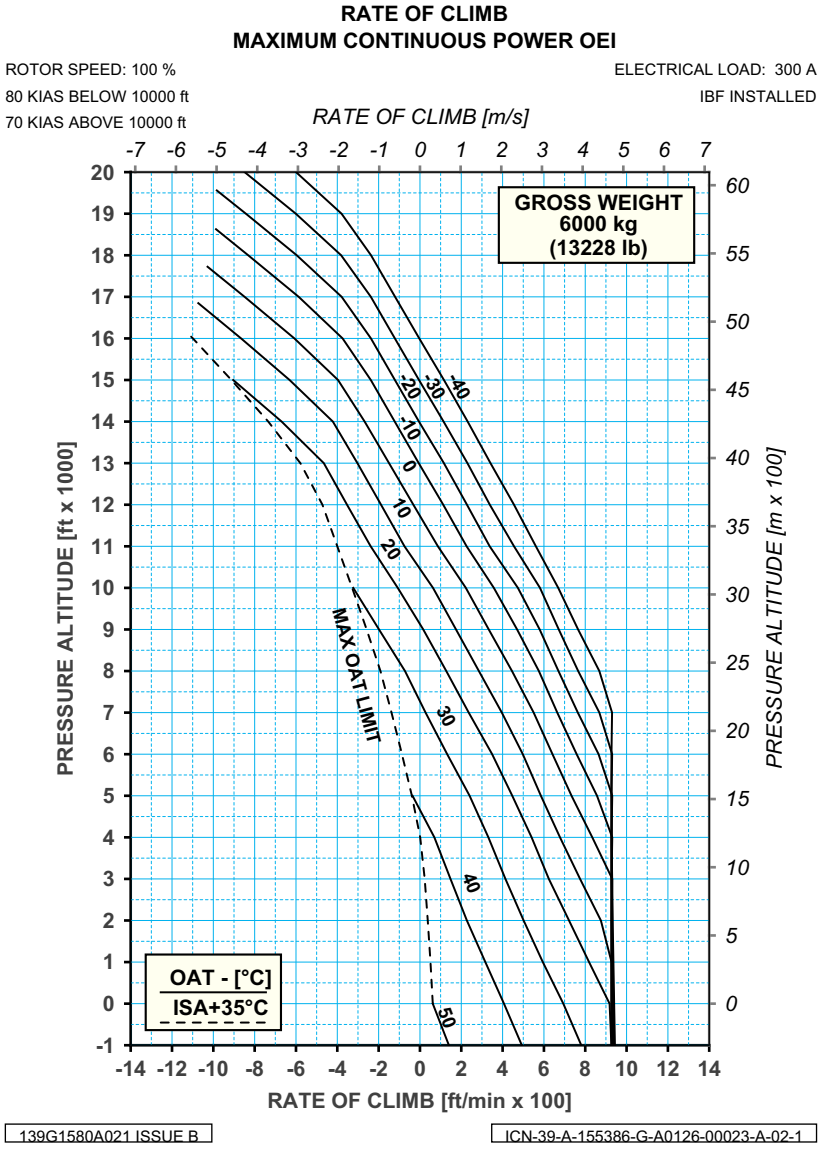

Figure 4-38 ROC MCP OEI Gross Weight 6000 kg, IBF Installed

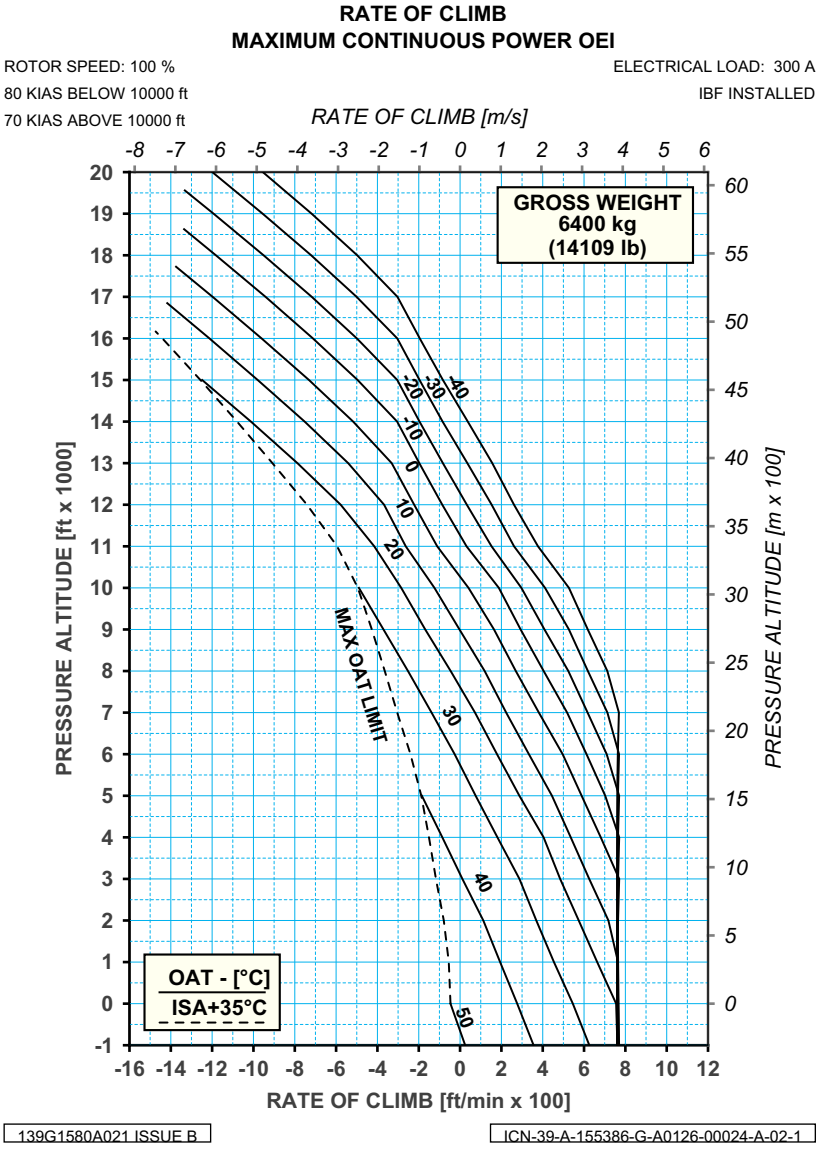

Figure 4-39 ROC MCP OEI Gross Weight 6400 kg, IBF Installed

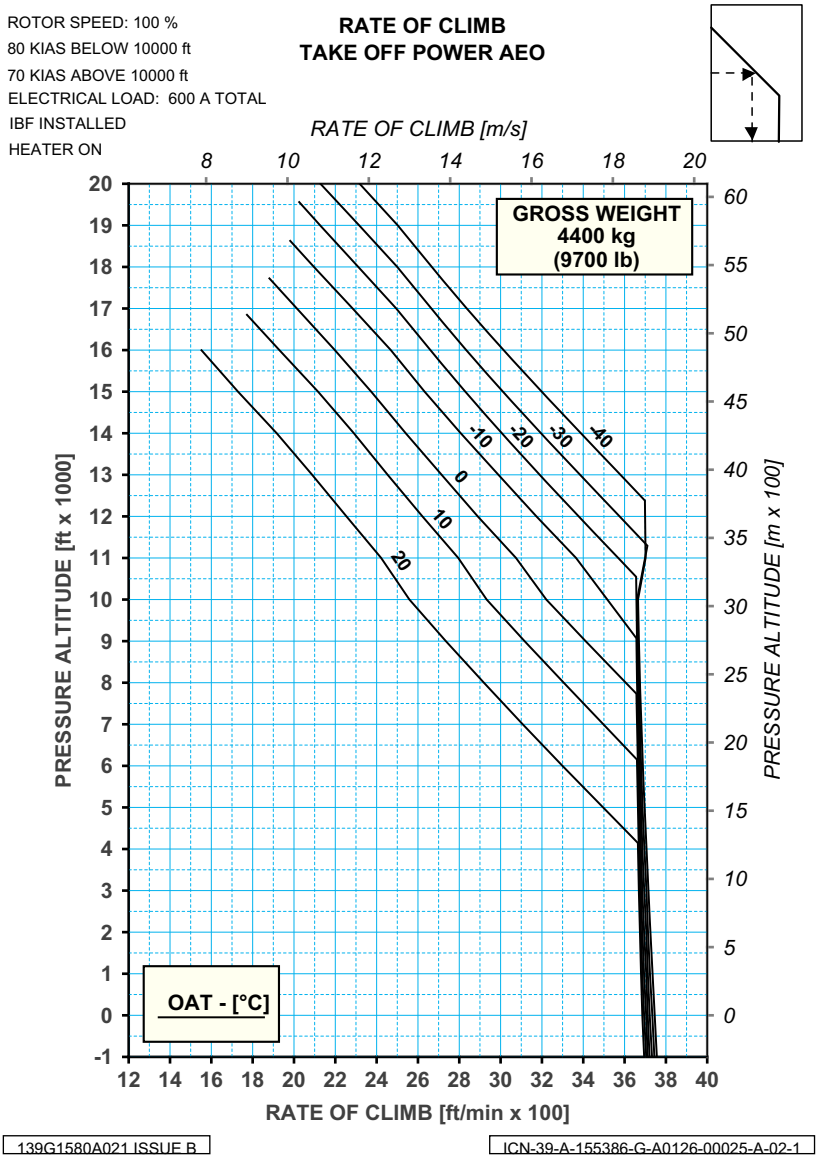

Figure 4-40 ROC TOP AEO Gross Weight 4400 kg Heater ON, IBF Installed

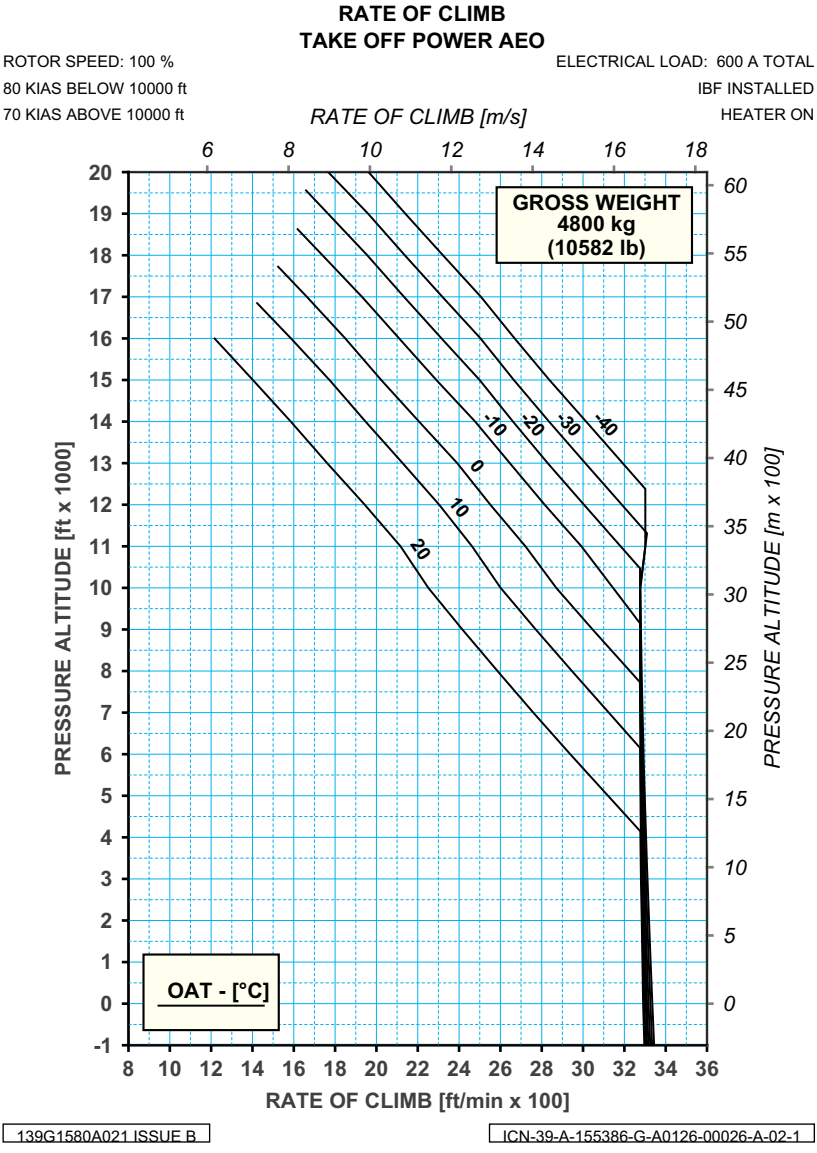

Figure 4-41 ROC TOP AEO Gross Weight 4800 kg Heater ON, IBF Installed

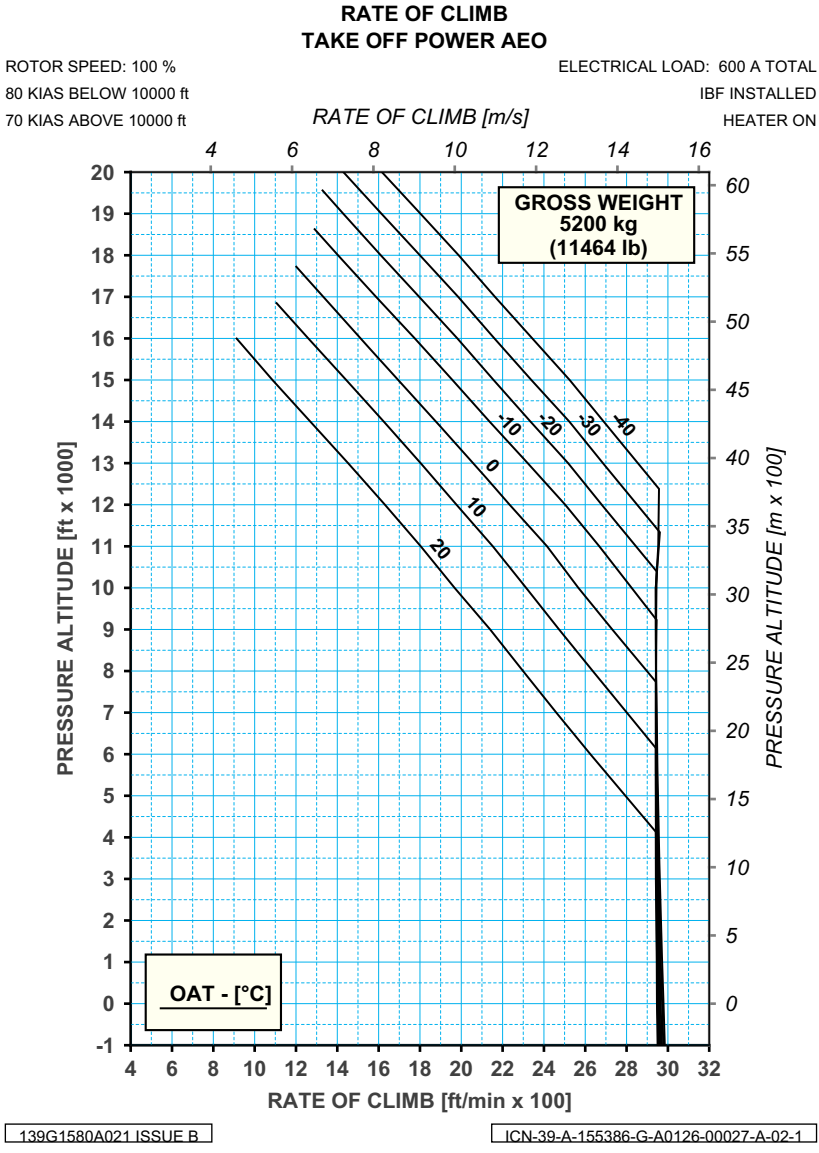

Figure 4-42 ROC TOP AEO Gross Weight 5200 kg Heater ON, IBF Installed

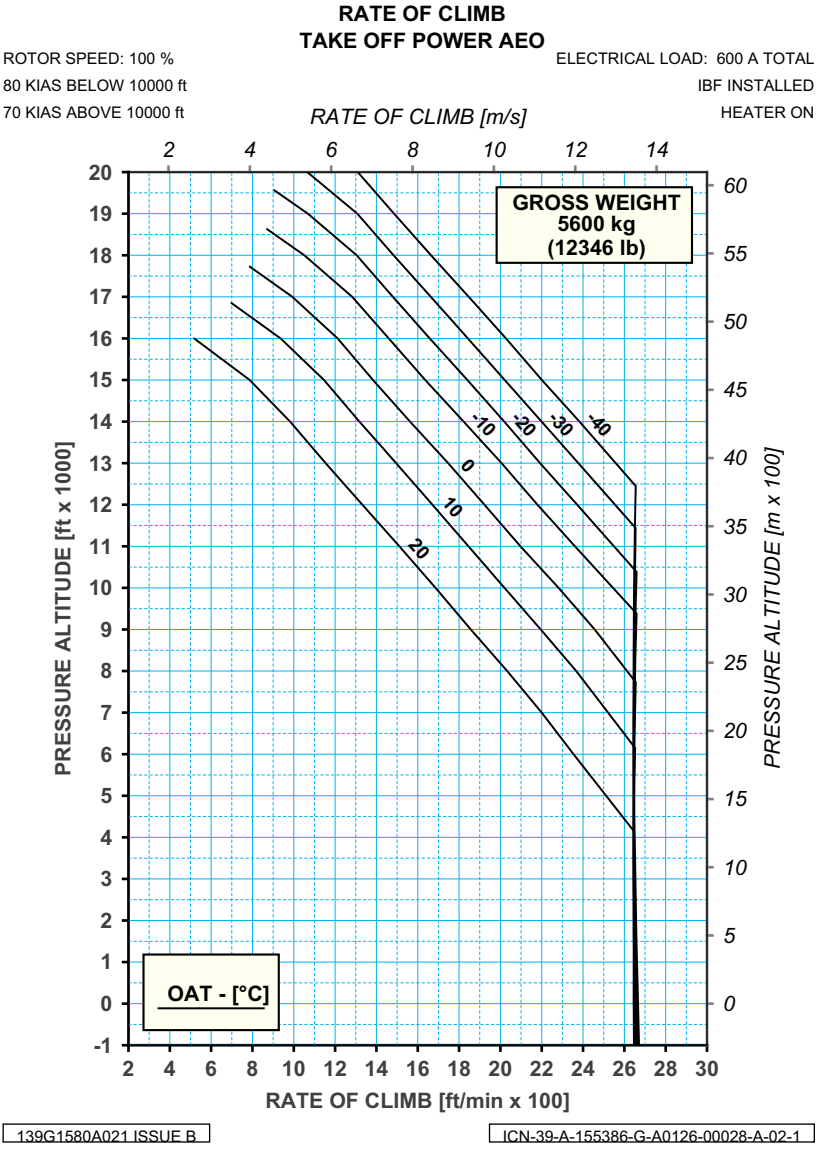

Figure 4-43 ROC TOP AEO Gross Weight 5600 kg Heater ON, IBF Installed

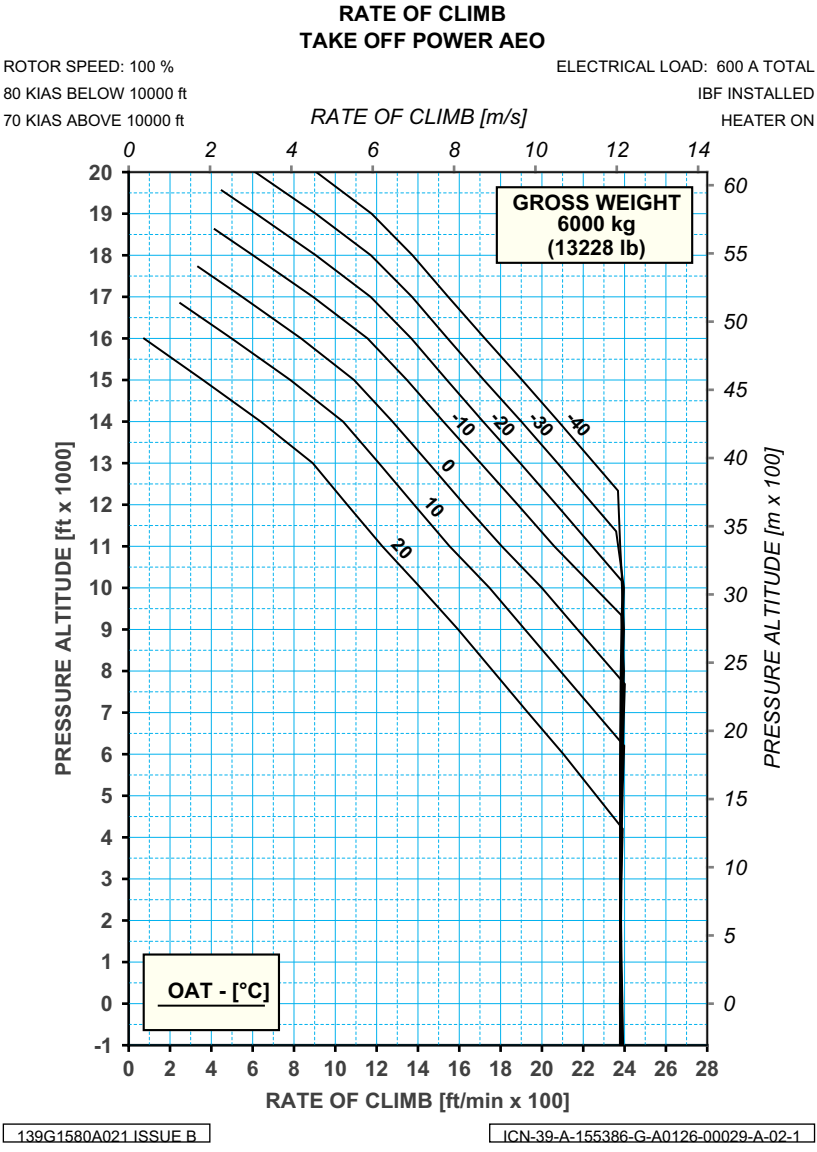

Figure 4-44 ROC TOP AEO Gross Weight 6000 kg Heater ON, IBF Installed

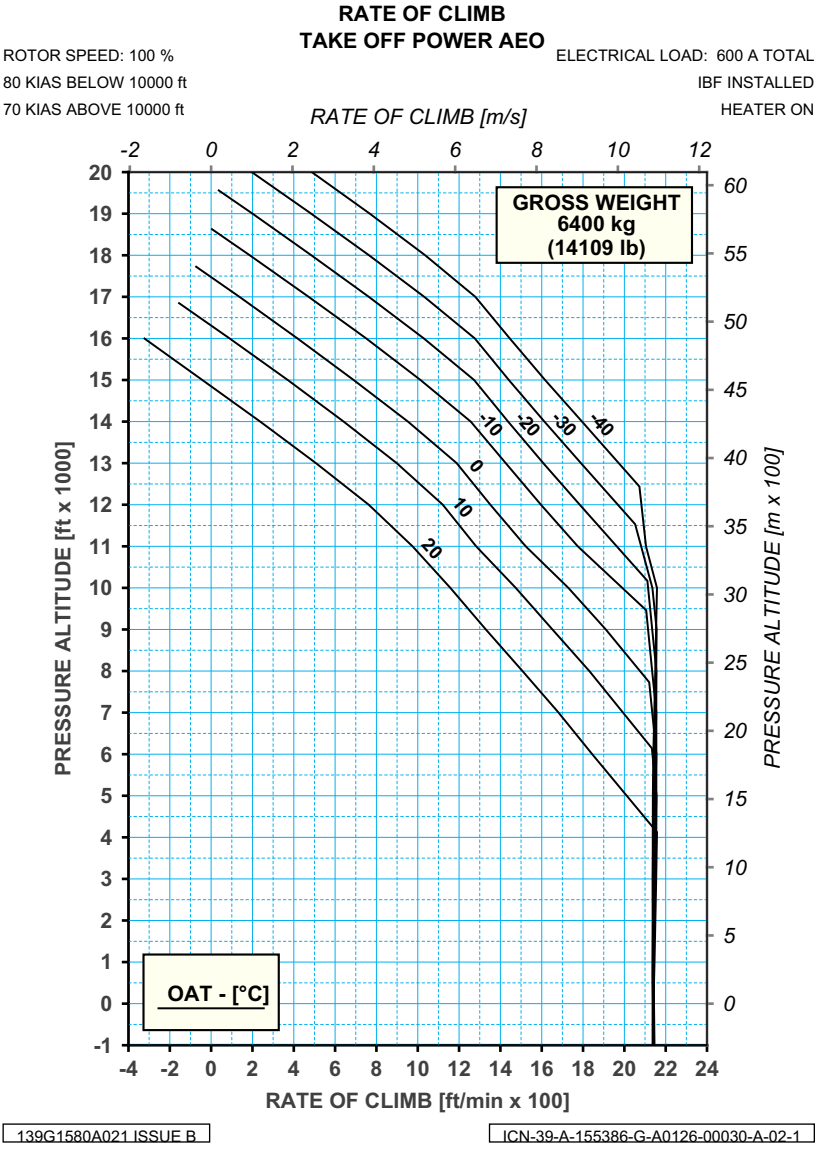

Figure 4-45 ROC TOP AEO Gross Weight 6400 kg Heater ON, IBF Installed

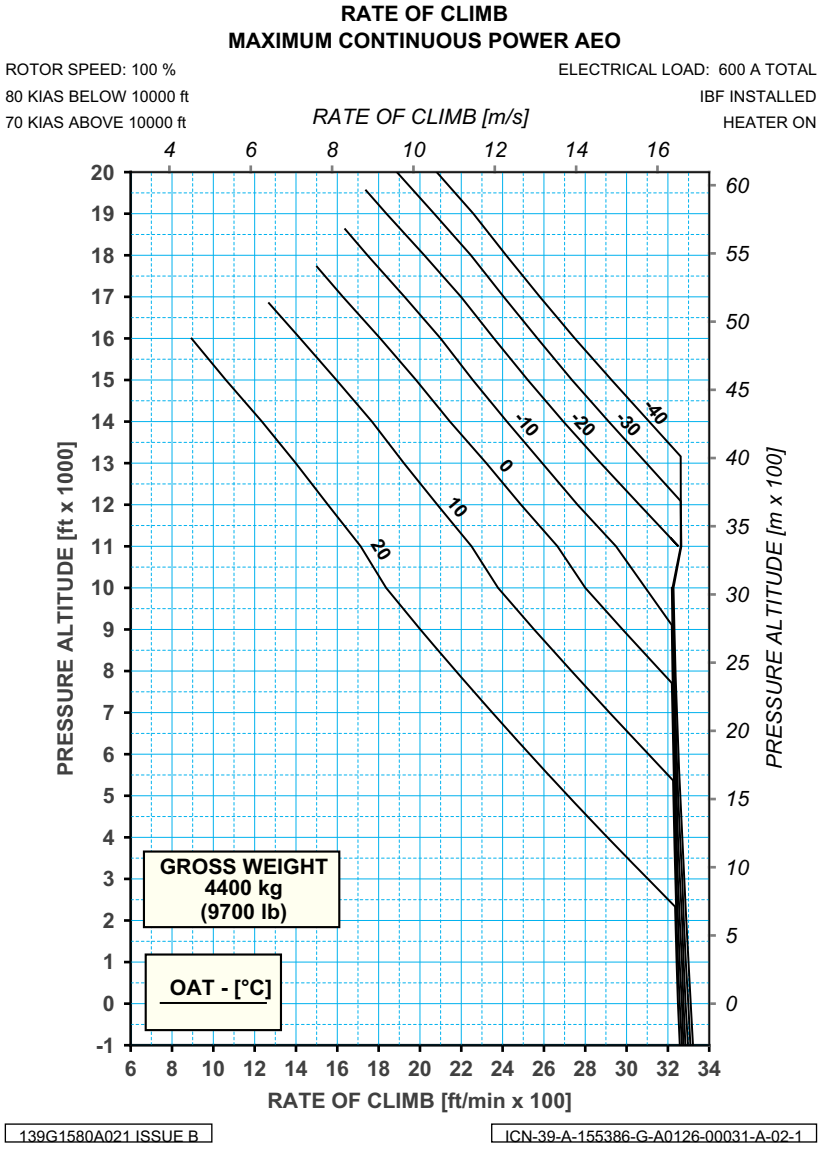

Figure 4-46 ROC MCP AEO Gross Weight 4400 kg Heater ON, IBF Installed

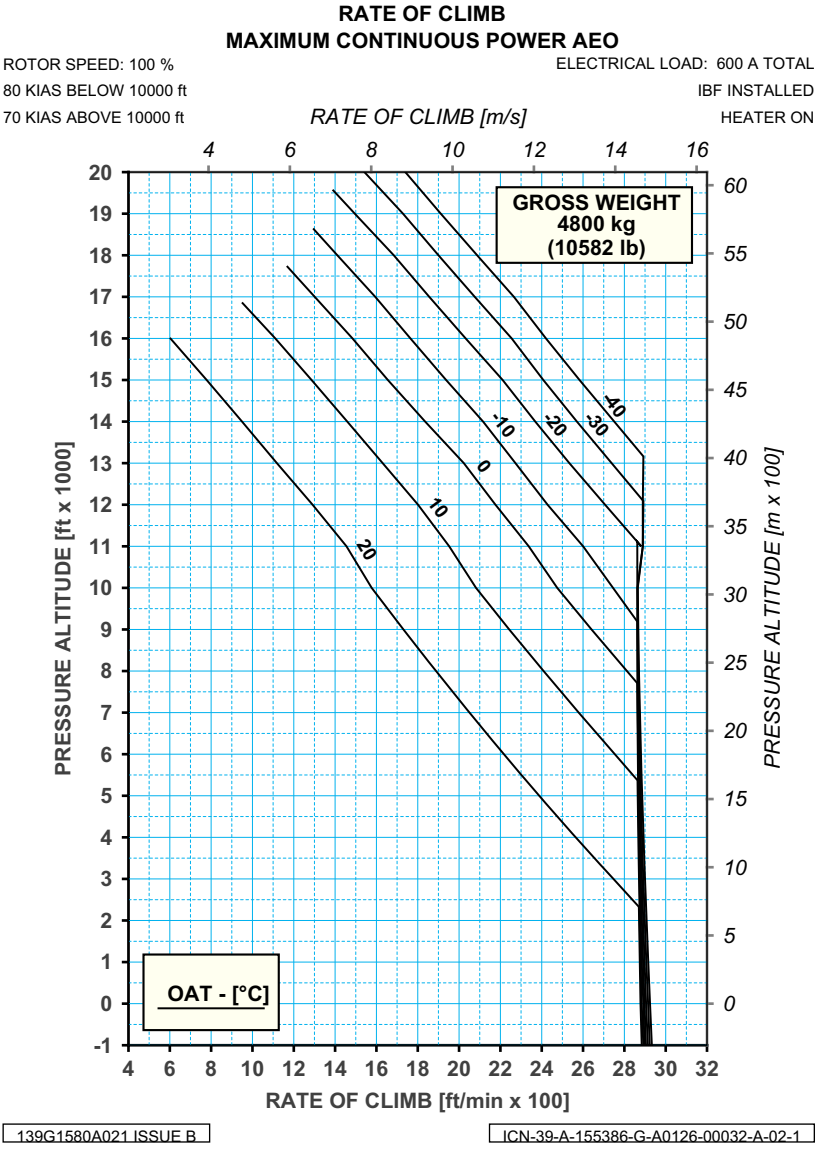

Figure 4-47 ROC MCP AEO Gross Weight 4800 kg Heater ON, IBF Installed

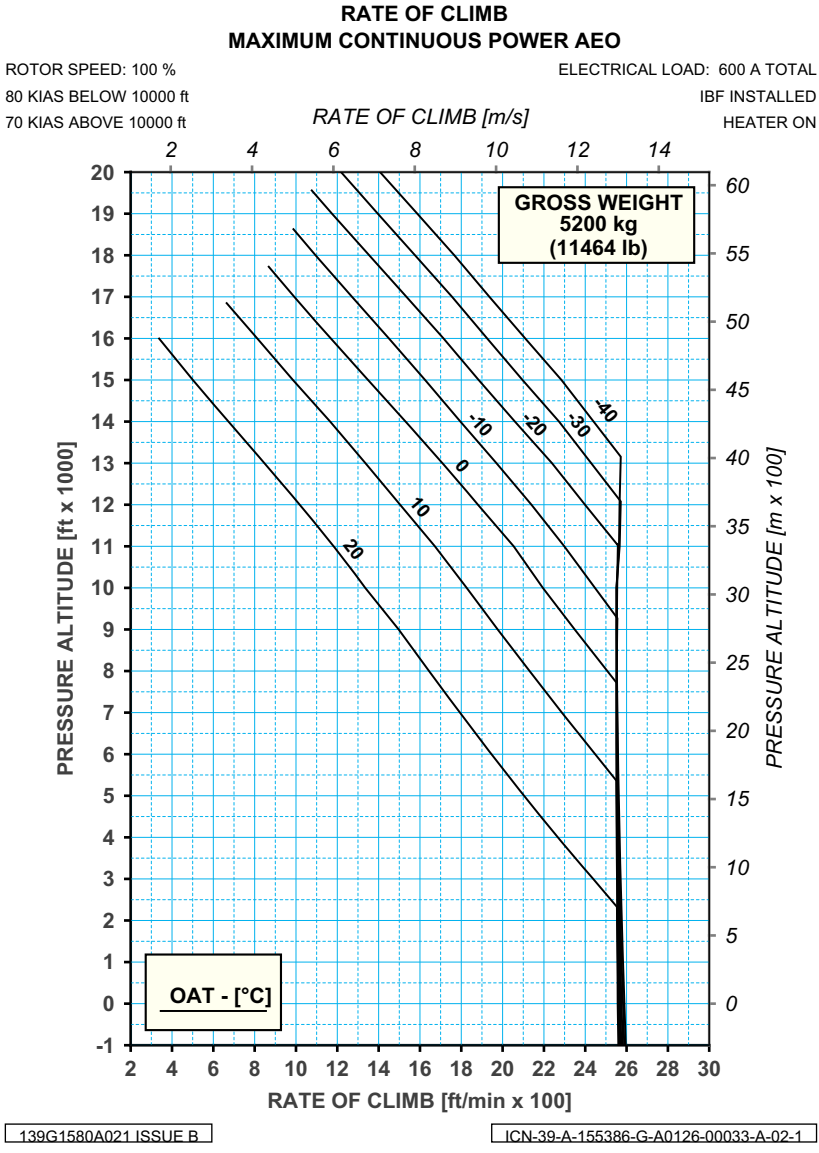

Figure 4-48 ROC MCP AEO Gross Weight 5200 kg Heater ON, IBF Installed

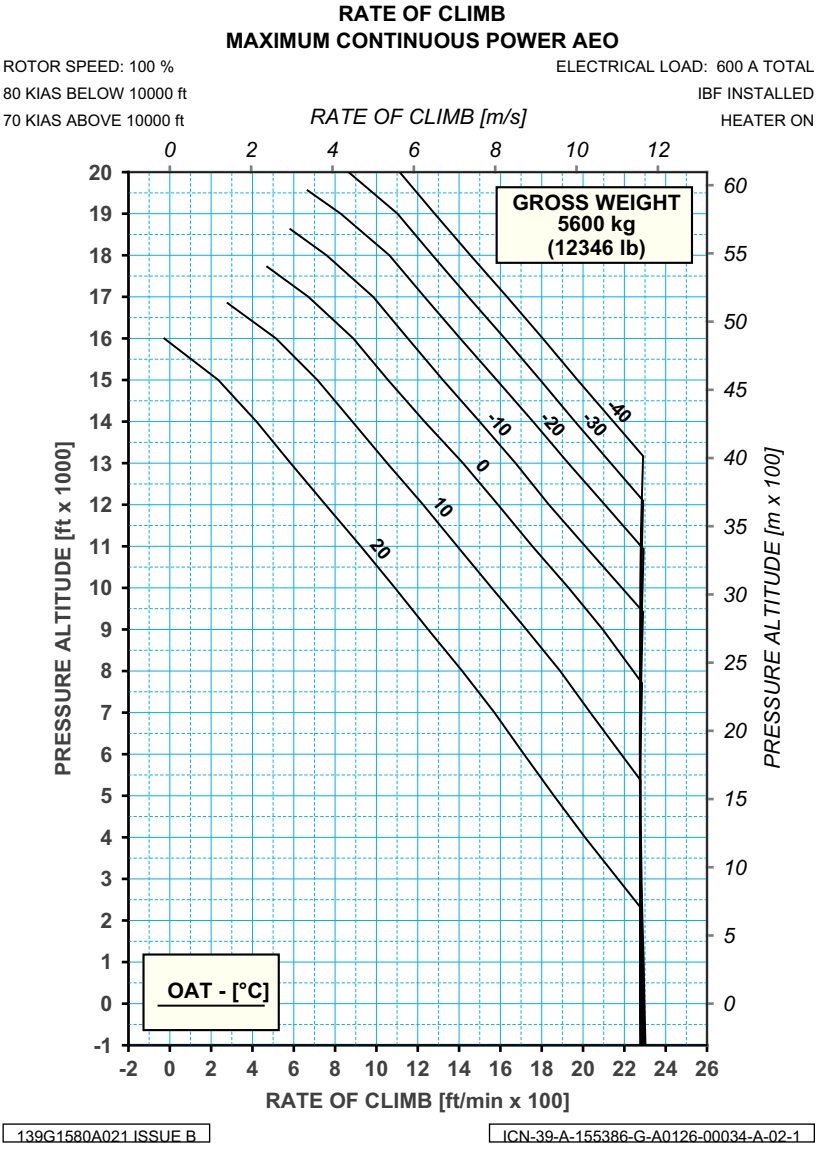

Figure 4-49 ROC MCP AEO Gross Weight 5600 kg Heater ON, IBF Installed

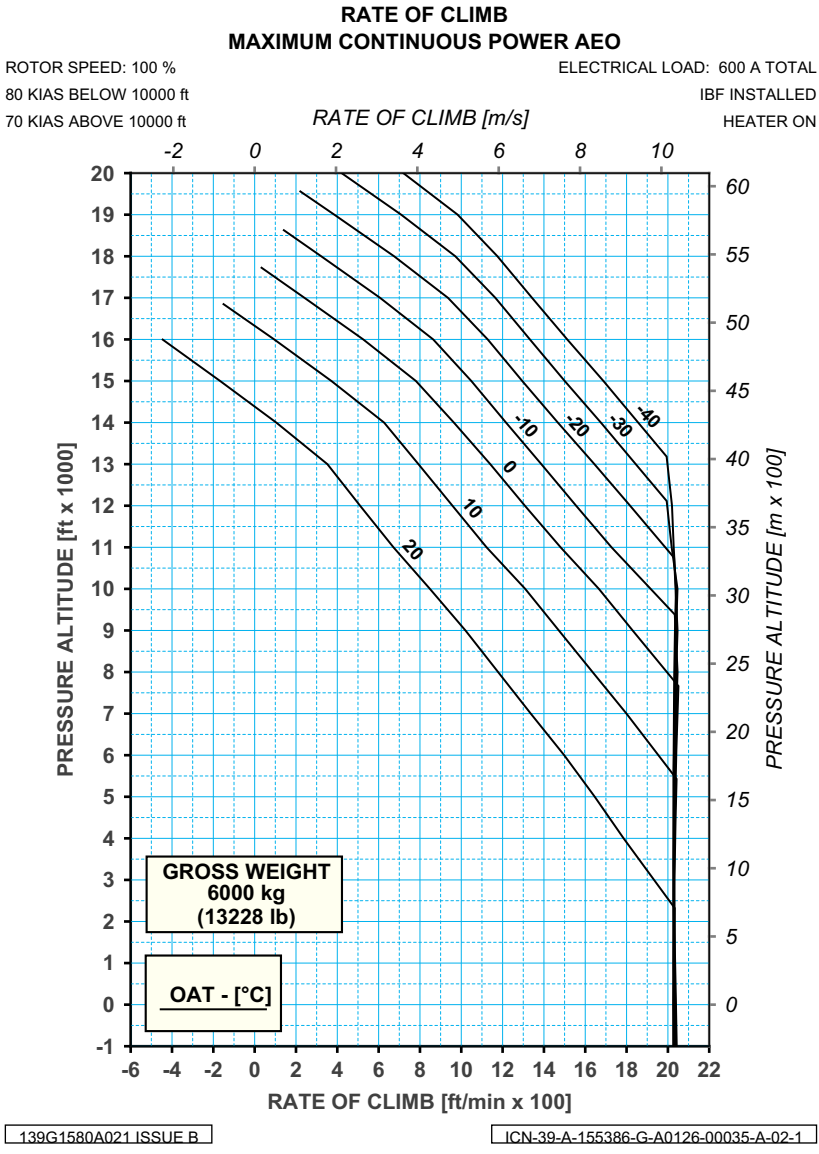

Figure 4-50 ROC MCP AEO Gross Weight 6000 kg Heater ON, IBF Installed

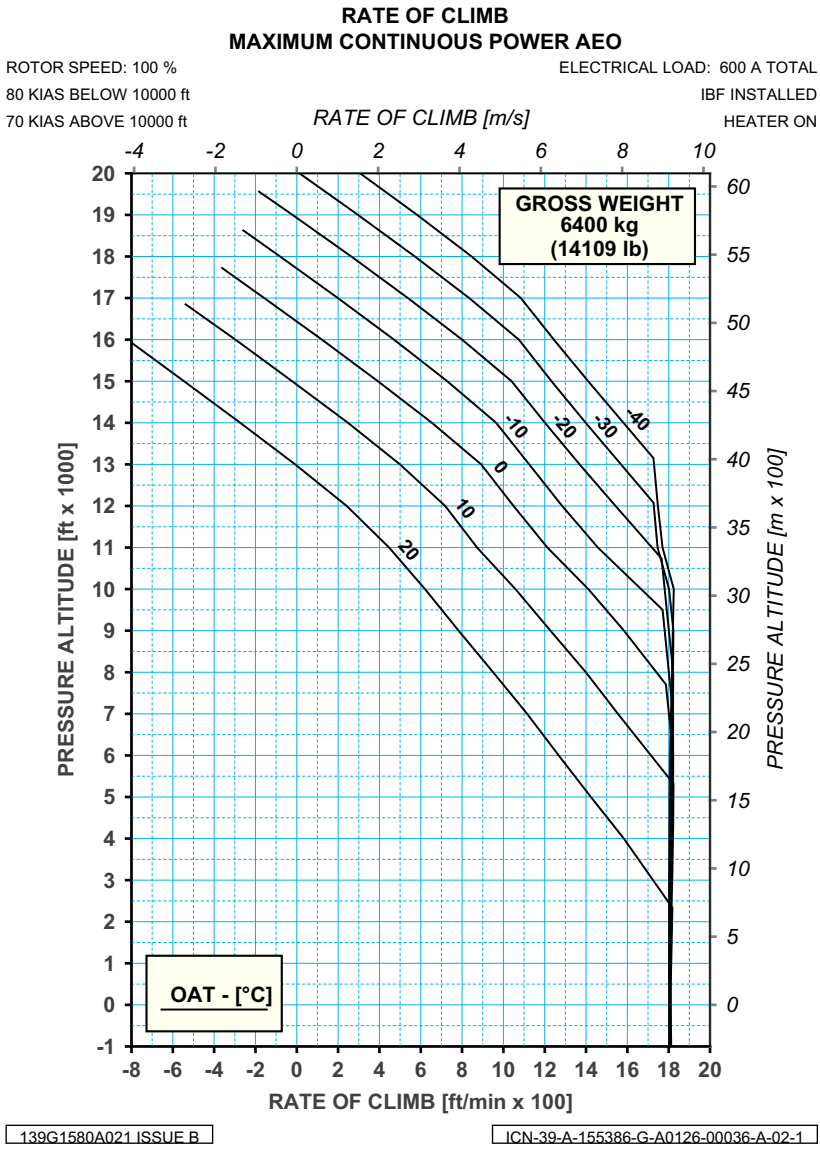

Figure 4-51 ROC MCP AEO Gross Weight 6400 kg Heater ON, IBF Installed

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 87

HEATING/VENTILATION AND AIR CONDITIONING SYSTEMS (ENVIRO)

P/N 3G2141A00111 P/N 3G2141A00112	Heating and Forced Ventilation Kit
P/N 3G2150F00511 P/N 3G2150F00512	Air Conditioning Kit
P/N 4G2150F00711	Kit ECS for AGB
P/N 4G2150F00611 P/N 4G2150F00911	Dual Zone Kit ECS Dual Zone for AGB

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SUPPLEMENT 87
HEATING/VENTILATION AND AIR CONDITIONING SYSTEMS (ENVIRO)

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GENERAL INFORMATION

Installation of the Heating/Ventilation and Air Conditioning System (ENVIRO) kits permits automatic or manual control of the temperature and airflow environment, independently for cockpit and cabin, dependant on which kits are installed.

Three kits are available:

P/N 3G2141A00111 P/N 3G2141A00112	Heating and Forced Ventilation Kit
P/N 3G2150F00511 P/N 3G2150F00512 P/N 4G2150F00711	Air Conditioning Kit (Vapour Cycle System) Kit ECS for AGB
P/N 4G2150F00611 P/N 4G2150F00911	Dual Zone (Heating and Air conditioning) Kit ECS Dual Zone for AGB

The kits consists of the basic configuration Heating and Forced Ventilation and the optional Air Conditioning Kit which is installed in addition to the basic configuration.

The basic configuration instals the following items: bleed air shut off valves, ejector heating valve (jet pump), pressure and temperature sensors, outside air intake, fresh air valves, fans, pilot and passenger area air outlets, connecting ducts and tubing, cockpit control panel to operate the system and a controlling unit.

The Air Condition kit adds to the basic installation the air conditioning vapour cycle units and associated tubing, valves and switches.

The Dual Zone kit includes the modification necessary to the Heating and Air Conditioning kit to enable the temperature of the cockpit and cabin to be controlled independantly.

The control panel for the Heating and Ventilation is shown in Figure 1, the Heating and Ventilation and with Air Conditioning in Figure 2 and the Dual Zone (Heating and Air Conditioning) control panel in Figure 3.

The operation of the panels differs due to the incorporation of the air conditioning VCS system selections and the Dual zone selections.

ECS CONTROL selector knob:

— Selecting FULL AUTO controls the cockpit and cabin temperature automatically to the temperature selected on the AUTO TEMP SETTING knob. The fresh air valves are controlled automatically and the positionis dependant on the aircraft airspeed and fan speed. The temperature setting can be varied between 10°C and 32°C and when heating is necessary the SOV's are opened as required and all the air mixing is automatic to maintain the temperature selected. When the air conditioning system is present this will automatically activate, if necessary. With the FAN setting for CREW and PAX in AUTO the fan speed is selected automatically to maintain the ambient temperature as selected. The FAN speed can also be selected to positions 1, 2 or 3 to manually select a fixed fan speed.
The Dual Zone panel enables the cockpit and cabin temperature to be selected independently by the crew (when PAX CONTROL is selected to CREW) or the cabin temperature and FAN speed can be selected from the cabin if the PAX CONTROL is set to PAX. A control panel (not included in this kit) must be installed in the cabin to permit this.
The Dual Zone operation for cabin fan speed and temperature simultaneously only operates for the FULL AUTO selection, while in other selections only the fan speed can be modified.

— Selecting A/C RECYCLE (air conditioning installation only) activates the air conditioning VCS continuously. The FAN speed must be selected as required, however if the FAN is selected to AUTO or OFF the associated fan will be switched off.

— Selecting VENT closes the ejector heating valve and/or selects the air conditioning OFF (if fitted) and ventilation is just via positioning of the vent FAN switches.

— Selecting MAN HEAT permits the SOV's to be controlled manually by the MAN HEAT toggle switch selecting momentarily to INCREASE or DECREASE to control the temperature.

— Selecting RAM ONLY closes SOV's and/or selects the air conditioning OFF (if fitted) and opens the fresh air valve fully. The FAN speed is then controlled by the FAN CREW/PAX switches.

— Selecting the SOV from the NORM position, where control of the valves is automatic, to CLOSE forces the SOV's to close overriding the system.

— Selecting the ECS CONTROL to OFF disactivates the heating/air conditioning and ventilation (Refer to Section 1 - Limitations).

Operation of the Heater System is indicated by a HEATER ON advisory message.

Operation of the Air Conditioning System is indicated by a AIR COND ON advisory message.

Malfunctions of the heating or air conditioning systems are indicated on the CAS by caution messages.

CONTROL PANEL DIAGRAMS

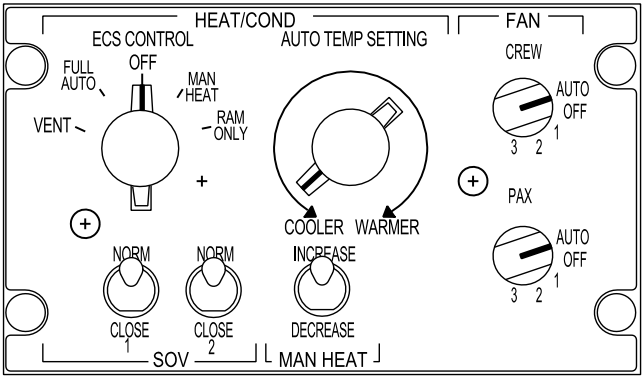

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Figure 1 Heating with Forced Ventilation

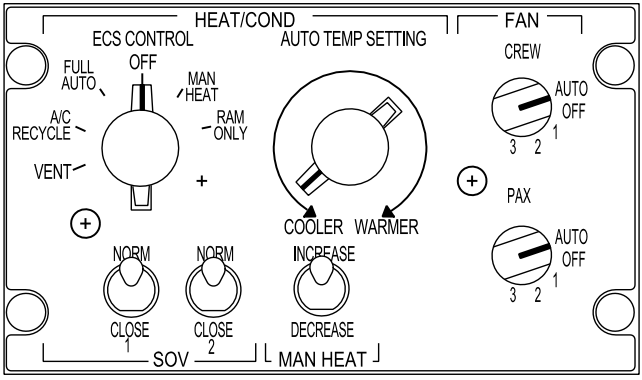

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Figure 2 Heating/Ventilation and Air Conditioning

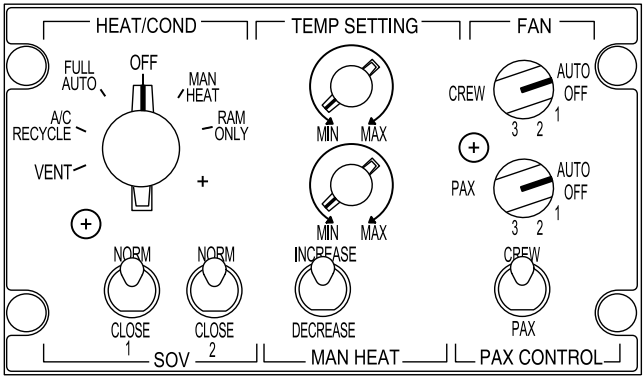

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Figure 3 Dual Zone Control Panel

SECTION 1 - LIMITATIONS

GENERAL

When the ECS ENVIRO system is selected OFF refer to the basic RFM or appropriate Supplement performance charts.

WEIGHT AND CENTRE OF GRAVITY LIMITATIONS

After environmental control system installation the new empty weight and CG must be determined.

WEIGHT

Refer to CAT B W.A.T Limits chart ENVIRO FULL AUTO ...Figure 4-4

For MAN HEAT and A/C RECYCLE selections refer to Supplement 2 HEATER ON and COND ON charts.

CENTRE OF GRAVITY

No change in CG limitations.

AIRSPEED LIMITATIONS

Max airspeed in sideward or rearward flight,
ECS ENVIRO selected to FULL AUTO.....Figure 4-4

For MAN HEAT and A/C RECYCLE selections refer to HEATER ON and COND ON charts in Supplement 2 or appropriate Supplement.

CATEGORY B OPERATION LIMITATIONS

The CAT B W.A.T. Limits chart ECS ENVIRO selected to FULL AUTO Figure 4-4 is used to define the maximum take off and landing weight for the given ambient and wind conditions.

CAT B weights between 6400 kg and 6800 kg the ECS ENVIRO must not be selected to FULL AUTO or MAN HEAT. See Supplement 50 for CAT B W.A.T chart.

For MAN HEAT and A/C RECYCLE selections refer to HEATER ON and COND ON charts in Supplement 2 or appropriate Supplement.

(See Flight Planning in Basic RFM Section 2 for examples of using the CAT B W.A.T. Limits chart).

HEIGHT- VELOCITY LIMITATIONS

The Height-Velocity diagram defines, in the event of a single engine failure during take off, landing or other operation near the surface, a combination of airspeed and height above ground from which a safe single engine landing on a smooth, level and hard surface cannot be assured.

CAUTION

Prior to the determination of the H-V envelope the CATEGORY B weight for FULL AUTO selection should be defined for the ambient conditions. See Flight Planning in Basic RFM Section 2 for use of the CAT B W.A.T. and H-V envelope charts.

Height Velocity Chart ENVIRO FULL AUTO .....Figure 4-1

H_V Chart ENVIRO FULL AUTO 6400 kg to 6800 kg .....Figure 4-2
(Supplement 50 Increased Gross Weight 6800 kg)

H_V Chart ENVIRO FULL AUTO 6400 kg Altitude
Extension .....Figure 4-3
(Supplement 51 T_O and Landing Altitude Extension)

For MAN HEAT and A/C RECYCLE selections refer to HEATER ON and COND ON charts in Supplement 2 or appropriate Supplement.

— If the given ambient conditions are not present in the chart then no H-V avoid area exists.

— If the given ambient conditions and weight intercept are within the green ‘NO H-V Area’ then no H-V avoid area exists.

— If the given ambient conditions and weight intercept indicate an H-V avoid area then low hover and knee points are fixed and the high hover varies according to the conditions and weight.

ECS GENERAL LIMITATIONS

With the aircaft on the ground at MPOG the ECS CONTROl knob:

— Must not be selected to RAM ONLY

— Must not be selected to A/C RECYCLE unless the FANS are selected to ‘3’

— Must not be selected to A/C RECYCLE if a Cockpit/Cabin dividing device is installed

SECTION 2 - NORMAL PROCEDURES

ENGINE PRE-START CHECK

HEAT/COND control panel

1. ECS CONTROL — OFF.
2. HEATER SOV 1 & 2 — Confirm NORM.

AFTER START

HEAT/COND control panel

1. ECS CONTROL mode — FULL AUTO or as required. (HEATER ON or AIR COND ON advisory may illuminate).

Note

When FULL AUTO is selected ensure that either the CAT B WAT curve or appropriate Hover Ceiling charts with FULL AUTO selected are used to define the operating weight.
When MAN HEAT or A/C RECYCLE are selected refer to HEATER ON and COND ON charts in Supplement 2 or appropriate Supplement.

2. AUTO TEMP SETTING — As required.

3. FAN CREW/PAX — AUTO or as required (VENT advisory illuminates when fan ON).

DEMISTING COCKPIT TRANSPARENCIES

HEAT/COND control panel

1. ECS CONTROL — MAN HEAT.
2. MAN HEAT — Select INCREASE as required.
3. FAN CREW — Select FAN CREW switch to 3 and direct front vents towards side windows.

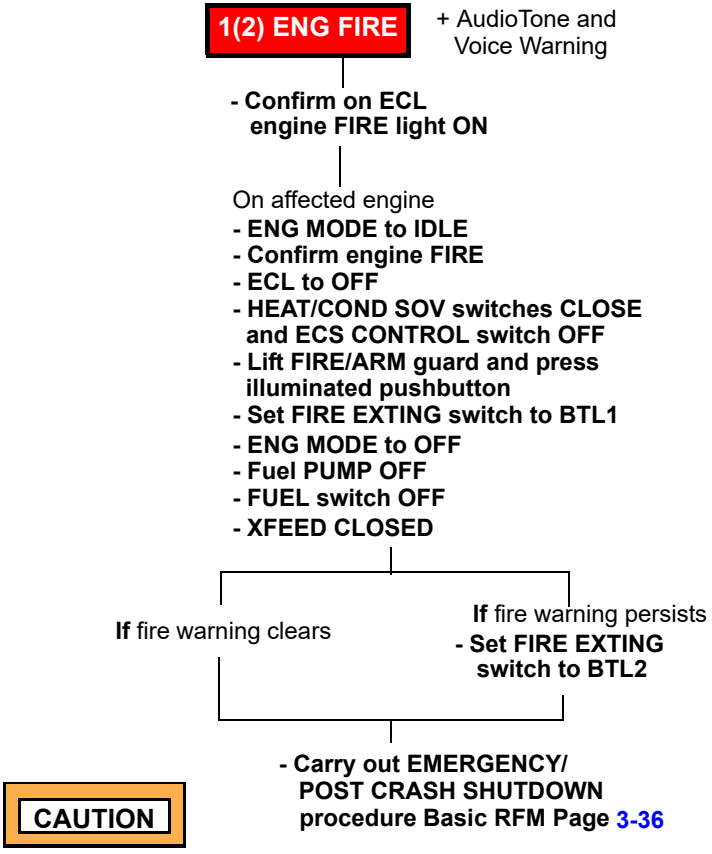
ADVISORY CAPTION DEFINITION

CAS Caption (Green)	System State
AFT VENT	Cabin fan ON
AIR COND ON	Air Conditioning system switched ON and operation
FWD VENT	Cockpit fan ON
HEATER ON	Heater switched ON and bleed valves open

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

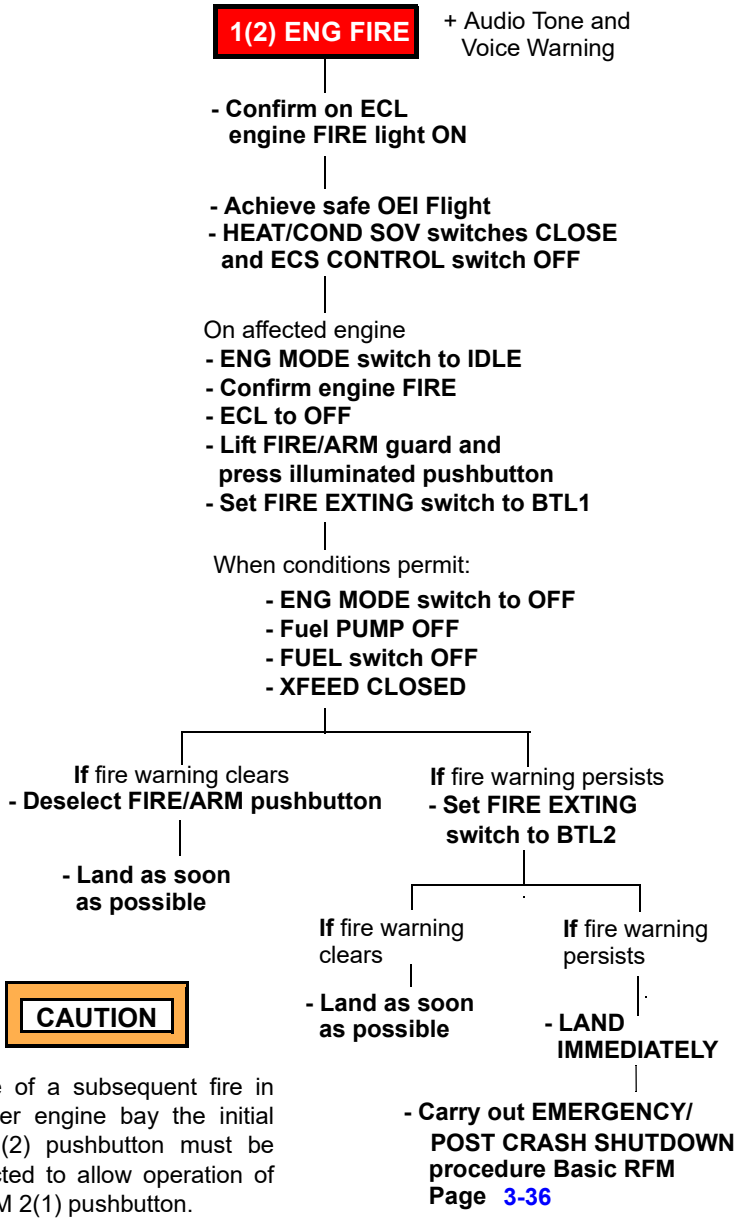
ENGINE BAY FIRE (GROUND)



CAUTION

In case of a subsequent fire in the other engine bay the initial ARM 1(2) pushbutton must be deselected to allow operation of the ARM 2(1) push-button.

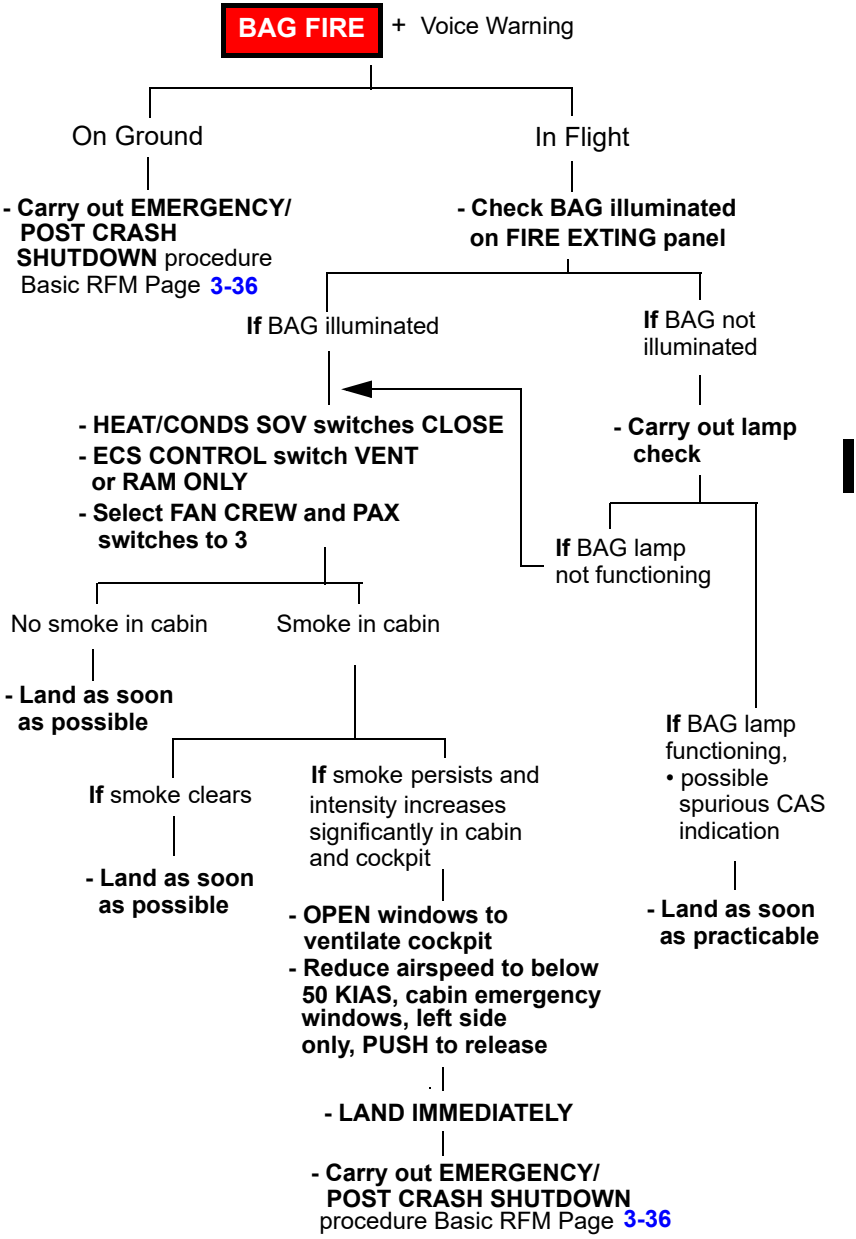
ENGINE BAY FIRE (FLIGHT)



CAUTION

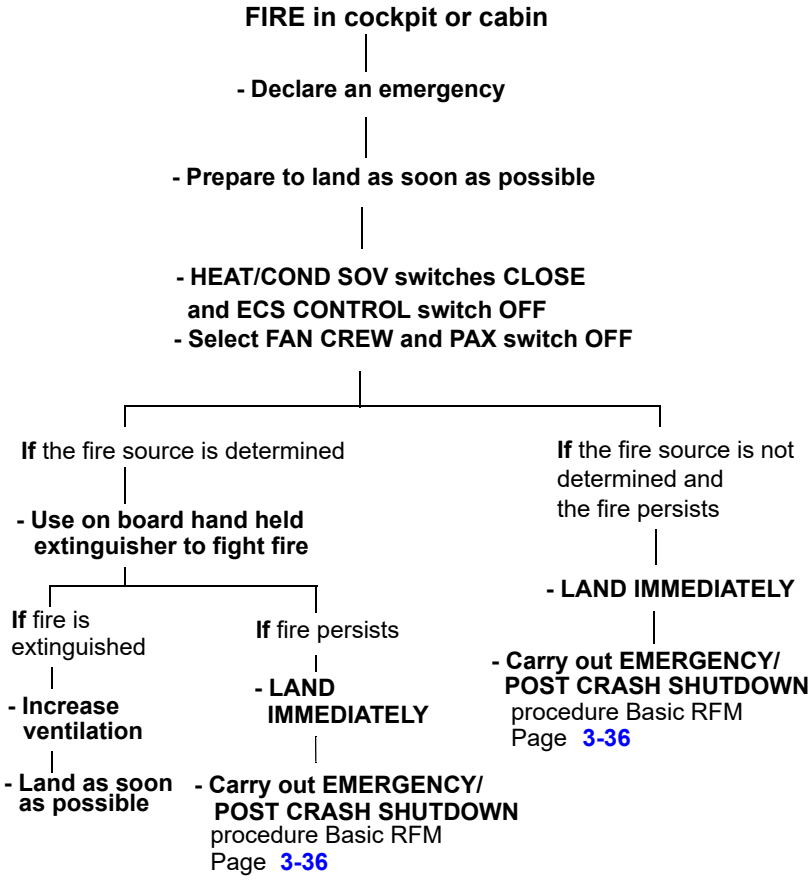
In case of a subsequent fire in the other engine bay the initial ARM 1(2) pushbutton must be deselected to allow operation of the ARM 2(1) pushbutton.

BAGGAGE BAY FIRE



COCKPIT / CABIN FIRE (FLIGHT)

An in-flight fire has no single set of detailed procedures that can address all the fire scenarios that are possible in flight. The most critical action is to get the aircraft on the ground as soon as possible with a reasonable degree of safety.



CAUTION

If the fire is not completely extinguished, increased ventilation may aggravate the problem.

ENGINE FAILURES

For any engine failure or loss of power the following must be carried out:

HEAT/COND control panel

1. Heater SOV 1 & 2 — CLOSE.

1. ECS CONTROL — OFF, VENT or RAM. (HEATER ON or AIR COND ON advisory message NOT displayed).

MALFUNCTION PROCEDURES

VENT FAN FAILURE

VENT FAIL

Failure of vent fan and/or fresh air valve of the CREW and/or PAX

- If necessary confirm, using Advisory indications, which fan has failed (not illuminated)

On failed FAN
- Switch OFF

HEATER FAILURE

HEATER FAIL

Heater system failure

- ECS CONTROL switch OFF

If HEATER required for demist:

1. ECS CONTROL switch — MAN HEAT.
2. FAN CREW — As required
3. MAN HEAT — Control temperature manually using MAN HEAT toggle switch to INCREASE/DECREASE.

COND FAILURE

FWD(AFT) COND FAIL

CREW (PAX)air conditioner failure

- Switch ECS CONTROL OFF and leave for minimum of 4 minutes.
Switch FULL AUTO or A/C RECYCLE

If system fails again
- Switch ECS CONTROL OFF

CAUTION

Be aware that failure of a ventilation fan with the air conditioner system operative may cause the air conditioner to fail after several minutes, in which case switch ECS CONTROL to OFF.

ECS ENVIRO INSTALLATION SERVICES LOST DURING BUS FAILURES

DC MAIN BUS 1

ADM 1
ANTI-COLL LIGHT
CARGO HOOK RELEASE
CLOCK CPLT
COCKPIT CPLT LIGHT
CPLT ICS
(CPLT ICS in back up mode)
CPLT PFD
CSL ILLUM
FD1
HOIST POWER
HOIST CUTTER 1
HOIST CONTROL
HUMS
HYD ELEC PUMP
LINEAR ACTUATOR 1
MAU1 (PRI POWER)
MCDU PLT
MRC 1 (NIM 1, NAV 1)
OVHD PANEL ILLUM
PA
PFD CPLT CONTROL
PITOT 1 FAIL INDICATION
PITOT HEAT 1
RAD ALT 1
UTIL POWER
VENT/ECS CONTROL
W/RADAR
XMSN OIL LEVEL SENSOR

DC MAIN BUS 2

AUTO TRIM
BAGGAGE COMPT LIGHT
CABIN LIGHT
COCKPIT/CABIN HEATER
CPLT MFD
DOME LIGHT
FD2
HOIST LIGHT
MAU 1 (AUX POWER)
MCDU CPLT
MRC 2 (ADF & DME)
PLT W/WIPER
PSU
RAD ALT 2
SEARCH LIGHT CONTROL
SEARCH LIGHT POWER
STORM LIGHT
SUN LIGHT CONTROL
V/UHF

DC NON ESS BUS 1

CABIN VENT
COCKPIT VENT (CPLT)
CPLT W/WIPE
ECS (COCKPIT)
FUEL DRAIN VALVE
STEP LIGHT
NOSE BAY FAN 1*

DC NON ESS BUS 2

COCKPIT VENT (PLT)
ECS (CABIN)
EXT/SPKR POWER
NOSE BAY FAN 2*

* NOSE BAY FANS for Long Nose Variant only (function on ground only).

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SECTION 4 - PERFORMANCE

The maximum power available with the HEATER or Air Conditioner operating is less than that available with the systems OFF. The power loss is caused by the engine compressor bleed air used for the heating or the mechanical output from the main transmission for the air conditioning system.

Performance charts with the ECS ENVIRO system switched to FULL AUTO are provided for All Engine Operating conditions. This includes the performance relative to Supplement 13 Cargo Hook Operations, Supplement 50 Increased Gross Weight 6800 kg and Supplement 51 T-O and Landing Altitude Extension.

When MAN HEAT or A/C RECYCLE is selected refer to HEATER ON and COND ON charts in Supplement 2 or appropriate Supplement.

The CAT B Distances are the same as those shown in the basic Rotorcaft Flight Manual or appropriate Supplement.

The performance of the aircraft with the ECS ENVIRO switched OFF or at VENT or RAM ONLY is the same as that shown in the basic Rotorcraft Flight Manual.

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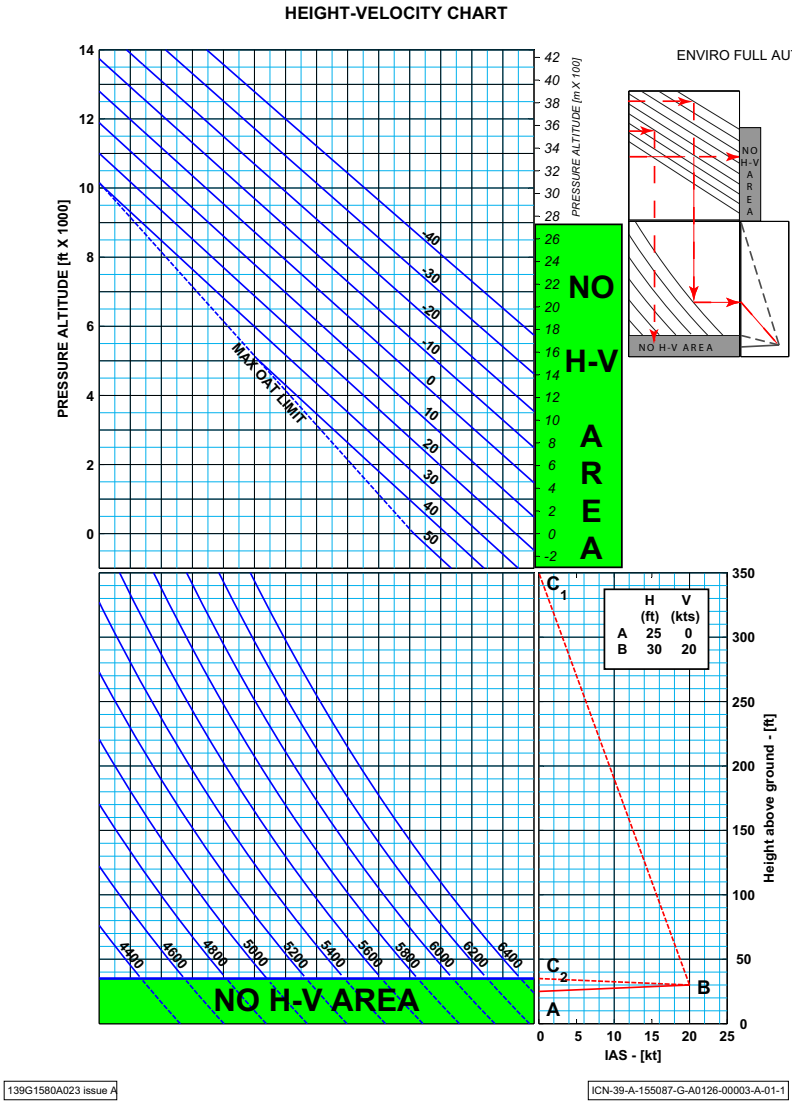

Figure 4-1 Height Velocity Chart 6400 kg ENVIRO FULL AUTO

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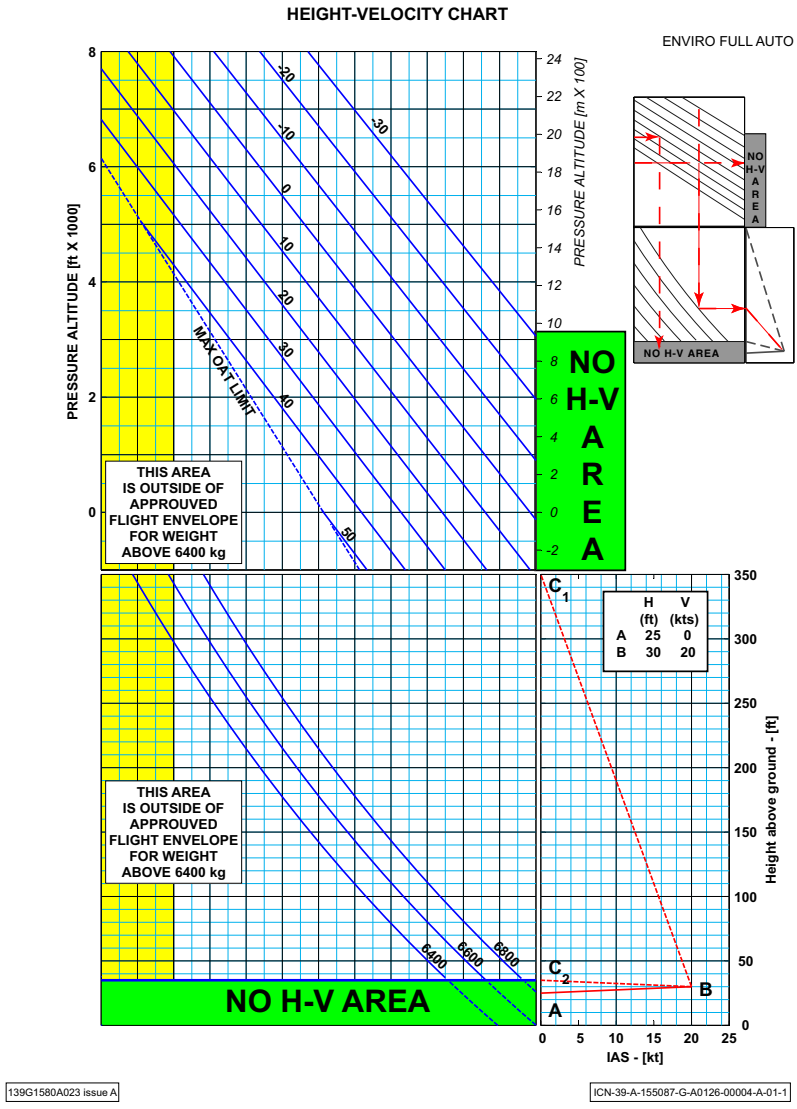

Figure 4-2 Height-Velocity Chart, 6400 kg to 6800 kg, ECS ENVIRO FULL AUTO (Supplement 50)

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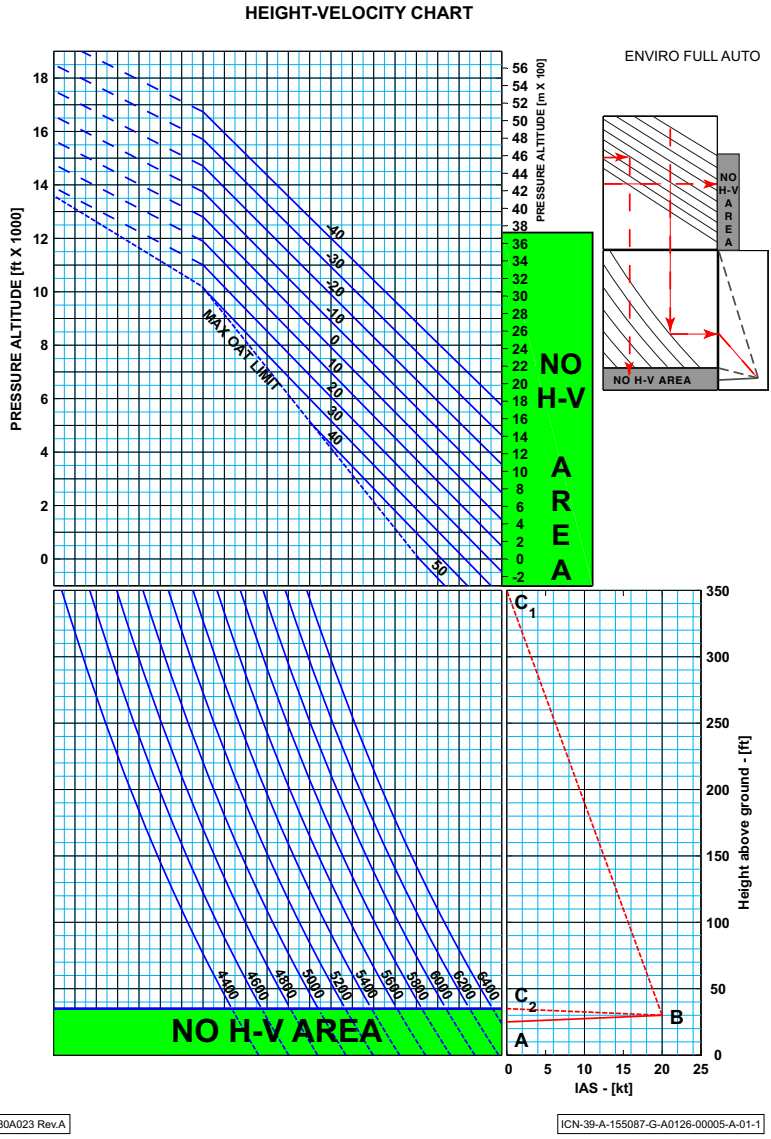

Figure 4-3 Height Velocity Chart, 6400 kg, Altitude Extension, ECS ENVIRO FULL AUTO (Supplement 51)

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WEIGHT-ALTITUDE-TEMPERATURE
for TAKE-OFF, LANDING and IGE MANOEUVRES
RELATIVE WIND AZIMUTH: 10 to 350 deg
Note: no windspeed limitation exists for headwind conditions (wind azimuth ±10deg)

ROTOR 100%

ENVIRO FULL AUTO

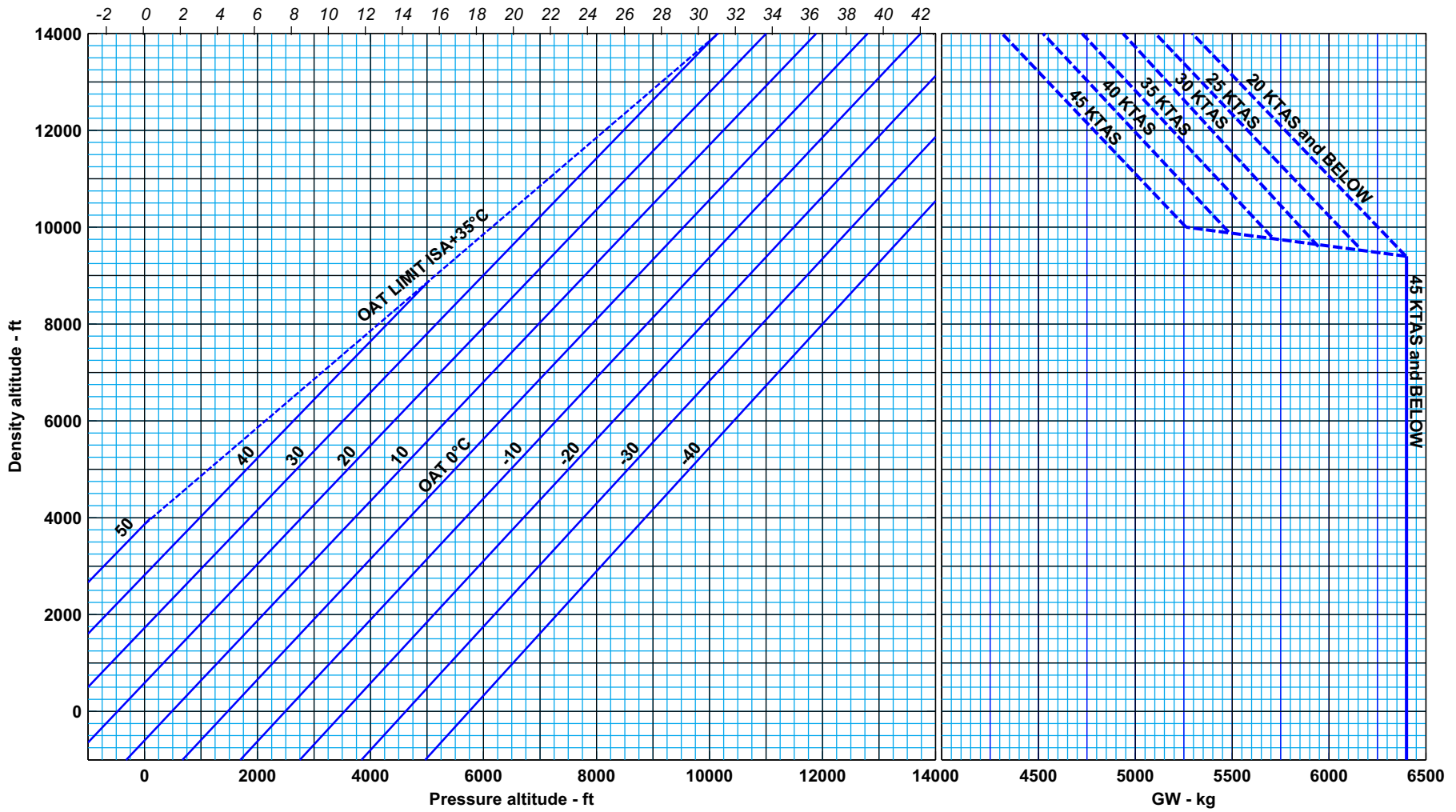

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Figure 4-4 Category B WAT Limits 6400 kg, ENVIRO FULL AUTO

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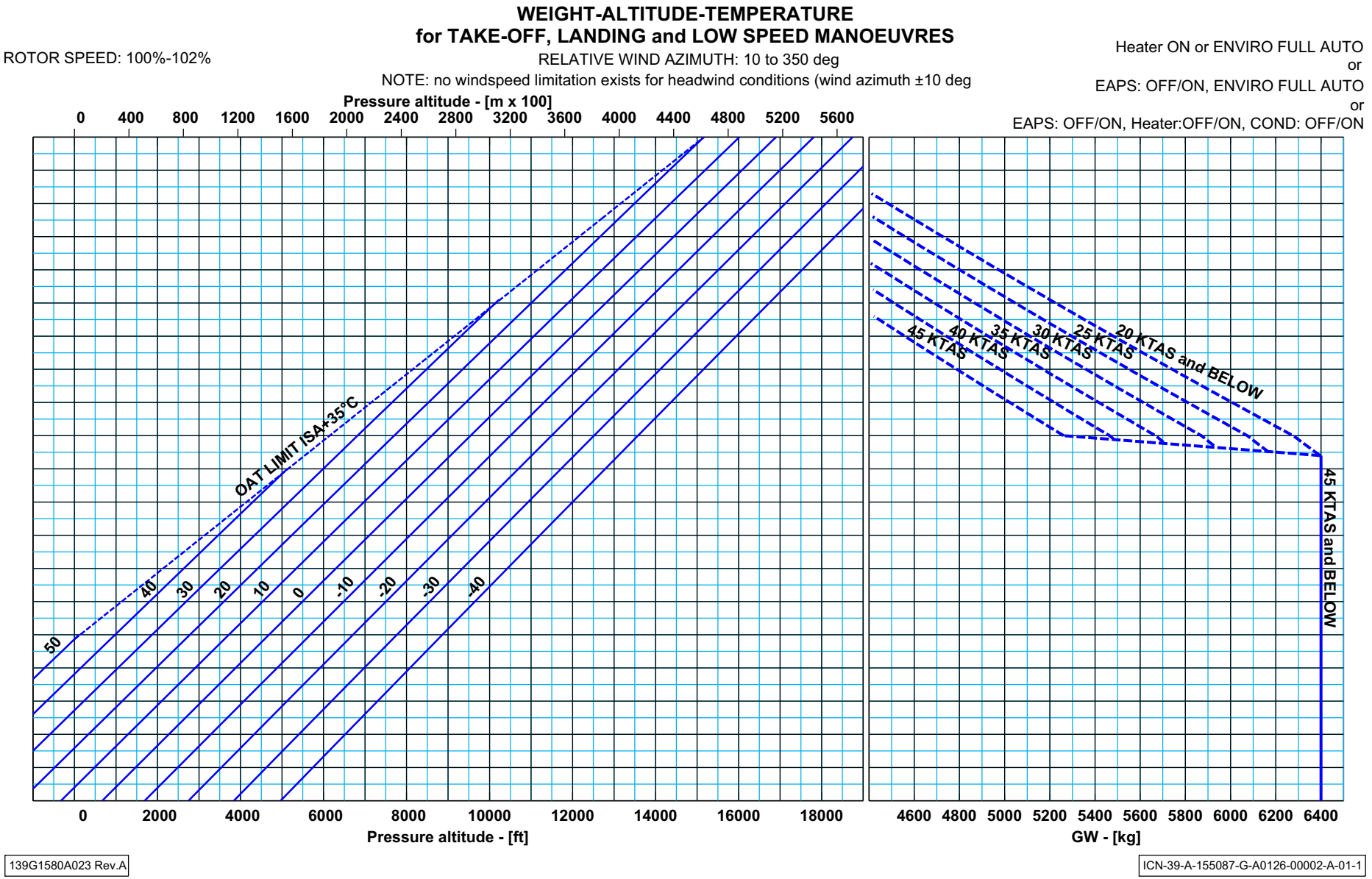

Figure 4-5 CAT B Low Speed IGE Manoeuvre Envelope, 6400 kg Altitude Extension, ECS ENVIRO FULL AUTO (Supplement 51)

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HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL
WHEEL HEIGHT: 5 FT

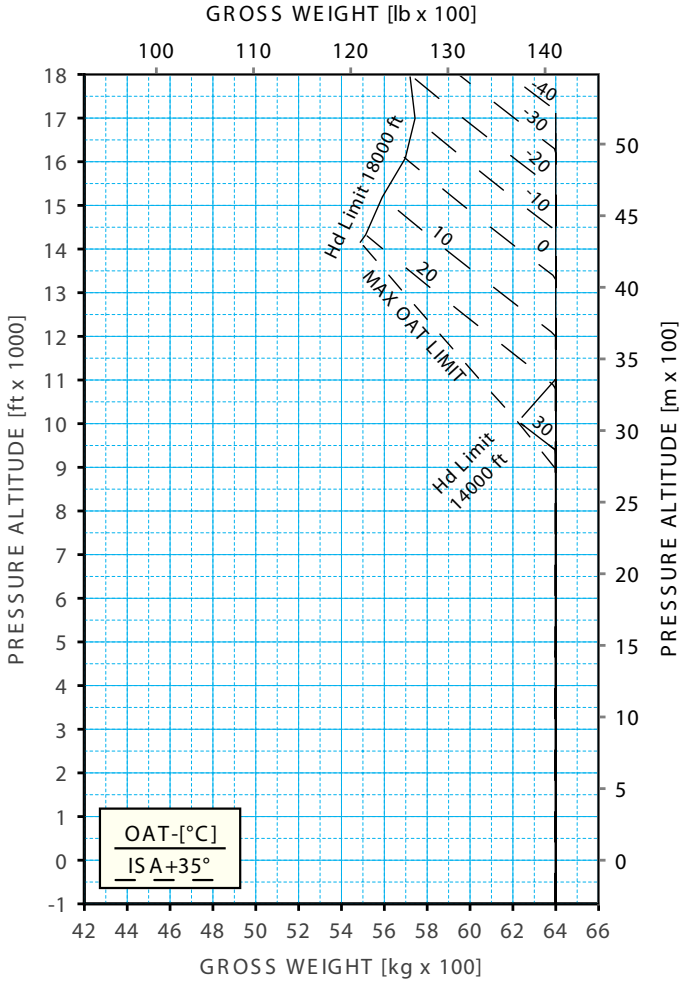

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Figure 4-6 Hover Ceiling IGE TOP AEO ENVIRO FULL AUTO

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL
WHEEL HEIGHT: 5 FT

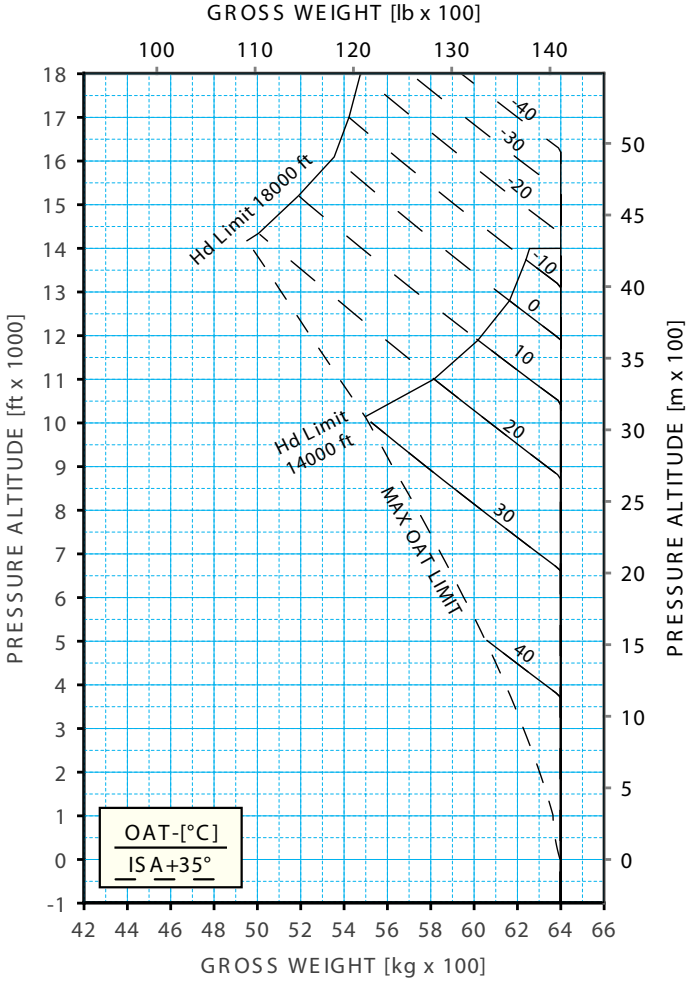

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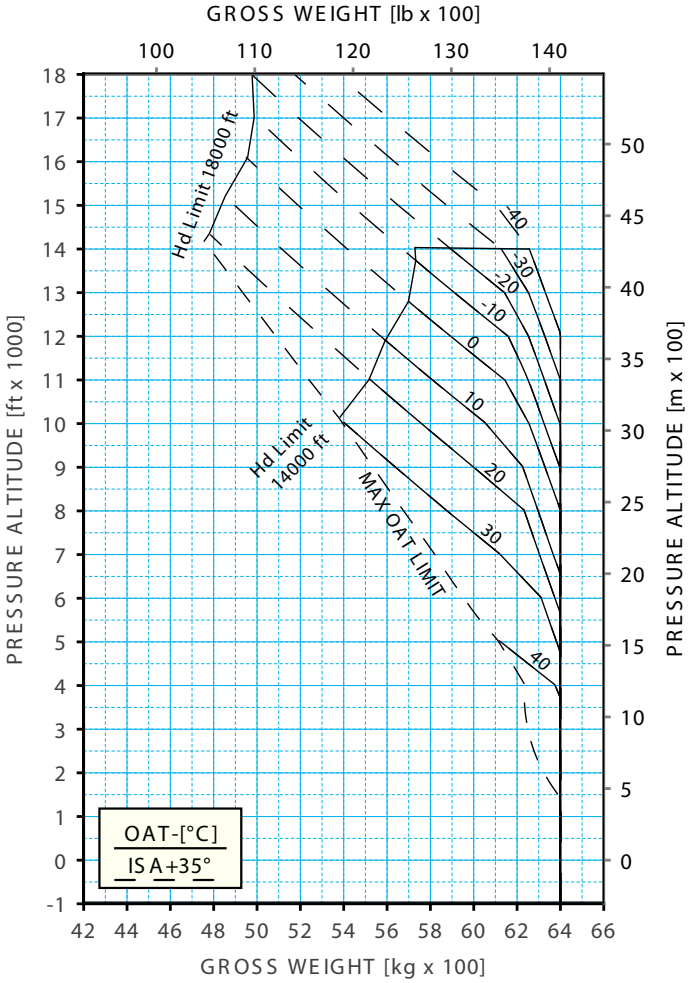
Figure 4-7 Hover Ceiling IGE MCP AEO ENVIRO FULL AUTO

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL



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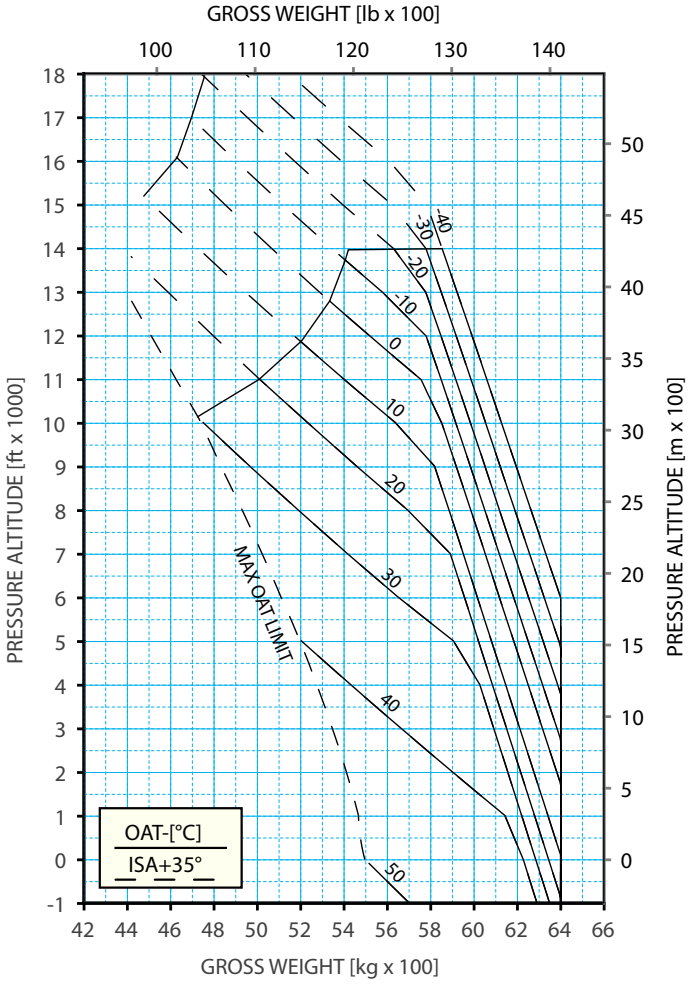
ICN-39-A-155187-G-A0126-00003-A-01-1

Figure 4-8 Hover Ceiling OGE TOP AEO ENVIRO FULL AUTO

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL



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ICN-39-A-155187-G-A0126-00004-A-01-1

Figure 4-9 Hover Ceiling OGE MCP AEO ENVIRO FULL AUTO

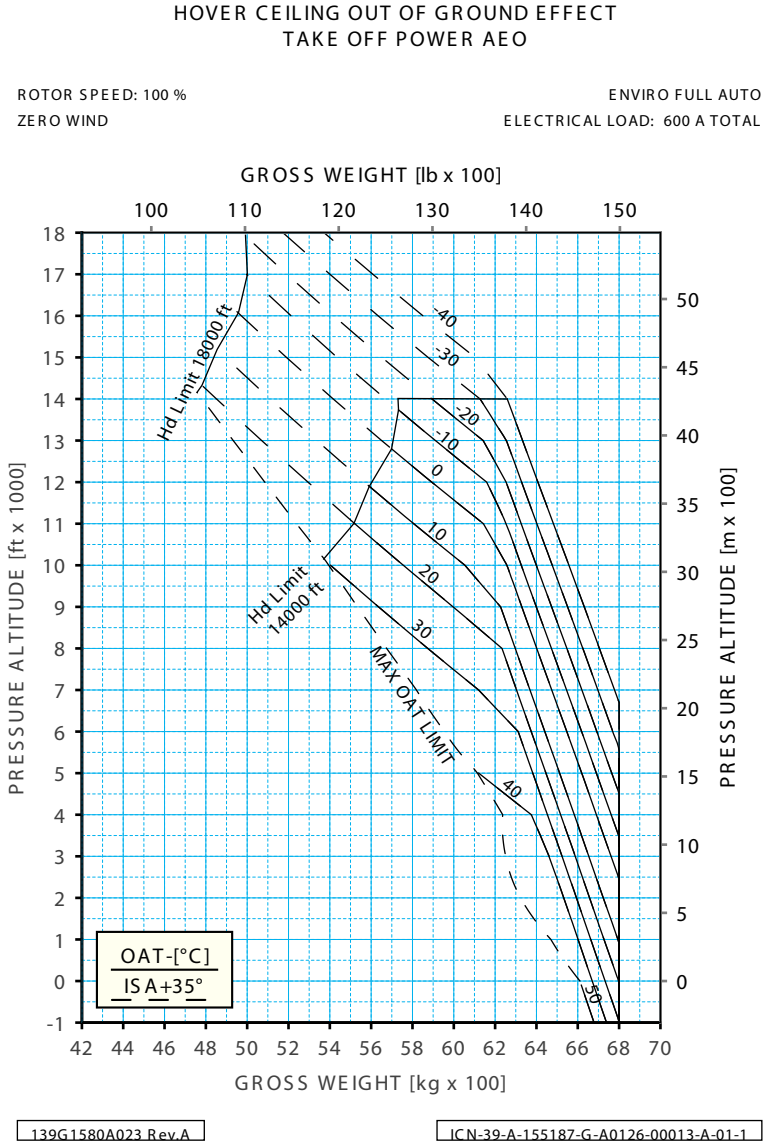

Figure 4-10 Hover Ceiling OGE TOP AEO, ECS ENVIRO FULL AUTO (Supplement 13)

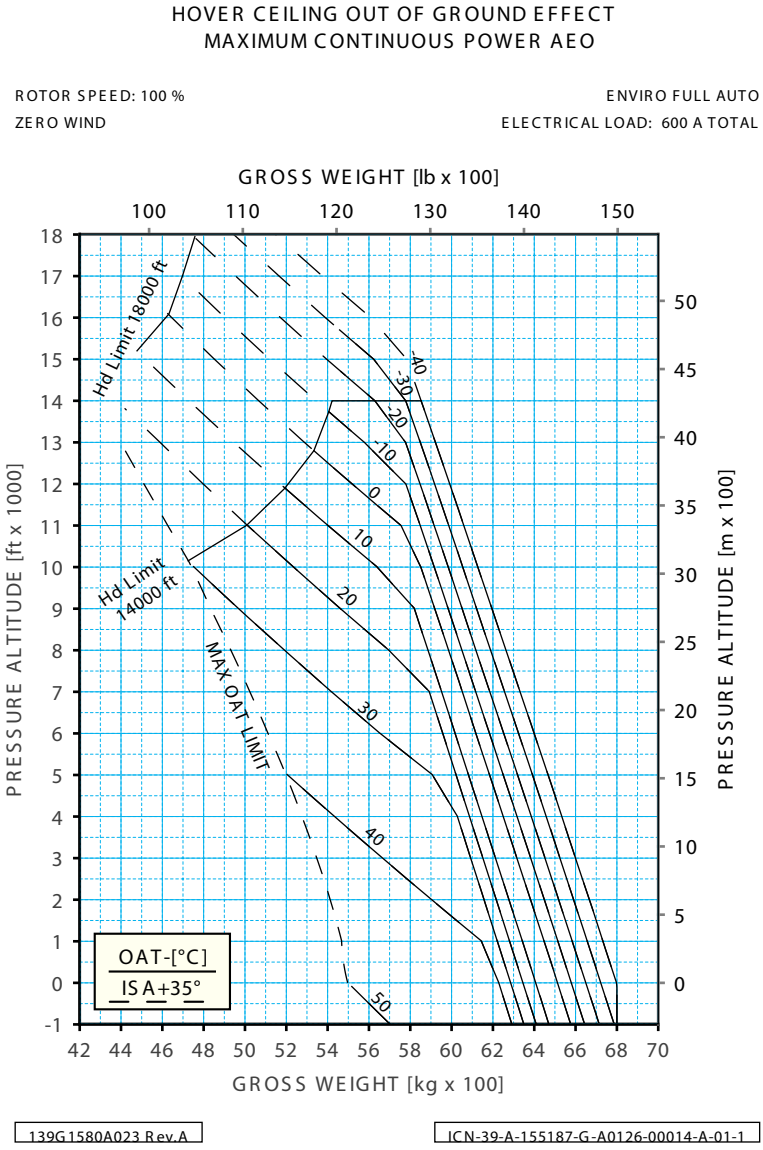

Figure 4-11 Hover Ceiling OGE MCP AEO, ECS ENVIRO FULL AUTO (Supplement 13)

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL
WHEEL HEIGHT: 5 FT

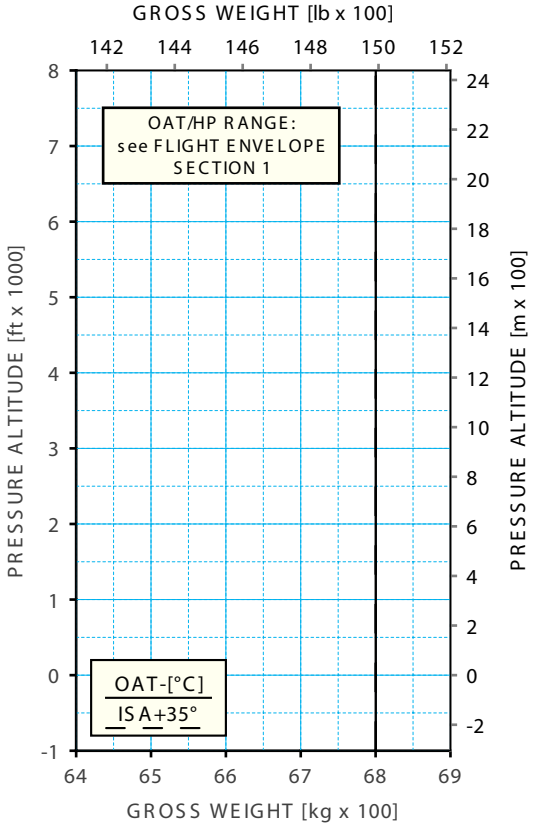

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Figure 4-12 Hover Ceiling IGE at TOP, ECS ENVIRO FULL AUTO (Supplement 50)

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL
WHEEL HEIGHT: 5 FT

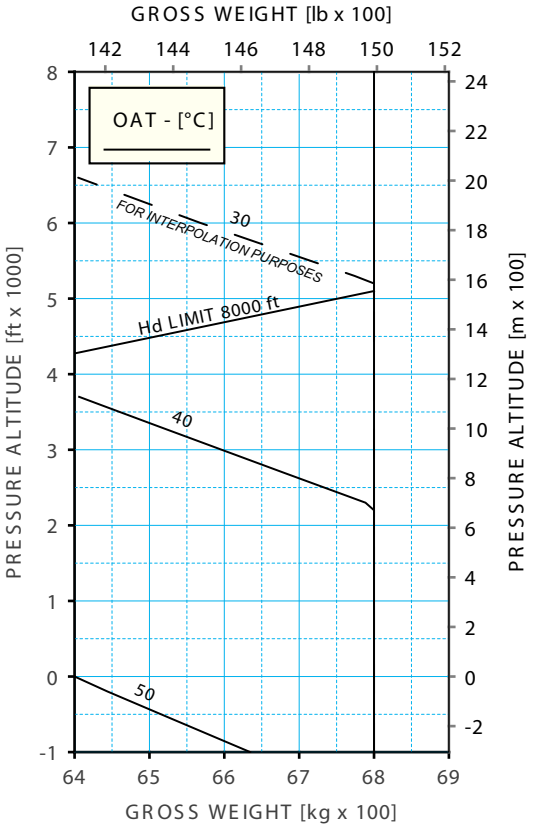

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Figure 4-13 Hover Ceiling IGE at MCP, ECS ENVIRO FULL AUTO (Supplement 50)

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL

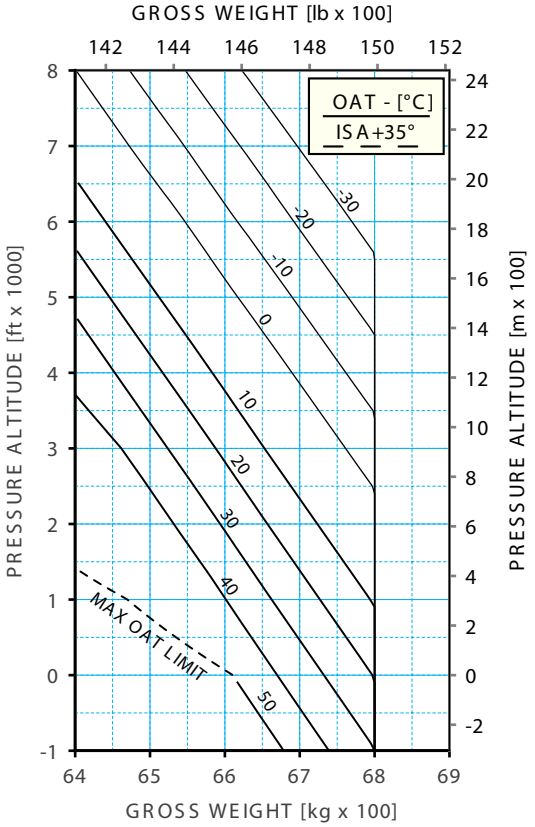

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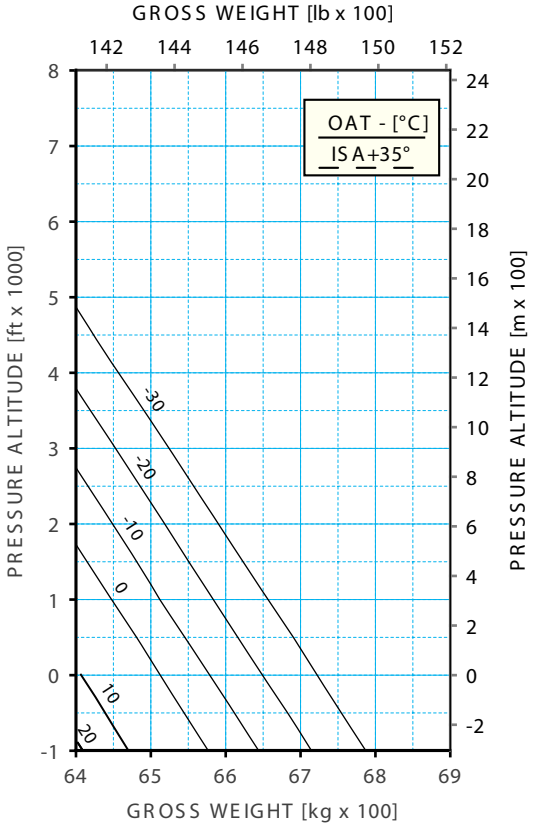
Figure 4-14 Hover Ceiling OGE at TOP, ECS ENVIRO FULL AUTO (Supplement 50)

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTIUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL



139G1580A023 Rev.A

ICN-39-A-155187-G-A0126-00022-A-01-1

Figure 4-15 Hover Ceiling OGE at MCP, ECS ENVIRO FULL AUTO (Supplement 50)

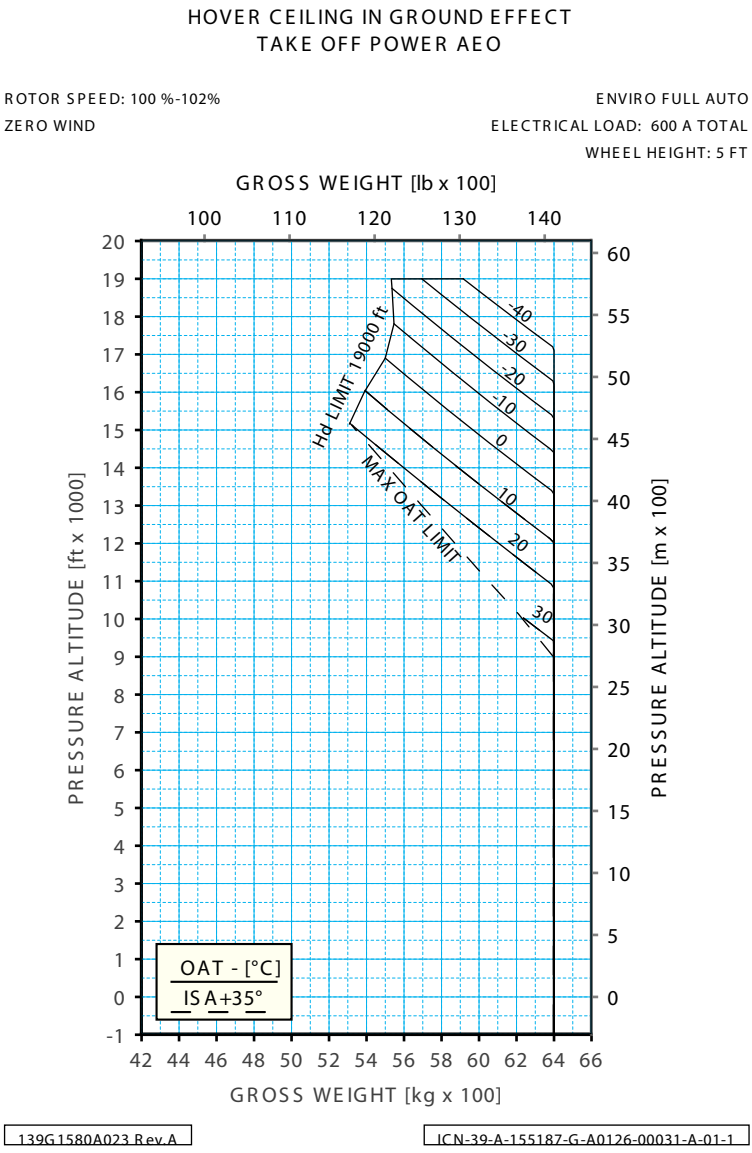


Figure 4-16 Hover Ceiling IGE at TOP, ECS ENVIRO FULL AUTO (Supplement 51)

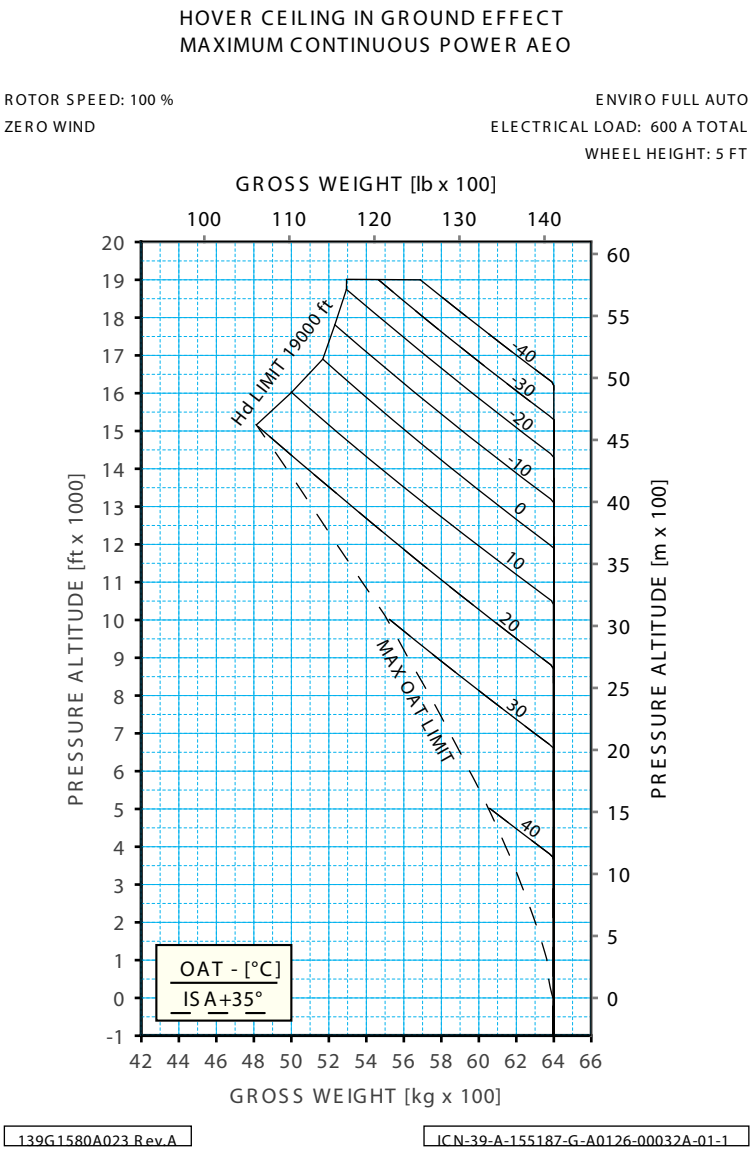
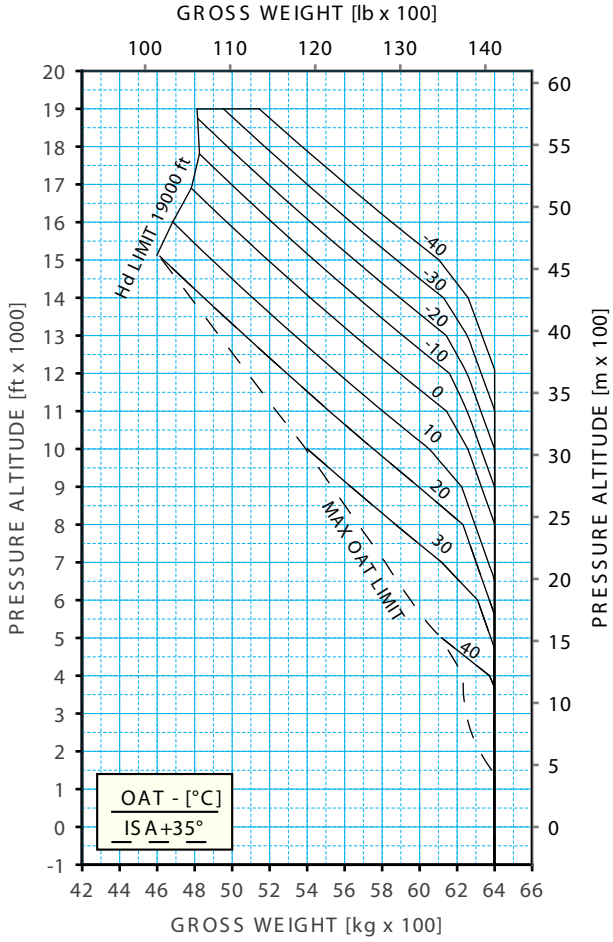


Figure 4-17 Hover Ceiling IGE at MCP, ECS ENVIRO FULL AUTO (Supplement 51)

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

ENVIRO FULL AUTO
ELECTRICAL LOAD: 600 A TOTAL



139G1580A023 Rev.A

ICN-39-A-155187-G-A0126-00033-A-01-1

Figure 4-18 Hover Ceiling OGE at TOP, ECS ENVIRO FULL AUTO (Supplement 51)

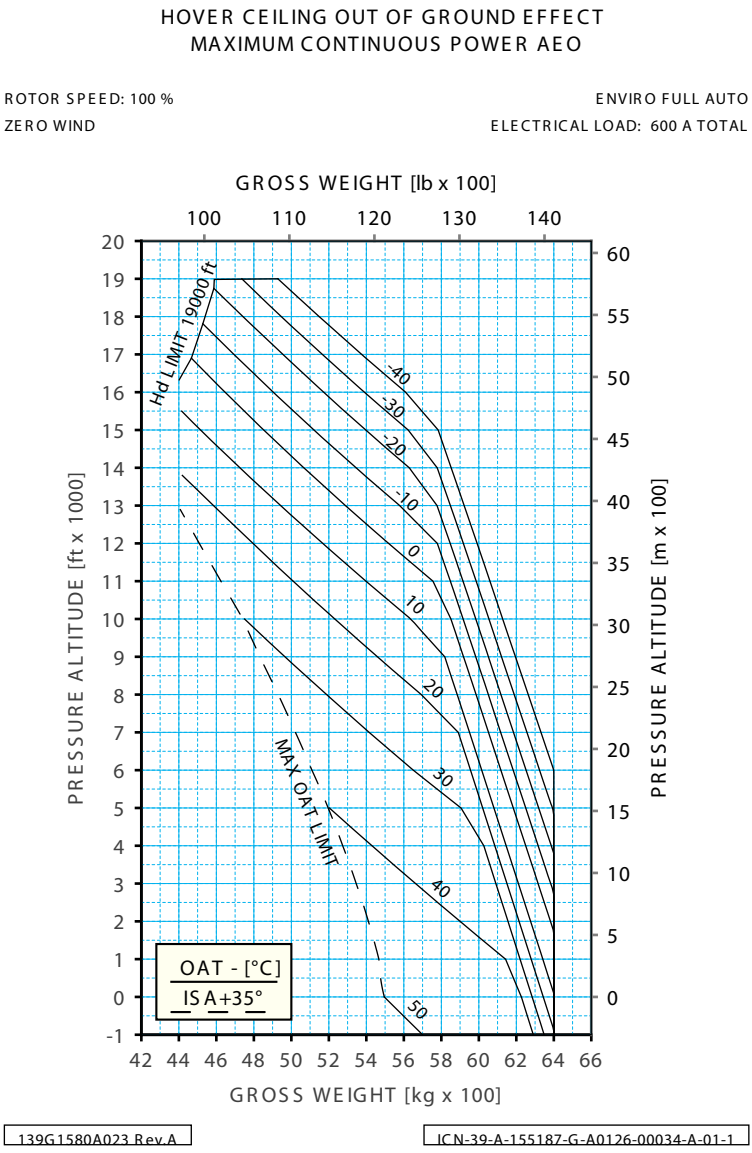
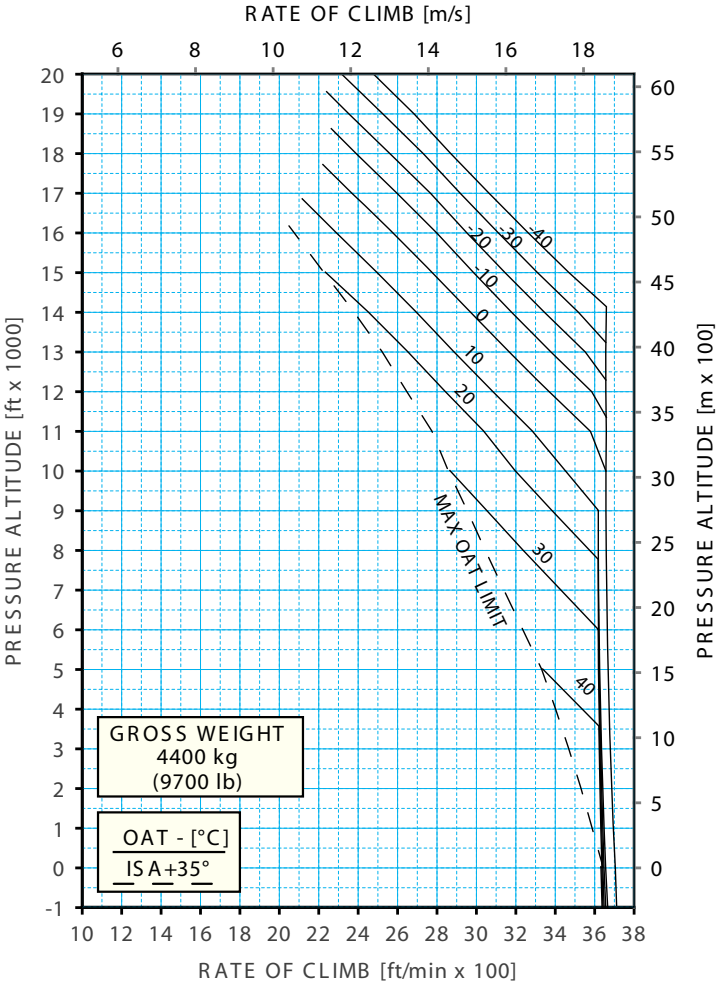


Figure 4-19 Hover Ceiling OGE at MCP, ECS ENVIRO FULL AUTO (Supplement 51)

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO



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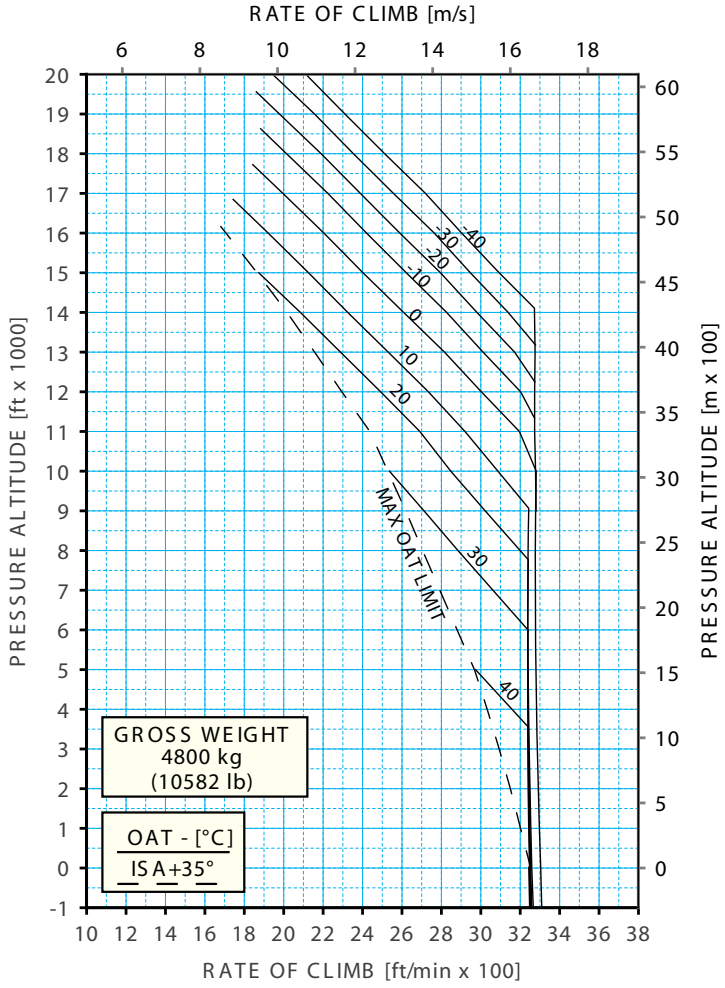
ICN-39-A-155387-G-A0126-00001-A-01-1

Figure 4-20 ROC TOP AEO GW 4400 kg ENVIRO FULL AUTO

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO



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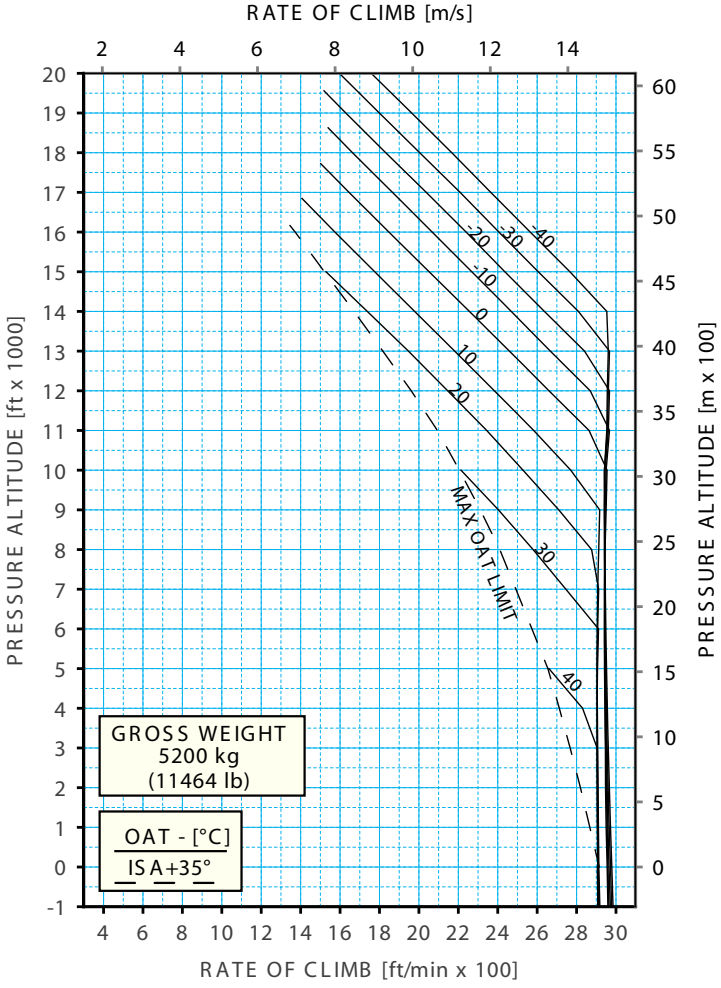
ICN-39-A-155387-G-A0126-00002-A-01-1

Figure 4-21 ROC TOP AEO GW 4800 kg ENVIRO FULL AUTO

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS Belove Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO



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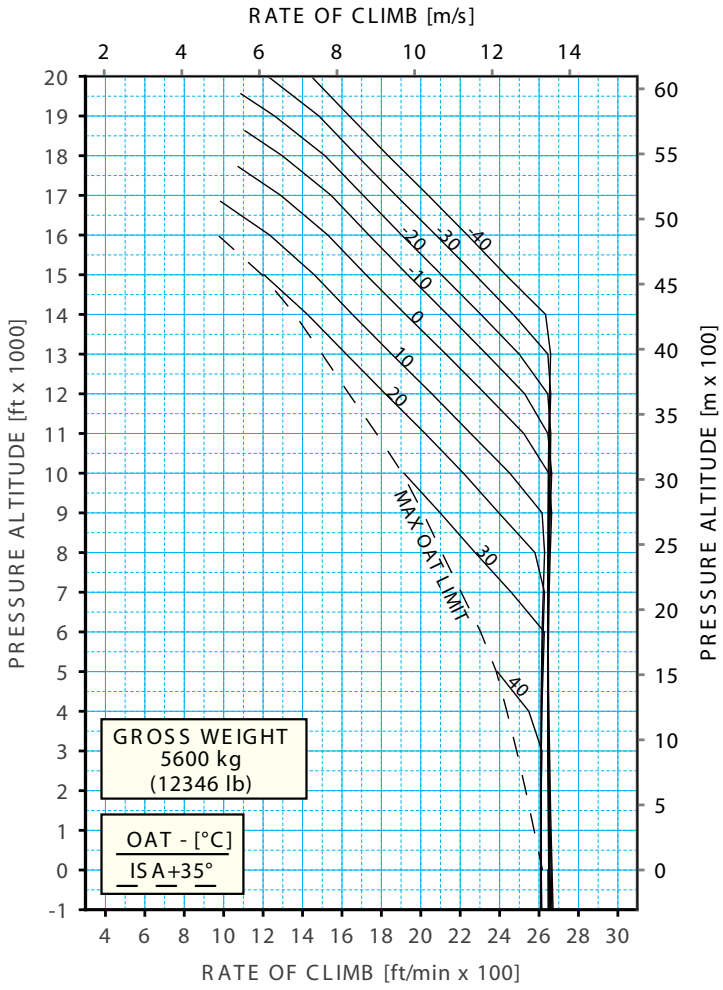
ICN-39-A-155387-G-A0126-00003-A-01-1

Figure 4-22 ROC TOP AEO GW 5200 kg ENVIRO FULL AUTO

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS Belove Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO



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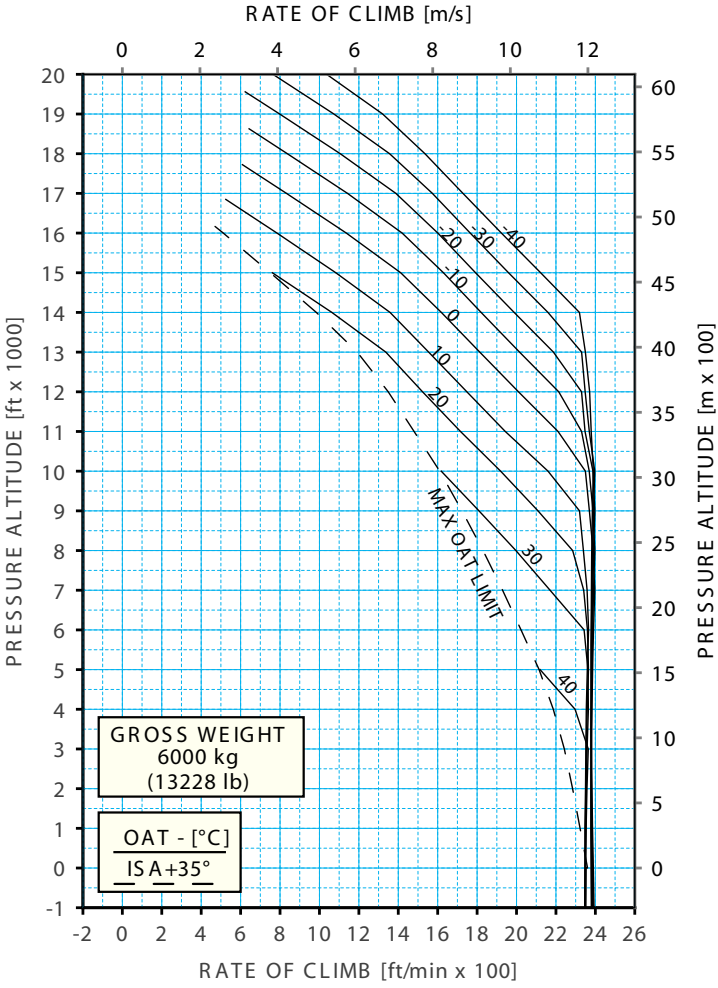
ICN-39-A-155387-G-A0126-00004-A-01-1

Figure 4-23 ROC TOP AEO GW 5600 kg ENVIRO FULL AUTO

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAI
ENVIRO: FULL AUTO



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ICN-39-A-155387-G-A0126-00005-A-01-1

Figure 4-24 ROC TOP AEO GW 6000 kg ENVIRO FULL AUTO

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO

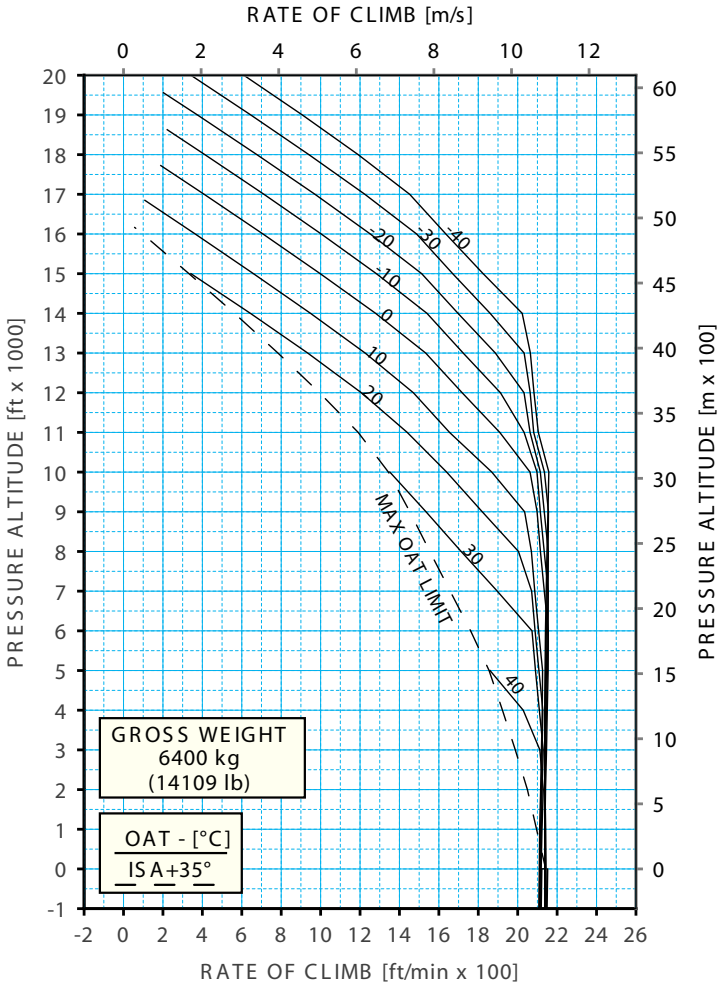

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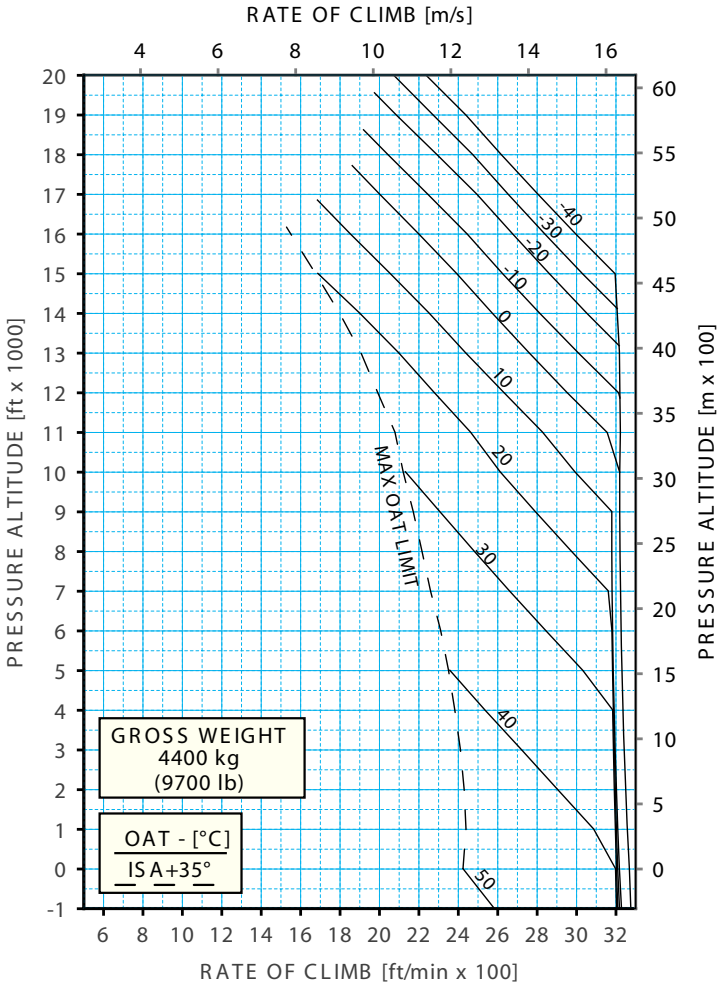
Figure 4-25 ROC TOP AEO GW 6400 kg ENVIRO FULL AUTO

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Below Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO



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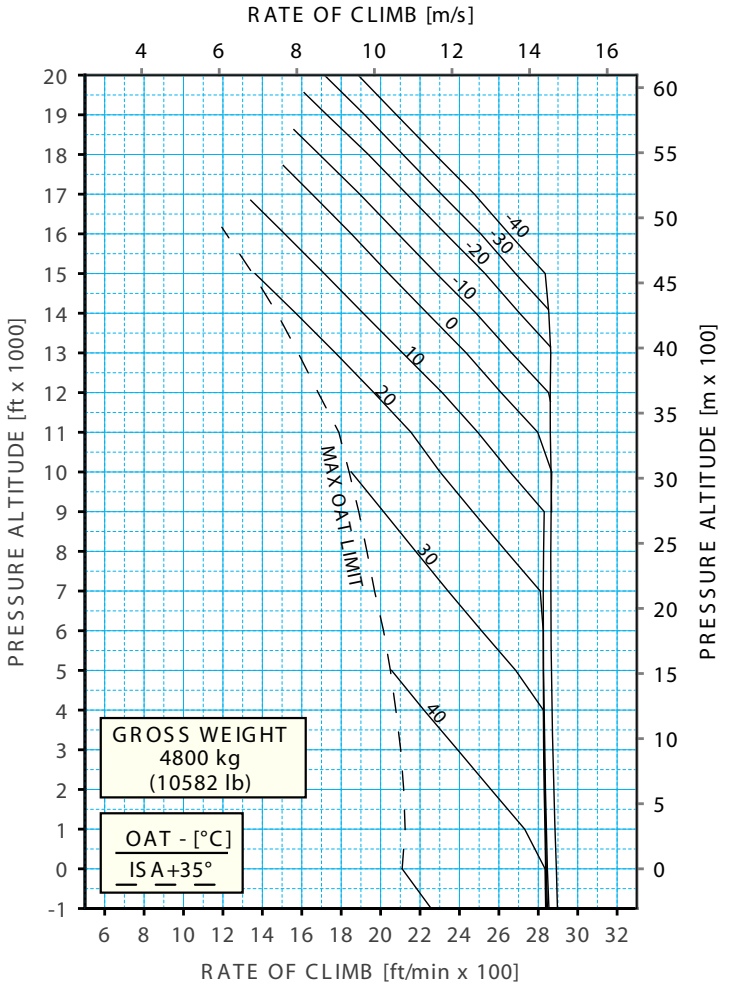
ICN-39-A-155387-G-A0126-00007-A-01-1

Figure 4-26 ROC MCP AEO GW 4400 kg ENVIRO FULL AUTO

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Below Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTA
ENVIRO: FULL AUT(



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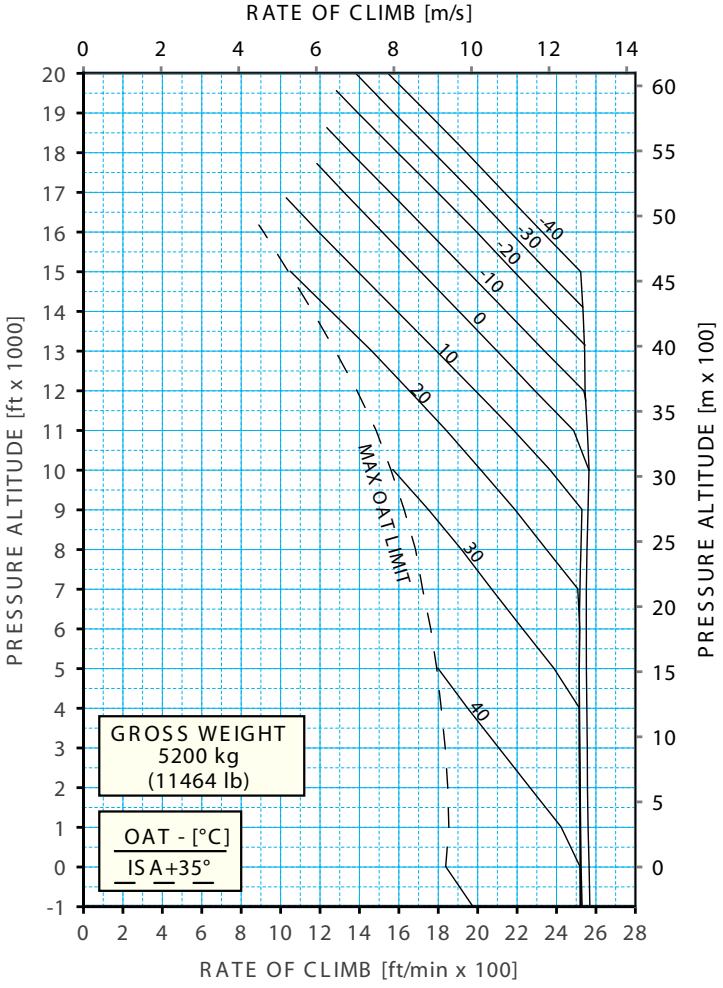
ICN-39-A-155387-G-A0126-00008-A-01-1

Figure 4-27 ROC MCP AEO GW 4800 kg ENVIRO FULL AUTO

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO



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ICN-39-A-155387-G-A0126-00009-A-01-1

Figure 4-28 ROC MCP AEO GW 5200 kg ENVIRO FULL AUTO

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO

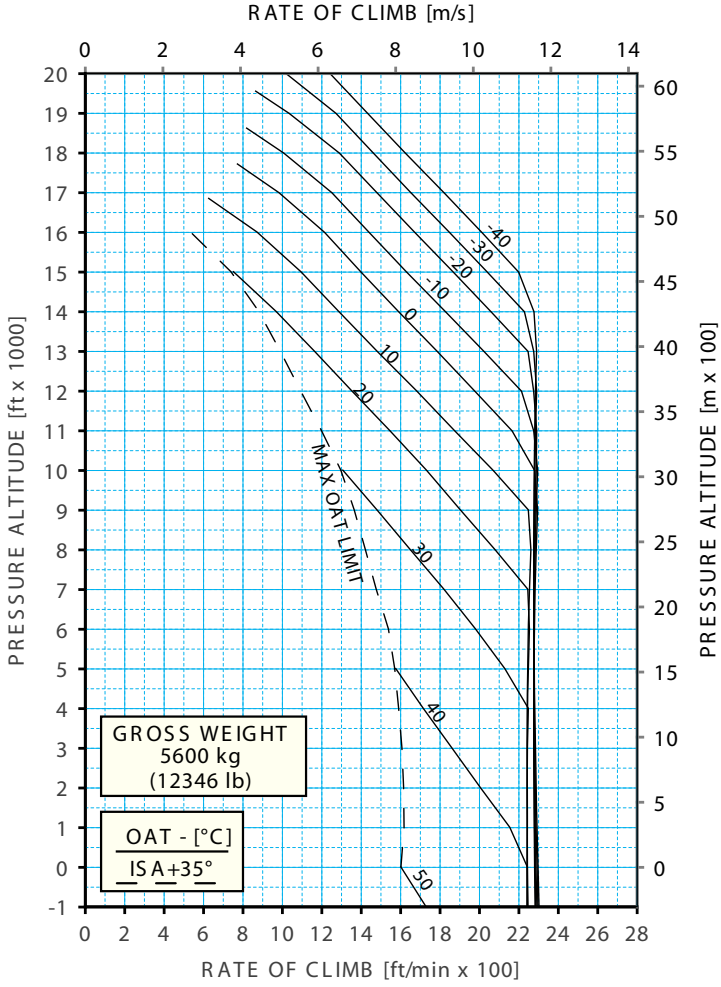

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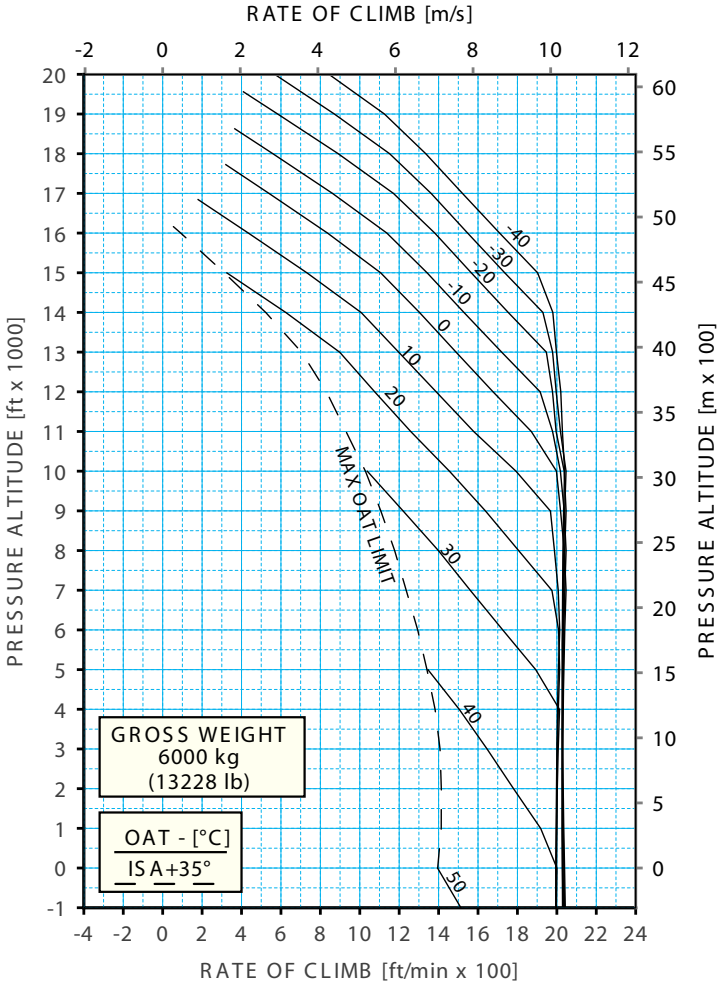
Figure 4-29 ROC MCP AEO GW 5600 kg ENVIRO FULL AUTO

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTC



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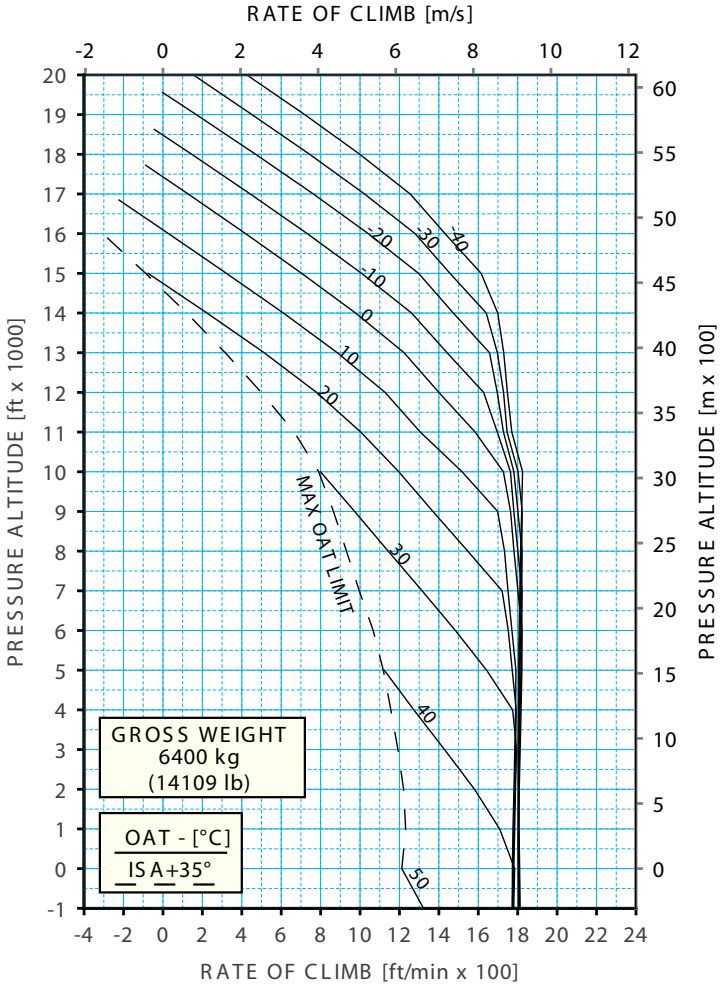
ICN-39-A-155387-G-A0126-00011-A-01-1

Figure 4-30 ROC MCP AEO GW 6000 kg ENVIRO FULL AUTO

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
80 KIAS Below Hp 10000 ft
70 KIAS Above Hp 10000 ft

ELECTRICAL LOAD: 600 A TOTA
ENVIRO: FULL AUT



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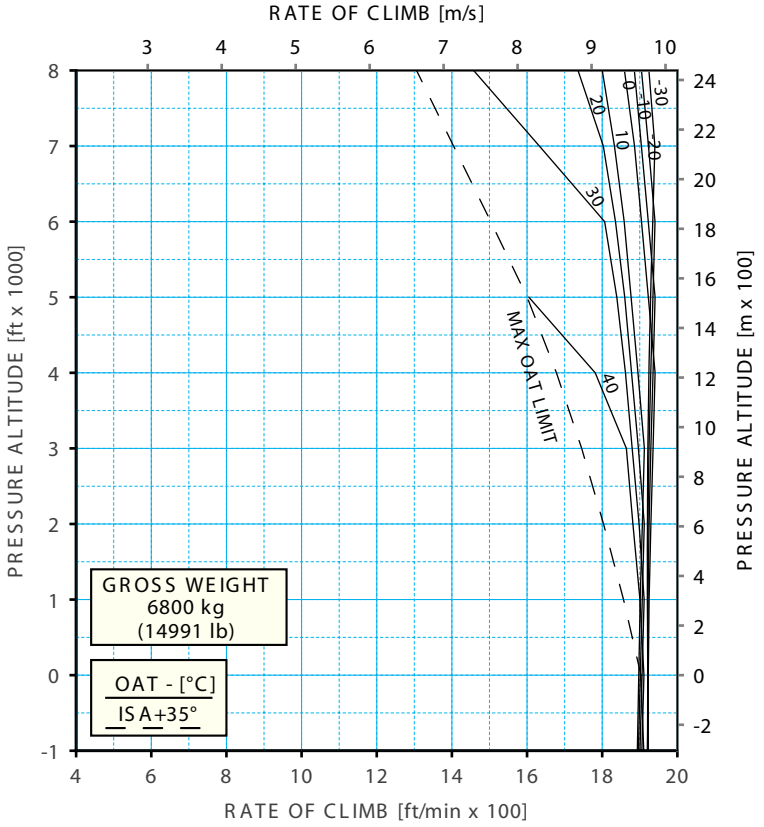
ICN-39-A-155387-G-A0126-00012-A-01-1

Figure 4-31 ROC MCP AEO GW 6400 kg ENVIRO FULL AUTO

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO



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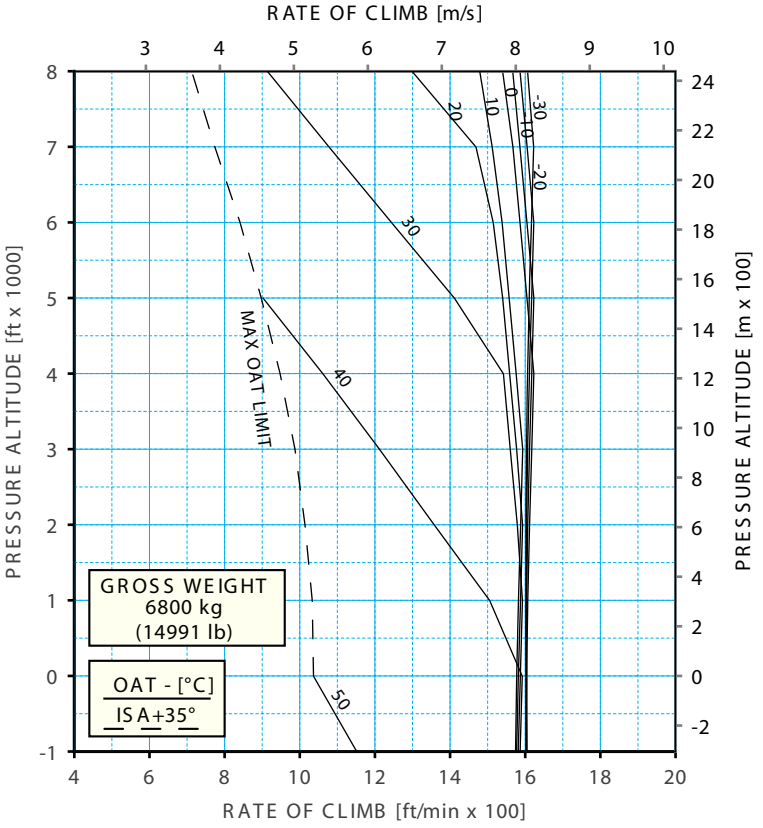
ICN-39-A-155387-G-A0126-00043-A-01-1

Figure 4-32 ROC TOP AEO Gross Weight 6800 kg, ECS ENVIRO FULL AUTO (Supplement 50)

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO



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ICN-39-A-155387-G-A0126-00044-A-01-1

Figure 4-33 ROC MCP AEO Gross Weight 6800 kg, ECS ENVIRO FULL AUTO (Supplement 50)

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 88

RADIO EQUIPMENT
ROCKWELL COLLINS HF-9000D

P/N 4G2310F03511

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SUPPLEMENT 88
RADIO EQUIPMENT
ROCKWELL COLLINS HF-9000D

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GENERAL INFORMATION

The Rockwell Collins HF-9000D system P/N 4G2310F03511 is used for long distance communication in the frequency range 2.0 to 29.9999 MHz with 100 Hz resolution with operational modes USB (voice or data), LSB (voice or data), ISB (data) single frequency, AME and CW. Functions also include Enhanced USB, LSB, ISB and ALE and DSP.

The system comprises of HF-9000D Transceiver mounted in the aft avionics bay, the antenna mounted on the tail cone, the antenna coupler mounted at the back of the baggage bay, a control panel mounted in the interseat console (Figure 2) and all necessary wiring see Figure 1.

The HF-9000D also includes the optional 2nd control panel mounted in the cabin, see Figure 3, permitting control of the radio from the Mission Console.

For complete HF radio functionality refer to the Rockwell Collins HF-9000 High Frequency Communications System Operators Guide, latest issue.

The installation also supports the optional Codan 3590 AES-256 DV Encrytor unit. For information on this equipment see the Encryptor User Manual, latest issue.

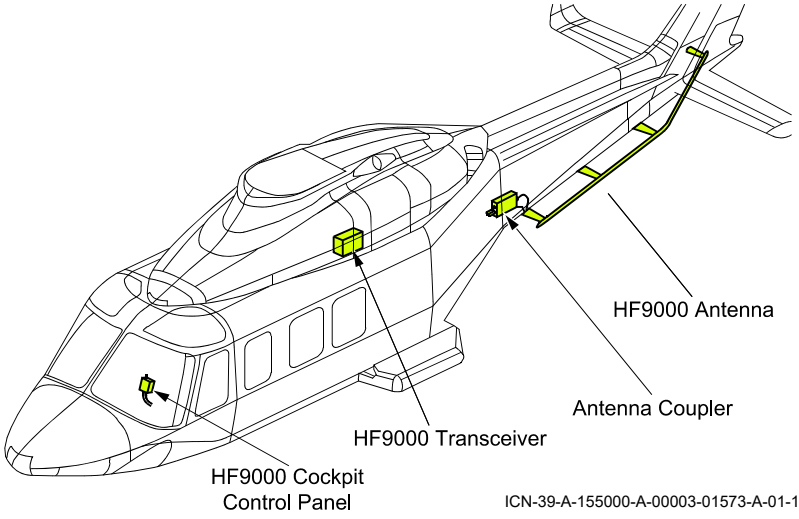
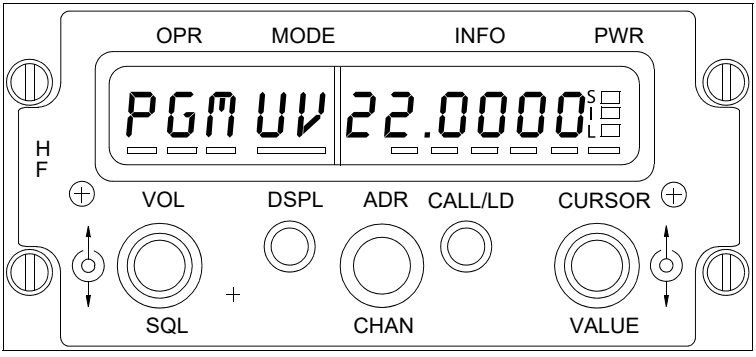
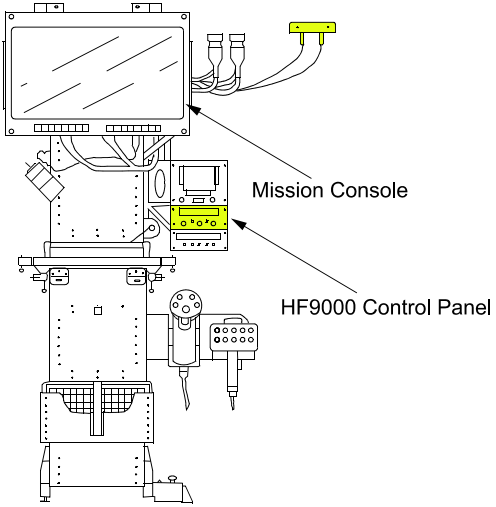


Figure 1 Rockwell Collins HF-9000D Installation



ICN-39-A-155000-A-00003-01574-A-01-1

Figure 2 HF-9000 Controller



ICN-39-A-155000-A-00003-01575-A-01-1

Figure 3 HF-9000 Optional Mission Console Controller

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SECTION 1 - LIMITATIONS

CENTRE OF GRAVITY LIMITATIONS

After HF-90000D system installation, the new empty weight and center of gravity location must be determined.

HF-9000D LIMITATION

It is prohibited to transmit on the HF-9000D system during refueling and if personnel are in close proximity to the rotorcraft.

With cabin door open, HF-9000D radio transmissions are prohibited.

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE-FLIGHT CHECK

AREA N°5 (Tail Boom- Left Hand Side)

1. HF Antenna — Condition and security.

IN FLIGHT PROCEDURES

Note

For complete HF radio functionality refer to the Rockwell Collins HF-9000 High Frequency Communications System Operators Guide, latest issue.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE

No Change.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 89

CIRCULAR FORCE ACTIVE VIBRATION CONTROL SYSTEM

P/N 4G1830F00611/12
P/N 4G1830F00711/12
P/N 4G1830F00411/12
P/N 4G1830F00511/12

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SUPPLEMENT 89
CIRCULAR FORCE ACTIVE VIBRATION CONTROL SYSTEM

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GENERAL INFORMATION

The Circular Force Active Vibration Control System (CF AVCS) is designed to reduce the 5R vibration levels experienced in the cockpit and cabin. The system comprises of Circular Force Generator Units (CFGU) mounted under the cabin and cockpit floor, accelerometers mounted at a series of key positions on the fuselage, rotor speed signal, an electronic integrated central controller unit (CC) and a control panel, mounted in the interseat panel. The exact configuration depends on the aircraft configuration and customer requirements.

The system takes signals from the vibration accelerometers and rotor speed which are processed by the CC. Correction signals are then sent to the Circular Force Generators to minimise the vibrations.

Two control panels are available which have slightly different functionalities:

- Control panel P/N 3G1830V00251 (Figure 1) consists of an OFF/ON switch with PWR ON indicator, a built in TEST pushbutton, a system message FAIL and a maintenance port (MTN PORT) to connect maintenance and trouble shooting equipment.
- Control panel P/N 3G1830V00252 (Figure 2) consists of an OFF/ON switch with CFG PWR indicator, a SYS ID guarded pushbutton, system messages amber FAIL and white MAINT captions and a maintenance port (MTN PORT) to connect maintenance and trouble shooting equipment.

The TEST/SYS ID button can be used with the aircraft at IDLE or shut down (with external power and ON/OFF switch selected to ON) to recalibrate the AVCS system. This function is intended to be used when the aircraft configuration has been changed or a degradation of the vibration control is felt. The TEST/SYS ID button when pressed requires a period of up to 5 minutes to complete the procedure (depending on number of CFGs installed) during which time the FAIL lamp will flash.

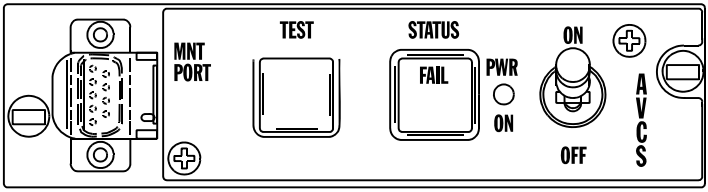

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Figure 1 CF AVCS Control Panel P/N 3G1830V00251

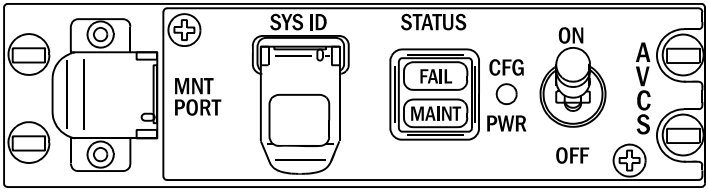

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Figure 2 CF AVCS Control Panel P/N 3G1830V00252

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the CF AVCS kit, the new empty weight and center of gravity position must be determined.

SECTION 2 - NORMAL PROCEDURES

COCKPIT/ENGINE PRE-START CHECKS

1. AVCS control panel power switch	— Confirm ON Confirm PWR ON/CFG PWR indicator illuminates.

SYSTEM CHECKS

1. AVCS control panel TEST/SYS ID pushbutton	— Press, when required, due to change of aircraft configuration or reduction in AVCS performance. FAIL lamp will flash during recalibration procedure (up to 5 minutes depending on configuration).

Note

The TEST/SYS ID pushbutton is for ground use only with the aircraft at IDLE or shut down and external power connected.

IN FLIGHT

Note

When control panel P/N 3G1830V00251 is fitted if the AVCS is selected OFF in flight the system cannot be re-engaged.

STATUS CAPTION DEFINITION

Caption (White)	System State
MAINT	AVCS degraded

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM FAILURE

After failure of the DC Non Essential (NON ESS) bus the AVCS system is automatically switched off. An increase in aircraft vibration level may be experienced.

AVCS FAILURE

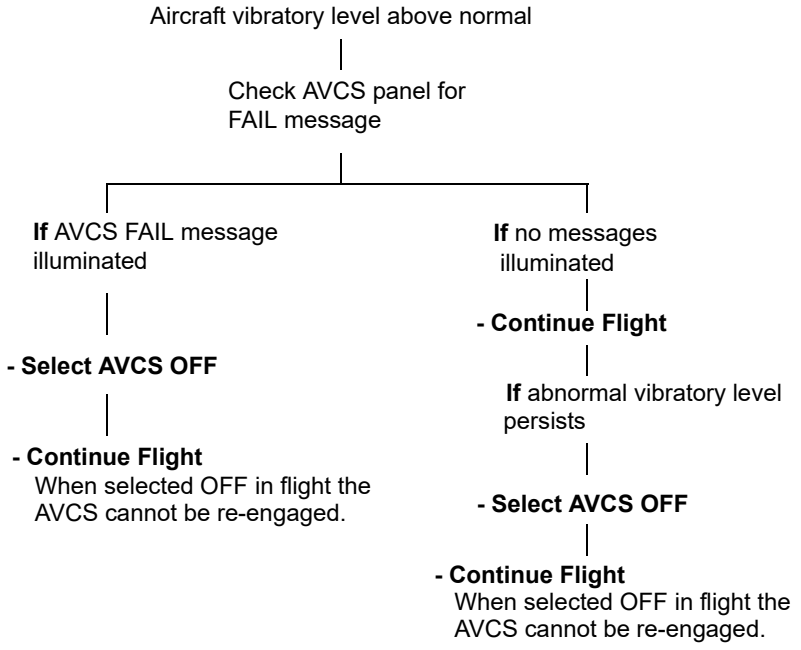
General

An amber FAIL message illuminated on the control panel indicates that the sytem has failed and the CFGs are unpowered.

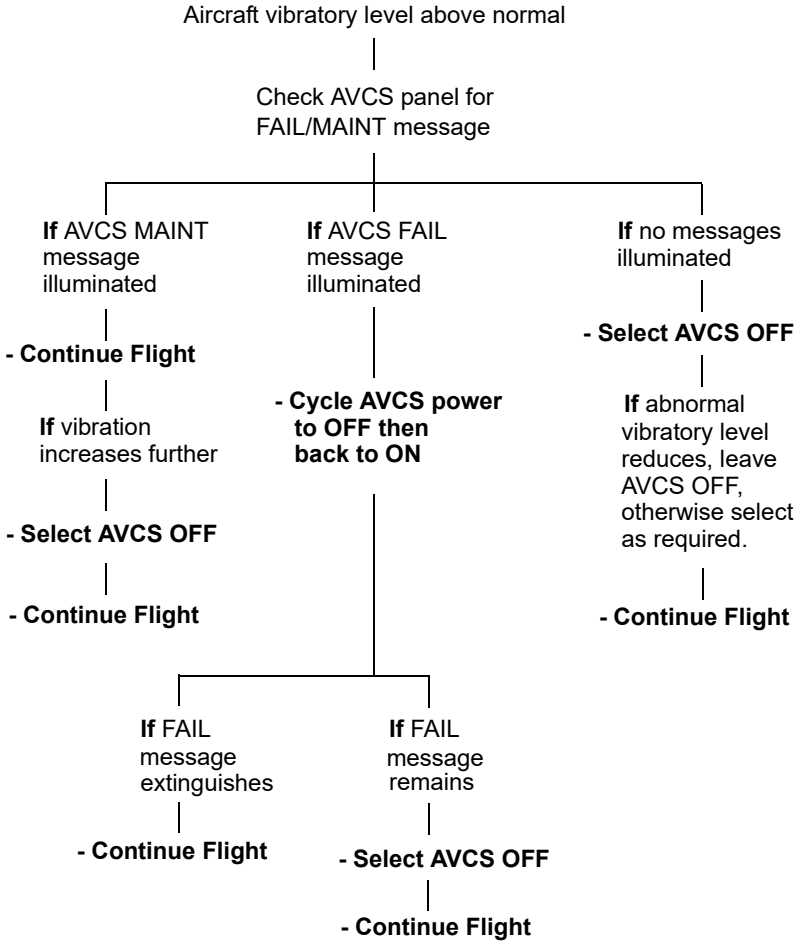
On Ground

If, at POWER ON of the system, a FAIL message illuminates on the control panel, continue flight or as required, being aware that the vibration reduction system is not operational.

In Flight (Control Panel P/N 3G1830V00251)



In Flight (Control Panel P/N 3G1830V00252)



SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 90

WEIGHT EXTENSION 7000 KG

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SUPPLEMENT 90
WEIGHT EXTENSION 7000 KG

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GENERAL INFORMATION

This Supplement details the changes to the Basic RFM to operate the aircraft with an increased Gross Weight up to 7000 kg. This information is valid for all weights in excess of the RFM Supplement 50 weight limit of 6800 kg.

SECTION 1 - LIMITATIONS

GENERAL

For Limitations not included in this Supplement refer to Basic RFM or applicable Supplements.

If the aircraft weight, at any time, exceeds 6800 kg the entire flight duration and all Take-Offs / Landings must be recorded as flight operations above 6800 kg in the helicopter log-book.

AIRCRAFT CONFIGURATION

The following must be present on the aircraft for operation between 6800 kg and 7000 kg:

— Kit Increased Gross Weight 7000 kg P/N 4G0000F00311.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

WEIGHT

Maximum gross weight for towing..... 6450 kg

Maximum gross weight for taxiing..... 7050 kg

Maximum gross weight for CAT B Take-Off / Landing ..... 7000 kg

Maximum gross weight for CAT A Take-Off and Landing
(Clear Area Procedure only in Supplement 12) ..... 7000 kg

Maximum gross weight for CAT A Take-Off
(Enhanced Offshore Procedure Supplement 97)..... 7000 kg

Weight limitations CAT B W.A.T.

Clean Intake ..... Figure 4-1

EAPS OFF ..... Figure 4-2

EAPS ON ..... Figure 4-3

IBF ..... Figure 4-4

Weight Limitations CAT A Take-Off and Landing
(Clear Area Procedure only permitted from Supplement 12)

Clean Intake ..... Figure 4-5

EAPS OFF ..... Figure 4-6

EAPS ON ..... Figure 4-7

IBF ..... Figure 4-8

Weight Limitations CAT A Take-Off Enhanced Offshore Procedure ..... Refer Supplement 97

CENTRE OF GRAVITY

Longitudinal limitations ..... Figure 1-1 & Figure 1-3

Lateral limitations ..... Figure 1-2 & Figure 1-4

CAUTION

Refer to Basic RFM Section 6 for loading instructions to not exceed maximum allowable.

ALTITUDE LIMITATIONS

Refer Figure 1-5 for complete altitude envelope.

Maximum operating altitude ..... 6000 ft (1800 m) Hp or Hd whichever comes first

Minimum operating altitude ..... -1000 ft Hp

Maximum altitude for CAT B Take Off and Landing ..... 4500 ft (1370 m) Hp or Hd whichever comes first

Maximum altitude for CAT A Clear Area Take Off and Landing ..... 2500 ft (750 m) Hp or Hd whichever comes first

Maximum altitude for CAT A Take Off Enhanced Offshore Procedure..... Refer Supplement 97

AMBIENT AIR TEMPERATURE LIMITATIONS (OAT)

Minimum temperature for ground starting ..... -40° C

Minimum ambient air temperature ..... -40° C

Maximum ambient air temperature ..... Figure 1-5

COLD WEATHER OPERATION

If the helicopter is to be operated with an OAT at or below -30°C, ensure that the flight logbook records that the nitrogen pressure on the NLG and MLG is appropriate and in accordance with Maintenance Manual.

AIRSPEED LIMITATIONS

Vne (Power ON, OEI/Power OFF) ..... 147 KIAS

Maximum airspeed in sideward or rearward flight ..... Figure 1-7

Maximum allowable tailwind and crosswind ..... Figure 1-7

CATEGORY A WIND LIMITATIONS

Maximum crosswind for Take Off and Landing CAT A Clear Area Procedure ..... 15 kts (8 m/s)

Take-Off with tail wind component is prohibited.

GROUND SPEED LIMITATIONS

On Paved Surfaces

Maximum taxi speed

at or above -30° C ..... 20 kts (10 m/s)

below -30° C ..... 10 kts (5 m/s)

Maximum for emergency landing speed (nose wheel locked in fore and aft position)..... 60 kts (110 km/hr)

On Prepared Grass Surfaces

Taxiing on grass surfaces is prohibited.

WHEEL BRAKE LIMITATIONS

Maximum running speed for brake application ..... 40 knots
(74 km/hr)

SLOPE LIMITATIONS

Sloped Take Off and Landing are limited to the following:

Nose up .....10°

Nose down .....10°

Left wing low .....10°

Right wing low .....10°

CAUTION

When landing nose down on slopes up to 10° attention should be given to have a slope that does not endanger striking the tail. A slope which allows the tail to overhang the top of the slope is recommended.

HEIGHT-VELOCITY DIAGRAM

Clean Intake, ECS HEATER (all settings),
ECS ENVIRO (all settings), EAPS OFF/ON, IBF ..... See Figure 1-8

CATEGORY B OPERATION LIMITATIONS

The CAT B W.A.T. charts, Figure 4-1 to Figure 4-4 are used to define the maximum take off and landing weight for the given ambient conditions. Figure 1-7 defines the maximum wind speed compatible with the W.A.T. charts.

CAT B weights above 6800 kg the HEATER must not be selected ON or the ECS ENVIRO must not be selected to FULL AUTO or MAN HEAT.

CATEGORY A OPERATION LIMITATIONS

Above 6800 kg Clear Area Procedure only permitted from Supplement 12 and Enhanced Offshore Procedure Supplement 97.

Weight

The CAT A W.A.T. charts for Clear Area (Figure 4-5 to Figure 4-8) T-O and Landing procedure are used to define the maximum take off and landing weight for the given ambient condition.

The CAT A W.A.T. charts for the Enhanced Offshore Procedure, Supplement 97, define the maximum take off weight for the given ambient condition.

HOIST OPERATIONS LIMITATIONS

Hoist operations above 6800 kg are prohibited.

CARGO HOOK OPERATIONS LIMITATIONS

Cargo hook operations above 6800 kg are prohibited.

FLIGHT DIRECTOR LIMITATIONS

Above 6800 kg use of the following Flight Director modes is prohibited:

— HOV

— TDH (Transition Down to Hover)

— MOT

— WTR

— TU

For other Flight Director limitations refer to applicable Supplements 34, 40, 67, 69 and 70.

DITCHING CONFIGURATIONS LIMITATIONS

Ditching Configurations (see Supplement 9 and 95) are approved for weights up to 7000 kg.

SNOW SKIDS/SLUMP PADS LIMITATIONS

Operations with Snow Skids (Supplement 19) or Slump Pads (Supplement 20) are prohibited at weights above 6400 kg.

OPERATIONS WITH COCKPIT DOORS REMOVED LIMITATIONS

Operations with Cockpit Doors Removed (Supplement 30) are prohibited at weights above 6400 kg.

ICING LIMITATIONS

Flight in Icing conditions, Supplement 71, and flight in Limited Icing conditions, Supplement 76, are prohibited at weights above 6800 kg.

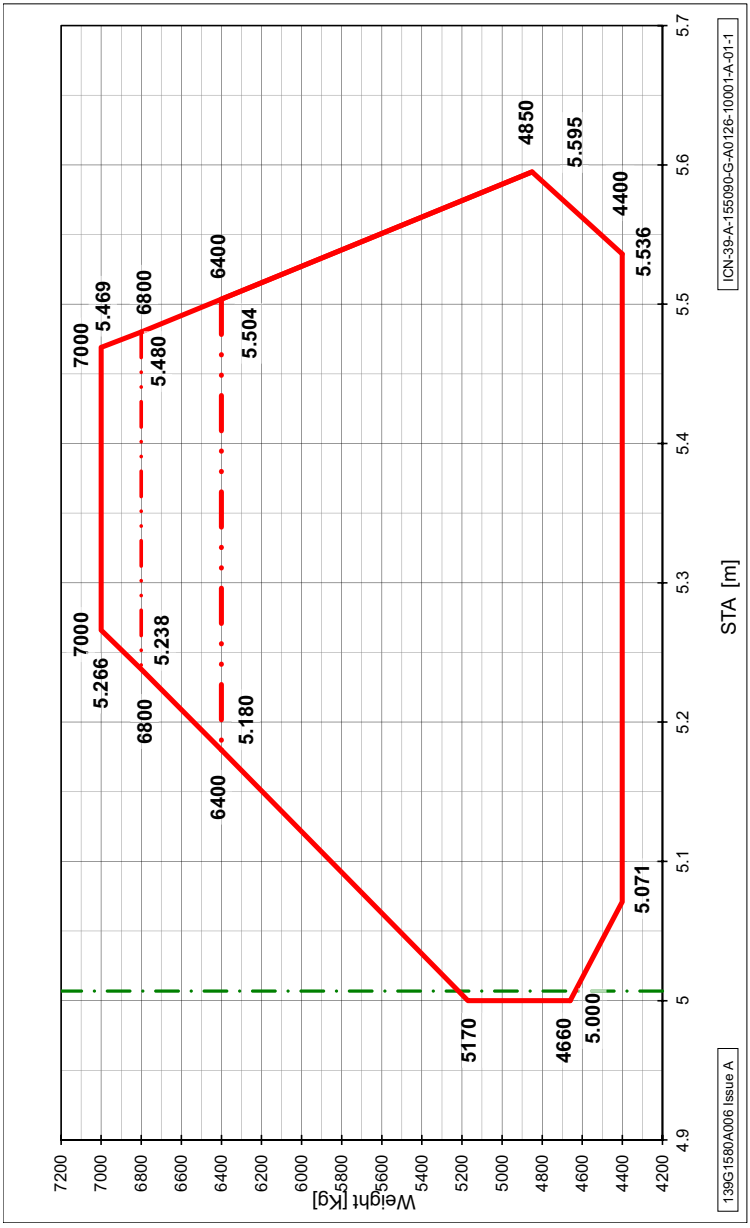

Figure 1-1 Weight and Longitudinal CG Limitations

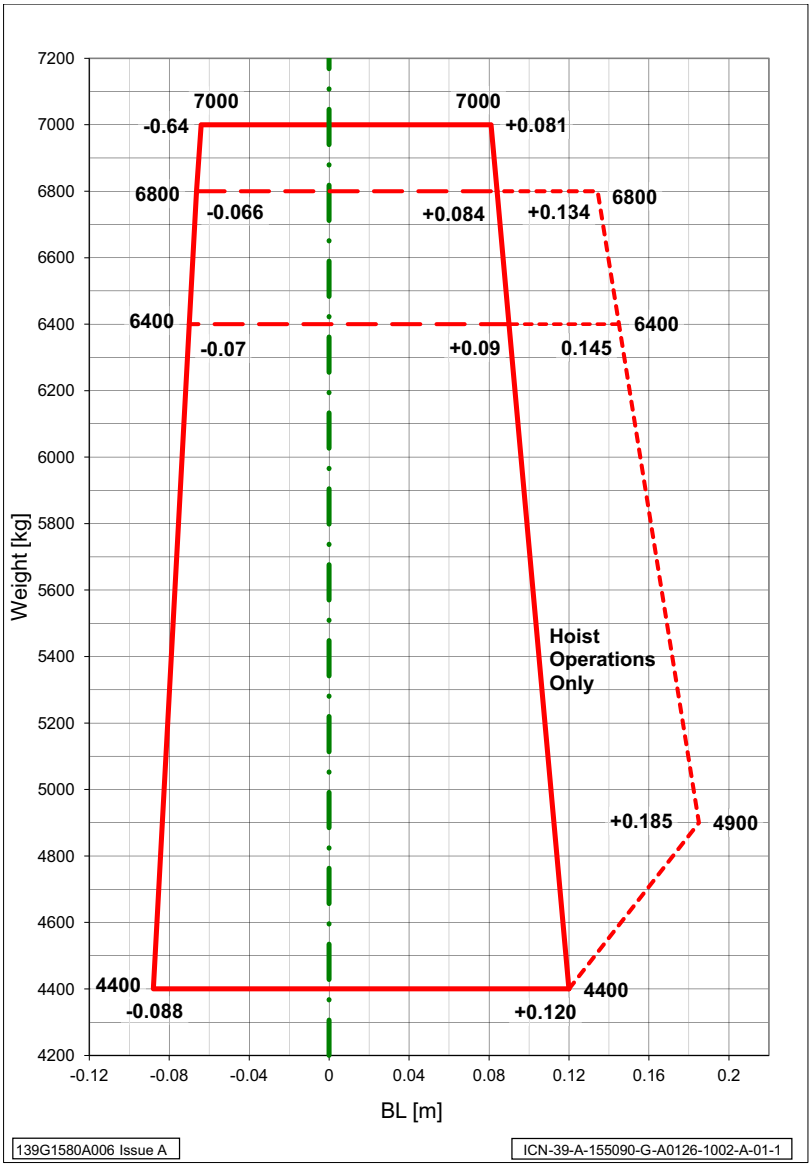

Figure 1-2 Weight and Lateral CG Limitations

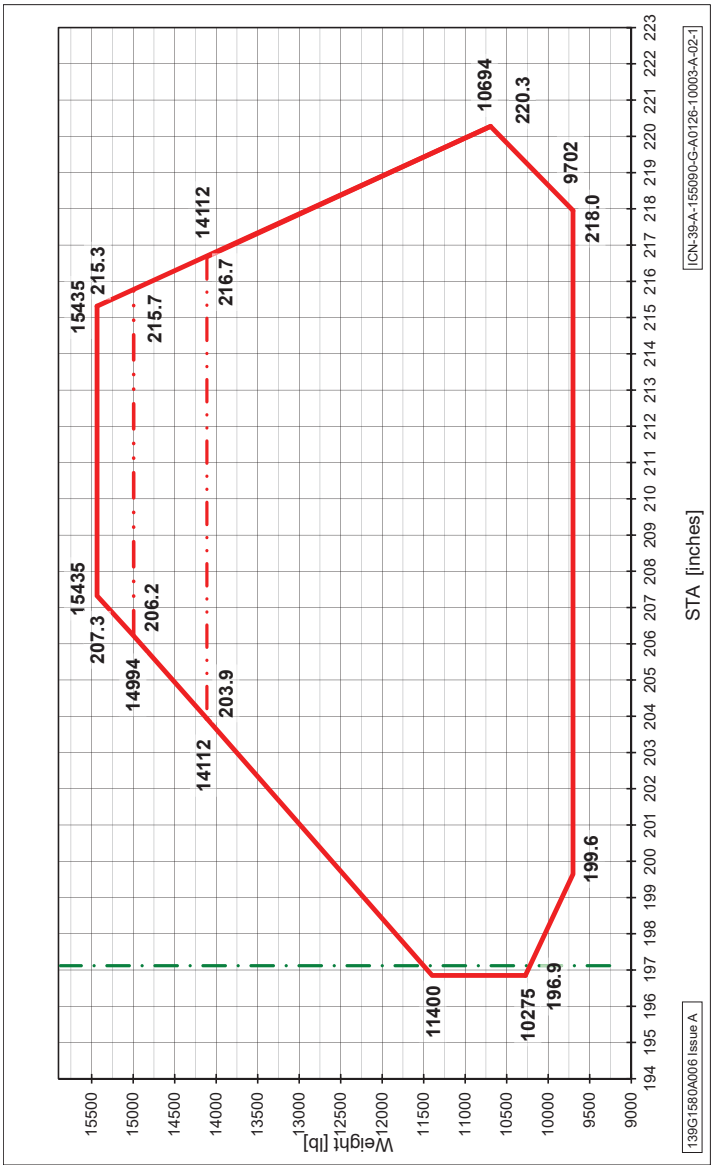

Figure 1-3 Weight and Longitudinal CG Limitations (Imperial Units)

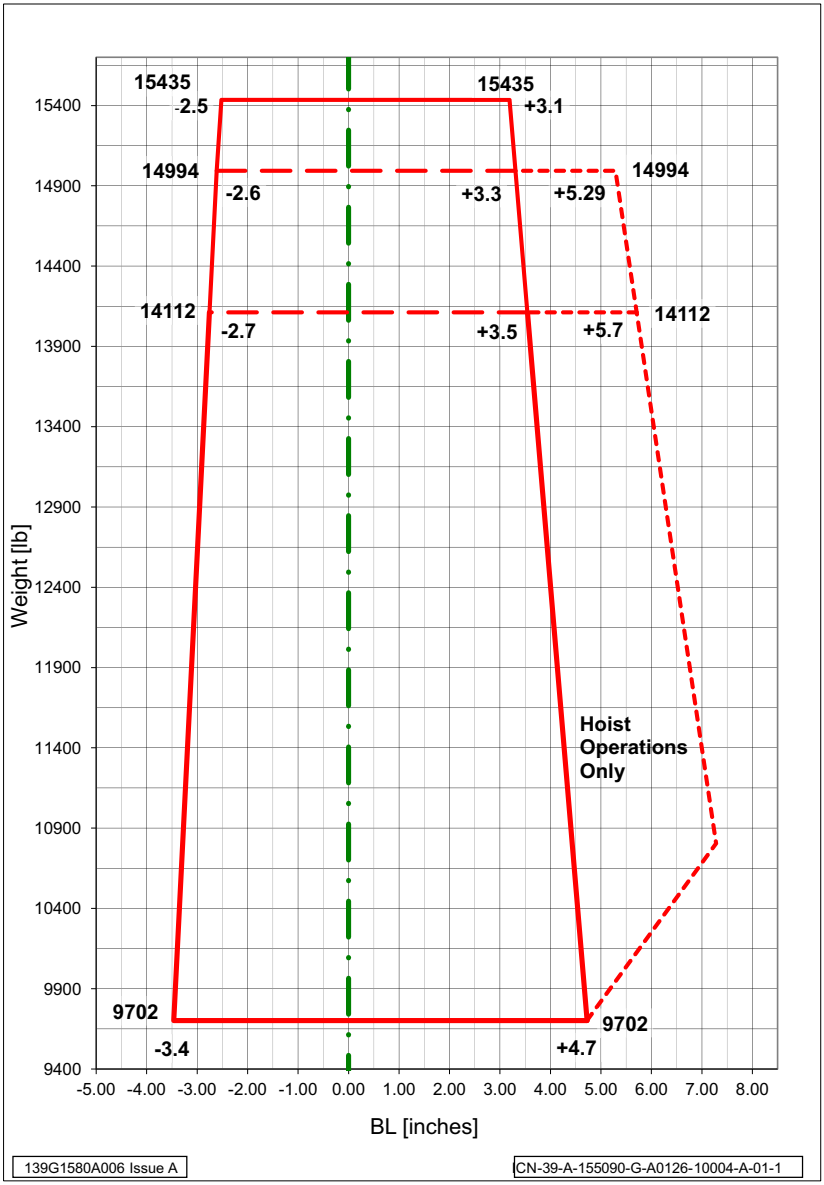

Figure 1-4 Weight and Lateral CG Limitations (Imperial Units)

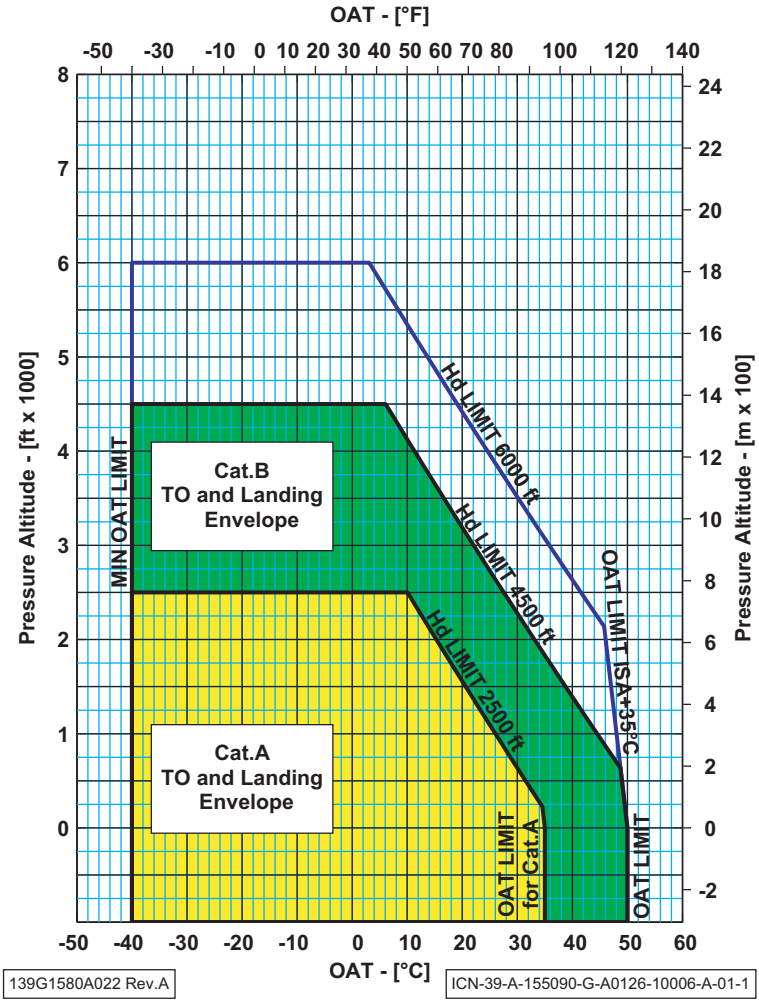

Figure 1-5 Flight and Take Off/Landing Altitude and OAT Limitations (CAT A Clear Area limitation shown)

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AIRSPEED LIMITATION

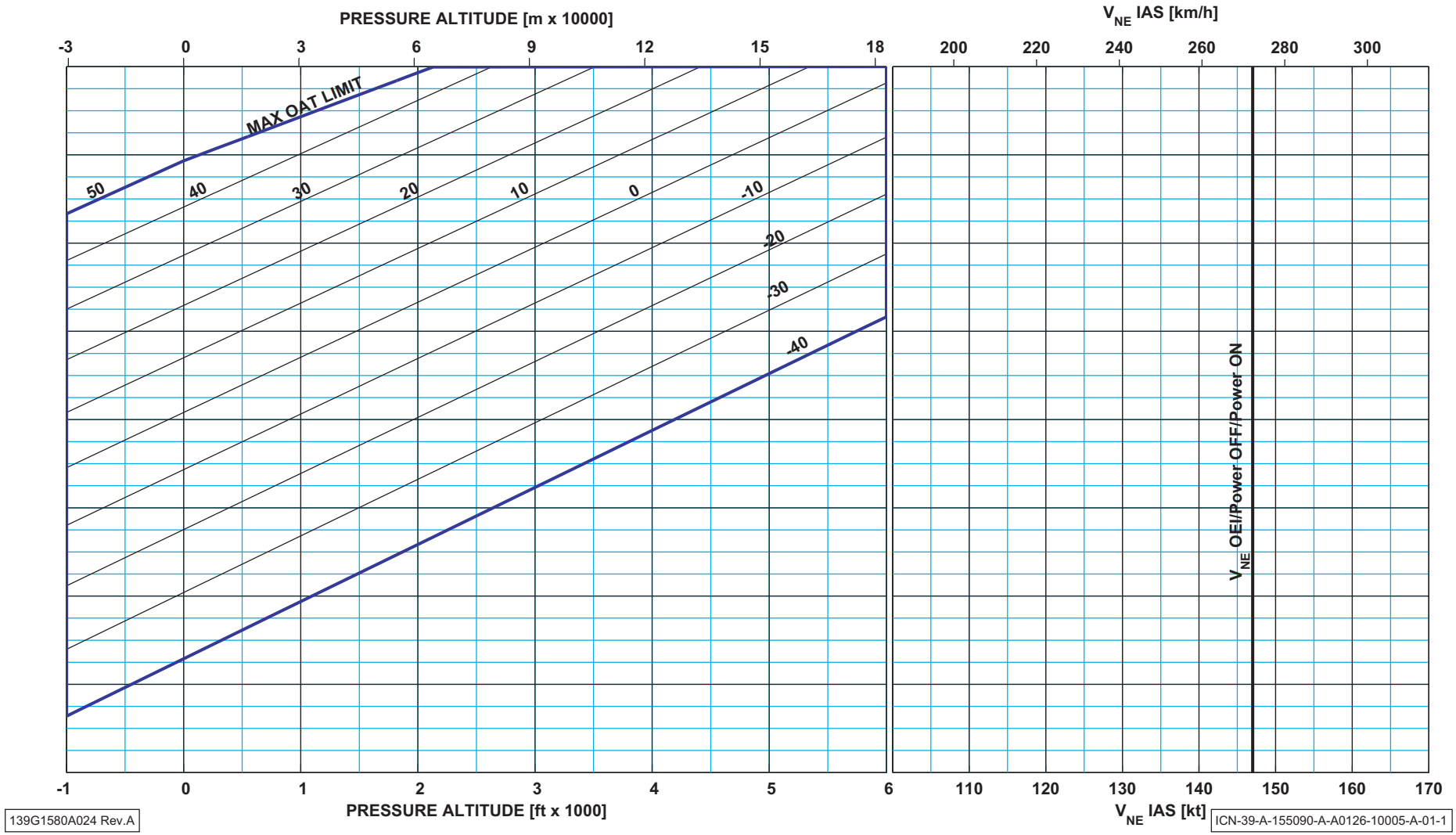

Figure 1-6 Airspeed Envelope (Vne-Power On, OEI/Power Off)

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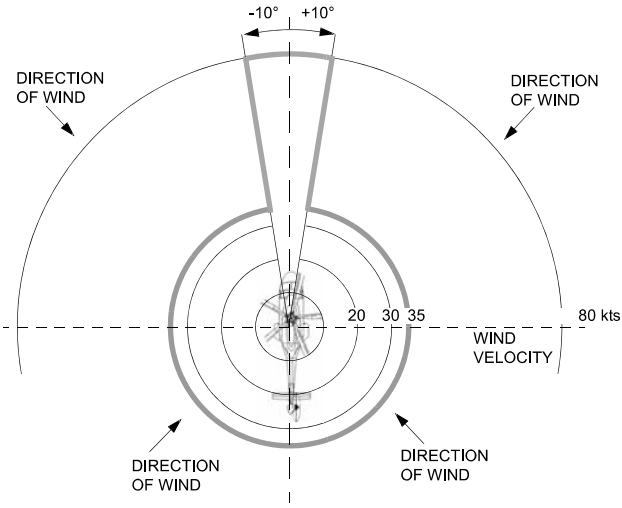

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Figure 1-7 Controllability Envelope for Low Speed IGE Manoeuvres

HEIGHT-VELOCITY CHART
for GW above 6800 kg

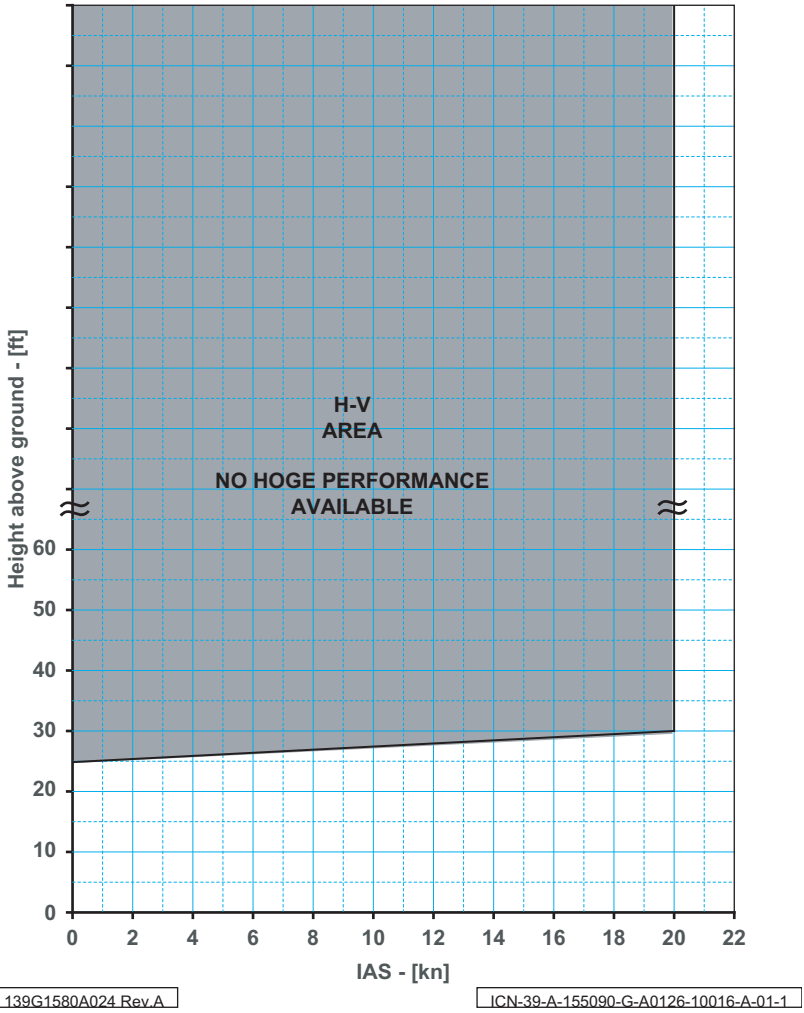

Figure 1-8 Height-Velocity Limitations, Clean Intake/ ECS HEATER (all settings)/EAPS ON/OFF/ ECS ENVIRO (all settings)/IBF

PLACARDS

A

VNE POWER ON AIRSPEED LIMITATION KIAS						
ABOVE 6800KG Vne PWR ON/OEI/PWR OFF = 147KIAS						
Hp ft / OAT °C	-1000 to SL	4000	8000	10000	15000	20000
50	160	-	-	-	-	-
20	167	157	145	147	128	-
10	167	159	147	151	133	-
0	167	162	150	156	136	-
-10	167	164	154	159	139	-
-25 AND BELOW	167	167	158	165	144	125
VNE OEI/PWR OFF=VNE PWR ON LESS 20 KIAS					V_{LE}/V_{LO}=150 KIAS	

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SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

AUTOROTATIVE LANDING PROCEDURE ON LAND

The procedure which follows outlines the steps required to execute a successful autorotation landing, time permitting, consult the appropriate Emergency Procedure for the additional steps required to deal with a specific type failure.

1. Collective pitch	— Smoothly and rapidly reduce to enter autorotation.
2. Cyclic	— Adjust to obtain autorotation at between 80 KIAS (minimum rate of descent speed) and 100 KIAS (Best range speed).
3. Collective pitch	— Adjust to obtain up to 110% NR.
4. Landing gear	— Extend.
5. Landing site	— Select and manoeuvre into wind.
6. Brief	— Cabin crew and occupants.
7. Radar altimeter	— Verify working.
8. Distress procedure	— Broadcast Mayday (time permitting).
9. Shutdown	— If appropriate and time available carry out **EMERGENCY/ POST CRASH SHUTDOWN** procedure Page 3-36.

10. Cyclic	— At approximately 200 ft (61 m) AGL, initiate a cyclic flare to a maximum 30° nose-up angle.
11. Collective pitch	— Adjust, as required, to maintain NR at 110% maximum during the flare.
12. Cyclic /Collective pitch	— At approximately 35 ft (15 m) AGL, reduce pitch attitude to 10° nose-up and apply collective pitch, as required, to achieve touchdown at approximately 300 feet per minute (fpm) or less.
13. Touchdown speed	— As required by surface characteristics. (Maximum touchdown speed 40 kts on paved surface, avoid grass surfaces if possible, if not 20 kts on grass surfaces).
14. Collective pitch	— Following touchdown, lower promptly to conserve the remaining rotor speed.
15. Wheel brakes	— Apply as required (land only).
16. Shutdown	— If not carried out previously, execute the **EMERGENCY/ POST CRASH SHUTDOWN** procedure Page 3-36.
17. Evacuate	— Evacuate the aircraft as soon as possible.

SECTION 4 - PERFORMANCE DATA

LOW SPEED MANOEUVRES IGE

Above 6800 kg the maximum relative wind for which satisfactory stability and control has been demonstrated is 35 kts.

TAKE OFF AND LANDING CATEGORY B

The Weight Limitation charts for CAT B operations are shown in Figure 4-1 to Figure 4-4.

Category B Take Off Distance and Landing Distance charts, Figure 4-42 and Figure 4-43.

TAKE OFF AND LANDING CATEGORY A

The Weight Limitation charts for CAT A Clear Area operations are shown in Figure 4-5 to Figure 4-8.

Category A Take Off Distance and Landing Distance charts, Figure 4-92 to Figure 4-102.

The weight limitation and performance charts for CAT A Enhanced Offshore Procedure Take Off refer Supplement 97.

HOVER CEILING

The Hover Ceiling charts define the maximum weights at which an IGE hover (at 5 ft wheel height) is possible for varying combinations of Pressure Altitude and OAT with main rotor speed at 100% and zero wind conditions.

See Figure 4-10 to Figure 4-40.

W.A.T. CHART EXAMPLES FOR WEIGHTS ABOVE 6800 KG

Example 1

Determine the maximum take-off weight permitted for the following ambient conditions:

— Aircraft = Clean Intake

— Pressure Altitude = 2500 ft

— OAT = 25° C

Solution:

Using chart Figure 4-1 enter the graph at a pressure altitude of 2500 ft and proceed horizontally to intersect the 25° C point, determined by interpolating between the 20° C line and 30° C line. From this point drop down vertically to a weight of 6920 kg which represent the maximum Take-Off weight for CAT B Take Off procedure.

Using charts Figure 4-5 the intersection between 2500 ft line and 25° C point is beyond the Hd 2500 ft limit and therefore CAT A Take-Off in these ambient conditions is not permitted.

Example 2

Determine the maximum take-off weight permitted for the following ambient conditions:

— Aircraft = Clean Intake

— Pressure Altitude = 3500 ft

— OAT = 20° C

Solution:

Using chart Figure 4-1 enter the graph at a pressure altitude of 3500 ft and proceed horizontally. It can be seen however that the 20° C point, the extrapolated 30° C line, produces an intersection point outside of the Hd limit line therefore Take-Off in these ambient conditions is not permitted.

Example 3

Determine the maximum take-off weight permitted for the following ambient conditions:

— Aircraft = Clean Intake

— Pressure Altitude = 500 ft

— OAT = 30° C

Solution:

Using chart Figure 4-1 enter the graph at a pressure altitude of 500 ft and proceed horizontally. It can be seen that the 30° C point would be to the right of the maximum take off weight line of Figure 4-1, therefore maximum Take-Off weight is 7000 kg for CAT B Take Off procedure.

In this case, using chart Figure 4-5 enter the graph at a pressure altitude of 500 ft and proceed horizontally to intersect the 30° C point. From this point drop down vertically to a weight of 6975 kg which represent the maximum Take-Off weight for CAT A Take-Off procedure.

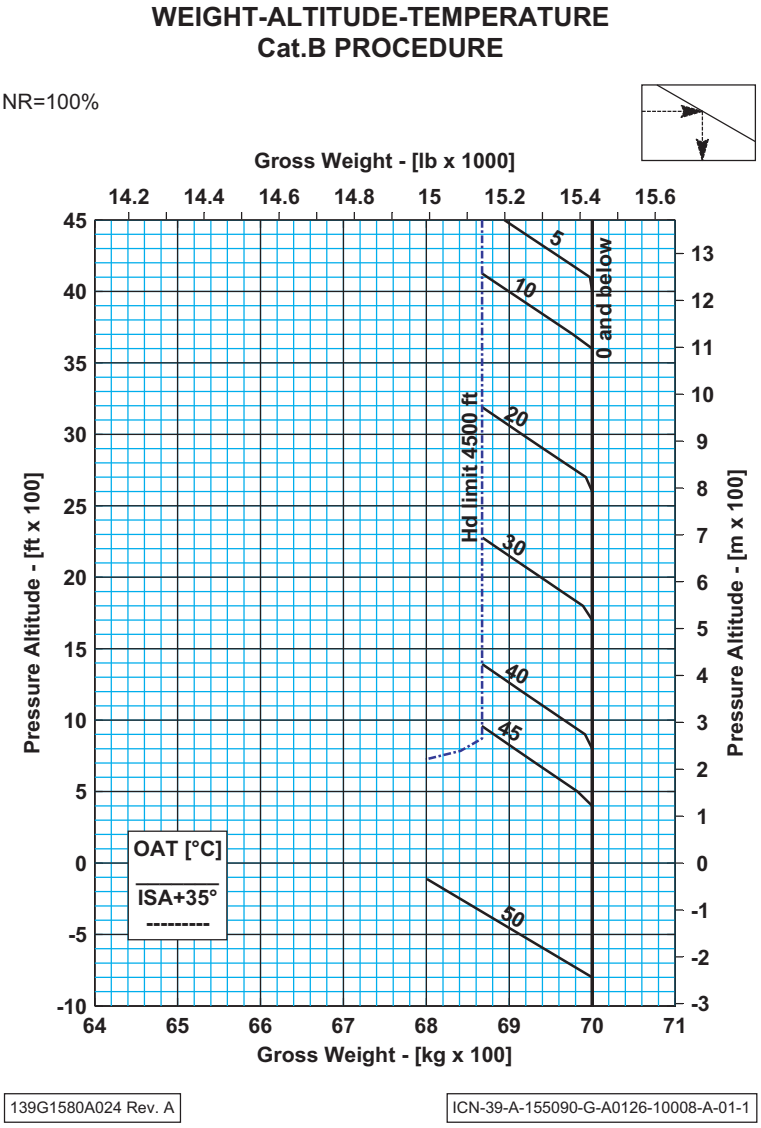

Figure 4-1 Weight Limitations for CAT B Procedure

WEIGHT-ALTITUDE-TEMPERATURE
Cat.B PROCEDURE

EAPS OFF
NR=100%

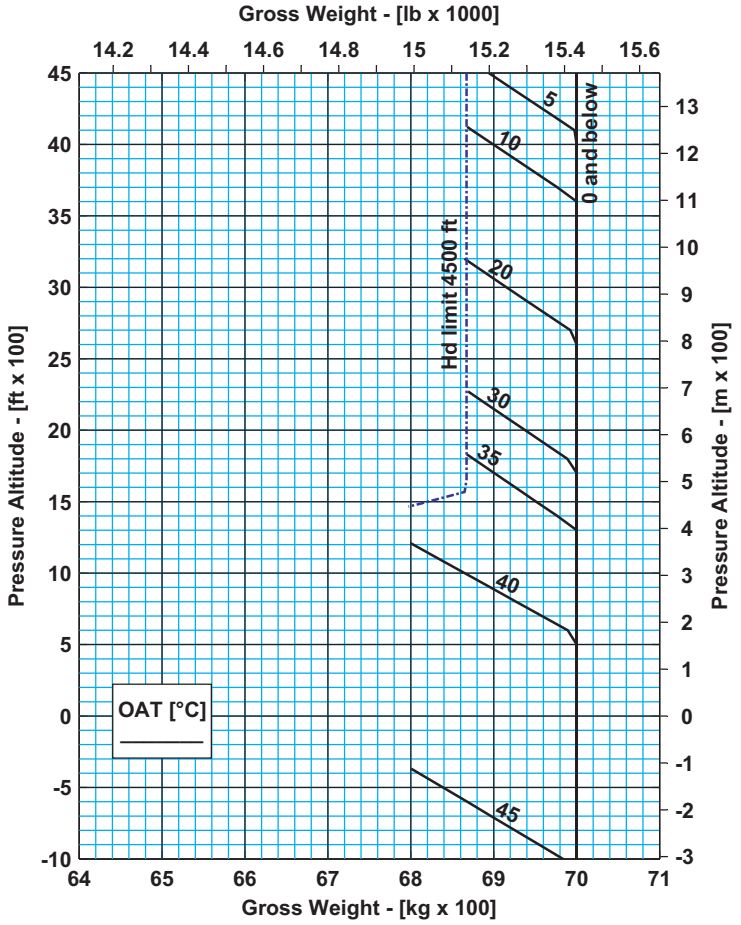

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Figure 4-2 Weight Limitations for CAT B Procedure, EAPS OFF

WEIGHT-ALTITUDE-TEMPERATURE
Cat.B PROCEDURE

EAPS ON
NR=100%

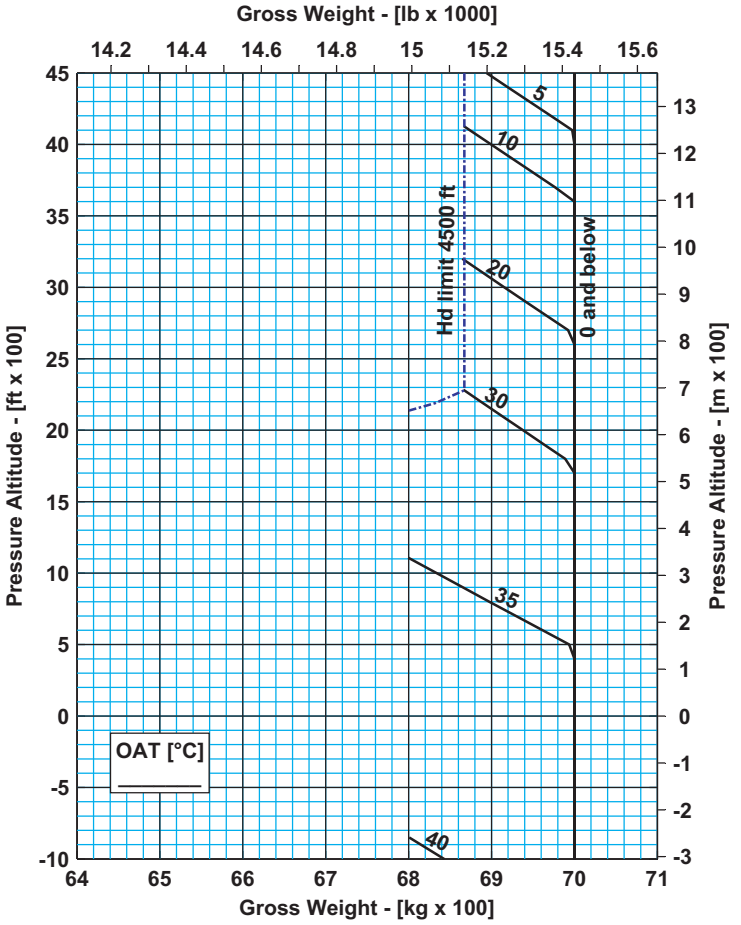

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Figure 4-3 Weight Limitations for CAT B Procedure, EAPS ON

WEIGHT-ALTITUDE-TEMPERATURE
Cat.B PROCEDURE

IBF installed
NR=100%

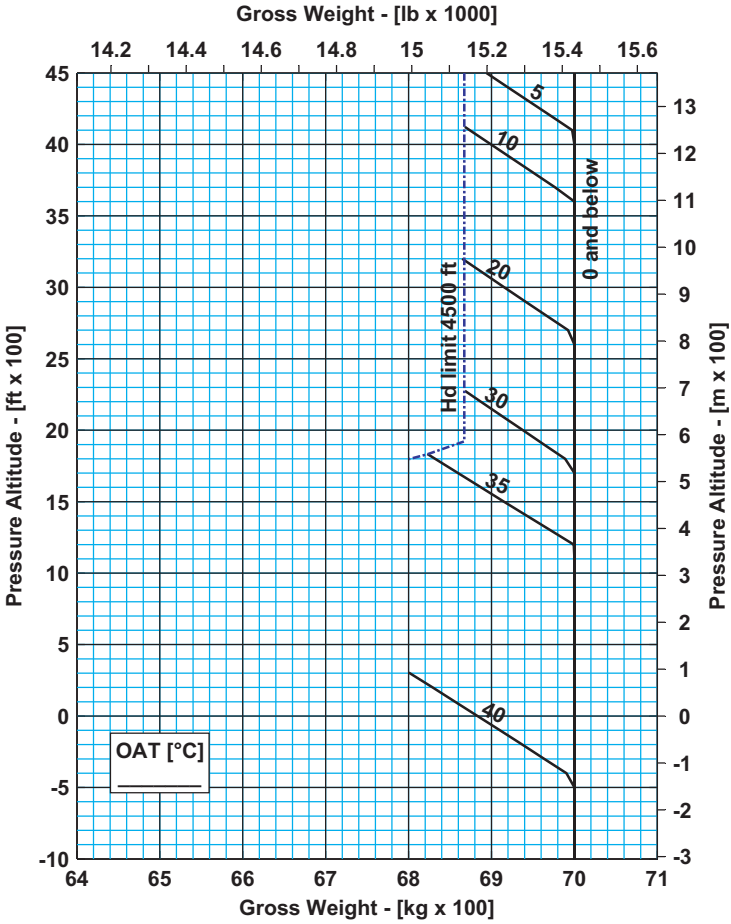

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Figure 4-4 Weight Limitations for CAT B Procedure, IBF Installed

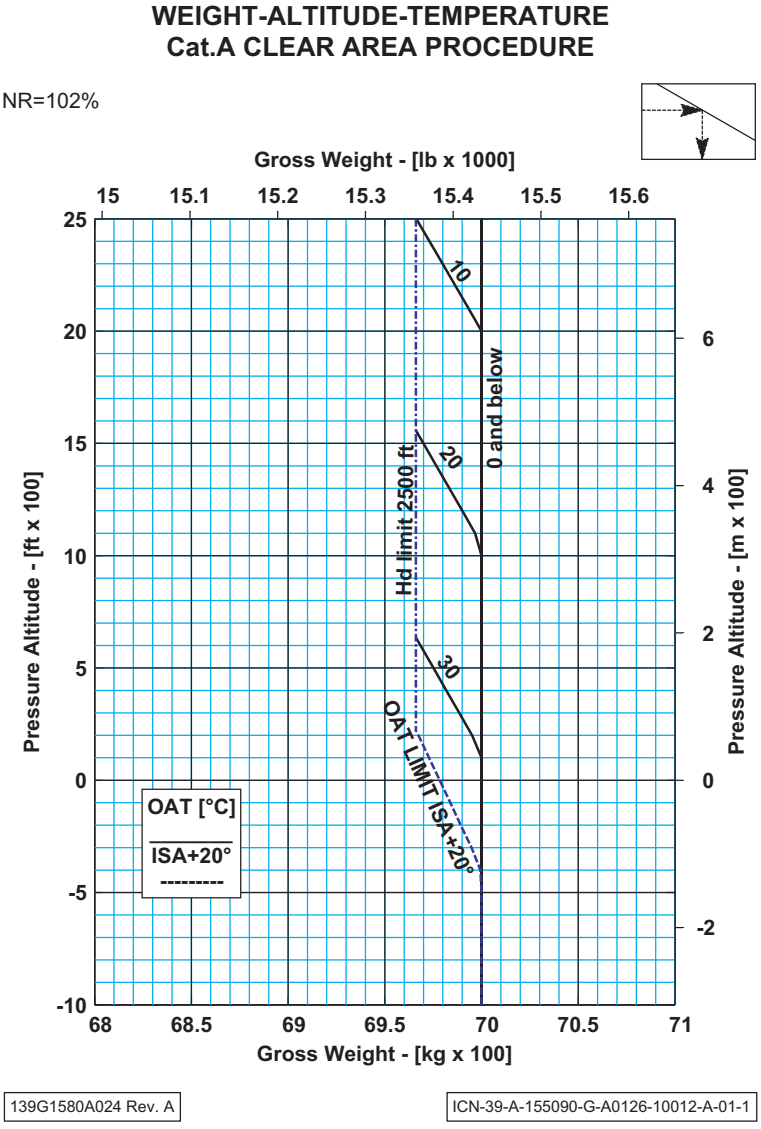

Figure 4-5 Weight Limitations for CAT A Clear Area Procedure

WEIGHT-ALTITUDE-TEMPERATURE
Cat.A CLEAR AREA PROCEDURE

EAPS OFF
NR=102%

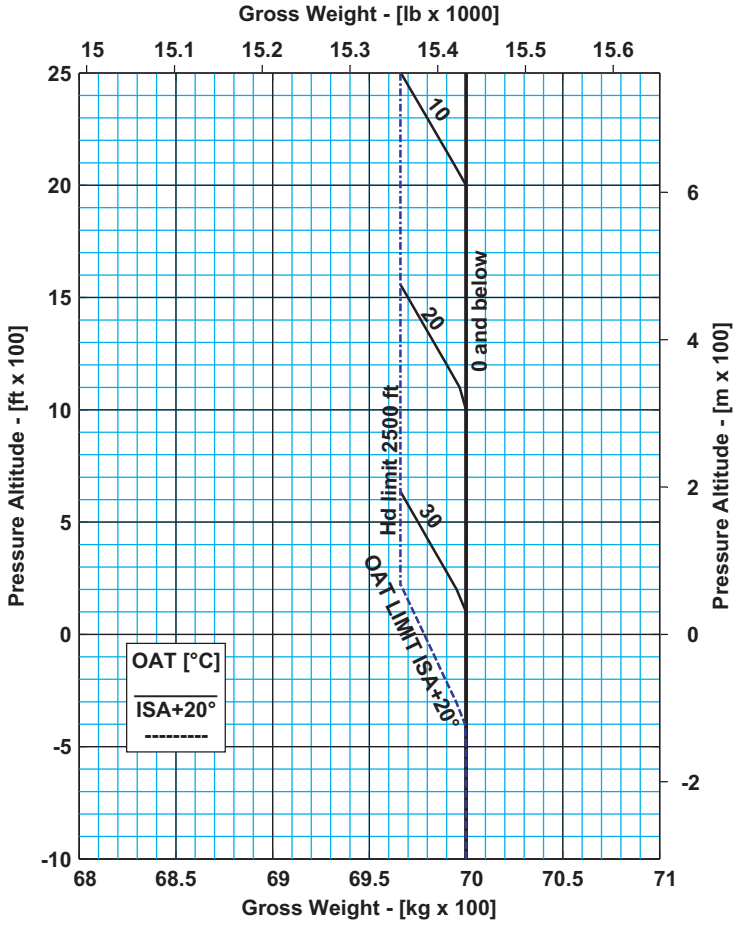

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Figure 4-6 Weight Limitations for CAT A Clear Area Procedure, EAPS OFF

WEIGHT-ALTITUDE-TEMPERATURE
Cat.A CLEAR AREA PROCEDURE

EAPS ON
NR=102%

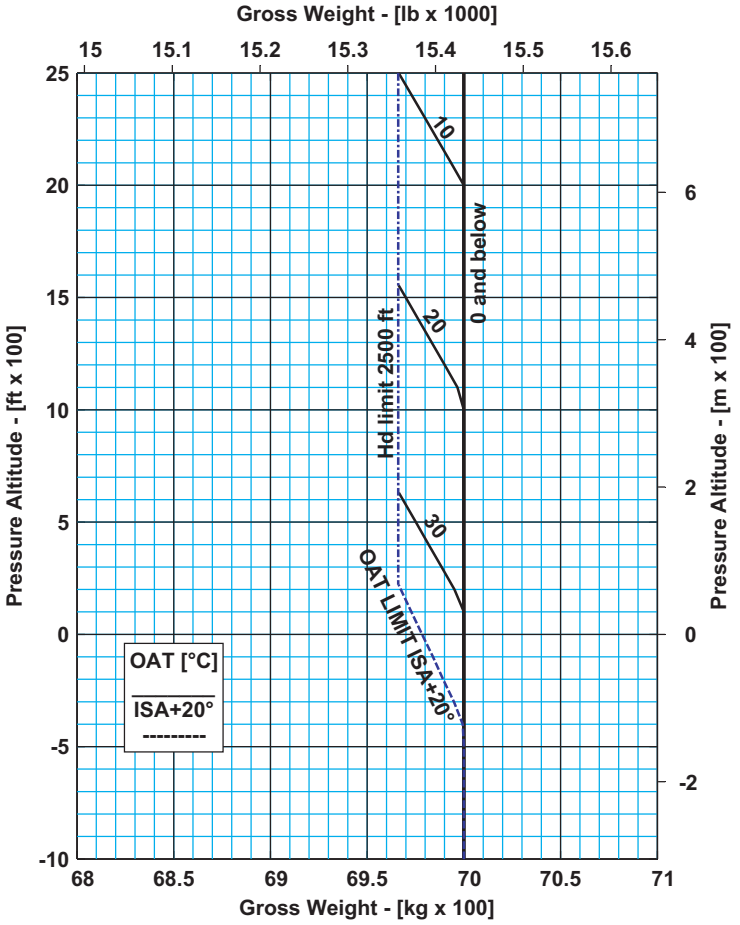

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Figure 4-7 Weight Limitations for CAT A Clear Area Procedure, EAPS ON

WEIGHT-ALTITUDE-TEMPERATURE
Cat.A CLEAR AREA PROCEDURE

IBF installed
NR=102%

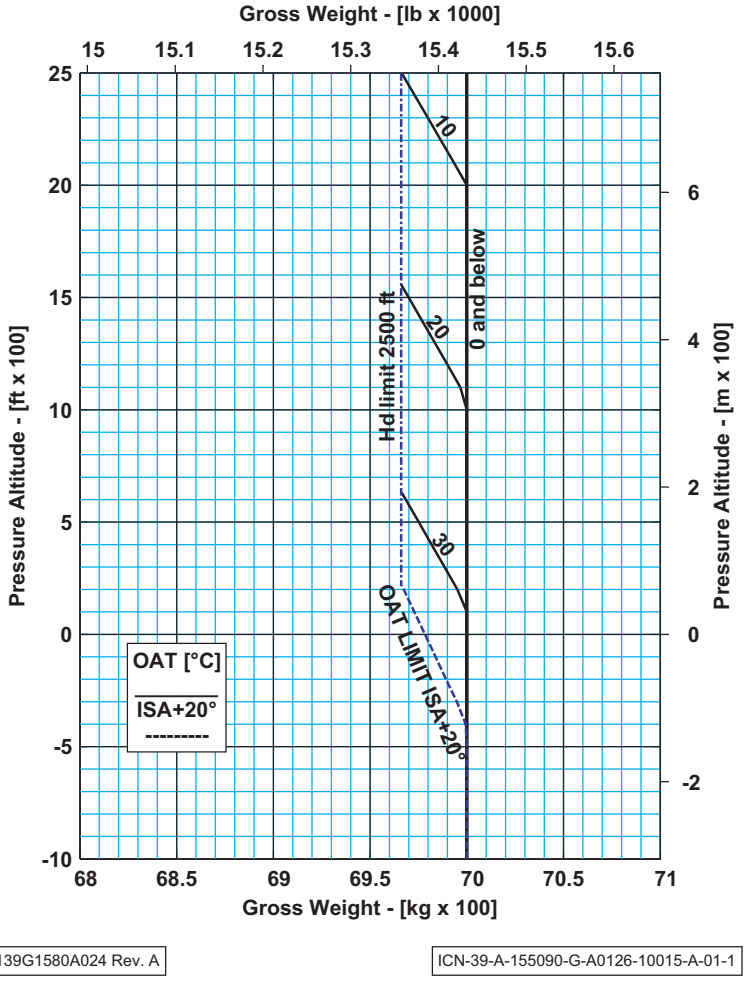

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Figure 4-8 Weight Limitations for CAT A Clear Area Procedure, IBF Installed

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LOW SPEED MANOEUVRES IN QUARTERING FLIGHT IGE

Satisfactory stability and control has been demonstrated for all azimuths shown below, Figure 4-9, for wind speed in accordance with the Controllability Envelope in Figure 1-7.
The critical sectors, requiring slightly increased workload, are indicated below. The sector 225°/270° is critical for high altitude/high temperature. An increase in PI may be observed, which will remain within limits. However if it is required to exit the condition, it is sufficient to modify the heading by 20-30°.
The sector 90°/135° is critical for pedal margin.

No limitation exists for headwind conditions (±10°).

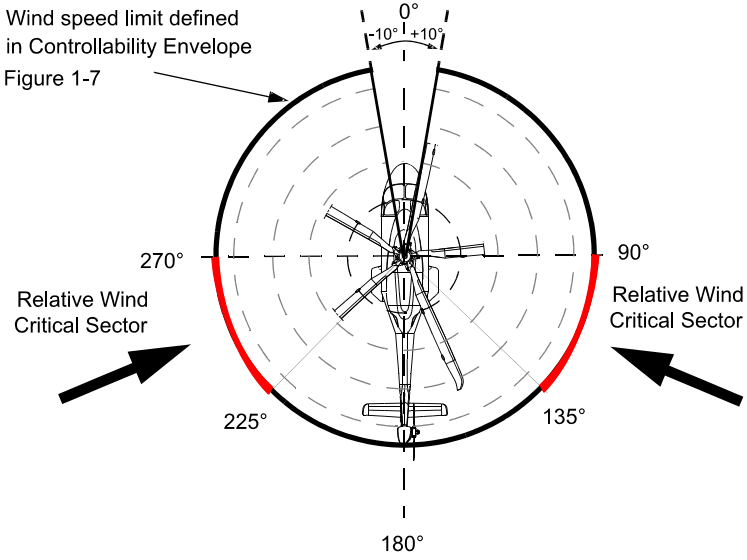

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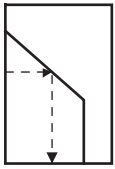
Figure 4-9 Azimuth Envelope Critical Sector

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO



ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT
COND ON: reduce weight by to 50 kg
ELECTRICAL LOAD: 600 A TOTAL

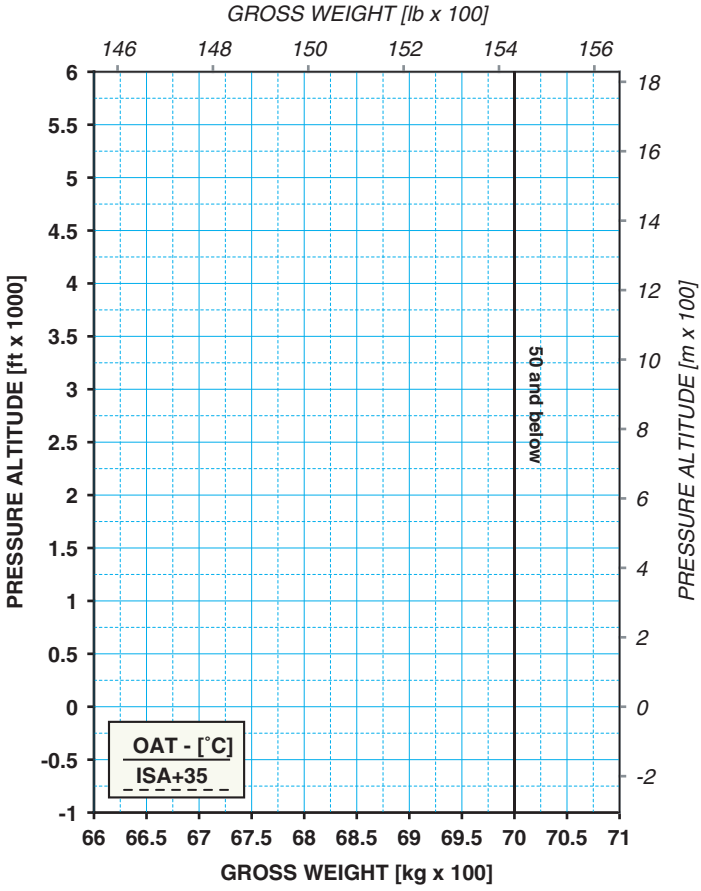


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Figure 4-10 Hover Ceiling IGE at TOP AEO

HIGE TAKE OFF POWER for COND ON reduce weight by 50 Kg										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
2000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-11 Hover Ceiling IGE at TOP AEO Table

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
COND ON: reduce weight by 50 kg

ELECTRICAL LOAD: 600 A TOTAL
WHEEL HEIGHT: 5 FT

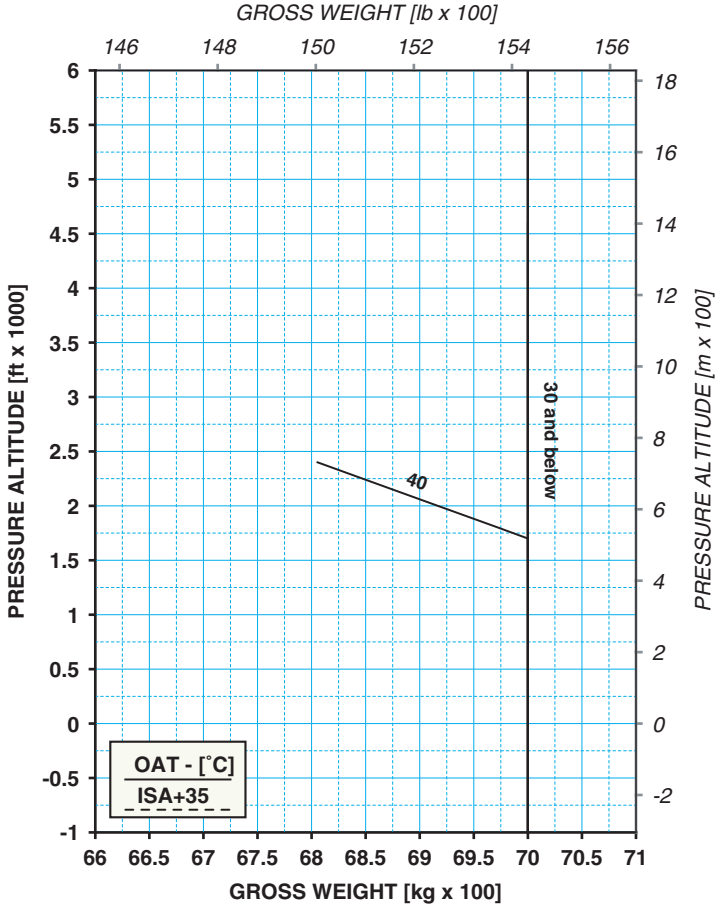

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Figure 4-12 Hover Ceiling IGE at MCP AEO

HIGE MAXIMUM CONTINUOUS POWER for COND ON reduce weight by 50 Kg										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	6697
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	6445
1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
2000	7000	7000	7000	7000	7000	7000	7000	7000	6917	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-13 Hover Ceiling IGE at MCP AEO Table

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

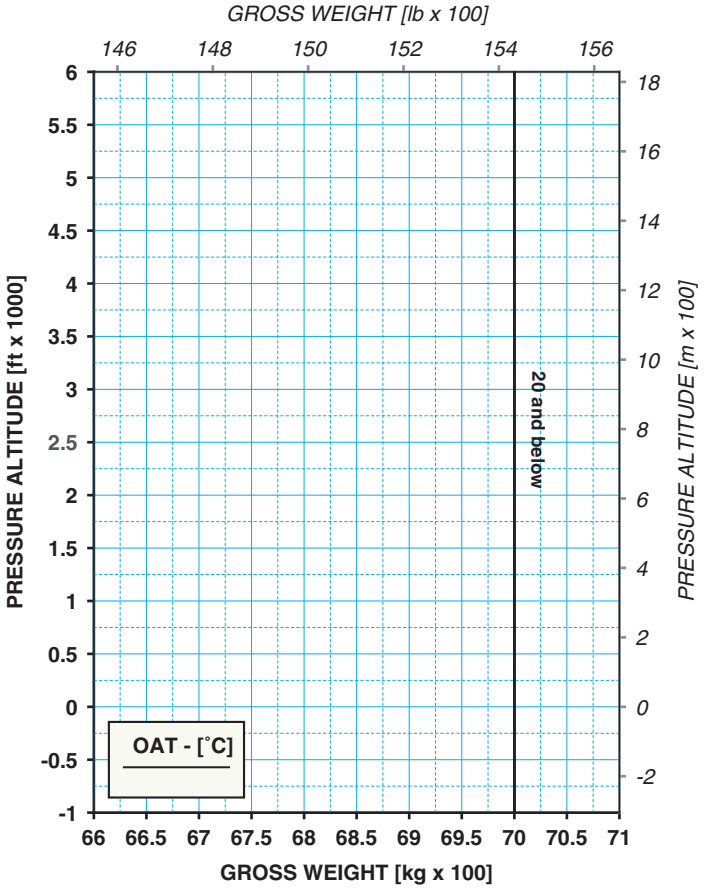

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Figure 4-14 Hover Ceiling IGE at TOP AEO, HEATER ON

HIGE TAKE OFF POWER HEATER ON										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000			
0	7000	7000	7000	7000	7000	7000	7000			
1000	7000	7000	7000	7000	7000	7000	7000			
2000	7000	7000	7000	7000	7000	7000	7000			
3000	7000	7000	7000	7000	7000	7000	7000			
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-15 Hover Ceiling IGE at TOP AEO, HEATER ON Table

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

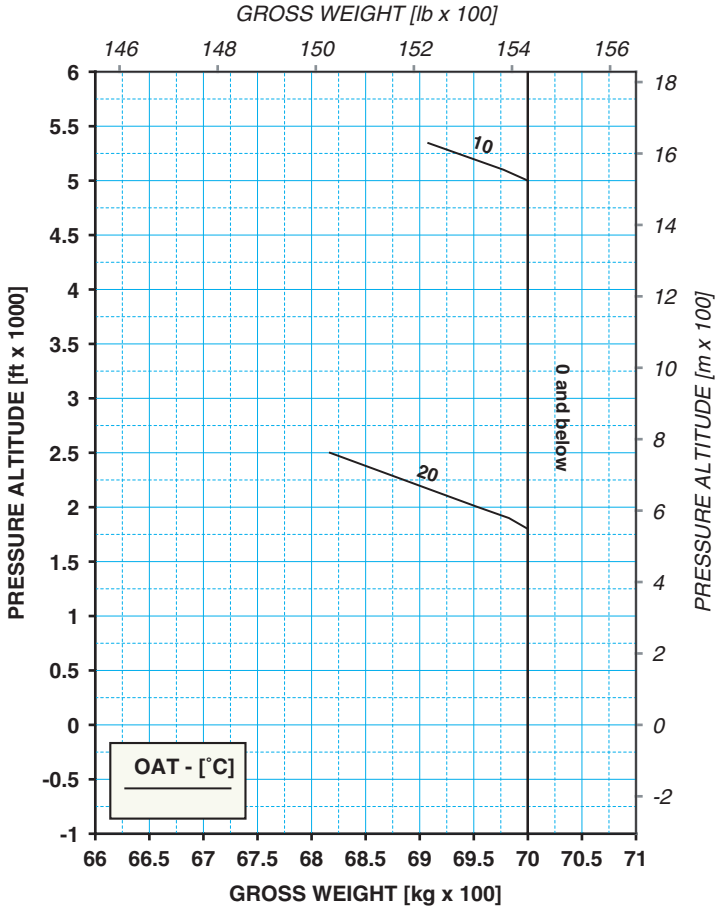

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Figure 4-16 Hover Ceiling IGE at MCP AEO, HEATER ON

HIGE MAXIMUM CONTINUOUS POWER HEATER ON										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000			
0	7000	7000	7000	7000	7000	7000	7000			
1000	7000	7000	7000	7000	7000	7000	7000			
2000	7000	7000	7000	7000	7000	7000	6954			
3000	7000	7000	7000	7000	7000	7000	6681			
4000	7000	7000	7000	7000	7000	7000	6409			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-17 Hover Ceiling IGE at MCP AEO, HEATER ON Table

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
COND ON: reduce weight by to 50 kg

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO AUTO/MAN
WHEEL HEIGHT: 5 FT

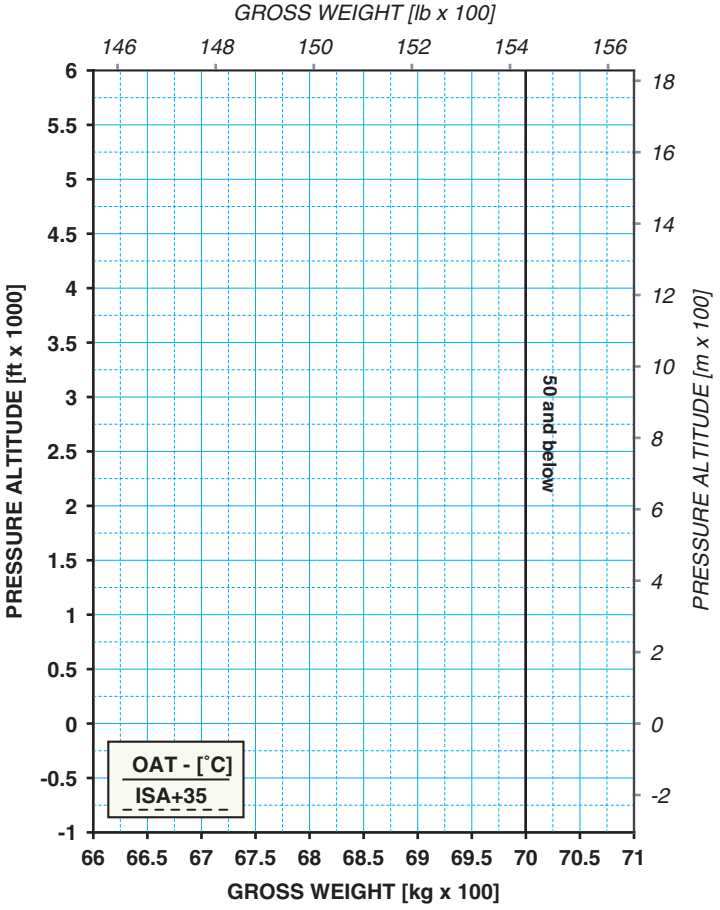

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Figure 4-18 Hover Ceiling IGE at TOP AEO, ENVIRO FULL AUTO

HIGE TAKE OFF POWER ENVIRO AUTO/MAN										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
2000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-19 Hover Ceiling IGE at TOP AEO, ENVIRO FULL AUTO Table

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO AUTO/MAN

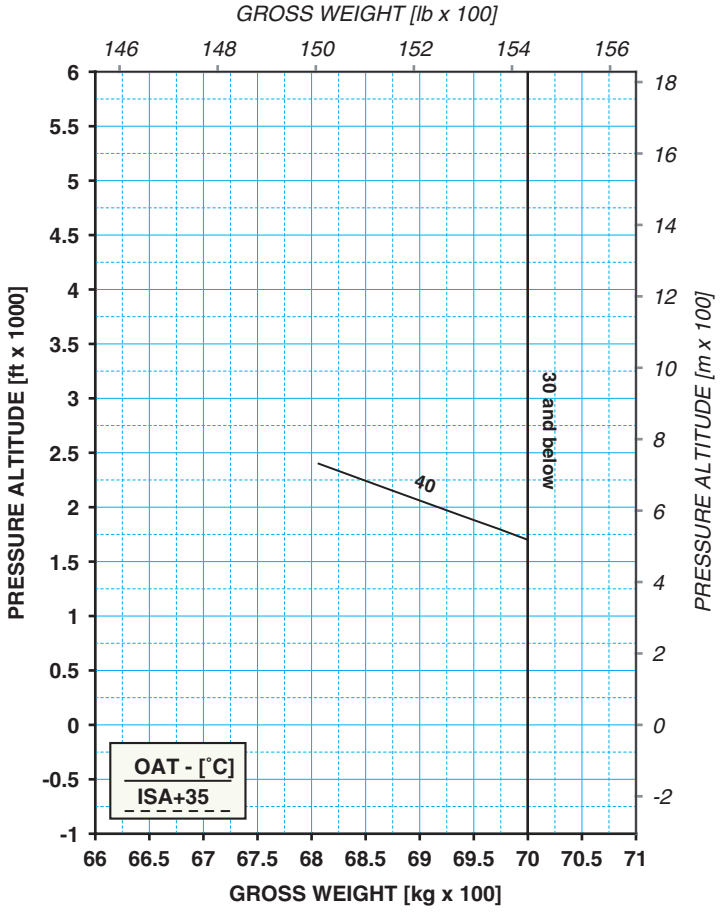

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Figure 4-20 Hover Ceiling IGE at MCP AEO, ENVIRO FULL AUTO

HIGE MAXIMUM CONTINUOUS POWER ENVIRO AUTO/MAN										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	6635
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	6397
1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
2000	7000	7000	7000	7000	7000	7000	7000	7000	6867	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-21 Hover Ceiling IGE at MCP AEO, ENVIRO FULL AUTO Table

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
COND ON: reduce weight by to 50 kg

WHEEL HEIGHT: 5 FT
ELECTRICAL LOAD: 600 A TOTAL
EAPS: ON

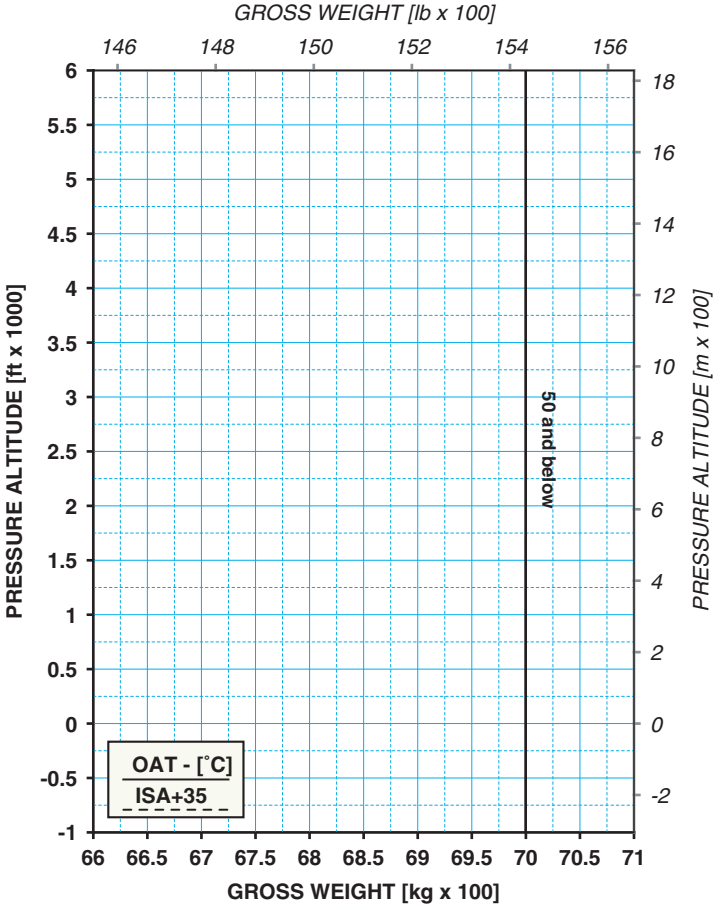

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Figure 4-22 Hover Ceiling IGE at TOP AEO, EAPS OFF

HIGE TAKE OFF POWER EAPS OFF , for COND ON reduce weight by 50 Kg										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
2000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-23 Hover Ceiling IGE at TOP AEO, EAPS OFF Table

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
COND ON: reduce weight by 50 kg

ELECTRICAL LOAD: 600 A TOTAL
EAPS OFF
WHEEL HEIGHT: 5 FT

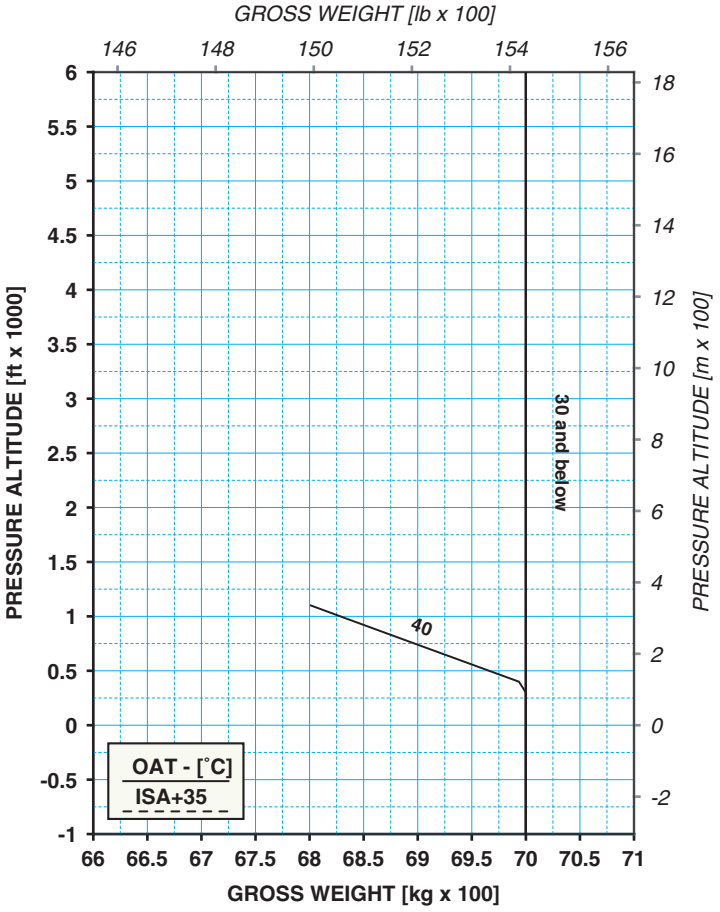

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Figure 4-24 Hover Ceiling IGE at MCP AEO, EAPS OFF

HIGE MAXIMUM CONTINUOUS POWER EAPS OFF, for COND ON reduce weight by 50 Kg										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	6367
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	6117
1000	7000	7000	7000	7000	7000	7000	7000	7000	6828	
2000	7000	7000	7000	7000	7000	7000	7000	7000	6557	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-25 Hover Ceiling IGE at MCP AEO, EAPS OFF Table

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
COND ON: reduce weight by 50 kg

ELECTRICAL LOAD: 600 A TOTAL
EAPS: ON
WHEEL HEIGHT: 5 FT

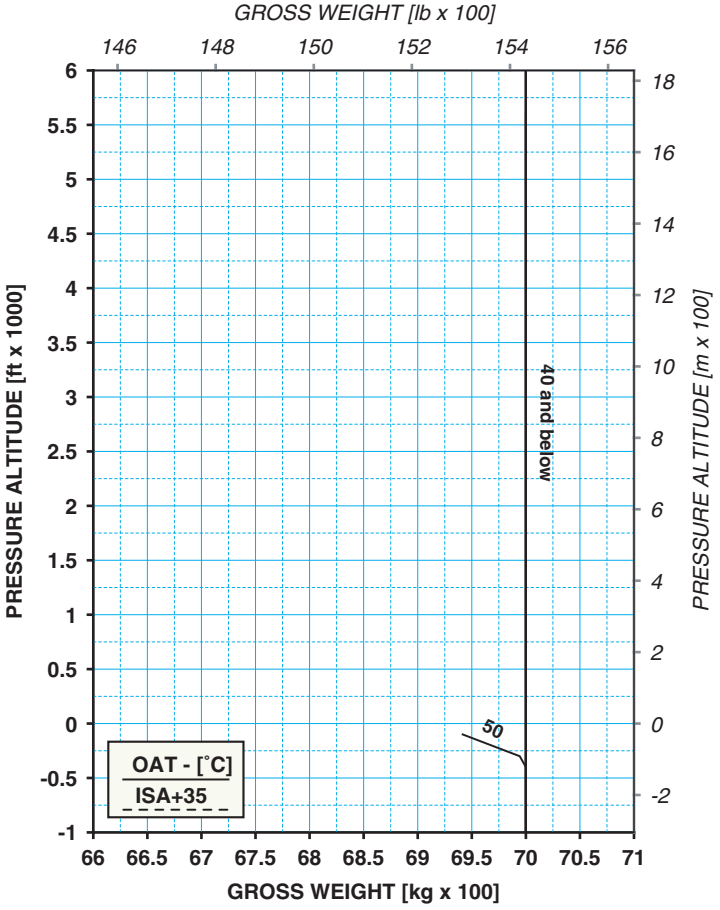

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Figure 4-26 Hover Ceiling IGE at TOP AEO, EAPS ON

HIGE TAKE OFF POWER EAPS ON, for COND ON reduce weight by 50 Kg										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	6915
1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
2000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-27 Hover Ceiling IGE at TOP AEO, EAPS ON Table

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
COND ON: reduce weight by 50 kg

ELECTRICAL LOAD: 600 A TOTAL
EAPS ON
WHEEL HEIGHT: 5 FT

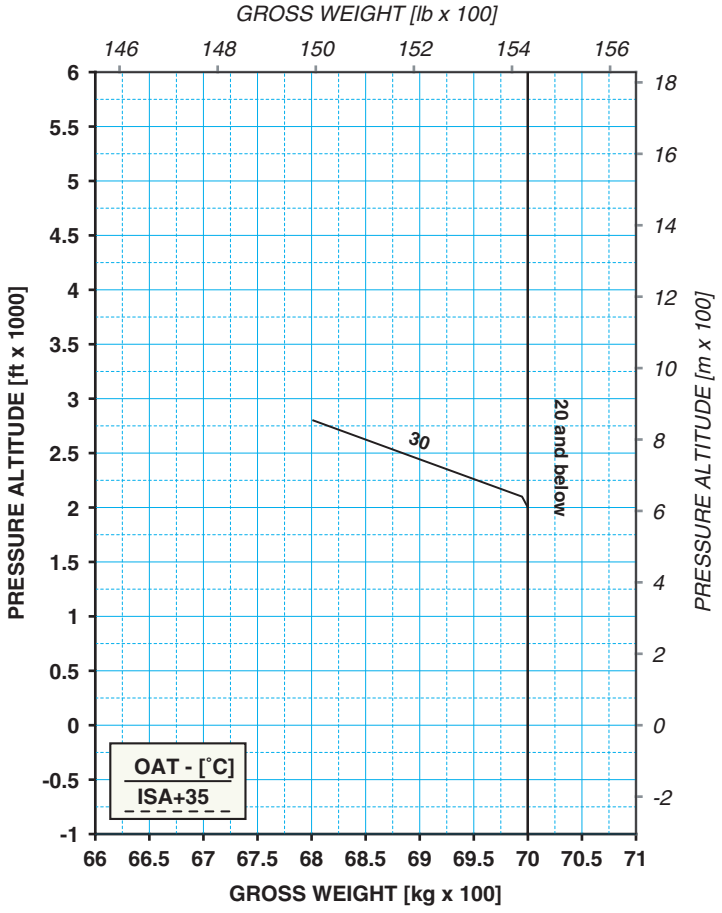

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Figure 4-28 Hover Ceiling IGE at MCP AEO, EAPS ON

HIGE MAXIMUM CONTINUOUS POWER EAPS ON, for COND ON reduce weight by 50 Kg										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	6788	5473
0	7000	7000	7000	7000	7000	7000	7000	7000	6537	5260
1000	7000	7000	7000	7000	7000	7000	7000	7000	6282	
2000	7000	7000	7000	7000	7000	7000	7000	7000	6032	
3000	7000	7000	7000	7000	7000	7000	7000	6747		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-29 Hover Ceiling IGE at MCP AEO, EAPS ON Table

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL
EAPS: OFF/ON
HEATER ON

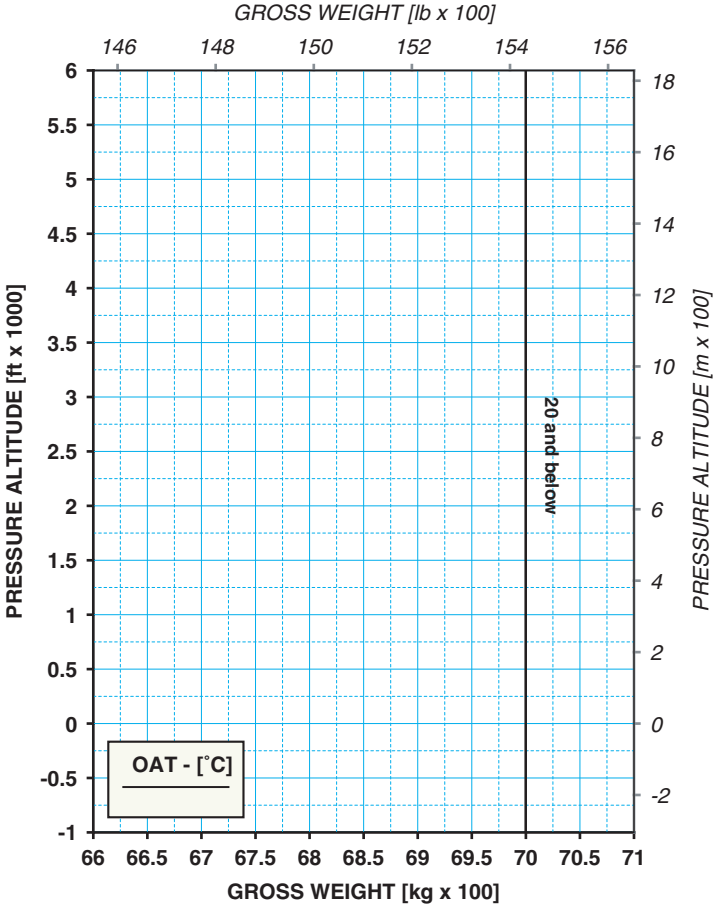

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Figure 4-30 Hover Ceiling IGE at TOP AEO, EAPS OFF/ON, HEATER ON

HIGE TAKE OFF POWER EAPS OFF/ON, HEATER ON										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000			
0	7000	7000	7000	7000	7000	7000	7000			
1000	7000	7000	7000	7000	7000	7000	7000			
2000	7000	7000	7000	7000	7000	7000	7000			
3000	7000	7000	7000	7000	7000	7000	7000			
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-31 Hover Ceiling IGE at TOP AEO, EAPS OFF/ON, HEATER ON Table

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL
EAPS OFF/ON
HEATER ON

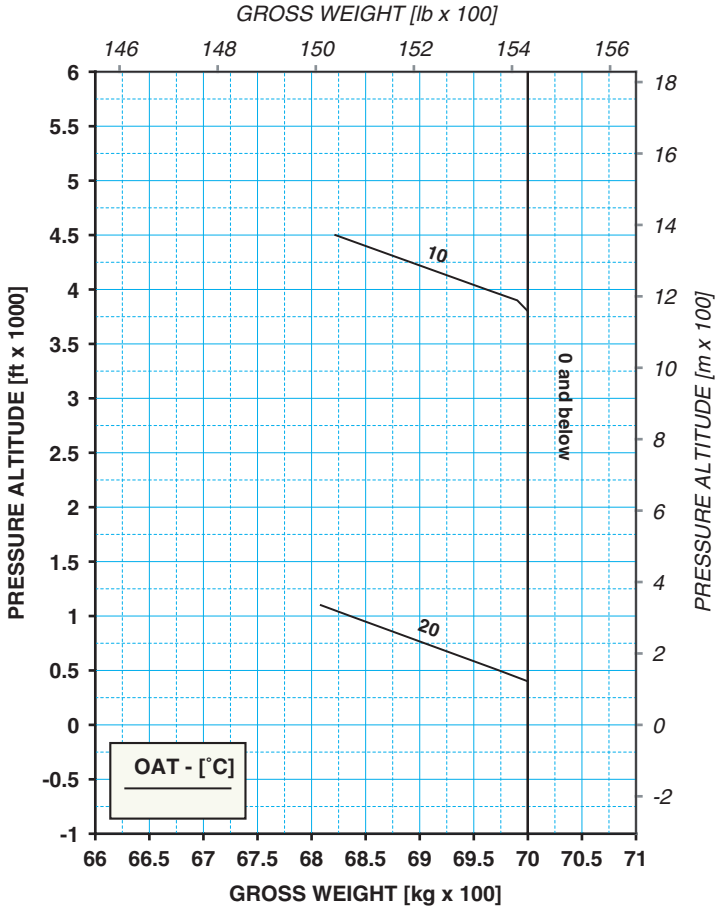

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Figure 4-32 Hover Ceiling IGE at MCP AEO, EAPS OFF/ON, HEATER ON

HIGE MAXIMUM CONTINUOUS POWER EAPS OFF/ON, HEATER ON										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000			
0	7000	7000	7000	7000	7000	7000	7000			
1000	7000	7000	7000	7000	7000	7000	6836			
2000	7000	7000	7000	7000	7000	7000	6565			
3000	7000	7000	7000	7000	7000	7000	6301			
4000	7000	7000	7000	7000	7000	6962	6042			
5000	7000	7000	7000	7000	7000	6683				
6000	7000	7000	7000	7000	7000					

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Figure 4-33 Hover Ceiling IGE at MCP AEO, EAPS OFF/ON, HEATER ON Table

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL
IBF INSTALLED

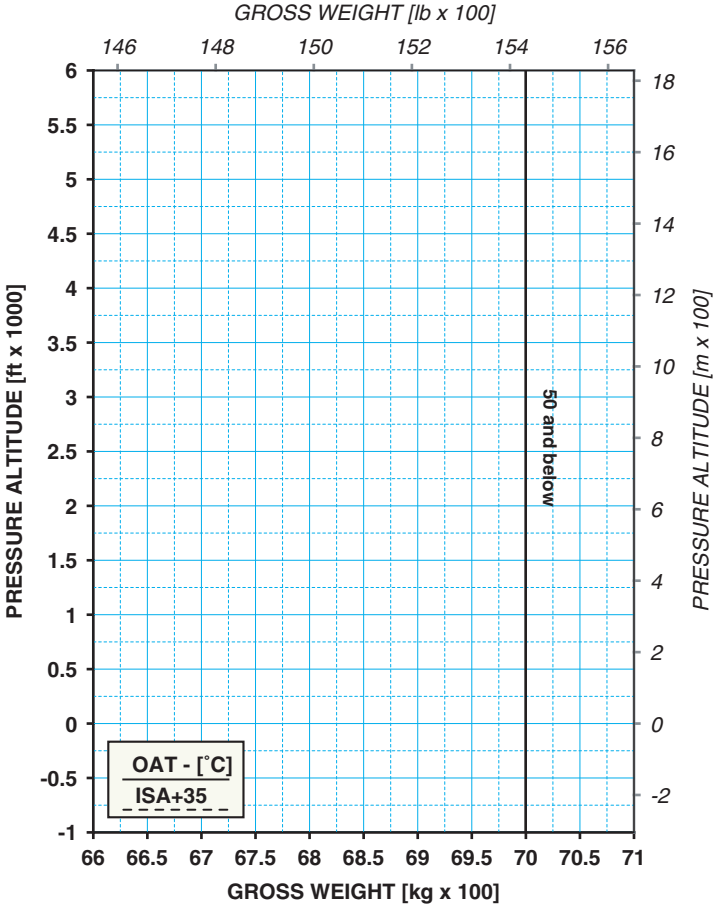

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Figure 4-34 Hover Ceiling IGE at TOP AEO, IBF Installed

HIGE TAKE OFF POWER IBF INSTALLED										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
2000	7000	7000	7000	7000	7000	7000	7000	7000	7000	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-35 Hover Ceiling IGE at TOP AEO, IBF Installed Table

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL
IBF INSTALLED

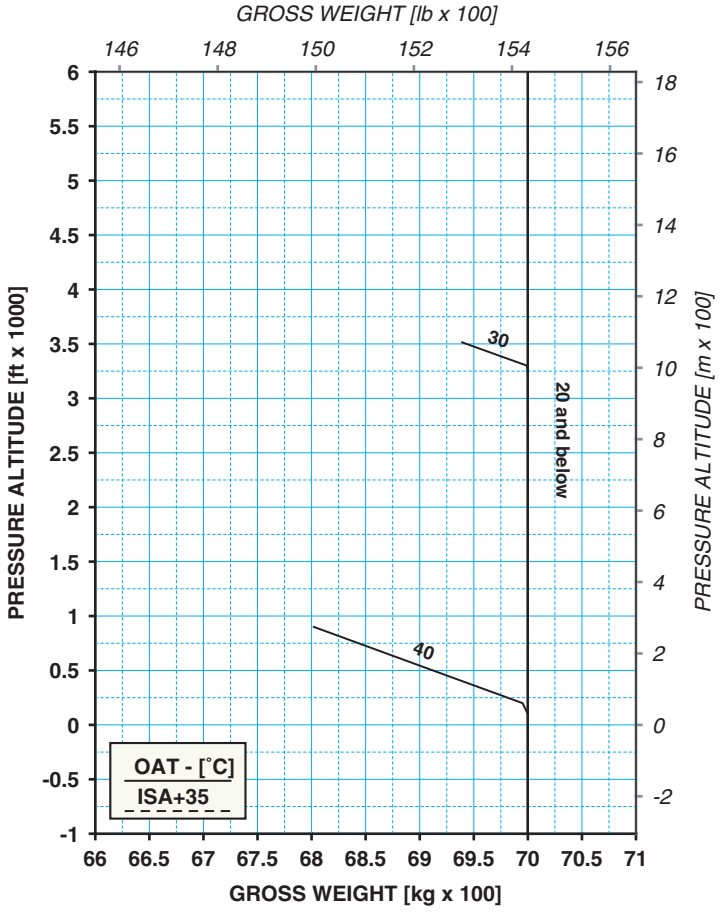

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Figure 4-36 Hover Ceiling IGE at MCP AEO, IBF Installed

HIGE MAXIMUM CONTINUOUS POWER IBF INSTALLED										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	7000	7000	6315
0	7000	7000	7000	7000	7000	7000	7000	7000	7000	6080
1000	7000	7000	7000	7000	7000	7000	7000	7000	6775	
2000	7000	7000	7000	7000	7000	7000	7000	7000	6509	
3000	7000	7000	7000	7000	7000	7000	7000	7000		
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-37 Hover Ceiling IGE at MCP AEO, IBF Installed Table

HOVER CEILING IN GROUND EFFECT
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL
IBF INSTALLED
HEATER ON

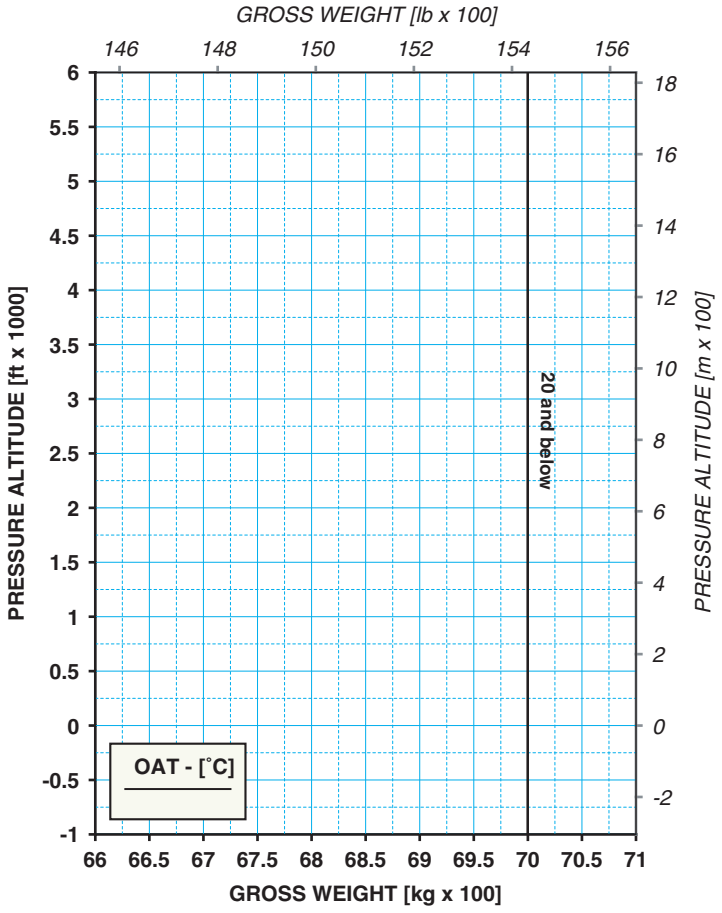

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Figure 4-38 Hover Ceiling IGE at TOP AEO, IBF Installed, HEATER ON

HIGE TAKE OFF POWER IBF INSTALLED, HEATER ON										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000			
0	7000	7000	7000	7000	7000	7000	7000			
1000	7000	7000	7000	7000	7000	7000	7000			
2000	7000	7000	7000	7000	7000	7000	7000			
3000	7000	7000	7000	7000	7000	7000	7000			
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-39 Hover Ceiling IGE at TOP AEO, IBF Installed, HEATER ON Table

HOVER CEILING IN GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
ZERO WIND
WHEEL HEIGHT: 5 FT

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON
IBF INSTALLED

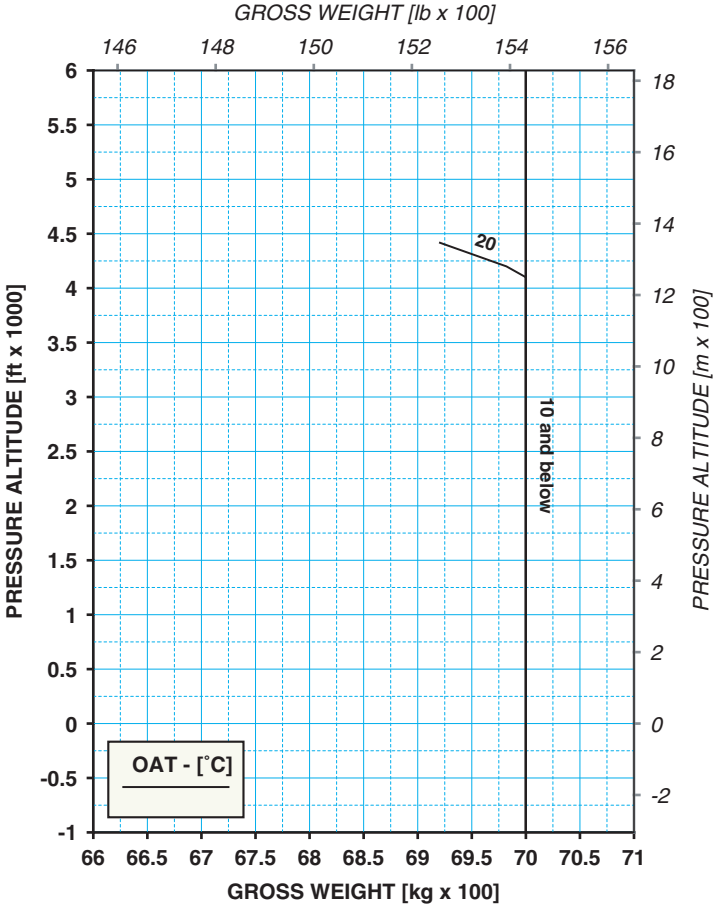

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Figure 4-40 Hover Ceiling IGE at MCP AEO, IBF Installed, HEATER ON

HIGE MAXIMUM CONTINUOUS POWER IBF INSTALLED, HEATER ON										
	OAT [°C]									
Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000			
0	7000	7000	7000	7000	7000	7000	7000			
1000	7000	7000	7000	7000	7000	7000	7000			
2000	7000	7000	7000	7000	7000	7000	7000			
3000	7000	7000	7000	7000	7000	7000	7000			
4000	7000	7000	7000	7000	7000	7000	7000			
5000	7000	7000	7000	7000	7000	7000				
6000	7000	7000	7000	7000	7000					

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Figure 4-41 Hover Ceiling IGE at MCP AEO, IBF Installed, HEATER ON Table

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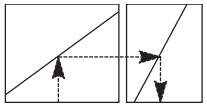
CAT.B TAKE OFF DISTANCE
over 50ft OBSTACLE

ROTOR SPEED: 100%
POWER= H.IGE + 5% TQ PER ENGINE
ELECTRICAL LOAD: 600A TOTAL
ZERO WIND



INITIATED FROM H.IGE (5 FT)
V_{50FT}: 50 KIAS

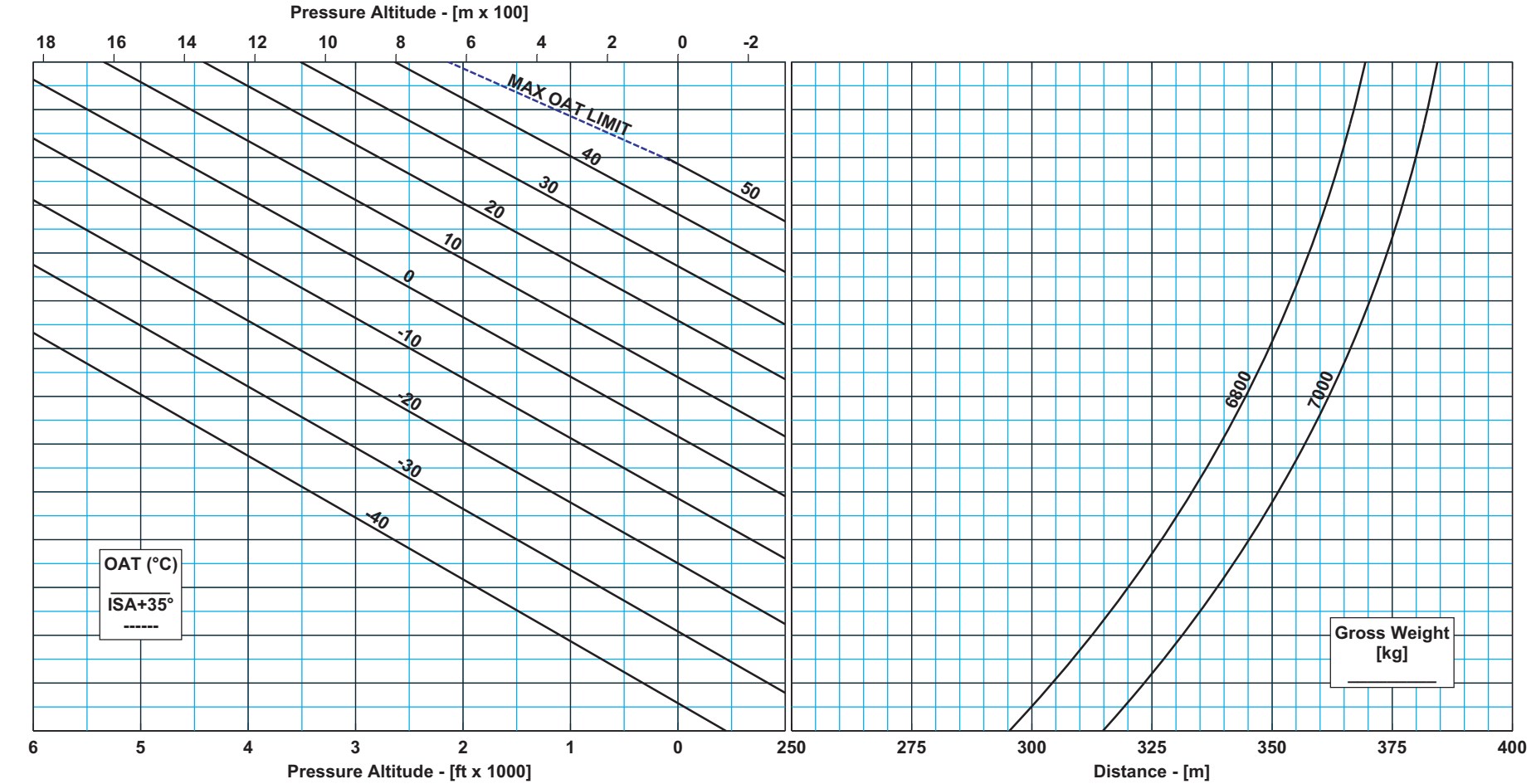


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Figure 4-42 CAT B Take-Off Distance

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CAT.B OEI/AEO LANDING DISTANCE OVER 50 ft OBSTACLE

ROTOR SPEED: 100%
2.5MIN. OEI/TOP AEO MAXIMUM
ELECTRICAL LOAD: 300A OEI/600A AEO
ZERO WIND

V_{app}: 30 KIAS
RATE OF DESCENT: 500 fpm
SURFACE: HARD, SMOOTH, LEVEL
INOPERATIVE ENGINE SECURED

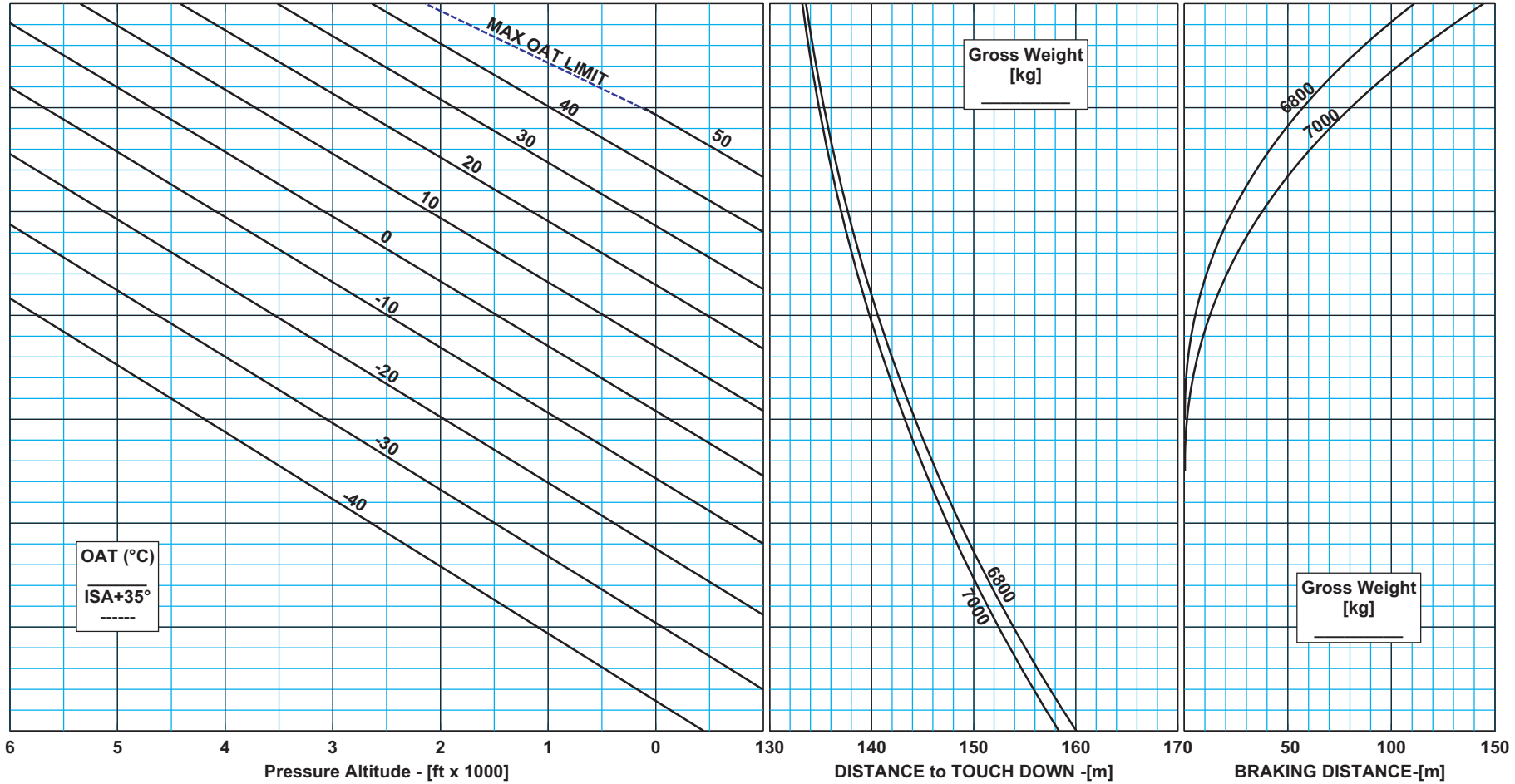

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Figure 4-43 CAT B Landing Distance

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RATE OF CLIMB

The climb performance shown is based on flight test results and covers a range of gross weights from 6800 kg to the Maximum Gross Weight of 7000 kg. (For gross weights below 6800 kg see Basic RFM Supplement 50 or appropriate Supplement for aircraft configuration).

Rate of Climb performance is given for All Engines Operating (AEO) case and for the One Engine Inoperative (OEI) case.

For the AEO case, rate of climb is given with the engines operating at the Maximum Continuous Power (MCP) Rating limits and at Take Off Power Rating limits. For the OEI case, rate of climb is given with the engines operating at the 2.5 min rating limit. The datum speed for all rate of climb graphs presented is 80 KIAS.

For ECS ENVIRO operation in MAN HEAT or A/C RECYCLE use HEATER ON/COND ON ROC charts contained in this Supplement.

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min

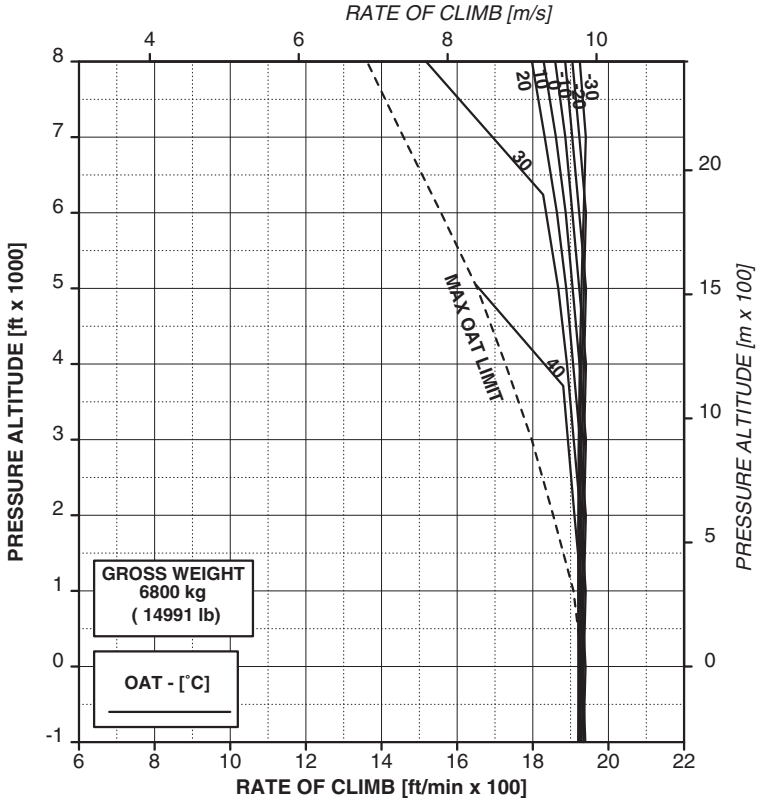

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Figure 4-44 ROC TOP AEO, Gross Weight 6800 kg

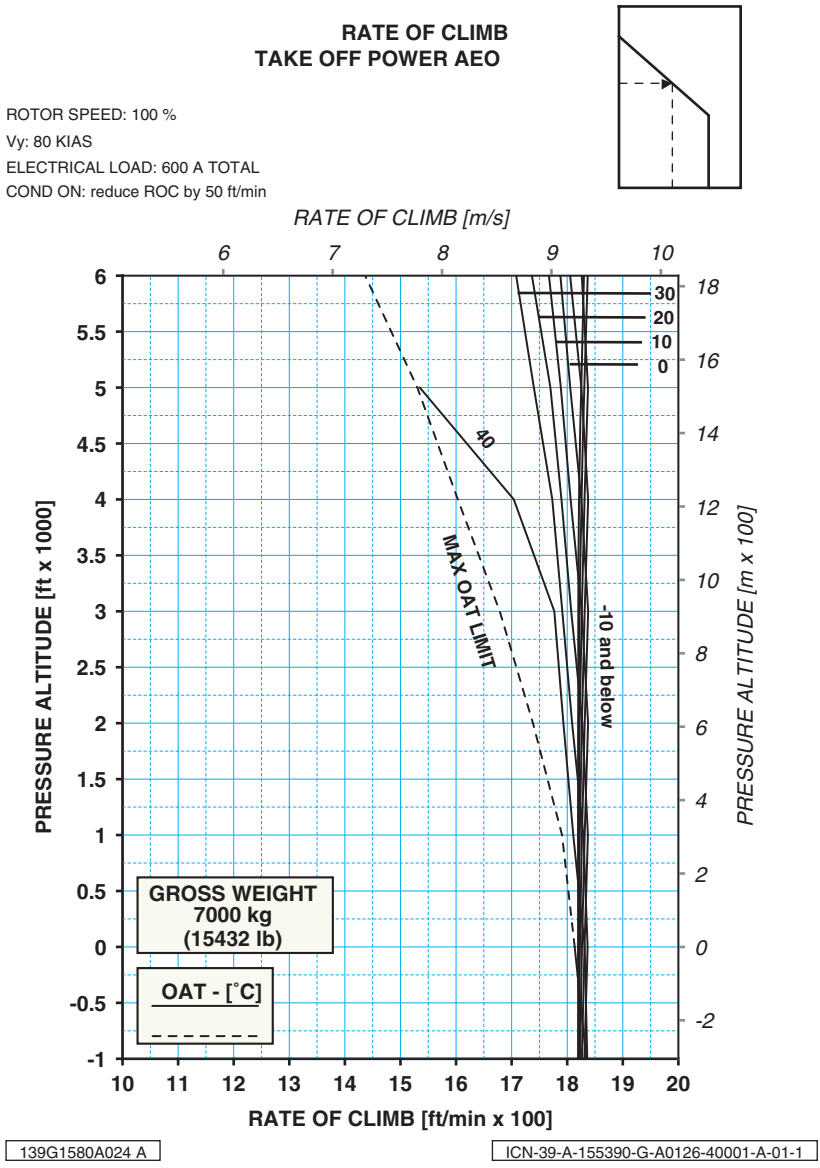

Figure 4-45 ROC TOP AEO, Gross Weight 7000 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min

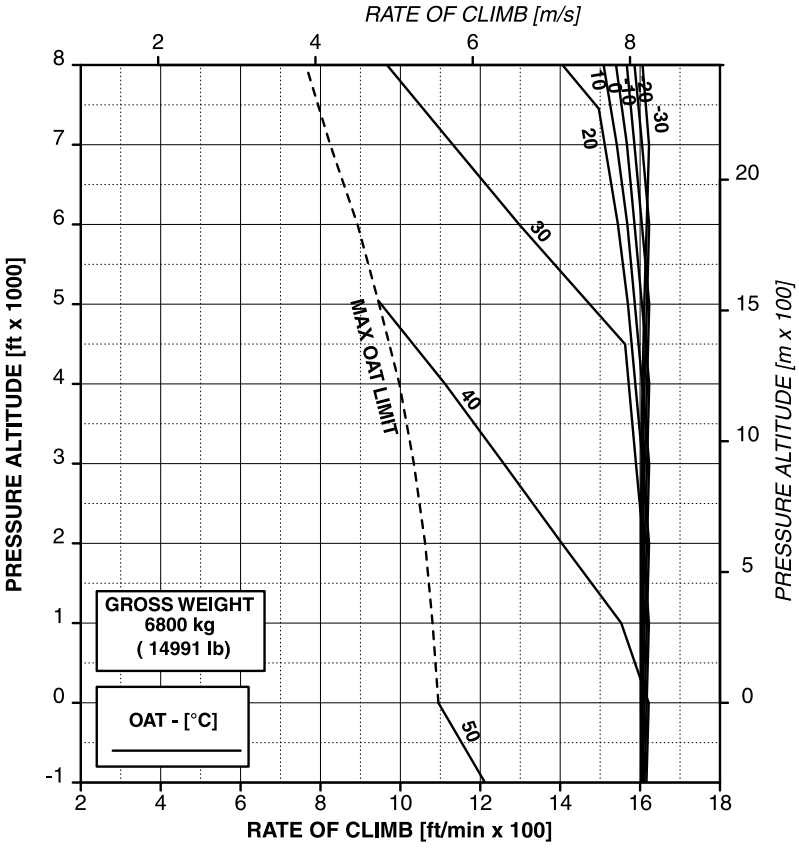

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Figure 4-46 ROC MCP AEO, Gross Weight 6800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

COND ON: reduce ROC by 50 ft/min

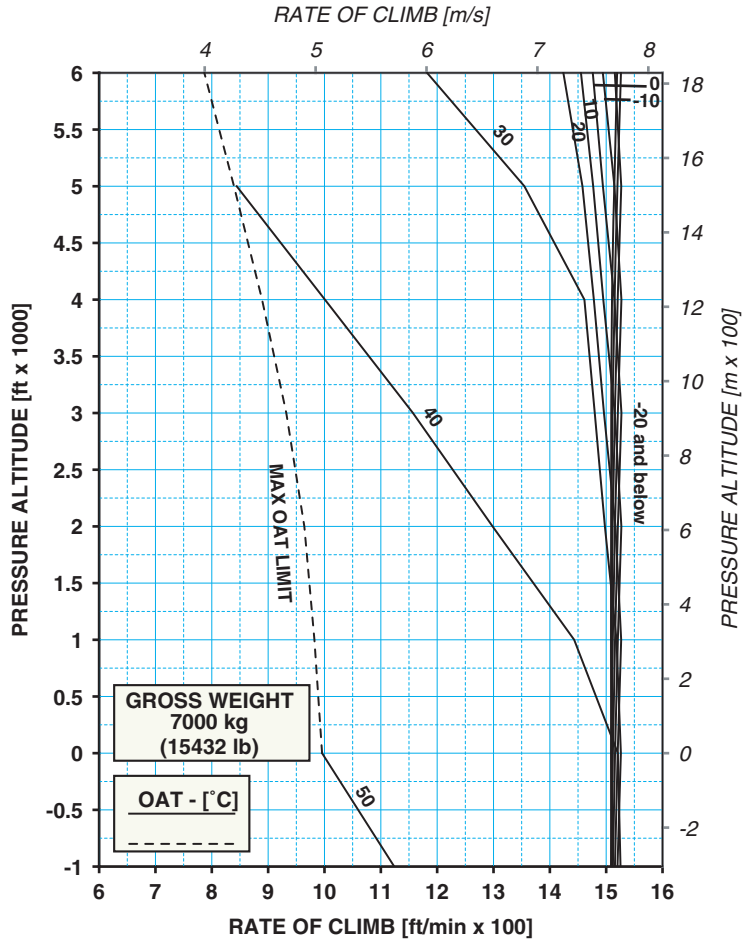

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Figure 4-47 ROC MCP AEO, Gross Weight 7000 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A

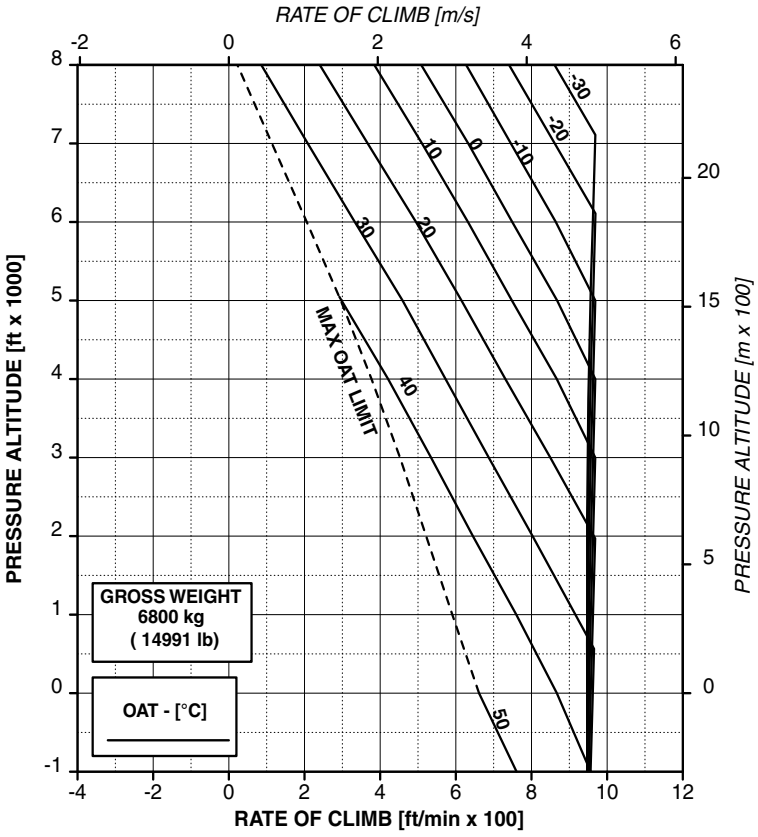

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Figure 4-48 ROC 2.5 Minute Power OEI, Gross Weight 6800 kg

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A TOTAL

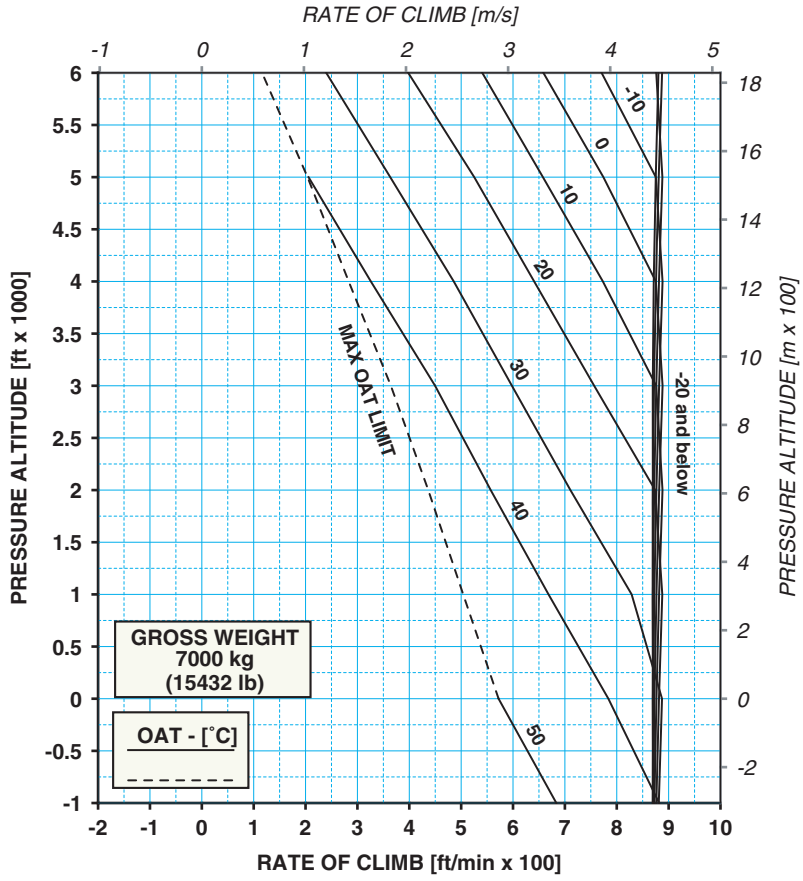

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Figure 4-49 ROC 2.5min OEI, Gross Weight 7000 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100% **ELECTRICAL LOAD: 300 A**
Vy: 80 KIAS

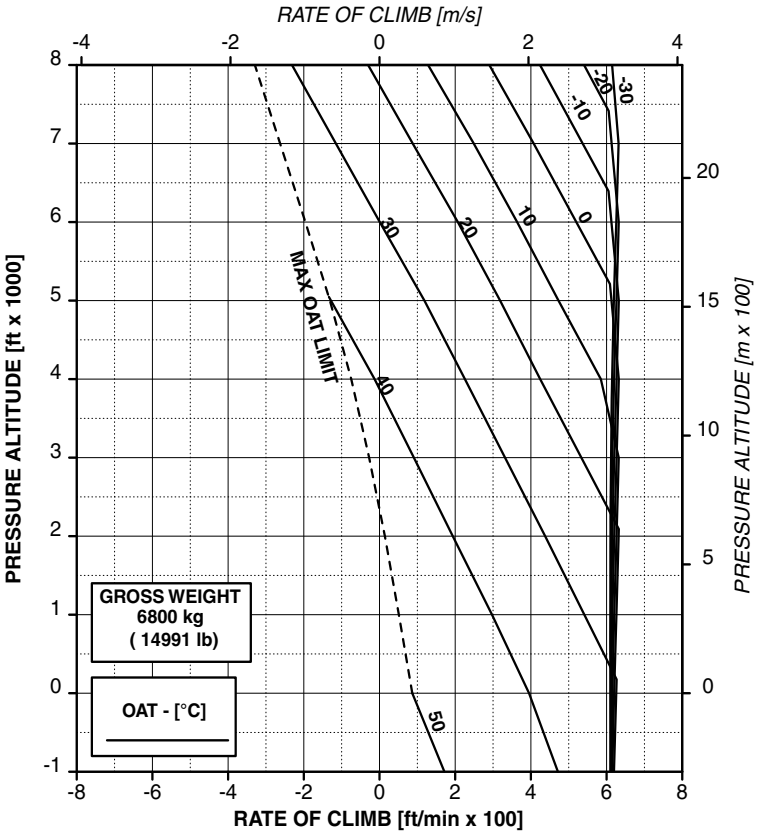

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Figure 4-50 ROC MCP OEI, Gross Weight 6800 kg

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A TOTAL

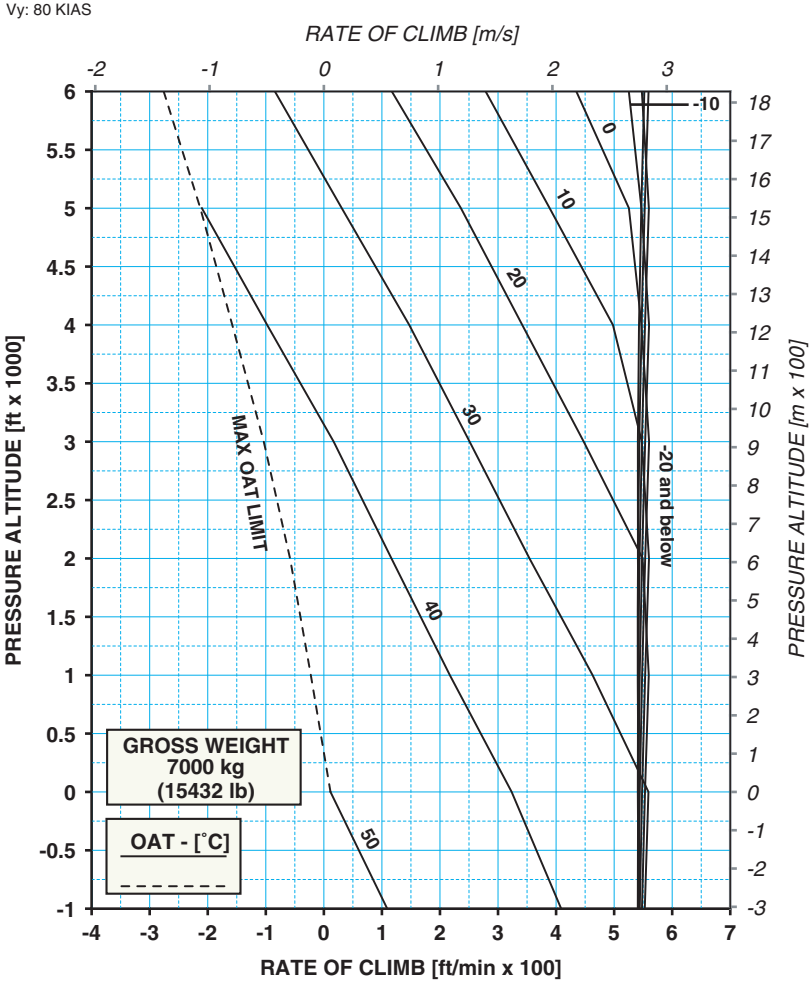

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Figure 4-51 ROC MCP OEI, Gross Weight 7000 kg

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

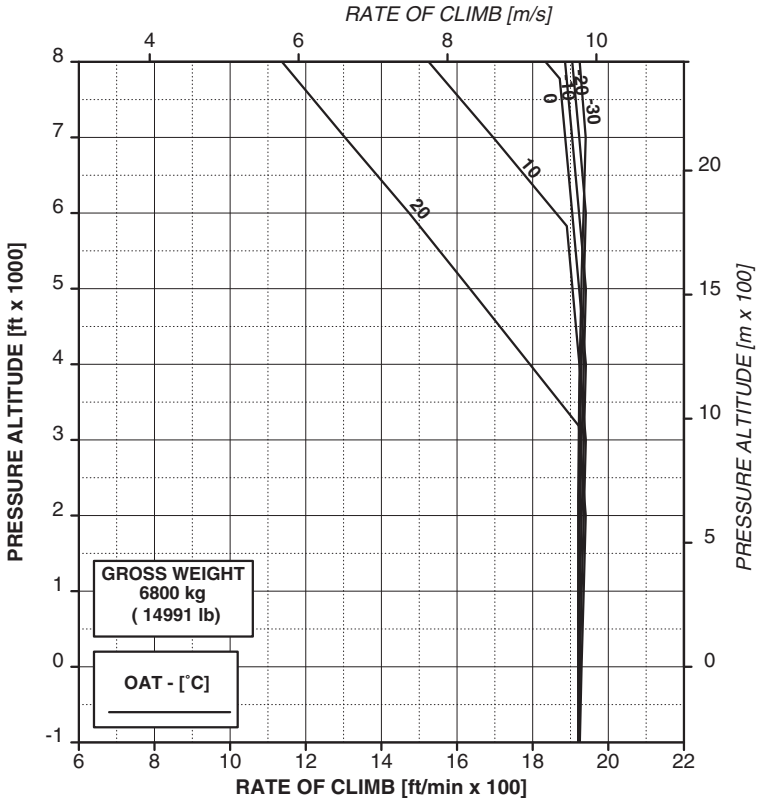

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Figure 4-52 ROC TOP AEO, Gross Weight 6800 kg, HEATER ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

HEATER ON

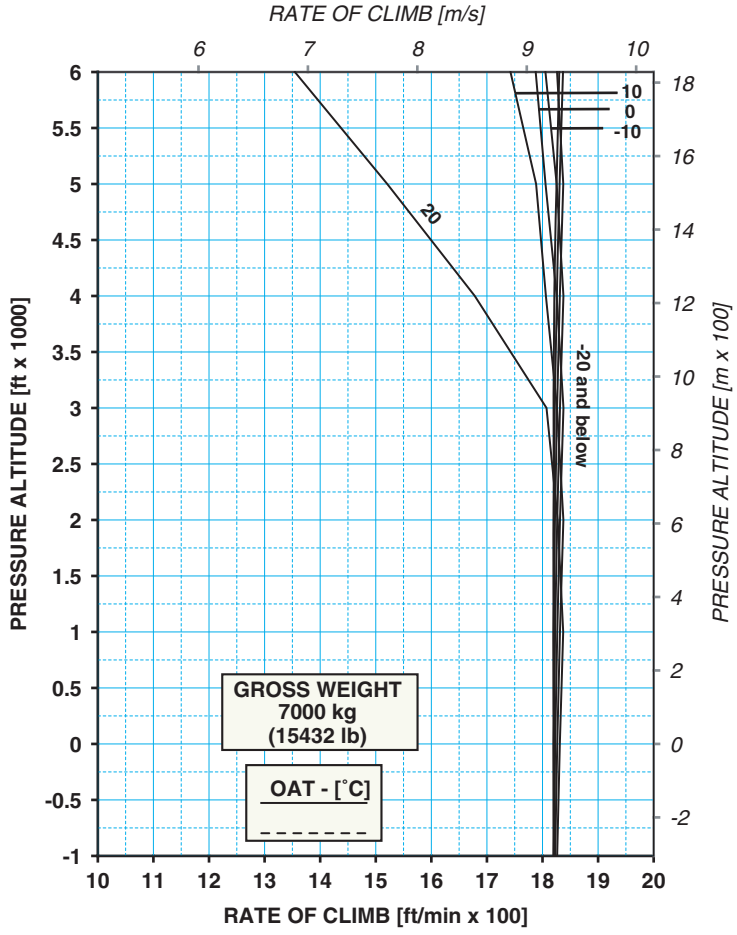

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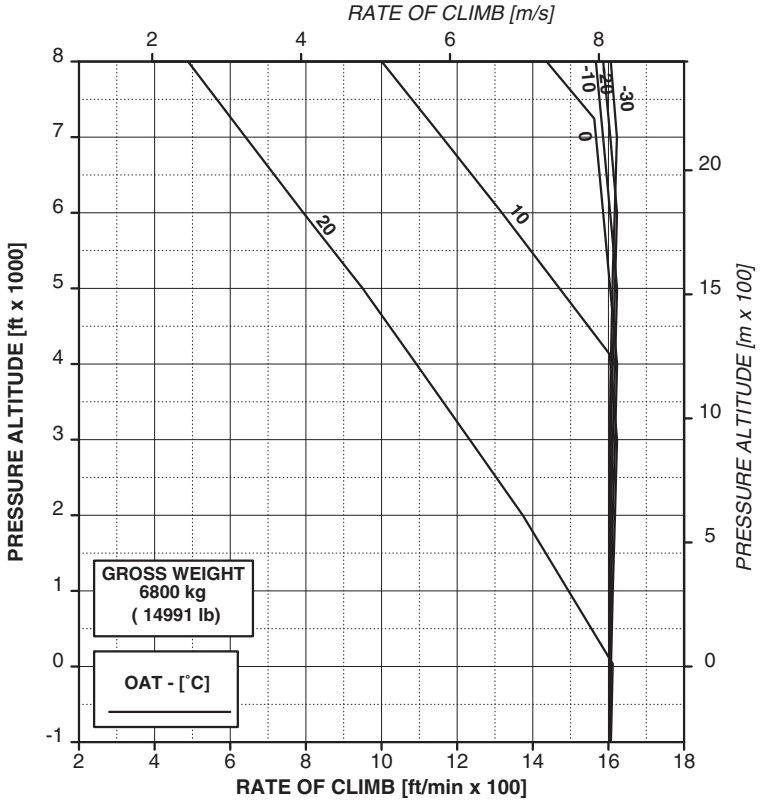
Figure 4-53 ROC TOP AEO, Gross Weight 7000 kg, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



139G1580A006 ISSUE A

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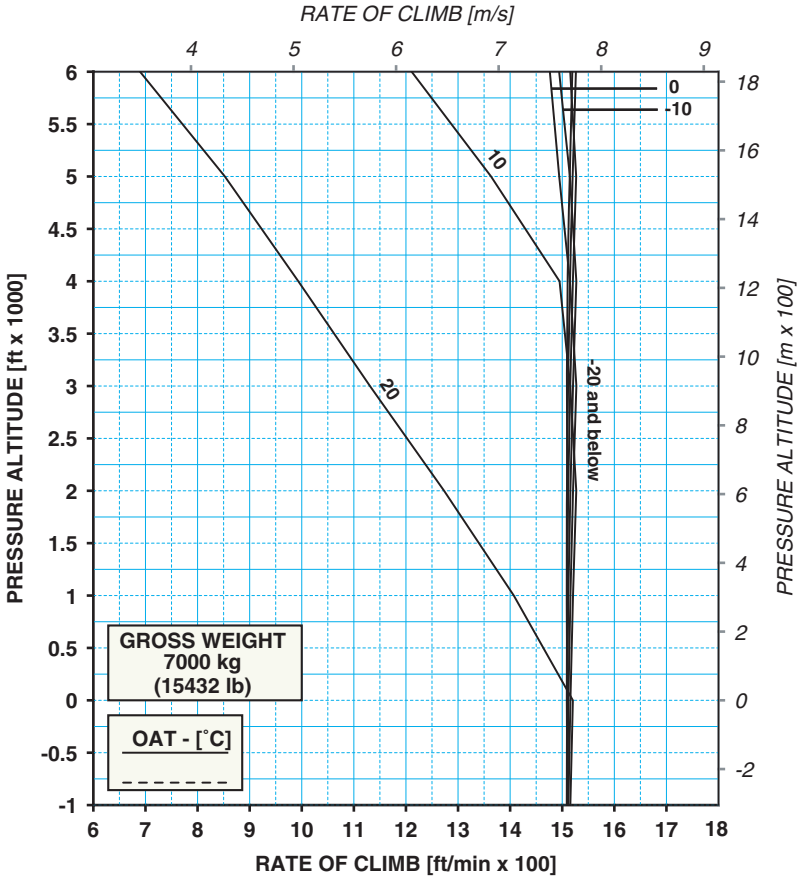
Figure 4-54 ROC MCP AEO, Gross Weight 6800 kg, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

HEATER ON



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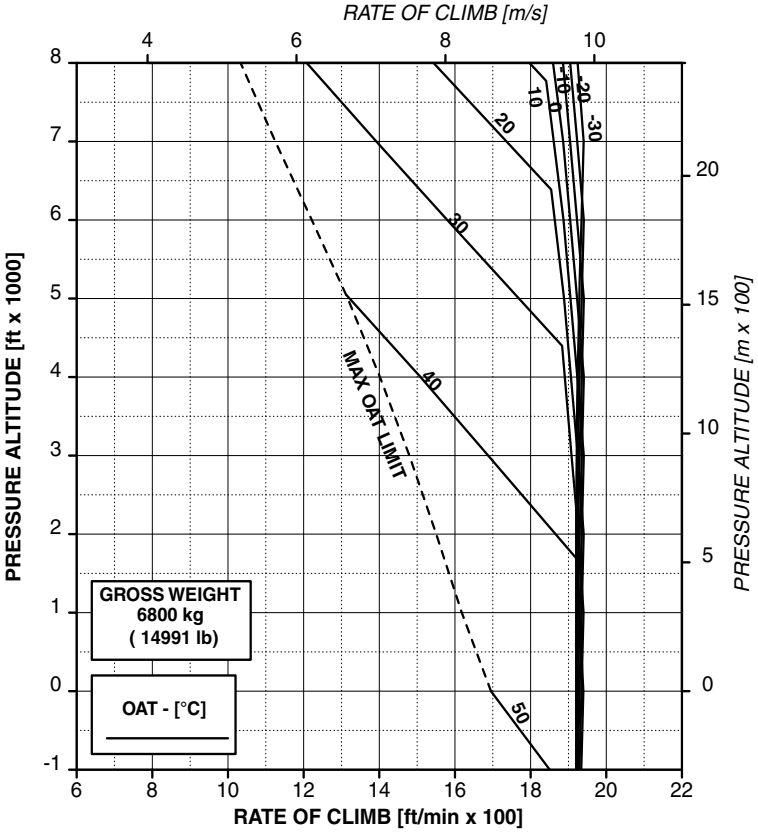
ICN-39-A-155390-G-A0126-40011-A-01-1

Figure 4-55 ROC MCP AEO, Gross Weight 7000 kg, HEATER ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



139G1580A006 ISSUE C

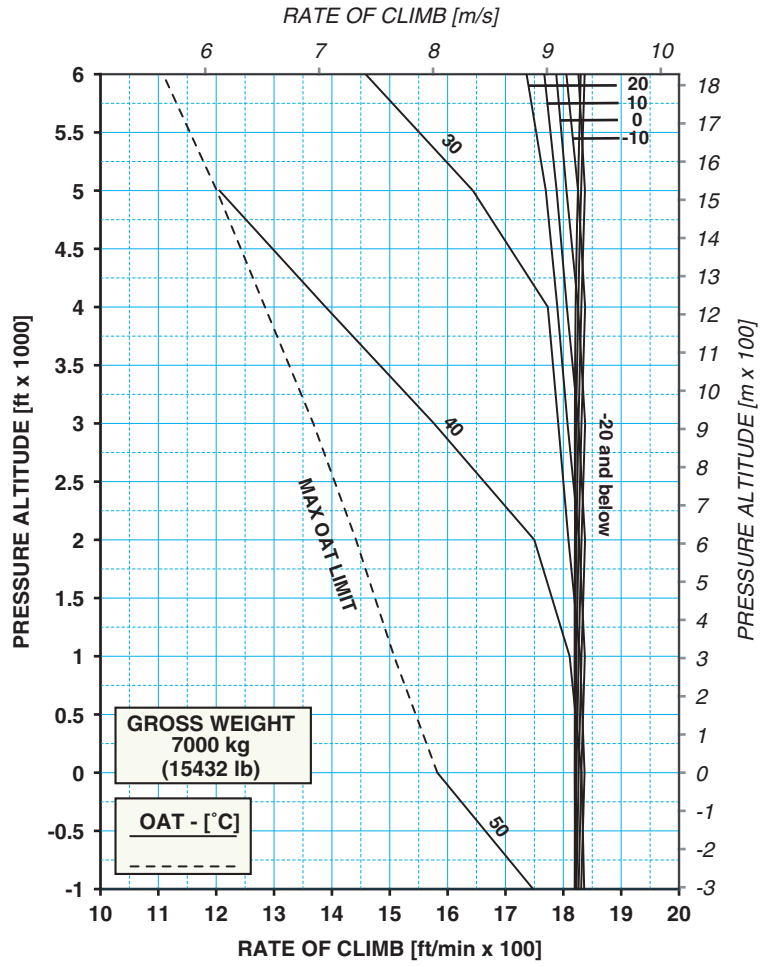
ICN-39-A-155350-A-A0126-40003-A-03-1

Figure 4-56 ROC TOP AEO, Gross Weight 6800 kg, EAPS OFF

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
COND ON: reduce ROC by 50 ft/min

EAPS: OFF
ELECTRICAL LOAD: 600 A TOTAL



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ICN-39-A-155390-G-A0126-40004-A-01-1

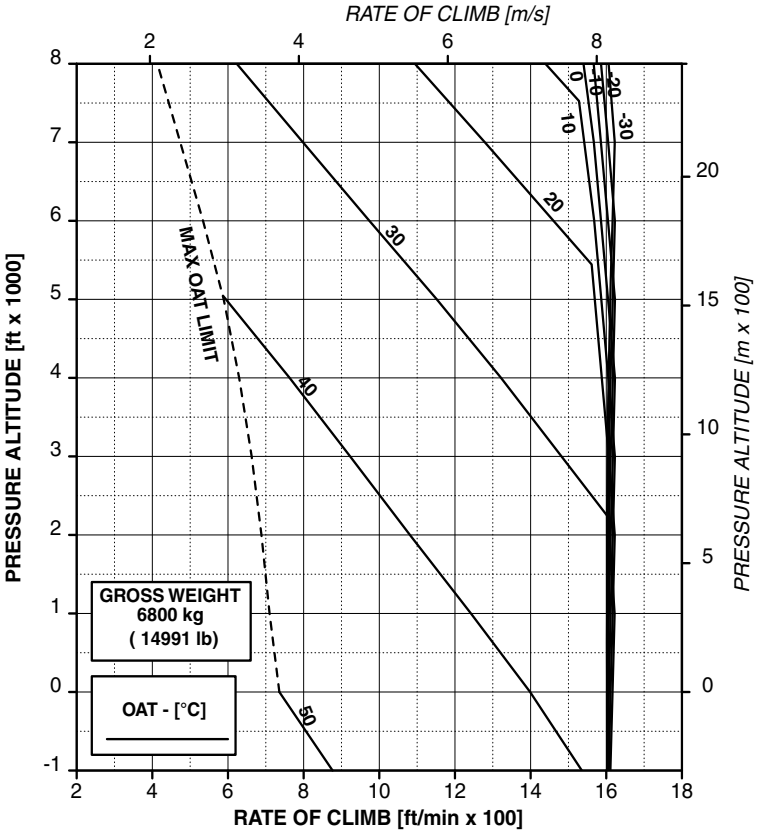
Figure 4-57 ROC TOP AEO, Gross Weight 7000 kg, EAPS OFF

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



139G1580A006 ISSUE C

ICN-39-A-155350-A-A0126-40008-A-03-1

Figure 4-58 ROC MCP AEO, Gross Weight 6800 kg, EAPS OFF

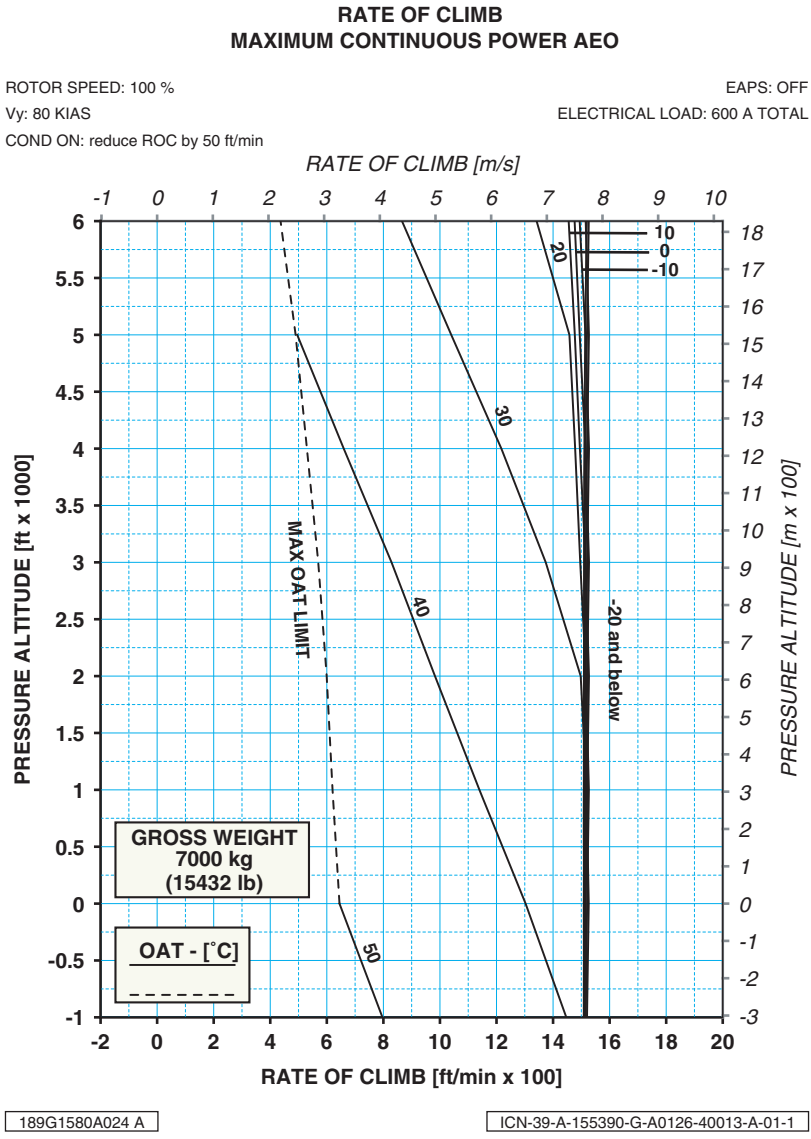


Figure 4-59 ROC MCP AEO, Gross Weight 7000 kg, EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A

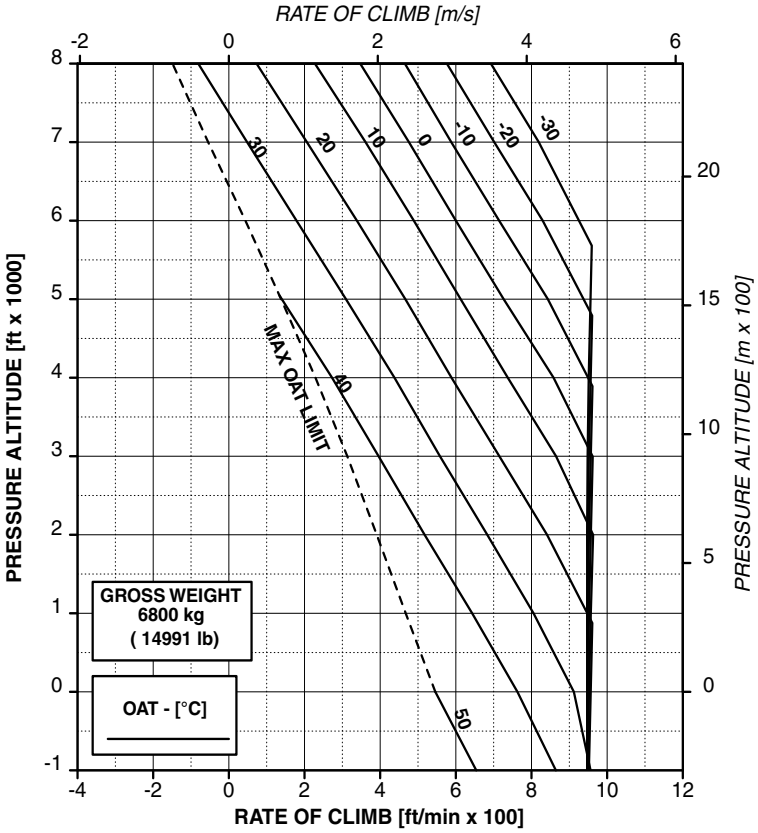


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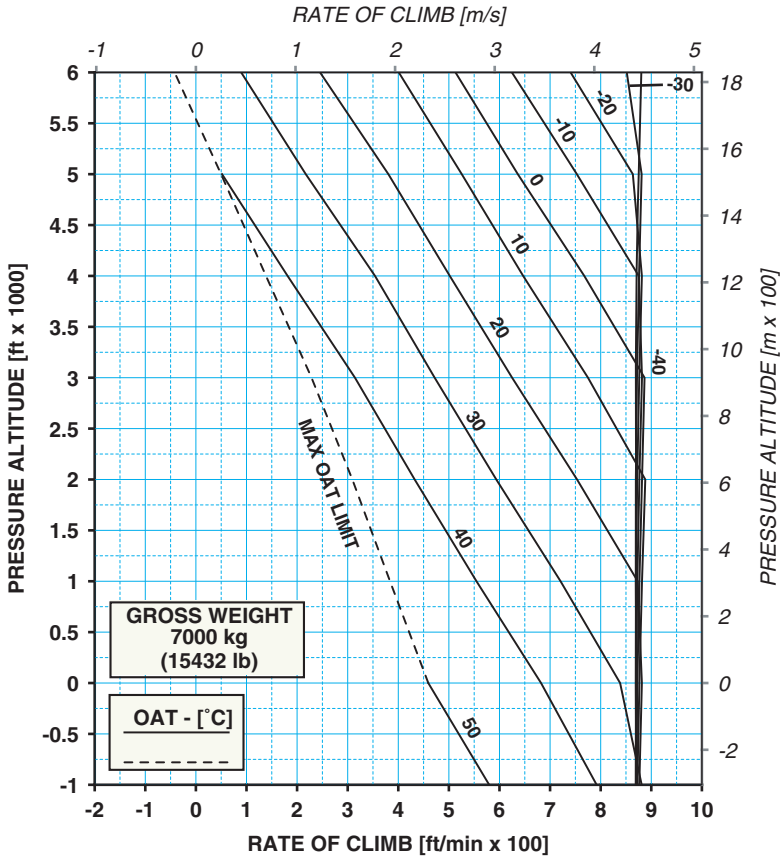
Figure 4-60 ROC 2.5 Min Power OEI, Gross Weight 6800 kg, EAPS OFF

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A TOTAL
EAPS: OFF



139G1580A024 A

ICN-39-A-155390-G-A0126-40020-A-01-1

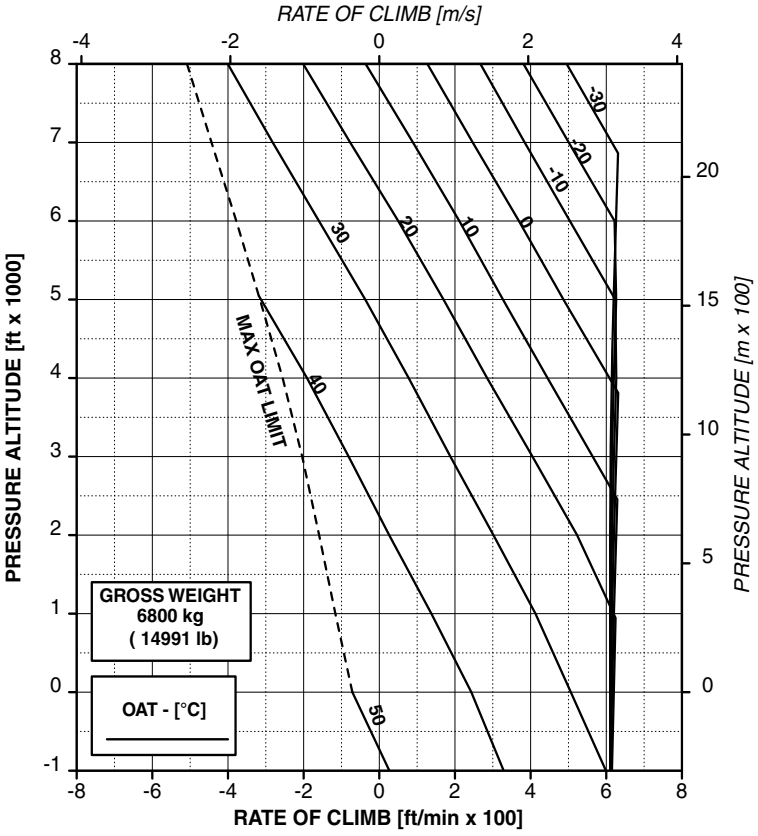
Figure 4-61 ROC 2.5min OEI, Gross Weight 7000 kg, EAPS OFF

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A



139G1580A006 ISSUE C

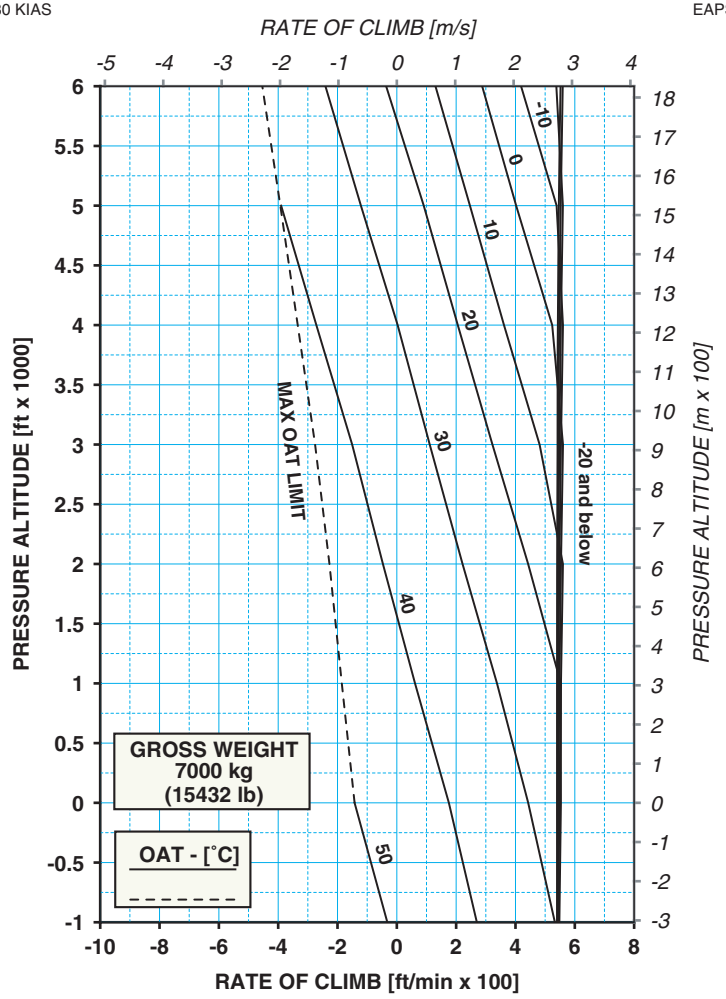
ICN-39-A-155350-A-A0126-40015-A-03-1

Figure 4-62 ROC MCP OEI, Gross Weight 6800 kg, EAPS OFF

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A TOTAL
EAPS: OFF



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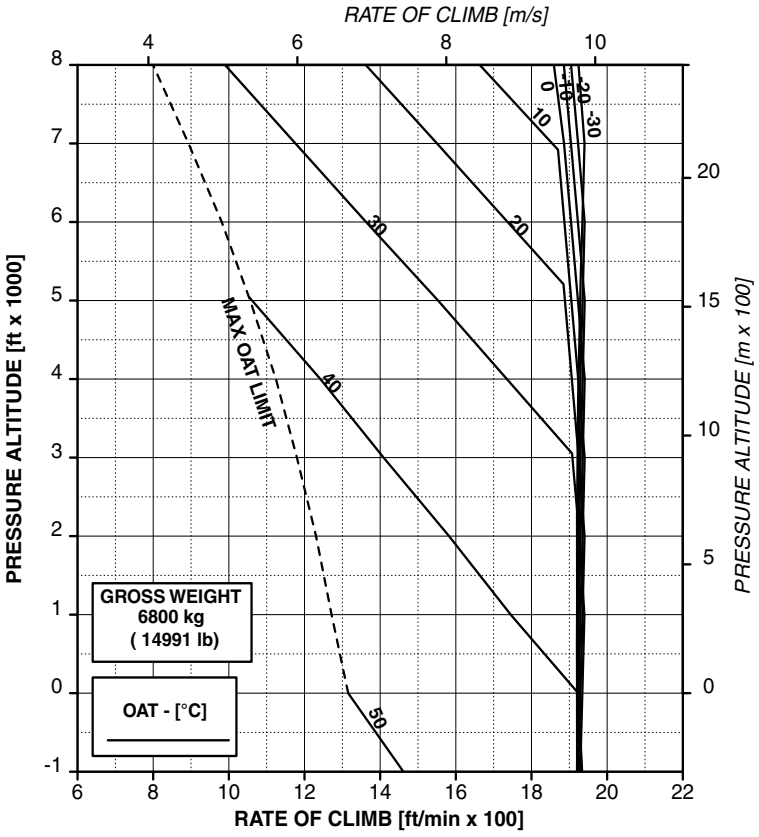
ICN-39-A-155390-G-A0126-40024-A-01-1

Figure 4-63 ROC MCP OEI, Gross Weight 7000 kg, EAPS OFF

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



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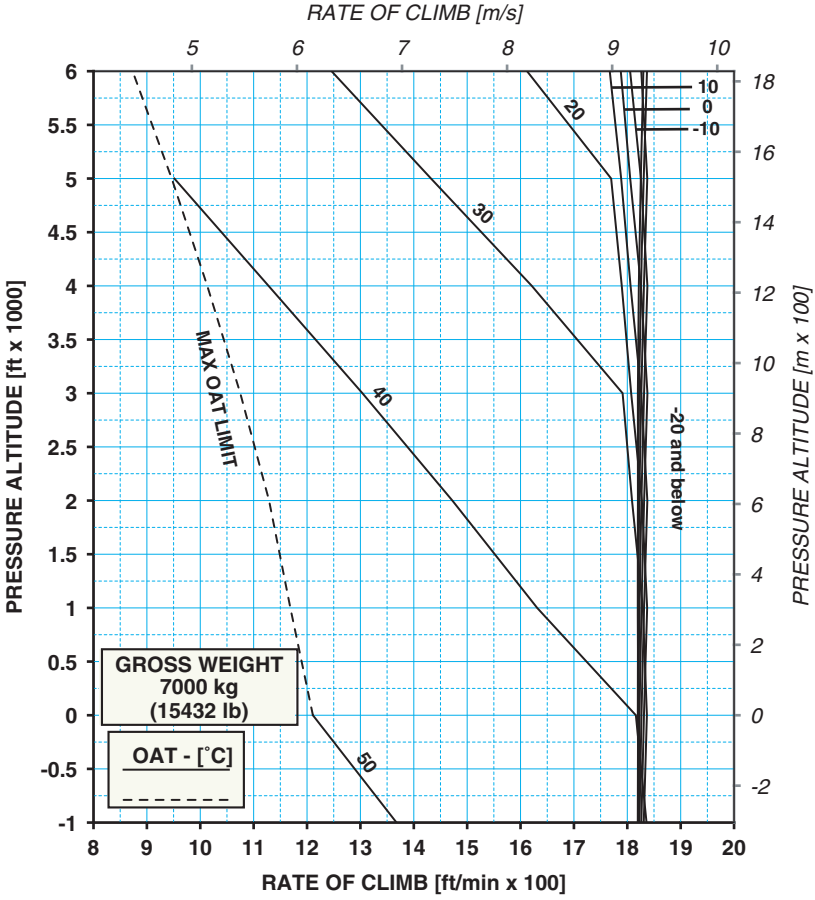
ICN-39-A-155350-A-A0126-40004-A-03-1

Figure 4-64 ROC TOP AEO, Gross Weight 6800 kg, EAPS ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

EAPS: ON
CON ON: reduce ROC by 50 ft/min



189G1580A024 A

ICN-39-A-155390-G-A0126-40005-A-01-1

Figure 4-65 ROC TOP AEO, Gross Weight 7000 kg, EAPS ON

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min

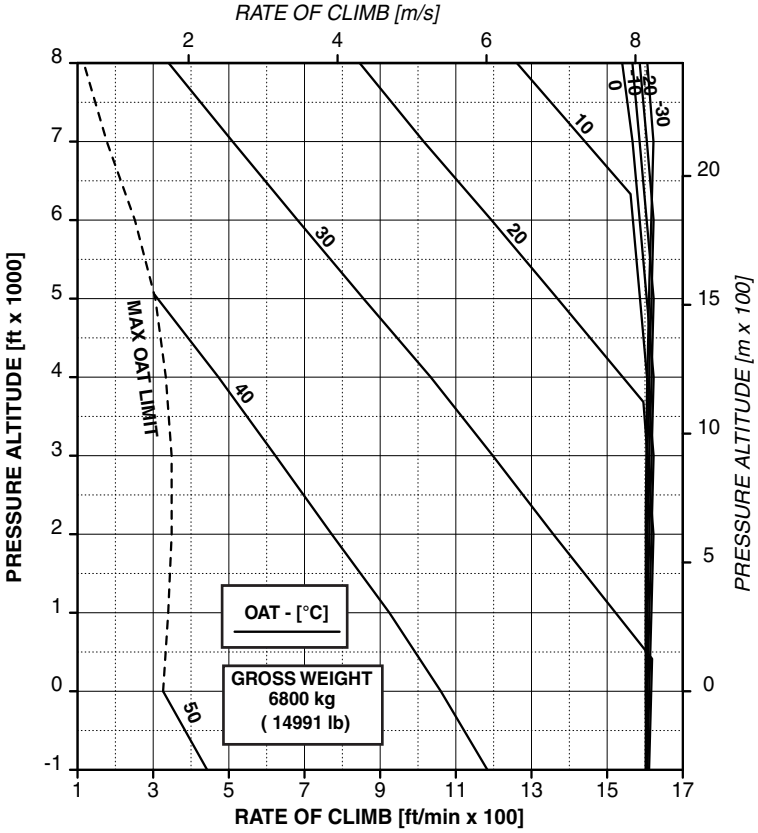


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Figure 4-66 ROC MCP AEO, Gross Weight 6800 kg, EAPS ON

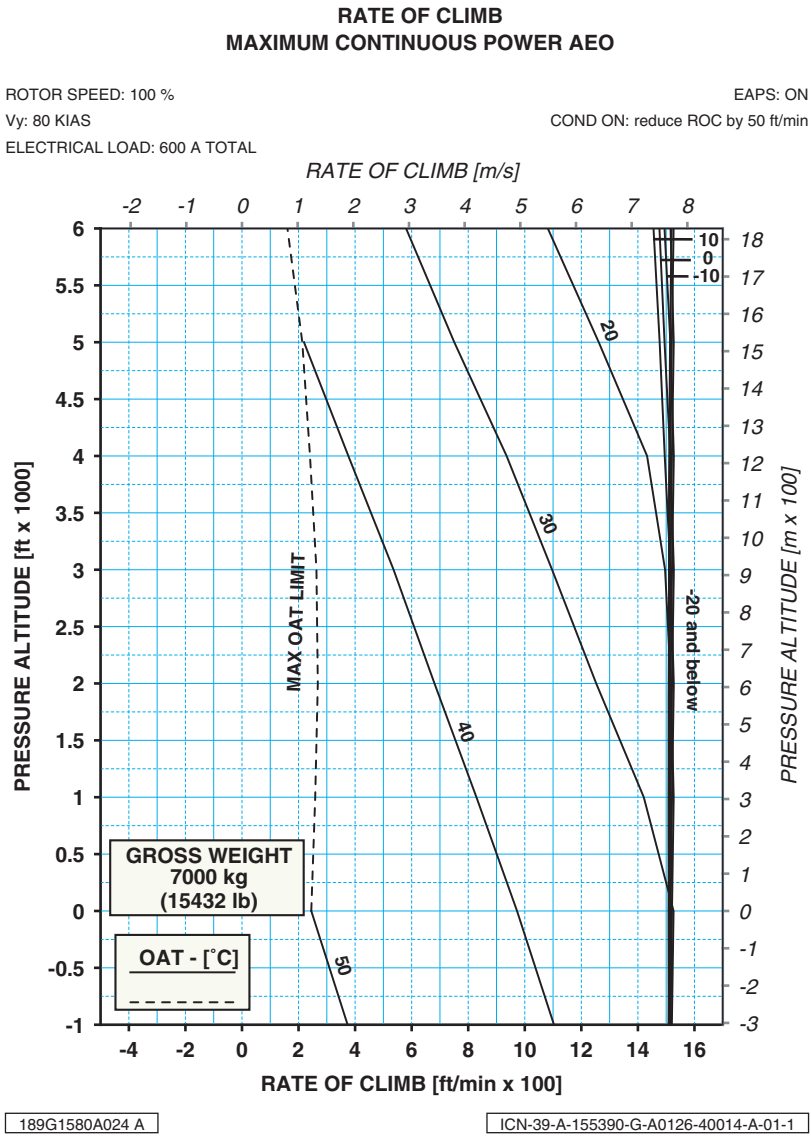
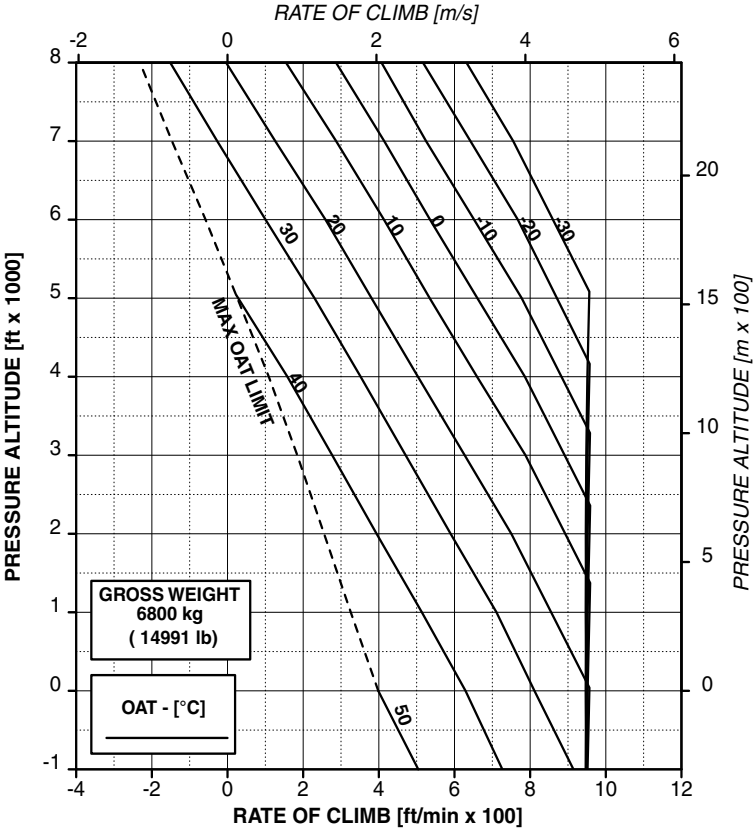


Figure 4-67 ROC MCP AEO, Gross Weight 7000 kg, EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A



139G1580A006 ISSUE C

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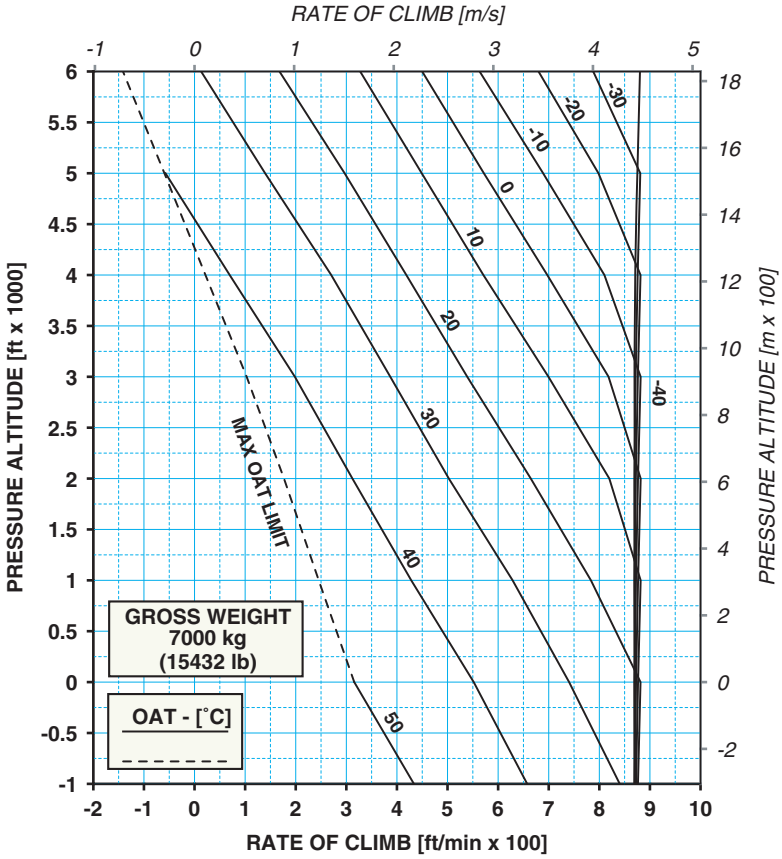
Figure 4-68 ROC 2.5 Min Power OEI, Gross Weight 6800 kg, EAPS ON

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A TOTAL
EAPS: ON



139G1580A024 A

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Figure 4-69 ROC 2.5min OEI, Gross Weight 7000 kg, EAPS ON

RATE OF CLIMB

MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A

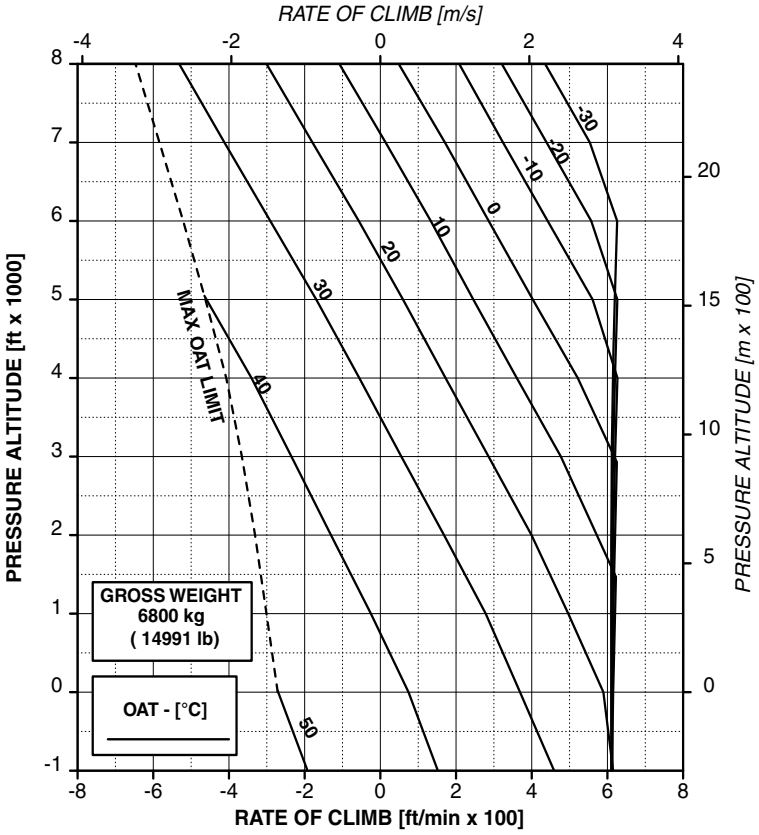

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Figure 4-70 ROC MCP OEI, Gross Weight 6800 kg, EAPS ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A TOTAL
EAPS: ON

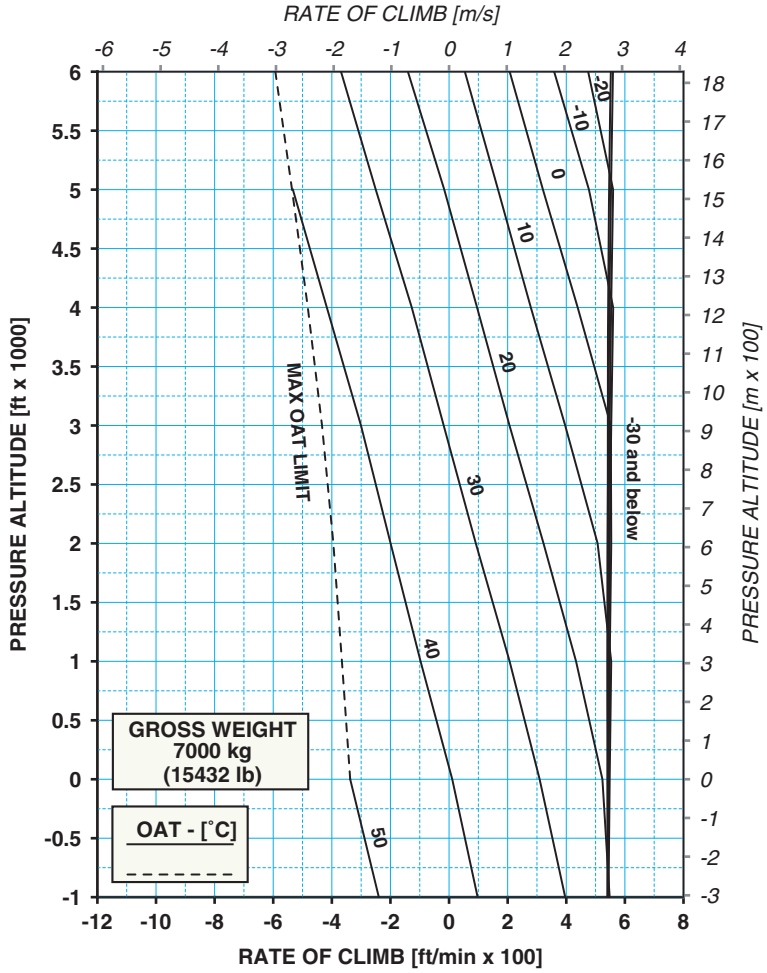

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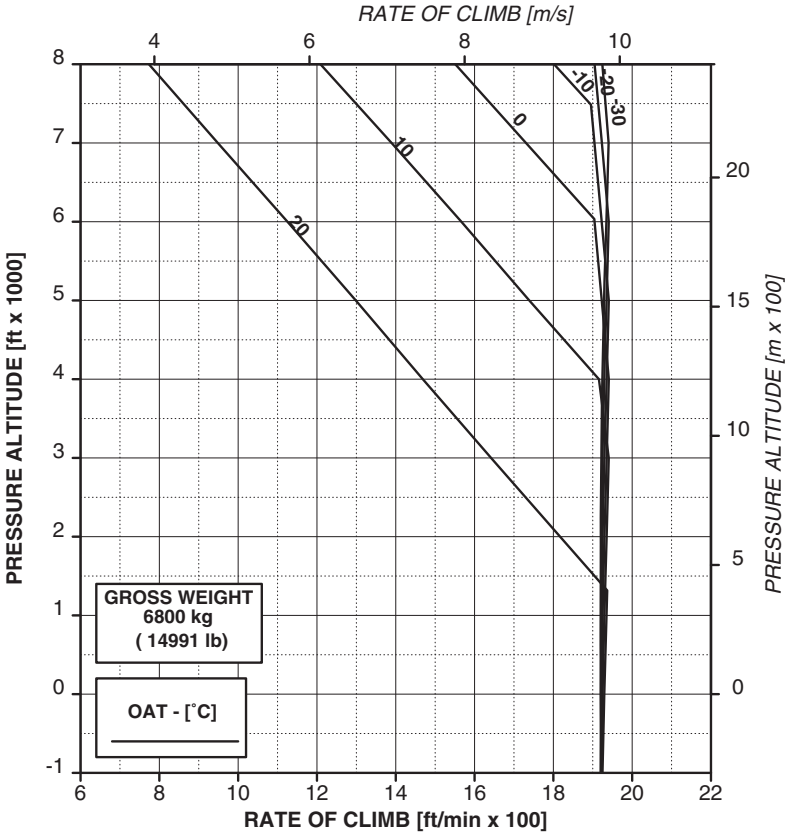
Figure 4-71 ROC MCP OEI, Gross Weight 7000 kg, EAPS ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON



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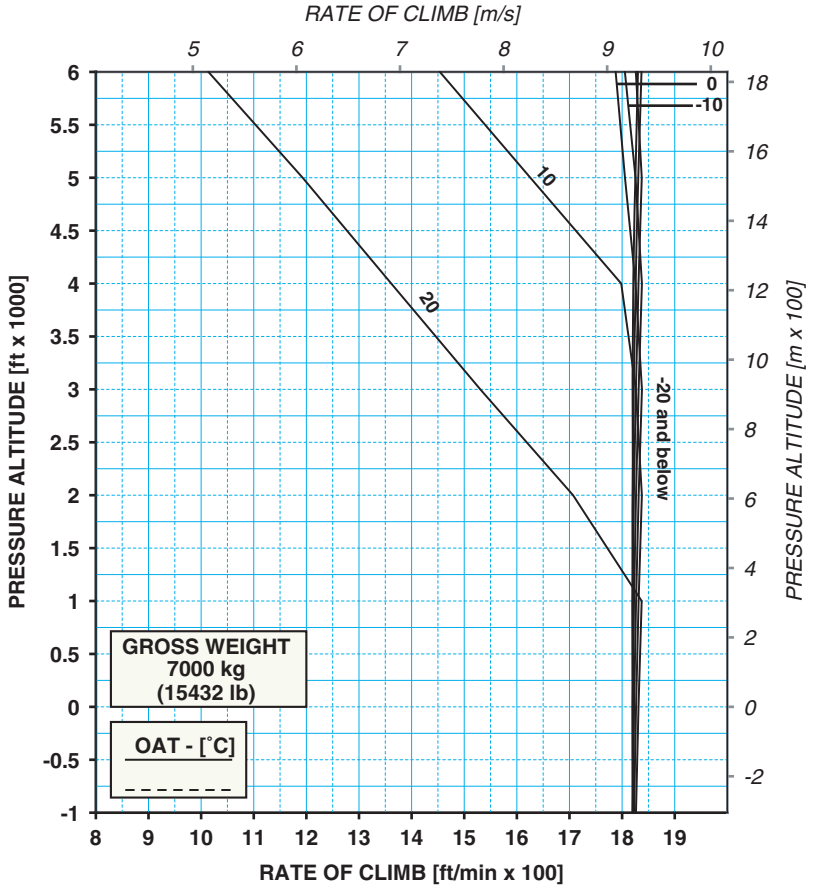
ICN-39-A-155350-A-A0126-40005-A-01-1

Figure 4-72 ROC TOP AEO, Gross Weight 6800 kg, EAPS OFF/ON, HEATER ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

HEATER ON
EAPS: OFF/ON



139G1580A024 A

ICN-39-A-155390-G-A0126-40006-A-01-1

Figure 4-73 ROC TOP AEO, Gross Weight 7000 kg, EAPS OFF/ON, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100%
Vy: 80 KIAS
EAPS: OFF/ON

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

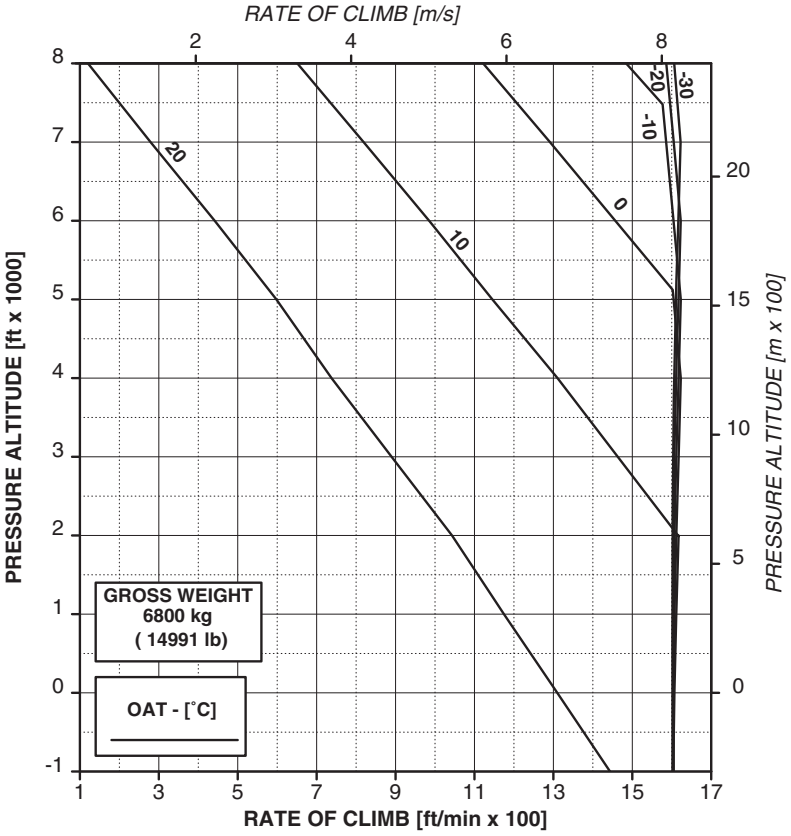


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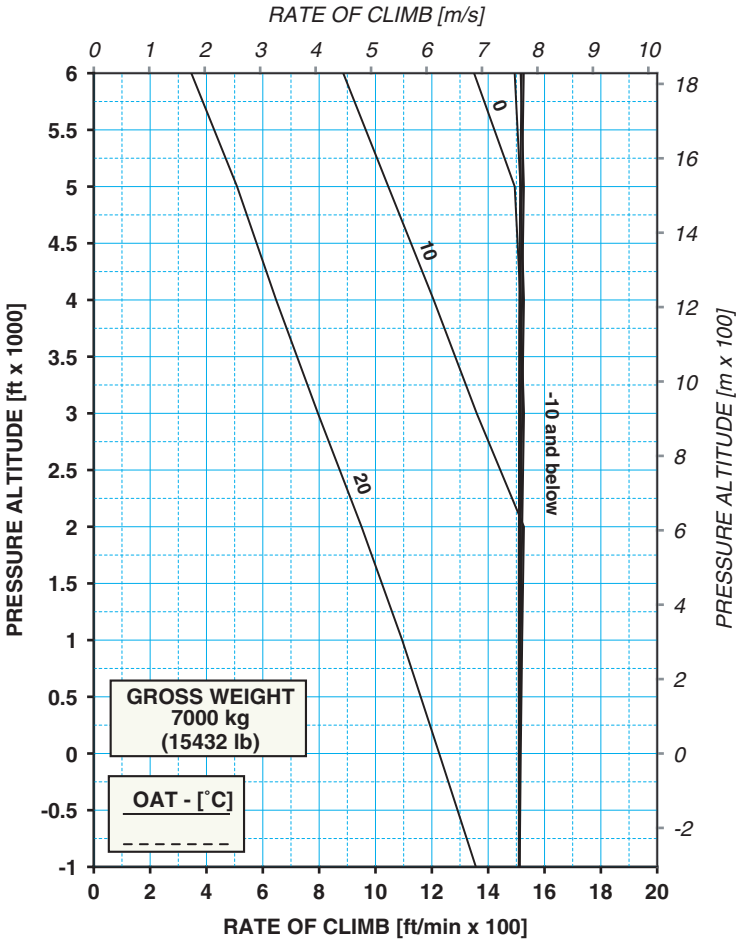
Figure 4-74 ROC MCP AEO, Gross Weight 6800 kg, EAPS OFF/ON, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

HEATER: ON
EAPS: OFF/ON



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ICN-39-A-155390-G-A0126-40015-A-01-1

Figure 4-75 ROC MCP AEO, Gross Weight 7000 kg, EAPS OFF/ON, HEATER ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KTS
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
COND ON: ROC by 50 ft/min

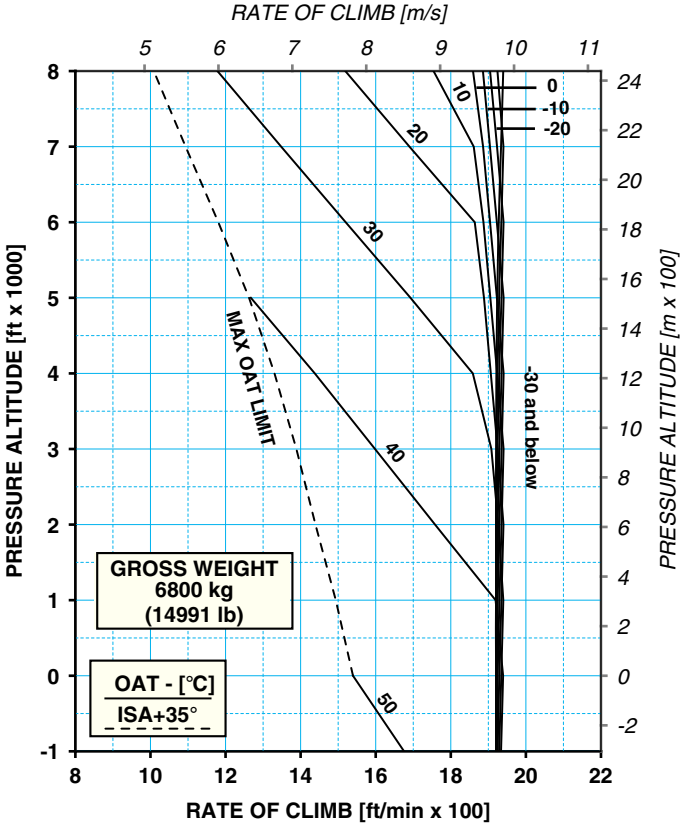

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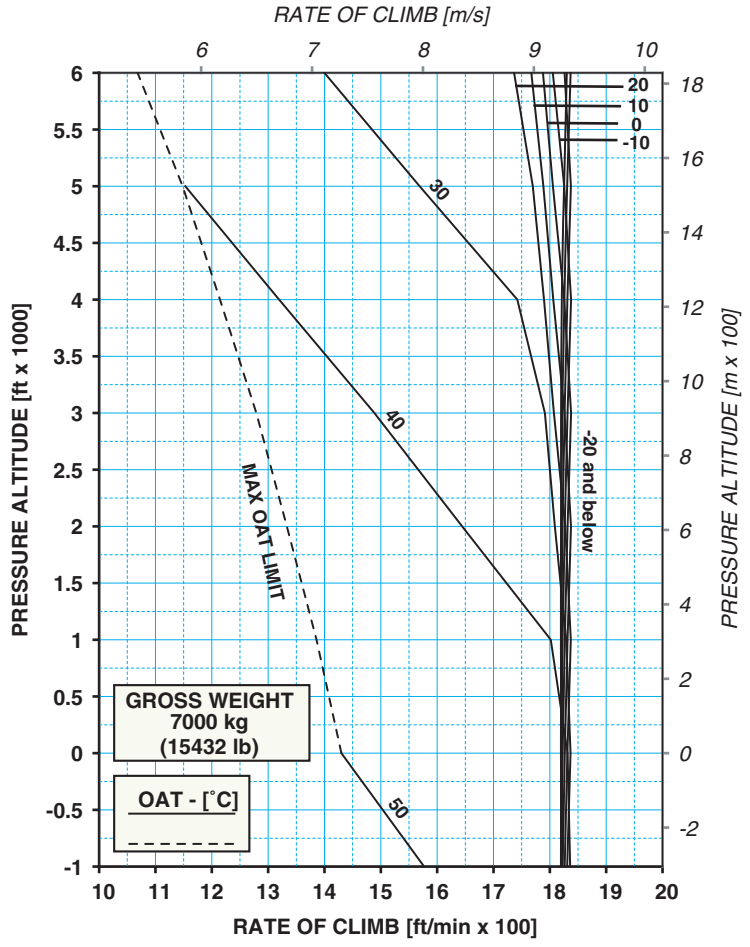
Figure 4-76 ROC TOP AEO, Gross Weight 6800 kg, IBF Installed

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

IBF INSTALLED
COND ON: reduce ROC by 50 ft/min



139G1580A024 A

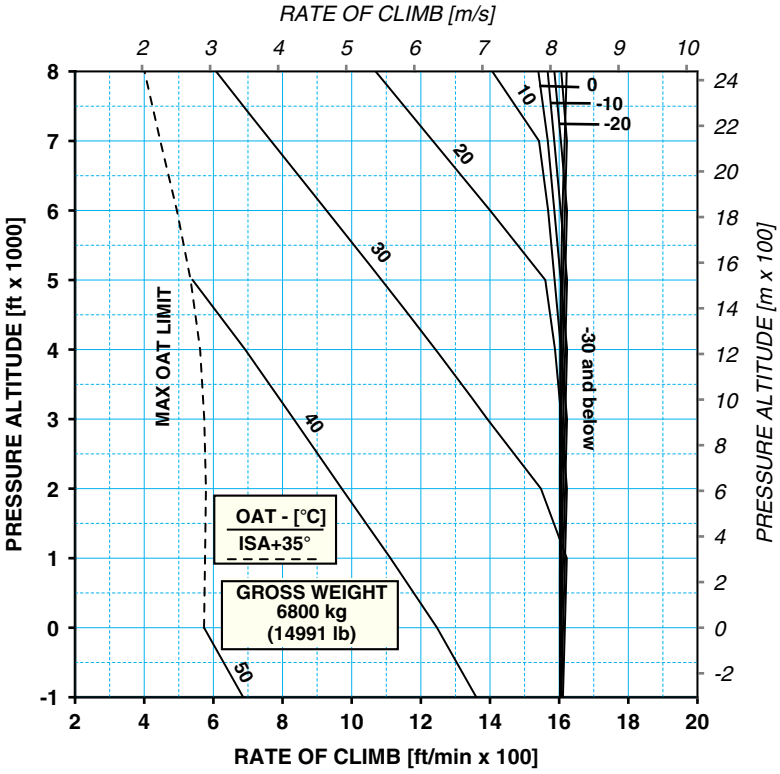
ICN-39-A-155390-G-A0126-40007-A-01-1

Figure 4-77 ROC TOP AEO, Gross Weight 7000 kg, IBF Installed

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy. 80 KIAS
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min



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ICN-39-A-155350-G-A0126-00002-A-01-1

Figure 4-78 ROC MCP AEO, Gross Weight 6800 kg, IBF Installed

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

IBF INSTALLED
COND ON: reduce ROC by 50 ft/min

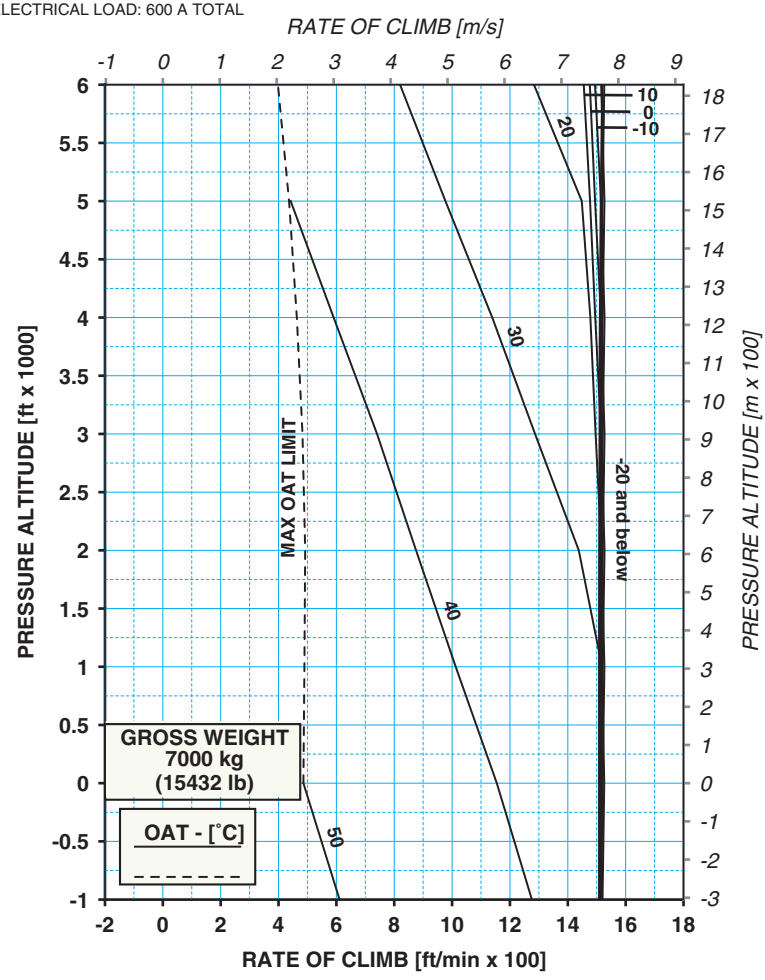

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Figure 4-79 ROC MCP AEO, Gross Weight 7000 kg, IBF Installed

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
IBF INSTALLED

ELECTRICAL LOAD: 300 A TOTAL

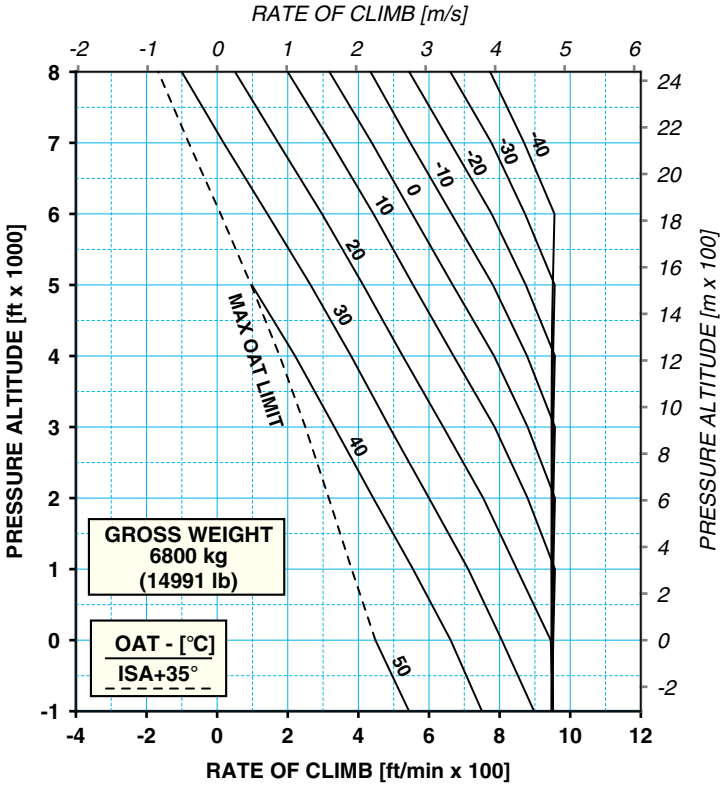

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Figure 4-80 ROC 2.5 min OEI, Gross Weight 6800 kg, IBF Installed

RATE OF CLIMB
2.5 MINUTE POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A TOTAL
IBF INSTALLED

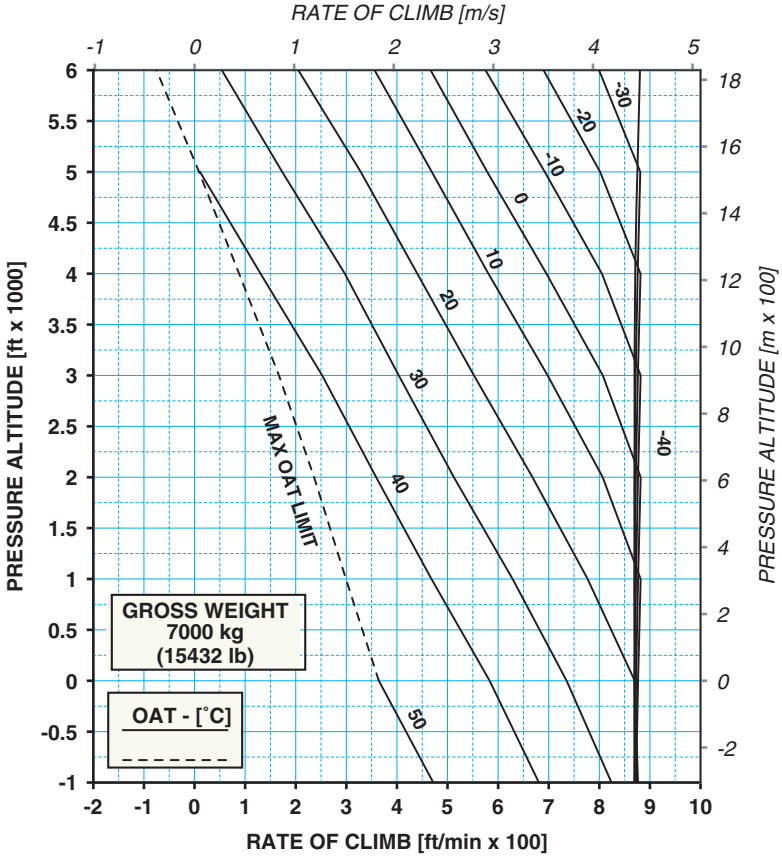

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Figure 4-81 ROC 2.5min OEI, Gross Weight 7000 kg, IBF Installed

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 300 A
IBF Installed

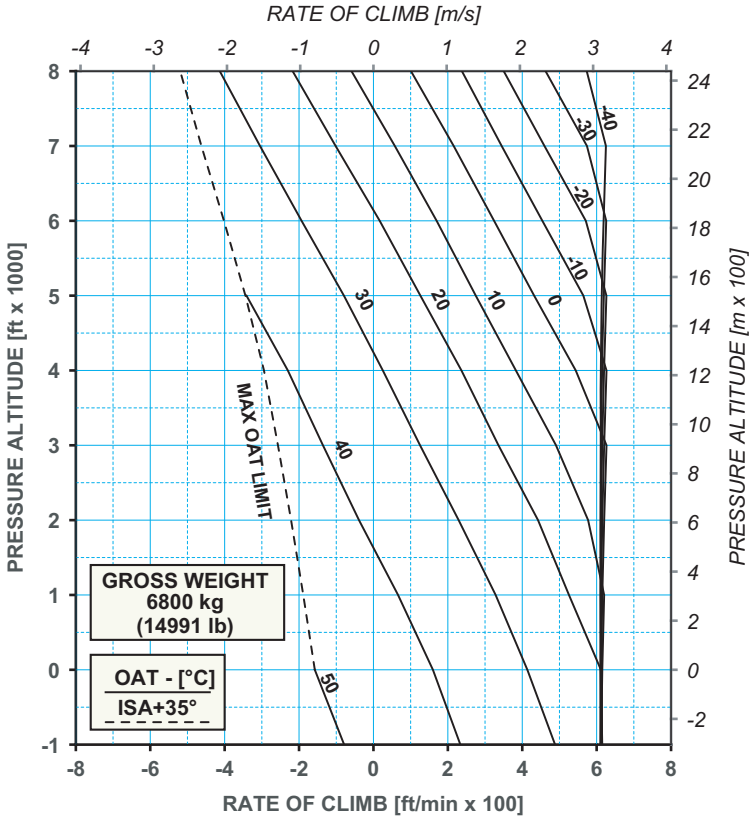

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Figure 4-82 ROC MCP OEI, Gross Weight 6800 kg, IBF Installed

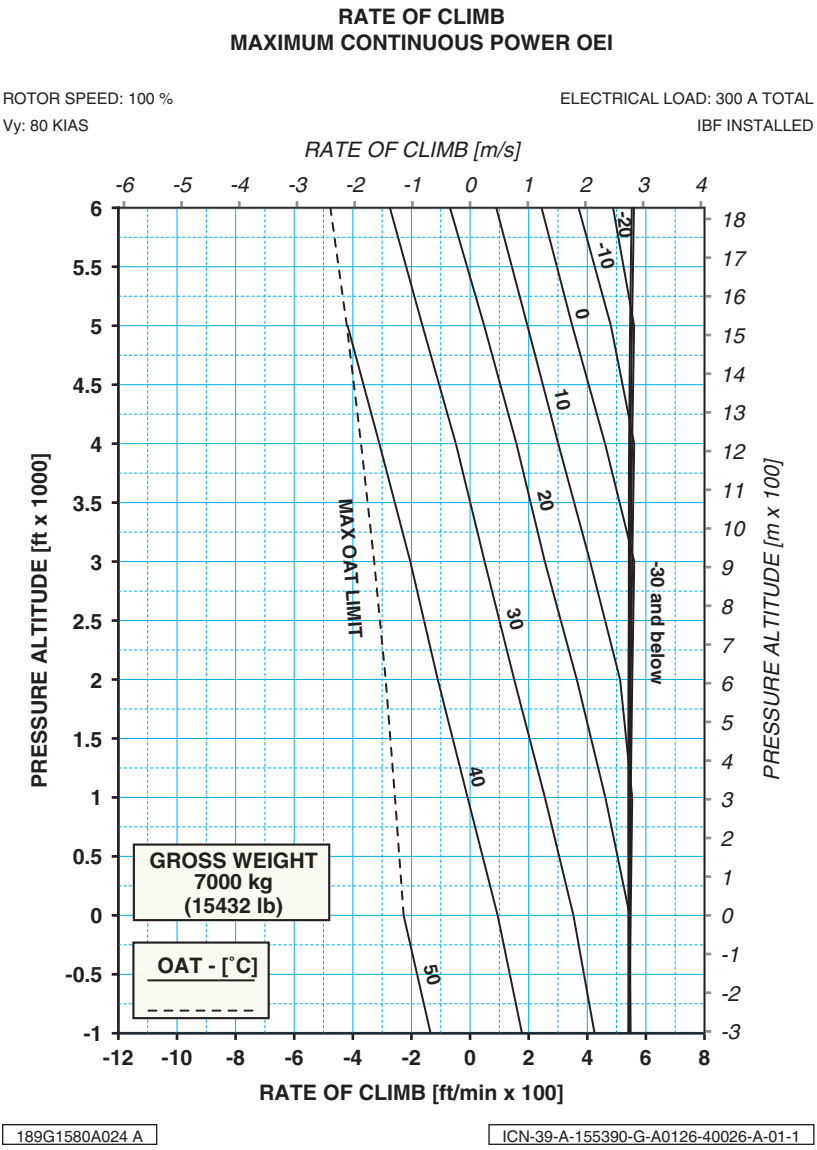

Figure 4-83 ROC MCP OEI, Gross Weight 7000 kg, IBF Installed

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO

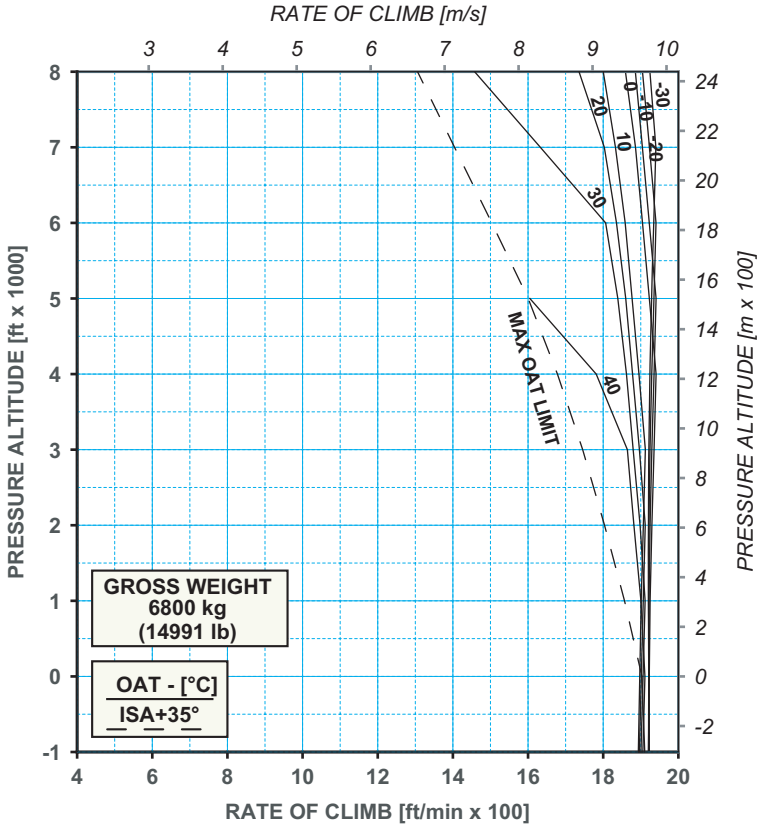

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Figure 4-84 ROC TOP AEO, Gross Weight 6800 kg, ENVIRO FULL AUTO

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

ENVIRO: AUTO/MAN

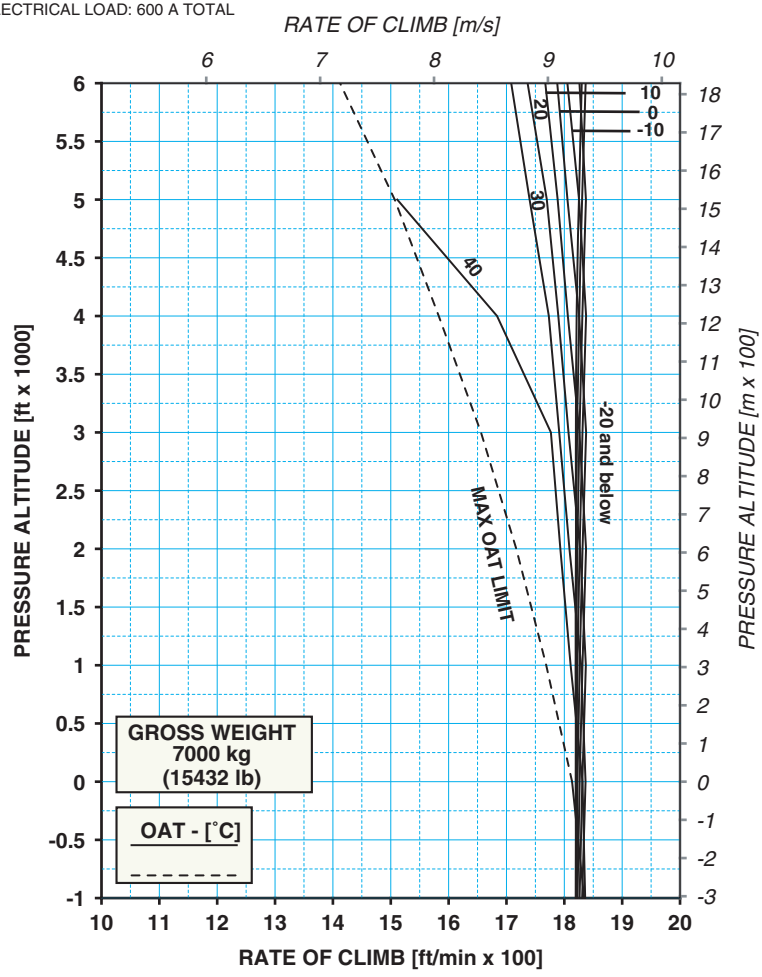

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Figure 4-85 ROC TOP AEO, Gross Weight 7000 kg, ENVIRO FULL AUTO

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS

ELECTRICAL LOAD: 600 A TOTAL
ENVIRO: FULL AUTO

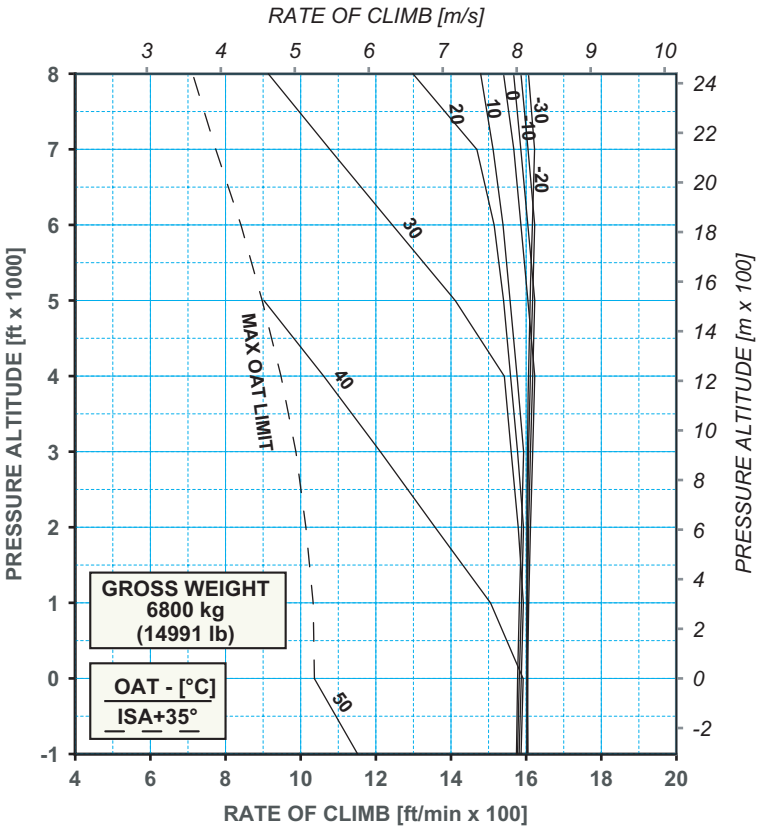

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Figure 4-86 ROC MCP AEO, Gross Weight 6800 kg, ENVIRO FULL AUTO

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

ENVIRO: AUTO/MAN

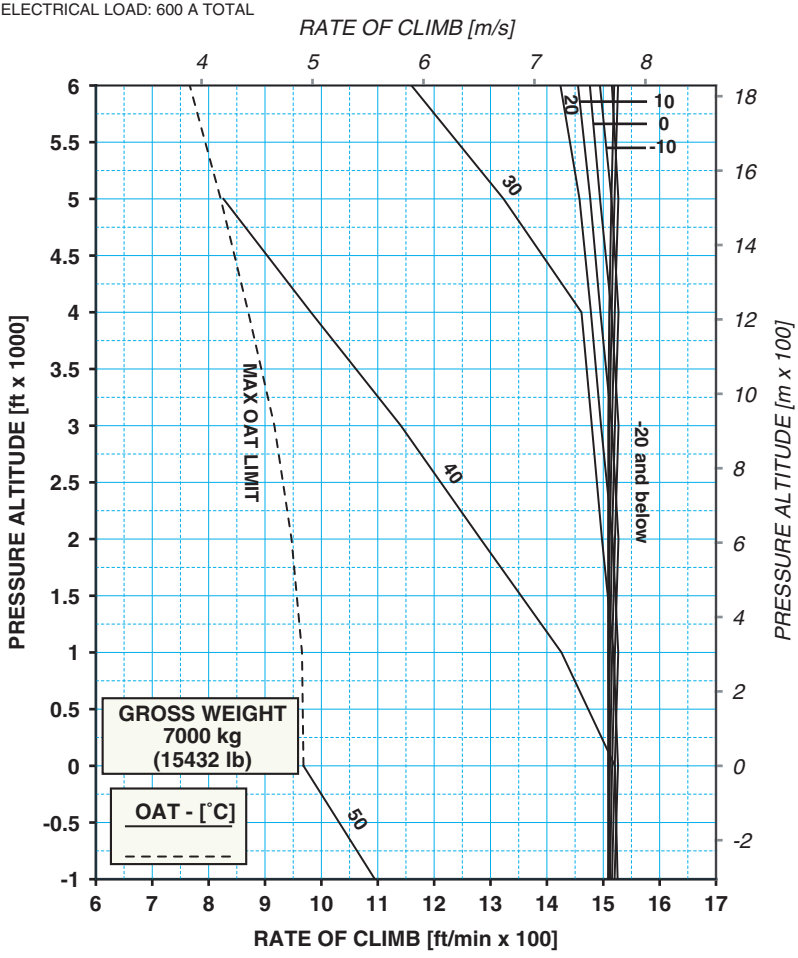

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Figure 4-87 ROC MCP AEO, Gross Weight 7000 kg, ENVIRO FULL AUTO

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
HEATER ON

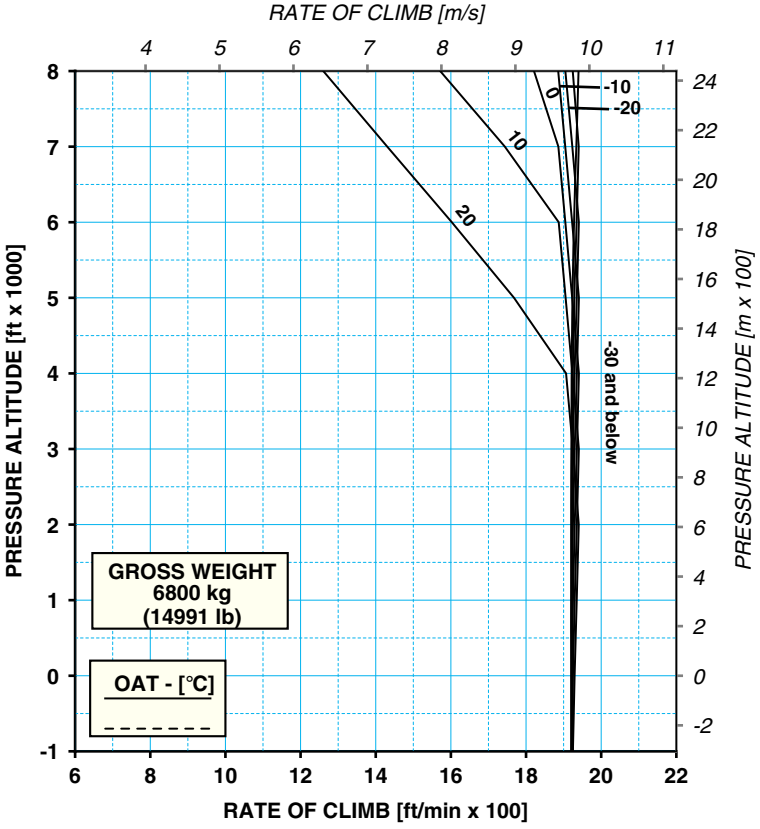

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Figure 4-88 ROC TOP AEO, Gross Weight 6800 kg, IBF Installed, HEATER ON

RATE OF CLIMB
TAKE OFF POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

IBF INSTALLED
HEATER ON

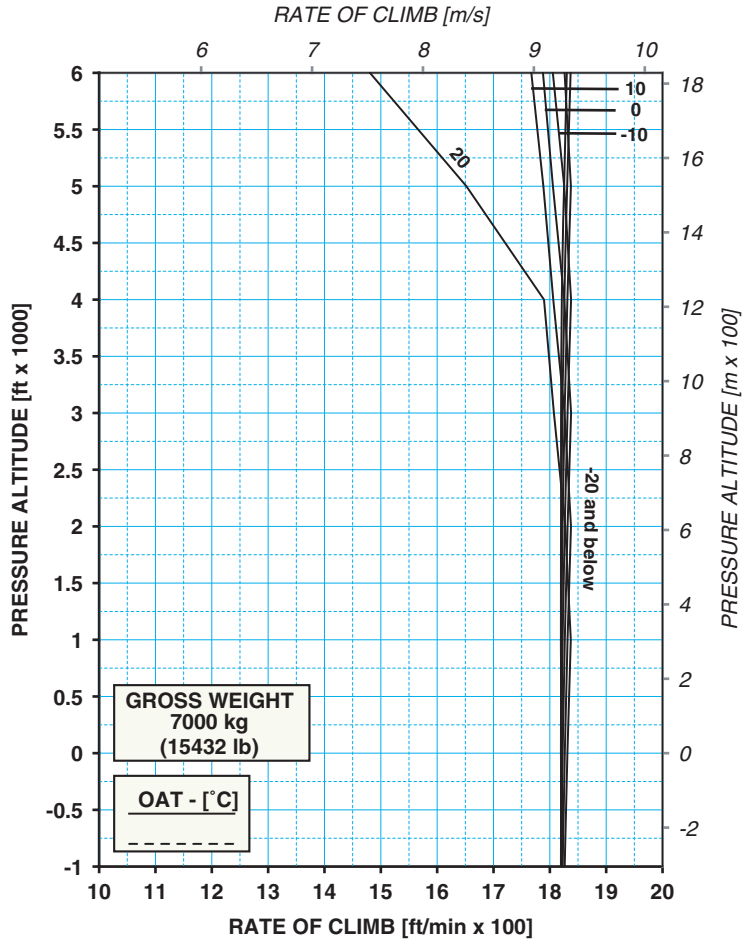

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Figure 4-89 ROC TOP AEO, Gross Weight 7000 kg, IBF Installed, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy:80 KTS
IBF INSTALLED

ELECTRICAL LOAD: 600 A TOTAL
COND ON: reduce ROC by 50 ft/min
HEATER ON

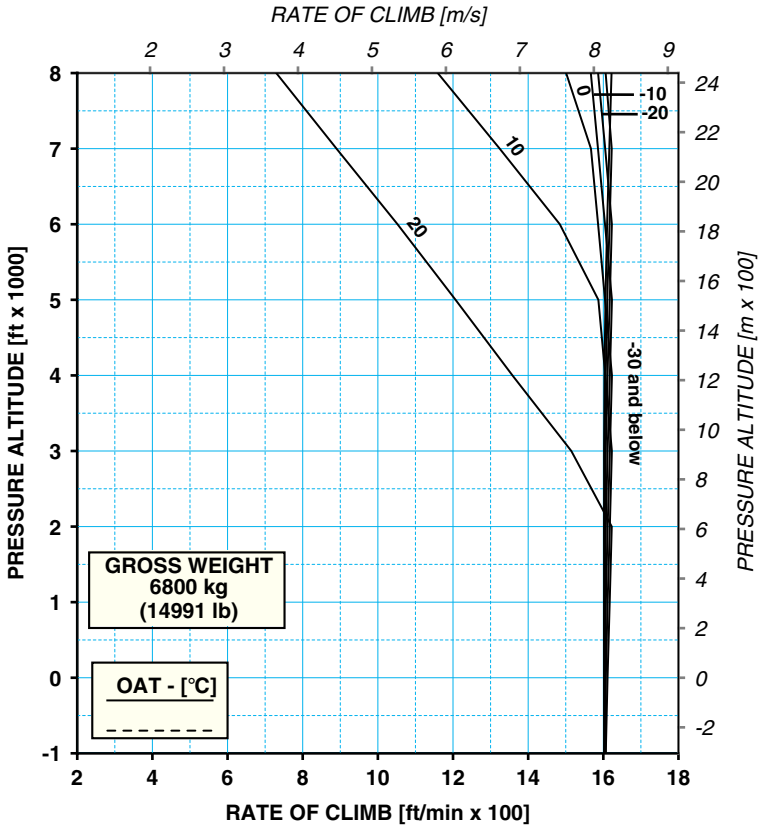

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Figure 4-90 ROC MCP AEO, Gross Weight 6800 kg, IBF Installed, HEATER ON

RATE OF CLIMB
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 100 %
Vy: 80 KIAS
ELECTRICAL LOAD: 600 A TOTAL

IBF INSTALLED
HEATER ON

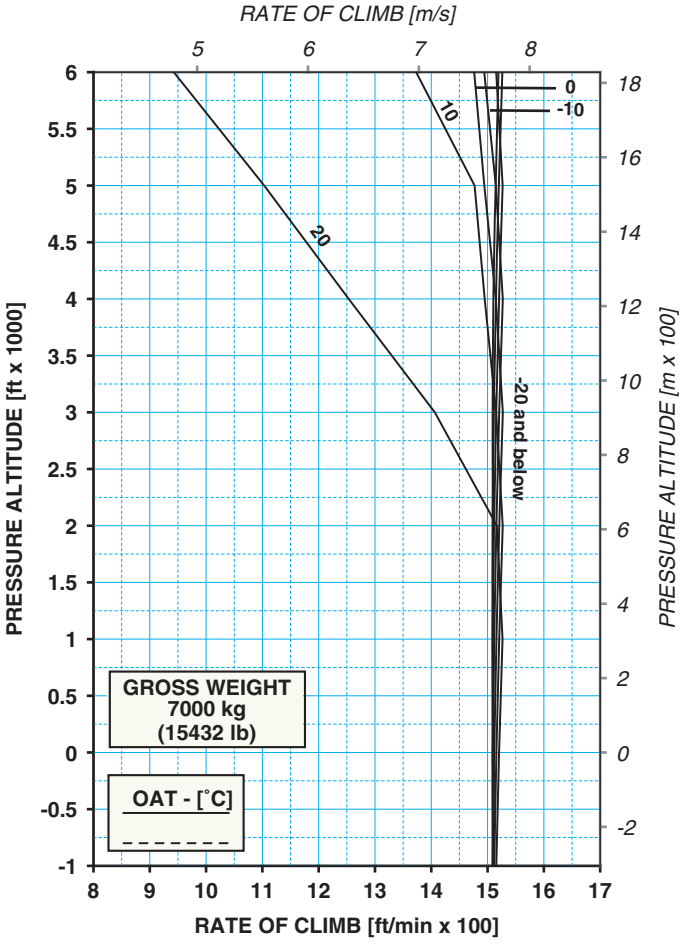

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Figure 4-91 ROC MCP AEO, Gross Weight 7000 kg, IBF Installed, HEATER ON

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CAT A CLEAR AREA TAKE OFF AND LANDING DISTANCES, PATH 1 AND PATH 2 CLIMB GRADIENTS

W.A.T. Charts

Clear Area Procedure Weight Limitations ..... Figure 4-5 to Figure 4-8.

Landing Distances

Clear Area Landing Distance OEI
(Clean Intake, EAPS or IBF) ..... Figure 4-100 & Figure 4-101

Clear Area Balked Landing Distance OEI
(Clean Intake, EAPS or IBF) ..... Figure 4-102

Take Off Flight Path 1

Mean height Gained in 100 ft (30 m) Horizontal Distance

Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS

Clean Intake ..... Figure 4-103, Figure 4-104
EAPS OFF ..... Figure 4-105, Figure 4-106
EAPS ON ..... Figure 4-107, Figure 4-108
IBF ..... Figure 4-109, Figure 4-110

Take Off Flight Path 2

Mean height Gained in 100 ft (30 m) Horizontal Distance

Clear Area Procedure

Clean Intake ..... Figure 4-111, Figure 4-112
EAPS OFF ..... Figure 4-113, Figure 4-114
EAPS ON ..... Figure 4-115, Figure 4-116
IBF ..... Figure 4-117, Figure 4-118

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REJECTED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A

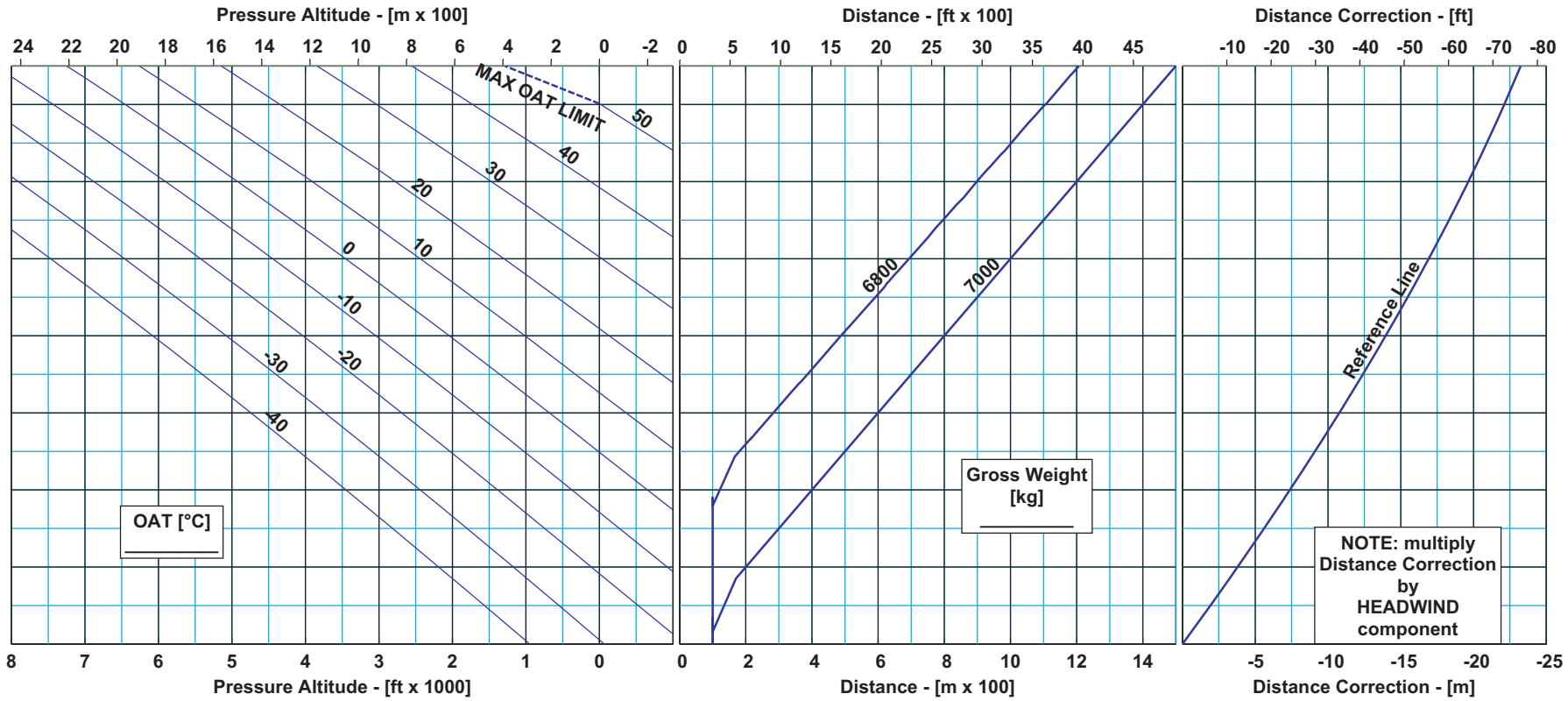

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Figure 4-92 Rejected Take Off Distance OEI Clear Area Procedure

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OEI CONTINUED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A

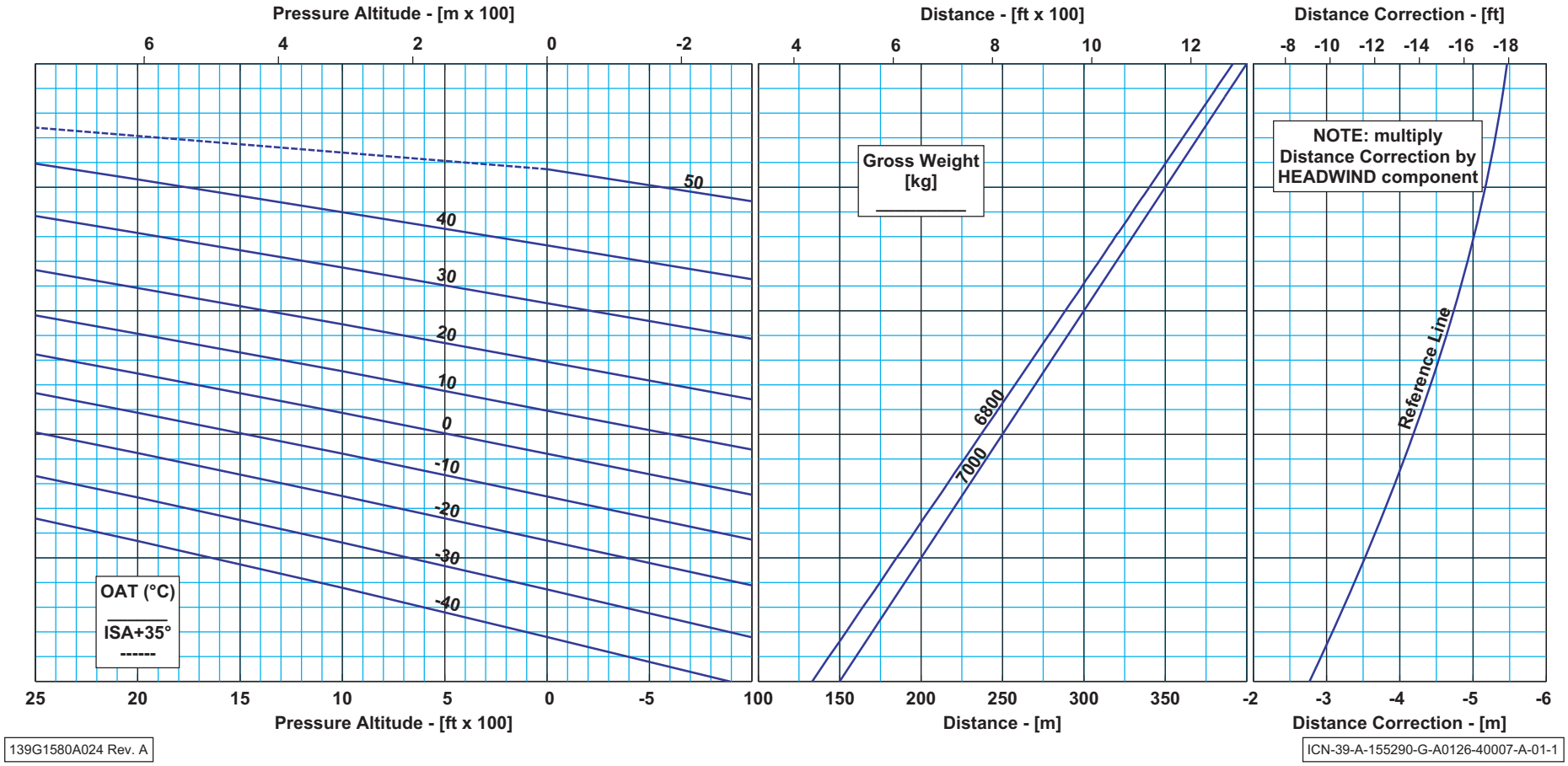

Figure 4-93 Continued Take Off Distance OEI Clear Area Procedure

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REJECTED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
EAPS OFF

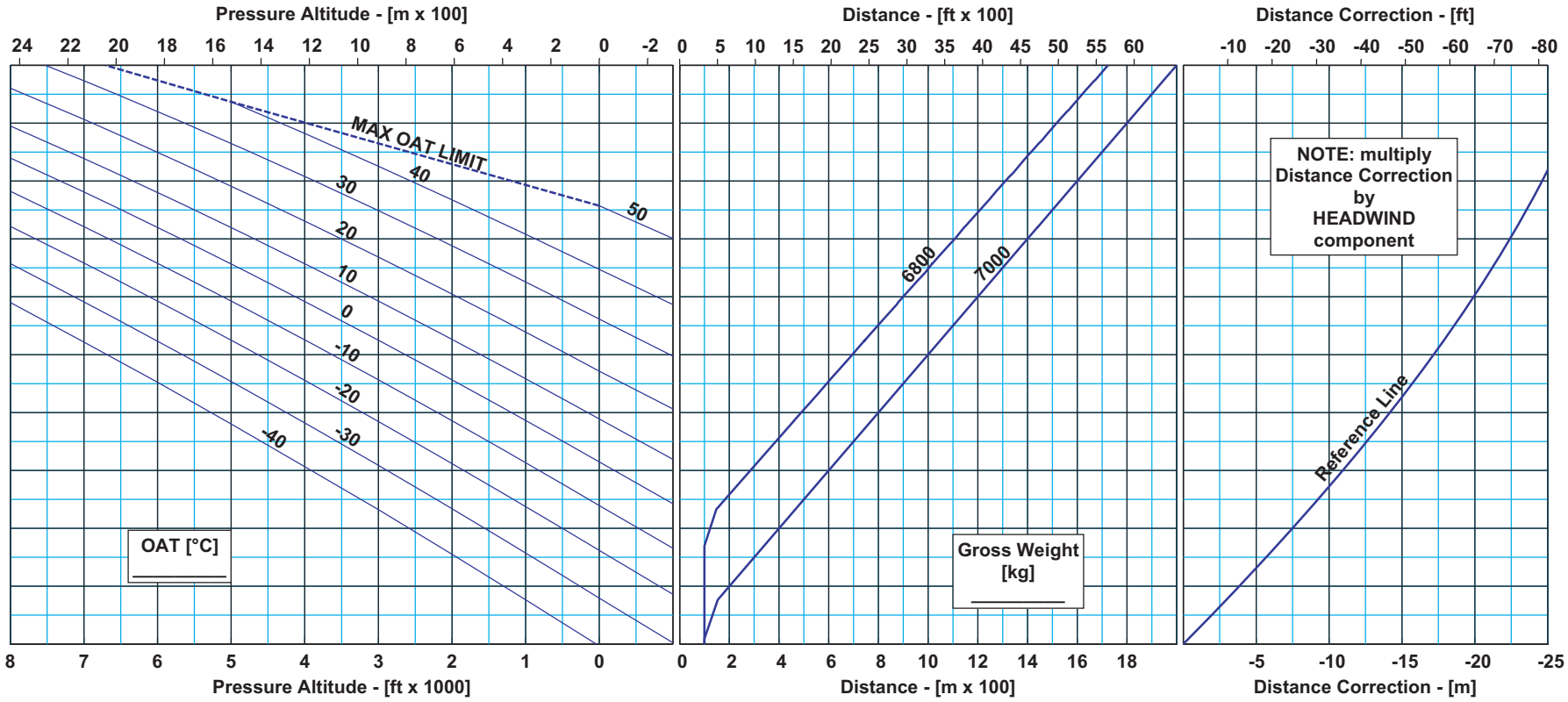

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Figure 4-94 Rejected Take Off Distance OEI Clear Area Procedure, EAPS OFF

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OEI CONTINUED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
EAPS OFF

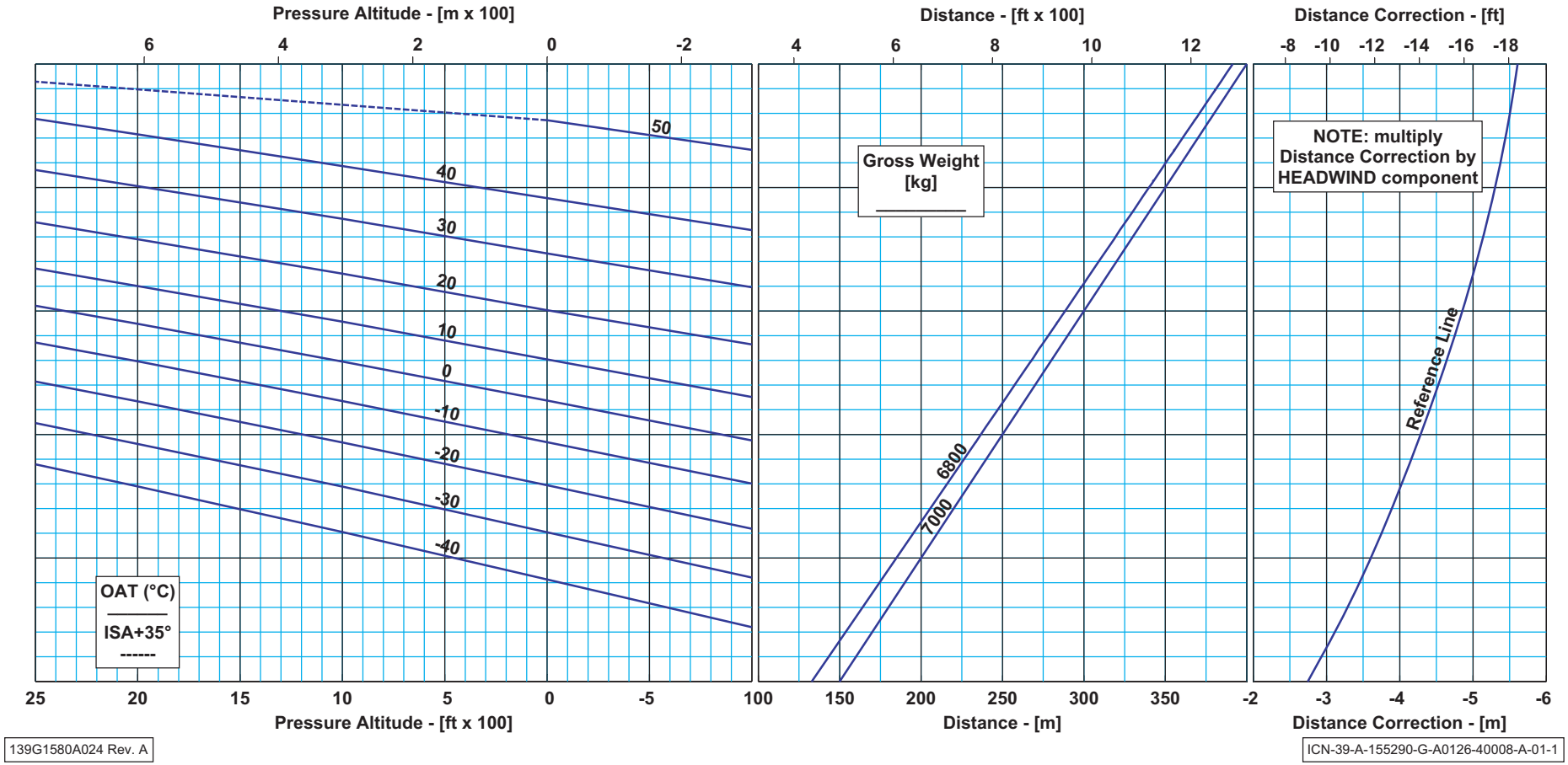

Figure 4-95 CTO Distance OEI Clear Area Procedure, EAPS OFF

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REJECTED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
EAPS ON

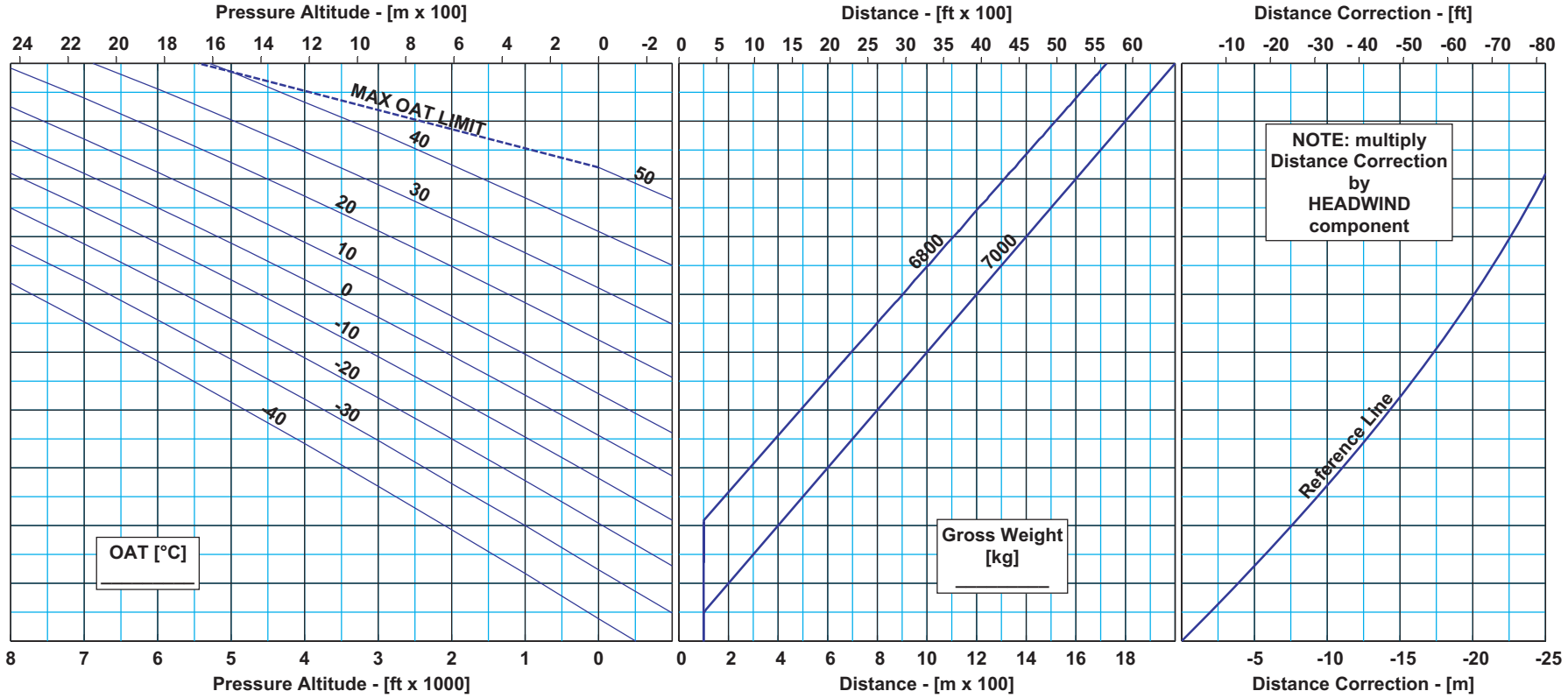

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Figure 4-96 Rejected Take Off Distance OEI Clear Area Procedure, EAPS ON

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OEI CONTINUED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
EAPS ON

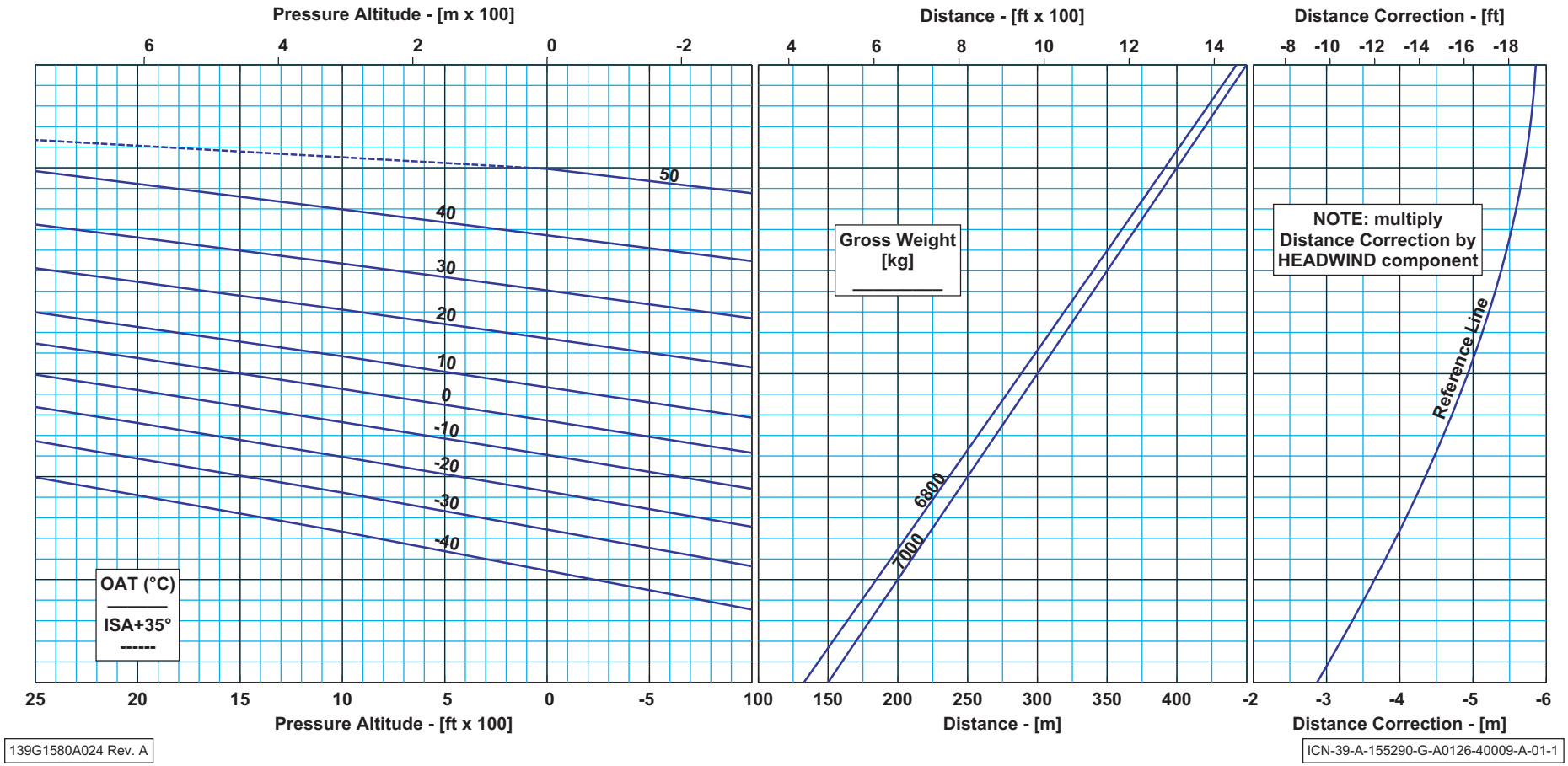

Figure 4-97 CTO Distance OEI Clear Area Procedure, EAPS ON

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REJECTED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
IBF Installed

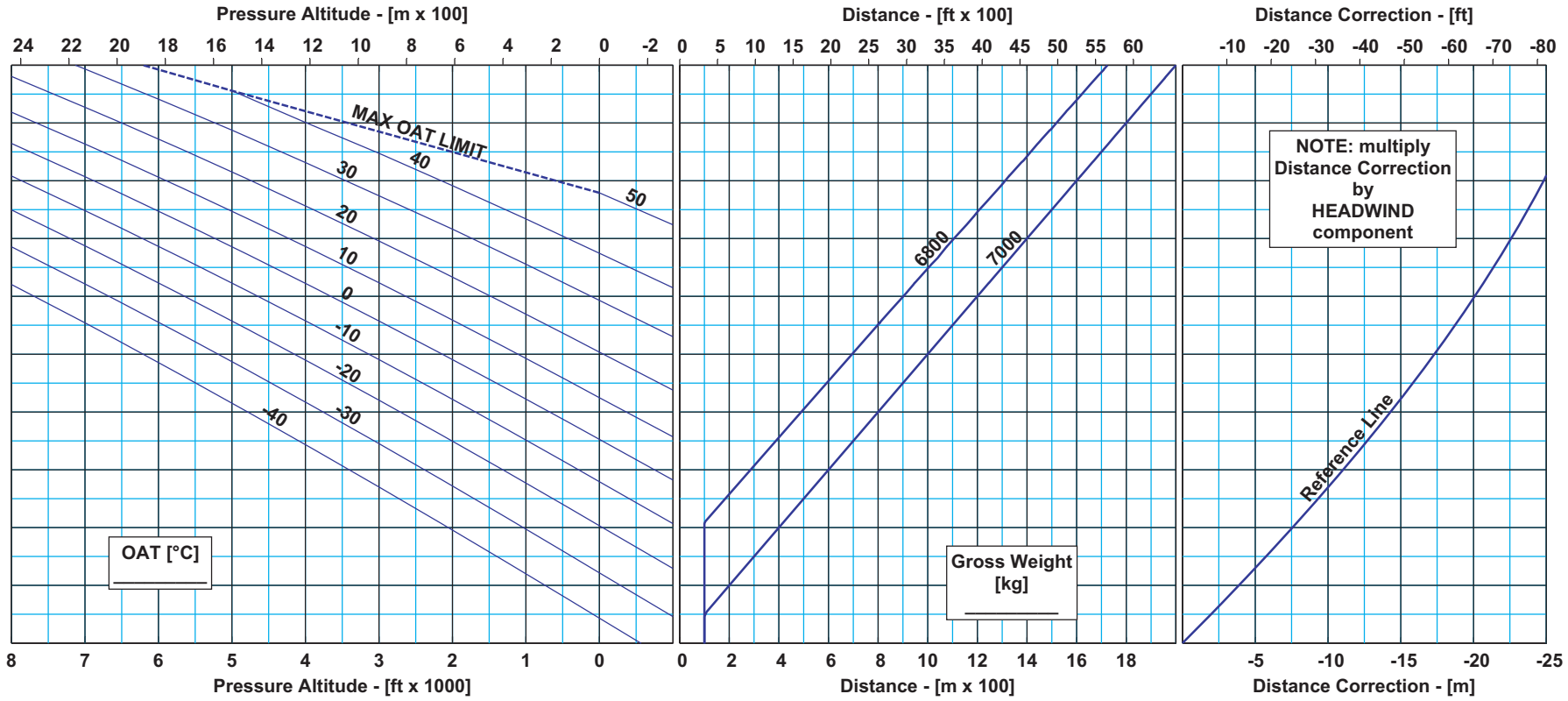

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Figure 4-98 Rejected Take Off Distance OEI Clear Area Procedure, IBF Installed

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OEI CONTINUED TAKE OFF DISTANCE
CLEAR AREA

POWER 2.5 min OEI
ELECTRICAL LOAD 300A
IBF INSTALLED

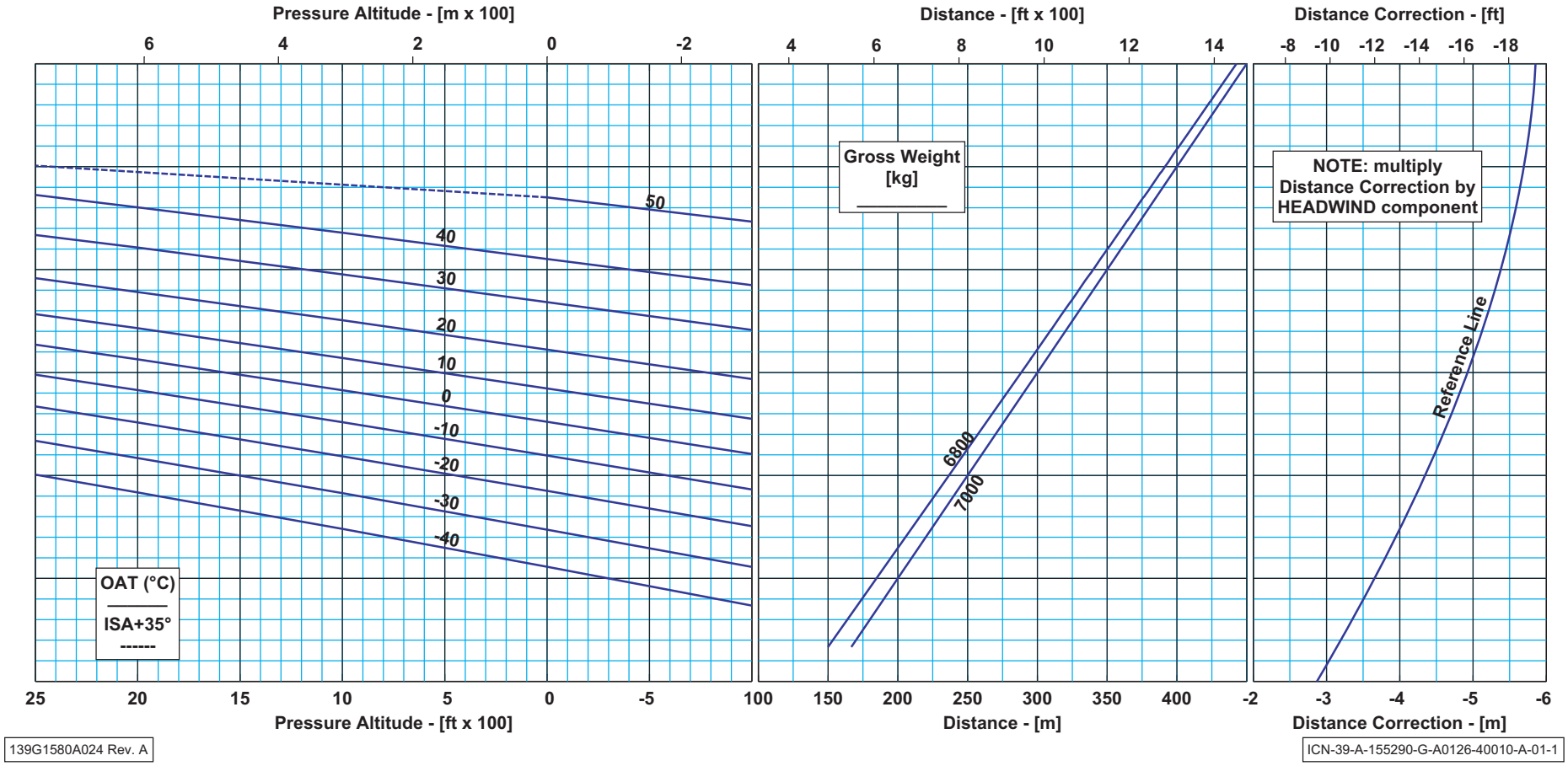

Figure 4-99 CTO Distance OEI Clear Area Procedure, IBF Installed

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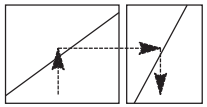
LANDING DISTANCE OEI
CLEAR AREA
from LDP to TOUCHDOWN



Clean Air Intake / EAPS OFF / EAPS ON /IBF installed
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{LDP} 50 KIAS
RoD <350 ft/min

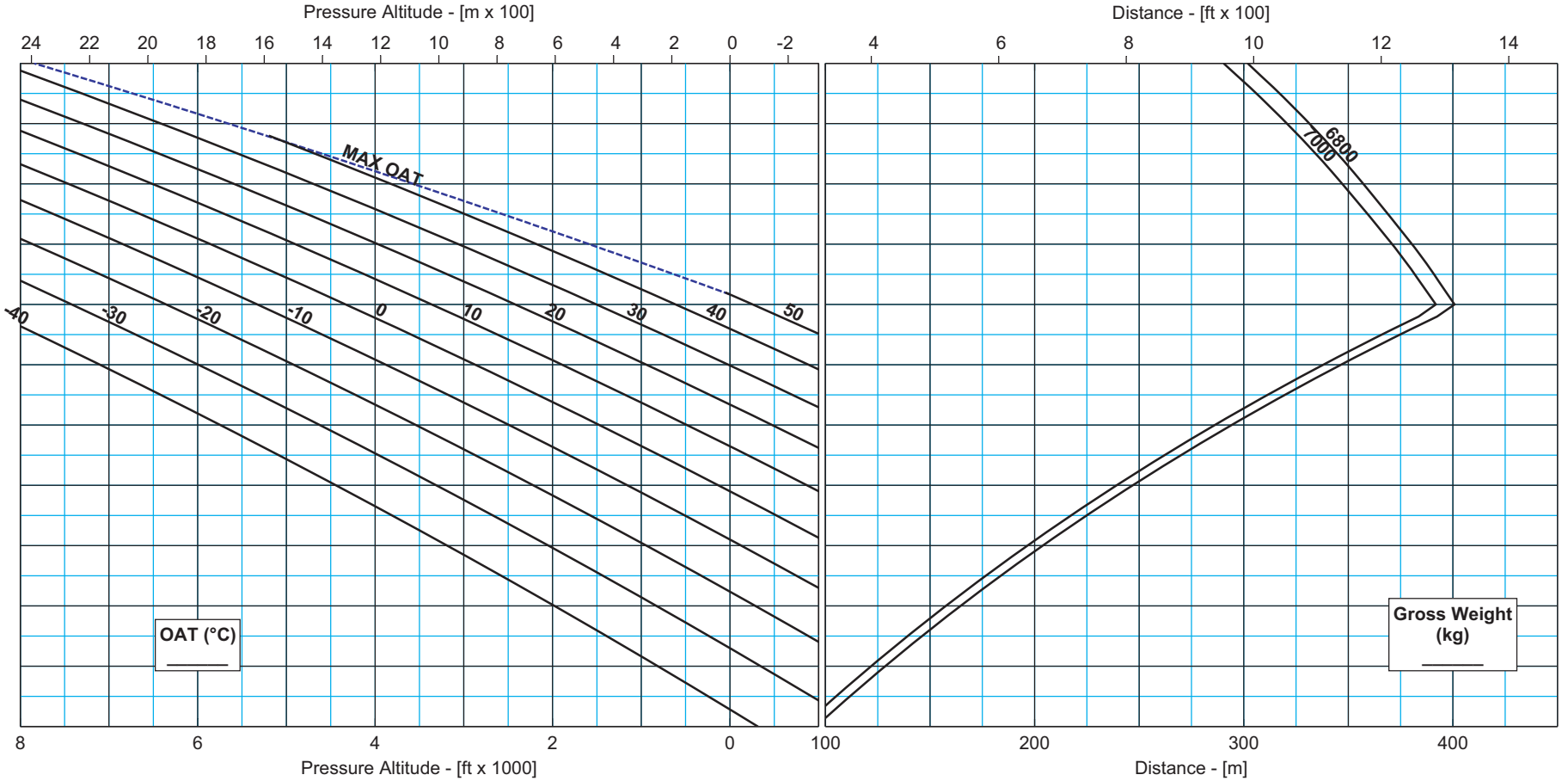


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Figure 4-100 Clear Area Landing Distance OEI

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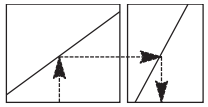
BRAKING DISTANCE
CLEAR AREA
from TOUCHDOWN to STOP



GS_{max}=30 kts

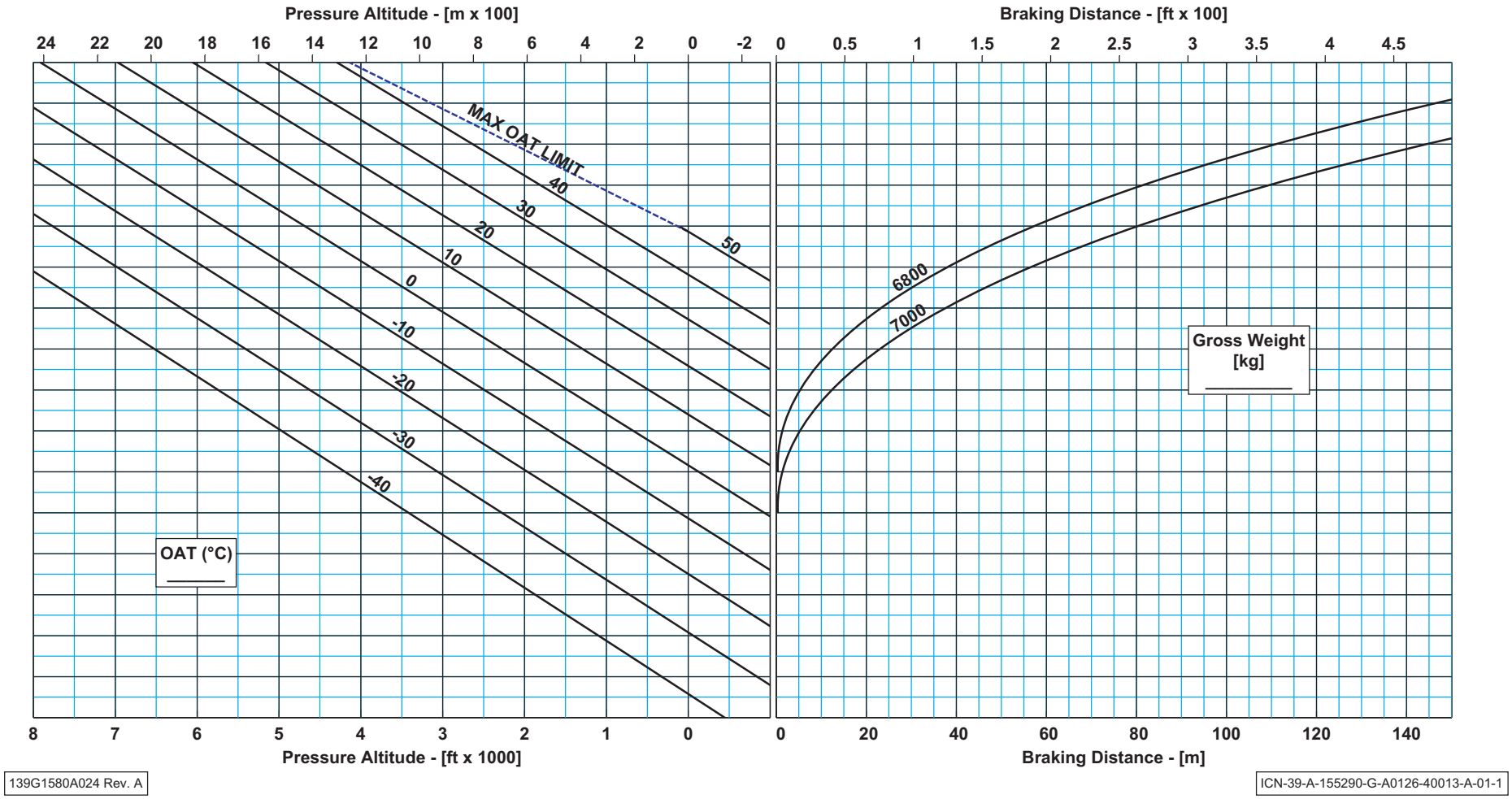


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Figure 4-101 Braking Distance Clear Area

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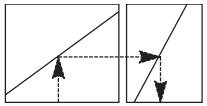
BALKED LANDING DISTANCE
CLEAR AREA



Clean Air Intake / EAPS OFF / EAPS ON / IBF installed
POWER 2.5 min OEI
ELECTRICAL LOAD 300 A
V_{LDP} 50 KIAS
RoD <350 ft/min

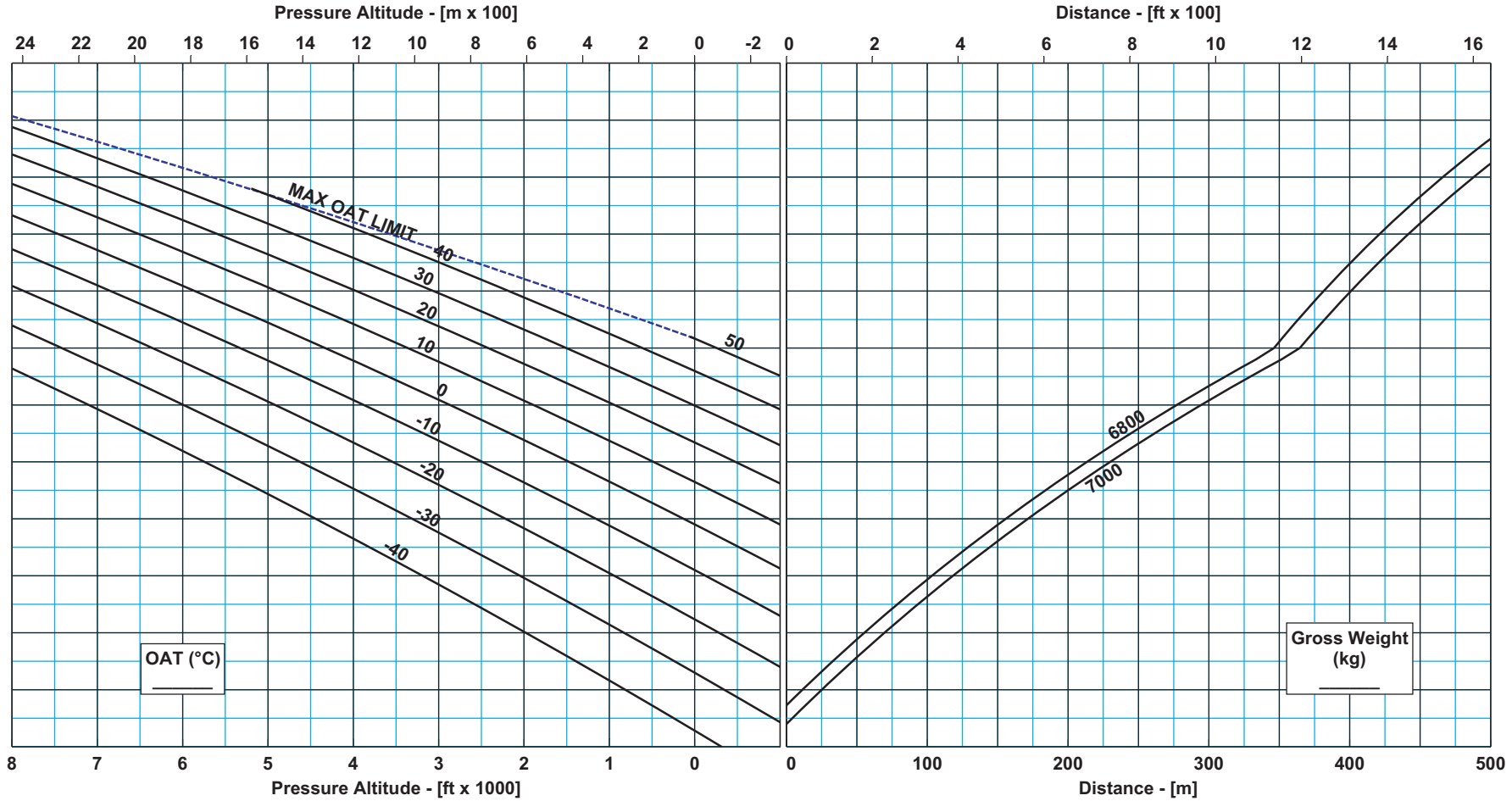


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Figure 4-102 Clear Area Balked Landing Distance OEI

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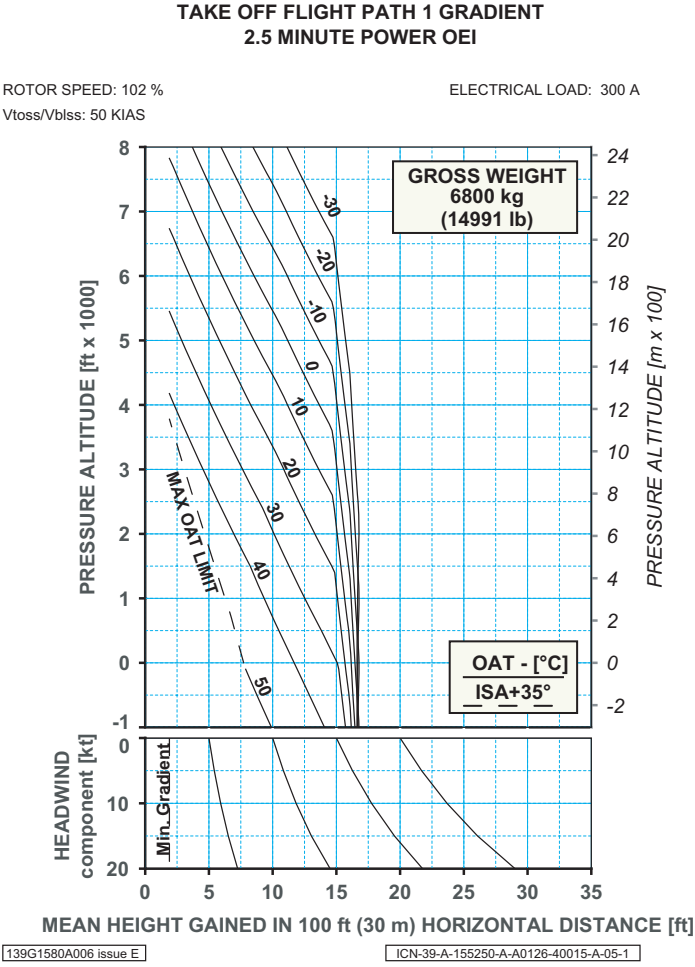

Figure 4-103 PATH 1 Gradient Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 6800 kg

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

ELECTRICAL LOAD: 300 A

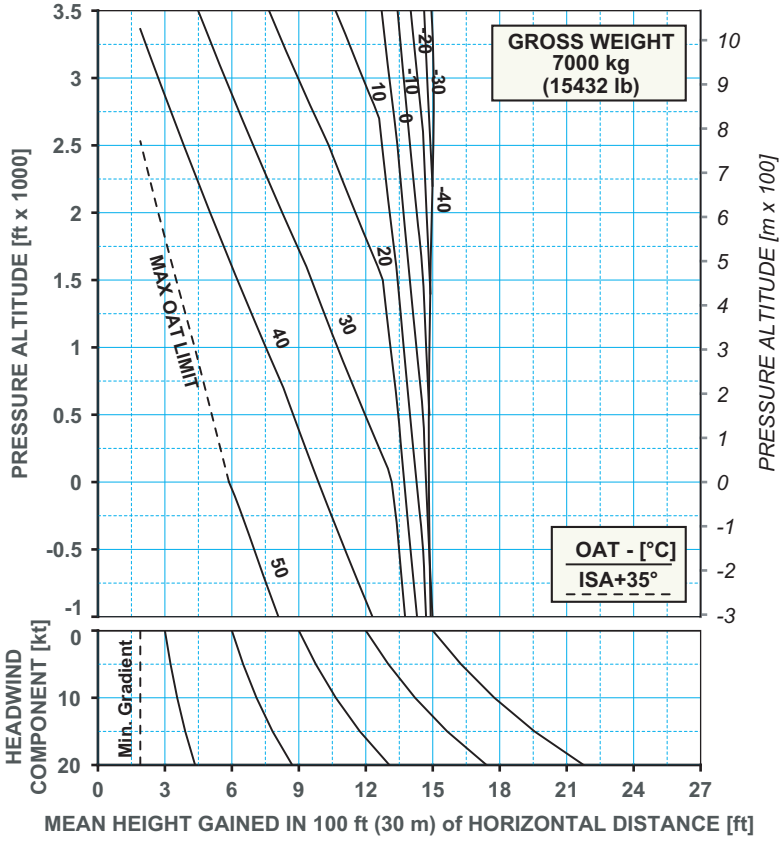

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Figure 4-104 PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 7000 kg

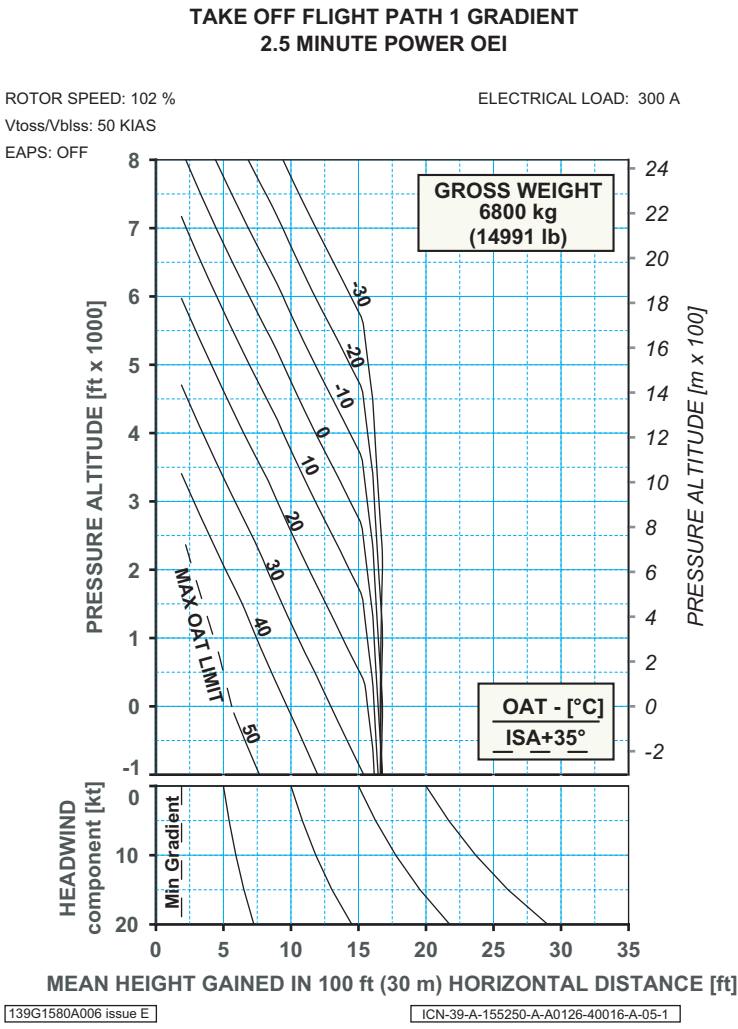

Figure 4-105 PATH 1 Gradient Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 6800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

ELECTRICAL LOAD: 300 A
EAPS OFF

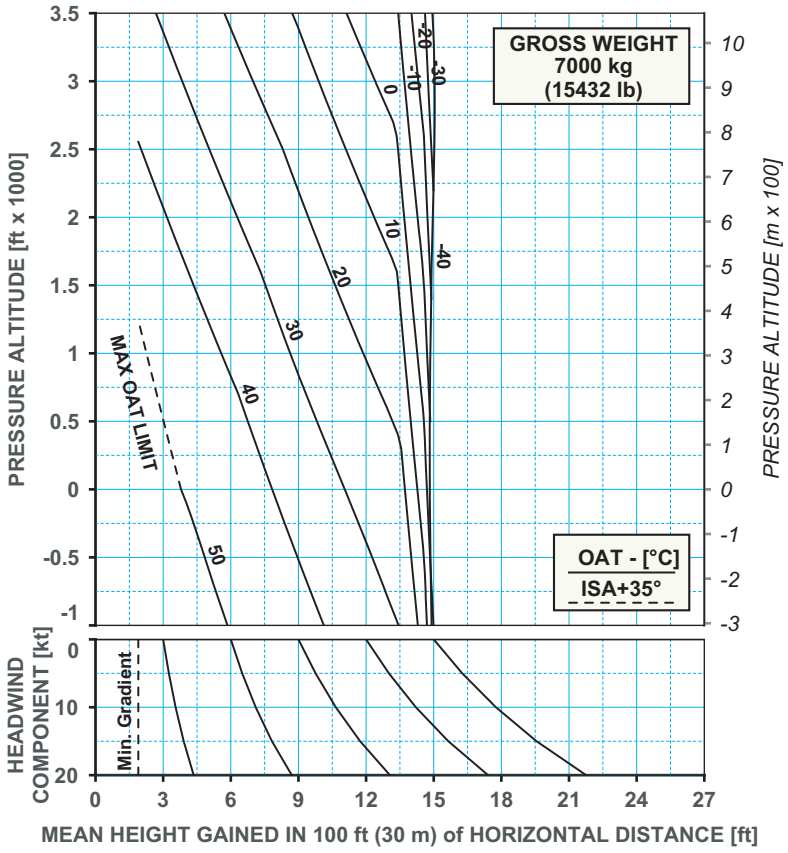

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Figure 4-106 PATH 1 Gradient, Clear Area Procedure V_{TOSS}/ V_{BLSS} 50 KIAS, GW 7000 kg, EAPS OFF

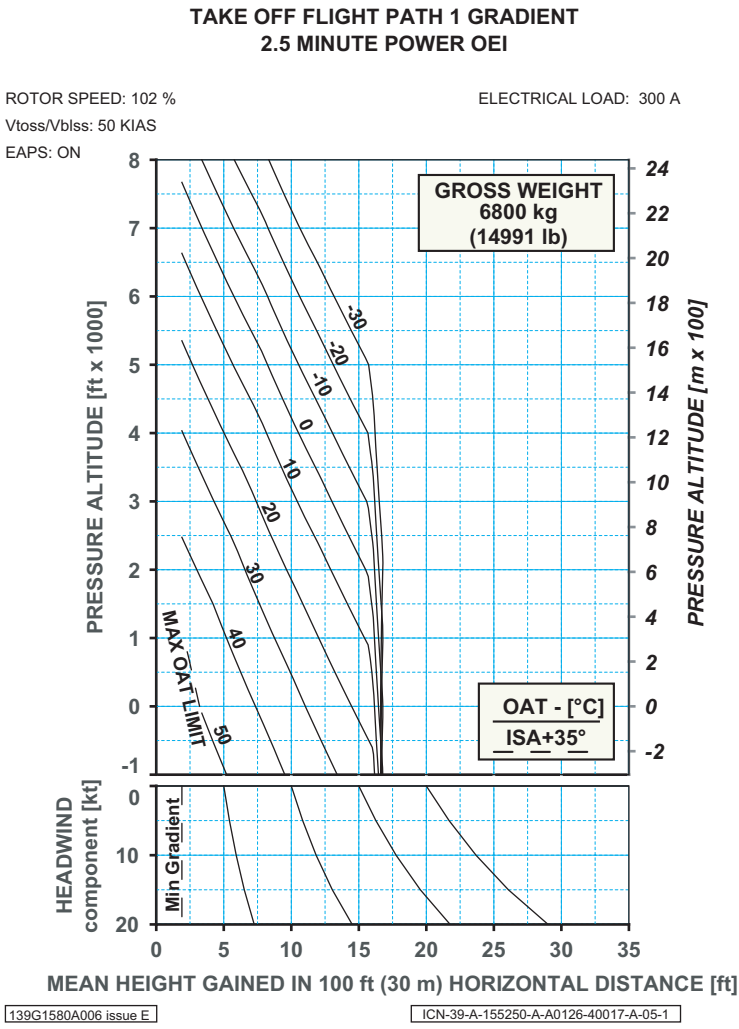

Figure 4-107 PATH 1 Gradient Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 6800 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

ELECTRICAL LOAD: 300 A
EAPS ON

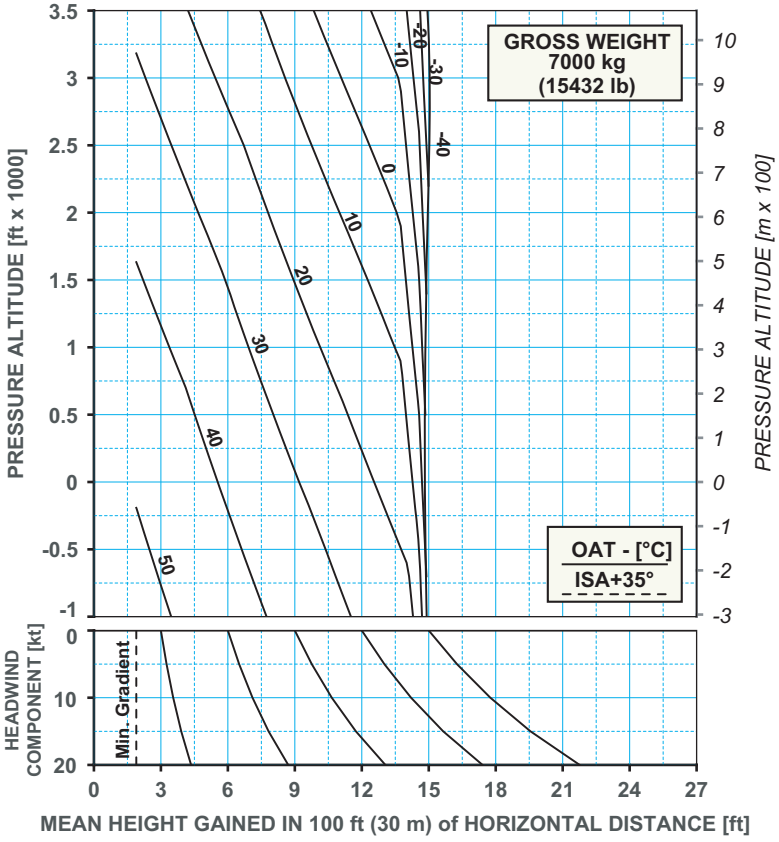

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Figure 4-108 PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 7000 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

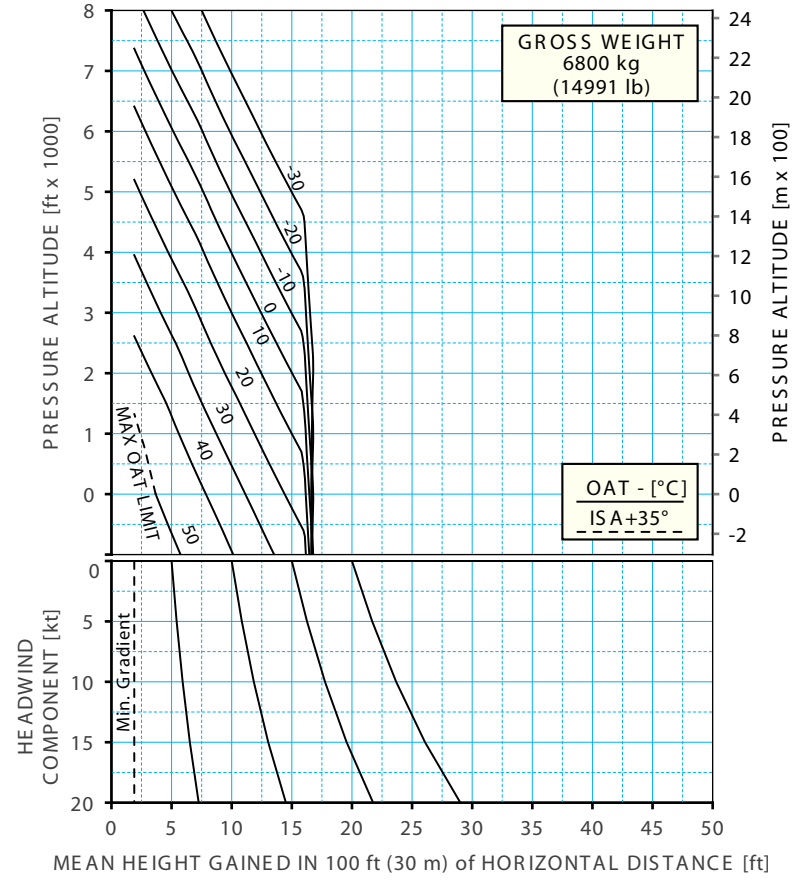

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Figure 4-109 PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 6800 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vtoss/Vblss: 50 kIAS

ELECTRICAL LOAD: 300 A
IBF Installed

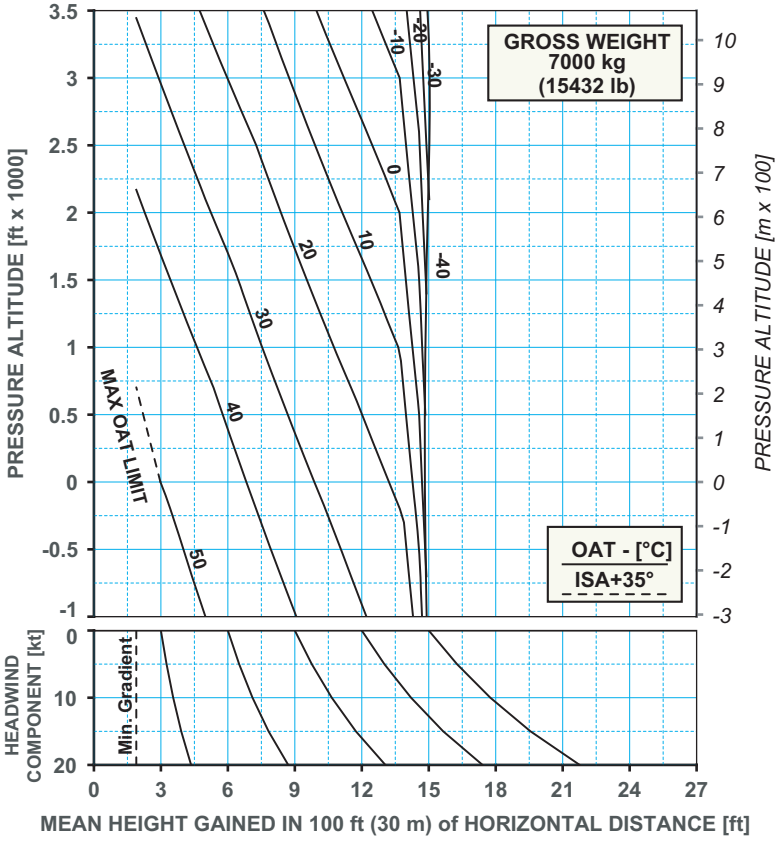

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Figure 4-110 PATH 1 Gradient, Clear Area Procedure V_{TOSS}/V_{BLSS} 50 KIAS, GW 7000 kg, IBF Installed

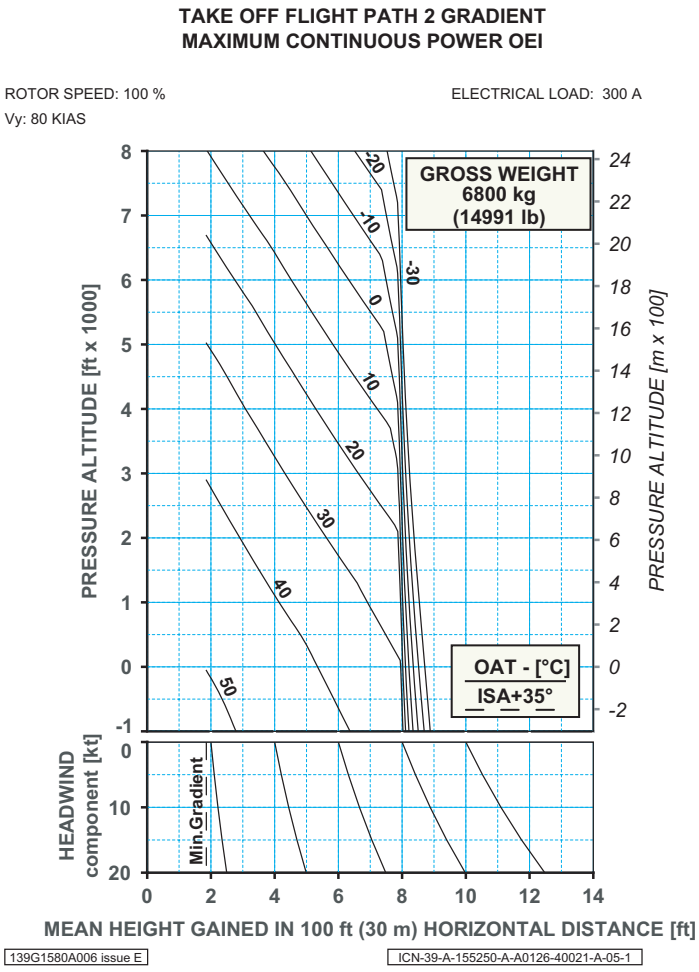
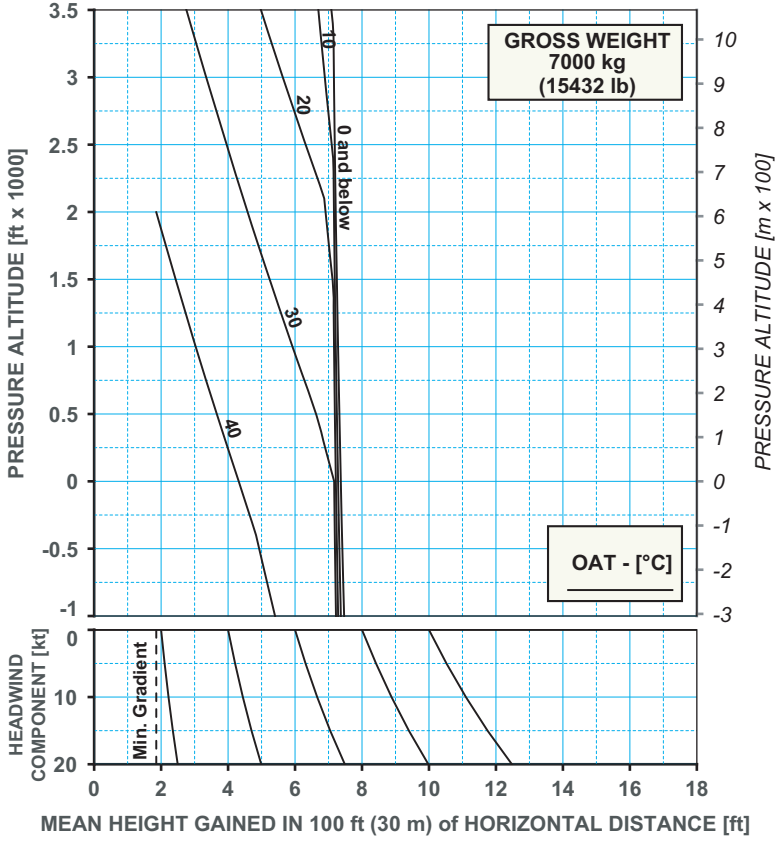


Figure 4-111 PATH 2 Gradient, GW 6800 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

ELECTRICAL LOAD: 300 A



139G1580A024 Rev.A

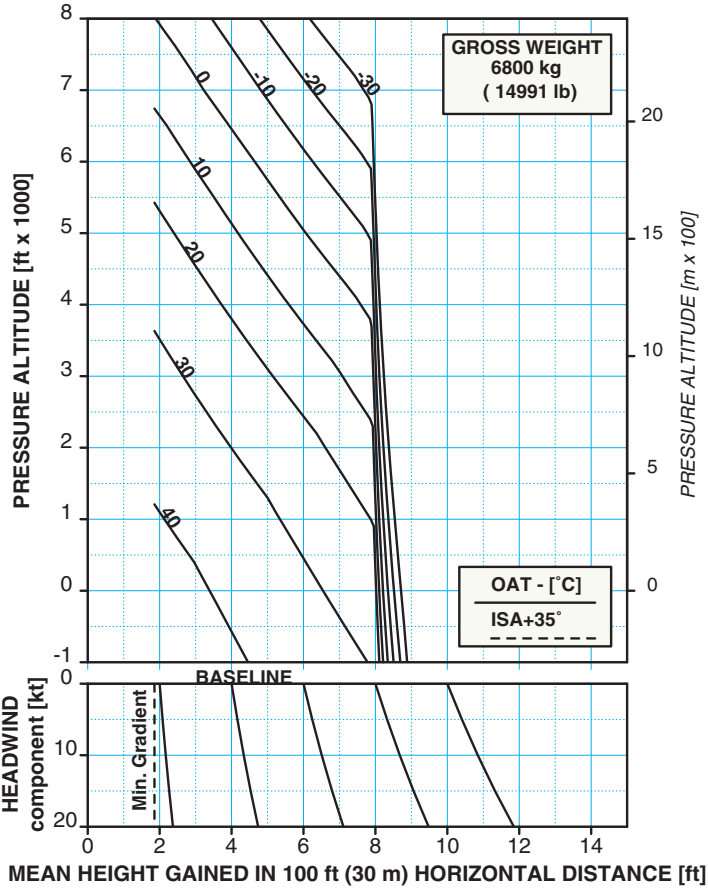
ICN-39-A-155390-G-A0126-40039-A-01-1

Figure 4-112 PATH 2 Gradient, GW 7000 kg

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
EAPS: OFF

ELECTRICAL LOAD: 300 A TOTAL



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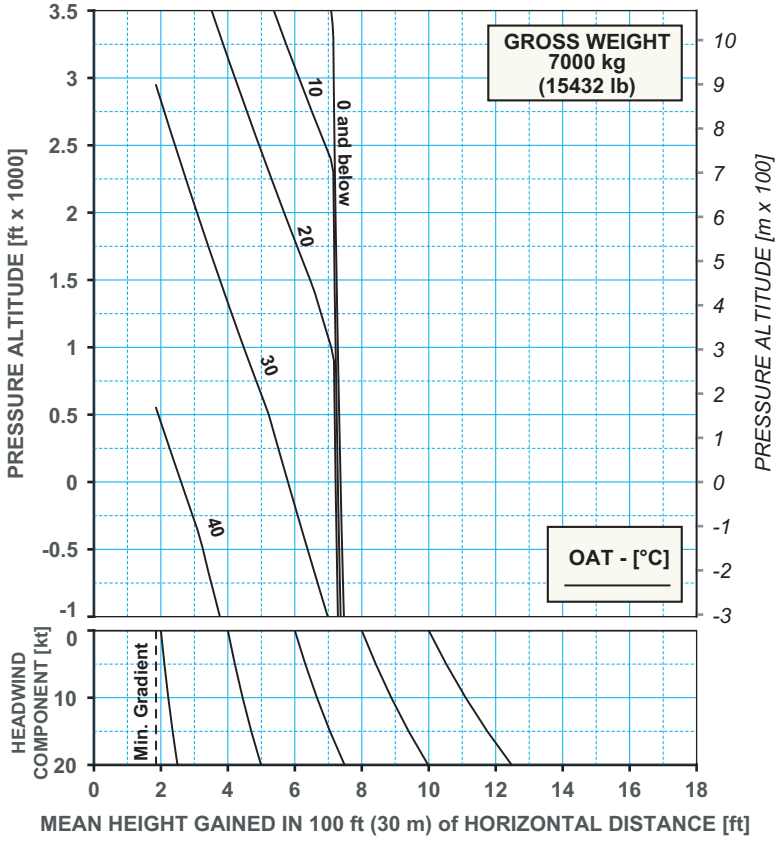
ICN-39-A-155250-A-A0126-40022-A-01-1

Figure 4-113 PATH 2 Gradient, GW 6800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

ELECTRICAL LOAD: 300 A
EAPS OFF



139G1580A024 Rev.A

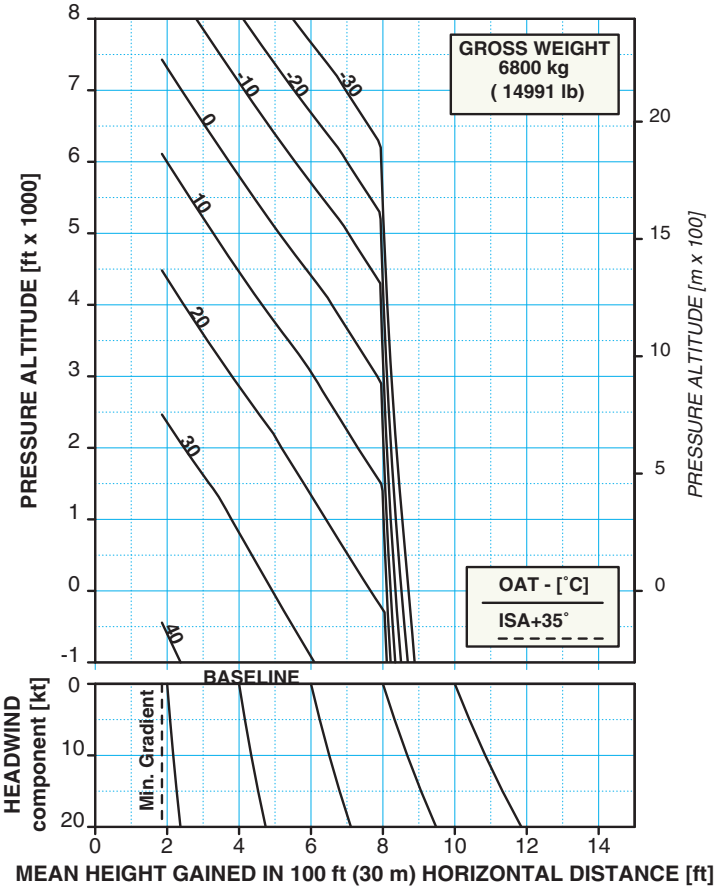
ICN-39-A-155390-G-A0126-40040-A-01-1

Figure 4-114 PATH 2 Gradient, GW 7000 kg, EAPS OFF

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 KIAS
EAPS: ON

ELECTRICAL LOAD: 300 A TOTAL



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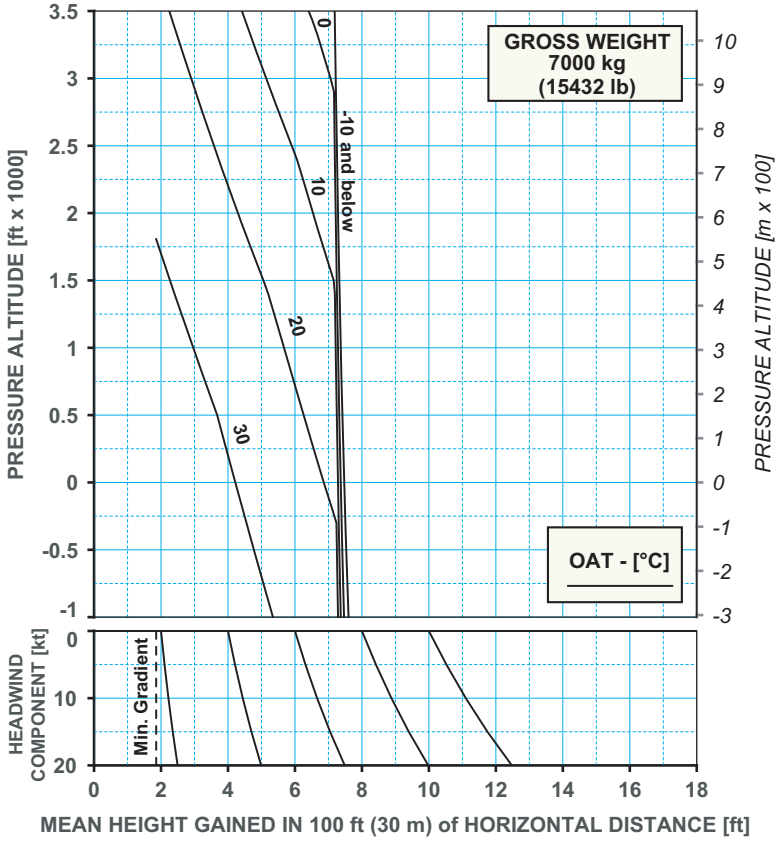
ICN-39-A-155250-A-A0126-40023-A-01-1

Figure 4-115 PATH 2 Gradient, GW 6800 kg, EAPS ON

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

ELECTRICAL LOAD: 300 A
EAPS ON



139G1580A024 Rev.A

ICN-39-A-155390-G-A0126-40041-A-01-1

Figure 4-116 PATH 2 Gradient, GW 7000 kg, EAPS ON

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

IBF INSTALLED
ELECTRICAL LOAD: 300 A

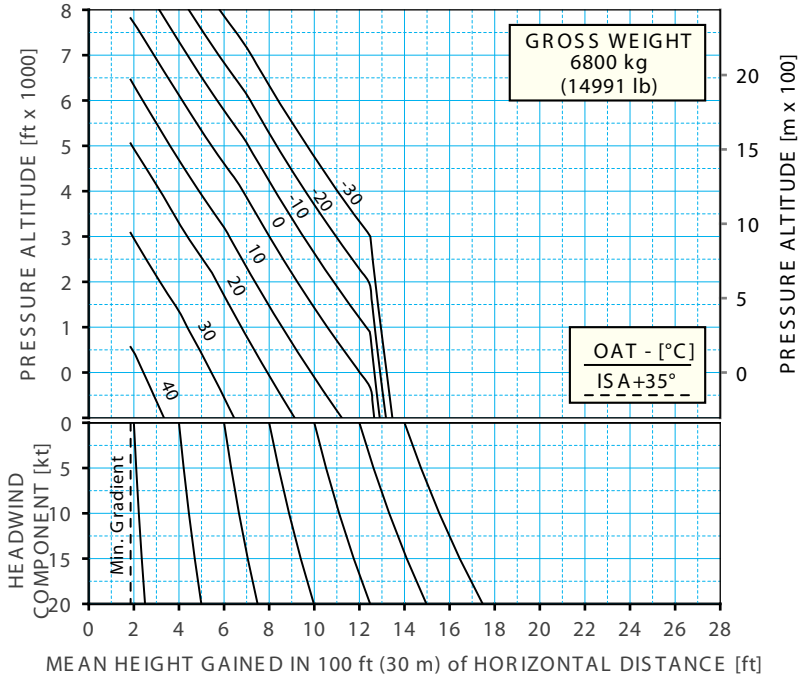


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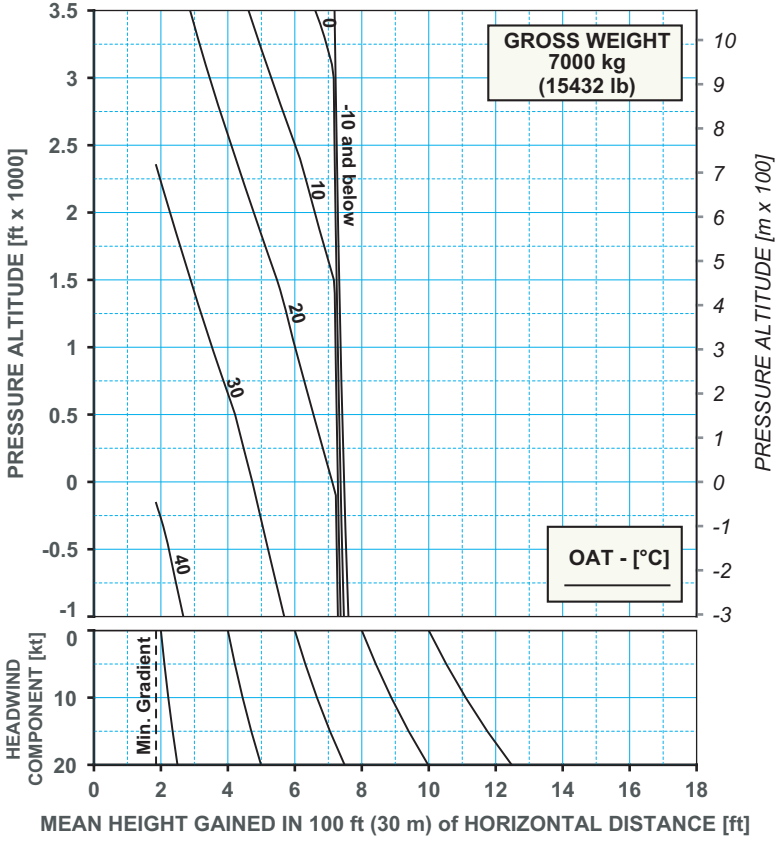
Figure 4-117 PATH 2 Gradient, GW 6800 kg, IBF Installed

TAKE OFF FLIGHT PATH 2 GRADIENT
MAXIMUM CONTINUOUS POWER OEI

ROTOR SPEED: 100 %
Vy: 80 kIAS

ELECTRICAL LOAD: 300 A
IBF Installled



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ICN-39-A-155390-G-A0126-40042-A-01-1

Figure 4-118 PATH 2 Gradient, GW 7000 kg, IBF Installed

NOISE CHARACTERISTICS

The following noise levels comply with ICAO Annex 16, Chapter 8, “NOISE requirement” according to TCDSN EASA.R.006.

Model: AW139 Engine Pratt and Whitney PT6C-67C Gross Weight 7000 kg			
Configuration	Level Flyover (Overflight) EPNL (EPNdB)	Take Off EPNL (EPNdB)	Approach EPNL (EPNdB)
Clean aircraft No external kits installed	100% NR	100%NR	100%NR
	90.7	90.3	94.1

See Section 9 for operations at 102% NR.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 91

DIGITAL POWER LINE DETECTOR SYSTEM

P/N 4G9380F00111

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DIGITAL POWER LINE DETECTOR SYSTEM

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GENERAL INFORMATION

The Digital Power Line Detector (DPLD) System detects 50 Hz and 60 Hz power line signal in the vicinity of the helicopter and warns the pilot.

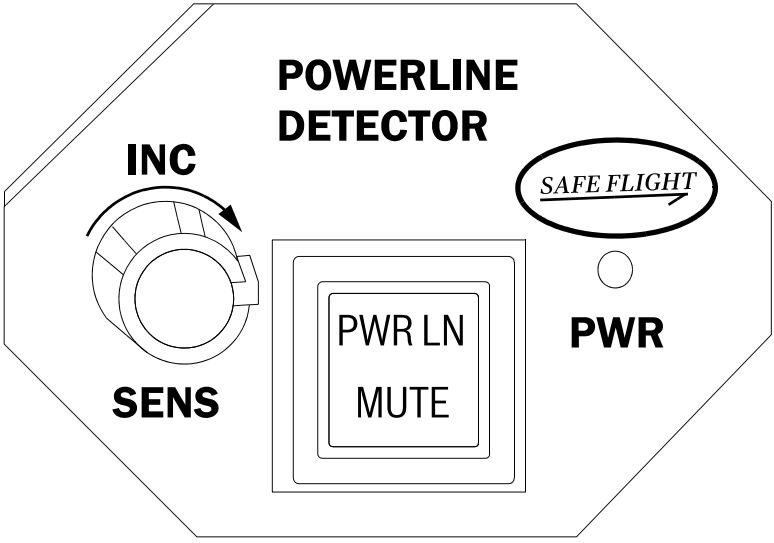
The system comprises of a Power Line Detector (PLD) unit mounted in the cockpit instrument panel Figure 1, an antenna mounted externally on the helicopter tail cone lower inclined panel and an antenna coupler.

The DPLD consists of a super low frequency receiver with a digital processor to measure energy at power line frequencies, a level detector and a visual and aural warning generator.

When a nearby power transmission line is detected and the intensity of the field exceeds a value based on the unit software sensitivity setting, the system illuminates an amber lamp PWR LN on the panel and sends a pulsed audio signal to the helicopters ICS system (AUX 1 channel). The sound increases in frequency with the intensity of the power lines radiated field and indicates proximity to the source power line.

A potentiometer is also mounted on the panel to turn the system OFF (fully anti-clockwise) and provide adjustment of the sensitivity level on the system. The audio warning may be muted by pressing the panel button which illuminates the amber MUTE lamp to indicate the system is in the mute condition.

At start up the system performs a SBIT as well as periodic monitoring of the systems health.



ICN-39-A-155091-A-00003-01777-A-01-1

Figure 1 Power Line Detector Controller Panel

SECTION 1 - LIMITATIONS

WEIGHT AND CG LIMITATIONS

After Digital Power Line Detector installation, the new empty weight and CG location must be determined.

DPLD LIMITATIONS

The DPLD must not be used as the primary means for seeing and avoiding power cables.

SECTION 2 - NORMAL PROCEDURES

PRE FLIGHT CHECK

AREA N°4 (Fin, Intermediate and Tail Gearbox, Tail Rotor)

1. DPLD Antenna (1) ➡ — Condition.

SYSTEM CHECKS

1. PLD panel — Select SENS to maximum (MUTE will blink until MUTE button pressed.)
2. PLD display — Confirm SBIT activates audio and visual warning.
3. PLD display — Select sensitivity as required.

Note

To define sensitivity level, rotate SENS knob to INC until PWR LN message and audio signal are activated. The sensitivity level may require further adjustment, in flight, as a function of the powerline cable characteristics

IN FLIGHT

CAUTION

The DPLD display is intended to serve as an awareness tool only and must not replace see and avoid techniques.

1. PLD panel — Confirm green ON PWR light illuminated.
2. DPLD PWR LN alert occurs in flight — Visually identify the position of the power line and correct aircraft flight path as necessary.
3. PLD panel MUTE button — Select as required to MUTE audio.

CAUTION

The DPLD system display indicates power cable that are powered. The system does not detect power cables that are not powered or have a frequency other than 50 Hz or 60 Hz.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

ELECTRICAL SYSTEM

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure confirmed.

CAUTION

Ensure that the DPLD is switched OFF.

DPLD SYSTEM FAILURE

Any failure of the DPLD system will cause the MUTE and WARN messages to illuminate alternately. A momentary depression of the pushbutton will cause both messages to illuminate continuously. Depression of the pushbutton for longer than 2 seconds will restart the system and carry out the self test function.

If the system that cannot be reset it must be switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 92

LEO III HD FLIR

P/N 4G9350F01011

The replacement of the equipment detailed in this Supplement is not allowed without the successful completion of the additional verifications reported in the Maintenance Manual.

Changes to the helicopter configuration (ie. installation of approved equipments) are not allowed without the successful completion of the verifications reported in the Maintenance Manual.

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SUPPLEMENT 92
LEO III HD FLIR

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GENERAL INFORMATION

The LEO III HD FLIR P/N 4G9350F01011 is an airborne Observation System with High Definition sensors, remotely controlled day/night imaging system with Microwave Down Link capability.

The system consists of a Stabilized Turret Assembly (STA), mounted under the nose of the helicopter (Figure 1 & Figure 2), a Control Electronics Unit (CEU) which processes the electronics and a system control unit which consists of a Laptop Control Unit (LCU) that contains all the controls necessary to operate the FLIR turret and systems or a Hand Control (HC), see Figure 3 & Figure 4. The LCU keyboard can only be used in the cabin.

The STA is gyro stabilized and its azimuth and elevation, and therefore the FLIR Line Of Sight (LOS), corresponding to the center of the image, can be directed to any position within the Field Of Regard (FOR) which is 20° to -120° in elevation and 360° in azimuth from the forward position.

The STA contains the following sensors:

— Third generation IR camera with 10 step or continuous zoom, ATTICA Z 640-2. The camera provides an optical Horizontal Field of View (HFOV) from 20° to 2° HFOV. The camera has operator control of focus (manual and auto), gain and level control, Image polarity control Local adaptive dynamic compression (to optimize visibility of details in very bright and dark areas of the immage), homogenization (NUC)

— Progressive scan HD multi-spectral Zoom TV camera with 4 sensors. The HD zoom lens fitted has an zoom ratio of 20x, and optical HFOV of 20° to 1° HFOV and a x2 and x4 digital zoom capability allowing for an ultra narrow FOV of 0.25 HOV.
The camera has operator control of Focus (manual or auto), Iris control (manual or auto), gain control (manual or auto), selectable preset control modes for differing light and weather conditions and a multi spectral image selection.

— HD spotter TV camera with 4 sensors and a super narrow HD spotter lens. The HD zoom lens fitted has a super narrow FOV of 0.4 HFOV and a x2 and x4 digital zoom capability <allowing an ultra narrow HFOV of 0.1 HFOV.

The camera has operator control of Focus (manual or auto), Gain control (manual or auto), Automatic white balancing, selectable preset control modes for differing light and weather conditions and a multi spectral image selection.

— Infra Red (NIR) Laser illuminator Class 3b to extend night capability of the 2 camera.

— Laser pointer (optional) Class 3b, with either a NIR laser or a visible red laser pointer.

— Eye Safe Multi repetition laser range finder (LRF) (optional). the LRF provides slant range to an object up to a distance of 15 km with an accuracy of 5 m

— Internal inertial measuring unit (IMU) (optional) which provides an independent capability to perform geo location/geo pointing function to determine the attitude of the aircraft with respect tot he surroundings.

The CEO provides all the necessary electronic processing to display and interface signals with the helicopter equipment.

The LCU or the HC interface can be used to operate the system with thumb joystick, rotary encoders, arm switch and pushbutton commands to control the system without entering the multi layer menu selections.

To operate the LRF, Laser Pointer or Laser Illuminator (if fitted) a series of hardware and software interlocks are incorporated in addition to the Laser Safety Interlock Unit (LIU) (Figure 5) which is fitted in the interseat console and incorporates an ARM switch requiring a key to ARM the laser before firing. A WOW interlock also ensures the laser is not used when the aircraft is on the ground.

The Pilot and Copilot MFD, optional central 5th display or the Mission Console Display can also be used to display the image.

If a search light is installed the searchlight may be slaved to the FLIR for night illumination. See appropriate Supplement for Searchlight.

For full information on the use of the LEO III HD FLIR refer to the LEO III HD Airborne Observation System Operator’s Manual Document, latest revision.

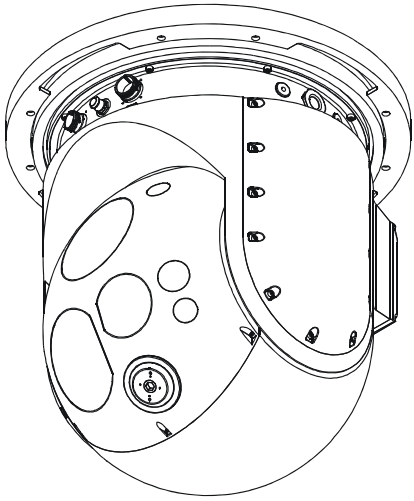

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Figure 1 LEO III HD FLIR STA (for reference only)

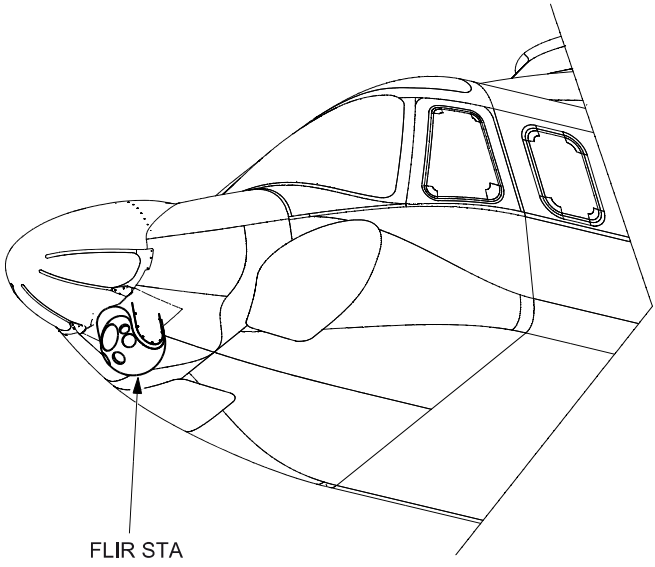

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Figure 2 LEO III HD FLIR Installation (for reference only)

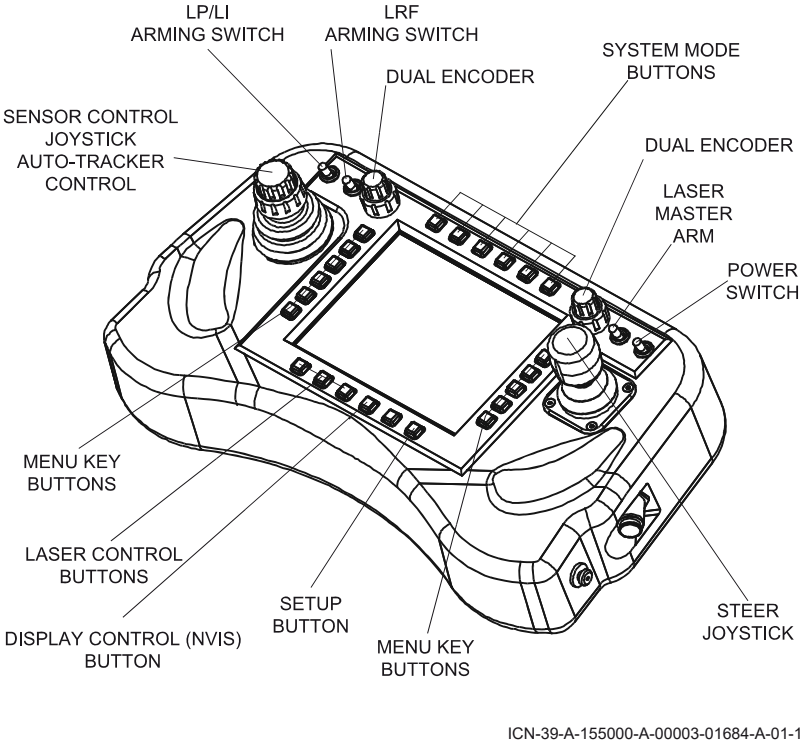

Figure 3 Lap Top Control Unit (LCU)

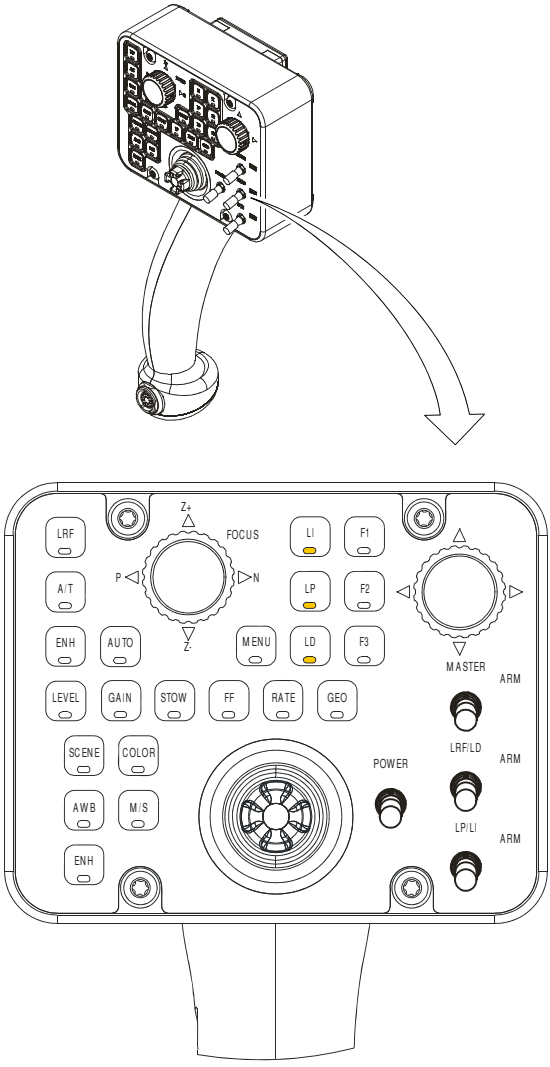

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Figure 4 Hand Control Unit (HC)

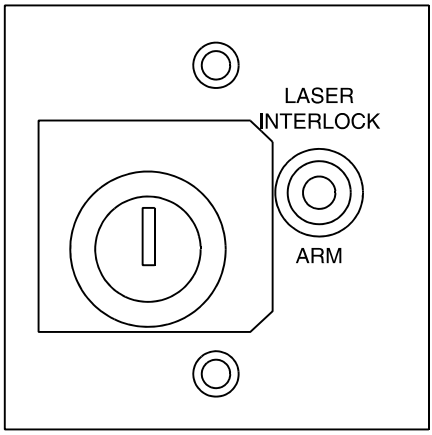

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Figure 5 Laser Safety Interlock Unit (LIU)

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the LEO III HD FLIR kit, the new empty weight and center of gravity position must be determined.

LEO III HD FLIR LIMITATIONS

The FLIR must not be used for navigation.

The FLIR LCU and HC must be operated from the left hand seat or by cabin crew.

The FLIR Eye Safe LRF must not be operated when close to personnel.

Laser Class IIIa/IIIb/IV operation is not EASA approved.

The laser pointer/illuminator is disabled.

LEO III HD FLIR STA LIMITATIONS

Maximum speed for STA operation..... 160 KIAS

Minimum OAT for STA operation ..... -20°C

SECTION 2 - NORMAL PROCEDURES

Note

For full information on the use of the LEO III HD FLIR refer to LEO III HD Airborne Observation System Operator's Manual Document, latest revision.

EXTERNAL PRE FLIGHT CHECKS

AREA N°1 (Helicopter Nose)

1. LEO III HD FLIR STA — Secure.
   Check IR and camera lens condition and cleanliness.

AREA N°7 (Cockpit/Cabin Interior)

1. LEO III HD FLIR LCU/HC — Check present, connected and secure.

2. LIU ARM switch (if fitted) — Confirm OFF.

ENGINE PRE-START CHECKS

1. LEO III HD FLIR LCU/HC — Confirm
   - System switched OFF,
   - LRF ARM OFF.

SYSTEM CHECKS

1. LEO III HD FLIR LCU/HC — Switch system ON.

2. LEO III HD FLIR image — Select image display as required (pilot, copilot MFD, Central 5th display, Mission console display).
   Select IR or video camera as required.

3. LEO III HD FLIR LCU/HC — Stow FLIR and switch OFF, or as required.
   Stow LCU/HC or as required.

IN FLIGHT

1. LEO III HD FLIR LCU/HC — Switch system ON.

2. LEO III HD FLIR image — Select image display as required. (pilot/copilot MFD by selecting FLIR Cam on MFD system menu, or Central 5th display or Mission console display, if fitted).
   Select IR or Video camera as required.

3. LEO III HD FLIR LCU/HC — Control FLIR direction and settings as required.

CAUTION

The Eye Safe LRF must not be operated when close to personnel.

4. LIU ARM switch — Select ARM.

5. LRF — ARM and activate as required.

6. LIU ARM switch — Select OFF when not required.

7. SLAVE button on searchlight pendant (if installed) — Select as required.

Note

When FLIR is not being used it should be stowed to protect the FLIR cameras.

PRE LANDING CHECKS

1. LEO III HD FLIR LCU/HC — Stow FLIR cameras and switch system OFF. Stow LCU/HC.

2. LIU ARM switch — Confirm OFF.

PRE SHUTDOWN CHECKS

1. LEO III HD FLIR LCU/HC — Confirm FLIR switched OFF and LCU/HC stowed.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

DOUBLE DC GENERATOR FAILURE

The following assumes the Double DC generator Failure procedures, presented in Section 3 of the Basic Manual, have been followed and a double DC generator failure is confirmed.

CAUTION

Ensure that the LEO III HD FLIR system is switched OFF.

SECTION 4 - PERFORMANCE DATA

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 93

MGB IMPROVED LUBRICATION SYSTEM

P/N 4G6320F00311
P/N 4G6320F00312
P/N 4G6320F00511

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SUPPLEMENT 93
MGB IMPROVED LUBRICATION SYSTEM

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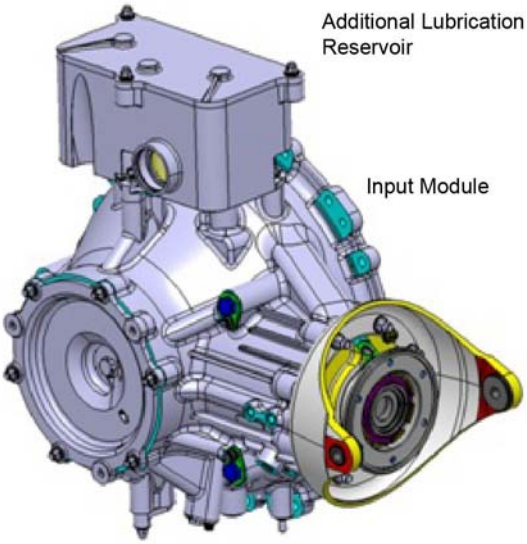
GENERAL INFORMATION

The Main Gearbox (MGB) Improved Lubrication System consists of modified engine input modules which contain an oil reservoir mounted on the top of each module. The reservoir, which holds approximately 1.5 litres of oil, is connected to the module via an oil lubrication jet and a reservoir overflow pipe. The reservoir mounted on the input module becomes a closed loop system with the MGB. See Figure 1.

During normal MGB operation an oil jet, pressurized by the MGB oil pumps, continuously fill the oil reservoir with MGB oil. Being a closed system the oil then exits the sealed reservoir via an overflow pipe back into the MGB. Oil exiting the reservoir in this manner does not contribute directly to the lubrication of the input bearings.

When the MGB suffers loss of oil or loss of oil pressure the oil in the reservoir then exits the reservoir through the oil jet, under the effect of gravity. The oil jet directly lubricates the input pinion ball bearing and is centrifugally spread around the other bearings in the input module to continue lubrication of the input module and maintain the temperature of the bearings low. As the input modules are the critical part of the MGB for the ‘run dry’ capability this improvement permits a modification to the MGB OIL PRESS emergency procedure, see Section 3 of this Supplement.

This optional modification on new production MGB’s is recorded as P/N 4G6320F00311 and is available as an option for retrofit on previous MGBs P/N 4G6320F00312 or the new P/N 4G6320F00511.



ICN-39-A-155093-A-00003-01781-A-01-1

Figure 1 Input Module with Lubrication Oil Tank

SECTION 1 - LIMITATIONS

WEIGHT AND CG LIMITATIONS

After MGB Improved Lubrication System installation, the new empty weight and CG location must be determined.

SECTION 2 - NORMAL PROCEDURES

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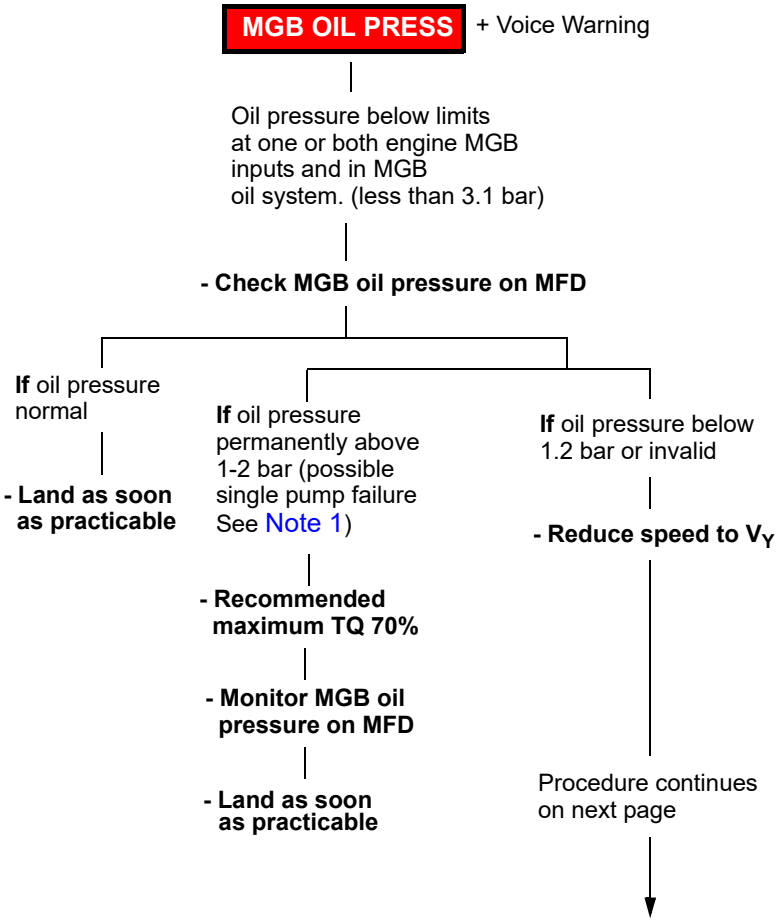
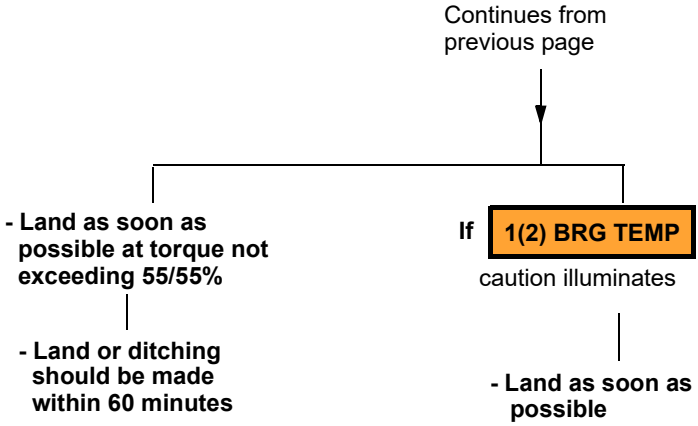
SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

MAIN GEARBOX

OIL PRESSURE LOW



OIL PRESSURE LOW (CONTINUED)



Note 1

The most likely cause of oil pressure low but remaining above 1.2 bar permanently is a failure of one of the two MGB pumps. Lubrication is provided by the remaining pump to allow continued flight.

Note

If MGB CHIP MAST or MGB CHIP SUMP cautions illuminate when MGB OIL PRESS warning is illuminated the CHIP BURNER must not be activated.

Note

• It is acceptable for the MGB OIL PRESS warning to illuminate at GI providing the indicated pressure is above 2 BAR and, at FLT (100%NR), the warning is not illuminated.
• It is acceptable for the MGB OIL PRESS warning to illuminate transiently when accelerating from GI to FLT providing the warning is not illuminated at 100%NR.

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 94

KIT LEFT HAND CONTROLS REMOVAL

P/N 4G6700F00311

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SUPPLEMENT 94
KIT LEFT HAND CONTROLS REMOVAL

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GENERAL INFORMATION

The Kit for the Left Hand Controls Removal P/N 4G6700F00311 comprises of left hand cyclic and collective covers, stowage of the connectors and compensating masses for the pilot cyclic and collective. The left hand yaw pedals have a transparent panel mounted in front of the pedals and a cover for the left hand pedal adjuster.

After the removal of the left hand cyclic stick and collective lever the connectors are stowed and the covers are fitted to avoid interference of the controls. Due to the effect on the control system balance weights are added to the right hand cyclic and collective to compensate for the removal of the LH controls. See Figure 1 and Figure 2.

The yaw pedals remain installed, however, a transparent plexiglass panel is mounted in front of the pedals, to avoid interference of pedal movement, and a cover mounted over the yaw pedal adjuster mechanism see Figure 3.

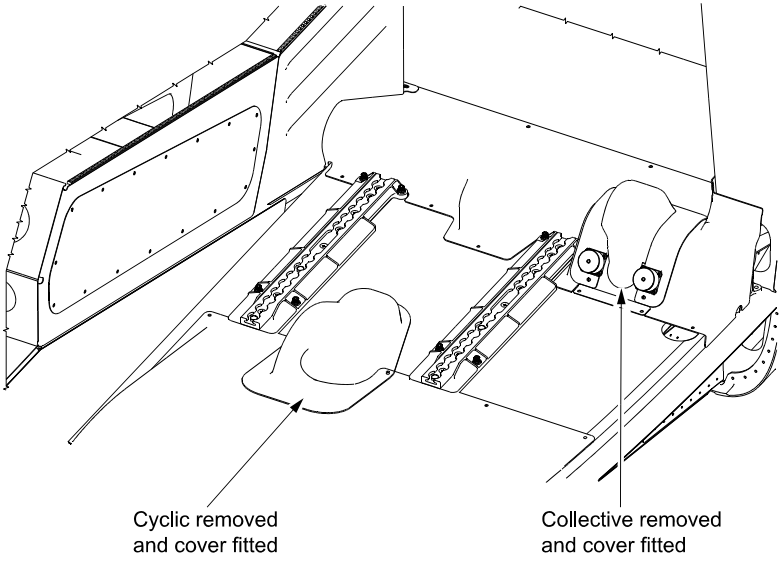

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Figure 1 LH Cyclic and Collective covers (seat omitted for clarity)

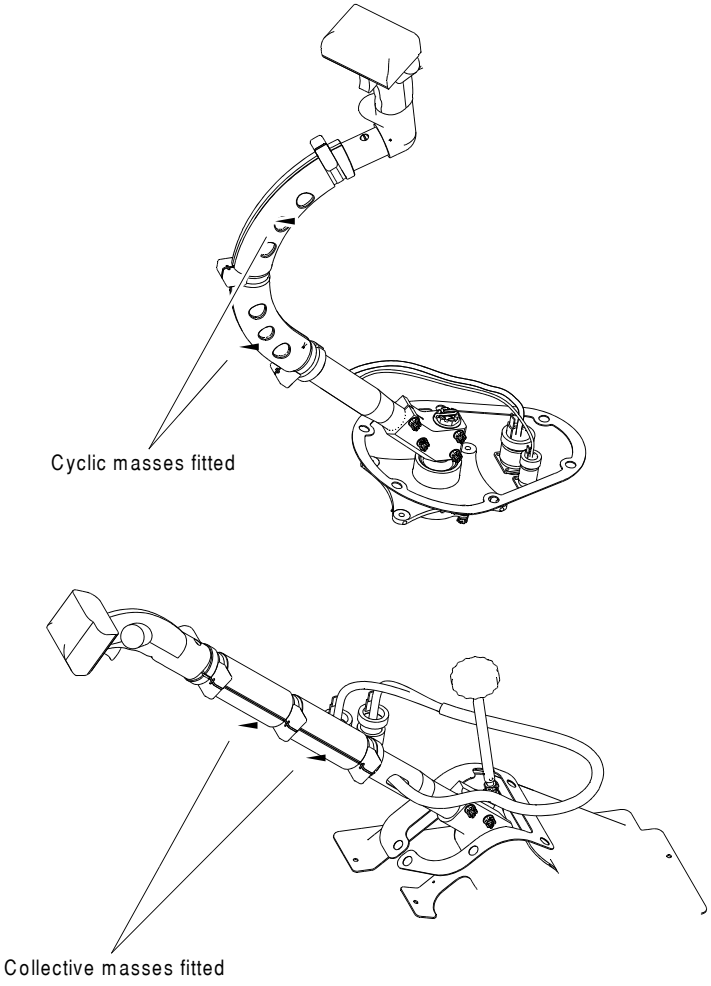

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Figure 2 RH Cyclic and Collective Masses fitted

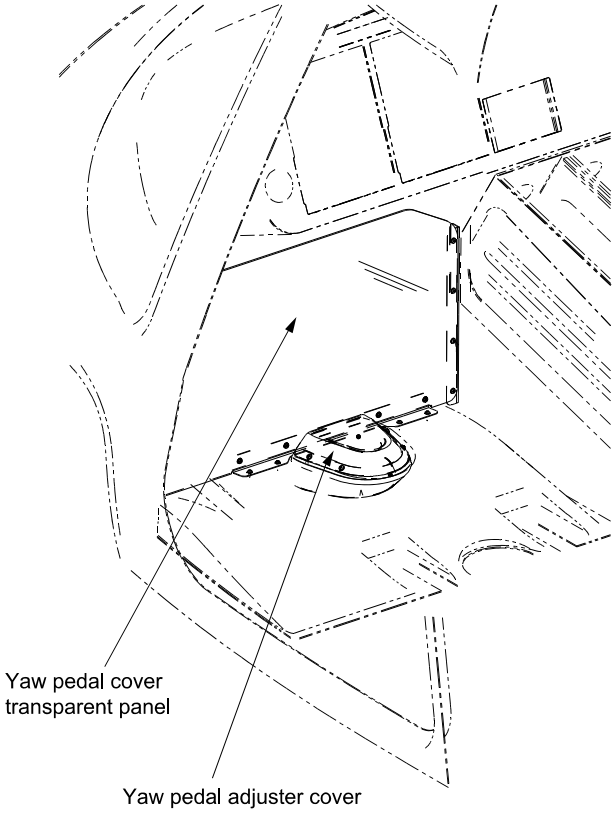

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Figure 3 LH yaw pedal barrier and adjuster cover fitted (seat omitted for clarity)

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SECTION 1 - LIMITATIONS

MINIMUM FLIGHT CREW

Visual Flight Rules (VFR) Day ..... One pilot

For VFR Night Single Pilot Operation see Supplement 24.

For IFR Single Pilot Operation see Supplement 22.

After removal of the Left Hand Controls two pilot operations are not permitted including:

— Category A Offshore Helideck (Supplement 12)

— Search and Rescue Operations (Supplement 69)

— Limited Ice Conditions (Supplement 76)

Only a crew member can occupy the cockpit left hand seat.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Kit Left Hand Controls Removal, the new empty weight and center of gravity position must be determined.

SECTION 2 - NORMAL PROCEDURES

Note

After removal or installation of the cyclic and collective controls carry out full and free check of cyclic, collective and yaw pedals movement.

AREA N°7 (Cabin and Cockpit Interior)

1. LH cyclic	— Confirm removed and cover installed and secure.
2. LH Collective	— Confirm removed and cover installed and secure.
3. Yaw pedal panel	— Confirm transparent panel fitted and secure.
4. RH cyclic stick	— Confirm balance weights fitted and secure.
5. RH collective	— Confirm balance weights fitted and secure.

COCKPIT/ENGINE PRE START CHECKS

1. Occupant in LH seat	— Brief as required.
2. Flight Controls	— Push ELEC PUMP on HYD panel. Carry out cyclic, collective and yaw pedals full and free check. Utilizing the cyclic position indicator, on PFD, centralize cyclic control by moving in the direction indicated by the yellow arrows to obtain the central circle green. ELEC HYD PUMP select OFF.

CAUTION

Full and free check should be carried out with slow displacement of the controls and one control at a time in order not to overload the electric pump.

Note

Procedures that request actions from the LH cyclic or collective switches (such as hoist operations Supplement 11, 41 and 49) can be ignored.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 95

DITCHING CONFIGURATIONS WITH DART INTEGRATED EMERGENCY FLOTATION AND LIFERAFT KIT

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SUPPLEMENT 95

DITCHING CONFIGURATIONS WITH DART INTEGRATED EMERGENCY FLOTATION AND LIFERAFT KIT

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APPROVED CABIN LAYOUTS FOR OPERATIONS OVER WATER IN ACCORDANCE WITH POINT CAT.IDE.H.320(A) OF ANNEX IV TO REGULATION (EU) NO 965/2012 S95-25

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GENERAL INFORMATION

Ditching Regulations

Demonstration of emergency over water landing capability and buoyancy up to Sea State 4 is required by ditching regulations. However, for this installation Sea State 6 has been demonstrated and approved.

Emergency Flotation and Life Raft System (P/N 4G9560F00111 & P/N 4G9560F00211)

This system comprises of :

— 4 flotation bags, 2 mounted on the lower nose section (left and right hand sides) and two mounted on the lower aft central section (left and right hand side). One inflation bottle is mounted in the left flotation cover.

— 2 life rafts mounted, one on each aft flotation bag, left and right hand side, in a dedicated pocket on the flotation bags. two configurations are available,

- P/N 4G9560F00111 contains 10 man (15 man overload) Life Rafts
- P/N 4G9560F00211, contains 12 man (18 man overload) Life Rafts

The flotation bags are automatically deployed on ditching by water sensors (four sensors are installed and 2 adjacent sensors must be activated to inflate the flotation) or by manual operation of the guarded FLOAT pushbutton on either the Pilot or Copilot collective grip. (See Figure 2)

For operation of both automatic or manual flotation inflation the OFF/ ARMED switch on the FLOATS EMER control panel, mounted in the interseat console (pilots side), must be set to ARMED. The control panel also incorporates a self test function for the flotation system. Two panels are available P/N 3G9560V00558 & P/N 3G9560V00559 Figure 1.

The life raft inflation is activated manually, and independently, for left or right life raft installation. Two basic modes of manual deployment are available, plus optional additional handles:

— The Primary activation handle is mounted on the Pilot/Copilot forward door frame.

— The Secondary is by handles mounted externally to the aircraft on the left and right cargo door forward frame.

— The Third, optional deployment means are additional life raft inflation handles mounted under the belly at the edges, on the left and right hand side, close to the sponson.

To activate the life raft inflation remove the safety pin from the cockpit handles and rotated aft. The Secondary handles on the external cabin door forward frame can also be used by removing the safety pin, lifting the guard and rotating the handles downward.

The Third handles (if installed) under the belly can also be used by removing the safety pin, lifting the guard and rotating the handles.

A cable system, connected to the liferaft, activates the inflation. (See Figure 3 & Figure 5).

The left and right hand life raft activation is independent, the left side handles are used to deploy the left hand life raft and the right side handle to deploy the right hand liferaft.

Each life raft contains an Survival Kit and Emergency Locator Transmitter (ELT) compliant with ETSO-C126a. Both the ELT and Survival Kit are accessible, when the raft is packed inside the aft float container, via an access window. See Figure 4.

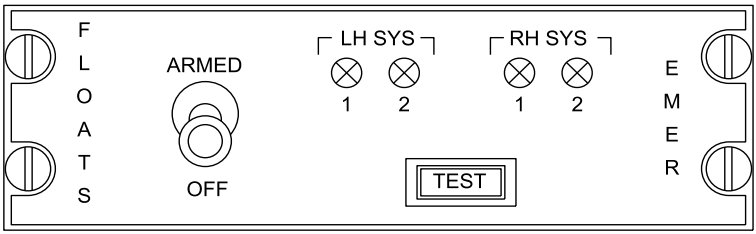

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Figure 1 Emergency Flotation Control Panel P/N 3G9560V00558/9

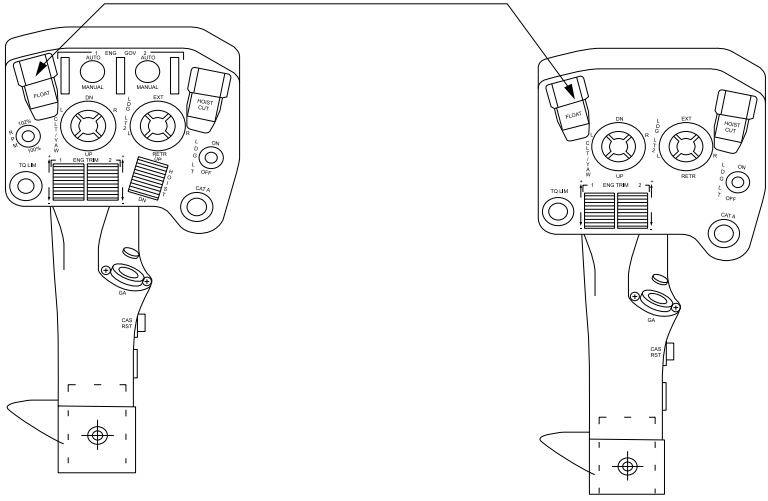

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Figure 2 FLOAT Guarded Pushbutton Switch Positions (Pilot and Copilot Collective Grips)

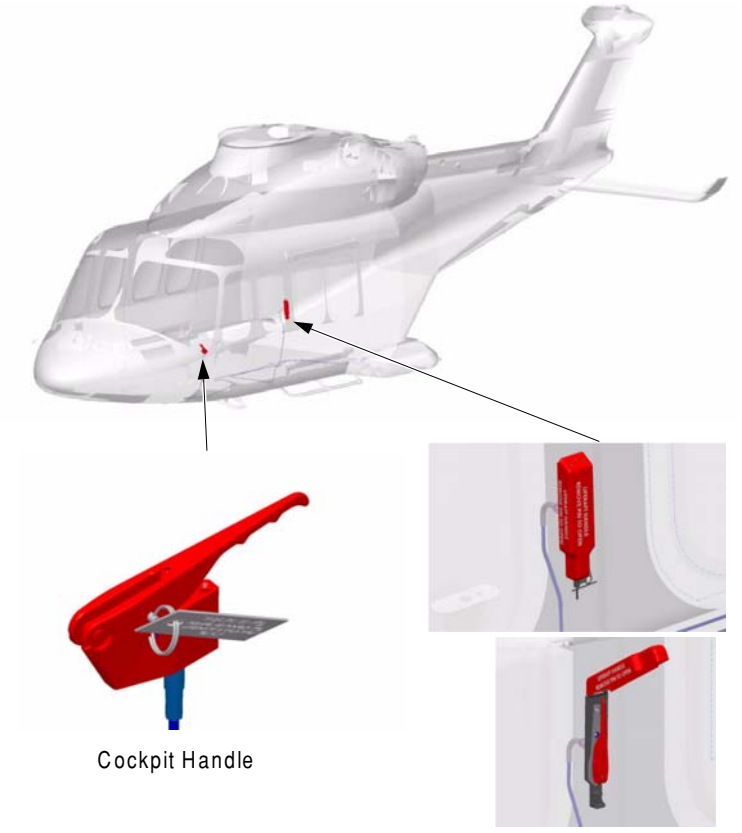

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Figure 3 Life Raft, Cockpit Primary and Externally Mounted Secondary Manual Deployment Handle Positions (Left Hand Side shown, example for Reference Only)

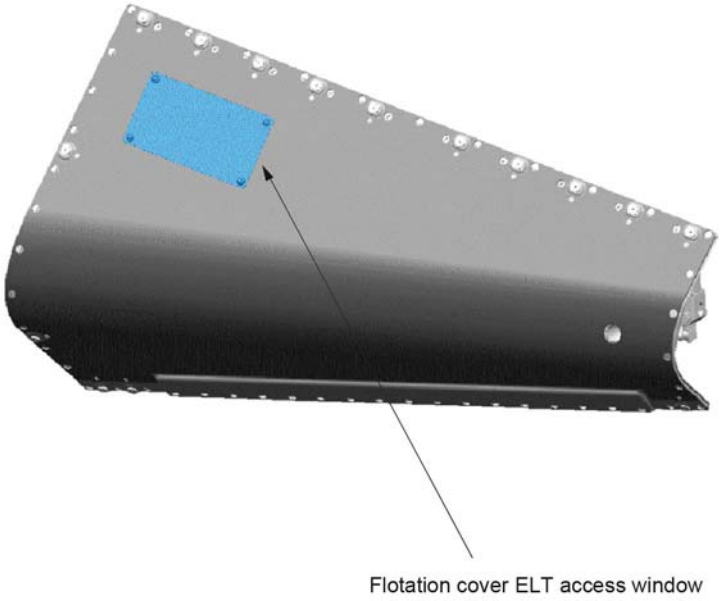
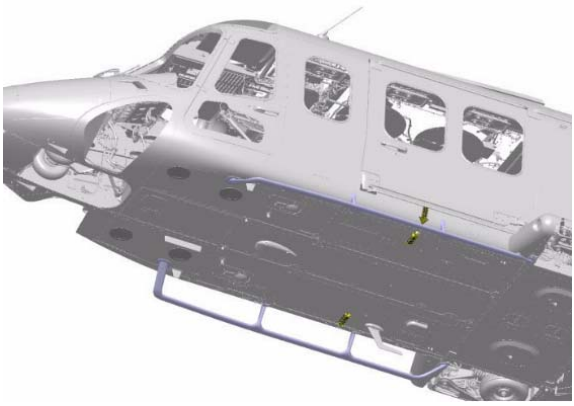


Figure 4 ELT Access Window (Left Hand Side Shown)



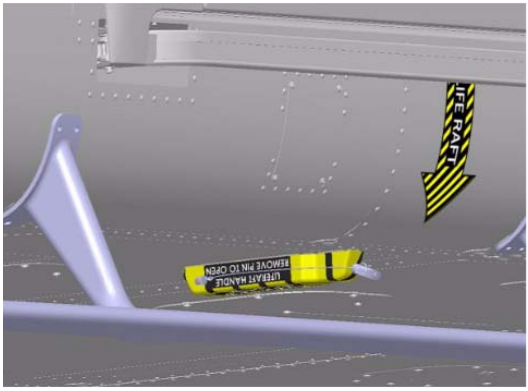


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Figure 5 If Installed, Third Manual Deployment Handle Positions, and handle detail (Left Hand Side shown)

SECTION 1 - LIMITATIONS

BASIS OF CERTIFICATION

The Emergency Flotation and Life Raft System is approved for ditching, up to Sea State 6, in accordance with JAR/FAR 29.

The Emergency Flotation System P/N 4G9560F00111 and 4G9560F00211 are approved for ditching, up to Sea State 6, in accordance with JAR/FAR 29 provided the following approved equipments, in accordance with the National Operation rules, are fitted:

— Life preservers.

TYPE OF OPERATIONS

For flight over water the helicopter must be operated in accordance with the National Operating rules.

The approved cabin layouts are detailed in Section 6 of this Supplement and in Section 6 of the Basic RFM and appropriate Supplement.

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the DART Emergency Flotation System the new empty weight and center of gravity position must be determined.

No change to weight or CG limitations.

TAKE OFF LIMITATIONS

Take off after ditching is prohibited.

MISCELLANEOUS LIMITATIONS

Flotation System

The Emergency Flotation system shall only be used for ditching.

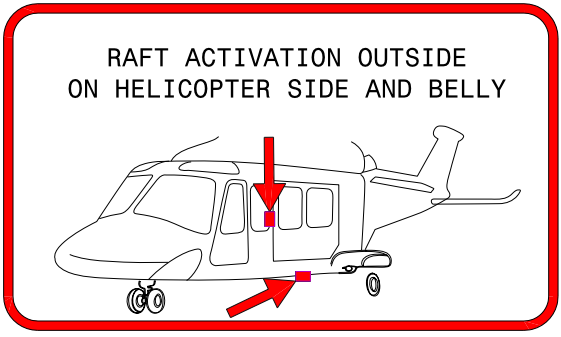
Flotation bags shall not be inflated in flight.

PLACARDS



Placard mounted in cabin on left and right hand side to identify the Secondary liferaft activation handle position.

Figure 1-1 Placard with Secondary liferaft activation handle



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Placard mounted in cabin on left and right hand side to identify the Secondary and Third (if installed) liferaft activation handle positions.

Figure 1-2 Placard with Secondary and Third liferaft activation handle

SECTION 2 - NORMAL PROCEDURES

GENERAL

Gas Bottle Pressures

The flotation gas bottle pressure is related to ambient temperature and the normal operating pressure with respect to ambient condition can be see in Figure 2-1.

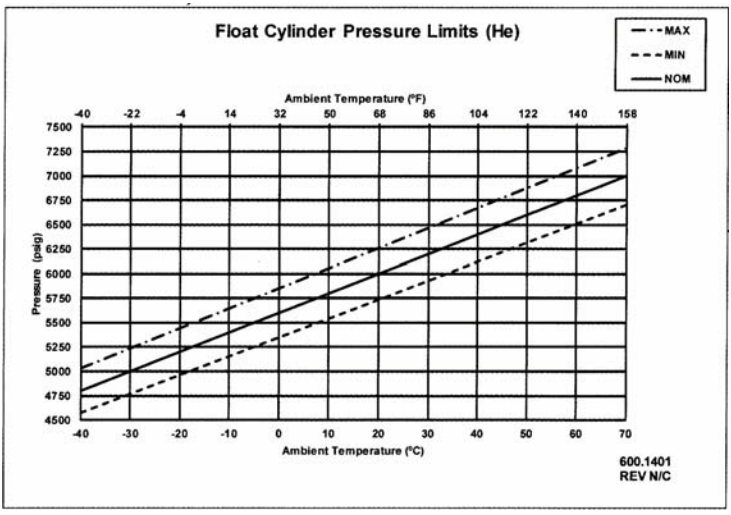


Figure 2-1 Flotation Gas Bottle Pressure Limits

The liferaft gas bottle pressure is related to ambient temperature and the normal operating pressure with respect to ambient condition can be see in Figure 2-2.

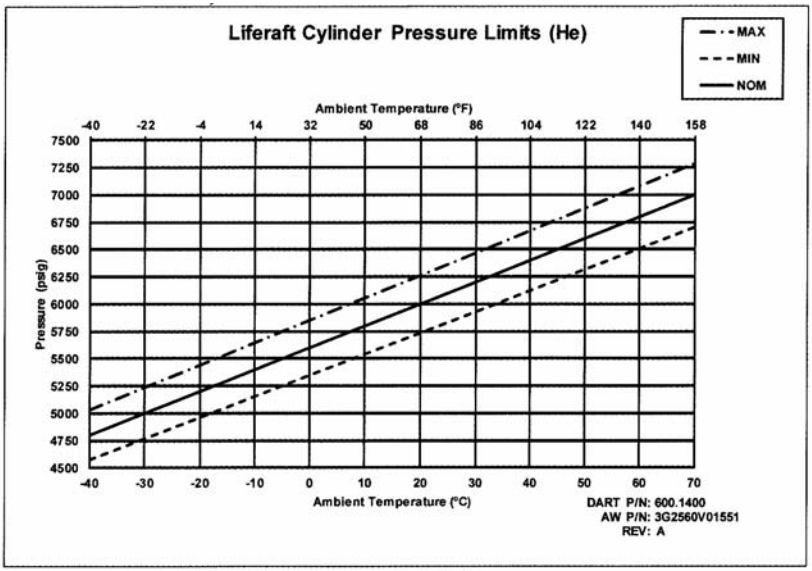


Figure 2-2 Life Raft Gas Bottle Pressure Limits

EXTERNAL PRE-FLIGHT CHECK

AREA N°1 (Helicopter Nose)

1. Left and right nose flotation covers	— Condition of covers and attachment bolts present.

AREA N°2 (Fuselage – Right Hand Side)

1. Right hand inflation handles	— • Side of aircraft, condition and in place, • under belly (if Installed), condition and in place.
2. Right hand sponson aft fairing inspection door ➡	— Open inspection door and verify life raft gas bottle pressure is within limits for the ambient conditions, see Figure 2-2. (Inflation diagram on sponson aft fairing)
3. Right hand flotation cover	— Condition of cover and attachment bolts present

AREA N°6 (Fuselage – Left Hand Side)

1. Left hand flotation cover inspection window ➡	— Verify gas bottle pressure is within limits for ambient conditions, see Figure 2-1. (Inflation diagram on flotation cover).
2. Left hand flotation cover	— Condition of cover and attachment bolts present.
3. Left hand sponson aft fairing inspection door ➡	— Open inspection door and verify life raft gas bottle pressure is within limits for the ambient conditions, see Figure 2-2. (Inflation diagram on sponson aft fairing)

4. Left hand inflation handles — • Side of aircraft, condition and in place,
• under belly (if Installed), condition and in place.

COCKPIT PRE-START CHECKS

CAUTION

The FLOAT override pushbutton guard on the collective grips must not be raised during the following checks.

After BATTERY MASTER ON:

EMER FLOATS Panel

1. FLOATS EMER TEST pushbutton — Press, confirm the two LH SYS and two RH SYS lights illuminate. Release and confirm lights extinguish

CAUTION

If FLOAT ARM caution is illuminated, prior to the following procedure, do not continue as the flotation system has malfunctioned.

CAUTION

During the following test personnel must NOT be close to flotation bags as an internal malfunction of the FLOAT system may cause the flotation to inflate.

2. OFF/ARMED switch (FLOATS EMER panel) — ARMED, confirm FLOAT ARM caution displayed on CAS, the LH SYS and RH SYS lights do not illuminate and flotation system does not inflate. Select switch to OFF.

CAUTION

If the LH SYS and RH SYS lights illuminate when the flotation system is in ARMED do not continue as the flotation system has malfunctioned.

PRE-TAKE OFF CHECKS

1. OFF/ARMED switch (FLOATS EMER panel)

   Over land operation — OFF.

   Over water operation — ARMED, FLOAT ARM caution displayed on CAS.

IN FLIGHT PROCEDURES

CAUTION

The FLOAT override pushbutton guard on the collective grips must not be raised unless a manual deployment is deemed necessary after ditching.

1. OFF/ARMED switch (FLOATS EMER panel)

   Over land operation — Confirm OFF.

   Over water operation — Confirm ARMED, FLOAT ARM caution displayed on CAS.

PRE-LANDING CHECKS

1. OFF/ARMED switch (FLOATS EMER panel)

   Over land operation — Confirm OFF.

   Over water operation — Confirm ARMED, FLOAT ARM caution displayed on CAS.

SHUTDOWN PROCEDURES

PRE-SHUTDOWN CHECKS

1. OFF/ARMED switch (FLOATS EMER panel) — OFF, FLOAT ARM caution not displayed on CAS.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY PROCEDURES

DITCHING

Consideration should be given to the environmental factors, such as wind direction and speed, sea state and engine power available.

Approach and landing should be into wind.

When landing into waves, land head-on to oncoming waves avoiding, if possible, ditching into the face of the wave.

WARNING

As considerable error can result from estimation of height over water, the radar altimeter should be used for height cues during descent.

WARNING

Do not deploy flotation bags in flight. Bags will automatically deploy on water touchdown.

CAUTION

At high touchdown speeds, the rotorcraft may roll and turn to the left after touchdown due to gyroscopic effects. This will require pilot corrective action.

Note

After ditching the rotor brake does not function, even if the undercarriage is extended.

DITCHING PROCEDURES - AEO

1. Pre-ditching checks — Warn crew and passengers to prepare for ditching.
2. OFF/ARMED switch (FLOATS EMER panel) — Confirm ARMED. FLOAT ARM caution displayed on CAS.
3. Landing Gear — Confirm UP.

CAUTION

If the landing gear cannot be retracted, ditching with minimum forward speed is recommended.

4. Lights — At night, switch ON emergency lights and landing light.
5. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.
6. Brief — Cabin crew and occupants.
7. Radar altimeter — Verify working.
8. Windscreen wipers — Select FAST.
9. Distress procedure — Broadcast Mayday.
10. Initial point — During the approach, reduce airspeed gradually to arrive at a position 200 ft (60 m) above touchdown point with a rate of descent of no more than 500 fpm. Initiate a deceleration to achieve 30 kts at 50 ft (15 m). At 50 ft (15 m) rotate nose up to approximately 20° to decelerate.

11. Approach and hover — Continue the deceleration and descent to hover.

12. Touchdown — Enter water cushioning touchdown with collective in a level or slightly nose up attitude (5°). Avoid rearward movement of the helicopter.

13. Flotation bags — Check inflated, if not lift guard and press FLOAT override button on either Pilot or Copilot collective grip.

14. Collective — Lower collective.

15. Emergency exits — As soon as possible inform crew and passengers to jettison the emergency exits in cockpit and cabin.

16. Engines — Shut down using **ENGINE SHUTDOWN IN EMERGENCY** procedure in Basic RFM page 3-35.

17. Collective — If required gently raise collective to slow rotor.

CAUTION

Collective application will cause the helicopter to yaw left.

When rotors stationary

18. GEN 1 & 2 and BATT MASTER switches — OFF (using gang-bar).

19. Life Raft deployment handles — Pilot and Copilot, remove pin, rotated deployment handles aft, confirm life rafts deploy. If life rafts do not deploy, locate through sliding doors emergency exits, the left and right hand secondary deployment handles on forward cabin door frame. Remove pin, lift guard and rotate handles downwards to inflate rafts.
If installed, and required, the third deployment handle, under the belly, remove pin, lift guard and rotated deployment handles.

20. Life Raft lanyards — Locate life raft lanyards on rear flotation inflatable boom to manoeuvre life rafts, as required.

21. Evacuation — Evacuate the aircraft, with life preservers.

DITCHING PROCEDURES - OEI

In the event of a ditching being required following a single engine failure the approach and ditching should be carried out as follows:

1. Speed — Reduce speed (recommended 80 KIAS.

2. OFF/ARMED switch (FLOATS EMER panel) — Confirm ARMED. FLOAT ARM caution displayed on CAS.

3. Landing Gear — Confirm UP.

CAUTION

If the landing gear cannot be retracted, ditching with minimum forward speed is recommended.

4. Lights — At night switch ON emergency lights and landing light.
5. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind.
6. Brief — Cabin crew and occupants.
7. Radar altimeter — Verify working.
8. Windscreen wipers — Select FAST.
9. Distress procedure — Broadcast Mayday.
10. Initial point — During the approach, reduce airspeed gradually to arrive at a point 200 ft (60 m) above touchdown point with a rate of descent of no more than 500 fpm.
11. Approach — Initiate a deceleration to achieve 30 kts at 50 ft (15 m). At 50 ft (15 m) rotate nose up to a maximum of 20° to decelerate.
12. Touchdown — Continue deceleration to attain landing attitude (level or 5° nose up) prior to ditching at the slowest forward speed possible (not exceeding 30 kts). Apply collective to cushion touchdown.
13. Flotation equipment — Check inflated, if not lift guard and press FLOAT override button on either Pilot or Copilot collective grip.

14. Collective — Lower collective.

15. Emergency exits — As soon as possible inform crew and passengers to jettison the emergency exits in cockpit and cabin.

16. Engines — Shut down remaining engine using **ENGINE SHUTDOWN IN EMERGENCY** procedure in Basic RFM page 3-35.

17. Collective — If required gently raise collective to slow rotor.

CAUTION

Collective application will cause the helicopter to yaw left.

When rotors stationary.

18. GEN 1 & 2 and BATT MASTER switches — OFF (using gang-bar).

19. Life Raft deployment handles — Pilot and Copilot, remove pin, rotated deployment handles aft and confirm life rafts deploy. If life rafts do not deploy, locate through sliding doors emergency exits, the left and right hand secondary deployment handles on forward cabin door frame. Remove pin, lift guard and rotate handles downwards to inflate rafts.
If installed, and required, the third deployment handle, under the belly, remove pin, lift guard and rotated deployment handles.

20. Life Raft lanyards — Locate life raft lanyards on rear flotation inflatable boom to manoeuvre life rafts, as required.

21. Evacuation — Evacuate the aircraft, with life preservers.

AUTOROTATIVE LANDING PROCEDURE ON WATER

In the event of a ditching being required following a twin engine failure the approach and ditching should be carried out as follows:

1. Collective pitch — Smoothly and rapidly reduce to enter autorotation.

2. Cyclic — Adjust to obtain autorotation speed between 80 KIAS (minimum rate of descent speed) and 100 KIAS (Best range speed).

3. Collective pitch — Adjust to obtain up to 110% NR.

4. OFF/ARMED switch (FLOATS EMER panel) — Confirm ARMED. FLOAT ARM caution displayed on CAS.

5. Landing gear — Confirm UP.

CAUTION

If the landing gear cannot be retracted, ditching with minimum forward speed is recommended.

6. Landing direction — Select and manoeuvre into wind

7. Brief — Cabin crew and occupants.

8. Radar altimeter — Verify working.

9. Windscreen wipers — Select FAST.

10. Distress procedure	— Broadcast Mayday (time permitting).
11. Shutdown	— If appropriate and time available carry out **ENGINE SHUTDOWN IN EMERGENCY** procedure in Basic RFM page 3-35.
12. Flare	— At approximately 200 feet (60 m) AGL, initiate a cyclic flare to a maximum 30° nose-up angle.
13. Collective pitch	— Adjust, as required, to maintain NR at 110% maximum during the flare.
14. Cyclic/Collective pitch	— At approximately 35 feet (10 m) AGL, reduce pitch attitude to 10° nose-up and apply collective pitch, as required, to achieve touchdown at approximately 300 feet per minute or less.
15. Waves	— Approach into oncoming waves, if possible.
16. Touchdown speed	— Not exceeding 30 kts.
17. Collective pitch	— Following touchdown, lower promptly.
18. Flotation equipment	— Check inflated, if not lift guard and press FLOAT override button on either Pilot or Copilot collective grip.
19. Emergency exits	— As soon as possible inform crew and passengers to jettison the emergency exits in cockpit and cabin.

20. Collective — If required gently raise collective to slow rotor.

CAUTION

Collective application will cause the helicopter to yaw left.

When rotors stationary

21. GEN 1 & 2 and BATT MASTER switches — OFF (using gang-bar).

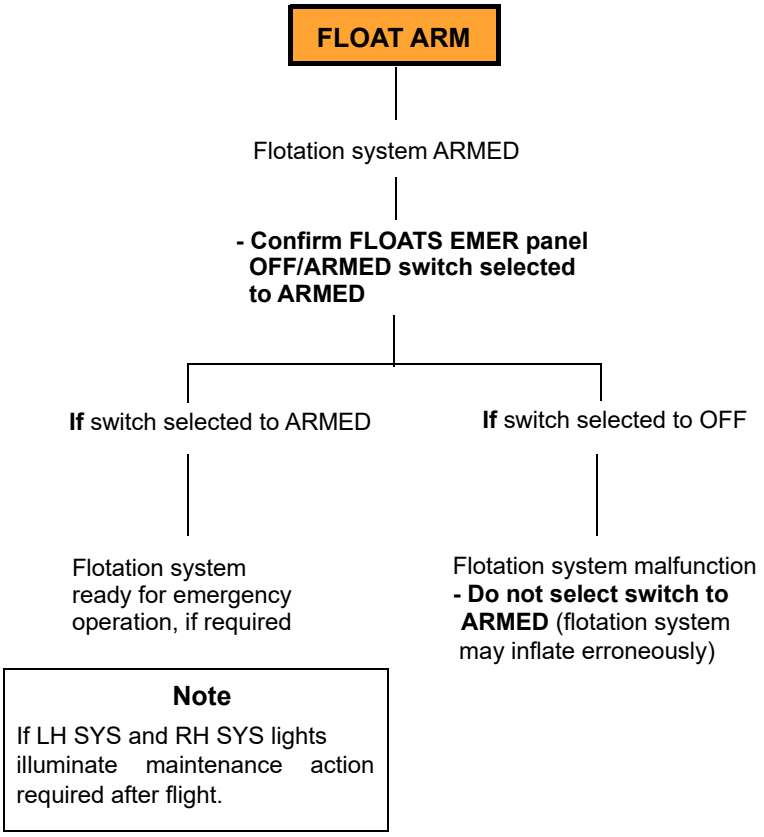
22. Life Raft deployment handles — Pilot and Copilot, remove pin, rotate deployment handles aft and confirm life rafts deploy. If life rafts do not deploy, locate through sliding doors emergency exits, the left and right hand secondary deployment handles on forward cabin door frame. Remove pin, lift guard and rotate handles downwards to inflate rafts. If installed, and required, the third deployment handle, under the belly, remove pin, lift guard rotated deployment handles.

23. Life Raft lanyards — Locate life raft lanyards on rear flotation inflatable boom to manoeuvre life rafts, as required.

24. Evacuation — Evacuate the aircraft, with life preservers.

MALFUNCTION PROCEDURES

Flotation Arm Caution



SECTION 4 - PERFORMANCE DATA

No change in aircraft performance when emergency flotation equipment and life rafts are installed.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

APPROVED CABIN LAYOUTS FOR OPERATIONS OVER WATER IN ACCORDANCE WITH POINT CAT.IDE.H.320(A) OF ANNEX IV TO REGULATION (EU) NO 965/2012

Ensure:

— the rotorcraft has one emergency exit, in each side of the rotorcraft cabin, for each unit (or part of unit) of four passenger seats;

— all the emergency controls that need to be operated underwater are marked with the method of operation as well as with yellow and black stripes;

— an additional third life raft inflation handle mounted under the aircraft belly edge left and right, near the sponson;

— the following placard is mounted on each emergency exit:



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Figure 6-1 Placard on each emergency exit

It is the Operators responsibility to select the cabin layouts eligible for operations over water in accordance with CAT.IDE.H.320(a) of Annex IV to Regulation (EU) No 965/2012 between those detailed in the Basic RFM and appropriate Supplements, depending on the number of emergency exits installed on each side of the rotorcraft.

Layouts not eligible for operations over water in accordance with CAT.IDE.H.320(a) of Annex IV to Regulation (EU) No 965/2012 are identified as 'High Density'.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 96

HEAVY DUTY BAGGAGE COMPARTMENT

P/N 4G2550F00211

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SUPPLEMENT 96
HEAVY DUTY BAGGAGE COMPARTMENT

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GENERAL INFORMATION

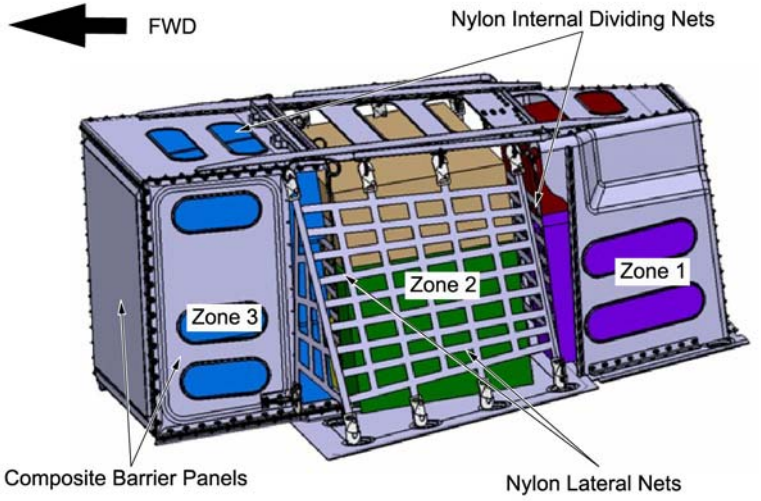
The Heavy Duty Baggage Compartment Kit consists of an optional kit that is installed in the baggage compartment area to allow all of the baggage bay volume to be used for baggage.

The kit consist of barrier panels and vertical nets around the baggage bay area. This permits the baggage to be loaded without the requirement for a restraint net. The vertical nets are connected to attachments on the baggage bay floor and ceiling.

Heavy Duty Baggage Compartment Kit permits baggage to be loaded up to the cabin/tunnel dividing barrier utilizing 3 zones. Two additional internal dividing nets are also mounted in the baggage bay area between Zone 1, Zone 2 and Zone 3. See Figure 2. Zone 3 is intended for personal items only.

This configuration is compatible with the Auxiliary Fuel Tank (Supplement 15).

The dividing nets used in the Heavy Duty Baggage Compartment can be seen in Figure 2. To load/unload baggage these nets must be unhooked, as required, to load the baggage in the appropriate zone, then re-attached for flight. No further securing is required for baggage.



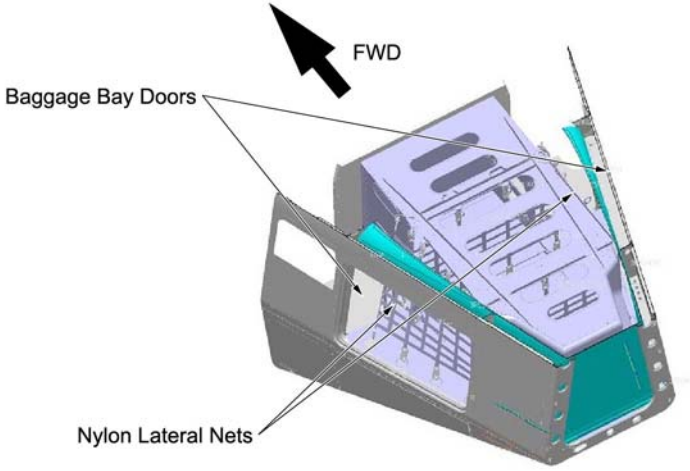


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Figure 1 Heavy Duty Baggage Compartment Kit

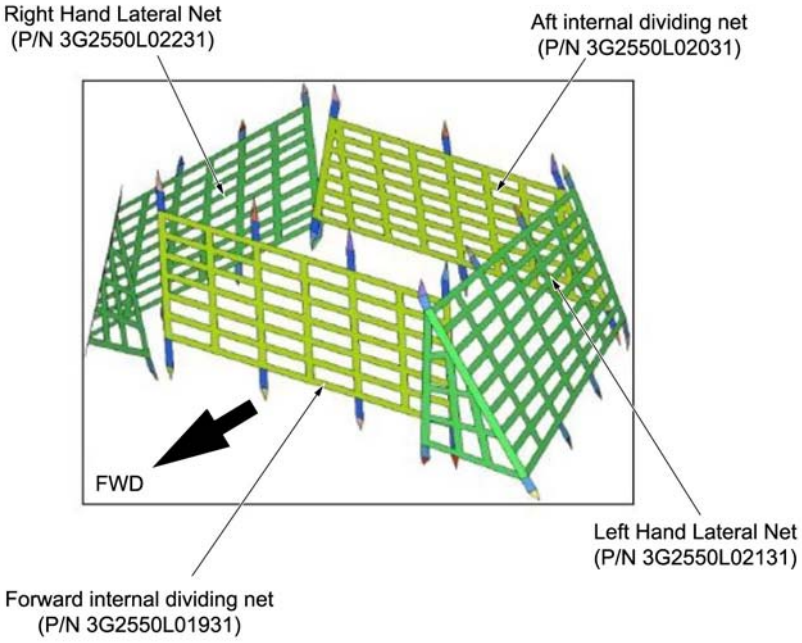

Figure 2 Heavy Duty Baggage Compartment Net Configuration

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SECTION 1 - LIMITATIONS

WEIGHT AND CG LIMITATIONS

After installation of the Heavy Duty Baggage Compartment Kit, the new empty weight and CG location must be determined.

BAGGAGE COMPARTMENT LIMITATIONS

When the Heavy Duty Baggage Compartment Kit is installed the baggage compartment limitations become:

Total Maximum baggage load ..... 300 kg (660 lb)

Maximum load in Zone 1..... 60 kg (130 lb)

Maximum load in Zone 2..... 120 kg (265 lb)

Maximum load in Zone 3 (personal items only) ..... 120 kg (265 lb)

Maximum unit load .....550 kg/m2 (110 lb/sq.ft)

Heavy items with weight above 25 kg (55lb) must be secured with restraint net P/N 3G2550A00231 or other approved means.

MISCELLANEOUS LIMITATIONS

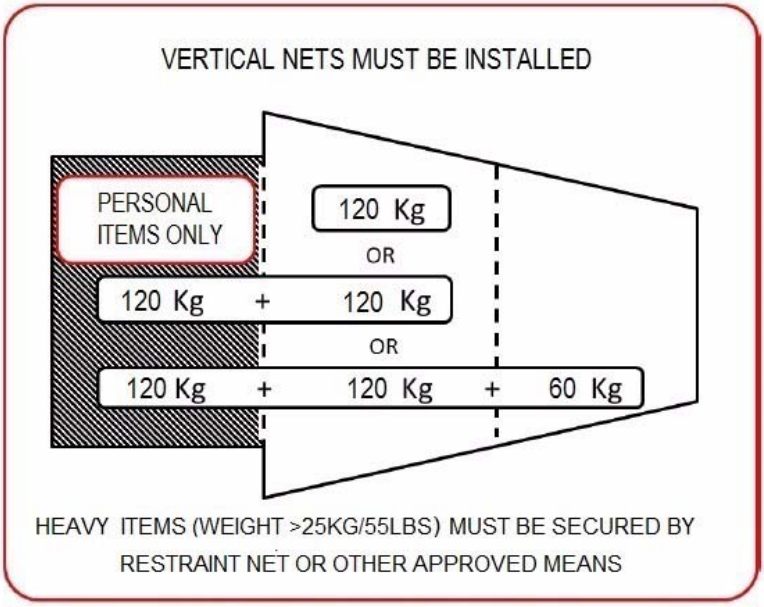
This supplement has the following restrictions:

— Supplement 17 P/N 4G2350F00511, 4G2350F02111, External Loud Speakers, cannot be installed.

— Supplement 54 P/N 4G5340F00111, Full Cabin Extension, cannot be installed.

PLACARDS

Heavy Duty Baggage Compartment Kit



SECTION 2 - NORMAL PROCEDURES

PRE FLIGHT CHECKS

AREA N°2 (Fuselage - Right Hand Side)

1. Baggage compartment	— Condition, cargo (if on board) correctly distributed in the bay zones. (Refer placard). Lateral and internal nets correctly mounted and secure.
2. Baggage door	— Secure.

AREA N°6 (Fuselage - Left Hand Side)

1. Baggage compartment	— Condition, cargo (if on board) correctly distributed in the bay zones. (Refer placard). Lateral and internal nets correctly mounted and secure.
2. Baggage door	— Secure.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

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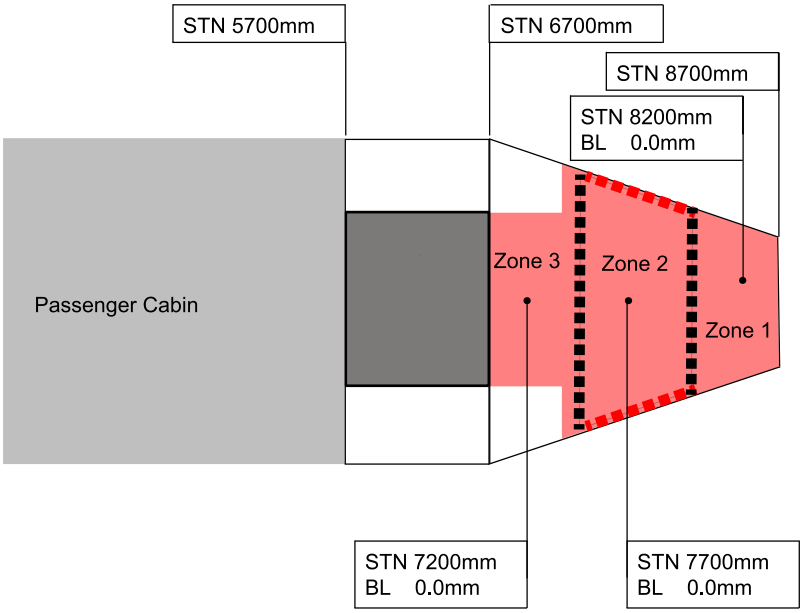
PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

HEAVY DUTY BAGGAGE COMPARTMENT STN AND BL POSITIONS

The diagram below gives the Longitudinal and Lateral position for baggage in the Heavy Duty Baggage Bay for the 3 Loading Zones. These values should be used in the weight and balance calculations.



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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 97

CATEGORY A ENHANCED OFFSHORE ELEVATED HELIDECK PROCEDURES

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SUPPLEMENT 97
CATEGORY A ENHANCED OFFSHORE ELEVATED HELIDECK PROCEDURES

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GENERAL INFORMATION

ABBREVIATIONS

- AGL Above Ground Level
- ATS Above Take Off Surface
- BTS Below Take Off Surface
- CTO Continued Take Off
- CTO Continued Take Off
- FATO Final Approach and Take Off Area
- GS Ground Speed
- IFR Instrument Flight Rules
- LH Left Hand
- MPOG Minimum Pitch On Ground
- OEI One Engine Inoperative
- PF Pilot Flying
- RH Right Hand
- PNF Pilot Not Flying
- RoD Rate of Descent
- RTO Rejected Take Off
- TDP Take Off Decision Point
- T-O Take Off
- V_{COSS} Climb Out Safety Speed
- V_{TOSS} Take Off Safety Speed
- V_Y Speed for Best Rate of Climb
- VFR Visual Flight Rules
- WAT Weight-Altitude-Temperature

DEFINITIONS

1. Take Off Decision Point (TDP) — The first point in the Take-Off path from which a CTO capability is assured and the last point from which a RTO is assured, within the rejected take off distance.
2. Continued Take Off distance — The horizontal distance from the start of the take off procedure to a point at least where V_{TOSS} and a positive rate of climb are attained following an engine failure at or after TDP.
3. Rejected Take Off distance — The horizontal distance from the start of the take off procedure to a point where the helicopter lands and stops safely following an engine failure prior to TDP.
4. PATH 1 - PATH 2 — The segment between the end of the CTO distance (or BL distance) to a height of 1000 ft (300 m) ATS during an OEI 2.5 min power climb at V_{COSS} for a minimum ROC of 600 fpm.
5. Take Off Safety Speed (V_{TOSS}) — The airspeed at which 100 fpm rate of climb is assured.
6. Climb Out Safety Speed V_{COSS} — The airspeed at which the scheduled climb gradient OEI can be achieved.
7. Elevated Heliport — A heliport which is at least 3 m (10 ft) above the surrounding surface.

8. Helideck — A Heliport located on a floating or fixed Offshore structure.

9. Heliport — A defined area of land or structure intended to be used for the arrival and departure of helicopters.

10. FATO — A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced and includes the rejected take-off area available.

GENERAL

This supplement details an Enhanced Offshore Elevated Helideck Take-Off procedure permitting an improved WAT for the take-off.

For Landing Procedures see appropriate Part in Supplement 12.

The Take-Off technique requires the Pilot Flying (PF) and Pilot Not Flying (PNF) coordinate their activities so that the PNF will monitor the height and call out Take Off Decision Point (TDP) and, in the case of engine failure, the rotor speed (NR) allowing the PF to concentrate on flying the manoeuvres.

The technique uses a vertical climb at 400 to 500 fpm (using 25% Delta PI) above the helideck to achieve a TDP height of 25 ft (7.5 m) where a nose down rotation commences for the flyaway. An engine failure before TDP means the vertical climb must be stopped and the aircraft rejected back to the helideck (RTO). An engine failure at or after the TDP means the pilot must continue the rotation for a Continued Take Off (CTO) on one engine (OEI). This Take-Off procedure also assures a deck edge clearance (always exceeding 15 ft (5 m) vertical and 35 ft horizontal), even when the manoeuvre requires a drop down Below the Take Off Surface (BTS).

The Take-Off manoeuvre is commenced with the helicopter nose wheel between 1.5 m and 4.0 m from the edge of the helideck.

When operating at the condition given in the Weight, Altitude, Temperature (WAT) chart below, the technique above always assures no exposure time to a ditching in case of an engine failure.

If the Take-Off WAT weight is such that in case of an engine failure a drop down is required it is assumed that the height of the Elevated Helideck is greater than the Drop Down plus a height clearance margin, as required by the Competent Authorities, and that there are no obstacles beyond and below the deck edge.

SECTION 1 - LIMITATIONS

GENERAL

For Limitations not included in this Supplement see Basic RFM, Supplement 50 Increased Gross Weight 6800 kg, Supplement 90 Weight Extension 7000 kg, Supplement 5 EAPS or Supplement 86 Inlet Barrier Filter.

TYPE OF OPERATION

CATEGORY A TAKE OFF

Weather conditions must be such that visual references exist in the FATO area and in Take-Off distance.

CREW LIMITATIONS

Minimum flight crew is 2 pilots.

HELIDECK SIZE

Minimum demonstrated helideck size ..... Diameter 15 m (50 ft)
or 15 m x 15 m (50 ft x 50 ft)

WEIGHT LIMITATIONS

Maximum Take-Off Weight ..... 6400 kg

Maximum Take-Off Weight (aircraft configured for 6800 kg).... 6800 kg

Maximum Take-Off Weight (aircraft configured for 7000 kg).... 7000 kg

Take-Off Weight Limitations

Weight Limitation, clean engine air intake ..... Figure 4-1, Figure 4-2

Weight Limitation, EAPS OFF ..... Figure 4-3, Figure 4-4

Weight Limitation, EAPS ON..... Figure 4-5, Figure 4-6

Weight Limitations, IBF Installed..... Figure 4-7, Figure 4-8

GROUND SPEED LIMITATIONS

Maximum GS with PARK BRAKE ON .....5 kts (9 km/hr)

ALTITUDE LIMITATIONS

Altitude Envelope ..... See Figure 1-1

Maximum Altitude for Enhanced
Offshore Helideck CAT A Take-Off..... 1000 ft Hp
(300 m Hp)

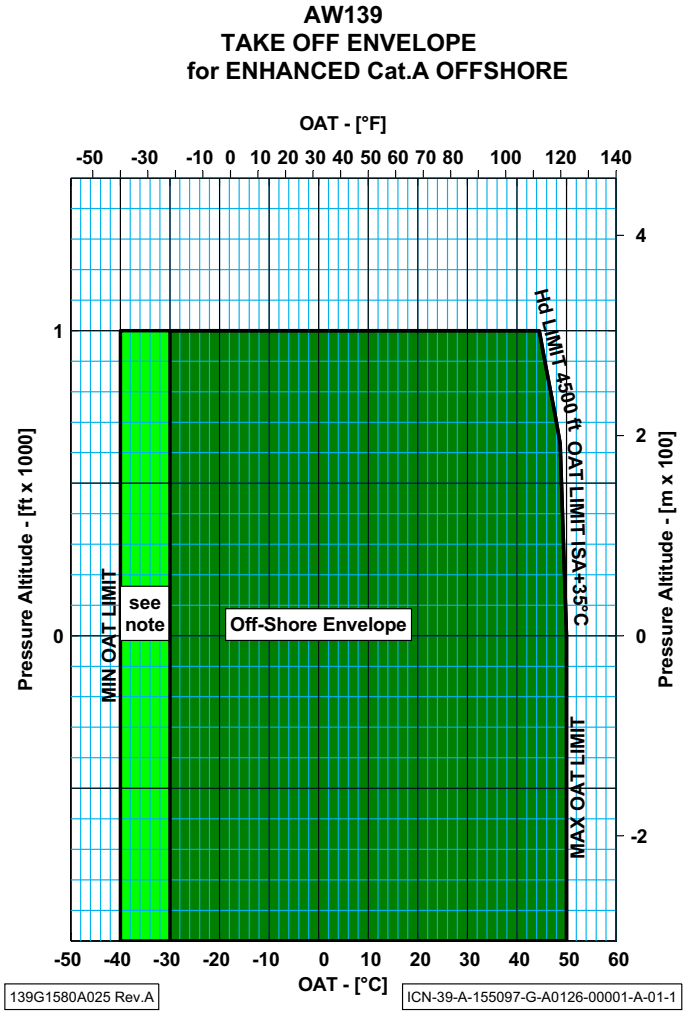
WIND LIMITATIONS

Wind Benefit Chart .....Figure 1-2

Take-Off with tail wind component is prohibited.

Note

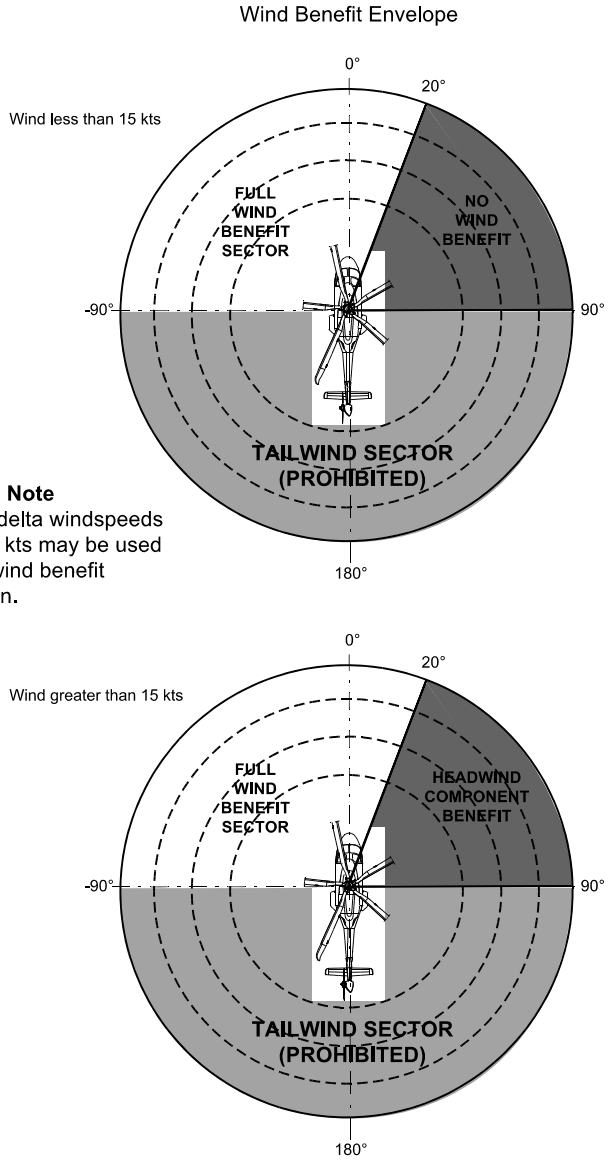
Unless otherwise authorized by operation regulations, the pilot is not authorized to credit more than 50 percent of the performance increase resulting from the wind component presented in Figure 1-2.



Note

For Gross weight above 6400kg only if kit 3G3200F00211 or 4G0000F00311 installed.

Figure 1-1 Altitude and Temperature Limitations



Note

Only the delta windspeeds above 15 kts may be used for headwind benefit calculation.

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Figure 1-2 Wind Benefit Chart

SECTION 2 - NORMAL PROCEDURES

AIRSPEED DEFINITIONS

Take-Off Safety Speed (V_{TOSS}) ..... 40 KIAS

Climb Out Safety Speed (V_{COSS})..... Figure 2-1

Best Rate of Climb Speed (V_Y) ..... 80 KIAS

TAKE OFF DELTA PI

Delta PI value for Take-Off 25%

TAKE-OFF DECISION POINT HEIGHT (TDP)

TDP ..... 25 ft (7.5 m) ATS

Note

Radar Altimeter heights are shown in the flight path profiles.

Note

Pitch attitudes given in the procedures are absolute values.

TAKE OFF PROCEDURE

For Take-Off the PNF should monitor engine and rotor parameters and make the following calls:

— TDP

— Approaching 25 kts

Vcoss SELECTION
for PATH 1-2

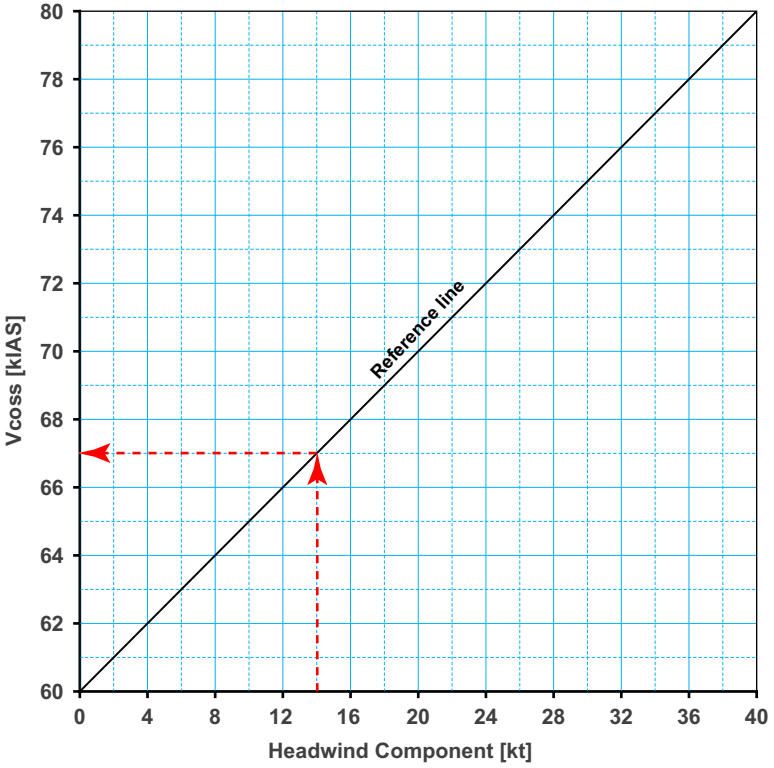

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Figure 2-1 Climb Out Safety Speed Chart

OFFSHORE HELIDECK TAKE-OFF PROCEDURE

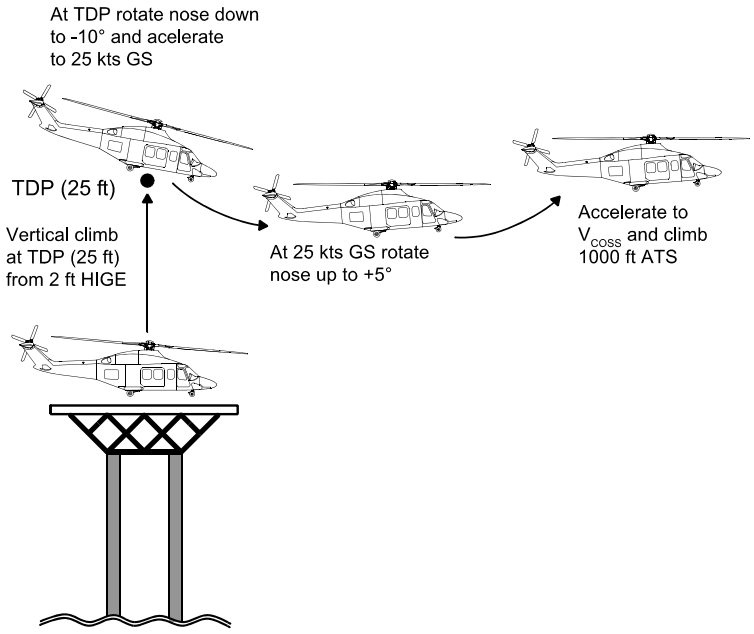

Figure 2-2 Enhanced Offshore Helideck Take-Off Profile

1. V_{COSS} — Select V_{COSS} based on head-wind component.
2. LDG LT & LDG LT2 switches — As required.
3. Rotor speed — Set 102%.
4. PARK BRAKE — Apply. Confirm PARK BRAKE ON advisory illuminated on CAS.

5. HEATER	— Confirm SOV 1 & 2 switches selected to NORMAL. Select HTR switch to AUTO, note ITT increase on both engines, and HEATER ON advisory illuminates. Select HTR switch to OFF, note ITT decreases, on both engines, and HEATER ON advisory extinguishes.
6. ECS ENVIRO (if fitted)	— Confirm SOV 1 & 2 switches selected to NORMAL. Select ECS CONTROL switch to MAN HEAT and hold MAN HEAT switch to increase until ITT increase noted on both engines, and HEATER ON advisory illuminates. Select ECS CONTROL switch to OFF, note ITT decrease, on both engines, and HEATER ON advisory extinguished.
7. Power checks	— Carry out as required in accordance with ENGINE POWER CHECKS procedure in Supplement 12 CAT A Operations, Part K.
8. Pilot Altimeter	— Set 0 ft or nearest 1000 ft (300 m) setting to T-O altitude, with collective at MPOG.
9. Rad Alt	— Check.
10. NOSEWHEEL lock	— LOCK.
11. Flight controls	— Check correct functioning.

12. MFD PWR PLANT page — Check all parameters within normal operating limits and cross check with PFD.

13. Compass Controller — Select DG.

14. Warnings and Cautions — Clear/as required.

15. PI/NR — Check PI's matched NR 102%.

16. Hover — Establish a 2 ft (0.6 m) ATS hover with the helicopter nose wheel between 1.5 and 4.0 m from the front edge of the helideck and note hovering PI.

17. Collective/Cyclic Control — Apply a PI delta value of 25%. in 1-2 seconds to climb vertically, maintaining hover position.

18. Take Off Decision Point (TDP) — At 25 ft (7.5 m) ATS rotate nose down to -10° to accelerate to 25 kts GS.

19. At 20 kts groundspeed — PNF calls 'Approaching 25 kts'.

20. At 25 kts groundspeed — Rotate nose up to +5° and accelerate to V_{TOSS}.

Note

The absolute pitch attitude values defined in the procedures are not affected by aircraft longitudinal C of G position.

21. Acceleration/Climb — When V_{TOSS} (40 KIAS) is achieved continue acceleration to V_{COSS}. Maintain collective position.

22. Climb	— At V_{COSS} adjust attitude to stabilize speed. Continue climb.
23. Landing gear	— UP (when reaching V_{COSS} but not below 200ft (60 m) ATS.
24. Power	— Adjust collective to continue climb at V_{COSS}, utilizing up to Take- Off power, as required, to 1000 ft (300 m) ATS or cruise altitude if lower.
25. Compass controller	— Select MAG.
26. After Take-Off checks	— Complete.
27. At 1000ft (300 m) ATS or cruise altitude if lower	— Adjust collective and cyclic to establish climb at V_y or accelerate to cruise speed as required.
28. NR/NF	— Select 100% at V_y.
29. HEATER/ECS ENVIRO (if fitted)	— As required.
30. PARK BRAKE	— Release, Confirm PARK BRAKE ON advisory not illuminated on CAS.
31. LDG LT & LDG LT2 switches	— OFF (if used).
32. Pilot Altimeter	— Set as required.

CAUTION

If this procedure is modified, it may not be possible, if an engine fails in the Take-Off path, to carry out a safe OEI landing or achieve the scheduled OEI performance.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL TAKE - OFF

The procedures detailed herein only consider the failure of one engine in the Take-Off path and assume the pilot gives first priority to aircraft control and to achieve a safe flight path.

For the Take-Off procedure the following shall be observed:

1. Engine failure prior to TDP — Recognition of engine failure prior to the TDP dictates that the Take-Off be rejected.

2. Engine failure at or after TDP — Recognition of the failure at or after the TDP dictates that the Take-Off be continued.

Procedures dealing with subsequent Failure/Malfunctions, other than engine failure, must be initiated only after the aircraft control and a safe flight/ground condition have been obtained. The procedures for the emergency/malfunction can be followed according to the appropriate instructions detailed in Section 3 of the basic Rotorcraft Flight Manual.

TAKE OFF PROCEDURES

For Take-Off the PNF should monitor engine and rotor parameters and make the following calls:

— TDP

— Approaching 25 kts

EMERGENCY PROCEDURE FOR SINGLE ENGINE FAILURE DURING TAKE-OFF

SINGLE ENGINE FAILURE RECOGNIZED IN HOVER (2 feet (0.5 m) ATS)

1. Collective	— Maintain collective setting or lower collective slightly, if required, to land.
2. Touchdown	— Increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).
3. Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4. Engine	— On affected engine, carry out ENGINE SHUTDOWN IN AN EMERGENCY procedure, Basic RFM Page 3-35.
5. PARK BRAKE	— As required.

SINGLE ENGINE FAILURE RECOGNIZED IN CLIMB, PRIOR TO TDP (REJECTED TAKE-OFF)

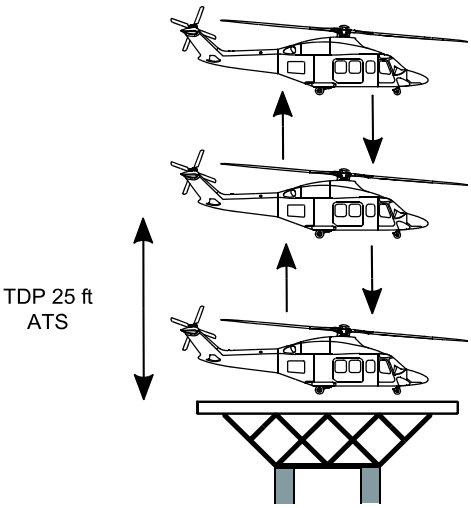

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Figure 3-1 Offshore Helideck Procedure Engine Failure before TDP

1. Collective/Cyclic	— Decrease collective to arrest climb and adjusts pitch attitude by 2° to 3° nose down to commence vertical movement toward helideck. Maintain the rotor speed close to 100%NR. • PNF monitor and call out rotor speed.

Note

The aircraft will continue to climb after engine failure.

2.	Touchdown	— At approximately 5-10 ft (1.5-3 m) ATS increase collective to cushion landing as touchdown becomes imminent. Maximum permitted GS at touchdown 5 kts (9 km/hr).
3.	Landing	— After touchdown, centralize cyclic and simultaneously reduce collective to MPOG.
4.	Engine	— On affected engine, carry out ENGINE SHUTDOWN IN AN EMERGENCY procedure, Basic RFM Page 3-35.
5.	PARK BRAKE	— As required.

SINGLE ENGINE FAILURE RECOGNIZED AT OR AFTER TDP (CONTINUED TAKE-OFF)

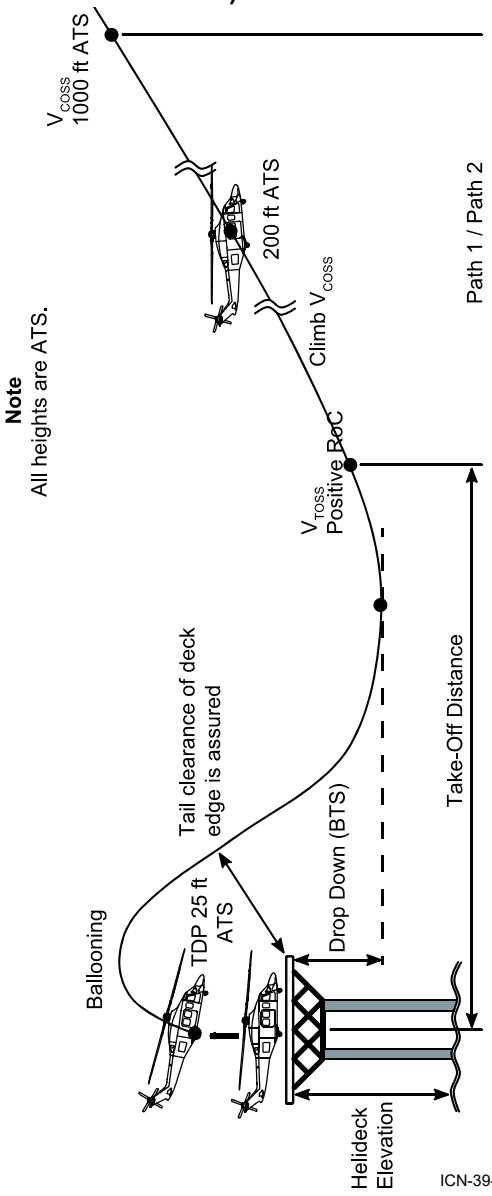

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Figure 3-2 Offshore Helideck Procedure Engine Failure at/after TDP

1.	Collective/Cyclic	— Continue nose down rotation to -10° to accelerate to 25 kts GS using collective to droop NR to a minimum of 90% and to set 2.5 min power. • PNF calls out rotor speed.

Note

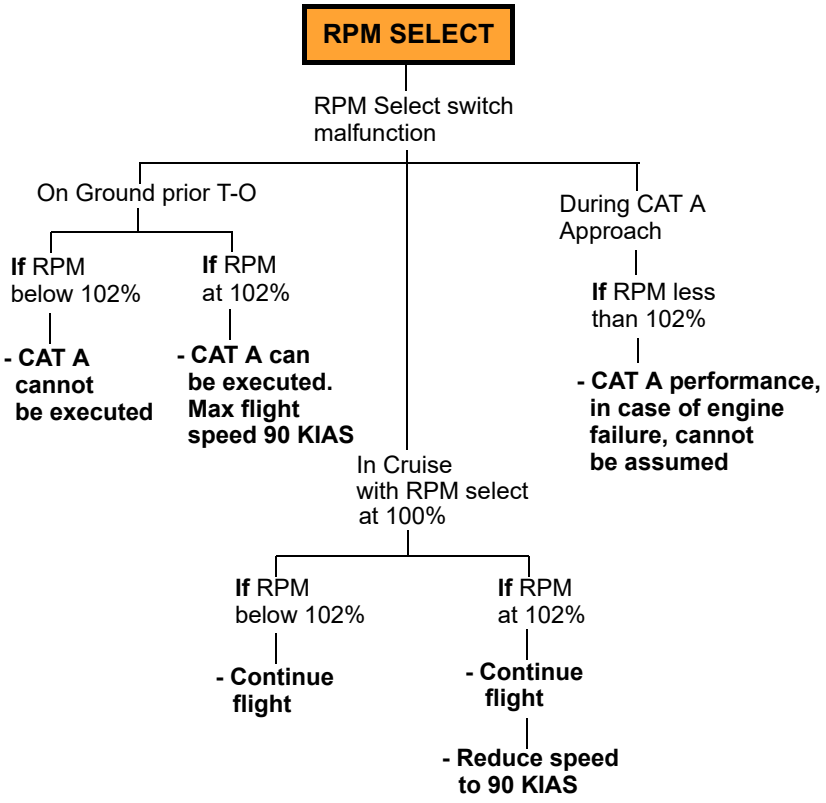
The absolute pitch attitude values defined in the procedures are not affected by aircraft longitudinal C of G position.

2.	At 20 kts groundspeed	— PNF calls ‘Approaching 25 kts’.
3.	At 25 kts groundspeed	— Rotate nose up to +5° and continue accelerate to V_{TOSS}.
4.	Climb	— When the aircraft achieves V_{TOSS} (40 KIAS) continue acceleration to V_{COSS} and lower collective to recover NR to 102%. Continue climb at V_{COSS} using 2.5 min power rating to 1000 ft (300 m) ATS or cruise altitude if lower and accelerate to Vy. Reduce power to OEI MCP rating (140% PI) when convenient before expiry of the “2.5 m” rating
5.	Landing gear	— UP (when reaching V_{COSS} but not below 200 ft (60 m) ATS).
6.	Rotor Speed	— Select 100% at 1000 ft (300 m) ATS or cruise altitude if lower.

7.	At 1000 ft (300 m) ATS or selected cruise altitude	— On affected engine, carry out **ENGINE SHUTDOWN IN AN EMERGENCY** procedure, Basic RFM Page 3-35.
8.	PARK BRAKE	— Release. Confirm PARK BRAKE ON advisory not illuminated on CAS.
9.	LDG LT & LDG LT2 switches	— OFF (if used).
10.	Compass controller	— Select MAG.
11.	MFD	— During OEI cruise every 30 minutes select PWR PLANT page to verify engine normal operation.

MALFUNCTION PROCEDURES

ROTOR SPEED SELECTOR



SECTION 4 - PERFORMANCE DATA

WIND EFFECT

For Crosswind and Headwind Benefit Component refer to Wind Component Chart (Figure 1-2) to define if wind benefit is applicable.

For Azimuths between 20° and 90° and windspeed below 15 kts no wind benefit is applicable.

For Azimuths between 20° and 90° and windspeed above 15 kts refer to Wind Component Chart Figure 4-13 for Crosswind and Headwind Benefit computation.

For Azimuths between -90° and 20° full windspeed is applicable for wind benefit computation.

W.A.T. CHARTS

The Enhanced Offshore Helideck Take-Off Procedure Weight Limitations Charts/Tables are shown in Figure 4-1 to Figure 4-8 for weights up to 7000 kg.

CONTINUED TAKE OFF DISTANCE OEI

The Continued Take Off distance is shown in Figure 4-9. This represents the horizontal distance from the start of the Take-Off to a point at V_{TOSS} and positive rate of climb. The chart is valid for all intake configurations.

CONTINUED TAKE-OFF DROP DOWN

Maximum drop down below Take Off Surface (BTS) during Continued Take Off (valid for Clean Intake, EAPS ON/OFF, IBF Installed ..... Figure 4-10 to Figure 4-12

V_{COSS} CLIMB PROCEDURE PATH 1 & 2

Mean Height Gained in 100 ft (30 m) Horizontal Distance

The mean height gained in 100 ft (30 m) of horizontal distance travelled during the 2.5min OEI climb at V_{COSS}. The climb is done at 2.5min OEI, gradients calculated at 2.5 min OEI power are shown in Figure 4-14 to Figure 4-45 for various altitudes, temperatures, weights, air intake configuration and Headwind Component.

These charts apply from the CTO distance to 1000 ft (300 m) ATS.

CLIMB PERFORMANCE

Rate Of Climb OEI at V_Y

The ROC, at V_Y and MCP OEI, is unchanged from the basic Rotorcraft Flight Manual or the appropriate Supplement for weights above 6400 kg or if EAPS or IBF are installed.

WEIGHT-ALTITUDE-TEMPERATURE
ENHANCED OFFSHORE PROCEDURE

ROTOR SPEED 102%

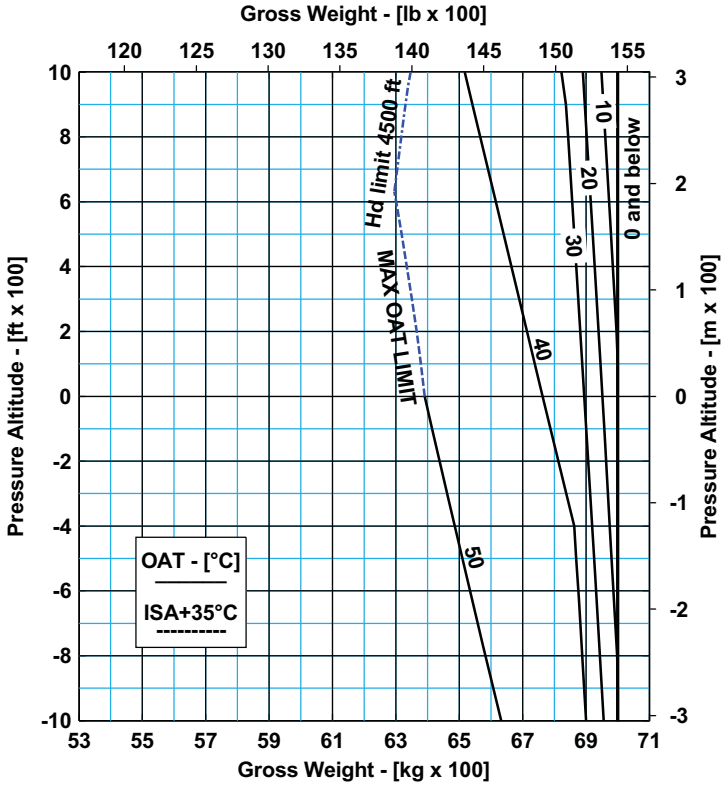


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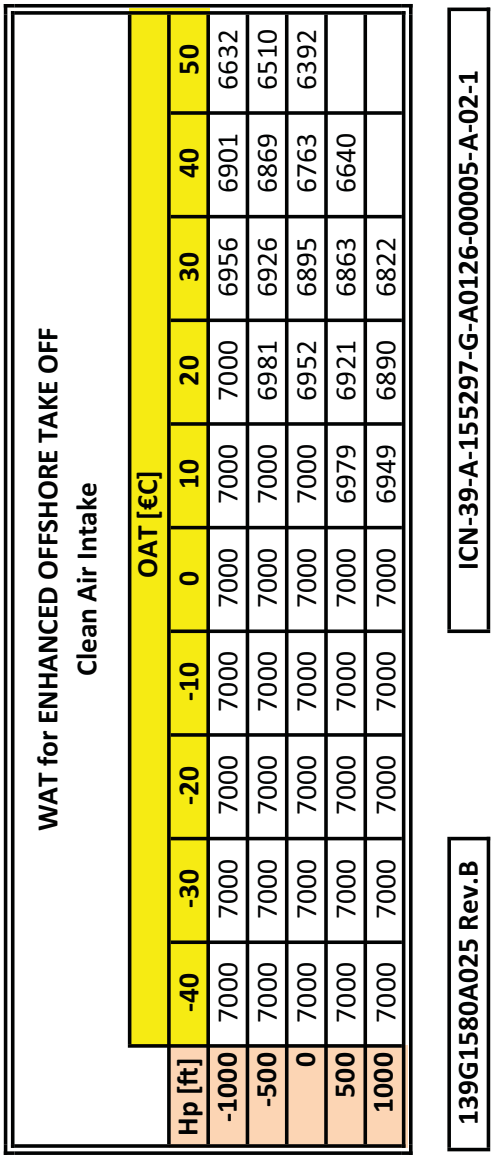
Figure 4-1 Enhance Offshore Helideck Procedure Take-Off Weight Limitations



WAT for ENHANCED OFFSHORE TAKE OFF
Clean Air Intake

Hp [ft]	OAT [°C]									
	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	6956	6901	6632
-500	7000	7000	7000	7000	7000	7000	6981	6926	6869	6510
0	7000	7000	7000	7000	7000	7000	6952	6895	6763	6392
500	7000	7000	7000	7000	7000	6979	6921	6863	6640	
1000	7000	7000	7000	7000	7000	6949	6890	6822		

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Figure 4-2 Enhance Offshore Helideck Procedure Take-Off Weight Limitations Table

WEIGHT-ALTITUDE-TEMPERATUR E
ENHANCED OFFSHORE PROCEDURE

EAPS OFF
ROTOR SPEED 102%

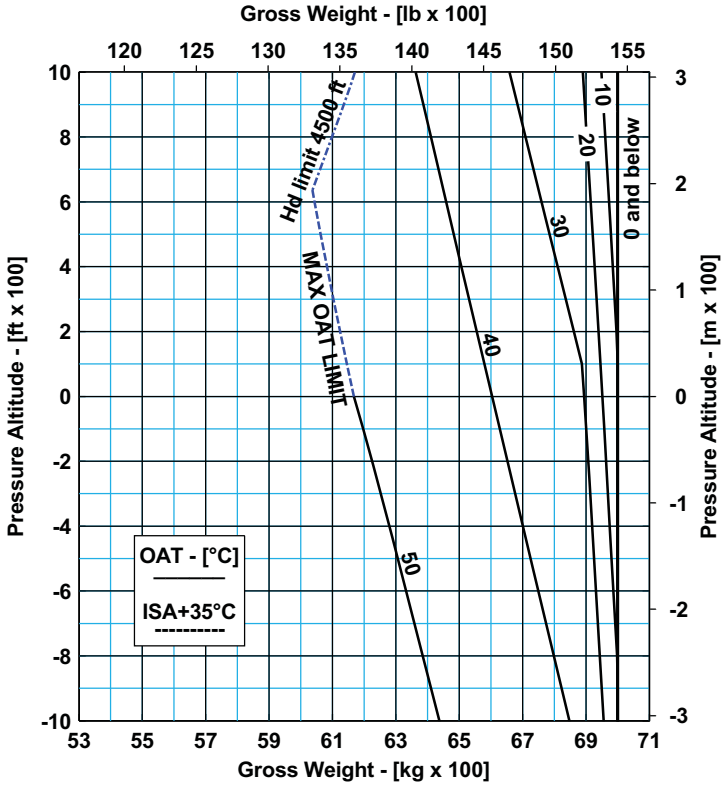

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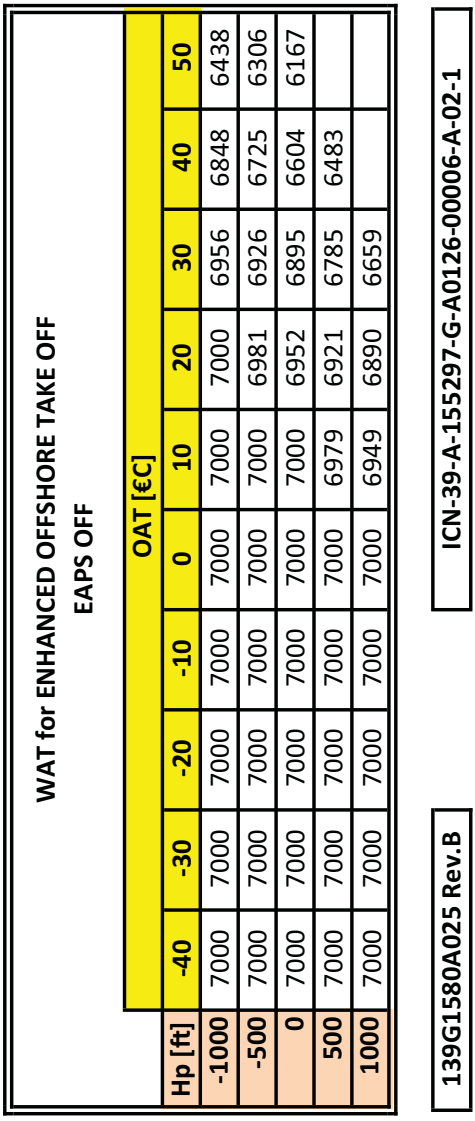
Figure 4-3 Enhanced Offshore Helideck Take-Off Procedure Weight Limitations, EAPS OFF



WAT for ENHANCED OFFSHORE TAKE OFF
EAPS OFF

Hp [ft]	OAT [€C]									
	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	6956	6848	6438
-500	7000	7000	7000	7000	7000	7000	6981	6926	6725	6306
0	7000	7000	7000	7000	7000	7000	6952	6895	6604	6167
500	7000	7000	7000	7000	7000	6979	6921	6785	6483	
1000	7000	7000	7000	7000	7000	6949	6890	6659		

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Figure 4-4 Enhanced Offshore Helideck Take-Off Procedure Weight Limitations Table, EAPS OFF

WEIGHT-ALTITUDE-TEMPERATURE
ENHANCED OFFSHORE PROCEDURE

EAPS ON
ROTOR SPEED 102%

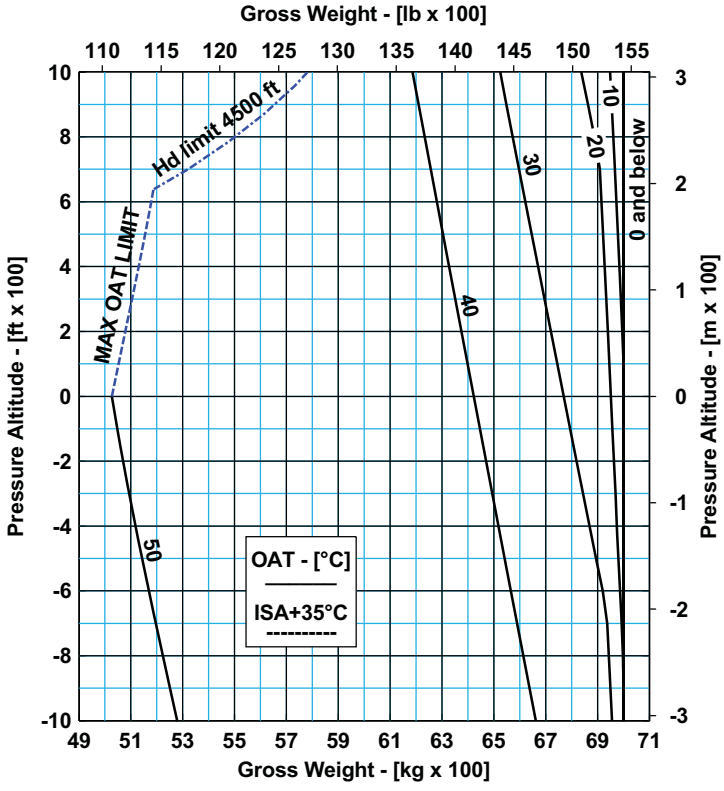

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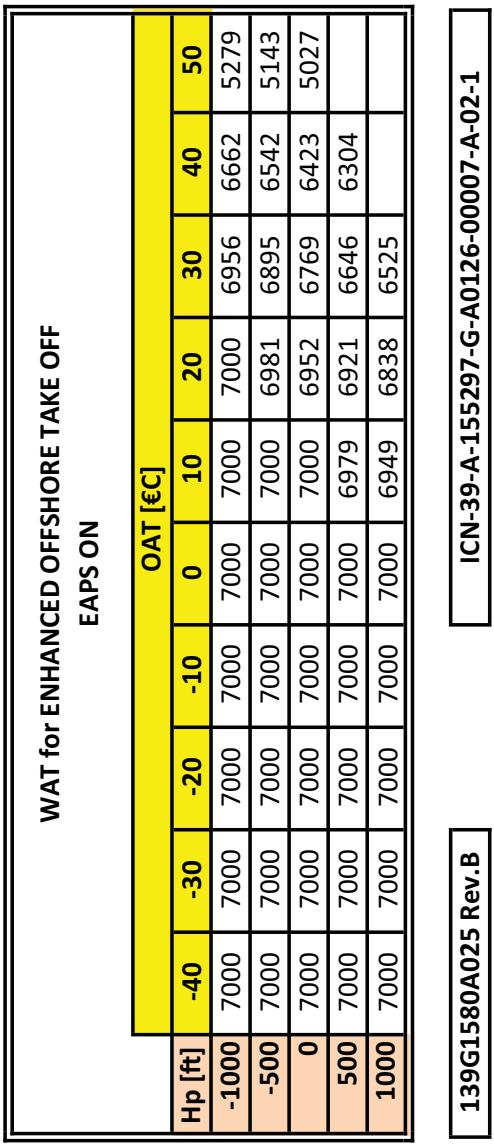
Figure 4-5 Enhanced Offshore Helideck Take-Off Procedure Weight Limitations, EAPS ON



WAT for ENHANCED OFFSHORE TAKE OFF
EAPS ON

Hp [ft]	OAT [€C]									
	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	6956	6662	5279
-500	7000	7000	7000	7000	7000	7000	6981	6895	6542	5143
0	7000	7000	7000	7000	7000	7000	6952	6769	6423	5027
500	7000	7000	7000	7000	7000	6979	6921	6646	6304	
1000	7000	7000	7000	7000	7000	6949	6838	6525		

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Figure 4-6 Enhanced Offshore Helideck Take-Off Procedure Weight Limitations Table, EAPS ON

WEIGHT-ALTITUDE-TEMPERATURE
ENHANCED OFFSHORE PROCEDURE

IBF Installed
ROTOR SPEED 102%

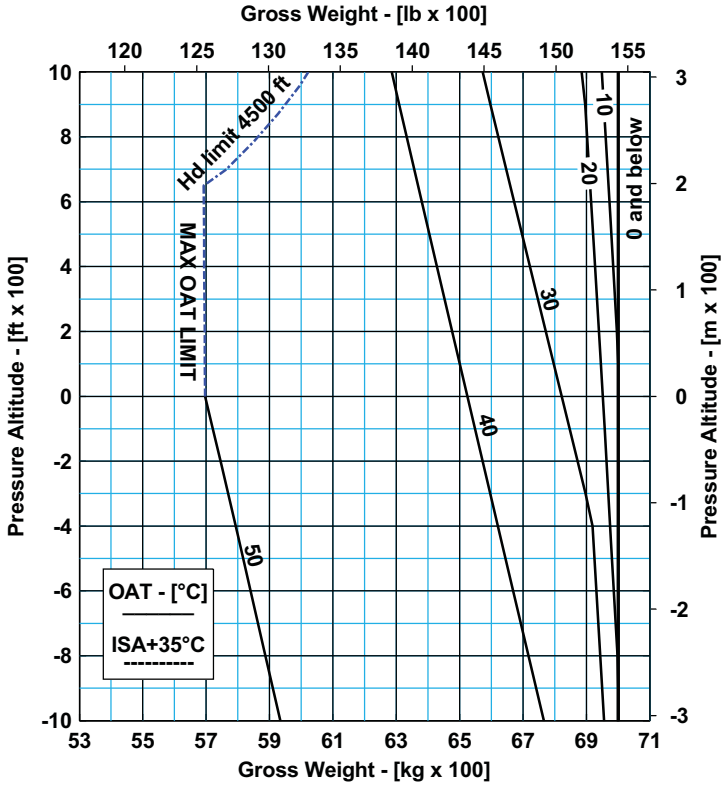

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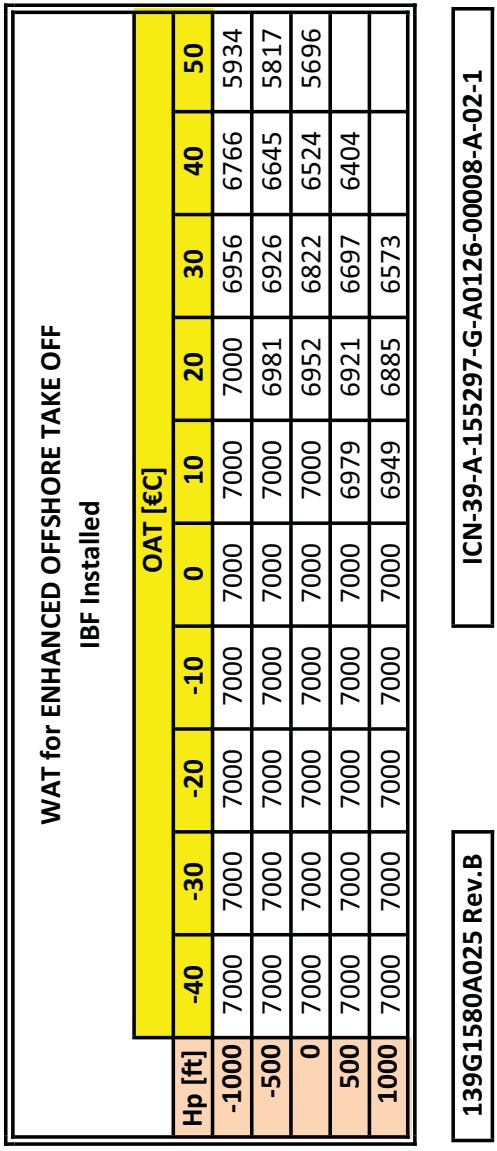
Figure 4-7 Enhanced Offshore Helideck Take-Off Procedure Weight Limitations, IBF Installed



WAT for ENHANCED OFFSHORE TAKE OFF
IBF Installed

Hp [ft]	OAT [€C]									
	-40	-30	-20	-10	0	10	20	30	40	50
-1000	7000	7000	7000	7000	7000	7000	7000	6956	6766	5934
-500	7000	7000	7000	7000	7000	7000	6981	6926	6645	5817
0	7000	7000	7000	7000	7000	7000	6952	6822	6524	5696
500	7000	7000	7000	7000	7000	6979	6921	6697	6404	
1000	7000	7000	7000	7000	7000	6949	6885	6573		

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Figure 4-8 Enhanced Offshore Helideck Take-Off Procedure Weight Limitations Table, IBF Installed

CONTINUED TAKE OFF DISTANCE
ENHANCED OFFSHORE PROCEDURE

ROTOR SPEED 102%

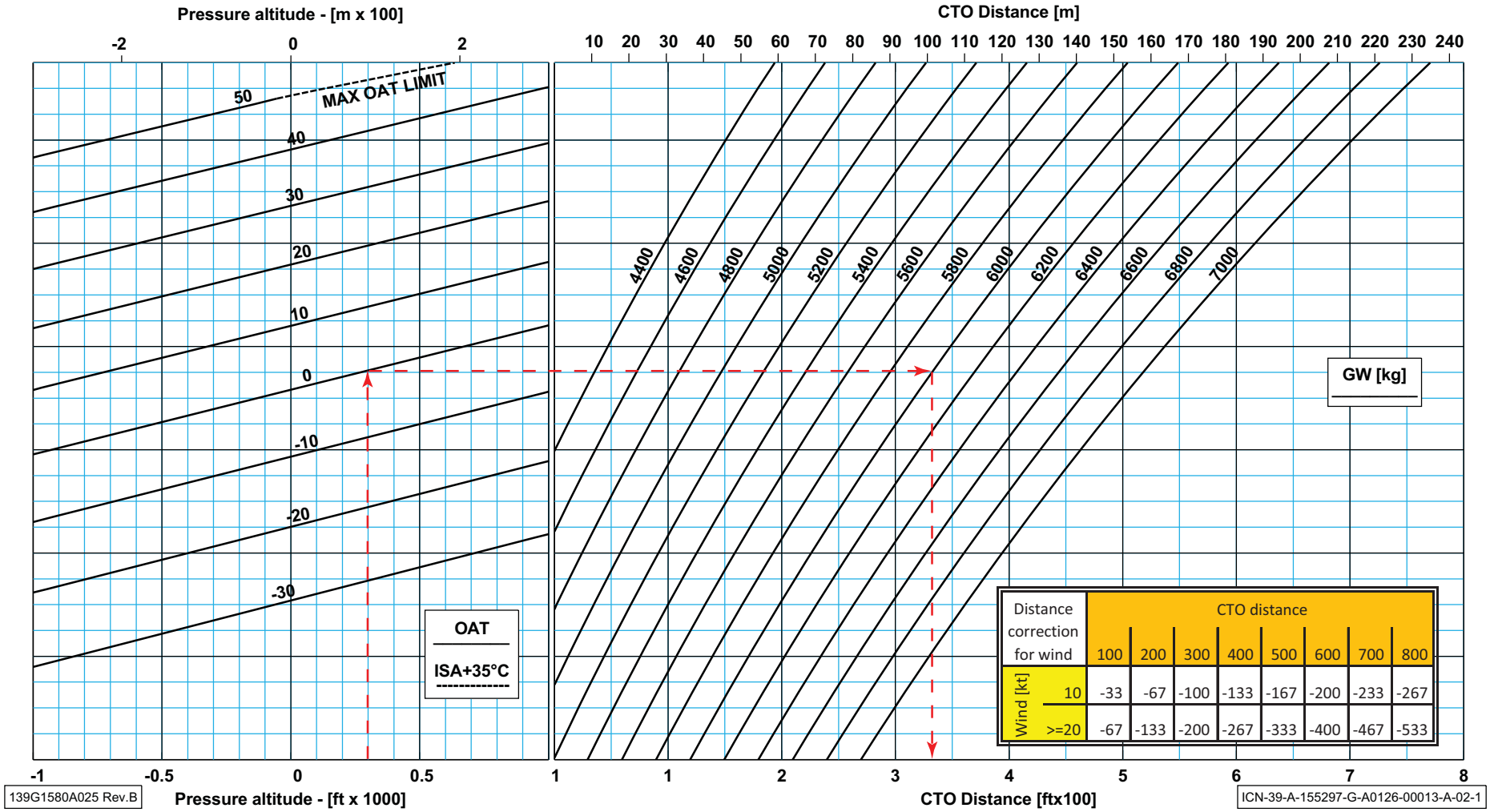

Figure 4-9 Enhanced Offshore Helideck CTO Distance OEI

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DROP DOWN
ENHANCED OFFSHORE PROCEDURE

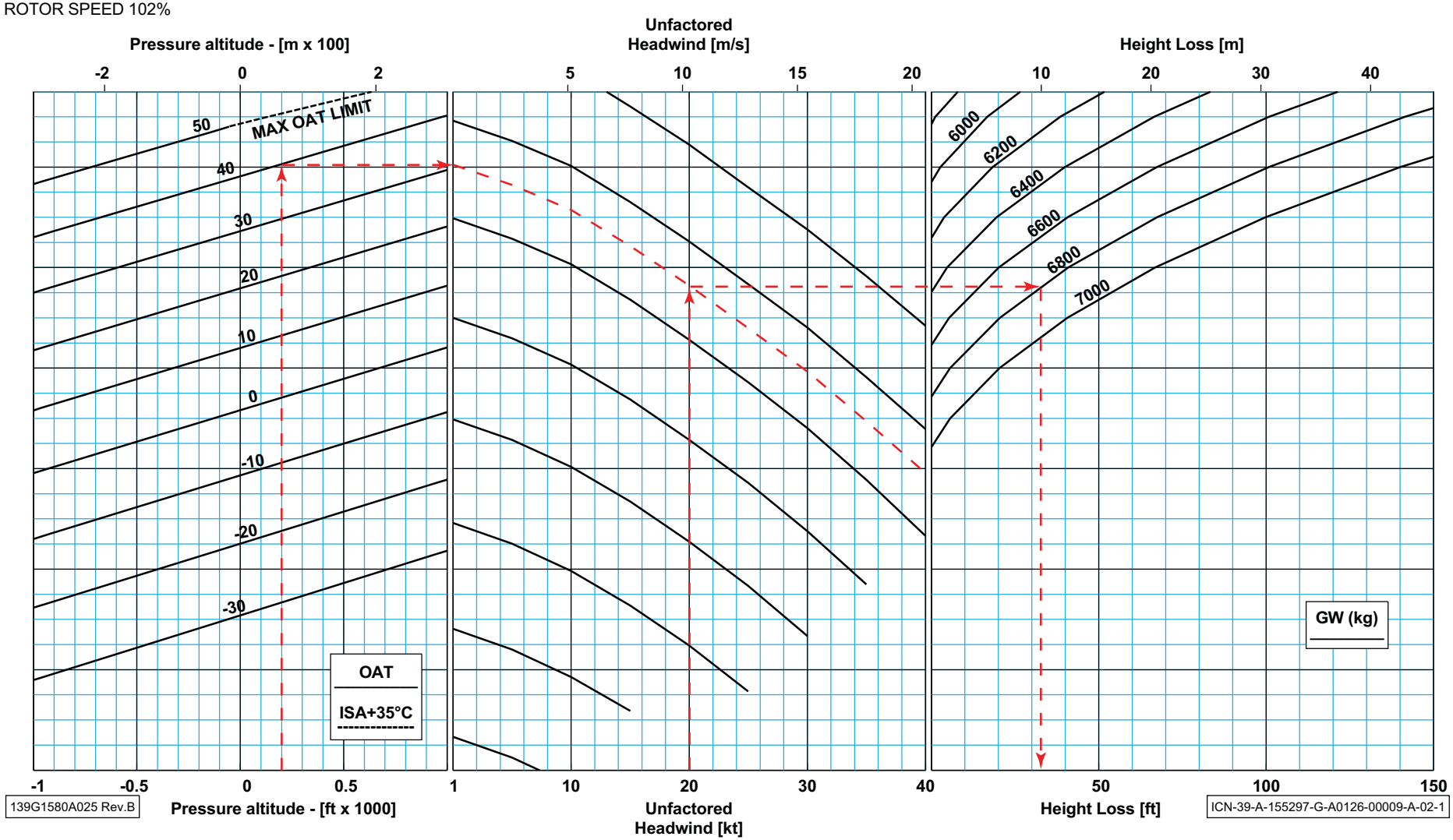

Figure 4-10 Enhanced Offshore Helideck Procedure Drop Down Height BTS for CTO OEI

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DROP DOWN HEIGHT

		OAT [€C]									
	Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
6000 kg	-1000	0	0	0	0	0	0	0	0	0	0
	-500	0	0	0	0	0	0	0	0	0	6
	0	0	0	0	0	0	0	0	0	1	14
	500	0	0	0	0	0	0	0	0	8	
	1000	0	0	0	0	0	0	0	2	17	

		OAT [€C]									
	Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
6200 kg	-1000	0	0	0	0	0	0	0	0	0	13
	-500	0	0	0	0	0	0	0	0	6	23
	0	0	0	0	0	0	0	0	1	15	35
	500	0	0	0	0	0	0	0	8	26	
	1000	0	0	0	0	0	0	2	17	39	

		OAT [€C]									
	Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
6400 kg	-1000	0	0	0	0	0	0	0	0	13	32
	-500	0	0	0	0	0	0	0	6	23	46
	0	0	0	0	0	0	0	0	15	36	63
	500	0	0	0	0	0	0	7	26	50	
	1000	0	0	0	0	0	1	16	39	67	

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Note

For wind effect calculation refer to Figure 4-10.

Figure 4-11 Enhanced Offshore Helideck Procedure Drop Down Height BTS Table for CTO OEI (Zero wind)

DROP DOWN HEIGHT

		OAT [€C]									
	Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
6600 kg	-1000	0	0	0	0	0	0	0	12	32	58
	-500	0	0	0	0	0	0	5	22	46	75
	0	0	0	0	0	0	0	13	34	62	96
	500	0	0	0	0	0	6	24	49	81	
	1000	0	0	0	0	0	14	36	66	102	

		OAT [€C]									
	Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
6800 kg	-1000	0	0	0	0	0	0	10	30	56	89
	-500	0	0	0	0	0	3	20	44	74	111
	0	0	0	0	0	0	11	32	59	94	136
	500	0	0	0	0	3	21	46	78	117	
	1000	0	0	0	0	11	33	62	99	143	

		OAT [€C]									
	Hp [ft]	-40	-30	-20	-10	0	10	20	30	40	50
7000 kg	-1000	0	0	0	0	0	8	27	53	86	126
	-500	0	0	0	0	0	17	40	70	108	152
	0	0	0	0	0	8	28	55	90	132	181
	500	0	0	0	0	17	41	73	112	159	
	1000	0	0	0	7	28	57	93	138	190	

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Note

For wind effect calculation refer to Figure 4-10.

Figure 4-12 Enhanced Offshore Helideck Procedure Drop Down Height BTS Table for CTO OEI (Zero wind)

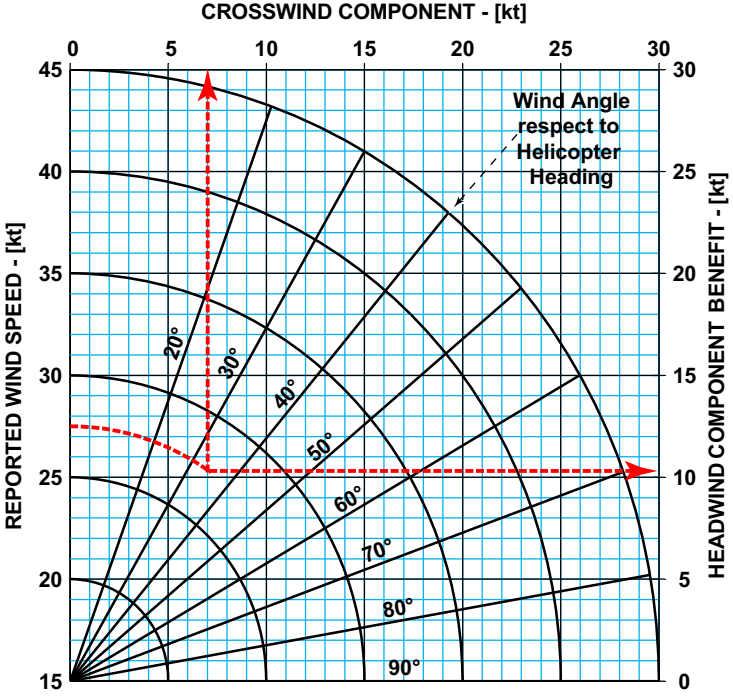

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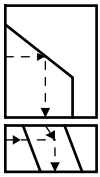
Figure 4-13 Wind Component Chart for Calculation of Headwind Component Benefit for Azimuth 20° to 90° and Windspeeds above 15 kts

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
ELECTRICAL LOAD: 300 A



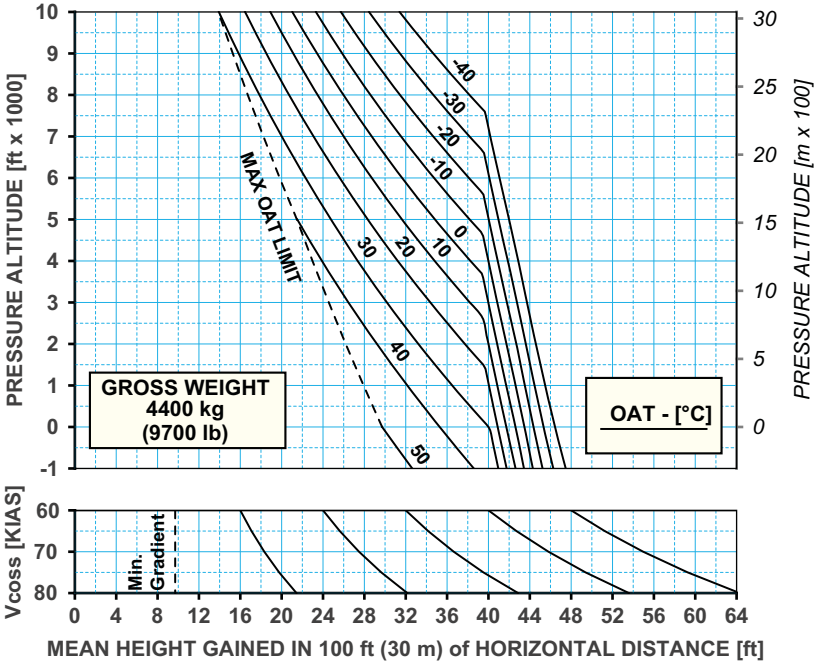


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Figure 4-14 PATH 1 & 2 Gradient at V_{COSS}, GW 4400 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %

ELECTRICAL LOAD: 300 A

Vcoss

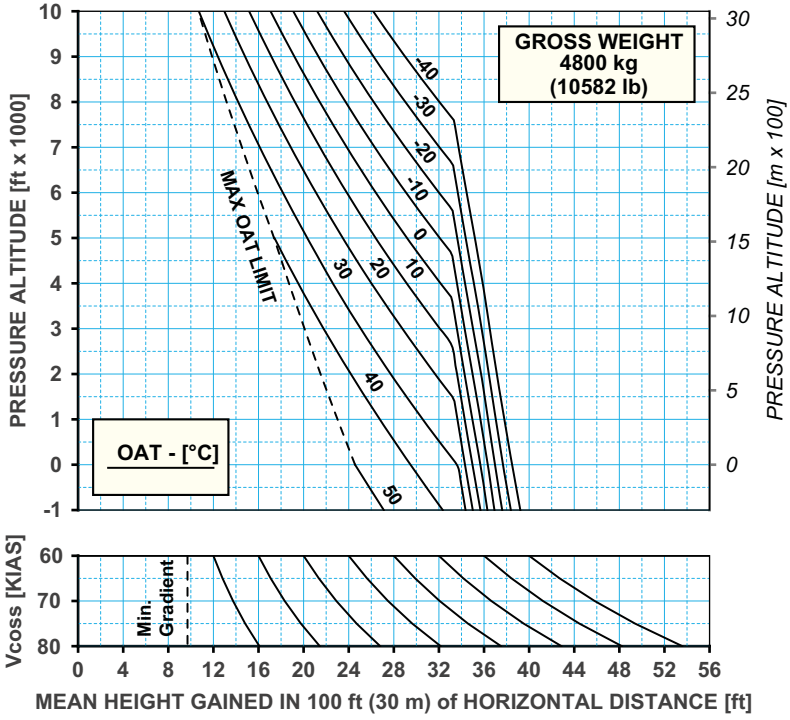

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Figure 4-15 PATH 1 & 2 Gradient at V_{COSS}, GW 4800 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %

ELECTRICAL LOAD: 300 A

Vcoss

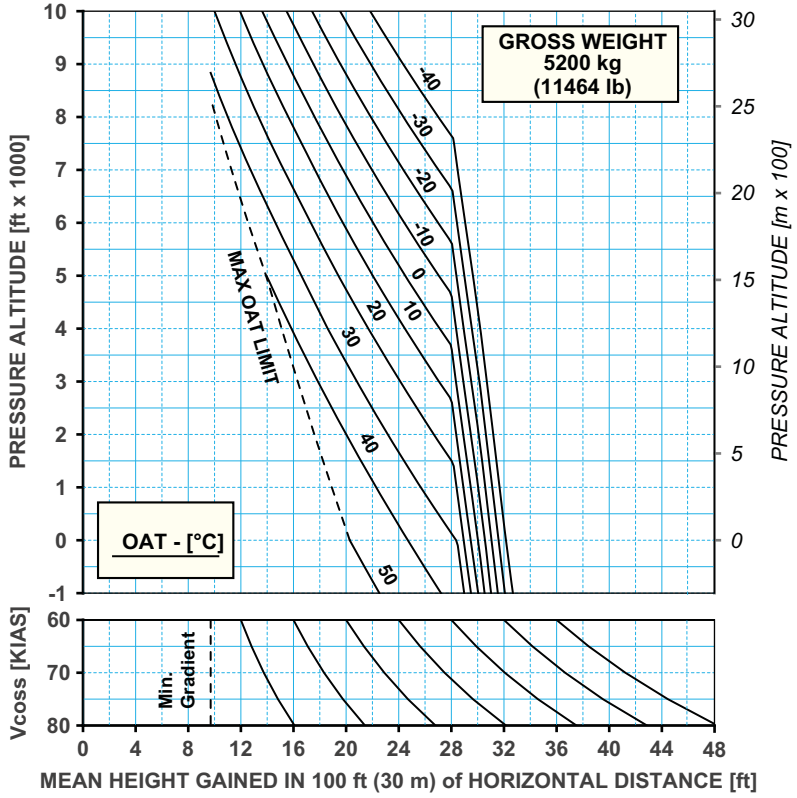

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Figure 4-16 PATH 1 & 2 Gradient at V_{COSS}, GW 5200 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss

ELECTRICAL LOAD: 300 A

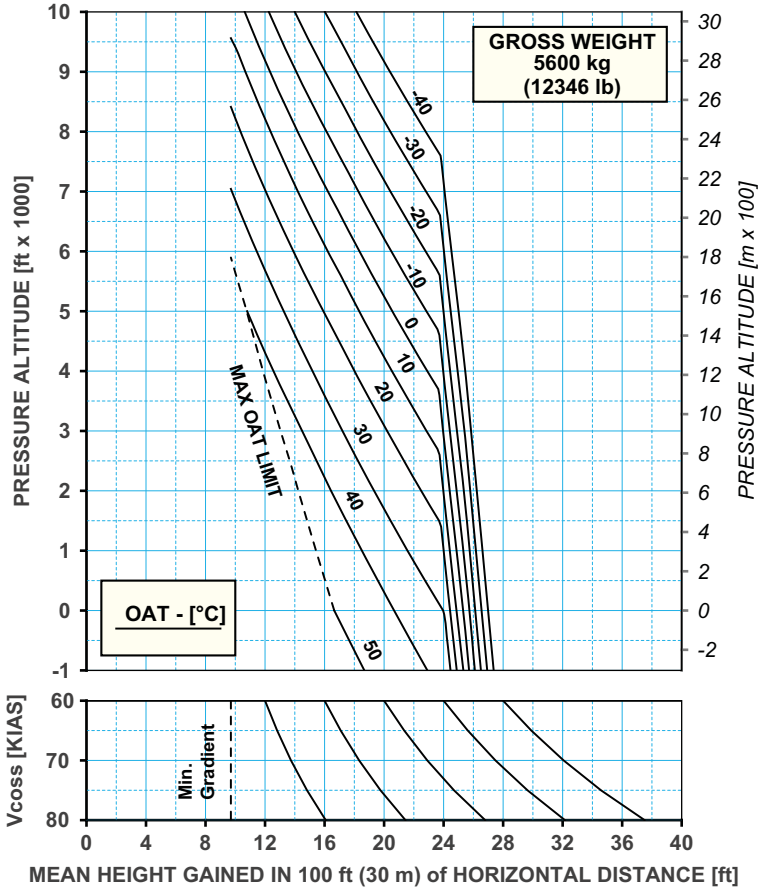

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Figure 4-17 PATH 1 & 2 Gradient at V_{COSS}, GW 5600 kg

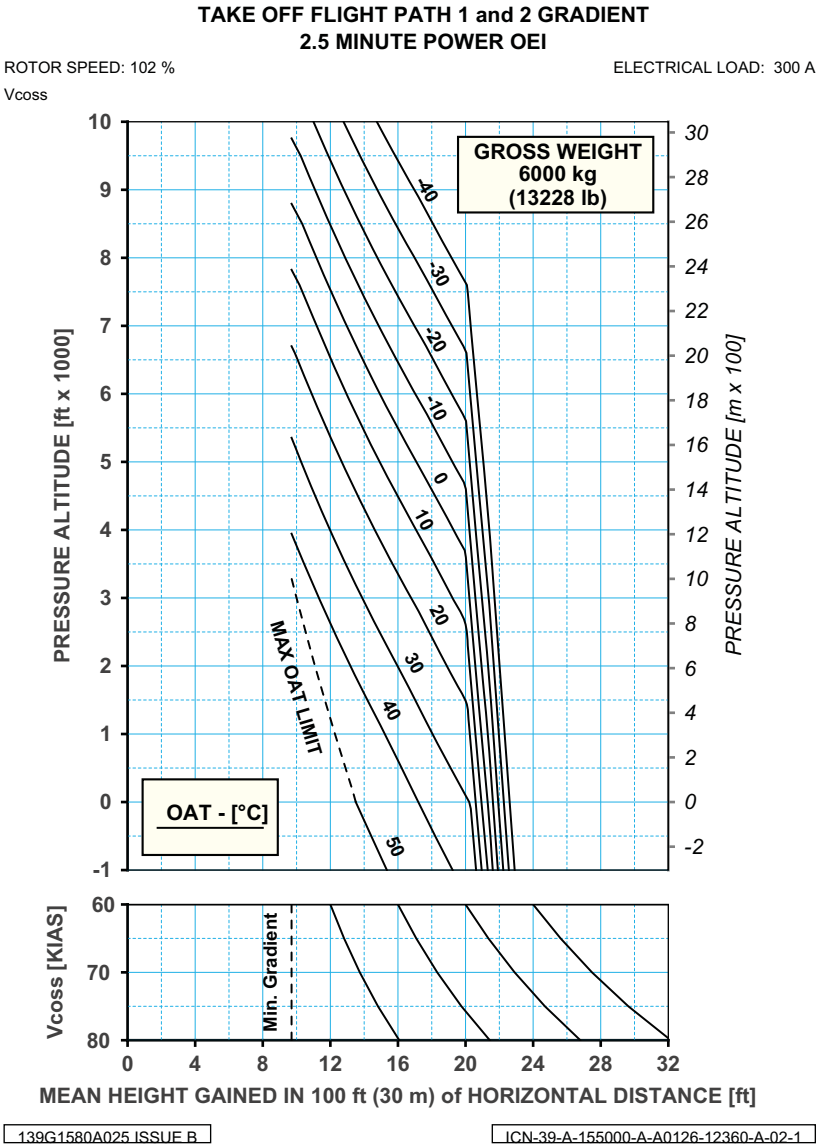

Figure 4-18 PATH 1 & 2 Gradient at V_{COSS}, GW 6000 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %

ELECTRICAL LOAD: 300 A

Vcoss

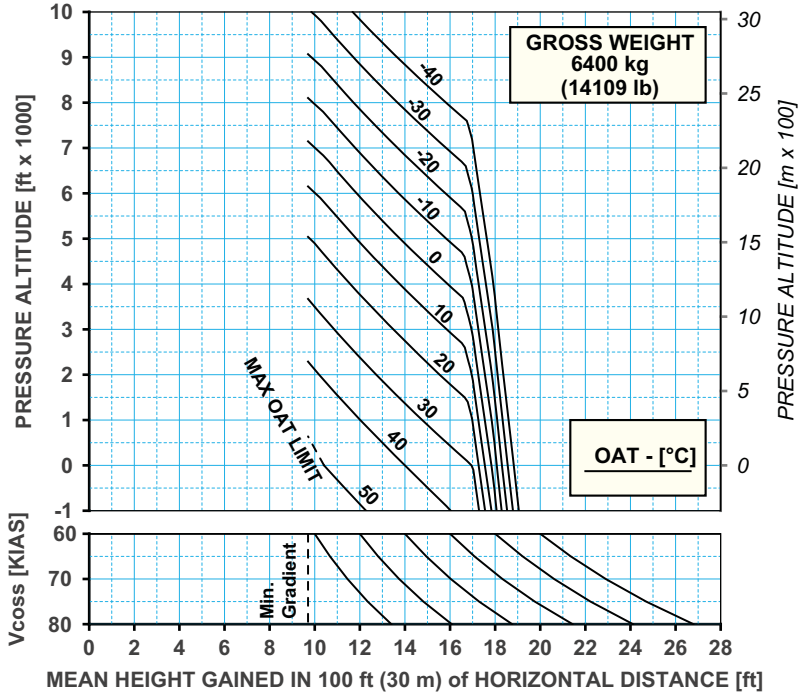

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Figure 4-19 PATH 1 & 2 Gradient at V_{COSS}, GW 6400 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %

ELECTRICAL LOAD: 300 A

Vcoss

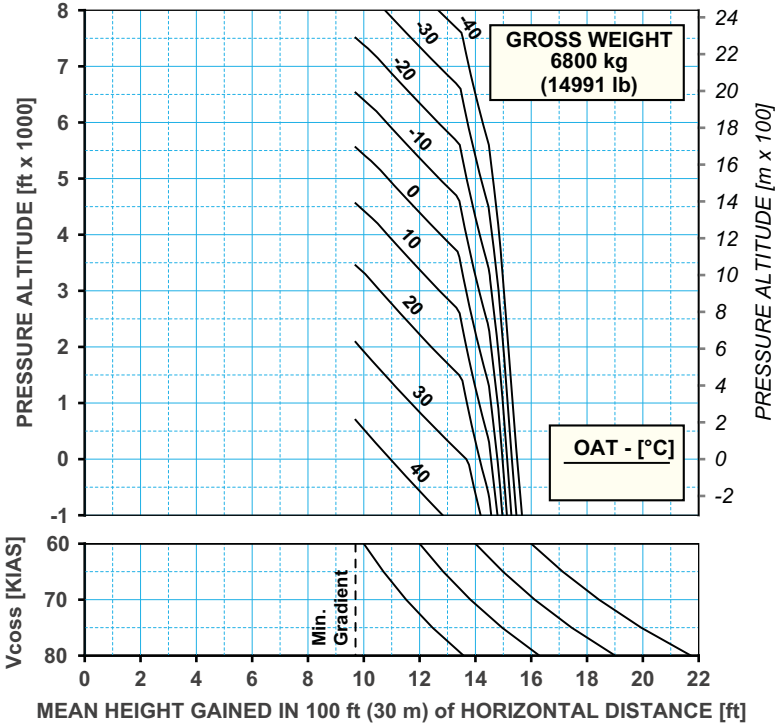

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Figure 4-20 PATH 1 & 2 Gradient at V_{COSS}, GW 6800 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %

ELECTRICAL LOAD: 300 A

Vcoss

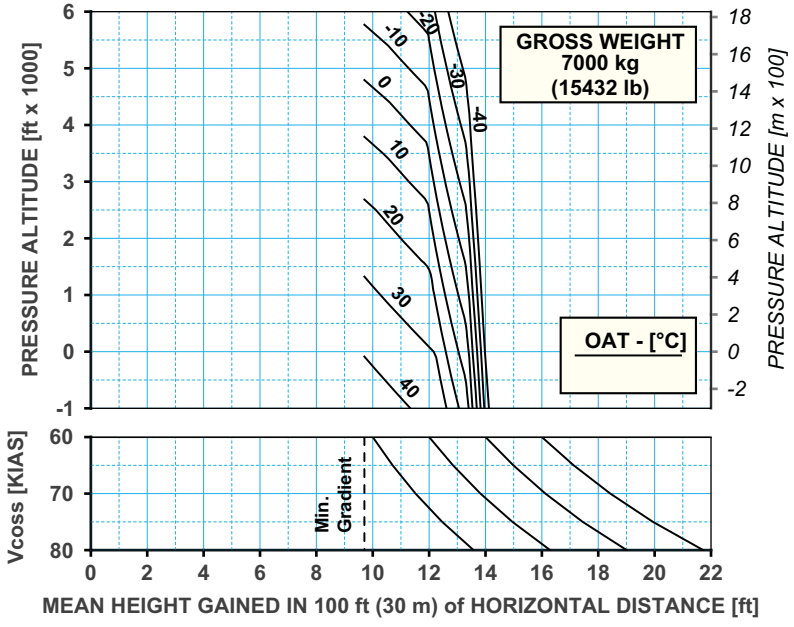

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Figure 4-21 PATH 1 & 2 Gradient at V_{COSS}, GW 7000 kg

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS OFF

ELECTRICAL LOAD: 300 A

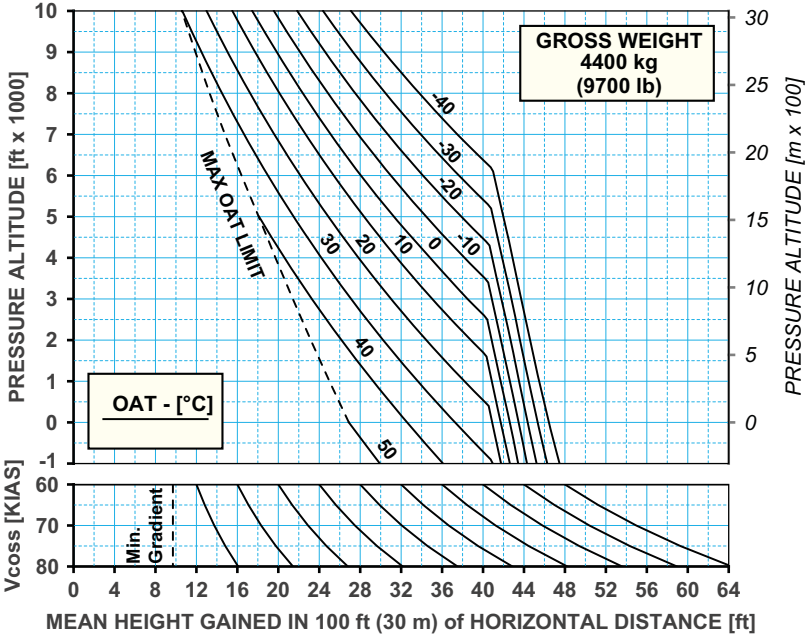

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Figure 4-22 PATH 1 & 2 Gradient at V_{COSS}, GW 4400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS OFF

ELECTRICAL LOAD: 300 A

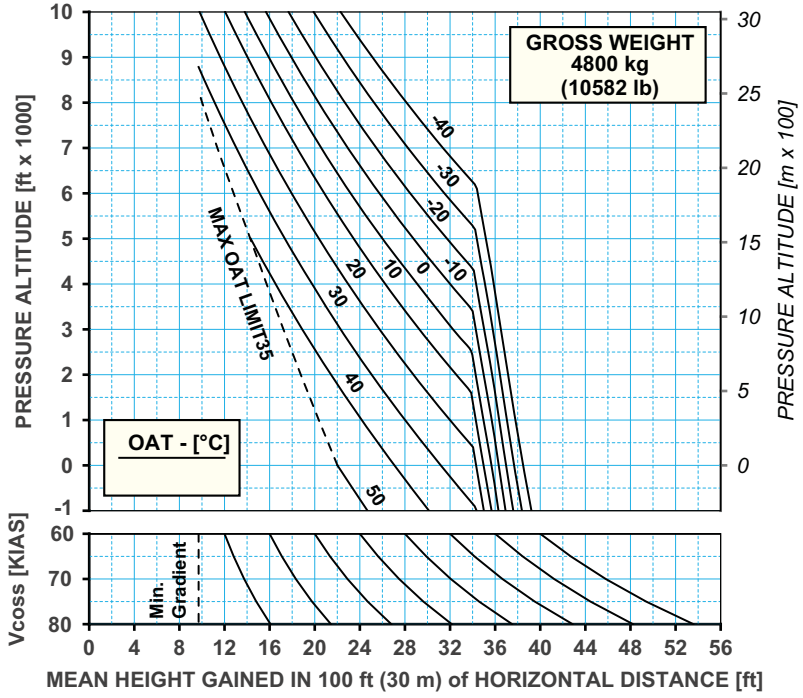

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Figure 4-23 PATH 1 & 2 Gradient at V_{COSS}, GW 4800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS OFF

ELECTRICAL LOAD: 300 A

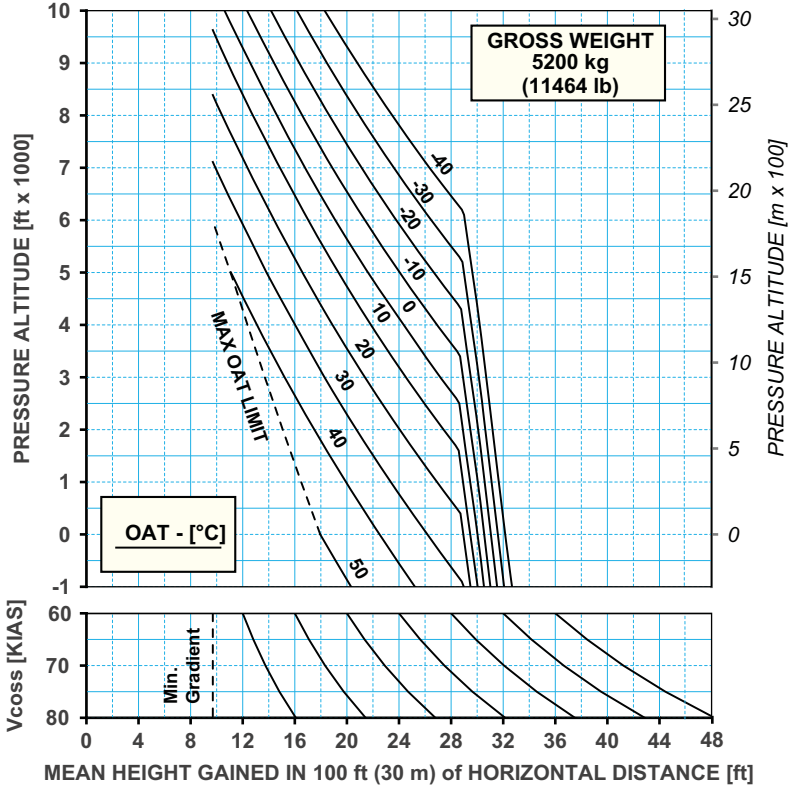

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Figure 4-24 PATH 1 & 2 Gradient at V_{COSS}, GW 5200 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS OFF

ELECTRICAL LOAD: 300 A

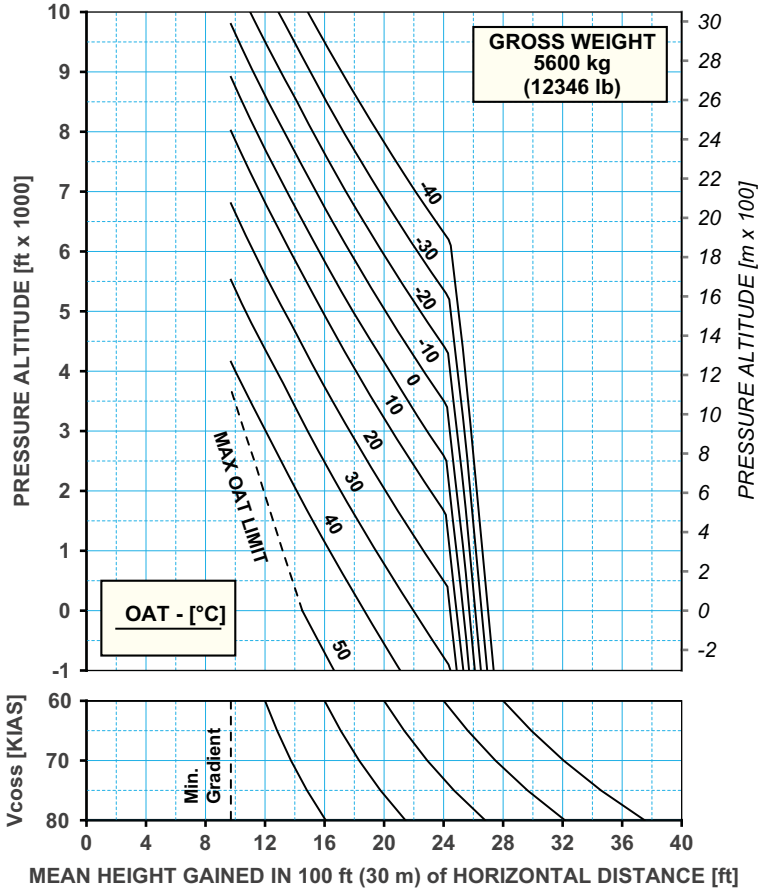

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Figure 4-25 PATH 1 & 2 Gradient at V_{COSS}, GW 5600 kg, EAPS OFF

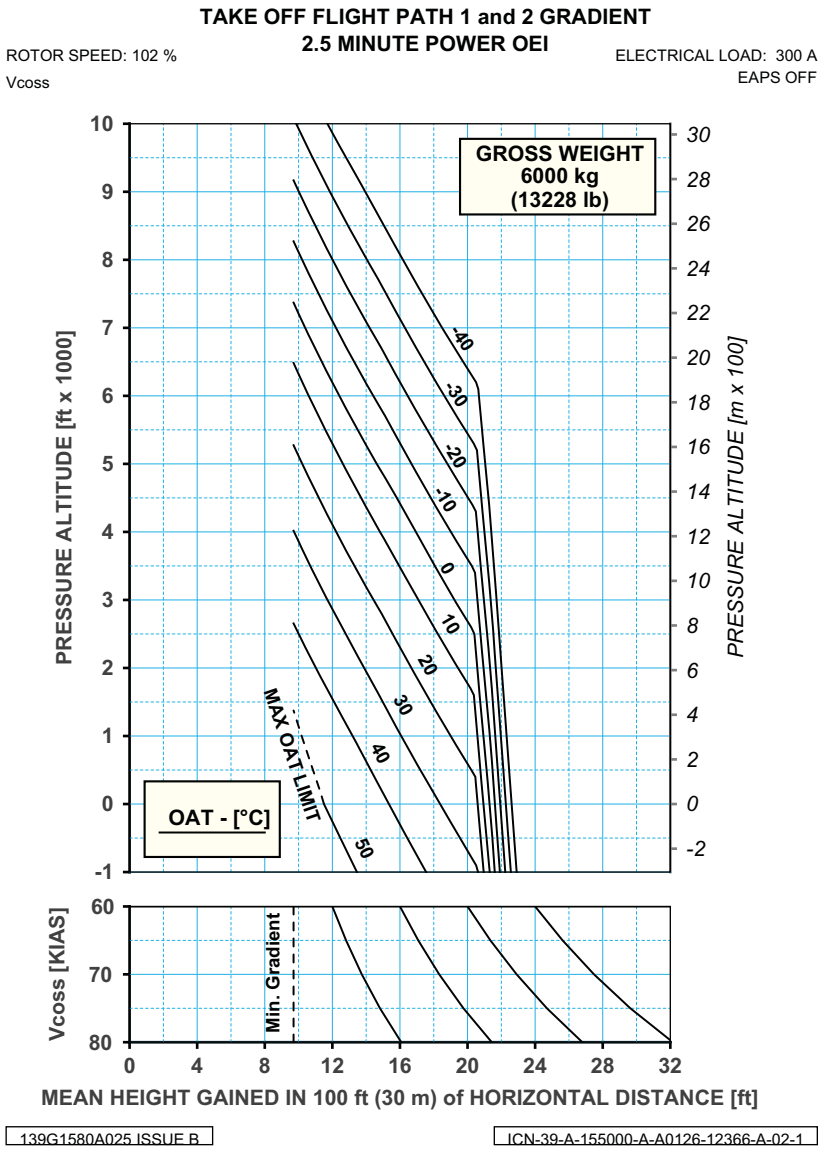

Figure 4-26 PATH 1 & 2 Gradient at V_{COSS}, GW 6000 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS OFF

ELECTRICAL LOAD: 300 A

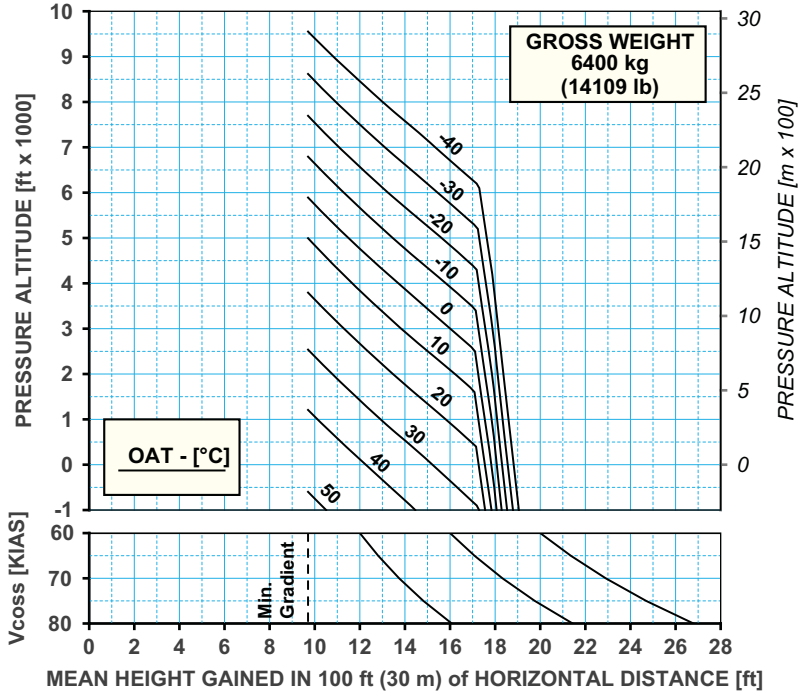

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Figure 4-27 PATH 1 & 2 Gradient at V_{COSS}, GW 6400 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS OFF

ELECTRICAL LOAD: 300 A

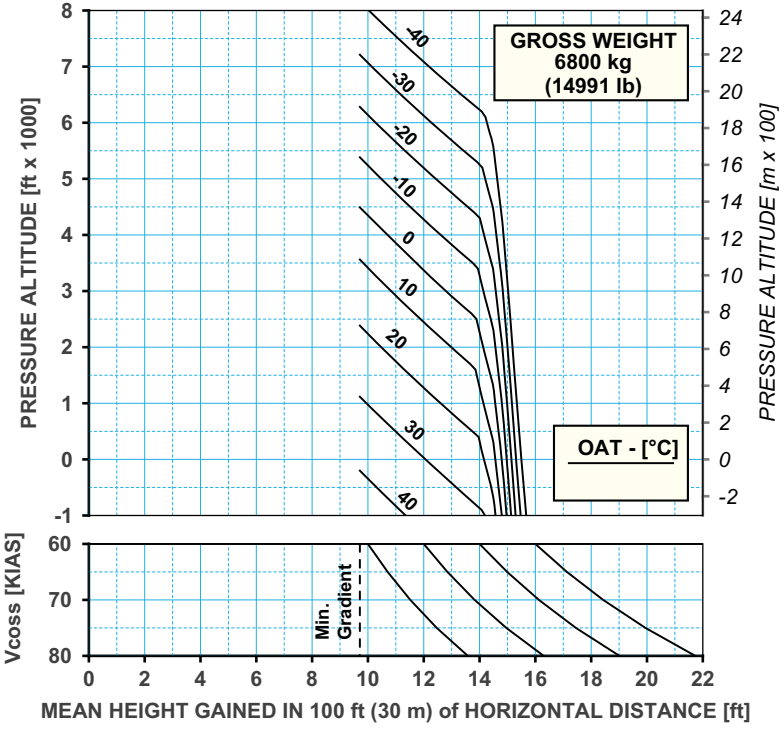

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Figure 4-28 PATH 1 & 2 Gradient at V_{COSS}, GW 6800 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS OFF

ELECTRICAL LOAD: 300 A

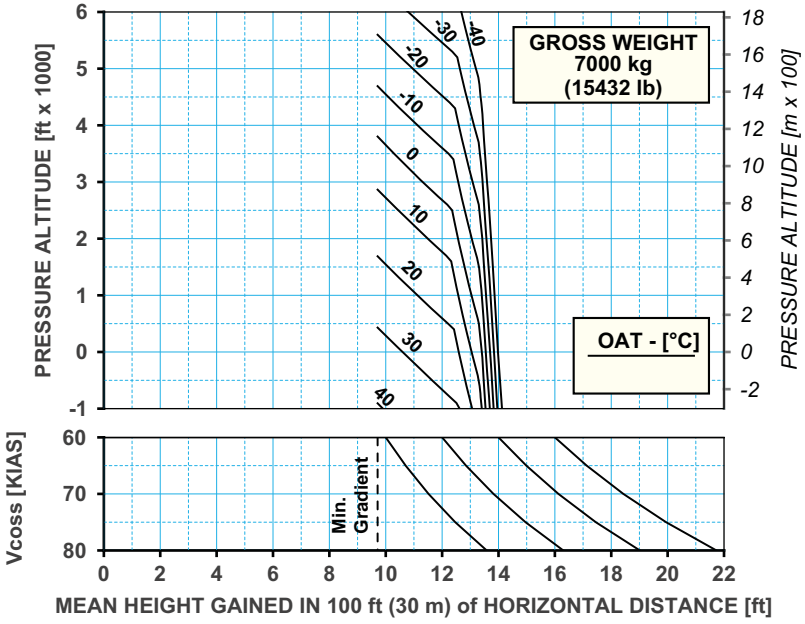

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Figure 4-29 PATH 1 & 2 Gradient at V_{COSS}, GW 7000 kg, EAPS OFF

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS ON

ELECTRICAL LOAD: 300 A

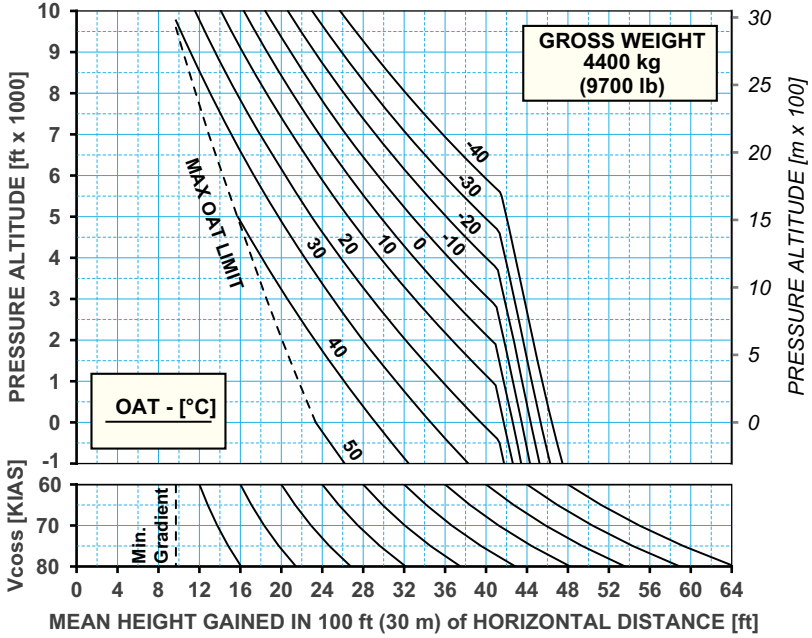

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Figure 4-30 PATH 1 & 2 Gradient at V_{COSS}, GW 4400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS ON

ELECTRICAL LOAD: 300 A

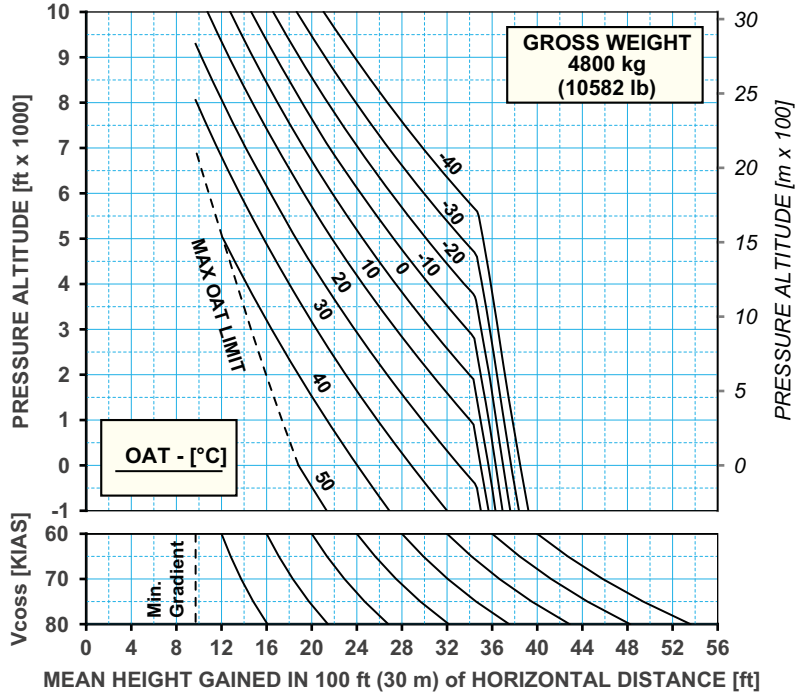

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Figure 4-31 PATH 1 & 2 Gradient at V_{COSS}, GW 4800 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS ON

ELECTRICAL LOAD: 300 A

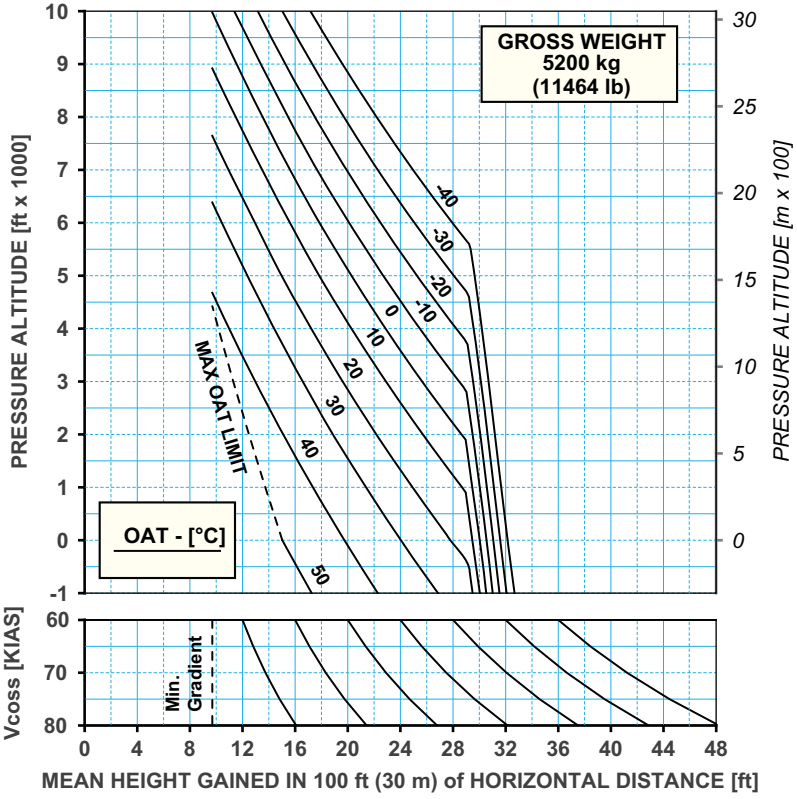

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Figure 4-32 PATH 1 & 2 Gradient at V_{COSS}, GW 5200 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS ON

ELECTRICAL LOAD: 300 A

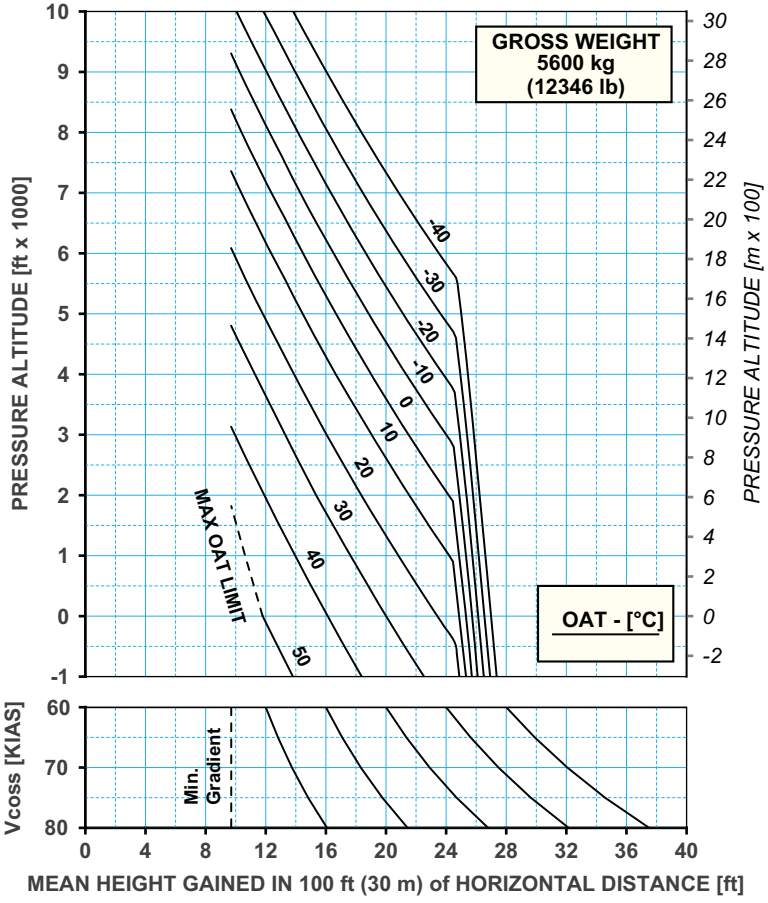

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Figure 4-33 PATH 1 & 2 Gradient at V_{COSS}, GW 5600 kg, EAPS ON

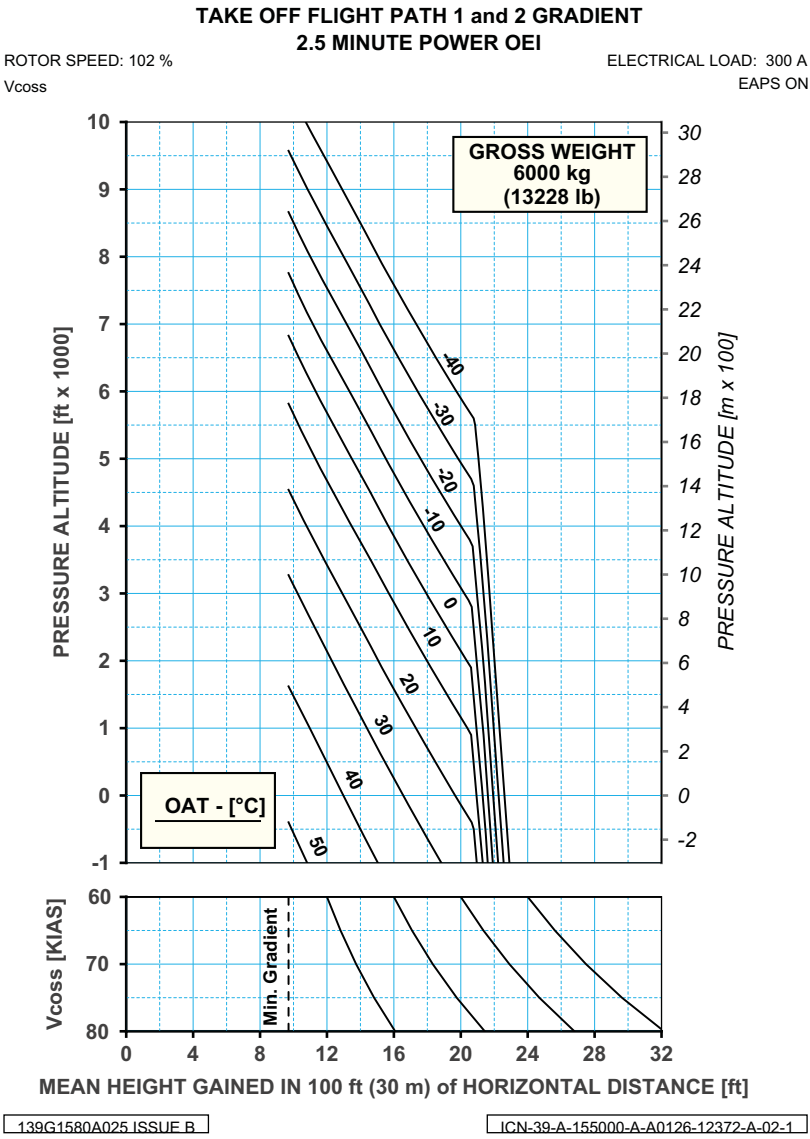

Figure 4-34 PATH 1 & 2 Gradient at V_{COSS}, GW 6000 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS ON

ELECTRICAL LOAD: 300 A

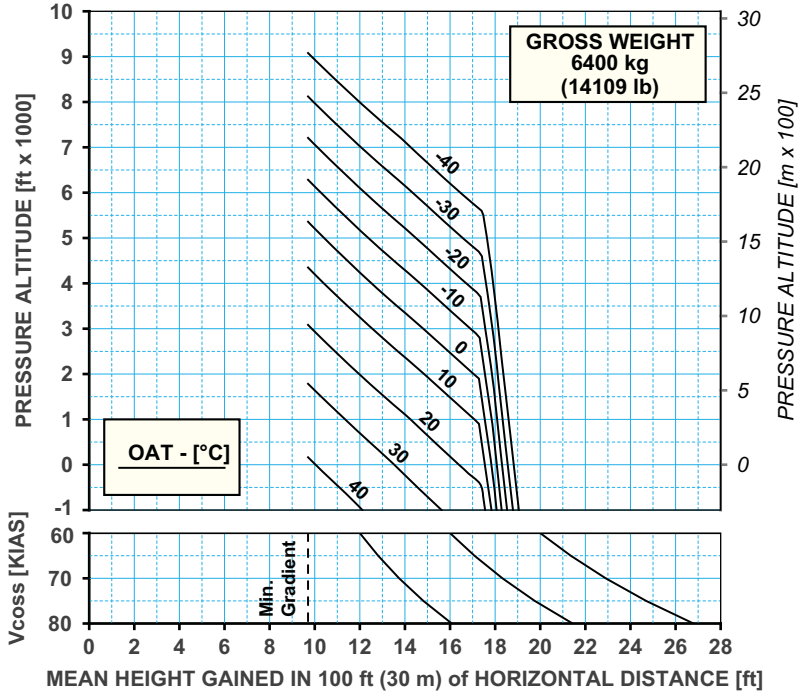

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Figure 4-35 PATH 1 & 2 Gradient at V_{COSS}, GW 6400 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS ON

ELECTRICAL LOAD: 300 A

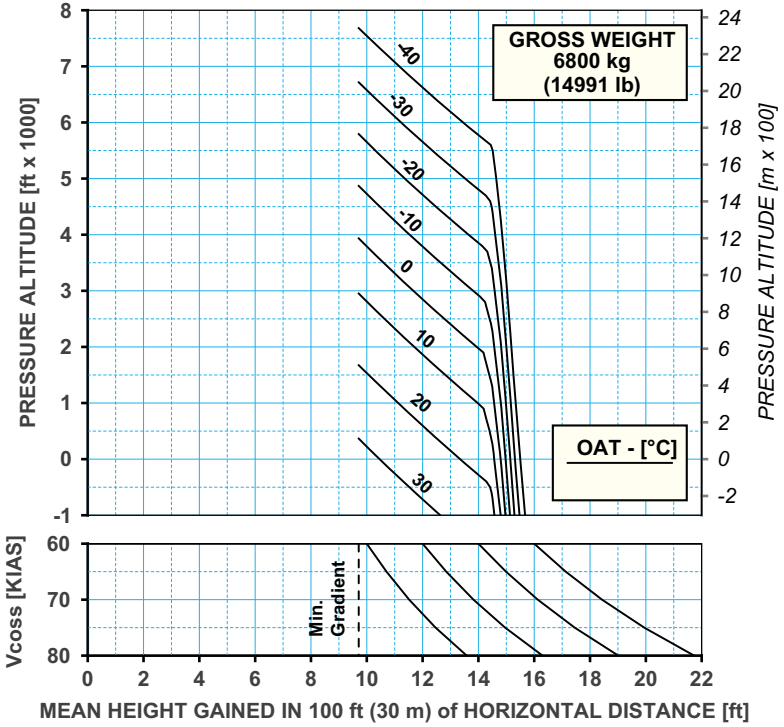

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Figure 4-36 PATH 1 & 2 Gradient at V_{COSS}, GW 6800 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss
EAPS ON

ELECTRICAL LOAD: 300 A

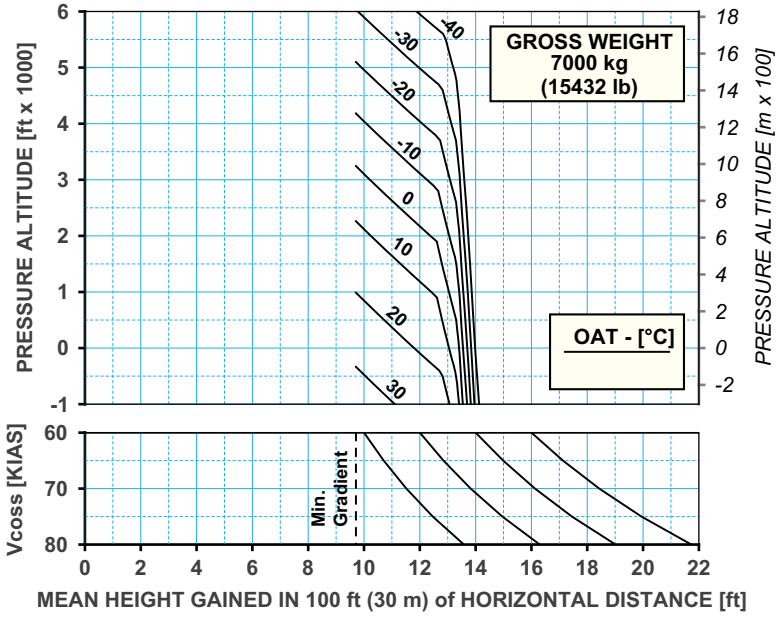

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Figure 4-37 PATH 1 & 2 Gradient at V_{COSS}, GW 7000 kg, EAPS ON

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss

IBF INSTALLED
ELECTRICAL LOAD: 300 A

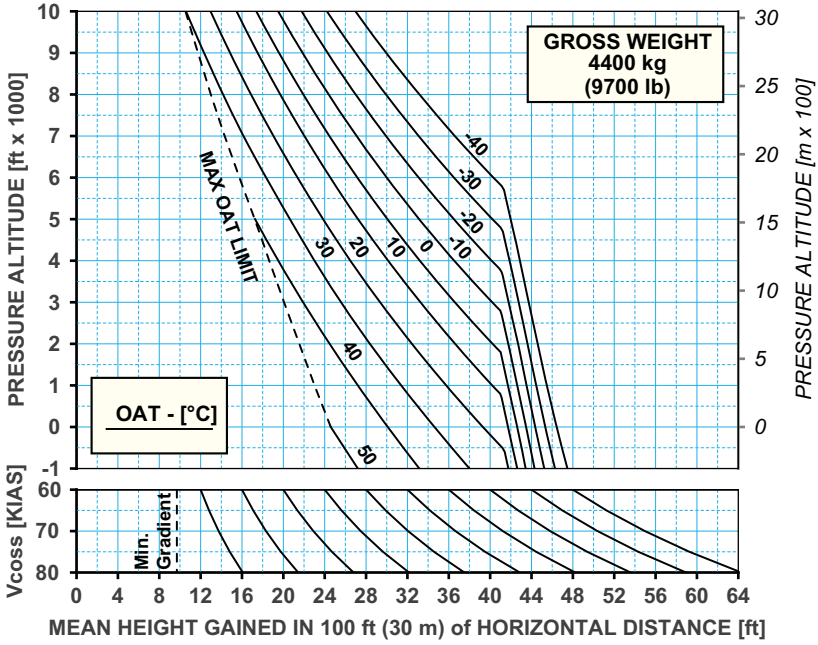

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Figure 4-38 PATH 1 & 2 Gradient at V_{COSS}, GW 4400 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss

IBF INSTALLED
ELECTRICAL LOAD: 300 A

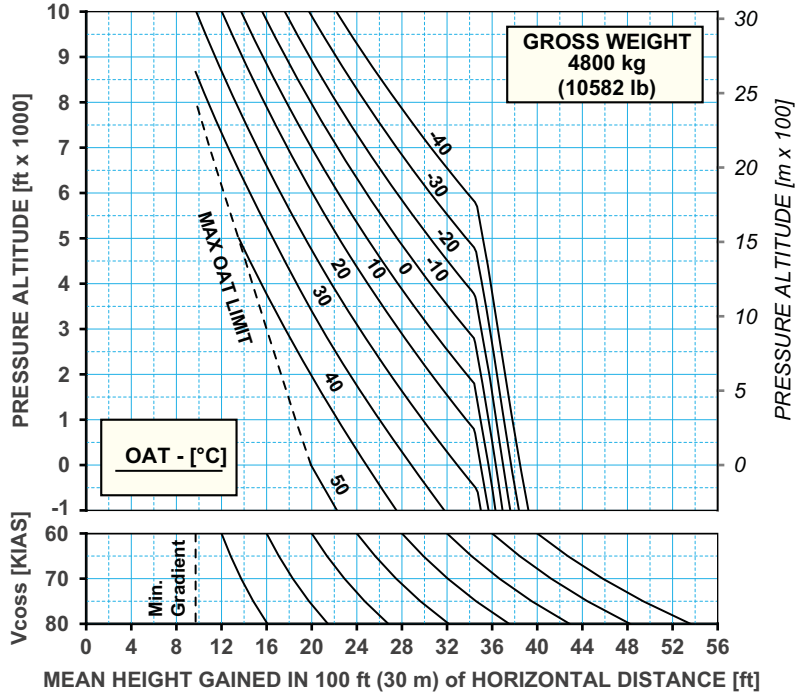

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Figure 4-39 PATH 1 & 2 Gradient at V_{COSS}, GW 4800 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss

IBF INSTALLED
ELECTRICAL LOAD: 300 A

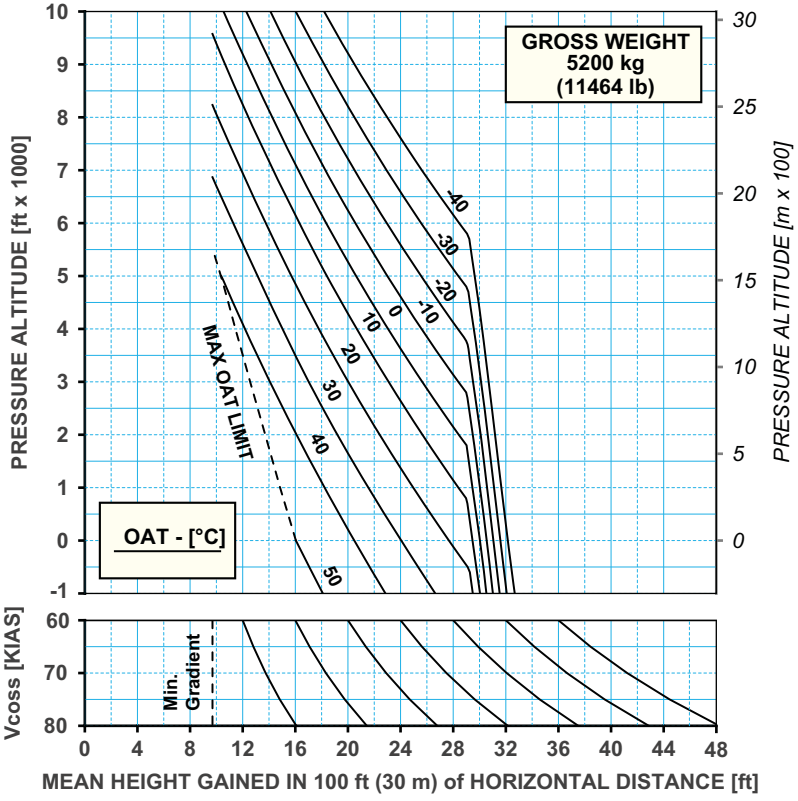

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Figure 4-40 PATH 1 & 2 Gradient at V_{COSS}, GW 5200 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss

IBF INSTALLED
ELECTRICAL LOAD: 300 A

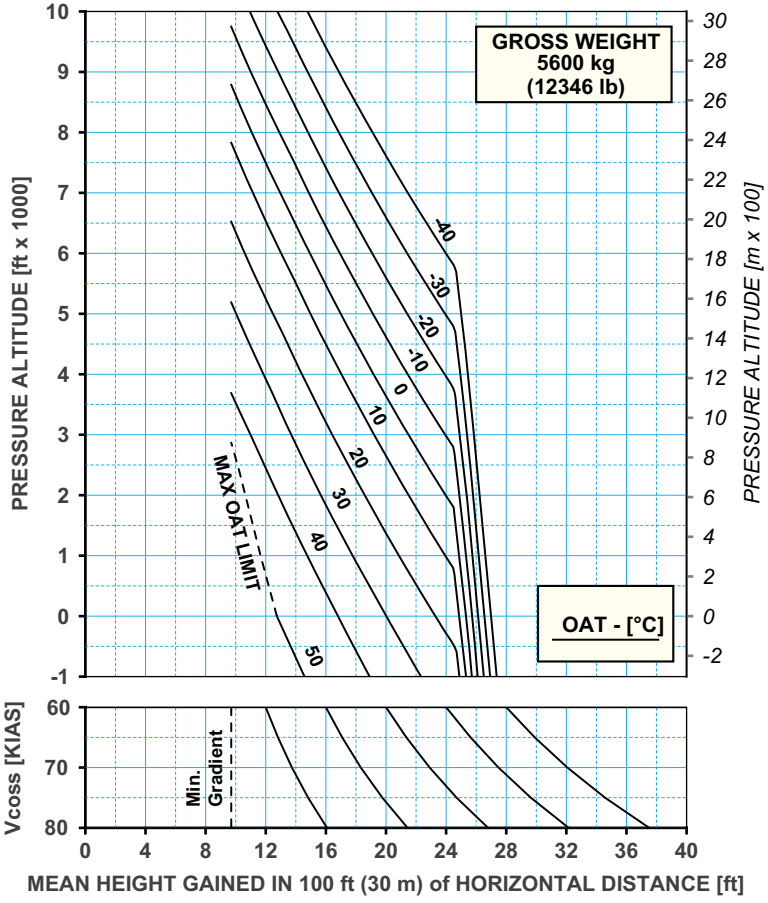

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Figure 4-41 PATH 1 & 2 Gradient at V_{COSS}, GW 5600 kg, IBF Installed

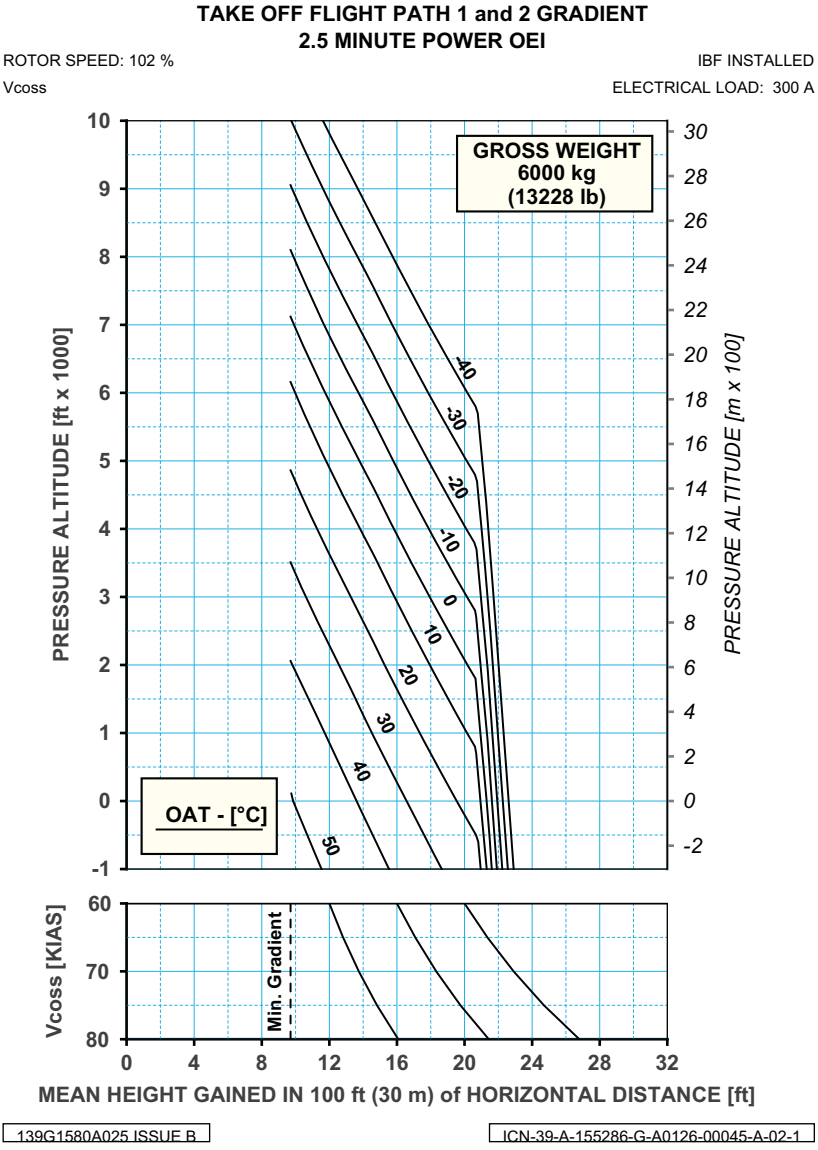

Figure 4-42 PATH 1 & 2 Gradient at V_{COSS}, GW 6000 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss

IBF INSTALLED
ELECTRICAL LOAD: 300 A

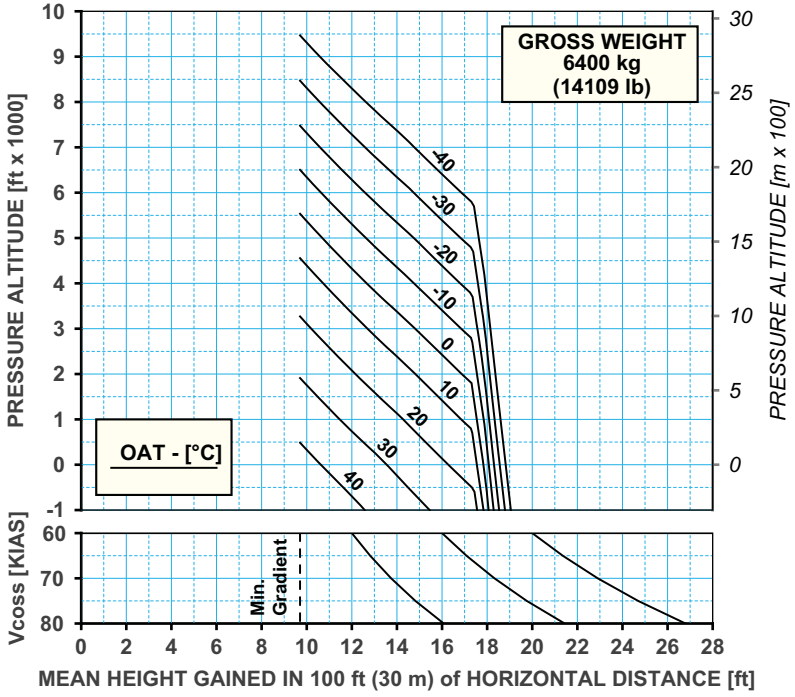

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Figure 4-43 PATH 1 & 2 Gradient at V_{COSS}, GW 6400 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss

IBF INSTALLED
ELECTRICAL LOAD: 300 A

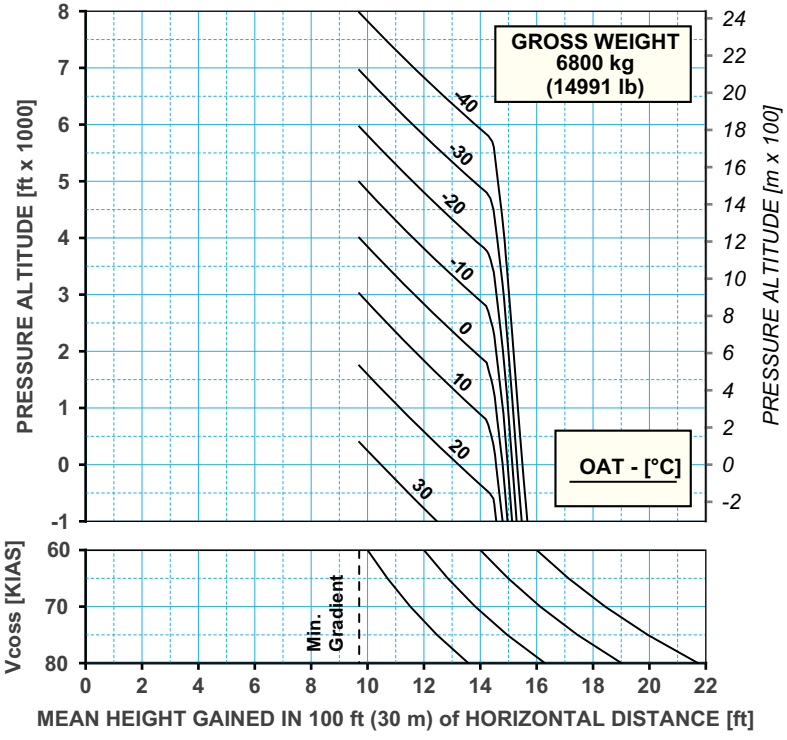

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Figure 4-44 PATH 1 & 2 Gradient at V_{COSS}, GW 6800 kg, IBF Installed

TAKE OFF FLIGHT PATH 1 and 2 GRADIENT
2.5 MINUTE POWER OEI

ROTOR SPEED: 102 %
Vcoss

IBF INSTALLED
ELECTRICAL LOAD: 300 A

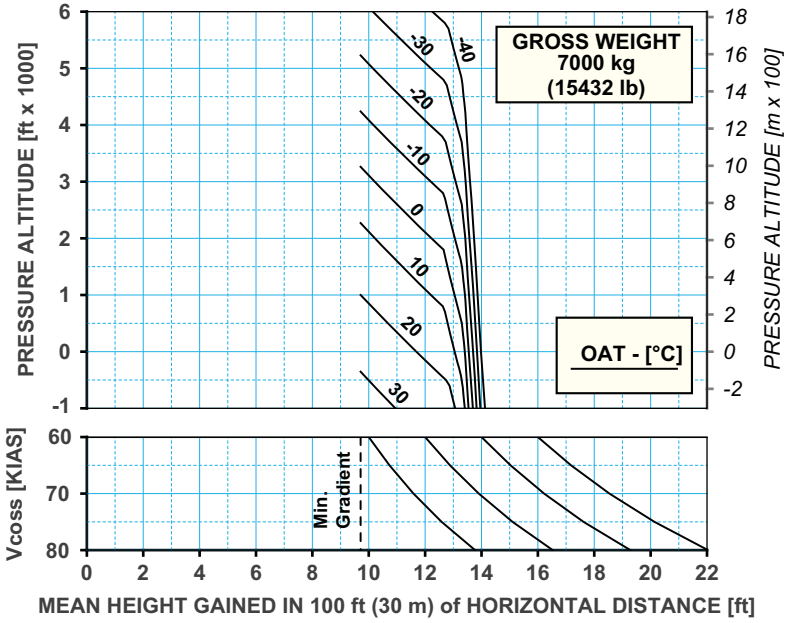

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Figure 4-45 PATH 1 & 2 Gradient at V_{COSS}, GW 7000 kg, IBF Installed

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 98

DUAL CARGO HOOK OPERATIONS

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SUPPLEMENT 98
DUAL CARGO HOOK OPERATIONS

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DEFINITIONS AND ABBREVIATIONS

Abbreviations and acronyms used throughout this Supplement are defined as follows:

— BQRS : Backup Quick Release System

— HEC : Human External Cargo

— NHEC : Non Human External Cargo

— PCDS : Personnel Carrying Device System

— PQRS : Primary Quick Release System

GENERAL INFORMATION

This supplement details the use of the DUAL CARGO HOOK installation for HEC operations.

The dual cargo hook system P/N 4G2592F00111 introduces a secondary cargo hook mounted in front of the already certified main cargo hook (refer Supplement 13). See Figure 1 & Figure 2.

The main cargo hook, during normal operation, takes the suspended load and only in the case of an inadvertent release from the main hook the load is then supported by the secondary hook.

The Dual Cargo Hook system therefore consists of:

— the Main Hook (P/N 3G2592F00111)

— the Secondary hook

— the DUAL HOOK control panel (fitted in the interseat control panel)

— Primary and Secondary Quick Release Systems for the Main and Secondary Hook

— ‘Y’ shaped long line (for HEC use) and safety harness.

The main hook P/N 3G2592F00111 has a support frame assembly, a cargo hook assembly and a hook load indicator mounted in the cockpit (Figure 9). The hook has a PQRS via a guarded pushbutton on the pilot and copilot cyclic (Figure 7). A secondary manual release system, for operation by ground personnel only, is mounted on the cargo hook. An Emergency Cargo Release (MAIN EMER) guarded switch, located on the DUAL HOOK control panel in the interseat

console, that operates an electrical explosive cartridge to release the load.

The secondary hook is mounted on a dedicated frame which is attached to the fuselage, in front of the main hook. The hook has a normal load release (PQRS) which is hydraulically operated via double action levers located on the pilot collective stick (Figure 8). To open the hook, the pilot must lower the yellow locking lever then pull the red release lever. A secondary manual release system, for operation by ground personnel only, is mounted on the cargo hook (a protection plate prevents inadvertent operation of the manual release Figure 5). An Emergency Cargo Release (SEC EMER) guarded switch, located on the DUAL HOOK control panel in the interseat console, operates an electrical rotary solenoid to release the load. Once the secondary hook has been opened, by any of the means, then it must be closed manually and confirmed, using the lock indicators on the side of the hook, that it is closed correctly, see Figure 6.

When the system is selected ON using the PWR switch on the DUAL HOOK control panel (Figure 4) the system status is indicated by CAS cautions. The HOOK ARM caution illuminates if any of the CARGO REL switch guards on either cyclic is opened or the MAIN EMERG or SEC EMERG guards are opened on the DUAL HOOK control panel. The HOOK OPEN caution illuminates when the main cargo hook is opened by the following methods:

- holding depressed either cyclic pushbutton, the hook load arm opens releasing the load. When the pushbutton has been released, a spring in the cargo hook assembly closes the load arm back to its closed and latched position (caution no longer illuminated),

or

- pressing the MAIN EMERG pushbutton the electrical explosive system allows the hook load arm to open releasing the load. A spring in the cargo hook assembly automatically closes the load arm back to its closed (but not latched) position (caution no longer illuminated),

or

- when opened manually on the ground.

The secondary hook does not produce a hook open caution for either the PQRS or the SEC EMER release.

For HEC operations the load is suspended to the helicopter by a Y shaped Long Line connected to the main and secondary hook by two separate cable ends. The main hook end is the shorter one, so that in normal operations the load is sustained by the main hook only and the line attached to the secondary hook is slack.

A kit of two monitoring cameras (P/N 3G9770F00111) which display images of load movement and hook condition on the MFD, and/or the 5th display (if fitted), is available. The monitoring cameras are operated by a switch on the Auxiliary Circuit Breaker Panel (Figure 12).

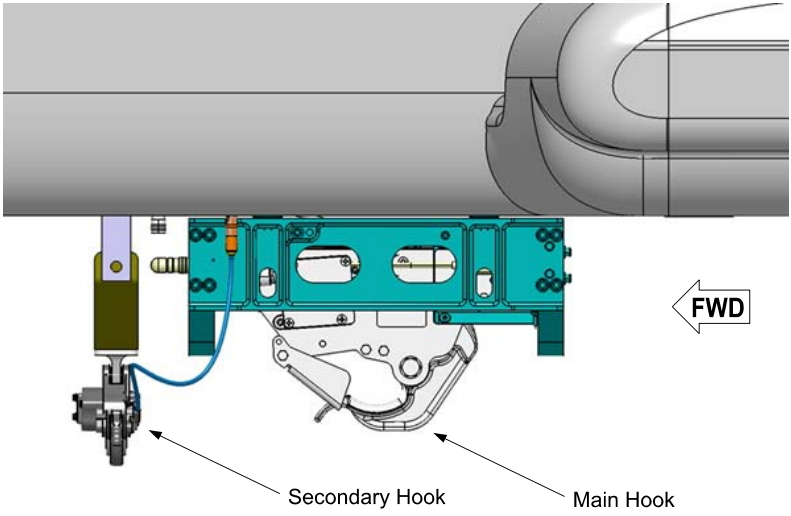

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Figure 1 Dual Cargo Hook Installation

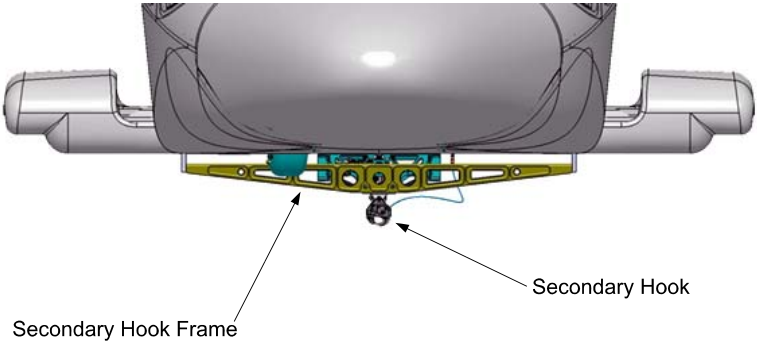

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Figure 2 Secondary Hook Support Frame Installation (View looking aft)

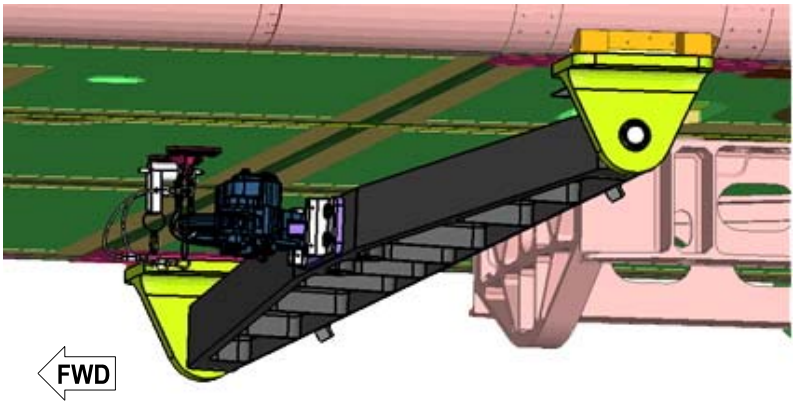

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Figure 3 Secondary Hook in Stowed position

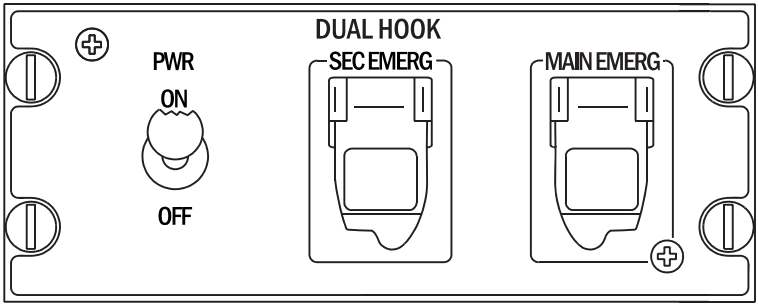

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Figure 4 DUAL HOOK Control Panel with MAIN EMERG and SEC EMERG Guarded Pushbuttons (BQRS)

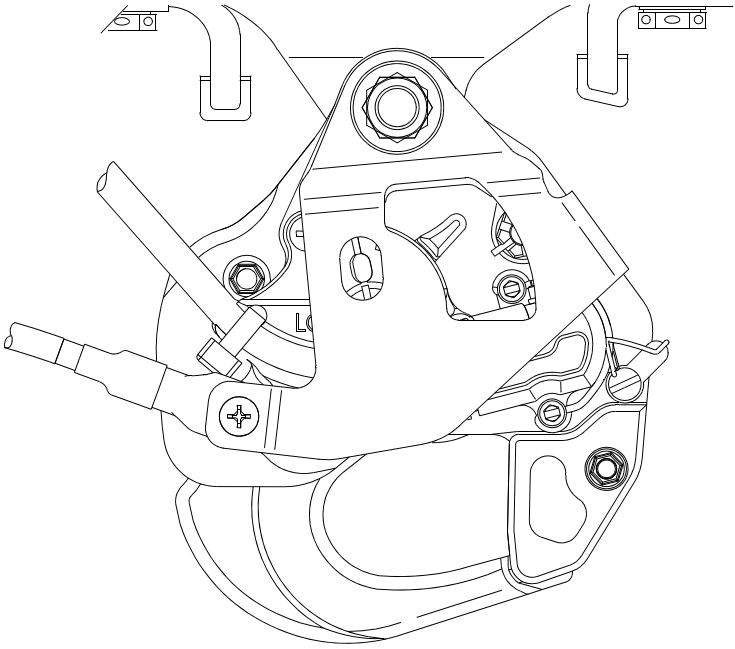

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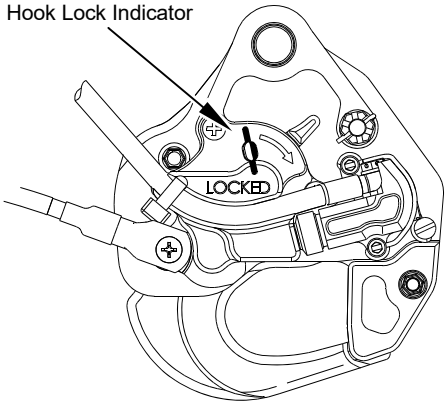
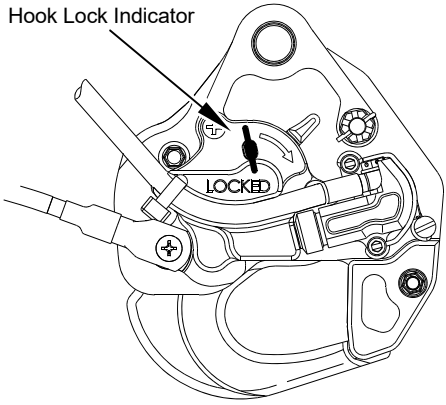
Figure 5 Secondary Hook with Manual Release Lever Protection Plate



NOT ACCEPTABLE
LOCK INDICATOR DIAMOND IS VISIBLE BUT IS NOT ALIGNED WITH ENGRAVED LINES ON THE COVER



ACCEPTABLE
LOCK INDICATOR DIAMOND IS ALIGNED WITH ENGRAVED LINES ON THE COVER

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Figure 6 Secondary Hook locking Indications on side of hook body (protection plate removed for clarity)

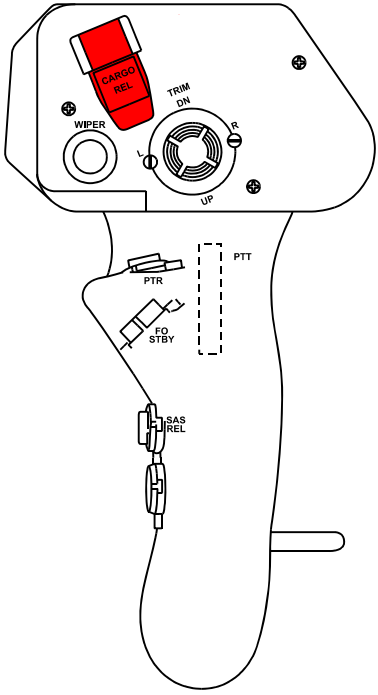

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Figure 7 Main CARGO REL Guarded Pushbutton on Pilot and Copilot Cyclic (PQRS)

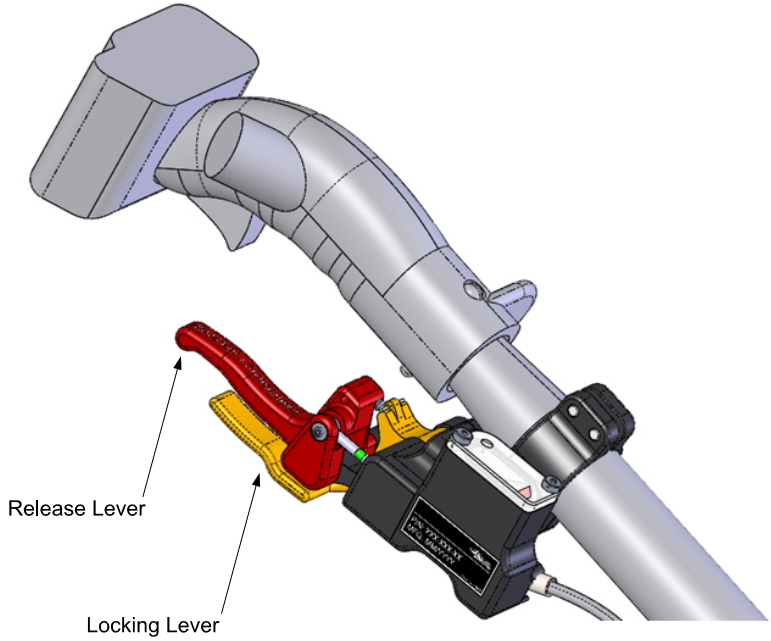

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Figure 8 Secondary Cargo Release Levers on Pilot Collective (PQRS)

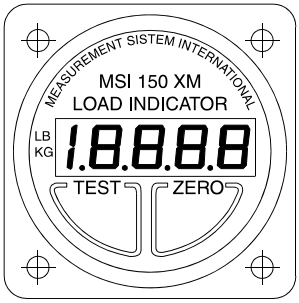

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Figure 9 Main Cargo Hook Load Indicator

'Y' SHAPED LONG LINE

The Y shaped Long Line (Figure 10) intended for HEC operation consists of the first segment of the Long Line (the Y-shaped part) which is approximately 18 m long and has one line for the main hook shorter than the other line for the secondary hook (slack line), and the swivel part which is approximately 2 m long, therefore the minimum Long Line length is 20 m.

The intermediate segments available are 10 m, 20 m, and 40 m segment long therefore the total length of the Long Line can vary from 20 m to 90 m with 10 steps depending on customer requirements.

At the bottom end of the Long Line a swivel provides independent rotation of the load with respect to the Long Line.

The load is attached to the swivel by 4 lugs each one provided by a carabiner.

An additional attachment tool with 8 carabiners can also be connected to increase the number of attachment points (Figure 11).

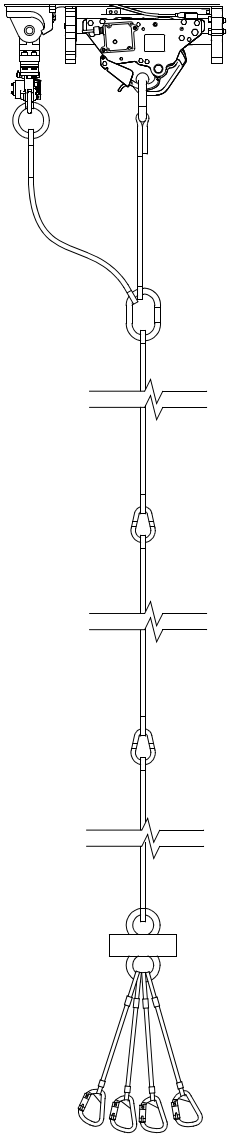

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Figure 10 HEC Long Line Cable

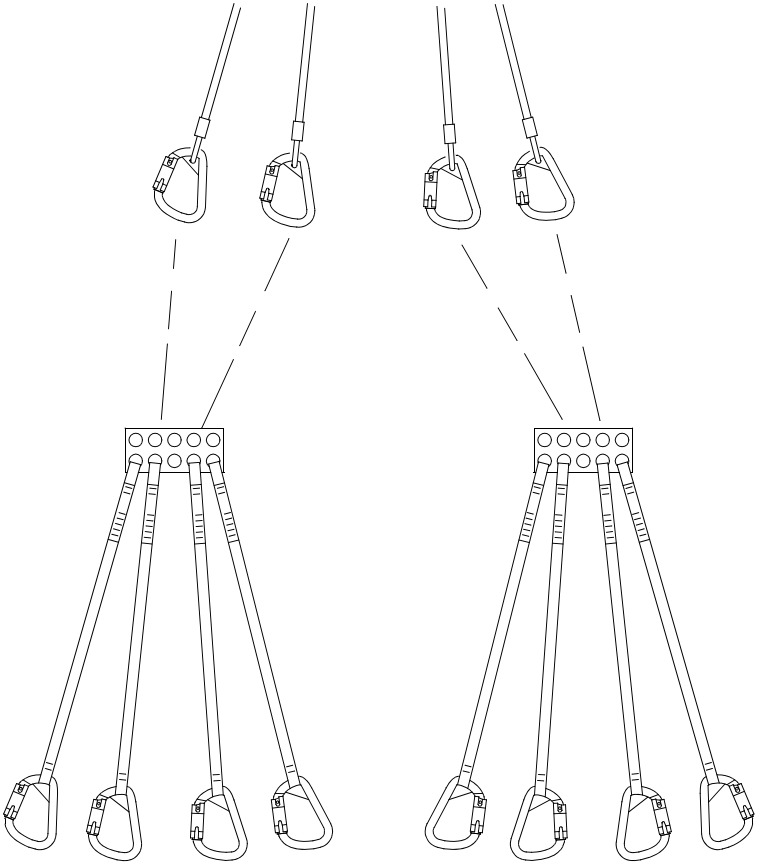

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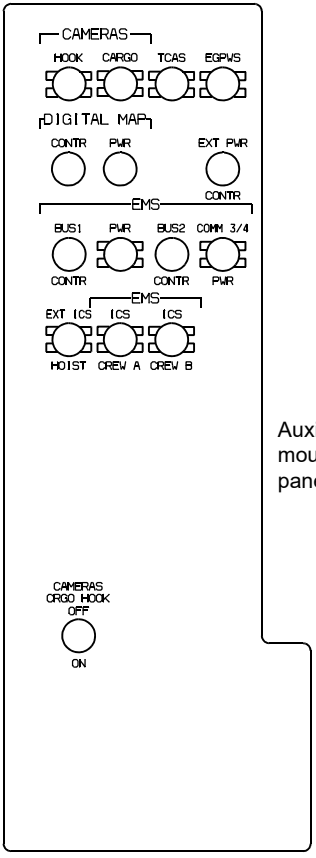
Figure 11 Additional Attachment Cables



Auxiliary circuit breaker panel is mounted on the left of overhead panel

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Figure 12 Auxiliary Circuit Breaker Panel with Cargo Hook Monitoring Cameras Switch

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SECTION 1 - LIMITATIONS

GENERAL

NHEC operations must be conducted using only the Main Hook, see Supplement 13.

The PCDS Long Line part Number 6F2592V01151 is intended for HEC operations and must not be used for any other type of operations.

When HEC operations are not envisaged the Secondary hook must be stowed.

When operations using the Secondary Hook are not required, and the hook is stowed, refer to Supplement 13 for Cargo Hook Operations using just the main cargo hook installation (be aware that the DUAL HOOK control panel labeling for MAIN EMERG is slightly different from the single hook panel but has exactly the same function).

With the Dual Cargo Hook fitted, but not used, and the hooks are in a stowed position, the Limitations and Performance stated in the Basic RFM and applicable Supplements apply.

The Dual Cargo Hook equipment certification approval does NOT constitute operational approval. Operational approval for external load operation must be granted by the Competent Aviation Authority.

The Dual Cargo Hook system meets the certification requirements for HEC operations.

For compliance with operating rules, the AW139 is certified to CAT A engineering standards.

During HEC cargo Hook operations the number of external load cycles must be recorded in the helicopter log-book.

An external load cycle is defined as every external load lift using the Cargo Hook.

A load cycle is defined as the lifting of at least 1 person with the load attached to the main hook.

TYPE OF OPERATION

— Dual Cargo Hook operation must be authorized by the Competent Authority in accordance with the applicable National Operating Regulations.

— The Dual Cargo hook installation is approved for HEC operations.

— Dual Cargo hook operation is approved for Day and Night VFR with ground visual contact.

— Operation of the Dual Cargo Hook equipment for HEC requires the use of an approved PCDS which has the appropriate size selected for the mission.
The Y Long Line P/N 6F2592V01151 together with Safety Harness AMTC-H1037-BL is an approved PCDS for HEC operations.

— For HEC operations there shall be equipment to allow direct inter communication between the required crew members and the external occupants. An approved Radio-ICS system must be installed and operated in accordance with the applicable Local Operating Regulations.
Polycon P/N 4G2350F02311 is an approved Radio-ICS system. However, the Radio ICS shall not be the only means of communication with the Crew/HEC.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

Weight

Maximum weight with external load ..... 6800 kg

HEC operation requiring oei capability

If the operating rules require one engine inoperative hover performance capability procedures, the maximum weight is defined using the Hover OGE 2.5 min OEI charts.

Refer Section 4 of this Supplement.

Center of Gravity

Longitudinal limit ..... See Figure 1-1 & Figure 1-3

Lateral limit..... See Figure 1-2 & Figure 1-4

Note

The longitudinal limit graph displays CG forward limit lines for loads on the main hook from 200 kg to 800 kg. These limits ensure that in case of failure of the main hook and the load is transferred to the secondary hook the aircraft longitudinal limits are not exceeded.

AIRSPEED LIMITATIONS WITH HEC

V_{MAX} ..... 90 KIAS

WARNING

Operations with an empty PCDS (as with any unballasted strop) can be extremely dangerous. The most critical flight condition is forward flight which can result in close proximity or contact between the PCDS and the aircraft, especially if other factors such as high rate of descent, abrupt aircraft manoeuvres or turbulence are present. Extreme care must be taken when flying with empty PCDS and flight conditions and manoeuvres must be limited as necessary to ensure satisfactory PCDS behaviour in the prevailing atmospheric conditions.

CAUTION

The airspeed with external cargo may be limited by load dynamic characteristics to an airspeed below V_{MAX}. Caution should be exercised when carrying external load to ensure satisfactory load dynamic characteristics, which may be affected by the size, weight and shape of the load, as well as by the length of the strop between the load and the hook. The operator is responsible to establish adequate operating limits to ensure satisfactory load dynamics characteristics for the type of load being carried.

Maximum airspeed for flight within ±10 degrees azimuth quadrant ..... V_{MAX}

Maximum groundspeed for sideways and rearwards flight beyond forward ±10 degrees azimuth quadrant .. See Figure 4-1

Maximum windspeed beyond forward ±10 degrees azimuth quadrant ..... See Figure 4-1

ALTITUDE LIMITATIONS WITH EXTERNAL LOAD

Maximum operating altitude ..... See Figure 1-5

Maximum altitude for load pick up and release ..... See Figure 1-5

ENGINE POWER TURBINE (NF %) AND ROTOR (NR %) SPEED LIMITATIONS

All Engines Operating

Approved Range for CARGO HOOK operations ..... 101 to 103

Maximum for CARGO HOOK operations 103

Note

100% NR may be used for operations above 50 KIAS.

One Engine Inoperative

Approved Range for CARGO HOOK operations ..... 101 to 103

Maximum for CARGO HOOK operations 103

For all other Engine and Rotor Limitations see Basic RFM.

DUAL CARGO HOOK LIMITATIONS

Maximum Load

Maximum load for Dual Cargo Hook operation..... 800 kg (1766 lb)

During normal operation the cargo load weight must be taken by the main cargo hook and the Y Long Line slack cable must be attached to the Secondary hook and not taking any load.

PCDS

The PCDS release must be completed on ground only, unless required in an emergency condition.

Taxiing

Taxing on unprepared surfaces with hooks extended is prohibited.

MISCELLANEOUS LIMITATIONS

Autopilot Limitations

During Dual Cargo Hook operations the Pilot must fly manually.

Primus HF 1050 Radio (Supplement 8)

During Dual Cargo Hook operations, HF 1050 radio transmissions are prohibited.

Honeywell Weather Radar Series (Supplement 21) and Radar RDR-1500B+ (Supplement 42), Radar Selex Gabbiano T20N (Supplement 73)

During Dual Cargo hook operations, Weather Radar must be in SBY or OFF.

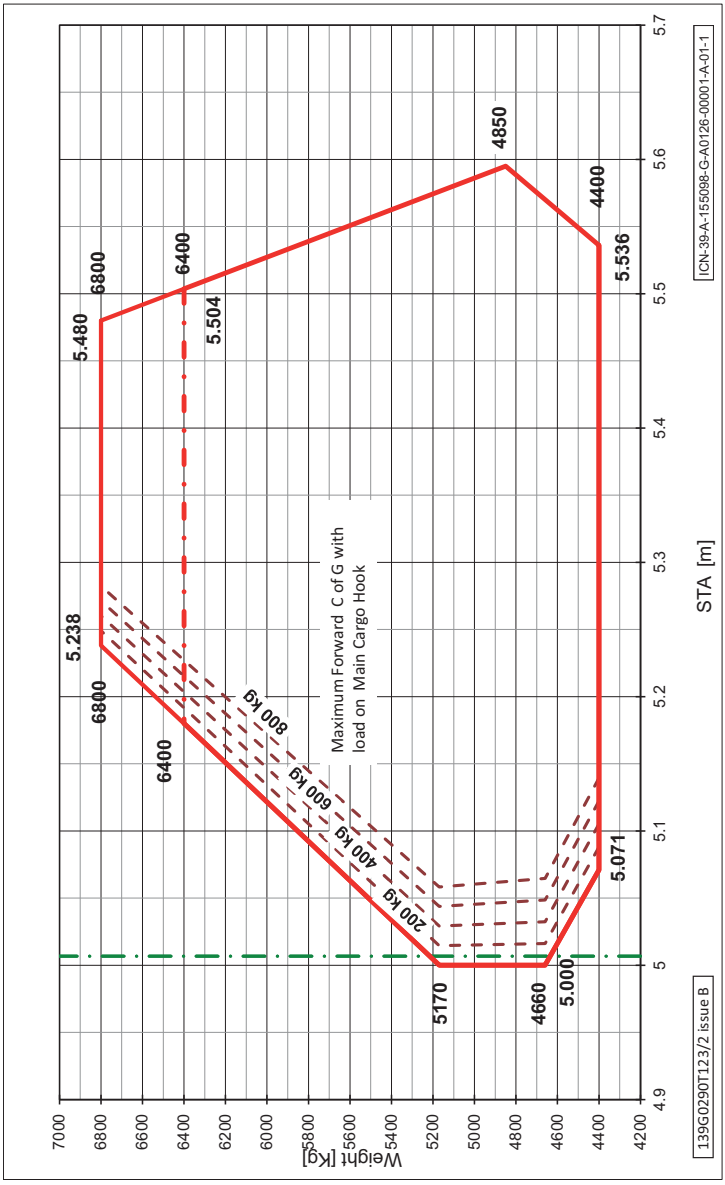

Figure 1-1 Weight and Longitudinal C of G Limitations for Cargo Hook Operations (Metric units)

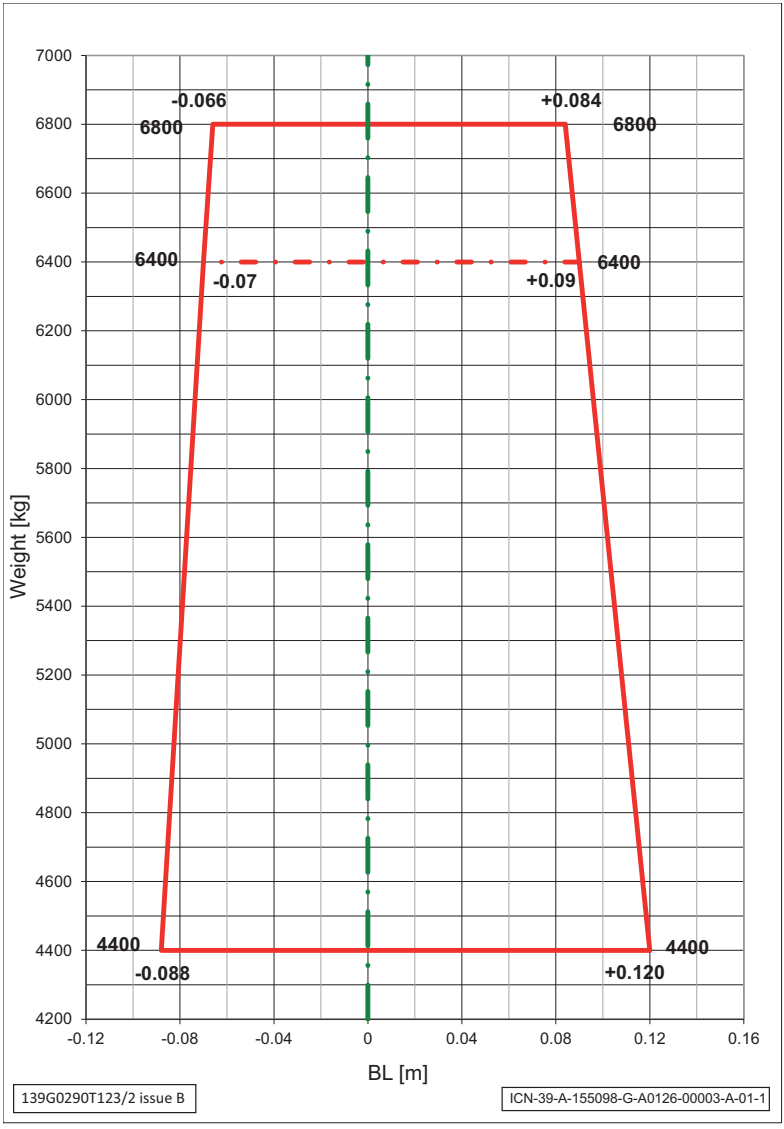

Figure 1-2 Weight and Lateral C of G Limitation for Cargo Hook Operations (Metric units)

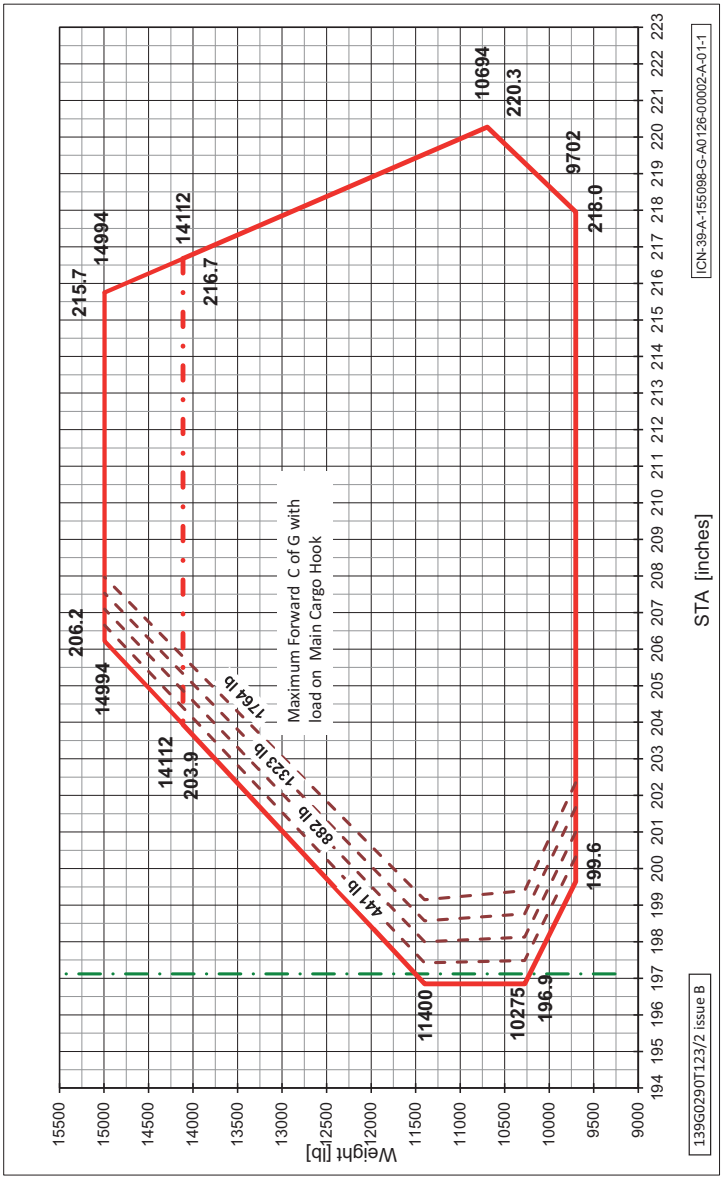

Figure 1-3 Weight and Longitudinal C of G Limitations for Cargo Hook Operations (Imperial units)

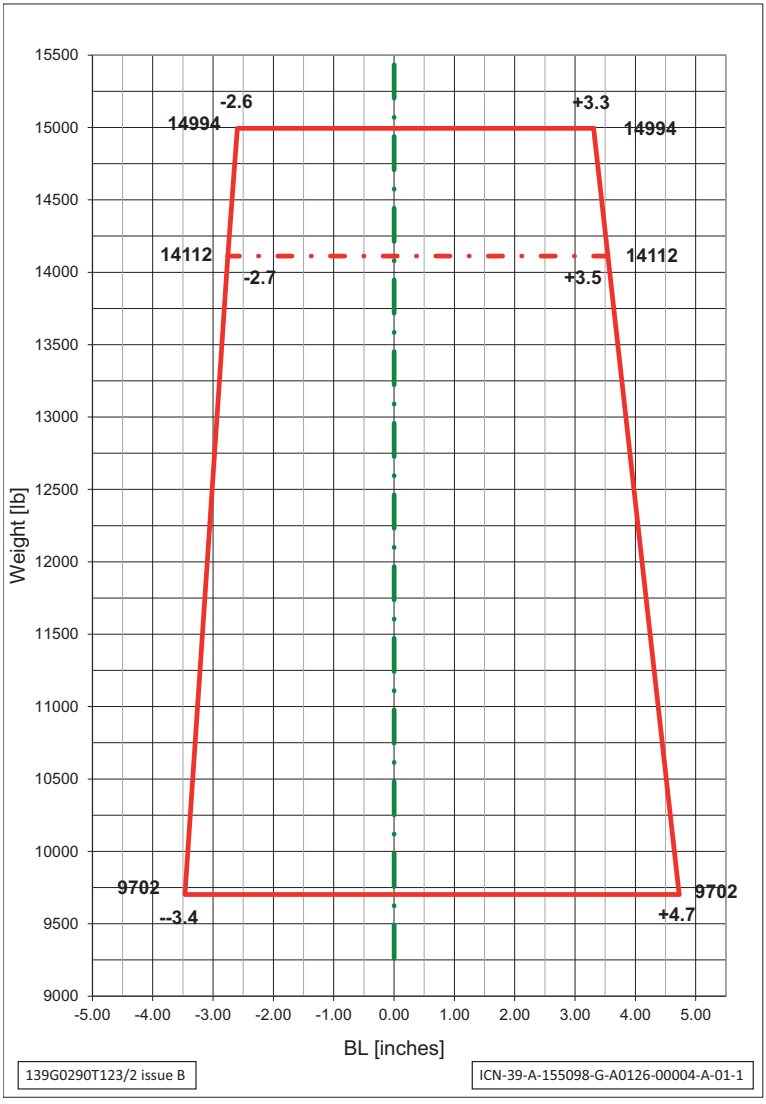

Figure 1-4 Weight and Lateral C of G Limitation for Cargo Hook Operations (Imperial units)

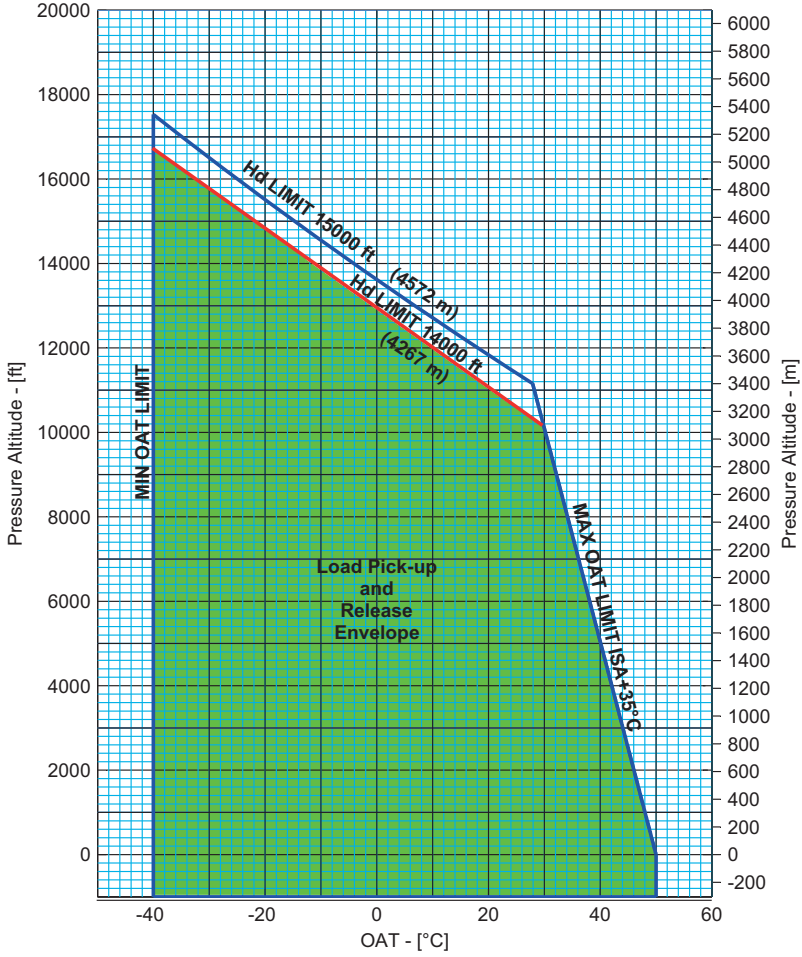

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Figure 1-5 Altitude Limitations for Cargo Hook Operations

SECTION 2 - NORMAL PROCEDURES

EXTERNAL PRE FLIGHT CHECKS

AREA N°2 (Fuselage - Right Hand Side)

1. Cargo Hook (Main and Secondary) — Condition, and secure. Confirm hooks extended for Dual Cargo Hook operations.
2. Cargo and Hook monitoring cameras — Cleanliness of lens and secure.

COCKPIT PRE START CHECKS

AREA N°2 (Fuselage - Right Hand Side)

1. CARGO REL pushbutton on pilot and copilot cyclic grip — Guard closed.
2. Secondary Hook release and locking levers on pilot collective grip — Red release lever in correct position and locked with Yellow locking lever.
3. MAIN and SEC EMERG pushbutton on DUAL HOOK control panel — Guard closed.

Note

The following checks require a significant electrical consumption and consequent reduction of battery charge. If possible use external power.

After BATTERY MASTER ON:

4. PWR switch on DUAL HOOK control panel — ON.
5. Hook load indicator — Set to zero (0).

Note

Ground personnel shall assist the pilot during the cargo hook checks. The main cargo hook is provided with a spring which keeps it in the closed position, even when the opening system releases the locking device. A force of approximately 5 kg (11 lb) must be applied to the cargo hook to overcome the spring force and open the hook. When the force is removed the hook will close immediately.

Main Cargo Hook Checks

1. Manual release handle on main cargo hook assembly ➡ — Ground personnel rotate manual release handle. Apply force to open hook and confirm HOOK OPEN caution illuminates on CAS. Return manual release handle, remove force and confirm hook closes and HOOK OPEN caution extinguishes.
2. CARGO REL guarded pushbutton on pilot/copilots cyclic grip ➡ — Lift guard, confirm HOOK ARM caution illuminates on CAS.
3. CARGO REL pushbutton ➡ — Press, apply force and confirm opening of cargo hook and HOOK OPEN caution illuminates on CAS. Release pushbutton and release force, confirm cargo hook returns to closed position and HOOK OPEN caution extinguishes.
4. CARGO REL pushbutton ➡ — Close guard, confirm HOOK ARM caution extinguished.

5. MAIN EMERG guarded pushbutton on DUAL HOOK control panel ➡	— Lift guard, confirm HOOK ARM caution illuminates on CAS. Close guard and confirm caution extinguishes.

Secondary Cargo Hook Checks

1. Manual release handle on secondary cargo hook ➡	— Ground personnel rotate manual release handle and confirm hook opens (No HOOK OPEN caution is displayed). Release handle, manually close hook. Verify that the hook lock indicator returns to the fully locked position. (In the fully locked position the hook lock indicator aligns with the line on the manual release cover).
2. Secondary hook release lever on pilots collective grip ➡	— Un-lock and move release lever to open secondary hook. Confirm secondary hook opens.
3. Close Secondary hook lever and lock ➡	— Ground personnel manually close hook. Verify that the hook lock indicator returns to the fully locked position. (In the fully locked position the hook lock indicator aligns with the line on the manual release cover). Confirm secondary hook closed and locked.
4. SEC EMERG guarded pushbutton on DUAL HOOK control panel ➡	— Lift guard, confirm HOOK ARM caution illuminates on CAS. Press pushbutton to open hook and confirm secondary hook opens. Close guard and confirm caution extinguishes. Ground personnel manually close hook.

Verify that the hook lock indicator returns to the fully locked position.
(In the fully locked position the hook lock indicator aligns with the line on the manual release cover).

Cargo Hook Monitoring Cameras & ICS

1. Cargo monitoring cameras — Switch ON (overhead panel). Select VIDEO picture on MFD and confirm functioning.
   Switch OFF or as required.

2. PWR switch on DUAL HOOK control panel — OFF or as required.

3. Radio-ICS portable transceiver (HEC operations) — Verify transceiver and control box are set on the same frequency and confirm communication with Crew/HEC is satisfactory.

Cargo Hook Long Line Checks (for HEC) ➡

1. Long Line cable — Condition and cleanlines of all parts, Confirm no cuts, kinks or stitching broken or protruding especially where the line is in contact with the metal parts.

2. Long Line carabiners — Condition and cleanliness. Confirm no damage, distortion or fretting to any of the carabiners and the closing mechanisms. Confirm opening and closing mechanisms function correctly and freely.

3. Long Line swivel — Condition and cleanlines. Confirm swivel free to rotate.

4. Safety Harness — Condition and cleanliness of all parts. Confirm no cuts or stitching broken.

DUAL CARGO HOOK OPERATING PROCEDURES

General

In normal conditions the long line will be attached to the hooks whilst the helicopter is on ground, at the beginning of the HEC mission. The human load is attached to (and detached from) the long line by means of the carabiners provided on the long line lower end. The long line shall be detached from the hooks at the end of the HEC mission, when the helicopter is on ground, by means of the PQRS or the manual release systems (to be operated by ground personnel).

The following procedure assumes that the load is attached and detached while the helicopter is in the hover. Depending on number of people and sling length being used other techniques may also be applicable.

PCDS Attachmen

1. Main hook ring — Attach to Main hook, verify closed and no hook open caution displayed.
2. Secondary hook ring — Open secondary hook using the manual release, attach ring to secondary hook close and lock. Verify hook lock indicator returns to the fully locked position. (In the fully locked position the hook lock indicator aligns with the line on the manual release cover.)

Load lifting

1. RPM switch — Set 102%.
2. Take Off — Take Off and stabilize a hover to allow ground personnel to discharge static electricity from helicopter and attach load.
   Confirm main cargo hook is taking the load and the secondary hook cable is attached to the secondary hook and the cable is slack.
3. MFD PWR PLANT page — Check all parameters within normal operating limits and confirm no engine matching abnormalities.
4. Load lifting — Slowly increase collective pitch and ascend vertically to take-up the slack of the PCDS.
   Lift HEC vertically from surface and confirm the hook load indicator is within the hook loading limitations.

5. Hover — Hover to check for satisfactory controllability and power is within limits.

6. Load monitoring — Confirm hook and load can be monitored on the MFD, or by other means.

CAUTION

Allow adequate load clearance over obstacles.

Note

TCAS II, if fitted and active, select to TA Only.

7. Forward flight — Translate into slow forward flight. Confirm the controllability of the helicopter/load combination, and ensure that no undesired or potentially hazardous characteristics are observed.

8. Cruise — Select an operational airspeed within the maximum speed limitation, which is suitable for the load being carried.

APPROACH AND LANDING

1. Hover — Stabilize a hover above load touch down area at a height sufficient to keep the load above the ground.

2. Descent — Descend slowly and vertically to place HEC gently on ground.

PCDS Release

Establish a hover at approximately 30 ft, without HEC, then:

1. CARGO REL guarded pushbutton on pilot/copilot cyclic grip — Lift guard, confirm HOOK ARM caution illuminates on CAS.
2. CARGO REL pushbutton — Press, confirm opening of cargo hook and HOOK OPEN caution illuminates on CAS. Release pushbutton and confirm HOOK OPEN caution extinguishes.

Gently descend to land and once on ground:

3. Secondary hook release lever on pilots collective grip — Un-lock and move release lever to open secondary hook. Confirm, using cameras or other means, secondary hook opens and cable is released.
4. CARGO REL pushbutton — Close guard, confirm HOOK ARM caution extinguished.
5. Secondary hook lever on pilots collective grip — Close and lock.
6. Load monitoring cameras — OFF or as required.
7. PWR switch on DUAL HOOK control panel — OFF or as required.

Alternatively PCDS release can be carried out on ground, or low hover using the same sequence. Personal will be required to apply sufficient force to remove the PCDS from the main hook and avoid PCDS damage from hitting the ground.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

An unexpected thump/impulse/noise from the hook area, possibly accompanied by an abrupt vertical/pitch disturbance, should be interpreted as indicating that the primary load connection to the aircraft has failed, due to either primary hook or PCDS failure resulting in load transfer to the secondary PCDS cable and secondary hook. This event may or may not be associated with a HOOK OPEN caution. If this is confirmed, using the cargo hook monitoring cameras and/or main hook load indicator reads zero, HEC operations must be discontinued and the HEC taken to the nearest operationally suitable safe set down area.

PCDS EMERGENCY JETTISON

An emergency jettison of the PCDS, in flight, should only be carried out if absolutely necessary, using the following procedure:

1. PWR switch on DUAL HOOK control panel — Confirm ON.
2. Secondary hook release lever on pilots collective grip — Un-lock and move release lever to open secondary hook. Confirm visually that cable is released.

If cable not released from secondary hook or cable release cannot be confirmed:

3. SEC EMERG guarded pushbutton on DUAL HOOK control panel — Lift guard, confirm HOOK ARM caution illuminated on CAS, press pushbutton. Confirm cable is released, lower guard.
4. CARGO REL guarded pushbutton on pilot/copilot cyclic — Lift guard, confirm HOOK ARM caution illuminates on CAS.

5. CARGO REL pushbutton — Press, HOOK OPEN caution illuminates on CAS. Confirm load jettisoned.

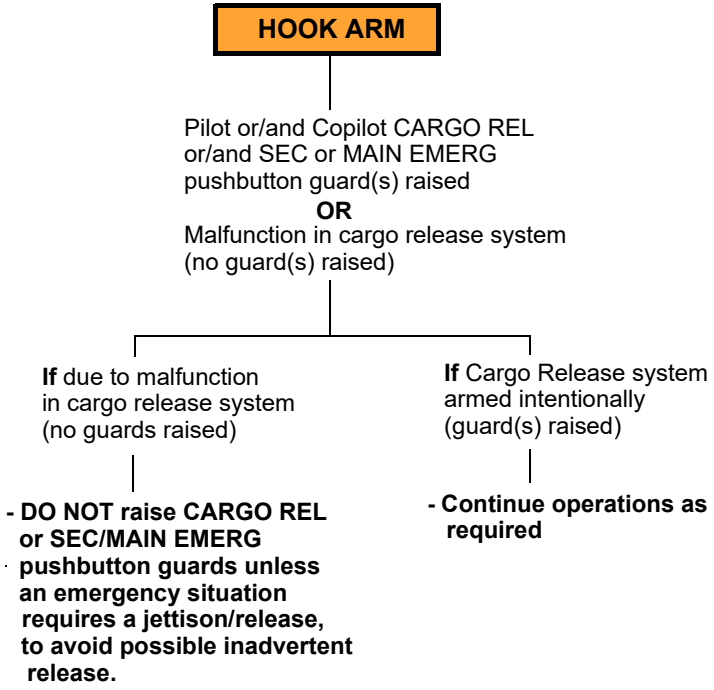
If load is not jettisoned:

6. MAIN EMERG guarded pushbutton on DUAL HOOK control panel — Lift guard, confirm HOOK ARM caution illuminated on CAS, press pushbutton. Confirm load jettisoned.

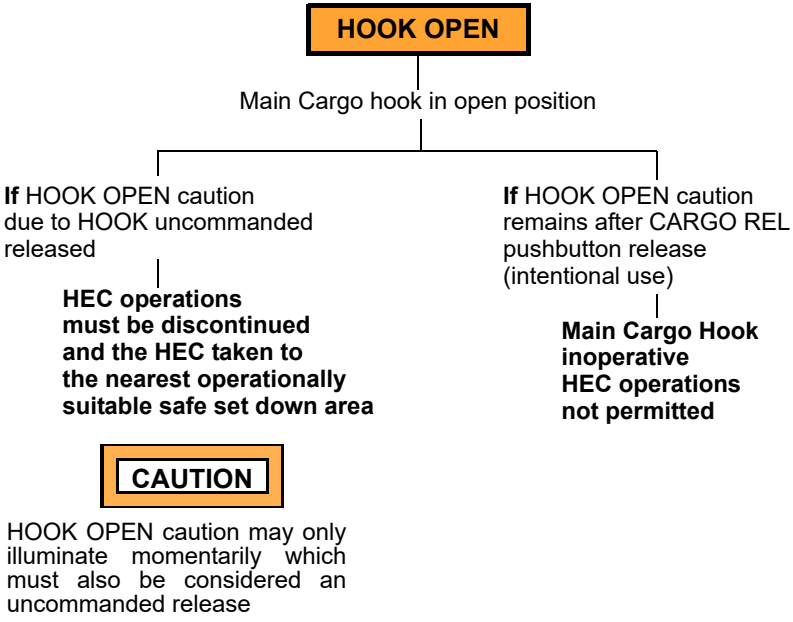
7. CARGO REL EMERG pushbuttons — Close guard, confirm HOOK ARM caution extinguished.

8. PWR switch on HOOK control panel — OFF. Cargo Hook operations must be interrupted.

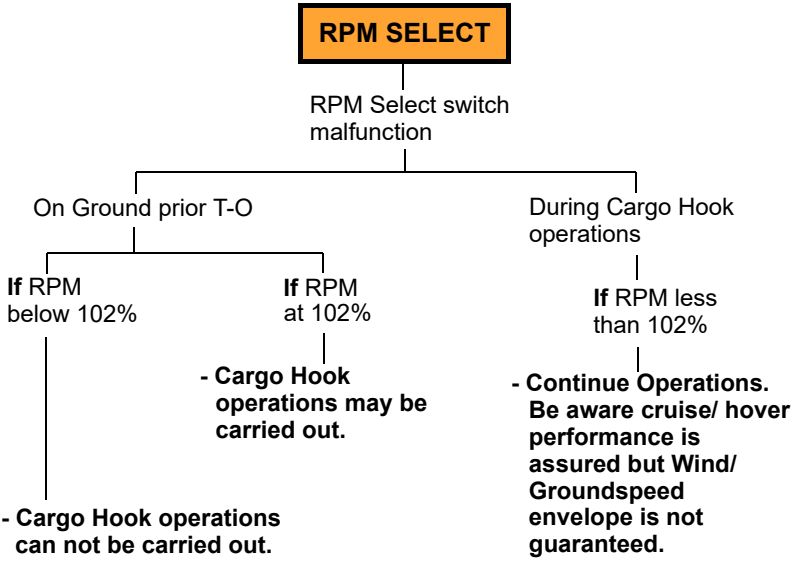
HOOK ARM CAUTION



HOOK OPEN CAUTION



ROTOR SPEED SELECTOR



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SECTION 4 - PERFORMANCE DATA

GENERAL

Forward flight and climb performance will be degraded due to the load aerodynamic drag. The level of degradation will depend on load size and shape.

There are no significant load effects on hover performance.

HEC OPERATIONS REQUIRING OEI CAPABILITY

Maximum weight for HEC, requiring OEI hover performance capability, is Hover Ceiling OGE, 2.5 min OEI chart for the appropriate systems/ helicopter configuration:

Clean Intake HEATER OFF/ECS ENVIRO OFF
See Basic RFM ..... Figure 4-14

EAPS Intake EAPS OFF
See RFM Supplement 5..... Figure 4-8

EAPS Intake EAPS ON
See RFM Supplement 5..... Figure 4-16

IBF Installed HEATER OFF
See RFM Supplement 86..... Figure 4-8

Note

Weights defined in the above charts guarantee no rotor droop/height loss in case of an engine failure, therefore do not lower collective.

HOVER CEILING

Hover performance of the Basic RFM, Supplement 13 and/or appropriate system/helicopter configuration apply.

LOW SPEED ENVELOPE

— Low speed manoeuvre envelope, as detailed in Figure 4-1, guarantees adequate controllability margins for weights defined in the Hover Ceiling OGE, MCP, AEO charts for the appropriate systems/helicopter configuration:

Clean Intake HEATER OFF/COND OFF
See Basic RFM ..... Figure 4-13
or Supplement 13 ..... Figure 4-8

Clean Intake HEATER ON/ECS ENVIRO MAN HEAT
See RFM Supplement 2 ..... Figure 4-4
or Supplement 13 ..... Figure 4-9

Clean Intake COND ON/ECS ENVIRO A/C RECYCLE
See RFM Supplement 2 ..... Figure 4-23
or Supplement 13 ..... Figure 4-9

Clean Intake ECS ENVIRO FULL AUTO
See RFM Supplement 87 ..... Figure 4-9 & Figure 4-15

EAPS Intake EAPS OFF
See RFM Supplement 5 ..... Figure 4-7
or Supplement 13 ..... Figure 4-10

EAPS Intake EAPS ON
See RFM Supplement 5 ..... Figure 4-15
or Supplement 13 ..... Figure 4-10A

EAPS Intake EAPS OFF/ON, HEATER ON
See RFM Supplement 5 ..... Figure 4-21
or Supplement 13 ..... Figure 4-10B

IBF Installed HEATER OFF
See RFM Supplement 86 ..... Figure 4-7
or Supplement 13 ..... Figure 4-10C

IBF Installed HEATER ON
See RFM Supplement 86 ..... Figure 4-13
or Supplement 13 ..... Figure 4-10D

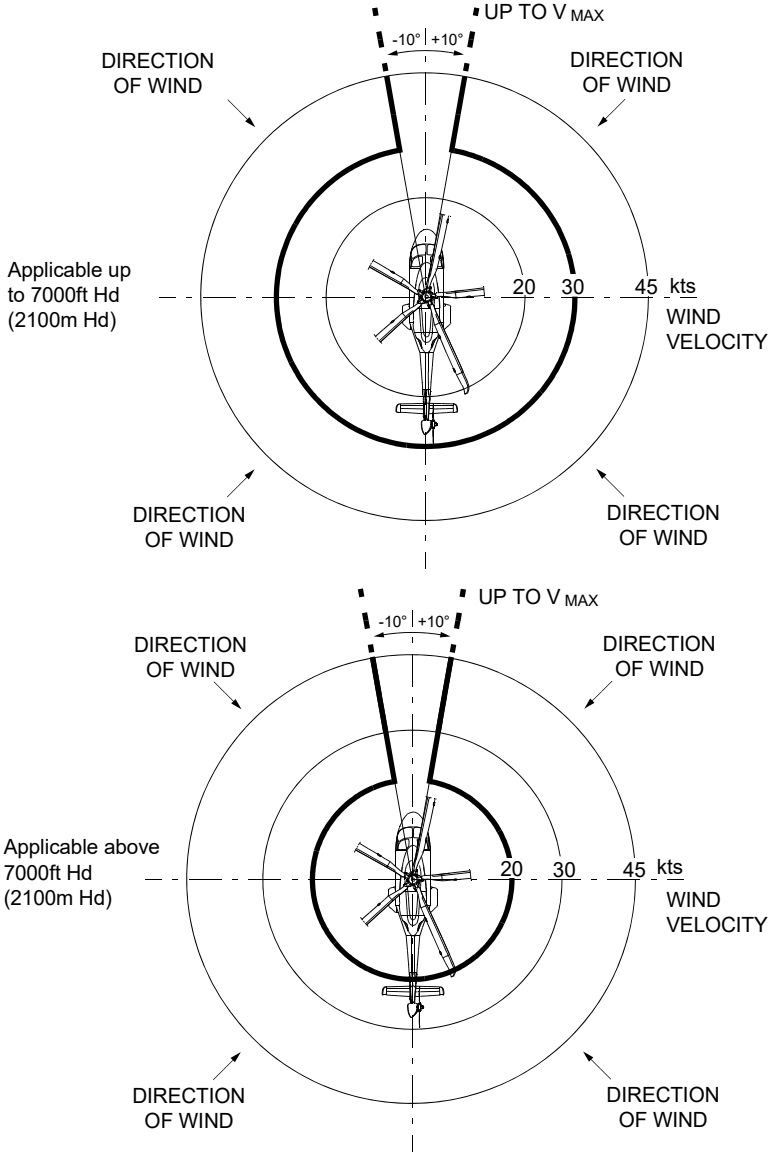

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Figure 4-1 Wind/Ground/Air Speed Azimuth Envelopes for Operation at OGE with MCP, AEO

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

After installation of the Dual Cargo Hook System determined the new empty weight and center of gravity position.

For DUAL CARGO HOOK operations Longitudinal and Lateral Moments may be calcuated using:

— the MAIN Cargo Hook positions of STA 5300 mm, BL 0 mm

and

— the Secondary Cargo Hook position of STA 4923mm, BL 0 mm.

These values must be used in the Weight and Balance Calculations to ensure if the load transfers to the Secondary Cargo Hook the longitudinal moment remains within the Limitations reported in Section 1.

See below for examples of CG movement due to HEC transfer from Main Hook to Secondary hook.

Example 1

Basic information for weight, CG and longitudinal moment or aircraft and HEC.

Aircraft Take-Off No HEC		
5570 kg	5.392 m	30035 kgm
HEC (on Main Hook)		
800 kg	5.300 m	4240 kgm
HEC on Secondary Hook		
800 kg	4.923 m	3938 kgm

Calculation of CG movement

Aircraft with HEC on Main Hook		
5570 kg	5.392 m	30035 kgm
800 kg	5.300 m	4240 kgm
6370 kg	**5.381 m**	**34725 kgm**

Aircraft with HEC transferred to Secondary Hook		
5570 kg	5.392 m	30035 kgm
800 kg	4.923 m	3938 kgm
6370 kg	**5.333 m**	**33973 kgm**

Checking the forward CG limit on Figure 1-1 for 6370 kg the limit is 5.153 m. Therefore, for this case the movement of the CG, if the HEC is transferred from Main to Secondary hook, remains within the aircraft longitudinal limits for the aircraft weight, and is an acceptable configuration.

Example 2

Basic information for weight, CG and longitudinal moment or aircraft and HEC.

Aircraft Take-Off No HEC		
5600 kg	5.185 m	29036 kgm
HEC (on Main Hook)		
800 kg	5.300 m	4240 kgm
HEC on Secondary Hook		
800 kg	4.923 m	3938 kgm

Calculation of CG movement

Aircraft with HEC on Main Hook

5600 kg	5.185 m	29036 kgm
800 kg	5.300 m	4240 kgm
6400 kg	**5.2 m**	**33276 kgm**

Aircraft with HEC transferred to Secondary Hook

5600 kg	5.185 m	29036 kgm
800 kg	4.923 m	3938 kgm
6400 kg	**5.152 m**	**32974 kgm**

Checking the forward CG limit on Figure 1-1 for 6400 kg the limit is 5.155 m. Therefore, for this case the movement of the CG, if the HEC is transferred from the Main to Secondary hook, is outside of the aircraft longitudinal limits so this aircraft weight and configuration is unacceptable.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 99

CABIN COMPARTMENT PARTIAL EXTENSION WITH BAGGAGE BARRIER NET

P/N 4G5338F00111

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SUPPLEMENT 99
CABIN COMPARTMENT PARTIAL EXTENSION WITH BAGGAGE BARRIER NET

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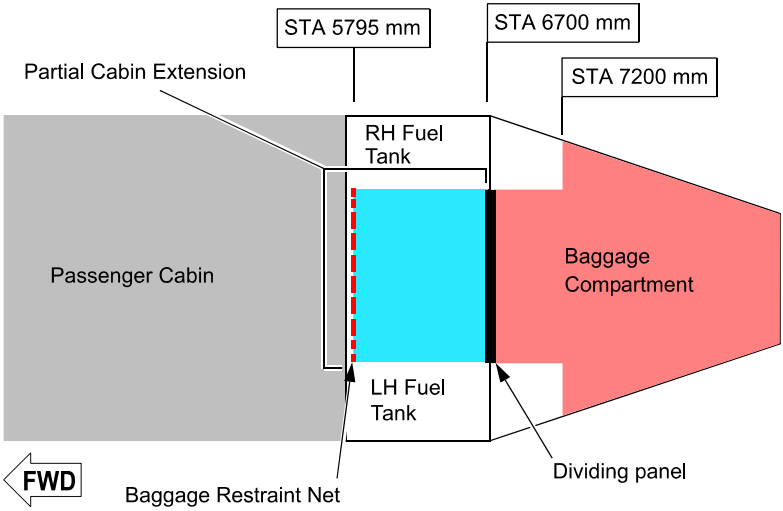
GENERAL INFORMATION

The Cabin Partial Extension with Baggage Barrier Net modification consists of:

- Removal of the cabin rear dividing panel, from STN 5700 mm
- Installation of a new panel at STN 6700 mm
- Installation of Restraint Net attachments at STN 5795, which allows the Baggage Barrier Restraint Net (P/N 3G2550A16811) to be installed
- Tunnel floor and walls reinforced panel installation.

The new area exposed allows the space above/between the main fuel tanks (Tunnel Stowage Area) to be used as a storage area for non dangerous, personal items I.A.W. ICAO Annex 18. See Figure 1. The baggage can be contained in the tunnel area up to a maximum of 370 kg.

When the Partial Cabin Extension is installed and baggage is loaded the area directly infront of the baggage barrier net is required to be free of obstacles. Therefore, depending on the cabin layout seats may need to be removed. to keep the area clear. See Section 6 of this supplement for information of seating area which is to remain clear when the tunnel stowage area is being used.



ICN-39-A-155099-G-00001-29094-A-001-01

Figure 1 Partial Cabin Extension

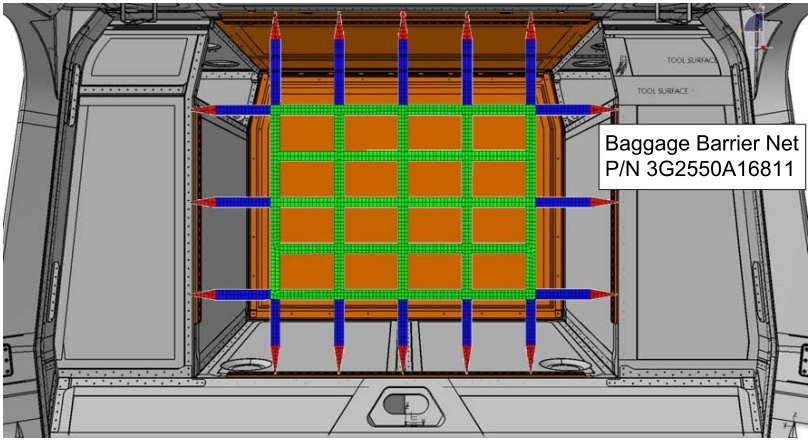


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Figure 2 Cabin Partial Extension Baggage Restraint Net (Shown Installed, view looking aft)

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Partial Cabin Extension and Baggage Barrier Net, the new empty weight and center of gravity position must be determined.

MISCELLANEOUS LIMITATIONS

PARTIAL CABIN EXTENSION LIMITATIONS

— Maximum load in Tunnel Stowage Area ..... 370 kg (815 lb)

— Maximum unit load..... 650 kg/m^2 (133 lb/sq.ft)

— Maximum weight of any single item of baggage..... 25 kg (55 lb)

— Baggage barrier net must be secured correctly.

— Access to Tunnel Stowage Area must be kept unobstructed.

— Row 3 seat must not have seats installed in front of the tunnel access area, therefore:

  • when low density seats are installed the 2 middle seats must be removed

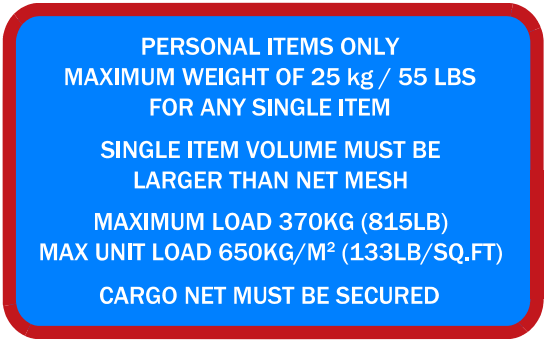
  • when the high density seats are installed the 3 middle seats must be removed.

  • P/N 4G2520F28911 Row 3 seats Kit (Supplement 104) cannot be installed.

— When baggage is loaded in the Tunnel Stowage Area a trained crew member must have unobstructed access to the stowage area, at all times. The crew member must also have easy access to a cabin fire extinguisher.

— The baggage barrier net must not be opened in flight, except for an emergency which requires access to the Tunnel Stowage Area.

PLACARDS



Placed in Tunnel Stowage Area

ICN-39-A-155099-G-00001-29096-A-001-01

Figure 1-1 Placards

SECTION 2 - NORMAL PROCEDURES

PRE TAKE-OFF CHECK

1. Cabin — Confirm baggage loaded correctly and baggage barrier net correctly installed and secure.

2. Cabin Hand Held Fire Extinguisher — Confirm present, condition and within easy reach of trained crew member in cabin.

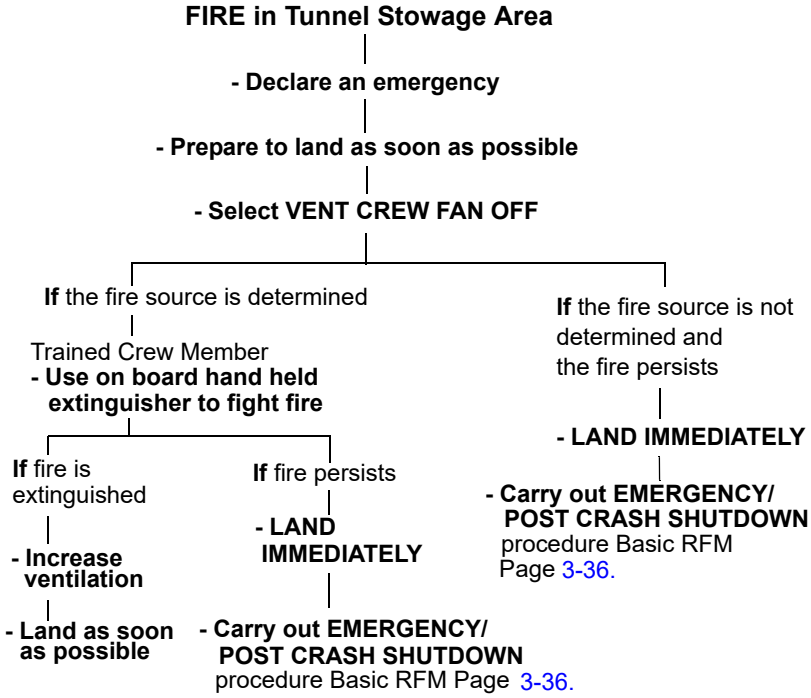
SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

CABIN PARTIAL EXTENSION FIRE (GROUND)

No change.

CABIN PARTIAL EXTENSION FIRE (FLIGHT)

An in-flight fire has no single set of detailed procedures that can address all the fire scenarios that are possible in flight. The most urgent action is to get the aircraft on the ground as soon as possible with a reasonable degree of safety.



CAUTION

If fire is not completely extinguished, increased ventilation may aggravate the problem.

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

The diagram below gives the Longitudinal and Lateral positions for baggage loaded between the fuel tanks in the Cabin Partial Extension. The baggage should be loaded symmetrically around the aircraft centerline.

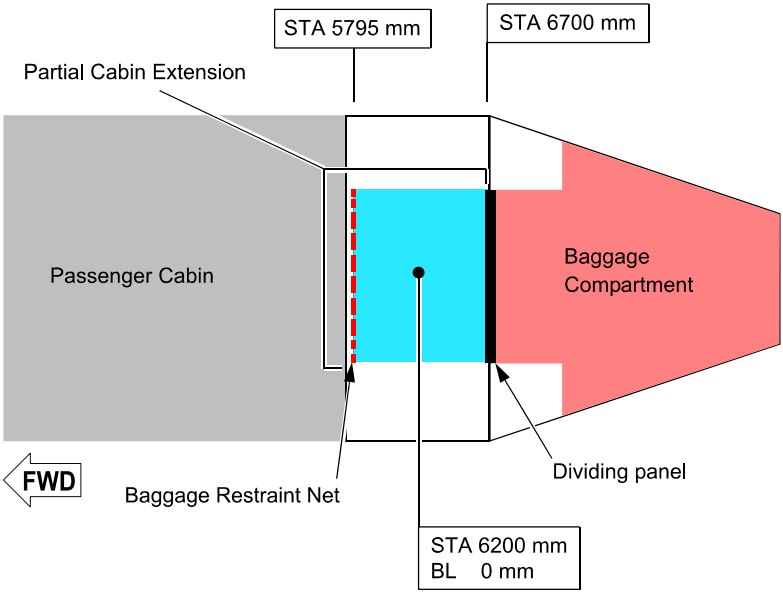


Figure 6-1 Longitudinal and Lateral Position for Partial Cabin Extension

Cabin Configurations with Cabin Partial Extension.

The access to the partial baggage extension tunnel loading area requires the cabin to be configured to maintain the space infront of the tunnel free of obstacles.

As there are a variety of cabin configurations available differing configurations may require slightly different arrangements to keep the area clear.

Figure 6-2 shows the plan view of the area to be kept clear to allow access to the tunnel baggage area.

Figure 6-3 shows the side view of the area to be kept clear for access to the tunnel baggage area.

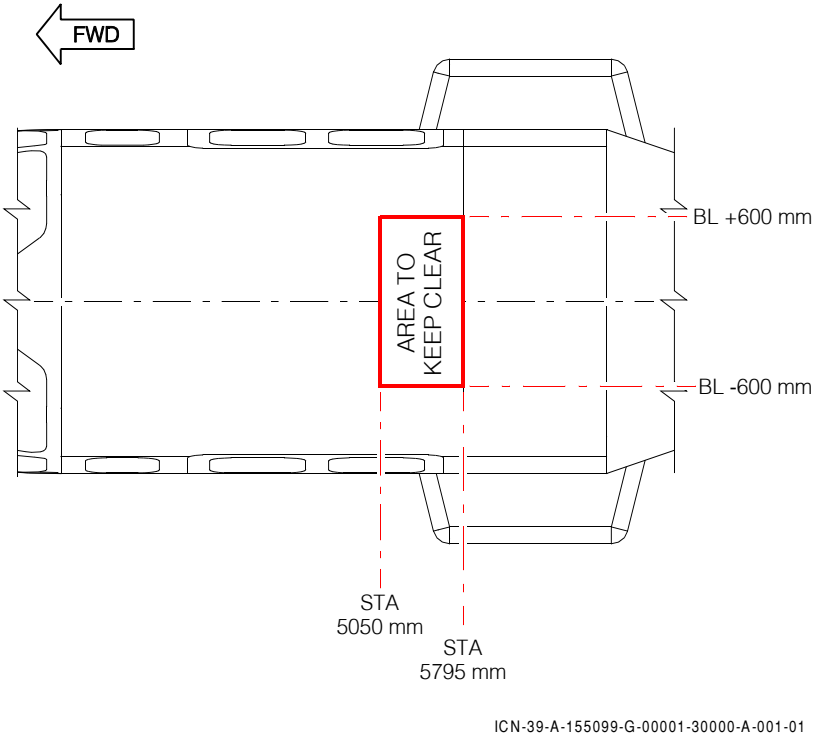


Figure 6-2 Cabin Area to Remain Clear for Tunnel Access (Top View)

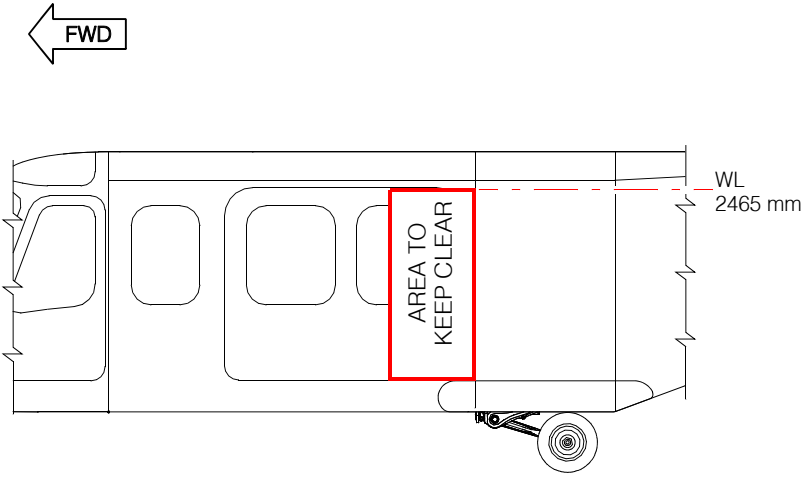


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Figure 6-3 Cabin Area to Remain Clear for Tunnel Access (Side View)

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual

SUPPLEMENT 100

BAGGAGE COMPARTMENT RESTRAINT SYSTEM

P/N 4G5340F00311
P/N 4G5230F00111

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SUPPLEMENT 100
BAGGAGE COMPARTMENT RESTRAINT SYSTEM

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GENERAL INFORMATION

This Supplement covers the Baggage Compartment Restraint System which improves the loading and restraint of baggage in the baggage compartment.

The installation is made up of:

- The Baggage Compartment Restraints System (P/N 4G5340F00311) installs a modified baggage bay floor, at the same level as the baggage door opening and including a series of rollers and tied down points which eases the loading and unloading process
- Cargo Restraint Net P/N 4G2550F00711 and Cargo Anchor System P/N 4G2550F00811 used to secure the baggage onto the floor tied down points.

The Baggage Restraint System also requires the installation of the Baggage Door Extension Kit (P/N 4G5230F00111) which increases the baggage door opening by 80 mm along the top edge of the door and installs a new door and a locking mechanism on the front and rear edge of the door. This kit also include the installation of compatible fire proof panels around the baggage compartment.

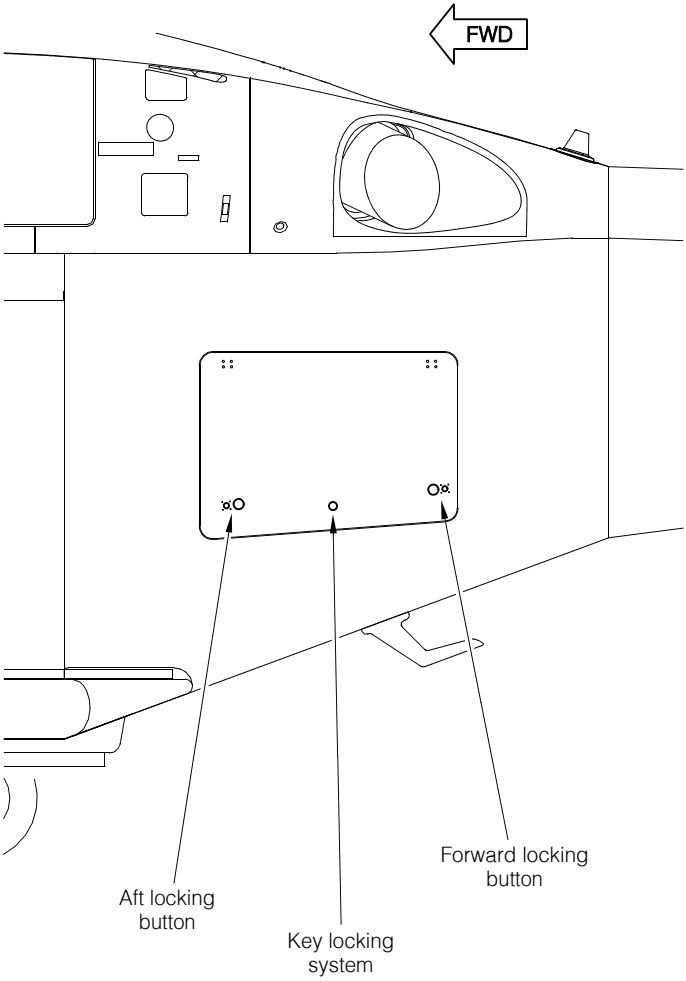

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Figure 1 Baggage Door Locking System (Left Hand Side shown)

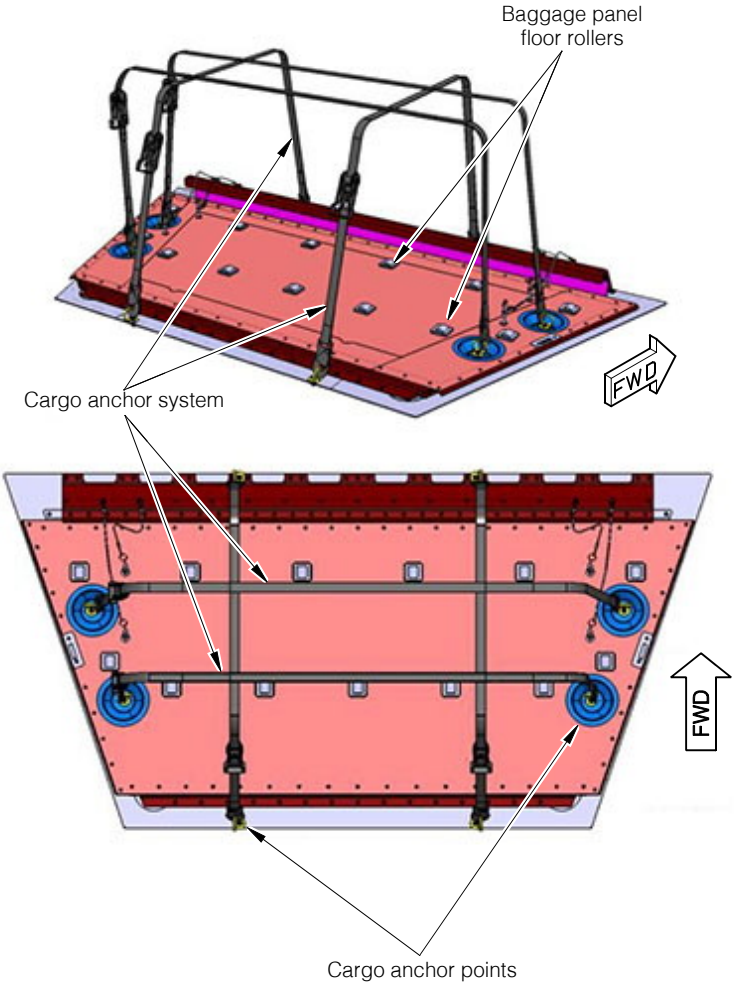

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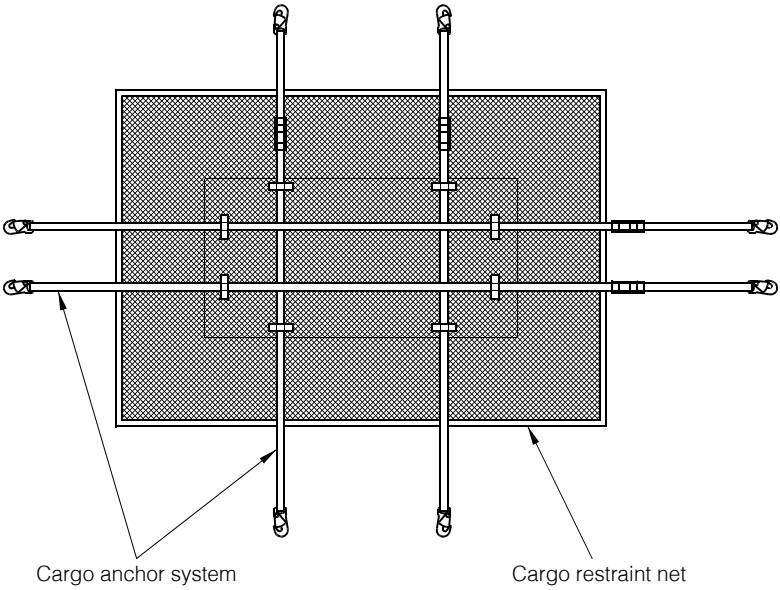
Figure 2 Baggage Compartment Restraint System
(Restraint Net not shown for clarity)



ICN-39-A-155000-G-00001-30004-A-001-01

Figure 3 Baggage Compartment Restraint System and Net

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATION

After installation of the Baggage Compartment Restraint System modifications, the new empty weight and center of gravity position must be determined.

BAGGAGE COMPARTMENT LIMITATIONS

— Maximum load ..... 200 kg (440 lb)

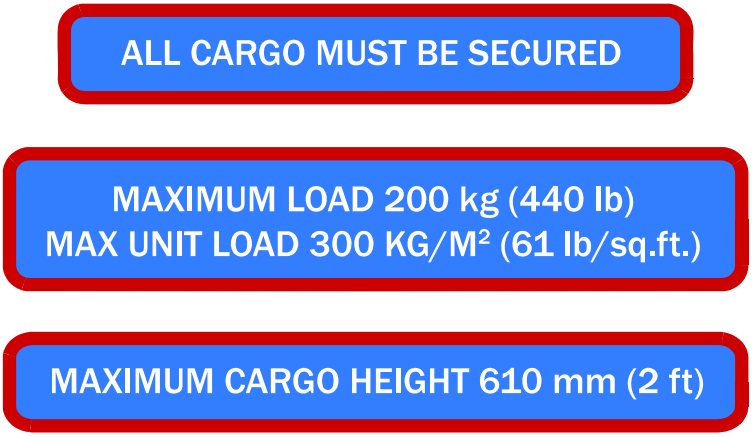
— Maximum unit load..... 300 kg/m^2 (61 lb/sq.ft).

— Maximum load height..... 610 mm (2 ft).

— Cargo must be secured by Cargo Restraint Net P/N 4G2550F00711.

— Baggage Compartment doors must be locked before flight.

PLACARDS



Placed in Baggage Compartment



Placed near Baggage Door Lock

ICN-39-A-155000-G-00001-30006-A-001-01

Figure 1-1 Placards

SECTION 2 - NORMAL PROCEDURES

PRE TAKE-OFF CHECK

1. Baggage compartment — Confirm all items secure and restraint net installed correctly.

2. Baggage compartment doors — Confirm both baggage compartment doors are closed and secure and key is on CLOSED position..

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 101

PHASE 8 ADDITIONAL FUNCTIONS

S/W EB7030191-00113/00120

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SUPPLEMENT 101
PHASE 8 ADDITIONAL FUNCTIONS

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GENERAL INFORMATION

The Primus EPIC Phase 8 provides the following:

1. Additional functions:

— PFD page layout changes

- Expansion of Pitch Tape for conformity with optional SVS representation.
- Full Blue over Brown (BoB) format to avoid abrupt changes in PFD layout when activating / deactivating SVS
- Introduction of Path/Pitch Modes to emphasis aircraft flight path or allow pilots to use legacy Flight Director display positioning with less emphasis on flight path.
  Path mode only available if optional SVS enabled in option file.

— Flight Path Symbol

- To indicate actual path angle of aircraft
- To provide awareness of aircraft path with respect to external scene depiction on PFD when optional SVS is selected ON.

— 2D Terrain on MFD and PFD HSI

Representation of absolute terrain with various colour shades from green to brown, depending on terrain absolute elevation above MSL. Known obstacles are superimposed to the terrain representation.

— INAV Map on MFD

Interactive Navigation (INAV) map, displaying geopolitical boundaries and other elements (airways, airspaces, airports, heliports etc.) in surrounding environment with respect to the aircraft position and flight plan.

— Custom Approach

Custom Approach is an assistance function to help reduce pilot workload when approaching small airports, airfields, heliports and oil rigs with a non-published approach procedure.

Custom Approach allows the pilot to fly a user defined, flight director-coupled approach to the active flight plan destination waypoint (user defined or from the NAV DB).
Custom approaches can be set with or without a final level segment. When Custom approach with a final level segment is enabled in the option file, the selection between the type of approach is made during settings via MCDU.

— Cursor Control Device (CCD)

Optimised cursor control device which includes the SVS selection button (only active if SVS kit installed) and a handgrip joystick.

— Flight Plan Upload - Download

The capability to import and export single flight plans from or to an external memory device through DLMU-W/ADG-400 interface.

— VTA Annunciation

VTA annunciation is displayed starting at 200 ft above MAP waypoint when flying with VGP mode engaged.

— Continuation of Performance Calculations After Landing

Once Initialized, the FMS performance computation will keep operating, without pilot's actions, also after a landing.

— Reduced Leg Length of Leg Search Patterns

Refer Supplement 68 for details.

2. Support to the following:

— Synthetic Vision System (SVS)

This is an optional kit which gives a 3D perspective representation of the external scene integrated onto the PFD. Refer Supplement 102.

— EGPWS integration with SVS and 2D Terrain (Software version - 034 and later)

Colouring of the 2D Terrain and Obstacles (represented on MFD and PFD HSI) based on vertical separation to enhance awareness of possible collisions with surrounding terrain/ obstacles. For information on the optional Enhanced Ground Proximity Warning System refer Supplement 81.

For more information on the Phase 8 additional functions refer to Section 7 of this Supplement and the Primus EPIC FMS Pilot's Guide and Integrated Avionics and AFCS, latest issue.

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SECTION 1 - LIMITATIONS

REQUIRED EQUIPMENT

PRIMUS EPIC Phase 8 Software Release EB7030191-00113/00120.

FMS LIMITATIONS

Upload of Flight Plans from an external device to the FMS selected as Navigation Source for PFD in command is forbidden.

2D TERRAIN/OBSTACLE LIMITATIONS

The 2D Terrain and Obstacle display on PFD HSI and MFD is intended to enhance awareness only:

— Navigation shall not be based upon the use of the 2D Terrain/ Obstacle display

— Terrain and obstacle avoidance must not rely upon 2D Terrain/ Obstacle display only.

INAV DATABASE LIMITATIONS

Approval of the Honeywell INAV is based upon Terrain, Obstacle and Navigation databases from a database provider who has obtained a Type 2 Letter of Acceptance (LOA). The operator must ensure compliance with section 13 of AC 20-153B.

The last updated INAV database must be loaded on the displays.

CUSTOM APPROACH LIMITATIONS

Type of Operation

— Custom Approach, without level segment, is approved under Day/ Night VFR operation,

— Custom Approach with level segment is approved under DAY/ Night VFR and IFR operation.
The final approach segment must be carried out over water.

— All Custom Approaches must only be flown with FD coupled.

CAUTION

It is the pilot's responsibility to check that the Custom Approach Profile stays clear of obstacles and terrain during planning and execution of the procedure. The altitude MSL of the destination waypoint must be known in order to set the MAP altitude accordingly to guarantee safe terrain clearance. Pilot must also set correct baro setting for the area of the approach.

Custom Approach Airspeed/ROD Limitations

Minimum APP mode engagement airspeed for
Custom Approach.....50 KIAS

Maximum ROD:
Approach, without level segment, while approaching the
MAP with any Glideslope ..... 1000 fpm

Approach, with level segment, while approaching the BOD
with 4 deg glideslope..... 1000 fpm

SECTION 2 - NORMAL PROCEDURES

SYSTEM CHECKS

PRE START CHECKS

1. MFD — Set SYSTEM page, select SYS CONFIG and verify Top Level System Part Number (EPIC software release) installed: EB7030191-00113/00120.

2. MCDU — Select MENU, on SVS page, set as required:
   • FPRL
   • TERR BRT.
   If SVS installed:
   • FLT MODE PITCH/PATH
   • SVS.

CUSTOM APPROACH PROCEDURES

CUSTOM APPROACH WITHOUT LEVEL SEGMENT

Set Up

Note

If the approach information entered into the MCDU pages produces an inappropriate approach profile the conflicting parameters will be inverse video, on the MCDU, and require modification.

1. MCDU — Select FPL, on the ACTIVE FLT PLAN ensure required approach waypoint is the destination waypoint.

2. MCDU — Select DIR, select CST APPR on ACTIVE FLT PLAN page,
On CST APPR EDIT page 1/2 set:
• RHT LVL SEG OFF (if displayed)
• Approach parameters as required.
Select CST APPR EDIT page 2/2 set:
• Approach parameters as required.

Custom Approach Speed Set Up

1. MCDU — If deceleration profile required, from CST APPR EDIT page 1/2 or 2/2 select CST APP SPD page and set parameters as required.

Note

MCDU APPRCH SPD page is not applicable for Custom Approaches.

Custom Approach Without Level Segment Activation

1. MCDU — Select ACTIVATE on any CST APPR EDIT page.

2. MCDU — FLPN page remove discontinuity before the approach.

3. PFD — Check white CST indication (when less than 30 NM from destination), upper right of ADI.

Custom Approach Without Level Segment Execution and Monitoring

Within Terminal Area

1. Display controller	— Press LNAV to select FMS as navigation source.
2. Guidance control panel	— Press APP or DCL pushbutton to arm LNAV and VGP modes. Confirm DCL armed or engaged if DCL mode selected.

At IAF (Initial Approach Fix)

3. PFD	— After sequencing the IAF point check the Lateral Deviation indicator on the HSI.
4. Altimeters	— Verify QNH/QFE, crosscheck pilot and copilot (or STBY altimeters agree within ±100 ft.

Note

If altimeter crosscheck fails then the procedure must not be continued.

5. Landing path	— Adjust speed to comply with the limitations in Section 1.

Prior to FAF (Final Approach Fix)

6. PFD	— Check APP (lower left on PFD) and CST (Upper right of ADI) green advisory messages displayed and “P” displayed in vertical deviation bug.

7. Lateral Deviation — Confirm lateral deviation on HSI is within RNP limit and DGR message not displayed otherwise discontinue approach.

During FAS (Final Approach Segment)

8. AFCS — Confirm:
   • VGP engaged at TOD
   • IAS or DCL mode engaged, as required.

9. Airspeed — Adjust as required to maintain ROD less than 1000 fpm, while approaching MAP.

Note

The approach airspeed must ensure a ROD of 1000 fpm is not exceeded while approaching the BOD, Refer to Table 7-1.

Missed Approach Procedure

1. Collective — Press GA pushbutton, Confirm LNAV engages and remains engaged.

CAUTION

GA mode does not target altitude constraints, therefore the pilot must manage altitude according to the missed approach procedure profile. Pilot must ensure there are no obstacles in the missed approach profile.

CUSTOM APPROACH WITH LEVEL SEGMENT (if enabled)

Set Up

Note

The EGPWS Offshore Mode, if installed and selected, may trigger Mode 1 alerts (SINK RATE/PULL UP). Nuisance alerts will be minimised when the following approach parameters are respected:

- Level segment RHT height equal or greater than 200 ft
- Groundspeed at BOD equal or less than 80 kt
- DCL FINAL DIST (on CST APPR SPEEDS page) is equal or greater than BOD to MAP (on CST APPR EDIT 2/2 page).

Note

If the approach information entered into the MCDU pages produces an inappropriate approach profile the conflicting parameters will be inverse video, on the MCDU, and require modification.

1. MCDU — Select FPL, on the ACTIVE FLT PLAN ensure required approach waypoint is the destination waypoint.

2. MCDU — Select DIR and CST APP on ACTIVE FLT PLAN page,
   On CUST APP EDIT page 1/2 set:
   - RHT LVL SEG ON
   - Approach parameters as required

   Select CUST APP EDIT page 2/2 set:
   - Approach parameters as required.

Custom Approach Speed Set Up

1. MCDU — From CST APPR EDIT page 1/2 or 2/2 select CST APP SPD page and set parameters as required.

Note

MCDU APPRCH SPD page is not applicable for Custom Approaches.

Custom Approach With Level Segment Activation

Note

National offshore operating rules may require installation of equipment capable of providing real time obstacle information for obstacle clearance during the approach phase in IMC conditions such as Weather Radar with ground mapping mode.
When Honeywell Weather Radar Series (Supplement 21), RDR-7000 Vertical Buffer with Maritime, P/N 4G3441F01111 is installed select GMAP2.

1. MCDU — Select ACTIVATE on any CST APPR EDIT page.

2. MCDU — FLPN page remove discontinuity before the approach.

3. PFD — Check white CST indication (when less than 30 NM from destination), upper right of ADI.

Custom Approach With Level Segment Execution and Monitoring

Within Terminal Area

1. Display controller — Press LNAV to select FMS as navigation source.

2. Guidance control panel — Press APP or DCL pushbutton to arm LNAV and VRT modes. Confirm DCL armed or engaged if DCL mode selected.

Note

VRT mode can be armed or engaged only with the Rad Alt (RA) valid and below 2400 ft AGL.
With RA invalid or above 2400 ft AGL, pressing DCL / APP button will result in VRT UNAVAILABLE message being displayed on MCDU scratchpad.
Once VRT mode is armed or engaged, climbing above 2500 ft AGL will cause VRT mode to disarm or disengage.

At IAF (Initial Approach Fix)

3. PFD — After sequencing the IAF point check Lateral Deviation indicator on the HSI.

4. Altimeters — Verify QNH/QFE, crosscheck pilot and copilot (or STBY) altimeters agree within ±100 ft.

Note

If the altimeter crosscheck fails then the procedure must not be continued.

5. Landing path — Adjust speed to comply with the limitations in Section 1.

Prior to FAF (Final Approach Fix)

6. PFD — Check APP (lower left on PFD) and CST (upper right of ADI) green advisory messages displayed and “P” displayed in vertical deviation bug.

7. Lateral Deviation — Confirm lateral deviation on HSI is within RNP limit and DGR message not displayed, otherwise discontinue approach.

During FAS (Final Approach Segment)

8. AFCS — Confirm:
   • VRT engaged at TOD
   • IAS or DCL mode engaged, as required.

9. PFD — Check RHT REF for final level off is displayed (magenta colour) on Rad Alt tape.

10. Airspeed — Adjust as required to maintain ROD less than 1000 fpm, while approaching the BOD.

Note

The approach airspeed must ensure a ROD of 1000 fpm is not exceeded while approaching the BOD, Refer to Table 7-1.

While Approaching the RHT Reference

11. AFCS/PFD	— Confirm: • Collective mode transitions from VRT to RHT mode • RHT REF is captured and held.

Missed Approach Procedure

1. Collective	— Press GA pushbutton, Confirm LNAV engages and remains engaged.

CAUTION

GA mode does not target altitude constraints, therefore the pilot must manage altitude according to the missed approach procedure profile. Pilot must ensure there are no obstacles in the missed approach profile.

ADVISORY CAPTION DEFINITIONS

CAS Caption (Green)	System State
SVS NOT INSTALLED	(Caption present for 5 secs) SVS button pressed and function not fitted
CVS NOT INSTALLED	(Caption present for 5 secs) CVS button pressed and function not fitted

CAS Caption (white)	System State
1(2)(3)(4) DU DB OLD	(Caption only active on ground) Informs crew that one or more Databases loaded on affected display is outdated.

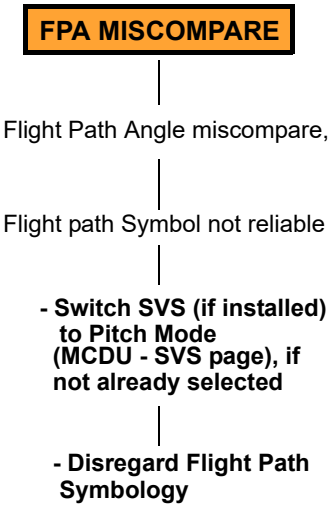
SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

GENERAL

The following malfunction procedures are intended to integrate those of the basic RFM and, if a Flight Director is used, those of the applicable Supplement installed 67, 69 or 70.

CAS MESSAGES

FLIGHT PATH ANGLE MISCOMPARE



DISPLAY UNIT DATABASE DEGRADED

1(2)(3)(4) DU DB DGRD

One or more databases, loaded on affected display, degraded

If a PFD is affected or an MFD in composite mode:

- **Select SVS OFF (if installed)**
- **Select 2D Terrain in HSI OFF** (TERR/HSI button on display controller)

If a MFD is affected

- **Select Terrain, Aeronautical, Geopolitical and Flight Plans OFF on affected MFD**

The following malfunction procedures are to be used only during Customer Approach Operations.

SINGLE GPS FAIL

1(2) GPS FAIL

Single GPS system failure

Loss of GPS redundancy

Continue Flight

DOUBLE GPS FAIL (APPROACH WITHOUT LEVEL SEGMENT)

1-2 GPS FAIL + **FMS/GPS MSCP UNAVL**

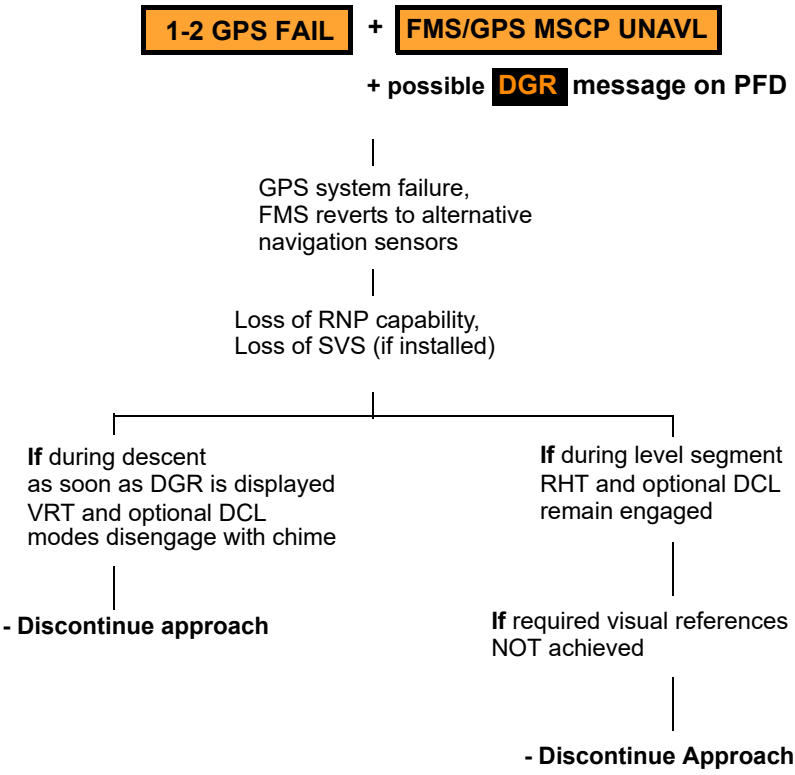
+ possible DGR message on PFD

GPS system failure,
FMS reverts to alternative
navigation sensors

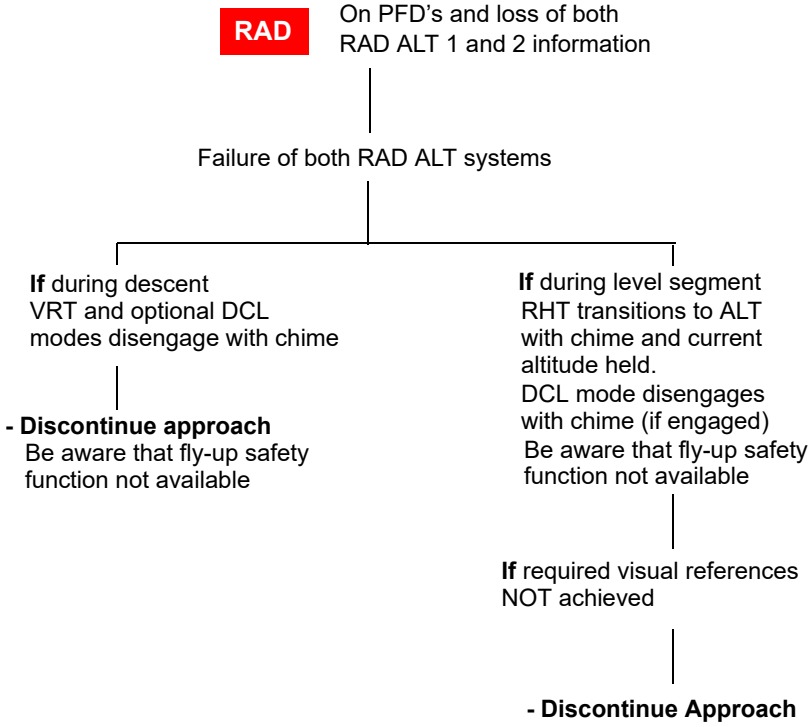
Loss of RNP capability,
Loss of SVS (if installed)

- Discontinue Approach

DOUBLE GPS FAIL (APPROACH WITH FINAL LEVEL SEGMENT)



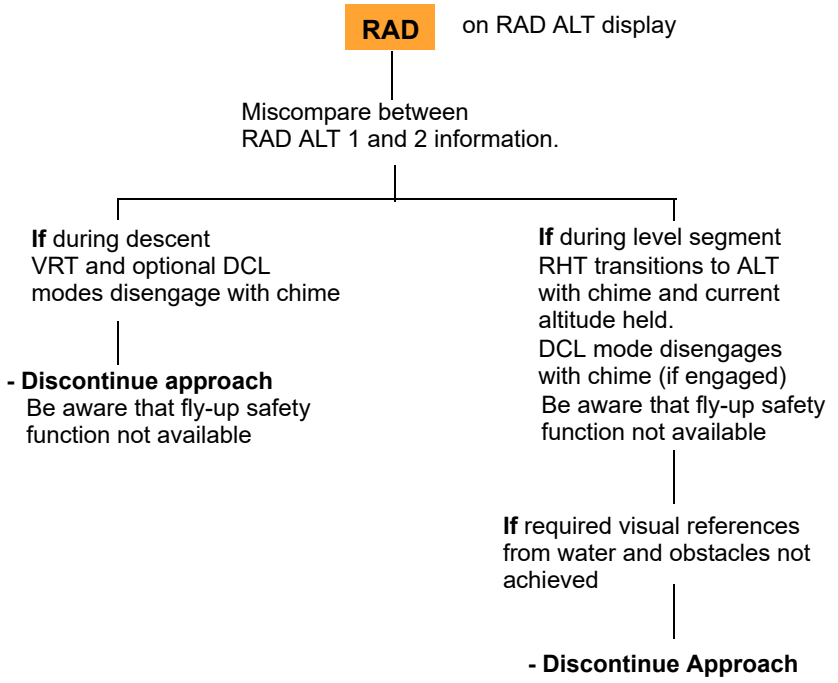
DOUBLE RAD ALT FAILURE (APPROACH WITH FINAL LEVEL SEGMENT)



CAUTION

When both RAD ALT's fail, the 150 ft aural warning message does not function and the LANDING GEAR caution will be displayed if the LDG GEAR is retracted, regardless of height.

RAD ALT MISCOMPARE (APPROACH WITH FINAL LEVEL SEGMENT)



FD FAIL DURING CUSTOM APPROACH

FD FAIL replaces FD arrow above attitude indicator on both PFD's

+

Loss of flight director cue information

|

Both Flight Directors invalid and NOT available

|

- Discontinue Approach

PFD AND MCDU MESSAGES

DEGRADED (DGR) ON PFD

This annunciator is displayed when the FMS cannot guarantee the position accuracy for the present phase of flight due to sensor unavailability. Practically the annunciator appears when the EPU (estimated position uncertainty) is greater than RNP (required navigation performance).
DGR will cause disengagement of following modes if engaged: VGP/ VRT and DCL (with chime)

RHT will not be disengaged but lateral RNP value is no longer guaranteed.

VGP UNAVAILABLE (MCDU SCRATCHPAD MSG)

This is an alerting system message indicating vertical glide path (VGP) is not available.

APP (or DCL) button was pushed but arming criteria were not met.

VRT UNAVAILABLE (MCDU SCRATCHPAD MSG)

This is an alerting system message indicating vertical glide path with level segment (VRT) is not available.

APP (or DCL) button was pushed but arming criteria were not met.

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full information on the Phase 8 additional functions refer to Primus EPIC FMS Pilot's Guide and Integrated Avionics and AFCS, latest issue.

ABBREVIATIONS

— AFCS : Automatic Flight Control System

— ARS : Aircraft Reference Symbol

— BoB : Blue over Brown

— CCD : Cursor Control Device

— CVS : Combined Vision System

— DLMU-W : Data LAN Management Unit with Wireless connectivity

— FD : Flight Director

— FMS : Flight Management System

— FOV : Field of View

— FPA : Flight Path Angle

— FPRL : Flight Path Reference Line

— FPS : Flight Path Symbol

— GC : Guidance Controller

— GPS : Global Positioning System

— HSI : Horizontal Situation Indicator

— INAV : Integrated NAVigation

— L/R : Left/Right

— MCDU : Multifunction Control Display Unit

— MFD : Multifunction Display Unit

— PFD : Primary Flight Display

— PPOS : Present Position

— PRL : Pitch Reference Line

— SA : Situational Awareness

— SVS : Synthetic Vision System

— ZPRL : Zero Pitch Reference Line

PFD CHANGES

The PFD layout has an expansion of the pitch scale and the introduction of a Blue over Brown (BoB) format. See Figure 7-1.

The existing symbology has been slightly adjusted in size, transparency and location to adapt to the BoB format, the Synthetic Terrain depiction (if enabled and selected ON) and the FPS movements.

When the SVS is installed and ON (Supplement 102) the display format together with FPS assists the pilot to interpret, at first glance, the aircraft's path angle and make him aware of inadvertent descent into land or water. If the SVS is not installed or OFF the FPS is still a good vertical speed indication.

Expanded Pitch Tape is designed to be conformal to SVS 3D Terrain depiction (when installed and selected on) and its aspect does not change when SVS is OFF or not installed, to avoid abrupt changes of Attitude Display Indication.

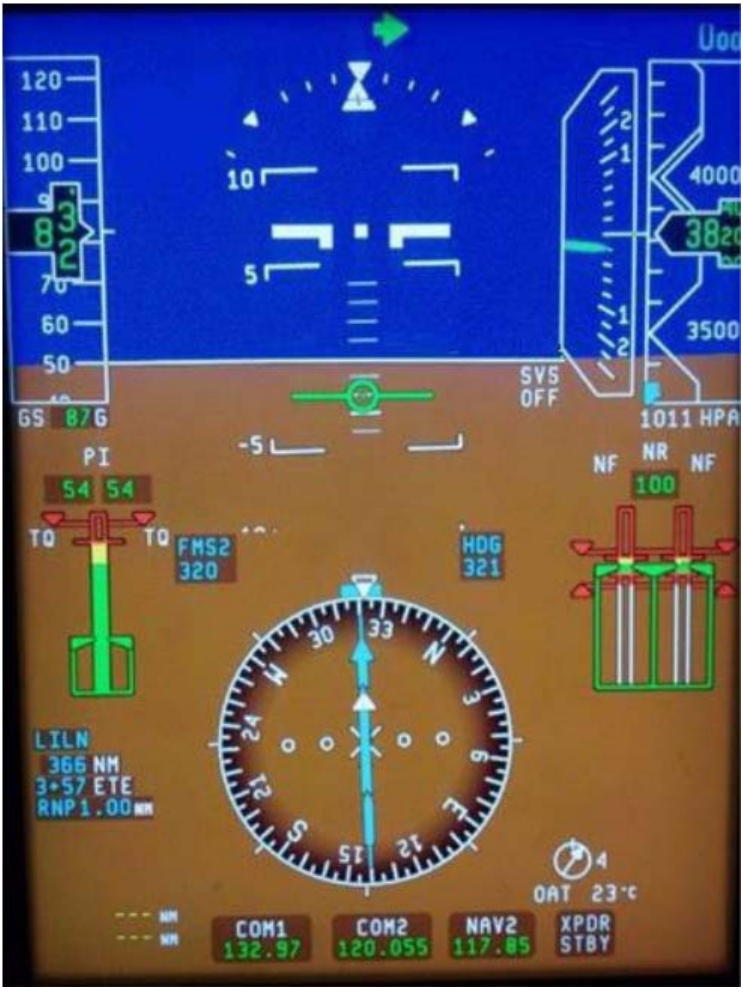


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Figure 7-1 EPIC Phase 8 Blue on Brown (BoB) Display (Example)

FLIGHT PATH PITCH AND PATH BASED SYMBOLOGY

The Flight Path Symbol (FPS) on the PFD represent the actual path angle of the aircraft.

FPS is introduced as additional primary cue for helicopter's maneuvering in conjunction with Aircraft Symbol that remains the primary cue for attitude's control.

Two modes, PITCH and PATH, are available for selection on the MCDU SVS page. See Figure 7-6. Path mode, however, can be selected only if SVS is installed (and independently from SVS ON/ OFF selection). If SVS is not installed, the PFD is forced into Pitch Mode.

PITCH MODE:

— FPS, if displayed, is the pitch-based FPS (small and white)



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Figure 7-2 Pitch Based FPS

— FD cues are always referenced to the aircraft symbol

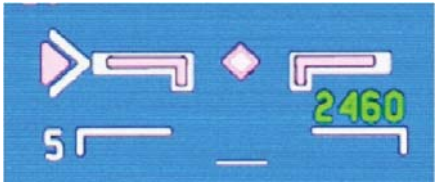

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Figure 7-3 Aircraft symbol referenced to FD cues

— No HSI push down (Cat A exception see below)

— No aircraft symbol movement from its home position (Cat A exception)

PATH MODE

— FPS, if displayed, is the path-based FPS (big and green)

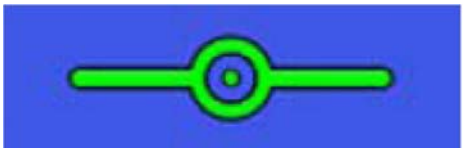

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Figure 7-4 Path based FPS (nocyclic FD cue)

— FD cues are referenced to the FPS, if displayed

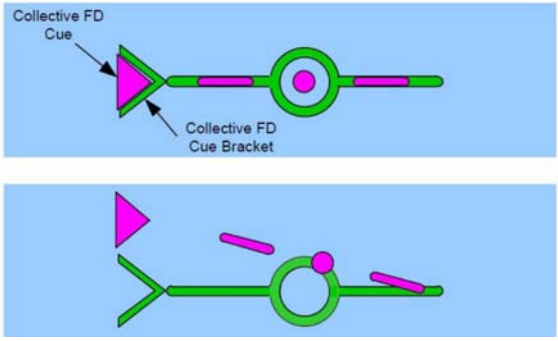

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Figure 7-5 Path Based FPS (with collective and cyclic FD cues)

— HSI can be pushed down

— Aircraft symbol / Pitch Tape can slightly move up/down from its home position

CAT A PRE-PUSH

In order to provide the best visual cues, room for the FPS on the pitch tape is made during a dynamic CAT manoeuvre. When the CAT A is selected for display (NF switch set to 102% and CAT A button pressed on collective's grip), the ARS and the HSI will be pre-pushed down. At deselection of the CAT A, the ARS returns to their standard location within 3 sec. while the HSI returns within 30 sec.



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Figure 7-6 MCDU SVS page

CURSOR CONTROL DEVICE (CC-701)

The Cursor Control Device (CCD) has been revised ergonomically compare to previous phases of software to include a new joystick which is used to move the display cursor through the MFD menu selections and operate the MFD designator. There are two **ENTER** buttons used for selecting an item currently highlighted by the cursor. These are the center of the joystick, which is intended for use with the thumb, and a dedicated button on top of the turret, which is intended for use with the ring finger.

Also included on the CCD panel are SVS (if installed) select button and CVS button (not active). See Figure 7-7.



SVS select button (only active when SVS installed),
CVS button (not active)

Figure 7-7 EPIC Phase 8 CCD panel

INTERACTIVE NAVIGATION

The Interactive NAVigation (INAV) is a DB-based enhanced map integrated into the Multi-Function Display (MFD) and selectable to display the surrounding environment with respect to the aircraft position and flight plan. The various options are available after selecting the MAP or PLAN menu button and setting the TERRAIN, AERONAUTICAL, GEOPOLITICAL and FLIGHT PLANS as required.

The feature provides enhanced graphical depiction of terrain, obstacles, geopolitical boundaries and other elements as airways, airspaces, airports, navaids, roads and railroads. See Figure 7-8 to Figure 7-10.

INAV includes a 2-D representation of the terrain that can be displayed inside the Horizontal Situation Indicator (HSI) of the PFD. This is selected from the Display Controller WX/TERR button (Figure 7-11 and Figure 7-12) which toggles through the various options listed below:

No press = No Weather or Terrain

1st press = Weather Radar (if installed)

2nd press = Absolute Terrain, SA Terrain, and Threat Terrain (If EGPWS installed and functional)

3rd press = Absolute Terrain and Threat Terrain (if EGPWS installed and functional)

4th press = No Weather (if Radar installed) or Terrain.

If EGPWS is installed, the Absolute Terrain layer is improved by Situational Awareness and Threat Alert layers.



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Figure 7-8 MFD INAV Display (Example)



ICN-39-A-155101-G-A0126-01009-A-01-1

Figure 7-9 MFD Menu Terrain



ICN-39-A-155101-G-A0126-01010-A-01-1

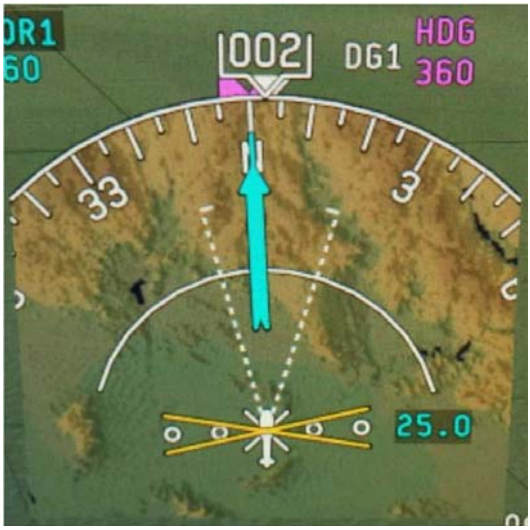
Figure 7-10 MFD Menus Aeronautical, Geopolitical, Flight Plans



ICN-39-A-155101-G-A0126-01011-A-01-1

HSI display toggle button

Figure 7-11 Display Controller



ICN-39-A-155101-G-A0126-01012-A-01-1

Figure 7-12 2D Absolute Display on PFD HSI (Example)



ICN-39-A-155101-G-A0126-01013-A-01-1

Figure 7-13 2D Absolute Display and Situational Awareness Terrain display on PFD HSI (Example)

CUSTOM APPROACH

Custom Approach allows the pilot to build and fly a user defined approach to the active flight plan destination, which could be either a user defined waypoint or a waypoint from the NAV DB. Two different approach definitions, (depending on the option files activated at installation) may be selected from the MCDU CST APPR EDIT page:

— Custom approach without Level Segment: used for overland VFR approaches.
The custom approach without the level segment comprises of IAF, FAF, MAP, and MAH waypoints. These are shown in the vertical and lateral profiles in Figure 7-14. The waypoints are temporary so their idents are preceded by an asterisk.
The function uses VGP mode for vertical guidance during the descent. The guidance will be along a descent vertical glide path from the TOD to the MAP.

— Custom approach with the Level Segment used for offshore approaches (if option file installed).

The approach creates a lateral profile comprising of an initial approach fix (IAF), final approach fix (FAF), bottom of descent (BOD), missed approach point (MAP), and missed approach hold (MAH) waypoints. These are shown in the vertical and lateral profiles in Figure 7-15.

The function uses VRT mode for vertical guidance during the descent. The VRT glideslope will be drawn to the BOD waypoint, which is longitudinally offset from the MAP to create a level segment prior to the MAP and to allow for deceleration and visual location of the destination.

The VRT mode remains coupled during the descent to the BOD then transitions to radio altitude hold (RHT) mode in order to flare to the level segment. This happens when laterally sequencing the BOD or when the capture criteria for RHT are met prior to the BOD as determined by the flight director. The RHT mode remains engaged at the MAP.

Note

If the approach information entered into the MCDU pages produces an inappropriate approach profile the conflicting parameters will be inverse video, on the MCDU, and require modification.

For full information on the use of the Custom Approach refer Primus FMS Phase 8 Pilot's Manual, latest issue.

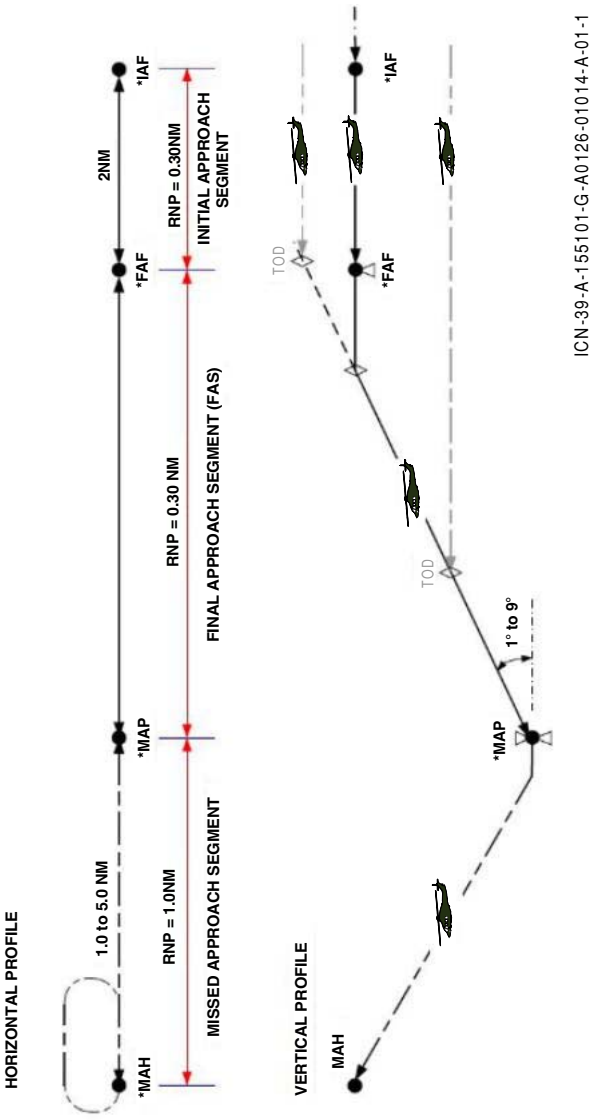


Figure 7-14 Custom Approach, without Final Level Segment, Vertical and Lateral Profile

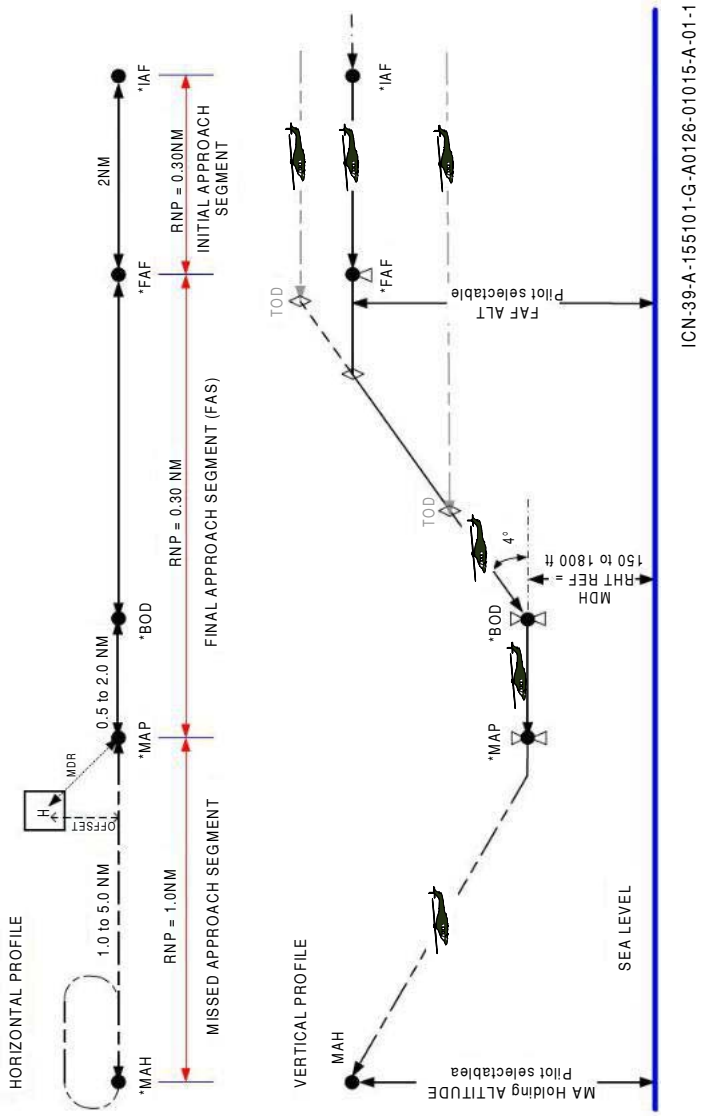


Figure 7-15 Custom Approach, with Final Level Segment Vertical and Lateral Profile



ICN-39-A-155101-G-A0126-01016-A-01-1

Figure 7-16 MCDU ACTIVE FLT PLAN page



ICN-39-A-155101-G-A0126-01017-A-01-1

Figure 7-17 MCDU CST APPR EDIT page 1/2 (without final level segment). Example has no final level segment option active



ICN-39-A-155101-G-A0126-01018-A-01-1

Figure 7-18 ECDU CST APPR EDIT page 2/2 (without final level segment)

The parameters required to construct the Custom Approach without level segment are:

Custom Approach EditPage 1 / 2

- 1L - Approach Course (CRS)
- 1R - Distance between MAP and destination WP (Nm - 0 to 1.5 Nm)
- 2L - Selection of level section (RHT LVL SEG ON/OFF) only present if level segment is active in option file, otherwise this is blank.
- 3R - Glide Path Angle (GPA) Default 4 deg, range 1 to 9 deg
- 4L - MAP Altitude (MAP ALT)
- 4R - FAF altitude ft AMSL (FAF ALT) Default 700 ft above MAP ft AMSL
- 5L - Missed approach course change (MAPROC CRS CHG) Default 0 deg, range L180 and R180.
- 5R - Baro altitude of MAP hold waypoint (MAPROC ALT) Default 1800 ft above MAP altitude AMSL.

Custom Approach Edit Page 2 / 2

- 1L - Distance between FAF and MAP (FAF MAP) Range 2.0 to 10 Nm.
- 4L - Distance between MAP and missed Approach Hold WP (MAP HOLD)
  Default 3.0 Nm Range 1.0 to 5.0 Nm.



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Figure 7-19 MCDU CST APPR EDIT page 1/2 (with final level segment)



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Figure 7-20 MCDU CST APPR EDIT page 2/2 (with final level segment)

The parameters required to construct the Custom Approach with level segment are:

Custom Approach Edit Page 1 / 2

- 1L - Final approach course from IAF to MAP (CRS)
- 1R - Parallel offset of approach course with respect to destination (MAP OFFSET) Range L0.5 to L0.7 (left offset or R0.5 to R0.7 (right offset).
- 2L - Selection of final level segment ON (RHT LVL SEG)
- 2R - Distance between MAP and destination WP (Range 0.7 Nm to 1.5 Nm).
- 3L - Rad Alt for level segment (RHT REF) Range 150 to 1800 ft
- 4L - MAP Altitude (MAP ALT) Default maximum of 150 ft or stored default.
- 4R - FAF altitude ft AMSL (FAF ALT) Default 700 ft above MAP ft AMSL
- 5L - Missed approach course change (MAPROC CRS CHG) Range L0 to 180 or R0 to 180 depending on paralled offset input.
- 5R - Baro altitude of MAP hold waypoint (MAPROC ALT) Default 1800 ft above MAP altitude AMSL.

Custom Approach Edit Page 2 / 2

- 1L - Distance between FAF and MAP (FAF MAP) Range 2.0 Nm to 10 Nm.
- 1R - Distance between BOD and MAP (BOD MAP) Range 0.5 to 2.0 Nm.
- 2L - Approach transition (APPR TRANS) Default DIR, Options:
  - DIR (direct), commencing at the IF created on the final course 1 Nm prior to IAF
  - RIGHT, right 180 deg radius transition to the IAF (1 Nm radius)
  - LEFT, left 180 deg radius transition to the IAF (1 Nm radius)
- 4L - Distance between MAP and missed Approach Hold WP (MAP HOLD) Default 3.0 Nm Range 1.0 to 5.0 Nm.

The deceleration profile can be selected on the dedicate page for Custom Approach by selecting the 6L on the CST APPR EDIT page.



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Figure 7-21 MCDU CST APPR SPEEDS page 1/1

Custom Approach Speed Page 1 / 1

- 1L - Initial approach speed (INIT SPEED) Default 80 KIAS
- 2L - Initial distance from MAP (INIT DIST) where FMS start to decelerate to INIT SPEED, Default 5.0 Nm.
- 3L - Approach speed for final approach (FINAL SPEED) Default 50 KIAS
- 4L - Final Approach distance. Distance from MAP to where the FINAL SPEED is achieved. Default is value from aircraft database.

GLIDE PATH ANGLES

The following table provides, as reference, the ROD (Rate Of Descent) for varying Ground Speed (GS) and Glide Path Angle (GPA) for Custom Approach without final level segment, (Custom approach with final level segment GPA fixed at 4 degrees):

GPA (deg)	GROUNDSPEED (kts)	ROD (fpm)
4	141	1000
4.5	125	1000
5	113	1000
5.5	103	1000
6	94	1000
6.5	87	1000
7	80	1000
7.5	75	1000
7.5	68	900
7.5	60	800
7.5	53	700
8	70	1000
8	60	850
8	50	710
9	62	1000
9	50	800

Table 7-1 GPA / GS / ROD Relationship

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 102

SYNTHETIC VISION SYSTEM (SVS)

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SUPPLEMENT 102
SYNTHETIC VISION SYSTEM
(SVS)

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GENERAL INFORMATION

The Primus EPIC Phase 8, when enabled via option file, allows the selection of the Synthetic Vision System (SVS). This system enhances flight crew awareness by providing a synthetic three dimensional view of surrounding terrain, obstacles, runways and helipads on the Primary Flight Display, in addition to standard flight instrument data.

The SVS uses terrain, obstacle and navigation databases to integrate existing flight deck data with advanced symbology to assist in the pilot's ability to identify potential terrain and obstacle conflicts, as well as to identify visual references.

An example of the PFD with SVS selected ON is shown in Figure 1.

For full information on the use of the SVS refer Primus EPIC Phase 8 Avionics and AFCS Pilot's Manual, latest issue.



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Figure 1 PFD with SVS selected ON (Example)

SECTION 1 - LIMITATIONS

REQUIRED EQUIPMENT

PRIMUS EPIC Phase 8 Software Release EB7030191-00113/-00120.

SVS LIMITATIONS

The SVS display is intended to enhance terrain and obstacle awareness only:

— Navigation shall not be based upon the use of the SVS information.

— Terrain and obstacle avoidance must not rely upon SVS display only.

SVS DATABASE LIMITATIONS

The database needs to be approved by the Competent Authority.

The last updated regional terrain database for the area of operations must be loaded on the displays. The last updated INAV database must be loaded on the displays.

SECTION 2 - NORMAL PROCEDURES

SYSTEM CHECKS

1. MCDU — Confirm present position initialised on the on-side MCDU.

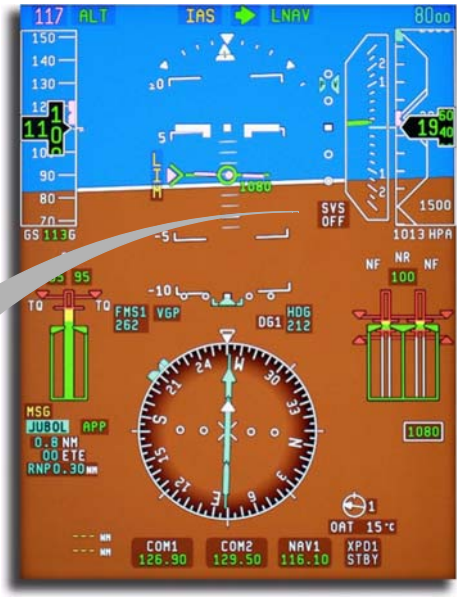
2. MCDU — Select MENU and SVS option for SVS settings and set as required.

IN FLIGHT PROCEDURES

1. MCDU — Select MENU and SVS option to modify SVS settings as required.

2. SVS button on CCD — Select as required.

SVS OFF MESSAGES ON PFD



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SVS OFF

SVS system selected OFF

Select SVS ON, if required

If SVS display does not appear
SVS is not available.

ADVISORY CAPTION DEFINITIONS

CAS Caption (white)	System State
1(2)(3)(4) DU DB OLD	(Caption only active on ground) Informs crew that one or more Databases loaded on affected display is outdated.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

CAS MESSAGES

FLIGHT PATH ANGLE MISCOMPARE

FPA MISCOMPARE

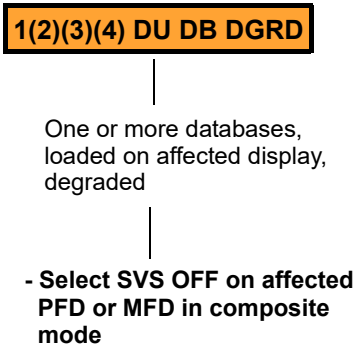
Flight Path Angle miscompare,

Flight Path Symbol not reliable

- Switch SVS to Pitch Mode (MCDU - SVS page), if not already selected

- Disregard Flight Path Symbol

DISPLAY UNIT DATABASE DEGRADED



SVS POS MESSAGE



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SVS POS

Present position has not been initialized, invalid FMS selected as NAV source or position integrity failure

- **Check POS INIT**, if necessary perform POS INIT procedure
- **Check FMS NAV source,** if necessary select valid NAV source

If SVS POS still present SVS display not available

- **Select SVS display OFF**

SVS TERR MESSAGE



ICN-39-A-155102-G-A0126-01004-A-01-1

SVS TER

On PFD when SVS selected ON but terrain is not displayed due to terrain information being unavailable or inconsistent with actual aircraft position

SVS display not available

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

For full information on the use of the SVS refer Primus EPIC Integrated Avionic and Flight Control System for Phase 8, latest issue.

ABBREVIATIONS

— AFCS : Automatic Flight Control System

— ARS : Aircraft Reference Symbol

— BoB : Blue over Brown

— CCD : Cursor Control Device

— CVS : Combined Vision System

— FD : Flight Director

— FMS : Flight Management System

— FOV : Field of View

— FPA : Flight Path Angle

— FPRL : Flight Path Reference Line

— FPS : Flight Path Symbol

— GC : Guidance Controller

— GPS : Global Positioning System

— HSI : Horizontal Situation Indicator

— INAV : Integrated NAVigation

— L/R : Left/Right

— MCDU : Multifunction Control Display Unit

— MFD : Multifunction Display Unit

— PFD : Primary Flight Display

— PPOS : Present Position

— PRL : Pitch Reference Line

— SA : Situational Awareness

— SVS : Synthetic Vision System

— ZPRL : Zero Pitch Reference Line

GENERAL

The Synthetic Vision System provides a three dimensional rendering of terrain, obstacles, runway, helipad and approach symbology, conformal to the actual aircraft position, altitude and attitude.

The SVS imagery, when selected on, acts as background for PFD data.

The SVS is turned ON and OFF by selecting or deselecting the SVS button on the CCD (Figure 7-1) or on the MCDU, selecting MENU and the SVS page for SVS options. When the SVS is turned OFF, the Blue-over-Brown display replaces the terrain on the PFD. An example of the PDF with the SVS selected ON is shown in Figure 1.



Figure 7-1 CCD panel

The SVS settings can be modified using the SVS MCDU page, by selecting appropriate LSK in MCDU MENU.

The layout of the SVS page is shown in Figure 7-2. The following selections are available:

L1 - Pushing L1 turns the FPRL OFF, AUTO or MAN.

L2 - Pushing L2 when FPRL is in Manual mode gives the pilot the ability to adjust the value by turning the MCDU outer turn knob.

L5 - Adjusting the SVS terrain and HSI 2-D terrain brightness is done by pushing L5 and using the MCDU outer turn knob.

R2 - Pushing R2 selects the PITCH or PATH mode.

R5 - Pushing R5 turns the SVS ON and OFF.

The SVS page operation for the Pilot and Co-Pilot are independent of one another.



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Figure 7-2 SVS Page on MCDU

SYNTHETIC SCENERY GENERAL

The terrain, obstacle, and airport databases have the following areas of coverage:

- The terrain database has an area of coverage from North 80 degrees latitude to South 50 degrees latitude in all longitudes.
- The obstacle database has a worldwide area coverage for reported obstacles taller than 100 feet (approximately 100,000 obstacles).
  It should be noted that the inclusion of all such obstacles is not guaranteed.
- The airport database has a worldwide area coverage for airports with runways longer than 2,000 feet (approximately 8,600 airports and 30,000 runways).

CAUTION

The SVS display is intended to enhance terrain and obstacle awareness. The display and database may not provide the accuracy and fidelity on which to base routine navigation decisions and plan routes to avoid terrain or obstacles.

FLIGHT PATH REFERENCE LINE

The Flight Path Reference Line (FPRL) offers a terms of reference to compare the aircraft Flight Path Symbol (FPS). It can be selected via MCDU - SVS page and set manually or, for approaches, retrieved automatically from FMS.

SVS Path Mode

Path-based mode offers a PFD representation prioritizing the display of aircraft path, as represented by FPS. The FPS appears as a large green symbol on the ADI. Cyclic Flight Director cues are referenced to the FPS. A digital readout of Radar Height is placed close to the FPS, when lower than 2500 ft. Significant split between FPS and ARS are displayed via the use of Vertical Centering function.

SVS Pitch Mode

Pitch-based mode offers a traditional PFD representation, with reduced emphasis on aircraft path. The FPS appears as a small white symbol on the ADI. Cyclic Flight Director cues are referenced to the ARS. A digital readout of Radar Height is placed close to the ARS, when lower than 2500 ft. Vertical Centering is inactive, except for the CAT A pre-push function.

SCENERY ORIENTATION

The three main symbols are overlaid on the SVS are the Zero Pitch Reference Line (ZPRL), the Aircraft Reference Symbol (ARS) and the Flight Path Symbol (FPS). Together with the pitch ladder, the ARS and ZPRL give an immediate indication of the pitch attitude. The combination of FPS and ZPRL give an immediate indication of vertical speed while FPS and SVS provide immediate feedback about the flight path with respect to represented scene, being the FPS conformal. The FOV sector lines (frustum lines) on the HSI indicate the sector that corresponds to the SVS lateral FOV, see Figure 7-4.

LATERAL TERRAIN CENTRING

In order to provide the best visual representation to enhance the crew's situational awareness, depending upon the flight condition, the SVS automatically selects the lateral centering among three different modes: Track (TRK), Heading (HDG) and Split (SPL).

The basic mode for forward flight is the Track mode, which laterally centres the SVS representation on the aircraft track. In low speed and hover conditions, Heading mode is used instead, centering the SVS representation on the aircraft heading. The Split mode supports smooth transitions between HDG and TRK modes.

The actual centering mode is indicated on the left of the ADI, right of the airspeed tape, via a dedicated annunciation, as shown in Figure 7-3.

The lateral mode annunciator is boxed when the mode is steady, flashing three times at the start of a mode transition and is unboxed when transitioning between different modes. The unboxed label indicates a hybrid situation in which the SVS is neither TRK nor HDG centred.

Aircraft track and heading are represented by a single full or hollow triangle respectively on the Zero Pitch Reference Line (ZPRL). In case of high sideslip angles, these references can be shown dashed while parked laterally on the ZPRL to indicate that they are no longer conformal to the scene. In TRK the Flight Path Symbol (FPS) is always centred in the display (allowed to move up and down to indicate the flight path angle), while in HDG mode the FPS is removed.

The lateral terrain centring is the centring of SVS re-positioning along from TRK centred to HDG centred or vice versa, during the mode changes. As stated above, this is indicated by a label on the ADI as shown in Figure 7-3. The label is boxed when the mode is steady, flashing three times at the start of a mode transition and unboxed when the transition is not yet complete.
Note that an unboxed label indicates a hybrid situation in which the SVS is not TRK or HDG centred.

In TRK mode, the Field of View sector lines (so-called frustum) on the HSI indicate the sector that corresponds to the SVS lateral FOV, see Figure 7-4.



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Figure 7-3 SVS Mode Indications Right of Airspeed Tape

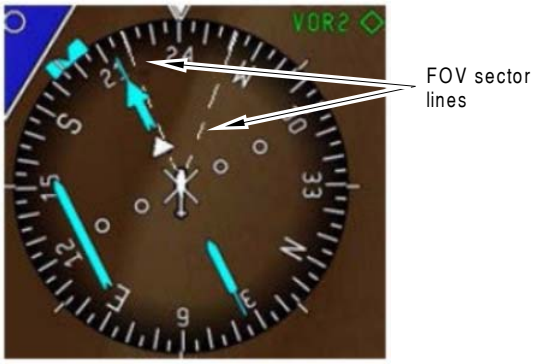

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Figure 7-4 FOV Sector Lines on HSI Indicate the SVS Lateral Field of View

VERTICAL TERRAIN CENTRING

The FPS indicates the aircraft path angle with respect to the ZPRL and the aircraft path with respect to the scene represented by SVS.

Whenever the SVS is set to Path Mode, the vertical terrain centring technique is used to maximize the availability of path angle information and to allow FPS remaining conformal to SVS as much as possible.

This is achieved by moving the ARS, the pitch tape and the ZPRL up or down as a group, together with represented terrain scene.

For downward movements of FPS, after the FPS has moved down to the top of the HSI, it continues to move down to towards its lower limit, pushing the HSI down as well as causing the removal of VHF, NAV and XPDR tuning boxes. NO PFD TUNING is displayed, in this condition radios will be tunable via MCDU only. Once the HSI has reached its maximum down position, the FPS will then start to push the SVS and ARS up (at a very slow rate).

Once the HSI has reached its maximum downward location, the ARS, the ZPRL the pitch tape and SVS scene (if selected ON) will move up as a group. After the push down condition is removed, due to FPS

returning up, the ARS, the ZPRL pitch scale and SVS scene will return to their original position (at a very slow rate) and the VHF, NAV and XPDR tuning boxes will re-appear.

For upward FPS movement, after the FPS has reached its upper limit, the ARS, the ZPRL, the pitch tape and the SVS scene (if selected ON) will move down at a very slow rate to continue to display the FPS conformal to the SVS. After the high FPA condition is removed, the FPS will descend and the ARS, the ZPRL, the pitch tape and the SVS scene (if selected ON) will return to their original position (at a very slow rate).

Note the FPS may be displayed dashed when at the top or bottom of the display to indicate that it is no longer conformal to the scene.

CAT A PRE-PUSH

In order to provide the best visual cues, room for the FPS on the pitch tape and prevent SVS movement during a dynamic manoeuvre as CAT A, when CAT A is selected for display (NF switch set to 102% and CAT A button pressed on collective's grip), the ARS and the HSI will be pre-pushed down. At deselection of the CAT A, the ARS returns to their standard location within 3 sec while the HSI returns within 30 sec.

SCENERY SYMBOLOGY

GRID LINES

Grid lines are regularly spaced semi-transparent black lines overlaying the synthetic terrain. The grid lines run approximately North/South and East/West and are spaced at approximately 0.1 NM by 0.1 NM for terrain up to 2500 ft (820 m) and 0.4 NM by 0.4 NM for terrain beyond. They follow the contour of the terrain.

The grid lines are hidden when higher terrain is near the aircraft viewpoint as appropriate. The grid lines fade as they extend away from the aircraft viewpoint.

RANGE RINGS

The terrain image on the PFD is displayed with a set of curves labeled with their distance from the aircraft. Range rings are white in color and are displayed at 3 NM, 5 NM, 10 NM, and 20 NM from the aircraft position.

The range rings follow the contour of the terrain and are masked by the foreground terrain. Range rings are labeled with their distance from the aircraft and are displayed to the right of the airspeed tape and to the left of the aircraft pitch reference symbol.

RUNWAYS

The runway environment is comprised of the runway, displaced area, stopway, and runway shoulder. The runway pavement can contain the following markings.

Runway marking locations are estimated using the navigation database. Since they are being estimated, the markings are given a distinctive nonrealistic look so that while they give the pilot reference information about the runway surface, it is still apparent to the pilot that the runway markings on the PFD do no represent the physical markings on the runway pavement.

All runways that are in the navigation database are displayed on the PFD.

Runways are displayed at the width, length, and location indicated by the navigation database with a minimum width of 40 feet.

The FMS-selected arrival runway is shown on the PFD with a cyan colour. Runways that are not the FMS-selected arrival runway are not highlighted.

Extended Arrival Runway Centerline

The extended arrival runway centerline is a dashed line originating from the FMS-selected arrival runway that extends out 20 NM, providing the pilot with improved visual alignment with the inbound course.

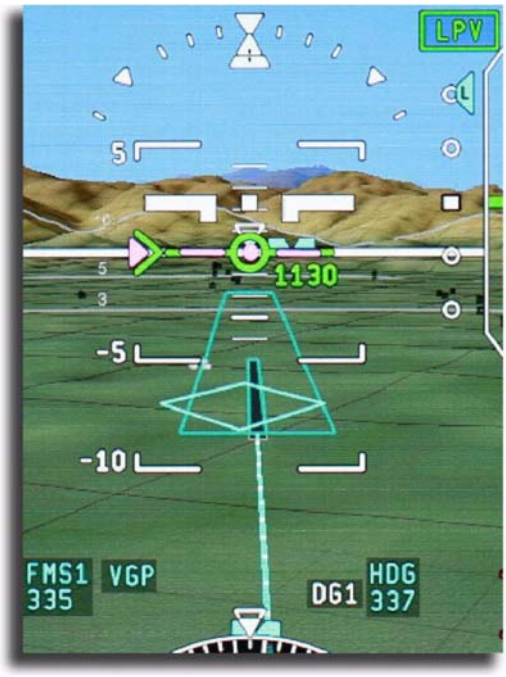

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Figure 7-5 SVS Runway Display

Airport Symbols and Runways

An airport symbol is displayed as a cyan box around the FMS-selected arrival runway. The size of the airport symbol is exaggerated when it comes into view to aid in locating it. As the aircraft moves toward the airport, the size is decreased. When 3 NM from the airport, the symbol is displayed to frame the runway. The runway length is justified to the threshold end of the runway longitudinally and centered on it laterally.

Helipad Symbol

The helipad symbol is made of a circular textured surface and a "H" in the center. The location and radius of the helipad are retrieved from the Navigation Database. When a helipad elevation is over 25 feet the symbol is displayed on a pedestal, See Figure 7-6.

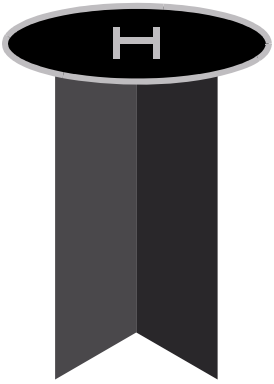

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Figure 7-6 Elevated Helipad Symbol

The FMS selected arrival helipad is displayed by a cyan colored helipad border and an expanded arrival helipad symbol displayed as a cyan outer circle.

OBSTACLES

When EGPWS (Supplement 81) is installed, threats are represented on SVS terrain and obstacles.

The EGPWS determines areas of terrain that are threats to the aircraft due to either the terrain itself or obstacles that are located on the terrain. Terrain and obstacles in the SVS image that are within a threat area will be colored yellow (for caution) or red (for warning) as appropriate to provide a visual alert to the pilot.

All reported obstacles in the terrain view that are taller than 100 feet are shown. An obstacle is displayed as a solid rectangle that represents the true height of the obstacle, but not the true width. The width of the obstacles are fixed at 80 feet.

It should be noted that the inclusion of all such obstacles is not guaranteed.

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The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 103

CABIN STOWAGE BOXES

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SUPPLEMENT 103
CABIN STOWAGE BOXES

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GENERAL INFORMATION

The Cabin Stowage Boxes consists of three different types of stowage boxes (tall, medium and low) that can be mounted in the cabin passenger compartment. The position of boxes mounted are only compatible with certain cabin seating configurations and the stowage box is installed after removal of passenger seats.

The boxes are intended for stowage of non- dangerous goods (as per ICAO ANNEX 18).

The three sizes of baggage stowage boxes are shown in Figure 1 to Figure 3.

The boxes are designed to attach to the standard seat rails in Row 1 and Row 2.

The box types are:

— Tall Stowage box, P/N 8G5010A24532

— Medium Stowage box, P/N 8G5010A24732

— Low Stowage box, P/N 8G5010A33432.

The Tall and Medium boxes have a door panel with a handle that, when rotated anti-clockwise 90°, unlocks and allows the door to be opened and removed. The closing procedure is the reverse of the opening procedure. When closed and the handle rotated clockwise the door is locked closed, see Figure 4.

An additional fixed handle is also mounted on the boxes which can be used as a hand hold for passengers moving around the cabin.

The Low boxes have a top panel with a handle that when rotated anticlockwise the panels are unlocked and can be raised and slid on the rails to open. When shut and rotated clockwise the door panel is locked, Figure 5.

The Cabin Stowage Boxes have front and side openings to allow fire extinguisher discharge inside the container, in case of fire.

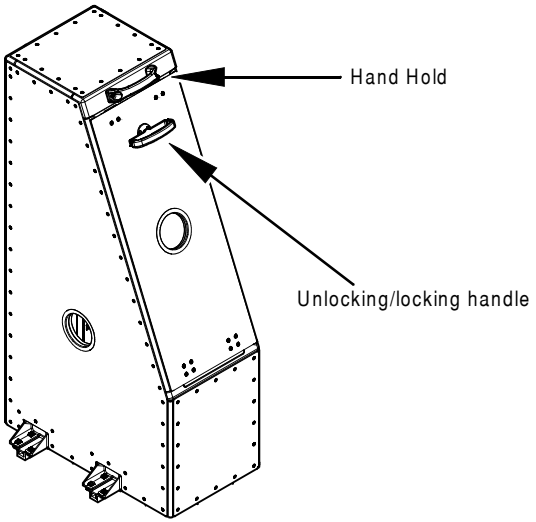

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Figure 1 Tall Stowage Box P/N 8G5010A24532

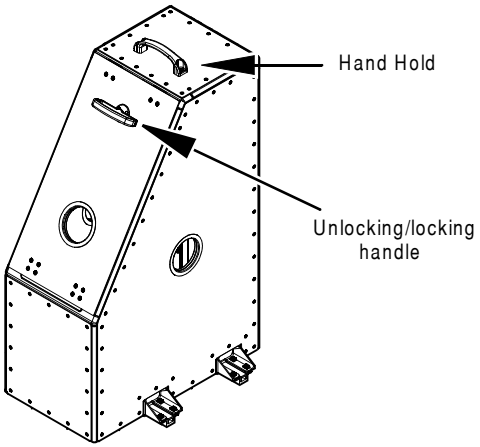

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Figure 2 Medium Stowage Box P/N 8G5010A24732

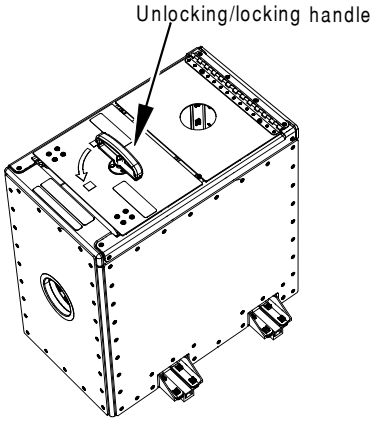

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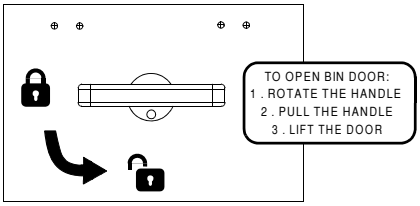
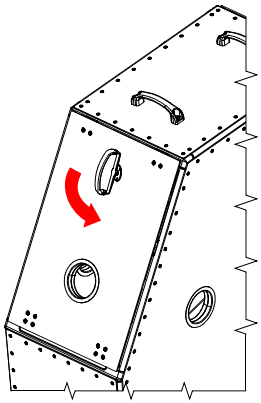
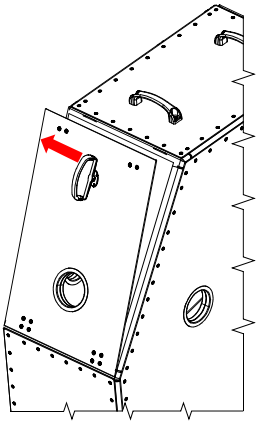
Figure 3 Low Stowage Box P/N 8G5010A33432



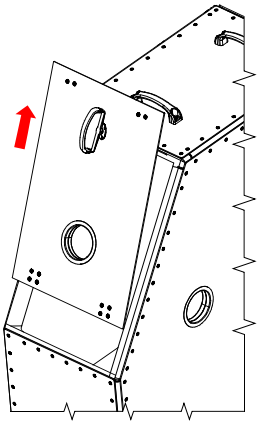
Handle in locked position



Rotate Handle 90° anticlockwise
to disengage lock



Pull Handle to disengage
locators on top edge of door



Lift to disengage locators
on lower edge of door

TO SECURELY CLOSE BIN DOOR:
1. ENGAGE LOWER SPIGOTS
2. LAY DOOR ON BIN
3. ROTATE THE HANDLE

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Figure 4 Tall and Medium Stowage Door Opening, Removal and Closing Procedure

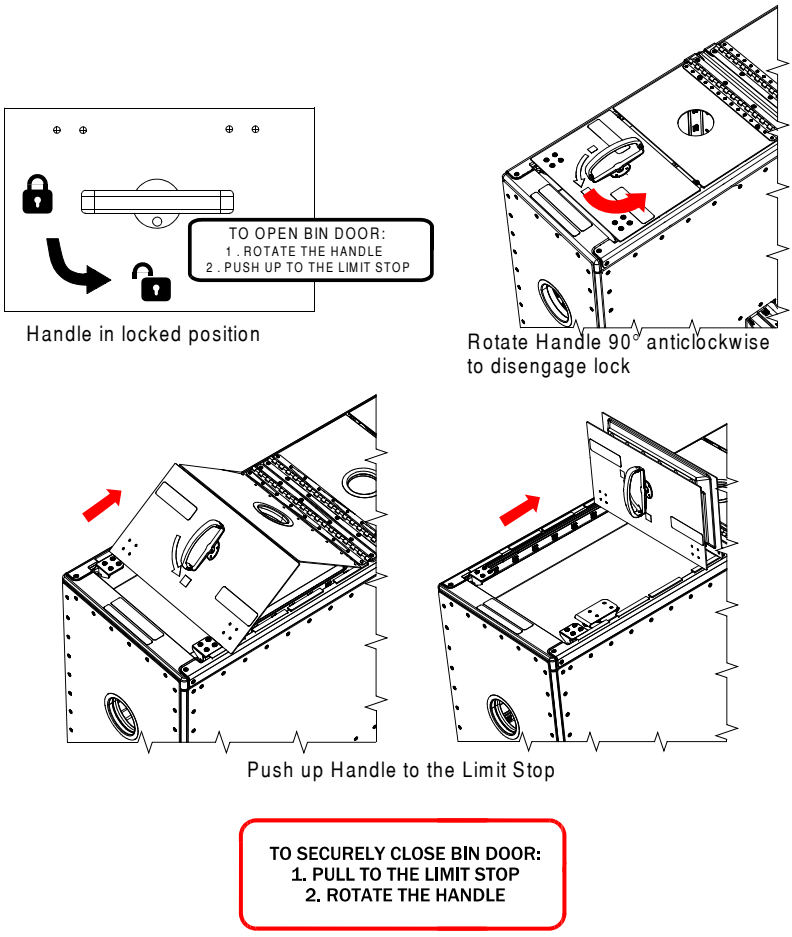

Figure 5 Low Stowage Door Opening and Closing Procedure

CABIN STOWAGE BOXES COMPATIBLE CONFIGURATIONS

ROW 1 CONFIGURATIONS

Row 1, 4 Standard Low Density Configuration (4G2520F13116) and 4 Corporate Low Density Configuration (P/N 4G2520F29011)

Row 1 right hand central seat replaced with low or medium or tall box with the following P/N:

P/N 4G5010F00111 - Low cabin stowage box

P/N 4G5010F00112 - Medium cabin stowage box

P/N 4G5010F00113 - Tall cabin stowage box.

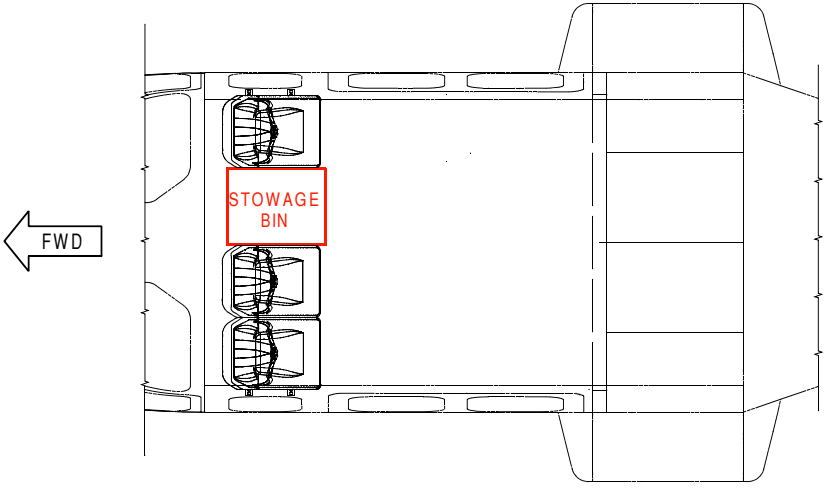

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Figure 6 Row 1 Central Right Box Position

Row 1 left hand central seat replaced with low or medium or tall box with the following P/N:

P/N 4G5010F00114 - Low cabin stowage box

P/N 4G5010F00115 - Medium cabin stowage box

P/N 4G5010F00116 - Tall cabin stowage box.

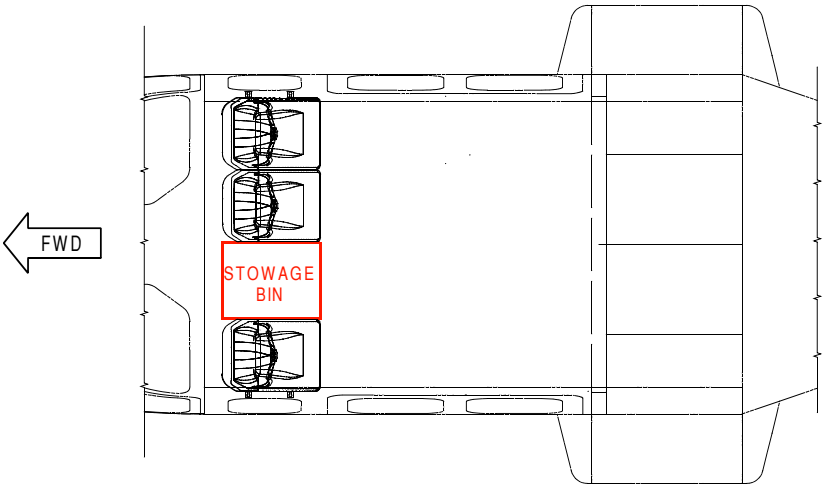

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Figure 7 Row 1 Central Left Box Position

Two stowage boxes are permitted to be installed together to combine one central right box (P/N's 4G5010F00111, 4G5010F00112, 4G5010F00113) with one central left box (P/N's 4G5010F00114, 4G5010F00115, 4G5010F00116.)

Row 1, 2 Foldable Seats and Mission Console (P/N 4G2520F13115, refer Supplement 45)

Row 1 central seat replaced with low or medium or tall box with the following P/N:

P/N 4G5010F00120 - Low cabin stowage box

P/N 4G5010F00121 - Medium cabin stowage box

P/N 4G5010F00122 - Tall cabin stowage box.

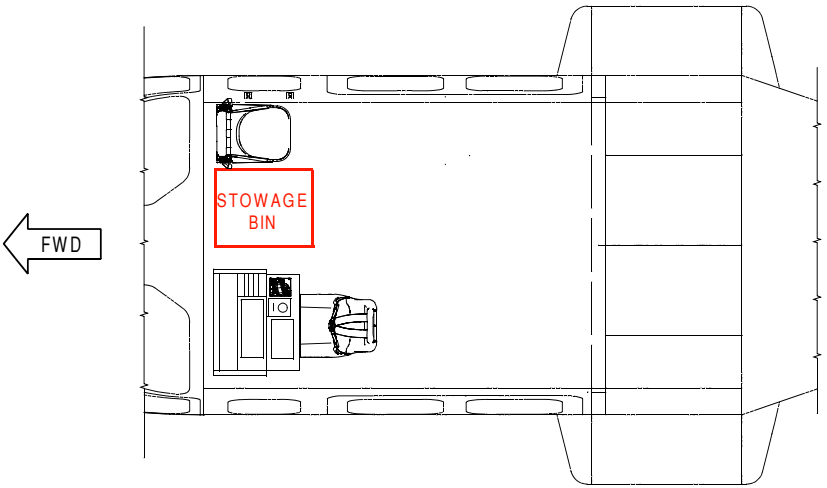

Figure 8 Row 1 Central Box Position

Row 1, 4 Foldable Seats
(P/N 4G2520F13111, refer Supplement 45**)**

Row 1, 2 central seats replaced with low or medium or tall box with the following P/N:

P/N 4G5010F00117 - Low cabin stowage box

P/N 4G5010F00118 - Medium cabin stowage box

P/N 4G5010F00119 - Tall cabin stowage box.

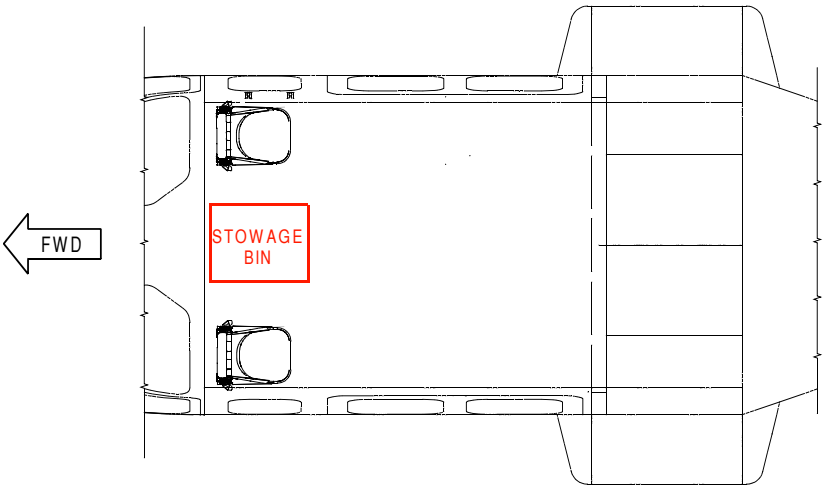

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Figure 9 Row 1 Central Box Position

ROW 2 CONFIGURATIONS

Row 2, 4 Standard Low Density Configuration (4G2520F13211)

Row 2 right hand central seat replaced with low or medium or tall box with the following P/N:

P/N 4G5010F00211 - Low cabin stowage box

P/N 4G5010F00212 - Medium cabin stowage box

P/N 4G5010F00213 - Tall cabin stowage box.

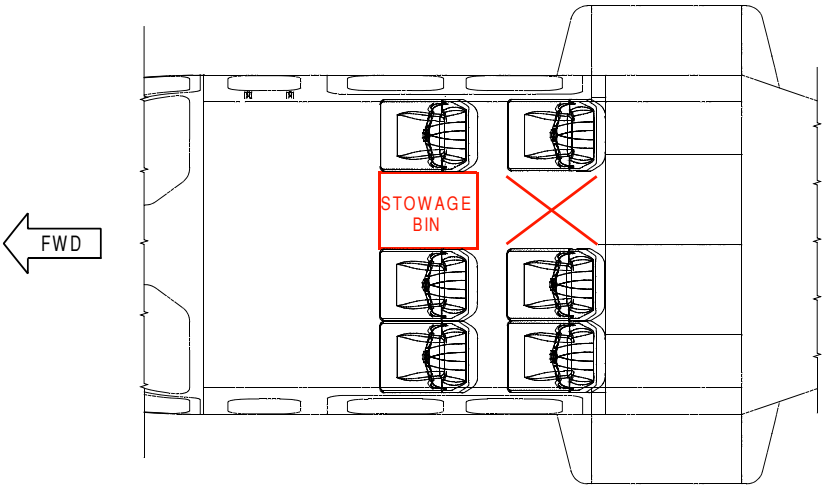

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Figure 10 Row 2 Central Right Box Position (The third row has been included for clarity, the red X indicates the Row 3 seat directly behind the stowage bin has been removed)

Row 2 left hand central seat replaced with low or medium or tall box with the following P/N:

P/N 4G5010F00214 - Low cabin stowage box

P/N 4G5010F00215 - Medium cabin stowage box

P/N 4G5010F00216 - Tall cabin stowage box.

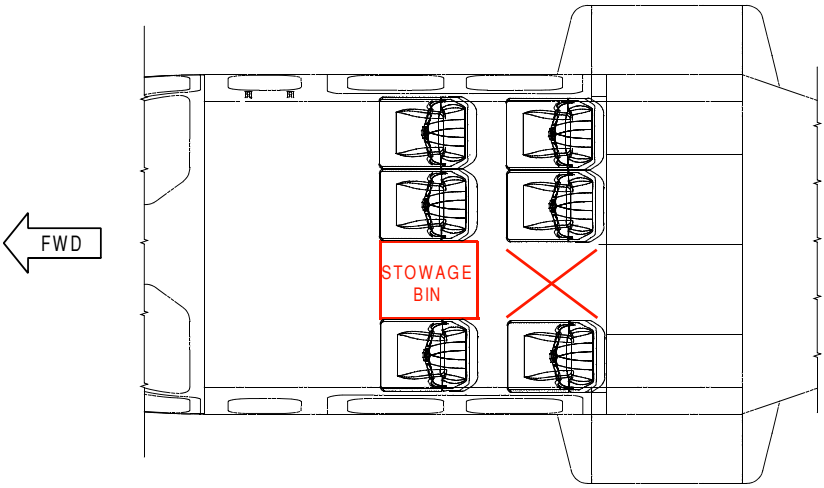

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Figure 11 Row 1 Central Left Box Position (The third row has been included for clarity, the red X indicates the Row 3 seat directly behind the stowage bin has been removed)

Only one stowage box at a time is permitted to be installed in Row 2.

ROW 3 CONFIGURATIONS

In Row 3 any basic RFM or appropriate Supplement seat configuration may be installed.

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Cabin Stowage Boxes kit, the new empty weight and center of gravity position must be determined.

CABIN CONFIGURATIONS LIMITATIONS

— A minimum of 3 seats, in at least one row, must be installed.

— In Row 1 a maximum of 2 stowage boxes may be installed, if the seat configuration permits.

— In Row 2 a maximum of 1 stowage box may be installed when the seat configuration permits.
When installed the Row 3 seat directly behind the stowage box (if installed) must be removed.

— The stowage boxes must only be installed between BL -482.6 mm and BL +482.6 mm, in order to not interfere with an emergency exit.

— When the Mission Console is installed and a Row 2 stowage box is required it must be installed on the opposite side of the cabin with respect to the mission console position.

CABIN STOWAGE BOX LIMITATIONS

Only non-dangerous items may be stored in the cabin stowage boxes as per ICAO Annex 18.

Occupants must be present, seated in a position which permits them to have full access to the door of each loaded cabin stowage box.

Stowage box (bin) doors must be closed and locked during Taxiing, Take-Off, Flight and Landing.

Opening of any stowage box in flight is not permitted except for an emergency to tackle a suspected fire within the stowage box.

Maximum Stowage Loads

Tall Stowage P/N 8G5010A24532 ..... 55 kg (121 lb)

Medium Stowage P/N 8G5010A24732 ..... 70 kg (155 lb)

Low Stowage P/N 8G5010A33432 ..... 40 kg (88 lb)

PLACARDS

A MAXIMUM LOAD ALLOWED 55KG (121 LB)

B MAXIMUM LOAD ALLOWED 70KG (154LB)

C MAXIMUM LOAD ALLOWED 40KG (88 LB)

A Placed on Tall Stowage Box

B Placed on Medium Stowage Box

C Placed on Low Stowage Box

BIN DOOR MUST BE CLOSED DURING
TAXIING, TAKE OFF, FLIGHT AND LANDING

Placed on each stowage box door

ICN-39-A-155103-G-A0126-01010-A-01-1

Figure 1-1 Cabin stowage box placards

SECTION 2 - NORMAL PROCEDURES

Note

Refer General Information in this Supplement for information on closing and locking the bins.

EXTERNAL PRE-FLIGHT CHECKS

AREA N°7 (CABIN AND COCKPIT INTERIOR)

1. Cabin interior	— Cabin stowage boxes closed and latched.

IN-FLIGHT PROCEDURES

PRE-LANDING CHECKS

1. Cabin interior	— Cabin stowage boxes closed and latched.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

Note

In accordance with E.A.S.A procedures, the balance data of this Section are not subject to E.A.S.A. approval. However, these informations have been accepted for loading the rotorcraft within approved limits of center of gravity and on maintaining the loading within such limits.

NON DANGEROUS CARGO

The definition of 'Non dangerous items' is cargo that is non-flammable, non-breakable, non-toxic, non-explosive and inert.

CABIN STOWAGE BOXES WEIGHT STA AND BL POSITIONS

The following information is to be used in the weight and balance calculation when Cabin Stowage Boxes are used.

The correct positions, as installed in the aircraft, are to be used.

Tall Stowage P/N 8G5010A24532, empty weight ..... 12 kg

Mounted Row 1 right hand central side ... STA 3415 mm BL 241.3 mm

Mounted Row 1 central mounting ..... STA 3415 mm BL 0 mm

Mounted Row 1 left hand central side..... STA 3415 mm BL -241.3 mm

Mounted Row 2 right central hand side ... STA 4789 mm BL 241.3 mm

Mounted Row 2 left hand central side..... STA 4789 mm BL -241.3 mm

Medium Stowage P/N 8G5010A24732 empty weight.....10 kg

Mounted Row 1 right hand central side....STA 3415 mm BL 241.3 mm

Mounted Row 1 central mounting .....STA 3415 mm BL 0 mm

Mounted Row 1 left hand central side.....STA 3415 mm BL -241.3 mm

Mounted Row 2 right hand central side....STA 4789 mm BL 241.3 mm

Mounted Row 2 left hand central side.....STA 4789 mm BL -241.3 mm

Low Stowage P/N 8G5010A33432 empty weight.....8 kg

Mounted Row 1 right hand central side....STA 3415 mm BL 241.3 mm

Mounted Row 1 central mounting .....STA 3415 mm BL 0 mm

Mounted Row 1 left hand central side.....STA 3415 mm BL -241.3 mm

Mounted Row 2 right hand central side....STA 4789 mm BL 241.3 mm

Mounted Row 2 left hand central side.....STA 4789 mm BL -241.3 mm

For weight and balance information of the seat installation refer to Basic RFM Section 6 or Supplement 47, as applicable.

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 104

VIP SEAT INSTALLATIONS

P/N 4G2520F29011
P/N 4G2520F28911

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SUPPLEMENT 104
VIP SEAT INSTALLATIONS

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INTRODUCTION

GENERAL INFORMATION

The supplement covers the installation in the cabin of Corporate passenger seats VIP passenger.

P/N 4G2520F29011 Row 1

This configuration has up to 4 corporate seats installed in Row 1 (Refer Figure 1). Row 2 and Row 3, as already available (basic RFM or Supplement 45) may be installed with the Coporate seats in Row 1.

Cabin Stowage boxes may also be installed (Refer Supplement 103).

P/N 4G2520F28911 Row 3

This configuration has up to 3 VIP seats installed in Row 3 (Refer Figure 1). The Row 1 corporate seat configuration P/N 4G2520F29011 may be installed or Row 1 seats, as already available (basic RFM or Supplement 45) may be installed with the VIP seats in Row 1. The Mission Console Supplement configuration (Supplement 38) or the Cabin Stowage boxes (Supplement 103) may also be installed.
Row 2 configurations cannot be installed.

Additional Kits Installed with the VIP Seat Installations

When the VIP Seat installation is fitted the following additional kits options may also be installed:

The box types are:

— P/N 4G2520F29111, lower covers with stowage pockets for the 4, Row 1 seats P/N 4G2520F29011.

— P/N 4G2520F01311, life jackets installed below the 4, Row 1 seats, when required.

— P/N 4G2520F01411, life jackets installed below the 3, Row 3 seats, when required.

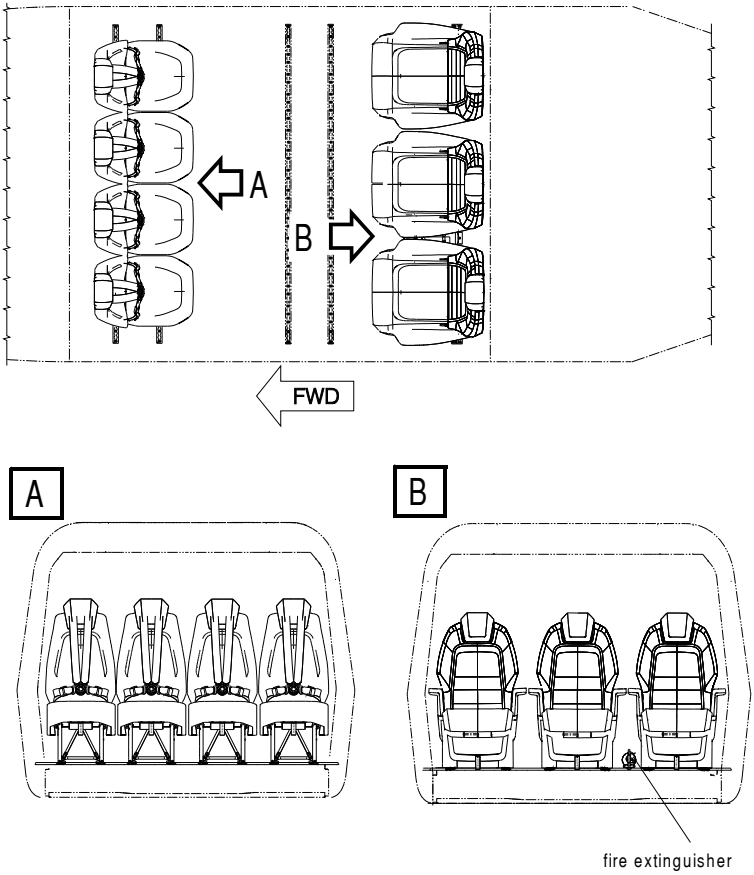

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Figure 1 4 Row 1 Corporate seats and 3 Row 3 VIP Seats Installed

VIP SEAT INSTALLATIONS COMPATIBLE CABIN CONFIGURATIONS

Compatible with P/N 4G2520F29011 Row 1 (4x18” Corporate) Seats

— Supplement 104 VIP Seat installations P/N 4G2520F28911 Row 3 seats.

— Already certified low/high density seats installed in Row 2 and Row 3.

— Supplement 45 Cabin Configurations with Pole Mounted Seats, P/N 4G2520F03111 and 4G2520F13311 may be installed in Row 3.

— Supplement 103 Cabin Stowage boxes in Row 1 (maximum of 2 stowage boxes) and/or Row 2 may be installed, in accordance with the limitations presented in Supplement 103, removing the appropriate seats in Row 1 and 2.

Compatible with P/N 4G2520F28911 Row 3 VIP (3 Armchair) Seats

— Supplement 104 VIP Seat installations P/N 4G2520F29011 Row 1 (4x18” Corporate) seats.

— Already certified low/high density seats installed in Row 1.

— Supplement 38 Cabin Mission Console, P/N 4G4620F004XX/6XX and 4G4620F009XX including the mission console Row 1 seats only, as referenced in Supplement 38.

— Supplement 39 Cabin Row 1 Forward Facing Seat Configurations P/N 3G2520F006XX/7XX.

— Supplement 45 Cabin configurations with Pole Mounted Seats P/N 4G2520F03011, P/N 4G2520F13111, P/N 4G2520F13112, P/N 4G2520F13113 and P/N 4G2520F13115 only.

— Supplement 103 Cabin Stowage boxes in Row 1 may be installed in the positions already approved for the AW139.
(Refer Supplement 103).

— Supplement 54 Cabin Compartment Extension, Supplement 99 Cabin Compartment Partial Extension with Baggage Barrier Net and Supplement 105 Cabin Tunnel Extension STN 7200.

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the Corporate and/or VIP Seats kit, the new empty weight and center of gravity position must be determined.

CABIN VIP SEAT LIMITATIONS

AW139 cabin seat configurations may have a reduced number of passenger seats installed in the cabin. A minimum of 3 seats, in at least one row, must be installed.

P/N 4G2520F29011 Row 1 Seats

— Up to a maximum of 4 Corporate (18”) PAX seats may be installed in Row 1.

— The removal of one or more Row 1 seats requires the removal of the lower covers P/N 4G2520F29111.

— When the lower covers P/N 4G2520F29111 are installed:
  • Maximum load allowed in lower cover stowage pocket 1 kg.
  • The lower cover stowage pocket lid must be kept closed with no objects allowed to protrude from the stowage.

— Hoist operation (Supplements 11, 41 & 49) are not permitted.

— Corporate PAX seats cannot be mixed with other types of seats in Row 1.

P/N 4G2520F28911 Row 3 Seats

— Up to a maximum of 3 VIP (18”) PAX seats may be installed in Row 3.

— No seat or cabin stowage boxes installations are permitted in Row 2.

— VIP PAX seats cannot be mixed with other types of seats in Row 3.

For cabin configurations compatible with the VIP Seat Installations kit, refer Introduction of this Supplement.

SECTION 2 - NORMAL PROCEDURES

No Change.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

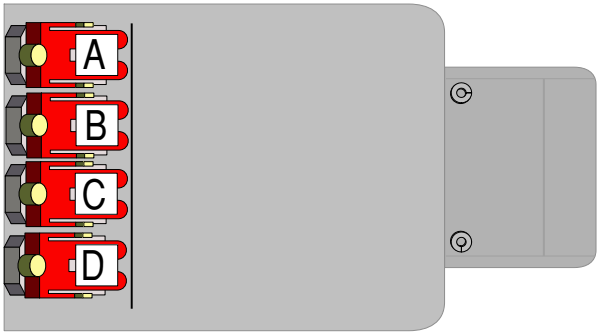
PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

Note

In accordance with E.A.S.A procedures, the balance data of this Section are not subject to E.A.S.A. approval. However, these informations have been accepted for loading the rotorcraft within approved limits of center of gravity and on maintaining the loading within such limits.

The following weight and balance information of the seat installations are applicable.



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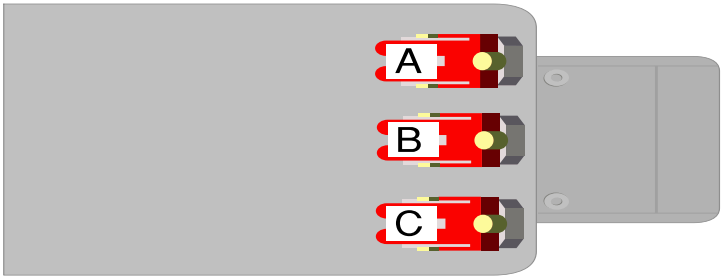
DESCRIPTION (Row 1 seat configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 1 passenger A	3415	687
Row 1 passenger B	3415	228
Row 1 passenger C	3415	-228
Row 1 passenger D	3415	-687

Figure 6-1 Row 1 Corporate Seats (P/N 4G2520F29011)



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DESCRIPTION (Row 3 seat configuration)	ARMS	
	Longitudinal (STA) (mm)	Lateral (BL) (mm)
Row 3 passenger A	5600	686
Row 3 passenger B	5600	0
Row 3 passenger C	5600	-686

Figure 6-2 Row 3 VIP Seats (P/N 4G2520F28911)

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 105

CABIN TUNNEL EXTENSION STN 7200

P/N 4G5338F00211
P/N 4G5338F00311

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SUPPLEMENT 105
CABIN COMPARTMENT EXTENSION
STN 7200

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INTRODUCTION

GENERAL INFORMATION

This Supplement covers the Cabin Full Tunnel Extension (tunnel above/between fuel tanks) and the Cabin Partial Tunnel Extension. The installation has a dividing panel at STN 7200 mm to separate the tunnel from the baggage area. The installation allows crew access into these areas, as required, up to the dividing panel.

Cabin Full Tunnel Extension P/N 4G5338F00311

The modification consists of the removal of the cabin dividing panel from STN 5700 mm and the installation of a panel at STN 7200 mm and floor panel, mounted in the tunnel, with tie down rings and restraint nets.

The new area exposed after the removal of the partition panel at STN 5700 mm allows the space above/between the main fuel tanks and into the front part of the baggage bay from STN 5700 mm to 7200 mm to be used as a storage area. Four Loading Areas with tie down rings and dedicated net assemblies are available and all may be used. See Figure 1.

Mounted on both side walls of the tunnel are two rails which can be used to attach items.

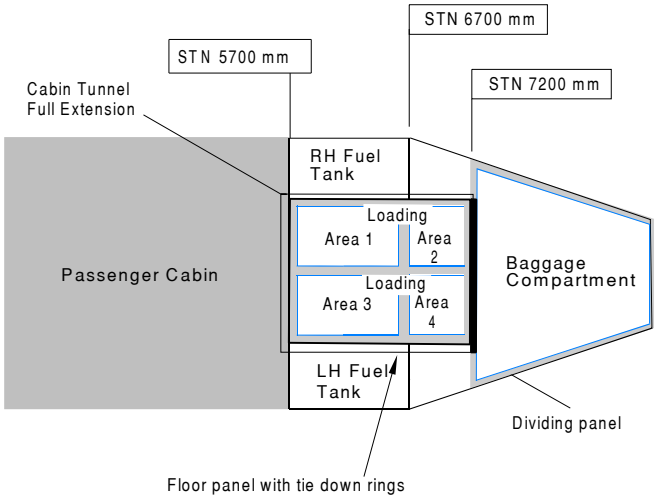


Figure 1 Cabin Full Tunnel Extension STN 7200 mm

Cabin Half Tunnel Extension P/N 4G5338F00211

The modification consists of a panel at STN 7200 mm and floor panel, mounted in the tunnel, with tie down rings and restraint nets.

This installation is compatible with the Longitudinal Auxiliary Fuel Tank Installation P/N 4G2800F00111.

The new area exposed after the removal of the partition panel at STN 5700 mm allows the space above/between the main fuel tanks, longitudinal auxiliary fuel tank and into the front part of the baggage bay from STN 5700 mm to 7200 mm to be used as a storage area. Two Loading Areas with tie down rings and dedicated net assemblies, are available and both may be used. See Figure 2.

Mounted on the right side wall of the tunnel are two rails which can be used to attach items.

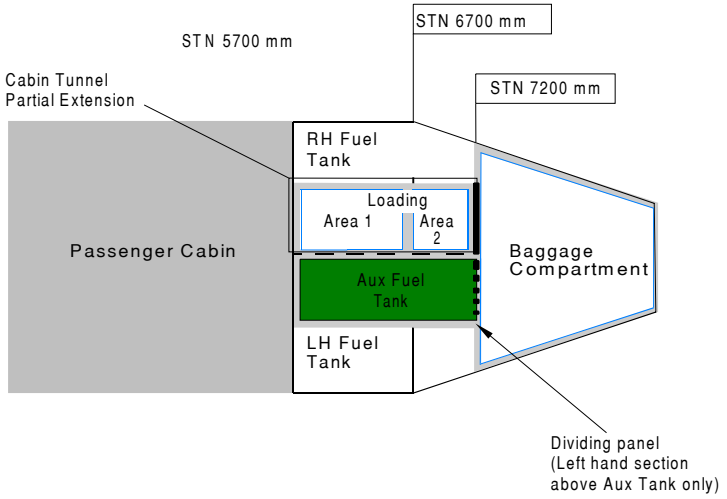


Figure 2 Cabin Partial Tunnel Extension with for Aux Tank

LONGITUDINAL AUXILIARY FUEL TANK (P/N 4G2800F00111)

The Longitudinal Auxiliary Fuel Tank is a single additional fuel tank. The tank consists of a fuel cell installed on the left hand side of the bay above the standard fuel tanks. (See Figure 2) The tank is connected to the left hand part of the main fuel tank and forms an extension to the main fuel tank through one connector. It is filled via the main tank and feeds the main tank by gravity. A fuel vent line from the tank is connected to the main tank vent line system and an electrical connection provides Fuel Gauging Control Unit information. The Fuel Gauging System automatically compensates for the additional fuel quantity.

SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After installation of the:

— Cabin Full Tunnel Extension (P/N 4G5338F00311) or

— Cabin Partial Tunnel Extension (P/N 4G5338F00211) with Additional Longitudinal Auxiliary Fuel Tank fitted.

modifications, the new empty weight and center of gravity position must be determined.

FUEL CAPACITIES WHEN ADDITIONAL AUXILIARY FUEL TANK FITTED (P/N 4G2800F00111)

Auxiliary Tank Usable.....500 litres

Total Usable (Main plus Auxiliary Tanks) .....2088 litres

Unusable.....No change

CABIN TUNNEL EXTENSION LIMITATIONS

— When baggage is loaded in the Tunnel Stowage Area a trained crew member must have unobstructed access to the stowage area at all times.

— A cabin Hand Held Fire Extinguisher must be within easy access for the trained crew member.

— Tunnel ceiling installations, above the loading areas, are not permitted.

— P/N 4G5338F00311 Row 3 must not have a seat installed infront of the tunnel access area when baggage is loaded in the Tunnel Stowage area therefore:

  • for low density seat configuration the 2 seats infront of the tunnel area must be removed;

  • for high density seat configuration the 3 middle seats must be removed;

- P/N 4G2520F28911 Row 3 seats Kit (Supplement 104) cannot be installed.

— P/N 4G5338F00211 Row 3 must not have seats installed infront of the tunnel access area when baggage is loaded in the tunnel stowage area, therefore:
  - for low density seat configuration the seat infront of the tunnel area must be removed;
  - for high density seat configuration the 2 middle seats infront of the tunnel must be removed;
  - P/N 4G2520F28911 VIP Seat Installations (Supplement 104) the right and central seats must be removed.

— Only the carriage of personal items, which are non-dangerous items as per ICAO Annex 18, are permitted.

— Maximum load in Loading Area 1 and 2.....50 kg + 50 kg (100 lb + 100 lb)

— Maximum load in Loading Area 3 and 4.....50 kg + 50 kg (100 lb + 100 lb)

Note

All Loading Areas 1, 2, 3 & 4 (if available) may be used simultaneously.

— Maximum weight of any single item of baggage.....25 kg (50 lb)

— Maximum unit load.....250 kg/m^2 (51 lb/sq.ft)

— Maximum load height.....,,,,,,600 mm (2 ft)

— All cargo in Loading Area 1 and 2 (if available) must be secured by restraint net P/N 3G2550A014XX or other restraint net approved by EASA or the National Aviation Authority.

— All cargo in Loading Area 3 and 4 (if available) must be secured by restraint net P/N 3G2550A199XX or other restraint net approved by EASA or the National Aviation Authority.

— It is prohibited to attach any mass on the rail without the use of a restraint system approved by EASA or the National Aviation Authority.
Any restraint system must comply with the following:
  • Maximum total load on rails 20 kg (44 lb);
  • Load C.G. arm must not exceed 100 mm (0.33 ft) from rail;
  • Both rails must be used to secure items.

CABIN TUNNEL EXTENSION INCOMPATIBILITIES

The Cabin Tunnel Extension modification is incompatible with the following kits:

— Supplement 15 Auxiliary Fuel Tank

— Supplement 54 Cabin Compartment Extension

— Supplement 55 Baggage Compartment Extension

— Supplement 65 Cabin Compartment Extension with Longitudinal Auxiliary Fuel Tank

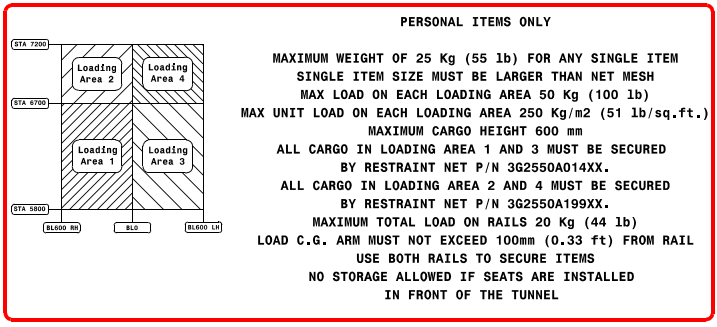
— Supplement 75 Baggage Barrier Net Installation

— Supplement 96 Heavy duty Baggage Compartment

— Supplement 99 Cabin Compartment Partial Extension with Baggage Barrier Net

— Supplement 100 Baggage Compartment Restraint System.

CABIN TUNNEL EXTENSION PLACARDS FOR P/N 4G5338F00311



Placed in Cabin Tunnel Extension

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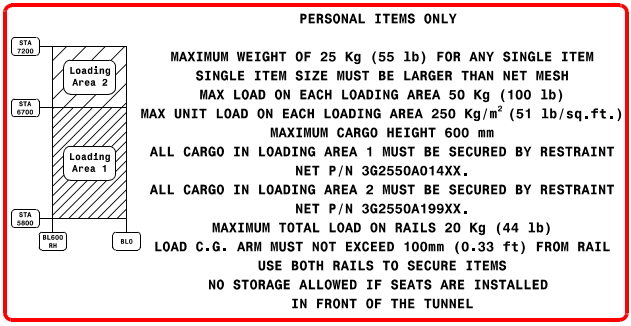
Figure 3 Cabin tunnel extension placards for P/N 4G5338F00311

CABIN TUNNEL EXTENSION PLACARDS FOR P/N 4G5338F00211



Placed in Cabin Tunnel Extension

ICN-39-A-155105-G-A0126-01005-A-001-01

Figure 4 Cabin tunnel extension placards for P/N 4G5338F00211

SECTION 2 - NORMAL PROCEDURES

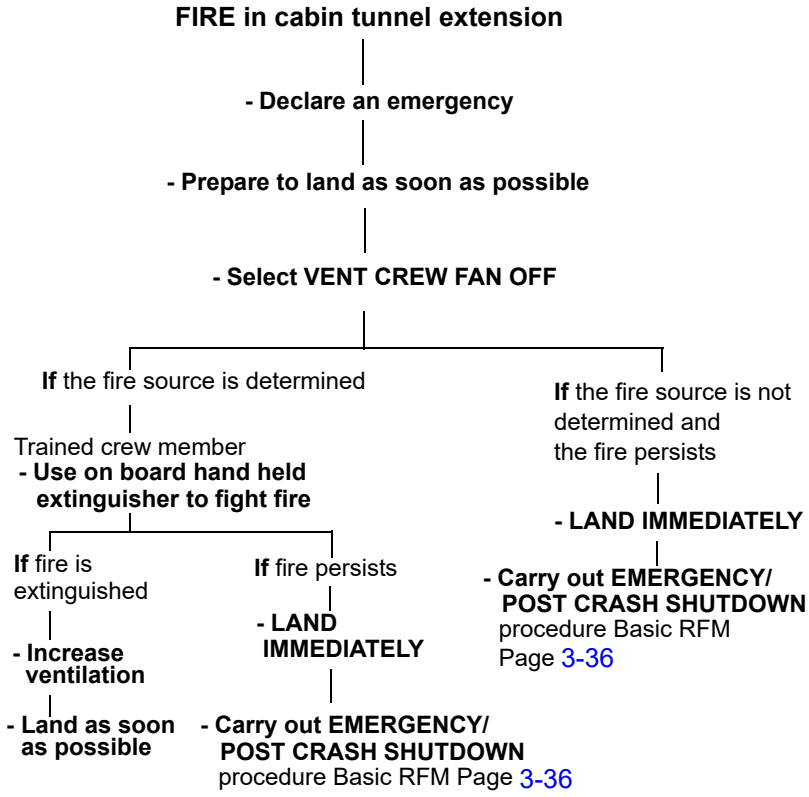
PRE TAKE-OFF CHECK

1. Cabin — Confirm baggage loaded and items secure.
2. Hand Held Fire Extinguisher — Confirm present and condition and within easy reach of the trained crew member.

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

CABIN TUNNEL EXTENSION FIRE (FLIGHT)

An in-flight fire has no single set of detailed procedures that can address all the fire scenarios that are possible in flight. The most urgent action is to get the aircraft on the ground as soon as possible with a reasonable degree of safety.



CAUTION

If fire is not completely extinguished, increased ventilation may aggravate the problem.

SECTION 4 - PERFORMANCE DATA

No Change.

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PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

The diagrams and tables below give the Longitudinal and Lateral positions for baggage in the zone between the fuel tanks.

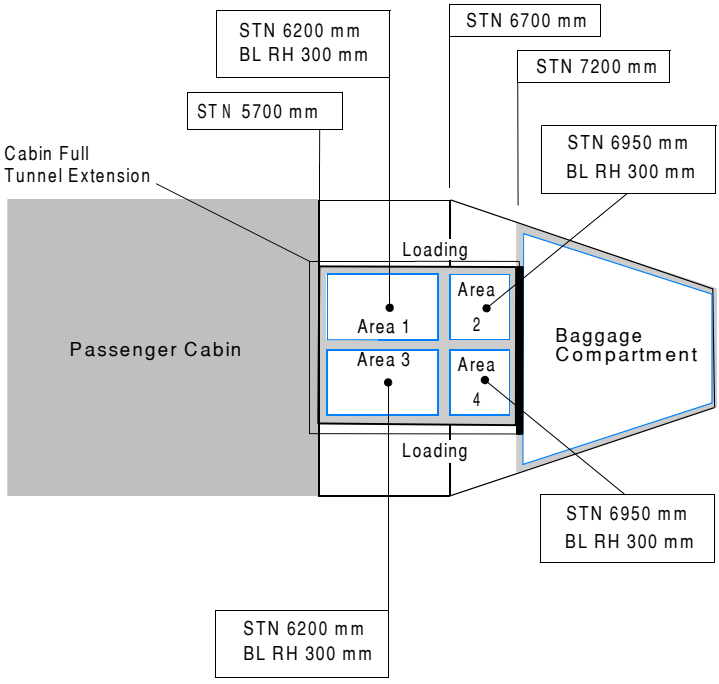

Figure 6-1 Longitudinal and Lateral Position for Cabin Full Tunnel Extension

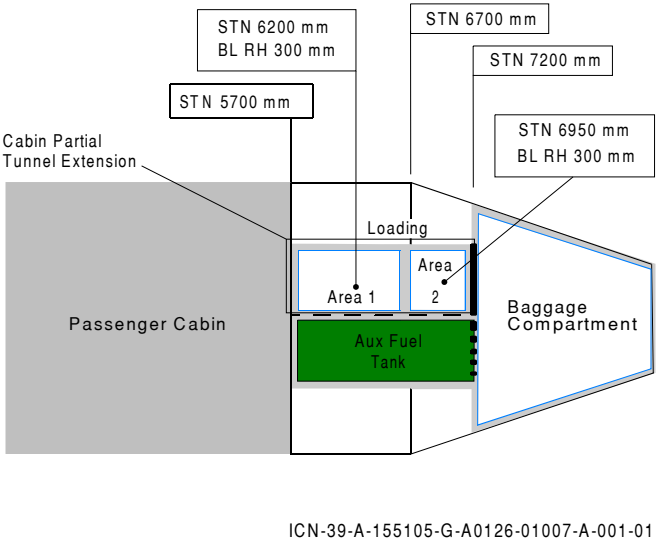

Figure 6-2 Longitudinal and Lateral Position for Partial Cabin Extension

Longitudinal Auxiliary Fuel Tank

When the Longitudinal Auxiliary Fuel Tank is installed the following Longitudinal and Lateral Moments for the Fuel must be used in the Weight and Balance Calculations.

WEIGHT - ARMS AND MOMENTS

LONGITUDINAL AND LATERAL MOMENTS

TOTAL FUEL MAIN + LONGITUDINAL AUX TANKS					
Weight (kg)	**L (0,8 kg/L)**	**Arm (STA) (mm)**	**Longitudinal Moment (kgm)**	**Arm (BL) (mm)**	**Lateral Moment (kgm)**
25	31	6208	155,2	0	0,0
50	63	6209	310,5	0	0,0
75	94	6210	465,8	0	0,0
100	125	6210	621,0	0	0,0
125	156	6210	776,3	0	0,0
150	188	6210	931,5	0	0,0
175	219	6210	1086,8	0	0,0
200	250	6210	1242,0	0	0,0
225	281	6210	1397,3	0	0,0
250	313	6210	1552,5	0	0,0
275	344	6210	1707,8	0	0,0
300	375	6210	1863,0	0	0,0
325	406	6210	2018,3	0	0,0
350	438	6211	2173,9	0	0,0
375	469	6211	2329,1	0	0,0
400	500	6211	2484,4	0	0,0
425	531	6211	2639,7	0	0,0
450	563	6211	2795,0	0	0,0
475	594	6211	2950,2	0	0,0
500	625	6212	3106,0	0	0,0
525	656	6212	3261,3	0	0,0
550	688	6212	3416,6	0	0,0
575	719	6212	3571,9	0	0,0
600	750	6213	3727,8	0	0,0
625	781	6213	3883,1	0	0,0
650	813	6214	4039,1	0	0,0
675	844	6214	4194,5	0	0,0
700	875	6214	4349,8	0	0,0

LONGITUDINAL AND LATERAL MOMENTS (CONT)

TOTAL FUEL MAIN + LONGITUDINAL AUX TANKS					
Weight (kg)	L (0,8 kg/L)	Arm (STA) (mm)	Longitudinal Moment (kgm)	Arm (BL) (mm)	Lateral Moment (kgm)
725	906	6215	4505,9	0	0,0
750	938	6215	4661,3	0	0,0
775	969	6216	4817,4	0	0,0
800	1000	6217	4973,6	0	0,0
825	1031	6217	5129,0	-1	-0,8
850	1063	6219	5286,2	-1	-0,9
875	1094	6221	5443,4	-2	-1,8
900	1125	6223	5600,7	-4	-3,6
925	1156	6224	5757,2	-8	-7,4
950	1188	6226	5914,7	-10	-9,5
975	1219	6229	6073,3	-14	-13,7
1000	1250	6233	6233,0	-16	-16,0
1025	1281	6235	6390,9	-20	-20,5
1050	1313	6239	6551,0	-22	-23,1
1075	1344	6242	6710,2	-25	-26,9
1100	1375	6244	6868,4	-27	-29,7
1125	1406	6247	7027,9	-30	-33,8
1150	1438	6250	7187,5	-33	-38,0
1175	1469	6253	7347,3	-36	-42,3
1200	1500	6255	7506,0	-38	-45,6
1225	1531	6258	7666,1	-40	-49,0
1250	1563	6260	7825,0	-42	-52,5
1275	1594	6262	7984,1	-44	-56,1
1300	1625	6264	8143,2	-46	-59,8
1325	1656	6266	8302,5	-48	-63,6
1350	1688	6268	8461,8	-50	-67,5
1375	1719	6270	8621,3	-52	-71,5
1400	1750	6272	8780,8	-54	-75,6
1425	1781	6274	8940,5	-55	-78,4
1450	1813	6275	9098,8	-57	-82,7
1475	1844	6277	9258,6	-59	-87,0
1500	1875	6278	9417,0	-60	-90,0
1525	1906	6280	9577,0	-62	-94,6
1550	1938	6281	9735,6	-64	-99,2
1575	1969	6282	9894,2	-65	-102,4
1600	2000	6284	10054,4	-66	-105,6
1625	2031	6286	10214,8	-68	-110,5
1650	2063	6287	10373,6	-69	-113,9
1675	2094	6289	10534,1	-71	-118,9
1700	2125	6290	10693,0	-72	-122,4

The information contained in this document supplements the information of the Basic Flight Manual.
For limitations, procedures and performance data not contained in this Supplement, consult the basic Rotorcraft Flight Manual.

SUPPLEMENT 106

HIGH INTENSITY STROBE LIGHT (HISL)

P/N 4G3340F03111

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SUPPLEMENT 106

HIGH INTENSITY STROBE LIGHT (HISL)

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SECTION 1 - LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

After HISL installation, the new empty weight and CG location must be determined.

HISL LIMITATIONS

The white high intensity strobe light must be selected OFF or to RED when:

— In the vicinity of other aircraft or person on the ground.

— During flight in cloud, fog or haze.

— During night operations.

SECTION 2 - NORMAL PROCEDURES

IN-FLIGHT PROCEDURES

AFTER TAKE-OFF

1.	A/COLLswitch (Overhead panel)	— Select BOTH-OFF-UPPER as required.
2.	SEC A/COLL MODE switch (Overhead panel)	— Select RED-WHITE as required when A/COLL selected to BOTH.

PRE-LANDING CHECKS

1.	SEC A/COLL MODE switch (Overhead panel)	— Select RED (on Overhead panel) or UPPER (on A/COLL light switch on Overhead panel).

SECTION 3 - EMERGENCY AND MALFUNCTION PROCEDURES

No Change.

SECTION 4 - PERFORMANCE DATA

No Change.

PART II - MANUFACTURER'S DATA

SECTION 6 - WEIGHT AND BALANCE

No Change.

SECTION 7 - SYSTEM DESCRIPTION

The High Intensity Strobe Light (HISL) installation configures the aircraft with a dual colour white/red strobe light under the belly of the aircraft (Figure 106-1) which is in addition to the standard red strobe light mounted on the top of the fin. The white HISL emits a light at an intensity of 2000 candela and is designed to increase the visibility of the helicopter in daylight conditions. The red light is of lower intensity.

Pilot selection of the light is through the Anticollision switch (A/COLL) on the Overhead panel with the following selections:

- BOTH (the fin mounted red upper light and the lower HISL light illuminated)
- OFF (all anticollision lights unpowered)
- UPPER (the fin mounted red upper anticollision light illuminated)

The selection of the HISL Light colour is using an additional switch on the Overhead panel SEC A/COLL MODE with the following selections:

- RED
- WHITE

Refer Figure 106-2 for switch positions.

When the lighting MODE switch is on NVG mode (if installed) the WHITE mode of the HISL is inhibited.

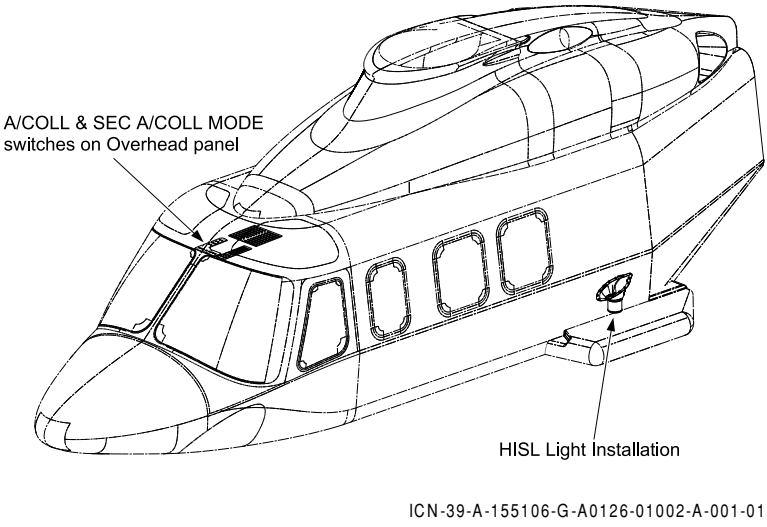

Figure 106-1 HISL LIGHT Installation

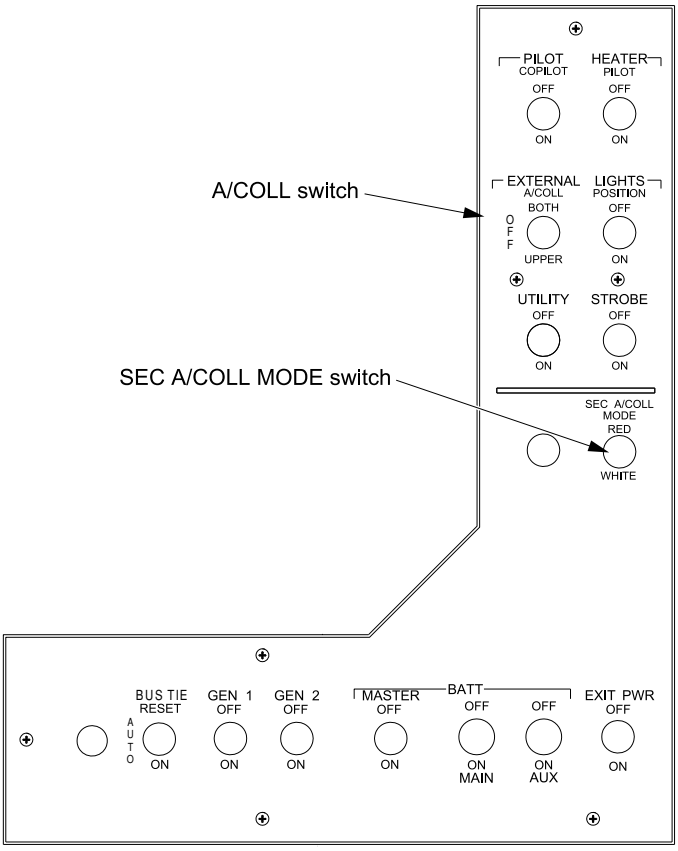

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Figure 106-2 HISL Switches on Overhead Panel (Example)

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PART II - MANUFACTURER'S DATA

SECTION 6

WEIGHT AND BALANCE

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SECTION 6

WEIGHT AND BALANCE

Note

In accordance with E.A.S.A. procedures, the detail weight and balance data of this Section are not subject to E.A.S.A. approval.
The loading instructions of this Section, however, have been accepted by E.A.S.A. as satisfying all requirements for instructions on loading of the rotorcraft within approved limits of weight and center of gravity, and on maintaining the loading within such limits.

GENERAL

This Section provides information for the weight and balance computation of the AW139 helicopter.

It is the pilot's responsibility to ensure that the helicopter is properly loaded to maintain for the duration of the flight the center of gravity within the limitations defined in Section 1 of the Rotorcraft Flight Manual.

Figures, charts and examples are provided to assist the pilot in computing the proper loading conditions.

DATUM LINE LOCATIONS

Figure 6-1 and Figure 6-2 present fuselage stations and butt lines data to aid in weight and balance computations.

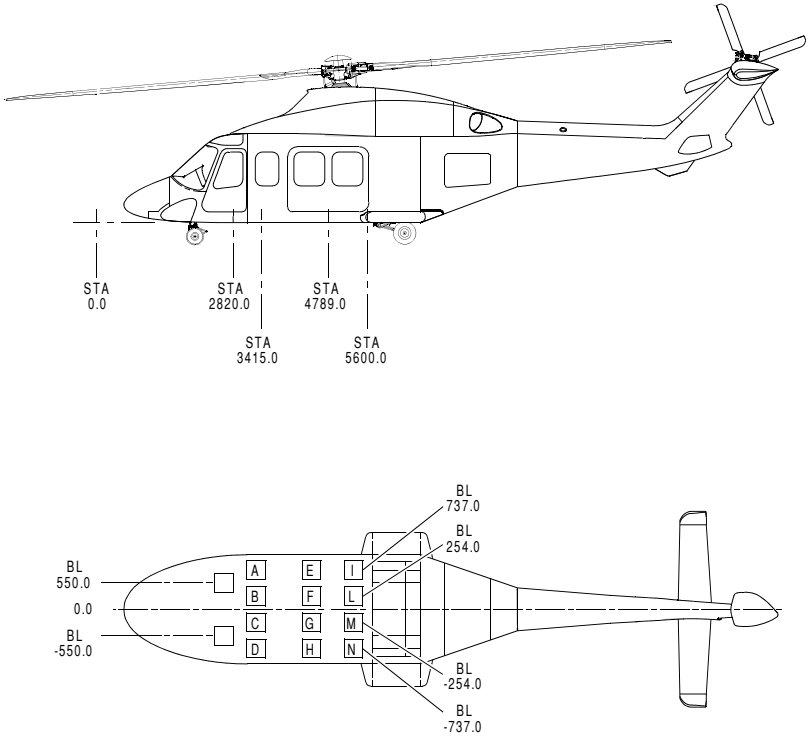

Figure 6-1 Helicopter Stations Diagram (12 passengers)

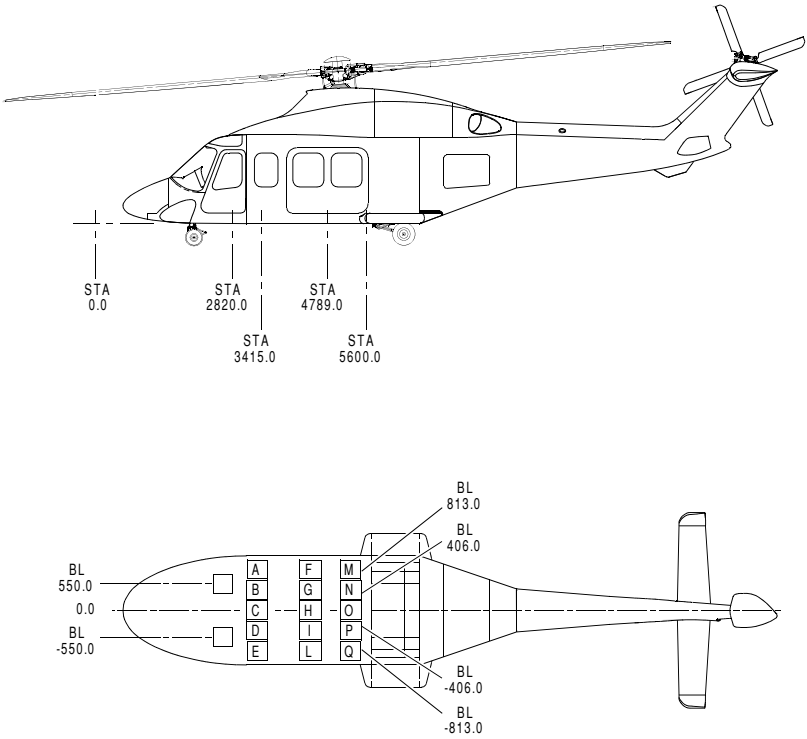

Figure 6-2 Helicopter Stations Diagram (15 passengers)

PASSENGERS LOADING

The tables below give the recommended passenger loading sequence to be followed for the 12 or 15 seats configurations, in order to maintain the center of gravity (CG) within the limits.

The passengers loading sequence may be altered, provided the pilot ensures that the aircraft C of G limitations are not exceeded.

PASSENGERS (12 SEATS)	ROW	STATION (mm)
A	1	3415
B	1	3415
C	1	3415
D	1	3415
E	2	4789
F	2	4789
G	2	4789
H	2	4789
I	3	5600
L	3	5600
M	3	5600
N	3	5600

PASSENGERS (15 SEATS)	ROW	STATION (mm)
A	1	3449
B	1	3415
C	1	3415
D	1	3415
E	1	3449
F	2	4789
G	2	4789
H	2	4789
I	2	4789
L	2	4789
M	3	5556
N	3	5600
O	3	5600
P	3	5600
Q	3	5556

WEIGHTS - ARMS AND MOMENTS

LONGITUDINAL MOMENTS

Pilots and Passengers						
Weight	**Pilot Copilot or pas-senger**	**Passengers first row (4 seats & 3 mid of 5 seat)**	**Passengers first row Seats A & E for 5 seat**	**Passengers second row (4 -5 seats)**	**Passengers third row (4 seats & 3 mid of 5 seat)**	**Passengers third row Seats M & Q for 5 seat**
(kg)	**(Arm 2820 mm) Moment (kgm)**	**(Arm 3415 mm) Moment (kgm)**	**(Arm 3449 mm) Moment (kgm)**	**(Arm 4789 mm) Moment (kgm)**	**(Arm 5600 mm) Moment (kgm)**	**(Arm 5556 mm) Moment (kgm)**
70	197	239	241	335	392	388
80	226	273	276	383	448	444
90	254	307	310	431	504	500
100	282	342	345	479	560	555
110	310	376	379	527	616	611
120	338	410	414	575	672	667
130	367	444	448	623	728	722
140	395	478	483	670	784	778
150	423	512	517	718	840	833
160	451	546	552	766	896	889
170	479	581	586	814	952	944
180	508	615	621	862	1008	1000
190	536	649	655	910	1064	1055
200	564	683	690	958	1120	1111
210	592	717	724	1006	1176	1167
220	620	751	759	1054	1232	1222
230	649	785	793	1101	1288	1278
240	677	820	828	1149	1344	1333
250		854		1197	1400	
260		888		1245	1456	
270		922		1293	1512	
280		956		1341	1568	
290		990		1389	1624	
300		1025		1437	1680	
310		1059		1485	1736	
320		1093		1532	1792	
330		1127		1580	1848	
340		1161		1628	1904	
350		1195		1676	1960	
360		1229		1724	2016	
370		1264		1772	2072	
380		1298		1820	2128	
390		1332		1868	2184	
400		1366		1916	2240	
410		1400		1963	2296	
420		1434		2011	2352	
430		1468		2059	2408	
440		1503		2107	2464	
450		1537		2155	2520	
460		1571		2203	2576	
470		1605		2251	2632	
480		1639		2299	2688	

WEIGHTS - ARMS AND MOMENTS (12 PASSENGERS)

LATERAL MOMENTS

Pilots and Passengers						
Weight (kg)	Pilot (Arm 550 mm) Moment (kgm)	Copilot or passenger (Arm -550 mm) Moment (kgm)	Passengers max left (Arm -737 mm) Moment (kgm)	Passengers left (Arm -254 mm) Moment (kgm)	Passengers right (Arm 254 mm) Moment (kgm)	Passengers max right (Arm 737 mm) Moment (kgm)
70	39	-39	-52	-18	18	52
80	44	-44	-59	-20	20	59
90	50	-50	-66	-23	23	66
100	55	-55	-74	-25	25	74
110	61	-61	-81	-28	28	81
120	66	-66	-88	-30	30	88
130	72	-72	-96	-33	33	96
140	77	-77	-103	-36	36	103
150	83	-83	-111	-38	38	111
160			-118	-41	41	118
170			-125	-43	43	125
180			-133	-46	46	133
190			-140	-48	48	140
200			-147	-51	51	147
210			-155	-53	53	155
220			-162	-56	56	162
230			-170	-58	58	170
240			-177	-61	61	177
250			-184	-64	64	184
260			-192	-66	66	192
270			-199	-69	69	199
280			-206	-71	71	206
290			-214	-74	74	214
300			-221	-76	76	221
310			-228	-79	79	228
320			-236	-81	81	236
330			-243	-84	84	243
340			-251	-86	86	251
350			-258	-89	89	258

WEIGHTS - ARMS AND MOMENTS (15 PASSENGERS)

LATERAL MOMENTS

Pilots and Passengers							
Weight (kg)	Pilot (Arm 550 mm) Moment (kgm)	Copilot or passenger (Arm -550 mm) Moment (kgm)	Passengers max left (Arm -813 mm) Moment (kgm)	Passengers left (Arm -406 mm) Moment (kgm)	Passengers central (Arm 0 mm) Moment (kgm)	Passengers right (Arm 406 mm) Moment (kgm)	Passengers max right (Arm 813 mm) Moment (kgm)
70	39	-39	-57	-28	0	28	57
80	44	-44	-65	-32	0	32	65
90	50	-50	-73	-37	0	37	73
100	55	-55	-81	-41	0	41	81
110	61	-61	-89	-45	0	45	89
120	66	-66	-98	-49	0	49	98
130	72	-72	-106	-53	0	53	106
140	77	-77	-114	-57	0	57	114
150	83	-83	-122	-61	0	61	122
160			-130	-65	0	65	130
170			-138	-69	0	69	138
180			-146	-73	0	73	146
190			-154	-77	0	77	154
200			-163	-81	0	81	163
210			-171	-85	0	85	171
220			-179	-89	0	89	179
230			-187	-93	0	93	187
240			-195	-97	0	97	195
250			-203	-102	0	102	203
260			-211	-106	0	106	211
270			-220	-110	0	110	220
280			-228	-114	0	114	228
290			-236	-118	0	118	236
300			-244	-122	0	122	244
310			-252	-126	0	126	252
320			-260	-130	0	130	260
330			-268	-134	0	134	268
340			-276	-138	0	138	276
350			-285	-142	0	142	285
360			-293	-146	0	146	293
370			-301	-150	0	150	301
380			-309	-154	0	154	309
390			-317	-158	0	158	317
400			-325	-162	0	162	325
410			-333	-166	0	166	333
420			-341	-171	0	171	341
430			-350	-175	0	175	350
440			-358	-179	0	179	358
450			-366	-183	0	183	366
460			-374	-187	0	187	374
470			-382	-191	0	191	382
480			-390	-195	0	195	390

WEIGHTS - ARMS AND MOMENTS

LONGITUDINAL MOMENTS

ENGINE OIL (Arm 6878)		
Weight (kg)	**(L)**	**Moment (kgm)**
16	16	110,0

MAIN TRANSMISSION OIL (Arm 5094)		
Weight (kg)	**(L)**	**Moment (kgm)**
20	21,1	101,9

INTERMEDIATE GEAR BOX OIL (Arm 12315)		
Weight (kg)	**(L)**	**Moment (kgm)**
1,0	1,0	12,1

TAIL GEAR BOX OIL (Arm 13410)		
Weight (kg)	**(L)**	**Moment (kgm)**
1,5	1,6	20

BAGGAGE			
Weight (kg)	**Moment (kgm)**		
	Arm 7200	**Arm 7700**	**Arm 8200**
25	180	193	205
50	360	385	410
75	540	578	615
100	720	770	820
125	900	963	1025
150	1080	1155	1230
175	1260	1348	1435
200	1440	1540	1640
225	1620	1733	1845
250	1800	1925	2050
275	1980	2118	2255
300	2160	2310	2460

WEIGHTS - ARMS AND MOMENTS

LONGITUDINAL MOMENTS

TOTAL FUEL			
Weight (kg)	**L (0,8 kg/L)**	**Arm (mm)**	**Moment (kgm)**
25	31	6208	155,2
50	63	6209	310,5
75	94	6210	465,8
100	125	6210	621,0
125	156	6210	776,3
150	188	6210	931,5
175	219	6210	1086,8
200	250	6210	1242,0
225	281	6210	1397,3
250	313	6210	1552,5
275	344	6210	1707,8
300	375	6210	1863,0
325	406	6210	2018,3
350	438	6211	2173,9
375	469	6211	2329,1
400	500	6211	2484,4
425	531	6211	2639,7
450	563	6211	2795,0
475	594	6211	2950,2
500	625	6212	3106,0
525	656	6212	3261,3
550	688	6212	3416,6
575	719	6212	3571,9
600	750	6213	3727,8
625	781	6213	3883,1
650	813	6214	4039,1
675	844	6214	4194,5
700	875	6214	4349,8
725	906	6215	4505,9
750	938	6215	4661,3
775	969	6216	4817,4
800	1000	6217	4973,6
825	1031	6219	5130,7
850	1063	6221	5287,9
875	1094	6223	5445,1
900	1125	6225	5602,5
925	1156	6225	5758,1
950	1188	6226	5914,7
975	1219	6227	6071,3
1000	1250	6228	6228,0
1025	1281	6228	6383,7
1050	1313	6229	6540,5
1075	1344	6229	6696,2
1100	1375	6230	6853,0
1125	1406	6230	7008,8
1150	1438	6231	7165,7
1175	1469	6231	7321,4
1200	1500	6232	7478,4
1225	1531	6232	7634,2
1250	1563	6233	7791,3
1270	1588	6233	7915,9

UNUSABLE FUEL			
Weight (kg)	**L (0,8 kg/L)**	**Arm (mm)**	**Moment (kgm)**
16	**20**	**6206**	**99,3**

COMPUTATION OF LOADING

LONGITUDINAL LOADING EXAMPLES

The empty weight and the moment of the AW139 helicopter can be found in Chart B (Helicopter Weighing Record).

The values in Chart B are obtained by weighing the aircraft and computing the empty weight, moment and CG.

Subsequently as items of equipment are added or removed, entries shall be made in Chart C (Basic Weight and Balance Record) and the new empty weight and balance computed.

The empty weight includes fixed ballast, hydraulic fluid, transmission oil, engine oil and unusable fuel.

Three sample loadings are shown below (in the sample loading the empty weight and CG arm are assumed to be 3700 Kg and 5500 mm).

a)	ITEM	Weight (kg)	CG Arm (mm)	Moment (kgm)
	Empty weight	3700	5500	20350,0
	Pilots (2)	160	2820	451,2
	First row passengers (3)	240	3415	819,6
	Second row passengers (1)	80	4789	383,1
	Baggage	50	7700	385,0
	Total weight	4230	5292,9	22388,9
	Fuel at Take-off	500	6212,0	3106,0
	Take-off Weight	4730	5390,0	25494,9
	Fuel at Landing	100	6210,0	621,0
	Landing Weight	4330	5314,1	23009,9

b)

ITEM	Weight (kg)	CG Arm (mm)	Moment (kgm)
Empty weight	3700	5500	20350,0
Pilots (2)	160	2820	451,2
First row passengers (4)	320	3415	1092,8
Second row passengers (4)	320	4789	1532,5
Third row passengers (1)	80	5600	448,0
Baggage	150	7700	1155,0
Total weight	4730	5291,6	25029,5
Fuel at Take-off	800	6217,0	4973,6
Take-off Weight	5530	5425,5	30003,1
Fuel at Landing	150	6210,0	931,5
Landing Weight	4880	5319,9	25961,0

c)

ITEM	Weight (kg)	CG Arm (mm)	Moment (kgm)
Empty weight	3700	5500	20350,0
Pilots (2)	160	2820	451,2
First row passengers (4)	320	3415	1092,8
Second row passengers (4)	320	4789	1532,5
Third row passengers (4)	320	5600	1792,0
Baggage	100	7700	770,0
Total weight	4920	5282,2	25988,5
Fuel at Take-off	1000	6228,0	6228,0
Take-off Weight	5920	5442,0	32216,5
Fuel at Landing	300	6210,0	1863,0
Landing Weight	5220	5335,5	27851,5

LATERAL LOADING EXAMPLES

Two examples loadings are shown below (in this case the empty weight and CG arm are assumed to be 3700 Kg and 0 mm).

a) ITEM	Weight (kg)	CG Arm (mm)	Moment (kgm)
Empty weight	3700	0	0,0
Pilots	80	550	44,0
Co-pilot	80	-550	-44,0
First row passengers (right)	80	254	20,3
First row passengers (max right)	80	737	59,0
First row passengers (left)	80	-254	-20,3
Second row passengers (right)	80	254	20,3
Second row passengers (left)	80	-254	-20,3
Baggage	50	0	0,0
Total weight	4310	13,7	59,0
Fuel at Take-off	500	0	0,0
Take-off Weight	4810	12,3	59,0
Fuel at Landing	100	0	0,0
Landing Weight	4410	13,4	59,0

b)	ITEM	Weight (kg)	CG Arm (mm)	Moment (kgm)
	Empty weight	3700	0	0,0
	Pilots	80	550	44,0
	Co-pilot	80	-550	-44,0
	First row passengers (right)	80	254	20,3
	First row passengers (max right)	80	737	59,0
	First row passengers (left)	80	-254	-20,3
	First row passengers (max left)	80	-737	-59,0
	Second row passengers (right)	80	254	20,3
	Second row passengers (left)	80	-254	-20,3
	Second row passengers (max left)	80	-737	-59,0
	Baggage	150	0	0,0
	Total weight	4570	-12,9	-59,0
	Fuel at Take-off	1200	0	0,0
	Take-off Weight	5770	-10,2	-59,0
	Fuel at Landing	200	0	0,0
	Landing Weight	4770	-12,4	-59,0

WEIGHT AND BALANCE DETERMINATION

Instructions for weight and balance determination are herewith enclosed with instructions for use of charts to enable the operator to obtain all necessary data as to basic helicopter configuration, empty weight and center of gravity. These charts will also provide for continuous control of weight and balance of the helicopter.

This system of weight and balance computation requires the use of charts and forms. They are identified as follows:

Chart A - Equipment List.

Chart B - Helicopter Weighing Record.

Chart C - Basic Weight and Balance Record.

Chart D - Data for Helicopter Weight and Balance Computation

Chart E - Weight and Balance Computation

WEIGHT AND BALANCE DATA RESPONSIBILITY

The aircraft manufacturer inserts all helicopter identifying data on the various charts. This record constitutes the basic weight and balance data of the helicopter, to which the Rotorcraft Flight Manual was assigned, for the condition shown on chart A. The operator shall keep this data up-to-date by recording all changes made to the configuration of the helicopter.

HELICOPTER WEIGHING

The helicopter must be weighed:

1. When major modifications or repairs are made, or kits are installed /removed.

2. When the basic weight data is suspected to be an error.

3. At time of major overhaul.

4. In accordance with E.A.S.A. instructions.

USE OF CHARTS AND FORMS

USE OF CHART A

The Chart A gives the weight, arm and moment of all the standard and optional equipment. The manufacturer of the helicopter places check marks in the “Basic Configuration” column to identify the items of equipment in the helicopter for the weighing condition. A check (V) in the columns headed “In Helicopter” indicates the presence of the item in the helicopter, and a zero (0) indicates its absence. The next columns of chart A will permit inspection of the helicopter for equipment actually installed. When making an inventory, note whether any items of equipment have been installed or removed and if so enter corresponding weight and moment change on Chart C.

Subsequent check list inventories shall be carried out in the following cases:

1. When the helicopter undergoes modification, major repair or overhaul.

2. When changes in equipment are made for a different type of operation.

3. When the helicopter is reweighed.

WEIGHING INSTRUCTIONS

Preliminary instructions

1. Remove dirt, grease, moisture, etc. from the helicopter.

Note

The helicopter must be weighed in a closed hangar.

2. Drain fuel from tanks.

Note

If it is impossible to drain fuel due to fire hazard or local regulations, fill fuel tanks to capacity. Since the weight of fuel varies with temperature, determine actual specific gravity by use of a hydrometer. Multiply by tank capacity to obtain total fuel weight. Never weigh with partially filled tanks.

3. Always keep oil reservoirs filled.

4. Fill main transmission to normal level.

5. Fill hydraulic fluid reservoirs to normal level.

6. Conduct an inventory of the operating equipment actually installed in the helicopter by means of Chart A.

Weighing procedure
(Figure 6-3)

1. Install levelling equipment on helicopter as outlined in Chapter 08-31 of Maintenance Manual.

2. Make sure that weighing equipment is zeroed.

3. Connect each cell (1) to the scales equipment.

4. Let each cell (1) and the scales indications become stable.

5. Record the weights shown on the scales for each cell. Make sure that you record the related jack position for each weight.

6. Calculate the longitudinal and lateral Center of Gravity (CG) positions.

7. Disconnect each cell (1) from the scales equipment.

8. Lower the helicopter.

9. Remove the bracket (4) from the forward jack (2).

10. Remove the three jacks (2) from the helicopter.

11. Remove the cells (1) and the adapters (3) from the three jacks (2).

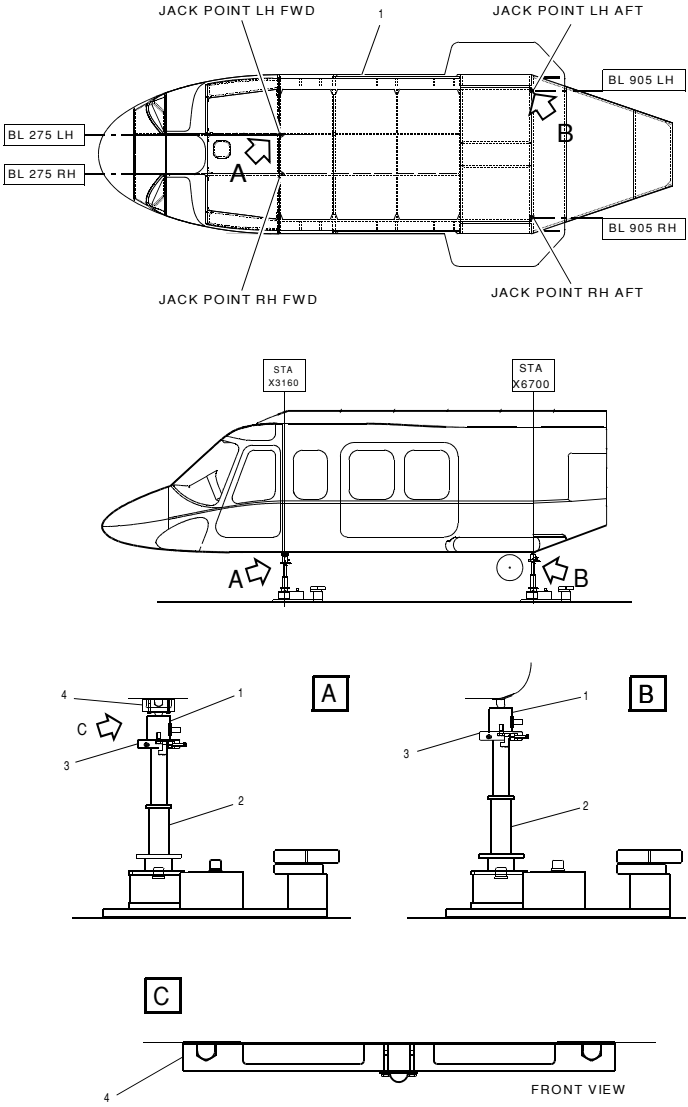

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Figure 6-3 Weighing of Helicopter

USE OF CHART B

1. Enter the actual scale readings in the first column of sheet 1. Subtract tare, if any, from the scale readings to obtain the net weight.

2. Multiply the net weights by their respective arms.

3. Add the net weight and moments.

4. Divide the total moment by the net weight to obtain “as weighed” CG position. Transfer the “TOTAL” (as weighed) weight arm and moment to the sheet 2 of Chart B.

5. Subtract the total weight and moment of equipment weighed but not part of the basic helicopter (list these items in column one).

6. Add the weight and moment of unusable fuel.

7. Add the total weight and moment of the basic items not in helicopter when weighed (list these in column two). Added items shall be marked on Chart A.

8. Enter the new basic weight and moment on Chart C.

USE OF CHART C

Chart C is a continuous history of the basic weight and moment resulting from modifications and equipment is considered the current weight and balance status of the basic helicopter. Make additions or subtractions to the basic weight and moment in Chart C as follows:

1. When the helicopter undergoes modification, major repair or overhaul.

2. When changes in equipment are made for a different type of operation.

3. When the helicopter is reweighed.

Note

If any equipment is not listed on Chart A, determine its weight and arm, and list corresponding data on Charts A and C.

USE OF CHART D

The Chart D provides information necessary for weight and balance computation.

USE OF CHART E

The Chart E serves as a work sheet and records the calculations and any corrections that must be made to ensure that helicopter will be within weight and CG limits.

Note

A Chart E shall be filled prior to any flight.

1. Enter the helicopter basic weight and moment. Obtain these figures from the last entry on Chart E.

2. Enter the weight of all applicable items in the marked “Weight”. Obtain the corresponding arms from Chart D and calculate the moments.

3. Add weight and moments. Divide total moment by total weight to obtain CG arm.

4. Ascertain that CG is within allowable limits.

5. Should corrections be required, readjust ballast to return CG within allowable limits.

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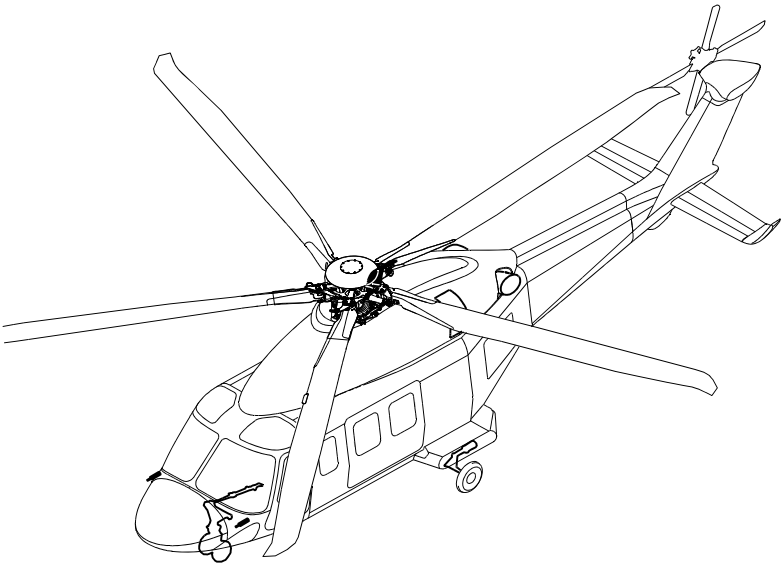
WEIGHT AND BALANCE DATA



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HELICOPTER AW139

SERIAL NUMBER . . . . . .

REGISTRATION MARKS . . . . . .

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For all pages of Chart A:

— √ Means installed on the helicopter

— ○ Means not installed on the helicopter

Page of

CHART A - EQUIPMENT LIST
Report

RECORD OF CHECKING (Date and Signature)						

MODEL: AW139	REGISTRATION MARKS	S/N											

ITEM NUMBER	POWER PLANT SYSTEM		Q.ty	WEIGHT (Kg)	ARM (mm)	MOMENT (Kgmm)	Basic configuration	In helicopter	Chart C entry	In helicopter	Chart C entry	In helicopter	Chart C entry
	P/N	DENOMINATION											

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CHART B - HELICOPTER WEIGHING RECORD			Sheet 1 of 2
MODEL:	**S/N:**	**REGISTRATION MARKS:**	
DATE:	**PLACE:**	**SIGNATURE:**	
Reason for weighing:			
Scale type:			

JACKPOINTS	SCALE READING	TARE	NET WEIGHT	STA (1)	LONGITUDINAL MOMENT	BL (2)	LATERAL MOMENT
	(Kg)	(Kg)	(Kg)	(mm)	(Kgmm)	(mm)	(Kgmm)
FORWARD				3160		0	
LH AFTERWARD				6700		-905	
RH AFTERWARD				6700		905	
TOTAL (as weighed) (to Sht. 2 of 2)							

Note 1
The forward lower Central Cabin is provided by two FWD jack points, only one FWD jack point is assured by using a proper tool which collect both jacking points.
The Station Reference Datum (STA 0) is located 3160 mm forward the FWD jack points. Therefore the STA are positive.
E = Distance from the reference datum (STA 0) to the FWD jackpoint Station of 3160 mm.
F = Distance from the reference datum (STA 0) to the LH and RH aft jackpoints Station of 6700 mm.

Note 2
The Buttock Line Reference Datum (BL 0) is located on the fuselage Center Line.
Therefore the BL are negative on the Left Hand side and positive on the Right Hand side.

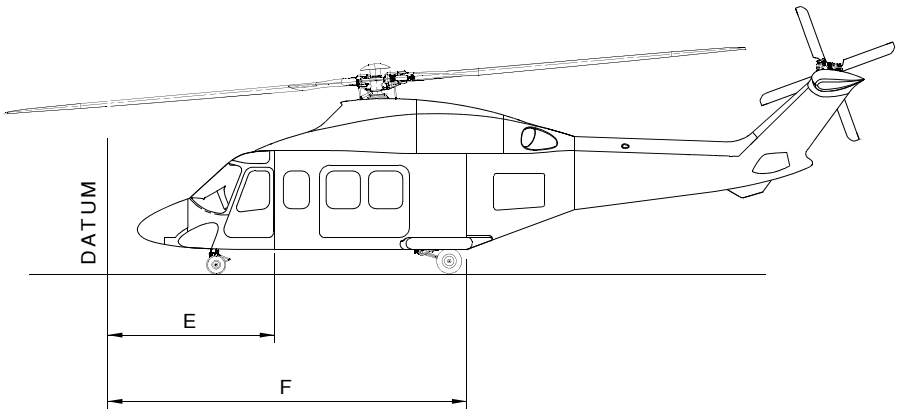

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CHART B - HELICOPTER WEIGHING RECORD					Sheet 2 of 2
DESCRIPTION	**NET WEIGHT**	**STA**	**LONG. MOMENT**	**BL**	**LAT. MOMENT**
	(Kg)	(mm)	(Kgmm)	(mm)	(Kgmm)
TOTAL (as weighed) (from Sht. 1 of 2)					
SUBTRACT (from Tab. 1)					
ADD (from Tab. 2)					
BASIC AIRCRAFT (to Chart C)					

TABLE 1 ITEMS WEIGHED BUT NOT PART OF BASIC WEIGHT

DENOMINATION	**WEIGHT**	**STA**	**LONG. MOMENT**	**BL**	**LAT. MOMENT**
	(Kg)	(mm)	(Kgmm)	(mm)	(Kgmm)
TOTAL					

TABLE 2 BASIC ITEMS NOT INSTALLED WHEN WEIGHED

DENOMINATION	**WEIGHT**	**STA**	**LONG. MOMENT**	**BL**	**LAT. MOMENT**
	(Kg)	(mm)	(Kgmm)	(mm)	(Kgmm)
TOTAL					

Reasons of the weighing:	Type Scales:

NOTE :
Remove the weight of the mission equipment items, which are pointed out in Chart A in [ ]

CHART C BASIC WEIGHT AND BALANCE RECORD															Page N°
MODEL			S/N			REGISTRATION MARKS									
DATE	Item n° see Chart A		DENOMINATION	LOADING CHANGE					BASIC WEIGHT, MOMENT & COG						SIGNAT.
	IN (1)	OUT (2)		WGT (3) (Kg)	STA CG (mm)	LONG MOMENT (Kgmm)	BL CG (mm)	LATERAL MOMENT (Kgmm)	WGT (Kg)	LONG MOMENT (Kgmm)	STA CG (mm)	LATERAL MOMENT (Kgmm)	BL CG (mm)		

Note 1 IN = installed component **Note 2** OUT = removed component
Note 3 Weight of an installed component is positive (+) Weight of a removed component is negative (-)

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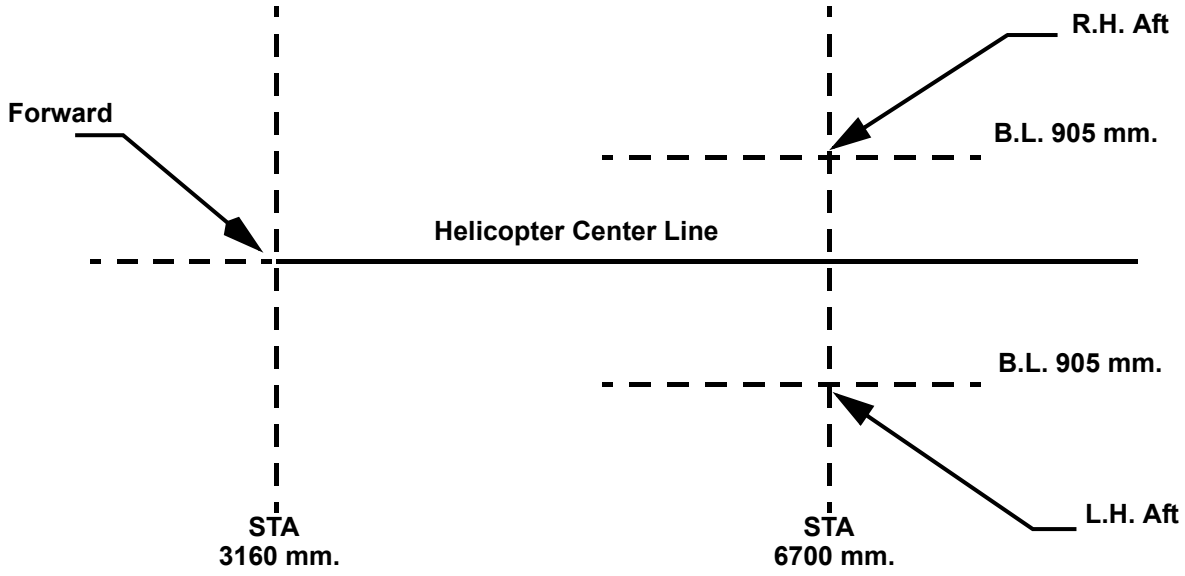
CHART D - DATA FOR HELICOPTER WEIGHT & BALANCE COMPUTATION

MODEL AW139

JACKPOINTS LOCATION



Longitudinal STA. 0 (Datum) is 3160 mm. Forward of the front jackpoint.

TYPICAL DATA

		ARM		WEIGHT (Kg.)
		STA (mm.)	BL (mm.)	
FUEL	Capacity		0	
	Unusable	6206	0	16
ENGINE OIL	Capacity	6878	0	16
	Undrainable	—	—	0
	Baggage	7700		

NOTE 1 - For pilot and crew station and for further information see Section 6 of this Flight Manual.

NOTE 2 - For further information see specific section of this Flight Manual.

NOTE 3 - Empty weight includes undrainable oil and unusable fuel.

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CHART E - WEIGHT & BALANCE COMPUTATION FORM - (12 passengers)

MODEL	S/N	REGISTRATION MARKS		DATE	PLACE	COMPUTED BY
Ref.	ITEM	WEIGHT	STA	LONG. MOMENT	BL	LAT. MOMENT
		(Kg)	(mm)	(Kgmm)	(mm)	(Kgmm)
1	HELICOPTER EMPTY (Ref. To Chart C)					
2	PILOT		2820		550	
3	COPILOT		2820		-550	
4	PASSENGER A		3415		737	
5	PASSENGER B		3415		254	
6	PASSENGER C		3415		-254	
7	PASSENGER D		3415		-737	
8	PASSENGER E		4789		737	
9	PASSENGER F		4789		254	
10	PASSENGER G		4789		-254	
11	PASSENGER H		4789		-737	
12	PASSENGER I		5600		737	
13	PASSENGER L		5600		254	
14	PASSENGER M		5600		-254	
15	PASSENGER N		5600		-737	
16	LOOSE EQUIPMENT					
17	CABIN LOAD					
18	BAGGAGE COMPARTMENT LOAD		7700			
19						
20						
21	FUEL					
22	OIL		6878		0	
23						
24	**TOTAL WEIGHT**					
25	**BALLAST (if required)**					
26	**TAKE-OFF CONDITION**					

LIMITATIONS	REMARKS
Refer to Section 1	

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CHART E - WEIGHT & BALANCE COMPUTATION FORM - (15 passengers)

MODEL	S/N	REGISTRATION MARKS		DATE	PLACE	COMPUTED BY
Ref.	ITEM	WEIGHT	STA	LONG. MOMENT	BL	LAT. MOMENT
		(Kg)	(mm)	(Kgmm)	(mm)	(Kgmm)
1	HELICOPTER EMPTY (Ref. To Chart C)					
2	PILOT		2820		550	
3	COPILOT		2820		-550	
4	PASSENGER A		3449		813	
5	PASSENGER B		3415		406	
6	PASSENGER C		3415		0	
7	PASSENGER D		3415		-406	
8	PASSENGER E		3449		-813	
9	PASSENGER F		4789		813	
10	PASSENGER G		4789		406	
11	PASSENGER H		4789		0	
12	PASSENGER I		4789		-406	
13	PASSENGER L		4789		-813	
14	PASSENGER M		5556		813	
15	PASSENGER N		5600		406	
16	PASSENGER O		5600		0	
17	PASSENGER P		5600		-406	
18	PASSENGER Q		5556		-813	
19	LOOSE EQUIPMENT					
20	CABIN LOAD					
21	BAGGAGE COMPARTMENT LOAD		7700			
22						
23						
24	FUEL					
25	OIL		6878		0	
26						
27	**TOTAL WEIGHT**					
28	**BALLAST (if required)**					
29	**TAKE-OFF CONDITION**					

LIMITATIONS	REMARKS
Refer to Section 1	

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SECTION 7
SYSTEM DESCRIPTION

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SECTION 7

SYSTEM DESCRIPTION

INTRODUCTION

This section provides a general description of the AW139 helicopter and its systems.

HELICOPTER DESCRIPTION

The AW139 is a large size multi-purpose helicopter, powered by two Pratt & Whitney PT6C-67C turbo-shaft engines. The helicopter has a five-blade fully articulated main-rotor and a four-blade articulated tail-rotor.

The structure is made up of three main modules: the cockpit, the cabin and the tail-boom.

The cockpit includes the pilot (RH) and co-pilot (LH) seats. The seats are installed side by side and are adjustable and crash-worthy.

The instrumentation is NVG compatible and the dual-controls are adjustable. Two forward opening hinged-doors with an emergency release give access to the cockpit on both sides. Large glass windshields and clear acrylic windows in the crew doors, lower nose, and roof area give the crew good visibility.

The cabin includes the passenger seats and the baggage-bay area at the back of the fuselage. A full size plug-in sliding door is located on each side of the cabin area. Each sliding door has two acrylic-plastic windows, and can be secured in the open or closed position.

The seating arrangements can be changed depending on the configuration:

Standard civil transport	12 passengers
High density civil transport	15 passengers
Civil EMS	4 litter patients, 2 non-litter patients and 2 medical attendants

The cockpit and the cabin have separate ventilation and heating systems with air-conditioning as an optional.

The tail-boom is attached to back of the fuselage and can be removed. The tail-boom holds the tail-rotor and drive-train, the vertical fin and the horizontal stabilizer.

MAJOR ZONES

Refer to 7-1 for the airframe major zones.

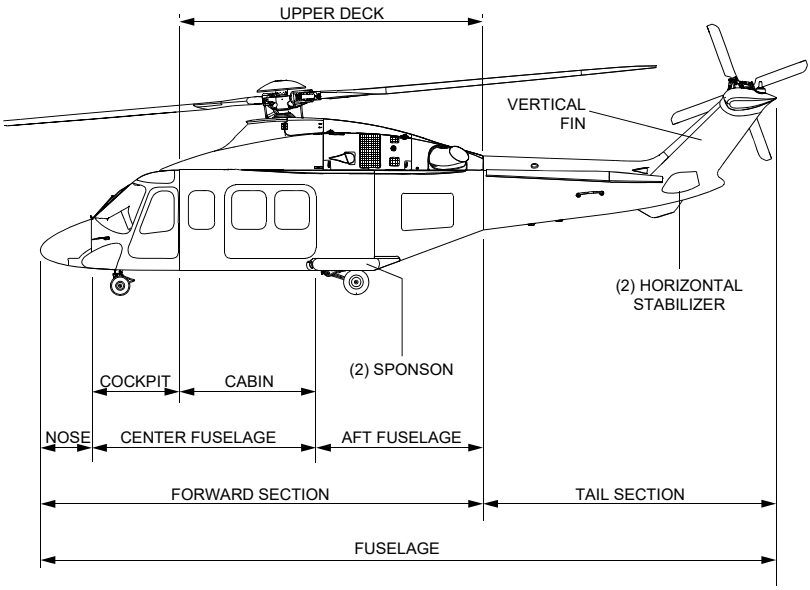


Figure 7-1 Aircraft Major Zones

INSTRUMENT PANEL AND CONSOLES

Refer to:

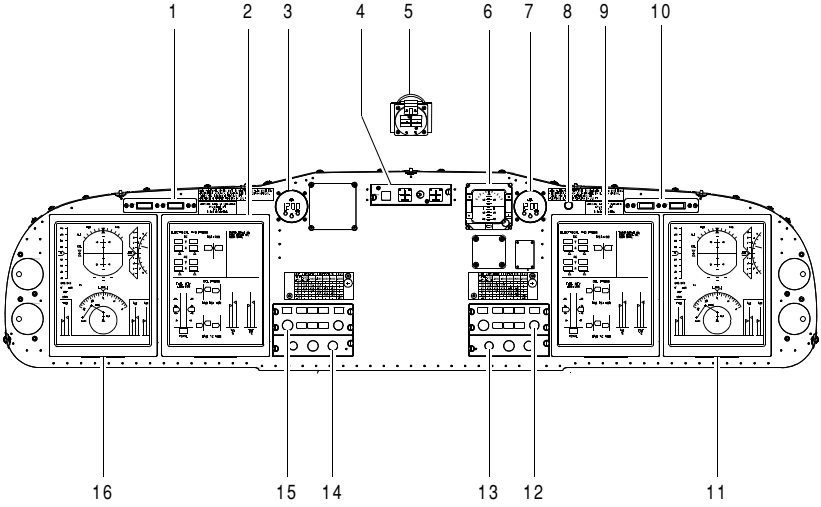
7.2 for the instrument panel.

7.3 for the central console.

7.4 for the overhead circuit-breaker panel.

7.5 for the DC generation and distribution panel.

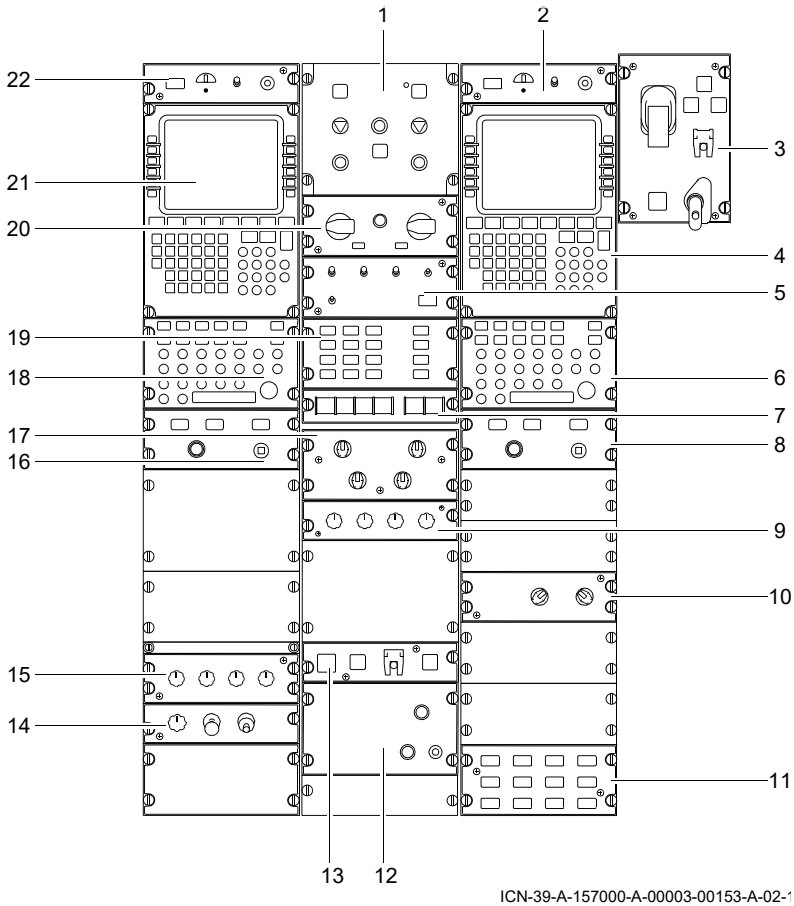
7.6 for the power distribution panels.



ICN-39-A-157000-A-A0126-00002-A-01-1

1. Co-Pilot Master Caution/Warning
2. Co-Pilot Flat Panel Display Unit
3. Co-Pilot Clock
4. Fire Detect/Ext Control Panel
5. Magnetic Compass Assy
6. Electronic Standby Display
7. Pilot Clock
8. F.D.R. Microphone Assy
9. Pilot Flat Panel Display Unit
10. Pilot Master Caution/Warning
11. Pilot Flat Panel Display Unit
12. Pilot Display Controller
13. Pilot Remote Instrument Controller
14. Co-Pilot Remote Instrument Controller
15. Co-Pilot Display Controller
16. Co-Pilot Flat Panel Display Unit

Figure 7-2 Instrument Panel



1. Fuel System Control Panel
2. Pilot Compass Control Panel
3. Landing Gear Control Panel
4. Pilot Multi-Function Control Display
5. Miscellaneous Control Panel
6. Pilot ICS Control Panel
7. Auto-Pilot Control Panel
8. Pilot Cursor Control Device
9. Display Dimming Control Panel
10. Wiper Control Panel
11. Test Control Panel
12. VENT/HTR Control Panel
13. Hydraulic System Control Panel
14. Cabin Lights Control Panel
15. Dimming System Control Panel
16. Co-Pilot Cursor Control Device
17. Display Revisionary Control Panel
18. Co-Pilot ICS Control Panel
19. Guidance Control Panel
20. Engine Control Panel
21. Co-Pilot Multi-Function Control Display
22. Co-Pilot Compass Control Panel

Figure 7-3 Central Console (basic aircraft)

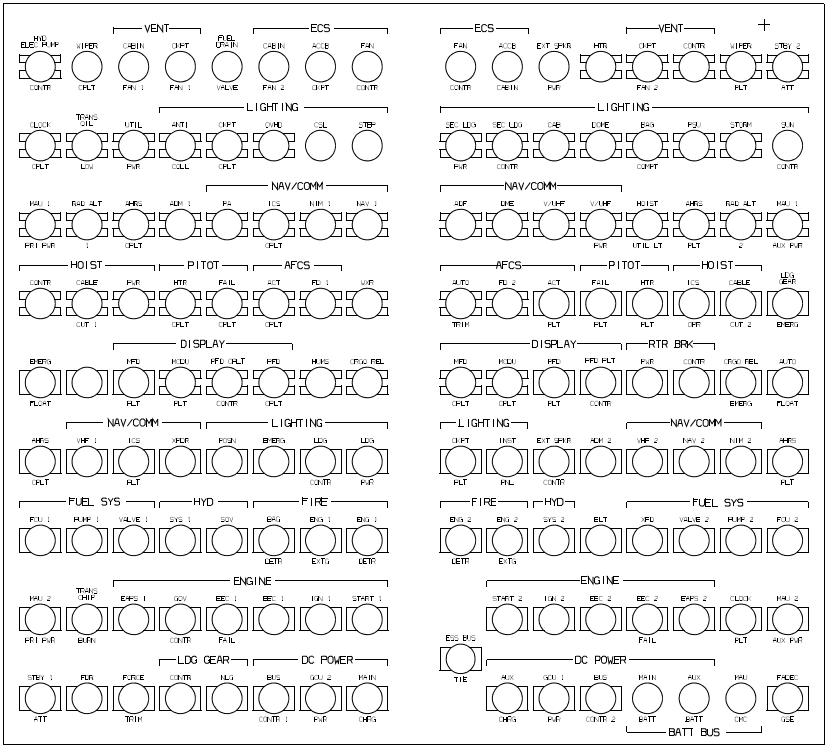


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Figure 7-4 Overhead Circuit Breaker Panel

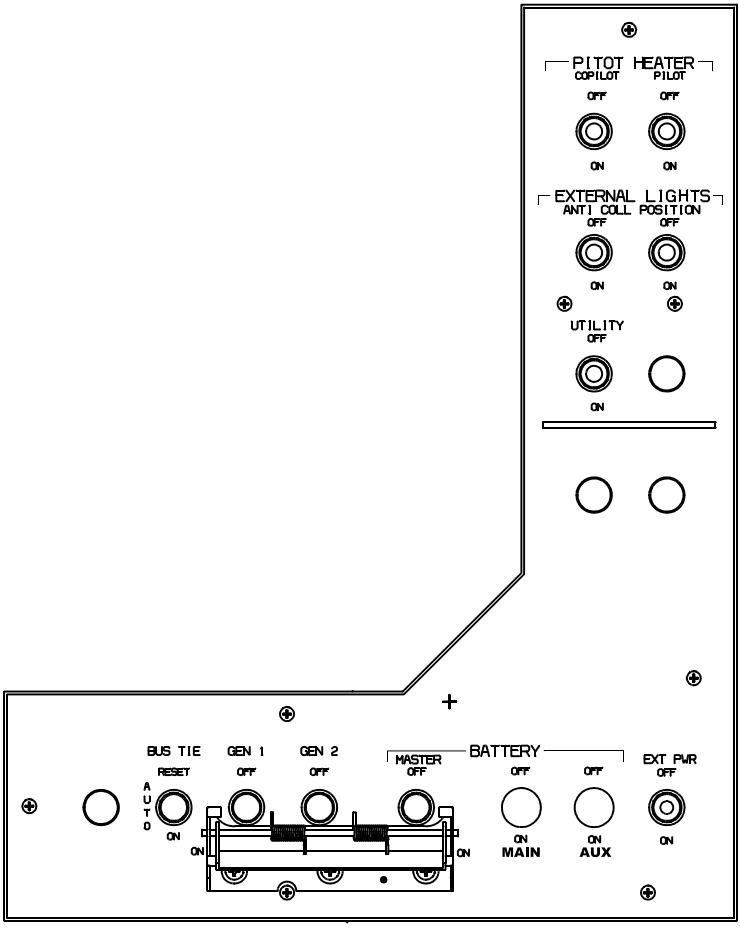

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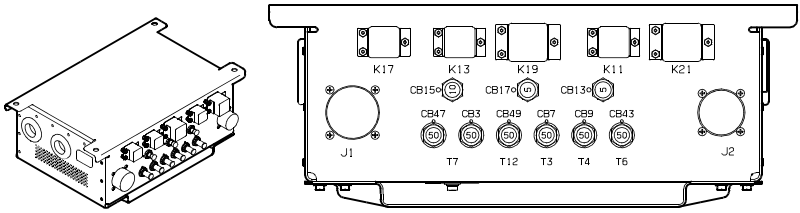
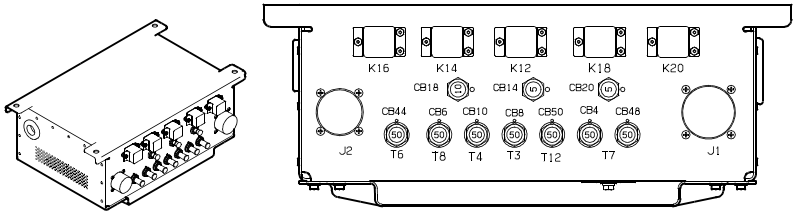
Figure 7-5 DC Generation and Distribution Panel



POWER DISTRUBUTION PANEL No. 1



POWER DISTRUBUTION PANEL No. 2

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Figure 7-6 Power Distribution Panels

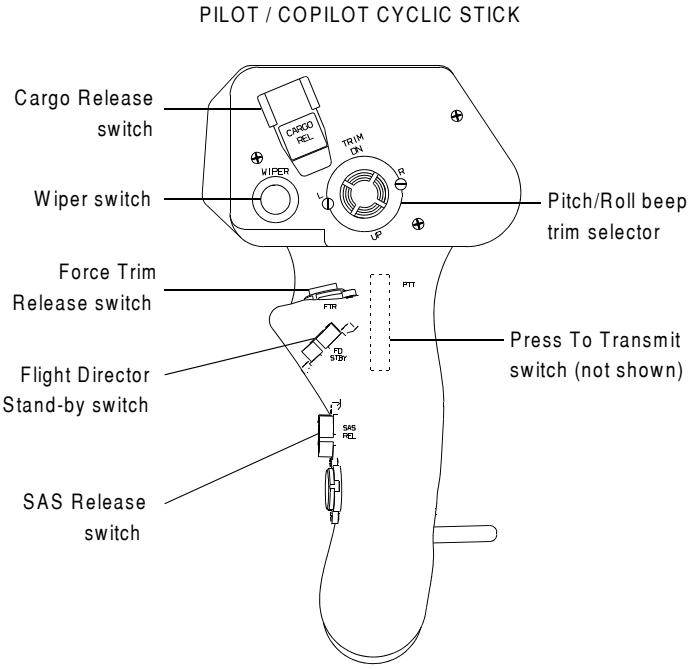

Figure 7-7 Cyclic Grip

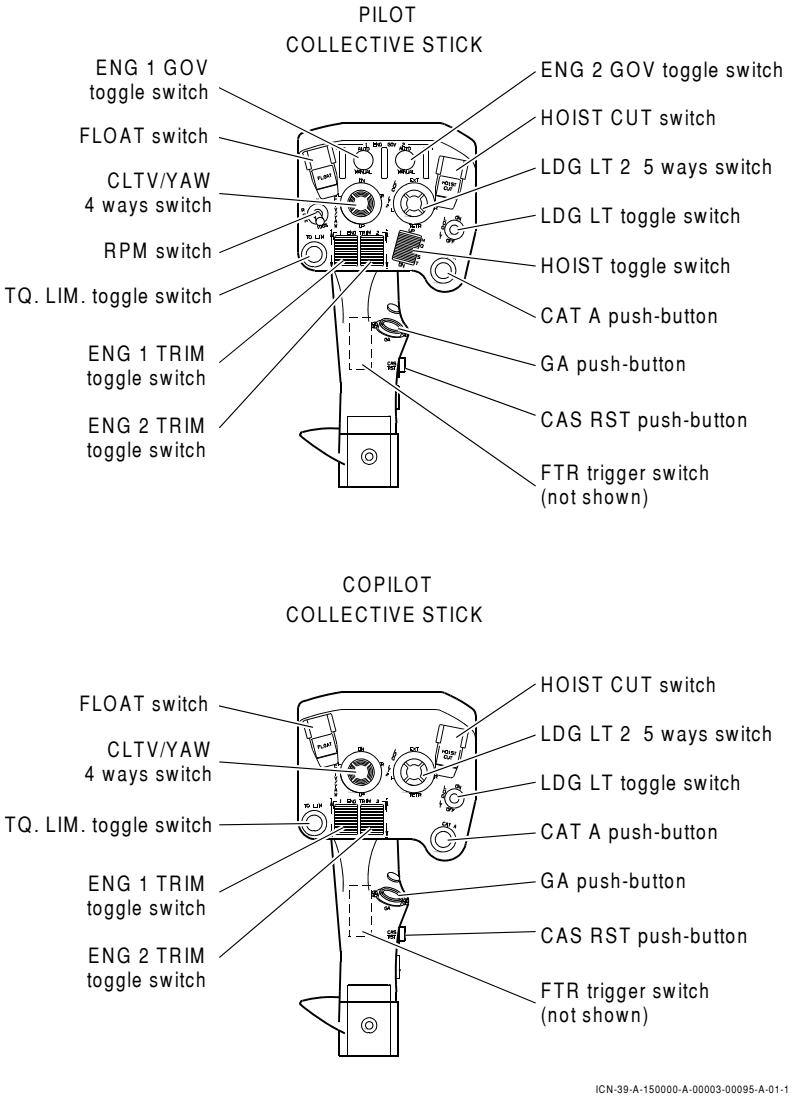

Figure 7-8 Collective Grips

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INTEGRATED AVIONICS SYSTEM (PRIMUS EPIC SYSTEM)

INTRODUCTION

The PRIMUS EPIC® system is an integrated avionics system that includes the following sub-systems necessary to operate the helicopter.

— Auto-Flight

— Communications

— Indicating and recording

— Navigation

— Central maintenance

The system can also integrate the communications and navigation systems with other sub-systems of the helicopter.

GENERAL

The PRIMUS EPIC® system is integrated into the Modular Avionics Units (MAU), the Modular Radio Displays (MRC) and the flat panel displays.

The software is integrated in different places under the Digital Engine Operating System (DEOS). Mechanical and virtual controllers are used to control the helicopter. The system includes a Maintenance System to monitor the operation of the helicopter.

The AW139 PRIMUS EPIC® system is available in two main configurations:

— Single pilot VFR

— Dual pilot IFR

Both configurations use the same display formats, controllers and sensors. The VFR configuration is a sub-system to the IFR configuration.

Modular Avionics Unit (MAU)

The MAU is a cabinet that contains field-removable modules that integrate the following equipment or systems.

— Power Supply Module (PSM)

— Network Interface Controller with Processor (NIC/PROC)

— Custom I/O (CSIO) module

— Control I/O (CIO) module

— Actuator I/O Processor (AIOP)

— Central Maintenance Computer (CMC)

— Database Module (DBM)

— Global Positioning System (GPS) (optional)

— Video CIO (optional)

AUTO-FLIGHT

The Automatic Flight Control System (AFCS) is controlled by the two Modular Avionics Units (MAU) of the PRIMUS EPIC® avionics system. The MAU's process information for the AFCS and are connected to the following components:

— The autopilot controller

— The guidance controller

— Linear-actuators

— Rotary trim actuators

— Air data modules

— Attitude and reference Systems

The AFCS has the following two basic modes of operation:

— Attitude Retention mode(ATT)

— Stability Augmentation System mode (SAS).

The ATT retention mode permits long term stabilization for hands-off flying and it can be coupled to the flight director commands. SAS mode gives short-term damping for hands-on flying.

The Yaw control function is engaged automatically when the auto-pilot is selected. The yaw control remains active in both ATT and SAS mode. Dual yaw control is provided when both auto-pilots are engaged.

The collective axis of the AFCS drives the helicopter collective controls. The collective controls are linked to a parallel actuator and a force feel assembly to give the pilot motive power and artificial feel.

The auto-trim system controls the linear actuators and keeps them in their center-of-travel position. Pitch and roll auto-trim is functional when one or both auto-pilots are engaged in any mode, except SAS mode.

The autopilot controller

The autopilot controller permits the following functions:

— Engagement of the auto-pilots

— Selection of the auto-pilot mode

— Coupling of the auto-pilot to the flight director

— Selection of Pre-Flight Test Mode

The guidance controller

The guidance controller permits the selection of all the AFCS Flight Director functions. The AFCS is controlled by the autopilot controller that interfaces with the two MAU’s.

Linear-actuators

Six high-frequency smart linear-actuators provide limited control of the pitch, roll and yaw axis. The linear actuators receive 28 V dc electrical power directly from the aircraft power bus.

Rotary trim actuators

Three low-frequency rotary trim actuators provide full control of the pitch, roll, yaw and collective axis.

Air data modules

Two Air Data Modules (ADM) supply static and dynamic pressure information to the MAU's

Attitude and reference Systems

Two Attitude and Reference Systems (AHRS) provide the MAU's with inner loop control and outer loop filter prediction where required.

Attitude Retention mode (ATT)

In the ATT mode (uncoupled), the autopilot pitch and roll channels are engaged and will maintain the attitude of the helicopter. The ATT mode will bring the helicopter back to its reference attitude after a disturbance.

To make small changes to the pitch or roll attitude the pilot can use the switch on the cyclic control lever. To make larger corrections the pilot can use the Force Trim Correct (FTR) switch and make the changes manually.

The pilot can override the AFCS ATT mode at any time by taking over the controls manually.

In ATT mode, the autopilots pitch and roll channels can be coupled to the Flight Director (FD) commands. This allows for Two-Cue operation that lets the FD control the lateral (roll) and vertical (pitch) axis.

The collective channel is also coupled to the FD commands for Three-Cue operations. Three-cue operation allows the FD to control the lateral, vertical and collective (power) axis.

The autopilot will couple to the FD if both autopilots are engaged in the ATT mode and the FD modes are selected.

Stability Augmentation System mode (SAS)

SAS mode gives short-term damping of external aircraft disturbances and improves the handling capabilities during hands-on flying. SAS mode also gives yaw rate damping, low speed heading hold and automatic turn co-ordination. SAS is intended for use where extensive aircraft maneuvering is required and the pilot prefers to be hands-on without attitude retention.

SAS is selected by pushing the SAS button on the auto-pilot controller. When operating in SAS, the cyclic beep switches will not give attitude reference changes but may still be used to set Flight Director (FD) references. Because this is a hands-on control mode, the AFCS can be operated with force trim ON or OFF.

COMMUNICATIONS

The communication system contains the equipment for communicating in the helicopter, with other aircraft, and with ground stations.

The communication system includes the following sub-systems:

— Modular Radio System

— Audio Integrating System

— VHF AM/FM NAT NTX 138 radio installation (optional equipment)

Modular Radio System

The Modular Radio System includes the Modular Radio Cabinet (MRC). The MRC uses modules from the PRIMUS EPIC® system that supply Communication and Navigational data to the flight-crew. It contains the standard navigation and communication systems, including VOR, ILS, ADF DME and VHF communication, and the Mode-S transponder system.

Audio Integrating System

The Audio Integrating System connects the communication and navigational radios to the radio headsets, microphones and loudspeakers of the helicopter.

The Audio Integrating System includes the Airborne Audio System that transmits communication and navigational audio data through two isolated buses.

The Airborne Audio System gives a high level of failure protection. If one Audio panel fails or is set to back-up mode, the system can supply the pilots with the following emergency communications:

— ICS and on-side radio receive-transmit (using PTT).

INDICATING AND RECORDING SYSTEM

The Indicating and Recording System gives the crew warnings of conditions in different systems that are not related. The system includes the Central Display System that shows the pilot and co-pilot primary flight data, navigation data and engine data.

Display system

The PRIMUS EPIC® system supplies the crew with the displays necessary for the control and navigation of the helicopter. The Active Liquid Crystal Displays (ACLCD) are the same and include the following components:

1. Flat panel display units
   - — Two flight and navigation displays (PFD) with integrated engine instruments and crew alerting information.
   - — Two Multi-Function Display (MFD) for a better display of navigation, weather-radar, and secondary engine instruments.
2. Display controllers
   - — Two PFD controllers
   - — Two Cursor Control Devices (CCD)
   - — Two Remote Instrument Controllers

— Menu selections from the MFD

— A Reconfiguration Control Panel (RCP)

— A Dimming Control Panel

3. One ADI Standby that includes attitude, airspeed and altimeter indications.

4. Each crew station has Master Caution and Master Warning lights.

NAVIGATION

The navigation system is integrated in the PRIMUS EPIC® avionic system and includes the following sub-systems:

— Flight Environmental Data

— Attitude and Direction

— Landing and Taxiing Aids

— Independent Position Determining

— Dependant Position Determining

— Flight Management Computing.

Flight enviromental data

The Flight Environmental Data system includes a primary and a secondary Air Data System (ADS).

The ADS uses air data probes to show the airspeed, outside air temperature, altitude and static/pitot pressure on the Primary Flight Display.

Attitude and direction

The attitude and direction system supplies attitude heading reference data to the flight-crew and includes the Attitude Heading Reference System (AHRS).

The AHRS uses magnetic and inertial forces to measure and give the attitude and direction of the helicopter.

Landing and taxiing aids

The Landing and Taxiing Aids receive data from ground installations and include the following sub-systems:

— Radio Altimeter System

— VOR/ILS/Data Link (VIDL) System.

RADIO ALTIMETER SYSTEM

The Radio Altimeter System uses Frequency-Modulated Continuous Wave (FMCW) signals to find the helicopters altitude during the approach and landing stages of a flight. The Radio Altitude Data is shown on the Primary Flight Displays.

VOR/ILS/DATA LINK SYSTEM (VIDL)

The VIDL system is part of the Modular Radio System and can operate in VOR, ILS and VDB mode.

The VOR receiver supplies bearing in degrees to and from the ground station.

The ILS supplies approach and landing navigation data.

The VDB receiver supplies reception of GPS correction data and runway flight-paths for the GPS landing system.

Independent position determining

The Independent Position Determining system can determine the helicopters position without ground stations and/or orbital satellites. The system includes the Weather Radar System (WX) and the Lightning Sensor System (LSS).

The WX system identifies the location and intensity of rain and hail in the helicopters flight-path. It includes a ground-map function that identifies the contour of the ground (terrain). The weather and terrain data is shown on the Primary Flight Display (PFD) and the Multi Function Display (MFD) units.

The LSS identifies the location and intensity of lightning in a radius of 5 to 100 NM of the helicopter. The LSS operates directly with the WX system, the LSS data is shown on the PFDs and the MFDs.

Dependant position determining

The Dependant Position Determining system uses ground stations and/or orbital satellites to find the helicopters position and velocity. The Dependant Position Determining system is part of the Modular Radio System and includes the following sub-systems:

— Distance Measuring Equipment (DME) System

— Air Traffic Control (ATC) Transponder (XPDR) System

— Automatic Direction Finder (ADF) System

— Global Positioning System (GPS)(optional).

DISTANCE MEASURING EQUIPMENT SYSTEM

The Distance Measuring Equipment supplies the data for in-flight navigation, terminal navigation and area guidance. The system measures the distance from the ground station, ground speed and time-to-station. The Distance Measuring Equipment consists of a DME Module and a dedicated DME antenna. The DME system is connected to the display system and to the Flight Management System through the Avionic Standard Communication Bus (ASCB-D).The digital audio bus transmits the DME identification audio signals (IDENT) to each audio panel in the audio system.

The DME system operates with radio pulses in the frequency range from 960 MHz to 1215 MHz. The airborne system transmits from 1025 MHz to 1150 MHz to a ground station. The receiver frequency range is from 962 MHz to 1213 MHz.

Indication

The PFD receives the distance data from the DME and displays the distance indication in nautical miles to the left of the horizontal situation indicator (HSI). When the source of NAV data shown is DME-hold, a DME H indication is shown adjacent to the distance indication. Indications that identify a DME station or FMS TO waypoint can also be displayed adjacent to the distance indication.

Operational Modes

The MCDU controls the modes, frequencies, and codes of all the modules in the MRC. The Radio page 1 / 2 shows DME Hold frequencies and indications that identify the DME station. When in hold, the DME frequency can be tuned independently in the Radio page 1 / 2. The NAV detail page allows selection of DME hold mode and displays the frequency related to the currently tuned DME channel.

AIR TRAFFIC CONTROL TRANSPONDER SYSTEM

The XS-856 Transponder Module has the encoding and decoding capability to operate in Mode S that allows digital addressing of individual aircraft and it is fundamental for the operation of the Optional Kit Traffic Collision Avoidance System (TCAS). It supports provision of data and control to the TCAS* computer through an ARINC 429 link.

The XS-856 Transponder Module obtains barometric altitude data from the air data functions on the Avionic Standard Communications Bus (ASCB-D). The XS-856 Transponder connects to the display system through the ASCB-D, following the same arrangement as the other radio systems.

One XPDR, P/N 3G0630A00912, is included in the basic equipment configuration. The 2nd XPDR P/N 3G3450F00512 is optional.

The Enhanced Mode S XPDR XS-858A P/N 7517401-960, which is compliant with ICAO Doc 7030/4 Regional Supplementary Procedues where Enhanced Surveillance is required, is an available option. With this system the following parameters are transmitted: Magnetic Heading, Indicated Air Speed, Barometric Altitude Rate, Roll Angle, True Track Angle, Ground Speed, True Air Speed, Selected Altitude.

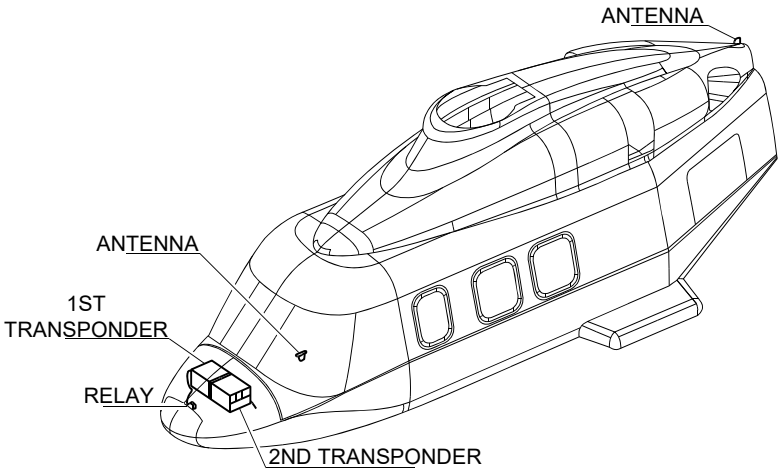

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Figure 7-9 Installation Layout

OPERATION MODES

The Transponder Module modes of operation are Mode A, C and S.

The XS-856 Transponder Module modes of operation are:

— STANDBY: ready but not replying, the XPDR system is ON

— ALT OFF: Transponder modes A and S, no altitude reporting

— ALT ON: Transponder modes A, C and S, altitude reporting enabled

— TA: TCAS is enabled, if installed.

INDICATION

The Electronic Display System (EDS) receives data from the XPDR module through the Network Interface Module (NIM) on the Avionics Standard Communications Bus (ASCB-D). The EDS displays on the Radio NAV window of the PFD the transponder code, indicating which XPDR is active. When the selected transponder is in standby mode the transponder code is replaced with the "STBY" annunciation.

In the Radio page 1/2 of the MCDU, XPDR code, status and operating mode are displayed. In the TCAS/XPDR 1/2 page of the MCDU, XPDR code (active and preset), selection (XPDR1 and XPDR2), barometric altitude data and flight ID are displayed.In the TCAS/XPDR 2/2 page of the MCDU, the transponder operating mode selection is displayed.

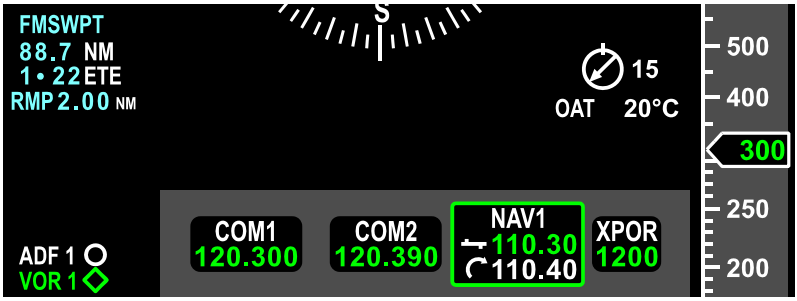

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Figure 7-10 Transponder Code Indication on PFD

OPERATION WITH CURSOR CONTROL DEVICE (CCD) AND MULTIFUNCTION CONTROL DISPLAY UNIT (MCDU).

Both CCD and MCDU can be used to operate with XPDR Module. In case of two Transponders installed, the TCAS/XPDR page 1/2 allows selection of the active transponder by the XPDR SEL key. When the selected transponder is active, each PFD provides tuning control of the transponder code. When the selected transponder is in standby mode the cursor is inhibited from selecting the transponder code to be tuned. The MCDU Radio page 1 / 2 allows control of the active transponder and current code.The following list describes the available operating modes when TCAS and transponders are installed

— If TCAS I is installed, then only modes TA, ALT-ON, ALT-OFF will be available.

— If only one transponder is installed with no TCAS, then only modes ALT-ON and ALT-OFF will be available.

The single XPDR, included in the basic configuration, is in the MRC2 (pilot side) and supplied by the ESS BUS 1. In this configuration the transponder is identified on the MCDU as XPDR.

When a second transponder is fitted, this additional XPDR is identified as XPDR1 on the MCDU. It is installed in the MRC no.1 (copilot side) and is supplied by the MAIN BUS 1. This transponder becomes the default XPDR at power up, the originally installed transponder is then identified as XPDR2. Either XPDR can be selected using the MCDU.

In the two transponder configuration the default transponder is the active system (XPDR1), a double generator failure will cause loss of this transponder and a reconfiguration to XPDR2 is required. To reconfigure to transponder XPDR2 (supplied by ESS BUS 1) the pilot MCDU must be powered temporarily (BATTERY MAIN ON), the XPDR2 set as the active transponder and the MAIN BATTERY selected OFF or as required by the Double Generator Procedure in Section 3. The transponder code may then be changed using the CCD and pilot PFD.

EQUIPMENT SPECIFICATION

For detailed information see System Description And Operation Manual PRIMUS EPIC® Integrated Avionics System for the Agusta AW139 Helicopter.

AUTOMATIC DIRECTION FINDER SYSTEM

The ADF system supplies data for in-flight navigation, terminal navigation, and area guidance. The system uses a narrow-band and wide-band to reduce noise and improve the quality of voice signals during navigation.

The selectable modes are ANT, ADF, BFO (Beat Frequency Oscillator) for the narrow band and VOICE for the wide band.

When the ADF system is used with the electronic flight instrument system (EFIS) display, the ADF system gives the radio-bearing relative to the rotorcraft-heading.

Specifically, the second DF-855 ADF module (KIT 2ND ADF, P/N 3G3450F00211 or P/N 3G3450F00212) is installed in the MRC no.1 (copilot side) whilst the single ADF installed is in the MRC2 (pilot side). In the single ADF configuration, the ADF is identified on the displays DU-1080 and MCDU as “ADF”. When the second ADF is installed, it is identified as ADF 1, and the originally installed ADF is

identified as ADF 2. The MCDU controls the modes, frequencies, and codes of all the modules in the MRC.

Pilot and/or copilot can select the PFD to display the data coming form ADF 1, ADF 2 or both by using the MCDU controls.

The second ADF Antenna is installed on the bottom center fuselage, behind the first ADF Antenna.

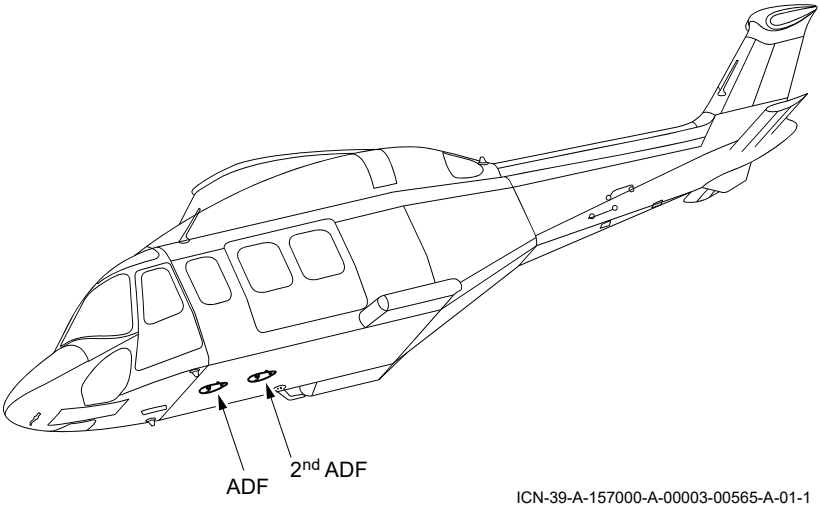

Figure 7-11 ADF Installation Layout

For detailed information see System Description And Operation Manual PRIMUS EPIC® Integrated Avionics System for the Agusta AB-139 Helicopter.

FMS AND GPS

FUNCTIONAL DESCRIPTION

The FMS combines the inputs of other aircraft systems (GPS, DME, VOR, AHRS, ADS) to output navigation, lateral and vertical commands, and aircraft performance predictions. FMS uses GPS as long range sensor and DME/DME and VOR/DME as short range sensors.

Primary functions of FMS are position computation and flight planning. These functions work with the associated guidance in both lateral and vertical axes. The FMS Database is essential to these functions in order to easily retrieve, navaids, airways, procedures, airports, other navigation data and store and retrieve waypoints and flight plans.

Performance is a secondary function containing fuel management, time estimates for the flight, vertical navigation estimates, stored flight plans and other functions.

Provided the FMS is receiving usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications of:

— VFR/IFR en route domestic, terminal, and instrument approach (GPS, VOR, VOR-DME, NDB, NDB-DME, RNAV) operation using the WGS-84 (or NAD 83) coordinate reference datum in accordance with the criteria of AC 25-11, AC 00-314, AC 20-130A. Satellite navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States.

FMS DISPLAYS AND CONTROL PANELS

General

FMS displays and data are presented on the MFD (MAP page), PFD (HSI) and MCDU.

Displayed data includes:

— A map presentation that shows:

• Radio navigation aids

• Airports

- Waypoints on the active flight plan
- Legs, patterns and approach profiles of the active flight plan.

— FMS mode annunciations.

Electronic maps integrate route map data with auxiliary navigation data to display the aircraft's situation at any time. Electronic displays integrate map data with weather radar displays, terrain maps and electronic charts. (see Primus EPIC for AB 139 PILOT'S MANUAL for MFD and PFD displays)
Control panels used in FMS operation are MCDU (Multipurpose Control Display Unit), RICP (Remote Instrument Control Panel), DICP (Display Instrument Control Panel) and GC (Guidance Controller - see Flight Director)

MCDU

MCDU includes (see figure on following page):

— MCDU display;

— nine active function keys;

— twelve line selected keys;

— an alphanumeric keyboard.

MCDU Display

The MCDU has a full color display and contains fourteen lines. Each line contains twenty four characters. The first line is a title line and the fourteenth line is the scratchpad.

Color Assignments

Color on the MCDU display page is designed to highlight important information. Color assignments are not fully coordinated with MFD and PFD displays.
Refer to following table for MCDU Color Coding Scheme

Assigned Color	Parameter
Cyan	Vertical, Performance, and Atmospheric Data
Green	Lateral, Modes
Yellow	Warnings, FROM Waypoint, Flight Plan Names
Magenta	TO Waypoint
White	Names, Titles and scratchpad messages
Red	Failures

— **Scratchpad**

The bottom line on the MCDU display is the scratchpad. The scratchpad is a working area where the pilot can enter data and/or verify data before line selecting the data into its proper position. Alphanumeric entries are made to the scratchpad using the keyboard. As each key is pushed, the character is displayed in the scratchpad. Information in the scratchpad does not affect the FMS until it is moved to another line on the display. Data is retained in the scratchpad throughout all mode and page changes.

— **Function keys**

Functions keys are presented directly below the screen. These keys access primary functions, indices (menus) and page selection.

Function keys are:

- PERF (performance)
- MENU
- NAV (navigation)
- PREV (Preview)
- NEXT
- FPL (Flight Plan)
- PROG (Progress)
- DIR (Direct To)
- RADIO

— **PERF Key**

Pushing the PERF function key displays page 1 of the performance index. The pilot can select any of the index functions by pushing the respective line select key.

— **MENU Key**

Pushing the MENU function key displays the MCDU menu page, which accesses the maintenance and status information.

— **NAV Key**

Pushing the NAV function key displays page 1 of the navigation index. The pilot can select any of the index functions by pushing the respective line select key.

— **PREV/NEXT Keys**

The specific page and number of pages in a particular function or menu display are shown in the upper right corner of the display. The page number format is AA/BB where AA is the current page and BB is the total number of pages available. Page changes are made by pushing the PREV (previous) and NEXT keys.The keys can be held down for repeated page changing.

— **FPL Key**

Pushing the FPL key displays the first page of the active flight plan. If no flight plan is entered, the pilot can perform the following:

Manually create a flight plan

Select a stored flight plan

Create and store flight plan.

— **PROG Key**

Pushing the PROG key displays the first progress page. This mode shows the current status of the flight. The first progress page displays distance to, the estimated time enroute (ETE) and fuel projection for the TO waypoint, the NEXT waypoint and destination. It also displays the current NAV mode (i.e.:GPS, DME-DME, VOR-DME,AHRS), the required and

estimated navigation performance, and the navaids that are presently tuned.

— **DIR Key**

Pushing the DIR function key displays the active flight plan page with the DIRECT, PATTERN, and INTERCEPT prompts. If other than an active flight plan page is displayed when pushing the button, the first page of the flight plan is displayed. If the active flight plan is already displayed when pushing the button, the display remains on the same page with prompts displayed. DIRECT is the primary function. PATTERN and INTERCEPT must be selected at 6L or 6R, respectively.

— **RADIO Key**

Pushing the RADIO function key results in the display of the RADIO 1/2 page. From this location and also the RADIO 2/2 page, the pilot can tune various radios including COM1, COM2, NAV 1, NAV 2, ADF and set Transponder code.

— **Function Key Paging**

Function key paging is an option that, when activated (via FLIGHT CONFIG), can be used to advance function pages using additional pushes of the function key instead of the NEXT key. For example, when initially selecting a function key, the MCDU displays page 1 for that function key. Pushing the same function key again displays page 2 for that function.

— **Line Select Keys (LSK)**

Line select keys are six on each side of the MCDU displays. Data is selected to a line from the scratchpad or viceversa using the line select keys. These keys are identified from top to bottom as 1L through 6L on the left side and 1R through 6R on the right side. The line select keys are the most often used keys on the MCDU. Typical LSK functions are:

- Direct Access Prompts/Function Selects

  In the case of an index display, the line select keys are used to select functions from the index.

In displays other than index, the bottom line select keys (6L, 6R) are primarily used for direct access to other functions in the FMS.

The FMS prompts the pilot at 6L and 6R for the most likely functions to be selected. An example is the ARRIVAL prompt that is displayed on the active flight plan pages when within 200 NM of the destination. These types of prompts reduce the number of key strokes in order to minimize pilot workload. The pilot can also access functions through the main navigation and performance indices.

- Transfer Line Data to Scratchpad

  If the scratchpad is empty, pushing a line select key transfers the respective line data to the scratchpad.

- Transfer Scratchpad Data to Line Fields

  Once data has been entered into the scratchpad either through line selection or manual keyboard entry, it can be transferred to any of the allowable line select fields on a page. To transfer the data, push the key adjacent to the line where the scratchpad data is intended.

— **Alphanumeric keyboard**

Alphanumeric keyboard is used by the pilot for input to the FMS. The alphanumeric keys make entries to the scratchpad only.

The following are each represented with a key on the MCDU:

- Letters of the alphabet
- The numbers 0-9
- The decimal
- The plus/minus
- The space
- The slash.

See MCDU figure for key location. The SP (space) key is used to insert a space following a character in the scratchpad. The +/- (Plus/Minus) key is used to enter a - or + in the scratchpad. The initial push of the +/- key results in a - being entered. A subsequent push changes the – to a +. Continued pushing of this key toggles the +/- display.

Note

When an entry is made check that no SP was previously entered. This would result in an invalid entry

— CLR Key

This key performs the following functions:

- When a message is displayed in the scratchpad, pushing the CLR key deletes the message.
- When a scratchpad entry begins with an asterisk (*) or pound sign (#), pushing the CLR key removes the entire entry.
- When an alphanumeric entry is made in the scratchpad, one character is cleared from the scratchpad (from right to left) each time the CLR key is pushed. If the CLR key is held down after the first character is cleared, other characters are cleared, one at a time, until the key is released.

— DEL Key

The DEL key is used to delete items from the FMS. When the DEL key is pushed, *DELETE* is displayed in the scratchpad. The DEL key can be line selected to delete waypoints or other items displayed in the MCDU data fields. When there is a message displayed, the delete operation is inhibited.

Delete is also used to return default values after entries have been made.

The DEL key can also be used in the scratchpad edit mode. With a dash (-) at the end of the scratchpad entry, pushing the DEL key deletes the entire scratchpad entry.

— Brightness Control

Both manual and automatic (photo sensor) brightness controls are used to increase or decrease the MCDU display brightness. When manually selected, a bright/dim bar is displayed in the scratchpad. The bright/dim bar level is controlled by pushing BRT or DIM.

Following manual adjustment, the photo sensors monitor the ambient light and maintain the brightness level of the MCDU display over various lighting conditions. Note that the brightness can be adjusted during evening hours such that, during daylight hours, the display cannot be seen.



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Figure 7-12 MCDU

DISPLAY INSTRUMENT CONTROL PANEL (DICP).

DICP has eight push buttons and two knobs.

Push buttons are (see figure below):

- BRG (1)
- BRG (2)
- NAV
- PRV (Preview)
- LNAV (Lateral Navigation)
- HSI
- MAP
- WX

These pushbuttons are used to set different presentation on HSI display. PRV and LNAV pushbuttons are used for FMS operation.

Knobs are:

- ALT SEL (Altitude Selector) to set the altitude reference on PFD altitude tape with digital readout.
- BARO, to set barometric reference to PFD altitude.



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Figure 7-13 Display Instrument Control Panel

FMS DATA BASE

The FMS Database consists of two parts: a navigation database and a custom (or pilot defined) database.

The navigation data base (NDB) can not be changed by the pilot.

Using the custom database the pilot can customize the FMS by defining waypoints and storing flight plans.

NAVIGATION DATA BASE

The navigation database contains worldwide coverage of navaids, airways, standard instrument departure/standard terminal arrival route (SID/STAR) procedures, approach procedures, airports, heliports and runways as following:

- Navaids (VOR, DME, ILS, MLS, NDB)
- Airports
- Heliports
- Runways
- Airways
- SIDs and STARs
- Approaches
- Named Intersections
- Outer Markers

CUSTOM DATA BASE

The custom database consists of pilot defined waypoints and stored flight plans. Up to 1000 pilot defined waypoints can be stored.

— Store a waypoint.

To store a waypoint perform the following:

- Press WPT LIST on NAV page
- Name the waypoint
- Enter coordinates or bearing and distance from a waypoint

— Store Present position as a waypoint.

To store present position as a waypoint perform the following:

- Press WPT LIST on NAV page
- Name the waypoint
- Press current present position coordinates adjacent line (5R)

FMS OPERATIONS

NAVIGATION

— General

The navigation function computes the aircraft position and velocity for all phases of flight. The navigation function automatically blends or selects position sensors to compute an optimum position.

First option sensor is GPS mode, second DME- DME, third VOR-DME and than the system uses AHRS (heading) and ADS (TAS) for the DR (dead reckoning) solution.

The pilot can deselect individual sensors when required.

The flight planning function computes the active flight plan with both lateral and vertical definition.

— Autotuning

In autotuning the FMS automatically selects a navaid, tunes, and checks the data from the navaid. No pilot interaction is required. During autotuning, the FMS tunes the VOR that the pilot would most likely tune whenever possible. If the VOR is required for navigation, the FMS tunes the VOR so the most optimum VOR/DME position can be established. The FMS will autotune the localizer frequency for localizer based approaches.

The tuning modes are as follows:

- A (autotune)
- V (VOR displayed as navigation source, autotune suspended)
- R (remote tune)

If autotuning is active when VOR is selected as the navigation source on the PFD, the letter V (in PROG 1 page) is displayed adjacent to navaid identifier. The V indicates that autotune is selected but is suspended while VOR is displayed as source selected. If the PFD is switched back to FMS, autotuning resumes. Remote tuning by the pilot is possible while V is displayed. If this is done, the tuning mode changes to remote (R). If VOR has been selected with PFD preview display feature, autotuning is disabled.

The tuning mode is remote if the pilot has tuned the NAV radios through MCDU of CCD. The FMS does not change the frequency the pilot has selected.

LEG SEQUENCING

During flight, the active flight plan automatically sequences so that the first leg of the active flight plan is the active leg that is referenced to the guidance parameters. Normally, the FMS sequences before the waypoint for an inside turn when the aircraft is on or close to on course: a flyover option is also available to the pilot. If the aircraft is not on course, the normal sequence occurs no later than a point abeam of the waypoint. Some waypoints have unique sequence criteria. For example, a holding fix is a flyover waypoint. The holding fix should be overflown before entering or exiting holding. Some waypoints in SID and STAR procedures also have unique sequence criteria. The FMS is programmed to automatically comply with these requirements.

There are situations where the sequence criteria cannot be satisfied by the FMS. Under these conditions, the pilot must perform the sequence manually to aid the FMS. This requires the pilot to modify the active flight plan and it may consist of one of the following:

— The FROM waypoint can be changed to force a sequence. To accomplish this task, line select the waypoint to be sequenced into the scratchpad. Then, make the waypoint the FROM waypoint on the ACTIVE FLT PLAN page by selecting 1L. The FMS will then look through the flight plan to find the same waypoint. All waypoints between will be deleted from the ACTIVE FLT PLAN. The advantage of this method is that it preserves the leg definitions contained in the flight plan.

— A direct-to can be performed to the desired TO waypoint. This will delete all the waypoints prior to the waypoint and the FMS will create a direct leg to the waypoint. This will result in a new path to the waypoint that can be different than the previous path contained in the flight plan.

— Some leg sequences indicate the direction of turn to the new leg by displaying an **L** or an **R** in reverse video. This notation is used when either the direction of turn is indicated (by a SID, STAR, or approach) or the new leg requires a large turn (near 180×) to track the new course.

— When the destination waypoint is sequenced, it is retained by the FMS as the TO waypoint. Bearing, distance, and required track to the destination waypoint continue to be computed and displayed.

Discontinuities

A discontinuity can exist in the flight plan. A discontinuity is a segment in the flight plan where there is no lateral flight plan definition. However, there must be a lateral definition before and after a discontinuity.

When making a change, discontinuities in the flight plan are kept to the minimum. There are times when it is necessary to have a discontinuity. The following rules apply:

— When adding or deleting a single waypoint, no discontinuity can be inserted in the flight plan. The flight plan is directly linked between the waypoints. Deleting several waypoints at a time does not cause a discontinuity.

— When linking flight plans or inserting a procedure, no discontinuity can exist when a common waypoint is used. If there is not a common waypoint, the inserted flight plan or procedure is linked at the point of insertion, but has a discontinuity at the end. For example, if the last waypoint of a SID is also a waypoint in the flight plan, the flight plan and procedure are linked at that waypoint with no discontinuity. If the last waypoint of a SID is not in the flight plan, there is a discontinuity between the SID and the flight plan. Some procedures have embedded discontinuities that are inserted along with the procedure.

— A SID can only be replaced with another procedure and cannot be deleted. The linked portions of an arrival can be deleted via the ARRIVAL page. In both cases, the discontinuity depends upon the changed procedure. Linked flight plans or procedures can be deleted under the same operation for deleting waypoints. This operation does not cause discontinuity.

— DIRECT-TO does not cause a discontinuity even though several waypoints are deleted or a single waypoint is added.

— If an airway is inserted in the flight plan, there is no discontinuity since the pilot has to specify the beginning and end points.

— The INTERCEPT function does not create a discontinuity before or after the intercept point. When choosing the heading to intercept option, a fly heading select leg is inserted that disengages the FMS when the leg is sequenced.

A discontinuity can be deleted pressing DELETE key and adjacent Line Select Key.

APPROACH

Once an approach has been selected, there are many things the pilot should check and/or monitor during the approach. The following is a list of those items:

— Before starting a non--precision approach transition or approach, the crew must review the published approach procedure and verify the FMS waypoints and altitude restrictions.

— Before starting a non-precision approach transition that is flown by the FMS, it is important to verify that the transition is cleared by ATC.

— The APP annunciator must turn on 2 NM before the final approach fix. It will remain lit for the remainder of the approach. This is a positive cue to the flight crew that the sensor configuration is correct and sensor integrity is within limits for the approach. The approach annunciator is not lit during localizer based approaches since the FMS is not authorized to be coupled during localizer approaches. The DGR annunciator must be off throughout the approach. If the DGR annunciator turns on, the FMS should not be used for the remainder of the approach and the flight crew can continue the approach using raw data or perform the missed approach procedure.

— If VNAV (VPATH) is used for vertical guidance on the approach, verify that the approach plate waypoint altitudes are shown on the FMS MCDU. Verify that the altitude selector is set to the minimum descent altitude (MDA).

— Since charts are continually updated, the FMS waypoint names may not exactly match the chart names. Additionally, there can be differences between courses displayed on the chart and those displayed on the MCDU and MFD/PFD. These differences are the result of changes in magnetic variation and are normally less than 2 degrees.Verify possible changes before starting an approach.

— Refer to the GPS for information on GPS RAIM for GPS only approaches.

— Approaches in the navigation database consist of localizer based approaches and non--precision approaches. There are no circle-to-land procedures in the database. The FMS is certified to fly all non-precision approaches (GPS, NDB, VOR/DME, VOR, RNAV, NDBDME, DME/DME). Approaches from the database can contain DME arcs. The FMS flies the arc as specified in the approach. In some cases, clearance to intercept the arc other than specified in the approach is given.

— The FMS cannot be used to fly localizer approaches (ILS, LOC,BC (back course), SDF, LDA, IGS (instrument guidance system), DGPS (differential global positioning system)). These approaches are flown by displaying the localizer data and by using the flight director/autopilot. However, these procedures can be selected and activated on the FMS to enhance situational awareness. The FMS displays the approach on the MFD map displays. The FMS can be used to fly the approach transition and the missed approach phases of precision approaches. If the approach transition is in the active flight plan, and the radios are in AUTOTUNE, the FMS will autotune the localizer frequency on the leg to the final approach course.

— An approach can be selected with or without an approach transition. For example, if receiving vectors to the final approach course, an approach transition need not be selected with the approach. The pilot flies the specified vectors and arms LNAV. The FMS automatically captures the final approach course.

— A proper use of the altitude selector is recommended while in VNAV during all phases of flight, including the approach phase. The altitude selector should not be set below the published MDA until the runway is visible and the approach can be made.

— Before flying the approach, the waypoints, as well as constraints in the procedure, should be verified with the approach charts. If the database contains more waypoints for the procedure than the chart actually shows, the flight plan should reflect the selected procedure.

— Following selection of an approach, the following should NOT be performed to the approach procedure.

- Add waypoints into the middle of an approach procedure.
- Relocate procedure waypoints in the flight plan.
- Remove waypoints from an approach procedure (other than by DELETING the FROM waypoint, performing a DIRECT TO, activating another approach, or activating another flight plan), and then continue to fly the procedure.
- Change an altitude or angle constraint associated with an approach waypoint.
- Add holding patterns, orbits, or radial intercepts to approach waypoints.
- Change the destination and then continue to fly the approach procedure to the original destination.

MISSED APPROACH

The FMS displays a MISSED APRCH prompt at 6L on the active flight plan pages. This occurs 2 NM before the FAF or 5 NM from the runway, whichever is reached first. If the prompt is selected, the missed approach procedure is activated and inserted in the flight plan following the MAP.

Pressing the go-around button(s) (GA) on the collective grip, while the MISSED APRCH prompt is displayed, activates the missed approach.

When MISSED APRCH is selected, the APP annunciator extinguishes and the FMS transfers from the approach mode to the terminal mode.

ALTERNATE

An alternate, if entered, follows the active flight plan and missed approach (if entered) pages.

— Alternate Origin

The alternate origin is the destination of the primary flight plan. No alternate flight plan can be specified until the primary destination has been specified. Changing the primary destination clears the alternate flight plan because the alternate origin changes.

— Alternate Waypoints

Alternate waypoints apply to the alternate portion of the flight plan only. The FMS guidance is not engaged until the pilot selects the alternate destination. If the alternate portion of the flight plan is enabled, the corresponding waypoints are incorporated into the primary portion of the flight plan. At that point, all active flight plan rules apply.

— Alternate Destination

The alternate destination is entered when defining a flight plan to an alternate. Like the primary flight plan, the alternate destination is entered as the final waypoint to close out the alternate flight plan.

PATTERNS

Patterns can be selected for both the active and stored flight plans. For active flight plans only, the PATTERN prompt at 6L is displayed when selecting the DIR key. For stored flight plans, the prompt at 6L is always PATTERN. The procedures for selecting and defining all patterns are similar. In addition to the pilot defined patterns, some procedures, such as approach procedures, contain patterns. These database patterns are added to the flight plan when activating the approach procedure.

PATTERNS key prompt the following patterns:

— HOLD

A hold can be entered and defined with leg time/distance, inbound track, left or right turn and type of entry

— PROCEDURE TURN

Selecting this key it is possible to change leg distance if a procedure turn is part of the activated approach.Note that default speed used to calculate the leg distance is, by default, 120 kts.

— FLYOVER

A flyover can be selected on a waypoint instead of the inside turn.

— ORBIT

An orbit can be entered and defined with a radius from the waypoint and a CCW or CW direction. Orbit cannot be entered at destination.

— RADIAL

A radial can be entered and defined with inbound/outbound track and distance from a waypoint.

— SUSPEND

An active flight plan can be suspended at the present position or at the downpath waypoint.

LATERAL NAVIGATION (LNAV)

LNAV is the function in the FMS that sends commands to the flight guidance computer to laterally steer the aircraft.

LNAV guides the aircraft along a flight path predetermined by the pilot including flight plans, departures, holding patterns and approaches.

LNAV maintains the aircraft within an airway or protected airspace.

General LNAV Rules

— The FMS must be selected as the navigation source.

— A minimum of one leg must be defined for LNAV calculations.

— LNAV is available for all phases of flight.

— Leg sequencing is performed with inside turns between two legs.

— LNAV bank angles are normally as for rate 1. Roll rate is 3 degrees per second.

— The distance shown for each leg of the flight plan accounts for the distance travelled due to the change in course from one leg to the next.

— A lateral track alert (waypoint identifier flashing) is given for each waypoint sequence. The alert is given 30 seconds before starting a turn.

LNAV Submodes

— LNAV arm

When initially selected, LNAV arm (white caption) becomes the active mode. While armed, the FMS monitors aircraft position and heading against the active leg. When within the capture zone, the FMS automatically changes from LNAV arm to LNAV capture (green caption) and guides the aircraft to capture the active leg.

While in the armed mode, the FMS does not laterally control the aircraft. The HEADING lateral mode is used to control the aircraft until the FMS changes to LNAV capture.

— LNAV capture

The FMS begins lateral steering control when the mode changes from arm to capture.

One of the requirements of LNAV is to keep the aircraft within protected airspace. This is done by incorporating a model of protected airspace into the FMS.

VERTICAL NAVIGATION (VNAV)

VNAV gives a complete vertical profile for the entire flight and is integrated with the lateral flight plan. Using FMS VNAV, the operator can define vertical profile information that may be manually flown by pilot.

Note

VNAV cannot be coupled to the FD. VNAV altitude profile must be flown manually.

VNAV General Rules

— For VNAV operation, performance initialization and activation of altitude selector (ALT SEL) is required.

— It is recommended to set the altitude selector at the altitude cleared by ATC

— For climbs, only TOC information is provided on the MFD. The TOC is the location at which the aircraft should complete the climb.

— For descents TOD information is provided on the MFD and VPATH (vertical flight path) on the PFD. On MCDU a BOD (Bottom of descent) information is also presented. The TOD is the location at which the aircraft should commence a descent. The BOD is the location at which the aircraft should complete the descent.

— When the altimeter is adjusted to display height above the ground (Q_{FE}) rather than sea level, VNAV should not be used.

VPATH

A vertical path will be shown during a descent if:

- There is an altitude constraint in the descent
- An approach is activated

With a VPATH, a slope angle (from 1 to 6 degrees) will be indicated in the MCDU displays. Whenever the vertical profile includes two consecutive slopes with different slope angles, a discontinuity in the vertical indicator may be shown at the transition.

Vertical Entries

Vertical definitions for waypoints are entered using the right hand line select. The FMS supplies vertical predicted information for each waypoint and displays it in small characters. Pilot entries are used to modify and further define the vertical profile. Pilot entries are displayed in large characters. The following information is displayed and/or entered for each waypoint in the flight plan.

— **Altitude.**

Predicted altitudes are displayed in small characters for each waypoint. Pilot entries, displayed in large characters, become altitude constraints for VNAV. Altitude constraints from procedures are also displayed in large characters.

— **Constraint type.**

Constraint type is displayed directly above altitude constraints on MCDU display. The constraint type shows as CLB for climb constraints and DES for descent constraints. The FMS automatically assigns constraints in the first half of the flight plan as climb (CLB), unless the entered constraint is below the current aircraft altitude, and those in the last half as descent (DES). This automatic assignment is correct for most flights. The pilot can make an overriding entry. C, CLB, D, or DES are accepted as entries. Pilot entries are required for flights that climb, descend, and climb again.

Climb constraints are altitude and speed constraints that are

associated with waypoints in the climb or cruise portion of the flight plan. Altitude constraints can be AT, AT or ABOVE, or AT or BELOW. For example, an entry of 10000A (**A** following the altitude) indicates AT or ABOVE. An entry of 10000B (**B** following the altitude) indicates AT or BELOW. An entry of 10000 (no letter following the altitude) indicates AT. A constraint altitude will be indicated on MCDU in larger digit.

Descent constraints are altitude, speed, and angle constraints that are associated with waypoints in the descent portion of the flight plan. The FMS obeys descent speed constraints at and after the waypoint that contains the constraint. The FMS obeys angle constraints from the TOD to the waypoint containing the constraint. Normally, the FMS calculates the angle constraint based on performance initialization; however, a specific angle constraint can be entered at a waypoint in the flight plan.

— Speed.

Speed is displayed except when an angle is entered. The FMS calculates and displays a predicted speed for each waypoint. Speed can be entered in either CAS or MACH. If the waypoint is in a path descent, the angle is displayed.

Note

CAS is recommended for speed entries

— Angle.

A descent vertical path (VPATH) is displayed when the FMS will fly a vertical path to a waypoint. An altitude constraint for the waypoint is required for the FMS to be able to fly a vertical descent path. The vertical angle is calculated based on current conditions and performance initialization. FMS computed vertical descent angles are displayed in small font while pilot entered angles are displayed in large font. VPATH angles are from 1° to 6°. VPATH default descent angle is part of performance initialization, however, after the angle is displayed for each waypoint, the crew can change it.

— Vertical speed.

The FMS predicted vertical speed is displayed unless a higher priority item is displayed. Pilot entry of vertical speed is not permitted.

Top of Climb (TOC)

A TOC waypoint is calculated and displayed on the vertical profile and shown on the PROGRESS 2 page.

However, it is not in the active flight plan. There can only be one TOC waypoint at a time. The TOC is calculated based on current aircraft altitude, climb speed, and the cruise altitude.

Initial Cruise Altitude

The initial cruise altitude is used by the FMS to determine the altitude where the cruise phase of flight

commences. The initial cruise altitude is set during performance initialization on PERFORMANCE INIT.

Cruise Altitude

Cruise altitude is the current altitude that is used by the FMS to plan the cruise portion of the flight. Initially, the cruise altitude is set equal to the entered initial cruise altitude. The cruise altitude is automatically adjusted by the FMS as function of the the altitude selector settings.

Top of Descent (TOD)

A TOD waypoint is calculated and displayed on the vertical profile and shown on PROGRESS page 2.

If there are no constraints during the descent, the TOD is calculated using the destination elevation (if available) and the descent speed schedule. If there are constraints during the descent, the TOD is calculated using the path mode and a vertical flight path is shown on PFD at the TOD.

PERFORMANCE

The FMS performance computations are based upon initialization data, flight plan, and input from aircraft systems. With this information, the FMS can control a variety of mission planning and speed control functions for the aircraft.

The MCDU pages that control performance are similar to the navigation pages. As a general rule, when the system supplies the information, items are displayed in small characters. They are displayed in large characters when the pilot makes an entry.

There are several areas of initialization within the performance functions of the FMS. In order for the FMS to calculate performance data, the initialization pages must be reviewed and the CONFIRM INIT prompt at 6R on the last page of initialization must be pushed.

Performance information in the FMS is based on data entered by the pilot and calculated by the FMS. Mission planning data has not been evaluated accuracy and is not approved by the Aviation Authorities.

FMS fuel quantities are displayed in two different ways. When displaying current fuel on board, the quantity is in pounds or kilograms. When displaying planned fuel remaining at waypoints and fuel required, the quantity is displayed in thousands of pounds or kilograms (e.g., 0.9, meaning 900). Fuel quantities that reflect the gauge value are displayed in pounds or kilograms. Fuel quantities associated with the flight plan are displayed in thousands of pounds or kilograms.

The FMS fuel management data is advisory information only. It must not be used in lieu of the aircraft's primary fuel quantity and fuel flow indicator display.

Performance initialization

Performance initialization is required for the operation of vertical navigation (VNAV) and performance calculations. There are four PERFORMANCE INIT pages when CURRENT GS/FF or PILOTSPD/FF is selected.

The default values for most performance initialization data are the values from the previous flight. Assuming the aircraft is flown the same way each flight, performance initialization consists of verifying the

default values, making changes where required, and entering items such as wind and weight.

Data verified and entered under performance initialization effects several performance functions important to the completion of the flight.

For example, understating wind can indicate sufficient fuel to complete the flight. In reality, more fuel may can be required. A careful review of initialization data is required to ensure accurate predicted aircraft performance.

All data must be entered on the PERF INIT pages in order for the FMS to display VNAV predictions.

Fuel Management

Fuel management shows the current fuel quantity, fuel flow, groundspeed, true airspeed, ground specific range and air specific range on page 1, individual and total engine fuel flow as well as fuel used on page 2.

Fuel quantity units can be customized on kg or lbs

The current fuel weight calculated by the FMS is displayed in large characters. It is the same value as the fuel weight on the PERFORMANCE INIT page. Entering *DELETE* returns the display to the sensed fuel weight. If the performance initialization has not been completed, dashes are displayed.

The sensed fuel flow is displayed in small characters when received by the FMS. Pilot entries are permitted and displayed in large characters. Entering *DELETE* returns the display to the sensed fuel flow if one is available.

The FMS fuel weight is equal to the gauge value when the aircraft is on the ground. This is the case when no engines are running in flight position. Upon completion of engine start for both engines, the FMS fuel weight is set equal to the gauge value. This value is then decremented by the sensed fuel flow.

This method allows also for fuel leak detection.

The FMS displays the scratchpad message COMPARE FUEL QUANTITY when the FMS fuel weight differs from the gauge value by more than 2% of the BOW (Basic Operating Weight).

Entering a manual fuel flow can cause significant differences between the FMS fuel quantity and the actual fuel quantity. For this reason, it is recommended that no entry of fuel be made unless the sensed fuel flow is not available.

Note

Entry of a fuel flow here is not the same as entry on PERF INIT for pilot entered GS/FF mode.

The fuel used display is normally cumulative from the last power up on the ground. The total fuel used is the same as what is displayed at 2L on the FLIGHT SUMMARY page, which can be reset. Resetting fuel used on the FLIGHT SUMMARY page also resets individual engine fuel used on this page.

POWER PLANT

The AW139 is powered by two Pratt & Whitney Canada PT6C-67C turbine engines. The engines are installed in separate fire-proof compartments above the cabin roof and are attached to the helicopter airframe and the Main Gearbox (MGB).

Each engine is a free turbine turbo-shaft propulsion engine that includes a four stage axial compressor and a one stage centrifugal compressor. The compressors are driven by a single-stage compressor turbine.

The engine lubrication system includes an oil tank, a pressure system, a scavenge system and a breather system. The system supplies a regulated and filtered flow of oil to the engine.

The engine indicating system includes sensors and probes installed on the engine that check the status of the engines. The signals are sent either directly to the cockpit instrument panel, or via the Electronic Engine Control (EEC) system.

The engine fuel and control systems supply the engines with clean fuel at the required pressure and flow. The EEC system permits the accurate control of the engine speed and protects the engines from over-speeding. The engine control system includes a manual back-up engine control system operated by push-pull cables.

Fuel to the engines is supplied by the fuel system through the selector manifold, while air is supplied by individual air inlets. The exhaust gases from the engines are sent through an exhaust duct into the atmosphere.

The engine ignition system includes a high-voltage ignition unit and two spark igniters. The system is used to start combustion with quick light-ups over a wide temperature range. Energy for the system is supplied by the aircraft 28 volt DC power supply.

An Accessory Gearbox (AG) on each engine supplies drive to the starter-generators, the alternator, the fuel management module and the oil pumps.

The power turbine turns the output shaft at the front of the engine. The output shaft supplies power to the input gears of the MGB.

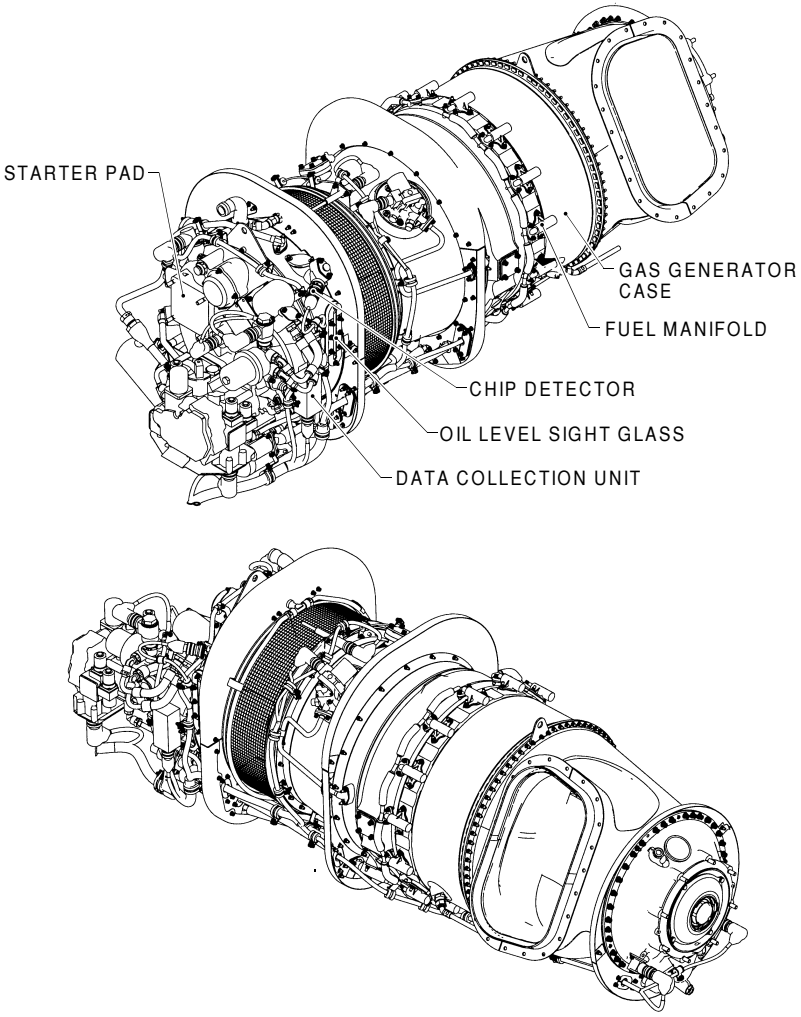

Figure 7-14 Pratt & Whitney Canada PT6C-67C Engine

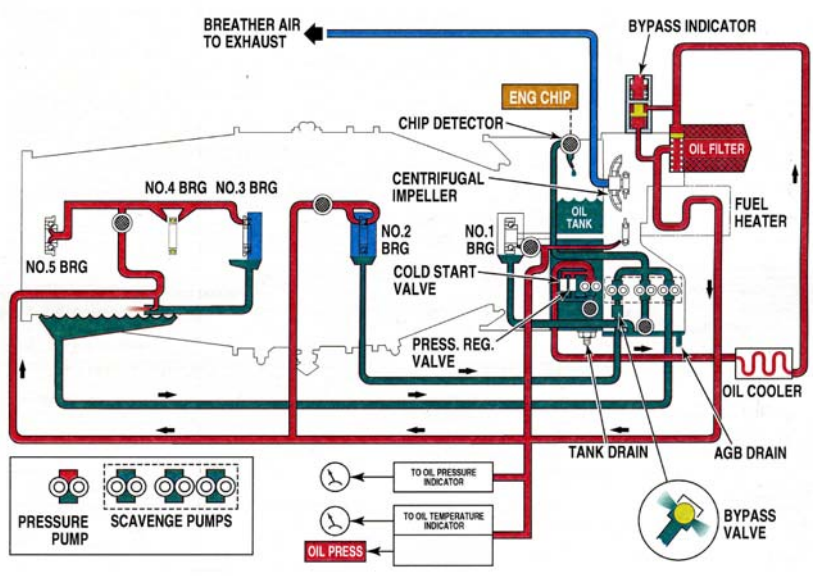

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Figure 7-15 Engine Oil System

FIRE DETECTION AND PROTECTION SYSTEM

The fire detection and protection system includes a fire detection and fire extinguisher sub-system. The system is controlled by the FIRE DETECT/EXTING Control Panel, installed on the instrument panel.

A Test Control Panel gives a lamp test of all the control panels used in the fire detection and protection system.

Malfunctions of the system are shown on the CAS message window of the Multi Function Display (MFD).

Fire detection system

The fire detection system has a heat detector installed in each engine compartment, and a smoke sensor installed in the baggage compartment.

The heat detectors are continuous wires that protect the critical areas of the engine. When a fire or smoke is detected, the sensors transmit a message to the DETECT/EXTING Control Panel. A warning alarm goes off and the control panel shows the status of the system and the location of the fire.

Fire extinguisher system

Each engine compartment has two fire extinguisher bottles and directional flow valves installed. The extinguisher bottles are controlled manually by the pilot on the FIRE DETECT/EXTING control panel.

When the pilot operates the system, the directional flow valves make sure that only one of the extinguisher bottles is operated. If the pilot operates the system a second time, the second bottle will be operated.

FUEL SYSTEM

The fuel system consists of primary elements

— Fuel Storage

— Fuel Gauging

— Fuel Distribution

— Fuel venting and Drainage.

The flexible bladder type fuel cells are installed behind the passenger cabin. The cells are interconnected, however retain a capacity of fuel below the interconnection to avoid a rupture of one fuel cell draining all fuel from the helicopter. The cells are filled via gravity refuelling or as a customer option a Closed Circuit refuelling receiver CCRR may be accommodated. The fuel cells and supporting sealed tank structure have been demonstrated crash resistant. The fuel cells incorporate inspection features, water drain and fuel drain provisions.

The gauging system consists of fuel control unit (FCU) and 4 off capacitance probes (2 off main probe, 2 off secondary [Lower] probes). The response to the probes is reported to Pilot's Primary Display Unit, via the Fuel Control Unit. The secondary [lower] probe facilitates the installation of an independent low level sensor.

The fuel control unit (FCP) controls the operation of the fuel cell mounted booster pump, shut off and cross-feed valve functionality. Either of the 2 off systems is capable of impendent operation, or as required, cross-feed functionality via the manifold. Booster pumps provide primary motive flow to the powerplant portion of the fuel system, however the engine mounted high-pressure pumps are capable of maintaining adequate fuel supply in purely suction mode. Pressure transducers and switches are incorporated to monitor system performance. The powerplant portion of the fuel system consists of an accessory gearbox (AG) mounted pump, and complimentary fuel management unit, fuel heater, and nozzle manifold.

The fuel system incorporates venting and drainage provisions to preclude the build up vapours or spillage. The fuel cells are vented to atmosphere via independent lines incorporating flame arrestor's and lightening protection features.

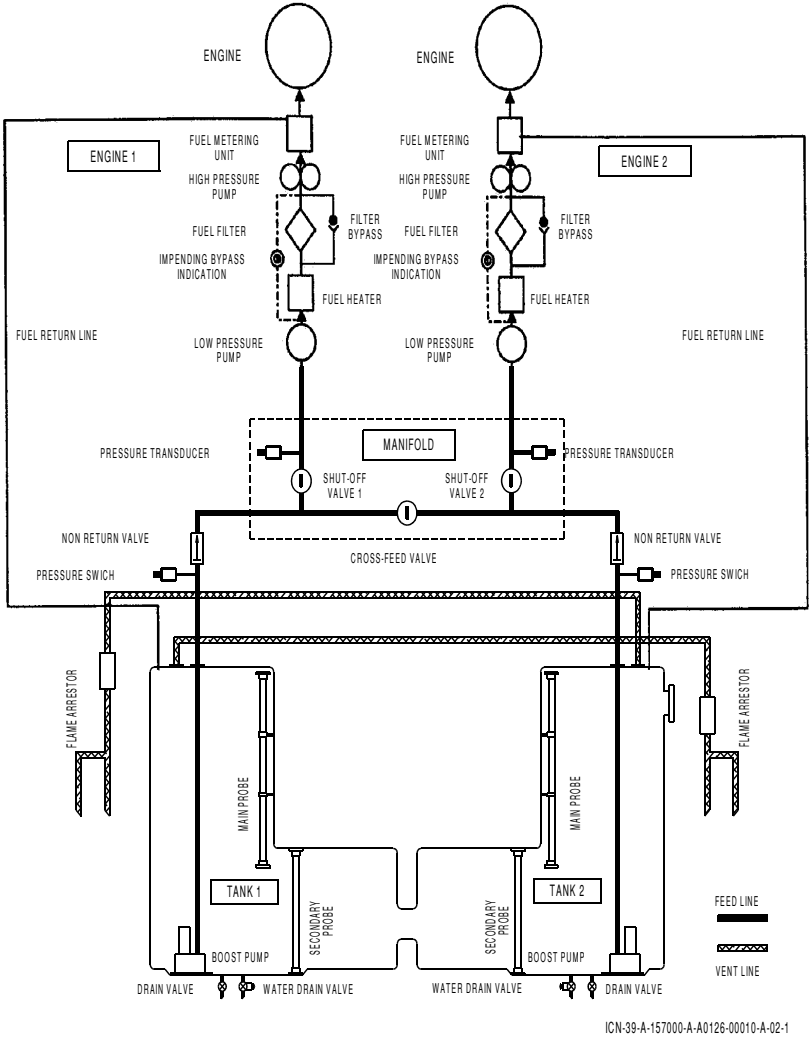


Figure 7-16 Fuel System

TRANSMISSION

The transmission supplies the drive from the engines to the main and tail rotors, but also to accessory components. It is made up of the following systems:

— The main-rotor drive system

— The tail-rotor drive system

MAIN-ROTOR DRIVE SYSTEM

The main-rotor drive system transmits and decreases the rotational drive from the engines to the main rotor. It is made up of the following sub-systems

— Engine shaft, gimbal assy

— Main gearbox assembly

— Main-rotor drive indicating system.

Engine shaft, gimbal assy

The engine shaft, between the engines and the gearbox, has the functions to transmit drive from the engines to the main gearbox; the gimbal assy gives forward mounting-support to the engines.

The drive shaft connections to the gearbox are made to two input modules. This changes the rotational axis and acts as a first reduction before the main gearbox. The input modules have a centrifugal free-wheeling unit that permits the drives to be disengaged from the engines. This is necessary in case of engine failure or shutdown.

Main gearbox assembly

The main gearbox (MGB) is a three-stage reduction gearbox that changes the horizontal drive from the motors to a vertical drive. The drive turns the output mast on which the main-rotor hub is installed. The three reduction stages of the MGB reduce the engine input speed from 21000 rpm to a rotor drive of 296 rpm.

The MGB also supplies drive to the tail-rotor and accessories. The accessories include the oil cooler fan, two lubrification pumps, three

hydraulic pumps and if fitted, the ECS compressor. The MGB also holds the main-rotor actuators and the rotor-brake assembly (optional).

The MGB is lubricated by a self-contained lubricating system. The system includes an oil cooling sub-system that uses an oil-air heat exchanger and a cooling fan to cool the oil.

Main-rotor drive indicating system

The indicating system gives the pilot information about the lubrification and cooling of the MGB. The data is transmitted by temperature and pressure sensors and switches installed on the MGB to the Multi-Function Display (MFD). The MFD shows and monitors the MGB status and gives a caution if the levels go over the pre-defined values.

The MFD is responsible for monitoring and indicating the following conditions of the MGB:

— MGB oil pressure status

— MGB oil temperature status

— Ferrous particles in the MGB

— Impending filter block

— High temperature of input bearings

TAIL-ROTOR DRIVE SYSTEM

The tail-rotor drive system includes the components that make the mechanical connection from the Main Gearbox (MGB) to the tail rotor.

The tail-rotor drive system includes the following sub-systems:

— Tail-rotor drive shafts

— Tail-rotor drive gearboxes

— Tail-rotor drive indicating system

Tail-rotor drive shafts

Three drive shafts make the connection and transmit the torque between the gearboxes. Drive shaft No. 1 at the forward end of the drive-train connects from the MGB tail drive flange coupling to a support bearing assembly. The same support assembly makes a connection to the forward end of shaft No. 2. The rear end of this shaft connects to the IGB input drive pinion. Shaft No. 3 connects between the IGB and the TGB.

Shaft No. 1 and 2 have damper-assemblies to dampen the shaft flexing movements that can happen at critical rotational speeds. An anti-flail assembly is installed for the unlikely event of a failure or disconnection of shaft No. 2.

Tail-rotor drive gearboxes

The Intermediate Gearbox (IGB) and the Tail Gearbox (TGB) transmit the drive while changing the drive angle. The gearboxes also reduce the rotational speed between the input and output drive. The gearboxes have a self-contained splash lubrification and condition-monitoring system.

The IGB is a bevel gearbox attached to the lower tail-fin structure. It changes the angle of the horizontal drive shafts to an upward sloping direction. The IGB transmits drive to the TGB at the top of the tail-fin. The reduction gear ratio reduces the input speed of 4532 rpm to an output speed of 3458 rpm.

The TGB changes the direction of the drive from the fore and aft direction to a lateral direction drive for the tail rotor. The reduction gear ratio reduces the input speed of 3458 rpm to an output speed of 1435rpm.

Tail-rotor drive indicating system

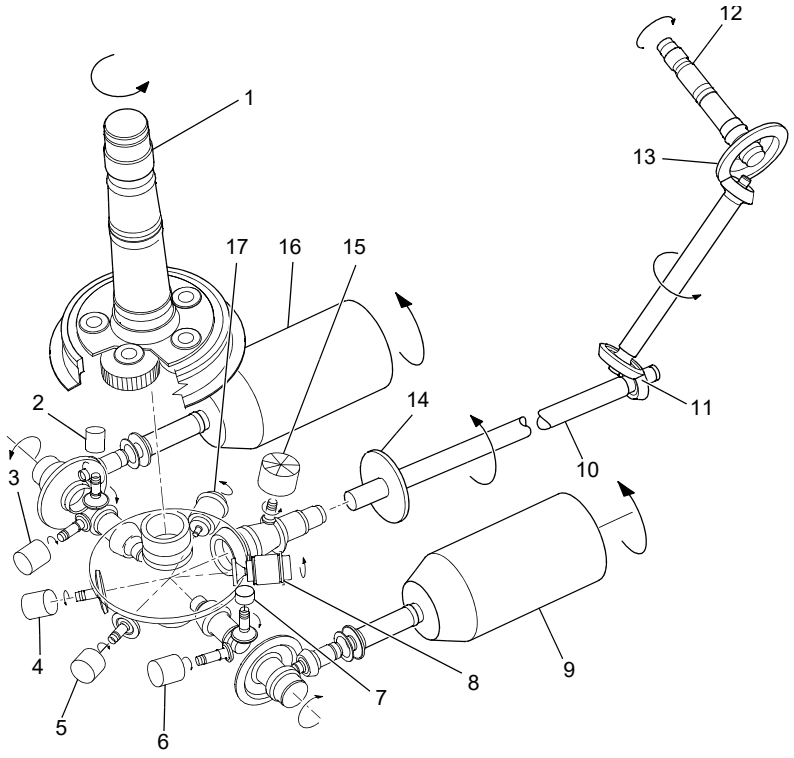
The indicating system gives the pilot information about the lubrification and cooling of the IGB and the TGB. Indication of abnormal condition associated with the TRDS are provided by monitoring conditions within the IGB and TGB. The gearboxes are monitored for a low oil level condition, oil high temperature and the detection of ferrous particles that may result from damage or wear. The Multi-Function Display (MFD) monitors and shows the IGB and TGB status, and gives a caution if the levels go over the limits permitted.

The MFD monitors the following conditions of the IGB and TGB:

— Low oil level for the IGB and the TGB

— IGB and TGB oil temperature status

— Ferrous debris particles in the IGB and TBG



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1. Main Rotor Shaft
2. Hydraulic Pump No. 2
3. Alternator No. 2
4. ECS
5. Hydraulic Pump No. 3
6. Alternator No. 1
7. Hydraulic Pump No. 1
8. Lubricating Pump
9. Port Engine No. 1
10. Tail-Rotor Drive Shaft
11. Intermediate Gearbox
12. Tail-Rotor Gearbox
13. Tail-Rotor Shaft
14. Rotor Brake
15. Cooler Unit
16. Starboard Engine No. 2
17. Lubricating Pump

Figure 7-17 Transmission

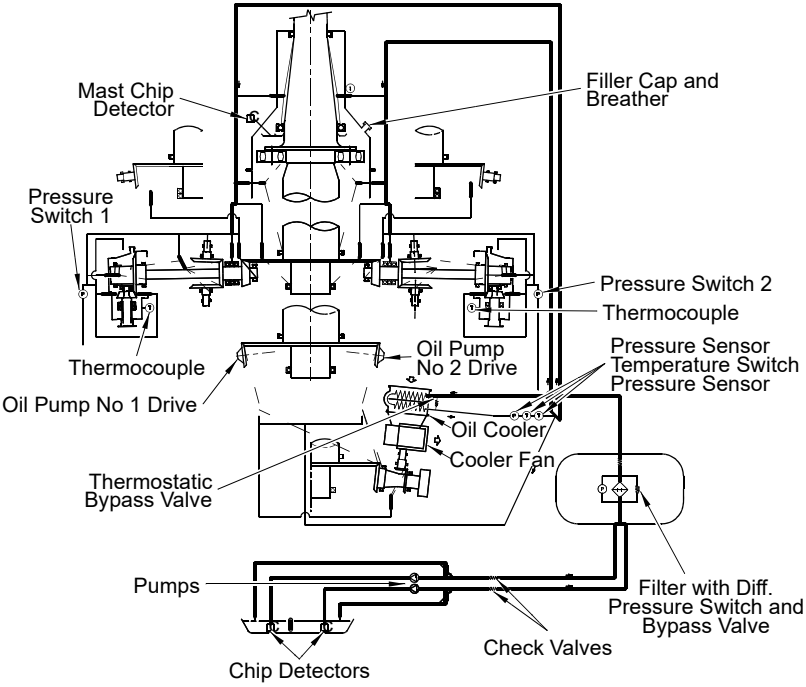

Figure 7-18 MGB Lubricating System

ROTOR SYSTEM

The rotor system gives the lift and thrust necessary for flight and includes:

— The main rotor system.

— The tail rotor system.

MAIN ROTOR

The main rotor is a fully articulated type with 5 blades. It is equipped with elastomeric bearings for the flapping, lead-lag and pitch change articulations.

The lead lag motion is reacted by hydraulic dampers (1 for each blade) that provide also the stops (cushion areas). A separated stop system is provided for the flapping motions. The upper stop is provided with a support (for the flight position) and a limiter (for ground position) while the lower stop is provided with a sliding ring both for flight and ground conditions.

Blades

The blades are made of composite materials except the metallic erosion shields (central (steel) and tip (nickel) leading edges) the 2 trim tabs (Al) and some other minor parts while the hub is an hybrid structure made of metal (Ti) and composite.

The blades are of the sealed type and the main subcomponents are:

— The spar with a “D” shaped cross section made of fiberglass tape straps wrapped by cross ply glassfiber tape to form an antitorsional box. The spar straps realizes the attachment holes at the root of the blade. The spar also carry the steel erosion shield bonded at the leading edge.

— The lower and upper skins made of multilayered graphite tape covering an internal shape of honeycomb. The skins are bonded to the spar to form the blade body.

— At the blade body a tip is bonded to complete the blade. The tip is composed of skins made of glassfiber covering an internal honeycomb filler. The tip leading edge is covered by a nickel erosion shield.

Hub assy

The rotor head is composed of the hub made of titanium, the composite tension links, the elastomeric bearings, the dampers and the control levers.

— The hub is produced in one piece starting from a forging. At the bottom is attached a Ti flange with the function to connect the scissor drive links and at the same location the sliding ring is positioned.
The hub is splined internally to be fitted to the mast and so to receive the torque to rotate, then the rotation is transmitted to the swashplate by the scissors drive links.

— The tension links are composed of graphite cross ply tape to form the antitorsional box. The windings provides the blade attachment holes. Some metallic parts are bonded to the tension link and namely the stop support which provides also the elastomeric bearing positioning location.

— The elastomeric bearings are composed of an Al inner member, a Ti outer member and several intermediate rubber and metallic disks. The bearings allow the blade motions while reacting the centrifugal force.

— The dampers are of conventional hydraulic type. They connect the pitch control lever to the damper attachment lugs of the hub.

— The control levers are Al made multiple function components. The main function is to connect the blade to the swashplate so to transmit the pitch change input. On the same component the damper attachment (blade side) is provided. At last the lever is also carrying the droop sto pin in order to receive the flapping limitation from the limiter (ground position) and the limiter support (flight position).

Rotating controls

The rotating control system is composed of the following parts:

— The pitch links. The pitch links (one for each blade) are connecting the pitch control lever to the rotating part of the swashplate. They are located on the leading edge side of the pitch control lever.

— The swashplate is composed of the rotating and stationary stars. The relative rotation is allowed by a double raw ball bearing. The stationary star receives the control input from the servoactuators (fixed controls) and transmit it to the rotating star. To do this the swashplate is tilted with respect to the axis of a central pivot element.

— The spherical pivot is the part supporting the swashplate while allowing the tilting and translating motions imposed by the servoactuators. This component is shaped internally in such a way that allows it to be centered and prevented by the inplane rotation with respect to the M/R gearbox case. Four plates made of steel supporting teflon layers are fitted to the upper portion of the case. The surface are contact with the internal surfaces of the spherical pivot allowing it to slide but not to rotate. This last function is made by stationary scissors in conventional desing system.

THE ROTATING SCISSORS DRIVE LINKS

There are two drive links scissors assemblies connecting the hub (scissors attachment flange) to the rotating swashplate and keeping it rotating. Each assembly is composed of an upper lever and a lower lever hinged to the swashplate through an uniball bearing.

The main-rotor rotating controls are made up of the following components:

— Sliding bearing assembly

— Swashplate assembly

— Rotating scissors assemblies

— Pitch change links.

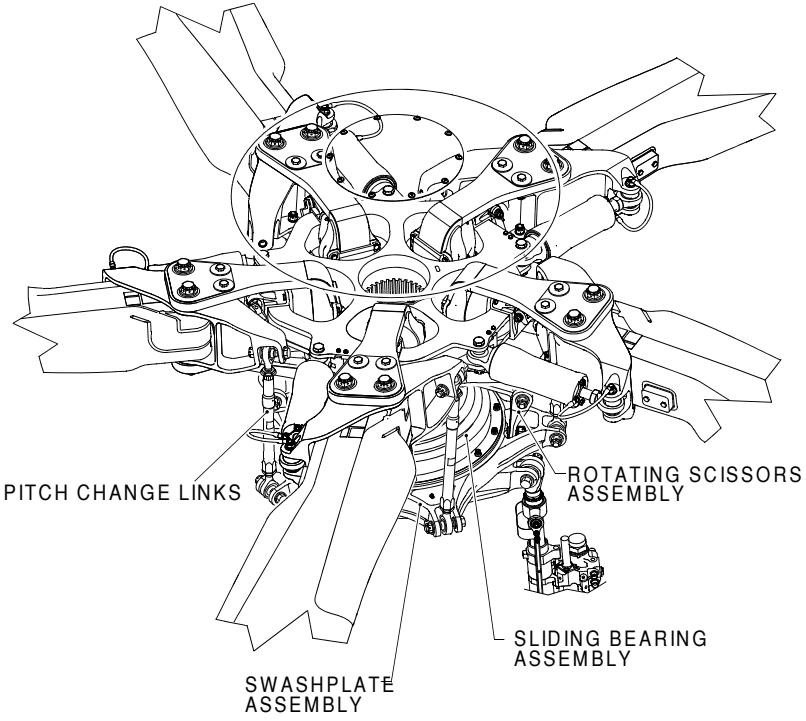

Figure 7-19 Main Rotor

TAIL ROTOR SYSTEM

The AW139 Tail Rotor is a four blade fully articulated rotor with elastomeric spherical bearings, which allow flapping, lead-lag and feathering movements.

The tail rotor system includes the components that connect the tail-rotor hub and the Tail-Rotor gearbox (TGB) mast. And also, the parts that translate the output movements of the tail-rotor actuator pitch change rods, into pitch changes of the rotor blades.

The tail rotor system is made up of the following sub-systems:

— The tail-rotor blades

— The tail-rotor head

— The tail-rotor rotating controls

The four tail-rotor blades give a lateral thrust that counter-acts the torque generated by the main rotor. The thrust can be controlled to give directional control of the aircraft.

The tail-rotor head includes a hub, elastomeric bearings, elastomeric dampers and an upper and a lower limiter which are present on the hub and on the blade, in order to limit the flapping movements (i.e. -10°, + 12°).

The hub connects to the TGB mast and makes the connection to the four tail-rotor blades. Elastomeric bearings make the connection between the blades and the hub and permit lead/lag, flap, pitch change and movement of the blades. The Elastomeric dampers are installed between the blades and the hub, and dampen the lag movements of the blades. The limiting stops limit tail-blade flap movement to the maximum lateral flap position of the tail-blade.

The tail-rotor rotating controls receive inputs from the tail-rotor actuator and translate them to give the required blade pitch-angle changes.

The controls include a main hub (spider), which is installed over a sliding tube. The sliding tube is installed on the TGB mast and supplies the attachments for one end of the rotating scissors.

The rotating scissors supply a rotary drive force from the hub to the spider. At the same time the rotating scissors turn to allow lateral pitch-change movement.

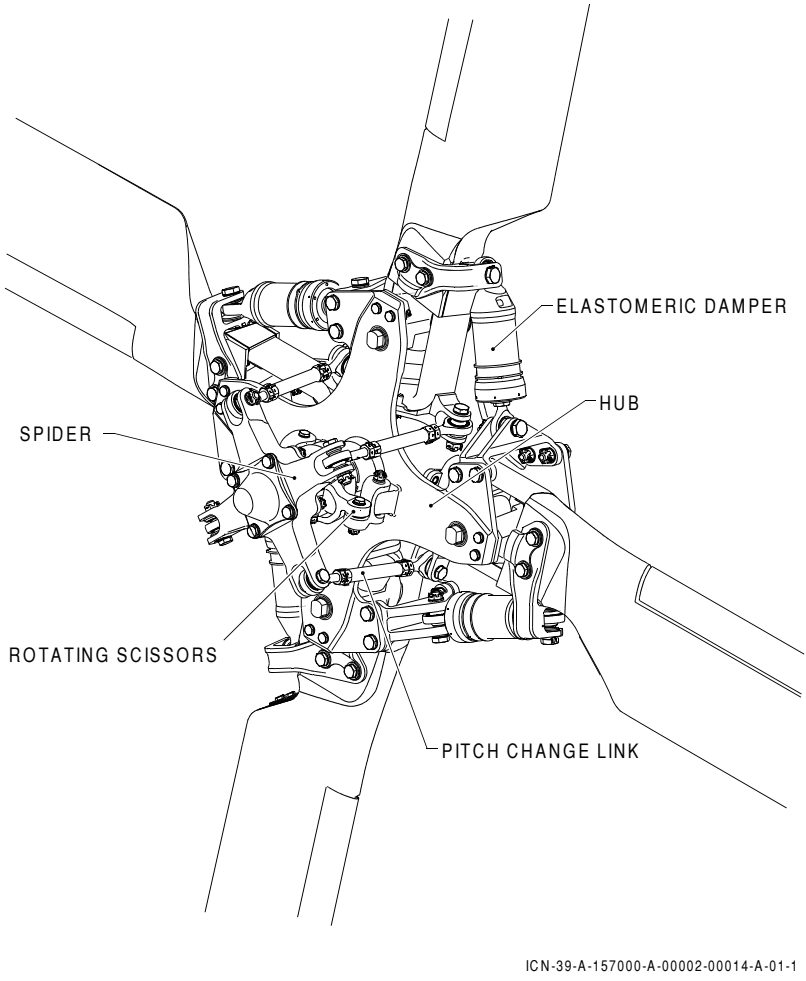

Figure 7-20 Tail Rotor

Blades

The main structural element of the AW139 composite blades is a D-shaped constructed from unidirectional fiberglass tapes, that are wrapped in cross-ply fiberglass layers (+/- 45° oriented relative to the 0° fiber direction of the spar, along blade axis). This structure so formed reacts most of the centrifugal, chord and bending loads acting on the blade, and also the torsional loads thanks mainly to the cross-ply layers.

Spar assembly is completed with a filler made of Rohacell material.
A thin nickel shield is bounded on the outer surface at the leading edge to give protection against erosion. Upper and lower skins are bonded at the rear of the leading edge spar and extended back to joint together and form the trailing edge. The skins are made from layers of fiberglass tape. Between the upper and lower skin the space is filled with honeycomb structure.

The root section is formed in the spar by unidirectional glass fibre strips that are wound so as to allow the attachment of the elastomeric bearing (see Fig. 7-21).
At the blade tip there is a pocket that allows the introduction of masses for the balancing of the blade; similar masses are placed in root sections.

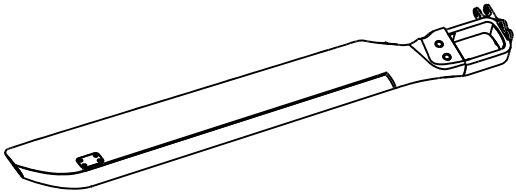

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Figure 7-21 Blade Assembly - Top view

Hub

The Tail Rotor Hub has the function of transferring both the torque from the mast to the blades and the shears and moments to the mast, arising from the blades loading.

It is attached to the mast by means of a spline. It bears up against the lower conical ring and is located on the outboard side by the upper conical ring. The whole assembly is secured in place by locknut and four bolts on the outboard side.

The hub is constituted of four (4) arms carrying the four (4) blades. The loads are transferred into the hub via the elastomeric bearing, in the centre of which is inserted a titanium bolt (which bears on the inner element via two bushings) that greatly add to the stiffness of the hub.

From each arm of the hub two small parallel wings extend (see Figure 7-22, damper attachment), with axes tilted at 66 degrees relative to the hub arm axes. The damper bracket is attached to these wings using four (4) bolts. A single bolted joint connects the damper to the damper bracket.

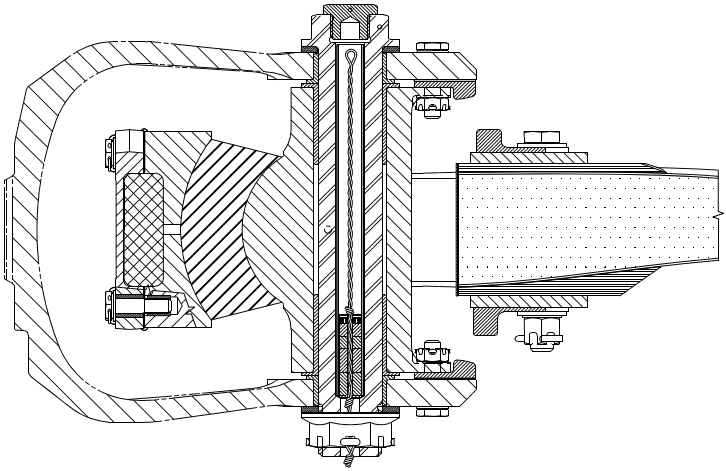

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Figure 7-22 Tail Rotor Hub Elastomeric Bearing - Section view

ROTOR FLIGHT CONTROLS

The rotor flight controls permit the crew to control the flight attitude, altitude and direction of the rotorcraft. This control is transmitted by mechanical linkages that interface with the manual input controls and the Automatic Flight Control System (AFCS).

The system includes:

— The main-rotor controls system

— The tail-rotor controls system

— The rotor flight-controls indicating system

MAIN-ROTOR CONTROLS SYSTEM

The system includes a collective and a cyclic control system. The two systems are mixed to control the attitude and altitude of the rotorcraft. This is done by changing the angle of the main-rotor blades.

Collective control system

The pilot and co-pilot collective-control sticks are connected together to give a common input to the mixing unit. The mixing unit receives collective and cyclic inputs, and gives a common output to three hydraulic actuators. The actuators then transmit a powered output to the main-rotor pitch-change mechanism.

An electrical actuator connected to the crew controls can provide an AFCS command input to the collective controls.

Cyclic control system

This system is a mechanical, dual linkage system, controlled by the crews cyclic control sticks. The cyclic linkage gives the pitch and roll commands to the main-rotor pitch-change mechanism.

The mechanical linkage also gives a connection to two electrical trim actuators, which can give pitch and roll commands. The commands can be made by the crew or provided by the AFCS.

An auto-stabilization function is given by automatic high frequency control commands. This function is controlled by two electrical actuators connected with the upper linkage.

The two cyclic inputs are transmitted to the mixing unit, which sends the output to the three main-rotor actuators.

TAIL-ROTOR CONTROLS SYSTEM

The tail-rotor controls are operated by mechanical linkages that give an input to a dual-channel hydraulic actuator. The actuator adjusts the tail-rotor pitch-change mechanism to give a yaw action. Each crewmember has dual-pedals to operate the mechanical linkages and the main wheel brakes. The linkages are also controlled by electrical actuators for manual and automatic trimming commands.

ROTOR FLIGHT CONTROLS INDICATING SYSTEM

The indication system of the rotor flight controls is supplied by a pressure switch installed on each actuator control-valve. If the control spool of an actuator control-valve jams or moves abnormally, the pressure switch will send an input to the indicating system.

The indicating system will generate a caution and a “1 SERVO” or “2 SERVO” message, depending on which system has had a jam.

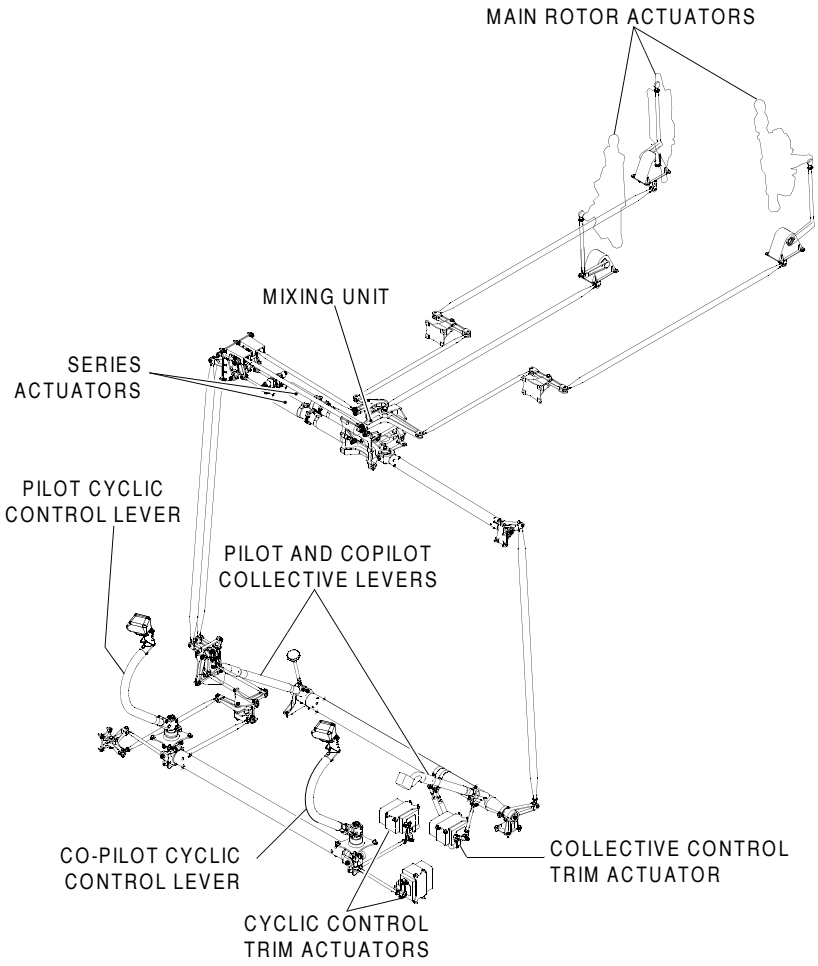

Figure 7-23 Fixed Flight Controls – Cyclic and Collective

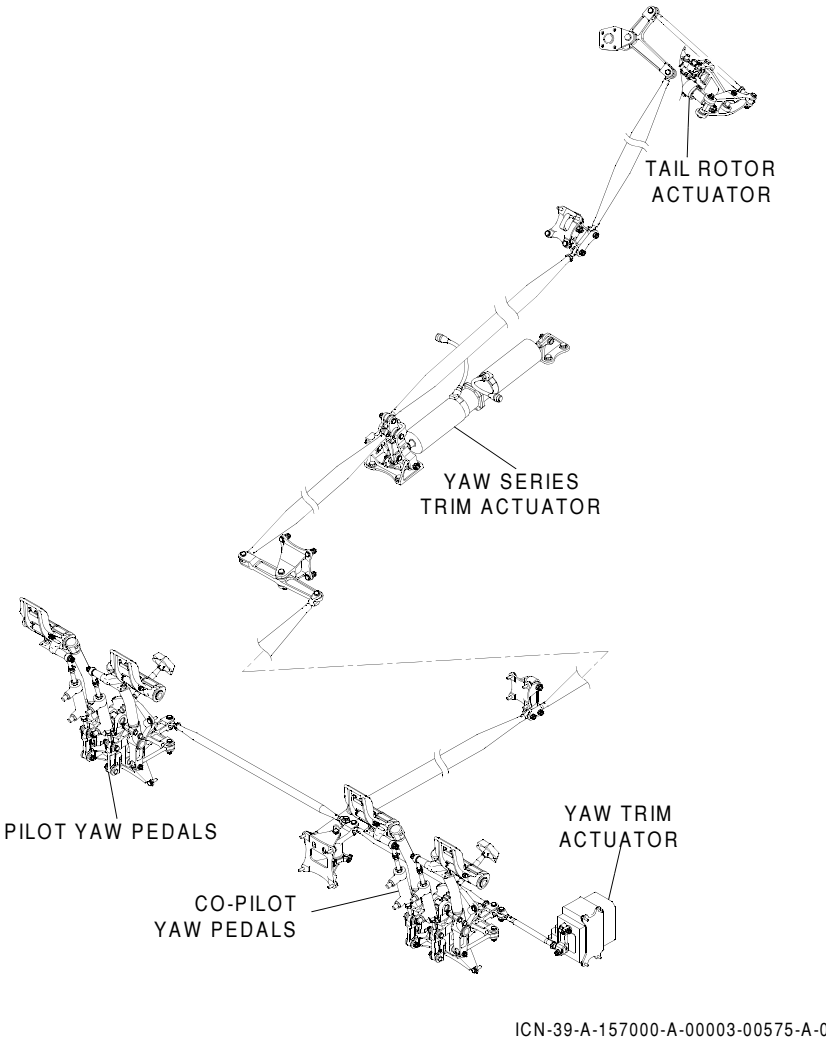

Figure 7-24 Fixed Flight Controls - Yaw

ELECTRICAL POWER

The electrical power system includes two sub-systems: the primary 28V DC power supply, and the secondary AC power generating system.

DC and AC circuit breaker panels are installed in the cabin compartment. These circuit breaker panels include distribution protection devices necessary for flight safety.

AC SYSTEM (OPTIONAL)

The AC system is a dual 115 Vac and 26 Vac, 400 Hz single-phase system. The power is supplied by two invertors that can supply all of the helicopters AC requirements. The AC networks can be powered by the DC External Power Unit or by a Nickel-cadium battery (On the ground with the rotor stopped).

DC SYSTEM

The primary 28V DC power for the helicopter is supplied by two 30V 300A starter generators and two batteries. Each DC generator is driven through a gearbox by a main engine. The No. 1 generator is connected to the Main Bus No. 1, and the No. 2 generator to the Main Bus. No. 2.

Two batteries supply power to the starter-generators to start the main engines. The batteries also supply essential power if there is a total loss of generated power.

External DC power

The external power supply can be connected to the external power connector on the nose section of the helicopter. It can supply 28V of DC power to equipment that is usually powered by the DC system. The power can also be used to start the main engines.

DC Electrical load distribution

The load distribution system makes sure that the supply of DC power to the essential loads of the rotorcraft is not stopped.

The Power Distribution panels No. 1 and No. 2 send electrical power to the user loads. The power is supplied by the Main and AUX batteries, the Starter-Generators or from the External Power System.

A circuit breaker installed in the Overhead Panel connects the rotorcraft electrical loads to the power distribution system.

Controls and indications

The DC generation and distribution controls and the external power controls, are installed on the Overhead Switch Panel.

Malfunctions and the operational status of the system are shown in the Vehicle Monitoring System (VMS) window, and the CAS message window. These windows are found on the Multi Function Display (MFD).

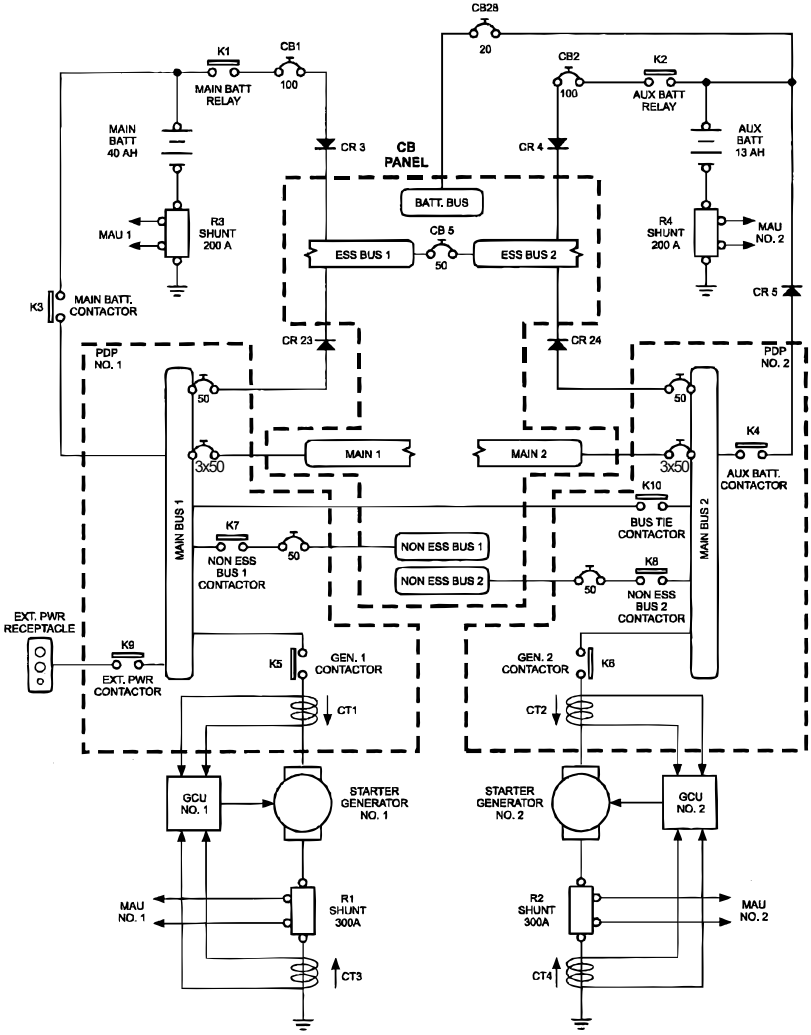

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Figure 7-25 DC Generation and Distribution

HYDRAULIC POWER SYSTEM

The hydraulic power system supplies the hydraulic power necessary to operate the flight control servo-actuators and the landing gear. The system includes two independent circuits that supply hydraulic fluid at a nominal working pressure of 3000 psi (207 Bar). An indicating system shows the status of the system on the Cockpit Control Panel (CCP).

HYDRAULIC SYSTEM No. 1

The No. 1 hydraulic system supplies power for one channel of the main and tail-rotor actuators (three main-rotor actuators and one tail-rotor actuator). The supply of power to the flight-control actuators is referred to as the Flight Control Circuit (FCC).

The No. 1 hydraulic system also supplies back-up power to the landing-gear extension system; this system is referred to as the emergency circuit.

The distribution and control of the FCC and the emergency circuit is supplied by the Power Control Module (PCM). The PCM in system 1 is referred to as PCM1 and controls the flow and status of the hydraulic fluid.

The primary power supply in system 1 is supplied by a mechanical pump that is driven by the main gearbox. The pump keeps a constant pressure output with a variable flow rate; this pump is referred to as Hydraulic Power Supply 1 (HPS 1).

A secondary, but limited power supply is supplied by an electrical pump. This pump is powered by the aircraft battery and is only intended for pre-flight checks of the flight controls system. The electrical pump is set on a 2-minute timer relay to save battery power, and supplies a nominal 1523 psi (105 Bar) power supply.

Manual and automatic controls

The hydraulic system is controlled by a combination of manual and automatic controls.

The manual controls are operated from the CCP, which is the same on both system 1 and system 2. The manual controls for system 1 include a pump switch (ELEC PUMP) and a Flight Control Shut-Off Valves (SOV) switch.

The SOV switch can be set to close the appropriate F/C SOV in order to check single systems during a ground check. It may also be used in-flight to isolate certain circuits in the event of abnormal conditions. The switch is protected against accidental operation by a switch-guard.

Features of the system include:

— The interlocking of the two circuits (Circuit 1 and 2) without the possibility of excluding both systems.

— The automatic re-activation of the excluded circuit in the event of a failure in the other (low pressure).

— Interception of the utility (EMERG LG PRESS) circuit 1 at minimum level.

— Interception of the utility (UTIL PRESS) and tail rotor (TRSOV) circuit 2 at the levels LOW 1, LOW 2 and MIN.

The automatic controls for system 1 are provided by fluid level switches in the PCM reservoirs. The automatic operations for system 1 include:

— PCM 1 low-level switch
If the hydraulic fluid reaches the minimum level (0,7 liters), the PCM 1 low-level switch will give a signal. The signal will close the PCM emergency circuit SOV, thus stopping a further drop in fluid pressure.

— PCM 2 level switch No. 2
If the level in the PCM 2 reservoir reaches a minimum level (0,9 liters), the PCM 1 flight controls SOV is automatically prevented from closing. This is to make sure that if the tail rotor SOV closes, the tail rotor will not lose power completely.

HYDRAULIC SYSTEM No. 2

The No. 2 hydraulic system supplies power for one channel of the main and tail-rotor actuators (three main-rotor actuators and one tail-rotor actuator). The supply of power to the flight-control actuators is referred to as the Flight Control Circuit (FCC).

The No. 2 hydraulic system also supplies primary power to the landing-gear extension and retraction system; this system is referred to as the utility circuit.

The distribution and control of the FCC and the utility circuit is supplied by the Power Control Module (PCM). The PCM in system 2 is referred to as PCM2 and controls the flow and status of the hydraulic system No. 2.

The power supply in system 2 is supplied by two mechanical pumps, referred to as Hydraulic Power Supply 2 (HPS 2) and Hydraulic Power Supply 4 (HPS 4). As a safety measure, the two pumps are driven separately by the main gearbox. The pumps keep a constant pressure output with a variable flow rate.

The No. 2 hydraulic system includes a Tail Rotor Shut-off Valve (TRSOV) installed on the supply line of the tail-rotor actuator. The TRSOV will automatically cut off the supply of fluid to the tail-rotor actuator if the fluid level in system 2 falls below the minimum level.

Manual and automatic controls

The hydraulic system is controlled by the manual and automatic controls. The manual controls are operated from the CCP, which is the same for both system 1 and system 2. The manual controls for system 2 include a Flight Control Shut-Off Valves (SOV) switch.

The SOV switch can be set to close the appropriate F/C SOV in order to check single systems during a ground check. It may also be used in-flight to isolate certain circuits if there are abnormal conditions. The switch is protected against accidental operation by a switch-guard.

The automatic controls for system 2 are provided by fluid level switches in the PCM reservoirs. The automatic operations for system 1 include:

— PCM 2 low-level switch No. 1
If the fluid in the utility circuit (normal landing gear supply) reaches the low-level switch No. 1, the utility SOV is closed. Thus, if there is a leak in the utility circuit it will be stopped.

— PCM 2 low-level switch No. 2
If the fluid in the PCM 2 reaches the low-level switch No. 2, the TRSOV will be closed and the utility SOV is re-opened.

— PCM 2 Minimum level switch.
If the fluid in the PCM 2 reaches the minimum level switch, the utility SOV is closed again.

INDICATING SYSTEM

The indicating system shows the status, pressure and temperature of the hydraulic systems No. 1 and No. 2. The system also shows abnormal conditions of the hydraulic power supplies.

Direct indications are shown on the (CCP), while indirect indications are stored in an electronic maintenance log. These indications will be shown on the cockpit display only when the aircraft is on the ground.

The CCP includes an electric pump switch (EL PMP) that shows the pump status, and two lamps. The HYD 1 and HYD 2 lamps show abnormal temperature and pressure conditions in the hydraulic fluid systems.

The CCP provides secondary indications – primary indications are shown on the cockpit display as a caution.

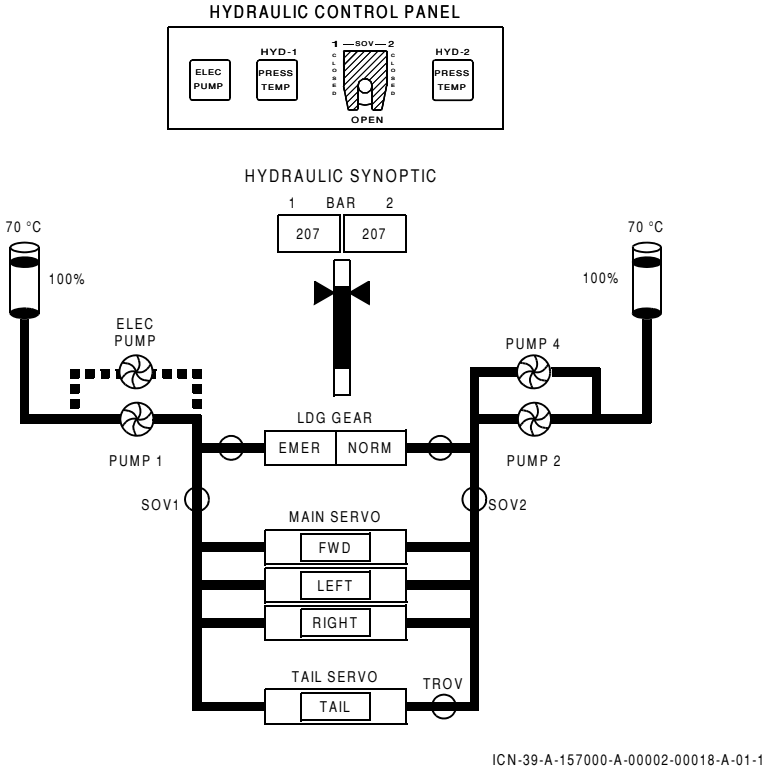

Figure 7-26 Hydraulic Power System Synoptic

LANDING GEAR

The Landing Gear (LG) is a “fore and aft” retractable tricycle type, that includes two single main-wheels (main landing gear) and a twin nose-wheel (nose landing gear). The LG gives shock absorption and rebound control and has an emergency lowering system. The Main Landing Gear (MLG) includes a differential braking system and a parking brake. The nose-wheel has an automatic centering and center-lock system installed. The nose-wheel can be steered by pilot controlled inputs.

LANDING GEAR CONTROL PANEL (LGCP)

The LGCP is located on the center console and is responsible for the following operations related to the LG:

— Normal operation of the landing gear

— Emergency operation of the landing gear

— Selection of nose wheel locking

— Selection of parking brake

— Selection of maintenance safety-locking position.

EXTENSION AND RETRACTION

The LG control lever is connected to the LG control valve that operates the LG hydraulic actuators. The lever has an “UP” and a “DOWN” position to extend and retract the LG. The lever is protected against an UP selection while the aircraft is on the ground.

Three hydraulic retract-actuators retract and extend the LG. When the LG is extended the actuator also applies a mechanical lock. In the case of the MLG, the lock holds the gear braced and locked laterally. The Nose landing Gear (NLG) actuator acts as a drag brace and mechanically locks the gear against folding.

The extension and retraction of the LG from the landing gear bays is powered by the No. 2 hydraulic power system. If there is an emergency extension, hydraulic power is derived from the No. 1 hydraulic system.

The movement of the NLG during extension and retraction is a one-stage operation. Because of space constraints, the MLG requires two separate stages of extension and retraction. During the retraction stage, the MLG is shortened before it is retracted laterally into the bay. During the extension operation, the retraction stage is reversed before the MLG is locked in position.

The emergency extension of the LG is controlled by a push button switch on the LGCP. To use the switch, the guard shall be lifted. When the switch is pushed to “Down”, the emergency solenoid valve of the control valve is operated, lowering the LG.

NOSE-WHEEL AUTOMATIC CENTERING AND CENTER-LOCK SYSTEM

The nose wheel steering system gives the pilot control of the aircraft during ground movement. After take-off, centering mechanisms will automatically align the wheels in a fore and aft direction for retraction in the NLG bay.

For high speed rolling, the nose wheels need to be held directionally aligned. The nose wheel center-lock is controlled by a switch on the Landing Gear Control Panel (LGCP). Pressing the switch once engages the center-lock, locking the nose wheels in a directionally aligned fore and aft position. Pressing the switch a second time will disengage the center-lock, leaving the nose wheels free for ground maneuvering.

PARKING BRAKE

The park-brake handle on the LGCP is connected with a cable to the park-brake control valve. To apply the park brake the pilot must first pull the park-brake handle and turn it 90° into the locked position, and then operate both toe brake pedals until the caution message “CAUTION PARK BRAKE PRESSURE” on the MFD goes off. In this way the pilot can be sure that the brake system is pressurized to the correct pressure. To release the parking brake, the handle must be turned 90° while pressure is applied to the LH side brake pedal. This will release the detent mechanism and allow the cable to return to the unlocked position.

LANDING GEAR INDICATING SYSTEM

The system gives indications to show the normal and abnormal operating status of the LG. The status of normal LG and nose wheel operations is shown on their relevant switches on the LGCP. If there is a problem related to the LG, a caution will be indicated and the message “LANDING GEAR” will be shown on the Multi Function Display (MFD). To identify the specific problem, choose the LG page of the MFD. The MFD provides information and indications about the status of the following LG operations:

— Normal LG operations

— Nose wheel locking and unlocking

— Landing gear emergency system

— Hydraulic power supply.

— Parking brake

— Weight on wheels.

ENVIROMENTAL CONTROL SYSTEM

The Environmental Control System (ECS) supplies the cockpit and cabin with ventilation and heating.

VENTILATION

The cockpit ventilation system has two separate sub-systems for the pilot and co-pilot. It supplies ventilation and windshield de-fogging. Fresh air is supplied by air intakes with electrically controlled flapper valves. The flow of air is regulated by electric fans that are controlled by the crew.

The cabin has a single independent ventilation system that provides fresh air to the passengers. The flow of air in the cabin is regulated by electric fans that are controlled by the crew.

HEATING

The heating system supplies warm air and defrosting to the cockpit and cabin. The system uses bleed air from the discharge port of each engine. The air is sent through a Temperature Control Valve (TVC) and a Heating Control Box (HCB) before being sent into the ventilation ducts.

The controls for the ventilation and heating system are installed on the VENT/HTR control panel and set by the crewmembers. The status of the system and operational indications are shown in the CAS message window of the MFD.

LIGHTING SYSTEM

The lighting system of the helicopter includes an interior and exterior lights system.

INTERIOR LIGHTS

The interior lights system is controlled by the Dimming Light Control Panel and the Cabin light Control Panel. The system gives light to the cockpit and cabin and includes the following:

— Baggage compartment lights

— Cabin lights

— Utility light

— Dome lights

— Storm lights

— Display dimming control panel lights

— Instruments and console lights

— Passenger/advisory lighting

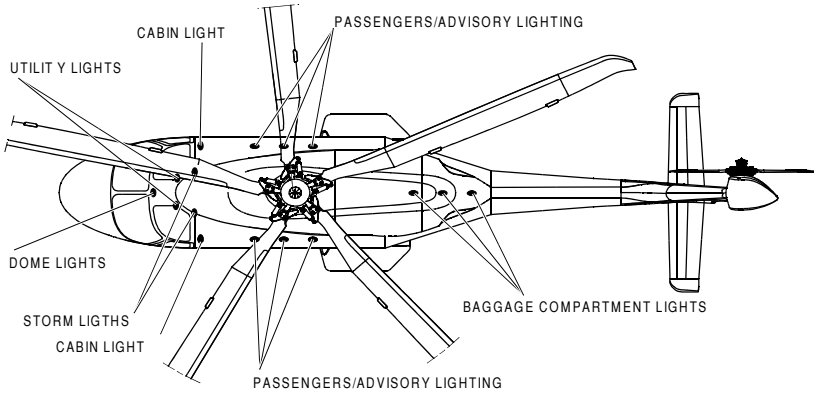

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Figure 7-27 Interior Lights

EXTERIOR LIGHTS

The exterior lights system supplies direction and navigation lights and makes the rotorcraft visible from great distances. The system includes:

— Anti-collision light system

— Tail white position light

— Left red position light

— Right green position light

— Landing lights system

— Secondary landing lights system

— Steps lights system

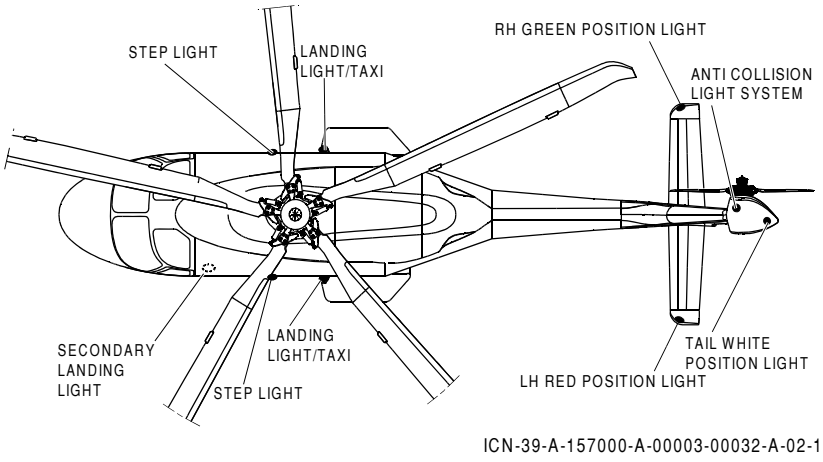

Figure 7-28 Exterior Lights

Note

Red and green position light may be on sponsons instead of tail stabilizer for some aircraft.

EMERGENCY LIGHTS

The Emergency lights system includes the following:

— Two battery packs

— Two emergency Dome lights installed in cabin

— Two external emergency lights installed in left and right sponson.

The Internal and External Emergency lights are supplied by two rechargeable battery power installed in the Nose bay.

The rechargeable battery power consumption is 28 V_{DC} input voltage, and 6.1 V_{DC} output voltage.

The two Internal Emergency lights are installed in the cabin ceiling to provide general lighting in the passenger cabin.

The two External Emergency lights are provided to illuminate the ground surface at the emergency exits.

All the Internal and External Emergency lights are controlled from a main switch installed on the Light Control Panel and secondary switch installed in the cabin.

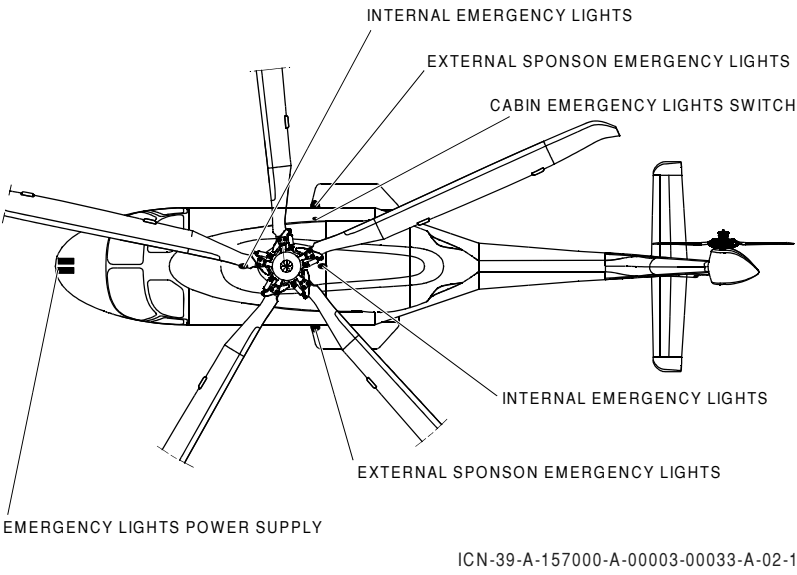

Figure 7-29 Emergency Lights

OPTIONAL EQUIPMENT

GENERAL

The following details optional equipments available that do not require a dedicated Flight Manual Supplement.

OPTIONAL EXTERIOR LIGHTS

— Optional Navigation/Position Lights System (NVG compatible)

— Optional Second Anti Collision Light

— Optional Strobe Light

— Optional Pulse Light

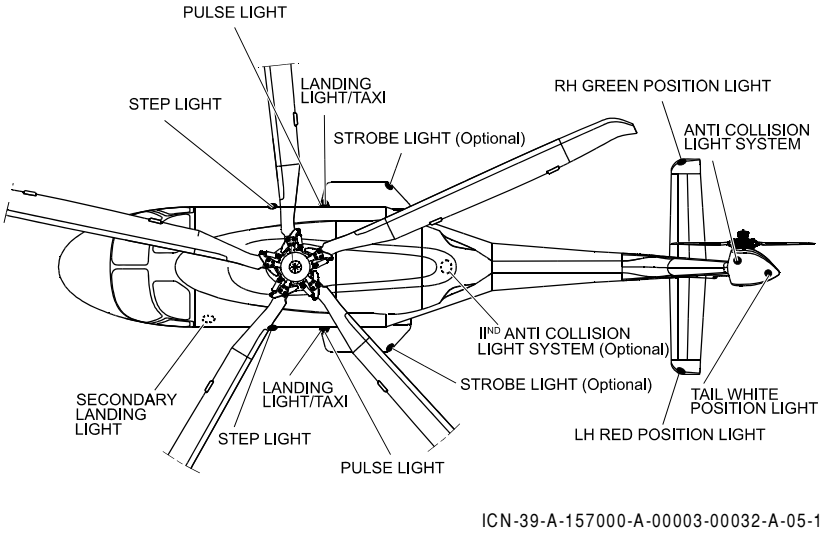

Figure 7-30 Optional Exterior Lights

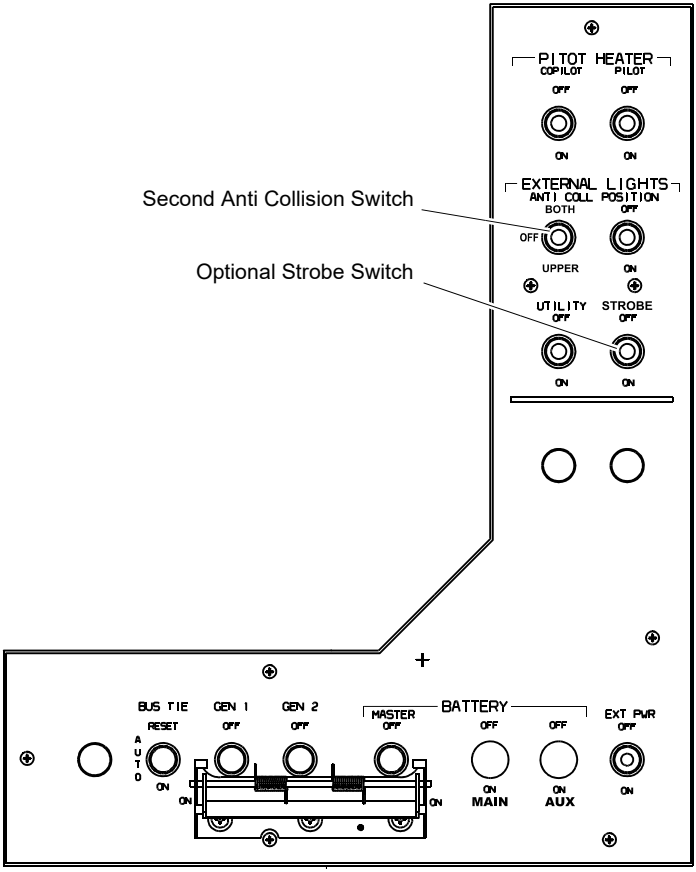

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Figure 7-31 Optional Strobe and Second Anti Collision Lights Switch Positions

OPTIONAL PULSE LIGHTS

The Pulse Lights system is controlled by a 3 position switch on the Auxiliary Circuit Breaker Panel (Figure 7-31A): ACTIVE, OFF and PULSE.

— OFF: the system is extinguished.

— PULSE: the two pulse lights flash simultaneously.

— ACTIVE: the lights will flash simultaneously when TCASI or TCASII detects the presence of another aircraft.

The Pulse Lights are disabled when NVG mode is selected and/or IR mode of the steerable lights is selected.

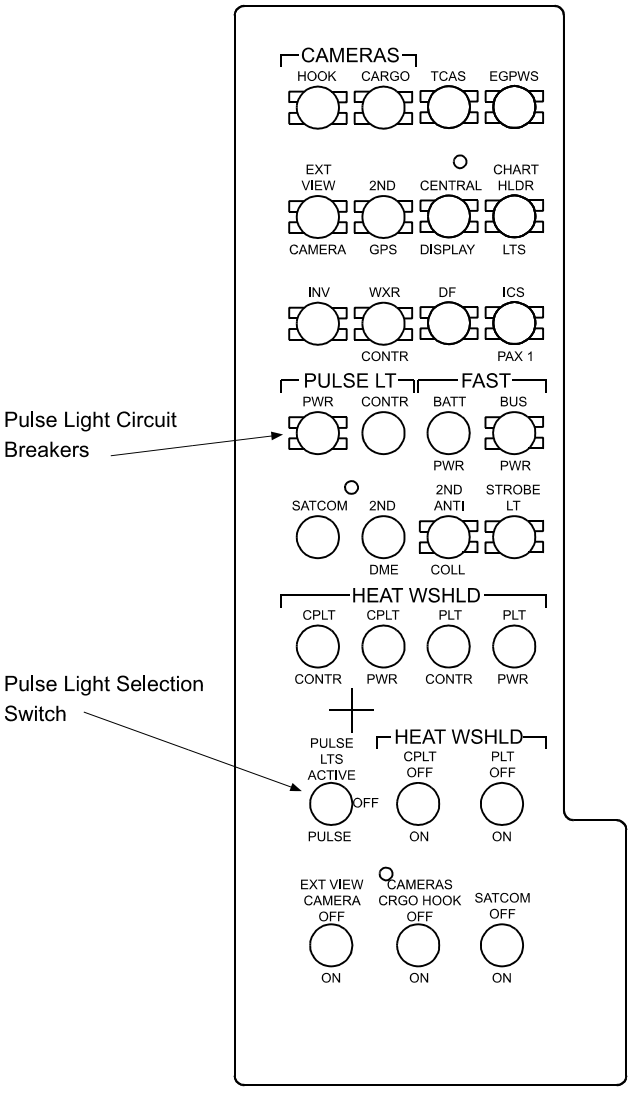

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Figure 7-31A Auxiliary Circuit Breaker Panel (Example)

SECOND DISTANCE MEASURING EQUIPMENT SYSTEM

The second Distance Measuring Equipment (P/N 3G3450F00711) consists of a second DME Module, installed on the MRC 1, and a second dedicated antenna (see Figure 7-32).

When the second DME is installed, the selection of the DME source to be displayed on the Pilot's (Copilot's) PFD is done by the NAV push-button on the Pilot's (Copilot's) Display Controller, which controls the NAV source.

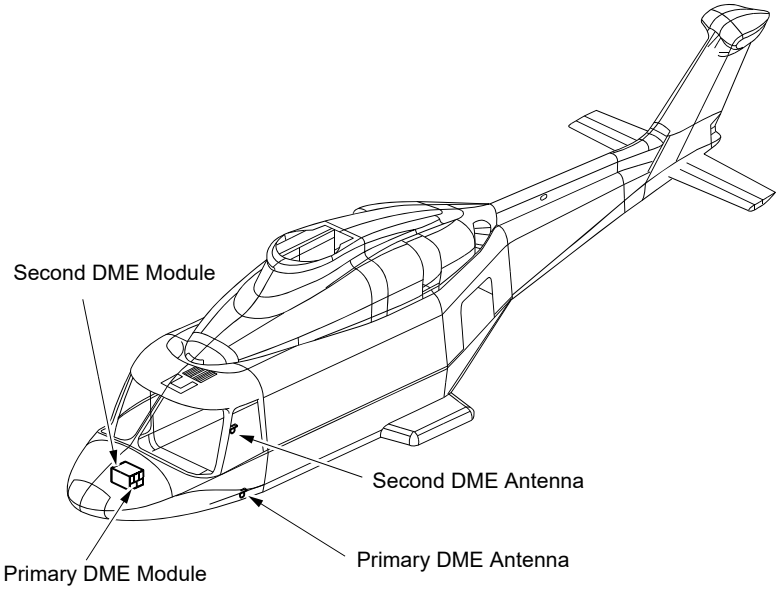

Figure 7-32 DME Installation

VHF AM/FM NAT SERIES RADIO INSTALLATION

Two options of the AM/FM NAT radios may be installed:

a. The VHF AM/FM NAT NTX 138 (P/N 4G2310F00111) is an AM/FM analog/digital radio communication system. The system comprises one NTX 138-100 transceiver, one TAC/COM control panel (Figure 7-33) and dedicated tunable antenna. (See Figure 7-34 for component positions)

The pushbutton COM3, on the ICS AV900 audio panel is used to access the VHF NAT FM.

The NAT NTX covers the frequency range 138.0000 to 173.9975 MHz in 2,5 kHz increments.

The NAT NTX Radio Controller can support up to 128 preset channels. Each channel can be configured for independent transmit and receive frequencies and subaudible tones (CTCSS). In addition to a frequency and channel number, each channel can be assigned an alphanumeric code.

Note

For complete NAT NTX 138 functionality refer to NAT document number SM06 “TAC/COM Control Head Communications Management controller Installation and Operational Manual” Rev 3.04 or subsequent issue.

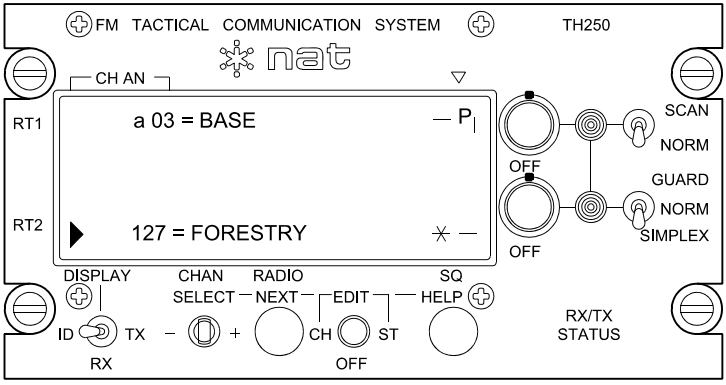

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Figure 7-33 TAC/COM Control Panel

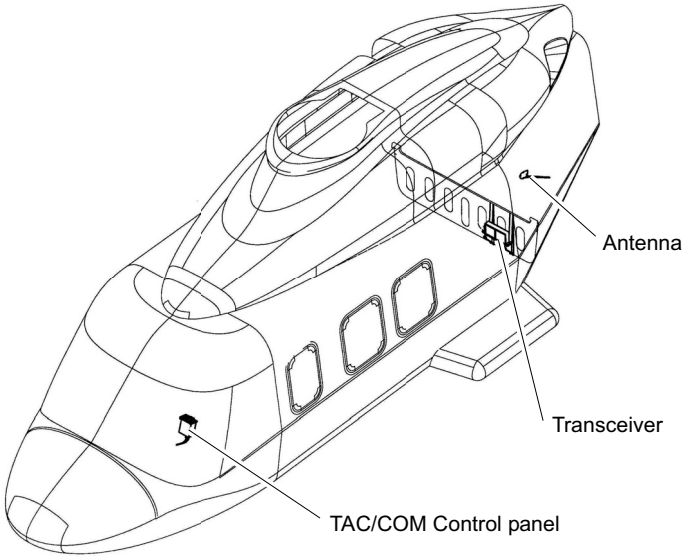

Figure 7-34 VHF NAT NTX Radio Component Positions

b. The VHF NAT NPX138N FM (P/N 4G2310F02411 and P/N 4G2310F09111) is an AM/FM analog/digital radio communication system. The system comprises of the NPX138 panel mounted transceiver (Figure 7-35) and depending on the configuration this may be mounted either in the interseat console or cabin mission console and a dedicated tunable antenna either under the tail cone (as for NAT NTX radio, Figure 7-34) or on the upper surface of the tail cone (Figure 7-36).

The ICS audio panel COM channel (3/4/5) used to access the VHF NAT FM radio on the ICS system will depend on the aircraft configuration.

The NAT NPX138N covers the frequency range 138.0000 to 173.995 MHz in 5 kHz and 6.25 kHz increments.

The NAT NPX138 Radio Controller can support up to 100 preset channels. Each channel can be configured for independant transmit and receive frequencies and subaudible tones (CTCSS). In addition to a frequency and channel number, each channel can be assigned an alphanumeric identification.

Wide Band Operation provides a bandwidth of ±5 kHz and Narrow Band a bandwidth of ±2.5 kHZ.

Transmit power can be either 1 Watt or 10 Watts and is selectable.

A Scan function of selected channels is also incorporated.



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Figure 7-35 NAT NPX138N Control

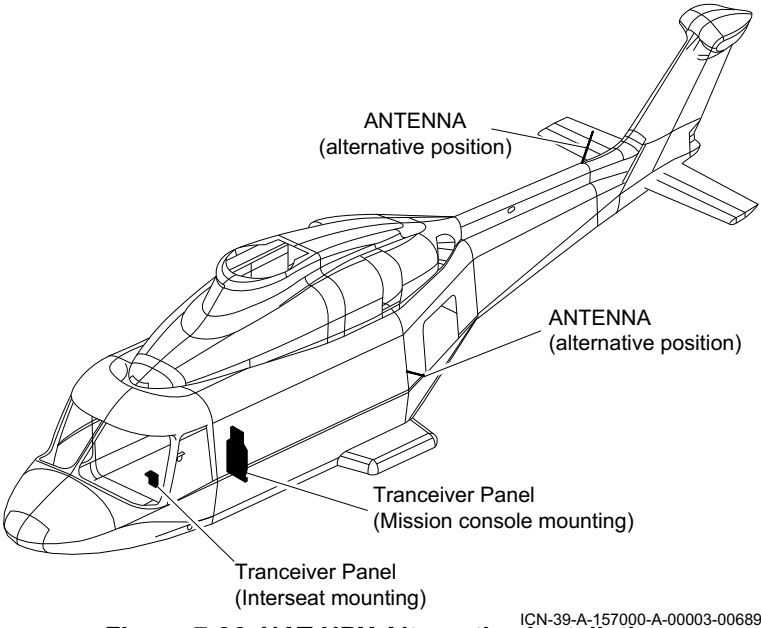

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Figure 7-36 NAT NPX Alternative Installations

Note

For complete NAT NPX138 functionality refer SM41 NAT NPX Panel mounted radio and Operational Manual, latest issue.

MTR 138 VHF/FM RADIO

The MTR138 Radio P/N 4G2310F07311 consists of the MTR Transceiver and the MTC100 controller.

MTR138 radio is an VHF/FM analog radio communication system. The system comprises one MTR138 transceiver, mounted in the tail cone, and an MCTC100 control panel mounted in the interseat panel or alternatively in a mission console in the cabin when appropriate cabling is installed. The system also has a dedicated antenna. (See Figure 7-36B for component positions).

The ICS AV900 audio panel COM is used to access the MTR138.

The AEM MTR138 covers the frequency range 138.0000 to 173.9975 MHz in 2,5 kHz increments.

The MTC100 Radio Controller (Figure 7-36A) can support up to 128 programable channels. Each channel can be configured for independent transmit and receive frequencies, sub audible tones (CTCSS) and custom super audio tones. In addition to a frequency and channel number, each channel can be assigned an alphanumeric code.

The MTC100 panel also provides a Crypto activation ON/OFF output allowing Crypto functionality to be integrated through an external Crypto unit when required.

Note

For complete MTR138 functionality refer ASM-MTR138-100 and ASM-MTC100-100N Operational Manuals, latest issue.



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Figure 7-36A MTC100 Controller

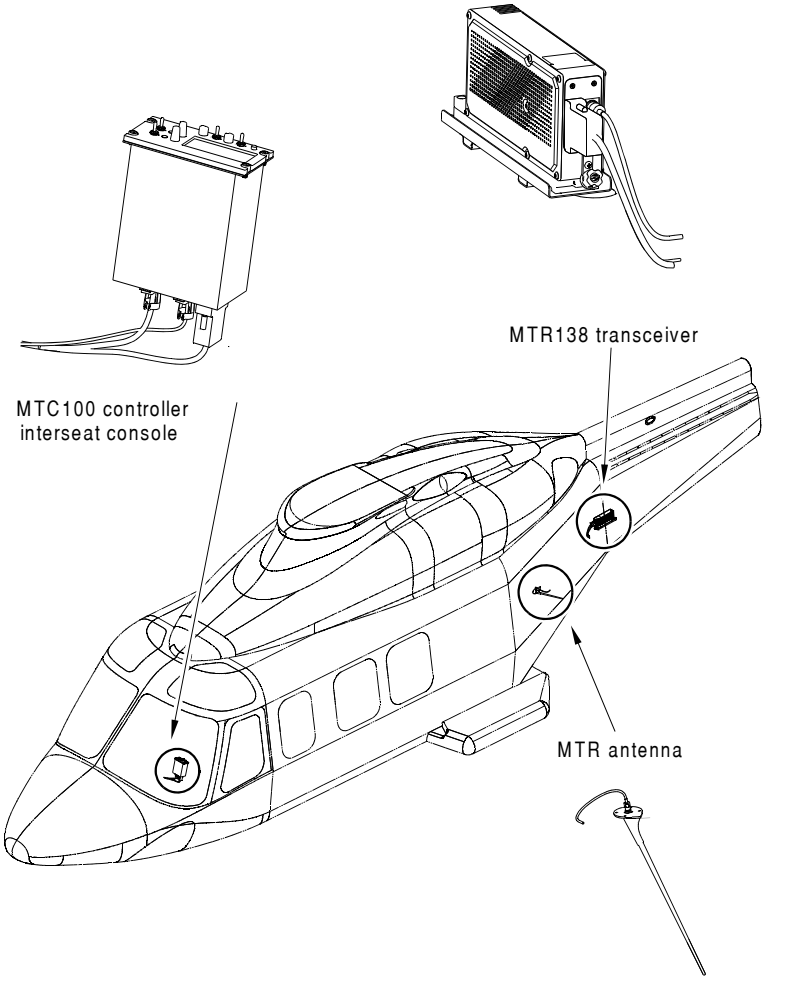

Figure 7-36B MTR138 Radio Component Installation

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HEALTH AND USAGE MONITORING SYSTEM

The Health and Usage Monitoring System (HUMS) is an integrated recording and monitoring system that provides the helicopter with structural and transmission usage monitoring (SUM and TUM), transmission vibration monitoring (TVM) and rotor track and balance (RTB).
The HUMS is designed to be operated by a technician and does not affect flight operations.

The following two alternative kits installation are available:

GE HUMS

The HUMS Cockpit Display Unit (CDU) is the operator interface to HUMS (See Figure 7-37). When the system is powered up, information on BIT (Built in Test) status is displayed. The CDU is used to initiate the collection of RTB data, to turn the Enhanced Universal Tracking Device (EUTD) on/off, and to display information if there is a problem with the analysis. The CDU keypad is used for entering various operation related data.
The Data Transfer Unit (DTU) provides the interface between a PCMCIA card, known as the DTD, and the HUMS. The DTU is used for the loading of initialization data for use by a dedicated HUMS Ground Station (Heliwise).
The HUMS On-Board System (OBS) indications are meant to be used by maintenance personnel and do not trigger any message that affects pilot operations. Signals from HUMS sensors are transferred between the OBS and the Heliwise through the use of a Data Transfer Device (DTD). Through the DTD, aircraft specific initialization and configuration data can also be uploaded into the HUMS. The HUMS provides an operator display for access to aircraft and usage data as well as initiating built-in test (BIT) of the system and interfacing sensors, and performing RTB checks. In addition, when the EUTD is

fitted to the aircraft, HUMS provides the ability to perform main rotor tracking measurements.

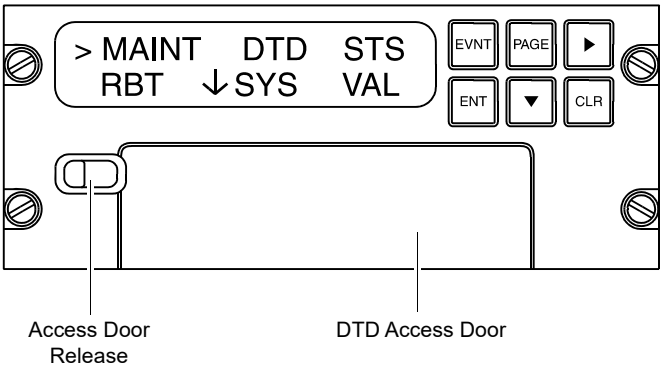

Figure 7-37 GE HUMS Control Panel

FAMILY HUMS (P/N 4G3130F00611/612)

The Family HUMS system is designed to operate with no pilot actions required to start and stop the different monitoring functions, which are automatically carried out when the Health and Usage Monitoring Computer (HUMC) recognizes that the appropriate H/C operating conditions are present.

Only the Vibration Monitoring functions permit manually request acquisitions by the pilot/crew, which may involve a single acquisition or a series of acquisitions. The manual request temporarily interrupts the automatic Vibration Health Monitoring (VHM) acquisitions management, which is re-activated at the completion of the manually requested acquisition(s).

The manual VHM acquisitions request is typically carried out in order to:

— Force the execution of VHM acquisitions outside of the normal data acquisition windows defined for the automatic acquisitions management (this allows, for example, to carry out shaft balance checks on ground),

— Perform specific VHM acquisitions under well controlled flight conditions (this typically applies to RTB or Structural Vibration Monitoring (SVM) acquisitions in order to precisely control the H/Coperating conditions during the acquisition),

— Anticipate the execution of specific acquisitions.

The relevant commands are made available in the VIBR MON page (for TVM and SVM acquisitions) and in the RTB CYC page (for RTB acquisitions) on the MCDU. See Figure 7-37A and Figure 7-37B for the top level MCDU pages.

The data is automatically saved to the DTD for standard acquisitions or manually saved for HUMS data download (via the MCDU page). The DTD device is located at the rear of the interseat console or in the avionics bay and is normally accessed for data download by technicians, no pilot input is envisaged.

The data may then be transferred to the Heliwise ground station for analysis.

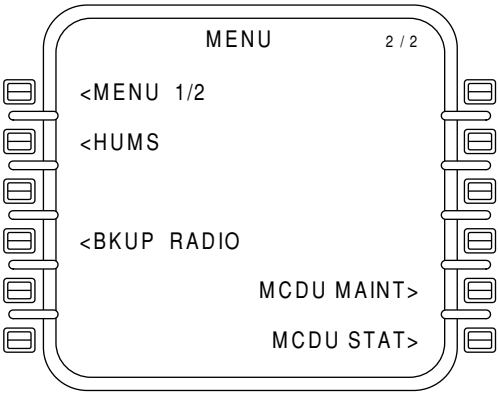

Figure 7-37A MCDU MENU page 2/2

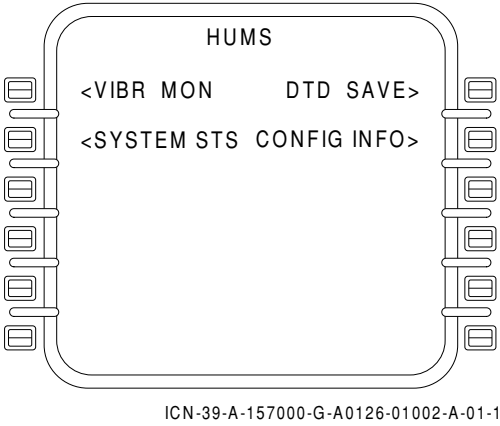

Figure 7-37B MCDU HUMS page

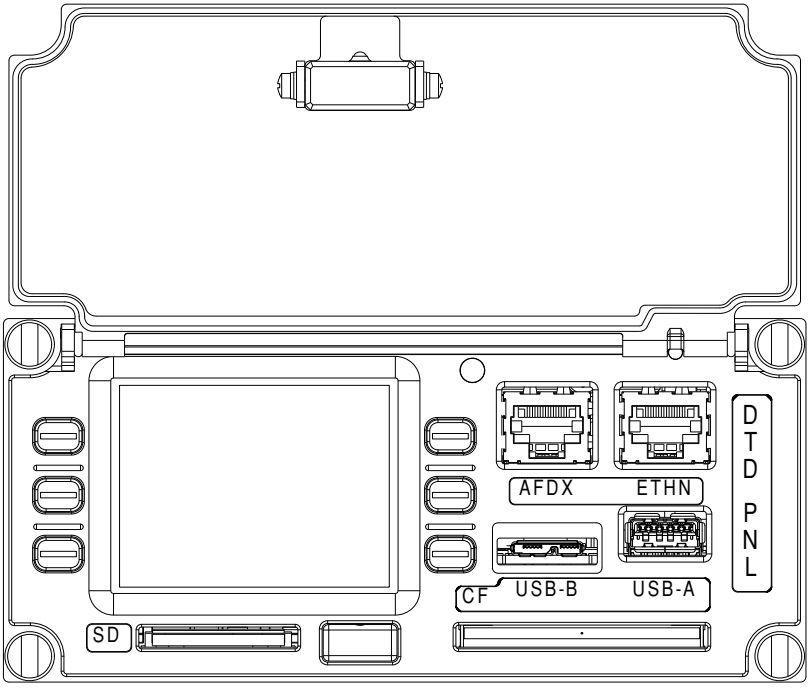

Figure 7-37C FAMILY HUMS DTD Control Panel

If the P/N 4G3130F00612 is installed together with the following kits:

— ISAT-200A kit P/N 4G2310F03012;

— DAL-200 kit P/N 4G4390F01511;

— HELICOPTER DATA TRANSMISSION kit P/N 4G4390F01411;

— PRIMUS EPIC SOFTWARE PHASE 7 or later;

the new SW allows the capability, during the flight phase, to transmit the HUMS data exceedances of the aircraft to the ground servers (via satellite communication channels) and, on ground, to transmit the HUMS data download (via Wi-Fi connection) while maintaining all the other functionalities of the kit P/N 4G3130F00611.

SKYQUEST CENTRAL (5TH) DISPLAY

The SkyQuest 5th display (P/N 4G4630F0111/211) is a stand alone Liquid Crystal display which has a variety of applications including Digital Map display, Video display, FLIR display etc. The unit is controlled by a set of keys available to the pilot, on the right hand side of the display, and a repeated for the copilot, on the left hand side of the display. The keys are used for selecting the image source and display functions. A rotary knob and a thumb joystick are positioned on the lower part of the display. The rotary knob is used for ON/OFF and brightness control while the joystick is used for activation and navigation of the display menus.

Note

Installation of the central Map/QRH holder P/N 4G2510F00111 is not possible when the 5th display is installed.

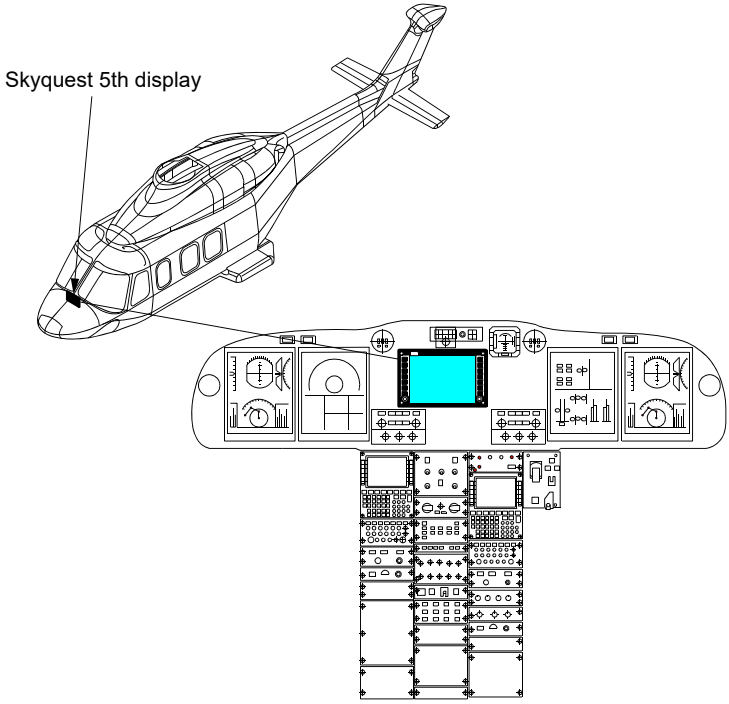

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Figure 7-38 Skyquest 5th Display Position

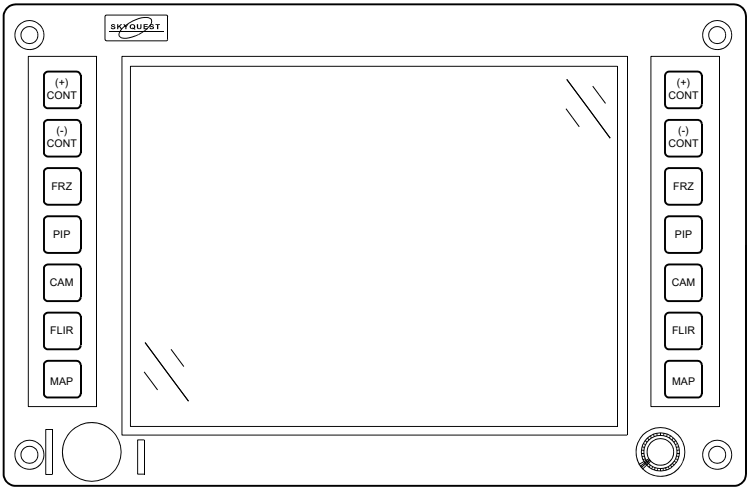

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Figure 7-39 Skyquest 5th Display

Description of Skyquest controls:

Ref	Label	Description
1	CONT+	Contrast control or, in FRZ mode, Zoom in
2	CONT -	Contrast control or, in FRZ mode, Zoom out
3	FRZ	Video picture freeze mode
4	PIP	Picture in Picture mode display
5	CAM	Video inputs toggle (when fitted)
6	FLIR	FLIR image display (when fitted)
7	MAP	Digital Map display (when fitted)
8	Rotary knob	ON/OFF (push) and brightness control
9	Joystick	Moves picture in FRZ and PIP mode Selection and Navigation in On Screen Display menu

EMS INTERCOM SYSTEM

The EMS ICS communication system (P/N 3G2350A01611) consists of one pilot ICS Mode Selector, mounted in the cockpit interseat console (Figure 7-41), two ICS Cabin Control Panels (Figure 7-42) with a PILOT/ICS PTT switch mounted alongside (Figure 7-43). The layout of the controls available to the flight crew and passengers is presented in Figure 7-40.

The ICS EMS system provides communication among passengers or between pilots and passengers. The ICS EMS system is also interfaced with the basic COM1 and COM2 radios, the hoist ICS (if fitted) and the COM3 and COM4 radios.

The ICS Mode Selector controls the communication between cockpit and cabin. The pilot can isolate communication from the cabin (ISO), select communication to panel #1 only (CREW A) or panel #2 only (CREW B) or CREW A and CREW B combined (ALL).

When CREW A is selected on the ICS Mode Selector, CREW B are isolated from the pilot and CREW A and viceversa when CREW B is selected. When ISO is selected intercommunication between CREW A and CREW B is always active.

To call the pilot when in ISO the CREW A or CREW B must press their on-side pilot call pushbutton which flashes the associated indicator, the appropriate lamp on the Mode Select Panel, the CAB lamp on the Pilots AV900 Audio Panel and a chime is heard on the pilots and relevant passenger headsets. To communicate the pilot must select, on the Mode Selector Panel, the required CREW A, CREW B or ALL which lights the relevant indicator in the cabin. On the AV900 CAB button must be selected and communication can commence.

The two ICS Cabin Control Panels are connected to the basic digital network and supports up to 6 intercom connections:

— 2 connections are managed by ICS Panel #1 mounted on left side of cabin roof, (CREW A).

— 2 connections are managed by ICS Panel #2 mounted on right side of cabin roof (CREW B)

— 2 additional connections via ICS panel #1 with dedicated amplifier.

Each ICS Cabin Control Panel includes the following functions:

— Selection of audio source combination for the intercom lines connected

— Selection of COM 1 and COM 2 for listening only and COM 3 and COM 4 radios, non-ATC, for radio transmissions

— Activation of communication with hoist operator (If fitted)

— Headset volume setting for intercom and radios

— Hot MIC / OFF selection

The RADIO/ICS PTT switch, associated to each Cabin Control Panel, is used for:

— ICS cabin communication when set to ICS and the HOT MIC/OFF switch on the cabin control panel is selected to OFF

— Transmitting on COM 3, COM 4 or hoist operator radio (if fitted) when selected to RADIO and the appropriate selection on the cabin control panel has been made.

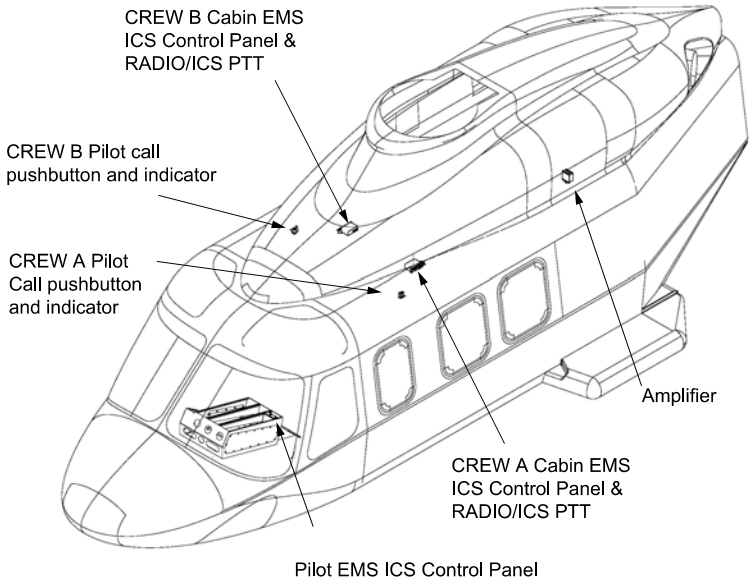

Figure 7-40 EMS ICS Installation Layout

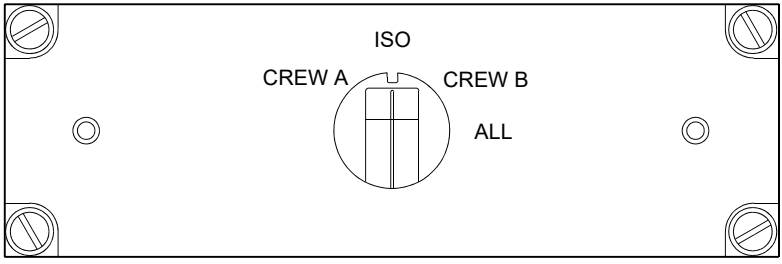

Figure 7-41 Pilot EMS ICS Mode Selector Panel

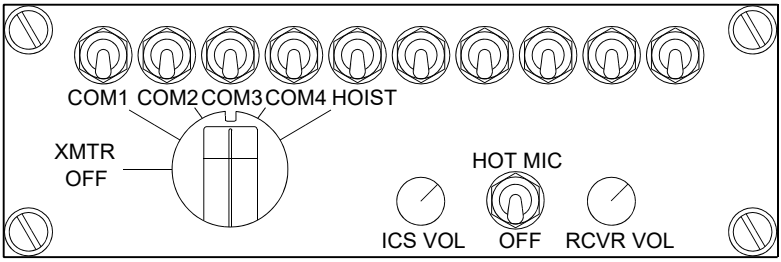

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Figure 7-42 Cabin EMS ICS Control Panel

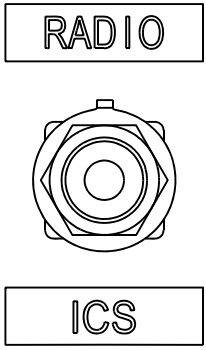

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Figure 7-43 Cabin EMS ICS RADIO/ICS PTT Switch

CHELTON DIRECTION FINDER DF 935

The Chelton 935-2 is a stand-alone Tactical Direction Finder system. The system comprises of one 935-2 receiver/antenna unit and a 715-40 control panel mounted in the intertseat console (see Figure 7-44). The receiver-antenna unit is mounted under the fuselage. The system has an integral synthesized receiver in addition to 5 separate guard receivers to monitor predefined distress frequencies. All 6 receivers take bearings simultaneously; may be separately switched on and off; and may have their individual squelch levels set. Each of the 6 receivers is able to remembering and display the last bearing if the signal is lost and time from signal loss in seconds.

MAN Receiver is tuneable across the frequency range 30 to 470MHz and can store 10 pre-programmed channels for this receiver.

VHF Receiver is the Guard Receiver for VHF Search and rescue frequency (121.5 MHz) and also has an Auxiliary channel programmable between 121.200 MHz and 123.200 MHz

Marine (MAR) Receiver is the guard receiver for Maritime (MAR) Search and rescue frequency (156.8 MHz) and also has an Auxiliary channel programmable between 155.600 MHz and 158.500 MHz.

UHF Receiver is the guard receiver for UHF search and rescue frequency (243 MHz). The receiver has an Auxiliary channel programmable between 241.200MHz and 245.100 MHz.

DSC Guard Receiver is permanently tuned to 156.525 MHz, this is the GMDSS VHF DSC channel which is capable of receiving and decoding DSC distress messages

SARSAT Guard Receiver is permanently tuned to 406.025 MHz SARSAT frequency. although the bandwidth is sufficient to receive transmissions on 406.028 MHz. The SARSAT decoded messages display the HEX ID of the Beacon and any GPS position data on the display.

Any one bearing may be displayed at a time on the dedicated control panel and simultaneously on the PFD HSI. The bearing displayed is that of the selected radio. While the controller screen for display of the bearing for any receiver is active, the signal-present status for all 5 other receivers can simultaneously be monitored on the same display. The bearing display screen additionally displays the age of the applicable bearing, enabling an operator to see how long-ago (in seconds) the bearing value was valid.

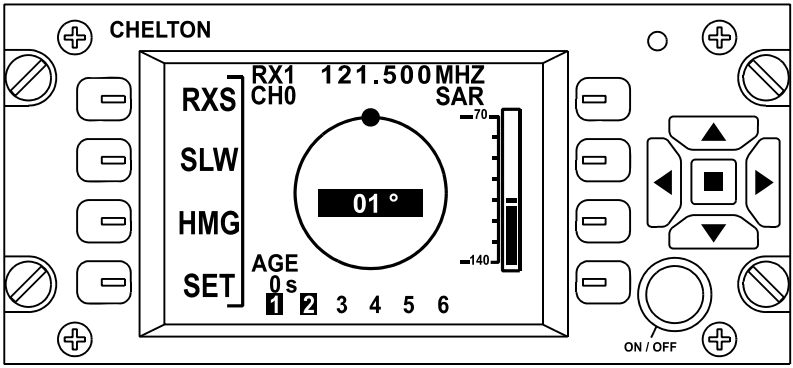

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Figure 7-44 Chelton 715-40 control Panel

OPERATION MODES

The controller is used to control and display the operational parameters of the six receivers contained in the DF Antenna, as well as provide access to its own set-up parameters. The operation of the system is menu driven via a set of push-button keys and a rotary knob. The system status is displayed using an electro luminescent, graphics display.

There are three basic operational display screens, and several set-up and Decoded Data Information screens. The three basic operational screens that are primarily used in an operation are:

— Receiver Status Screen with Monitoring

— DF Screen with Monitoring

— Homing Screen with Monitoring

Common features of all screens, other than the start-up screens, is the ‘distress alert’ indicator.

The distress alert indicator is shown as an ‘A’ character in the top-left position of the screen and indicates that a ‘Distress Alert’, has been detected by the DF.

The DF bearing of the active receiver can be displayed on the Pilot or copilot PFD HSI by using the Bearing Select pushbutton on the Display Controller. The analog audio from the DF radio can be heard using the DF pushbutton on the AV-900 audio panel.

Note

For full operation functionality details see Chelton Operation Manual for the 935-2 DF System Comprising 715-40 (2) DF Location and installation Guide Notes Doc No 935-2-600 latest issue.

FIRE BUCKET SYSTEM PROVISIONS P/N 4G2590F00311

A fire bucket can be attached to the cargo hook (Supplement 13, P/N 3G2592F00111).

The water dumping is activated using a guarded pushbutton labeled FIRE BUCKET (See Figure 7-45) on either the pilot or copilot cyclic. When the guard is lifted power is supplied to the circuit and a BUCKET ARM caution illuminates on the CAS. Pushing the pushbutton, momentarily, supplies current to the belly monted socket.

Jettisoning the fire bucket is carried out using the Emergency Jettison function of the Cargo hook. The electrical connection to the control head is automatically disconnected in this case.

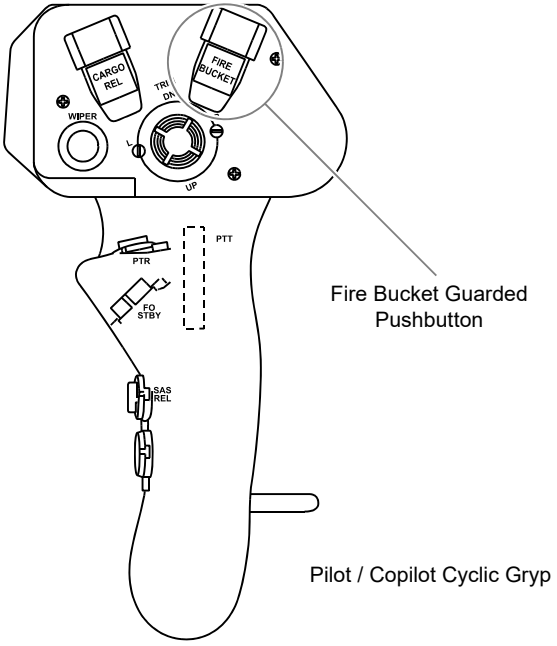

Figure 7-45 Fire Bucket Guarded Pushbutton for Water Release

ICE DETECTOR SYSTEM

The Goodrich Ice Detector system P/N 4G3080F00111/112/113 comprises of an ice detector sensor on the fuselage and a control switch mounted in the overhead panel. In the CAS window 2 white status messages are displayed:

— ICE DET ON

— ICING

to inform the pilot on the status of the system and on icing conditions.

The control switch has 3 positions, OFF/ON and a spring loaded TEST position. When held in the TEST position the ICE DET ON message is displayed followed by the ICING message. While selected to ON the ICE DET ON message is displayed and when ice is detected by the sensor the ICING message is displayed.

Note

The ice detection capability of the system has not been assessed. Therefore no credit is to be given to this system as icing conditions may not be detected.

MAIN AND TAIL ROTOR LIGHTS

The Main and Tail Rotor lights installation is intended to illuminate two portions of the main rotor (right side and left side) and the tail rotor. These lights allows the crew to identify, during night time ground and hover condition, the extremity of the main and tail rotor discs.

The system is comprised of two main rotor lights, two tail rotor lights and control switching on the Auxiliary Overhead Panel.

An option also available to customers is to have either just the Main Rotor lights or just the Tail Rotor lights installation.

The main rotor lights are positioned one on the right and one on the left side of the transmission cowling (See Figure 7-46), at STA 5595 and WL 2537. The lights are inclined up at 13° with respect to horizontal plane and have a light cone of 28° and 4500 candle power max.

The tail rotor lights are installed under the rear sloped surface of each sponson and inclined up at 11° with respect to the horizontal plane (See Figure 7-46). These lights have different light cones, the right hand light has a cone 45° wide with 2700 candle power max, the left hand light is 24° wide with 6000 candle power max. An alternative position for these lights is also available on the external side of the sponsons to resolve inteference issues when the Emergency Flotation and Integrated Liferafts kit is fitted.

For the installation of both the Main and Tail Rotor lights a three position ROTOR LTS switch, on the auxiliary overhead panel, is used to control the lights. The three positions of the switch are OFF/MAIN/BOTH. When selected to MAIN the Main Rotor Lights are illuminated and when set to BOTH the Main Rotor and Tail Rotor Lights are illuminated.

For the single installation a two position ROTOR LTS switch, on the auxiliary overhead panel, is used to control the lights OFF/ON. This will illuminate the single installation present on the aircraft.

The lighting system uses 28VDC from the NON ESS BUS 2 through two dedicated Circuit Breakers of 7.5A each (CB 238 for MR lights and CB239 for TR lights).

The Main and Tail Rotor lights are not NVG compatible. If NVG installation is present then in “COVERT” mode the main and tail rotor lights are automatically selected to OFF.

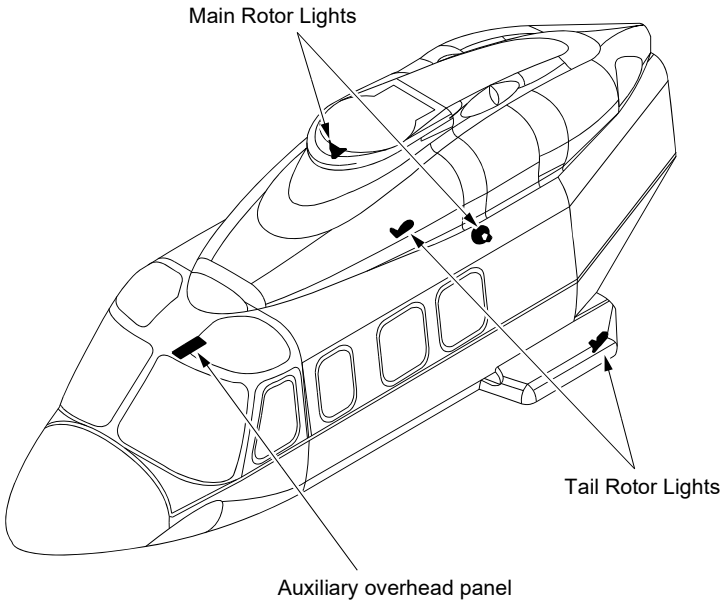

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Figure 7-46 Main and Tail Rotor Lights Installation

HELICOPTER EMERGENCY EXIT LIGHTING SYSTEM

The Helicopter Emergency Exit Lighting System (HEELS) is a stand alone automatically operated lighting system around the Emergency Exits to aid and assist passenger and crew evacuation in case of helicopter ditching. See Figure 7-47 and Figure 7-48.

The system comprises of:

— 5 luminescent strip lights on the internal side of each of the six cabin windows (four curved strips positioned at each corner of the window and one straight strip positioned on the lower side to identify the pull out strip.

— 5 luminescent strip lights on the internal side of the flight crew door windows (four curved strips positioned at each corner of the window and one straight strip positioned on the lower side to identify the pull out strip.

— 5 independent batteries, one for the windows in each of the cabin and cockpit doors and one for the 2 fixed windows.

— 10 water activated sensors, 2 sensors for each door (one in the lower part and one in the upper part) and 2 for the fixed windows.

The system is activated by the water sensors, in a ditching situation, and illumination of the luminescent strips is independent of the aircraft power system due to the stand alone batteries.



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Figure 7-47 HEELS System Illuminated

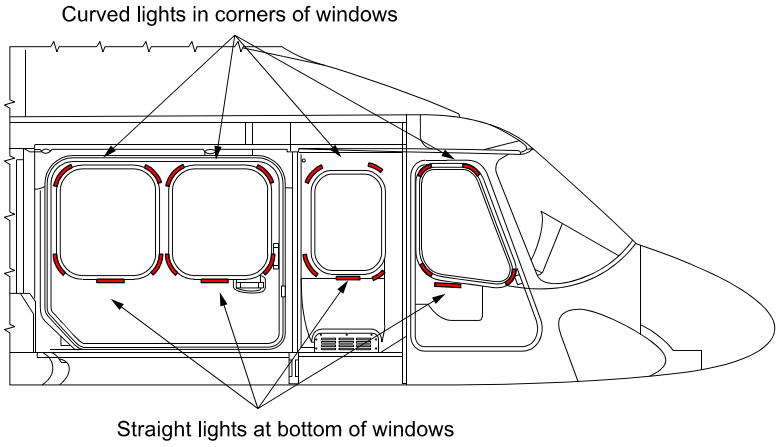

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Figure 7-48 HEELS Luminescent Strip Lights (Internal view left hand side)

AV900 AUDIO PANEL VERSION 99001/2 & 99201/2 (BLOCK 3)

Note

For AV-900 audio panel basic operation refer Primus EPIC Pilots guide Honeywell Pub No A28-1146-160-00, latest issue.

The AV-900 version 99201/2 differs from 99001/2 only for NVG compatible lighting.

The AV-900 version 99001/2 and 99201/2 audio panel (See Figure 7-49) adds the following functionality to the basic AV-900 Audio panel:

— support for COM5, FONE2 (FONE functions:
  • can detect incoming call
  • have option of phone privacy)

— two additional buttons (AUX1 & AUX2) for standard receiver audio

— Emergency All Call function

— AUTH or MUSIC button replaced with ENBL

— second intercom channel is provided for the cabin crew members.

The INPH on the standard panel has been replaced by the PLT and CAB buttons. For the audio panels, PLT and CAB buttons control the volume and selection of the respective intercom channel.

This version, when mounted in the cabin, may be configured to transmit on COM1 and COM2.

This version may be configured with up to 6 cabin audio panels.

The PA sidetone is internally generated on this version of the AV-900 (it is not a feed back from the PA amplifier as on previous versions) and therefore when hearing the PA sidetone this does not guarantee that the PA system is functioning.

Note

When the ALPHA Mark 4A helmets (installed with AA39 NAT adapters) are used the audio level must be set below 60 for the pushbuttons PLT, HDPH and CAB for each AV900 audio panel installed on the aircraft.

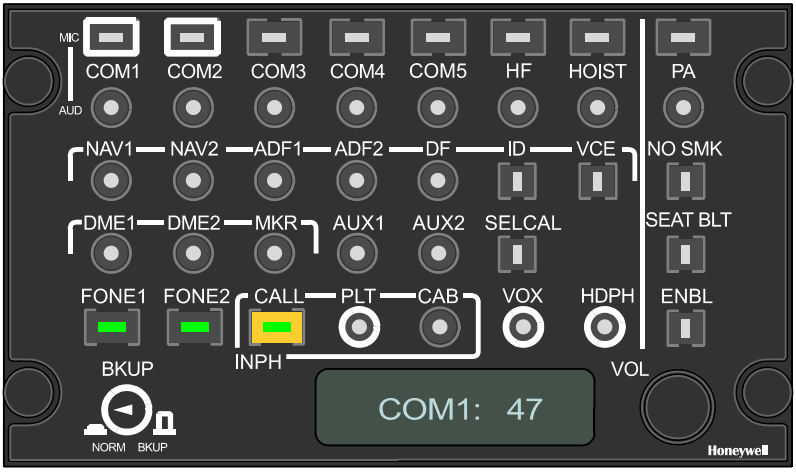

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Figure 7-49 AV-900 Audio Panel 99001/2 & 99201/2

AV900 Audio Panel 99001/2 & 99201/2 additional Operational Procedures

Cabin Communications

The Audio System provides the following cabin intercom functionality to support cabin-to-cabin crew member communication, as well as cockpit-to-cabin communication.

For audio panels mounted in the cabin, the CAB button also supports selection and volume control for the Cabin Intercom Channel. The PLT button annunciator is used to indicate to the cabin crew that at least one of the cockpit audio panels is on the Cabin Intercom Channel.
The cabin crew do not have access to the Cockpit Intercom Channel and so the PLT button can also be used for paging.
The default power-up of the audio panel enables the Cockpit and Cabin Intercom Channels for the AV-900s and the third-party cabin ICS (PLT and CAB buttons lit).

If the cockpit is not connected to the Cabin Intercom Channel and the cabin crew require to talk to the cockpit crew the connection can be made by the following:

1. Pressing PLT button, the CAB button is lit automatically (if it was not already) to enable the Cabin Intercom Channel

   • The PLT button begin to flash on the cabin audio panel that originated the call

   • The CAB button on the cockpit audio panels begin to flash

   • The cockpit audio panels sound a chime to alert the pilots to the call from the cabin

2. When the CAB button on one of the version 99001/2 & 99201/2 cockpit audio panels is selected, in response to an incoming call from the cabin, the following happens:

   • The CAB button on that audio panel stops flashing and remains illuminated

   • The CAB buttons on the other cockpit audio panels stop flashing and turns off

   • The PLT button on all cabin audio panels is illuminated to indicate that at least one pilot is on the Cabin Intercom Channel

   • The pilot then is able to talk to the personnel in the cabin using the Cabin Intercom Channel

3. If the PLT button is pressed again on the cabin audio panel that originated a call to the cockpit, before a cockpit audio panel answers the call, the call is cancelled and the following happens:

   • The PLT button on the cabin audio panel that originated the call stops flashing

   • The CAB button on the cockpit audio panels stops flashing

Emergency All Call

The audio panel includes a yellow CALL button so that any crew member can immediately make an emergency intercom call. The CALL button immediately connects the cabin to the pilots during the time the button is held down with no acknowledgement required by the pilots or any other crew member.

When the CALL button is held down, the following happens:

— The audio from that audio panel is routed to the headphone, cabin speaker, and cockpit speaker outputs of all AV-900s;

— The display for that audio panel indicates “CALL: TX” and the display for the other audio panels indicates “EM CALL” and their CALL buttons illuminate

— The incoming CALL audio is summed with other previously selected audio and provided to headsets and speakers.

The Emergency All Call command does not suppress other audio, pilot or maintenance intercom audio and does not overide Radio TX, BKUP, and Config Mode functions.

When the CALL button is pressed a CALL button press on another audio panel is ignored.

If the AV-900 is in BKUP Mode, the CALL button is ignored.

If the AV-900 CALL button is held down for more than two minutes, the Emergency All Call is terminated.

Full Duplex FONE Interfaces

The audio panels, provides analog audio interfaces for two full duplex communication devices (FONEs). i.e. Satellite or Cell Phones.
The FONE1 and FONE2 interfaces can detect an incoming call. The light on the relevant FONE1 or FONE2 button begin to flash and a chime is heard to indicating an incoming call.
The FONE1 and FONE2 buttons connect the microphone and audio for the corresponding FONE, only one may be active at a time.

WINDSCREEN WIPER (P/N 3G3040A00811 OR 3G3040A00812) WASHING SYSTEM (P/N 4G3040F00111, 4G3040F00112 OR 4G3040F00113)

A twin, parallel action, windscreen wiper system is installed in the helicopter basic configuration which allows cleaning of both the pilot and copilot windscreens.

The windscreen wiper system is composed of:

— a control panel in the cockpit interseat console

— wiper blades system

— electric motor drive installation

The system can operate with 2 different speeds (SLOW/FAST) and dual or single side operation. The mode of operation is selected on the control panel in the cockpit interseat console and ON/OFF control of the wipers is controlled by the pushbutton switches on the cyclic control grips. Dual mode activation is started by pushing either cyclic button which activates both wipers (Figure 7-50 & 7-51).

The windshield washing system (P/N 4G3040F00112) is provided in addition to the windshield wiper system (included in the basic configuration) to allow cleaning of the windshield surface of any accumulation of water, insects, dirt, sand, dust, salt spray etc.

The windshield wash system consists of:

— Washer pump

— Fluid tank with low-level sensor (for maintenance message)

— Piping up to the wiperblade spray bar

— Control panel located in the cockpit interseat console

— Reservoir with capacity of 5 liters

Two washing cycles are available, dependent on the time pressure is applied to the washer button:

— Light washing cycle, button held for 1 second or less, (1 cycle spray and wipe, followed by 2 cycles of wiping).

— Heavy washing cycle, button held for more than 1 second, (continuous cycle of spraying and wiping until pushbutton is released, and then 2 cycles of wiping).

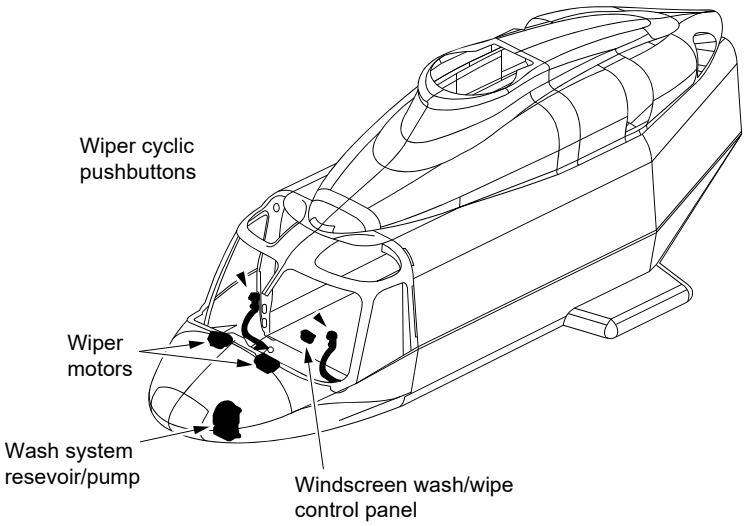

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Figure 7-50 Windscreen Wash/Wipe System Installation

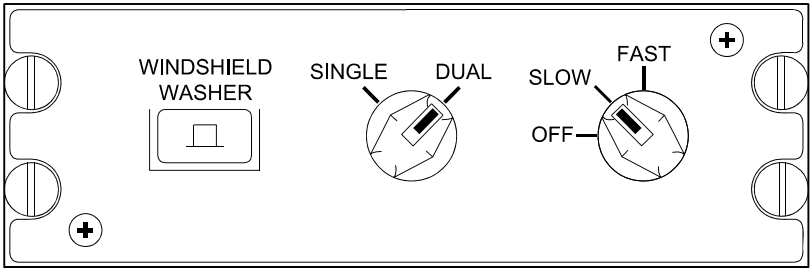

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Figure 7-51 Windscreen Wash/Wipe Control Panel

LIGHTINING SENSOR SYSTEM (LSS)

The LSS LSZ-860 kit is used to detect areas of lightining activity, in a 200-NM radius around the aircraft. It gives the operator a visual display of lightining position, relative to the aircraft, and the rate of occurrence. The system is integrated into the Primus Epic EDS System so that the LSS is normally presented with weather radar information, however, the LSS display is also available independant of the weather radar status and if the radar is not present. See Figure 7-52.

The information may be displayed pn the MFDs. Selection of the LSS modes and the display of information on the MFD is carried out using the MFDs Map drop down menu. See Figure 7-53.



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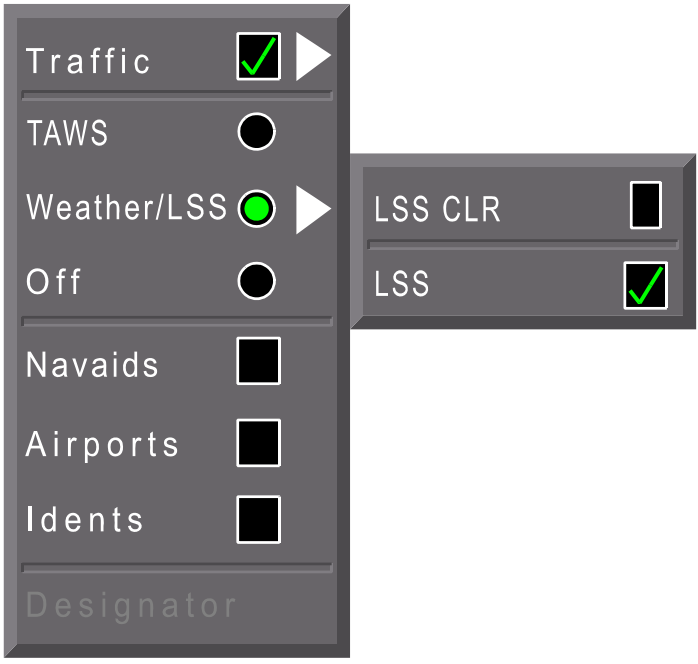
Figure 7-52 LSS Symbology on MFD, Overlayed on Weather Radar Display



Map Menu when Weather Radar and LSS installed



Map Menu when LSS installed and No Weather Radar

ICN-39-A-157000-A-00003-00594-A-01-1

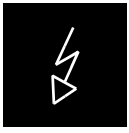
Figure 7-53 LSS Selection in MFD MAP Menu

The LSS detects high energy invisible electromagnetic and electrostatic discharges (lightning) that may indicate areas of turbulent activity. The lightning activity uses a “rate of occurrence” symbols that show three level of lightning activity within a circular cell around the symbol. The white rate symbol is coded, according to the lightning strike rate of occurrence within the cell and upgrades the symbol as more lightning strikes are detected. The symbol is downgraded if two minutes passes with no new lightning strikes detected, see Figure 7-54.

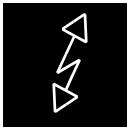
The magenta ALERT symbol is displayed after the first lightning strike for 5 seconds on the bearing of the strike and a white rate one symbol which is upgraded depending on the strikes detected.



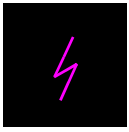
RATE ONE: SINGLE STRIKE



RATE TWO: THREE STRIKES



RATE THREE: SIX STRIKES



ALERT SYMBOL

ICN-39-A-157000-A-00003-00595-A-01-1

Figure 7-54 LSS Display Symbology

Status messages for the LSS are presented on the last line in the WEATHER window, which is located on the bottom left of the MFD Map display.

Two modes are available for the LSS display:

- LSS LSS display is activated and lightning strikes are col lected and displayed
- LSS CLR All memory of past strikes and symbols are cleared

The modes are selected from the MFD MAP menu and are selected independantly for each MFD.

The LSS test mode is automatically selected at power-up but can also be selected manually from the MCDU TEST page. The test simulates lightning signals at a bearing of 45° at 25 NM. The simulated strike progresses in severity up to Rate 3 within 15 seconds after initiating the TEST. Aslo a lightning ALERT symbol is generated along the outermost range ring at a bearing of 45°. The test symbology is removed after 2 minutes.

For a detailed description of the LSZ-860 Lightning Sensor System, refer to the document Pilots Guide, Integrated Avionics and Automatic Flight Control System for the Agusta AW139/AB139 Helicopter, latest Issue.

RADIO ITT AN/ARC-201E SINCGARS

The AN/ARC-201E is a VHF FM tactical military radio. The system comprises of the RT AN/ARC-201E receiver/transmitter, an Export Radio Control/display unit (ERCDU) mounted in the interseat console (Figure 7-55) and a dedicated antenna mounted above and between the engine exhausts.

The ICS panel COM 4 is used to access the radio system on the ICS system.

The AN/ARC-201E radio is a 2320 channel, Frequency Hopping, voice or data, COMSEC radio. The radio operates on VHF FM from 30 to 87.975 MHz for radio communications of voice and data with secure (Cipher Text) or Plain Text, in single channel (25 KHz increments) and in the SINCGARS ECCM mode of operation. The RT is remotely controlled with the ERCDU through two 1553B buses. The equipment is capable of using the SINCGARS data rates 16k, AD1, and AD2. The RT requires Communication Information for secure and frequency hopping operations. An external interface provides the capability for loading of Fill inputs to include Single Channel frequencies, hopsets, TRANSEC, COMSEC and time.

See Figure 7-56 for component installation positions.

For full information on the use of the ITT AN/ARC-201E Sincgars radio refer to Operators Manual Pub No 07BAN12P, latest issue.

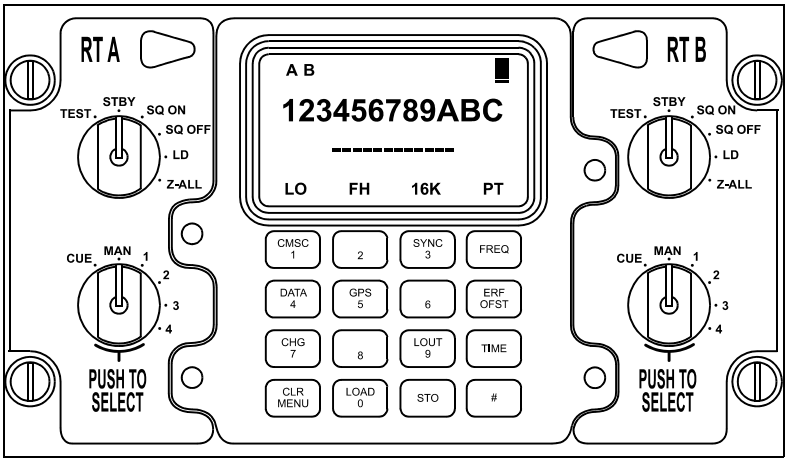


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Figure 7-55 ITT AN/ARC-201E ERCDU Control Panel

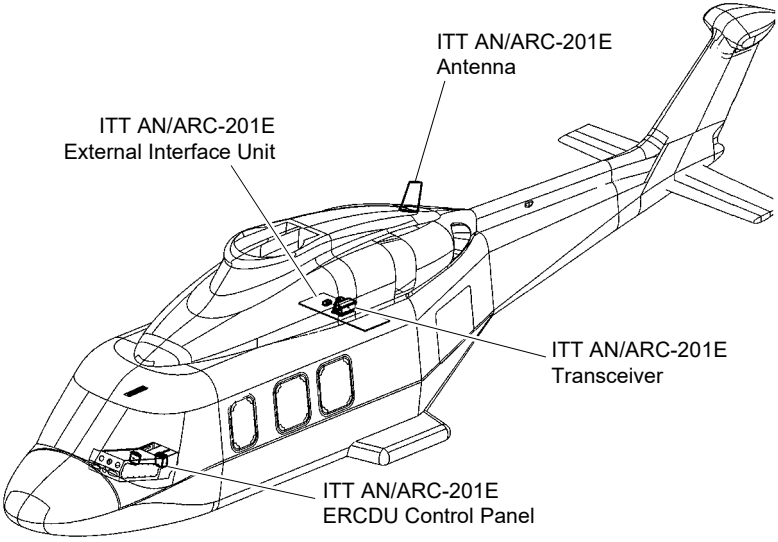

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Figure 7-56 ITT AN/ARC-201E Radio System Component Positions

RADIO BENDIX KING KTR 909

The Bendix King KTR 909 is a UHF Comm radio P/N 4G2310F02011. The system comprises of the KTR 909 receiver/transmitter, a KFS 599A UHF Comm Control Head, mounted in the interseat console (Figure 7-57) and a UHF Comm antenna, mounted under the tail cone (Figure 7-58).

The ICS panel COM 4 is used to access the radio system on the ICS system.

The radio frequency range is 225.000 MHz to 399.975 MHz in 25 Hz increments.

The radio frequency may be selected manually or up to 20 Preset channels can be programmed. The Guard channel is also preset within the unit.

For full information on the use of the Bendix King KTR 909 UHF radio refer to the Bendix/King Pilot's Guide KTR 909.

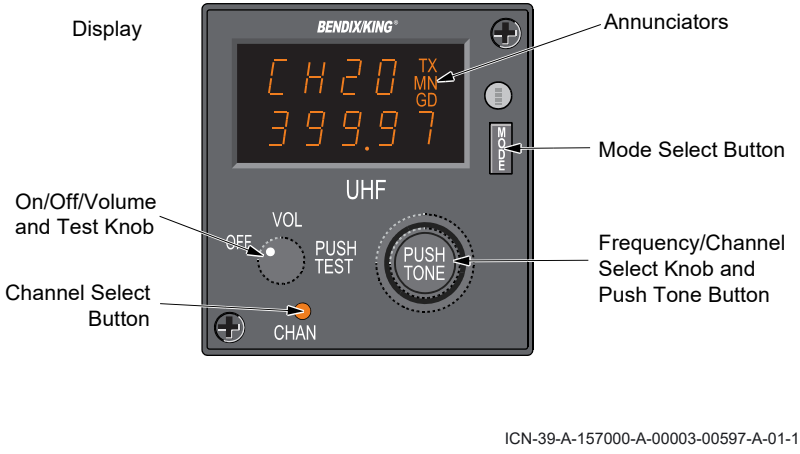

Figure 7-57 KFS 599A Controller Panel

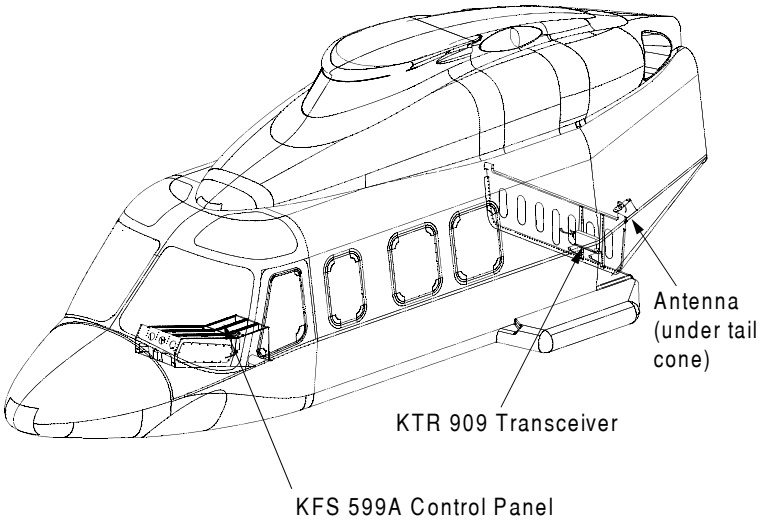

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Figure 7-58 Bendix King System Component Positions

VIDEO MANAGEMENT UNIT (VMU)

The VMU kit, P/N 4G9310F00611, allows different video graphics inputs to be managed onto several display outputs (such as 5th display, MFD display, Mission Console display, digital video recorder, video up/downlink) and provides better imaging performance, multiple standard conversions and an improved video signal customization. The kit consists of two main items, the video processor, located beneath the floor behind the copilot seat, and the configuration module, located in the rear avionics bay.

A C/B for the system is mounted in the overhead Auxiliary Circuit Breaker panel. An optional switch may be installed next to the C/B (Figure 7-57). The 2 position optional switch is used to select between 2 graphic sources on the MFD (eg. digital map or search radar) depending on the equipment installed. The labeling of this switch XXXX/XXXX will vary depending on the installations (eg. DMAP, RADAR etc).The 2 position input source switch is used to select between 2 sources ie. digital map, radar, video etc, dependant on the installed on the aircraft. The labeling of this switch XXXX/XXXX will vary depending on the installations (eg. DMAP, RADAR etc).

When the system is off a white status message, in the CAS window, is displayed “CHECK VMU” to inform the pilot that the VMU is powered off or in fail (no configuration module installed).

Note

If the VMU is powered off or in fail, the video source image is frozen on the MFD.

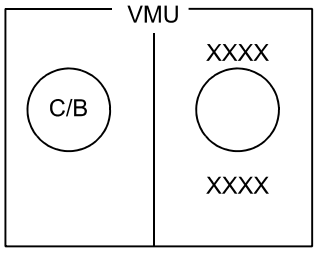

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Figure 7-59 VMU Panel CB and (Optional) Switch in Overhead Auxiliary CB panel

SIRIO CENTRAL (5TH) DISPLAY

The optional SIRIO 5th display (P/N 4G4630F00311/312) is a stand alone high resolution Liquid Crystal display which has a variety of applications including Digital Map display, Video display, FLIR display etc. The unit is controlled by a set of keys available to the pilot, on the right hand side of the display, and a repeated for the copilot, on the left hand side of the display. The keys are used for selecting the image source and display functions. The brigtness and contrast are automatically set when the unit is powered, however, they may be adjusted independantly, as required, via rocker switches under the screen.

Note

Installation of the central Map/QRH holder P/N 4G2510F00111 is not possible when the 5th display is installed.

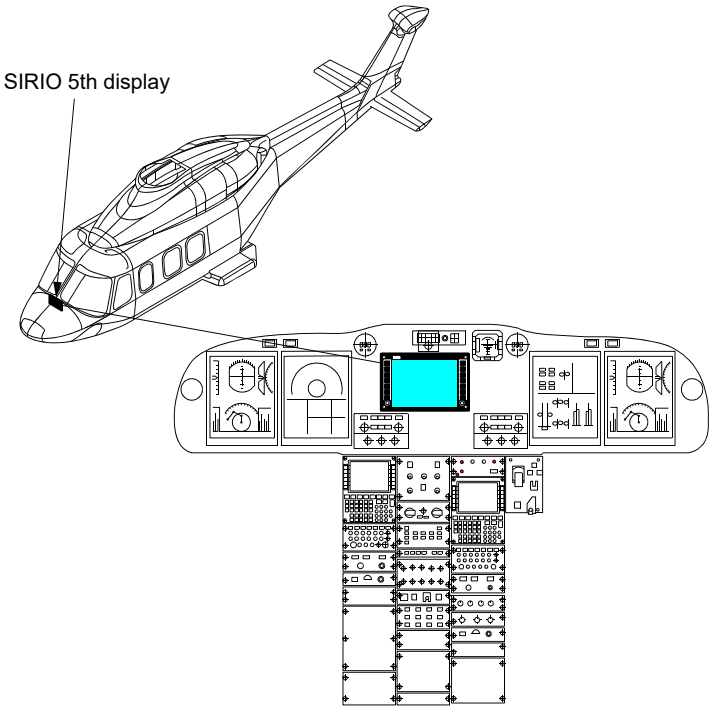

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Figure 7-60 SIRIO 5th Display Position

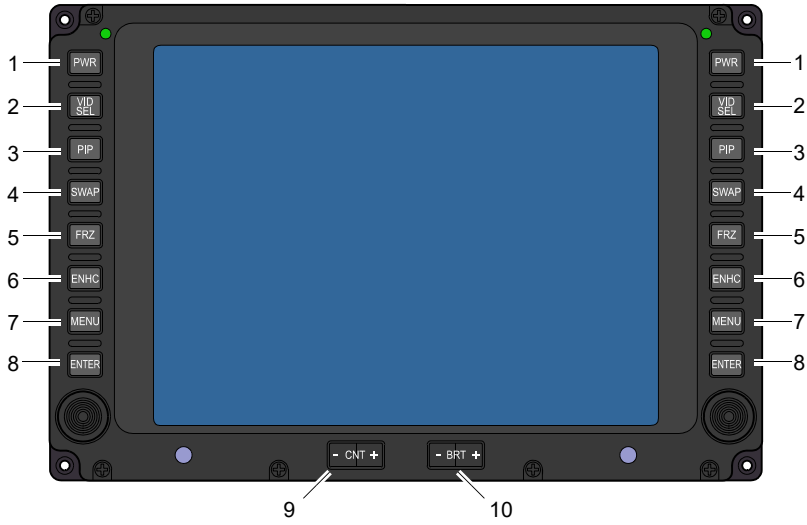

Figure 7-61 SIRIO 5th Display

Description of Skyquest controls:

Ref	Label	Description
1	PWR	ON/OFF Power switch
2	VID SEL	INPUT video source menu
3	PIP	Select Picture in Picture mode display
4	SWAP	Swaps MAIN and PIP sources when PIP mode engaged
5	FREEZE	Video picture freeze mode
6	ESC/-	Closes MENU windows, ZOOMS in frozen picture
7	MENU	Displays configuration and setting page and MENU
8	ENTER/+	Enters selection in MENU, ZOOMS in frozen picture
9	CNT ±	Adjusts contrast in display mode, ZOOM IN and ZOOM OUT in FREEZE mode.
10	BRT±	Adjust screen brightness

NAT DACS INTERCOM SYSTEM

The NAT DACS ICS system (P/N 4G2350F01711) is a communications management system that distributes and controls audio in the cabin. It manages the audio from all transceivers, receivers and audio warning sources. It allows the transmission of microphone audio to selected transmitter and distributes the intercom audio.

The system comprises the Audio Management Unit (AMU50) (Figure 7-62) and up to 6 Audio Control Panels (ACP) type ACP51 or ACP53 (Figure 7-62 and Figure 7-63). A maximum of 7 headsets can be connected. The audio managment unit has the cockpit intercom bus, selected transceivers and receivers and audio control panels connected to it. The Audio Management Unit sums and distributes all audio to each user attached to it.

A panel, next to each ACP, contains the CALL and EM CALL pushbuttons which control the communication between the cabin and cockpit crew (Figure 7-64).

The system is configurable using a PC connected to the Audio Management Unit via a USB serial port and DACS configuration management software (DevCs). Configuration options include the number of radios, audio levels, microphone levels, alert audio levels, etc.

The system can be customized to adapt to each installation. Customization includes expected receive audio input levels, number of crew members, microphone impedance, etc. These settings are saved in a small, remote mounted unit; the RM01. Also saved in the RM01 are all of the Aural Alert audio files and the Aural Alert setting, such as priority and number of repetitions. Storing the system configuration in this unit enables the replacement of the Audio Management Unit without the need of downloading a new configuration file.

The DACS system is used as cabin digital ICS system. The system is connected with the cockpit intercom Audio through an analog audio port. The discretes are used to control the CALL logic between the cockpit and cabin and are not connected to the DACS system. To manage the Call logic two external pushbutton, with internal circuitry, (CALL and EM-CALL), are used.

For full information on the use of the NAT DACS ICS system refer to the Operators manual latest issue.

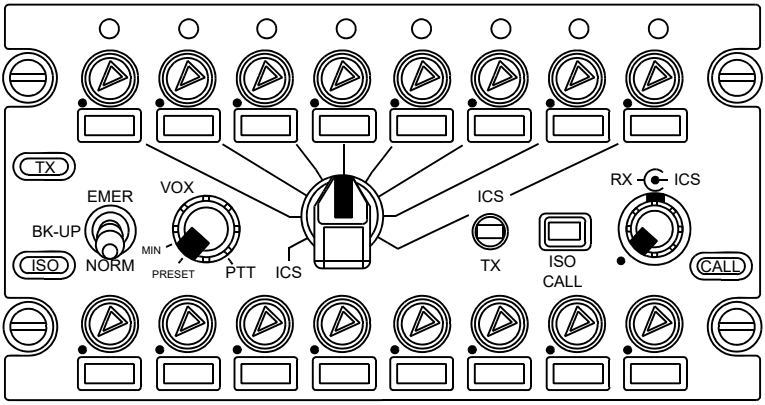

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Figure 7-62 DACS Audio Control Panel ACP 53

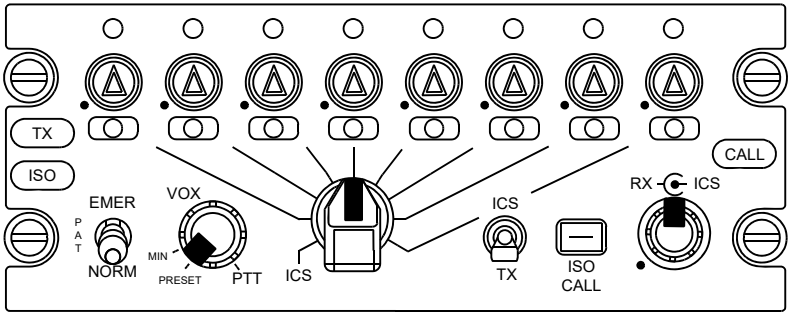

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Figure 7-63 DACS Audio Control Panel ACP 51



ICN-39-A-157000-A-00003-00651-A-01-1

Figure 7-64 CALL and EM CALL pushbuttons

DIGITAL VIDEO AUDIO RECORDER (DVAR)

The SAAB Digital Video Audio Recorder (DVAR) and Audio Mixer Panel P/N 4G9700F00511 and dual AVALEX P/N 4G9700F01511 are customer options for the AW139. They provide the ability to digitally record video and audio signals (Radar, FLIR, ICS, Digital Map etc) depending on the aircraft configuration and selections on the control panels.

Saab DVAR

The installation comprises of athe DVAR control panel located either in the interseat console, mission console, avionics rack or both dependant on the customer configuration. The DVAR Processor unit is installed in a position in order to make the cartridge accessible to crew. Depending on the customer requirements the position currently available are the mission console or mounted on the cabin wall beside the mission console or in the avionics rack.

The Audio mixer is used control the ICS channel volumes that are registered on the DVAR.

The video and audio is stored on a removable MMC flashcard. The recorded video and audio signals can either be viewed on the aircraft cabin display (if fitted) or on a Ground Replay Station by removing the MCC Flash Card. An optional unit is also availbale to downloaded from the DVAR Processor to a PC using a suitable connecting cable on ground.

Avalex DVAR

The Avalex DVAR kit is composed by a single unit with a control panel and the DVAR processor, which can be installed in the interseat console, mission console or avionic rack dependant on the customer configuration.

The video and audio is stored on a removable SSD, SD or USB memory or inside the internal DVAR memory. The recorded video and audio signals can either be viewed on an aircraft cabin display (if connected to the device) or on a Ground Replay Station by removing the memory, if possible, or by trasferring the data via USB flash drive.

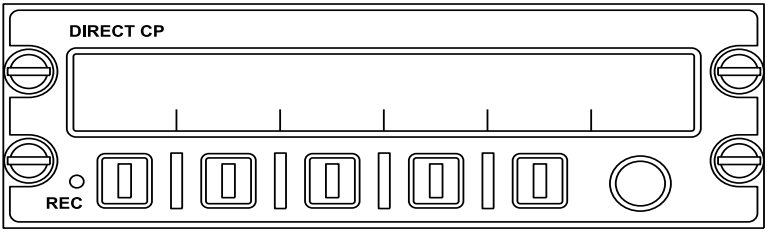

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Figure 7-65 DVAR Control Panel

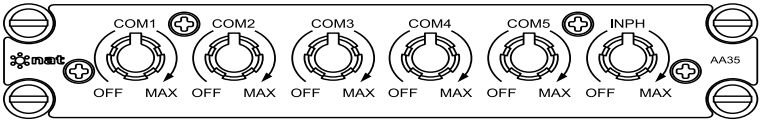

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Figure 7-66 Audio Mixer Panel

COCKPIT CALL LIGHTS

The Cockpit Call Lights Kit P/N 4G2300F00111/112 mounts two indicator lights in the cockpit to inform pilots of incoming calls from the cabin interphone system or the Satcom system. The two indicators are mounted one to the left of the pilot MFD and one to the right of the copilot MFD (See Figure 7-67). Each indicator is divided into an upper and lower part which illuminate green for an incomming Satcom or Cabin Cell respectively, otherwise the indicator remains black (See Figure 7-68)

The Cabin Call messages flashes while the Cabin Call button is held pushed or while the cabin handset is ‘off the hook’. the Satcom Call message flashes for 20 seconds when and incomming call is active. The dimming of the indicators is controlled by INSTR control dimmer on the LT dimming panel.

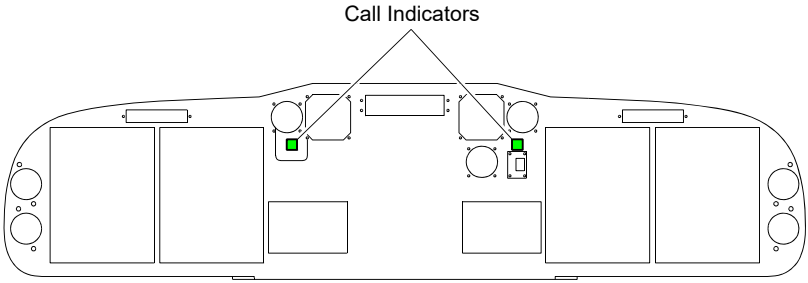

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Figure 7-67 Call Indicator Positions

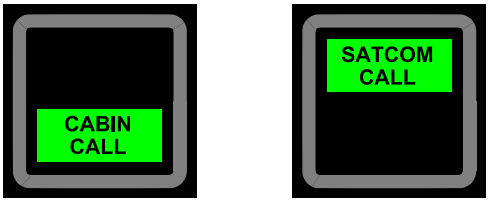

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Figure 7-68 Indicator Illumination (Satcom Call Upper part, Cabin Call Lower part)

CABIN DOOR EXTERNAL LIGHTING P/N 4G3340F02311

The cabin door external lighting kit consists of two lights installed above the cabin doors (one on the right side and one on the left side) at STA 4815 and inclined to illuminate the area around the two cabin cargo doors. This illumination aids loading and unloading the cabin when in areas of low ambient light. See Figure 7-70 and 7-69 for illuminated areas.

The lights are controlled through one ON/OFF switch installed in the auxiliary circuit breaker panel in the cockpit and labeled as “LIGHTING EXT AREA”. The lights are supplied by the NON ESSENTIAL BUS 2 and protected by a circuit breaker installed in the auxiliary circuit breaker panel.

The light will only illuminated when the ON/OFF switch is selected to ON, the aircraft in on the ground (WOW at ground), NORM/NVG mode switch (if fitted) is selected to NORM and with both engine generators functioning.

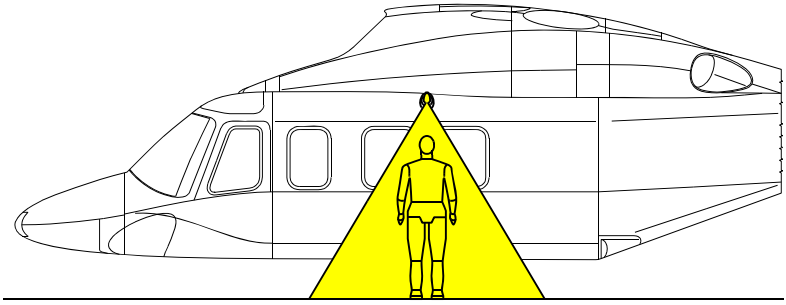

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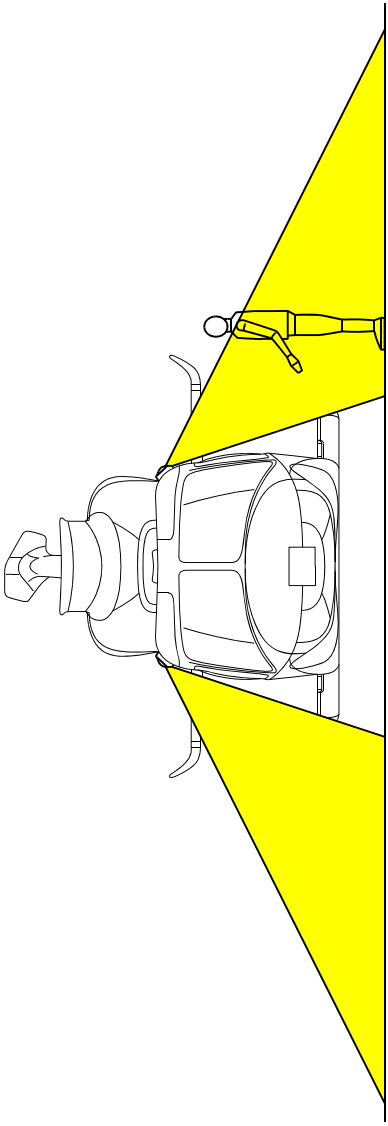
Figure 7-69 Cabin Door Light Illuminated Area (Side)



ICN-39-A-157000-A-00003-00895-A-01-1

Figure 7-70 Cabin Door Light Illuminated Area (Front)

RADIO WULFSBERG P2000

The Wulfsberg P2000 is multiband FM Tactical radio and is a self contained panel mounted unit. The radio can be installed with a combination of frequency bands requested by the customer. The unit is connected to a Chelton 16-16P3 VHF antenna which is installed under the helicopter on the left hand side.

This radio configuration has a module installed giving a frequency range of 380 to 470 Mhz, FM analog, selectable power output of LO power (1 Watt) or HI power (10 Watts), 512 channels and P25 Digital trunking standard.

The ICS panel is used to access the radio system. Control of the radio is via the Control Panel (see Figure 7-71), mounted in the interseat console and is configured as COM 4 on the AV900 intercom system.

The control panel also has the option of the installation of a second seperate transceiver.

For complete details of the Wulfsberg P2000 operation refer to Wulfsberg Flexcomm 2000 Operators Manual number 150-049105 latest issue.



ICN-39-A-155075-A-00003-00973-A-01-1

Figure 7-71 Wulfsberg P2000 Transceiver/control panel

MISSION CONSOLE POWER SWITCH

This kit installs a new mission CB panel in order to enable the mission console loads powered by Non Essential Busses including tactical radios and mission console equipments, if installed, to be turned off.

The mission console CB panel is mounted in the cockpit on the LHS above the copilot seat.

A dedicated switch, labeled "UTILITY CB CB", positioned on the switch control panel can be used to activate or de-activate the mission console equipment loads.

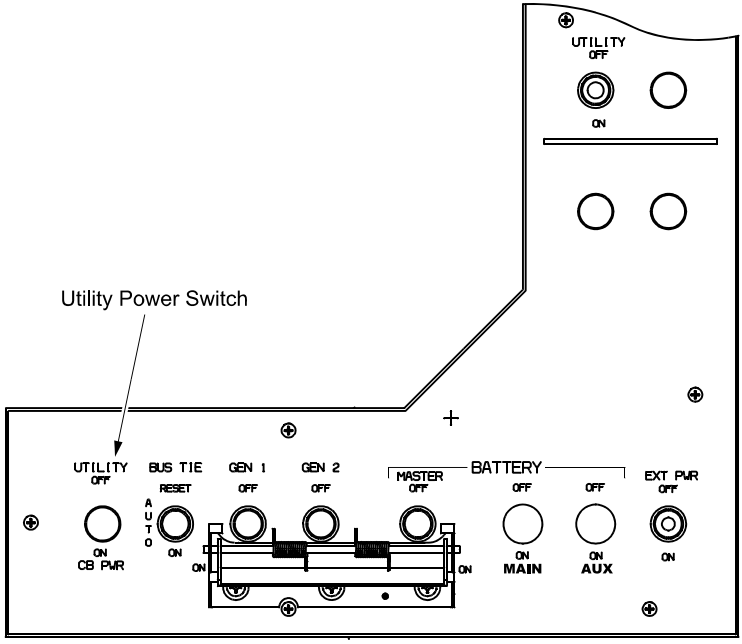


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Figure 7-72 DC Generation and Distribution Panel with Utility Power Switch

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LEFT HAND CABIN STEERABLE LIGHT

The left hand steerable light kit P/N 4G3340F02511 introduces a sterable light on the left hand underside of the of the cabin fuselage. The light is symmetric to and identical to the Goodrich Hoist steerable light (if fitted).

The kit consists of the steerable light mounting, a control panel and pendant mounted on the left had side of the cabin and all the necessary wiring. The light can be operated by the cabin crew using the control panel which has a LAMP ON/OFF switch and a 5 way switch. When selected ON the lamp system is supplied with power but the lamp remains off. Pressing the central fifth position on the 5 way switch the lamp illuminates but remains stowed. Moving the 5 way switch to FWD un-stows the lamp, which can then be directed using the switch FWD/R/AFT/L positions. Switching the LAMP switch to OFF turns the lamp off but leaves it extended. Pushing the center position switches the light off (if not already switched off) and stows the light. The additional pendant provides a remote means of controlling the light direction. The pendant has a 4 way switch that can be used to direct the light, instead of the control panel switch. See Figure 7-73 and Figure 7-74.

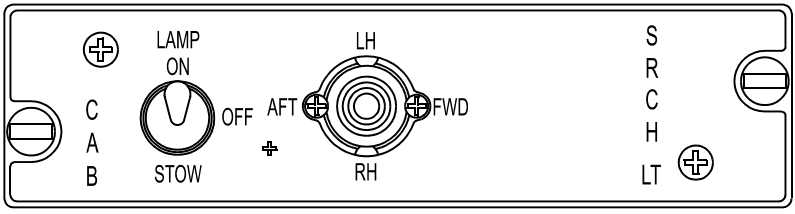

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Figure 7-73 Steerable Light Cabin Control Panel

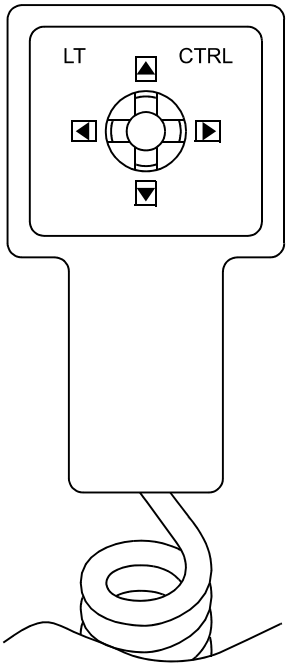

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Figure 7-74 Steerable Light Cabin Pendant

CABIN CAMERA INSTALLATION

Rigid Liner Installation

The Cabin Camera Rigid Liners installation P/N 4G9750F00612 introduces a camera into the rigid liners in the forward ceiling of the cabin looging aft to enable the cockpit crew to monitor the cabin.

The installation comprises of the camera mounting, a power supply and all the necessary wiring which allows the camera image to be displayed on the cockpit MFD and 5th Display (if fitted) and recorded. See Figure 7-75



ICN-39-A-157000-A-00003-01395-A-01-1

Figure 7-75 Cabin Rigid Liner Camera

Soft Liner Installation

The Cabin Camera Soft Liners installation P/N 4G9750F00611 introduces a camera into the soft liners above the left cabin door looking forward to enable the cockpit crew to monitor the cabin.

The installation comprises of the camera mounting, a power supply and all the necessary wiring which allows the camera image to be displayed on the cockpit MFD and 5th Display (if fitted) and recorded. See Figure 7-76



ICN-39-A-157000-A-00003-01396-A-01-1

Figure 7-76 Cabin Soft Liner Camera

HIGH VISIBILITY COCKPIT DOORS

The High Visibility Cockpit Door kit P/N 4G5211F00111 consists of replacement left and right cockpit doors that contain an additional transparent panel below the standard window. This gives the pilot/ copilot increased visibilty laterally below the aircraft. See Figure 7-77

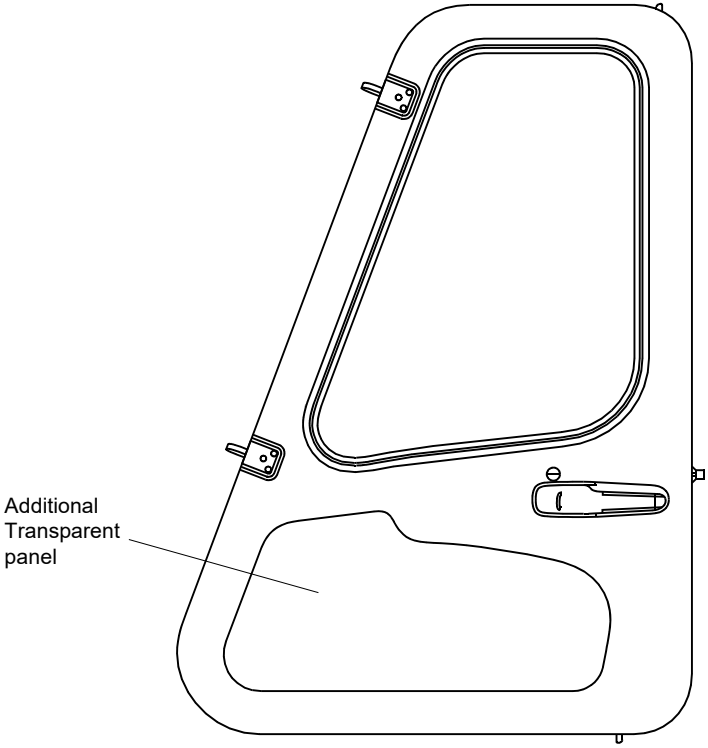

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Figure 7-77 High Visibility Cockpit Door (Left hand door shown from outside)

RADIO TETRA CHELTON

The Radio Tetra Chelton P/N 4G2310F02911 is designed to provide airborne communications compatible within a TETRA communications network. The system comprises the Chelton 7-450-14-1 transceiver located in the baggage compartment, the Chelton CH150-14 Control and Display Unit (CDU) mounted in the interseat console (Figure 7-78), an RF antenna located on the top of the tail cone and all the necessary wiring.

The system interfaces directly to standard aircraft audio systems on COM 3, 4 or 5 depending on the installation.

The radio supports the transmission of voice and data and can operate in both the Trunked Mode of Operation (TMO, in a network) and the Direct Mode of Operation (DMO, without a network infrastructure).

A GPS antenna is connected to the TETRA transceiver module to provide GPS positional information to the CDU (or remote user).

For complete details of the Radio Tetra Chelton operation refer to Operators Manual latest issue.

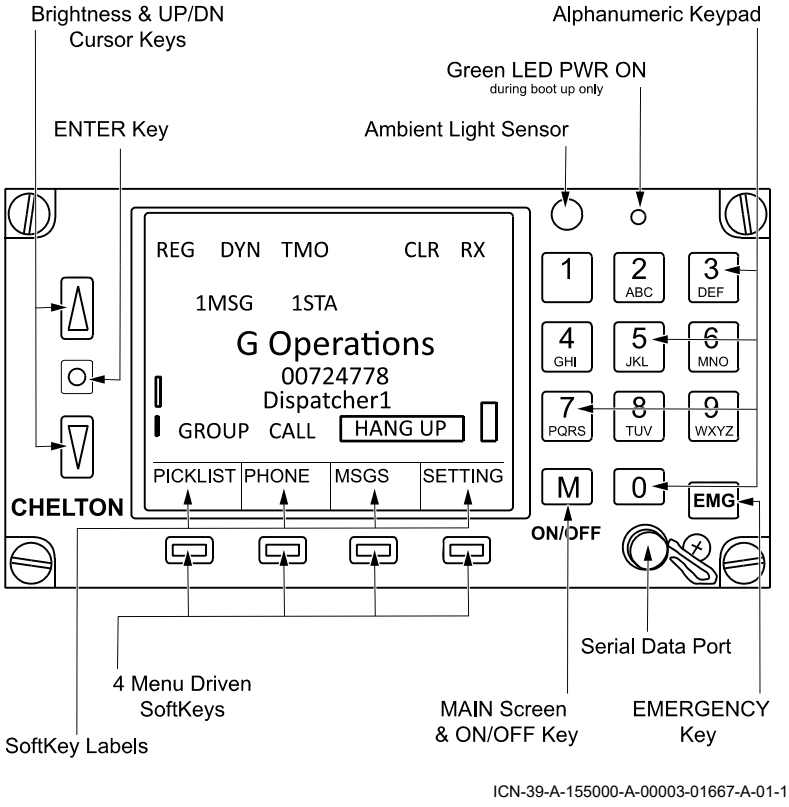


Figure 7-78 Tetra Chelton Control and Display Unit (CDU)

POLYCON RADIO SYSTEMS

The following polycon systems have been approved by LH and EASA for HEC operations.

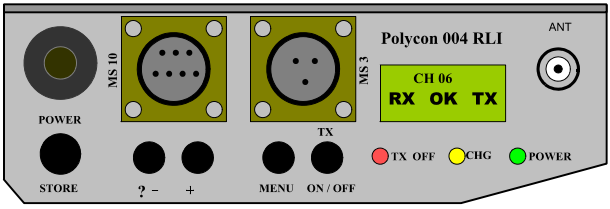
Polycon Communication System P/N 4G2350F00211/ 3G2350F00511

The system is linked to the aircraft ICS and provides a wireless communication link between the HEC portable transceiver and the crew.

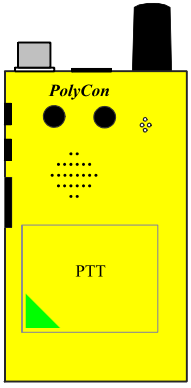
The HO ICS audio panel is used to connect the wireless system to the ICS. Any crew member that has an audio panel can listen and talk to the HEC by selecting HOIST.

The Polycon control panel, mounted in the cabin, controls the system transmission and channel selection for crew HEC communication.

The cabin configuration may vary depending on customerization.



Polycon control panel



Polycon Portable
Transceiver unit

ICN-39-A-155011-A-00003-00345-A-01-1

Figure 7-78A Polycon Control Panel and HEC Portable Transceiver

POLYCON NEXT GENERATION WIRELES INTERCOM P/N 4G2350F02311

The Polycon Next Generation (PNG) is an updated version of the Polycon system. The PNG consists of a BST50 Base Station, an optional CP50 Control Panel, a Primary and optional secondary antenna, one or more battery operated MP50 Hand Held Transceivers and a CHG55 Charger.

The base station and control panel (if fitted, Figure 7-79) are connected to the aircraft ICS and support multiple audio connection points either analogue or digital. The base station can be mounted in any suitabe position in the aircaft and the control panel (if fitted) mounted in the cockpit or cabin for crew operation depending on customer requirements.

Note

For full information on the use of the PNG System refer to Axnes Aviation PNG System Operator's Manual Document, latest revision.

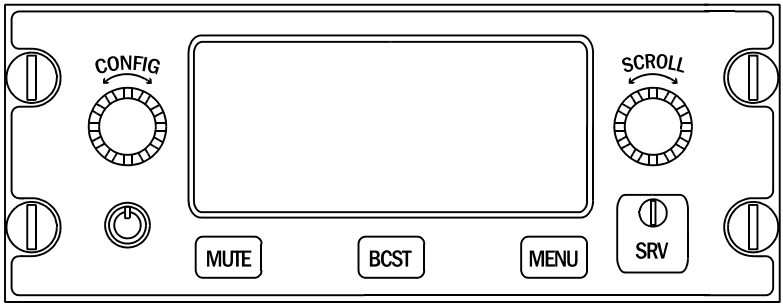


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Figure 7-79 CP50 PNG Control Panel

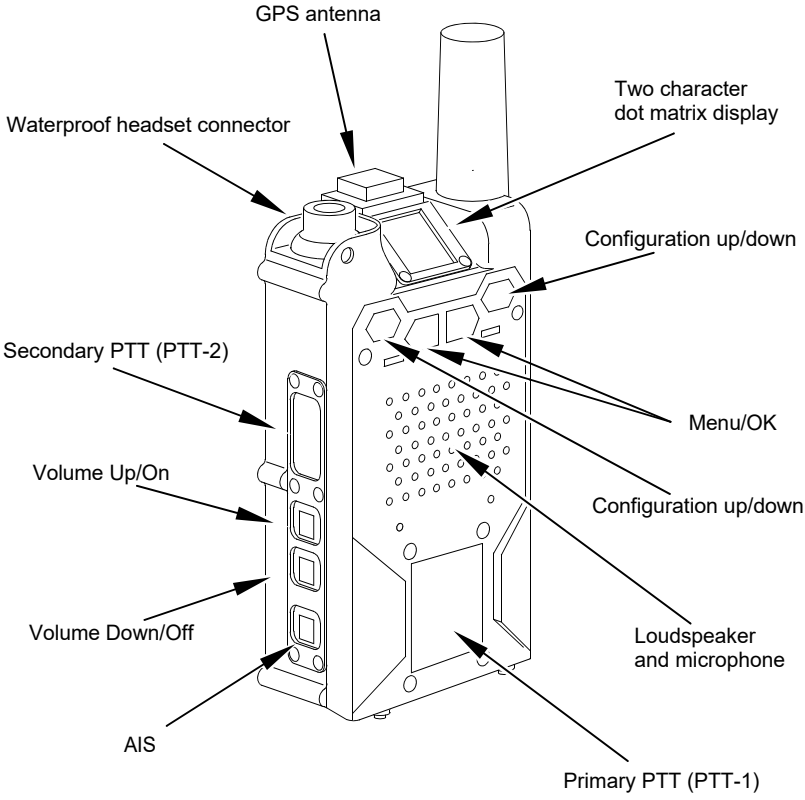

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Figure 7-80 PNG MP50 Transceiver

EMS CABIN PATIENT LIGHT SYSTEM

The EMS Patient Lights kit P/N 4G3320F00111 is installed as an option on the Emergency Medical Service (EMS) configuration to provide lighting in the cabin for EMS personel aboard.

The EMS Patient Light kit consists of:

— 6 LED Patient lights

— 2 Dimmer units

— 1 EMS control panel

— C/B and ON/OFF switch in the Auxiliarly C/B panel.

The EMS Patient lights are selected on using the EMS LTS ON/OFF switch mounted in the Auxiliary Circuit breaker panel in the cockpit (Figure 7-81). The lights are connected to the MAIN BUS 1.

The lights, when powered, can be controlled by the EMS LTS panel mounted in the cabin, Figure 7-82.

The control panel has 3 rotary switches FWD, MID and AFT which are used to control independently the light intensity from the fwd, mid and aft LED lights.

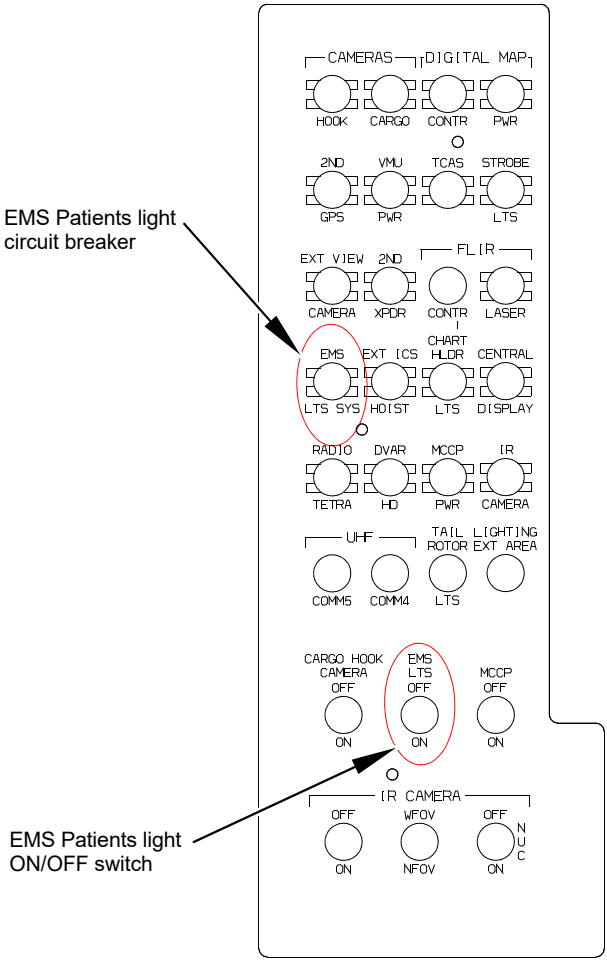

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Figure 7-81 Patient Light ON/OFF Switch in Auxiliary Circuit Breaker Panel (Example)

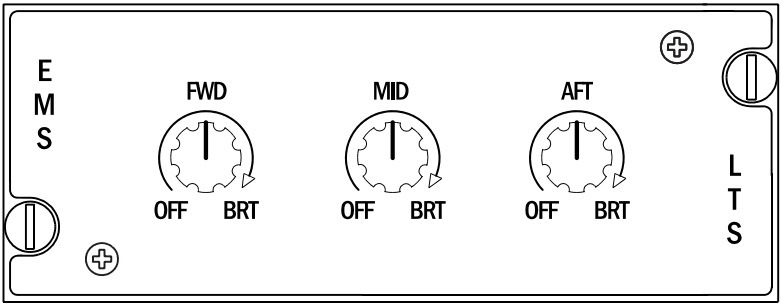

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Figure 7-82 EMS Patient Light Dimmer Panel

MULTIPURPOSE CABIN CONTROL PANELS

The optional MCCP is used to control various optional kits that can be installed in the cabin area and on the underbelly. The kit consists of 2 MCCP units, a master mounted in the cockpit interseat console and a slave mounted in the cabin.

The MCCP can be used to control a variety of kits when installed in the helicopter. The following are examples of some of the kits available:

P/N 4G3320F00211 Kit RGB Lights

P/N 4G3340F02811 Kit Underbelly Lights

P/N 4G2350F02211 Kit Audio Hi-Fi System.

The MCCP is a touch screen 4.3” display, Figure 7-83, and is configured via maintenance pages depending on the systems it is required to control.

The main power for the MCCP is via an ON/OFF switch on the Auxiliary Circuit Breaker Panel in the cockpit, Figure 7-84, which is used to power the units. The control of the main or slave can then be selected with the main MCCP as required and the settings for the various kits adjusted.



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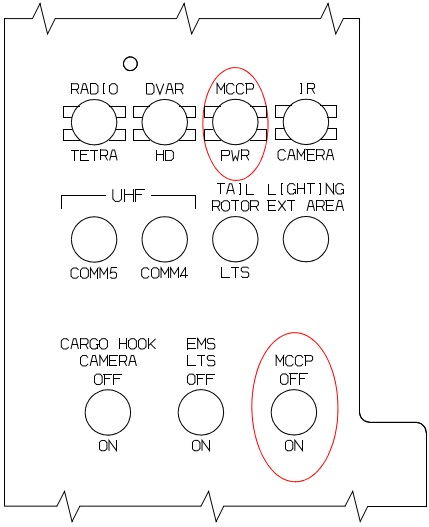
Figure 7-83 MCCP Display (Example)



ICN-39-A-157000-G-00001-29052-A-001-01

Figure 7-84 MCCP ON/OFF switch on Auxiliary Circuit Breaker Panel (Example)

P/N P/N 4G3320F00211 KIT RGB LIGHTS

This optional kit consists of RGBW led bars mounted in the cabin roof which have a wide range of area lighting effects fully controlled and adjustable using the MCCP (Figure 7-85).



ICN-39-A-157000-G-00001-29053-A-001-01

Figure 7-85 MCCP RGB Cabin Lights pages (Example)

P/N 4G3340F02811 KIT UNDERBELLY LIGHTS

This optional kit consists of RGBW led bars mounted on the underside of the fuselage. The lights has six prefixed mood lights selected by the MCCP (Figure 7-87):

— OFF

— All White

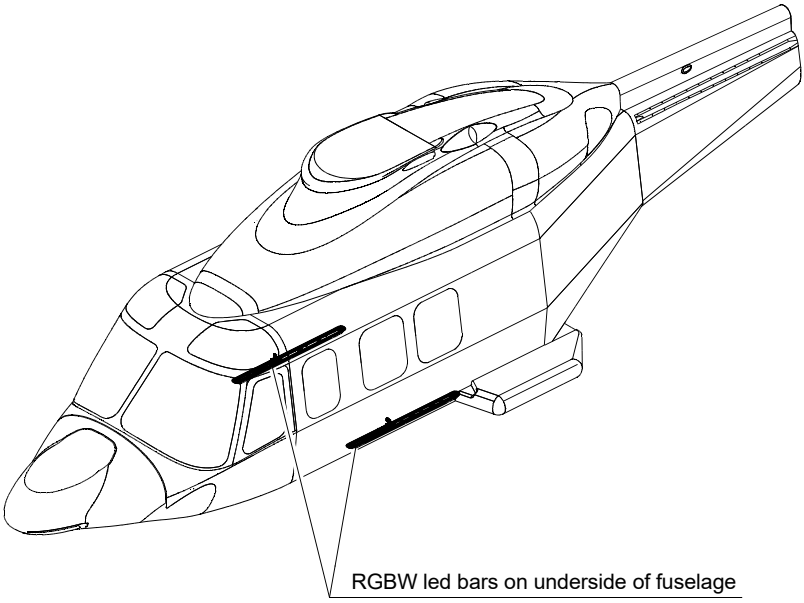
— Police 1 - flashing lights with alternate blue-red colour

— Police 2 - sliding lights with alternate red - blue colour

— EMS 1 - flashing light alternating yellow - red

— EMS 2 - sliding lights alternating yellow - red colour.

The lights are connected to the WOW and when the aircraft is on the ground the lights go ‘All White’ reverting to the last colour setting when the WOW is no longer active.



ICN-39-A-157000-G-00001-29042-A-001-01

Figure 7-86 Underbelly light installation



ICN-39-A-157000-G-00001-29054-A-001-01

Figure 7-87 MCCP Underbelly light page (Example)

P/N 4G2350F02211 KIT AUDIO HI-FI SYSTEM

This optional kit consists of an audio memory file and cabin audio Hi-Fi control of four audio speakers mounted in the cabin roof, Figure 7-88 & Figure 7-89.

Using the MCCP audio page, Figure 7-90, it is possible to play pre-recorded songs from a play list or by navigation through play/pause/stop/next/previous buttons. Volume slider and Mute can also be selected as required.

The audio system is stopped if the pilot or copilot selects the PA pushbutton on the ICS panel and selects the PTT switch. The system is reactivated when the buttons are deselected.



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Figure 7-88 Audio speaker (Example)

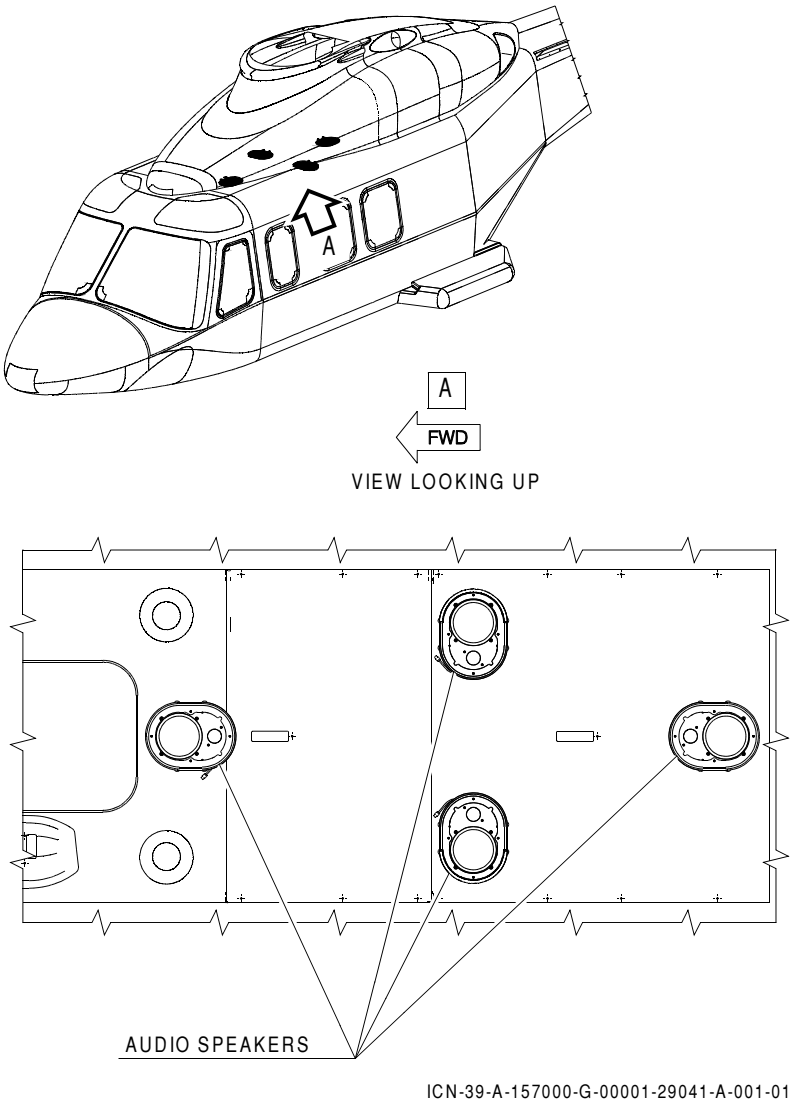

Figure 7-89 Audio speakers in cabin roof



ICN-39-A-157000-G-00001-29056-A-001-01

Figure 7-90 4 MCCP Audio page (Example)

RADIO COBHAM RT7000PMR

The RT7000PMR is a panel mounted Tactical multi-band multi-transceiver device with a touch screen display.

The radio has a modular architecture and the panel mounted control unit can contain one to three transceivers, combining the Cobham wideband transceiver or integrated Motorola APX 8000 radio. Different combinations are managed throught kit dash numbers.
(P/N 4G2310FXXXXX)

The radio system is made up of:

— The panel mounted control unit which can house up to three internal transceivers covering the frequency band 29.7 MHz to 960 MHz AM/FM. The transceivers that are fitted depend on the customer requirements.

— Three wide antennas may be installed at different positions on the helicopter. In general the positions available are on the cabin underbelly, rear fuselage or engine exhaust upper cowling between the exhausts. The antenna positions depend on the helicopter configuration and customerization.

The system is designed to be modular so each transceiver is connected to its own antenna, LCU and antenna switch in order to have three separate transmission systems.

Radio front panel control is through a Touch Panel Display or through two concentric knobs, see Figure 7-91.

For complete details of the Cobham RT7000PMR refer Operator Guide - RT7000PMR.

Another option for the RT7000PMR is the RT7000 RCDU (Remote Control display Unit P/N 4G2310F05511) which installs and additional remote control touch screen display unit in the cabin. The control has the same display as the RT7000PMR with similar control functions but in a smaller chassis unit.

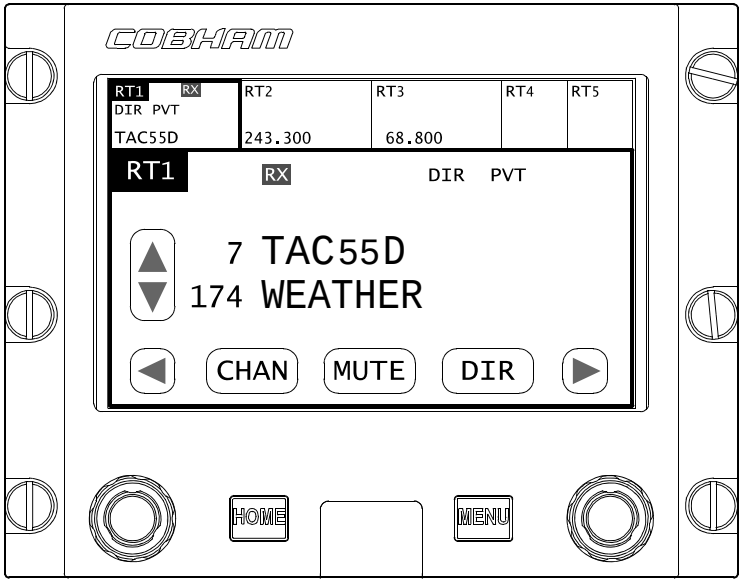

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Figure 7-91 Cobham RT7000PMR and RCDU Control Panel

KIT CABIN STORM WINDOWS

This kit introduces the optional kit for storm windows in the cabin left and right hand sliding door, front windows.

The left and right storm windows are introduced with the following kits:

— P/N4G5630F00311 for the Left Cabin Door Storm Window

— P/N 4G5630F00411 for the Right Cabin Door Storm Window.

The windows can be locked closed.

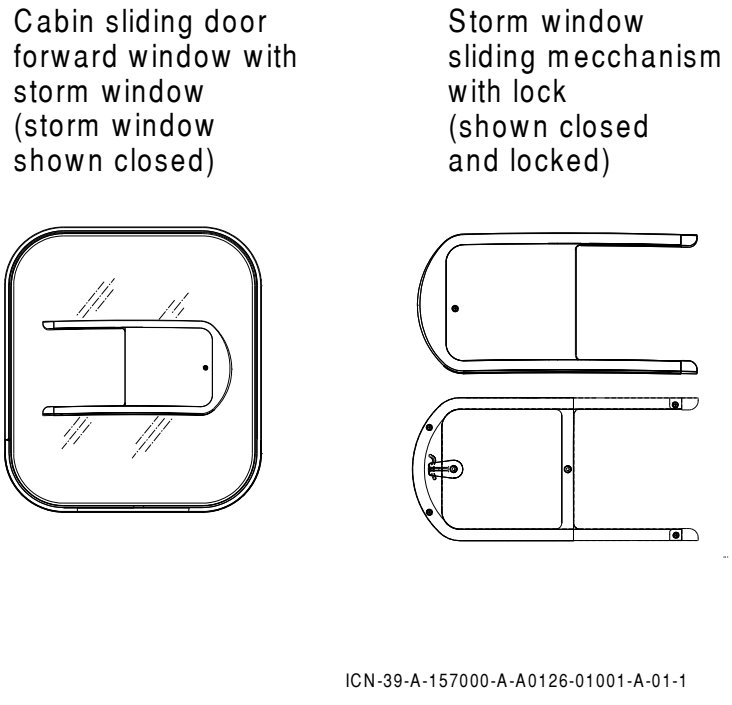

Figure 7-92 Cabin Sliding Door Storm Windows (Example)

DAL-200 WI-FI BRIDGE KIT

The DAL-200 kit works as a Wi-Fi bridge providing connectivity to devices installed in the aircraft via external Wi-Fi networks.

The KIT DAL-200 P/N 4G4390F01511 provides:

— Wi-Fi functionality that operates in the 2.4GHz band, and complies to wireless standards 802.11 a/b/g/n with a maximum wireless speed of 54 Mbps;

— Bluetooth functionality, Bluetooth 4.2 compliant with dual mode Bluetooth and Bluetooth Low Energy;

— Ethernet connection to the ISAT-200A in order to allow HUMS data exchange.

Refer to Figure 7-93.

The DAL -200 also interfaces with the Helicopter Data Transmission Kit P/N 4G4390F01411 for transmission of data to a ground station.

The Helicopter Data Transmission Kit provides the following functions:

— The collection and post flight transmission of HUMS and flight data (the latest retrieved from the FDR) from the aircraft to ground servers via Wi-Fi channels,

— The real time in-flight transmission of HUMS exceedances from the aircraft to ground servers via satellite communication channels,

— The reception and the storage of thresholds to compute HUMS exceedances (by means of HUMS data loader device (DTD)) from ground server to the aircraft via Wi-Fi channels.

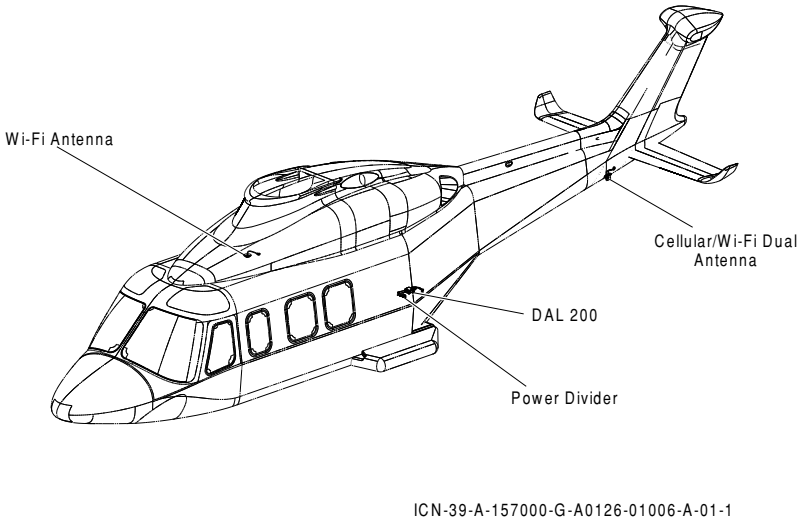

Figure 7-93 DAL-200 Installation

REMOTE BATTERY KIT

The Remote Battery Kit installs an additional 24VDC 25AH battery P/N 4G2430F01011 in a removable rack which is installed in the rear compartment, refer to Figure 7-94.

The battery is for ground use only and is used to supply power, when the aircraft is shut down and Main and Auxiliary battery are OFF and no DC External power is connected, to allow operation of:

- Cabin ventilation systen P/N 3G2141A00112
- Electrical Step lights and movement (extend and retract) P/N 4G5260F00213.

The system is selected with the REMOTE BATTERY ON/OFF switch installed in the AUX circuit breaker panel.

The remote battery is recharged when both electrical power generators are online (engines running). In this condition the electrical power to the cabin ventilation fan and electrical step is automatically restored, through diodes, to the aircraft electrical system.

The remote battery automatically disconnects if one generator fails or is OFF.

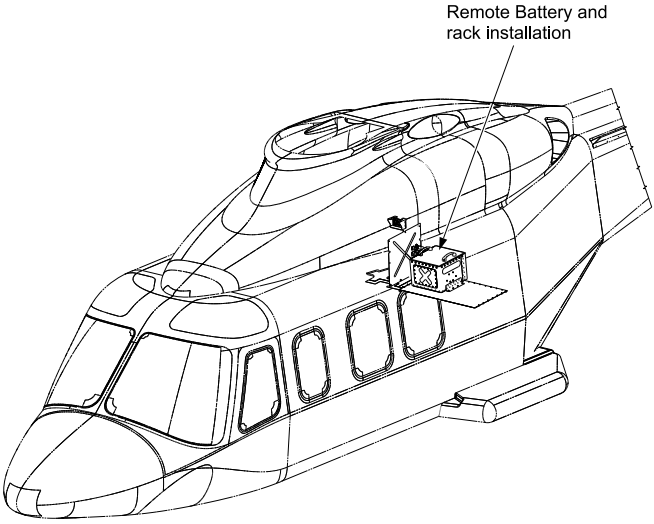

Figure 7-94 Remote Battery Installation

SECTION 8

HANDLING, SERVICING AND MAINTENANCE

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SECTION 8

HANDLING, SERVICING AND MAINTENANCE

HANDLING

Ground handling of the helicopter consists of towing, parking, securing, and mooring. Refer to Maintenance Manual for more detailed ground handling information.

TOWING

The helicopter may be towed at walking speeds for very short distances using a standard tow bar (Figure 8-1).

Prior to movement, clear towing area of support equipment, such as work stands, power units, fire extinguishers, etc., and disconnect static ground wire.

Towing operations may be carried out using tow bar configurations P/N 3G0905G00133, 3G0905G00134, 3G0905G00232 or 3G0905G10331, for other approved tow bar configurations refer AgustaWestland Maintenance Publication AW139 IETP.

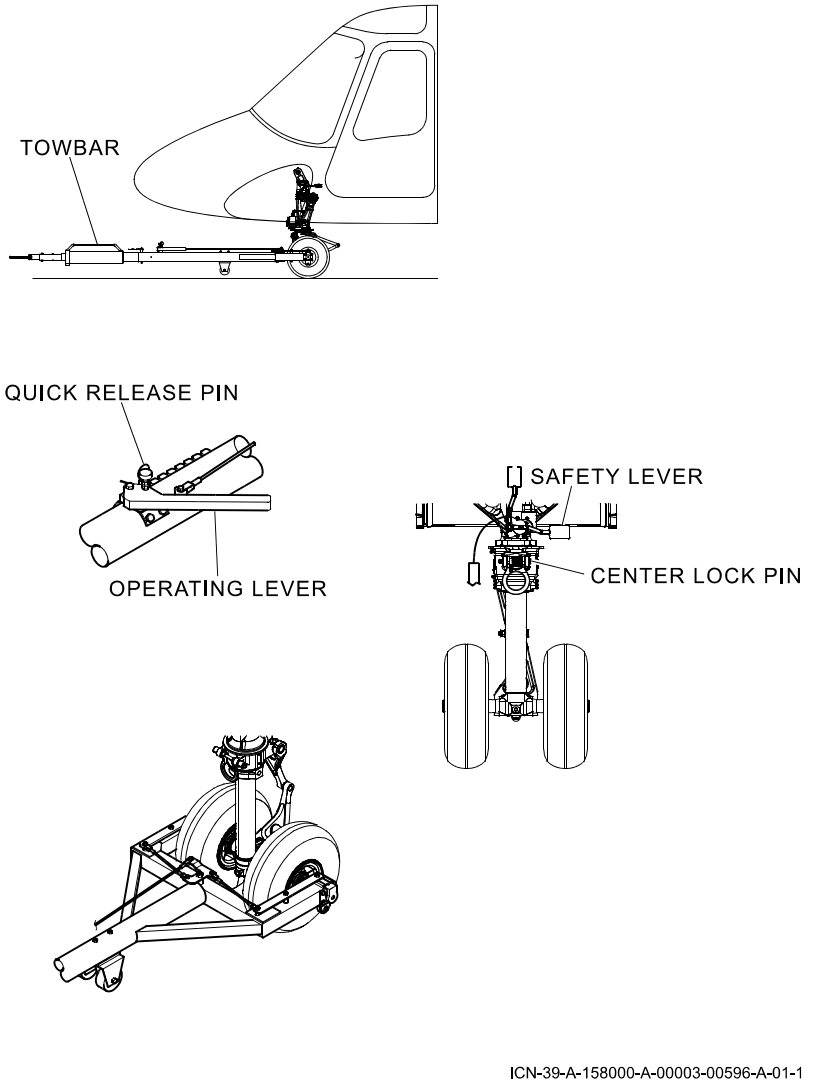
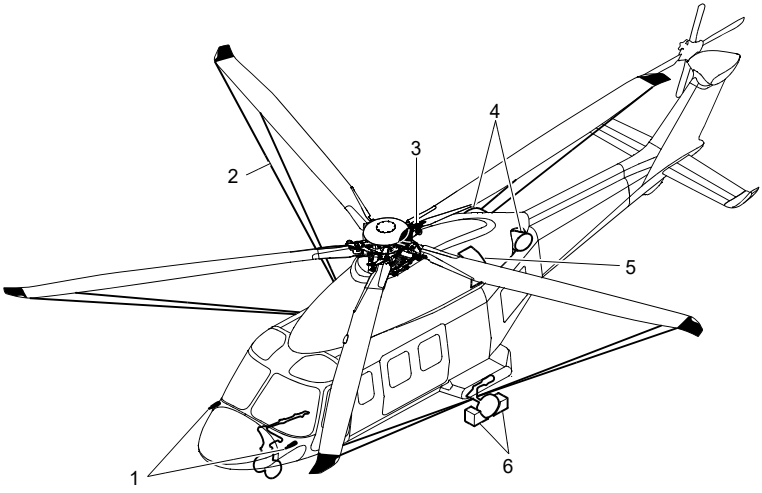


Figure 8-1 Towing

PARKING AND SECURING

Position helicopter in desired parking area on level surface when possible. Remove towbar and attach static ground wire to receptacle on lower right aft fuselage. Check all switches in OFF position. Install approved tie downs on main and tail rotor blades and wheel chocks. For extended parking, disconnect battery, lock rotor brake, and close doors and windows. Install protective covers on pitot tubes, engine air inlets, and exhaust ejectors (Figure 8-2).



1. Pitot tube covers
2. Main rotor tiedown
3. Number 1 engine air intake
4. Exhaust ejectors
5. Number 2 engine air intake
6. Wheel chocks

Figure 8-2 Protective Covers and Tiedowns

TIE DOWN MAIN ROTOR

Tie down main rotor blades whenever any of the following condition exist: Thunderstorms are in the local area or forecasted. Winds in excess of 20 knots or a gust spread of 15 knots exists or is forecasted. Helicopter is parked within 150 feet of hovering or taxiing aircraft that are in excess of 11,900 pounds gross weight. Helicopter to be parked overnight.

The main rotor tie downs are socks which fit over the end of each blade with cords which attach to mooring points on the fuselage (Figure 8-3). The tie down cords are manufactured to specified lengths for forward and aft mooring points, as identified by streamers adjacent to the brass rings to which the snap hooks attach. When secure, the tie downs should be free of slack or under slight tension, but not under sufficient tension to flex the main rotor blades appreciably. The cords should never be shortened from their design lengths, as excessive loads could be induced in the main rotor yokes.

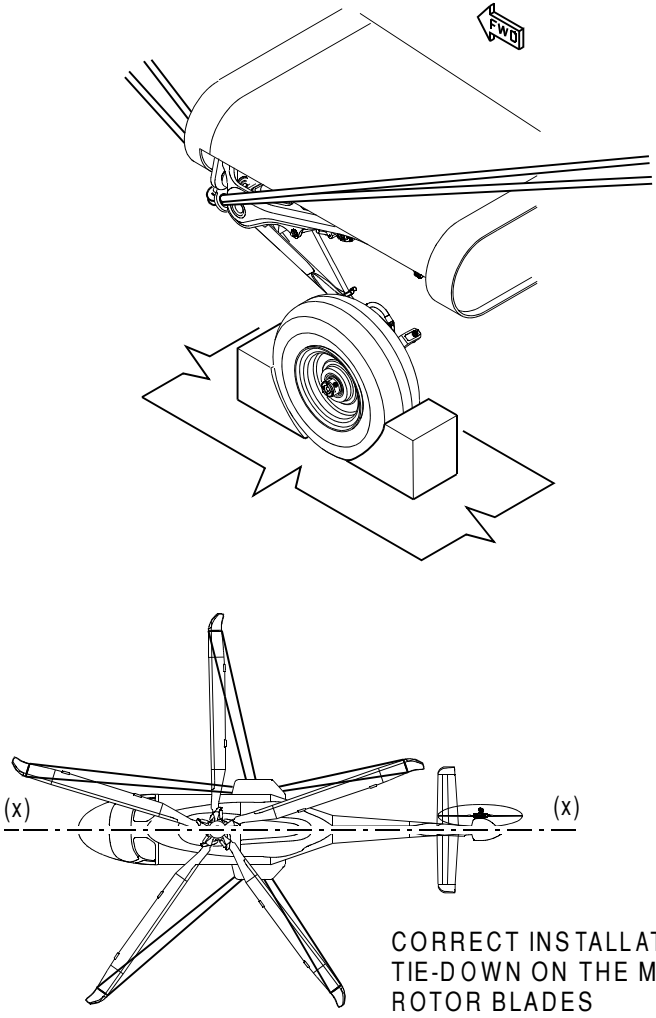


Figure 8-3 Main Rotor Tiedown

TIE DOWN TAIL ROTOR

The tail rotor tie down is red and is stenciled in white letters “REMOVE BEFORE FLIGHT”. To tie down the tail rotor assembly, rotate main rotor until tail rotor blades are aligned with the vertical fin and main rotor blades are approximately 45 degrees to helicopter centerline. Tie down main rotor first, then secure tail rotor with tail rotor blades flapping block.

COVER ENGINE AIR INTAKE

The cover engine air intake engine is installed on each engine Each cover is attached with a red streamer stenciled in white letters "REMOVE BEFORE FLIGHT". Press inlet plugs in engine air inlets.

COVER ENGINE EXHAUST DUCT

A cover is installed on each engine exhaust ejector and is tied with a nylon cord in the cover. The covers have red streamers on each side stenciled in white letters "REMOVE BEFORE FLIGHT".

COVER PITOT TUBE

The pitot tube covers are flame resistant and are attached with a red streamer stenciled in white letters "REMOVE BEFORE FLIGHT". Cover pitot tubes and tie cord to secure to pitot tubes.

MOORING

Mooring is securing the helicopter to prevent damage during periods of high winds or turbulent weather.

The helicopter should be moored if parked in the open when forecast wind velocity is 45 knots (52 mph) or higher. If forecast wind velocity exceeds 75 knots (86 mph), the helicopter should be hangared or evacuated to a safe area. If parked in the open, the helicopter should be positioned on a paved ramp between suitably spaced tie down rings and should be headed in the direction from which the highest forecast winds are expected.

The main and tail rotors should be properly secured with tie downs immediately after shutdown during windy conditions to minimize rotor flapping.

Protective covers should be installed, and fuel tanks should be serviced to maximum capacity with prescribed fuel to add weight to the helicopter. Fuselage mooring shackles should be secured to ramp tie down points with rope, cable, or manufactured tie down assemblies. If suitably spaced ramp tie downs are not available, the helicopter should be parked on an unpaved surface and secured to subsurface mooring anchors or "deadman" anchors.

All ground support equipment and other objects which might be blown by wind should be properly secured. After winds subside, the helicopter should be checked for damage.

SERVICING

This paragraph includes the instructions necessary to service and lubricate the helicopter systems and components. It also includes a list of consumable materials used in performing the helicopter maintenance operations (Refer to Figure 8-4).

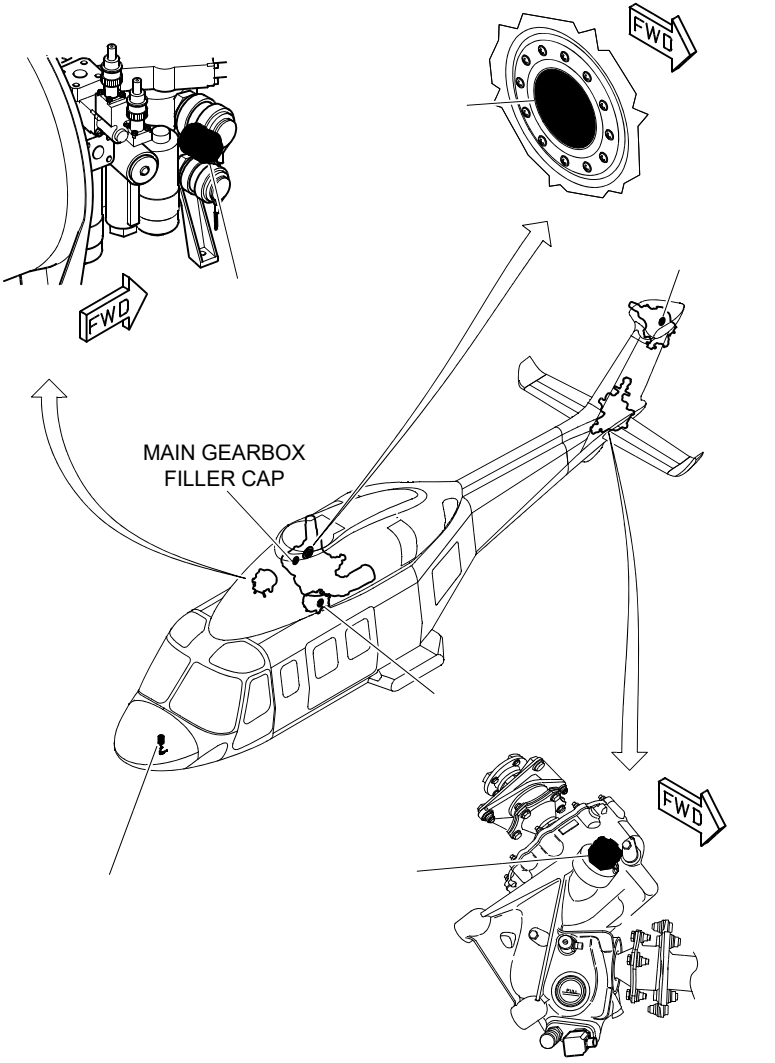


Figure 8-4 Servicing (sheet 1 of 2)

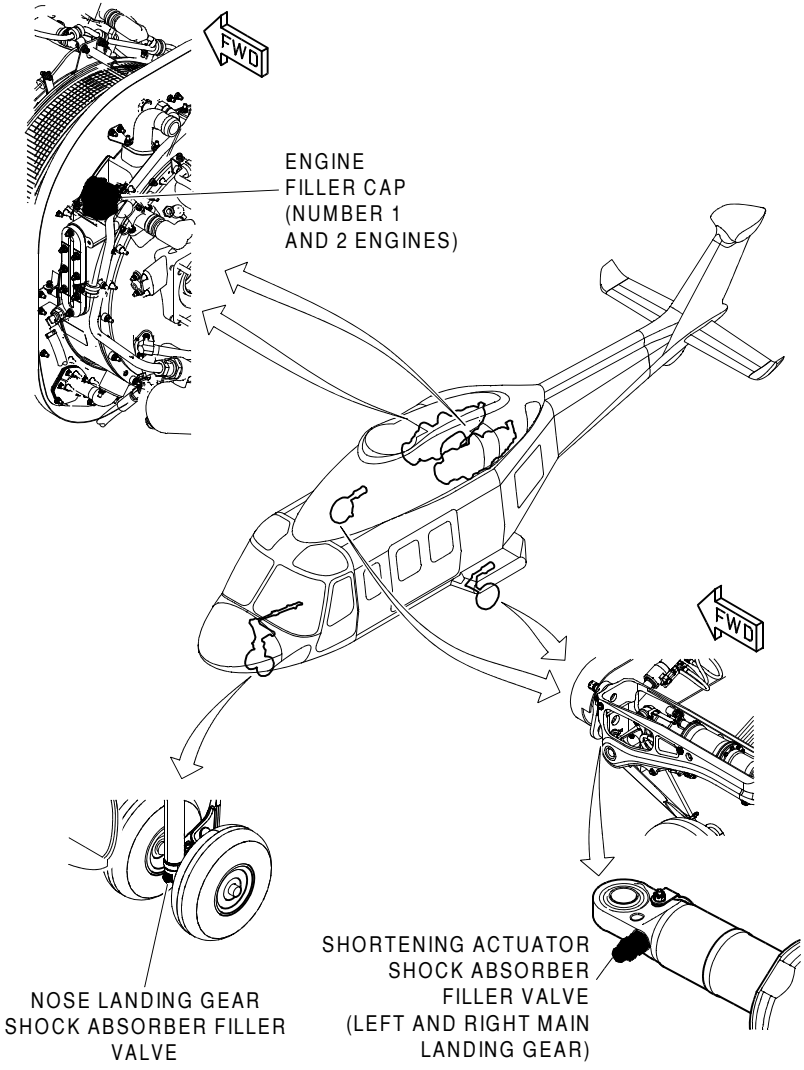


Figure 8-4 Servicing (sheet 2 of 2)

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FUELS

Refer to Section 1 - Fuel Limitations in Flight Manual for ambient temperature limits. It shall be the responsibility of the operator and his fuel supplier to ensure that the fuel conforms to one of the approved specifications above.

FUEL SYSTEM SERVICING

Total capacity basic helicopter:
1300 Kg. (2820 lb)

Auxiliary fuel tanks kit:.
400 Kg. (880 lb)

The fuel system is gravity serviced through a single filler port on the right side of the aft fuselage. A grounding jack is provided below the fueling port.

OILS

Approved oils and vendors are listed in this section for the convenience of the operator. An appropriate entry shall be made in the helicopter logbook when oil has been added to the engine, transmission, 42 degree intermediate gearbox, or 90 degree tail rotor gearbox. The entry shall show the type and brand name of oil used to prevent inadvertent mixing of oils.

ENGINE OILS

Refer to Section 1 - Fuel Limitations in Flight Manual for authorized engine oils.

Engine oils shall meet the engine manufacturer's approval in all cases. Consult the engine manufacturer for use of oil brands not listed herein.

CAUTION

Do not mix brands or types of oils. if oils become mixed, the system shall be drained and flushed.

ENGINE SERVICING

Engine oil capacity (each):
8.45 U.S. quarts (8.0 liters)

The engine lubrication system is a regulated system and consists of an integral oil tank, a pressure system, a acavenge system and a brether system.The oil tank is integral with the engine. It is the annular cavity created between the air inlet case and the accesory gearbox rear case. A drain plug, located at the bottom of AGB, permits drainage of the cavity. Oil level indication is achieved by means of oil level sight glasses on each side of accesory gearbox.

TRANSMISSION, INTERMEDIATE, AND TAIL ROTOR GEARBOX OILS

Oil conforming to MIL L 236999 is the only approved oil for use in the transmission, intermediate, and tail rotor gearbox. Refer to Transmission, Intermediate and Tail Rotor Gearbox Oil Limitations in Flight Manual for ambient temperature limitations.

TRANSMISSION, INTERMEDIATE, AND TAIL ROTOR GEARBOX SERVICING

Transmission oil capacity:
(19 liters)

Intermediate gearbox oil capacity:
(0.9 liters)

Tail rotor gearbox oil capacity:
(1.5 liters)

The transmission filler is located on the left side of the main transmission. Oil level indicator is located in the fwd side of main transmission.

The intermediate and tail rotor gearboxes also incorporate oil level sight glasses.

The intermediate gearbox filler cap is accessible through the access door 360BL positioned on the right side of the Helicopter. The tail gearbox filler cap is accessible removing the fairing 360AT and 360CT.

Refer to Maintenance Manual for draining oil and cleaning or replacing filters.

HYDRAULIC FLUIDS

The hydraulic fluids must conform to MIL-PRF-83282 or MIL-PRF-5606. (Alternate for low Temperature operation - see Section 1 - Limitations).

The Landing Gear Shock Absorber must be filled always with MIL-PRF-5606 only.

HYDRAULIC SYSTEM SERVICING

The reservoir of the hydraulic system is incorporated in the Integrated Hydraulic Power Supply and is provided with a sight glass to permit checking of the fluid level. The reservoir is of the diaphram type and has a total volume of 4.1 dm^3 (250.19 in^3).

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SUPPLEMENTAL PERFORMANCE INFORMATION

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SECTION 9

SUPPLEMENTAL PERFORMANCE INFORMATION

GENERAL INFORMATION

The Supplemental Performance Information contained in this section is provided for use in conjunction with Section 4 and optional equipment Supplements, as applicable.

The section titled CRUISE CHARTS contains data that allows the determination of the fuel flow, max endurance and recommended cruise for AEO and OEI conditions.

The section titled CLIMB GRADIENT (page 9-118) contains charts of mean height gained in 100 ft of horizontal distance for different airspeeds and gross weights.

The section titled HOVER CEILING WITH HEADWIND BENEFIT contains charts of gross weight benefit with headwind, for hover out of ground effect and OEI 2.5 MIN power.

The section titled HOVER CEILING CHARTS AT 102 %NR contains Hover Ceiling charts defining the maximum weights at which an OGE hover is possible for varying combinations of Pressure Altitude and OAT with main rotor speed at 102% and zero wind conditions.

HELICOPTER CONFIGURATION

Clean configuration.

CRUISE CHARTS

The cruise charts are based on estimates and flight test data.

This data does not include the effect of bleed air on fuel consumption. Fuel flow data are applicable to the basic helicopter. A delta torque (DTQ) correction reference line is also included to calculate the effect of various optional equipment that can be fitted to the aircraft. The reference line (dotted line on the left side of chart, equivalent to the drag of a 1 square meter plate) is used in combination with the Correction Factor for the optional equipment (Table 9-1) to calculate the additional Torque/Fuel consumption with the equipment installed.

All Engine Operation (AEO) and One Engine Inoperative (OEI) conditions are included.

The Range and Endurance Chart is valid for both AEO and OEI conditions.

CRUISE CHART TERMINOLOGY

Max Endurance	This line defines the TAS/IAS, for a given Gross Weight, for which the corresponding Fuel Consumption is at a minimum and, therefore, the mission duration is maximised.
Maximum Range Cruise:	This line defines the TAS/IAS, for a given Gross Weight, for the maximum distance achievable.
Recommended Cruise:	This line defines the TAS/IAS, for a given Gross Weight, based on a 1% reduction of the Maximum Cruise range, for the same Gross Weight. The speed increase given by this method provides a good compromise between fuel consumption and time.
Vne:	The Vne line is plotted when the Vne is less than Vh (level flight speed at MCP).

EXAMPLE FOR INTERPOLATION AMONG CHARTS

Wanted — True airspeed, Indicated airspeed, torque, fuel consumption for recommended cruise.

Known — Pressure altitude: 5000 ft OAT: 10° C
Gross weight: 5600 kg

Method — Select to suitable charts (figures 9-15, 9-16, 9-21, 9-22) on each 4 charts intersect the gross weight 5600 kg line with the recommended cruise line to read TAS, IAS, TQ, fuel consumption. See table below.

	DATA (GW=5600 kg)				INTERPOLATION		
	Fig. 9-15	Fig. 9-16	Fig. 9-21	Fig. 9-22			
Pressure Altitude [ft]	4000	4000	6000	6000	4000	6000	5000
OAT [° C]	0	20	0	20	10	10	10
Torque (%)	76	73	70	68	74.5	69	72
IAS [kt]	149	143	141	134	146	137.5	142
TAS [kt]	154	154	152	151	154	151.5	153
Fuel consumption [kg/h]	420	418	390	388	419	389	404

NOTE: To obtain data for pressure altitude 5000 ft and 10° C interpolate linearly first for OAT (constant pressure altitude) and obtain data for OAT 10° C at pressure altitude 4000 and 6000 ft. Then interpolate linearly for pressure altitude and obtain the final results at pressure altitude 5000 ft and 10° C.

RANGE AND ENDURANCE

The Figure 9-107 show the charts to obtain endurance, distance and specific range in relation to fuel consumption.

Note

The range evaluated with the diagram correspond to effective range on ground (wind=0).
To take into account the wind effect in the range calculation, use TAS reduced by the headwind component (ground speed) before entering in the chart.

EXAMPLE NO WIND (See Figure 9-107)

Wanted — Endurance, distance and specific range.

Known — Fuel consumption: 393 kg/h Available fuel: 1000 kg TAS: 150 kt.

Method — Enter chart at fuel consumption 393 kg/h move up and intersect available fuel 1000 kg line, move the left and read 2.54h (2h:32':24").
Return to 393 kg/h, than move up to intersect True airspeed 150 kt line, move to the left to intersect available fuel 1000 kg line, move to the left and read 0.38 nm/kg, or move down and read 382 nm than move up and read 707 km.

EXAMPLE With WIND (See Figure 9-107 and Figure 9-108)

Wanted — TAS corrected with headwind and respective range.

Known — Wind: 25 kt from 35° respect to flight direction
TAS: 150 kt.

Method — Enter chart (Figure 9-108) at 25 kt reported wind speed (point A), proceed right following shape of curved lines to wind relative angle 35° (point B) than proceed right horizontally to read 20 on the headwind component scale (point C).
Reduce TAS of 20 kt to obtain a ground speed of 130 kt.
Enter chart (Figure 9-107) at fuel consumption of 393 kg/h, TAS corrected of 130 kt and available fuel of 1000 kg to obtain a distance of 331 nm or 613 km with an endurance of 2.54 h.

EXAMPLES WITH OPTIONAL EQUIPMENT INSTALLED

Example 1

Wanted — True airspeed, Indicated airspeed, torque, fuel consumption for Recommended Cruise with Optional Equipment Searchlight SX16 and Double External Hoist Goodrich in Stowed position.

Known — Pressure altitude: 0 ft OAT: 20° C
Gross weight: 5600 kg.

Method — Select the suitable chart (Figure 9-4), intersect the gross weight 5600 kg line with the recommended cruise line to read TAS = 161 kt, IAS = 162 kt, TQ = 88%, fuel consumption = 492 kg/hr. These define the Recommended Cruise values for a clean aircraft configuration.

To correct for the effect of Optional Equipment installed determine the intersect of the DTQ reference line at the TAS = 161kts and move vertically to read DTQ = 23%. This value is then factored by the total of the Correction Factors (CF) for the equipment installed i.e. from Table 9-1 Searchlight CF = 0.3, Double External Hoist in stowed position CF = 0.2.

Torque penalty for optional equipment becomes:

23 x (0.3+0.2) = 11.5%.

To correct the Recommended Cruise speed, maintaining the TQ and fuel flow as for the clean configuration, subtract the Torque Penalty from the clean aircraft Recommended Cruise torque value ie:

88 - 11.5 = 76.5% TQ, enter the bottom scale at 76.5% TQ, and move vertically to intercept the 5600 kg then move horizontally to read TAS = 152 kt and IAS = 152 kt which is the Recommended Cruise speed with Optional Equipment fitted and keeping the TQ = 88% and fuel consumption = 492 kg/hr.

Note

If, at the new corrected TQ the appropriate weight line cannot be intercepted this indicates that there is no speed reduction available that maintains the TQ and fuel flow fixed.

For the example above, if the Recommended Cruise speed is maintained then an increase in TQ required, and therefore fuel consumption, is required. This can be calculated as follows:
The Torque Penalty from the clean aircraft is ADDED to the initial Recommended Cruise torque value ie:
88 + 11.5 = 99.5% TQ,
Then enter the bottom scale at 99.5% TQ, and move vertically to read the fuel consumption = 532 kg/hr which is the value maintaining the Recommended Cruise speed with kits installed.

Example 2

Wanted — Maximum True airspeed, Indicated airspeed, torque, fuel consumption with Optional Equipment External Hoist Breeze fitted.

Known — Pressure altitude: 4000 ft OAT: 40° C
Gross weight: 6000 kg.

Method — Select the suitable chart (Figure 9-17), intersect the gross weight of 6000 kg line with the Maximum Continuous power line. Move across to read TAS = 158 kt,
IAS = 142 kt, move vertically down to read TQ = 80.5 % and up to read fuel consumption = 445 kg/hr. These define the values for a clean aircraft configuration.

To correct for the effect of Optional Equipment installed determine the intersect of the DTQ reference line at the TAS = 158 kt and move vertically up to read DTQ = 17 %. This value is then factored by the total of the correction factors for the equipment installed i.e. from Table 9-1 External Hoist Breeze CF = 0.4.

Torque penalty becomes 17 x 0.4 = 6.8 %.

To correct the Maximum True airspeed:

80.5 - 6.8 = 73.7 %. Enter the bottom at 73.7 % TQ and move up to intersect the 6000 kg line then move horizontally to read TAS = 153 kt and IAS = 138 kt, the maximum airspeed with Optional Equipments fitted, TQ = 80.5 % and fuel consumption = 445 kg/hr.

Table 9-1 OPTIONAL EQUIPMENT CORRECTION FACTORS

External Optional Equipment Installed	Correction Factor (CF)
Searchlight SX16 (Supp 29) or SX5 (Supp 44) or Nightsun II XP (Supp 53) or Trakkabeam A800 (Supp 83)	0.3
Radar Telephonic 1500B+ and Star Safire Series FLIR (Supp 42 and Supp 43)	0.3
SEA FLIR II (Supp 36) or Star Safire Series FLIR (Supp 439 or FLIR WESCAM MX 15 Series (Supp 52) or TALON FLIR (Supp 64) or Ultraforce 350 FLIR (Supp 72)	0.3
Radar Selex Gabbiano T20N and Ultraforce 350 FLIR (Supp 73 and Supp 72)	0.3
Double or Single External Hoist Goodrich, in Stowed Position (Supp 41 or Supp 49)	0.2
Double or Single External Hoist Goodrich, any position other than Stowed (Supp 41 or Supp 49)	0.4
External Hoist Breeze (Supp 11)	0.4
Snow Skids (Supp 19) or Slump Pads (Supp 20)	0.5

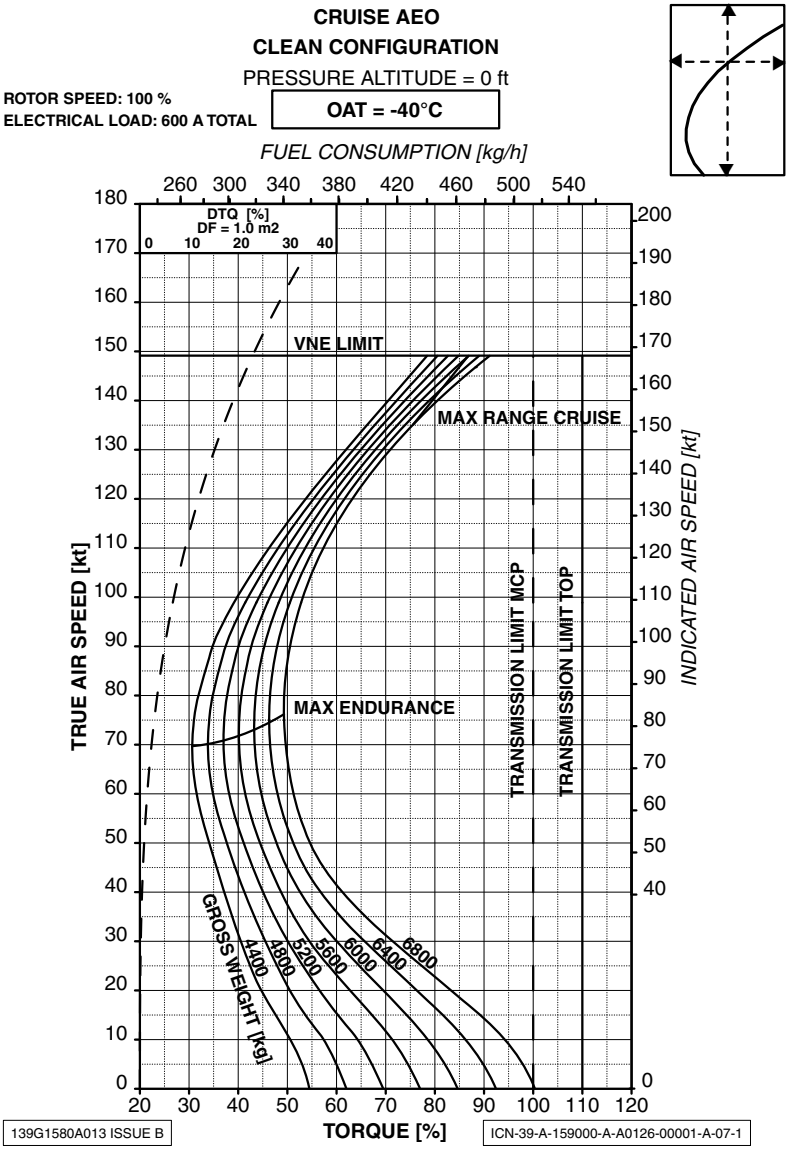

Figure 9-1 Cruise (PA 0 ft, OAT -40° C)

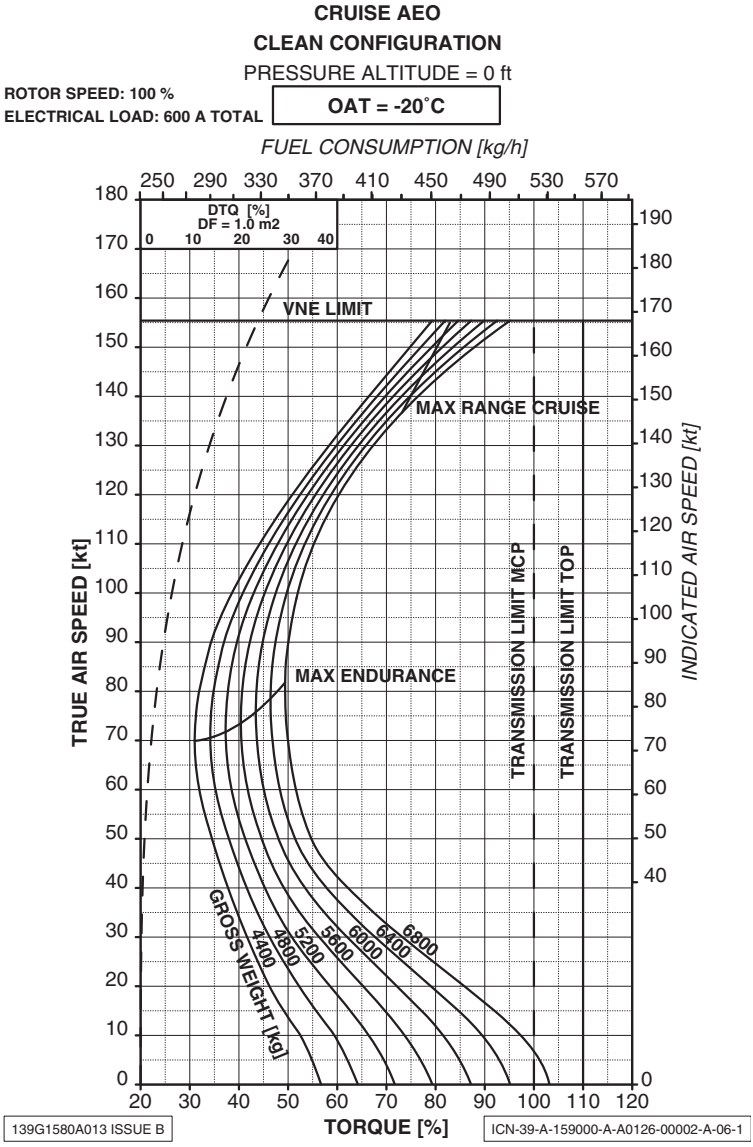

Figure 9-2 Cruise (PA 0 ft, OAT -20° C)

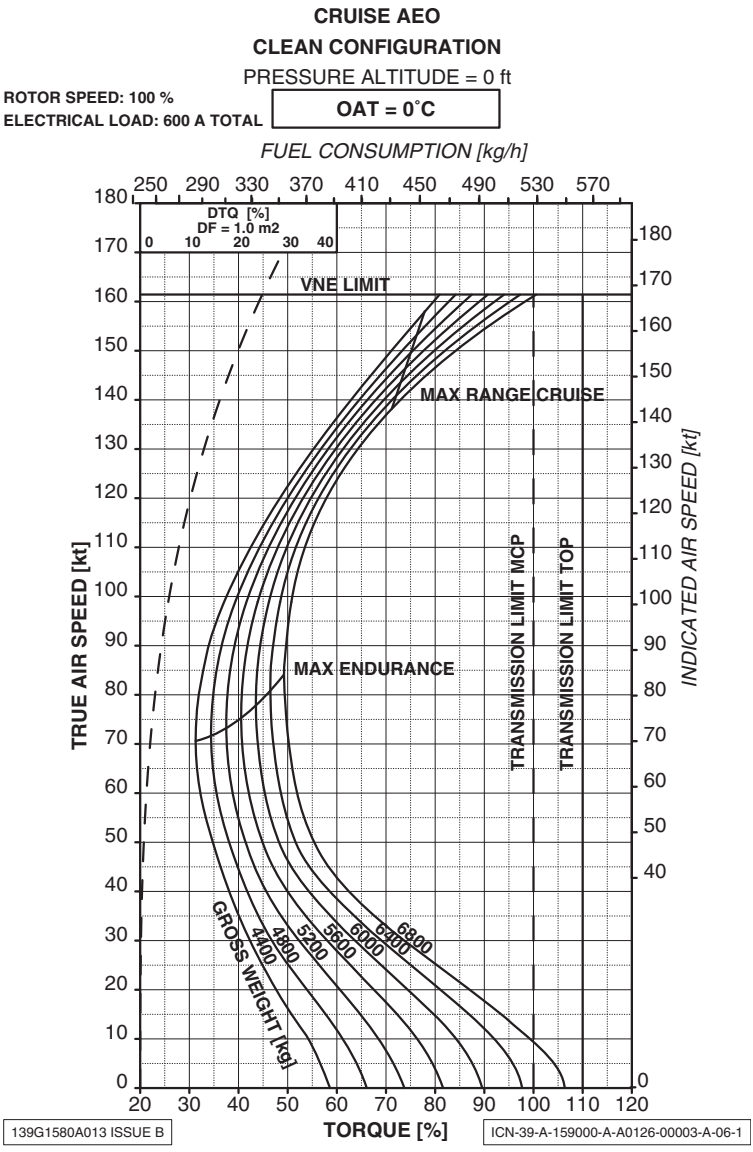

Figure 9-3 Cruise (PA 0 ft, OAT 0° C)

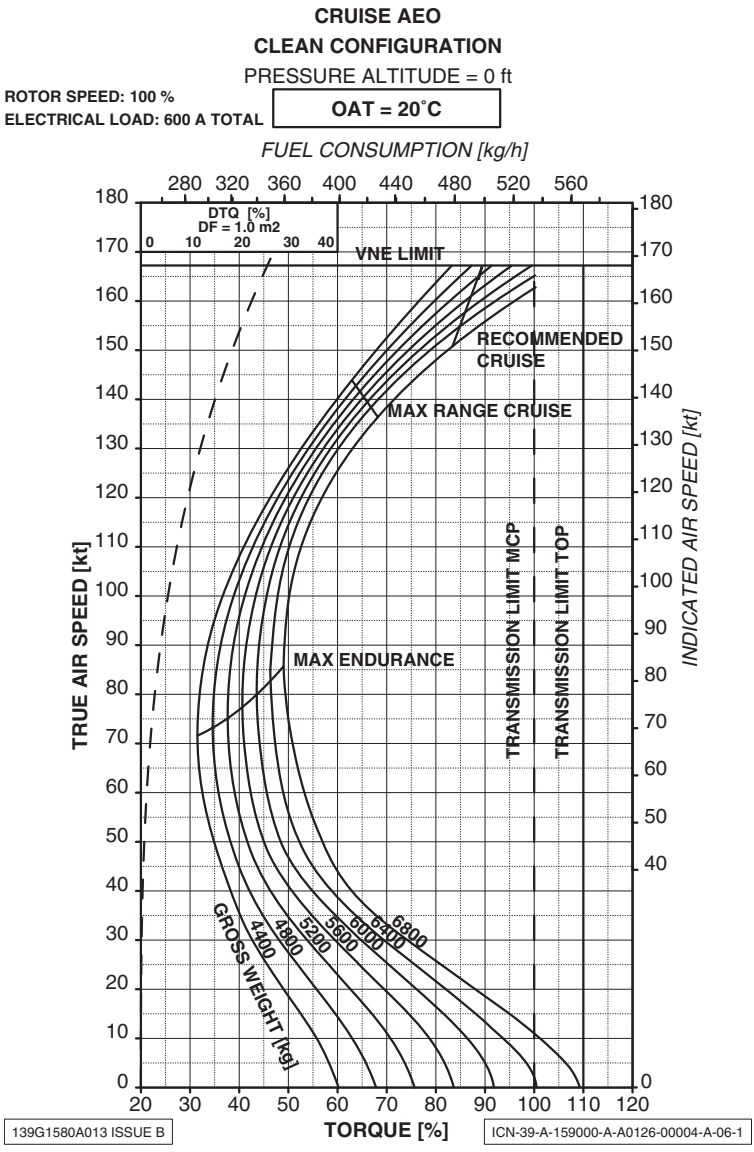

Figure 9-4 Cruise (PA 0 ft, OAT +20° C)

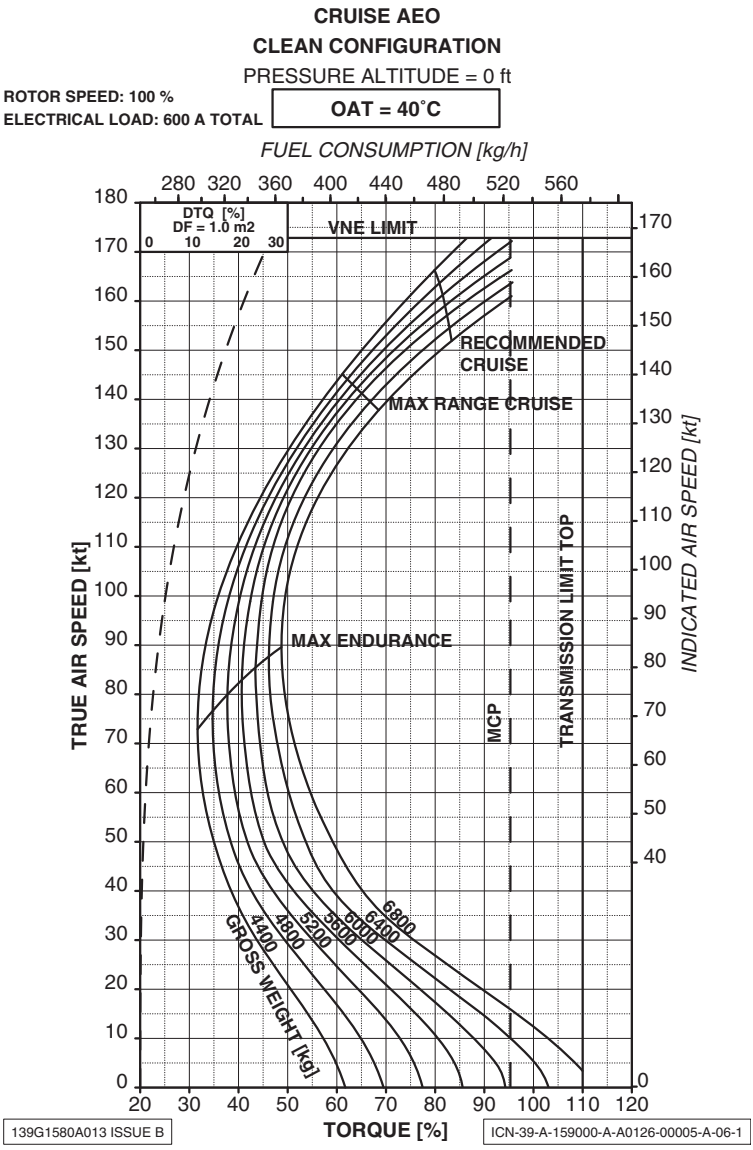

Figure 9-5 Cruise (PA 0 ft, OAT +40° C)

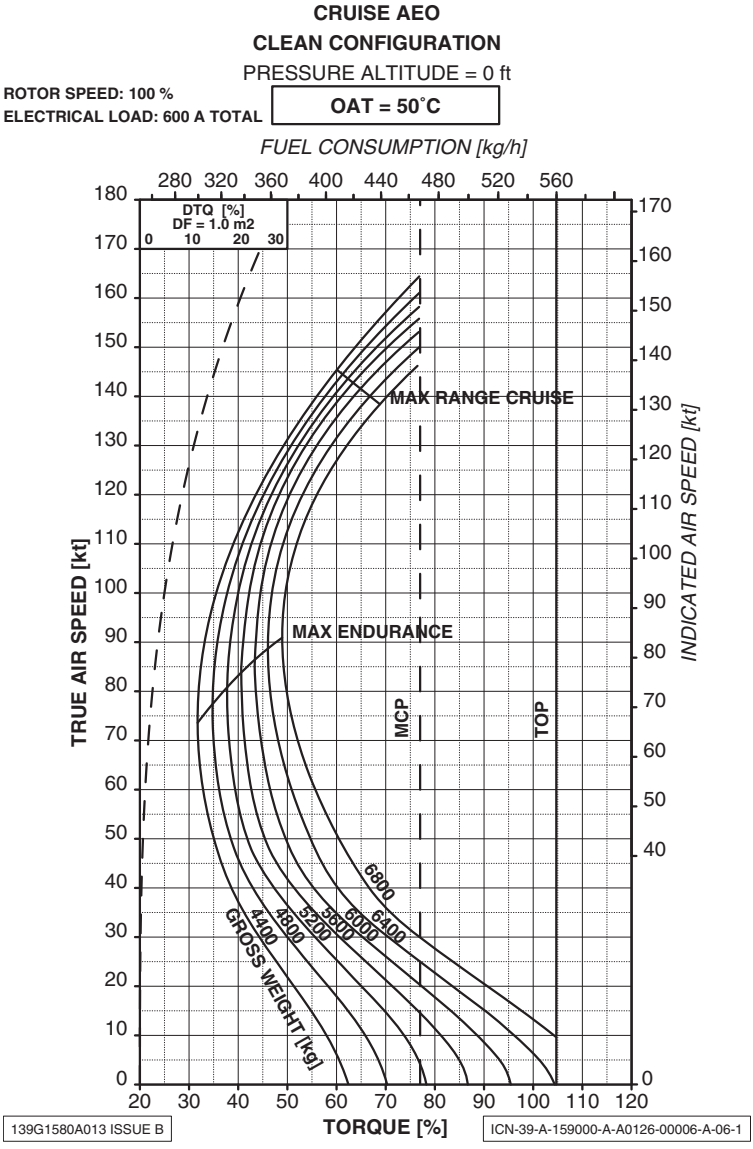

Figure 9-6 Cruise (PA 0 ft, OAT +50° C)

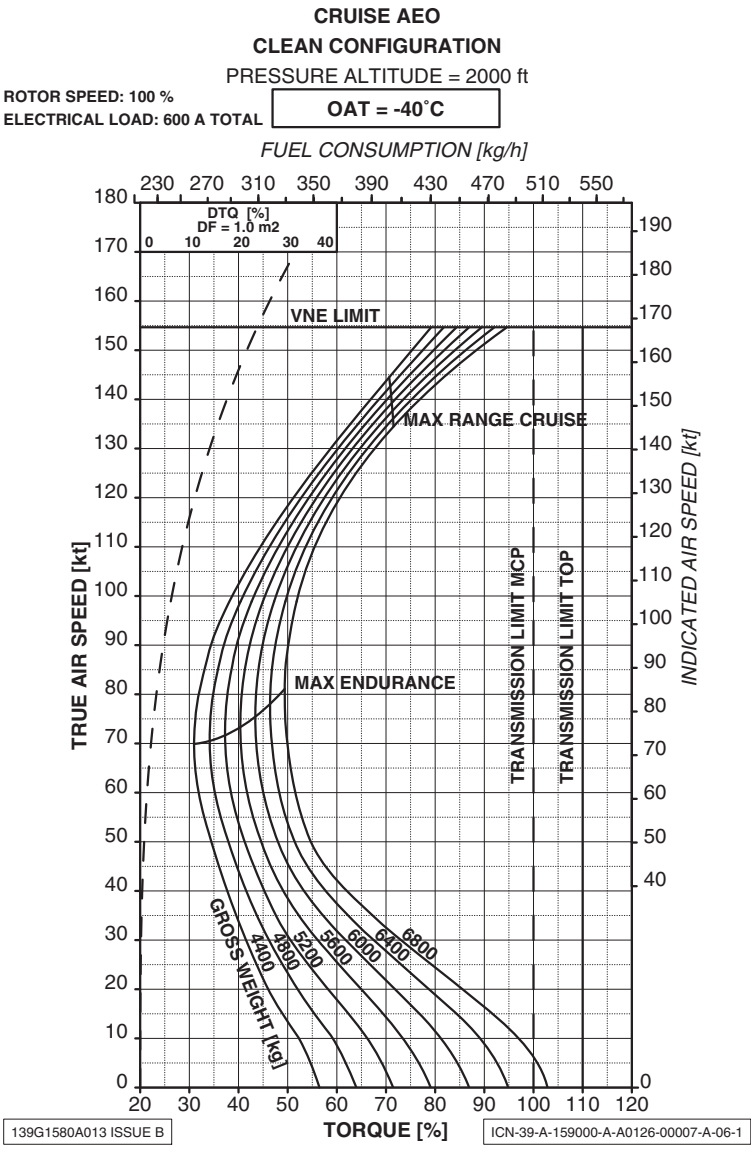

Figure 9-7 Cruise (PA 2000 ft, OAT -40° C)

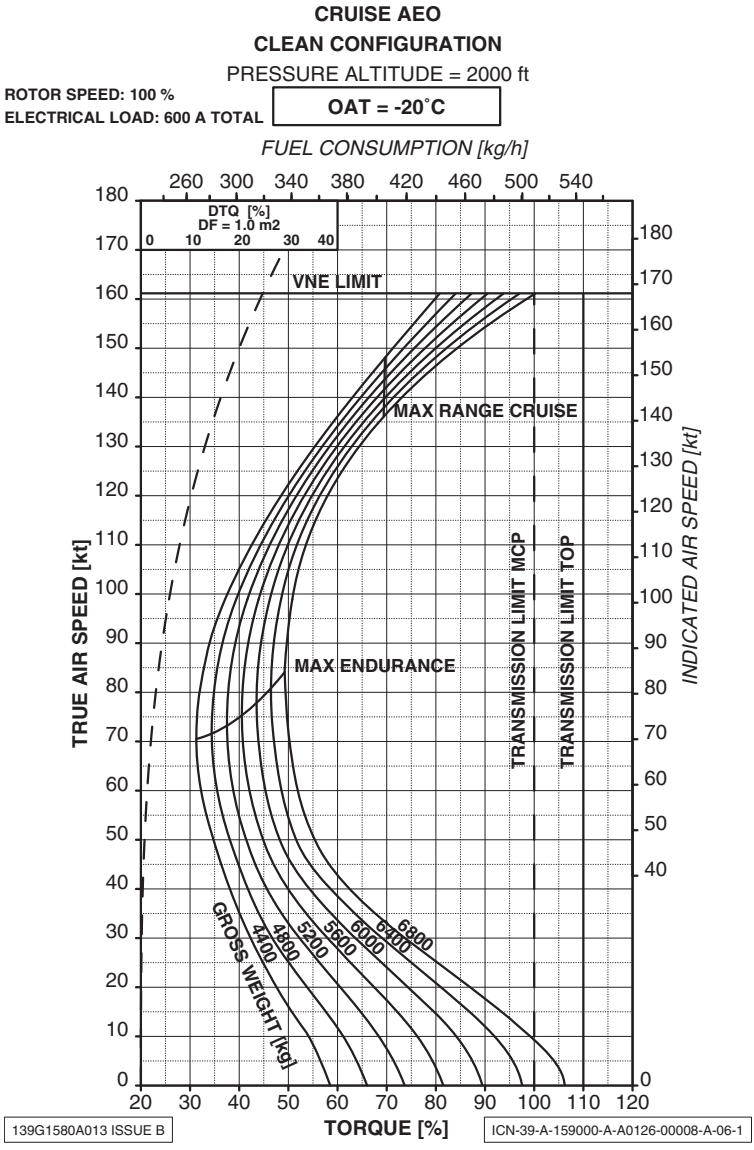

Figure 9-8 Cruise (PA 2000 ft, OAT -20° C)

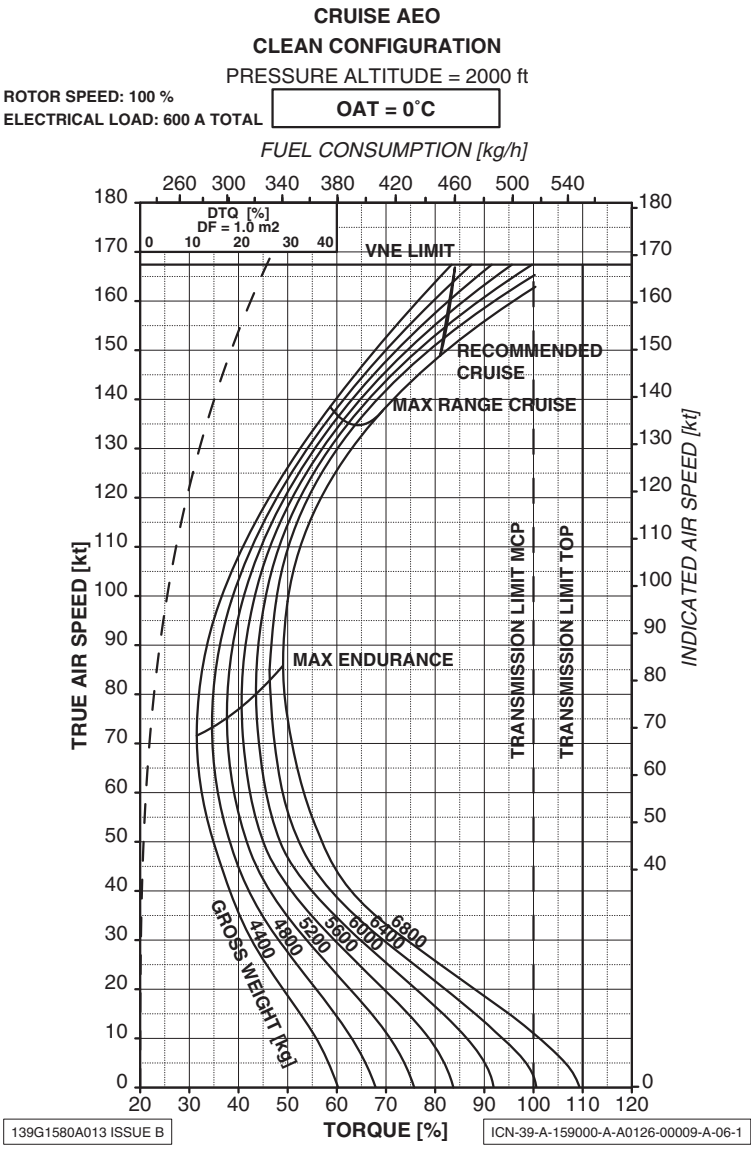

Figure 9-9 Cruise (PA 2000 ft, OAT 0° C)

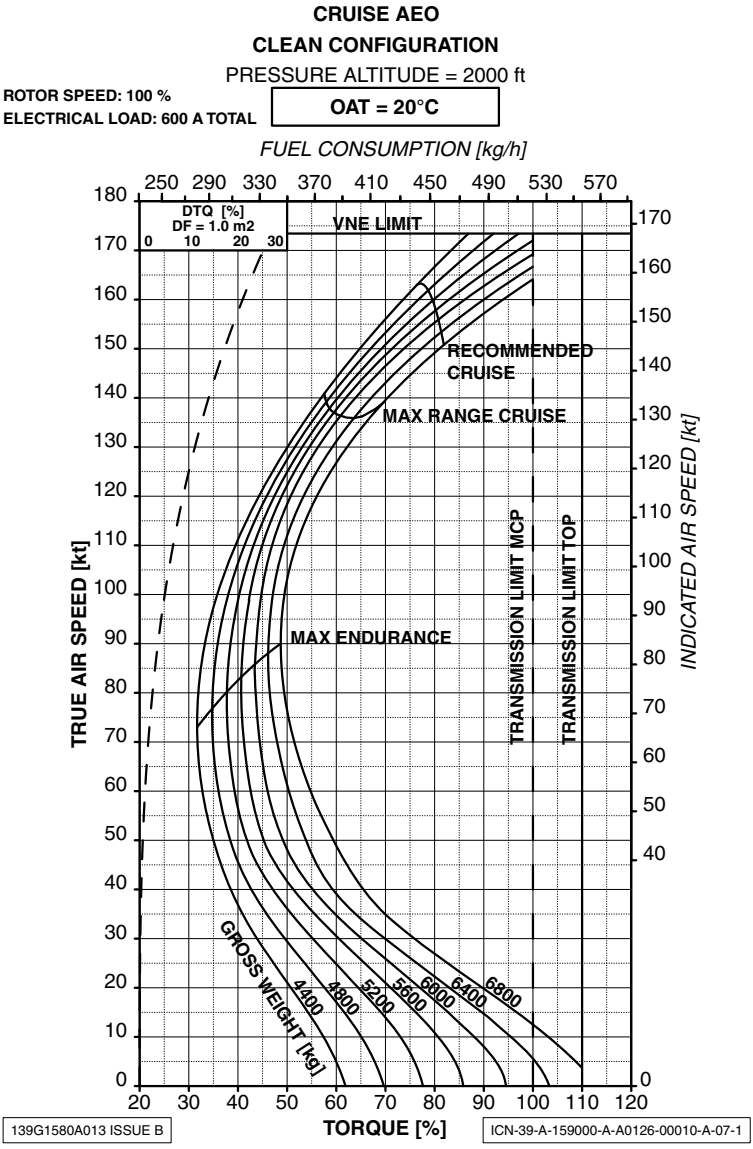

Figure 9-10 Cruise (PA 2000 ft, OAT +20° C)

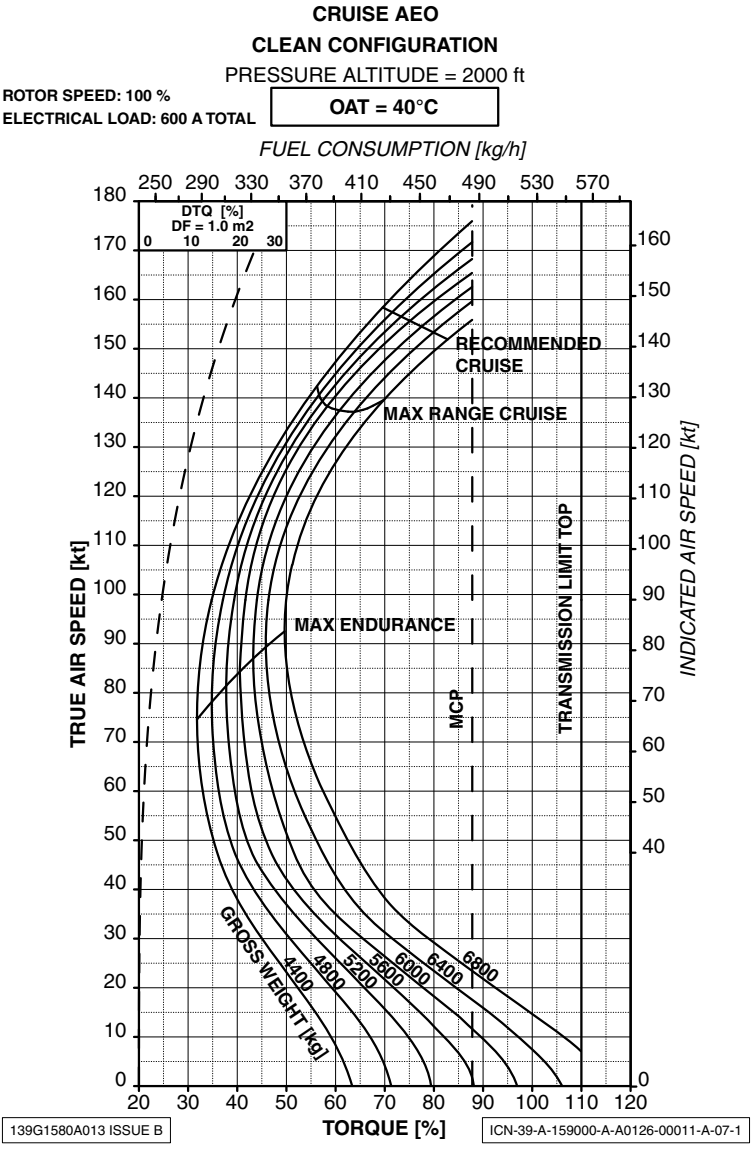

Figure 9-11 Cruise (PA 2000 ft, OAT +40° C)

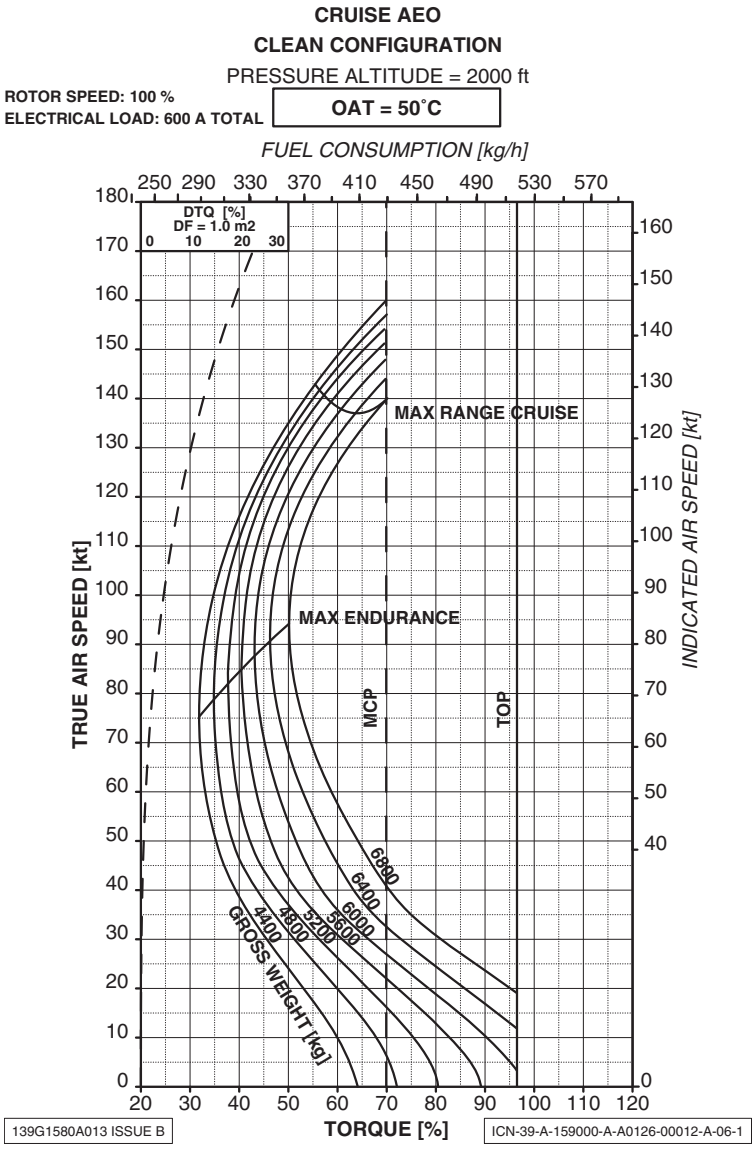

Figure 9-12 Cruise (PA 2000 ft, OAT +50° C)

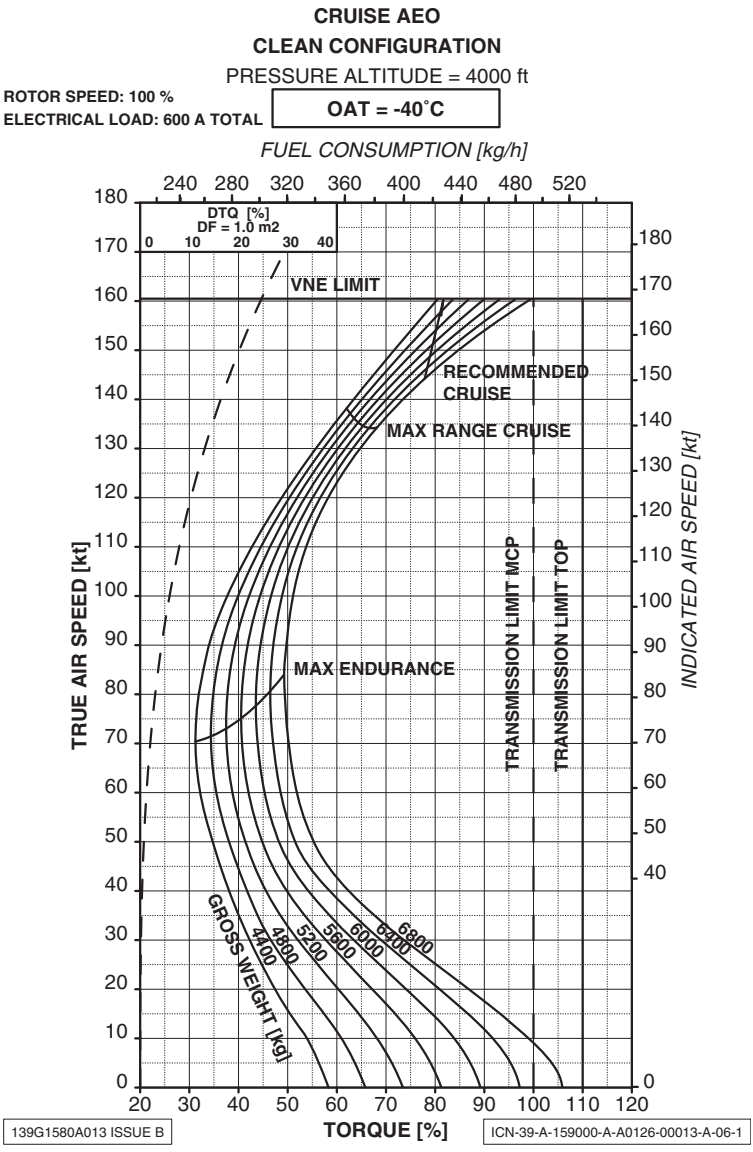

Figure 9-13 Cruise (PA 4000 ft, OAT -40° C)

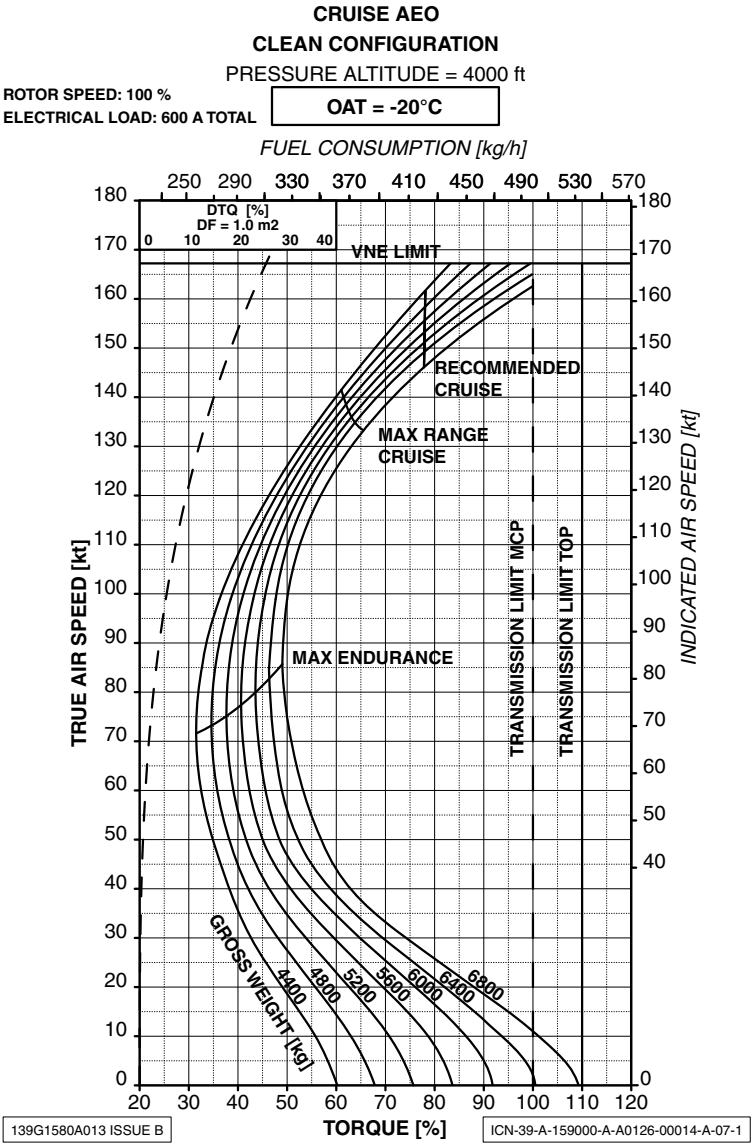

Figure 9-14 Cruise (PA 4000 ft, OAT -20° C)

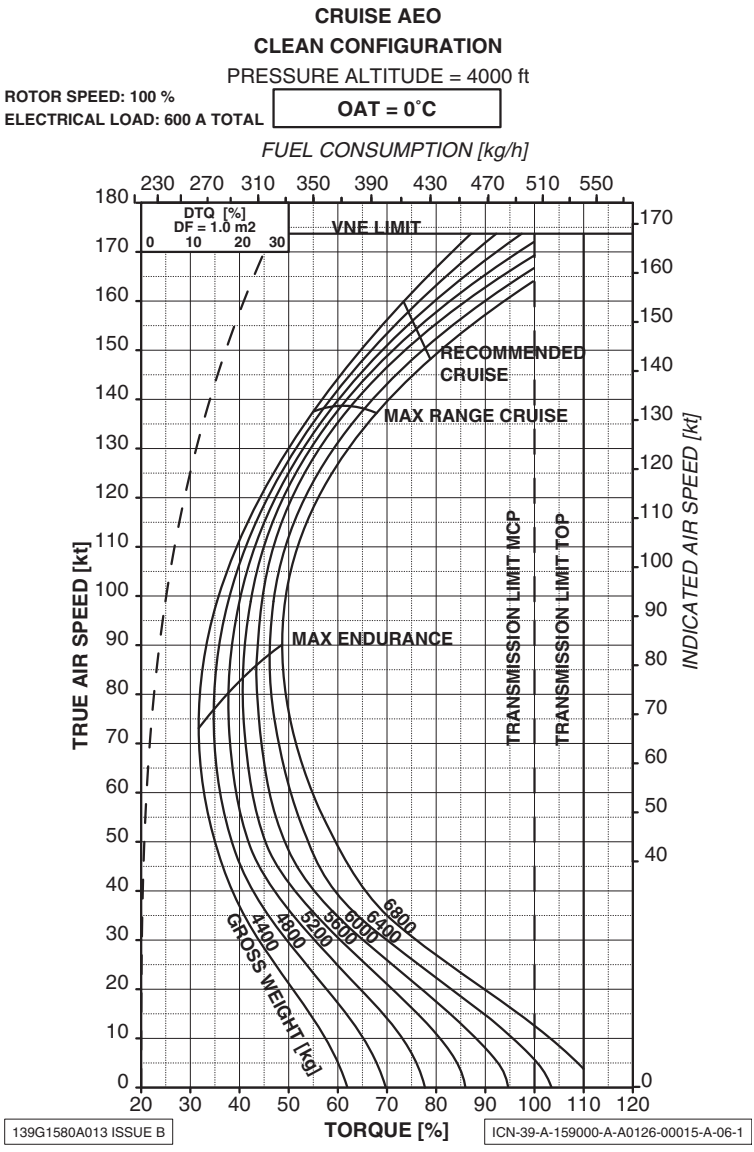

Figure 9-15 Cruise (PA 4000 ft, OAT 0° C)

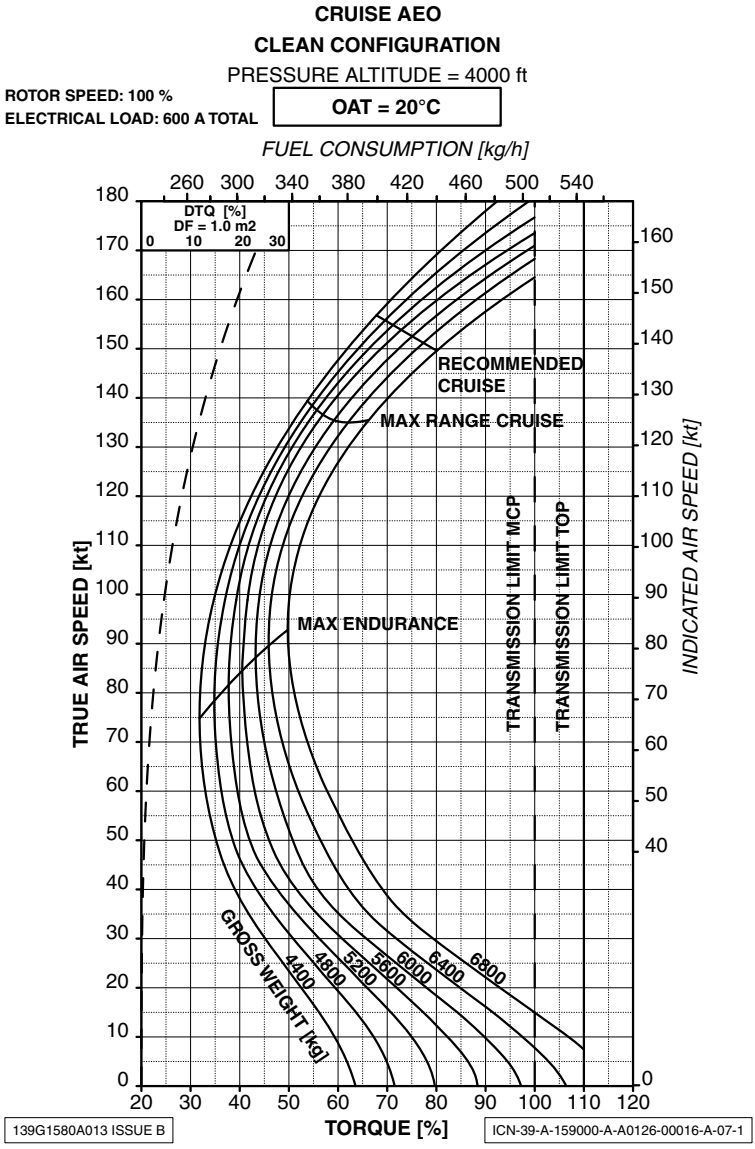

Figure 9-16 Cruise (PA 4000 ft, OAT +20° C)

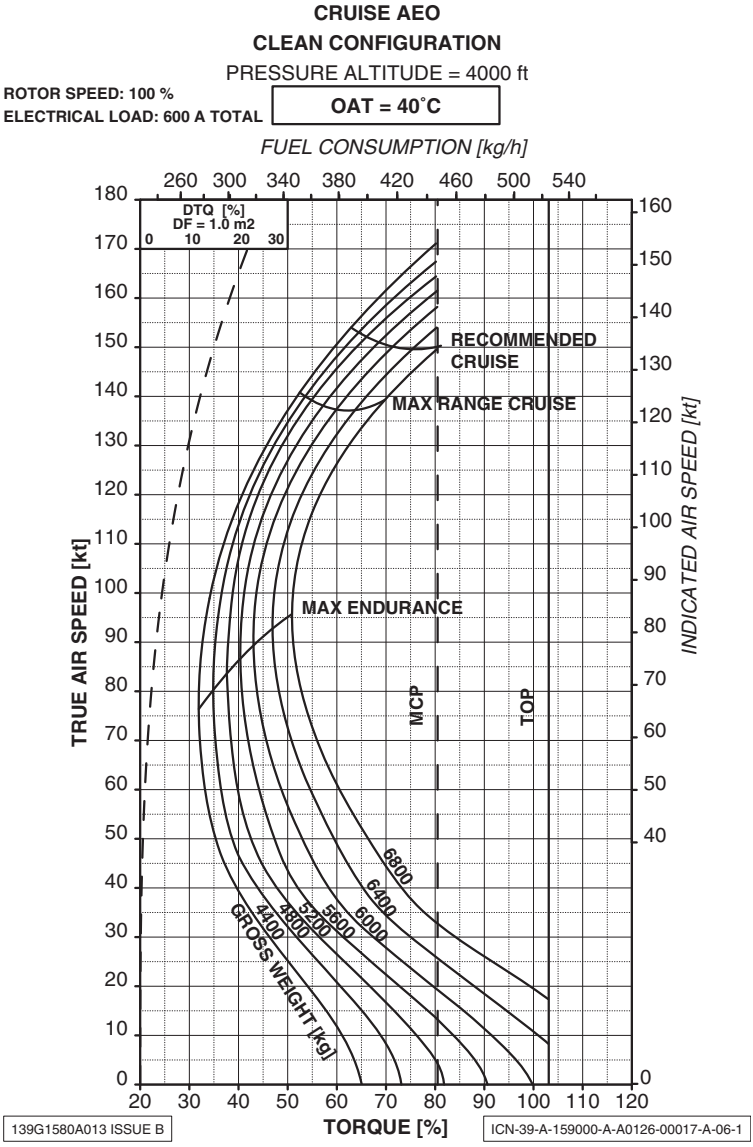

Figure 9-17 Cruise (PA 4000 ft, OAT +40° C)

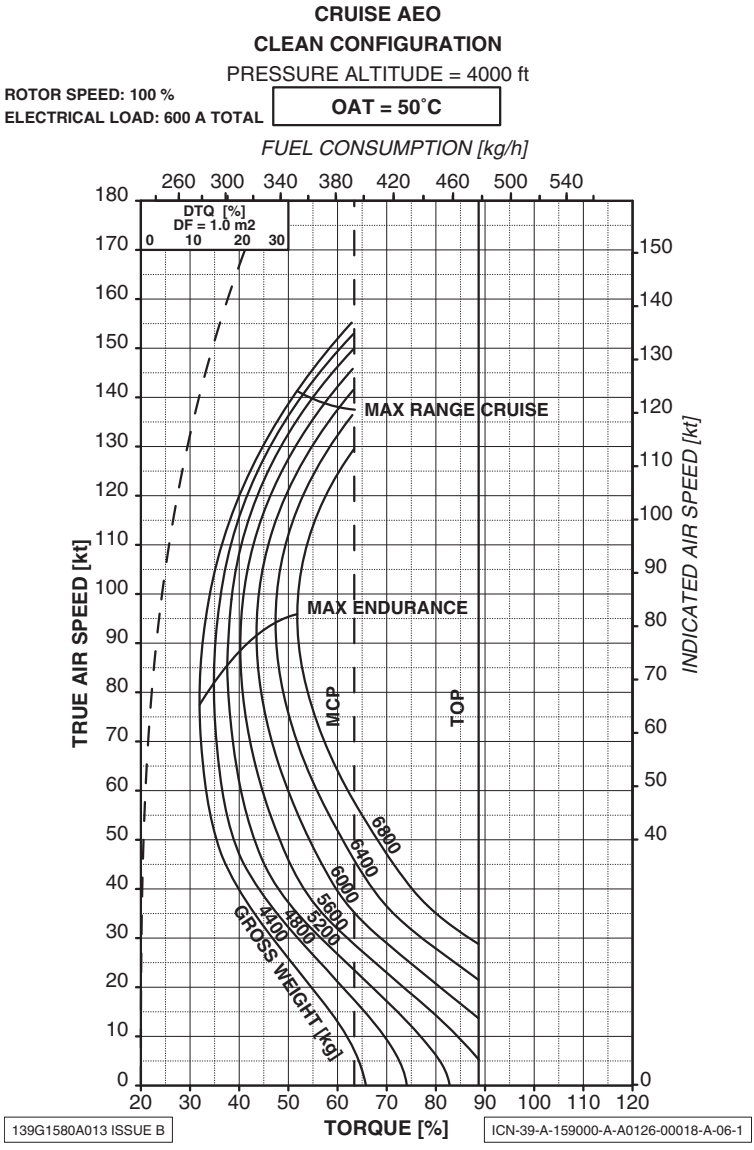

Figure 9-18 Cruise (PA 4000 ft, OAT +50° C)

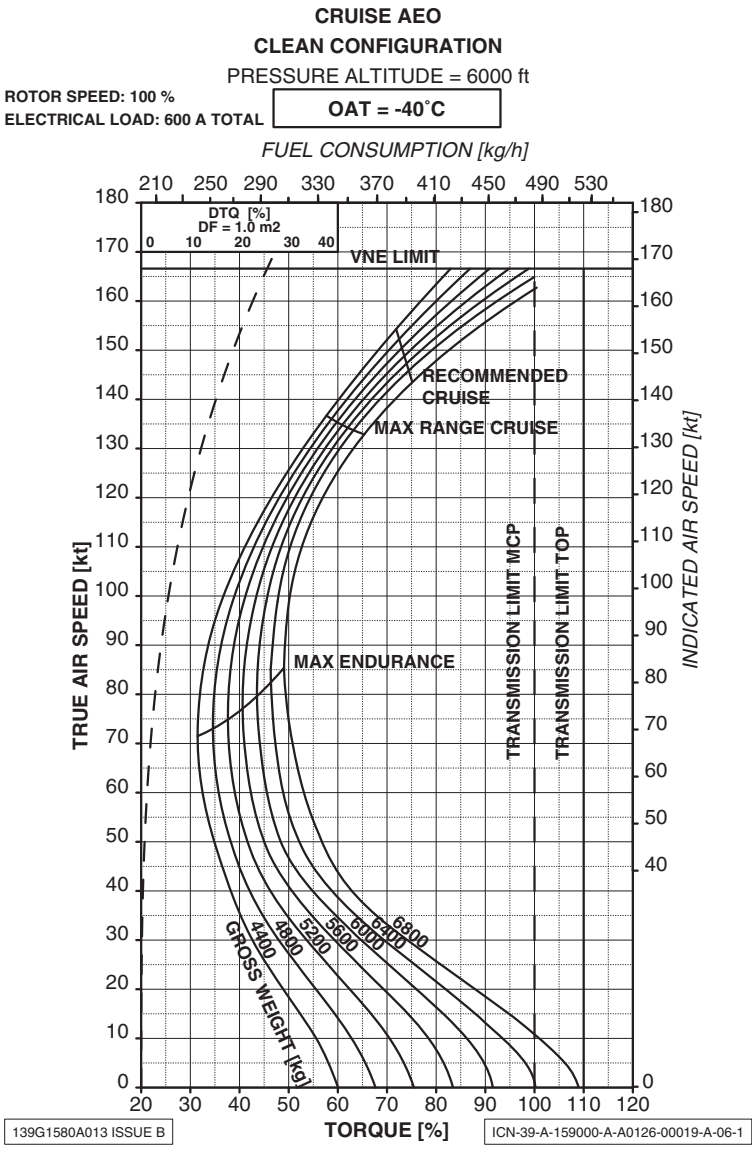

Figure 9-19 Cruise (PA 6000 ft, OAT -40° C)

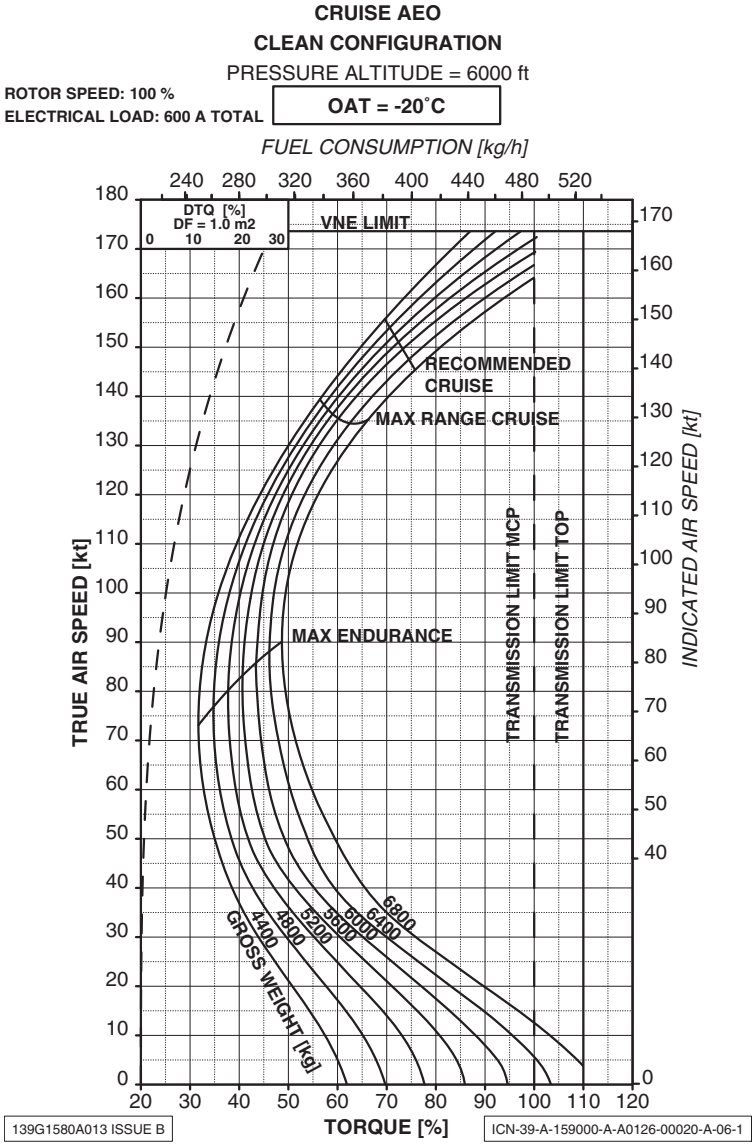

Figure 9-20 Cruise (PA 6000 ft, OAT -20° C)

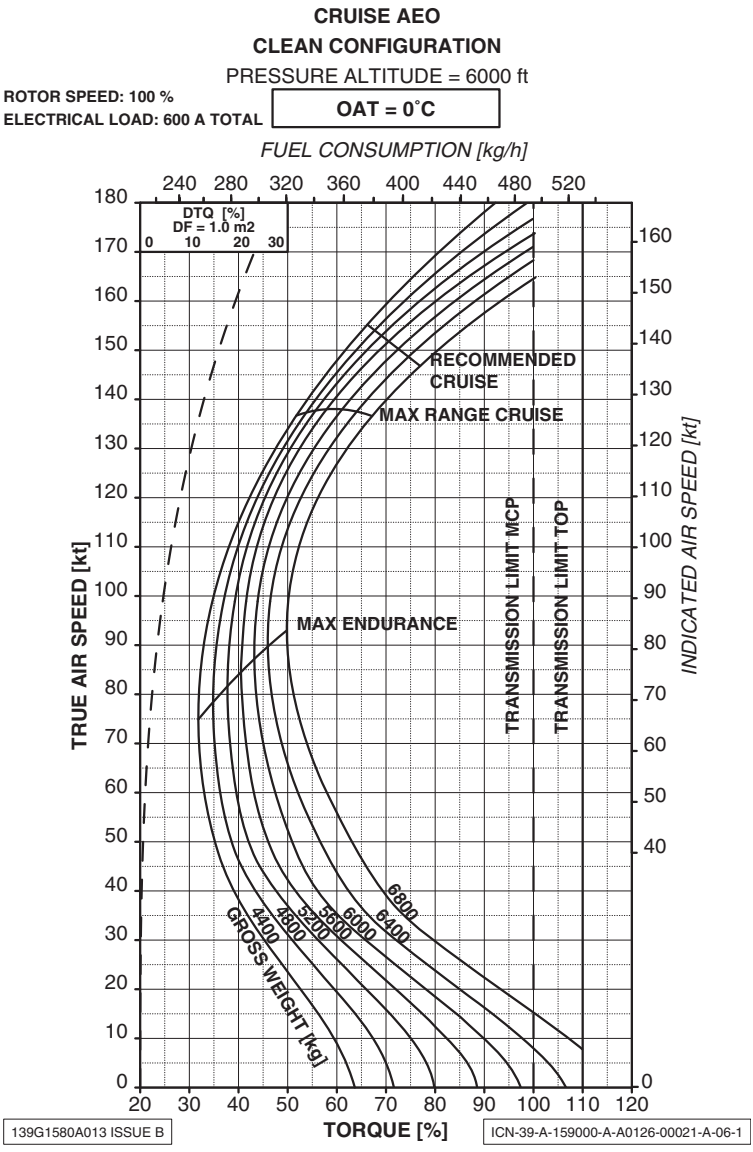

Figure 9-21 Cruise (PA 6000 ft, OAT 0° C)

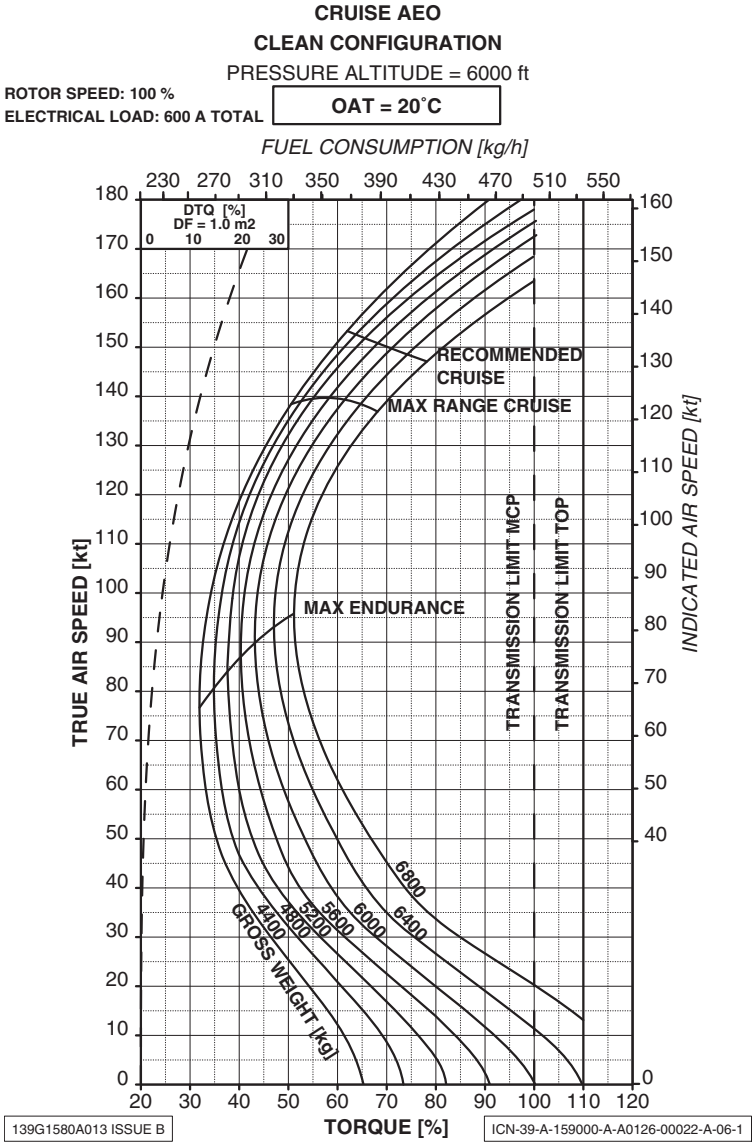

Figure 9-22 Cruise (PA 6000 ft, OAT +20° C)

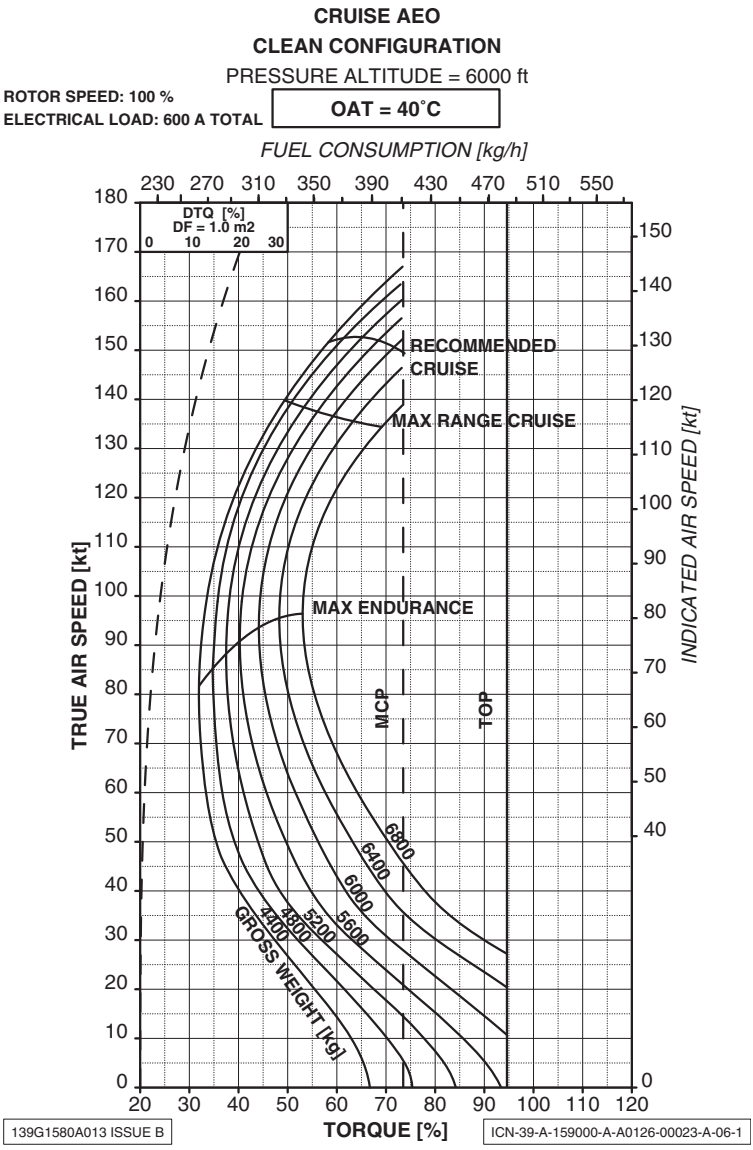

Figure 9-23 Cruise (PA 6000 ft, OAT +40° C)

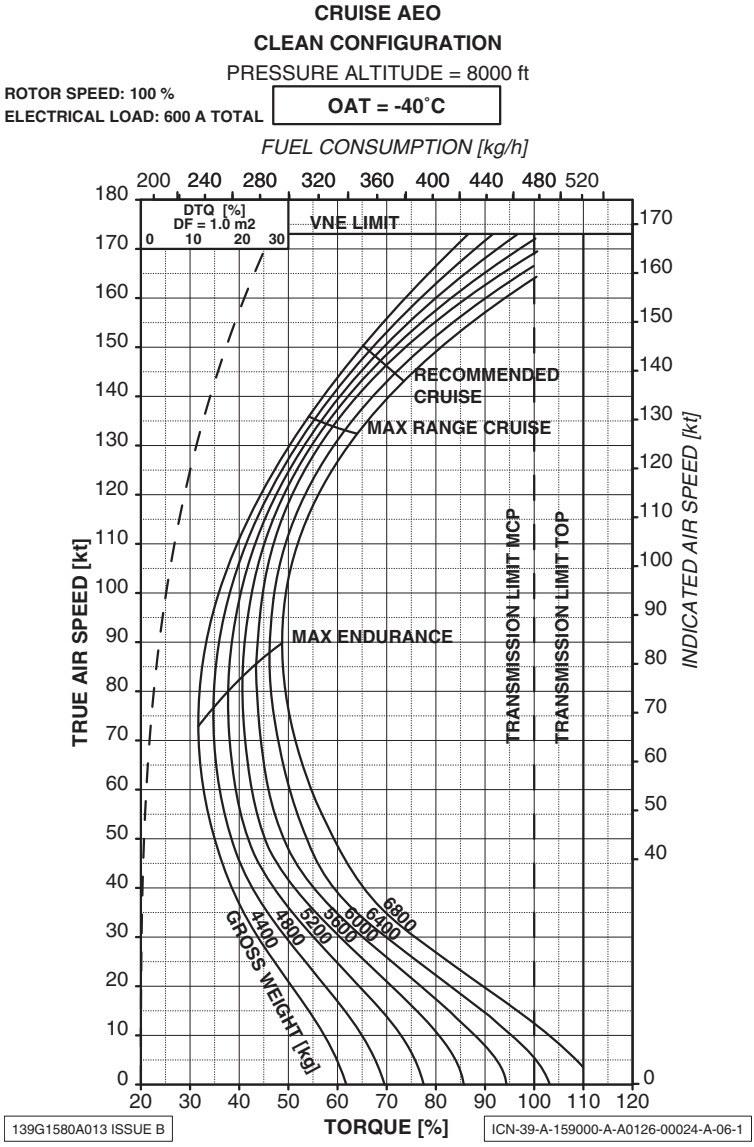

Figure 9-24 Cruise (PA 8000 ft, OAT -40° C)

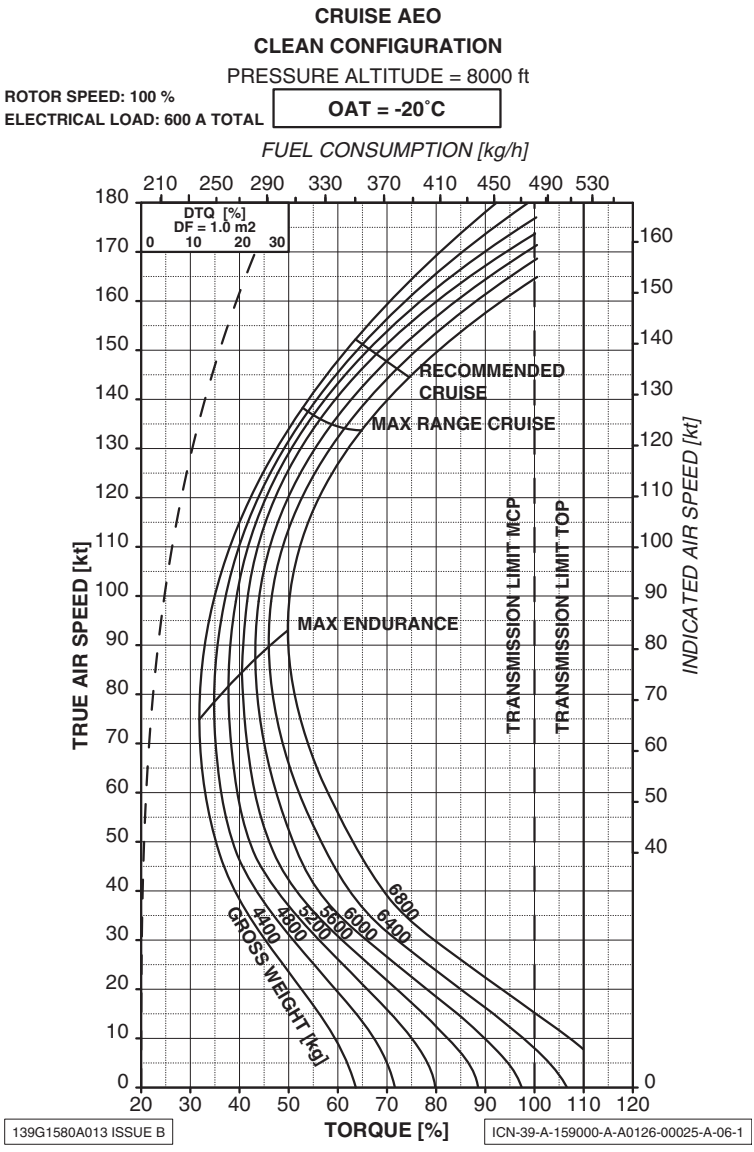

Figure 9-25 Cruise (PA 8000 ft, OAT -20° C)

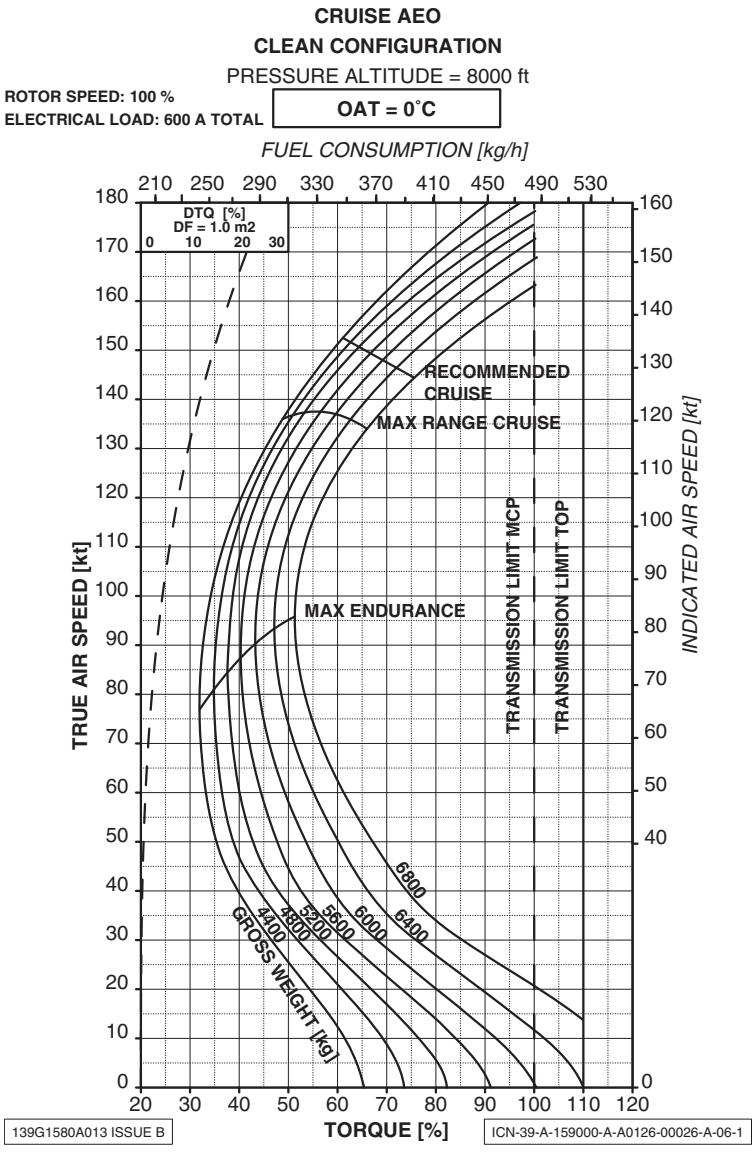

Figure 9-26 Cruise (PA 8000 ft, OAT 0° C)

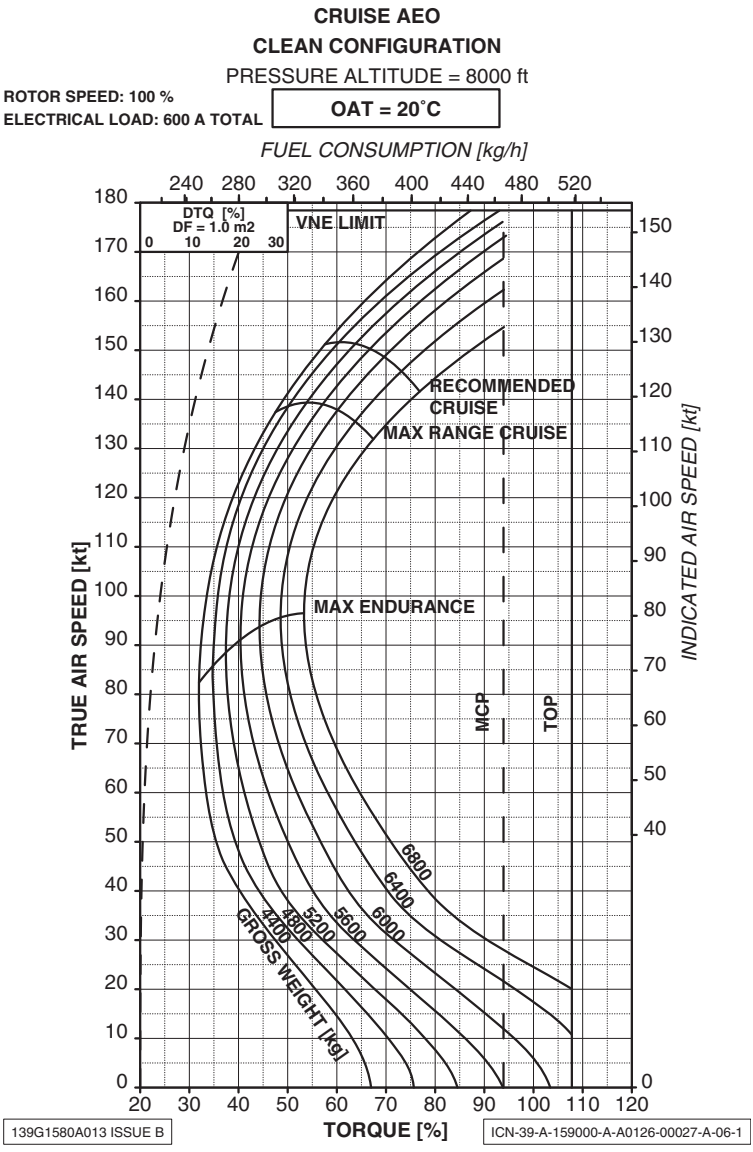

Figure 9-27 Cruise (PA 8000 ft, OAT +20° C)

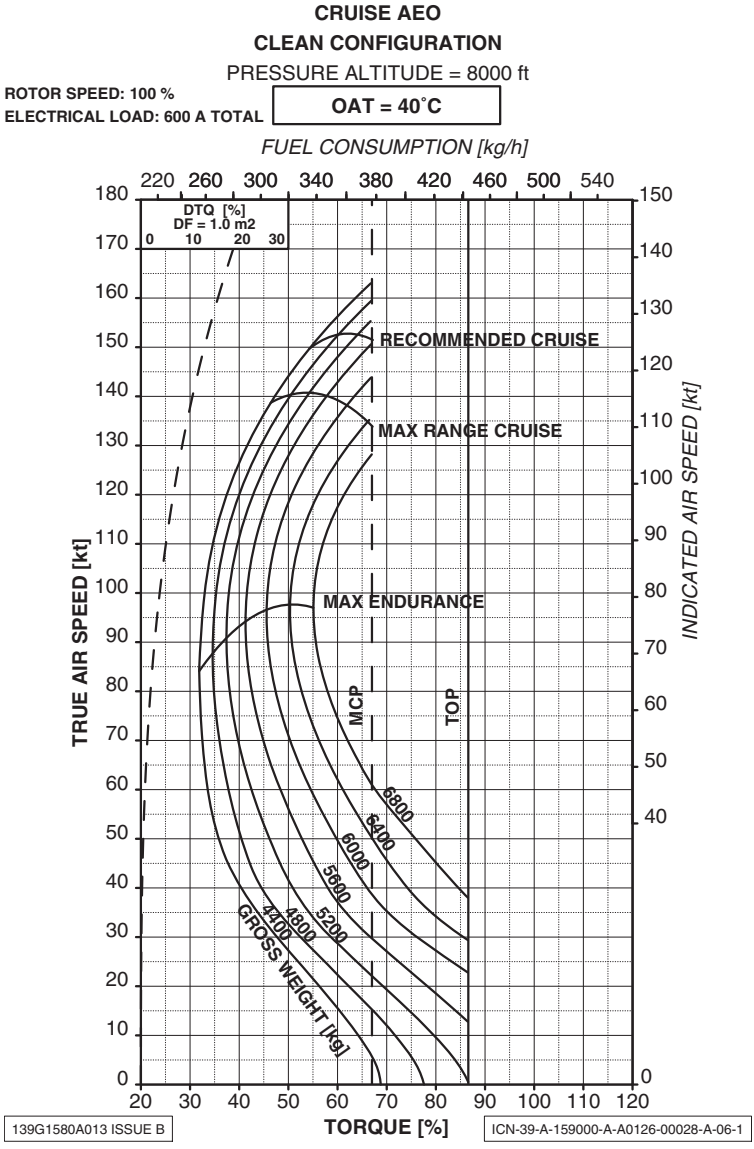

Figure 9-28 Cruise (PA 8000 ft, OAT +40° C)

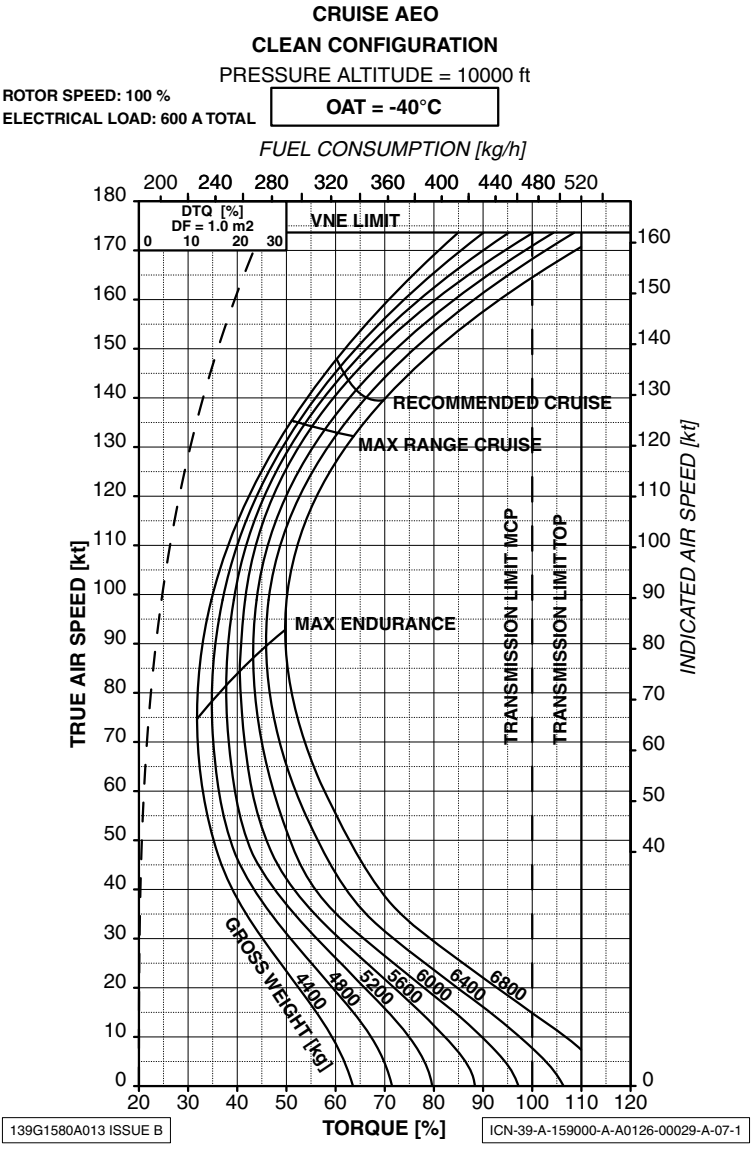

Figure 9-29 Cruise (PA 10000 ft, OAT -40° C)

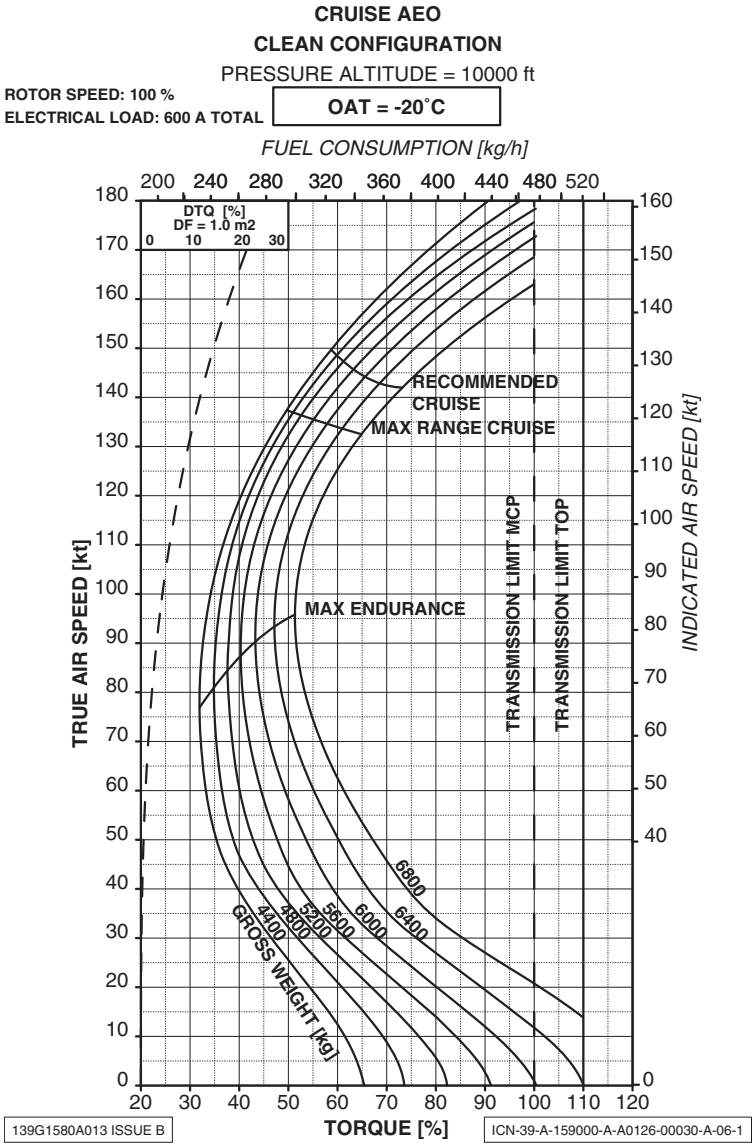

Figure 9-30 Cruise (PA 10000 ft, OAT -20° C)

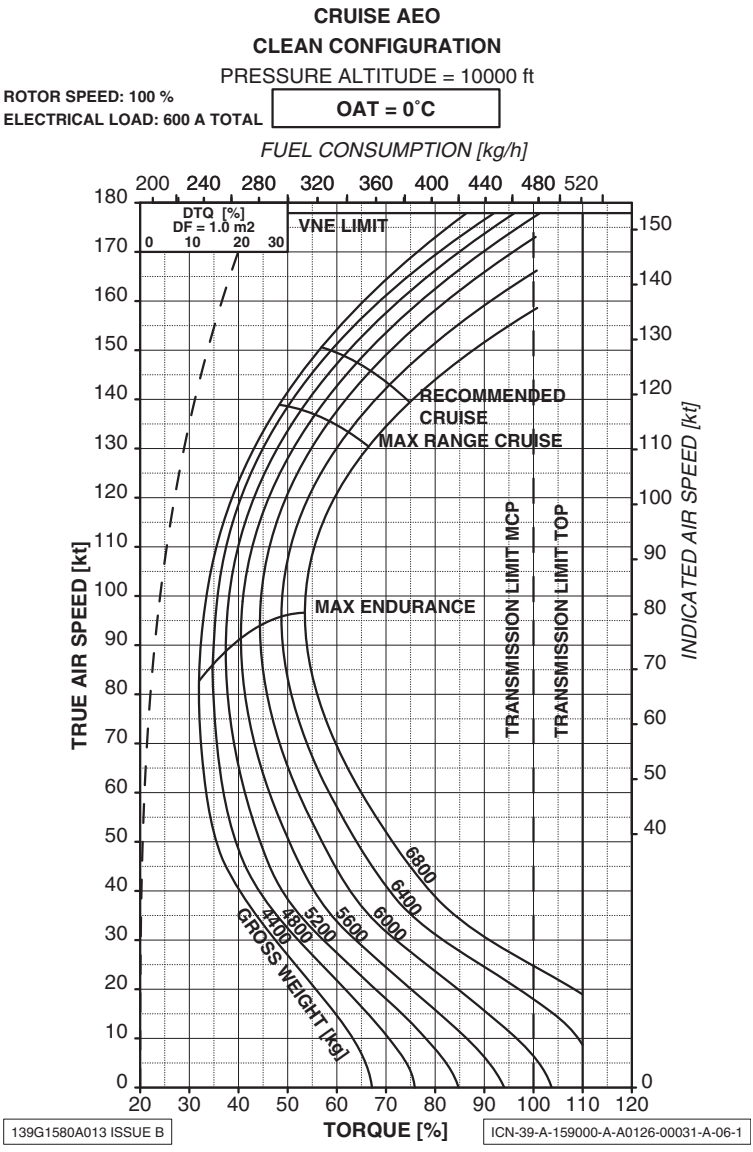

Figure 9-31 Cruise (PA 10000 ft, OAT 0° C)

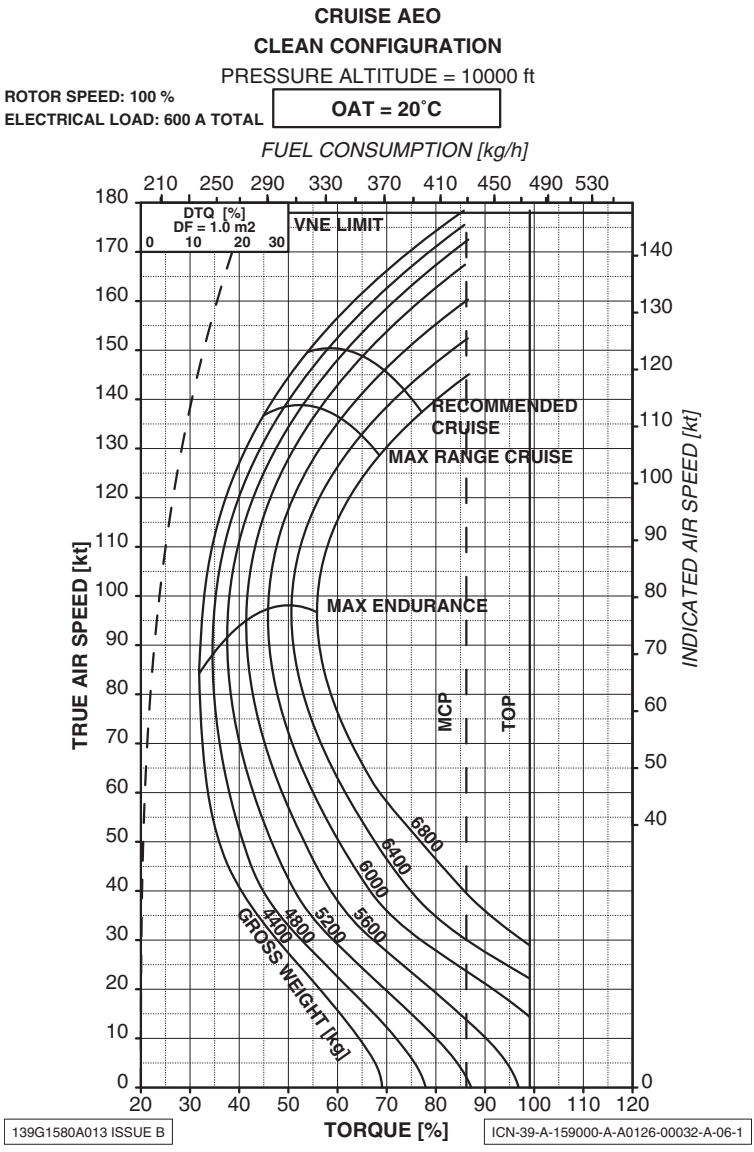

Figure 9-32 Cruise (PA 10000 ft, OAT +20° C)

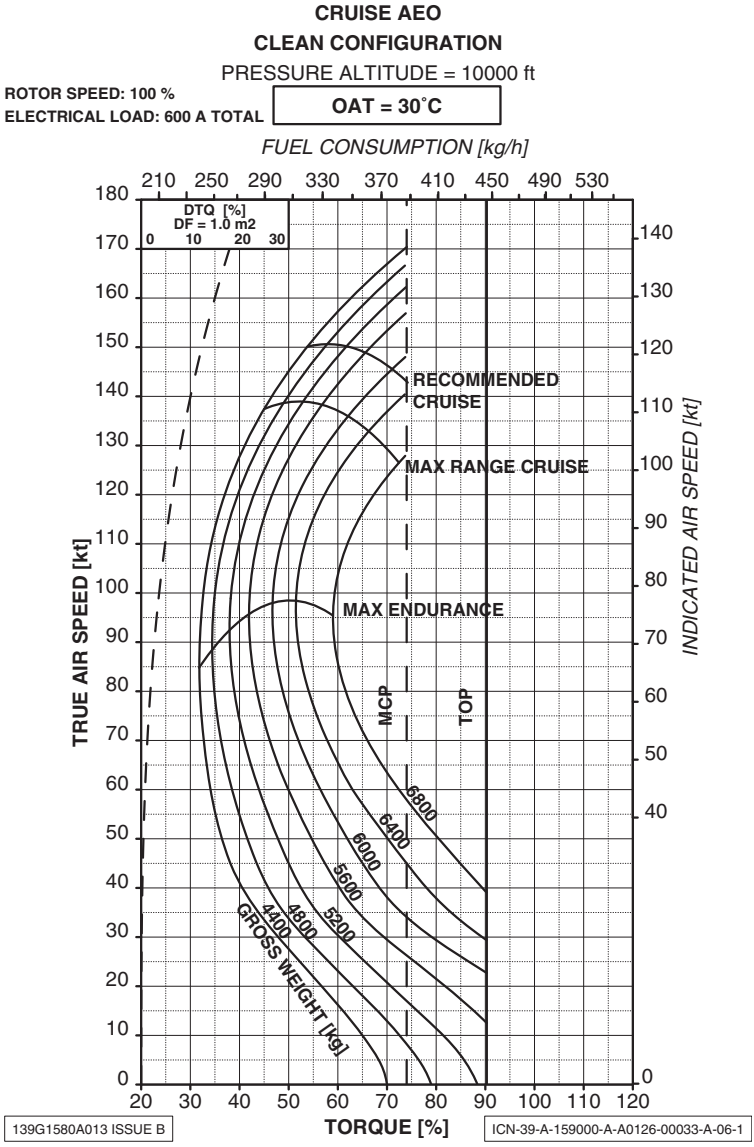

Figure 9-33 Cruise (PA 10000 ft, OAT +30° C)

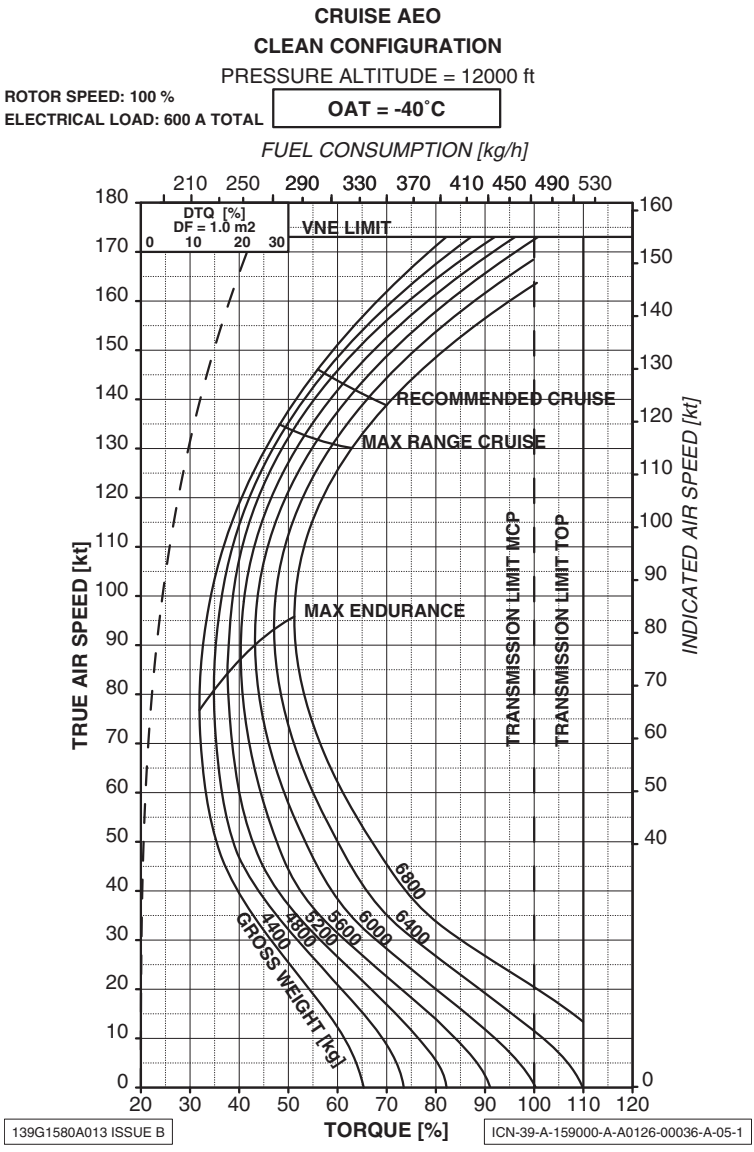

Figure 9-34 Cruise (PA 12000 ft, OAT -40° C)

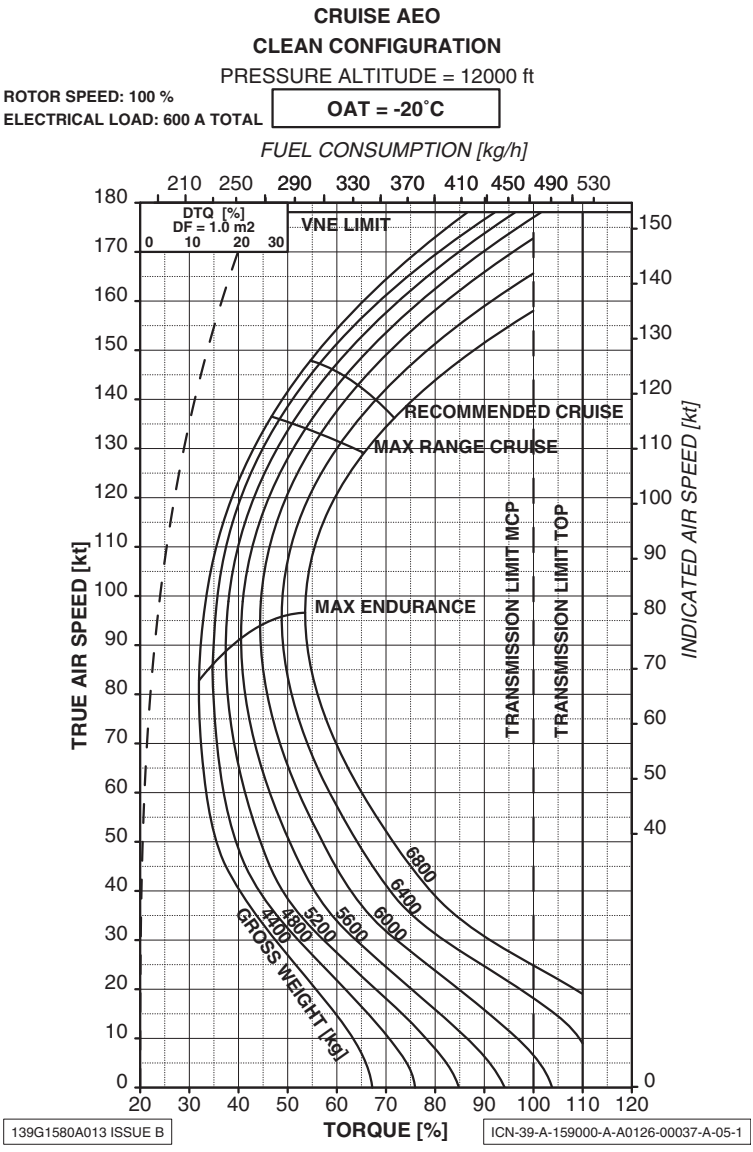

Figure 9-35 Cruise (PA 12000 ft, OAT -20° C)

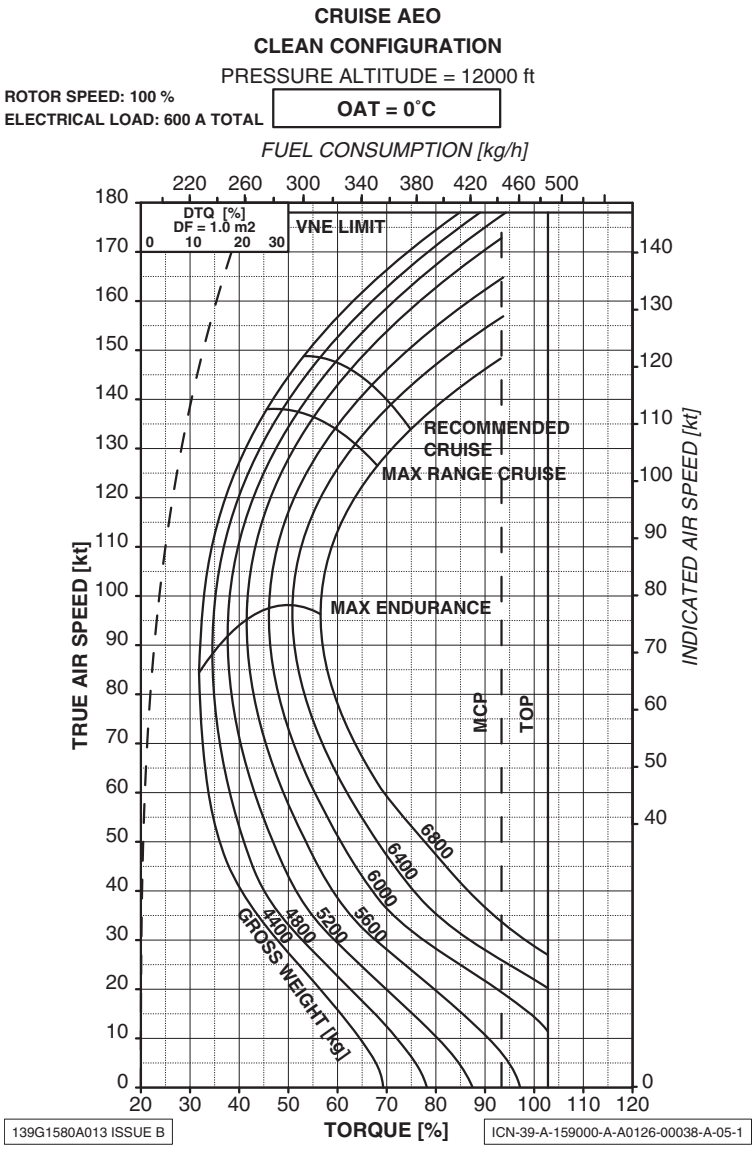

Figure 9-36 Cruise (PA 12000 ft, OAT 0° C)

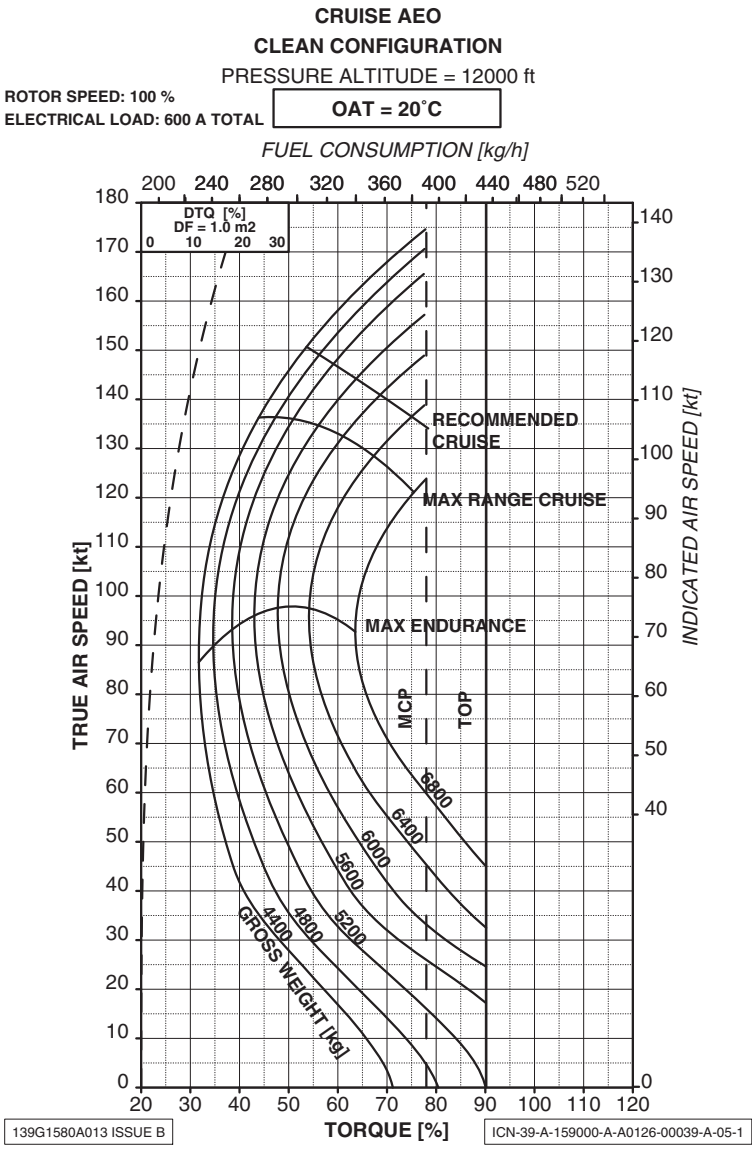

Figure 9-37 Cruise (PA 12000 ft, OAT +20° C)

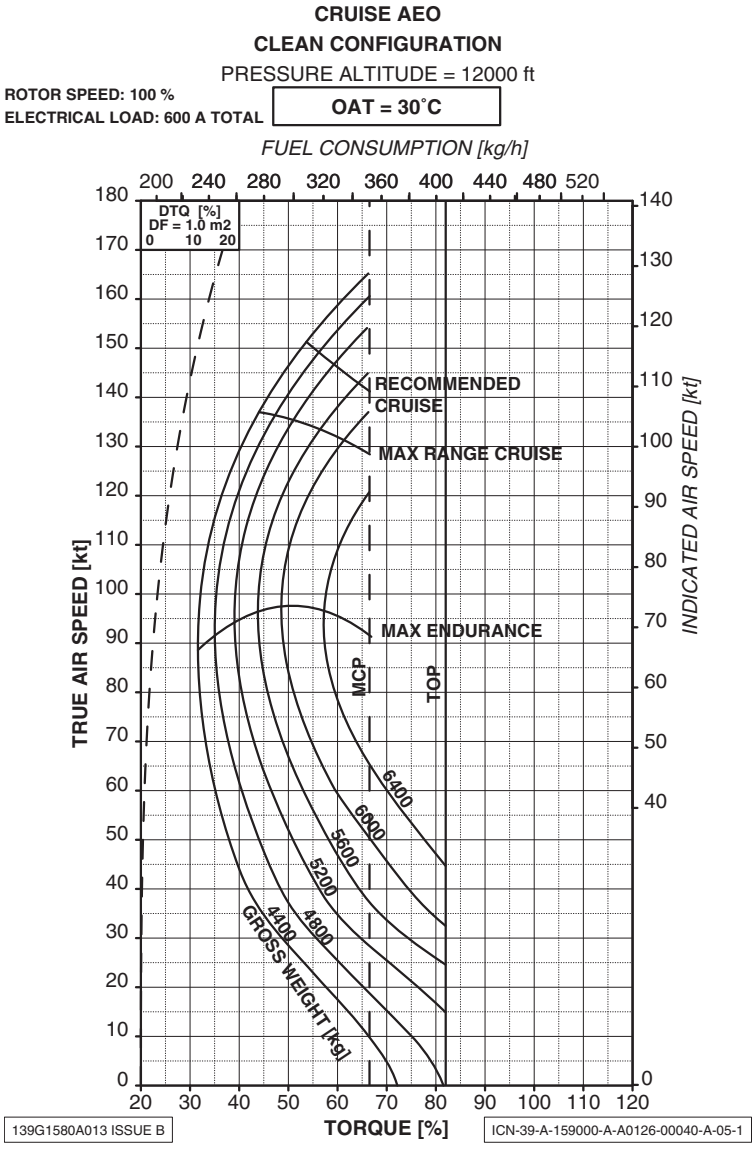

Figure 9-38 Cruise (PA 12000 ft, OAT +30° C)

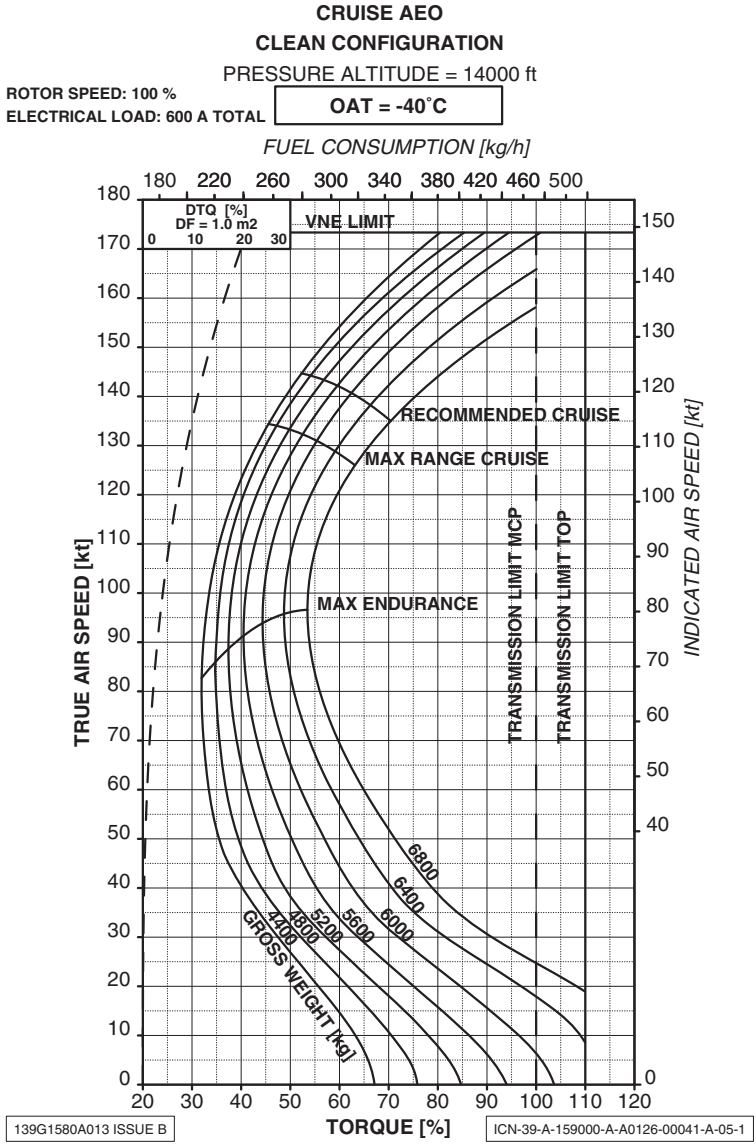

Figure 9-39 Cruise (PA 14000 ft, OAT -40° C)

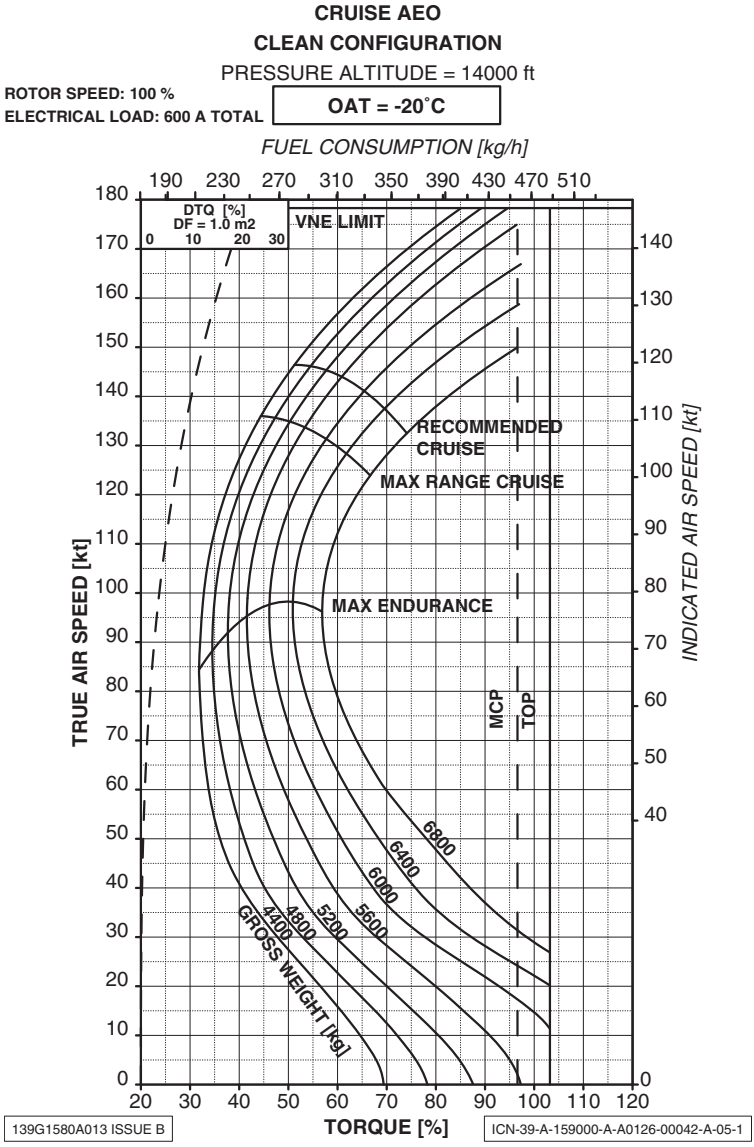

Figure 9-40 Cruise (PA 14000 ft, OAT -20° C)

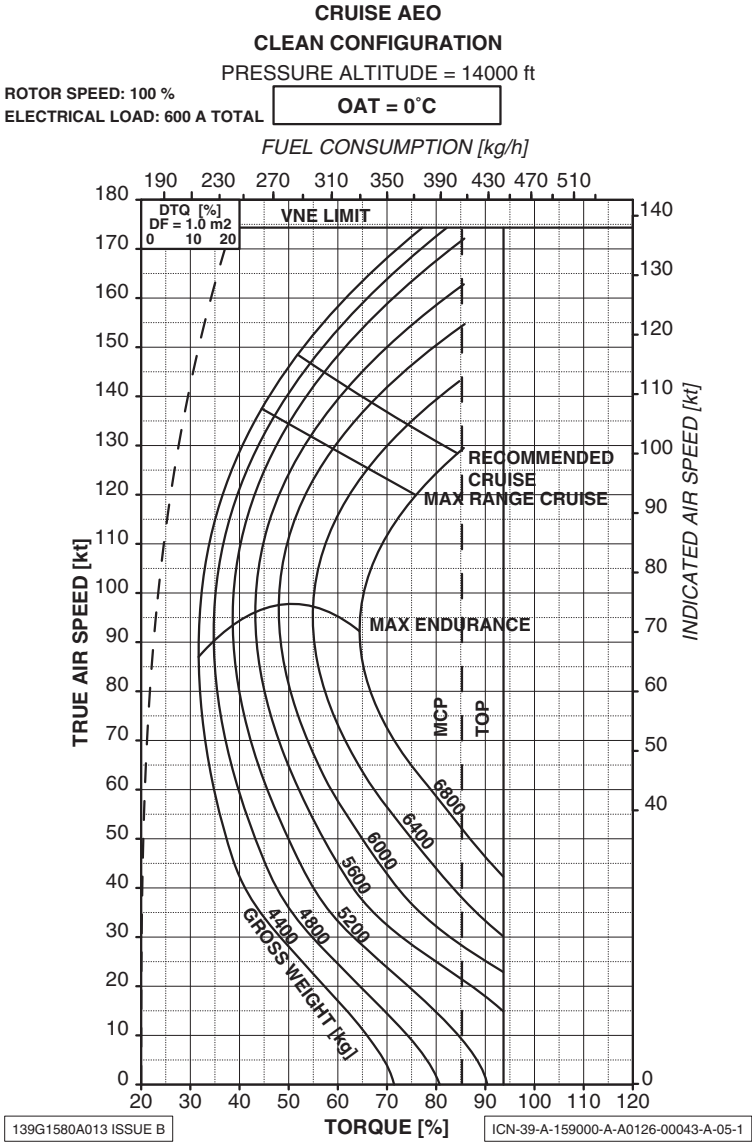

Figure 9-41 Cruise (PA 14000 ft, OAT 0° C)

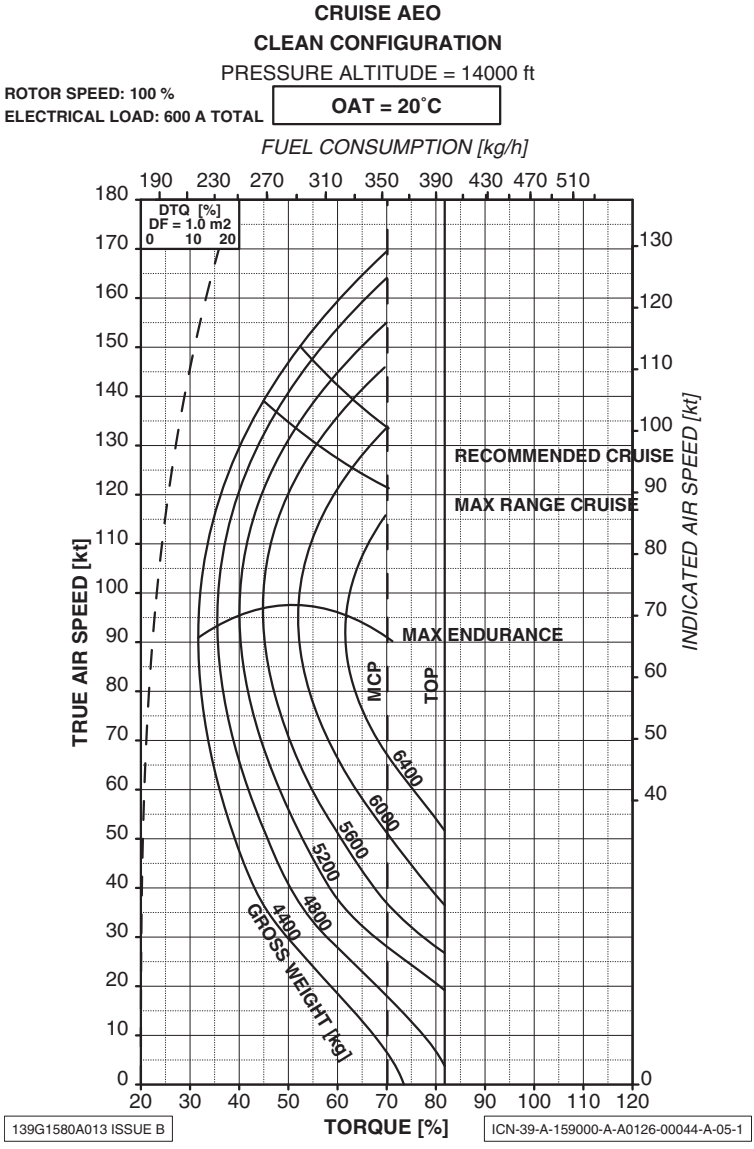

Figure 9-42 Cruise (PA 14000 ft, OAT +20° C)

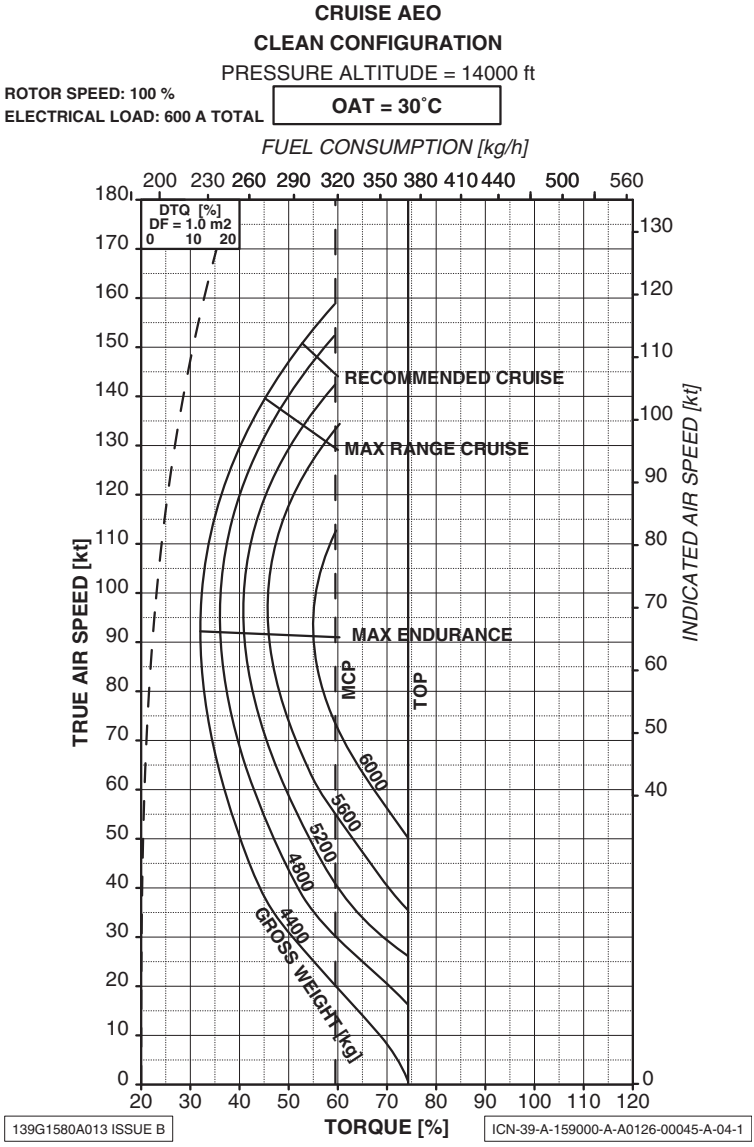

Figure 9-43 Cruise (PA 14000 ft, OAT +30° C)

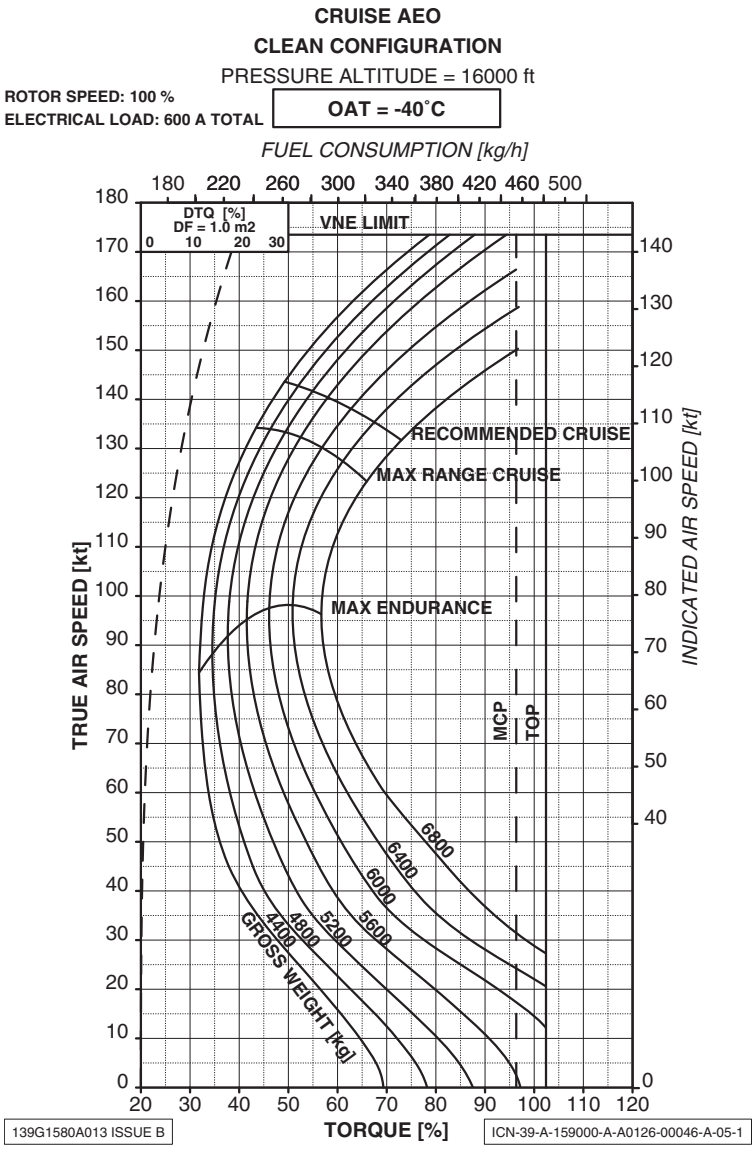

Figure 9-44 Cruise (PA 16000 ft, OAT -40° C)

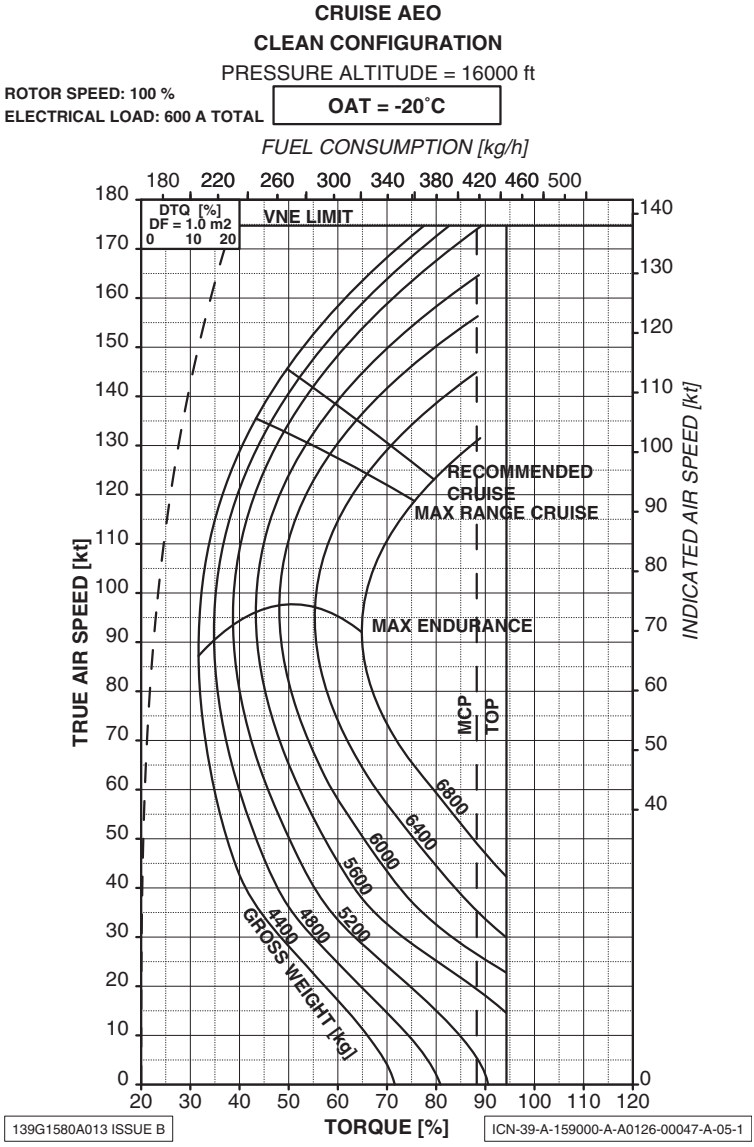

Figure 9-45 Cruise (PA 16000 ft, OAT -20° C)

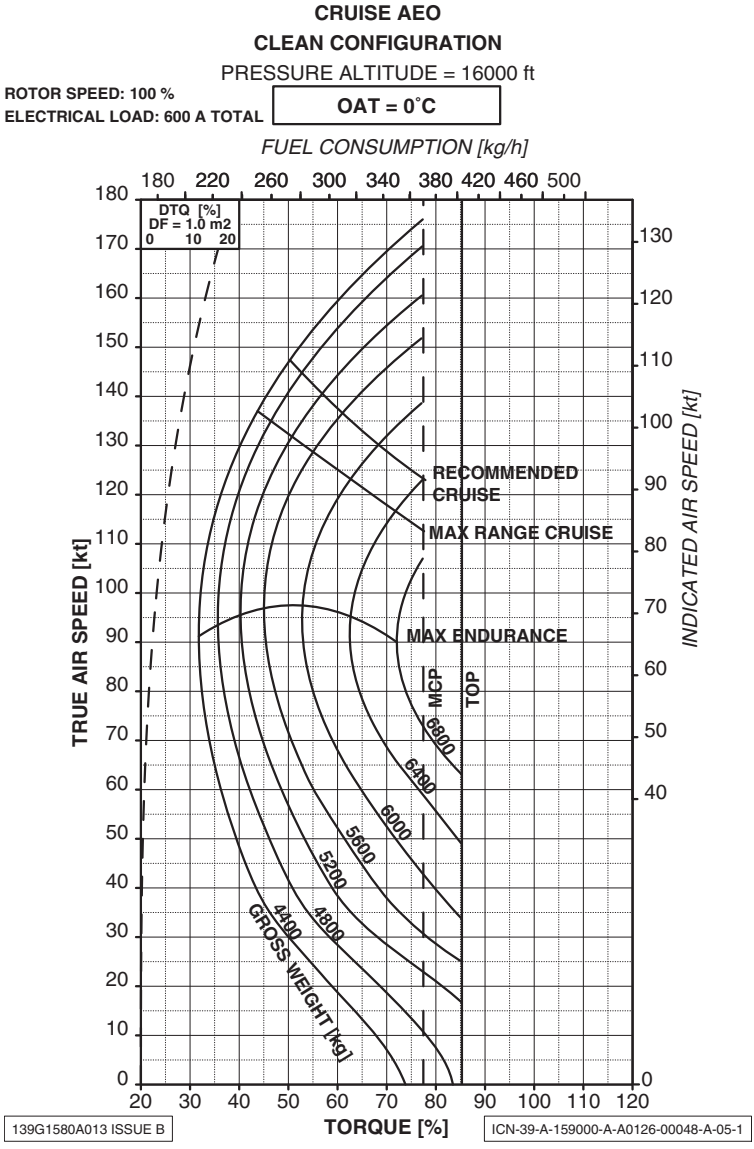

Figure 9-46 Cruise (PA 16000 ft, OAT 0° C)

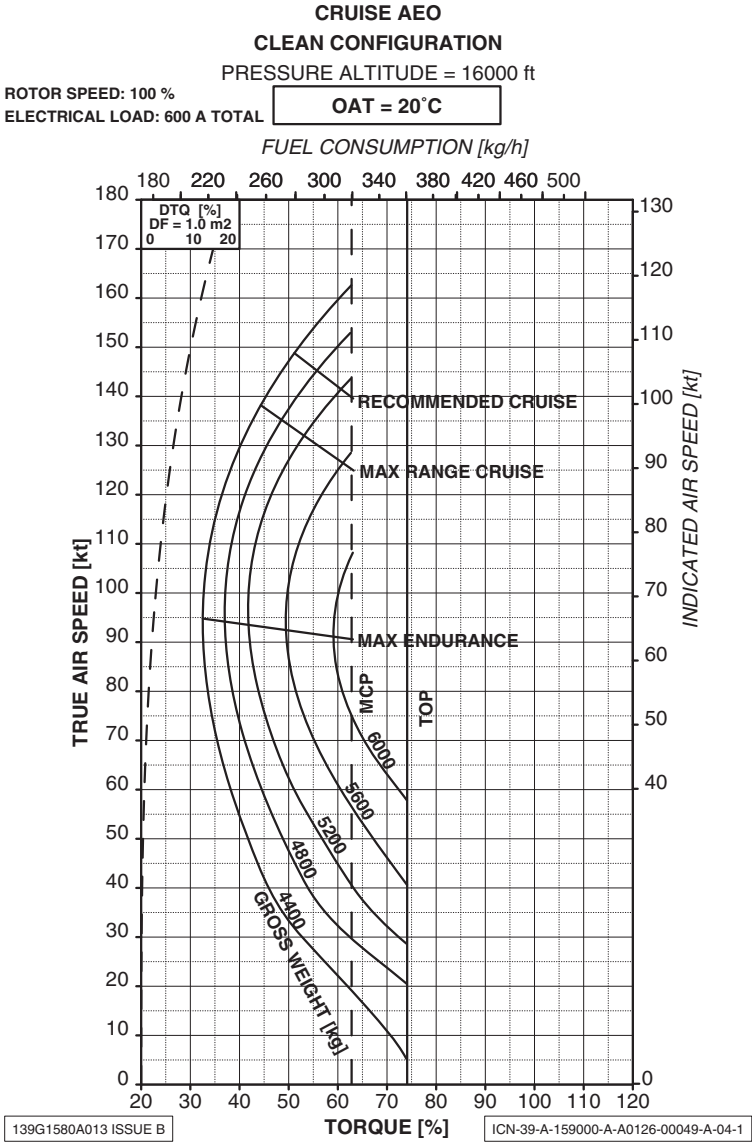

Figure 9-47 Cruise (PA 16000 ft, OAT +20° C)

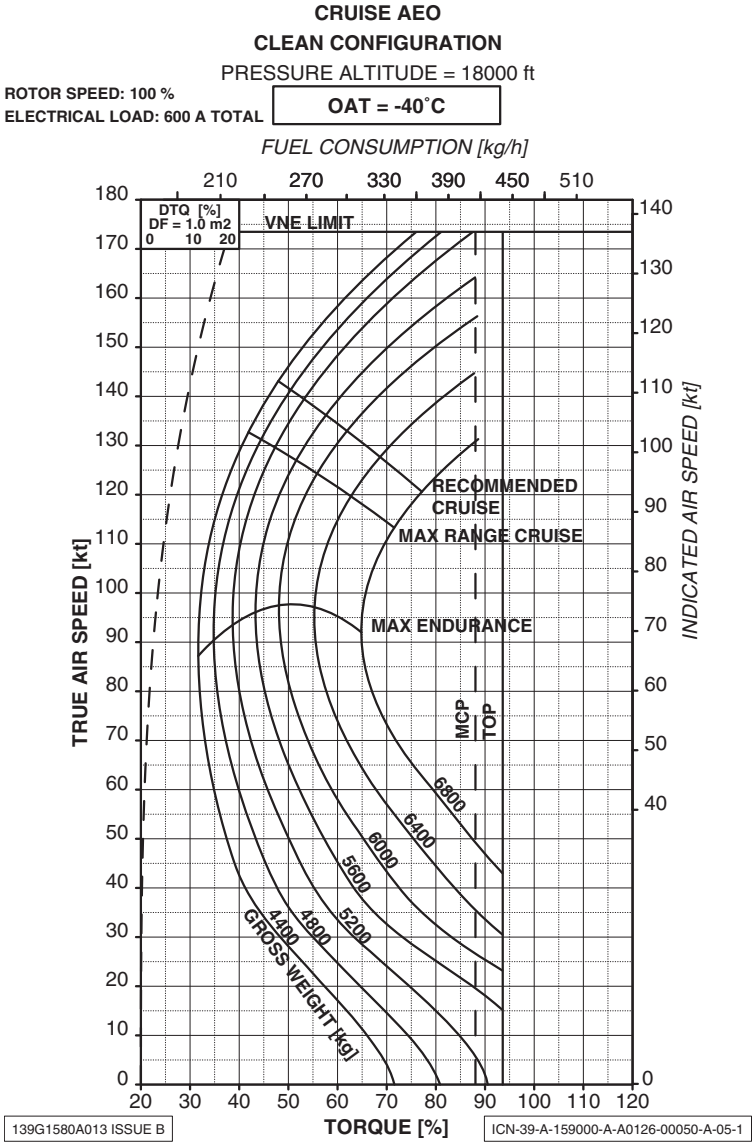

Figure 9-48 Cruise (PA 18000 ft, OAT -40° C)

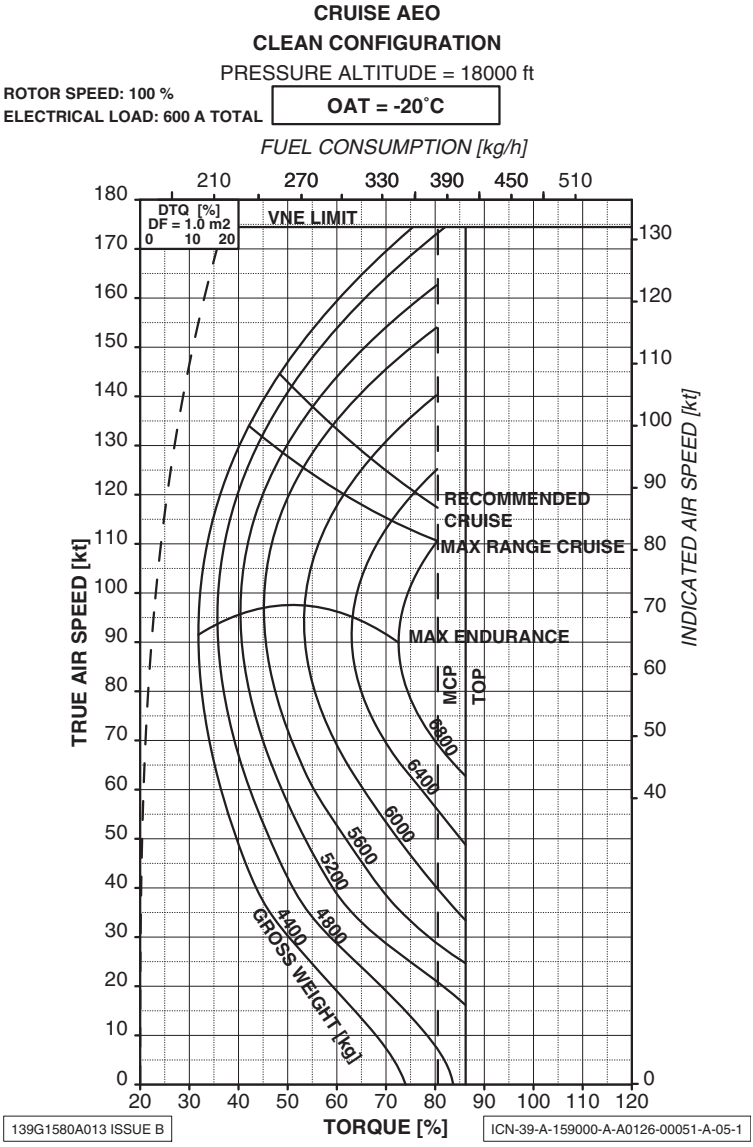

Figure 9-49 Cruise (PA 18000 ft, OAT -20° C)

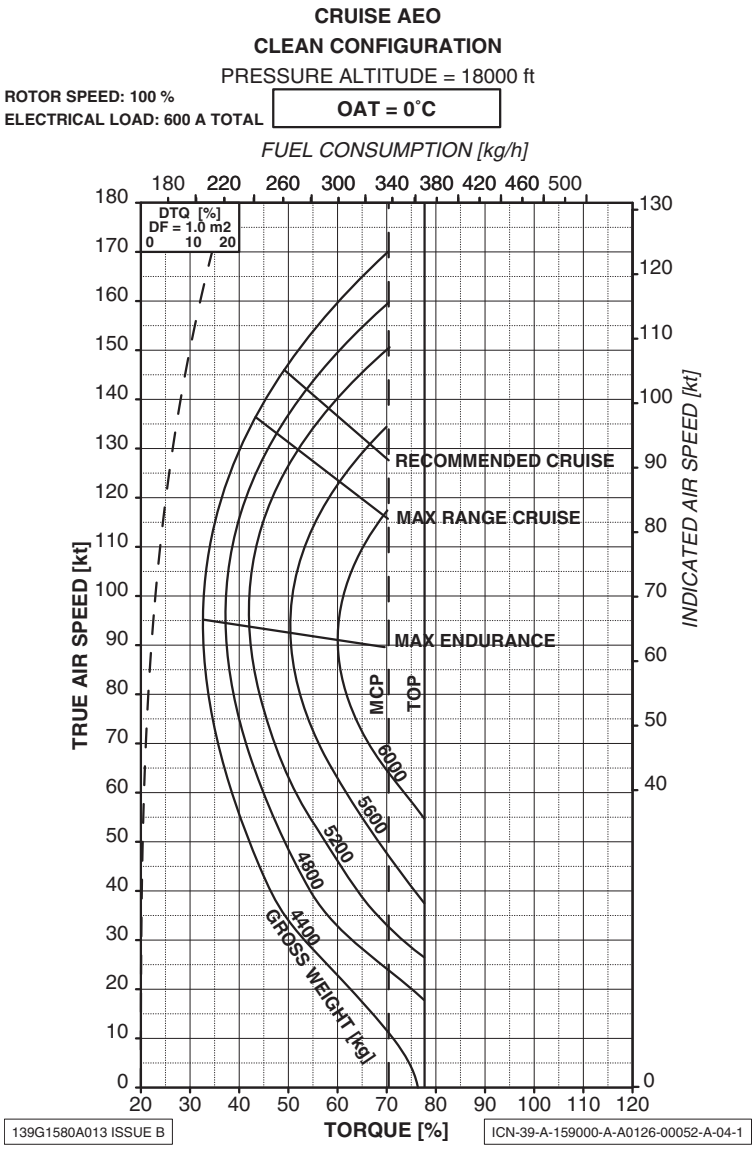

Figure 9-50 Cruise (PA 18000 ft, OAT 0° C)

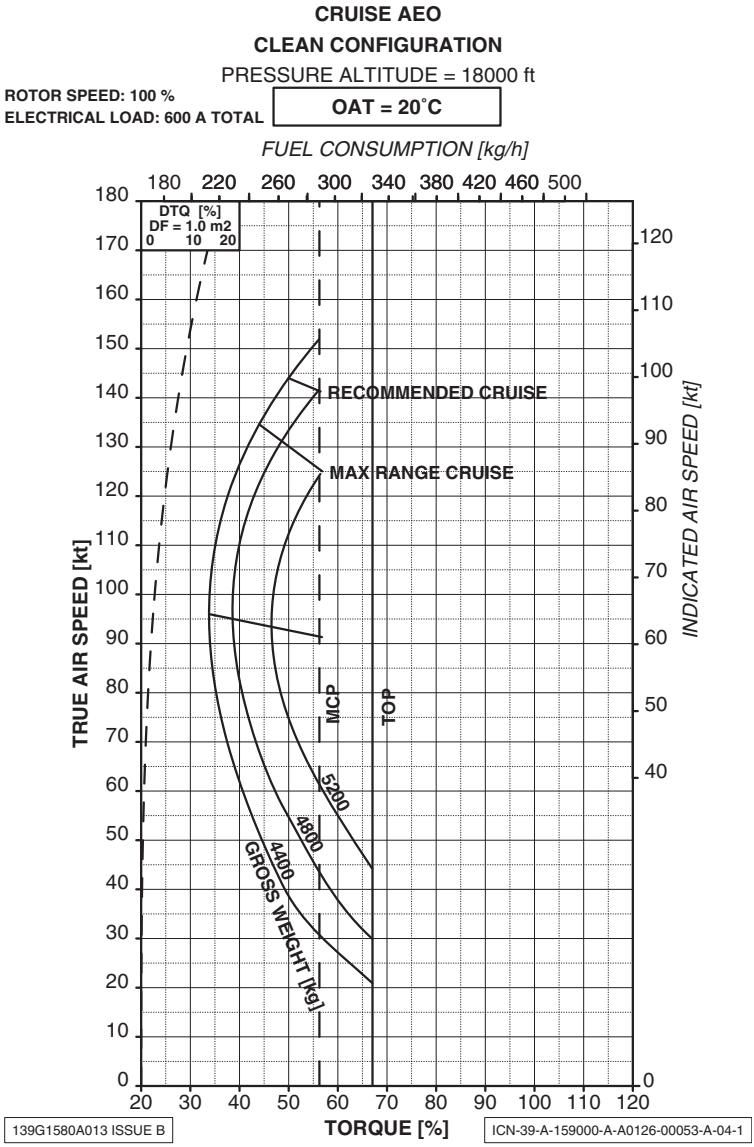

Figure 9-51 Cruise (PA 18000 ft, OAT +20° C)

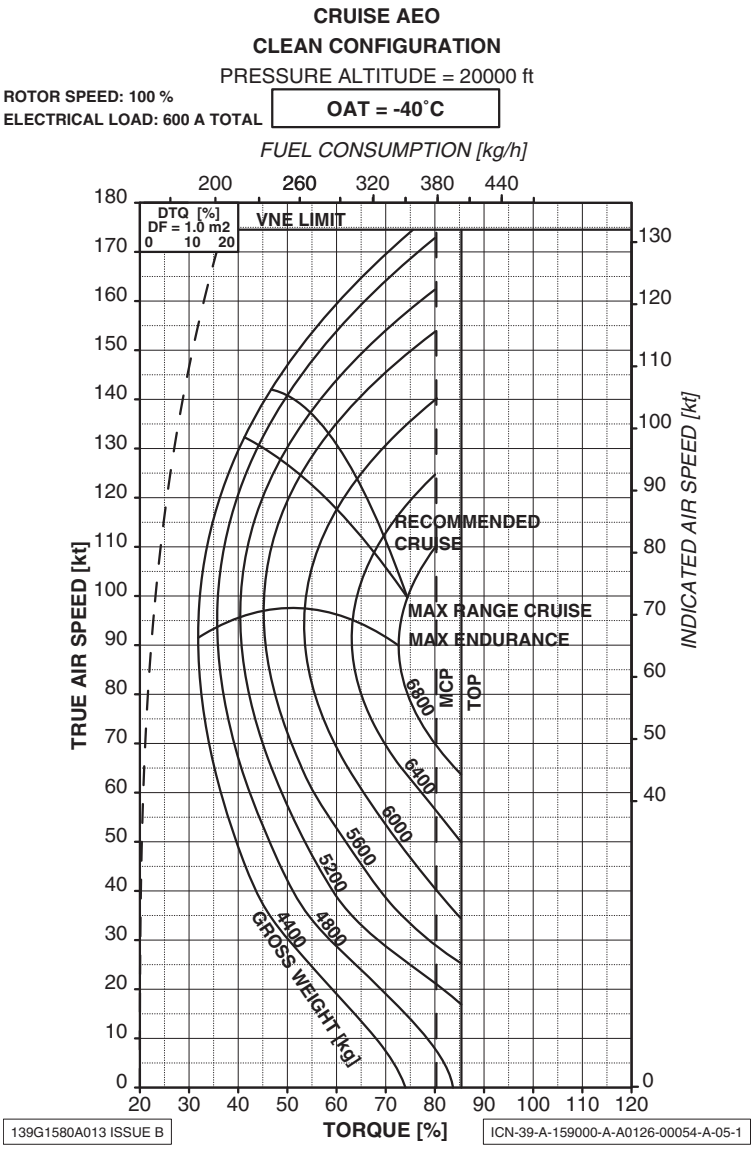

Figure 9-52 Cruise (PA 20000 ft, OAT -40° C)

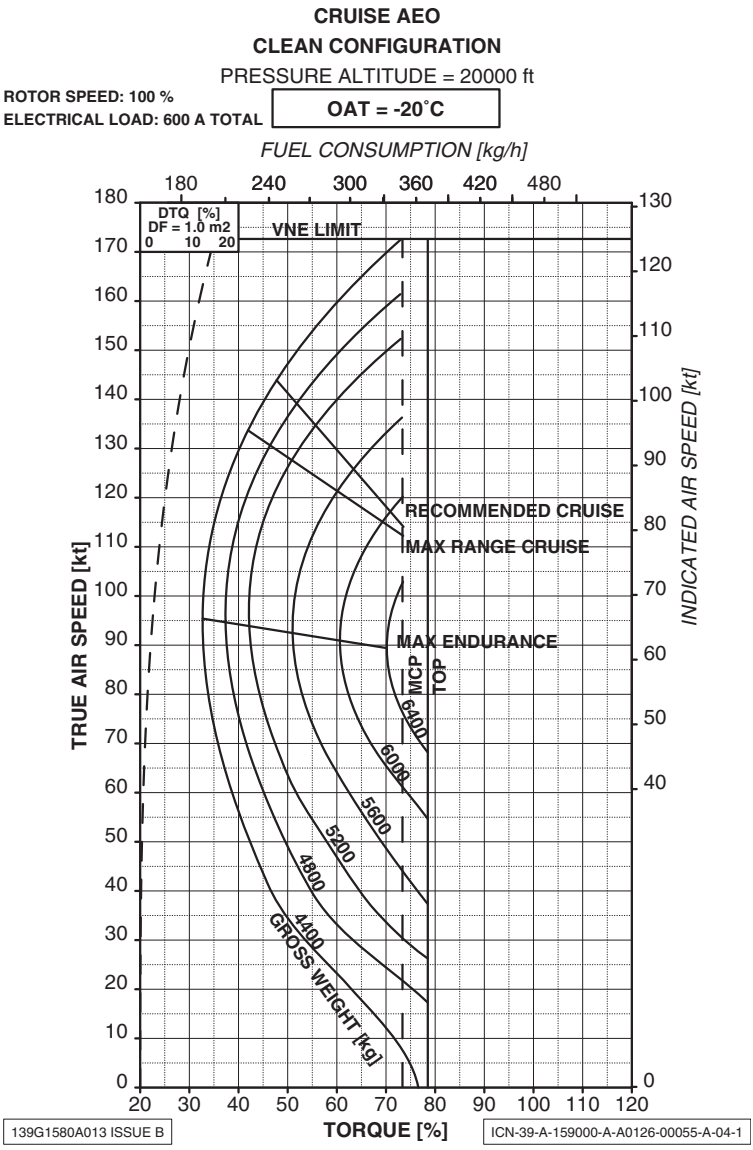

Figure 9-53 Cruise (PA 20000 ft, OAT -20° C)

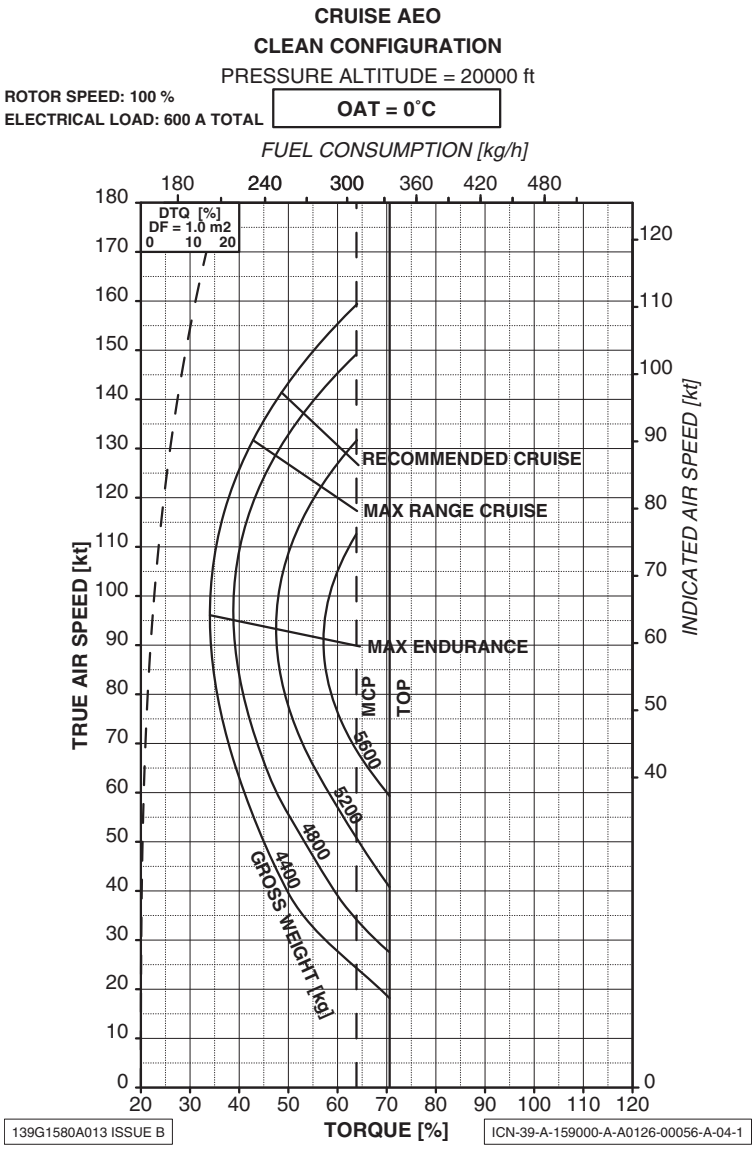

Figure 9-54 Cruise (PA 20000 ft, OAT 0° C)

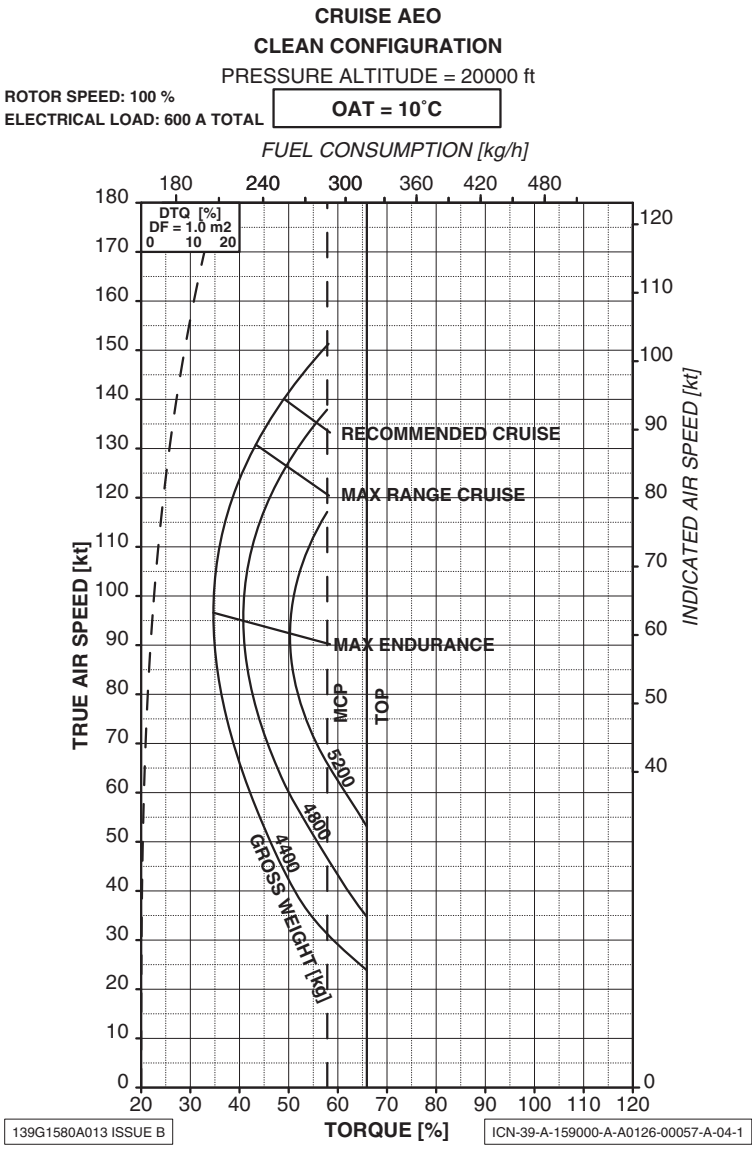

Figure 9-55 Cruise (PA 20000 ft, OAT +10° C)

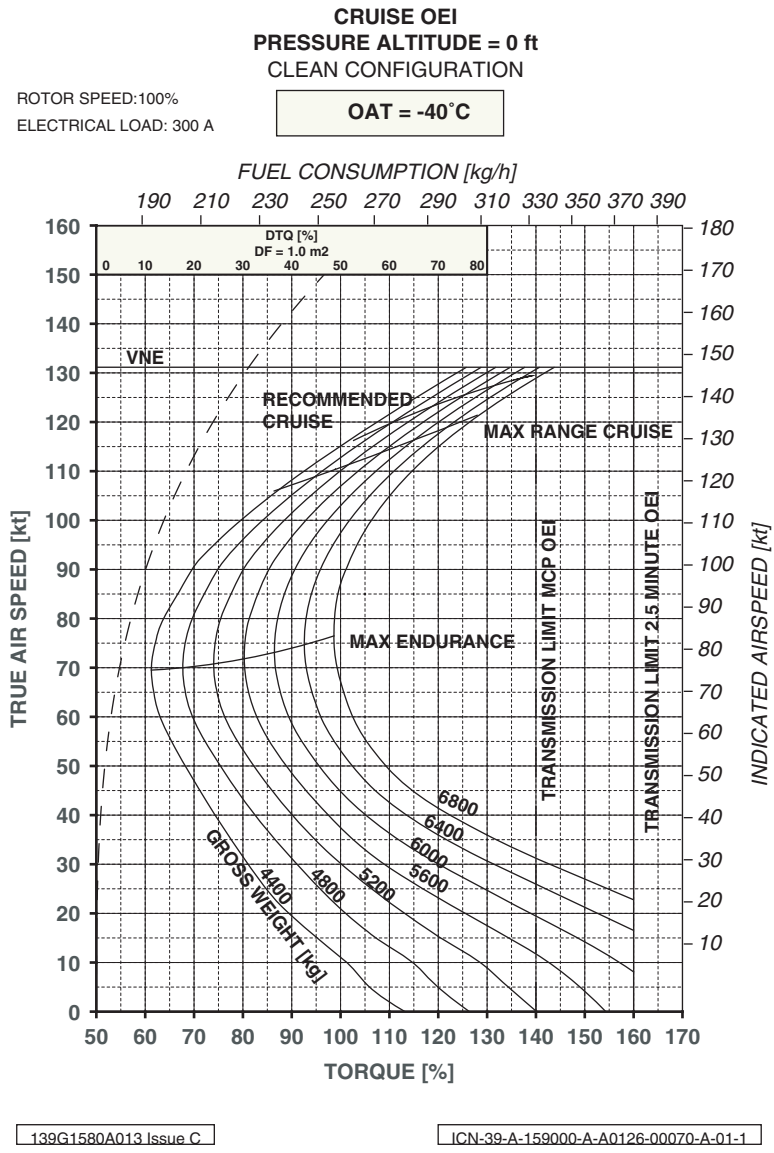

Figure 9-56 OEI Cruise (PA 0 ft, OAT -40° C)

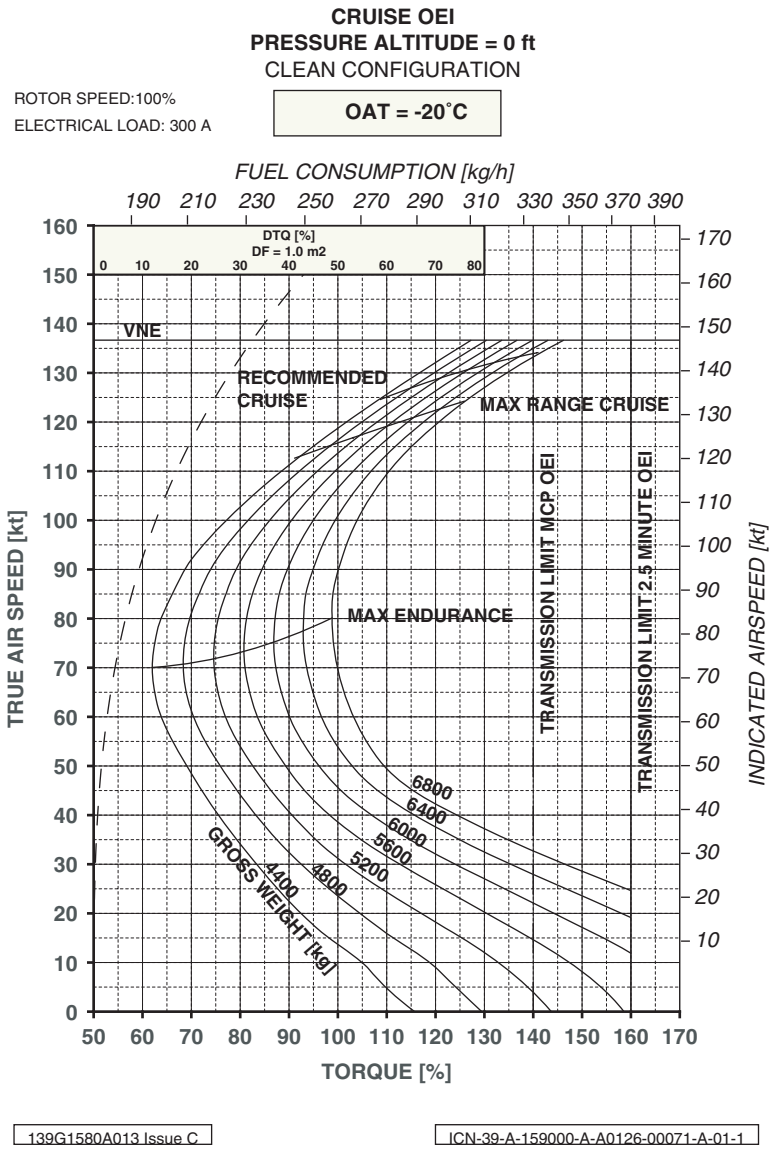

Figure 9-57 OEI Cruise (PA 0 ft, OAT -20° C)

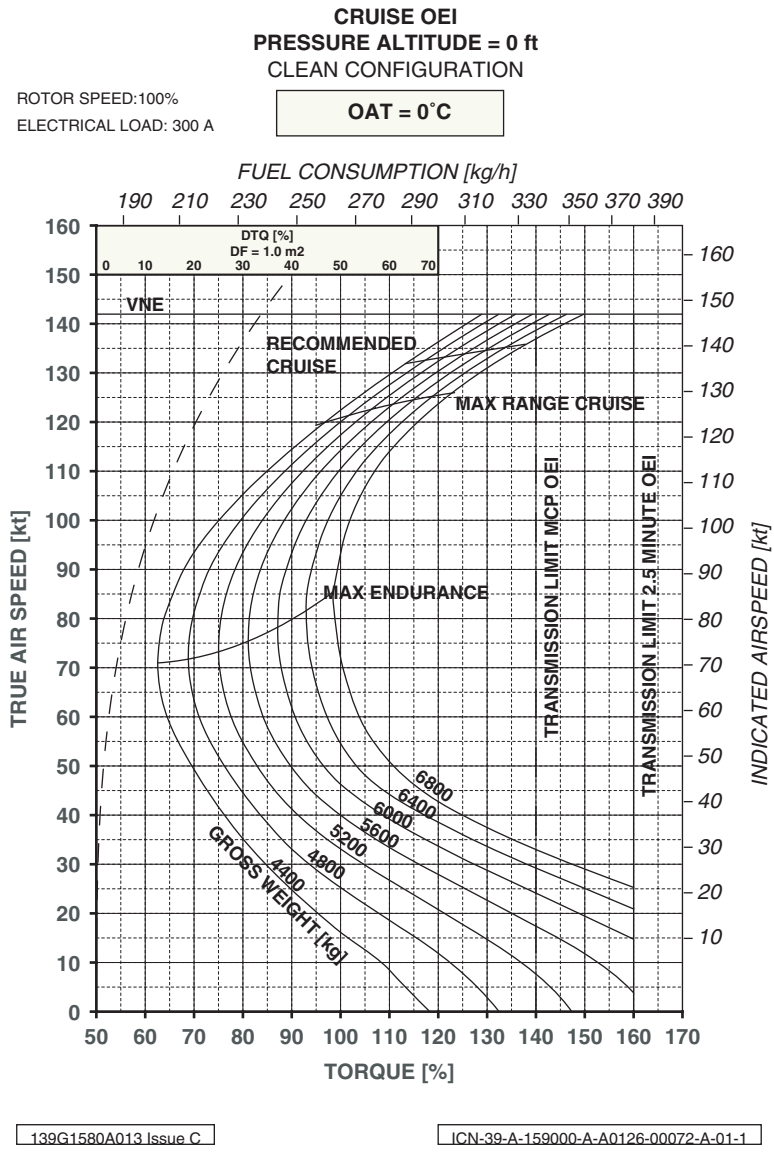

Figure 9-58 OEI Cruise (PA 0 ft, OAT 0° C)

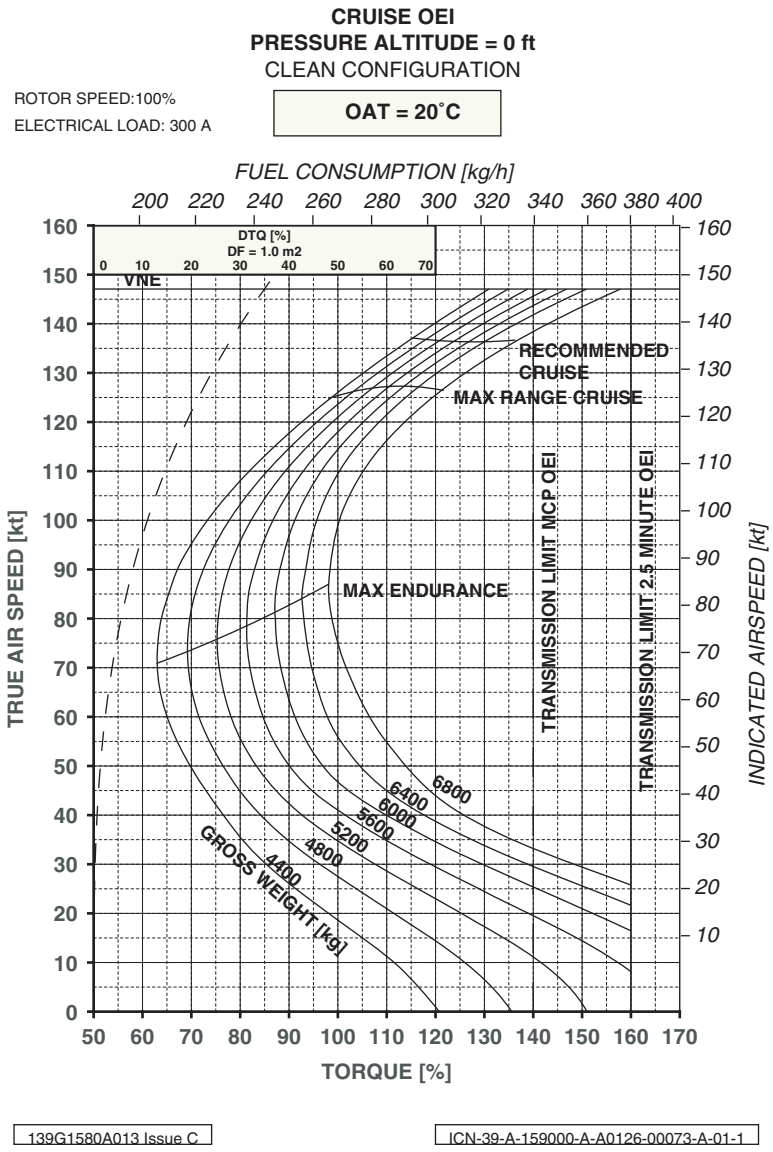

Figure 9-59 OEI Cruise (PA 0 ft, OAT 20° C)

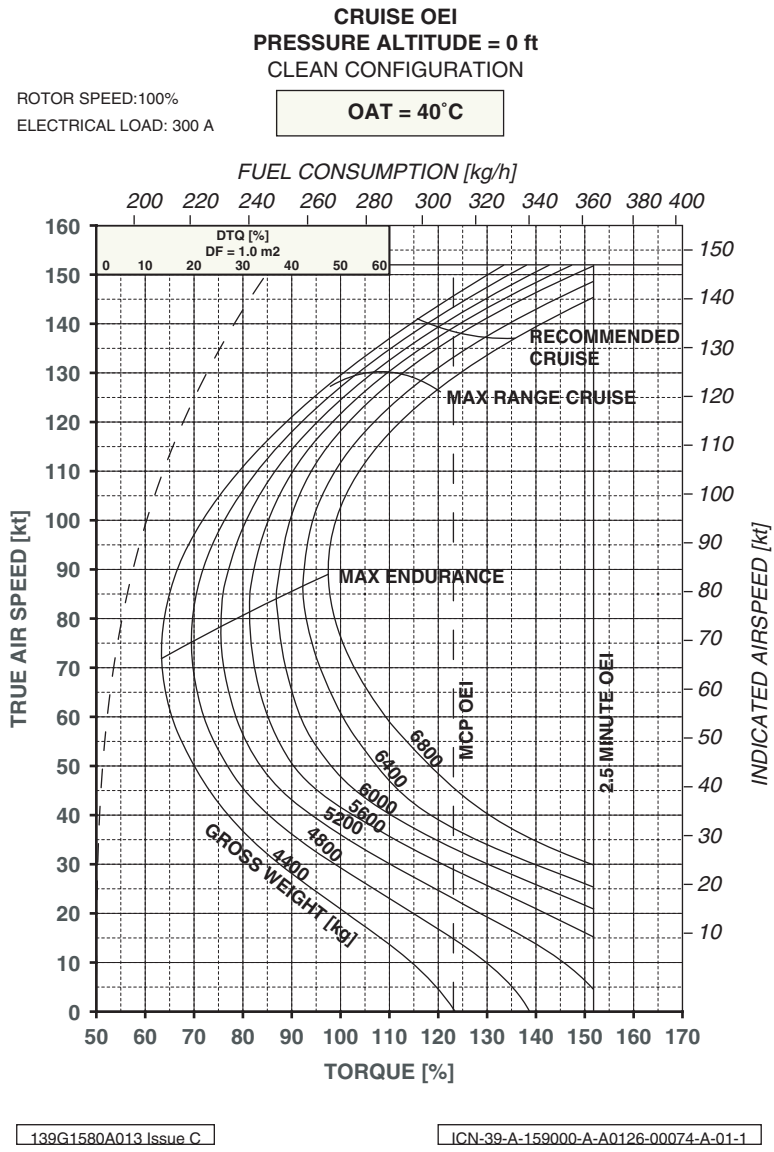

Figure 9-60 OEI Cruise (PA 0 ft, OAT 40° C)

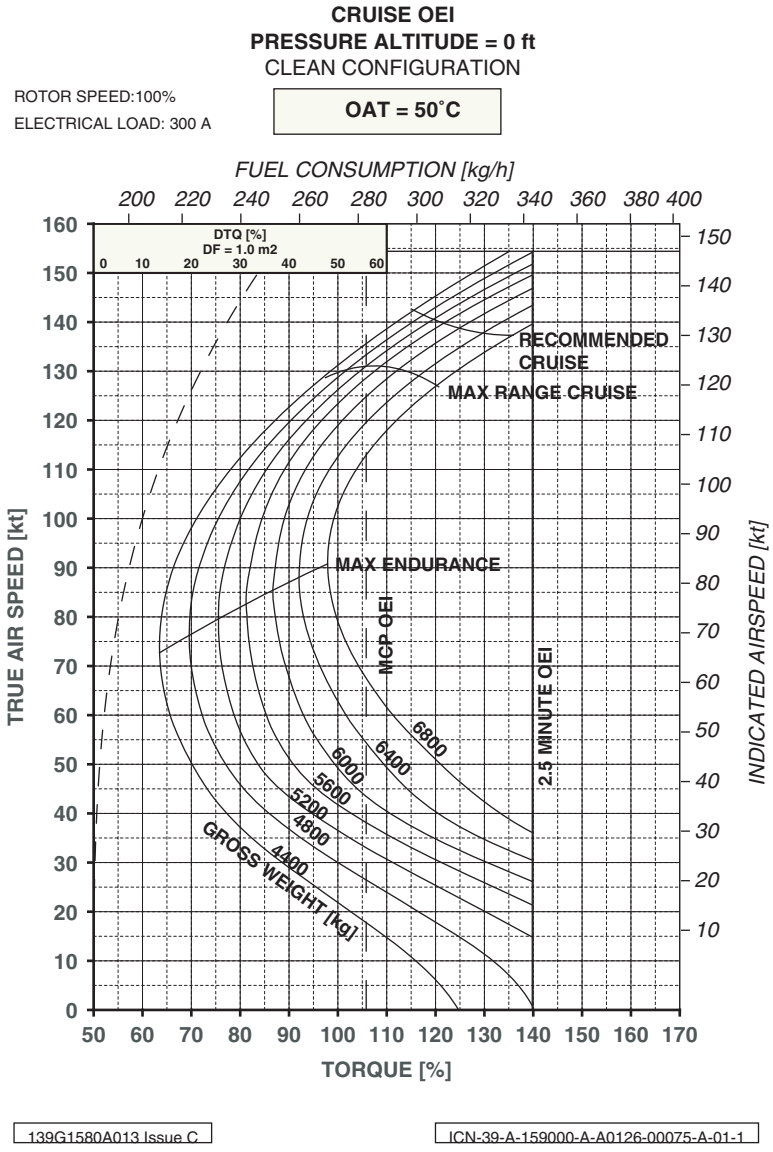

Figure 9-61 OEI Cruise (PA 0 ft, OAT -50° C)

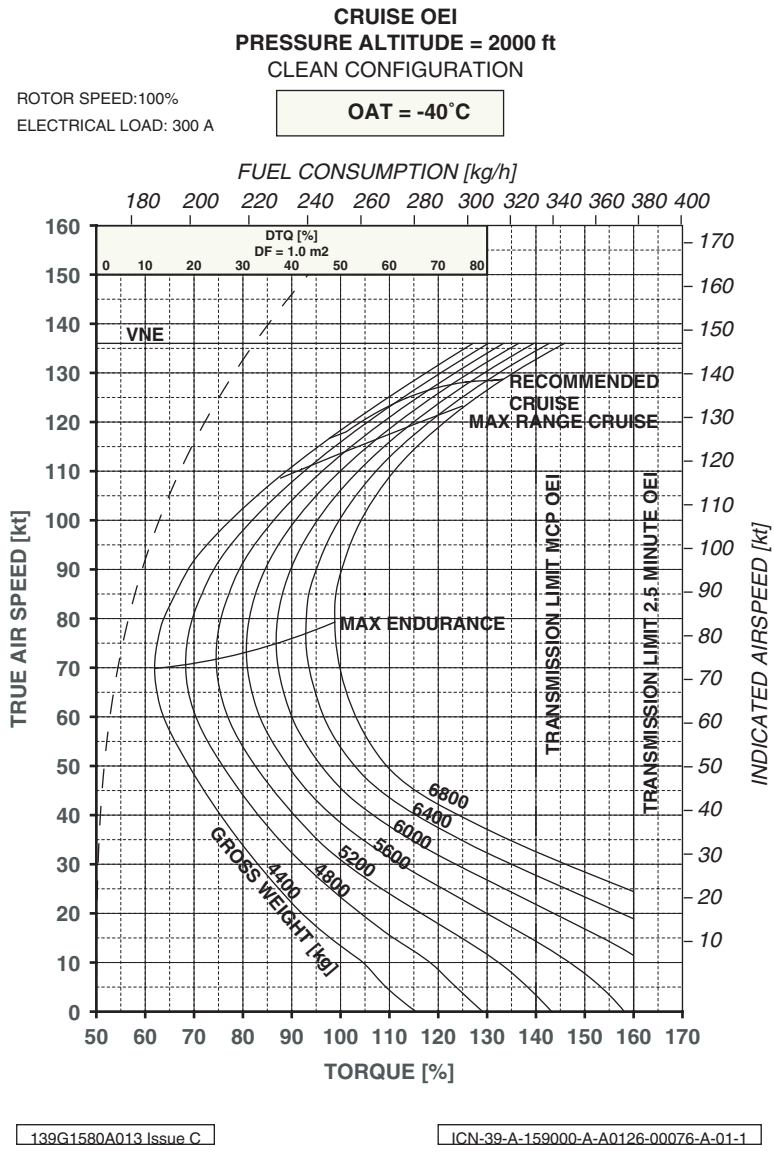

Figure 9-62 OEI Cruise (PA 2000 ft, OAT -40° C)

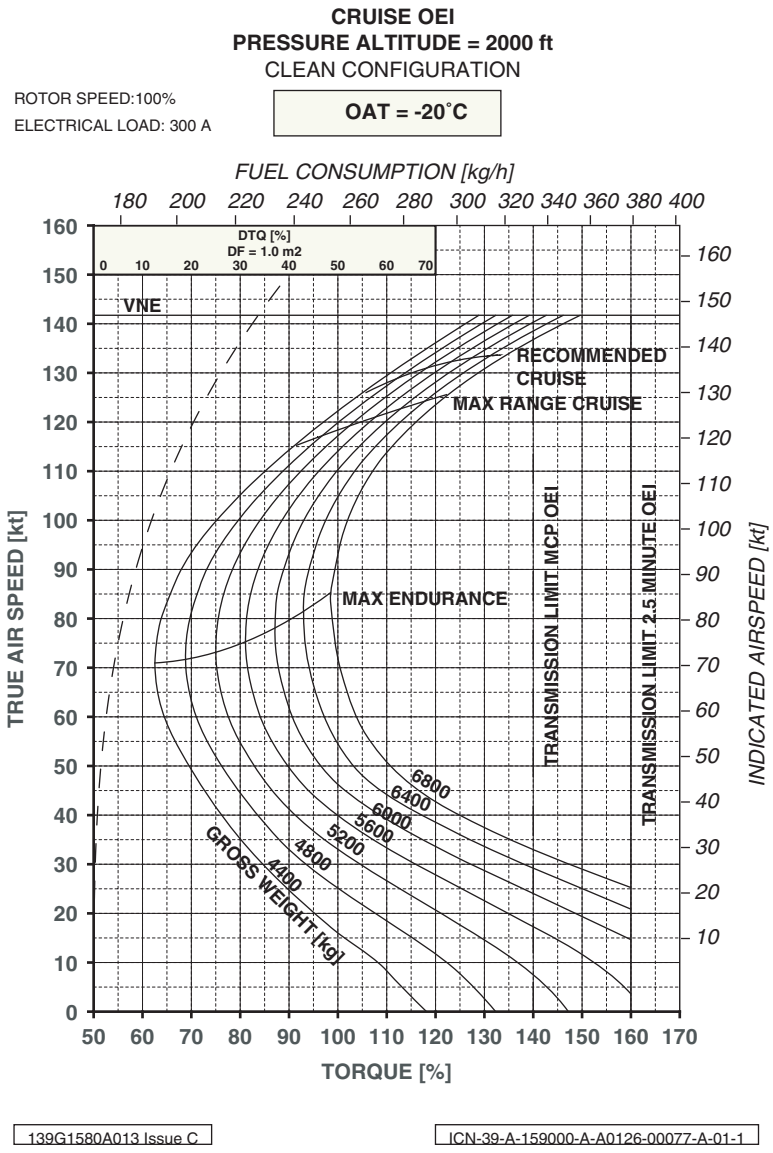

Figure 9-63 OEI Cruise (PA 2000 ft, OAT -20° C)

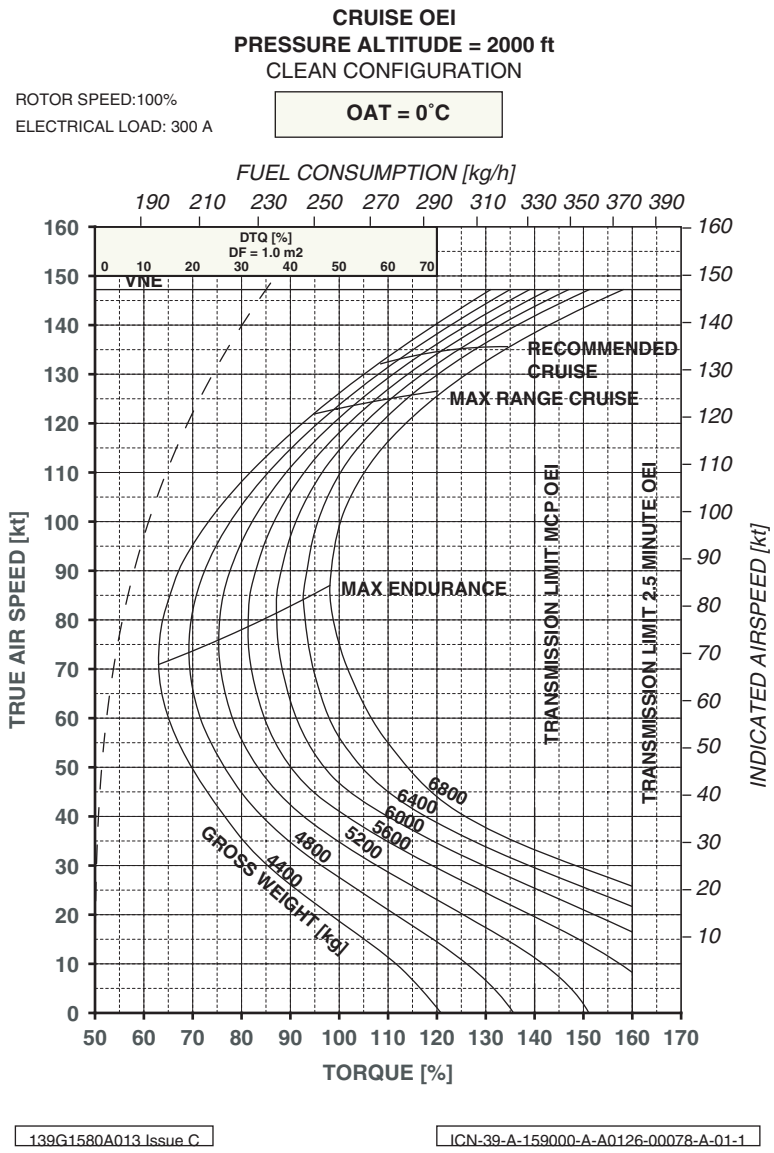

Figure 9-64 OEI Cruise (PA 2000 ft, OAT 0° C)

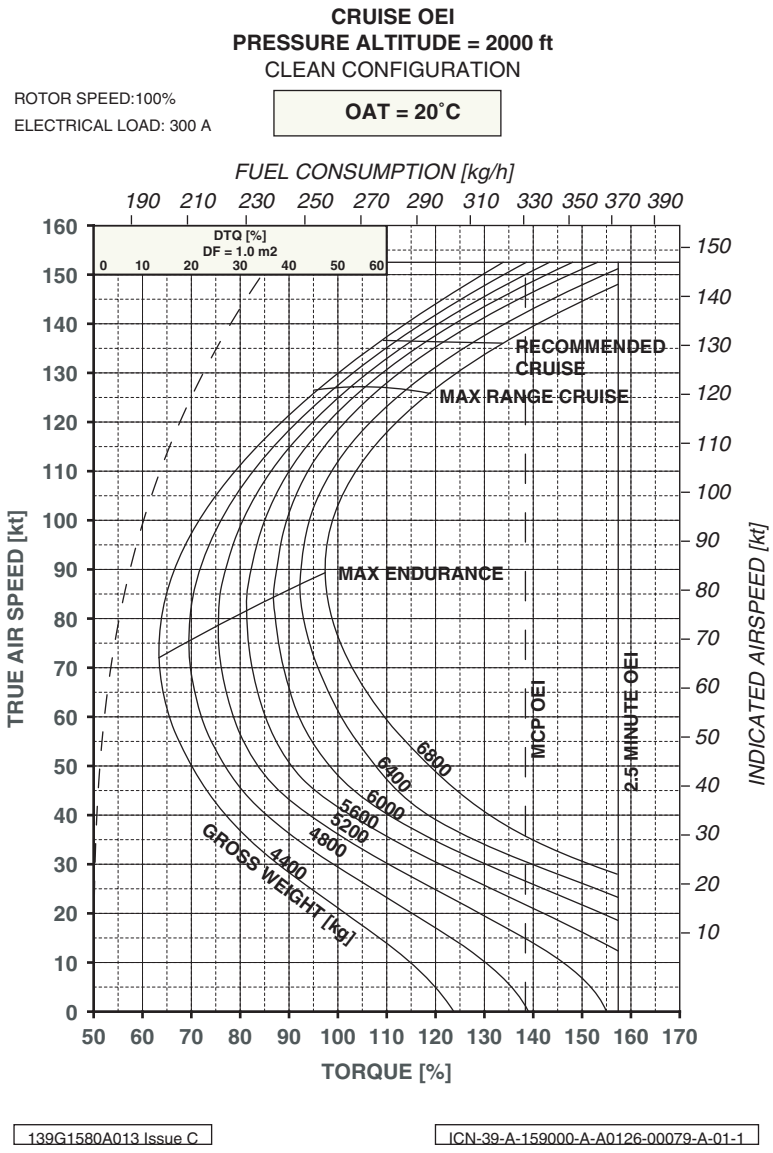

Figure 9-65 OEI Cruise (PA 2000 ft, OAT 20° C)

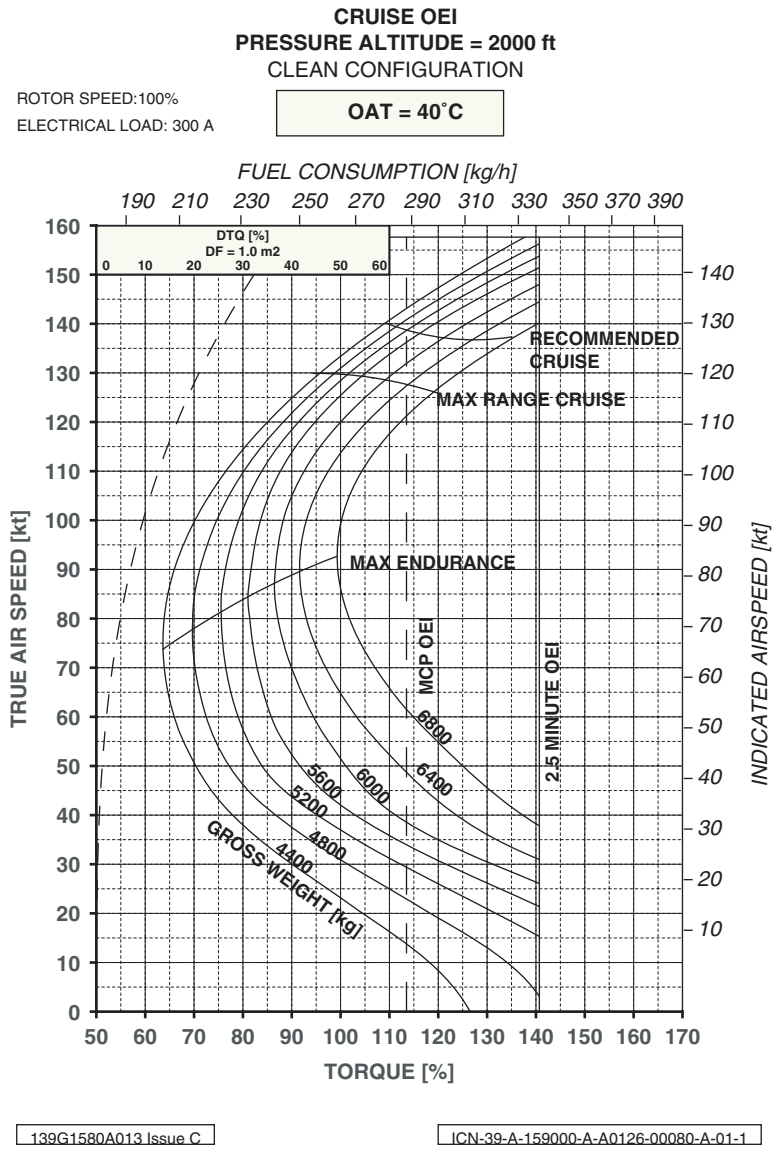

Figure 9-66 OEI Cruise (PA 2000 ft, OAT 40° C)

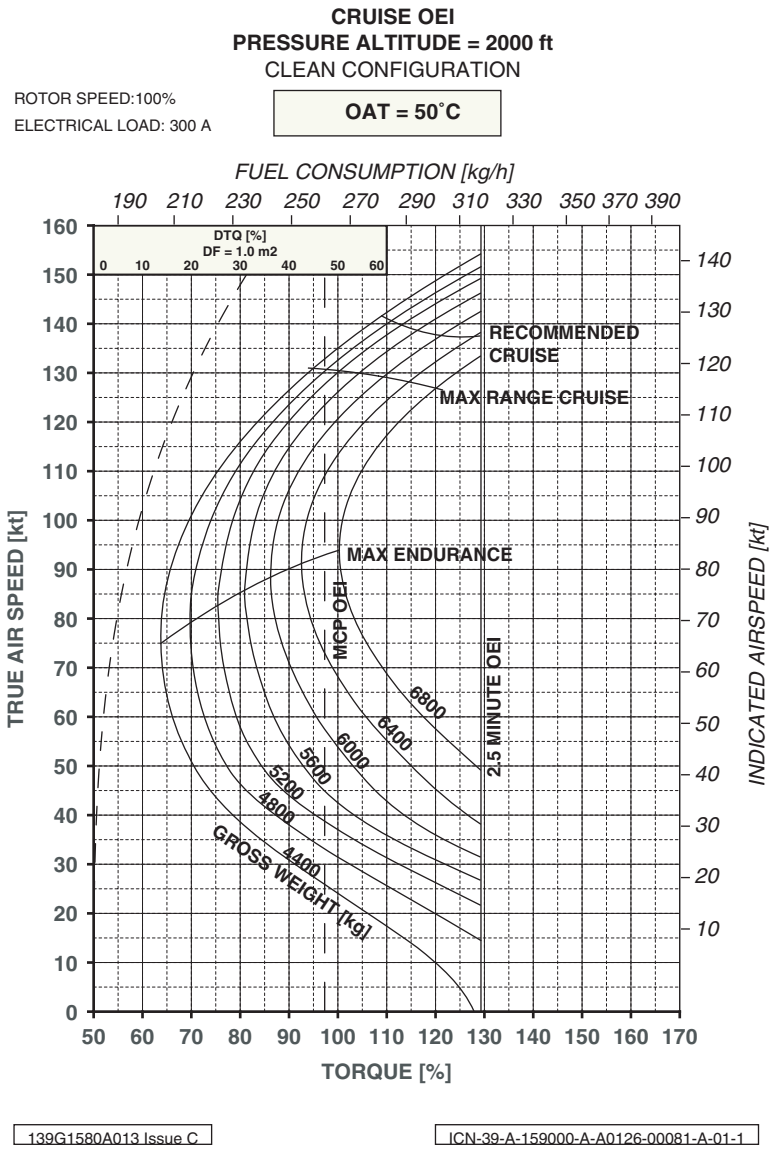

Figure 9-67 OEI Cruise (PA 2000 ft, OAT 50° C)

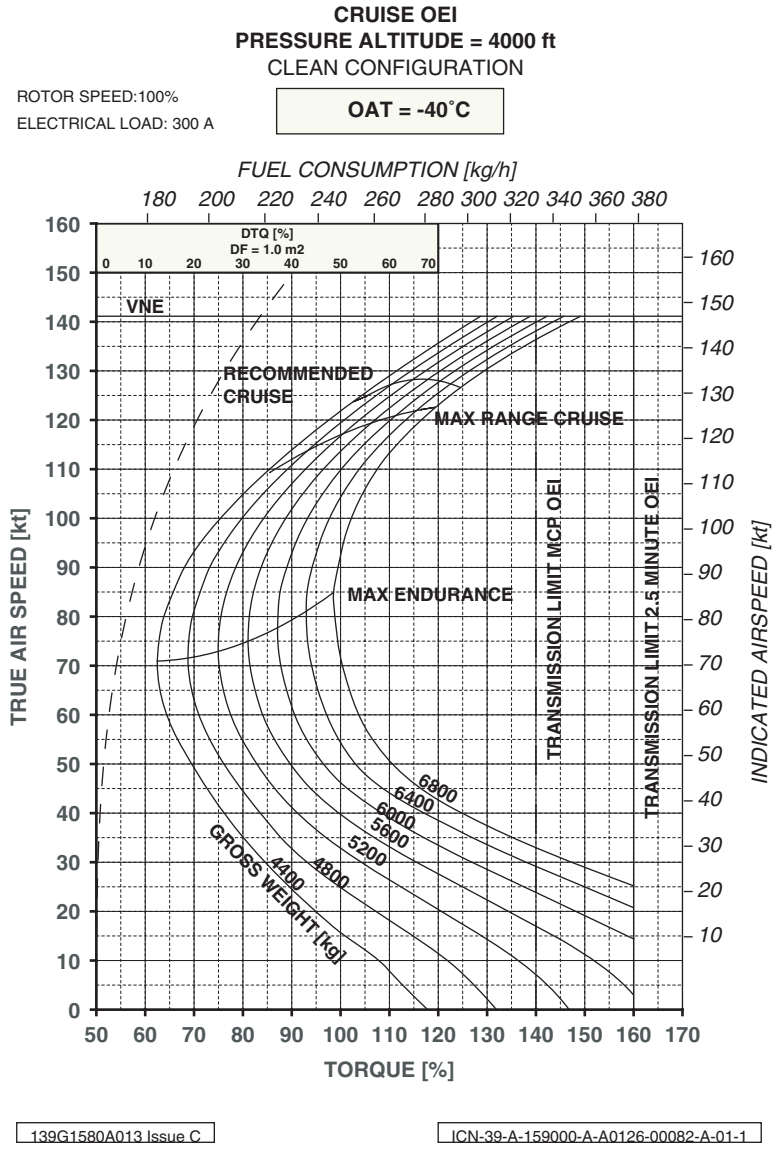

Figure 9-68 OEI Cruise (PA 4000 ft, OAT -40° C)

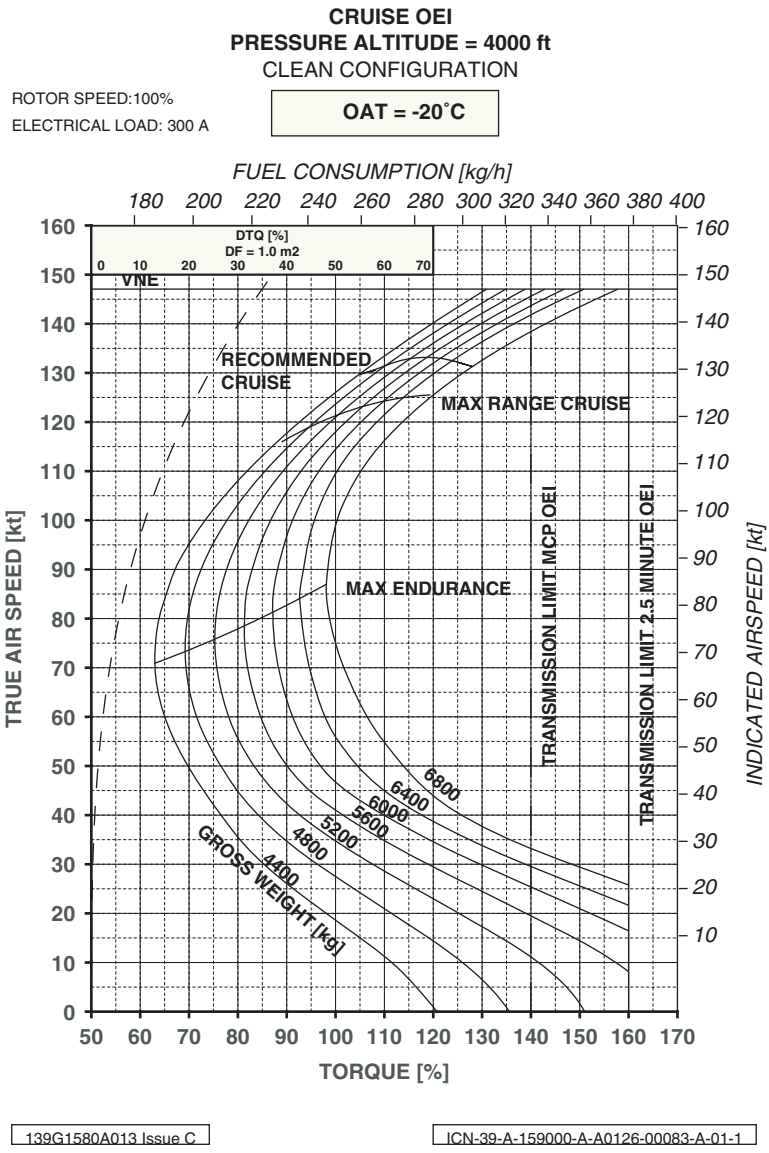

Figure 9-69 OEI Cruise (PA 4000 ft, OAT -20° C)

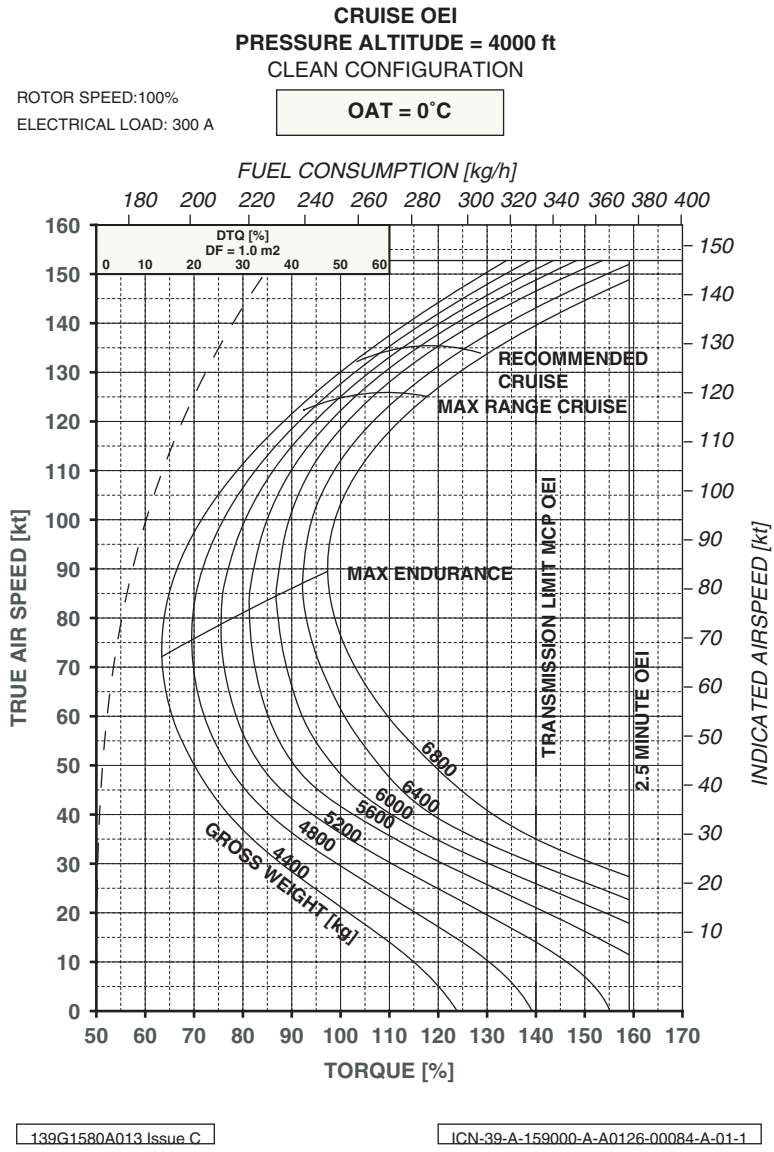

Figure 9-70 OEI Cruise (PA 4000 ft, OAT 0° C)

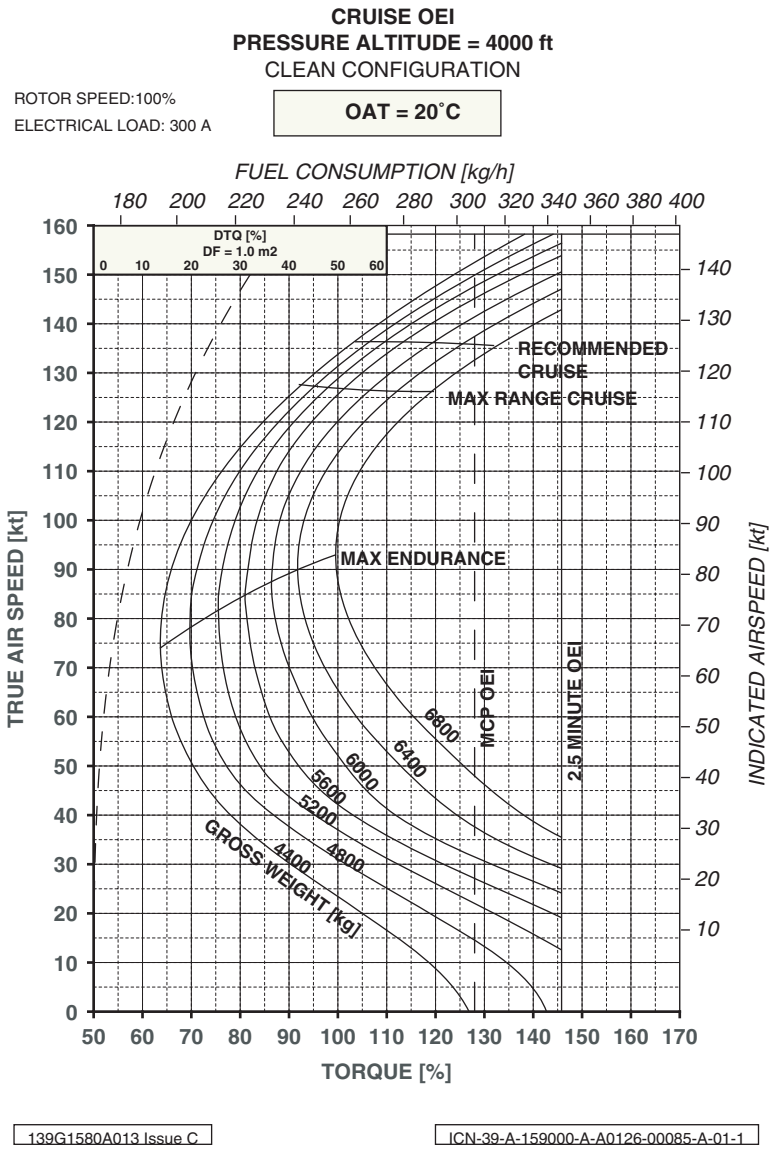

Figure 9-71 OEI Cruise (PA 4000 ft, OAT 20° C)

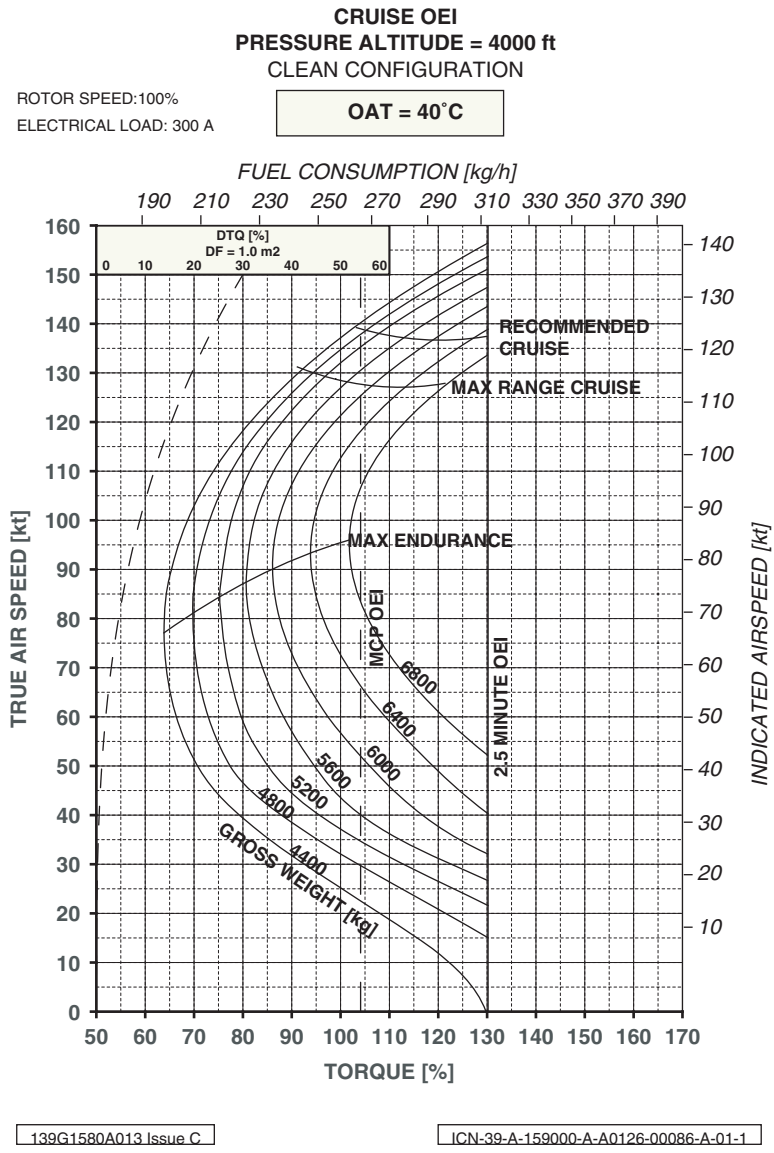

Figure 9-72 OEI Cruise (PA 4000 ft, OAT 40° C)

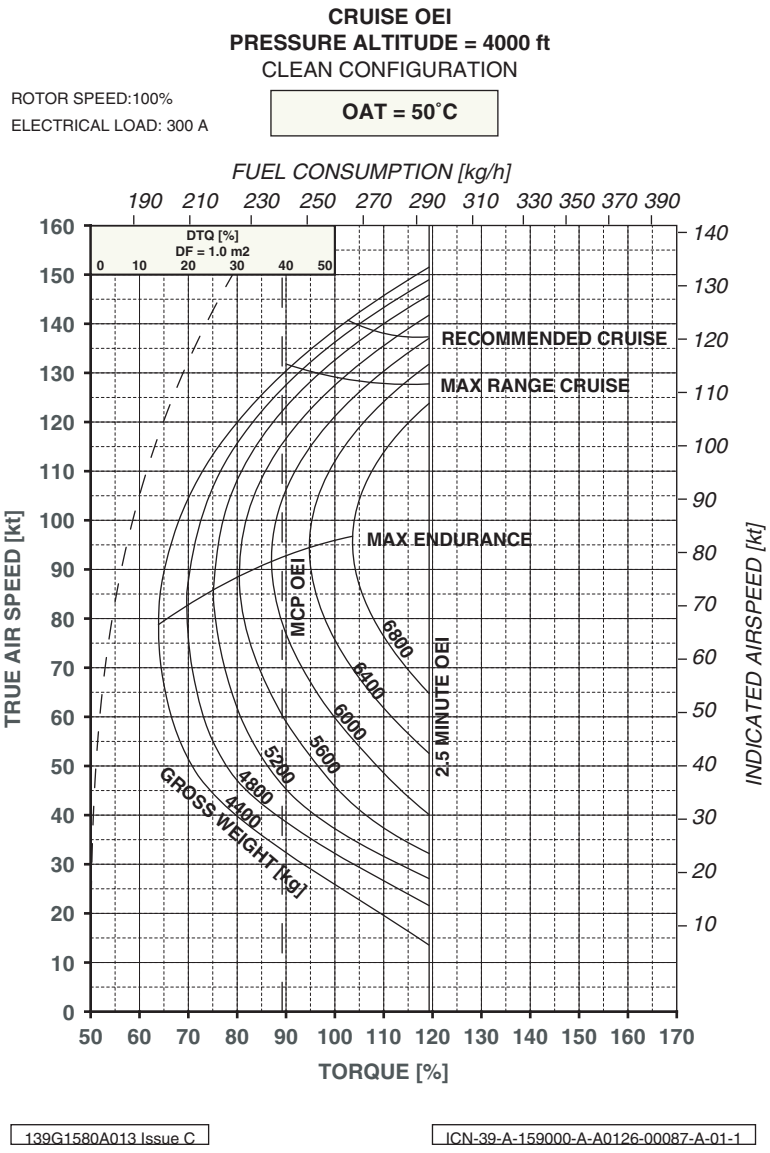

Figure 9-73 OEI Cruise (PA 4000 ft, OAT 50° C)

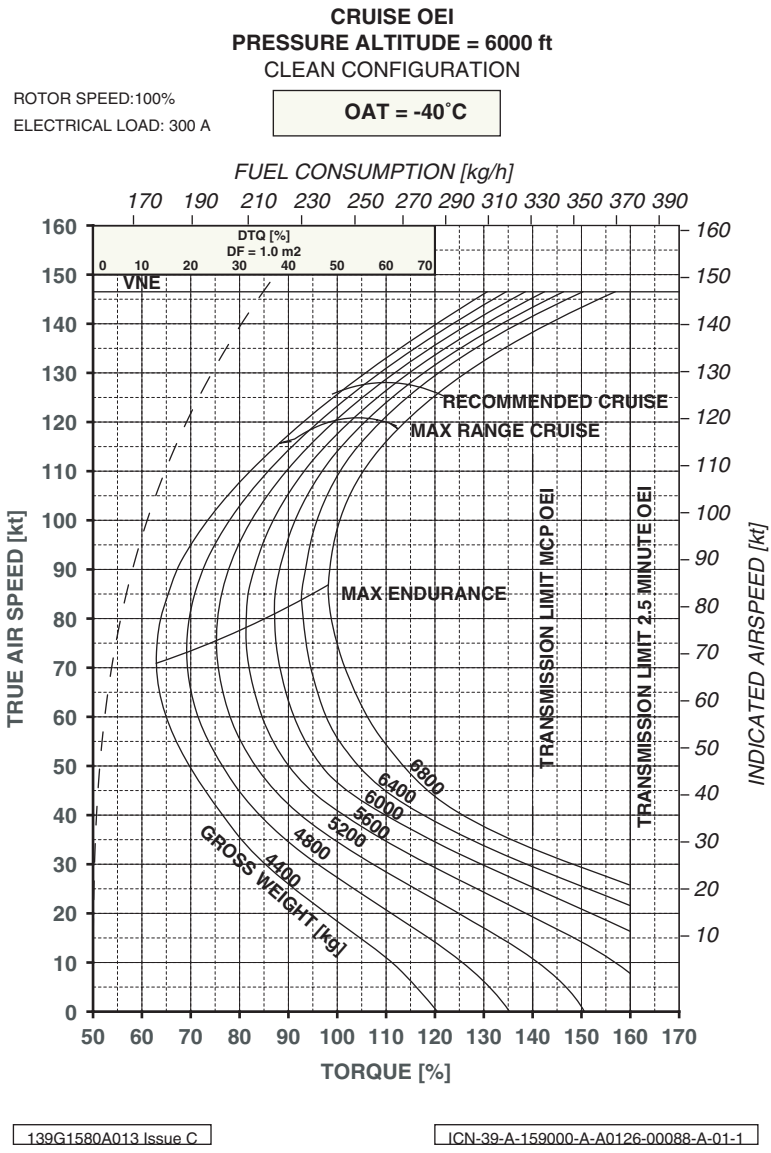

Figure 9-74 OEI Cruise (PA 6000 ft, OAT -40° C)

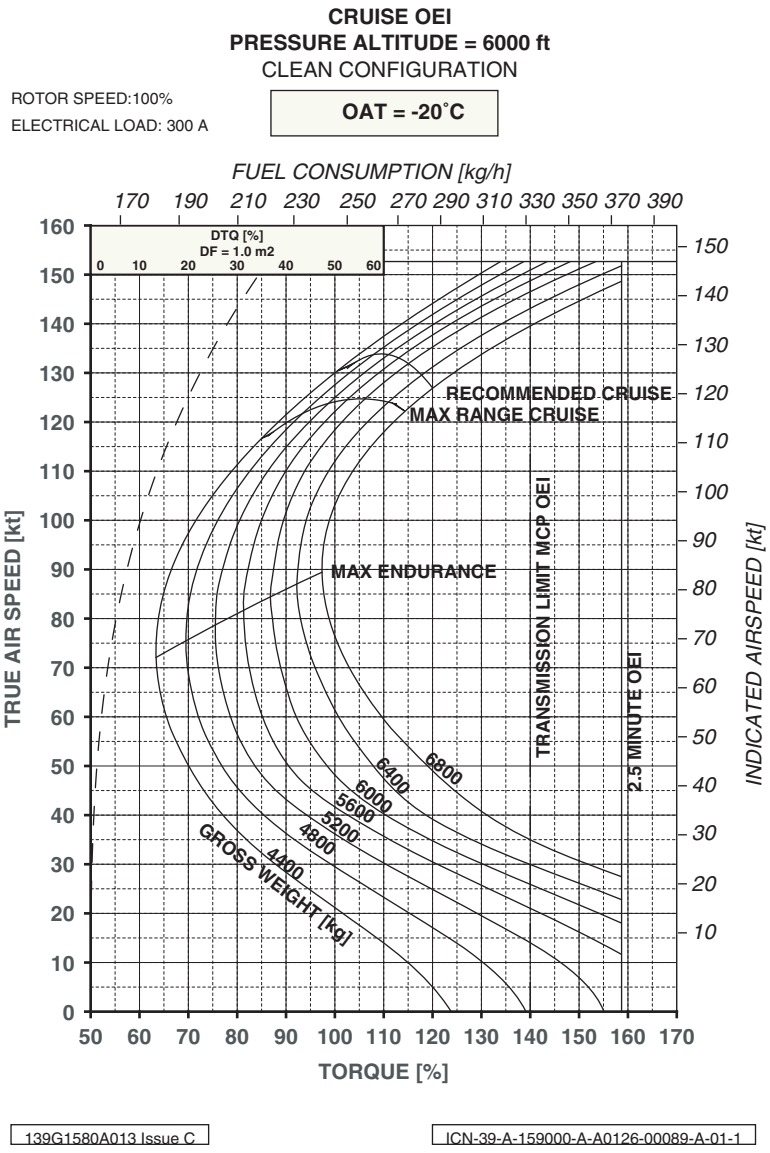

Figure 9-75 OEI Cruise (PA 6000 ft, OAT -20° C)

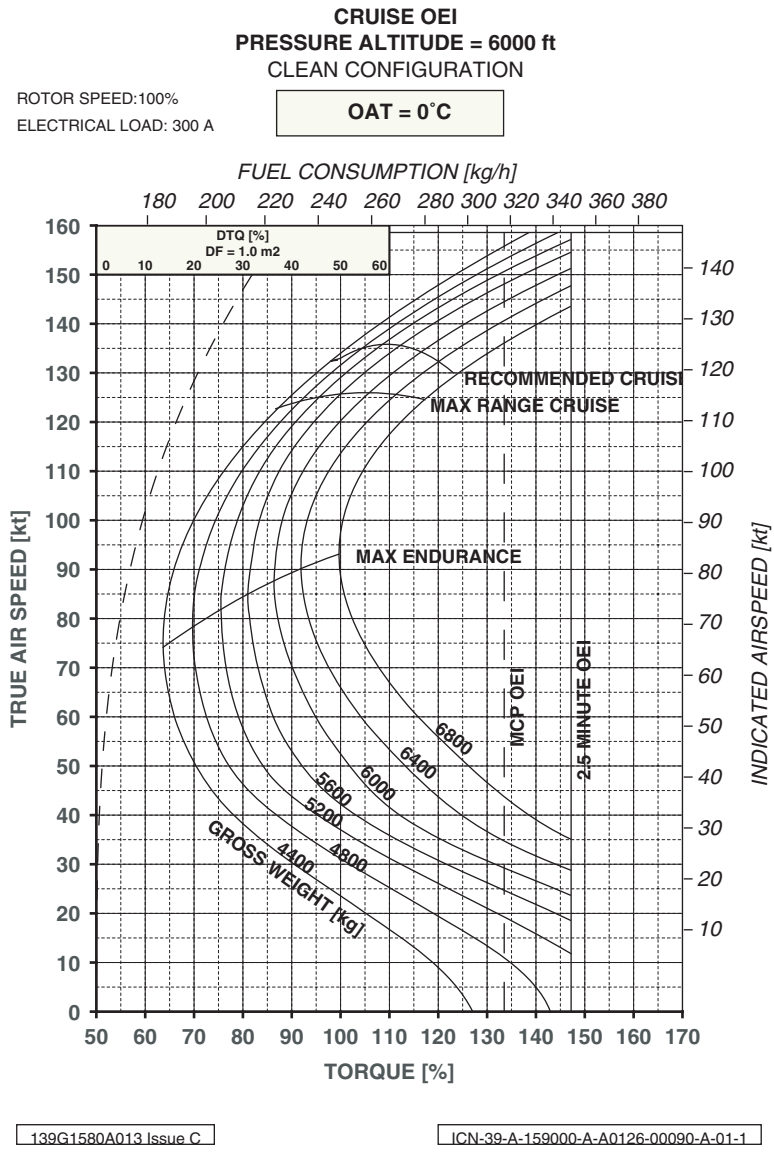

Figure 9-76 OEI Cruise (PA 6000 ft, OAT 0° C)

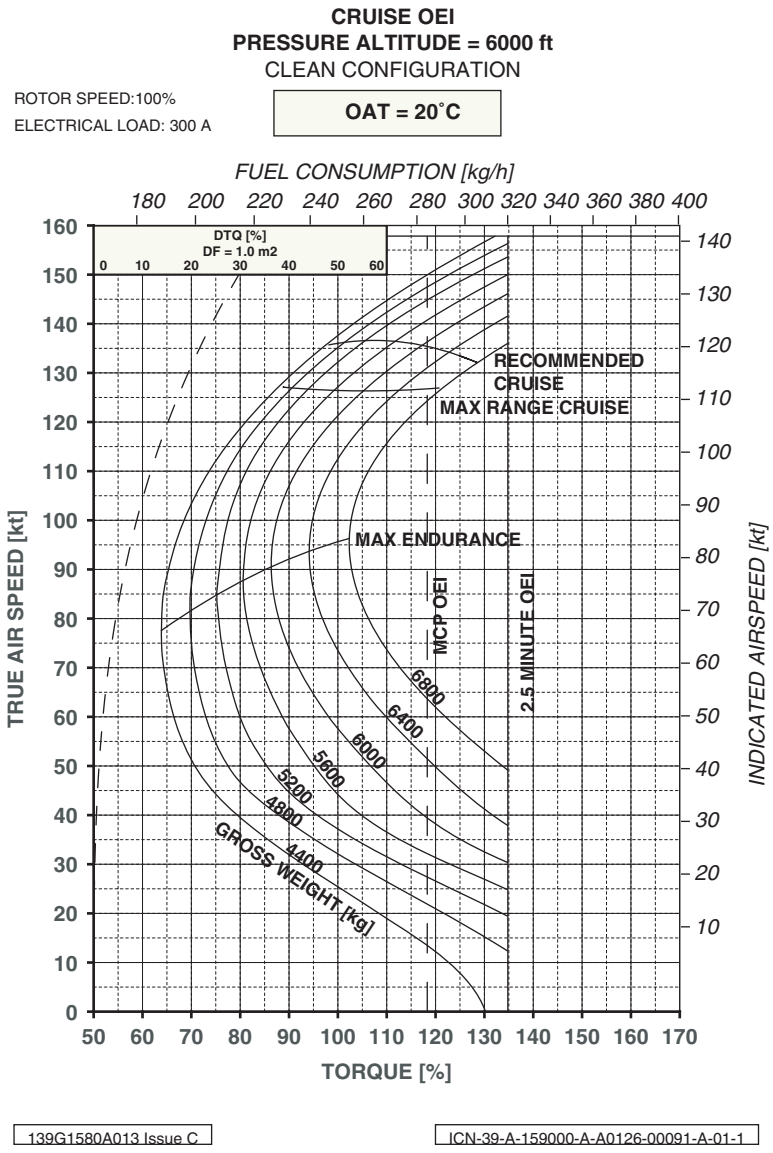

Figure 9-77 OEI Cruise (PA 6000 ft, OAT 20° C)

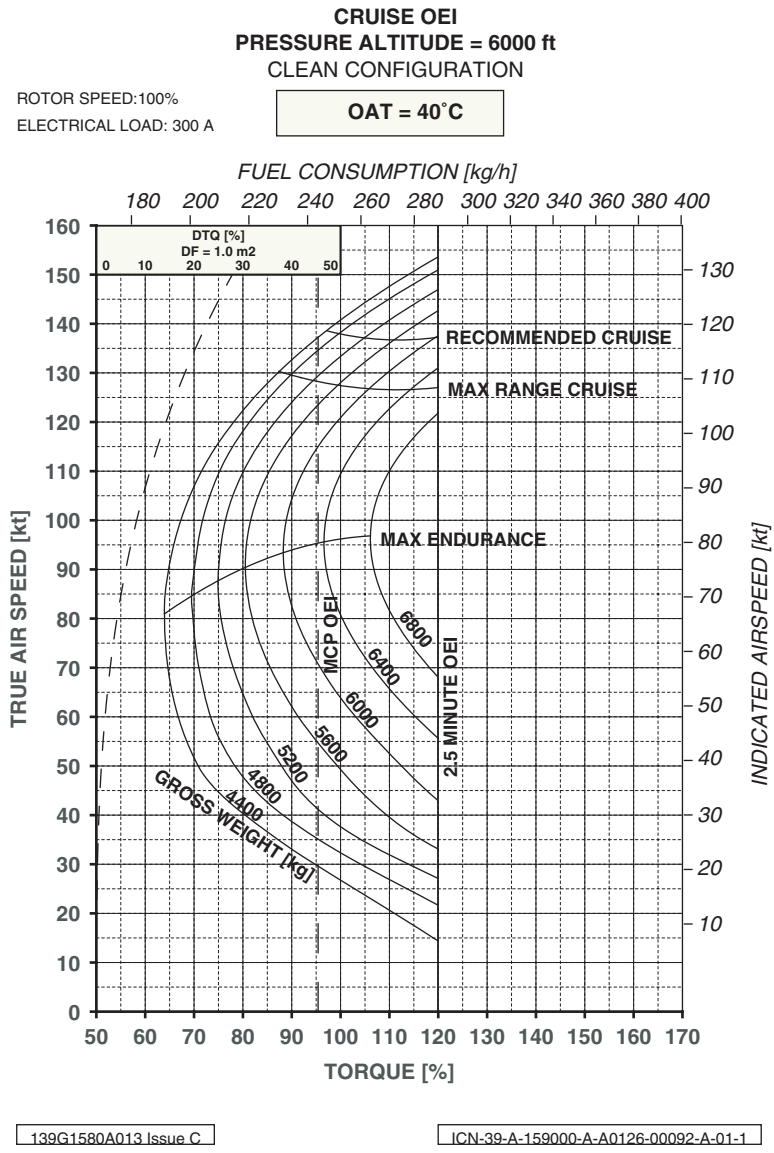

Figure 9-78 OEI Cruise (PA 6000 ft, OAT 40° C)

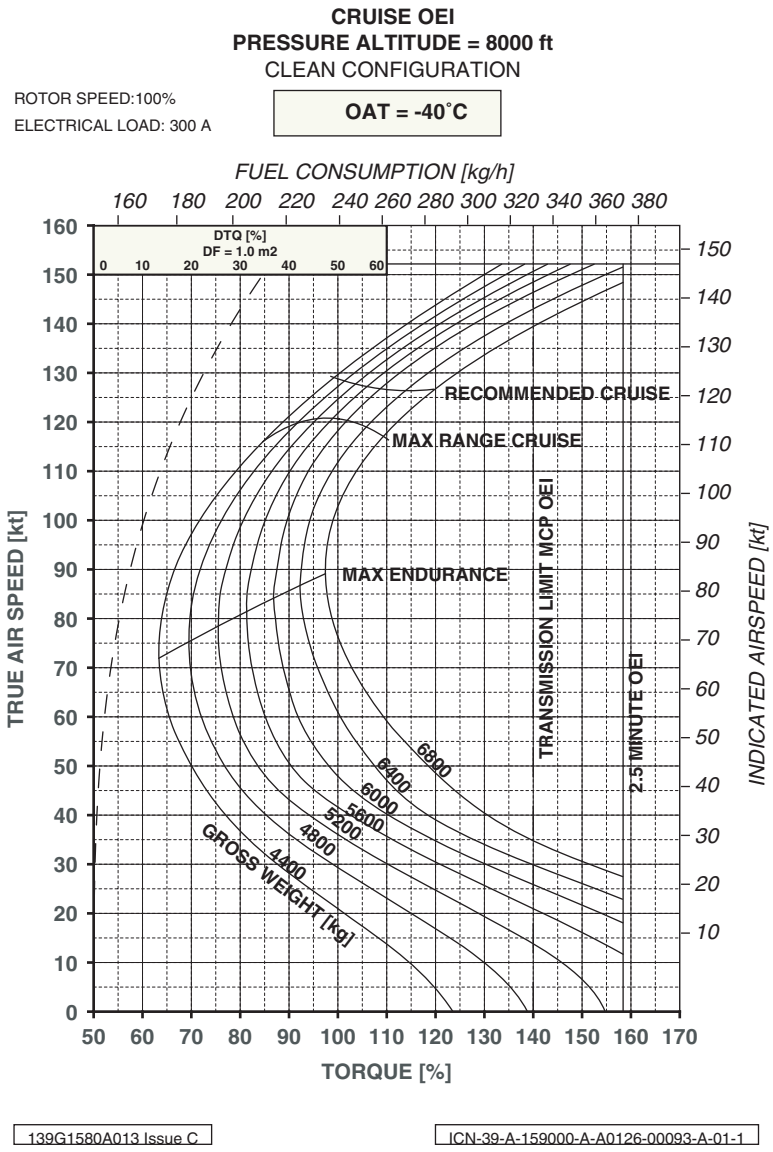

Figure 9-79 OEI Cruise (PA 8000 ft, OAT -40° C)

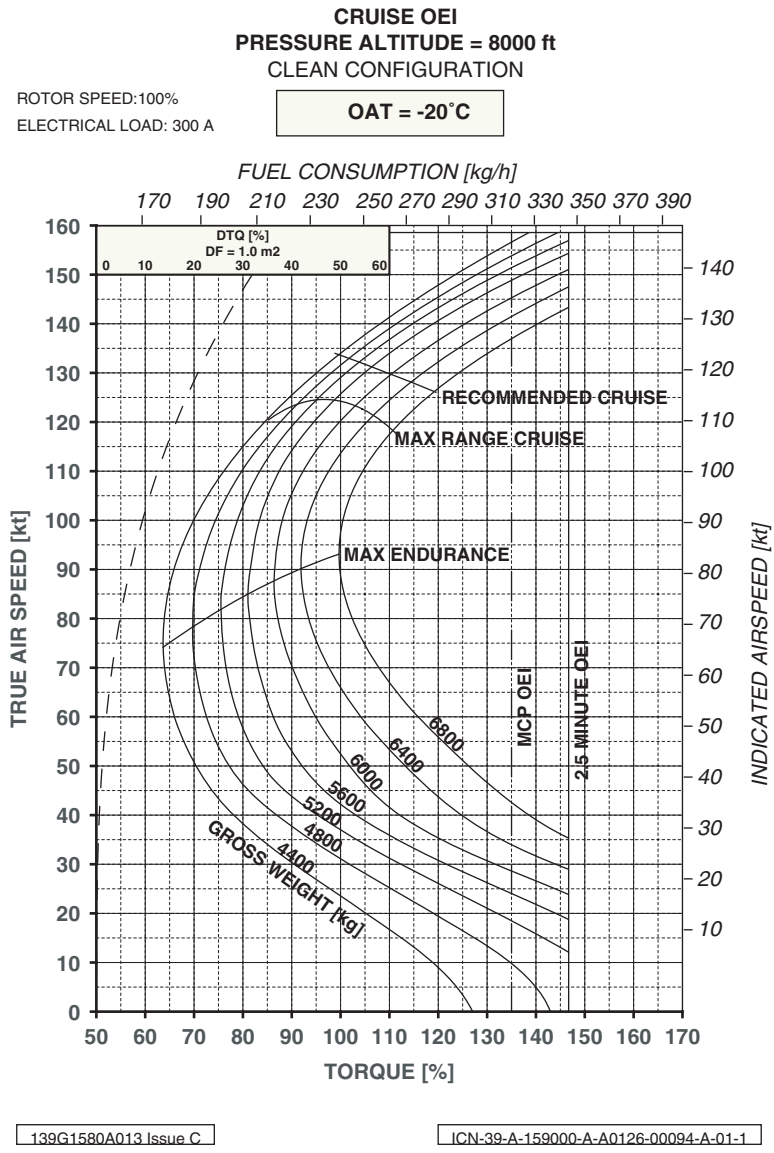

Figure 9-80 OEI Cruise (PA 8000 ft, OAT -20° C)

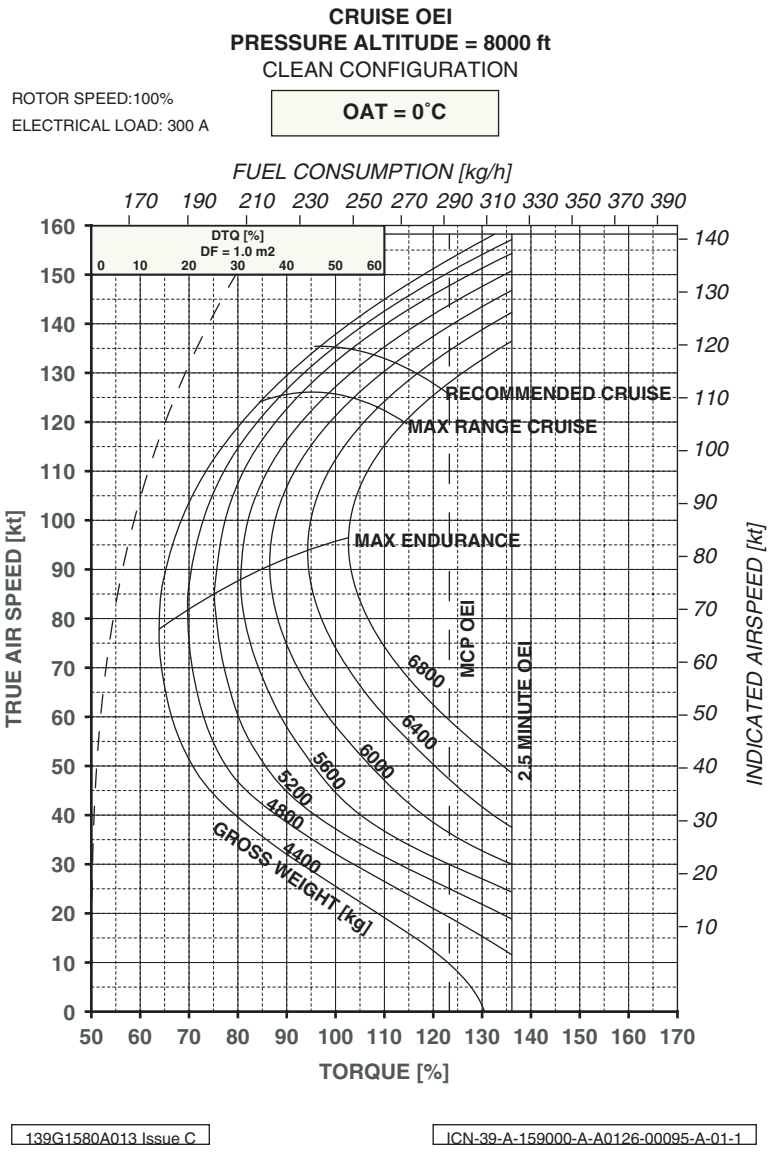

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Figure 9-81 OEI Cruise (PA 8000 ft, OAT 0° C)

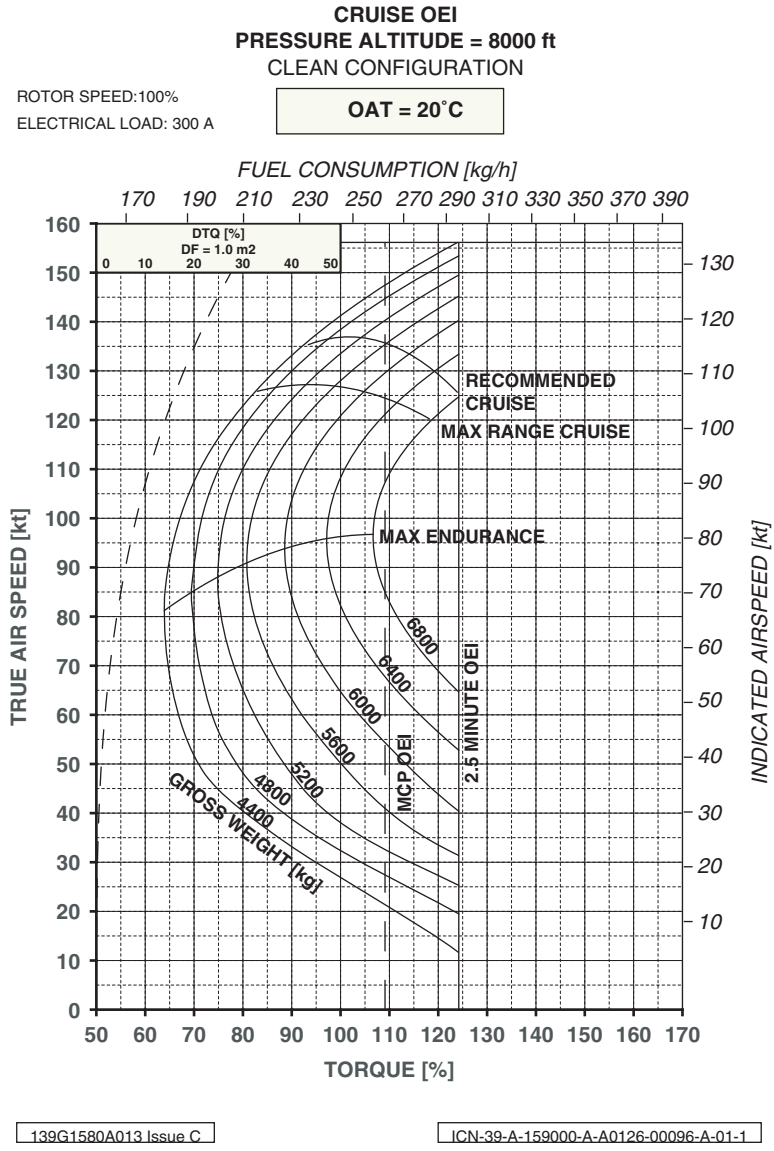

Figure 9-82 OEI Cruise (PA 8000 ft, OAT 20° C)

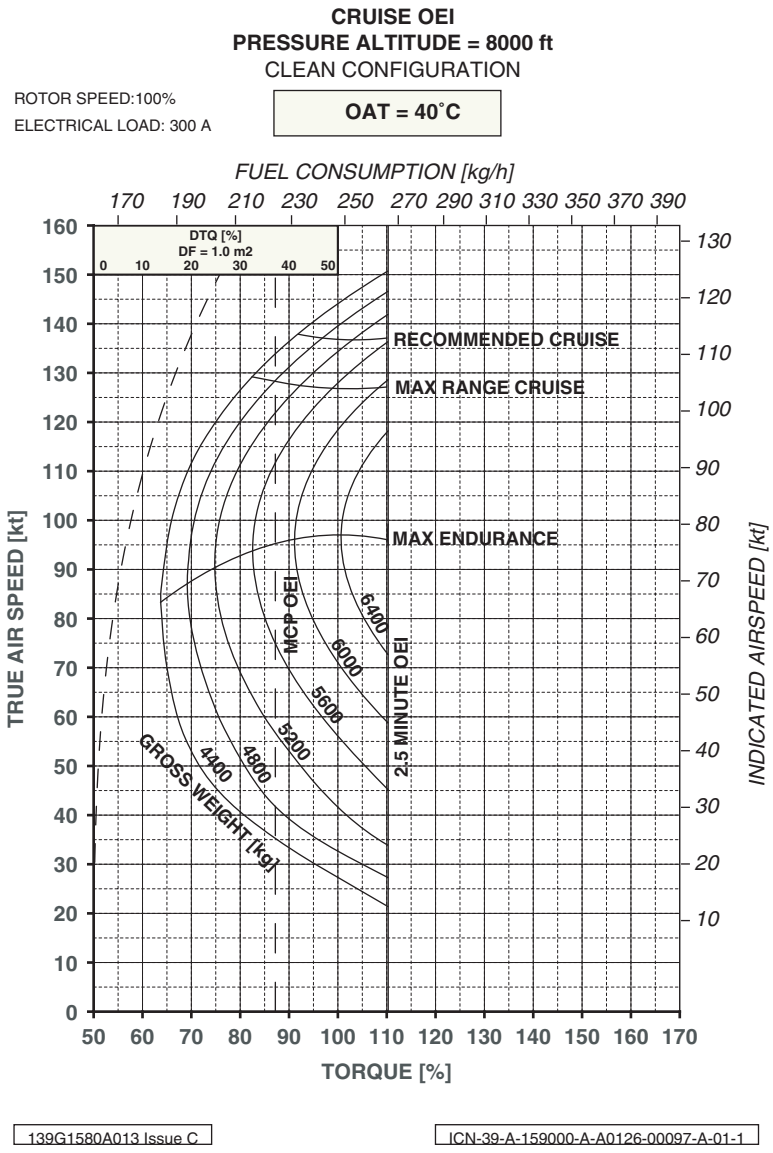

Figure 9-83 OEI Cruise (PA 8000 ft, OAT 40° C)

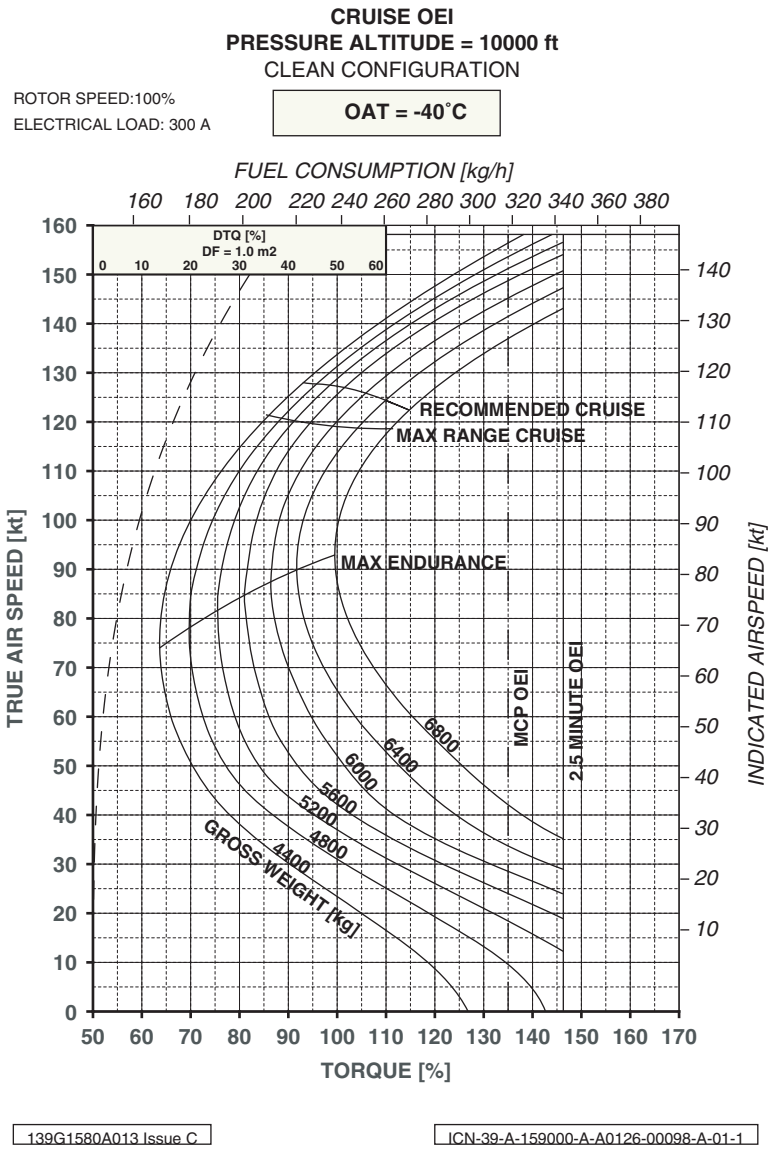

Figure 9-84 OEI Cruise (PA 10000 ft, OAT -40° C)

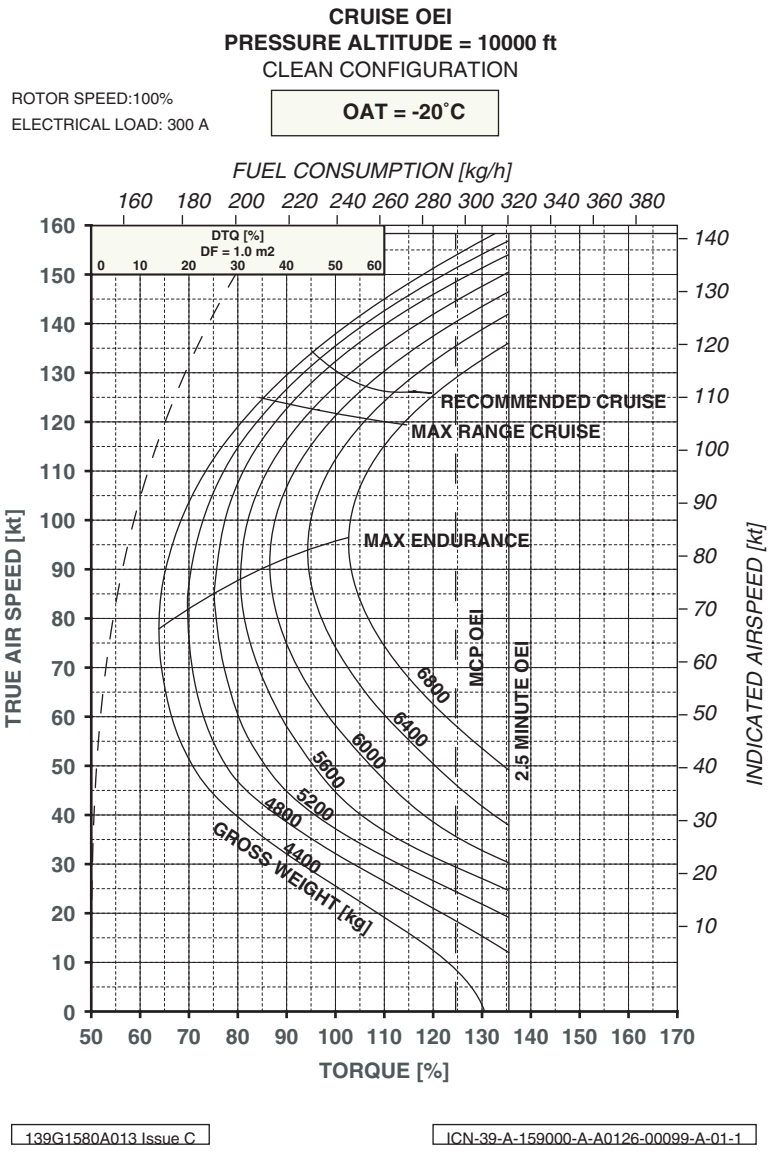

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Figure 9-85 OEI Cruise (PA 10000 ft, OAT -20° C)

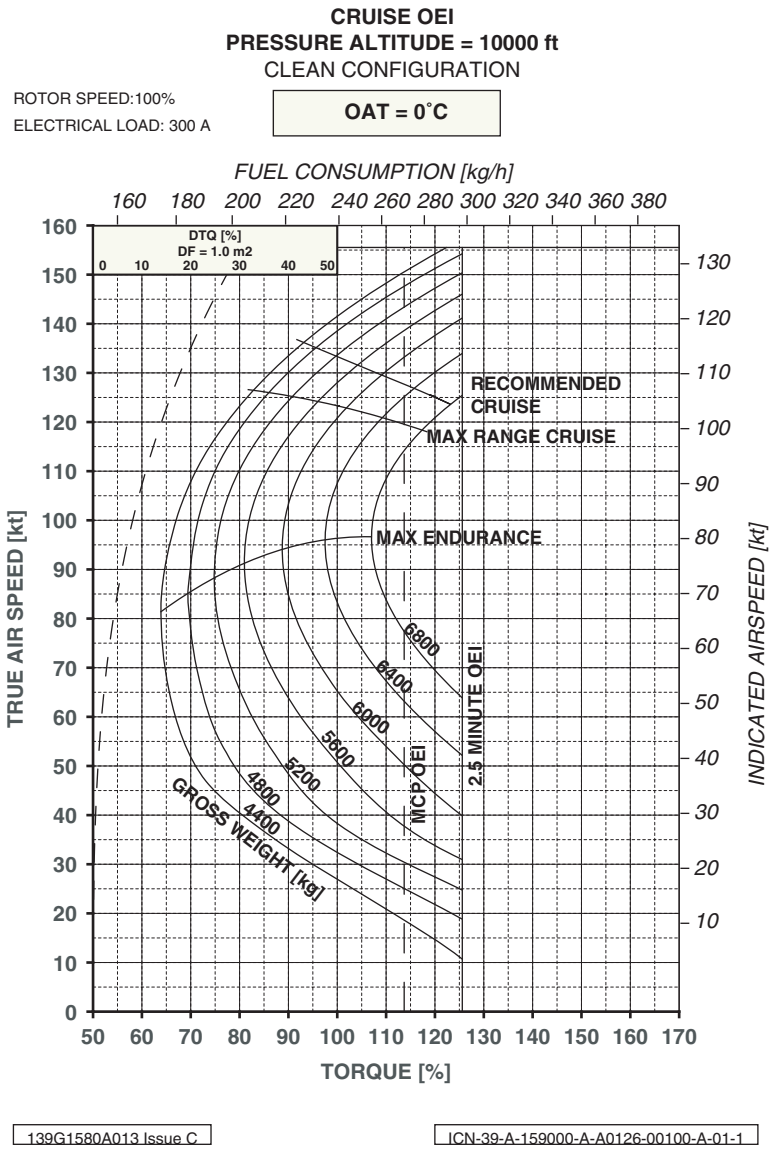

Figure 9-86 OEI Cruise (PA 10000 ft, OAT 0° C)

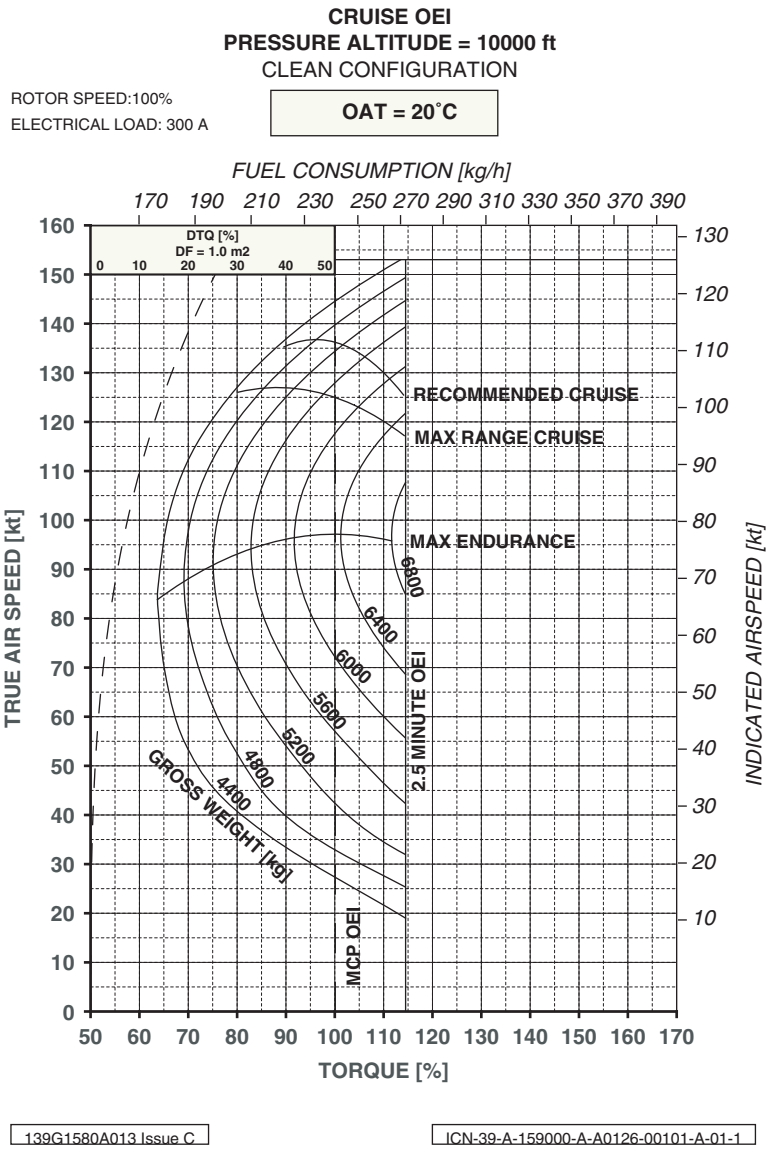

Figure 9-87 OEI Cruise (PA 10000 ft, OAT 20° C)

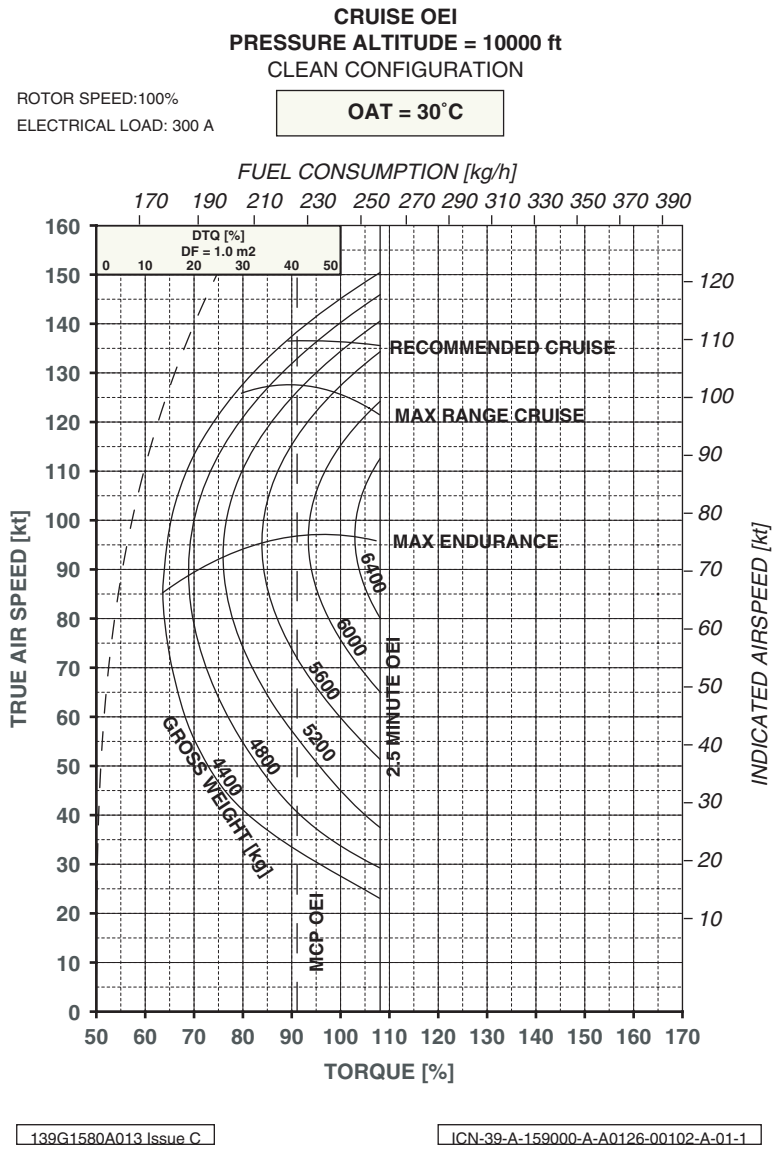

Figure 9-88 OEI Cruise (PA 10000 ft, OAT 30° C)

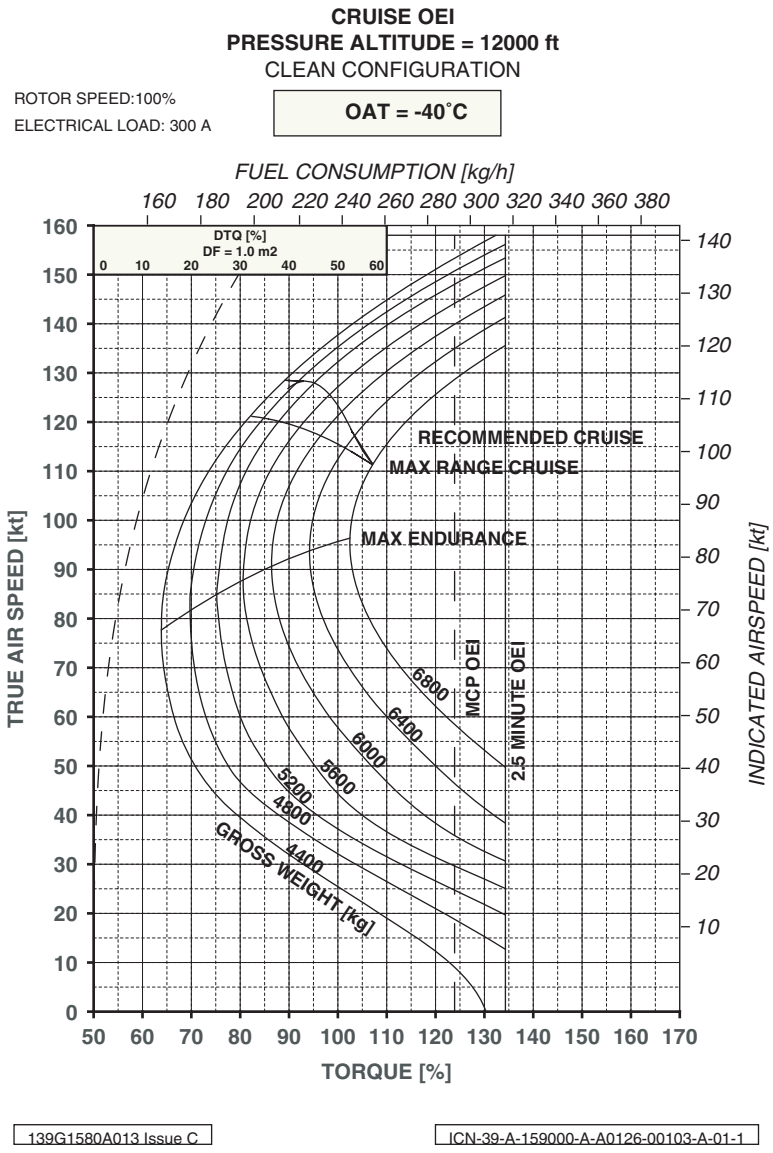

Figure 9-89 OEI Cruise (PA 12000 ft, OAT -40° C)

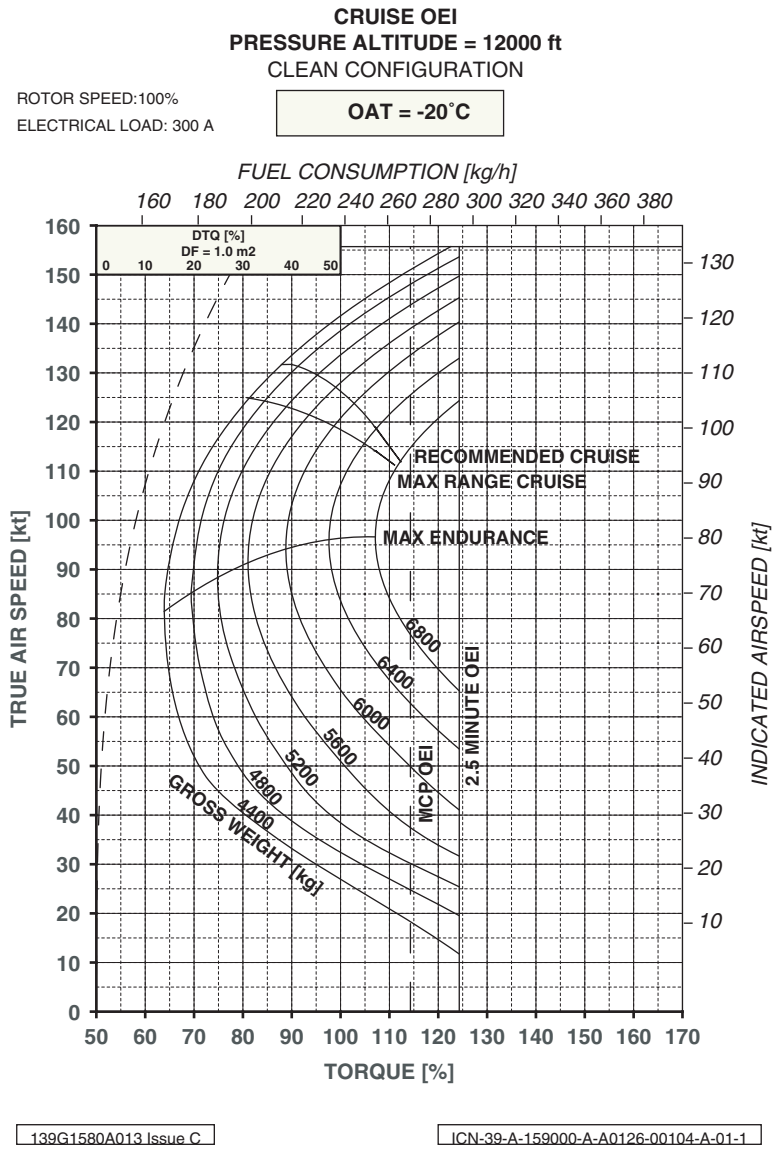

Figure 9-90 OEI Cruise (PA 12000 ft, OAT -20° C)

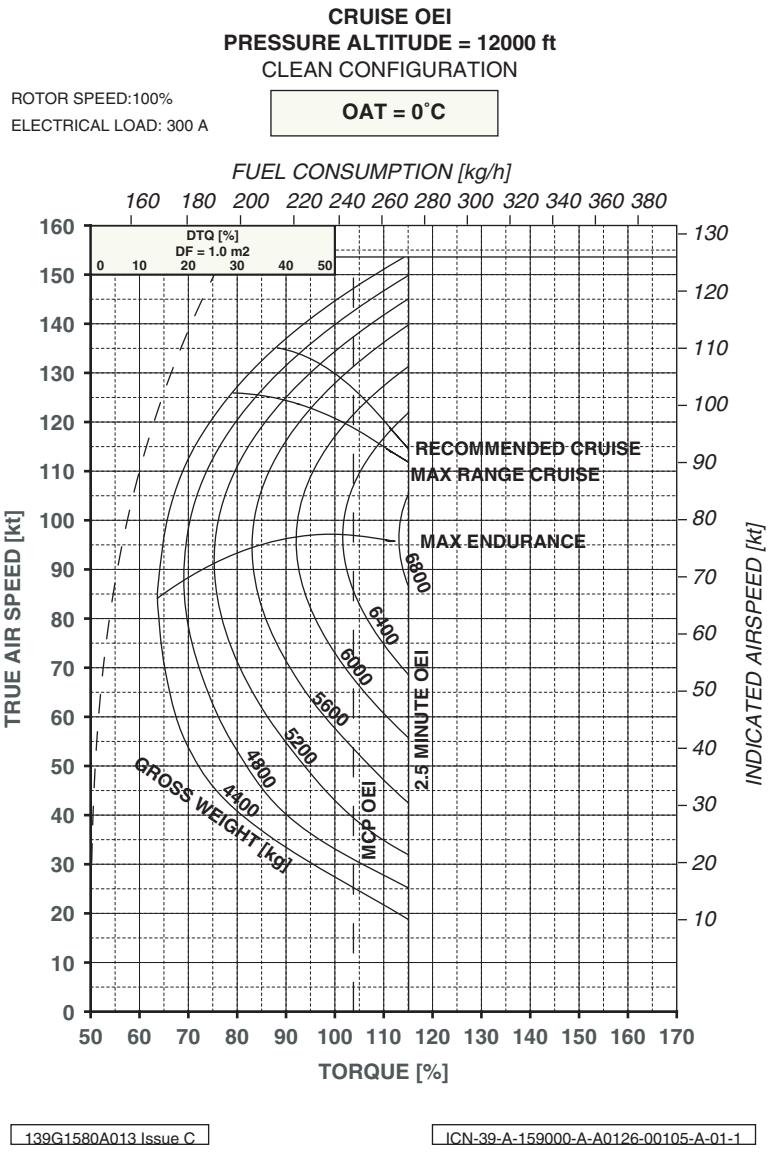

Figure 9-91 OEI Cruise (PA 12000 ft, OAT 0° C)

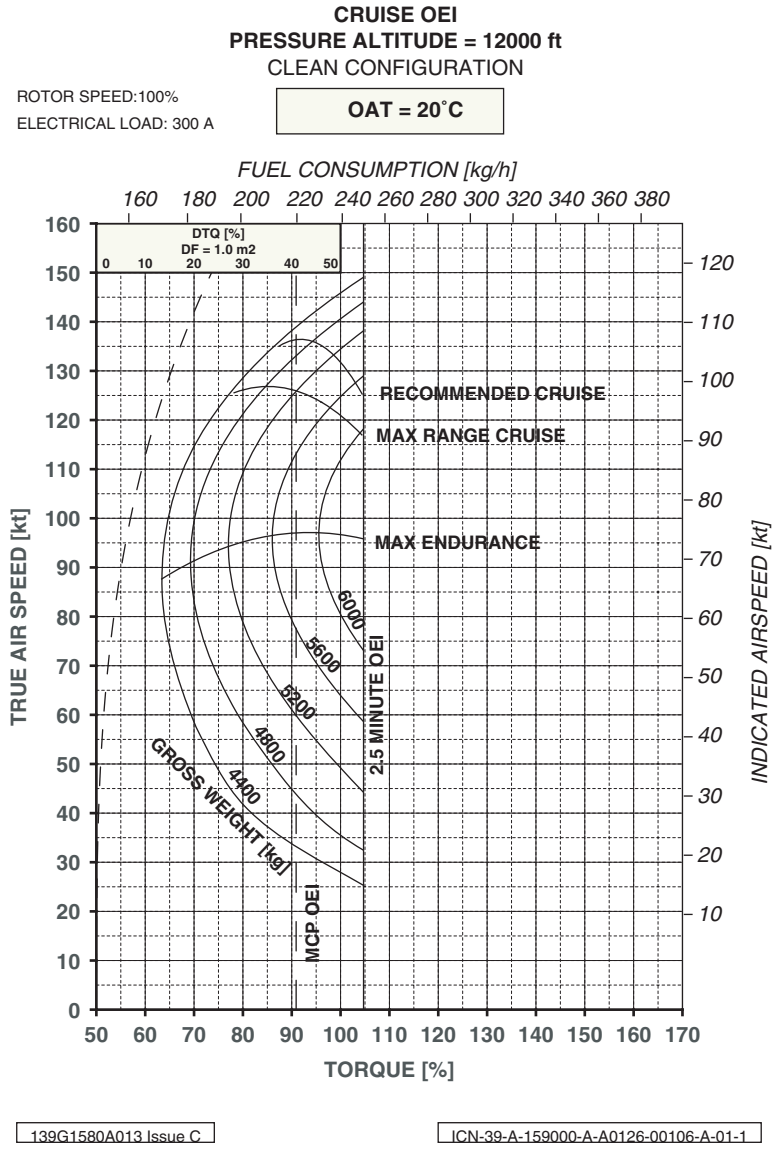

Figure 9-92 OEI Cruise (PA 12000 ft, OAT 20° C)

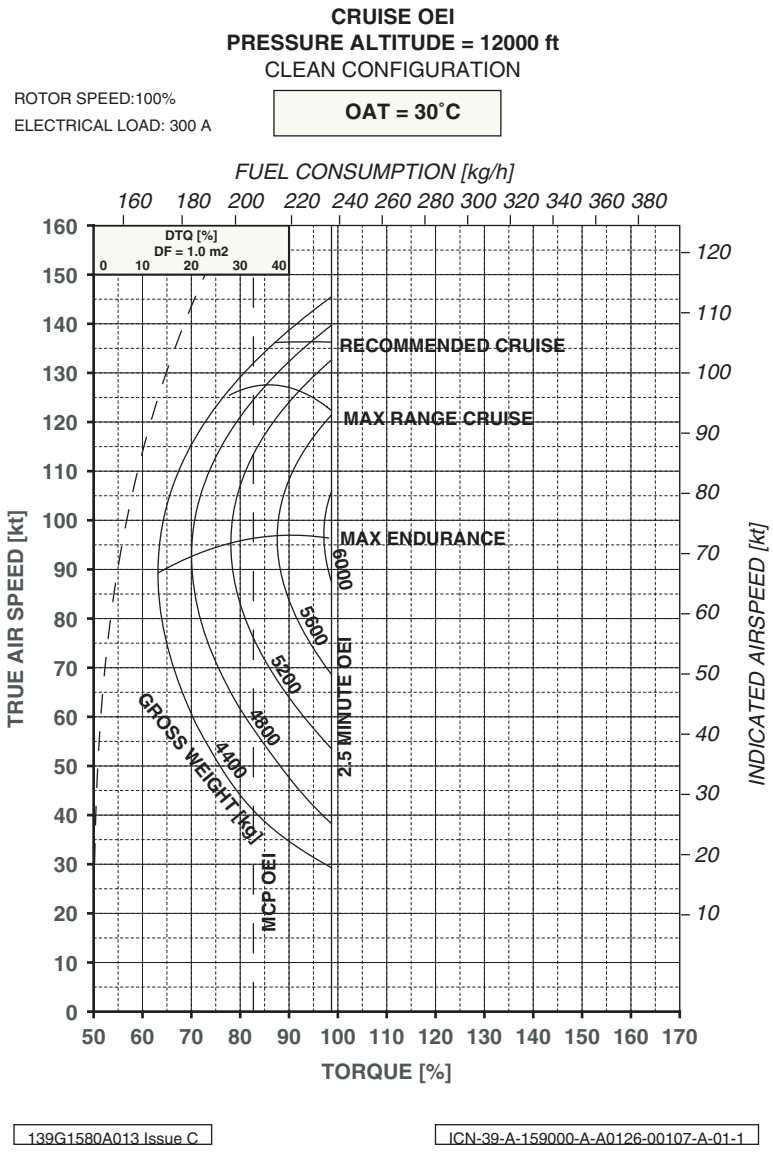

Figure 9-93 OEI Cruise (PA 12000 ft, OAT 30° C)

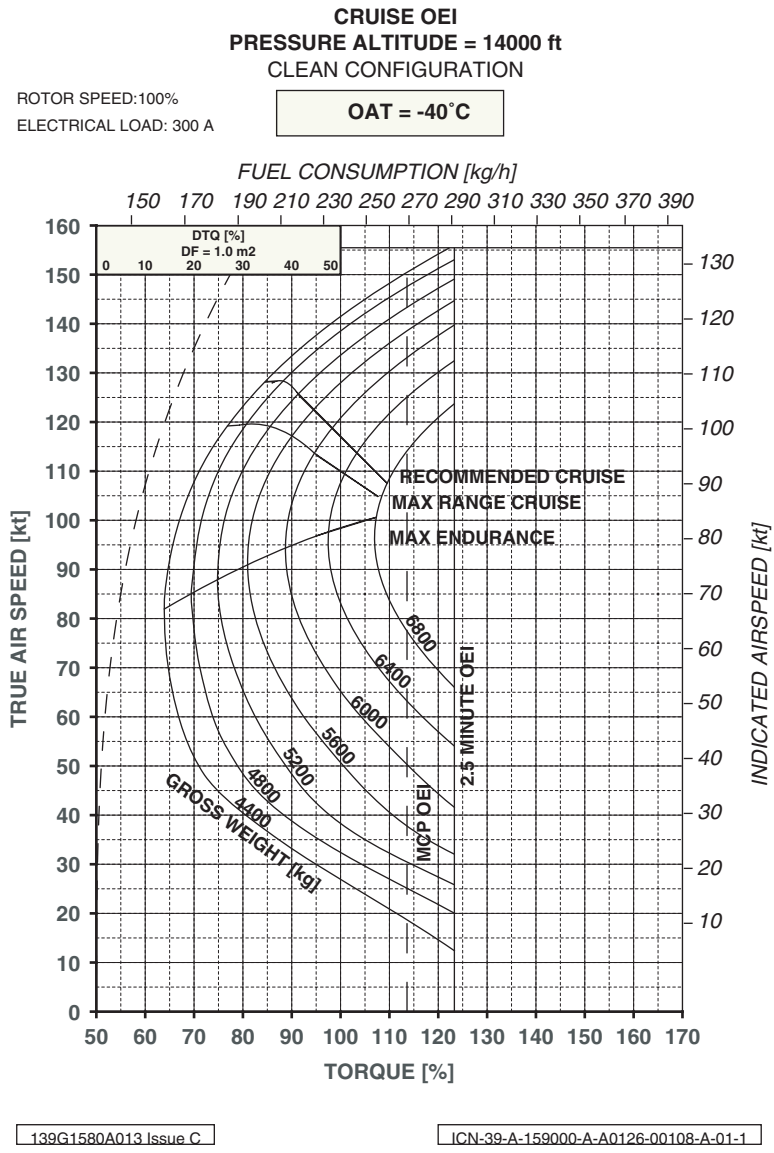

Figure 9-94 OEI Cruise (PA 14000 ft, OAT -40° C)

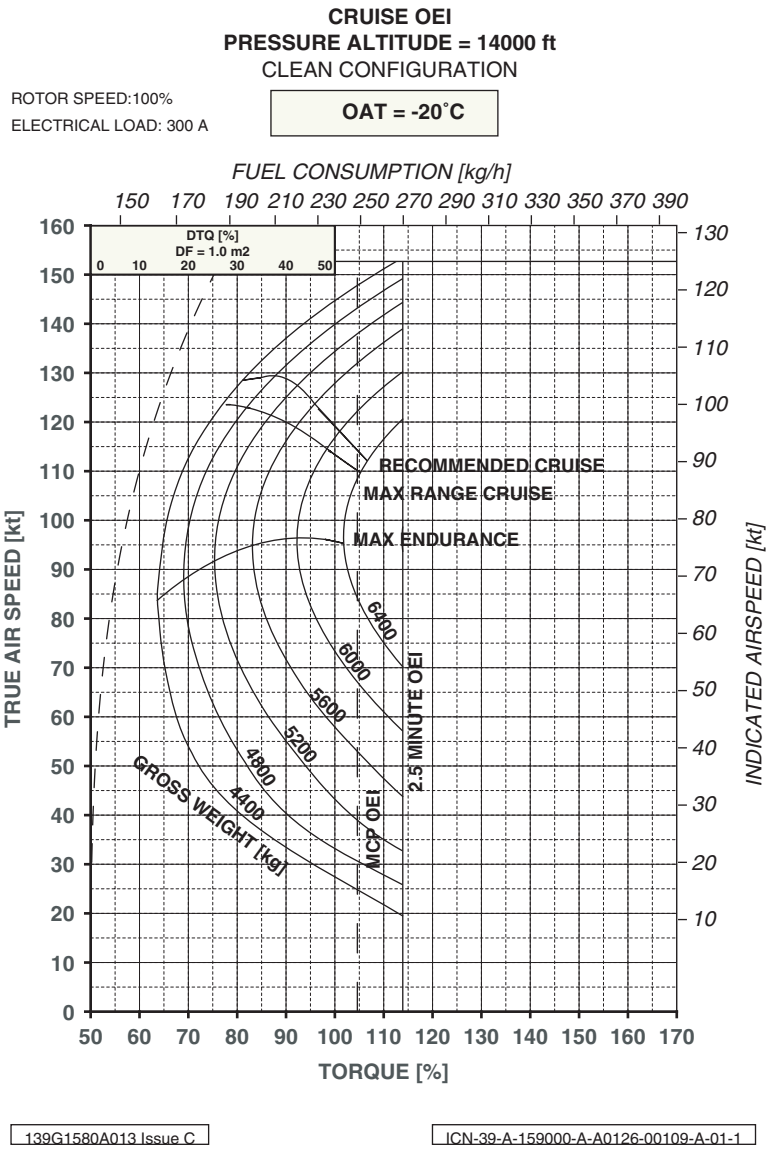

Figure 9-95 OEI Cruise (PA 14000 ft, OAT -20° C)

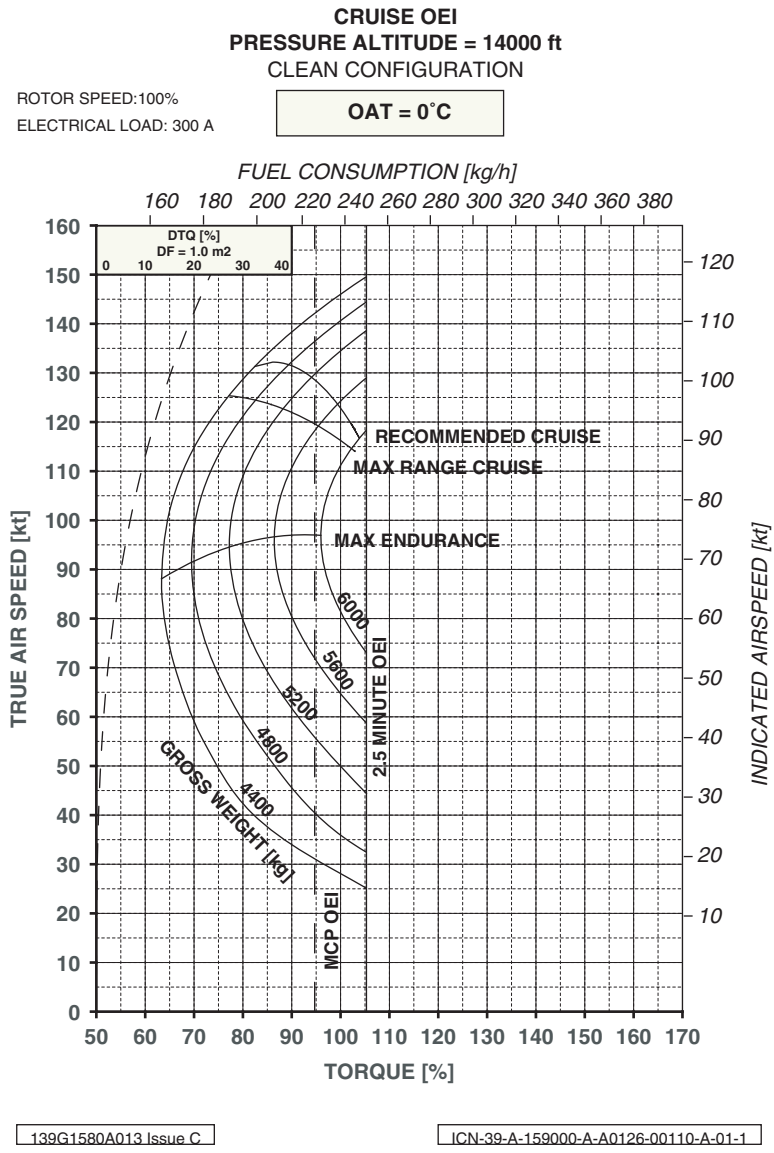

Figure 9-96 OEI Cruise (PA 14000 ft, OAT 0° C)

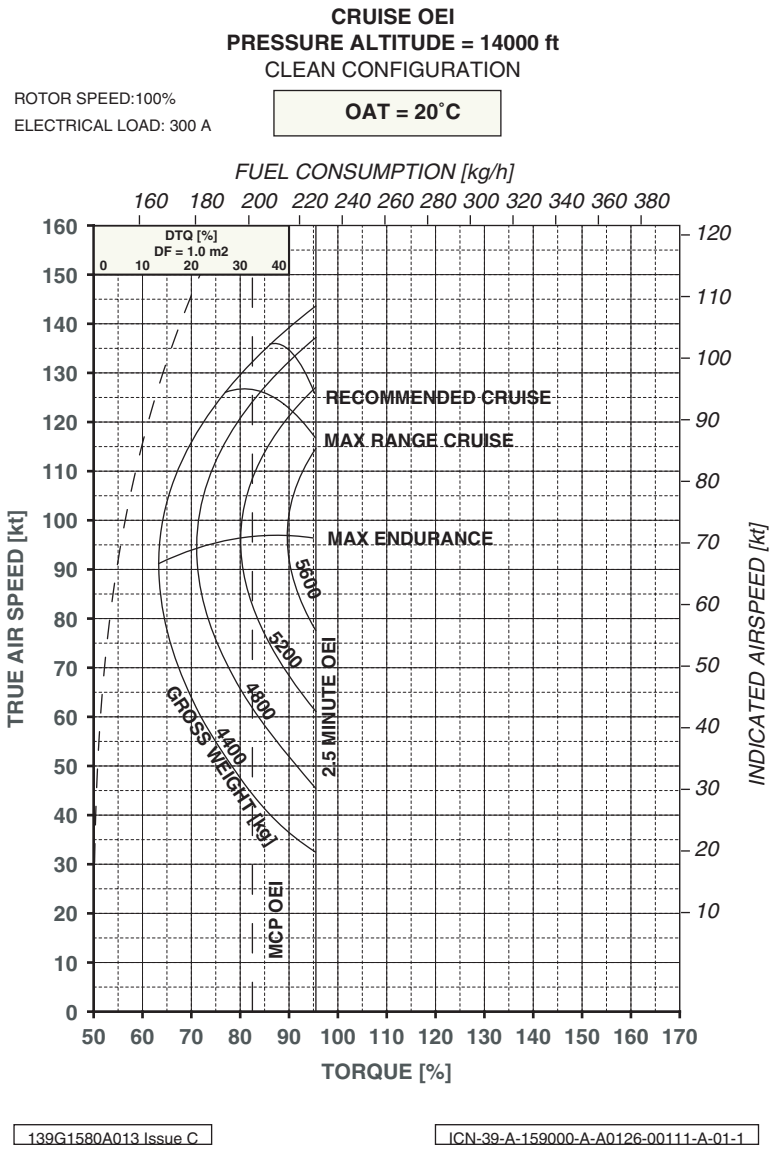

Figure 9-97 OEI Cruise (PA 14000 ft, OAT 20° C)

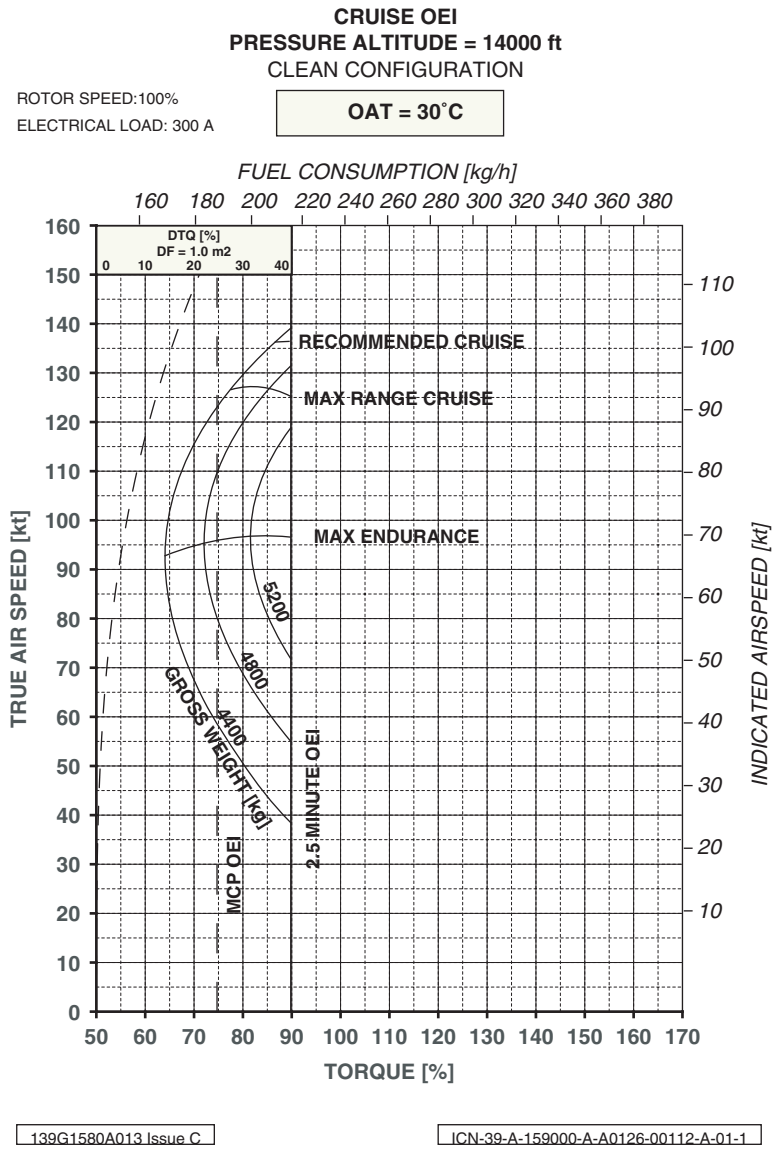

Figure 9-98 OEI Cruise (PA 14000 ft, OAT 30° C)

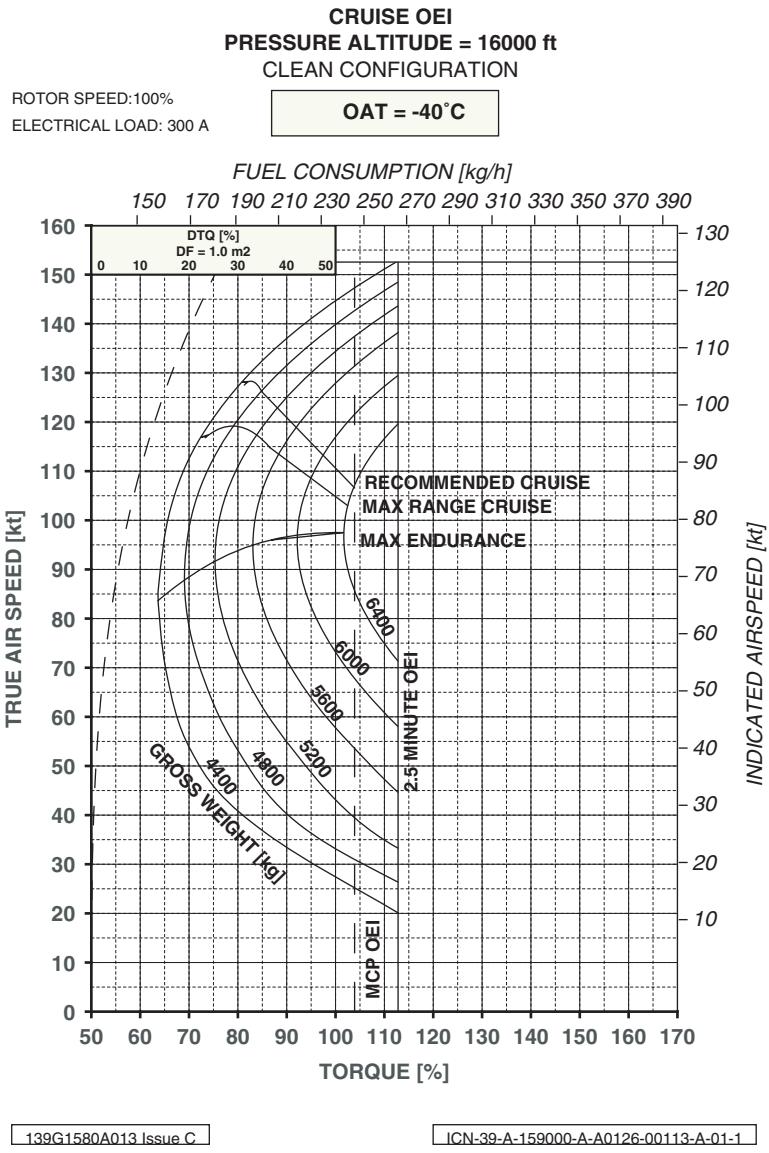

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Figure 9-99 OEI Cruise (PA 16000 ft, OAT -40° C)

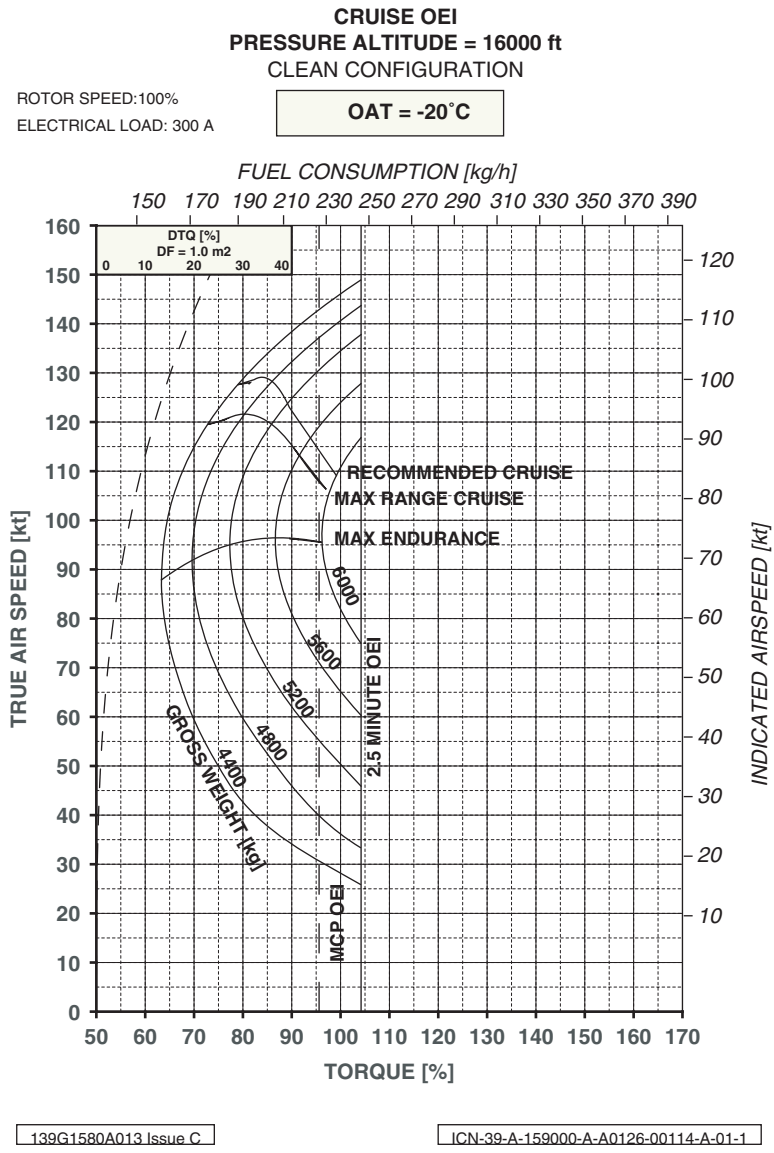

Figure 9-100 OEI Cruise (PA 16000 ft, OAT -20° C)

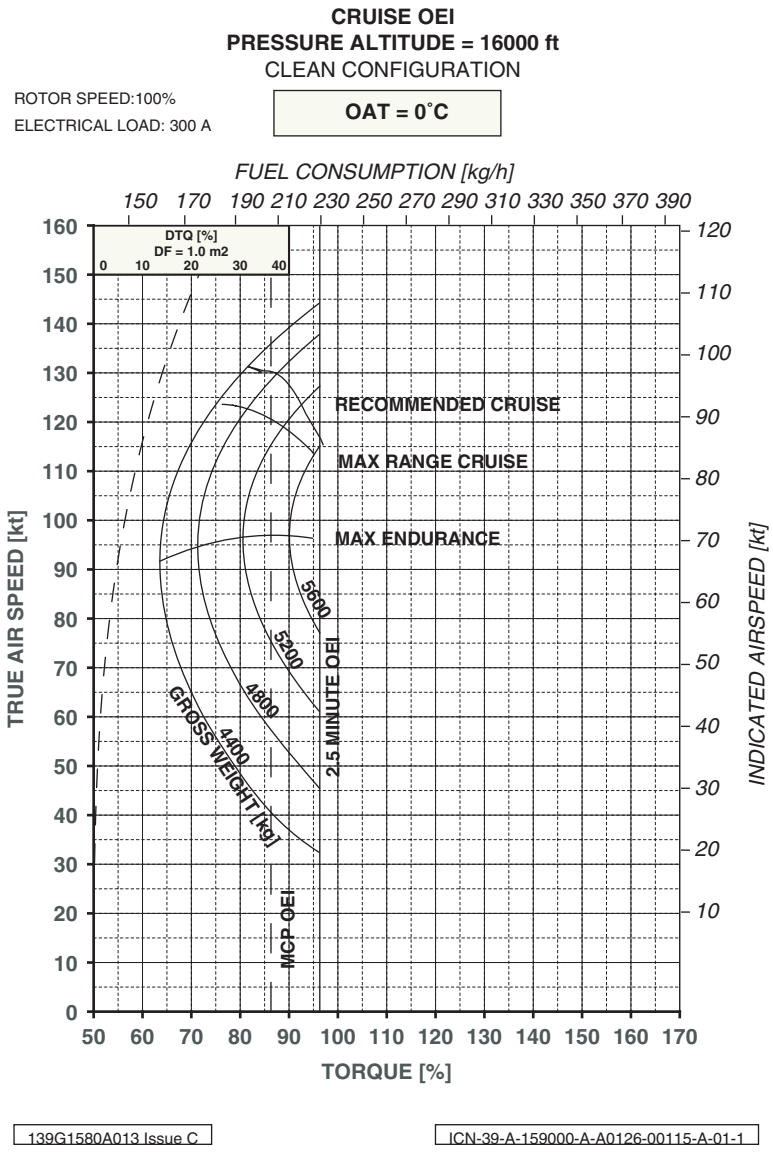

Figure 9-101 OEI Cruise (PA 16000 ft, OAT 0° C)

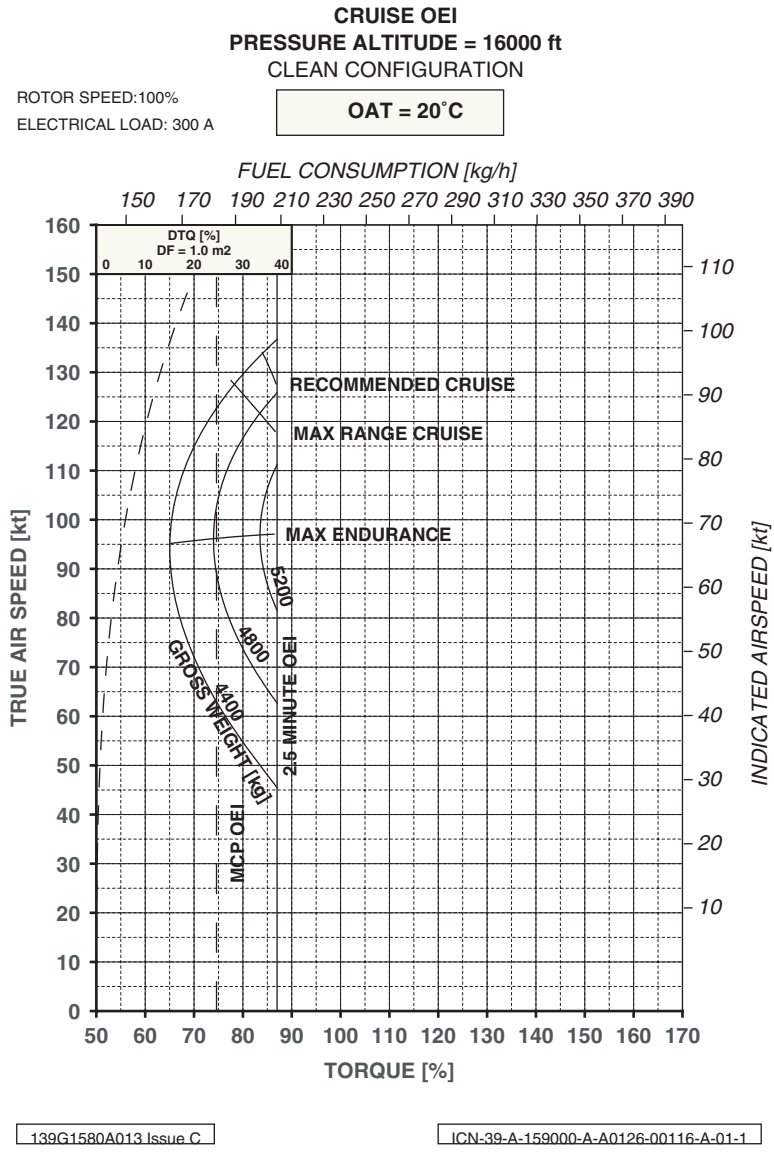

Figure 9-102 OEI Cruise (PA 16000 ft, OAT 20° C)

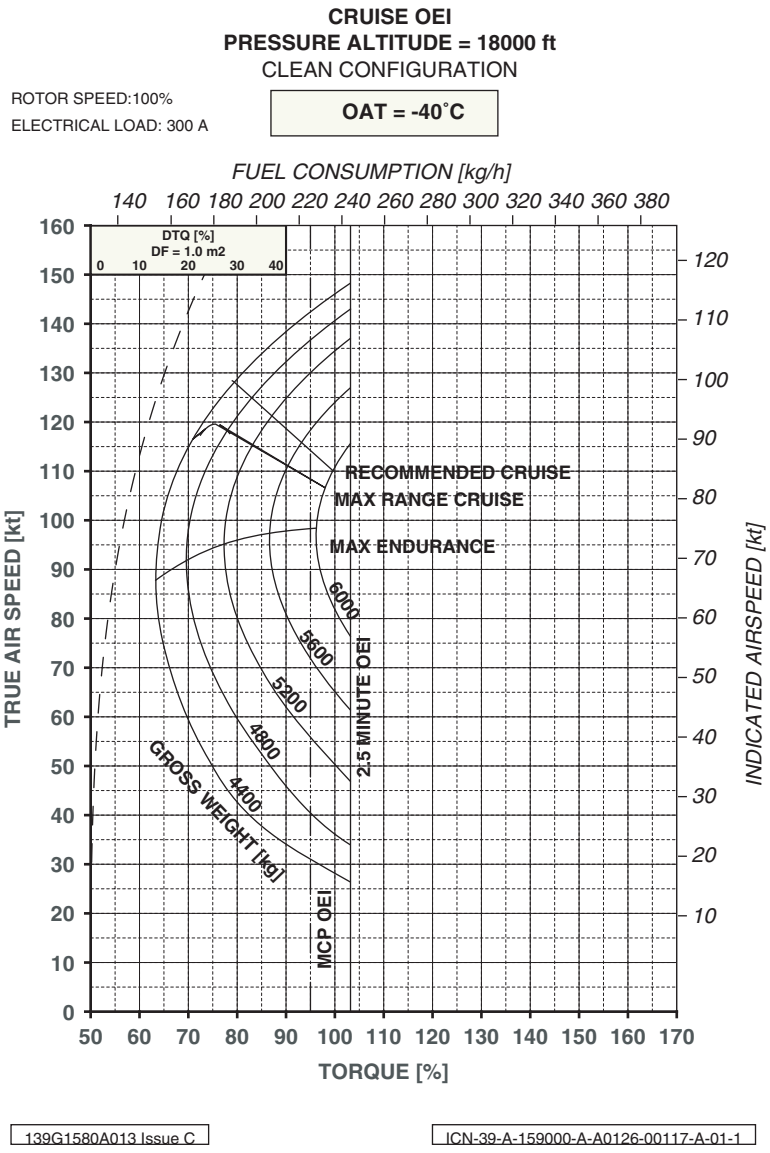

Figure 9-103 OEI Cruise (PA 18000 ft, OAT -40° C)

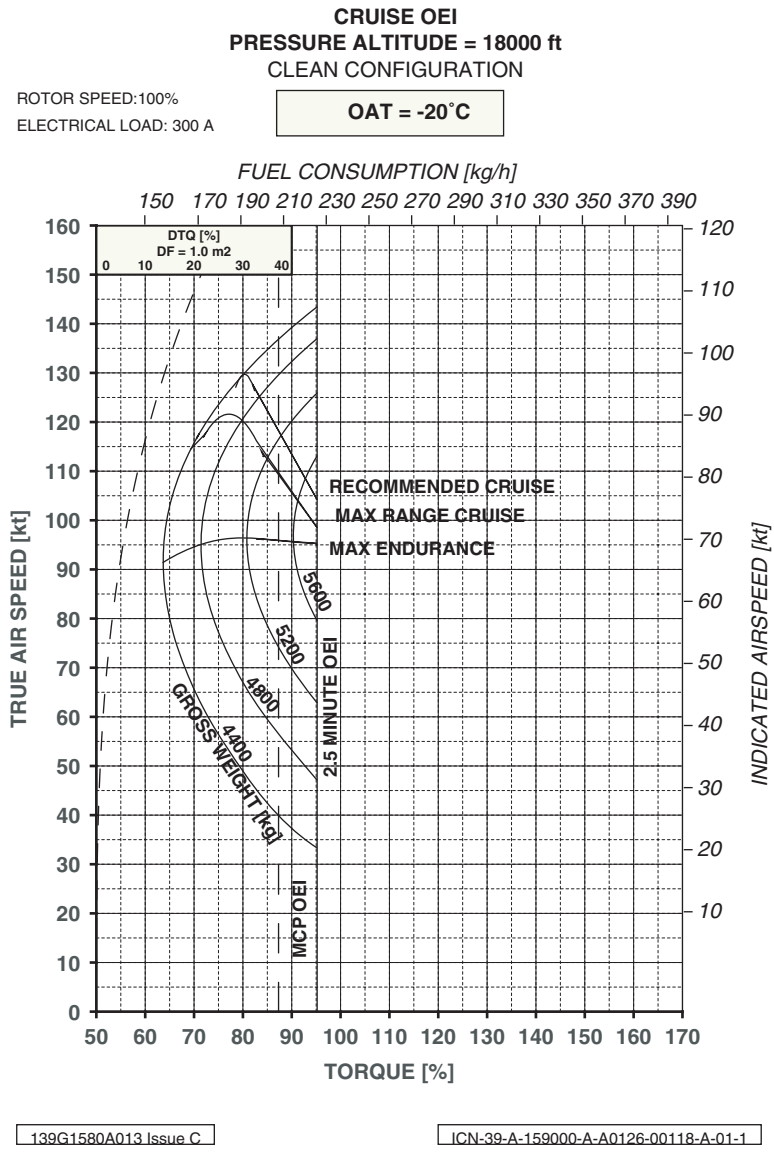

Figure 9-104 OEI Cruise (PA 18000 ft, OAT -20° C)

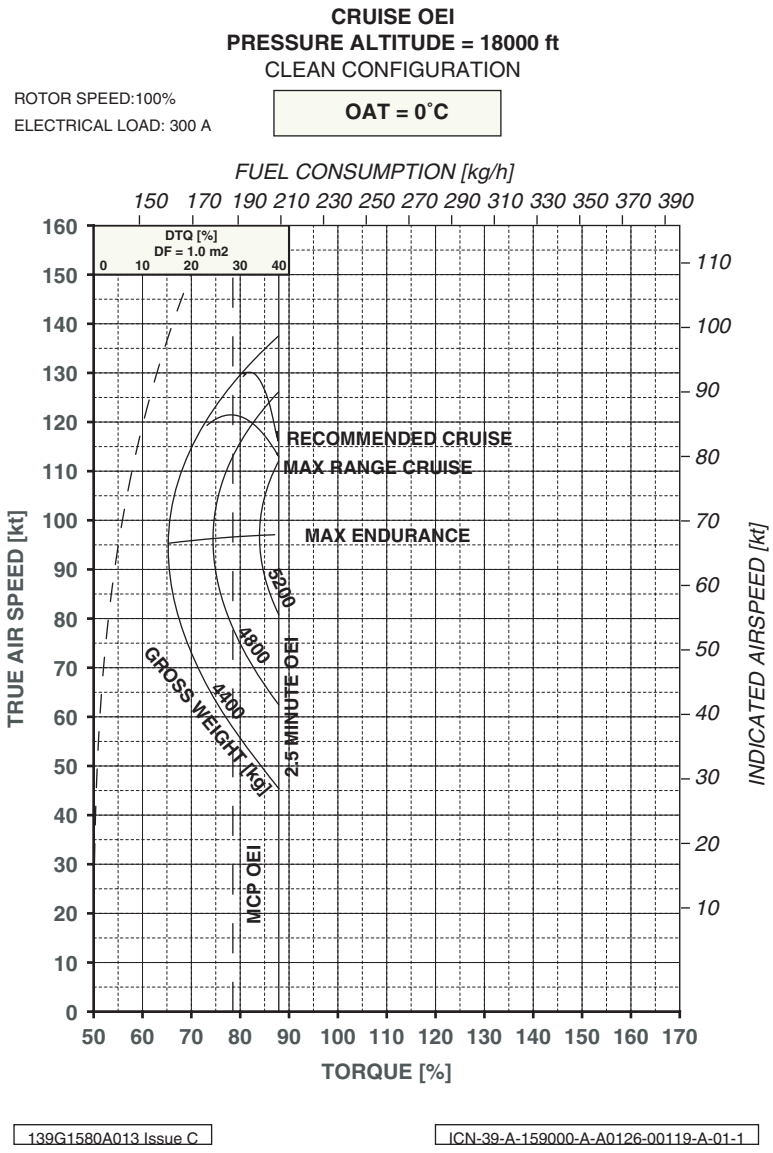

Figure 9-105 OEI Cruise (PA 18000 ft, OAT 0° C)

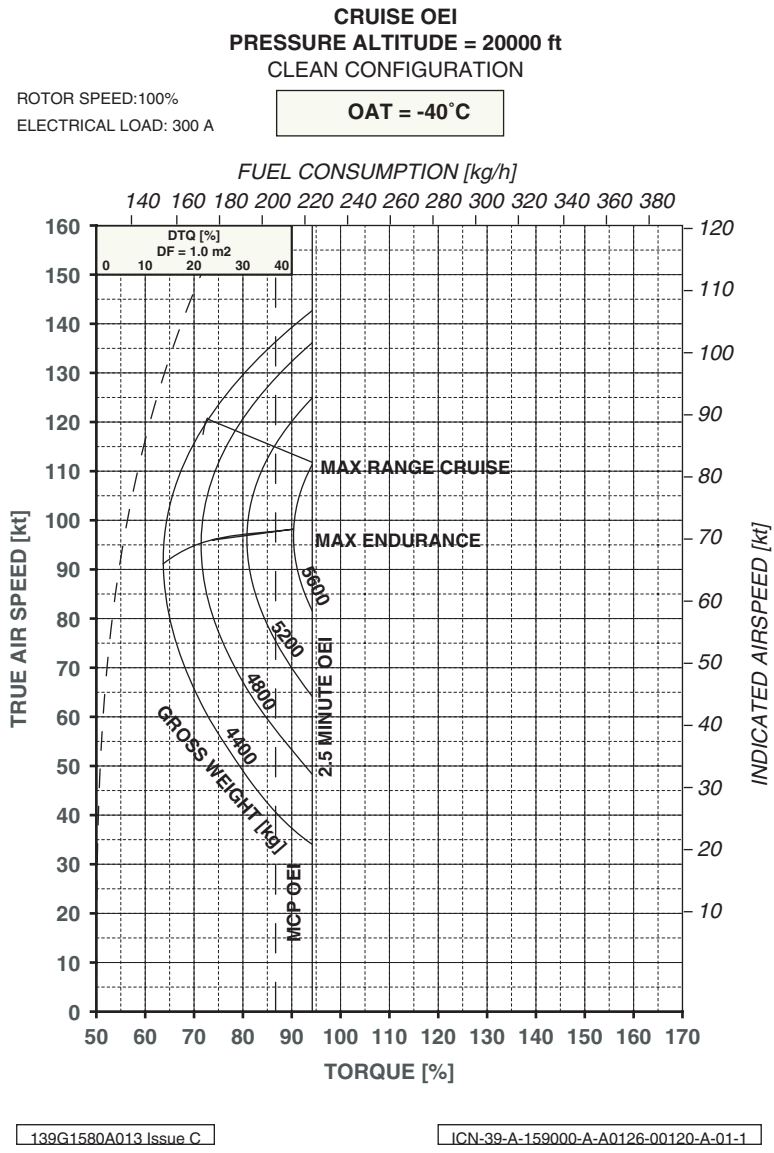

Figure 9-106 OEI Cruise (PA 20000 ft, OAT -40° C)

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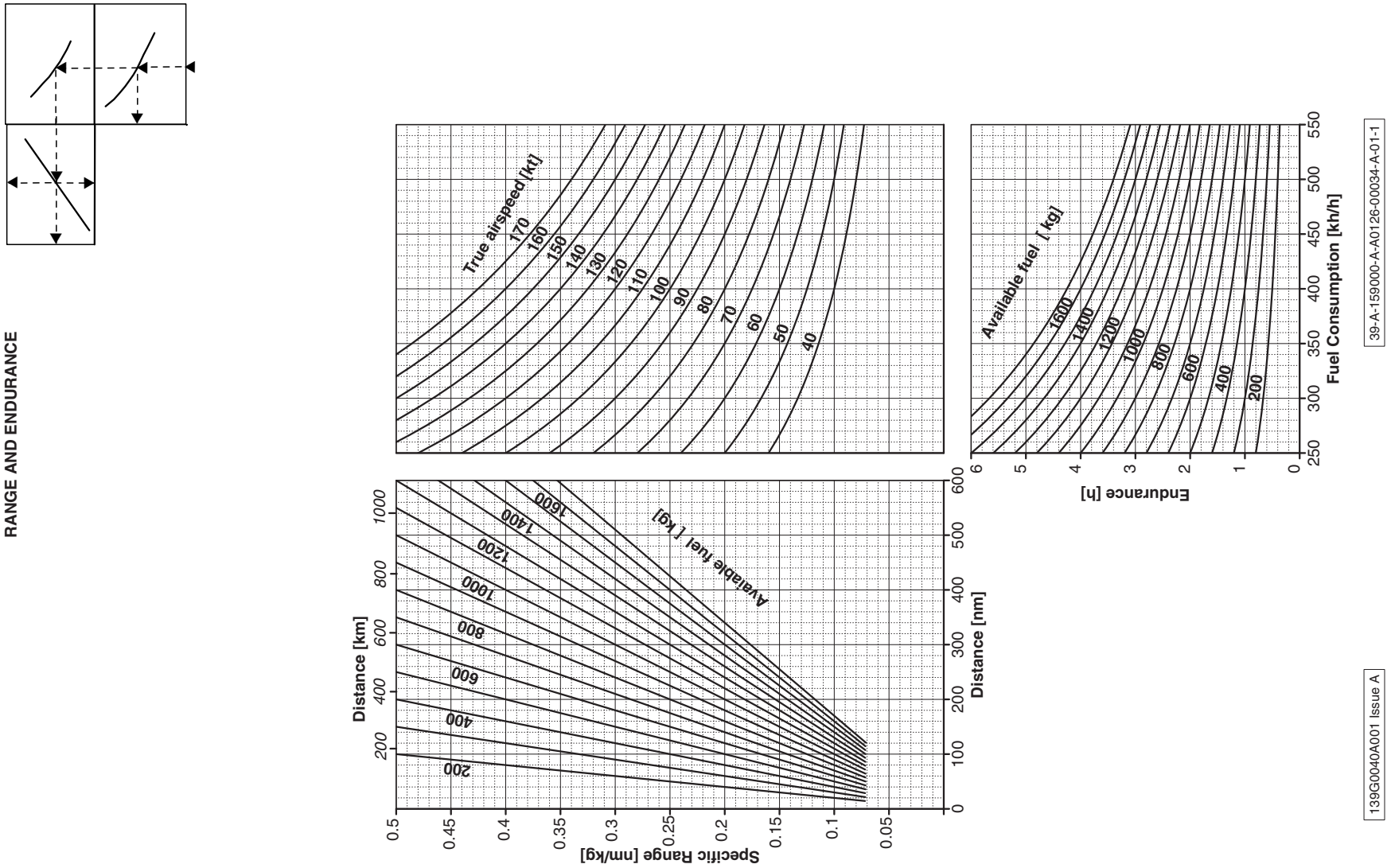

Figure 9-107 Range and Endurance

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WIND COMPONENT CHART

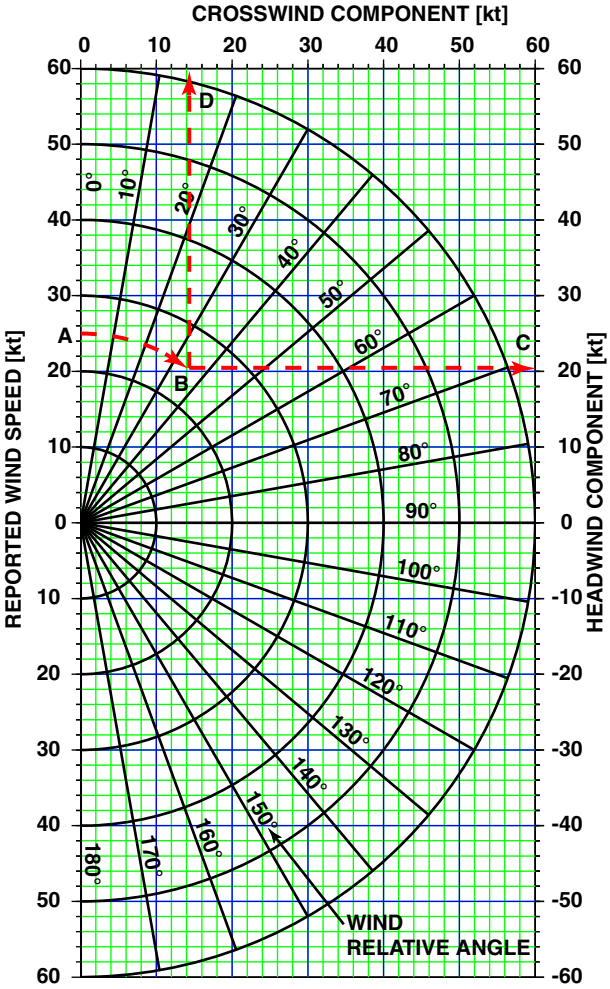

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Figure 9-108 Wind Component Chart

CLIMB GRADIENT

The charts of Minimum Climb Gradient for 2.5 min OEI power for airspeeds of 50 KIAS, 70 KIAS and 90 KIAS show the mean height gained in 100 ft of horizontal distance in relation to the ambient conditions and the aircraft gross weight.

The charts are based on estimates and flight test data.

EXAMPLE

Wanted — Climb gradient 2.5 min OEI.

Known — Pressure altitude: 5000 ft OAT: 10° C Gross weight: 6000 kg, Airspeed 50 KIAS.

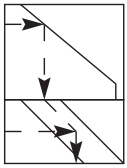
Method — Select the correct chart for 50 KIAS (Figure 9-109). Intersect the 10° C OAT line with the pressure altitude line at 5000 ft. Drop down vertically from this point to intersect the first line of the lower part of the chart. Follow parallel to the lines to intersect the gross weight line of 6000 kg. Drop vertically from the intersection to a value of 20 ft of height gain for every 10 0ft of horizontal distance.

Note

If the Gross Weight value gives an intersection which is off to the right hand side of the graph then add 1.5 ft to the maximum value of 25 ft on the graph for every 200 kg of weight below the weight of the intercept with the 25 ft line. i.e. taking the example above the intersept on the 25 ft line is at 5400 kg but if the gross weight required is 4600 kg then the mean heigh gain will be

25 + (5400-4600)/200 x 1.5 = 31 ft height gain in 100 ft horizontal distance.

MINIMUM CLIMB GRADIENT
2.5 min OEI



ROTOR SPEED: 100 %
ELECTRICAL LOAD: 300 A
50 KIAS

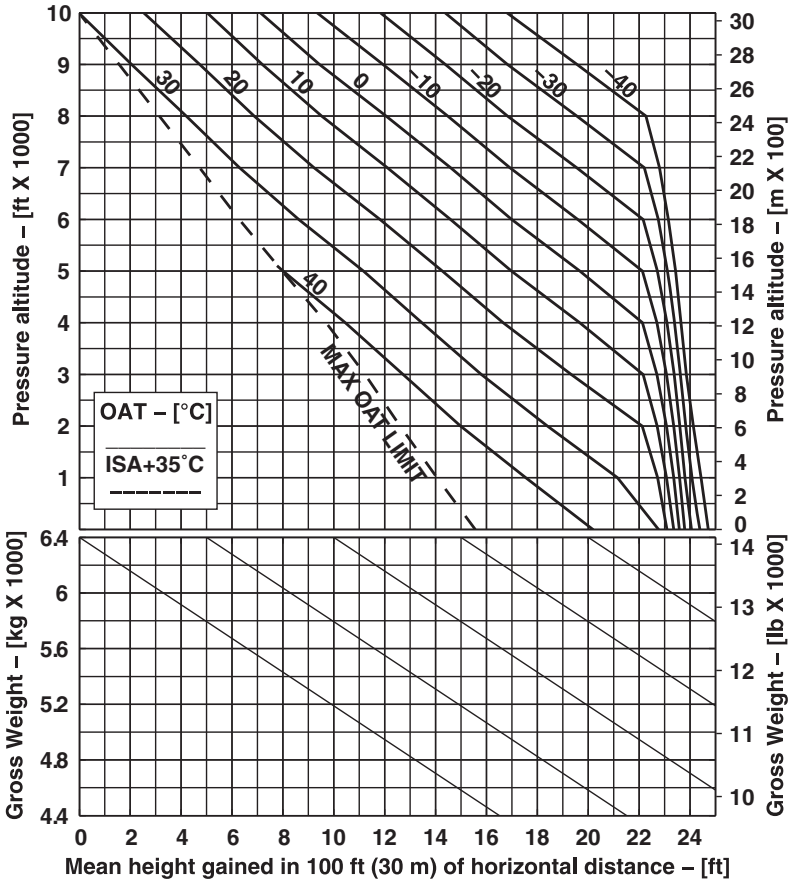


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Figure 9-109 Minimum Climb Gradient 50 KIAS

MINIMUM CLIMB GRADIENT
2.5 min OEI

ROTOR SPEED: 100 %
70 KIAS

ELECTRICAL LOAD: 300 A

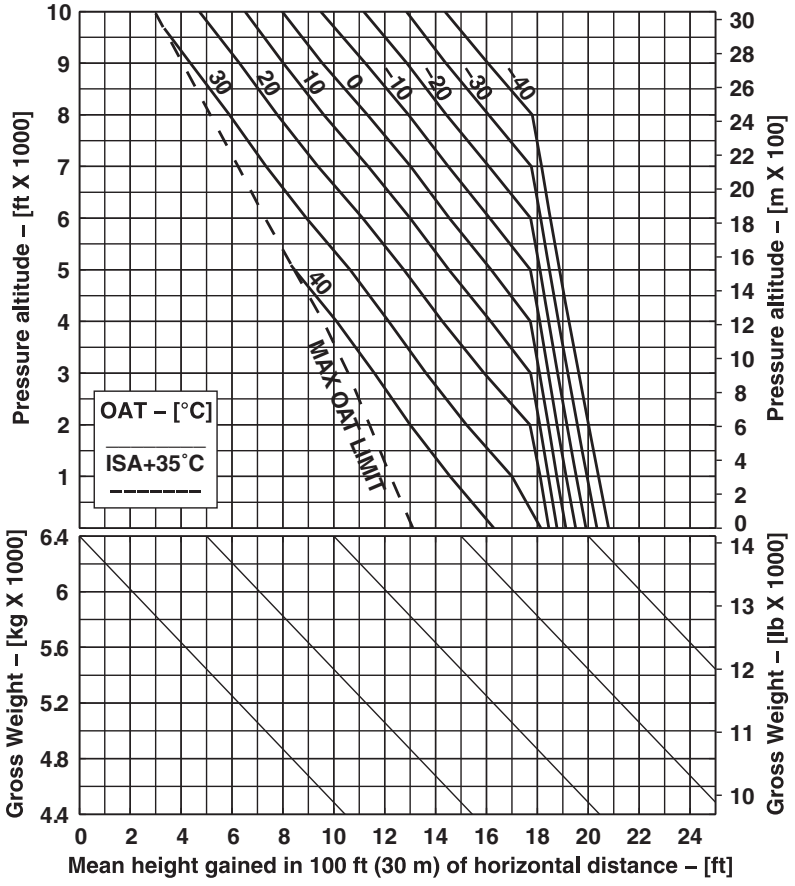

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Figure 9-110 Minimum Climb Gradient 70 KIAS

MINIMUM CLIMB GRADIENT
2.5 min OEI

ROTOR SPEED: 100 %
90 KIAS

ELECTRICAL LOAD: 300 A

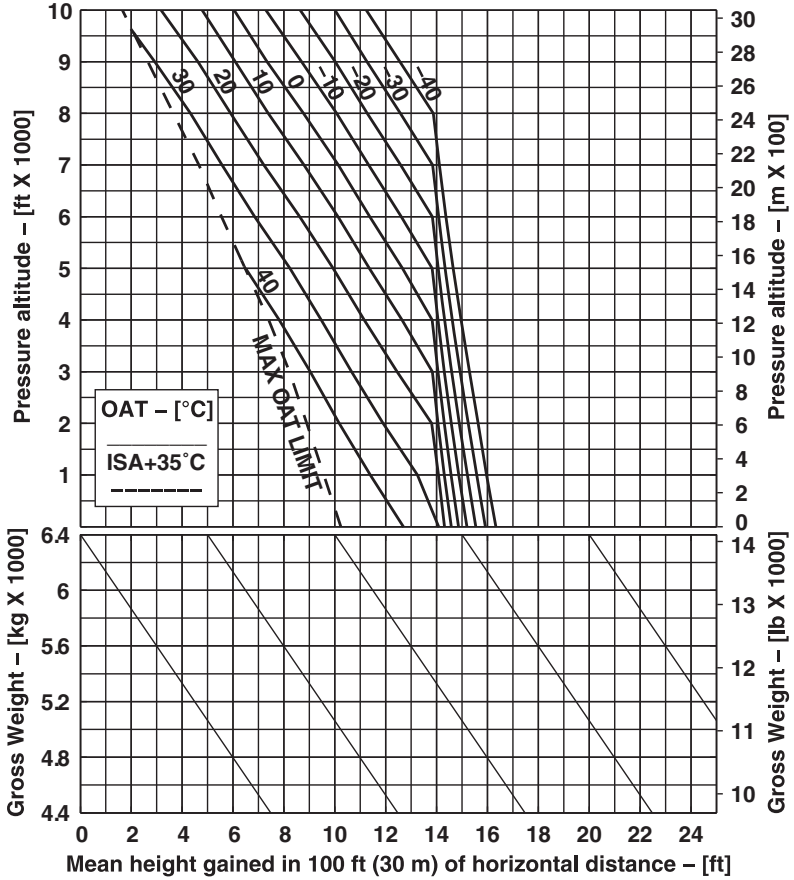
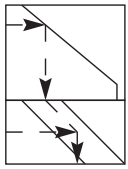


Figure 9-111 Minimum Climb Gradient 90 KIAS

MINIMUM CLIMB GRADIENT
2.5 min OEI
EAPS OFF



ROTOR SPEED: 100 %
ELECTRICAL LOAD: 300 A
50 KIAS

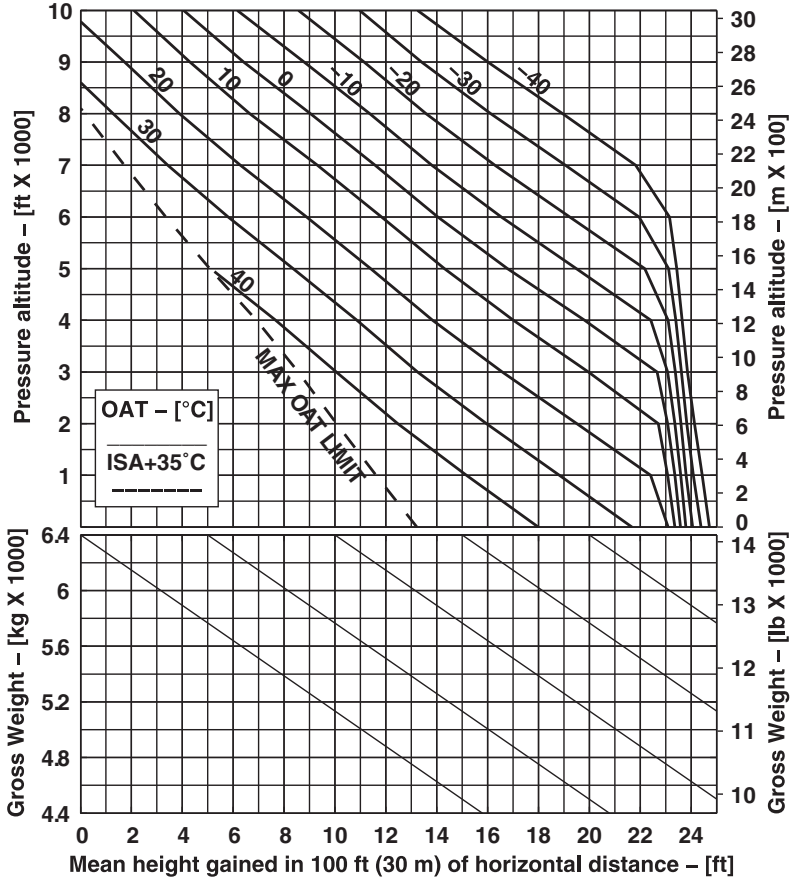


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Figure 9-112 Minimum Climb Gradient 50 KIAS, EAPS OFF

MINIMUM CLIMB GRADIENT
2.5 min OEI
EAPS OFF

ROTOR SPEED: 100 %
70 KIAS

ELECTRICAL LOAD: 300 A

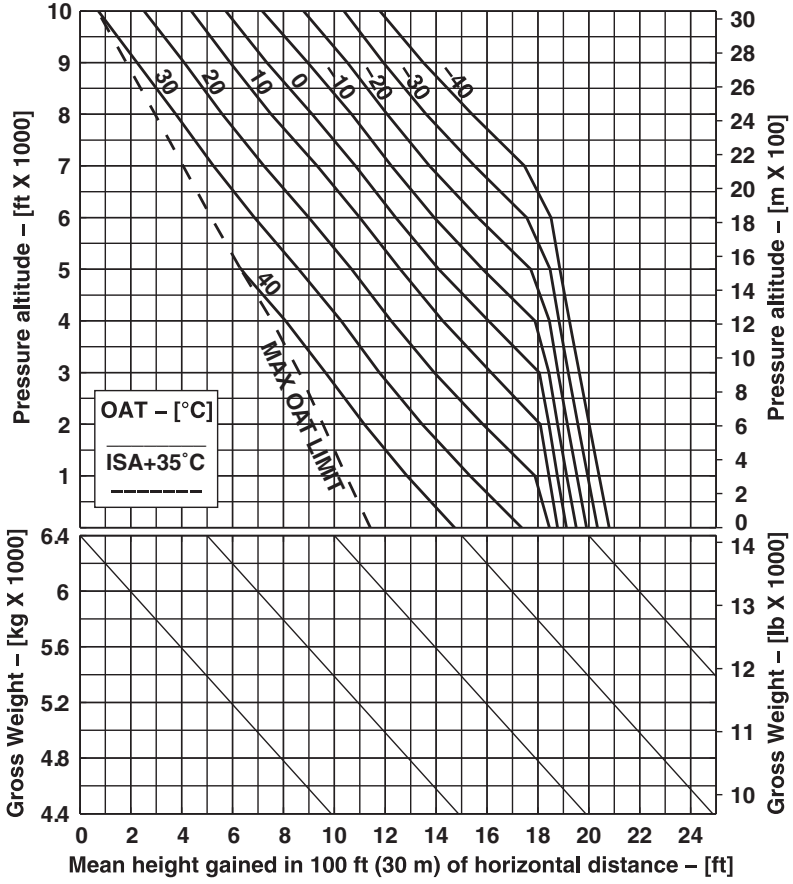

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Figure 9-113 Minimum Climb Gradient 70 KIAS, EAPS OFF

MINIMUM CLIMB GRADIENT
2.5 min OEI
EAPS OFF

ROTOR SPEED: 100 %
90 KIAS

ELECTRICAL LOAD: 300 A

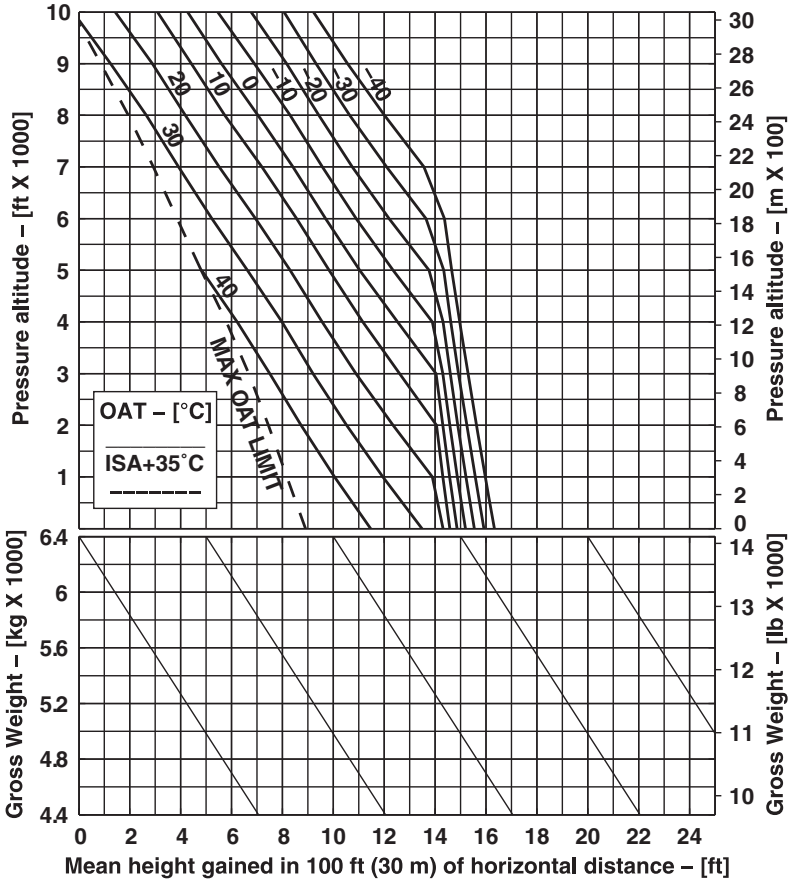

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Figure 9-114 Minimum Climb Gradient 90 KIAS, EAPS OFF

HOVER CEILING WITH HEADWIND BENEFIT

The charts of hover ceiling OGE at OEI 2.5 min power give the hover gross weight and the gross weight with headwind benefit.
Charts for clean intake and EAPS (EAPS switched OFF) intake configurations are presented.

The charts are based on estimates and flight test data.

EXAMPLE

Wanted — Maximum Gross weight for hover at 2.5 min OEI.

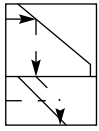
Known — Pressure altitude: 6000 ft OAT: 10° C Headwind: 20 kt, Engine intake: Clean, Rotor Speed: 102 %.

Method — Select the correct chart for Clean engine intake (Figure 9-115). Intersect the 10° C OAT line with the pressure altitude line at 6000 ft. Drop down vertically from this point to intersect the 0 headwind line. Follow parallel to the lines to intersect the Headwind line of 20 kt. Drop vertically to a Gross Weight value of 5550 kg.

Note

With a wind direction which is not a 'Headwind' the headwind component must be calculated from Figure 9-108 and this value used as Headwind.

HOVER CEILING OUT OF GROUND EFFECT
2.5 MINUTE POWER OEI



ROTOR SPEED: 102 %
ELECTRICAL LOAD: 300 A

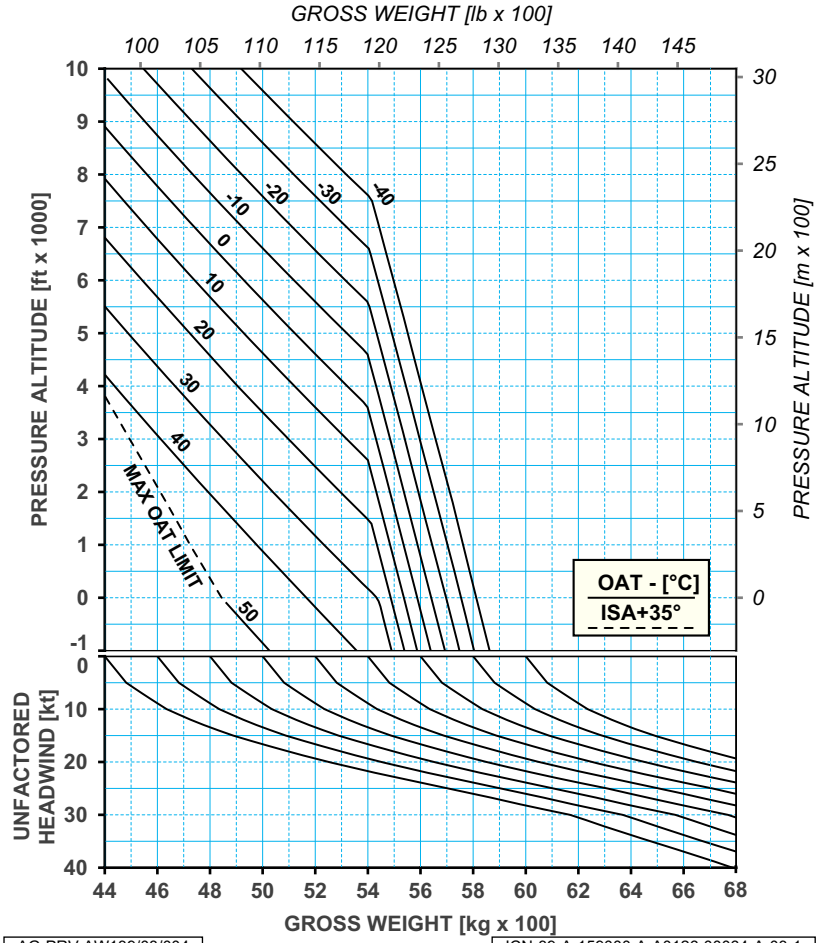


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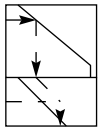
Figure 9-115 Hover Ceiling OGE, OEI 2.5 Min Power, Clean Intake with Unfactored Headwind Benefit

HOVER CEILING OUT OF GROUND EFFECT
2.5 MINUTE POWER OEI



ROTOR SPEED: 102 %
ELECTRICAL LOAD: 300 A
EAPS OFF

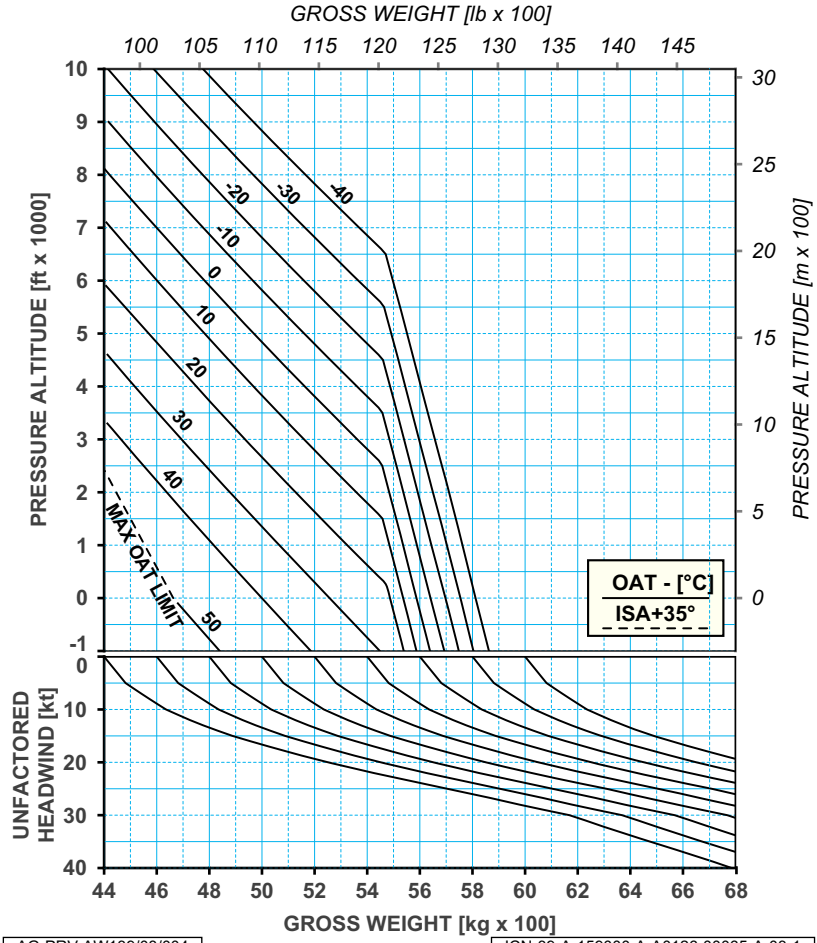


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Figure 9-116 Hover Ceiling OGE, OEI 2.5 Min Power, EAPS OFF with Unfactored Headwind Benefit

OPERATIONS IN ACCORDANCE WITH AIR-OPS REGULATIONS (EU) 965/2012

This information is provided to assist the operators to utilize the CAT A Procedures and Performance (Supplement 12 for weights up to 6400 kg, Supplement 50 for weights between 6400 kg and 6800 kg, Supplement 90 and Supplement 97 for weights up to 7000 kg) when operations are conducted in accordance with the Performance Class 1 (PC1), 2 (PC2) and 2 enhanced (PC2e) as defined in Authority Requirements for Air Operation CAT.POL.H.305.

A) Performance Class 1

- These operations require full compliance with Supplement 12 and 50 or Supplement 90 and 97.
- The CAT A performance (Rejected/Continued TO distance, Balked and OEI Landing distance, OEI climb gradient up to 200 ft and 1000 ft above the Take-off and Landing surface) are applicable if the selected weight does not exceed the weight defined by the CAT A WAT chart for the selected procedure.
- The weight is the lesser of:
  - — that prescribed by the applicable CAT A WAT chart for the selected procedure;

    or

  - — that prescribed by the applicable CAT A WAT chart for the selected procedure as modified to ensure that the distances required do not exceed the distances declared, and prescribed obstacle clearances are achieved;

    or

  - — that required for obstacle clearance in the first and second segment (from 35 ft to 200 ft and from 200 ft to 1000 ft).
- The heliport/helideck must have been surveyed to establish the obstacle environment and facilities.

B) Performance Class 2 without exposure(safe forced landing capability required)

- The Normal and Emergency procedures, as defined in Supplement 12 and 50 or Supplement 90 and 97 for the selected Take-Off and Landing profiles, remain valid.

- The weight shall be the lesser of:

  — the maximum certified weight

  or

  — that prescribed by the second segment minimum Rate of Climb OEI (150 fpm at 1000 ft above the Take-Off and Landing surface) as provided in the Basic Flight Manual

  or

  — that required by the obstacle clearance in the second segment (from 200 ft to 1000 ft above the Take-Off and Landing surface)

  or

  — in the case of elevated heliport or helideck that which provides deck edge clearance i.e. the weight prescribed by the CAT A WAT chart for the selected procedure.

- The helideck/heliport must have the size required for a safe-forced-landing.

- The surface surrounding the heliport/helideck shall permit a safe-forced-landing (in the case of helidecks, the Sea State must be at or less than Sea State 4).

C) Performance Class 2 with exposure (no safe forced landing capability).

- The Normal and Emergency procedures, as defined in Supplement 12 and 50 or Supplement 90 and 97 for the selected Take–Off and Landing profiles, remain valid.

- The weight shall be the lesser of:
  - — the maximum certified weight

    or

  - — the AEO HOGE weight in still air at the AEO TOP

    or

  - — that prescribed by the second segment minimum Rate of Climb OEI (150 fpm at 1000 ft above the Take-Off and Landing surface) as provided in the Basic Flight Manual

    or

  - — that required by the obstacle clearance in the second segment (from 200 ft to 1000 ft above the Take-Off and Landing surface)
- These operations must be approved by the competent Authority

D) Performance Class 2 Enhanced (operations to / from a helideck)

- The Normal and Emergency procedures, as defined in Supplement 12 and 50 or Supplement 90 and 97 for the Offshore Helideck profile, remain valid
- The weight shall be the lesser of:
  - — that prescribed by the CAT A WAT chart applicable to the selected procedure

    or

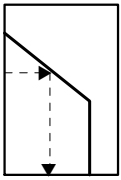
  - — that which provides drop down appropriate to the helideck height

    or

  - — that which allows the required obstacle clearance in the first and second segment (from 35 ft to 200 ft and from 200 ft to 1000 ft)
- The heliport/helideck must have the size required for a safe-forced-landing
- These operations must be approved by the Competent Authority

HOVER CEILING CHARTS AT 102% NR

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO



ROTOR SPEED: 102%
ZERO WIND
ELECTRICAL LOAD: 600 A

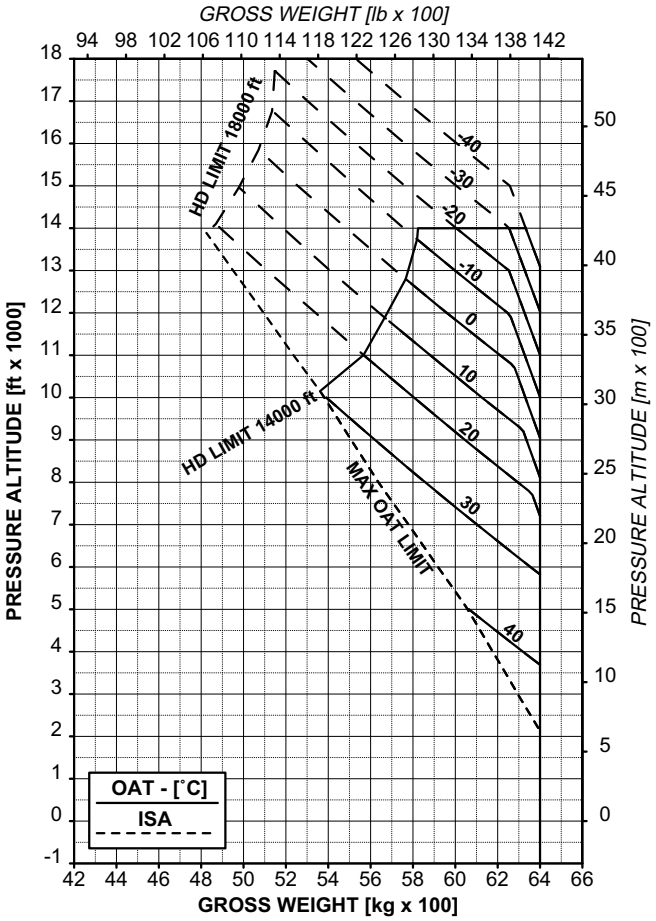


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Figure 9-117 Hover Ceiling OGE at TOP and 102% NR for Weights up to 6400 kg

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 102%
ZERO WIND

ELECTRICAL LOAD: 600 A

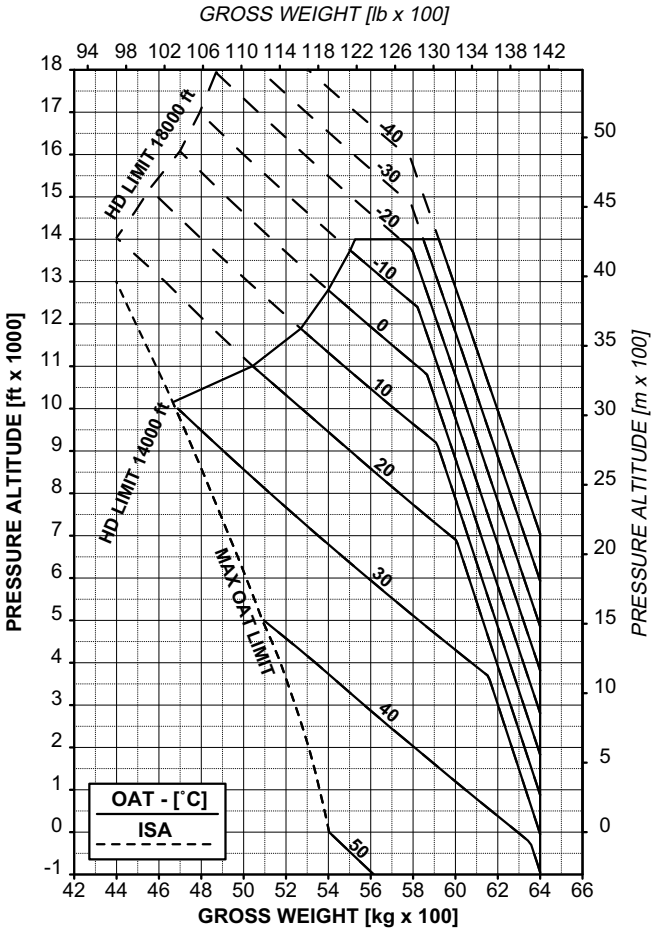

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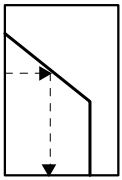
Figure 9-118 Hover Ceiling OGE at MCP and 102% NR for Weights up to 6400 kg

HOVER CEILING OUT OF GROUND EFFECT
TAKE OFF POWER AEO



ROTOR SPEED: 102%
ZERO WIND
ELECTRICAL LOAD: 600 A

COND ON: reduce weight by 50 kg

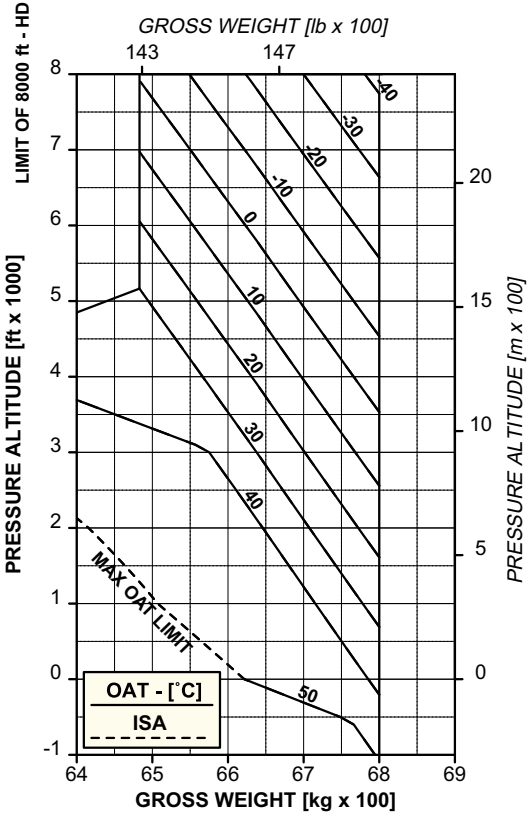


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Figure 9-119 Hover Ceiling OGE at TOP and 102% NR for Weights up to 6800 kg

HOVER CEILING OUT OF GROUND EFFECT
MAXIMUM CONTINUOUS POWER AEO

ROTOR SPEED: 102%
ZERO WIND
COND ON: reduce weight by 50 kg

ELECTRICAL LOAD: 600 A

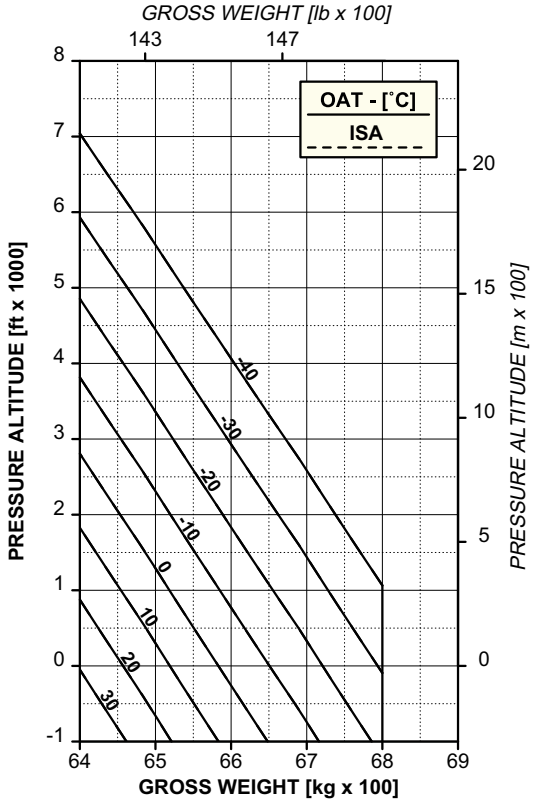

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Figure 9-120 Hover Ceiling OGE at MCP and 102% NR for Weights up to 6800 kg

NOISE CHARACTERISTICS AT 102% NR

The following data is not requested by the requirement, but included as Manufacturer's Data

Model: AW139 Engine Pratt and Whitney PT6C-67C Gross Weight 6400 kg		
Configuration	Take Off EPNL (EPNdB)	Approach EPNL (EPNdB)
Clean aircraft No external kits installed	102%NR 91.0	102%NR 93.5

Model: AW139 Engine Pratt and Whitney PT6C-67C Gross Weight 6800 kg		
Configuration	Take Off EPNL (EPNdB)	Approach EPNL (EPNdB)
Clean aircraft No external kits installed	102%NR 90.8	102%NR 94.6

TURN RADIUS INFORMATION

The aircraft Turn Radius in calm air with respect to Angle of Bank and True Airspeed can be calculated using the chart in Figure 9-121.

Example

Wanted	Turn Radius.
Known	TAS: 100 kt Angle of Bank: 15°
Method	Select the chart in Figure 9-121, on the bottom axis from 100 kt move up vertically to intersect the 15° line then move horizontally left to read a Turn Radius of 0.55 nm.

TURN RADIUS

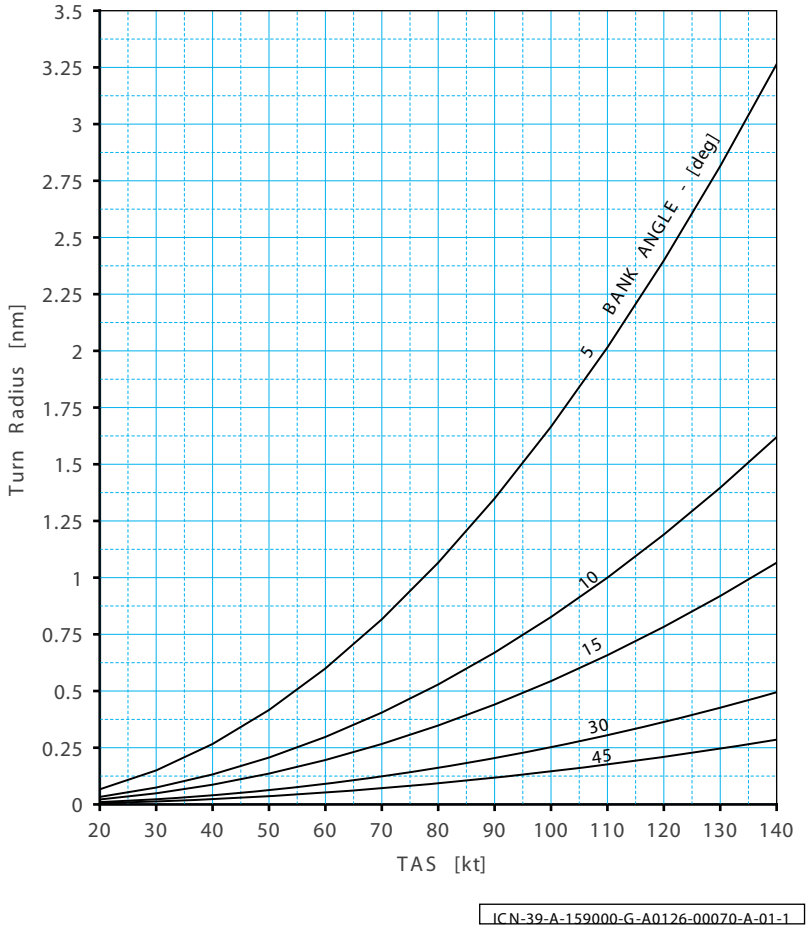

Figure 9-121 Aircraft Turn Radius

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