MEU

PREVIOUS

VOLUME 1

VOLUME 2

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LEGACY® 600

BY EMBRAER

AIRPLANE OPERATIONS MANUAL
VOLUME 1

EMBRAER S.A.

This manual is applicable to the Legacy 600 airplanes all models equipped with AE3007A1E engines and operating under FAA certification.

NOTE: THE EMB-135BJ MODEL HAS THE COMMERCIAL DESIGNATION OF LEGACY 600 OR LEGACY 650.

THIS PUBLICATION IS INCOMPLETE WITHOUT AIRPLANE OPERATIONS MANUAL AOM–135/1542 VOLUME 2

AOM–135/1542-07

NOVEMBER 30, 2001

REVISION 23 – MAY 18, 2021

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LEGACY

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Airplane Operations Manual
AOM–135/1542

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Please use this Customer Comment Form to notify us of any discrepancies or problems you find in the Airplane Operations Manual. We would also welcome constructive suggestions on how we can further improve our documentation or service.

Your feedback will be acknowledged, and we will advise you of the action we intend to take.

Sincerely,
Embraer Executive Flight Operations Support

Please return this form to:

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São José dos Campos - SP - BRASIL

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Airplane Operations Manual
AOM–135/1542

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HIGHLIGHTS OF CHANGE

REVISION 23 – MAY 18, 2021

- 1-00-10 code 01 Standadized the terminology for the cockpit controls and indications.
- 1-01-10 code 02 Standadized the terminology for the cockpit controls and indications.
- 1-01-30 code 01 Standadized the terminology for the cockpit controls and indications.
  Editorial Changes.
- 1-01-36 code 02 Standadized the terminology for the cockpit controls and indications.
  Editorial Changes.
- 1-01-50 code 03 Standadized the terminology for the cockpit controls and indications.
- 1-01-56 code 02 Standadized the terminology for the cockpit controls and indications.
- 1-01-60 code 02 Standadized the terminology for the cockpit controls and indications.
- 1-01-60 code 06 Standadized the terminology for the cockpit controls and indications.
- 1-01-65 code 01 Removed Windshield Rain Repellent Coating Code.
  Editorial Changes.
- 1-01-70 code 02 Updated Steep Appproach Operation SB effectivity.
  Editorial changes.
- 1-02-00 code 02 Updated Table of Contents.

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- 1-02-01 code 01 — Included "if applicable" expression for airplanes that do not have windshield wipers installed.
  Revised Normal Procedures to reflect the best practices and harmonized with SOP.
  Standadized the terminology for the cockpit controls and indications.

- 1-02-05 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP.
  Standadized the terminology for the cockpit controls and indications.

- 1-02-09 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP.
  Standadized the terminology for the cockpit controls and indications.

- 1-02-13 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP.
  Standadized the terminology for the cockpit controls and indications.

- 1-02-17 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP.
  Standadized the terminology for the cockpit controls and indications.

- 1-02-21 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP.
  Standadized the terminology for the cockpit controls and indications.

- 1-02-25 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP.
  Standadized the terminology for the cockpit controls and indications.

- 1-02-27 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP.
  Standadized the terminology for the cockpit controls and indications.

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- 1-02-29 code 01 Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-33 code 01 Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-37 code 01 Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-40 code 01 Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-45 code 01 Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-47 code 01 New section for Climb and Cruise Procedures.
- 1-02-49 code 01 Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-57 code 01 Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-59 code 01 Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.

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- 1-02-61 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-69 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-73 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-77 code 01 — Revised Normal Procedures to reflect the best practices and harmonized with SOP. Standadized the terminology for the cockpit controls and indications.
- 1-02-78 code 01 — Standadized the terminology for the cockpit controls and indications.
- 1-02-79 code 01 — Standadized the terminology for the cockpit controls and indications. Corrected a typo in the CLR/I INOP1 (2) messages.
- 1-02-80 code 01 — Standadized the terminology for the cockpit controls and indications.
- 1-02-81 code 01 — Deleted block. Remove and discard block 1-02-81 code 01 from your manual.
- 1-02-82 code 01 — Normal Procedures harmonization.
- 1-02-83 code 01 — Standadized the terminology for the cockpit controls and indications.
- 1-02-84 code 02 — Standadized the terminology for the cockpit controls and indications.
- 1-02-85 code 01 — Normal Procedures harmonization.

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- 1-02-86 code 01 Standadized the terminology for the cockpit controls and indications.
- 1-02-87 code 01 Normal Procedures harmonization.
- 1-02-91 code 01 Normal Procedures harmonization.
- 1-02-92 code 01 Standadized the terminology for the cockpit controls and indications.
- 1-02-93 code 03 Normal Procedures harmonization.
- 1-02-95 code 01 Normal Procedures harmonization.
- 1-02-97 code 01 Standadized the terminology for the cockpit controls and indications.
- 1-02-99 code 01 Standadized the terminology for the cockpit controls and indications.
- 1-03-00 code 02 Updated Table of Contents.
- 1-03-02 code 02 Updated Lavatory Smoke Procedure.
- 1-03-32 code 02 Corrected a typo in the GEN1 (2, 3, 4) BRG FAIL messages.
- 1-03-44 code 01 Included "if applicable" expression for airplanes that do not have windshield wipers installed.
  Corrected a typo in the CLR/I INOP1 (2) messages.
- 1-03-48 code 02 Corrected a typo in the RAAS NOT AVAIL message.
- 1-04-15 code 02 Updated information about Operation in Contamined Runways.
- 1-04-30 code 02 Updated information regarding UNFACTORED LANDING DISTANCES.

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- 1-05-35 code 01 — Updated information about SPEED SCHEDULE KIAS/MACH.
  Included information about GP-3763 - 180-MINUTE DIVERSION WITH ONE ENGINE INOPERATIVE.
- 1-07-60 code 01 — Included a NOTE about baggage compartment limits.
- 1-10-20 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-02-65 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-02-70 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-02-70 code 03 — Deleted block. Remove and discard block 2-02-70 code 03 from your manual.
- 2-02-85 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-04-00 code 01 — Updated Table of Contents.
- 2-04-05 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-04-10 code 01 — Corrected a typo in the CLR/I INOP1 (2) messages.
  Improved figures design.
- 2-04-13 code 01 — Updated CAS MSG (CAS MESSAGE) description.

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- 2-04-20 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-04-25 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-04-30 code 01 — Updated ALTITUDE CALLOUTS Table and Inserted applicability.
  Standadized the terminology for the cockpit controls and indications.
- 2-04-40 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-04-45 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-04-55 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-05-05 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-05-10 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-05-15 code 01 — Corrected a typo in the GEN1 (2, 3, 4) BRG FAIL messages.
  Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-05-20 code 01 — Updated DC Bus Load Distribution.
- 2-06-00 code 01 — Updated Table of Contents.

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- 2-06-05 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-06-10 code 01 Standadized the terminology for the cockpit controls and indications.
- 2-06-15 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-06-20 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-07-05 code 01 Included "if applicable" expression for airplanes that do not have smoke detection system dedicated to the Lavatory.
- 2-07-10 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-07-20 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-08-05 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-09-05 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
  Updated NOTE about EICAS Indications.
- 2-10-60 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-11-05 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.

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- 2-12-05 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-12-10 code 01 Standadized the terminology for the cockpit controls and indications.
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- 2-13-00 code 01 Updated Table of Contents.
- 2-13-10 code 01 Standadized the terminology for the cockpit controls and indications.
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- 2-13-15 code 01 Standadized the terminology for the cockpit controls and indications.
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  Improved figures design.
- 2-13-25 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-13-30 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-13-35 code 01 Improved figures design.
- 2-14-10 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-14-15 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.

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- 2-15-10 code 01 — Corrected a typo in the CLR/I INOP1 (2) messages.
  Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-16-15 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-16-25 code 01 — Updated oxygen duration table description.
- 2-17-25 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-18-00 code 01 — Updated Table of Contents.
- 2-18-11 code 01 — Improved figures design.
- 2-18-15 code 01 — Improved figures design.
- 2-18-24 code 01 — Improved figures design.
- 2-18-25 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-18-27 code 01 — Standadized the terminology for the cockpit controls and indications.
  Improved figures design.
- 2-18-28 code 01 — Improved figures design.
- 2-18-29 code 01 — Improved figures design.
- 2-18-30 code 01 — Improved figures design.
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  Improved figures design.

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- 2-18-55 code 01 Updated FANS 1A+ effectivity.
  Improved figures design.
- 2-18-58 code 01 New section about Satellite-based Augmentation System (SBAS).
- 2-18-60 code 01 Improved figures design.
- 2-18-70 code 01 Updated LPV description.
- 2-19-15 code 01 Standadized the terminology for the cockpit controls and indications.
  Improved figures design.

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NOTE: The references to the deleted pages from the previous revisions (revision 22 and earlier) were removed from the LEP.

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1-01-60	1	02			REVISION 22	FAA FMS FMZ2000
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1-01-65	1	01	*		REVISION 23	ANAC/FAA CAT II
1-01-65	2	01	*		REVISION 23	
1-01-70	1	02	*		REVISION 23	Legacy 600 FAA Steep App
1-01-70	2	02	*		REVISION 23	
1-01-75	1	01			REVISION 16	Legacy 600 Tires With Low Press
1-01-75	2	01			REVISION 16	
1-01-80	1	01			REVISION 20	Legacy 600 RVSM
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1-01-85	1	01			REVISION 18	RAAS
1-01-85	2	01			REVISION 18	
1-01-87	1	01			REVISION 19	Legacy 600 Long Range Operation
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1-02-00	1	02	*		REVISION 23	FAA
1-02-00	2	02	*		REVISION 23	
1-02-00	3	02	*		REVISION 23	
1-02-00	4	02	*		REVISION 23	
1-02-00	5	02	*	del	REVISION 23	
1-02-00	6	02	*	del	REVISION 23	
1-02-01	1	01	*		REVISION 23	ALL
1-02-01	2	01	*		REVISION 23	
1-02-01	3	01	*		REVISION 23	
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1-02-05	7	01	*	new	REVISION 23	
1-02-05	8	01	*	new	REVISION 23	
1-02-05	9	01	*	new	REVISION 23	
1-02-05	10	01	*	new	REVISION 23	
1-02-05	11	01	*	new	REVISION 23	
1-02-05	12	01	*	new	REVISION 23	
1-02-05	13	01	*	new	REVISION 23	
1-02-05	14	01	*	new	REVISION 23	
1-02-05	15	01	*	new	REVISION 23	
1-02-05	16	01	*	new	REVISION 23	
1-02-09	1	01	*		REVISION 23	ALL
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1-02-09	3	01	*		REVISION 23	
1-02-09	4	01	*		REVISION 23	
1-02-09	5	01	*		REVISION 23	
1-02-09	6	01	*		REVISION 23	
1-02-09	7	01	*	new	REVISION 23	
1-02-09	8	01	*	new	REVISION 23	
1-02-13	1	01	*		REVISION 23	ALL
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1-02-13	7	01	*		REVISION 23	
1-02-13	8	01	*		REVISION 23	
1-02-13	9	01	*		REVISION 23	
1-02-13	10	01	*		REVISION 23	
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1-02-13	16	01	*	new	REVISION 23	
1-02-17	1	01	*		REVISION 23	Legacy 600
1-02-17	2	01	*		REVISION 23	
1-02-17	3	01	*		REVISION 23	
1-02-17	4	01	*		REVISION 23	
1-02-17	5	01	*		REVISION 23	
1-02-17	6	01	*		REVISION 23	
1-02-17	7	01	*		REVISION 23	
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1-02-17	15	01	*	new	REVISION 23	
1-02-17	16	01	*	new	REVISION 23	
1-02-17	17	01	*	new	REVISION 23	
1-02-17	18	01	*	new	REVISION 23	
1-02-21	1	01	*		REVISION 23	ALL
1-02-21	2	01	*		REVISION 23	
1-02-21	3	01	*		REVISION 23	
1-02-21	4	01	*		REVISION 23	
1-02-21	5	01	*	new	REVISION 23	
1-02-21	6	01	*	new	REVISION 23	
1-02-25	1	01	*		REVISION 23	ALL
1-02-25	2	01	*		REVISION 23	
1-02-25	3	01	*	del	REVISION 23	
1-02-25	4	01	*	del	REVISION 23	
1-02-27	1	01	*		REVISION 23	Legacy 600
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1-02-27	3	01	*	new	REVISION 23	
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1-02-27	6	01	*	new	REVISION 23	
1-02-27	7	01	*	new	REVISION 23	
1-02-27	8	01	*	new	REVISION 23	
1-02-29	1	01	*		REVISION 23	Legacy 600
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1-02-29	3	01	*	new	REVISION 23	
1-02-29	4	01	*	new	REVISION 23	
1-02-29	5	01	*	new	REVISION 23	
1-02-29	6	01	*	new	REVISION 23	
1-02-33	1	01	*		REVISION 23	Legacy 600
1-02-33	2	01	*		REVISION 23	
1-02-33	3	01	*		REVISION 23	
1-02-33	4	01	*		REVISION 23	
1-02-37	1	01	*		REVISION 23	ALL
1-02-37	2	01	*		REVISION 23	
1-02-40	1	01	*		REVISION 23	ALL
1-02-40	2	01	*		REVISION 23	
1-02-45	1	01	*		REVISION 23	Legacy 600
1-02-45	2	01	*		REVISION 23	
1-02-47	1	01	*	new	REVISION 23	ALL
1-02-47	2	01	*	new	REVISION 23	
1-02-49	1	01	*		REVISION 23	ALL
1-02-49	2	01	*		REVISION 23	
1-02-49	3	01	*	new	REVISION 23	
1-02-49	4	01	*	new	REVISION 23	
1-02-49	5	01	*	new	REVISION 23	
1-02-49	6	01	*	new	REVISION 23	
1-02-57	1	01	*		REVISION 23	Legacy 600
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1-02-61	1	01	*		REVISION 23	ALL
1-02-61	2	01	*		REVISION 23	
1-02-69	1	01	*		REVISION 23	ALL
1-02-69	2	01	*		REVISION 23	
1-02-69	3	01	*	new	REVISION 23	
1-02-69	4	01	*	new	REVISION 23	
1-02-73	1	01	*		REVISION 23	ALL
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1-02-73	3	01	*		REVISION 23	
1-02-73	4	01	*		REVISION 23	
1-02-77	1	01	*		REVISION 23	ALL
1-02-77	2	01	*		REVISION 23	
1-02-78	1	01	*		REVISION 23	ANAC/FAA
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1-02-79	1	01	*		REVISION 23	Legacy 600
1-02-79	2	01	*		REVISION 23	
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1-02-79	11	01	*		REVISION 23	
1-02-79	12	01	*		REVISION 23	
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1-02-79	37	01	*	new	REVISION 23	
1-02-79	38	01	*	new	REVISION 23	
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1-02-80	1	01	*		REVISION 23	ANAC/FAA
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1-02-81	6	01	*	del	REVISION 23	
1-02-82	1	01	*		REVISION 23	ALL
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1-02-83	1	01	*		REVISION 23	ANAC/FAA CAT II
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1-02-84	1	02	*		REVISION 23	Legacy 600 FAA Steep App
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1-02-85	1	01	*		REVISION 23	ALL
1-02-85	2	01	*		REVISION 23	
1-02-86	1	01	*		REVISION 23	ALL
1-02-86	2	01	*		REVISION 23	
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1-02-95	3	01	*		REVISION 23	
1-02-95	4	01	*		REVISION 23	
1-02-95	5	01	*		REVISION 23	
1-02-95	6	01	*		REVISION 23	
1-02-97	1	01	*		REVISION 23	ALL
1-02-97	2	01	*		REVISION 23	
1-02-99	1	01	*		REVISION 23	ALL
1-02-99	2	01	*		REVISION 23	
1-03-00	1	02	*		REVISION 23	Legacy 600 FAA
1-03-00	2	02	*		REVISION 23	
1-03-00	3	02	*		REVISION 23	
1-03-00	4	02	*		REVISION 23	
1-03-02	1	02	*		REVISION 23	FAA
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1-03-08	1	01			REVISION 19	Legacy 600 FAA
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1-03-08	3	01			REVISION 19	
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1-03-12	1	02	REVISION 19	Legacy 600 FAA
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1-03-12	3	02	REVISION 17	
1-03-12	4	02	REVISION 18	
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1-03-14	7	02	REVISION 15	
1-03-14	8	02	REVISION 19	
1-03-16	1	02	REVISION 16	Legacy 600 FAA
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1-03-18	1	01	REVISION 15	ANAC/FAA
1-03-18	2	01	REVISION 15	
1-03-20	1	01	REVISION 22	ANAC/FAA
1-03-20	2	01	REVISION 22	
1-03-22	1	01	JAN 17, 2003	ANAC/FAA
1-03-22	2	01	NOV 30, 2001	
1-03-24	1	02	REVISION 15	FAA
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1-03-24	3	02	REVISION 18	
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1-03-26	1	02	REVISION 19	FAA
1-03-26	2	02	REVISION 19	
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1-03-26	8	02		REVISION 19	
1-03-26	9	02		REVISION 19	
1-03-26	10	02		REVISION 19	
1-03-26	11	02		REVISION 19	
1-03-26	12	02		REVISION 19	
1-03-28	1	01		REVISION 18	ANAC/FAA
1-03-28	2	01		REVISION 18	
1-03-30	1	01		REVISION 22	FAA
1-03-30	2	01		REVISION 22	
1-03-30	3	01		REVISION 22	
1-03-30	4	01		REVISION 22	
1-03-30	5	01		REVISION 22	
1-03-30	6	01		REVISION 22	
1-03-32	1	02	*	REVISION 23	FAA
1-03-32	2	02	*	REVISION 23	
1-03-32	3	02	*	REVISION 23	
1-03-32	4	02	*	REVISION 23	
1-03-32	5	02	*	REVISION 23	
1-03-32	6	02	*	REVISION 23	
1-03-34	1	02		REVISION 15	FAA
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1-03-34	5	02		REVISION 15	
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1-03-34	9	02		REVISION 19	
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1-03-34	11	02		REVISION 19	
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1-03-38	1	02		REVISION 15	FAA
1-03-38	2	02		REVISION 15	
1-03-38	3	02		REVISION 15	
1-03-38	4	02		REVISION 19	
1-03-38	5	02		REVISION 19	
1-03-38	6	02		REVISION 19	
1-03-38	7	02		REVISION 19	
1-03-38	8	02		REVISION 19	
1-03-40	1	01		REVISION 22	Legacy 600 ANAC/FAA
1-03-40	2	01		REVISION 22	
1-03-40	3	01		REVISION 22	
1-03-40	4	01		REVISION 22	
1-03-40	5	01		REVISION 22	
1-03-40	6	01		REVISION 22	
1-03-40	7	01		REVISION 22	
1-03-40	8	01		REVISION 22	
1-03-40	9	01		REVISION 22	
1-03-40	10	01		REVISION 22	
1-03-42	1	02		REVISION 22	Legacy 600 FAA
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1-04-30	94	02	REVISION 20	
1-05-00	1	08	REVISION 21	Legacy 600 CONFIG D lb
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1-05-05	1	08	REVISION 21	Legacy 600 CONFIG D lb
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1-05-05	6	08	REVISION 21	
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1-05-07	1	02	REVISION 16	A1P/A1E/A2 lb
1-05-07	2	02	REVISION 16	
1-05-10	1	08	REVISION 21	Legacy 600 CONFIG D lb
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1-05-10	10	08	REVISION 20	
1-05-10	11	08	REVISION 20	
1-05-10	12	08	REVISION 20	
1-05-10	13	08	REVISION 20	
1-05-10	14	08	REVISION 20	
1-05-10	15	08	REVISION 20	
1-05-10	16	08	REVISION 20	
1-05-10	17	08	REVISION 20	
1-05-10	18	08	REVISION 20	
1-05-10	19	08	REVISION 20	
1-05-10	20	08	REVISION 20	
1-05-15	1	08	REVISION 21	CONFIG D lb
1-05-15	2	08	REVISION 21	
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1-05-15	4	08	REVISION 21	
1-05-15	5	08	REVISION 21	
1-05-15	6	08	REVISION 21	
1-05-15	7	08	REVISION 21	
1-05-15	8	08	REVISION 21	
1-05-15	9	08	REVISION 21	
1-05-15	10	08	REVISION 21	
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1-05-15	27	08	REVISION 21	
1-05-15	28	08	REVISION 21	
1-05-15	29	08	REVISION 21	
1-05-15	30	08	REVISION 21	
1-05-15	31	08	REVISION 21	
1-05-15	32	08	REVISION 21	
1-05-15	33	08	REVISION 21	
1-05-15	34	08	REVISION 21	
1-05-15	35	08	REVISION 21	
1-05-15	36	08	REVISION 21	
1-05-15	37	08	REVISION 21	
1-05-15	38	08	REVISION 21	
1-05-15	39	08	REVISION 21	
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1-05-30	10	11		REVISION 21	
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1-05-30	14	11		REVISION 21	
1-05-35	1	01	*	REVISION 23	CONFIG D/A1E FAA
1-05-35	2	01	*	REVISION 23	
1-05-35	3	01	*	REVISION 23	
1-05-35	4	01	*	REVISION 23	
1-06-00	1	01		REVISION 20	Legacy 600
1-06-00	2	01		REVISION 20	
1-06-10	1	01		REVISION 20	ALL
1-06-10	2	01		REVISION 20	
1-06-10	3	01		REVISION 20	
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1-06-20	1	02		REVISION 20	Legacy 600 lb
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1-06-20	6	02		REVISION 20	
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1-06-25	24	01	REVISION 20	
1-06-25	25	01	REVISION 20	
1-06-25	26	01	REVISION 20	
1-06-25	27	01	REVISION 20	
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1-06-25	32	01	REVISION 20	
1-06-25	33	01	REVISION 20	
1-06-25	34	01	REVISION 20	
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1-06-25	47	01	REVISION 20	
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1-06-25	49	01	REVISION 20	
1-06-25	50	01	REVISION 20	
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1-06-25	53	01	REVISION 20	
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1-06-25	55	01	REVISION 20	
1-06-25	56	01	REVISION 20	
1-06-25	57	01	REVISION 20	
1-06-25	58	01	REVISION 20	
1-06-25	59	01	REVISION 20	
1-06-25	60	01	REVISION 20	
1-06-25	61	01	REVISION 20	
1-06-25	62	01	REVISION 20	
1-06-25	63	01	REVISION 20	
1-06-25	64	01	REVISION 20	
1-06-25	65	01	REVISION 20	
1-06-25	66	01	REVISION 20	
1-06-25	67	01	REVISION 20	
1-06-25	68	01	REVISION 20	
1-06-30	1	02	REVISION 20	Legacy 600 lb
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1-07-00	1	01		REVISION 18	ALL
1-07-00	2	01		REVISION 18	
1-07-10	1	01		NOV 30, 2001	ALL
1-07-10	2	01		NOV 30, 2001	
1-07-10	3	01		NOV 30, 2001	
1-07-10	4	01		NOV 30, 2001	
1-07-20	1	01		NOV 30, 2001	ALL
1-07-20	2	01		NOV 30, 2001	
1-07-40	1	01		NOV 30, 2001	ALL
1-07-40	2	01		NOV 30, 2001	
1-07-50	1	01		NOV 30, 2001	ALL
1-07-50	2	01		NOV 30, 2001	
1-07-60	1	01	*	REVISION 23	ALL
1-07-60	2	01		REVISION 20	
1-07-60	3	01		REVISION 20	
1-07-60	4	01		REVISION 20	
1-07-70	1	01		NOV 30, 2001	ALL
1-07-70	2	01		NOV 30, 2001	
1-07-70	3	01		NOV 30, 2001	
1-07-70	4	01		NOV 30, 2001	
1-07-80	1	01		REVISION 9	ALL
1-07-80	2	01		ORIGINAL	
1-08-00	1	02		REVISION 20	FAA
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1-08-00	3	02		REVISION 20	
1-08-00	4	02		REVISION 20	
1-08-06	1	02		REVISION 17	FAA
1-08-06	2	02		REVISION 17	
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1-08-28	1	02	REVISION 17	FAA
1-08-28	2	02	REVISION 17	
1-08-28	3	02	REVISION 17	
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1-08-32	1	02	REVISION 20	FAA
1-08-32	2	02	REVISION 20	
1-08-33	1	02	JAN 17, 2003	FAA
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1-08-49	1	02	JAN 17, 2003	FAA
1-08-49	2	02	JAN 17, 2003	
1-08-52	1	02	JAN 17, 2003	FAA
1-08-52	2	02	JAN 17, 2003	
1-08-54	1	02	REVISION 6	FAA
1-08-54	2	02	REVISION 3	
1-08-54	3	02	JAN 17, 2003	
1-08-54	4	02	JAN 17, 2003	
1-08-55	1	02	JAN 17, 2003	FAA
1-08-55	2	02	JAN 17, 2003	
1-08-55	3	02	JAN 17, 2003	
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1-08-55	6	02	JAN 17, 2003	
1-08-55	7	02	JAN 17, 2003	
1-08-55	8	02	JAN 17, 2003	
1-08-57	1	02	JAN 17, 2003	FAA
1-08-57	2	02	JAN 17, 2003	
1-08-78	1	02	REVISION 6	FAA
1-08-78	2	02	REVISION 6	
1-09-01	1	01	REVISION 21	ALL
1-09-01	2	01	REVISION 21	
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1-10-05	5	01		REVISION 15	
1-10-05	6	01		REVISION 15	
1-10-05	7	01		REVISION 15	
1-10-05	8	01		REVISION 15	
1-10-05	9	01		REVISION 15	
1-10-05	10	01		REVISION 15	
1-10-08	1	01		NOV 30, 2001	ALL
1-10-08	2	01		NOV 30, 2001	
1-10-10	1	01		NOV 30, 2001	ALL
1-10-10	2	01		NOV 30, 2001	
1-10-15	1	01		REVISION 22	ALL
1-10-15	2	01		REVISION 22	
1-10-20	1	01		REVISION 21	ALL
1-10-20	2	01		REVISION 21	
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1-10-20	7	01		REVISION 21	
1-10-20	8	01		REVISION 21	
1-10-25	1	01		NOV 30, 2001	ALL
1-10-25	2	01		NOV 30, 2001	
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1-11-00	1	01		REVISION 18	ALL
1-11-00	2	01		REVISION 18	
1-11-05	1	01		REVISION 19	FAA
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1-11-40	6	01	NOV 30, 2001	
1-11-40	7	01	NOV 30, 2001	
1-11-40	8	01	NOV 30, 2001	
1-11-45	1	01	NOV 30, 2001	ALL
1-11-45	2	01	NOV 30, 2001	
1-11-45	3	01	NOV 30, 2001	
1-11-45	4	01	NOV 30, 2001	
1-12-00	1	01	REVISION 22	ALL
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1-12-05	5	01	REVISION 22	
1-12-05	6	01	REVISION 22	
1-12-05	7	01	REVISION 22	
1-12-05	8	01	REVISION 22	
1-12-10	1	01	REVISION 19	ALL
1-12-10	2	01	REVISION 19	
1-12-10	3	01	REVISION 19	
1-12-10	4	01	REVISION 19	
1-12-10	5	01	REVISION 19	
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1-12-20	7	01	REVISION 20	
1-12-20	8	01	REVISION 20	
1-12-20	9	01	REVISION 20	
1-12-20	10	01	REVISION 20	
1-12-20	11	01	REVISION 20	
1-12-20	12	01	REVISION 20	
1-12-20	13	01	REVISION 20	
1-12-20	14	01	REVISION 20	
1-12-20	15	01	REVISION 20	
1-12-20	16	01	REVISION 20	
1-12-20	17	01	REVISION 20	
1-12-20	18	01	REVISION 20	
1-12-20	19	01	REVISION 20	
1-12-20	20	01	REVISION 20	
1-12-25	1	01	REVISION 20	Legacy 600
1-12-25	2	01	REVISION 20	
1-12-25	3	01	REVISION 20	
1-12-25	4	01	REVISION 20	
1-12-25	5	01	REVISION 20	
1-12-25	6	01	REVISION 20	
1-12-25	7	01	REVISION 20	
1-12-25	8	01	REVISION 20	
1-12-25	9	01	REVISION 20	
1-12-25	10	01	REVISION 20	
1-12-25	11	01	REVISION 20	
1-12-25	12	01	REVISION 20	
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1-12-25	22	01	REVISION 20	
1-12-25	23	01	REVISION 20	
1-12-25	24	01	REVISION 20	
1-12-25	25	01	REVISION 20	
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SECTION 1-00

GENERAL INFORMATION AND DEFINITION OF TERMS

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GENERAL INFORMATION

This Airplane Operations Manual provides useful information to complement the Airplane Flight Manual, Weight and Balance Manual and the Master Minimum Equipment List. It must be used in conjunction with those publications to safe and efficiently operate all the EMB-135BJ models.

Any difference found between the data in the Airplane Operations Manual and the approved Manuals is due to airplane modifications and scheduling of amendments to publications. In the event of such a difference, the data in the approved manuals must prevail.

The Airplane Operations Manual philosophy and structure are described on the next pages.

In the EMBRAER Operational Manuals, the Brazilian Civil Aviation authority is identified as both ANAC and CTA. Therefore, whenever you find either, it corresponds to Brazilian certification. This is because since March 26, 2006, the Brazilian Civil Aviation authority was replaced by Civil Aviation National Agency (ANAC) instead of CTA.

Similarly, the European Aviation Safety Agency (EASA) co-exists with JAA. So, from now on, you may find JAA/EASA or just JAA, with both corresponding to European certification.

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OPERATIONAL REQUIREMENTS AND THE AIRPLANE OPERATIONS MANUAL

The existence of fleets composed by different airplanes or by airplanes made by different manufacturers, led the Airworthiness Authorities to require operators' manuals certification, when applicable, in addition to the airplane's certification.

The idea is to standardize manuals, training and operation, so as to make it easier for a pilot to change equipment. For instance, if a pilot used to fly an EMB-145 is scheduled to fly an EMB-135 BJ, the training syllabus from the EMB-135 BJ has to be very similar to the ones for the EMB-145; the operator normal, abnormal and emergency procedures must be quite similar when different of the associated AFM, as well as the manuals for the airplanes. By doing so, the operator will assure that human factors/errors are minimized.

The operational requirements may define the main subjects that must be presented in an Airplane Operations Manual matter. However, even detailing the Airplane Operations Manual at that level, all the requirements let the operators free to use different Airplane Operations Manual structures, depending on the manuals that have been already issued. Therefore, EMBRAER has developed this Airplane Operations Manual to comply, in the best possible way, the most currently used requirements. By doing so, it is possible for an operator to use the EMBRAER Airplane Operations Manual, by just adding some missing information that is specific to that operator.

Following is a suggested Airplane Operations Manual structure to comply with most of the Operational Requirements:

PART A

Presents operator’s administrative information, such as who are the president , vice-president, the managers, who is the chief pilot for the EMB-135 BJ, who is the responsible for revising manuals, where the offices and bases are located, etc.

PART B

Presents airplane related information like procedures, performance, dispatch, Weight and Balance, bulletins and systems description.

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PART C

Presents the operator's airport and route information (performance and navigation).

PART D

Presents training information.

EMBRAER AIRPLANE OPERATIONS MANUAL

This EMBRAER Airplane Operations Manual covers only Part B. Parts A and D should be generated by the operator. Part C can be generated by the operator with the help of EMBRAER operational software (runway analysis, driftdown , and route analysis).

AIRPLANE OPERATIONS MANUAL STRUCTURE

The EMBRAER Airplane Operations Manual is organized in two volumes, with the following contents:

- Volume 1:
  - 1-00 General Information and Definition of Terms
  - 1-01 Limitations
  - 1-02 Normal Procedures
  - 1-03 Emergency and Abnormal Procedures
  - 1-04 Performance
  - 1-05 Flight Planning
  - 1-06 Weight and Balance
  - 1-07 Loading
  - 1-08 Configuration Deviation List
  - 1-09 Minimum Equipment List
  - 1-10 Emergency Information
  - 1-11 Emergency Evacuation
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- Volume 2:
  - 2-1 Airplane Description
  - 2-2 Equipment and Furnishings
  - 2-3 Emergency Equipment
  - 2-4 Crew Awareness
  - 2-5 Electrical
  - 2-6 Lighting
  - 2-7 Fire Protection
  - 2-8 Fuel
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  - 2-12 Landing Gear and Brakes
  - 2-13 Flight Controls
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  - 2-15 Ice and Rain Protection
  - 2-16 Oxygen
  - 2-17 Flight Instruments
  - 2-18 Navigation and Communication
  - 2-19 Autopilot

Each of the above sections may be divided into smaller parts, called blocks. Such blocks are identified by the number of the section followed by a two-digit number.

For example:

Section 1-04 can be divided as follows:

- 1-04-00 Introduction
- 1-04-05 Wind and altitude
- 1-04-10 Thrust Setting
- 1-04-15 Takeoff
- 1-04-20 Supplementary Takeoff
- 1-04-25 Approach
- 1-04-30 Landing

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The page numbering of each part is independent from the remaining parts. Each page number is presented just to the right of the block number.

As a complement, a code number is provided, to help to identify to which configuration each block is applicable. Some codes may be applicable to more than one configuration, whilst more than one code may be specific to one configuration.

As an example, there could be:

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REVISIONS

EMBRAER may revise this manual periodically as required to update information or to provide information not available at the time of printing the original issue. Revised data may result from EMBRAER approved airplane modifications or from improved techniques gained through operational experience. They are either replacements or additional pages. A vertical line in the outside margin indicates changes to the text.

A vertical line adjacent to the page number indicates relocated or rearranged text or illustrations.

The basic issuance date of this Manual is presented in the title page. The revisions affecting this Manual to be issued from the basic issuance date onwards, will be numbered sequentially (Rev. 1, 2, 3 etc.), even for such pages bearing those earlier revision-denoting symbols.

LIST OF EFFECTIVE PAGES

A list of Effective Pages for all Sections is located at the beginning of this Manual. This list presents the issuance date of each page and it is revised together with the Manual. Its purpose is to check if all the revised pages of a revision have been correctly sent to the purchaser.

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DEFINITION OF TERMS

The following definitions apply to the terms below:

WARNING: **OPERATING PROCEDURES, TECHNIQUES AND OTHER RELATED INFORMATION WHICH MAY RESULT IN PERSONAL INJURY OR LOSS OF LIFE, IF NOT FOLLOWED.**

CAUTION: OPERATING PROCEDURES, TECHNIQUES AND OTHER RELATED INFORMATION WHICH MAY RESULT IN DAMAGE OR DESTRUCTION OF EQUIPMENT, IF NOT FOLLOWED.

NOTE: Operating procedures, techniques and other related information which are considered essential to emphasize.

Legacy 600: EMB-135BJ equipped with FUS 1 and FUS 2 Fuselage Auxiliary Fuel Tanks and equipped with either two AE3007A1P or two AE3007A1E Engines.

Legacy 650: EMB-135BJ equipped with FUS 1, FUS 2 and VTRL Fuselage Auxiliary Fuel Tanks, equipped with two AE3007A2 Engines and with increased maximum structural design weights.

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ABBREVIATIONS AND ACRONYMS

ABBREVIATIONS OR ACRONYMS	MEANING
°C	Degree Celsius
°F	Degree Fahrenheit
ft	Feet
g	Gravity Acceleration
h	Hour
Hz	Hertz
in.Hg	Inches of Mercury
kg	Kilogram
km	Kilometer
kph	Kilograms per Hour
kt	Knot
lb	Pounds
m	Meter
mb	Milibar
min	Minute
mm	Millimeter
mph	Miles per Hour
NM	Nautical Mile
pph	Pounds per Hour
psi	Pound per Square Inch
sec	Second

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ABBREVIATIONS OR ACRONYMS	MEANING
A	
A	Ampere
A/C	Airplane
AC	Alternating Current
ACM	Air Cycle Machine
ACOC	Air Cooled Oil Cooler
ACT	Actuation, Active
ADC	Air Data Computer
ADF	Automatic Direction Finder
ADJ	Adjustment
ADV	Advance
AEO	All Engines Operating
AFM	Airplane Flight Manual
AFS	Autoflight System
AGL	Above Ground Level
AHC	Attitude and Heading Computer
AHRS	Attitude and Heading Reference System
AIL	Aileron
ALC	APU Line Contactor
ALT	Altitude
ALTN	Alternate
AM	Amplitude Modulation

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ABBREVIATIONS OR ACRONYMS	MEANING
ANAC	Agência Nacional de Aviação Civil (Brazilian Civil Aviation Authority)
ANR	Automatic Navigation Realignment
ANT	Antenna
AOA	Angle of Attack
AP	Autopilot
API	Antenna Position Indicator
APR	Automatic Power Reserve
APU	Auxiliary Power Unit
ASC	APU Starting Contactor
ATC	Air Traffic Control
ATDT, ATTD	Attendant
ATIS	Automatic Terminal Information Service
ATS	Air Turbine Starter
ATT	Attitude
ATTCS	Automatic Takeoff Thrust Control System
AUTO	Automatic
AUX	Auxiliary
AVAIL	Available
AWU	Aural Warning Unit
B	
B/C	Back Course

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ABBREVIATIONS OR ACRONYMS	MEANING
BACV	Bleed Air Check Valve
BAGG	Baggage
BATT	Battery
BBC	Backup Battery Contactor
BC	Battery Contactor
BCU	Brake Control Unit
BCV	Brake Control Valve
BEW	Basic Empty Weight
BFO	Beat Frequency Oscillator
BIT	Built In Test
BKUP INPH	Back-Up Interphone
BLD	Bleed
BTC	Bus Tie Contactor
BTL	Bottle
C	
CAB EMERG	Cabin Emergency
CAS	Calibrated Airspeed, Crew Alerting System
CBV	Cross Bleed Valve
CCDL	Cross-Channel Data Link
CCW	Counterclockwise
CDH	Clearance Delivery Head
CDL	Configuration Deviation List

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ABBREVIATIONS OR ACRONYMS	MEANING
CDU	Control Display Unit
CG	Center of Gravity
CIS	Cabin Interphone System
CL	Climb
CLB	Climb
CLR	Clear
CLSD	Closed
CMC	Central Maintenance Computer
COMM, COM	Communication
CON	Continuous
CPAM	Cabin Pressure Acquisition Module
CPCS	Cabin Pressure Control System
CR	Cruise
CRZ	Cruise
CVG	Compressor Variable Geometry
CVR	Cockpit Voice Recorder
CW	Clockwise
D	
DAP	Digital Audio Panel
DAU	Data Acquisition Unit
DC	Direct Current, Digital Controller
DEC	Decrease

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ABBREVIATIONS OR ACRONYMS	MEANING
DET	Detector
DFDR	Digital Flight Data Recorder
DG	Directional Gyro
DH	Decision Height
DISC	Disconnect
DME	Distance Measurement Equipment
DMU	Data Management Unit
DN	Down
E	
EADI	Electronic Attitude Director Indicator
EBC	Essential Bus Contactor
EBV	Engine Bleed Valve
ECM	Electronic Control Module
ECS	Environmental Control System
ECU	Environmental Control Unit
EDL	Electrical Distribution Logic
EDS	Electrical Distribution System
EDU	Electronic Display Unit
EEMU	Enhanced Expansion Module Unit
EFB	Electronic Flight Bag
EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground Position Warning System

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ABBREVIATIONS OR ACRONYMS	MEANING
EGT	Exhaust Gas Temperature
EHSI	Electronic Horizontal Situation Indicator
EIC	Essential Interconnection Contactor
EICAS	Engine Indication and Crew Alerting System
ELEC	Electrical
ELEV	Elevator
ELT	Emergency Locator Transmitter
EMG, EMERG	Emergency
EMER PILOT	Emergency Pilot
ENG	Engine
ERR	Error
ESU	Electronic Sequence Unit
ET	Elapsed Time
EXT	External
EXTG	Extinguish
F	
FADEC	Full Authority Digital Electronic Control
FCOC	Fuel Cooled Oil Cooler
FDAU	Flight Data Acquisition Unit
FDRS	Flight Data Recorder System
FECU	Flap Electronic Control Unit
FLC	Flight Level Change Mode

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ABBREVIATIONS OR ACRONYMS	MEANING
FLS	Flap Selector Lever
FLX	Flexible
FMA	Flight Mode Annunciations
FMS	Flight Management System
FPDU	Flap Power and Drive Unit
FPLN	Flight Plan
FPMU	Fuel Pump and Metering Unit
FQIS	Fuel Quantity Indicating System
FR	Fuel Remaining
FSBY	Forced Standby
FTB	Flap Transmission Brake
FU	Fuel Used
FVS	Flap Velocity Sensor
FWD	Forward
G	
G/S, GS	Glide Slope
GCU	Generator Control Unit
GI	Ground Idle
GLC	Generator Line Contactor
GMAP	Ground Mapping
GMT	Greenwich Mean Time
GND	Ground

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ABBREVIATIONS OR ACRONYMS	MEANING
GPC	Ground Power Contactor
GPS	Global Positioning System
GPU	Ground Power Unit
GPWS	Ground Proximity Warning System
H	
HDG	Heading
HF	High Frequency
HP	High Pressure
hPa	HectoPascal
HSCU	Horizontal Stabilizer Control Unit
HSV	High Stage Valve
HYDR	Hydraulic
I	
IAC	Integrated Avionics Computer
IAS	Indicated Airspeed
IC	Integrated Computer
ICAO	International Civil Aviation Organization
ICU	Integrated Communication Unit Interphone Control Unit
IFR	Instrument Flight Rules
IFOG	Interferometer Fiber Optic Gyros
ILS	Instrument Landing System

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ABBREVIATIONS OR ACRONYMS	MEANING
IM	Integrated Computer Configuration Module
INBD	Inboard
INC	Increase
INOP	Inoperative
INTPH	Interphone
INU	Integrated Navigation Unit
IPS	Inches Per Second
IRS	Inertial Reference System
IRU	Inertial Reference Unit
ISA	International Standard Atmosphere
ISIS	Integrated Standby Instrument System
ITT	Interturbine Temperature
K	
KCAS	Calibrated Airspeed in Knots
KEAS	Equivalent Airspeed in Knots
kHz	Kilohertz
KIAS	Indicated Airspeed in Knots
L	
LAV	Lavatory
LEI	Local Engine Inoperative
LGEU	Landing Gear Electronic Unit
LH	Left-Hand

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ABBREVIATIONS OR ACRONYMS	MEANING
LOC	Localizer
LOGO	Logotype
LP	Low Pressure
LRN	Long Range
LRU	Line Replaceable Unit
LSB	Lower Sideband
LSS	Lightning Sensor System
LX	Lightning Detection
M	
M	Mach
MAC	Mean Aerodynamic Chord
MAN	Manual
MAX	Maximum
MB	Marker Beacon
MEA	Minimum Enroute Altitude
MFD	Multifunction Display
MFDU	Magnetic Flux Detector Unit
MHz	Megahertz
MIN	Minimum
MKR	Marker
MLS	Microwave Landing System
MLW	Maximum Design Landing Weight

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ABBREVIATIONS OR ACRONYMS	MEANING
MMEL	Master Minimum Equipment List
M_{MO}	Maximum Operating Mach
MOW	Maximum Design Operating Weight
MRW	Maximum Design Ramp Weight
MSU	Mode Select Unit
MTOW	Maximum Design Takeoff Weight
MZFW	Maximum Zero Fuel Weight
N	
N1	Fan Speed
N2	High-Pressure-Rotor Shaft Speed
NAV	Navigation
NB	Narrow Bandwidth
NDB	Non-Directional Beacon
NEXRAD	Next-Generation Radar
NOTAM	Notice to Airmen
O	
OEI	One Engine Inoperative
OEW	Operational Empty Weight
OM	Operations Manual
OUTBD	Outboard
OVHT	Overheating
OVLD	Overload

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ABBREVIATIONS OR ACRONYMS	MEANING
OVPRESS	Overpressure
OXY	Oxygen
P	
PAA	Passenger Address Amplifier
PAS	Passenger Address System
PAST	Pilot Activated Self Test
PAX	Passenger
PBE	Protective Breathing Equipment
PCU	Power Control Unit
PDSV	Pressure Drop Spill Valve
PFD	Primary Flight Display
PMA	Permanent Magnet Alternator
POST	Power On Self Test
PRCS	Process
PRESS	Pressure
PRV	Pressurizing Valve
PSU	Passenger Service Unit
PTT	Press To Transmit
Q	
QFE	Altimeter Pressure Setting – Atmospheric Pressure at Aerodrome Elevation

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ABBREVIATIONS OR ACRONYMS	MEANING
QNE	Question Normal Elevation – Standard Pressure (1013 hPa/29.92 in.Hg) (Q-code)
QNH	Altimeter Pressure Setting – Atmospheric Pressure at Mean Sea Level
QTY	Quantity
R	
RA	Radio Altimeter
RAAS	Runway Awareness and Advisory System
RBHA	Regulamento Brasileiro de Homologação Aeronáutica
REACT	Rain Echo Attenuation Compensation Technique
REF	Reference
REI	Remote Engine Inoperative
RH	Right-Hand
RMI	Radio Magnetic Indicator
RMS	Radio Management System
RMU	Radio Management Unit
RNG	Range
RNP	Required Navigation Performance
RNP AR	Required Navigation Performance Authorization Required
RNP RF	Required Navigation Performance Radius Fixed

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ABBREVIATIONS OR ACRONYMS	MEANING
RPM	Revolution Per Minute
RSB	Radio System Bus
RTA	Receiver/Transmitter/Antenna
S	
SAT	Static Air Temperature
SBC	Shed Bus Contactor
SCV	Starting Control Valve
SELCAL	Selective Call
SG	Symbol Generator
SL	Sea Level
SLVD	Slaved
SOV	Shutoff Valve
SPC	Stall Protection Computer
SPS	Stall Protection System
SQ	Squelch
SRN	Short Range
SSB	Single Sideband
STAB	Stabilizer
STBY	Stand By
T	
TA	Traffic Advisory
TACAN	Tactical Air Navigation Aid

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ABBREVIATIONS OR ACRONYMS	MEANING
TAS	True Airspeed
TAT	Total Air Temperature
TCAS	Traffic and Collision Avoidance System
TEMP	Temperature
TGT	Target
TKNB	Turn Knob
TLA	Thrust Lever Angle
TO	Takeoff
TRB	Turbulence
TST	Test
TWA	Time Weighted Average
U	
USB	Universal Serial Bus
V	
V	Volt
V_1	Decision Speed
V_2	Takeoff Safety Speed
VA	Volt-Ampere
VAPP	VOR Approach Mode
V_A	Design Maneuvering Speed
V_{EF}	Critical Engine Failure Speed

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ABBREVIATIONS OR ACRONYMS	MEANING
V_{FE}	Maximum Flaps Extended Speed
VFR	Visual Flight Rules
VHF	Very High Frequency
V_{LE}	Maximum Landing Gear Extended Speed
VLF	Very Low Frequency
V_{LO}	Maximum Landing Gear Operating Speed
V_{LOF}	Lift Off Speed
VLV	Valve
VMC	Visual Minimum Condition
V_{MCA}	Air Minimum Control Speed
V_{MCG}	Ground Minimum Control Speed
V_{MO}	Maximum Operating Speed
VNAV	Vertical Navigation Mode
VOR	VHF Omnidirectional Range
V_R	Rotation Speed
V_{REF}	Landing Reference Speed
V_{REFXX}	Landing Reference Speed associated to the flap setting XX
V_S	Stall Speed
VS	Vertical Speed
W	
W/S	Windshield

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ABBREVIATIONS OR ACRONYMS	MEANING
WB	Weight and Balance
WB	Wide Bandwidth
WG	Wing
WX	Weather Detection
X	
X	Cross
XFR	Transfer
XPDR	Transponder

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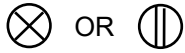
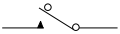
SYMBOLS AND NOTATIONS

SYMBOL	MEANING
	SHUTOFF VALVE, PRIORITY VALVE
	CHECK VALVE
	RESTRICTOR
	RELIEF VALVE
	OPTIONAL EQUIPMENT
	SYSTEM MODULE
	COMMUNICATION LINE
	ELECTRIC PUMP
	MECHANIC PUMP
	ACCUMULATOR
	ELECTRIC CONTACTOR (OPEN POSITION)
	SWITCH
	NACA AIR INLET

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UNITS CONVERSION

TO CONVERT	INTO	MULTIPLY BY	AND ADD
Degree Celsius (ºC)	Degree Fahrenheit (ºF)	1.8000	+32
Degree Fahrenheit (ºF)	Degree Celsius (ºC)	0.5556	-17.7778
Feet (ft)	Meter (m)	0.3048	-
Inches (In)	Millimeter (mm)	25.4000	-
Inches of Mercury (in.Hg)	Millibar (mb)	33.8636	-
Kilogram (kg)	Pounds (lb)	2.2046	-
Kilogram force per Square meter (kgf/m^2)	Pound per Square Inch (psi)	0.0014	-
Kilometer (km)	Nautical Mile (nm)	0.5396	-
Kilometer per hour (km/h)	Knot (kt)	0.5396	-
Knot (kt)	Kilometer per hour (km/h)	1.8532	-
Pounds (lb)	Kilogram (kg)	0.4536	-
Meter (m)	Feet (ft)	3.2808	-
Millibar (mb)	Inches of Mercury (in.Hg)	0.0295	-
Millimeter (mm)	Inches (In)	0.0394	-
Nautical Mile (nm)	Kilometer (km)	1.8532	-
Pound per Square Inch (psi)	Kilogram force per Square meter (kgf/m^2)	703.0740	-

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SERVICE BULLETIN TABLE

The following table shows the Service Bulletins which affect the airplane operation and have been incorporated into AFM.

NOTE: - Check (✓) the accomplished Service Bulletins or equivalent modification factory incorporated.

- An equivalent modification factory incorporated may be identified in the documentation delivered with the airplane (Flight Operations Manuals Configuration, Service Bulletin Report, and Design Change Report).
- When a new software version is incorporated into the airplane, either during its production or by a Service Bulletin, subsequent software versions are equivalent and have the functionalities of the previous one, except when informed otherwise.

SB	SUBJECT	✓
SB 145LEG-00-0007	Reconfiguration for 41000 ft Operational Ceiling	
SB 145LEG-21-0007	Installation of the Ozone Converters	
SB 145LEG-22-0003	Autothrottle Installation	
SB 145LEG-23-0027	Passenger Address System Audio Interference Removal and ATTD CALL Button Activation	
SB 145LEG-23-0034	Communication Management Unit (CMU) and VHF-3 Installation	
SB 145LEG-23-0040	Future Air Navigation System (FANS) Installation	

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SB	SUBJECT	✓
SB 145LEG-23-0052	HSD Honeywell System Installation	
SB 145LEG-23-0059	Upgrade of MARK III Communication Management Unit (CMU) Software to Version Block 1.29	
SB 145LEG-25-0078	Reduces the MTOW to 22000 kg	
SB 145LEG-25-0079	Increases the MTOW to the Value Used for Airplanes Pre-Mod. SB 145LEG-25-0078	
SB 145LEG-26-0007	Portable Halon Fire Extinguisher Replacement	
SB 145LEG-27-0010	Replacement of the Stall Protection Computer	
SB 145LEG-27-0011	Gust Lock Electromechanical New Logic	
SB 145LEG-28-0010	Increase in the Capacity of the Forward Auxiliary Fuel Tanks	
SB 145LEG-28-0019	Aft Tanks Relief Backup System Replacement	
SB 145LEG-30-0010	New Windshield Heating System	
SB 145LEG-31-0009	Incorporates EICAS Version 20.6	
SB 145LEG-31-0012	Aural Warning Unit Upgrade (PN - 6)	
SB 145LEG-31-0014	Incorporates EICAS Version 20.7	
SB 145LEG-31-0015	Replacement of DU-875 LCD Displays and Charts & Maps Installation	

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SB	SUBJECT	✓
SB 145LEG-31-0019	Connect the Digital Clock to the GPS for Time & Date Synchronization	
SB 145LEG-31-0020	Aural Warning Unit Upgrade (PN - 8)	
SB 145LEG-31-0024	Incorporates EICAS Version 24 (Phase 14)	
SB 145LEG-31-0027	Synthetic Vision System Installation	
SB 145LEG-32-0020	New Nose Wheel Steering System Reset Logic	
SB 145LEG-32-0023	New Tire Calibration for Operation on Y Pavement	
SB 145LEG-32-0025	Use of Towbarless TUG Towing	
SB 145LEG-34-0007	New Air Data Computer (ADC) for RVSM Operation	
SB 145LEG-34-0011	Transponder Mode S for Elementary Surveillance	
SB 145LEG-34-0013	Steep Approach Installation	
SB 145LEG-34-0014	Mode S Enhanced Surveillance Transponder	
SB 145LEG-34-0022	Electronic Flight Bag Installation	
SB 145LEG-34-0023	Steep Approach System Installation for Provisioned Aircraft	
SB 145LEG-34-0027	XM Weather System Installation	
SB 145LEG-34-0029	Smart Landing and Smart Runway Functionality Activation	
SB 145LEG-34-0032	VNAV and RNP Functions Enabling	

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SB	SUBJECT	✓
SB 145LEG-34-0033	LPV Functionality Activation	
SB 145LEG-34-0035	ADS-B Out	
SB 145LEG-34-0037	FMZ NZ6.1 Installation	
SB 145LEG-34-0039	Air Data Computer Replacement	
SB 145LEG-34-0040	Electronic Flight Bag (EFB) Upgrade from Windows XP to Windows 7	
SB 145LEG-34-0042	EGPWS Altitude Callout Menu Change	
SB 145LEG-34-0043	Incorporates FMS NZ6.1.1 PN-03046 Installation	
SB 145LEG-38-0016	Improvement in the Drain Lines of the Galley Sink and Ice Drawers	
SB 145LEG-73-0003	Incorporates FADEC B7.6 Version on AE3007A1P Engines	
SB 145LEG-73-0004	Incorporates FADEC B7.6 Version on AE3007A1E Engines	
SB 145LEG-73-0005	Incorporates FADEC B8.0 Version on AE3007A1P Engines	
SB 145LEG-73-0006	Incorporates FADEC B8.0 Version on AE3007A1E Engines	
SB 145LEG-73-0007	Incorporates FADEC B8.0.5 Version on AE3007A1P Engines	
SB 145LEG-73-0008	Incorporates FADEC B9.4 Version on AE3007A2 Engines	
SB 145LEG-73-0009	Incorporates FADEC B9.4 Version on AE3007A1P Engines	

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SB	SUBJECT	✓
SB 145LEG-73-0010	Incorporates FADEC B9.4 Version on AE3007A1E Engines	
SB 145LEG-73-0011	Incorporates FADEC B9.4.1 Version on AE3007A1E Engines	
SB 145LEG-73-0012	Incorporates FADEC B9.4.1 Version on AE3007A1P Engines	
SB 145LEG-73-0013	Incorporates FADEC B9.4.1 Version on AE3007A2 Engines	
SB 145-27-0115	Electromechanical Gust Lock Lever Replacement	
SB 145-32-0002	Change in the Travel Limits of the Nose Wheel Steering System	
SB 145-49-0025	APU Fail to Start Due to FADEC Low Voltage	

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SECTION 1-01

LIMITATIONS

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INTRODUCTION

The airplane must be operated in accordance with the limitations presented in this Section. These limitations also apply to operations in accordance with an approved Supplement or Appendix to the AFM, except as modified by such Supplement or Appendix.

The information contained in this section is derived from the Approved Airplane Flight Manual.

Flight crewmembers should have all limitations committed to memory (except tables and charts). Some items may not be included herein, as they may be identified in a panel/placard or annunciated by some kind of alarm/warning. Compliance to the Emergency and Abnormal Procedures will also assure that certain limitations are complied with.

In the event that a limitation in this manual disagrees with the AFM limitation, the AFM must prevail.

In the event that a placard or instrument marking disagrees with the limitations shown in this manual, the more restrictive limitation must prevail.

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GENERAL

MINIMUM CREW

Minimum Flight Crew ..... PILOT AND COPILOT

KINDS OF OPERATION

This airplane may be flown day and night in the following conditions, when the appropriate equipment and instruments required by airworthiness and operating regulations are approved, installed and in an operable condition:

- Visual (VFR);
- Instrument (IFR);
- Icing conditions;
- Extended Overwater Operation.

NOTE: Ditching capability is not certified.

MAXIMUM NUMBER OF SEATS (NON-AFM)

The maximum number of available seats is 19 on the EMB-135 BJ. It includes 2 seats for pilots, 1 optional seat for attendant, 1 for cockpit observer, and up to 15 passenger seats.

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WEIGHT AND CENTER OF GRAVITY

TAKEOFF WITH FLAPS 9°

AIRPLANE MODEL	MAXIMUM WEIGHT (lb)			
	Max. Ramp Weight (MRW)	Max. Takeoff Weight (MTOW)	Max. Landing Weight (MLW)	Max. Zero Fuel Weight (MZFW)
LEGACY 600 S/N up to 591 and Pre-Mod. SB 145LEG-28-0010	49096	48942 (2) (3)	40786 (1)	35274
LEGACY 600 S/N 625 and on or Post-Mod. SB 145LEG-28-0010	49758	49604 (2) (4)	40786 (1)	35274

NOTE: 1) For takeoff and landing operations above 8500 ft up to 9500 ft the Maximum Landing Weight (MLW) is limited to 39683 lb.

2) For airplanes Post-Mod. SB 145LEG-25-0078 or featuring an equivalent modification factory incorporated, the MTOW is 48501 lb.

3) For airplanes Post-Mod. SB 145LEG-25-0079 or featuring an equivalent modification factory incorporated, the MTOW is 48942 lb.

4) For airplanes Post-Mod. SB 145LEG-25-0079 or featuring an equivalent modification factory incorporated, the MTOW is 49604 lb.

To comply with the performance and operating limitations of the regulations, the maximum allowable takeoff and landing operational weights may be equal to, but not greater than design limits.

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The takeoff weight (weight at brake release or at start of takeoff run) is the lowest among MTOW and the following weights:

- Maximum takeoff weight for altitude and temperature determined from Maximum Takeoff Weight - Climb Limited chart.
- Maximum takeoff weight, as limited by runway length and determined from Maximum Takeoff Weight - Field Length Limited chart.
- Maximum takeoff weight, as limited by brake energy and determined from Maximum Takeoff Weight - Brake Energy Limited chart.
- Maximum takeoff weight, as limited by obstacle clearance, enroute, and landing operating requirements.

The landing weight is the lowest among MLW and the following weights:

- Maximum approach and landing weight for altitude and temperature determined from Maximum Landing Weight - Climb Limited charts.
- Maximum landing weight, as limited by runway length and determined from Maximum Landing Weight - Field Length Limited chart.

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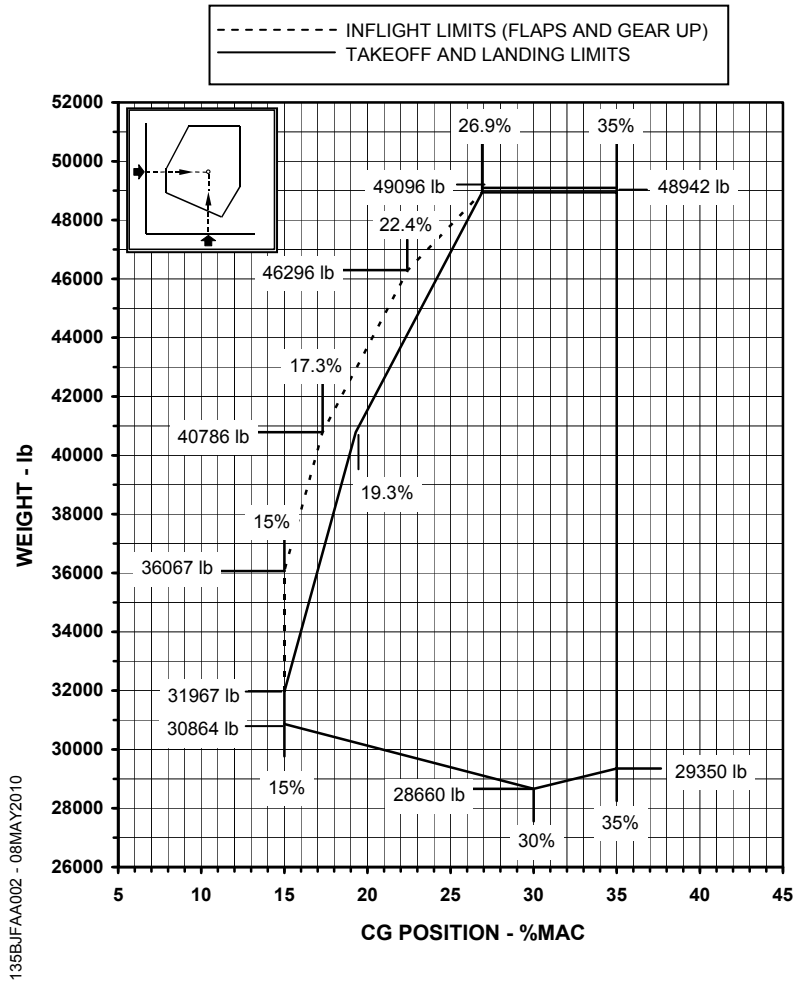
CENTER OF GRAVITY ENVELOPE

LEGACY 600 S/N UP TO 591 AND PRE-MOD. SB 145LEG-28-0010

(TAKEOFF WITH FLAPS 9°)



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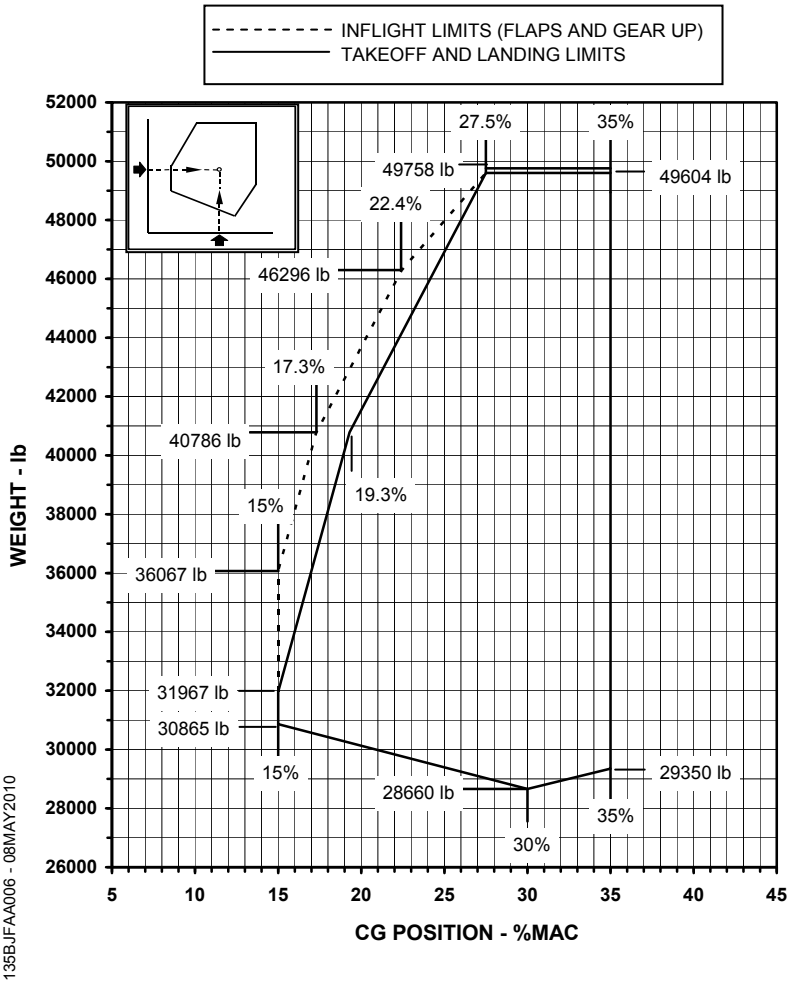
LEGACY 600 S/N 625 AND ON OR POST-MOD. SB 145LEG-28-0010

(TAKEOFF WITH FLAPS 9°)



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LOADING

The airplane must be loaded in accordance with the information contained in the Weight and Balance Manual (WB-135/1562).

NOTE: The RH side mid-cabin divider must not be installed if the closest divan seat position to the divider is occupied for taxi, takeoff and landing.

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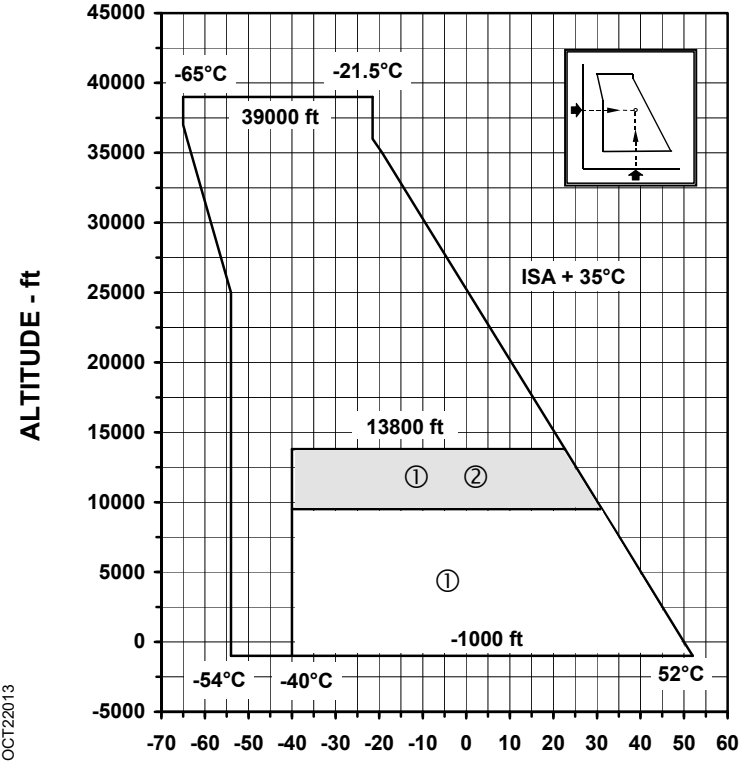
OPERATIONAL LIMITATIONS

OPERATIONAL ENVELOPE

AIRPLANES PRE-MOD. SB 145LEG-00-0007



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NOTE: - For takeoff and landing operations above 8500 ft up to 9500 ft tires 19.5X6.75-8 10 PR must be installed in the Nose Landing Gear. However these tires do not constitute a limitation for operations up to 8500 ft. Refer to Weight Limitations for related restrictions.

- In the event of a landing below -40°C, the airplane may not takeoff without further maintenance inspection.

- Minimum Total Air Temperature above 25000 ft is -45°C.

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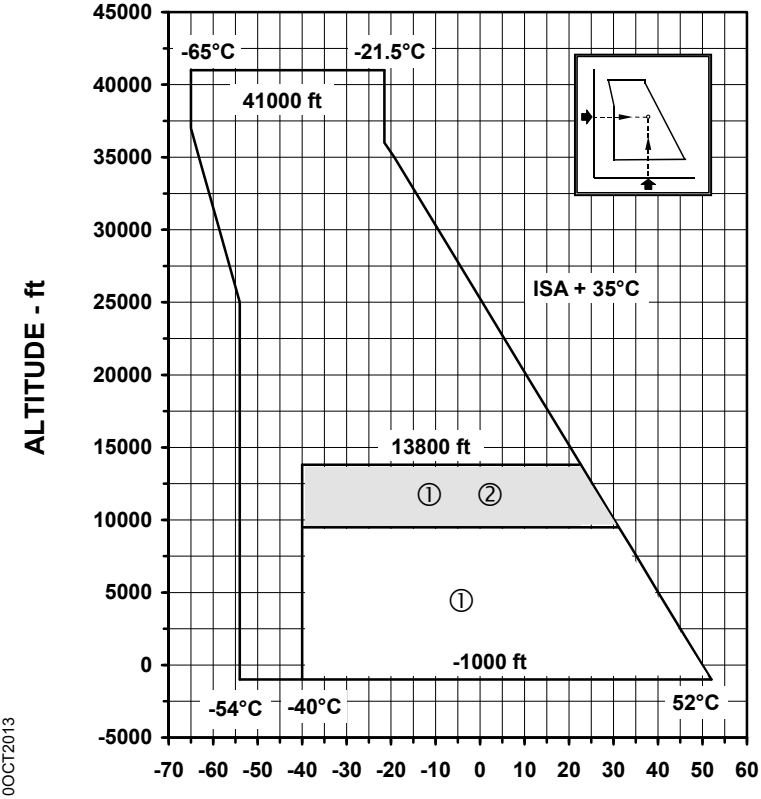
AIRPLANES POST-MOD. SB 145LEG-00-0007 OR EQUIPPED WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED



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NOTE: - For takeoff and landing operations above 8500 ft up to 9500 ft tires 19.5X6.75-8 10 PR must be installed in the Nose Landing Gear. However, these tires do not constitute a limitation for operations up to 8500 ft. Refer to Weight Limitations for related restrictions.

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AIRSPEEDS

LANDING GEAR OPERATION/EXTENDED SPEED (V_{LO} AND V_{LE})

V_{LO} for Retraction..... 200 KIAS

V_{LO} for Extension ..... 250 KIAS

V_{LE}..... 250 KIAS

NOTE: - V_{LO} for retraction is the maximum speed at which the Landing Gear can be safely retracted.

- V_{LO} for extension is the maximum speed at which the Landing Gear can be safely extended.

- V_{LE} is the maximum speed at which the airplane can be safely flown with the Landing Gear extended and locked.

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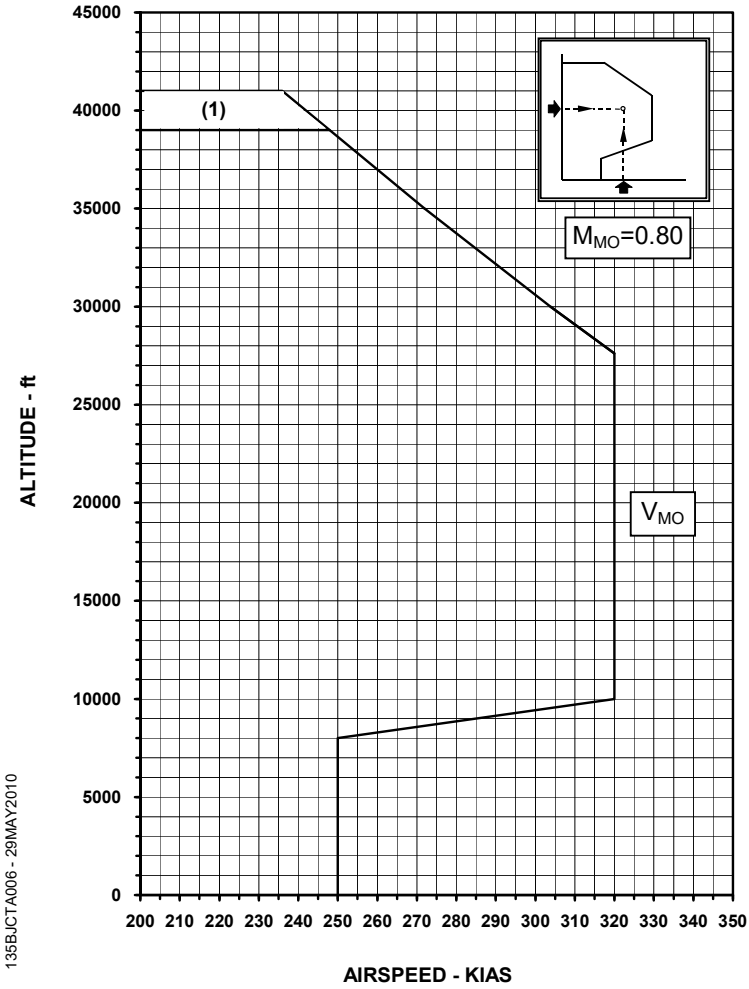
MAXIMUM OPERATING SPEED

NOTE: The V_{MO}/M_{MO} may not be deliberately exceeded in any regime of flight (climb, cruise or descent).



NOTE: (1) Only applicable to airplanes Post-Mod. SB 145LEG-00-0007 or equipped with an equivalent modification factory incorporated.

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MANEUVERING SPEED (V_A)

V_A ..... 200 KIAS

NOTE: Maneuvers that involve angle of attack near the stall or full application of rudder, elevator, and aileron controls should be confined to speeds below V_A. In addition, the maneuvering flight load factor limits, presented in this Section, should not be exceeded.

WARNING: RAPID AND LARGE ALTERNATING CONTROL INPUTS, ESPECIALLY IN COMBINATION WITH LARGE CHANGES IN PITCH, ROLL OR YAW (E.G. LARGE SIDE SLIP ANGLES) MAY RESULT IN STRUCTURAL FAILURES AT ANY SPEED, EVEN BELOW V_A.

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FLIGHT CONTROLS

ELECTROMECHANICAL GUST LOCK

Each time Electromechanical Gust Lock Lever is set to unlocked (FREE) position elevator movement must be checked. This check must be performed at least 10 seconds after positioning the GUST LOCK Lever to the unlocked (FREE) position by moving the control column from the full up stop to the full down stop and back to the full up stop position.

MAXIMUM FLAP EXTENDED SPEED (V_{FE})

Flaps 9° ..... 250 KIAS

Flaps 22° ..... 200 KIAS

NOTE: For flaps 22°, in icing conditions, Yaw Damper must be engaged above 180 KIAS.

Flaps 45° ..... 145 KIAS

MAXIMUM FLAP EXTENDED ALTITUDE

Maximum Altitude for Flap Extension ..... 20000 ft

PITCH TRIM

Maximum Airspeed after Takeoff/During Climb without Retrimming ..... 160 KIAS

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TAILWIND

Maximum Takeoff and Landing
Tailwind Component..... 10 kt

DIRECT VISION WINDOW (AFM PROCEDURES)

Maximum recommended speed to remove Direct Vision Windows is 140 KIAS.

UNPRESSURIZED FLIGHT (NON-AFM)

Maximum altitude for operation after an in-flight depressurization, is 10000 ft MSL unless MEA or otherwise required.

Maximum altitude for dispatch for an unpressurized flight is 10000 ft.

TURBULENT AIR PENETRATION SPEED (AFM PROCEDURES)

At or Below 10000 ft	200 KIAS
Above 10000 ft	250 KIAS/ 0.63M, WHICHEVER IS LOWER

MAXIMUM RECOMMENDED CROSSWIND (NON-AFM)

Embraer aerodynamics analysis have resulted in the following maximum recommended crosswinds for takeoff and landing:

Dry Runway	30 kt
Wet Runway	25 kt
Runway Contaminated by Compacted Snow	20 kt
Runway Contaminated by Standing Water, Slush or Loose Snow	15 kt
Runway Contaminated by Ice (no melting)	10 kt

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MANEUVERING FLIGHT LOAD FACTORS

These corresponding accelerations limit the bank angle during turns and limit the pull-up maneuvers.

LOAD FACTOR LIMIT	FLAPS 0°	FLAPS DOWN (9°, 22° and 45°)
Positive	2.51 g	2.00 g
Negative	-1.00 g	0 g

RUNWAY

Runway Slope.....-2% TO +2%

Runway Surface Type.....PAVED

DRY RUNWAY

A runway is considered dry when it is clear of contaminants and visible moisture within the required length and width being used.

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ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)

The following limitations are applicable to the Enhanced Ground Proximity Warning System (EGPWS):

- The Allied-Signal Enhanced Ground Proximity Warning System Pilot's Guide, Document Number 060-4241-000, March 1997 edition (or later revision of the manual) or certification authority accepted Operating Manual, must be immediately available to the flight crew.
- Allied-Signal Application Software version 202 and Configuration Software version 202 or later must be installed.
- Navigation is not to be predicated on the use of the Terrain Awareness Display.
- The EGPWS data base, displays, and alerting algorithms currently do not account for man-made obstructions.
- Pilot should inhibit the Terrain Awareness Alerting and Display function by pressing the TERRAIN SYS OVRD Button when within 15 NM of takeoff, approach, or landing at an airport when any of the following conditions apply:
  - The airport has no approved instrument approach procedure.
  - The airport is not included in the Allied Signal data base.
  - The longest runway is less than 1070 m (3500 ft) in length.
- Terrain Awareness Alerting and Display functionality must be manually inhibited when below the transition altitude while flying QFE on approach into an airport which is more than 200 ft above or below sea level (not applicable to software version 216 and on).
- Pilots are authorized to deviate from their current Air Traffic Control (ATC) clearance to the extent necessary to comply with an EGPWS warning.
- The Terrain Display is intended to be used as a situational tool only and may not provide the accuracy and/or fidelity on which to solely base terrain avoidance maneuvering.

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– In the event that accuracy of the airplane position data from the FMS becomes inadequate for navigation (Dead Reckoning Mode), the Terrain Awareness Alerting and Display functions must be inhibited. This will not affect the basic GPWS functions (modes 1 to 7). If the FMS is restored after a period of inadequacy, the Terrain Awareness may be enabled by pressing again the TERRAIN SYS OVRD Button.

– In case of a conflict between the terrain alerts and an auto-popped-up picture, pilots must check the sweeping marker movement on the horizontal line below the terrain picture. If the marker is frozen, the MFD terrain indication must be deselected on MFD bezel panel.

– In case of a conflict between the terrain alerts and an auto-popped-up picture, pilots must check the MFD 2 terrain information. If the terrain picture bus fail is not annunciated (TERR amber annunciation), the MFD 2 must be used as terrain picture reference.

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ELECTRICAL

Maximum Load on Main Generator ..... 400 A
Maximum Load on APU Generator:
Up to 30000 ft ..... 400 A
Above 30000 ft..... 300 A

Maximum Battery Temperature ..... 70°C

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FUEL

USABLE FUEL

NOTE: If tanks are pressure refueled, usable fuel in each wing is decreased by 13.2 US Gal (88 lb) and total wings usable fuel is decreased by 26.4 US Gal (176 lb).

LEGACY 600 S/N UP TO 591 AND PRE-MOD. SB 145LEG-28-0010

TANK		USABLE FUEL	TOTAL
WING TANK		844.9 US Gal (5703.4 lb)	1689.64 US Gal (11406.76 lb)
FUS 1 (left side)	**FWD 1**	279 US Gal limited to 1764 lb	496 US Gal limited to 3219 lb
	AFT 1	217 US Gal limited to 1455 lb	
FUS 2 (right side)	**FWD 2**	279 US Gal limited to 1764 lb	496 US Gal limited to 3219 lb
	AFT 2	217 US Gal limited to 1455 lb	

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LEGACY 600 S/N 625 AND ON OR POST-MOD. SB 145LEG-28-0010

TANK		USABLE FUEL	TOTAL
WING TANK		844.9 US Gal (5703.4 lb)	1689.64 US Gal (11406.76 lb)
FUS 1 (left side)	**FWD 1**	294 US Gal limited to 1984 lb	511 US Gal limited to 3461 lb
	AFT 1	217 US Gal limited to 1477 lb	
FUS 2 (right side)	**FWD 2**	294 US Gal limited to 1984 lb	511 US Gal limited to 3461 lb
	AFT 2	217 US Gal limited to 1477 lb	

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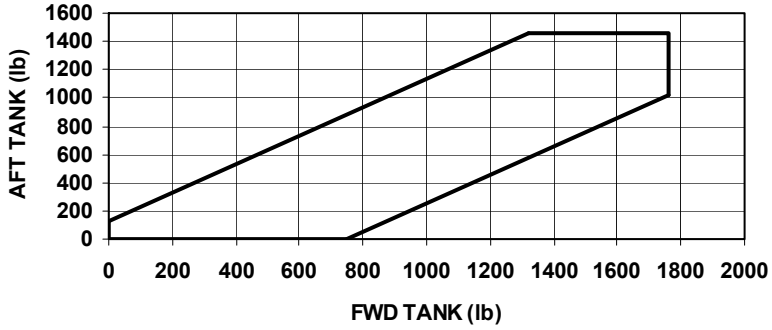
FUEL TANKS MAXIMUM PERMITTED IMBALANCE

The maximum permitted imbalance between the wing tanks is 800 lb.

For the maximum permitted imbalance between the FWD Tank and AFT Tank of each system, see the following load charts applicable to your airplane:

AIRPLANES S/N UP TO 591 AND PRE-MOD. SB 145LEG-28-0010

FUSELAGE TANKS LOAD CHART I



135BJAOM112002A - 18SEP2003

NOTE: The fuselage tanks fuel load must be within the closed area of the chart.

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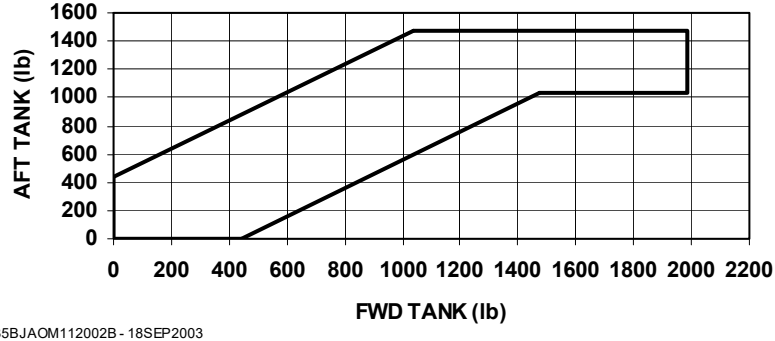
AIRPLANES S/N 625 AND ON OR POST-MOD. SB 145LEG-28-0010

FUSELAGE TANKS LOAD CHART II



135BJAOM112002B - 18SEP2003

NOTE: The fuselage tanks fuel load must be within the closed area of the chart.

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UNUSABLE FUEL

NOTE: - When the EICAS fuel quantity is zero in level flight, any fuel remaining in the tanks can not be used safely in flight.

- The unusable fuel values above have been determined for an adopted fuel density of 6.751 lb/US Gal.

- When performing pressure refueling, the usable fuel quantity in each Wing Tank may be reduced by 13.2 US Gal (88 lb) maximum.

TANK		UNUSABLE FUEL	TOTAL
WING TANK (All electric fuel pumps operating)		5.8 US Gal (39 lb)	11.6 US Gal (78 lb)
WING TANK (Any electric fuel pump inoperative)		Up to 54 US Gal (364.5 lb)	Up to 108 US Gal (729 lb)
FUS 1 (left side)	**FWD 1**	3.6 US Gal (24 lb)	8.2 US Gal (55 lb)
	AFT 1	4.6 US Gal (31 lb)	
FUS 2 (right side)	**FWD 2**	3.6 US Gal (24 lb)	8.2 US Gal (55 lb)
	AFT 2	4.6 US Gal (31 lb)	

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FUEL SPECIFICATION

Brazilian Specification QAV1

ASTM Specification ..... D1655-JET A AND JET A-1

American Specification MIL-T-83133A-JP8

NOTE: The use of Red Dye contaminated fuel is restricted to emergency conditions and must comply with Rolls-Royce's recommendations.

FUEL TANK TEMPERATURE

Minimum ..... -40°C

Maximum ..... 52°C

NOTE: If fuel does not contain an icing inhibitor, the temperature of fuel leaving FCOC must be above 4°C (refer to FUEL LOW TEMPERATURE Procedure).

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AUXILIARY POWER UNIT

OPERATIONAL LIMITS

APU Model	T-62T-40C14	
PARAMETER	**MIN**	**MAX**
ALTITUDE FOR START	-	30000 ft
OPERATION ALTITUDE	-	39000 ft (3)
ROTOR SPEED	-	108% (1)
EGT:	-	-
START	-	884°C
CONTINUOUS	-	680°C (2)

NOTE: 1) The APU will be automatically shut down at 104% rotor speed.

2) The APU EGT may be exceeded up to 717ºC for 5 minutes maximum.

3) Above 37000 ft APU bleed usage is not allowed.

4) Minimum battery temperature for APU start is -20ºC.

APU STARTER LIMITS

Cooling period between each starting attempt:

Between Three Consecutive Attempts..... 1 MINUTE OFF

Between Two Series of Three Consecutive Attempts ..... 30 MINUTES OFF

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POWER PLANT

WARNING: ALL FOUR FADECS INSTALLED ON THE AIRPLANE MUST BE THE SAME PART NUMBER. INCORRECT ENGINE OPERATION CAN RESULT FROM USING FADECS WITH TWO DIFFERENT PART NUMBERS.

OPERATIONAL LIMITS (ROLLS-ROYCE AE3007A1E)

PARAMETER (11)	MIN	MAX
N1	-	100.0%
N2	-	103.7% (11)
ITT:		
START	-	800°C (9)
ALL TAKEOFF MODES	-	992°C (1) 970°C (2)
MAX CONTINUOUS	-	935°C
OIL PRESSURE:		
BELOW 88% N2	34 psi	95 psi (4)(7) 110 psi (4) (8)
AT OR ABOVE 88% N2	48 psi (3)	95 psi (7) 110 psi (8)
OIL TEMPERATURE	21°C (5)	126°C
VIBRATION:		
LP SPOOL	-	1.8 IPS (6)
HP SPOOL	-	1.1 IPS (6)

NOTE: 1) Temperatures between 971°C and 992°C are time limited to 90 seconds.

2) Takeoff Thrust is time limited to 5 minutes (including the transient allowance).

3) While this is an abnormal condition, operation between 48 and 34 psi is permitted during takeoff and go around phases.

4) May be exceeded during starts if oil temperature is below 21°C. The engine must remain at IDLE until the oil pressure is less than 95 psi (110 psi for airplanes Post-Mod. SB 145LEG-73-0004 or equipped with an equivalent modification factory incorporated).

5) Minimum oil temperature for starting is -40°C for lubrication oil specified by MIL-L-23699D and -54°C for lubrication oil specified by MIL-L-7808K.

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6) Vibration in the amber range below 2.5 IPS is time limited to 5 minutes during the takeoff or go-around phases or 10 seconds during the remainder flight phases.

7) Operation in oil pressure amber range between 96 and 115 psi is permitted in all operational modes and time limited to 5 minutes or between 116 and 155 psi in all operational modes time limited to 2 minutes. Total time above 95 psi may not exceed 5 minutes.

8) For airplanes Post-Mod. SB 145LEG-73-0004 or equipped with an equivalent modification factory incorporated the upper limit of the oil pressure green range is 110 psi. Operation in oil pressure amber range is permitted between 111 and 115 psi in all operational modes time limited to 5 minutes, or between 116 and 155 psi in all operational modes time limited to 2 minutes. Total time above 110 psi may not exceed 5 minutes.

9) During start the ITT limit of 800°C may be exceeded for up to 5 seconds to a maximum temperature of 850°C.

10) Any engine exceedance or peak must be monitored and logged by the crew.

11) For airplanes Post-Mod. SB 145LEG-73-0006 or equipped with an equivalent modification factory incorporated, the N2 limit is 105%.

TAKEOFF THRUST MODE

Only ALT T/O-1, T/O and E T/O modes are allowed for takeoff.

STARTER LIMITS

On Ground:

Starting or Dry .....UP TO 5 MINUTES ON
5 MINUTES OFF

OR

First to Fourth Cycles .....1 MINUTE ON,
1 MINUTE OFF

Following Cycles .....1 MINUTE ON,
5 MINUTES OFF

In Flight:

Maximun Continuous Operation Time .....5 MINUTES ON

NOTE: No cool down time is required should an in-flight start be re-attempted.

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AUTOMATIC TAKEOFF THRUST CONTROL SYSTEM (ATTCS)

ATTCS must be operative to select ALT T/O-1, T/O or E T/O modes. The Thrust Assurance Check is not required.

THRUST REVERSER

Thrust reversers are intended for use during rejected takeoff or landing only. Do not attempt a go-around procedure after deployment of the thrust reversers following a landing.

Selection of thrust reversers in flight or their preselection before touchdown is prohibited.

ENGINE WARM-UP

Prior to takeoff, the engines must be allowed to run at low thrust to stabilize the engine temperatures before takeoff thrust is adjusted.
After start, the engines must run at idle or taxi thrust during at least 4 minutes for cold engines or 2 minutes for warm engines.

NOTE: - To increase N2 above 83% the engine oil temperature must be at 40°C minimum. In lieu of this limit, it is acceptable to either run the engine for at least 8 minutes or complete a static run-up to 88% N2, stabilize, and check to ensure that oil pressure is equal or less than 83 psi.

- The engine is considered cold if it has been shutdown for more than 90 minutes.

ENGINE COOL DOWN

The engines must run for at least 1 minute at idle or taxi thrust before shutdown.

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PNEUMATIC, AIR CONDITIONING AND PRESSURIZATION

PRESSURIZATION

AIRPLANES PRE-MOD. SB 145LEG-00-0007

Maximum differential pressure..... 8.1 psi
Maximum differential overpressure..... 8.4 psi
Maximum differential negative pressure ..... -0.3 psi

AIRPLANES POST-MOD. SB 145LEG-00-0007 OR EQUIPPED WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

Maximum differential pressure..... 8.4 psi
Maximum differential overpressure..... 8.6 psi
Maximum differential negative pressure ..... -0.3 psi

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ICE AND RAIN PROTECTION

OPERATION IN ICING CONDITIONS

Maximum Temperature for Anti-Icing Operation ..... 10°C

Minimum Temperature for Manual Anti-Icing Operation ..... -40°C

Single Engine or Single Bleed Maximum Altitude Operation in Icing Conditions ..... 15000 ft

Holding configuration:

Landing Gear Lever ..... UP

FLAP Lever ..... 0°

Minimum Airspeed ..... 200 KIAS

NOTE: - There is no temperature limitation for anti-icing system automatic operation.

- Use Static Air Temperature (SAT) on ground or for takeoff operations and Total Air Temperature (TAT) for operations in flight.

- Icing conditions may exist whenever the Static Air Temperature (SAT) on the ground or for takeoff, or Total Air Temperature (TAT) in flight, is 10°C or below and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet, and ice crystals).

- Icing conditions may also exist when the SAT on the ground and for takeoff is 10°C or below when operating on ramps, taxiways, or runways where surface snow, ice, standing water, or slush may be ingested by the engines, or freeze on engines, nacelles, or engine sensor probes.

- Takeoff is prohibited with frost, ice, snow or slush adhering to wings, control surfaces, engine inlets, or other critical surfaces (refer to the applicable requirements).

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- There are many methods to ensure the wing is clear of ice. If visual inspection or installed clear ice detectors do not indicate wing contamination, a tactile (hand on surface) check of the wing leading edge and the upper surface must be accomplished prior to takeoff. The tactile check must also be performed when the holdover time is exceeded after airplane de/anti-icing fluids are applied. This check should be performed whenever the outside temperature is less than 6°C or if it cannot be ascertained that the wing fuel temperature is above 0°C; and
  - there is visible moisture; or
  - water is present on the wing; or
  - the difference between the dew point and the outside air temperature is 3°C or less; or
  - the atmospheric conditions have been conducive to frost formation.

Anti-icing system must be selected to ENG during all ground operations when icing conditions exist or are anticipated.

CAUTION:
- ON GROUND, DO NOT RELY ON VISUAL ICING EVIDENCE OR ICE DETECTOR ACTUATION TO TURN ON THE ANTI-ICING SYSTEM. USE THE TEMPERATURE AND VISUAL MOISTURE CRITERIA AS SPECIFIED ABOVE. DELAYING THE USE OF THE ANTI-ICING SYSTEM UNTIL ICE BUILD-UP IS VISIBLE FROM THE COCKPIT MAY RESULT IN ICE INGESTION AND POSSIBLE ENGINE DAMAGE OR FLAME-OUT.
- DO NOT USE APU BLEED AS PNEUMATIC SOURCE FOR ANTI-ICING SYSTEM.

WINDSHIELD WIPER OPERATION (IF APPLICABLE)

Maximum Airspeed for Windshield Wiper Operation ..... 170 KIAS

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FLIGHT CONTROLS

APPROACH AND LANDING FLAPS

Flaps 45° operation is not allowed in icing conditions and after ice encounter, except for airplanes S/N 145686, 145770 and on or Post-Mod. SB 145LEG-27-0010.

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OXYGEN

OZONE CONCENTRATION

The tables below show the airplane altitude limitations due to ozone concentration in atmosphere.

NOTE: - EMB-135 BJ airplanes Post-Mod. SB 145LEG-21-0007 or equipped with an equivalent modification factory incorporated are not subjected to this limitation.

- These tables are based on FAA ADVISORY CIRCULAR 120.38.
- The tables show altitude limitations calculated for constant ozone concentration, cabin stabilized at 8000 ft, and both recirculation fans turned on.
- For conditions other than those specified in item 2 above, an optimized flight plan must be approved by regulatory agencies.
- For longitudes, the following apply:

  W = Western

  E = Eastern

  Reference = 100°W longitude

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NORTH AMERICA - MAXIMUM OZONE CRITERIA

FLIGHT LEVEL	JAN		FEB		MAR		APR		MAY		JUN	
LATITUDE	W	E	W	E	W	E	W	E	W	E	W	E
80°N	-	320	-	320	-	310	-	310	-	300	-	320
75°N	-	320	-	320	-	320	-	310	-	310	-	320
70°N	-	340	-	320	-	320	-	320	-	310	-	330
65°N	350	340	330	320	320	320	320	320	320	320	330	330
60°N	370	350	340	330	330	330	320	320	320	320	340	330
55°N	390	360	370	340	340	340	320	330	320	320	340	350
50°N	400	370	400	360	360	340	320	330	330	330	350	360
45°N	-	390	-	370	370	360	340	340	340	360	370	390
40°N	400	-	360	380	370	390	380	360	400	390	-	-
35°N	-	-	-	-	-	-	-	-	-	-	-	-

FLIGHT LEVEL	JUL		AUG		SEP		OCT		NOV		DEC	
LATITUDE	W	E	W	E	W	E	W	E	W	E	W	E
80°N	-	330	-	380	-	390	-	380	-	340	-	340
75°N	-	340	-	390	-	380	-	380	-	360	-	350
70°N	-	340	-	400	-	390	-	380	-	380	-	350
65°N	340	350	390	400	400	400	380	390	400	380	370	360
60°N	340	360	400	-	-	-	390	400	400	390	380	380
55°N	350	380	400	-	-	-	-	-	400	400	400	390
50°N	360	400	-	-	-	-	-	-	-	400	-	-
45°N	-	-	-	-	-	-	-	-	-	-	-	-
40°N	-	-	-	-	-	-	-	-	-	-	-	-
35°N	-	-	-	-	-	-	-	-	-	-	-	-

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NORTH AMERICA - TWA OZONE CRITERIA

NOTE: Values below are the altitude limitations which the airplane is allowed to fly more than 3 continuous hours.

FLIGHT LEVEL	JAN		FEB		MAR		APR		MAY		JUN	
LATITUDE	W	E	W	E	W	E	W	E	W	E	W	E
80°N	-	270	-	250	-	250	-	250	-	250	-	250
75°N	-	270	-	270	-	250	-	250	-	250	-	250
70°N	-	290	-	270	-	260	-	250	-	250	-	270
65°N	310	290	290	250	300	270	290	250	250	250	300	270
60°N	320	290	310	270	300	290	270	250	250	250	310	270
55°N	330	290	320	290	310	290	250	270	250	250	310	290
50°N	330	310	350	290	310	290	250	270	270	270	310	310
45°N	330	310	330	310	310	310	270	290	290	290	310	310
40°N	330	330	310	310	310	310	310	310	310	310	330	330
35°N	370	350	370	350	330	350	350	330	370	330	390	370
30°N	-	-	-	-	-	390	-	-	-	370	-	400
25°N	-	-	-	-	-	-	-	-	-	390	-	-
20°N	-	-	-	-	-	-	-	-	-	-	-	-

FLIGHT LEVEL	JUL		AUG		SEP		OCT		NOV		DEC	
LATITUDE	W	E	W	E	W	E	W	E	W	E	W	E
80°N	-	250	-	290	-	290	-	290	-	290	-	290
75°N	-	270	-	310	-	310	-	290	-	290	-	290
70°N	-	270	-	320	-	310	-	310	-	290	-	290
65°N	290	290	330	330	330	310	320	310	330	290	310	300
60°N	290	310	330	330	330	330	320	310	330	290	320	310
55°N	300	310	330	330	350	330	330	330	330	310	330	310
50°N	310	310	330	330	370	330	350	350	330	330	350	330
45°N	320	330	350	350	-	370	370	350	350	330	350	330
40°N	-	350	-	390	-	-	-	370	390	350	350	330
35°N	-	390	-	-	-	-	-	-	-	390	-	370
30°N	-	-	-	-	-	-	-	-	-	-	-	-
25°N	-	-	-	-	-	-	-	-	-	-	-	-
20°N	-	-	-	-	-	-	-	-	-	-	-	-

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SOUTH AMERICA - MAXIMUM OZONE CRITERIA

FLIGHT LEVEL	JAN		FEB		MAR		APR		MAY		JUN	
LATITUDE	W	E	W	E	W	E	W	E	W	E	W	E
80°S	-	330	-	380	-	390	-	380	-	340	-	340
75°S	-	340	-	390	-	380	-	380	-	360	-	350
70°S	-	340	-	400	-	390	-	380	-	380	-	350
65°S	340	350	390	400	400	400	380	390	400	380	370	360
60°S	340	360	400	-	-	-	390	400	400	390	380	380
55°S	350	380	400	-	-	-	-	-	400	400	400	390
50°S	360	400	-	-	-	-	-	-	-	400	-	-
45°S	-	-	-	-	-	-	-	-	-	-	-	-
40°S	-	-	-	-	-	-	-	-	-	-	-	-
35°S	-	-	-	-	-	-	-	-	-	-	-	-

FLIGHT LEVEL	JUL		AUG		SEP		OCT		NOV		DEC	
LATITUDE	W	E	W	E	W	E	W	E	W	E	W	E
80°S	-	320	-	320	-	310	-	310	-	300	-	320
75°S	-	320	-	320	-	320	-	310	-	310	-	320
70°S	-	340	-	320	-	320	-	320	-	310	-	330
65°S	350	340	330	320	320	320	320	320	320	320	330	330
60°S	370	350	340	330	330	330	320	320	320	320	340	330
55°S	390	360	370	340	340	340	320	330	320	320	340	350
50°S	400	370	400	360	360	340	320	330	330	330	350	360
45°S	-	390	-	370	370	360	340	340	340	360	370	390
40°S	400	-	360	380	370	390	380	360	400	390	-	-
35°S	-	-	-	-	-	-	-	-	-	-	-	-

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SOUTH AMERICA - TWA OZONE CRITERIA

NOTE: Values below are the altitude limitations which the airplane is allowed to fly more than 3 continuous hours.

FLIGHT LEVEL	JAN		FEB		MAR		APR		MAY		JUN	
LATITUDE	W	E	W	E	W	E	W	E	W	E	W	E
80°S	-	250	-	290	-	290	-	290	-	290	-	290
75°S	-	270	-	310	-	310	-	290	-	290	-	290
70°S	-	270	-	320	-	310	-	310	-	290	-	290
65°S	290	290	330	330	330	310	320	310	330	290	310	300
60°S	290	310	330	330	330	330	320	310	330	290	320	310
55°S	300	310	330	330	350	330	330	330	330	310	330	310
50°S	310	310	330	330	370	330	350	350	330	330	350	330
45°S	320	330	350	350	-	370	370	350	350	330	350	330
40°S	-	350	-	390	-	-	-	370	390	350	350	330
35°S	-	390	-	-	-	-	-	-	-	390	-	370
30°S	-	-	-	-	-	-	-	-	-	-	-	-
25°S	-	-	-	-	-	-	-	-	-	-	-	-
20°S	-	-	-	-	-	-	-	-	-	-	-	-

FLIGHT LEVEL	JUL		AUG		SEP		OCT		NOV		DEC	
LATITUDE	W	E	W	E	W	E	W	E	W	E	W	E
80°S	-	270	-	250	-	250	-	250	-	250	-	250
75°S	-	270	-	270	-	250	-	250	-	250	-	250
70°S	-	290	-	270	-	260	-	250	-	250	-	270
65°S	310	290	290	250	300	270	290	250	250	250	300	270
60°S	320	290	310	270	300	290	270	250	250	250	310	270
55°S	330	290	320	290	310	290	250	270	250	250	310	290
50°S	330	310	350	290	310	290	250	270	270	270	310	310
45°S	330	310	330	310	310	310	270	290	290	290	310	310
40°S	330	330	310	310	310	310	310	310	310	310	330	330
35°S	370	350	370	350	330	350	350	330	370	330	390	370
30°S	-	-	-	-	-	390	-	-	-	370	-	400
25°S	-	-	-	-	-	-	-	-	-	390	-	-
20°S	-	-	-	-	-	-	-	-	-	-	-	-

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JAPAN - MAXIMUM OZONE CRITERIA

FLIGHT LEVEL / LATITUDE	JAN	FEB	MAR	APR	MAY	JUN
43°N	350	340	340	350	340	400
36°N	400	-	380	390	-	-
32°N	-	-	-	-	-	-

FLIGHT LEVEL / LATITUDE	JUL	AUG	SEP	OCT	NOV	DEC
43°N	-	-	-	-	-	380
36°N	-	-	-	-	-	-
32°N	-	-	-	-	-	-

JAPAN - TWA OZONE CRITERIA

NOTE: Values below are the altitude limitations which the airplane is allowed to fly more than 3 continuous hours.

FLIGHT LEVEL / LATITUDE	JAN	FEB	MAR	APR	MAY	JUN
43°N	290	290	300	310	270	310
36°N	330	310	310	320	330	390
32°N	-	-	390	370	-	-

FLIGHT LEVEL / LATITUDE	JUL	AUG	SEP	OCT	NOV	DEC
43°N	350	-	350	350	350	310
36°N	-	-	-	-	-	390
32°N	-	-	-	-	-	-

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AUSTRALIA - MAXIMUM OZONE CRITERIA

FLIGHT LEVEL / LATITUDE	JAN	FEB	MAR	APR	MAY	JUN
43°S	-	-	-	-	-	380
36°S	-	-	-	-	-	-
32°S	-	-	-	-	-	-

FLIGHT LEVEL / LATITUDE	JUL	AUG	SEP	OCT	NOV	DEC
43°S	350	340	340	350	340	400
36°S	400	-	380	390	-	-
32°S	-	-	-	-	-	-

AUSTRALIA - TWA OZONE CRITERIA

NOTE: Values below are the altitude limitations which the airplane is allowed to fly more than 3 continuous hours.

FLIGHT LEVEL / LATITUDE	JAN	FEB	MAR	APR	MAY	JUN
43°S	350	-	350	350	350	310
36°S	-	-	-	-	-	390
32°S	-	-	-	-	-	-

FLIGHT LEVEL / LATITUDE	JUL	AUG	SEP	OCT	NOV	DEC
43°S	290	290	300	310	270	310
36°S	330	310	310	320	330	390
32°S	-	-	390	370	-	-

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WESTERN EUROPE - MAXIMUM OZONE CRITERIA

FLIGHT LEVEL / LATITUDE	JAN	FEB	MAR	APR	MAY	JUN
52°N	390	350	350	330	350	380
47°N	400	370	360	350	370	370
39°N	-	-	390	350	360	-

FLIGHT LEVEL / LATITUDE	JUL	AUG	SEP	OCT	NOV	DEC
52°N	400	-	-	-	-	400
47°N	-	-	-	-	-	-
39°N	-	-	-	-	-	-

WESTERN EUROPE - TWA OZONE CRITERIA

NOTE: Values below are the altitude limitations which the airplane is allowed to fly more than 3 continuous hours.

FLIGHT LEVEL / LATITUDE	JAN	FEB	MAR	APR	MAY	JUN
52°N	330	310	310	270	290	310
47°N	330	320	310	310	310	310
39°N	390	350	330	310	310	330

FLIGHT LEVEL / LATITUDE	JUL	AUG	SEP	OCT	NOV	DEC
52°N	320	350	350	370	350	330
47°N	330	370	390	390	370	330
39°N	390	-	-	-	-	350

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AFRICA - MAXIMUM OZONE CRITERIA

FLIGHT LEVEL / LATITUDE	JAN	FEB	MAR	APR	MAY	JUN
52°S	400	-	-	-	-	400
47°S	-	-	-	-	-	-
39°S	-	-	-	-	-	-

FLIGHT LEVEL / LATITUDE	JUL	AUG	SEP	OCT	NOV	DEC
52°S	390	350	350	330	350	380
47°S	400	370	360	350	370	370
39°S	-	-	390	350	360	-

AFRICA - TWA OZONE CRITERIA

NOTE: Values below are the altitude limitations which the airplane is allowed to fly more than 3 continuous hours.

FLIGHT LEVEL / LATITUDE	JAN	FEB	MAR	APR	MAY	JUN
52°S	320	350	350	370	350	330
47°S	330	370	390	390	370	330
39°S	390	-	-	-	-	350

FLIGHT LEVEL / LATITUDE	JUL	AUG	SEP	OCT	NOV	DEC
52°S	330	310	310	270	290	310
47°S	330	320	310	310	310	310
39°S	390	350	330	310	310	330

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NAVIGATION EQUIPMENT

ELECTRONIC FLIGHT BAG (EFB) (IF APPLICABLE)

The factory incorporated EFB is a Class 2 type. Guidance of the AC 120-76A (Guidelines for the Certification, Airworthiness, and Operational Approval of Electronic Flight Bag Computing Devices) must apply.

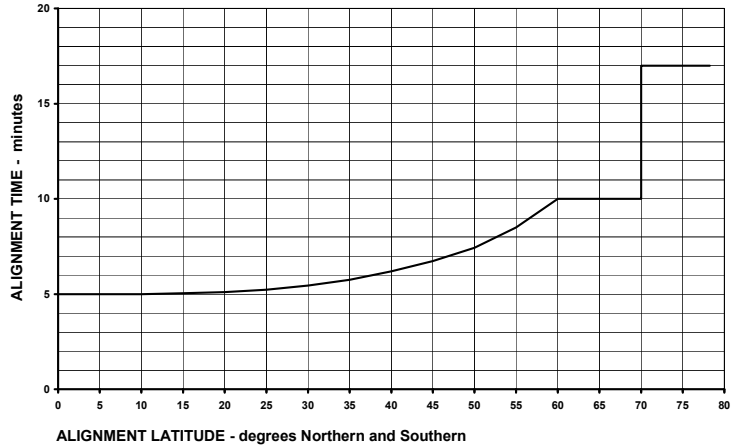
The EFB display adjustment must not interfere with steering handle operation.

INERTIAL REFERENCE SYSTEM (IRS)

Airplane must not be moved until all attitude and heading information presented on PFD is valid.

Alignment Limitations:

– Maximum latitude for alignment ..... 78.25° Northern and Southern
– IRS alignment will complete only after a valid airplane present position (latitude and longitude) is received.
– Time to Alignment:



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– The airplanes may not be operated within the North and South magnetic polar cut-out regions below:

MAGNETIC CUT-OUT REGIONS	LATITUDE	LONGITUDE
North	Between 70°N and 82°N	Between 90°W and 120°W
	North of 82°N	Between 0° and 180°W/E
South	Between 60°S and 82°S	Between 120°E and 160°E
	South of 82°S	Between 0° and 180°W/E

NOTE: Within the magnetic polar cut-out regions IRS heading data is not available.

INSTRUMENT LANDING SYSTEM (ILS)

This limitation applies to airplanes equipped with Mod. L of the Honeywell Primus II NV-850 Navigation Receiver Module P/N 7510134-831; which is part of the Honeywell Primus II RNZ-851 Integrated Navigation Unit P/N 7510100-831, -832, -833 and -834.

When crossing the Outer Marker on glideslope, the altitude must be verified with the value on the published procedure.

For airplanes with a single operating glideslope receiver, the approach may be flown using normal procedures no lower than Localizer Only Minimum Descent Altitude (MDA).

For airplanes with two operating glideslope receivers, the airplane may be flown to the published minimums for the approach using normal procedures if both glideslope receivers are tuned to the approach and both crew members are monitoring the approach using independent data and displays.

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INTEGRATED STANDBY INSTRUMENT SYSTEM (ISIS)

Maximum duration of ISIS when operating on batteries only is 40 minutes.

NOTE: The maximum duration of battery power can be extended to 45 minutes if the Pitot 3 Sensor Heating Button is turned off when not operating in icing conditions.

Airplane must not be moved during power-up initialization.

Do not cage attitude in turning flight.

RADAR

Do not operate Weather Radar during refueling, near fuel spills or people.

CHARTS AND MAPS FUNCTION (PRIMUS ELITE) (IF APPLICABLE)

The display of maps on the MFD (Charts & Maps function) is for enhanced situational awareness only, and use as a primary navigation source is prohibited.

The use of the Charts and Maps function on MFD to take credit for a paperless cockpit approval/application is prohibited.

SATELLITE WEATHER RADIO SYSTEM (XM WEATHER) (IF APPLICABLE)

XM Weather information must not be used for hazardous weather penetration. XM Weather information is provided only for hazardous weather avoidance.

NEXRAD weather data is intended for long-range planning purposes only. Due to inherent delays and relative age of the data, NEXRAD weather data should not be used for short-range avoidance of hazardous weather.

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COMMUNICATION EQUIPMENT

HF

Do not rely on ADF indications shown on PFD while transmitting in HF.

Do not transmit through HF Radio during airplane fueling.

TRANSPONDER MODE S ENHANCED SURVEILLANCE

For airplanes Post-Mod. SB 145LEG-34-0014 or equipped with an equivalent modification factory incorporated, the installed Mode S system satisfies the data requirements of ICAO Doc 7030/4, Regional Supplementary Procedures for SSR Mode S Enhanced Surveillance in designated European airspace.

The system is not capable to transmit the Track Angle Rate parameter.

ADS-B OUT (IF APPLICABLE)

For airplanes Post-Mod. SB 145LEG-34-0035 (ADS-B Out) or equipped with an equivalent modification factory incorporated, the installed ADS-B Out system has been shown to meet the equipment requirements of 14 CFR § 91.227.

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AUTOPILOT

The following limitations are applicable to the Autopilot:

Minimum Engagement Height After Takeoff ..... 500 ft

Autopilot coupled approaches approved down to 200 ft AGL.

Malfunction altitude loss:

Cruise ..... Up to 80 ft

Maneuver..... Up to 100 ft

ILS Approach..... 15 ft

Descent below Minimum Descent Altitude on a non precision approach with Autopilot engaged is prohibited.

Single engine go-around with Autopilot engaged is prohibited.

Approach mode selection during Localizer capture is allowed only when airplane is inbound.

NOTE: Coupled go-around height loss may be 40 ft.

Maximum Operation Altitude with Yaw Damper Disengaged (Mach > 0.7) ..... 35000 ft

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FMZ2000 FLIGHT MANAGEMENT SYSTEM

The following limitations are applicable to the FMS:

– The Honeywell Flight Management System (FMS) Pilot's Operating Manual, Honeywell Publication Number A28-1146-133-00, February 1999 edition (or later revision of the manual) for the software version NZ5.2 or FAA accepted Operating Manual, must be immediately available to the flight crew whenever navigation is predicated on the use of the FMS. The software status stated in the Pilot's Manual must match that displayed on the FMS Control Display Unit (CDU).

– FMS instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the FMS navigation data base. The FMS data base must incorporate the current update cycle.

– Use of FMS guidance for conducting instrument approach procedures is prohibited with the FMS operating in the degraded or dead-reckoning mode, (DGR or DR annunciation set on PFD).

– Operation above 72° 30.0' north latitude and below 59° 30.0' south latitude is prohibited due to unreliable magnetic heading.

– The FMS is approved for oceanic and North Atlantic (NAT) Minimum Navigation Performance Specification (MNPS) routes requiring only a single FMS and a single GPS in accordance with AC 20-130A.

– The dual FMZ2000 installation using dual GPS and dual Inertial Reference System (IRS) is eligible to operate in RNP Oceanic (RNP-10) and North Atlantic High Level Airspace (NAT-HLA) areas with no time limitation, in accordance with AC 20-138D.

– The dual FMZ2000 installation using dual IRS, when used as a primary means of navigation, is eligible to operate in RNP Oceanic (RNP-10) and North Atlantic High Level Airspace (NAT-HLA) areas for flights up to 6.2 hours after the system is set to navigation mode, in accordance with AC 20-138D.

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- The pilot must review the complete transition-approach, comparing the waypoints and altitudes displayed on the FMS with those on the published procedure prior to activation to insure that the correct procedure and transition are selected.
- The Flight Director must be coupled to the LNAV mode (Autopilot coupled or not coupled), to accomplish GPS only approaches.
- When using FMS guidance for conducting instrument approach procedures that do not include a GPS reference in the title of the published procedure, the flight crew must verify that the procedure specified navaid and associated avionics are operational.
- For airplanes equipped with single FMS, when using FMS guidance for conducting instrument approach procedures, the procedure navaid must be tuned and valid, and the raw data must be displayed in the cockpit, under the following conditions:
  - For VOR approaches (where the procedure specified navaid is a VOR only navaid - no DME capability) and NDB approaches, without GPS (GPS failed or RAIM out of limits or unavailable).
  - For any instrument approach (other than a GPS stand alone approach), outside the Brazilian Airspace, with GPS as the navigation sensor.
- ILS, LOC, LOC-BC, LDA, SDF and MLS approaches, using the FMS for guidance, are prohibited.
- FMS missed approaches using the CDU Mode Select Button are prohibited.
- When flying to an airport where GPS (non-overlay) is the intended approach, prior to dispatch, the crew is required to verify that the predictive RAIM at the destination ETA is within the approach criteria. This information (RAIM AVAILABLE), is displayed on the PREDICTIVE RAIM page, accessed via the GPS STATUS page.

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- When the approach at the destination is based on GPS and an alternate airport is required by the applicable operating rules, the alternate must be served by an approach based on a navigation aid other than GPS. The navigation aid must be operational and the airplane must have operational equipment capable of using that navigation aid.
- IFR non-precision approach approval is limited to published approaches within the Brazilian airspace. Approaches to airports in other airspace are not approved unless authorized by the appropriate governing authority.
- During oceanic, enroute and terminal area operation with DGR or DR annunciated on the PFD, the flight crew must verify the FMS position using VOR/DME raw data or other appropriate means.
- The airplane must have other navigation equipment installed and operating, appropriate to the route of flight.
- IFR enroute and terminal navigation is prohibited unless the pilot verifies the currency of the data base or verifies each selected waypoint for accuracy by reference to current approved data.
- Operation above 72° 30.0' north latitude and below 59° 30.0' south latitude is prohibited due to unreliable magnetic heading, unless an Inertial Reference System (IRS) is installed and operating as a sensor to the FMS.
- The fuel flow and fuel used presented on the FMS are supplementary information only. The flight crew must use fuel information primarily from the MFD and EICAS display.

NOTE: Types of airplane operations permitted:

- Oceanic/Remote: RNP-10.
- En Route: B-RNAV (RNAV 5)/RNAV 1/RNAV 2.
- Terminal: P-RNAV/RNAV 1.

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FMZ2010 FLIGHT MANAGEMENT SYSTEM

The following limitations are applicable to Honeywell Flight Management System version NZ6.1 and on:

– The Honeywell Flight Management System (FMS) Pilot's Operating Manual, Honeywell Publication Number D200802000002 (or later revision of the manual) for the software version NZ6.1 or FAA accepted Operating Manual, must be immediately available to the flight crew whenever navigation is predicated on the use of the FMS. The software status stated in the Pilot's Manual must match that displayed on the FMS Control Display Unit (CDU).

– Honeywell software version NZ6.1 (or later approved version) must be installed.

– The dual FMZ2010 installation using dual GPS and dual Inertial Reference System (IRS) is eligible to operate in RNP Oceanic (RNP-10) and North Atlantic High Level Airspace (NAT-HLA) areas with no time limitation, in accordance with AC 20-138D.

– The dual FMZ2010 installation using dual IRS, when used as a primary means of navigation, is eligible to operate in RNP Oceanic (RNP-10) and North Atlantic High Level Airspace (NAT-HLA) areas for flights up to 6.2 hours after the system is set to navigation mode, in accordance with AC 20-138D.

– FMS instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the FMS navigation data base. The FMS data base must incorporate the current update cycle.

– Use of FMS guidance for conducting instrument approach procedures is prohibited with the FMS operating in the degraded or dead-reckoning mode, (DGR or DR annunciation set on PFD).

– The pilot must review the complete transition-approach, comparing the waypoints and altitudes displayed on the FMS with those on the published procedure prior to activation to insure that the correct procedure and transition are selected.

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- The Flight Director must be coupled to the LNAV mode (Autopilot coupled or not coupled), to accomplish RNAV (GPS) approaches.
- When using FMS guidance for conducting instrument approach procedures that do not include a GPS reference in the title of the published procedure, the flight crew must verify that the procedure specified navaid and associated avionics are operational.
- When using FMS guidance for conducting instrument approach procedures, the procedure navaid must be tuned and valid, and the raw data must be displayed in the cockpit, under the following conditions:
  - For VOR approaches (where the procedure specified navaid is a VOR only navaid - no DME capability) and NDB approaches, without GPS (GPS failed or RAIM out of limits or unavailable).
  - For any instrument approach (other than a GPS stand alone approach), outside the Brazilian Airspace, with GPS as the navigation sensor.
- ILS, LOC, LOC-BC, LDA, SDF and MLS approaches, using the FMS for guidance, are prohibited.
- FMS missed approaches using the CDU Mode Select Button are prohibited.
- When flying to an airport where GPS (non-overlay) is the intended approach, prior to dispatch, the crew is required to verify that the predictive RAIM at the destination ETA is within the approach criteria. This information (RAIM AVAILABLE), is displayed on the PREDICTIVE RAIM page, accessed via the GPS STATUS page.
- When an alternate airport is required by the applicable operating rules, the alternate airport must not be defined with an approach based on GPS. The alternate airport must be flight planned using an available ground-based approach aid. The navigation aid must be operational and the airplane must have operational equipment capable of using that navigation aid. However, once at the alternate airport, the pilot may perform a GPS approach if the equipment indicates integrity is available to support the approach.

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- During oceanic, enroute and terminal area operation with DGR or DR annunciated on the PFD, the flight crew must verify the FMS position using VOR/DME raw data or other appropriate means.
- The airplane must have other navigation equipment installed and operating, appropriate to the route of flight.
- IFR enroute and terminal navigation is prohibited unless the pilot verifies the currency of the data base or verifies each selected waypoint for accuracy by reference to current approved data.
- Operation in the following region using FMS as primary navigation source is prohibited: north of 72° 30.0' N and south of 59°30.0' S.
- The fuel flow and fuel used presented on the FMS are supplementary information only. The flight crew must use fuel information primarily from the MFD and EICAS display.
- The use of IRS is limited to a maximum of 2 hours of operation in designated B-RNAV airspace from the time the system is placed in the navigation mode.
- The operation of Saving Flight Plan is limited to two Flight Plans and only allowed if the custom data base have been cleared via Maintenance page.
- Manual position updates are not approved during RNP 10 operations.
- If GPS RAIM is annunciated as not available during any phase of flight, the flight crew must monitor FMS guidance data and crosscheck with raw data from an alternate source (VOR, DME or IRS).

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RNP NAVIGATION LIMITATIONS (FOR AIRPLANES WITH RNP ENABLED)

- Airplane is not approved for RNP less than 0.3 operations.
- Airplane is not approved for RNP AR operations.
- Airplane is not approved for procedures containing RF legs.
- For operations using RNP 1 to RNP less than 2 the use of Flight Director is required.
- For operations using RNP 0.3 to RNP less than 1 the use of GPS and Flight Director is required.
- Airplane is not approved for missed approach operations less than RNP 1.

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BAROMETRIC VERTICAL NAVIGATION LIMITATIONS (FOR AIRPLANES WITH VNAV ENABLED)

- The use of the VNAV guidance when the FD mode is other than VNAV is prohibited unless pilots set the ALT SEL to each waypoint altitude constraint required by the FMS entered procedure.
- Advisory vertical guidance deviation information is only an aid to help pilots comply with altitude restrictions. When using advisory vertical guidance, the pilot must rely on the altimeter as the primary vertical reference during the final approach segment, including step down fixes. VNAV path guidance, if installed, is supplementary guidance information.
- Use of VNAV is prohibited if the Speed Intervention function is not available.
- VNAV must not be used if Flight Director is not available.
- VNAV must not be engaged on ground.
- VNAV must not be used when the airplane is operating using height above the ground (QFE) rather than sea level.
- VNAV must not be used below the published approach minimums.
- When the reported station temperature exceeds the limits published in the approach chart, the use of VNAV barometric procedures are prohibited unless the pilot uses the VNAV temperature compensation function.
- The use of speed mode in FMS is prohibited for one engine inoperative condition.
- The FMS does not correct the speed targets, including approach and go around speeds for Flap/Landing Gear positions, ice conditions or non-normal conditions. It is the pilot responsibility to ensure that the speeds are within the limits in these conditions.
- Entry of a planned speed into the FMS which is below the minimum safe maneuver speed prescribed in the basic AFM is prohibited.
- VNAV submode VFLC must not be used without Autopilot engaged. This limitation is not applicable for airplanes Post-Mod. SB 145LEG-31-0024 or SB 145LEG-34-0029 or SB 145LEG-34-0032 or SB 145LEG-34-0035 or with an equivalent modification factory incorporated.

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CAT II OPERATION

MINIMUM EQUIPMENT REQUIRED

The performance of CAT II approaches requires that the following equipment and instruments be in proper operating conditions:

- 2 Inertial Reference Systems;
- 1 Yaw Damper System;
- 2 Flight Director Systems;
- 2 Primary Flight Displays (PFD);
- Windshield Wipers or Approved Rain Repellent Coating application;
- 2 VHF/NAV Systems;
- 1 VHF/COMM System;
- Both Engines;
- Cat II Checklist Logic;
- 1 Electrical Trim System;
- 1 Radio Altimeter;
- 1 Enhanced Ground Proximity Warning System (EGPWS);
- 1 Aural Warning Unit (AWU) Channel;
- 2 Air Data Systems (ADS);
- 1 Standby Attitude Indicator;
- 1 Standby Airspeed Indicator;
- 1 Standby Altimeter.

NOTE: CAT II operation with Autopilot engaged is to be performed by the pilot who has the Flight Director coupled to the Autopilot.

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AUTOPILOT SYSTEM

Minimum Decision Height (DH)..... 100 ft

NOTE: Although the radio altitude setting may be adjusted down to 80 ft, if requested by an ILS CAT II Approved Chart, the Decision Height (DH) is limited to 100 ft above ground level.

Minimum Use Height (MUH)..... 50 ft

Runway Visual Range (RVR)..... 365 m (1200 ft)

Maximum Tailwind ..... 10 kt

Maximum Crosswind..... 25 kt

NOTE: Coupled go-around height loss may be 40 ft.

APPROACH AND LANDING FLAPS

CAT II approach and landing must be performed with Flaps 22°.

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STEEP APPROACH OPERATION

NOTE: The Steep Approach Operation is limited to airplanes Post-Mod. SB 145LEG-34-0013 or SB 145LEG-34-0023 or equipped with an equivalent modification factory incorporated and following the applicable AFM Supplement.

OPERATIONAL LIMITATIONS

The Steep Approach Landing may be performed with an approach flight path angle up to 5.5°.

This operation can not be initiated with one engine inoperative.

This operation is not permitted if the STEEP APPROACH mode is not armed.

A visual glidepath indicating system is required to perform landings with 35 ft screen height.

WARNING: FOR AIRPLANES EQUIPPED WITH EICAS 20 OR PREVIOUS, THE USE OF THE RA (RADIO ALTIMETER) IS PROHIBITED AS REFERENCE FOR FLARE.

OPERATIONAL ENVELOPE

The Steep Approach Operation is limited to airports with pressure altitude up to 8500 ft.

AIRSPEEDS

LANDING REFERENCE SPEED (V_{REF})

The Steep Approach must be done at Landing Reference Speed (V_{REF}).

AUTOPILOT

Minimum Use Height ..... 200 ft

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LANDING FLAPS

Steep Approach Landing must be performed with Flaps 45°.

WIND COMPONENTS

For Steep Approach the following wind component must not be exceeded:

Maximum Tailwind Component ..... 5 kt

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OPERATION USING TIRES WITH LOW PRESSURE

The airplane limitations are the same as those in the basic AOM except as follows:

OPERATIONAL LIMITATIONS

AIRPLANES

Only airplanes Post-Mod. SB 145LEG-32-0023 or with an equivalent modification factory incorporated are allowed to operate with reduced tire pressure.

WEIGHT

To operate using reduced tire pressure, the maximum takeoff weight allowed is 20000 kg (44092 lb) and the maximum ramp weight allowed is 20070 kg (44247 lb).

TIRES

Airplane must be equipped with 30x9.5-14 16PR main landing gear tires.

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RVSM OPERATION

The RVSM operation reduces the EMB-135BJ minimum vertical separation from 2000 ft to 1000 ft between FL 290 and FL 410 inclusive.

Airworthiness approval alone does not authorize flight into airspace for which an RVSM operational approval is required by an ICAO Regional Navigation Agreement.

MINIMUM EQUIPMENT REQUIRED

For RVSM operation, the following factory-incorporated or equivalent Embraer-approved equipment and instruments must be in proper operating condition:

- 2 Primary Altitude Measurement Systems;
- 1 Autopilot with Altitude Hold Mode operative;
- 1 Altitude Alerter;
- 1 Transponder.

NOTE: - An operating transponder may not be required for entry into all designated RVSM airspace. The operator should determine the requirement for an operational transponder in each RVSM area where operations are intended. The operator should also determine the transponder requirements for transition areas next to RVSM airspace.

- Should any of the required equipment fail prior to the airplane entering RVSM airspace, the pilot should request a new clearance to avoid entering this airspace.

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RUNWAY AWARENESS AND ADVISORY SYSTEM (RAAS) (IF APPLICABLE)

RAAS advisories are not approved for navigation purposes. RAAS advisories cannot be used to guide an airplane in or around the terminal area.

RAAS does not include knowledge of prevailing Notice to Airmen (NOTAM). Therefore factors such as closure of runways are not reflected by advisories. It is the flight crew responsibility to be aware of prevailing NOTAM and Automatic Terminal Information Service (ATIS) data. In addition, data on newly constructed runways, changes of length to existing runways, or changes of runway identifier may not necessarily be included in the RAAS runway database.

RAAS distance advisories do not imply that the airplane can or cannot be safely landed, stopped, or taken off from a runway. It is the crew's responsibility to calculate the performance required for takeoff and landing.

RAAS does not have knowledge of where painted hold lines are located at airports. In some cases, the RAAS Approaching Runway – On Ground Advisory may be issued after an airplane has crossed a hold line.

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LONG RANGE OPERATION

The airplane limitations are the same as those in the basic AOM except as follows:

FIRE PROTECTION

BAGGAGE FIRE EXTINGUISHING BOTLLE

The factory-incorporated baggage compartment fire extinguishing bottles agent duration is 75 minutes.

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SECTION 1-02

NORMAL PROCEDURES

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NOTE: Items marked with an asterisk (*) may not be presented in this manual.

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INTRODUCTION

The operating procedures defined in this section have been defined with the purpose of providing expanded normal procedures that should be used by trained flight crew to ensure that the airplane is in a proper condition and correctly configured for each phase of flight.

The source document for all procedures contained herein is the approved Airplane Flight Manual (AFM). In the event that any procedure disagrees with the AFM, the AFM will prevail. In the event that any of the procedures are missing or unusable, operations may be continued provided the approved AFM is available for use.

The normal procedures established are based on the assumption that all equipment is operating normally. It is the crew's responsibility to verify proper system response. In case improper indications are observed, verification of the appropriate controls position, checking of Circuit Breakers and testing of the related system should be performed to determine whether the condition affects dispatch or compliance with the MMEL, and whether any requires maintenance action is required.

* Items marked with an asterisk are to be performed at least once a day, by flight crew or maintenance personnel, at the operator's discretion.

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LEGACY EMBRAER

NORMAL CHECKLIST

EXTERNAL SAFETY INSPECTION

External Lights.....AS REQ
Emergency/Parking Brake .....APPLIED
Wheel Chocks .....IN PLACE
Fuel Tanks Draining .....AS REQUIRED

----------NOSE SECTION----------

Landing/Taxi Lights .....CONDITION
Access Doors and Panels .....SECURED
Static Ports.....NO OBSTRUCT
Sensors and Pitot Tubes.....CONDITION, NO OBSTRUCT
Windshield Wipers (if applicable) .....CONDITION
Air Inlets/Outlets.....NO OBSTRUCT
Radome.....SECURED
Nose Gear.....CKD
Static Discharger.....CONDITION
Hydraulic Compartment .....NO LEAKS

----------FUSELAGE----------

Access Doors and Panels .....SECURED
Windows.....CONDITION
Static Ports.....NO OBSTRUCT
Sensors and Pitot Tubes.....CONDITION, NO OBSTRUCT
Oxy Press Green Disc.....CKD IN PLACE
Fueling Compartment Door....SECURED
Inspection Lights .....CONDITION
Emergency Lights.....CONDITION
Air Inlets and Outlets.....NO OBSTRUCT
Red Beacon.....CONDITION
* Emergency/Parking Brake Hydraulic Accumulator .....DISCH & CKD
Antennas..... CONDITION
Ram Air Inlet..... NO OBSTRUCT
Fluid Drain Holes ..... NO LEAKS
Pylons ..... CONDITION
Engines..... CKD
Thrust Reverser Doors ..... FLUSH WITH NACELLE
Pressurization Static Ports .... NO OBSTRUCT
Baggage Door ..... LATCHED/ LOCK PANEL CLOSED

----------WINGS/MAIN GEAR----------

Landing Lights ..... CONDITION
Wing Leading Edge ..... CONDITION
Access Doors and Panels ..... SECURED
Direct Measuring Sticks..... PUSHED IN
Air Inlets, Outlets and Vents .. NO OBSTRUCT
Fluid Drain Holes ..... NO LEAKS
Vortilons and Vortex Gen ..... NUMBER & CONDITION
Nav and Strobe Lights ..... CONDITION
Static Discharger ..... NUMBER & CONDITION
Flight Control Surface & Fair . CONDITION
Main Gear..... CKD

----------TAIL CONE SECTION----------

Horizontal Stabilizer..... CONDITION
Nav and Logo Lights..... CONDITION
Flight Control Surfaces ..... CONDITION
Static Dischargers ..... NUMBER & CONDITION
APU ..... CONDITION
Fuel Drain Holes..... NO LEAKS

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LEGACY EMBRAER

NORMAL CHECKLIST

INTERNAL SAFETY INSPECTION

----------COCKPIT----------
Maintenance Status ..... CKD
Manuals & Documents..... ON BOARD
Cockpit Emergency Equip ..... CKD
Overhead/Main/Pedestal/ Circuit Breakers Panels ..... CKD
Radar ..... OFF
ELT ..... ARMED
IRS 1 & 2 ..... OFF
Gear ..... DOWN
Passenger Oxygen ..... AUTO
Gust Lock..... LOCKED
Speed Brake ..... CLOSED
Parking Brake ..... ON
Flaps ..... 0°
Free Fall..... CKD
----------PASSENGER CABIN----------
Cabin Emergency Equip ..... CKD
PBE Indicator..... GREEN
Emergency Exit..... CLOSED & LATCHED
Overwing Fueling Caps ..... SECURED
PAX Seats and Belts ..... CONDITION
Galley and Toilet..... CONDITION
Lav Smoke Det System ..... CKD
Baggage Compart Access Door ..... CLOSED & LATCHED
Pocket Door ..... OPEN & LOCKED

POWER UP

Internal Safety Inspection..... COMPLETED

APU START WITH BATTERIES

Batteries 1 & 2 ..... AUTO
Avionics Master 1 or 2 ..... ON
* Batteries Voltage..... CKD
* Backups Battery ..... CKD
Avionics Master 1 & 2 ..... OFF
Pump Power..... ON
* Fire Detection ..... CKD
APU Master ..... ON/WAIT 3 SECS/START/ THEN ON
Avionics Master 1 & 2 ..... ON
Push Button Lights ..... CKD
----------After 3 minutes----------
APU Bleed..... OPEN
Air Cond Panel ..... AS REQ

APU START WITH GPU

Batteries 1 & 2..... AUTO
Avionics Master 1 or 2..... ON
* Batteries Voltage ..... CKD
* Backups Battery ..... CKD
GPU Voltage ..... CKD
Avionics Master 1 & 2 ..... OFF
GPU ..... ON
Pump Power..... ON
* Fire Detection ..... CKD
APU Master..... ON/WAIT 3 SECS/START/ THEN ON
GPU ..... OFF
Avionics Master 1 & 2 ..... ON
Push Button Lights ..... CKD
----------After 3 minutes----------
APU Bleed..... OPEN
Air Cond Panel ..... AS REQ

GPU POWER (NO APU)

Batteries 1 & 2..... AUTO
Avionics Master 1 or 2..... ON
* Batteries Voltage ..... CKD
* Backups Battery ..... CKD
GPU Voltage ..... CKD
GPU ..... ON
* Fire Detection ..... CKD

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LEGACY EMBRAER

NORMAL CHECKLIST

BEFORE START

CVR ..... CKD
Electrical Panel ..... SET
Emergency Lights ..... ARMD
Cockpit/Glareshield Lights ..... AS REQ
♦ Fuel Panel & Qty ..... SET/_lb/kg
♦ Power Plant Panel ..... SET
* Elec Hyd Pumps ..... CKD & OFF
♦ Pax Signs ..... ON
Ice Protection Panel ..... SET
Air Cond Panel ..... SET
Windshield Wiper ..... OFF
Oxy Press & Masks CKD/100%
Radar ..... TEST/STBY
Autopilot ..... CKD
IRS 1 & 2 ..... NAV
♦ Flight Instruments ..... SET & X-CKD
♦ Speed Bugs ..... SET
♦ Trims ..... CKD & SET
DISCONNECT ..... CKD
Speed Brake ..... CLSD
♦ Parking Brake ..... ON
♦ RMU & FMS ..... SET
♦ Stall Protection Sys ..... CKD
♦ Pressurization ..... SET
Safety Pins ..... ON BOARD
♦ EICAS Messages ..... CKD
♦ Pax Briefing ..... COMPLETED

♦ **ON THROUGH FLIGHTS CHECKLIST**

CLEARED TO START

Windows ..... CLSD
Red Beacon ..... ON
Pump Power ..... ON

AFTER START

Electrical Panel ..... SET
FADEC ..... RESET/ALT
Elec Hyd Pumps ..... AUTO
Windshield Heating ..... AS REQ
Air Conditioning ..... SET
APU/GPU ..... SET

BEFORE TAKEOFF

Pax Announcement ..... COMPLETED
Takeoff Briefing ..... COMPLETED
PC Power ..... OFF
Fuel Transfer & XFeed ..... OFF
Ice Protection Test ..... AS REQ
Flight Director ..... SET
Engine Thrust Rating ..... CKD
Brakes Temperature ..... CKD
Flaps ..... __°SET
Flight Controls ..... CKD

CLEARED INTO POSITION

External Lights ..... ON
EICAS Messages ..... CKD
Transponder ..... TA/RA
Takeoff Configuration ..... CKD
Gust Lock ..... UNLOCKED
Elevator ..... CKD

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LEGACY EMBRAER

NORMAL CHECKLIST

AFTER TAKEOFF

Fuel Transfer & XFeed	AS REQ
Windshield Heating	AS REQ
Air Cond Panel	SET
Altimeters	SET & X-CKD
Thrust Rating	CLB
Landing Gear	UP
Flaps	0°
Pressurization	CKD
APU	AS REQ
----------Above 10000 ft----------	
PC Power	AS REQ

DESCENT

Windshield Heating	ON
Speed Bugs	SET
Pressurization	CKD
Approach Briefing	COMPLETED
----------Below 10000 ft----------	
PC Power	OFF
Pax Signs	ON
Pax Announcement	COMPLETED
Pocket Door	OPN & LOCK

APPROACH

Fuel Transfer & XFeed	OFF
Altimeters	SET & X-CKD
Approach Aids	SET & X-CKD

BEFORE LANDING

Landing Gear	DOWN
Flaps	___°SET
Autopilot & Yaw Damp	OFF

AFTER LANDING

Windshield Heating	OFF
Flaps	0°
APU	AS REQ
Transponder	AS REQ
Radar	STBY
Gust Lock	LOCKED

SHUTDOWN

GPU/APU	SET
Shed Buses	SET
Pump Power	SET
Red Beacon	OFF
Start/Stop Selector	STOP
Elec Hyd Pumps	OFF
Air Cond Panel	SET
Pax Signs	OFF
Parking Brake	ON

LEAVING THE AIRPLANE

IRS 1 & 2	OFF
Avionics Master 1 & 2	OFF
Emergency Lights	OFF
External & Internal Lights	OFF
Radar	OFF
GPU/APU	OFF
Pump Power	OFF
Air Cond Panel	SET
Batteries 1 & 2	OFF
Overhead/Main/Pedestal/ Circuit Breakers Panels	CKD

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NORMAL PROCEDURES

EXTERNAL SAFETY INSPECTION

When approaching the airplane, take time to watch the area where the airplane is parked. Evaluate if there is room for the taxi-out or push-back maneuver. Make sure that there will be enough clearance throughout the maneuver.

Also take time to have a look at the airplane as a whole from a reasonable distance. See if the airplane looks good, level, and normal. Experience shows that this "initial look" can reveal details that will otherwise go unnoticed such as fluid spots on the ground, unexpected things attached to the airplane, bent or unaligned airframe components, etc.

If icing is an issue, examine the airplane external surface to determine the exact nature and extent of the airplane icing. A close inspection of critical areas such as the wing upper surface is recommended since clear ice, however critical is not always visible at a distance. Advise the other pilot immediately if it helps having de-icing equipment available in a timely manner. Frost-like ice along the wing lower surface where the fuel tank stations are located comes as a result of fuel cooling during a previous long flight. This phenomenon does not have a significant effect on the airplane flight characteristics if frost thickness is less than 3 mm (0.12 in).

If evidence is found that type IV anti-icing fluid has been applied to the airplane before the previous flight and it is not clean, a fluid residue cleanup is required.

Make sure that the airplane has the chocks and safety pins placed as required.

The External Safety Inspection must be carried out prior to the first flight of the day, between flights, whenever the crew-airplane combination changes, and after the final flight of the day.

The external lights must be turned on for inspection with the exception of the ones that may be a nuisance to other people in the vicinity of the airplane. The lights must be checked and switched off before commencing the walk around.

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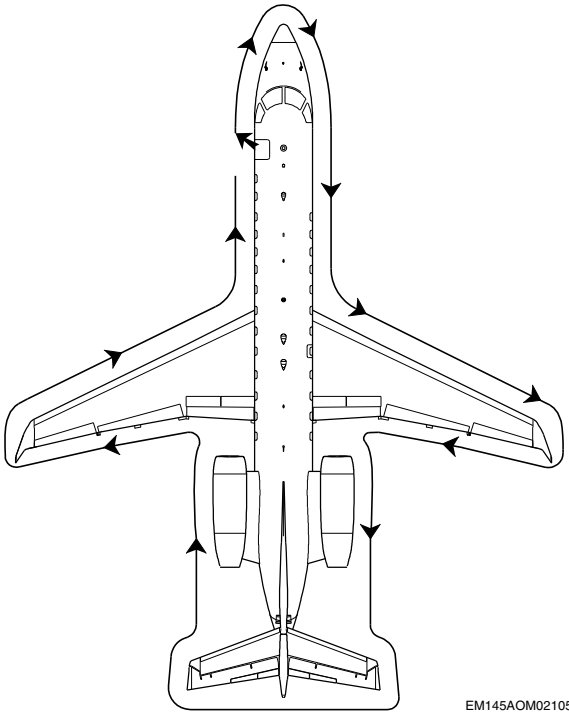
RECOMMENDED WALK AROUND



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WALK AROUND SEQUENCE

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The inspection can be done according to the list below:

External Lights ..... AS REQUIRED

Maintenance personnel should make the external lights check. If necessary, flight crew should perform the external lights test, turning the lights ON, and then OFF immediately after checking them.

Emergency/Parking Brake ..... APPLIED

Wheel Chocks ..... IN PLACE

Fuel Tanks Draining ..... AS REQUIRED

Refer to AOM Section 1-12-25 for further information.

EXTERNAL INSPECTION CHECK	
LEFT FWD FUSELAGE	− **Main Door** − **Access Doors and Panels** − **Sensors/Static Ports** Verify condition with no obstructions, covers or damage. − **Windows** Verify conditions and undamaged. − **Windshield Wipers (if applicable)** Verify conditions and undamaged.

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MENU

PREVIOUS

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EXTERNAL INSPECTION CHECK	
NOSE SECTION	− **Air Inlets/Outlets** No obstruction or damage. − **Pitot Tubes and Sensor** Verify condition with no obstructions, covers or damage. − **Access Doors and Panels** − **Radome** − **Nose Gear Bay** − **Nose Gear Struts/Wheel Well/Doors** Verify condition and no leaks. − **Nose Gear Up Lock Hook** Unlocked. If the uplock hook is in the LOCKED position, cycle the freefall lever to reposition the uplock to the UNLOCKED position. − **Landing and Taxi Lights** Clean and undamaged. − **Wheel Position Indication Scale Limits** Check if the nose-wheel position indication mark is within the nose-wheel position indication scale limits. − **Shock Absorber Extension** Check minimum extension according to the table below:

CG POSITION (% MAC)	17	20	25	28	32	35
MINIMUM EXTENSION mm (in)	56 (2.20)	51 (2.01)	47 (1.85)	51 (2.01)	57 (2.24)	62 (2.44)

(Continued)

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EXTERNAL INSPECTION CHECK	
NOSE SECTION	− **Wheels and Tires** Verify condition with no obstructions, covers or damage. Tire should not be worn past the bottom of the tire grooves. *– **Tires Pressure** Cold tire pressure should be within gray range. Gray range corresponds to 84 ± 2 psi. **NOTE: -** According to the tire manufacturer, this step should be performed before the first flight of the day or three hours after landing, in order to have a proper pressure reading. - Special attention should be given when SB 145LEG-25-0078 is applied, regarding tire pressure. − **Static Discharger** Verify condition. Make sure that the static discharger is present and touches the ground. Otherwise, refer to the CDL for dispatch with missing item. − **Ground Locking Pin** Remove. − **Air Inlets** No obstruction or damage. − **Hydraulic Compartment** No Leaks. Remove Maintenance Safety Pin.

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EXTERNAL INSPECTION CHECK	
RIGHT FWD FUSELAGE	− **Pitot Tube/Sensors/Static Ports** Verify condition with no obstructions, covers or damage. − **Oxygen Discharge Indicator** Check oxygen overpressure green disc in place. − **Access Doors and Panels** Secured. − **Antennas** Undamaged. − **Ram Air Inlet** No obstruction or damage. − **Air Inlets and Outlets** No obstruction or damage. − **Fluid Drain Holes** Condition and no leaks. − **Fueling Compartment Door** Secured. − **Inspection Light** Clean and undamaged. − **Emergency Lights** Clean and undamaged. − **Red Beacon** Clean and undamaged.

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EXTERNAL INSPECTION CHECK	
RIGHT WING	− **Landing Light** Clean and undamaged. − **Wing Leading Edge** Condition. − **Clear Ice Detector** Condition. − **Access Doors and Panels** Secured. − **Direct Measuring Sticks** Pushed IN and with no leaks. − **Fluid Drain Holes** No Leaks. − **Air Inlets, Outlets and Vent** No obstruction or damage. − **Vortilons and Vortex Generators** Number and condition. − **Navigation and Strobe Lights** Clean and undamaged. − **Static Dischargers** Number and condition. Refer to the CDL for dispatch with missing items. − **Flight Control Surfaces and Fairings** Flaps must be retracted, and Spoilers closed. Surfaces are unobstructed and free from ice and snow.

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EXTERNAL INSPECTION CHECK	
RIGHT MAIN GEAR	− **Gear Struts/Wheel Wells** Verify condition and no leaks. − **Main Gear Up Lock Hook** Unlocked. If the uplock hook is in the LOCKED position, cycle the freefall lever to reposition the uplock to the UNLOCKED position. Carry out this procedure with pins in place. − **Shock Absorber Extension** Check 48 mm (1.89 in) minimum extension. − **Brake Wear Indicators** Wear indicators should be no less than flush with the housing. The Parking Brake must be applied. − **Wheels and Tires** Verify condition with no obstructions, covers or damage. * – **Tires Pressure** Cold tire pressure should be within gray range. Gray range corresponds to 160 ± 4 psi. **NOTE: -** According to the tire manufacturer, this step should be performed before the first flight of the day or three hours after landing, in order to have a proper pressure reading. **-** Special attention should be given when SB 145LEG-25-0078 is applied, regarding tire pressure. − **Ground Safety Pin** Remove.

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EXTERNAL INSPECTION CHECK	
RIGHT AFT FUSELAGE	− **Air Inlets and Outlets** No obstruction or damage. *− **Emergency/Parking Brake Hydraulic Accumulator** The pressure from the Emergency/Parking Brake hydraulic accumulator must be fully released and checked at least once a day. To accomplish this task, proceed as follows: – Park the airplane where there is no slope; – Put chocks at the landing gear wheels; – Release the parking brake. Make sure that the airplane will not move; – Open the access panel and hold the oil discharge valve open until the hydraulic accumulator is fully discharged; – Wait for 2 (two) minutes and, after this interval, make sure that the precharge of nitrogen shown on the pressure gage is 2000 psi at the ambient temperature of 21.1°C (70°F). For other ambient temperatures, refer to the graph shown beside the valve; – Turn the hydraulic pump ON to recharge the hydraulic accumulator; – Apply the parking brake. **CAUTION:** DISCHARGING THE HYDRAULIC ACCUMULATOR WILL MAKE THE EMERGENCY/PARKING BRAKE INOPERATIVE. Perform this procedure with the airplane energized.

(Continued)

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EXTERNAL INSPECTION CHECK	
RIGHT AFT FUSELAGE	− **Antennas** Undamaged. − **Access Doors and Panels** Secured. − **Pylon** Undamaged. − **Right Engine** Check engine for leaks and damage. Foreign Objects/Obstructions in the air inlets. Check access panels secured. All cowling latches are secured. − **Thrust Reverser Doors** Flush with Nacelle. − **Pressurization Static Ports** No obstruction or damage. − **Fluid Drain Holes** No Leaks.

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EXTERNAL INSPECTION CHECK	
TAIL SECTION	− **Horizontal Stabilizer** Surfaces clear and unobstructed. − **Navigation and Logo Lights** Clean and undamaged. − **Flight Control Surfaces** Surfaces clear and unobstructed. − **Static Dischargers** Number and condition. Refer to the CDL for dispatch with missing items. − **APU** − **General Condition** − **Access Doors and Panels** Secured. − **Fluid Drain Holes** No Leaks. − **Air Inlets and Outlets** No obstruction.

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EXTERNAL INSPECTION CHECK	
LEFT AFT FUSELAGE	− **Air Inlets and Outlets** No obstruction or damage. − **Fluid Drain Holes** No leaks. − **Antennas** Undamaged. − **Thrust Reverser Doors** Flush with Nacelle. − **Pylon** Undamaged. − **Left Engine** Check engine for leaks and damage. Foreign Objects/Obstructions in the air inlets. Check access panels secured. All cowling latches are secured. − **Pressurization Static Ports** No obstruction or damage. − **Baggage Compartment Door** Latched. Lock Panel Closed. − **Access Doors and Panels** Secured.

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EXTERNAL INSPECTION CHECK	
LEFT MAIN GEAR	− **Gear Struts/Wheel Wells** Condition and no leaks. − **Main Gear Up Lock Hook** Unlocked. If the uplock hook is in the LOCKED position, cycle the freefall lever to reposition the uplock to the UNLOCKED position. Carry out this procedure with pins in place. − **Shock Absorber Extension** Check 48 mm (1.89 in) minimum extension. − **Brake Wear Indicators** Wear indicators should be no less than flush with the housing. The Parking Brake must be applied. − **Wheels and Tires** Verify condition with no obstructions, covers or damage. * – **Tires Pressure** Cold tire pressure should be within gray range. Gray range corresponds to 160 ± 4 psi. **NOTE: -** According to the tire manufacturer, this step should be performed before the first flight of the day or three hours after landing, in order to have a proper pressure reading. - Special attention should be given when SB 145LEG-25-0078 is applied, regarding tire pressure. − **Ground Safety Pin** Remove.

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EXTERNAL INSPECTION CHECK	
LEFT WING	− **Flight Control Surfaces and Fairings** Flaps must be retracted, and Spoilers closed. Surfaces are unobstructed and free from ice and snow. − **Static Dischargers** Number and condition. Refer to the CDL for dispatch with missing items. − **Navigation and Strobe Lights** Clean and undamaged. − **Vortilons and Vortex Generators** Number and condition. − **Wing Leading Edge** Condition. − **Air Inlets, Outlets and Vent** No obstruction or damage. − **Access Doors and Panels** Secured. − **Direct Measuring Sticks** Pushed IN and with no leaks. − **Clear Ice Detector** Condition. − **Landing Light** Clean and undamaged. − **Fluid Drain Holes** No Leaks.

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EXTERNAL INSPECTION CHECK	
LEFT FWD FUSELAGE	− **Ram Air Inlet** No obstruction or damage.

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DETAILED NORMAL PROCEDURES

NOTE: ∗ Items marked with an asterisk are to be performed at least once a day, by flight crew or maintenance personnel, at the operator's discretion.

INTERNAL SAFETY INSPECTION

The Internal Safety Inspection procedures must be performed before the POWER UP.

Maintenance Status ..... CHECK

Manuals & Documents..... ON BOARD

Check for regulations in countries intended for flight and company policy for the required on-board operational documents.

Other documents required by the operator's authority or company.

Make sure that documents that are legally required to be on board are really on board, such as:

- Certificate of Airworthiness.
- Copy of the Insurance Policy.
- Airplane Weighing document.
- The Crew handles the documents such as General Declaration and passenger documentation.
- Technical Log.
- AFM.
- AOM.
- QRH.
- Approved MEL.
- Radio Station Certificate.
- Navigation Kit.
- Data such as Runway Analyses, Driftdown Analyses (if applicable), En route Diversion Data and any other flight analysis must also be onboard.
- Even if the predicted en route meteorological information does not foresee in-flight icing conditions, landing analysis for both flaps 45° and flaps 22° must be carried onboard.

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Cockpit Emergency Equipment.....CHECK

Check for the availability, status and proper location of the following equipment:

- Protective Breathing Equipment (PBE).
- Fire Extinguisher.
- Life Vests.
- Crash Axe.
- Escape Ropes.
- Oxygen Masks.
- Smoke Goggles.
- Flashlights.

Internal Light .....AS REQUIRED

Circuit Breakers .....CHECK

Verify all circuit breakers IN at the overhead panel, behind the LSP and RSP seats to ensure agreement with maintenance status.

If any CB is pulled, check the reason for it and, if there is any operational implication, advise the other pilot.

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OVERHEAD PANEL

IFE Button	PUSHED IN
PC POWER Button	AS REQUIRED
ELECTRICAL Panel	CHECK
GEN 1, 3, 2 & 4 Buttons	PUSHED IN
GPU Button	PUSHED OUT
APU GEN Button	PUSHED IN
BATT 1 & 2 Knobs	OFF
ESSENTIAL POWER Button	GUARDED OUT
BUS TIES Selector	AUTO
SHED BUSES Selector	AUTO
AC POWER Button (if applicable)	PUSHED IN
BACKUP Battery Button	PUSHED IN
AVIONICS MASTER 1 & 2 Buttons	PUSHED OUT
EMERG LT Switch	OFF
ENGINE 1 FIRE EXTG Handle	STOWED
FUEL Panel	CHECK
XFEED Knob	OFF
PUMP PWR TK 1 & 2 Selector	OFF
LEGACY 600	
FUS TK XFER Knob	OFF
LEGACY 650	
XFER OVRD Button	GUARDED IN (OFF)
MASTER FUEL XFER Knob	OFF
EXTERIOR LIGHTS	CHECK
NAV Switch	OFF
RED BCN Switch	OFF
STROBE Switch	OFF
INSP Switch	OFF

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OVERHEAD PANEL

FIRE Panel	CHECK
APU FIRE EXTG Button	GUARDED
BAGG FIRE EXTG Button	GUARDED
APU CONTROL Panel	CHECK
APU MASTER Selector	OFF
APU FUEL SHUTOFF Button	GUARDED OUT
POWERPLANT Panel	CHECK
IGNITION 1 & 2 Knobs	AUTO
ENG 1 & 2 START/STOP Selectors	STOP
EXTERIOR LIGHTS	CHECK
LDG 1 Switch	OFF
NOSE Switch	OFF
LDG 2 Switch	OFF
TAXI Switch	OFF
ENGINE 2 FIRE EXTG Handle	STOWED
FLIGHT CONTROLS Panel	CHECK
AILERON SHUTOFF 1 & 2 Buttons	PUSHED IN
RUDDER SHUTOFF 1 & 2 Buttons	PUSHED IN
HYDRAULIC Panel	CHECK
ENG PUMP SHUTOFF Buttons	GUARDED OUT
ELEC HYD PUMP 1 & 2 Knobs	OFF
EXT LT/CKPT PANEL	CHECK
LOGO Switch (if applicable)	OFF
DOME Switch	AS REQUIRED
PASS SIGNS PANEL	CHECK
FSTN BELTS Switch	OFF
NO SMKG Switch	OFF

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OVERHEAD PANEL

ICE PROTECTION Panel ..... CHECK
- ENG AIR INLET 1 & 2 Buttons ..... PUSHED IN
- WING Button ..... PUSHED IN
- STAB Button ..... PUSHED IN
- WINDSHIELD Heating 1 & 2 Buttons ..... PUSHED OUT
- SENSORS Buttons ..... PUSHED IN
- ICE DETECTION OVERRIDE Knob ..... AUTO

AIR CONDITIONING/PNEUMATIC Panel ..... CHECK
- RECIRC & GASPER Buttons ..... PUSHED IN
- PACK 1 & 2 Buttons ..... PUSHED OUT
- ENG XBLEED Knob ..... AUTO
- ENG BLEED 1 & 2 Buttons ..... PUSHED OUT
- APU BLEED Button ..... PUSHED OUT

WINDSHIELD WIPER Knobs (if installed) ..... OFF

GLARESHIELD PANEL

Weather RADAR 1 & 2 Knobs ..... OFF

MAIN PANEL

ELT ..... ARMED OR AUTO
- ELT ARTEX 110-4/C406-2 Models ..... ARMED
- ELT SATORI 96 or 97 Models ..... AUTO

IRS 1 & 2 Knobs (if applicable) ..... OFF

Landing Gear Lever ..... DOWN

RIGHT SIDE PANEL

PASSENGER OXYGEN Panel ..... SET
- Verify Masks Deploy Selector in AUTO position.

Crew Oxygen Cylinder ..... CHECK "ON" POSITION

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PEDESTAL PANEL

ELEV DISC Handle ..... PUSHED IN
AIL DISC Handle ..... PUSHED IN
GUST LOCK Lever ..... LOCKED
THRUST Levers ..... IDLE
SPEED BRAKE Lever ..... CLOSED
EMERG/PARK BRAKE Handle ..... APPLY

NOTE: - Make sure that there is sufficient hydraulic pressure to active the Emergency/Parking Brake system.

- If the airplane is pushed back for engine start and if the start is performed with the APU, the crew may leave the EMERG/PARK BRAKE Handle released as long as the chocks are in place.

- To prevent hydraulic fluid transfer between systems, do as follows:

  - before applying the EMERG/PARK BRAKE Handle, press the brake pedals to full deflection and then pull the EMERG/PARK BRAKE Handle.

  - before releasing the EMERG/PARK BRAKE Handle, press the brake pedals to full deflection and then release the EMERG/PARK BRAKE Handle.

FLAP Lever ..... VERIFY POSITION

Make sure that the FLAP selected position is consistent with the position observed during external inspection. If not, be aware that, once the airplane is energized and the lever is lifted from the detent, the flaps will move to the commanded position.

CAUTION: NEVER MOVE CONTROL SURFACES SUCH AS FLAPS AND SPOILERS WITHOUT FIRST MAKING SURE THAT THE WING AREA IS CLEAR.

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PEDESTAL PANEL

LANDING GEAR EMERGENCY

Compartment..... CHECK

Verify:

– Electrical Override switch is in the "NORMAL" position/locked.

– FREE FALL Lever is fully down.

Close the compartment.

NOTE: If, during the external inspection, one of the gears uplock hooks is found mispositioned, the FREE FALL Lever may be pulled for the uplock hook repositioning.

This procedure must be carried out with the gear pins in place.

PASSENGER CABIN

Cabin Emergency Equipment..... CHECK

PBE Indicator..... GREEN

Emergency Exit ..... CLOSED & LATCHED

Emergency Exit Locking Pin (if applicable) ..... REMOVE

Overwing Fueling Caps ..... SECURED

Passenger Seats and Belts ..... CONDITION

Galley and Toilet..... CONDITION

BAGG Compartment Access Door..... CLOSED & LOCKED

BAGG Compartment Door ..... CLOSED

Pocket Door..... OPEN & LOCKED

Curtains ..... STOWED

CAUTION: DURING TAXIING AND TAKEOFF OPERATIONS, THE UPPER CABIN PARTITION MUST BE REMOVED WHEN IT IS EXPECTED TO HAVE A PASSENGER SEATED IN THE DIVAN FORWARDMOST POSITION.

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INTERNAL SAFETY INSPECTION (AIRPLANE ALREADY ENERGYZED)

Internal Safety Inspection ..... COMPLETED

FUEL QUANTITY and FUEL USED ..... CHECK & SET

APU FIRE EXTG Button ..... GUARDED & NOT ILLUMINATED

BAGG FIRE EXTG Button ..... GUARDED & NOT ILLUMINATED

CREW/PAX OXYGEN Pressure ..... CHECK

Check the Crew and Passenger minimum oxygen pressure on the MFD ECS page.

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POWER UP

The POWER UP procedures and checklist must be performed at every crew's first flight of the day or when a power down was required.

If receiving the airplane already powered up, verify compliance with all items and perform the FIRE EXTINGUISHER Test.

APU START RECOMMENDATIONS

For APU start and operation the following is recommended:

Starting cycle:

After First Attempt..... 60 SECONDS OFF

After Second Attempt..... 60 SECONDS OFF

After Third Attempt..... 30 MINUTES OFF

In case of an unsuccessful APU start, or if BATT 1 OFF BUS is followed by APU GEN OFF BUS, messages are displayed on EICAS, the APU master switch must be set to OFF position, and time intervals as stated above shall be observed before the next start attempt.

If during start ignition is not detected at about 30% engine speed, the starter generator is de-energized. When the engine decelerates to about 5% engine speed, the starter is automatically re-energized for another start attempt (Swing Start). Swing Start is limited to one time per start attempt.

CAUTION: DO NOT TOUCH THE PROBES IMMEDIATELY AFTER AIRPLANE POWER UP (APU OR GPU) BECAUSE, DURING FADEC INITIALIZATION, THE HEATERS ARE ACTIVATED FOR 20 SECONDS AND TOUCHING THEM CAN CAUSE INJURIES.

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APU START WITH BATTERIES

External & Internal Safety Inspection.....COMPLETED

BATT 1 & 2 Knobs .....AUTO

Immediately after the batteries are switched ON, aural message "AURAL UNIT OK" should be heard.

NOTE: Once the batteries are ON, the pilot must concentrate on starting up the APU shortly, to save the batteries charge.

AVIONICS MASTER 1 or 2 Button .....PUSH IN

In order to save the batteries, only one of the AVIONICS MASTER should be turned ON.

∗ Batteries Voltage.....CHECK

Check battery voltage on the MFD.

If battery voltage is below 19 V, it must be replaced.

If battery voltage is below 24 V, report to the maintenance personnel or recharge the affected battery using the APU generator.

In case of recharging, it is recommended that battery 1 be turned OFF before APU start. After APU start, wait 3 minutes then set battery 1 to AUTO.

The minimum time for battery recharging is 30 minutes.

For cold soak operation, refer to Section 1-02-79 – "Operation in Icing Conditions".

Once the batteries are ON, the pilot must concentrate on starting up the APU shortly, to save the batteries. Avoid, for example, taking time to adjust the seat or to look at documents. Plan to do these things after starting the APU and after its generator is ON.

∗ BACKUP Battery Button.....PUSH OUT THEN PUSH IN

Momentarily release the BACKUP Battery Button and check if ISIS remains operating normally.

NOTE: This action is not applied to airplanes S/N 484, 495, 528, 540 and 555.

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AVIONICS MASTER 1 & 2 Buttons..... PUSH OUT

Once the battery charge is checked, AVIONICS MASTER 1 & 2 Buttons must be switched to OFF before starting the APU.

PUMP PWR TK 2 Selector ..... ON

– Select one of the TANK 2 fuel pumps and switch the PUMP PWR WING TK 2 Selector to ON.
– If TANK 1 has more fuel than TANK 2, select XFEED knob to Low 2 and select one of the TANK 1 fuel pumps, then switch the PUMP PWR WING TK 1 Selector to ON.

* FIRE DET TEST Button..... PRESS

Press and hold (for at least 2 seconds) the FIRE DET TEST Button and, at the same time, observe the following EICAS messages, lights and warnings:

– Aural Fire Warning.
– ENGINE 1 & 2 FIRE EXTG Handle illuminated.
– BAGG FIRE EXTG button illuminated.
– Warning/Caution Lights flashing.
– EICAS messages:

  Warning: APU FIRE, ENG 1 (2) FIRE, BAGG SMOKE.

  Caution: APU FIREDET FAIL, E1 (2) FIREDET FAIL.

NOTE: If the FIRE DET TEST Button is held for less than 2 seconds, the BAGG FIRE EXTG button may remain illuminated. If it happens, repeat the test.

If it is necessary to repeat the test, wait at least 6 seconds to press the TEST button.

On the ground, if FIRE DET TEST Button is held for more than 10 seconds with the APU running, the APU will automatically shutdown.

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APU MASTER Selector ..... ON/WAIT
3 SEC/START

Turn the selector to ON, wait 3 seconds, and then momentarily turn it to START.

Monitor APU EGT and RPM increasing within limits.

The APU generator will come online after RPM exceeds 95%.

NOTE: Start the APU only 30 seconds after the airplane is energized, to prevent disturbances in the IRS (AHRS, if applicable) initialization.

Following every APU start attempt, allow 3 minutes of APU warm-up before adding pneumatic load. This is particularly important after unsuccessful APU start attempts, so as to permit that excessive fuel accumulated during the previous start attempts is burned, preventing fuel odor inside the cabin/cockpit.

AVIONICS MASTER 1 & 2 Buttons ..... PUSH IN

Verify voltage and amperage on the electrical page. Amperage may be greater than 400 A (APU GEN OVLD may appear on the EICAS) at first, while the APU recharges the batteries. Do not bring any additional load online until amperage is below 400 A.

If the message APU GEN OVLD appears before Avionics Master is turned to ON, wait a few seconds until the message disappears and then turn the Avionics Master to ON.

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EXTERIOR & Internal Lights ..... AS REQUIRED

NAV Lights Switch ..... ON

Turn the NAV lights ON, even during day or night.

NAV lights ON show the ramp personnel that the airplane is powered up and make wingtips and tail end more visible to people driving vehicles and other airplanes in the proximity of the airplane.

The LOGO light may also be switched ON during nighttime.

PB LT Switch ..... CHECK

Moving the PB LT Switch to the TEST position will illuminate all the bars and button annunciators.

NOTE: The ENGINE 1 & 2 FIRE EXTG Handle, APU FIRE EXTG Button, BAGG FIRE EXTG Button, GUST LOCK indication lights, GPU AVAIL annunciator, digital pressurization control button and ATTD CALL button will not illuminate and will not be tested.

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----------Wait 3 minutes after APU Start----------

AIR CONDITIONING/PNEUMATIC Panel.....AS REQUIRED

Should it be necessary to climatize the airplane:

Temperature Control Knobs .....AUTO

PACK 1 & 2 Buttons .....PUSH IN

ENG XBLEED Knob .....OPEN

APU BLEED Button .....PUSH IN

If Pack 2 control by galley or VIP seats controller is desired, select the corresponding knob to ATTD.

NOTE: - Turn Pack 2 to OFF during forward lavatory and potable water servicing in order to avoid the ingestion of foreign objects by the ducts.

- If only PACK 2 is capable of keeping a comfortable cabin temperature, PACK 1 can be left OFF until after both engines are running (after going through the After Start Checklist), in order to reduce the external noise in the vicinity of the main passenger door for better passenger comfort.
- To avoid the possibility of ice formation on the Air Conditioning System (ACS), do not select "AUTO FULL COLD" position after cabin/cockpit cooling down (pull down). Set the ACS as required.
- With continuous operation of the ACS positioned at "AUTO FULL COLD", select the "AUTO FULL HOT" position for one minute, at every 30 minutes and before takeoff. This procedure will not cause a significant increase in the internal temperature of the airplane.
- SHED BUSES Knob must be set to OVRD position to turn ON the Cockpit & Passenger Cabin Recirculation Fans and to activate the IFE system when the electrical system is energized by the APU generator only.

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APU START WITH GPU

External & Internal Safety Inspection ..... COMPLETED

BATT 1 & 2 Knobs ..... AUTO

Immediately after the batteries are switched ON the aural message "AURAL UNIT OK" should be heard.

AVIONICS MASTER 1 or 2 Button ..... PUSH IN

In order to save the batteries, only one of the AVIONICS MASTER should be turned ON.

∗ Batteries Voltage ..... CHECK

Check battery voltage on the MFD.

If battery voltage is below 19 V, it must be replaced.

If battery voltage is below 24 V, report to the maintenance personnel or recharge the affected battery using the APU generator.

In case of recharging, it is recommended that battery 1 be turned OFF before APU start. After APU start, wait 3 minutes and then set battery 1 to AUTO.

The minimum time for battery recharging is 30 minutes.

While GPU is energizing the airplane electrical system, batteries will not be recharged.

For cold soak operation, refer to Section 1-02-79 – "Operation In Icing Conditions".

∗ BACKUP Battery Button ..... PUSH OUT THEN PUSH IN

Momentarily release the BACKUP Battery Button and check if ISIS remains operating normally.

NOTE: This action is not applied to airplanes S/N 484, 495, 528, 540 and 555.

GPU Voltage ..... CHECK

Check the ELEC page on the MFD if voltage is within 28.0 V (-2.0 V/+ 1.0 V).

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GPU Button ..... PUSH IN

When the GPU Button is pushed in, the "GPU AVAIL" inscription goes OFF and the white stripe lights up.

AVIONICS MASTER 1 & 2 Buttons ..... PUSH OUT

Once the Batteries and GPU voltage are checked, AVIONICS MASTER Buttons 1 & 2 must be turned OFF.

PUMP PWR TK 2 Selector ..... ON

– Select one of the TANK 2 fuel pumps and switch the PUMP PWR WING TK 2 Knob to ON.
– If TANK 1 has more fuel than TANK 2, select FUEL XFEED knob to Low 2 and select one of the TANK 1 fuel pumps, then switch the PUMP PWR WING TK 1 Knob to ON.

∗ FIRE DET TEST Button ..... PRESS

Press and hold (for at least 2 seconds) the FIRE DET TEST Button and, at the same time, observe the following EICAS messages, lights and warnings:

– Aural Fire Warning.
– ENGINE 1 & 2 FIRE EXTG Handle illuminated.
– BAGG FIRE EXTG button illuminated.
– Warning/Caution Lights flashing.
– EICAS messages:

  Warning: APU FIRE, ENG 1 (2) FIRE, BAGG SMOKE.

  Caution: APU FIREDET FAIL, E1 (2) FIREDET FAIL.

NOTE: If the FIRE DET TEST Button is held for less than 2 seconds, the BAGG FIRE EXTG button may remain illuminated. If it happens, repeat the test.

If it is necessary to repeat the test, wait at least 6 seconds to press the TEST button.

On the ground, if FIRE DET TEST Button is held for more than 10 seconds with the APU running, the APU will automatically shutdown.

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APU MASTER Selector ..... ON/WAIT 3 SEC/START

Turn the selector to ON, wait 3 seconds, and then turn it momentarily to START.

Monitor APU EGT and RPM increasing within limits.

The APU generator will come online after RPM exceeds 95%.

NOTE: Start the APU only 30 seconds after the airplane is energized, to prevent disturbances in the IRS (AHRS, if applicable) initialization.

Following every APU start attempt, allow 3 minutes of APU warm-up before adding pneumatic load. This is particularly important after unsuccessful APU start attempts, so as to permit that excessive fuel accumulated during the previous start attempts is burned, preventing fuel odor inside the cabin/cockpit.

GPU Button..... PUSH OUT

Crew must deselect the GPU as soon as the APU is running and stable to prevent the ground crew from disconnecting it while it is still powering the buses, which causes an unwanted transient.

AVIONICS MASTER 1 & 2 Buttons..... PUSH IN

Verify voltage and amperage on the electrical page. Amperage may be greater than 400 A (APU GEN OVLD may appear on the EICAS) at first, while the APU recharges the batteries. Do not bring any additional load online until amperage is below 400 A.

If the message APU GEN OVLD appears before Avionics Master is turned to ON, wait a few seconds until the message disappears and then turn the Avionics Master to ON.

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EXTERIOR & Internal Lights.....AS REQUIRED

NAV Lights Switch .....ON

Turn the NAV lights ON, even during day or night.

NAV lights ON show the ramp personnel that the airplane is powered up, and also make wingtips and tail end more visible to people driving vehicles in the proximity of the airplane.

The LOGO light may also be switched ON during nighttime.

PB LT Switch .....CHECK

Moving the PB LT Switch to the TEST position will illuminate all the bars and button annunciators.

NOTE: The ENGINE 1 & 2 FIRE EXTG Handle, APU FIRE EXTG Button, BAGG FIRE EXTG button, GUST LOCK indication lights, GPU AVAIL annunciator, digital pressurization control button and ATTD CALL button will not illuminate and will not be tested.

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----------Wait 3 minutes after APU Start----------

AIR CONDITIONING/PNEUMATIC Panel..... AS REQUIRED

Should it be necessary to climatize the airplane:

Temperature Control Knobs ..... AUTO

PACK 1 & 2 Buttons ..... PUSH IN

ENG XBLEED Knob ..... OPEN

APU BLEED Button ..... PUSH IN

If Pack 2 control by galley or VIP seats controller is desired, select the corresponding knob to ATTD.

NOTE: - Turn Pack 2 to OFF during forward lavatory and potable water servicing in order to avoid the ingestion of foreign objects by the ducts.

- If only PACK 2 is capable of keeping a comfortable cabin temperature, PACK 1 can be left OFF until after both engines are running (after going through the After Start Checklist), in order to reduce the external noise in the vicinity of the main passenger door for better passenger comfort.
- To avoid the possibility of ice formation on the Air Conditioning System (ACS), do not select "AUTO FULL COLD" position after cabin/cockpit cooling down (pull down). Set the ACS as required.
- With continuous operation of the ACS positioned to "AUTO FULL COLD", select the "AUTO FULL HOT" position for one minute, at every 30 minutes and before takeoff. This procedure will not cause a significant increase in the internal temperature of the airplane.
- SHED BUSES Knob must be set to OVRD position to turn ON the Cockpit & Passenger Cabin Recirculation Fans and to activate the IFE system when the electrical system is energized by the APU generator only.

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GPU POWER AND EXTERNAL PNEUMATIC SOURCE (NO APU)

When APU is unserviceable, it is recommended that a GPU be used in conjunction with an External Pneumatic Start Unit to start the engines.

NOTE: - The External Pneumatic Start Unit output must be set between 40 and 45 psi.

- Engine Start relying on the airplane batteries as the sole source of electrical power is possible, but it puts a heavy stress on the batteries because of the amount of time required to power the airplane systems. If the batteries are not properly charged, spurious messages and indications may occur as battery voltages drop below minimum acceptable levels.

External & Internal Safety Inspection.....COMPLETED

BATT 1 & 2 Knobs .....AUTO

Immediately after the batteries are switched ON the aural message "AURAL UNIT OK" should be heard.

AVIONICS MASTER 1 & 2 Buttons .....PUSH IN

Make sure that both AVIONICS MASTER Buttons are Pushed IN.

∗ Batteries Voltage.....CHECK

If battery voltage is below 19 V, it must be replaced.

If battery voltage is below 24 V, report to the maintenance personnel or recharge the affected battery using the engine generators.

In case of recharging the batteries by engine generators, it is recommended that battery 1 be turned OFF before GPU disconnection. After GPU disconnection, wait 3 minutes, and then select battery 1 to AUTO.

While GPU is energizing the airplane electrical system, batteries will not be recharged.

The minimum time for battery recharging is 30 minutes.

For cold soak operation, refer to Section 1-02-79 – "Operation In Icing Conditions".

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∗ BACKUP Battery Button ..... PUSH OUT THEN PUSH IN

Momentarily release the BACKUP Battery Button and check if ISIS remains operating normally.

NOTE: This action is not applied to airplanes S/N 484, 495, 528, 540 and 555.

GPU Voltage ..... CHECK

Check on the ELEC page, on the MFD, if the voltage is within 28.0 V (-2.0 V/+1.0 V).

GPU Button ..... PUSH IN

When the GPU Button is pushed in, the "GPU AVAIL" inscription goes OFF and the white stripe lights up.

EXTERIOR and Internal Lights ..... AS REQUIRED

NAV Lights Switch ..... ON

Turn the Navigation lights ON, even during day or night.

NAV lights ON show the ramp personnel that the airplane is powered up, and also make wingtips and tail end more visible to people driving vehicles in the proximity of the airplane.

The LOGO light may also be switched ON during nighttime.

PB LT Switch ..... CHECK

Moving the PB LT Switch to the TEST position will illuminate all the bars and button annunciators.

NOTE: The ENGINE 1 & 2 FIRE EXTG Handle, APU FIRE EXTG Button, BAGG FIRE EXTG button, GUST LOCK indication lights, GPU AVAIL annunciator, digital pressurization control button and ATTD CALL button will not illuminate and will not be tested.

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* FIRE DET TEST Button .....PRESS

Press and hold (for at least 2 seconds) the FIRE DET TEST Button and, at the same time, observe the following EICAS messages, lights and warnings:

- Aural Fire Warning.
- ENGINE 1 & 2 FIRE EXTG Handle illuminated.
- BAGG FIRE EXTG button illuminated.
- Warning/Caution Lights flashing.
- EICAS messages:

  Warning: APU FIRE, ENG 1 (2) FIRE, BAGG SMOKE.

  Caution: APU FIREDET FAIL, E1 (2) FIREDET FAIL.

NOTE: If the FIRE DET TEST Button is held for less than 2 seconds, the BAGG FIRE EXTG button may remain illuminated. If it happens, repeat the test.

If it is necessary to repeat the test, wait at least 6 seconds to press the TEST button.

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APU SHUTDOWN

APU STOP Button ..... PRESS

Monitor APU EGT decreasing and RPM reaching zero.

PUMP PWR TK 1 & 2 Selectors..... AS REQUIRED

APU MASTER Selector ..... OFF

Check APU SOV CLOSED message on EICAS within 10 seconds.

NOTE: After pressing the APU Shutdown button, the RPM and EGT APU indications on the EICAS Display will decrease. When the APU Speed reaches 10% RPM or less, the pilot should select APU MASTER Selector to OFF. The RPM and EGT indications will be replaced by OFF inscription.

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BEFORE START (FIRST FLIGHT)

TO BE PERFORMED ON THE FIRST FLIGHT OF THE DAY OR FIRST FLIGHT BY THE CREW/AIRPLANE COMBINATION.

External & Internal Safety Inspection ..... COMPLETED

Seat, PEDALs and Seat Belts ..... ADJUST

CVR ..... TEST

When pressing the CVR TEST button check if the STATUS LED stays illuminated for about one second.

ELECTRICAL Panel ..... SET

CHECK IF:

GEN 1, 3, 2 & 4 Buttons ..... PUSHED IN

GPU Button ..... AS REQUIRED

APU GEN Button ..... PUSHED IN

BATT 1 & 2 Knobs ..... AUTO

ESSENTIAL POWER Button ..... GUARDED OUT

BUS TIES Selector ..... AUTO

SHED BUSES Selector ..... AS REQUIRED

SHED BUSES Selector must be set to OVRD to operate the galley oven, recirculation fans and to activate the IFE system when the electrical system is energized by the APU generator.

AC POWER Button (if applicable) ..... PUSHED IN

BACKUP Battery Button ..... PUSHED IN

AVIONICS MASTER 1 & 2 Buttons ..... PUSHED IN

EMERG LT Switch ..... CHECK ARM

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COCKPIT LIGHTS ..... AS REQUIRED

Adjust the OVHD PNL LIGHT Controller, MAIN PANEL and PEDESTAL Lights.

Set DOME light as required.

FUEL Panel..... SET & CHECK

Check if onboard fuel quantity (lb/kg) matches the required fuel for the intended flight.

Select the fuel pumps according to the alternating policy in use.

If the APU is running, feed it from the wing tank that has more fuel.

Reset the fuel used readout on the MFD Fuel page.

Check the Fuselage Tanks Transfer System according to the procedure that follows:

NOTE: The test must be performed only if there is fuel in the auxiliary tanks.

– Set FUS 1 on the overhead fuel panel and keep it in this position for at least 10 seconds.

– Check the MFD Fuel Page for pump indications.

FWD tank must display pump A or B indication. Alternate the FWD pumps and check if the other pump (A or B) is displayed.

AFT tank must display pump A indication.

Repeat the procedure for FUS 2 system.

NOTE: During the test, the EICAS Caution FUEL XFER OVERFLOW may be displayed.

Turn the Fuselage Transfer System to OFF.

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POWERPLANT Panel ..... SET

IGNITION 1 & 2 Knobs ..... AUTO

TAKEOFF DATA SET Controller ..... SET

Proceed as follows to enter the takeoff data:

- Select the T/O page on the MFD.
- Press the STORE button once and verify the white mark beside the T/O MODE line, which means that it is prompting for the selection of engine takeoff thrust rating mode.
- Use the DEC/INC knob to select the takeoff thrust rating mode.

  NOTE: As a general guideline, the lower engine thrust rating mode should always be used if the airplane's performance for the prevailing ambient conditions and the intended departure runway allows it.
- Press the STORE button one more time and the white mark will move to the REF TO TEMP line.
- Use the DEC/INC knob again to select the reference local temperature. Each movement of the knob will change the reference temperature by 1°C.
- Press the STORE button one more time and the white mark will move to the FADEC REF A-ICE line.
- Use the DEC/INC knob to select FADEC REF A-ICE to ON or OFF.

  If there are chances of ice being encountered during takeoff, FADEC REF A-ICE must be set to ON, so that the FADEC allows an ITT margin for the anti-icing ON condition.

  If FADEC REF A-ICE is set to ON, the takeoff performance-limitations must be based on the AFM and/or Takeoff Analysis Software in icing conditions.

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The following FADEC REF A-ICE Policy must be observed when setting it to ON or OFF:

Whenever temperature on the ground is at or below 10°C (50°F) and there is visible moisture in the air, it must be assumed that icing conditions are present. Under these circumstances, the use of engine anti-icing (anti-icing override switch to ENG) is mandatory.

The anti-icing system works in a way that, if any ice is detected at a speed above 25 kt, the whole ice protection system goes ON.

– Press STORE Button to complete the TAKEOFF DATA.

ENG 1 & 2 START/STOP Selectors ..... STOP

FLIGHT CONTROLS Panel ..... CHECK

AILERON SHUTOFF 1 & 2 Buttons ..... PUSHED IN

RUDDER SHUTOFF 1 & 2 Buttons ..... PUSHED IN

HYDRAULIC Panel ..... CHECK

ENG PUMP SHUTOFF Buttons ..... GUARDED OUT

ELEC HYD PUMP 1 & 2 Knobs ..... CHECK/THEN OFF

Check if the pump is working on both positions (AUTO and ON).

The ELEC HYD PUMPs should NEVER be switched ON if batteries are the sole source of electrical power. Wait until the APU or a GPU is available before switching ON the ELEC HYD PUMPs.

Select the MFD HYD page and switch ELEC HYD PUMPs 1 and 2 (one at a time) to AUTO.

– Make sure that the indicated pressures are within 2900 ± 200 psi.
– Check also if the hydraulic fluid quantity indications of systems 1 and 2 are on the "green band".

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PASS SIGNS Panel ..... SET

- Turn FSTN BELTS Switch to ON after finishing refueling the airplane.
- Turn NO SMKG Switch to ON.

ICE PROTECTION Panel ..... SET

ENG AIR INLET 1 & 2 Buttons ..... PUSHED IN

WING Button ..... PUSHED IN

STAB Button ..... PUSHED IN

WINDSHIELD Heating 1 & 2 Buttons ..... AS REQUIRED

The WINDSHIELD Buttons must be PUSHED IN only if windshield defogging or deicing is required.

SENSORS Buttons ..... PUSHED IN

ICE DETECTION OVERRIDE Knob ..... AUTO

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AIR CONDITIONING/PNEUMATIC Panel ..... SET

RECIRC & GASPER Buttons ..... PUSH IN

PACK 1 & 2 Buttons ..... AS REQUIRED

Set the panel according to the source bleed/engine start:

ENGINE START ASSISTED BY THE APU

ENG XBLEED Knob ..... OPEN OR AUTO

ENG BLEED 1 & 2 Buttons ..... PUSH OUT

APU BLEED Button ..... PUSH IN

ENGINE START WITH GPU AND LPU

GPU Button ..... PUSH IN

PACK 1 & 2 Buttons ..... PUSH OUT

ENG XBLEED Knob ..... OPEN

ENG BLEED 1 & 2 Buttons ..... PUSH OUT

APU BLEED Button ..... PUSH OUT

LPU ..... CONNECT

ENGINE START WITH BATTERIES AND LPU

PACK 1 & 2 Buttons ..... PUSH OUT

ENG XBLEED Knob ..... OPEN

ENG BLEED 1 & 2 Buttons ..... PUSH OUT

APU BLEED Button ..... PUSH OUT

LPU ..... CONNECT

WINDSHIELD WIPER Knobs (if applicable) ..... OFF

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Oxygen Press & Masks CHECK/100%

Both pilots must check their masks for supply of oxygen and for microphone functionality. The masks must be set to 100% oxygen.

NOTE: Both pilots must adjust the respective goggles.

The MFD ECS page must be checked for available crew/passenger oxygen pressure.

The minimum oxygen pressure values for dispatch are:

CREW OXYGEN	MIN PRESS AT 21°C (70°F)
LSP and RSP	1130 psi
LSP, RSP and Observer	1570 psi

PASSENGER OXYGEN	MIN PRESS AT 21°C (70°F)
Airplane equipped with one cylinder (77 cu ft)	1730 psi
Airplane equipped with two cylinders (77 cu ft) (optional)	1250 psi
Airplane equipped with one cylinder (115.7 cu ft) (optional)	1570 psi
Airplane equipped with one cylinder (77 cu ft and 115.7 cu ft) (optional)	1040 psi

NOTE: The minimum oxygen pressure for dispatch was calculated considering an ambient temperature of 21°C (70°F). For other temperatures, refer to Oxygen Pressure Correction Chart on Section 2-16.

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Perform a mask complete check as follows:

- Select the MASK position on the Audio Panel.
- Set the mask to 100%.
- Select SPKR on the Audio Panel and set the volume to mid-range.
- Select HOT MIC on the control wheel communication switch.
- Actuate the test button on the mask stowage location. Check if the blinker changes color (1).
- The OXY ON flag must appear on the stowage box (1).
- For EROS masks: While maintaining the RESET TEST lever (TEST/SHUTOFF sliding control) depressed, check if the blinker changes color momentarily, then depress the PRESS-TO-TEST regulator for 1 second.
- For Puritan Bennett or B/E Aerospace masks: Set the regulator's control knob to EMERGENCY and momentarily actuate the test button on the mask stowage location.
- Check that the blinker changes color.
- The OXY ON flag must appear on the box (1).
- The sound of oxygen flowing must be heard momentarily on the speaker, thereby assuring the microphone electrical integrity.
- Set the mask to 100% (1).
- After finishing the test, select the BOOM position on the Audio Panel.

(1) Applicable only to Puritan Bennett or B/E Aerospace masks.

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If there is an observer on the jump seat, check the observer oxygen mask as follows:

- Select the MASK position on the observer Audio Panel.
- Set the mask to 100%.
- Select SPKR on the Audio Panel and set the volume to mid-range.
- Select HOT MIC on the control wheel communication switch.
- For EROS masks: Depress the PRESS-TO-TEST regulator for 1 second; or
- For Puritan Bennett or B/E Aerospace masks: Turn the regulator knob to the EMERGENCY position momentarily and then turn back the knob to 100% position.
- The sound of oxygen flowing must be heard momentarily on the speaker, thereby assuring the microphone electrical integrity.
- After finishing the test, select the BOOM position on the Audio Panel.

Glareshield Lights Control Panel ..... AS REQUIRED

Weather RADAR 1 & 2 Knob..... TEST & STANDBY

- Select MFD page and WX through the MFD bezel.
- Set the Weather RADAR Knob to TST position and wait for indication on the MFD.
- Set the Weather RADAR Knob to SBY position.

Display Controller Panel ..... SET

- Press FULL/WX Button for Full Compass format or Arc format.
- Select NAV or FMS as the PFD lateral navigation mode.
- BRG circle (O) to OFF, NAV1, ADF1 or FMS1 as required.
- BRG diamond (◊) to OFF, NAV2, ADF2 or FMS2 as required.
- DH on the PFD as appropriate.

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Flight Guidance Controller ..... AS REQUIRED

Autopilot ..... CHECK/THEN OFF

The PF assigned for the flight must carry out the AUTOPILOT check as follows:

- Release the GUST LOCK Lever, bring the control column to its midcourse position, between full up and full down.
- Select the AP to PF side and engage it, verifying the "AP" and "YD" indications on the PFD.
- Press the AP/PUSHER/TRIM button on the control wheel and check if the AP is disengaged and if the respective indications on the PFD disappeared.

NOTE: When the wind is strong enough to force the horizontal stabilizer, an automatic pitch trim action may occur if the airplane is on the ground and the autopilot is engaged.

CLOCKS ..... SET

LSP/RSP set the respective CLOCKS.

- Set date, time and flight number (if applicable).

Both pilots check time on FMS.

Reset the Chronometers.

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IRS 1 & 2 Knobs ..... NAV

Enter Present Position through FMS on both CDUs.

The initial alignment must be performed by setting the MSU switch to NAV.

Make sure that the airplane is not moved or bumped during the alignment process. Alignment time varies with latitude.

It is necessary to enter the airplane present position through the FMS CDU to complete the initial alignment.

NOTE: The IRS knob should never be moved to ATT on ground. If for any reason it is set to ATT, restart the alignment process from scratch by setting the knob to OFF then back to NAV.

AHRS (if applicable) ..... SET

Enter Present Position through FMS CDU.

Digital Audio Panel ..... SET

Select the microphone and audio reception buttons as required and adjust the volume levels.

REVERSIONARY 1 & 2 Panels..... CHECK

MFD Knob ..... NORMAL

ADC Button..... PUSHED OUT

IRS (AHRS if applicable) Button..... PUSHED OUT

SG Button ..... PUSHED OUT

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Flight Instruments ..... SET & X-CHECK

Verify:

- Airspeed tapes not showing speed.
- EADIs leveled and flag-free.
- Initial assigned altitude on the ALT SEL.
- Crosscheck PFDs altitude tape indications.

  Set altimeter setting on PFDs, QNH (QHE if applicable), and cross-check it with the field elevation.

  CAUTION: VNAV IS PROHIBITED ON QFE OPERATIONS.
- Both Vertical Speed Indications (VSI) showing zero.
- EHSIs with the courses selected according to the intended departure procedure or runway course for a possible return and select lateral/vertical modes for the departure.
- EHSIs and magnetic compass flag free and showing the same magnetic heading.

NOTE: In case of heading split, check if there are ferrous structures or other magnetic interference sources close to the airplane, and/or move the airplane to a different location.

- Weather set on PFD and/or MFDs MAP page as required.
- It is recommended that PM sets the Terrain on MFD up to MSA.
- Set the MFDs MAP page menu as required.
- TCAS should be always displayed on both MFDs.

NOTE: Set both VORs to the same station and X-Check. If the bearing difference is greater than 4°, register it in the airplane flight log book.

If the clearance is not available, select the requested altitude minus 100 ft as a reminder until have the cleared altitude from the ATC.

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ISIS ..... SET & CHECK

The airplane must not be moved during the first 90 seconds after power-up, while the ISIS is undergoing alignment. Moving the airplane during this period can cause in-flight attitude indication errors that are not noticeable on ground.

After the Integrated Standby Instruments System (ISIS) initialization, adjust the altimeter setting QNH (QFE if applicable), then compare its indication with PFDs Attitude and Altitude.

Speed Bugs ..... SET

Set V_1, V_R, and V_2 on the MFD according to the runway analysis. Set the V_{AP} bug to $V_{REF\ 45}$ plus 5 kt (or plus wind correction, whichever is greater) so, if an air return is to be carried out, the final approach speed is already set.

The wind correction to be added to the V_{AP} is limited to 15 kt.

The V_{FS} is shown at the upper left corner of the PFD and is set through the SPD button.

MFD SYS Pages..... CHECK

– Select T/O page on the MFD and check the ENGINE OIL LEVEL.

NOTE: The Minimum Dispatch Oil Quantity is 8 quarts before engine start or 6 quarts after engine start.

– Select and check other systems page.

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RMU ..... SET

– Set COMM and NAV radios.

  PF assigned for the flight must set the COMM and NAV frequencies as appropriate for the expected SID or departure procedure.

  The use of the VHF COMM setting must follow the arrangement described below:

    COMM 1: ATC.

    COMM 2: Company frequency, ATIS, VOLMET, (121.5) and air-to-air broadcast, etc.

    COMM 3 (if available): DATA (for ACARS communication).

– TCAS Test.
  – Verify if the ATC/TCAS window is in STBY.
  – Select the ABOVE function.
  – Test the TCAS.
    – Place the yellow cursor box over the code.
    – Press the RMU test button for 5 to 7 seconds until the test OK message shows on the RMU and the "TCAS TEST, PASSED" aural annunciation is heard.
– To insert CALL SIGN on the RMU, select PAGE button and press ATC/TCAS line select key.

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FMS ..... SET

The PF must enter all the data into the FMS, including passengers' number and cargo data. So, the FMS initialization includes the check to see if the DATABANK is still valid, the check for correct date and time and for possible messages related to the status of the FMS. If the flight plan needs to be entered, it can be done at this time. It is recommended that the FMS be used in dual mode. In case of single operation, the flight plan must be copied by the PF from his FMS to the other to ensure consistency among flight plans.

If VNAV is installed and it is intended to use PERF INIT Page 2, it is suggested that both LSP and RSP carefully set the descent schedule regarding:

- the difference from cruise schedule (if VFLC is intended), and
- the descent angle (if VPATH is intended).

CAUTION: HIGH DIFFERENCES BETWEEN CRUISE AND DESCENT SPEEDS OR HIGH DESCENT ANGLES ON FMS SETTINGS MIGHT CAUSE UNCOMFORTABLE PITCH CHANGES.

To activate the VNAV (if applicable), the crew must close the flight plan with a destination and complete all performance initialization data. The ACTIVE FLIGHT PLAN page and PROGRESS page 2 display VNAV information.

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Flight Control Disconnect Handles.....CHECK IN

Verify if ELEV DISC and AIL DISC lights are OFF.

SPEED BRAKE Lever.....CLOSED

THRUST Levers.....IDLE

EMERG/PARK BRAKE Handle .....AS REQUIRED

Verify if the PARK BRAKE Handle is set in accordance with the Engine Start Procedures.

- If the PARK BRAKE Handle is applied, the corresponding light on the Main Panel is ON.
- If the EICAS Message "EMRG BRK LO PRESS" appears, select the ELEC HYD PUMP 2 to ON position in order to re-pressurize the accumulator.

STALL PROTECTION Panel .....CHECK

Wait for IRS alignment.

- Pull the control column to neutral position.
- Press STALL PROTECTION TEST Button and check if both stick shaker and pusher actuate and if button amber light extinguishes.
- The test takes about 5 seconds and is valid only if the amber light on the TEST button extinguish.
- Verify the STALL PROTECTION CUTOUT 1 and 2 buttons PUSHED OUT, guarded and with no striped bars illuminated.
- Apply the GUST LOCK Lever.

NOTE: Before testing the SPS, wait 40 seconds for power up built in test to finish.

TEST Button must be released at the first stick shaker actuation signal.

Charts & Maps (if applicable).....SET

Press the Map Button for system initialization and select the desired option on Map Data presented on the MFD.

Press the Chart Button for system initialization, check Map coverage subscription, and push the Enter button to view chart information.

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TBCH – Tuning Backup Control Head..... SET

Set to NORMAL and copying RMU 2.

Press the transfer button in case of an ERROR message on the radio display.

TRIMs Panel ..... CHECK & SET

Verify PITCH TRIM MAIN & BACKUP CUTOUT Buttons are PUSHED OUT/Guarded and Not Illuminated.

Verify that ROLL, YAW and PITCH (Main and Backup) trims are operating properly both ways. Verify system's 3 seconds protection working properly.

Adjust YAW and ROLL trims to the neutral position and PITCH trim to the green band according to required takeoff CG position.

PITCH TRIM UNITS	8	7	6	5	4
CG POSITION (%)	LESS THAN OR EQUAL TO 26.0	26.1 UP TO 28.5	28.6 UP TO 30.5	30.6 UP TO 33.5	ABOVE OR EQUAL TO 33.6

COMM 3 (if applicable) ..... SET

Pressurization ..... SET

- Set destination airport elevation.
- DUMP and AUTO/MAN buttons are guarded and not illuminated.
- Manual controller knob set on FULL DOWN (green mark) position.

If High Altitude Operation (HALTO) Procedure is applicable, refer to HALTO Supplement on the AFM.

NOTE: If HIGH ALT Mode is applied in airports with pressure altitude between 8400 ft and 14300 ft, the cabin altitude displayed on the EICAS will be amber.

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EICAS Messages ..... CHECK

The PF should check if there are any critical messages on the EICAS that may affect the engine starting.

Safety Pins, Covers, and Chocks ..... ON BOARD

Verify if the 5 safety pins (3 gears, 1 hydraulic safety, and 1 emergency exit) are on board, behind the LSP seat.

Passenger Briefing ..... COMPLETE

The passenger briefing must be carried out by the CREW and must cover the items on Passenger Briefing Card, as follows:

- Fasten seat belts and all shoulder harnesses.
- Seats back must be in upright position.
- Seats must be positioned outboard (against the sidewall).
- Headrest must be in the up position for aft facing seat and in the down position for the forward-facing seats.
- Leg rest must be in down position.
- Divan must be in the seating position.
- All tables and monitors must be stowed.
- Extinguish all smoking materials.
- Passenger must inform the crew before entering the baggage compartment.
- The baggage compartment door must be kept opened while there is anyone inside.

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BEFORE START (THROUGH FLIGHT)

TO BE PERFORMED ONLY DURING THROUGH FLIGHTS.

FUEL Panel & Quantity..... CHECK__lb/kg

POWERPLANT Panel ..... SET

As a general guideline, the lower thrust rating should always be used if the airplane's performance for the prevailing ambient conditions and the intended departure runway allow it.

Set the appropriate takeoff data:

- Engine T/O mode.
- REF TO TEMP.
- FADEC REF ANTI-ICE.

PASS SIGNS Panel..... SET

- Turn FSTN BELTS Switch to ON after finishing refueling the airplane.
- Turn NO SMKG Switch to ON.

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Flight Instruments ..... SET & X-CHECK

Verify:

- Airspeed tapes not showing speed.
- EADIs leveled and flag-free.
- Initial assigned altitude on the ALT SEL.
- Crosscheck PFDs altitude tape indications.

  Set altimeter setting on PFDs, QNH (QHE if applicable), and cross-check it with the field elevation.

  CAUTION: VNAV IS PROHIBITED ON QFE OPERATIONS.
- Both Vertical Speed Indications (VSI) showing zero.
- EHSIs with the courses selected according to the intended departure procedure or runway course for a possible return and select lateral/vertical modes for the departure.
- EHSIs and magnetic compass flag free and showing the same magnetic heading.

ISIS ..... SET

Adjust the altimeter setting QNH (QFE if applicable), then compare its indication with PFDs Attitude and Altitude

Speed Bugs..... SET

Set V_1, V_R, and V_2 on the MFD according to the runway analysis. Set the V_{AP} bug to $V_{REF\ 45}$ plus 5 kt (or plus wind correction, whichever is greater) so, if an air return is to be carried out, the final approach speed is already set.

The wind correction added to the V_{AP} is limited to 15 kt.

The V_{FS} is shown at the upper left corner of the PFD and is set through the SPD button.

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MFD SYS Pages..... CHECK

– Select T/O page on the MFD and check the ENGINE OIL LEVEL.
– Select and check other systems page.

RMU..... SET

The PF assigned for the flight must select the applicable COMM and NAV frequencies for the intended departure and select ABOVE and a proper range on the TCAS.

FMS ..... SET

The PF must enter all the data into the FMS, including passengers' number and cargo data. So, the FMS initialization includes the check to see if the DATABANK is still valid, the check for correct date and time and for possible messages related to the status of the FMS. If the flight plan needs to be entered, it can be done at this time. It is recommended to use the FMS in dual mode. In case of single operation, the flight plan must be copied by the PF from his FMS to the other to ensure consistency among flight plans.

If VNAV is installed and is intended, on PERF INIT Page 2, it is suggested that both LSP and RSP must set the descent schedule regarding:

– the difference from cruise schedule (if VFLC is intended), and
– the descent angle (if VPATH is intended).

CAUTION: HIGH DIFFERENCES BETWEEN CRUISE AND DESCENT SPEEDS OR HIGH DESCENT ANGLES ON FMS SETTINGS MIGHT CAUSE UNCOMFORTABLE PITCH CHANGES.

To activate the VNAV (if applicable), the crew must close the flight plan with a destination and complete all performance initialization data. The ACTIVE FLIGHT PLAN page and PROGRESS page 2 display VNAV information.

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EMERG/PARK BRAKE Handle ..... AS REQUIRED

Verify if the parking brake is set in accordance with the engine start procedures.

Stall Protection System ..... AS REQUIRED

- If required to reset de stall protection system (SPS ADVANCED), release the GUST LOCK and pull control column to neutral position.
- Press STALL PROTECTION TEST button and check if both stick shaker and pusher actuate and if button amber light extinguishes.
- Apply the GUST LOCK.

TRIMs Panel ..... CHECK & SET

Set the pitch trim to the units required for takeoff according to the CG position.

PITCH TRIM UNITS	8	7	6	5	4
CG POSITION (%)	LESS THAN OR EQUAL TO 26.0	26.1 UP TO 28.5	28.6 UP TO 30.5	30.6 UP TO 33.5	ABOVE OR EQUAL TO 33.6

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Pressurization ..... SET

– Set destination airport elevation.
– If applicable, refer to High Altitude Operation Procedure on the AFM.

NOTE: If HIGH ALT Mode is applied in airports with pressure altitude between 8400 ft and 13800 ft, the cabin altitude displayed in EICAS will be amber.

Safety Pins..... 5 ON BOARD

Verify if the 5 safety pins (3 gears, 1 hydraulic safety, and 1 emergency exit) are on board, behind the LSP seat.

EICAS Messages..... CHECK

The PF should check if there are any critical messages on the EICAS that may affect the engine starting.

Passenger Briefing ..... COMPLETE

The passenger briefing must be carried out by the CREW and must cover the items on Passenger Briefing Card.

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CLEARED TO START

Baggage Compartment ..... CLOSED

Hazard Areas ..... CLEAR

Ground Crew Communication (if applicable)..... ESTABLISH

It is recommended that audio communication with the ground crew be used instead of signaling, if this service is available.

Doors & Windows ..... CLOSED

FUEL Panel ..... SET

XFEED Knob ..... AS REQUIRED

PUMP PWR TK 1 & 2 Selectors..... ON

RED BCN Switch ..... ON

The RED BEACON Switch must be set to ON:

- Whenever the airplane is moved as part of a flight operation, or
- When an engine is being operated.

EXTERIOR LIGHTS Switch..... AS REQUIRED

THRUST Levers ..... IDLE

Make sure that both THRUST Levers are in idle position before starting engines.

EMERG/PARK BRAKE Handle ..... AS REQUIRED

Verify if the PARKING BRAKE Handle is set in accordance with the engine start procedures.

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ENGINE START PROCEDURE

Whenever possible, initiate the engine starting procedure with the right engine.

ENG 1 & 2 START/STOP Selector..... START, THEN RUN

– Turn the ENG START/STOP Selector to RUN for 2 seconds, then turn the selector to START position momentarily and then to RUN.
– Start the Chronometer.

The ENG START/STOP Selector activates the starter air-control valve. Rotating the Selector to START position signals the initiate start sequence to the FADEC. When released, the Selector returns to the central RUN position. In this position, fuel and ignition (with ignition in AUTO position) will be commanded by the FADEC.

If the ENG START/STOP Selector is held on the START position for more than 3 seconds, it will cause the FADEC to discontinue the start.

N2 Increasing..... CHECK

Verify the N2 RPM increasing within 5 seconds after start selection.

Make sure N2 accelerates normally.

IGN A (B) Annunciation ..... CHECK ON

Ignition is activated when N2 is at approximately 14%.

Observe the annunciation IGN A (B) on the EICAS Display.

With ignition in AUTO, only the FADEC in control activates the ignition system.

The FADEC in control is alternated on every subsequent ground start. Only one ignition channel is activated on grounds starts. Ignition channels are also alternated on every subsequent start.

If ignition is set to OFF, FADEC neither activates ignition nor actuates the fuel valve to open, thus allowing dry motoring. However, a dry motoring procedure must not be performed if one of the FADECs is declared incapable.

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FF/ITT .....CHECK

Observe the Fuel Flow and ITT indications raise with N2 at about 31.5% (28.5% for airplanes equipped with FADEC B7.4 and on), or 12 seconds after ignition is activated.

For airplanes equipped with FADEC older than B8.0, there is NO automatic shutdown by the FADEC if an overtemperature occurs during start.

Airplanes equipped with FADEC B8.0 and on have an automatic shutdown as a backup protection.

Regardless of the FADEC version, the pilot must keep his/her hand on the ENG START/STOP Selector and manually abort the engine start, if necessary.

IGN A (B) Annunciation.....CHECK OFF

Verify if the annunciation IGN A (B) goes OFF at about 57% N2.

The start cycle ends at approximately 57% N2, which can be observed when IGNITION A or B annunciation on EICAS disappears.

After start is completed, engine stabilizes with N2 at about 64% and N1 at 24%.

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Engine Parameters ..... CHECK

Check N1, ITT, N2, Fuel Flow, Oil Pressure, and Oil Temperature for normal indications.

CAUTION: ABORT THE ENGINE START BY SELECTING THE START/STOP SELECTOR TO STOP IF ANY ABNORMAL INDICATION IS DETECTED.

NOTE: - Light-up at 28% N2 will be achieved with systems meeting minimum performance requirements. If light-up are occurring below 28%, the airplane should be scheduled for maintenance to avoid disruptions to passenger service.

- If the light-up occurs between 5 and 10 seconds after the first Fuel Flow indication, smoke and a momentary flash of combustion may be produced.
- If any starting limit is exceeded prior to aborting a start, do not attempt further starts.
- If a hung or no start occurs, accomplish the Dry Motoring Procedure before attempting another start.

Repeat the procedure for the other engine.

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ENGINE START ASSISTED BY THE APU

This procedure may be used to start the engine using the APU bleed as the pneumatic source.

BEFORE START & CLEARED TO START ..... COMPLETED

ENG XBLEED Knob ..... OPEN OR AUTO

ENG BLEED 1 & 2 Buttons ..... PUSH OUT

APU BLEED Button ..... PUSH IN

Engine Start Procedure ..... ACCOMPLISH

With the APU BLEED Button PUSHED IN and the ENG XBLEED Knob in the AUTO position, Engine 1 will always be started assisted by the APU, even when Engine 2 is running with the associated ENG BLEED 2 Button PUSHED IN.

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ENGINE START ASSISTED BY THE OPPOSITE ENGINE (CROSS START)

This procedure may be used to start the second engine using the operating engine bleed as the pneumatic source.

BEFORE START & CLEARED TO START ..... COMPLETED
ENG XBLEED Knob ..... AUTO OR OPEN
ENG BLEED Button (non-operating engine) ..... PUSH OUT
ENG BLEED Button (operating engine) ..... PUSH IN
N2 Operating Engine ..... ABOVE 80%
Engine Start Procedure ..... ACCOMPLISH
N2 Operating Engine ..... IDLE

After the start of the second engine is completed, reduce the other engine power to idle.

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ENGINE START WITH AIRPLANE BATTERIES AND LOW-PRESSURE UNIT (LPU)

This procedure may be used when operating without APU or GPU, but with the batteries and a Low-Pressure Unit (LPU) available for engine start.

NOTE: - Before attempting to start the engines using the batteries, ensure that the minimum voltage of the batteries is 24.0 V DC.

- The engine pneumatic start does not affect the electrical system or the individual loads connected to it. The voltage of the buses fed by the batteries remain steady during engine starts, with no power transients. After the first engine start and with generators online, the normal electrical system voltage will be between 24 V and 28.5 V.

- It is recommended that audio communication with the ground crew be used instead of signaling.

CAUTION:
- MAKE SURE THAT IT IS SAFE TO START THE PNEUMATIC START UNIT.
- LPU BLEED DUCT PRESSURE MUST BE BETWEEN 40 AND 45 PSI FOR ENGINE START AND ACHIEVED BEFORE ATTEMPTING A START.

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AIR CONDITIONING PACKS

Before connecting the ground pneumatic cart, the packs must be pushed out in order to avoid any cabin air contamination.

BEFORE START WITH LOW PRESSURE UNIT (LPU)

Accomplish a BEFORE START – FIRST FLIGHT procedure as soon as the electrical source is established.

BEFORE START & CLEARED TO START..... COMPLETED
PACK 1 & 2 Buttons ..... PUSH OUT
ENG XBLEED Knob ..... OPEN
ENG BLEED 1 & 2 Buttons ..... PUSH OUT
APU BLEED Button ..... PUSH OUT
LPU ..... CONNECT

- All safety measures for ground personnel must be observed.
- LPU bleed duct pressure must be between 40 and 45 psi for engine start and achieved before attempting a start.

Engine Start Procedure ..... ACCOMPLISH

Start the remaining engine using a crossbleed start or perform with the LPU.

NOTE: Engine starts using Low Pressure Unit (LPU) usually present higher ITT values.

Consider performing a crossbleed start on the second engine.

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ABNORMAL ENGINE START INDICATIONS

The pilot performing the engine start is responsible for monitoring engine parameters and manually aborting the start in the cases described below:

- N1 and/or N2 failing to accelerate to stable idle speed (hung start).
- N1 rotation is not confirmed or decreases.
- ITT exceeds start limit (hot start).
- No N2 increase within 5 seconds after start selection.
- If Oil Pressure stabilizes below the engine minimum limits.
- An Intermittent Electrical Pneumatic or Starter Malfunction occurs before the starter disengagement.
- Abnormal Noise, Vibration, Fire, or Smoke.

NOTE: In case an automatic abort occurs, hung start or engine start is manually aborted due to abnormal engine indications. Its cause must be investigated and corrected before further attempts to start.

If any starting limit is exceeded prior to aborting a start, do not attempt further starts.

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AFTER START

ELECTRICAL Panel ..... SET

GPU Button ..... PUSH OUT

GPU (if applicable) ..... DISCONNECT

Disconnect the GPU only after the release of the GPU Button. If not, spurious EICAS messages may be presented.

If the SHED BUSES are set to OVRD, switch them to AUTO.

APU (if applicable) ..... AS REQUIRED

When shutting the APU down, a cool down period is not required. APU should be shut down while loaded, that is, with APU Bleed and APU GEN ON, or immediately after the load is removed.

A1P Engines – Pre-Mod. SB 145LEG-73-0009

A1E Engines – Pre-Mod. SB 145LEG-73-0010

FADEC 1 & 2 Controllers ..... RESET/ALTN

This swapping of the FADECs is important because it ensures that both the controlling and the standby FADECs are properly set.

ELEC HYD PUMP 1 & 2 Knobs..... AUTO

Set the ELEC HYD PUMPs to AUTO after engine start.

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ICE PROTECTION Panel ..... AS REQ

Windshield Sierracin without Goodrich Temperature Controller (Pre-Mod. SB 145LEG-30-0013).

WINDSHIELD Heating Buttons ..... AS REQ

Turn WINDSHIELD Heating to ON only if icing conditions or windshield fogging is encountered or anticipated.

Windshield Sierracin with Goodrich Temperature Controller (Post-Mod. SB 145LEG-30-0013).

WINDSHIELD Heating Buttons ..... PUSH IN

CAUTION: ICE DETECTION OVERRIDE KNOB MUST NOT BE SET TO ALL ON GROUND, EXCEPT DURING TEST.

WARNING: **IF ICING CONDITIONS EXIST OR ARE FORECAST, REFER TO OPERATION IN ICING CONDITIONS PROCEDURE.**

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AIR CONDITIONING/PNEUMATIC Panel..... SET

The AIR CONDITIONING/PNEUMATIC Panel must be set according to the RWY analysis on the performance software.

Set the panel considering the APU ON.

TAKEOFF CONDITIONS		ENGINE TAKEOFF MODE	ENG BLEED Button	APU BLEED Button	ENG XBLEED Knob
NO ICING	APU ON	ALT T/O-1	PUSH IN	PUSH OUT	AUTO
		T/O	PUSH OUT	PUSH IN	OPEN
		E T/O (if applicable)	PUSH OUT	PUSH IN	OPEN
ICING		ALT T/O-1	PUSH IN	PUSH OUT	AUTO
		T/O	PUSH IN	PUSH OUT	AUTO
		E T/O (if applicable)	PUSH IN	PUSH OUT	AUTO

Set the panel considering the APU OFF.

TAKEOFF CONDITIONS		ENGINE TAKEOFF MODE	ENG BLEED Button	APU BLEED Button	ENG XBLEED Knob
NO ICING	APU OFF	ALT T/O-1	PUSH IN	PUSH OUT	AUTO
		T/O	PUSH IN	PUSH OUT	AUTO
		E T/O (if applicable)	PUSH IN	PUSH OUT	AUTO
ICING		ALT T/O-1	PUSH IN	PUSH OUT	AUTO
		T/O	PUSH IN	PUSH OUT	AUTO
		E T/O (if applicable)	PUSH IN	PUSH OUT	AUTO

ENGINE TAKEOFF DATA..... CHECK

Check the ATTCS annunciation on the EICAS Display.

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TAXI

Ground Equipment ..... REMOVE

NOTE: - The STEERING Handle engagement actuation with the Nose wheels beyond their operational limits may cause damage to the Nose Wheel Steering System.

- If applicable, do not start taxiing before receiving confirmation from the ground crew that the airplane is free to taxi. Then acknowledge that and switch OFF the COCKPIT DOME Lights.

Wheel Chocks ..... REMOVE

TAXI Light Switch ..... ON

It is recommended that the TAXI light be ON during taxi even during daytime.

Transponder ..... AS REQUIRED

Set the transponder to the appropriated mode according to the local regulations.

STEERING ..... CHECK

Verify the STEER INOP message displayed on the EICAS.

Press and hold for 5 seconds the STEERING Handwheel, maintaining it in the neutral position. Verify if the STERR INOP message is removed and, after handwheel is released, the message is not displayed again.

NOTE: Avoid use of reverse below 50 KIAS in order to prevent engine damage due to foreign objects ingestion.

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SINGLE ENGINE TAXI AND CROSS START

If a single engine taxi is intended, the full after-start checklist must be completed after the start of the first engine.

The crossbleed start of the second engine requires a minimum of 80% N2 operating engine.

It is recommended that the cross start be carried out at a run-up area or in a position where the jet blast does not affect other airplane or objects in general (containers, ground support equipment, etc) behind it.

The start of the second engine should preferably be carried out with the airplane static. Paying attention to the engine start while taxiing the airplane may lead to distractions and dangerous situations.

The following items must be checked before the start of the second engine:

EMERG/PARK BRAKE Handle ..... APPLY
ENG XBLEED Knob ..... AUTO OR OPEN
ENG BLEED Button (non-operating engine) ..... PUSH OUT
ENG BLEED Button (operating engine) ..... PUSH IN
APU BLEED Button ..... PUSH OUT

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BEFORE TAKEOFF

NOTE: - Make sure that a "cold" engine operates at least 4 minutes before increasing N2 above 83%. An engine is considered "cold" if it has not run for the previous 90 minutes.

- Make sure that a "warm" engine operates at least 2 minutes before increasing N2 above 83%. An engine is considered "warm" if it has run for the previous 90 minutes.

- Should the pilot observe any noticeable change in the weather conditions or when total time between setting of the T/O data and takeoff roll is expected to be longer than 20 minutes, it is recommended that the temperature stored in the T/O data setting be updated shortly before takeoff.

- To increase N2 above 83%, the engine oil temperature must be at 40°C (104°F) minimum. If the oil temperature is below 40°C (104°F) after 4 minutes, the engine should be run for additional 4 minutes before advancing the Thrust Levers for takeoff.

Passenger Announcement ..... PERFORM

This announcement is performed by the CREW in order to inform the passengers that the cabin must be in takeoff configuration according to Passenger Briefing.

Takeoff Briefing..... COMPLETE

It is recommended that the briefing be performed before engine start if there is time for that, and if there is enough information about the cleared departure procedure.

If briefing is performed before engine start and there are clearance amendments afterwards, or if there are any new facts that may cause significant changes in the departure procedure, the briefing must be amended.

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PC POWER Button ..... PUSH OUT

The PC Power System must be turned OFF until the airplane reaches 10000 ft.

FUEL Panel ..... SET

XFEED Knob ..... OFF

FUS TK XFER Knob ..... OFF

Ice Protection Test ..... AS REQUIRED

The ice protection test must be carried out once a day (not necessarily at the first flight of the day) when icing conditions are forecast.

The test may be carried out completely on the ground, or in 2 separate phases (first phase on the ground and second phase in flight), depending on weather conditions and crew discretion. For ice protection test information, refer to SOP Supplementary Normal Procedures, Environmental, Section 2-79.

Flight Director ..... SET

Make sure that the Auto Pilot is selected to his/her side, then press the FD button and select GO AROUND by pressing the respective button at the thrust lever head. Check that the flight director bar on T/O mode became visible on the PFD.

Engine THRUST RATING ..... CHECK

Check the selected Engine THRUST RATING and ATTCS annunciation on the EICAS.

Brakes Temperature ..... CHECK

Check on the MFD HYD page if the brakes temperature is within the green range.

CAUTION: TAKEOFF CANNOT BE ATTEMPTED WITH BRAKE TEMPERATURES OUTSIDE THE GREEN RANGE.

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FLAP Lever..... SET 9°

Flight Controls..... CHECK

- Release the GUST LOCK.
- Check AILERON and ELEVATOR free travel.
- The LSP should press the STEERING DISENGAGE SWITCH and check the rudder pedals full travel in both directions. The RSP should follow the LSP during rudder check.
- Flight controls should be checked for freedom of movement in a smooth and continuous manner.
- For each direction, check that the EICAS message RUD SYS 1-2 INOP is not presented when pedal is at the stop.
- Once this check is complete, the GUST LOCK Lever must be applied again.

NOTE: The flight controls must be checked close to the holding point during a prolonged taxi in cold soak or under any other weather conditions that can possibly affect the flight controls, due to freezing, snow and/or slush accumulation.

Each time the electromechanical GUST LOCK Lever is set to the unlocked (FREE) position, the elevator movement must be checked. This check must be performed by lifting the GUST LOCK Lever and moving it to the intermediate detent position. At this position, the locking pins are commanded to open and the elevators are unlocked after approximately 10 seconds. To complete the unlocking cycle, lift the GUST LOCK Lever and move it to the full forward in-flight resting position. The indication lights come into view during the unlocking cycle. After the indication lights go out, the control column must be moving from full-up stop to the full-down stop and back to the full-up stop position.

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CLEARED INTO POSITION

GUST LOCK Lever ..... UNLOCK

Elevator ..... CHECK

The elevator movement must be checked after the GUST LOCK Lever is in the unlocked (FREE) position.

For airplanes equipped with electromechanical gust lock system, the elevator movement must be checked at least 10 seconds after setting the GUST LOCK Lever to the unlocked (FREE) position by moving the control column from the full-up stop to the full-down stop, and back to the full-up stop position.

EXTERIOR Lights ..... ON

The following lights must be turned to ON prior to entering the runway: LDG 1, NOSE, LDG 2, TAXI (if not ON yet) and STROBE.

It is advisable to have STROBE lights ON whenever entering or crossing an active runway.

EICAS Messages ..... CHECK

Make sure that there are no CAUTION or WARNING messages on the EICAS Display. If there is any ADVISORY message, evaluate the associated condition and its effects on the takeoff.

Transponder ..... TA/RA

Check if the TCAS is set to ABOVE and that a proper range has been selected. Also check if the transponder code is the correct one and if it is set to TA/RA.

TO CONFIG Button ..... PRESS & CHECK

The TAKEOFF CONFIGURATION TEST Button (TO CONFIG) must be pressed once runway line up is authorized. The "TAKEOFF OK" aural message should be heard. If any other announcement is heard, the airplane is out of the normal configuration and must be properly configured prior to takeoff.

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TAKEOFF

THRUST Levers ..... THRUST SET

Check if the green ATTCS indication shows on the EICAS.

During takeoff run, pedals should be used to steer the airplane.

NOTE: - If the runway is considered to be limiting, a static takeoff must be accomplished. In this case, release brakes after engine has reached target N1.

- For rolling takeoffs, performance data is valid from the point where takeoff thrust is achieved.

Engine Parameters ..... MONITOR

NOTE: High vibration indicates a malfunction which may worsen and increase vibration severity. Therefore, continuous engine operation with vibration in the amber range is not recommended. According to engine vibration limits, the pilot may choose not to reduce TLA for vibration below 2.5 IPS, and time limited to 5 minutes. If vibration returns to the green range within 5 minutes, the flight may continue but vibration causes should be investigated before the next flight. According to Rolls-Royce AE3007A Series Operation Manual, vibration in any flight phase in the amber range, up to 1.5 IPS for less than 30 seconds does not require maintenance action.

Flight Director Guidance ..... FOLLOW

At V_R rotate the airplane to 14° or follow the Flight Director.

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WITH POSITIVE RATE OF CLIMB:

Landing Gear Lever ..... SET UP

Command gear up on request, after confirming on the altimeter the rate of climb is positive.

Confirm the three white UP indications on the EICAS Display.

Do not apply brakes after becoming airborne. The main wheels will stop automatically.

Minimum Airspeed ..... V_2

If maneuvering is required, maintain a minimum airspeed of V_2 + 10 KIAS with a maximum bank of 25°.

PITCH TRIM ..... AS REQUIRED

NOTE: The airplane should be trimmed before 160 KIAS to avoid excessive loads on the Horizontal Stabilizer Actuator. Failure to accomplish the above procedure may lead to an inoperative trim condition not associated with any EICAS message.

AT LEVEL OFF HEIGHT ALTITUDE:

V_2 + 15 KIAS ..... FLAP 0°

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AFTER TAKEOFF

Engine THRUST RATING ..... CLB

A1P Engines

Select CLB mode on the THRUST RATING panel and confirm the climb mode indication on the EICAS Display.

A1E Engines

Select E CLB or CLB mode on the THRUST RATING panel and confirm the respective climb mode indication on the EICAS Display.

SPEED..... SET

Select 210KT, FLC, or according to local restrictions.

Autopilot/Flight Director ..... AS REQUIRED

VNAV (if applicable)..... AS REQUIRED

The VNAV must be selected at or above 500 ft AGL and it engages automatically when all the conditions for engagement are satisfied (refer to Section 2-18-60).

The crew can change the altitude restriction associated with a waypoint on the CDU or use altitude pre-selector to include intermediate altitude clearance.

WINDSHIELD Heating 1 & 2 Buttons..... AS REQUIRED

Windshield Sierracin without Goodrich Temperature Controller.

Turn WINDSHIELD Heating to ON only if icing conditions or windshield fogging is encountered or anticipated.

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AIR CONDITIONING/PNEUMATIC Panel ..... SET

Check for the proper air conditioning and pressurization settings and parameters.

Takeoff with APU BLEED:

ENG BLEED 1 & 2 Buttons ..... PUSH IN.

ENG XBLEED Knob ..... AUTO

APU BLEED Button ..... PUSH OUT

Takeoff with Engine BLEED:

LEGACY 600 – before SN 644 (Except SN 462, 516, and 591)

– Takeoff performed by E/TO or T/O mode. Both PACKS must be reset manually, preferably one at a time, one shortly after the other for the sake of passenger comfort.

LEGACY 600 (SN 462, 516, 591, 644 and on)

– The packs are automatically reset when the conditions for the ECS OFF signal cease to exist.

Pressurization ..... CHECK

Once the air conditioning system is set, make sure that the pressurization is functioning properly. Verify the cabin altitude, the differential pressure and the cabin rate of climb on the EICAS.

APU ..... AS REQUIRED

Shut the APU down in case this has not yet been done.

If the expected flight time to destination is less than 30 minutes, it is recommended that the APU be left running throughout the flight because the wear caused by the start is more significant than the wear caused by 30 minutes of continuous operation.

NOTE: To extend APU life, shut down the APU IMMEDIATELY (within 10 seconds) after the engine bleed valves are open, that is, without cool down period.

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CLIMB

----------At Transition Altitude----------

Altimeters and Standby Altimeter ..... SET & X-CHECK

Both pilots must set the altimeters to standard (QNE) upon passing the transition altitude if it is an operation in ICAO airspace or an altitude defined by local regulations.

The LSP must also set the Standby altimeter.

----------Above 10000 ft----------

EXTERIOR Lights..... OFF

Upon passing 10000 ft, switches OFF the EXTERIOR lights according to the operating policies.

Set EXTERIOR lights switches to OFF, except for STROBE and RED BEACON lights. The LOGO light must also be switched to OFF.

FSTN BELTS Switch ..... AS REQUIRED

Check the local regulations for compliance.

Set the FASTEN SEAT BELTS Switch to OFF, if conditions permit.

PC POWER Button..... AS REQUIRED

If PC Power supply is desired, push in the PC POWER Button on the IFE Overhead Panel.

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CRUISE

Engine THRUST RATING.....CRZ

Weather RADAR.....AS REQUIRED

FUEL XFER System .....AS REQUIRED

Select the system only if there is usable fuel in the selected auxiliary tank.

LEGACY 600

Set the FUS TK XFER Knob to FUS 1 or FUS 2.

LEGACY 650

Set the MASTER FUEL XFER Knob in the following recommended order: FUS 1, then FUS 2, then VTRL.

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DESCENT

Approach Briefing..... COMPLETE

It is recommended that the approach briefing be performed before starting descent and it must be carried out by the PF and must address at least the following items:

– Inoperative airplane components.
– Weather conditions and runway conditions at destination/alternate airports (LDA; Contamination; Prevailing Winds; Lighting; etc).

  Assess the landing distance for current conditions and compare it with the runway length available.

  The approach must be planned to allow a stabilized approach for the last 3 miles before touchdown.

  If the destination airport runway is reported to be slippery or contaminated, it is necessary to discuss the outcome on the landing distance during the approach briefing. The same discussion is applicable if the crew has planned to use additional speed for the approach due to wind/gust conditions.

  If any failure that affects the required landing distance occurs on the final approach, consider a missed approach in order to better evaluate the situation and an appropriate runway length.

  Failures that affect the landing distance are commonly associated to brakes, ground spoilers and/or thrust reversers.

  The missed approach procedure must be discussed in detail and both pilots must be totally aware of what to do should the need for a missed approach procedure ever arise.

  Discuss the best alternate airport to satisfy the operational constraints. Reserve time before proceeding to the alternate airport; analyze conditions, radio aids, arrival and ground facilities.

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NOTE: - It is highly recommended that the briefing be performed with the active participation of both pilots. Techniques such as reading back or posing questions to each other enhance this participation. Briefings consisting of mechanical repetition of a memorized speech without having the mind set on the subject are useless.

- SPS ADVANCED advisory message indicates that the Stall Protection System trigger speeds have been increased and, therefore, ice speeds must be used. When ice conditions are suspected or detected on Approach, use landing distance for ice condition speeds.
- Closely monitor the SAT indication and presence of moisture. If environmental ice conditions exist, even intermittent, check the windshield, windshield wiper, and wing surface for ice accumulation. To visualize ice formation, if necessary, use a flashlight on the windshield and the wing inspection light on the wing. If any ice formation is detected or suspected, select the anti-icing protection system override knob to ALL. When flying in detected or suspected ice conditions, use ice speeds as a reference.
- Check the VNAV performance initialization on the FMS and make the adjustment as necessary to comply with the remaining portions of the flight.

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WINDSHIELD Heating 1 & 2 Buttons ..... PUSH IN

Applicable to Legacy 600 with Windshield Sierracin and without Goodrich Temperature Controller.

The system must be ON to prevent fog and ice formation on the windshield inner layer.

Approach Aids ..... SET & X-CHECK

Set the Radios, select the radio frequencies, identify the radios aids, set courses, altitudes and heights for the intended approach.

Both pilots should perform RA test and set RA minimums (CAT II Approach only).

NOTE: Setting DH is mandatory for CAT II operations. For other operations, it is a reminder only.

Also verify that the FMS is properly programmed for the type of approach in use.

Keep in mind that is the last opportunity to do major reprogramming on the FMS. Once airplane is below 10000 ft AGL, entries into the FMS must be limited to basic data such as DIRECT TO.

Ensure that both PFDs are displaying appropriate information.

On the EFB or Charts & Maps, if applicable, prepare the approach charts.

With VNAV engaged, the PF should select the Altitude Selector only to altitudes cleared by ATC.

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Speed Bugs.....SET

Check on the FMS the expected landing weight and set V_{FS} V_{REF}, $V_{APP\ CLB}$, and V_{APP} on the MFD:

For V_{REF}, $V_{APP\ CLB}$ and V_{FS} definitions, see the Speed definitions on Section 3-05.

V_{APP} = V_{REF} + wind correction.

Wind correction = ½ steady headwind component + gust increment above steady wind.

For Flaps 45° landing, the minimum wind correction is 5 kt and the maximum is 15 kt.

For Flaps 22° landing, the minimum wind correction is 5 kt and the maximum is 20 kt.

EXAMPLE:

- V_{REF} = 118 KIAS
- Reported wind = 16 kt, gusting to 25 kt
- The wind correction would be ½ (16) + (25 - 16) = 17 kt
- However, the maximum wind correction is 15 kt (Flaps 45°), thus:
- V_{APP} = 118 KIAS + 15 kt = 133 KIAS

This policy is for normal flight only. Refer to the Abnormal and Emergency procedures to obtain the approach speeds for specific non-standard configurations.

MAGENTA BUG	= V_{FS}	(the same bug used for V_1)
CYAN BUG	= V_{REF}	(the same bug used for takeoff V_R)
WHITE BUG	= $V_{APP\ CLB}$	(the same bug used for takeoff V_2)
GREEN BUG	= V_{APP}	(the same bug used for takeoff V_{AP})

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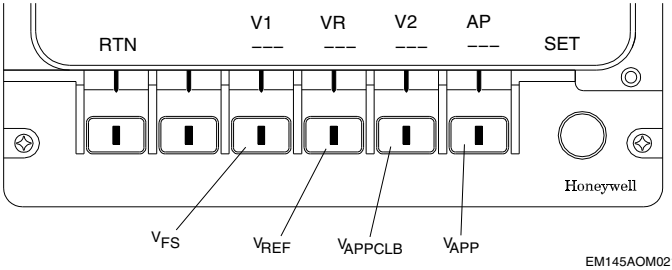

EM145AOM021035A.DGN

SPEEDS SETTING

TCAS ..... SET BELOW

Pressurization ..... CHECK

Make sure that the digital controller was set to the destination airport elevation.

If High Altitude Operation (HALTO) Procedure is applicable, refers to HALTO Supplement on the AFM.

NOTE: If HIGH ALT Mode is applied in airports with pressure altitude between 8400 ft and 13800 ft, the cabin altitude displayed on the EICAS will be in amber.

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----------Passing 10000 ft----------

PC POWER Button ..... PUSH OUT

Below 10000 ft, the PC Power System must be turned OFF by pressing the PC POWER Button on the IFE Overhead Panel.

EXTERIOR Lights ..... ON

The following lights must be turned ON upon crossing 10000 ft:

– LDG1, NOSE, and LDG2.

During nighttime, the LOGO light must also be turned ON.

PASS SIGNS Panel ..... SET

Turn FSTN BELTS and NO SMKG Switches signs to ON upon passing 10000 ft, if they are not ON yet.

Pocket Door ..... OPN & LOCK

Assure that the Pocket Door is in open and locked position.

CAUTION: THE UPPER CABIN PARTITION MUST BE REMOVED DURING LANDING OPERATIONS, WHEN IT IS EXPECTED TO HAVE A PASSENGER SEATED IN THE DIVAN FORWARDMOST POSITION.

Curtains ..... STOW

Stow any curtain used during flight.

Passenger Announcement..... PERFORM

This announcement is performed by the CREW in order to inform the passengers that the cabin must be in landing configuration according to Passenger Briefing.

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APPROACH

FUEL Panel ..... SET

XFEED Knob ..... OFF

FUS TK XFER Knob ..... OFF

Altimeters ..... SET & X-CHECK

If the flight is being conducted in ICAO airspace, set the altimeters to QNH (QFE if applicable) when passing the Transition Level.

Otherwise, set as required by local regulations.

NOTE: VNAV is prohibited on QFE operations.

Approach Aids ..... SET & X-CHECK

Verify that the frequencies and courses that were selected and pre-selected are correct for the intended approach.

Ensure that both PFDs are displaying appropriate information.

Also verify that the radio altimeter alert (DH) and the FMS are properly selected for the type of approach in use.

Check if the radio altimeter alert (DH) and the FMS are properly selected for the type of approach in mind.

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CAUTION: RADIO ALTIMETER-BASED DECISION HEIGHTS ARE NOT RECOMMENDED ON CAT I APPROACHES. THE DECISION ON A CAT I APPROACH HAS TO BE BASED ON THE ALTIMETER RATHER THAN ON THE RADIO ALTIMETER. THE DH ALERT IN THESE CASES IS A REFERENCE ONLY THAT MUST BE USED WITH CARE AND ITS VALIDITY DEPENDS ON THE PILOTS' KNOWLEDGE OF THE TERRAIN BEFORE THE RUNWAY.

ALTIMETER-BASED DECISIONS ARE NOT ALLOWED ON CAT II APPROACHES. THE DECISION ON THESE APPROACHES HAS TO BE BASED ON THE RADIO ALTIMETER.

NOTE: The V_{APP} (VOR Approach) mode should be selected only on final approach segment, with airplane below 2500 ft AGL. Therefore, the outbound segment should be flown using any other mode.

Engine Thrust Rating ..... CHECK MODE

A1P Engines

Check T/O Mode on the EICAS Display.

A1E Engines

Check E T/O Mode on the EICAS Display.

NOTE: Engine Takeoff Mode is automatically selected in flight, below or descending through 15000 ft, provided the landing gear is down and locked.

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GO-AROUND

GO-AROUND Button ..... PRESS

Press the GO-AROUND Button at the THRUST Levers and check if Flight Director goes to pitch 10° nose up.

Manually rotate or check if the Autopilot rotates the airplane following the Flight Director.

THRUST Levers ..... MAX

Advance the THRUST Levers to MAX position and verify the engines parameter.

FLAP Lever ..... SET 9°

WITH POSITIVE RATE OF CLIMB:

Landing Gear Lever ..... UP

Minimum Airspeed ..... V_{AC}

Maintain the pitch as commanded by the Flight Director or pitch 10° if Go-Around is being performed on raw data to maintain the airplane airspeed above the minimum airspeed (approach climb speed selected on the MFD).

NOTE: - For coupled Go-Around, the altitude loss may be 40 ft.

- During Go-Around procedure, the DON'T SINK aural warning may sound. In this case, monitor the sink rate and follow the Go-Around Guidance.

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BEFORE LANDING

Landing Lights ..... AS REQUIRED

Taxi (NOSE) switch may be used to assist landing.

Landing Gear Lever ..... DOWN & CHECK

FLAP Lever ..... ___°SET

Both pilots must check if the 22° or 45° flap position on the EICAS Display is the intended for landing.

Autopilot & Yaw Damper ..... OFF

CAUTION: THE AIRPLANE DIRECTIONAL CONTROLLABILITY ON THE RUNWAY WITH YAW DUMPER COUPLED IS MORE DIFFICULT, ESPECIALLY WITH GUSTS AND CROSS WINDS.

----------At 200 ft AGL----------

Autothrottle RTD Mode (if applicable) ..... ARMED

Below DA (DH) or MDA (MDH), whichever is applicable:

Airspeed ..... $V_{REF\ XX}$

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LANDING

Airspeed..... $V_{REF\ XX}$

THRUST Levers ..... IDLE OR REVERSE

Upon landing, if thrust reversers have been used, it must be stowed at 60 KIAS.

Brakes..... AS REQUIRED

NOTE: During landing run, pedals should be used to steer the airplane.

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AFTER LANDING

Normal landing is accomplished by using idle and braking as necessary. Braking is most effective at low speeds. If maximum braking is necessary, apply maximum and steady force to the brake pedals. The anti-skid will modulate the pressure applied to each wheel to ensure maximum braking for the runway condition. Do not pump the pedals.

Use pedal steering to maintain runway centerline. Avoid using the steering handle at high speeds, which may result in losing the runway centerline and causing passenger discomfort due to its sensitivity.

Reverse thrust can be used whenever required to reduce the runway rollout. Reverse thrust is available when the main wheels are rolling at a speed greater than 25 kt. Use reverse thrust judiciously: it is most effective when the airplane is moving at high speed. After the nose wheel contacts the ground, lift idle gates, smoothly retard thrust levers into Reverse range, then set the proper amount of thrust according to the runway length. Avoid making the first turnoff and use maximum reverse whenever it is operationally essential, but within safety limits.

Applying reverse at low ground speeds may cause ingestion of fine sand and debris, which can damage the engine. Therefore, select Idle below 60 KIAS and use brakes for deceleration.

With speed below 60 KIAS, apply the GUST LOCK.

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EXTERIOR & Internal Lights ..... AS REQUIRED

The STROBE lights must be turned OFF by the RSP as soon as the airplane leaves the runway.

However, LDG1, NOSE and LDG2 are switched OFF at the PF's discretion.

The TAXI light must remain ON throughout the taxi regardless of the time of the day.

Transponder ..... AS REQUIRED

RSP selects the transponder to STBY or in accordance with local requirements.

GUST LOCK Lever ..... LOCK

The GUST LOCK Lever must be applied immediately after the airplane leaves the runway.

APU..... AS REQUIRED

If the intention is to start the APU, do it at this time.

Do not use the APU Bleed until the airplane is parked and with blocks on.

After start, wait at least 3 minutes to use APU bleed (this will maximize the APU life).

NOTE: To prevent spurious overcurrent in the electrical system, engines must not be shut down concurrently with the starting of the APU. A minimum one-minute interval between those two procedures is recommended.

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WINDSHIELD Heating 1 & 2 Buttons ..... AS REQUIRED

Windshield Sierracin without Goodrich Temperature Controller

WINDSHIELD Heating 1 & 2 Buttons ..... AS REQ

Turn Windshield Heating to OFF only if it is not necessary to Defog or De-Ice the windshield.

AIR CONDITIONING/PNEUMATIC Panel ..... AS REQUIRED

Weather RADAR 1 & 2 Knobs ..... SBY

Switch both Weather RADARs to standby position.

Pressurization ..... CHECK

FLAP Lever ..... SET 0°

NOTE: Flaps retraction from 22° to 0° following landing on a contaminated runway or after operation in icing condition should be delayed until maintenance can visually inspect flap gaps and actuators for freedom of contamination or ice.

PITCH TRIM..... SET

Set the PITCH TRIM to the "GREEN BAND" on the EICAS Display.

CAUTION: DURING TAXI, ENGINE 2 MUST NOT BE SHUTDOWN JUST BEFORE OR DURING A TURN, AS THIS MAY CAUSE STEERING COMMAND LOSS (STEERING IS SUPPLIED BY DC BUS 2).

NOTE: In case an overcurrent protection is actuated, and the EICAS message DC BUS 2 OFF (PFD 2 and MFD 1 blank and MFD 2 displaying a red X) is displayed after a commanded engine 2 shutdown during taxi, the following actions must be carried out:

- Stop the airplane.
- Restart engine 2.
- Taxi the airplane normally to the appropriate area.
- To shut the airplane down and reset the overcurrent protection, refer to Shutdown Procedures.

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ENGINE SHUTDOWN

THRUST Levers ..... IDLE

EMERG/PARK BRAKE Handle ..... APPLY

Typically, when approaching the parking position and turning towards the marshal, turn OFF the TAXI light. This is especially important at night.

Apply the EMERGENCY/PARKING BRAKE Handle after airplane has stopped. Make sure that the airplane is static before doing so.

Verify brake temperature. If close to the cautionary range, verify that chocks are on and release the EMERGENCY/PARKING BRAKE to reduce the brake cooling time.

NOTE: To avoid hydraulic fluid transference from system 1 to system 2, first apply brakes using the pedals, then pull the EMERGENCY/PARKING BRAKE handle. To release the EMERGENCY/PARKING BRAKE, repeat this procedure.

ELECTRICAL Panel ..... SET

GPU Button (if available) ..... PUSH IN

If the APU (or the APU generator) is unserviceable and there is a GPU available, select the GPU before shutting down the engine. Check the GPU voltage on the MFD ELEC page before selecting it.

SHED BUSES Selector ..... CHECK & SET

When the electrical system is being powered by the APU after the shutdown of both engines, verify if the switch is in OVRD position if the galley and IFE power are necessary.

If the electrical system is being powered by a GPU after shutdown, the SHED BUSES can be left in AUTO.

EXTERIOR and Internal Lights ..... AS REQUIRED

APU ..... AS REQUIRED

If the APU is not running yet, then start it up before the engines are shut down.

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ELEC HYD PUMP 1 & 2 Knobs ..... OFF

Once the airplane is parked and the EMERGENCY/PARKING BRAKE is applied, switch ELEC HYD PUMP 1 & 2 Knobs to OFF.

ICE PROTECTION Panel ..... SET

WINDSHIELD Heating 1 & 2 Buttons ..... PUSH OUT

AIR CONDITIONING/PNEUMATIC Panel ..... SET

RECIRC & GASPER Buttons ..... PUSHED IN

PACK 1 Button ..... PUSH OUT

PACK 2 Button ..... PUSHED IN

APU BLEED Button ..... PUSH IN

ENG XBLEED Knob ..... OPEN

ENG BLEED 1 & 2 Buttons ..... PUSH OUT

Switch PACK 1 to OFF, thus reducing the external noise in the vicinity of the main passenger door, for better passenger comfort. If better cooling is required after disembarkation is finished, PACK 1 can be switched ON again.

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ENG 1 & 2 START/STOP Selectors..... STOP

Once the EMERGENCY/PARKING BRAKE is applied, shut down the engines by selecting the ENGINE START/STOP Selectors to STOP.

NOTE: The engines will not shut down with START/STOP Selectors unless Thrust Levers are first moved to IDLE.

If STOP is selected before THRUST Lever is retarded to IDLE, momentarily cycle START/STOP Selector to RUN and back to STOP.

LEGACY 600 – The engines must run for at least 1 minute at IDLE thrust before shutdown. Time operation at or near idle, such as taxing, is included in this 1-minute period.

According to the Rolls-Royce, operating the engines at idle for 3-5 minutes before shutdown reduces thermal soakback effects.

LEGACY 650 – The engines must run for at least 2 minutes at IDLE thrust before shutdown. Time operation at or near idle, such as taxing, is included in this 2-minute period. According to the Rolls-Royce, operating the engines at idle for 3-5 minutes before shutdown reduces thermal soakback effects.

To prevent spurious overcurrent in the electrical system, engines must not be shut down concurrently with the starting of the APU. An interval of one-minute minimum between those two procedures is recommended.

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NOTE: If the overcurrent protection is actuated, the airplane will enter in electrical emergency when both engines are shut down (both PFDs and MFDs de-energized, but EICAS display energized). In this case, the following steps must be accomplished:

BATT 1 & 2 Knobs ..... OFF

BUS TIES Selector ..... OFF

– Properly trained personnel must reset the electrical system through ELEC SW switch on the Maintenance Panel behind the pilot's seat.

– If the failure persists, the related fault isolation task (FIM TASK 24-60-00-810-820-A) should be accomplished.

RED BCN Switch ..... OFF

The RED BCN Switch should be set to OFF after the engines are shut down. The use of the RED BEACON Light should be associated with engine(s) running or airplane in movement.

PUMP PWR TK 1 & 2 Selectors ..... AS REQUIRED

If the APU is running, keep the PUMP PWR WING TK 2 ON (or the PUMP PWR WING TK 1 ON and FUEL XFEED to LOW 2).

If the APU is not running, turn WING FUEL PUMP Knobs to OFF.

PASS SIGNS Panel ..... SET

Set FASTEN SEAT BELT and NO SMOKING Switches to OFF as soon as the airplane is static, and the engines are shut down.

Transponder ..... STANDBY

Set the TCAS to STBY on the RMU and press the button related to the transponder code for 3 seconds to recall the discrete number that was stored in memory (ex.: 2000 or 1200).

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LEAVING THE AIRPLANE

IRS 1 & 2 Knobs ..... OFF

NOTE: Switching the IRS to OFF ensures transfer process of the transfer last calculated latitude and longitude and other IRS parameters.

The airplane must not be de-energized before the ALIGN annunciator light extinguishes.

Weather RADAR 1 & 2 Knobs ..... OFF

Switch both Weather RADARs Knobs from standby (SBY) to OFF position.

SHED BUSES Selector ..... AUTO

AVIONICS MASTER 1 & 2 Buttons ..... PUSH OUT

Select AVIONICS MASTER 1 & 2 to OFF prior to switching GPU or APU OFF.

NOTE: If the airplane is equipped with UNIVERSAL FMS installation, switch the FMS to OFF prior to switching AVIONICS MASTER 1 & 2 to OFF.

EMERG LT Switch ..... OFF

The EMERGENCY LIGHTs must be switched from ARM to OFF before the BATTERIES are switched OFF. Otherwise, the EMERGENCY LIGHTs will illuminate and drain their BATTERIES.

EXTERIOR & Internal Lights ..... OFF

Make sure that all EXTERIOR and Internal lights are switched OFF (except for the cockpit DOME Light at night) before switching GPU or APU to OFF.

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GPU/APU (if available) ..... OFF

Shut the APU down by pressing the STOP button on its panel. Verify the shutdown on the EICAS. Wait until APU rotation drops to 10% before switching APU Master OFF.

NOTE: Do not close the air conditioning PACKS before shutting down the APU. Shutting down the APU while bleed air is coming out of it helps extending APU life.

If a GPU is the source of electrical power, switch it OFF through the GPU button on the ELECTRICAL System panel after the APU is turned OFF.

Pilots should never leave the airplane unattended and energized. A member of the maintenance team (if applicable), familiar with the airplane, should always be left in charge before the Crew leaves.

PUMP PWR TK 1 & 2 Selectors ..... OFF

WINGs FUEL PUMPs are needed only while the APU is in use. Once the APU is shut down, the WINGs FUEL PUMPs are no longer needed. So, if the airplane is being powered by the GPU or solely by the BATTERIES, FUEL PUMPs are not required.

AIR CONDITIONING/PNEUMATIC Panel ..... SET

Set the air conditioning and pressurization panel as follows:

RECIRC & GASPER Buttons ..... PUSHED IN
PACK 1 & 2 Buttons ..... PUSH OUT
ENG XBLEED Knob ..... AUTO
ENG BLEED 1 & 2 Buttons ..... PUSH OUT
APU BLEED Button ..... PUSH OUT

EMERG/PARK BRAKE Handle ..... AS REQUIRED

BATT 1 & 2 Knobs ..... OFF

Switch BATTERY 1 & 2 Knobs from AUTO to OFF.

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CROSSFEED OPERATION

NOTE: XFEED Knob must be OFF during takeoff and landing.

If wing fuel imbalance is verified:

Attitude ..... WINGS LEVELED

Compare Total Fuel indication in MFD Fuel Page with FMS Fuel Remaining information.

If FMS Fuel Remaining quantity is lower than MFD Total Fuel indication or if FMS Fuel Remaining quantity is less than 300 kg above the MFD Total Fuel indication:

If left wing presents lower level:

XFEED Knob LOW1

If right wing presents lower level:

XFEED Knob LOW2

Set engines at the same N1 and compare the Fuel Flow indications.

In case of a discrepancy is noticed and is coherent to the imbalance, a fuel leakage may be occurring after the fuel flow sensor.

Monitor fuel quantities and consider diversion.

When the desired balance is achieved:

XFEED Knob ..... OFF

If FMS Fuel Remaining quantity is more than 300 kg above the MFD Total Fuel indication, a fuel leakage may be occurring before the fuel flow sensor. Proceed as follows:

XFEED Knob ..... OFF

Asymmetric Thrust ..... AS REQUIRED

Use asymmetric thrust to improve or maintain wing fuel balance, that is, to counteract the effect of the presumed wing fuel leak.

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If EICAS Message AP AIL MISTRM is presented:

Autopilot.....DISENGAGE

Fly the airplane manually. Consider shutting the engine down at the same side of the presumed fuel leakage in order to maintain roll control.

Land at the nearest suitable airport.

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This Section contains amplified procedures for the following operations that supplement those procedures published in the AFM. In case of disagreement, the AFM shall prevail.

- Hot Weather.
- Ice Conditions, Cold Weather Operation, and Cold Soak.
- Lightning Strike.
- Pressurization in Manual Mode.
- Turbulent Air Penetration.
- Volcanic Ash.
- Windshear.

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HOT WEATHER

The following procedures will improve cockpit and cabin cooling during ground operations.

When engine is shut down, apply cool air from the air conditioning cart whenever possible.

RECIRC & GASPER Buttons..... PUSHED IN

CKPT/PAX CABIN Temperature
Controllers..... MAX COLD

At every 30 minutes during continuous ground operations and also prior to takeoff the airplane, set both controllers to AUTO FULL HOT for approximately 1 minute and then back to AUTO FULL COLD.

Doors and Windows..... KEEP CLOSED

Passenger Cabin Gasper and
Cockpit Outlets ..... OPEN

Window Shades on the
Sun-Exposed Side of the Cabin ..... CLOSED

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ICE CONDITIONS, COLD WEATHER OPERATION, AND COLD SOAK

GENERAL REMARKS WHEN FLYING IN ICING CONDITIONS

- Continuously monitor engine parameters, airplane pitch attitude and airspeed.
- Closely monitor the SAT indication and presence of moisture. If environmental ice conditions exist, even intermittently, check the windshield, windshield wiper, and wing surface for ice accumulation. To visualize ice formation, if necessary, use a flashlight on the windshield and the wing inspection light on the wing. If any ice formation is detected or suspected, select the ICE DETECTION OVERRIDE Knob to ALL. When flying in detected or suspected ice conditions, use ice speeds as a reference.
- Keep the airplane trimmed at all times. Be careful with any mistrimed condition that the autopilot may cover-up and. consider turning the autopilot off if you suspect you are flying in severe icing conditions.
- Monitor anti-icing systems for proper operation. Apply the associated AFM abnormal procedure in case of system failure. If the failure persists, exit and avoid icing conditions. Let the air traffic controller know you are requesting a change due to icing conditions and keep him informed about it.
- Strictly follow AFM Operation In Icing Condition normal procedures.
- Avoid landing in an airport where icing conditions exist or are anticipated if anti-icing system, brakes, thrust reverse, ground spoilers, nosewheel steering or flight controls have failed.
- Do not hesitate to leave icing conditions when icing cannot be handled, even with anti-icing system operating properly.

NOTE: Engine and Wing Ice Protection Systems operation is automatic and based on the primary ice detection system. However, the crew remains responsible for monitoring icing conditions and for manual activation of the ice protection system, if icing conditions are present and the ice detection system is not activating the ice protection system.

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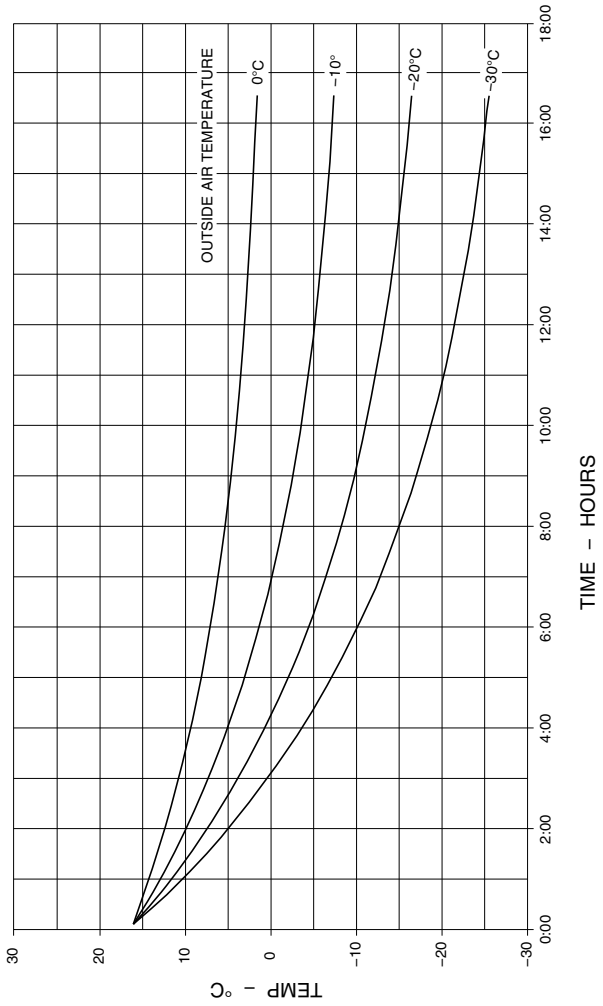
WATER AND WASTE SYSTEMS COOL–DOWN

TIME OF COOL– DOWN IN HOURS (VALID FOR GALLEY REGION)



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FREEZING RAIN AND FREEZING DRIZZLE

Atmospheric conditions involving freezing rain or freezing drizzle associated to supercooled large droplets (SLD), may present a condition that is beyond those for which the airplane was certified. Both freezing rain and freezing drizzle can exist down to ground level and cause ice to form quite rapidly on all surfaces even during short exposures and on areas not normally known to be subjected to ice accretion. This means that the airplane is not designed to fly under freezing rain/drizzle (SLD) conditions.

If the crew notices abnormal ice formation on areas not usually affected by this phenomenon, or ice formation on the previously treated upper surface of the wings, they must consider to be flying under severe icing conditions. In this case, the anti-ice system is failing to reduce or control ice formation. The crew must then exit freezing rain/drizzle conditions as soon as possible since continuous flight under such conditions is, indeed, quite hazardous.

FLAP OPERATION UNDER ICING CONDITIONS

Ice accretion on an airplane depends mainly on the cloud type encountered, the cloud liquid water content and droplet size, and weather conditions. Icing should be expected when flying in visible precipitation, such as rain or cloud droplets, with a temperature between +2°C and -10°C (between 35.6°F and 14°F).

Regardless of the airplane type, the wing, horizontal stabilizer, and engine inlets are typically critical airplane parts for ice accretion and are protected with anti-icing or de-icing systems. The wing flaps are not equipped with an anti-icing or de-icing system and, therefore, if they remain extended for a long period of time in icing conditions, ice may build up on the flaps leading edge. This ice may cause difficulties in retracting the flaps.

For a certain flight time in different weather conditions, the ice accretion intensity may vary, being either trace, light, moderate, or severe. Because of the varying conditions, it is not possible to state a reliable time figure that would cover all situations.

Therefore, as a general policy, the use of flaps in icing conditions should be avoided or minimized whenever possible.

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EXTERNAL SAFETY INSPECTION

Operating regulations clearly state that no takeoff is allowed when snow, ice, or frost is adhering to the airplane.

The responsibility for ensuring a clean airplane rests with the flight crew. The primary method for the flight crew to ensure a clean airplane is through close visual and physical inspection of the critical surfaces prior to takeoff. Visually check the wing, control surfaces, engines and fuselage prior to takeoff. In addition, as no frozen contamination is allowed on the wing upper surface, carry out a physical (hands-on) inspection to ensure that there is no ice accretion. Do not touch the surfaces with bare hands, as the skin may stick to a freezing surface.

When approaching the airplane, evaluate it from a reasonable distance, watch the area where the airplane is parked and evaluate if there is room for the taxi-out or push-back maneuver. Do a complete walk around.

Even at intermediate stops, an external walk around is necessary due to the possibility of ice forming after landing from either cold soaking frost, conventional frost or precipitation freezing on the airplane.

During the pre-flight walk-around, ensure that the pitot tubes, static ports, TAT probe, AOA vanes, all inlets, outlets and vents are clear of ice and unobstructed. Ice buildup or gel close to pitot and static ports may disturb airflow over the sensor, resulting in erroneous readings even when sensors themselves are clear.

A 3-mm (1/8 inch) frost layer is permitted on the underwing surfaces. Frost is not permitted on the lower surface of the horizontal stabilizer or the upper surface of the wing.

If the airplane has become cold soaked as a result of flight at very cold temperatures, fuel might be at a subfreezing temperature. This can cause ice accretion if the airplane is subjected to high humidity, fog, drizzle or rain even when the outside air temperature is substantially above freezing.

At the completion of the walk-around, if ice, snow or frost is discovered, de-icing, and possibly anti-icing will be required. The check for ice accumulation should be done in a well-lit area.

Wheel Chocks ..... CHECK IN PLACE

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All Protective Covers ..... REMOVE

Remove covers from engine air inlet/outlet, APU air outlet, pitot tubes, TAT probes and wheels.

Fuselage, Wing, Tail and Control Surfaces ..... FREE OF FROST, ICE OR SNOW

Check that the fuselage, wing upper and lower surfaces, tail and control surfaces are free of frost, ice or snow. Inspect control surfaces, gaps and hinges for signs of residual fluid or gel.

A thin layer of hoarfrost is permitted on the fuselage provided that the layer is thin enough to distinguish surface features underneath, such as painting and markings. Frost is not permitted on the lower surface of the horizontal stabilizer or the upper surface of the wing.

Pitot Tubes, TAT, Static Ports and AOA Vanes ..... CHECK

Check clear of ice and residual deicing and anti-icing fluids.

Engine/APU Air Inlet ..... CLEAR OF ICE OR SNOW

Check that the engine inlet and the APU air inlet are clear of ice or snow. Check that the engine fan is free to rotate. Fluid applied close to the inlet area may be ingested and cause a flameout and result in APU internal parts damage. Preferably, all soft snow should be mechanically removed by blowing cold air across the airplane surface, using brooms or soft hand scrappers.

Landing Gear ..... CLEAR OF ICE, UNOBSTRUCTED

Check that doors, gear locks and mechanisms are unobstructed and clear of ice and snow. Check that no leakage exists.

Air Conditioning Inlets and Outlets ..... CLEAR OF ICE

Fuel Tank Vents ..... CLEAR OF ICE OR SNOW

Batteries ..... CHECK INSTALLED

Certain temperatures require batteries removal to prevent cold soaking. Verify that batteries have been re-installed.

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Tires Pressure.....CHECK

Before the flight, the temperatures from the departure and the destination airports must be checked. For detailed information regarding tire pressure when there is a large temperature decrease between the departure and destination airport, check Section 1-12-40.

INTERNAL SAFETY INSPECTION

Batteries Voltage.....CHECK

Check battery voltage on the MFD.

If battery voltage is below 24 V and battery temperature is colder than -15°C (5°F), replace the battery, as it may not recharge under very low temperatures.

APU.....START

Observe fuel and oil limitations before APU starting. Minimum fuel temperature is -40°C (-40°F). Minimum MIL-L-23699 oil temperature is -43°C (-45°F). Minimum MIL-L-7808 oil temperature is -54°C (-65°F).

Minimum battery temperature to start the APU is -20°C (-4°F). Minimum temperature to start APU using external electrical power is -54°C (-65°F).

If APU cannot be started, apply heat from a ground cart directly into the APU compartment. Do not allow the hot air from the ground heating cart to exceed 100°C (212°F), as it may damage the components inside the compartment.

Observe RPM and EGT during starting. If the APU flames out, make sure that ice or snow deposits are cleared before attempting a second start.

After the APU has been started, RPM and EGT fluctuation may be an indication of fluid ingestion into the APU. Record any discrepancy in the logbook.

Crew awareness is required to monitor electrical load and not exceed the APU generator limits. Normally with the APU generator supplying the airplane, only windshield heating 1 is available. Once the shed buses are overridden, heating will be available for windshield 2. Crew awareness is required to monitor electrical load so as not to exceed APU generator limits.

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AIR CONDITIONING/PNEUMATIC Panel..... SET

Bleed Air from the APU:

RECIRC & GASPER Buttons..... PUSHED IN
PACK 1 & 2 Buttons..... PUSH IN
ENG XBLEED Knob..... OPEN
ENG BLEED 1 & 2 Buttons..... PUSHED OUT
APU BLEED Button..... PUSH IN

Bleed Air from the Ground Conditioned Air Car:

RECIRC & GASPER Buttons..... PUSHED IN
PACK 1 & 2 Buttons..... PUSHED OUT
ENG XBLEED Knob..... AUTO
ENG BLEED 1 & 2 Buttons..... PUSHED OUT
APU BLEED Button..... PUSHED OUT

The warm-up should be accomplished with all doors closed, if possible.

In very cold days, Embraer recommends a gradual warming of the cabin, as follows:

– Set air conditioning control to manual mode.
– Put the cockpit temperature selection knob in the 9 o'clock position.
– Wait approximately 3 minutes.
– Change control to automatic mode.
– Wait other 2 minutes before controlling the temperature as required.

CAUTION: • MANTAIN CABIN AT THE FIELD ELEVATION. DO NOT PRESSURIZE THE AIRPLANE.

• WITH PACKS OPERATING AND DOORS CLOSED, DO NOT LEAVE THE AIRPLANE UNATTENDED.

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NOTE: - To warm up the cabin temperature using both packs, it may take 10 minutes to raise the temperature from 0°C to 21°C (32°F to 70°F). Furniture and seat inside the cabin might follow that rate with just 5 minutes delay, so you can count with a proper boarding condition within 15 minutes after warm-up has started. Using only one pack, it will double warm-up time.

- Cockpit and cabin temperature indication may show some difference due to temperature sensor positioning. Use the cockpit indication as the primary temperature reference for warming up.

Main Panel ..... CHECK

Check proper operation of all instruments and systems. Liquid Crystal Display may not be readable at temperatures below -20°C (-4°F).

ELEC HYD PUMP 1 & 2 Knobs ..... ON

Check hydraulic pressure. If pressure does not rise to normal values, warm up the hydraulic reservoir compartment with hot air and keep the electric hydraulic pumps running for 15 minutes.

Do not allow the hot air from the ground cart to exceed 100°C (212°F), as it may damage the components inside the compartment.

Flight Controls ..... CHECK

Check control wheel, control column and rudder pedals for freedom of movement and full travel. Control forces can be increased at low temperatures.

Operate all trim systems, including back-up pitch trim system, checking for freedom of movement and full travel. If any flight control is suspected of restricted movement or jamming, report to the maintenance personnel.

Flaps ..... CHECK

Extend and retract the flaps. Make sure the flaps are free from snow or ice before moving them. Leave flaps at 0° position if application of anti-icing/deicing fluids is expected.

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BEFORE ENGINE START

ICE PROTECTION B – FIRST PHASE

NOTE: - The ice protection test must be carried out once a day (not necessarily at the first flight of the day) when icing conditions are forecasted.

- The test may be carried out completely on the ground (TEST A), or in 2 separate phases (TEST B – First Phase on the ground and Second Phase in flight), depending on the weather conditions, crew discretion or airport regulations.

- For takeoffs when icing conditions exist or are anticipated for takeoff or climb, the tests in paragraph "TEST A" must be performed.

On the ground, if engine vibration increases, advance THRUST Levers, one at a time, to obtain at least 60% N1 for 5 seconds and then return to the former setting.

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TEST B – FIRST PHASE – BEFORE ENGINES START

For flight when no actual icing conditions exist or are anticipated for takeoff and climb, proceed:

Before engines start, perform the on-ground test:

ICE PROTECTION Panel ..... SET
- ENG AIR INLET 1 & 2 Buttons ..... PUSHED IN
- WING Button ..... PUSHED IN
- STAB Button ..... PUSHED IN

ICE DETECTION OVERRIDE Knob ..... AUTO

AIR CONDITIONING/PNEUMATIC Panel .... SET
- PACK 1 & 2 Buttons ..... PUSHED IN
- APU BLEED Button ..... PUSH OUT
- ENG BLEED 1 & 2 Buttons ..... PUSHED OUT

ICE DETECTION TEST Controller ..... 1 THEN 2

Test knob must be held at least 10 seconds in each test position.

For each side separately, check the following EICAS messages:

– CAUTION – ICE DET 1 (or 2) FAIL and BLD 1 (or 2) LOW TEMP.
– ADVISORY – ICE CONDITION.
– The CROSS BLD OPEN advisory message and/or the PACK 1 (2) VLV FAIL caution message may also be displayed.

NOTE: - When the Ice Detection Test Knob is selected to 1, the CLR ICE 1, CLR ICE 2, CLR/I INOP1, and CLR/I INOP2 caution messages are displayed on the EICAS and lights CLR ICE 1 and CLR ICE 2 illuminate.

- When the Ice Detection Override Knob is selected to 2, none of those caution messages are displayed on the EICAS.

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ENGINE START

Minimum fuel temperature is -40°C (-40°F), which is a value that represents the fuel freezing point. This limitation stands for the fuel temperature conditions that could result in the precipitation of waxy products in the fuel, which could risk fuel lines and filter becoming blocked.

SPS/ICE SPEEDS message will remain displayed after icing encounter. Before takeoff the message must be removed by testing the Stall Protection System.

Do not start the engine until it has been checked that all ice deposits have been removed from the air inlet.

Fuel and oil temperature limits are the same as those prescribed for APU start.

Proceed with normal engine start.

In cold weather conditions, the usage of dual ignition (ignition switch rotated to the ON position) is highly recommended for the first engine start of the day or if the engine has not been run in the previous 90 minutes. This procedure may reduce the time from fuel introduction to light-up.

As a reference, this procedure can be used for temperatures below 5°C (41°F), or at operator's discretion.

After a successful start, the Ignition Switch must be switched to the AUTO position.

If the engine does not start, ground heating may be necessary to warm the nacelle, Air Turbine Starter (ATS) and Starting Control Valve (SCV).

Do not allow the hot air from the ground cart to exceed 100°C (212°F), as it may damage the components inside the nacelle.

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AFTER START

ICE DETECTION OVERRIDE Knob.....ENG

The ICE DETECTION OVERRIDE Knob must be at ENG during all ground operations (in icing conditions), except during ice protection system test. Wing and stabilizer anti-icing must be kept off.

ENG XBLEED Knob.....AUTO

CAUTION: • BOTH ENGINE BLEEDS MUST BE OPEN, IN ORDER TO ASSURE BLEED AIR FLOW THROUGH THE LEADING EDGES. APU BLEED MUST NOT BE USED.

• DELAYING THE USE OF THE ENGINE ANTI-ICING SYSTEM UNTIL ICE BUILD-UP IS VISIBLE FROM THE COCKPIT MAY RESULT IN ICE INGESTION AND POSSIBLE ENGINE DAMAGE OR FLAME-OUT.

Engine Instruments.....MONITOR

Continue to monitor engine instruments, mainly oil pressure and temperature. Apply associated abnormal procedure if any failure arises.

NOTE: - After start and prior to takeoff, the engines must run at idle or taxi thrust for at least 4 minutes for cold engines or 2 minutes for warm engines. An engine is considered cold if it has been shut down for more than 90 minutes.

- To increase N2 above 83%, the engine oil temperature must be at 40°C (104°F) minimum.

- One engine taxi is authorized when OAT is 4°C (39°F) or higher and falling precipitation is not present.

- When thrust is set to N2 below 83%, the ENG 1-2 A/ICE FAIL message may appear due to the low pressure available for anti-icing. Moving THRUST Levers forward will cause the message to disappear.

Main Panel.....CHECK

Check proper operation of all instruments and systems.

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AIRPLANE ANTI-ICING/DEICING FLUID APPLICATION WITH ENGINES/APU RUNNING

WARNING: APU OPERATION IS NOT RECOMMENDED DURING THE AIRPLANE DEICING/ANTI-ICING PROCEDURE. IF THE APU IS KEPT IN OPERATION DURING THE DEICING/ANTI-ICING PROCEDURE, DAMAGE CAN OCCUR TO IT. IF APU OPERATION IS ABSOLUTELY NECESSARY, MAKE SURE THAT THE APU BLEED AIR VALVE IS CLOSED, PACKS ARE SET TO OFF, AND THE DEICING/ANTI-ICING FLUID IS NOT APPLIED DIRECTLY TO OR NEAR THE APU AIR INLET.

EMERG/PARK BRAKE Handle ..... APPLY

THRUST Levers ..... IDLE

GUST LOCK Lever ..... LOCK

Doors ..... CLSD

FLAP Lever ..... CHECK 0°

PITCH TRIM ..... AS REQUIRED

Field survey and tests revealed that the best position to prevent or avoid fluid ingestion is FULL NOSE DOWN. The spray flow normally cascades downwards and aft, thus keeping the leading edge free of the drip that causes fluid ingestion into the APU.

However, operators are reminded to frequently inspect surfaces for residue, as prescribed in the SNL 145LEG-30-0003. This is applicable mainly for fluid Types II, III and IV, which may leave residue on the aerodynamic quiet areas.

ICE DETECTION OVERRIDE Knob..... ENG

PACK 1 & 2 Buttons ..... PUSH OUT

ENG BLEED 1 & 2 Buttons ..... PUSH OUT

APU BLEED Button ..... PUSH OUT

Packs should be off to avoid contamination of cabin air with fumes generated from ingestion of fluids in engine/APU.

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After Deicing/Anti-icing Procedure is complete:

ENG BLEED 1 & 2 Buttons..... PUSH IN AFTER 1 MIN

PACK 1 & 2 Buttons..... PUSH IN AFTER NEXT 3 MIN

APU BLEED Buttons..... PUSH OUT DURING T/O AND INITIAL CLIMB

Wait at least 1 minute to open engine bleed and 3 minutes to turn air conditioning packs on, thereby avoiding contaminating the airframe air conditioning system with deicing/anti-icing fluid gases.

The deicing/anti-icing fluid shall drop out after initial climb then allowing the APU bleed valve opening.

ICE DETECTION OVERRIDE Knob..... ENG

The Ice Detection Override Knob must be at ENG during all ground operations in icing conditions.

PITCH TRIM..... SET

PITCH TRIM must be set as per CG position stated in the Weight and Balance sheet.

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TAXI

The maximum recommended wind speeds for airplane towing, pivoting, turning and taxi are:

Dry Runways ..... 50 kt

Wet Runways..... 45 kt

Snow-Covered Runways ..... 30 kt

Ice-Covered Runways ..... 10 kt

One engine taxi is authorized when OAT is 4°C (39°F) or higher and falling precipitation is not present.

During taxi, "cold set" (the condition in which the tire retains the flat shape it had while parked) may induce vibration in the airplane. Vibration should disappear as the tires recover their elasticity during taxi. Do not initiate your takeoff run before the cold set disappears.

Use minimum thrust to avoid blowing snow or slush on personnel or airplanes nearby.

Maintain a distance greater than normal from other airplanes while taxiing in snow-covered runways, to avoid contamination by snow blown by jet blasts.

Do not apply reverse thrust during taxi, unless it is strictly necessary.

Power back is not allowed.

CAUTION: TAXI AT REDUCED SPEED IN ICE-COVERED RUNWAYS TO AVOID SKIDDING THE AIRPLANE. REDUCE SPEED FOR ALL TURNS AND USE CAUTION WHEN TAXING WITH HIGH CROSSWINDS.

FLAP Lever ..... CHECK 0°

When taxiing through slush or standing water, flaps should be retracted to avoid snow and slush contamination to the main gear wheels.

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BEFORE TAKEOFF

ICE PROTECTION TEST A

NOTE: - The ice protection test must be carried out once a day (not necessarily at the first flight of the day) when icing conditions are forecasted.

- The test may be carried out completely on the ground (TEST A), or in 2 separate phases (TEST B – First Phase – Before Engine Start on the ground and Second Phase After Takeoff in flight), depending on the weather conditions, crew discretion or airport regulations.
- For takeoffs when icing conditions exist or are anticipated for takeoff or climb, the "TEST A" must be performed.

On the ground, if engine vibration increases, advance THRUST Levers, one at a time, to obtain at least 60% N1 for 5 seconds and then return to the former setting.

When actual icing conditions exist or are anticipated for takeoff and climb, proceed:

ICE PROTECTION Panel ..... SET
ENG AIR INLET 1 & 2 Buttons ..... PUSHED IN
WING Button ..... PUSHED IN
STAB Button ..... PUSHED IN
ICE DETECTION OVERRIDE Knob ..... ALL
THRUST Levers 83% N2
ICE DETECTION TEST Controller ..... 1 THEN 2

Test knob must be held at least 10 seconds in each test position but no more than 15 seconds.

For each side separately, check that OPEN inscriptions in the buttons are illuminated and the following EICAS messages:

– CAUTION – ICE DET 1 (or 2) FAIL and BLD 1 (or 2) LOW TEMP.
– ADVISORY – ICE CONDITION.
– The CROSS BLD OPEN advisory message may also be displayed.

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NOTE: - When the ICE DETECTION TEST Controller is selected to 1, the CLR ICE 1, CLR ICE 2, CLR/I INOP1, and CLR/I INOP2 caution messages are displayed on the EICAS and lights CLR ICE 1 and CLR ICE 2 illuminate; When the ICE DETECTION TEST Controller is selected to 2, none of those caution messages are displayed on the EICAS.

- Wait for the messages go out of view after each release of the Test knob.

THRUST Levers ..... IDLE

ICE DETECTION OVERRIDE Knob ..... ENG

CAUTION: ICE DETECTION OVERRIDE KNOB MUST NOT BE SET TO "ALL" ON GROUND, EXCEPT DURING TEST.

IGNITION 1 & 2 Knobs ..... ON

Turn IGNITION 1 & 2 Knobs to ON when standing water, ice, or snow is present on the takeoff runway.

Takeoff Briefing..... COMPLETE

Confirm $V_1/V_R/V_2$ and V_{FS} speeds for the associated runway or takeoff condition.

Flight Controls..... CHECK

Check freedom of movement and full travel of all flight controls (including trims).

FLAP Lever..... SET 9°

Set flaps to takeoff position.

Ice Accumulation ..... CHECK

Continuously monitor ice accumulation by checking windshield and windshield wiper (if installed). High winds and jet blast may cause anti-icing fluid to flow off and many other factors contribute to reduce fluid effectiveness.

TO CONFIG Button ..... CHECK

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TAKEOFF

Takeoff normally. Check Engine Thrust Rating mode for the associated runway on the EICAS Display.

Do not apply static takeoff technique on an icy or slippery runway, as the airplane may begin to slide when THRUST Levers are advanced with brakes applied. In this case, release brakes and advance THRUST Levers simultaneously.

However, takeoff distance for slippery runways is calculated in the AFM using the static takeoff technique only. For rolling takeoffs, performance data is valid from the point where takeoff thrust is achieved.

Check N1 indication consistent with takeoff thrust setting tables (check AFM performance tables which have dedicated thrust setting tables for takeoff in icing conditions). Check N1 pointer reaching N1 target.

Apply light forward pressure on control column to increase nose wheel steering effectiveness.

Check engine stable operation during takeoff run. Rotate the airplane at V_R smoothly to takeoff attitude. After lift-off, smooth flight control inputs should be applied if any tendency in pitch and roll are felt. Use of flight director takeoff sub-mode is recommended (on those certifications which allow the use of flight director during takeoff).

Flight controls forces may be heavier than normal, without causing any difficult in controllability.

Increased V_2 procedures (if available in the approved AFM) may be used if runway length is not a limiting factor.

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AFTER TAKEOFF

ICE PROTECTION TEST B – SECOND PHASE – DURING CLIMB

NOTE: Only if the "TEST B" First Phase was performed on ground.

During climb, perform the in-flight test:

ENG BLEED 1 & 2 Buttons ..... PUSHED IN

THRUST Levers ..... THRUST SET

Altitude..... FROM 2000 ft TO FL 230

TAT ..... LESS THAN 10°C (50°F)

ICE DETECTION OVERRIDE Knob ..... ALL

Check that OPEN inscriptions in the buttons are illuminated and NO ICE-A/ICE ON caution message is displayed on EICAS.

The CROSS BLD OPEN advisory message may be also displayed.

ICE DETECTION OVERRIDE Knob ..... AUTO (AFTER 20 SECONDS)

NOTE: - The ice protection test must be fully accomplished before entering icing conditions and before reaching 23000 ft.

- Do not reset/alternate the FADEC after the Anti-Icing System test.

Ice Protection TEST B (if applicable)..... COMPLETE

IGNITION 1 & 2 Knobs ..... AS REQUIRED

ICE DETECTION OVERRIDE Knob..... AUTO

Monitor weather conditions for an encounter with ice for the remainder of the flight. Closely monitor the static air temperature indication so that, when moisture is present, a look at the windshield and windshield wiper (if applicable) will indicate if ice is accumulating. Notwithstanding, installation of the ice detector, the crew remains responsible for monitoring icing conditions and for manual activation of the ice protection system whenever necessary.

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CLIMB/CRUISE

If engine vibration increases, advance THRUST Levers, one at a time, to obtain 60% N1 minimum for 5 seconds, and then return to the former setting.

If ITT increases beyond limits, reduce THRUST Levers as required to maintain ITT within limits.

When flying in icing conditions or after flying in icing conditions, ice accretion on unprotected areas may cause vibration at high speeds. If vibration and/or buffeting occurs, a change in the current airspeed will eliminate these effects. At high speeds reduce the airspeed as required, limited to a minimum of 200 KIAS. Observe normal (including operation in icing conditions) procedures contained in the approved AFM.

No special technique is required to fly with the autopilot ON or OFF. Climb using FLC mode provides enough speed margin to stall. SPD and VS modes may also be used, provided that the airspeed is not allowed to decrease below 200 KIAS (when flying IAS) or 0.56 M (when flying Mach). During autopilot operation, monitor pitch attitude and speed continuously.

If BLD 1 (2) LOW TEMP message appears, advance the respective THRUST Lever until the message disappears and check bleed temperature pointer (MFD ECS and Pneumatic page) in the green range.

During cruise, observe minimum fuel tank temperature (-40°C (-40°F)). If fuel temperature is reaching the limit, apply the FUEL LOW TEMPERATURE procedure in the AFM.

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HOLDING

Landing Gear Lever ..... UP

FLAP Lever ..... 0°

Minimum Airspeed ..... 200 KIAS

CAUTION: MAINTAIN A MINIMUM AIRSPEED OF 200 KIAS SINCE EVEN SMALL ACCUMULATIONS OF ICE ON THE WING LEADING EDGE MAY CHANGE THE STALL CHARACTERISTICS OR THE STALL PROTECTION SYSTEM WARNING MARGIN.

NOTE: It is recommended to closely monitor the SAT indication and presence of moisture. If environmental ice conditions exist, even intermittently, check the windshield, windshield wiper (if applicable), and wing surface for ice accumulation. To visualize ice formation, if necessary, use a flashlight on the windshield and the wing inspection light on the wing. If any ice formation is detected or suspected, select the ICE DETECTION OVERRIDE Knob to ALL. When flying in detected or suspected ice conditions, use ice speeds as reference.

DESCENT

Observe normal (including operation in icing conditions) procedures contained in the approved AFM.

When using the autopilot, monitor pitch attitude and speed continuously.

If approaching the terminal area in icing conditions, an increased rate of descent may be necessary. In this case, a combination of flaps set at 9° and speed brakes open may be used.

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APPROACH AND LANDING

Observe normal approach/landing procedures (including operation in icing conditions) contained in the approved AFM.

When landing below -40°C (-40°F), ensure that the rate of descent before touchdown is less than 300 ft/min. After landing, report to the maintenance personnel.

NOTE: During approach and landing with engines and anti-icing system ON, the FADEC logic automatically reduces the Flight Idle thrust when landing gear is lowered. On airplanes equipped with an EICAS version earlier than the 16.5, the WG 1 (2) A/ICE FAIL, WG A/ICE ASYMMETRY and/or STAB A/ICE FAIL messages may be presented due to low bleed pressure available. If these messages appear, the OPEN inscription on the buttons may still be illuminated. To avoid that these messages appear, it is recommended to maintain a minimum of 55% N1 during descent and landing phases when landing gear is down. Reducing N1 to below 55% is recommended only when needed for landing.

LANDING ON WET OR SLIPPERY RUNWAYS

Wet runways can cause airplane hydroplaning, the technical term used to express slipperiness. The factors that influence the occurrence of this phenomenon are high speed, standing water and poor runway macrotexture. When hydroplaning occurs, it causes a substantial loss of tire friction and wheel spin-up may not occur.

Icy runways can be very slippery at all speeds depending on temperature.

Stopping the airplane with the least landing run must be emphasized when landing on wet or slippery runways.

- Anticipate the approach procedures and speeds: a well-planned and executed approach, flare and touchdown minimize the landing distance.
- Immediately after touchdown, check the ground spoiler automatic deployment when THRUST Levers are reduced to IDLE.

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– Lower nose wheel immediately to the runway. It will decrease lift and will increase main gear loading.
– Apply thrust reversers judiciously to observe how the airplane responds before full reverse is used. Normal procedure is to move the THRUST Levers out of reverse when ground speed is reduced to 50 kt. In a emergency, reverse thrust may be used to bring the airplane to a full stop.
– Do not use asymmetric reverse thrust on slippery and icy runways.
– Apply brakes with moderate-to-firm pressure, smoothly and symmetrically, and let the anti-skid do its job.
– If no breaking action is felt, hydroplanning is probably occurring. Do not apply Emergency/Parking Brake, as it will cut anti-skid protection and may cause the spoilers to close. Maintain runway centerline and keep braking until airplane is decelerated.

TAXI-IN AND PARKING

ICE DETECTION OVERRIDE Knob..... ENG

FLAP Lever..... 0º

NOTE: Make sure the that flaps are free from snow, ice or slush before moving them to the zero-degree position.

Flight Controls..... NOSE UP

Set PITCH TRIM to at least 4° nose UP after landing in icing conditions to prevent melting snow from accumulating and freezing between control surfaces.

CAUTION: TAXI AT REDUCED SPEED IN ICE-COVERED RUNWAYS TO AVOID SKIDDING THE AIRPLANE.

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THROUGH-FLIGHTS

Doors and Windows ..... CLOSE

Whenever possible, to maintain the cabin warm, keep the passenger, baggage and service doors closed at intermediate stops.

APU ..... ON

APU should be ON to provide bleed air to maintain cabin warm.

PACK 1 & 2 Buttons ..... PUSHED IN

RECIRC & GASPER Buttons ..... PUSHED IN

Walk around the airplane and check the following items:

Fuselage, Wing, Tail and Control Surfaces ..... FREE OF FROST, ICE OR SNOW

Pitot Tubes, TAT, Static Ports and AOA Vanes ..... CLEAR OF ICE

Engine/APU Air Inlet ..... CLEAR OF ICE OR SNOW

Landing Gear ..... CLEAR OF ICE, UNOBSTRUCTED

Air Conditioning Inlets and Outlets ..... CLEAR OF ICE

Fuel Tank Vents ..... CLEAR OF ICE OR SNOW

Ask for deice/anti-icing fluid application, if necessary.

LEAVING THE AIRPLANE – SECURING FOR COLD SOAK OR AN EXTENDED PERIOD

Check in the chart (on this Section) how cabin internal temperature can go down if the airplane is left soaking in the weather outside. It can take just 3 hours for the temperature adjacent to water lines to go close to freezing point when the OAT is -30°C (-22°F). In most cases, it is more economical and time-saving to use a hangar than leaving the airplane outside in the harsh weather.

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The procedures below should be performed in the event of extended airplane exposure at low temperatures. In the event that the airplane is off the maintenance base, the crew should ensure that all actions have been accomplished.

Wheel Chocks..... CHECK IN PLACE

EMERG/PARK BRAKE Handle ..... AS REQUIRED

For an icy ramp, leave EMERG/PARK BRAKE Handle applied. Otherwise, EMERG/PARK BRAKE Handle must not be applied to avoid freezing of the brakes.

GUST LOCK Lever ..... LOCK

Protective Covers ..... INSTALL

Install protective covers at engines and APU inlets/outlets, pitot, TAT probes, and wheels.

Water and Waste System ..... DRAIN

It is recommended that the Water System be drained if the airplane is expected to stay overnight in an environment below the freezing point of water. Refer to Section 2-02-40.

Fuel System ..... DRAIN

Drain water from all fuel tanks, if cold soak temperature is expected to be below 0°C (32°F).

Batteries..... REMOVE

As the batteries may not fully recharge under very low temperatures, batteries should be removed whenever the temperature forecast during the overnight is below -15°C (5°F).

Doors and Windows..... CLOSE

All doors and windows must be closed to prevent snow and humidity from entering into the airplane.

PITCH TRIM Setting ..... FULL NOSE DOWN

For overnight with high precipitation, it is recommended that stabilizer be left at the full nose down position.

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LIGHTNING STRIKE

Even though the airplane is adequately protected against lightning strikes effects, operating procedures should be established in an attempt to avoid such phenomenon.

Avoid penetration of thunderstorms. In-flight lightning avoidance is closely associated with thunderstorm avoidance. Maintain visual contact with thunderstorms during the daytime and lightning at night.

Check the radar for precipitation, review all available types of weather information, examine other pilot reports and follow ATC instructions. Even with a good weather report received and understood, pay close attention to those storms that develop rapidly along the route in a given area and that cannot be predicted. While enroute, constantly update the previous weather briefing through radio contact and airborne equipment for actual storm avoidance.

Remember that radar detects only liquid droplets, not the cloud itself. Only rain suspended in the cloud will produce a radar echo, which may lead to occasional encounters with hail and lightning.

Circumnavigate the detected thundercloud or area, if possible by more than 25 miles when traffic conditions permit. Flying over the top of the thunderclouds is preferable.

Be aware that lightning can strike an airplane miles away from the extreme side of a developed thunderstorm. Reports of airplane receiving strikes in clear air at 25 or more miles from the nearest storm are common.

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The following paragraphs summarize the conditions in which strikes are most common:

- Meteorological conditions: incident reports show that an airplane must be within or beneath a cloud to receive a strike, or in or near regions of precipitation. Incident reports show that in over 80% of the strikes, the airplane was within a cloud and experiencing some precipitation and turbulence. But other strikes may occur in a cloud where there is no precipitation nearby, in clear air reasonably distant from a thundercloud, during snowstorms and in clouds over erupting volcanoes. Flight through or in the vicinity of cold front, warm front, stationary front, unstable air or squall line are indicators of imminent lightning strikes. Incident reports also show that lightning strikes occur most commonly under light or heavy turbulence conditions.
- Flight regime: Takeoff, climb, level flight, descent or approach.
- Altitude: strikes are more intercepted between 5000 ft and 15000 ft, but may occur at virtually all flight altitudes. Lightning strike incidents at lower altitudes are far more frequent since at higher altitudes airplanes can divert around thunderclouds with greater ease.
- Outside air temperature: most strike incidents have occurred when the airplane is flying in temperatures near or at freezing level. Strikes may also occur at temperatures as high as 25°C (77°F), or as low as -45°C (-49°F).

Metal airplanes produce a phenomenon called Faraday Cage effect, which distributes electrical charges along the airframe in such a manner that occupants and internal components will not receive the high current that causes injury and damage. There seems to be no record of any case of crew incapacitation due to lightning, although flash blindness can occur for a few seconds.

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Direct effects which result from lightning current attachment to and flow through the airplane may be:

- Pit marks are often seen along the fuselage or holes in the trailing edge of wing and tail tips.
- Melting of rivets.
- Puncturing of nonmetallic structures.
- Puncturing and de-lamination of composites.
- Slight deformation of metal skins and structure.
- Welding or roughening of moveable hinges and bearings.
- Damage to other parts that may conduct lightning current other than the airframe, such as bonding or diverted straps and pitot tubes.

Effects caused by the flash-induced electromagnetic field and the increase of the voltage due to the current at the airplane structure are defined as indirect effects and may be:

- Interruption of instruments and navigation equipment.
- Damage to electronic and electrical equipment.
- Popping of circuit breakers.
- Loss of electrical power.
- Engine flame-out.

In case of lightning strike, report the incident to the maintenance personnel, by filling out the LIGHTNING STRIKE REPORT (Abnormal Procedures – Section 1-03-30 – Doors and Miscellaneous).

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LIGHTNING STRIKE – IN FLIGHT OPERATIONS

IF LIGHTNING STRIKE IS SUSPECTED TO OCCUR

An imminent lightning strike event may be indicated to flight crews by the buildup of static discharge which causes interference on ADF indicators or noise in communication receivers. Another indication is St. Elmo's Fire, which is visible at night as small electrical discharges running across the windshields and sparking on the wings.

All Cockpit Lights ..... ON/FULL BRIGHTNESS

Penetration of Thunderstorm ..... AVOID

Visual Contact with Thunderstorm and Lightning .... MAINTAIN

Weather RADAR ..... CHECK FOR PRECIPITATION

Remember that radar detects only liquid droplets, not the cloud itself.

Thundercloud Detected ..... CIRCUMNAVIGATE

Circumnavigate the detected thundercloud or area by 25 miles or more when traffic conditions permit.

All Cockpit Lights ..... ON/FULL BRIGHTNESS

Sunglasses ..... CONSIDER WEAR

Consider wearing sunglasses to protect your eyes from the flash or have one pilot keep eyes downward.

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IF THE AIRPLANE HAS BEEN HIT BY LIGHTNING

If situation is under control after a lightning strike, apply the following procedure to ascertain whether the flight may be proceed.

Altitude ..... MAINTAIN

Never climb the airplane after a lightning strike, unless required by performance (climb or obstacle clearance) or operation contingencies. If any structural damage is suspected, apply EMERGENCY DESCENT procedure.

Circuit Breakers ..... CHECK

Compass/Heading System ..... CHECK

Check magnetic compass and heading system for normal indication.

Engine Indication ..... CHECK

Check engine for normal indication and apply associated procedure if any failure arises after strike attachment.

In case of engine shutdown, the flight crew shall analyze the circumstances of the event and consider an engine airstart.

Pressurization ..... CHECK

Check pressurization system for normal indication.

Flight Controls ..... CHECK

Check all flight controls for freedom of movement. Verify that flaps and speed brakes are working properly (refer to flaps and speed brakes operating limits).

Fuel System ..... CHECK

Check fuel system for normal operation. Monitor fuel remaining and fuel consumption to ascertain that no fuel leak exists.

All Other Airplane Systems ..... CHECK

Check all airplane instruments following a panel scan sequence to ascertain that flight safety prevails.

The display colors may be changed. However, the display information remains valid.

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Communication Systems ..... CHECK

Apply the associated emergency/abnormal procedure if any failure arises after a lightning strike. Consider discontinuing the flight and land at the nearest suitable airport if any unsafe condition is revealed after checking system operation and general airplane condition.

AFTER LANDING

Lightning Strike Event ..... REPORT TO MAINTENANCE

Report the lightning strike to the maintenance personnel, by filling out the LIGHTNING STRIKE INCIDENT REPORT form.

LIGHTNING STRIKE – ON GROUND OPERATIONS

ON THE GROUND

Approaching and landing an airplane during a thunderstorm is strongly not recommended. The human body may provide the grounding that is otherwise lacking. If you are in the cockpit, do not attempt to communicate with ground through a wire handset, and stay inside the airplane until the storm has passed.

IF THE AIRPLANE HAS BEEN HIT BY LIGHTNING

EXTERNAL SAFETY INSPECTION

Check for holes, punctures, discoloration and de-lamination throughout the whole airframe.

Verify for loose, melted or missing rivets.

Check that all static dischargers are in place or in accordance with the CDL.

Verify the integrity of the lights installed on tail, wing, fuselage and landing gear.

Verify all antennas, ice detectors, pitot tubes, angle-of-attack vanes, TAT probes, static ports and lights for conditions.

Report to the maintenance personnel any detected damage or failure. Perform Section 05-50-01 (AMM) for detailed procedures to carry out a general inspection after a lightning strikes the airplane. Make sure that these procedures are carried out before flying the airplane again.

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PRESSURIZATION IN MANUAL MODE

This section contains additional information to assist pressurization operation in manual mode. If necessary, consult Section 2-14-15 – Pressurization System. Procedures are intended to supplement the procedures published in the QRH.

Procedures herein are valid for dispatch with the pressurization system automatic mode inoperative (MEL item 21-30-00) or in case of loss of automatic mode in flight. For rapid loss of pressurization, refer to the RAPID CABIN DEPRESSURIZATION procedure in the QRH.

GENERAL

It has been observed that cabin altitude indication may vary under manual mode operation. Therefore, it is recommended to wait until cabin altitude indication stabilizes, when the manual controller should be operated as required to control cabin altitude.

In manual mode, crew selection of the cabin rate and proper monitoring of cabin differential pressure is required to maintain appropriate cabin pressurization. With relation to the 12 o'clock position, clockwise rotation of the controller will induce a positive cabin rate of climb, and a counter-clockwise rotation will induce a negative cabin rate of climb.

The manual controller gain is very sensitive and the response time to the command may take few seconds. Avoid fast and large displacement of the controller.

After making cabin rate changes, wait a few seconds for the system to stabilize and then verify if the result is the desired one.

If necessary repeat the procedure until the desired result is achieved.

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RECEIVING/BEFORE DOOR CLOSING

Pressurization Manual Controller ..... FULL UP

Pressurization Mode Selector Button ..... MANUAL

Check that MAN inscription illuminates inside the button.

Pack ..... ONLY ONE PACK ON

This setting allows one outflow valve to be fully open and reduces cabin airflow, thus avoiding uncomfortable pressure changes when the doors are closed or during engine starts.

TAXI OUT/BEFORE TAKEOFF

Pressurization Manual Controller ..... FULL UP

This setting will make the cabin altitude remain stable during taxi, independent of any variation in bleed.

Just before take-off:

Manual Controller ..... 11 O'CLOCK POSITION

This position will guarantee an acceptable pressurization during climb out.

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AFTER TAKEOFF/CLIMB

Just after the initial climb:

Pressurization Manual Controller ..... BETWEEN 11 AND 12 O'CLOCK

Keeping the manual controller within the white mark allows a null or slightly positive rate for the cabin altitude.

Passing 10000 ft pressure altitude:

Manual Controller ..... TURN CLOCKWISE

Identify the resulting cabin rate. Usually a 400 to 500 ft/min will be sufficient for this situation.

Above 10000 ft:

QRH Table ..... CHECK

Search for the LOSS OF PRESSURIZATION INDICATION procedure in the QRH and use the table contained therein. Maintain the cabin altitude consistent with the airplane altitude specified on the table by close monitoring differential pressure and intermittent setting of the manual controller.

CRUISE

Once cruise level is established, or a step in the climb is desired:

QRH Table ..... CHECK

Manual Controller ..... NULL RATE

Allow the cabin to climb (or descend) to the value specified on the QRH table, then set null rate. Cabin altitude and ΔP must be consistent with the table. Keeping the manual controller close to the 12 o'clock position to keep a null rate is a good position for the rest of the cruise. However, minor adjustments might be required.

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DESCENT

Just after initiating descent:

Manual Controller ..... SLOWLY TURN COUNTER CLOCKWISE

Initially, set -400 ft/min rate, which corresponds to a position between 12 and 11 o'clock in the manual controller.

During descent:

Set a cabin rate that will meet the required landing altitude upon landing. Allow the cabin to descend slowly towards the desired landing altitude so that upon landing ΔP reads zero.

During holding at any flight altitude:

Manual Controller ..... SET AROUND 12 O'CLOCK POSITION

Keep the manual controller close to the 12 o'clock position to keep a null rate. However, minor adjustments might be required.

TAXI-IN

On the ground:

Differential Pressure ..... ZERO

Once ΔP reads zero:

Manual Controller ..... FULL UP

In this position, the outflow valve will be kept fully open, which will equalize outside and inside cabin pressure. After that, cockpit side windows and airplane doors can be opened.

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TURBULENT AIR PENETRATION

Flight through severe turbulence must be avoided, if possible.

If not possible, reduce altitude to increase buffet margin.

The recommended procedures for turbulent air penetration are:

1. AIRSPEED

At or Below 10000 ft ..... 200 KIAS

Above 10000 ft..... 250 KIAS/0.63 M, WHICHEVER IS LOWER

Severe turbulence will cause large and often rapid variations in indicated airspeed. Do not chase the airspeed.

2. ATTITUDE

Maintain wings level and proper pitch attitude. Use attitude indicator as the primary instrument. In extreme drafts, large attitude changes may occur. Do not use sudden large control inputs.

3. PITCH TRIM

Maintain control of the airplane with the elevators. After establishing the trim setting for penetration speed, do not change pitch trim.

4. ALTITUDE

Large altitude variations are possible in severe turbulence. Sacrifice altitude in order to maintain the desired attitude. Do not chase altitude.

5. THRUST SETTING

Make an initial thrust setting for the target airspeed. Change thrust setting only in case of extreme airspeed variation.

In case of inadvertent negative-g condition, reduce THRUST Levers.

NOTE: Do not extend flaps except for approach and landing.

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VOLCANIC ASH

Flight in areas of known volcanic activity must be avoided. This is particularly important during hours of darkness or daytime instrument meteorological conditions when volcanic dust may not be visible. When a flight is planned into an area with a known potential for volcanic activity, it is recommended that all NOTAMs and air traffic control directives be reviewed for current status of volcanic activity. If volcanic activity is reported, the planned flight should remain well clear of the area and, if possible, stay on the upwind side of the volcanic dust.

The airplane's weather radar is not capable of detecting volcanic ash/dust clouds and is therefore not reliable under these circumstances. The presence of volcanic ash/dust may be indicated by:

- Smoke of dust appearing inside the airplane.
- An acrid odor similar to electrical smoke or burnt dust or sulfur.
- Engine malfunctions such as power loss, engine stalls, increasing ITT, fluctuating engine RPM, etc.
- At night, Saint Elmo's fire/static discharges may be observed around the windshield or Windows.
- Orange glow from engine inlets.

Flight into volcanic ash/dust clouds can result in the degradation of airplane and engine performance. The adverse effects cause by volcanic ash/dust encounters may be:

- Rapid erosion and damage to the internal engine componentes.
- Ash/dust build-up and blockage of the guide vanes and cooling holes, which may cause surge, loss of thrust and/or high ITT.
- Ash/dust blockage of the pitot system, resulting in unreliable airspeed indications.
- The abrasive properties of volcanic material may cause serious damage to the engines, wing and tail leading edge surfaces, windshields, landing lights, etc.
- Windshield and windows may become opaque, reducing the visibility.

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VOLCANIC ASH – ON GROUND OPERATIONS

The following recommendations apply to starting and operating engines on airports where volcanic ash has fallen and ground contamination is present:

- When the airplane is parked install engine covers or reposition the airplane to limit blowing ash accumulation from wind and jet blasts from other airplane.
- During preflight, check that the engine inlet and exhaust areas have been cleared of volcanic ash.
- Check that all volcanic ash has been cleaned away from the area within 25 ft of the engine inlets.
- Use APU for engine starting only, not for air conditioning.
- Prior to starting, dry motor the engine for one minute in order to blow out any ash that may have entered the engine by-pass duct area.
- Use minimum required thrust for breakaway and taxi. Avoid single engine taxi.
- Keep bleed valves closed during taxi. Use the cleanest taxiways whenever possible.
- Be aware of loose ash being blown by the exhaust wake of other airplane. Maintain adequate ground separation and allow for dust to set on the runway before starting the takeoff roll.
- Use a rolling takeoff technique. Avoid setting high thrust at low airspeeds.
- After landing at an airport contaminated with volcanic ash, minimize the use of reverse thrust to prevent any recirculation ingestion.
- Avoid static engine operation above idle.
- Use APU for engine starting only, not for air conditioning.

VOLCANIC ASH – IN FLIGHT OPERATIONS

Flight operations in volcanic ash are extremely hazardous and must be avoided. However, volcanic ash/dust clouds may sometimes extend for hundreds of miles, reaching altitudes above 60000 ft and an encounter may be unavoidable.

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In case of an inadvertent encounter, proceed as follows:

Volcanic Ash Area ..... EXIT/AVOID

Consider performing a 180° turn. Due to the dimensions of the Ash clouds a 180° turn could be the fastest way to exit an Ash cloud.

Oxygen Masks (if necessary) ..... DON, 100%

If a significant amount of volcanic ash fills the cockpit or if there is a strong smell of sulphur, don an oxygen mask and select 100%.

APU (is available) ..... START

IGNITION 1 & 2 Knobs ..... ON

THRUST Lever (if altitude permits) ..... IDLE

ENG AIR INLET 1 & 2 Buttons ..... PUSHED IN

WING Button..... PUSHED IN

STAB Button ..... PUSHED IN

ICE DETECTION OVERRIDE Knob..... ALL

This action will increase bleed air extraction from the engines and further improve the engine stall margin.

ITT..... MONITOR

If the ITT is still increasing even with the THRUST Levers in idle:

Affected Engine ..... SHUTDOWN

If it becomes necessary to shutdown an engine to prevent exceeding ITT limits, restart the engine after it cooled down. If the engine fails to start, repeat the attempts immediately.

NOTE: A successful start may not be possible until the airplane is clear of the volcanic ash/dust, and the airspeed and altitude is within the airstart envelope. The engines can be very slow to accelerate to idle at high altitudes and looks like a failure to start or as an engine malfunction.

After exiting the area of volcanic ash/dust cloud and the engine(s) restarted, restore systems to normal operation. Inform ATC of the encounter.

Airspeed..... MONITOR

Monitor airspeed for any abnormal indication. If necessary, perform the Unreliable Airspeed procedure.

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WINDSHEAR

INDICATION: WDSHEAR on the PFD (red or amber).

AURAL WARNING: WINDSHEAR voice message is generated if WDSHEAR red indication is presented, and CAUTION WINDSHEAR voice message is generated if WDSHEAR amber indication is presented (GPWS warning may also be activated).

CONDITION: Airplane loses altitude after windshear is encountered and threat of ground contact exists.

THRUST LEVERS ..... MAX

For airplanes equipped with Autothrottle, the A/T system is automatically disengaged with THRUST Levers beyond Thrust Set. Aural message "THROTTLE" is triggered.

GO-AROUND Button ..... PRESS

Rotate the airplane smoothly to minimize altitude loss. Flight guidance on the EADI must be followed.

NOTE: Pitch attitude may be well above normal angles.

Maintain airplane configuration. Do not change gear and flap position until terrain clearance is assured.

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FMZ2000 FLIGHT MANAGEMENT SYSTEM

The information contained herein supplements the information of the basic AOM Normal Procedures.

BEFORE START

FMS ..... SET

HOLDING

If a Holding Pattern entering is necessary:

FMS ..... AS REQUIRED

The pilot must check the entry type and turn direction of holding pattern before entering it. For entry types other than the direct one, the pilot must activate the procedure holding pattern as soon as the approach procedure is retrieved from the navigation data base.

NOTE: The FMS normal operating procedures are contained in the Honeywell Flight Management System (FMS) Pilot's Operating Manual, Honeywell Publication Number A28-1146-133-00, February 1999 edition (or later revision of the manual) for the software version NZ5.2.

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FMS SOURCE SELECTION

Flight Plan ..... SELECT OR CREATE

FMS Source ..... SELECT

The FMS can be selected as the navigation source through the FMS Button located on the Display Control Panel.

FMS Label ..... CHECK

The FMS label appears on the associated PFD and MFD.

On PFD and MFD the FMS label will be always magenta.

For FMS coupling to the Autopilot/Flight Director:

NAV Mode (Flight Guidance Controller) ..... SELECT

The FMS will be coupled to the Autopilot/Flight Director when is selected and valid at the on side EHSI and crew selects the NAV mode on the associated Flight Guidance Controller. Once coupled the autopilot will follow the preselected flight plan on the FMS.

APPROACH

The FMS GPS, NDB, RNAV, VOR, VOR/DME and VFR approaches may be linked into the flight plan and laterally coupled to the Autopilot/Flight Director.

ILS approaches can be retrieved from the navigation data base and linked to the flight plan, but cannot be armed or activated as FMS approaches. The FMS can be used to provide navigation up to the final approach course at the point that the PFD must be changed to display raw ILS data.

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TRANSITION FROM FMS TO AUTOPILOT ILS APPROACH

ILS Frequency ..... SELECT AS REQUIRED

Radio Altitude ..... SELECT AS REQUIRED

HDG Mode (Flight Guidance Controller) ..... SELECT

Before selection, set the desired interception course on heading bug.

Navigation Source ..... SELECT

Select the NAV Button source on the Display Control Panel (LOC course selected on the PFD).

Autopilot/Flight Director ..... AS REQUIRED

When cleared for approach:

APR Mode (Flight Guidance Controller)..... SELECT

ARC DME APPROACH USING FMS

Pilot Not-Flying ..... CHECK DME

During Arc DME approach using FMS the pilot not-flying must check DME raw data.

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MISSED APPROACH

GO-AROUND Button ..... PRESS

THRUST Levers ..... MAX

Verify that airplane rotates to 10° nose up wings level (Pitch Mode) and changes to Speed Hold Mode after 20 seconds.

FLAP Lever ..... 9°

With positive rate of climb:

Landing Gear Lever ..... UP

Airspeed ..... APPROACH CLIMB SPEED OR ABOVE

NOTE: During the GO-AROUND Procedure DON'T SINK aural warning may sound. In this case monitor the sink rate and follow the GO-AROUND guidance.

NAV Mode (Flight Guidance Controller) ..... SELECT

Reselecting the NAV mode the airplane will regain the lateral guidance from the FMS to fly the missed approach legs to the missed holding point and to enter holding, as required.

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FMZ2010 FLIGHT MANAGEMENT SYSTEM

The information contained herein supplements the information of the basic AOM Normal Procedures.

BEFORE START

FMS ..... SET

FMS Custom Data Base ..... CLEAR

NOTE: The operation of saving a flight plan may prevent the speed intervention function on the FMS, depending on how many waypoints on all flight plans have been stored in the custom data base.

HOLDING

If a Holding Pattern entering is necessary:

FMS ..... AS REQUIRED

The pilot must check the entry type and turn direction of holding pattern before entering it. For entry types other than the direct one, the pilot must activate the procedure holding pattern as soon as the approach procedure is retrieved from the navigation data base.

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FMS SOURCE SELECTION

Flight Plan ..... SELECT OR CREATE

FMS Source ..... SELECT

The FMS can be selected as the navigation source through the FMS Button located on the Display Control Panel.

FMS Label ..... CHECK

The FMS label appears on the associated PFD and MFD.

On PFD and MFD the FMS label will be always magenta.

For FMS coupling to the Autopilot/Flight Director:

NAV Mode (Flight Guidance Controller) ..... SELECT

The FMS will be coupled to the Autopilot/Flight Director when is selected and valid at the on side EHSI and crew selects the NAV mode on the associated Flight Guidance Controller. Once coupled the autopilot will follow the preselected flight plan on the FMS.

APPROACH

The FMS GPS, NDB, RNAV, VOR, VOR/DME and VFR approaches may be linked into the flight plan and laterally coupled to the Autopilot/Flight Director.

ILS approaches can be retrieved from the navigation data base and linked to the flight plan, but cannot be armed or activated as FMS approaches. The FMS can be used to provide navigation up to the final approach course at the point that the PFD must be changed to display raw ILS data.

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TRANSITION FROM FMS TO AUTOPILOT ILS APPROACH

ILS Frequency ..... SELECT AS REQUIRED

Radio Altitude ..... SELECT AS REQUIRED

HDG Mode (Flight Guidance Controller) ..... SELECT

Before selection, set the desired interception course on heading bug.

Navigation Source ..... SELECT

Select the NAV Button source on the Display Control Panel (LOC course selected on the PFD).

Autopilot/Flight Director ..... AS REQUIRED

When cleared for approach:

APR Mode (Flight Guidance Controller)..... SELECT

ARC DME APPROACH USING FMS

Pilot Not-Flying ..... CHECK DME

During Arc DME approach using FMS the pilot not-flying must check DME raw data.

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MISSED APPROACH

GO-AROUND Button ..... PRESS

THRUST Levers ..... MAX

NOTE: For airplanes equipped with Autothrottle, the A/T will disengage automatically.

Verify that airplane rotates to 10° nose up wings level (Pitch Mode) and changes to Speed Hold Mode after 20 seconds.

FLAP Lever ..... 9°

With positive rate of climb:

Landing Gear Lever ..... UP

Airspeed ..... APPROACH CLIMB SPEED OR ABOVE

NOTE: During the GO-AROUND Procedure DON'T SINK aural warning may sound. In this case monitor the sink rate and follow the GO-AROUND guidance.

LNAV Mode (Flight Guidance Controller) ..... CHECK IF ARMED

When flying a ILS or non-RNAV approach, by reselecting the FMS source the airplane will regain the lateral guidance from the FMS to fly the missed approach legs to the missed holding point and to enter holding, as required.

Autothrottle (if applicable, on request) ..... AS REQUIRED

BEFORE LANDING

PFD Speed ..... SET APPROACH CLIMB SPEED VIA SPEED INTERVENTION FUNCTION ON FMS

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ENHANCED GROUND PROXIMITY WARNING

Aural Warning: Voice Messages: PULL UP, SINK RATE, TERRAIN TERRAIN PULL UP, CAUTION TERRAIN, OBSTACLE OBSTACLE PULL UP, CAUTION OBSTACLE, DON'T SINK DON'T SINK, TOO LOW TERRAIN, TOO LOW GEAR, TOO LOW FLAPS, GLIDE SLOPE and BANK ANGLE voice messages may be generated, but are not associated with EGPWS EICAS message.

When an EGPWS alert occurs, use the flight controls and thrust as necessary to correct the airplane attitude, flight path and configuration according to the voice message presented to provide terrain clearance.

CAUTION: THE TERRAIN DISPLAY IS INTENDED TO BE USED AS A SITUATIONAL TOOL ONLY AND MAY NOT PROVIDE THE ACCURACY AND/OR FIDELITY ON WHICH TO SOLELY BASE TERRAIN AVOIDANCE MANEUVERING DECISIONS.

WINDSHEAR PREVENTION/RECOVERY

Aural Warning: WINDSHEAR voice message is generated if WDSHEAR red indication is presented (EGPWS warning may also be activated).

THRUST Levers	MAX
GO-AROUND Button	PRESS

Rotate the airplane smoothly to minimize altitude loss. Flight guidance on EADI must be followed.

NOTE: Pitch attitude may be well above normal angles.

Maintain airplane configuration. Do not change gear and flap position until terrain clearance is assured.

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TRAFFIC AND COLLISION AVOIDANCE

Aural Warning: According to the Traffic Advisory (TA) and Resolution Advisory (RA) associated.

The pilot must not initiate evasive maneuvers using information from the traffic display or the voice message only, without visually sighting the traffic. The traffic display and advisories are intended for assistance in visually locating the traffic.

Compliance with TCAS resolution advisory is required unless the pilot considers it unsafe to do so. Maneuvers which are in the opposite direction of the RA are extremely hazardous, especially RAs involving altitude crossing, and are prohibited unless it is visually determined to be the only means to assure safe separation.

TRANSPONDER

In compliance with FAA Airworthiness Directive 2006-19-04, during all flight phases, after completion of any 4096 ATC Code change (also referred to as Mode A Code), check the status of the transponder. If the transponder indicates that it is in standby mode, re-select the desired mode (i.e., the transponder should be in the active mode).

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ALTIMETER MISCOMPARE TOLERANCES

This Section provides information regarding maximum allowed tolerances between PFD altitude indications and standby system.

For the EMB-135BJ model, there are two pitot probes, four static probes and one pitot static probe. Pitot probes 1 and 2 and the static ports send information to ADCs 1 and 2. The third (auxiliary) pitot probe sends information directly to the Integrated Standby Instrument System.

The standby system is a back-up navigation source to be used in the event of a total loss of the primary source (ADC).

The differences between the readings of ADC 1 and 2 altimeters and between these and the standby system, with the airplane on ground or in flight, can occur due to a number of reasons and may vary with altitude, airspeed and airplane configuration. In addition, the static port for the standby system and the static port for the primary system are located in different positions.

This criterion considers additional parameters, as follows: measurement errors, installation deviations, internal and skin waviness distortions and airplane sideslip condition that bear an influence on data variations when comparing the two systems.

For the EMB-135BJ model, the maximum acceptable difference between both ADC altimeter indications and between the ADC altimeters and the Standby System are shown in the table on the next page.

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To verify if altimeter difference is within tolerance, the flight crew should proceed as follows:

Altitude ..... STABILIZE

Maintain variation within ± 50 ft.

Airspeed ..... STABILIZE

Maintain variation within ± 5 kt.

Wait a minimum of 15 seconds in straight and leveled flight, preferably with Autopilot engaged, to compare the difference between altitudes using the following table:

ALTITUDE (ft)	MAXIMUM DIFFERENCE BETWEEN PILOT AND COPILOT'S ALTIMETERS (ft)	MAXIMUM DIFFERENCE BETWEEN PILOT OR COPILOT'S ALTIMETERS AND STANDBY SYSTEM (ft)
0	50	150
5000	60	200
10000	60	280
15000	70	320
20000	70	500
25000	100	600
30000	120	750
35000	150	750
37000	160	750
39000	180	800

Differences greater than the values in the table must be verified by maintenance checks.

In flight, if a discrepancy is reported between the values shown in the table, a double check must be performed using the previous and the next referenced altitude level.

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CAT II OPERATION

The information contained herein supplements the information of the basic AOM Normal Procedures.

AUTOPILOT COUPLED CAT II APPROACH

BEFORE INTERCEPTING LOCALIZER COURSE

– Perform the Descent/Approach/Before Landing checklists, as appropriate.
– Perform the Radio Altimeter test.
– Set the CAT II Decision Height on both Display Control Panels.
– Check radio altimeter information on both PFD.
– Select the same ILS frequency on both RMU.

NOTE: - After test, if Radio Altimeter is checked not functioning properly the CAT II approach must discontinued.

- A minimum distance of 4 NM to the Outer Marker is recommended for interception and stabilization along the approach course.

BEFORE INTERCEPTING THE GLIDE SLOPE

– Monitor radio altimeter information.
– Lower Landing Gear (one dot below GS interception) and set flaps to 22°.
– Set the Approach Speed (V_{APP}) for flaps 22° on AP bug (green bug).

NOTE: The V_{APP} is determined by adjusting the V_{APP} for head wind component and gust according to the following equation:
$V_{APP} = V_{REF}$ + WIND CORRECTION, where
WIND CORRECTION = ½ head wind component + full gust, limited to 20 kt.

– Stabilize and maintain $V_{REF\ 22}$ + 5 KIAS.
– Set approach climb speed on SPD reference speed bug (cyan bug).
– Be sure that Marker Beacon audio is on.

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AFTER PASSING THE OUTER MARKER INBOUND

- The pilot flying should maintain the Approach Speed (V_{APP}) for flaps 22°.
- Both pilots must monitor the progress of the approach on their displays down to approximately 200 ft above the decision height. At this point the pilot not flying looks out for external visual references while the pilot flying continues to monitor his displays down to the decision height.
- At 80 ft above the decision height setting the EGPWS will call out "APPROACHING MINIMUM".
- At the decision height setting the EGPWS will call out "MINIMUM", and the pilot flying will call out "LANDING" or "GO AROUND", as appropriate.
- If visual contact is not made upon reaching the decision height or if any malfunction could not be promptly identified during approach, a missed approach must be immediately initiated.

NOTE: The V_{APP} must be bled off in such a way that, over the runway threshold, the target speed is the $V_{REF\ 22}$.

MISSED APPROACH

GO-AROUND Procedure ..... ACCOMPLISH

LANDING

Reaching the Decision Height with runway in sight:

Autopilot ..... DISENGAGE
Airspeed ..... $V_{REF\ 22}$
Landing ..... PERFORM

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STEEP APPROACH OPERATION

NOTE: The Steep Approach Operation is limited to airplanes Post-Mod. SB 145LEG-34-0013 or factory incorporated and following the applicable AFM Supplement.

FINAL APPROACH

BEFORE INTERCEPTING GLIDE SLOPE

Autopilot ..... AS REQUIRED
Landing Gear Lever ..... DOWN
FLAP Lever ..... 45°
Airspeed ..... $V_{REF\ 45}$
STEEP Approach Button ..... PRESS
Check green indication in the STEEP Approach Button.

MISSED APPROACH

GO-AROUND Button ..... PRESS
THRUST Levers ..... MAX
Rotate or verify that autopilot rotates the airplane to 10° nose up.
FLAP Lever ..... 9°
With positive rate of climb:
Landing Gear Lever ..... UP
Minimum Airspeed ..... APPROACH CLIMB SPEED
At the level off height, proceed as in a normal takeoff.

NOTE: - If the autopilot does not rotate the airplane to a minimum of 10° nose up, disengage the autopilot and keep a minimum of 10° nose up.

- During the GO-AROUND procedure, the DON'T SINK aural warning may sound. In this case monitor the sink rate and follow the GO-AROUND guidance.

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LANDING

Reaching DA (DH) or MDA (MDH), whichever is applicable, with runway in sight:

Landing ..... PERFORM

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BOUNCED LANDING RECOVERY

The key factor for a successful landing is a stabilized approach and proper thrust/flare coordination. Do not extend the flare at idle thrust as it will significantly increase landing distance. Reducing to idle before the flare will also require an increase in pitch. Flaring high and quickly reducing thrust to idle can cause the plane to settle abruptly. Do not apply stabilizer trim during the flare.

When a light bounce occurs, maintain or re-establish a normal landing attitude. Increasing pitch can lead to a tail strike. Beware of the increased landing distance and use power as required to soften the second touchdown. When a more severe bounce occurs, initiate a go-around, do not attempt to land. Press the go-around button and advance thrust levers to MAX. Hold the flare attitude until the engines spool up and reset stabilizer trim, then follow normal go-around procedures.

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MAINTENANCE INSPECTIONS PERFORMED BY THE FLIGHT CREW

This Section contains procedures to be accomplished by the flight crew when the airplane is not at the maintenance base. In case of conflicting information between these procedures and the AFM, the AFM must prevail.

For further instructions pertaining to the subjects covered herein refer to the Aircraft Maintenance Manual.

NOTE: The flight crew that will accomplish the procedures contained in this section must be properly trained.

CMC MESSAGES CHECK ON THE MFD

NOTE: ENG 1 (2) OIL DEBRIS and CMC FADEC 1A (1B, 2A, 2B) INPUT FAIL messages must be checked each:

a. 50 h or 30 Calendar Days (whichever occurs first) for AE3007A1P engine,
b. 70 h or 30 Calendar Days (whichever occurs first) for AE3007A1E engine,
c. 70 h or 30 Calendar Days (whichever occurs first) for AE3007A2 engine.

The purpose of this procedure is to check on the MFD 1 maintenance page if there is any maintenance message.

– Make sure that the airplane is safe for maintenance.
– Energize the airplane.
– Make sure that the CMC system is operational and ON.
– On the MFD select the maintenance page.
– Make sure that the CMC FADEC 1A (1B, 2A, 2B) INPUT FAIL message is not shown on the MFD maintenance page.
– Check if any message is displayed and report to the maintenance personnel.

CAUTION: IF THE CMC MESSAGE ENG 1 (2) OIL DEBRIS IS DISPLAYED, DO NOT TAKEOFF.

– Return the MFD to its normal condition.

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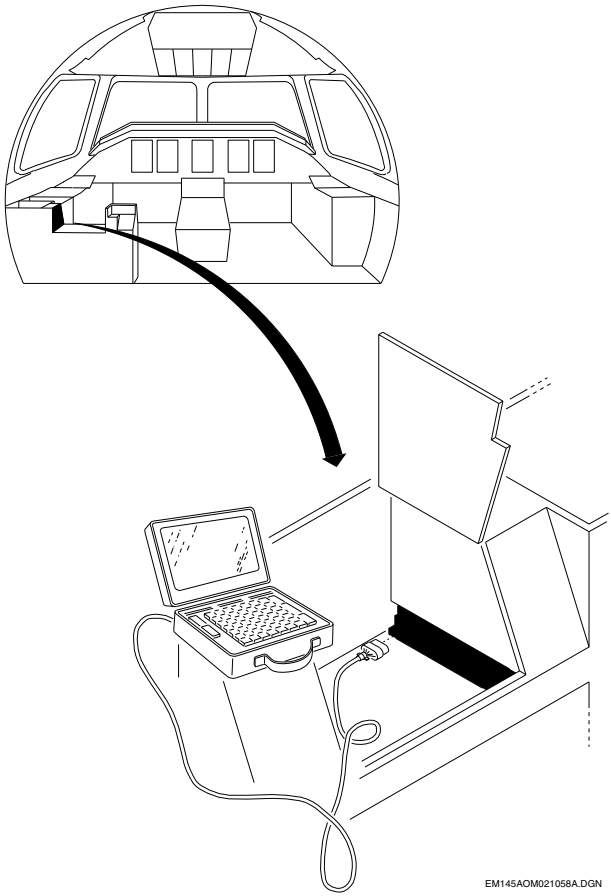
ENGINE TREND DOWNLOAD

To accomplish the engine trend download/analysis procedures, follow the instructions below:

– Install the Personal Computer to download the engine trend data.
– On the Menu bar of the DAS program, choose the option TREND & EXCEED and download Engine Trend Data.
– Save the data and send it to the maintenance base.



ENGINE TREND DOWNLOAD

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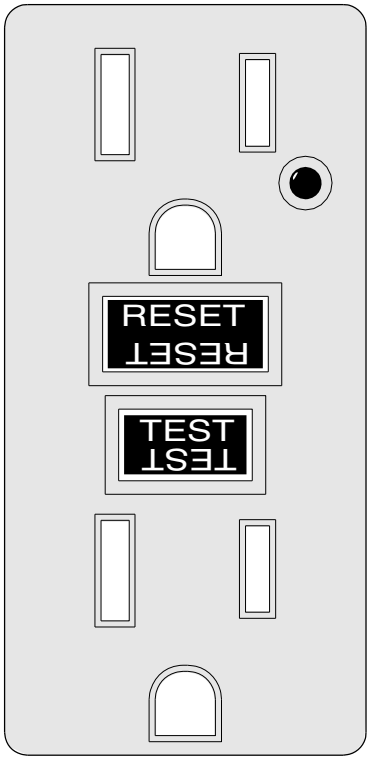
TOILET AND GALLEY OUTLET

At least once a month, perform the outlet test as shown below:

– With the airplane energized and the outlet green light on, press the TEST button.
– The RESET button will pop out and the green light will extinguish.
– Press the RESET button again. The green light will illuminate to show that the equipment is energized again.



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OUTLET POWER

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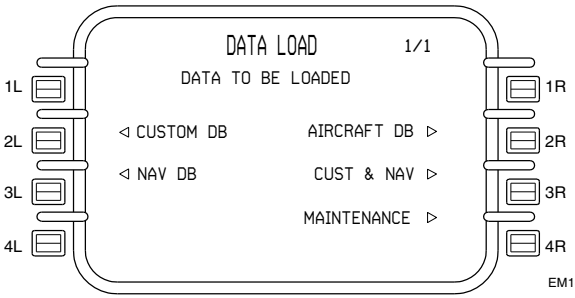
FMS NAVIGATION DATABASE UPDATING (HONEYWELL FMZ2000 AND FMZ2010)

The FMS navigation database is normally updated every 28 days. This updating can be done by the pilot. To update FMS navigation database:

– Turn on the Data Loader by pushing the POWER button.
– Press the SELECT button to choose LEFT (indicated by a green led).
– On the Control Display Unit (CDU), push the NAV function key, go to the next page and then push the DATA LOAD key. The DATA LOAD 1/1 page is shown with the message "DATA TO BE LOADED".
– Push the NAV DB key.



DATA LOAD PAGE

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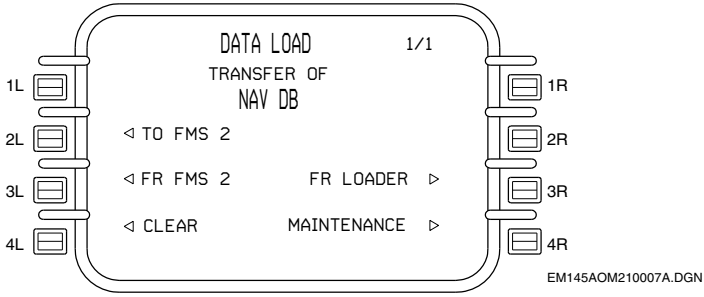
– The DATA LOAD 1/1 page is shown with the message "TRANSFER OF NAV DB".



DATA LOAD PAGE – TRANSFER OF NAV DB

– On Data Loader insert Navigation database disk 1, connect the USB Drive or insert the SD Card (according to Data Loader model).

NOTE: USB Drive must be formatted for (file allocation table) FAT File System (MS-DOS compatible). The communications protocols will operate on any file located in the root directory. The USB drive or the SD Card capacity should be at least 16 Megabytes (MB).

– In the case of Floppy Disk Data Loader: When necessary insert the subsequent disk to be read by the FMS.

– On the CDU, push the FR LOADER key.

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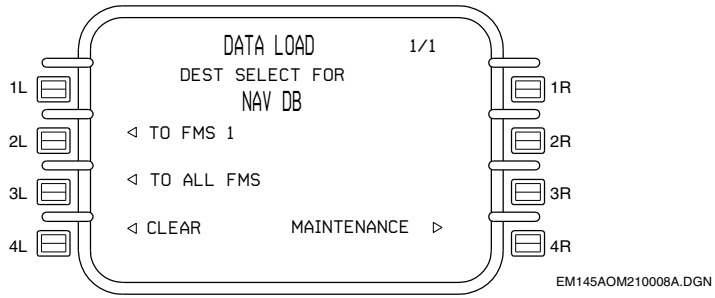
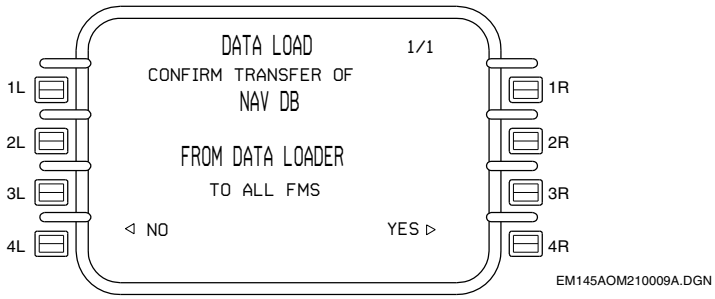
– Push the TO ALL FMS key.



DATA LOAD PAGE

– The message "CONFIRM TRANSFER OF NAV DB FROM DATA LOADER TO ALL FMS" will be displayed. Push YES to confirm.



DATA LOAD – TRANSFER CONFIRMATION

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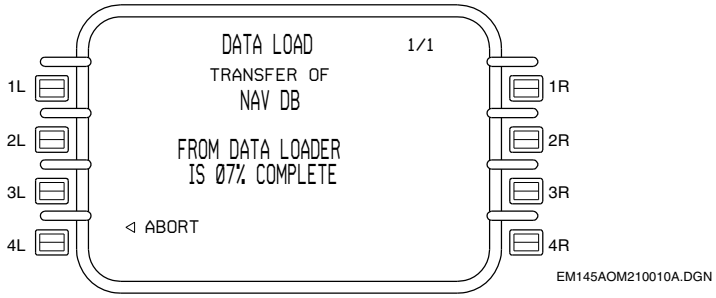
– The DATA LOAD 1/1 page will display the process status "TRANSFER OF NAV DB FROM DATA LOADER IS XX% COMPLETE".



DATA LOAD – TRANSFERING

– When the FMS data loading is completed, CDU will display "DB TRANSFER COMPLETE" and the FMS will restart.

NOTE: If power is interrupted, ABORT is selected, or other problems that stop the loading process occur, the data load process must be repeated from the beginning.

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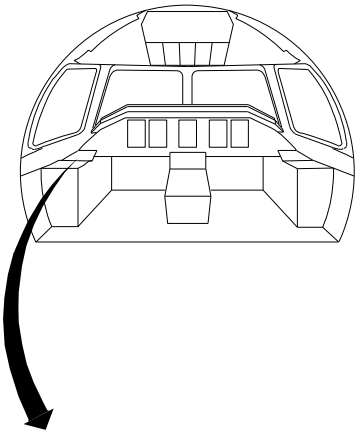
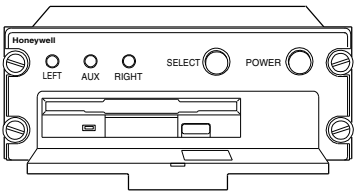
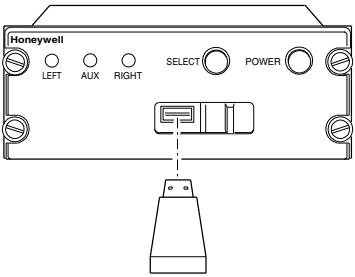


FLOPPY DISK DATA LOADER



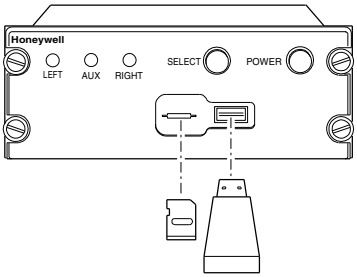
OR

USB DATA LOADER



OR

USB OR SD CARD DATA LOADER



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FMS DATA LOADER

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ICE AND RAIN PROTECTION ADJUSTMENT/TEST

This procedure performs a check of the anti-icing system messages on EICAS display and it permits to make sure that the following messages come into view.

- ICE DET 1-2 FAIL (CAUTION).
- CLR/I INOP1-2 (CAUTION).
- CLR ICE 1-2 (CAUTION).
- BLD 1 (2) LOW TEMP (CAUTION).
- WG A/ICE FAIL (CAUTION).
- STAB A/ICE FAIL (CAUTION).
- ICE DET 1 (2) FAIL (CAUTION).
- ICE CONDITION (ADVISORY).
- ICE COND - A/I INOP (CAUTION).
- ICE DETECTORS FAIL (CAUTION).

Accomplish the procedure as follows:

Energize the airplane using a GPU.

NOTE: If a GPU is not available, do not perform this procedure.

ENG BLEED 1 Button..... PUSH OUT
ENG BLEED 2 Button..... PUSH OUT
ENG XBLEED Knob ..... AUTO
APU BLEED Button ..... PUSH OUT
WING Button ..... PUSH IN
STAB Button..... PUSH IN
ICE DETECTION OVERRIDE Knob ..... ALL

CAUTION: MAKE SURE THAT ENG BLEED 1, ENG BLEED 2, AND APU BLEED BUTTONS ARE OFF (PUSHED OUT).

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On overhead panel, set the TEST switch to 1 and hold it for approximately 15 seconds. The EICAS display will show BLD 1 LOW TEMP, ICE CONDITION, ICE DET 1 FAIL, WG A/ICE FAIL, STAB A/ICE FAIL, CLR ICE 1-2 and CLR/I INOP1-2 messages. Release the TEST switch.

NOTE: - The master CAUTION lights will illuminate.

- For airplane equipped with clear ice indicating lights, these lights will go on.

Inhibit ENG AIR INLET 1 by pulling its Circuit Breaker (CB G16). After approximately 10 seconds the E1 A/ICE FAIL message will appear on EICAS display. Push CB G16 back into position.

On overhead panel, set the TEST switch to 2 and hold it for approximately 15 seconds. The EICAS display will show BLD 2 LOW TEMP, ICE CONDITION, ICE DET 2 FAIL, WG A/ICE FAIL and STAB A/ICE FAIL messages. Release the TEST switch.

NOTE: - The master CAUTION lights will illuminate.

- For airplane equipped with clear ice indicating lights, these lights will go on.

Inhibit ENG AIR INLET 2 by pulling its Circuit Breaker (CB G19). After approximately 10 seconds the E2 A/ICE FAIL message will appear on EICAS display. Push CB G19 back into position.

On LH electrical-power control/distribution box (behind pilot's seat) inhibit the ICE DETECTOR 1 by pulling its Circuit Breaker (CB B4) and on RH electrical-power control/distribution box (behind copilot's seat) inhibit the ICE DETECTOR 2 by pulling its Circuit Breaker (CB B4). After it the EICAS display will show the ICE DETECTORS FAIL and ICE DET 1-2 FAIL messages and the master CAUTION lights will illuminate. Push the CB's back into position.

ICE DETECTION OVERRIDE Knob.....AUTO

WARNING: BE CAREFUL WHILE YOU PERFOM THE ICE DETECTOR PROBES TEST. DO NOT TOUCH THE PROBES. THE PROBES WILL BE HEATED AND TOUCHING THEM MAY CAUSE INJURIES.

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To test ICE CONDITION and ICE COND - A/I INOP EICAS messages related to ICE DETECTOR 1, proceed as follows:

For airplanes Pre-Mod. SB 145LEG-31-0014, on ICE DETECTOR 1 probe apply the Freeze Spray (supplied by your maintenance personnel) and in sequence spray water on it. The ICE CONDITION and ICE COND - A/I INOP messages will appear on EICAS display after approximately 35 seconds.

For airplanes Post-Mod. SB 145LEG-31-0014 inhibit N2 SIGNAL 1A, 2A, 1B, and 2B (CB's B13, B14, B21 and B22 respectively) and AIR/GROUND A, B, C, and D (CB's E17, A7, E18, and A28 respectively) by pulling the circuit breakers in reference on overhead panel. Apply Freeze Spray on ICE DETECTOR 1 probe and in sequence spray water on it. The ICE CONDITION and ICE COND - A/I INOP messages will appear on EICAS display after approximately 35 seconds.

Push the CB's (A7, A28, B13, B14, B21, B22, E17, and E18) back into position.

To test ICE CONDITION and ICE COND - A/I INOP messages related to ICE DETECTOR 2, proceed as follows:

For airplanes Pre-Mod. SB 145LEG-31-0014, on ICE DETECTOR 2 probe apply the Freeze Spray (supplied by your maintenance personnel) and in sequence spray water on it. The ICE CONDITION and ICE COND - A/I INOP messages will appear on EICAS display after approximately 35 seconds.

For airplanes Post-Mod. SB 145LEG-31-0014 inhibit N2 SIGNAL 1A, 2A, 1B, and 2B (CB's B13, B14, B21 and B22 respectively) and AIR/GROUND A, B, C, and D (CB's E17, A7, E18, and A28 respectively) by pulling the circuit breakers in reference on overhead panel. Apply Freeze Spray on ICE DETECTOR 2 probe and in sequence spray water on it. The ICE CONDITION and ICE COND - A/I INOP messages will appear on EICAS display after approximately 35 seconds.

Push the CB's (A7, A28, B13, B14, B21, B22, E17, and E18) back into position.

WING Button ..... PUSH OUT

STAB Button ..... PUSH OUT

De-energize the airplane if necessary.

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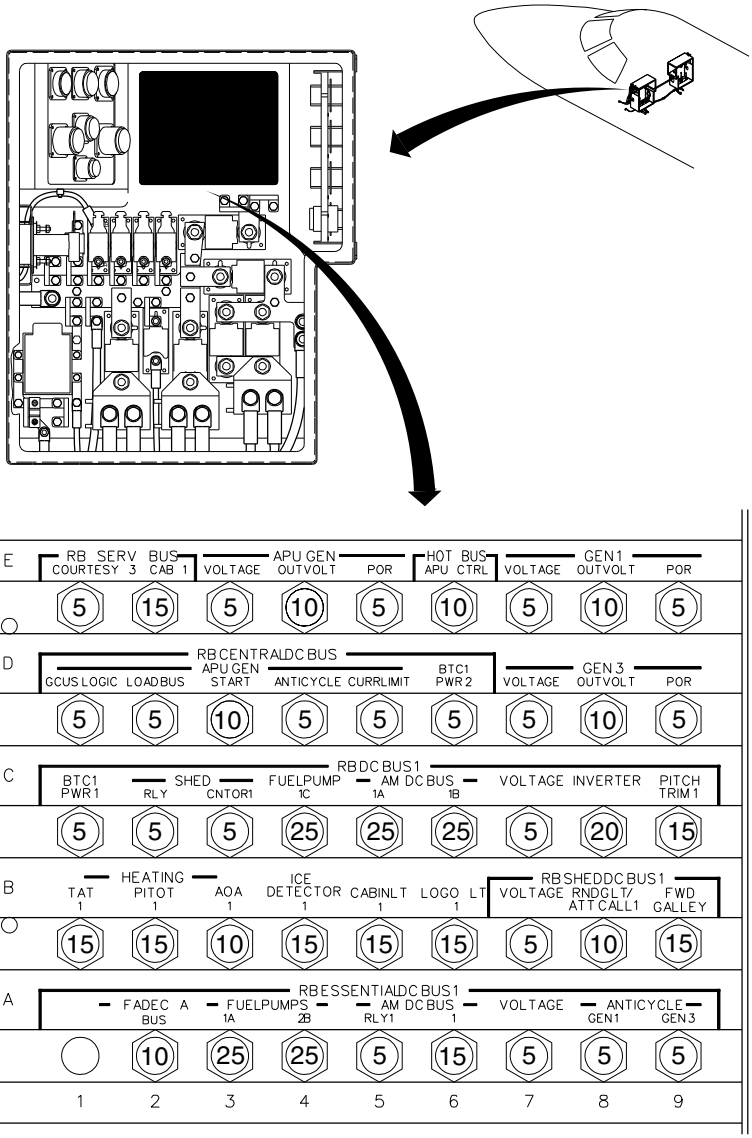

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LH ELECTRICAL-POWER CONTROL/DISTRIBUTION BOX

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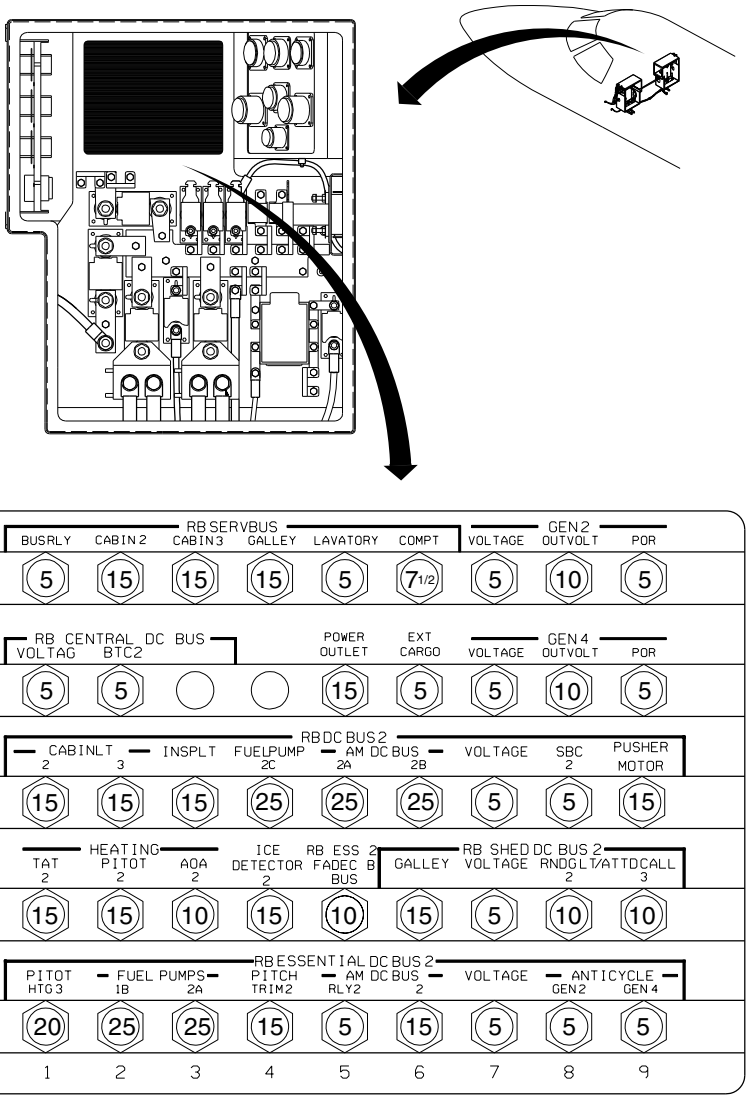

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RH ELECTRICAL-POWER CONTROL/DISTRIBUTION BOX

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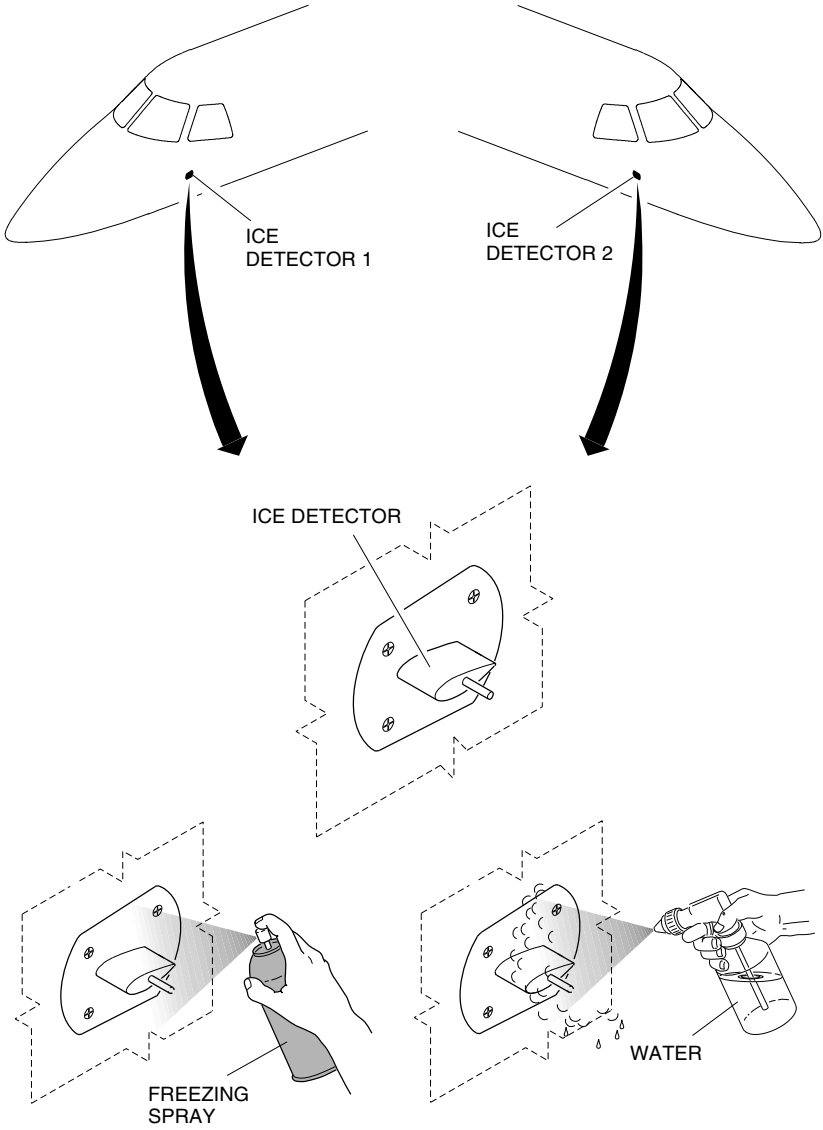

FREEZE SPRAY AND WATER APPLICATION ON ICE DETECTORS

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HIGH ALTITUDE OPERATION

NOTE: During high altitude operations, at least one pilot is required to use oxygen continuously, until the cabin altitude has reached 8000 ft.

BEFORE START

Pressurization ..... 8000 ft

If flying from an airport above 9500 ft:

High Altitude Mode ..... ON

Check that HI ALT LDG-T/O advisory message is displayed on the EICAS.

Crew Oxygen Mask ..... DON

CLIMB

Monitor cabin altitude.

When cabin altitude is below 9700 ft:

High Altitude Mode ..... OFF

Check that HI ALT LDG-T/O advisory message is no longer displayed on the EICAS.

NOTE: If cabin is not pressurizing, perform the PRESSURIZATION AUTOMATIC SYSTEM FAILURE/CABIN DEPRESSURIZATION Abnormal Procedure.

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DESCENT

If landing in an airport above 9500 ft:

Below 25000 ft:

Crew Oxygen Mask ..... DON

NOTE: The crew must put on the oxygen masks before activating High Altitude Mode.

Set the destination airport altitude.

High Altitude Mode ..... ON

NOTE: Turn on HALTO Mode just after crossing 25000 ft. If cruise level is already below 25000 ft, HALTO Mode must be activated at the top of descent. In any case, check that HI ALT LDG-T/O advisory message is displayed on the EICAS.

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OPERATION USING TIRES WITH LOW PRESSURE

EXTERNAL SAFETY INSPECTION

WINGS

Main Gear ..... CHECK

Tires ..... CHECK PRESSURE

Cold tire pressure should be within limits (140 ± 3 psi).

NOTE: Built-in pressure gauge must not be used to check tire pressure.

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RVSM OPERATION

The procedures presented in the basic AOM Normal Procedures remain unchanged, except as amended herein.

EXTERNAL SAFETY INSPECTION – NOSE SECTION

Sensors, Pitot Tubes and Static Ports..... CONDITION, NO OBSTRUCTION

Particular attention should be paid to the condition of static sources and to the marked area on the fuselage skin near each primary static source.

BEFORE TAKEOFF

Altimeters..... SET TO THE AIRFIELD QNH

Altitude Indications..... CHECK

NOTE: - An alternative procedure using QFE may also be used.

- The maximum difference between altimeters indication should not exceed 23 m (75 ft).

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CRUISE

Be sure that all required equipment are in proper operating condition.

Ensure that the airplane is flown at the cleared flight level and that ATC clearances are fully understood and followed. Do not depart from cleared flight level without a positive clearance from ATC except for a contingency or emergency situation.

While changing flight levels, do not overshoot or undershoot the cleared flight level by more than 45 m (150 ft).

The Autopilot should be operative and engaged during level cruise, except for circumstances such as the need to re-trim the airplane or when it must be disengaged due to turbulence.

AFTER LANDING

In case of failure or malfunction, the following information should be recorded when appropriate:

– Primary and standby altimeter readings.
– Altitude selector setting.
– Subscale setting on altimeter.
– Flight Director used with the Autopilot to control the airplane and any differences when the other Flight Director was coupled.
– Use of air data computer selector for fault diagnosis procedure.
– The transponder selected to provide altitude information to ATC and any difference noted when an alternative transponder was selected.

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RUNWAY AWARENESS AND ADVISORY SYSTEM (RAAS) (IF APPLICABLE)

TAXIWAY TAKEOFF

AURAL CAUTION: "CAUTION, ON TAXIWAY!, ON TAXIWAY!"

Reject Takeoff. Take appropriate measures to keep the airplane in a safe position.

Contact ATC.

INSUFFICIENT RUNWAY LENGTH (ON GROUND) CAUTION

AURAL CAUTION: "CAUTION, SHORT RUNWAY, SHORT RUNWAY"

Reject Takeoff. Take appropriate measures to keep the airplane in a safe position.

Contact ATC.

TAXIWAY LANDING

AURAL CAUTION: "CAUTION, TAXIWAY!, CAUTION, TAXIWAY!"

GO-AROUND Procedure..... PERFORM

Contact ATC.

UNSTABLE APPROACH

AURAL CAUTION: "UNSTABLE, UNSTABLE"

GO-AROUND Procedure..... PERFORM

Contact ATC.

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LONG LANDING

AURAL CAUTION: "LONG LANDING, LONG LANDING"

GO-AROUND Procedure ..... PERFORM

Contact ATC.

GROUND RAAS ADVISORY MESSAGES

If the advisory message is in conflict with expectations, stop and confirm current airplane position. If necessary, contact ATC. Take appropriate measures to keep the airplane in a safe position.

APPROACH RAAS ADVISORY MESSAGES

Verify the following conditions:

– Airplane position.
– Altimeter setting.
– Approach speed.
– Approach angle.
– Landing configuration (flaps).

If necessary, contact ATC. Take appropriate measures to keep the airplane in a safe position.

NOTE: RAAS must not be used when the airplane is operating using height above the ground (QFE) rather than sea level.

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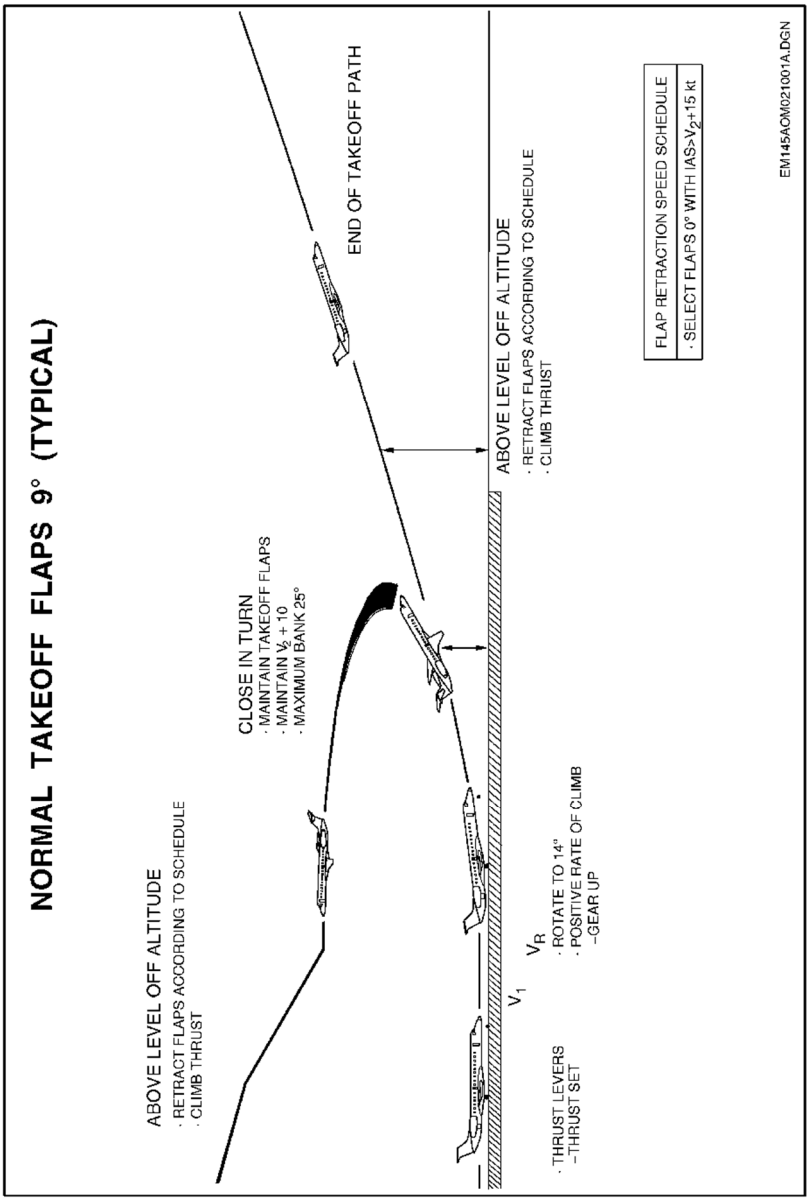
PROFILES



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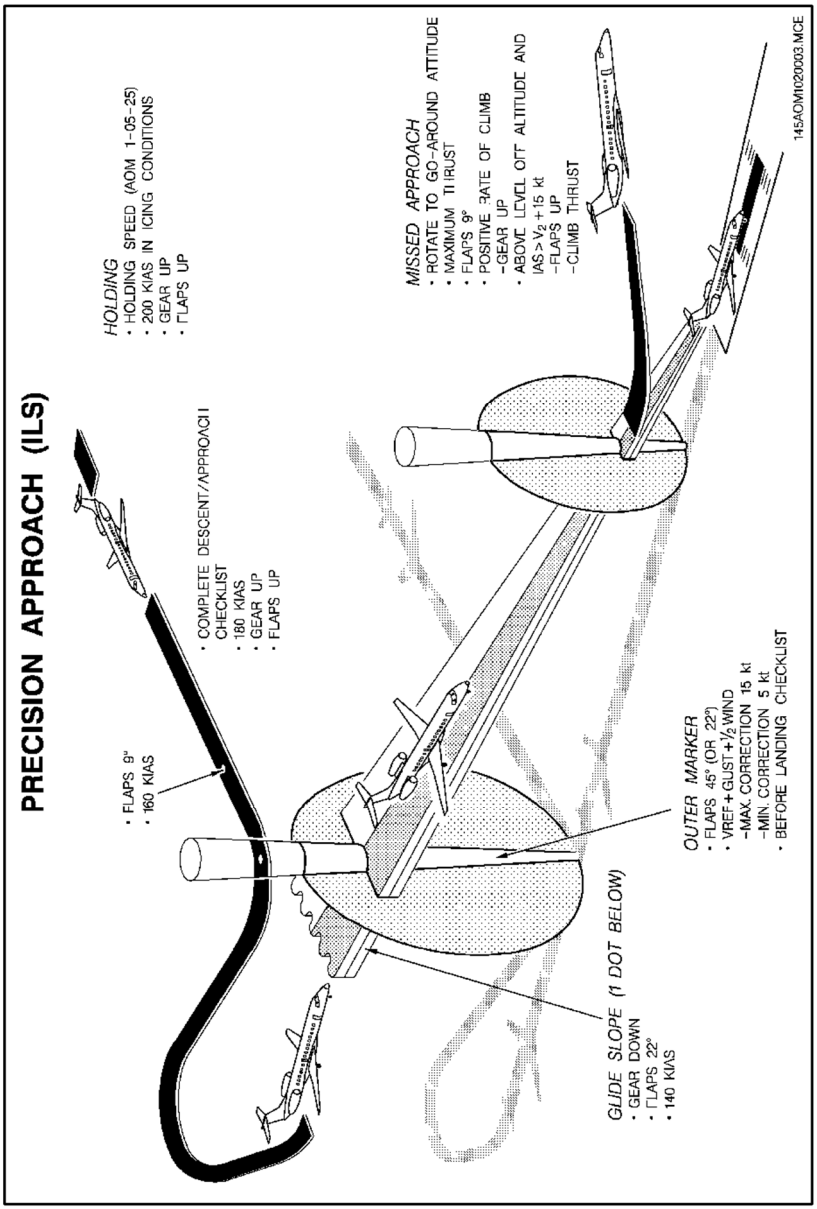

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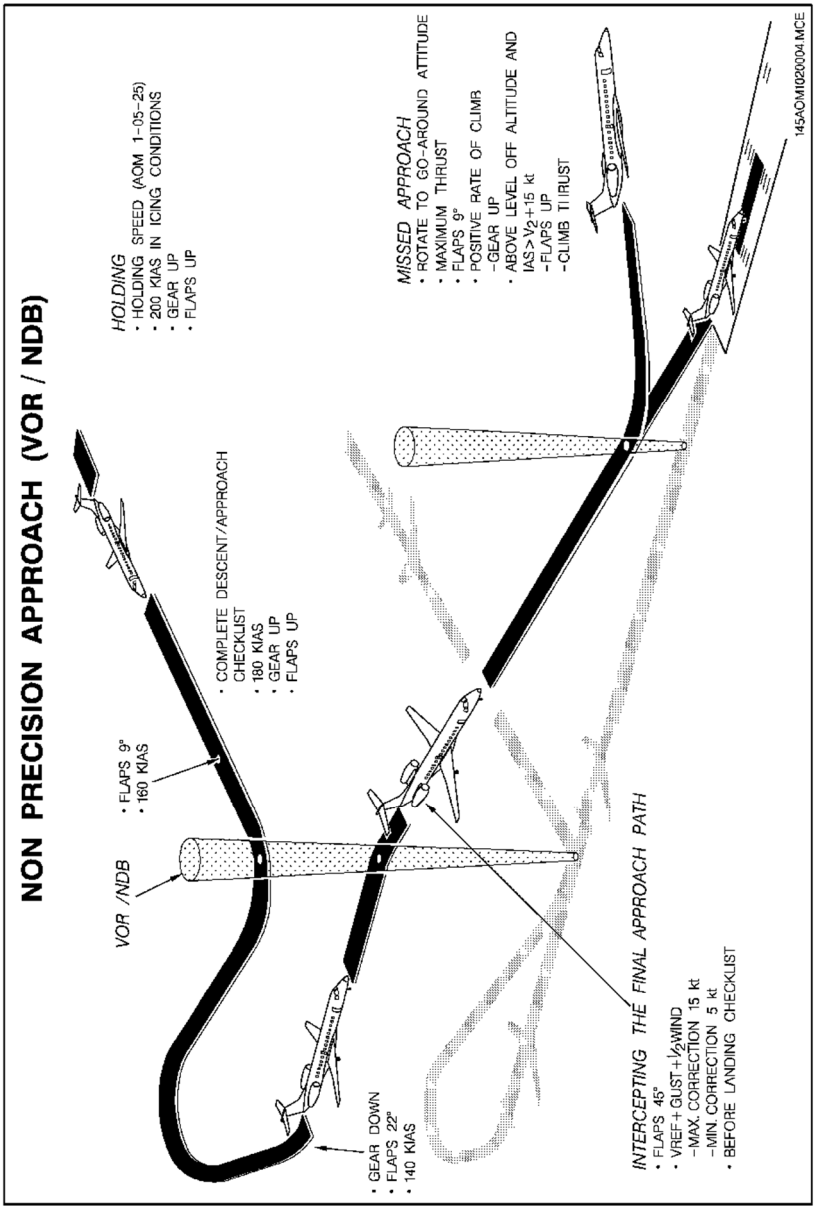

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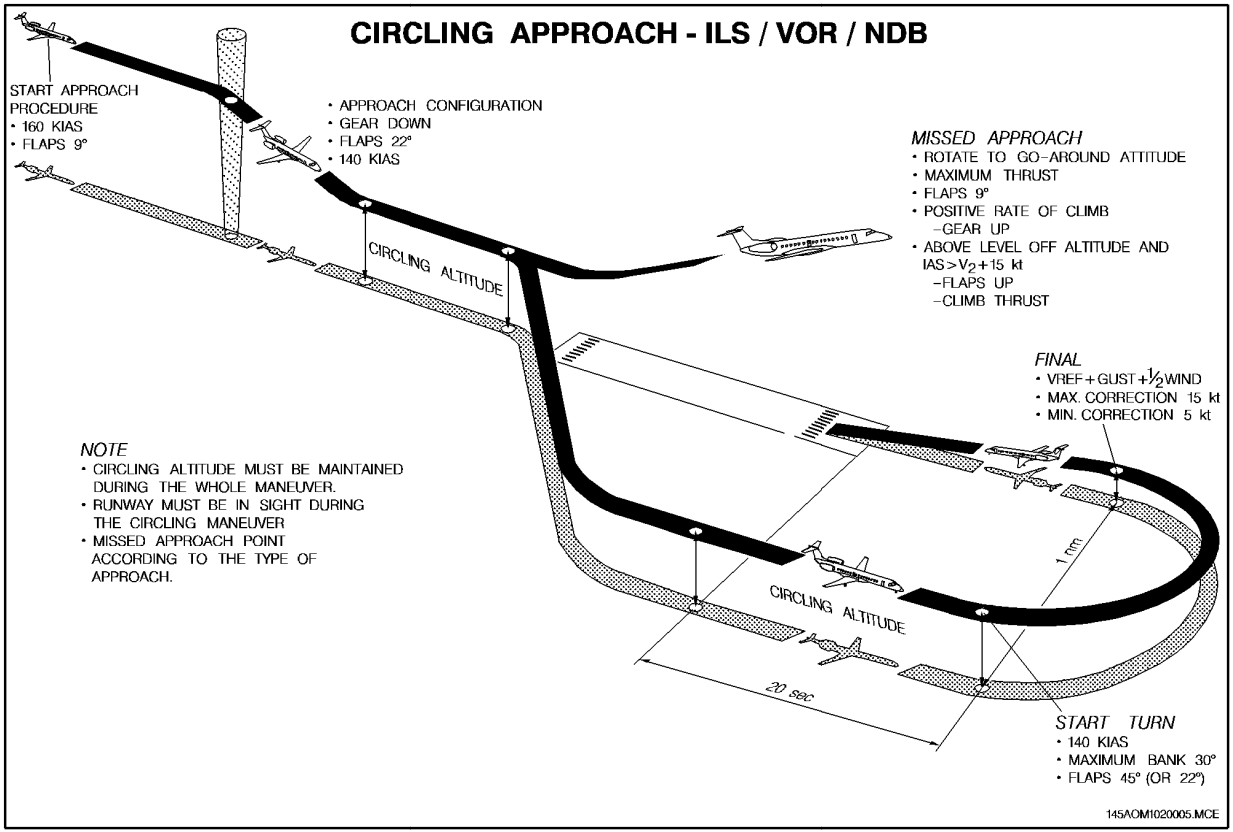
CIRCLING APPROACH - ILS / VOR / NDB



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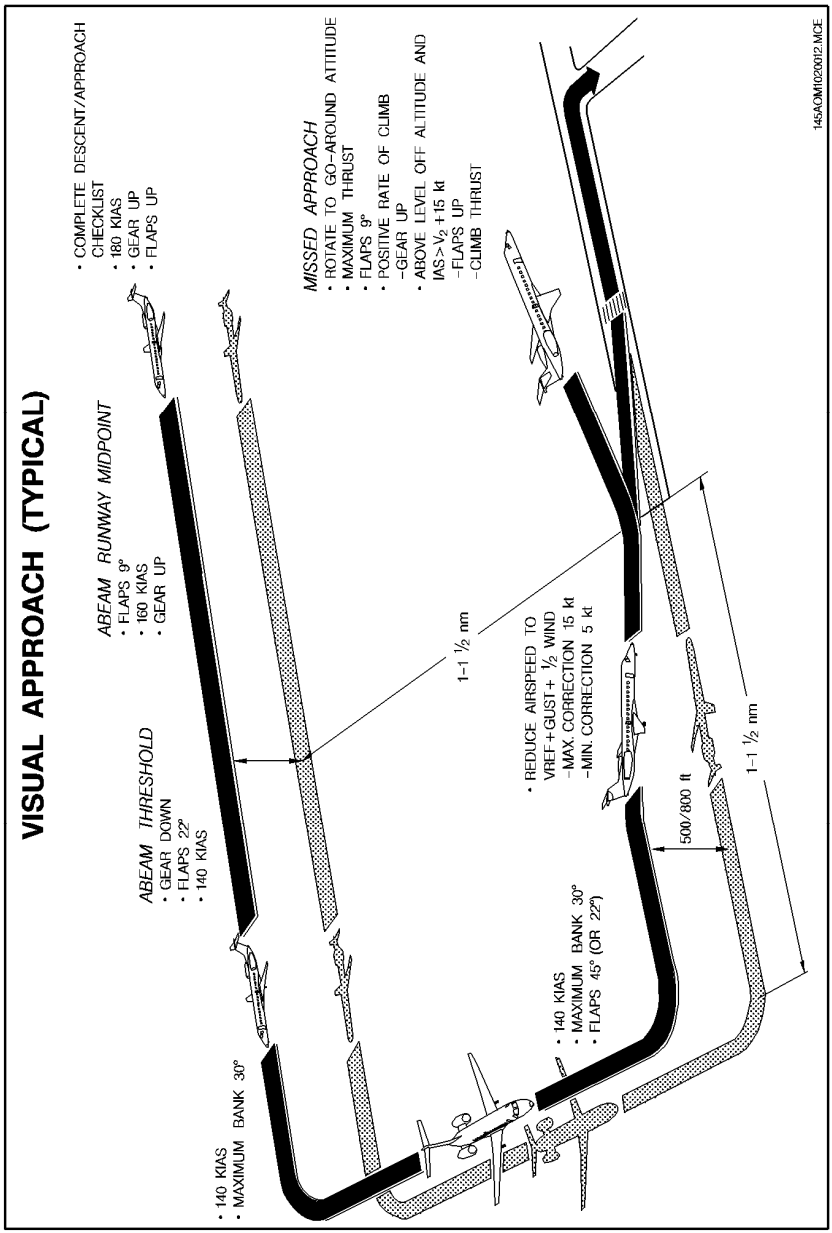

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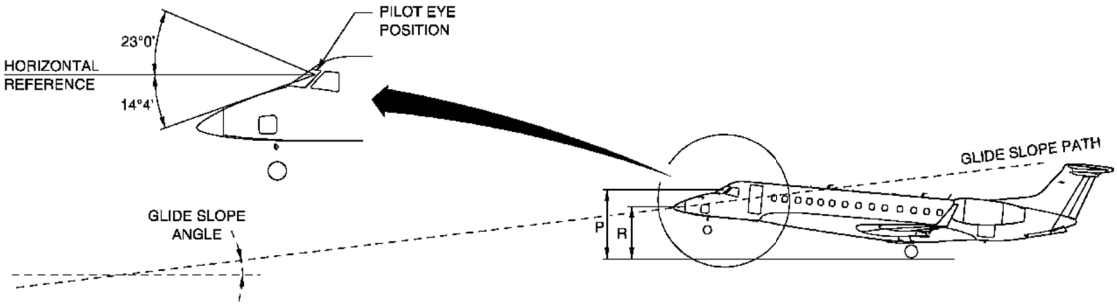
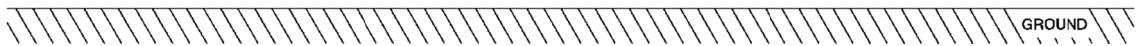
EMB-135 BJ

CAT II APPROACH GEOMETRY AT DECISION HEIGHT

CTA / FAA FLAPS 22°



P - HEIGHT OF THE PILOT'S EYE ABOVE THE WHEELS
R - HEIGHT OF GLIDE RECEIVER ANTENNA ABOVE THE WHEELS



GLIDE SLOPE ANGLE (DEGREES)	AIRPLANE ATTITUDE (DEGREES)	P (FEET)	R (FEET)
2,5	6.0	15.1	11.8
3,0	5.5	14.8	11.4

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LONG RANGE OPERATION

The procedures presented in the basic AOM Normal Procedures remain unchanged, except as amended herein.

BEFORE START

Fuel Pumps..... TEST

ENG 1 & 2 PUMP SEL Knobs..... 1A AND 2A

Associated Fuel Pump Power ..... ON

Check on the MFD Fuel Page that the selected fuel pump is operating normally.

Repeat the procedure for the remaining fuel pumps.

Associated Fuel Pump Power ..... OFF

CRUISE

XFEED Knob ..... OFF

NOTE: Use asymmetric thrust to improve or maintain wing fuel balance.

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QFE OPERATION

This procedure is accomplished when ATC altitude assignments are referenced to QFE altimeter settings.

NOTE: Do not use FMS LNAV information in procedures that contain conditional waypoints. Altitudes in the navigation database are not referenced to QFE. Navigation raw data information must be used (green).

Altimeters ..... SET

Set altimeters to QFE when below transition altitude/level.

NOTE: If QFE altimeter setting is beyond the range of the altimeters, QNH procedures must be used with QNH set in the altimeters.

Pressurization ..... SET

Set the system to zero and verify that the DUMP and AUTO/MAN Buttons are guarded and were not pushed (if they have been pushed the white mark on the buttons will be lit). The Manual Controller Knob must be set to the green mark (DN position) to enable automatic pressurization control.

NOTE: - VNAV (FMZ2010 if applicable) must not be used when the airplane is operating using height above the ground (QFE) rather than sea level.

- Terrain Awareness Alerting and Display functionality must be manually inhibited when below the transition altitude while flying QFE on approach into an airport which is more than 200 ft above or below Sea Level (not applicable to EGPWS software version 216 and on).

- RAAS must not be used when the airplane is operating using height above the ground (QFE) rather than sea level.

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SECTION 1-03

EMERGENCY AND ABNORMAL PROCEDURES

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INTRODUCTION

The emergency and abnormal procedures contained in this manual have been developed by the airplane manufacturer and approved by the certification authority for use in the operation of this airplane.

This Section provides the emergency and abnormal procedures to be performed in case of a system malfunction or failure, in order to protect passengers and/or crew from serious harm and to maintain the airworthiness of the airplane.

Some procedures require a landing at the nearest suitable airport. Such information is provided with the intent of establishing that the flight should be terminated at the pilot's discretion. It is the pilot's responsibility to use good judgement concerning the time and place to land, as well as to evaluate factors such as airplane condition, weather, etc.

The decision to reject takeoff should be considered if any undesirable event occurs.

However, it is emphasized that for fire or smoke that cannot be positively located and extinguished, an immediate descent, landing and passenger evacuation should be performed.

The procedures are presented as follows:

– The actions contained in a box are immediate actions. They must be performed expeditiously and from memory to minimize hazards. The other actions should be performed as soon as the condition permits.
– All the actions must be performed in the given order.

Procedures contained herein assume:

– Airplane systems are operating normally prior to the failure.
– Normal procedures have been properly accomplished.
– System controls are in normal condition prior to initiation of the associated procedure.
– Aural warnings are silenced as applicable. Master Warning/Caution lights are reset as soon as the failure is recognized.
– Oxygen masks and smoke goggles are donned when cabin altitude is excessive or ambient air is contaminated.
– Crew communication is established when required.
– Circuit breakers are checked.

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EMERGENCY PROCEDURES

SMOKE

AIR CONDITIONING SMOKE

Suspect Bleed..... CLOSE

Crossbleed..... OPEN

If procedure does not eliminate smoke, change bleed source supplying the air conditioning (including APU bleed).

SMOKE EVACUATION and
CABIN FIRE OR SMOKE Procedures ..... AS REQUIRED

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

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BAGGAGE COMPARTMENT SMOKE

EICAS WARNING: BAGG SMOKE
LIGHT: Master Warning

EICAS CAUTION BAGG ACCESS OPN	NOT DISPLAYED
Baggage Fire Extinguishing Button	PRESS

Diversion ..... CONSIDER

Altitude ..... MAINTAIN

Maintain the current flight level as long as possible.

Alternate Airport ..... IDENTIFY

Commence the diversion to land at the nearest suitable airport.

NOTE: - The extinguishing agent duration is approximately 75 minutes.

- Advise ground crew of possible presence of Halon vapors and smoke trapped in the compartment.

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CABIN FIRE OR SMOKE

Crew Oxygen Masks	DON, SELECT 100%
Smoke Goggles or PBE	DON
Recirculation Fan	OFF
Crew Communication	ESTABLISH

Diversion ..... CONSIDER

Fire or Smoke Source ..... IDENTIFY

AIR CONDITIONING SMOKE Procedure ..... AS REQUIRED

ELECTRICAL SYSTEM FIRE OR SMOKE Procedure ..... AS REQUIRED

SMOKE EVACUATION Procedure (if necessary) ..... ACCOMPLISH

Determine and extinguish any source of fire or smoke within the cabin.

After conducting the fire or smoke procedures, even though smoke has dissipated, land at the nearest suitable airport, unless it can be visually verified that the fire has been extinguished.

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ELECTRICAL SYSTEM FIRE OR SMOKE

CONDITION: Smoke visually confirmed as being from electrical source, or identified by odor.

Crew Oxygen Masks	DON, 100%
Smoke Goggles	DON
Crew Communication	ESTABLISH
Recirculation Fan	OFF

Land at the nearest suitable airport.

If smoke source can be determined:

Electrical Power to Associated Equipment ..... OFF
SMOKE EVACUATION Procedure ..... AS REQUIRED

If smoke source cannot be determined:

Shed Buses ..... OFF
If smoke dissipates after a reasonable time:

SMOKE EVACUATION Procedure ..... AS REQUIRED

If smoke does not dissipate after a reasonable time:

Bus Ties ..... OFF
APU Generator ..... OFF
Battery 2 ..... OFF
The Central Bus is deenergized.

If smoke dissipates after a reasonable time:

SMOKE EVACUATION Procedure ..... AS REQUIRED

If smoke does not dissipate after a reasonable time:

Fuel Pumps ..... 1B AND 2A OR 2C
Battery 2 ..... AUTO
Battery 1 ..... OFF
Generators 1 and 3 ..... OFF
DC Bus 1 and Essential Bus 1 are deenergized.

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If smoke dissipates after a reasonable time:

On Reversionary Panel 1:

SG ..... ON

Icing Conditions ..... EXIT/AVOID

Altitude ..... MAX 25000 ft, MIN MEA

Brake Effectiveness will be reduced.

Monitor fuel quantity indication 1 through FMS.

COM 2 on Digital Audio Panel 2 ..... ON

Do not set Thrust Lever 1 below idle in flight.

Anticipate flap actuation.

Do not actuate Thrust Reverser 1.

Landing configuration:

Flaps ..... 22°

V_{REF} ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: MULTIPLY BY 1.42 THE FLAPS 45° UNFACTORED LANDING DISTANCE.

SMOKE EVACUATION Procedure ..... AS REQUIRED

If smoke does not dissipate after a reasonable time:

Generators 1 and 3 ..... ON

Fuel Pumps ..... 2B AND 1A OR 1C

Battery 1 ..... AUTO

Battery 2 ..... OFF

Generators 2 and 4 ..... OFF

DC Bus 2 and Essential Bus 2 are deenergized.

If smoke dissipates after a reasonable time:

Icing Conditions ..... EXIT/AVOID

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Altitude ..... MAX 25000 ft, MIN MEA

Airspeed ..... MAX 250 KIAS

SG 2 ..... ON

Monitor fuel quantity indication 2 through FMS.

Do not set Thrust Lever 2 below idle in flight.

Do not actuate Thrust Reverser 2.

Brake effectiveness will be reduced.

When necessary to extend landing gear:

Gear Electrical Override ..... DOORS

Wait 3 seconds.

Gear Electrical Override ..... GEAR/DOORS

Anticipate flap actuation.

Landing configuration:

Flaps ..... 22°

V_{REF} ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: MULTIPLY BY 1.42 THE FLAPS 45° UNFACTORED LANDING DISTANCE.

SMOKE EVACUATION Procedure ..... AS REQUIRED

If smoke does not dissipate after a reasonable time:

Generators 2 and 4 ..... ON

Battery 2 ..... AUTO

APU Generator ..... ON

Bus Ties ..... AUTO

Shed Buses ..... AUTO

Backup Battery ..... OFF

SMOKE EVACUATION Procedure ..... AS REQUIRED

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LAVATORY SMOKE

EICAS WARNING: LAV SMOKE (if applicable)

Crew Oxygen Masks..... DON, 100%
Smoke Goggles ..... DON
Crew Communication ..... ESTABLISH
PBE (investigating crew member) ..... AS REQUIRED
Handheld Fire Extinguisher ..... AS REQUIRED

Inspect the lavatory and use the handheld fire extinguisher if necessary.

If smoke stops or decrease:

SMOKE EVACUATION Procedure ..... AS REQUIRED

If smoke does not stop or decrease:

LAND AT THE NEAREST SUITABLE AIRPORT.

CABIN FIRE OR SMOKE Procedure ..... ACCOMPLISH

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SMOKE EVACUATION

Cockpit Door ..... CLOSE
Recirculation Fan ..... OFF
Gasper Fan ..... OFF
Pressurization Manual Controller ..... 1 O'CLOCK
Wait 15 seconds.
Pressurization Mode Selector ..... MAN
Pressurization Manual Controller ..... AS REQUIRED
Passenger Oxygen ..... AS REQUIRED
To evacuate the smoke faster:

- Pressurization Manual Controller ..... UP
- Packs 1 and 2 ..... OFF
- Bleeds (engine or APU) ..... OPEN
- Emergency Descent ..... AS REQUIRED
- Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER

Recover cabin pressure as soon as smoke has been cleared.

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AIR CONDITIONING, PNEUMATICS, PRESSURIZATION

BLEED LEAK

EICAS WARNING: BLD 1 (2) LEAK or BLD APU LEAK
LIGHT: Master Warning

Crossbleed ..... CLOSE
Associated Bleed and APU Bleed ..... CLOSE
Altitude ..... MAX 25000 ft
MINIMUM MEA
Icing Conditions ..... EXIT/AVOID
Wait 3 minutes.
If the message remains on, but the associated advisory message on EICAS (BLD 1 or 2 VLV CLSD) indicates the valve is closed:
- Opposite Bleed ..... CLOSE
- Associated Bleed ..... OPEN
- Wait 3 minutes.
- If the message still remains:
  - Associated Bleed ..... CLOSE
  - Altitude ..... MEA OR 10000 ft WHICHEVER IS HIGHER

If the message remains on and is associated with a failed engine bleed valve (BLD 1 or 2 VLV FAIL caution message):
- Associated Thrust Lever ..... IDLE
- Wait 3 minutes.
- If the message still remains:
  - Associated Engine (or APU) ..... SHUTDOWN

BLEED OVERTEMPERATURE

EICAS WARNING: BLD 1 (2) OVTEMP
LIGHT: Master Warning

Crossbleed ..... OPEN
Cross-side Bleed ..... OPEN
Associated Bleed ..... CLOSE
Altitude ..... MAX 25000 ft
MINIMUM MEA

<u>WARNING:</u> IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

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EMERGENCY DESCENT

Cabin Crew	NOTIFY
Fasten Belts	ON
Thrust Levers	IDLE
Speed Brakes	OPEN
Airspeed	250 KIAS
Landing Gear	DOWN
Transponder	7700
Minimum Enroute Altitude	CHECK

CAUTION: THIS PROCEDURE ASSUMES THAT THE INTEGRITY OF THE STRUCTURE IS NOT AFFECTED. IF STRUCTURAL DAMAGE IS SUSPECTED, USE THE FLIGHT CONTROLS WITH CAUTION AVOIDING HIGH MANEUVERING LOADS AND REDUCING AIRSPEED AS APPROPRIATE.

NOTE: It is recommended that descent be initiated by a turn with a bank angle of 30°.

RAPID CABIN DEPRESSURIZATION

AURAL WARNING: CABIN

Crew Oxygen Masks	DON
Crew Communication	ESTABLISH
Emergency Descent	AS REQUIRED

Passenger Announcement ..... PERFORM
Passengers inside the baggage compartment must be told to return immediately to their seats.
Passenger Oxygen ..... AS REQUIRED
Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER

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APU

APU FIRE

EICAS WARNING: APU FIRE
AURAL WARNING: BELL
LIGHT: Master Warning

APU Fuel Shutoff Valve ..... CLOSE

APU Master Knob ..... OFF
APU FUEL SOV CLSD message
on EICAS ..... CONFIRM

If the valve is not confirmed closed and the fire message remains:
Right Electric Fuel Pumps ..... OFF
Crossfeed ..... OFF
Initiate a descent to 25000 ft or MEA, whichever is higher.

After 30 seconds, if the APU FIRE message remains displayed or if APU FIREDET FAIL message is displayed:
APU Fire Extinguishing Button ..... PRESS

Land at the nearest suitable airport.

WARNING: DO NOT ATTEMPT TO RESTART APU.

APU OVERTEMPERATURE

EICAS Indication: EGT enters amber or red range.

APU Bleed ..... CLOSE
Wait 10 seconds.
If EGT still in red or amber range:
APU Fuel Shutoff Valve ..... CLOSE
APU Master Knob ..... OFF

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DOORS, DITCHING, FORCED LANDING, EMERGENCY EVACUATION

DITCHING

WARNING: THE EMB-135BJ WAS NOT TESTED FOR DITCHING. BELOW ARE THE RECOMMENDED PROCEDURES, WHICH HAVE BEEN DEVELOPED BASED ON PREVIOUS EXPERIENCE.

ATC/Cabin Crew ..... NOTIFY
Transponder 7700
ELT ..... ON
Emergency Lights ..... ON
Passengers ..... PREPARE FOR DITCHING
Cabin (below 10000 ft) ..... DEPRESSURIZE

If necessary, inhibit EGPWS (D2 or J8) and Aural Warning System (B4 and E29 or B4 and E30) by pulling their circuit breakers.

When reaching 1000 ft:
- Fuel Transfer System ..... TURN OFF
  Set Fuselage Tank Transfer Knob to OFF.
- Air Conditioning 1 and 2 ..... OFF
- Engine Bleeds ..... CLOSE

Approach configuration:
- If in icing conditions:
  - Landing Gear ..... UP
  - Flaps ..... 22°
  - If it is not possible to achieve the selected flap position, maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0° to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22°	$V_{REF\ 45}$ + 5 KIAS

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If not in icing conditions:

Landing Gear ..... UP
Flaps ..... 45°
If it is not possible to achieve the selected flap position, maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0° to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22° to 44°	$V_{REF\ 45}$ + 5 KIAS
45°	$V_{REF\ 45}$

The final path should be made with airplane straight and level. Yaw angles should be limited to one ball of sideslip. If possible, ditching should be made parallel to the line of the wave crests.

Before touchdown:

Rate of Descent ..... LESS THAN 180 ft/MIN
Attitude ..... 4° NOSE UP

Upon water contact:

Start/Stop Selectors ..... STOP
EMERGENCY EVACUATION Procedure ..... ACCOMPLISH

WARNING: AIRPLANE EVACUATION MUST BE DONE THROUGH THE OVERWING EMERGENCY EXITS ONLY. DO NOT OPEN REMAINING DOORS.

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EMERGENCY EVACUATION

Parking Brake (if necessary)	APPLY
Cabin	DEPRESSURIZE
Fire Extinguishing Handles	PULL
APU Fuel Shutoff Valve	CLOSE
Electric Fuel Pumps	OFF
Electric Hydraulic Pumps	OFF
APU and Engine Fire Extinguishing Bottles (if necessary)	DISCHARGE

Cabin Crew ..... NOTIFY
Emergency Lights ..... ON
Evacuation ..... INITIATE

NOTE: - Cockpit door blow-out panels may be broken to be used as an alternative way to leave cockpit.

- In case of the cabin dual pocket door becomes jammed, push or kick at the center until door breaks free and then stow it.
- The fwd lavatory bi-fold door must be securely locked to ensure a free pathway.

ATC ..... NOTIFY
Before leaving the airplane:
Batteries ..... OFF

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FORCED LANDING

This procedure is recommended for landings with all engines inoperative or for landings in unprepared surfaces.

ATC and Cabin Crew ..... NOTIFY
Transponder 7700
ELT ..... ON
Emergency Lights ..... ON
Passenger ..... PREPARE FOR FORCED LANDING
Cabin (below 10000 ft) ..... DEPRESSURIZE

When committed to land:

If in icing conditions:

Landing Gear ..... AS REQUIRED
Flaps ..... 22°

If it is not possible to achieve the selected flap position, maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0° to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22°	$V_{REF\ 45}$ + 5 KIAS

If not in icing conditions:

Landing Gear ..... AS REQUIRED
Flaps ..... 45°

If it is not possible to achieve the selected flap position, maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0° to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22° to 44°	$V_{REF\ 45}$ + 5 KIAS
45°	$V_{REF\ 45}$

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If necessary, inhibit EGPWS (D2 or J8) and Aural Warning System (B4 and E29 or B4 and E30) by pulling their circuit breakers.

If crash is unavoidable, just before touchdown:

Fire Extinguishing Handles..... PULL
APU Fuel Shutoff Valve..... CLOSE
Fuel Transfer System ..... TURN OFF
Set Fuselage Tank Transfer Knob to OFF.

When the airplane comes to a complete stop:

EMERGENCY EVACUATION
Procedure..... ACCOMPLISH

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MAIN DOOR OPEN

EICAS WARNING: MAIN DOOR OPN

LIGHT: Master Warning

Fasten Seat Belts..... ON

Check doors pictorial indication on MFD Takeoff Page. If message is confirmed or if MFD is not available:

Door Internal Lock Indicator (red marks) ..... CHECK

If the door is confirmed locked:

Monitor cabin pressure.

If the door internal lock indicators are not aligned or it is not possible to maintain the pressurization, proceed:

Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER

Cabin..... DEPRESSURIZE

Land at the nearest suitable airport.

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ELECTRICAL POWER, LIGHTING

BATTERY OVERTEMPERATURE

EICAS WARNING: BATT 1 (2) OVTEMP
LIGHT: Master Warning

Associated Battery ..... OFF

If the associated BATT OFF BUS message is not on, land at the nearest suitable airport.

ELECTRIC ESSENTIAL TRANSFER FAILURE

EICAS WARNING: ELEC ESS XFR FAIL
LIGHT: Master Warning

If no generator is available:
LOSS OF ALL GENERATORS
Procedure ..... ACCOMPLISH
If the message remains:
Bus Ties ..... OFF
If the message still remains:
Shed Buses ..... OFF
Turn off equipment not essential for the flight. Begin with the equipment connected to DC Buses 1 and 2 (Circuit Breaker Panel rows D, E, F, G, H).
Land at the nearest suitable airport.

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LOSS OF ALL GENERATORS

EICAS CAUTION: GEN 1-2-3-4 OFF BUS and APU GEN OFF BUS
LIGHT: Master Caution
INDICATION: Generators voltage indication on MFD may be amber.

Airspeed ..... MAXIMUM 250 KIAS
Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER
Essential Power ..... ON
Crew Oxygen ..... AS REQUIRED
Passenger Oxygen ..... AS REQUIRED
Emergency Lights ..... OFF
If required, turn on Emergency Lights before landing.
Land at the nearest suitable airport.
Approach and landing configuration:
Landing Gear ..... DOWN

FLAPS POSITION	MINIMUM AIRSPEED
0° to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22° to 44°	$V_{REF\ 45}$ + 5 KIAS
45°	$V_{REF\ 45}$

CAUTION:
- MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.95.
- BATTERY DURATION IS 40 MINUTES. THIS DURATION IS VALID WITH UP TO THREE APU START ATTEMPTS IN FLIGHT.

NOTE:
- ISIS battery duration is 4 hours. The Airplanes S/N 484, 495, 528, 540 and 555 the ISIS battery duration is 40 minutes.
- The nose landing doors will open if DC Bus 2 is off, therefore the pilot should expect noise increase.

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NOTE: - The following warning messages will be presented: SPS 1-2 INOP and ICE COND-A/I INOP.

- The following caution messages will be presented: STICK PUSHER FAIL, SPS ADVANCED, GPWS INOP, WINDSHEAR INOP, CHECK PFD 1, IC BUS FAIL, APU GEN OFF BUS, GEN 1-2-3-4 OFF BUS, DC BUS 1-2 OFF, SHED BUS 1-2 OFF, 115 VAC BUS OFF, EMERG LT NOT ARMD, E1-2 CTL A-B FAIL, ENG 1-2 REV FAIL, LG AIR/GND FAIL, FLAP FAIL, SPOILER FAIL, PITOT 1-2 INOP, W/S 1-2 HEAT FAIL, TAT 1-2 HEAT INOP, STAB A/ICE FAIL, A/ICE SW OFF, WG 1-2 A/ICE FAIL, E1-2 A/ICE FAIL, AOA 1-2 HEAT INOP, ICE DET 1-2 FAIL and ICE DETECTORS FAIL.

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ENGINE

ATTCS FAILURE

EICAS WARNING: ATTCS FAIL
LIGHT: Master Warning

Thrust Levers	MAX

Another takeoff is not permitted.

DUAL ENGINE FAILURE

EICAS WARNING: ENG 1-2 OUT
LIGHT: Master Warning

Airspeed	MINIMUM 260 KIAS
Oxygen Mask (if required)	DON

Altitude ..... MAX 25000 ft
ENGINE AIRSTART Procedure ..... ACCOMPLISH
Transponder 7700
TCAS ..... TA ONLY

CAUTION: IF APU HAS BEEN USED TO START THE ENGINES, DO NOT ALTERNATE THE FADECS AFTER START.

NOTE: If APU is not available, only equipment supplied by the Essential DC Bus 1 and 2 will be available. Engine windmilling should drive engine driven pumps and supply hydraulic pressure.

If neither engine can be restarted:

FORCED LANDING Procedure ..... ACCOMPLISH

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ENGINE ATTCS NO MARGIN

EICAS WARNING: E1 (2) ATTCS NO MRGN
LIGHT: Master Warning

Do not take off.

CAUTION: BRAKES TEMPERATURE MUST BE CHECKED AFTER REJECTED TAKEOFFS.

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ENGINE FIRE, SEVERE DAMAGE OR SEPARATION

EICAS WARNING: ENG 1 (2) FIRE
LIGHT: Engine Fire Handle
AURAL WARNING: BELL (in case of fire)

Identify the affected engine.
Associated Thrust Lever ..... IDLE
Associated Start/Stop Selector ..... STOP
Associated Fire Extinguishing Handle ..... PULL (DO NOT ROTATE)
Fuel Transfer System ..... TURN OFF
Set Fuselage Tank Transfer Knob to OFF.

TCAS ..... TA ONLY

If E1 (2) FUELSOV CLSD advisory message is displayed on the EICAS:

If the fire message remains displayed after 30 seconds from pulling the Fire Handle:

Fire Extinguishing Handle (1st shot) ..... ROTATE

If the fire message remains displayed on EICAS after 30 seconds from 1st shot:

Fire Extinguishing Handle (2nd shot) ..... ROTATE

If E1 (2) FUELSOV CLSD advisory message is not displayed on the EICAS:

Crossfeed Selector Knob..... OFF
Associated Fuel Pumps..... OFF

If the fire message remains displayed after 30 seconds from selecting the fuel pumps to off:

Fire Extinguishing Handle (1st shot) ..... ROTATE

If the fire message remains displayed on EICAS after 30 seconds from 1st shot:

Fire Extinguishing Handle (2nd shot) ..... ROTATE

If an engine failure is associated to E1 (2) FIREDET FAIL message:

Fire Extinguishing Handle (one shot, if available) ... ROTATE

If an engine failure is associated to high vibration:

Autopilot.....DISENGAGE
Yaw Damper.....DISENGAGE
Airspeed.....REDUCE

Chase the better airspeed to reduce the vibration. Airspeeds around 180 KIAS are recommended.

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In flight:

Remaining Engine Thrust Rating	CON
Associated Bleed	CLOSE
APU (if serviceable)	START
APU Bleed	AS REQUIRED
Crossbleed	AS REQUIRED

Land at the nearest suitable airport.

EMERGENCY EVACUATION Procedure..... AS REQUIRED

WARNING: • DO NOT ATTEMPT TO RESTART ENGINE.

• IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

NOTE: - If in flight below 9700 ft, the air conditioning pack valves will close automatically. The APU may be used as pneumatic source by closing the remaining engine bleed valve.

- Engine will not shutdown with the Start/Stop Selector unless associated Thrust Lever is first moved to IDLE. If STOP is selected before Thrust Lever is retarded to IDLE, momentarily cycle START/STOP Selector to RUN and back to STOP.

ENGINE LOW N1

EICAS WARNING: E1 (2) LOW N1
LIGHT: Master Warning

Do not take off.

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ENGINE OIL LOW PRESSURE

EICAS WARNING: E1 (2) OIL LOW PRESS (may be presented)
LIGHT: Master Warning

Oil Pressure Indication..... CHECK
When conditions permit, reduce N2 below 88%, and monitor oil temperature and oil quantity indication.

Monitor oil pressure for the remainder of the flight. If oil pressure is in the red range:

Associated Thrust Lever..... IDLE
If oil pressure is still in the red range:
PRECAUTIONARY ENGINE
SHUTDOWN Procedure..... ACCOMPLISH

REJECTED TAKEOFF (AT OR BELOW V_1)

Thrust Levers.....	IDLE OR MAX REVERSE

Brakes..... APPLY MAXIMUM
Directional Control ..... MAINTAIN
Immediately after stopping:

PRECAUTIONARY ENGINE SHUTDOWN or
ENGINE FIRE, SEVERE DAMAGE OR
SEPARATION Procedure..... AS REQUIRED

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TAKEOFF WITH ENGINE FAILURE ABOVE V_1

Maximum Takeoff Thrust	CHECK
At V_R rotate the airplane to 14° (for flaps 9°).	
With positive rate of climb:	
Landing Gear	UP
Airspeed	V_2

Maintain V_2 up to the level off altitude. If maneuvering is required, maintain a maximum bank of 15°.

When reaching the level off height:

At V_2 + 15 KIAS	FLAPS UP
Airspeed	ACCELERATE TO FINAL SEGMENT SPEED

After flaps are retracted:

PRECAUTIONARY ENGINE SHUTDOWN or ENGINE FIRE, SEVERE DAMAGE OR SEPARATION Procedure	AS REQUIRED

After a maximum of 5 minutes at Takeoff Thrust:

Thrust Rating	AS REQUIRED

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FLIGHT CONTROLS

AILERON/ROLL TRIM RUNAWAY

Quick Disconnect Button	PRESS AND HOLD
Aileron Systems 1 and 2	OFF

Roll Trim Circuit Breaker (F22 or F23)	PULL
Quick Disconnect Button	RELEASE
Airspeed	MAXIMUM 250 KIAS

If necessary, turn on one aileron hydraulic system at a time to identify the failed system. Prepare to overcome the roll generated by the failed aileron system. If the failure is confirmed in one aileron system, the roll trim system may be used as required.

If the message AIL SYS 1-2 INOP is presented on EICAS:

Aileron is operating under mechanical reversion mode. Expect greater aileron control force. If required, both pilots should act together to control airplane. Avoid landing at airports with anticipated turbulence or crosswind. Perform a long final approach.

Approach and landing configuration:

Landing gear	DOWN
Flaps	22°
Airspeed	$V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

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INADVERTENT SPOILER OPENING IN FLIGHT

EICAS CAUTION: SPOILER FAIL (may be presented)
LIGHT: Master Caution
CONDITION: Sudden airspeed or altitude decrease.

Speed Brake	CLOSE

Speed Brake Circuit Breaker (F13) ..... PULL
Ground Spoiler Outboard
Circuit Breaker (F14) ..... PULL
Ground Spoiler Inboard
Circuit Breaker (F20 or F21) ..... PULL

If any panel is jammed closed, open or is floating:
Approach and landing configuration:
Landing Gear ..... DOWN
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

Do not reduce engine thrust during flare to avoid abrupt lateral and directional corrections before touchdown.

CAUTION:
- IN CASE OF PANEL JAMMED CLOSED OR FLOATING, TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.50.
- IN CASE OF PANEL JAMMED OPEN, TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

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JAMMED AILERON

CONDITION: Both control columns can not be moved to either side.

Aileron Disconnect	PULL

Autopilot ..... OFF
Airspeed ..... MAXIMUM 200 KIAS

NOTE: Roll rate with aileron disconnected is lower than with full system.

After control is regained:

If the copilot's aileron is operative, roll trim and artificial feel are available.

If the pilot's aileron is operative, roll trim and artificial feel are not available. Do not make sudden and large aileron inputs. Do not increase bank angle above 20°.

In either case, autopilot must not be reengaged.

If both ailerons are jammed, use rudder to control the airplane.

Avoid landing at airports with anticipated turbulence or crosswind.

Approach and landing configuration:

If in icing conditions:

Landing Gear ..... DOWN
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$ + 15 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.55.

If not in icing conditions:

Landing Gear ..... DOWN
Flaps ..... 45°
Airspeed ..... $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.13.

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JAMMED ELEVATOR

EICAS WARNING: SPS 1-2 INOP (may be presented)
EICAS CAUTION: STICK PUSHER FAIL
LIGHT: Master Warning and Master Caution lights illuminate if STICK PUSHER FAIL and SPS 1-2 INOP messages are presented.
CONDITION: Both control columns can not be moved either forward or backward.

Elevator Disconnect	PULL

Autopilot ..... OFF
Airspeed ..... MAXIMUM 200 KIAS
Pitch Trim ..... AS REQUIRED
Avoid landing at airports with anticipated turbulence or crosswind.
Approach and landing configuration:
- Landing Gear ..... DOWN
- Flaps ..... 22°
- Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

If both elevators are jammed, pitch trim may be used to land the airplane.
If left elevator is jammed, Stick Pusher will not be available.
Depending on the jammed elevator position, the remaining elevator power to flare the airplane will be reduced.
Do not reengage autopilot.

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

JAMMED RUDDER

CONDITION: Pedals can not be moved.
Command rudder through yaw trim. If not possible:
- Rudder System 2 ..... OFF

If still jammed:
- Rudder System 2 ..... ON
- Rudder System 1 ..... OFF

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If rudder control through pedals is not restored:

Airspeed..... MAXIMUM 200 KIAS

Avoid landing at airports with anticipated turbulence or crosswind.

Approach and landing configuration:

If in icing conditions:

Landing Gear..... DOWN
Flaps..... 22°
Airspeed ..... $V_{REF\ 45}$ + 15 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.85.

If not in icing conditions:

Landing Gear..... DOWN
Flaps..... 45°
Airspeed ..... $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.42.

If required, use asymmetric thrust to trim the airplane and do not reduce engine thrust during flare in order to avoid abrupt lateral and directional corrections before touchdown.

During approach, the pilot not flying must keep the Steering Disengage Button pressed to avoid inadvertent nose wheel deflection once on ground.

When the airplane is firmly on ground, use the Steering Handle to control the airplane still keeping the Steering Disengage Button pressed and then reduce the engine thrust to IDLE.

If necessary, use differential braking to steer the airplane.

NOTE: The Steering handle is effective even with the Steering Disengage Button pressed.

PITCH TRIM INOPERATIVE

EICAS WARNING: PTRIM MAIN INOP, PTRIM BACKUP INOP
LIGHT: Master Warning
EICAS CAUTION: AUTO TRIM FAIL
LIGHT: Master Caution

If at least one message is presented without pressing any Pitch Trim Switch:

Affected Pitch Trim System ..... OFF
Use the remaining Pitch Trim System.

If both Pitch Trim Systems become inoperative:
Pitch Trim Main System..... OFF
Pitch Trim Back Up System..... OFF
Consider landing at the nearest suitable airport.

If message is presented when pressing any Pitch Trim Switch:
Airspeed..... REDUCE
Airspeed reduction alleviates control column forces and may permit Pitch Trim command to be recovered.
If Pitch Trim command is reestablished continue using with the remaining Pitch Trim System.

NOTE: - Do not engage the Autopilot if the Main Pitch Trim System is inoperative.

- If only one segment of the Pitch Trim Switch is pressed, the TRIM aural warning message will be generated.

WARNING: IF PITCH TRIM COMMAND IS NOT REESTABLISHED, DO NOT OPEN SPEEDBRAKE.

If pitch trim command is not reestablished and the airplane presents a NOSE UP tendency:

Airspeed..... REDUCE
If it is necessary to reduce airspeed below 180 KIAS (or 200 KIAS in icing conditions), extend flaps to 9° (at 20000 ft maximum).
If it is necessary to reduce airspeed below 160 KIAS, extend flaps to 22°.

NOTE: Turning the airplane and extending the landing gear helps to maintain minimum airspeed with unwanted pitch up tendency.

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Pitch Trim Command ..... CHECK ALL SWITCHES

If pitch trim is recovered, retrim the airplane and proceed with flight normally.

If pitch trim is not recovered:

Consider landing at the nearest suitable airport.

Approach and landing configuration:

Landing Gear ..... DOWN

Flaps ..... 22°

Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

If pitch trim command is not reestablished and the airplane presents a NOSE DOWN tendency:

Airspeed ..... REDUCE

Below 250 KIAS:

Flaps (at 20000 ft maximum) ..... 9°

Below 180 KIAS:

Flaps ..... 22°

Approach and landing configuration:

Landing Gear ..... DOWN

NOTE: Gear extension should be delayed as long as possible.

Flaps ..... 22°

Airspeed ..... $V_{REF\ 45}$ + 25 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.75.

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PITCH TRIM RUNAWAY

EICAS WARNING: AUTOPILOT FAIL (may be presented)
LIGHT: Master Warning
EICAS CAUTION: AUTO TRIM FAIL (may be presented)
LIGHT: Master Caution

Quick Disconnect Button	PRESS AND HOLD

NOTE: Do not change flap setting.

At a safe altitude:

Pitch Trim Main System ..... OFF
Pitch Trim Back Up System ..... OFF
Quick Disconnect Button ..... RELEASE

WARNING: DO NOT OPEN THE SPEED BRAKE.

If control column forces are excessive, try to recover airplane control by turning one system on and trimming the airplane as necessary. Initiate with the Backup System. Leave the failed system off.

Autopilot ..... AS REQUIRED

If neither Main nor Backup Pitch Trim system is operative:

PITCH TRIM INOPERATIVE Procedure ..... ACCOMPLISH

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FUEL

AIRPLANE FUEL LOAD

EICAS WARNING: CHECK ACFT LOAD or FUEL XFER CRITICAL
LIGHT: Master Warning
Thrust Levers ..... REDUCE TO LONG RANGE SET
Fuselage Tank Transfer Knob ..... FUS 1 or FUS 2
Fuel Transfer System ..... CHECK STATUS
If fuel transfer is observed on MFD Fuel Page proceed with flight normally.

NOTE: The EICAS Warning will remain presented while any wing tank quantity is below 2200 lb and total fuselage tanks quantity is above 1760 lb.

If system is inoperative:
Check remaining fuel and consider diversion.
Avoid rapid maneuvers and flying in severe turbulence conditions.
Before touchdown:
Rate of Descent ..... MAXIMUM 450 ft/min
Touch smoothly the runway surface. Reduce the engine thrust only after the touchdown.

FUEL LOW LEVEL

EICAS WARNING: FUEL 1 (2) LO LEVEL
LIGHT: Master Warning
Thrust Levers ..... REDUCE TO LONG RANGE SET
Level the airplane and check available fuel quantities.
If fuel quantity is sufficient, complete the flight normally.
If fuel quantity is not sufficient:
Avoid pitch attitudes in excess of 10° nose down or 10° nose up attitude, uncoordinated maneuvers and negative g's.
CROSSFEED OPERATION
Procedure ..... AS REQUIRED
Land at the nearest suitable airport.

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HYDRAULICS, LANDING GEAR AND BRAKES

LANDING GEAR/LEVER DISAGREE

EICAS WARNING: LG/LEVER DISAGREE

In flight:

Airspeed.....MAXIMUM 200 KIAS
Landing Gear.....CYCLE
If the message persists:

In a retraction:
Landing Gear.....DOWN
Airspeed .....MAXIMUM 250 KIAS
Land at the nearest suitable airport. Leave and avoid icing conditions.

In an extension:
ABNORMAL LANDING GEAR
EXTENSION Procedure.....ACCOMPLISH

On ground:
Consider to stop the airplane. Takeoff is not permitted.

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ICE AND RAIN PROTECTION, OXYGEN

ANTI-ICING INOPERATIVE IN ICING CONDITIONS

EICAS WARNING: ICE COND-A/I INOP with any or all Anti-Icing System EICAS CAUTION

LIGHT: Master Warning

On ground, whenever the message is displayed, do not take off and perform the test below:

Thrust Levers..... IDLE
Ice Detection Override Knob ..... AUTO
Ice Detection Test Knob ..... 1, THEN 2
Test knob must be held for 5 seconds in each test position.

For each side separately, check that OPEN inscriptions in the anti-icing buttons are flashing and that ICE DET1 (2) FAIL caution message and ICE CONDITION advisory message are displayed on the EICAS.
If any OPEN inscription does not flash do not take off.
If the message ICE COND-A/I INOP persists do not take off.
If the message ICE COND-A/I INOP disappears within 60 seconds:
Takeoff..... ACCOMPLISH

In flight:

Ice Detection Override Knob ..... ALL
If necessary, refer to the specific anti-icing system failure.
If the message persists, exit and avoid icing conditions.

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NAVIGATION, FLIGHT INSTRUMENTS, AUTOPILOT

AUTOPILOT FAILURE

EICAS WARNING: AUTOPILOT FAIL
LIGHT: Master Warning
Aural Warning: AUTOPILOT (only below 2500 ft radio altitude, when autopilot is disconnected)

Autopilot ..... DISENGAGE

Trim airplane as required.

NOTE: If associated with autopilot hardover a sudden deviation from the expected flight path may occur.

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WARNING SYSTEMS

STALL PROTECTION INOPERATIVE

EICAS WARNING: SPS 1 (2) INOP

LIGHT: Master Warning

Associated Stall Protection System..... OFF

Avoid skidding the airplane.

If in icing conditions:
Add 15 KIAS to go-around speed.
Approach and landing configuration:

Landing Gear..... DOWN
Flaps..... 22°
Airspeed..... $V_{REF\ 45}$ + 15 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.55.

If not in icing conditions:
Add 5 KIAS to go-around speed.
Approach and landing configuration:

Landing Gear..... DOWN
Flaps..... 45°
Airspeed..... $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.13.

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STICK PUSHER FAILURE

EICAS WARNING: SPS 1-2 INOP

LIGHT: Master Warning

EICAS CAUTION: STICK PUSHER FAIL

LIGHT: Master Caution

Control Column ..... PUSH FORWARD TO NEUTRAL

Stall Protection is not available.

Airspeed ..... 1.2 V_{SR} MINIMUM

TAKEOFF CONFIGURATION WARNING

EICAS WARNING: NO TAKEOFF CONFIG

LIGHT: Master Warning

Aural Warning: Voice Messages TAKEOFF-BRAKES, TAKEOFF-FLAPS, TAKEOFF-SPOILERS, TAKEOFF-TRIM or TAKEOFF-FUEL

Do not takeoff.

Airplane Configuration ..... CORRECT

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STALL RECOVERY

ACTIONS AND CALLOUTS		
	PF	**PNF**
Upon Stick Shaker activation or feeling the stall buffeting	• Applies nose down and levels the wings until out of stall. • Moves both Thrust Levers to MAX. • Accelerates the airplane to a safe speed and retracts the Speed Brakes. • After recovery, return to the normal flight path.	• Checks Auto Pilot disengaged. • Verifies that both thrust levers are on the MAX position. • Monitors altitude and speed. Performs any necessary callout. • Reconfigure the airplane as necessary.

After recovery, if the airplane is in landing or takeoff configuration, retract landing gear and flaps as in a normal go-around procedure.

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ABNORMAL PROCEDURES

AIR CONDITIONING, PNEUMATICS AND PRESSURIZATION

APU BLEED VALVE FAIL

EICAS CAUTION: APU BLD VLV FAIL
LIGHT: Master Caution

If valve failed closed:
Engine Bleed ..... AS REQUIRED

If valve failed open and a duct leak exists:
APU ..... SHUTDOWN

BLEED LOW TEMPERATURE

EICAS CAUTION: BLD 1 (2) LOW TEMP
LIGHT: Master Caution

If temperature indication on MFD (ECS and Pneumatic Page) is in the green range or the pointer is out of view, disregard the message. Monitor the bleed temperature.
If the pointer on MFD indicates low temperature (white range):

Associated Thrust Lever..... ADVANCE
Adjust associated Thrust Lever until the message disappears or until the pointer of the failed side reaches the green range or the remaining pointer.
If Thrust Lever advance required to clear the message exceeds 86% N2, report to the maintenance personnel.

If the message persists or if the MFD is not available:
Associated Bleed..... CLOSE
Altitude..... MAX 25000 ft
MINIMUM MEA

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

If the message persists, avoid or exit icing conditions.

NOTE: Ice Detection Override Knob must be set to ALL during at least 2 minutes either after exiting icing conditions or after ICE CONDITION advisory message has disappeared.

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BLEED VALVE CLOSED

EICAS ADVISORY: BLD 1 (2) VLV CLSD

If required and situation permitting:
- Associated Pack ..... OFF THEN ON
- Associated Bleed ..... OPEN

If it is not possible to open bleed valve:
- BLEED VALVE FAILURE Procedure..... ACCOMPLISH

BLEED VALVE FAILURE

EICAS CAUTION: BLD VLV 1 (2) FAIL
LIGHT: Master Caution

If BLD 2 VLV CLSD message is also displayed on the EICAS:
- Crossbleed..... OPEN
- Altitude ..... MAX 25000 ft MINIMUM MEA

If BLD 1 VLV CLSD message is also displayed on the EICAS:

If APU not serviceable:
- Crossbleed..... OPEN
- Altitude ..... MAX 25000 ft MINIMUM MEA

If APU serviceable:
- Crossbleed..... CLOSE
- APU..... START
- APU Bleed ..... OPEN
- Altitude ..... MAX 37000 ft MINIMUM MEA

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

If BLD 1 (2) VLV CLSD message is not displayed on the EICAS:
Monitor the system for the remainder of the flight.

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CROSSBLEED FAILURE

EICAS CAUTION: CROSS BLD FAIL
LIGHT: Master Caution
If the valve has failed open, associated to a duct leakage or engine overtemperature:

Both Engine Bleeds	CLOSE
APU Bleed	CLOSE
Altitude	MAXIMUM MEA OR 10000 ft
Icing Conditions	EXIT/AVOID

CROSSBLEED SELECTED OFF

EICAS CAUTION: CROSSBLD SW OFF
LIGHT: Master Caution
Crossbleed Knob ..... AUTO

ELECTRONIC BAY OVERTEMPERATURE

EICAS CAUTION: ELEKBAY OVTEMP
LIGHT: Master Caution
Turn off the redundant system and equipment unessential for the present phase of flight.

The following equipment is installed in the forward electronic compartment:

- ADC;
- Transponder Mode S;
- Integrated Communication Unit;
- Aural Warning Computer;
- FMS;
- IRS;
- Passenger Address;
- Integrated Navigation Unit;
- Inverters;
- Dimmers;
- Backup Battery.

If the message remains, maintain a cross-check between main and standby instruments. In case a disagreement arises, assume the main instruments indication is unreliable and land at the nearest suitable airport.

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HIGH STAGE VALVE FAILURE

EICAS CAUTION: HS VLV 1 (2) FAIL

Monitor bleed temperature.

If the bleed temperature is too high:
BLEED OVERTEMPERATURE
Procedure ..... AS REQUIRED

If the bleed temperature is too low:
BLEED LOW TEMPERATURE
Procedure ..... AS REQUIRED

WARNING: **IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.**

HIGH ALTITUDE LANDING AND TAKEOFF FUNCTION

EICAS CAUTION: HI ALT LDG-T/O

NOTE: The use of the High Altitude function is prohibited.

If message is displayed:
HIGH ALT Button on MFD ..... PRESS

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PACK OVERHEAT

EICAS CAUTION: PACK 1 (2) OVHT

Associated Temperature & Mode Selector ..... AUTO/ FULL COLD
Cabin Temperature ..... MONITOR
Associated Pack ..... OFF
Wait 3 minutes.
Associated Pack ..... ON

If message remains:

- Associated Temperature & Mode Selector ..... MANUAL/ FULL COLD
- Cabin Temperature ..... MONITOR
- Associated Pack ..... OFF
- Wait 3 minutes.
- Associated Pack ..... ON

If the message still remains:

- Associated Pack ..... OFF
- Altitude ..... MAX 25000 ft MINIMUM MEA

If both packs have been shutoff:

- Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER
- Pressurization Mode Selector ..... MAN
- Pressurization Manual Controller ..... AS REQUIRED
- If required:
  - Pressurization Manual Controller ..... FULL UP

NOTE: At least one bleed source, engines or APU, must be kept open.

PACK OVERLOAD

EICAS CAUTION: PACK 1 (2) OVLD

Recirculation Fan ..... ON
Associated Temperature & Mode Selector ..... AUTO/ 12 O'CLOCK
Associated Pack ..... OFF
Wait 3 minutes.
Associated Pack ..... ON
If the message remains on:
- Associated Temperature & Mode Selector ..... MANUAL/ 12 O'CLOCK
- Associated Pack ..... OFF
- Wait 3 minutes.
- Associated Pack ..... ON

If message still remains on:
- Associated Pack ..... OFF
- Altitude ..... MAX 25000 ft MINIMUM MEA
- Associated Engine Bleed ..... OPEN

If both packs have been shutoff:
- Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER
- Pressurization Mode Selector ..... MAN
- Pressurization Manual Controller ..... AS REQUIRED
- If required:
  - Pressurization Manual Controller ..... FULL UP

NOTE: At least one bleed source, engines or APU, must be kept open.

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PACK VALVE CLOSED

EICAS ADVISORY: PACK 1 (2) VLV CLSD

If required and situation permitting:
Associated Pack ..... OFF, THEN ON

If it is not possible to open pack valve:
Altitude ..... MAX 25000 ft
MINIMUM MEA

If both packs are closed:
Altitude ..... MEA OR
10000 ft,
WHICHEVER
IS HIGHER

PACK VALVE FAILURE

EICAS CAUTION: PACK 1 (2) VLV FAIL

If valve failed closed (pack valve closed advisory message is on):
Altitude ..... MAX 25000 ft
MINIMUM MEA

If valve failed open and it is necessary to turn off associated air conditioning system:
Crossbleed ..... CLOSE
Associated Bleed ..... CLOSE
APU Bleed (if left pack failed) ..... CLOSE
Altitude ..... MAX 25000 ft
MINIMUM MEA

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

If both packs have been shutoff:
Altitude ..... MEA OR
10000 ft,
WHICHEVER
IS HIGHER

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Pressurization Mode Selector ..... MAN
Pressurization Manual Controller ..... AS REQUIRED
If required:
Pressurization Manual Controller ..... FULL UP

NOTE: At least one bleed source, engines or APU, must be kept open.

PRESSURIZATION AUTOMATIC SYSTEM FAILURE/ CABIN DEPRESSURIZATION

EICAS CAUTION: PRESN AUTO FAIL (may be presented)
LIGHT: Master Caution

Pressurization Manual Controller ..... 11 O'CLOCK POSITION
Pressurization Mode Selector ..... MAN
Pressurization Manual Controller ..... AS REQUIRED

If unsuccessful:
Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER
Pressurization Manual Controller ..... FULL DOWN
Pressurization Mode Selector ..... AUTO
Pressurization Dump Button ..... PRESS

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RAM AIR VALVE FAILURE

EICAS CAUTION: RAM AIR VLV FAIL
LIGHT: Master Caution

Air Conditioning System ..... MONITOR

If the PACK 1 (2) OVLD or PACK 1 (2) OVHT caution message appears:

- Associated Pack ..... OFF
- Altitude ..... MAX 25000 ft MINIMUM MEA

If both packs have been shutoff:

- Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER
- Pressurization Mode Selector ..... MAN
- Pressurization Manual Controller ..... AS REQUIRED
- If necessary:
  - Pressurization Manual Controller ..... FULL UP
- At least one bleed source, engines or APU, must be kept open.

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LOSS OF PRESSURIZATION INDICATION

AIRPLANES PRE-MOD. SB 145LEG-00-0007

Use the remaining indications to maintain cabin altitude below 10000 ft, according to the table below:

AIRPLANE ALTITUDE (ft)	CABIN ALTITUDE (ft)	DIFFERENTIAL PRESSURE (psi)
10000	800	4.2
11000	1100	4.4
12000	1300	4.7
13000	1500	4.9
14000	1700	5.2
15000	2000	5.4
16000	2200	5.6
17000	2400	5.8
18000	2600	6.0
19000	2800	6.2
20000	3100	6.4
21000	3300	6.6
22000	3500	6.7
23000	3800	6.8
24000	4000	7.0
25000	4200	7.1
26000	4500	7.2
27000	4700	7.4
28000	4900	7.5
29000	5200	7.6
30000	5400	7.7
31000	5600	7.8
32000	5900	7.8
33000	6200	7.9
34000	6400	8.0
35000	6700	8.0
36000	7000	8.0
37000	7300	8.1
38000	7700	8.1
39000	8000	8.1

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AIRPLANES POST-MOD. SB 145LEG-00-0007 OR EQUIPPED WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

Use the remaining indications to maintain cabin altitude below 10000 ft, according to the table below:

AIRPLANE ALTITUDE (ft)	CABIN ALTITUDE (ft)	DIFFERENTIAL PRESSURE (psi)
10000	600	4.3
11000	900	4.5
12000	1100	4.8
13000	1300	5.0
14000	1500	5.3
15000	1700	5.5
16000	1900	5.7
17000	2100	6.0
18000	2300	6.2
19000	2500	6.4
20000	2700	6.6
21000	3000	6.7
22000	3200	6.9
23000	3400	7.0
24000	3600	7.2
25000	3800	7.3
26000	4000	7.5
27000	4200	7.6
28000	4500	7.7
29000	4700	7.8
30000	4900	7.9
31000	5100	8.0
32000	5400	8.1
33000	5600	8.1
34000	5800	8.2
35000	6100	8.2
36000	6400	8.3
37000	6700	8.3
38000	7100	8.3
39000	7400	8.3
40000	7700	8.3
41000	8000	8.4

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AUXILIARY POWER UNIT

APU AUTOMATIC SHUTDOWN

EICAS CAUTION: APU FAIL
LIGHT: Master Caution

If shutdown occurs with APU running:
Do not try to restart the APU.

If shutdown occurs during APU start cycle and provided there is no obvious safety hazard:
APU START Procedure ..... AS REQUIRED
If APU fails to restart, two more APU start attempts may be accomplished.

NOTE: Refer to APU STARTER LIMITS in AOM Limitations section between start attempts.

APU OIL LOW PRESSURE/OIL HIGH TEMPERATURE

EICAS CAUTION: APU OIL LO PRESS or APU OIL HI TEMP
LIGHT: Master Caution

If the APU is not essential for the flight:
APU ..... SHUTDOWN

If APU is essential, monitor APU EGT and RPM.
If the APU EGT enters the red or amber range, apply the APU OVERTEMPERATURE Procedure.
If RPM enters red range:
APU ..... SHUTDOWN

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DOORS AND MISCELLANEOUS

BAGGAGE/ACCESS DOOR OPEN

EICAS CAUTION: BAGGAGE DOOR OPN or ACCESS DOORS OPN
LIGHT: Master Caution

Avoid rapid maneuvers.
If it is not possible to maintain the pressurization, proceed:

Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER
Pressurization ..... MONITOR

BIRD IMPACT

Against windshield:

CRACKED WINDSHIELD Procedure ..... APPLY

Against leading edge (wing or tail) or fuselage:

Maneuverability may be reduced. Refer to the associated leading edge deicer failure procedure, if necessary.

At a safe altitude, perform a controllability check step by step up to the landing configuration. Define a safe configuration and V_{REF} for approach and landing.

The use of a greater V_{REF} will cause the landing distance to increase.

Against engine:

PRECAUTIONARY ENGINE SHUTDOWN Procedure (if necessary) ..... APPLY

Land at the nearest suitable airport.

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EMERGENCY EXIT OPEN

EICAS CAUTION: EMERG EXIT OPN
LIGHT: Master Caution

Fasten Belts ..... ON
Verify door handle pushed in and remove passengers from the seats near the associated emergency exit.
If emergency exit is not confirmed locked or it is not possible to maintain the pressurization:

Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER
Cabin Pressure ..... MONITOR

IMPAIRED OR CRACKED WINDSHIELD

Associated Windshield Heating ..... OFF
If only the outer layer (glass) is cracked, no action is required.
If not, proceed as follows:

Cockpit Door ..... CLOSE
Altitude ..... MEA OR BELOW 10000 ft, WHICHEVER IS HIGHER
Cabin ΔP = 1 psi ..... SET

NOTE: Pressurization Manual Controller must be used to reach and maintain cabin altitude steady while descending.

Airspeed ..... MAXIMUM 250 KIAS
Smoke Goggle ..... DON
In case both windshields are impaired:

Cabin (below 10000 ft) ..... DEPRESSURIZE
Airspeed ..... MAX 140 KIAS MINIMUM V_{REF}

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Check no loose objects in the cockpit.
If necessary:
Direct Vision Window ..... REMOVE
Landing must be made by looking through Direct Vision Window.

NOTE: Intercommunication will be impossible with window removed.

INTERNAL BAGGAGE ACCESS DOOR OPEN

EICAS CAUTION: BAGG ACCESS OPN
LIGHT: Master Caution

Check doors pictorial on MFD Takeoff Page. If message is confirmed or if MFD is not available:
Door ..... CLOSE AND LOCK

LANDING BELOW -40°C

Before touchdown:
Rate of Descent..... LESS THAN 300 ft/MIN

After landing, report to the maintenance personnel.

LIGHTNING STRIKE REPORT

In case of lightning strike, report the incident to the maintenance personnel, by filling the LIGHTNING STRIKE INCIDENT REPORT form, part I (see model on the next page).
The part II of the LIGHTNING STRIKE INCIDENT REPORT form is reserved to the ground personnel, and is presented in the Aircraft Maintenance Manual.

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EMB-135BJ LIGHTNING STRIKE INCIDENT REPORT

Part I (to be completed by flight crew)

Conditions at time of strike:

- Operator: _____ Date of incident: _____
- ACFT S/N: _____ Flight no.: _____
- Route: From _____ To: _____
- Altitude: _____ ft Airspeed: _____ kt
- Flight phase: Approach ☐ Climb ☐ Level Flight ☐
  Other: _____
- Weather: Cloud type % Cover Ceiling (ft) Top at (ft) OAT (°C)
  _____ _____ _____ _____ _____
  Rain ☐ Sleet ☐ Hail ☐ Snow ☐ None ☐
- Was St. Elmo's fire visible before strike? Yes ☐ No ☐
- Any effects on:

DC power system: _____

Flight controls: _____

Engine: _____

Avionics: _____

Other (describe): _____

- Any effects on personnel, such as: Flash blindness: _____
  Electrical shock: _____

Part I completed by: _____

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MAIN DOOR BLOCKED

LIGHT: Door Blocked (Entrance Control Panel)

To open the door on ground:

Check that the door opening area is free of both people and ground equipment.

Hydraulic System 1 ..... OFF

Main Door Alternative Opening Valve ..... ACTUATE DURING 2 MINUTES

Unlock the door and open it.

OVERWEIGHT LANDING

Approach and landing configuration:

If in icing conditions:

Landing Gear ..... DOWN

Flaps ..... 22°

Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

If not in icing conditions:

Landing Gear ..... DOWN

Flaps ..... 45°

Airspeed ..... $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.06.

Before touchdown:

Rate of Descent ..... MAXIMUM 300 ft/min

Touch smoothly the runway surface. Reduce the engine thrust only after the touchdown.

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STRUCTURAL DAMAGE

On evidence of structural damage:

Airspeed Under Turbulence	BELOW 200 KIAS
Load Factor	BELOW 2.0

Refer to Buffet Onset Envelope to obtain altitude and airspeed for the desired load factor.

Aileron and Rudder Deflection	BELOW 30%

If fuselage is damaged:

Altitude	MEA OR BELOW 10000 ft, WHICHEVER IS HIGHER
Cabin	DEPRESSURIZE

When landing:

Rate of Descent	LESS THAN 300 ft/MIN

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ELECTRICAL POWER, LIGHTING

115 V AC BUS OFF

EICAS CAUTION: 115 VAC BUS OFF
LIGHT: Master Caution

AC Power ..... OFF, THEN ON

If unsuccessful:

AC Power ..... OFF

APU CONTACTOR CLOSED

EICAS CAUTION: APU CNTOR CLSD
LIGHT: Master Caution

Bus Ties ..... OFF

Battery 2 ..... OFF

BACK-UP BATTERY OFF BUS

EICAS CAUTION: BKUP BATT OFF BUS
LIGHT: Master Caution

Backup Battery ..... VERIFY ON

BATTERY OFF BUS

EICAS CAUTION: BATT 1 (2) OFF BUS
LIGHT: Master Caution

Affected Battery ..... AUTO

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DC BUS OFF

EICAS CAUTION: DC BUS 1 (2) OFF
LIGHT: Master Caution

Bus Ties ..... OVERRIDE

If associated bus is still off:

Bus Ties ..... AUTO

Remaining Buses ..... CHECK

If DC Bus 2 is off:

Airspeed ..... MAXIMUM 250 KIAS

NOTE: The nose landing doors will open, therefore the pilot should expect noise increase.

Icing Conditions ..... EXIT/AVOID

ELECTRICAL EMERGENCY ABNORMAL TRANSFER

EICAS CAUTION: ELEC EMERG ABNORM
LIGHT: Master Caution

Essential Power ..... OFF

APU Generator ..... ON

CAUTION: IF APU GENERATOR IS NOT AVAILABLE OR IF THE MESSAGE REMAINS, BATTERY DURATION WILL BE 40 MINUTES.

Land at the nearest suitable airport.

EMERGENCY LIGHTS NOT ARMED

EICAS CAUTION: EMERG LT NOT ARMD
LIGHT: Master Caution

Emergency Lighting Selector ..... ARM

If unsuccessful, check that Attendant Emergency Light Control Button is set to NORM.

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ESSENTIAL BUS 1 OFF

EICAS CAUTION: ESS BUS 1 OFF
LIGHT: Master Caution
MFD Indication: ESS BUS may be amber.

On Reversionary Panel 1:

SG Button ..... PUSH IN

NOTE: Do not press the SG button again within a 3-second interval. In some cases, this action may cause loss of PFD indication. The display indication can be recovered by reverting the MFD to PFD and returning to the normal configuration.

Fuel Pump 1 ..... 1B OR 1C

NOTE: Start selecting the Fuel Pump 1B.

Fuel Pump 2 ..... 2A OR 2C

Icing Conditions ..... EXIT/AVOID

Crossfeed ..... OFF

NOTE: Use asymmetric thrust to improve or maintain wing fuel balance.

Altitude ..... MAX 25000 ft, MINIMUM MEA

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.

Monitor fuel quantity indication 1 through FMS.

Fuselage Fuel Transfer System ..... CHECK STATUS

If fuel transfer is not observed consider a diversion.

Brake effectiveness will be reduced.

If the EICAS is energized:

COM 2 on Digital Audio Panel 2..... PUSH IN

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If the EICAS is not energized:

DAU 1 on EICAS Rev ..... PUSH IN

At pilot's discretion, on Reversionary Panel 1:

MFD Knob..... EICAS

COM 2 on Digital Audio Panel 2 ..... PUSH IN

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.49.

ESSENTIAL BUS 2 OFF

EICAS CAUTION: ESS BUS 2 OFF
LIGHT: Master Caution
MFD Indication: ESS BUS may be amber.

Fuel Pump 1..... 1A OR 1C

Fuel Pump 2..... 2B OR 2C

NOTE: Start selecting the Fuel Pump 2B.

Icing Conditions ..... EXIT/AVOID

Altitude ..... MAX 25000 ft, MINIMUM MEA

Monitor fuel quantity indication 2 through FMS.

Fuselage Fuel Transfer System..... CHECK STATUS

If fuel transfer is not observed consider a diversion.

When necessary to extend landing gear:

ABNORMAL LANDING GEAR EXTENSION Procedure ..... ACCOMPLISH

CAUTION: • DO NOT USE CROSSFEED.

• TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.49.

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ESSENTIAL BUS 1-2 OFF

EICAS CAUTION: ESS BUS 1-2 OFF

Bus Ties ..... OFF
MFD Electrical Page ..... CHECK
If both DC buses are energized:

Batteries 1 and 2 ..... OFF
Check if the essential buses remain off.

Associated ESS BUS OFF Procedure ..... ACCOMPLISH

If only DC BUS 1 is energized:

Battery 1 ..... OFF
Check which essential bus is off.

Associated ESS BUS OFF Procedure ..... ACCOMPLISH

If only DC BUS 2 is energized:

Battery 2 ..... OFF
Check which essential bus remains off.

Associated ESS BUS OFF Procedure ..... ACCOMPLISH

GENERATOR BEARING FAILURE

EICAS ADVISORY: GEN1 (2, 3, 4) BRG FAIL

Crew awareness.

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GENERATOR OFF BUS

EICAS CAUTION: GEN 1 (2, 3, 4) OFF BUS or APU GEN OFF BUS
LIGHT: Master Caution

Affected Generator.....OFF, THEN ON

If the generator does not reset:

APU Generator .....AS REQUIRED

CAUTION: • IF ALL GENERATORS ARE OFF BUS, CABIN WILL DEPRESSURIZE. REFER TO LOSS OF ALL GENERATORS PROCEDURE.

• BATTERY DURATION IS 40 MINUTES.

GENERATOR OVERLOAD

EICAS CAUTION: GEN 1 (2, 3, 4) OVLD or APU GEN OVLD
LIGHT: Master Caution

Shed Buses.....OFF

If the message remains:

Electrical Load (on affected generator) .....REDUCE

If APU generator is not affected and any generator is overloaded:

APU Generator .....ON

SHED BUS OFF

EICAS CAUTION: SHED BUS 1 (2) OFF
LIGHT: Master Caution

If message is confirmed and shed buses are off, monitor the system for the remainder of the flight.

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ENGINE

ABNORMAL ENGINE START

Abort engine start immediately when:

- Only on ground, no light-up in 10 seconds after the first fuel flow indication.

  NOTE: The start should not be aborted if fuel flow drops to zero kph (pph) immediately after light-up.

- ITT approaches start limit.
- N2 remains steady or decreases for more than 30 seconds.
- N2 indicates no rotation up to 10 seconds after the start command.
- Any unusual noise or vibration occurs.
- Engine instruments indicate abnormal conditions.
- Visible burning on the exhaust pipe.
- Oil pressure does not reach at least 34 psi after the engine reaches stabilized idle.

To abort start:
Associated Thrust Lever..... IDLE
Start/Stop Selector ..... STOP

If fire occurs or engine does not shutdown:
Fire Extinguishing Handle..... PULL
ENGINE DRY MOTORING Procedure..... ACCOMPLISH

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CHECK ENGINE PERFORMANCE

EICAS ADVISORY: CHECK A1P (A1E) (A2) PERF
Associated Engine Performance ..... CHECK

ENGINE ABNORMAL VIBRATION

Associated Thrust Lever ..... REDUCE TO KEEP VIBRATION WITHIN LIMITS

CAUTION: CONTINUOUS VIBRATION ABOVE LIMITS MAY DAMAGE THE ENGINE.

If vibration indication remains out of limits:
PRECAUTIONARY ENGINE SHUTDOWN Procedure ..... ACCOMPLISH

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ENGINE AIRSTART

Affected engine:

- One Electric Fuel Pump (A or B) ..... ON
- Ignition ..... AUTO
- Start/Stop Selector ..... STOP
- Engine Bleed ..... CLOSE
- Thrust Lever ..... IDLE

Airspeed and Altitude..... REFER TO AIRSTART ENVELOPE

Perform an assisted start or windmilling, as required:

CAUTION: IN ICING CONDITIONS DO NOT USE APU BLEED START, TO AVOID LOSS OF ANTI-ICE SYSTEM PERFORMANCE.

Assisted Start:

Crossbleed Start:

- N2 (operating engine)..... ABOVE 80%
- Crossbleed ..... AUTO OR OPEN
- Engine Bleed (operating engine)..... OPEN
- Start/Stop Selector ..... START, THEN RUN
- Engine Indication ..... MONITOR

  Check ignition. Check N2 rising. Observe limits. Abort start immediately if an Abnormal Engine Start is detected.
- Engine Bleed (operating engine)..... AS REQUIRED

NOTE: For AE3007A1E engines only, if the engine airstart was unsuccessful, reset the FADEC of the inoperative engine and reattempt engine airstart.

APU Bleed Start:

- APU ..... START
- APU Bleed ..... OPEN
- Crossbleed ..... AUTO OR OPEN
- Engine Bleed (operating engine)..... CLOSE
- Start/Stop Selector ..... START, THEN RUN

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Engine Indication ..... MONITOR
Check ignition. Check N2 rising. Observe limits. Abort start immediately if an Abnormal Engine Start is detected.
Engine Bleed (operating engine) ..... AS REQUIRED

NOTE: For AE3007A1E engines only, if the engine airstart was unsuccessful, reset the FADEC of the inoperative engine and reattempt engine airstart.

Windmilling Start:
Airspeed ..... ABOVE 260 KIAS
Minimum N2 ..... 10%
Start/Stop Selector ..... START, THEN RUN
ITT and N2 ..... MONITOR
Observe limits. Abort start immediately if an Abnormal Engine Start is detected.
Engine Bleed (operating engine) ..... AS REQUIRED

NOTE:
- Windmilling start will be slower than an assisted start.
- For AE3007A1E engines only, if the engine airstart was unsuccessful, reset the FADEC of the inoperative engine and reattempt engine airstart.
- Windmilling start with N2 above 30% and increasing, the loss of altitude may be minimized, by reducing airspeed.
- Initiate windmilling start with N2 as high as possible. Windmilling starts are not possible with N2 below 10%. Once N2 is below 10%, it may not be recovered.
- ITT peaks may occur during windmilling starts above 10000 ft with airspeed below 290 kt. In this case, the engine may operate above the ITT limit, up to 850°C, for a maximum of 5 seconds. Abort the start if the engine remains operating above the ITT limit for more than 5 seconds.

After Start:
Affected Engine Bleed ..... AS REQUIRED
Crossbleed ..... AUTO
APU Bleed ..... AS REQUIRED

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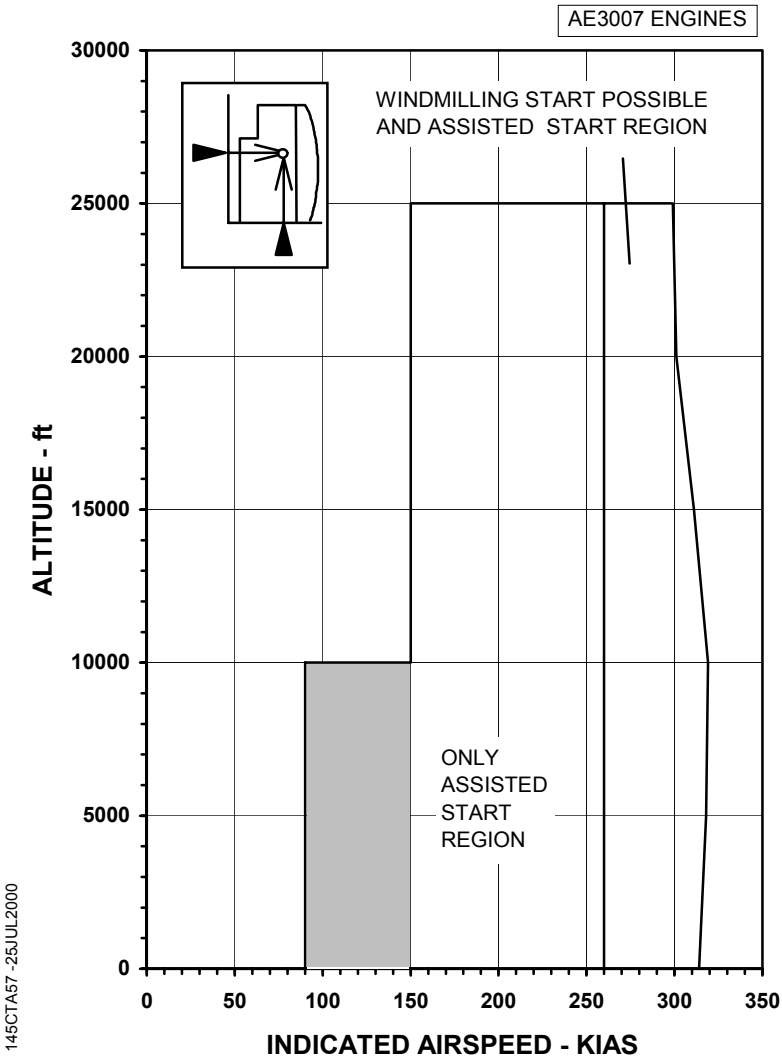
ENGINE AIRSTART ENVELOPE



NOTE: Shaded area may be below 1.23 V_{SR}.

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ENGINE ATS SHUTOFF VALVE OPEN

EICAS CAUTION: E1 (2) ATS SOV OPN
LIGHT: Master Caution

Associated Bleed (including APU Bleed) ..... CLOSE
Crossbleed ..... CLOSE

On ground:
- Associated Thrust Lever ..... IDLE
- Associated Start/Stop Selector ..... STOP
- If engine shutdown does not occur:
  - Fire Extinguishing Handle ..... PULL (DO NOT ROTATE)

In flight:
- Altitude ..... MAX 25000 ft
- Exit and avoid icing conditions.

ENGINE CONTROL FAILURE

EICAS CAUTION: E1 (2) CTL FAIL (may be presented)
LIGHT: Master Caution

CAUTION: DO NOT MANUALLY ALTERNATE ASSOCIATED FADECS.

Verify the associated FADEC in control.
Associated FADEC ..... RESET
If FADEC alternates automatically:
- Avoid quick movements of the associated Thrust Lever.

NOTE: Thrust Lever movements may cause surge or an uncommanded engine shutdown.

- If the associated engine thrust is no longer controllable:
  - PRECAUTIONARY ENGINE SHUTDOWN Procedure ..... AS REQUIRED

If FADEC does not alternate automatically:
- Engine control is recovered.

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ENGINE DRY MOTORING

Dry motor the engine for a minimum of 30 seconds to clear it of unburned fuel prior to attempting another start.

FADEC Control Knob..... ALTN
Check alternation of FADEC-in-control indication on the EICAS.

CAUTION: IF FADEC DOES NOT ALTERNATE, DO NOT PROCEED WITH THE ENGINE DRY MOTORING.

Ignition ..... OFF
Check IGN OFF indication on EICAS display.
Start/Stop Selector..... START, THEN RUN

NOTE: If N2 indicates no rotation after 10 seconds, abort dry motoring attempt immediately.

After 30 seconds:
Start/Stop Selector ..... STOP
Ignition Selector..... AUTO

ENGINE FAILURE

Remaining Engine Thrust Rating..... CON
TCAS ..... TA ONLY
Altitude..... MAX 25000 ft
MINIMUM MEA
ENGINE AIRSTART Procedure ..... AS REQUIRED

WARNING: **IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.**

NOTE: If in flight below 9700 ft, the air conditioning pack valves will close automatically. The APU may be used as pneumatic source by closing the remaining engine bleed valve.

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ENGINE FPMU NOT DISPATCHABLE

EICAS CAUTION: E1 (2) FPMU NO DISP
Do not Takeoff.

ENGINE FUEL FILTER IMPENDING BYPASS

EICAS ADVISORY: E1 (2) FUEL IMP BYP

If both engine fuel filters are affected:
Land at the nearest suitable airport.

ENGINE LIMITS EXCEEDANCE

EICAS CAUTION: E1 (2) EXCEEDANCE
LIGHT: Master Caution
Do not Takeoff.

ENGINE NO TAKEOFF DATA

EICAS CAUTION: ENG NO TO DATA
LIGHT: Master Caution
Enter takeoff data before takeoff.

ENGINE NOT DISPATCHABLE

EICAS CAUTION: E1 (2) NO DISP
LIGHT: Master Caution
Crew awareness.

ENGINE OIL FILTER IMPENDING BYPASS

EICAS ADVISORY: E1 (2) OIL IMP BYP
Crew awareness.

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ENGINE OIL HIGH PRESSURE

Oil Pressure, Oil Temperature,
Oil Level, Engine Vibration ..... MONITOR

If oil temperature, and/or oil level, and/or engine vibration, exceeds normal operation range:
Associated Procedure ..... ACCOMPLISH

ENGINE OIL HIGH TEMPERATURE

Associated Thrust Lever ..... REDUCE
Reduce thrust lever and maintain the temperature within limits.

If oil temperature remains high, above 25000 ft:
Altitude ..... MAX 25000 ft
MINIMUM MEA

Monitor oil temperature for the remainder of the flight.
If limits cannot be maintained, perform a precautionary engine shutdown to prevent engine damage.

ENGINE OIL LOW LEVEL

MFD Indication: Oil level digits become amber.
Oil Pressure, Oil Temperature ..... MONITOR

If oil temperature exceeds normal operation range:
ENGINE OIL HIGH
TEMPERATURE Procedure ..... ACCOMPLISH

If oil temperature is in amber range or already reached the red range:
PRECAUTIONARY ENGINE
SHUTDOWN Procedure ..... ACCOMPLISH

NOTE: Oil quantity indication will decrease at engine start 0.5 to 1.5 quarts due to oil circulation in the system.

ENGINE OIL LOW PRESSURE

When conditions permit, reduce N2 below 88%, and monitor oil temperature.

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ENGINE OUT

EICAS CAUTION: ENG1 (2) OUT
LIGHT: Master Caution

If during takeoff, above V_1 and associated with an engine flameout:
TAKEOFF WITH ENGINE FAILURE Procedure ..... ACCOMPLISH

If in flight:
PRECAUTIONARY ENGINE SHUTDOWN Procedure ..... ACCOMPLISH
ENGINE AIRSTART Procedure ..... AS REQUIRED

ENGINE OVERTEMPERATURE

Associated Thrust Lever ..... REDUCE

If the condition remains:
Associated Bleed ..... CLOSE
Altitude ..... MAX 25000 ft MINIMUM MEA

If the condition remains:
PRECAUTIONARY ENGINE SHUTDOWN or ENGINE FIRE, SEVERE DAMAGE OR SEPARATION Procedure ..... ACCOMPLISH

ENGINE REFERENCE ANTI-ICE DISAGREE

EICAS CAUTION: ENG REF A/I DISAG
LIGHT: Master Caution
Check ice protection system selection against takeoff data entered.

ENGINE SHORT DISPATCHABLE

EICAS ADVISORY: E1 (2) SHORT DISP
Crew awareness.

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ENGINE TAILPIPE FIRE

CONDITION: Tailpipe fire was detected visually by crew or ground personnel. No EICAS message displayed.

Affected engine:
- Thrust Lever ..... IDLE
- Start/Stop Selector ..... STOP
- Ignition ..... OFF
- Fuel Pump ..... OFF
- XFEED Selector Knob ..... OFF
- Start/Stop Selector ..... START, THEN RUN

ITT ..... MONITOR
ATC ..... NOTIFY
Wait 90 seconds.
Associated Start/Stop Selector ..... STOP
Associated Fire Extinguishing Handle ..... PULL (DO NOT ROTATE)

If fire is not extinguished while the engine is motored, ground personnel support must be requested.

ENGINE REVERSER FAILURE/DISAGREE

EICAS CAUTION: ENG1 (2) REV FAIL or
ENG1 (2) REV DISAGREE
LIGHT: Master Caution

Do not takeoff.

On ground, during landing:
- Affected Thrust Lever ..... IDLE

In flight:
- N1 ..... CHECK
- If N1 is decreasing:
  - Associated Thrust Lever ..... IDLE
  - Airspeed ..... MAXIMUM 200 KIAS
  - PRECAUTIONARY ENGINE SHUTDOWN Procedure ..... ACCOMPLISH
- Land at the nearest suitable airport.

FADEC NOT DISPATCHABLE

EICAS CAUTION: FADEC ID NO DISP
LIGHT: Master Caution
Crew awareness.

LOSS OF ENGINE INDICATIONS

CONDITION: Loss of Thrust Mode, ITT, N1 and N2 indications.

If engine is operative but the indications are lost, proceed:
Associated FADEC ..... RESET

If engine indications are still not available:
Associated FADEC ..... ALTN

If engine indications are still not available:
Monitor the remaining engine indications.
PRECAUTIONARY ENGINE SHUTDOWN Procedure ..... AS REQUIRED

ONE ENGINE INOPERATIVE APPROACH AND LANDING

CONDITION: Loss of Thrust Mode, ITT, N1 and N2 indications.
Inoperative Engine Thrust Lever ..... IDLE
Landing Gear ..... DOWN
Thrust Rating ..... TAKEOFF MODE

When landing is assured:
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.44.

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ONE ENGINE INOPERATIVE GO-AROUND

Quick Disconnect Button ..... PRESS
Go Around Button ..... PRESS
Engine Thrust Lever ..... MAX

Rotate to go-around attitude (10° nose up).
Flaps ..... 9°
With positive rate of climb:
Landing Gear ..... UP
Minimum Airspeed ..... APPROACH CLIMB SPEED
At level off height, proceed as for TAKEOFF WITH ENGINE FAILURE Procedure.

NOTE: - Limiting bank angle to 5° towards operative engine improves climb performance.
- During the GO-AROUND procedure, the DON'T SINK aural warning may sound. In this case monitor the sink rate and follow the GO-AROUND guidance.

PRECAUTIONARY ENGINE SHUTDOWN

Associated Thrust Lever ..... IDLE
Associated Start/Stop Selector ..... STOP

NOTE: Engine will not shutdown with the START/STOP Selector unless associated Thrust Lever is first moved to IDLE. If STOP is selected before Thrust Lever is retarded to IDLE, momentarily cycle START/STOP Selector to RUN and back to STOP.

If engine shutdown does not occur:
Fire Extinguishing Handle ..... PULL (DO NOT ROTATE)
Verify N2 and ITT decreasing below IDLE values.
Remaining Engine Thrust Rating ..... CON
TCAS ..... TA ONLY
APU ..... START
APU Bleed ..... AS REQUIRED
Crossbleed ..... AS REQUIRED

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WARNING: **IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURE.**

NOTE: If in flight below 9700 ft, the air conditioning pack valves will close automatically. The APU may be used as pneumatic source by closing the remaining engine bleed valve.

THRUST LEVER FAILURE

EICAS CAUTION: ENG1 (2) TLA FAIL
LIGHT: Master Caution
Associated FADEC ..... RESET

If Thrust Lever command is not available:
Associated FADEC ..... ALTN

If thrust lever still does not respond thrust can be partially controlled through the Thrust Rating Buttons.

PRECAUTIONARY ENGINE SHUTDOWN Procedure ..... AS REQUIRED

THRUST LEVER STOP FAILURE

EICAS ADVISORY: E1 (2) IDL STP FAIL
Be careful when reducing engines near IDLE.

CAUTION: NEVER SET THRUST LEVERS BELOW IDLE INFLIGHT.

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FIRE PROTECTION

FIRE DETECTION FAILURE

EICAS CAUTION: E1 (2) FIREDET FAIL or APU FIREDET FAIL

Engine or APU ..... MONITOR

If engine fire or overheat is suspected or if E1 (2) FIREDET FAIL message appears simultaneously with engine failure:

ENGINE FIRE, SEVERE DAMAGE OR SEPARATION Procedure ..... ACCOMPLISH

If APU fire or overheat is suspected or if APU FIREDET FAIL message appears simultaneously with APU failure:

APU FIRE Procedure ..... ACCOMPLISH

FIRE EXTINGUISHING INOPERATIVE

EICAS CAUTION: E1 (2) EXTBTLA INOP, E1 (2) EXTBTLB INOP, APU EXTBTL INOP or BAGG EXTBTL INOP (if installed)

On Engines:

Only one discharge will be available from the remaining bottle, to protect both engines against fire.

On APU:

Consider shutting APU down (or not starting it) if bleed extraction or electrical generation is not essential.

On Baggage Compartment:

In flight:

If associated with the BAGG SMOKE message, land at the nearest suitable airport.

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FLIGHT CONTROLS

AILERON ARTIFICIAL FEEL INOPERATIVE

CONDITION: Control Wheel inputs become light and do not center by itself.

Airspeed ..... BELOW 200 KIAS

Do not make sudden and large aileron inputs.

AILERON SYSTEM INOPERATIVE

EICAS CAUTION: AIL SYS 1 (2) INOP
LIGHT: Master Caution
Associated Aileron System ..... OFF
Airspeed ..... MAXIMUM 250 KIAS

If the remaining system fails:
- Remaining Aileron System ..... OFF
- Quick Disconnect Button ..... PRESS

Aileron is operating under mechanical reversion mode. Expect greater aileron control force. If required, both pilot should act together to control airplane. Avoid landing at airports with anticipated turbulence or crosswind. Perform a long final approach.

Approach and landing configuration:
- Landing Gear ..... DOWN
- Flaps ..... 22°
- Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

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ASYMMETRIC RUDDER OPERATION

CONDITION: Rudder pedals require more effort to be moved to one side than the other. Also, the rudder and yaw trim commands provide different results for both sides.

Rudder System 2 ..... OFF

If the failure persists:

Rudder System 2 ..... ON

Land at the nearest suitable airport.

The remainder of the flight should be made with both rudder systems operational, which provides better rudder performance than in mechanical reversion mode.

FLAP LOW ACTUATION SPEED

EICAS ADVISORY: FLAP LOW SPEED

Anticipate flap actuation.

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FLAP SYSTEM FAILURE

EICAS CAUTION: FLAP FAIL
LIGHT: Master Caution

Flaps may be at intermediate positions. Maintain airspeed according to the following:

FLAPS POSITION	MAXIMUM AIRSPEED
1° to 9°	250 KIAS
10° to 22°	180 KIAS
23° to 45°	145 KIAS

When landing maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0° to 8°	$V_{REF\ 45}$ + 30 KIAS
9° to 21°	$V_{REF\ 45}$ + 10 KIAS
22° to 44°	$V_{REF\ 45}$ + 5 KIAS
45°	$V_{REF\ 45}$

CAUTION:
- IF FLAP FAILED BETWEEN 22° AND 45° POSITION EXIT OR AVOID ICING CONDITIONS.
- TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.70 WHEN LANDING WITH FLAPS BETWEEN ZERO AND 8°.
- TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.40 WHEN LANDING WITH FLAPS BETWEEN 9° AND 21°.
- TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.20 WHEN LANDING WITH FLAPS BETWEEN 22° AND 44°.

NOTE:
- Depending on the flap position, EGPWS warnings may sound. If necessary, inhibit EGPWS by pulling its circuit breaker (D2 or J8).
- If flap indication on EICAS is not available, use flap position marks on the wing.

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GUST LOCK FAILURE

LIGHT: GUST LOCK (amber)

On ground:

Do not takeoff.

In flight:

Do not push control column full Nose Down.
Avoid flying in turbulence conditions.
Consider diversion.
Avoid landing at airports with anticipated turbulence or crosswind.

PITCH TRIM SWITCH INOPERATIVE

EICAS CAUTION: PTRIM CPT SW FAIL, PTRIM F/O SW FAIL, PTRIM BKP SW FAIL

LIGHT: Master Caution

On ground:

Deenergize the airplane and energize it again.

In flight:

Use another serviceable switch.

RUDDER ARTIFICIAL FEEL INOPERATIVE

CONDITION: Rudder pedals become extremely light and do not center by themselves. Yaw Trim does not operate properly, although its pictorial indicates normal condition.

Rudder System 2 ..... OFF

If the failure persists:

Rudder System 1 ..... OFF

Expect greater rudder pedal force. If required, both pilots should act together to control the airplane. Consider the use of aileron to help in yaw control, and asymmetric thrust to control the airplane.

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Avoid landing at airports with anticipated turbulence, gusts or crosswind.

If landing in icing conditions:

Landing Gear ..... DOWN
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

RUDDER HARDOVER PROTECTION FAILURE

EICAS CAUTION: RUD HDOV PROTFAIL
LIGHT: Master Caution

On ground:

Do not takeoff.

In flight:

Hardover protection is not available.

RUDDER OVERBOOST

EICAS CAUTION: RUDDER OVERBOOST
LIGHT: Master Caution

Rudder System 2 ..... OFF

If the message disappears:

Continue flight with rudder system 2 off.

Below 135 KIAS:

Rudder System 2 ..... ON

If message remains:

Rudder System 2 ..... ON
Rudder System 1 ..... OFF
Continue flight with the rudder system 1 off.

Below 135 KIAS:

Rudder System 1 ..... ON

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RUDDER SYSTEM INOPERATIVE

EICAS CAUTION: RUDDER SYS 1 (2) INOP or RUDDER SYS 1-2 INOP

If only one rudder system is affected:

Affected Rudder System ..... OFF

If RUDDER SYS 1-2 INOP message is displayed:

Rudder System 2 ..... OFF

If RUDDER SYS 1-2 INOP message is still displayed:

Rudder System 1 ..... OFF

CAUTION: IF THE MESSAGE IS PRESENTED FOLLOWING A RUDDER RUNAWAY, DO NOT TURN ON THE SYSTEMS.

Both Rudder Systems ..... ON

If RUDDER SYS 1-2 INOP message is still displayed:

Expect greater rudder pedal force. If required, both pilots should act together to control the airplane. Consider the use of aileron to help in yaw control, and asymmetric thrust to control the airplane.

Avoid landing at airports with anticipated turbulence, gusts or crosswind.

If in icing conditions:

Landing configuration:

Landing Gear ..... DOWN
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.45.

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If not in icing conditions:

Landing configuration:

Landing Gear ..... DOWN
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.06.

RUDDER/YAW TRIM RUNAWAY

Quick Disconnect Button	PRESS AND HOLD
Rudder Systems 1 and 2	OFF

Yaw Trim Circuit Breaker (F12) ..... PULL
Quick Disconnect Button ..... RELEASE
Strongly push pedal opposite to the side of the uncommanded yaw, while applying ailerons to control roll.
If necessary, turn on one rudder system at a time to identify the failed system. Prepare to overcome the yaw generated by the failed system.

If both systems remain inoperative:

Expect greater rudder pedals force. Both pilots should act together to control the airplane, if required. Consider the use of aileron to help in yaw control, and asymmetric thrust to trim the airplane.
Do not use yaw trim system for the remainder of the flight.
Avoid landing at airports with anticipated turbulence or crosswind.
Land at the nearest suitable airport.

CAUTION: DO NOT TRY TO RESET THE RUDDER SYSTEMS.

SPEED BRAKE LEVER DISAGREE

EICAS CAUTION: SPBK LVR DISAGREE
LIGHT: Master Caution
Speed Brake Lever ..... CLOSE

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STIFFENED ELEVATOR

EICAS WARNING: AUTOPILOT FAIL (may be presented),
SPS 1-2 INOP (may be presented)
EICAS CAUTION: STICK PUSHER FAIL (may be presented)
CONDITION: Elevator control columns movement is stiffened, but not jammed.

Autopilot ..... DISENGAGE
Pitch Trim ..... AS REQUIRED
Avoid abrupt and large elevator inputs.
Consider descent to a warmer altitude.
Freezing conditions may lead to de/anti-icing fluids residues to stiffen the elevator.

If the elevator control columns movement is not recovered:
JAMMED ELEVATOR Procedure ..... ACCOMPLISH

UNCOMMANDED ELEVATOR OR AILERON DISCONNECTION

LIGHT: Amber ELEV DISC or AIL DISC on Control Stand.
CONDITION: One control column or control wheel moves independently of the other.

Affected Surface Disconnection Handle ..... PULL
Avoid landing at airport with anticipated turbulence or crosswind.

NOTE: Since aileron artificial feel unit is installed in the copilot's side, avoid use of pilot's control wheel, when aileron is disconnected.

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FUEL

APU FUEL LOW PRESSURE

EICAS CAUTION: APU FUEL LO PRESS
LIGHT: Master Caution

Select another right electric fuel pump (2A, 2B or 2C) on the associated tank.
If message remains, repeat the procedure.

APU FUEL SHUTOFF VALVE CLOSED

EICAS ADVISORY: APU FUEL SOV CLSD
LIGHT: Master Caution

If valve is open and APU is running normally, disregard the message.

APU FUEL SHUTOFF VALVE FAILED

EICAS CAUTION: APU FUEL SOV INOP
LIGHT: Master Caution

Check that APU Fuel Shutoff Button is not pressed.
If valve remains closed and it is not possible to restart the APU:
APU Master Knob..... OFF

If APU is running normally, disregard the message.

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ENGINE FUEL SHUTOFF VALVE CLOSED

EICAS ADVISORY: E1 (2) FUELSOV CLSD
LIGHT: Master Caution

Fire Extinguishing Handle ..... CHECK IN
If engine is running normally, disregard the message.
If valve remains closed and it is not possible to restart the affected engine:
PRECAUTIONARY ENGINE
SHUTDOWN Procedure ..... ACCOMPLISH
Land at the nearest suitable airport.

ENGINE FUEL SHUTOFF VALVE FAILURE

EICAS CAUTION: E1 (2) FUEL SOV INOP
LIGHT: Master Caution

Engine Fuel Indications ..... MONITOR
If the message has been presented during a fire procedure:
Crossfeed ..... OFF
Associated Fuel Pumps ..... OFF

If valve is confirmed closed during normal operation (fuel flow decreasing to zero):
Fire Extinguishing Handle ..... CHECK IN
If valve remains closed and it is not possible to restart the affected engine, land at the nearest suitable airport.
PRECAUTIONARY ENGINE
SHUTDOWN Procedure ..... ACCOMPLISH
If engine is running normally, disregard the message.

FUEL CROSSFEED FAILURE

EICAS CAUTION: FUEL XFEED FAIL
LIGHT: Master Caution

Crossfeed ..... OFF
Fuel Imbalance ..... MONITOR
Asymmetric Thrust ..... AS REQUIRED
If crossfeed failed open:
Avoid uncoordinated maneuvers, flying in turbulence conditions and negative g's.

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FUEL CROSSFEED MISCOMMAND

EICAS CAUTION: FUEL XFEED MISCMD
LIGHT: Master Caution

Crossfeed Selector Knob..... OFF
Fuel Imbalance ..... CHECK
Crossfeed Selector Knob..... AS REQUIRED
Check crossfeed selector knob properly positioned to correct wing fuel imbalance.

FUEL CROSSFEED OPEN

EICAS ADVISORY: FUEL XFEED OPEN

If not required, close crossfeed.

FUEL LOW PRESSURE

EICAS CAUTION: E1 (2) FUEL LO PRESS
LIGHT: Master Caution

Select another electric fuel pump on the associated tank.
If all pumps in one tank are inoperative:

Altitude..... MAX 25000 ft
MINIMUM MEA

If operating with TS-1 KEROSENE:
Land at the nearest suitable airport.

Avoid rapid thrust lever movements and set minimum required thrust.

NOTE: If required, Crossfeed may be open above 25000 ft.

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FUEL LOW TEMPERATURE

EICAS CAUTION: FUEL TANK LO TEMP or E1 (2) FUEL LO TEMP
LIGHT: Master Caution

WARNING: ENGINE FLAMEOUT MAY OCCUR IF FUEL TANK LO TEMP MESSAGE IS PRESENTED, OR E1 (2) FUEL LO TEMP IS PRESENTED WITHOUT FUEL ICING INHIBITOR.

On ground:

Low temperature in the engine (E1 or E2 FUEL LO TEMP):

Before takeoff, check that fuel icing inhibitor has been added to the fuel.

Low temperature in the tank (FUEL TANK LO TEMP):

Check tank temperature. If message is confirmed or if MFD is not available, do not take off.

In flight:

Descend to lower altitude and monitor engine indications as long as the message remains.

If the low temperature is in the tank (FUEL TANK LO TEMP) and MFD is available, tank temperature may be checked on the MFD Fuel Page, before descending.

FUEL TANK VENTILATION VALVE OPEN

EICAS CAUTION: FUEL TK VENT OPEN
LIGHT: Master Caution

On ground:

Do not take off.

In flight:

While there is fuel in aft auxiliary fuel tanks:

Altitude	MAX 25000 ft MINIMUM MEA
Airspeed	MAXIMUM 300 KIAS

Avoid pitch attitudes in excess of 5° nose up attitude, uncoordinated maneuvers and negative g's.

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FUEL TRANSFER SYSTEM CHECK

EICAS CAUTION: FUEL XFER CHECK
LIGHT: Master Caution

Fuselage Tank Transfer Knob ..... FUS 1 OR FUS 2

FUEL TRANSFER SYSTEM INOPERATIVE

EICAS CAUTION: FUEL XFER INOP or FUEL XFER 1 (2) INOP
LIGHT: Master Caution

On ground:
Do not take off.

In flight:
Fuel Transfer Pump Selector Button ..... SELECT ANOTHER

If message persists:
Altitude ..... ABOVE 20000 ft

If message persists:
Fuselage Tank Transfer Knob ..... ALTERNATE FUS TK

Fuel Quantity ..... MONITOR
Check remaining fuel quantity available and consider diversion.

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FUSELAGE FUEL IMBALANCE

EICAS CAUTION: FUSELAGE FUEL IMB
LIGHT: Master Caution

If fuselage fuel imbalance is confirmed:
Fuselage Tank Transfer Knob ..... OFF
Check MFD Fuel page for auxiliary tanks total quantity.
If any left side auxiliary tanks quantity decreases:
Fuselage Tank Transfer Knob ..... FUS 1

If any right side auxiliary tanks quantity decreases:
Fuselage Tank Transfer Knob ..... FUS 2

If auxiliary tanks quantity remains steady:
Fuselage Tank Transfer Knob ..... OFF

If message persists during approach:
Autopilot ..... DISENGAGE

REFUELING COMPARTMENT DOOR OPEN

EICAS CAUTION: FUELING DOOR OPN
LIGHT: Master Caution

On ground:
Check the door for positive locking before takeoff. If the message remains, repair is required before takeoff.

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SUSPECTED FUEL LEAK

CONDITION:
- FMS Fuel Remaining quantity is above the MFD or EICAS total fuel indication.
- Excessive Fuel flow from one of the engines.
- Fuel imbalance develops.
- Fuel quantity of a tank decreases at an abnormal rate.

If FMS Fuel Remaining quantity is less than 300 kg (660 lb) above the MFD Total Fuel indication:

If left wing presents lower level:

Crossfeed Selector ..... LOW 1

If right wing presents lower level:

Crossfeed Selector ..... LOW 2

Set engines at the same N1 and compare the Fuel Flow indications.

If a discrepancy is noticed and is consistent with the imbalance (high fuel flow with fuel low level at the same side), a fuel leakage may be occurring after the fuel flow sensor.

Land at the nearest suitable airport.

The pilot may consider to shutdown the associated engine in order to minimize fuel loss:

PRECAUTIONARY ENGINE SHUTDOWN Procedure ..... ACCOMPLISH

Fire Extinguishing Handle ..... PULL (DO NOT ROTATE)

Altitude ..... MAX 25000 ft, MIN MEA

If no discrepancy is noticed, when the desired balance is achieved:

Crossfeed Selector ..... OFF

Monitor Total Fuel Indication in MFD Fuel Page with FMS Fuel Remaining information.

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If FMS Fuel Remaining quantity is more than 300 kg (660 lb) above the MFD Total Fuel indication, a fuel leakage may be occurring before the fuel flow sensor. Proceed as follows:

Land at the nearest suitable airport.

Crossfeed Selector ..... OFF
Affected Fuel Tank..... IDENTIFY
Associated Thrust Lever ..... IDLE
Start/Stop Selector..... STOP

NOTE: Engine will not shutdown with the Start/Stop Selector unless associated Thrust Lever is first moved to IDLE. If STOP is selected before Thrust Lever is retarded to IDLE, momentarily cycle Start/Stop Selector to RUN and back to STOP.

Fire Extinguishing Handle..... PULL (DO NOT ROTATE)
Thrust Rating ..... CONTINUOUS
Altitude ..... MAX 25000 ft, MIN MEA

If the leak continues and is on the right side tank:

APU..... OFF

Right tank supplies fuel to the APU.

WARNING: IF IN ICING CONDITIONS, REFER TO SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS PROCEDURES.

ONE ENGINE INOPERATIVE APPROACH AND LANDING Procedure.....ACCOMPLISH

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WING FUEL IMBALANCE

EICAS CAUTION: WING FUEL IMB
LIGHT: Master Caution

If wing fuel imbalance is confirmed:
CROSSFEED OPERATION
Procedure ..... ACCOMPLISH

WING TANKS OVERFLOW

EICAS CAUTION: FUEL XFER OVFLOW
LIGHT: Master Caution

Fuselage Tank Transfer Knob ..... OFF
When required:
Fuselage Tank Transfer Knob ..... FUS 1 OR FUS 2
Wing Fuel Tank Quantity ..... MONITOR
Monitor wing fuel quantity and turn Fuselage Tank Transfer Knob OFF when wing fuel reaches 2400 kg (5290 lb).

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HYDRAULICS, LANDING GEAR AND BRAKES

ABNORMAL LANDING GEAR EXTENSION

Landing Gear Lever ..... DOWN
Gear Electrical Override ..... DOORS
Wait 3 seconds:
Gear Electrical Override ..... GEAR
Landing Gear Indication ..... CHECK

If any of the gear is not locked down:
Landing Gear Lever ..... UP
Gear Electrical Override ..... NORMAL
Wait 10 seconds.
Free Fall Lever ..... ACTUATE
Actuate the free fall lever up to full uplock position.

Landing Gear Lever ..... DOWN
Landing Gear Indication ..... CHECK
If the failure persists:
Free Fall Lever ..... CYCLE
Cycle the free fall lever as long as necessary, but limited to 10 times, to lower the landing gear. Wait 20 seconds, with the lever in the uplock position, between each cycle. Verify lever at full uplock position after cycling.

If the failure still persists:
PARTIAL OR GEAR UP
LANDING Procedure ..... ACCOMPLISH

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BOTH HYDRAULIC SYSTEMS FAILURE

EICAS CAUTION: HYD SYS 1-2 FAIL, RUDDER SYS 1-2 INOP, AIL SYS 1-2 INOP
EICAS ADVISORY: E1-2 HYD PUMP FAIL
LIGHT: Master Caution
INDICATION: Hydraulic pressure indication on MFD may be amber.

Airspeed ..... MAXIMUM 250 KIAS

Check hydraulic systems fluid quantity:

If any hydraulic system fluid quantity is in green range:
Associated Electric Hydraulic Pump ..... ON

If any hydraulic system fluid quantity is in amber range:
Associated Electric Hydraulic Pump ..... OFF

CAUTION: DO NOT OPEN THE SPEED BRAKE.

If one system can be recovered, complete the appropriate procedure for one hydraulic system failure.
If both systems remain inoperative:

Quick Disconnect Button ..... PRESS
Both Electric Hydraulic Pumps ..... OFF

NOTE: The nose landing gear doors will open, therefore the pilot should expect noise increase.

ABNORMAL LANDING GEAR EXTENSION Procedure ..... ACCOMPLISH

Use rudder for directional control on the ground.
Rudder and aileron are operating under mechanical reversion mode. Expect greater rudder pedals and control wheels control forces. Both pilots should act together to control the airplane, if required. Pilots should minimize the use of rudder pedals to control lateral oscillations. Ailerons are better suitable to control yaw tendency. Also consider the use of asymmetric thrust to help in yaw control.

NOTE: Pitch Trim and Roll Trim systems are available.

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Land at the nearest suitable airport. Avoid landings at airports with anticipated crosswind or turbulence. Perform a long final approach.
Approach and landing configuration:

Landing Gear	DOWN
Flaps	22°
Airspeed	$V_{REF\ 45}$ + 10 KIAS

EMERGENCY BRAKE
TECHNIQUE Procedure ..... ACCOMPLISH
Do not attempt to taxi.

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 2.67.

BRAKE DEGRADED

EICAS CAUTION: BRAKE DEGRADED
LIGHT: Master Caution

Apply brakes normally.
Brake effectiveness may be reduced and braking asymmetry may be felt.
Approach and landing configuration:
If in icing conditions:

Landing Gear	DOWN
Flaps	22°
Airspeed	$V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.71.

If not in icing conditions:
Landing Gear ..... DOWN

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Flaps ..... 45°
Airspeed ..... $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.20.

During landing run:
Thrust Levers (if available) ..... REVERSE

BRAKES INOPERATIVE

EICAS CAUTION: BRK OUTBD (INBD) INOP
LIGHT: Master Caution

If one pair of brakes is inoperative, apply brakes normally through the pedals.
If both pair of brakes are inoperative:
EMERGENCY BRAKING
TECHNIQUE Procedure ..... ACCOMPLISH

In case of one or both pairs inoperative:
If in icing conditions:
Landing Gear ..... DOWN
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 2.18.

If not in icing conditions:
Landing Gear ..... DOWN
Flaps ..... 45°
Airspeed ..... $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.49.

During landing run:
Thrust Levers ..... REVERSE

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BRAKES OVERHEAT

EICAS CAUTION: BRAKE OVERHEAT
LIGHT: Master Caution

If during landing and runway length is enough:
Brake Pressure ..... REDUCE
Use of full reverse thrust is recommended.

If after takeoff:
Lower landing gear for cooling as soon as possible.
Airspeed ..... BELOW 200 KIAS
Retract gear when brakes temperature is at green range.
If MFD is not available, retract gear after message is removed.
Airspeed ..... AS REQUIRED

When on ground, park the airplane as soon as possible.
Before next takeoff:
Brakes Temperature ..... CHECK AT GREEN RANGE
If Brakes Temperature Monitoring System is not available:
Quick Turn Around Chart ..... CHECK
Wheel Thermal Plugs ..... CHECK

NOTE: A positive way to check Wheel Thermal Plugs is to verify that none of tires is flat.

EMERGENCY BRAKING TECHNIQUE

Pull the emergency brake handle carefully and continuously until the first airplane reaction. Use the parking brake light as a reference for brake application. Modulate brake application until the airplane achieves the desired deceleration.
In case of airplane skidding, release the handle and pull it again as required.

NOTE: Anti-skid protection is not available for emergency/parking brake.

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EMERGENCY/PARKING BRAKE HANDLE DISAGREE

INDICATION: BRAKE ON light illuminated with Emergency/Parking Brake handle not actuated.

Park the airplane as soon as possible.
Do not take off.

EMERGENCY/PARKING BRAKE LOW PRESSURE

EICAS CAUTION: EMRG BRK LO PRES
LIGHT: Master Caution

If necessary to use the emergency/parking brake, apply it in advance.
When parking the airplane, use wheel blocks.

GEAR LEVER CANNOT BE MOVED TO UP AFTER TAKEOFF

CONDITION: Landing gear cannot be moved to up position after takeoff in the normal manner.

Wait 10 seconds to verify if the LG AIR/GND FAIL message is presented.
If the message is presented, do not move Landing Gear Lever.
If the message is not presented:

Downlock Release Button..... PRESS
Landing Gear Lever ..... UP

Landing Gear Lever will be released, permitting gear retraction.

HYDRAULIC ENGINE PUMP FAILURE

EICAS ADVISORY: E1 (2) HYD PUMP FAIL

Altitude ..... AT OR BELOW 37000 ft

Monitor associated hydraulic system.
Refer to HYDRAULIC SYSTEM 1 (2) FAILURE Procedure, if necessary.

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HYDRAULIC PUMP SELECTED OFF

EICAS ADVISORY: HYD PUMP SELEC OF

Electric Hydraulic Pumps..... AUTO

HYDRAULIC SHUTOFF VALVE CLOSED

EICAS ADVISORY: E1 (2) HYDSOV CLSD

If valve is not intentionally closed:
Engine Pump Shutoff Button ..... CHECK NOT PRESSED

HYDRAULIC SYSTEM 1 FAILURE

EICAS CAUTION: HYD SYS 1 FAIL, RUDDER SYS 1 INOP or AIL SYS 1 INOP
EICAS ADVISORY: E1 HYD PUMP FAIL
LIGHT: Master Caution
INDICATION: Hydraulic pressure indication on MFD may be amber.

Check hydraulic system fluid quantity:
If hydraulic system fluid quantity is in green range:
Electric Hydraulic Pump 1 ..... ON

If hydraulic system fluid quantity is in amber range:
Electric Hydraulic Pump 1 ..... OFF

If hydraulic power is not recovered:
Airspeed..... MAXIMUM 250 KIAS
Electric Hydraulic Pump 1 ..... OFF

NOTE: As the nose landing gear doors will open, the pilot should expect a noise increasing during flight.

For landing gear extension:
ABNORMAL LANDING GEAR EXTENSION Procedure ..... ACCOMPLISH

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Do not actuate left Thrust Reverser.
Use rudder and differential braking for directional control on ground.
Approach and landing configuration:
If in icing conditions:

Landing Gear ..... DOWN
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 2.38.

If not in icing conditions:

Landing Gear ..... DOWN
Flaps ..... 45°
Airspeed ..... $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.64.

NOTE: The following systems will be inoperative: Inboard Spoiler, Outboard Brakes, LH Thrust Reverser, Landing Gear Extension, Steering and Nose Landing Gear Doors Retraction.

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HYDRAULIC SYSTEM 2 FAILURE

EICAS CAUTION: HYD SYS 2 FAIL, RUDDER SYS 2 INOP or AIL SYS 2 INOP
EICAS ADVISORY: E2 HYD PUMP FAIL
LIGHT: Master Caution
INDICATION: Hydraulic pressure indication on MFD may be amber.

Check hydraulic system fluid quantity:
If hydraulic system fluid quantity is in green range:
Electric Hydraulic Pump 2 ..... ON

If hydraulic system fluid quantity is in amber range:
Electric Hydraulic Pump 2 ..... OFF

If hydraulic power is not recovered:
Airspeed..... MAXIMUM 250 KIAS
Electric Hydraulic Pump 2 ..... OFF
Do not actuate right Thrust Reverser.

CAUTION: DO NOT OPEN THE SPEED BRAKE.

Approach and landing configuration:
If in icing conditions:
Landing Gear..... DOWN
Flaps..... 22°
Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 2.27.

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If not in icing conditions:

Landing Gear ..... DOWN
Flaps ..... 45°
Airspeed ..... $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.56.

NOTE: - The Emergency/Parking Brake will be available only with the accumulator charge.

- The following systems will be inoperative: Outboard Spoiler, Inboard Brakes, RH Thrust Reverser, and Emergency/Parking Brake.

HYDRAULIC SYSTEM LOW QUANTITY

EICAS ADVISORY: HYD1 (2) LO QTY

Monitor associated hydraulic system.

NOTE: Do not open the Speed Brake if hydraulic system 2 is affected.

HYDRAULIC SYSTEM 1 (2) FAILURE Procedure ..... AS REQUIRED

HYDRAULIC SYSTEM OVERHEAT

EICAS CAUTION: HYD SYS 1 (2) OVHT
LIGHT: Master Caution

Associated Engine Hydraulic Pump ..... SHUTOFF
Associated Electric Hydraulic Pump ..... OFF
Airspeed ..... MAXIMUM 250 KIAS

Recover system pressure each 15 minutes or when required, even if message is displayed. Turn off the affected hydraulic system again after 1 minute or when no service is required. Recover system pressure on approach and landing and turn it off when taxiing at low speeds.

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LANDING GEAR AIR/GROUND SYSTEM FAILURE

EICAS CAUTION: LG AIR/GND FAIL
LIGHT: Master Caution

If not in icing conditions:
- Icing Conditions ..... AVOID
- Approach and landing configuration:
  - Landing Gear ..... DOWN
  - Flaps ..... 45°
  - Airspeed ..... $V_{REF\ 45}$

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.70.

If in icing conditions:
- Anti-Icing System ..... MONITOR

If any anti-ice valve does not open or anti-ice failure messages appear, leave and avoid icing conditions.

After exiting icing conditions, proceed as follows:
- Maximum Bank Angle ..... 30°
- Minimum Airspeed for Flaps 0° or 9° ..... 190 KIAS
- Approach and landing configuration:
  - Flaps ..... 22°
  - Airspeed ..... $V_{REF\ 45}$ + 10 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 2.00.

NOTE: - Thrust Reversers, and Ground Spoiler, may not be available. Depending on the failed condition, Ground Idle may not be selectable. Refer to the associated abnormal procedures.

- If message is presented on ground, one pair of brakes (below 10 kt ground speed) and Steering may not be available. Refer to the associated abnormal procedures.

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NOSE LANDING GEAR UP DOOR OPEN

CONDITION: Noise increase due to nose landing gear doors open.

Airspeed ..... MAX 250 KIAS
Icing Conditions ..... AVOID/EXIT
Fuel Consumption ..... MONITOR
ABNORMAL LANDING GEAR
EXTENSION Procedure ..... AS REQUIRED

PARTIAL OR GEAR UP LANDING

EICAS WARNING: LG/LEVER DISAGREE
LIGHT: Master Warning

Burn fuel to reduce touchdown speed.
Passengers/Crew ..... PREPARE FOR EMERGENCY LANDING AND EVACUATION PROCEDURE

Prior to approach:
Inhibit EGPWS (D2 or J8) and Aural Warning System (B4 and E29 or B4 and E30) by pulling their circuit breakers.
Emergency Lights ..... ON
Electric Hydraulic Pumps ..... OFF
Engine Bleed ..... OFF
Pressurization Dump Button ..... PRESS
If in icing conditions:
Flaps ..... 22°

If not in icing conditions:
Flaps ..... 45°

Landing Gear ..... AS REQUIRED

NOTE: The decision to land with all gear up or with any gear extended is left to pilots. The choice of configuration is based on the number of gear available, airplane load distribution, controllability and conditions of the landing field.

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Landing Briefing ..... PERFORM
Before landing:
Fuel Transfer System ..... TURN OFF
Set Fuselage Tank Transfer Knob to OFF.

APU Master Knob ..... OFF
APU Fuel Shutoff Valve ..... CLOSE

Apply thrust reverser (if installed) at touchdown. Ground spoilers, thrust reverser, steering and normal brakes will not operate if any main gear is up.
Rudder is available to maintain runway centerline during initial landing phase.
Maintain wings level as long as possible and use brakes and steering (if available) for directional control.
After the airplane comes to a complete stop:
Start/Stop Selector ..... STOP
Electric Fuel Pumps ..... OFF
Fire Extinguishing Handles ..... PULL AND ROTATE
EMERGENCY EVACUATION
Procedure ..... ACCOMPLISH

STEERING SYSTEM INOPERATIVE OR UNCOMMANDED SWERVING ON GROUND

EICAS CAUTION: STEER INOP (may be presented)
LIGHT: Master Caution

Steering Handwheel	DO NOT USE
Steering Disengagement Button	PRESS

Control the airplane using differential brakes and rudder.
Consider the use of differential thrust reverser if serviceable.

NOTE: Do not actuate the steering handwheel since it will reengage the steering system and will disable the 7° maximum nose wheel deflection protection. This may cause the nose wheel to be steered up to its limit and may exacerbate the swerving effect.

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ICE AND RAIN PROTECTION, OXYGEN

ANTI-ICING LOW CAPACITY

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: A/ICE LOW CAPACIT, WG A/ICE FAIL (may be presented), STAB A/ICE FAIL (may be presented)
LIGHT: Master Warning and Master Caution

Thrust Lever..... ADVANCE

Advance Thrust Lever to at least 55% N1 and wait for 5 seconds.

If Thrust Lever advance required to clear the message exceeds 55% N1, report to the maintenance personnel.

If the message persists and is associated with Wing and/or Stabilizer Anti-Icing Failure messages:

Associated System Anti-Icing Failure Procedure..... ACCOMPLISH

ANTI-ICING ON WITHOUT ICING CONDITIONS

EICAS CAUTION: NO ICE-A/ICE ON
LIGHT: Master Caution

Ice Detection Override Knob ..... AUTO

If the message persists, check the overhead panel and turn off all unnecessary anti-icing system.

If the message persists and is associated with Wing or Stabilizer Anti-Icing System:

Altitude..... MAX 25000 ft
MINIMUM MEA
APU ..... START
APU Bleed ..... OPEN
Crossbleed ..... OPEN
Engine Bleeds ..... CLOSE

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ANTI-ICING SWITCH OFF

EICAS CAUTION: A/ICE SWITCH OFF
LIGHT: Master Caution

Turn on all anti-icing system buttons.

AOA SENSOR HEATING FAILURE

EICAS CAUTION: AOA 1 (2) HEAT INOP
LIGHT: Master Caution

Maintain airspeed according to the following:

FLAPS POSITION	MINIMUM AIRSPEED
0°	$V_{REF\ 45}$ + 20 KIAS
9°	$V_{REF\ 45}$ + 5 KIAS
22°	$V_{REF\ 22}$
45°	$V_{REF\ 45}$

CLEAR ICE DETECTED

EICAS CAUTION: CLR ICE 1 (2)
LIGHT: Master Caution
CLR ICE 1 (2)

Do not take off.

Airplane de-icing is required.

If there is no clear ice on the wing surface, disregard the message.

CLEAR ICE DETECTION SYSTEM FAILURE

EICAS CAUTION: CLR/I INOP1 (2)
LIGHT: Master Caution

Check physically if wing surface is free of clear ice before each flight.

If clear ice is found, de-ice the airplane.

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ENGINE ANTI-ICING FAILURE

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: E1 (2) A/ICE FAIL
LIGHT: Master Warning and Master Caution

Thrust Levers ..... ADVANCE

If the message persists:

Ice Detection Override Knob ..... ALL

If the message persists:

Engine Air Inlet Anti-Icing Button ..... CYCLE

If the message persists:

Icing Conditions..... AVOID/EXIT

Two minutes after exiting icing conditions:

Ice Detection Override Knob ..... AUTO

NOTE: Ice Detection Override Knob must be set to ALL for at least 2 minutes either after exiting icing conditions or after ICE CONDITION advisory message has disappeared. In such condition, caution message NO ICE-A/ICE ON may be presented, and must be disregarded.

Engine Vibration ..... MONITOR

If vibration increases, advance thrust levers, one at a time, to obtain 60% N1 minimum for 5 seconds, and then return to the former setting.

If vibration increases to unacceptable values or engine parameters indicate abnormal values, exit icing conditions.

ENGINE ANTI-ICING OVERPRESSURE

EICAS ADVISORY: ENG A/ICEOVERPRES

Crew awareness.

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ICE DETECTOR FAIL

EICAS CAUTION: ICE DET1 (2) FAIL or ICE DETECTORS FAIL
LIGHT: Master Caution

Use visual cues (ice accretion on windshield and windshield wipers, if applicable) and temperature criteria to determine whether icing conditions exist.

When flying in icing conditions:

Ice Detection Override Knob..... ALL

After positively exiting icing conditions:

Ice Detection Override Knob..... AUTO

NOTE: - Icing conditions may exist inflight when Total Air Temperature (TAT) is 10°C or below and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet, and ice crystals).

- Ice Detection Override Knob must be kept at ALL for at least 2 minutes either after exiting icing conditions or after ICE CONDITION advisory message has disappeared. In such condition, caution message NO ICE-A/ICE ON may be presented, and must be disregarded.

CREW/PASSENGER OXYGEN LOW PRESSURE

EICAS CAUTION: CREW (PAX) OXY LO PRESS
LIGHT: Master Caution

Check oxygen pressure on the MFD ECS page. If message is confirmed or if MFD is not available:

Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER

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OXYGEN LEAKAGE

CONDITION: Evidence of oxygen leakage through the crew mask, mask hose, flow indicator (blinker), or oxygen line.

No Smoking ..... ON

If oxygen leakage is verified in the crew mask, mask hose, or flow indicator:

Affected Mask ..... REMOVE FROM STOWAGE BOX

Stowage Box Doors ..... CLOSE

Test and Shutoff Sliding Control ..... ACTUATE

Oxygen Pressure ..... CHECK

Altitude ..... AS REQUIRED

If oxygen pressure is below minimum oxygen pressure for dispatch, descend to below 10000 ft or minimum altitude for terrain clearance. The pilot of the affected side should use the crew portable oxygen cylinder, if necessary. The oxygen supply by the Portable Oxygen Cylinder lasts for at least 30 minutes.

If oxygen leakage is verified in the oxygen line:

Oxygen Cylinder Shutoff Valve ..... OFF

Altitude ..... MEA OR 10000 ft, WHICHEVER IS HIGHER

PITOT SENSORS HEATING FAILURE

EICAS CAUTION: PITOT 1 (2, 3) INOP
LIGHT: Master Caution

Information on the instruments supplied by the affected system may be unreliable. Cross-check and do not use the affected system if a disagreement is found.

If the Pitot 3 is the affected one, standby instruments and pressurization system may be affected.

If necessary:

ADC Button (Reversionary Panel) ..... PRESS

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SINGLE ENGINE OR SINGLE BLEED OPERATION IN ICING CONDITIONS

Crossbleed ..... OPEN

Altitude ..... MEA OR BELOW 15000 ft, WHICHEVER IS HIGHER

Above 15000 ft:

Anti-icing system performance decreases.

If it is not possible to descend below 15000 ft, failure messages may be presented. In this case, exit icing conditions and refer to the appropriate approach and landing procedure.

Below 15000 ft:

If an anti-icing system failure message is presented, refer to the associated anti-icing system failure procedure.

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STABILIZER ANTI-ICING FAILURE

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: STAB A/ICE FAIL
LIGHT: Master Warning and Master Caution

Ice Detection Override Knob ..... ALL

Thrust Levers ..... ADVANCE

If the failure persists:

Stabilizer Anti-Icing Button ..... CYCLE

If even so the failure persists:

Stabilizer Anti-Icing Button ..... OFF

Avoid or exit icing conditions.

After exiting icing conditions:

Ice Detection Override Knob ..... AUTO

Maximum Bank Angle ..... 30°

Minimum Airspeed for Flaps 0° or 9° ..... 190 KIAS

Landing configuration:

Flaps ..... 22°

Airspeed ..... $V_{REF\ 45}$ + 15 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.55.

If associated with Wing Anti-Icing System failure and if in icing conditions or if there is any uncertainty as to whether the wing surfaces are clear of ice prior to approach and landing, proceed:

Landing configuration:

Flaps ..... 22°

Airspeed ..... $V_{REF\ 45}$ + 30 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.85.

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TAT SENSORS HEATING FAILURE

EICAS CAUTION: TAT 1 (2) HEAT INOP
LIGHT: Master Caution

TAT, TAS and SAT indication may be unreliable.

WINDSHIELD HEATING FAILURE

EICAS CAUTION: W/S 1 (2) HEAT FAIL
LIGHT: Master Caution

Associated Windshield Heating ..... OFF

If the message disappears, system may be turned on again after 15 seconds.

If message persists:

Continue normal flight.

NOTE: After landing, prepare for loss of systems supplied by the electrical source associated with the failed windshield heating.

For Windshield 2 failure, after landing proceed:

Shed Buses ..... OFF

For Windshield 1 failure, after landing proceed:

Bus Ties ..... OFF

Generators 1 and 3 ..... OFF

If both windshield heatings fail and windshields become impaired, refer to IMPAIRED OR CRACKED WINDSHIELD Procedure.

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WING ANTI-ICE ASYMMETRY

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: WG A/ICE ASYMETRY
LIGHT: Master Warning and Master Caution

Wing Anti-Icing..... OFF

Maximum Bank Angle..... 30°

Minimum Airspeed for Flaps 0° or 9°..... 190 KIAS

Avoid or exit icing conditions.

With Wing Anti-Icing System inoperative in icing conditions or if there is any uncertainty as to whether the wing surfaces are clear of ice prior to approach and landing, proceed:

Landing configuration:

Flaps..... 22°

Airspeed ..... $V_{REF\ 45}$ + 30 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.85.

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WING ANTI-ICING FAILURE

EICAS WARNING: ICE COND-A/I INOP
EICAS CAUTION: WG A/ICE FAIL
LIGHT: Master Warning and Master Caution

Ice Detection Override Knob ..... ALL

Thrust Levers ..... ADVANCE

If the failure persists:

Wing Anti-Icing Button ..... CYCLE

If even so the failure persists:

Wing Anti-Icing Button ..... OFF

Avoid or exit icing conditions.

After exiting icing conditions:

Ice Detection Override Knob ..... AUTO

Maximum Bank Angle ..... 30°

Minimum Airspeed for Flaps 0° or 9° ..... 190 KIAS

If in icing conditions or if there is any uncertainty as to whether the wing surfaces are clear of ice prior to approach and landing, proceed:

Landing configuration:

Flaps ..... 22°

Airspeed ..... $V_{REF\ 45}$ + 30 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.85.

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NAVIGATION, FLIGHT INSTRUMENTS, AUTOPILOT

AILERON OUT OF TRIM

EICAS CAUTION: AP AIL MISTRIM
LIGHT: Master Caution

If the message is displayed more than 10 seconds, proceed:
Control Wheel ..... HOLD FIRMLY
Quick Disconnect Button ..... PRESS
Roll Trim ..... AS REQUIRED
Return the airplane to an in-trim condition, by trimming in the direction as requested by the EICAS indication.

Autopilot ..... AS REQUIRED

AUTOPILOT TRIM FAILED

EICAS CAUTION: AUTO TRIM FAIL
LIGHT: Master Caution

Control Column ..... HOLD FIRMLY
Quick Disconnect Button ..... PRESS AND HOLD
Pitch Trim ..... AS REQUIRED
Return the airplane to an in-trim condition, by trimming in the direction as requested by the EICAS indication.

Autopilot ..... AS REQUIRED

CENTRAL MAINTENANCE COMPUTER FAILURE

EICAS ADVISORY: CMC FAIL

Crew awareness.

CHECK IC SOFTWARE

EICAS CAUTION: CHECK IC 1 (2) SW
LIGHT: Master Caution

Do not take off.

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DAU AIRPLANE ID MISCOMPARE

EICAS CAUTION: DAU AC ID MISCMP
LIGHT: Master Caution

Do not take off.

DAU FAILURE

EICAS CAUTION: DAU1 (2) A FAIL
LIGHT: Master Caution
EICAS ADVISORY: DAU1 (2) B FAIL

For DAU1 A FAIL caution message, proceed:

DAU 1 Reversion ..... ON

Check DAU 1 REVERSION message on EICAS.

NOTE: The following indications and messages will not be available:

- Indications: Engine 1 oil (temperature, pressure and level), battery 1 and 2 temperature, wing fuel tank temperature, fuel used, roll trim position, cockpit temperature and bleed 1 temperature.
- Messages: BLD 1 OVTEMP, E1 FUEL LO TEMP, FUEL TANK LO TEMP.

BLD 1 LOW TEMP and DFDR FAIL messages will appear.

For DAU2 A FAIL caution message, proceed:

DAU 2 Reversion ..... ON

Check DAU 2 REVERSION message on EICAS.

NOTE: The following indications and messages will not be available:

- Indications: Engine 2 oil (temperature, pressure and level), fuel used, hydraulic quantity 1 and 2, yaw trim position, cabin temperature and bleed 2 temperature.
- Messages: BLD 2 OVTEMP, E2 FUEL LO TEMP, HYD1 LO QTY, HYD2 LO QTY.

BLD 2 LOW TEMP, APU OIL HI TEMP and DFDR FAIL messages will appear.

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If both channels of DAU 1 have failed, the messages and indications associated with the following systems will not be available:

- All messages and indications: Oxygen, Steering, Pressurization, Landing Gear, Roll Trim, and the message EMERG LT NOT ARMD.
- Some messages and indications: Doors, Stall Protection, Electrical, Fire Protection, Fuel, APU, Power Plant, Thrust Reverser, Flap, Spoiler, Brakes, Air Conditioning, Ice and Rain Protection, Hydraulic.

If both channels of DAU 2 have failed, the messages and indications associated with the following systems will not be available:

- All messages and indications: Smoke, Hydraulic, Rudder, Yaw Trim.
- Some messages and indications: Doors, Stall Protection, Electrical, Fire Protection, Fuel, APU, Power Plant, Thrust Reverser, Flap, Spoiler, Brakes, Air Conditioning, Ice and Rain Protection.

DAU MISCOMPARE

EICAS CAUTION: DAU1 (2) ENG MISCOMP or DAU1 (2) SYS MISCOMP or DAU1 (2) WRN MISCOMP

LIGHT: Master Caution

Associated DAU Reversion ..... ON

NOTE: For each miscompare message and each side, check the following parameters before and after the reversion:

- Engine: N1, N2, ITT.
- System: Battery voltage and temperature, takeoff temperature, hydraulic pressure, oxygen pressure.
- Warning: all warning messages, if any.

DAU REVERSION

EICAS ADVISORY: DAU 1 (2) REVERSION

If the reversionary condition is not required, press the associated DAU Reversionary Button to remove it.

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DISPLAY FAILURE

EICAS CAUTION: CHECK PFD 1 (2) message is presented if PFD is the failed display.

LIGHT: Master Caution

If PFD failed:

Associated MFD Selector Knob..... PFD

If EICAS failed:

MFD Selector Knob (as required)..... EICAS

If all main panel displays failed:

Exit or avoid icing conditions.

RMU..... AS REQUIRED

Use RMU to access power plant or navigation data.

Land at the nearest suitable airport.

DISPLAY FAN FAILURE

EICAS ADVISORY: DU 1 (2, 3, 4, 5) FAN FAIL

An overheat condition may arise in the associated display. In this case, it will be shut down automatically. Use reversionary capabilities.

DISPLAY OVERHEAT

EICAS ADVISORY: DU 1 (2, 3, 4, 5) OVHT

An overheat condition may arise in the associated display. In this case, it will be shut down automatically. Use reversionary capabilities.

FDAU FAIL

EICAS ADVISORY: FDAU FAIL

Crew awareness.

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FD LATERAL MODE FAILURE

EICAS CAUTION: LATERAL MODE OFF
LIGHT: Master Caution

At crew discretion, re-select the affected Flight Director or select the other.

NOTE: This message will also be presented if the crew turns the Flight Director off. In this case, the message must be disregarded.

FD VERTICAL MODE FAILURE

EICAS CAUTION: VERTICAL MODE OFF
LIGHT: Master Caution

At crew discretion, re-select the affected Flight Director or select the other.

NOTE: This message will also be presented if the crew turns the Flight Director off. In this case, the message must be disregarded.

FLIGHT DATA RECORDER FAILURE

EICAS CAUTION: DFDR FAIL
LIGHT: Master Caution

Crew awareness.

IC AIR/GROUND CONDITION SIGNAL INOPERATIVE

EICAS CAUTION: IC 1 (2) WOW INOP
LIGHT: Master Caution

Do not take off.

IC CONFIGURATION FAILURE

EICAS ADVISORY: IC1 (2) CONFIG FAIL

Crew awareness.

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IC FAILURE/IC BUS FAILURE

CONDITION: Associated Display Units blank and with a red X drawn over them.
EICAS CAUTION: IC BUS FAIL (may be presented)
LIGHT: Master Caution if IC BUS FAIL message is presented

The following features will be inoperative:

- EICAS messages miscompare monitoring,
- Takeoff speeds synchronization,
- Check List Display synchronization, and
- Flight Director mode synchronization.

If IC 1 failed (loss of PFD 1, MFD 1 and EICAS):
SG 1 Button ..... PRESS

If IC 2 failed (loss of MFD 2 and PFD 2):
SG 2 Button ..... PRESS

NOTE: - In case of IC 1 failure, the PTRIM MAIN INOP or PTRIM BACKUP INOP messages may not be available.

- Do not press the SG Button again within a 3-second interval. In some cases, this action may cause loss of PFD indication. The display indication can be recovered by reverting the MFD to PFD and returning to the normal configuration.

IC FAN FAILURE

EICAS ADVISORY: IC 1 (2) FAN FAIL

An overheat condition may arise in the associated IC. In this case, turn the IC off by pulling its respective circuit breaker (C3 or D32).

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IC OVERHEAT

EICAS CAUTION: IC 1 (2) OVERHEAT
LIGHT: Master Caution

If there is smoke associated to IC 1 OVERHEAT message:
IC 1 Circuit Breaker (C3) ..... PULL
Backup Battery ..... OFF
SG 1 Button ..... PRESS
If smoke persists:
ELECTRICAL SYSTEM
FAILURE OR SMOKE Procedure ..... ACCOMPLISH

If there is smoke associated to IC 2 OVERHEAT message:
IC 2 Circuit Breaker (D32) ..... PULL
SG 2 Button ..... PRESS

NOTE: Do not press the SG Button again within a 3-second interval. In some cases, this action may cause loss of PFD indication. The display indication can be recovered by reverting the MFD to PFD and returning to the normal configuration.

If smoke persists:
ELECTRICAL SYSTEM
FAILURE OR SMOKE Procedure ..... ACCOMPLISH

IC'S CONFIGURATION MISMATCH

EICAS CAUTION: CHK IC CONFIG
LIGHT: Master Caution
EICAS ADVISORY: CONFIG MISMATCH

Do not take off.

IRS ALIGNMENT

EICAS ADVISORY: IRS 1 (2) ALN

IRU Mode Select Switch ..... CHECK NAV
This message is only presented during alignment phase or while the IRU mode select switch is set at ALIGN position.

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IRS ALIGNMENT FAULT

EICAS CAUTION: IRS 1 (2) ALN FAULT
LIGHT: Master Caution

Check and reenter present position. If necessary, reenter present position once again.

IRS ATTITUDE MODE

EICAS ADVISORY: IRS 1 (2) ATT MODE

On ground:

IRU Mode Select Switch ..... OFF
Wait until POWER-OFF phase is finished (MSU annunciator lights extinguished).
IRU Mode Select Switch ..... NAV

IRS EXCESSIVE MOTION

EICAS ADVISORY: IRS 1 (2) EXC MOTION

Make sure the airplane is completely stationary.
The IRU will restart a full alignment 30 seconds after the motion is stopped.

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IRS FAIL

EICAS CAUTION: IRS 1 (2) FAIL
LIGHT: Master Caution

During power on or alignment phases:
IRU Mode Select Switch..... OFF
Wait until POWER-OFF phase is finished (MSU annunciator lights extinguished).
IRU Mode Select Switch..... NAV

In flight:
Reversionary Panel IRS Button..... PRESS
If cross-side IRU is not available:
IRU Mode Select Switch..... ATT
Maintain wings level and constant airspeed until IRS 1 (2) ALN message is no longer displayed and attitude is recovered (approximately 20 seconds).
Magnetic Heading ..... ENTER

CAUTION: FOR IRS IN ATTITUDE MODE, NAVIGATION AND ATTITUDE OUTPUTS ARE NOT AS ACCURATE AS IN THE NAV MODE. MAGNETIC HEADING MUST BE ENTERED AND UPDATED PERIODICALLY FROM THE BEST AVAILABLE ALTERNATIVE SOURCE, THROUGH THE FMS CDU.

NOTE: The Autopilot is available if the IRS 1 (2) ATT MODE message is displayed and the IRS 1 (2) ALN message is extinguished.

IRS NO MAGNETIC HEADING

EICAS ADVISORY: IRS 1 (2) NO MAG HDG

This message is presented when IRS is in attitude mode.
Enter Magnetic Heading.

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IRS NO PRESENT POSITION

EICAS ADVISORY: IRS 1 (2) NO PPOS

Enter Present Position.

IRS ON BATTERY

EICAS ADVISORY: IRS 1 (2) ON BATT

Associated IRU will operate for 40 minutes.

IRS OVERHEAT

EICAS CAUTION: IRS 1 (2) OVERHEAT

Operate affected IRU until completion of the flight.
If MSU FAULT annunciator is lighted, IRS 1 (2) FAIL message is presented or inertial data ceases to be transmitted by IRU:

Associated IRS Reversionary Button..... PRESS
Affected IRU Mode Select Switch..... OFF

NOTE: The Autopilot is not available.

If IRU is OFF, the airplane is near the end of the flight and additional attitude reference is necessary:

IRU Mode Select Switch..... ATT

CAUTION: FOR IRS IN ATTITUDE MODE, NAVIGATION AND ATTITUDE OUTPUTS ARE NOT AS ACCURATE AS IN THE NAV MODE. MAGNETIC HEADING MUST BE ENTERED AND UPDATED PERIODICALLY FROM THE BEST AVAILABLE ALTERNATIVE SOURCE, THROUGH THE FMS CDU.

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IRS/MSU FAILURE ANNUNCIATION

LIGHT	OPERATION PHASE		
	POWER ON	ALIGNMENT	IN FLIGHT
ALIGN	– No light: – Check IRS CB's. – Set mode select switch to ALIGN or NAV. – Press MSU Test switch. Annunciator bulb must be replaced if the other MSU annunciators do light.	– Flashes immediately after entry: – Check and reenter latitude or longitude. – Reenter same latitude or longitude. – Flashes at the end of alignment: – Enter latitude. – Check and reenter latitude. – Allow additional time for alignment.	– Flashes: – Select the remaining IRU by pressing the IRS Button on the associated reversionary panel. – If necessary set mode select switch to ATT.
FAULT	– Set mode select switch to OFF for at least 3 seconds. Then set mode select switch back to ALIGN or NAV. – If the annunciator remains lighted, do not take off.	– Associated with ALIGN annunciation: – Recheck coordinates and reenter latitude. – Allow additional time for alignment. – Try new alignment. Set mode select switch to OFF for at least 3 seconds, then to ALIGN, and enter present position. – If on ground, do not take off.	– Select the remaining IRU by pressing the IRS Button on the associated reversionary panel. – If necessary set mode select switch to ATT.

(Continued)

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IRS/MSU FAILURE ANNUNCIATION (CONTINUED)

LIGHT	OPERATION PHASE		
	POWER ON	ALIGNMENT	IN FLIGHT
ON BATT	– Check IRS CB's. – If the annunciator remains lighted, do not take off.	*******	– The IRU operates on backup DC power and will operate for 40 minutes.
BATT FAIL	– Do not take off.	*******	*******
NO AIR	– Do not take off.	*******	– Operate IRU until completion of flight. – If fault annunciator is ON or inertial data ceases to be transmitted by IRU, select the remaining IRU and set mode select switch for affected IRU to OFF. If IRU is OFF, the airplane is near the end of the flight and additional attitude reference is needed, set mode select switch to ATT.

MESSAGE MISCOMPARISON

PFD Indication: CAS MSG in amber.

Reversionary Panel:
MFD 1 Knob..... EICAS
MFD 2 Knob..... EICAS

Pilot's/Copilot's EICAS Messages..... COMPARE
Discrepant Messages ..... CHECK
Analyze the situation to check whether the discrepant message is spurious or not, and take the appropriate corrective action.

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NAV/FLIGHT INSTRUMENTS FAILURE

ANNUNCIATOR/ FAILURE	LOCATION	ACTION
ATT FAIL (red)	PFD	Use cross-side attitude by pressing the IRS button on associated reversionary panel or use standby attitude indicator.
"X" (red) over IAS tape		Use cross-side airspeed by pressing the ADC button on associated reversionary panel or use standby airspeed indicator.
"X" (red) over altitude tape		Use cross-side altitude by pressing the ADC button on associated reversionary panel or use standby altimeter.
"X" (red) over course scale		Select another sensor.
VS (red) or "X" (red) over VS indicator		Use cross-side vertical speed by pressing the ADC button on associated reversionary panel.
ROL, PIT, ATT, IAS, or ALT (amber)		Compare data with Standby Indicator. For altitude compare the PFD altimeters setting also. If required, use cross-side data by pressing the appropriate button on associated reversionary panel.
RA (amber)		Compare both radio altimeter indications. If required, consider only the lower indication. Otherwise, disregard Radio Altitude.
RA1 (2) (amber)		Radio altimeter automatic reversion has occurred. No action is required.
PFD or EICAS Blank or "X"(red)		Use the MFD Knob to present the required information on MFD.

(Continued)

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NAV/FLIGHT INSTRUMENTS FAILURE (CONTINUED)

ANNUNCIATOR/ FAILURE	LOCATION	ACTION
HDG FAIL (red)	PFD MFD	Use cross-side heading by pressing the IRS button on associated reversionary panel or use RMU or standby attitude indicator.
HDG (amber)		Compare data with the Magnetic Compass. After identifying the failed side, use cross-side data by pressing the IRS button on associated reversionary panel.
MENU INOP (amber)	MFD	Crew awareness.
ATT: CAGE (amber)	ISIS	Press the CAGE push button in order to recover attitude indication. Caging the ISIS in flight will result in loss of attitude indication for up to 10 seconds and the amber message ATT 10s will be presented during this time. Until attitude indication is available again use the primary indication source.
ATT, ALT, SPD, M, HDG (red)		Use the primary indication source.

RADIO ALTIMETER FAIL

EICAS ADVISORY: RAD ALT 1 (2) FAIL or
RAD ALT FAIL

If one Radio altimeter is lost (RAD ALT 1 (2) FAIL is presented):

Automatic Reversion..... CONFIRM

Automatic reversion may be confirmed through the RA1 (2) amber annunciator presented on both PFDs.

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STABILIZER OUT OF TRIM

EICAS CAUTION: AP ELEV MISTRIM
LIGHT: Master Caution

Control Column ..... HOLD FIRMLY
Quick Disconnect Button ..... PRESS AND HOLD
Pitch Trim ..... AS REQUIRED
Return the airplane to an in-trim condition, by trimming in the direction as requested by the EICAS indication.

Autopilot ..... AS REQUIRED

YAW DAMPER FAILURE

EICAS CAUTION: YAW DAMPER FAIL
LIGHT: Master Caution

Yaw Damper ..... DISENGAGE
Autopilot may be reengaged at pilot's discretion. If after reengagement the failure persists, continue the flight with autopilot disengaged.
If flying above Mach 0.7 with Yaw Damper disengaged:
Altitude ..... MAX 35000 ft
MINIMUM MEA

If flying at or below Mach 0.7 with Yaw Damper disengaged, no altitude restriction is applied.

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WARNING SYSTEMS

ERRONEOUS STALL PROTECTION ACTUATION

Immediately and simultaneously:
Quick Disconnect Button ..... PRESS
Both Stall Protection Systems ..... CUTOUT

Avoid skidding the airplane.

If in icing conditions:

Add 15 KIAS to go-around speed to prevent stall protection from being actuated.

Approach and landing configuration:

Landing Gear..... DOWN

Flaps..... 22°

Airspeed ..... $V_{REF\ 45}$ + 15 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.55.

If not in icing conditions:

Add 5 KIAS to go-around speed to prevent stall protection from being actuated.

Approach and landing configuration:

Landing Gear..... DOWN

Flaps..... 45°

Airspeed ..... $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.13.

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ADVANCED STALL PROTECTION

EICAS CAUTION: SPS ADVANCED
LIGHT: Master Caution

If altitude is above 25000 ft:

Airspeed ..... ABOVE 150 KIAS

If in icing conditions:

Add 15 KIAS to go-around speed to prevent stall protection from being actuated.

Approach and landing configuration:

Landing Gear ..... DOWN
Flaps ..... 22°
Airspeed ..... $V_{REF\ 45}$ + 15 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.55.

If not in icing conditions:

Add 5 KIAS to go-around speed to prevent stall protection from being actuated.

Approach and landing configuration:

Landing Gear ..... DOWN
Flaps ..... 45°
Airspeed ..... $V_{REF\ 45}$ + 5 KIAS

CAUTION: TO DETERMINE THE MINIMUM SUITABLE LANDING DISTANCE, MULTIPLY THE UNFACTORED LANDING DISTANCE FOR FLAPS 45° BY 1.13.

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STICK PUSHER JAMMING

EICAS CAUTION: STICK PUSHER FAIL
LIGHT: Master Caution

Elevator Disconnection Handle ..... PULL

Copilot must fly the airplane.

Avoid landings at airports with anticipated turbulence or crosswinds.

EGPWS INOPERATIVE

EICAS CAUTION: TERR INOP, GPWS INOP, WINDSHEAR INOP
EICAS ADVISORY: RAAS NOT AVAIL (if applicable)
LIGHT: Master Caution

Monitor any trend toward terrain contact, excessive sink rate, marginal flight path and airplane configuration. Avoid windshear.

Do not perform CAT II approaches.

AURAL WARNING FAILURE

EICAS CAUTION: AURAL WARN FAIL
LIGHT: Master Caution

Monitor airplane instruments.

Do not perform CAT II approaches.

WINDSHEAR DETECTION INOPERATIVE

EICAS CAUTION: WINDSHEAR INOP
LIGHT: Master Caution

Avoid windshear.

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RAAS FAILURE (IF APPLICABLE)

NOTE: RAAS failure may be indicated by aural messages not consistent with the current situation.

If a RAAS malfunction is confirmed:

RAAS Button.....PRESS

RAAS INHIBIT EICAS Message will be presented.

RAAS NOT AVAILABLE (IF APPLICABLE)

EICAS ADVISORY: RAAS NOT AVAIL

Some valid RAAS alerts may still be available.

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CAT II OPERATION

HARDOVER

If any unusual acceleration or motion is noticed on the airplane flight path the approach must be discontinued, and:

Autopilot ..... DISENGAGE
MISSED APPROACH Procedure ..... PERFORM AS REQUIRED

Perform a normal missed approach procedure, unless the approach is continued under VMC and in visual contact with the runway so that the airplane position and attitude assure a safe landing. The possibility of continuing the approach using the flight director for guidance may also be considered.

SLOWOVER

The Slowover consists in a smooth and slow airplane attitude change due to an autopilot system malfunction.
If a Slowover tendency is confirmed:

Autopilot ..... DISENGAGE
MISSED APPROACH Procedure ..... PERFORM AS REQUIRED

Perform a normal missed approach procedure, unless the approach is continued under VMC and in visual contact with the runway so that the airplane position and attitude assure a safe landing. The possibility of continuing the approach using the flight director for guidance may also be considered.

ENGINE FAILURE ON FINAL APPROACH OR DURING GO-AROUND

ONE ENGINE INOPERATIVE
GO-AROUND Procedure ..... ACCOMPLISH

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AUTOPILOT MALFUNCTION

BEFORE REACHING OUTER MARKER

If the autopilot disengages or has to be disengaged, transfer autopilot and reengage it. The pilot on-side of the engaged autopilot may continue the approach. Check no failure light illuminated on the PFD and no EICAS message related to the autopilot system.

If the autopilot disengages again:

MISSED APPROACH Procedure.....PERFORM AS REQUIRED

Perform a normal missed approach procedure, unless the approach is continued under VMC and in visual contact with the runway so that the airplane position and attitude assure a safe landing. The possibility of continuing the approach using the flight director for guidance may also be considered.

REACHING OUTER MARKER

If the autopilot disengages or has to be disengaged, do not reengage the autopilot.

MISSED APPROACH Procedure.....PERFORM AS REQUIRED

Perform a normal missed approach procedure, unless the approach is continued under VMC and in visual contact with the runway so that the airplane position and attitude assure a safe landing. The possibility of continuing the approach using the flight director for guidance may also be considered.

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DISPLAY WARNINGS DURING FINAL APPROACH

Discontinue the approach if any of the following warnings occur:

- CAT 2 (not displayed or amber)
- RAD ALT FAIL (cyan)
- RA (red or amber)
- GS (red or amber)
- LOC (red or amber)
- ILS (amber)
- ATT FAIL (red)
- ATT (amber)
- PIT (amber)
- ROL (amber)
- HDG FAIL (red)
- HDG (amber)
- FD (red)

Perform a normal MISSED APPROACH Procedure, unless the approach is continued under VMC and in visual contact with the runway so that the airplane position and attitude assure a safe landing.

EXCESSIVE DEVIATION WARNING

If warning occurs above 200 ft Radio Altitude:

Monitor the ILS deviation to ensure that the airplane returns to the center beam. If not recovered up to 200 ft radio altitude:

Discontinue the approach.

If warning occurs below 200 ft Radio Altitude:

Discontinue the approach.

In both cases, perform a normal MISSED APPROACH Procedure, unless the approach is continued under VMC and in visual contact with the runway so that the airplane position and attitude assure a safe landing.

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ABNORMALITIES

The following abnormalities are deviation from CAT II normal range and must be called out:

- Excessive LOC or GS deviations.
- Airspeed 10 kt higher or 5 kt lower than the Landing Reference Speed ($V_{REF\ 22}$).
- Roll angle in excess of 15°.
- Pitch angle below - 5° or above 5°.
- Rate of descent in excess of 1200 ft/min.

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STEEP APPROACH OPERATION

NOTE: The Steep Approach Operation is limited to airplanes Pos-Mod. SB 145LEG-34-0013 or factory incorporated and following the applicable AFM Supplement.

ENGINE FAILURE ON FINAL APPROACH

Above DA (DH) or MDA (MDH), whichever is applicable:

ONE ENGINE INOPERATIVE
GO-AROUND Procedure..... ACCOMPLISH

At or Below DA (DH) or MDA, whichever is applicable, the approach may be continued to landing provided the existing configuration is maintained.

STEEP APPROACH SYSTEM FAILURE

LIGHT: Amber indication in the STEEP push button.
Do not perform Steep Approach operation.

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RVSM OPERATION

The procedures presented in the basic AOM Emergency/Abnormal Procedures remain unchanged, except as amended herein.

- In case of emergency or abnormal situation or contingencies (equipment failures, weather, etc.) which affect the ability to maintain the cleared flight level, notify ATC and co-ordinate an action plan that is appropriate to the airspace concerned;
- Notify ATC when encountering greater than moderate turbulence;
- If unable to notify ATC and obtain an ATC clearance prior to deviating from the cleared flight level, follow any established contingency procedures and obtain ATC clearance as soon as possible.

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ADS-B NOT AVAILABLE

EICAS ADVISORY: ADS-B NOT AVAIL

XPDR ..... SELECT ANOTHER

NOTE: The ADS-B FAIL message should disappear from RMU.

Contact ATC.

ADS-B OUT NOT ON

EICAS ADVISORY: ADS-B NOT ON

ADS-B ON/OFF Switch..... ON AS REQUIRED

NOTE: The ADS-B ON/OFF status on RMU should indicate ON.

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UNRELIABLE AIRSPEED

CONDITION: Airspeed indications are erroneous or unreliable.

Autopilot/Yaw Damper ..... DISENGAGE
Flight Directors 1 and 2..... OFF
If speed indication on both PFD is below 135 kt:
Rudder Shutoff Sys 1 Button ..... PUSH OUT

Avoid using the speed brake.
Attitude/Thrust ..... ADJUST
Maintain airplane control. Refer to Unreliable Airspeed tables in the next pages. Altitude and/or Vertical Speed indications may also be unreliable.

Ground speed indication is available in the FMS for reference.

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UNRELIABLE AIRSPEED TABLES

Airplane: Legacy 600	Engine: AE3007A1P & A1E	Anti-Ice: OFF

CLIMB							
PRESSURE ALTITUDE (ft)		WEIGHT (lb)					
		30000	35000	40000	45000	50000	55000
0 (240 KIAS)	Pitch (deg)	13	12	11	10	10	9
	V/S (ft/min)	5200	4300	3600	3100	2700	2400
10000 (240 KIAS)	Pitch (deg)	10	9	8	8	8	7
	V/S (ft/min)	3700	3000	2500	2200	1900	1600
20000 (270 KIAS)	Pitch (deg)	6	6	5	5	5	5
	V/S (ft/min)	2700	2100	1700	1400	1200	1000
30000 (0.65 M)	Pitch (deg)	6	5	5	5	5	5
	V/S (ft/min)	1700	1400	1100	900	700	500
40000 (0.65 M)	Pitch (deg)	5	5	5	5	-	-
	V/S (ft/min)	800	600	400	200		

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UNRELIABLE AIRSPEED TABLES

Airplane: Legacy 600	Engine: AE3007A1P & A1E	Anti-Ice: OFF

CRUISE							
PRESSURE ALTITUDE (ft)		WEIGHT (lb)					
		30000	35000	40000	45000	50000	55000
15000 (250 KIAS)	Pitch (deg)	1	2	2	2	3	3
	N1 (%)	67.8	68.9	69.8	70.8	71.7	72.6
20000 (250 KIAS)	Pitch (deg)	1	2	2	2	3	3
	N1 (%)	70.4	71.5	72.8	74.0	75.2	76.2
25000 (250 KIAS)	Pitch (deg)	1	2	2	2	3	3
	N1 (%)	73.6	75.1	76.6	78.0	79.3	80.5
30000 (0.63 M)	Pitch (deg)	2	2	3	3	3	4
	N1 (%)	75.9	77.6	79.2	80.4	81.7	83.1
35000 (0.63 M)	Pitch (deg)	2	3	3	4	5	5
	N1 (%)	76.9	78.4	80.1	81.8	84.2	86.8
40000 (0.63 M)	Pitch (deg)	3	4	5	5	6	7
	N1 (%)	79.1	81.1	84.2	88.3	91.4	93.0
45000 (0.63 M)	Pitch (deg)	4	5	6	6	7	8
	N1 (%)	82.7	88.0	92.2	92.2	92.2	92.2

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UNRELIABLE AIRSPEED TABLES

Airplane: Legacy 600	Engine: AE3007A1P & A1E	Anti-Ice: OFF

DESCENT							
PRESSURE ALTITUDE (ft)		WEIGHT (lb)					
		30000	35000	40000	45000	50000	55000
0 (240 KIAS)	Pitch (deg)	-3	-2	-1	-1	0	1
	V/S (ft/min)	-1800	-1700	-1600	-1500	-1400	-1400
10000 (240 KIAS)	Pitch (deg)	-3	-2	-1	-1	0	0
	V/S (ft/min)	-1900	-1700	-1600	-1500	-1500	-1400
20000 (310 KIAS)	Pitch (deg)	-7	-5	-5	-4	-3	-3
	V/S (ft/min)	-3900	-3400	-3000	-2800	-2600	-2500
30000 (310 KIAS)	Pitch (deg)	-6	-5	-4	-4	-3	-3
	V/S (ft/min)	-3400	-3000	-2700	-2600	-2500	-2400
40000 (0.78 M)	Pitch (deg)	-2	-2	-2	-1	-1	-1
	V/S (ft/min)	-1700	-1600	-1700	-1700	-1800	-2000

HOLDING							
PRESSURE ALTITUDE (ft)		WEIGHT (lb)					
		30000	35000	40000	45000	50000	55000
5000 (200 KIAS)	Pitch (deg)	3	3	4	5	5	6
	N1 (%)	53.7	55.2	56.6	58.6	60.3	62.2
10000 (200 KIAS)	Pitch (deg)	3	3	4	5	5	6
	N1 (%)	57.3	58.8	60.3	62.3	64.1	66.0

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UNRELIABLE AIRSPEED TABLES

Airplane: Legacy 600	Engine: AE3007A1P & A1E	Anti-Ice: OFF

TERMINAL AREA (5000 FT) - % N1 FOR LEVEL FLIGHT							
FLAPS POSITION (V_{REF} + INCREMENT)		WEIGHT (lb)					
		30000	35000	40000	45000	50000	55000
0 (V_{REF45} + 30)	Pitch (deg)	7	7	7	8	8	8
	N1 (%)	46.6	50.0	53.3	56.3	59.1	61.7
9 (V_{REF45} + 15)	Pitch (deg)	7	8	8	8	9	10
	N1 (%)	50.0	54.0	57.5	60.8	66.0	75.5

FINAL APPROACH (1500 FT) - % N1 FOR 3° GLIDESLOPE							
FLAPS POSITION (V_{REF} + INCREMENT)		WEIGHT (lb)					
		30000	35000	40000	45000	50000	55000
22 (V_{REF22} + 10)	Pitch (deg)	3	3	3	4	4	4
	N1 (%)	45.2	48.5	51.7	54.6	57.2	59.8
45 (V_{REF45} + 10)	Pitch (deg)	0	0	0	0	1	1
	N1 (%)	58.4	62.0	65.5	68.7	71.4	74.0

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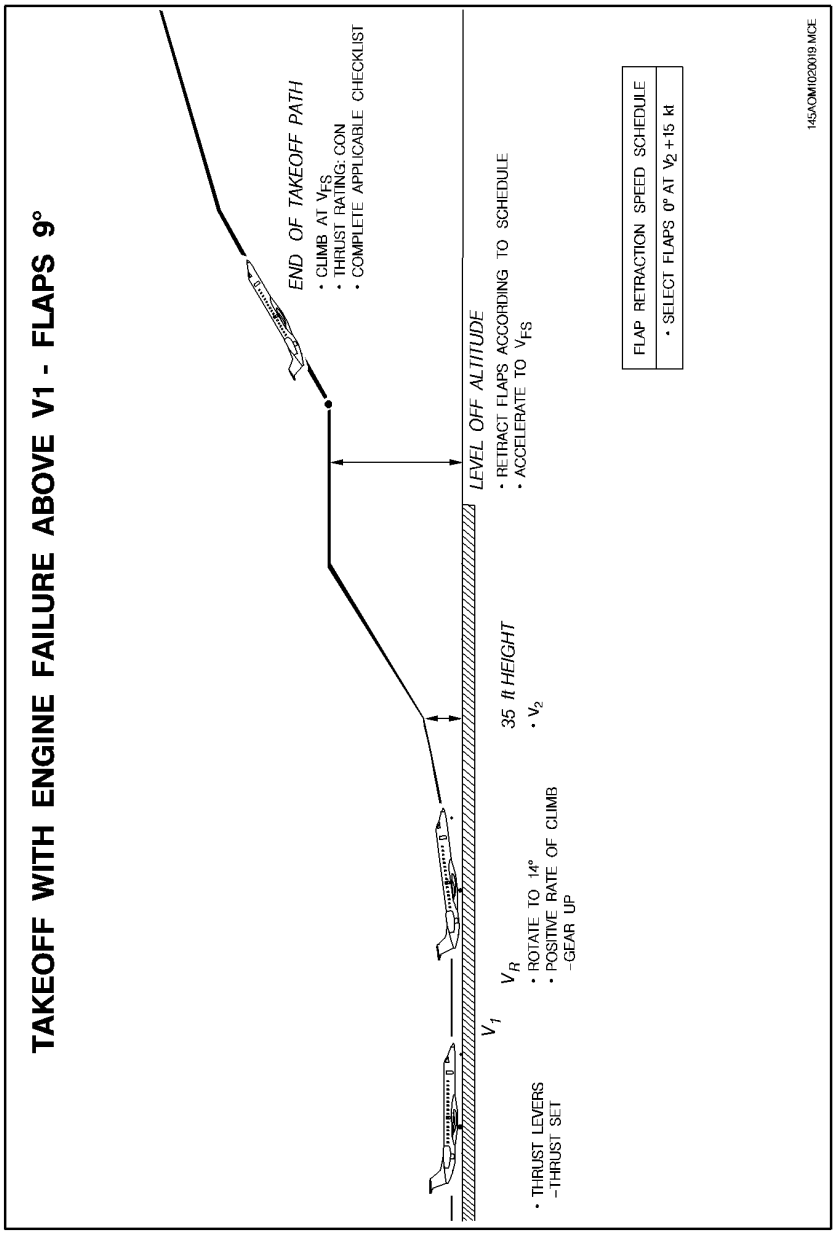
EMERGENCY PROFILES



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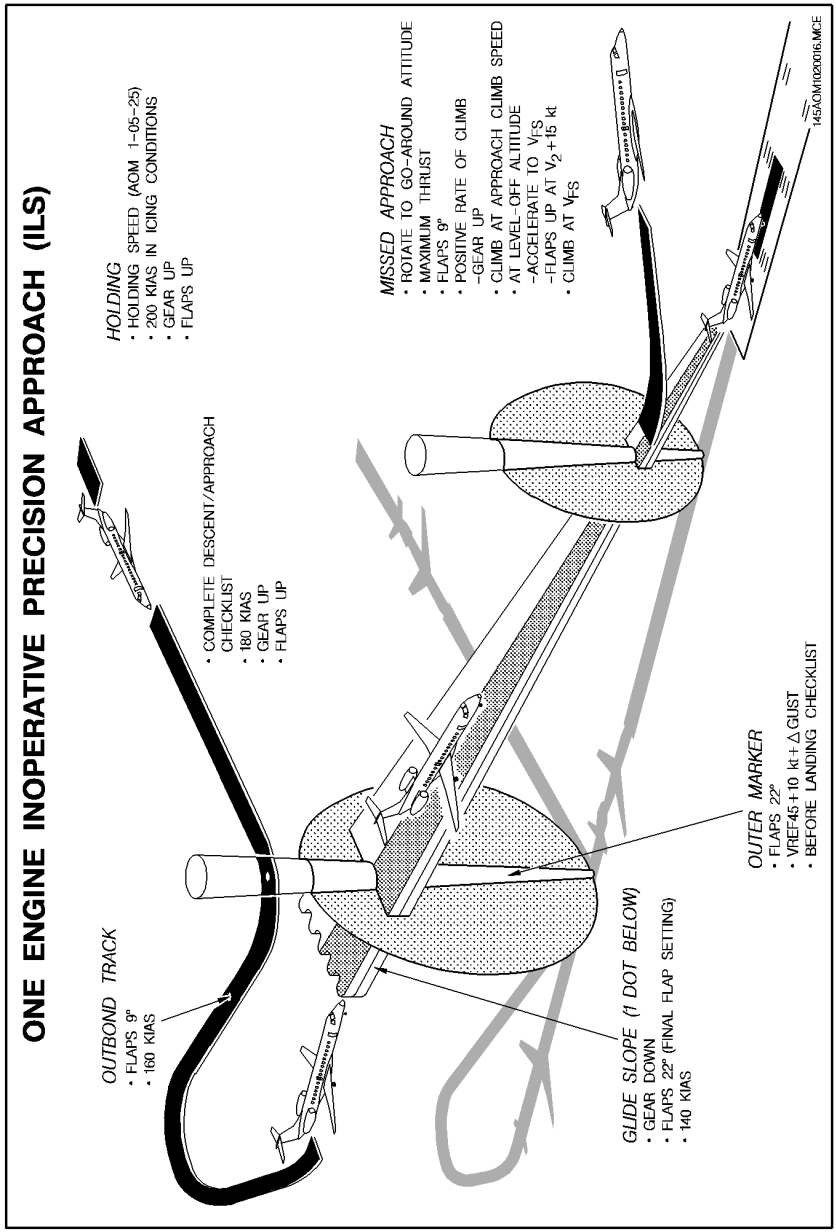
ABNORMAL PROFILES



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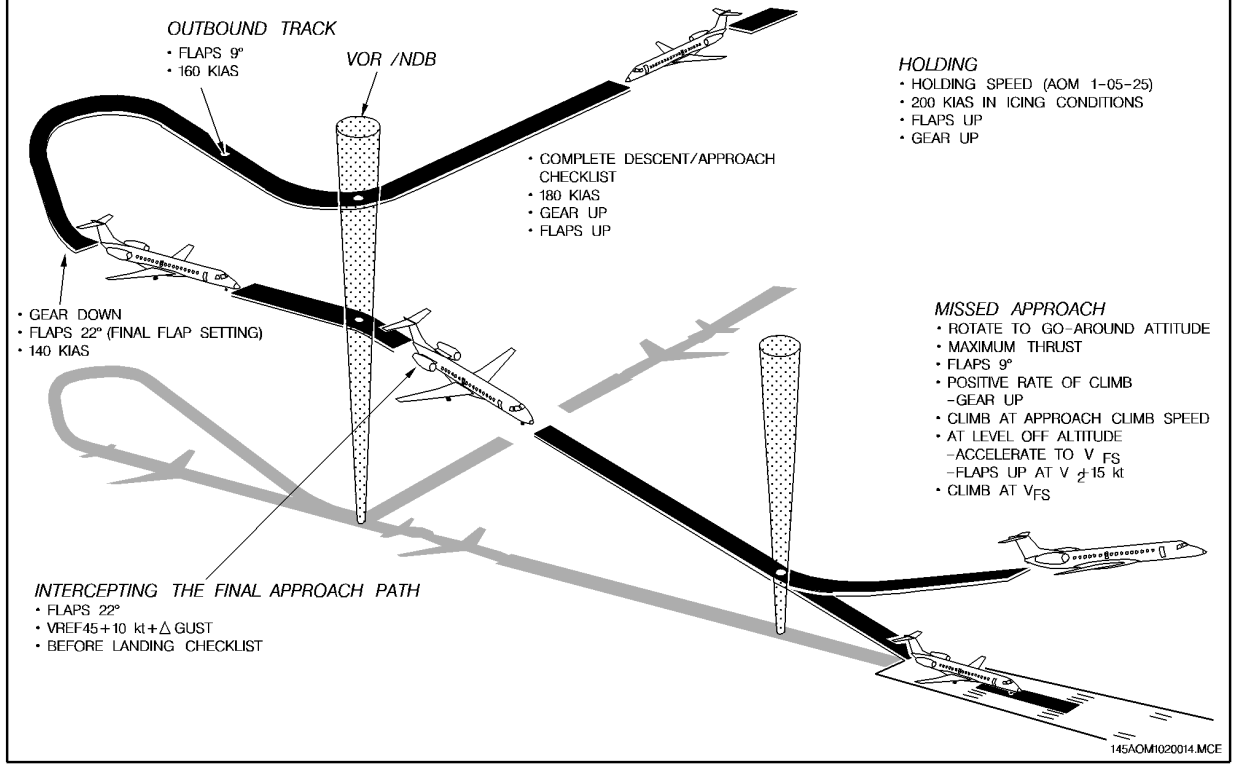
ONE ENGINE INOPERATIVE NON PRECISION APPROACH (VOR / NDB)



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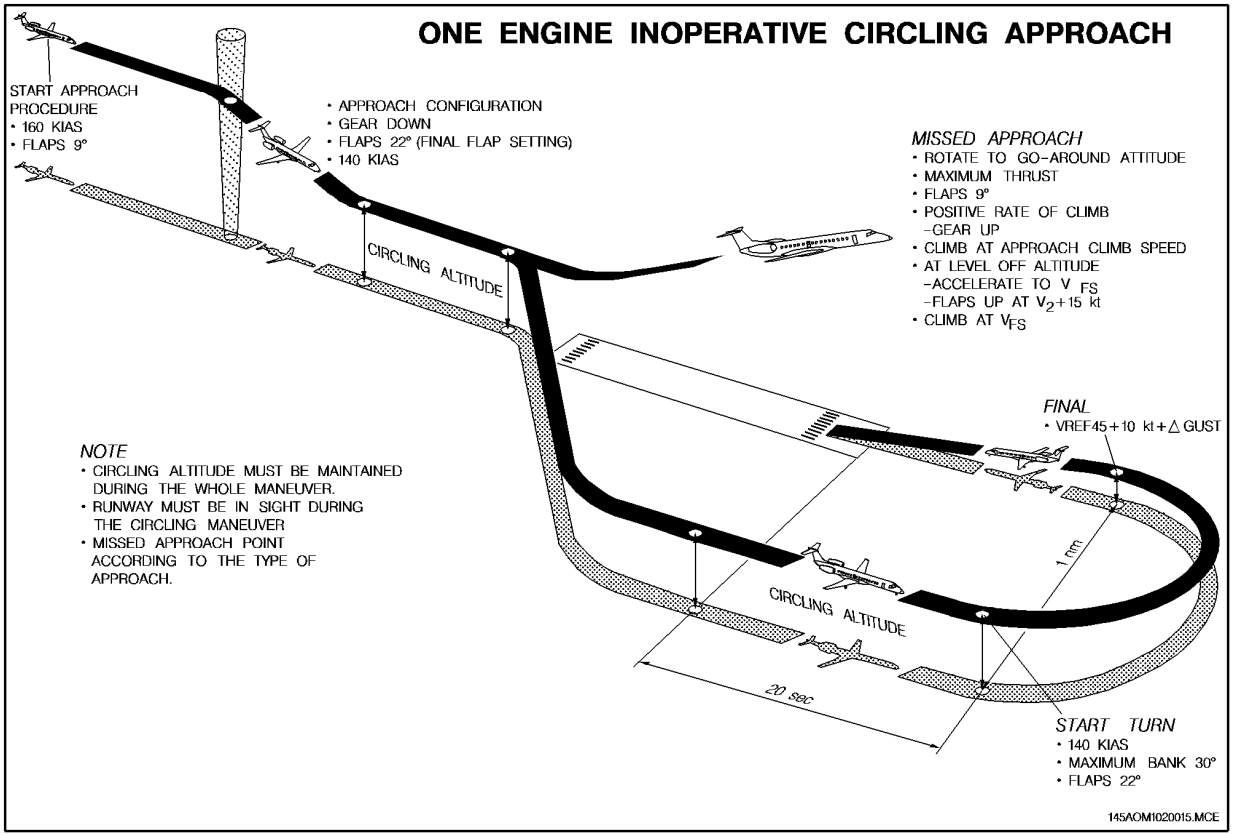

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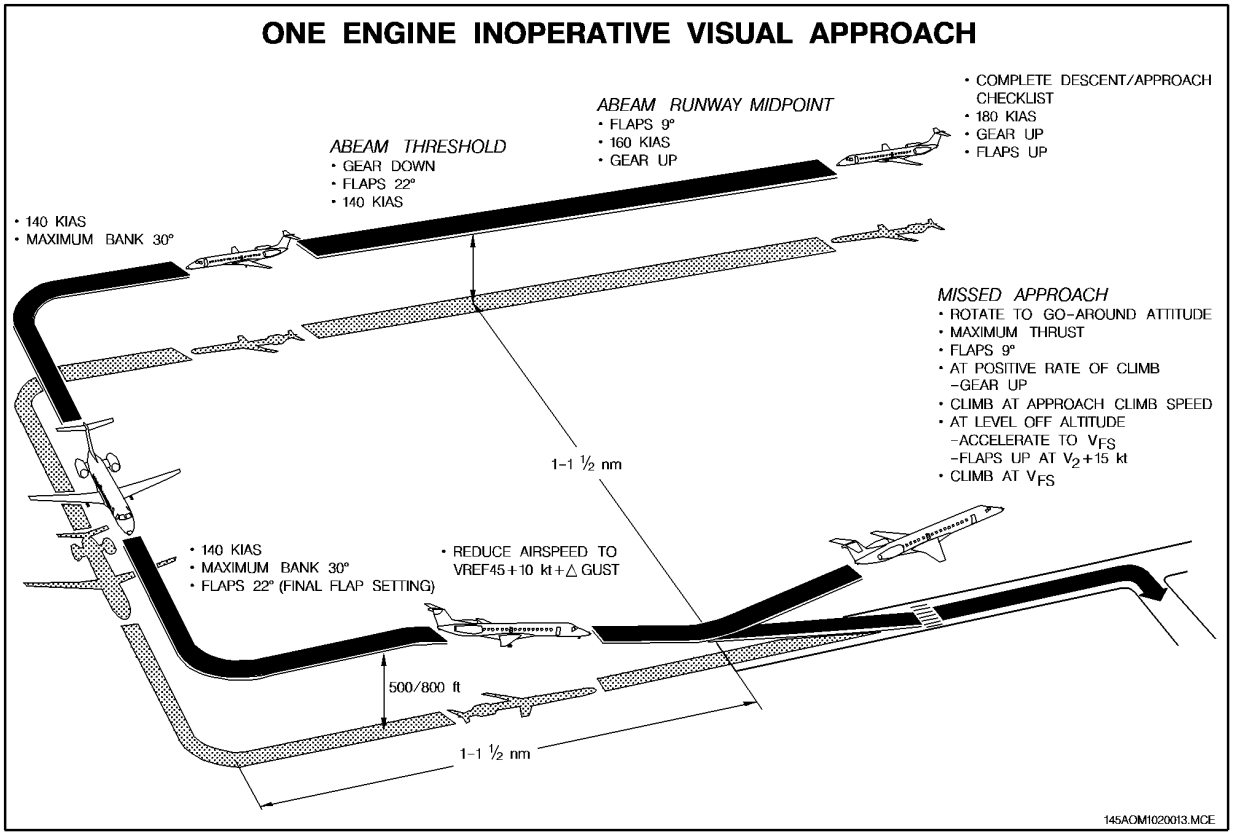
ONE ENGINE INOPERATIVE VISUAL APPROACH



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SECTION 1-04

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INTRODUCTION

This Section presents takeoff, approach and landing performance information.

For determination of the takeoff and landing limiting weights, the performance data as presented in the approved Airplane Flight Manual (AFM) or Runway Analysis Software must be used.

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NOISE LEVELS

The following Effective Perceived Noise Levels (EPNL's) comply with FAR Part 36, Appendix C Amendment 23, Stage 3 noise limits. The tests and analysis procedures used to obtain these noise levels are essentially equivalent to those required by the ICAO Annex 16, Volume 1, Chapter 3.

These values are stated for reference conditions of standard atmosphere pressure at sea level, 25°C ambient temperature, 70% relative humidity, and zero wind.

Flyover and lateral noise levels were established for the Legacy 600 equipped with two Rolls-Royce AE3007A1P or AE3007A1E engines at the maximum takeoff weight of 40785 lb, V_2 + 15 KIAS, flaps 9° and maximum takeoff power on both engines. No special power cutback procedure was used for flyover.

Approach noise levels were established from a 3° glide slope at the maximum landing weight of 40786 lb, V_{REF} + 10 KIAS, and flaps 45°.

No determination has been made by the Airworthiness Authority that the noise levels in this manual are or should be acceptable or unacceptable for operation at, into, or out of any airport.

NOISE LEVEL IN EPNdb				
Engine Model	Noise Level	CONDITION		
		Lateral	Flyover	Approach
	Maximum Allowable	94.0	89.0	98.0
AE3007A1P	Actual	85.3	80.6 (1) (2)	91.3
AE3007A1E	Actual	86.8	79.7 (3)	91.3

NOTE: 1) For airplanes with MTOW of 48942 lb, the noise level for flyover condition is 80.0 EPNdb.

2) For airplanes with MTOW of 48501 lb, the noise level for flyover condition is 79.8 EPNdb.

3) For airplanes with MTOW of 48501 lb, the noise level for flyover condition is 79.3 EPNdb.

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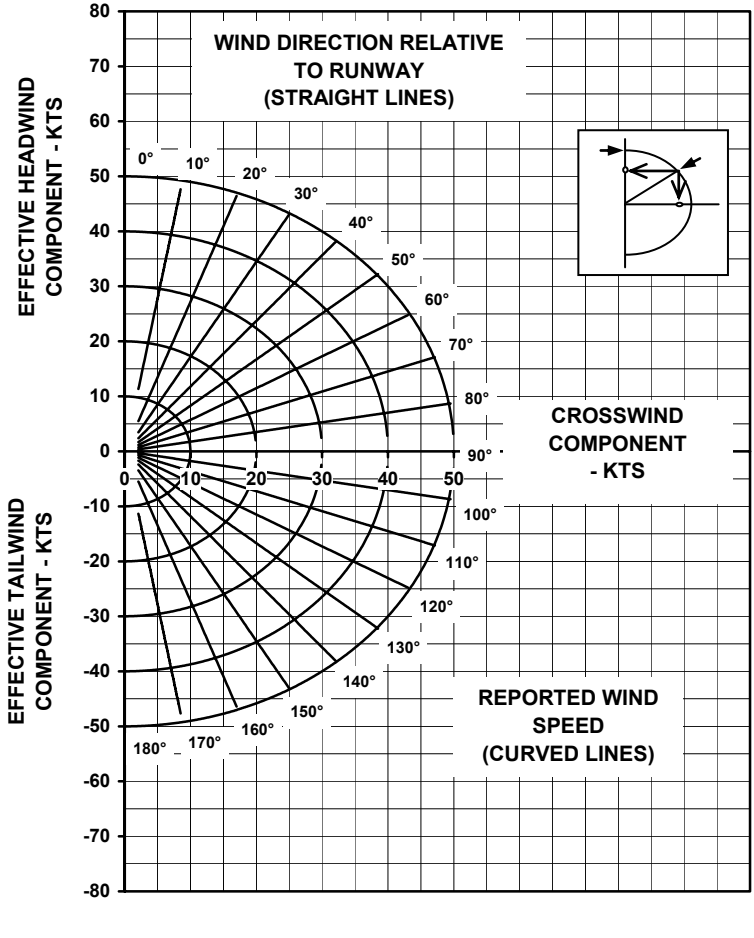
WIND AND ALTITUDE CONVERSION

WIND COMPONENT



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USE

Enter the chart with the reported wind velocity and the relative angle to the runway, to read the wind component parallel to the runway and the crosswind.

EXAMPLE

Given:

Wind Velocity ..... 20 kt
Wind Direction..... 60°

Determine:

Wind Component Parallel to the Runway..... 10 kt
Crosswind ..... 17.5 kt

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ALTIMETER SETTING TO STATION PRESSURE

QNH TO PRESSURE ALTITUDE

QNH		CORRECTION TO ELEVATION FOR PRESSURE ALTITUDE (ft)
in Hg	hPa	
28.81 to 28.91	976 to 979	1000
28.92 to 29.02	980 to 983	900
29.03 to 29.12	984 to 986	800
29.13 to 29.23	987 to 990	700
29.24 to 29.34	991 to 994	600
29.35 to 29.44	995 to 997	500
29.45 to 29.55	998 to 1001	400
29.56 to 29.66	1002 to 1004	300
29.67 to 29.76	1005 to 1008	200
29.77 to 29.87	1009 to 1012	100
29.88 to 29.97	1013 to 1015	0
29.98 to 30.08	1016 to 1019	-100
30.09 to 30.19	1020 to 1022	-200
30.20 to 30.30	1023 to 1026	-300
30.31 to 30.41	1027 to 1030	-400
30.42 to 30.52	1031 to 1034	-500
30.53 to 30.63	1035 to 1037	-600
30.64 to 30.74	1038 to 1041	-700
30.75 to 30.85	1042 to 1045	-800
30.86 to 30.96	1046 to 1048	-900
30.97 to 31.07	1049 to 1052	-1000

EXAMPLE: Elevation = 2000 ft
QNH = 29.60 in Hg
Correction = 300 ft
Pressure Altitude = 2300 ft

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QFE TO STATION PRESSURE

QFE		PRESSURE ALTITUDE (ft)
in Hg	hPa	
31.01	1050	-989
30.86	1045	-856
30.71	1040	-723
30.57	1035	-589
30.42	1030	-454
30.27	1025	-319
30.12	1020	-184
29.98	1015	-48
29.83	1010	89
29.68	1005	227
29.53	1000	364
29.38	995	503
29.23	990	641
29.09	985	781
28.94	980	921
28.79	975	1062
28.64	970	1202
28.50	965	1344
28.35	960	1486
28.20	955	1630
28.05	950	1773
27.91	945	1918
27.76	940	2062
27.61	935	2208
27.46	930	2353
27.32	925	2500
27.17	920	2647
27.02	915	2796
26.87	910	2944
26.73	905	3094
26.58	900	3243
26.43	895	3394
26.28	890	3545
26.14	885	3698
25.99	880	3850
25.84	875	4004
25.69	870	4157

QFE		PRESSURE ALTITUDE (ft)
in Hg	hPa	
25.55	865	4313
25.40	860	4468
25.25	855	4625
25.10	850	4781
24.96	845	4939
24.81	840	5097
24.66	835	5257
24.51	830	5417
24.36	825	5579
24.21	820	5740
24.07	815	5903
23.92	810	6065
23.77	805	6230
23.62	800	6394
23.48	795	6561
23.33	790	6727
23.18	785	6895
23.03	780	7063
22.89	775	7233
22.74	770	7402
22.59	765	7574
22.44	760	7745
22.30	755	7920
22.15	750	8095
22.00	745	8269
21.85	740	8442
21.71	735	8619
21.56	730	8796
21.41	725	8975
21.26	720	9154
21.12	715	9335
20.97	710	9516
20.82	705	9699
20.67	700	9882
20.53	695	10068
20.38	690	10253
20.19	685	10439

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GEOMETRIC HEIGHT TO PRESSURE HEIGHT

Pressure altimeters are calibrated to indicate true altitude under International Standard Atmosphere (ISA) conditions. Any deviation from ISA will therefore result in an erroneous reading on the altimeter. In the case when the temperature is higher than ISA the true altitude will be higher than the figure indicated by the altimeter, and the true altitude will be lower when the temperature is lower than ISA. The altimeter error may be significant under conditions of extremely cold temperature (ICAO PANS-OPS Vol I 3.1.4.3.2).

AERODROME TEMPERATURE (°C)	HEIGHT ABOVE THE ELEVATION OF THE ALTIMETER SETTING SOURCE (ft)						
	200	300	400	500	600	700	800
0	20	20	30	30	40	40	50
-10	20	30	40	50	60	70	80
-20	30	50	60	70	90	100	120
-30	40	60	80	100	120	140	150
-40	50	80	100	120	150	170	190
-50	60	90	120	150	180	210	240

AERODROME TEMPERATURE (°C)	HEIGHT ABOVE THE ELEVATION OF THE ALTIMETER SETTING SOURCE (ft)						
	900	1000	1500	2000	3000	4000	5000
0	50	60	90	120	170	230	280
-10	90	100	150	200	290	390	490
-20	130	140	210	280	420	570	710
-30	170	190	280	380	570	760	950
-40	220	240	360	480	720	970	1210
-50	270	300	450	590	890	1190	1500

NOTE: The tables above are based on an aerodrome elevation at sea level. However, they can be used operationally at any aerodrome elevation.

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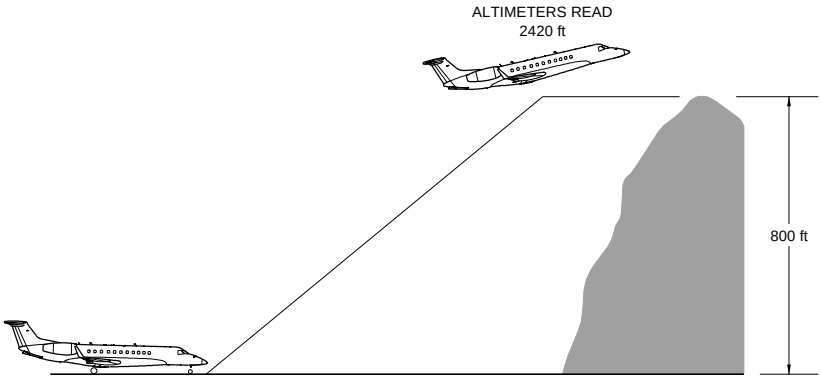
EXAMPLE

Airport Elevation..... 1500 ft
Airport Temperature..... -20°C
Obstacle Height Above Airport Elevation..... 800 ft
Altimeter adjusted to airport QNH (on ground altimeter reads 1500 ft).

Enter table with 800 ft and -20°C and read 120 ft. So, when the airplane reaches the obstacle geometric height, the altimeter will read 1500 + 800 + 120 = 2420 ft.



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THRUST SETTING TABLES

Thrust setting tables are presented for various Pressure Altitudes and Static Air Temperatures, and anti-icing ON or OFF.

The tables present the following data:

- N1 for Takeoff (ALT T/O-1 mode).
- N1 for Takeoff (T/O mode).
- N1 for Takoeff (E T/O mode).
- N1 for Go-Around (E T/O mode).
- N1 for Maximum Continuous Thrust (CON mode).

ALT T/O-1: It is an engine rating lower than the takeoff thrust, intended for engine life extension (due to lower turbine temperatures). It is also time-limited to 5 minutes. In the case of an engine failure, the FADEC will command the operating engine to T/O-1 mode.

T/O: It is the normal thrust at takeoff for existing conditions of temperature and pressure altitude. This rating is time-limited to 5 minutes. In the case of an engine failure, the FADEC will command the operating engine to T/O RSV mode.

E T/O: It is the maximum permissible thrust at takeoff for existing conditions of temperature and pressure altitude. This rating is time-limited to 5 minutes. In the case of an engine failure, the FADEC will command the operating engine to E T/O RSV mode.

GO AROUND (E T/O): It is the maximum permissible thrust during go around. The amount of thrust is the same as for takeoff at E T/O mode, but the N1s are different because the effect of the airplane's airspeed during go around is taken into consideration.
Go-around thrust is also time-limited to 5 minutes.

MAXIMUM CONTINUOUS THRUST (CON): It is the maximum permissible thrust for continuous use.
Maximum Continuous Thrust is to be used whenever in the pilot's judgment it is deemed necessary for safety reasons (1 engine inoperative, severe icing, etc).

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N1 FOR TAKEOFF - ALT T/O-1 MODE

FADEC REF A/ICE OFF

AIRSPEED: 0 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)									
	-40	-30	-20	-10	0	10	20	30	40	50
-1000	74.6	76.1	77.7	79.2	80.7	82.2	83.6	85	86.4	87.3
0	75.1	76.7	78.3	79.8	81.3	82.8	84.3	85.7	87.1	87.5
1000	76.1	77.7	79.2	80.8	82.3	83.8	85.3	86.7	88.1	86.9
2000	77.0	78.6	80.2	81.8	83.3	84.8	86.3	87.8	88.6	87.1
3000	77.9	79.6	81.2	82.8	84.3	85.9	87.4	88.9	88.4	87.3
4000	79.0	80.6	82.3	83.9	85.5	87.0	88.5	89.8	88.5	87.6
5000	80.0	81.7	83.4	85.0	86.6	88.2	89.7	90.2	88.5	-
6000	80.5	82.2	83.9	85.5	87.1	88.7	90.2	89.7	88.5	-
7000	81.0	82.7	84.4	86.0	87.6	89.2	90.8	89.7	88.3	-
8000	81.4	83.1	84.8	86.5	88.1	89.7	91.0	89.6	88.3	-
9000	81.8	83.6	85.3	86.9	88.6	90.2	91.2	89.5	88.5	-
10000	82.2	84.0	85.7	87.4	89.0	90.6	91.3	89.4	-	-

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N1 FOR TAKEOFF - ALT T/O-1 MODE

FADEC REF A/ICE ON

AIRSPEED: 0 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	75.7	76.5	77.3	78.1	78.9	79.6	80.4	81.2	80.7	81.4	82.2
0	76.3	77.1	77.9	78.7	79.5	80.3	81.0	81.8	81.3	82.1	82.8
1000	77.2	78.0	78.8	79.6	80.4	81.2	82.0	82.8	82.3	83.1	83.8
2000	78.1	78.9	79.7	80.6	81.4	82.2	83.0	83.8	83.3	84.1	84.8
3000	79.1	79.9	80.7	81.6	82.4	83.2	84.0	84.8	84.3	85.1	85.9
4000	80.1	80.9	81.8	82.6	83.5	84.3	85.1	85.9	85.5	86.2	87.0
5000	81.1	82.0	82.9	83.7	84.5	85.4	86.2	87.0	86.6	87.4	88.1
6000	81.6	82.5	83.3	84.2	85.0	85.9	86.7	87.5	87.1	87.9	88.7
7000	82.1	83.0	83.8	84.7	85.5	86.4	87.2	88.0	87.6	88.4	89.2
8000	82.5	83.4	84.3	85.2	86.0	86.9	87.7	88.5	88.1	88.9	89.4
9000	83.0	83.8	84.7	85.6	86.5	87.3	88.1	89.0	88.6	89.4	89.3
10000	83.4	84.3	85.2	86.0	86.9	87.7	88.6	89.4	89.0	89.8	89.2

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N1 FOR TAKEOFF - T/O MODE

FADEC REF A/ICE OFF

AIRSPEED: 0 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	74.8	75.5	76.4	77.2	78.0	78.8	79.6	80.4	81.2	82.0	82.8
0	75.5	76.1	77.0	77.8	78.7	79.5	80.3	81.1	81.9	82.7	83.5
1000	76.5	77.2	78.0	78.9	79.7	80.6	81.4	82.2	83.0	83.8	84.6
2000	77.5	78.2	79.1	80.0	80.8	81.7	82.5	83.3	84.1	84.9	85.7
3000	78.5	79.2	80.1	81.0	81.8	82.7	83.5	84.4	85.2	86.0	86.8
4000	79.5	80.2	81.1	82.0	82.8	83.7	84.6	85.4	86.2	87.1	87.9
5000	80.4	81.1	82.0	82.9	83.8	84.7	85.6	86.4	87.3	88.1	88.9
6000	80.9	81.7	82.6	83.5	84.4	85.2	86.1	87.0	87.8	88.7	89.5
7000	81.4	82.2	83.1	84.0	84.9	85.8	86.7	87.5	88.4	89.2	90.1
8000	82.0	82.7	83.6	84.6	85.5	86.3	87.2	88.1	89.0	89.8	90.7

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	0	5	10	15	20	25	30	35	40	45	50
-1000	83.6	84.3	85.1	85.8	86.6	87.3	88.0	88.8	89.5	90.2	90.3
0	84.2	85.0	85.8	86.5	87.3	88.0	88.8	89.5	90.2	90.9	90.8
1000	85.4	86.2	86.9	87.7	88.4	89.2	90.0	90.7	91.4	91.4	90.1
2000	86.5	87.3	88.1	88.9	89.7	90.4	91.2	91.9	92.0	91.0	90.1
3000	87.6	88.4	89.2	90.0	90.8	91.6	92.3	92.7	91.8	91.0	90.4
4000	88.7	89.5	90.3	91.1	91.9	92.7	93.2	93.1	91.8	91.0	90.7
5000	89.8	90.6	91.4	92.2	93.0	93.8	93.7	92.7	91.9	91.0	-
6000	90.3	91.2	92.0	92.8	93.6	94.0	93.2	92.6	91.7	91.2	-
7000	90.9	91.7	92.6	93.4	94.2	94.2	93.2	92.4	91.6	91.4	-
8000	91.5	92.4	93.2	94.0	94.5	94.4	93.1	92.3	91.6	-	-

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N1 FOR TAKEOFF - T/O MODE

FADEC REF A/ICE ON

AIRSPEED: 0 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-54	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	75.9	76.6	77.5	78.3	79.2	80.0	80.8	81.6	82.4	83.2	84.0
0	76.6	77.3	78.1	79.0	79.8	80.6	81.5	82.3	83.1	83.9	84.7
1000	77.6	78.3	79.2	80.0	80.9	81.7	82.6	83.4	84.2	85.0	85.8
2000	78.6	79.3	80.2	81.1	82.0	82.8	83.7	84.5	85.3	86.2	87.0
3000	79.6	80.3	81.2	82.1	83.0	83.9	84.7	85.6	86.4	87.2	88.1
4000	80.6	81.3	82.2	83.1	84.0	84.9	85.7	86.6	87.4	88.3	89.1
5000	81.5	82.3	83.2	84.1	85.0	85.9	86.7	87.6	88.5	89.3	90.2
6000	82.0	82.8	83.7	84.6	85.5	86.4	87.3	88.2	89.0	89.9	90.7
7000	82.5	83.3	84.2	85.1	86.0	86.9	87.8	88.7	89.6	90.4	91.3
8000	83.1	83.8	84.8	85.7	86.6	87.5	88.4	89.3	90.2	91.0	91.8

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	0	5	10	15	20	25	30	35	40	45	50
-1000	83.6	84.3	85.1	85.8	86.6	87.3	88.0	88.8	89.5	90.2	90.3
0	84.2	85.0	85.8	86.5	87.3	88.0	88.8	89.5	90.2	90.9	90.8
1000	85.4	86.2	86.9	87.7	88.4	89.2	90.0	90.7	91.4	91.4	90.1
2000	86.5	87.3	88.1	88.9	89.7	90.4	91.2	91.9	92.0	91.0	90.1
3000	87.6	88.4	89.2	90.0	90.8	91.6	92.3	92.7	91.8	91.0	90.4
4000	88.7	89.5	89.5	91.1	91.9	92.7	93.2	93.1	91.8	91.0	90.7
5000	89.8	90.5	89.5	92.2	93.0	93.8	93.7	92.7	91.9	91.0	-
6000	90.3	90.1	89.1	92.8	93.6	94.0	93.2	92.6	91.7	91.2	-
7000	90.6	89.8	88.8	93.4	94.2	94.2	93.2	92.4	91.6	91.4	-
8000	90.0	89.3	88.4	94.0	94.5	94.4	93.1	92.3	91.6	-	-

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N1 FOR TAKEOFF - E T/O MODE

FADEC REF A/ICE OFF

AIRSPEED: 0 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)									
	-40	-30	-20	-10	0	10	20	30	40	50
-1000	79.2	80.9	82.5	84.1	85.7	87.3	88.8	90.3	91.3	89.1
0	79.9	81.6	83.2	84.9	86.5	88.0	89.6	91.1	91.6	89.2
1000	80.9	82.6	84.3	86.0	87.6	89.2	90.7	92.3	90.9	89.2
2000	81.9	83.7	85.4	87.0	88.7	90.3	91.9	92.8	90.9	89.3
3000	83.0	84.8	86.5	88.2	89.8	91.5	93.1	92.3	90.8	89.4
4000	84.2	86.0	87.7	89.4	91.1	92.8	94.0	92.3	90.9	89.7
5000	85.3	87.2	88.9	90.7	92.4	94.0	94.7	92.3	90.9	-
6000	86.0	87.8	89.6	91.3	93.1	94.8	93.7	92.2	90.7	-
7000	86.6	88.5	90.3	92.0	93.8	95.4	93.5	92.1	90.5	-
8000	87.2	89.1	90.9	92.7	94.4	95.6	93.5	92.0	90.5	-
9000	87.8	89.7	91.5	93.3	95.0	95.8	93.4	91.7	90.7	-
10000	88.4	90.3	92.1	93.9	95.7	95.0	93.2	91.5	-	-

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N1 FOR TAKEOFF - E T/O MODE

FADEC REF A/ICE ON

AIRSPEED: 0 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	80.3	81.2	82.0	82.9	83.7	84.5	85.3	86.1	85.7	86.5	87.3
0	81.0	81.9	82.7	83.6	84.4	85.3	86.1	86.9	86.5	87.3	88.0
1000	82.0	82.9	83.8	84.6	85.5	86.3	87.2	88.0	87.6	88.4	89.2
2000	83.1	83.9	84.8	85.7	86.5	87.4	88.2	89.1	88.9	89.5	90.3
3000	84.1	85.0	85.9	86.8	87.7	88.5	89.4	90.2	89.8	90.7	91.5
4000	85.3	86.2	87.1	88.0	88.9	89.8	90.6	91.5	91.1	91.9	92.5
5000	86.5	87.4	88.3	89.2	90.1	91.0	91.9	92.7	92.4	93.2	92.7
6000	87.1	88.0	89.0	89.9	90.8	91.7	92.6	93.4	93.1	92.8	92.0
7000	87.8	88.7	89.6	90.5	91.4	92.3	93.2	94.1	93.8	92.8	91.8
8000	88.4	89.3	90.2	91.2	92.1	93.0	93.9	94.8	94.4	92.1	91.5
9000	88.9	89.9	90.8	91.8	92.7	93.6	94.5	95.0	92.3	91.8	91.2
10000	89.5	90.5	91.4	92.4	93.3	94.2	94.7	94.7	92.0	91.5	90.9

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N1 FOR GO-AROUND - E T/O MODE

FADEC REF A/ICE OFF

AIRSPEED: 100 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	76.5	77.3	78.2	79.1	79.9	80.7	81.6	82.4	83.2	84.0	84.8
0	77.2	78.0	78.9	79.8	80.6	81.5	82.3	83.1	83.9	84.7	85.5
1000	78.1	79.0	79.9	80.8	81.6	82.5	83.3	84.2	85.0	85.8	86.6
2000	79.1	80.0	80.9	81.7	82.6	83.5	84.3	85.2	86.0	86.8	87.7
3000	80.1	81.0	81.9	82.8	83.7	84.5	85.4	86.3	87.1	88.0	88.8
4000	81.1	82.1	83.0	83.9	84.8	85.7	86.5	87.4	88.3	89.1	89.9
5000	82.2	83.1	84.0	85.0	85.9	86.8	87.6	88.5	89.4	90.3	91.1
6000	82.8	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	91.8
7000	83.3	84.3	85.2	86.2	87.1	88.0	88.9	89.8	90.7	91.5	92.4
8000	83.9	84.9	85.8	86.8	87.7	88.6	89.5	90.4	91.3	92.2	93.1

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	0	5	10	15	20	25	30	35	40	45	50
-1000	85.6	86.3	87.1	87.9	88.6	89.4	90.1	90.9	91.1	90.0	89.1
0	86.3	87.1	87.9	88.7	89.4	90.2	91.0	91.7	91.5	90.1	89.1
1000	87.4	88.2	89.0	89.8	90.6	91.3	92.1	92.1	90.8	90.0	89.1
2000	88.5	89.3	90.1	90.9	91.7	92.4	92.7	91.6	90.8	90.0	89.2
3000	89.6	90.4	91.2	92.0	92.8	93.3	92.3	91.5	90.8	90.0	89.4
4000	90.8	91.6	92.4	93.2	94.0	93.8	92.2	91.5	90.8	90.0	89.7
5000	92.0	92.8	93.6	94.4	94.5	92.8	92.2	91.6	90.8	90.0	-
6000	92.6	93.5	94.3	94.8	93.6	92.7	92.2	91.5	90.7	90.1	-
7000	93.3	94.1	95.0	95.0	93.4	92.7	92.1	91.3	90.5	90.3	-
8000	93.9	94.8	95.3	94.2	93.3	92.6	92.0	91.1	90.4	-	-

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N1 FOR GO-AROUND - E T/O MODE

FADEC REF A/ICE ON

AIRSPEED: 100 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	78.5	79.3	80.2	81.0	81.9	82.7	83.6	84.4	85.2	86.0	85.6	86.3	87.1
0	79.2	80.0	80.9	81.8	82.6	83.5	84.3	85.1	86.0	86.8	86.3	87.1	87.9
1000	80.1	81.0	81.9	82.8	83.6	84.5	85.3	86.2	87.0	87.8	87.4	88.2	89.0
2000	81.1	82.0	82.9	83.8	84.6	85.5	86.4	87.2	88.1	88.9	88.7	89.3	90.1
3000	82.1	83.0	83.9	84.8	85.7	86.6	87.5	88.3	89.2	90.0	89.6	90.4	91.2
4000	83.2	84.1	85.0	85.9	86.8	87.7	88.6	89.5	90.3	91.2	90.8	91.6	92.4
5000	84.2	85.2	86.1	87.0	87.9	88.8	89.7	90.6	91.5	92.3	92.0	92.8	92.8
6000	84.8	85.8	86.7	87.6	88.5	89.4	90.3	91.2	92.1	93.0	92.6	92.9	92.1
7000	85.4	86.4	87.3	88.2	89.2	90.1	91.0	91.9	92.7	93.6	93.3	93.0	91.9
8000	86.0	87.0	87.9	88.9	89.8	90.7	91.6	92.5	93.4	94.3	93.3	92.3	91.6

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N1 FOR GO-AROUND - E T/O MODE

FADEC REF A/ICE OFF

AIRSPEED: 150 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	76.3	77.2	78.0	78.9	79.7	80.6	81.4	82.2	83.0	83.8	84.6
0	77.0	77.9	78.7	79.6	80.4	81.3	82.1	82.9	83.8	84.6	85.4
1000	78.0	78.9	79.7	80.6	81.5	82.3	83.2	84.0	84.8	85.6	86.4
2000	79.0	79.9	80.8	81.6	82.5	83.4	84.2	85.1	85.9	86.7	87.5
3000	80.0	80.9	81.8	82.7	83.6	84.4	85.3	86.1	87.0	87.8	88.7
4000	81.0	81.9	82.8	83.7	84.6	85.5	86.4	87.2	88.1	88.9	89.8
5000	82.0	82.9	83.8	84.7	85.6	86.5	87.4	88.3	89.2	90.0	90.9
6000	82.5	83.4	84.4	85.3	86.2	87.1	88.0	88.9	89.7	90.6	91.5
7000	83.0	84.0	84.9	85.8	86.7	87.6	88.5	89.4	90.3	91.2	92.0
8000	83.6	84.5	85.5	86.4	87.3	88.2	89.1	90.0	90.9	91.8	92.7

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	0	5	10	15	20	25	30	35	40	45	50
-1000	85.4	86.2	86.9	87.7	88.5	89.2	90.0	90.7	91.0	89.9	88.9
0	86.2	86.9	87.7	88.5	89.3	90.0	90.8	91.5	91.5	90.0	88.9
1000	87.2	88.0	88.8	89.6	90.4	91.2	91.9	92.0	90.8	89.9	88.8
2000	88.4	89.2	90.0	90.8	91.5	92.3	92.6	91.5	90.7	89.8	88.9
3000	89.5	90.3	91.1	91.9	92.7	93.2	92.2	91.5	90.7	89.8	89.1
4000	90.6	91.4	92.2	93.0	93.9	93.7	92.1	91.5	90.7	89.8	89.5
5000	91.7	92.5	93.4	94.2	94.4	92.7	92.1	91.5	90.7	89.9	-
6000	92.3	93.1	94.0	94.6	94.4	92.6	92.0	91.4	90.5	90.1	-
7000	92.9	93.7	94.6	94.7	93.2	92.6	92.0	91.2	90.4	90.2	-
8000	93.5	94.4	95.0	94.8	93.1	92.5	91.9	91.1	90.4	-	-

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N1 FOR GO-AROUND - E T/O MODE

FADEC REF A/ICE ON

AIRSPEED: 150 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	78.3	79.2	80.0	80.9	81.7	82.6	83.4	84.2	85.0	85.8	85.4	86.2	86.9
0	79.0	79.9	80.7	81.6	82.5	83.3	84.1	85.0	85.8	86.6	86.2	86.9	87.7
1000	80.0	80.9	81.8	82.6	83.5	84.3	85.2	86.0	86.9	87.7	87.2	88.0	88.8
2000	81.0	81.9	82.8	83.7	84.5	85.4	86.3	87.1	87.9	88.8	88.4	89.2	90.0
3000	82.0	82.9	83.8	84.7	85.6	86.5	87.3	88.2	89.0	89.9	89.7	90.3	91.1
4000	83.0	83.9	84.8	85.7	86.6	87.5	88.4	89.3	90.1	91.0	90.6	91.4	92.2
5000	84.0	84.9	85.9	86.8	87.7	88.6	89.5	90.4	91.2	92.1	91.7	92.5	92.8
6000	84.5	85.5	86.4	87.3	88.3	89.2	90.0	90.9	91.8	92.7	92.3	92.9	92.7
7000	85.1	86.0	87.0	87.9	88.8	89.7	90.6	91.5	92.4	93.3	92.9	93.1	91.9
8000	85.7	86.6	87.5	88.5	89.4	90.3	91.2	92.1	93.0	93.9	93.0	92.8	91.6

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N1 FOR GO-AROUND - E T/O MODE

FADEC REF A/ICE OFF

AIRSPEED: 200 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	75.9	76.8	77.7	78.5	79.3	80.2	81.0	81.8	82.6	83.4	84.2
0	76.6	77.5	78.3	79.2	80.0	80.9	81.7	82.5	83.3	84.1	84.9
1000	77.7	78.6	79.5	80.3	81.2	82.0	82.9	83.7	84.5	85.3	86.1
2000	78.8	79.7	80.6	81.5	82.3	83.2	84.1	84.9	85.7	86.6	87.4
3000	79.9	80.8	81.7	82.6	83.4	84.3	85.2	86.0	86.9	87.7	88.5
4000	80.8	81.7	82.6	83.5	84.4	85.3	86.2	87.1	87.9	88.8	89.6
5000	81.8	82.7	83.6	84.5	85.4	86.3	87.2	88.1	88.9	89.8	90.6
6000	82.2	83.2	84.1	85.0	85.9	86.8	87.7	88.6	89.5	90.3	91.2
7000	82.7	83.7	84.6	85.5	86.4	87.3	88.2	89.1	90.0	90.8	91.7
8000	83.2	84.2	85.1	86.1	87.0	87.9	88.8	89.7	90.5	91.4	92.3

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	0	5	10	15	20	25	30	35	40	45	50
-1000	85.0	85.7	86.5	87.3	88.0	88.8	89.5	90.2	90.7	89.7	88.5
0	85.7	86.5	87.2	88.0	88.8	89.5	90.3	91.0	91.2	89.8	88.5
1000	86.9	87.7	88.5	89.3	90.1	90.8	91.6	91.8	90.6	89.6	88.4
2000	88.2	89.0	89.8	90.6	91.4	92.1	92.5	91.4	90.6	89.6	88.5
3000	89.4	90.2	91.0	91.8	92.6	93.1	92.1	91.4	90.6	89.6	88.8
4000	90.4	91.2	92.1	92.9	93.7	93.6	92.1	91.4	90.6	89.6	89.2
5000	91.5	92.3	93.1	94.0	94.1	92.8	92.1	91.4	90.6	89.7	-
6000	92.0	92.9	93.7	94.5	94.3	92.6	92.0	91.3	90.5	89.9	-
7000	92.6	93.4	94.2	94.7	93.2	92.5	91.9	91.2	90.4	90.2	-
8000	93.1	94.0	94.8	94.7	93.0	92.4	91.8	91.0	90.4	-	-

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N1 FOR GO-AROUND - E T/O MODE

FADEC REF A/ICE ON

AIRSPEED: 200 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	77.9	78.8	79.6	80.5	81.3	82.2	83.0	83.8	84.6	85.4	85.0	85.7	86.5
0	78.6	79.5	80.3	81.2	82.0	82.9	83.7	84.5	85.3	86.1	85.7	86.5	87.2
1000	79.7	80.6	81.5	82.3	83.2	84.0	84.9	85.7	86.6	87.4	86.9	87.7	88.5
2000	80.8	81.7	82.6	83.5	84.4	85.2	86.1	86.9	87.8	88.6	88.2	89.0	89.8
3000	81.9	82.8	83.7	84.6	85.5	86.4	87.2	88.1	88.9	89.8	89.7	90.2	91.0
4000	82.9	83.8	84.7	85.6	86.5	87.4	88.2	89.1	90.0	90.8	90.7	91.2	92.1
5000	83.8	84.8	85.7	86.6	87.5	88.4	89.3	90.2	91.0	91.9	91.5	92.3	92.7
6000	84.3	85.2	86.2	87.1	88.0	88.9	89.8	90.7	91.6	92.4	92.0	92.9	92.8
7000	84.8	85.7	86.7	87.6	88.5	89.4	90.3	91.2	92.1	92.9	92.6	92.9	92.0
8000	85.3	86.3	87.2	88.1	89.1	90.0	90.9	91.8	92.6	93.5	93.1	92.9	91.7

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE OFF

AIRSPEED: 100 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	74.0	74.8	75.6	76.5	77.3	78.1	78.9	79.7	80.5	81.2	82.0
0	74.5	75.3	76.2	77.0	77.8	78.6	79.4	80.2	81.0	81.8	82.6
2000	76.4	77.3	78.2	79.0	79.9	80.7	81.5	82.3	83.2	84.0	84.7
4000	78.4	79.3	80.2	81.1	81.9	82.8	83.6	84.5	85.3	86.1	86.9
6000	79.8	80.7	81.6	82.5	83.4	84.3	85.1	86.0	86.8	87.7	88.5
8000	80.7	81.6	82.5	83.4	84.3	85.2	86.1	86.9	87.8	88.6	89.5
10000	81.7	82.6	83.5	84.4	85.3	86.2	87.1	88.0	88.8	89.7	90.5
12000	82.7	83.7	84.6	85.5	86.4	87.3	88.2	89.1	90.0	90.8	91.7
14000	83.9	84.8	85.8	86.7	87.6	88.5	89.4	90.3	91.2	92.1	93.0
16000	85.0	85.9	86.9	87.8	88.8	89.7	90.6	91.5	92.4	93.3	94.2
18000	86.1	87.1	88.1	89.1	90.0	91.0	91.9	92.8	93.7	94.6	95.5
20000	87.9	88.9	89.9	90.9	91.8	92.8	93.7	94.7	95.6	96.1	95.3
22000	88.0	89.0	90.0	91.0	92.0	92.9	93.9	94.8	95.8	95.7	94.4
24000	88.2	89.2	90.2	91.2	92.2	93.1	94.1	95.0	95.5	94.7	93.4
26000	88.5	89.5	90.5	91.5	92.4	93.4	94.4	94.9	94.3	93.2	92.3
28000	88.7	89.8	90.8	91.7	92.7	93.7	94.4	93.7	93.0	92.2	91.5
30000	89.6	90.6	91.7	92.7	93.6	94.4	93.8	93.1	92.4	91.7	90.9
32000	90.5	91.6	92.6	93.6	94.2	94.1	93.2	92.6	91.8	91.0	90.7
34000	91.4	92.4	93.5	94.1	94.0	93.3	92.7	92.0	91.1	90.7	-
36000	92.3	93.3	94.0	93.7	93.7	92.8	92.2	91.3	90.6	-	-
37000	92.3	93.3	94.2	94.0	94.0	93.2	92.5	91.5	90.8	-	-

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE OFF

AIRSPEED: 100 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	0	5	10	15	20	25	30	35	40	45	50
-1000	82.8	83.5	84.3	85.0	85.7	86.5	87.2	87.9	88.6	89.3	89.4
0	83.3	84.1	84.9	85.6	86.3	87.1	87.8	88.5	89.2	89.6	88.8
2000	85.5	86.3	87.1	87.9	88.6	89.4	90.1	90.8	90.9	89.4	88.6
4000	87.8	88.6	89.3	90.1	90.9	91.7	92.0	90.7	89.9	89.1	88.8
6000	89.3	90.1	90.9	91.7	92.5	92.6	91.3	90.4	89.6	89.1	-
8000	90.3	91.1	91.9	92.7	92.8	91.7	91.0	90.1	89.3	-	-
10000	91.4	92.2	93.0	93.4	92.2	91.5	90.5	89.6	-	-	-
12000	92.6	93.4	93.9	92.7	91.9	91.0	90.1	89.8	-	-	-
14000	93.8	94.3	93.2	92.3	91.4	90.6	90.2	-	-	-	-
16000	95.0	94.8	92.7	91.8	91.0	90.5	-	-	-	-	-
18000	95.4	93.3	92.1	91.4	90.7	-	-	-	-	-	-
20000	94.0	92.6	91.8	91.1	-	-	-	-	-	-	-
22000	93.0	92.0	91.1	90.8	-	-	-	-	-	-	-
24000	92.2	91.2	90.7	-	-	-	-	-	-	-	-
26000	91.4	90.8	-	-	-	-	-	-	-	-	-
28000	90.8	-	-	-	-	-	-	-	-	-	-
30000	-	-	-	-	-	-	-	-	-	-	-
32000	-	-	-	-	-	-	-	-	-	-	-
34000	-	-	-	-	-	-	-	-	-	-	-
36000	-	-	-	-	-	-	-	-	-	-	-
37000	-	-	-	-	-	-	-	-	-	-	-

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE ON

AIRSPEED: 100 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	75.9	76.8	77.6	78.4	79.3	80.1	80.9	81.7	82.4	83.2	82.8	83.5	84.3
0	76.4	77.3	78.1	79.0	79.8	80.6	81.4	82.2	83.0	83.8	83.3	84.1	84.9
2000	78.4	79.3	80.2	81.0	81.9	82.7	83.5	84.4	85.2	86.0	85.5	86.3	87.1
4000	80.4	81.3	82.2	83.1	84.0	84.8	85.7	86.5	87.3	88.2	88.1	88.6	88.3
6000	81.9	82.8	83.7	84.6	85.4	86.3	87.2	88.0	88.9	89.7	89.7	89.0	88.1
8000	82.7	83.6	84.6	85.5	86.3	87.2	88.1	89.0	89.8	90.7	90.4	88.7	87.7
10000	83.7	84.6	85.6	86.5	87.4	88.3	89.2	90.0	90.9	90.9	88.2	87.4	86.7
12000	84.8	85.7	86.7	87.6	88.5	89.4	90.3	91.2	91.3	89.4	87.5	86.8	86.0
14000	85.9	86.9	87.8	88.8	89.7	90.6	91.5	91.5	89.5	88.9	86.9	86.2	85.2
16000	87.1	88.0	89.0	89.9	90.9	91.5	91.2	89.1	88.6	88.0	86.2	85.4	84.1
18000	88.2	89.2	90.2	91.2	91.2	89.4	88.4	88.0	87.6	87.1	85.3	84.1	83.0
20000	90.0	90.8	90.3	89.8	89.3	88.7	88.0	87.2	86.4	85.5	83.8	83.2	82.4
22000	90.1	90.4	89.4	88.6	87.7	87.1	86.5	85.8	85.1	84.6	82.9	82.1	81.3
24000	90.0	88.9	87.8	86.8	86.0	85.6	85.1	84.6	84.2	83.7	81.9	81.1	80.7
26000	90.6	90.7	88.4	87.3	86.4	85.6	84.6	83.8	83.4	82.9	81.1	80.7	-
28000	90.9	90.9	88.5	87.3	86.0	84.7	83.5	83.1	82.7	82.3	80.8	-	-
30000	89.2	87.3	86.5	85.6	84.7	83.8	83.2	82.7	82.2	81.8	-	-	-
32000	86.5	85.5	85.0	84.5	84.0	83.4	82.7	82.1	81.7	81.5	-	-	-
34000	87.1	85.8	85.0	84.1	83.4	82.7	82.1	81.5	81.2	-	-	-	-
36000	87.4	85.5	84.4	83.4	82.7	82.1	81.4	80.9	-	-	-	-	-
37000	87.0	85.4	84.5	83.6	83.0	82.3	81.4	80.7	-	-	-	-	-

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE OFF

AIRSPEED: 150 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	73.9	74.7	75.6	76.4	77.2	78.0	78.8	79.6	80.4	81.2	81.9
0	74.5	75.3	76.2	77.0	77.8	78.6	79.4	80.2	81.0	81.8	82.6
2000	76.4	77.3	78.2	79.0	79.9	80.7	81.5	82.3	83.1	84.0	84.7
4000	78.5	79.3	80.2	81.1	82.0	82.8	83.7	84.5	85.3	86.2	87.0
6000	79.9	80.8	81.7	82.6	83.4	84.3	85.2	86.0	86.9	87.7	88.5
8000	80.6	81.6	82.5	83.4	84.3	85.1	86.0	86.9	87.7	88.6	89.4
10000	81.5	82.5	83.4	84.3	85.2	86.1	87.0	87.8	88.7	89.5	90.4
12000	82.5	83.5	84.4	85.3	86.2	87.1	88.0	88.9	89.8	90.6	91.5
14000	83.6	84.6	85.5	86.4	87.3	88.3	89.2	90.1	90.9	91.8	92.7
16000	84.6	85.6	86.5	87.5	88.4	89.3	90.3	91.2	92.1	92.9	93.8
18000	85.9	86.8	87.8	88.8	89.7	90.6	91.6	92.5	93.4	94.3	95.2
20000	87.6	88.6	89.6	90.6	91.6	92.5	93.5	94.4	95.3	96.0	95.8
22000	88.2	89.2	90.2	91.2	92.2	93.1	94.1	95.0	96.0	95.9	94.3
24000	88.9	89.9	90.9	91.9	92.9	93.9	94.9	95.8	95.9	94.8	93.4
26000	88.9	89.9	91.0	91.9	92.9	93.9	94.9	95.2	94.3	93.2	92.3
28000	88.9	89.9	90.9	91.9	92.9	93.9	94.3	93.7	93.0	92.2	91.4
30000	90.0	91.0	92.0	93.0	94.0	94.4	93.7	93.1	92.4	91.6	90.7
32000	91.2	92.2	93.2	94.2	94.3	93.7	93.2	92.6	91.7	90.7	90.4
34000	92.2	93.3	94.3	94.5	93.8	93.3	92.7	91.9	90.9	90.4	-
36000	93.3	94.4	94.7	94.5	93.4	92.8	92.1	91.1	90.4	-	-
37000	93.1	94.2	94.8	94.6	93.7	93.2	92.4	91.3	90.5	-	-

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE OFF

AIRSPEED: 150 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	0	5	10	15	20	25	30	35	40	45	50
-1000	82.7	83.5	84.2	84.9	85.7	86.4	87.1	87.8	88.5	89.3	89.4
0	83.3	84.1	84.9	85.6	86.3	87.1	87.8	88.5	89.2	89.6	88.7
2000	85.5	86.3	87.1	87.8	88.6	89.4	90.1	90.8	90.8	89.4	88.5
4000	87.8	88.6	89.4	90.2	90.9	91.7	91.9	90.7	89.9	89.2	88.8
6000	89.4	90.2	91.0	91.8	92.6	92.5	91.2	90.4	89.6	89.1	-
8000	90.2	91.1	91.9	92.7	92.8	91.7	90.9	90.1	89.4	-	-
10000	91.2	92.1	92.9	93.3	92.1	91.4	90.5	89.6	-	-	-
12000	92.3	93.2	93.6	92.5	91.8	91.0	90.3	89.8	-	-	-
14000	93.5	94.0	93.0	92.2	91.4	90.5	90.1	-	-	-	-
16000	94.7	94.5	92.6	91.7	90.9	90.4	-	-	-	-	-
18000	95.2	93.1	92.1	91.3	90.6	-	-	-	-	-	-
20000	93.7	92.4	91.7	91.0	-	-	-	-	-	-	-
22000	92.9	92.0	91.2	91.0	-	-	-	-	-	-	-
24000	92.3	91.4	91.0	-	-	-	-	-	-	-	-
26000	91.4	90.8	-	-	-	-	-	-	-	-	-
28000	90.7	-	-	-	-	-	-	-	-	-	-
30000	-	-	-	-	-	-	-	-	-	-	-
32000	-	-	-	-	-	-	-	-	-	-	-
34000	-	-	-	-	-	-	-	-	-	-	-
36000	-	-	-	-	-	-	-	-	-	-	-
37000	-	-	-	-	-	-	-	-	-	-	-

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE ON

AIRSPEED: 150 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	75.9	76.7	77.5	78.4	79.2	80.0	80.8	81.6	82.4	83.2	82.7	83.5	84.2
0	76.4	77.3	78.1	79.0	79.8	80.6	81.4	82.2	83.0	83.8	83.3	84.1	84.9
2000	78.4	79.3	80.2	81.0	81.9	82.7	83.5	84.4	85.2	86.0	85.5	86.3	87.1
4000	80.5	81.4	82.3	83.1	84.0	84.9	85.7	86.5	87.4	88.2	87.8	88.6	88.8
6000	81.9	82.8	83.7	84.6	85.5	86.4	87.2	88.1	88.9	89.8	89.7	88.9	88.1
8000	82.7	83.6	84.5	85.4	86.3	87.2	88.1	88.9	89.8	90.6	90.5	88.5	87.6
10000	83.6	84.5	85.4	86.3	87.2	88.1	89.0	89.9	90.8	90.8	88.1	87.5	86.8
12000	84.6	85.5	86.5	87.4	88.3	89.2	90.1	91.0	90.9	89.2	87.4	86.8	86.2
14000	85.7	86.6	87.6	88.5	89.4	90.3	91.2	91.3	89.3	88.7	86.9	86.3	85.4
16000	86.7	87.7	88.6	89.6	90.5	91.4	91.6	89.0	88.5	88.1	86.3	85.6	84.4
18000	88.0	88.9	89.9	90.9	91.5	91.3	88.7	88.3	87.8	87.3	85.5	84.4	83.3
20000	89.7	90.7	91.7	92.1	90.9	90.0	89.0	88.0	86.9	85.8	84.0	83.4	82.5
22000	90.3	91.4	91.3	89.7	88.8	88.0	87.2	86.3	85.5	84.9	83.2	82.5	81.7
24000	90.5	89.4	88.6	87.6	86.9	86.3	85.7	85.0	84.5	84.2	82.4	81.7	81.3
26000	90.7	89.5	88.4	87.4	86.6	85.7	84.8	84.1	83.8	83.4	81.6	81.1	-
28000	90.5	88.8	87.6	86.7	85.7	84.6	83.6	83.5	83.3	82.7	81.0	-	-
30000	88.8	87.2	86.4	85.6	84.7	83.8	83.5	83.2	82.7	82.0	-	-	-
32000	87.6	86.3	85.6	84.8	84.0	83.5	83.2	82.6	82.0	81.7	-	-	-
34000	87.6	85.8	84.7	83.5	82.9	82.7	82.3	81.6	81.2	-	-	-	-
36000	86.7	84.3	82.9	81.9	81.9	81.7	81.1	80.6	-	-	-	-	-
37000	86.7	84.6	83.4	82.5	82.4	82.1	81.3	80.8	-	-	-	-	-

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE OFF

AIRSPEED: 200 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5
-1000	73.7	74.5	75.4	76.2	77.0	77.8	78.6	79.4	80.2	80.9	81.7
0	74.3	75.2	76.0	76.9	77.7	78.5	79.3	80.1	80.9	81.7	82.4
2000	76.4	77.3	78.1	79.0	79.8	80.7	81.5	82.3	83.1	83.9	84.7
4000	78.5	79.4	80.3	81.2	82.0	82.9	83.7	84.6	85.4	86.2	87.0
6000	79.9	80.8	81.7	82.6	83.5	84.4	85.3	86.1	87.0	87.8	88.6
8000	80.7	81.6	82.5	83.4	84.3	85.2	86.1	86.9	87.8	88.6	89.5
10000	81.5	82.4	83.3	84.2	85.1	86.0	86.9	87.8	88.6	89.5	90.3
12000	82.4	83.3	84.2	85.2	86.1	87.0	87.9	88.7	89.6	90.5	91.3
14000	83.3	84.3	85.2	86.1	87.1	88.0	88.9	89.8	90.6	91.5	92.4
16000	84.3	85.2	86.2	87.1	88.0	89.0	89.9	90.8	91.7	92.5	93.4
18000	85.3	86.3	87.2	88.2	89.1	90.0	91.0	91.9	92.8	93.7	94.5
20000	86.8	87.8	88.8	89.7	90.7	91.7	92.6	93.5	94.4	95.3	95.3
22000	88.0	89.0	90.0	91.0	91.9	92.9	93.1	94.8	95.7	94.9	93.8
24000	89.4	90.4	91.4	92.4	93.4	94.4	95.4	96.3	96.1	94.4	93.1
26000	89.4	90.4	91.4	92.4	93.4	94.4	95.3	95.3	94.0	93.1	92.2
28000	89.1	90.1	91.1	92.1	93.1	94.1	94.3	93.4	92.8	92.2	91.3
30000	90.3	91.4	92.4	93.4	94.4	94.4	93.4	92.9	92.3	91.4	90.4
32000	91.8	92.9	93.9	94.5	94.0	93.5	92.9	92.3	91.4	90.4	90.1
34000	92.1	93.1	94.2	94.3	93.5	93.0	92.3	91.5	90.5	89.9	-
36000	92.3	93.3	93.9	93.4	92.9	92.2	91.4	90.4	89.7	-	-
37000	92.3	93.3	94.1	93.7	93.1	92.4	91.6	90.6	89.9	-	-

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE OFF

AIRSPEED: 200 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)										
	0	5	10	15	20	25	30	35	40	45	50
-1000	82.5	83.2	84.0	84.7	85.4	86.2	86.9	87.6	88.3	89.0	89.2
0	83.2	84.0	84.7	85.4	86.2	86.9	87.6	88.4	89.1	89.6	89.4
2000	85.5	86.3	87.0	87.8	88.6	89.3	90.1	90.8	90.8	89.3	88.4
4000	87.8	88.6	89.4	90.2	91.0	91.8	92.0	90.7	89.9	89.2	88.9
6000	89.4	90.3	91.1	91.9	92.7	92.7	91.2	90.4	89.7	89.2	-
8000	90.3	91.1	91.9	92.7	93.0	91.7	90.9	90.1	89.5	-	-
10000	91.2	92.0	92.8	93.2	92.1	91.3	90.5	89.7	-	-	-
12000	92.2	93.0	93.5	92.5	91.7	90.9	90.1	89.9	-	-	-
14000	93.2	93.8	93.5	92.1	91.3	90.5	90.1	-	-	-	-
16000	94.3	94.1	92.5	91.7	90.9	90.3	-	-	-	-	-
18000	94.4	92.9	92.0	91.2	90.5	-	-	-	-	-	-
20000	93.3	92.3	91.5	90.8	-	-	-	-	-	-	-
22000	92.7	91.9	91.1	90.9	-	-	-	-	-	-	-
24000	92.2	91.5	91.1	-	-	-	-	-	-	-	-
26000	91.4	90.8	-	-	-	-	-	-	-	-	-
28000	90.4	-	-	-	-	-	-	-	-	-	-
30000	-	-	-	-	-	-	-	-	-	-	-
32000	-	-	-	-	-	-	-	-	-	-	-
34000	-	-	-	-	-	-	-	-	-	-	-
36000	-	-	-	-	-	-	-	-	-	-	-
37000	-	-	-	-	-	-	-	-	-	-	-

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N1 FOR MAXIMUM CONTINUOUS MODE - CON MODE

ANTI-ICE ON

AIRSPEED: 200 KIAS

ROLLS-ROYCE AE3007A1E ENGINES

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)												
	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	75.7	76.5	77.3	78.2	79.0	79.8	80.6	81.4	82.2	82.9	82.5	83.2	84.0
0	76.3	77.2	78.0	78.8	79.7	80.5	81.3	82.1	82.9	83.7	83.2	84.0	84.7
2000	78.4	79.3	80.1	81.0	81.8	82.7	83.5	84.3	85.1	85.9	85.5	86.3	87.0
4000	80.5	81.4	82.3	83.2	84.0	84.9	85.8	86.6	87.4	88.3	87.8	88.6	88.8
6000	82.0	82.9	83.8	84.7	85.6	86.4	87.3	88.2	89.0	89.8	89.8	88.8	88.1
8000	82.7	83.7	84.6	85.5	86.4	87.3	88.1	89.0	89.9	90.7	90.4	88.4	87.7
10000	83.5	84.5	85.4	86.3	87.2	88.1	89.0	89.8	90.7	90.5	88.1	87.6	87.0
12000	84.4	85.4	86.3	87.2	88.1	89.0	89.9	90.8	90.8	89.2	87.5	87.0	86.5
14000	85.4	86.3	87.3	88.2	89.1	90.1	91.0	91.0	89.2	88.7	87.0	86.5	85.6
16000	86.3	87.3	88.3	89.2	90.1	91.1	91.0	88.8	88.5	88.1	86.5	85.8	84.6
18000	87.4	88.4	89.3	90.3	91.2	91.1	88.5	88.2	87.8	87.5	85.7	84.6	83.4
20000	88.9	89.9	90.9	91.9	92.1	90.2	89.2	88.2	87.2	86.1	84.2	83.5	82.3
22000	90.1	91.1	92.1	91.9	89.9	88.9	87.9	86.9	85.9	85.2	83.3	82.4	81.4
24000	91.6	91.8	90.6	89.8	88.8	87.8	86.8	85.7	84.9	84.4	82.5	81.9	81.5
26000	91.1	90.0	89.1	88.1	87.2	86.3	85.3	84.5	84.3	83.8	81.8	81.2	-
28000	89.7	87.9	86.9	86.2	85.5	84.8	84.0	84.0	83.9	82.9	80.9	-	-
30000	88.9	87.2	86.4	85.7	84.9	84.0	83.9	83.8	83.0	82.0	-	-	-
32000	88.1	86.4	85.7	84.9	84.0	83.8	83.7	83.1	82.3	82.0	-	-	-
34000	86.5	85.3	84.6	83.9	83.6	83.5	83.1	82.2	81.7	-	-	-	-
36000	85.6	84.6	84.0	83.5	83.4	83.0	82.2	81.6	-	-	-	-	-
37000	85.9	84.9	84.3	83.8	83.5	83.1	82.3	81.7	-	-	-	-	-

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TAKEOFF

TAKEOFF ANALYSIS
WEIGHTS AND SPEEDS DETERMINATION METHOD

1) Using the Simplified Takeoff Analysis Tables enter Airport Pressure Altitude, Runway Length and Temperature, according to airplane configuration (Thrust Setting and Anti-Ice ON or OFF), and obtain the Maximum Takeoff Weight and associated V_1, V_R and V_2.

2) Determine Actual Takeoff Weight.

   - If Actual Takeoff Weight is equal to the Maximum Takeoff Weight, use V_1, V_R and V_2 from Simplified Takeoff Analysis Tables.
   - If Actual Takeoff Weight is lower than the Maximum Takeoff Weight, get V_1, V_R and V_2 associated to Actual Weight and Thrust Setting from $V_1/V_R/V_2$ Speeds Tables.

NOTE: The Simplified Takeoff Analysis Tables do not take into account obstacles.

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SIMPLIFIED TAKEOFF ANALYSIS TABLES

Simplified Takeoff Analysis tables are presented for a set of pressure altitudes, temperatures and runway lengths for the conditions below:

- Dry runway;
- Zero wind;
- Zero slope;
- No clearway;
- No stopway;
- Obstacles are not considered.

Following limitation factors were considered in the calculation of these tables:

- Field length;
- Climb;
- Brake energy.

Limitation codes:

- R - Runway Length;
- W - WAT (Climb);
- B - Brake;
- S - Structural.

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 0 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	41767 R 113/120/129	45265 R 120/126/133	48437 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
4	41456 R 113/120/128	44927 R 119/125/133	48093 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
8	41146 R 112/119/128	44593 R 118/125/132	47748 R 124/129/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
12	40858 R 112/119/127	44262 R 118/124/132	47425 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
16	40566 R 111/118/127	43944 R 117/124/132	47082 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
20	40286 R 110/118/127	43636 R 117/123/131	46737 R 122/128/135	49597 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
24	40004 R 110/117/126	43328 R 116/123/131	46418 R 121/127/135	49264 R 126/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
28	39726 R 109/117/126	43025 R 115/122/130	46097 R 121/127/134	48934 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
32	39454 R 109/116/125	42727 R 115/122/130	45775 R 120/126/134	48602 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
36	39188 R 108/116/125	42438 R 114/121/130	45466 R 120/126/134	48263 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
40	38930 R 108/116/125	42160 R 114/121/129	45170 R 119/125/133	47957 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
44	38617 R 107/115/124	41818 R 113/120/129	44804 R 118/125/133	47565 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
48	37648 R 106/114/123	40753 R 112/119/127	43659 R 117/124/131	46360 R 122/128/135	48859 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	41392 R 113/120/128	44858 R 119/125/133	48021 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
4	41081 R 112/119/128	44525 R 118/124/132	47677 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
8	40790 R 112/119/127	44188 R 118/124/132	47321 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
12	40495 R 111/118/127	43867 R 117/123/131	47000 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	40211 R 110/118/126	43557 R 116/123/131	46660 R 122/128/135	49520 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
20	39931 R 110/117/126	43250 R 116/123/131	46338 R 121/127/135	49181 R 126/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
24	39651 R 109/117/126	42944 R 115/122/130	46010 R 120/127/134	48848 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
28	39375 R 109/116/125	42643 R 115/122/130	45686 R 120/126/134	48509 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
32	39105 R 108/116/125	42349 R 114/121/129	45372 R 119/126/133	48166 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
36	38839 R 107/115/124	42061 R 114/121/129	45064 R 119/125/133	47847 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
40	38579 R 107/115/124	41776 R 113/120/129	44760 R 118/125/133	47518 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
44	37973 R 106/114/123	41115 R 112/119/128	44053 R 118/124/132	46788 R 122/128/135	49329 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
48	36949 R 105/113/122	40013 R 111/118/126	42840 R 116/123/130	45487 R 121/127/134	47932 R 125/130/137	49604 S 128/133/139	49604 S 128/133/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 1000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	41017 R 112/119/128	44457 R 118/124/132	47607 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
4	40728 R 111/118/127	44122 R 118/124/132	47251 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	40422 R 111/118/127	43789 R 117/123/131	46888 R 122/128/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	40133 R 110/118/126	43473 R 116/123/131	46579 R 122/128/135	49436 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	39859 R 110/117/126	43173 R 116/122/131	46259 R 121/127/135	49100 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
20	39577 R 109/117/126	42865 R 115/122/130	45925 R 120/127/134	48764 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
24	39300 R 108/116/125	42562 R 115/121/130	45601 R 120/126/134	48419 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
28	39026 R 108/116/125	42265 R 114/121/129	45283 R 119/126/133	48074 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
32	38757 R 107/115/124	41973 R 113/121/129	44972 R 119/125/133	47749 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
36	38494 R 107/115/124	41685 R 113/120/129	44664 R 118/125/133	47415 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
40	38229 R 106/114/124	41395 R 112/120/128	44353 R 118/124/132	47081 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
44	37334 R 105/113/122	40421 R 111/118/127	43307 R 117/123/131	45995 R 121/127/134	48493 R 125/131/137	49604 S 127/132/139	49604 S 127/132/139
48	36256 R 104/112/121	39261 R 110/117/125	42026 R 115/122/129	44621 R 120/126/132	47011 R 124/129/136	48894 W 127/132/138	48894 W 127/132/138

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 1500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	40649 R 111/118/127	44038 R 117/124/132	47185 R 123/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	40349 R 111/118/127	43711 R 117/123/131	46835 R 122/128/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	40052 R 110/117/126	43389 R 116/123/131	46489 R 121/127/135	49358 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	39769 R 109/117/126	43078 R 116/122/130	46154 R 121/127/134	49012 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	39496 R 109/116/125	42778 R 115/122/130	45832 R 120/126/134	48667 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
20	39215 R 108/116/125	42472 R 114/121/130	45507 R 120/126/134	48312 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
24	38938 R 108/116/125	42172 R 114/121/129	45186 R 119/125/133	47980 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
28	38667 R 107/115/124	41877 R 113/120/129	44871 R 118/125/133	47639 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
32	38402 R 106/115/124	41588 R 113/120/128	44562 R 118/125/132	47308 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
36	38140 R 106/114/123	41303 R 112/119/128	44258 R 117/124/132	46984 R 122/128/136	49565 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
40	37604 R 105/113/123	40716 R 111/119/127	43628 R 117/123/131	46334 R 121/127/135	48854 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
44	36646 R 104/112/121	39692 R 110/117/126	42498 R 116/122/130	45138 R 120/126/133	47576 R 124/130/136	49604 S 127/133/139	49604 S 127/133/139
47	35865 R 104/111/120	38839 R 110/116/124	41571 R 115/121/128	44142 R 119/125/132	46530 R 123/128/135	48545 W 126/131/138	48545 W 126/131/138

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 2000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	40267 R 110/118/127	43624 R 117/123/131	46747 R 122/128/135	49604 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	39971 R 110/117/126	43302 R 116/123/131	46393 R 121/127/135	49266 R 126/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	39683 R 109/117/126	42989 R 115/122/130	46062 R 121/127/134	48917 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	39406 R 109/116/125	42685 R 115/122/130	45738 R 120/126/134	48562 R 125/130/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	39134 R 108/116/125	42386 R 114/121/129	45416 R 119/126/134	48225 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
20	38854 R 107/115/125	42083 R 114/121/129	45093 R 119/125/133	47878 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
24	38580 R 107/115/124	41784 R 113/120/129	44773 R 118/125/133	47535 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
28	38311 R 106/115/124	41491 R 113/120/128	44461 R 118/124/132	47202 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
32	38046 R 106/114/123	41204 R 112/119/128	44155 R 117/124/132	46875 R 122/128/135	49461 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
36	37776 R 105/114/123	40923 R 111/119/127	43854 R 117/124/131	46580 R 121/128/135	49125 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
40	36983 R 104/113/122	40064 R 110/118/126	42907 R 116/122/130	45572 R 120/126/134	48052 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139
44	35980 R 103/111/120	38951 R 109/116/125	41695 R 115/121/129	44286 R 119/125/132	46690 R 123/129/135	48908 R 127/132/138	49251 W 127/132/138
46	35473 R 103/111/120	38399 R 109/116/124	41096 R 114/120/128	43639 R 119/124/131	46002 R 122/128/134	48179 R 126/131/137	48185 W 126/131/137

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 2500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	39883 R 110/117/126	43210 R 116/123/131	46298 R 121/127/135	49168 R 126/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	39589 R 109/117/126	42888 R 115/122/130	45956 R 121/127/134	48804 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	39310 R 109/116/125	42583 R 115/122/130	45632 R 120/126/134	48461 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	39037 R 108/116/125	42285 R 114/121/129	45312 R 119/126/133	48116 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	38762 R 107/115/124	41985 R 114/121/129	44991 R 119/125/133	47770 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
20	38487 R 107/115/124	41685 R 113/120/129	44671 R 118/125/133	47430 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
24	38214 R 106/114/124	41390 R 112/120/128	44355 R 118/124/132	47093 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
28	37940 R 106/114/123	41100 R 112/119/128	44045 R 117/124/132	46762 R 121/128/135	49339 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
32	37680 R 105/113/123	40816 R 111/119/127	43741 R 116/123/131	46462 R 121/127/135	49000 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
36	37184 R 104/113/122	40259 R 110/118/127	43140 R 116/123/130	45823 R 120/127/134	48321 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
40	36312 R 103/112/121	39317 R 110/117/125	42099 R 115/121/129	44714 R 119/125/133	47138 R 123/129/136	49437 R 127/132/139	49604 S 127/132/139
44	35320 R 102/110/119	38235 R 109/115/124	40921 R 114/120/127	43462 R 118/124/131	45820 R 122/127/134	47992 R 126/131/137	48325 W 126/131/137
45	35073 R 102/110/119	37964 R 108/115/123	40628 R 113/120/127	43142 R 118/124/130	45479 R 122/127/134	47630 R 125/130/136	47792 W 125/130/137

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 3000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	39502 R 109/117/125	42796 R 115/122/130	45860 R 120/127/134	48705 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	39209 R 108/116/125	42477 R 115/121/130	45521 R 120/126/134	48339 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	38940 R 108/116/125	42182 R 114/121/129	45204 R 119/126/133	48001 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	38669 R 107/115/124	41887 R 113/120/129	44889 R 119/125/133	47665 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	38382 R 107/115/124	41587 R 113/120/128	44568 R 118/125/132	47323 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
20	38114 R 106/114/123	41290 R 112/119/128	44251 R 117/124/132	46985 R 122/128/136	49570 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
24	37850 R 105/114/123	40996 R 112/119/128	43939 R 117/124/132	46651 R 121/128/135	49224 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
28	37603 R 105/113/123	40700 R 111/119/127	43631 R 116/123/131	46348 R 121/127/135	48882 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
32	37342 R 104/113/122	40421 R 110/118/127	43328 R 116/123/131	46028 R 120/127/134	48544 R 124/130/138	49604 S 126/132/139	49604 S 126/132/139
36	36581 R 103/112/121	39620 R 110/117/126	42432 R 115/122/130	45072 R 119/126/133	47550 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
40	35629 R 102/111/120	38576 R 109/116/124	41298 R 114/120/128	43863 R 118/124/131	46270 R 122/128/135	48490 R 126/131/137	49396 W 127/132/139
44	34665 R 102/109/118	37524 R 108/114/123	40175 R 113/119/126	42644 R 117/123/130	44957 R 121/126/133	47081 R 124/129/136	47378 W 125/130/136

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 3500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	39114 R 108/116/125	42376 R 114/121/129	45415 R 120/126/134	48229 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	38822 R 108/115/124	42069 R 114/121/129	45088 R 119/125/133	47882 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	38554 R 107/115/124	41775 R 113/120/129	44772 R 118/125/133	47544 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	38289 R 106/115/124	41482 R 113/120/128	44458 R 118/124/132	47208 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	38021 R 106/114/123	41172 R 112/119/128	44141 R 117/124/132	46870 R 122/128/135	49452 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
20	37743 R 105/114/123	40879 R 111/119/127	43822 R 117/124/131	46553 R 121/128/135	49101 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
24	37490 R 105/113/123	40595 R 111/118/127	43512 R 116/123/131	46225 R 121/127/135	48756 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
28	37213 R 104/113/122	40308 R 110/118/127	43182 R 116/123/131	45884 R 120/127/134	48396 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
32	36731 R 103/112/121	39777 R 110/117/126	42614 R 115/122/130	45270 R 119/126/133	47741 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139
36	35903 R 102/111/120	38886 R 109/116/125	41638 R 114/121/128	44229 R 118/125/132	46661 R 122/128/135	48931 R 126/132/138	49604 S 127/132/139
40	34966 R 102/110/119	37856 R 108/115/123	40519 R 113/119/127	43034 R 117/123/130	45394 R 121/127/133	47562 R 125/130/136	48473 W 126/131/137
43	34254 R 101/109/118	37078 R 107/114/122	39700 R 112/118/126	42139 R 116/122/129	44429 R 120/126/132	46549 R 124/129/135	46939 W 124/129/135

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 4000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	38724 R 107/115/124	41958 R 114/121/129	44971 R 119/125/133	47759 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	38452 R 107/115/124	41650 R 113/120/128	44657 R 118/125/133	47426 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	38184 R 106/114/124	41359 R 112/120/128	44342 R 118/124/132	47088 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	37917 R 106/114/123	41072 R 112/119/128	44030 R 117/124/132	46753 R 122/128/135	49334 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	37643 R 105/113/123	40785 R 111/119/127	43717 R 116/123/131	46444 R 121/127/135	48988 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
20	37388 R 104/113/122	40482 R 111/118/127	43383 R 116/123/131	46104 R 120/127/134	48629 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139
24	37119 R 104/113/122	40212 R 110/118/126	43083 R 115/122/130	45779 R 120/126/134	48286 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
28	36821 R 103/112/122	39898 R 110/117/126	42746 R 115/122/130	45417 R 119/126/134	47912 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139
32	36125 R 102/111/120	39122 R 109/116/125	41905 R 114/121/129	44518 R 118/125/132	46943 R 122/128/135	49256 R 126/132/138	49604 S 126/132/139
36	35232 R 102/110/119	38157 R 108/115/124	40850 R 113/120/127	43393 R 117/124/131	45771 R 121/127/134	47999 R 125/130/137	49394 W 127/132/139
40	34308 R 101/109/118	37140 R 107/114/122	39770 R 112/118/126	42211 R 116/122/129	44528 R 120/126/132	46663 R 124/129/135	47508 W 125/130/136
42	33841 R 100/108/117	36630 R 106/113/121	39221 R 111/118/125	41625 R 116/121/128	43895 R 120/125/132	45990 R 123/128/134	46515 W 124/129/135

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 4500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	38363 R 107/115/124	41561 R 113/120/128	44548 R 118/125/132	47308 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	38099 R 106/114/123	41272 R 112/120/128	44240 R 117/124/132	46979 R 122/128/136	49576 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	37829 R 105/114/123	40970 R 112/119/128	43925 R 117/124/132	46641 R 121/128/135	49218 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
12	37574 R 105/113/123	40682 R 111/119/127	43610 R 116/123/131	46331 R 121/127/135	48868 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
16	37303 R 104/113/122	40395 R 110/118/127	43297 R 116/123/131	46000 R 120/127/134	48520 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
20	37033 R 104/112/122	40120 R 110/118/126	42974 R 115/122/130	45668 R 120/126/134	48169 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
24	36756 R 103/112/121	39818 R 109/117/126	42645 R 115/122/130	45318 R 119/126/133	47798 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139
28	36234 R 102/111/121	39249 R 109/116/125	42047 R 114/121/129	44675 R 118/125/133	47115 R 122/129/136	49437 R 126/132/139	49604 S 126/132/139
32	35452 R 101/110/119	38389 R 108/115/124	41114 R 113/120/128	43677 R 117/124/131	46075 R 121/127/134	48324 R 125/131/137	49604 S 127/132/139
36	34571 R 101/109/118	37441 R 107/114/122	40098 R 112/119/126	42570 R 116/122/130	44905 R 120/126/133	47107 R 124/129/136	48482 W 126/131/137
40	33662 R 100/108/117	36439 R 106/113/121	39019 R 111/117/125	41407 R 115/121/128	43680 R 119/125/131	45772 R 123/128/134	46561 W 124/129/135
41	33432 R 100/107/116	36188 R 105/112/121	38749 R 111/117/124	41118 R 115/121/128	43369 R 119/124/131	45442 R 122/127/134	46079 W 123/128/134

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 5000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	38004 R 106/114/123	41168 R 112/119/128	44128 R 117/124/132	46858 R 122/128/135	49442 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	37746 R 105/114/123	40887 R 111/119/127	43826 R 117/124/131	46558 R 121/128/135	49107 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
8	37492 R 105/113/123	40585 R 111/118/127	43510 R 116/123/131	46224 R 121/127/135	48755 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
12	37218 R 104/113/122	40294 R 110/118/127	43194 R 115/123/131	45889 R 120/127/134	48402 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
16	36949 R 103/112/122	40027 R 110/117/126	42881 R 115/122/130	45560 R 119/126/134	48055 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139
20	36687 R 103/112/121	39743 R 109/117/126	42567 R 114/122/130	45235 R 119/126/133	47711 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
24	36393 R 102/111/121	39419 R 108/116/125	42225 R 114/121/129	44862 R 118/125/133	47313 R 122/129/136	49604 R 126/132/139	49604 S 126/132/139
28	35651 R 101/110/120	38613 R 108/115/124	41352 R 113/120/128	43934 R 117/124/132	46350 R 121/128/135	48621 R 125/131/138	49604 S 126/132/139
32	34783 R 101/109/118	37662 R 107/114/123	40331 R 112/119/127	42842 R 116/123/130	45195 R 120/126/133	47395 R 124/130/136	49172 W 126/132/138
36	33915 R 100/108/117	36731 R 106/113/121	39337 R 111/117/125	41753 R 115/121/129	44046 R 119/125/132	46199 R 123/128/135	47454 W 125/130/136
40	33022 R 99/107/116	35743 R 105/112/120	38273 R 110/116/124	40628 R 114/120/127	42838 R 118/124/130	44888 R 121/127/133	45565 W 123/128/134

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 5500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	37442 R 105/113/122	40558 R 111/118/127	43473 R 116/123/131	46185 R 121/127/135	48712 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
4	37200 R 104/113/122	40276 R 110/118/127	43168 R 116/123/131	45860 R 120/127/134	48368 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
8	36936 R 104/112/122	39975 R 110/118/126	42856 R 115/122/130	45529 R 120/126/134	48018 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
12	36665 R 103/112/121	39710 R 109/117/126	42545 R 115/122/130	45199 R 119/126/133	47670 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
16	36401 R 102/111/121	39430 R 109/117/125	42236 R 114/121/129	44875 R 119/125/133	47327 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139
20	36142 R 102/111/121	39152 R 108/116/125	41927 R 113/121/129	44555 R 118/125/132	46988 R 122/128/136	49306 R 125/132/139	49604 S 126/132/139
24	35781 R 101/110/120	38732 R 108/116/124	41488 R 113/120/128	44076 R 117/124/132	46500 R 121/128/135	48771 R 125/131/138	49604 S 126/132/139
28	34970 R 100/109/119	37871 R 107/114/123	40554 R 112/119/127	43082 R 116/123/130	45451 R 120/127/134	47671 R 124/130/136	49604 S 127/133/139
32	34110 R 100/108/117	36929 R 106/113/122	39564 R 111/118/126	42002 R 115/122/129	44308 R 119/125/132	46485 R 123/128/135	48168 W 125/131/137
36	33246 R 99/107/116	36003 R 105/112/120	38557 R 110/116/124	40918 R 114/120/127	43167 R 118/124/131	45271 R 122/127/133	46417 W 123/129/135
39	32584 R 98/106/115	35268 R 104/111/119	37766 R 109/115/123	40090 R 113/119/126	42264 R 117/123/129	44296 R 121/126/132	45017 W 122/127/133

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 6000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	36901 R 104/112/122	39956 R 110/118/126	42824 R 115/122/130	45496 R 120/126/134	47982 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
4	36644 R 103/112/121	39692 R 110/117/126	42516 R 115/122/130	45167 R 119/126/133	47633 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
8	36384 R 103/111/121	39393 R 109/117/125	42207 R 114/121/129	44840 R 119/125/133	47287 R 123/129/136	49604 R 126/132/139	49604 S 126/132/139
12	36118 R 102/111/120	39114 R 108/116/125	41901 R 114/121/129	44516 R 118/125/132	46944 R 122/128/135	49267 R 126/132/138	49604 S 126/132/139
16	35857 R 102/110/120	38839 R 108/116/124	41597 R 113/120/128	44196 R 118/124/132	46605 R 122/128/135	48907 R 125/131/138	49604 S 126/132/139
20	35614 R 101/110/120	38566 R 107/115/124	41292 R 113/120/128	43881 R 117/124/131	46296 R 121/127/135	48559 R 125/131/138	49604 S 126/132/139
24	35163 R 100/109/119	38066 R 107/115/123	40756 R 112/119/127	43296 R 116/123/131	45676 R 120/127/134	47901 R 124/130/137	49604 S 126/132/139
28	34295 R 100/108/118	37133 R 106/113/122	39782 R 111/118/126	42237 R 115/122/129	44559 R 119/125/132	46726 R 123/129/135	48803 R 126/132/138
32	33443 R 99/107/116	36202 R 105/112/121	38786 R 110/117/124	41167 R 114/121/128	43428 R 118/124/131	45558 R 122/127/134	47147 W 124/130/136
36	32581 R 98/106/115	35281 R 104/111/119	37783 R 109/115/123	40112 R 113/119/126	42293 R 117/123/129	44350 R 121/126/132	45395 W 122/127/133
38	32148 R 98/105/114	34795 R 103/110/119	37260 R 108/115/122	39554 R 113/119/126	41695 R 116/122/129	43705 R 120/125/131	44474 W 121/126/132

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 6500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	36349 R 103/112/121	39375 R 109/117/125	42174 R 115/121/129	44804 R 119/125/133	47274 R 123/129/136	49578 R 127/132/139	49604 S 127/132/139
4	36089 R 103/111/120	39088 R 109/116/125	41863 R 114/121/129	44474 R 118/125/132	46897 R 122/128/135	49213 R 126/132/138	49604 S 127/132/139
8	35828 R 102/111/120	38793 R 108/116/124	41557 R 113/120/128	44150 R 118/124/132	46577 R 122/128/135	48857 R 125/131/138	49604 S 127/132/139
12	35566 R 101/110/120	38518 R 108/115/124	41256 R 113/120/128	43831 R 117/124/131	46242 R 121/128/135	48509 R 125/131/137	49604 S 126/132/139
16	35307 R 101/110/119	38247 R 107/115/124	40946 R 112/119/127	43517 R 117/123/131	45912 R 121/127/134	48153 R 124/130/137	49604 S 126/132/139
20	35073 R 100/109/119	37976 R 106/114/123	40660 R 112/119/127	43206 R 116/123/131	45585 R 120/127/134	47811 R 124/130/137	49604 S 126/132/139
24	34486 R 99/108/118	37331 R 106/114/122	39983 R 111/118/126	42451 R 115/122/130	44784 R 119/126/133	46982 R 123/129/136	49053 R 126/132/138
28	33630 R 99/107/117	36409 R 105/112/121	39007 R 110/117/125	41406 R 114/121/128	43682 R 118/124/131	45827 R 122/128/134	47836 R 125/130/137
32	32786 R 98/106/115	35505 R 104/111/120	38019 R 109/116/123	40366 R 113/119/127	42560 R 117/123/130	44643 R 121/126/133	46144 W 123/128/134
36	31937 R 97/105/114	34568 R 103/110/118	37018 R 108/114/122	39299 R 112/118/125	41425 R 116/122/128	43439 R 119/125/131	44381 W 121/126/132
37	31727 R 97/105/114	34326 R 103/110/118	36758 R 108/114/121	39022 R 112/118/125	41123 R 116/121/128	43118 R 119/124/130	43927 W 121/126/132

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 7000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	35802 R 102/111/120	38781 R 108/116/124	41529 R 114/120/128	44120 R 118/124/132	46542 R 122/128/135	48810 R 126/131/138	49604 S 127/132/139
4	35539 R 102/110/120	38490 R 108/115/124	41216 R 113/120/128	43788 R 117/124/131	46194 R 121/128/135	48455 R 125/131/137	49604 S 127/132/139
8	35277 R 101/110/119	38198 R 107/115/124	40913 R 112/119/127	43466 R 117/123/131	45856 R 121/127/134	48095 R 124/130/137	49604 S 127/132/139
12	35019 R 100/109/119	37927 R 107/114/123	40617 R 112/119/127	43152 R 116/123/131	45526 R 120/127/134	47753 R 124/130/137	49604 S 127/132/139
16	34781 R 100/109/118	37661 R 106/114/123	40316 R 111/118/127	42843 R 116/123/130	45202 R 120/126/133	47404 R 123/129/136	49515 R 126/132/139
20	34535 R 99/108/118	37392 R 105/114/122	40034 R 111/118/126	42537 R 115/122/130	44881 R 119/126/133	47067 R 123/129/136	49162 R 126/132/138
24	33815 R 99/107/117	36602 R 105/113/121	39201 R 110/117/125	41612 R 114/121/128	43899 R 118/124/132	46055 R 122/128/134	48076 R 125/131/137
28	32984 R 98/106/116	35691 R 104/111/120	38239 R 109/116/124	40583 R 113/120/127	42811 R 117/123/130	44917 R 121/126/133	46895 R 124/129/135
32	32134 R 97/105/114	34787 R 103/110/118	37257 R 108/115/122	39557 R 112/118/126	41699 R 116/122/129	43748 R 120/125/131	45132 W 122/127/133
36	31310 R 96/104/113	33859 R 102/109/117	36258 R 107/113/121	38491 R 111/117/124	40582 R 115/120/127	42533 R 118/124/130	43375 W 120/125/131

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 7500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	35249 R 101/110/119	38180 R 108/115/124	40880 R 113/120/127	43430 R 117/124/131	45815 R 121/127/134	48044 R 125/130/137	49559 W 127/133/139
4	34991 R 101/109/119	37896 R 107/115/123	40575 R 112/119/127	43106 R 117/123/130	45475 R 120/127/134	47697 R 124/130/136	49550 W 127/133/139
8	34734 R 100/109/118	37608 R 106/114/123	40279 R 112/119/127	42790 R 116/123/130	45144 R 120/126/133	47341 R 123/129/136	49447 R 127/132/139
12	34494 R 100/108/118	37342 R 106/114/122	40007 R 111/118/126	42481 R 115/122/130	44819 R 119/126/133	47026 R 123/129/136	49089 R 126/132/138
16	34243 R 99/108/118	37076 R 105/113/122	39705 R 110/118/126	42171 R 115/122/129	44494 R 119/125/132	46656 R 122/128/135	48741 R 125/131/138
20	33920 R 98/107/117	36716 R 105/113/121	39337 R 110/117/125	41761 R 114/121/129	44060 R 118/125/132	46222 R 122/128/135	48259 R 125/131/137
24	33156 R 98/106/116	35885 R 104/111/120	38433 R 109/116/124	40789 R 113/120/127	43030 R 117/123/130	45147 R 121/127/133	47119 R 124/129/136
28	32326 R 97/105/115	34984 R 103/110/119	37471 R 108/115/122	39784 R 112/119/126	41943 R 116/122/129	44005 R 120/125/132	45929 W 123/128/134
32	31499 R 96/104/113	34077 R 102/109/117	36495 R 107/113/121	38747 R 111/117/124	40862 R 115/121/127	42844 R 118/124/130	44116 W 121/126/132
35	30886 R 96/103/112	33393 R 101/108/116	35759 R 106/112/120	37962 R 110/116/123	40029 R 114/120/126	41949 R 118/123/129	42808 W 119/124/130

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 8000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	34699 R 101/109/118	37584 R 107/114/123	40238 R 112/119/126	42746 R 116/123/130	45094 R 120/126/133	47284 R 124/129/136	49020 W 126/132/138
4	34449 R 100/108/118	37307 R 106/114/122	39961 R 111/118/126	42430 R 116/122/130	44763 R 120/126/133	46966 R 123/129/136	49008 W 126/132/138
8	34208 R 99/108/118	37024 R 105/113/122	39670 R 111/118/126	42119 R 115/122/129	44437 R 119/125/132	46620 R 122/128/135	48674 R 126/131/138
12	33962 R 99/108/117	36762 R 105/113/121	39386 R 110/117/125	41815 R 114/121/129	44117 R 118/125/132	46290 R 122/128/135	48318 R 125/131/137
16	33708 R 98/107/117	36497 R 104/112/121	39085 R 109/117/125	41505 R 114/121/128	43792 R 118/124/131	45942 R 121/127/134	47967 R 125/130/137
20	33325 R 98/106/116	36062 R 104/112/120	38622 R 109/116/124	40992 R 113/120/128	43246 R 117/123/131	45374 R 121/127/133	47382 R 124/130/136
24	32499 R 97/105/115	35175 R 103/110/119	37671 R 108/115/123	39995 R 112/119/126	42168 R 116/122/129	44241 R 120/125/132	46189 R 123/128/135
28	31674 R 96/104/114	34275 R 102/109/118	36708 R 107/114/121	38975 R 111/117/125	41082 R 115/121/128	43097 R 118/124/130	44896 W 121/127/133
32	30871 R 95/103/112	33372 R 101/108/116	35738 R 106/112/120	37943 R 110/116/123	40008 R 114/120/126	41949 R 117/123/129	43094 W 119/124/130
34	30465 R 95/102/112	32932 R 100/107/116	35251 R 105/112/119	37424 R 110/115/122	39463 R 113/119/125	41351 R 117/122/128	42242 W 118/123/129

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 8500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	34041 R 100/108/117	36866 R 106/113/122	39493 R 111/118/125	41936 R 115/121/129	44225 R 119/125/132	46360 R 123/128/135	48364 R 126/131/137
4	33787 R 99/107/117	36593 R 105/113/121	39201 R 110/117/125	41618 R 115/121/128	43907 R 119/125/132	46029 R 122/128/134	48019 R 126/131/137
8	33553 R 99/107/117	36325 R 105/112/121	38915 R 110/117/125	41318 R 114/120/128	43595 R 118/124/131	45704 R 122/127/134	47679 R 125/130/136
12	33307 R 98/106/116	36063 R 104/112/120	38634 R 109/116/124	41014 R 114/120/128	43283 R 118/124/131	45383 R 121/127/133	47344 R 124/130/136
16	33072 R 98/106/116	35800 R 103/111/120	38352 R 109/116/124	40711 R 113/120/127	42965 R 117/123/130	45065 R 121/126/133	47011 R 124/129/136
20	32529 R 97/105/115	35208 R 103/110/119	37714 R 108/115/123	40049 R 112/119/126	42212 R 116/122/129	44254 R 120/125/132	46181 R 123/128/135
24	31729 R 96/104/114	34331 R 102/109/118	36771 R 107/114/121	39050 R 111/117/125	41148 R 115/121/128	43136 R 119/124/130	45010 R 122/127/133
28	30930 R 95/103/112	33453 R 101/108/116	35816 R 106/112/120	38038 R 110/116/123	40092 R 114/120/126	42002 R 118/123/129	43825 R 121/125/131
32	30140 R 94/102/111	32563 R 100/107/115	34862 R 105/111/119	37019 R 109/115/122	39002 R 113/118/125	40847 R 116/121/127	42071 W 119/123/129
33	29946 R 94/101/111	32343 R 100/106/115	34626 R 105/111/118	36759 R 109/114/121	38726 R 113/118/124	40572 R 116/121/127	41669 W 118/123/128

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 9000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	33400 R 99/107/116	36160 R 105/112/121	38720 R 110/116/124	41079 R 115/120/128	43311 R 119/124/131	45407 R 122/127/134	47367 R 125/130/136
4	33152 R 98/106/116	35895 R 104/111/120	38439 R 110/116/124	40780 R 114/120/127	42998 R 118/123/130	45080 R 122/126/133	47026 R 125/129/136
8	32902 R 98/106/116	35630 R 104/111/120	38163 R 109/115/124	40487 R 113/119/127	42689 R 117/123/130	44759 R 121/126/133	46689 R 124/129/135
12	32657 R 97/105/115	35369 R 103/110/119	37890 R 108/115/123	40216 R 113/119/126	42386 R 117/122/129	44442 R 120/125/132	46382 R 124/128/135
16	32311 R 97/105/115	35128 R 103/110/119	37623 R 108/115/123	39933 R 112/118/126	42087 R 116/122/129	44131 R 120/125/132	46058 R 123/128/134
20	31612 R 96/104/114	34363 R 102/109/118	36779 R 107/113/121	39033 R 111/117/125	41126 R 115/121/128	43118 R 119/124/130	44998 R 122/127/133
24	30927 R 95/103/112	33508 R 101/108/117	35859 R 106/112/120	38054 R 110/116/123	40103 R 114/119/126	42021 R 118/122/129	43850 R 121/125/131
28	30194 R 94/102/111	32634 R 100/107/115	34919 R 105/111/119	37052 R 109/115/122	39044 R 113/118/125	40899 R 117/121/127	42676 R 120/124/130
32	29420 R 94/100/110	31752 R 99/105/114	33969 R 104/110/117	36039 R 108/113/120	37971 R 112/117/123	39784 R 116/120/126	41091 W 118/122/128

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 9500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	32702 R 98/106/115	35412 R 104/111/119	37925 R 109/115/123	40236 R 114/119/126	42425 R 118/122/130	44483 R 121/126/132	46408 R 125/128/135
4	32457 R 98/105/115	35153 R 104/110/119	37650 R 109/115/123	39963 R 113/119/126	42119 R 117/122/129	44164 R 121/125/132	46076 R 124/128/134
8	32110 R 97/105/115	34899 R 103/110/119	37379 R 108/114/122	39677 R 113/118/126	41816 R 117/122/129	43848 R 120/125/131	45765 R 123/128/134
12	31815 R 97/104/114	34655 R 102/109/118	37102 R 108/114/122	39384 R 112/118/125	41507 R 116/121/128	43525 R 120/124/131	45429 R 123/127/134
16	31472 R 96/104/114	34329 R 102/109/118	36751 R 107/113/121	39011 R 112/117/125	41109 R 115/120/128	43107 R 119/124/130	44978 R 122/126/133
20	30770 R 95/103/113	33480 R 101/108/116	35836 R 106/112/120	38035 R 110/116/123	40089 R 114/119/126	42013 R 118/122/129	43462 W 120/124/131
24	30120 R 94/101/111	32635 R 100/106/115	34926 R 105/111/119	37067 R 110/115/122	39066 R 113/118/125	40929 R 117/121/127	41599 W 118/122/128
28	29428 R 94/100/110	31774 R 99/105/114	34003 R 104/109/117	36082 R 109/113/120	38024 R 112/117/123	39848 R 116/120/126	39944 W 116/120/126
31	28857 R 93/99/109	31149 R 99/104/113	33305 R 103/109/116	35337 R 108/112/119	37235 R 112/116/122	38843 W 115/118/124	38843 W 115/118/124

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 10000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	31910 R 98/105/114	34660 R 103/110/118	37126 R 109/114/122	39412 R 113/118/125	41537 R 117/121/128	43558 R 121/124/131	45450 R 124/127/134
4	31647 R 97/104/114	34419 R 103/109/118	36855 R 108/114/122	39126 R 113/117/125	41236 R 117/121/128	43244 R 120/124/131	45124 R 123/127/133
8	31356 R 97/104/114	34168 R 102/109/118	36586 R 108/113/121	38842 R 112/117/124	40936 R 116/120/127	42932 R 119/123/130	44798 R 123/126/133
12	31104 R 96/103/113	33879 R 102/108/117	36278 R 107/113/121	38517 R 111/116/124	40594 R 115/120/127	42574 R 119/123/130	44444 R 122/126/132
16	30650 R 95/103/112	33333 R 101/108/116	35729 R 106/112/120	37940 R 111/116/123	40005 R 115/119/126	41939 R 118/122/129	43784 R 121/125/131
20	29923 R 94/101/111	32421 R 100/106/115	34746 R 105/111/118	36891 R 110/114/122	38895 R 114/118/125	40764 R 117/121/127	42445 W 120/124/130
24	29194 R 94/100/109	31562 R 99/105/113	33832 R 104/109/117	35933 R 109/113/120	37885 R 113/117/123	39718 R 116/120/126	40604 W 118/121/127
28	28466 R 93/99/108	30785 R 99/104/112	32963 R 103/108/116	34979 R 108/112/119	36874 R 112/115/122	38653 R 115/118/124	39031 W 116/119/125
30	28104 R 92/98/107	30387 R 98/103/111	32519 R 103/108/115	34503 R 107/111/118	36368 R 111/115/121	38120 R 114/118/123	38324 W 115/118/124

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 10500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	31184 R 97/103/113	33908 R 103/108/117	36326 R 108/113/121	38569 R 112/117/124	40650 R 116/120/127	42617 R 120/123/130	44490 R 123/126/132
4	30917 R 96/103/113	33674 R 102/108/117	36061 R 107/112/120	38289 R 112/116/124	40355 R 116/120/127	42309 R 119/123/129	44170 R 123/126/132
8	30655 R 96/103/113	33428 R 102/108/116	35799 R 107/112/120	38012 R 111/116/123	40063 R 115/119/126	42018 R 119/122/129	43852 R 122/125/131
12	30411 R 95/102/112	33141 R 101/107/116	35494 R 106/111/120	37692 R 111/115/123	39746 R 115/119/126	41669 R 118/122/128	43505 R 121/125/131
16	29889 R 95/101/111	32498 R 100/106/115	34803 R 105/111/119	36957 R 110/114/122	38971 R 114/118/125	40849 R 117/121/127	42648 R 120/124/130
20	29192 R 94/100/110	31615 R 99/105/114	33849 R 104/109/117	35941 R 109/113/120	37896 R 113/116/123	39733 R 116/119/126	41444 W 119/122/128
24	28502 R 93/99/108	30819 R 99/104/112	32966 R 104/108/116	35001 R 108/112/119	36904 R 112/115/122	38691 R 115/118/124	39669 W 117/120/126
28	27791 R 92/98/107	30036 R 98/103/111	32094 R 103/107/114	34067 R 107/111/117	35914 R 111/114/120	37649 R 114/117/123	38140 W 115/118/123
29	27620 R 92/97/106	29841 R 97/102/110	31882 R 102/107/114	33835 R 107/110/117	35667 R 110/114/120	37388 R 114/116/122	37796 W 115/117/123

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 11000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	30485 R 96/102/112	33184 R 102/107/116	35540 R 107/112/120	37740 R 112/115/123	39767 R 116/119/126	41708 R 119/122/129	43546 R 122/125/131
4	30225 R 96/102/112	32941 R 101/107/116	35280 R 107/111/119	37465 R 111/115/122	39508 R 115/118/125	41404 R 119/121/128	43231 R 122/124/131
8	29969 R 95/102/112	32702 R 101/106/115	35025 R 106/111/119	37195 R 110/115/122	39224 R 114/118/125	41106 R 118/121/128	42921 R 121/124/130
12	29724 R 95/101/111	32417 R 100/106/115	34724 R 105/110/118	36881 R 110/114/122	38897 R 114/118/125	40778 R 117/121/127	42566 R 121/123/130
16	29107 R 94/100/110	31660 R 99/105/114	33892 R 105/109/117	35991 R 109/113/120	37954 R 113/116/123	39798 R 116/119/126	41516 R 120/122/128
20	28432 R 93/99/108	30820 R 99/104/112	32969 R 104/108/116	35007 R 108/112/119	36913 R 112/115/122	38705 R 115/118/124	40367 R 118/121/127
24	27801 R 92/98/107	30039 R 98/102/111	32104 R 103/107/114	34085 R 107/110/117	35939 R 111/114/120	37681 R 114/117/123	38748 W 116/119/124
28	27085 R 91/96/105	29273 R 97/101/109	31278 R 102/105/113	33173 R 106/109/116	34972 R 110/112/119	36650 R 113/115/121	37288 W 114/116/122

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 11500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	29794 R 95/101/111	32455 R 101/106/115	34764 R 106/110/118	36921 R 111/114/122	38925 R 115/118/125	40809 R 118/121/127	42612 R 122/124/130
4	29540 R 95/101/111	32219 R 101/106/115	34512 R 106/110/118	36654 R 110/114/121	38644 R 114/117/124	40515 R 118/120/127	42306 R 121/123/129
8	29291 R 94/100/110	31974 R 100/105/114	34262 R 105/109/118	36390 R 110/113/121	38367 R 114/117/124	40224 R 117/120/126	42003 R 120/123/129
12	28953 R 94/100/110	31600 R 99/105/113	33847 R 105/109/117	35950 R 109/113/120	37917 R 113/116/123	39753 R 117/119/126	41492 R 120/122/128
16	28326 R 93/99/108	30853 R 99/103/112	33012 R 104/108/116	35057 R 108/112/119	36971 R 112/115/122	38757 R 116/118/124	40442 R 119/121/127
20	27685 R 92/97/107	30043 R 98/102/111	32112 R 103/107/114	34097 R 107/110/117	35956 R 111/114/120	37693 R 114/117/123	39344 R 118/119/125
24	27087 R 91/96/105	29280 R 97/101/109	31292 R 102/105/113	33196 R 106/109/116	34993 R 110/112/119	36691 R 113/115/121	37832 W 116/117/123
27	26574 R 91/95/105	28720 R 96/100/108	30690 R 101/104/112	32530 R 105/108/115	34285 R 109/111/118	35947 R 113/114/120	36760 W 114/116/121

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 12000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	29105 R 95/100/110	31739 R 100/105/114	34003 R 106/109/117	36104 R 110/113/120	38083 R 114/116/123	39931 R 118/119/126	41696 R 121/122/129
4	28859 R 94/100/110	31517 R 100/104/113	33758 R 105/109/117	35845 R 110/113/120	37811 R 114/116/123	39644 R 117/119/126	41398 R 120/122/128
8	28615 R 94/99/109	31296 R 99/104/113	33513 R 104/108/117	35599 R 109/112/120	37539 R 113/116/123	39359 R 116/119/125	41101 R 120/121/128
12	28201 R 93/99/109	30824 R 99/103/112	32986 R 104/108/116	35036 R 108/111/119	36943 R 112/115/122	38748 R 116/118/124	40441 R 119/121/127
16	27588 R 92/97/107	30072 R 98/102/111	32148 R 103/106/114	34128 R 107/110/117	35994 R 111/113/120	37749 R 115/116/123	39406 R 118/119/125
20	26947 R 91/96/106	29278 R 97/101/109	31294 R 102/105/113	33203 R 106/109/116	35005 R 110/112/119	36711 R 114/115/121	38321 R 117/118/124
24	- -	28535 R 96/100/108	30497 R 101/104/112	32324 R 105/108/115	34075 R 109/111/117	35732 R 113/114/120	36967 W 115/116/122
26	- -	28169 R 96/99/107	30104 R 100/103/111	31886 R 105/107/114	33616 R 109/110/117	35247 R 112/113/119	36251 W 114/115/121

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 12500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	28452 R 94/99/109	31080 R 100/104/113	33264 R 105/108/116	35339 R 109/112/119	37280 R 113/115/122	39090 R 117/118/125	40819 R 120/121/127
4	28209 R 93/99/109	30861 R 99/103/112	33035 R 104/108/116	35082 R 109/111/119	37011 R 113/115/122	38808 R 116/118/124	40526 R 119/121/127
8	27970 R 93/98/108	30638 R 99/103/112	32789 R 104/107/115	34822 R 108/111/119	36738 R 112/114/121	38540 R 116/117/124	40230 R 119/120/126
12	27488 R 92/97/107	30068 R 98/102/111	32155 R 103/106/114	34154 R 107/110/118	36028 R 111/113/120	37791 R 115/116/123	39440 R 118/119/125
16	26869 R 91/96/106	29315 R 97/101/109	31329 R 102/105/113	33248 R 106/109/116	35068 R 110/112/119	36779 R 114/115/121	38396 R 117/118/124
20	- -	28537 R 96/100/108	30504 R 101/104/112	32329 R 105/107/115	34096 R 109/111/117	35759 R 113/114/120	37329 R 116/116/122
24	- -	27815 R 95/98/107	29729 R 100/102/110	31495 R 104/106/113	33192 R 108/109/116	34806 R 112/112/119	36109 W 114/115/120
25	- -	27634 R 95/98/106	29527 R 100/102/110	31289 R 104/106/113	32966 R 108/109/116	34568 R 111/112/118	35768 W 114/114/120

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	27809 R 93/98/108	30421 R 99/102/111	32551 R 104/107/115	34585 R 109/111/118	36489 R 113/114/121	38279 R 116/117/124	39948 R 119/120/126
4	27571 R 93/98/108	30205 R 98/102/111	32313 R 103/106/115	34332 R 108/110/118	36223 R 112/114/121	38002 R 115/117/123	39669 R 119/119/126
8	27327 R 92/97/107	30000 R 98/102/111	32065 R 103/106/114	34070 R 107/110/117	35949 R 111/113/120	37717 R 115/116/123	39372 R 118/119/125
12	26765 R 91/96/106	29337 R 97/100/110	31369 R 102/105/113	33298 R 106/109/116	35127 R 110/112/119	36848 R 114/115/122	38462 R 117/118/124
16	- -	28566 R 96/99/108	30539 R 101/103/112	32382 R 105/107/115	34155 R 109/111/118	35824 R 113/114/120	37393 R 116/116/122
20	- -	27808 R 95/98/107	29720 R 100/102/110	31502 R 104/106/113	33204 R 108/109/116	34815 R 112/112/119	36351 R 115/115/121
24	- -	27091 R 94/97/105	28965 R 99/101/109	30698 R 103/105/112	32323 R 107/108/115	33889 R 111/111/117	35297 W 114/114/119

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	27176 R 92/97/107	29797 R 98/101/110	31870 R 103/106/114	33857 R 108/109/117	35724 R 112/113/120	37469 R 115/116/122	39119 R 118/119/125
4	26944 R 92/97/107	29584 R 98/101/110	31643 R 103/105/114	33609 R 107/109/117	35462 R 111/112/120	37182 R 115/115/122	38834 R 118/118/124
8	26643 R 91/96/106	29276 R 97/100/109	31313 R 102/105/113	33245 R 106/108/116	35079 R 110/112/119	36804 R 114/115/122	38428 R 117/118/124
12	- -	28611 R 96/99/108	30595 R 101/103/112	32449 R 105/107/115	34233 R 109/111/118	35903 R 113/114/120	37495 R 116/116/123
16	- -	27851 R 95/98/107	29776 R 100/102/110	31563 R 104/106/113	33274 R 108/109/116	34896 R 112/112/119	36435 R 115/115/121
20	- -	27096 R 94/97/105	28975 R 99/101/109	30713 R 103/105/112	32336 R 107/108/115	33912 R 111/111/117	35410 R 114/114/119
23	- -	26571 R 94/96/105	28420 R 98/100/108	30122 R 103/104/111	31703 R 107/107/114	33238 R 110/110/116	34694 R 113/113/118

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13800 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	26803 R 92/96/106	29427 R 98/101/110	31477 R 103/105/113	33426 R 107/109/116	35270 R 111/112/119	37000 R 115/115/122	38643 R 118/118/124
4	26572 R 91/96/106	29214 R 97/100/109	31252 R 102/104/113	33179 R 107/108/116	35011 R 111/112/119	36727 R 114/115/121	38335 R 117/117/124
8	- -	28868 R 96/99/109	30869 R 101/104/112	32756 R 106/108/115	34563 R 110/111/118	36255 R 113/114/121	37857 R 117/117/123
12	- -	28181 R 96/98/107	30136 R 101/103/111	31950 R 105/106/114	33703 R 109/110/117	35352 R 112/113/119	36917 R 115/115/122
16	- -	27418 R 95/97/106	29325 R 100/101/110	31086 R 104/105/113	32746 R 108/108/115	34348 R 111/111/118	35865 R 114/114/120
20	- -	26679 R 94/96/105	28532 R 99/100/108	30245 R 103/104/111	31837 R 107/107/114	33385 R 110/110/116	34851 R 113/113/119

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 0 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	44280 R 119/124/132	47884 R 125/130/137	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-30	43934 R 118/124/132	47512 R 124/129/136	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-26	43593 R 118/123/131	47145 R 124/129/136	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-22	43266 R 117/123/131	46817 R 123/128/135	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-18	42933 R 116/122/130	46469 R 122/128/135	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-14	42581 R 116/122/130	46118 R 122/127/134	49316 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 128/132/139
-10	42257 R 115/121/129	45775 R 121/127/134	48955 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	41939 R 114/121/129	45451 R 120/126/134	48610 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-2	41640 R 114/120/128	45117 R 120/126/133	48289 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	41338 R 113/120/128	44804 R 119/125/133	47960 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	41026 R 112/119/128	44460 R 119/125/132	47612 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
10	40714 R 112/119/127	44126 R 118/124/132	47275 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	43918 R 118/124/132	47497 R 124/129/136	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-30	43572 R 118/123/131	47124 R 124/129/136	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-26	43235 R 117/123/131	46787 R 123/128/135	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-22	42898 R 116/122/130	46436 R 122/127/135	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-18	42550 R 116/122/130	46088 R 122/127/134	49286 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	42223 R 115/121/129	45743 R 121/126/134	48922 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	41894 R 114/121/129	45403 R 120/126/134	48567 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	41576 R 114/120/128	45050 R 120/125/133	48219 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-2	41268 R 113/120/128	44729 R 119/125/133	47878 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	40958 R 112/119/127	44387 R 118/124/132	47534 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	40646 R 112/119/127	44052 R 118/124/132	47198 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
10	40358 R 111/118/127	43719 R 117/123/131	46837 R 122/128/135	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 1000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	43557 R 118/123/131	47110 R 124/128/136	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-30	43212 R 117/123/131	46764 R 123/128/135	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-26	42865 R 116/122/130	46408 R 122/127/135	49604 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 128/132/139
-22	42518 R 116/122/130	46056 R 122/127/134	49255 R 127/132/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	42183 R 115/121/129	45708 R 121/126/134	48887 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	41851 R 114/120/129	45359 R 120/126/133	48526 R 126/131/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	41534 R 114/120/128	45011 R 120/125/133	48180 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	41235 R 113/120/128	44674 R 119/125/133	47829 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-2	40914 R 112/119/127	44322 R 118/124/132	47487 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	40599 R 112/118/127	43981 R 118/124/132	47123 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	40291 R 111/118/127	43647 R 117/123/131	46761 R 122/128/135	49604 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
10	39985 R 110/117/126	43314 R 116/123/131	46407 R 122/128/135	49263 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 1500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	43169 R 117/123/131	46720 R 123/128/135	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-30	42816 R 116/122/130	46356 R 122/127/135	49573 R 127/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-26	42467 R 115/121/130	46003 R 122/127/134	49202 R 127/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	42131 R 115/121/129	45655 R 121/126/134	48832 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	41795 R 114/120/129	45300 R 120/126/133	48467 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	41468 R 113/120/128	44942 R 120/125/133	48108 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	41170 R 113/119/128	44605 R 119/125/132	47759 R 124/129/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	40856 R 112/119/127	44263 R 118/124/132	47425 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-2	40529 R 111/118/127	43907 R 118/124/132	47045 R 123/128/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	40212 R 111/118/126	43562 R 117/123/131	46675 R 122/128/135	49533 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	39914 R 110/117/126	43238 R 116/123/131	46326 R 122/127/135	49184 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
10	39626 R 110/117/126	42927 R 116/122/130	45994 R 121/127/134	48839 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 2000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	42772 R 116/122/130	46310 R 122/127/135	49526 R 127/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-30	42417 R 115/121/130	45950 R 121/127/134	49147 R 127/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	42078 R 115/121/129	45599 R 121/126/134	48775 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	41741 R 114/120/129	45243 R 120/126/133	48408 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	41411 R 113/120/128	44883 R 119/125/133	48047 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	41107 R 113/119/128	44537 R 119/125/132	47692 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	40791 R 112/119/127	44194 R 118/124/132	47352 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	40482 R 111/118/127	43858 R 118/124/131	46964 R 123/128/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-2	40148 R 111/118/126	43494 R 117/123/131	46607 R 122/128/135	49467 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	39828 R 110/117/126	43146 R 116/123/131	46227 R 121/127/135	49089 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	39538 R 109/117/125	42831 R 116/122/130	45891 R 121/127/134	48731 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
10	39268 R 109/116/125	42541 R 115/122/130	45585 R 120/126/134	48407 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 2500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	42371 R 115/121/129	45902 R 121/127/134	49097 R 127/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	42032 R 115/121/129	45545 R 121/126/134	48718 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	41687 R 114/120/129	45184 R 120/126/133	48346 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	41354 R 113/120/128	44820 R 119/125/133	47980 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	41048 R 113/119/128	44473 R 119/125/132	47622 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	40730 R 112/119/127	44127 R 118/124/132	47281 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	40417 R 111/118/127	43787 R 117/124/131	46912 R 123/128/135	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	40110 R 111/118/126	43455 R 117/123/131	46560 R 122/128/135	49431 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-2	39769 R 110/117/126	43085 R 116/122/130	46163 R 121/127/134	49021 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	39446 R 109/117/125	42733 R 115/122/130	45788 R 121/127/134	48620 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	39162 R 109/116/125	42424 R 115/121/130	45459 R 120/126/134	48273 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
10	38916 R 108/116/125	42154 R 114/121/129	45171 R 119/126/133	47959 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 3000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	41990 R 115/121/129	45496 R 121/126/134	48666 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	41640 R 114/120/128	45132 R 120/126/133	48288 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	41301 R 113/120/128	44760 R 119/125/133	47917 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	40990 R 112/119/128	44411 R 119/124/132	47555 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	40671 R 112/119/127	44062 R 118/124/132	47211 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	40358 R 111/118/127	43722 R 117/123/131	46843 R 123/128/135	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	40046 R 111/118/126	43383 R 117/123/131	46483 R 122/128/135	49353 R 126/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	39741 R 110/117/126	43053 R 116/122/130	46129 R 121/127/134	48985 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-2	39393 R 109/117/125	42677 R 115/122/130	45730 R 121/127/134	48565 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	39052 R 109/116/125	42322 R 115/121/129	45352 R 120/126/133	48156 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	38777 R 108/116/124	42018 R 114/121/129	45029 R 119/126/133	47812 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
10	38568 R 107/115/124	41771 R 113/120/129	44760 R 119/125/133	47524 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 3500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	41620 R 114/120/128	45108 R 120/126/133	48254 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	41272 R 113/120/128	44737 R 119/125/133	47874 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	40960 R 112/119/128	44380 R 118/124/132	47511 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	40640 R 112/119/127	44027 R 118/124/132	47176 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	40323 R 111/118/127	43683 R 117/123/131	46795 R 122/128/135	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	40007 R 110/118/126	43341 R 117/123/131	46441 R 122/128/135	49298 R 126/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	39696 R 110/117/126	43003 R 116/122/130	46074 R 121/127/134	48927 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	39390 R 109/116/125	42671 R 115/122/130	45721 R 120/126/134	48545 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-2	39016 R 108/116/125	42269 R 115/121/129	45298 R 120/126/133	48098 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	38679 R 108/115/124	41908 R 114/121/129	44916 R 119/125/133	47696 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	38406 R 107/115/124	41607 R 113/120/128	44597 R 119/125/132	47357 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
10	38128 R 107/114/123	41294 R 113/120/128	44272 R 118/124/132	47009 R 122/128/136	49595 R 126/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 4000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	41251 R 113/119/128	44715 R 119/125/133	47843 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	40928 R 112/119/127	44335 R 118/124/132	47462 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	40606 R 112/118/127	43994 R 118/124/132	47129 R 123/128/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	40292 R 111/118/127	43649 R 117/123/131	46772 R 122/128/135	49604 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	39977 R 110/117/126	43307 R 116/123/131	46401 R 122/127/135	49253 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	39658 R 110/117/126	42962 R 116/122/130	46033 R 121/127/134	48882 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	39347 R 109/116/125	42625 R 115/122/130	45671 R 120/126/134	48500 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	39041 R 108/116/125	42291 R 114/121/129	45317 R 120/126/133	48123 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	38638 R 108/115/124	41865 R 114/121/129	44868 R 119/125/133	47643 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	38298 R 107/115/124	41489 R 113/120/128	44481 R 118/125/132	47237 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
6	38017 R 106/114/123	41196 R 113/120/128	44166 R 118/124/132	46903 R 122/128/135	49499 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
10	37692 R 106/114/123	40840 R 112/119/127	43781 R 117/124/131	46520 R 122/128/135	49069 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 4500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	40884 R 112/119/127	44292 R 118/124/132	47418 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	40549 R 111/118/127	43935 R 118/124/132	47068 R 123/128/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	40227 R 111/118/126	43581 R 117/123/131	46702 R 122/128/135	49546 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	39911 R 110/117/126	43238 R 116/123/131	46330 R 122/127/135	49180 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	39597 R 109/117/126	42897 R 116/122/130	45965 R 121/127/134	48811 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	39285 R 109/116/125	42558 R 115/122/130	45602 R 120/126/134	48441 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	38973 R 108/116/125	42219 R 114/121/129	45243 R 120/126/133	48047 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	38682 R 108/115/124	41903 R 114/121/129	44906 R 119/125/133	47681 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	38280 R 107/115/124	41471 R 113/120/128	44448 R 118/125/132	47197 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
2	37944 R 106/114/123	41098 R 112/119/128	44062 R 118/124/132	46787 R 122/128/135	49375 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
6	37647 R 106/114/123	40788 R 112/119/127	43725 R 117/124/131	46454 R 122/128/135	48998 R 126/131/138	49604 S 126/132/139	49604 S 126/132/139
10	37149 R 105/113/122	40272 R 111/118/127	43189 R 117/123/131	45904 R 121/127/134	48432 R 125/131/137	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 5000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	40502 R 111/118/127	43885 R 118/124/131	47019 R 123/128/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	40173 R 111/118/126	43525 R 117/123/131	46644 R 122/128/135	49487 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	39851 R 110/117/126	43175 R 116/123/131	46265 R 121/127/135	49113 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	39531 R 109/117/125	42828 R 116/122/130	45893 R 121/127/134	48737 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	39219 R 109/116/125	42490 R 115/121/130	45531 R 120/126/134	48368 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	38913 R 108/116/125	42155 R 114/121/129	45176 R 119/126/133	47976 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	38601 R 107/115/124	41817 R 114/120/129	44817 R 119/125/133	47588 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	38316 R 107/115/124	41517 R 113/120/128	44496 R 118/125/132	47247 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	37919 R 106/114/123	41092 R 112/119/128	44030 R 118/124/132	46752 R 122/128/135	49338 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
2	37594 R 105/114/123	40711 R 112/119/127	43646 R 117/123/131	46366 R 121/128/135	48900 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
6	37291 R 105/113/122	40378 R 111/118/127	43274 R 116/123/131	45989 R 121/127/134	48507 R 125/131/137	49604 S 126/132/139	49604 S 126/132/139
10	36619 R 104/112/121	39725 R 111/118/126	42596 R 116/122/130	45289 R 120/126/133	47794 R 124/130/137	49235 W 127/132/138	49235 W 127/132/138

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 5500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	39880 R 111/117/126	43203 R 117/123/131	46298 R 122/127/135	49112 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	39554 R 110/117/126	42849 R 116/122/130	45910 R 121/127/134	48730 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	39235 R 109/116/125	42503 R 115/122/130	45548 R 120/126/134	48356 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	38923 R 108/116/125	42165 R 115/121/129	45182 R 120/126/133	47978 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	38618 R 108/115/124	41832 R 114/121/129	44830 R 119/125/133	47601 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	38317 R 107/115/124	41505 R 113/120/128	44482 R 119/125/132	47251 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	38003 R 107/114/123	41179 R 113/120/128	44134 R 118/124/132	46857 R 122/128/135	49446 R 126/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	37728 R 106/114/123	40872 R 112/119/127	43806 R 117/124/131	46534 R 122/128/135	49085 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139
-2	37351 R 105/113/122	40462 R 111/118/127	43370 R 117/123/131	46074 R 121/127/134	48592 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139
2	37005 R 104/113/122	40086 R 111/118/126	42972 R 116/123/130	45654 R 120/127/134	48149 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139
6	36648 R 104/112/121	39712 R 110/117/126	42546 R 115/122/130	45207 R 120/126/133	47695 R 124/130/136	49604 S 127/132/139	49604 S 127/132/139
10	35951 R 104/112/120	39012 R 110/117/125	41836 R 115/121/129	44490 R 120/125/132	46953 R 124/129/136	48080 W 125/131/137	48080 W 125/131/137

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 6000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	39262 R 110/117/125	42530 R 116/122/130	45577 R 121/127/134	48355 R 125/131/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	38939 R 109/116/125	42179 R 115/121/129	45203 R 120/126/133	47977 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	38624 R 108/115/124	41837 R 114/121/129	44830 R 120/125/133	47623 R 124/130/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	38320 R 108/115/124	41507 R 114/120/128	44479 R 119/125/132	47219 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	38021 R 107/114/123	41182 R 113/120/128	44135 R 118/124/132	46886 R 123/128/135	49433 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	37723 R 106/114/123	40861 R 112/119/127	43793 R 118/124/131	46517 R 122/128/135	49062 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139
-10	37429 R 106/113/122	40548 R 112/119/127	43457 R 117/123/131	46162 R 121/127/134	48684 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139
-6	37160 R 105/113/122	40235 R 111/118/126	43122 R 116/123/130	45808 R 121/127/134	48311 R 125/131/137	49604 S 127/132/139	49604 S 127/132/139
-2	36805 R 104/112/122	39872 R 110/118/126	42714 R 116/122/130	45379 R 120/126/133	47858 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139
2	36446 R 104/112/121	39485 R 110/117/125	42303 R 115/122/129	44946 R 120/126/133	47402 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139
6	36008 R 103/111/120	39029 R 109/117/125	41823 R 115/121/129	44443 R 119/125/132	46908 R 123/129/135	49208 R 127/132/138	49339 W 127/132/139
10	35286 R 103/111/119	38303 R 109/116/124	41080 R 114/120/128	43697 R 119/125/131	46142 R 123/128/134	46867 W 124/129/135	46867 W 124/129/135

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 6500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	38663 R 109/116/124	41878 R 115/121/129	44882 R 120/126/133	47633 R 124/130/136	49604 S 128/132/139	49604 S 128/132/139	49604 S 128/132/139
-30	38346 R 108/115/124	41534 R 114/120/128	44507 R 119/125/132	47280 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	38035 R 107/115/123	41197 R 113/120/128	44148 R 119/125/132	46865 R 123/129/135	49426 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	37731 R 107/114/123	40868 R 113/119/127	43797 R 118/124/131	46527 R 122/128/135	49058 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139
-18	37426 R 106/114/122	40548 R 112/119/127	43457 R 117/123/131	46161 R 122/128/134	48685 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139
-14	37144 R 105/113/122	40236 R 112/118/126	43122 R 117/123/130	45808 R 121/127/134	48309 R 125/131/137	49604 S 127/132/139	49604 S 127/132/139
-10	36870 R 105/113/122	39942 R 111/118/126	42786 R 116/122/130	45452 R 121/126/134	47932 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139
-6	36585 R 104/112/121	39630 R 110/117/126	42459 R 115/122/130	45107 R 120/126/133	47590 R 124/130/136	49604 S 127/132/139	49604 S 127/132/139
-2	36260 R 103/112/121	39277 R 110/117/125	42067 R 115/121/129	44691 R 119/125/133	47131 R 123/129/136	49447 R 127/132/139	49604 S 127/132/139
2	35858 R 103/111/120	38845 R 109/116/125	41607 R 114/121/128	44219 R 119/125/132	46630 R 123/128/135	48932 R 126/132/138	49604 S 127/133/139
6	35333 R 102/110/119	38316 R 109/116/124	41063 R 114/120/128	43653 R 118/124/131	46073 R 122/128/134	48091 W 125/131/137	48091 W 125/131/137
10	34637 R 102/110/118	37610 R 108/115/123	40342 R 113/120/127	42917 R 118/124/130	45327 R 122/127/133	45665 W 122/128/134	45665 W 122/128/134

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 7000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	38068 R 108/115/123	41231 R 114/120/128	44184 R 119/125/132	46937 R 124/129/135	49340 W 127/132/139	49340 W 127/132/139	49340 W 127/132/139
-30	37758 R 107/114/123	40895 R 113/120/127	43825 R 118/124/131	46545 R 123/128/135	49064 R 127/132/138	49342 W 127/132/139	49342 W 127/132/139
-26	37452 R 107/114/122	40565 R 113/119/127	43472 R 118/124/131	46181 R 122/128/135	48691 R 126/131/138	49339 W 127/132/139	49339 W 127/132/139
-22	37140 R 106/113/122	40235 R 112/119/126	43121 R 117/123/130	45805 R 122/127/134	48307 R 125/131/137	49332 W 127/132/139	49332 W 127/132/139
-18	36855 R 105/113/122	39940 R 111/118/126	42784 R 116/123/130	45450 R 121/127/134	47930 R 125/130/137	49321 W 127/132/139	49321 W 127/132/139
-14	36585 R 105/112/121	39626 R 111/118/126	42458 R 116/122/130	45105 R 120/126/133	47562 R 124/130/136	49307 W 127/132/139	49307 W 127/132/139
-10	36300 R 104/112/121	39320 R 110/117/125	42120 R 115/122/129	44748 R 120/126/133	47211 R 124/129/136	49276 W 127/132/139	49276 W 127/132/139
-6	36024 R 103/111/120	39025 R 109/117/125	41800 R 115/121/129	44411 R 119/125/132	46828 R 123/129/135	49143 R 127/132/138	49349 W 127/132/139
-2	35720 R 103/111/120	38687 R 109/116/124	41427 R 114/120/128	44009 R 118/124/132	46432 R 122/128/135	48691 R 126/131/138	49327 W 127/132/139
2	35275 R 102/110/119	38219 R 108/115/124	40933 R 113/120/127	43498 R 118/124/131	45892 R 122/127/134	48140 R 125/131/137	48679 W 126/131/138
6	34669 R 102/109/118	37607 R 108/115/123	40311 R 113/119/127	42860 R 117/123/130	45246 R 121/127/133	46659 W 124/129/135	46659 W 124/129/135
10	33993 R 101/109/117	36921 R 107/114/122	39610 R 113/119/126	42144 R 117/123/129	44412 W 121/126/132	44412 W 121/126/132	44412 W 121/126/132

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 7500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	37473 R 107/114/123	40585 R 113/119/127	43492 R 118/124/131	46201 R 123/128/135	48668 W 127/131/138	48668 W 127/131/138	48668 W 127/131/138
-30	37169 R 106/113/122	40257 R 112/119/127	43140 R 117/123/130	45831 R 122/127/134	48312 R 126/131/137	48685 W 126/131/138	48685 W 126/131/138
-26	36859 R 106/113/122	39951 R 112/118/126	42792 R 117/123/130	45454 R 121/127/134	47934 R 125/130/137	48689 W 126/131/138	48689 W 126/131/138
-22	36564 R 105/112/121	39625 R 111/118/126	42444 R 116/122/130	45088 R 121/126/133	47542 R 125/130/136	48678 W 126/131/138	48678 W 126/131/138
-18	36288 R 104/112/121	39304 R 110/117/125	42111 R 116/122/129	44737 R 120/126/133	47197 R 124/129/136	48660 W 126/131/138	48660 W 126/131/138
-14	36016 R 104/111/120	39014 R 110/117/125	41789 R 115/121/129	44397 R 119/125/132	46842 R 123/129/135	48646 W 126/131/138	48646 W 126/131/138
-10	35733 R 103/111/120	38709 R 109/116/124	41459 R 114/121/128	44050 R 119/125/132	46469 R 123/128/135	48620 W 126/131/138	48620 W 126/131/138
-6	35466 R 102/110/120	38423 R 109/116/124	41156 R 114/120/128	43730 R 118/124/131	46135 R 122/128/134	48391 R 126/131/137	48822 W 126/132/138
-2	35114 R 102/110/119	38040 R 108/115/123	40737 R 113/120/127	43284 R 117/124/131	45665 R 121/127/134	47897 R 125/130/137	48660 W 126/131/138
2	34608 R 101/109/118	37515 R 107/114/123	40190 R 112/119/126	42713 R 117/123/130	45075 R 121/126/133	47278 R 124/130/136	47569 W 125/130/136
6	33973 R 101/109/117	36866 R 107/114/122	39544 R 112/118/126	42031 R 117/122/129	44381 R 120/126/132	45208 W 122/127/133	45208 W 122/127/133
10	33300 R 100/108/116	36175 R 107/113/121	38835 R 112/118/124	41299 R 116/122/128	43148 W 119/124/131	43148 W 119/124/131	43148 W 119/124/131

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 8000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	36884 R 106/113/122	39966 R 112/118/126	42806 R 117/123/130	45473 R 122/127/134	47928 R 126/131/137	48013 W 126/131/137	48013 W 126/131/137
-30	36577 R 105/113/121	39645 R 112/118/126	42461 R 117/122/130	45103 R 121/126/133	47561 R 125/130/136	48019 W 126/131/137	48019 W 126/131/137
-26	36285 R 105/112/121	39324 R 111/117/125	42117 R 116/122/129	44741 R 120/126/133	47201 R 124/129/136	48005 W 126/131/137	48005 W 126/131/137
-22	35999 R 104/112/120	38991 R 110/117/125	41773 R 115/121/129	44378 R 120/125/132	46821 R 124/129/135	47990 W 125/131/137	47990 W 125/131/137
-18	35719 R 103/111/120	38692 R 110/116/124	41443 R 115/121/128	44030 R 119/125/132	46455 R 123/128/135	47979 W 125/131/137	47979 W 125/131/137
-14	35446 R 103/111/119	38398 R 109/116/124	41125 R 114/120/128	43695 R 118/124/131	46095 R 122/128/134	47970 W 125/131/137	47970 W 125/131/137
-10	35170 R 102/110/119	38097 R 108/115/123	40801 R 113/120/127	43358 R 118/124/131	45741 R 122/127/134	47932 W 125/131/137	47932 W 125/131/137
-6	34907 R 101/110/119	37825 R 108/115/123	40509 R 113/119/127	43054 R 117/123/130	45426 R 121/127/134	47642 R 125/130/136	48095 W 125/131/137
-2	34505 R 101/109/118	37397 R 107/114/122	40052 R 112/119/126	42563 R 117/123/130	44910 R 120/126/133	47105 R 124/129/136	47554 W 125/130/136
2	33949 R 100/108/117	36815 R 106/113/122	39468 R 112/118/125	41933 R 116/122/129	44261 R 120/125/132	46066 W 123/128/134	46066 W 123/128/134
6	33283 R 100/108/116	36131 R 106/113/121	38767 R 111/117/124	41209 R 116/121/128	43522 R 120/125/131	43797 W 120/125/131	43797 W 120/125/131
10	32613 R 100/107/115	35435 R 106/112/119	38047 R 111/117/123	40462 R 115/121/127	41918 W 118/123/129	41918 W 118/123/129	41918 W 118/123/129

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 8500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	36156 R 105/112/121	39183 R 111/117/125	41975 R 116/122/129	44548 R 121/126/132	46922 R 125/129/135	47350 W 126/130/136	47350 W 126/130/136
-30	35864 R 105/111/120	38871 R 111/117/125	41653 R 116/121/128	44212 R 120/125/132	46591 R 124/129/135	47345 W 125/130/136	47345 W 125/130/136
-26	35583 R 104/111/120	38550 R 110/116/124	41292 R 115/121/128	43864 R 120/125/131	46227 R 124/128/135	47311 W 125/130/136	47311 W 125/130/136
-22	35294 R 103/110/119	38238 R 109/116/124	40951 R 114/120/127	43520 R 119/124/131	45872 R 123/128/134	47291 W 125/130/136	47291 W 125/130/136
-18	35015 R 103/110/119	37937 R 109/115/123	40627 R 114/120/127	43186 R 118/124/131	45531 R 122/127/134	47290 W 125/130/136	47290 W 125/130/136
-14	34742 R 102/109/118	37643 R 108/115/123	40332 R 113/119/127	42842 R 118/123/130	45197 R 122/127/133	47286 W 125/130/136	47286 W 125/130/136
-10	34460 R 101/109/118	37349 R 107/114/122	40019 R 113/119/126	42501 R 117/123/130	44856 R 121/126/133	47001 R 124/129/136	47233 W 125/130/136
-6	34194 R 101/108/118	37061 R 107/114/122	39718 R 112/118/126	42186 R 116/122/129	44529 R 120/126/132	46690 R 124/129/135	47318 W 125/130/136
-2	33718 R 100/108/117	36552 R 106/113/121	39188 R 111/117/125	41628 R 116/121/128	43938 R 120/125/132	46118 R 123/128/134	46365 W 124/129/135
2	33134 R 100/107/116	35948 R 106/112/120	38558 R 111/117/124	40977 R 115/121/128	43266 R 119/124/131	44467 W 121/126/132	44467 W 121/126/132
6	32484 R 99/106/115	35283 R 105/112/119	37874 R 110/116/123	40271 R 115/120/127	42399 W 119/123/129	42399 W 119/123/129	42399 W 119/123/129
10	31802 R 99/106/114	34551 R 105/111/118	37106 R 110/115/122	39464 R 114/119/125	40713 W 117/121/127	40713 W 117/121/127	40713 W 117/121/127

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 9000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	35443 R 104/111/119	38398 R 111/116/124	41086 R 116/120/128	43607 R 120/124/131	45956 R 124/128/134	46644 W 125/129/135	46644 W 125/129/135
-30	35168 R 104/110/119	38108 R 110/116/123	40776 R 115/120/127	43281 R 119/124/131	45616 R 123/127/134	46633 W 125/129/135	46633 W 125/129/135
-26	34880 R 103/110/119	37794 R 109/115/123	40445 R 114/119/127	42932 R 119/123/130	45250 R 123/127/133	46615 W 125/129/135	46615 W 125/129/135
-22	34596 R 102/109/118	37490 R 109/115/123	40153 R 114/119/126	42602 R 118/123/130	44906 R 122/126/133	46599 W 125/129/135	46599 W 125/129/135
-18	34321 R 102/109/118	37190 R 108/114/122	39850 R 113/118/126	42281 R 117/122/129	44571 R 121/126/132	46586 W 125/129/135	46586 W 125/129/135
-14	34048 R 101/108/117	36896 R 107/113/122	39545 R 112/118/126	41962 R 117/122/129	44238 R 121/125/132	46373 R 124/129/135	46569 W 125/129/135
-10	33781 R 101/108/117	36605 R 107/113/121	39235 R 112/117/125	41645 R 116/121/128	43906 R 120/125/132	46027 R 124/128/134	46511 W 124/129/135
-6	33491 R 100/107/117	36302 R 106/113/121	38920 R 111/117/125	41333 R 116/121/128	43583 R 120/124/131	45693 R 123/128/134	46147 W 124/128/134
-2	32941 R 99/107/116	35725 R 105/112/120	38319 R 111/116/124	40708 R 115/120/127	42990 R 119/124/130	44881 W 122/127/133	44881 W 122/127/133
2	32329 R 99/106/115	35096 R 105/111/119	37666 R 110/116/123	40040 R 115/120/126	42288 R 119/123/129	42977 W 120/124/130	42977 W 120/124/130
6	31711 R 99/105/114	34450 R 105/110/118	36998 R 110/115/122	39350 R 114/119/125	41151 W 117/122/128	41151 W 117/122/128	41151 W 117/122/128
10	31024 R 98/104/112	33681 R 104/109/117	36181 R 109/114/121	38504 R 113/118/124	39653 W 115/120/126	39653 W 115/120/126	39653 W 115/120/126

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 9500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	34677 R 104/110/118	37564 R 110/115/123	40195 R 115/119/126	42665 R 119/123/130	44969 R 123/127/133	45935 W 125/128/134	45935 W 125/128/134
-30	34417 R 103/109/118	37269 R 109/114/122	39900 R 114/119/126	42334 R 119/123/129	44624 R 123/126/132	45943 W 125/128/134	45943 W 125/128/134
-26	34147 R 102/109/118	36978 R 108/114/122	39591 R 114/118/126	42005 R 118/122/129	44280 R 122/126/132	45927 W 125/128/134	45927 W 125/128/134
-22	33882 R 102/108/117	36693 R 108/113/121	39287 R 113/118/125	41682 R 117/122/129	43943 R 121/125/132	45894 W 125/128/134	45894 W 125/128/134
-18	33619 R 101/108/117	36411 R 107/113/121	38988 R 112/117/125	41365 R 117/121/128	43611 R 121/125/131	45717 R 124/128/134	45862 W 124/128/134
-14	33355 R 100/107/116	36131 R 106/112/121	38691 R 112/117/124	41050 R 116/121/128	43282 R 120/124/131	45375 R 124/127/133	45843 W 124/128/134
-10	33073 R 100/107/116	35852 R 106/112/120	38396 R 111/116/124	40738 R 115/120/127	42955 R 119/124/130	45035 R 123/127/133	45694 W 124/128/134
-6	32693 R 99/106/115	35455 R 105/111/119	38019 R 110/116/123	40379 R 115/120/127	42584 R 119/123/130	43496 W 120/125/131	43496 W 120/125/131
-2	32141 R 99/105/114	34881 R 105/111/119	37429 R 110/115/122	39798 R 114/119/126	41230 W 117/121/128	41230 W 117/121/128	41230 W 117/121/128
2	31581 R 98/105/113	34287 R 104/110/118	36817 R 109/115/122	39173 R 114/118/125	39545 W 115/119/126	39545 W 115/119/126	39545 W 115/119/126
6	31005 R 98/104/112	33664 R 104/109/117	36169 R 109/114/121	38200 W 113/117/124	38200 W 113/117/124	38200 W 113/117/124	38200 W 113/117/124
10	30275 R 97/103/111	32844 R 103/108/115	35285 R 108/113/119	36866 W 111/115/122	36866 W 111/115/122	36866 W 111/115/122	36866 W 111/115/122

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 10000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	33930 R 103/108/117	36744 R 109/114/121	39341 R 114/118/125	41739 R 119/122/129	43984 R 122/125/132	45035 W 124/127/133	45035 W 124/127/133
-30	33653 R 102/108/117	36445 R 108/113/121	39025 R 113/117/125	41404 R 118/121/128	43635 R 122/125/131	45035 W 124/127/133	45035 W 124/127/133
-26	33399 R 102/107/116	36172 R 108/113/121	38733 R 113/117/124	41094 R 117/121/128	43326 R 121/124/131	45020 W 124/127/133	45020 W 124/127/133
-22	33138 R 101/107/116	35891 R 107/112/120	38434 R 112/116/124	40777 R 117/120/127	42993 R 120/124/130	44992 W 124/127/133	44992 W 124/127/133
-18	32879 R 100/106/116	35612 R 106/112/120	38138 R 111/116/123	40464 R 116/120/127	42664 R 120/123/130	44730 R 123/126/133	44963 W 124/127/133
-14	32619 R 100/106/115	35334 R 106/111/119	37843 R 111/115/123	40170 R 115/119/126	42338 R 119/123/129	44392 R 123/126/132	44935 W 124/127/133
-10	32341 R 99/106/115	35041 R 105/111/119	37536 R 110/115/123	39850 R 115/119/126	42004 R 119/122/129	44047 R 122/125/132	44555 W 123/126/132
-6	31644 R 99/105/114	34352 R 105/110/118	36885 R 110/115/122	39249 R 114/119/125	41440 R 118/122/128	42236 W 120/123/129	42236 W 120/123/129
-2	31047 R 98/104/113	33719 R 104/109/117	36236 R 109/114/121	38579 R 114/118/124	40074 W 117/120/126	40074 W 117/120/126	40074 W 117/120/126
2	30527 R 98/103/112	33174 R 104/109/116	35675 R 109/113/120	38001 R 113/117/123	38544 W 114/118/124	38544 W 114/118/124	38544 W 114/118/124
6	29997 R 97/103/111	32594 R 103/108/115	35065 R 108/113/119	37291 W 113/116/122	37291 W 113/116/122	37291 W 113/116/122	37291 W 113/116/122
10	29240 R 96/101/109	31742 R 102/107/114	34124 R 107/111/117	36022 W 111/115/120	36022 W 111/115/120	36022 W 111/115/120	36022 W 111/115/120

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 10500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	33164 R 102/107/116	35920 R 108/112/120	38466 R 113/117/124	40796 R 118/121/127	43014 R 122/124/130	44117 W 124/126/132	44117 W 124/126/132
-30	32897 R 101/107/116	35632 R 107/112/120	38160 R 113/116/124	40487 R 117/120/127	42674 R 121/123/130	44103 W 123/126/132	44103 W 123/126/132
-26	32643 R 101/106/115	35358 R 107/111/119	37868 R 112/116/123	40178 R 116/120/126	42349 R 120/123/129	44084 W 123/126/132	44084 W 123/126/132
-22	32388 R 100/106/115	35083 R 106/111/119	37575 R 111/115/123	39886 R 116/119/126	42023 R 120/122/129	44061 W 123/126/132	44061 W 123/126/132
-18	32136 R 99/105/114	34811 R 105/110/119	37286 R 111/115/122	39582 R 115/119/126	41717 R 119/122/129	43729 R 123/125/131	44038 W 123/126/132
-14	31880 R 99/105/114	34533 R 105/110/118	36992 R 110/114/122	39273 R 115/118/125	41392 R 118/122/128	43390 R 122/125/131	43991 W 123/126/132
-10	31597 R 98/104/113	34225 R 104/109/118	36670 R 109/114/121	38939 R 114/118/125	41045 R 118/121/128	43048 R 121/124/130	43368 W 122/125/131
-6	30937 R 98/104/112	33572 R 104/109/117	36058 R 109/113/120	38382 R 114/117/124	40512 R 117/121/127	41014 W 118/122/128	41014 W 118/122/128
-2	30363 R 98/103/111	32977 R 104/108/116	35453 R 109/113/119	37758 R 113/117/123	39005 W 115/119/125	39005 W 115/119/125	39005 W 115/119/125
2	29850 R 97/102/110	32421 R 103/108/115	34874 R 108/112/119	37159 R 113/116/122	37596 W 113/117/123	37596 W 113/117/123	37596 W 113/117/123
6	29289 R 96/101/109	31807 R 102/107/114	34210 R 107/111/118	36408 W 112/115/121	36408 W 112/115/121	36408 W 112/115/121	36408 W 112/115/121
10	28545 R 95/100/108	30990 R 101/105/112	33284 R 106/110/116	35216 W 110/113/119	35216 W 110/113/119	35216 W 110/113/119	35216 W 110/113/119

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 11000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	32412 R 101/106/115	35111 R 107/111/119	37605 R 113/115/123	39888 R 117/119/126	42060 R 121/123/129	43206 W 123/124/131	43206 W 123/124/131
-30	32155 R 101/105/114	34833 R 107/111/119	37309 R 112/115/122	39592 R 116/119/126	41730 R 120/122/129	43194 W 123/124/131	43194 W 123/124/131
-26	31904 R 100/105/114	34558 R 106/110/118	37017 R 111/114/122	39283 R 116/118/125	41404 R 120/122/128	43175 W 123/124/131	43175 W 123/124/131
-22	31663 R 99/104/114	34289 R 105/110/118	36730 R 111/114/121	38995 R 115/118/125	41085 R 119/121/128	43086 R 122/124/130	43153 W 123/124/131
-18	31425 R 99/104/113	34024 R 105/109/117	36448 R 110/113/121	38698 R 114/117/124	40771 R 118/121/127	42759 R 122/124/130	43115 W 122/124/130
-14	31174 R 98/104/113	33746 R 104/109/117	36155 R 109/113/121	38390 R 114/117/124	40463 R 118/120/127	42422 R 121/123/130	42987 W 122/124/130
-10	30874 R 98/103/112	33422 R 103/108/116	35818 R 109/113/120	38042 R 113/116/123	40103 R 117/120/126	41682 W 120/122/129	41682 W 120/122/129
-6	30242 R 97/102/111	32804 R 103/108/115	35256 R 108/112/119	37535 R 113/116/123	39600 R 117/120/126	39706 W 117/120/126	39706 W 117/120/126
-2	29704 R 97/102/110	32249 R 103/107/115	34678 R 108/112/118	36946 R 112/116/122	38006 W 114/117/123	38006 W 114/117/123	38006 W 114/117/123
2	29186 R 96/101/109	31695 R 102/106/114	34089 R 107/111/117	36330 R 112/115/121	36715 W 112/116/121	36715 W 113/116/121	36715 W 113/116/121
6	28591 R 95/100/108	31051 R 101/105/113	33368 R 106/110/116	35559 R 111/114/120	35587 W 111/114/120	35587 W 111/114/120	35587 W 111/114/120
10	27850 R 94/99/107	30246 R 100/104/111	32453 R 105/109/115	34475 W 109/112/118	34475 W 109/112/118	34475 W 109/112/118	34475 W 109/112/118

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 11500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	31673 R 101/105/114	34315 R 107/110/118	36745 R 112/114/121	38997 R 116/118/125	41121 R 120/121/128	42298 W 122/123/129	42298 W 122/123/129
-30	31430 R 100/104/113	34044 R 106/109/117	36456 R 111/114/121	38708 R 116/118/124	40800 R 119/121/127	42290 W 122/123/129	42290 W 122/123/129
-26	31200 R 99/104/113	33774 R 105/109/117	36182 R 110/113/121	38404 R 115/117/124	40481 R 119/120/127	42273 W 122/123/129	42273 W 122/123/129
-22	30962 R 99/103/112	33509 R 105/108/117	35899 R 110/113/120	38105 R 114/117/123	40166 R 118/120/126	42124 R 122/123/129	42251 W 122/123/129
-18	30725 R 98/103/112	33245 R 104/108/116	35619 R 109/112/120	37809 R 114/116/123	39855 R 117/119/126	41799 R 121/123/129	42193 W 122/123/129
-14	30459 R 97/102/112	32953 R 103/107/116	35312 R 108/112/119	37502 R 113/116/123	39519 R 117/119/125	41451 R 120/122/128	41963 W 121/123/129
-10	30076 R 97/102/111	32575 R 103/107/115	34922 R 108/111/119	37101 R 112/115/122	39137 R 116/119/125	39937 W 118/120/126	39937 W 118/120/126
-6	29530 R 96/101/110	32039 R 102/107/114	34448 R 108/111/118	36669 R 112/115/121	38372 W 115/118/124	38372 W 115/118/124	38372 W 115/118/124
-2	29066 R 96/101/109	31561 R 102/106/113	33933 R 107/111/117	36169 R 112/115/121	37037 W 113/116/122	37037 W 113/116/122	37037 W 113/116/122
2	28536 R 95/100/108	30997 R 101/105/112	33310 R 106/110/116	35513 R 111/114/120	35843 W 111/114/120	35843 W 111/114/120	35843 W 111/114/120
6	27893 R 95/99/107	30303 R 100/104/111	32531 R 105/109/115	34672 R 110/113/118	34787 W 110/113/118	34787 W 110/113/118	34787 W 110/113/118
10	27199 R 94/98/106	29519 R 99/103/110	31678 R 104/107/114	33733 R 109/111/117	33740 W 109/111/117	33740 W 109/111/117	33740 W 109/111/117

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 12000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	30972 R 100/103/112	33520 R 106/109/117	35914 R 111/113/120	38118 R 115/117/123	40198 R 119/120/126	41534 W 122/122/128	41534 W 122/122/128
-30	30735 R 99/103/112	33269 R 105/108/116	35632 R 110/112/120	37838 R 115/116/123	39886 R 119/120/126	41517 W 122/122/128	41517 W 122/122/128
-26	30497 R 98/102/112	33004 R 104/108/116	35350 R 110/112/119	37540 R 114/116/123	39573 R 118/119/126	41493 W 121/122/128	41493 W 121/122/128
-22	30273 R 98/102/111	32743 R 104/107/115	35070 R 109/111/119	37245 R 113/115/122	39263 R 117/119/125	41178 R 121/122/128	41466 W 121/122/128
-18	30036 R 97/102/111	32480 R 103/107/115	34804 R 108/111/119	36951 R 113/115/122	38955 R 117/118/125	40857 R 120/121/127	41355 W 121/122/128
-14	29756 R 97/101/110	32176 R 103/106/114	34485 R 108/111/118	36630 R 112/114/121	38608 R 116/118/124	40499 R 120/121/127	40937 W 120/122/127
-10	29277 R 96/101/109	31753 R 102/106/114	34042 R 107/110/117	36177 R 112/114/121	38171 R 116/118/124	38756 W 117/119/124	38756 W 117/119/124
-6	28851 R 96/100/109	31313 R 102/105/113	33652 R 107/110/117	35805 R 111/114/120	37310 W 114/116/122	37310 W 114/116/122	37310 W 114/116/122
-2	28436 R 95/100/108	30887 R 101/105/112	33196 R 106/109/116	35395 R 111/113/119	36129 W 112/115/120	36129 W 112/115/120	36129 W 112/115/120
2	27892 R 95/99/107	30308 R 100/104/111	32548 R 105/109/115	34706 R 110/113/118	35037 W 110/113/119	35037 W 110/113/119	35037 W 110/113/119
6	27214 R 94/98/106	29561 R 99/103/110	31722 R 104/107/114	33775 R 109/111/117	34048 W 109/112/117	34048 W 109/112/117	34048 W 109/112/117
10	26548 R 93/97/104	28832 R 98/101/109	30929 R 103/106/112	32815 R 108/110/115	33013 W 108/110/116	33013 W 108/110/116	33013 W 108/110/116

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 12500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	30294 R 99/102/111	32777 R 105/107/115	35123 R 110/112/119	37299 R 115/116/122	39310 R 118/119/125	40776 W 121/121/127	40776 W 121/121/127
-30	30058 R 98/102/111	32515 R 104/107/115	34843 R 109/111/119	37004 R 114/115/122	38997 R 118/118/125	40751 W 121/121/127	40751 W 121/121/127
-26	29826 R 98/101/110	32257 R 104/106/115	34567 R 109/111/118	36713 R 113/115/121	38702 R 117/118/124	40584 R 121/121/127	40721 W 121/121/127
-22	29594 R 97/101/110	32013 R 103/106/114	34293 R 108/110/118	36424 R 113/114/121	38399 R 116/117/124	40265 R 120/120/127	40692 W 121/121/127
-18	29371 R 96/100/110	31754 R 102/105/114	34008 R 107/110/117	36126 R 112/114/120	38104 R 116/117/123	39939 R 119/120/126	40529 W 120/121/127
-14	29069 R 96/100/109	31448 R 102/105/113	33690 R 107/109/117	35780 R 111/113/120	37748 R 115/117/123	39584 R 119/120/126	39952 W 119/120/126
-10	28621 R 95/100/108	31047 R 101/105/113	33250 R 106/109/116	35340 R 111/113/119	37294 R 115/116/122	37703 W 116/117/123	37703 W 116/117/123
-6	28215 R 95/99/108	30634 R 101/104/112	32905 R 106/109/116	34969 R 110/113/119	36328 W 113/115/121	36328 W 113/115/121	36328 W 113/115/121
-2	27787 R 94/99/107	30194 R 100/104/111	32430 R 105/108/115	34553 R 110/112/118	35243 W 111/113/119	35243 W 111/113/119	35243 W 111/113/119
2	27229 R 94/98/106	29595 R 99/103/110	31775 R 104/107/114	33818 R 109/111/117	34261 W 110/112/118	34261 W 110/112/118	34261 W 110/112/118
6	26559 R 93/96/104	28857 R 98/101/109	30947 R 103/106/112	32848 R 108/110/116	33315 W 109/110/116	33315 W 109/110/116	33315 W 109/110/116
10	- -	28150 R 97/100/107	30134 R 102/104/111	31940 R 107/108/114	32287 W 107/109/115	32287 W 107/109/115	32287 W 107/109/115

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	29637 R 98/101/110	32048 R 104/106/114	34343 R 109/110/118	36466 R 114/114/121	38462 R 118/118/124	40132 W 120/120/126	40132 W 120/120/126
-30	29403 R 97/101/110	31796 R 103/106/114	34066 R 109/110/117	36183 R 113/114/121	38157 R 117/117/124	39999 R 120/120/126	40104 W 120/120/126
-26	29175 R 97/100/109	31552 R 103/105/113	33797 R 108/109/117	35899 R 112/113/120	37857 R 116/117/123	39707 R 120/120/126	40075 W 120/120/126
-22	28960 R 96/100/109	31309 R 102/105/113	33529 R 107/109/117	35616 R 112/113/120	37557 R 116/116/123	39378 R 119/119/125	39981 W 120/120/126
-18	28706 R 96/99/108	31054 R 101/104/113	33239 R 107/109/116	35314 R 111/112/119	37252 R 115/116/122	39054 R 118/119/125	39554 W 119/120/126
-14	28404 R 95/99/108	30737 R 101/104/112	32907 R 106/108/116	34957 R 111/112/119	36886 R 114/115/122	38426 W 117/118/124	38426 W 117/118/124
-10	27978 R 95/99/107	30341 R 100/104/111	32473 R 106/108/115	34520 R 110/112/118	36434 R 114/115/121	36665 W 115/116/121	36665 W 115/116/121
-6	27588 R 94/98/106	29975 R 100/103/111	32139 R 105/108/114	34159 R 110/111/118	35425 W 112/114/119	35425 W 112/114/119	35425 W 112/114/119
-2	27137 R 94/97/106	29502 R 99/102/110	31688 R 104/107/114	33669 R 109/111/117	34424 W 110/112/118	34424 W 110/112/118	34424 W 110/112/118
2	26568 R 93/96/105	28889 R 98/101/109	30992 R 103/106/112	32902 R 108/110/116	33521 W 109/111/117	33521 W 109/111/117	33521 W 109/111/117
6	- -	28159 R 97/100/107	30129 R 102/104/111	31945 R 107/108/114	32625 W 108/109/115	32625 W 108/109/115	32625 W 108/109/115
10	- -	27442 R 96/99/106	29345 R 101/103/110	31115 R 106/107/113	31548 W 107/108/113	31548 W 107/108/113	31548 W 107/108/113

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	28999 R 97/100/109	31362 R 103/105/113	33586 R 108/109/117	35672 R 113/113/120	37623 R 116/116/123	39453 R 119/119/125	39502 W 120/120/125
-30	28771 R 97/99/109	31116 R 103/104/113	33315 R 108/109/116	35383 R 112/113/119	37323 R 116/116/122	39142 R 119/119/125	39472 W 119/119/125
-26	28554 R 96/99/108	30875 R 102/104/112	33048 R 107/108/116	35099 R 112/112/119	37029 R 115/115/122	38835 R 118/118/124	39445 W 119/119/125
-22	28315 R 95/99/108	30623 R 101/103/112	32774 R 106/108/115	34808 R 111/112/119	36720 R 115/115/121	38524 R 118/118/124	39271 W 119/119/125
-18	28036 R 95/98/107	30338 R 101/103/111	32456 R 106/107/115	34489 R 110/111/118	36384 R 114/115/121	38173 R 118/118/124	38528 W 118/118/124
-14	27720 R 94/98/107	30003 R 100/103/111	32104 R 105/107/114	34113 R 110/111/117	36003 R 114/114/120	36783 W 115/116/121	36783 W 115/116/121
-10	27370 R 94/98/106	29662 R 100/102/110	31737 R 105/107/114	33732 R 109/111/117	35583 R 113/114/120	35620 W 113/114/120	35620 W 113/114/120
-6	26987 R 93/97/105	29340 R 99/102/110	31413 R 104/106/113	33371 R 109/110/116	34550 W 111/112/118	34550 W 111/112/118	34550 W 111/112/118
-2	26519 R 93/96/104	28844 R 98/101/109	30909 R 103/106/112	32817 R 108/109/115	33634 W 110/111/117	33634 W 110/111/117	33634 W 110/111/117
2	- -	28210 R 97/100/108	30197 R 102/104/111	32030 R 107/108/114	32798 W 109/110/115	32798 W 109/110/115	32798 W 109/110/115
6	- -	27444 R 97/99/106	29357 R 101/103/110	31136 R 106/107/113	31948 W 108/108/114	31948 W 108/108/114	31948 W 108/108/114
10	- -	26744 R 96/98/105	28606 R 100/102/108	30328 R 105/105/111	30796 W 106/106/112	30796 W 106/106/112	30796 W 106/106/112

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13800 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	28621 R 97/99/108	30956 R 103/104/112	33129 R 108/108/116	35197 R 112/112/119	37123 R 116/116/122	38931 R 119/119/125	39134 W 119/119/125
-30	28394 R 96/99/108	30713 R 102/104/112	32871 R 107/108/116	34909 R 112/112/119	36828 R 115/115/122	38624 R 118/118/124	39102 W 119/119/125
-26	28178 R 96/98/107	30473 R 101/103/112	32605 R 107/108/115	34634 R 111/111/118	36534 R 115/115/121	38318 R 118/118/124	39034 W 119/119/125
-22	27931 R 95/98/107	30216 R 101/103/111	32326 R 106/107/115	34339 R 110/111/118	36232 R 114/114/121	38005 R 117/117/123	38780 W 118/118/124
-18	27641 R 94/97/106	29914 R 100/102/111	31994 R 105/107/114	34000 R 110/110/117	35872 R 114/114/120	37639 R 117/117/123	37927 W 117/117/123
-14	27306 R 94/97/106	29570 R 100/102/110	31643 R 105/106/114	33615 R 109/110/117	35476 R 113/114/120	36076 W 114/115/120	36076 W 114/115/120
-10	27001 R 93/97/105	29260 R 99/102/109	31298 R 104/106/113	33265 R 109/110/116	35061 W 113/113/119	35061 W 113/113/119	35061 W 113/113/119
-6	26633 R 93/96/105	28960 R 99/101/109	30995 R 104/106/112	32915 R 108/109/116	34063 W 111/112/117	34063 W 111/112/117	34063 W 111/112/117
-2	- -	28439 R 98/101/108	30454 R 103/105/112	32319 R 107/109/115	33178 W 109/110/116	33178 W 109/110/116	33178 W 109/110/116
2	- -	27772 R 97/99/107	29718 R 102/104/110	31530 R 106/107/113	32386 W 108/109/115	32386 W 108/109/115	32386 W 108/109/115
6	- -	27005 R 96/98/105	28904 R 101/102/109	30650 R 105/106/112	31575 W 107/108/113	31575 W 107/108/113	31575 W 107/108/113
10	- -	- -	28168 R 100/101/107	29868 R 104/104/110	30345 W 105/105/111	30345 W 105/105/111	30345 W 105/105/111

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 0 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	43962 R 115/123/132	47655 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
4	43630 R 114/122/131	47317 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
8	43318 R 113/122/131	46935 R 120/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
12	43007 R 113/121/130	46621 R 119/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
16	42702 R 112/121/130	46290 R 119/126/135	49601 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
20	42408 R 112/120/130	45965 R 118/126/134	49254 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
24	42110 R 111/120/129	45638 R 117/125/134	48901 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
28	41814 R 110/119/129	45318 R 117/125/133	48565 R 122/129/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
32	41514 R 110/119/128	45012 R 116/124/133	48226 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
36	41139 R 109/118/128	44616 R 116/124/132	47811 R 121/128/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
40	40512 R 109/118/127	43959 R 115/123/132	47136 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
44	39636 R 108/117/126	43015 R 115/122/130	46158 R 120/127/134	49072 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
48	38438 R 107/115/124	41694 R 114/121/129	44733 R 119/125/133	47540 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	43469 R 114/122/131	47127 R 120/127/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
4	43160 R 113/121/131	46796 R 120/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
8	42835 R 113/121/130	46445 R 119/126/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
12	42525 R 112/120/130	46109 R 119/126/134	49416 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
16	42230 R 112/120/129	45788 R 118/125/134	49075 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
20	41935 R 111/119/129	45465 R 117/125/134	48726 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
24	41639 R 110/119/128	45144 R 117/124/133	48381 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
28	41336 R 110/118/128	44828 R 116/124/133	48040 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
32	41046 R 109/118/128	44518 R 116/124/132	47706 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
36	40589 R 109/118/127	44038 R 115/123/132	47205 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
40	39869 R 108/117/126	43266 R 115/122/131	46422 R 120/127/135	49350 R 125/131/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
44	38883 R 107/116/125	42188 R 114/121/129	45269 R 119/126/133	48120 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
48	37717 R 106/114/123	40903 R 113/120/127	43883 R 118/124/131	46628 R 123/128/135	49227 R 127/132/138	49604 S 127/133/139	49604 S 127/133/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 1000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	42993 R 113/121/130	46627 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
4	42671 R 113/121/130	46277 R 119/126/135	49604 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
8	42347 R 112/120/129	45927 R 118/126/134	49234 R 124/131/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
12	42045 R 111/120/129	45598 R 118/125/134	48881 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
16	41761 R 111/119/129	45287 R 117/125/133	48545 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
20	41463 R 110/119/128	44965 R 117/124/133	48197 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
24	41168 R 110/118/128	44647 R 116/124/133	47854 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
28	40867 R 109/118/127	44333 R 115/123/132	47516 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
32	40581 R 108/117/127	44024 R 115/123/132	47184 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
36	40042 R 108/117/126	43461 R 114/122/131	46627 R 120/127/135	49562 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
40	39230 R 107/116/125	42577 R 114/121/130	45692 R 119/126/134	48581 R 124/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
44	38136 R 106/115/123	41368 R 113/120/128	44387 R 118/125/132	47175 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
48	37001 R 105/113/122	40121 R 112/118/126	43038 R 117/123/130	45751 R 122/127/134	48275 R 126/131/137	48923 W 127/132/138	48923 W 127/132/138

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 1500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	42489 R 113/121/130	46090 R 119/126/134	49414 R 124/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
4	42171 R 112/120/129	45745 R 118/126/134	49049 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
8	41859 R 111/120/129	45407 R 118/125/134	48687 R 123/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
12	41563 R 111/119/128	45085 R 117/125/133	48338 R 123/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
16	41277 R 110/119/128	44772 R 116/124/133	47999 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
20	40982 R 109/118/128	44453 R 116/124/132	47654 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
24	40680 R 109/118/127	44136 R 115/123/132	47312 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
28	40391 R 108/117/127	43824 R 115/123/131	46977 R 120/127/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
32	40068 R 108/117/126	43452 R 114/122/131	46606 R 120/127/135	49529 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
36	39392 R 107/116/125	42757 R 114/121/130	45880 R 119/126/134	48778 R 124/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
40	38489 R 106/115/124	41765 R 113/120/129	44820 R 118/125/133	47648 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
44	37419 R 106/114/122	40584 R 112/119/127	43543 R 117/124/131	46295 R 122/128/135	48860 R 126/131/138	49604 S 127/133/139	49604 S 127/133/139
47	36597 R 105/113/121	39682 R 111/118/126	42566 R 116/122/130	45250 R 121/127/133	47744 R 125/130/137	48562 W 126/131/138	48562 W 126/131/138

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 2000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	41987 R 112/120/129	45555 R 118/125/134	48853 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
4	41674 R 111/119/128	45216 R 118/125/133	48488 R 123/130/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
8	41373 R 111/119/128	44890 R 117/124/133	48139 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
12	41082 R 110/118/128	44573 R 116/124/132	47796 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
16	40796 R 109/118/127	44260 R 116/123/132	47455 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
20	40496 R 109/117/127	43942 R 115/123/132	47112 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
24	40203 R 108/117/126	43628 R 115/122/131	46797 R 120/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
28	39938 R 108/117/126	43318 R 114/122/131	46468 R 119/127/135	49389 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
32	39536 R 107/116/125	42883 R 113/121/130	46008 R 119/126/134	48907 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
36	38746 R 106/115/124	42058 R 113/121/129	45139 R 118/125/133	47993 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
40	37753 R 105/114/123	40959 R 112/119/128	43955 R 117/124/132	46720 R 122/128/135	49339 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
44	36708 R 105/113/121	39808 R 111/118/126	42705 R 116/123/130	45403 R 121/127/134	47913 R 125/130/137	49262 W 127/132/138	49262 W 127/132/138
46	36180 R 104/112/121	39247 R 110/117/125	42076 R 116/122/129	44730 R 120/126/133	47193 R 124/129/136	48195 W 126/131/137	48195 W 126/131/137

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 2500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	41486 R 111/119/128	45020 R 118/125/133	48285 R 123/130/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
4	41174 R 110/119/128	44681 R 117/124/133	47920 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
8	40880 R 110/118/127	44363 R 116/124/132	47576 R 122/129/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
12	40594 R 109/118/127	44049 R 116/123/132	47237 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
16	40305 R 109/117/127	43733 R 115/123/131	46895 R 120/128/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
20	40004 R 108/117/126	43417 R 114/122/131	46579 R 120/127/135	49512 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
24	39733 R 107/116/126	43103 R 114/122/130	46245 R 119/127/135	49161 R 124/131/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
28	39444 R 107/116/125	42783 R 113/121/130	45904 R 119/126/134	48798 R 123/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
32	38897 R 106/115/125	42196 R 113/121/129	45280 R 118/125/133	48138 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
36	38014 R 105/114/123	41256 R 112/120/128	44278 R 117/124/132	47071 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
40	37043 R 105/113/122	40183 R 111/118/126	43117 R 116/123/130	45850 R 121/127/134	48396 R 125/131/137	49604 S 127/132/139	49604 S 127/132/139
44	36023 R 104/112/120	39080 R 110/117/125	41898 R 115/121/129	44544 R 120/126/132	47000 R 124/129/136	48332 W 126/131/137	48332 W 126/131/137
45	35768 R 103/111/120	38801 R 110/117/124	41593 R 115/121/128	44218 R 119/125/132	46650 R 123/129/135	47798 W 125/130/137	47798 W 125/130/137

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 3000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	40988 R 110/119/128	44488 R 117/124/132	47718 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
4	40677 R 110/118/127	44149 R 116/124/132	47354 R 122/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
8	40393 R 109/118/127	43838 R 116/123/131	47017 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
12	40109 R 108/117/126	43528 R 115/123/131	46705 R 120/127/135	49604 R 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
16	39808 R 108/117/126	43209 R 114/122/131	46364 R 120/127/135	49292 R 124/131/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
20	39515 R 107/116/125	42894 R 114/122/130	46028 R 119/126/134	48937 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
24	39248 R 107/116/125	42581 R 113/121/130	45695 R 119/126/134	48582 R 123/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
28	38953 R 106/115/125	42252 R 113/121/129	45343 R 118/125/133	48206 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
32	38263 R 105/114/124	41513 R 112/120/128	44557 R 117/124/132	47373 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
36	37309 R 105/113/122	40463 R 111/118/127	43423 R 116/123/131	46181 R 121/127/135	48753 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
40	36337 R 104/112/121	39432 R 110/117/125	42286 R 115/122/129	44965 R 120/126/133	47456 R 124/130/136	49410 W 127/132/139	49410 W 127/132/139
44	35343 R 103/111/119	38341 R 109/116/124	41097 R 114/120/128	43692 R 119/124/131	46118 R 123/128/134	47388 W 125/130/136	47388 W 125/130/136

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 3500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	40492 R 110/118/127	43956 R 116/123/132	47152 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
4	40191 R 109/117/126	43628 R 115/123/131	46800 R 121/128/135	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
8	39906 R 108/117/126	43316 R 115/122/131	46486 R 120/127/135	49427 R 125/131/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
12	39615 R 108/116/126	43005 R 114/122/130	46151 R 120/127/134	49074 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
16	39323 R 107/116/125	42689 R 114/121/130	45813 R 119/126/134	48714 R 124/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
20	39048 R 106/115/125	42371 R 113/121/129	45474 R 118/126/134	48353 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
24	38765 R 106/115/124	42058 R 112/120/129	45143 R 118/125/133	47999 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
28	38349 R 105/114/124	41595 R 112/120/128	44644 R 117/125/133	47461 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
32	37536 R 104/113/123	40716 R 111/119/127	43701 R 116/123/131	46479 R 121/128/135	49073 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
36	36611 R 104/112/121	39700 R 110/117/126	42600 R 115/122/130	45305 R 120/126/133	47822 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139
40	35654 R 103/111/120	38689 R 109/116/124	41481 R 114/121/128	44108 R 119/125/132	46544 R 123/128/135	48488 W 126/131/137	48488 W 126/131/137
43	34919 R 102/110/119	37881 R 108/115/123	40603 R 113/120/127	43167 R 118/124/131	45565 R 122/127/134	46953 W 124/129/136	46953 W 124/129/136

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 4000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	39998 R 109/117/126	43427 R 115/123/131	46613 R 121/127/135	49566 R 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
4	39707 R 108/117/126	43110 R 115/122/130	46275 R 120/127/135	49213 R 125/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
8	39421 R 108/116/125	42796 R 114/122/130	45937 R 119/126/134	48852 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
12	39132 R 107/116/125	42484 R 113/121/130	45601 R 119/126/134	48493 R 124/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
16	38839 R 106/115/124	42171 R 113/121/129	45266 R 118/125/133	48135 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
20	38567 R 106/115/124	41850 R 112/120/129	44925 R 118/125/133	47772 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
24	38285 R 105/114/124	41538 R 112/120/128	44594 R 117/124/132	47418 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
28	37750 R 104/113/123	40963 R 111/119/128	43949 R 116/124/132	46721 R 121/128/135	49352 R 125/132/139	49604 S 125/132/139	49604 S 125/132/139
32	36815 R 103/112/122	39948 R 110/118/126	42851 R 115/122/130	45575 R 120/126/134	48113 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
36	35919 R 103/111/120	38965 R 109/116/125	41783 R 114/121/129	44435 R 119/125/132	46897 R 123/129/135	49241 R 126/132/138	49405 W 127/132/139
40	34976 R 102/110/119	37951 R 108/115/123	40683 R 113/120/127	43258 R 118/124/131	45667 R 122/127/134	47523 W 125/130/136	47523 W 125/130/136
42	34493 R 101/109/118	37420 R 107/114/122	40108 R 113/119/126	42639 R 117/123/130	45009 R 121/127/133	46529 W 124/129/135	46529 W 124/129/135

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 4500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	39527 R 108/117/125	42926 R 115/122/130	46089 R 120/127/134	49025 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	39244 R 107/116/125	42617 R 114/122/130	45757 R 119/126/134	48671 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	38953 R 107/116/125	42303 R 113/121/129	45420 R 119/126/134	48311 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
12	38665 R 106/115/124	41990 R 113/121/129	45084 R 118/125/133	47951 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
16	38395 R 106/115/124	41678 R 112/120/128	44750 R 118/125/133	47594 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
20	38111 R 105/114/123	41363 R 111/120/128	44416 R 117/124/132	47238 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
24	37729 R 104/113/123	40949 R 111/119/127	43942 R 116/124/132	46721 R 121/128/135	49358 R 125/132/139	49604 S 125/132/139	49604 S 125/132/139
28	37030 R 103/112/122	40179 R 110/118/126	43101 R 115/123/130	45841 R 120/127/134	48398 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
32	36121 R 102/111/120	39192 R 109/117/125	42032 R 114/121/129	44704 R 119/125/133	47187 R 123/129/136	49546 R 126/132/139	49604 S 127/132/139
36	35246 R 102/110/119	38232 R 108/115/124	40989 R 113/120/128	43590 R 118/124/131	46024 R 122/128/134	48301 R 125/131/137	48496 W 126/131/137
40	34325 R 101/109/118	37225 R 107/114/122	39901 R 112/119/126	42422 R 117/123/130	44784 R 121/126/133	46577 W 124/129/135	46577 W 124/129/135
41	34071 R 101/109/117	36963 R 107/114/122	39617 R 112/118/126	42116 R 116/122/129	44460 R 120/126/132	46095 W 123/128/134	46095 W 123/128/134

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 5000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	39056 R 107/116/125	42426 R 114/121/130	45565 R 119/126/134	48477 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	38777 R 107/115/124	42125 R 113/121/129	45241 R 119/126/133	48129 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	38491 R 106/115/124	41812 R 113/120/129	44905 R 118/125/133	47770 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	38199 R 105/114/124	41497 R 112/120/128	44567 R 117/125/132	47410 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
16	37934 R 105/114/123	41185 R 111/119/128	44235 R 117/124/132	47054 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
20	37656 R 104/113/123	40878 R 111/119/127	43908 R 116/124/132	46704 R 121/128/135	49358 R 125/132/139	49604 S 125/132/139	49604 S 125/132/139
24	37177 R 103/113/122	40350 R 110/118/127	43296 R 115/123/131	46057 R 120/127/134	48635 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139
28	36314 R 102/111/121	39401 R 109/117/125	42258 R 114/121/129	44945 R 119/126/133	47446 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
32	35432 R 102/110/119	38443 R 108/116/124	41220 R 113/120/128	43840 R 118/124/131	46291 R 122/128/135	48588 R 125/131/138	49198 W 126/132/138
36	34577 R 101/109/118	37504 R 107/114/123	40205 R 112/119/126	42752 R 117/123/130	45138 R 121/127/133	47366 R 124/130/136	47467 W 124/130/136
40	33663 R 100/108/117	36504 R 106/113/121	39143 R 111/118/125	41592 R 116/122/128	43908 R 120/125/132	45580 W 122/128/134	45580 W 122/128/134

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 5500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	38476 R 106/115/124	41800 R 113/120/129	44895 R 118/125/133	47762 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	38204 R 106/115/124	41498 R 112/120/128	44569 R 118/125/132	47411 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	37919 R 105/114/123	41189 R 112/119/128	44236 R 117/124/132	47055 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
12	37653 R 105/114/123	40878 R 111/119/127	43904 R 117/124/132	46700 R 121/128/135	49351 R 125/132/139	49604 S 126/132/139	49604 S 126/132/139
16	37375 R 104/113/122	40573 R 110/118/127	43577 R 116/123/131	46375 R 121/127/135	48988 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
20	37102 R 103/113/122	40293 R 110/118/127	43256 R 115/123/131	46034 R 120/127/134	48628 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139
24	36501 R 102/112/121	39610 R 109/117/126	42489 R 114/122/130	45194 R 119/126/133	47715 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
28	35616 R 101/110/120	38640 R 108/116/124	41433 R 113/120/128	44067 R 118/124/132	46510 R 122/128/135	48844 R 125/131/138	49604 S 127/133/139
32	34737 R 101/109/118	37687 R 107/115/123	40404 R 112/119/127	42969 R 117/123/130	45371 R 121/127/133	47616 R 124/130/136	48193 W 125/131/137
36	33882 R 100/108/117	36748 R 106/113/121	39390 R 111/118/125	41880 R 116/122/129	44217 R 120/125/132	46392 R 123/129/135	46427 W 123/129/135
39	33204 R 99/107/116	36006 R 105/112/120	38608 R 110/117/124	41019 R 115/121/128	43304 R 119/124/131	45029 W 122/127/133	45029 W 122/127/133

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 6000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	37908 R 106/114/123	41180 R 112/120/128	44231 R 117/124/132	47052 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
4	37633 R 105/114/123	40877 R 111/119/127	43903 R 117/124/132	46698 R 121/128/135	49347 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
8	37372 R 104/113/122	40571 R 111/119/127	43574 R 116/123/131	46370 R 121/128/135	48981 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
12	37095 R 104/113/122	40267 R 110/118/127	43247 R 116/123/131	46024 R 120/127/134	48615 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139
16	36821 R 103/112/122	39989 R 110/118/126	42926 R 115/122/130	45683 R 120/127/134	48254 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
20	36553 R 102/112/121	39697 R 109/117/126	42610 R 114/122/130	45348 R 119/126/133	47900 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139
24	35829 R 101/111/120	38876 R 108/116/125	41689 R 113/121/129	44339 R 118/125/132	46800 R 122/128/135	49150 R 125/132/138	49604 S 126/132/139
28	34923 R 101/109/119	37885 R 107/115/123	40616 R 112/119/127	43195 R 117/123/131	45611 R 121/127/134	47871 R 124/130/137	49025 W 126/132/138
32	34049 R 100/108/117	36937 R 106/113/122	39596 R 111/118/126	42104 R 116/122/129	44457 R 120/126/132	46650 R 123/129/135	47169 W 124/130/136
36	33193 R 99/107/116	35996 R 105/112/120	38601 R 110/117/124	41014 R 115/121/128	43302 R 119/124/131	45406 W 122/127/134	45406 W 122/127/134
38	32746 R 99/106/115	35507 R 104/112/120	38074 R 110/116/123	40449 R 114/120/127	42700 R 118/124/130	44486 W 121/126/132	44486 W 121/126/132

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 6500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	37336 R 105/113/122	40554 R 111/119/127	43555 R 117/123/131	46351 R 121/128/135	48960 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
4	37076 R 104/113/122	40250 R 110/118/127	43227 R 116/123/131	46001 R 121/127/134	48590 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
8	36801 R 103/112/122	39947 R 110/118/126	42902 R 115/122/130	45656 R 120/127/134	48225 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
12	36528 R 103/112/121	39670 R 109/117/126	42581 R 115/122/130	45316 R 119/126/133	47864 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139
16	36259 R 102/111/121	39378 R 109/117/125	42265 R 114/121/129	44981 R 119/126/133	47509 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
20	35907 R 101/111/120	38990 R 108/116/125	41837 R 113/121/129	44517 R 118/125/132	47010 R 122/129/136	49383 R 126/132/139	49604 S 126/132/139
24	35146 R 100/110/119	38116 R 107/115/123	40864 R 112/119/127	43461 R 117/124/131	45893 R 121/127/134	48170 R 124/131/137	49604 S 127/133/139
28	34240 R 100/108/118	37142 R 106/114/122	39816 R 111/118/126	42339 R 116/122/129	44706 R 120/126/133	46914 R 123/129/135	48004 W 125/131/137
32	33371 R 99/107/116	36199 R 105/112/121	38821 R 110/117/124	41254 R 115/121/128	43559 R 119/124/131	45727 R 122/128/134	46164 W 123/128/134
36	32516 R 98/106/115	35259 R 104/111/119	37808 R 109/116/123	40168 R 114/120/126	42404 R 117/123/129	44393 W 121/126/132	44393 W 121/126/132
37	32296 R 98/106/115	35018 R 104/111/119	37548 R 109/115/123	39889 R 113/119/126	42107 R 117/123/129	43939 W 120/126/132	43939 W 120/126/132

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 7000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	36788 R 104/112/121	39935 R 110/118/126	42887 R 116/123/130	45638 R 120/127/134	48203 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
4	36509 R 103/112/121	39649 R 110/117/126	42558 R 115/122/130	45290 R 120/126/133	47835 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
8	36236 R 102/111/121	39352 R 109/117/125	42237 R 114/122/129	44949 R 119/126/133	47474 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
12	35967 R 102/111/120	39059 R 108/116/125	41921 R 114/121/129	44614 R 118/125/132	47119 R 122/129/136	49500 R 126/132/139	49604 S 126/132/139
16	35699 R 101/110/120	38772 R 108/116/124	41611 R 113/121/128	44285 R 118/125/132	46770 R 122/128/135	49141 R 126/132/138	49604 S 126/132/139
20	35287 R 101/110/119	38289 R 107/115/124	41069 R 112/120/128	43694 R 117/124/131	46152 R 121/128/134	48456 R 125/131/137	49604 S 126/132/139
24	34453 R 100/109/118	37361 R 106/114/122	40050 R 111/118/126	42590 R 116/122/130	44972 R 120/126/133	47196 R 123/129/136	48811 W 126/132/138
28	33562 R 99/107/117	36405 R 105/113/121	39041 R 110/117/125	41489 R 115/121/128	43808 R 119/125/131	45989 R 122/128/134	46967 W 124/129/136
32	32699 R 98/106/115	35467 R 104/111/120	38035 R 109/116/123	40412 R 114/120/127	42668 R 118/123/130	44790 R 121/127/133	45146 W 122/127/133
36	31837 R 97/105/114	34527 R 103/110/118	37021 R 108/115/122	39327 R 113/118/125	41512 R 116/122/128	43385 W 120/125/131	43385 W 120/125/131

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 7500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	36221 R 103/112/121	39337 R 109/117/125	42221 R 115/122/129	44930 R 119/126/133	47452 R 123/130/136	49569 W 127/133/139	49569 W 127/133/139
4	35948 R 102/111/120	39039 R 109/116/125	41899 R 114/121/129	44589 R 119/125/132	47091 R 123/129/136	49469 R 126/132/139	49559 W 127/133/139
8	35679 R 102/111/120	38747 R 108/116/124	41582 R 113/121/128	44254 R 118/125/132	46736 R 122/128/135	49103 R 126/132/138	49542 W 126/133/139
12	35414 R 101/110/119	38460 R 107/116/124	41272 R 113/120/128	43925 R 117/124/132	46386 R 122/128/135	48739 R 125/131/138	49524 W 126/132/139
16	35159 R 100/110/119	38171 R 107/115/124	40961 R 112/120/128	43595 R 117/124/131	46062 R 121/128/134	48375 R 125/131/137	49490 B 126/132/139
20	34634 R 100/109/118	37571 R 106/114/123	40289 R 111/119/127	42855 R 116/123/130	45262 R 120/126/133	47512 R 123/130/136	49249 W 126/132/138
24	33771 R 99/108/117	36618 R 105/113/121	39269 R 110/117/125	41732 R 115/121/129	44066 R 119/125/132	46261 R 122/128/135	47796 W 125/130/137
28	32879 R 98/106/116	35664 R 104/111/120	38246 R 109/116/124	40637 R 114/120/127	42907 R 118/124/130	45043 R 121/127/133	45943 W 122/128/134
32	32030 R 97/105/114	34732 R 103/110/118	37244 R 108/115/122	39569 R 113/119/126	41772 R 116/122/129	43850 R 120/125/131	44123 W 120/126/132
35	31417 R 96/104/113	34038 R 102/109/117	36497 R 107/114/121	38787 R 112/118/124	40920 R 116/121/127	42814 W 119/124/130	42814 W 119/124/130

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 8000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	35660 R 102/111/120	38727 R 108/116/124	41560 R 114/121/128	44229 R 118/125/132	46708 R 122/129/135	49028 W 126/132/138	49028 W 126/132/138
4	35392 R 101/110/119	38435 R 108/116/124	41245 R 113/120/128	43895 R 118/124/132	46353 R 122/128/135	48702 R 125/131/138	49016 W 126/132/138
8	35128 R 101/110/119	38147 R 107/115/123	40934 R 113/120/127	43565 R 117/124/131	46029 R 121/128/134	48338 R 125/131/137	48999 W 126/132/138
12	34864 R 100/109/119	37866 R 107/115/123	40631 R 112/119/127	43241 R 117/123/131	45688 R 121/127/134	47979 R 124/130/137	48981 W 126/132/138
16	34611 R 100/109/118	37576 R 106/114/123	40320 R 111/119/127	42910 R 116/123/130	45340 R 120/127/133	47613 R 124/130/136	48954 W 126/132/138
20	33984 R 99/108/117	36860 R 105/113/122	39535 R 110/118/125	42024 R 115/122/129	44379 R 119/125/132	46574 R 122/128/135	48423 W 125/131/137
24	33094 R 98/106/116	35881 R 104/112/120	38476 R 109/116/124	40882 R 114/120/127	43167 R 118/124/131	45316 R 121/127/133	46758 W 123/129/135
28	32205 R 97/105/114	34929 R 103/110/119	37456 R 108/115/122	39794 R 113/119/126	42012 R 116/122/129	44103 R 120/126/132	44908 W 121/127/133
32	31384 R 96/104/113	34002 R 102/109/117	36460 R 107/114/121	38750 R 112/117/124	40883 R 115/121/127	42916 R 119/124/130	43099 W 119/124/130
34	30981 R 96/103/112	33545 R 101/109/117	35967 R 107/113/120	38224 R 111/117/124	40324 R 115/120/127	42248 W 118/123/129	42248 W 118/123/129

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 8500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	34979 R 101/110/119	37995 R 108/115/123	40777 R 113/120/127	43402 R 118/124/131	45861 R 122/127/134	48164 R 125/131/137	48424 W 126/131/137
4	34717 R 101/109/118	37708 R 107/115/123	40468 R 112/119/127	43073 R 117/123/130	45514 R 121/127/134	47800 R 125/130/137	48407 W 126/131/137
8	34453 R 100/109/118	37426 R 106/114/122	40164 R 112/119/126	42749 R 116/123/130	45174 R 120/126/133	47441 R 124/130/136	48389 W 125/131/137
12	34213 R 99/108/118	37149 R 106/114/122	39866 R 111/118/126	42431 R 116/122/130	44839 R 120/126/133	47088 R 123/129/136	48369 W 125/131/137
16	33865 R 99/108/117	36766 R 105/113/121	39445 R 110/117/125	41973 R 115/122/129	44349 R 119/125/132	46565 R 123/129/135	48344 W 125/131/137
20	33195 R 98/106/116	36002 R 104/112/120	38619 R 109/116/124	41047 R 114/120/128	43352 R 118/124/131	45522 R 121/127/134	47516 W 124/130/136
24	32288 R 97/105/115	35016 R 103/110/119	37554 R 108/115/123	39904 R 113/119/126	42134 R 117/122/129	44237 R 120/126/132	45730 W 122/128/134
28	31433 R 96/104/113	34070 R 102/109/117	36539 R 107/114/121	38840 R 112/117/124	40984 R 115/121/128	43027 R 119/124/130	43869 W 120/125/131
32	30635 R 95/103/112	33163 R 101/108/116	35563 R 106/112/120	37801 R 111/116/123	39882 R 114/120/126	41861 R 118/123/129	42076 W 118/123/129
33	30440 R 95/102/111	32942 R 101/108/116	35324 R 106/112/119	37547 R 110/116/123	39610 R 114/119/126	41574 R 118/122/128	41674 W 118/123/128

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 9000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	34308 R 100/109/118	37274 R 107/114/122	40007 R 112/118/126	42586 R 117/123/130	45006 R 121/126/133	47268 R 124/130/136	47801 W 125/130/137
4	34045 R 100/108/117	36991 R 106/113/122	39704 R 111/118/126	42262 R 116/122/129	44665 R 120/126/133	46909 R 124/129/135	47784 W 125/130/137
8	33804 R 99/108/117	36715 R 106/113/121	39406 R 111/118/125	41944 R 116/122/129	44330 R 120/125/132	46556 R 123/129/135	47765 W 125/130/137
12	33559 R 99/107/117	36443 R 105/112/121	39132 R 110/117/125	41632 R 115/121/128	44001 R 119/125/132	46209 R 123/128/135	47724 W 125/130/136
16	33069 R 98/106/116	35967 R 104/112/120	38602 R 109/116/124	41047 R 114/120/128	43369 R 118/124/131	45556 R 122/127/134	47610 R 125/130/136
20	32260 R 97/105/115	35155 R 103/110/119	37716 R 108/115/123	40087 R 113/119/126	42339 R 117/122/129	44460 R 120/126/132	46468 R 124/129/135
24	31426 R 96/104/113	34164 R 102/109/118	36644 R 107/114/121	38958 R 112/117/125	41113 R 116/121/128	43163 R 119/124/131	44684 W 122/126/133
28	30681 R 95/103/112	33223 R 101/108/116	35633 R 106/112/120	37880 R 111/116/123	39987 R 114/120/126	41962 R 118/123/129	42834 W 119/124/130
32	29897 R 94/101/111	32335 R 100/107/115	34677 R 105/111/118	36861 R 110/115/122	38909 R 113/118/125	40815 R 117/121/127	41097 W 117/122/128

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 9500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	33642 R 100/107/117	36555 R 106/113/121	39240 R 111/117/125	41771 R 116/121/129	44152 R 120/125/132	46372 R 123/128/135	46960 W 124/129/136
4	33392 R 99/107/116	36277 R 105/112/121	38959 R 111/117/125	41453 R 115/121/128	43817 R 119/125/131	46042 R 123/128/134	46926 W 124/129/135
8	33106 R 98/107/116	36005 R 105/112/120	38666 R 110/116/124	41139 R 115/120/128	43486 R 119/124/131	45695 R 122/127/134	46873 W 124/129/135
12	32687 R 98/106/116	35690 R 104/111/120	38326 R 109/116/124	40773 R 114/120/127	43097 R 118/124/130	45286 R 122/127/133	46744 W 124/129/135
16	32148 R 97/105/115	35182 R 103/110/119	37758 R 108/115/123	40146 R 113/119/126	42414 R 117/123/130	44553 R 121/126/132	45328 W 122/127/133
20	31430 R 96/104/114	34307 R 102/109/118	36810 R 107/114/122	39143 R 112/118/125	41320 R 116/121/128	43394 R 119/124/131	43485 W 119/124/131
24	30651 R 95/103/112	33307 R 101/108/116	35723 R 106/112/120	37987 R 111/116/123	40085 R 115/120/126	41618 W 117/122/128	41618 W 117/122/128
28	29947 R 94/101/111	32395 R 100/106/115	34745 R 105/111/118	36939 R 110/115/122	39000 R 113/118/125	39960 W 115/120/126	39960 W 115/120/126
31	29368 R 94/100/110	31758 R 100/106/114	34043 R 104/110/117	36196 R 109/114/121	38215 R 113/117/124	38860 W 114/118/125	38860 W 114/118/125

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 10000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	32968 R 99/106/116	35815 R 105/112/120	38472 R 110/116/124	40937 R 115/120/127	43277 R 119/124/131	45453 R 123/127/134	46101 W 124/128/134
4	32577 R 98/106/115	35539 R 104/111/120	38175 R 110/116/124	40622 R 114/120/127	42946 R 118/123/130	45133 R 122/127/133	46074 W 124/128/134
8	32214 R 98/106/115	35262 R 104/111/119	37878 R 109/115/123	40306 R 114/119/127	42610 R 118/123/130	44783 R 121/126/133	46029 W 123/128/134
12	31774 R 97/105/115	34846 R 103/110/119	37432 R 109/115/122	39830 R 113/119/126	42106 R 117/122/129	44254 R 121/126/132	45763 W 123/128/134
16	31172 R 96/104/113	34072 R 102/109/117	36596 R 108/114/121	38949 R 112/118/125	41147 R 116/121/128	43240 R 120/124/131	44339 W 122/126/132
20	30455 R 95/103/112	33144 R 101/108/116	35594 R 107/112/120	37878 R 111/116/123	40002 R 115/120/126	42022 R 119/123/129	42468 W 119/124/130
24	29664 R 94/101/110	32131 R 100/106/114	34502 R 105/111/118	36715 R 110/115/121	38789 R 114/118/124	40622 W 117/121/127	40622 W 117/121/127
28	28900 R 94/100/109	31302 R 99/105/113	33578 R 104/109/117	35724 R 109/113/120	37739 R 113/117/123	39048 W 115/119/125	39048 W 115/119/125
30	28546 R 93/99/108	30916 R 99/104/112	33144 R 104/109/116	35261 R 108/113/119	37245 R 112/116/122	38341 W 114/118/124	38341 W 114/118/124

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 10500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	32026 R 98/105/115	35011 R 104/110/119	37614 R 109/115/123	40024 R 114/119/126	42313 R 118/123/129	44474 R 122/126/132	45190 W 123/127/133
4	31729 R 98/105/114	34741 R 104/110/118	37324 R 109/115/122	39717 R 114/119/126	41982 R 118/122/129	44126 R 121/125/132	45157 W 123/127/133
8	31436 R 97/105/114	34473 R 103/109/118	37036 R 108/114/122	39410 R 113/118/125	41661 R 117/122/128	43790 R 121/125/131	45117 W 123/127/133
12	31030 R 96/104/113	34024 R 102/109/117	36553 R 108/113/121	38913 R 112/117/125	41114 R 116/121/128	43215 R 120/124/131	44713 W 122/126/133
16	30428 R 95/103/112	33256 R 101/108/116	35725 R 107/112/120	38026 R 111/116/123	40169 R 115/120/126	42208 R 119/123/129	43355 W 121/125/131
20	29719 R 95/101/111	32326 R 101/106/115	34717 R 106/111/118	36945 R 110/115/122	39039 R 114/118/125	41001 R 118/122/128	41462 W 118/122/128
24	28966 R 94/100/109	31370 R 99/105/113	33657 R 105/109/117	35818 R 109/113/120	37850 R 113/117/123	39681 W 116/120/126	39681 W 116/120/126
28	28221 R 93/99/108	30569 R 99/104/112	32764 R 104/108/115	34875 R 108/112/119	36831 R 112/115/122	38153 W 114/118/123	38153 W 114/118/123
29	28050 R 93/98/107	30382 R 98/103/111	32566 R 103/108/115	34641 R 108/112/118	36594 R 111/115/121	37811 W 114/117/123	37811 W 114/117/123

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 11000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	31291 R 97/104/114	34219 R 103/109/118	36761 R 109/114/121	39140 R 113/118/125	41365 R 117/121/128	43477 R 121/125/131	44296 W 122/126/132
4	31006 R 97/104/113	33955 R 103/109/117	36484 R 108/113/121	38841 R 113/117/124	41044 R 117/121/128	43139 R 120/124/130	44264 W 122/126/132
8	30725 R 96/103/113	33694 R 102/108/117	36199 R 107/113/121	38546 R 112/117/124	40724 R 116/120/127	42813 R 120/124/130	44227 W 122/126/132
12	30298 R 95/103/112	33213 R 101/107/116	35682 R 107/112/120	37993 R 111/116/123	40136 R 115/120/126	42193 R 119/123/129	43766 W 121/125/131
16	29698 R 95/101/111	32454 R 101/106/115	34862 R 106/111/119	37113 R 110/115/122	39231 R 114/118/125	41202 R 118/122/128	42357 W 120/123/129
20	28989 R 94/100/109	31535 R 100/105/113	33854 R 105/110/117	36037 R 109/113/120	38080 R 113/117/123	39960 R 117/120/126	40442 W 117/121/127
24	28265 R 93/99/108	30621 R 99/104/112	32824 R 104/108/115	34939 R 108/112/119	36899 R 112/115/122	38704 R 115/118/124	38760 W 115/119/124
28	27549 R 92/97/106	29846 R 98/102/110	31968 R 103/107/114	34027 R 107/111/117	35886 R 111/114/120	37301 W 114/116/122	37301 W 114/116/122

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 11500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	30576 R 96/103/113	33446 R 102/108/116	35937 R 108/113/120	38272 R 112/117/124	40420 R 116/120/127	42430 R 120/123/130	43409 W 122/125/131
4	30298 R 96/103/112	33189 R 102/107/116	35663 R 107/112/120	37980 R 112/116/123	40127 R 116/120/126	42125 R 119/123/129	43380 W 121/125/131
8	30025 R 95/102/112	32930 R 101/107/116	35391 R 106/112/119	37690 R 111/116/123	39840 R 115/119/126	41824 R 119/122/129	43347 W 121/125/131
12	29598 R 95/101/111	32436 R 100/106/115	34859 R 106/111/119	37122 R 110/115/122	39237 R 114/118/125	41182 R 118/121/128	42855 W 121/124/130
16	28983 R 94/100/110	31672 R 100/105/114	34008 R 105/110/117	36214 R 109/114/121	38260 R 113/117/124	40130 R 117/120/126	41365 W 119/122/128
20	28254 R 93/99/108	30765 R 99/104/112	32997 R 104/108/116	35124 R 108/112/119	37061 R 112/116/122	38880 R 116/119/125	39452 W 117/119/125
24	27560 R 92/97/106	29895 R 98/102/111	32042 R 103/107/114	34053 R 107/111/117	35925 R 111/114/120	37683 R 114/117/123	37846 W 115/117/123
27	27072 R 91/97/105	29326 R 97/101/110	31419 R 102/106/113	33354 R 106/110/116	35182 R 110/113/119	36774 W 113/116/121	36774 W 113/116/121

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 12000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	29873 R 96/102/111	32683 R 101/107/115	35130 R 107/111/119	37369 R 111/115/122	39427 R 115/119/125	41384 R 119/122/128	42665 W 121/124/130
4	29595 R 95/101/111	32434 R 101/106/115	34862 R 106/111/119	37103 R 111/115/122	39164 R 115/118/125	41091 R 118/121/128	42631 W 121/124/130
8	29334 R 94/101/111	32201 R 100/106/114	34597 R 106/110/118	36838 R 110/114/122	38885 R 114/118/125	40798 R 118/121/127	42545 W 121/124/130
12	28901 R 94/100/110	31695 R 100/105/114	34045 R 105/109/117	36249 R 109/113/121	38262 R 113/117/124	40140 R 117/120/126	41938 R 120/123/129
16	28274 R 93/99/108	30913 R 99/104/112	33173 R 104/108/116	35282 R 108/112/119	37235 R 112/116/122	39071 R 116/119/125	40385 W 118/121/127
20	27552 R 92/98/107	30013 R 98/102/111	32141 R 103/107/114	34150 R 107/111/118	36032 R 111/114/120	37801 R 115/117/123	38498 W 116/118/124
24	26888 R 91/96/105	29188 R 97/101/109	31230 R 102/105/113	33148 R 106/109/116	34968 R 110/113/119	36680 R 114/115/121	36981 W 114/116/122
26	26584 R 91/96/105	28814 R 96/100/109	30814 R 101/105/112	32688 R 106/108/115	34480 R 109/112/118	36165 R 113/115/121	36265 W 113/115/121

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 12500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	29217 R 95/101/110	31999 R 101/106/114	34351 R 106/110/118	36520 R 110/114/121	38549 R 115/117/124	40445 R 118/120/127	41962 W 121/123/129
4	28939 R 94/100/110	31757 R 100/105/114	34102 R 105/110/117	36257 R 110/113/121	38273 R 114/117/124	40156 R 117/120/126	41923 W 121/123/129
8	28657 R 94/100/110	31492 R 99/105/113	33829 R 105/109/117	35956 R 109/113/120	37956 R 113/116/123	39824 R 117/120/126	41610 R 120/122/128
12	28207 R 93/99/109	30973 R 99/104/112	33239 R 104/108/116	35325 R 108/112/119	37288 R 112/116/122	39134 R 116/119/125	40868 R 119/121/127
16	27573 R 92/98/107	30185 R 98/102/111	32306 R 103/107/115	34337 R 107/111/118	36238 R 111/114/121	38026 R 115/117/123	39438 W 118/119/125
20	26869 R 91/96/106	29266 R 97/101/109	31294 R 102/105/113	33223 R 106/109/116	35053 R 110/113/119	36775 R 114/115/121	37568 W 115/117/123
24	- -	28461 R 96/100/108	30439 R 101/104/111	32279 R 105/108/115	34052 R 109/111/117	35708 R 113/114/120	36122 W 113/115/120
25	- -	28262 R 96/99/108	30224 R 101/104/111	32043 R 105/107/114	33801 R 109/111/117	35444 R 112/114/119	35783 W 113/114/120

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	28561 R 94/100/109	31307 R 100/104/113	33563 R 105/109/117	35685 R 110/113/120	37670 R 114/116/123	39525 R 117/119/125	41284 R 120/122/128
4	28298 R 93/99/109	31094 R 99/104/113	33317 R 104/108/116	35424 R 109/112/119	37397 R 113/116/122	39238 R 117/119/125	40998 R 120/122/128
8	28000 R 93/99/109	30808 R 98/103/112	33000 R 104/108/116	35087 R 108/112/119	37042 R 112/115/122	38865 R 116/118/125	40609 R 119/121/127
12	27534 R 92/98/108	30247 R 98/102/111	32373 R 103/107/115	34417 R 108/111/118	36331 R 112/114/121	38132 R 115/117/123	39821 R 118/120/126
16	26890 R 91/97/106	29397 R 97/101/110	31453 R 102/105/113	33408 R 106/109/116	35258 R 110/113/119	36999 R 114/116/122	38514 W 117/118/124
20	- -	28483 R 96/100/108	30466 R 101/104/112	32314 R 105/108/115	34093 R 109/111/117	35758 R 113/114/120	36710 W 115/116/121
24	- -	27721 R 95/98/107	29658 R 100/103/110	31444 R 104/106/113	33140 R 108/110/116	34766 R 112/113/118	35310 W 113/114/119

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	27939 R 93/99/108	30647 R 99/103/112	32833 R 104/108/115	34912 R 109/111/119	36858 R 113/115/122	38663 R 116/118/124	40402 R 120/121/127
4	27695 R 93/98/108	30428 R 98/103/111	32591 R 104/107/115	34656 R 108/111/118	36589 R 112/114/121	38392 R 116/117/124	40109 R 119/120/126
8	27386 R 92/98/108	30117 R 98/102/111	32248 R 103/107/115	34290 R 107/110/118	36203 R 112/114/121	38004 R 115/117/123	39684 R 118/120/126
12	26840 R 91/97/106	29462 R 97/101/110	31533 R 102/105/113	33505 R 107/109/117	35369 R 111/113/119	37112 R 114/116/122	38758 R 117/118/124
16	- -	28639 R 96/100/108	30643 R 101/104/112	32517 R 106/108/115	34318 R 109/111/118	36005 R 113/114/120	37609 W 116/117/123
20	- -	27758 R 95/98/107	29703 R 100/102/110	31496 R 104/106/113	33203 R 108/110/116	34837 R 112/113/119	35887 W 114/114/120
23	- -	27205 R 94/97/106	29105 R 99/101/109	30861 R 104/105/112	32508 R 108/109/115	34105 R 111/112/117	34842 W 113/113/119

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13800 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	27539 R 93/98/108	30255 R 98/102/111	32401 R 104/107/115	34454 R 108/111/118	36376 R 112/114/121	38161 R 116/117/124	39879 R 119/120/126
4	27300 R 92/98/107	30038 R 98/102/111	32162 R 103/106/114	34200 R 108/110/118	36110 R 112/114/120	37881 R 115/117/123	39589 R 118/119/126
8	26991 R 91/97/107	29712 R 97/101/110	31810 R 102/106/114	33817 R 107/110/117	35706 R 111/113/120	37472 R 115/116/123	39143 R 118/119/125
12	- -	29002 R 96/100/109	31041 R 101/104/113	32965 R 106/108/116	34799 R 110/112/119	36517 R 114/115/121	38153 R 117/118/123
16	- -	28190 R 95/99/107	30163 R 100/103/111	31992 R 105/107/114	33754 R 109/110/117	35424 R 112/113/119	36993 R 116/116/122
20	- -	27337 R 95/98/106	29251 R 99/102/109	31008 R 104/105/112	32683 R 108/109/115	34281 R 111/112/118	35397 W 114/114/119

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 0 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	46666 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-30	46283 R 120/126/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-26	45906 R 119/126/134	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-22	45542 R 118/125/134	49350 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-18	45180 R 118/125/133	48963 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-14	44823 R 117/124/133	48579 R 123/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-10	44468 R 116/123/132	48199 R 123/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-6	44124 R 116/123/132	47837 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-2	43821 R 115/122/131	47499 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
2	43498 R 114/122/131	47144 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
6	43194 R 114/122/131	46820 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
10	42868 R 113/121/130	46468 R 119/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	46174 R 120/126/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-30	45793 R 119/126/134	49604 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-26	45421 R 118/125/134	49229 R 125/131/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-22	45056 R 118/124/133	48837 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-18	44690 R 117/124/133	48449 R 123/130/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-14	44341 R 116/123/132	48068 R 123/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-10	43992 R 116/123/132	47688 R 122/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-6	43660 R 115/122/131	47333 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-2	43333 R 114/122/131	46980 R 121/127/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
2	43006 R 114/121/130	46654 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
6	42703 R 113/121/130	46303 R 119/126/135	49604 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
10	42377 R 112/120/129	45950 R 119/126/134	49248 R 124/131/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 1000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	45684 R 119/126/134	49517 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-30	45297 R 118/125/133	49110 R 125/131/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-26	44934 R 118/124/133	48714 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-22	44573 R 117/124/132	48314 R 123/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-18	44215 R 116/123/132	47936 R 123/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-14	43864 R 116/123/131	47551 R 122/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-10	43530 R 115/122/131	47198 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-6	43212 R 114/122/131	46856 R 121/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-2	42871 R 114/121/130	46492 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
2	42537 R 113/121/130	46134 R 119/126/134	49452 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
6	42213 R 112/120/129	45783 R 119/126/134	49081 R 124/131/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
10	41889 R 112/120/129	45432 R 118/125/134	48704 R 123/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 1500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	45198 R 118/125/133	49013 R 125/130/138	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139
-30	44829 R 118/124/133	48603 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-26	44463 R 117/124/132	48205 R 123/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-22	44103 R 116/123/132	47821 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-18	43748 R 115/123/131	47438 R 122/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-14	43400 R 115/122/131	47064 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-10	43086 R 114/122/130	46727 R 121/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-6	42753 R 114/121/130	46366 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-2	42383 R 113/121/129	45973 R 119/126/134	49285 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
2	42033 R 112/120/129	45598 R 119/126/134	48889 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
6	41711 R 112/120/129	45250 R 118/125/133	48518 R 123/130/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
10	41378 R 111/119/128	44896 R 117/125/133	48142 R 123/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 2000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	44727 R 118/124/133	48503 R 124/130/137	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139
-30	44355 R 117/124/132	48100 R 123/129/137	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139
-26	43991 R 116/123/132	47707 R 122/129/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-22	43633 R 115/123/131	47320 R 122/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-18	43283 R 115/122/131	46943 R 121/128/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-14	42960 R 114/122/130	46598 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-10	42624 R 113/121/130	46235 R 120/127/135	49563 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-6	42294 R 113/120/129	45878 R 119/126/134	49186 R 125/131/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-2	41898 R 112/120/129	45456 R 118/125/134	48741 R 124/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
2	41532 R 111/119/128	45064 R 118/125/133	48324 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
6	41211 R 111/119/128	44719 R 117/124/133	47956 R 123/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
10	40869 R 110/118/127	44360 R 117/124/132	47580 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 2500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	44247 R 117/124/132	47992 R 123/129/137	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139	49604 S 126/131/139
-30	43880 R 116/123/131	47595 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	43515 R 115/122/131	47201 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	43159 R 115/122/131	46842 R 121/128/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	42811 R 114/121/130	46470 R 120/127/135	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-14	42495 R 113/121/130	46104 R 120/126/134	49433 R 125/131/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-10	42160 R 113/120/129	45743 R 119/126/134	49050 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-6	41832 R 112/120/129	45388 R 118/125/133	48670 R 124/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-2	41410 R 111/119/128	44937 R 118/125/133	48190 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
2	41028 R 111/119/128	44525 R 117/124/132	47752 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
6	40705 R 110/118/127	44177 R 117/124/132	47379 R 122/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
10	40346 R 110/118/127	43798 R 116/123/131	46980 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 3000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	43769 R 116/123/131	47482 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-30	43406 R 115/122/131	47090 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	43040 R 115/122/130	46722 R 121/127/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	42686 R 114/121/130	46343 R 120/127/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	42365 R 113/121/129	45974 R 120/126/134	49303 R 125/131/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	42031 R 113/120/129	45612 R 119/126/134	48917 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	41698 R 112/120/129	45252 R 118/125/133	48532 R 124/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-6	41371 R 111/119/128	44900 R 118/125/133	48154 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-2	40925 R 111/119/127	44419 R 117/124/132	47642 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
2	40529 R 110/118/127	43990 R 116/124/132	47182 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
6	40202 R 109/118/126	43637 R 116/123/131	46804 R 121/128/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
10	39826 R 109/117/126	43239 R 115/122/131	46410 R 121/127/135	49349 R 125/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 3500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	43279 R 115/122/131	46966 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-30	42913 R 115/122/130	46597 R 121/127/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	42554 R 114/121/130	46214 R 120/127/135	49569 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	42229 R 113/121/129	45842 R 120/126/134	49176 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	41889 R 113/120/129	45474 R 119/126/134	48782 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	41550 R 112/120/128	45108 R 118/125/133	48390 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	41220 R 111/119/128	44750 R 118/125/133	48006 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	40894 R 111/119/127	44397 R 117/124/132	47628 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	40435 R 110/118/127	43897 R 116/123/132	47089 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
2	40039 R 109/117/126	43466 R 116/123/131	46650 R 121/128/135	49598 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
6	39709 R 109/117/126	43112 R 115/122/130	46275 R 120/127/135	49209 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
10	39260 R 108/116/125	42639 R 115/122/130	45781 R 120/127/134	48695 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 4000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	42790 R 115/122/130	46477 R 121/127/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-30	42420 R 114/121/130	46082 R 120/127/134	49442 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	42070 R 113/121/129	45707 R 120/126/134	49045 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	41752 R 113/120/129	45342 R 119/126/133	48653 R 124/130/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	41413 R 112/120/128	44974 R 118/125/133	48259 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	41071 R 111/119/128	44604 R 118/125/132	47863 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	40744 R 111/118/127	44249 R 117/124/132	47481 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	40419 R 110/118/127	43895 R 116/123/132	47100 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	39948 R 109/117/126	43376 R 116/123/131	46563 R 121/128/135	49514 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
2	39552 R 108/117/126	42944 R 115/122/130	46100 R 120/127/134	49027 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
6	39216 R 108/116/125	42588 R 114/122/130	45725 R 120/126/134	48634 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
10	38689 R 107/116/124	42040 R 114/121/129	45155 R 119/126/133	48038 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 4500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	42263 R 114/121/129	45920 R 120/127/134	49281 R 126/131/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-30	41900 R 113/120/129	45532 R 120/126/134	48868 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	41571 R 113/120/128	45157 R 119/125/133	48466 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	41231 R 112/119/128	44789 R 118/125/133	48071 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	40896 R 111/119/127	44425 R 118/124/132	47681 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	40563 R 110/118/127	44063 R 117/124/132	47292 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	40234 R 110/118/126	43706 R 116/123/131	46907 R 122/128/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	39924 R 109/117/126	43368 R 116/123/131	46567 R 121/128/135	49531 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	39469 R 108/117/125	42868 R 115/122/130	46029 R 120/127/134	48961 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
2	39093 R 108/116/125	42455 R 114/121/130	45584 R 120/126/134	48486 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
6	38756 R 107/115/124	42094 R 114/121/129	45203 R 119/126/133	48084 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
10	38145 R 107/115/123	41467 R 113/120/128	44559 R 119/125/132	47418 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 5000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	41738 R 113/120/129	45366 R 120/126/133	48699 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-30	41381 R 112/120/128	44984 R 119/125/133	48291 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	41054 R 112/119/128	44609 R 118/125/132	47889 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	40713 R 111/119/127	44239 R 117/124/132	47491 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	40383 R 110/118/127	43879 R 117/124/131	47103 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	40058 R 110/118/126	43525 R 116/123/131	46722 R 122/128/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	39727 R 109/117/126	43165 R 115/123/131	46360 R 121/127/135	49323 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	39424 R 108/117/125	42843 R 115/122/130	46015 R 120/127/134	48958 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	38992 R 108/116/125	42361 R 114/121/129	45497 R 120/126/134	48403 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
2	38637 R 107/115/124	41967 R 113/121/129	45071 R 119/126/133	47945 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
6	38291 R 106/115/124	41601 R 113/120/128	44684 R 118/125/133	47536 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
10	37600 R 106/114/123	40894 R 112/120/127	43964 R 118/124/132	46798 R 123/129/135	49248 W 126/132/138	49248 W 126/132/138	49248 W 126/132/138

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 5500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	41070 R 112/119/128	44642 R 119/125/132	47918 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	40741 R 112/119/127	44265 R 118/124/132	47515 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	40399 R 111/118/127	43893 R 117/124/132	47115 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	40069 R 110/118/126	43534 R 117/123/131	46729 R 122/128/135	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	39747 R 109/117/126	43182 R 116/123/131	46376 R 121/128/135	49334 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	39428 R 109/117/125	42835 R 115/122/130	46004 R 121/127/134	48942 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	39107 R 108/116/125	42487 R 115/122/130	45633 R 120/126/134	48548 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	38801 R 107/116/124	42161 R 114/121/129	45283 R 119/126/133	48176 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	38400 R 107/115/124	41722 R 113/121/129	44813 R 119/125/133	47674 R 123/130/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
2	38036 R 106/114/123	41322 R 113/120/128	44384 R 118/125/132	47215 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
6	37635 R 105/114/123	40896 R 112/119/127	43936 R 117/124/132	46744 R 122/128/135	49401 R 126/132/139	49604 S 127/132/139	49604 S 127/132/139
10	36915 R 105/113/122	40164 R 112/119/126	43188 R 117/124/131	46003 R 122/128/134	48092 W 125/131/137	48092 W 125/131/137	48092 W 125/131/137

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 6000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	40431 R 111/118/127	43924 R 118/124/132	47144 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	40090 R 111/118/126	43553 R 117/123/131	46745 R 122/128/135	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	39751 R 110/117/126	43183 R 116/123/131	46372 R 122/128/135	49326 R 126/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	39431 R 109/117/125	42835 R 116/122/130	46001 R 121/127/134	48934 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	39117 R 109/116/125	42492 R 115/122/130	45635 R 120/127/134	48546 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	38803 R 108/116/124	42151 R 114/121/129	45270 R 120/126/133	48159 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	38494 R 107/115/124	41816 R 114/121/129	44912 R 119/126/133	47777 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	38184 R 107/115/124	41485 R 113/120/128	44558 R 118/125/132	47400 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	37820 R 106/114/123	41089 R 112/120/128	44135 R 118/124/132	46950 R 122/129/136	49604 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
2	37445 R 105/114/122	40683 R 112/119/127	43702 R 117/124/131	46489 R 122/128/135	49133 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139
6	36983 R 105/113/122	40199 R 111/118/126	43194 R 117/123/131	45983 R 121/127/134	48584 R 125/131/138	49362 W 126/132/139	49362 W 126/132/139
10	36254 R 104/112/121	39438 R 111/118/125	42417 R 116/123/130	45192 R 121/127/133	46879 W 124/129/135	46879 W 124/129/135	46879 W 124/129/135

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 6500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	39777 R 110/118/126	43208 R 117/123/131	46370 R 122/128/135	49346 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	39443 R 110/117/125	42844 R 116/122/130	46007 R 121/127/134	48938 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	39112 R 109/116/125	42483 R 115/122/130	45622 R 121/127/134	48528 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	38792 R 108/116/124	42136 R 115/121/129	45251 R 120/126/133	48135 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-18	38481 R 108/115/124	41797 R 114/121/129	44890 R 119/126/133	47751 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-14	38173 R 107/115/124	41463 R 113/120/128	44533 R 119/125/132	47370 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-10	37867 R 106/114/123	41130 R 113/120/128	44175 R 118/125/132	46989 R 123/129/136	49604 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-6	37564 R 106/114/123	40807 R 112/119/127	43830 R 117/124/131	46621 R 122/128/135	49266 R 126/132/138	49604 S 127/132/139	49604 S 127/132/139
-2	37242 R 105/113/122	40454 R 111/119/127	43448 R 117/123/131	46236 R 121/128/135	48837 R 125/131/138	49604 S 127/132/139	49604 S 127/132/139
2	36835 R 104/113/122	40022 R 111/118/126	42990 R 116/123/130	45756 R 121/127/134	48334 R 125/131/137	49604 S 127/133/139	49604 S 127/133/139
6	36311 R 104/112/121	39461 R 110/118/125	42409 R 116/122/130	45159 R 120/126/133	47717 R 124/130/136	48123 W 125/131/137	48123 W 125/131/137
10	35584 R 103/111/120	38740 R 110/117/124	41651 R 115/122/128	44387 R 120/126/132	45676 W 122/128/134	45676 W 122/128/134	45676 W 122/128/134

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 7000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	39129 R 109/117/125	42498 R 116/122/130	45633 R 121/127/134	48538 R 126/131/138	49345 W 127/132/139	49345 W 127/132/139	49345 W 127/132/139
-30	38801 R 109/116/124	42142 R 115/122/129	45254 R 120/126/133	48134 R 125/131/137	49345 W 127/132/139	49345 W 127/132/139	49345 W 127/132/139
-26	38478 R 108/116/124	41790 R 114/121/129	44878 R 120/126/133	47734 R 124/130/136	49345 W 127/132/139	49345 W 127/132/139	49345 W 127/132/139
-22	38158 R 107/115/124	41442 R 114/120/128	44509 R 119/125/132	47342 R 124/129/136	49342 W 127/132/139	49342 W 127/132/139	49342 W 127/132/139
-18	37850 R 107/115/123	41108 R 113/120/128	44151 R 118/125/132	46961 R 123/129/136	49333 W 127/132/139	49333 W 127/132/139	49333 W 127/132/139
-14	37550 R 106/114/123	40782 R 112/119/127	43802 R 118/124/131	46588 R 122/128/135	49228 R 126/132/138	49313 W 127/132/139	49313 W 127/132/139
-10	37258 R 105/114/122	40452 R 112/119/127	43446 R 117/124/131	46233 R 122/128/135	48832 R 126/132/138	49274 W 127/132/139	49274 W 127/132/139
-6	36948 R 105/113/122	40139 R 111/118/126	43109 R 116/123/130	45877 R 121/127/134	48456 R 125/131/137	49348 W 127/132/139	49348 W 127/132/139
-2	36687 R 104/112/121	39827 R 110/118/126	42768 R 116/123/130	45511 R 120/127/134	48065 R 124/130/137	49335 W 126/132/139	49335 W 126/132/139
2	36251 R 103/112/121	39387 R 110/117/125	42285 R 115/122/129	45008 R 120/126/133	47540 R 124/130/136	48700 W 126/131/138	48700 W 126/131/138
6	35626 R 103/111/120	38749 R 109/117/124	41630 R 115/121/128	44340 R 119/126/132	46690 W 123/129/135	46690 W 123/129/135	46690 W 123/129/135
10	34917 R 103/110/119	38028 R 109/116/123	40891 R 115/121/127	43587 R 119/125/131	44424 W 121/126/132	44424 W 121/126/132	44424 W 121/126/132

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 7500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	38496 R 109/116/124	41805 R 115/121/129	44889 R 120/126/133	47742 R 125/130/137	48673 W 126/131/138	48673 W 126/131/138	48673 W 126/131/138
-30	38174 R 108/115/124	41455 R 114/121/128	44517 R 119/125/132	47346 R 124/130/136	48686 W 126/131/138	48686 W 126/131/138	48686 W 126/131/138
-26	37857 R 107/115/123	41110 R 113/120/128	44149 R 119/125/132	46954 R 123/129/136	48692 W 126/131/138	48692 W 126/131/138	48692 W 126/131/138
-22	37540 R 106/114/123	40766 R 113/120/127	43782 R 118/124/131	46564 R 123/128/135	48681 W 126/131/138	48681 W 126/131/138	48681 W 126/131/138
-18	37235 R 106/114/122	40437 R 112/119/127	43429 R 117/124/131	46212 R 122/128/135	48662 W 126/131/138	48662 W 126/131/138	48662 W 126/131/138
-14	36941 R 105/113/122	40119 R 111/118/126	43087 R 117/123/130	45850 R 121/127/134	48424 R 125/131/137	48651 W 126/131/138	48651 W 126/131/138
-10	36637 R 104/113/121	39797 R 111/118/126	42740 R 116/123/130	45483 R 121/127/134	48036 R 125/131/137	48617 W 126/131/138	48617 W 126/131/138
-6	36377 R 104/112/121	39499 R 110/117/125	42422 R 116/122/130	45148 R 120/126/133	47684 R 124/130/136	48823 W 126/132/138	48823 W 126/132/138
-2	36062 R 103/112/120	39175 R 110/117/125	42052 R 115/122/129	44756 R 120/126/133	47270 R 124/129/136	48669 W 126/131/138	48669 W 126/131/138
2	35575 R 103/111/120	38667 R 109/116/124	41520 R 114/121/128	44204 R 119/125/132	46696 R 123/129/135	47588 W 124/130/136	47588 W 124/130/136
6	34921 R 102/110/119	38000 R 109/116/123	40834 R 114/120/127	43504 R 119/125/131	45237 W 122/127/133	45237 W 122/127/133	45237 W 122/127/133
10	34130 R 102/109/117	37169 R 108/115/122	39964 R 113/119/126	42594 R 118/124/130	43162 W 119/124/131	43162 W 119/124/131	43162 W 119/124/131

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 8000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	37869 R 108/115/123	41118 R 114/120/128	44152 R 119/125/132	46954 R 124/129/136	48018 W 125/131/137	48018 W 125/131/137	48018 W 125/131/137
-30	37552 R 107/114/123	40775 R 113/120/127	43786 R 118/124/131	46564 R 123/129/135	48021 W 125/131/137	48021 W 125/131/137	48021 W 125/131/137
-26	37241 R 106/114/122	40438 R 113/119/127	43426 R 118/124/131	46205 R 122/128/135	48007 W 125/131/137	48007 W 125/131/137	48007 W 125/131/137
-22	36927 R 106/113/122	40099 R 112/119/126	43062 R 117/123/130	45820 R 122/127/134	47989 W 125/131/137	47989 W 125/131/137	47989 W 125/131/137
-18	36626 R 105/113/121	39773 R 111/118/126	42712 R 117/123/130	45450 R 121/127/134	47976 W 125/131/137	47976 W 125/131/137	47976 W 125/131/137
-14	36337 R 104/112/121	39462 R 111/118/125	42378 R 116/122/129	45096 R 120/126/133	47624 R 124/130/136	47970 W 125/131/137	47970 W 125/131/137
-10	36058 R 104/112/120	39168 R 110/117/125	42040 R 115/122/129	44739 R 120/126/133	47247 R 124/130/136	47929 W 125/131/137	47929 W 125/131/137
-6	35793 R 103/111/120	38885 R 109/117/125	41739 R 115/121/129	44424 R 119/125/132	46917 R 123/129/135	48097 W 125/131/137	48097 W 125/131/137
-2	35439 R 102/111/119	38509 R 109/116/124	41340 R 114/121/128	44006 R 119/125/132	46478 R 123/128/135	47563 W 124/130/136	47563 W 124/130/136
2	34901 R 102/110/119	37951 R 108/115/123	40759 R 114/120/127	43406 R 118/124/131	45882 R 122/128/134	46082 W 123/128/134	46082 W 123/128/134
6	34221 R 101/109/118	37255 R 108/115/122	40046 R 113/119/126	42674 R 118/124/130	43822 W 120/125/131	43822 W 120/125/131	43822 W 120/125/131
10	33348 R 101/108/116	36316 R 107/114/121	39062 R 112/118/125	41608 R 117/122/128	41932 W 117/123/129	41932 W 117/123/129	41932 W 117/123/129

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 8500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	37125 R 107/114/122	40316 R 113/119/127	43295 R 118/124/131	46067 R 123/128/134	47356 W 125/130/136	47356 W 125/130/136	47356 W 125/130/136
-30	36817 R 106/113/122	39982 R 112/119/126	42938 R 118/123/130	45690 R 122/127/134	47350 W 125/130/136	47350 W 125/130/136	47350 W 125/130/136
-26	36505 R 105/113/121	39643 R 112/118/126	42575 R 117/123/130	45306 R 122/127/133	47313 W 125/130/136	47313 W 125/130/136	47313 W 125/130/136
-22	36198 R 105/112/121	39312 R 111/117/125	42220 R 116/122/129	44932 R 121/126/133	47288 W 125/130/136	47288 W 125/130/136	47288 W 125/130/136
-18	35902 R 104/112/120	39012 R 110/117/125	41877 R 116/122/129	44570 R 120/126/132	47071 R 124/129/136	47283 W 125/130/136	47283 W 125/130/136
-14	35631 R 103/111/120	38703 R 110/116/124	41543 R 115/121/128	44217 R 120/125/132	46698 R 124/129/135	47281 W 125/130/136	47281 W 125/130/136
-10	35345 R 103/111/119	38394 R 109/116/124	41210 R 114/121/128	43864 R 119/125/131	46324 R 123/128/135	47229 W 124/130/136	47229 W 124/130/136
-6	35056 R 102/110/119	38096 R 108/115/123	40897 R 114/120/127	43537 R 118/124/131	46008 R 122/128/134	47320 W 124/130/136	47320 W 124/130/136
-2	34624 R 102/109/118	37645 R 108/115/123	40427 R 113/119/127	43048 R 118/124/130	45502 R 122/127/134	46372 W 123/129/135	46372 W 123/129/135
2	34058 R 101/109/117	37062 R 108/114/122	39826 R 113/119/126	42428 R 117/123/130	44480 W 121/126/132	44480 W 121/126/132	44480 W 121/126/132
6	33321 R 101/108/116	36289 R 107/113/121	39018 R 112/118/125	41585 R 117/122/128	42421 W 118/123/130	42421 W 118/123/130	42421 W 118/123/130
10	32471 R 100/107/115	35366 R 106/112/119	38045 R 111/117/123	40522 R 116/121/127	40728 W 116/121/127	40728 W 116/121/127	40728 W 116/121/127

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 9000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	36392 R 106/113/121	39525 R 112/118/125	42452 R 117/123/130	45179 R 122/127/133	46651 W 124/129/135	46651 W 124/129/135	46651 W 124/129/135
-30	36094 R 105/112/120	39200 R 111/117/125	42103 R 117/122/129	44808 R 121/126/133	46645 W 124/129/135	46645 W 124/129/135	46645 W 124/129/135
-26	35779 R 105/111/120	38879 R 111/117/125	41738 R 116/122/129	44421 R 121/126/132	46619 W 124/129/135	46619 W 124/129/135	46619 W 124/129/135
-22	35481 R 104/111/120	38558 R 110/116/124	41391 R 115/121/128	44056 R 120/125/132	46529 R 124/129/135	46597 W 124/129/135	46597 W 124/129/135
-18	35191 R 103/110/119	38247 R 109/116/124	41055 R 115/120/128	43701 R 119/125/131	46155 R 123/128/134	46582 W 124/129/135	46582 W 124/129/135
-14	34921 R 103/110/119	37938 R 109/115/123	40723 R 114/120/127	43350 R 119/124/131	45810 R 123/128/134	46562 W 124/129/135	46562 W 124/129/135
-10	34639 R 102/109/118	37632 R 108/115/123	40395 R 114/119/127	43000 R 118/124/130	45442 R 122/127/134	46506 W 124/129/135	46506 W 124/129/135
-6	34339 R 101/109/118	37319 R 108/114/122	40069 R 113/119/126	42662 R 117/123/130	45092 R 122/127/133	46152 W 123/128/134	46152 W 123/128/134
-2	33822 R 101/108/117	36794 R 107/114/121	39529 R 112/118/125	42105 R 117/122/129	44521 R 121/126/132	44895 W 122/127/133	44895 W 122/127/133
2	33231 R 100/108/116	36188 R 107/113/121	38908 R 112/118/125	41467 R 117/122/128	42994 W 119/124/130	42994 W 119/124/130	42994 W 119/124/130
6	32435 R 100/107/115	35338 R 106/112/119	38025 R 111/117/123	40513 R 116/121/127	41169 W 117/122/128	41169 W 117/122/128	41169 W 117/122/128
10	31625 R 99/105/114	34429 R 105/111/118	37040 R 110/115/122	39451 R 115/119/125	39664 W 115/120/126	39664 W 115/120/126	39664 W 115/120/126

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 9500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	35650 R 105/111/120	38743 R 111/117/124	41594 R 117/121/128	44272 R 121/126/132	45939 W 124/128/134	45939 W 124/128/134	45939 W 124/128/134
-30	35349 R 104/111/119	38417 R 111/116/124	41243 R 116/121/128	43900 R 120/125/132	45944 W 124/128/134	45944 W 124/128/134	45944 W 124/128/134
-26	35049 R 104/110/119	38093 R 110/116/123	40895 R 115/120/127	43534 R 120/124/131	45926 W 124/128/134	45926 W 124/128/134	45926 W 124/128/134
-22	34757 R 103/110/118	37779 R 109/115/123	40557 R 115/120/127	43175 R 119/124/131	45622 R 123/128/134	45893 W 124/128/134	45893 W 124/128/134
-18	34486 R 102/109/118	37470 R 109/115/122	40225 R 114/119/126	42823 R 118/123/130	45253 R 123/127/133	45861 W 123/128/134	45861 W 123/128/134
-14	34202 R 102/109/118	37163 R 108/114/122	39898 R 113/119/126	42473 R 118/123/130	44889 R 122/127/133	45839 W 123/128/134	45839 W 123/128/134
-10	33913 R 101/108/117	36854 R 107/114/122	39568 R 113/118/126	42124 R 117/122/129	44523 R 121/126/132	45685 W 123/128/134	45685 W 123/128/134
-6	33516 R 101/108/117	36444 R 107/113/121	39144 R 112/118/125	41688 R 117/122/129	43496 W 120/125/131	43496 W 120/125/131	43496 W 120/125/131
-2	32969 R 100/107/116	35890 R 106/112/120	38593 R 112/117/124	41101 R 116/121/128	41236 W 116/121/128	41236 W 116/121/128	41236 W 116/121/128
2	32343 R 100/106/115	35234 R 106/112/119	37912 R 111/116/123	39550 W 114/119/126	39550 W 114/119/126	39550 W 114/119/126	39550 W 114/119/126
6	31597 R 99/105/113	34411 R 105/111/118	37032 R 110/115/122	38201 W 113/117/124	38201 W 113/117/124	38201 W 113/117/124	38201 W 113/117/124
10	30853 R 98/104/112	33559 R 104/109/117	36108 R 109/114/120	36867 W 111/115/122	36867 W 111/115/122	36867 W 111/115/122	36867 W 111/115/122

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 10000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	34916 R 104/110/119	37955 R 110/116/123	40748 R 116/120/127	43372 R 120/124/131	45038 W 123/127/133	45038 W 123/127/133	45038 W 123/127/133
-30	34612 R 103/110/118	37626 R 110/115/123	40395 R 115/120/127	43002 R 119/124/130	45037 W 123/127/133	45037 W 123/127/133	45037 W 123/127/133
-26	34330 R 103/109/118	37319 R 109/115/122	40066 R 114/119/126	42654 R 119/123/130	45022 W 123/127/133	45022 W 123/127/133	45022 W 123/127/133
-22	34042 R 102/109/117	37008 R 108/114/122	39733 R 114/119/126	42300 R 118/123/129	44701 R 122/126/133	44994 W 123/127/133	44994 W 123/127/133
-18	33773 R 101/108/117	36702 R 108/113/121	39405 R 113/118/125	41951 R 118/122/129	44338 R 122/126/132	44963 W 123/127/133	44963 W 123/127/133
-14	33484 R 101/108/116	36392 R 107/113/121	39075 R 112/118/125	41602 R 117/122/128	43977 R 121/125/132	44931 W 122/127/133	44931 W 122/127/133
-10	33151 R 100/107/116	36045 R 107/112/120	38715 R 112/117/124	41229 R 116/121/128	43591 R 120/125/131	44551 W 122/126/132	44551 W 122/126/132
-6	32411 R 100/106/115	35298 R 106/112/119	37977 R 112/116/123	40460 R 116/120/127	42241 W 119/123/129	42241 W 119/123/129	42241 W 119/123/129
-2	31776 R 99/106/114	34652 R 106/111/118	37319 R 111/116/122	39787 R 116/120/126	40080 W 116/120/126	40080 W 116/120/126	40080 W 116/120/126
2	31146 R 99/105/113	33961 R 105/110/117	36590 R 110/115/121	38546 W 114/118/124	38546 W 114/118/124	38546 W 114/118/124	38546 W 114/118/124
6	30467 R 98/104/112	33188 R 104/109/116	35753 R 110/114/120	37291 W 113/116/122	37291 W 113/116/122	37291 W 113/116/122	37291 W 113/116/122
10	29780 R 97/103/110	32400 R 103/108/115	34894 R 109/113/119	36023 W 111/115/120	36023 W 111/115/120	36023 W 111/115/120	36023 W 111/115/120

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 10500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	34116 R 103/109/117	37091 R 109/114/122	39834 R 115/119/126	42397 R 119/123/129	44116 W 122/126/132	44116 W 122/126/132	44116 W 122/126/132
-30	33821 R 103/108/117	36767 R 109/114/121	39495 R 114/118/125	42027 R 119/122/129	44104 W 122/126/132	44104 W 122/126/132	44104 W 122/126/132
-26	33540 R 102/108/117	36463 R 108/113/121	39170 R 113/118/125	41686 R 118/122/129	44058 R 122/126/132	44089 W 122/126/132	44089 W 122/126/132
-22	33273 R 101/107/116	36162 R 108/113/121	38845 R 113/117/125	41336 R 117/121/128	43688 R 121/125/131	44066 W 122/126/132	44066 W 122/126/132
-18	32997 R 101/107/116	35863 R 107/112/120	38517 R 112/117/124	40987 R 117/121/128	43328 R 121/124/131	44038 W 122/126/132	44038 W 122/126/132
-14	32702 R 100/106/115	35548 R 106/112/120	38186 R 111/116/124	40639 R 116/120/127	42969 R 120/124/130	43987 W 122/126/132	43987 W 122/126/132
-10	32331 R 99/106/115	35166 R 106/111/119	37801 R 111/116/123	40236 R 115/120/126	42547 R 119/123/130	43367 W 121/125/131	43367 W 121/125/131
-6	31617 R 99/105/114	34442 R 105/110/118	37068 R 111/115/122	39499 R 115/119/125	41023 W 118/122/128	41023 W 118/122/128	41023 W 118/122/128
-2	31047 R 99/104/113	33836 R 105/110/117	36450 R 110/115/121	38867 R 115/119/125	39012 W 115/119/125	39012 W 115/119/125	39012 W 115/119/125
2	30417 R 98/103/111	33135 R 104/109/116	35705 R 109/114/120	37596 W 113/117/123	37596 W 113/117/123	37596 W 113/117/123	37596 W 113/117/123
6	29766 R 97/102/110	32400 R 103/108/115	34908 R 109/113/119	36409 W 112/115/121	36409 W 112/115/121	36409 W 112/115/121	36409 W 112/115/121
10	29109 R 96/101/109	31662 R 102/107/114	34088 R 108/111/117	35217 W 110/113/119	35217 W 110/113/119	35217 W 110/113/119	35217 W 110/113/119

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 11000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	33342 R 102/108/116	36236 R 108/113/121	38934 R 114/118/125	41368 R 118/122/128	43204 W 122/124/131	43204 W 122/124/131	43204 W 122/124/131
-30	33057 R 102/107/116	35927 R 108/113/120	38598 R 113/117/124	41038 R 118/121/128	43196 W 121/124/131	43196 W 121/124/131	43196 W 121/124/131
-26	32777 R 101/107/115	35625 R 107/112/120	38274 R 112/117/124	40715 R 117/121/127	42969 R 121/124/130	43179 W 121/124/131	43179 W 121/124/131
-22	32497 R 100/106/115	35327 R 107/111/119	37959 R 112/116/123	40408 R 116/120/127	42634 R 120/124/130	43155 W 121/124/131	43155 W 121/124/131
-18	32232 R 100/106/115	35034 R 106/111/119	37636 R 111/116/123	40073 R 116/120/126	42305 R 120/123/129	43113 W 121/124/130	43113 W 121/124/130
-14	31934 R 99/105/114	34714 R 105/110/118	37301 R 110/115/122	39722 R 115/119/126	41967 R 119/123/129	42986 W 121/124/130	42986 W 121/124/130
-10	31542 R 99/105/113	34301 R 105/110/118	36880 R 110/114/122	39282 R 115/119/125	41532 R 118/122/128	41682 W 119/122/129	41682 W 119/122/129
-6	30862 R 98/104/112	33600 R 104/109/117	36174 R 110/114/121	38571 R 114/118/124	39717 W 116/120/126	39717 W 116/120/126	39717 W 116/120/126
-2	30328 R 98/103/111	33034 R 104/109/116	35597 R 109/113/120	37965 R 114/117/123	38014 W 114/117/123	38014 W 114/117/123	38014 W 114/117/123
2	29698 R 97/102/110	32325 R 103/108/115	34836 R 108/112/119	36715 W 112/116/121	36715 W 112/116/121	36715 W 112/116/121	36715 W 112/116/121
6	29083 R 96/101/109	31640 R 102/107/114	34076 R 108/111/117	35590 W 111/114/120	35590 W 111/114/120	35590 W 111/114/120	35590 W 111/114/120
10	28437 R 95/100/108	30938 R 101/106/112	33281 R 107/110/116	34476 W 109/112/118	34476 W 109/112/118	34476 W 109/112/118	34476 W 109/112/118

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 11500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	32570 R 101/107/115	35408 R 108/112/119	37977 R 113/116/123	40335 R 117/120/127	42296 W 121/123/129	42296 W 121/123/129	42296 W 121/123/129
-30	32294 R 101/106/115	35107 R 107/111/119	37676 R 112/116/123	40017 R 117/120/126	42229 R 121/123/129	42293 W 121/123/129	42293 W 121/123/129
-26	32021 R 100/105/114	34808 R 106/111/119	37377 R 112/115/122	39700 R 116/119/126	41896 R 120/123/129	42276 W 121/123/129	42276 W 121/123/129
-22	31760 R 99/105/114	34509 R 106/110/118	37089 R 111/115/122	39405 R 115/119/125	41567 R 119/122/128	42250 W 121/123/129	42250 W 121/123/129
-18	31496 R 99/104/113	34216 R 105/110/118	36774 R 110/114/121	39098 R 115/118/125	41244 R 119/122/128	42189 W 120/123/129	42189 W 120/123/129
-14	31167 R 98/104/113	33866 R 104/109/117	36409 R 110/114/121	38775 R 114/118/124	40898 R 118/121/127	41967 W 120/123/129	41967 W 120/123/129
-10	30676 R 98/103/112	33349 R 104/109/116	35878 R 109/113/120	38243 R 114/117/124	39939 W 117/120/126	39939 W 117/120/126	39939 W 117/120/126
-6	30112 R 97/103/111	32763 R 104/108/115	35285 R 109/113/119	37632 R 113/117/123	38385 W 115/118/124	38385 W 115/118/124	38385 W 115/118/124
-2	29599 R 97/102/110	32215 R 103/107/115	34720 R 108/112/118	37047 W 113/116/122	37047 W 113/116/122	37047 W 113/116/122	37047 W 113/116/122
2	29014 R 96/101/109	31573 R 102/106/113	34011 R 108/111/117	35843 W 111/114/120	35843 W 111/114/120	35843 W 111/114/120	35843 W 111/114/120
6	28413 R 95/100/108	30918 R 101/105/112	33287 R 107/110/116	34790 W 110/113/118	34790 W 110/113/118	34790 W 110/113/118	34790 W 110/113/118
10	27812 R 95/99/107	30263 R 101/104/111	32531 R 106/109/115	33742 W 108/111/117	33742 W 108/111/117	33742 W 108/111/117	33742 W 108/111/117

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 12000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	31811 R 101/105/114	34528 R 107/110/118	37023 R 112/115/122	39323 R 116/119/125	41493 R 120/122/128	41532 W 121/122/128	41532 W 121/122/128
-30	31563 R 100/105/113	34254 R 106/110/118	36732 R 111/114/121	39014 R 116/118/125	41170 R 120/122/128	41518 W 120/122/128	41518 W 120/122/128
-26	31304 R 99/104/113	33989 R 105/109/117	36438 R 111/114/121	38720 R 115/118/124	40842 R 119/121/127	41494 W 120/122/128	41494 W 120/122/128
-22	31044 R 99/104/113	33714 R 105/109/117	36147 R 110/113/121	38414 R 115/117/124	40520 R 118/121/127	41466 W 120/122/128	41466 W 120/122/128
-18	30777 R 98/103/112	33417 R 104/108/116	35860 R 109/113/120	38112 R 114/117/123	40203 R 118/120/126	41354 W 120/122/128	41354 W 120/122/128
-14	30421 R 97/103/111	33029 R 103/108/116	35521 R 109/112/120	37770 R 113/116/123	39848 R 117/120/126	40936 W 119/122/127	40936 W 119/122/127
-10	29815 R 97/102/110	32414 R 103/107/115	34897 R 108/112/119	37215 R 113/116/122	38758 W 116/119/124	38758 W 116/119/124	38758 W 116/119/124
-6	29373 R 97/101/110	31943 R 103/107/114	34409 R 108/111/118	36707 R 112/115/121	37324 W 114/116/122	37324 W 114/116/122	37324 W 114/116/122
-2	28881 R 96/101/109	31431 R 102/106/113	33855 R 107/111/117	36137 R 112/115/121	36141 W 112/115/121	36141 W 112/115/121	36141 W 112/115/121
2	28323 R 95/100/108	30841 R 101/105/112	33197 R 107/110/116	35038 W 110/113/119	35038 W 110/113/119	35038 W 110/113/119	35038 W 110/113/119
6	27768 R 95/99/107	30219 R 100/104/111	32510 R 106/109/115	34051 W 109/112/117	34051 W 109/112/117	34051 W 109/112/117	34051 W 109/112/117
10	27198 R 94/98/106	29595 R 100/103/110	31802 R 105/108/114	33015 W 107/110/116	33015 W 107/110/116	33015 W 107/110/116	33015 W 107/110/116

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 12500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	31100 R 100/104/113	33714 R 106/109/117	36153 R 111/114/121	38401 R 116/117/124	40511 R 120/121/127	40775 W 120/121/127	40775 W 120/121/127
-30	30866 R 99/103/112	33443 R 105/109/116	35863 R 110/113/120	38095 R 115/117/123	40189 R 119/120/126	40750 W 120/121/127	40750 W 120/121/127
-26	30624 R 98/103/112	33173 R 104/108/116	35576 R 110/113/120	37807 R 114/116/123	39881 R 118/120/126	40721 W 120/121/127	40721 W 120/121/127
-22	30385 R 98/102/111	32909 R 104/108/116	35294 R 109/112/119	37510 R 114/116/123	39568 R 118/119/126	40694 W 120/121/127	40694 W 120/121/127
-18	30100 R 97/102/111	32644 R 103/107/115	35002 R 108/112/119	37204 R 113/115/122	39248 R 117/119/125	40531 W 119/121/127	40531 W 119/121/127
-14	29718 R 97/101/110	32258 R 103/107/115	34673 R 108/111/118	36850 R 112/115/122	38882 R 116/118/125	39945 W 118/120/126	39945 W 118/120/126
-10	29121 R 96/101/109	31660 R 102/106/114	34075 R 107/111/117	36351 R 112/115/121	37705 W 115/117/123	37705 W 115/117/123	37705 W 115/117/123
-6	28683 R 96/100/108	31204 R 102/105/113	33589 R 107/110/117	35844 R 111/114/120	36343 W 112/115/121	36343 W 112/115/121	36343 W 112/115/121
-2	28204 R 95/99/107	30701 R 101/105/112	33044 R 106/109/116	35258 W 111/113/119	35258 W 111/113/119	35258 W 111/113/119	35258 W 111/113/119
2	27680 R 94/99/107	30145 R 100/104/111	32424 R 106/109/115	34265 W 109/112/118	34265 W 109/112/118	34265 W 109/112/118	34265 W 109/112/118
6	27143 R 94/98/106	29543 R 100/103/110	31759 R 105/108/114	33316 W 108/110/116	33316 W 108/110/116	33316 W 108/110/116	33316 W 108/110/116
10	26562 R 93/97/105	28923 R 99/102/109	31086 R 104/106/113	32291 W 106/109/115	32291 W 106/109/115	32291 W 106/109/115	32291 W 106/109/115

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	30384 R 99/103/111	32912 R 105/108/116	35296 R 110/112/119	37482 R 115/116/123	39559 R 119/119/126	40131 W 120/120/126	40131 W 120/120/126
-30	30142 R 98/102/111	32643 R 104/107/115	35009 R 109/112/119	37176 R 114/116/122	39239 R 118/119/125	40101 W 120/120/126	40101 W 120/120/126
-26	29904 R 97/102/111	32380 R 104/107/115	34727 R 109/111/118	36908 R 113/115/122	38925 R 117/118/125	40073 W 119/120/126	40073 W 119/120/126
-22	29683 R 97/101/110	32124 R 103/106/114	34453 R 108/111/118	36619 R 113/115/121	38619 R 117/118/124	39981 W 119/120/126	39981 W 119/120/126
-18	29436 R 96/101/110	31849 R 102/106/114	34157 R 108/110/118	36310 R 112/114/121	38306 R 116/117/124	39554 W 118/120/126	39554 W 118/120/126
-14	29025 R 96/100/109	31514 R 102/105/113	33805 R 107/110/117	35945 R 112/114/120	37930 R 115/117/123	38420 W 116/118/124	38420 W 116/118/124
-10	28440 R 95/100/108	30931 R 101/105/112	33280 R 107/109/116	35495 R 111/114/120	36668 W 113/116/121	36668 W 113/116/121	36668 W 113/116/121
-6	28004 R 95/99/107	30474 R 101/104/112	32778 R 106/109/115	34985 R 110/113/119	35438 W 111/114/119	35438 W 111/114/119	35438 W 111/114/119
-2	27527 R 94/98/106	29981 R 100/103/111	32243 R 105/108/115	34425 R 110/112/118	34437 W 110/112/118	34437 W 110/112/118	34437 W 110/112/118
2	27047 R 94/97/105	29446 R 99/103/110	31657 R 105/107/114	33526 W 108/111/117	33526 W 108/111/117	33526 W 108/111/117	33526 W 108/111/117
6	26518 R 93/97/104	28876 R 99/102/109	31043 R 104/106/113	32626 W 107/109/115	32626 W 107/109/115	32626 W 107/109/115	32626 W 107/109/115
10	- -	28260 R 98/101/108	30375 R 103/105/111	31551 W 105/108/113	31551 W 105/108/113	31551 W 105/108/113	31551 W 105/108/113

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	29719 R 98/101/110	32171 R 104/107/114	34502 R 109/111/118	36662 R 114/115/121	38670 R 118/118/124	39501 W 119/120/125	39501 W 119/120/125
-30	29483 R 97/101/110	31912 R 103/106/114	34222 R 109/110/118	36364 R 113/114/121	38364 R 117/118/124	39468 W 119/119/125	39468 W 119/119/125
-26	29247 R 97/100/109	31663 R 103/106/114	33946 R 108/110/117	36072 R 113/114/120	38057 R 116/117/123	39442 W 119/119/125	39442 W 119/119/125
-22	29013 R 96/100/109	31405 R 102/105/113	33664 R 107/109/117	35774 R 112/113/120	37746 R 116/117/123	39269 W 119/119/125	39269 W 119/119/125
-18	28739 R 95/100/108	31105 R 101/105/113	33340 R 107/109/116	35448 R 111/113/119	37393 R 115/116/122	38525 W 117/118/124	38525 W 117/118/124
-14	28283 R 95/99/108	30754 R 101/104/112	32973 R 106/109/116	35058 R 111/113/119	36780 W 114/116/121	36780 W 114/116/121	36780 W 114/116/121
-10	27803 R 94/98/107	30246 R 100/104/111	32525 R 106/108/115	34644 R 110/112/118	35624 W 112/114/120	35624 W 112/114/120	35624 W 112/114/120
-6	27337 R 94/98/106	29760 R 100/103/110	31999 R 105/108/114	34133 R 109/112/117	34559 W 110/112/118	34559 W 110/112/118	34559 W 110/112/118
-2	26888 R 93/97/105	29296 R 99/102/109	31496 R 104/107/113	33616 R 109/111/117	33643 W 109/111/117	33643 W 109/111/117	33643 W 109/111/117
2	- -	28790 R 98/101/109	30957 R 103/106/112	32803 W 108/110/115	32803 W 108/110/115	32803 W 108/110/115	32803 W 108/110/115
6	- -	28229 R 98/100/108	30355 R 103/105/111	31950 W 106/108/114	31950 W 106/108/114	31950 W 106/108/114	31950 W 106/108/114
10	- -	27574 R 97/99/106	29643 R 102/104/110	30797 W 104/106/112	30797 W 104/106/112	30797 W 104/106/112	30797 W 104/106/112

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13800 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	29325 R 97/101/110	31741 R 104/106/114	34023 R 109/110/117	36167 R 113/114/121	38145 R 117/117/123	39133 W 119/119/125	39133 W 119/119/125
-30	29090 R 97/100/109	31492 R 103/105/113	33746 R 108/110/117	35874 R 113/114/120	37842 R 117/117/123	39099 W 119/119/125	39099 W 119/119/125
-26	28858 R 96/100/109	31245 R 102/105/113	33484 R 107/109/116	35585 R 112/113/120	37533 R 116/116/123	39032 W 119/119/125	39032 W 119/119/125
-22	28617 R 96/99/108	30981 R 102/104/112	33196 R 107/109/116	35282 R 111/113/119	37245 R 115/116/122	38778 W 118/118/124	38778 W 118/118/124
-18	28325 R 95/99/108	30663 R 101/104/112	32855 R 106/108/116	34937 R 111/112/119	36877 R 115/116/122	37923 W 117/117/123	37923 W 117/117/123
-14	27853 R 94/98/107	30287 R 100/104/111	32476 R 106/108/115	34534 R 110/112/118	36075 W 113/115/120	36075 W 113/115/120	36075 W 113/115/120
-10	27413 R 94/98/106	29839 R 100/103/110	32081 R 105/108/114	34140 R 110/111/118	35066 W 112/113/119	35066 W 112/113/119	35066 W 112/113/119
-6	26950 R 93/97/105	29341 R 99/102/110	31548 R 104/107/113	33581 R 109/111/117	34070 W 110/112/117	34070 W 110/112/117	34070 W 110/112/117
-2	26517 R 93/96/104	28888 R 99/101/109	31072 R 104/106/113	33090 R 108/110/116	33185 W 108/110/116	33185 W 108/110/116	33185 W 108/110/116
2	- -	28401 R 98/101/108	30548 R 103/105/112	32391 W 107/109/115	32391 W 107/109/115	32391 W 107/109/115	32391 W 107/109/115
6	- -	27843 R 97/100/107	29946 R 102/104/111	31578 W 106/108/113	31578 W 106/108/113	31578 W 106/108/113	31578 W 106/108/113
10	- -	27153 R 96/99/106	29211 R 101/103/109	30346 W 104/105/111	30346 W 104/105/111	30346 W 104/105/111	30346 W 104/105/111

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 0 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	45531 R 115/124/134	49367 R 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
4	45184 R 115/124/133	48996 R 121/129/138	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
8	44868 R 114/123/133	48629 R 121/129/138	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
12	44532 R 114/123/132	48272 R 120/128/137	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
16	44212 R 113/122/132	47925 R 119/128/137	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
20	43903 R 112/122/132	47584 R 119/127/136	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
24	43591 R 112/121/131	47271 R 118/127/136	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
28	43303 R 111/121/131	46939 R 118/126/135	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
32	42991 R 110/120/130	46604 R 117/126/135	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
36	42483 R 110/120/130	46054 R 116/125/134	49359 R 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
40	41399 R 109/118/128	44868 R 115/124/133	48081 R 121/129/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
44	40299 R 108/117/127	43661 R 114/122/131	46793 R 120/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
48	39076 R 107/115/125	42325 R 113/121/129	45355 R 119/125/133	48153 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	45009 R 115/123/133	48814 R 121/129/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
4	44685 R 114/123/133	48439 R 121/129/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
8	44341 R 113/122/132	48071 R 120/128/137	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
12	44019 R 113/122/132	47721 R 119/128/136	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
16	43711 R 112/121/131	47410 R 119/127/136	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
20	43401 R 112/121/131	47073 R 118/127/136	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
24	43088 R 111/120/130	46738 R 117/126/135	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
28	42804 R 110/120/130	46407 R 117/126/135	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
32	42448 R 110/119/130	46017 R 116/125/134	49323 R 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
36	41682 R 109/118/129	45183 R 115/124/133	48427 R 121/129/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
40	40625 R 108/117/127	44023 R 114/123/132	47169 R 120/127/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
44	39527 R 107/116/125	42810 R 113/121/130	45885 R 119/126/134	48731 R 123/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
48	38341 R 106/114/124	41513 R 112/120/128	44488 R 118/124/132	47226 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 1000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	44513 R 114/123/132	48259 R 121/128/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
4	44162 R 113/122/132	47884 R 120/128/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
8	43823 R 113/122/131	47515 R 119/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
12	43509 R 112/121/131	47198 R 119/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
16	43212 R 111/121/131	46877 R 118/126/135	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
20	42899 R 111/120/130	46541 R 117/126/135	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
24	42613 R 110/120/130	46206 R 117/125/135	49533 R 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
28	42307 R 110/119/129	45878 R 116/125/134	49186 R 122/130/138	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
32	41908 R 109/119/129	45434 R 115/124/134	48702 R 121/129/138	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139	49604 S 122/130/139
36	40887 R 108/117/127	44318 R 114/123/132	47496 R 120/128/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
40	39860 R 107/116/126	43184 R 113/122/131	46294 R 119/126/135	49170 R 123/131/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
44	38761 R 106/115/124	41972 R 112/120/129	44981 R 118/125/133	47769 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
48	37608 R 105/113/123	40708 R 111/119/127	43627 R 117/123/131	46330 R 121/127/135	48847 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 1500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	43987 R 113/122/132	47694 R 120/128/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
4	43642 R 113/122/131	47325 R 119/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
8	43313 R 112/121/131	46997 R 118/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
12	43003 R 111/121/130	46662 R 118/126/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
16	42704 R 111/120/130	46337 R 117/126/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
20	42417 R 110/120/130	46002 R 117/125/134	49323 R 122/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
24	42108 R 109/119/129	45669 R 116/125/134	48970 R 122/130/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
28	41758 R 109/119/129	45288 R 115/124/133	48557 R 121/129/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
32	41132 R 108/118/128	44593 R 114/123/132	47796 R 120/128/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
36	40117 R 107/116/126	43474 R 113/122/131	46614 R 119/127/135	49518 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
40	39112 R 106/115/125	42363 R 112/121/129	45415 R 118/125/134	48235 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
44	38031 R 105/114/123	41175 R 111/119/128	44119 R 117/124/132	46851 R 121/128/135	49428 R 125/132/139	49604 S 126/132/139	49604 S 126/132/139
47	37208 R 104/113/122	40259 R 111/118/127	43144 R 116/123/130	45818 R 120/127/134	48306 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 2000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	43456 R 112/121/131	47156 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
4	43123 R 112/121/130	46797 R 118/126/135	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
8	42806 R 111/120/130	46458 R 118/126/135	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
12	42499 R 110/120/130	46127 R 117/125/134	49465 R 123/130/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
16	42222 R 110/119/129	45799 R 116/125/134	49114 R 122/130/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
20	41913 R 109/119/129	45465 R 116/124/134	48757 R 121/129/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
24	41606 R 109/118/128	45135 R 115/124/133	48404 R 121/129/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
28	41235 R 108/118/128	44702 R 114/123/133	47932 R 120/128/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
32	40390 R 107/117/127	43756 R 113/122/131	46923 R 119/127/135	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
36	39353 R 106/115/125	42658 R 112/121/130	45718 R 118/126/134	48566 R 122/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
40	38369 R 105/114/124	41571 R 111/120/128	44536 R 117/124/132	47299 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
44	37312 R 104/113/122	40407 R 110/118/127	43278 R 116/123/131	45968 R 120/127/134	48472 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139
46	36777 R 104/112/121	39811 R 110/117/126	42642 R 115/122/130	45287 R 120/126/133	47744 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 2500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	42978 R 112/121/130	46653 R 118/126/135	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
4	42648 R 111/120/130	46298 R 118/126/135	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
8	42340 R 110/120/129	45967 R 117/125/134	49306 R 123/130/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
12	42059 R 110/119/129	45639 R 116/125/134	48956 R 122/130/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
16	41758 R 109/119/129	45308 R 116/124/133	48599 R 121/129/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
20	41449 R 109/118/128	44975 R 115/124/133	48242 R 121/129/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
24	41098 R 108/118/128	44593 R 114/123/132	47829 R 120/128/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
28	40570 R 107/117/127	43968 R 113/122/132	47158 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
32	39637 R 106/116/126	42953 R 112/121/130	46037 R 118/126/134	48910 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
36	38610 R 105/114/124	41846 R 111/120/129	44844 R 117/124/133	47630 R 121/129/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
40	37636 R 104/113/123	40772 R 110/118/127	43677 R 116/123/131	46401 R 120/127/135	48950 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139
44	36601 R 103/112/121	39638 R 109/117/126	42449 R 115/122/130	45088 R 119/126/133	47539 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
45	36345 R 103/112/121	39349 R 109/117/125	42141 R 114/121/129	44757 R 119/125/133	47183 R 123/129/136	49497 R 126/132/139	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 3000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	42501 R 111/120/130	46151 R 118/126/134	49513 R 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
4	42173 R 110/120/129	45799 R 117/125/134	49139 R 123/130/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
8	41895 R 110/119/129	45476 R 116/125/134	48792 R 122/130/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
12	41601 R 109/119/128	45152 R 116/124/133	48443 R 121/129/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
16	41292 R 108/118/128	44816 R 115/124/133	48083 R 121/129/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
20	40983 R 108/118/128	44485 R 114/123/132	47728 R 120/128/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
24	40616 R 107/117/127	44054 R 114/123/132	47257 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
28	39911 R 106/116/126	43263 R 112/121/131	46373 R 118/126/135	49270 R 123/130/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
32	38889 R 105/115/125	42136 R 111/120/129	45157 R 117/125/133	47968 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
36	37873 R 104/113/123	41039 R 110/119/128	43977 R 116/123/132	46726 R 120/127/135	49293 R 125/131/139	49604 S 125/132/139	49604 S 125/132/139
40	36908 R 103/112/122	39983 R 110/117/126	42826 R 115/122/130	45492 R 119/126/134	47989 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139
44	35899 R 102/111/120	38876 R 109/116/125	41625 R 114/121/128	44214 R 118/125/132	46632 R 122/128/135	48904 R 126/131/138	49604 S 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 3500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	41997 R 110/119/129	45619 R 117/125/134	48958 R 122/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
4	41677 R 110/119/128	45278 R 116/125/133	48592 R 122/129/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
8	41404 R 109/118/128	44953 R 116/124/133	48242 R 121/129/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
12	41108 R 108/118/128	44628 R 115/124/132	47891 R 121/128/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
16	40797 R 108/117/127	44293 R 114/123/132	47532 R 120/128/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
20	40499 R 107/117/127	43948 R 114/123/132	47162 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
24	39929 R 106/116/126	43318 R 113/122/131	46462 R 118/126/135	49389 R 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
28	39148 R 105/115/125	42432 R 111/120/130	45478 R 117/125/134	48315 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
32	38147 R 104/114/123	41325 R 110/119/128	44286 R 116/124/132	47034 R 120/128/136	49604 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139
36	37151 R 103/112/122	40253 R 110/118/127	43129 R 115/122/130	45826 R 119/126/134	48342 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139
40	36193 R 102/111/121	39210 R 109/116/125	41989 R 114/121/129	44608 R 118/125/132	47048 R 122/129/136	49362 R 126/132/139	49604 S 126/132/139
43	35457 R 102/110/119	38395 R 108/115/124	41101 R 113/120/128	43668 R 117/124/131	46059 R 121/127/134	48304 R 125/131/137	49604 S 127/133/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 4000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	41494 R 110/119/128	45089 R 116/124/133	48398 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
4	41207 R 109/118/128	44757 R 116/124/133	48044 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
8	40913 R 108/118/127	44432 R 115/123/132	47692 R 120/128/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
12	40616 R 108/117/127	44105 R 114/123/132	47340 R 120/128/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
16	40305 R 107/117/127	43770 R 114/122/131	47006 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
20	39998 R 106/116/126	43412 R 113/122/131	46626 R 119/127/135	49596 R 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
24	39266 R 105/115/125	42569 R 112/120/130	45648 R 117/125/134	48516 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
28	38410 R 104/114/124	41606 R 110/119/128	44590 R 116/124/132	47362 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
32	37411 R 103/113/122	40523 R 109/118/127	43421 R 115/122/131	46137 R 119/127/134	48671 R 123/130/138	49604 S 125/132/139	49604 S 125/132/139
36	36432 R 102/111/121	39473 R 109/117/125	42287 R 114/121/129	44932 R 118/125/133	47393 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139
40	35485 R 101/110/120	38441 R 108/115/124	41165 R 113/120/128	43731 R 117/124/131	46140 R 121/127/134	48388 R 125/131/137	49604 S 127/132/139
42	35005 R 101/109/119	37904 R 107/115/123	40588 R 112/119/127	43116 R 117/123/130	45480 R 121/127/134	47710 R 124/130/136	49287 W 127/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 4500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	40973 R 109/118/128	44512 R 115/124/132	47785 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
4	40683 R 108/118/127	44192 R 115/123/132	47442 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
8	40391 R 107/117/127	43868 R 114/123/131	47092 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
12	40090 R 107/117/126	43543 R 113/122/131	46770 R 119/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
16	39787 R 106/116/126	43192 R 113/122/131	46398 R 118/126/135	49365 R 123/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
20	39298 R 105/115/125	42665 R 112/121/130	45790 R 117/126/134	48702 R 122/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
24	38558 R 104/114/124	41785 R 111/119/129	44794 R 116/124/133	47593 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
28	37661 R 103/113/123	40788 R 109/118/127	43709 R 115/123/131	46444 R 119/127/135	49000 R 123/131/138	49604 S 124/131/139	49604 S 124/131/139
32	36689 R 102/112/121	39740 R 109/117/126	42577 R 114/121/130	45241 R 118/126/133	47720 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139
36	35723 R 101/110/120	38707 R 108/116/124	41460 R 113/120/128	44055 R 117/124/132	46487 R 121/128/135	48763 R 125/131/138	49604 S 126/132/139
40	34794 R 100/109/118	37692 R 107/114/123	40359 R 112/119/127	42872 R 116/123/130	45234 R 120/126/133	47433 R 124/130/136	49209 W 126/132/138
41	34557 R 100/109/118	37432 R 106/114/122	40092 R 112/118/126	42572 R 116/122/130	44910 R 120/126/133	47087 R 123/129/136	48758 W 126/132/138

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 5000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	40440 R 108/117/127	43938 R 115/123/132	47175 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
4	40164 R 107/117/126	43630 R 114/122/131	46867 R 120/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
8	39869 R 107/116/126	43307 R 113/122/131	46525 R 119/127/135	49504 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
12	39587 R 106/116/126	42983 R 113/121/130	46180 R 118/126/135	49142 R 123/131/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
16	39251 R 105/115/125	42641 R 112/121/130	45794 R 118/126/134	48732 R 122/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
20	38623 R 104/114/124	41901 R 111/120/129	44960 R 116/124/133	47807 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
24	37853 R 103/113/123	41007 R 109/118/128	43947 R 115/123/132	46701 R 119/127/135	49274 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139
28	36917 R 102/112/122	39979 R 108/117/126	42833 R 114/122/130	45514 R 118/126/134	48011 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139
32	35973 R 101/111/120	38964 R 108/116/125	41738 R 113/120/129	44351 R 117/124/132	46799 R 121/128/135	49095 R 125/131/138	49604 S 126/132/139
36	35020 R 100/109/119	37946 R 107/115/123	40641 R 112/119/127	43185 R 116/123/131	45570 R 120/127/134	47797 R 124/130/137	49604 S 127/133/139
40	34109 R 100/108/117	36948 R 106/113/122	39559 R 111/118/126	42019 R 115/122/129	44335 R 119/125/132	46505 R 123/128/135	48145 W 125/131/137

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 5500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	39839 R 107/116/126	43279 R 114/122/131	46493 R 119/127/135	49473 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
4	39563 R 106/116/126	42969 R 113/122/130	46161 R 119/126/134	49121 R 123/131/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
8	39266 R 106/115/125	42649 R 112/121/130	45822 R 118/126/134	48758 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
12	38995 R 105/115/125	42355 R 112/121/129	45482 R 117/125/134	48395 R 122/130/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
16	38563 R 104/114/124	41884 R 111/120/129	44969 R 116/125/133	47841 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
20	37932 R 103/113/123	41137 R 110/119/128	44127 R 115/123/132	46904 R 120/128/135	49542 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139
24	37129 R 102/112/122	40221 R 108/117/126	43098 R 114/122/130	45798 R 118/126/134	48317 R 122/130/137	49604 S 125/132/139	49604 S 125/132/139
28	36197 R 101/111/121	39196 R 107/116/125	41987 R 113/121/129	44615 R 117/125/132	47056 R 121/128/136	49386 R 125/132/139	49604 S 125/132/139
32	35255 R 100/109/119	38184 R 107/115/124	40896 R 112/119/127	43456 R 116/123/131	45856 R 120/127/134	48100 R 124/130/137	49604 S 126/132/139
36	34307 R 100/108/118	37171 R 106/113/122	39825 R 111/118/126	42294 R 115/122/129	44629 R 119/126/132	46803 R 123/129/135	48849 W 126/132/138
39	33636 R 99/107/117	36435 R 105/113/121	39030 R 110/117/125	41435 R 115/121/128	43717 R 118/124/131	45859 R 122/128/134	47485 W 124/130/136

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 6000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	39244 R 106/116/125	42626 R 113/121/130	45795 R 118/126/134	48733 R 123/130/138	49604 S 124/132/139	49604 S 124/132/139	49604 S 124/132/139
4	38963 R 105/115/125	42314 R 112/121/129	45461 R 118/125/134	48374 R 122/130/137	49604 S 124/132/139	49604 S 124/132/139	49604 S 124/132/139
8	38691 R 105/115/124	42022 R 112/120/129	45125 R 117/125/133	48013 R 122/129/137	49604 S 124/132/139	49604 S 124/132/139	49604 S 124/132/139
12	38407 R 104/114/124	41712 R 111/120/129	44790 R 116/124/133	47654 R 121/129/136	49604 S 124/132/139	49604 S 124/132/139	49604 S 124/132/139
16	37902 R 103/113/123	41132 R 110/119/128	44150 R 115/123/132	46955 R 120/128/136	49604 R 124/132/139	49604 S 124/132/139	49604 S 124/132/139
20	37259 R 102/112/122	40381 R 109/118/127	43300 R 114/122/131	46039 R 119/126/134	48596 R 123/130/138	49604 S 124/132/139	49604 S 124/132/139
24	36410 R 101/111/121	39439 R 107/116/125	42253 R 113/121/129	44900 R 117/125/133	47363 R 121/129/136	49604 S 125/132/139	49604 S 125/132/139
28	35482 R 100/110/120	38419 R 106/115/124	41147 R 112/119/128	43722 R 116/123/131	46134 R 120/127/134	48396 R 124/130/137	49604 S 126/132/139
32	34542 R 99/108/118	37411 R 106/114/122	40063 R 111/118/126	42568 R 115/122/130	44919 R 119/126/133	47110 R 123/129/136	49206 R 126/132/138
36	33598 R 99/107/117	36401 R 105/112/121	39000 R 110/117/125	41409 R 114/121/128	43692 R 118/124/131	45842 R 122/128/134	47738 W 125/130/137
38	33160 R 98/107/116	35919 R 104/112/120	38478 R 109/116/124	40847 R 114/120/127	43097 R 118/124/130	45209 R 121/127/133	46850 W 124/129/135

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 6500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	38650 R 105/115/124	41968 R 112/120/129	45091 R 117/125/133	47978 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
4	38359 R 105/114/124	41680 R 111/120/129	44757 R 117/125/133	47619 R 121/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
8	38095 R 104/114/123	41370 R 111/119/128	44423 R 116/124/132	47262 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
12	37752 R 103/113/123	41000 R 110/119/128	44024 R 115/123/132	46833 R 120/128/135	49500 R 124/132/139	49604 S 125/132/139	49604 S 125/132/139
16	37220 R 102/112/122	40379 R 109/118/127	43327 R 114/122/131	46093 R 119/127/134	48676 R 123/130/138	49604 S 125/132/139	49604 S 125/132/139
20	36583 R 101/111/121	39640 R 108/116/126	42488 R 113/121/130	45166 R 118/125/133	47661 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139
24	35691 R 100/110/120	38655 R 106/115/124	41405 R 112/120/128	43999 R 116/124/132	46404 R 120/127/135	48707 R 124/131/138	49604 S 125/132/139
28	34768 R 99/109/118	37644 R 106/114/123	40313 R 111/118/127	42834 R 115/122/130	45199 R 119/126/133	47408 R 123/129/136	49515 R 126/132/139
32	33835 R 99/107/117	36644 R 105/113/121	39260 R 110/117/125	41688 R 114/121/129	43992 R 118/125/132	46156 R 122/128/134	48189 R 125/131/137
36	32907 R 98/106/116	35652 R 104/111/120	38195 R 109/116/124	40548 R 113/120/127	42776 R 117/123/130	44886 R 121/126/133	46630 W 123/129/135
37	32691 R 98/106/115	35415 R 103/111/119	37939 R 109/115/123	40271 R 113/119/127	42489 R 117/123/130	44574 R 120/126/132	46207 W 123/128/135

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 7000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	38059 R 104/114/123	41343 R 111/119/128	44394 R 116/124/132	47230 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
4	37784 R 104/113/123	41031 R 110/119/128	44058 R 116/124/132	46870 R 121/128/135	49537 R 125/132/139	49604 S 125/132/139	49604 S 125/132/139
8	37503 R 103/113/123	40725 R 110/118/127	43728 R 115/123/131	46542 R 120/127/135	49172 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139
12	37122 R 102/112/122	40297 R 109/118/127	43263 R 114/122/131	46046 R 119/127/134	48648 R 123/130/138	49604 S 125/132/139	49604 S 125/132/139
16	36553 R 101/111/121	39633 R 108/117/126	42510 R 113/121/130	45215 R 118/125/133	47736 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139
20	35928 R 100/110/120	38903 R 106/115/125	41682 R 112/120/129	44301 R 116/124/132	46756 R 120/128/135	49058 R 124/131/138	49604 S 125/132/139
24	34975 R 99/109/119	37878 R 105/114/123	40566 R 111/119/127	43104 R 115/123/130	45483 R 119/126/134	47702 R 123/129/136	49604 S 126/132/139
28	34044 R 98/108/117	36875 R 105/113/122	39507 R 110/117/125	41952 R 114/121/129	44270 R 118/125/132	46450 R 122/128/135	48498 R 125/131/137
32	33134 R 98/106/116	35883 R 104/111/120	38445 R 109/116/124	40817 R 113/120/127	43071 R 117/123/130	45191 R 121/127/133	47174 R 124/130/136
36	32224 R 97/105/115	34908 R 103/110/119	37396 R 108/115/122	39711 R 112/119/126	41878 R 116/122/129	43935 R 120/125/132	45582 W 122/128/134

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 7500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	37455 R 103/113/122	40689 R 110/118/127	43689 R 115/123/131	46500 R 120/127/135	49127 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139
4	37188 R 103/113/122	40382 R 109/118/127	43358 R 115/123/131	46149 R 120/127/134	48755 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139
8	36906 R 102/112/122	40079 R 109/117/126	43030 R 114/122/130	45800 R 119/126/134	48386 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139
12	36460 R 101/111/121	39567 R 108/117/126	42464 R 113/121/130	45188 R 118/125/133	47729 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139
16	35899 R 100/110/120	38911 R 107/116/125	41720 R 112/120/129	44367 R 117/124/132	46827 R 121/128/135	49180 R 124/131/138	49604 S 125/132/139
20	35213 R 99/109/119	38125 R 105/114/123	40842 R 111/119/127	43407 R 115/123/131	45811 R 119/127/134	48061 R 123/130/137	49604 S 125/132/139
24	34269 R 98/108/118	37110 R 104/113/122	39760 R 110/117/126	42223 R 114/121/129	44556 R 118/125/132	46730 R 122/128/135	48817 R 125/131/138
28	33338 R 98/107/116	36110 R 104/112/120	38687 R 109/116/124	41074 R 113/120/128	43344 R 117/124/131	45477 R 121/127/134	47476 R 124/130/136
32	32440 R 97/105/115	35132 R 103/110/119	37639 R 108/115/123	39955 R 112/119/126	42156 R 116/122/129	44232 R 120/125/132	46189 R 123/128/135
35	31777 R 96/104/114	34410 R 102/109/118	36863 R 107/114/122	39145 R 111/118/125	41277 R 115/121/128	43305 R 119/124/131	44998 W 121/127/133

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 8000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	36876 R 102/112/122	40043 R 109/118/126	42991 R 115/122/130	45758 R 119/126/134	48341 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139
4	36597 R 102/112/121	39740 R 108/117/126	42664 R 114/122/130	45411 R 119/126/134	47973 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139
8	36311 R 101/111/121	39439 R 108/117/125	42338 R 113/121/129	45064 R 118/125/133	47604 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139
12	35798 R 100/110/120	38843 R 107/116/124	41671 R 112/120/128	44337 R 117/124/132	46816 R 121/128/135	49185 R 125/131/138	49604 B 125/132/139
16	35243 R 99/109/119	38194 R 106/114/124	40936 R 111/119/127	43525 R 116/123/131	45954 R 120/127/134	48230 R 123/130/137	49479 B 125/132/139
20	34487 R 98/108/118	37353 R 104/113/122	40030 R 110/118/126	42519 R 114/122/130	44873 R 118/125/133	47071 R 122/129/136	49173 R 125/132/138
24	33577 R 97/107/117	36348 R 103/112/121	38944 R 109/116/125	41349 R 113/120/128	43634 R 117/124/131	45784 R 121/127/134	47800 R 124/130/137
28	32648 R 97/105/115	35351 R 103/111/119	37872 R 108/115/123	40204 R 112/119/126	42423 R 116/122/130	44511 R 120/126/132	46483 R 123/129/135
32	31764 R 96/104/114	34386 R 102/109/118	36837 R 107/114/122	39100 R 111/118/125	41245 R 115/121/128	43280 R 118/124/131	45194 R 122/127/133
34	31342 R 95/104/113	33919 R 101/109/117	36335 R 106/113/121	38586 R 111/117/124	40678 R 114/120/127	42677 R 118/123/130	44434 W 121/126/132

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 8500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	36159 R 102/111/121	39269 R 108/116/125	42159 R 114/121/129	44880 R 118/125/133	47414 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139
4	35880 R 101/110/120	38971 R 108/116/125	41837 R 113/121/129	44538 R 118/125/132	47051 R 122/129/136	49445 R 126/132/139	49604 B 126/132/139
8	35546 R 100/110/120	38589 R 107/115/124	41418 R 112/120/128	44088 R 117/124/132	46568 R 121/128/135	48941 R 125/131/138	49314 B 125/132/139
12	35033 R 99/109/119	37996 R 106/114/123	40753 R 111/119/127	43358 R 116/123/131	45801 R 120/127/134	48092 R 124/130/137	49105 B 125/131/138
16	34467 R 98/108/118	37341 R 105/113/122	40020 R 110/118/126	42549 R 115/122/130	44925 R 119/125/133	47144 R 122/129/136	48932 B 125/131/138
20	33679 R 98/107/117	36467 R 104/112/121	39083 R 109/116/125	41500 R 113/120/128	43814 R 117/124/131	45982 R 121/127/134	48026 R 124/130/137
24	32648 R 97/106/116	35448 R 103/110/119	37992 R 108/115/123	40353 R 112/119/127	42564 R 116/122/130	44666 R 120/126/133	46660 R 123/129/135
28	31739 R 96/104/114	34488 R 102/109/118	36939 R 107/114/122	39232 R 111/118/125	41369 R 115/121/128	43417 R 119/124/131	45339 R 122/127/133
32	31007 R 95/103/112	33554 R 101/108/117	35933 R 106/112/120	38162 R 110/116/124	40256 R 114/120/127	42216 R 117/123/129	44064 R 121/126/132
33	30816 R 95/103/112	33327 R 101/108/116	35689 R 106/112/120	37902 R 110/116/123	39977 R 114/119/126	41926 R 117/122/129	43749 R 120/125/131

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 9000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	35449 R 101/110/119	38506 R 107/115/124	41340 R 113/120/128	44015 R 118/124/132	46500 R 122/128/135	48877 R 125/131/138	49370 B 126/132/139
4	35190 R 100/109/119	38213 R 107/115/124	41023 R 112/119/128	43677 R 117/124/131	46166 R 121/127/134	48503 R 125/131/137	49036 B 126/131/138
8	34779 R 99/109/118	37750 R 106/114/123	40512 R 111/119/127	43122 R 116/123/130	45573 R 120/126/134	47869 R 124/130/137	48768 B 125/131/138
12	34235 R 99/108/118	37162 R 105/113/122	39851 R 110/118/126	42390 R 115/122/129	44778 R 119/125/133	47007 R 122/129/136	48569 B 125/131/138
16	33517 R 98/107/117	36492 R 104/112/121	39128 R 109/116/125	41582 R 114/120/128	43904 R 118/124/132	46091 R 121/127/134	48150 R 124/130/137
20	32635 R 97/106/116	35608 R 103/111/120	38151 R 108/115/123	40513 R 112/119/127	42765 R 116/123/130	44894 R 120/126/133	46872 R 123/129/135
24	31711 R 96/104/114	34591 R 102/109/118	37052 R 107/114/122	39364 R 111/118/125	41513 R 115/121/128	43533 R 119/124/131	45437 R 122/127/134
28	30962 R 95/103/113	33630 R 101/108/117	36016 R 106/112/120	38261 R 110/116/124	40339 R 114/120/127	42274 R 118/123/129	44119 R 121/126/132
32	30237 R 94/102/111	32721 R 100/107/115	35041 R 105/111/119	37214 R 109/115/122	39218 R 113/118/125	41085 R 117/121/128	42872 R 120/124/130

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 9500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	34760 R 100/109/118	37757 R 107/114/123	40538 R 112/119/127	43164 R 117/123/131	45630 R 121/127/134	47941 R 124/130/137	48790 B 126/131/138
4	34463 R 99/108/118	37433 R 106/114/122	40186 R 111/118/126	42786 R 116/122/130	45229 R 120/126/133	47516 R 124/129/136	48471 B 125/131/137
8	33888 R 99/108/118	36926 R 105/113/122	39622 R 110/117/126	42167 R 115/121/129	44562 R 119/125/132	46799 R 123/128/135	48226 B 125/130/137
12	33258 R 98/107/117	36335 R 104/112/121	38982 R 109/116/125	41438 R 114/120/128	43772 R 118/124/131	45968 R 121/127/134	48033 R 125/130/137
16	32514 R 97/106/116	35657 R 103/111/120	38215 R 108/115/124	40595 R 113/119/127	42870 R 117/123/130	44991 R 120/126/133	46956 R 123/129/136
20	31701 R 96/105/115	34735 R 102/109/118	37219 R 107/114/122	39550 R 112/118/126	41689 R 116/121/129	43725 R 119/124/131	45645 R 122/127/134
24	30918 R 95/103/113	33715 R 101/108/117	36104 R 106/112/120	38327 R 110/116/124	40386 R 114/120/127	42350 R 118/123/129	43961 W 121/125/132
28	30186 R 94/102/111	32783 R 100/107/115	35090 R 105/111/119	37244 R 109/115/122	39256 R 113/118/125	41133 R 117/121/128	41985 W 118/122/129
31	29662 R 94/101/110	32120 R 99/106/114	34373 R 104/110/118	36478 R 109/114/121	38445 R 113/117/124	40292 R 116/120/127	40705 W 117/121/127

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 10000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	33938 R 99/108/117	36970 R 106/113/122	39699 R 111/118/126	42278 R 116/122/129	44703 R 120/126/133	46969 R 124/129/136	48178 B 125/131/137
4	33496 R 99/107/117	36609 R 105/112/121	39306 R 110/117/125	41853 R 115/121/129	44251 R 119/125/132	46489 R 123/128/135	47867 B 125/130/137
8	32886 R 98/106/117	36049 R 104/111/120	38700 R 109/116/124	41162 R 114/120/128	43501 R 118/124/131	45707 R 122/127/134	47650 B 125/130/136
12	32199 R 97/106/116	35420 R 103/110/119	37991 R 108/115/123	40383 R 113/119/127	42661 R 117/123/130	44814 R 120/126/133	46853 R 124/129/135
16	31476 R 96/104/114	34523 R 102/109/118	37036 R 107/114/122	39384 R 112/118/125	41582 R 116/121/128	43677 R 119/124/131	45624 R 123/127/134
20	30746 R 95/103/113	33590 R 101/108/117	36019 R 106/112/120	38295 R 111/116/124	40440 R 115/120/127	42423 R 118/123/130	44296 R 121/126/132
24	29920 R 94/101/111	32528 R 100/106/115	34872 R 105/111/119	37080 R 110/115/122	39137 R 114/118/125	41024 R 117/121/128	42831 R 120/124/130
28	29211 R 93/100/109	31633 R 99/105/114	33905 R 104/109/117	36050 R 109/113/120	38027 R 113/117/123	39869 R 116/120/126	40962 W 118/122/128
30	28876 R 93/99/109	31226 R 99/104/113	33452 R 104/109/116	35567 R 108/113/120	37508 R 112/116/123	39322 R 115/119/125	40169 W 117/120/126

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 10500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	32968 R 99/107/117	36138 R 105/112/121	38827 R 110/116/124	41329 R 115/120/128	43704 R 119/124/131	45936 R 123/128/134	47594 B 125/130/136
4	32506 R 98/106/116	35760 R 104/111/120	38414 R 109/116/124	40880 R 114/120/127	43224 R 118/123/131	45424 R 122/127/134	47299 B 125/130/136
8	31925 R 97/105/116	35214 R 103/110/119	37797 R 108/115/123	40206 R 113/119/126	42489 R 117/122/130	44655 R 121/126/133	46694 R 124/129/135
12	31374 R 96/104/115	34575 R 102/109/118	37086 R 107/114/122	39447 R 112/118/125	41654 R 116/121/128	43716 R 120/124/131	45661 R 123/127/134
16	30724 R 95/103/113	33702 R 101/108/117	36145 R 106/112/121	38447 R 111/116/124	40556 R 115/120/127	42555 R 118/123/130	44441 R 122/126/132
20	29997 R 94/102/112	32754 R 100/107/115	35119 R 105/111/119	37335 R 110/115/122	39376 R 114/118/125	41283 R 117/121/128	43107 R 121/124/130
24	29202 R 93/100/110	31742 R 99/105/114	34022 R 104/109/117	36132 R 109/113/121	38102 R 113/117/123	39952 R 116/120/126	41691 R 119/123/129
28	28519 R 93/99/108	30889 R 98/104/112	33075 R 103/108/116	35118 R 108/112/119	37028 R 112/115/122	38822 R 115/118/124	40008 W 117/120/126
29	28356 R 92/99/108	30690 R 98/103/112	32853 R 103/108/116	34881 R 107/112/119	36777 R 111/115/121	38558 R 115/118/124	39629 W 117/120/126

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 11000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	32022 R 98/106/116	35317 R 104/110/119	37952 R 109/115/123	40389 R 114/119/127	42719 R 118/123/130	44904 R 122/126/133	46969 R 125/129/136
4	31640 R 97/105/115	34920 R 103/110/119	37510 R 108/114/123	39921 R 113/118/126	42207 R 117/122/129	44375 R 121/125/132	46418 R 124/128/135
8	31151 R 96/104/114	34404 R 102/109/118	36920 R 107/113/122	39284 R 112/117/125	41497 R 116/121/128	43570 R 120/124/131	45518 R 123/127/134
12	30612 R 95/103/113	33739 R 101/108/117	36198 R 106/112/121	38476 R 111/116/124	40580 R 115/120/127	42587 R 119/123/130	44484 R 122/126/132
16	29981 R 95/102/112	32886 R 100/107/116	35257 R 105/111/119	37457 R 110/115/122	39514 R 114/118/125	41438 R 118/121/128	43278 R 121/124/131
20	29249 R 94/100/110	31931 R 99/105/114	34201 R 104/110/118	36326 R 109/113/121	38312 R 113/117/124	40163 R 116/120/126	41936 R 120/123/129
24	28493 R 93/99/109	30949 R 98/104/112	33116 R 103/108/116	35166 R 108/112/119	37083 R 112/115/122	38885 R 115/118/125	40571 R 118/121/127
28	27813 R 92/98/107	30125 R 97/102/111	32198 R 102/107/114	34185 R 107/110/118	36045 R 111/114/120	37793 R 114/117/123	39084 W 117/119/125

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 11500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	31273 R 97/105/114	34517 R 103/109/118	37099 R 108/114/122	39503 R 113/118/125	41762 R 117/122/129	43908 R 121/125/132	45909 R 124/128/134
4	30890 R 96/104/114	34125 R 102/109/117	36649 R 108/113/121	39023 R 112/117/125	41251 R 116/121/128	43328 R 120/124/131	45276 R 123/127/133
8	30413 R 95/103/113	33603 R 101/108/117	36067 R 106/112/120	38349 R 111/116/124	40456 R 115/120/127	42466 R 119/123/130	44365 R 122/126/132
12	29867 R 95/102/112	32909 R 100/106/116	35273 R 106/111/119	37483 R 110/115/123	39550 R 114/118/126	41483 R 118/121/128	43333 R 121/124/131
16	29234 R 94/101/111	32028 R 99/105/114	34319 R 105/110/118	36461 R 109/113/121	38465 R 113/117/124	40333 R 117/120/127	42123 R 120/123/129
20	28479 R 93/99/109	31080 R 98/104/113	33255 R 104/108/116	35321 R 108/112/119	37253 R 112/115/122	39070 R 115/118/125	40758 R 119/121/127
24	27730 R 92/98/107	30156 R 97/102/111	32237 R 102/107/115	34231 R 107/110/118	36098 R 111/114/120	37853 R 114/117/123	39498 R 117/119/125
27	27240 R 91/97/106	29549 R 97/101/110	31579 R 102/106/113	33512 R 106/109/117	35336 R 110/113/119	37039 R 113/116/122	38527 W 116/118/124

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 12000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	30551 R 96/103/113	33745 R 102/108/117	36254 R 107/113/121	38619 R 112/117/124	40807 R 116/120/127	42852 R 120/123/130	44782 R 123/126/133
4	30152 R 95/103/113	33327 R 101/107/116	35798 R 107/112/120	38112 R 111/116/123	40218 R 115/119/126	42226 R 119/123/129	44125 R 122/125/132
8	29692 R 95/102/112	32793 R 100/106/115	35159 R 106/111/119	37372 R 110/115/122	39441 R 114/118/125	41379 R 118/121/128	43232 R 121/124/131
12	29139 R 94/101/111	32054 R 99/105/114	34355 R 105/109/118	36508 R 109/113/121	38522 R 113/117/124	40401 R 117/120/127	42202 R 120/123/129
16	28436 R 93/99/109	31197 R 99/104/113	33397 R 104/108/116	35482 R 108/112/120	37433 R 112/115/122	39267 R 116/118/125	40974 R 119/121/128
20	27677 R 92/98/108	30232 R 98/102/111	32328 R 103/107/115	34335 R 107/110/118	36213 R 111/114/121	37966 R 115/117/123	39619 R 118/119/126
24	26974 R 91/96/106	29374 R 97/101/110	31395 R 102/105/113	33313 R 106/109/116	35118 R 110/112/119	36828 R 113/115/122	38443 R 116/118/124
26	26661 R 91/96/105	28976 R 96/100/109	30967 R 101/105/112	32840 R 105/108/115	34618 R 109/112/118	36302 R 113/115/121	37892 R 116/117/123

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 12500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	29863 R 95/102/112	33016 R 101/107/116	35475 R 107/111/120	37769 R 111/115/123	39863 R 115/119/126	41857 R 119/122/129	43746 R 122/125/131
4	29445 R 94/101/112	32567 R 100/106/115	34938 R 106/110/119	37150 R 110/114/122	39218 R 114/118/125	41154 R 118/121/128	43006 R 121/124/130
8	28985 R 94/100/111	31963 R 99/105/114	34269 R 105/109/118	36427 R 109/113/121	38445 R 113/117/124	40329 R 117/120/127	42120 R 120/123/129
12	28354 R 93/99/110	31236 R 99/104/113	33452 R 104/108/116	35550 R 108/112/120	37513 R 112/115/123	39345 R 116/118/125	41081 R 119/121/128
16	27671 R 92/98/108	30386 R 98/102/111	32499 R 103/107/115	34527 R 107/110/118	36427 R 111/114/121	38201 R 115/117/124	39877 R 118/120/126
20	26929 R 91/96/106	29439 R 97/101/110	31472 R 102/105/113	33403 R 106/109/116	35220 R 110/112/119	36941 R 114/115/122	38565 R 117/118/124
24	- -	28625 R 96/100/108	30595 R 101/104/112	32425 R 105/108/115	34196 R 109/111/118	35863 R 112/114/120	37437 R 116/117/122
25	- -	28421 R 96/99/108	30376 R 100/103/111	32184 R 105/107/114	33941 R 109/110/117	35593 R 112/113/120	37154 R 115/116/122

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	29190 R 94/101/111	32305 R 100/106/115	34686 R 106/110/118	36889 R 110/114/122	38951 R 114/118/125	40880 R 118/121/127	42727 R 121/124/130
4	28736 R 94/100/110	31753 R 99/105/114	34049 R 105/109/117	36203 R 109/113/121	38219 R 113/116/124	40102 R 117/120/126	41905 R 120/122/129
8	28201 R 93/99/110	31146 R 99/103/113	33395 R 104/108/116	35497 R 108/112/120	37465 R 112/115/122	39287 R 116/118/125	41045 R 119/121/128
12	27599 R 92/98/108	30435 R 98/102/111	32568 R 103/107/115	34609 R 107/110/118	36509 R 111/114/121	38310 R 115/117/124	40000 R 118/120/126
16	26922 R 91/97/107	29586 R 97/101/110	31630 R 102/105/114	33588 R 106/109/117	35426 R 110/112/119	37167 R 114/115/122	38812 R 117/118/124
20	- -	28659 R 96/99/108	30637 R 101/104/112	32478 R 105/107/115	34257 R 109/111/118	35930 R 113/114/120	37511 R 116/116/123
24	- -	27888 R 95/98/107	29814 R 100/102/110	31583 R 104/106/113	33291 R 108/109/116	34914 R 111/112/119	36439 R 115/115/121

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	28508 R 94/100/110	31544 R 99/104/113	33829 R 105/109/117	35977 R 109/113/120	37989 R 113/116/123	39868 R 117/119/126	41652 R 120/122/128
4	28021 R 93/99/109	30951 R 98/103/113	33201 R 104/108/116	35301 R 108/111/119	37267 R 112/115/122	39090 R 116/118/125	40848 R 119/121/127
8	27456 R 92/98/108	30327 R 98/102/112	32527 R 103/106/115	34574 R 107/110/118	36481 R 111/114/121	38272 R 115/117/124	39985 R 118/120/126
12	26856 R 91/97/107	29633 R 97/101/110	31708 R 102/105/114	33673 R 106/109/117	35537 R 110/112/120	37292 R 114/115/122	38936 R 117/118/125
16	- -	28799 R 96/99/109	30802 R 101/104/112	32682 R 105/108/115	34484 R 109/111/118	36180 R 113/114/121	37770 R 116/117/123
20	- -	27933 R 95/98/107	29864 R 100/102/110	31656 R 104/106/114	33375 R 108/109/116	34997 R 112/112/119	36545 R 115/115/121
23	- -	27351 R 94/97/106	29249 R 99/101/109	31003 R 103/105/112	32660 R 107/108/115	34247 R 111/111/118	35754 R 114/114/120

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE OFF

Airport Pressure Altitude: 13800 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
0	28102 R 93/99/109	31087 R 99/103/113	33323 R 104/108/116	35438 R 109/112/119	37420 R 113/115/122	39271 R 117/118/125	41029 R 120/121/128
4	27563 R 92/98/109	30453 R 98/102/112	32699 R 103/107/115	34766 R 108/111/118	36690 R 112/114/121	38500 R 115/117/124	40231 R 119/120/126
8	27021 R 91/97/108	29818 R 97/101/111	32012 R 102/106/114	34015 R 107/109/117	35906 R 111/113/120	37686 R 114/116/123	39356 R 118/119/125
12	- -	29171 R 96/100/109	31198 R 101/104/113	33126 R 106/108/116	34962 R 110/111/119	36689 R 113/115/121	38293 R 117/117/124
16	- -	28347 R 95/99/108	30319 R 100/103/111	32153 R 105/107/114	33925 R 109/110/117	35594 R 112/113/120	37165 R 115/116/122
20	- -	27509 R 94/97/106	29411 R 99/101/110	31177 R 104/105/113	32853 R 108/108/116	34454 R 111/111/118	35974 R 114/114/120

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 0 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	48421 R 121/128/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-30	48019 R 120/128/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-26	47654 R 120/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-22	47269 R 119/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-18	46896 R 118/126/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-14	46523 R 118/126/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-10	46175 R 117/125/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-6	45812 R 116/125/134	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-2	45425 R 116/124/134	49245 R 122/130/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
2	45049 R 115/124/133	48852 R 122/129/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
6	44727 R 114/123/133	48480 R 121/129/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
10	44384 R 114/123/132	48113 R 120/128/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	47892 R 121/128/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-30	47520 R 120/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-26	47120 R 119/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-22	46751 R 118/126/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-18	46377 R 118/126/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-14	46021 R 117/125/134	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-10	45663 R 116/125/134	49505 R 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-6	45307 R 116/124/133	49134 R 122/130/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-2	44907 R 115/123/133	48704 R 121/129/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
2	44550 R 114/123/132	48293 R 121/129/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
6	44207 R 114/122/132	47920 R 120/128/137	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
10	43861 R 113/122/131	47551 R 120/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 1000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	47382 R 120/127/136	49604 S 124/130/139	49604 S 124/130/139	49604 S 124/130/139	49604 S 124/130/139	49604 S 124/130/139	49604 S 124/130/139
-30	46997 R 119/127/136	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-26	46601 R 118/126/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-22	46238 R 118/125/135	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-18	45876 R 117/125/134	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-14	45507 R 116/124/134	49354 R 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-10	45152 R 116/124/133	48976 R 122/130/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-6	44790 R 115/123/133	48594 R 121/129/138	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139	49604 S 123/130/139
-2	44417 R 114/123/132	48155 R 121/128/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
2	44033 R 114/122/132	47737 R 120/128/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
6	43681 R 113/122/131	47362 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
10	43341 R 112/121/131	47020 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 1500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	46881 R 119/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-30	46491 R 118/126/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-26	46103 R 118/125/134	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-22	45736 R 117/125/134	49604 R 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
-18	45373 R 116/124/133	49227 R 123/130/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
-14	45009 R 116/124/133	48835 R 122/129/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
-10	44679 R 115/123/133	48455 R 121/129/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
-6	44318 R 114/123/132	48068 R 121/128/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
-2	43898 R 114/122/132	47608 R 120/128/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
2	43499 R 113/122/131	47195 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
6	43163 R 112/121/131	46835 R 119/127/135	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
10	42852 R 112/121/130	46500 R 118/126/135	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 2000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	46372 R 118/126/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-30	45986 R 118/125/134	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-26	45604 R 117/125/134	49487 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-22	45233 R 116/124/133	49092 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-18	44870 R 116/124/133	48700 R 122/129/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-14	44511 R 115/123/132	48313 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-10	44186 R 114/123/132	47934 R 121/128/137	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
-6	43821 R 114/122/131	47543 R 120/128/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
-2	43388 R 113/121/131	47090 R 119/127/136	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
2	42973 R 112/121/130	46636 R 119/126/135	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
6	42648 R 111/120/130	46287 R 118/126/135	49604 R 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139
10	42365 R 111/120/129	45982 R 117/125/134	49309 R 123/130/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 2500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	45837 R 118/125/134	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-30	45452 R 117/125/134	49336 R 124/130/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-26	45080 R 116/124/133	48938 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-22	44716 R 116/124/133	48545 R 122/129/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-18	44350 R 115/123/132	48151 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-14	44014 R 114/122/132	47760 R 121/128/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-10	43666 R 113/122/131	47387 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-6	43315 R 113/121/131	47032 R 119/127/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-2	42895 R 112/121/130	46572 R 119/126/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
2	42500 R 111/120/130	46139 R 118/126/134	49489 R 123/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
6	42183 R 111/120/129	45798 R 117/125/134	49126 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
10	41918 R 110/119/129	45507 R 117/125/134	48810 R 122/130/138	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139	49604 S 123/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 3000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	45304 R 117/125/133	49190 R 124/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-30	44918 R 116/124/133	48775 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-26	44557 R 116/123/132	48386 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-22	44199 R 115/123/132	47999 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-18	43858 R 114/122/131	47603 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-14	43496 R 113/122/131	47208 R 120/127/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-10	43154 R 113/121/131	46871 R 119/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-6	42809 R 112/121/130	46500 R 119/126/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-2	42403 R 111/120/129	46053 R 118/126/134	49413 R 123/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
2	42027 R 111/120/129	45642 R 117/125/134	48971 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
6	41719 R 110/119/129	45309 R 117/125/133	48612 R 122/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
10	41497 R 109/119/128	45034 R 116/124/133	48309 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 3500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	44750 R 116/124/133	48600 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-30	44369 R 115/123/132	48190 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-26	44003 R 115/123/132	47796 R 121/128/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-22	43672 R 114/122/131	47410 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-18	43317 R 113/122/131	47048 R 120/127/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-14	42956 R 113/121/130	46666 R 119/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-10	42619 R 112/121/130	46302 R 119/126/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-6	42280 R 111/120/129	45939 R 118/126/134	49305 R 123/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-2	41890 R 111/119/129	45511 R 117/125/134	48843 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
2	41530 R 110/119/128	45119 R 117/125/133	48420 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
6	41247 R 109/118/128	44791 R 116/124/133	48069 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
10	40942 R 109/118/127	44450 R 115/123/132	47698 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 4000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	44197 R 115/123/132	48012 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-30	43822 R 115/123/131	47607 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-26	43476 R 114/122/131	47208 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-22	43126 R 113/122/130	46851 R 120/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-18	42771 R 113/121/130	46476 R 119/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-14	42426 R 112/120/130	46102 R 118/126/134	49486 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-10	42086 R 111/120/129	45735 R 118/126/134	49097 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-6	41754 R 110/119/129	45380 R 117/125/133	48715 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-2	41379 R 110/119/128	44970 R 116/124/133	48271 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
2	41055 R 109/118/128	44596 R 116/124/132	47869 R 121/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
6	40756 R 109/118/127	44272 R 115/123/132	47525 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
10	40388 R 108/117/127	43864 R 114/123/131	47087 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 4500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	43617 R 115/122/131	47392 R 121/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-30	43269 R 114/122/131	46990 R 120/128/136	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-26	42906 R 113/121/130	46621 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-22	42560 R 113/121/130	46247 R 119/126/135	49604 R 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-18	42210 R 112/120/129	45875 R 118/126/134	49253 R 124/131/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-14	41868 R 111/120/129	45505 R 118/125/134	48857 R 123/130/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-10	41537 R 110/119/128	45151 R 117/125/133	48475 R 123/130/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-6	41225 R 110/119/128	44793 R 116/124/133	48091 R 122/129/137	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-2	40858 R 109/118/127	44391 R 116/124/132	47656 R 121/129/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
2	40537 R 108/118/127	44036 R 115/123/132	47272 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
6	40270 R 108/117/127	43739 R 114/123/131	46953 R 120/127/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
10	39596 R 107/116/126	42996 R 113/122/130	46181 R 119/127/135	49130 R 124/131/138	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 5000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	43042 R 114/122/130	46800 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-30	42699 R 113/121/130	46405 R 120/127/135	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-26	42340 R 112/121/129	46015 R 119/126/134	49408 R 124/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-22	41990 R 112/120/129	45646 R 118/126/134	49015 R 124/131/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-18	41652 R 111/119/128	45278 R 118/125/133	48619 R 123/130/138	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-14	41313 R 110/119/128	44913 R 117/125/133	48226 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-10	40991 R 110/118/128	44569 R 116/124/132	47856 R 122/129/137	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139	49604 S 125/131/139
-6	40683 R 109/118/127	44209 R 116/123/132	47470 R 121/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
-2	40325 R 108/117/127	43816 R 115/123/131	47045 R 120/128/136	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
2	40023 R 108/117/126	43479 R 114/122/131	46705 R 120/127/135	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
6	39787 R 107/116/126	43210 R 114/122/131	46415 R 119/127/135	49384 R 124/131/139	49604 S 124/131/139	49604 S 124/131/139	49604 S 124/131/139
10	38809 R 106/115/124	42158 R 112/121/129	45258 R 118/125/133	48142 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 5500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	42367 R 113/121/129	46042 R 119/126/134	49435 R 125/131/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-30	42002 R 112/120/129	45647 R 119/126/134	49016 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-26	41653 R 111/120/128	45270 R 118/125/133	48609 R 123/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-22	41305 R 111/119/128	44901 R 117/125/133	48213 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-18	40973 R 110/119/128	44539 R 117/124/132	47823 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-14	40643 R 109/118/127	44185 R 116/124/132	47440 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-10	40344 R 109/117/127	43839 R 115/123/131	47069 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-6	40030 R 108/117/126	43493 R 115/123/131	46724 R 120/127/135	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-2	39712 R 107/116/126	43144 R 114/122/130	46351 R 119/127/135	49323 R 124/131/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
2	39431 R 107/116/125	42829 R 113/121/130	46011 R 119/126/134	48960 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
6	38997 R 106/115/125	42338 R 112/121/129	45478 R 118/126/134	48381 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
10	38056 R 105/114/123	41309 R 111/119/128	44340 R 117/124/132	47155 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 6000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	41676 R 112/120/128	45291 R 118/125/133	48631 R 124/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-30	41311 R 111/119/128	44896 R 118/125/133	48207 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-26	40973 R 110/119/128	44531 R 117/124/132	47812 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-22	40628 R 110/118/127	44163 R 116/124/132	47416 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-18	40301 R 109/118/127	43807 R 116/123/131	47032 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-14	39980 R 108/117/126	43463 R 115/123/131	46686 R 120/128/135	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-10	39684 R 108/117/126	43116 R 114/122/130	46318 R 120/127/135	49287 R 125/131/139	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-6	39384 R 107/116/125	42783 R 114/122/130	45965 R 119/126/134	48913 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-2	39104 R 106/116/125	42477 R 113/121/130	45639 R 119/126/134	48567 R 123/130/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
2	38844 R 106/115/125	42184 R 112/121/129	45322 R 118/125/133	48224 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
6	38229 R 105/114/124	41498 R 111/120/128	44545 R 117/124/132	47378 R 121/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
10	37290 R 104/113/122	40469 R 110/118/127	43429 R 116/123/131	46201 R 120/127/135	48790 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 6500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	40986 R 111/119/128	44539 R 117/124/132	47819 R 123/129/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-30	40634 R 110/118/127	44157 R 117/124/132	47408 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	40306 R 110/118/127	43800 R 116/123/131	47021 R 121/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	39967 R 109/117/126	43438 R 115/123/131	46656 R 121/128/135	49604 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	39640 R 108/117/126	43085 R 115/122/130	46278 R 120/127/135	49242 R 125/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-14	39343 R 108/116/125	42742 R 114/122/130	45913 R 120/127/134	48855 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-10	39033 R 107/116/125	42400 R 113/121/129	45551 R 119/126/134	48469 R 124/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-6	38731 R 106/115/124	42065 R 113/121/129	45197 R 118/125/133	48092 R 123/130/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
-2	38479 R 105/115/124	41786 R 112/120/129	44899 R 118/125/133	47773 R 122/129/137	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
2	38195 R 105/114/124	41491 R 111/120/128	44550 R 117/124/132	47393 R 122/129/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
6	37466 R 104/113/122	40660 R 110/118/127	43638 R 116/123/131	46428 R 120/127/135	49035 R 124/131/138	49604 S 125/132/139	49604 S 125/132/139
10	36533 R 103/112/121	39643 R 109/117/126	42532 R 115/122/130	45245 R 119/126/133	47771 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 7000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	40305 R 110/118/127	43794 R 117/123/131	47014 R 122/128/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-30	39966 R 109/117/126	43425 R 116/123/131	46615 R 121/128/135	49604 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	39637 R 109/117/126	43076 R 115/122/130	46265 R 121/127/135	49224 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	39311 R 108/116/125	42720 R 114/122/130	45884 R 120/127/134	48821 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	38984 R 107/116/125	42370 R 114/121/129	45510 R 119/126/134	48423 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	38693 R 107/115/124	42028 R 113/121/129	45148 R 119/126/133	48036 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	38388 R 106/115/124	41690 R 112/120/129	44791 R 118/125/133	47655 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	38084 R 105/114/123	41378 R 112/120/128	44437 R 117/124/132	47278 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-2	37857 R 105/114/123	41128 R 111/119/128	44166 R 117/124/132	46986 R 121/128/136	49604 S 125/132/139	49604 S 125/132/139	49604 S 125/132/139
2	37570 R 104/113/123	40786 R 110/119/127	43785 R 116/123/131	46593 R 120/128/135	49215 R 125/131/138	49604 S 125/132/139	49604 S 125/132/139
6	36708 R 103/112/121	39832 R 109/117/126	42738 R 115/122/130	45467 R 119/126/134	48011 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139
10	35791 R 102/111/120	38824 R 108/116/124	41642 R 114/121/128	44296 R 118/125/132	46758 R 122/128/135	49111 R 126/132/138	49604 S 127/133/139

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 7500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	39641 R 109/117/126	43068 R 116/123/130	46254 R 121/127/135	49208 R 126/132/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-30	39305 R 108/116/125	42703 R 115/122/130	45864 R 120/127/134	48795 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-26	38970 R 108/116/125	42346 R 114/121/129	45483 R 120/126/134	48390 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	38654 R 107/115/124	42001 R 113/121/129	45114 R 119/126/133	47996 R 124/130/137	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	38358 R 106/115/124	41663 R 113/120/128	44752 R 118/125/133	47611 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	38053 R 106/114/123	41325 R 112/120/128	44395 R 118/125/132	47230 R 122/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-10	37751 R 105/114/123	41013 R 112/119/128	44042 R 117/124/132	46853 R 122/128/135	49516 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-6	37469 R 104/113/122	40714 R 111/119/127	43724 R 116/124/131	46541 R 121/128/135	49171 R 125/132/138	49604 S 126/132/139	49604 S 126/132/139
-2	37250 R 104/113/122	40473 R 110/118/127	43459 R 116/123/131	46255 R 120/127/135	48865 R 124/131/138	49604 S 126/132/139	49604 S 126/132/139
2	36784 R 103/112/121	39920 R 109/117/126	42838 R 115/122/130	45579 R 119/126/134	48135 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139
6	35933 R 102/111/120	38987 R 108/116/125	41820 R 113/121/129	44488 R 118/125/132	46968 R 122/129/136	49332 R 126/132/139	49604 S 126/132/139
10	35027 R 101/110/119	37990 R 107/115/123	40738 R 112/119/127	43332 R 117/124/131	45760 R 121/127/134	48032 R 125/131/137	48694 W 126/131/138

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 8000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	38984 R 108/116/125	42348 R 115/122/129	45482 R 120/126/134	48384 R 125/131/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	38650 R 108/116/124	41987 R 114/121/129	45096 R 119/126/133	47975 R 124/130/137	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	38308 R 107/115/124	41622 R 113/120/128	44707 R 119/125/133	47560 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-22	38002 R 106/114/123	41289 R 113/120/128	44350 R 118/125/132	47179 R 123/129/136	49604 S 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-18	37720 R 105/114/123	40963 R 112/119/128	44000 R 117/124/132	46806 R 122/128/135	49462 R 126/132/139	49604 S 126/132/139	49604 S 126/132/139
-14	37419 R 105/113/122	40631 R 111/119/127	43649 R 117/124/131	46455 R 121/128/135	49075 R 125/132/138	49604 S 126/132/139	49604 S 126/132/139
-10	37120 R 104/113/122	40326 R 111/118/127	43300 R 116/123/131	46086 R 121/127/134	48685 R 125/131/138	49604 S 126/132/139	49604 S 126/132/139
-6	36858 R 103/112/122	40058 R 110/118/126	43017 R 115/123/130	45791 R 120/127/134	48378 R 124/131/137	49604 S 126/132/139	49604 S 126/132/139
-2	36668 R 103/112/121	39824 R 109/117/126	42757 R 115/122/130	45509 R 119/126/134	48072 R 123/130/137	49604 S 126/132/139	49604 S 126/132/139
2	36003 R 102/111/120	39058 R 108/116/125	41896 R 113/121/129	44569 R 118/125/132	47055 R 122/129/136	49424 R 126/132/139	49604 S 126/132/139
6	35160 R 101/110/119	38148 R 107/115/123	40909 R 112/120/127	43516 R 117/124/131	45958 R 121/127/134	48246 R 125/131/137	49342 W 126/132/139
10	34267 R 100/108/118	37162 R 106/114/122	39864 R 111/118/126	42374 R 116/122/129	44746 R 120/126/133	46958 R 123/129/136	47530 W 124/130/136

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 8500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	38202 R 107/115/124	41500 R 114/120/128	44579 R 119/125/132	47427 R 124/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-30	37878 R 107/114/123	41148 R 113/120/128	44203 R 118/125/132	47027 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-26	37555 R 106/114/123	40798 R 112/119/127	43828 R 118/124/131	46626 R 122/128/135	49277 R 127/132/139	49604 S 127/132/139	49604 S 127/132/139
-22	37259 R 105/113/122	40468 R 112/119/127	43473 R 117/123/131	46272 R 122/128/135	48883 R 126/131/138	49604 S 127/132/139	49604 S 127/132/139
-18	36963 R 105/113/122	40144 R 111/118/126	43127 R 116/123/130	45906 R 121/127/134	48497 R 125/131/137	49604 S 127/132/139	49604 S 127/132/139
-14	36667 R 104/112/121	39843 R 110/118/126	42782 R 116/122/130	45541 R 120/127/134	48112 R 125/130/137	49604 S 127/132/139	49604 S 127/132/139
-10	36372 R 103/112/121	39521 R 110/117/125	42436 R 115/122/130	45174 R 120/126/133	47723 R 124/130/136	49604 S 127/132/139	49604 S 127/132/139
-6	36151 R 102/111/121	39269 R 109/117/125	42163 R 114/121/129	44884 R 119/126/133	47416 R 123/129/136	49604 S 127/132/139	49604 S 127/132/139
-2	35788 R 102/111/120	38861 R 108/116/125	41711 R 114/121/129	44396 R 118/125/132	46890 R 122/129/135	49269 R 126/132/139	49604 S 127/132/139
2	35087 R 101/109/119	38069 R 107/115/123	40830 R 112/119/127	43439 R 117/123/131	45884 R 121/127/134	48174 R 125/130/137	49604 S 127/133/139
6	34273 R 100/108/118	37173 R 106/114/122	39863 R 111/118/126	42401 R 116/122/129	44784 R 120/126/133	47008 R 123/129/136	48195 W 125/131/137
10	33382 R 99/107/116	36207 R 105/112/121	38844 R 110/117/125	41283 R 115/121/128	43598 R 119/124/131	45774 R 122/128/134	46347 W 123/129/135

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 9000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	37433 R 107/114/122	40667 R 113/119/127	43690 R 118/124/131	46482 R 123/128/135	49129 R 127/132/138	49247 W 127/132/138	49247 W 127/132/138
-30	37118 R 106/113/122	40327 R 112/119/127	43324 R 118/123/131	46117 R 122/128/134	48723 R 126/131/138	49232 W 127/132/138	49232 W 127/132/138
-26	36823 R 105/113/122	39990 R 112/118/126	42962 R 117/123/130	45733 R 122/127/134	48316 R 126/131/137	49209 W 127/132/138	49209 W 127/132/138
-22	36519 R 104/112/121	39660 R 111/118/126	42609 R 116/122/130	45359 R 121/126/133	47921 R 125/130/137	49194 W 127/132/138	49194 W 127/132/138
-18	36219 R 104/112/121	39360 R 110/117/125	42266 R 116/122/129	44997 R 120/126/133	47539 R 124/130/136	49189 W 127/132/138	49189 W 127/132/138
-14	35928 R 103/111/120	39046 R 109/117/125	41928 R 115/121/129	44640 R 120/125/132	47162 R 124/129/136	49182 W 127/132/138	49182 W 127/132/138
-10	35630 R 102/111/120	38728 R 109/116/124	41584 R 114/121/128	44275 R 119/125/132	46775 R 123/129/135	49141 W 127/132/138	49141 W 127/132/138
-6	35439 R 102/110/119	38492 R 108/116/124	41322 R 114/120/128	43990 R 118/124/132	46468 R 122/128/135	48836 R 126/131/138	49482 W 127/132/139
-2	34916 R 101/109/119	37908 R 107/115/123	40679 R 112/119/127	43295 R 117/123/131	45748 R 121/127/134	48046 R 125/130/137	49518 W 127/132/139
2	34178 R 100/108/118	37092 R 106/113/122	39781 R 111/118/126	42321 R 116/122/129	44705 R 120/126/133	46931 R 123/129/135	48616 W 126/131/138
6	33382 R 99/107/116	36210 R 105/112/121	38851 R 110/117/125	41300 R 115/121/128	43622 R 119/124/131	45802 R 122/128/134	46919 W 124/129/135
10	32524 R 98/106/115	35282 R 104/111/119	37836 R 109/115/123	40208 R 114/119/126	42456 R 118/123/130	44582 R 121/126/132	45014 W 122/127/133

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 9500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	36690 R 106/113/121	39866 R 112/118/126	42833 R 117/123/130	45600 R 122/127/134	48174 R 126/131/137	48559 W 127/131/138	48559 W 127/131/138
-30	36375 R 105/112/121	39527 R 111/117/125	42469 R 117/122/130	45214 R 121/126/133	47771 R 125/130/137	48550 W 127/131/138	48550 W 127/131/138
-26	36083 R 104/112/120	39211 R 111/117/125	42110 R 116/122/129	44832 R 121/126/133	47366 R 125/130/136	48537 W 127/131/138	48537 W 127/131/138
-22	35785 R 104/111/120	38887 R 110/116/125	41759 R 115/121/129	44462 R 120/125/132	46974 R 124/129/136	48514 W 126/131/137	48514 W 126/131/137
-18	35487 R 103/110/120	38572 R 109/116/124	41419 R 115/121/128	44102 R 119/125/132	46594 R 123/128/135	48482 W 126/131/137	48482 W 126/131/137
-14	35194 R 102/110/119	38257 R 109/115/124	41081 R 114/120/128	43744 R 119/124/131	46240 R 123/128/135	48451 W 126/131/137	48451 W 126/131/137
-10	34908 R 101/109/119	37934 R 108/115/123	40733 R 113/120/127	43376 R 118/124/131	45853 R 122/127/134	48172 R 126/131/137	48409 W 126/131/137
-6	34558 R 101/109/118	37529 R 107/114/123	40277 R 112/119/127	42872 R 117/123/130	45309 R 121/126/133	47587 R 125/130/136	48291 W 126/131/137
-2	34027 R 100/108/117	36939 R 106/113/122	39626 R 111/118/126	42163 R 116/122/129	44547 R 120/125/132	46713 W 123/129/135	46713 W 123/129/135
2	33316 R 99/107/116	36147 R 105/112/121	38787 R 110/117/124	41231 R 115/121/128	43561 R 119/124/131	45442 W 122/127/134	45442 W 122/127/134
6	32531 R 98/106/115	35284 R 104/111/119	37860 R 109/115/123	40239 R 114/119/126	42500 R 118/123/130	43703 W 120/125/131	43703 W 120/125/131
10	31697 R 97/104/114	34377 R 103/110/118	36867 R 108/114/122	39195 R 113/118/125	41385 R 117/122/128	41731 W 117/122/129	41731 W 117/122/129

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 10000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	35957 R 105/111/120	39075 R 111/117/125	41986 R 117/122/129	44704 R 121/126/133	47230 R 125/130/136	47608 W 126/130/136	47608 W 126/130/136
-30	35662 R 104/111/120	38760 R 110/116/124	41626 R 116/121/128	44324 R 120/125/132	46827 R 125/129/135	47593 W 126/130/136	47593 W 126/130/136
-26	35362 R 103/110/119	38433 R 110/116/124	41274 R 115/121/128	43952 R 120/125/132	46429 R 124/128/135	47565 W 126/130/136	47565 W 126/130/136
-22	35065 R 103/110/119	38113 R 109/115/123	40929 R 114/120/127	43586 R 119/124/131	46071 R 123/128/134	47545 W 126/130/136	47545 W 126/130/136
-18	34775 R 102/109/118	37798 R 108/115/123	40591 R 114/119/127	43227 R 118/124/131	45694 R 123/127/134	47523 W 125/130/136	47523 W 125/130/136
-14	34472 R 101/109/118	37484 R 108/114/123	40254 R 113/119/127	42866 R 118/123/130	45317 R 122/127/133	47505 W 125/130/136	47505 W 125/130/136
-10	34182 R 101/108/118	37154 R 107/114/122	39900 R 112/118/126	42490 R 117/122/130	44923 R 121/126/133	47196 R 125/130/136	47460 W 125/130/136
-6	33500 R 100/107/117	36398 R 106/112/121	39090 R 111/117/125	41592 R 116/121/128	43967 R 120/125/132	46177 R 123/128/135	47033 W 125/129/136
-2	32816 R 99/106/115	35642 R 105/111/120	38276 R 110/116/124	40716 R 115/120/127	43034 R 119/124/130	45143 W 122/127/133	45143 W 122/127/133
2	32126 R 98/105/114	34896 R 104/110/119	37474 R 110/115/123	39859 R 114/119/126	42122 R 118/123/129	43399 W 120/125/131	43399 W 120/125/131
6	31353 R 97/104/113	34024 R 103/109/117	36540 R 109/114/121	38877 R 113/118/125	41063 R 117/121/128	41905 W 118/123/129	41905 W 118/123/129
10	30519 R 97/103/112	33104 R 102/108/116	35538 R 108/113/120	37816 R 112/116/123	39949 R 116/120/126	40462 W 117/121/127	40462 W 117/121/127

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 10500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	35130 R 104/110/119	38204 R 110/116/124	41022 R 116/120/128	43683 R 120/124/131	46183 R 124/128/135	46620 W 125/129/135	46620 W 125/129/135
-30	34841 R 103/110/119	37874 R 110/115/123	40669 R 115/120/127	43311 R 119/124/131	45791 R 124/128/134	46594 W 125/129/135	46594 W 125/129/135
-26	34543 R 102/109/118	37550 R 109/115/123	40325 R 114/119/127	42942 R 119/123/130	45399 R 123/127/133	46568 W 125/129/135	46568 W 125/129/135
-22	34256 R 102/109/118	37238 R 108/114/122	39991 R 114/119/126	42583 R 118/123/130	45018 R 122/126/133	46544 W 125/129/135	46544 W 125/129/135
-18	33973 R 101/108/117	36935 R 108/114/122	39667 R 113/118/126	42237 R 117/122/129	44657 R 122/126/133	46529 W 125/129/135	46529 W 125/129/135
-14	33705 R 100/108/117	36630 R 107/113/121	39339 R 112/118/125	41893 R 117/122/129	44293 R 121/125/132	46522 W 124/129/135	46522 W 124/129/135
-10	33378 R 100/107/116	36281 R 106/112/121	38983 R 112/117/125	41495 R 116/121/128	43876 R 120/125/131	46087 R 124/128/134	46471 W 124/129/135
-6	32597 R 99/106/115	35474 R 105/111/120	38104 R 110/116/123	40541 R 115/120/127	42854 R 119/123/130	45043 R 122/127/133	45705 W 124/128/134
-2	31886 R 98/105/114	34749 R 104/110/118	37320 R 109/115/122	39722 R 114/119/126	41970 R 118/122/129	43932 W 121/125/132	43932 W 121/125/132
2	31288 R 97/104/113	34014 R 103/109/117	36532 R 109/114/121	38883 R 113/118/125	41074 R 117/121/128	42283 W 119/123/129	42283 W 119/123/129
6	30564 R 96/103/112	33171 R 102/108/116	35610 R 108/112/120	37902 R 112/116/123	40056 R 116/120/126	40863 W 117/121/127	40863 W 117/121/127
10	29757 R 96/101/110	32253 R 102/107/115	34623 R 107/111/118	36854 R 111/115/122	38948 R 115/119/125	39468 W 116/119/125	39468 W 116/119/125

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 11000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	34333 R 103/109/118	37323 R 109/114/122	40077 R 115/119/126	42689 R 119/123/130	45091 R 123/127/133	45668 W 124/128/134	45668 W 124/128/134
-30	34033 R 102/108/117	36989 R 109/114/122	39750 R 114/118/126	42313 R 118/123/129	44730 R 123/126/133	45631 W 124/128/134	45631 W 124/128/134
-26	33737 R 102/108/117	36677 R 108/113/121	39407 R 113/118/125	41951 R 118/122/129	44351 R 122/126/132	45613 W 124/128/134	45613 W 124/128/134
-22	33456 R 101/107/116	36370 R 107/113/121	39086 R 113/117/125	41605 R 117/121/128	43983 R 121/125/132	45592 W 124/128/134	45592 W 124/128/134
-18	33198 R 100/107/116	36083 R 107/112/120	38775 R 112/117/124	41264 R 116/121/128	43641 R 121/125/131	45569 W 124/128/134	45569 W 124/128/134
-14	32928 R 100/106/116	35788 R 106/112/120	38456 R 111/116/124	40927 R 116/120/127	43285 R 120/124/131	45494 R 124/127/134	45550 W 124/127/134
-10	32465 R 99/106/115	35418 R 105/111/119	38059 R 111/116/123	40508 R 115/120/127	42842 R 119/123/130	45033 R 123/127/133	45459 W 123/127/134
-6	31655 R 98/105/114	34562 R 104/110/118	37132 R 109/114/122	39534 R 114/118/125	41768 R 118/122/129	43857 R 122/125/131	44524 W 123/126/132
-2	31097 R 97/104/113	33869 R 103/109/117	36384 R 108/113/121	38732 R 113/117/124	40914 R 117/121/127	42727 W 120/124/130	42727 W 120/124/130
2	30512 R 96/103/112	33161 R 102/108/116	35608 R 108/112/120	37906 R 112/116/123	40064 R 116/120/126	41171 W 118/122/128	41171 W 118/122/128
6	29802 R 96/101/110	32296 R 102/107/115	34701 R 107/111/118	36942 R 111/115/122	39044 R 115/119/125	39874 W 117/120/126	39874 W 117/120/126
10	28994 R 95/100/109	31419 R 101/105/113	33744 R 106/110/117	35913 R 110/114/120	37949 R 114/117/123	38383 W 115/118/124	38383 W 115/118/124

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 11500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	33542 R 102/108/117	36464 R 108/113/121	39189 R 114/118/125	41655 R 118/122/128	43968 R 122/125/132	44720 W 124/126/133	44720 W 124/126/133
-30	33250 R 101/107/116	36149 R 108/113/121	38849 R 113/117/125	41322 R 118/121/128	43621 R 122/125/131	44675 W 123/126/133	44675 W 123/126/133
-26	32958 R 101/107/116	35839 R 107/112/120	38516 R 112/117/124	40986 R 117/121/128	43269 R 121/124/131	44667 W 123/126/133	44667 W 123/126/133
-22	32692 R 100/106/115	35542 R 106/111/120	38203 R 112/116/124	40674 R 116/120/127	42935 R 120/124/130	44650 W 123/126/133	44650 W 123/126/133
-18	32424 R 99/106/115	35250 R 106/111/119	37882 R 111/116/123	40344 R 116/120/127	42610 R 120/123/130	44618 W 123/126/132	44618 W 123/126/132
-14	31984 R 99/105/115	34953 R 105/110/119	37564 R 110/115/123	40003 R 115/119/126	42277 R 119/123/129	44380 R 123/126/132	44580 W 123/126/132
-10	31493 R 98/104/114	34434 R 104/109/118	37009 R 109/114/122	39400 R 114/118/125	41573 R 118/122/128	43640 R 122/125/131	44435 W 123/126/132
-6	30869 R 97/103/113	33685 R 103/108/117	36180 R 108/113/121	38499 R 113/117/124	40615 R 117/120/127	42631 R 121/124/130	43350 W 122/125/131
-2	30340 R 96/102/112	33031 R 102/108/116	35477 R 108/112/120	37752 R 112/116/123	39819 R 116/119/126	41609 W 119/122/128	41609 W 119/122/128
2	29760 R 96/101/110	32321 R 101/107/115	34718 R 107/111/118	36954 R 111/115/122	38980 R 115/118/125	40171 W 117/120/126	40171 W 117/120/126
6	29066 R 95/100/109	31510 R 101/105/113	33839 R 106/110/117	36006 R 110/114/120	37977 R 114/117/123	38957 W 116/119/125	38957 W 116/119/125
10	28265 R 94/99/108	30657 R 100/104/112	32890 R 105/109/116	34995 R 109/112/119	36910 R 113/116/122	37317 W 114/116/122	37317 W 114/116/122

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 12000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	32761 R 101/106/115	35625 R 107/112/120	38221 R 113/116/124	40607 R 117/120/127	42863 R 121/124/130	43901 W 123/125/132	43901 W 123/125/132
-30	32475 R 100/106/115	35318 R 107/111/119	37919 R 112/116/123	40289 R 117/120/127	42530 R 121/123/130	43857 W 123/125/131	43857 W 123/125/131
-26	32208 R 100/105/114	35017 R 106/111/119	37631 R 111/115/123	39968 R 116/119/126	42193 R 120/123/129	43844 W 123/125/131	43844 W 123/125/131
-22	31873 R 99/105/114	34719 R 105/110/118	37321 R 111/115/122	39654 R 115/119/126	41863 R 119/122/129	43819 W 123/125/131	43819 W 123/125/131
-18	31557 R 99/105/114	34429 R 105/110/118	37013 R 110/114/122	39364 R 115/118/125	41538 R 119/122/128	43603 R 122/125/131	43778 W 123/125/131
-14	31228 R 98/104/113	34127 R 104/109/117	36689 R 109/114/121	39063 R 114/118/125	41207 R 118/121/128	43259 R 122/124/131	43734 W 122/125/131
-10	30648 R 97/103/112	33483 R 103/108/116	35889 R 108/112/120	38146 R 113/116/123	40240 R 117/120/126	42235 R 120/123/129	43376 W 122/125/131
-6	30092 R 96/102/111	32811 R 102/107/115	35200 R 107/112/119	37415 R 112/115/122	39486 R 116/119/125	41423 R 120/122/128	41985 W 121/123/129
-2	29580 R 95/101/110	32190 R 101/106/114	34567 R 107/111/118	36728 R 111/114/121	38759 R 115/118/124	40514 W 118/121/127	40514 W 118/121/127
2	29016 R 95/100/109	31518 R 101/105/113	33825 R 106/110/117	35938 R 110/113/120	37923 R 114/117/123	39204 W 117/119/125	39204 W 117/119/125
6	28328 R 94/99/108	30724 R 100/104/112	32955 R 105/108/116	35010 R 109/112/119	36941 R 113/116/122	38042 W 115/117/123	38042 W 115/117/123
10	27549 R 93/98/106	29880 R 99/103/110	32035 R 104/107/114	34037 R 108/111/117	35899 R 112/114/120	36333 W 113/115/121	36333 W 113/115/121

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 12500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	32047 R 100/105/114	34795 R 106/110/119	37323 R 112/115/122	39654 R 116/119/126	41858 R 120/122/129	43099 W 123/124/130	43099 W 123/124/130
-30	31769 R 100/105/114	34526 R 106/110/118	37025 R 111/115/122	39356 R 116/118/125	41526 R 120/122/128	43059 W 123/124/130	43059 W 123/124/130
-26	31470 R 99/104/113	34249 R 105/110/118	36730 R 110/114/121	39044 R 115/118/125	41198 R 119/121/128	43041 W 122/124/130	43041 W 122/124/130
-22	31158 R 98/104/113	33962 R 104/109/117	36439 R 110/114/121	38737 R 114/117/124	40873 R 118/121/127	42906 R 122/124/130	43010 W 122/124/130
-18	30842 R 98/103/113	33684 R 104/108/117	36144 R 109/113/121	38425 R 114/117/124	40545 R 118/120/127	42563 R 121/124/130	42963 W 122/124/130
-14	30510 R 97/103/112	33360 R 103/108/116	35798 R 108/112/120	38057 R 113/116/123	40155 R 117/120/126	42153 R 121/123/129	42916 W 122/124/130
-10	29892 R 96/102/111	32569 R 102/107/115	34923 R 107/111/119	37121 R 112/115/122	39176 R 116/118/125	41098 R 119/121/128	42110 W 121/123/129
-6	29347 R 95/101/110	31947 R 101/106/114	34253 R 106/110/118	36410 R 111/114/121	38426 R 115/117/124	40309 R 119/120/127	40797 W 119/121/127
-2	28854 R 95/100/109	31388 R 100/105/113	33629 R 106/109/117	35745 R 110/113/120	37723 R 114/116/123	39492 W 118/119/125	39492 W 118/119/125
2	28305 R 94/99/108	30742 R 100/104/112	32912 R 105/108/116	34978 R 109/112/119	36911 R 113/115/122	38280 W 116/118/124	38280 W 116/118/124
6	27632 R 93/98/106	29970 R 99/103/111	32076 R 104/107/114	34075 R 108/111/117	35955 R 112/114/120	37097 W 115/116/122	37097 W 115/116/122
10	26880 R 92/97/105	29162 R 98/101/109	31206 R 103/106/113	33116 R 107/110/116	34939 R 111/113/119	35384 W 112/114/119	35384 W 112/114/119

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13000 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	31323 R 99/104/113	33972 R 106/109/117	36442 R 111/114/121	38722 R 116/118/124	40861 R 120/121/127	42419 W 122/123/130	42419 W 122/123/130
-30	31089 R 99/104/113	33694 R 105/109/117	36147 R 110/113/121	38409 R 115/117/124	40545 R 119/121/127	42380 W 122/123/129	42380 W 122/123/129
-26	30761 R 98/103/112	33423 R 104/108/116	35859 R 110/113/120	38121 R 114/117/123	40225 R 118/120/126	42212 R 122/123/129	42354 W 122/123/129
-22	30458 R 97/103/112	33155 R 104/108/116	35573 R 109/112/120	37819 R 114/116/123	39907 R 118/120/126	41878 R 121/123/129	42318 W 122/123/129
-18	30132 R 97/102/112	32885 R 103/107/116	35273 R 108/112/119	37503 R 113/116/123	39574 R 117/119/126	41542 R 121/122/128	42258 W 122/123/129
-14	29804 R 96/102/111	32512 R 102/107/115	34881 R 107/111/119	37082 R 112/115/122	39125 R 116/118/125	41068 R 120/121/128	42159 W 122/123/129
-10	29096 R 95/100/110	31685 R 101/105/114	33975 R 106/110/117	36115 R 111/113/120	38116 R 115/117/123	39975 R 119/120/126	40852 W 120/121/127
-6	28582 R 94/99/109	31100 R 100/104/113	33324 R 106/109/116	35422 R 110/112/119	37385 R 114/116/122	39206 R 118/119/125	39674 W 118/120/126
-2	28119 R 94/99/108	30556 R 100/103/112	32718 R 105/108/115	34777 R 109/112/118	36703 R 113/115/121	38485 W 117/118/124	38485 W 117/118/124
2	27597 R 93/98/107	29938 R 99/102/111	32022 R 104/107/114	34033 R 108/111/117	35915 R 112/114/120	37355 W 115/116/122	37355 W 115/116/122
6	26946 R 92/96/105	29199 R 98/101/109	31228 R 103/106/113	33156 R 107/109/116	34987 R 111/113/119	36168 W 114/115/121	36168 W 114/115/121
10	- -	28397 R 97/100/108	30379 R 102/104/111	32219 R 106/108/115	33993 R 110/111/117	34514 W 111/112/118	34514 W 111/112/118

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13500 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	30643 R 98/103/112	33214 R 105/108/116	35633 R 110/112/120	37864 R 115/116/123	39963 R 119/120/126	41767 W 122/123/129	41767 W 122/123/129
-30	30314 R 98/102/112	32937 R 104/107/116	35336 R 109/112/119	37550 R 114/116/123	39631 R 118/119/126	41603 R 122/122/128	41730 W 122/123/129
-26	30028 R 97/102/111	32674 R 103/107/115	35057 R 109/111/119	37272 R 113/115/122	39321 R 117/119/125	41278 R 121/122/128	41698 W 122/123/129
-22	29725 R 97/101/111	32390 R 103/106/115	34753 R 108/111/118	36950 R 113/115/122	38981 R 117/118/125	40922 R 120/121/127	41660 W 122/122/128
-18	29364 R 96/101/110	32031 R 102/106/114	34366 R 107/110/118	36537 R 112/114/121	38554 R 116/117/124	40460 R 120/121/127	41585 W 122/122/128
-14	28874 R 95/100/110	31518 R 101/105/113	33790 R 106/109/117	35919 R 111/113/120	37883 R 115/116/123	39764 R 119/120/126	41337 W 121/122/128
-10	28303 R 94/99/108	30854 R 100/104/112	33051 R 105/108/116	35133 R 110/112/119	37071 R 114/115/122	38891 R 118/118/125	39721 W 119/120/126
-6	27822 R 94/98/107	30291 R 99/103/111	32426 R 105/107/115	34468 R 109/111/118	36370 R 113/114/121	38153 R 117/117/123	38617 W 117/118/124
-2	27368 R 93/97/106	29769 R 99/102/110	31853 R 104/106/114	33851 R 108/110/117	35717 R 112/113/120	37484 R 116/117/123	37529 W 116/117/123
2	26884 R 92/96/105	29166 R 98/101/109	31207 R 103/105/113	33137 R 107/109/116	34962 R 111/113/119	36499 W 115/115/121	36499 W 115/115/121
6	- -	28436 R 97/100/108	30436 R 102/104/111	32287 R 107/108/115	34061 R 110/111/117	35269 W 113/113/119	35269 W 113/113/119
10	- -	27652 R 96/99/106	29577 R 101/103/110	31364 R 105/107/113	33061 R 109/110/116	33679 W 111/111/117	33679 W 111/111/117

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SIMPLIFIED TAKEOFF ANALYSIS TABLES
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9° - DRY RUNWAY - ANTI-ICE ON

Airport Pressure Altitude: 13800 ft

Temp (°C)	RUNWAY LENGTH (ft)						
	4600	5300	6000	6700	7400	8100	8800
	MAXIMUM TAKEOFF WEIGHT (lb) - LIMITATION CODE $V_1/V_R/V_2$ (KIAS)						
-34	30181 R 98/102/111	32766 R 104/107/115	35153 R 110/112/119	37346 R 114/115/122	39430 R 118/119/125	41369 W 122/122/128	41369 W 122/122/128
-30	29883 R 97/102/111	32488 R 103/107/115	34856 R 109/111/119	37029 R 113/115/122	39098 R 118/118/125	41032 R 121/122/128	41339 W 122/122/128
-26	29604 R 97/101/111	32232 R 103/106/115	34583 R 108/111/118	36769 R 113/115/121	38793 R 117/118/124	40725 R 120/121/127	41307 W 122/122/128
-22	29292 R 96/101/110	31940 R 102/106/114	34268 R 107/110/118	36436 R 112/114/121	38441 R 116/117/124	40357 R 120/120/127	41267 W 121/122/128
-18	28895 R 95/100/110	31547 R 101/105/113	33828 R 107/109/117	35965 R 111/113/120	37939 R 115/117/123	39828 R 119/120/126	41192 W 121/122/128
-14	28311 R 95/99/109	30935 R 100/104/112	33139 R 106/108/116	35216 R 110/112/119	37171 R 114/115/122	38984 R 118/118/125	40252 W 120/120/127
-10	27839 R 94/98/108	30359 R 100/103/111	32503 R 105/107/115	34540 R 109/111/118	36460 R 113/114/121	38237 R 117/117/124	39057 W 118/119/125
-6	27360 R 93/97/107	29811 R 99/102/110	31900 R 104/106/114	33893 R 109/110/117	35777 R 113/113/120	37537 R 116/116/123	37983 W 117/117/123
-2	26935 R 92/96/106	29302 R 98/101/109	31355 R 103/105/113	33302 R 108/109/116	35141 R 112/113/119	36870 R 115/116/122	36956 W 115/116/122
2	26462 R 92/96/105	28715 R 97/100/108	30725 R 102/105/112	32608 R 107/108/115	34406 R 111/112/118	35976 W 114/114/120	35976 W 114/114/120
6	- -	27998 R 97/99/107	29966 R 101/103/111	31780 R 106/107/114	33522 R 110/110/117	34748 W 112/113/118	34748 W 112/113/118
10	- -	27214 R 96/98/106	29110 R 100/102/109	30862 R 105/106/112	32515 R 109/109/115	33178 W 110/110/116	33178 W 110/110/116

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TAKEOFF SPEEDS

Takeoff performance in the FAA approved Legacy 600 AFM is presented in the following format:

1) Balanced Field Length:

- Flaps 9°, ALT T/O-1 thrust - AFM.
- Flaps 9°, T/O thrust - AFM.
- Flaps 9°, E T/O thrust - AFM.

TAKEOFF SPEEDS FOR BALANCED PERFORMANCE

Takeoff speeds V_1, V_R and V_2 for Balanced Performance are read from the tables using the procedure below:

1) Enter the appropriate table with Airport Pressure Altitude and move right as far as the appropriate Static Air Temperature Range.

2) Enter the table with Airplane Brake Release Gross Weight and move right as far as the appropriate temperature column. Read V_1, V_R and V_2. If necessary, interpolate between two weights to obtain the associated speed.

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$V_1/V_R/V_2$ SPEEDS
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
ALT T/O-1 MODE - FLAPS 9°
ANTI-ICE ON OR OFF

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)											
SL →	-40	to	49	50	to	50						
1000 →	-40	to	47	48	to	48						
2000 →	-40	to	44	45	to	46						
3000 →	-40	to	40	41	to	44						
4000 →	-40	to	37	38	to	41	42	to	42			
5000 →	-40	to	32	33	to	35	36	to	40			
6000 →				-40	to	27	28	to	38			
7000 →				-40	to	17	18	to	36			
8000 →				-40	to	4	5	to	30	31	to	34
9000 →							-40	to	20	21	to	32
9500 →							-40	to	14	15	to	30
	↓			↓			↓			↓		
WEIGHT (lb)	V_1	V_R	V_2	V_1	V_R	V_2	V_1	V_R	V_2	V_1	V_R	V_2
30000	99	104	116	96	102	114	93	102	112	94	101	111
31000	99	105	116	96	104	115	95	103	113	96	103	113
32000	99	106	116	96	105	115	97	105	114	99	105	114
33000	99	107	117	98	106	116	99	106	116	101	107	116
34000	99	108	118	99	108	118	101	108	117	103	109	117
35000	101	109	119	101	110	119	103	110	119	106	111	119
36000	102	111	120	103	111	120	105	112	120	108	113	120
37000	104	112	122	105	113	122	107	114	122	110	115	122
38000	106	114	123	107	115	123	109	116	123	112	116	123
39000	108	116	125	109	116	125	111	117	125	113	118	125
40000	111	118	126	111	118	126	113	119	126	115	120	126
41000	113	119	128	113	120	128	115	120	128	117	121	127
42000	115	121	129	115	121	129	117	122	129	118	122	128
43000	116	122	130	117	123	130	118	124	130	118	122	128
44000	118	124	132	119	125	132	120	125	132	118	122	128
45000	120	126	133	120	126	133	121	126	133	118	122	128
46000	121	127	134	122	128	134	122	127	134	118	122	128
47000	123	128	136	124	129	136	122	127	134	118	122	128
48000	124	130	137	125	130	137	122	127	134	118	122	128
49000	126	131	138	126	131	138	122	127	134	118	122	128
50000	128	133	139	127	132	139	122	127	134	118	122	128

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$V_1/V_R/V_2$ SPEEDS
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
T/O MODE - FLAPS 9°
ANTI-ICE ON OR OFF

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)														
SL →	-40 to 39			40 to 47			48 to 50								
1000 →	-40 to 37			38 to 45			46 to 48								
2000 →	-40 to 32			33 to 42			43 to 46								
3000 →				-40 to 38			39 to 44								
4000 →				-40 to 34			35 to 42								
5000 →				-40 to 29			30 to 38			39 to 40					
6000 →							-40 to 30			31 to 38					
7000 →							-40 to 23			24 to 36					
8000 →							-40 to 16			17 to 34					
9000 →							-40 to -1			0 to 27			28 to 32		
9500 →							-40 to -10			-9 to 23			24 to 30		
	↓			↓			↓			↓			↓		
WEIGHT (lb)	V_1	V_R	V_2	V_1	V_R	V_2	V_1	V_R	V_2	V_1	V_R	V_2	V_1	V_R	V_2
30000	104	112	123	100	109	118	96	108	115	94	107	113	94	107	112
31000	104	110	122	100	108	118	96	107	116	96	106	113	97	106	113
32000	104	109	121	100	106	118	96	105	116	97	105	114	99	106	114
33000	104	109	121	100	107	118	97	107	117	99	107	116	101	107	116
34000	103	109	121	100	108	119	99	108	118	101	108	117	103	109	117
35000	103	110	121	100	109	120	101	110	119	103	110	119	105	111	119
36000	103	110	121	101	110	121	103	111	120	105	112	120	108	113	120
37000	104	112	122	103	112	122	105	113	122	107	114	122	110	115	122
38000	105	113	123	105	114	123	107	115	123	109	116	123	112	116	123
39000	106	115	125	107	115	125	109	116	125	111	117	125	113	118	125
40000	108	116	126	109	117	126	111	118	126	113	119	126	115	120	126
41000	110	118	128	111	119	128	113	120	128	115	121	128	116	121	127
42000	112	120	129	113	120	129	115	121	129	116	122	129	117	122	128
43000	114	121	130	115	122	130	117	123	130	118	124	130	117	122	128
44000	115	123	132	117	124	132	118	124	132	120	125	132	117	122	128
45000	117	124	133	119	125	133	120	126	133	121	126	133	117	122	128
46000	119	126	134	120	127	134	122	127	134	122	128	134	117	122	128
47000	121	127	136	122	128	136	123	129	136	122	128	134	117	122	128
48000	122	128	137	124	129	137	125	130	137	122	128	134	117	122	128
49000	124	130	138	125	131	138	126	131	138	122	128	134	117	122	128
50000	126	131	139	127	132	139	128	132	139	122	128	134	117	122	128

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$V_1/V_R/V_2$ SPEEDS
LEGACY 600 - AE3007A1E ENGINES - SLOPE ZERO
E T/O MODE - FLAPS 9°
ANTI-ICE ON OR OFF

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)														
SL →	-40 to 39			40 to 46			47 to 50								
1000 →	-40 to 36			37 to 43			44 to 48								
2000 →	-40 to 32			33 to 39			40 to 46								
3000 →				-40 to 34			35 to 44								
4000 →				-40 to 31			32 to 41			42 to 42					
5000 →							-40 to 36			37 to 40					
6000 →							-40 to 32			33 to 38					
7000 →							-40 to 28			29 to 36					
8000 →										-40 to 30			31 to 34		
9000 →										-40 to 21			22 to 32		
9500 →										-40 to 17			18 to 30		
	↓			↓			↓			↓			↓		
WEIGHT (lb)	V_1	V_R	V_2	V_1	V_R	V_2	V_1	V_R	V_2	V_1	V_R	V_2	V_1	V_R	V_2
30000	109	115	129	105	110	123	101	106	118	96	103	114	93	102	112
31000	109	115	128	104	110	122	100	106	118	96	104	115	95	103	113
32000	108	114	127	104	109	122	100	106	117	95	105	115	98	105	114
33000	108	113	126	104	109	121	100	107	118	97	106	116	100	107	116
34000	108	113	125	104	109	121	100	108	118	99	108	117	102	109	117
35000	108	112	125	104	109	121	100	109	119	101	109	119	104	111	119
36000	108	112	124	103	110	121	101	110	120	103	111	120	106	112	120
37000	107	112	124	103	112	122	103	112	122	105	113	122	108	114	122
38000	107	113	124	103	113	123	105	114	123	107	115	123	110	116	123
39000	107	114	125	105	115	125	107	116	125	110	117	125	112	118	125
40000	107	116	126	107	116	126	109	117	126	112	118	126	114	119	126
41000	108	117	128	109	118	128	111	119	128	113	120	128	116	121	128
42000	109	119	129	111	120	129	113	121	129	115	122	129	118	122	129
43000	111	120	130	113	121	130	115	122	130	117	123	130	119	123	130
44000	113	122	132	114	123	132	116	124	132	119	125	132	120	124	130
45000	115	124	133	116	124	133	118	125	133	120	126	133	120	124	130
46000	117	125	134	118	126	134	120	127	134	122	128	134	120	124	130
47000	118	127	136	120	127	136	121	128	136	123	129	135	120	124	130
48000	120	128	137	121	129	137	123	130	137	125	130	136	120	124	130
49000	122	129	138	123	130	138	124	131	138	125	130	136	120	124	130
50000	124	131	139	125	132	139	126	132	139	125	130	136	120	124	130

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FLAPS RETRACTION SCHEDULE

Takeoff with flaps 9°:

Flaps 9° to 0° ..... V_2 + 15 KIAS

FINAL SEGMENT SPEED

WEIGHT (lb)	V_{FS} (KIAS)
29000	136
30000	138
31000	140
32000	142
33000	144
34000	146
35000	148
36000	150
37000	152
38000	154
39000	156

WEIGHT (lb)	V_{FS} (KIAS)
40000	157
41000	159
42000	161
43000	162
44000	164
45000	166
46000	167
47000	169
48000	170
49000	172
50000	173

PITCH TRIM SETTING FOR TAKEOFF

PITCH TRIM UNITS	8	7	6	5	4
CG POSITION (%)	LESS THAN OR EQUAL TO 26.0	26.1 UP TO 28.5	28.6 UP TO 30.5	30.6 UP TO 33.5	ABOVE OR EQUAL TO 33.6

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OPERATION ON CONTAMINATED RUNWAYS

The takeoff data is only a guidance, as it is not required by FAR/RBHA Part 25.

A runway is considered contaminated when more than 25% of the surface used if covered with:

– Standing water with a depth exceeding 1/8 inch (3 mm).
– Slush or loose snow with a depth equivalent to more than 1/8 inch (3 mm) of water.

For each contaminant type and depth there is an associated precipitation drag (landing gear displacement drag and spray impingement drag), for which there always exist a certain water depth that results in the same precipitation drag. This equivalent water depth (WED) is the contaminant depth multiplied by its specific gravity and can be obtained by a chart presented in the Embraer Runway Analysis Software.

A runway is considered slippery when the surface used is covered with:

– Compacted snow or ice/wet ice (WED is not applicable in this case).

Takeoff performance for contaminated and slippery runways can be computed through the Embraer Runway Analysis Software using the AFM – ETOAS Method (refer to Supplement 7 of the AFM). The takeoff output data is valid only as guidance and it does not consider the use of reverse thrust for airplane stopping.

An acceptable overall level of safety will be ensured only if operations on contaminated runways are carried out on rare occasions.

Every effort should be made to ensure that the runway surface is cleared of any significant depth of contaminant before takeoff or landing.

NOTE: For AE3007A1E engines only E T/O and T/O thrust rating modes are allowed for takeoff on contaminated and slippery runways.

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CLIMB GRADIENT

The climb gradient tables show the climb gradients for several weights, temperatures and altitudes. These tables are published in the following configurations:

GRADIENTS FOR TAKEOFF THRUST AND FLAPS 9°

The gradients were obtained for a speed equal to V_2 + 10 KIAS and V_2/V_S ratio equal to 1.18. The thrust rating was E T/O with Anti-Ice OFF. Correction in the climb gradient for Anti-Ice ON is also provided below each table.

GRADIENTS FOR TAKEOFF THRUST AND FLAPS 0°

The gradients were obtained for a speed equal to 200 KIAS. The thrust rating was E T/O with Anti-Ice OFF. Below each table are provided corrections in the climb gradients for Anti-Ice ON and corrections for climb speed equal to V_{FS}.

GRADIENTS FOR CLIMB THRUST AND FLAPS 0°

The gradients were obtained for the following climb schedule:

– 240 KIAS up to 10000 ft, increasing linearly to 300 KIAS at 12000 ft, maintaining this speed up to 20000 ft.
– The thrust rating was CLB with Anti-Ice OFF. Corrections in the climb gradient for Anti-Ice ON are provided after the tables.

SECOND SEGMENT GROSS CLIMB GRADIENT

The gradients were obtained for E T/O, T/O and ALT T/O-1 takeoff ratings, at V_2 and wings leveled, with the landing gear retracted, anti-ice OFF, flaps 9°, One Engine Inoperative and maximum level-off height (1500 ft). Below each table are provided corrections in the climb gradients for Anti-Ice ON.

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CLIMB GRADIENT - ALL ENGINES OPERATING
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
E T/O MODE
AIRSPEED: V_2 + 10 KIAS
WINGS LEVELED

ALTITUDE: 0 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	36.76	33.96	31.46	29.21	27.16	25.27	23.48	21.86	20.41	19.09	17.88
-20	36.76	33.96	31.45	29.20	27.15	25.26	23.48	21.86	20.40	19.08	17.88
-10	36.87	34.05	31.52	29.24	27.16	25.23	23.42	21.80	20.35	19.03	17.83
0	36.76	33.94	31.41	29.14	27.07	25.14	23.33	21.72	20.27	18.96	17.76
10	36.64	33.83	31.31	29.04	26.97	25.04	23.24	21.63	20.19	18.88	17.68
20	36.53	33.73	31.20	28.94	26.87	24.94	23.15	21.54	20.10	18.80	17.61
30	32.76	30.12	27.73	25.54	23.55	21.74	20.12	18.67	17.37	16.19	15.12

ALTITUDE: 2000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	36.71	33.88	31.34	29.06	26.97	25.02	23.23	21.63	20.19	18.88	17.69
-20	36.68	33.85	31.32	29.04	26.95	25.00	23.21	21.61	20.17	18.86	17.67
-10	36.76	33.91	31.35	29.05	26.92	24.96	23.17	21.57	20.13	18.83	17.64
0	36.66	33.81	31.26	28.96	26.84	24.87	23.09	21.49	20.06	18.76	17.57
10	36.55	33.71	31.16	28.87	26.74	24.79	23.01	21.42	19.99	18.69	17.51
20	35.04	32.28	29.81	27.58	25.51	23.61	21.90	20.37	18.99	17.74	16.60
30	31.38	28.78	26.39	24.25	22.32	20.58	19.02	17.63	16.38	15.25	14.22

ALTITUDE: 4000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	37.02	34.14	31.54	29.21	27.02	25.04	23.25	21.64	20.20	18.90	17.70
-20	37.02	34.13	31.54	29.20	27.02	25.04	23.25	21.64	20.20	18.89	17.70
-10	37.01	34.12	31.52	29.17	26.99	25.01	23.21	21.61	20.17	18.86	17.67
0	36.99	34.09	31.48	29.09	26.91	24.94	23.15	21.55	20.11	18.81	17.62
10	36.87	33.98	31.38	28.99	26.82	24.85	23.07	21.47	20.04	18.74	17.56
20	33.34	30.66	28.24	26.02	24.01	22.18	20.54	19.08	17.76	16.57	15.48
30	29.97	27.40	25.02	22.95	21.08	19.42	17.92	16.59	15.40	14.31	13.33

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 4.31%.

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CLIMB GRADIENT - ALL ENGINES OPERATING
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
E T/O MODE
AIRSPEED: V_2 + 10 KIAS
WINGS LEVELED

ALTITUDE: 6000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	35.91	33.05	30.45	28.07	25.94	24.01	22.27	20.72	19.32	18.06	16.90
-20	35.92	33.06	30.46	28.08	25.95	24.02	22.28	20.72	19.33	18.06	16.91
-10	35.90	33.05	30.45	28.07	25.95	24.01	22.27	20.72	19.32	18.06	16.91
0	35.89	33.02	30.38	28.00	25.88	23.95	22.21	20.66	19.27	18.01	16.86
10	35.68	32.82	30.20	27.83	25.72	23.79	22.05	20.51	19.12	17.86	16.71
20	31.63	29.02	26.61	24.45	22.52	20.77	19.21	17.81	16.56	15.43	14.39
30	28.35	25.78	23.50	21.51	19.72	18.14	16.71	15.44	14.31	13.28	12.34

ALTITUDE: 8000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	33.98	31.18	28.56	26.29	24.25	22.40	20.75	19.28	17.96	16.76	15.66
-20	34.00	31.20	28.58	26.31	24.26	22.42	20.77	19.29	17.97	16.77	15.67
-10	33.97	31.18	28.56	26.29	24.25	22.40	20.75	19.28	17.96	16.76	15.66
0	33.92	31.11	28.49	26.23	24.19	22.35	20.70	19.23	17.91	16.71	15.62
10	33.63	30.83	28.24	25.98	23.96	22.14	20.50	19.04	17.73	16.55	15.46
20	29.89	27.32	24.94	22.87	21.01	19.34	17.85	16.52	15.33	14.25	13.26
30	26.51	24.03	21.85	19.95	18.26	16.75	15.41	14.21	13.13	12.16	11.27

ALTITUDE: 10000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	31.97	29.16	26.67	24.50	22.54	20.79	19.23	17.83	16.57	15.44	14.40
-20	32.03	29.22	26.72	24.55	22.59	20.84	19.27	17.87	16.62	15.48	14.44
-10	31.97	29.17	26.67	24.50	22.55	20.80	19.23	17.83	16.58	15.44	14.41
0	31.90	29.10	26.61	24.44	22.49	20.74	19.18	17.79	16.54	15.40	14.37
10	31.27	28.49	26.04	23.91	21.99	20.28	18.74	17.37	16.15	15.03	14.02
20	28.21	25.63	23.35	21.36	19.58	17.99	16.57	15.31	14.18	13.15	12.22
30	24.50	22.16	20.09	18.30	16.71	15.30	14.03	12.91	11.90	10.99	10.16

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 4.31%.

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CLIMB GRADIENT - ALL ENGINES OPERATING
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
E T/O MODE
AIRSPEED: V_2 + 10 KIAS
WINGS LEVELED

ALTITUDE: 12000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	29.03	26.38	24.05	22.01	20.20	18.58	17.14	15.85	14.69	13.64	12.69
-20	29.07	26.41	24.08	22.05	20.23	18.61	17.17	15.88	14.72	13.67	12.71
-10	29.05	26.39	24.06	22.03	20.21	18.59	17.15	15.85	14.70	13.65	12.69
0	28.98	26.33	24.01	21.97	20.16	18.54	17.10	15.81	14.65	13.61	12.65
10	28.86	26.21	23.89	21.86	20.06	18.45	17.01	15.72	14.57	13.53	12.57
20	26.34	23.87	21.70	19.80	18.11	16.62	15.27	14.08	13.01	12.04	11.16
30	22.75	20.50	18.54	16.83	15.33	13.98	12.78	11.72	10.76	9.90	9.11

ALTITUDE: 14000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	26.74	24.24	22.05	20.13	18.43	16.92	15.57	14.36	13.29	12.31	11.42
-20	26.77	24.27	22.07	20.15	18.45	16.94	15.59	14.38	13.30	12.32	11.43
-10	26.77	24.27	22.07	20.16	18.46	16.95	15.59	14.39	13.31	12.33	11.43
0	26.70	24.20	22.00	20.09	18.39	16.88	15.53	14.33	13.25	12.27	11.38
10	26.53	24.04	21.84	19.92	18.23	16.72	15.37	14.16	13.09	12.11	11.22
20	24.38	22.04	19.98	18.19	16.61	15.20	13.94	12.82	11.81	10.90	10.08
30	21.15	19.00	17.14	15.52	14.09	12.82	11.68	10.67	9.77	8.95	8.21

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 4.31%.

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CLIMB GRADIENT - ALL ENGINES OPERATING
TAKEOFF RATING - FLAPS 0°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
E T/O MODE
AIRSPEED: 200 KIAS
WINGS LEVELED

ALTITUDE: 0 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	31.72	29.40	27.35	25.53	23.90	22.43	21.10	19.88	18.77	17.74	16.79
-20	31.65	29.33	27.29	25.48	23.85	22.39	21.06	19.84	18.73	17.70	16.75
-10	31.54	29.23	27.20	25.39	23.77	22.30	20.98	19.77	18.66	17.64	16.69
0	31.38	29.08	27.05	25.25	23.64	22.18	20.86	19.66	18.55	17.54	16.59
10	31.21	28.92	26.90	25.11	23.50	22.06	20.74	19.54	18.44	17.43	16.49
20	31.06	28.78	26.77	24.99	23.39	21.95	20.64	19.45	18.35	17.34	16.41
30	27.31	25.28	23.49	21.90	20.47	19.18	18.01	16.95	15.96	15.06	14.22

ALTITUDE: 2000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	31.82	29.49	27.44	25.62	23.98	22.51	21.18	19.96	18.84	17.81	16.86
-20	31.75	29.43	27.38	25.56	23.93	22.46	21.13	19.91	18.79	17.77	16.81
-10	31.67	29.35	27.30	25.49	23.86	22.40	21.07	19.85	18.74	17.71	16.76
0	31.52	29.21	27.17	25.36	23.75	22.29	20.96	19.75	18.64	17.62	16.68
10	31.38	29.08	27.05	25.25	23.64	22.18	20.87	19.66	18.56	17.54	16.60
20	29.97	27.76	25.82	24.09	22.54	21.15	19.88	18.72	17.66	16.68	15.77
30	25.98	24.04	22.33	20.80	19.44	18.20	17.08	16.06	15.12	14.25	13.45

ALTITUDE: 4000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	31.81	29.48	27.43	25.61	23.97	22.50	21.17	19.95	18.83	17.80	16.85
-20	31.78	29.45	27.40	25.58	23.95	22.48	21.15	19.93	18.81	17.78	16.83
-10	31.68	29.36	27.32	25.50	23.88	22.41	21.08	19.87	18.75	17.73	16.78
0	31.53	29.22	27.19	25.38	23.76	22.30	20.97	19.77	18.66	17.63	16.69
10	31.37	29.07	27.04	25.24	23.63	22.18	20.86	19.66	18.55	17.54	16.59
20	28.25	26.16	24.31	22.67	21.20	19.88	18.68	17.58	16.57	15.64	14.77
30	24.61	22.76	21.13	19.68	18.38	17.20	16.13	15.15	14.25	13.42	12.65

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 4.29%.
CLIMBING IN V_{FS}, INCREASE THE CLIMB GRADIENT BY 0.82%.

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CLIMB GRADIENT - ALL ENGINES OPERATING
TAKEOFF RATING - FLAPS 0°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
E T/O MODE
AIRSPEED: 200 KIAS
WINGS LEVELED

ALTITUDE: 6000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	30.64	28.39	26.41	24.64	23.07	21.64	20.35	19.17	18.09	17.09	16.17
-20	30.60	28.35	26.37	24.61	23.04	21.62	20.33	19.15	18.07	17.07	16.15
-10	30.54	28.29	26.32	24.56	22.99	21.57	20.28	19.11	18.03	17.03	16.11
0	30.41	28.17	26.20	24.45	22.89	21.47	20.19	19.02	17.95	16.96	16.04
10	30.26	28.03	26.07	24.33	22.77	21.36	20.08	18.92	17.85	16.86	15.95
20	26.47	24.49	22.76	21.21	19.82	18.57	17.43	16.39	15.44	14.56	13.74
30	23.09	21.34	19.80	18.43	17.19	16.08	15.07	14.14	13.29	12.50	11.77

ALTITUDE: 8000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	28.62	26.50	24.64	22.98	21.50	20.16	18.94	17.83	16.81	15.87	15.00
-20	28.61	26.50	24.63	22.98	21.49	20.15	18.94	17.83	16.81	15.87	14.99
-10	28.54	26.43	24.57	22.92	21.44	20.10	18.89	17.78	16.76	15.82	14.95
0	28.42	26.32	24.47	22.82	21.34	20.01	18.80	17.70	16.69	15.75	14.88
10	28.29	26.20	24.35	22.71	21.24	19.92	18.71	17.61	16.60	15.67	14.81
20	24.47	22.63	21.01	19.57	18.27	17.10	16.04	15.06	14.17	13.34	12.58
30	21.43	19.79	18.35	17.06	15.91	14.86	13.91	13.04	12.24	11.50	10.81

ALTITUDE: 10000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	26.68	24.70	22.95	21.39	19.99	18.73	17.59	16.54	15.58	14.70	13.87
-20	26.68	24.70	22.95	21.39	19.99	18.73	17.59	16.54	15.58	14.70	13.87
-10	26.58	24.60	22.86	21.31	19.92	18.66	17.52	16.48	15.52	14.63	13.82
0	26.49	24.52	22.78	21.23	19.85	18.59	17.46	16.42	15.46	14.58	13.76
10	25.95	24.01	22.31	20.79	19.42	18.19	17.08	16.06	15.12	14.25	13.45
20	22.74	21.02	19.50	18.15	16.93	15.83	14.83	13.92	13.08	12.30	11.58
30	19.74	18.21	16.87	15.67	14.59	13.62	12.73	11.91	11.16	10.47	9.82

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 4.29%.
CLIMBING IN V_{FS}, INCREASE THE CLIMB GRADIENT BY 0.82%.

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CLIMB GRADIENT - ALL ENGINES OPERATING
TAKEOFF RATING - FLAPS 0°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
E T/O MODE
AIRSPEED: 200 KIAS
WINGS LEVELED

ALTITUDE: 12000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	23.84	22.04	20.46	19.05	17.78	16.64	15.60	14.65	13.77	12.97	12.22
-20	23.82	22.02	20.44	19.03	17.77	16.63	15.59	14.64	13.76	12.96	12.21
-10	23.76	21.97	20.39	18.99	17.72	16.58	15.55	14.60	13.73	12.92	12.18
0	23.64	21.86	20.29	18.89	17.63	16.50	15.46	14.52	13.65	12.85	12.11
10	23.50	21.73	20.17	18.77	17.52	16.39	15.37	14.43	13.56	12.77	12.03
20	21.09	19.48	18.06	16.79	15.65	14.62	13.68	12.82	12.03	11.30	10.62
30	17.92	16.52	15.28	14.17	13.18	12.28	11.46	10.70	10.01	9.37	8.77

ALTITUDE: 14000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	21.76	20.10	18.64	17.34	16.17	15.11	14.15	13.27	12.46	11.71	11.01
-20	21.74	20.09	18.63	17.33	16.16	15.10	14.14	13.26	12.45	11.70	11.00
-10	21.69	20.04	18.58	17.28	16.12	15.06	14.10	13.22	12.42	11.67	10.97
0	21.58	19.93	18.48	17.19	16.03	14.98	14.02	13.15	12.34	11.60	10.91
10	21.42	19.78	18.34	17.06	15.90	14.86	13.91	13.04	12.24	11.50	10.81
20	19.42	17.94	16.61	15.43	14.36	13.40	12.52	11.72	10.98	10.30	9.66
30	16.37	15.08	13.93	12.90	11.98	11.14	10.38	9.68	9.03	8.43	7.87

ALTITUDE: 15000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	20.18	18.63	17.26	16.04	14.94	13.95	13.05	12.22	11.46	10.75	10.10
-20	20.15	18.60	17.24	16.02	14.92	13.93	13.03	12.20	11.44	10.73	10.08
-10	20.11	18.57	17.20	15.98	14.89	13.90	13.00	12.17	11.41	10.71	10.06
0	20.01	18.47	17.11	15.90	14.81	13.83	12.93	12.11	11.35	10.65	10.00
10	19.60	18.09	16.76	15.56	14.49	13.53	12.64	11.83	11.09	10.40	9.76
20	17.86	16.46	15.23	14.13	13.14	12.24	11.42	10.67	9.98	9.34	8.74
30	14.85	13.65	12.60	11.65	10.80	10.02	9.32	8.67	8.07	7.51	6.99

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 4.29%.
CLIMBING IN V_{FS}, INCREASE THE CLIMB GRADIENT BY 0.82%.

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CLIMB GRADIENT - ALL ENGINES OPERATING
CLIMB RATING - FLAPS 0°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
CLB MODE
WINGS LEVELED
SPEED SCHEDULE: 240 KIAS UP TO 10000 FT. INCREASING LINEARLY TO 300 KIAS AT 12000 FT, MAINTAINING THIS SPEED UP TO 20000 FT.

ALTITUDE: 0 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	23.21	21.52	20.03	18.71	17.53	16.46	15.50	14.62	13.81	13.07	12.38
-20	23.16	21.47	19.99	18.67	17.49	16.43	15.46	14.58	13.78	13.04	12.35
-10	23.03	21.35	19.88	18.56	17.39	16.33	15.37	14.50	13.70	12.96	12.28
0	22.85	21.19	19.72	18.42	17.25	16.20	15.25	14.38	13.58	12.85	12.17
10	22.68	21.03	19.57	18.28	17.12	16.08	15.13	14.27	13.47	12.75	12.07
20	19.94	18.47	17.18	16.02	14.99	14.06	13.21	12.44	11.73	11.08	10.47
30	16.66	15.41	14.30	13.32	12.44	11.64	10.92	10.25	9.64	9.08	8.56

ALTITUDE: 2000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	22.80	21.14	19.67	18.37	17.21	16.16	15.21	14.35	13.55	12.82	12.14
-20	22.75	21.10	19.64	18.34	17.18	16.13	15.18	14.32	13.52	12.79	12.12
-10	22.65	21.00	19.54	18.25	17.10	16.05	15.11	14.25	13.46	12.73	12.06
0	22.47	20.83	19.39	18.11	16.96	15.93	14.99	14.13	13.35	12.62	11.95
10	21.99	20.38	18.96	17.71	16.58	15.57	14.65	13.81	13.04	12.33	11.67
20	18.61	17.23	16.01	14.92	13.95	13.08	12.28	11.55	10.89	10.27	9.70
30	15.46	14.29	13.25	12.33	11.51	10.76	10.08	9.46	8.88	8.36	7.86

ALTITUDE: 4000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	21.63	20.05	18.65	17.41	16.31	15.31	14.40	13.57	12.81	12.11	11.46
-20	21.60	20.02	18.62	17.39	16.28	15.28	14.38	13.55	12.79	12.09	11.45
-10	21.50	19.93	18.54	17.31	16.20	15.21	14.31	13.48	12.73	12.03	11.39
0	21.36	19.79	18.41	17.19	16.09	15.10	14.21	13.39	12.64	11.95	11.31
10	20.62	19.11	17.77	16.59	15.52	14.57	13.70	12.90	12.17	11.50	10.88
20	17.26	15.97	14.83	13.82	12.91	12.09	11.34	10.66	10.03	9.45	8.92
30	14.22	13.13	12.17	11.31	10.54	9.85	9.21	8.63	8.10	7.60	7.14

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 3.88%.

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CLIMB GRADIENT - ALL ENGINES OPERATING
CLIMB RATING - FLAPS 0°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
CLB MODE
WINGS LEVELED
SPEED SCHEDULE: 240 KIAS UP TO 10000 FT. INCREASING LINEARLY TO 300 KIAS AT 12000 FT, MAINTAINING THIS SPEED UP TO 20000 FT.

ALTITUDE: 6000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	20.12	18.64	17.34	16.18	15.14	14.20	13.35	12.57	11.86	11.20	10.59
-20	20.09	18.61	17.31	16.15	15.11	14.18	13.33	12.55	11.84	11.18	10.57
-10	20.01	18.54	17.24	16.08	15.05	14.12	13.27	12.49	11.79	11.13	10.53
0	19.89	18.42	17.13	15.98	14.95	14.03	13.18	12.41	11.71	11.06	10.45
10	19.20	17.78	16.53	15.42	14.42	13.52	12.70	11.96	11.27	10.64	10.06
20	15.96	14.76	13.70	12.75	11.90	11.13	10.43	9.80	9.21	8.67	8.16
30	13.00	11.99	11.10	10.31	9.59	8.95	8.36	7.82	7.32	6.86	6.43

ALTITUDE: 8000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	18.64	17.26	16.04	14.96	13.98	13.11	12.31	11.58	10.92	10.30	9.73
-20	18.61	17.23	16.01	14.93	13.96	13.09	12.29	11.56	10.90	10.28	9.71
-10	18.55	17.17	15.96	14.88	13.91	13.04	12.25	11.52	10.86	10.25	9.68
0	18.42	17.06	15.85	14.78	13.82	12.95	12.16	11.44	10.78	10.17	9.60
10	17.92	16.58	15.41	14.36	13.42	12.57	11.80	11.10	10.46	9.86	9.31
20	14.77	13.65	12.65	11.77	10.98	10.26	9.60	9.01	8.45	7.95	7.47
30	11.85	10.92	10.09	9.36	8.70	8.10	7.56	7.05	6.59	6.17	5.77

ALTITUDE: 10000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	17.20	15.91	14.78	13.77	12.86	12.05	11.30	10.63	10.00	9.43	8.89
-20	17.16	15.88	14.75	13.74	12.84	12.02	11.28	10.60	9.98	9.41	8.87
-10	17.11	15.83	14.70	13.70	12.80	11.98	11.24	10.57	9.95	9.37	8.84
0	16.99	15.72	14.59	13.60	12.70	11.89	11.16	10.49	9.87	9.30	8.77
10	16.66	15.41	14.31	13.33	12.45	11.65	10.93	10.27	9.66	9.10	8.58
20	13.62	12.57	11.64	10.82	10.08	9.41	8.80	8.24	7.72	7.25	6.80
30	10.70	9.85	9.10	8.42	7.81	7.26	6.76	6.30	5.87	5.47	5.11

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 3.88%.

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CLIMB GRADIENT - ALL ENGINES OPERATING
CLIMB RATING - FLAPS 0°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
CLB MODE
WINGS LEVELED
SPEED SCHEDULE: 240 KIAS UP TO 10000 FT. INCREASING LINEARLY TO 300 KIAS AT 12000 FT, MAINTAINING THIS SPEED UP TO 20000 FT.

ALTITUDE: 12000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	9.82	9.08	8.43	7.85	7.33	6.86	6.43	6.04	5.68	5.34	5.03
-20	9.77	9.03	8.38	7.80	7.28	6.81	6.39	6.00	5.64	5.31	5.00
-10	9.69	8.96	8.31	7.74	7.22	6.76	6.33	5.95	5.59	5.26	4.96
0	9.54	8.82	8.18	7.62	7.11	6.65	6.23	5.85	5.50	5.17	4.87
10	9.12	8.43	7.82	7.27	6.78	6.34	5.94	5.57	5.23	4.92	4.63
20	6.45	5.94	5.48	5.07	4.71	4.37	4.07	3.79	3.53	3.29	3.07
30	3.99	3.64	3.32	3.04	2.79	2.56	2.34	2.15	1.96	1.79	1.63

ALTITUDE: 14000 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	8.63	7.97	7.39	6.87	6.40	5.98	5.60	5.25	4.92	4.62	4.34
-20	8.58	7.92	7.34	6.82	6.36	5.94	5.56	5.21	4.88	4.59	4.31
-10	8.50	7.85	7.28	6.76	6.30	5.89	5.51	5.16	4.84	4.54	4.27
0	8.38	7.73	7.17	6.66	6.21	5.79	5.42	5.08	4.76	4.47	4.20
10	7.86	7.25	6.71	6.23	5.80	5.41	5.06	4.73	4.43	4.15	3.89
20	5.48	5.03	4.63	4.27	3.95	3.66	3.39	3.14	2.91	2.70	2.50
30	3.06	2.78	2.52	2.29	2.07	1.88	1.70	1.53	1.38	1.23	1.10

ALTITUDE: 15500 FT

ISA + (°C)	WEIGHT (lb)										
	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000
-30	7.80	7.19	6.66	6.18	5.75	5.37	5.01	4.69	4.39	4.11	3.86
-20	7.74	7.14	6.61	6.13	5.71	5.32	4.97	4.65	4.35	4.08	3.82
-10	7.68	7.08	6.56	6.09	5.66	5.28	4.93	4.61	4.32	4.04	3.79
0	7.55	6.96	6.44	5.98	5.56	5.19	4.84	4.53	4.24	3.97	3.72
10	7.01	6.46	5.97	5.53	5.14	4.79	4.46	4.16	3.89	3.64	3.40
20	4.74	4.34	3.99	3.67	3.38	3.12	2.88	2.65	2.45	2.26	2.08
30	2.38	2.13	1.92	1.72	1.54	1.37	1.22	1.08	0.94	0.82	0.70

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 3.88%.

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SECOND SEGMENT GROSS CLIMB GRADIENT
ONE ENGINE INOPERATIVE
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
E T/O MODE
AIRSPEED: V_2
WINGS LEVELED
MAXIMUM LEVEL-OFF HEIGHT: 1500 FT

ALTITUDE: 0 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	15.51	13.94	12.51	11.19	9.94	8.79	7.86	7.06	6.33	5.68	5.08
-20	15.53	13.96	12.52	11.20	9.95	8.80	7.87	7.07	6.34	5.69	5.09
-10	15.58	13.98	12.51	11.16	9.87	8.79	7.86	7.06	6.33	5.68	5.08
0	15.60	13.99	12.52	11.17	9.88	8.80	7.87	7.07	6.34	5.69	5.09
10	15.62	14.01	12.53	11.17	9.89	8.81	7.88	7.08	6.35	5.70	5.10
20	15.40	13.80	12.33	10.97	9.70	8.64	7.72	6.93	6.21	5.57	4.98
30	13.44	11.86	10.41	9.16	8.07	7.13	6.30	5.59	4.93	4.35	3.82

ALTITUDE: 2000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	14.62	13.06	11.63	10.31	9.08	8.06	7.18	6.41	5.73	5.11	4.53
-20	14.64	13.08	11.65	10.33	9.09	8.08	7.20	6.42	5.74	5.11	4.55
-10	14.68	13.09	11.63	10.28	9.10	8.08	7.20	6.43	5.74	5.11	4.55
0	14.73	13.14	11.67	10.32	9.13	8.12	7.23	6.46	5.77	5.14	4.58
10	14.74	13.15	11.68	10.33	9.14	8.12	7.24	6.47	5.78	5.15	4.58
20	14.54	12.95	11.48	10.13	8.94	7.96	7.09	6.32	5.64	5.02	4.46
30	12.49	10.91	9.55	8.35	7.34	6.45	5.66	4.98	4.36	3.81	3.30

ALTITUDE: 4000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	13.62	12.07	10.64	9.36	8.22	7.28	6.44	5.72	5.07	4.48	3.94
-20	13.66	12.11	10.68	9.39	8.26	7.31	6.47	5.75	5.10	4.50	3.97
-10	13.69	12.13	10.68	9.41	8.27	7.33	6.48	5.76	5.11	4.51	3.98
0	13.76	12.18	10.72	9.46	8.32	7.37	6.53	5.81	5.15	4.55	4.02
10	13.77	12.19	10.73	9.47	8.33	7.38	6.54	5.81	5.16	4.56	4.02
20	13.55	11.96	10.50	9.25	8.15	7.21	6.38	5.66	5.01	4.42	3.89
30	11.41	9.90	8.62	7.49	6.55	5.71	4.96	4.32	3.74	3.22	2.78

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 0.4%.

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SECOND SEGMENT GROSS CLIMB GRADIENT
ONE ENGINE INOPERATIVE
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
E T/O MODE
AIRSPEED: V_2
WINGS LEVELED
MAXIMUM LEVEL-OFF HEIGHT: 1500 FT

ALTITUDE: 6000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	12.56	11.01	9.63	8.43	7.38	6.50	5.70	5.02	4.40	3.84	3.34
-20	12.61	11.06	9.68	8.48	7.42	6.54	5.74	5.05	4.43	3.87	3.37
-10	12.62	11.07	9.69	8.49	7.43	6.55	5.75	5.06	4.44	3.88	3.38
0	12.70	11.13	9.76	8.55	7.49	6.60	5.80	5.11	4.49	3.93	3.42
10	12.71	11.13	9.76	8.55	7.49	6.61	5.81	5.12	4.49	3.93	3.42
20	12.47	10.88	9.54	8.34	7.33	6.44	5.66	4.97	4.36	3.81	3.31
30	10.35	8.95	7.71	6.69	5.79	5.00	4.29	3.68	3.13	2.70	2.33

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 0.5%.

ALTITUDE: 8000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	11.42	9.93	8.64	7.49	6.55	5.70	4.95	4.31	3.73	3.21	2.79
-20	11.46	9.98	8.68	7.53	6.58	5.74	4.98	4.34	3.76	3.24	2.80
-10	11.49	10.00	8.70	7.55	6.60	5.75	5.00	4.35	3.77	3.25	2.81
0	11.57	10.08	8.78	7.62	6.67	5.82	5.07	4.41	3.83	3.30	2.84
10	11.58	10.09	8.79	7.63	6.67	5.82	5.07	4.42	3.83	3.31	2.85
20	11.28	9.80	8.52	7.40	6.47	5.65	4.90	4.27	3.70	3.18	2.75
30	9.35	8.02	6.87	5.91	5.06	4.31	3.64	3.06	2.64	2.24	-

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 1.8%.

ALTITUDE: 10000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	9.92	8.57	7.35	6.32	5.44	4.66	3.98	3.39	2.87	2.53	2.20
-20	9.98	8.63	7.41	6.38	5.50	4.71	4.02	3.43	2.90	2.54	2.21
-10	10.02	8.66	7.44	6.40	5.52	4.73	4.04	3.45	2.92	2.55	2.22
0	10.02	8.66	7.44	6.40	5.52	4.74	4.05	3.45	2.92	2.55	2.22
10	10.00	8.64	7.42	6.39	5.51	4.73	4.04	3.45	2.91	2.54	2.21
20	9.57	8.23	7.05	6.08	5.23	4.47	3.79	3.21	2.74	2.36	-
30	7.58	6.38	5.39	4.51	3.75	3.06	2.56	2.11	-	-	-

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 2.3%.

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SECOND SEGMENT GROSS CLIMB GRADIENT
ONE ENGINE INOPERATIVE
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
T/O MODE
AIRSPEED: V_2
WINGS LEVELED
MAXIMUM LEVEL-OFF HEIGHT: 1500 FT

ALTITUDE: 0 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	14.05	12.50	11.08	9.75	8.57	7.61	6.76	6.01	5.35	4.74	4.19
-20	14.08	12.53	11.11	9.77	8.60	7.63	6.78	6.03	5.37	4.76	4.21
-10	14.10	12.52	11.07	9.74	8.59	7.63	6.78	6.03	5.36	4.75	4.20
0	14.12	12.54	11.08	9.75	8.61	7.64	6.79	6.04	5.38	4.77	4.22
10	14.15	12.56	11.10	9.77	8.62	7.66	6.81	6.06	5.39	4.78	4.23
20	14.03	12.45	10.98	9.67	8.53	7.57	6.73	5.98	5.32	4.71	4.16
30	12.04	10.49	9.17	7.99	7.00	6.13	5.36	4.68	4.08	3.54	3.05

ALTITUDE: 2000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	13.16	11.62	10.21	8.93	7.86	6.94	6.12	5.41	4.77	4.19	3.67
-20	13.19	11.65	10.23	8.96	7.88	6.96	6.14	5.43	4.79	4.21	3.69
-10	13.20	11.62	10.20	8.96	7.87	6.96	6.14	5.43	4.79	4.21	3.69
0	13.23	11.65	10.23	8.98	7.90	6.98	6.16	5.45	4.81	4.23	3.71
10	13.24	11.65	10.24	8.99	7.90	6.99	6.16	5.46	4.81	4.24	3.71
20	13.08	11.50	10.10	8.85	7.78	6.87	6.05	5.35	4.71	4.13	3.61
30	11.19	9.73	8.45	7.33	6.39	5.56	4.82	4.18	3.61	3.08	2.67

ALTITUDE: 4000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	12.21	10.68	9.32	8.13	7.12	6.25	5.47	4.80	4.19	3.65	3.14
-20	12.26	10.72	9.36	8.17	7.15	6.28	5.50	4.82	4.22	3.67	3.17
-10	12.26	10.70	9.36	8.17	7.16	6.28	5.51	4.83	4.22	3.68	3.17
0	12.30	10.74	9.41	8.21	7.20	6.32	5.54	4.86	4.26	3.71	3.20
10	12.30	10.73	9.40	8.21	7.20	6.32	5.54	4.86	4.25	3.71	3.20
20	12.19	10.63	9.30	8.12	7.11	6.24	5.47	4.79	4.19	3.64	3.14
30	10.33	8.93	7.70	6.66	5.77	4.97	4.27	3.66	3.10	2.68	2.29

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 0.5%.

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SECOND SEGMENT GROSS CLIMB GRADIENT
ONE ENGINE INOPERATIVE
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
T/O MODE
AIRSPEED: V_2
WINGS LEVELED
MAXIMUM LEVEL-OFF HEIGHT: 1500 FT

ALTITUDE: 6000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	11.18	9.69	8.42	7.28	6.35	5.53	4.78	4.15	3.58	3.06	2.67
-20	11.21	9.72	8.45	7.31	6.38	5.56	4.81	4.18	3.61	3.09	2.69
-10	11.23	9.74	8.47	7.33	6.39	5.57	4.83	4.19	3.62	3.09	2.69
0	11.27	9.80	8.53	7.38	6.44	5.62	4.87	4.23	3.66	3.13	2.72
10	11.26	9.80	8.52	7.38	6.44	5.61	4.87	4.23	3.65	3.13	2.72
20	11.18	9.71	8.44	7.31	6.38	5.55	4.81	4.17	3.60	3.08	2.69
30	9.36	8.03	6.87	5.91	5.05	4.31	3.64	3.05	2.62	2.22	-

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 0.5%.

ALTITUDE: 8000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	10.13	8.75	7.53	6.50	5.61	4.82	4.13	3.53	2.99	2.60	2.23
-20	10.17	8.78	7.57	6.53	5.64	4.85	4.16	3.55	3.02	2.61	2.24
-10	10.19	8.80	7.58	6.55	5.66	4.87	4.17	3.57	3.03	2.62	2.25
0	10.25	8.86	7.64	6.60	5.70	4.91	4.21	3.61	3.05	2.65	2.27
10	10.25	8.85	7.63	6.59	5.70	4.91	4.21	3.61	3.05	2.64	2.26
20	10.18	8.79	7.57	6.54	5.66	4.87	4.17	3.57	3.03	2.63	2.22
30	8.40	7.13	6.06	5.16	4.36	3.65	3.02	2.56	2.15	-	-

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 2.9%.

ALTITUDE: 10000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	8.76	7.47	6.33	5.41	4.58	3.86	3.22	2.75	2.38	-	-
-20	8.81	7.52	6.38	5.45	4.62	3.90	3.26	2.76	2.40	-	-
-10	8.84	7.56	6.41	5.48	4.65	3.93	3.28	2.78	2.41	-	-
0	8.85	7.56	6.41	5.48	4.65	3.93	3.28	2.78	2.40	-	-
10	8.83	7.55	6.40	5.47	4.64	3.92	3.27	2.77	2.39	-	-
20	8.46	7.19	6.10	5.20	4.39	3.68	3.04	2.59	-	-	-
30	6.65	5.55	4.61	3.80	3.08	2.54	-	-	-	-	-

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 3.4%.

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SECOND SEGMENT GROSS CLIMB GRADIENT
ONE ENGINE INOPERATIVE
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
ALT T/O-1 MODE
AIRSPEED: V_2
WINGS LEVELED
MAXIMUM LEVEL-OFF HEIGHT: 1500 FT

ALTITUDE: 0 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	12.75	11.17	9.76	8.54	7.53	6.63	5.83	5.13	4.51	3.94	3.43
-20	12.76	11.18	9.77	8.55	7.53	6.63	5.83	5.14	4.51	3.95	3.43
-10	12.72	11.11	9.74	8.52	7.51	6.62	5.82	5.12	4.50	3.93	3.42
0	12.71	11.10	9.73	8.52	7.51	6.61	5.81	5.12	4.50	3.93	3.42
10	12.71	11.10	9.73	8.52	7.51	6.61	5.81	5.12	4.49	3.93	3.42
20	12.67	11.06	9.70	8.49	7.48	6.58	5.79	5.09	4.47	3.91	3.40
30	12.00	10.44	9.12	7.94	6.97	6.11	5.34	4.67	4.07	3.53	3.05

ALTITUDE: 2000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	12.55	10.97	9.58	8.38	7.38	6.49	5.70	5.01	4.39	3.84	3.33
-20	12.56	10.98	9.59	8.39	7.38	6.49	5.70	5.02	4.40	3.84	3.33
-10	12.52	10.93	9.57	8.37	7.37	6.48	5.69	5.00	4.39	3.83	3.32
0	12.54	10.94	9.59	8.38	7.38	6.49	5.70	5.02	4.40	3.84	3.34
10	12.53	10.94	9.58	8.38	7.38	6.49	5.70	5.01	4.40	3.84	3.33
20	12.46	10.87	9.52	8.32	7.32	6.44	5.65	4.97	4.35	3.80	3.29
30	11.18	9.70	8.42	7.32	6.39	5.56	4.82	4.18	3.60	3.09	2.67

ALTITUDE: 4000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	12.20	10.64	9.27	8.09	7.12	6.24	5.47	4.79	4.19	3.64	3.15
-20	12.25	10.68	9.31	8.13	7.15	6.27	5.50	4.82	4.21	3.67	3.16
-10	12.23	10.66	9.31	8.13	7.16	6.28	5.50	4.82	4.22	3.67	3.17
0	12.26	10.70	9.35	8.17	7.19	6.31	5.54	4.86	4.25	3.70	3.20
10	12.26	10.70	9.35	8.17	7.19	6.31	5.53	4.85	4.25	3.70	3.20
20	12.15	10.60	9.25	8.08	7.11	6.23	5.46	4.78	4.18	3.64	3.13
30	10.31	8.91	7.67	6.65	5.77	4.97	4.26	3.66	3.10	2.68	2.29

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 0.4%.

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SECOND SEGMENT GROSS CLIMB GRADIENT
ONE ENGINE INOPERATIVE
TAKEOFF RATING - FLAPS 9°

AE3007A1E ENGINES

ANTI ICE: OFF
LANDING GEAR UP
ALT T/O-1 MODE
AIRSPEED: V_2
WINGS LEVELED
MAXIMUM LEVEL-OFF HEIGHT: 1500 FT

ALTITUDE: 6000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	11.17	9.65	8.38	7.28	6.34	5.52	4.78	4.15	3.57	3.06	2.67
-20	11.20	9.69	8.41	7.31	6.37	5.55	4.81	4.18	3.60	3.09	2.70
-10	11.22	9.70	8.43	7.32	6.38	5.56	4.82	4.18	3.61	3.09	2.70
0	11.26	9.77	8.49	7.38	6.44	5.61	4.87	4.23	3.65	3.13	2.72
10	11.26	9.77	8.49	7.38	6.44	5.61	4.86	4.23	3.65	3.12	2.72
20	11.17	9.68	8.41	7.31	6.37	5.55	4.80	4.17	3.60	3.07	2.70
30	9.34	8.01	6.86	5.90	5.05	4.30	3.63	3.06	2.62	2.22	-

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 0.5%.

ALTITUDE: 8000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	10.11	8.71	7.49	6.48	5.61	4.82	4.13	3.53	3.01	2.60	2.23
-20	10.14	8.75	7.53	6.53	5.64	4.85	4.15	3.55	3.02	2.62	2.24
-10	10.16	8.77	7.55	6.53	5.65	4.86	4.17	3.56	3.03	2.63	2.25
0	10.22	8.83	7.60	6.60	5.70	4.91	4.21	3.61	3.06	2.65	2.28
10	10.22	8.82	7.60	6.59	5.70	4.91	4.21	3.60	3.05	2.65	2.27
20	10.16	8.77	7.54	6.54	5.66	4.87	4.17	3.57	3.03	2.64	2.23
30	8.37	7.10	6.06	5.16	4.35	3.64	3.02	2.57	2.15	-	-

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 2.9%.

ALTITUDE: 10000 FT

ISA + (°C)	WEIGHT (lb)										
	29000	31000	33000	35000	37000	39000	41000	43000	45000	47000	49000
-30	8.73	7.44	6.33	5.40	4.58	3.86	3.22	2.75	2.39	-	-
-20	8.78	7.49	6.38	5.45	4.62	3.90	3.26	2.78	2.40	-	-
-10	8.81	7.52	6.41	5.48	4.65	3.93	3.28	2.78	2.41	-	-
0	8.82	7.52	6.41	5.48	4.65	3.93	3.28	2.78	2.41	-	-
10	8.80	7.49	6.40	5.47	4.64	3.92	3.27	2.78	2.39	-	-
20	8.44	7.17	6.10	5.19	4.39	3.67	3.03	2.59	2.19	-	-
30	6.64	5.55	4.61	3.79	3.07	2.54	-	-	-	-	-

FOR ANTI-ICE ON, REDUCE THE CLIMB GRADIENT BY 3.4%.

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SUPPLEMENTARY TAKEOFF INFORMATION

TURN ANALYSIS

The method below presents the criteria for transforming a takeoff flight path with turns in an equivalent straight one to allow the use of the AFM charts or runway analysis software to determine obstacle clearance.

The method to be used herein converts an actual flight path with turns and wind effects to an equivalent straight flight path with still air.

The equivalent straight flight path with still air will be determined in terms of increments on the existing obstacles' height that should be taken into account to ensure obstacle clearance. With the equivalent straight flight path, the performance calculation must be done, as usual, as presented in the AFM.

OPERATIONAL LIMITATIONS

Maximum bank angle: All Engines Operative: 25° at V_2 + 10
One Engine Inoperative: 15° at V_2
One Engine Inoperative: 20° at V_2 + 5 (*)
One Engine Inoperative: 25° at V_2 + 10 (*)

(*) According FAR 121.189 (f), the maximum bank angle with one engine inoperative is 15°.

According EU-OPS 1.495 (c), if the airplane is banked by more than 15° the net path must clear all obstacles after the banked turn by 50 ft instead of 35 ft.

EQUIVALENT STRAIGHT FLIGHT PATH DETERMINATION

The equivalent straight flight path (zero wind) to be used in the performance calculation should be determined as follows:

1) OBSTACLE INCREMENT IN A STEADY TURN
During a steady turn the climb gradient deteriorates. To compensate, an increment of the actual obstacle height must be obtained as a function of the gradient loss due to a steady turn and the turning distance flown to the obstacle by the following relation:

$$\Delta H = D_T \times G_L + A_W$$

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Where:

ΔH = obstacle height increment.

D_T = distance flown along the turning flight to the obstacle.

G_L = gradient loss (obtained from the gradient loss due to a steady turn chart).

A_W = allowance to compensate the lower wing tip height due to the bank angle.

A_W = [wingspan x sin (bank angle)]/2

The equivalent obstacle height to be used in a obstacle clearance calculation is:

$H_E = H_A + \Delta H_1 + \Delta H_2 + ...+ \Delta H_n$

Where:

H_E = equivalent obstacle height.

H_A = actual obstacle height.

$\Delta H_{1,\ 2,\ n}$ = height increments for each distance portion flown in turn to the obstacle.

2) WIND EFFECT ON THE FLIGHT PATH

a) STRAIGHT FLIGHT PORTIONS

Considering the drift compensation, the straight portions of the flight path may be corrected to still air equivalent distance as follows:

$$SAD = \frac{GD \times TAS}{GS}$$

Where:

SAD = still air equivalent distance.

GD = actual ground distance.

TAS = airplane true airspeed (obtained from the radius of turns and speed conversion chart).

GS = airplane ground speed.

For straight flight:

$GS = TAS + (V_W \times \cos\alpha)$.

Where:

V_W = wind speed.

α = angle between flight direction and wind direction.

Remarks:

$V_W \times \cos\alpha$ is negative for a head wind component.

$V_W \times \cos\alpha$ is positive for a tailwind component.

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b) TURNING FLIGHT PORTIONS

Two effects must be taken into account:

b1) Trajectory Displacement:

The trajectory is displaced in the wind component direction proportionally to the time.

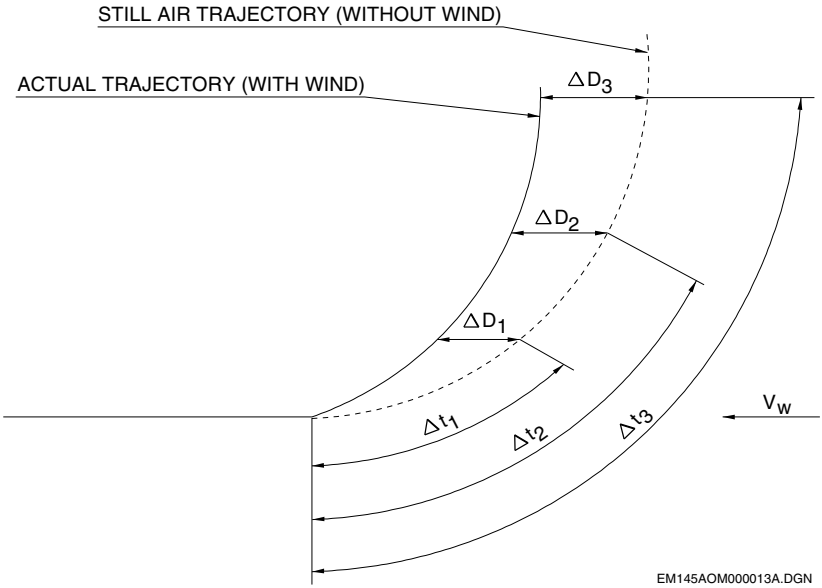
The displacement may be calculated by:

$\Delta D = \Delta t \times V_W$.

ΔD = trajectory displacement in the wind component direction.

Δt = elapsed time in turning flight (obtained from the Horizontal Distance and Time to Complete chart).

V_W = wind speed.



b2) Distance Flown Compensation:

The wind takes the same effect as mentioned in item 2a.

$$SAD = \frac{GD \times TAS}{GS}$$

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For turning flight:

$$GS = \frac{Dm}{\Delta t}$$

Where:

Dm = distance flown along the actual trajectory.

Δt = elapsed time in turning flight.

PERFORMANCE CHARTS PRESENTATION

GRADIENT LOSS DUE TO A STEADY TURN

This chart shows the gradient loss due to a steady turn as a function of the bank angle.

For bank angle greater than 15° use the following corrections:

BANK	SPEED	GRADIENT CORRECTION
20°	V_2 + 5	15° gradient loss multiplied by 2
25°	V_2 + 10	15° gradient loss multiplied by 3

NOTE: For bank angle greater than 15°, add an extra 15 ft to the corrected obstacle height, due to net path margin increased from 35 ft to 50 ft.

RADIUS OF TURN AND SPEED CONVERSION

This chart shows the radius of turn and the true airspeed to be used on the turning flight path calculation as a function of the indicated airspeed (V_2), airport pressure altitude, outside air temperature and the bank angle.

HORIZONTAL DISTANCE AND TIME TO COMPLETE

This chart shows the horizontal distance and the elapsed time during a turning flight as a function of the radius of turn, heading change and the bank angle.

NOTE: If necessary, the heading change may be divided in segments and the elapsed time of each segment should be added.

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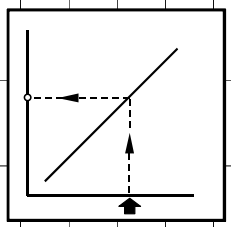
GRADIENT LOSS DUE TO A STEADY TURN

ONE ENGINE INOPERATIVE FLAPS 9°

Φ	ΔV (KIAS)
0	0
15	0
20	5
25	10
30	15



GRADIENT LOSS - %

2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

BANK ANGLE - deg

135BJAOMCTA003 - 07APR2002

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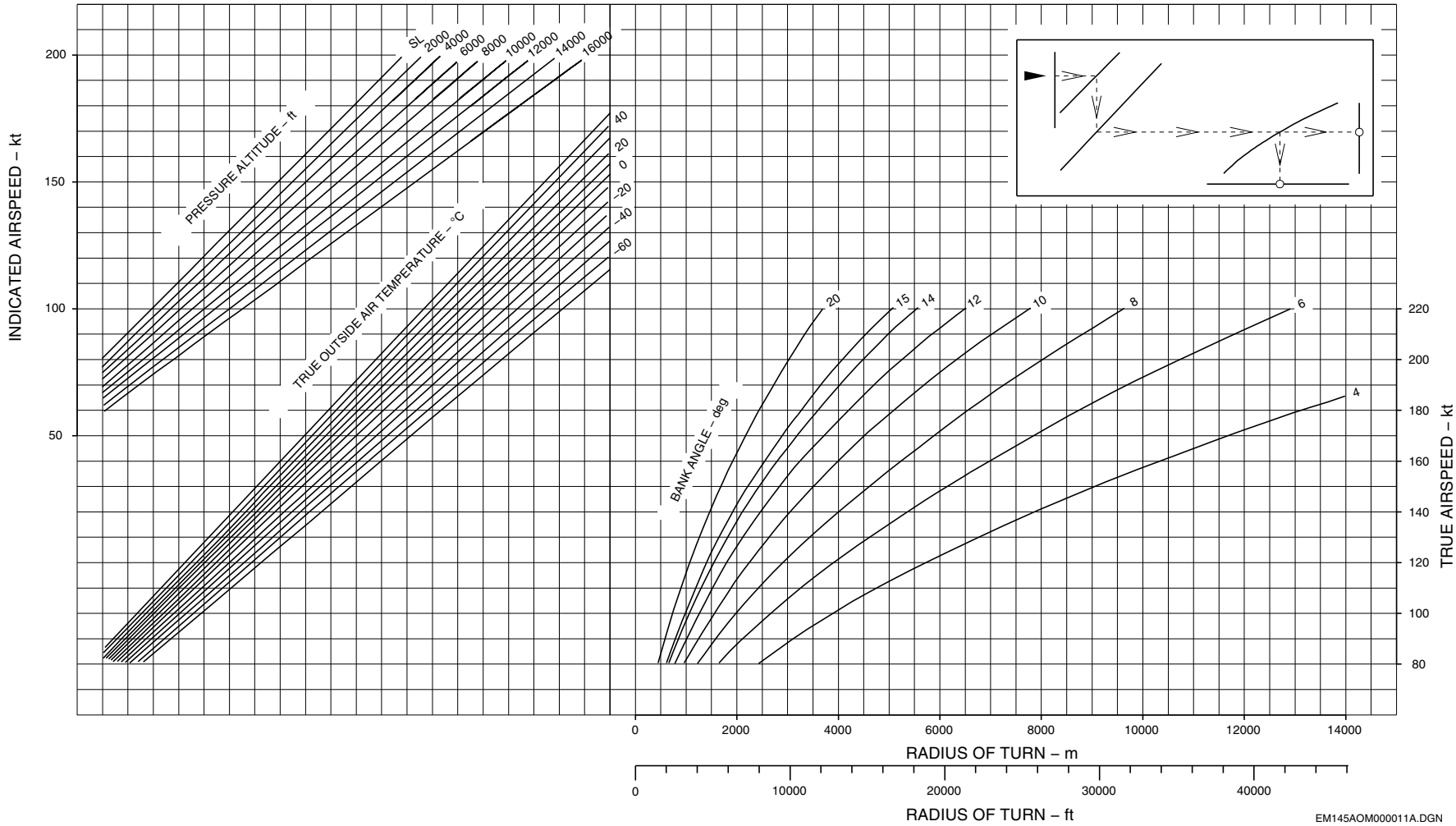
RADIUS OF TURN AND SPEED CONVERSION



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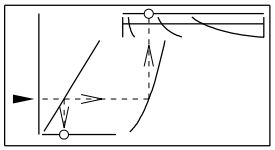
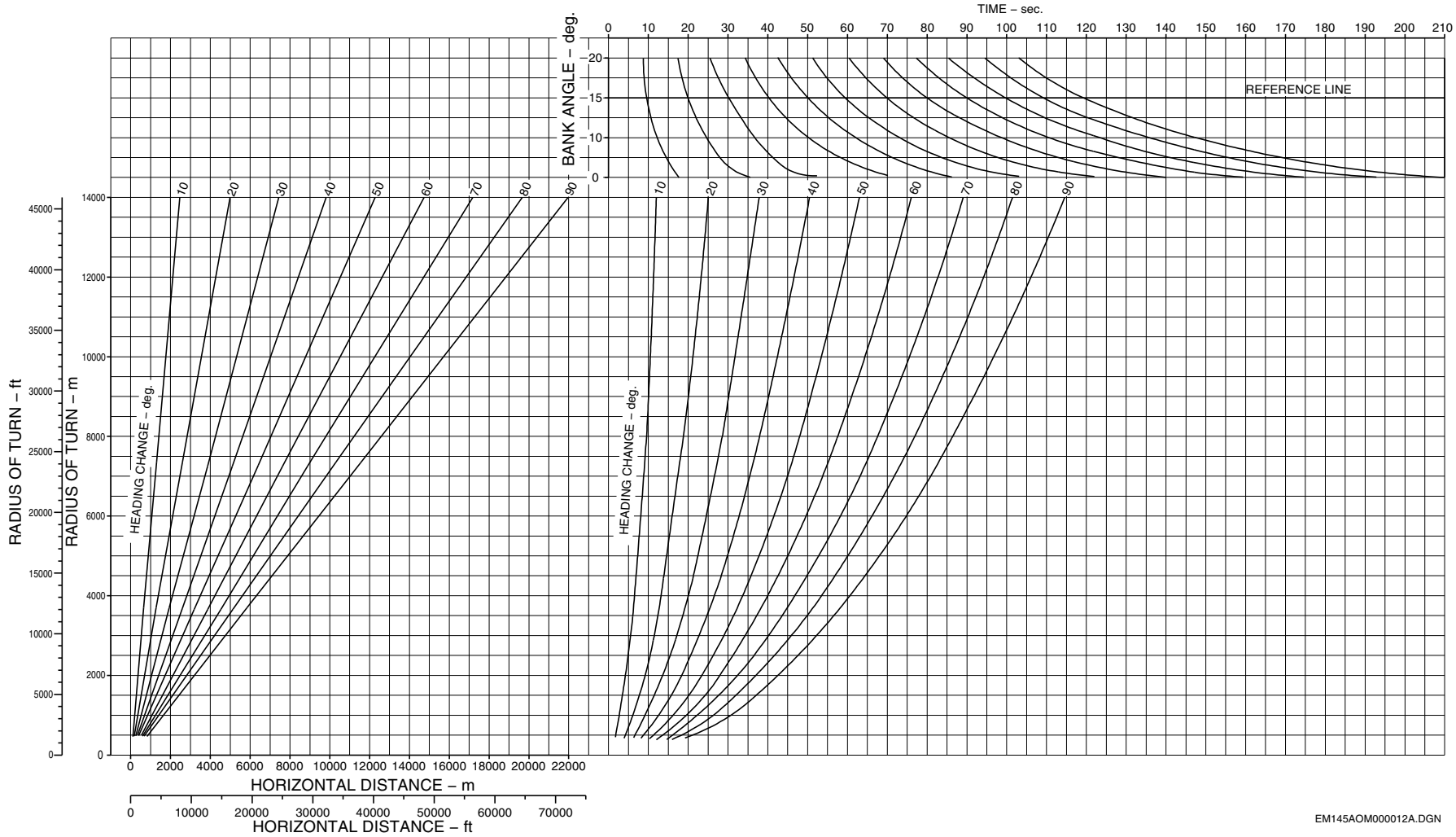
HORIZONTAL DISTANCE AND TIME TO COMPLETE





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AIRPLANE CLASSIFICATION NUMBER - ACN

The Pavement Classification Number (PCN) reported shall indicate that an airplane with ACN equal to or less than the reported PCN can operate on that pavement.

PCN - PAVEMENT CLASSIFICATION NUMBER

Example: PCN 50/F/A/X/T

1 2 3 4

1 - Type of pavement:

R = Rigid (concrete); F = Flexible (asphalt).

2 - Pavement sub-grade strength category:

A = High; B = Medium; C = Low; D = Ultra-low.

3 - Maximum tire pressure authorized for the pavement:

W = Unlimited, no limit; X = High (up to 254 psi).

Y = Medium (up to 181 psi); Z = Low (up to 73 psi).

4 - Pavement evaluation method:

T = Technical evaluation;

U = By experience of airplane actually using the pavement.

NOTE: The classification above depicts ICAO's recommendation as per Annex 14, Amendment 11. Local Authorities classification should prevail if discrepancies with ICAO's are found.

OVERLOAD OPERATIONS

Individual airport authorities are free to decide on their own criteria for permitting overload operations as long as pavements remain safe for use by airplane. However, a 10% difference in ACN over PCN for flexible pavement and 5% for rigid pavements is generally accepted, provided that overload operations do not exceed 5% of the annual departures and are spread throughout the year.

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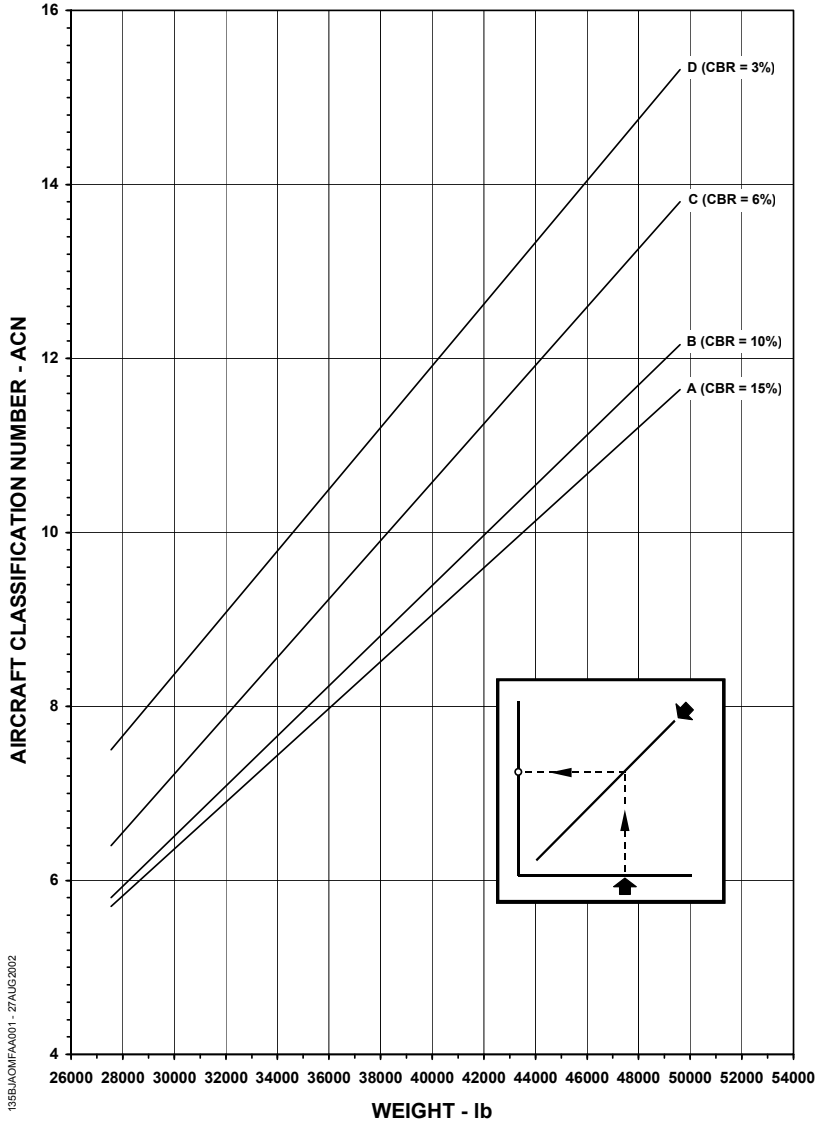
EMB-135BJ - ACN FLEXIBLE PAVEMENT



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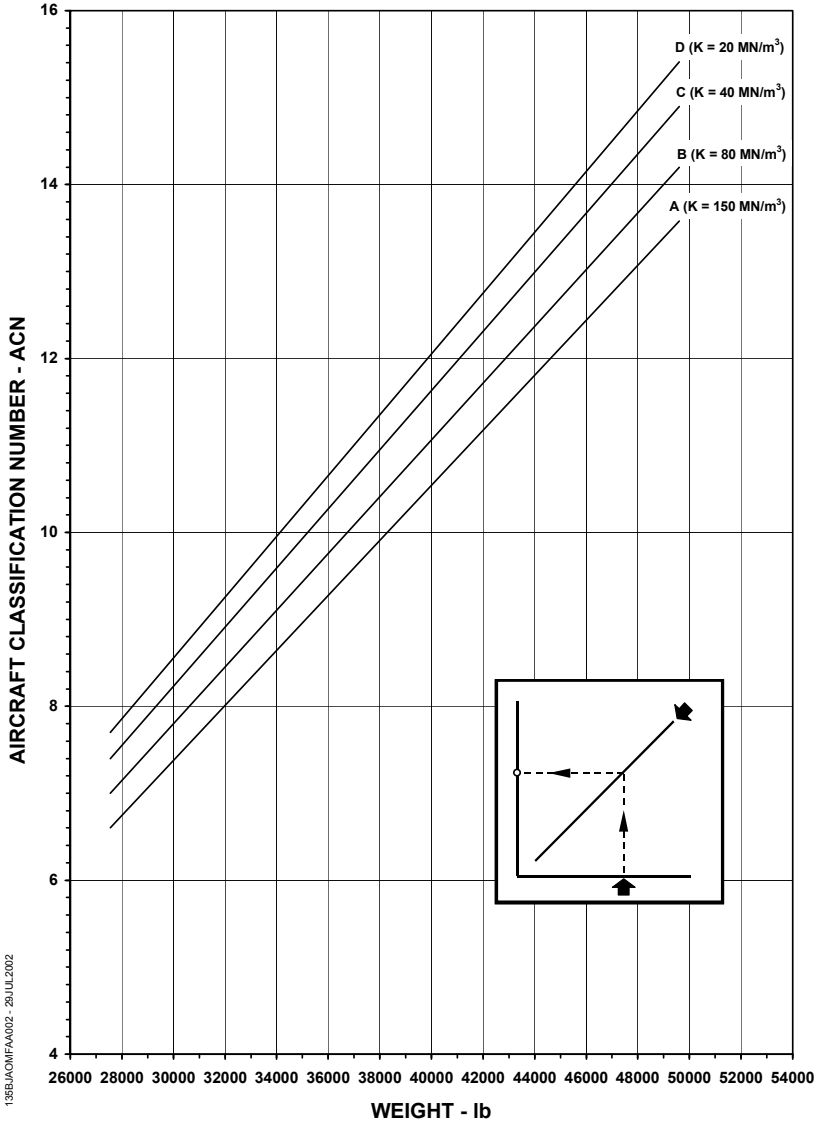
EMB-135BJ - ACN RIGID PAVEMENT



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TAKEOFF PERFORMANCE

Refer to the Airplane Flight Manual for a complete set of charts for determination of the limiting takeoff weights.

EMBRAER RUNWAY ANALYSIS SOFTWARE

Although the AFM presents all the required performance data for takeoff, the amount of options and charts presented, makes their use very difficult. In order to help operators, Embraer developed runway analysis software for determination of the limiting weights.

THE TAKEOFF OUTPUT DATA

The program outputs the N1, weight, $V_1/V_R/V_2$, the level-off altitude and height, and the code assigned to the limitation detected during the calculation process. These data are valid for the wind and temperature associated.

The data are calculated for up to seven reference winds for a range of temperatures.

The level-off output depends upon the Minimum Level-off Height entered in the data input. If obstacle clearance is required, a value higher than the one entered will be automatically be provided.

NOTE: Level-off height must be corrected for temperatures below standard.

Limitation codes assigned are a number (1, 2 etc) for Obstacle limited weight, R for Runway limited weight, W for WAT limited weight (same as Climb or Second Segment), S for Structural limited weight, V for V_{1MIN}, L for Level Off limited weight and B for a Brake Energy limited weight.

If the operation for a specific condition is considered unfeasible or outside the performance tables, the relevant data will be provided with asterisks.

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Wind (in knots)

EMB-135 BJ RUNWAY ANALYSIS, ALLISON 3007A1P ENGINES, FAA CERTIFICATION

Airport: AIRPORT NAME Runway: 01
Elevation: 101 RUNWAY LENGTH: 6500 ft
Slope: 1 %

Anti Ice: OFF
Normal V2
Thrust schedule : T/O 1
NO REVERSE
Alignment allowance: 0ft

LIMIT WEIGHTS (lb), V1, R, V2 (Kt) as function of Temperature and Wind:

Temp(C)/N1(%)	-10 Kt	0 Kt	10 Kt	20 Kt
4 / 84.9	41137/ 123/ 123/ 134 R	43503/ 129/ 129/ 139 R	43600/ 129/ 129/ 139 S	43600/ 129/ 129/ 139 S
6 / 85.2	41086/ 123/ 123/ 134 R	43450/ 128/ 128/ 139 R	43600/ 129/ 129/ 139 S	43600/ 129/ 129/ 139 S
8 / 85.5	41035/ 123/ 123/ 134 R	43397/ 128/ 128/ 138 R	43600/ 129/ 129/ 139 S	43600/ 129/ 129/ 139 S
10 / 85.9	40983/ 122/ 123/ 134 R	43346/ 128/ 128/ 138 R	43600/ 129/ 129/ 139 S	43600/ 129/ 129/ 139 S
12 / 86.1	40928/ 122/ 122/ 134 R	43292/ 128/ 128/ 138 R	43600/ 129/ 129/ 139 S	43600/ 129/ 129/ 139 S
14 / 86.4	40872/ 122/ 122/ 133 R	43238/ 128/ 128/ 138 R	43600/ 129/ 129/ 139 S	43600/ 129/ 129/ 139 S
16 / 86.7	40817/ 122/ 122/ 133 R	43186/ 127/ 127/ 138 R	43300/ 129/ 129/ 139 R	43600/ 129/ 129/ 139 S
18 / 87.1	40764/ 121/ 122/ 133 R	43135/ 127/ 127/ 138 R	42600/ 129/ 129/ 139 R	43600/ 129/ 129/ 139 S
20 / 87.4	40710/ 121/ 121/ 133 R	43084/ 127/ 127/ 137 R	42479/ 129/ 129/ 139 R	43600/ 129/ 129/ 139 S
22 / 87.7	40656/ 121/ 121/ 133 R	43033/ 127/ 127/ 137 R	42425/ 128/ 128/ 139 R	43600/ 129/ 129/ 139 S
24 / 87.9	40602/ 121/ 121/ 132 R	42981/ 127/ 127/ 137 R	42372/ 128/ 128/ 138 R	43600/ 129/ 129/ 139 S
26 / 88.2	40549/ 120/ 121/ 132 R	42923/ 126/ 126/ 137 R	42320/ 128/ 128/ 138 R	43600/ 129/ 129/ 139 S
28 / 88.6	40496/ 120/ 120/ 132 R	42865/ 126/ 126/ 137 R	42268/ 128/ 128/ 138 R	43600/ 129/ 129/ 139 S
30 / 88.9	40444/ 120/ 120/ 132 R	42809/ 126/ 126/ 137 R	42217/ 128/ 128/ 138 R	43600/ 129/ 129/ 139 S
32 / 89.2	40393/ 120/ 120/ 132 R	42753/ 126/ 126/ 136 R	42167/ 127/ 127/ 138 R	42560/ 129/ 129/ 139 R
34 / 89.4	40343/ 119/ 120/ 132 R	42699/ 126/ 126/ 136 R	41119/ 127/ 127/ 138 R	42509/ 129/ 129/ 139 R
36 / 89.7	40293/ 119/ 120/ 131 R	42645/ 125/ 125/ 136 R	41071/ 127/ 127/ 137 R	42458/ 129/ 129/ 139 R
38 / 90	40244/ 119/ 119/ 131 R	42593/ 125/ 125/ 136 R	41024/ 127/ 127/ 137 R	42409/ 128/ 128/ 138 R
40 / 90.3	40188/ 119/ 119/ 131 R	42533/ 125/ 125/ 136 R	41966/ 127/ 127/ 137 R	42352/ 128/ 128/ 138 R
42 / 90.5	40107/ 118/ 119/ 131 R	42445/ 125/ 125/ 135 R	40874/ 126/ 126/ 137 R	42270/ 128/ 128/ 138 R

Limitation codes: 1,2,.. - Obstacle No.; L = Level off; R - Runway; S - Structural; B - Brake Energy; W - WAT

Temperature (in degrees Celsius) and N1 (in percentage)

Weight/V_1/V_R/V_2 and limitation code (weight in pounds, and speeds in knots)

EXAMPLE

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APPROACH

APPROACH CLIMB SPEED - FLAPS 9°

WEIGHT (lb)	APPROACH CLIMB SPEED (KIAS)
29000	127
30000	129
31000	132
32000	134
33000	136
34000	137
35000	139
36000	141
37000	143
38000	145
39000	146
40000	148
41000	150
42000	152
43000	153
44000	155
45000	157
46000	158
47000	160
48000	161
49000	163
50000	164

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LANDING CLIMB AND REFERENCE SPEEDS

NO ICE ENCOUNTER

WEIGHT (lb)	V_{REF} - KIAS	
	FLAPS 45°	FLAPS 22°
29000	110	110
30000	110	111
31000	110	113
32000	112	114
33000	113	116
34000	115	118
35000	117	119
36000	118	121
37000	120	122
38000	121	124
39000	123	125
40000	124	127
41000	126	128
42000	127	130
43000	129	131
44000	130	133
45000	132	134
46000	133	135
47000	135	137
48000	136	138
49000	137	139
50000	139	141

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AFTER ICE ENCOUNTER

WEIGHT (lb)	V_{REF} - KIAS	
	FLAPS 45°	FLAPS 22°
29000	114	117
30000	116	119
31000	118	121
32000	119	122
33000	121	124
34000	123	126
35000	124	127
36000	126	129
37000	127	130
38000	129	132
39000	131	133
40000	132	135
41000	134	136
42000	135	138
43000	137	139
44000	138	141
45000	140	142
46000	141	143
47000	142	145
48000	144	146
49000	145	147
50000	146	149

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FLAP MANEUVERING SPEED

		FLAP MANEUVERING SPEED (KIAS)	
FLAPS	GEAR	NO ICING CONDITIONS	WITH ICING CONDITIONS
0°	UP	180	200
9°	UP	160	
22°	DN	140	
45°	DN	140	

These speeds allow a maximum 40° bank angle which provides 1.3 g margin over stick shaker speed. They are valid for all weights up to the maximum structural landing weight.

If an overweight land is unavoidable, the speeds above are maintained except for GEAR DN/FLAPS 22° configurations, which must be 150 KIAS.

If fuel consumption is a consideration, consult the in-flight performance software for maximum endurance speeds.

FINAL APPROACH SPEED

$V_{APP} = V_{REF}$ + wind correction.

Wind correction = ½ steady headwind component + gust increment above steady wind.

For Flaps 45° landing, the minimum wind correction is 5 KIAS and the maximum is 15 KIAS.

For Flaps 22° landing:

– Performing CAT I approaches, the minimum wind correction is 5 KIAS and the maximum is 20 KIAS.

– Performing CAT II approaches, the minimum wind correction is 0 KIAS and the maximum is 20 KIAS.

For Emergency and Abnormal procedures using Flaps 0° and 9°, the minimum wind correction is 0 KIAS and the maximum is 20 KIAS.

When there is wind and abnormal operation speed additives, use the sum of both corrections.

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APPROACH CLIMB WEIGHT TABLES

The one engine inoperative Approach Climb Weight tables show the weights as function of airport pressure altitude (ft) and temperature (°C) for different Approach Climb Gradients.

The associated conditions are:

Flaps	9°
Gear	UP
Anti-Ice	ON OR OFF
Temperature	
Anti-Ice OFF	UP TO ISA + 30°C
Anti-Ice ON	UP TO 10°C

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APPROACH CLIMB WEIGHTS - ONE ENGINE INOPERATIVE

ANTI-ICE OFF - NO ICE ACCRETION

ALTITUDE (ft)	GRADIENT (%)								
	2.1	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
0	52910	52910	52236	50088	48117	46224	44609	42917	41323
500	52910	52910	51258	49168	47187	45397	43719	41945	40504
1000	52910	52910	51352	49257	47277	45477	43809	42039	40583
1500	52910	52706	50426	48358	46358	44665	42894	41237	39777
2000	52910	52817	50531	48465	46471	44764	43006	41332	39876
2500	52910	51891	49656	47575	45653	43925	42069	40543	39147
3000	52910	51872	49638	47556	45637	43906	42050	40527	39132
3500	52850	50925	48743	46638	44829	42988	41243	39716	38418
4000	52850	50925	48743	46638	44829	42988	41243	39716	38418
4500	51924	50034	47845	45794	43994	42041	40447	39009	37690
5000	51904	50015	47825	45777	43975	42020	40430	38994	37674
5500	50873	49049	46824	44899	42967	41145	39563	38215	36927
6000	50704	48890	46659	44755	42800	41005	39440	38087	36808
6500	49767	47919	45750	43843	41792	40140	38683	37318	36069
7000	49646	47795	45642	43717	41686	40029	38586	37227	35973
7500	48638	46748	44731	42655	40795	39192	37774	36460	35188
8000	48490	46594	44597	42499	40664	39077	37655	36348	35087
8500	47427	45626	43582	41472	39716	38256	36860	35533	34359
9000	47315	45530	43469	41377	39628	38170	36778	35447	34282
9500	45268	43524	41312	39491	37964	36518	35135	33936	32788
10000	44092	42124	40145	38489	36959	35503	34232	33008	31959
10500	42897	41087	39211	37602	36094	34699	33431	32299	31223
11000	42499	40760	38932	37322	35807	34445	33166	32065	30980
11500	41635	39994	38282	36684	35158	33853	32627	31520	30484
12000	41369	39715	38047	36452	34952	33638	32437	31322	30312
12500	40287	38802	37118	35508	34118	32813	31667	30575	29611
13000	40311	38821	37138	35528	34137	32829	31684	30590	29626

The data above is valid to temperature up to ISA + 30°C.

NOTE: - Decrease weight by 1100 lb per 1°C above ISA + 30°C conditions.

- In case of ICE ACCRETION increase required approach climb gradient by 2.2%.

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APPROACH CLIMB WEIGHTS - ONE ENGINE INOPERATIVE

ANTI-ICE ON - NO ICE ACCRETION

ALTITUDE (ft)	GRADIENT (%)								
	2.1	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
0	52910	52910	52910	52287	50233	48351	46555	44982	43408
500	52910	52910	52910	52219	50168	48287	46488	44922	43341
1000	52910	52910	52910	52150	50104	48223	46420	44862	43275
1500	52910	52910	52910	52081	50039	48158	46352	44801	43208
2000	52910	52910	52910	51977	49941	48061	46256	44710	43107
2500	52910	52910	52910	51977	49941	48061	46256	44710	43107
3000	52910	52910	52910	51977	49941	48061	46256	44710	43107
3500	52910	52910	52910	51396	49396	47515	45768	44202	42541
4000	52910	52910	52806	50625	48663	46779	45112	43479	41798
4500	52910	52910	51982	49849	47876	46009	44384	42665	41110
5000	52910	52910	51126	49043	47061	45285	43593	41827	40393
5500	52910	52121	49874	47797	45850	44143	42303	40740	39321
6000	52695	50763	48590	46481	44690	42830	41110	39594	38296
6500	51415	49557	47352	45361	43498	41592	40009	38624	37310
7000	50123	48287	46072	44204	42161	40469	38971	37599	36350
7500	48827	46945	44902	42855	40962	39338	37926	36604	35324
8000	47450	45645	43604	41491	39736	38273	36877	35550	34374
8500	46124	44482	42227	40339	38728	37253	35881	34620	33449
9000	44939	43135	40986	39210	37671	36235	34883	33674	32556
9500	42526	40782	38951	37340	35827	34462	33183	32081	30996
10000	40120	38662	36980	35362	33990	32699	31548	30471	29503
10500	39186	37783	36101	34572	33178	31980	30809	29814	28820
11000	38298	36887	35185	33753	32435	31221	30143	29122	28192
11500	37433	36016	34419	32968	31722	30538	29491	28478	27603
12000	36551	35122	33613	32251	30972	29879	28803	27881	26983
12500	35614	34312	32808	31494	30289	29184	28174	27252	-
13000	34733	33456	32046	30722	29585	28484	27536	26588	-

The data above is valid to temperature up to 10°C.

NOTE: In case of ICE ACCRETION increase required approach climb gradient by 2.2%.

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LANDING

UNFACTORED LANDING DISTANCES

Unfactored landing distance is the distance to land the airplane on a zero slope, ISA temperature, dry runway from a point 50 ft above runway threshold at V_{REF}, using only the brakes and spoilers as deceleration device (i.e., no engine reverse thrust is used).

The Unfactored Landing Distance does not account for operational deviations such as environmental changes or even slight landing technique variations. Therefore, for normal operations it is recommended to use factored landing distances. For additional information refer to GP-1917 "UNDERSTANDING V_{REF} AND APPROACH SPEEDS".

The mandatory application of factors depends on the local operational regulations. For commercial operations the following factors are commonly used:

– For obtaining the dispatch DRY runway factored distance, multiply the unfactored landing distance by 1.67.
– For obtaining the dispatch WET runway distance, multiply the unfactored landing distance by 1.92.

For abnormal and emergency procedures, follow the AFM to obtain the applicable landing distances.

CAUTION: THE HIGH ALTITUDE LANDING AND TAKEOFF OPERATION-HALTO (ABOVE 9500 UP TO 13800 FT) IS APPLICABLE ONLY TO AIRPLANES WITH THE A1E ENGINE AND THE POST-MOD. SB 145LEG-21-0014 OR POST-MOD. SB 145DGL-21-0001 OR EQUIPPED WITH AN EQUIVALENT FACTORY INCORPORATED MODIFICATION.

NOTE: The landing distance correction factors mentioned in some emergency or abnormal procedures must be applied to the flaps 45° unfactored landing distance.

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 22° - NO ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	0 ft				1000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2944	2495	2353	2213	3002	2548	2403	2263
29000	3065	2605	2459	2316	3126	2660	2512	2368
31000	3213	2739	2589	2442	3278	2798	2646	2498
33000	3358	2871	2716	2566	3428	2934	2778	2625
35000	3501	3000	2842	2687	3575	3068	2907	2750
37000	3644	3130	2967	2809	3723	3201	3036	2876
39000	3788	3261	3094	2931	3871	3336	3167	3002
41000	3933	3392	3221	3054	4020	3471	3298	3129
43000	4079	3524	3349	3178	4171	3608	3430	3257

WEIGHT (lb)	ALTITUDE							
	2000 ft				3000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3062	2602	2456	2314	3124	2658	2510	2366
29000	3190	2718	2568	2422	3255	2778	2626	2478
31000	3346	2860	2706	2556	3417	2924	2768	2616
33000	3501	3000	2841	2687	3576	3068	2907	2751
35000	3652	3137	2974	2816	3732	3210	3045	2884
37000	3804	3275	3108	2945	3889	3352	3182	3017
39000	3957	3414	3242	3075	4047	3496	3321	3151
41000	4112	3554	3378	3206	4207	3640	3461	3287
43000	4268	3696	3515	3339	4368	3786	3603	3424

CAUTION: THE SHADED AREAS REPRESENT CONDITIONS WHERE THE MAXIMUM LANDING WEIGHT WAS EXCEEDED.

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 22° - NO ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	4000 ft				5000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3190	2718	2568	2422	3258	2780	2629	2481
29000	3325	2841	2687	2537	3398	2907	2751	2599
31000	3491	2992	2833	2679	3569	3062	2902	2745
33000	3655	3140	2977	2818	3738	3216	3050	2889
35000	3816	3286	3119	2955	3905	3366	3196	3030
37000	3978	3433	3261	3093	4072	3518	3343	3172
39000	4142	3581	3404	3232	4241	3671	3491	3316
41000	4306	3731	3549	3372	4412	3826	3641	3461
43000	4473	3882	3695	3514	4584	3983	3793	3608

WEIGHT (lb)	ALTITUDE							
	6000 ft				7000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3329	2844	2690	2541	3402	2910	2754	2603
29000	3472	2974	2817	2663	3550	3045	2885	2729
31000	3649	3135	2972	2813	3732	3210	3045	2883
33000	3823	3293	3125	2961	3912	3373	3202	3036
35000	3995	3448	3275	3107	4089	3534	3358	3187
37000	4168	3605	3427	3254	4268	3696	3515	3339
39000	4343	3764	3581	3403	4449	3860	3674	3493
41000	4519	3924	3736	3553	4632	4026	3835	3649
43000	4698	4086	3893	3705	4818	4195	3998	3807

CAUTION: THE SHADED AREAS REPRESENT CONDITIONS WHERE THE MAXIMUM LANDING WEIGHT WAS EXCEEDED.

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 22° - NO ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	8000 ft				9000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3478	2979	2821	2667	3556	3050	2890	2734
29000	3631	3118	2956	2797	3714	3194	3029	2868
31000	3818	3288	3120	2957	3908	3369	3199	3033
33000	4004	3457	3283	3115	4100	3543	3367	3196
35000	4187	3623	3444	3271	4290	3715	3534	3357
37000	4372	3790	3607	3428	4481	3889	3702	3520
39000	4560	3960	3771	3587	4675	4065	3872	3685
41000	4750	4133	3938	3748	4872	4243	4045	3852
43000	4942	4307	4107	3912	5072	4425	4221	4023

WEIGHT (lb)	ALTITUDE							
	9500 ft				10000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3598	3088	2927	2769	3639	3126	2963	2805
29000	3758	3234	3068	2906	3802	3274	3106	2943
31000	3955	3412	3240	3073	4002	3455	3282	3113
33000	4150	3589	3412	3239	4201	3635	3456	3282
35000	4343	3764	3581	3403	4397	3813	3628	3449
37000	4538	3941	3752	3569	4595	3993	3803	3618
39000	4736	4120	3926	3737	4797	4175	3979	3789
41000	4937	4302	4102	3907	5001	4361	4159	3963
43000	5141	4487	4281	4081	5210	4550	4342	4140

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 22° - NO ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	11000 ft				12000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3726	3205	3040	2879	3816	3286	3119	2955
29000	3895	3357	3187	3022	3990	3444	3271	3103
31000	4102	3545	3369	3198	4204	3638	3459	3285
33000	4307	3731	3549	3372	4416	3831	3645	3465
35000	4510	3915	3728	3545	4627	4021	3830	3644
37000	4716	4102	3908	3720	4841	4215	4018	3826
39000	4925	4291	4092	3897	5058	4412	4208	4010
41000	5137	4484	4278	4078	5279	4612	4402	4198
43000	5354	4681	4469	4262	5504	4817	4601	4390

WEIGHT (lb)	ALTITUDE							
	13000 ft				13800 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3915	3375	3205	3039	3996	3449	3276	3108
29000	4094	3538	3363	3192	4181	3617	3438	3265
31000	4316	3739	3557	3380	4408	3823	3638	3458
33000	4536	3939	3750	3567	4634	4028	3837	3651
35000	4754	4137	3942	3752	4860	4232	4034	3842
37000	4976	4338	4136	3941	5088	4440	4235	4036
39000	5201	4542	4334	4133	5321	4651	4440	4234
41000	5431	4751	4536	4328	5559	4866	4648	4436
43000	5667	4964	4743	4528	5802	5087	4862	4644

CAUTION: THE SHADED AREAS REPRESENT CONDITIONS WHERE THE MAXIMUM LANDING WEIGHT WAS EXCEEDED.

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 22° - AFTER ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	0 ft				1000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3222	2755	2606	2461	3286	2813	2663	2516
29000	3381	2899	2746	2596	3450	2962	2806	2655
31000	3539	3042	2884	2730	3613	3109	2949	2793
33000	3698	3186	3023	2865	3777	3258	3093	2932
35000	3850	3324	3157	2994	3934	3400	3230	3065
37000	3999	3459	3288	3121	4088	3539	3365	3196
39000	4152	3598	3422	3251	4245	3682	3504	3330
41000	4309	3740	3559	3384	4407	3829	3646	3467
43000	4469	3885	3700	3520	4573	3979	3791	3608

WEIGHT (lb)	ALTITUDE							
	2000 ft				3000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3354	2874	2721	2573	3423	2937	2783	2632
29000	3522	3027	2869	2716	3597	3095	2935	2779
31000	3690	3179	3017	2859	3770	3251	3087	2926
33000	3859	3332	3165	3002	3944	3409	3239	3074
35000	4020	3478	3306	3139	4110	3560	3385	3215
37000	4179	3622	3446	3274	4275	3709	3529	3355
39000	4342	3770	3589	3412	4443	3862	3677	3498
41000	4510	3922	3736	3554	4616	4018	3829	3645
43000	4681	4077	3886	3700	4794	4179	3985	3796

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 22° - AFTER ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	4000 ft				5000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3497	3004	2847	2694	3574	3074	2915	2760
29000	3676	3166	3004	2846	3759	3241	3077	2917
31000	3854	3328	3161	2998	3942	3408	3238	3073
33000	4033	3490	3318	3150	4127	3575	3400	3230
35000	4206	3646	3469	3296	4305	3736	3556	3381
37000	4375	3800	3618	3440	4481	3895	3710	3530
39000	4550	3958	3771	3588	4661	4059	3869	3683
41000	4729	4120	3928	3740	4847	4227	4032	3841
43000	4913	4287	4089	3897	5038	4400	4199	4003

WEIGHT (lb)	ALTITUDE							
	6000 ft				7000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3653	3145	2984	2827	3735	3220	3056	2897
29000	3843	3318	3151	2988	3931	3397	3228	3063
31000	4033	3489	3317	3149	4127	3575	3400	3229
33000	4224	3663	3485	3311	4324	3753	3573	3397
35000	4407	3829	3646	3468	4514	3926	3740	3558
37000	4589	3993	3805	3622	4702	4096	3904	3718
39000	4776	4163	3969	3780	4896	4272	4074	3882
41000	4969	4338	4138	3944	5096	4453	4250	4052
43000	5166	4517	4312	4112	5301	4639	4430	4226

CAUTION: THE SHADED AREAS REPRESENT CONDITIONS WHERE THE MAXIMUM LANDING WEIGHT WAS EXCEEDED.

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 22° - AFTER ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	8000 ft				9000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3820	3297	3131	2969	3909	3377	3209	3044
29000	4022	3480	3308	3141	4117	3566	3392	3221
31000	4224	3663	3485	3312	4326	3755	3574	3398
33000	4428	3848	3664	3485	4537	3947	3760	3578
35000	4625	4026	3837	3652	4741	4131	3938	3751
37000	4820	4203	4007	3818	4942	4314	4115	3922
39000	5021	4385	4184	3988	5151	4503	4298	4099
41000	5228	4573	4366	4165	5366	4698	4487	4282
43000	5442	4766	4553	4346	5589	4899	4682	4471

WEIGHT (lb)	ALTITUDE							
	9500 ft				10000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3956	3420	3250	3084	4002	3462	3291	3124
29000	4168	3612	3436	3264	4218	3657	3480	3307
31000	4380	3804	3622	3444	4434	3853	3669	3490
33000	4594	3999	3810	3626	4652	4051	3860	3675
35000	4802	4187	3992	3803	4863	4242	4046	3854
37000	5007	4373	4172	3977	5072	4431	4229	4032
39000	5220	4565	4359	4157	5289	4628	4419	4216
41000	5440	4764	4551	4344	5513	4831	4615	4406
43000	5666	4970	4750	4537	5744	5040	4818	4603

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 22° - AFTER ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	11000 ft				12000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	4100	3551	3377	3207	4202	3643	3466	3293
29000	4323	3753	3572	3396	4432	3851	3667	3488
31000	4546	3955	3768	3585	4663	4060	3870	3684
33000	4772	4160	3966	3777	4897	4273	4075	3883
35000	4991	4358	4158	3963	5124	4478	4274	4076
37000	5208	4554	4348	4147	5349	4683	4472	4267
39000	5433	4759	4546	4339	5583	4895	4678	4466
41000	5666	4970	4750	4537	5826	5115	4891	4673
43000	5907	5188	4962	4741	6078	5343	5111	4886

WEIGHT (lb)	ALTITUDE							
	13000 ft				13800 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	4312	3743	3563	3387	4404	3826	3643	3465
29000	4550	3958	3771	3589	4649	4048	3858	3672
31000	4790	4176	3981	3792	4895	4271	4074	3882
33000	5032	4396	4194	3998	5145	4497	4293	4094
35000	5268	4609	4401	4198	5388	4718	4506	4300
37000	5502	4821	4606	4397	5630	4937	4718	4506
39000	5746	5043	4821	4605	5882	5165	4939	4720
41000	6000	5272	5043	4820	6144	5403	5169	4943
43000	6262	5510	5273	5043	6416	5650	5408	5174

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 45° - NO ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	0 ft				1000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2447	2064	1943	1826	2493	2105	1984	1866
29000	2494	2107	1985	1867	2542	2150	2027	1908
31000	2606	2208	2083	1962	2656	2254	2128	2005
33000	2715	2307	2179	2055	2768	2356	2226	2100
35000	2822	2404	2273	2146	2878	2455	2323	2194
37000	2927	2500	2366	2236	2986	2554	2418	2286
39000	3032	2596	2459	2326	3093	2651	2513	2378
41000	3140	2694	2553	2417	3206	2754	2612	2474
43000	3252	2795	2652	2513	3323	2860	2714	2573

WEIGHT (lb)	ALTITUDE							
	2000 ft				3000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2540	2149	2026	1907	2590	2194	2070	1949
29000	2591	2195	2070	1950	2642	2241	2115	1993
31000	2708	2301	2174	2049	2762	2350	2221	2095
33000	2823	2406	2275	2147	2880	2457	2325	2196
35000	2935	2508	2373	2243	2995	2562	2426	2294
37000	3047	2609	2471	2338	3109	2666	2527	2391
39000	3158	2710	2570	2433	3226	2772	2629	2491
41000	3275	2817	2673	2533	3348	2882	2736	2594
43000	3396	2926	2779	2635	3472	2995	2845	2700

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 45° - NO ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	4000 ft				5000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2642	2241	2115	1993	2697	2291	2164	2040
29000	2696	2290	2163	2039	2752	2341	2212	2087
31000	2819	2402	2271	2144	2878	2456	2323	2194
33000	2940	2512	2377	2247	3002	2569	2432	2300
35000	3058	2619	2482	2348	3124	2679	2539	2403
37000	3175	2726	2584	2447	3244	2788	2645	2506
39000	3297	2836	2692	2551	3371	2904	2757	2615
41000	3424	2951	2803	2659	3503	3023	2873	2727
43000	3552	3068	2916	2768	3635	3144	2989	2839

WEIGHT (lb)	ALTITUDE							
	6000 ft				7000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2753	2342	2213	2087	2810	2394	2263	2136
29000	2809	2393	2262	2135	2868	2447	2314	2186
31000	2939	2511	2376	2246	3001	2568	2431	2299
33000	3066	2626	2488	2354	3132	2686	2546	2410
35000	3190	2739	2598	2460	3260	2802	2659	2519
37000	3316	2854	2708	2567	3392	2922	2775	2632
39000	3449	2974	2825	2680	3529	3047	2896	2749
41000	3585	3098	2944	2796	3669	3175	3019	2868
43000	3721	3222	3065	2913	3811	3303	3143	2989

CAUTION: THE SHADED AREAS REPRESENT CONDITIONS WHERE THE MAXIMUM LANDING WEIGHT WAS EXCEEDED.

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 45° - NO ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	8000 ft				9000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2870	2448	2316	2187	2931	2504	2370	2240
29000	2929	2502	2368	2238	2993	2560	2424	2292
31000	3066	2627	2488	2354	3133	2687	2547	2412
33000	3200	2748	2606	2469	3271	2813	2669	2529
35000	3331	2868	2722	2580	3406	2935	2787	2644
37000	3470	2993	2844	2698	3552	3068	2915	2768
39000	3613	3123	2969	2820	3700	3202	3046	2894
41000	3758	3255	3097	2943	3849	3338	3177	3022
43000	3904	3387	3225	3068	4001	3475	3310	3150

WEIGHT (lb)	ALTITUDE							
	9500 ft				10000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2964	2534	2399	2267	2997	2563	2427	2295
29000	3026	2590	2453	2320	3059	2620	2482	2349
31000	3168	2719	2578	2442	3204	2751	2609	2472
33000	3308	2846	2701	2561	3345	2880	2734	2592
35000	3447	2972	2823	2679	3487	3009	2859	2713
37000	3595	3107	2953	2805	3638	3146	2991	2841
39000	3745	3244	3086	2933	3791	3285	3126	2972
41000	3898	3382	3220	3063	3946	3426	3262	3104
43000	4051	3522	3355	3194	4102	3568	3400	3237

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 45° - NO ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	11000 ft				12000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3064	2625	2487	2353	3134	2688	2548	2412
29000	3129	2684	2544	2408	3200	2749	2607	2469
31000	3277	2818	2674	2534	3353	2887	2741	2599
33000	3423	2950	2802	2658	3502	3023	2872	2726
35000	3572	3086	2933	2785	3660	3166	3010	2860
37000	3728	3228	3071	2918	3821	3313	3153	2998
39000	3886	3372	3210	3053	3985	3462	3297	3138
41000	4047	3517	3351	3190	4151	3612	3443	3279
43000	4209	3665	3494	3328	4319	3765	3591	3422

WEIGHT (lb)	ALTITUDE							
	13000 ft				13800 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3210	2757	2615	2477	3272	2814	2670	2530
29000	3278	2819	2675	2535	3342	2877	2731	2589
31000	3434	2961	2812	2668	3502	3022	2872	2726
33000	3588	3101	2948	2799	3662	3168	3013	2862
35000	3754	3252	3094	2940	3833	3323	3163	3007
37000	3922	3404	3241	3083	4005	3480	3315	3154
39000	4092	3558	3391	3228	4180	3638	3468	3303
41000	4264	3715	3542	3375	4357	3799	3624	3454
43000	4438	3873	3696	3523	4537	3963	3782	3607

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 45° - AFTER ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	0 ft				1000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2609	2211	2087	1966	2659	2257	2130	2008
29000	2725	2317	2189	2065	2778	2365	2236	2110
31000	2843	2424	2293	2165	2899	2475	2342	2213
33000	2956	2527	2392	2261	3014	2580	2444	2311
35000	3066	2627	2490	2356	3128	2683	2544	2408
37000	3175	2726	2585	2448	3239	2784	2641	2503
39000	3288	2829	2684	2545	3357	2892	2746	2604
41000	3406	2936	2789	2645	3480	3003	2854	2709
43000	3526	3046	2895	2748	3604	3116	2963	2815

WEIGHT (lb)	ALTITUDE							
	2000 ft				3000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2710	2303	2176	2052	2764	2352	2223	2097
29000	2833	2415	2284	2156	2889	2466	2333	2204
31000	2957	2528	2393	2262	3016	2582	2445	2313
33000	3075	2635	2497	2363	3137	2692	2552	2416
35000	3191	2741	2600	2462	3257	2801	2657	2518
37000	3306	2846	2701	2561	3378	2911	2764	2622
39000	3430	2958	2810	2666	3505	3027	2876	2730
41000	3556	3073	2921	2774	3636	3146	2991	2842
43000	3685	3190	3034	2883	3768	3266	3108	2955

CAUTION: THE SHADED AREAS REPRESENT CONDITIONS WHERE THE MAXIMUM LANDING WEIGHT WAS EXCEEDED.

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 45° - AFTER ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	4000 ft				5000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2820	2403	2272	2145	2878	2456	2324	2195
29000	2948	2520	2385	2255	3010	2576	2440	2308
31000	3079	2639	2500	2366	3144	2698	2558	2422
33000	3203	2752	2610	2472	3272	2814	2670	2531
35000	3326	2863	2718	2577	3398	2929	2782	2639
37000	3453	2979	2830	2685	3531	3050	2899	2752
39000	3585	3099	2946	2798	3668	3175	3020	2869
41000	3720	3222	3065	2913	3807	3301	3142	2988
43000	3856	3346	3186	3030	3948	3430	3267	3108

WEIGHT (lb)	ALTITUDE							
	6000 ft				7000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	2938	2511	2377	2246	3000	2567	2431	2299
29000	3074	2634	2496	2362	3139	2693	2553	2418
31000	3211	2759	2617	2479	3280	2822	2678	2538
33000	3342	2878	2732	2591	3414	2944	2796	2653
35000	3473	2998	2848	2703	3553	3070	2918	2771
37000	3612	3123	2970	2821	3696	3200	3044	2893
39000	3753	3252	3095	2942	3842	3333	3173	3018
41000	3897	3383	3222	3065	3991	3468	3304	3145
43000	4043	3516	3350	3189	4141	3605	3437	3273

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 45° - AFTER ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	8000 ft				9000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3064	2625	2488	2354	3131	2686	2546	2411
29000	3207	2755	2613	2476	3277	2819	2675	2535
31000	3352	2887	2741	2599	3426	2954	2806	2662
33000	3489	3012	2862	2717	3567	3083	2931	2783
35000	3635	3145	2991	2841	3721	3223	3066	2914
37000	3783	3280	3121	2968	3874	3362	3202	3045
39000	3935	3417	3254	3097	4031	3505	3339	3179
41000	4088	3557	3390	3228	4189	3649	3479	3314
43000	4244	3699	3527	3361	4351	3796	3621	3452

WEIGHT (lb)	ALTITUDE							
	9500 ft				10000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3166	2718	2577	2440	3200	2749	2608	2470
29000	3314	2853	2708	2567	3351	2886	2740	2599
31000	3465	2990	2841	2696	3504	3025	2875	2729
33000	3610	3122	2968	2819	3652	3160	3005	2855
35000	3766	3264	3106	2953	3811	3305	3146	2991
37000	3922	3406	3244	3086	3970	3449	3286	3127
39000	4081	3551	3384	3222	4132	3596	3428	3265
41000	4243	3698	3526	3360	4296	3746	3573	3405
43000	4407	3847	3671	3500	4463	3898	3721	3548

CAUTION: THE SHADED AREAS REPRESENT CONDITIONS WHERE THE MAXIMUM LANDING WEIGHT WAS EXCEEDED.

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UNFACTORED LANDING DISTANCE (ft)

FLAPS 45° - AFTER ICE ENCOUNTER
ISA CONDITIONS - SLOPE 0%

WEIGHT (lb)	ALTITUDE							
	11000 ft				12000 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3273	2816	2672	2532	3348	2884	2738	2596
29000	3428	2956	2808	2664	3507	3028	2878	2732
31000	3585	3099	2947	2799	3669	3176	3021	2870
33000	3741	3241	3084	2932	3833	3325	3165	3010
35000	3906	3391	3229	3072	4004	3480	3315	3156
37000	4070	3540	3374	3212	4173	3634	3465	3300
39000	4237	3692	3521	3355	4346	3792	3617	3448
41000	4407	3847	3671	3500	4523	3953	3773	3599
43000	4581	4005	3824	3648	4703	4116	3932	3753

WEIGHT (lb)	ALTITUDE							
	13000 ft				13800 ft			
	WIND							
	-10 kt	0 kt	10 kt	20 kt	-10 kt	0 kt	10 kt	20 kt
27000	3430	2958	2810	2666	3497	3019	2869	2723
29000	3593	3106	2954	2805	3664	3171	3016	2866
31000	3760	3258	3100	2947	3836	3327	3167	3012
33000	3933	3415	3253	3095	4015	3490	3325	3165
35000	4109	3576	3408	3245	4196	3655	3485	3320
37000	4285	3736	3563	3395	4377	3820	3644	3474
39000	4464	3899	3721	3549	4562	3988	3807	3632
41000	4647	4066	3883	3705	4751	4160	3974	3793
43000	4834	4236	4047	3865	4943	4335	4143	3958

CAUTION: THE SHADED AREAS REPRESENT CONDITIONS WHERE THE MAXIMUM LANDING WEIGHT WAS EXCEEDED.

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CONTAMINATED RUNWAYS - UNFACTORED LANDING DISTANCE - ADVISORY INFORMATION

A runway is considered to be contaminated when more than 25% of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by the following:

– surface water more than 3 mm (0.125 in) deep, or by slush, or loose snow, equivalent to more than 3 mm (0.125 in) of water;

– snow which has been compressed into a solid mass which resists further compression and will hold together or break into lumps if picked up (compacted snow); or

– ice, including wet ice.

Contaminants can be classified as being: drag producing, for example by contaminant displacement or impingement; braking friction reducing; or a combination of both. Runways contaminated with compacted snow, ice and wet ice are considered slippery, once there is no impingent drag and the braking friction coefficient reduces. Other contaminants, such as, standing water, slush or loose snow, combine both effects.

The contaminated unfactored landing distance is the actual distance to land the airplane after a stabilized approach, crossing a point at 50 ft above the runway threshold at V_{REF}, on a zero slope runway, ISA temperature, using maximum manual braking effort.

The following tables present guidance information for obtaining the airplane landing distance on contaminated runways. The result is the worst value between wet and contaminated landing distance. However, this distance does not consider the 1.15 factor from EU-OPS 1.515 and 1.520. It is the operator's responsibility to evaluate the application of the factor above.

In order to find the contaminated landing distance, enter the table with the current contaminant, flaps configuration and actual landing weight and obtain a reference contaminated unfactored landing distance ($CULD_{REF}$).

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Apply corrections to the reference contaminated unfactored landing distance according to the formula below:

Final altitude correction (%) = Altitude correction from the table x (Current altitude in ft/1000 ft).

Final tailwind correction (%) = Wind correction from the table x (Current tailwind component in kt/5 kt).

Final overspeed correction (%) = Overspeed correction from the table x (Current overspeed in kt/5 kt).

The unfactored landing distance on contaminated runways (CULD) becomes:

Additional Distance = $CULD_{REF}$ x (Final Altitude Correction + Final Tailwind Correction + Final Overspeed Correction).

CULD = $CULD_{REF}$ + Additional distance.

Suppose:

Airport Pressure Altitude.....4000 ft
Wind.....10 kt HEADWIND
Overspeed .....V_{REF} + 5 kt
$CULD_{REF}$ .....2000 ft
Altitude Correction 3%
Wind Correction 8%
Overspeed Correction.....7%

Calculations:

Final Altitude Correction = 3% x (4000 ft/1000 ft) = 12%

Final Tailwind Correction = 8% x (0 kt/5 kt) = 0%

Final Overspeed Correction = 7% x (5 kt/5 kt) = 7%

Unfactored landing distance on contaminated runway:

Additional Distance = 2000 ft x (12% + 0% + 7%) = 2000 ft x 19% = 380 ft

CULD = 2000 ft + 380 ft = 2380 ft

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ADVISORY INFORMATION
UNFACTORED LANDING DISTANCE (ft)
CONTAMINATED RUNWAYS - AFTER ICE ENCOUNTER - V_{REF}
SEA LEVEL - ZERO WIND - ISA CONDITIONS - ZERO SLOPE
STANDING WATER 0.125 in/SLUSH 0.15 in
WET SNOW 0.25 in/DRY SNOW 1.00 in

WEIGHT (lb)	FLAPS 22°	FLAPS 45°
31000	6718	5415
32000	6910	5557
33000	7102	5699
34000	7298	5844
35000	7494	5990
36000	7690	6136
37000	7886	6280
38000	8090	6430
39000	8298	6585
40000	8503	6741
41000	8708	6896
42000	8914	7052
43000	9131	7217
44000	9347	7382
45000	9563	7546
46000	9780	7711
47000	9994	7875
48000	10205	8038
49000	10416	8200
50000	10627	8363

CORRECTIONS	
ALTITUDE:	LANDING DISTANCE + 11% per 1000 ft above sea level. (Altitude correction limited up to 10000 ft above sea level).
WIND:	LANDING DISTANCE + 9% per 5 kt tailwind.
OVERSPEED:	LANDING DISTANCE + 9% per 5 kt above V_{REF}.

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ADVISORY INFORMATION
UNFACTORED LANDING DISTANCE (ft)
CONTAMINATED RUNWAYS - AFTER ICE ENCOUNTER - V_{REF}
SEA LEVEL - ZERO WIND - ISA CONDITIONS - ZERO SLOPE
STANDING WATER 0.25 in/SLUSH 0.29 in
WET SNOW 0.50 in/DRY SNOW 2.00 in

WEIGHT (lb)	FLAPS 22°	FLAPS 45°
31000	6076	5029
32000	6242	5157
33000	6409	5285
34000	6579	5417
35000	6749	5549
36000	6920	5680
37000	7090	5812
38000	7267	5948
39000	7449	6089
40000	7629	6230
41000	7809	6371
42000	7991	6514
43000	8181	6664
44000	8371	6815
45000	8562	6966
46000	8752	7117
47000	8941	7267
48000	9129	7417
49000	9317	7566
50000	9505	7716

CORRECTIONS	
ALTITUDE:	LANDING DISTANCE + 11% per 1000 ft above sea level. (Altitude correction limited up to 10000 ft above sea level).
WIND:	LANDING DISTANCE + 9% per 5 kt tailwind.
OVERSPEED:	LANDING DISTANCE + 8% per 5 kt above V_{REF}.

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ADVISORY INFORMATION
UNFACTORED LANDING DISTANCE (ft)
CONTAMINATED RUNWAYS - AFTER ICE ENCOUNTER - V_{REF}
SEA LEVEL - ZERO WIND - ISA CONDITIONS - ZERO SLOPE
STANDING WATER 0.50 IN/SLUSH 0.59 IN
WET SNOW 1.00 IN/DRY SNOW 4.00 IN

WEIGHT (lb)	FLAPS 22°	FLAPS 45°
31000	5320	4536
32000	5460	4647
33000	5600	4757
34000	5742	4871
35000	5885	4985
36000	6027	5098
37000	6170	5212
38000	6318	5330
39000	6471	5452
40000	6622	5575
41000	6774	5697
42000	6926	5820
43000	7086	5951
44000	7246	6082
45000	7406	6213
46000	7566	6344
47000	7726	6475
48000	7884	6605
49000	8043	6736
50000	8201	6866

CORRECTIONS	
ALTITUDE:	LANDING DISTANCE + 11% per 1000 ft above sea level. (Altitude correction limited up to 10000 ft above sea level).
WIND:	LANDING DISTANCE + 10% per 5 kt tailwind.
OVERSPEED:	LANDING DISTANCE + 9% per 5 kt above V_{REF}.

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ADVISORY INFORMATION
UNFACTORED LANDING DISTANCE (ft)
CONTAMINATED RUNWAYS - AFTER ICE ENCOUNTER - V_{REF} LEVEL - ZERO WIND - ISA CONDITIONS - ZERO SLOPE
COMPACTED SNOW

WEIGHT (lb)	FLAPS 22°	FLAPS 45°
31000	4393	4119
32000	4490	4210
33000	4586	4300
34000	4675	4387
35000	4764	4474
36000	4852	4561
37000	4940	4648
38000	5029	4734
39000	5117	4820
40000	5206	4905
41000	5294	4991
42000	5383	5077
43000	5467	5160
44000	5552	5244
45000	5637	5327
46000	5721	5410
47000	5806	5494
48000	5891	5577
49000	5976	5660
50000	6060	5744

CORRECTIONS	
ALTITUDE:	LANDING DISTANCE + 3% per 1000 ft above sea level. (Altitude correction limited up to 10000 ft above sea level).
WIND:	LANDING DISTANCE + 9% per 5 kt tailwind.
OVERSPEED:	LANDING DISTANCE + 7% per 5 kt above V_{REF}.

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ADVISORY INFORMATION
UNFACTORED LANDING DISTANCE (ft)
CONTAMINATED RUNWAYS - AFTER ICE ENCOUNTER - V_{REF}
SEA LEVEL - ZERO WIND - ISA CONDITIONS - ZERO SLOPE
ICE

WEIGHT (lb)	FLAPS 22°	FLAPS 45°
31000	12100	9880
32000	12146	9925
33000	12191	9971
34000	12269	10056
35000	12349	10145
36000	12430	10234
37000	12510	10323
38000	12627	10434
39000	12776	10566
40000	12926	10697
41000	13076	10829
42000	13226	10961
43000	13381	11096
44000	13536	11231
45000	13691	11365
46000	13846	11500
47000	14001	11635
48000	14156	11770
49000	14311	11905
50000	14466	12040

CORRECTIONS	
ALTITUDE:	LANDING DISTANCE + 3% per 1000 ft above sea level. (Altitude correction limited up to 10000 ft above sea level).
WIND:	LANDING DISTANCE + 6% per 5 kt tailwind.
OVERSPEED:	LANDING DISTANCE + 6% per 5 kt above V_{REF}.

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LANDING DISTANCE CORRECTION FACTOR

EMERG/ABNORMAL PROCEDURE	FLAPS - SPEED	FACTOR
Advanced Stall Protection - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 15 kt	1.55
Advanced Stall Protection - No icing conditions	Flaps 45° - $V_{REF\,45}$ + 5 kt	1.13
Aileron System Inoperative	Flaps 22° - $V_{REF\,45}$ + 10 kt	1.45
Both Hydraulic Systems Failure	Flaps 22° - $V_{REF\,45}$ + 10 kt	2.67
Brakes Degraded - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 10 kt	1.71
Brakes Degraded - No icing conditions	Flaps 45° - $V_{REF\,45}$	1.20
Brakes Inoperative - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 10 kt	2.18
Brakes Inoperative - No icing conditions	Flaps 45° - $V_{REF\,45}$	1.49
Flap System Failure (1)	Flaps 0° to 8° - $V_{REF\,45}$ + 30 kt	1.70
Flap System Failure (2)	Flaps 9° to 21° - $V_{REF\,45}$ + 10 kt	1.40
Flap System Failure (3)	Flaps 22° to 44° - $V_{REF\,45}$ + 5 kt	1.20
Hydraulic System 1 Failure - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 10 kt	2.38
Hydraulic System 1 Failure - No icing conditions	Flaps 45° - $V_{REF\,45}$	1.64
Hydraulic System 2 Failure - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 10 kt	2.27
Hydraulic System 2 Failure - No icing conditions	Flaps 45° - $V_{REF\,45}$	1.56
Inadvertent Spoiler Opening in Flight (spoilers closed or floating)	Flaps 22° - $V_{REF\,45}$ + 10 kt	1.50

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EMERG/ABNORMAL PROCEDURE	FLAPS - SPEED	FACTOR
Inadvertent Spoiler Opening in Flight (spoilers open)	Flaps 22° - $V_{REF\,45}$ + 10 kt	1.45
Erroneous Stall Protect. Actuation - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 15 kt	1.55
Erroneous Stall Protect. Actuation - No icing conditions	Flaps 45° - $V_{REF\,45}$ + 5 kt	1.13
Jammed Aileron - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 15 kt	1.55
Jammed Aileron - No icing conditions	Flaps 45° - $V_{REF\,45}$ + 5 kt	1.13
Jammed Elevator	Flaps 22° - $V_{REF\,45}$ + 10 kt	1.45
Jammed Rudder - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 15 kt	1.55
Jammed Rudder - No icing conditions	Flaps 45° - $V_{REF\,45}$ + 5 kt	1.13
Landing Gear Air/Ground Failure - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 10 kt	1.73
Landing Gear Air/Ground Failure - No icing conditions	Flaps 45° - $V_{REF\,45}$	1.34
Pitch Trim Inoperative (Pitch up tendency)	Flaps 22° - $V_{REF\,45}$ + 10 kt	1.45
Pitch Trim Inoperative (Pitch down tendency)	Flaps 22° - $V_{REF\,45}$ + 25 kt	1.75
Stabilizer Anti-Icing Failure	Flaps 22° - $V_{REF\,45}$ + 15 kt	1.55
Stabilizer + Wing Anti-Icing Failure	Flaps 22° - $V_{REF\,45}$ + 30 kt	1.85
Stall Protection Inoperative - Icing conditions	Flaps 22° - $V_{REF\,45}$ + 15 kt	1.55
Stall Protection Inoperative - No icing conditions	Flaps 45° - $V_{REF\,45}$ + 5 kt	1.13
Wing Anti-Icing Asymmetry	Flaps 22° - $V_{REF\,45}$ + 30 kt	1.85
One Engine Inoperative - Approach and Landing	Flaps 22° - $V_{REF\,45}$ + 10 kt	1.44
Wing Anti-Icing Failure	Flaps 22° - $V_{REF\,45}$ + 30 kt	1.85

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MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED

Maximum Landing Weights - Field Length Limited are read from the tables based on the runway length, surface condition, pressure altitude and Flaps (22° or 45°) configuration.

The associated conditions are:

Anti-Ice System ..... ON OR OFF
Wind..... ZERO
Temperature ..... ISA

NOTE: - The Maximum Landing Weight - Field Length Limited tables incorporate runway factoring. Refer to the Unfactored Landing Distances tables for obtaining the actual landing distance.

- Check the Maximum Landing Weight (MLW) according to the information provided in the AOM Limitations section before using the table.

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MAXIMUM LANDING WEIGHT TABLES - FIELD LENGHT LIMITED

FLAPS 22° - NO ICE ENCOUNTER

RUNWAY LENGTH (ft)	DRY						
	ALTITUDE (ft)						
	0	1000	2000	3000	4000	5000	6000
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)						
4200	27475	26483	-	-	-	-	-
4400	29524	28706	27688	26678	-	-	-
4600	31318	30443	29592	28759	27718	26664	-
4800	33138	32200	31285	30396	29520	28652	27578
5000	34994	33983	32999	32053	31114	30196	29319
5200	36844	35782	34745	33730	32729	31753	30817
5400	38686	37576	36487	35424	34366	33323	32335
5600	40517	39358	38220	37110	36005	34916	33865
5800	42336	41127	39945	38783	37636	36499	35405
6000	44139	42880	41653	40446	39253	38073	36934
6200	45924	44618	43344	42098	40857	39636	38451
6400	47687	46342	45019	43729	42447	41180	39958
6600	49431	48043	46679	45342	44022	42711	41449
6800	51156	49722	48320	46939	45573	44231	42924

RUNWAY LENGTH (ft)	DRY							
	ALTITUDE (ft)							
	7000	8000	9000	10000	11000	12000	13000	13800
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)							
4200	-	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-	-
4600	-	-	-	-	-	-	-	-
4800	26527	-	-	-	-	-	-	-
5000	28399	27315	-	-	-	-	-	-
5200	29910	29025	28019	26916	-	-	-	-
5400	31370	30435	29528	28621	27485	-	-	-
5600	32842	31854	30894	29952	29029	27979	26802	-
5800	34330	33281	32272	31277	30306	29369	28347	27386
6000	35817	34726	33658	32610	31590	30607	29613	28839
6200	37296	36161	35053	33955	32880	31852	30809	30002
6400	38757	37588	36436	35305	34182	33099	32012	31166
6600	40209	38996	37811	36636	35482	34356	33216	32336
6800	41646	40393	39171	37959	36766	35607	34428	33508

CAUTION:
- THE VALUES ABOVE MAXIMUM LANDING WEIGHT MUST NOT BE USED FOR DISPATCH.
- HIGH ALTITUDE LANDING AND TAKEOFF OPERATION IS APPLICABLE ONLY TO THE ROLLS-ROYCE AE3007A1E ENGINES.

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MAXIMUM LANDING WEIGHT TABLES - FIELD LENGHT LIMITED

FLAPS 22° - NO ICE ENCOUNTER

RUNWAY LENGTH (ft)	WET						
	ALTITUDE (ft)						
	0	1000	2000	3000	4000	5000	6000
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)						
4200	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-
4600	-	-	-	-	-	-	-
4800	27176	-	-	-	-	-	-
5000	29059	28136	27122	-	-	-	-
5200	30611	29763	28932	27962	26917	-	-
5400	32187	31279	30398	29542	28690	27614	26571
5600	33783	32813	31881	30967	30073	29190	28250
5800	35397	34374	33378	32415	31465	30532	29644
6000	37004	35938	34897	33877	32870	31889	30948
6200	38606	37498	36411	35351	34295	33254	32269
6400	40200	39048	37920	36817	35721	34639	33597
6600	41786	40590	39422	38275	37141	36018	34937
6800	43355	42122	40910	39727	38550	37393	36270

RUNWAY LENGTH (ft)	WET							
	ALTITUDE (ft)							
	7000	8000	9000	10000	11000	12000	13000	13800
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)							
4200	-	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-	-
4600	-	-	-	-	-	-	-	-
4800	-	-	-	-	-	-	-	-
5000	-	-	-	-	-	-	-	-
5200	-	-	-	-	-	-	-	-
5400	-	-	-	-	-	-	-	-
5600	27178	-	-	-	-	-	-	-
5800	28773	27710	26644	-	-	-	-	-
6000	30037	29147	28172	27064	-	-	-	-
6200	31306	30374	29468	28547	27413	-	-	-
6400	32586	31607	30656	29722	28806	27701	26533	-
6600	33876	32845	31853	30871	29917	28993	27877	26927
6800	35174	34098	33051	32030	31030	30069	29093	28237

CAUTION:
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MAXIMUM LANDING WEIGHT TABLES - FIELD LENGHT LIMITED

FLAPS 22° - AFTER ICE ENCOUNTER

RUNWAY LENGTH (ft)	DRY						
	ALTITUDE (ft)						
	0	1000	2000	3000	4000	5000	6000
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)						
4200	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-
4600	27075	-	-	-	-	-	-
4800	28735	27898	27077	-	-	-	-
5000	30411	29518	28647	27798	26951	-	-
5200	32082	31142	30223	29324	28431	27550	26704
5400	33781	32759	31796	30855	29915	28987	28098
5600	35527	34438	33381	32379	31397	30429	29494
5800	37307	36147	35022	33939	32874	31863	30891
6000	39032	37858	36689	35534	34405	33304	32278
6200	40725	39524	38328	37151	35956	34796	33688
6400	42391	41149	39931	38721	37521	36301	35130
6600	44027	42749	41499	40262	39026	37800	36592
6800	45661	44331	43039	41777	40508	39253	38031

RUNWAY LENGTH (ft)	DRY							
	ALTITUDE (ft)							
	7000	8000	9000	10000	11000	12000	13000	13800
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)							
4200	-	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-	-
4600	-	-	-	-	-	-	-	-
4800	-	-	-	-	-	-	-	-
5000	-	-	-	-	-	-	-	-
5200	-	-	-	-	-	-	-	-
5400	27227	-	-	-	-	-	-	-
5600	28578	27687	26817	-	-	-	-	-
5800	29932	28999	28086	27183	-	-	-	-
6000	31283	30310	29357	28414	27487	26590	-	-
6200	32626	31614	30628	29643	28677	27742	26786	-
6400	34003	32912	31886	30871	29865	28894	27901	27125
6600	35399	34254	33144	32084	31051	30042	29014	28210
6800	36812	35606	34445	33305	32221	31184	30121	29290

CAUTION:
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MAXIMUM LANDING WEIGHT TABLES - FIELD LENGHT LIMITED

FLAPS 22° - AFTER ICE ENCOUNTER

RUNWAY LENGTH (ft)	WET						
	ALTITUDE (ft)						
	0	1000	2000	3000	4000	5000	6000
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)						
4200	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-
4600	-	-	-	-	-	-	-
4800	-	-	-	-	-	-	-
5000	-	-	-	-	-	-	-
5200	-	-	-	-	-	-	-
5400	27869	27055	-	-	-	-	-
5600	29318	28460	27623	26804	-	-	-
5800	30775	29872	28990	28129	27273	-	-
6000	32228	31283	30360	29458	28560	27675	26825
6200	33705	32689	31728	30789	29851	28924	28037
6400	35219	34143	33096	32114	31140	30178	29251
6600	36766	35622	34523	33455	32425	31428	30466
6800	38285	37122	35962	34838	33736	32672	31675

RUNWAY LENGTH (ft)	WET							
	ALTITUDE (ft)							
	7000	8000	9000	10000	11000	12000	13000	13800
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)							
4200	-	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-	-
4600	-	-	-	-	-	-	-	-
4800	-	-	-	-	-	-	-	-
5000	-	-	-	-	-	-	-	-
5200	-	-	-	-	-	-	-	-
5400	-	-	-	-	-	-	-	-
5600	-	-	-	-	-	-	-	-
5800	-	-	-	-	-	-	-	-
6000	-	-	-	-	-	-	-	-
6200	27168	-	-	-	-	-	-	-
6400	28343	27459	26597	-	-	-	-	-
6600	29520	28600	27700	26809	-	-	-	-
6800	30698	29740	28804	27879	26969	-	-	-

CAUTION:
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MAXIMUM LANDING WEIGHT TABLES - FIELD LENGHT LIMITED

FLAPS 45° - NO ICE ENCOUNTER

RUNWAY LENGTH (ft)	DRY						
	ALTITUDE (ft)						
	0	1000	2000	3000	4000	5000	6000
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)						
4200	37407	36313	35242	34195	33149	32139	31160
4400	39921	38766	37615	36501	35386	34296	33241
4600	42317	41118	39961	38779	37639	36490	35363
4800	44634	43384	42161	40958	39773	38596	37463
5000	46930	45621	44341	43084	41840	40610	39420
5200	49204	47839	46503	45190	43893	42607	41364
5400	51454	50033	48645	47274	45922	44589	43292
5600	52911	52201	50757	49337	47932	46547	45200
5800	52911	52911	52844	51373	49917	48484	47087
6000	52911	52911	52911	52911	51876	50396	48952
6200	52911	52911	52911	52911	52911	52279	50794
6400	52911	52911	52911	52911	52911	52911	52603
6600	52911	52911	52911	52911	52911	52911	52911
6800	52911	52911	52911	52911	52911	52911	52911

RUNWAY LENGTH (ft)	DRY							
	ALTITUDE (ft)							
	7000	8000	9000	10000	11000	12000	13000	13800
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)							
4200	30211	29285	27776	-	-	-	-	-
4400	32220	31221	30256	29300	27701	-	-	-
4600	34269	33194	32160	31134	30134	29165	27131	-
4800	36299	35209	34098	33000	31935	30898	29859	29043
5000	38253	37103	35989	34859	33734	32666	31558	30692
5200	40144	38950	37781	36625	35491	34363	33261	32339
5400	42023	40777	39561	38353	37170	36016	34848	33930
5600	43884	42589	41322	40068	38837	37639	36423	35474
5800	45721	44382	43065	41769	40490	39244	37988	37003
6000	47536	46155	44791	43446	42129	40835	39538	38517
6200	49329	47900	46497	45107	43747	42412	41069	40018
6400	51099	49623	48179	46749	45341	43973	42585	41503
6600	52845	51323	49835	48368	46918	45506	44087	42967
6800	52911	52911	51469	49959	48477	47021	45561	44417

CAUTION: • THE VALUES ABOVE MAXIMUM LANDING WEIGHT MUST NOT BE USED FOR DISPATCH.

• HIGH ALTITUDE LANDING AND TAKEOFF OPERATION IS APPLICABLE ONLY TO THE ROLLS-ROYCE AE3007A1E ENGINES.

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MAXIMUM LANDING WEIGHT TABLES - FIELD LENGHT LIMITED

FLAPS 45° - NO ICE ENCOUNTER

Runway Length (ft)	WET						
	ALTITUDE (ft)						
	0	1000	2000	3000	4000	5000	6000
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)						
4200	30662	29792	28933	26849	-	-	-
4400	32763	31820	30891	29995	29099	27243	-
4600	34909	33889	32892	31928	30962	30026	29120
4800	37081	35995	34935	33896	32862	31861	30889
5000	39274	38122	36996	35895	34801	33727	32695
5200	41390	40224	39055	37900	36763	35626	34533
5400	43427	42207	41014	39845	38661	37540	36367
5600	45434	44167	42920	41700	40492	39300	38144
5800	47426	46105	44811	43545	42287	41045	39844
6000	49401	48032	46690	45372	44071	42780	41533
6200	51357	49938	48553	47184	45834	44503	43208
6400	52911	51826	50390	48981	47583	46209	44870
6600	52911	52911	52209	50759	49315	47895	46518
6800	52911	52911	52911	52514	51029	49565	48145

RUNWAY LENGTH (ft)	WET							
	ALTITUDE (ft)							
	7000	8000	9000	10000	11000	12000	13000	13800
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)							
4200	-	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-	-
4600	27313	-	-	-	-	-	-	-
4800	29953	29034	27007	-	-	-	-	-
5000	31692	30710	29766	28823	-	-	-	-
5200	33460	32420	31410	30413	29438	28120	-	-
5400	35258	34158	33077	32026	30988	29994	28979	27156
5600	36993	35871	34778	33647	32567	31513	30445	29616
5800	38665	37513	36379	35263	34118	33051	31932	31050
6000	40308	39110	37936	36776	35637	34509	33399	32482
6200	41942	40698	39484	38278	37097	35945	34779	33863
6400	43560	42276	41016	39772	38548	37358	36150	35207
6600	45163	43839	42537	41251	39990	38756	37516	36538
6800	46750	45384	44047	42718	41419	40146	38864	37862

CAUTION:
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MAXIMUM LANDING WEIGHT TABLES - FIELD LENGHT LIMITED

FLAPS 45° - AFTER ICE ENCOUNTER

RUNWAY LENGTH (ft)	DRY						
	ALTITUDE (ft)						
	0	1000	2000	3000	4000	5000	6000
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)						
4200	32872	31856	30860	29931	29003	28064	27153
4400	35251	34163	33096	32059	31026	30040	29097
4600	37685	36521	35360	34252	33150	32067	31020
4800	39973	38786	37638	36444	35299	34149	33038
5000	42167	40940	39738	38547	37367	36183	35041
5200	44350	43063	41808	40572	39345	38130	36946
5400	46516	45171	43858	42572	41295	40036	38809
5600	48696	47276	45893	44553	43224	41921	40647
5800	50859	49379	47933	46522	45137	43780	42465
6000	52911	51465	49963	48498	47043	45624	44262
6200	52911	52911	51973	50455	48949	47468	46039
6400	52911	52911	52911	52389	50833	49303	47821
6600	52911	52911	52911	52911	52702	51119	49586
6800	52911	52911	52911	52911	52911	52911	51333

RUNWAY LENGTH (ft)	DRY							
	ALTITUDE (ft)							
	7000	8000	9000	10000	11000	12000	13000	13800
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)							
4200	-	-	-	-	-	-	-	-
4400	28160	27226	-	-	-	-	-	-
4600	30035	29074	28119	27156	-	-	-	-
4800	31954	30891	29900	28910	27920	26948	-	-
5000	33891	32806	31711	30633	29611	28614	27570	26750
5200	35776	34627	33532	32407	31291	30246	29180	28336
5400	37609	36413	35246	34107	32984	31862	30766	29887
5600	39400	38173	36965	35762	34588	33454	32296	31402
5800	41171	39906	38656	37425	36194	35001	33806	32873
6000	42922	41613	40325	39048	37795	36555	35301	34329
6200	44654	43298	41975	40652	39363	38093	36803	35786
6400	46368	44966	43596	42240	40907	39607	38281	37247
6600	48089	46623	45201	43804	42434	41092	39739	38670
6800	49788	48280	46799	45350	43943	42561	41169	40078

CAUTION:
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MAXIMUM LANDING WEIGHT TABLES - FIELD LENGHT LIMITED

FLAPS 45° - AFTER ICE ENCOUNTER

RUNWAY LENGTH (ft)	WET						
	ALTITUDE (ft)						
	0	1000	2000	3000	4000	5000	6000
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)						
4200	26619	-	-	-	-	-	-
4400	28600	27723	26860	-	-	-	-
4600	30542	29632	28740	27847	26952	-	-
4800	32566	31557	30583	29661	28740	27803	26898
5000	34630	33557	32512	31491	30492	29528	28597
5200	36741	35585	34473	33389	32318	31256	30263
5400	38786	37648	36457	35307	34178	33057	31985
5600	40737	39545	38369	37201	36018	34877	33734
5800	42643	41403	40188	38990	37801	36610	35465
6000	44538	43247	41987	40746	39517	38296	37111
6200	46421	45080	43769	42486	41210	39954	38729
6400	48318	46909	45539	44211	42890	41593	40330
6600	50202	48742	47312	45922	44557	43214	41917
6800	52070	50562	49083	47639	46213	44823	43481

RUNWAY LENGTH (ft)	WET							
	ALTITUDE (ft)							
	7000	8000	9000	10000	11000	12000	13000	13800
	MAXIMUM LANDING WEIGHT - FIELD LENGTH LIMITED (lb)							
4200	-	-	-	-	-	-	-	-
4400	-	-	-	-	-	-	-	-
4600	-	-	-	-	-	-	-	-
4800	-	-	-	-	-	-	-	-
5000	27662	26742	-	-	-	-	-	-
5200	29306	28356	27412	26468	-	-	-	-
5400	30930	29942	28977	27997	27027	-	-	-
5600	32636	31557	30515	29509	28515	27528	26512	-
5800	34304	33213	32115	31012	29976	28969	27922	27095
6000	35935	34784	33681	32562	31438	30387	29318	28474
6200	37531	36336	35172	34035	32910	31792	30697	29820
6400	39089	37871	36666	35473	34310	33186	32030	31146
6600	40633	39381	38145	36919	35704	34530	33351	32425
6800	42165	40871	39606	38343	37104	35879	34651	33697

CAUTION:
- THE VALUES ABOVE MAXIMUM LANDING WEIGHT MUST NOT BE USED FOR DISPATCH.
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QUICK TURN AROUND WEIGHT

For normal operation, the brake temperature can be monitored through the brake temperature indication in the MFD.

The Quick Turn Around Weight Table must be used only when the brake temperature indication is not working properly (according to the MMEL). In this case, if the landing weight exceeds the Quick Turn Around Weight, a subsequent takeoff must not be performed before 33 minutes for ER Brakes (P/N 2-1582) or 36 minutes for LR Brakes (P/N 2-1624) after chocks on. At the end of this time interval, check that the wheel thermal plugs have not melted.

The identification of which brakes equip a given airplane can be done through the tire size stamped in its side:

- ER brakes: 30 X 9.5-14 tires.
- LR brakes: H30 X 9.5-16 tires.

NOTE: - If the tires are not flat after 33 minutes for ER Brakes (P/N 2-1582) or 36 minutes for LR Brakes (P/N 2-1624), this is a positive indication that the wheel thermal plugs have not melted.

- The tables presented in this section refer to ER Brakes (P/N 2-1582), but can also be used to LR Brakes (P/N 2-1624). If the airplane is equipped with LR Brakes and restrictive weights are found, refer to AFM Quick Turn Around Weight charts.

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - SEA LEVEL

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	33455	33961	34437	34974	35439	36611	37148	37675	38259	38766
-16	33186	33689	34160	34694	35155	36302	36835	37357	37937	38440
-12	32926	33426	33893	34423	34881	36003	36534	37051	37626	38125
-8	32665	33163	33626	34152	34607	35705	36232	36744	37315	37810
-4	32411	32906	33365	33887	34339	35412	35937	36445	37011	37502
0	32166	32659	33114	33632	34080	35131	35653	36156	36718	37205
4	31924	32415	32866	33381	33826	34854	35373	35871	36429	36913
8	31690	32179	32626	33137	33579	34585	35102	35596	36150	36630
12	31462	31948	32391	32900	33338	34323	34837	35327	35877	36354
16	31235	31719	32159	32664	33100	34063	34574	35060	35606	36080
20	31016	31498	31934	32436	32869	33812	34320	34802	35345	35815
24	30803	31283	31715	32214	32644	33567	34073	34551	35090	35557
28	30595	31073	31502	31998	32425	33328	33832	34306	34842	35305
32	30387	30863	31289	31781	32206	33090	33591	34061	34593	35054
36	30182	30655	31078	31567	31989	32853	33353	33819	34348	34805
40	29985	30457	30876	31362	31782	32628	33125	33587	34113	34567
44	29788	30258	30675	31158	31575	32402	32897	33356	33878	34329
48	29601	30069	30483	30963	31377	32187	32680	33135	33654	34103

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	37801	38349	38895	39496	40020	39018	39578	40145	40764	41303
-16	37476	38021	38562	39159	39678	38680	39236	39797	40411	40946
-12	37163	37705	38241	38833	39348	38353	38906	39461	40071	40601
-8	36850	37389	37920	38507	39018	38026	38576	39126	39731	40257
-4	36544	37079	37605	38188	38695	37706	38253	38798	39398	39919
0	36249	36781	37303	37881	38384	37397	37942	38481	39077	39595
4	35958	36488	37005	37579	38077	37094	37635	38170	38761	39275
8	35677	36204	36716	37286	37781	36800	37338	37868	38455	38965
12	35402	35926	36434	37000	37491	36513	37048	37574	38156	38662
16	35129	35651	36154	36716	37204	36228	36761	37282	37860	38362
20	34866	35385	35884	36442	36926	35953	36483	36999	37573	38072
24	34609	35126	35620	36175	36655	35685	36212	36724	37294	37789
28	34359	34873	35364	35914	36392	35424	35948	36456	37022	37514
32	34109	34621	35107	35654	36128	35162	35685	36188	36751	37239
36	33861	34370	34853	35396	35867	34904	35423	35923	36481	36966
40	33624	34132	34610	35150	35618	34657	35174	35669	36224	36706
44	33388	33893	34368	34904	35368	34410	34924	35416	35967	36445
48	33163	33665	34136	34670	35131	34174	34687	35174	35722	36197

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 1000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	32877	33377	33843	34372	34830	35947	36477	36994	37568	38066
-16	32611	33108	33571	34096	34550	35642	36169	36681	37250	37745
-12	32351	32846	33304	33825	34275	35344	35867	36374	36939	37430
-8	32098	32591	33044	33562	34009	35053	35575	36076	36637	37124
-4	31849	32339	32789	33303	33747	34768	35286	35783	36340	36823
0	31610	32097	32543	33053	33494	34493	35008	35501	36054	36533
4	31372	31857	32299	32806	33244	34220	34733	35221	35770	36245
8	31144	31627	32065	32568	33003	33958	34468	34952	35497	35969
12	30920	31401	31835	32336	32767	33701	34209	34689	35230	35698
16	30696	31175	31606	32103	32531	33444	33949	34425	34962	35428
20	30479	30956	31383	31877	32303	33195	33698	34169	34703	35165
24	30268	30742	31166	31657	32080	32952	33453	33920	34450	34909
28	30064	30536	30957	31444	31865	32718	33216	33680	34207	34662
32	29863	30334	30751	31236	31653	32488	32984	33444	33967	34420
36	29666	30134	30549	31030	31445	32261	32755	33212	33731	34181
40	29468	29935	30346	30825	31237	32035	32526	32979	33496	33942
44	29279	29744	30152	30628	31038	31818	32307	32756	33270	33713
48	29092	29555	29960	30433	30841	31603	32090	32536	33046	33487

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	37105	37646	38181	38772	39286	38291	38844	39399	40007	40537
-16	36785	37323	37853	38439	38949	37957	38507	39056	39660	40185
-12	36472	37007	37532	38113	38619	37630	38177	38720	39319	39840
-8	36168	36700	37220	37797	38298	37313	37856	38394	38989	39505
-4	35868	36397	36912	37485	37982	37000	37540	38073	38663	39175
0	35580	36106	36616	37185	37679	36699	37236	37764	38350	38858
4	35294	35817	36323	36887	37377	36400	36934	37458	38039	38543
8	35019	35540	36041	36601	37087	36113	36644	37163	37740	38241
12	34750	35268	35765	36321	36804	35832	36360	36875	37447	37944
16	34480	34996	35488	36041	36520	35551	36077	36587	37155	37648
20	34219	34732	35220	35769	36245	35278	35801	36307	36871	37360
24	33965	34475	34959	35504	35976	35012	35533	36034	36594	37080
28	33719	34227	34707	35249	35717	34755	35274	35771	36327	36810
32	33478	33984	34460	34998	35463	34504	35019	35512	36065	36544
36	33240	33744	34216	34750	35213	34255	34769	35258	35807	36283
40	33003	33504	33972	34503	34962	34007	34518	35003	35549	36021
44	32775	33274	33739	34266	34723	33770	34278	34759	35301	35771
48	32550	33047	33508	34032	34485	33534	34041	34518	35056	35523

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 2000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	32793	33250	33770	34220	35283	35807	36312	36877	37366
-16	49603	32532	32985	33502	33948	34987	35507	36008	36568	37054
-12	49603	32277	32726	33239	33682	34697	35214	35710	36266	36748
-8	49603	32029	32474	32983	33423	34415	34930	35422	35973	36451
-4	49603	31784	32224	32730	33167	34136	34648	35135	35682	36157
0	49603	31547	31984	32487	32920	33867	34377	34860	35403	35874
4	49603	31309	31742	32241	32672	33597	34104	34582	35121	35588
8	49603	31079	31508	32003	32431	33335	33839	34313	34848	35312
12	49603	30857	31283	31775	32200	33083	33585	34055	34587	35047
16	49603	30638	31061	31550	31971	32834	33333	33799	34327	34784
20	49603	30423	30842	31327	31746	32589	33086	33548	34072	34526
24	49603	30213	30628	31111	31527	32350	32845	33303	33824	34275
28	49603	30009	30421	30901	31314	32118	32611	33065	33583	34030
32	49603	29812	30221	30698	31109	31895	32385	32836	33350	33795
36	49603	29617	30024	30498	30906	31674	32162	32609	33120	33561
40	49603	29421	29824	30295	30701	31450	31936	32379	32887	33326
44	49603	29236	29636	30104	30507	31240	31723	32163	32668	33104

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	36409	36943	37467	38048	38552	37565	38110	38653	39251	39771
-16	36098	36629	37148	37724	38225	37240	37782	38320	38913	39428
-12	35794	36322	36836	37408	37904	36922	37462	37994	38582	39094
-8	35499	36024	36533	37101	37593	36614	37150	37678	38261	38769
-4	35206	35728	36233	36796	37284	36308	36842	37364	37943	38446
0	34924	35444	35944	36503	36988	36014	36545	37062	37637	38136
4	34640	35157	35653	36207	36689	35718	36245	36758	37329	37824
8	34366	34880	35371	35921	36399	35431	35955	36463	37030	37521
12	34102	34614	35100	35647	36121	35155	35677	36181	36743	37231
16	33841	34350	34832	35375	35846	34882	35402	35901	36459	36944
20	33584	34091	34569	35108	35575	34614	35131	35626	36180	36661
24	33334	33838	34312	34848	35311	34353	34867	35358	35908	36386
28	33091	33593	34063	34595	35055	34099	34611	35097	35644	36118
32	32856	33356	33822	34351	34808	33854	34364	34846	35389	35860
36	32624	33122	33584	34109	34564	33612	34119	34598	35137	35605
40	32390	32885	33344	33866	34317	33367	33872	34346	34883	35347
44	32169	32662	33117	33636	34084	33137	33639	34110	34643	35104

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 3000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	32216	32664	33176	33618	34628	35145	35640	36195	36676
-16	49603	31957	32401	32909	33348	34334	34848	35338	35888	36365
-12	49603	31710	32149	32654	33090	34052	34563	35049	35595	36069
-8	49603	31470	31906	32407	32839	33779	34288	34769	35311	35781
-4	49603	31232	31664	32161	32591	33509	34015	34491	35030	35496
0	49603	30993	31422	31916	32342	33238	33741	34214	34748	35210
4	49603	30765	31189	31680	32103	32978	33479	33947	34477	34936
8	49603	30540	30961	31448	31869	32722	33221	33684	34211	34667
12	49603	30319	30736	31220	31638	32471	32967	33426	33949	34402
16	49603	30105	30519	31000	31415	32228	32722	33177	33697	34146
20	49603	29895	30306	30784	31196	31989	32481	32933	33449	33894
24	49603	29689	30097	30572	30981	31755	32244	32692	33205	33647
28	49603	29491	29895	30367	30774	31530	32016	32461	32970	33410
32	49603	29294	29695	30165	30568	31306	31791	32232	32737	33174
36	49603	29101	29499	29966	30367	31087	31569	32007	32509	32943
40	49603	28916	29311	29775	30174	30876	31357	31791	32290	32721
44	49603	28737	29129	29590	29986	30672	31151	31581	32078	32506

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	35722	36249	36762	37333	37828	36847	37386	37917	38504	39014
-16	35413	35938	36445	37011	37503	36525	37060	37586	38168	38675
-12	35118	35640	36143	36704	37192	36216	36749	37270	37848	38350
-8	34832	35351	35849	36407	36890	35918	36447	36963	37537	38035
-4	34548	35064	35558	36111	36591	35621	36148	36659	37228	37722
0	34264	34778	35267	35816	36292	35325	35849	36355	36920	37410
4	33992	34502	34987	35532	36005	35040	35561	36063	36623	37110
8	33724	34232	34712	35253	35722	34760	35278	35775	36332	36815
12	33460	33966	34442	34979	35444	34485	35000	35493	36046	36525
16	33206	33709	34180	34714	35176	34219	34732	35220	35769	36244
20	32956	33456	33924	34454	34913	33958	34468	34952	35497	35969
24	32710	33208	33672	34198	34654	33701	34209	34689	35230	35699
28	32473	32969	33429	33952	34405	33454	33960	34436	34973	35438
32	32239	32733	33189	33709	34158	33210	33713	34185	34719	35181
36	32009	32501	32953	33469	33915	32970	33471	33939	34469	34928
40	31789	32278	32727	33240	33683	32739	33238	33702	34229	34685
44	31575	32062	32507	33017	33457	32516	33012	33473	33996	34449

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 4000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	31632	32071	32574	33009	33964	34475	34959	35504	35976
-16	49603	31383	31817	32317	32748	33680	34188	34668	35208	35677
-12	49603	31139	31569	32066	32494	33403	33908	34383	34920	35385
-8	49603	30899	31326	31818	32243	33130	33633	34103	34636	35097
-4	49603	30665	31087	31577	31999	32864	33364	33830	34359	34816
0	49603	30436	30855	31341	31760	32604	33101	33563	34088	34542
4	49603	30209	30625	31107	31523	32346	32841	33299	33820	34270
8	49603	29992	30404	30883	31296	32099	32591	33045	33563	34010
12	49603	29774	30183	30659	31070	31852	32342	32792	33305	33749
16	49603	29561	29966	30439	30847	31609	32097	32542	33053	33493
20	49603	29359	29760	30231	30635	31379	31864	32307	32813	33251
24	49603	29160	29559	30026	30428	31154	31637	32075	32579	33013
28	49603	28967	29363	29828	30227	30934	31415	31850	32350	32782
32	49603	28778	29171	29633	30030	30719	31198	31630	32127	32556
36	49603	28595	28985	29444	29838	30511	30988	31416	31910	32336
40	49603	28419	28806	29263	29655	30311	30786	31211	31702	32126

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	35026	35546	36048	36608	37094	36120	36652	37171	37747	38248
-16	34728	35246	35743	36299	36781	35809	36338	36852	37424	37921
-12	34438	34953	35445	35996	36475	35506	36031	36541	37108	37601
-8	34152	34664	35151	35699	36173	35207	35730	36234	36797	37286
-4	33872	34382	34864	35408	35879	34915	35435	35935	36494	36978
0	33600	34107	34585	35124	35592	34631	35148	35643	36197	36678
4	33329	33834	34308	34843	35307	34348	34863	35353	35904	36381
8	33070	33572	34042	34574	35034	34078	34589	35075	35622	36096
12	32811	33311	33776	34304	34761	33807	34316	34798	35340	35810
16	32557	33054	33515	34039	34492	33541	34048	34525	35064	35530
20	32316	32810	33268	33788	34238	33290	33794	34267	34802	35265
24	32079	32571	33025	33542	33989	33043	33544	34013	34545	35005
28	31850	32339	32789	33303	33747	32803	33302	33767	34295	34752
32	31624	32112	32558	33069	33509	32568	33064	33526	34050	34504
36	31406	31891	32334	32841	33279	32339	32834	33292	33813	34263
40	31196	31680	32119	32623	33058	32121	32613	33067	33585	34032

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 5000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	31058	31487	31982	32409	33311	33815	34289	34824	35287
-16	49603	30812	31237	31729	32153	33032	33533	34002	34533	34993
-12	49603	30576	30997	31485	31906	32763	33262	33726	34254	34710
-8	49603	30340	30757	31242	31659	32494	32991	33451	33974	34427
-4	49603	30105	30519	31000	31415	32228	32722	33177	33697	34146
0	49603	29882	30292	30770	31182	31974	32465	32917	33433	33878
4	49603	29659	30066	30540	30949	31721	32209	32657	33169	33611
8	49603	29445	29849	30320	30726	31478	31964	32408	32916	33355
12	49603	29238	29638	30106	30509	31242	31726	32165	32670	33106
16	49603	29033	29430	29896	30296	31010	31491	31927	32429	32862
20	49603	28837	29230	29693	30091	30786	31266	31698	32196	32626
24	49603	28644	29034	29494	29890	30567	31044	31473	31968	32395
28	49603	28457	28844	29302	29694	30354	30829	31255	31747	32171
32	49603	28274	28658	29113	29503	30146	30619	31041	31530	31951
36	49603	28092	28474	28926	29314	29939	30411	30829	31315	31734
40	49603	27915	28293	28743	29128	29737	30207	30622	31105	31521

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	34341	34855	35345	35896	36373	35405	35929	36437	37003	37494
-16	34048	34559	35045	35591	36064	35099	35620	36123	36685	37172
-12	33766	34275	34756	35298	35767	34805	35323	35821	36379	36862
-8	33485	33991	34467	35005	35471	34511	35027	35520	36073	36552
-4	33206	33709	34180	34714	35176	34219	34732	35220	35769	36244
0	32940	33440	33908	34438	34896	33941	34452	34935	35480	35952
4	32674	33172	33635	34161	34616	33664	34171	34651	35191	35659
8	32419	32915	33374	33896	34348	33398	33903	34378	34914	35379
12	32172	32665	33120	33638	34086	33139	33642	34112	34645	35106
16	31928	32419	32870	33385	33830	32885	33385	33852	34381	34838
20	31694	32182	32630	33141	33583	32640	33138	33601	34126	34581
24	31464	31950	32394	32902	33341	32400	32896	33354	33876	34328
28	31241	31725	32165	32670	33106	32168	32661	33115	33634	34082
32	31023	31505	31941	32443	32876	31939	32430	32881	33396	33842
36	30807	31286	31719	32217	32648	31713	32202	32650	33161	33603
40	30595	31072	31502	31997	32424	31492	31979	32423	32931	33370

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QUICK TURN AROUND WEIGHT TABLE (lb)
FLAPS 22° - NO ICE ENCOUNTER - 6000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	30495	30915	31401	31821	32671	33168	33632	34157	34612
-16	49603	30253	30669	31152	31569	32396	32891	33349	33871	34322
-12	49603	30016	30429	30909	31322	32127	32620	33074	33592	34039
-8	49603	29784	30193	30669	31079	31863	32353	32803	33317	33761
-4	49603	29559	29964	30437	30845	31607	32094	32540	33050	33491
0	49603	29338	29739	30209	30614	31356	31841	32282	32789	33226
4	49603	29122	29520	29987	30389	31111	31593	32031	32534	32968
8	49603	28916	29311	29775	30174	30876	31357	31791	32290	32721
12	49603	28716	29107	29568	29965	30649	31127	31557	32053	32481
16	49603	28521	28910	29368	29762	30427	30903	31330	31823	32248
20	49603	28328	28714	29169	29560	30208	30682	31105	31595	32017
24	49603	28139	28522	28974	29363	29993	30465	30885	31371	31790
28	49603	27954	28334	28783	29170	29783	30252	30669	31152	31568
32	49603	27773	28149	28597	28980	29576	30044	30457	30937	31351
36	49603	27597	27971	28415	28797	29376	29842	30252	30729	31140

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	33670	34177	34656	35197	35665	34704	35221	35718	36273	36755
-16	33381	33886	34361	34897	35361	34402	34917	35409	35960	36438
-12	33100	33602	34072	34604	35065	34108	34620	35107	35654	36128
-8	32823	33322	33788	34316	34773	33819	34328	34810	35353	35823
-4	32555	33051	33512	34037	34490	33539	34045	34523	35061	35528
0	32291	32785	33242	33762	34212	33264	33767	34240	34775	35238
4	32034	32526	32979	33495	33942	32996	33497	33965	34496	34955
8	31789	32278	32727	33240	33683	32739	33238	33702	34229	34685
12	31550	32037	32482	32991	33431	32490	32986	33446	33969	34422
16	31318	31803	32244	32750	33187	32248	32741	33197	33717	34166
20	31088	31571	32008	32511	32944	32008	32499	32951	33467	33913
24	30863	31343	31777	32276	32707	31772	32261	32710	33223	33665
28	30642	31120	31550	32046	32474	31542	32029	32473	32983	33422
32	30426	30902	31328	31821	32246	31316	31801	32242	32748	33184
36	30216	30690	31114	31603	32026	31097	31580	32017	32520	32954

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 7000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	49603	30342	30821	31233	32030	32522	32975	33491	33937
-16	49603	49603	30100	30576	30985	31760	32248	32697	33209	33652
-12	49603	49603	29868	30340	30746	31500	31986	32430	32939	33378
-8	49603	49603	29639	30108	30511	31244	31728	32168	32673	33108
-4	49603	49603	29415	29880	30280	30992	31474	31910	32411	32843
0	49603	49603	29202	29664	30061	30754	31233	31665	32163	32592
4	49603	49603	28990	29450	29844	30517	30994	31422	31917	32343
8	49603	49603	28785	29241	29633	30288	30762	31187	31677	32101
12	49603	49603	28585	29039	29428	30064	30537	30957	31445	31865
16	49603	49603	28385	28836	29223	29841	30311	30728	31212	31630
20	49603	49603	28195	28643	29028	29628	30096	30510	30991	31405
24	49603	49603	28009	28454	28836	29419	29886	30296	30774	31186
28	49603	49603	27825	28267	28647	29213	29677	30084	30559	30968
32	49603	49603	27646	28086	28463	29013	29476	29879	30351	30758
36	49603	49603	27473	27911	28286	28820	29280	29681	30150	30554

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	32998	33499	33968	34498	34958	34003	34513	34998	35544	36016
-16	32714	33213	33677	34203	34659	33706	34214	34694	35235	35704
-12	32442	32938	33397	33919	34371	33421	33927	34402	34939	35404
-8	32174	32667	33122	33641	34089	33142	33644	34115	34648	35109
-4	31910	32401	32852	33366	33811	32866	33366	33832	34361	34819
0	31660	32148	32595	33106	33547	32605	33102	33564	34089	34543
4	31413	31898	32341	32848	33286	32346	32841	33299	33820	34271
8	31171	31655	32093	32597	33032	32095	32587	33041	33558	34005
12	30937	31418	31853	32353	32785	31850	32340	32790	33303	33747
16	30703	31182	31613	32110	32538	31605	32093	32539	33049	33489
20	30480	30956	31384	31878	32303	31372	31858	32300	32806	33244
24	30261	30736	31160	31650	32073	31144	31627	32065	32569	33003
28	30045	30517	30938	31425	31845	30918	31399	31834	32334	32765
32	29836	30306	30723	31207	31624	30699	31178	31609	32106	32535
36	29633	30101	30515	30996	31411	30488	30964	31392	31886	32312

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 8000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	49603	29780	30250	30655	31401	31886	32329	32836	33274
-16	49603	49603	29541	30009	30411	31134	31617	32055	32558	32993
-12	49603	49603	29317	29781	30180	30883	31363	31797	32297	32728
-8	49603	49603	29098	29559	29955	30638	31116	31546	32042	32470
-4	49603	49603	28883	29341	29734	30397	30873	31299	31791	32216
0	49603	49603	28673	29128	29519	30163	30636	31059	31548	31969
4	49603	49603	28468	28920	29308	29933	30404	30823	31308	31727
8	49603	49603	28266	28715	29101	29707	30176	30591	31074	31489
12	49603	49603	28069	28515	28897	29486	29953	30364	30843	31256
16	49603	49603	27877	28320	28700	29271	29736	30144	30620	31029
20	49603	49603	27690	28131	28509	29063	29525	29930	30403	30810
24	49603	49603	27506	27944	28319	28856	29317	29718	30188	30592
28	49603	49603	27327	27763	28136	28657	29115	29513	29980	30382
32	49603	49603	27153	27586	27956	28461	28918	29313	29777	30176

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	32338	32833	33291	33812	34262	33313	33817	34291	34826	35290
-16	32059	32551	33004	33521	33968	33022	33523	33992	34523	34982
-12	31795	32285	32734	33247	33690	32746	33245	33709	34236	34692
-8	31539	32025	32470	32979	33419	32478	32974	33434	33957	34409
-4	31286	31771	32211	32717	33153	32215	32708	33164	33683	34132
0	31041	31523	31959	32461	32895	31958	32449	32901	33416	33861
4	30800	31279	31712	32210	32640	31706	32195	32642	33154	33596
8	30563	31041	31469	31964	32391	31459	31945	32389	32897	33336
12	30331	30806	31231	31723	32147	31217	31701	32140	32645	33080
16	30106	30579	31000	31488	31909	30982	31463	31899	32400	32832
20	29887	30358	30776	31261	31679	30754	31233	31665	32162	32592
24	29671	30140	30554	31036	31451	30528	31005	31433	31927	32354
28	29462	29928	30339	30818	31230	30309	30784	31208	31700	32123
32	29257	29721	30129	30605	31014	30095	30568	30989	31477	31897

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 9000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	49603	29228	29691	30089	30784	31263	31696	32194	32624
-16	49603	49603	29004	29463	29858	30533	31010	31438	31932	32359
-12	49603	49603	28783	29239	29631	30285	30760	31184	31675	32098
-8	49603	49603	28568	29021	29410	30045	30517	30937	31425	31845
-4	49603	49603	28357	28807	29193	29808	30278	30695	31179	31596
0	49603	49603	28151	28598	28982	29578	30046	30459	30939	31353
4	49603	49603	27950	28394	28775	29353	29818	30228	30705	31115
8	49603	49603	27754	28195	28574	29134	29597	30003	30477	30884
12	49603	49603	27562	28001	28377	28919	29380	29782	30253	30658
16	49603	49603	27373	27810	28183	28708	29167	29566	30034	30436
20	49603	49603	27189	27623	27994	28502	28959	29355	29819	30219
24	49603	49603	27011	27442	27811	28302	28757	29150	29611	30008
28	49603	49603	26834	27262	27629	28104	28558	28947	29405	29800
32	49603	49603	26663	27089	27453	27913	28365	28750	29206	29598

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	31692	32180	32627	33139	33581	32638	33136	33598	34124	34578
-16	31428	31914	32357	32865	33303	32363	32858	33316	33837	34288
-12	31169	31652	32091	32595	33030	32092	32585	33038	33556	34003
-8	30917	31398	31832	32332	32764	31829	32318	32768	33281	33725
-4	30669	31148	31578	32074	32503	31570	32057	32502	33012	33452
0	30428	30904	31331	31824	32249	31318	31803	32244	32750	33187
4	30192	30665	31088	31577	31999	31071	31553	31991	32493	32927
8	29962	30433	30852	31338	31757	30831	31311	31744	32243	32674
12	29737	30206	30621	31104	31520	30596	31074	31503	31998	32426
16	29516	29983	30395	30874	31287	30365	30841	31266	31758	32183
20	29300	29765	30173	30649	31059	30139	30613	31035	31523	31945
24	29090	29553	29958	30431	30838	29921	30392	30810	31296	31714
28	28883	29344	29745	30216	30620	29704	30173	30588	31070	31486
32	28682	29141	29540	30007	30409	29495	29962	30373	30852	31265

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 10000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	49603	28679	29134	29525	49603	30643	31065	31554	31976
-16	49603	49603	28456	28908	29296	49603	30391	30810	31295	31713
-12	49603	49603	28241	28690	29075	49603	30148	30563	31044	31460
-8	49603	49603	28030	28476	28858	49603	29909	30320	30799	31211
-4	49603	49603	27827	28269	28649	49603	29679	30086	30561	30970
0	49603	49603	27623	28063	28440	49603	29449	29853	30324	30730
4	49603	49603	27427	27864	28239	49603	29228	29628	30096	30499
8	49603	49603	27235	27669	28041	49603	29011	29407	29873	30273
12	49603	49603	27047	27479	27848	49603	28799	29191	29654	30051
16	49603	49603	26863	27292	27659	49603	28590	28980	29439	29834
20	49603	49603	26682	27108	27473	49603	28386	28773	29229	29621
24	49603	49603	26507	26931	27294	49603	28189	28572	29025	29415
28	49603	49603	26455	26455	26455	49603	27991	28371	28822	29208

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	31048	31530	31966	32468	32902	31965	32456	32908	33423	33869
-16	30786	31266	31698	32196	32626	31692	32181	32628	33139	33581
-12	30534	31011	31439	31934	32360	31429	31915	32357	32865	33303
-8	30286	30761	31185	31676	32099	31170	31653	32092	32596	33031
-4	30047	30520	30940	31427	31848	30921	31401	31836	32336	32768
0	29809	30279	30695	31179	31596	30671	31150	31580	32077	32505
4	29579	30047	30460	30940	31354	30431	30907	31334	31827	32252
8	29354	29819	30228	30705	31116	30196	30670	31093	31582	32004
12	29133	29596	30002	30476	30884	29965	30437	30856	31342	31761
16	28917	29378	29780	30251	30656	29740	30209	30624	31107	31523
20	28705	29164	29563	30030	30432	29518	29985	30397	30877	31290
24	28500	28957	29353	29817	30216	29304	29769	30178	30654	31064
28	28295	28750	29142	29604	30000	29090	29553	29958	30431	30839

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 11000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	49603	49603	28583	28966	49603	30029	30441	30922	31335
-16	49603	49603	49603	28361	28742	49603	29781	30190	30667	31077
-12	49603	49603	49603	28149	28527	49603	29545	29950	30423	30830
-8	49603	49603	49603	27938	28314	49603	29311	29712	30181	30585
-4	49603	49603	49603	27734	28106	49603	29083	29480	29947	30348
0	49603	49603	49603	27533	27903	49603	28859	29253	29716	30114
4	49603	49603	49603	27338	27706	49603	28642	29033	29493	29888
8	49603	49603	49603	27147	27513	49603	28430	28817	29273	29666
12	49603	49603	49603	26960	27323	49603	28221	28605	29059	29449
16	49603	49603	49603	26455	26455	49603	28017	28398	28849	29236
20	49603	49603	49603	26455	26455	49603	27818	28195	28643	29027
24	49603	49603	49603	26455	26455	49603	27623	27997	28442	28823
28	49603	49603	49603	26455	26455	49603	27432	27803	28245	28624

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	30410	30886	31312	31805	32230	31299	31784	32225	32730	33167
-16	30153	30627	31049	31538	31959	31031	31513	31950	32451	32884
-12	29908	30379	30797	31282	31700	30775	31254	31686	32184	32614
-8	29664	30133	30547	31029	31444	30521	30998	31426	31920	32346
-4	29428	29894	30305	30783	31195	30274	30748	31172	31663	32086
0	29196	29660	30067	30541	30950	30031	30503	30924	31411	31830
4	28971	29432	29836	30307	30713	29796	30266	30682	31166	31582
8	28750	29210	29609	30077	30480	29565	30033	30446	30926	31339
12	28534	28991	29387	29852	30252	29340	29805	30214	30691	31101
16	28322	28777	29170	29632	30029	29118	29582	29987	30461	30868
20	28115	28568	28957	29416	29810	28902	29363	29765	30235	30640
24	27912	28363	28749	29205	29597	28690	29149	29548	30015	30417
28	27714	28163	28546	28999	29388	28483	28940	29335	29800	30199

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 12000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	49603	49603	28039	28416	49603	29423	29826	30298	30703
-16	49603	49603	49603	27823	28197	49603	29183	29582	30049	30452
-12	49603	49603	49603	27613	27984	49603	28948	29344	29808	30207
-8	49603	49603	49603	27408	27777	49603	28720	29112	29573	29969
-4	49603	49603	49603	27208	27574	49603	28497	28885	29343	29736
0	49603	49603	49603	27013	27377	49603	28280	28665	29119	29510
4	49603	49603	49603	26455	26455	49603	28067	28448	28900	29288
8	49603	49603	49603	26455	26455	49603	27859	28237	28685	29070
12	49603	49603	49603	26455	26455	49603	27655	28030	28475	28857
16	49603	49603	49603	26455	26455	49603	27455	27827	28269	28649
20	49603	49603	49603	26455	26455	49603	27258	27626	28066	28443
24	49603	49603	49603	26455	26455	49603	27067	27432	27869	28244

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	30251	30668	31151	31567	30643	31121	31551	32047	32475
-16	49603	29999	30411	30891	31304	30382	30857	31283	31775	32200
-12	49603	29753	30161	30637	31047	30128	30601	31023	31511	31932
-8	49603	29514	29919	30391	30798	29881	30351	30769	31254	31672
-4	49603	29280	29681	30150	30554	29638	30107	30521	31002	31416
0	49603	29053	29450	29915	30316	29403	29869	30279	30757	31168
4	49603	28830	29223	29686	30083	29173	29636	30043	30517	30925
8	49603	28611	29001	29461	29856	28947	29408	29811	30282	30687
12	49603	28398	28784	29240	29632	28725	29185	29584	30052	30454
16	49603	28188	28571	29025	29414	28509	28966	29362	29827	30226
20	49603	27981	28361	28811	29198	28295	28750	29142	29604	30000
24	49603	27781	28158	28605	28989	28088	28541	28930	29388	29782

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - NO ICE ENCOUNTER - 13800 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	49603	49603	49603	27390	49603	49603	28680	29135	29526
-16	49603	49603	49603	49603	26455	49603	49603	28446	28898	29285
-12	49603	49603	49603	49603	26455	49603	49603	28217	28665	29050
-8	49603	49603	49603	49603	26455	49603	49603	27994	28439	28821
-4	49603	49603	49603	49603	26455	49603	49603	27776	28218	28597
0	49603	49603	49603	49603	26455	49603	49603	27562	28001	28377
4	49603	49603	49603	49603	26455	49603	49603	27353	27789	28162
8	49603	49603	49603	49603	26455	49603	49603	27150	27583	27954
12	49603	49603	49603	49603	26455	49603	49603	26949	27379	27748
16	49603	49603	49603	49603	26455	49603	49603	26608	27033	27397
20	49603	49603	49603	49603	27240	49603	49603	26455	26879	27240

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	49603	29069	29466	29932	30333	49603	29886	30296	30774	31186
-16	49603	28827	29221	29683	30081	49603	29634	30040	30515	30923
-12	49603	28591	28980	29440	29834	49603	29387	29789	30260	30665
-8	49603	28361	28747	29203	29594	49603	29147	29545	30013	30415
-4	49603	28136	28518	28971	29359	49603	28912	29306	29770	30169
0	49603	27915	28294	28743	29129	49603	28681	29072	29533	29929
4	49603	27699	28074	28521	28904	49603	28456	28843	29300	29693
8	49603	27490	27862	28305	28685	49603	28237	28621	29075	29465
12	49603	27283	27652	28092	28469	49603	28021	28401	28852	29239
16	49603	26930	27293	27728	28101	49603	27653	28027	28473	28855
20	49603	26106	26455	26879	27240	49603	26106	26455	26879	27240

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - SEA LEVEL

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	32527	32997	33520	33990	34972	35494	36008	36576	37077
-24	49603	32389	32856	33378	33846	34816	35336	35847	36413	36912
-22	49603	32251	32716	33235	33703	34660	35177	35686	36250	36747
-20	49603	32114	32578	33095	33561	34505	35021	35528	36089	36585
-18	49603	31980	32441	32956	33421	34353	34866	35371	35930	36424
-16	49603	31847	32306	32820	33283	34203	34714	35217	35773	36266
-14	49603	31718	32176	32687	33149	34058	34567	35067	35621	36112
-12	49603	31590	32045	32554	33015	33912	34419	34917	35469	35959
-10	49603	31463	31916	32424	32882	33769	34273	34769	35319	35807
-8	49603	31334	31785	32291	32748	33623	34126	34619	35167	35653
-6	49603	31205	31655	32158	32614	33477	33978	34469	35015	35500
-4	49603	31080	31528	32029	32484	33336	33835	34324	34867	35351
-2	49603	30961	31406	31906	32360	33201	33698	34185	34726	35208
0	49603	30839	31283	31781	32234	33064	33559	34044	34583	35064
2	49603	30720	31162	31659	32110	32929	33422	33905	34442	34921
4	49603	30603	31043	31538	31988	32796	33287	33768	34303	34781
6	49603	30485	30924	31417	31865	32664	33153	33632	34165	34641
8	49603	30373	30810	31301	31749	32537	33025	33501	34033	34508

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	36083	36620	37151	37736	38249	37215	37769	38317	38919	39444
-24	35919	36454	36983	37566	38076	37044	37595	38140	38740	39263
-22	35756	36289	36815	37395	37904	36873	37421	37964	38562	39082
-20	35595	36125	36649	37227	37734	36704	37250	37790	38385	38904
-18	35436	35964	36485	37061	37566	36537	37081	37619	38211	38729
-16	35279	35805	36324	36897	37401	36373	36915	37450	38040	38555
-14	35127	35651	36168	36738	37241	36214	36753	37286	37873	38387
-12	34975	35497	36011	36579	37080	36054	36591	37122	37707	38219
-10	34825	35345	35857	36423	36922	35897	36432	36960	37542	38053
-8	34673	35191	35700	36264	36761	35738	36270	36796	37376	37885
-6	34521	35036	35543	36105	36601	35578	36108	36632	37209	37716
-4	34373	34887	35391	35951	36445	35423	35951	36472	37047	37553
-2	34232	34744	35246	35803	36296	35276	35802	36320	36893	37397
0	34089	34598	35099	35654	36145	35126	35649	36166	36736	37239
2	33948	34456	34954	35506	35997	34978	35500	36014	36582	37083
4	33809	34315	34811	35362	35850	34832	35352	35864	36430	36929
6	33671	34174	34668	35217	35704	34687	35205	35714	36278	36776
8	33539	34040	34532	35079	35565	34549	35064	35572	36134	36630

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 1000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	31946	32406	32921	33385	34315	34827	35331	35889	36383
-24	49603	31811	32270	32783	33245	34163	34673	35175	35731	36223
-22	49603	31679	32135	32646	33107	34013	34521	35020	35574	36065
-20	49603	31546	32001	32509	32969	33863	34369	34866	35417	35907
-18	49603	31413	31866	32373	32831	33713	34217	34712	35261	35748
-16	49603	31283	31733	32238	32695	33565	34067	34560	35106	35592
-14	49603	31154	31603	32105	32561	33420	33919	34410	34954	35439
-12	49603	31027	31474	31975	32429	33276	33774	34262	34804	35287
-10	49603	30902	31347	31846	32299	33135	33631	34117	34657	35138
-8	49603	30777	31220	31717	32169	32993	33487	33971	34509	34989
-6	49603	30654	31095	31590	32041	32854	33346	33828	34364	34842
-4	49603	30532	30972	31465	31915	32717	33207	33687	34220	34698
-2	49603	30415	30853	31344	31792	32584	33072	33550	34082	34557
0	49603	30298	30733	31223	31670	32452	32938	33413	33943	34417
2	49603	30182	30616	31104	31550	32321	32805	33279	33807	34279
4	49603	30068	30501	30987	31432	32192	32675	33147	33672	34144
6	49603	29957	30387	30872	31315	32066	32547	33016	33540	34010
8	49603	29847	30276	30759	31201	31942	32421	32889	33411	33879

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	35396	35923	36444	37019	37524	36495	37038	37576	38167	38684
-24	35237	35762	36280	36853	37356	36329	36870	37404	37993	38508
-22	35080	35604	36119	36689	37191	36164	36703	37235	37822	38335
-20	34924	35445	35958	36525	37026	36000	36537	37066	37650	38162
-18	34767	35286	35797	36362	36861	35836	36370	36897	37479	37989
-16	34613	35129	35638	36201	36698	35674	36206	36731	37310	37818
-14	34461	34975	35481	36042	36537	35515	36044	36566	37143	37650
-12	34311	34823	35327	35885	36379	35358	35885	36405	36979	37484
-10	34163	34673	35175	35731	36223	35203	35728	36245	36817	37320
-8	34015	34524	35023	35577	36067	35048	35571	36086	36655	37157
-6	33870	34376	34873	35425	35914	34896	35416	35929	36496	36996
-4	33727	34231	34726	35275	35763	34746	35264	35775	36339	36838
-2	33588	34090	34583	35130	35616	34600	35117	35625	36188	36685
0	33449	33950	34440	34985	35470	34455	34969	35475	36036	36531
2	33313	33811	34300	34843	35326	34312	34824	35328	35886	36380
4	33179	33675	34162	34703	35184	34171	34681	35183	35739	36232
6	33047	33541	34026	34565	35045	34033	34541	35041	35595	36086
8	32917	33410	33892	34429	34908	33897	34403	34901	35453	35942

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 2000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	31372	31824	32330	32788	33666	34169	34663	35212	35699
-24	49603	31239	31689	32193	32650	33516	34017	34509	35055	35540
-22	49603	31108	31556	32059	32514	33368	33867	34357	34901	35385
-20	49603	30981	31428	31928	32382	33225	33722	34209	34751	35233
-18	49603	30853	31297	31795	32248	33079	33574	34059	34599	35079
-16	49603	30726	31168	31664	32116	32936	33429	33912	34449	34928
-14	49603	30599	31039	31534	31984	32792	33283	33764	34299	34777
-12	49603	30478	30916	31409	31857	32655	33144	33623	34156	34632
-10	49603	30356	30793	31284	31731	32518	33005	33482	34012	34487
-8	49603	30237	30672	31161	31607	32383	32868	33343	33871	34345
-6	49603	30119	30553	31040	31485	32250	32734	33206	33733	34205
-4	49603	30004	30435	30921	31365	32120	32601	33072	33596	34067
-2	49603	29888	30318	30802	31244	31989	32469	32937	33460	33929
0	49603	29775	30203	30685	31126	31860	32338	32805	33326	33794
2	49603	29661	30087	30568	31008	31732	32208	32673	33191	33658
4	49603	29545	29970	30449	30888	31601	32075	32538	33055	33520
6	49603	29436	29858	30335	30773	31477	31949	32410	32925	33389
8	49603	29326	29747	30222	30659	31353	31823	32282	32795	33258

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	34718	35236	35746	36310	36809	35785	36318	36844	37425	37934
-24	34561	35077	35585	36147	36643	35620	36151	36675	37253	37761
-22	34407	34921	35426	35986	36481	35459	35987	36509	37084	37590
-20	34257	34769	35272	35829	36322	35301	35828	36347	36920	37424
-18	34105	34614	35115	35670	36162	35142	35666	36183	36753	37256
-16	33955	34462	34961	35513	36004	34985	35507	36021	36589	37090
-14	33805	34310	34806	35357	35845	34828	35347	35859	36425	36925
-12	33662	34165	34659	35207	35694	34678	35195	35705	36268	36766
-10	33519	34020	34512	35058	35543	34527	35043	35550	36112	36608
-8	33378	33877	34367	34911	35395	34380	34893	35398	35957	36452
-6	33239	33736	34224	34766	35248	34234	34746	35248	35805	36298
-4	33102	33598	34083	34623	35104	34091	34601	35101	35656	36147
-2	32966	33459	33943	34481	34960	33948	34455	34954	35506	35997
0	32832	33323	33805	34340	34819	33807	34313	34809	35359	35848
2	32698	33187	33667	34200	34677	33667	34170	34664	35212	35700
4	32561	33049	33526	34057	34533	33524	34025	34517	35063	35549
6	32431	32917	33392	33922	34396	33388	33887	34377	34921	35405
8	32302	32786	33259	33786	34259	33252	33749	34237	34779	35261

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 3000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	31253	31750	32202	33030	33524	34009	34547	35027
-24	49603	49603	31118	31614	32064	32880	33372	33854	34391	34869
-22	49603	49603	30989	31483	31932	32736	33227	33706	34241	34718
-20	49603	49603	30860	31352	31800	32593	33081	33559	34091	34566
-18	49603	49603	30733	31223	31670	32452	32938	33413	33943	34417
-16	49603	49603	30607	31095	31540	32310	32794	33268	33795	34268
-14	49603	49603	30485	30972	31416	32175	32658	33129	33654	34126
-12	49603	49603	30368	30853	31296	32045	32525	32994	33518	33988
-10	49603	49603	30249	30732	31173	31912	32390	32858	33379	33848
-8	49603	49603	30132	30613	31053	31781	32258	32723	33243	33710
-6	49603	49603	30016	30495	30935	31653	32128	32591	33109	33574
-4	49603	49603	29899	30376	30815	31522	31995	32456	32972	33436
-2	49603	49603	29783	30259	30696	31393	31865	32324	32838	33301
0	49603	49603	29668	30142	30578	31265	31734	32192	32704	33165
2	49603	49603	29557	30029	30464	31141	31608	32064	32574	33034
4	49603	49603	29447	29918	30351	31019	31485	31938	32446	32905
6	49603	49603	29339	29809	30241	30899	31363	31815	32321	32779
8	49603	49603	29230	29697	30129	30777	31239	31689	32193	32650

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	34053	34562	35062	35616	36108	35088	35611	36127	36697	37199
-24	33897	34403	34901	35453	35942	34924	35445	35958	36526	37026
-22	33747	34251	34747	35296	35784	34767	35286	35796	36361	36860
-20	33597	34099	34592	35140	35626	34610	35126	35635	36197	36694
-18	33449	33950	34440	34985	35470	34455	34969	35475	36036	36531
-16	33302	33800	34288	34831	35314	34300	34812	35316	35874	36368
-14	33161	33657	34143	34684	35166	34152	34662	35164	35720	36212
-12	33024	33518	34003	34541	35022	34009	34517	35017	35570	36061
-10	32885	33378	33860	34396	34875	33864	34370	34867	35418	35907
-8	32749	33239	33719	34254	34731	33721	34225	34720	35269	35756
-6	32615	33103	33581	34114	34590	33580	34082	34575	35122	35608
-4	32478	32965	33441	33971	34446	33437	33937	34428	34972	35457
-2	32344	32829	33303	33831	34304	33296	33794	34283	34825	35309
0	32210	32693	33164	33691	34162	33155	33652	34138	34678	35160
2	32080	32561	33031	33555	34025	33019	33514	33998	34536	35016
4	31953	32432	32900	33422	33891	32886	33378	33860	34397	34875
6	31827	32305	32771	33291	33759	32754	33245	33725	34259	34737
8	31700	32175	32639	33158	33624	32621	33109	33587	34120	34596

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 4000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	30678	31167	31613	32389	32875	33349	33878	34352
-24	49603	49603	30547	31034	31479	32244	32727	33199	33726	34198
-22	49603	49603	30421	30906	31350	32103	32585	33055	33580	34050
-20	49603	49603	30295	30778	31221	31963	32442	32911	33433	33902
-18	49603	49603	30172	30654	31095	31826	32303	32770	33290	33757
-16	49603	49603	30051	30531	30970	31691	32167	32631	33149	33615
-14	49603	49603	29932	30410	30848	31558	32032	32494	33010	33475
-12	49603	49603	29812	30289	30726	31426	31897	32357	32871	33335
-10	49603	49603	29697	30172	30608	31297	31767	32225	32737	33199
-8	49603	49603	29580	30052	30487	31166	31635	32090	32601	33061
-6	49603	49603	29464	29935	30369	31038	31504	31958	32466	32926
-4	49603	49603	29355	29824	30257	30916	31380	31833	32339	32797
-2	49603	49603	29243	29711	30142	30792	31254	31705	32209	32666
0	49603	49603	29135	29602	30032	30672	31133	31581	32084	32539
2	49603	49603	29026	29490	29920	30550	31009	31456	31956	32410
4	49603	49603	28937	29401	29829	30451	30909	31354	31853	32306
6	49603	49603	28810	29272	29699	30310	30766	31209	31706	32157
8	49603	49603	28707	29166	29592	30194	30648	31090	31585	32035

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	33384	33884	34374	34918	35402	34387	34900	35405	35965	36459
-24	33232	33729	34217	34759	35241	34227	34739	35241	35798	36291
-22	33086	33581	34066	34606	35086	34074	34583	35083	35638	36129
-20	32939	33432	33915	34452	34932	33920	34427	34925	35477	35967
-18	32796	33287	33768	34303	34781	33770	34275	34770	35320	35808
-16	32655	33144	33623	34156	34632	33622	34125	34618	35166	35653
-14	32516	33003	33480	34011	34486	33477	33977	34469	35014	35499
-12	32378	32863	33337	33866	34339	33331	33830	34319	34862	35346
-10	32243	32727	33199	33726	34198	33191	33687	34174	34715	35197
-8	32107	32588	33059	33583	34054	33048	33542	34027	34566	35046
-6	31973	32452	32920	33443	33912	32907	33399	33882	34419	34898
-4	31845	32323	32789	33310	33777	32773	33264	33744	34279	34757
-2	31715	32191	32656	33174	33641	32637	33126	33604	34137	34613
0	31590	32064	32527	33043	33508	32506	32993	33469	34000	34474
2	31463	31935	32395	32910	33374	32372	32857	33331	33860	34333
4	31360	31830	32289	32802	33265	32264	32748	33220	33747	34220
6	31212	31681	32137	32648	33109	32109	32591	33061	33586	34056
8	31091	31558	32013	32522	32982	31983	32462	32931	33453	33923

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 5000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	30112	30593	31034	49603	32236	32701	33220	33687
-24	49603	49603	29985	30464	30903	49603	32093	32556	33073	33538
-22	49603	49603	29860	30337	30775	49603	31952	32412	32927	33391
-20	49603	49603	29737	30213	30649	49603	31813	32271	32784	33247
-18	49603	49603	29618	30092	30527	49603	31678	32135	32645	33107
-16	49603	49603	29499	29971	30405	49603	31543	31998	32507	32966
-14	49603	49603	29383	29853	30286	49603	31413	31866	32372	32831
-12	49603	49603	29272	29740	30172	49603	31287	31738	32243	32700
-10	49603	49603	29160	29627	30058	49603	31161	31610	32113	32569
-8	49603	49603	29045	29510	29939	49603	31031	31478	31979	32433
-6	49603	49603	28932	29395	29823	49603	30903	31348	31847	32300
-4	49603	49603	28820	29282	29709	49603	30777	31220	31717	32169
-2	49603	49603	28712	29172	29598	49603	30655	31096	31592	32042
0	49603	49603	28620	29079	29504	49603	30551	30990	31484	31934
2	49603	49603	28497	28954	29378	49603	30412	30849	31341	31789
4	49603	49603	28389	28844	29267	49603	30290	30726	31216	31662
6	49603	49603	28285	28739	29161	49603	30173	30607	31095	31540
8	49603	49603	28182	28634	29054	49603	30055	30488	30974	31418

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	32727	33217	33696	34230	34708	33697	34201	34696	35244	35732
-24	32579	33067	33544	34076	34552	33542	34044	34536	35083	35568
-22	32434	32919	33395	33924	34398	33390	33889	34379	34923	35408
-20	32290	32774	33247	33775	34247	33240	33737	34225	34767	35249
-18	32152	32634	33105	33630	34101	33094	33590	34075	34615	35096
-16	32013	32493	32962	33485	33955	32949	33442	33925	34463	34942
-14	31879	32357	32824	33345	33813	32808	33300	33781	34316	34794
-12	31749	32225	32690	33209	33676	32672	33162	33640	34174	34650
-10	31619	32094	32556	33074	33539	32536	33024	33500	34032	34507
-8	31485	31957	32418	32933	33397	32395	32881	33356	33885	34358
-6	31353	31824	32282	32795	33258	32257	32741	33213	33740	34212
-4	31223	31692	32149	32660	33121	32121	32603	33073	33598	34069
-2	31098	31565	32020	32529	32989	31990	32469	32938	33461	33930
0	30990	31456	31909	32417	32876	31877	32355	32822	33343	33811
2	30847	31311	31762	32267	32725	31727	32203	32668	33186	33653
4	30722	31184	31633	32136	32592	31596	32070	32532	33049	33514
6	30601	31061	31509	32010	32465	31469	31941	32402	32917	33381
8	30480	30939	31384	31884	32337	31342	31813	32272	32784	33247

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 6000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	49603	30029	30464	49603	31608	32064	32574	33034
-24	49603	49603	49603	29904	30338	49603	31469	31923	32431	32890
-22	49603	49603	49603	29783	30215	49603	31335	31786	32292	32749
-20	49603	49603	49603	29664	30095	49603	31202	31652	32155	32612
-18	49603	49603	49603	29545	29975	49603	31070	31517	32019	32474
-16	49603	49603	49603	29428	29857	49603	30939	31385	31885	32338
-14	49603	49603	49603	29313	29740	49603	30811	31255	31753	32205
-12	49603	49603	49603	29198	29624	49603	30683	31125	31621	32071
-10	49603	49603	49603	29085	29510	49603	30557	30997	31491	31940
-8	49603	49603	49603	28971	29395	49603	30431	30869	31361	31809
-6	49603	49603	49603	28860	29283	49603	30307	30743	31234	31680
-4	49603	49603	49603	28749	29171	49603	30184	30618	31106	31552
-2	49603	49603	49603	28640	29060	49603	30062	30494	30981	31425
0	49603	49603	49603	28532	28952	49603	29943	30373	30858	31301
2	49603	49603	49603	28427	28845	49603	29825	30254	30737	31179
4	49603	49603	49603	28321	28739	49603	29708	30135	30616	31057
6	49603	49603	49603	28218	28634	49603	29593	30018	30497	30937
8	49603	49603	49603	28116	28532	49603	29480	29904	30381	30819

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	32080	32561	33031	33555	34025	33019	33514	33998	34536	35016
-24	31937	32416	32884	33405	33874	32869	33361	33843	34379	34858
-22	31798	32275	32741	33261	33728	32724	33214	33694	34228	34705
-20	31662	32137	32600	33118	33584	32581	33069	33546	34078	34554
-18	31525	31998	32460	32975	33440	32438	32924	33399	33929	34403
-16	31391	31862	32322	32835	33298	32297	32781	33254	33782	34254
-14	31259	31728	32186	32697	33159	32159	32641	33112	33637	34108
-12	31127	31594	32050	32559	33020	32020	32500	32969	33493	33962
-10	30997	31463	31916	32424	32883	31884	32362	32829	33350	33819
-8	30867	31331	31783	32288	32746	31748	32224	32689	33208	33675
-6	30740	31202	31651	32155	32611	31614	32089	32552	33069	33534
-4	30612	31073	31520	32022	32477	31481	31953	32414	32929	33393
-2	30487	30946	31391	31891	32344	31349	31820	32279	32792	33254
0	30364	30821	31265	31762	32215	31220	31689	32146	32657	33118
2	30243	30698	31140	31636	32087	31094	31561	32016	32525	32985
4	30122	30576	31016	31510	31960	30967	31432	31885	32392	32851
6	30004	30455	30894	31386	31835	30843	31306	31757	32262	32720
8	29887	30338	30774	31265	31712	30721	31183	31632	32135	32591

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 7000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	49603	29475	29904	49603	30992	31438	31938	32392
-24	49603	49603	49603	29354	29782	49603	30857	31301	31800	32252
-22	49603	49603	49603	29235	29661	49603	30724	31167	31663	32114
-20	49603	49603	49603	29118	29543	49603	30594	31034	31529	31979
-18	49603	49603	49603	29001	29425	49603	30464	30902	31395	31843
-16	49603	49603	49603	28885	29309	49603	30336	30772	31263	31710
-14	49603	49603	49603	28772	29194	49603	30210	30644	31133	31579
-12	49603	49603	49603	28661	29082	49603	30086	30519	31005	31450
-10	49603	49603	49603	28550	28970	49603	29962	30393	30878	31321
-8	49603	49603	49603	28440	28859	49603	29840	30269	30753	31195
-6	49603	49603	49603	28329	28747	49603	29717	30144	30625	31066
-4	49603	49603	49603	28222	28638	49603	29597	30023	30502	30941
-2	49603	49603	49603	28114	28530	49603	29478	29901	30379	30817
0	49603	49603	49603	28011	28426	49603	29363	29784	30260	30697
2	49603	49603	49603	27906	28319	49603	29245	29665	30140	30575
4	49603	49603	49603	27802	28215	49603	29130	29549	30021	30456
6	49603	49603	49603	27701	28112	49603	29017	29434	29905	30338
8	49603	49603	49603	27601	28012	49603	28906	29321	29790	30223

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	31445	31917	32377	32891	33355	32353	32838	33312	33840	34314
-24	31306	31776	32234	32746	33209	32208	32691	33162	33689	34160
-22	31169	31638	32094	32604	33065	32065	32546	33015	33539	34009
-20	31035	31501	31955	32464	32923	31924	32403	32870	33392	33861
-18	30901	31365	31817	32323	32781	31783	32260	32725	33245	33712
-16	30769	31231	31681	32185	32642	31645	32120	32583	33100	33566
-14	30639	31100	31548	32050	32505	31509	31982	32443	32958	33423
-12	30512	30971	31417	31917	32370	31375	31846	32305	32819	33282
-10	30384	30841	31285	31783	32236	31242	31711	32168	32679	33141
-8	30259	30714	31156	31652	32104	31110	31577	32033	32542	33002
-6	30131	30585	31025	31519	31969	30976	31442	31895	32402	32861
-4	30008	30460	30898	31391	31839	30847	31311	31762	32267	32725
-2	29885	30335	30772	31262	31709	30718	31180	31629	32133	32589
0	29767	30215	30650	31138	31584	30594	31054	31501	32003	32457
2	29646	30092	30525	31012	31457	30467	30926	31371	31870	32324
4	29527	29972	30403	30888	31332	30343	30800	31243	31741	32193
6	29411	29854	30283	30767	31209	30221	30676	31118	31613	32064
8	29297	29739	30166	30648	31089	30102	30555	30994	31488	31938

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 8000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	49603	28930	29354	49603	30386	30823	31314	31762
-24	49603	49603	49603	28811	29234	49603	30253	30688	31178	31624
-22	49603	49603	49603	28696	29117	49603	30125	30558	31046	31491
-20	49603	49603	49603	28579	28999	49603	29995	30426	30911	31355
-18	49603	49603	49603	28464	28883	49603	29867	30296	30779	31222
-16	49603	49603	49603	28349	28767	49603	29738	30166	30647	31088
-14	49603	49603	49603	28237	28654	49603	29615	30040	30520	30960
-12	49603	49603	49603	28128	28544	49603	29493	29917	30395	30833
-10	49603	49603	49603	28021	28435	49603	29373	29795	30272	30709
-8	49603	49603	49603	27913	28327	49603	29254	29674	30148	30584
-6	49603	49603	49603	27806	28219	49603	29135	29553	30025	30460
-4	49603	49603	49603	27701	28112	49603	29017	29434	29905	30338
-2	49603	49603	49603	27595	28006	49603	28900	29315	29784	30216
0	49603	49603	49603	27494	27903	49603	28787	29200	29667	30099
2	49603	49603	49603	27390	27799	49603	28672	29083	29549	29979
4	49603	49603	49603	27289	27696	49603	28559	28969	29433	29861
6	49603	49603	49603	27189	27596	49603	28448	28856	29318	29746
8	49603	49603	49603	27111	27517	49603	28361	28768	29229	29656

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	31284	31734	32239	32696	31699	32174	32639	33157	33623
-24	49603	31145	31594	32097	32552	31556	32029	32491	33007	33472
-22	49603	31011	31458	31959	32413	31417	31889	32349	32863	33326
-20	49603	30875	31320	31818	32271	31277	31746	32204	32716	33178
-18	49603	30741	31184	31681	32132	31138	31606	32062	32571	33032
-16	49603	30608	31048	31543	31993	31000	31466	31919	32427	32886
-14	49603	30478	30917	31409	31858	30866	31330	31781	32287	32745
-12	49603	30351	30788	31279	31726	30735	31197	31646	32150	32606
-10	49603	30226	30661	31150	31596	30606	31066	31513	32015	32470
-8	49603	30102	30535	31021	31466	30477	30935	31381	31880	32334
-6	49603	29977	30408	30893	31336	30348	30804	31248	31745	32198
-4	49603	29854	30283	30767	31209	30221	30676	31118	31613	32064
-2	49603	29732	30159	30641	31081	30095	30548	30987	31481	31930
0	49603	29614	30039	30519	30959	29973	30424	30862	31353	31802
2	49603	29494	29917	30395	30834	29848	30298	30734	31224	31670
4	49603	29376	29798	30274	30711	29726	30174	30608	31096	31542
6	49603	29260	29680	30154	30590	29607	30053	30485	30971	31416
8	49603	29169	29588	30061	30496	29513	29958	30388	30873	31317

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 9000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	49603	49603	28808	49603	29784	30212	30694	31136
-24	49603	49603	49603	49603	28692	49603	29656	30082	30562	31002
-22	49603	49603	49603	49603	28575	49603	29528	29952	30430	30869
-20	49603	49603	49603	49603	28459	49603	29400	29822	30298	30736
-18	49603	49603	49603	49603	28347	49603	29276	29696	30171	30607
-16	49603	49603	49603	49603	28234	49603	29152	29571	30043	30478
-14	49603	49603	49603	49603	28124	49603	29030	29447	29918	30352
-12	49603	49603	49603	49603	28016	49603	28911	29326	29795	30227
-10	49603	49603	49603	49603	27907	49603	28791	29205	29672	30103
-8	49603	49603	49603	49603	27801	49603	28674	29086	29551	29981
-6	49603	49603	49603	49603	27694	49603	28557	28967	29430	29859
-4	49603	49603	49603	49603	27590	49603	28442	28850	29312	29739
-2	49603	49603	49603	49603	27507	49603	28350	28757	29218	29644
0	49603	49603	49603	49603	27387	49603	28218	28623	29081	29506
2	49603	49603	49603	49603	26455	49603	28105	28508	28965	29389
4	49603	49603	49603	49603	26455	49603	27996	28398	28853	29276
6	49603	49603	49603	49603	26455	49603	27888	28288	28741	29163
8	49603	49603	49603	49603	26455	49603	27781	28179	28632	29052

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	30655	31096	31592	32042	31049	31516	31970	32478	32938
-24	49603	30521	30961	31454	31903	30911	31375	31827	32334	32792
-22	49603	30387	30825	31316	31764	30772	31235	31685	32189	32646
-20	49603	30254	30689	31178	31624	30634	31095	31542	32044	32500
-18	49603	30124	30558	31045	31490	30500	30959	31405	31905	32358
-16	49603	29995	30426	30912	31355	30367	30823	31267	31765	32217
-14	49603	29868	30297	30781	31223	30235	30690	31132	31628	32079
-12	49603	29743	30171	30652	31093	30106	30559	30999	31493	31943
-10	49603	29618	30044	30524	30963	29977	30429	30866	31358	31807
-8	49603	29496	29920	30397	30836	29851	30300	30736	31226	31673
-6	49603	29373	29795	30271	30708	29724	30172	30606	31094	31539
-4	49603	29253	29673	30147	30583	29600	30046	30478	30964	31408
-2	49603	29158	29576	30049	30484	29501	29946	30376	30861	31304
0	49603	29019	29436	29907	30340	29358	29801	30229	30712	31153
2	49603	28901	29316	29785	30217	29236	29677	30104	30584	31024
4	49603	28788	29201	29668	30099	29119	29558	29983	30462	30901
6	49603	28674	29086	29551	29981	29002	29439	29862	30339	30777
8	49603	28563	28973	29437	29866	28887	29323	29744	30219	30656

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 10000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	49603	49603	28254	49603	49603	29593	30066	30501
-24	49603	49603	49603	49603	28138	49603	49603	29463	29934	30367
-22	49603	49603	49603	49603	28025	49603	49603	29337	29806	30239
-20	49603	49603	49603	49603	27915	49603	49603	29213	29681	30112
-18	49603	49603	49603	49603	27804	49603	49603	29089	29554	29984
-16	49603	49603	49603	49603	27692	49603	49603	28964	29428	29857
-14	49603	49603	49603	49603	27584	49603	49603	28843	29305	29732
-12	49603	49603	49603	49603	27477	49603	49603	28724	29184	29610
-10	49603	49603	49603	49603	27371	49603	49603	28605	29063	29488
-8	49603	49603	49603	49603	26455	49603	49603	28501	28958	29382
-6	49603	49603	49603	49603	26455	49603	49603	28378	28833	29256
-4	49603	49603	49603	49603	26455	49603	49603	28263	28717	29138
-2	49603	49603	49603	49603	26455	49603	49603	28149	28600	29021
0	49603	49603	49603	49603	26455	49603	49603	28036	28486	28905
2	49603	49603	49603	49603	26455	49603	49603	27928	28376	28795
4	49603	49603	49603	49603	26455	49603	49603	27820	28267	28684
6	49603	49603	49603	49603	26455	49603	49603	27712	28157	28573
8	49603	49603	49603	49603	26455	49603	49603	27606	28050	28465

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	30018	30449	30935	31379	49603	30847	31291	31790	32242
-24	49603	29884	30313	30797	31240	49603	30707	31149	31645	32096
-22	49603	29754	30182	30664	31105	49603	30571	31011	31505	31955
-20	49603	29627	30053	30533	30973	49603	30438	30876	31368	31816
-18	49603	29499	29923	30401	30839	49603	30304	30740	31230	31677
-16	49603	29371	29793	30269	30706	49603	30169	30603	31091	31537
-14	49603	29246	29666	30140	30576	49603	30039	30471	30957	31401
-12	49603	29124	29542	30014	30449	49603	29910	30340	30824	31267
-10	49603	29001	29418	29888	30321	49603	29782	30210	30692	31133
-8	49603	28895	29309	29778	30210	49603	29670	30096	30577	31017
-6	49603	28767	29180	29647	30078	49603	29537	29961	30440	30878
-4	49603	28649	29061	29526	29955	49603	29413	29836	30312	30750
-2	49603	28531	28941	29404	29833	49603	29289	29710	30185	30621
0	49603	28416	28823	29285	29712	49603	29168	29587	30060	30495
2	49603	28305	28711	29171	29597	49603	29051	29469	29940	30374
4	49603	28193	28598	29056	29481	49603	28935	29350	29820	30252
6	49603	28082	28485	28941	29365	49603	28818	29232	29700	30131
8	49603	27973	28374	28829	29252	49603	28704	29116	29582	30012

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 11000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	49603	49603	49603	49603	49603	28984	29448	29877
-24	49603	49603	49603	49603	49603	49603	49603	28859	29321	29748
-22	49603	49603	49603	49603	49603	49603	49603	28733	29193	29619
-20	49603	49603	49603	49603	49603	49603	49603	28634	29092	29518
-18	49603	49603	49603	49603	49603	49603	49603	28488	28945	29369
-16	49603	49603	49603	49603	49603	49603	49603	28367	28822	29244
-14	49603	49603	49603	49603	49603	49603	49603	28250	28703	29125
-12	49603	49603	49603	49603	49603	49603	49603	28133	28585	29005
-10	49603	49603	49603	49603	49603	49603	49603	28016	28466	28885
-8	49603	49603	49603	49603	49603	49603	49603	27904	28352	28770
-6	49603	49603	49603	49603	49603	49603	49603	27791	28238	28654
-4	49603	49603	49603	49603	49603	49603	49603	27681	28126	28541
-2	49603	49603	49603	49603	49603	49603	49603	27571	28014	28429
0	49603	49603	49603	49603	49603	49603	49603	27463	27904	28318
2	49603	49603	49603	49603	49603	49603	49603	27355	27795	28207
4	49603	49603	49603	49603	49603	49603	49603	27271	27710	28121
6	49603	49603	49603	49603	49603	49603	49603	27146	27582	27992
8	49603	49603	49603	49603	49603	49603	49603	27042	27477	27886

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	29391	29814	30290	30727	49603	30191	30625	31113	31559
-24	49603	29262	29682	30157	30593	49603	30055	30487	30974	31418
-22	49603	29133	29551	30024	30458	49603	29920	30350	30834	31277
-20	49603	29031	29448	29918	30352	49603	29813	30241	30724	31166
-18	49603	28881	29296	29764	30196	49603	29656	30082	30562	31002
-16	49603	28756	29169	29636	30066	49603	29525	29949	30427	30866
-14	49603	28636	29047	29512	29941	49603	29399	29821	30297	30735
-12	49603	28516	28925	29388	29816	49603	29273	29693	30168	30604
-10	49603	28395	28803	29264	29691	49603	29147	29565	30038	30473
-8	49603	28280	28685	29145	29571	49603	29025	29442	29913	30346
-6	49603	28164	28568	29026	29450	49603	28904	29319	29788	30220
-4	49603	28050	28453	28909	29332	49603	28785	29198	29665	30096
-2	49603	27937	28337	28792	29214	49603	28666	29077	29543	29973
0	49603	27826	28225	28677	29098	49603	28550	28959	29423	29851
2	49603	27715	28112	28563	28983	49603	28433	28841	29303	29730
4	49603	27628	28024	28474	28893	49603	28343	28749	29210	29636
6	49603	27499	27893	28341	28759	49603	28207	28612	29070	29495
8	49603	27393	27785	28231	28648	49603	28095	28498	28955	29379

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 12000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	49603	49603	49603	49603	49603	28382	28837	29260
-24	49603	49603	49603	49603	49603	49603	49603	28290	28743	29165
-22	49603	49603	49603	49603	49603	49603	49603	28138	28589	29009
-20	49603	49603	49603	49603	49603	49603	49603	28016	28466	28885
-18	49603	49603	49603	49603	49603	49603	49603	27900	28347	28765
-16	49603	49603	49603	49603	49603	49603	49603	27780	28227	28643
-14	49603	49603	49603	49603	49603	49603	49603	27666	28110	28526
-12	49603	49603	49603	49603	49603	49603	49603	27551	27994	28408
-10	49603	49603	49603	49603	49603	49603	49603	27441	27882	28295
-8	49603	49603	49603	49603	49603	49603	49603	27329	27768	28180
-6	49603	49603	49603	49603	49603	49603	49603	27218	27656	28067
-4	49603	49603	49603	49603	49603	49603	49603	27110	27546	27956
-2	49603	49603	49603	49603	49603	49603	49603	26995	27429	27838
0	49603	49603	49603	49603	49603	49603	49603	26896	27329	27737
2	49603	49603	49603	49603	49603	49603	49603	26793	27224	27631
4	49603	49603	49603	49603	49603	49603	49603	26689	27119	27525
6	49603	49603	49603	49603	49603	49603	49603	26586	27014	27418
8	49603	49603	49603	49603	49603	49603	49603	26484	26911	27314

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	29185	29652	30083	49603	29541	29966	30444	30883
-24	49603	49603	29088	29554	29984	49603	29442	29865	30342	30779
-22	49603	49603	28929	29393	29821	49603	29277	29698	30173	30609
-20	49603	49603	28803	29264	29691	49603	29147	29565	30038	30473
-18	49603	49603	28681	29140	29566	49603	29020	29437	29908	30341
-16	49603	49603	28556	29014	29438	49603	28892	29307	29776	30208
-14	49603	49603	28437	28892	29316	49603	28768	29181	29648	30079
-12	49603	49603	28317	28771	29193	49603	28645	29056	29521	29950
-10	49603	49603	28202	28654	29075	49603	28526	28935	29398	29827
-8	49603	49603	28084	28535	28954	49603	28404	28812	29273	29700
-6	49603	49603	27969	28418	28836	49603	28286	28691	29151	29577
-4	49603	49603	27856	28303	28721	49603	28169	28573	29031	29455
-2	49603	49603	27736	28181	28597	49603	28044	28447	28903	29326
0	49603	49603	27633	28077	28492	49603	27938	28339	28793	29215
2	49603	49603	27525	27967	28381	49603	27826	28225	28678	29099
4	49603	49603	27416	27857	28270	49603	27715	28112	28563	28983
6	49603	49603	27308	27747	28159	49603	27603	27998	28448	28866
8	49603	49603	27202	27640	28050	49603	27493	27887	28335	28753

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 22° - AFTER ICE ENCOUNTER - 13800 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	49603	49603	49603	49603	49603	49603	27730	28142
-24	49603	49603	49603	49603	49603	49603	49603	49603	27582	27992
-22	49603	49603	49603	49603	49603	49603	49603	49603	27473	27882
-20	49603	49603	49603	49603	49603	49603	49603	49603	27347	27755
-18	49603	49603	49603	49603	49603	49603	49603	49603	27233	27640
-16	49603	49603	49603	49603	49603	49603	49603	49603	27139	27545
-14	49603	49603	49603	49603	49603	49603	49603	49603	27005	27409
-12	49603	49603	49603	49603	49603	49603	49603	49603	26895	27299
-10	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
-8	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
-6	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
-4	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
-2	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
0	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
2	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
4	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
6	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285
8	49603	49603	49603	49603	49603	49603	49603	49603	26882	27285

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	28045	28495	28914	49603	49603	28771	29232	29658
-24	49603	49603	27893	28341	28759	49603	49603	28612	29070	29495
-22	49603	49603	27780	28226	28643	49603	49603	28493	28950	29374
-20	49603	49603	27651	28095	28511	49603	49603	28358	28813	29235
-18	49603	49603	27534	27976	28390	49603	49603	28235	28688	29109
-16	49603	49603	27437	27878	28291	49603	49603	28133	28585	29005
-14	49603	49603	27299	27738	28150	49603	49603	27989	28438	28857
-12	49603	49603	27186	27623	28034	49603	49603	27870	28318	28735
-10	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
-8	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
-6	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
-4	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
-2	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
0	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
2	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
4	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
6	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285
8	49603	49603	26455	26882	27285	49603	49603	26455	26882	27285

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - SEA LEVEL

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	35690	36158	36564	37063	37498	38746	39224	39674	40211	40683
-16	35409	35877	36278	36774	37206	38430	38907	39353	39886	40353
-12	35135	35601	35998	36491	36920	38120	38596	39037	39567	40030
-8	34864	35329	35723	36212	36637	37814	38290	38726	39252	39712
-4	34597	35061	35451	35937	36359	37513	37988	38420	38942	39398
0	34339	34802	35189	35672	36090	37223	37697	38125	38643	39096
4	34085	34548	34930	35410	35826	36937	37410	37834	38348	38798
8	33839	34301	34680	35157	35570	36660	37132	37551	38063	38509
12	33600	34061	34436	34911	35320	36390	36861	37277	37785	38228
16	33363	33823	34195	34666	35073	36123	36593	37005	37510	37950
20	33128	33588	33956	34424	34829	35859	36328	36736	37237	37674
24	32907	33366	33731	34197	34598	35610	36078	36482	36981	37415
28	32688	33146	33508	33971	34370	35363	35830	36231	36726	37157
32	32469	32926	33285	33745	34142	35116	35582	35979	36472	36900
36	32254	32710	33066	33524	33918	34873	35339	35733	36222	36647
40	32046	32502	32855	33310	33701	34640	35104	35494	35981	36404
44	31842	32297	32646	33099	33488	34409	34872	35260	35744	36163
48	31643	32097	32444	32894	33281	34185	34648	35031	35513	35930

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	39918	40401	40868	41419	41905	41165	41652	42137	42703	43203
-16	39590	40071	40534	41081	41562	40821	41307	41787	42349	42845
-12	39268	39749	40206	40750	41227	40484	40969	41444	42003	42495
-8	38951	39430	39883	40423	40897	40153	40636	41107	41661	42149
-4	38638	39117	39565	40101	40571	39826	40308	40774	41324	41808
0	38337	38814	39258	39790	40257	39510	39992	40453	40999	41479
4	38040	38516	38956	39484	39947	39200	39680	40136	40679	41156
8	37752	38227	38663	39188	39647	38898	39377	39830	40369	40842
12	37472	37946	38378	38899	39355	38605	39083	39531	40067	40536
16	37194	37668	38095	38613	39066	38315	38792	39236	39767	40233
20	36920	37392	37816	38330	38780	38027	38504	38943	39471	39934
24	36661	37133	37552	38064	38510	37757	38232	38668	39193	39652
28	36405	36875	37291	37800	38243	37488	37963	38395	38916	39372
32	36148	36618	37030	37535	37976	37220	37694	38121	38640	39093
36	35896	36365	36774	37276	37713	36956	37429	37853	38368	38818
40	35653	36121	36527	37026	37460	36702	37174	37594	38106	38553
44	35414	35881	36283	36779	37210	36452	36922	37339	37848	38292
48	35181	35647	36046	36539	36968	36208	36678	37091	37597	38038

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 1000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	35077	35543	35940	36432	36859	38055	38531	38971	39500	39963
-16	34798	35263	35656	36145	36569	37741	38216	38651	39176	39635
-12	34526	34990	35378	35864	36285	37433	37907	38338	38859	39315
-8	34260	34723	35108	35591	36008	37134	37608	38034	38551	39003
-4	34001	34463	34844	35323	35738	36842	37314	37737	38250	38699
0	33747	34209	34586	35062	35474	36556	37027	37446	37956	38401
4	33497	33958	34332	34805	35213	36275	36745	37159	37666	38107
8	33259	33719	34089	34559	34965	36006	36475	36886	37389	37828
12	33024	33483	33850	34317	34720	35741	36209	36615	37116	37551
16	32790	33248	33612	34076	34476	35478	35945	36348	36845	37277
20	32561	33019	33379	33840	34238	35220	35686	36085	36579	37008
24	32338	32795	33152	33611	34006	34969	35434	35830	36320	36747
28	32123	32579	32933	33389	33781	34726	35191	35583	36070	36494
32	31912	32367	32718	33171	33561	34488	34952	35340	35825	36246
36	31704	32159	32506	32957	33345	34254	34717	35102	35584	36002
40	31497	31950	32295	32744	33128	34020	34482	34864	35343	35758
44	31298	31751	32093	32539	32921	33796	34258	34636	35112	35524
48	31101	31553	31892	32336	32716	33574	34035	34410	34884	35293

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	39201	39681	40138	40680	41157	40414	40898	41373	41930	42421
-16	38875	39354	39806	40344	40817	40073	40556	41025	41578	42065
-12	38555	39033	39480	40015	40484	39738	40221	40685	41234	41717
-8	38245	38722	39164	39695	40160	39414	39895	40354	40900	41379
-4	37941	38417	38855	39382	39844	39096	39576	40031	40572	41048
0	37644	38119	38553	39076	39535	38785	39264	39715	40252	40724
4	37352	37826	38255	38775	39230	38479	38957	39403	39937	40405
8	37073	37546	37971	38488	38939	38188	38664	39106	39636	40101
12	36797	37269	37691	38204	38652	37899	38375	38813	39339	39800
16	36524	36995	37413	37922	38367	37613	38088	38522	39045	39502
20	36256	36726	37140	37647	38088	37333	37807	38236	38756	39211
24	35995	36465	36875	37378	37816	37060	37533	37958	38475	38926
28	35743	36212	36618	37118	37554	36796	37268	37690	38203	38651
32	35496	35963	36366	36864	37296	36537	37009	37427	37937	38381
36	35253	35720	36119	36613	37043	36283	36754	37168	37675	38117
40	35010	35476	35872	36363	36790	36029	36499	36909	37413	37852
44	34777	35242	35635	36123	36547	35786	36254	36661	37162	37598
48	34547	35011	35400	35886	36307	35544	36012	36416	36913	37347

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 2000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	34466	34930	35318	35802	36223	37366	37840	38270	38790	39245
-16	34193	34656	35040	35521	35938	37059	37531	37957	38473	38924
-12	33928	34390	34770	35248	35662	36760	37232	37653	38165	38613
-8	33670	34131	34508	34983	35394	36469	36940	37357	37866	38311
-4	33415	33875	34248	34719	35127	36181	36651	37064	37570	38010
0	33169	33628	33997	34466	34871	35904	36373	36782	37284	37722
4	32921	33379	33745	34211	34613	35625	36093	36498	36996	37430
8	32682	33140	33502	33965	34364	35356	35823	36224	36720	37151
12	32453	32910	33269	33729	34125	35098	35564	35961	36454	36881
16	32223	32679	33035	33492	33886	34839	35304	35697	36186	36611
20	31998	32454	32806	33260	33651	34585	35050	35439	35925	36347
24	31779	32234	32583	33035	33423	34339	34802	35188	35671	36090
28	31568	32022	32368	32817	33203	34100	34563	34945	35426	35842
32	31362	31815	32158	32605	32988	33869	34330	34710	35187	35600
36	31158	31611	31951	32395	32776	33639	34100	34476	34950	35361
40	30955	31406	31743	32185	32564	33409	33870	34242	34714	35122
44	30761	31212	31546	31985	32361	33191	33650	34020	34489	34894

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	38485	38963	39409	39943	40411	39666	40147	40611	41159	41641
-16	38166	38643	39084	39614	40078	39331	39812	40271	40815	41293
-12	37855	38331	38768	39294	39755	39007	39486	39940	40480	40954
-8	37554	38029	38461	38984	39441	38691	39170	39619	40155	40626
-4	37255	37728	38157	38676	39129	38378	38856	39300	39833	40300
0	36967	37440	37864	38379	38829	38077	38553	38994	39522	39986
4	36677	37148	37568	38080	38527	37773	38249	38684	39210	39669
8	36398	36869	37284	37793	38236	37481	37956	38387	38909	39365
12	36130	36599	37011	37516	37956	37201	37674	38102	38620	39073
16	35860	36329	36737	37239	37676	36919	37391	37815	38329	38779
20	35597	36065	36469	36968	37402	36643	37115	37534	38046	38492
24	35341	35808	36208	36704	37134	36375	36846	37261	37769	38212
28	35093	35559	35956	36449	36876	36116	36586	36998	37503	37942
32	34853	35318	35711	36201	36626	35864	36333	36741	37243	37680
36	34614	35079	35469	35955	36377	35615	36083	36487	36986	37420
40	34376	34839	35226	35710	36129	35366	35832	36233	36729	37160
44	34149	34611	34995	35476	35892	35128	35594	35992	36484	36912

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 3000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	33859	34320	34700	35177	35590	36682	37153	37573	38085	38532
-16	33590	34050	34426	34900	35309	36379	36849	37265	37773	38216
-12	33332	33792	34164	34634	35041	36088	36558	36969	37474	37913
-8	33082	33541	33909	34377	34781	35807	36275	36683	37184	37620
-4	32834	33293	33657	34122	34522	35527	35995	36398	36896	37329
0	32586	33044	33404	33866	34264	35248	35715	36114	36608	37038
4	32348	32805	33162	33621	34016	34980	35445	35841	36331	36758
8	32114	32569	32923	33379	33771	34715	35180	35572	36059	36483
12	31885	32340	32690	33144	33533	34458	34921	35309	35794	36214
16	31662	32116	32463	32914	33301	34206	34669	35054	35535	35952
20	31443	31896	32240	32688	33072	33959	34422	34802	35281	35695
24	31230	31682	32023	32468	32850	33719	34180	34557	35033	35444
28	31022	31474	31812	32255	32634	33485	33946	34319	34792	35201
32	30816	31268	31603	32043	32420	33253	33713	34083	34553	34959
36	30615	31065	31397	31835	32209	33026	33485	33852	34319	34722
40	30419	30868	31198	31633	32005	32805	33263	33627	34091	34492
44	30228	30677	31004	31437	31807	32591	33048	33409	33871	34269

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	37775	38250	38686	39211	39671	38922	39401	39854	40393	40866
-16	37460	37934	38365	38886	39342	38592	39070	39518	40053	40523
-12	37158	37631	38058	38576	39028	38277	38754	39197	39728	40194
-8	36866	37338	37761	38275	38724	37971	38447	38886	39413	39875
-4	36576	37047	37465	37976	38421	37667	38142	38577	39100	39559
0	36285	36756	37170	37677	38119	37364	37838	38268	38788	39242
4	36007	36476	36886	37390	37828	37072	37545	37970	38487	38938
8	35732	36200	36607	37107	37542	36785	37257	37678	38191	38639
12	35464	35932	36334	36831	37263	36505	36976	37393	37903	38347
16	35204	35670	36069	36562	36991	36232	36702	37115	37621	38063
20	34947	35413	35808	36298	36724	35963	36432	36842	37345	37783
24	34697	35162	35553	36041	36464	35702	36170	36576	37076	37511
28	34455	34918	35306	35791	36211	35448	35915	36317	36814	37246
32	34214	34677	35061	35543	35960	35196	35662	36061	36555	36984
36	33978	34440	34821	35299	35714	34949	35414	35809	36300	36726
40	33748	34210	34587	35063	35475	34709	35174	35565	36053	36476
44	33526	33986	34360	34834	35243	34476	34940	35328	35813	36233

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 4000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	33249	33709	34079	34549	34955	35995	36464	36875	37378	37816
-16	32990	33449	33815	34282	34685	35703	36171	36577	37077	37512
-12	32734	33192	33555	34019	34418	35415	35882	36284	36780	37212
-8	32485	32942	33301	33761	34158	35133	35599	35997	36490	36918
-4	32240	32697	33052	33510	33904	34858	35323	35717	36207	36631
0	32004	32459	32812	33266	33657	34592	35056	35446	35932	36354
4	31768	32222	32571	33023	33411	34326	34789	35175	35658	36076
8	31539	31993	32338	32787	33173	34068	34530	34912	35392	35808
12	31314	31767	32109	32555	32938	33814	34276	34654	35131	35544
16	31093	31545	31884	32328	32708	33565	34026	34401	34875	35284
20	30880	31331	31667	32108	32486	33325	33785	34156	34627	35034
24	30672	31123	31456	31894	32269	33091	33550	33918	34386	34790
28	30469	30919	31249	31684	32057	32861	33320	33684	34149	34551
32	30269	30718	31045	31478	31849	32636	33094	33455	33917	34316
36	30073	30521	30845	31276	31644	32415	32872	33230	33690	34086
40	29882	30330	30652	31080	31446	32201	32657	33012	33469	33862

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	37061	37534	37960	38476	38927	38176	38652	39094	39624	40089
-16	36758	37230	37651	38163	38611	37858	38334	38771	39297	39757
-12	36459	36929	37346	37855	38299	37545	38019	38452	38974	39431
-8	36166	36636	37049	37554	37995	37239	37712	38141	38659	39112
-4	35881	36349	36758	37260	37697	36940	37413	37836	38351	38801
0	35604	36072	36476	36975	37409	36650	37122	37542	38053	38499
4	35327	35794	36195	36690	37120	36361	36832	37247	37755	38198
8	35060	35526	35922	36414	36841	36081	36550	36962	37466	37906
12	34796	35261	35654	36143	36567	35806	36274	36681	37183	37619
16	34538	35002	35391	35876	36298	35535	36003	36406	36904	37337
20	34288	34751	35137	35619	36037	35274	35740	36140	36635	37064
24	34045	34508	34889	35369	35784	35020	35485	35881	36373	36800
28	33807	34268	34647	35123	35536	34770	35235	35627	36116	36540
32	33573	34034	34409	34882	35292	34525	34989	35378	35864	36285
36	33343	33803	34175	34646	35053	34285	34748	35134	35616	36034
40	33121	33580	33948	34417	34821	34052	34515	34897	35376	35792

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 5000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	32648	33106	33467	33930	34328	35317	35784	36184	36680	37110
-16	32392	32849	33207	33666	34062	35029	35495	35891	36383	36810
-12	32144	32600	32954	33411	33803	34750	35215	35607	36095	36519
-8	31898	32353	32704	33157	33547	34473	34937	35325	35809	36230
-4	31656	32110	32458	32908	33295	34200	34663	35047	35528	35945
0	31422	31875	32219	32666	33050	33936	34398	34778	35256	35670
4	31191	31644	31984	32429	32810	33676	34137	34513	34988	35399
8	30968	31420	31757	32199	32578	33425	33885	34258	34730	35137
12	30751	31202	31536	31975	32351	33180	33639	34009	34477	34882
16	30538	30988	31319	31756	32129	32939	33398	33764	34230	34632
20	30328	30778	31106	31540	31911	32703	33161	33523	33987	34386
24	30123	30571	30896	31328	31697	32472	32929	33288	33748	34144
28	29923	30371	30693	31122	31488	32246	32703	33058	33516	33910
32	29727	30174	30493	30920	31284	32025	32481	32833	33288	33680
36	29533	29979	30296	30720	31082	31807	32261	32611	33063	33452
40	29344	29790	30104	30526	30885	31594	32048	32395	32844	33230

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	36357	36828	37243	37751	38194	37439	37913	38344	38865	39321
-16	36058	36528	36939	37443	37882	37126	37599	38026	38543	38995
-12	35768	36237	36643	37144	37580	36822	37294	37716	38230	38678
-8	35480	35948	36350	36847	37280	36521	36992	37410	37920	38364
-4	35197	35663	36062	36555	36984	36224	36695	37108	37614	38055
0	34922	35388	35782	36273	36698	35937	36406	36816	37318	37756
4	34653	35117	35508	35995	36417	35655	36123	36528	37027	37462
8	34392	34855	35242	35726	36145	35382	35849	36250	36746	37177
12	34137	34600	34983	35464	35880	35116	35582	35980	36472	36900
16	33888	34350	34729	35207	35620	34855	35320	35714	36203	36628
20	33643	34104	34480	34954	35365	34598	35063	35452	35939	36361
24	33402	33862	34235	34706	35114	34346	34810	35196	35679	36098
28	33168	33627	33996	34465	34870	34102	34564	34947	35427	35843
32	32938	33397	33763	34229	34631	33862	34323	34703	35180	35593
36	32711	33169	33532	33995	34394	33624	34085	34461	34935	35345
40	32491	32948	33307	33768	34164	33393	33853	34226	34697	35105

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 6000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	32056	32512	32864	33320	33711	34650	35115	35505	35992	36415
-16	31804	32259	32608	33060	33449	34367	34830	35217	35700	36119
-12	31558	32012	32358	32807	33193	34089	34552	34934	35415	35830
-8	31316	31769	32111	32557	32940	33817	34278	34657	35133	35546
-4	31082	31534	31873	32316	32696	33552	34013	34388	34861	35271
0	30851	31302	31638	32078	32456	33292	33752	34123	34593	35000
4	30626	31077	31409	31847	32221	33039	33498	33865	34332	34736
8	30409	30859	31188	31623	31995	32794	33252	33616	34080	34481
12	30196	30645	30971	31403	31773	32554	33011	33371	33833	34230
16	29986	30434	30757	31187	31554	32318	32774	33131	33589	33984
20	29782	30230	30550	30978	31342	32088	32544	32897	33353	33745
24	29579	30026	30343	30768	31130	31859	32314	32664	33117	33506
28	29383	29829	30143	30566	30925	31638	32092	32439	32889	33276
32	29191	29636	29948	30368	30725	31421	31875	32218	32666	33050
36	29002	29447	29756	30174	30529	31209	31662	32002	32447	32829

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	35665	36133	36538	37037	37472	36714	37186	37606	38118	38565
-16	35370	35837	36238	36734	37165	36406	36876	37292	37801	38244
-12	35082	35548	35945	36437	36865	36104	36574	36986	37490	37930
-8	34799	35264	35656	36145	36569	35808	36277	36684	37185	37621
-4	34524	34988	35377	35862	36283	35521	35988	36392	36889	37322
0	34254	34717	35102	35584	36002	35238	35705	36104	36598	37028
4	33991	34453	34834	35313	35728	34963	35429	35824	36315	36741
8	33737	34198	34576	35051	35463	34697	35162	35553	36041	36464
12	33487	33948	34322	34794	35203	34436	34900	35287	35771	36191
16	33242	33702	34072	34542	34947	34179	34642	35026	35507	35924
20	33004	33463	33829	34296	34699	33930	34392	34772	35250	35664
24	32765	33223	33587	34050	34450	33680	34142	34518	34993	35404
28	32536	32993	33353	33814	34211	33440	33901	34274	34746	35154
32	32311	32767	33124	33582	33977	33205	33664	34034	34503	34909
36	32090	32546	32900	33355	33747	32974	33433	33799	34266	34668

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 7000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	31466	31919	32264	32712	33096	33985	34448	34829	35307	35722
-16	31220	31673	32013	32458	32840	33708	34169	34546	35022	35433
-12	30980	31432	31769	32211	32590	33438	33898	34271	34743	35151
-8	30743	31194	31528	31967	32343	33171	33631	34000	34469	34873
-4	30513	30963	31294	31730	32103	32911	33370	33735	34201	34603
0	30290	30739	31067	31500	31871	32660	33118	33479	33942	34341
4	30069	30517	30842	31273	31640	32411	32868	33226	33685	34081
8	29854	30301	30622	31051	31416	32168	32624	32979	33436	33828
12	29644	30091	30409	30834	31197	31932	32387	32738	33192	33582
16	29435	29881	30196	30619	30980	31696	32151	32498	32949	33336
20	29235	29680	29993	30413	30771	31471	31925	32269	32717	33102
24	29039	29484	29793	30211	30567	31250	31703	32044	32490	32872
28	28846	29291	29597	30013	30367	31034	31486	31824	32266	32646
32	28660	29104	29408	29821	30172	30824	31275	31610	32050	32427
36	28479	28922	29224	29635	29984	30620	31070	31403	31840	32215

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	34974	35440	35835	36326	36752	35992	36461	36871	37374	37812
-16	34686	35151	35542	36029	36452	35690	36158	36564	37064	37499
-12	34405	34869	35256	35740	36159	35396	35863	36265	36761	37192
-8	34128	34591	34974	35455	35871	35107	35573	35970	36462	36890
-4	33858	34320	34699	35177	35590	34824	35289	35682	36171	36596
0	33598	34058	34434	34908	35318	34551	35015	35405	35890	36312
4	33339	33799	34170	34641	35048	34281	34744	35129	35611	36029
8	33087	33546	33914	34382	34786	34017	34479	34861	35340	35755
12	32841	33299	33664	34128	34529	33760	34221	34599	35075	35487
16	32596	33054	33415	33877	34275	33504	33964	34338	34811	35220
20	32363	32819	33177	33636	34031	33259	33719	34089	34559	34965
24	32133	32589	32943	33399	33792	33019	33478	33845	34312	34715
28	31908	32363	32714	33167	33557	32784	33242	33605	34069	34470
32	31690	32144	32492	32943	33330	32555	33013	33373	33834	34232
36	31479	31932	32277	32725	33110	32334	32791	33148	33606	34001

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QUICK TURN AROUND WEIGHT TABLE (lb)
FLAPS 45° - NO ICE ENCOUNTER - 8000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	30888	31339	31675	32116	32494	33334	33794	34165	34636	35043
-16	30642	31092	31425	31863	32237	33056	33515	33883	34350	34754
-12	30407	30857	31186	31621	31993	32792	33250	33614	34078	34478
-8	30178	30627	30953	31385	31755	32534	32992	33352	33813	34210
-4	29954	30402	30724	31154	31520	32281	32737	33094	33552	33946
0	29732	30180	30499	30926	31290	32032	32487	32840	33295	33686
4	29517	29964	30280	30704	31066	31789	32244	32593	33045	33434
8	29306	29752	30065	30487	30845	31551	32005	32351	32800	33185
12	29100	29545	29856	30275	30631	31319	31772	32115	32561	32944
16	28898	29343	29650	30067	30421	31092	31544	31883	32327	32707
20	28704	29148	29453	29867	30218	30873	31325	31661	32101	32479
24	28512	28955	29257	29669	30018	30657	31107	31440	31878	32253
28	28326	28768	29067	29477	29824	30447	30897	31226	31662	32034
32	28143	28585	28881	29289	29634	30241	30690	31017	31450	31820

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	34297	34760	35146	35628	36047	35283	35750	36150	36644	37074
-16	34009	34471	34853	35332	35747	34982	35448	35843	36334	36760
-12	33735	34196	34573	35049	35461	34695	35159	35551	36038	36461
-8	33467	33928	34301	34773	35182	34415	34878	35266	35750	36169
-4	33204	33663	34033	34502	34908	34139	34602	34985	35466	35882
0	32945	33404	33770	34236	34638	33869	34330	34710	35187	35600
4	32693	33151	33513	33976	34375	33605	34066	34441	34916	35326
8	32446	32903	33261	33721	34118	33346	33806	34178	34649	35056
12	32205	32661	33016	33473	33867	33094	33553	33921	34389	34793
16	31969	32424	32776	33230	33621	32847	33305	33670	34135	34536
20	31742	32196	32545	32996	33384	32609	33067	33428	33890	34288
24	31517	31970	32316	32764	33149	32374	32831	33188	33647	34043
28	31299	31751	32093	32539	32922	32146	32602	32956	33412	33805
32	31085	31537	31876	32319	32699	31922	32377	32728	33182	33572

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 9000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	30313	30762	31090	31524	31895	32686	33144	33506	33969	34368
-16	30077	30525	30849	31280	31648	32420	32877	33235	33694	34090
-12	29844	30292	30613	31041	31406	32158	32614	32968	33424	33817
-8	29619	30066	30384	30809	31172	31904	32359	32710	33163	33553
-4	29398	29844	30159	30582	30941	31655	32109	32456	32907	33294
0	29183	29628	29940	30360	30717	31413	31866	32210	32657	33041
4	28971	29416	29724	30142	30497	31174	31627	31967	32411	32793
8	28766	29210	29515	29930	30283	30943	31394	31731	32173	32551
12	28568	29011	29314	29726	30076	30720	31170	31504	31943	32319
16	28372	28814	29114	29524	29872	30499	30949	31279	31715	32088
20	28180	28622	28918	29326	29672	30282	30731	31059	31492	31863
24	27993	28435	28729	29134	29477	30072	30521	30845	31276	31644
28	27811	28251	28543	28946	29287	29866	30314	30635	31064	31429
32	27632	28072	28361	28762	29101	29665	30112	30430	30856	31220

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	33625	34085	34461	34936	35346	34579	35044	35433	35919	36341
-16	33348	33808	34180	34651	35058	34290	34753	35139	35621	36039
-12	33076	33535	33903	34370	34774	34005	34467	34849	35328	35743
-8	32812	33271	33635	34099	34500	33730	34191	34568	35044	35456
-4	32554	33011	33371	33833	34230	33459	33920	34293	34765	35173
0	32302	32758	33115	33573	33967	33196	33655	34024	34494	34899
4	32054	32510	32863	33318	33710	32937	33395	33761	34227	34629
8	31814	32268	32618	33070	33459	32685	33143	33505	33967	34367
12	31582	32036	32382	32831	33217	32442	32899	33258	33718	34114
16	31353	31806	32148	32595	32978	32202	32658	33013	33470	33864
20	31128	31580	31919	32363	32744	31967	32422	32774	33228	33618
24	30909	31361	31697	32139	32516	31739	32193	32541	32993	33381
28	30696	31147	31480	31918	32294	31515	31969	32314	32762	33148
32	30487	30937	31267	31703	32076	31296	31749	32091	32537	32919

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 10000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	29734	30182	30501	30928	31292	32034	32490	32842	33297	33689
-16	29502	29948	30264	30688	31050	31772	32227	32576	33027	33415
-12	29275	29721	30034	30455	30813	31517	31970	32315	32764	33149
-8	29056	29501	29811	30229	30585	31270	31722	32064	32510	32892
-4	28843	29287	29593	30009	30363	31029	31481	31819	32262	32641
0	28631	29075	29378	29792	30142	30791	31242	31577	32017	32393
4	28427	28870	29171	29582	29930	30561	31012	31343	31780	32154
8	28228	28670	28967	29376	29722	30336	30786	31114	31548	31919
12	28031	28472	28767	29173	29517	30114	30563	30888	31319	31688
16	27839	28280	28572	28976	29317	29899	30347	30669	31097	31463
20	27653	28093	28382	28784	29123	29689	30136	30455	30881	31244
24	27468	27908	28195	28594	28931	29481	29927	30243	30667	31028
28	27288	27727	28011	28408	28742	29277	29723	30036	30457	30816

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	32947	33406	33772	34238	34640	33871	34333	34712	35190	35603
-16	32675	33133	33495	33958	34357	33586	34047	34422	34896	35306
-12	32410	32867	33225	33684	34080	33308	33768	34140	34610	35017
-8	32153	32609	32964	33420	33813	33040	33499	33866	34334	34737
-4	31904	32359	32709	33163	33553	32779	33237	33600	34064	34465
0	31656	32110	32458	32908	33295	32520	32977	33337	33798	34195
4	31418	31871	32215	32662	33046	32270	32727	33083	33541	33935
8	31184	31636	31977	32421	32802	32026	32481	32834	33289	33680
12	30953	31405	31742	32184	32562	31784	32239	32588	33040	33428
16	30729	31180	31514	31953	32329	31550	32004	32350	32799	33184
20	30511	30961	31292	31728	32102	31322	31775	32117	32564	32946
24	30295	30745	31072	31506	31877	31096	31548	31887	32331	32711
28	30084	30533	30857	31288	31656	30875	31326	31662	32103	32480

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 11000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	29164	29609	29920	30340	30697	31391	31844	32187	32635	33018
-16	28937	29381	29689	30106	30461	31135	31588	31927	32371	32752
-12	28718	29162	29466	29881	30233	30889	31340	31676	32117	32495
-8	28504	28948	29249	29661	30010	30648	31099	31431	31869	32244
-4	28293	28735	29034	29443	29790	30410	30860	31189	31624	31996
0	28087	28529	28825	29231	29576	30178	30627	30953	31385	31754
4	27887	28328	28621	29025	29367	29953	30401	30724	31153	31520
8	27691	28132	28422	28823	29163	29732	30179	30499	30926	31289
12	27500	27940	28227	28626	28964	29517	29963	30279	30704	31065
16	27311	27750	28034	28431	28766	29303	29749	30062	30484	30843
20	27128	27567	27848	28243	28576	29097	29543	29853	30272	30628
24	26948	27385	27664	28057	28388	28894	29338	29646	30062	30416
28	26773	27210	27486	27877	28206	28697	29141	29445	29859	30211

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	32279	32736	33092	33550	33944	33172	33631	34001	34469	34874
-16	32014	32469	32822	33276	33667	32894	33353	33718	34183	34585
-12	31757	32212	32561	33012	33400	32626	33083	33445	33907	34305
-8	31508	31961	32306	32755	33140	32365	32821	33179	33638	34033
-4	31260	31713	32055	32500	32882	32106	32562	32915	33371	33763
0	31020	31472	31810	32252	32631	31854	32309	32659	33112	33501
4	30786	31237	31571	32011	32388	31609	32063	32410	32859	33246
8	30556	31007	31338	31775	32148	31369	31822	32165	32612	32995
12	30332	30782	31110	31544	31915	31135	31587	31927	32371	32751
16	30111	30560	30884	31316	31684	30903	31355	31691	32132	32510
20	29897	30345	30667	31096	31462	30680	31130	31463	31902	32277
24	29686	30133	30452	30878	31241	30458	30908	31238	31674	32046
28	29481	29928	30243	30667	31028	30244	30693	31020	31453	31823

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 12000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	28606	29050	29353	29766	30116	30763	31214	31548	31988	32364
-16	28385	28828	29128	29538	29886	30514	30964	31295	31731	32104
-12	28170	28612	28909	29316	29662	30271	30721	31048	31481	31851
-8	27959	28400	28693	29099	29441	30033	30482	30805	31236	31603
-4	27753	28193	28484	28887	29227	29801	30249	30569	30997	31362
0	27553	27993	28281	28681	29019	29576	30023	30340	30765	31127
4	27357	27796	28081	28479	28815	29355	29801	30115	30537	30897
8	27165	27603	27885	28281	28614	29139	29584	29895	30314	30671
12	26978	27416	27695	28088	28419	28928	29372	29680	30097	30451
16	26792	27229	27506	27897	28226	28718	29162	29467	29881	30233
20	26611	27048	27322	27711	28037	28515	28958	29260	29672	30021
24	26435	26871	27142	27529	27853	28316	28758	29057	29466	29813

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	31627	32081	32428	32878	33264	32489	32946	33306	33766	34163
-16	31368	31821	32164	32611	32995	32219	32675	33030	33487	33881
-12	31116	31569	31908	32352	32732	31955	32410	32762	33216	33606
-8	30869	31320	31656	32097	32474	31696	32151	32498	32949	33336
-4	30628	31079	31411	31849	32223	31444	31898	32242	32690	33074
0	30394	30844	31173	31608	31980	31200	31652	31993	32438	32819
4	30165	30614	30939	31372	31741	30960	31411	31748	32190	32569
8	29940	30388	30710	31140	31506	30724	31175	31509	31948	32323
12	29721	30168	30487	30914	31278	30495	30945	31276	31712	32085
16	29504	29950	30266	30690	31051	30268	30717	31044	31477	31848
20	29292	29738	30051	30472	30831	30046	30495	30819	31249	31617
24	29085	29530	29840	30259	30615	29830	30278	30598	31026	31392

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - NO ICE ENCOUNTER - 13800 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	27576	28016	28304	28705	29043	29602	30049	30366	30792	31154
-16	27363	27802	28087	28485	28821	29362	29808	30122	30544	30904
-12	27155	27594	27876	28271	28604	29128	29573	29884	30303	30660
-8	26953	27391	27670	28063	28394	28900	29345	29652	30069	30423
-4	26756	27193	27469	27859	28188	28677	29121	29425	29839	30190
0	26561	26998	27271	27659	27985	28459	28902	29202	29614	29962
4	26371	26807	27078	27463	27787	28244	28686	28984	29393	29739
8	26187	26622	26890	27273	27595	28036	28478	28773	29179	29522
12	26006	26441	26706	27088	27407	27833	28274	28566	28969	29311
16	25829	26263	26526	26905	27222	27633	28074	28362	28764	29103
20	26455	26455	26455	26455	26455	27436	27876	28162	28561	28897

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-20	30421	30871	31200	31636	32008	31228	31681	32021	32467	32848
-16	30172	30621	30946	31378	31748	30967	31418	31756	32197	32576
-12	29929	30377	30699	31128	31494	30712	31163	31497	31936	32311
-8	29693	30140	30459	30885	31248	30465	30915	31245	31681	32054
-4	29461	29907	30223	30646	31007	30223	30672	30999	31431	31801
0	29234	29679	29991	30412	30770	29985	30434	30757	31186	31553
4	29011	29456	29765	30183	30538	29752	30200	30519	30946	31311
8	28795	29239	29545	29960	30313	29526	29973	30289	30714	31075
12	28584	29028	29330	29743	30093	29306	29752	30065	30486	30845
16	28377	28819	29119	29529	29877	29089	29534	29844	30263	30619
20	28172	28614	28911	29318	29664	28874	29319	29626	30042	30396

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - SEA LEVEL

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	34667	35106	35553	36054	36500	37469	37939	38414	38953	39434
-24	34521	34959	35404	35903	36348	37306	37775	38248	38785	39263
-22	34378	34814	35258	35756	36198	37146	37613	38085	38619	39096
-20	34235	34670	35112	35608	36049	36987	37451	37922	38454	38929
-18	34096	34529	34970	35464	35903	36831	37294	37763	38293	38766
-16	33959	34391	34831	35322	35760	36678	37139	37606	38135	38606
-14	33822	34252	34691	35181	35616	36525	36984	37450	37976	38445
-12	33687	34116	34553	35041	35475	36373	36832	37296	37820	38287
-10	33554	33981	34417	34903	35336	36224	36681	37143	37666	38131
-8	33419	33844	34279	34763	35194	36073	36528	36989	37509	37973
-6	33285	33710	34143	34625	35055	35924	36378	36837	37355	37817
-4	33154	33577	34009	34490	34917	35777	36229	36687	37203	37663
-2	33027	33448	33879	34358	34784	35635	36085	36542	37056	37514
0	32901	33322	33750	34228	34653	35495	35943	36398	36911	37367
2	32776	33195	33622	34098	34521	35354	35801	36255	36766	37220
4	32650	33068	33494	33968	34390	35214	35659	36112	36620	37073
6	32529	32945	33370	33843	34263	35078	35522	35973	36480	36931
8	32409	32824	33248	33719	34137	34944	35387	35836	36341	36791

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	38558	39040	39526	40080	40574	39700	40194	40692	41261	41769
-24	38389	38869	39353	39904	40396	39523	40015	40511	41078	41583
-22	38222	38701	39183	39732	40222	39350	39840	40334	40898	41402
-20	38056	38533	39014	39560	40048	39176	39665	40157	40719	41221
-18	37894	38369	38849	39393	39879	39008	39494	39985	40545	41044
-16	37735	38208	38686	39228	39712	38841	39326	39815	40373	40870
-14	37576	38047	38523	39063	39545	38675	39158	39646	40201	40696
-12	37418	37888	38362	38901	39381	38511	38992	39478	40031	40524
-10	37263	37731	38204	38740	39218	38350	38829	39313	39864	40355
-8	37106	37572	38044	38578	39054	38186	38663	39146	39694	40184
-6	36951	37416	37885	38417	38892	38024	38500	38981	39527	40014
-4	36798	37261	37729	38259	38732	37865	38339	38818	39362	39848
-2	36650	37111	37578	38106	38577	37710	38183	38660	39202	39686
0	36504	36964	37429	37955	38424	37558	38029	38505	39045	39527
2	36358	36816	37280	37804	38271	37406	37875	38349	38887	39367
4	36212	36669	37131	37653	38118	37253	37721	38194	38730	39208
6	36071	36526	36987	37507	37970	37106	37572	38043	38577	39054
8	35931	36385	36844	37363	37824	36961	37425	37895	38427	38902

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 1000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	34055	34487	34928	35421	35860	36785	37247	37716	38245	38718
-24	33913	34344	34783	35274	35711	36626	37087	37554	38081	38551
-22	33772	34202	34639	35129	35564	36468	36928	37393	37918	38386
-20	33635	34063	34499	34987	35420	36315	36773	37236	37760	38226
-18	33496	33923	34357	34843	35275	36160	36615	37077	37599	38063
-16	33359	33784	34218	34701	35131	36006	36461	36921	37440	37903
-14	33224	33647	34080	34562	34990	35855	36308	36766	37284	37745
-12	33088	33511	33942	34422	34849	35704	36155	36612	37127	37586
-10	32957	33378	33808	34286	34711	35557	36006	36462	36976	37433
-8	32828	33247	33676	34152	34576	35413	35860	36315	36826	37281
-6	32698	33117	33543	34018	34440	35268	35714	36167	36676	37130
-4	32571	32988	33413	33887	34307	35125	35570	36021	36529	36981
-2	32446	32861	33285	33757	34176	34985	35428	35878	36384	36834
0	32320	32734	33157	33627	34044	34845	35286	35735	36238	36687
2	32197	32609	33031	33499	33915	34707	35146	35594	36095	36542
4	32075	32486	32907	33373	33788	34570	35009	35455	35955	36400
6	31957	32367	32787	33252	33664	34439	34876	35320	35818	36262
8	31841	32250	32668	33132	33543	34309	34745	35188	35684	36126

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	37846	38320	38799	39343	39828	38957	39444	39934	40493	40991
-24	37681	38153	38631	39172	39656	38785	39270	39758	40314	40811
-22	37517	37988	38463	39003	39484	38614	39097	39583	40138	40632
-20	37358	37826	38300	38838	39317	38448	38929	39414	39966	40458
-18	37196	37663	38135	38671	39148	38279	38758	39241	39791	40282
-16	37036	37502	37973	38506	38981	38113	38590	39072	39619	40108
-14	36879	37343	37812	38343	38816	37949	38424	38904	39450	39936
-12	36722	37184	37652	38180	38652	37785	38259	38737	39280	39764
-10	36569	37030	37496	38023	38492	37626	38098	38574	39115	39598
-8	36419	36877	37342	37867	38335	37469	37939	38414	38953	39433
-6	36268	36725	37188	37711	38177	37312	37780	38254	38791	39269
-4	36120	36576	37037	37558	38022	37157	37624	38096	38631	39107
-2	35974	36428	36888	37407	37869	37005	37470	37940	38473	38948
0	35828	36280	36739	37256	37716	36853	37316	37785	38316	38789
2	35684	36135	36592	37107	37566	36703	37165	37632	38161	38632
4	35543	35992	36448	36961	37418	36555	37015	37481	38008	38477
6	35406	35854	36308	36819	37274	36412	36871	37335	37860	38328
8	35271	35717	36170	36680	37133	36272	36729	37192	37715	38181

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 2000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	33446	33872	34306	34791	35222	36104	36559	37020	37541	38005
-24	33307	33731	34164	34647	35077	35948	36402	36861	37380	37842
-22	33169	33593	34024	34506	34933	35795	36247	36705	37221	37681
-20	33032	33454	33884	34364	34790	35641	36092	36548	37063	37521
-18	32899	33320	33748	34226	34651	35492	35941	36396	36909	37365
-16	32764	33183	33611	34086	34509	35341	35788	36242	36752	37207
-14	32633	33050	33476	33951	34372	35195	35640	36092	36600	37053
-12	32503	32920	33344	33817	34236	35050	35494	35944	36451	36902
-10	32374	32789	33212	33683	34101	34905	35347	35796	36301	36750
-8	32247	32660	33082	33551	33968	34763	35203	35651	36154	36601
-6	32123	32535	32956	33423	33838	34624	35064	35510	36011	36456
-4	31998	32408	32828	33294	33707	34484	34922	35367	35865	36309
-2	31878	32287	32706	33170	33582	34350	34786	35230	35727	36169
0	31756	32164	32582	33044	33454	34214	34649	35091	35586	36027
2	31635	32041	32458	32918	33327	34078	34511	34952	35445	35884
4	31515	31920	32335	32794	33202	33944	34376	34815	35307	35744
6	31397	31801	32215	32673	33078	33813	34243	34681	35171	35606
8	31280	31682	32095	32551	32955	33681	34110	34546	35034	35469

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	37138	37604	38076	38610	39087	38218	38697	39179	39728	40218
-24	36976	37441	37911	38443	38918	38050	38526	39007	39554	40041
-22	36816	37279	37748	38278	38751	37883	38358	38837	39382	39867
-20	36657	37118	37585	38113	38584	37717	38190	38667	39210	39693
-18	36502	36961	37427	37953	38422	37556	38026	38502	39043	39524
-16	36345	36803	37266	37790	38257	37392	37861	38335	38873	39353
-14	36192	36648	37110	37632	38097	37232	37700	38172	38708	39186
-12	36042	36496	36957	37477	37940	37075	37541	38012	38546	39022
-10	35891	36344	36803	37321	37782	36918	37382	37852	38384	38857
-8	35743	36194	36652	37168	37627	36764	37226	37694	38224	38696
-6	35599	36049	36505	37019	37477	36614	37075	37541	38069	38539
-4	35453	35901	36356	36868	37324	36462	36921	37386	37911	38379
-2	35314	35760	36214	36724	37178	36316	36774	37237	37761	38227
0	35172	35617	36069	36577	37030	36169	36625	37087	37608	38073
2	35031	35474	35925	36431	36882	36021	36476	36936	37456	37919
4	34892	35334	35783	36287	36736	35876	36329	36788	37305	37767
6	34755	35195	35643	36145	36593	35733	36184	36642	37158	37617
8	34618	35057	35503	36003	36449	35590	36040	36496	37010	37467

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 3000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	32847	33267	33695	34172	34596	35434	35882	36337	36848	37304
-24	32708	33126	33553	34028	34450	35279	35725	36178	36687	37141
-22	32573	32990	33415	33889	34309	35128	35572	36024	36531	36983
-20	32438	32853	33277	33749	34168	34976	35419	35869	36375	36825
-18	32305	32719	33141	33611	34028	34827	35269	35717	36221	36669
-16	32173	32586	33007	33475	33891	34681	35120	35567	36069	36515
-14	32046	32457	32877	33344	33757	34538	34976	35422	35921	36366
-12	31922	32332	32751	33216	33628	34400	34837	35281	35778	36221
-10	31799	32207	32625	33088	33499	34262	34697	35139	35635	36077
-8	31675	32082	32499	32960	33369	34124	34557	34998	35492	35932
-6	31554	31959	32375	32834	33242	33987	34420	34860	35352	35790
-4	31432	31837	32251	32709	33115	33851	34282	34721	35211	35647
-2	31310	31714	32126	32583	32988	33715	34145	34582	35070	35505
0	31189	31591	32002	32457	32860	33579	34007	34443	34930	35362
2	31073	31474	31884	32337	32739	33450	33876	34311	34796	35227
4	30957	31357	31766	32217	32618	33320	33745	34178	34662	35091
6	30841	31239	31647	32098	32497	33191	33614	34046	34527	34956
8	30725	31122	31529	31978	32375	33061	33483	33914	34393	34820

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	36441	36900	37365	37890	38358	37492	37963	38438	38977	39458
-24	36280	36737	37200	37723	38189	37324	37792	38266	38803	39282
-22	36122	36578	37039	37560	38024	37160	37626	38098	38633	39110
-20	35965	36419	36879	37398	37860	36996	37461	37931	38464	38938
-18	35810	36262	36721	37237	37698	36834	37297	37766	38296	38769
-16	35658	36108	36565	37079	37538	36675	37136	37603	38132	38602
-14	35509	35958	36413	36926	37382	36520	36980	37445	37972	38441
-12	35366	35813	36267	36777	37232	36370	36828	37292	37817	38284
-10	35222	35667	36120	36629	37082	36220	36677	37139	37662	38127
-8	35078	35522	35973	36480	36931	36071	36525	36986	37507	37970
-6	34937	35379	35829	36333	36783	35923	36376	36836	37354	37816
-4	34795	35236	35684	36187	36635	35775	36227	36685	37201	37661
-2	34654	35093	35540	36041	36487	35628	36078	36534	37049	37507
0	34512	34950	35395	35894	36339	35480	35929	36384	36896	37352
2	34377	34814	35258	35755	36198	35340	35787	36240	36751	37205
4	34243	34677	35120	35615	36057	35199	35645	36097	36605	37058
6	34108	34541	34982	35476	35915	35059	35503	35953	36460	36911
8	33973	34405	34845	35337	35774	34918	35361	35810	36315	36764

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 4000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	32243	32656	33078	33547	33964	34758	35199	35647	36149	36596
-24	32106	32518	32938	33405	33820	34605	35044	35490	35990	36436
-22	31974	32385	32804	33270	33683	34458	34895	35340	35839	36282
-20	31843	32252	32670	33134	33545	34311	34747	35190	35687	36129
-18	31714	32121	32538	33000	33410	34167	34601	35042	35537	35977
-16	31588	31995	32410	32870	33279	34026	34459	34899	35392	35830
-14	31463	31868	32282	32740	33147	33886	34317	34756	35247	35683
-12	31337	31741	32154	32611	33016	33746	34175	34613	35102	35536
-10	31216	31618	32030	32485	32889	33610	34038	34474	34961	35394
-8	31092	31493	31904	32357	32759	33471	33898	34333	34818	35249
-6	30973	31372	31781	32233	32634	33337	33763	34196	34679	35109
-4	30853	31251	31659	32110	32509	33204	33627	34059	34541	34969
-2	30737	31134	31541	31990	32387	33074	33496	33927	34407	34833
0	30621	31017	31423	31870	32266	32944	33365	33795	34273	34698
2	30503	30898	31303	31748	32143	32813	33232	33660	34137	34560
4	30390	30783	31186	31630	32024	32685	33103	33530	34005	34427
6	30276	30668	31070	31512	31905	32558	32975	33400	33873	34293
8	30166	30557	30958	31399	31789	32435	32850	33274	33746	34164

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	35738	36190	36647	37163	37622	36759	37221	37689	38219	38691
-24	35579	36028	36484	36998	37455	36593	37053	37520	38047	38517
-22	35426	35874	36328	36840	37296	36434	36892	37357	37882	38350
-20	35273	35720	36173	36682	37136	36274	36731	37194	37717	38183
-18	35123	35567	36019	36526	36978	36117	36573	37034	37555	38019
-16	34977	35420	35870	36375	36825	35965	36419	36879	37398	37860
-14	34831	35272	35721	36224	36672	35813	36265	36723	37240	37700
-12	34685	35125	35572	36073	36520	35661	36111	36568	37083	37541
-10	34544	34982	35427	35927	36372	35513	35962	36417	36930	37387
-8	34400	34836	35280	35778	36221	35363	35810	36264	36775	37230
-6	34261	34696	35138	35634	36075	35218	35664	36116	36625	37078
-4	34121	34555	34996	35490	35930	35073	35517	35968	36474	36926
-2	33986	34419	34858	35351	35789	34932	35375	35824	36329	36779
0	33852	34282	34721	35211	35647	34792	35233	35681	36184	36632
2	33715	34144	34581	35070	35504	34649	35088	35535	36036	36482
4	33582	34010	34446	34932	35365	34511	34949	35394	35893	36337
6	33450	33876	34310	34795	35227	34373	34809	35253	35750	36193
8	33322	33747	34180	34663	35093	34239	34674	35116	35612	36053

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 5000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	31650	32057	32473	32934	33343	34095	34529	34970	35463	35902
-24	31515	31920	32335	32794	33202	33944	34376	34815	35307	35744
-22	31384	31788	32201	32659	33064	33797	34228	34665	35155	35591
-20	31254	31657	32069	32525	32929	33653	34081	34518	35005	35439
-18	31129	31530	31941	32395	32798	33512	33939	34374	34860	35292
-16	31005	31405	31815	32267	32668	33374	33800	34233	34717	35148
-14	30882	31280	31689	32139	32539	33236	33660	34092	34574	35003
-12	30762	31159	31567	32016	32414	33102	33525	33956	34436	34863
-10	30642	31039	31444	31892	32288	32968	33389	33819	34297	34723
-8	30521	30916	31320	31766	32161	32832	33252	33680	34157	34580
-6	30401	30795	31198	31642	32036	32698	33116	33543	34018	34440
-4	30283	30676	31078	31520	31913	32567	32983	33409	33882	34302
-2	30168	30559	30960	31401	31791	32437	32852	33277	33748	34167
0	30056	30445	30845	31285	31674	32312	32726	33149	33618	34036
2	29942	30330	30729	31167	31555	32184	32597	33019	33487	33902
4	29828	30215	30613	31049	31436	32057	32468	32889	33355	33769
6	29716	30102	30498	30933	31319	31932	32342	32761	33225	33638
8	29606	29991	30386	30820	31203	31809	32217	32635	33098	33509

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	35049	35492	35943	36449	36900	36040	36494	36955	37475	37938
-24	34892	35334	35783	36287	36736	35876	36329	36788	37305	37767
-22	34739	35179	35627	36129	36576	35717	36168	36625	37141	37600
-20	34588	35027	35473	35973	36419	35560	36009	36465	36978	37436
-18	34442	34880	35324	35822	36266	35408	35855	36310	36821	37276
-16	34299	34734	35177	35674	36115	35258	35704	36157	36666	37119
-14	34155	34589	35030	35525	35965	35108	35552	36004	36511	36962
-12	34016	34448	34888	35381	35819	34963	35406	35855	36361	36810
-10	33876	34307	34746	35237	35673	34818	35259	35707	36210	36659
-8	33735	34164	34602	35090	35525	34670	35110	35556	36058	36504
-6	33596	34024	34459	34946	35379	34525	34963	35408	35908	36352
-4	33459	33885	34320	34805	35236	34382	34818	35262	35760	36203
-2	33324	33749	34182	34665	35095	34242	34676	35119	35614	36055
0	33194	33617	34049	34531	34959	34106	34539	34980	35474	35913
2	33061	33483	33914	34393	34820	33967	34399	34839	35331	35769
4	32929	33349	33778	34256	34681	33829	34260	34698	35188	35624
6	32798	33217	33645	34122	34545	33693	34122	34559	35048	35482
8	32670	33088	33515	33989	34411	33560	33987	34423	34909	35342

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 6000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	31061	31462	31872	32325	32727	33437	33863	34297	34782	35213
-24	30932	31331	31740	32191	32592	33292	33717	34150	34632	35062
-22	30805	31202	31610	32060	32458	33150	33573	34004	34485	34913
-20	30679	31076	31482	31930	32327	33009	33431	33861	34340	34766
-18	30556	30951	31356	31802	32198	32871	33291	33720	34197	34621
-16	30432	30826	31230	31674	32068	32733	33151	33579	34054	34476
-14	30310	30703	31105	31548	31941	32597	33014	33440	33913	34334
-12	30191	30582	30983	31425	31816	32463	32879	33303	33775	34194
-10	30071	30461	30861	31301	31690	32329	32743	33166	33636	34054
-8	29955	30344	30743	31181	31569	32199	32612	33034	33502	33918
-6	29837	30225	30623	31059	31446	32068	32479	32900	33366	33780
-4	29723	30110	30506	30941	31327	31940	32350	32770	33234	33647
-2	29608	29993	30388	30822	31205	31811	32219	32637	33100	33511
0	29496	29879	30274	30706	31088	31686	32093	32509	32971	33380
2	29384	29766	30159	30590	30971	31560	31966	32382	32841	33249
4	29274	29655	30047	30476	30856	31437	31842	32256	32714	33120
6	29166	29546	29937	30364	30743	31316	31720	32132	32589	32994
8	29059	29438	29828	30255	30632	31197	31600	32011	32466	32869

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	34364	34800	35244	35741	36183	35326	35773	36226	36736	37190
-24	34213	34648	35090	35585	36026	35169	35614	36066	36574	37026
-22	34065	34498	34939	35432	35871	35014	35458	35908	36414	36864
-20	33919	34350	34790	35281	35718	34862	35304	35753	36256	36705
-18	33775	34205	34643	35132	35568	34712	35152	35599	36101	36548
-16	33632	34060	34496	34984	35417	34562	35001	35446	35946	36391
-14	33490	33917	34352	34837	35269	34415	34852	35296	35794	36237
-12	33351	33776	34209	34693	35123	34270	34705	35148	35644	36085
-10	33212	33635	34067	34549	34977	34124	34558	34999	35493	35933
-8	33077	33499	33930	34410	34836	33984	34416	34856	35348	35786
-6	32940	33361	33790	34268	34693	33841	34272	34710	35200	35636
-4	32807	33227	33655	34131	34554	33703	34132	34569	35057	35492
-2	32672	33090	33517	33992	34413	33562	33990	34425	34912	35345
0	32542	32959	33384	33857	34277	33426	33852	34287	34771	35202
2	32412	32827	33251	33722	34140	33291	33715	34148	34631	35060
4	32284	32698	33120	33590	34007	33157	33580	34012	34493	34920
6	32158	32570	32992	33460	33875	33026	33448	33878	34357	34783
8	32035	32446	32866	33332	33746	32897	33317	33746	34224	34648

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 7000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	30476	30871	31275	31720	32115	32783	33202	33629	34105	34528
-24	30351	30744	31147	31590	31983	32642	33060	33486	33960	34381
-22	30225	30617	31019	31461	31852	32502	32918	33343	33815	34235
-20	30104	30494	30895	31335	31725	32366	32780	33204	33674	34092
-18	29982	30371	30770	31209	31597	32230	32643	33065	33534	33950
-16	29861	30248	30646	31083	31470	32094	32505	32926	33393	33807
-14	29743	30129	30526	30961	31347	31962	32372	32792	33257	33670
-12	29625	30010	30406	30840	31224	31830	32239	32657	33120	33532
-10	29509	29893	30288	30720	31102	31701	32108	32525	32986	33396
-8	29393	29776	30169	30600	30981	31571	31977	32393	32852	33260
-6	29278	29659	30051	30480	30860	31442	31846	32260	32718	33125
-4	29166	29546	29937	30364	30743	31316	31720	32132	32589	32994
-2	29054	29433	29822	30249	30625	31191	31593	32005	32459	32863
0	28945	29323	29712	30137	30512	31070	31471	31881	32334	32736
2	28835	29212	29600	30023	30397	30947	31346	31755	32207	32607
4	28729	29105	29491	29913	30286	30828	31226	31634	32084	32483
6	28623	28997	29383	29803	30175	30709	31106	31513	31961	32359
8	28519	28892	29276	29695	30066	30593	30988	31394	31841	32237

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	33683	34112	34549	35037	35471	34616	35055	35501	36002	36448
-24	33537	33964	34400	34886	35318	34464	34901	35346	35845	36288
-22	33391	33817	34251	34735	35165	34312	34747	35191	35687	36129
-20	33250	33674	34106	34589	35017	34164	34598	35040	35534	35975
-18	33108	33531	33962	34442	34869	34017	34449	34889	35382	35820
-16	32967	33388	33817	34296	34721	33869	34300	34739	35229	35666
-14	32830	33249	33677	34154	34578	33726	34156	34593	35081	35516
-12	32693	33111	33538	34012	34434	33583	34011	34447	34934	35367
-10	32558	32975	33400	33873	34293	33443	33869	34303	34788	35219
-8	32423	32838	33262	33734	34152	33302	33727	34160	34643	35072
-6	32288	32702	33125	33594	34011	33162	33585	34016	34498	34925
-4	32158	32570	32992	33460	33875	33026	33448	33878	34357	34783
-2	32028	32439	32859	33325	33739	32890	33310	33739	34217	34641
0	31902	32312	32730	33195	33607	32759	33178	33605	34081	34504
2	31774	32182	32600	33062	33473	32625	33043	33469	33943	34364
4	31651	32057	32474	32935	33344	32497	32913	33337	33810	34229
6	31527	31933	32348	32807	33214	32368	32782	33206	33676	34094
8	31406	31810	32224	32681	33087	32241	32654	33077	33545	33962

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 8000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	29905	30293	30692	31129	31517	32143	32555	32977	33444	33859
-24	29781	30168	30565	31001	31387	32005	32416	32836	33301	33715
-22	29658	30043	30439	30874	31258	31867	32276	32695	33158	33570
-20	29536	29920	30315	30748	31131	31731	32139	32556	33018	33428
-18	29415	29797	30191	30622	31003	31595	32001	32417	32877	33285
-16	29295	29676	30069	30498	30878	31461	31866	32280	32738	33145
-14	29179	29559	29950	30378	30757	31331	31735	32148	32604	33010
-12	29063	29442	29832	30259	30636	31202	31604	32016	32470	32874
-10	28951	29329	29718	30143	30518	31077	31477	31888	32341	32743
-8	28839	29216	29604	30027	30401	30951	31351	31760	32211	32612
-6	28729	29105	29491	29913	30286	30828	31226	31634	32084	32483
-4	28619	28993	29379	29799	30171	30705	31102	31508	31957	32354
-2	28511	28884	29269	29687	30058	30584	30980	31385	31832	32228
0	28405	28777	29160	29578	29947	30465	30860	31264	31709	32103
2	28299	28670	29052	29468	29835	30347	30740	31143	31586	31979
4	28195	28564	28945	29360	29726	30230	30622	31023	31465	31857
6	28092	28461	28841	29254	29619	30116	30506	30907	31347	31737
8	27990	28357	28736	29148	29512	30001	30390	30790	31229	31617

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	33018	33440	33870	34349	34775	33923	34354	34794	35285	35722
-24	32875	33295	33723	34201	34625	33773	34203	34641	35130	35565
-22	32731	33149	33577	34052	34474	33623	34051	34488	34975	35408
-20	32589	33006	33432	33906	34326	33476	33902	34337	34822	35254
-18	32448	32863	33288	33759	34178	33328	33753	34186	34670	35099
-16	32309	32723	33146	33615	34032	33183	33606	34038	34519	34947
-14	32174	32586	33008	33476	33891	33042	33464	33895	34374	34800
-12	32039	32450	32870	33336	33750	32902	33322	33751	34229	34653
-10	31909	32318	32737	33202	33614	32766	33185	33612	34088	34511
-8	31779	32187	32604	33067	33478	32630	33047	33474	33948	34369
-6	31651	32057	32474	32935	33344	32497	32913	33337	33810	34229
-4	31523	31928	32343	32802	33210	32363	32778	33201	33671	34089
-2	31397	31801	32215	32672	33078	32232	32645	33067	33536	33952
0	31273	31676	32088	32544	32949	32103	32515	32936	33403	33817
2	31150	31551	31962	32416	32819	31974	32385	32804	33269	33682
4	31028	31429	31838	32291	32692	31848	32257	32675	33138	33550
6	30909	31308	31717	32168	32568	31724	32131	32548	33010	33420
8	30790	31188	31595	32045	32443	31599	32006	32421	32882	33290

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 9000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	29334	29716	30108	30538	30918	31504	31909	32324	32783	33190
-24	29212	29593	29984	30412	30791	31368	31772	32185	32642	33048
-22	29092	29472	29862	30288	30666	31234	31637	32049	32504	32908
-20	28973	29351	29740	30165	30541	31100	31501	31912	32365	32768
-18	28857	29234	29621	30045	30419	30971	31370	31780	32231	32632
-16	28743	29118	29505	29927	30300	30843	31242	31650	32100	32499
-14	28629	29003	29389	29809	30181	30716	31113	31519	31968	32365
-12	28517	28890	29274	29693	30064	30591	30986	31392	31838	32234
-10	28407	28779	29162	29580	29949	30468	30862	31266	31711	32105
-8	28297	28668	29050	29466	29833	30345	30737	31140	31584	31977
-6	28189	28558	28939	29354	29720	30224	30615	31017	31459	31850
-4	28083	28451	28831	29244	29609	30105	30495	30896	31336	31726
-2	27976	28344	28723	29134	29498	29986	30375	30774	31213	31601
0	27872	28238	28616	29027	29389	29869	30257	30655	31092	31479
2	27770	28135	28512	28921	29282	29755	30142	30538	30974	31360
4	27668	28031	28407	28815	29175	29641	30026	30422	30856	31240
6	27567	27930	28305	28711	29070	29528	29912	30307	30739	31122
8	27469	27830	28204	28609	28967	29418	29801	30195	30626	31007

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	32354	32768	33191	33662	34079	33230	33654	34086	34568	34996
-24	32212	32625	33047	33515	33931	33082	33504	33935	34415	34842
-22	32073	32484	32905	33371	33786	32937	33358	33787	34265	34690
-20	31934	32343	32763	33227	33640	32792	33211	33639	34115	34538
-18	31799	32207	32625	33088	33499	32651	33069	33495	33969	34391
-16	31666	32073	32490	32951	33360	32513	32929	33354	33827	34246
-14	31534	31939	32354	32814	33221	32375	32789	33213	33684	34102
-12	31403	31808	32221	32679	33085	32239	32652	33074	33543	33959
-10	31275	31678	32091	32547	32951	32105	32517	32938	33405	33820
-8	31147	31549	31960	32414	32817	31972	32382	32802	33267	33680
-6	31022	31422	31832	32284	32685	31841	32250	32668	33131	33543
-4	30898	31297	31705	32156	32556	31712	32119	32536	32998	33408
-2	30775	31172	31579	32029	32427	31583	31989	32405	32865	33273
0	30653	31049	31456	31903	32300	31457	31861	32276	32734	33141
2	30534	30929	31334	31780	32175	31332	31736	32149	32605	33011
4	30415	30809	31212	31657	32051	31208	31610	32022	32477	32881
6	30298	30691	31093	31536	31928	31086	31487	31898	32351	32753
8	30184	30575	30976	31418	31808	30967	31367	31776	32228	32628

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 10000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	28760	29136	29523	29945	30318	30863	31261	31669	32120	32519
-24	28642	29017	29403	29823	30195	30731	31128	31535	31984	32381
-22	28527	28900	29284	29703	30074	30601	30997	31403	31850	32246
-20	28413	28785	29168	29586	29955	30474	30868	31273	31718	32112
-18	28299	28670	29052	29468	29835	30347	30740	31143	31586	31979
-16	28187	28556	28937	29352	29718	30221	30613	31015	31456	31848
-14	28075	28443	28823	29236	29601	30096	30486	30887	31327	31717
-12	27965	28332	28711	29122	29486	29973	30362	30761	31200	31588
-10	27857	28223	28600	29011	29373	29852	30240	30638	31074	31461
-8	27752	28117	28494	28903	29264	29736	30122	30519	30954	31339
-6	27648	28012	28388	28795	29154	29619	30004	30400	30833	31217
-4	27544	27907	28281	28687	29045	29502	29886	30280	30713	31095
-2	27442	27803	28177	28581	28938	29388	29770	30164	30594	30975
0	27337	27698	28070	28473	28829	29271	29653	30045	30474	30853
2	27239	27598	27970	28372	28726	29161	29541	29932	30360	30738
4	27139	27497	27867	28268	28621	29049	29428	29818	30244	30621
6	27042	27399	27769	28168	28520	28941	29319	29707	30132	30508
8	26946	27302	27670	28068	28419	28833	29209	29597	30020	30394

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	31686	32094	32510	32972	33381	32534	32950	33376	33848	34268
-24	31549	31955	32370	32830	33238	32391	32806	33230	33701	34119
-22	31415	31819	32233	32691	33097	32251	32664	33086	33555	33972
-20	31282	31685	32098	32554	32958	32112	32524	32945	33412	33827
-18	31150	31551	31962	32416	32819	31974	32385	32804	33269	33682
-16	31019	31420	31829	32282	32683	31838	32247	32665	33129	33540
-14	30889	31288	31696	32147	32547	31702	32110	32527	32988	33398
-12	30761	31158	31566	32015	32413	31569	31975	32390	32850	33258
-10	30635	31031	31437	31884	32281	31438	31842	32256	32715	33121
-8	30514	30909	31313	31759	32154	31311	31715	32127	32584	32989
-6	30393	30786	31190	31634	32027	31185	31587	31998	32453	32856
-4	30271	30664	31066	31508	31900	31058	31459	31869	32322	32724
-2	30152	30543	30944	31385	31776	30934	31333	31742	32194	32594
0	30031	30421	30820	31260	31649	30808	31206	31613	32063	32461
2	29917	30305	30703	31141	31529	30688	31085	31491	31939	32336
4	29800	30187	30584	31020	31406	30566	30962	31367	31813	32209
6	29687	30073	30469	30904	31289	30449	30843	31247	31692	32086
8	29575	29960	30355	30788	31171	30332	30725	31128	31571	31964

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 11000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	28202	28572	28953	29368	29734	30239	30630	31032	31474	31866
-24	28086	28455	28835	29248	29613	30109	30500	30900	31340	31730
-22	27973	28340	28719	29130	29494	29982	30371	30770	31209	31597
-20	27861	28227	28604	29015	29377	29856	30244	30642	31079	31466
-18	27749	28113	28490	28899	29260	29731	30118	30514	30949	31335
-16	27639	28002	28378	28785	29144	29608	29993	30389	30822	31206
-14	27530	27893	28267	28673	29031	29487	29871	30265	30697	31079
-12	27424	27786	28159	28563	28920	29368	29751	30144	30574	30955
-10	27320	27680	28052	28455	28811	29252	29633	30025	30454	30833
-8	27216	27575	27946	28348	28702	29135	29515	29906	30333	30711
-6	27114	27471	27842	28242	28595	29021	29399	29789	30215	30591
-4	27011	27368	27737	28136	28488	28906	29284	29672	30096	30471
-2	26911	27266	27635	28032	28383	28794	29170	29557	29980	30354
0	26812	27167	27534	27930	28280	28684	29059	29445	29866	30239
2	26714	27067	27434	27828	28177	28574	28948	29333	29752	30123
4	26617	26970	27335	27729	28075	28466	28838	29222	29641	30010
6	26523	26874	27238	27631	27976	28360	28731	29114	29531	29900
8	26428	26779	27142	27533	27877	28254	28624	29006	29422	29789

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	31037	31438	31848	32300	32702	31857	32266	32685	33148	33560
-24	30903	31301	31710	32161	32561	31717	32124	32541	33003	33413
-22	30770	31168	31575	32024	32422	31578	31984	32400	32860	33268
-20	30640	31036	31442	31889	32286	31442	31847	32261	32719	33126
-18	30510	30904	31309	31754	32149	31307	31710	32123	32579	32984
-16	30381	30775	31178	31622	32015	31173	31575	31986	32441	32844
-14	30256	30648	31050	31492	31884	31042	31442	31852	32305	32707
-12	30132	30523	30923	31364	31754	30913	31312	31721	32172	32572
-10	30011	30400	30800	31239	31627	30787	31184	31592	32041	32439
-8	29890	30278	30676	31113	31500	30660	31056	31463	31910	32307
-6	29770	30157	30554	30990	31376	30536	30931	31336	31782	32177
-4	29651	30037	30433	30867	31251	30412	30805	31209	31653	32047
-2	29535	29919	30313	30746	31129	30290	30682	31085	31527	31920
0	29420	29803	30197	30628	31009	30171	30562	30963	31404	31795
2	29306	29687	30080	30509	30889	30051	30441	30841	31280	31670
4	29193	29574	29965	30393	30772	29934	30322	30721	31159	31547
6	29083	29462	29853	30279	30656	29819	30206	30604	31040	31427
8	28973	29351	29740	30165	30541	29704	30090	30487	30922	31307

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 12000 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	28016	28391	28799	29159	29623	30008	30404	30838	31222
-24	49603	27903	28277	28683	29041	29498	29882	30276	30708	31091
-22	49603	27789	28163	28567	28924	29373	29755	30148	30579	30960
-20	49603	27678	28051	28453	28809	29250	29631	30023	30451	30831
-18	49603	27569	27940	28342	28696	29129	29509	29899	30326	30704
-16	49603	27460	27830	28230	28583	29008	29386	29776	30201	30578
-14	49603	27354	27723	28122	28474	28891	29268	29657	30081	30456
-12	49603	27249	27617	28014	28364	28775	29151	29538	29960	30333
-10	49603	27145	27512	27908	28257	28660	29035	29421	29842	30214
-8	49603	27042	27408	27803	28150	28546	28919	29304	29723	30094
-6	49603	26941	27305	27699	28045	28433	28806	29189	29607	29976
-4	49603	26841	27205	27597	27942	28323	28694	29077	29493	29861
-2	49603	26742	27104	27495	27839	28213	28583	28964	29379	29746
0	49603	26644	27006	27395	27738	28105	28474	28854	29268	29633
2	49603	26546	26907	27295	27637	27997	28365	28744	29156	29520
4	49603	26451	26811	27198	27538	27891	28258	28636	29046	29409
6	49603	26355	26714	27100	27439	27786	28151	28528	28937	29298
8	49603	26261	26620	27004	27342	27682	28046	28422	28830	29190

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	30397	30791	31194	31638	32032	31189	31591	32003	32458	32861
-24	30267	30659	31061	31503	31895	31054	31454	31864	32317	32719
-22	30137	30527	30928	31369	31759	30918	31317	31726	32177	32577
-20	30009	30398	30797	31236	31625	30784	31182	31589	32039	32437
-18	29883	30271	30669	31106	31493	30653	31049	31455	31903	32300
-16	29757	30144	30541	30976	31362	30522	30917	31321	31767	32162
-14	29636	30021	30417	30851	31235	30395	30789	31192	31636	32030
-12	29514	29898	30293	30725	31108	30269	30661	31063	31506	31898
-10	29395	29778	30171	30602	30983	30145	30536	30936	31377	31768
-8	29276	29658	30050	30479	30859	30021	30410	30810	31249	31638
-6	29160	29540	29931	30358	30736	29899	30287	30685	31123	31510
-4	29045	29424	29814	30240	30616	29779	30166	30563	30999	31385
-2	28930	29308	29697	30121	30497	29660	30045	30441	30876	31260
0	28818	29194	29582	30005	30379	29543	29927	30322	30755	31138
2	28706	29081	29467	29889	30261	29426	29809	30202	30633	31015
4	28596	28970	29355	29775	30146	29311	29693	30085	30515	30895
6	28486	28858	29243	29661	30031	29196	29577	29968	30396	30775
8	28378	28749	29132	29550	29918	29084	29463	29853	30280	30657

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QUICK TURN AROUND WEIGHT TABLE (lb)

FLAPS 45° - AFTER ICE ENCOUNTER - 13800 FT

TEMP. (°C)	WIND									
	-10 kt					0 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	49603	49603	27355	27749	28096	28487	28860	29244	29663	30033
-24	49603	49603	27246	27639	27985	28369	28740	29123	29540	29909
-22	49603	49603	27138	27529	27873	28250	28620	29002	29417	29784
-20	49603	49603	27030	27419	27762	28131	28500	28881	29294	29660
-18	49603	49603	26923	27311	27653	28014	28382	28762	29174	29538
-16	49603	49603	26819	27205	27546	27900	28267	28645	29055	29418
-14	49603	49603	26714	27100	27439	27786	28151	28528	28937	29298
-12	49603	49603	26614	26998	27336	27675	28039	28415	28823	29183
-10	49603	49603	26511	26894	27231	27563	27926	28301	28707	29066
-8	49603	49603	26455	26455	26455	27455	27817	28191	28595	28953
-6	49603	49603	26455	26455	26455	27347	27708	28080	28484	28839
-4	49603	49603	26455	26455	26455	27239	27599	27970	28372	28726
-2	49603	49603	26455	26455	26455	27134	27492	27862	28263	28616
0	49603	49603	26455	26455	26455	27028	27385	27754	28153	28505
2	49603	49603	26455	26455	26455	26924	27280	27648	28046	28397
4	49603	49603	26455	26455	26455	26823	27177	27545	27941	28290
6	49603	49603	26455	26455	26455	26721	27075	27441	27836	28184
8	49603	49603	26455	26455	26455	26622	26974	27340	27733	28080

TEMP. (°C)	WIND									
	10 kt					20 kt				
	SLOPE									
	-2%	-1%	0	1%	2%	-2%	-1%	0	1%	2%
-26	29216	29596	29988	30416	30795	29957	30346	30745	31183	31571
-24	29092	29472	29862	30288	30666	29829	30216	30614	31050	31437
-22	28969	29347	29736	30161	30537	29700	30086	30482	30917	31302
-20	28845	29222	29609	30033	30407	29571	29955	30351	30784	31167
-18	28724	29099	29486	29907	30280	29444	29828	30221	30653	31035
-16	28605	28979	29364	29784	30156	29320	29702	30095	30524	30905
-14	28486	28858	29243	29661	30031	29196	29577	29968	30396	30775
-12	28371	28743	29126	29543	29911	29077	29456	29846	30272	30650
-10	28254	28625	29006	29422	29789	28955	29333	29722	30146	30522
-8	28142	28511	28892	29306	29671	28838	29214	29602	30025	30400
-6	28030	28398	28777	29189	29554	28721	29096	29482	29904	30277
-4	27917	28284	28662	29073	29436	28604	28978	29363	29783	30154
-2	27807	28173	28550	28959	29321	28489	28862	29246	29664	30034
0	27697	28061	28438	28846	29206	28374	28746	29129	29546	29914
2	27589	27953	28328	28734	29093	28262	28632	29014	29429	29797
4	27484	27846	28220	28625	28982	28151	28521	28901	29315	29681
6	27378	27739	28112	28516	28872	28041	28409	28789	29202	29566
8	27275	27635	28006	28409	28764	27934	28300	28679	29090	29453

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LANDING PERFORMANCE

Refer to the Airplane Flight Manual for a complete set of charts for determination of the landing limiting weights.

EMBRAER RUNWAY ANALYSIS SOFTWARE

Although the AFM presents all the required performance data for landing, the amount of options and charts presented, makes its use very difficult. In order to help operators, Embraer developed a runway analysis software for determination of the limiting weights.

THE LANDING OUTPUT DATA

The program outputs the limit weight, the code for the limitation detected, the approach climb speed, the reference speed and the quick turn around weight. This data is provided for several combinations of wind and temperature.

The data is calculated for four reference winds and for a range of temperatures.

Limitation codes assigned are an A for approach climb limited weight, R for runway limited weight, L for landing climb limited weight, and S for structural limited weight.

If the operation for a specific condition is considered unfeasible or outside the performance tables, the relevant data will be provided with asterisks.

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EMB-135 BJ LANDING ANALYSIS, ALLISON 3007A1P ENGINES, FAA CERTIFICATION

Airport: AIRPORT NAME Runway: 20
Elevation: 110 LANDING DISTANCE AVAILABLE: 2000 m
Slope: 0 %

Anti Ice: OFF
Runway: WET

LIMIT WEIGHT (lb)/Code/V.Approach Climb(kt)/V.Ref(kt)/Quick T.Around Wt(lb) versus Temperature and Wind:

Temp(C)	-10 kt	0 kt	10 kt	20 kt
2	18700/S/153/127/15530	18700/S/153/127/17347	18700/S/153/127/17990	18700/S/153/127/18676
4	18700/S/153/127/15475	18700/S/153/127/17282	18700/S/153/127/17920	18700/S/153/127/18603
6	18700/S/153/127/15420	18700/S/153/127/17216	18700/S/153/127/17851	18700/S/153/127/18530
8	18700/S/153/127/15366	18700/S/153/127/17153	18700/S/153/127/17784	18700/S/153/127/18459
10	18700/S/153/127/15313	18700/S/153/127/17089	18700/S/153/127/17716	18700/S/153/127/18388
12	18700/S/153/127/15260	18700/S/153/127/17027	18700/S/153/127/17650	18700/S/153/127/18318
14	18700/S/153/127/15208	18700/S/153/127/16964	18700/S/153/127/17584	18700/S/153/127/18248
16	18700/S/153/127/15157	18700/S/153/127/16903	18700/S/153/127/17520	18700/S/153/127/18181
18	18700/S/153/127/15106	18700/S/153/127/16843	18700/S/153/127/17456	18700/S/153/127/18113
20	18700/S/153/127/15055	18700/S/153/127/16782	18700/S/153/127/17392	18700/S/153/127/18046
22	18700/S/153/127/15005	18700/S/153/127/16722	18700/S/153/127/17329	18700/S/153/127/17979
24	18700/S/153/127/14955	18700/S/153/127/16664	18700/S/153/127/17267	18700/S/153/127/17914
26	18700/S/153/127/14906	18700/S/153/127/16605	18700/S/153/127/17205	18700/S/153/127/17849
28	18700/S/153/127/14858	18700/S/153/127/16548	18700/S/153/127/17144	18700/S/153/127/17785
30	18700/S/153/127/14810	18700/S/153/127/16491	18700/S/153/127/17084	18700/S/153/127/17722
32	18700/S/153/127/14763	18700/S/153/127/16434	18700/S/153/127/17024	18700/S/153/127/17659
34	18700/S/153/127/14715	18700/S/153/127/16378	18700/S/153/127/16964	18700/S/153/127/17596
36	18700/S/153/127/14669	18700/S/153/127/16323	18700/S/153/127/16906	18700/S/153/127/17535
38	18700/S/153/127/14622	18700/S/153/127/16267	18700/S/153/127/16848	18700/S/153/127/17473

Limitation codes: A - Approach climb; L = Landing Climb; R - Runway; S - Structural

EXAMPLE

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SECTION 1-05

FLIGHT PLANNING

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NOTE: Items marked with an asterisk (*) may not be present in this manual.

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INTRODUCTION

This section presents climb, cruise, descent and holding performance data.

In addition, simplified flight planning charts are included.

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SIMPLIFIED FLIGHT PLANNING

Simplified flight planning charts allow quick determination of estimated trip fuel and time from brake release to landing. The following phases are included: takeoff, climb, cruise, descent, approach and landing.

Charts are provided for Long Range Cruise (LRC), Maximum Speed Cruise (MSC) and for Mach speeds 0.70, 0.72, 0.74, 0.76 and 0.78 at constant altitude.

Alternate fuel, holding, reserve fuel and other allowances (APU usage and taxi) should be added to the trip fuel in order to obtain the total fuel required.

To determine trip fuel enter trip ground distance, correct for wind condition and estimated landing weight, move as far as the line indicating cruise pressure altitude, and read the trip fuel.

To determine trip time, enter trip ground distance, correct for wind condition, move as far as the referring cruise pressure altitude, and read the trip time.

For winds greater than those shown, enter in the chart, directly, corrected ground distance, ignore wind correction reference line, to obtain the corrected ground distance, apply the following equation.

$$CGD = GD \times \frac{TAS}{TAS + WIND}$$

Where:

CGD: Corrected ground distance;
GD: Ground distance;
Head wind is negative;
Tail wind is positive.

The alternate fuel is determined by entering the LRC Simplified Flight Planning chart with the alternate distance and wind.

The holding fuel is determined from the holding table in this Section. Depending upon national regulations, the holding fuel is normally calculated so that the airplane can hold for 30 minutes, at 1500 ft above the alternate airport.

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The reserve fuel is also dependant on national regulations and normally is the fuel required for flying 10% of the trip time (based on the latest fuel flow) or is equivalent to 5% of the trip fuel.

The allowances below may be used:

PHASE OF FLIGHT	FUEL CONSUMPTION (lb/min)
TAXI	16.10
APU	2.73

EXAMPLE

Given:

DESTINATION AIRPORT

Trip Distance	1400 NM
Flight Level	FL 390
Cruise Speed	LRC
Wind	30 kt (HEAD WIND)
Estimated Landing Weight	38000 lb

ALTERNATE AIRPORT

Distance	200 NM
Flight Level	FL 200
Speed to Alternate Airport	LRC
Wind	0
Estimated Landing Weight at Alternate	34300 lb

RESERVE FUEL	5% OF TRIP FUEL

HOLDING

Time	30 MINUTES
Altitude	5000 ft
Estimated Airplane Weight at Holding	33000 lb

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RESULTS

From Simplified Flight Planning Chart - Long Range Cruise:

Trip Fuel..... 7800 lb

From Simplified Flight Planning Chart - Long Range Cruise:

Fuel to Alternate ..... 1400 lb
Reserve Fuel ..... 390 lb (5% OF TRIP FUEL)

From Holding Tables:

Fuel Consumption at 5000 ft ..... 1422 lb/h
For 30 Minutes of Holding, Fuel ..... 711 lb

To determine the TOTAL FUEL ON TAKEOFF, let's consider 5 minutes for taxi and an APU consumption equal to 110 lb.

TOTAL FUEL = TRIP FUEL + FUEL TO ALTERNATE + RESERVE FUEL + HOLDING + APU + TAXI

TOTAL FUEL = 7800 + 1400 + 390 + 711 + 110 + 81

TOTAL FUEL = 10492 lb

From Flight Time Chart - Long Range Cruise:

TRIP TIME..... 230 MINUTES

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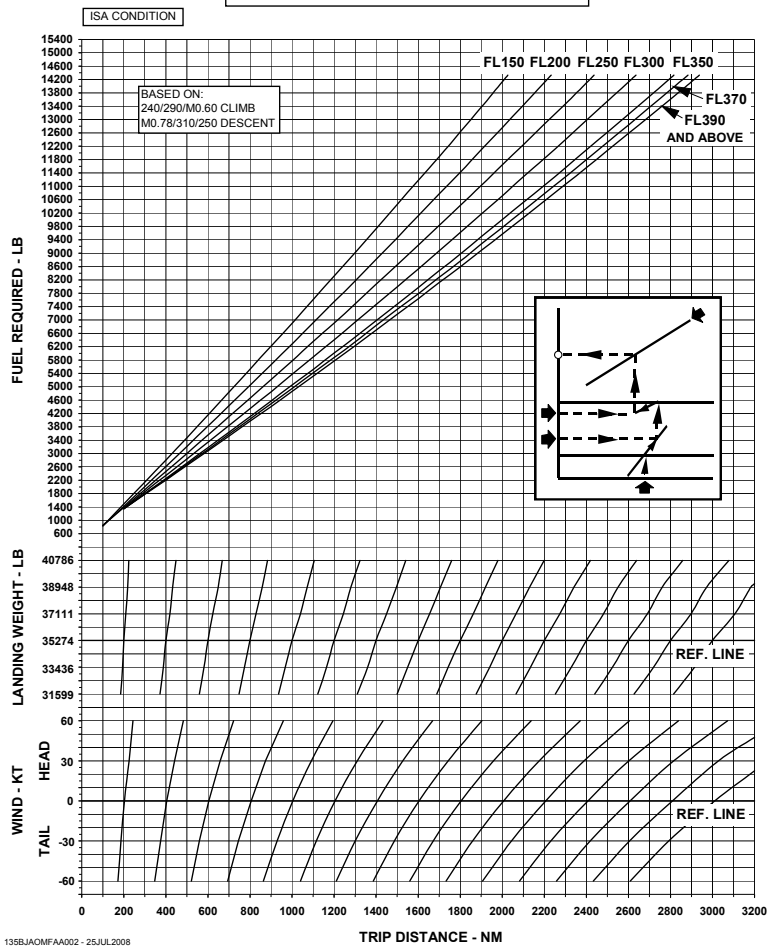
EMB-135BJ SIMPLIFIED FLIGHT PLANNING
TRIP FUEL
AE3007A1E ENGINE
LONG RANGE CRUISE



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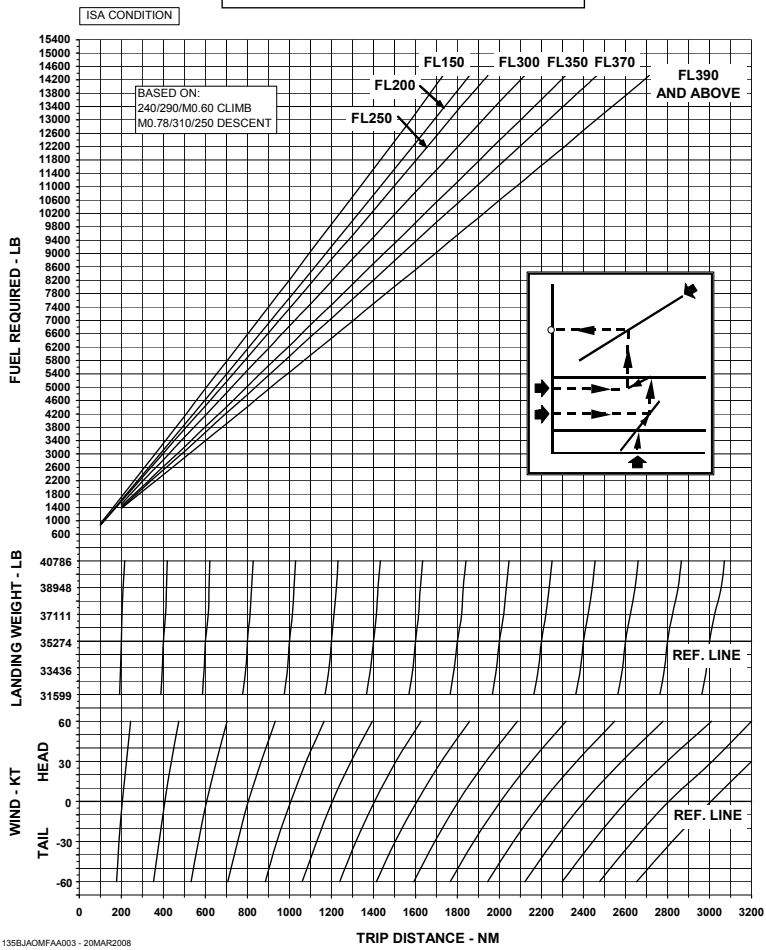
EMB-135BJ SIMPLIFIED FLIGHT PLANNING
TRIP FUEL
AE3007A1E ENGINE
MAXIMUM SPEED CRUISE



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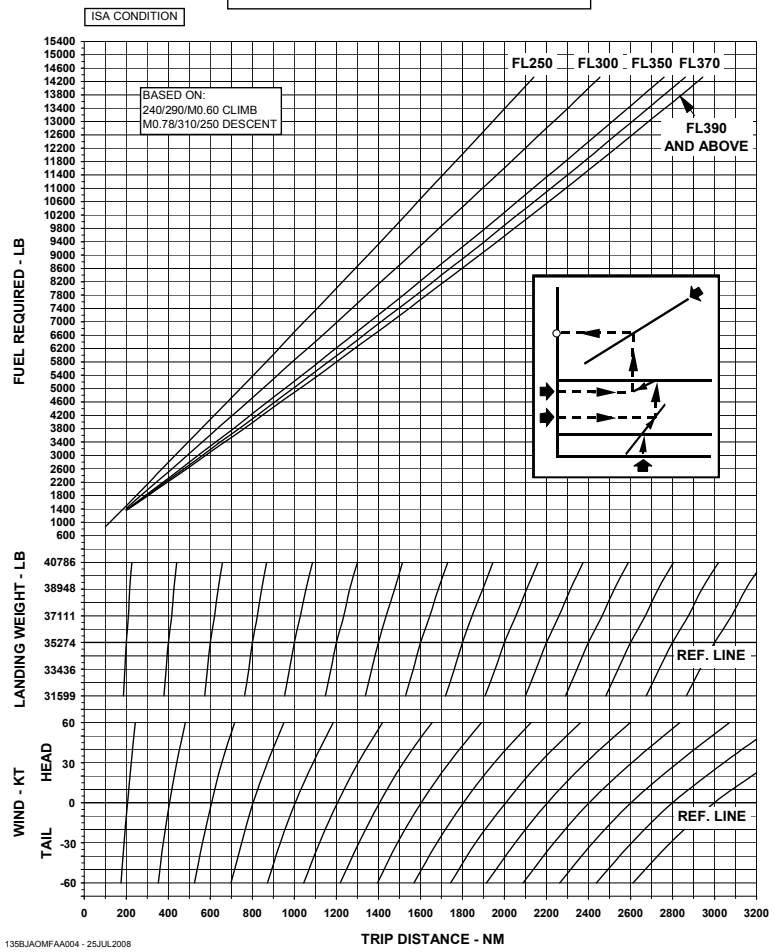
EMB-135BJ SIMPLIFIED FLIGHT PLANNING
TRIP FUEL
AE3007A1E ENGINE
MACH 0.70 CRUISE



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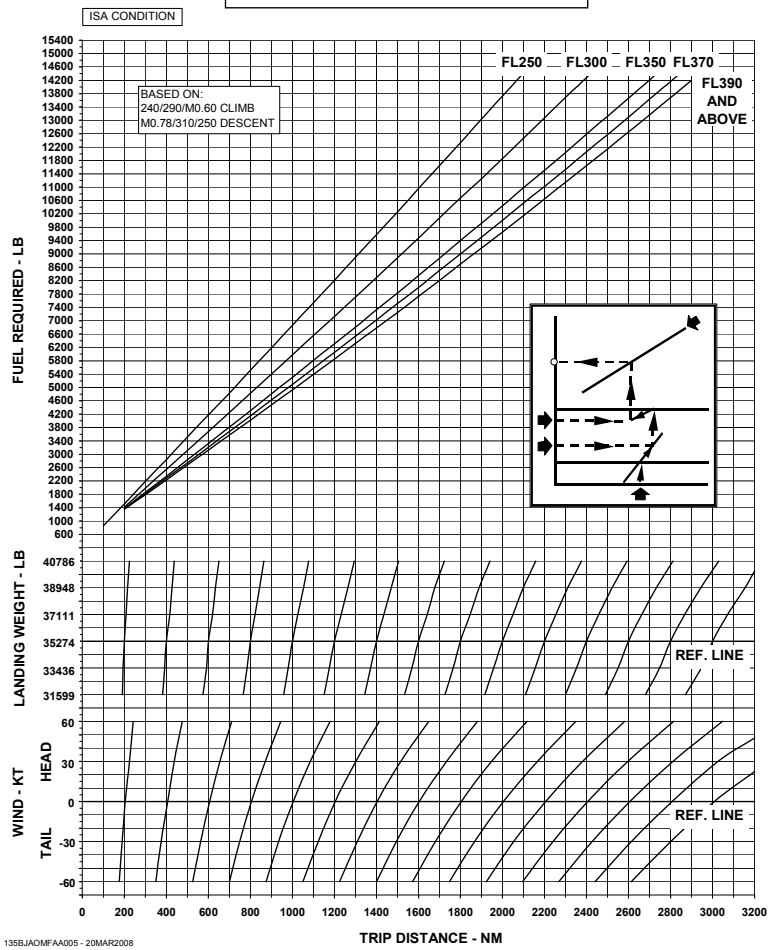
EMB-135BJ SIMPLIFIED FLIGHT PLANNING
TRIP FUEL
AE3007A1E ENGINE
MACH 0.72 CRUISE



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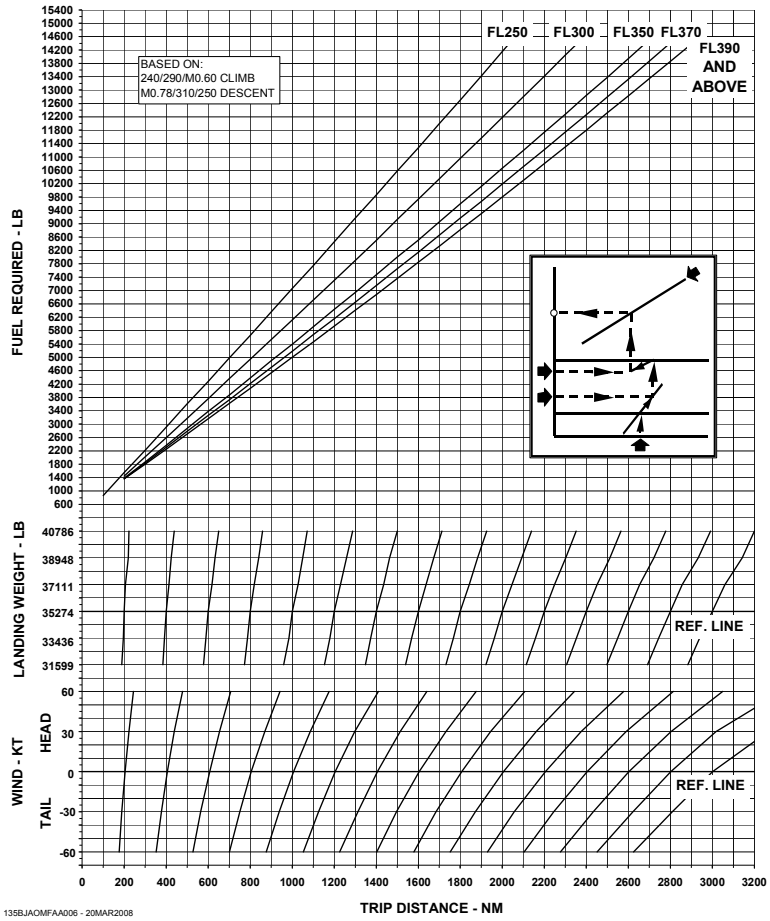
EMB-135BJ SIMPLIFIED FLIGHT PLANNING
TRIP FUEL
AE3007A1E ENGINE
MACH 0.74 CRUISE

ISA CONDITION



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MENU
PREVIOUS

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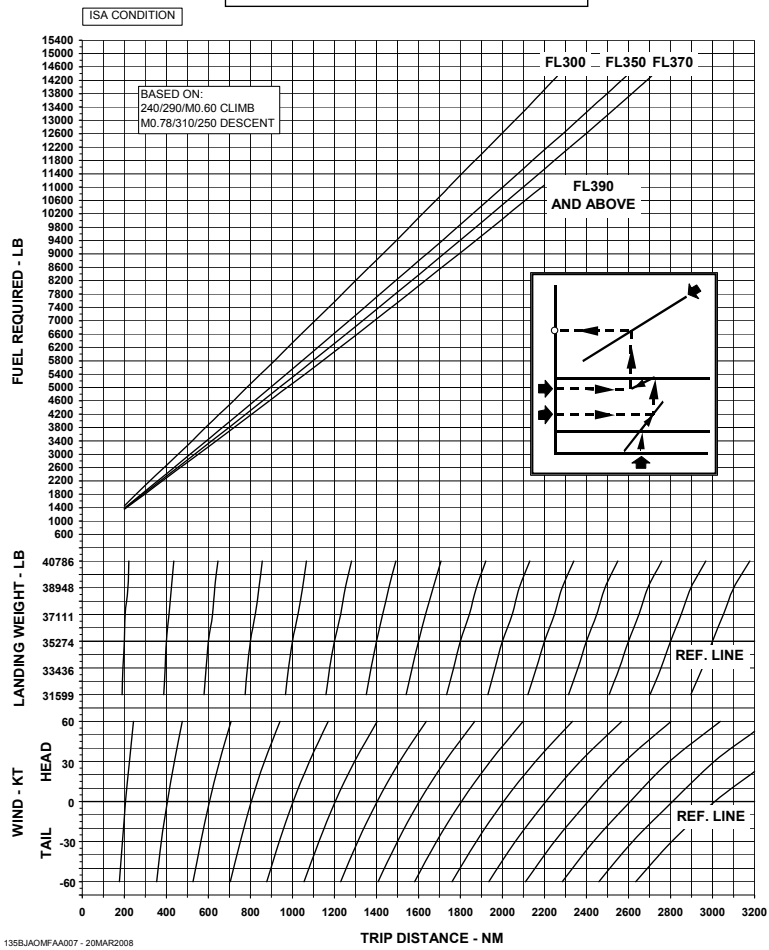
TRIP FUEL
AE3007A1E ENGINE
MACH 0.76 CRUISE



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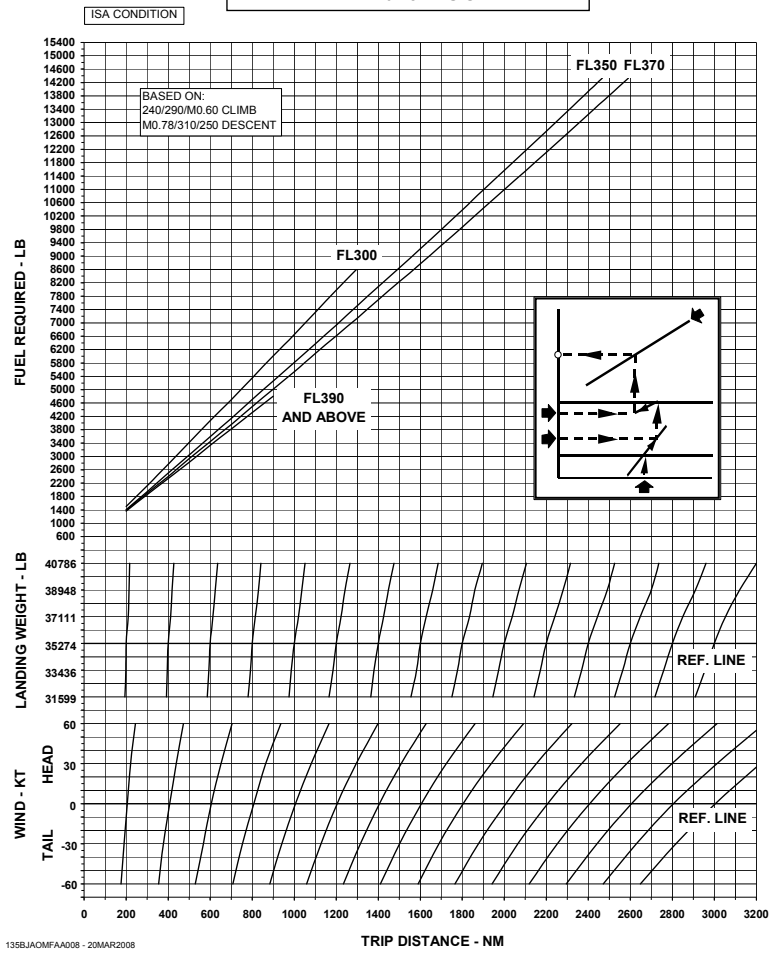
EMB-135BJ SIMPLIFIED FLIGHT PLANNING
TRIP FUEL
AE3007A1E ENGINE
MACH 0.78 CRUISE



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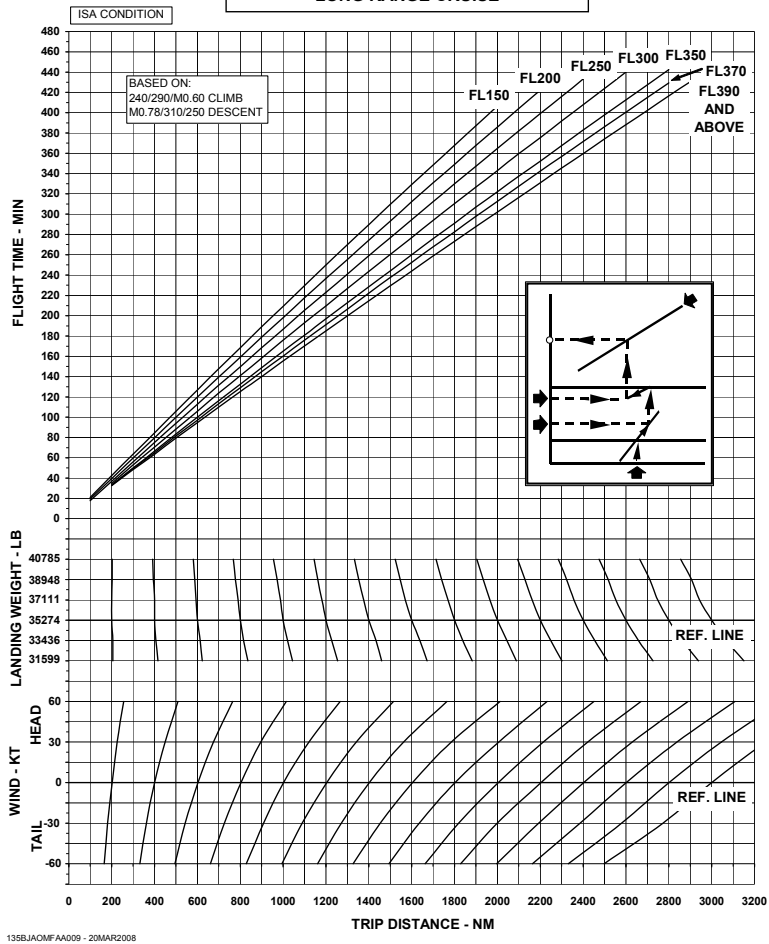
EMB-135BJ SIMPLIFIED FLIGHT PLANNING
TRIP TIME
AE3007A1E ENGINE
LONG RANGE CRUISE



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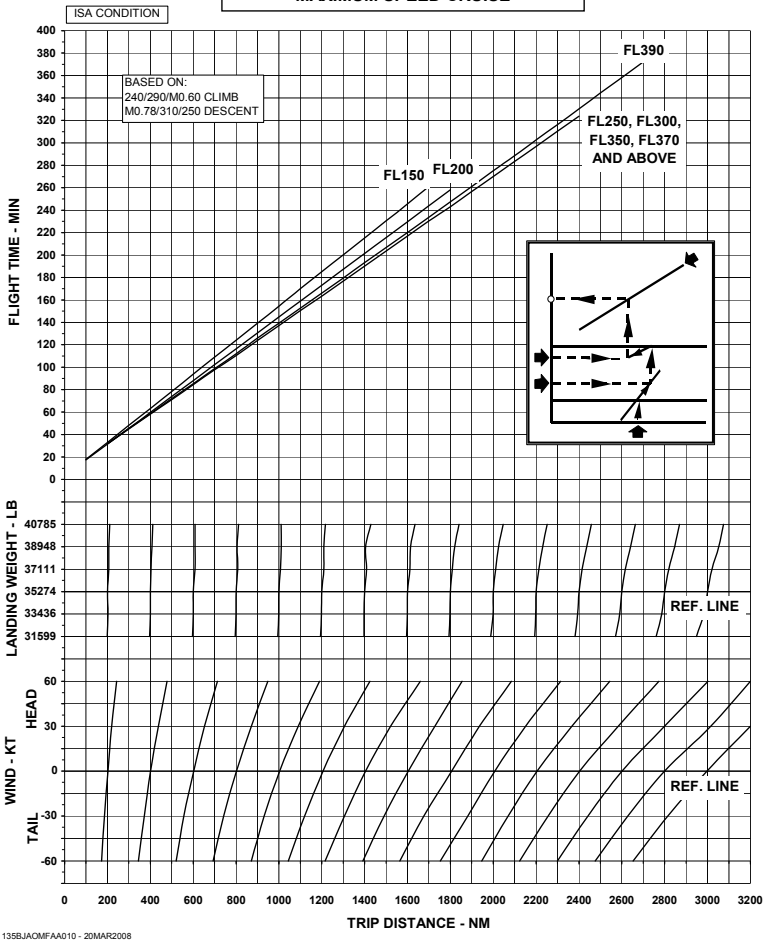
EMB-135BJ SIMPLIFIED FLIGHT PLANNING
TRIP TIME
AE3007A1E ENGINE
MAXIMUM SPEED CRUISE



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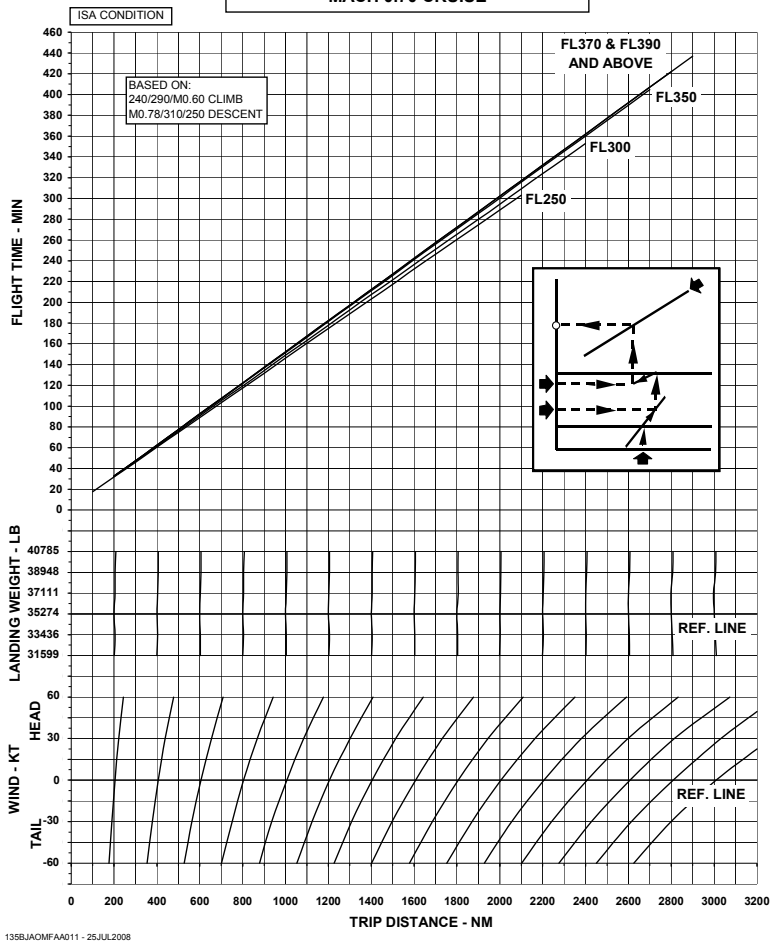
TRIP TIME
AE3007A1E ENGINE
MACH 0.70 CRUISE



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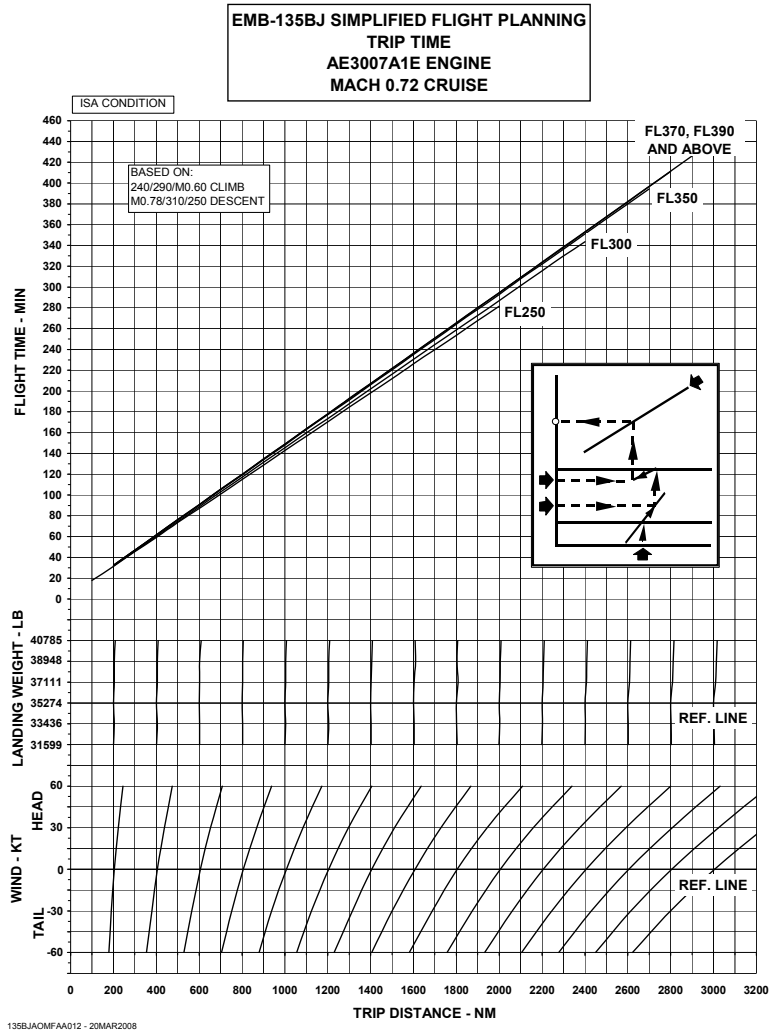

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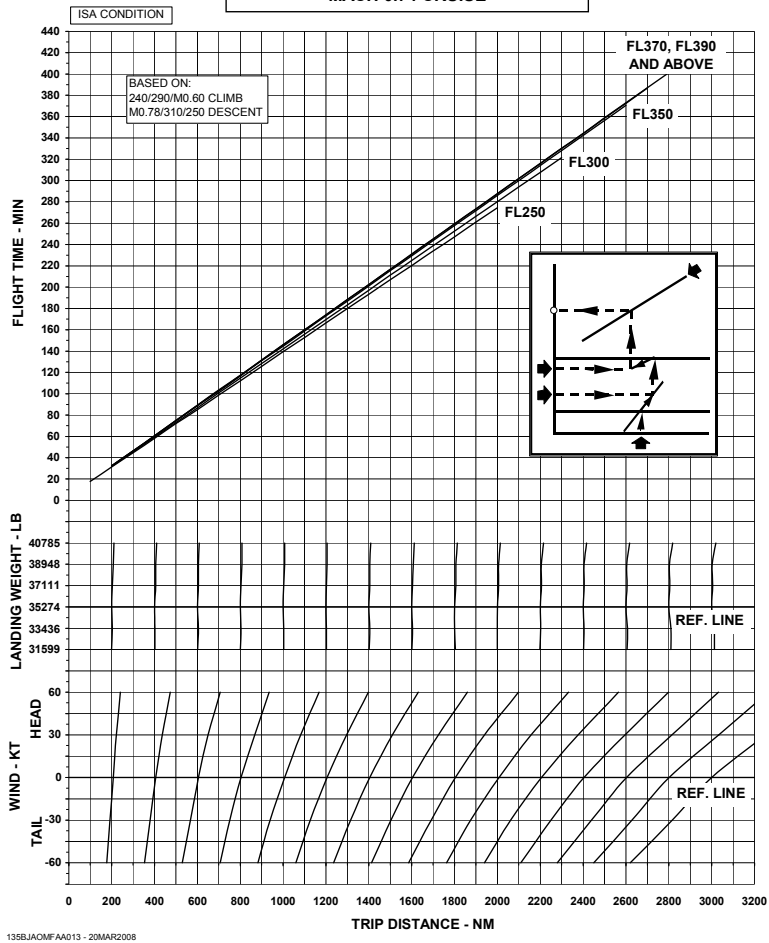
TRIP TIME
AE3007A1E ENGINE
MACH 0.74 CRUISE



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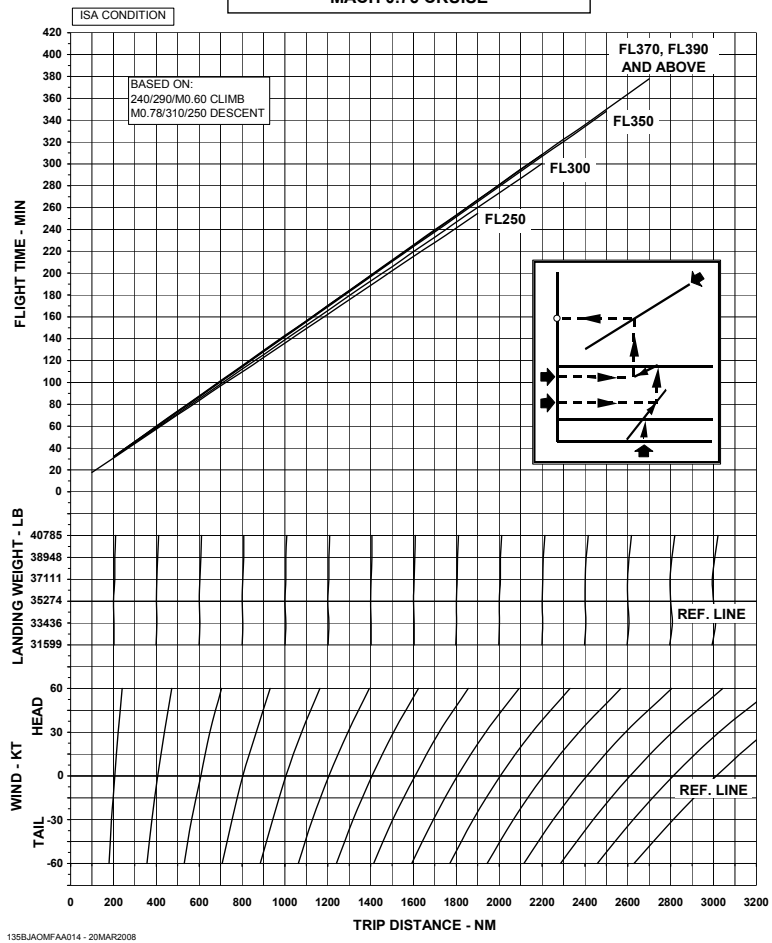
TRIP TIME
AE3007A1E ENGINE
MACH 0.76 CRUISE



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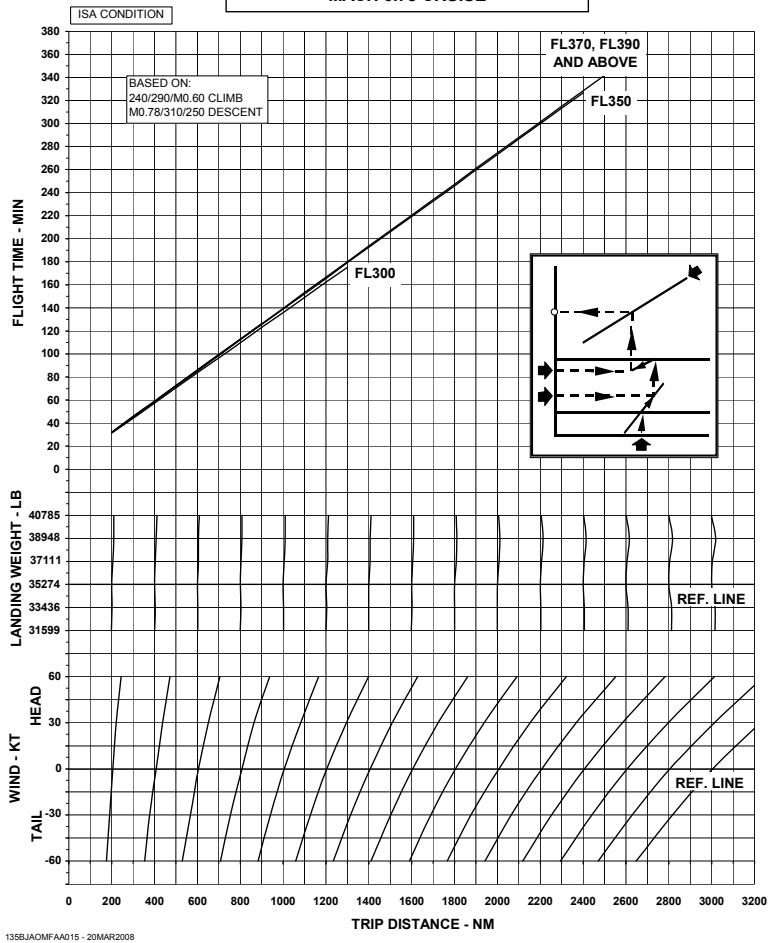
TRIP TIME
AE3007A1E ENGINE
MACH 0.78 CRUISE



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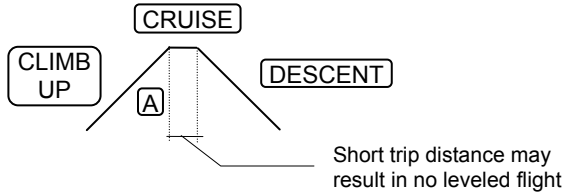
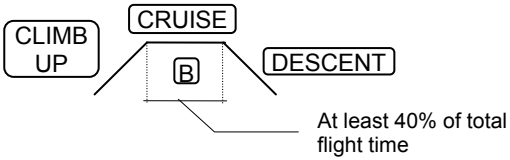
CRUISE - FLIGHT LEVEL TABLE

The table below permits quick determination of the cruise flight level for minimum fuel consumption, based on the trip distance and takeoff weight. For each takeoff weight two different flight levels are calculated (A or B) based on the following assumptions:

- Condition (A): The flight level was calculated based only on minimum fuel consumption. It may result on reduced time in leveled flight for short trip distances.



- Condition (B): The flight level was calculated based on a combination of minimum fuel consumption and at least 40% of the total flight time in cruise.



The tables data are presented for ISA condition, all engine operating and Maximum Speed Cruise schedule.

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FLIGHT LEVEL - ALL ENGINES OPERATING

AE3007A1E ENGINES, MAX SPEED CRUISE AND ISA CONDITIONS

TOW (lb)	COND	TRIP DISTANCE (NM)										
		50	75	100	150	200	250	300	350	400	450	500
50000	A	-	-	-	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-	-	-	-
48000	A	-	-	-	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-	-	-	-
46000	A	-	-	-	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-	-	-	-
44000	A	-	-	-	-	-	-	-	-	140	250	320
	B	-	-	-	-	-	-	-	-	140	250	320
42000	A	-	-	-	270	370	400	410	410	410	410	410
	B	-	-	-	180	230	270	320	360	390	410	410
40000	A	120	170	220	300	380	410	410	410	410	410	410
	B	-	-	130	190	240	290	330	370	400	410	410
38000	A	120	180	230	320	390	410	410	410	410	410	410
	B	-	-	140	200	250	300	350	380	410	410	410
36000	A	120	190	250	340	400	410	410	410	410	410	410
	B	-	-	140	210	250	320	370	400	410	410	410

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CRUISE - ALTITUDE CAPABILITY TABLE

The table below permits quick determination of the altitude capability, based on the initial cruise weight. The table data are presented for various ISA conditions, all engines operating and Maximum Speed Cruise schedule.

The established associated conditions are:

- Flaps.....0°
- Gears.....UP
- Bleeds .....OPEN

CRUISE ALTITUDE CAPABILITY
ALL ENGINES OPERATING

AE3007A1E ENGINES, MAX SPEED CRUISE, CRUISE THRUST LIMITED

WEIGHT (lb)	ISA + °C									
	-10	-5	0	5	10	15	20	25	30	35
50000	330	390	390	390	390	380	370	360	350	310
48000	330	400	400	400	390	390	380	370	360	340
46000	330	400	400	400	400	390	380	380	370	360
44000	330	410	410	410	410	400	390	380	370	360
42000	330	410	410	410	410	410	400	390	380	370
40000	330	410	410	410	410	410	410	400	390	380
38000	330	410	410	410	410	410	410	410	400	390
36000	330	410	410	410	410	410	410	410	410	400
34000	330	410	410	410	410	410	410	410	410	400
32000	330	410	410	410	410	410	410	410	410	410
30000	330	410	410	410	410	410	410	410	410	410

NOTE: The weight values refers to the initial cruise weight.

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APU AND ENGINE FUEL CONSUMPTION

APU FUEL CONSUMPTION

The table below shows the APU fuel consumption on the ground and during level flight at 5000 ft, 25000 ft, 37000 ft and 39000 ft altitudes. The data is calculated for different airspeeds, APU air bleeds and electrical loads.

APU FUEL CONSUMPTION

Applicable to Sundstrand APU T-62T-40C14 (500R)

ALTITUDE (ft)	AIRSPEED (KIAS)	APU AIR BLEED	APU GEN. LOAD	APU FUEL FLOW (lb/min)
0	0	No Load	No Load	1.59
			Max Load	1.70
		2 Packs	No Load	2.49
			Max Load	2.73
5000	140	No Load	No Load	0.82
			Max Load	1.94
		2 Packs	No Load	2.58
			Max Load	2.84
	220	No Load	No Load	0.82
			Max Load	1.94
		2 Packs	No Load	2.58
			Max Load	2.84
25000	140	No Load	No Load	1.04
			Max Load	1.17
		2 Packs	No Load	1.30
			Max Load	1.54
	220	No Load	No Load	1.04
			Max Load	1.17
		2 Packs	No Load	1.30
			Max Load	1.54
37000	140	No Load	No Load	0.55
			Max Load	0.75
		2 Packs	Max Load	0.97
	220	No Load	No Load	0.55
			Max Load	0.68
		2 Packs	Max Load	0.93
39000	140	No Load	No Load	0.55
			300A Load	0.66
	220		No Load	0.55
			300A Load	0.64

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ENGINE FUEL CONSUMPTION

The following values established for taxi, take-off, approach and go around fuel consumption should be considered when calculating detailed flight plans.

FUEL CONSUMPTION

ENGINE	PHASE OF FLIGHT	FUEL CONSUMPTION
		lb/min
AE3007 A1P, A1E, A2	TAXI	16.01
	TAKE-OFF	105.8
	APPROACH AND LANDING	30.86
	GO AROUND	105.8

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CLIMB

The climb planning tables show fuel consumption, distance, and time elapsed from the Sea Level to the top of climb. Data are shown for various weights, ISA deviations and cruise altitudes.

Tables present the scheduled climb speed according to the autopilot climb mode, i.e.:

- 240 KIAS for altitudes up to 8000 ft, increasing linearly to 270 KIAS at 14000 ft, maintaining 270 KIAS up to 25051 ft and 0.65 Mach above 25051 ft.

The associated conditions are:

- Thrust Mode ..... E CLB
- Flaps ..... 0°
- Gear ..... UP
- Bleeds ..... OPEN
- Minimum Rate of Climb ..... 300 ft/min

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 5000 AND 6000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			5000 ft ISA + °C					6000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	157	163	170	179	203	188	196	204	215	244
	Distance	NM	8	8	8	9	11	9	10	10	11	14
	Time	MIN	2	2	2	2	3	2	2	2	3	3
48000	Fuel	LB	148	155	161	169	191	178	186	194	204	231
	Distance	NM	7	7	8	8	10	9	9	10	10	13
	Time	MIN	2	2	2	2	2	2	2	2	2	3
46000	Fuel	LB	140	146	152	160	180	169	176	183	193	217
	Distance	NM	7	7	7	8	10	8	9	9	10	12
	Time	MIN	2	2	2	2	2	2	2	2	2	3
44000	Fuel	LB	133	138	144	151	170	159	166	173	182	205
	Distance	NM	6	7	7	7	9	8	8	9	9	11
	Time	MIN	2	2	2	2	2	2	2	2	2	3
42000	Fuel	LB	125	130	136	143	160	150	157	163	172	193
	Distance	NM	6	6	7	7	9	7	8	8	9	11
	Time	MIN	2	2	2	2	2	2	2	2	2	2
40000	Fuel	LB	118	123	128	134	150	142	148	154	162	181
	Distance	NM	6	6	6	7	8	7	7	8	8	10
	Time	MIN	1	1	2	2	2	2	2	2	2	2
38000	Fuel	LB	111	116	120	126	141	133	139	145	152	170
	Distance	NM	5	6	6	6	8	7	7	7	8	9
	Time	MIN	1	1	1	1	2	2	2	2	2	2
36000	Fuel	LB	104	108	113	119	132	125	130	136	142	159
	Distance	NM	5	5	5	6	7	6	6	7	7	9
	Time	MIN	1	1	1	1	2	2	2	2	2	2
34000	Fuel	LB	97	102	106	111	123	117	122	127	133	148
	Distance	NM	5	5	5	5	7	6	6	6	7	8
	Time	MIN	1	1	1	1	2	1	1	2	2	2
32000	Fuel	LB	91	95	99	103	115	109	114	118	124	138
	Distance	NM	4	5	5	5	6	5	6	6	6	8
	Time	MIN	1	1	1	1	1	1	1	1	1	2
30000	Fuel	LB	85	88	92	96	107	101	106	110	116	128
	Distance	NM	4	4	4	5	6	5	5	5	6	7
	Time	MIN	1	1	1	1	1	1	1	1	1	2
FOR ANTI ICE ON, INCREASE (%):												
Fuel			15	10	10	20	25	15	15	10	20	25
Distance			0	0	0	0	30	0	0	10	20	30
Time			0	0	0	0	0	0	0	0	0	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 7000 AND 8000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			7000 ft ISA + °C					8000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	220	229	239	252	286	252	263	274	289	329
	Distance	NM	11	12	12	13	16	13	13	14	15	19
	Time	MIN	3	3	3	3	4	3	3	3	4	4
48000	Fuel	LB	208	217	226	238	270	238	249	259	273	310
	Distance	NM	10	11	11	12	15	12	13	13	14	18
	Time	MIN	3	3	3	3	4	3	3	3	3	4
46000	Fuel	LB	197	205	214	225	255	225	235	245	258	292
	Distance	NM	10	10	11	12	14	11	12	13	13	17
	Time	MIN	2	3	3	3	3	3	3	3	3	4
44000	Fuel	LB	186	194	202	213	240	213	222	231	244	275
	Distance	NM	9	10	10	11	14	11	11	12	13	16
	Time	MIN	2	2	2	3	3	3	3	3	3	4
42000	Fuel	LB	176	183	191	201	225	201	209	218	230	259
	Distance	NM	9	9	10	10	13	10	11	11	12	15
	Time	MIN	2	2	2	2	3	3	3	3	3	3
40000	Fuel	LB	165	172	180	189	212	189	197	205	216	243
	Distance	NM	8	9	9	10	12	10	10	10	11	14
	Time	MIN	2	2	2	2	3	2	2	2	3	3
38000	Fuel	LB	155	162	169	177	199	178	185	193	203	228
	Distance	NM	8	8	8	9	11	9	9	10	11	13
	Time	MIN	2	2	2	2	3	2	2	2	2	3
36000	Fuel	LB	146	152	158	166	186	167	174	181	190	213
	Distance	NM	7	8	8	8	11	8	9	9	10	12
	Time	MIN	2	2	2	2	2	2	2	2	2	3
34000	Fuel	LB	136	142	148	156	173	156	163	169	178	199
	Distance	NM	7	7	7	8	10	8	8	9	9	11
	Time	MIN	2	2	2	2	2	2	2	2	2	3
32000	Fuel	LB	127	133	138	145	162	146	152	158	166	185
	Distance	NM	6	7	7	7	9	7	8	8	9	11
	Time	MIN	2	2	2	2	2	2	2	2	2	2
30000	Fuel	LB	118	123	129	135	150	135	141	147	154	172
	Distance	NM	6	6	6	7	8	7	7	7	8	10
	Time	MIN	1	2	2	2	2	2	2	2	2	2
FOR ANTI ICE ON, INCREASE (%):												
	Fuel		15	15	10	20	25	15	15	10	20	25
	Distance		20	10	10	25	35	20	20	10	25	30
	Time		0	0	0	0	0	0	0	0	0	0

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AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 9000 AND 10000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			9000 ft ISA + °C					10000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	284	296	309	326	373	317	331	345	364	418
	Distance	NM	15	15	16	17	22	17	18	18	20	25
	Time	MIN	4	4	4	4	5	4	4	4	5	6
48000	Fuel	LB	269	280	292	308	351	300	313	326	344	394
	Distance	NM	14	15	15	16	21	16	17	17	19	24
	Time	MIN	3	3	4	4	5	4	4	4	4	5
46000	Fuel	LB	254	265	276	291	331	283	296	308	325	371
	Distance	NM	13	14	14	15	20	15	16	16	18	22
	Time	MIN	3	3	3	4	4	4	4	4	4	5
44000	Fuel	LB	240	250	261	275	311	268	279	291	307	349
	Distance	NM	12	13	14	15	18	14	15	16	17	21
	Time	MIN	3	3	3	3	4	3	4	4	4	5
42000	Fuel	LB	226	236	246	259	292	252	263	274	289	327
	Distance	NM	12	12	13	14	17	13	14	15	16	20
	Time	MIN	3	3	3	3	4	3	3	3	4	4
40000	Fuel	LB	213	222	232	244	275	237	248	258	272	307
	Distance	NM	11	12	12	13	16	13	13	14	15	19
	Time	MIN	3	3	3	3	4	3	3	3	3	4
38000	Fuel	LB	200	209	218	229	257	223	233	243	255	288
	Distance	NM	10	11	11	12	15	12	12	13	14	17
	Time	MIN	3	3	3	3	3	3	3	3	3	4
36000	Fuel	LB	188	196	204	215	241	209	218	227	239	269
	Distance	NM	10	10	11	11	14	11	12	12	13	16
	Time	MIN	2	2	2	3	3	3	3	3	3	4
34000	Fuel	LB	176	183	191	201	225	196	204	213	224	251
	Distance	NM	9	9	10	11	13	10	11	11	12	15
	Time	MIN	2	2	2	2	3	3	3	3	3	3
32000	Fuel	LB	164	171	178	187	209	183	190	198	209	234
	Distance	NM	8	9	9	10	12	10	10	10	11	14
	Time	MIN	2	2	2	2	3	2	2	2	3	3
30000	Fuel	LB	152	159	166	174	194	170	177	184	194	217
	Distance	NM	8	8	9	9	11	9	9	10	10	13
	Time	MIN	2	2	2	2	3	2	2	2	2	3
FOR ANTI ICE ON, INCREASE (%):												
Fuel			15	15	10	20	25	15	15	15	20	25
Distance			20	15	10	30	30	20	10	15	30	35
Time			0	0	0	0	0	0	0	0	0	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 11000 AND 12000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			11000 ft ISA + °C					12000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	351	366	382	403	465	385	402	420	444	515
	Distance	NM	19	20	21	22	29	22	23	24	25	33
	Time	MIN	5	5	5	5	6	5	5	5	6	7
48000	Fuel	LB	332	346	361	381	438	364	380	397	419	485
	Distance	NM	18	19	20	21	27	20	21	22	24	31
	Time	MIN	4	4	5	5	6	5	5	5	5	7
46000	Fuel	LB	313	327	341	360	412	344	359	375	396	456
	Distance	NM	17	18	19	20	26	19	20	21	23	29
	Time	MIN	4	4	4	4	6	4	5	5	5	6
44000	Fuel	LB	296	309	322	339	387	325	339	354	373	428
	Distance	NM	16	17	18	19	24	18	19	20	21	27
	Time	MIN	4	4	4	4	5	4	4	4	5	6
42000	Fuel	LB	279	291	303	320	364	306	319	333	351	402
	Distance	NM	15	16	17	18	23	17	18	19	20	26
	Time	MIN	4	4	4	4	5	4	4	4	4	6
40000	Fuel	LB	262	274	285	301	341	288	300	313	331	377
	Distance	NM	14	15	16	17	21	16	17	18	19	24
	Time	MIN	3	3	4	4	5	4	4	4	4	5
38000	Fuel	LB	246	257	268	282	320	270	282	294	310	353
	Distance	NM	13	14	15	16	20	15	16	16	18	22
	Time	MIN	3	3	3	4	4	4	4	4	4	5
36000	Fuel	LB	231	241	251	265	299	254	265	276	291	330
	Distance	NM	13	13	14	15	19	14	15	15	17	21
	Time	MIN	3	3	3	3	4	3	3	3	4	5
34000	Fuel	LB	216	225	235	247	279	237	247	258	272	308
	Distance	NM	12	12	13	14	17	13	14	14	15	20
	Time	MIN	3	3	3	3	4	3	3	3	3	4
32000	Fuel	LB	202	210	219	231	259	221	231	241	253	286
	Distance	NM	11	11	12	13	16	12	13	13	14	18
	Time	MIN	3	3	3	3	4	3	3	3	3	4
30000	Fuel	LB	187	195	204	214	240	205	214	224	235	265
	Distance	NM	10	11	11	12	15	11	12	12	13	17
	Time	MIN	2	2	3	3	3	3	3	3	3	4
FOR ANTI ICE ON, INCREASE (%):												
	Fuel		15	15	15	20	30	15	15	15	25	30
	Distance		20	15	10	30	35	20	15	20	30	35
	Time		0	0	0	0	0	0	0	0	0	0

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AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 13000 AND 14000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			13000 ft ISA + °C					14000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	421	440	459	486	568	459	479	501	531	626
	Distance	NM	24	25	27	29	37	27	28	30	32	43
	Time	MIN	6	6	6	6	8	6	6	6	7	9
48000	Fuel	LB	398	416	434	459	534	434	453	473	501	588
	Distance	NM	23	24	25	27	35	26	27	28	30	40
	Time	MIN	5	5	6	6	7	6	6	6	6	8
46000	Fuel	LB	376	393	410	433	502	409	427	446	473	552
	Distance	NM	22	23	24	25	33	24	25	26	29	38
	Time	MIN	5	5	5	6	7	5	6	6	6	8
44000	Fuel	LB	355	370	387	408	472	386	403	421	445	518
	Distance	NM	20	21	22	24	31	23	24	25	27	35
	Time	MIN	5	5	5	5	7	5	5	5	6	7
42000	Fuel	LB	334	349	364	384	442	364	380	396	419	486
	Distance	NM	19	20	21	23	29	21	22	23	25	33
	Time	MIN	4	5	5	5	6	5	5	5	5	7
40000	Fuel	LB	314	328	342	361	415	342	357	373	394	455
	Distance	NM	18	19	20	21	27	20	21	22	24	31
	Time	MIN	4	4	4	5	6	5	5	5	5	6
38000	Fuel	LB	295	308	322	339	388	321	335	350	370	426
	Distance	NM	17	18	18	20	25	19	20	21	22	29
	Time	MIN	4	4	4	4	5	4	4	5	5	6
36000	Fuel	LB	277	289	301	318	362	301	314	328	346	397
	Distance	NM	16	17	17	19	24	18	18	19	21	27
	Time	MIN	4	4	4	4	5	4	4	4	4	6
34000	Fuel	LB	259	270	282	297	338	281	293	306	323	370
	Distance	NM	15	15	16	17	22	17	17	18	19	25
	Time	MIN	3	3	4	4	5	4	4	4	4	5
32000	Fuel	LB	241	252	263	277	314	262	274	285	301	344
	Distance	NM	14	14	15	16	21	15	16	17	18	23
	Time	MIN	3	3	3	4	4	3	4	4	4	5
30000	Fuel	LB	224	234	244	257	291	243	254	265	280	319
	Distance	NM	13	13	14	15	19	14	15	16	17	21
	Time	MIN	3	3	3	3	4	3	3	3	4	5
FOR ANTI ICE ON, INCREASE (%):												
Fuel			15	15	15	25	30	20	15	15	25	35
Distance			20	20	15	30	40	20	20	20	35	40
Time			0	0	0	0	0	0	0	0	0	0

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AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 15000 AND 16000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			15000 ft ISA + °C					16000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	498	520	544	577	687	537	562	587	625	751
	Distance	NM	30	32	33	36	48	34	35	37	40	55
	Time	MIN	7	7	7	8	10	7	8	8	8	11
48000	Fuel	LB	470	491	513	545	645	507	530	554	589	704
	Distance	NM	29	30	31	34	45	32	33	35	38	51
	Time	MIN	6	7	7	7	9	7	7	7	8	10
46000	Fuel	LB	444	464	484	514	605	479	500	523	555	660
	Distance	NM	27	28	30	32	43	30	31	33	36	48
	Time	MIN	6	6	6	7	9	7	7	7	7	10
44000	Fuel	LB	418	437	456	484	567	451	471	493	523	618
	Distance	NM	25	27	28	30	40	28	29	31	34	45
	Time	MIN	6	6	6	6	8	6	6	6	7	9
42000	Fuel	LB	394	411	430	455	532	424	444	464	492	579
	Distance	NM	24	25	26	28	37	26	28	29	31	42
	Time	MIN	5	5	6	6	8	6	6	6	6	8
40000	Fuel	LB	370	387	404	428	498	399	417	436	462	542
	Distance	NM	22	23	25	27	35	25	26	27	30	39
	Time	MIN	5	5	5	6	7	5	6	6	6	8
38000	Fuel	LB	347	363	379	401	465	374	391	409	433	506
	Distance	NM	21	22	23	25	33	23	24	26	28	37
	Time	MIN	5	5	5	5	7	5	5	5	6	7
36000	Fuel	LB	325	340	355	375	434	351	366	383	405	472
	Distance	NM	20	21	22	23	30	22	23	24	26	34
	Time	MIN	4	5	5	5	6	5	5	5	5	7
34000	Fuel	LB	304	318	332	351	404	327	342	357	378	439
	Distance	NM	18	19	20	22	28	20	21	22	24	32
	Time	MIN	4	4	4	5	6	4	5	5	5	6
32000	Fuel	LB	283	296	309	327	375	305	319	333	352	408
	Distance	NM	17	18	19	20	26	19	20	21	22	29
	Time	MIN	4	4	4	4	5	4	4	4	5	6
30000	Fuel	LB	263	275	287	303	348	283	296	309	327	378
	Distance	NM	16	17	17	19	24	18	18	19	21	27
	Time	MIN	4	4	4	4	5	4	4	4	4	5
FOR ANTI ICE ON, INCREASE (%):												
Fuel			20	15	20	30	35	20	20	20	35	40
Distance			20	20	20	40	45	20	20	20	45	50
Time			0	0	0	0	40	0	0	0	0	50

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AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 17000 AND 18000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			17000 ft ISA + °C					18000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	578	604	632	674	817	619	648	678	724	886
	Distance	NM	37	39	41	45	61	41	43	45	49	68
	Time	MIN	8	8	8	9	12	9	9	9	10	13
48000	Fuel	LB	545	570	596	635	766	584	611	639	682	829
	Distance	NM	35	37	38	42	57	38	40	42	46	64
	Time	MIN	8	8	8	8	11	8	8	9	9	12
46000	Fuel	LB	514	538	562	598	717	550	575	602	642	776
	Distance	NM	33	35	36	39	54	36	38	40	43	60
	Time	MIN	7	7	7	8	11	8	8	8	9	12
44000	Fuel	LB	484	506	529	563	671	518	542	567	604	726
	Distance	NM	31	33	34	37	50	34	36	37	41	56
	Time	MIN	7	7	7	8	10	7	7	8	8	11
42000	Fuel	LB	456	476	498	529	628	487	510	533	567	678
	Distance	NM	29	31	32	35	47	32	34	35	38	52
	Time	MIN	6	6	7	7	9	7	7	7	8	10
40000	Fuel	LB	428	448	468	497	587	458	479	500	533	634
	Distance	NM	27	29	30	33	44	30	31	33	36	48
	Time	MIN	6	6	6	7	9	6	7	7	7	9
38000	Fuel	LB	402	420	439	466	548	429	449	469	499	591
	Distance	NM	26	27	28	31	41	28	29	31	34	45
	Time	MIN	6	6	6	6	8	6	6	6	7	9
36000	Fuel	LB	376	393	411	436	511	402	420	439	467	551
	Distance	NM	24	25	26	29	38	26	28	29	31	42
	Time	MIN	5	5	5	6	8	6	6	6	6	8
34000	Fuel	LB	351	367	384	407	475	375	392	410	435	512
	Distance	NM	22	23	25	27	35	25	26	27	29	39
	Time	MIN	5	5	5	5	7	5	5	6	6	8
32000	Fuel	LB	327	342	357	379	441	349	365	382	405	475
	Distance	NM	21	22	23	25	33	23	24	25	27	36
	Time	MIN	5	5	5	5	6	5	5	5	5	7
30000	Fuel	LB	304	317	332	351	408	324	339	354	376	439
	Distance	NM	19	20	21	23	30	21	22	23	25	33
	Time	MIN	4	4	4	5	6	5	5	5	5	7
FOR ANTI ICE ON, INCREASE (%):												
Fuel			20	20	20	40	45	20	20	20	45	55
Distance			20	20	25	55	60	20	20	25	65	70
Time			0	0	0	0	55	0	0	0	50	65

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AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 19000 AND 20000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			19000 ft ISA + °C					20000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	660	691	723	775	956	701	734	769	825	1026
	Distance	NM	45	47	49	54	76	48	51	53	59	83
	Time	MIN	9	10	10	11	14	10	10	11	11	16
48000	Fuel	LB	622	651	682	729	894	661	692	724	776	958
	Distance	NM	42	44	46	51	71	46	48	50	55	78
	Time	MIN	9	9	9	10	13	9	10	10	11	15
46000	Fuel	LB	586	613	642	686	835	622	651	682	730	895
	Distance	NM	39	41	43	48	66	43	45	47	52	72
	Time	MIN	8	8	9	9	13	9	9	9	10	14
44000	Fuel	LB	552	577	604	645	781	585	613	641	686	835
	Distance	NM	37	39	41	45	62	40	42	44	49	67
	Time	MIN	8	8	8	9	12	8	9	9	9	13
42000	Fuel	LB	519	543	568	606	729	550	576	603	644	780
	Distance	NM	35	37	38	42	57	38	40	42	46	63
	Time	MIN	7	7	8	8	11	8	8	8	9	12
40000	Fuel	LB	487	510	533	568	681	517	541	566	604	727
	Distance	NM	33	34	36	39	53	35	37	39	43	58
	Time	MIN	7	7	7	8	10	7	8	8	8	11
38000	Fuel	LB	457	478	500	532	635	484	507	530	566	678
	Distance	NM	31	32	34	37	50	33	35	36	40	54
	Time	MIN	6	7	7	7	10	7	7	7	8	10
36000	Fuel	LB	427	447	468	498	591	453	474	496	529	631
	Distance	NM	29	30	31	34	46	31	32	34	37	51
	Time	MIN	6	6	6	7	9	6	7	7	7	10
34000	Fuel	LB	399	417	436	464	549	423	442	463	493	586
	Distance	NM	27	28	29	32	43	29	30	32	35	47
	Time	MIN	6	6	6	6	8	6	6	6	7	9
32000	Fuel	LB	371	388	406	432	509	393	412	431	459	543
	Distance	NM	25	26	27	30	40	27	28	29	32	43
	Time	MIN	5	5	6	6	8	6	6	6	6	8
30000	Fuel	LB	345	361	377	401	471	365	382	400	425	502
	Distance	NM	23	24	25	28	37	25	26	27	30	40
	Time	MIN	5	5	5	5	7	5	5	5	6	8
FOR ANTI ICE ON, INCREASE (%):												
Fuel			20	20	20	50	55	20	20	25	55	55
Distance			25	20	25	70	70	25	20	25	75	75
Time			0	10	20	60	65	20	20	20	75	70

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 21000 AND 22000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			21000 ft ISA + °C					22000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	742	778	815	876	1098	785	823	862	929	1175
	Distance	NM	52	55	58	64	91	56	59	62	69	100
	Time	MIN	11	11	11	12	17	11	12	12	13	18
48000	Fuel	LB	699	733	767	824	1024	739	775	812	873	1095
	Distance	NM	49	52	54	60	85	53	56	58	65	93
	Time	MIN	10	10	11	11	16	11	11	11	12	17
46000	Fuel	LB	658	690	722	774	955	696	729	764	821	1021
	Distance	NM	46	48	51	56	79	50	52	55	61	86
	Time	MIN	9	10	10	11	15	10	10	11	11	16
44000	Fuel	LB	619	649	679	728	892	654	685	718	771	952
	Distance	NM	43	46	48	53	74	47	49	52	57	80
	Time	MIN	9	9	9	10	14	9	10	10	11	15
42000	Fuel	LB	582	609	638	683	832	614	644	674	723	887
	Distance	NM	41	43	45	49	68	44	46	48	53	75
	Time	MIN	8	9	9	9	13	9	9	9	10	14
40000	Fuel	LB	546	572	599	640	775	576	604	632	677	826
	Distance	NM	38	40	42	46	64	41	43	45	50	70
	Time	MIN	8	8	8	9	12	8	9	9	9	13
38000	Fuel	LB	512	536	561	599	722	540	566	592	634	769
	Distance	NM	36	37	39	43	59	39	40	42	47	65
	Time	MIN	7	8	8	8	11	8	8	8	9	12
36000	Fuel	LB	479	501	524	560	672	505	529	554	592	715
	Distance	NM	33	35	37	40	55	36	38	40	44	60
	Time	MIN	7	7	7	8	10	7	7	8	8	11
34000	Fuel	LB	447	467	489	522	623	471	493	516	552	663
	Distance	NM	31	33	34	38	51	34	35	37	41	56
	Time	MIN	6	7	7	7	10	7	7	7	8	10
32000	Fuel	LB	416	435	455	485	578	438	459	480	513	614
	Distance	NM	29	30	32	35	47	31	33	34	38	51
	Time	MIN	6	6	6	7	9	6	6	7	7	9
30000	Fuel	LB	386	404	422	450	534	406	426	445	475	567
	Distance	NM	27	28	29	32	44	29	30	32	35	47
	Time	MIN	6	6	6	6	8	6	6	6	7	9
FOR ANTI ICE ON, INCREASE (%):												
Fuel			20	20	25	60	60	20	20	25	65	70
Distance			25	25	25	85	85	25	25	30	95	100
Time			20	20	30	85	80	30	20	30	85	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 230000 AND 24000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			23000 ft ISA + °C					24000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	829	869	912	985	1261	876	918	963	1044	1357
	Distance	NM	61	64	67	75	110	66	69	73	81	122
	Time	MIN	12	12	13	14	20	13	13	14	15	22
48000	Fuel	LB	780	818	858	925	1173	823	864	906	980	1259
	Distance	NM	57	60	63	70	102	62	65	68	76	113
	Time	MIN	11	12	12	13	18	12	12	13	14	20
46000	Fuel	LB	734	769	806	869	1092	774	812	851	919	1170
	Distance	NM	54	56	59	66	95	58	61	64	71	105
	Time	MIN	11	11	11	12	17	11	12	12	13	19
44000	Fuel	LB	690	723	758	815	1017	727	762	799	862	1088
	Distance	NM	50	53	56	62	88	54	57	60	67	97
	Time	MIN	10	10	11	12	16	11	11	11	12	17
42000	Fuel	LB	648	679	711	764	946	683	716	750	808	1011
	Distance	NM	47	50	52	58	82	51	53	56	62	90
	Time	MIN	9	10	10	11	15	10	10	11	12	16
40000	Fuel	LB	608	637	667	716	881	640	671	703	756	940
	Distance	NM	44	46	49	54	76	48	50	53	58	83
	Time	MIN	9	9	9	10	14	9	10	10	11	15
38000	Fuel	LB	569	596	624	670	819	599	628	658	707	873
	Distance	NM	41	43	46	50	71	45	47	49	54	77
	Time	MIN	8	8	9	9	13	9	9	9	10	14
36000	Fuel	LB	532	557	584	625	760	560	587	614	660	810
	Distance	NM	39	41	43	47	65	42	44	46	51	72
	Time	MIN	8	8	8	9	12	8	8	9	9	13
34000	Fuel	LB	496	520	544	583	705	522	547	573	615	750
	Distance	NM	36	38	40	44	61	39	41	43	47	66
	Time	MIN	7	7	8	8	11	8	8	8	9	12
32000	Fuel	LB	461	483	506	541	652	485	508	533	571	694
	Distance	NM	33	35	37	41	56	36	38	40	44	61
	Time	MIN	7	7	7	8	10	7	7	8	8	11
30000	Fuel	LB	428	448	469	502	602	450	471	494	529	640
	Distance	NM	31	32	34	38	52	33	35	37	41	56
	Time	MIN	6	6	7	7	9	7	7	7	8	10
FOR ANTI ICE ON, INCREASE (%):												
	Fuel		20	25	25	70	0	25	25	30	70	0
	Distance		25	25	30	100	0	25	25	30	105	0
	Time		30	25	30	95	0	30	25	30	100	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 25000 AND 26000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			25000 ft ISA + °C					26000 ft ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
50000	Fuel	LB	927	970	1018	1106	1464	977	1017	1068	1162	1561
	Distance	NM	71	75	79	88	136	77	80	84	95	149
	Time	MIN	14	14	15	16	24	15	15	15	17	26
48000	Fuel	LB	871	911	956	1037	1355	918	955	1003	1089	1442
	Distance	NM	67	70	74	83	125	72	75	79	89	137
	Time	MIN	13	13	14	15	22	14	14	14	16	24
46000	Fuel	LB	819	856	898	972	1256	862	897	941	1020	1333
	Distance	NM	63	66	69	77	116	67	70	74	83	126
	Time	MIN	12	12	13	14	20	13	13	14	15	22
44000	Fuel	LB	769	804	843	911	1165	808	841	883	955	1235
	Distance	NM	59	62	65	72	107	63	66	69	77	116
	Time	MIN	11	12	12	13	19	12	12	13	14	20
42000	Fuel	LB	721	754	790	853	1081	758	789	827	894	1144
	Distance	NM	55	58	61	68	99	59	62	65	72	107
	Time	MIN	11	11	11	12	17	11	12	12	13	19
40000	Fuel	LB	676	706	740	798	1004	710	738	774	836	1060
	Distance	NM	52	54	57	63	92	55	58	61	67	99
	Time	MIN	10	10	11	11	16	11	11	11	12	17
38000	Fuel	LB	632	661	693	746	931	664	691	724	781	982
	Distance	NM	48	50	53	59	85	52	54	57	63	92
	Time	MIN	9	10	10	11	15	10	10	10	11	16
36000	Fuel	LB	590	617	647	696	863	620	645	676	728	909
	Distance	NM	45	47	49	55	78	48	50	53	59	85
	Time	MIN	9	9	9	10	14	9	9	10	11	15
34000	Fuel	LB	550	575	603	648	798	577	600	630	677	841
	Distance	NM	42	44	46	51	72	45	47	49	54	78
	Time	MIN	8	8	9	9	13	9	9	9	10	14
32000	Fuel	LB	511	535	560	602	737	536	558	585	629	776
	Distance	NM	39	41	43	47	67	42	43	45	50	72
	Time	MIN	8	8	8	9	12	8	8	8	9	13
30000	Fuel	LB	474	495	519	557	680	497	517	542	582	715
	Distance	NM	36	38	39	44	61	38	40	42	47	66
	Time	MIN	7	7	7	8	11	7	8	8	8	12
FOR ANTI ICE ON, INCREASE (%):												
Fuel			25	25	30	70	0	25	25	30	80	0
Distance			25	25	35	110	0	25	25	35	125	0
Time			30	25	30	100	0	30	25	40	110	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 27000 AND 28000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			27000 ft ISA + °C					28000 ft ISA + °C				
			-17	-10	0	10	20	-16	-10	0	10	20
50000	Fuel	LB	1023	1060	1113	1212	1643	1071	1104	1160	1263	1722
	Distance	NM	82	85	90	101	160	88	90	95	107	171
	Time	MIN	15	16	16	18	27	16	17	17	19	29
48000	Fuel	LB	960	995	1044	1135	1514	1004	1035	1087	1181	1584
	Distance	NM	77	80	84	94	147	82	84	89	100	156
	Time	MIN	14	15	15	17	25	15	16	16	18	26
46000	Fuel	LB	901	933	979	1062	1398	941	970	1019	1105	1461
	Distance	NM	72	75	78	88	135	77	79	83	93	143
	Time	MIN	14	14	14	16	23	14	15	15	16	24
44000	Fuel	LB	845	875	918	994	1293	882	909	954	1033	1350
	Distance	NM	67	70	73	82	124	72	74	78	87	132
	Time	MIN	13	13	13	15	21	13	14	14	15	22
42000	Fuel	LB	791	820	860	930	1197	826	851	893	966	1248
	Distance	NM	63	65	69	77	114	67	69	73	81	121
	Time	MIN	12	12	13	14	20	13	13	13	14	21
40000	Fuel	LB	741	767	805	869	1108	773	796	835	902	1154
	Distance	NM	59	61	64	71	106	62	64	68	75	112
	Time	MIN	11	11	12	13	18	12	12	12	13	19
38000	Fuel	LB	692	717	752	811	1026	722	744	780	841	1067
	Distance	NM	55	57	60	67	97	58	60	63	70	103
	Time	MIN	10	11	11	12	17	11	11	11	12	18
36000	Fuel	LB	646	669	702	756	949	673	694	728	784	987
	Distance	NM	51	53	56	62	90	54	56	59	65	95
	Time	MIN	10	10	10	11	16	10	10	11	12	16
34000	Fuel	LB	602	623	653	703	877	627	646	677	729	911
	Distance	NM	48	49	52	57	83	50	52	55	61	87
	Time	MIN	9	9	9	10	14	9	10	10	11	15
32000	Fuel	LB	559	579	607	653	809	582	599	629	676	840
	Distance	NM	44	46	48	53	76	47	48	51	56	80
	Time	MIN	8	9	9	10	13	9	9	9	10	14
30000	Fuel	LB	518	536	562	604	744	539	555	582	625	773
	Distance	NM	41	42	44	49	70	43	44	47	52	74
	Time	MIN	8	8	8	9	12	8	8	9	9	13
FOR ANTI ICE ON, INCREASE (%):												
Fuel			25	25	30	85	0	25	25	35	90	0
Distance			25	25	35	135	0	25	30	40	145	0
Time			30	30	40	120	0	30	25	40	135	0

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AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 29000 AND 30000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			29000 ft ISA + °C					30000 ft ISA + °C				
			-15	-10	0	10	20	-14	-10	0	10	20
50000	Fuel	LB	1119	1148	1206	1313	1801	1167	1191	1252	1364	1879
	Distance	NM	93	96	101	113	182	99	101	107	120	193
	Time	MIN	17	17	18	20	30	18	18	19	21	32
48000	Fuel	LB	1048	1075	1129	1227	1654	1092	1115	1171	1273	1723
	Distance	NM	87	89	94	105	166	92	94	99	111	176
	Time	MIN	16	16	17	18	28	17	17	18	19	29
46000	Fuel	LB	982	1007	1058	1147	1523	1022	1043	1096	1189	1584
	Distance	NM	81	84	88	98	152	86	88	93	104	161
	Time	MIN	15	15	16	17	26	16	16	16	18	27
44000	Fuel	LB	919	943	990	1072	1405	956	976	1025	1110	1460
	Distance	NM	76	78	82	92	140	80	82	86	96	147
	Time	MIN	14	14	15	16	24	15	15	15	17	25
42000	Fuel	LB	860	882	926	1001	1298	894	912	958	1036	1347
	Distance	NM	71	73	77	85	128	75	77	81	90	135
	Time	MIN	13	13	14	15	22	14	14	14	16	23
40000	Fuel	LB	804	825	865	934	1199	836	852	895	967	1243
	Distance	NM	66	68	71	79	118	70	71	75	84	124
	Time	MIN	12	12	13	14	20	13	13	13	15	21
38000	Fuel	LB	751	770	808	871	1108	780	795	835	901	1148
	Distance	NM	62	63	67	74	109	65	66	70	78	114
	Time	MIN	11	12	12	13	19	12	12	13	14	19
36000	Fuel	LB	700	718	753	811	1024	727	741	778	838	1060
	Distance	NM	57	59	62	69	100	61	62	65	72	105
	Time	MIN	11	11	11	12	17	11	11	12	13	18
34000	Fuel	LB	651	668	701	754	945	676	689	723	779	977
	Distance	NM	53	55	58	64	92	56	57	60	67	97
	Time	MIN	10	10	10	11	16	10	11	11	12	16
32000	Fuel	LB	605	620	650	699	870	627	640	671	722	900
	Distance	NM	49	51	53	59	85	52	53	56	62	89
	Time	MIN	9	9	10	10	14	10	10	10	11	15
30000	Fuel	LB	560	574	602	646	800	580	592	621	667	827
	Distance	NM	46	47	49	54	78	48	49	52	57	81
	Time	MIN	9	9	9	10	13	9	9	9	10	14
FOR ANTI ICE ON, INCREASE (%):												
Fuel			25	25	35	95	0	25	25	35	100	0
Distance			25	25	40	155	0	30	30	45	155	0
Time			30	30	35	140	0	25	30	40	135	0

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AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 31000 AND 32000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			31000 ft ISA + °C					32000 ft ISA + °C				
			-13	-10	0	10	20	-12	-10	0	10	20
50000	Fuel	LB	1215	1233	1297	1415	1958	1262	1275	1340	1467	2039
	Distance	NM	105	106	112	126	204	110	112	118	133	216
	Time	MIN	19	19	20	22	34	20	20	21	23	36
48000	Fuel	LB	1136	1153	1212	1319	1792	1179	1191	1251	1367	1863
	Distance	NM	98	99	104	117	186	103	104	109	123	196
	Time	MIN	18	18	18	20	31	19	19	19	21	32
46000	Fuel	LB	1062	1078	1133	1231	1645	1102	1112	1169	1273	1708
	Distance	NM	91	92	97	109	169	96	97	102	115	179
	Time	MIN	17	17	17	19	28	17	17	18	20	30
44000	Fuel	LB	993	1008	1059	1148	1514	1029	1039	1092	1187	1569
	Distance	NM	85	86	91	101	155	89	90	95	106	163
	Time	MIN	15	16	16	18	26	16	16	17	18	27
42000	Fuel	LB	928	942	989	1071	1395	961	971	1020	1106	1444
	Distance	NM	79	80	85	94	142	83	84	88	99	150
	Time	MIN	14	15	15	16	24	15	15	16	17	25
40000	Fuel	LB	867	880	924	999	1287	897	906	951	1031	1331
	Distance	NM	74	75	79	88	131	77	78	82	92	137
	Time	MIN	13	14	14	15	22	14	14	15	16	23
38000	Fuel	LB	808	820	861	930	1187	837	845	887	959	1227
	Distance	NM	69	70	73	81	120	72	73	76	85	126
	Time	MIN	13	13	13	14	20	13	13	14	15	21
36000	Fuel	LB	753	764	802	865	1095	779	786	826	892	1130
	Distance	NM	64	65	68	76	110	67	67	71	79	116
	Time	MIN	12	12	12	13	19	12	12	13	14	19
34000	Fuel	LB	700	710	746	803	1009	724	731	767	828	1041
	Distance	NM	59	60	63	70	101	62	63	66	73	106
	Time	MIN	11	11	11	12	17	11	11	12	13	18
32000	Fuel	LB	649	659	691	744	929	671	678	711	766	958
	Distance	NM	55	56	58	65	93	57	58	61	68	97
	Time	MIN	10	10	10	11	16	10	11	11	12	16
30000	Fuel	LB	601	609	640	688	853	621	626	658	708	879
	Distance	NM	50	51	54	60	85	53	53	56	62	89
	Time	MIN	9	9	10	10	14	10	10	10	11	15
FOR ANTI ICE ON, INCREASE (%):												
	Fuel		25	30	40	105	0	30	30	40	105	0
	Distance		30	30	45	165	0	30	30	50	170	0
	Time		30	30	45	150	0	30	30	50	150	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 33000 AND 34000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			33000 ft ISA + °C					34000 ft ISA + °C				
			-10	-5	0	10	20	-9	-5	0	10	20
50000	Fuel	LB	1317	1350	1384	1521	2122	1362	1395	1431	1576	2207
	Distance	NM	117	120	123	140	229	123	126	129	148	242
	Time	MIN	21	21	22	24	38	22	22	23	25	40
48000	Fuel	LB	1228	1259	1291	1414	1934	1270	1300	1333	1463	2006
	Distance	NM	109	112	115	130	207	114	117	120	137	218
	Time	MIN	19	20	20	22	34	20	21	21	23	36
46000	Fuel	LB	1147	1176	1205	1316	1770	1184	1213	1243	1360	1832
	Distance	NM	101	104	107	120	188	106	109	112	127	198
	Time	MIN	18	18	19	21	31	19	19	19	22	33
44000	Fuel	LB	1071	1097	1125	1226	1624	1104	1131	1159	1265	1678
	Distance	NM	94	97	99	112	172	99	101	104	117	180
	Time	MIN	17	17	17	19	28	18	18	18	20	30
42000	Fuel	LB	999	1024	1050	1142	1493	1030	1055	1081	1177	1541
	Distance	NM	88	90	92	104	157	92	94	96	109	164
	Time	MIN	16	16	16	18	26	16	17	17	19	27
40000	Fuel	LB	932	955	979	1063	1374	960	983	1007	1095	1417
	Distance	NM	81	84	86	96	144	85	87	90	101	150
	Time	MIN	15	15	15	17	24	15	15	16	17	25
38000	Fuel	LB	869	890	912	988	1265	894	915	938	1018	1303
	Distance	NM	76	78	80	89	132	79	81	83	93	138
	Time	MIN	14	14	14	15	22	14	14	15	16	23
36000	Fuel	LB	808	828	849	918	1165	832	851	872	945	1199
	Distance	NM	70	72	74	83	121	73	75	77	86	126
	Time	MIN	13	13	13	14	20	13	13	14	15	21
34000	Fuel	LB	751	769	788	852	1072	772	790	810	876	1103
	Distance	NM	65	67	69	76	111	68	70	71	80	116
	Time	MIN	12	12	12	13	19	12	12	13	14	19
32000	Fuel	LB	696	713	731	789	986	715	732	750	811	1013
	Distance	NM	60	62	63	71	102	63	64	66	74	106
	Time	MIN	11	11	11	12	17	11	11	12	13	18
30000	Fuel	LB	643	659	675	728	904	661	677	693	748	929
	Distance	NM	56	57	58	65	93	58	59	61	68	97
	Time	MIN	10	10	10	11	16	10	11	11	12	16
FOR ANTI ICE ON, INCREASE (%):												
Fuel			30	35	45	110	0	35	35	45	110	0
Distance			35	40	60	170	0	40	45	60	175	0
Time			35	40	50	150	0	35	45	55	165	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 35000 AND 36000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			35000 ft ISA + °C					36000 ft ISA + °C				
			-8	-5	0	10	20	-7	-5	0	10	20
50000	Fuel	LB	1418	1444	1481	1633	2296	1477	1497	1535	1693	2392
	Distance	NM	130	133	136	156	256	138	140	144	165	271
	Time	MIN	23	23	24	26	42	24	24	25	28	44
48000	Fuel	LB	1319	1344	1378	1514	2082	1372	1390	1425	1566	2161
	Distance	NM	121	123	126	144	230	128	130	133	151	243
	Time	MIN	21	22	22	24	38	22	23	23	26	40
46000	Fuel	LB	1228	1251	1283	1405	1897	1275	1292	1325	1451	1964
	Distance	NM	112	114	117	133	208	118	120	123	140	219
	Time	MIN	20	20	20	23	34	21	21	21	24	36
44000	Fuel	LB	1145	1166	1195	1305	1734	1187	1202	1233	1346	1792
	Distance	NM	104	106	109	123	189	110	111	114	129	198
	Time	MIN	18	19	19	21	31	19	19	20	22	33
42000	Fuel	LB	1066	1086	1113	1213	1590	1104	1119	1147	1250	1640
	Distance	NM	96	98	101	114	172	102	103	106	119	180
	Time	MIN	17	17	18	19	28	18	18	18	20	30
40000	Fuel	LB	993	1012	1037	1127	1460	1027	1041	1067	1160	1504
	Distance	NM	89	91	94	105	157	94	95	98	110	164
	Time	MIN	16	16	16	18	26	17	17	17	19	27
38000	Fuel	LB	924	941	965	1047	1342	955	968	992	1077	1380
	Distance	NM	83	85	87	97	144	87	88	91	102	150
	Time	MIN	15	15	15	17	24	15	16	16	17	25
36000	Fuel	LB	859	875	897	972	1234	887	899	921	998	1268
	Distance	NM	77	78	80	90	132	81	82	84	94	137
	Time	MIN	14	14	14	15	22	14	14	15	16	23
34000	Fuel	LB	797	812	832	900	1134	823	834	854	924	1164
	Distance	NM	71	73	74	83	120	75	76	78	87	125
	Time	MIN	13	13	13	14	20	13	13	14	15	21
32000	Fuel	LB	738	752	770	832	1041	762	772	791	854	1068
	Distance	NM	66	67	69	77	110	69	70	72	80	115
	Time	MIN	12	12	12	13	18	12	12	13	14	19
30000	Fuel	LB	682	694	711	768	954	703	712	730	788	978
	Distance	NM	61	62	63	71	101	63	64	66	73	105
	Time	MIN	11	11	11	12	17	11	11	12	13	17
FOR ANTI ICE ON, INCREASE (%):												
	Fuel		35	35	45	115	0	35	35	45	120	0
	Distance		45	45	60	180	0	45	50	65	185	0
	Time		40	45	60	165	0	50	45	60	165	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 37000 AND 38000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			37000 ft ISA + °C					38000 ft ISA + °C				
			-8	-5	0	10	20	-8	-5	0	10	20
50000	Fuel	LB	1532	1558	1597	1762	-	1607	1634	1675	1852	-
	Distance	NM	147	149	153	175	-	159	161	165	190	-
	Time	MIN	26	26	26	29	-	28	28	28	32	-
48000	Fuel	LB	1419	1443	1479	1626	2256	1481	1506	1544	1699	-
	Distance	NM	135	137	141	160	259	145	147	151	172	-
	Time	MIN	24	24	24	27	42	25	26	26	29	-
46000	Fuel	LB	1316	1338	1372	1503	2042	1369	1392	1427	1565	2147
	Distance	NM	125	127	130	147	232	133	135	139	157	251
	Time	MIN	22	22	22	25	38	23	23	24	26	41
44000	Fuel	LB	1222	1243	1274	1392	1857	1268	1289	1322	1445	1941
	Distance	NM	115	117	120	136	209	122	124	127	144	224
	Time	MIN	20	20	21	23	34	21	22	22	24	36
42000	Fuel	LB	1136	1155	1184	1290	1696	1176	1195	1225	1336	1764
	Distance	NM	106	108	111	125	190	113	115	118	132	202
	Time	MIN	19	19	19	21	31	20	20	20	22	33
40000	Fuel	LB	1055	1073	1100	1196	1552	1090	1109	1136	1236	1609
	Distance	NM	98	100	103	115	172	104	106	108	122	183
	Time	MIN	17	18	18	20	28	18	18	19	21	30
38000	Fuel	LB	980	997	1021	1109	1422	1011	1028	1054	1144	1471
	Distance	NM	91	93	95	107	157	96	98	100	112	166
	Time	MIN	16	16	17	18	26	17	17	17	19	27
36000	Fuel	LB	909	925	948	1027	1305	937	953	976	1058	1347
	Distance	NM	84	86	88	98	143	89	90	92	103	151
	Time	MIN	15	15	15	17	24	16	16	16	18	25
34000	Fuel	LB	843	857	878	950	1197	867	882	904	978	1234
	Distance	NM	78	79	81	91	131	82	83	85	95	137
	Time	MIN	14	14	14	15	22	14	15	15	16	23
32000	Fuel	LB	779	792	812	877	1097	802	815	835	902	1129
	Distance	NM	72	73	75	83	119	75	76	78	87	125
	Time	MIN	13	13	13	14	20	13	13	14	15	21
30000	Fuel	LB	719	731	749	808	1004	739	751	770	831	1032
	Distance	NM	66	67	69	77	109	69	70	72	80	114
	Time	MIN	12	12	12	13	18	12	12	13	14	19
FOR ANTI ICE ON, INCREASE (%):												
Fuel			35	35	45	100	0	35	35	40	90	0
Distance			40	50	65	155	0	45	45	60	140	0
Time			40	50	60	145	0	40	45	60	130	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 39000 AND 40000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			39000 ft ISA + °C					40000 ft ISA + °C				
			-8	-5	0	10	20	-8	-5	0	10	20
	Fuel	LB	-	1732	1775	-	-	-	-	-	-	-
50000	Distance	NM	-	178	182	-	-	-	-	-	-	-
	Time	MIN	-	31	31	-	-	-	-	-	-	-
	Fuel	LB	1558	1584	1623	1794	-	-	-	-	-	-
48000	Distance	NM	158	160	164	188	-	-	-	-	-	-
	Time	MIN	27	28	28	31	-	-	-	-	-	-
	Fuel	LB	1432	1456	1492	1640	-	1510	1535	1573	-	-
46000	Distance	NM	143	146	149	170	-	157	159	163	-	-
	Time	MIN	25	25	26	28	-	27	27	28	-	-
	Fuel	LB	1320	1343	1376	1507	-	1383	1406	1441	1585	-
44000	Distance	NM	131	133	136	155	-	142	144	148	168	-
	Time	MIN	23	23	23	26	-	25	25	25	28	-
	Fuel	LB	1220	1241	1272	1389	1851	1272	1293	1325	1451	-
42000	Distance	NM	120	122	125	141	218	129	131	134	152	-
	Time	MIN	21	21	22	24	35	22	23	23	25	-
	Fuel	LB	1129	1148	1177	1281	1679	1173	1192	1222	1333	1770
40000	Distance	NM	110	112	115	129	196	118	120	123	139	214
	Time	MIN	19	20	20	22	32	21	21	21	23	35
	Fuel	LB	1045	1063	1089	1183	1529	1082	1100	1128	1227	1599
38000	Distance	NM	102	103	106	119	177	108	110	113	127	191
	Time	MIN	18	18	18	20	29	19	19	19	21	31
	Fuel	LB	967	983	1007	1093	1395	999	1016	1041	1130	1452
36000	Distance	NM	93	95	97	109	160	99	101	103	116	171
	Time	MIN	16	17	17	18	26	17	18	18	19	28
	Fuel	LB	894	909	931	1008	1275	922	937	961	1041	1322
34000	Distance	NM	86	87	90	100	145	91	92	95	106	155
	Time	MIN	15	15	16	17	24	16	16	16	18	25
	Fuel	LB	825	839	859	929	1165	850	864	885	958	1204
32000	Distance	NM	79	80	82	92	132	83	85	87	97	140
	Time	MIN	14	14	14	16	22	15	15	15	16	23
	Fuel	LB	760	772	791	854	1063	782	795	814	880	1097
30000	Distance	NM	72	74	76	84	120	76	78	80	89	127
	Time	MIN	13	13	13	14	20	13	14	14	15	21
FOR ANTI ICE ON, INCREASE (%):												
Fuel			35	35	45	0	0	35	35	40	0	0
Distance			45	50	65	0	0	45	55	60	0	0
Time			45	45	60	0	0	45	45	55	0	0

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CLIMB PLANNING - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: SEA LEVEL TO 41000 FT

SPEED SCHEDULE: 240 KIAS UP TO 8000 FT, INCREASING LINEARLY TO 270 KIAS AT 32000 FT, MAINTAINING 270 KIAS UP TO 25051 FT AND M = 0.65 ABOVE 25051 FT.

BLEED: OPEN
THRUST MODE: E CLB

WEIGHT (lb)			41000 ft ISA + °C				
			-8	-5	0	10	20
50000	Fuel	LB	-	-	-	-	-
	Distance	NM	-	-	-	-	-
	Time	MIN	-	-	-	-	-
48000	Fuel	LB	-	-	-	-	-
	Distance	NM	-	-	-	-	-
	Time	MIN	-	-	-	-	-
46000	Fuel	LB	-	-	-	-	-
	Distance	NM	-	-	-	-	-
	Time	MIN	-	-	-	-	-
44000	Fuel	LB	1464	1488	1525	-	-
	Distance	NM	157	159	163	-	-
	Time	MIN	27	27	28	-	-
42000	Fuel	LB	1335	1357	1391	1532	-
	Distance	NM	141	143	146	168	-
	Time	MIN	24	25	25	28	-
40000	Fuel	LB	1224	1244	1275	1397	-
	Distance	NM	127	129	133	151	-
	Time	MIN	22	22	23	25	-
38000	Fuel	LB	1125	1144	1172	1279	-
	Distance	NM	116	118	121	136	-
	Time	MIN	20	20	21	23	-
36000	Fuel	LB	1035	1053	1078	1173	1524
	Distance	NM	106	107	110	124	187
	Time	MIN	18	19	19	21	30
34000	Fuel	LB	953	969	993	1078	1378
	Distance	NM	97	98	101	113	167
	Time	MIN	17	17	17	19	27
32000	Fuel	LB	877	891	913	989	1250
	Distance	NM	88	90	92	103	150
	Time	MIN	15	16	16	17	24
30000	Fuel	LB	805	818	839	907	1135
	Distance	NM	81	82	84	94	135
	Time	MIN	14	14	14	16	22
FOR ANTI ICE ON, INCREASE (%):							
Fuel			35	35	40	0	0
Distance			45	50	65	0	0
Time			45	45	65	0	0

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CRUISE

MANEUVER CAPABILITY

NOTE: The recommended cruise altitude must ensure a maneuver load factor of 1.3 g before buffet onset.

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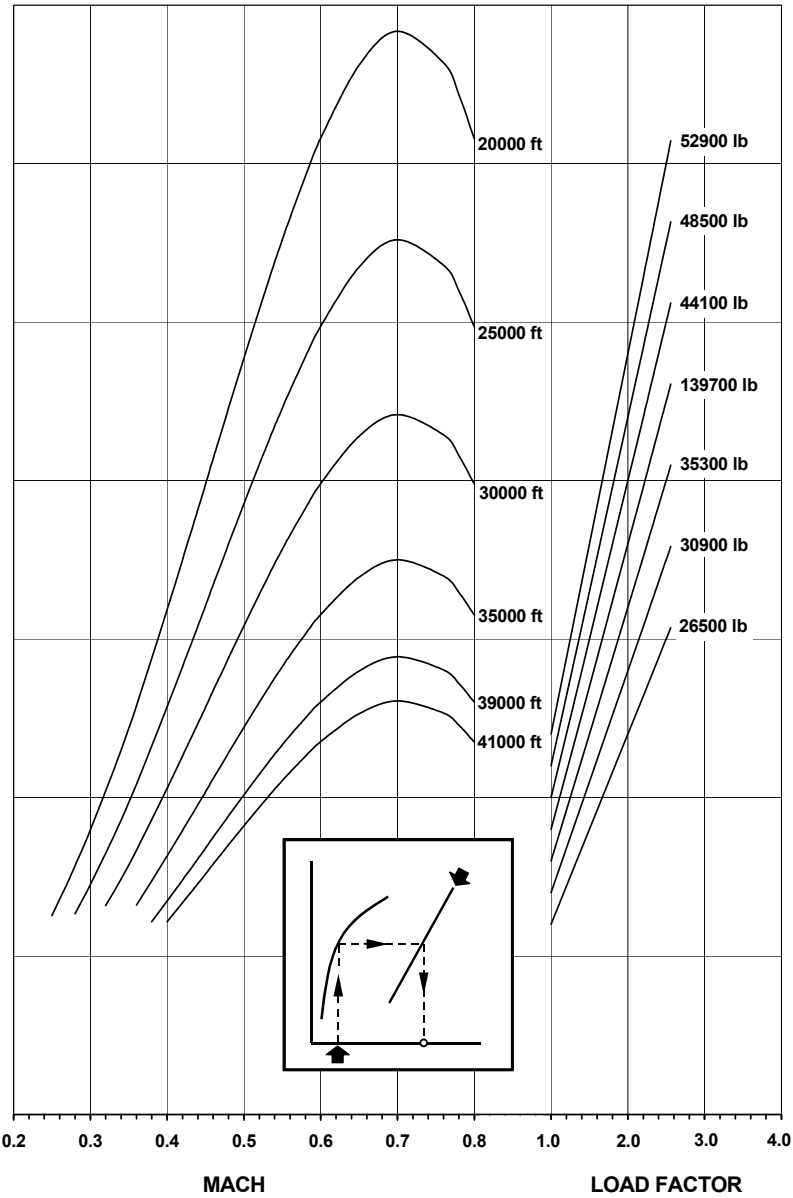

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CRUISE TABLES

The long range cruise and maximum speed cruise tables show N1, fuel flow, indicated airspeed, true airspeed, indicated Mach number, buffet margin and specific range. Data are presented for various weights and pressure altitudes.

In the long range cruise schedule, all engines operating or one engine inoperative, the airplane is flown at a speed corresponding to a specific range equal to 99% of maximum specific range. It is used when range is the principal factor.

In the maximum speed schedule, the airplane is flown in a speed resulting from maximum cruise power setting. It is used when minimum flight time is desired.

Thrust selection in cruise condition is adjusted to CRZ mode. The climb to cruise transition should be made as follows:

- After reaching the cruise level, allow the airplane to accelerate past 0.60 Mach, before selecting cruise mode.
- When in cruise mode, adjust thrust to keep N1 or cruise speed constant (whichever occurs first).

The associated conditions are:

- Flaps ..... 0°
- Gear ..... UP
- Bleeds ..... OPEN
- Anti-Ice ..... OFF

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LONG RANGE CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: 5000 FT TO 18000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	18000
50000	N1	%	64.8	69.7	70.2	70.7	71.2	71.8	72.4	72.9	73.5	74.2
	F FLOW	lb/h/ENG	1227	1242	1229	1217	1206	1196	1186	1178	1170	1162
	IAS	kt	250	260	259	257	256	256	255	254	253	252
	TAS	kt	268	300	303	306	310	313	317	320	324	328
	INDICATED MACH		0.413	0.470	0.476	0.483	0.490	0.498	0.506	0.514	0.522	0.530
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.55	2.51
	SR	NM/lb	0.109	0.121	0.123	0.126	0.128	0.131	0.133	0.136	0.139	0.141
48000	N1	%	64.4	68.9	69.4	69.9	70.4	71.0	71.5	72.1	72.7	73.3
	F FLOW	lb/h/ENG	1211	1202	1191	1180	1166	1155	1145	1136	1127	1119
	IAS	kt	250	256	255	254	252	251	250	249	248	248
	TAS	kt	268	295	298	302	305	308	311	315	319	323
	INDICATED MACH		0.413	0.462	0.469	0.476	0.483	0.490	0.497	0.505	0.513	0.521
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.54
	SR	NM/lb	0.111	0.123	0.125	0.128	0.131	0.133	0.136	0.139	0.141	0.144
46000	N1	%	64.0	68.1	68.6	69.1	69.6	70.2	70.7	71.3	71.8	72.4
	F FLOW	lb/h/ENG	1195	1161	1149	1137	1126	1116	1106	1097	1086	1077
	IAS	kt	250	251	250	249	248	247	246	245	244	243
	TAS	kt	268	290	293	296	300	303	307	310	313	317
	INDICATED MACH		0.413	0.454	0.461	0.468	0.475	0.482	0.490	0.497	0.504	0.512
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.112	0.125	0.128	0.130	0.133	0.136	0.139	0.141	0.144	0.147
44000	N1	%	63.6	67.2	67.7	68.3	68.8	69.3	69.8	70.4	71.0	71.5
	F FLOW	lb/h/ENG	1180	1122	1109	1097	1085	1074	1064	1055	1046	1037
	IAS	kt	250	247	246	245	244	243	242	241	240	239
	TAS	kt	268	285	288	291	294	298	301	305	308	312
	INDICATED MACH		0.413	0.447	0.453	0.459	0.466	0.473	0.480	0.488	0.496	0.503
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.114	0.127	0.130	0.133	0.136	0.138	0.141	0.144	0.147	0.150
42000	N1	%	63.4	66.3	66.9	67.4	67.9	68.4	68.9	69.5	70.0	70.6
	F FLOW	lb/h/ENG	1158	1085	1073	1058	1046	1034	1023	1013	1004	995
	IAS	kt	249	243	242	240	239	238	237	236	235	234
	TAS	kt	267	280	284	286	289	292	295	299	302	306
	INDICATED MACH		0.411	0.439	0.446	0.451	0.458	0.464	0.471	0.479	0.486	0.494
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.115	0.129	0.132	0.135	0.138	0.141	0.144	0.147	0.150	0.154

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 1.3% AND FUEL FLOW BY 4.0%.
DECREASE SR% BY 0.5%.

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LONG RANGE CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: 5000 FT TO 18000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	18000
40000	N1	%	62.4	65.3	65.9	66.4	67.0	67.5	68.0	68.5	69.1	69.6
	F FLOW	lb/h/ENG	1121	1045	1032	1020	1008	997	984	974	964	954
	IAS	kt	244	238	237	236	235	234	232	231	230	229
	TAS	kt	262	275	278	281	284	287	290	293	296	300
	INDICATED MACH		0.403	0.431	0.437	0.443	0.450	0.457	0.463	0.469	0.477	0.484
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.117	0.132	0.135	0.138	0.141	0.144	0.147	0.150	0.154	0.157
38000	N1	%	61.4	64.2	64.8	65.4	66.0	66.5	67.1	67.6	68.1	68.6
	F FLOW	lb/h/ENG	1084	1006	992	980	968	957	946	935	926	915
	IAS	kt	240	233	232	231	230	229	228	227	226	225
	TAS	kt	258	270	272	275	278	281	284	287	291	294
	INDICATED MACH		0.396	0.422	0.428	0.434	0.441	0.447	0.454	0.461	0.468	0.474
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.119	0.134	0.137	0.140	0.144	0.147	0.150	0.154	0.157	0.161
36000	N1	%	60.3	63.1	63.7	64.3	64.9	65.4	66.0	66.6	67.1	67.6
	F FLOW	lb/h/ENG	1045	968	954	941	929	917	906	896	885	876
	IAS	kt	235	229	227	226	225	224	223	222	221	220
	TAS	kt	253	264	267	269	272	275	278	281	284	288
	INDICATED MACH		0.388	0.414	0.420	0.425	0.431	0.438	0.444	0.451	0.458	0.465
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.121	0.137	0.140	0.143	0.147	0.150	0.154	0.157	0.161	0.164
34000	N1	%	59.2	62.0	62.6	63.1	63.7	64.3	64.9	65.4	66.0	66.6
	F FLOW	lb/h/ENG	1008	932	917	903	890	878	867	856	846	836
	IAS	kt	230	224	223	221	220	219	218	217	216	215
	TAS	kt	247	259	261	264	266	269	272	275	278	281
	INDICATED MACH		0.381	0.406	0.411	0.417	0.422	0.428	0.434	0.441	0.448	0.454
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.123	0.139	0.143	0.146	0.150	0.153	0.157	0.161	0.164	0.168
32000	N1	%	58.1	60.7	61.4	62.0	62.5	63.1	63.6	64.2	64.8	65.4
	F FLOW	lb/h/ENG	971	893	880	867	853	840	829	818	807	797
	IAS	kt	226	219	218	217	215	214	213	212	211	210
	TAS	kt	242	253	256	258	261	263	266	269	272	275
	INDICATED MACH		0.373	0.397	0.403	0.408	0.413	0.419	0.425	0.431	0.437	0.444
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.125	0.142	0.145	0.149	0.153	0.157	0.160	0.164	0.168	0.172

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.7% AND FUEL FLOW BY 1.0%.
DECREASE SR% BY 0.2%.

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LONG RANGE CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: 19000 FT TO 28000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)									
			19000	20000	21000	22000	23000	24000	25000	26000	27000	28000
	N1	%	74.9	75.6	76.3	77.0	77.8	78.6	79.4	80.1	80.7	81.4
	F FLOW	lb/h/ENG	1155	1149	1143	1138	1134	1130	1127	1124	1122	1121
	IAS	kt	251	250	250	249	248	247	247	246	245	245
50000	TAS	kt	332	336	341	345	349	354	359	363	368	373
	INDICATED MACH		0.539	0.548	0.557	0.566	0.576	0.586	0.596	0.606	0.617	0.628
	BUFFET MARGIN	G	2.46	2.42	2.37	2.33	2.28	2.23	2.18	2.12	2.07	2.01
	SR	NM/lb	0.144	0.146	0.149	0.152	0.154	0.157	0.159	0.162	0.164	0.167
	N1	%	73.9	74.6	75.3	76.1	76.8	77.6	78.3	79.2	79.9	80.5
	F FLOW	lb/h/ENG	1112	1105	1099	1094	1089	1085	1081	1078	1076	1074
	IAS	kt	247	246	245	244	244	243	242	241	241	240
48000	TAS	kt	327	331	335	339	343	348	352	357	362	367
	INDICATED MACH		0.529	0.538	0.547	0.556	0.566	0.576	0.585	0.596	0.606	0.617
	BUFFET MARGIN	G	2.50	2.46	2.41	2.37	2.32	2.27	2.22	2.17	2.12	2.06
	SR	NM/lb	0.147	0.150	0.152	0.155	0.158	0.160	0.163	0.166	0.168	0.171
	N1	%	73.0	73.7	74.3	75.0	75.8	76.5	77.3	78.1	78.9	79.6
	F FLOW	lb/h/ENG	1070	1062	1056	1050	1045	1040	1036	1034	1031	1030
	IAS	kt	242	241	241	240	239	238	238	237	236	236
46000	TAS	kt	321	325	329	333	337	342	346	351	356	361
	INDICATED MACH		0.520	0.529	0.537	0.546	0.556	0.565	0.575	0.586	0.596	0.607
	BUFFET MARGIN	G	2.54	2.50	2.45	2.41	2.36	2.32	2.27	2.22	2.17	2.11
	SR	NM/lb	0.150	0.153	0.156	0.159	0.161	0.164	0.167	0.170	0.173	0.175
	N1	%	72.1	72.7	73.4	74.1	74.8	75.5	76.3	77.0	77.8	78.6
	F FLOW	lb/h/ENG	1029	1022	1015	1009	1003	998	994	989	985	983
	IAS	kt	238	237	236	236	235	234	233	232	232	231
44000	TAS	kt	315	319	323	327	331	336	340	344	349	354
	INDICATED MACH		0.511	0.520	0.528	0.537	0.546	0.555	0.565	0.575	0.585	0.595
	BUFFET MARGIN	G	2.56	2.54	2.50	2.46	2.41	2.36	2.32	2.27	2.21	2.16
	SR	NM/lb	0.153	0.156	0.159	0.162	0.165	0.168	0.171	0.174	0.177	0.180
	N1	%	71.2	71.8	72.4	73.0	73.7	74.4	75.2	75.9	76.7	77.5
	F FLOW	lb/h/ENG	987	980	972	966	959	954	949	945	941	938
	IAS	kt	233	232	232	231	230	229	228	228	227	226
42000	TAS	kt	309	313	317	321	325	329	333	338	342	347
	INDICATED MACH		0.502	0.510	0.518	0.526	0.535	0.544	0.554	0.563	0.573	0.583
	BUFFET MARGIN	G	2.56	2.56	2.54	2.50	2.45	2.41	2.36	2.31	2.26	2.21
	SR	NM/lb	0.157	0.160	0.163	0.166	0.169	0.172	0.176	0.179	0.182	0.185

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 4 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.5% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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LONG RANGE CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: 19000 FT TO 28000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)									
			19000	20000	21000	22000	23000	24000	25000	26000	27000	28000
	N1	%	70.2	70.8	71.4	72.0	72.6	73.3	74.0	74.8	75.5	76.3
	F FLOW	lb/h/ENG	946	938	931	924	917	911	906	901	897	893
	IAS	kt	229	228	227	226	225	224	224	223	222	221
40000	TAS	kt	303	307	311	315	318	322	327	331	335	340
	INDICATED MACH		0.492	0.500	0.508	0.516	0.525	0.534	0.543	0.552	0.562	0.572
	BUFFET MARGIN	G	2.56	2.56	2.56	2.54	2.50	2.45	2.41	2.36	2.31	2.26
	SR	NM/lb	0.160	0.164	0.167	0.170	0.174	0.177	0.180	0.184	0.187	0.190
	N1	%	69.2	69.8	70.3	70.9	71.5	72.2	72.9	73.6	74.3	75.1
	F FLOW	lb/h/ENG	906	897	890	882	876	870	864	859	854	850
	IAS	kt	224	223	222	221	220	220	219	218	217	216
38000	TAS	kt	297	301	304	308	312	316	320	324	328	332
	INDICATED MACH		0.482	0.489	0.497	0.505	0.514	0.523	0.532	0.541	0.550	0.559
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.55	2.50	2.46	2.41	2.37	2.32
	SR	NM/lb	0.164	0.167	0.171	0.174	0.178	0.182	0.185	0.189	0.192	0.196
	N1	%	68.2	68.7	69.3	69.9	70.5	71.1	71.7	72.4	73.1	73.8
	F FLOW	lb/h/ENG	867	858	850	843	836	829	823	818	812	807
	IAS	kt	219	218	217	216	216	215	214	213	212	212
36000	TAS	kt	291	294	298	302	305	309	313	317	321	325
	INDICATED MACH		0.472	0.479	0.487	0.495	0.503	0.512	0.520	0.529	0.538	0.547
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.51	2.47	2.42	2.37
	SR	NM/lb	0.168	0.172	0.175	0.179	0.183	0.186	0.190	0.194	0.198	0.201
	N1	%	67.1	67.6	68.2	68.7	69.3	69.9	70.5	71.2	71.9	72.5
	F FLOW	lb/h/ENG	827	818	809	802	794	787	781	775	770	765
	IAS	kt	214	213	212	211	210	209	209	208	207	206
34000	TAS	kt	284	288	291	294	298	302	305	309	314	318
	INDICATED MACH		0.461	0.468	0.476	0.483	0.491	0.499	0.508	0.516	0.526	0.535
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.52	2.47	2.43
	SR	NM/lb	0.172	0.176	0.180	0.184	0.188	0.192	0.196	0.200	0.204	0.208
	N1	%	66.0	66.5	67.0	67.6	68.1	68.7	69.3	69.9	70.6	71.3
	F FLOW	lb/h/ENG	788	778	770	762	754	747	740	734	729	724
	IAS	kt	209	208	207	206	205	204	203	203	202	201
32000	TAS	kt	278	281	284	287	291	294	298	302	306	310
	INDICATED MACH		0.451	0.457	0.464	0.472	0.479	0.487	0.495	0.504	0.513	0.522
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.53	2.49
	SR	NM/lb	0.176	0.180	0.184	0.189	0.193	0.197	0.201	0.206	0.210	0.214

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.5% AND FUEL FLOW BY 0.1%.
DECREASE SR% BY 0.0%.

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LONG RANGE CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: 29000 FT TO 37000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			29000	30000	31000	32000	33000	34000	35000	36000	37000
50000	N1	%	82.0	82.7	83.4	84.1	84.8	85.5	86.4	87.5	89.2
	F FLOW	lb/h/ENG	1121	1121	1122	1124	1129	1131	1134	1135	1137
	IAS	kt	244	243	243	242	242	242	241	240	237
	TAS	kt	379	384	389	395	402	407	413	418	422
	INDICATED MACH		0.640	0.652	0.664	0.676	0.690	0.703	0.717	0.728	0.736
	BUFFET MARGIN	G	1.95	1.89	1.83	1.76	1.69	1.62	1.54	1.47	1.39
	SR	NM/lb	0.169	0.171	0.174	0.176	0.178	0.180	0.182	0.184	0.186
48000	N1	%	81.1	81.8	82.5	83.2	83.9	84.6	85.3	86.2	88.0
	F FLOW	lb/h/ENG	1074	1074	1074	1075	1078	1081	1084	1087	1089
	IAS	kt	240	239	238	238	237	237	236	236	234
	TAS	kt	372	378	383	388	394	400	406	412	417
	INDICATED MACH		0.629	0.641	0.652	0.665	0.678	0.691	0.704	0.718	0.727
	BUFFET MARGIN	G	2.00	1.94	1.88	1.82	1.75	1.68	1.61	1.53	1.46
	SR	NM/lb	0.173	0.176	0.178	0.181	0.183	0.185	0.187	0.189	0.191
46000	N1	%	80.2	80.9	81.6	82.2	83.0	83.7	84.4	85.1	86.8
	F FLOW	lb/h/ENG	1027	1028	1026	1026	1028	1032	1034	1036	1046
	IAS	kt	235	235	234	233	233	233	232	231	231
	TAS	kt	366	371	376	381	387	393	399	405	413
	INDICATED MACH		0.618	0.630	0.641	0.652	0.665	0.679	0.692	0.705	0.720
	BUFFET MARGIN	G	2.06	2.00	1.94	1.88	1.81	1.74	1.67	1.60	1.52
	SR	NM/lb	0.178	0.181	0.183	0.186	0.188	0.191	0.193	0.195	0.197
44000	N1	%	79.3	80.0	80.6	81.3	82.0	82.7	83.4	84.1	85.6
	F FLOW	lb/h/ENG	982	981	980	979	979	981	984	986	995
	IAS	kt	230	230	229	229	228	228	227	227	226
	TAS	kt	359	364	369	374	379	385	392	397	405
	INDICATED MACH		0.606	0.618	0.629	0.640	0.652	0.666	0.679	0.692	0.706
	BUFFET MARGIN	G	2.11	2.06	2.00	1.93	1.87	1.81	1.74	1.67	1.59
	SR	NM/lb	0.183	0.186	0.188	0.191	0.194	0.196	0.199	0.201	0.204
42000	N1	%	78.3	79.0	79.6	80.3	81.0	81.7	82.4	83.1	84.6
	F FLOW	lb/h/ENG	936	934	933	932	931	932	935	937	945
	IAS	kt	226	225	225	224	223	223	223	222	222
	TAS	kt	352	357	362	367	372	378	384	389	397
	INDICATED MACH		0.594	0.605	0.617	0.628	0.640	0.652	0.666	0.679	0.693
	BUFFET MARGIN	G	2.16	2.11	2.05	1.99	1.93	1.87	1.81	1.74	1.67
	SR	NM/lb	0.188	0.191	0.194	0.197	0.200	0.202	0.205	0.208	0.210

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 7 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.8% AND FUEL FLOW BY 0.4%.
DECREASE SR% BY 0.3%.

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LONG RANGE CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: 29000 FT TO 37000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			29000	30000	31000	32000	33000	34000	35000	36000	37000
40000	N1	%	77.1	77.9	78.7	79.3	79.9	80.6	81.3	82.0	83.5
	F FLOW	lb/h/ENG	890	888	888	886	885	884	886	887	894
	IAS	kt	221	220	220	219	218	218	217	217	217
	TAS	kt	344	349	355	359	364	370	375	381	389
	INDICATED MACH		0.582	0.593	0.605	0.615	0.627	0.639	0.652	0.664	0.678
	BUFFET MARGIN	G	2.21	2.16	2.11	2.05	1.99	1.93	1.87	1.81	1.74
	SR	NM/lb	0.193	0.197	0.200	0.203	0.206	0.209	0.212	0.215	0.217
38000	N1	%	75.8	76.6	77.5	78.2	78.8	79.5	80.2	81.0	82.4
	F FLOW	lb/h/ENG	846	843	842	841	838	838	839	841	844
	IAS	kt	216	215	215	214	213	213	212	212	211
	TAS	kt	337	342	347	352	356	362	367	374	380
	INDICATED MACH		0.569	0.580	0.591	0.603	0.613	0.625	0.638	0.651	0.663
	BUFFET MARGIN	G	2.27	2.22	2.17	2.12	2.06	2.00	1.94	1.88	1.81
	SR	NM/lb	0.199	0.203	0.206	0.209	0.213	0.216	0.219	0.222	0.225
36000	N1	%	74.6	75.4	76.2	77.0	77.8	78.4	79.1	79.8	81.2
	F FLOW	lb/h/ENG	803	799	797	796	794	791	791	792	797
	IAS	kt	211	210	209	209	208	208	207	207	206
	TAS	kt	329	334	339	344	349	353	359	364	372
	INDICATED MACH		0.557	0.567	0.577	0.589	0.600	0.611	0.623	0.636	0.648
	BUFFET MARGIN	G	2.32	2.27	2.22	2.17	2.12	2.06	2.00	1.94	1.88
	SR	NM/lb	0.205	0.209	0.212	0.216	0.220	0.223	0.227	0.230	0.233
34000	N1	%	73.3	74.0	74.8	75.6	76.5	77.2	77.9	78.6	80.0
	F FLOW	lb/h/ENG	761	756	753	752	750	746	745	745	748
	IAS	kt	206	205	204	204	203	202	202	201	201
	TAS	kt	322	326	331	336	341	345	350	355	362
	INDICATED MACH		0.544	0.554	0.564	0.575	0.587	0.596	0.608	0.620	0.632
	BUFFET MARGIN	G	2.38	2.33	2.28	2.24	2.19	2.13	2.07	2.01	1.95
	SR	NM/lb	0.212	0.216	0.219	0.223	0.227	0.231	0.235	0.239	0.242
32000	N1	%	71.9	72.7	73.4	74.2	75.0	75.8	76.6	77.3	78.7
	F FLOW	lb/h/ENG	719	715	710	707	706	702	700	699	701
	IAS	kt	200	200	199	198	198	197	196	196	195
	TAS	kt	314	318	322	327	332	336	341	346	353
	INDICATED MACH		0.531	0.541	0.550	0.560	0.572	0.582	0.593	0.604	0.616
	BUFFET MARGIN	G	2.44	2.39	2.34	2.30	2.25	2.19	2.14	2.08	2.02
	SR	NM/lb	0.218	0.223	0.227	0.231	0.235	0.239	0.244	0.248	0.251

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.5% AND FUEL FLOW BY 0.1%.
DECREASE SR% BY 0.0%.

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LONG RANGE CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: 38000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)			
			38000	39000	40000	41000
50000	N1	%	91.0	91.4	-	-
	F FLOW	lb/h/ENG	1134	1099	-	-
	IAS	kt	233	224	-	-
	TAS	kt	425	419	-	-
	INDICATED MACH		0.741	0.730	-	-
	BUFFET MARGIN	G	1.32	1.27	-	-
	SR	NM/lb	0.187	0.190	-	-
48000	N1	%	89.9	91.3	90.8	-
	F FLOW	lb/h/ENG	1095	1106	1030	-
	IAS	kt	232	230	213	-
	TAS	kt	423	428	408	-
	INDICATED MACH		0.738	0.747	0.712	-
	BUFFET MARGIN	G	1.38	1.31	1.26	-
	SR	NM/lb	0.193	0.194	0.198	-
46000	N1	%	88.6	90.6	90.6	-
	F FLOW	lb/h/ENG	1053	1054	1041	-
	IAS	kt	230	227	222	-
	TAS	kt	419	424	424	-
	INDICATED MACH		0.731	0.739	0.739	-
	BUFFET MARGIN	G	1.45	1.37	1.31	-
	SR	NM/lb	0.199	0.201	0.203	-
44000	N1	%	87.3	89.3	90.3	89.8
	F FLOW	lb/h/ENG	1003	1008	1012	974
	IAS	kt	226	224	222	212
	TAS	kt	413	419	424	415
	INDICATED MACH		0.720	0.730	0.740	0.723
	BUFFET MARGIN	G	1.52	1.44	1.37	1.31
	SR	NM/lb	0.206	0.208	0.210	0.213
42000	N1	%	86.1	87.8	88.9	89.6
	F FLOW	lb/h/ENG	952	960	963	982
	IAS	kt	221	220	218	218
	TAS	kt	405	412	418	427
	INDICATED MACH		0.706	0.719	0.728	0.744
	BUFFET MARGIN	G	1.59	1.52	1.44	1.36
	SR	NM/lb	0.213	0.215	0.217	0.217

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.7% AND FUEL FLOW BY 3.2%.
DECREASE SR% BY 0.9%.

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LONG RANGE CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

ALTITUDE: 38000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)			
			38000	39000	40000	41000
40000	N1	%	84.9	86.5	87.6	88.6
	F FLOW	lb/h/ENG	900	908	917	924
	IAS	kt	216	215	215	214
	TAS	kt	396	404	412	419
	INDICATED MACH		0.691	0.704	0.719	0.731
	BUFFET MARGIN	G	1.67	1.59	1.52	1.44
	SR	NM/lb	0.220	0.222	0.225	0.227
38000	N1	%	83.8	85.3	86.3	87.3
	F FLOW	lb/h/ENG	850	857	865	875
	IAS	kt	211	210	210	210
	TAS	kt	387	395	403	412
	INDICATED MACH		0.675	0.689	0.703	0.718
	BUFFET MARGIN	G	1.74	1.67	1.60	1.52
	SR	NM/lb	0.228	0.230	0.233	0.235
36000	N1	%	82.6	84.1	85.1	86.1
	F FLOW	lb/h/ENG	800	806	813	823
	IAS	kt	205	205	205	205
	TAS	kt	378	386	393	402
	INDICATED MACH		0.660	0.673	0.687	0.702
	BUFFET MARGIN	G	1.81	1.75	1.68	1.61
	SR	NM/lb	0.236	0.239	0.242	0.244
34000	N1	%	81.4	82.9	83.9	84.9
	F FLOW	lb/h/ENG	752	757	763	770
	IAS	kt	200	200	199	199
	TAS	kt	369	376	384	392
	INDICATED MACH		0.644	0.657	0.670	0.684
	BUFFET MARGIN	G	1.89	1.83	1.76	1.69
	SR	NM/lb	0.245	0.248	0.251	0.254
32000	N1	%	80.1	81.6	82.6	83.6
	F FLOW	lb/h/ENG	705	709	714	719
	IAS	kt	195	194	194	193
	TAS	kt	360	366	374	381
	INDICATED MACH		0.628	0.640	0.653	0.666
	BUFFET MARGIN	G	1.97	1.90	1.84	1.78
	SR	NM/lb	0.255	0.259	0.262	0.265

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 6 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.6% AND FUEL FLOW BY 0.2%.
DECREASE SR% BY 0.1%.

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MAXIMUM SPEED CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 5000 FT TO 18000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	18000
50000	N1	%	64.8	75.9	76.6	77.3	78.0	78.8	79.5	80.3	81.1	81.9
	F FLOW	lb/h/ENG	1227	1674	1669	1666	1663	1660	1659	1658	1657	1658
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.109	0.110	0.112	0.114	0.116	0.117	0.119	0.121	0.123	0.125
48000	N1	%	64.4	75.7	76.4	77.1	77.8	78.5	79.3	80.0	80.8	81.7
	F FLOW	lb/h/ENG	1211	1662	1657	1653	1650	1648	1646	1645	1644	1645
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.111	0.111	0.113	0.114	0.116	0.118	0.120	0.122	0.124	0.126
46000	N1	%	64.0	75.5	76.2	76.9	77.6	78.3	79.1	79.8	80.6	81.5
	F FLOW	lb/h/ENG	1195	1650	1646	1642	1638	1636	1634	1632	1632	1632
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.112	0.111	0.113	0.115	0.117	0.119	0.121	0.123	0.125	0.127
44000	N1	%	63.6	75.3	76.0	76.7	77.4	78.1	78.9	79.6	80.4	81.2
	F FLOW	lb/h/ENG	1180	1639	1635	1630	1627	1624	1622	1620	1620	1620
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.114	0.112	0.114	0.116	0.118	0.120	0.122	0.124	0.126	0.128
42000	N1	%	63.2	75.2	75.8	76.5	77.2	77.9	78.7	79.4	80.2	81.0
	F FLOW	lb/h/ENG	1166	1629	1624	1620	1616	1613	1611	1609	1608	1608
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.115	0.113	0.115	0.117	0.119	0.121	0.123	0.125	0.127	0.128

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 4 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 1.3% AND FUEL FLOW BY 5.7%.
DECREASE SR% BY 2.7%.

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MAXIMUM SPEED CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 5000 FT TO 18000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	18000
40000	N1	%	62.8	75.0	75.7	76.4	77.0	77.7	78.5	79.2	80.0	80.8
	F FLOW	lb/h/ENG	1153	1619	1614	1610	1606	1603	1600	1598	1597	1597
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.116	0.114	0.116	0.118	0.120	0.122	0.124	0.125	0.127	0.129
38000	N1	%	62.4	74.9	75.5	76.2	76.9	77.6	78.3	79.0	79.8	80.6
	F FLOW	lb/h/ENG	1140	1610	1605	1600	1596	1593	1590	1588	1587	1586
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.118	0.114	0.116	0.118	0.120	0.122	0.124	0.126	0.128	0.130
36000	N1	%	62.1	74.7	75.3	76.0	76.7	77.4	78.1	78.9	79.6	80.4
	F FLOW	lb/h/ENG	1128	1601	1596	1591	1587	1583	1581	1579	1577	1576
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.119	0.115	0.117	0.119	0.121	0.123	0.125	0.127	0.129	0.131
34000	N1	%	61.8	74.6	75.2	75.9	76.6	77.2	78.0	78.7	79.4	80.2
	F FLOW	lb/h/ENG	1117	1592	1587	1582	1578	1575	1572	1569	1568	1567
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.120	0.116	0.118	0.120	0.122	0.124	0.126	0.128	0.130	0.132
32000	N1	%	61.5	74.5	75.1	75.7	76.4	77.1	77.8	78.5	79.3	80.1
	F FLOW	lb/h/ENG	1106	1584	1579	1574	1570	1566	1563	1561	1559	1558
	IAS	kt	250	320	320	320	320	320	320	320	320	320
	TAS	kt	268	368	373	379	384	390	395	401	407	413
	INDICATED MACH		0.413	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655	0.667
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.121	0.116	0.118	0.120	0.122	0.124	0.126	0.129	0.131	0.133

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 4 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 1.4% AND FUEL FLOW BY 6.0%.
DECREASE SR% BY 3.0%.

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MAXIMUM SPEED CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 19000 FT TO 28000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)									
			19000	20000	21000	22000	23000	24000	25000	26000	27000	28000
50000	N1	%	82.6	83.3	84.0	84.7	85.3	86.0	86.9	87.8	87.8	87.7
	F FLOW	lb/h/ENG	1659	1661	1664	1667	1672	1690	1713	1733	1679	1623
	IAS	kt	320	320	320	320	320	320	320	318	312	305
	TAS	kt	419	425	432	438	445	451	458	462	461	459
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.771	0.772	0.772
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.50	2.36	2.23	2.13	2.04
	SR	NM/lb	0.126	0.128	0.130	0.131	0.133	0.134	0.134	0.133	0.137	0.141
48000	N1	%	82.4	83.1	83.8	84.5	85.1	85.8	86.7	87.8	87.7	87.7
	F FLOW	lb/h/ENG	1646	1647	1650	1653	1657	1675	1698	1734	1680	1624
	IAS	kt	320	320	320	320	320	320	320	319	313	306
	TAS	kt	419	425	432	438	445	451	458	464	463	460
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.774	0.775	0.774
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.46	2.31	2.21	2.11
	SR	NM/lb	0.127	0.129	0.131	0.133	0.134	0.135	0.135	0.134	0.138	0.142
46000	N1	%	82.2	82.9	83.6	84.3	84.9	85.6	86.5	87.6	87.7	87.7
	F FLOW	lb/h/ENG	1633	1634	1636	1639	1643	1661	1683	1727	1681	1625
	IAS	kt	320	320	320	320	320	320	320	320	314	307
	TAS	kt	419	425	432	438	445	451	458	465	464	462
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776	0.777	0.777
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.40	2.29	2.19
	SR	NM/lb	0.128	0.130	0.132	0.134	0.135	0.136	0.136	0.135	0.138	0.142
44000	N1	%	82.0	82.7	83.4	84.1	84.7	85.5	86.3	87.4	87.7	87.7
	F FLOW	lb/h/ENG	1620	1621	1624	1626	1630	1647	1669	1712	1682	1626
	IAS	kt	320	320	320	320	320	320	320	320	315	308
	TAS	kt	419	425	432	438	445	451	458	465	466	463
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776	0.780	0.779
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.51	2.38	2.28
	SR	NM/lb	0.129	0.131	0.133	0.135	0.136	0.137	0.137	0.136	0.138	0.142
42000	N1	%	81.9	82.5	83.2	83.9	84.5	85.3	86.1	87.2	87.7	87.7
	F FLOW	lb/h/ENG	1608	1609	1611	1614	1617	1635	1656	1698	1682	1627
	IAS	kt	320	320	320	320	320	320	320	320	315	309
	TAS	kt	419	425	432	438	445	451	458	465	466	465
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776	0.780	0.782
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.50	2.38
	SR	NM/lb	0.130	0.132	0.134	0.136	0.137	0.138	0.138	0.137	0.138	0.143

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 1.9% AND FUEL FLOW BY 8.9%.
DECREASE SR% BY 7.0%.

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MAXIMUM SPEED CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 19000 FT TO 28000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)									
			19000	20000	21000	22000	23000	24000	25000	26000	27000	28000
40000	N1	%	81.7	82.4	83.0	83.7	84.4	85.1	85.9	87.0	87.7	87.7
	F FLOW	lb/h/ENG	1597	1598	1600	1602	1605	1622	1643	1685	1683	1627
	IAS	kt	320	320	320	320	320	320	320	320	316	309
	TAS	kt	419	425	432	438	445	451	458	465	467	465
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776	0.782	0.782
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.50
	SR	NM/lb	0.131	0.133	0.135	0.137	0.139	0.139	0.139	0.138	0.139	0.143
38000	N1	%	81.5	82.2	82.8	83.5	84.2	85.0	85.8	86.9	87.7	87.7
	F FLOW	lb/h/ENG	1586	1587	1589	1591	1594	1610	1631	1672	1684	1628
	IAS	kt	320	320	320	320	320	320	320	320	317	311
	TAS	kt	419	425	432	438	445	451	458	465	469	466
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776	0.785	0.785
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.132	0.134	0.136	0.138	0.140	0.140	0.140	0.139	0.139	0.143
36000	N1	%	81.3	82.0	82.7	83.4	84.1	84.8	85.6	86.7	87.7	87.6
	F FLOW	lb/h/ENG	1576	1577	1578	1580	1583	1599	1620	1660	1684	1629
	IAS	kt	320	320	320	320	320	320	320	320	317	312
	TAS	kt	419	425	432	438	445	451	458	465	469	468
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776	0.785	0.787
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.133	0.135	0.137	0.139	0.140	0.141	0.141	0.140	0.139	0.144
34000	N1	%	81.1	81.9	82.5	83.2	83.9	84.7	85.5	86.6	87.7	87.6
	F FLOW	lb/h/ENG	1567	1567	1568	1570	1573	1589	1609	1649	1685	1629
	IAS	kt	320	320	320	320	320	320	320	320	318	312
	TAS	kt	419	425	432	438	445	451	458	465	470	468
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776	0.787	0.787
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.134	0.136	0.138	0.140	0.141	0.142	0.142	0.141	0.139	0.144
32000	N1	%	80.9	81.7	82.4	83.1	83.8	84.5	85.3	86.4	87.7	87.6
	F FLOW	lb/h/ENG	1558	1558	1559	1561	1563	1579	1599	1639	1685	1630
	IAS	kt	320	320	320	320	320	320	320	320	318	313
	TAS	kt	419	425	432	438	445	451	458	465	470	469
	INDICATED MACH		0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776	0.787	0.790
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.135	0.137	0.138	0.140	0.142	0.143	0.143	0.142	0.139	0.144

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 1.5% AND FUEL FLOW BY 6.7%.
DECREASE SR% BY 5.0%.

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MAXIMUM SPEED CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 29000 FT TO 37000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			29000	30000	31000	32000	33000	34000	35000	36000	37000
50000	N1	%	87.7	87.7	88.1	88.5	89.1	89.6	90.2	90.9	91.0
	F FLOW	lb/h/ENG	1568	1514	1480	1447	1420	1394	1371	1348	1263
	IAS	kt	298	292	286	281	275	270	265	260	251
	TAS	kt	456	454	453	453	452	451	451	450	444
	INDICATED MACH		0.771	0.770	0.772	0.775	0.777	0.779	0.782	0.784	0.775
	BUFFET MARGIN	G	1.95	1.86	1.77	1.69	1.61	1.52	1.45	1.37	1.33
	SR	NM/lb	0.146	0.150	0.153	0.156	0.159	0.162	0.164	0.167	0.176
48000	N1	%	87.7	87.7	88.1	88.5	89.0	89.6	90.2	90.8	91.0
	F FLOW	lb/h/ENG	1569	1515	1483	1449	1425	1399	1376	1350	1268
	IAS	kt	299	293	288	282	278	272	267	261	253
	TAS	kt	458	456	456	454	455	455	454	452	448
	INDICATED MACH		0.774	0.773	0.778	0.777	0.783	0.785	0.788	0.788	0.781
	BUFFET MARGIN	G	2.02	1.93	1.83	1.75	1.65	1.57	1.49	1.42	1.37
	SR	NM/lb	0.146	0.150	0.154	0.157	0.160	0.162	0.165	0.167	0.177
46000	N1	%	87.7	87.7	88.1	88.5	89.0	89.5	90.2	90.8	91.0
	F FLOW	lb/h/ENG	1570	1517	1484	1453	1427	1402	1379	1356	1270
	IAS	kt	300	295	289	284	279	274	269	263	254
	TAS	kt	459	459	458	457	457	456	456	455	450
	INDICATED MACH		0.776	0.778	0.781	0.783	0.786	0.788	0.791	0.794	0.784
	BUFFET MARGIN	G	2.10	2.00	1.90	1.81	1.72	1.63	1.54	1.46	1.42
	SR	NM/lb	0.146	0.151	0.154	0.157	0.160	0.163	0.165	0.168	0.177
44000	N1	%	87.7	87.7	88.0	88.5	89.0	89.5	90.1	90.8	90.9
	F FLOW	lb/h/ENG	1571	1517	1486	1455	1429	1405	1381	1358	1272
	IAS	kt	302	295	291	285	280	275	270	265	255
	TAS	kt	461	459	460	459	459	458	458	457	452
	INDICATED MACH		0.779	0.778	0.783	0.786	0.788	0.791	0.794	0.797	0.787
	BUFFET MARGIN	G	2.18	2.09	1.98	1.88	1.78	1.69	1.60	1.52	1.48
	SR	NM/lb	0.147	0.151	0.155	0.158	0.160	0.163	0.166	0.168	0.177
42000	N1	%	87.7	87.6	88.0	88.5	89.0	89.5	90.1	90.8	90.9
	F FLOW	lb/h/ENG	1572	1518	1486	1457	1432	1407	1384	1359	1277
	IAS	kt	303	296	291	286	281	276	271	266	257
	TAS	kt	463	460	460	461	460	460	459	459	455
	INDICATED MACH		0.782	0.781	0.783	0.789	0.791	0.794	0.797	0.800	0.794
	BUFFET MARGIN	G	2.28	2.18	2.07	1.96	1.86	1.76	1.67	1.58	1.53
	SR	NM/lb	0.147	0.152	0.155	0.158	0.161	0.163	0.166	0.169	0.178

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 10 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 2.8% AND FUEL FLOW BY 10.1%.
DECREASE SR% BY 8.5%.

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MAXIMUM SPEED CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 29000 FT TO 37000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			29000	30000	31000	32000	33000	34000	35000	36000	37000
40000	N1	%	87.6	87.6	88.0	88.5	89.0	89.5	90.1	90.3	90.8
	F FLOW	lb/h/ENG	1573	1519	1487	1457	1434	1410	1384	1338	1280
	IAS	kt	304	297	292	286	282	277	272	266	259
	TAS	kt	464	462	461	461	462	462	461	459	457
	INDICATED MACH		0.784	0.784	0.786	0.789	0.794	0.797	0.800	0.800	0.797
	BUFFET MARGIN	G	2.38	2.27	2.16	2.05	1.94	1.83	1.74	1.66	1.59
	SR	NM/lb	0.147	0.152	0.155	0.158	0.161	0.164	0.167	0.172	0.179
38000	N1	%	87.6	87.6	88.0	88.4	89.0	89.5	89.6	89.8	90.8
	F FLOW	lb/h/ENG	1573	1520	1489	1459	1434	1410	1364	1317	1279
	IAS	kt	304	298	293	287	282	277	272	266	260
	TAS	kt	464	464	463	462	462	462	461	459	459
	INDICATED MACH		0.784	0.787	0.789	0.792	0.794	0.797	0.800	0.800	0.800
	BUFFET MARGIN	G	2.50	2.38	2.26	2.15	2.04	1.93	1.83	1.74	1.66
	SR	NM/lb	0.147	0.152	0.155	0.159	0.161	0.164	0.169	0.174	0.179
36000	N1	%	87.6	87.6	88.0	88.4	88.9	89.1	89.2	89.3	90.3
	F FLOW	lb/h/ENG	1574	1520	1490	1461	1436	1397	1346	1297	1258
	IAS	kt	305	298	294	289	283	278	272	266	260
	TAS	kt	466	464	465	464	464	463	461	459	459
	INDICATED MACH		0.787	0.787	0.792	0.794	0.797	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	2.56	2.51	2.37	2.25	2.14	2.02	1.93	1.84	1.75
	SR	NM/lb	0.148	0.152	0.156	0.159	0.161	0.166	0.171	0.177	0.182
34000	N1	%	87.6	87.6	88.0	88.4	88.8	88.8	88.8	88.8	89.8
	F FLOW	lb/h/ENG	1575	1521	1490	1460	1434	1380	1328	1279	1239
	IAS	kt	306	299	294	289	284	278	272	266	260
	TAS	kt	467	465	465	464	465	463	461	459	459
	INDICATED MACH		0.789	0.789	0.792	0.794	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	2.56	2.56	2.51	2.39	2.24	2.14	2.04	1.95	1.86
	SR	NM/lb	0.148	0.153	0.156	0.159	0.162	0.168	0.174	0.179	0.185
32000	N1	%	87.6	87.6	88.0	88.4	88.5	88.5	88.4	88.4	89.3
	F FLOW	lb/h/ENG	1575	1522	1491	1462	1419	1364	1311	1261	1220
	IAS	kt	306	301	295	290	284	278	272	266	260
	TAS	kt	467	467	466	466	465	463	461	459	459
	INDICATED MACH		0.789	0.792	0.794	0.797	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	2.56	2.56	2.56	2.52	2.39	2.28	2.17	2.07	1.97
	SR	NM/lb	0.148	0.153	0.156	0.159	0.164	0.170	0.176	0.182	0.188

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 6 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 3.3% AND FUEL FLOW BY 10.5%.
DECREASE SR% BY 9.1%.

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MAXIMUM SPEED CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 38000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)			
			38000	39000	40000	41000
50000	N1	%	91.2	91.4	-	-
	F FLOW	lb/h/ENG	1178	1099	-	-
	IAS	kt	239	224	-	-
	TAS	kt	435	419	-	-
	INDICATED MACH		0.758	0.730	-	-
	BUFFET MARGIN	G	1.30	1.27	-	-
	SR	NM/lb	0.184	0.190	-	-
48000	N1	%	91.1	91.3	90.8	-
	F FLOW	lb/h/ENG	1183	1106	1030	-
	IAS	kt	242	230	213	-
	TAS	kt	440	428	408	-
	INDICATED MACH		0.767	0.747	0.712	-
	BUFFET MARGIN	G	1.34	1.31	1.26	-
	SR	NM/lb	0.186	0.194	0.198	-
46000	N1	%	91.1	91.2	90.6	-
	F FLOW	lb/h/ENG	1187	1112	1041	-
	IAS	kt	245	234	222	-
	TAS	kt	444	436	424	-
	INDICATED MACH		0.774	0.760	0.739	-
	BUFFET MARGIN	G	1.38	1.34	1.31	-
	SR	NM/lb	0.187	0.196	0.203	-
44000	N1	%	91.0	91.1	90.5	89.8
	F FLOW	lb/h/ENG	1191	1115	1047	974
	IAS	kt	247	236	226	212
	TAS	kt	448	440	431	415
	INDICATED MACH		0.780	0.767	0.752	0.723
	BUFFET MARGIN	G	1.43	1.39	1.35	1.31
	SR	NM/lb	0.188	0.197	0.206	0.213
42000	N1	%	91.0	91.0	90.3	89.6
	F FLOW	lb/h/ENG	1193	1120	1050	982
	IAS	kt	248	240	230	218
	TAS	kt	450	445	437	427
	INDICATED MACH		0.784	0.777	0.762	0.744
	BUFFET MARGIN	G	1.49	1.44	1.40	1.36
	SR	NM/lb	0.188	0.199	0.208	0.217

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 8 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 1.6% AND FUEL FLOW BY 5.6%.
DECREASE SR% BY 4.1%.

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MAXIMUM SPEED CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 38000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)			
			38000	39000	40000	41000
40000	N1	%	90.9	91.0	90.3	89.5
	F FLOW	lb/h/ENG	1197	1122	1053	987
	IAS	kt	250	241	232	223
	TAS	kt	453	447	441	435
	INDICATED MACH		0.790	0.780	0.769	0.758
	BUFFET MARGIN	G	1.54	1.50	1.45	1.41
	SR	NM/lb	0.189	0.199	0.210	0.220
38000	N1	%	90.8	90.9	90.2	89.4
	F FLOW	lb/h/ENG	1200	1125	1056	989
	IAS	kt	251	243	234	225
	TAS	kt	455	451	445	439
	INDICATED MACH		0.793	0.787	0.776	0.765
	BUFFET MARGIN	G	1.61	1.56	1.51	1.47
	SR	NM/lb	0.190	0.200	0.211	0.222
36000	N1	%	90.8	90.9	90.1	89.3
	F FLOW	lb/h/ENG	1202	1128	1059	991
	IAS	kt	253	244	236	227
	TAS	kt	457	453	449	443
	INDICATED MACH		0.797	0.790	0.783	0.772
	BUFFET MARGIN	G	1.68	1.63	1.58	1.53
	SR	NM/lb	0.190	0.201	0.212	0.223
34000	N1	%	90.8	90.9	90.1	89.3
	F FLOW	lb/h/ENG	1200	1130	1060	994
	IAS	kt	254	246	238	230
	TAS	kt	459	455	451	447
	INDICATED MACH		0.800	0.793	0.786	0.779
	BUFFET MARGIN	G	1.77	1.71	1.66	1.60
	SR	NM/lb	0.191	0.201	0.213	0.225
32000	N1	%	90.3	90.8	90.1	89.2
	F FLOW	lb/h/ENG	1183	1132	1062	995
	IAS	kt	254	247	239	231
	TAS	kt	459	457	453	449
	INDICATED MACH		0.800	0.797	0.790	0.783
	BUFFET MARGIN	G	1.88	1.81	1.75	1.69
	SR	NM/lb	0.194	0.202	0.213	0.226

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 10 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 2.9% AND FUEL FLOW BY 9.3%.
DECREASE SR% BY 7.9%.

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MACH 0.70 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
50000	N1	%	83.8	83.8	83.9	84.1	84.3	84.5	84.7	85.0	85.3
	F FLOW	lb/h/ENG	1350	1311	1274	1239	1207	1177	1149	1124	1102
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.23	2.13	2.04	1.95	1.86	1.78	1.70	1.62	1.54
	SR	NM/lb	0.155	0.159	0.163	0.166	0.170	0.174	0.177	0.180	0.183
48000	N1	%	83.5	83.5	83.6	83.7	83.8	84.0	84.2	84.5	84.8
	F FLOW	lb/h/ENG	1332	1292	1254	1218	1185	1154	1125	1099	1075
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.32	2.22	2.12	2.03	1.94	1.85	1.77	1.69	1.61
	SR	NM/lb	0.157	0.161	0.165	0.169	0.173	0.177	0.181	0.184	0.188
46000	N1	%	83.2	83.2	83.2	83.3	83.4	83.6	83.8	84.0	84.2
	F FLOW	lb/h/ENG	1315	1273	1234	1198	1164	1132	1102	1074	1049
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.42	2.32	2.21	2.12	2.02	1.93	1.84	1.76	1.68
	SR	NM/lb	0.159	0.163	0.168	0.172	0.177	0.181	0.185	0.189	0.192
44000	N1	%	82.9	82.9	82.9	83.0	83.0	83.1	83.3	83.5	83.7
	F FLOW	lb/h/ENG	1298	1256	1216	1179	1143	1110	1080	1051	1025
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.53	2.42	2.32	2.21	2.11	2.02	1.93	1.84	1.75
	SR	NM/lb	0.161	0.166	0.170	0.175	0.180	0.184	0.189	0.193	0.197
42000	N1	%	82.6	82.6	82.6	82.6	82.7	82.7	82.9	83.0	83.2
	F FLOW	lb/h/ENG	1282	1239	1199	1161	1124	1090	1059	1029	1001
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.56	2.54	2.43	2.32	2.21	2.11	2.02	1.93	1.84
	SR	NM/lb	0.163	0.168	0.173	0.178	0.183	0.188	0.192	0.197	0.201

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.70 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
40000	N1	%	82.3	82.3	82.3	82.3	82.3	82.4	82.4	82.5	82.7
	F FLOW	lb/h/ENG	1267	1223	1182	1143	1106	1071	1039	1008	979
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.56	2.56	2.55	2.43	2.32	2.22	2.12	2.02	1.93
	SR	NM/lb	0.165	0.170	0.175	0.180	0.186	0.191	0.196	0.201	0.206
38000	N1	%	82.1	82.0	82.0	82.0	82.0	82.0	82.0	82.1	82.2
	F FLOW	lb/h/ENG	1252	1208	1167	1127	1089	1053	1020	988	959
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.45	2.34	2.23	2.13	2.03
	SR	NM/lb	0.167	0.172	0.178	0.183	0.189	0.194	0.200	0.205	0.210
36000	N1	%	81.8	81.7	81.7	81.7	81.7	81.6	81.6	81.7	81.7
	F FLOW	lb/h/ENG	1239	1194	1152	1111	1073	1036	1002	970	939
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.47	2.35	2.25	2.14
	SR	NM/lb	0.169	0.174	0.180	0.186	0.191	0.197	0.203	0.209	0.215
34000	N1	%	81.5	81.5	81.4	81.4	81.4	81.3	81.3	81.3	81.3
	F FLOW	lb/h/ENG	1226	1181	1138	1097	1058	1020	985	952	921
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.49	2.38	2.27
	SR	NM/lb	0.170	0.176	0.182	0.188	0.194	0.200	0.207	0.213	0.219
32000	N1	%	81.3	81.2	81.1	81.1	81.0	81.0	80.9	80.9	80.9
	F FLOW	lb/h/ENG	1214	1168	1125	1083	1043	1005	970	936	903
	IAS	kt	280	274	269	263	257	251	246	240	235
	TAS	kt	418	416	414	413	411	409	407	405	404
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.53	2.41
	SR	NM/lb	0.172	0.178	0.184	0.190	0.197	0.203	0.210	0.217	0.223

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.70 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)					
			36000	37000	38000	39000	40000	41000
50000	N1	%	85.8	87.4	89.0	91.0	-	-
	F FLOW	lb/h/ENG	1082	1070	1061	1055	-	-
	IAS	kt	230	224	219	214	-	-
	TAS	kt	402	401	401	401	-	-
	INDICATED MACH		0.700	0.700	0.700	0.700	-	-
	BUFFET MARGIN	G	1.47	1.40	1.33	1.27	-	-
	SR	NM/lb	0.186	0.188	0.189	0.190	-	-
48000	N1	%	85.1	86.4	87.9	89.8	90.6	-
	F FLOW	lb/h/ENG	1053	1039	1029	1020	1015	-
	IAS	kt	230	224	219	214	209	-
	TAS	kt	402	401	401	401	401	-
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	-
	BUFFET MARGIN	G	1.53	1.46	1.39	1.33	1.26	-
	SR	NM/lb	0.191	0.193	0.195	0.197	0.198	-
46000	N1	%	84.5	85.6	87.0	88.6	89.5	-
	F FLOW	lb/h/ENG	1026	1011	998	988	980	-
	IAS	kt	230	224	219	214	209	-
	TAS	kt	402	401	401	401	401	-
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	-
	BUFFET MARGIN	G	1.60	1.52	1.45	1.38	1.32	-
	SR	NM/lb	0.196	0.199	0.201	0.203	0.205	-
44000	N1	%	83.9	85.0	86.2	87.6	88.4	89.2
	F FLOW	lb/h/ENG	1000	983	969	957	948	940
	IAS	kt	230	224	219	214	209	204
	TAS	kt	402	401	401	401	401	401
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	1.67	1.59	1.52	1.45	1.38	1.31
	SR	NM/lb	0.201	0.204	0.207	0.210	0.212	0.213
42000	N1	%	83.4	84.3	85.4	86.7	87.4	88.0
	F FLOW	lb/h/ENG	976	957	942	928	917	907
	IAS	kt	230	224	219	214	209	204
	TAS	kt	402	401	401	401	401	401
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	1.75	1.67	1.59	1.51	1.44	1.37
	SR	NM/lb	0.206	0.210	0.213	0.216	0.219	0.221

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.70 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)					
			36000	37000	38000	39000	40000	41000
40000	N1	%	82.9	83.8	84.8	85.9	86.5	87.2
	F FLOW	lb/h/ENG	953	933	916	901	888	876
	IAS	kt	230	224	219	214	209	204
	TAS	kt	402	401	401	401	401	401
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	1.84	1.75	1.67	1.59	1.52	1.44
	SR	NM/lb	0.211	0.215	0.219	0.223	0.226	0.229
38000	N1	%	82.3	83.2	84.1	85.3	85.8	86.3
	F FLOW	lb/h/ENG	931	910	891	875	860	847
	IAS	kt	230	224	219	214	209	204
	TAS	kt	402	401	401	401	401	401
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	1.94	1.84	1.76	1.67	1.59	1.52
	SR	NM/lb	0.216	0.221	0.225	0.229	0.233	0.237
36000	N1	%	81.8	82.7	83.6	84.6	85.1	85.6
	F FLOW	lb/h/ENG	910	888	868	850	834	820
	IAS	kt	230	224	219	214	209	204
	TAS	kt	402	401	401	401	401	401
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.04	1.95	1.85	1.77	1.68	1.60
	SR	NM/lb	0.221	0.226	0.231	0.236	0.240	0.245
34000	N1	%	81.4	82.2	83.0	84.0	84.5	84.9
	F FLOW	lb/h/ENG	891	868	847	828	810	794
	IAS	kt	230	224	219	214	209	204
	TAS	kt	402	401	401	401	401	401
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.16	2.06	1.96	1.87	1.78	1.70
	SR	NM/lb	0.225	0.231	0.237	0.242	0.248	0.253
32000	N1	%	80.9	81.7	82.5	83.4	83.9	84.3
	F FLOW	lb/h/ENG	873	848	826	806	788	770
	IAS	kt	230	224	219	214	209	204
	TAS	kt	402	401	401	401	401	401
	INDICATED MACH		0.700	0.700	0.700	0.700	0.700	0.700
	BUFFET MARGIN	G	2.30	2.19	2.09	1.99	1.89	1.80
	SR	NM/lb	0.230	0.237	0.243	0.249	0.255	0.260

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.72 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
50000	N1	%	84.6	84.6	84.7	84.8	84.9	85.1	85.3	85.6	85.9
	F FLOW	lb/h/ENG	1417	1374	1333	1295	1259	1226	1195	1167	1141
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.23	2.13	2.04	1.95	1.86	1.77	1.69	1.62	1.54
	SR	NM/lb	0.152	0.156	0.160	0.164	0.168	0.172	0.175	0.179	0.182
48000	N1	%	84.3	84.3	84.4	84.5	84.6	84.7	84.9	85.1	85.3
	F FLOW	lb/h/ENG	1400	1356	1314	1275	1238	1204	1172	1142	1115
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.32	2.22	2.12	2.03	1.94	1.85	1.76	1.68	1.61
	SR	NM/lb	0.154	0.158	0.162	0.166	0.171	0.175	0.179	0.182	0.186
46000	N1	%	84.0	84.0	84.1	84.1	84.2	84.3	84.4	84.6	84.8
	F FLOW	lb/h/ENG	1383	1338	1296	1256	1218	1183	1150	1119	1091
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.42	2.31	2.21	2.11	2.02	1.93	1.84	1.76	1.68
	SR	NM/lb	0.155	0.160	0.164	0.169	0.173	0.178	0.182	0.186	0.190
44000	N1	%	83.8	83.8	83.8	83.8	83.8	83.9	84.0	84.1	84.3
	F FLOW	lb/h/ENG	1367	1321	1278	1237	1199	1162	1128	1097	1067
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.53	2.42	2.31	2.21	2.11	2.02	1.93	1.84	1.75
	SR	NM/lb	0.157	0.162	0.167	0.171	0.176	0.181	0.186	0.190	0.194
42000	N1	%	83.5	83.5	83.5	83.5	83.5	83.5	83.6	83.7	83.8
	F FLOW	lb/h/ENG	1352	1305	1261	1220	1180	1143	1108	1075	1045
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.56	2.54	2.42	2.32	2.21	2.11	2.02	1.92	1.84
	SR	NM/lb	0.159	0.164	0.169	0.174	0.179	0.184	0.189	0.194	0.199

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.72 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
40000	N1	%	83.3	83.2	83.2	83.2	83.1	83.2	83.2	83.3	83.4
	F FLOW	lb/h/ENG	1337	1290	1245	1203	1163	1125	1089	1055	1024
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.56	2.56	2.54	2.43	2.32	2.22	2.12	2.02	1.93
	SR	NM/lb	0.161	0.166	0.171	0.176	0.182	0.187	0.192	0.198	0.203
38000	N1	%	83.1	83.0	82.9	82.9	82.8	82.8	82.8	82.9	83.0
	F FLOW	lb/h/ENG	1323	1276	1230	1187	1146	1108	1071	1036	1004
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.45	2.34	2.23	2.13	2.03
	SR	NM/lb	0.162	0.168	0.173	0.179	0.184	0.190	0.196	0.201	0.207
36000	N1	%	82.9	82.8	82.7	82.6	82.5	82.5	82.5	82.5	82.5
	F FLOW	lb/h/ENG	1310	1262	1216	1172	1131	1091	1054	1018	985
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.47	2.35	2.25	2.14
	SR	NM/lb	0.164	0.170	0.175	0.181	0.187	0.193	0.199	0.205	0.211
34000	N1	%	82.7	82.5	82.4	82.3	82.3	82.2	82.1	82.1	82.1
	F FLOW	lb/h/ENG	1298	1249	1203	1158	1116	1076	1038	1001	967
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.49	2.38	2.27
	SR	NM/lb	0.166	0.171	0.177	0.183	0.189	0.195	0.202	0.208	0.215
32000	N1	%	82.4	82.3	82.2	82.1	82.0	81.9	81.8	81.8	81.8
	F FLOW	lb/h/ENG	1286	1237	1190	1145	1102	1061	1023	986	951
	IAS	kt	289	283	277	271	265	259	253	248	242
	TAS	kt	430	428	426	424	422	421	419	417	415
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.53	2.41
	SR	NM/lb	0.167	0.173	0.179	0.185	0.192	0.198	0.205	0.211	0.218

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.72 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)		ALTITUDE (ft)					
		36000	37000	38000	39000	40000	41000
50000	N1 %	86.5	87.9	89.5	91.2	-	-
	F FLOW lb/h/ENG	1118	1103	1091	1082	-	-
	IAS kt	237	231	226	221	-	-
	TAS kt	413	413	413	413	-	-
	INDICATED MACH	0.720	0.720	0.720	0.720	-	-
	BUFFET MARGIN G	1.47	1.40	1.33	1.27	-	-
	SR NM/lb	0.185	0.187	0.189	0.191	-	-
48000	N1 %	85.7	87.0	88.4	90.3	-	-
	F FLOW lb/h/ENG	1091	1074	1060	1049	-	-
	IAS kt	237	231	226	221	-	-
	TAS kt	413	413	413	413	-	-
	INDICATED MACH	0.720	0.720	0.720	0.720	-	-
	BUFFET MARGIN G	1.53	1.46	1.39	1.32	-	-
	SR NM/lb	0.189	0.192	0.195	0.197	-	-
46000	N1 %	85.1	86.2	87.5	89.2	90.0	-
	F FLOW lb/h/ENG	1065	1047	1031	1018	1008	-
	IAS kt	237	231	226	221	216	-
	TAS kt	413	413	413	413	413	-
	INDICATED MACH	0.720	0.720	0.720	0.720	0.720	-
	BUFFET MARGIN G	1.60	1.52	1.45	1.38	1.32	-
	SR NM/lb	0.194	0.197	0.200	0.203	0.205	-
44000	N1 %	84.5	85.5	86.8	88.1	88.9	89.6
	F FLOW lb/h/ENG	1040	1020	1003	989	977	967
	IAS kt	237	231	226	221	216	211
	TAS kt	413	413	413	413	413	413
	INDICATED MACH	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN G	1.67	1.59	1.52	1.44	1.38	1.31
	SR NM/lb	0.199	0.202	0.206	0.209	0.211	0.214
42000	N1 %	84.0	85.0	86.0	87.2	87.9	88.6
	F FLOW lb/h/ENG	1017	996	977	961	947	935
	IAS kt	237	231	226	221	216	211
	TAS kt	413	413	413	413	413	413
	INDICATED MACH	0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN G	1.75	1.67	1.59	1.51	1.44	1.37
	SR NM/lb	0.203	0.207	0.211	0.215	0.218	0.221

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.72 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)					
			36000	37000	38000	39000	40000	41000
40000	N1	%	83.5	84.4	85.4	86.5	87.1	87.7
	F FLOW	lb/h/ENG	994	972	952	935	919	906
	IAS	kt	237	231	226	221	216	211
	TAS	kt	413	413	413	413	413	413
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	1.84	1.75	1.67	1.59	1.51	1.44
	SR	NM/lb	0.208	0.212	0.217	0.221	0.225	0.228
38000	N1	%	83.1	83.9	84.8	85.8	86.4	86.9
	F FLOW	lb/h/ENG	973	950	929	910	893	878
	IAS	kt	237	231	226	221	216	211
	TAS	kt	413	413	413	413	413	413
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	1.93	1.84	1.76	1.67	1.59	1.52
	SR	NM/lb	0.212	0.217	0.222	0.227	0.231	0.235
36000	N1	%	82.6	83.4	84.3	85.2	85.7	86.2
	F FLOW	lb/h/ENG	954	929	907	886	868	852
	IAS	kt	237	231	226	221	216	211
	TAS	kt	413	413	413	413	413	413
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.04	1.95	1.85	1.77	1.68	1.60
	SR	NM/lb	0.217	0.222	0.228	0.233	0.238	0.242
34000	N1	%	82.2	82.9	83.8	84.7	85.1	85.5
	F FLOW	lb/h/ENG	935	909	886	865	845	827
	IAS	kt	237	231	226	221	216	211
	TAS	kt	413	413	413	413	413	413
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.16	2.06	1.96	1.87	1.78	1.70
	SR	NM/lb	0.221	0.227	0.233	0.239	0.244	0.249
32000	N1	%	81.8	82.5	83.3	84.1	84.6	85.0
	F FLOW	lb/h/ENG	918	891	867	844	823	804
	IAS	kt	237	231	226	221	216	211
	TAS	kt	413	413	413	413	413	413
	INDICATED MACH		0.720	0.720	0.720	0.720	0.720	0.720
	BUFFET MARGIN	G	2.30	2.19	2.09	1.99	1.89	1.80
	SR	NM/lb	0.225	0.232	0.238	0.245	0.251	0.257

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.74 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
50000	N1	%	85.5	85.6	85.6	85.7	85.7	85.9	86.1	86.3	86.7
	F FLOW	lb/h/ENG	1495	1448	1403	1361	1321	1284	1250	1218	1189
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.21	2.11	2.02	1.93	1.84	1.76	1.68	1.60	1.53
	SR	NM/lb	0.148	0.152	0.156	0.160	0.164	0.168	0.172	0.176	0.179
48000	N1	%	85.3	85.3	85.3	85.3	85.4	85.5	85.6	85.8	86.1
	F FLOW	lb/h/ENG	1478	1430	1384	1341	1301	1263	1228	1195	1164
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.30	2.20	2.10	2.01	1.92	1.83	1.75	1.67	1.59
	SR	NM/lb	0.149	0.154	0.158	0.163	0.167	0.171	0.175	0.179	0.183
46000	N1	%	85.0	85.0	85.0	85.0	85.1	85.1	85.2	85.4	85.6
	F FLOW	lb/h/ENG	1462	1413	1367	1323	1281	1243	1206	1172	1140
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.40	2.29	2.19	2.10	2.00	1.91	1.82	1.74	1.66
	SR	NM/lb	0.151	0.156	0.160	0.165	0.169	0.174	0.178	0.183	0.187
44000	N1	%	84.8	84.7	84.7	84.7	84.7	84.8	84.8	84.9	85.1
	F FLOW	lb/h/ENG	1446	1397	1350	1305	1263	1223	1186	1150	1118
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.51	2.40	2.29	2.19	2.09	2.00	1.91	1.82	1.74
	SR	NM/lb	0.153	0.157	0.162	0.167	0.172	0.177	0.182	0.186	0.191
42000	N1	%	84.6	84.5	84.4	84.4	84.4	84.4	84.5	84.5	84.6
	F FLOW	lb/h/ENG	1431	1381	1333	1288	1245	1204	1166	1130	1096
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.56	2.51	2.40	2.29	2.19	2.09	2.00	1.91	1.82
	SR	NM/lb	0.154	0.159	0.164	0.169	0.174	0.179	0.185	0.190	0.195

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.74 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
40000	N1	%	84.3	84.3	84.2	84.1	84.1	84.1	84.1	84.1	84.2
	F FLOW	lb/h/ENG	1417	1366	1318	1272	1228	1187	1148	1111	1076
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.56	2.56	2.52	2.41	2.30	2.20	2.10	2.00	1.91
	SR	NM/lb	0.156	0.161	0.166	0.171	0.177	0.182	0.188	0.193	0.198
38000	N1	%	84.1	84.0	83.9	83.9	83.8	83.8	83.8	83.8	83.8
	F FLOW	lb/h/ENG	1404	1352	1303	1257	1212	1170	1130	1092	1057
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.56	2.56	2.56	2.54	2.42	2.31	2.21	2.11	2.01
	SR	NM/lb	0.157	0.163	0.168	0.174	0.179	0.185	0.190	0.196	0.202
36000	N1	%	83.9	83.8	83.7	83.6	83.5	83.5	83.4	83.4	83.4
	F FLOW	lb/h/ENG	1391	1339	1290	1242	1197	1154	1113	1075	1038
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.44	2.33	2.22	2.12
	SR	NM/lb	0.159	0.164	0.170	0.176	0.181	0.187	0.193	0.199	0.205
34000	N1	%	83.7	83.6	83.5	83.4	83.3	83.2	83.1	83.1	83.1
	F FLOW	lb/h/ENG	1379	1327	1277	1229	1183	1139	1098	1059	1021
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.47	2.35	2.25
	SR	NM/lb	0.160	0.166	0.172	0.177	0.184	0.190	0.196	0.202	0.209
32000	N1	%	83.6	83.4	83.3	83.1	83.0	82.9	82.8	82.8	82.7
	F FLOW	lb/h/ENG	1368	1315	1264	1216	1169	1125	1083	1043	1005
	IAS	kt	298	291	285	279	273	267	261	255	250
	TAS	kt	442	440	438	436	434	432	430	428	427
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.50	2.39
	SR	NM/lb	0.161	0.167	0.173	0.179	0.186	0.192	0.199	0.205	0.212

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.74 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)					
			36000	37000	38000	39000	40000	41000
	N1	%	87.3	88.6	90.3	-	-	-
	F FLOW	lb/h/ENG	1163	1144	1130	-	-	-
	IAS	kt	244	238	233	-	-	-
50000	TAS	kt	425	424	424	-	-	-
	INDICATED MACH		0.740	0.740	0.740	-	-	-
	BUFFET MARGIN	G	1.46	1.39	1.32	-	-	-
	SR	NM/lb	0.183	0.185	0.188	-	-	-
	N1	%	86.6	87.8	89.3	90.9	-	-
	F FLOW	lb/h/ENG	1136	1117	1100	1086	-	-
	IAS	kt	244	238	233	227	-	-
48000	TAS	kt	425	424	424	424	-	-
	INDICATED MACH		0.740	0.740	0.740	0.740	-	-
	BUFFET MARGIN	G	1.52	1.45	1.38	1.31	-	-
	SR	NM/lb	0.187	0.190	0.193	0.195	-	-
	N1	%	85.9	87.0	88.3	90.0	-	-
	F FLOW	lb/h/ENG	1111	1090	1072	1056	-	-
	IAS	kt	244	238	233	227	-	-
46000	TAS	kt	425	424	424	424	-	-
	INDICATED MACH		0.740	0.740	0.740	0.740	-	-
	BUFFET MARGIN	G	1.58	1.51	1.44	1.37	-	-
	SR	NM/lb	0.191	0.195	0.198	0.201	-	-
	N1	%	85.3	86.4	87.5	89.0	89.7	-
	F FLOW	lb/h/ENG	1087	1065	1045	1028	1013	-
	IAS	kt	244	238	233	227	222	-
44000	TAS	kt	425	424	424	424	424	-
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	-
	BUFFET MARGIN	G	1.65	1.58	1.50	1.43	1.36	-
	SR	NM/lb	0.195	0.199	0.203	0.206	0.209	-
	N1	%	84.8	85.7	86.8	88.0	88.7	89.3
	F FLOW	lb/h/ENG	1065	1041	1020	1001	985	970
	IAS	kt	244	238	233	227	222	217
42000	TAS	kt	425	424	424	424	424	424
	INDICATED MACH		0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN	G	1.73	1.65	1.57	1.50	1.43	1.36
	SR	NM/lb	0.199	0.204	0.208	0.212	0.215	0.219

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.74 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)		ALTITUDE (ft)					
		36000	37000	38000	39000	40000	41000
40000	N1 %	84.3	85.2	86.2	87.3	87.9	88.4
	F FLOW lb/h/ENG	1043	1018	996	976	958	942
	IAS kt	244	238	233	227	222	217
	TAS kt	425	424	424	424	424	424
	INDICATED MACH	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN G	1.82	1.73	1.65	1.58	1.50	1.43
	SR NM/lb	0.203	0.208	0.213	0.217	0.222	0.225
38000	N1 %	83.9	84.7	85.7	86.6	87.1	87.6
	F FLOW lb/h/ENG	1023	997	974	952	932	915
	IAS kt	244	238	233	227	222	217
	TAS kt	425	424	424	424	424	424
	INDICATED MACH	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN G	1.92	1.83	1.74	1.66	1.58	1.51
	SR NM/lb	0.208	0.213	0.218	0.223	0.228	0.232
36000	N1 %	83.5	84.3	85.2	86.0	86.5	87.0
	F FLOW lb/h/ENG	1004	977	952	930	909	890
	IAS kt	244	238	233	227	222	217
	TAS kt	425	424	424	424	424	424
	INDICATED MACH	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN G	2.02	1.93	1.84	1.75	1.67	1.59
	SR NM/lb	0.211	0.217	0.223	0.228	0.234	0.238
34000	N1 %	83.1	83.8	84.7	85.5	85.9	86.3
	F FLOW lb/h/ENG	986	958	932	908	886	866
	IAS kt	244	238	233	227	222	217
	TAS kt	425	424	424	424	424	424
	INDICATED MACH	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN G	2.14	2.04	1.94	1.85	1.77	1.68
	SR NM/lb	0.215	0.222	0.228	0.234	0.239	0.245
32000	N1 %	82.7	83.4	84.2	85.0	85.4	85.7
	F FLOW lb/h/ENG	969	940	913	889	865	844
	IAS kt	244	238	233	227	222	217
	TAS kt	425	424	424	424	424	424
	INDICATED MACH	0.740	0.740	0.740	0.740	0.740	0.740
	BUFFET MARGIN G	2.27	2.17	2.07	1.97	1.88	1.79
	SR NM/lb	0.219	0.226	0.232	0.239	0.245	0.251

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.76 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
50000	N1	%	86.7	86.7	86.7	86.8	86.8	87.0	87.2	87.6	88.0
	F FLOW	lb/h/ENG	1593	1541	1492	1446	1402	1361	1322	1287	1254
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.16	2.07	1.98	1.89	1.81	1.72	1.65	1.57	1.50
	SR	NM/lb	0.142	0.147	0.151	0.155	0.159	0.163	0.167	0.171	0.175
48000	N1	%	86.5	86.4	86.4	86.5	86.5	86.6	86.7	87.0	87.4
	F FLOW	lb/h/ENG	1576	1524	1474	1426	1382	1340	1300	1263	1229
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.25	2.16	2.06	1.97	1.88	1.80	1.71	1.64	1.56
	SR	NM/lb	0.144	0.148	0.153	0.157	0.161	0.166	0.170	0.174	0.178
46000	N1	%	86.2	86.2	86.2	86.2	86.2	86.2	86.3	86.5	86.8
	F FLOW	lb/h/ENG	1560	1507	1456	1408	1363	1320	1279	1241	1206
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.35	2.25	2.15	2.05	1.96	1.87	1.79	1.71	1.63
	SR	NM/lb	0.145	0.150	0.154	0.159	0.164	0.168	0.173	0.177	0.182
44000	N1	%	86.0	86.0	85.9	85.9	85.9	85.9	85.9	86.0	86.2
	F FLOW	lb/h/ENG	1545	1491	1440	1391	1344	1300	1259	1220	1184
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.46	2.35	2.25	2.15	2.05	1.96	1.87	1.78	1.70
	SR	NM/lb	0.147	0.151	0.156	0.161	0.166	0.171	0.176	0.180	0.185
42000	N1	%	85.8	85.7	85.7	85.6	85.6	85.6	85.6	85.6	85.7
	F FLOW	lb/h/ENG	1531	1476	1424	1374	1327	1282	1240	1200	1163
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.56	2.46	2.35	2.25	2.15	2.05	1.96	1.87	1.78
	SR	NM/lb	0.148	0.153	0.158	0.163	0.168	0.173	0.178	0.183	0.188

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.76 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
40000	N1	%	85.6	85.5	85.4	85.3	85.3	85.3	85.2	85.3	85.3
	F FLOW	lb/h/ENG	1517	1461	1409	1358	1310	1265	1222	1181	1143
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.56	2.56	2.47	2.36	2.26	2.16	2.06	1.96	1.87
	SR	NM/lb	0.150	0.155	0.160	0.165	0.170	0.176	0.181	0.186	0.192
38000	N1	%	85.4	85.3	85.2	85.1	85.0	85.0	84.9	84.9	84.9
	F FLOW	lb/h/ENG	1504	1448	1394	1343	1295	1249	1205	1163	1124
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.56	2.56	2.56	2.49	2.38	2.27	2.17	2.07	1.97
	SR	NM/lb	0.151	0.156	0.161	0.167	0.172	0.178	0.183	0.189	0.195
36000	N1	%	85.2	85.1	85.0	84.9	84.8	84.7	84.6	84.6	84.6
	F FLOW	lb/h/ENG	1491	1435	1381	1329	1280	1233	1188	1146	1106
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.51	2.40	2.29	2.18	2.08
	SR	NM/lb	0.152	0.157	0.163	0.168	0.174	0.180	0.186	0.192	0.198
34000	N1	%	85.1	84.9	84.8	84.6	84.5	84.4	84.3	84.3	84.2
	F FLOW	lb/h/ENG	1480	1423	1368	1316	1266	1218	1173	1130	1089
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.54	2.42	2.31	2.20
	SR	NM/lb	0.153	0.159	0.164	0.170	0.176	0.182	0.188	0.195	0.201
32000	N1	%	84.9	84.7	84.6	84.4	84.3	84.2	84.1	84.0	83.9
	F FLOW	lb/h/ENG	1468	1411	1356	1303	1253	1205	1159	1115	1074
	IAS	kt	306	300	294	287	281	275	269	263	257
	TAS	kt	454	452	450	448	446	444	442	440	438
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.45	2.34
	SR	NM/lb	0.154	0.160	0.166	0.172	0.178	0.184	0.191	0.197	0.204

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 6 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.76 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)					
			36000	37000	38000	39000	40000	41000
	N1	%	88.4	89.8	-	-	-	-
	F FLOW	lb/h/ENG	1223	1202	-	-	-	-
	IAS	kt	251	245	-	-	-	-
50000	TAS	kt	436	436	-	-	-	-
	INDICATED MACH		0.760	0.760	-	-	-	-
	BUFFET MARGIN	G	1.43	1.36	-	-	-	-
	SR	NM/lb	0.178	0.181	-	-	-	-
	N1	%	87.8	89.0	90.5	-	-	-
	F FLOW	lb/h/ENG	1198	1175	1155	-	-	-
	IAS	kt	251	245	240	-	-	-
48000	TAS	kt	436	436	436	-	-	-
	INDICATED MACH		0.760	0.760	0.760	-	-	-
	BUFFET MARGIN	G	1.49	1.42	1.35	-	-	-
	SR	NM/lb	0.182	0.186	0.189	-	-	-
	N1	%	87.1	88.3	89.7	91.0	-	-
	F FLOW	lb/h/ENG	1173	1149	1128	1109	-	-
	IAS	kt	251	245	240	234	-	-
46000	TAS	kt	436	436	436	436	-	-
	INDICATED MACH		0.760	0.760	0.760	0.760	-	-
	BUFFET MARGIN	G	1.55	1.48	1.41	1.34	-	-
	SR	NM/lb	0.186	0.190	0.193	0.197	-	-
	N1	%	86.5	87.6	88.8	90.3	-	-
	F FLOW	lb/h/ENG	1150	1124	1102	1082	-	-
	IAS	kt	251	245	240	234	-	-
44000	TAS	kt	436	436	436	436	-	-
	INDICATED MACH		0.760	0.760	0.760	0.760	-	-
	BUFFET MARGIN	G	1.62	1.55	1.47	1.40	-	-
	SR	NM/lb	0.190	0.194	0.198	0.202	-	-
	N1	%	86.0	86.9	88.0	89.4	89.9	-
	F FLOW	lb/h/ENG	1128	1101	1077	1055	1036	-
	IAS	kt	251	245	240	234	229	-
42000	TAS	kt	436	436	436	436	436	-
	INDICATED MACH		0.760	0.760	0.760	0.760	0.760	-
	BUFFET MARGIN	G	1.70	1.62	1.54	1.47	1.40	-
	SR	NM/lb	0.193	0.198	0.202	0.207	0.210	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 6 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.76 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)		ALTITUDE (ft)					
		36000	37000	38000	39000	40000	41000
40000	N1 %	85.4	86.4	87.3	88.5	89.1	-
	F FLOW lb/h/ENG	1107	1079	1054	1031	1010	-
	IAS kt	251	245	240	234	229	-
	TAS kt	436	436	436	436	436	-
	INDICATED MACH	0.760	0.760	0.760	0.760	0.760	-
	BUFFET MARGIN G	1.79	1.70	1.62	1.55	1.47	-
	SR NM/lb	0.197	0.202	0.207	0.211	0.216	-
38000	N1 %	85.0	85.8	86.8	87.7	88.3	88.7
	F FLOW lb/h/ENG	1087	1058	1031	1007	985	965
	IAS kt	251	245	240	234	229	223
	TAS kt	436	436	436	436	436	436
	INDICATED MACH	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN G	1.88	1.79	1.71	1.63	1.55	1.48
	SR NM/lb	0.201	0.206	0.211	0.216	0.221	0.226
36000	N1 %	84.6	85.4	86.3	87.2	87.6	88.0
	F FLOW lb/h/ENG	1068	1038	1011	985	962	940
	IAS kt	251	245	240	234	229	223
	TAS kt	436	436	436	436	436	436
	INDICATED MACH	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN G	1.98	1.89	1.80	1.72	1.64	1.56
	SR NM/lb	0.204	0.210	0.216	0.221	0.227	0.232
34000	N1 %	84.2	85.0	85.8	86.6	87.0	87.4
	F FLOW lb/h/ENG	1051	1019	991	965	940	917
	IAS kt	251	245	240	234	229	223
	TAS kt	436	436	436	436	436	436
	INDICATED MACH	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN G	2.10	2.00	1.91	1.82	1.73	1.65
	SR NM/lb	0.208	0.214	0.220	0.226	0.232	0.238
32000	N1 %	83.9	84.6	85.4	86.1	86.5	86.9
	F FLOW lb/h/ENG	1034	1002	973	945	919	895
	IAS kt	251	245	240	234	229	223
	TAS kt	436	436	436	436	436	436
	INDICATED MACH	0.760	0.760	0.760	0.760	0.760	0.760
	BUFFET MARGIN G	2.23	2.13	2.03	1.93	1.84	1.75
	SR NM/lb	0.211	0.218	0.224	0.231	0.237	0.243

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.78 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)		ALTITUDE (ft)								
		27000	28000	29000	30000	31000	32000	33000	34000	35000
50000	N1 %	-	-	-	-	-	-	-	-	89.7
	F FLOW lb/h/ENG	-	-	-	-	-	-	-	-	1349
	IAS kt	-	-	-	-	-	-	-	-	264
	TAS kt	-	-	-	-	-	-	-	-	450
	INDICATED MACH	-	-	-	-	-	-	-	-	0.780
	BUFFET MARGIN G	-	-	-	-	-	-	-	-	1.45
	SR NM/lb	-	-	-	-	-	-	-	-	0.167
48000	N1 %	-	-	-	-	-	-	88.7	88.9	89.2
	F FLOW lb/h/ENG	-	-	-	-	-	-	1405	1364	1325
	IAS kt	-	-	-	-	-	-	277	271	264
	TAS kt	-	-	-	-	-	-	454	452	450
	INDICATED MACH	-	-	-	-	-	-	0.780	0.780	0.780
	BUFFET MARGIN G	-	-	-	-	-	-	1.66	1.59	1.51
	SR NM/lb	-	-	-	-	-	-	0.161	0.166	0.170
46000	N1 %	-	-	-	-	87.9	88.0	88.2	88.4	88.7
	F FLOW lb/h/ENG	-	-	-	-	1478	1429	1384	1341	1302
	IAS kt	-	-	-	-	289	283	277	271	264
	TAS kt	-	-	-	-	458	456	454	452	450
	INDICATED MACH	-	-	-	-	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN G	-	-	-	-	1.90	1.82	1.73	1.66	1.58
	SR NM/lb	-	-	-	-	0.155	0.159	0.164	0.168	0.173
44000	N1 %	-	-	-	-	87.6	87.7	87.8	87.9	88.1
	F FLOW lb/h/ENG	-	-	-	-	1459	1410	1364	1320	1279
	IAS kt	-	-	-	-	289	283	277	271	264
	TAS kt	-	-	-	-	458	456	454	452	450
	INDICATED MACH	-	-	-	-	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN G	-	-	-	-	1.99	1.90	1.81	1.73	1.65
	SR NM/lb	-	-	-	-	0.157	0.162	0.166	0.171	0.176
42000	N1 %	-	87.4	87.3	87.3	87.2	87.3	87.4	87.5	87.7
	F FLOW lb/h/ENG	-	1607	1549	1494	1442	1392	1345	1300	1258
	IAS kt	-	309	302	296	289	283	277	271	264
	TAS kt	-	464	462	460	458	456	454	452	450
	INDICATED MACH	-	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN G	-	2.39	2.28	2.18	2.08	1.99	1.90	1.81	1.73
	SR NM/lb	-	0.144	0.149	0.154	0.159	0.164	0.169	0.174	0.179

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 6 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.78 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
40000	N1	%	87.3	87.2	87.1	87.0	87.0	86.9	87.0	87.1	87.2
	F FLOW	lb/h/ENG	1654	1593	1534	1478	1425	1375	1327	1281	1238
	IAS	kt	315	309	302	296	289	283	277	271	264
	TAS	kt	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.56	2.51	2.40	2.29	2.19	2.09	2.00	1.90	1.82
	SR	NM/lb	0.141	0.146	0.150	0.155	0.161	0.166	0.171	0.176	0.182
38000	N1	%	87.1	87.0	86.9	86.8	86.7	86.6	86.6	86.7	86.7
	F FLOW	lb/h/ENG	1641	1579	1520	1463	1409	1358	1309	1263	1219
	IAS	kt	315	309	302	296	289	283	277	271	264
	TAS	kt	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.56	2.56	2.52	2.41	2.30	2.20	2.10	2.00	1.91
	SR	NM/lb	0.142	0.147	0.152	0.157	0.162	0.168	0.173	0.179	0.184
36000	N1	%	86.9	86.8	86.7	86.5	86.4	86.4	86.3	86.3	86.3
	F FLOW	lb/h/ENG	1628	1566	1506	1449	1395	1343	1293	1246	1201
	IAS	kt	315	309	302	296	289	283	277	271	264
	TAS	kt	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.56	2.56	2.56	2.55	2.43	2.32	2.22	2.12	2.02
	SR	NM/lb	0.143	0.148	0.153	0.159	0.164	0.170	0.175	0.181	0.187
34000	N1	%	86.8	86.6	86.5	86.3	86.2	86.1	86.0	85.9	85.9
	F FLOW	lb/h/ENG	1617	1554	1493	1436	1381	1328	1278	1230	1185
	IAS	kt	315	309	302	296	289	283	277	271	264
	TAS	kt	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.46	2.35	2.24	2.14
	SR	NM/lb	0.144	0.149	0.155	0.160	0.166	0.172	0.178	0.184	0.190
32000	N1	%	86.6	86.5	86.3	86.1	86.0	85.9	85.7	85.6	85.6
	F FLOW	lb/h/ENG	1605	1542	1481	1423	1367	1314	1263	1215	1169
	IAS	kt	315	309	302	296	289	283	277	271	264
	TAS	kt	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.49	2.38	2.27
	SR	NM/lb	0.145	0.150	0.156	0.162	0.167	0.173	0.180	0.186	0.192

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 6 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.78 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)					
			36000	37000	38000	39000	40000	41000
50000	N1	%	90.1	-	-	-	-	-
	F FLOW	lb/h/ENG	1314	-	-	-	-	-
	IAS	kt	258	-	-	-	-	-
	TAS	kt	448	-	-	-	-	-
	INDICATED MACH		0.780	-	-	-	-	-
	BUFFET MARGIN	G	1.38	-	-	-	-	-
	SR	NM/lb	0.170	-	-	-	-	-
48000	N1	%	89.5	90.8	-	-	-	-
	F FLOW	lb/h/ENG	1289	1262	-	-	-	-
	IAS	kt	258	252	-	-	-	-
	TAS	kt	448	447	-	-	-	-
	INDICATED MACH		0.780	0.780	-	-	-	-
	BUFFET MARGIN	G	1.44	1.37	-	-	-	-
	SR	NM/lb	0.174	0.177	-	-	-	-
46000	N1	%	88.9	90.2	-	-	-	-
	F FLOW	lb/h/ENG	1264	1236	-	-	-	-
	IAS	kt	258	252	-	-	-	-
	TAS	kt	448	447	-	-	-	-
	INDICATED MACH		0.780	0.780	-	-	-	-
	BUFFET MARGIN	G	1.51	1.43	-	-	-	-
	SR	NM/lb	0.177	0.181	-	-	-	-
44000	N1	%	88.4	89.5	90.8	-	-	-
	F FLOW	lb/h/ENG	1241	1212	1185	-	-	-
	IAS	kt	258	252	247	-	-	-
	TAS	kt	448	447	447	-	-	-
	INDICATED MACH		0.780	0.780	0.780	-	-	-
	BUFFET MARGIN	G	1.57	1.50	1.43	-	-	-
	SR	NM/lb	0.180	0.185	0.189	-	-	-
42000	N1	%	87.9	88.9	90.1	-	-	-
	F FLOW	lb/h/ENG	1219	1188	1161	-	-	-
	IAS	kt	258	252	247	-	-	-
	TAS	kt	448	447	447	-	-	-
	INDICATED MACH		0.780	0.780	0.780	-	-	-
	BUFFET MARGIN	G	1.65	1.57	1.50	-	-	-
	SR	NM/lb	0.184	0.188	0.193	-	-	-

INCREASE/DECREASE N1% BY 0% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 0% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 0 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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MACH 0.78 CRUISE - ALL ENGINES OPERATING

AE3007A1E ENGINES

PRESSURE ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)		ALTITUDE (ft)					
		36000	37000	38000	39000	40000	41000
40000	N1 %	87.4	88.3	89.5	90.6	-	-
	F FLOW lb/h/ENG	1198	1166	1137	1111	-	-
	IAS kt	258	252	247	241	-	-
	TAS kt	448	447	447	447	-	-
	INDICATED MACH	0.780	0.780	0.780	0.780	-	-
	BUFFET MARGIN G	1.73	1.65	1.57	1.50	-	-
	SR NM/lb	0.187	0.192	0.197	0.201	-	-
38000	N1 %	86.9	87.7	88.8	90.0	-	-
	F FLOW lb/h/ENG	1178	1145	1115	1088	-	-
	IAS kt	258	252	247	241	-	-
	TAS kt	448	447	447	447	-	-
	INDICATED MACH	0.780	0.780	0.780	0.780	-	-
	BUFFET MARGIN G	1.82	1.74	1.65	1.58	-	-
	SR NM/lb	0.190	0.195	0.201	0.206	-	-
36000	N1 %	86.4	87.2	88.1	89.3	89.6	-
	F FLOW lb/h/ENG	1159	1125	1094	1065	1039	-
	IAS kt	258	252	247	241	235	-
	TAS kt	448	447	447	447	447	-
	INDICATED MACH	0.780	0.780	0.780	0.780	0.780	-
	BUFFET MARGIN G	1.92	1.83	1.75	1.66	1.59	-
	SR NM/lb	0.193	0.199	0.204	0.210	0.215	-
34000	N1 %	86.0	86.7	87.5	88.5	88.9	-
	F FLOW lb/h/ENG	1141	1107	1075	1045	1017	-
	IAS kt	258	252	247	241	235	-
	TAS kt	448	447	447	447	447	-
	INDICATED MACH	0.780	0.780	0.780	0.780	0.780	-
	BUFFET MARGIN G	2.04	1.94	1.85	1.76	1.68	-
	SR NM/lb	0.196	0.202	0.208	0.214	0.220	-
32000	N1 %	85.5	86.3	87.0	87.9	88.3	88.5
	F FLOW lb/h/ENG	1125	1089	1056	1025	996	969
	IAS kt	258	252	247	241	235	230
	TAS kt	448	447	447	447	447	447
	INDICATED MACH	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN G	2.16	2.06	1.97	1.87	1.78	1.70
	SR NM/lb	0.199	0.205	0.212	0.218	0.225	0.231

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 6 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON:
INCREASE N1% BY 0.0% AND FUEL FLOW BY 0.0%.
DECREASE SR% BY 0.0%.

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DESCENT

The descent table shows fuel consumption, distance and time from the top of descent to sea level for various cruise altitudes. The data are calculated for flight idle thrust setting, maintaining Mach 0.78 or 310 KIAS up to 12000 ft, decreasing linearly to 240 KIAS at 10000 ft and maintaining 240 KIAS below 10000 ft.

There are two sets of data:

- First set is calculated for all engines operating configuration, and
- Second set is calculated for one engine inoperative configuration.

The associated conditions are:

- Flaps ..... 0°
- Gear ..... UP
- Bleeds ..... OPEN
- Anti-Ice ..... OFF OR ON

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DESCENT - ALL ENGINES OPERATING

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
FLIGHT IDLE
AIRSPEED: MACH 0.78/310 KIAS/240 KIAS
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)							
			5000	10000	15000	20000	25000	30000	35000	41000
50000	Fuel	lb	68	123	167	200	229	253	277	308
	Distance	nm	15	30	44	57	70	83	97	119
	Time	min	4	7	9	11	13	15	17	20
48000	Fuel	lb	67	121	164	196	224	248	271	301
	Distance	nm	15	30	43	55	68	81	95	116
	Time	min	4	7	9	11	13	15	16	19
46000	Fuel	lb	66	119	161	191	219	242	264	294
	Distance	nm	15	29	42	54	67	79	93	113
	Time	min	4	7	9	11	13	14	16	19
44000	Fuel	lb	65	117	157	187	213	236	258	287
	Distance	nm	14	29	41	53	65	77	90	110
	Time	min	3	7	9	11	12	14	16	18
42000	Fuel	lb	63	114	153	182	207	229	250	279
	Distance	nm	14	28	40	51	63	75	88	107
	Time	MIN	3	7	9	10	12	13	15	18
40000	Fuel	lb	62	111	149	177	201	222	242	270
	Distance	nm	14	27	39	50	61	72	85	104
	Time	min	3	6	8	10	12	13	15	17
38000	Fuel	lb	60	108	144	171	194	215	234	261
	Distance	nm	13	26	38	48	59	70	82	100
	Time	min	3	6	8	10	11	13	14	17
36000	Fuel	lb	58	105	140	165	187	207	226	252
	Distance	nm	13	26	37	46	57	67	79	97
	Time	min	3	6	8	9	11	12	14	16
34000	Fuel	lb	56	101	134	159	180	198	216	242
	Distance	nm	12	25	35	45	54	64	75	93
	Time	min	3	6	8	9	10	12	13	15
32000	Fuel	lb	54	97	129	152	172	190	207	231
	Distance	nm	12	24	34	43	52	61	72	89
	Time	min	3	6	7	9	10	11	13	15
30000	Fuel	lb	51	93	123	145	164	180	197	220
	Distance	nm	11	23	32	41	49	58	68	84
	Time	min	3	5	7	8	9	11	12	14

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DESCENT - ALL ENGINES OPERATING

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON
FLIGHT IDLE
AIRSPEED: MACH 0.78/310 KIAS/240 KIAS
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)							
			5000	10000	15000	20000	25000	30000	35000	41000
50000	Fuel	lb	180	361	444	503	560	614	677	748
	Distance	nm	24	51	69	84	99	116	135	162
	Time	min	6	12	15	17	19	22	24	28
48000	Fuel	lb	180	362	443	501	556	609	671	741
	Distance	nm	24	51	68	83	98	114	133	160
	Time	min	6	12	15	17	19	21	24	27
46000	Fuel	lb	180	362	442	498	552	603	664	733
	Distance	nm	24	51	68	82	97	113	131	158
	Time	min	6	12	15	17	19	21	24	27
44000	Fuel	lb	179	362	440	495	547	596	655	724
	Distance	nm	24	51	68	81	96	111	129	155
	Time	min	6	12	15	17	19	21	23	27
42000	Fuel	lb	178	361	438	490	540	588	646	714
	Distance	nm	24	51	67	80	94	109	127	153
	Time	min	6	12	15	17	19	21	23	26
40000	Fuel	lb	177	359	434	484	533	579	635	702
	Distance	nm	24	51	67	79	93	107	124	149
	Time	MIN	6	12	15	16	18	20	23	26
38000	Fuel	lb	175	356	429	477	524	568	623	688
	Distance	nm	23	51	66	78	91	104	121	146
	Time	min	6	12	14	16	18	20	22	25
36000	Fuel	lb	173	352	423	469	514	556	609	673
	Distance	nm	23	50	65	76	89	102	118	142
	Time	min	6	12	14	16	18	19	22	25
34000	Fuel	lb	170	347	415	459	502	543	593	655
	Distance	nm	23	49	63	75	86	99	114	138
	Time	min	5	11	14	16	17	19	21	24
32000	Fuel	lb	167	341	406	448	488	527	576	636
	Distance	nm	22	48	62	73	84	95	111	133
	Time	min	5	11	14	15	17	18	20	23
30000	Fuel	lb	163	333	395	435	473	510	556	614
	Distance	nm	22	47	60	70	81	92	106	128
	Time	min	5	11	13	15	16	18	20	23

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DESCENT - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
FLIGHT IDLE
AIRSPEED: MACH 0.78/310 KIAS/240 KIAS
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)							
			5000	10000	15000	20000	25000	30000	35000	41000
50000	Fuel	lb	32	58	78	93	106	118	128	142
	Distance	nm	14	28	41	53	65	77	90	109
	Time	min	3	7	9	11	12	14	16	18
48000	Fuel	lb	31	57	76	91	104	115	125	139
	Distance	nm	14	28	40	52	63	75	88	107
	Time	min	3	6	9	10	12	14	15	18
46000	Fuel	lb	31	56	75	89	101	112	122	136
	Distance	nm	14	27	39	50	62	73	86	104
	Time	min	3	6	8	10	12	13	15	17
44000	Fuel	lb	30	54	73	87	99	109	119	132
	Distance	nm	13	27	38	49	60	71	83	101
	Time	min	3	6	8	10	11	13	14	17
42000	Fuel	lb	29	53	71	84	96	106	116	128
	Distance	nm	13	26	37	48	58	69	81	98
	Time	min	3	6	8	10	11	12	14	16
40000	Fuel	lb	28	52	69	82	93	103	112	124
	Distance	nm	13	25	36	46	56	66	78	95
	Time	min	3	6	8	9	11	12	14	16
38000	Fuel	lb	28	50	67	79	90	99	108	120
	Distance	nm	12	24	35	44	54	64	75	92
	Time	min	3	6	8	9	10	12	13	15
36000	Fuel	lb	27	48	64	76	86	95	104	115
	Distance	nm	12	24	34	43	52	62	72	88
	Time	min	3	6	7	9	10	11	13	15
34000	Fuel	lb	26	47	62	73	83	91	99	111
	Distance	nm	11	23	32	41	50	59	69	84
	Time	min	3	5	7	8	10	11	12	14
32000	Fuel	lb	25	45	59	70	79	87	95	106
	Distance	nm	11	22	31	39	48	56	66	81
	Time	min	3	5	7	8	9	10	12	14
30000	Fuel	lb	24	43	56	66	75	83	90	100
	Distance	nm	10	21	30	37	45	53	62	76
	Time	min	3	5	6	8	9	10	11	13

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DESCENT - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON
FLIGHT IDLE
AIRSPEED: MACH 0.78/310 KIAS/240 KIAS
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)							
			5000	10000	15000	20000	25000	30000	35000	41000
50000	Fuel	lb	63	122	156	181	204	226	251	278
	Distance	nm	17	35	49	61	75	88	103	124
	Time	min	4	8	11	12	14	16	18	21
48000	Fuel	lb	62	121	153	178	201	222	246	273
	Distance	nm	17	34	48	60	73	86	101	121
	Time	min	4	8	10	12	14	16	18	20
46000	Fuel	lb	61	119	151	175	197	217	241	268
	Distance	nm	16	34	47	59	71	84	98	119
	Time	min	4	8	10	12	14	15	17	20
44000	Fuel	lb	60	117	148	171	192	213	235	261
	Distance	nm	16	33	46	58	70	82	96	116
	Time	min	4	8	10	12	13	15	17	20
42000	Fuel	lb	59	115	145	167	188	207	229	255
	Distance	nm	16	33	45	56	68	80	93	113
	Time	min	4	8	10	11	13	15	16	19
40000	Fuel	lb	58	113	142	163	183	201	223	248
	Distance	nm	15	32	44	55	66	77	90	109
	Time	min	4	7	10	11	13	14	16	19
38000	Fuel	lb	56	110	138	158	177	195	216	240
	Distance	nm	15	31	43	53	64	75	87	106
	Time	min	4	7	9	11	12	14	15	18
36000	Fuel	lb	55	107	134	153	171	189	208	232
	Distance	nm	15	30	42	51	62	72	84	102
	Time	min	4	7	9	11	12	13	15	17
34000	Fuel	lb	53	103	129	148	165	182	200	223
	Distance	nm	14	29	40	50	59	69	81	98
	Time	min	3	7	9	10	12	13	14	17
32000	Fuel	lb	51	100	124	142	159	174	192	214
	Distance	nm	14	28	39	47	57	66	77	94
	Time	min	3	7	8	10	11	12	14	16
30000	Fuel	lb	49	96	119	136	151	166	183	204
	Distance	nm	13	27	37	45	54	63	73	89
	Time	min	3	6	8	9	11	12	13	15

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HOLDING

The holding tables show indicated airspeed, true airspeed, Mach number, N1, fuel flow and fuel consumption for various weights, altitudes, anti-ice ON (without ice accretion) and OFF condition. Data are presented in ISA condition. There are two sets of data:

- First set is calculated for all engines operating configuration, and
- Second set is calculated for one engine inoperative configuration.

The associated conditions are:

- Flaps ..... 0°
- Gear ..... UP
- Bleeds ..... OPEN
- Airspeed ..... MINIMUM FUEL CONSUMPTION SPEED
- Anti-Ice ..... ON OR OFF

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HOLDING - ALL ENGINES OPERATING

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
MINIMUM FUEL CONSUMPTION SPEED
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	41000
	IAS	kt	180	176	173	171	171	174	179	187	-
	TAS	kt	179	188	199	213	231	255	286	326	-
50000	Mach		0.272	0.290	0.313	0.342	0.379	0.426	0.487	0.567	-
	N1	%	55.2	58.7	62.7	66.6	70.3	74.6	78.9	83.1	-
	FFlow	lb/h/ENG	1035	983	944	917	901	897	908	940	-
	IAS	kt	178	173	170	168	168	170	174	182	-
	TAS	kt	177	185	195	209	226	249	278	317	-
48000	Mach		0.268	0.286	0.308	0.336	0.371	0.416	0.475	0.552	-
	N1	%	54.3	57.6	61.6	65.6	69.3	73.4	77.8	82.1	-
	FFlow	lb/h/ENG	1004	951	911	882	864	858	866	893	-
	IAS	kt	175	170	167	165	164	166	170	177	167
	TAS	kt	174	182	192	205	221	243	271	308	331
46000	Mach		0.265	0.282	0.303	0.329	0.363	0.406	0.462	0.536	0.581
	N1	%	53.3	56.6	60.5	64.5	68.3	72.3	76.7	81.1	90.2
	FFlow	lb/h/ENG	974	919	878	848	829	821	825	847	906
	IAS	kt	173	168	164	161	161	162	165	171	167
	TAS	kt	172	179	188	200	216	237	263	298	331
44000	Mach		0.261	0.277	0.297	0.323	0.355	0.397	0.450	0.521	0.581
	N1	%	52.3	55.6	59.3	63.4	67.3	71.2	75.6	80.0	88.6
	FFlow	lb/h/ENG	943	887	845	814	793	784	785	803	857
	IAS	kt	170	165	161	158	157	158	161	166	167
	TAS	kt	169	176	185	196	211	231	256	289	331
42000	Mach		0.258	0.273	0.292	0.316	0.347	0.387	0.438	0.505	0.581
	N1	%	51.3	54.5	58.1	62.3	66.2	70.0	74.5	78.8	87.0
	FFlow	lb/h/ENG	913	856	813	780	759	747	746	760	811

NOTE: MACH setting and FF lb/h/ENG remain constant, regardless of the temperature change.

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HOLDING - ALL ENGINES OPERATING

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
MINIMUM FUEL CONSUMPTION SPEED
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	41000
	IAS	kt	168	162	158	155	153	154	156	161	167
	TAS	kt	167	173	181	192	206	224	248	280	331
40000	Mach		0.254	0.269	0.287	0.310	0.339	0.377	0.426	0.490	0.581
	N1	%	50.2	53.5	56.9	61.0	65.0	68.9	73.2	77.6	85.6
	FFlow	lb/h/ENG	884	825	781	747	724	711	708	717	768
	IAS	kt	166	160	155	152	150	150	151	155	164
	TAS	kt	164	170	178	188	201	218	241	271	326
38000	Mach		0.250	0.264	0.282	0.304	0.331	0.367	0.414	0.474	0.572
	N1	%	49.1	52.4	55.7	59.7	63.8	67.7	71.8	76.3	84.3
	FFlow	lb/h/ENG	854	795	749	715	690	675	670	676	724
	IAS	kt	163	157	152	148	146	145	147	150	158
	TAS	kt	162	167	174	184	196	212	233	262	313
36000	Mach		0.247	0.260	0.276	0.297	0.324	0.357	0.401	0.459	0.552
	N1	%	48.0	51.2	54.5	58.3	62.4	66.4	70.4	75.0	82.9
	FFlow	lb/h/ENG	826	765	718	682	657	640	633	636	676
	IAS	kt	161	154	149	145	142	141	142	145	152
	TAS	kt	159	164	171	180	191	206	226	252	301
34000	Mach		0.243	0.256	0.271	0.291	0.316	0.348	0.389	0.444	0.531
	N1	%	46.9	49.9	53.2	56.9	61.1	65.0	69.0	73.6	81.5
	FFlow	lb/h/ENG	797	736	687	650	623	606	596	597	630
	IAS	kt	158	152	146	142	139	137	138	140	146
	TAS	kt	157	161	167	175	186	200	218	243	289
32000	Mach		0.239	0.251	0.266	0.284	0.308	0.338	0.377	0.428	0.511
	N1	%	45.8	48.6	52.0	55.4	59.6	63.7	67.6	72.1	80.0
	FFlow	lb/h/ENG	770	707	657	619	591	572	561	559	586
	IAS	kt	156	149	143	139	135	133	133	135	139
	TAS	kt	154	158	164	171	181	194	211	234	277
30000	Mach		0.236	0.247	0.261	0.278	0.300	0.328	0.365	0.413	0.490
	N1	%	44.6	47.3	50.6	54.0	57.9	62.1	66.1	70.4	78.4
	FFlow	lb/h/ENG	743	678	627	588	559	538	526	521	543

NOTE: MACH setting and FF lb/h/ENG remain constant, regardless of the temperature change.

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HOLDING - ALL ENGINES OPERATING

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITHOUT ICE ACCRETION)
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	41000
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
50000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	56.2	59.7	63.6	67.4	71.0	75.1	79.3	83.4	-
	FFlow	lb/h/ENG	1199	1138	1089	1051	1027	1016	1024	1052	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
48000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	55.6	59.0	62.9	66.8	70.2	74.2	78.5	82.6	-
	FFlow	lb/h/ENG	1176	1114	1064	1025	999	987	991	1016	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
46000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	55.0	58.3	62.1	66.1	69.6	73.4	77.7	81.7	-
	FFlow	lb/h/ENG	1153	1091	1040	1000	973	958	960	981	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
44000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	54.3	57.6	61.4	65.3	68.9	72.6	76.9	80.9	-
	FFlow	lb/h/ENG	1131	1069	1017	977	948	931	931	948	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
42000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	53.6	57.0	60.7	64.6	68.2	71.8	76.1	80.2	-
	FFlow	lb/h/ENG	1111	1048	996	954	924	906	903	917	-

NOTE: MACH setting and FF lb/h/ENG remain constant, regardless of the temperature change.

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HOLDING - ALL ENGINES OPERATING

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITHOUT ICE ACCRETION)
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	41000
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
40000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	52.9	56.3	60.0	63.9	67.5	71.1	75.3	79.4	-
	FFlow	lb/h/ENG	1091	1028	975	933	902	882	877	888	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
38000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	52.3	55.7	59.3	63.2	66.9	70.4	74.5	78.7	-
	FFlow	lb/h/ENG	1073	1009	956	913	880	859	852	861	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
36000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	51.7	55.2	58.7	62.6	66.3	69.7	73.7	78.0	-
	FFlow	lb/h/ENG	1055	991	937	894	860	838	829	835	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
34000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	51.2	54.6	58.0	62.0	65.7	69.1	73.0	77.3	-
	FFlow	lb/h/ENG	1039	974	920	876	841	818	807	811	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
32000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	50.6	54.0	57.5	61.4	65.1	68.5	72.2	76.7	-
	FFlow	lb/h/ENG	1023	958	904	859	824	799	786	788	-
	IAS	kt	200	200	200	200	200	200	200	200	-
	TAS	kt	200	215	231	250	270	293	318	347	-
30000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	0.541	0.603	-
	N1	%	50.1	53.4	56.9	60.8	64.5	67.9	71.6	75.9	-
	FFlow	lb/h/ENG	1009	943	889	843	807	781	767	767	-

NOTE: MACH setting and FF lb/h/ENG remain constant, regardless of the temperature change.

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HOLDING - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
MINIMUM FUEL CONSUMPTION SPEED
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	37000
	IAS	kt	180	176	173	171	171	-	-	-	-
	TAS	kt	179	188	199	213	231	-	-	-	-
50000	Mach		0.272	0.290	0.313	0.342	0.379	-	-	-	-
	N1	%	71.9	75.6	80.0	84.3	88.7	-	-	-	-
	FFlow	lb/h/ENG	1804	1777	1774	1792	1836	-	-	-	-
	IAS	kt	178	173	170	168	168	170	-	-	-
	TAS	kt	177	185	195	209	226	249	-	-	-
48000	Mach		0.268	0.286	0.308	0.336	0.371	0.416	-	-	-
	N1	%	70.8	74.5	78.8	83.1	87.3	93.6	-	-	-
	FFlow	lb/h/ENG	1737	1706	1697	1711	1748	1813	-	-	-
	IAS	kt	175	170	167	165	164	166	-	-	-
	TAS	kt	174	182	192	205	221	243	-	-	-
46000	Mach		0.265	0.282	0.303	0.329	0.363	0.406	-	-	-
	N1	%	69.7	73.4	77.5	81.9	86.1	92.5	-	-	-
	FFlow	lb/h/ENG	1670	1635	1623	1631	1663	1719	-	-	-
	IAS	kt	173	168	164	161	161	162	-	-	-
	TAS	kt	172	179	188	200	216	237	-	-	-
44000	Mach		0.261	0.277	0.297	0.323	0.355	0.397	-	-	-
	N1	%	68.6	72.3	76.2	80.6	85.0	90.6	-	-	-
	FFlow	lb/h/ENG	1605	1566	1549	1553	1578	1627	-	-	-
	IAS	kt	170	165	161	158	157	158	-	-	-
	TAS	kt	169	176	185	196	211	231	-	-	-
42000	Mach		0.258	0.273	0.292	0.316	0.347	0.387	-	-	-
	N1	%	67.4	71.1	74.9	79.3	83.8	88.7	-	-	-
	FFlow	lb/h/ENG	1540	1498	1476	1476	1495	1537	-	-	-

NOTE: MACH setting and FF lb/h/ENG remain constant, regardless of the temperature change.

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HOLDING - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
MINIMUM FUEL CONSUMPTION SPEED
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	37000
	IAS	kt	168	162	158	155	153	154	-	-	-
	TAS	kt	167	173	181	192	206	224	-	-	-
40000	Mach		0.254	0.269	0.287	0.310	0.339	0.377	-	-	-
	N1	%	66.1	69.8	73.5	78.0	82.4	86.9	-	-	-
	FFlow	lb/h/ENG	1477	1430	1405	1400	1414	1449	-	-	-
	IAS	kt	166	160	155	152	150	150	151	-	-
	TAS	kt	164	170	178	188	201	218	241	-	-
38000	Mach		0.250	0.264	0.282	0.304	0.331	0.367	0.414	-	-
	N1	%	64.8	68.5	72.2	76.4	81.0	85.2	91.6	-	-
	FFlow	lb/h/ENG	1415	1365	1335	1325	1334	1363	1415	-	-
	IAS	kt	163	157	152	148	146	145	147	-	-
	TAS	kt	162	167	174	184	196	212	233	-	-
36000	Mach		0.247	0.260	0.276	0.297	0.324	0.357	0.401	-	-
	N1	%	63.5	67.1	70.9	74.9	79.4	83.8	90.1	-	-
	FFlow	lb/h/ENG	1354	1300	1266	1252	1256	1279	1323	-	-
	IAS	kt	161	154	149	145	142	141	142	-	-
	TAS	kt	159	164	171	180	191	206	226	-	-
34000	Mach		0.243	0.256	0.271	0.291	0.316	0.348	0.389	-	-
	N1	%	62.1	65.7	69.5	73.3	77.8	82.4	87.7	-	-
	FFlow	lb/h/ENG	1295	1237	1199	1181	1180	1197	1233	-	-
	IAS	kt	158	152	146	142	139	137	138	140	-
	TAS	kt	157	161	167	175	186	200	218	243	-
32000	Mach		0.239	0.251	0.266	0.284	0.308	0.338	0.377	0.428	-
	N1	%	60.7	64.2	67.9	71.7	76.2	80.7	85.4	93.7	-
	FFlow	lb/h/ENG	1237	1175	1133	1110	1105	1116	1145	1196	-
	IAS	kt	156	149	143	139	135	133	133	135	-
	TAS	kt	154	158	164	171	181	194	211	234	-
30000	Mach		0.236	0.247	0.261	0.278	0.300	0.328	0.365	0.413	-
	N1	%	57.8	62.6	66.3	70.1	74.3	78.9	83.3	89.7	-
	FFlow	lb/h/ENG	1127	1114	1069	1042	1032	1038	1060	1102	-

NOTE: MACH setting and FF lb/h/ENG remain constant, regardless of the temperature change.

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HOLDING - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITHOUT ICE ACCRETION)
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	37000
	IAS	kt	200	200	200	200	-	-	-	-	-
	TAS	kt	200	215	231	250	-	-	-	-	-
50000	Mach		0.302	0.331	0.363	0.399	-	-	-	-	-
	N1	%	72.9	76.5	80.9	85.2	-	-	-	-	-
	FFlow	lb/h/ENG	2023	1989	1977	1991	-	-	-	-	-
	IAS	kt	200	200	200	200	-	-	-	-	-
	TAS	kt	200	215	231	250	-	-	-	-	-
48000	Mach		0.302	0.331	0.363	0.399	-	-	-	-	-
	N1	%	72.1	75.7	80.0	84.3	-	-	-	-	-
	FFlow	lb/h/ENG	1969	1934	1918	1927	-	-	-	-	-
	IAS	kt	200	200	200	200	200	-	-	-	-
	TAS	kt	200	215	231	250	270	-	-	-	-
46000	Mach		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	71.3	74.9	79.2	83.4	87.4	-	-	-	-
	FFlow	lb/h/ENG	1919	1880	1862	1866	1899	-	-	-	-
	IAS	kt	200	200	200	200	200	-	-	-	-
	TAS	kt	200	215	231	250	270	-	-	-	-
44000	Mach		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	70.6	74.2	78.2	82.5	86.6	-	-	-	-
	FFlow	lb/h/ENG	1870	1830	1808	1809	1836	-	-	-	-
	IAS	kt	200	200	200	200	200	-	-	-	-
	TAS	kt	200	215	231	250	270	-	-	-	-
42000	Mach		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	69.9	73.5	77.4	81.7	85.8	-	-	-	-
	FFlow	lb/h/ENG	1824	1782	1758	1754	1776	-	-	-	-

NOTE: MACH setting and FF lb/h/ENG remain constant, regardless of the temperature change.

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HOLDING - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITHOUT ICE ACCRETION)
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	37000
	IAS	kt	200	200	200	200	200	-	-	-	-
	TAS	kt	200	215	231	250	270	-	-	-	-
40000	Mach		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	69.2	72.8	76.5	80.9	85.1	-	-	-	-
	FFlow	lb/h/ENG	1780	1736	1710	1703	1720	-	-	-	-
	IAS	kt	200	200	200	200	200	-	-	-	-
	TAS	kt	200	215	231	250	270	-	-	-	-
38000	Mach		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	68.5	72.0	75.8	80.2	84.3	-	-	-	-
	FFlow	lb/h/ENG	1739	1693	1664	1655	1668	-	-	-	-
	IAS	kt	200	200	200	200	200	-	-	-	-
	TAS	kt	200	215	231	250	270	-	-	-	-
36000	Mach		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	67.7	71.4	75.0	79.5	83.5	-	-	-	-
	FFlow	lb/h/ENG	1700	1653	1622	1609	1618	-	-	-	-
	IAS	kt	200	200	200	200	200	-	-	-	-
	TAS	kt	200	215	231	250	270	-	-	-	-
34000	Mach		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	67.1	70.7	74.3	78.7	82.7	-	-	-	-
	FFlow	lb/h/ENG	1663	1614	1582	1567	1572	-	-	-	-
	IAS	kt	200	200	200	200	200	200	-	-	-
	TAS	kt	200	215	231	250	270	293	-	-	-
32000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	-	-	-
	N1	%	66.4	70.0	73.7	77.9	82.0	86.1	-	-	-
	FFlow	lb/h/ENG	1629	1579	1544	1527	1529	1555	-	-	-
	IAS	kt	200	200	200	200	200	200	-	-	-
	TAS	kt	200	215	231	250	270	293	-	-	-
30000	Mach		0.302	0.331	0.363	0.399	0.440	0.487	-	-	-
	N1	%	65.8	69.4	73.0	77.1	81.3	85.4	-	-	-
	FFlow	lb/h/ENG	1596	1545	1509	1489	1489	1511	-	-	-

NOTE: MACH setting and FF lb/h/ENG remain constant, regardless of the temperature change.

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ONE ENGINE INOPERATIVE PERFORMANCE

CRUISE TABLES

The one engine inoperative long range cruise tables show N1, fuel flow, indicated airspeed, true airspeed, indicated Mach number, buffet margin and specific range. Data are presented for various weights and altitudes.

The associated conditions are:

- Flaps ..... 0°
- Gear ..... UP
- Bleeds ..... OPEN
- Anti-Ice ..... OFF

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LONG RANGE CRUISE - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			5000	10000	11000	12000	13000	14000	15000	16000	17000
50000	N1	%	82.3	85.7	86.4	87.1	87.9	88.5	89.3	90.0	90.8
	F FLOW	lb/H/ENG	2251	2220	2219	2216	2217	2217	2220	2224	2229
	IAS	KT	248	244	243	243	242	241	241	240	240
	TAS	KT	266	282	285	289	292	296	300	304	308
	INDICATED MACH		0.409	0.441	0.449	0.456	0.463	0.471	0.479	0.487	0.495
	BUFFET MARGIN	G	2.56	2.53	2.51	2.48	2.46	2.43	2.40	2.38	2.35
	SR	NM/lb	0.118	0.127	0.129	0.130	0.132	0.134	0.135	0.137	0.138
48000	N1	%	81.2	84.6	85.4	86.1	86.8	87.5	88.2	89.0	89.8
	F FLOW	lb/H/ENG	2162	2129	2128	2123	2122	2123	2125	2128	2133
	IAS	KT	243	240	239	238	238	237	237	236	236
	TAS	KT	261	277	281	284	287	291	295	299	303
	INDICATED MACH		0.402	0.434	0.441	0.448	0.455	0.463	0.471	0.479	0.487
	BUFFET MARGIN	G	2.56	2.56	2.54	2.51	2.48	2.45	2.43	2.40	2.38
	SR	NM/lb	0.121	0.130	0.132	0.134	0.135	0.137	0.139	0.140	0.142
46000	N1	%	80.0	83.5	84.3	85.0	85.7	86.5	87.2	87.9	88.6
	F FLOW	lb/H/ENG	2076	2040	2036	2032	2029	2031	2030	2031	2033
	IAS	KT	239	235	235	234	233	233	232	232	231
	TAS	KT	257	272	275	279	282	286	289	293	297
	INDICATED MACH		0.395	0.426	0.433	0.440	0.447	0.454	0.462	0.470	0.478
	BUFFET MARGIN	G	2.56	2.56	2.55	2.53	2.50	2.48	2.45	2.43	2.40
	SR	NM/lb	0.124	0.133	0.135	0.137	0.139	0.141	0.143	0.144	0.146
44000	N1	%	78.8	82.4	83.1	83.8	84.6	85.3	86.1	86.8	87.5
	F FLOW	lb/H/ENG	1991	1952	1946	1941	1939	1937	1936	1935	1936
	IAS	KT	235	231	230	229	229	228	228	227	226
	TAS	KT	252	267	270	273	277	280	284	287	291
	INDICATED MACH		0.388	0.418	0.425	0.431	0.438	0.446	0.453	0.460	0.468
	BUFFET MARGIN	G	2.56	2.56	2.56	2.55	2.53	2.50	2.48	2.45	2.42
	SR	NM/lb	0.127	0.137	0.139	0.141	0.143	0.145	0.147	0.148	0.150
42000	N1	%	77.6	81.4	82.0	82.7	83.4	84.1	84.8	85.6	86.4
	F FLOW	lb/H/ENG	1910	1865	1858	1852	1850	1846	1843	1841	1843
	IAS	KT	230	226	226	225	224	224	223	222	222
	TAS	KT	247	262	265	268	271	275	278	281	285
	INDICATED MACH		0.381	0.410	0.416	0.423	0.430	0.437	0.444	0.451	0.459
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.55	2.53	2.50	2.47	2.45
	SR	NM/lb	0.129	0.140	0.142	0.145	0.147	0.149	0.151	0.153	0.155

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LONG RANGE CRUISE - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			5000	10000	11000	12000	13000	14000	15000	16000	17000
	N1	%	76.4	80.2	80.9	81.5	82.2	82.9	83.6	84.3	85.1
	F FLOW	lb/H/ENG	1826	1780	1772	1765	1763	1757	1752	1751	1752
	IAS	KT	226	222	221	220	220	219	218	218	217
40000	TAS	KT	242	256	259	262	266	269	272	276	280
	INDICATED MACH		0.373	0.402	0.408	0.414	0.421	0.428	0.435	0.442	0.450
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.55	2.52	2.50	2.48
	SR	NM/lb	0.133	0.144	0.146	0.149	0.151	0.153	0.155	0.157	0.160
	N1	%	75.2	78.8	79.6	80.3	81.0	81.6	82.3	83.1	83.8
	F FLOW	lb/H/ENG	1745	1696	1687	1679	1677	1668	1663	1662	1660
	IAS	KT	221	217	216	215	215	214	213	213	212
38000	TAS	KT	237	251	254	257	260	263	266	270	273
	INDICATED MACH		0.365	0.393	0.399	0.405	0.413	0.418	0.425	0.433	0.440
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.55	2.53	2.51
	SR	NM/lb	0.136	0.148	0.151	0.153	0.155	0.158	0.160	0.162	0.165
	N1	%	74.0	77.3	78.1	78.9	79.7	80.3	81.0	81.8	82.4
	F FLOW	lb/H/ENG	1665	1613	1602	1594	1589	1581	1577	1575	1569
	IAS	KT	216	212	211	211	210	209	208	208	207
36000	TAS	KT	232	246	248	251	254	257	260	264	267
	INDICATED MACH		0.357	0.385	0.390	0.396	0.403	0.409	0.416	0.423	0.430
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.53
	SR	NM/lb	0.139	0.152	0.155	0.157	0.160	0.163	0.165	0.168	0.170
	N1	%	72.8	75.9	76.6	77.4	78.2	79.0	79.7	80.4	81.0
	F FLOW	lb/H/ENG	1588	1531	1519	1511	1505	1496	1492	1488	1480
	IAS	KT	211	207	206	206	205	204	204	203	202
34000	TAS	KT	227	240	242	245	248	251	254	258	260
	INDICATED MACH		0.350	0.376	0.381	0.387	0.394	0.399	0.406	0.413	0.419
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.55
	SR	NM/lb	0.143	0.157	0.159	0.162	0.165	0.168	0.170	0.173	0.176
	N1	%	71.4	74.5	75.1	75.8	76.6	77.3	78.2	79.0	79.6
	F FLOW	lb/H/ENG	1508	1451	1437	1430	1421	1413	1408	1401	1394
	IAS	KT	206	202	201	201	200	199	199	198	197
32000	TAS	KT	222	234	236	239	242	245	248	251	254
	INDICATED MACH		0.341	0.367	0.372	0.378	0.384	0.390	0.396	0.403	0.409
	BUFFET MARGIN	G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
	SR	NM/lb	0.147	0.161	0.164	0.167	0.170	0.173	0.176	0.179	0.182

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LONG RANGE CRUISE - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			18000	19000	20000	21000	22000	23000	24000	25000	26000
50000	N1	%	91.1	91.6	92.1	92.6	93.0	93.4	-	-	-
	F FLOW	lb/H/ENG	2229	2183	2137	2080	2021	1966	-	-	-
	IAS	KT	239	233	228	220	212	201	-	-	-
	TAS	KT	311	309	307	302	295	285	-	-	-
	INDICATED MACH		0.503	0.501	0.500	0.493	0.484	0.470	-	-	-
	BUFFET MARGIN	G	2.31	2.20	2.10	1.97	1.83	1.66	-	-	-
	SR	NM/lb	0.140	0.142	0.144	0.145	0.146	0.145	-	-	-
48000	N1	%	90.6	91.5	92.0	92.4	92.9	93.4	93.7	-	-
	F FLOW	lb/H/ENG	2139	2188	2143	2091	2035	1988	1939	-	-
	IAS	KT	235	238	233	227	220	213	205	-	-
	TAS	KT	307	316	314	311	306	302	296	-	-
	INDICATED MACH		0.496	0.512	0.510	0.509	0.502	0.497	0.490	-	-
	BUFFET MARGIN	G	2.35	2.37	2.27	2.16	2.03	1.91	1.78	-	-
	SR	NM/lb	0.144	0.144	0.146	0.149	0.150	0.152	0.153	-	-
46000	N1	%	89.4	90.2	91.3	92.3	92.8	93.3	93.7	93.3	-
	F FLOW	lb/H/ENG	2036	2041	2049	2098	2047	2003	1956	1841	-
	IAS	KT	230	230	230	232	227	221	215	199	-
	TAS	KT	301	305	309	318	316	313	309	291	-
	INDICATED MACH		0.486	0.494	0.504	0.520	0.518	0.516	0.511	0.485	-
	BUFFET MARGIN	G	2.37	2.34	2.31	2.33	2.22	2.12	2.00	1.75	-
	SR	NM/lb	0.148	0.149	0.151	0.152	0.154	0.156	0.158	0.158	-
44000	N1	%	88.2	89.0	89.8	90.9	92.2	93.2	93.6	93.2	92.7
	F FLOW	lb/H/ENG	1939	1947	1947	1952	1960	2013	1969	1858	1741
	IAS	KT	226	226	225	224	224	227	222	209	192
	TAS	KT	295	299	303	307	312	321	319	306	286
	INDICATED MACH		0.476	0.486	0.493	0.502	0.511	0.530	0.528	0.508	0.479
	BUFFET MARGIN	G	2.39	2.37	2.34	2.31	2.28	2.30	2.19	1.98	1.71
	SR	NM/lb	0.152	0.154	0.156	0.157	0.159	0.160	0.162	0.165	0.164
42000	N1	%	87.1	87.8	88.5	89.4	90.5	91.7	93.0	93.1	92.7
	F FLOW	lb/H/ENG	1846	1845	1849	1857	1859	1865	1877	1869	1759
	IAS	KT	221	221	220	220	219	219	219	216	203
	TAS	KT	289	293	297	301	305	309	314	316	303
	INDICATED MACH		0.467	0.475	0.483	0.493	0.501	0.510	0.520	0.525	0.505
	BUFFET MARGIN	G	2.43	2.39	2.37	2.34	2.31	2.28	2.25	2.18	1.97
	SR	NM/lb	0.157	0.159	0.161	0.162	0.164	0.166	0.168	0.169	0.172

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LONG RANGE CRUISE - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			18000	19000	20000	21000	22000	23000	24000	25000	26000
40000	N1	%	85.9	86.6	87.3	88.0	88.9	90.0	91.2	92.5	92.6
	F FLOW	lb/H/ENG	1751	1749	1756	1754	1759	1768	1770	1781	1770
	IAS	KT	217	216	216	215	214	214	213	213	210
	TAS	KT	283	287	291	294	299	303	307	312	313
	INDICATED MACH		0.457	0.465	0.474	0.481	0.490	0.500	0.508	0.519	0.522
	BUFFET MARGIN	G	2.45	2.42	2.40	2.37	2.34	2.31	2.28	2.25	2.18
	SR	NM/lb	0.162	0.164	0.166	0.168	0.170	0.172	0.173	0.175	0.177
38000	N1	%	84.5	85.3	86.0	86.7	87.6	88.3	89.4	90.6	91.9
	F FLOW	lb/H/ENG	1656	1658	1657	1658	1665	1664	1673	1675	1685
	IAS	KT	211	211	210	210	210	209	209	208	208
	TAS	KT	277	280	284	288	292	296	301	304	309
	INDICATED MACH		0.447	0.455	0.463	0.471	0.480	0.488	0.498	0.506	0.516
	BUFFET MARGIN	G	2.47	2.45	2.42	2.39	2.38	2.34	2.31	2.28	2.25
	SR	NM/lb	0.167	0.169	0.171	0.174	0.176	0.178	0.180	0.182	0.184
36000	N1	%	83.2	84.0	84.7	85.5	86.1	86.9	87.7	88.7	89.9
	F FLOW	lb/H/ENG	1566	1569	1563	1567	1565	1569	1571	1579	1581
	IAS	KT	206	206	205	205	204	204	203	203	202
	TAS	KT	270	274	277	282	285	289	293	298	301
	INDICATED MACH		0.437	0.445	0.452	0.461	0.468	0.477	0.485	0.495	0.503
	BUFFET MARGIN	G	2.50	2.49	2.45	2.43	2.40	2.37	2.34	2.32	2.28
	SR	NM/lb	0.173	0.175	0.177	0.180	0.182	0.184	0.186	0.189	0.191
34000	N1	%	81.8	82.5	83.3	84.1	84.8	85.5	86.2	87.0	88.0
	F FLOW	lb/H/ENG	1478	1476	1473	1473	1472	1475	1475	1478	1485
	IAS	KT	202	201	200	200	199	199	198	198	198
	TAS	KT	264	267	271	274	278	282	286	290	294
	INDICATED MACH		0.426	0.434	0.441	0.449	0.457	0.465	0.473	0.482	0.492
	BUFFET MARGIN	G	2.53	2.51	2.48	2.46	2.43	2.41	2.37	2.34	2.32
	SR	NM/lb	0.178	0.181	0.184	0.186	0.189	0.191	0.194	0.196	0.198
32000	N1	%	80.3	81.0	81.8	82.5	83.3	84.0	84.8	85.5	86.3
	F FLOW	lb/H/ENG	1392	1386	1386	1381	1383	1380	1384	1383	1385
	IAS	KT	197	196	195	195	194	193	193	192	192
	TAS	KT	257	260	264	267	271	274	279	282	286
	INDICATED MACH		0.416	0.423	0.431	0.437	0.446	0.453	0.462	0.470	0.478
	BUFFET MARGIN	G	2.56	2.53	2.52	2.48	2.46	2.43	2.41	2.38	2.35
	SR	NM/lb	0.185	0.188	0.190	0.193	0.196	0.199	0.201	0.204	0.207

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LONG RANGE CRUISE - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
	N1	%	-	-	-	-	-	-	-	-	-
	F FLOW	lb/H/ENG	-	-	-	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-	-	-	-
50000	TAS	KT	-	-	-	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-
	SR	NM/lb	-	-	-	-	-	-	-	-	-
	N1	%	-	-	-	-	-	-	-	-	-
	F FLOW	lb/H/ENG	-	-	-	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-	-	-	-
48000	TAS	KT	-	-	-	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-
	SR	NM/lb	-	-	-	-	-	-	-	-	-
	N1	%	-	-	-	-	-	-	-	-	-
	F FLOW	lb/H/ENG	-	-	-	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-	-	-	-
46000	TAS	KT	-	-	-	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-
	SR	NM/lb	-	-	-	-	-	-	-	-	-
	N1	%	-	-	-	-	-	-	-	-	-
	F FLOW	lb/H/ENG	-	-	-	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-	-	-	-
44000	TAS	KT	-	-	-	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-
	SR	NM/lb									
	N1	%	92.2	-	-	-	-	-	-	-	-
	F FLOW	lb/H/ENG	1651	-	-	-	-	-	-	-	-
	IAS	KT	187	-	-	-	-	-	-	-	-
42000	TAS	KT	283	-	-	-	-	-	-	-	-
	INDICATED MACH		0.476	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	1.70	-	-	-	-	-	-	-	-
	SR	NM/lb	0.172	-	-	-	-	-	-	-	-

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LONG RANGE CRUISE - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ISA CONDITIONS

WEIGHT (lb)			ALTITUDE (ft)								
			27000	28000	29000	30000	31000	32000	33000	34000	35000
	N1	%	92.2	91.7	-	-	-	-	-	-	-
	F FLOW	lb/H/ENG	1668	1560	-	-	-	-	-	-	-
	IAS	KT	198	181	-	-	-	-	-	-	-
40000	TAS	KT	300	279	-	-	-	-	-	-	-
	INDICATED MACH		0.503	0.472	-	-	-	-	-	-	-
	BUFFET MARGIN	G	1.96	1.67	-	-	-	-	-	-	-
	SR	NM/lb	0.180	0.179	-	-	-	-	-	-	-
	N1	%	92.1	91.6	91.9	92.1	-	-	-	-	-
	F FLOW	lb/H/ENG	1678	1578	1535	1486	-	-	-	-	-
	IAS	KT	205	193	186	176	-	-	-	-	-
38000	TAS	KT	311	298	291	281	-	-	-	-	-
	INDICATED MACH		0.521	0.502	0.493	0.479	-	-	-	-	-
	BUFFET MARGIN	G	2.18	1.96	1.82	1.65	-	-	-	-	-
	SR	NM/lb	0.185	0.189	0.190	0.189	-	-	-	-	-
	N1	%	91.3	91.5	91.9	92.1	92.5	93.0	-	-	-
	F FLOW	lb/H/ENG	1591	1588	1548	1508	1478	1445	-	-	-
	IAS	KT	202	200	195	189	184	177	-	-	-
36000	TAS	KT	307	309	305	301	298	293	-	-	-
	INDICATED MACH		0.514	0.520	0.516	0.513	0.509	0.503	-	-	-
	BUFFET MARGIN	G	2.26	2.19	2.07	1.96	1.85	1.72	-	-	-
	SR	NM/lb	0.193	0.194	0.197	0.200	0.201	0.202	-	-	-
	N1	%	89.2	90.6	91.5	92.1	92.5	93.1	93.0	-	-
	F FLOW	lb/H/ENG	1486	1497	1501	1522	1496	1470	1397	-	-
	IAS	KT	197	197	196	197	193	188	178	-	-
34000	TAS	KT	298	303	307	314	312	311	299	-	-
	INDICATED MACH		0.500	0.511	0.520	0.534	0.534	0.533	0.516	-	-
	BUFFET MARGIN	G	2.28	2.26	2.22	2.21	2.11	2.01	1.82	-	-
	SR	NM/lb	0.201	0.203	0.205	0.206	0.209	0.211	0.214	-	-
	N1	%	87.2	88.3	89.7	90.8	91.7	92.6	93.0	95.0	-
	F FLOW	lb/H/ENG	1391	1393	1401	1405	1414	1422	1418	1345	-
	IAS	KT	192	191	191	190	190	190	188	178	-
32000	TAS	KT	291	295	299	304	309	313	316	304	-
	INDICATED MACH		0.488	0.497	0.507	0.516	0.527	0.537	0.544	0.527	-
	BUFFET MARGIN	G	2.33	2.29	2.27	2.23	2.20	2.16	2.10	1.90	-
	SR	NM/lb	0.209	0.211	0.214	0.216	0.218	0.220	0.223	0.226	-

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DRIFTDOWN TABLE

In the event of an engine failure during cruise it will generally be necessary to reduce speed and descent to a lower altitude.

Immediately after engine failure set maximum continuous N1 and allow the airplane to decelerate from the cruise speed to the initial drift down speed shown in the driftdown table. When this speed is achieved start the descend profile.

The airplane should level off at the gross altitude and weight shown in the driftdown table.

NET LEVEL OFF ALTITUDE

Federal regulations require terrain clearance flight planning based on net performance which is the gross (or real) gradient performance degraded by 1.1%.

To estimate the net level off pressure altitude, enter with the gross weight, proceed to the ISA deviation and find the value within bracket. This is the net level off pressure altitude. The net level off pressure altitude must clear all en-route obstacle by at least 1000 ft.

In case the obstacles heights are close to the values published in the following tables, a detailed driftdown analysis must be accomplished.

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DRIFTDOWN TABLE
LEGACY 600 - AE3007A1E ENGINES - FAA CERTIFICATION
BLEEDS OPEN/ANTI-ICE OFF

WEIGHT (lb)		INITIAL DRIFTDOWN SPEED (KIAS)	GROSS LEVEL OFF ALTITUDE - ft (NET LEVEL OFF ALTITUDE - ft)		
START DRIFTDOWN	LEVEL OFF		ISA	ISA + 10	ISA + 20
50000	50000	173	21680 (16330)	21600 (16195)	19995 (14985)
48000	48000	170	23047 (17805)	22945 (17650)	21255 (16355)
46000	46000	167	24315 (19685)	24250 (19560)	22575 (17860)
44000	44000	164	25500 (21290)	25430 (21190)	24080 (19580)
42000	42000	161	26315 (22545)	26250 (22450)	24955 (20795)
40000	40000	157	27370 (24100)	27330 (24035)	25985 (22260)
38000	38000	154	28935 (25240)	28555 (25170)	27097 (23740)
36000	36000	150	31080 (26390)	30620 (26330)	28440 (25035)
34000	34000	146	32830 (27550)	32375 (27525)	29905 (26235)
32000	32000	142	34230 (29380)	33960 (28935)	31435 (27495)

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HOLDING

The holding tables show indicated airspeed, mach number, N1, fuel flow and fuel consumption for various weights and altitudes. Data are presented in ISA condition for all engines operating and one engine inoperative configuration. For both conditions, tables for anti-ice ON (with and without ice accretion) and OFF are provided.

The associated conditions are:

- Flaps..... 0°
- Gear ..... UP
- Bleeds ..... OPEN
- Airspeed ..... MINIMUM FUEL CONSUMPTION SPEED
- Anti-Ice ..... ON OR OFF

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HOLDING - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
MINIMUM FUEL CONSUMPTION SPEED
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	39000
	IAS	KT	178	181	181	181	183	-	-	-	-
	TAS	KT	177	193	209	226	247	-	-	-	-
50000	MACH		0.269	0.299	0.328	0.362	0.404	-	-	-	-
	N1	%	71.9	75.7	80.0	84.3	88.7	-	-	-	-
	FF	lb/H/ENG	1802	1783	1781	1799	1847	-	-	-	-
	FC	lb/H	1802	1783	1781	1799	1847				
	IAS	KT	174	176	177	177	179	-	-	-	-
	TAS	KT	173	189	205	221	242	-	-	-	-
48000	MACH		0.264	0.292	0.322	0.354	0.395	-	-	-	-
	N1	%	70.7	74.6	78.8	83.1	87.3	-	-	-	-
	FF	lb/H/ENG	1732	1710	1705	1718	1758	-	-	-	-
	FC	lb/H	1732	1710	1705	1718	1758				
	IAS	KT	170	172	174	173	175	176	-	-	-
	TAS	KT	169	184	201	216	236	258	-	-	-
46000	MACH		0.258	0.285	0.316	0.347	0.386	0.431	-	-	-
	N1	%	69.6	73.4	77.5	81.9	86.1	92.2	-	-	-
	FF	lb/H/ENG	1663	1637	1630	1637	1670	1729	-	-	-
	FC	lb/H	1663	1637	1630	1637	1670	1729			
	IAS	KT	167	168	171	170	171	172	-	-	-
	TAS	KT	165	179	197	211	230	252	-	-	-
44000	MACH		0.252	0.278	0.310	0.339	0.377	0.422	-	-	-
	N1	%	68.4	72.3	76.3	80.6	85.0	90.4	-	-	-
	FF	lb/H/ENG	1595	1566	1556	1559	1585	1637	-	-	-
	FC	lb/H	1595	1566	1556	1559	1585	1637			
	IAS	KT	163	164	166	166	166	168	-	-	-
	TAS	KT	161	175	191	206	224	247	-	-	-
42000	MACH		0.246	0.271	0.301	0.332	0.368	0.413	-	-	-
	N1	%	67.2	71.1	74.9	79.3	83.8	88.6	-	-	-
	FF	lb/H/ENG	1528	1496	1482	1481	1501	1547	-	-	-
	FC	lb/H	1528	1496	1482	1481	1501	1547	-	-	-

NOTE: MACH setting and FF lb/H/ENG remain constant, regardless of the temperature change.

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HOLDING - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
MINIMUM FUEL CONSUMPTION SPEED
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	39000
	IAS	KT	159	159	161	162	162	164	-	-	-
	TAS	KT	157	170	185	201	218	240	-	-	-
40000	MACH		0.240	0.264	0.293	0.324	0.358	0.402	-	-	-
	N1	%	65.8	69.7	73.6	78.0	82.4	86.8	-	-	-
	FF	lb/H/ENG	1461	1427	1409	1405	1419	1457	-	-	-
	FC	lb/H	1461	1427	1409	1405	1419	1457			
	IAS	KT	155	155	157	158	158	159	160	-	-
	TAS	KT	154	165	180	197	212	233	255	-	-
38000	MACH		0.235	0.257	0.285	0.317	0.349	0.391	0.437	-	-
	N1	%	64.4	68.3	72.3	76.5	81.0	85.2	91.5	-	-
	FF	lb/H/ENG	1395	1358	1337	1331	1339	1369	1423	-	-
	FC	lb/H	1395	1358	1337	1331	1339	1369	1423	-	-
	IAS	KT	151	151	152	155	154	155	156	-	-
	TAS	KT	150	160	174	192	207	226	249	-	-
36000	MACH		0.229	0.250	0.276	0.309	0.340	0.379	0.426	-	-
	N1	%	62.9	66.9	70.9	74.9	79.4	83.8	89.8	-	-
	FF	lb/H/ENG	1330	1291	1266	1258	1261	1284	1330	-	-
	FC	lb/H	1330	1291	1266	1258	1261	1284	1330	-	-
	IAS	KT	147	147	147	149	150	150	152	-	-
	TAS	KT	146	156	169	185	201	219	242	-	-
34000	MACH		0.223	0.243	0.268	0.299	0.331	0.368	0.415	-	-
	N1	%	61.4	65.4	69.4	73.4	77.9	82.4	87.5	-	-
	FF	lb/H/ENG	1266	1225	1197	1184	1184	1201	1240	-	-
	FC	lb/H	1266	1225	1197	1184	1184	1201	1240	-	-
	IAS	KT	144	142	143	144	145	145	147	147	-
	TAS	KT	142	151	163	178	195	212	234	256	-
32000	MACH		0.217	0.236	0.259	0.289	0.322	0.357	0.402	0.450	-
	N1	%	59.8	63.8	67.8	71.7	76.2	80.7	85.3	91.9	-
	FF	lb/H/ENG	1202	1159	1129	1112	1109	1120	1152	1203	-
	FC	lb/H	1202	1159	1129	1112	1109	1120	1152	1203	-
	IAS	KT	140	138	138	139	141	140	142	143	-
	TAS	KT	137	146	157	172	189	205	225	248	-
30000	MACH		0.211	0.229	0.251	0.279	0.313	0.345	0.388	0.436	-
	N1	%	58.1	62.0	66.1	70.1	74.3	78.9	83.3	89.6	-
	FF	lb/H/ENG	1139	1095	1062	1042	1036	1041	1065	1108	-
	FC	lb/H	1139	1095	1062	1042	1036	1041	1065	1108	

NOTE: MACH setting and FF lb/H/ENG remain constant, regardless of the temperature change.

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HOLDING - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITHOUT ICE ACCRETION)
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	39000
	IAS	KT	200	200	200	200	200	-	-	-	-
	TAS	KT	200	215	231	250	270	-	-	-	-
50000	MACH		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	72.9	76.5	80.9	85.2	89.3	-	-	-	-
	FF	lb/H/ENG	1872	1851	1850	1870	1915	-	-	-	-
	FC	lb/H	1872	1851	1850	1870	1915				
	IAS	KT	200	200	200	200	200	-	-	-	-
	TAS	KT	200	215	231	250	270	-	-	-	-
48000	MACH		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	72.1	75.7	80.0	84.3	88.3	-	-	-	-
	FF	lb/H/ENG	1820	1797	1792	1808	1848	-	-	-	-
	FC	lb/H	1820	1797	1792	1808	1848	-	-	-	-
	IAS	KT	200	200	200	200	200	-	-	-	-
	TAS	KT	200	215	231	250	270	-	-	-	-
46000	MACH		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	71.3	74.9	79.2	83.4	87.4	-	-	-	-
	FF	lb/H/ENG	1771	1745	1738	1750	1784	-	-	-	-
	FC	lb/H	1771	1745	1738	1750	1784	-	-	-	-
	IAS	KT	200	200	200	200	200	-	-	-	-
	TAS	KT	200	215	231	250	270	-	-	-	-
44000	MACH		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	70.6	74.2	78.2	82.5	86.6	-	-	-	-
	FF	lb/H/ENG	1724	1696	1686	1694	1724	-	-	-	-
	FC	lb/H	1724	1696	1686	1694	1724	-	-	-	-
	IAS	KT	200	200	200	200	200	-	-	-	-
	TAS	KT	200	215	231	250	270	-	-	-	-
42000	MACH		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	69.9	73.5	77.4	81.7	85.8	-	-	-	-
	FF	lb/H/ENG	1679	1649	1636	1641	1666	-	-	-	-
	FC	lb/H	1679	1649	1636	1641	1666	-	-	-	-

NOTE: MACH setting and FF lb/H/ENG remain constant, regardless of the temperature change.

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HOLDING - ONE ENGINE INOPERATIVE

AE3007A1E ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITHOUT ICE ACCRETION)
STANDARD ATMOSPHERE

WEIGHT (lb)			ALTITUDE (ft)								
			0	5000	10000	15000	20000	25000	30000	35000	39000
	IAS	KT	200	200	200	200	200	-	-	-	-
	TAS	KT	200	215	231	250	270	-	-	-	-
40000	MACH		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	69.2	72.8	76.5	80.9	85.1	-	-	-	-
	FF	lb/H/ENG	1637	1605	1590	1591	1613	-	-	-	-
	FC	lb/H	1637	1605	1590	1591	1613	-	-	-	-
	IAS	KT	200	200	200	200	200	-	-	-	-
	TAS	KT	200	215	231	250	270	-	-	-	-
38000	MACH		0.302	0.331	0.363	0.399	0.440	-	-	-	-
	N1	%	68.5	72.0	75.8	80.2	84.3	-	-	-	-
	FF	lb/H/ENG	1596	1563	1546	1544	1562	-	-	-	-
	FC	lb/H	1596	1563	1546	1544	1562	-	-	-	-
	IAS	KT	200	200	200	200	200	200	-	-	-
	TAS	KT	200	215	231	250	270	293	-	-	-
36000	MACH		0.302	0.331	0.363	0.399	0.440	0.487	-	-	-
	N1	%	67.7	71.4	75.0	79.5	83.5	87.6	-	-	-
	FF	lb/H/ENG	1559	1524	1504	1500	1514	1548	-	-	-
	FC	lb/H	1559	1524	1504	1500	1514	1548	-	-	-
	IAS	KT	200	200	200	200	200	200	-	-	-
	TAS	KT	200	215	231	250	270	293	-	-	-
34000	MACH		0.302	0.331	0.363	0.399	0.440	0.487	-	-	-
	N1	%	67.0	70.7	74.3	78.7	82.7	86.8	-	-	-
	FF	lb/H/ENG	1523	1487	1465	1459	1469	1499	-	-	-
	FC	lb/H	1523	1487	1465	1459	1469	1499	-	-	-
	IAS	KT	200	200	200	200	200	200	-	-	-
	TAS	KT	200	215	231	250	270	293	-	-	-
32000	MACH		0.302	0.331	0.363	0.399	0.440	0.487	-	-	-
	FF	lb/H/ENG	1490	1452	1429	1420	1428	1453	-	-	-
	FC	lb/H	1490	1452	1429	1420	1428	1453	-	-	-
	IAS	KT	200	200	200	200	200	200	-	-	-
	TAS	KT	200	215	231	250	270	293	-	-	-
30000	MACH		0.302	0.331	0.363	0.399	0.440	0.487	-	-	-
	N1	%	65.8	69.4	73.0	77.1	81.3	85.4	-	-	-
	FF	lb/H/ENG	1458	1420	1395	1384	1389	1411	-	-	-
	FC	lb/H	1458	1420	1395	1384	1389	1411	-	-	-

NOTE: MACH setting and FF lb/H/ENG remain constant, regardless of the temperature change.

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EXTENDED DIVERSION TIME OPERATION (EDTO)

180 MINUTES EDTO – ONE ENGINE INOPERATIVE CONSIDERATIONS

The following tables show the diversion distances with one engine inoperative. Data are presented for a range of airplane weights, different speed schedules, two flight levels (39000 ft and 41000 ft), ISA conditions, wind speed 0 kt and anti-ice OFF.

The data was calculated considering that immediately after engine failure, pilots set maximum continuous thrust on the remaining engine and drift down using the speed schedule presented on the associated table.

Depending on operational requirements, operations with diversion times greater than 180 minutes may be restricted or may require operational approval. If additional analysis is requested by local authority, please request an evaluation of applicability for the GP-3763 – 180-MINUTE DIVERSION WITH ONE ENGINE INOPERATIVE.

NOTE: Operators are responsible for carrying sufficient fuel and oxygen to address other failure modes that may affect diversion time and distances (e.g.: loss of cabin pressurization or other altitude limiting failures).

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180 MINUTES AREA OF OPERATION WITH ONE ENGINE INOPERATIVE TABLE

AE3007A1E ENGINES

AIRPLANES PRE-MOD. SB 145LEG-00-0007

INITIAL ALTITUDE: 39000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
WIND: 0 kt
ISA CONDITION

SPEED SCHEDULE KIAS/MACH	INITIAL WEIGHT (lb)	DIVERSION DISTANCE (NM)
175/0.65	28000	937
	30000	924
	32000	910
	34000	897
	36000	882
	38000	863
	40000	843
	42000	824
	44000	812
	46000	800
	48000	789
	50000	779
285/0.77	28000	1059
	30000	1057
	32000	1054
	34000	1050
	36000	1047
	38000	1043
	40000	1039
	42000	1035
	44000	1031
	46000	1026
	48000	1021
	50000	1015

SPEED SCHEDULE KIAS/MACH	INITIAL WEIGHT (lb)	DIVERSION DISTANCE (NM)
310/0.75	28000	1052
	30000	1050
	32000	1048
	34000	1045
	36000	1042
	38000	1039
	40000	1036
	42000	1032
	44000	1027
	46000	1023
	48000	1018
	50000	1012
V_{MO}/M_{MO}	28000	1049
	30000	1047
	32000	1045
	34000	1042
	36000	1040
	38000	1036
	40000	1033
	42000	1029
	44000	1025
	46000	1020
	48000	1015
	50000	1010

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180 MINUTES AREA OF OPERATION WITH ONE ENGINE INOPERATIVE TABLE

AE3007A1E ENGINES

AIRPLANES POST-MOD. SB 145LEG-00-0007 OR EQUIPPED WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

INITIAL ALTITUDE: 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
WIND: 0 kt
ISA CONDITION

SPEED SCHEDULE KIAS/MACH	INITIAL WEIGHT (lb)	DIVERSION DISTANCE (NM)
175/0.65	28000	939
	30000	926
	32000	913
	34000	900
	36000	885
	38000	866
	40000	846
	42000	828
	44000	815
	46000	804
	48000	793
	50000	782
285/0.77	28000	1061
	30000	1058
	32000	1055
	34000	1052
	36000	1049
	38000	1045
	40000	1041
	42000	1037
	44000	1033
	46000	1028
	48000	1023
	50000	1017

SPEED SCHEDULE KIAS/MACH	INITIAL WEIGHT (lb)	DIVERSION DISTANCE (NM)
310/0.75	28000	1054
	30000	1052
	32000	1050
	34000	1047
	36000	1044
	38000	1041
	40000	1038
	42000	1034
	44000	1029
	46000	1025
	48000	1020
	50000	1014
V_{MO}/M_{MO}	28000	1051
	30000	1049
	32000	1046
	34000	1044
	36000	1041
	38000	1038
	40000	1035
	42000	1031
	44000	1027
	46000	1022
	48000	1017
	50000	1012

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SECTION 1-06

WEIGHT AND BALANCE

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INTRODUCTION

This Section contains supplementary information to that already presented in the Weight and Balance manual (ANAC: WB-135/1561, FAA: WB-135/1562 and EASA: WB-135/1563).

This supplementary information is intended to assist the operator in defining the weight and balance system and constrained CG limits.

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STANDARD TERMS AND DEFINITIONS

EQUIPPED EMPTY WEIGHT (EEW) OR

MANUFACTURER EMPTY WEIGHT (MEW)

It is the weight of structure, power plant, instruments, interior furnishings, systems, optional, portable, and emergency equipment and other items of equipment that are an integral part of the airplane configuration. It is essentially a dry weight, including only those fluids contained in closed systems such as oxygen, fire extinguisher agent, landing gear shock absorber fluid, etc.

BASIC EMPTY WEIGHT (BEW) OR

STANDARD BASIC EMPTY WEIGHT (SBEW)

It is the EEW plus the weight of the following items:

- APU oil;
- Engine oil;
- Hydraulic fluid;
- Unusable fuel.

BASIC OPERATING WEIGHT (BOW) OR

OPERATIONAL EMPTY WEIGHT (OEW) OR

DRY OPERATING WEIGHT (DOW)

It is the BEW plus the weight of the operational items.

Operational items are those necessary for airplane operation and not included in the BEW.

The operational items are:

- Crew and crew baggage;
- Navigation kit (manuals, charts, etc);
- Catering (beverages and foods) and removable service equipment for galley (such as standard units, etc);
- Lavatory rinse water;
- Lavatory chemical fluid.

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ACTUAL ZERO FUEL WEIGHT (AZFW)

This is the BOW plus actual payload.

PAYLOAD OR

TOTAL TRAFFIC LOAD

This is the weight of passengers, baggage and cargo.

MAXIMUM ALLOWABLE PAYLOAD

It is the maximum approved payload that can be loaded into the airplane. Such value varies with the fuel loaded into the fuselage tanks. The following formula defines the Maximum Allowable Payload:

$$\text{Maximum Allowable Payload} = \text{MZFW} - \text{Fuel in Fuselage Tanks} - \text{BOW}$$

As a consequence, if fuselage tanks are empty, then Maximum Payload is the Maximum Zero Fuel Weight (MZFW) less Basic Operating Weight (BOW).

MAXIMUM ZERO FUEL WEIGHT (MZFW)

This is the maximum authorized weight before usable fuel be loaded in the wings. The MZFW is related to airplane structural limitations.

MAXIMUM RAMP WEIGHT (MRW)

This is the maximum authorized ramp weight, related to maximum allowable, total loaded airplane weight for taxi.

MAXIMUM TAKEOFF WEIGHT (MTOW)

This is the maximum authorized weight for takeoff.

MAXIMUM LANDING WEIGHT (MLW)

This is the maximum authorized weight for landing.

MINIMUM OPERATING WEIGHT (MOW)

This is the minimum authorized weight to operate the airplane.

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CENTER OF GRAVITY (CG)

This is the position where the mass of the airplane is considered concentrated for balance purposes. It is normally referred to in terms of %MAC.

AIRPLANE DATUM LINE

This is an imaginary vertical line perpendicular to the fuselage centerline from where all arm measurements are taken.

MEAN AERODYNAMIC CHORD (MAC)

This is the chord of an imaginary rectangular airfoil with the same area of the actual wing and which produces the same resulting force vectors of the actual wing. The airplane forward and aft CG limits are referred to in terms of %MAC.

INDEX SYSTEM

This is a convention for presenting airplane or body moments. It is the moment of the body converted to a different measuring system.

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GENERAL DATA

The general data presented in this Section is intended to be used for specific weight and balance calculations and is equivalent to the information contained in the Weight & Balance Manual.

MAXIMUM GROSS WEIGHTS AND CENTER OF GRAVITY LIMITS

When performing an approved loading schedule, ensure that the airplane weight and center of gravity remains within the Weight x CG Envelope by accounting for airplane weight and balance with all load conditions.

For maximum structural weights and center of gravity envelopes, refer to AFM Section 2 – Limitations.

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BALANCE REFERENCE SYSTEM

BALANCE ARM/BODY STATION

Longitudinal location of the Centers of Gravity (CG) identified throughout this Manual regarding airplane and components will be referred to as Balance Arms. Balance Arms are the distance in inches from the Airplane Datum which is located at the zero station of the fuselage.

Balance Arm (BA) is equivalent to Body Station (BS) on the EMB-135BJ.

AIRPLANE DATUM

The Airplane Datum is a plane, perpendicular to the fuselage centerline, located at 456.50 in ahead of the wing stub front spar.

For external reference, the Datum is located at 570.63 in ahead of the wing jack points.

WING MEAN AERODYNAMIC CHORD (MAC)

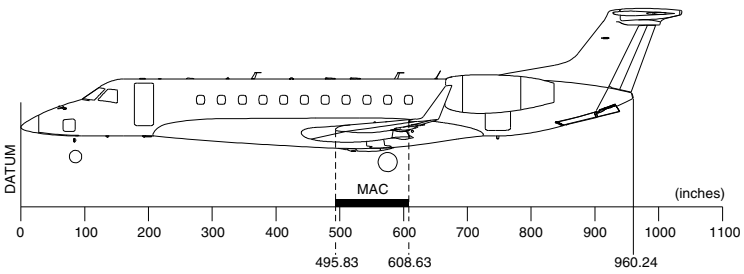
The length of the MAC is 112.80 in.

The leading edge of the MAC (LEMAC) is Balance Arm 495.83 in.

Percentage of MAC is obtained using the following formula:

$$\%MAC = \frac{(X - 495.83) \times 100}{112.80}$$

where X = Balance Arm of airplane CG measured in inches.



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FUEL DATA

FUEL DEFINITIONS

- USABLE FUEL – Is the fuel to be effectively consumed by the engines.
- UNUSABLE FUEL – Is the fuel remaining after total usable fuel has been consumed.
  - DRAINABLE FUEL – Is that portion of the unusable fuel which can be drawn off through fuel drains with the airplane leveled.
  - UNDRAINABLE FUEL – Is that portion of the unusable fuel which can not be drawn off by standard draining procedures.

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FUEL QUANTITIES

FUEL CATEGORY	VOLUME (US Gal)		WEIGHT (lb)		CG BALANCE ARM (inches)	
WING TANKS:						
• UNUSABLE UNDRAINABLE	2.64		17.82		490.32	
• UNUSABLE DRAINABLE	8.98		60.63		490.59	
• UNUSABLE	11.62		78.45		490.59	
• USABLE	1689.64		11406.76		517.60	
AUXILIARY FUEL SYSTEM 1 or 2: (2)	**FWD**	**AFT**	**FWD**	**AFT**	**FWD**	**AFT**
• UNUSABLE UNDRAINABLE	1.19	0.40	8.03	2.70	372.52	798.94
• UNUSABLE DRAINABLE	2.38	4.23	16.07	28.56	366.85	798.94
• UNUSABLE	3.57	4.63	24.10	31.26	366.85	798.94
• USABLE (3)	261.25	215.52	1763.7 (5)	1455.0 (5)	332.28	798.94
• USABLE (4)	293.90	218.80	1984.1 (5)	1477.1 (5)	332.28	799.49
TOTAL UNUSABLE	28.02		189.17			
TOTAL USABLE (3)	2643.18		17844.16			
TOTAL USABLE (4)	2715.04		18329.16			

NOTE: 1) The values above have been determined for an adopted fuel density of 6.751 lb/US Gal.

2) Each Auxiliary Fuel System is composed by one forward fuselage tank and one aft fuselage tank.

3) Max fuel weight allowed. Applicable to airplanes S/N up to 591 or Pre-Mod. SB 145LEG-28-0010.

4) Max fuel weight allowed. Applicable to airplanes S/N 625 and on or Post-Mod. SB 145LEG-28-0010.

5) Max fuel value allowed is weight limited due to structural restrictions.

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MISCELLANEOUS FLUIDS

FLUID	WEIGHT (lb)	BALANCE ARM (inches)
ENGINE OIL (1)	53.0	739.65
APU OIL (1)	4.4	930.71
HYDRAULIC (2)	75.0	608.27
LAVATORY CHEMICAL FLUID (3)	8.8	667.72
WATER (4)	110.2	650.00
WATER (5)	220.5	650.00
WATER (6)	77.2	651.57
WATER (7)	22.0	266.14
WATER (8)	33.1	255.91
WATER (9)	66.1	255.91

NOTE: 1) Adopted engine/APU oil density (ref. MIL-L-7808): 8.17 lb/US Gal.

2) Adopted hydraulic fluid density (ref. SAE AS 1241A TYPE IV): 8.26 lb/US Gal.

3) For airplanes with forward lavatory (optional), the forward lavatory chemical fluid weight is 4.2 lb and its balance arm is 251.57 in.

4) For airplanes S/N 528, 549, 625, 637, 642, 644 and 678.

5) For airplanes S/N 412, 462, 484, 495, 505, 516, 540, 555, 586 and 591.

6) For airplanes S/N 686 (inclusive) and on.

7) For airplanes S/N 686 (inclusive) and on equipped with optional forward lavatory.

8) For airplanes S/N 686 (inclusive) to 997 (excluded).

9) For airplanes S/N 997 (inclusive) and on.

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PITCH TRIM SETTING

NOTE: For takeoff when setting pitch trim to 8, first select 7 and stop trimming immediately when the value 8 is displayed. When setting pitch trim to 4, first select 5 and stop trimming immediately when the value 4 is displayed.

PITCH TRIM UNITS	8	7	6	5	4
CG POSITION (%)	LESS THAN OR EQUAL TO 26.0	26.1 UP TO 28.5	28.6 UP TO 30.5	30.6 UP TO 33.5	ABOVE OR EQUAL TO 33.6

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PASSENGERS

PASSENGER LOCATION

The passenger location and respective balance arm are shown in the applicable Interior Arrangement. Refer to AOM Section 1-06-25.

PASSENGER WEIGHT

Actual or standard average passenger weights may be used to compute passenger loads.

According to AC 120-27E, the standard average passenger weights include 5 lb for summer clothing, 10 lb for winter clothing and a 16 lb allowance for personal and carry-on bags.

Where no gender is given, the standard average passenger weights (*) are based on the assumption that 50 percent of passengers are male and 50 percent of passengers are female.

An operator that chooses to use standard average weights for checked bags should use a standard average weight of at least 30 lb.

Summer Operation

- Adult Passenger (*) ..... 190 lb
- Male ..... 200 lb
- Female ..... 179 lb
- Children (age 2-12) ..... 82 lb

Winter Operation

- Adult Passenger (*) ..... 195 lb
- Male ..... 205 lb
- Female ..... 184 lb
- Children (age 2-12) ..... 87 lb

NOTE: Children under age 2 are considered "babies-in-arms" and children over age 12 should be treated as adult passengers for purposes of standard average passenger weights.

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FLIGHT CREW ITEMS

ITEM	WEIGHT (lb)	BALANCE ARM (inches)
PILOT	192	145.08
COPILOT	192	145.08
OBSERVER	192	167.64
FLIGHT ATTENDANT	180	185.00
CREW BAGGAGE	33	252.76
NAVIGATION KIT	22	169.29

NOTE: - The adopted flight crew items are in accordance with the approved average weight, not including the respective carry-on baggage. The crew baggage is supposed to be carried in the forward wardrobe.

- The crewmembers and attendants weights presented herein refer to male.
- For female crewmembers and attendants, a weight equal to 160 lb may be adopted (AC 120-27E).

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INTERIOR ARRANGEMENT

This Section is intended to present the interior arrangements of the airplane. For information regarding the weighing and loading of the EMB-135BJ refer to the applicable Weight and Balance Manual.

For detailed information on each system, refer to the appropriate Section in this manual.

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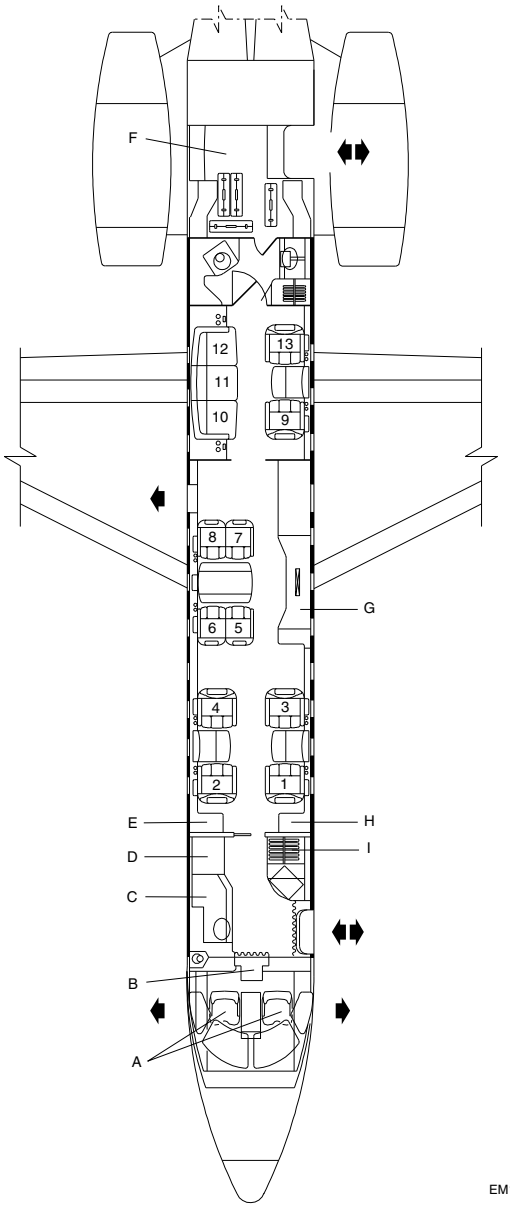
EMB-135BJ CONFIGURATION OPTION 1 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 1

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1, 2	7.503	295.39
2	3	9.135	359.65
3	4	9.272	365.04
4	5, 6	10.380	408.66
5	7, 8	12.070	475.20
6	9	13.908	547.56
7	10	14.100	555.12
8	11	14.813	583.19
9	12	15.499	610.20
10	13	15.636	615.59

PASSENGER AVERAGE CG: 11.713 m/461.14 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.360	211.02
D	RH FWD CLOSET	6.270	246.85
E	RH CLOSET	6.895	271.46
F	BAGGAGE COMPARTMENT	18.570	731.10
G	CREDENZA	11.741	462.24
H	LH CLOSET	6.895	271.46
I	LH FWD CLOSET	6.415	252.56

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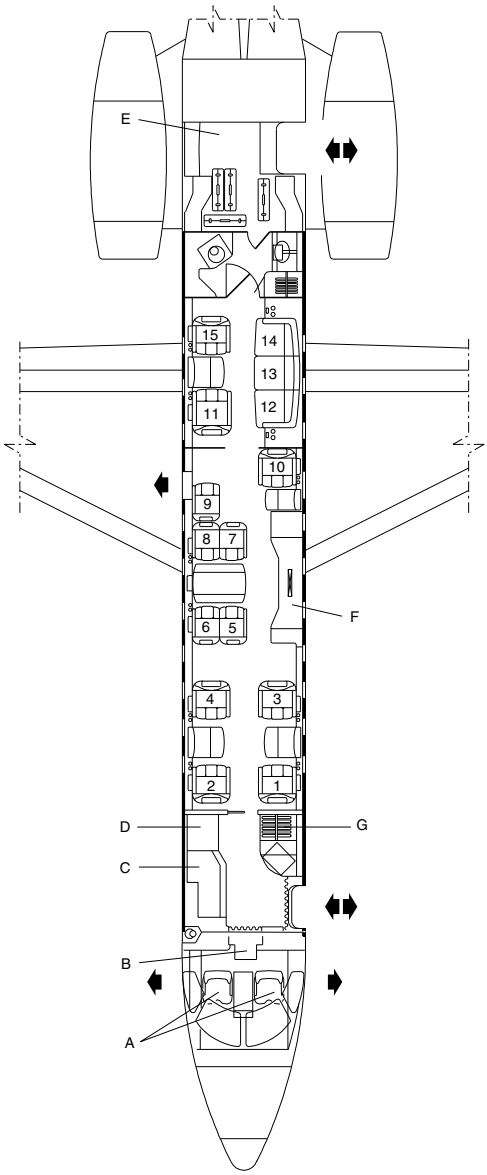
EMB-135BJ CONFIGURATION OPTION 2 (15 SEATS)



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EMB-135BJ CONFIGURATION OPTION 2

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1, 2	7.120	280.31
2	3	8.754	344.65
3	4	8.809	346.81
4	5, 6	9.830	387.01
5	7, 8	11.490	452.36
6	9	12.283	483.58
7	10	13.020	512.60
8	11	13.897	547.13
9	12	14.116	555.75
10	13	14.773	581.61
11	14	15.539	611.77
12	15	15.730	619.29

PASSENGER AVERAGE CG: 11.587 m/456.18 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.360	211.02
D	RH FWD CLOSET	6.270	246.85
E	BAGGAGE COMPARTMENT	18.570	731.10
F	CREDENZA	10.669	420.04
G	LH FWD CLOSET	6.415	252.56

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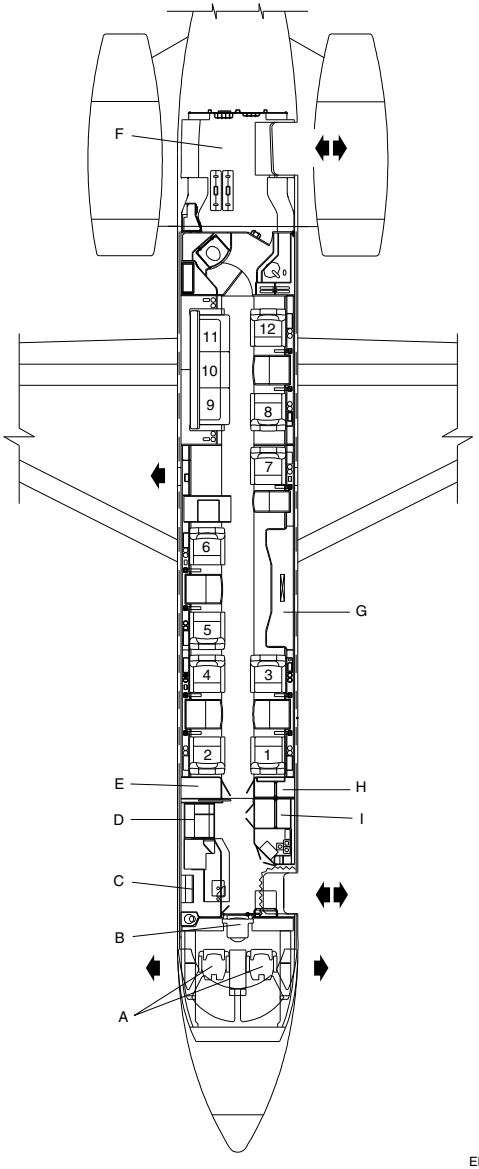
EMB-135BJ CONFIGURATION OPTION 3 (12 SEATS)



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EMB-135BJ CONFIGURATION OPTION 3

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1, 2	7.503	295.39
2	3, 4	9.068	357.01
3	5	9.830	387.01
4	6	10.712	421.73
5	7	13.020	512.60
6	8	13.920	548.03
7	9	14.105	555.31
8	10	14.821	583.50
9	11	15.537	611.69
10	12	15.643	615.87

PASSENGER AVERAGE CG: 11.728 m/461.71 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.360	211.02
D	RH FWD CLOSET	6.270	246.85
E	RH CLOSET	6.895	271.46
F	BAGGAGE COMPARTMENT	18.570	731.10
G	CREDENZA	11.454	450.94
H	LH CLOSET	6.895	271.46
I	LH FWD CLOSET	6.415	252.56

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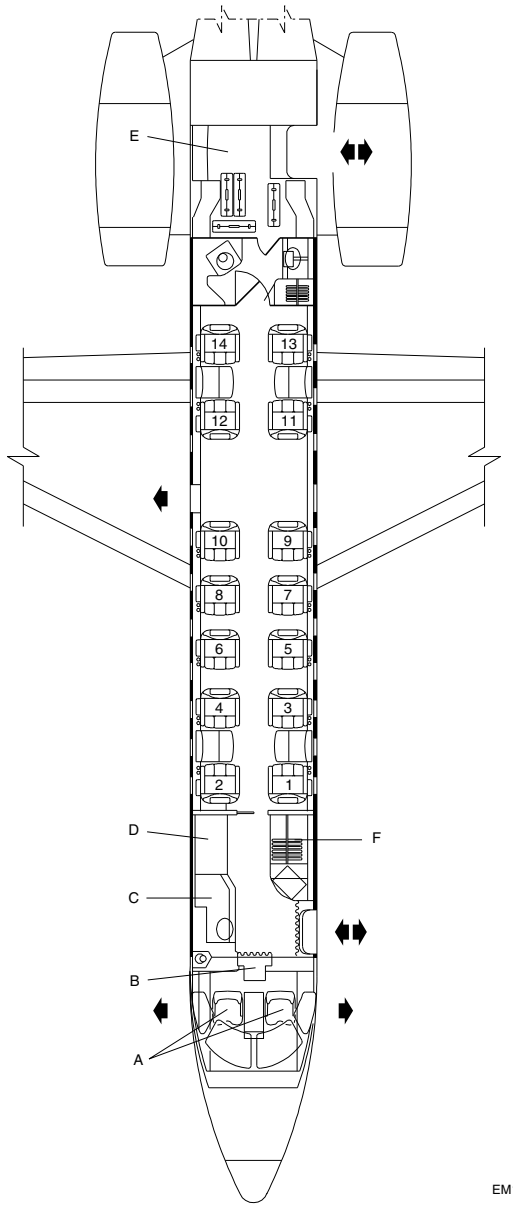
EMB-135BJ CONFIGURATION OPTION 4 (14 SEATS)



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EMB-135BJ CONFIGURATION OPTION 4

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1, 2	7.409	291.7
2	3, 4	9.040	355.9
3	5, 6	10.030	394.9
4	7, 8	11.021	433.9
5	9, 10	11.986	471.9
6	11, 12	13.734	540.7
7	13, 14	15.359	604.7

PASSENGER AVERAGE CG: 10.464 m/441.96 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.801	228.4
D	RH FWD CLOSET	6.270	246.85
E	BAGGAGE COMPARTMENT	18.570	731.10
F	LH FWD CLOSET	6.505	256.1

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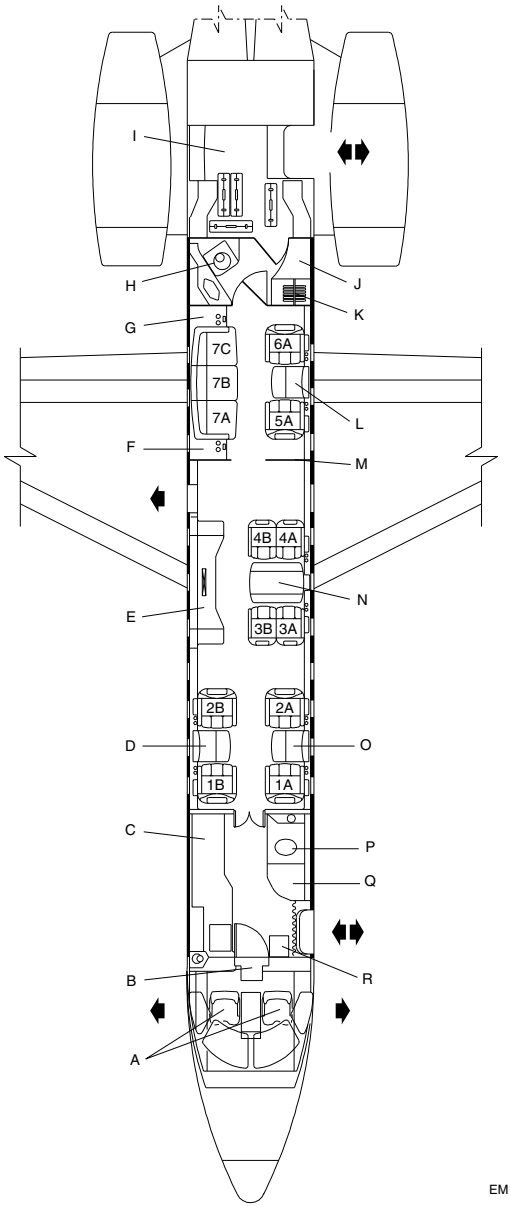
EMB-135BJ CONFIGURATION OPTION 5 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 5

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.17 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/O	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	DIVAN STOWAGE 1	13.472	530.39
G	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	BAGGAGE COMPARTMENT	18.570	731.10
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
L	EXECUTIVE TABLE 3	14.548	572.75
M	MID CABIN PARTITION AND CURTAIN	13.334	524.96
N	CONFERENCE TABLE	11.195	440.75
P	FWD LAVATORY	6.519	256.65
Q	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
R	FLIGHT ATTENDANT SEAT	4.699	185.00

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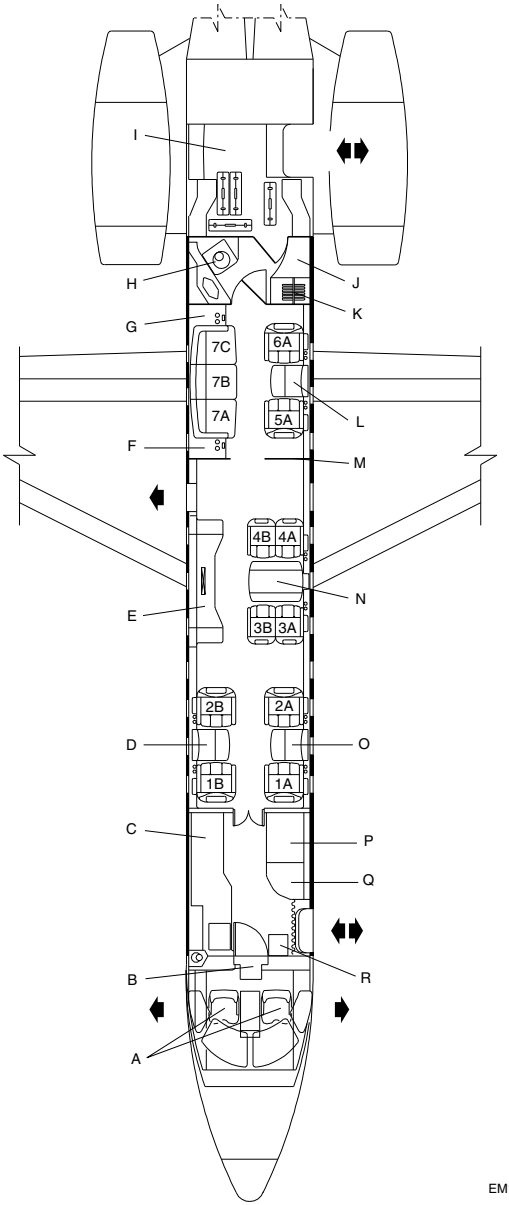
EMB-135BJ CONFIGURATION OPTION 6 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 6

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.17 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/O	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	DIVAN STOWAGE 1	13.472	530.39
G	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	BAGGAGE COMPARTMENT	18.570	731.10
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
L	EXECUTIVE TABLE 3	14.548	572.75
M	MID CABIN PARTITION AND CURTAIN	13.334	524.96
N	CONFERENCE TABLE	11.195	440.75
P	FWD CLOSET	6.519	256.65
Q	ENTERTAINMENT COMPARTMENT RACK	5.796	228.19
R	FLIGHT ATTENDANT SEAT	4.699	185.00

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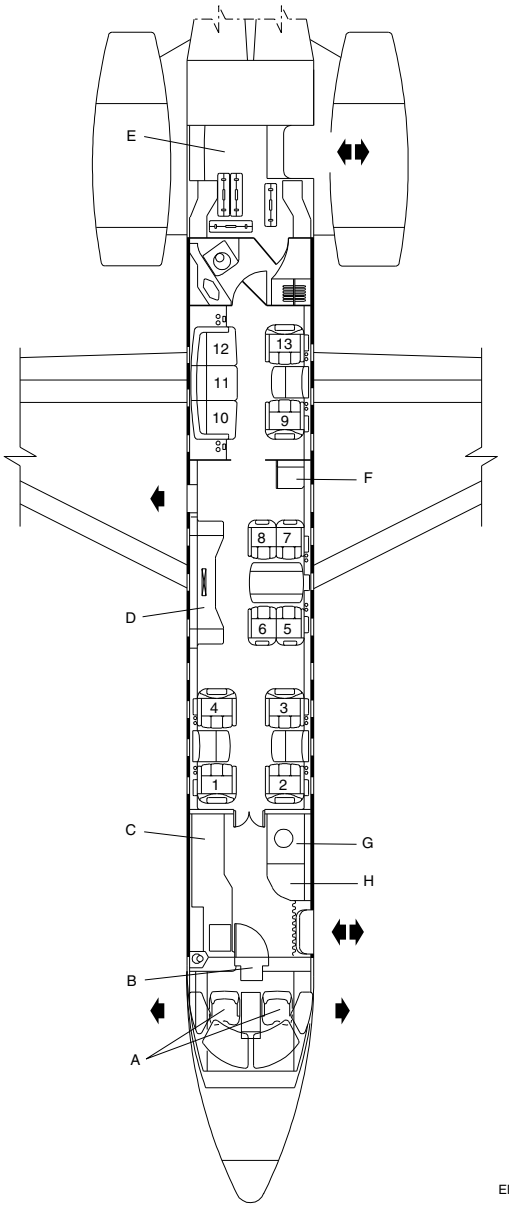
EMB-135BJ CONFIGURATION OPTION 7 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 7

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1, 2	7.539	296.80
2	3, 4	8.947	352.24
3	5, 6	10.485	412.80
4	7, 8	11.908	468.80
5	9	13.863	545.80
6	10	13.990	550.79
7	11	14.702	578.82
8	12	15.413	606.81
9	13	15.235	599.80

PASSENGER AVERAGE CG: 11.612 m/457.17 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D	CREDENZA	11.195	440.74
E	BAGGAGE COMPARTMENT	18.570	731.10
F	STOWAGE 1	13.134	517.09
G	FWD CLOSET	6.519	256.65
H	ENTERTAINMENT COMPARTMENT RACK	5.796	228.21

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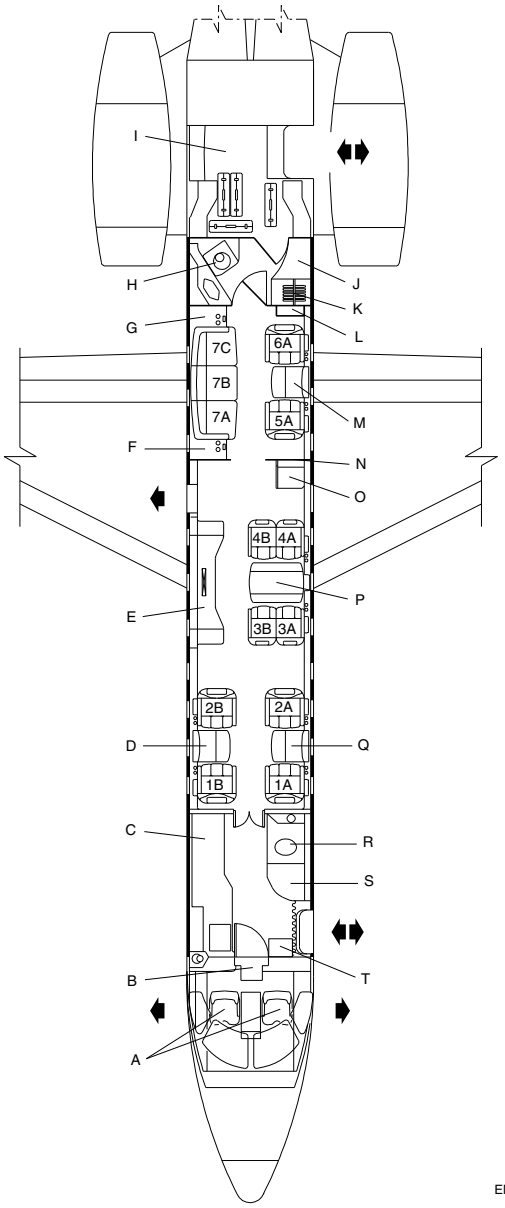
EMB-135BJ CONFIGURATION OPTIONS 8 AND 14 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTIONS 8 AND 14

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.17 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/Q	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	DIVAN STOWAGE 1	13.472	530.39
G	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	BAGGAGE COMPARTMENT	18.570	731.10
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
L	STOWAGE 2	15.837	623.50
M	EXECUTIVE TABLE 3	14.548	572.75
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
O	STOWAGE 1	13.133	517.05
P	CONFERENCE TABLE	11.195	440.75
R	FWD LAVATORY	6.519	256.65
S	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
T	FLIGHT ATTENDANT SEAT	4.699	185.00

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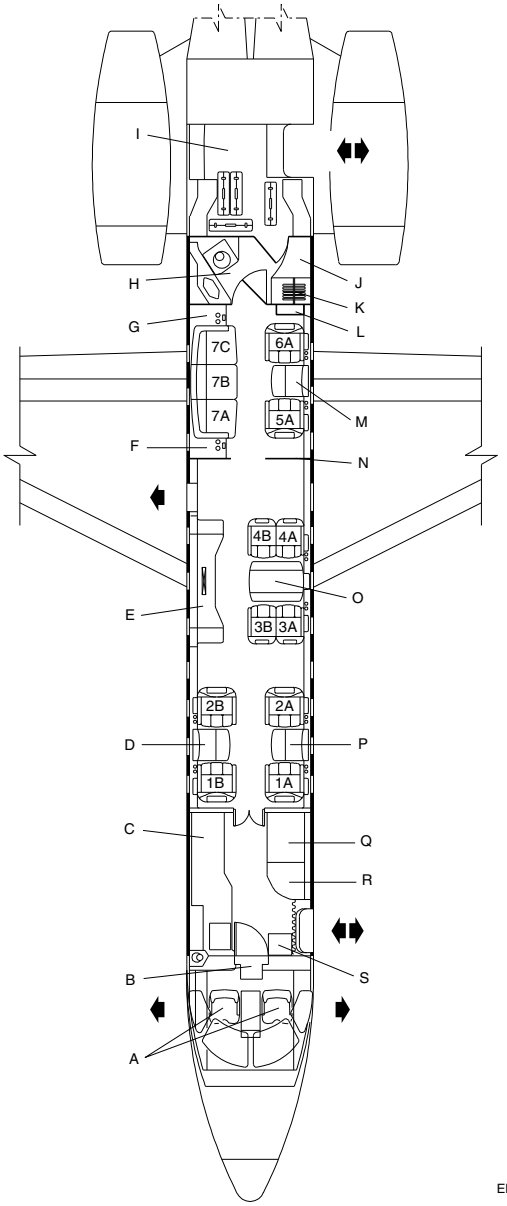
EMB-135BJ CONFIGURATION OPTIONS 9, 10 AND 17 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTIONS 9, 10 AND 17

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.17 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	DIVAN STOWAGE 1	13.472	530.39
G	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	BAGGAGE COMPARTMENT	18.570	731.10
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
L	STOWAGE	15.837	623.50
M	EXECUTIVE TABLE 3	14.548	572.75
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
O	CONFERENCE TABLE	11.195	440.75
Q	FWD CLOSET	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
S	FLIGHT ATTENDANT SEAT	4.699	185.00

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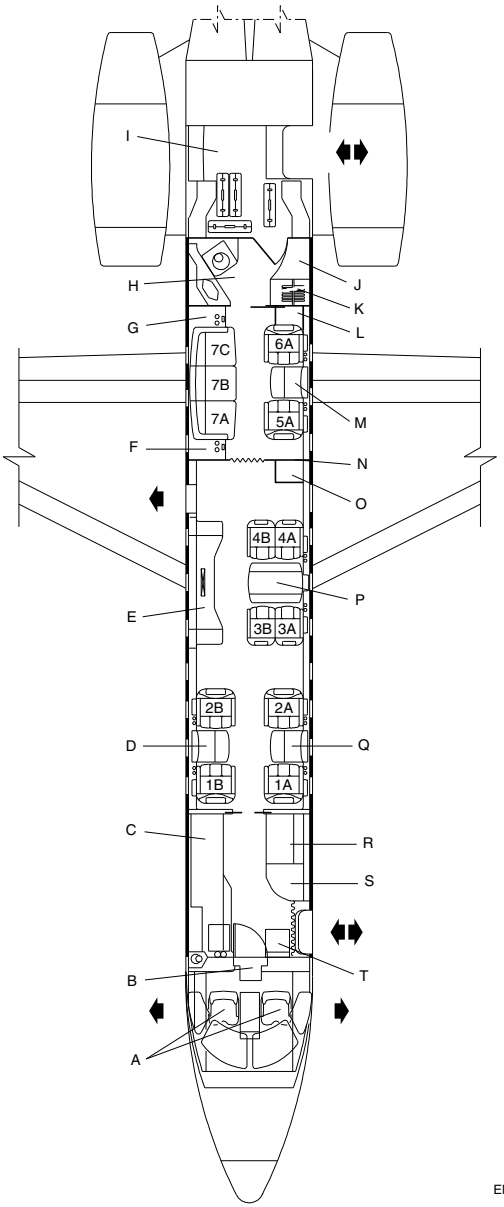
EMB-135BJ CONFIGURATION OPTION 11 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 11

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.18 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	DIVAN STOWAGE 1	13.472	530.39
G	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	BAGGAGE COMPARTMENT	18.570	731.10
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
L	STOWAGE 2	15.837	623.50
M	EXECUTIVE TABLE 3	14.548	572.75
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
O	STOWAGE 1	13.133	517.05
Q	CONFERENCE TABLE	11.195	440.75
R	FWD CLOSET	6.519	256.65
S	ENTERTAINMENT EQUIPMENT RACK	5.765	226.97
T	FLIGHT ATTENDANT SEAT	4.699	185.00

NOTE: For airplanes up to S/N 1164 with the interior layout herein described the Entertainment Equipment Rack Balance Arm is 5.796 m (228.19 in).

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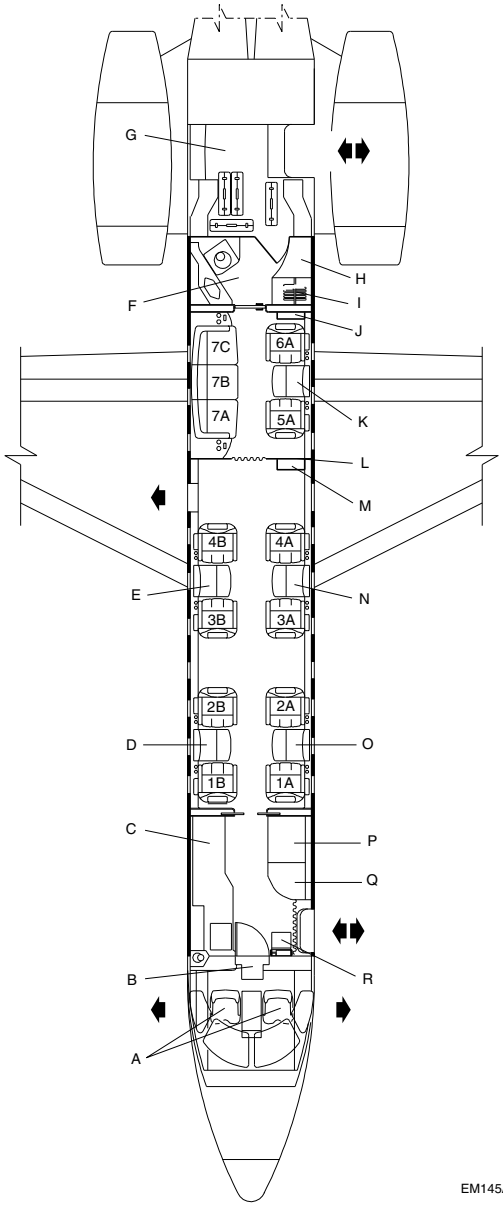
EMB-135BJ CONFIGURATION OPTION 12 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 12

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.944	470.24
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.618 m/457.40 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/O	EXECUTIVE TABLE 1, 2	8.223	323.74
E/N	EXECUTIVE TABLE 3, 4	11.195	440.75
F	TOILET AND VANITY	16.797	661.30
G	BAGGAGE COMPARTMENT	18.570	731.10
H	STORAGE COAT AFT	17.040	670.86

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	STORAGE COAT FWD	16.433	646.97
J	STOWAGE 2	15.837	623.50
K	EXECUTIVE TABLE 5	14.548	572.75
L	MID CABIN PARTITION AND CURTAIN	13.334	524.96
M	STOWAGE 1	13.133	517.05
P	FWD LAVATORY	6.519	256.65
Q	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
R	FLIGHT ATTENDANT SEAT	4.699	185.00

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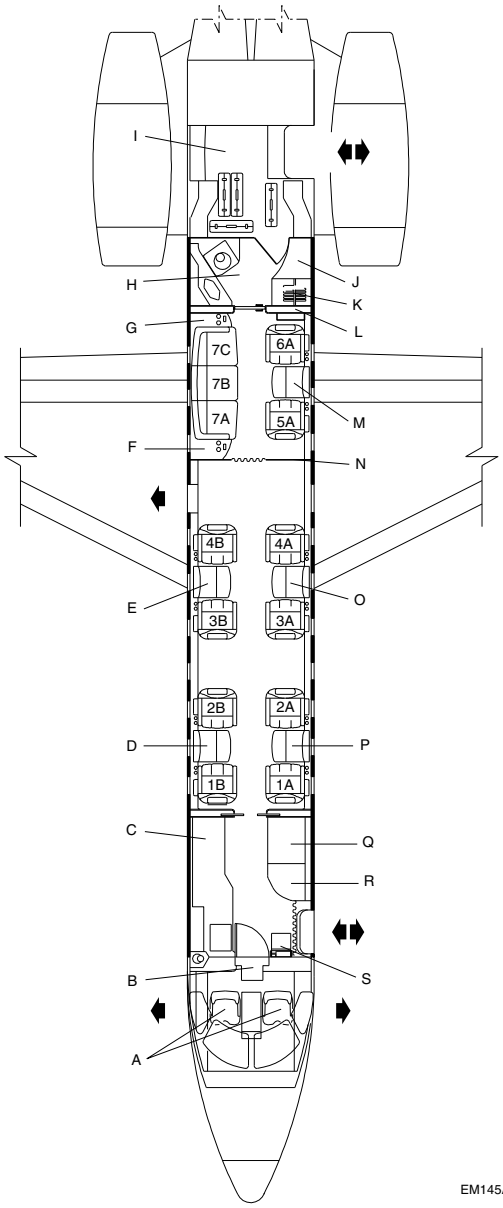
EMB-135BJ CONFIGURATION OPTIONS 13 AND 15 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTIONS 13 AND 15

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.944	470.24
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.618 m/457.40 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E/O	EXECUTIVE TABLE 3, 4	11.195	440.75
F	DIVAN STOWAGE 1	13.472	530.39
G	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30
I	BAGGAGE COMPARTMENT	18.570	731.10

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
L	STOWAGE	15.837	623.50
M	EXECUTIVE TABLE 5	14.548	572.75
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
Q	FWD CLOSET	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
S	FLIGHT ATTENDANT SEAT	4.699	185.00

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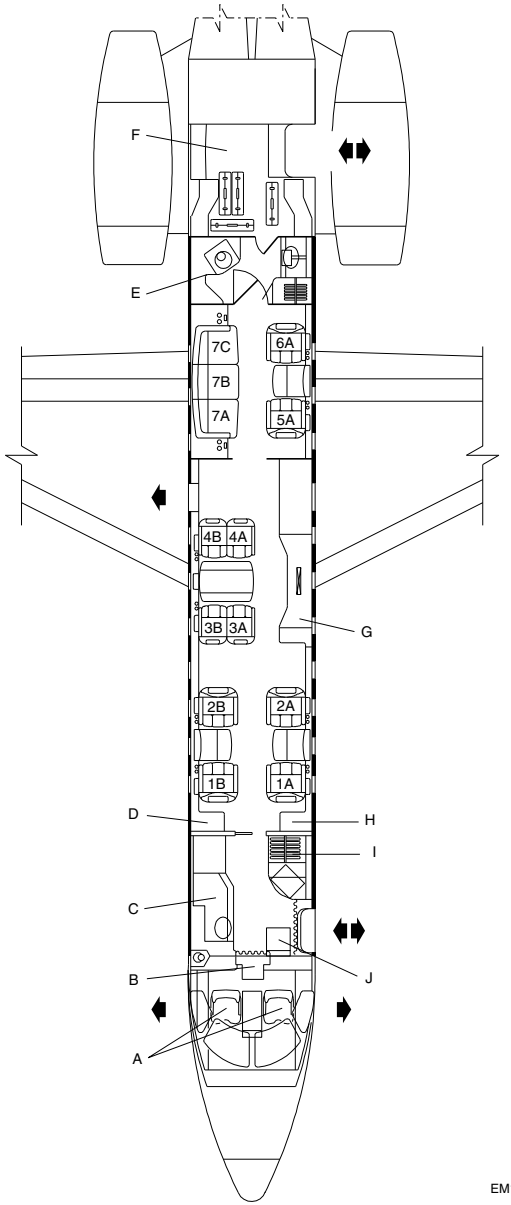
EMB-135BJ CONFIGURATION OPTION 16 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 16

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.470	294.09
2	2A, 2B	9.132	359.53
3	3A, 3B	10.238	403.07
4	4A, 4B	12.028	473.54
5	5A	13.782	542.60
6	6A	15.609	614.53
7	7A	14.101	555.16
	7B	14.813	583.19
	7C	15.524	611.18

PASSENGER AVERAGE CG: 11.351 m/459.01 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.678	223.54
D	RIGHT CLOSET	6.903	271.77
E	TOILET AND VANITY	16.797	661.30
F	BAGGAGE COMPARTMENT	18.570	731.10
G	CREDENZA	11.770	463.39
H	LEFT CLOSET	6.916	272.28
I	LEFT FORWARD CLOSET	6.413	252.48
J	FLIGHT ATTENDANT SEAT	4.699	185.00

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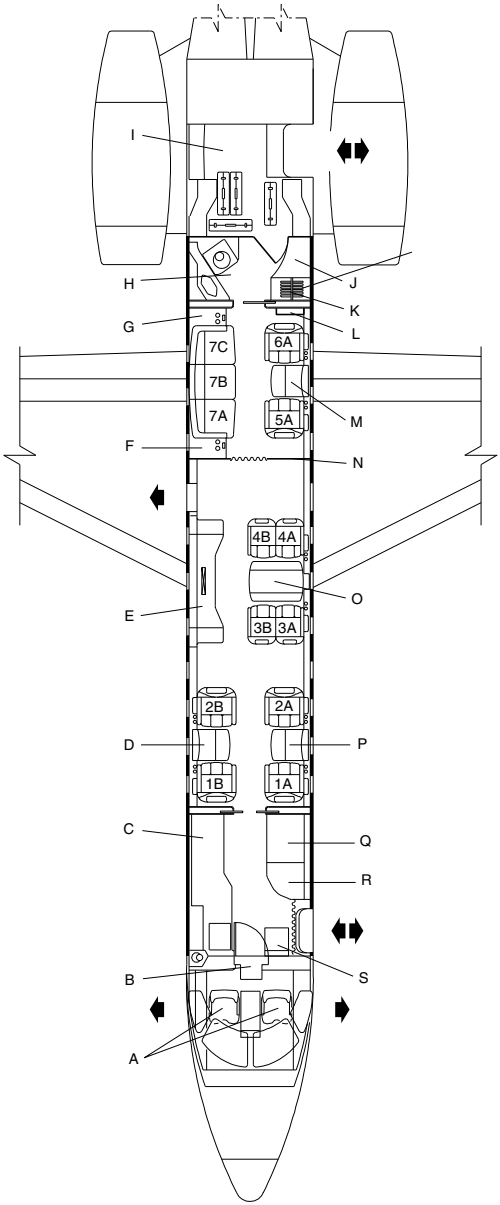
EMB-135BJ CONFIGURATION OPTION 18 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 18

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.18 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	DIVAN STOWAGE 1	13.472	530.39
G	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	BAGGAGE COMPARTMENT	18.570	731.10
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
L	STOWAGE	15.837	623.50
M	EXECUTIVE TABLE 3	14.548	572.75
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
O	CONFERENCE TABLE	11.195	440.75
Q	FWD LAVATORY	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
S	FLIGHT ATTENDANT SEAT	4.699	185.00

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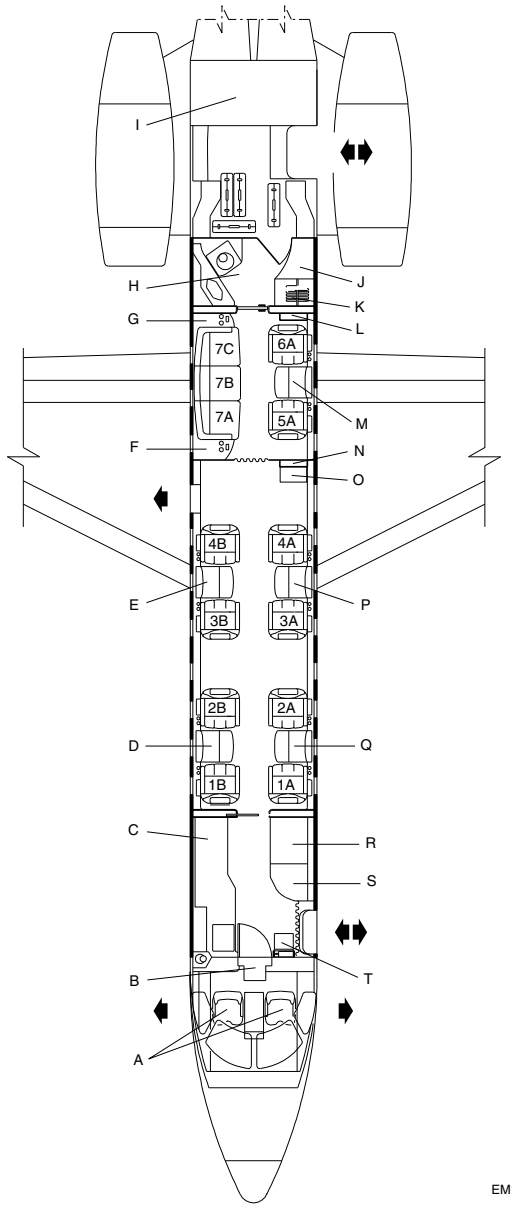
EMB-135BJ CONFIGURATION OPTION 19 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 19

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.944	470.24
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.618 m/457.40 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/Q	EXECUTIVE TABLE 1, 2	8.223	323.74
E/P	EXECUTIVE TABLE 3, 4	11.195	440.75
F	DIVAN STOWAGE 1	13.472	530.39
G	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30
I	BAGGAGE COMPARTMENT	18.570	731.10

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
L	STOWAGE 2	15.837	623.50
M	EXECUTIVE TABLE 5	14.548	572.75
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
O	STOWAGE 1	13.133	517.05
R	FWD CLOSET	6.519	256.65
S	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
T	FLIGHT ATTENDANT SEAT	4.699	185.00

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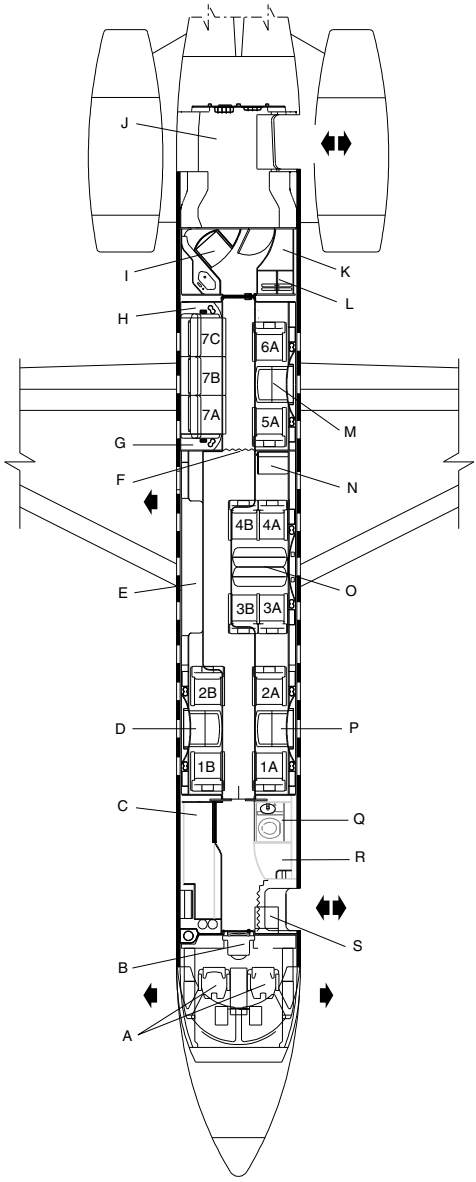
EMB-135BJ CONFIGURATION OPTION 20 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 20

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.18 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	MID CABIN PARTITION AND CURTAIN	13.334	524.96
G	DIVAN STOWAGE 1	13.472	530.39
H	DIVAN STOWAGE 2	15.930	627.16

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	TOILET AND VANITY	16.797	661.30
J	BAGGAGE COMPARTMENT	18.570	731.10
K	STORAGE COAT AFT	17.040	670.86
L	STORAGE COAT FWD	16.433	646.97
M	EXECUTIVE TABLE 3	14.548	572.75
N	STOWAGE	13.133	517.05
O	CONFERENCE TABLE	11.195	440.75
Q	FWD LAVATORY	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
S	FLIGHT ATTENDANT SEAT	4.699	185.00

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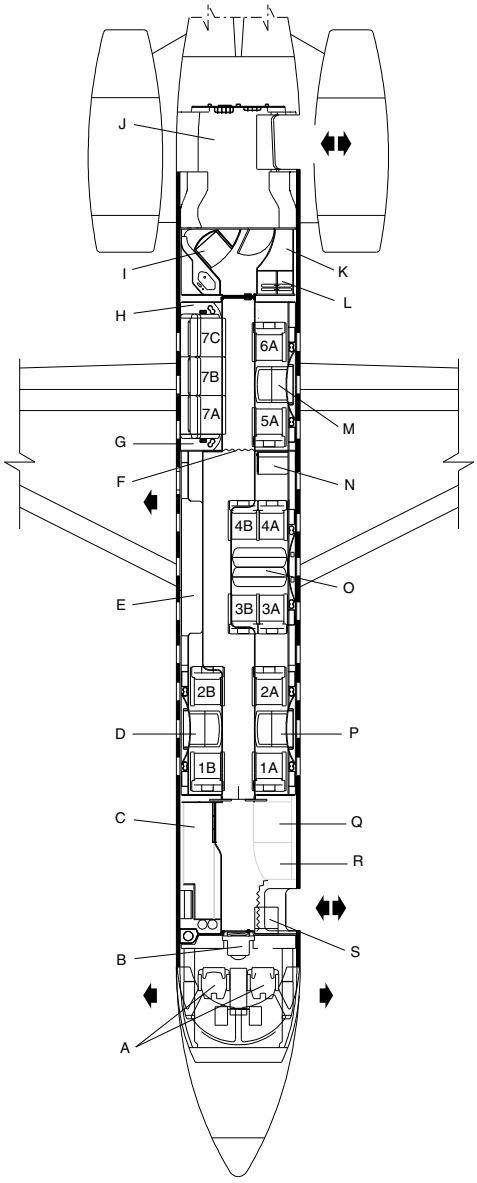
EMB-135BJ CONFIGURATION OPTION 21 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 21

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.18 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	MID CABIN PARTITION AND CURTAIN	13.334	524.96
G	DIVAN STOWAGE 1	13.472	530.39
H	DIVAN STOWAGE 2	15.930	627.16

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	TOILET AND VANITY	16.797	661.30
J	BAGGAGE COMPARTMENT	18.570	731.10
K	STORAGE COAT AFT	17.040	670.86
L	STORAGE COAT FWD	16.433	646.97
M	EXECUTIVE TABLE 3	14.548	572.75
N	STOWAGE	13.133	517.05
O	CONFERENCE TABLE	11.195	440.75
Q	FWD CLOSET	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
S	FLIGHT ATTENDANT SEAT	4.699	185.00

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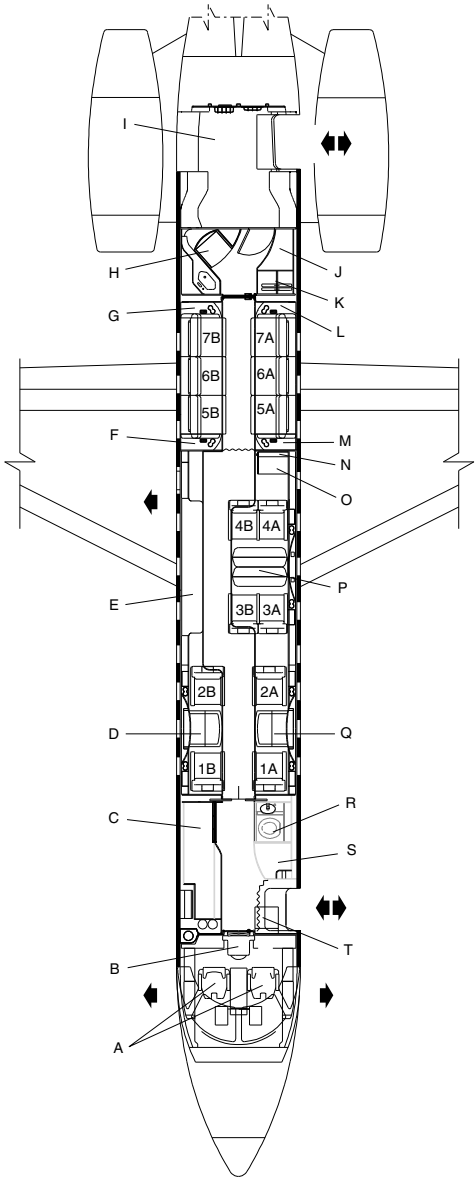
EMB-135BJ CONFIGURATION OPTION 22 (14 SEATS)



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EMB-135BJ CONFIGURATION OPTION 22

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A, 5B	13.990	550.79
6	6A, 6B	14.702	578.82
7	7A, 7B	15.413	606.81

PASSENGER AVERAGE CG: 11.855 m/466.73 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/Q	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F/M	DIVAN STOWAGE 1	13.472	530.39
G/L	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30
I	BAGGAGE COMPARTMENT	18.570	731.10

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
O	STOWAGE	13.133	517.05
P	CONFERENCE TABLE	11.195	440.75
R	FWD LAVATORY	6.519	256.65
S	ENTERTAINMENT EQUIPMENT RACK	5.765	226.97
T	FLIGHT ATTENDANT SEAT	4.699	185.00

NOTE: For airplanes up to S/N 1163 with the interior layout herein described the Entertainment Equipment Rack (Ref. S) Balance Arm is 5.796 m (228.19 in).

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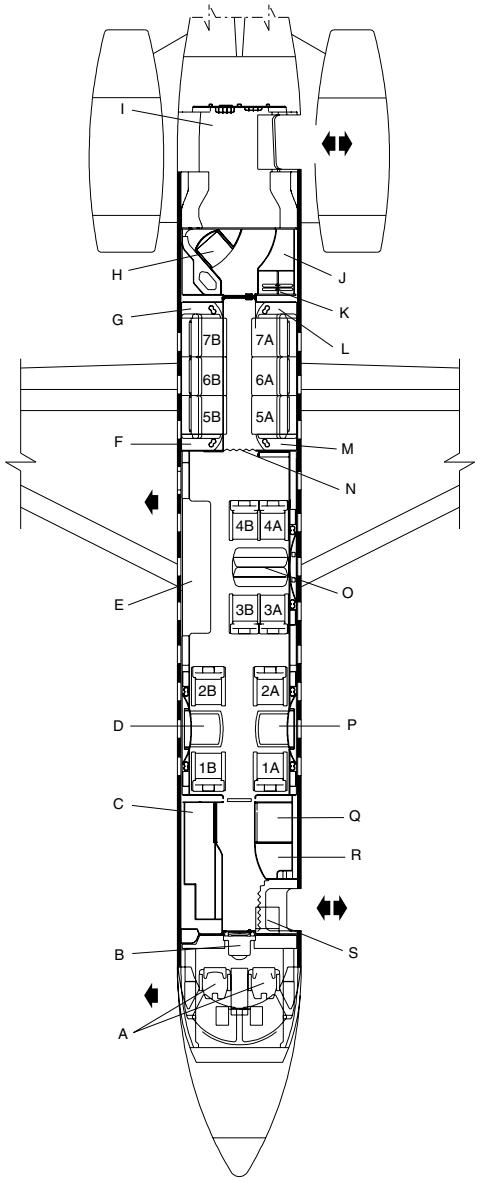
EMB-135BJ CONFIGURATION OPTION 23 (14 SEATS)



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EMB-135BJ CONFIGURATION OPTION 23

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A, 5B	13.990	550.79
6	6A, 6B	14.702	578.82
7	7A, 7B	15.413	606.81

PASSENGER AVERAGE CG: 11.855 m/466.73 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F/M	DIVAN STOWAGE 1	13.472	530.39
G/L	DIVAN STOWAGE 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30
I	BAGGAGE COMPARTMENT	18.570	731.10
J	STORAGE COAT AFT	17.040	670.86

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
K	STORAGE COAT FWD	16.433	646.97
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
O	CONFERENCE TABLE	11.195	440.75
Q	FWD LAVATORY	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
S	FLIGHT ATTENDANT SEAT	4.699	185.00

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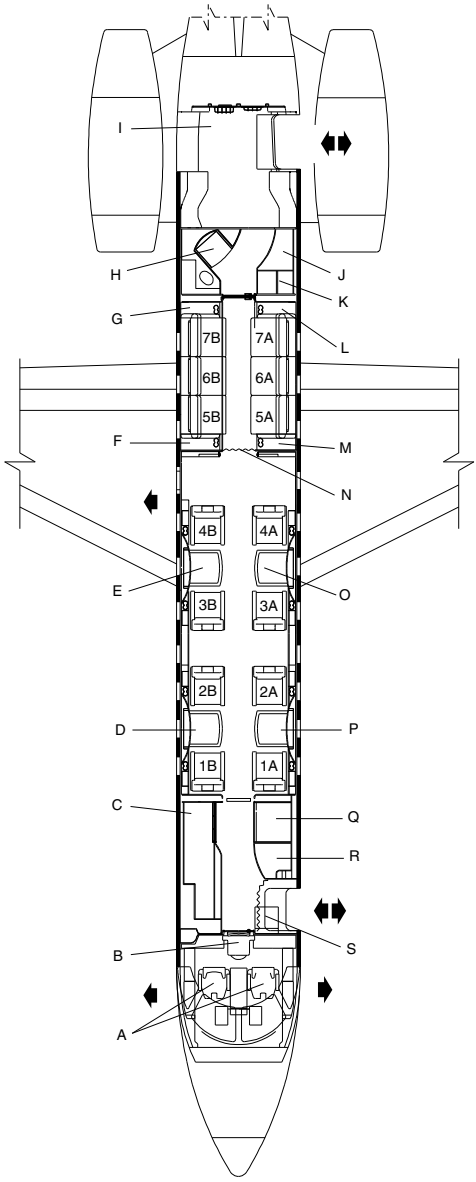
EMB-135BJ CONFIGURATION OPTION 24 (14 SEATS)



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EMB-135BJ CONFIGURATION OPTION 24

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A, 5B	13.990	550.79
6	6A, 6B	14.702	578.82
7	7A, 7B	15.413	606.81

PASSENGER AVERAGE CG: 11.855 m/466.73 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E/O	EXECUTIVE TABLE 3, 4	11.195	440.75
F/M	DIVAN STOWAGE FWD 1, 2	13.472	530.39
G/L	DIVAN STOWAGE FWD 1, 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30
I	BAGGAGE COMPARTMENT	18.570	731.10

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
Q	FWD LAVATORY	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
S	FLIGHT ATTENDANT SEAT	4.699	185.00

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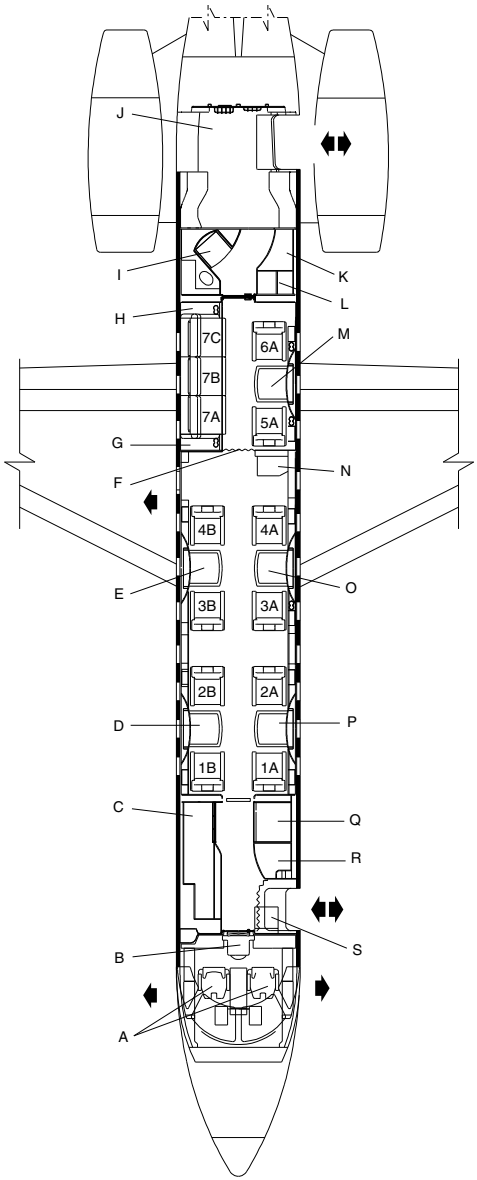
EMB-135BJ CONFIGURATION OPTIONS 25 AND 31 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTIONS 25 AND 31

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.944	470.24
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.618 m/457.40 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E/O	EXECUTIVE TABLE 3, 4	11.195	440.75
F	MID CABIN PARTITION AND CURTAIN	13.334	524.96
G	DIVAN STOWAGE 1	13.477	530.55
H	DIVAN STOWAGE 2	15.914	626.53

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	TOILET AND VANITY	16.797	661.30
J	BAGGAGE COMPARTMENT	18.570	731.10
K	STORAGE COAT AFT	17.040	670.86
L	STORAGE COAT FWD	16.433	646.97
M	EXECUTIVE TABLE 5	14.548	572.75
N	STOWAGE	13.098	515.67
Q	FWD LAVATORY	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
S	FLIGHT ATTENDANT SEAT	4.699	185.00

NOTE: The interior layout herein described for Configuration Option 31 does not present the stowage compartment and the following balance arms are applicable for Divan Stowage 1 (Ref. G) and 2 (Ref. H), respectively: 13.472 m (530.39 in) and 15.930 m (627.16 in).

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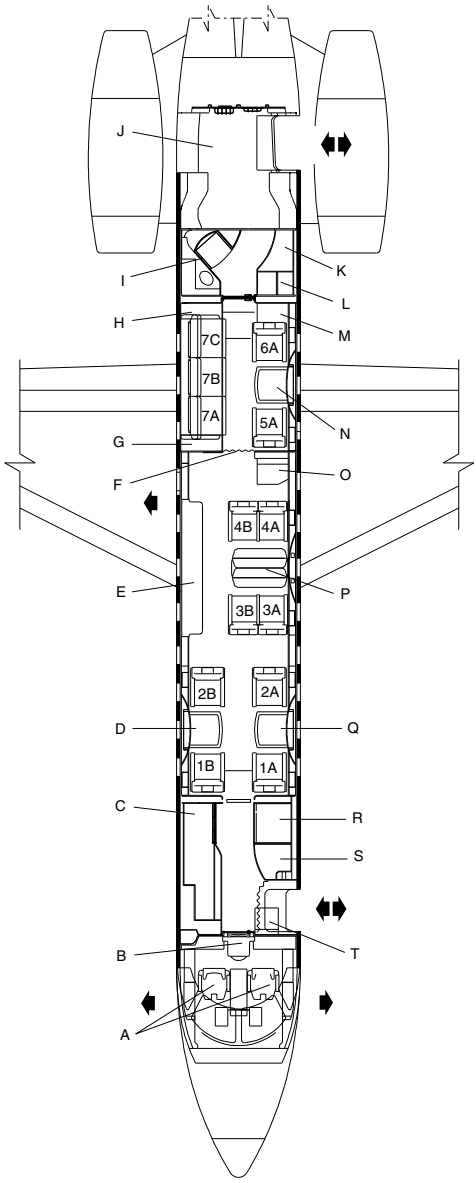
EMB-135BJ CONFIGURATION OPTION 26 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 26

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.612 m/457.18 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/Q	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	MID CABIN PARTITION AND CURTAIN	13.334	524.96
G	DIVAN STOWAGE 1	13.472	530.39
H	DIVAN STOWAGE 2	15.930	627.16

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	TOILET AND VANITY	16.797	661.30
J	BAGGAGE COMPARTMENT	18.570	731.10
K	STORAGE COAT AFT	17.040	670.86
L	STORAGE COAT FWD	16.433	646.97
M	STOWAGE 2	15.837	623.50
N	EXECUTIVE TABLE 3	14.548	572.75
O	STOWAGE 1	13.133	517.05
P	CONFERENCE TABLE	11.195	440.75
R	FWD LAVATORY	6.519	256.65
S	ENTERTAINMENT EQUIPMENT RACK	5.765	226.97
T	FLIGHT ATTENDANT SEAT	4.699	185.00

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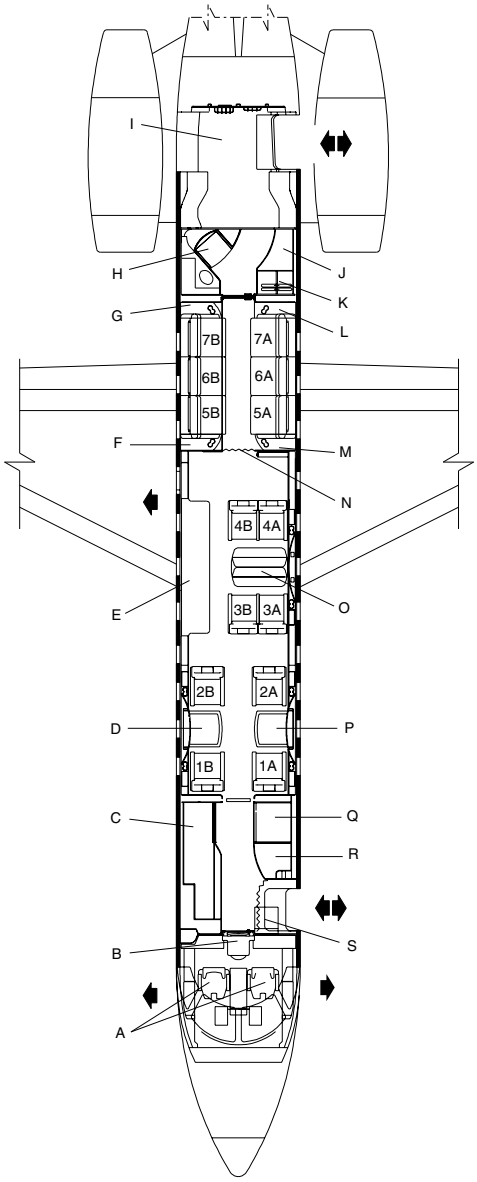
EMB-135BJ CONFIGURATION OPTION 27 (14 SEATS)



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EMB-135BJ CONFIGURATION OPTION 27

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.908	468.82
5	5A, 5B	13.990	550.79
6	6A, 6B	14.702	578.82
7	7A, 7B	15.413	606.81

PASSENGER AVERAGE CG: 11.855 m/466.73 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/P	EXECUTIVE TABLE 1, 2	8.223	323.74
E	CREDENZA	11.195	440.75
F	LIFE RAFT STOWAGE FWD 2	13.472	530.39
G/L	LIFE RAFT STOWAGE AFT 1, 2	15.930	627.16
H	TOILET AND VANITY	16.797	661.30

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	BAGGAGE COMPARTMENT	18.570	731.10
J	STORAGE COAT AFT	17.040	670.86
K	STORAGE COAT FWD	16.433	646.97
M	DIVAN STOWAGE 1	13.472	530.39
N	MID CABIN PARTITION AND CURTAIN	13.334	524.96
O	CONFERENCE TABLE	11.195	440.75
Q	FWD LAVATORY	6.519	256.65
R	ENTERTAINMENT EQUIPMENT RACK	5.765	226.97
S	FLIGHT ATTENDANT SEAT	4.699	185.00

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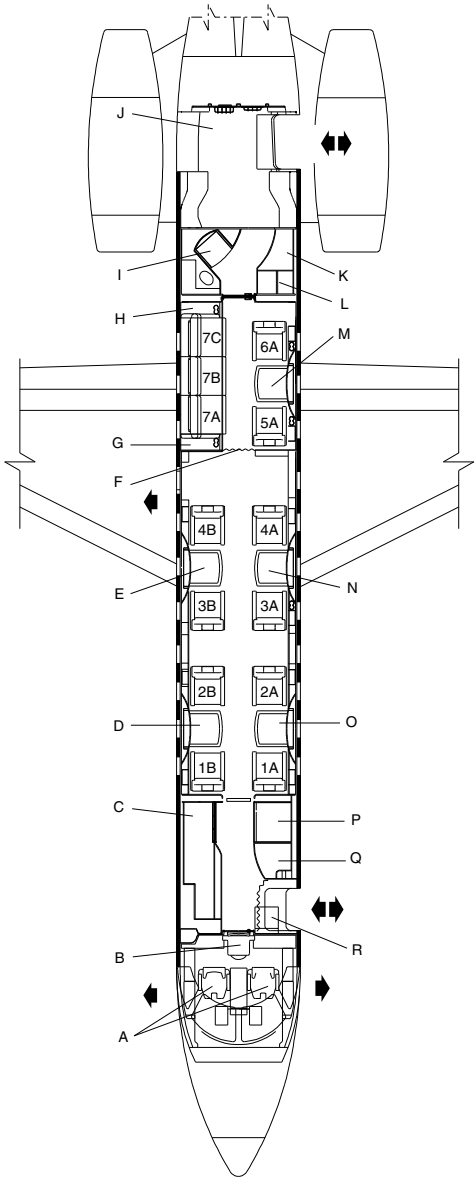
EMB-135BJ CONFIGURATION OPTION 31 (13 SEATS)



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EMB-135BJ CONFIGURATION OPTION 31

SEATS ROW	PASSENGER SEATS	BALANCE ARM	
		(m)	(in)
1	1A, 1B	7.539	296.81
2	2A, 2B	8.947	352.24
3	3A, 3B	10.485	412.79
4	4A, 4B	11.944	470.24
5	5A	13.863	545.79
6	6A	15.235	599.80
7	7A	13.990	550.79
	7B	14.702	578.82
	7C	15.413	606.81

PASSENGER AVERAGE CG: 11.618 m/457.40 in.

REF	COMPONENT	BALANCE ARM	
		(m)	(in)
A	PILOT SEATS	3.685	145.08
B	OBSERVER SEAT	4.258	167.64
C	GALLEY	5.846	230.16
D/O	EXECUTIVE TABLE 1, 2	8.223	323.74
E/N	EXECUTIVE TABLE 3, 4	11.195	440.75
F	MID CABIN PARTITION AND CURTAIN	13.334	524.96
G	DIVAN STOWAGE 1	13.472	530.39
H	DIVAN STOWAGE 2	15.930	627.16

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REF	COMPONENT	BALANCE ARM	
		(m)	(in)
I	TOILET AND VANITY	16.797	661.30
J	BAGGAGE COMPARTMENT	18.570	731.10
K	STORAGE COAT AFT	17.040	670.86
L	STORAGE COAT FWD	16.433	646.97
M	EXECUTIVE TABLE 5	14.548	572.75
P	FWD LAVATORY	6.519	256.65
Q	ENTERTAINMENT EQUIPMENT RACK	5.796	228.19
R	FLIGHT ATTENDANT SEAT	4.699	185.00

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INDEX SYSTEM

When determining the airplane center of gravity position, it is necessary to do calculations adding and/or subtracting the moment caused by each item loaded in the airplane.

Moment, per definition, is the weight multiplied by the distance to a reference point. If the moment of the airplane and of the items loaded in it are computed in reference to the airplane datum, the result will be very long numeric expressions.

As the operational usage of long numeric expressions may interfere with the airplane's safe operation, because the personnel may get confused with the long numbers, airlines usually adopt an Index System for weight and balance purposes.

The Index System is a convention for presenting airplane or body moments on a different measuring system. When the Index System, is used, the result will be short numeric expressions.

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The Index System formula is presented below:

$$I = \frac{W \times (Arm - A)}{B} + C$$

where:

I = Index.

W = Airplane or body weight.

Arm = Airplane or body center of gravity.

A = Reference arm. Selected arm around which all index values are calculated. On the balance chart CG envelope, the Reference Arm CG% line is the only vertical CG% line. (*)

B = Constant used as a denominator to convert moment values into index values. On the balance chart CG envelope, B controls the CG% lines splay (splay decreases with increasing B). (*)

C = Constant used as a plus value to avoid negative index figures. It is only used when computing the airplane Basic Operating Weight Index (BOW Index), and is not used when computing individual bodies index influence. On the balance chart CG envelope, the Reference Arm CG% vertical line is at C index units. (*)

(*) Values for A, B and C may be chosen at the operator discretion.

The Embraer recommended Index System formula is:

EMB-135BJ Model: $$I = \frac{W \times (Arm - 515)}{17400} + 13$$

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INDEX INFLUENCE

Index influence is the variation of index when a body is loaded or unloaded from the airplane. It is usually referred in index units per pound for variable weight bodies (cargo, catering, etc), index units per passenger when computing passenger influence or index units for fixed weight bodies (flight attendant, cockpit observer, etc).

The following table shows the index influence for various items:

INDEX INFLUENCE FOR LEGACY 600

ITEM	ARM (inches)	REFERENCE WEIGHT (lb)	INDEX INFLUENCE
Cargo/Baggage	731.10	1	+0.012 IU/lb
Galley	214.53	1	-0.017 IU/lb
LH Closet	271.85	1	-0.015 IU/lb
RH Closet	271.85	1	-0.014 IU/lb
LH Forward Closet	251.77	1	-0.014 IU/lb
Credenza	473.11	1	-0.024 IU/lb
Cockpit Observer	167.64	192	-3.833 IU

(*) The Galley, the LH Closet, LH Forward Closet, RH Closet and Credenza arms are for the standard configuration. Check the airplane actual configuration arms in the AOM Loading Section.

EXAMPLE:

Computation of cargo index influence for the EMB-135BJ.

The EMB-135BJ cargo compartment centroid is located 731.10 inches from the airplane datum.

The index influence per lb is:

$$I = \frac{1 \times (731.10 - 515)}{17400} = 0.012 \ \ IU/lb$$

So, for each 100 lb of cargo loaded in the cargo compartment, the index increases by 1.2 index units.

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LEGACY 600 FUEL INDEX VARIATION

WING TANKS FUEL

VOLUME (US Gal)	WEIGHT (lb)	ARM (inches)	INDEX (IU)
50	335	491.05	-0.5
100	670	491.88	-0.9
150	1005	492.73	-1.3
200	1340	493.55	-1.7
250	1675	494.35	-2.0
300	2010	495.07	-2.3
350	2345	495.78	-2.6
400	2680	496.45	-2.9
450	3015	497.10	-3.1
500	3350	497.73	-3.3
550	3685	498.33	-3.5
600	4020	498.91	-3.7
650	4355	499.48	-3.9
700	4690	500.08	-4.0
750	5025	500.67	-4.1
800	5360	501.28	-4.2
850	5695	501.95	-4.3
900	6030	502.58	-4.3
950	6365	503.18	-4.3
1000	6700	503.81	-4.3
1050	7035	504.45	-4.3
1100	7370	505.04	-4.2
1150	7705	505.68	-4.1
1200	8040	506.28	-4.0
1250	8375	506.82	-3.9
1300	8710	507.49	-3.8
1350	9045	508.38	-3.4
1400	9380	509.31	-3.1
1450	9715	510.40	-2.6
1500	10050	511.57	-2.0
1550	10385	512.85	-1.3
1600	10720	514.26	-0.5
1650	11055	516.12	0.7
1690	11323	517.61	1.7

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FORWARD FUSELAGE TANKS

LEGACY 600 S/N UP TO 591 OR PRE-MOD. SB 145LEG-28-0010

VOLUME (US Gal)	WEIGHT (lb)	ARM (inches)	INDEX (IU)
50	335	358.75	-3.01
75	503	355.22	-4.62
100	670	352.12	-6.27
125	838	349.35	-7.98
150	1005	346.86	-9.71
175	1173	344.63	-11.49
200	1340	342.71	-13.27
225	1508	341.08	-15.07
250	1675	339.68	-16.88
275	1843	338.48	-18.70
300	2010	337.45	-20.51
325	2178	336.58	-22.33
350	2345	335.85	-24.14
375	2513	335.20	-25.97
400	2680	334.64	-27.78
425	2848	334.14	-29.60
450	3015	333.71	-31.41
475	3183	333.32	-33.23
500	3350	332.99	-35.04
525	3518	332.70	-36.86
550	3685	332.46	-38.66
558	3739	332.40	-39.24

NOTE: Max usable fuel allowed on the forward tanks:

- Airplanes S/N up to 591 or Pre-Mod. SB 145LEG-28-0010: 3527 lb.
- Airplanes S/N 625 and on or Post-Mod. SB 145LEG-28-0010: 3968 lb.
- Adopted fuel density of 6.7 lb/US Gal.

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FORWARD FUSELAGE TANKS

LEGACY 600 S/N 625 AND ON OR POST-MOD. SB 145LEG-28-0010

VOLUME (US Gal)	WEIGHT (lb)	ARM (inches)	INDEX (IU)
50	335	358.65	-3.01
75	503	355.29	-4.62
100	670	352.25	-6.27
125	838	349.56	-7.97
150	1005	346.95	-9.71
175	1173	344.59	-11.49
200	1340	342.58	-13.29
225	1508	340.92	-15.09
250	1675	339.61	-16.88
275	1843	338.33	-18.71
300	2010	337.12	-20.55
325	2178	336.37	-22.36
350	2345	335.63	-24.17
375	2513	334.96	-26.00
400	2680	334.54	-27.79
425	2848	333.82	-29.66
450	3015	333.45	-31.46
475	3183	333.08	-33.28
500	3350	333.07	-35.03
525	3518	332.73	-36.85
558	3739	332.28	-39.26
586	3926	332.28	-41.23

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AFT FUSELAGE TANKS

The aft fuselage tanks total fuel capacity is 434 US Gal.

NOTE: Maximum usable fuel allowed on the aft fuselage tanks:

- Airplanes S/N up to 591 or Pre-Mod. SB 145LEG-28-0010: 2910 lb.
- Airplanes S/N 625 and on or Post-Mod. SB 145LEG-28-0010: 2954 lb.

The cg balance arm is 798.94 inches and does not vary relevantly with the mass due to its geometry.

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BOW AND BOW INDEX DETERMINATION

The BOW (Basic Operating Weight) is the Basic Empty Weight (BEW) plus the weight of the operational items (crew, catering, lavatory fluid, etc).

In order to determine the BOW and the respective Index is necessary to add to the BEW all the weight and moment variations referent to the operational items.

The BEW is obtained from the airplane weighing form.

EXAMPLE:

Computation of BOW and the respective Index for the Legacy 600.

For a BEW equal to 29391.17 lb and BEW moment equal to 15903562.09 lb.in:

ITEM	WEIGHT (lb)	ARM (inches)	MOMENT (lb.in
BEW	29391.17	-	15903562.09
Lavatory Fluid	44.1 110	673.62 649.85	29706.64 71483.50
Pilot & Co-Pilot	384	145.08	55710.72
Flight Attendant	180	185.00	33300.00
Crew Baggage	33	252.76	8341.08
Navigation Kit	22	169.29	3724.38
BOW (not including catering)	30197.27	-	16105828.41

Airplane Arm = 16105828.41/30197.27 = 533.35 inches

$$\text{Airplane Index} = \frac{30197.27 \times (533.35 - 515)}{17400} + 13 = 44.85 \text{ IU}$$

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NOTE: - Catering weight was not considered above because its weight is not constant. In our example we are considering catering as a separate item (see Index Influences).

- Unusable fuel, hydraulic fluid, engine and APU oil are considered included in the BEW.
- The values above are an example. Use the airplane actual BEW for determining the actual BOW.

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SECTION 1-07

LOADING

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INTRODUCTION

This Section contains airplane dimensions, interior arrangement data for loading purposes and loading capacity information in the passenger cabin and baggage compartment.

Instructions for loading and unloading the airplane and live animals transportation are also included in this Section.

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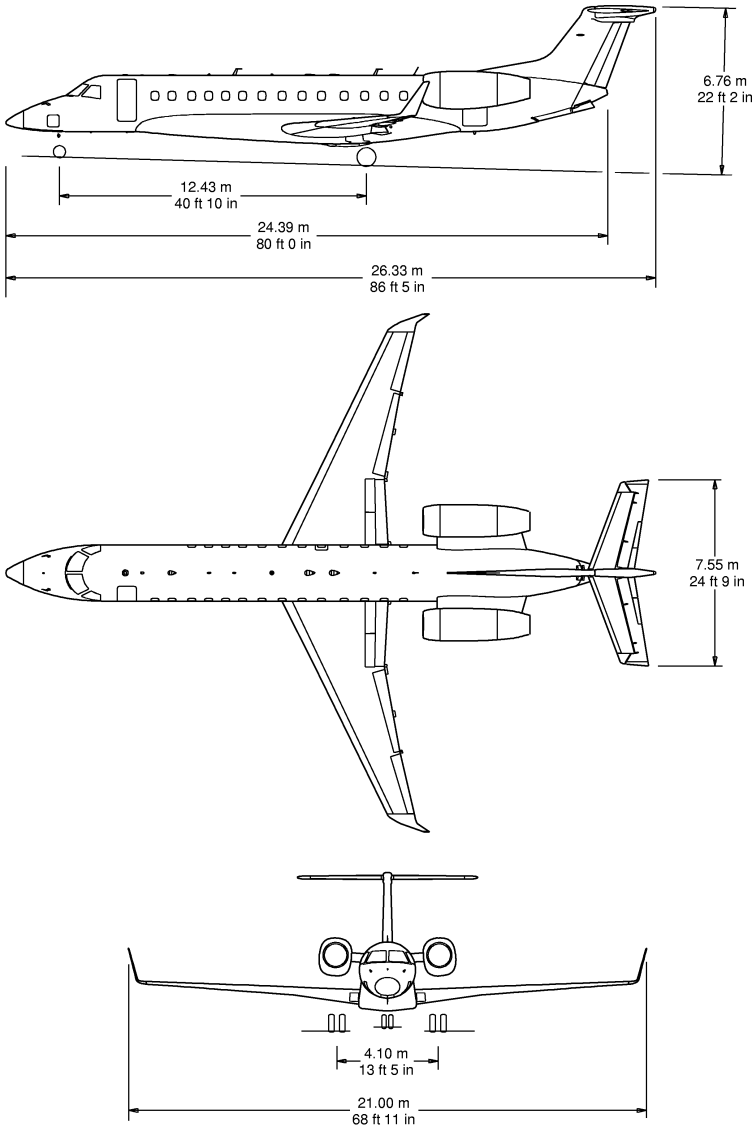
EXTERNAL DIMENSIONS

EMB-135BJ THREE VIEW DRAWING



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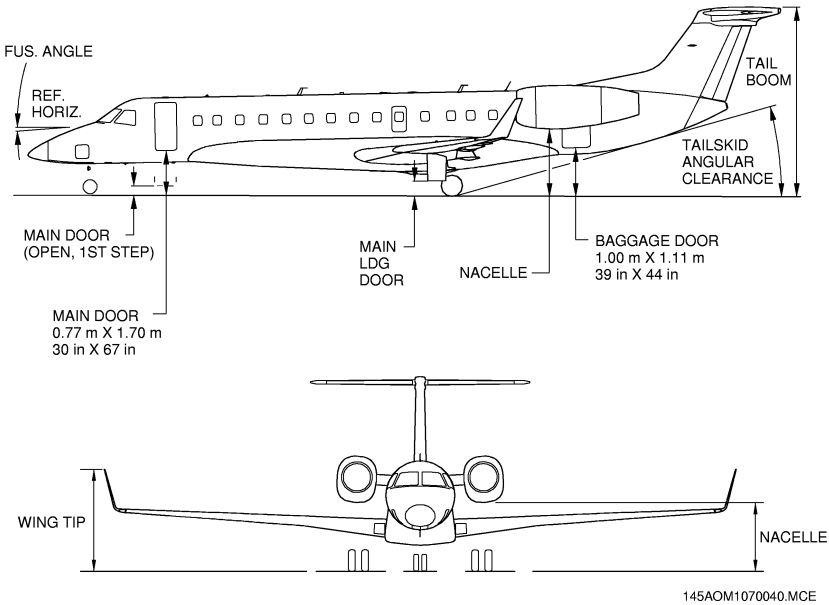
EMB-135BJ GROUND CLEARANCES



Vertical Clearance	Maximum	Minimum
Fuselage Angle	1°6´25”	0°51´32”
Main Door	1.64 m 5 ft 5 in	1.59 m 5 ft 3 in
Main Door Open (1st step)	0.48 m 1 ft 7 in	0.38 m 1 ft 3 in
Main Landing Gear Door	0.27 m 11 in	0.15 m 6 in
Nacelle	2.39 m 7 ft 10 in	2.27 m 7 ft 5 in
Baggage Door	1.73 m 5 ft 8 in	1.63 m 5 ft 4 in
Tail Boom	6.71 m 22 ft 3 in	6.59 m 21 ft 7 in
Wing Tip	3.51 m 11 ft 6 in	3.40 m 11 ft 2 in
Tailskid Angular Clearance	15°54’49”	14°56’46”

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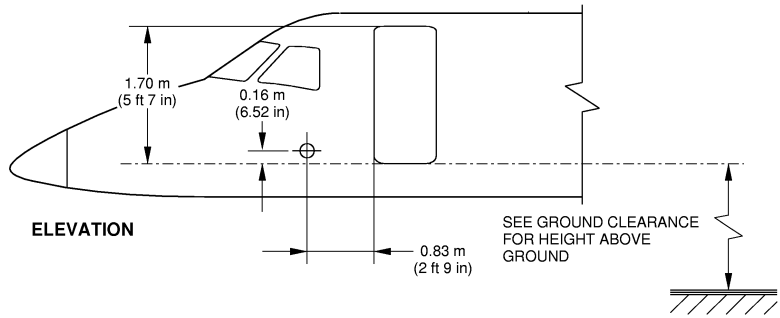
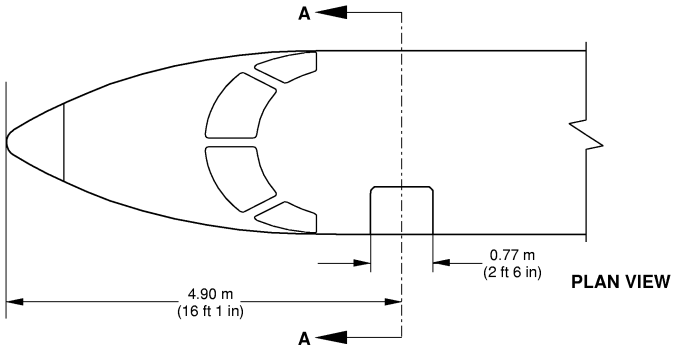
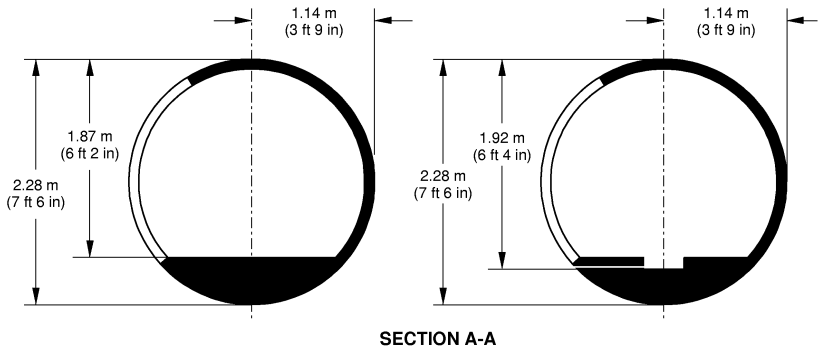
EMB-135BJ DOOR CLEARANCES







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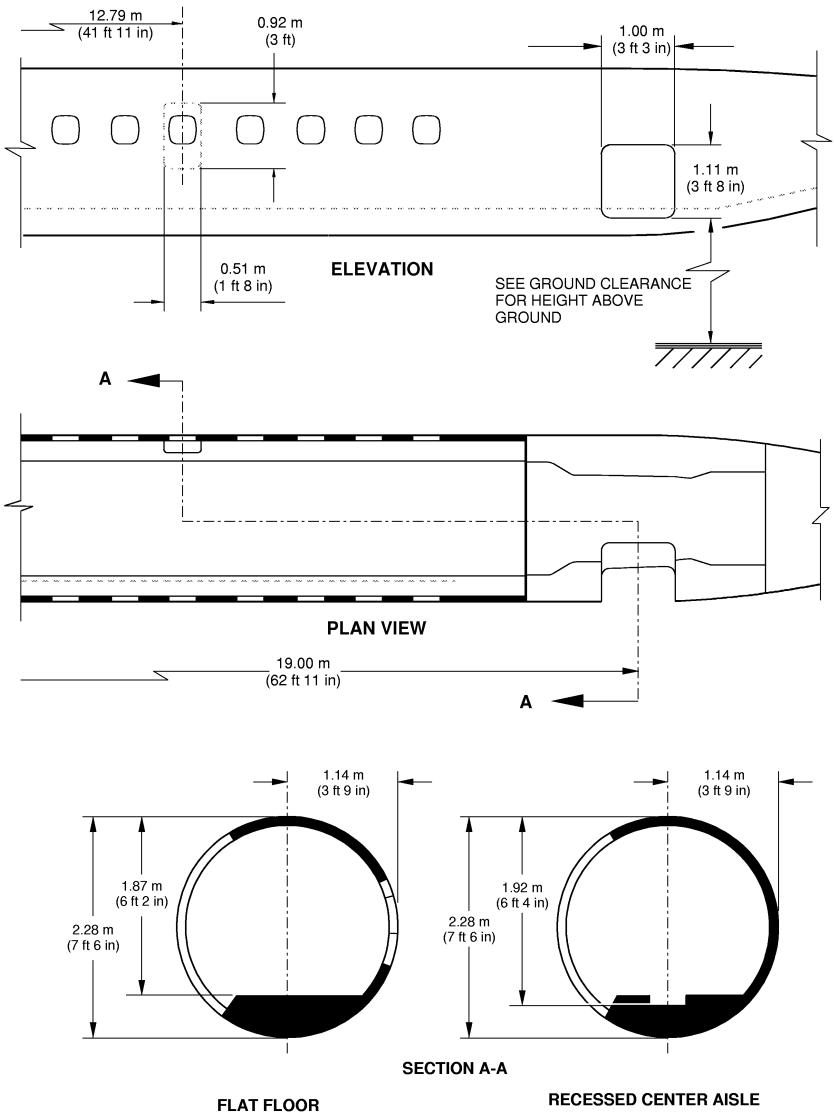
EMB-135BJ DOOR CLEARANCES



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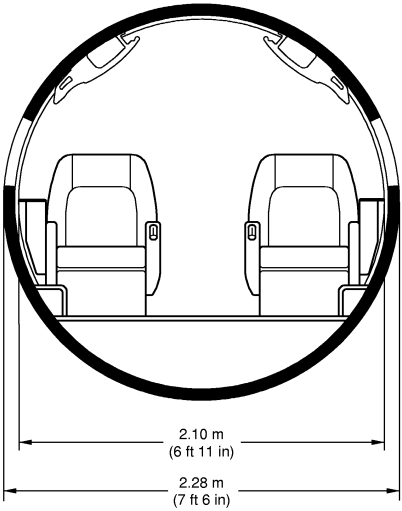
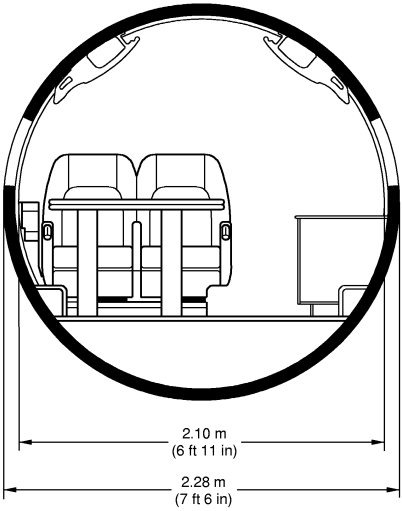
CABIN CROSS SECTION



CROSS SECTION A



CROSS SECTION B

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CARRY-ON BAGGAGE

Carry-on volumes may be stowed in the available furniture compartments as closets, wardrobes and stowage compartments, when existing.

There is no specific requirement for underseat carry-on volumes; however a maximum of 9.0 kg (20.0 lb) is allowable, provided the volume is properly restrained to avoid sliding.

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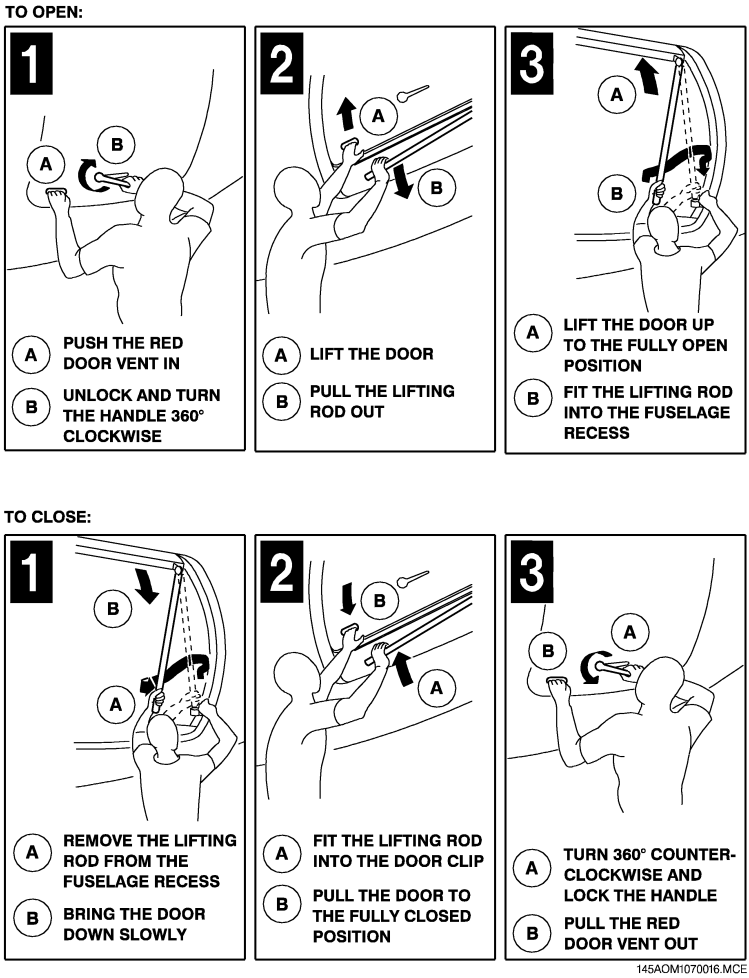
BAGGAGE DOOR

The baggage door, located on the rear left side of the fuselage, is 1.00 meter (39.4 in) wide and 1.11 meters (43.7 in) high.
The baggage door is manually operated from the outside. The initial opening movement (displacement of the door inward) and final closing and latching movement (displacement of the door outward) are achieved by means of a door locking mechanism controlled by an external handle which is stowed in the lower half of the door.



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BAGGAGE COMPARTMENT

The baggage compartment is located in the rear part of the fuselage.

The EMB-135BJ is fitted with a "class-C" baggage compartment. Airplanes with the "class-C" baggage compartment have the following systems installed:

– Baggage Compartment Smoke Detection System.
– Baggage Compartment Fire Extinguishing System.
– Baggage Compartment Ventilation System.

Although no dedicated temperature control is available (the "class-C" baggage compartment is heated by passenger cabin air flowing into it), the baggage ventilation system provides an adequate environment for carrying live animals in the compartment.

The following cargo nets may be installed in the baggage compartment:

– One Baggage Door Anti-Blockage Barrier.
– One Cargo Arresting Net (vertical restraint).

EMB-135BJ BAGGAGE COMPARTMENT LIMITS

Baggage Compartment Available Volume ..... 6.8 m^3 (240 cu.ft)

Maximum Floor Distributed Load..... 390 kg/m^2 (80 lb/ft^2)

Total Maximum Capacity for All Airplanes, except S/N 867, 880, 901, 910 and 919..... 450 kg (994 lb)

Total Maximum Capacity for Airplanes S/N 867, 880, 901, 910 and 919 ..... 500 kg (1102 lb)

NOTE: The total load capacity of the baggage compartment shall be reduced in 36 kg (80 lb) when the towbar and towbar head are installed on it.

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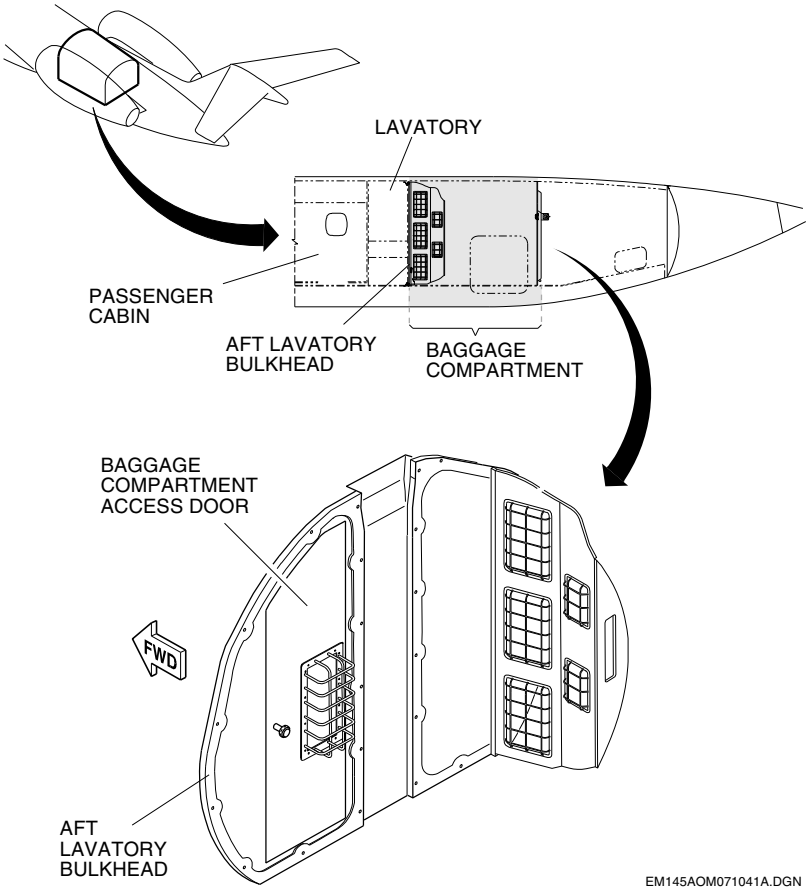
BAGGAGE COMPARTMENT ACCESS DOOR

The Baggage Compartment Access Door is installed in the aft lavatory bulkhead which separates the passenger cabin from the baggage compartment.

The door has a peephole (one way into the baggage area) and a latch mechanism which allows to be opened from within the baggage compartment.



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BAGGAGE AND CARGO LOADING

Baggage and cargo should be equally distributed in the baggage compartment to avoid load concentration.

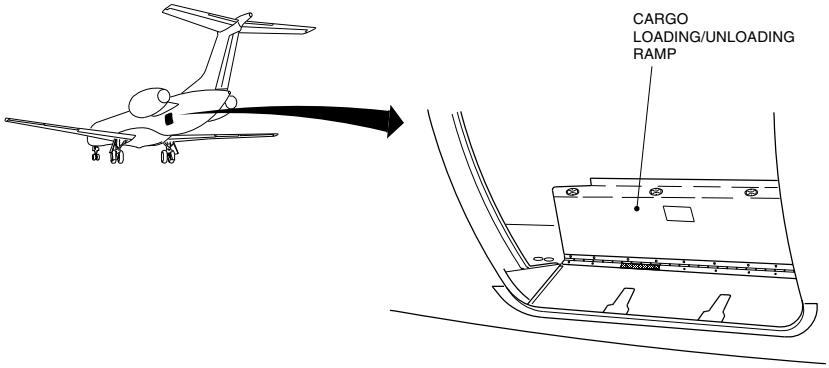
High density volumes must be tied down, unless the floor distributed load is less than 125 kg/m^2 (25.6 lb/ft^2).

Volumes with sharp edges should be fixed to the floor or conveniently protected to prevent vertical and lateral movements, in order to prevent structural damages.

To load the baggage compartment with the maximum capacity of 450 kg (500 kg for airplanes S/N 867, 880, 901, 910 and 919), no more than two persons can be at the airplane cone, one inside the baggage compartment and the other inside the rear electronic compartment.

CAUTION: IF THE CONDITIONS ABOVE ARE NOT OBSERVED, AIRPLANE TILTING (TAIL DOWN) MAY OCCUR.

Before loading or unloading the baggage compartment, the Cargo Loading/Unloading Ramp (also known as Door Jamb Barrier) must be lowered in order to protect the baggage door latching mechanism.



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CARGO NETS

BAGGAGE DOOR ANTI-BLOCKAGE BARRIER

The anti-blockage barrier net secures the baggage and prevents the cargo door from jamming when this is in the closed position (the door slides inboard before opening upward).
The net attaches to two pulley assemblies which attach to the net beam assembly. The net beam assembly is attached to an upper attach bracket. A cargo net adapter attaches the cargo door safety net to the upper attach bracket. Decals on the net assembly indicate orientation (FWD, AFT, UPSIDE, or RH/LH). Straps on the cargo safety net attach to anchor plates on the cargo loading/unloading ramp (door jamb barrier). The cargo door safety net is held to the cargo compartment floor by six anchor plates tiedown fittings. Two shock lanyard assemblies extend the door jamb barrier assembly when the baggage door is opened.

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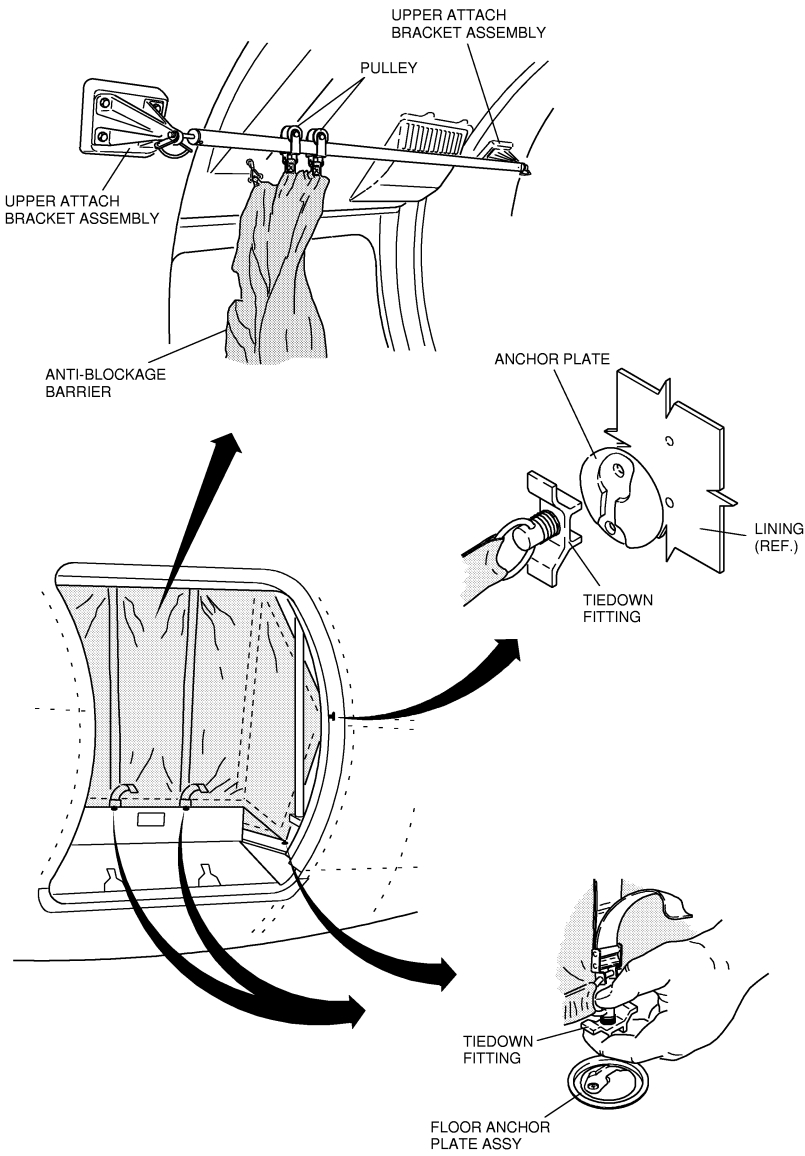

ANTI-BLOCKAGE BARRIER NET INSTALLATION

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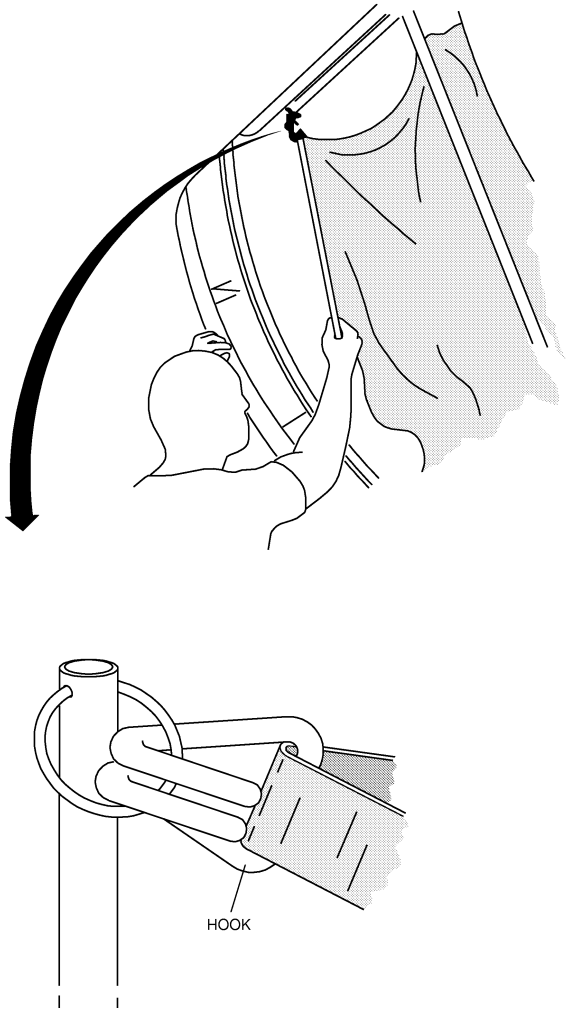

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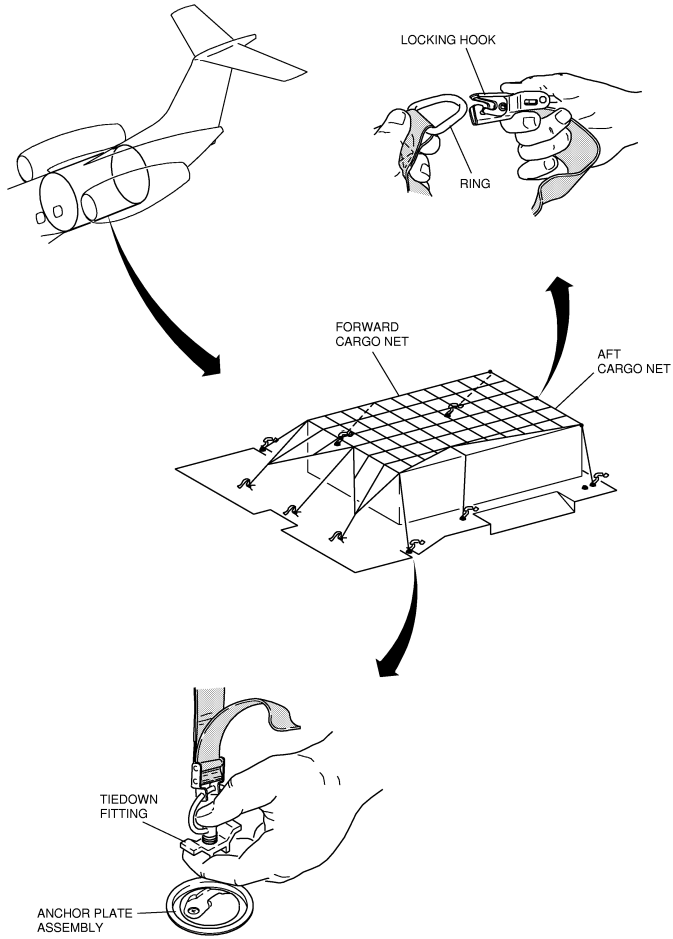
ANTI-BLOCKAGE BARRIER NET INSTALLATION

CARGO ARRESTING NET

The cargo arresting net (tie-down) provides vertical restraint to the baggage and cargo. It is attached to the cargo compartment floor by means of five anchor plates. Adjustable straps and pigtails allow the cargo arresting net to extend and retract. Decals on the cargo net assembly indicate orientation (FWD, AFT, UPSIDE, or RH/LH) of the net in the cargo compartment.



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LIVE ANIMALS TRANSPORTATION

This section presents the general conditions for live animal transportation in the EMB-135BJ Class C Baggage Compartment.
The main references that regulate and state methods and procedures to handling, appropriate packaging, legal aspects for animal transportation, etc. are the IATA Live Animal Regulations and SAE AIR1600.

GENERAL RECOMMENDATIONS

Generically, animals should be protected from stressing situations, like excessive noise, solar radiation, draft, high or low temperatures.

The containers should be appropriate for the type of animal to be transported, as recommended by IATA Live Animal Regulations.

Animals shall be handled with great care, to minimize the stress associated to handling. While waiting for the shipment, animals should be maintained in a waiting room with temperature control and protected from noise and draught. The adverse climatic conditions could cause additional stress to the animals. The ambient should be dark to make the animals more calm and comfortable while waiting for shipment. Animals of different species, specially which are natural enemies, such as cats and dogs, must be kept apart one from another. On the other hand, animals of the same species would be more calm if kept together.

Animals shall be loaded just before departure and unloaded just after arrival, in order to minimize the exposition to high or low temperatures on ground, where the baggage compartment ventilation is not completely effective. Specially in the hot season, it should be preferable to schedule the animal shipment for the night period, when the temperatures are lower than during the day. For the more sensitive animals, such as little birds, that would not resist to high temperatures, this is an important requirement. In addition, these animals would be too susceptible to low temperatures achieved during long cruise flights, so it could be necessary to limit the flight cruise altitude to reduce the temperature drop in the baggage compartment and protect them.

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SECTION 1-08

CONFIGURATION DEVIATION LIST

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INTRODUCTION

This Configuration Deviation List contains additional certificate limitations for operation of the EMB-135BJ airplanes without certain secondary airframe and engine parts as listed herein. When the airplane is operated using the CDL, it must be operated in accordance with the limitations specified in the AFM, as amended in the CDL. All the items which are related to the airworthiness of the airplane and not included on the list are automatically required to be installed.

The associated limitations must be listed on a placard affixed in the cockpit in clear view of the pilots and other appropriate crewmember(s). The pilot in command should be notified of each operation with a missing part(s) by listing the missing part(s) in the flight or dispatch release. The operator should list in the airplane logbook an appropriate notation covering the missing part(s) on each flight.

If an additional part is lost, the airplane may not depart the airport at which it landed following this event, until it complies with the limitation of the CDL. This, of course, does not preclude the issuance of a ferry permit to allow the airplane to be flown to a point where the necessary repairs or replacement can be made.

No more than one part for any one system may be missing, unless specific combinations of parts are included in the CDL. Unless otherwise specified, parts from different systems may be missing. The performance penalties are cumulative, unless specifically designated penalties are indicated for the combination of missing parts.

No more than three parts that have each been determined to cause negligible performance degradation may be missing for takeoff without applying a performance penalty. When more than three of such parts are missing, a performance penalty of 45 kilograms (100 pounds) must be applied for takeoff, en route, and landing for each missing part.

No more than ten parts that have each been determined to cause no performance penalty may be missing.

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Takeoff performance penalties should be applied to the takeoff weights that are limited by performance considerations (i.e., takeoff field length, first, second, or final segment climb, or takeoff flight path).

If the performance-limited takeoff weight is greater than the maximum certified takeoff weight, the takeoff performance penalties should be applied to the maximum certified takeoff weight to ensure compliance with the noise requirements.

Landing performance penalties should be applied to the landing weights that are limited by performance considerations (i.e., landing field length, landing climb, or approach climb). If the performance-limited landing weight is greater than the maximum certified landing weight, the landing performance penalties should be applied to the maximum certified landing weight to ensure compliance with the noise requirements.

En route performance penalties apply only to operations that are limited by the one-engine inoperative en route climb performance.

COMPONENT LOCATION

The numbering and designation of systems in this Section are based on ATA Spec. 100. The parts within each system are identified by their functional description and, when necessary, by door or panel identification, followed by the appropriate figure.

The access doors and panels in a zone are identified by an alphanumeric system which has three digits. They identify the zone where the access door or panel is located, followed by a two-letter or three-letter suffix.

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– The first digit indicates a major zone of the airplane, which gives the necessary reference for the identification of the service areas or components:

MAJOR ZONE	AREA
100	Lower fuselage (below the floor line)
200	Upper fuselage (above the floor line)
300	Tail cone and empennage group
400	Powerplant and nacellles
500	Left half-wing
600	Right half-wing
700	Landing gear wheel well doors
800	Doors (main, service, cargo, emergency)

– The following two digits indicates sub-zones. For example:
111 - Radome; 510 - Wing Leading Edge.

– The first letter identifies a sequence which starts with the letter A.

– The second letter shows the location of each access door or panel in relation to the airplane as follows:

B: Bottom T: Top
L: Left R: Right

– Each panel gets a fastener identification code, boxed, which identifies the type and quantity of the fasteners for each panel.

L: Latch
S: Screw
C: Camloc

For further details on this system, please see Airplane Maintenance Manual, Chapter 6, for the part identification.

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ATA CHAPTER 06 DIMENSIONS AND AREAS

System & Sequence Number / ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
6 DIMENSIONS AND AREAS			
41-1 Main Door Closing Control Panel Access Door (123AL – Figure 1)	1	0	May be missing with no penalty.
41-2 External Power Connection Access Door (113EL – Figure 1)	1	0	May be missing with no penalty.
41-3 Ground Air Conditioning Connection Access Door (*) (196CR – Figure 3) (*)For airplanes S/N 1035 and on equipped with FWD Lavatory, this door is the Forward Waste Service Panel Access.	1	0	May be missing provided maximum airspeed is limited to 250KIAS/0.65 M, whichever is lower.
41-5 Air Conditioning Heat Exchanger Grills (191ML – Figure 2) (191NR – Figure 3)	2	0	May be missing provided maximum airspeed is limited to 250KIAS/0.65 M, whichever is lower.
41-6 Pack Valve/Wing Anti-ice Valve Access Door (191KL – Figure 2) (191LR – Figure 3)	2	0	May be missing provided maximum airspeed is limited to 250KIAS/0.65 M, whichever is lower.
41-7 Bleed Flexible Joint Access Door (195AL/CL – Figure 2) (194AR/CR – Figure 3)	4	0	May be missing provided maximum airspeed is limited to 250KIAS/0.65 M, whichever is lower.
41-8 Red Beacon Fairing (192EL – Figure 2)	1	0	May be missing provided maximum airspeed is limited to 250KIAS/0.65 M, whichever is lower.

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System & Sequence Number ITEM 1.	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
6 DIMENSIONS AND AREAS			
41-9 Hydraulic System Servicing Access Door (193DL/EL/FL – Figure 2) (193GR/HR/JR – Figure 3)	6	0	May be missing provided maximum airspeed is limited to 250 KIAS/0.65 M, whichever is lower. **NOTE:** Legacy 650 must not be dispatched with access door 193 GR missing.
41-10 Wing Center Region Access Door (192AL – Figure 2) (192BR – Figure 3)	2	0	May be missing provided maximum airspeed is limited to 250 KIAS/0.65 M, whichever is lower.
42-1 Pressure Fueling Panel Access Door (191SR – Figure 3)	1	0	May be missing provided: a) Door microswitch is locked in the actuated position (simulating door closed); b) Refueling, defueling and power switches are checked in the CLOSED/NORMAL position; c) Refueling cap is locked and latched; and d) Maximum airspeed is limited to 250 KIAS/0.65 M, whichever is lower.

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System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
6 DIMENSIONS AND AREAS				
42-2	Potable Water Service Access Door (193NR – Figure 3) (Legacy 600)	1	0	May be missing provided maximum airspeed is limited to 250 KIAS/0.65 M, whichever is lower.
42-3	Waste Service Panel Access Door (193MR – Figure 3) (Legacy 600)	1	0	May be missing with no penalty.
42-4	Ground Pneumatic Engine Starting Connection Access Door (272CR – Figure 4)	1	0	May be missing with no penalty.
42-5	Ramp Interphone Connection Access Door (272BR – Figure 4)	1	0	May be missing with no penalty.
42-6	APU Cowling Attaching Bolts Access Door (313GR/DR/AL/BL – Figure 5)	4	0	May be missing with no penalty.
42-7	APU Servicing Access Door (313CL – Figure 5)	1	0	May be missing provided APU operates on the ground only.

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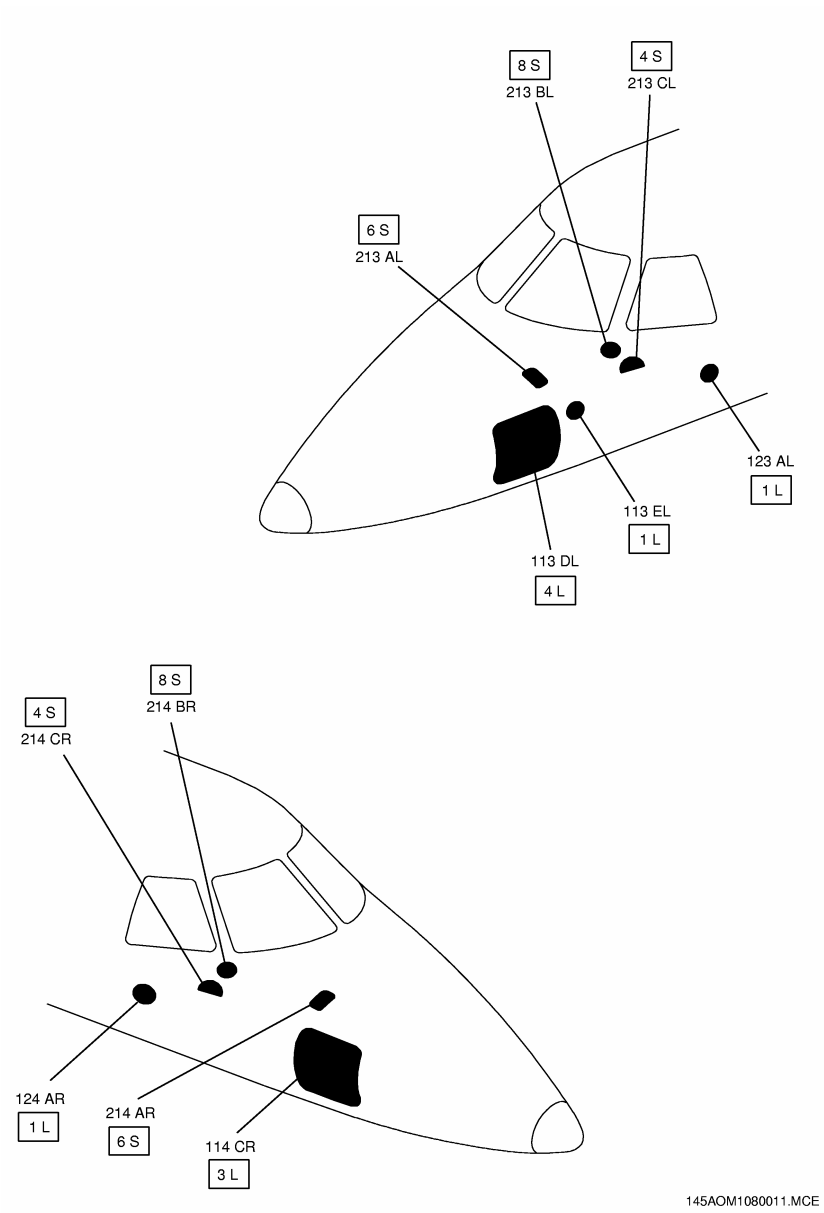

FIGURE 1

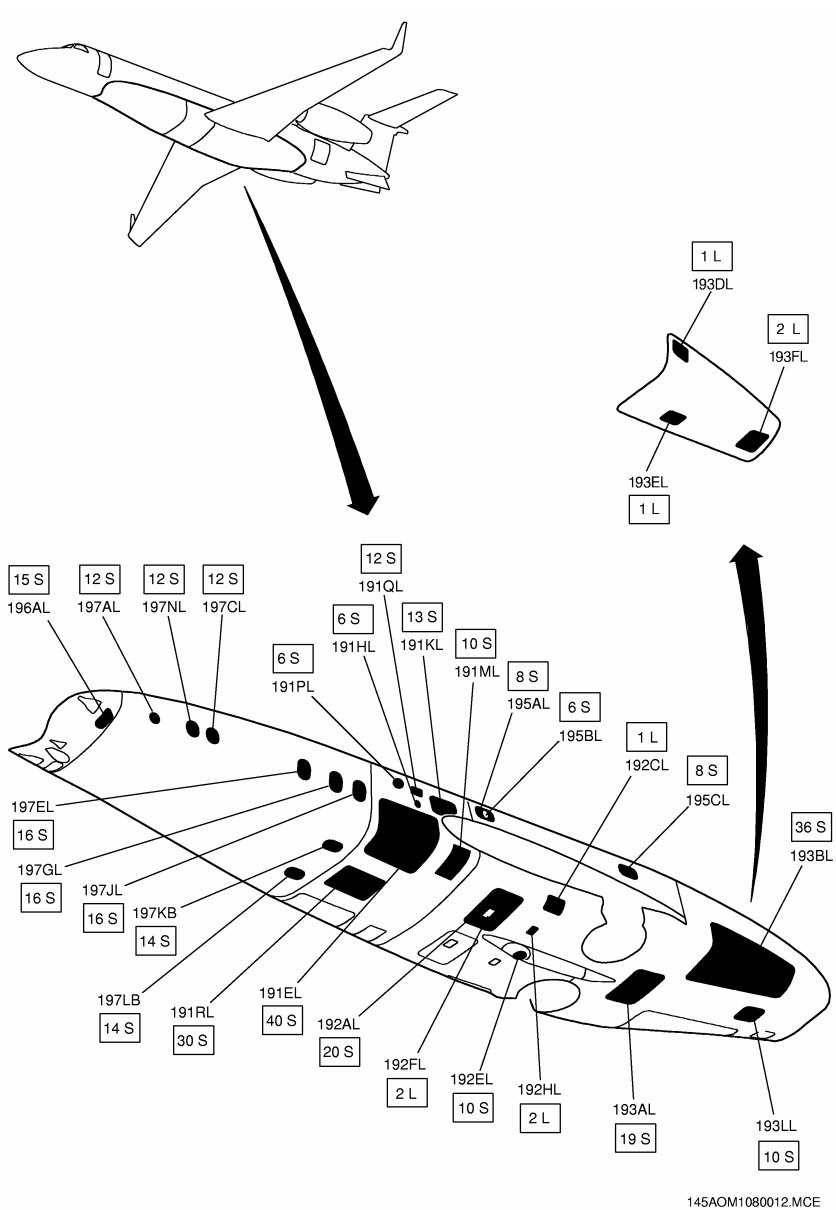

FIGURE 2

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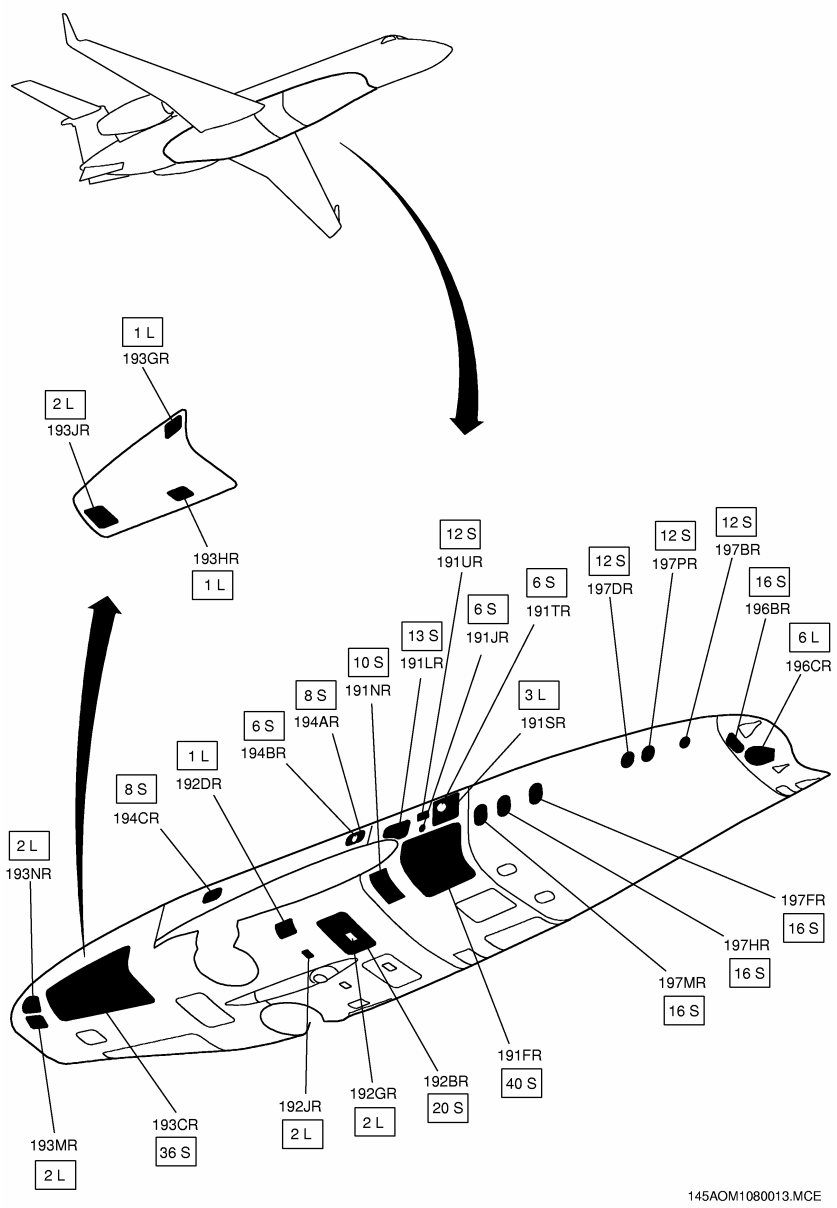

FIGURE 3

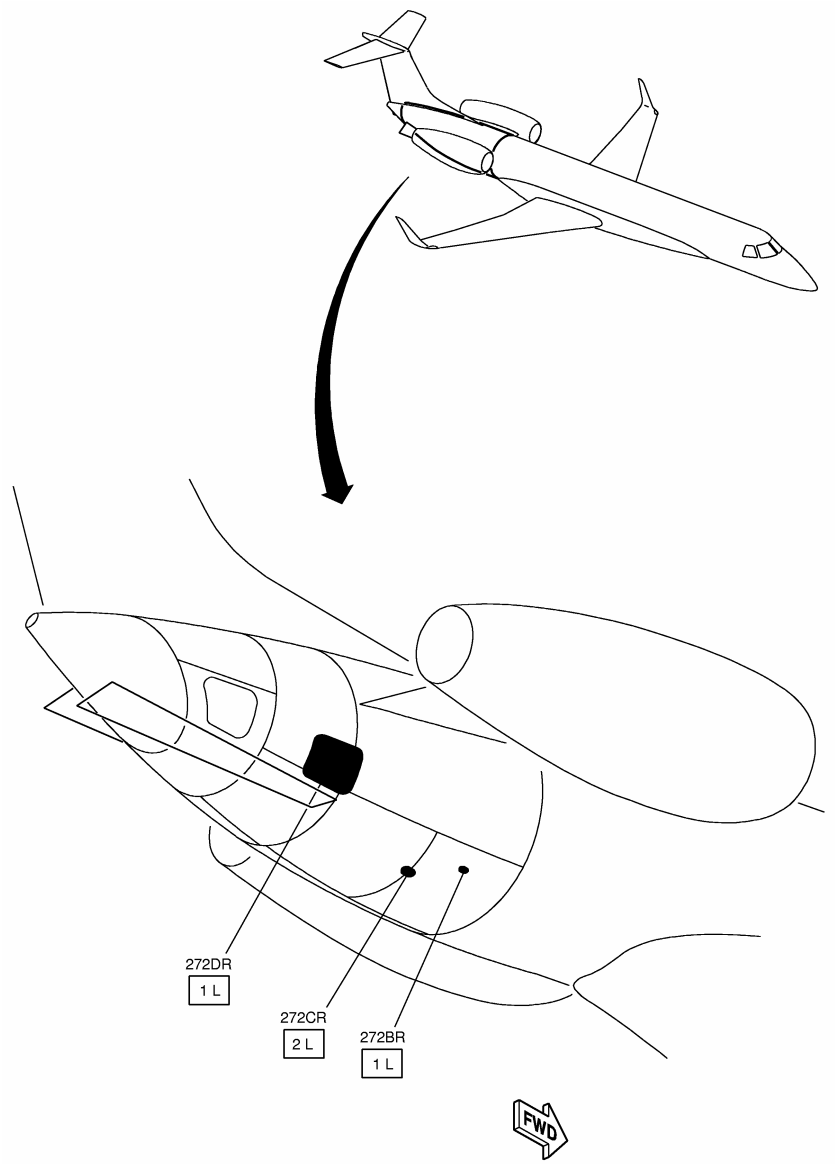

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FIGURE 4

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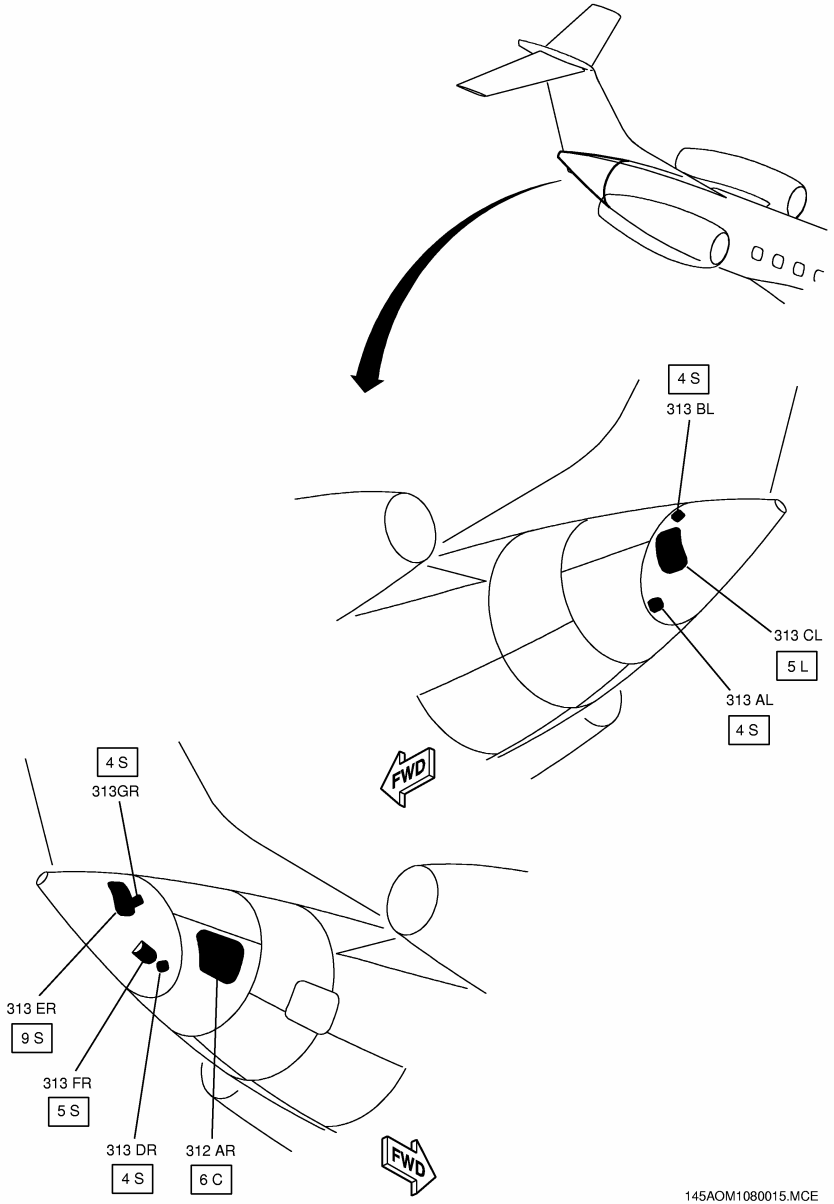

FIGURE 5

ATA CHAPTER 23 COMMUNICATIONS

System & Sequence Number ITEM 1.	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
23 COMMUNICATIONS			
60-1 Static Dischargers (Figure 6)	26	14	A maximum of 12 (twelve) static dischargers may be missing with no penalty. At least the following dischargers are required to be installed on the tip portion of each surface: a) 2 (two) on each ailerons; b) 2 (two) on each winglet; c) 1 (one) on the rudder; d) 2 (two) on each elevator; and e) 1 (one) on the rear moving Horizontal Stabilizer/Vertical Stabilizer.

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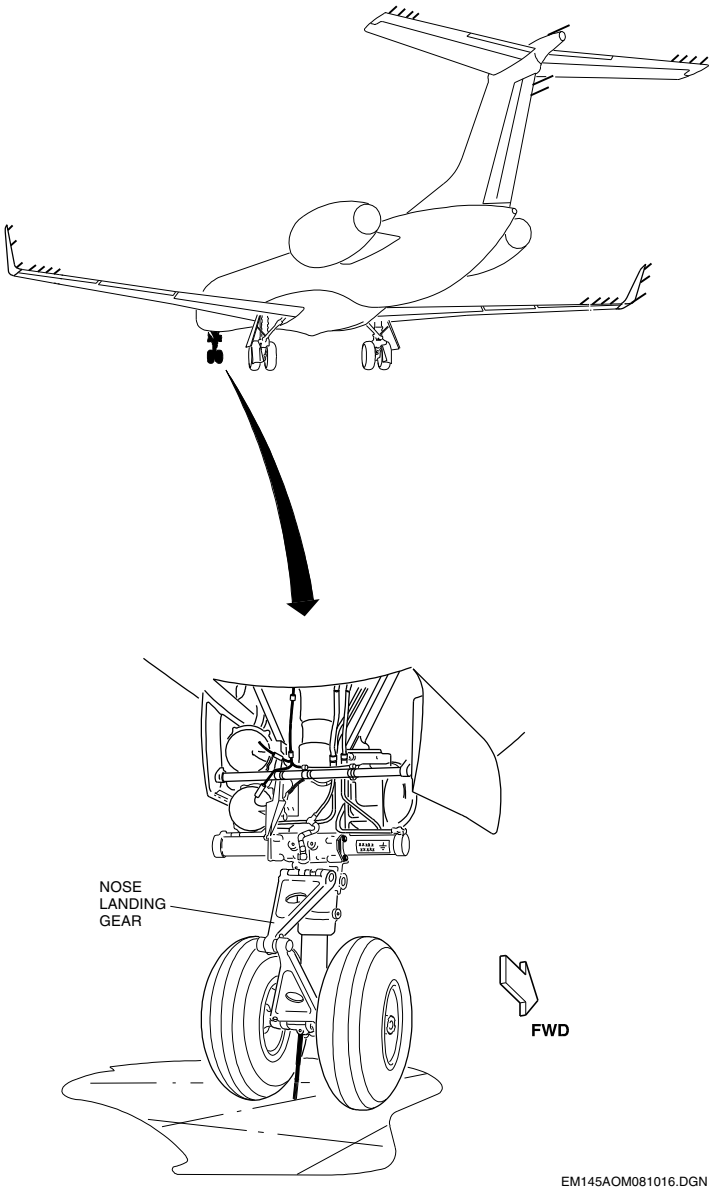

FIGURE 6

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ATA CHAPTER 28 FUEL

System & Sequence ITEM Number 1.	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
28 FUEL			
11-1 Fuel Tank Drain Access Door (192CL/HL - Figure 2) (192DR/JR - Figure 3)	4	0	May be missing provided maximum airspeed is limited to 250 KIAS /0.65 M, whichever is lower.
12-1 Vent Valves Screen Assembly (Legacy 600)	6	0	May be missing with no penalty. **NOTE:** Legacy 600 is equipped with 2 vent valves on the forward fuselage, 2 on the aft fuselage, 1 on the central fuselage and 2 on the wings.
(Legacy 650)	7	0	May be missing with no penalty. **NOTE:** Legacy 650 is equipped with 2 vent valves on the forward fuselage, 3 on the aft fuselage, 1 on the central fuselage and 2 on the wings.
42-1 Direct Quantity Measuring Sticks (192FL - Figure 2) (192GR - Figure 3) (531CB and 541BB - Figure 7) (631CB and 641BB - Figure 8)	6	0	May be missing with no penalty.

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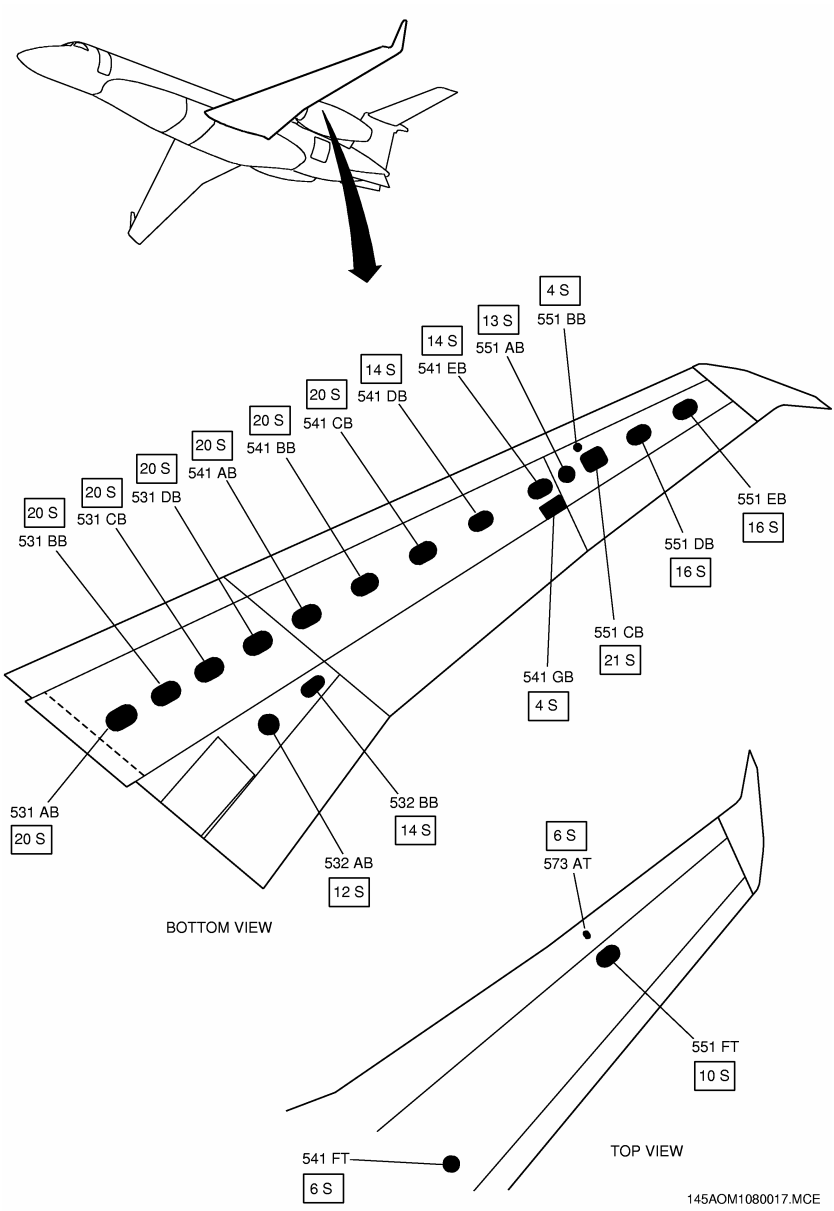

FIGURE 7

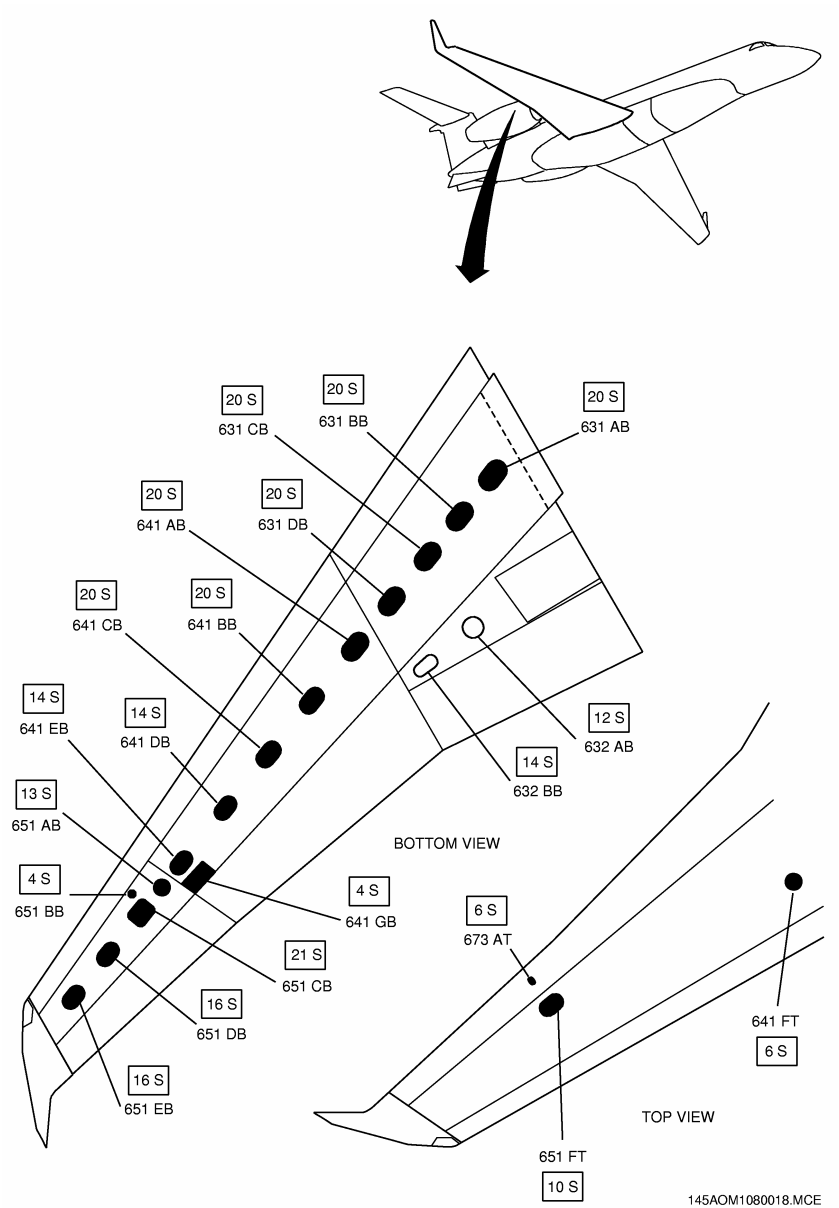

FIGURE 8

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ATA CHAPTER 32 LANDING GEAR

System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
32 LANDING GEAR				
10-1	Main Landing Gear Doors	2	0	May be missing provided maximum airspeed is limited to 250 KIAS/0.65 M, whichever is lower.
10-2	Main Landing Gear Lower Door	2	0	May be missing provided maximum airspeed is limited to 250 KIAS/0.65 M, whichever is lower.
10-3	Main Landing Gear Wheel Fairing and Support	2	0	May be missing with no penalty. **NOTE:** May be missing simultaneously with items 32-10-1 or 32-10-2.

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ATA CHAPTER 33 LIGHTS

System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
33 LIGHTS				
41-1	Nose Landing Light	1	0	May be missing with no penalty.
42-1	Taxi Light	2	0	May be missing with no penalty.
43-1	Navigation Light Protective Lens	3	0	May be missing with no penalty.
44-1	Inspection Light Protective Lens	2	0	May be missing with no penalty.
46-1	Logotype Light Protective Lens	2	0	May be missing with no penalty.
47-1	Red Beacon Light Protective Lens	2	0	May be missing with no penalty.
50-1	Exterior Emergency Light Protective Lens	2	0	May be missing with no penalty.

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ATA CHAPTER 49 AIRBORNE AUXILIARY POWER

System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
49 AUXILIARY POWER UNIT				
42-1	APU Starter/Generator Air Intake Scoop	1	0	May be missing provided APU operates on the ground only.
52-1	APU Compartment Cooling Air Intake Scoop	1	0	May be missing provided APU operates on the ground only.

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ATA CHAPTER 52 DOORS

System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
52 DOORS				
10-1	Main Door Handgrip	1	0	May be missing with no penalty.
43-2	Tail Cone Access Door (312AR – Figure 5)	1	0	May be missing with no penalty.

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ATA CHAPTER 54 NACELLE/PYLONS

System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
54 NACELLE/PYLONS				
50-1	Systems Access Door (414AB/BB/EB – Figure 9) (424AB/BB/EB – Figure 10)	6	4	A maximum of 1 per pylon for a total of 2 may be missing provided maximum airspeed is limited to 250 KIAS/0.65 M, whichever is lower.
50-2	Bleed Valve Access Door (414DB – Figure 9) (424DB – Figure 10)	2	0	May be missing with no penalty.
50-3	Pre-cooler and Fan Air Valve Access Door (414CB – Figure 9) (424CB – Figure 10)	2	0	May be missing with no penalty.
50-4	Engine Pylon Fairing (414HL, 424HR)	2	0	May be missing with no penalty.

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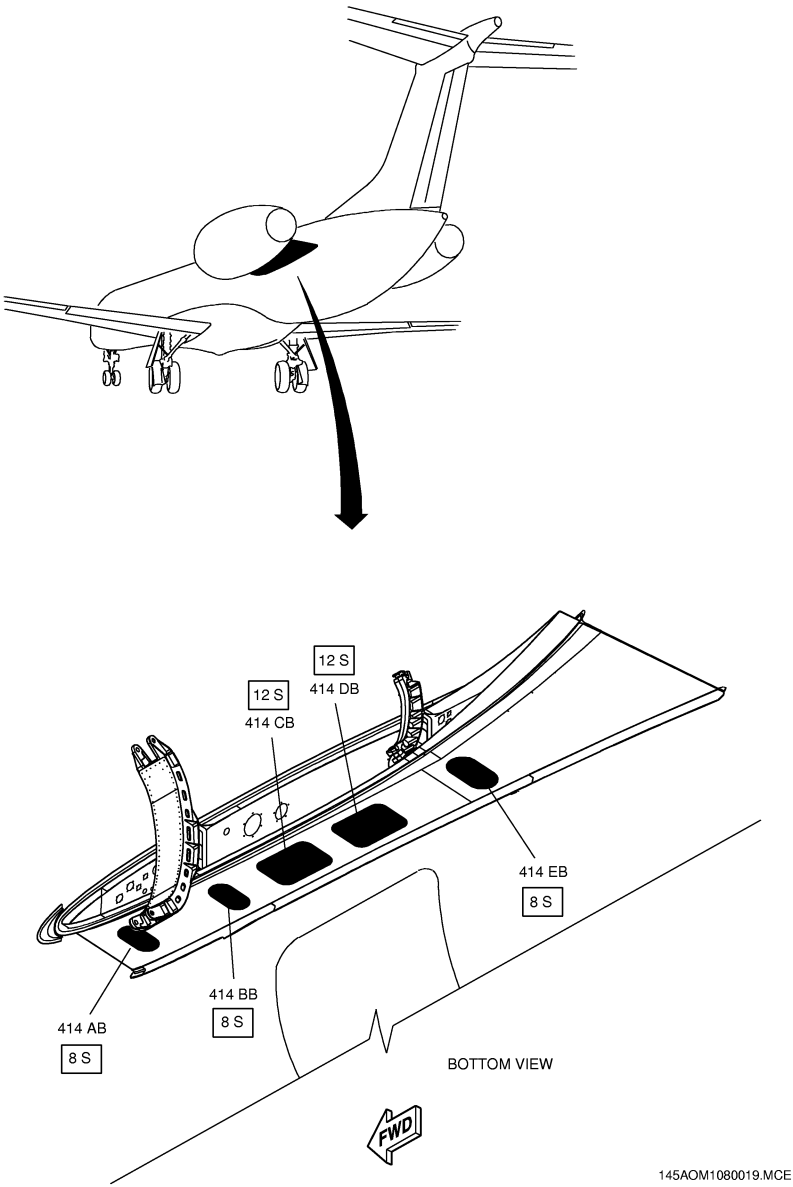

FIGURE 9

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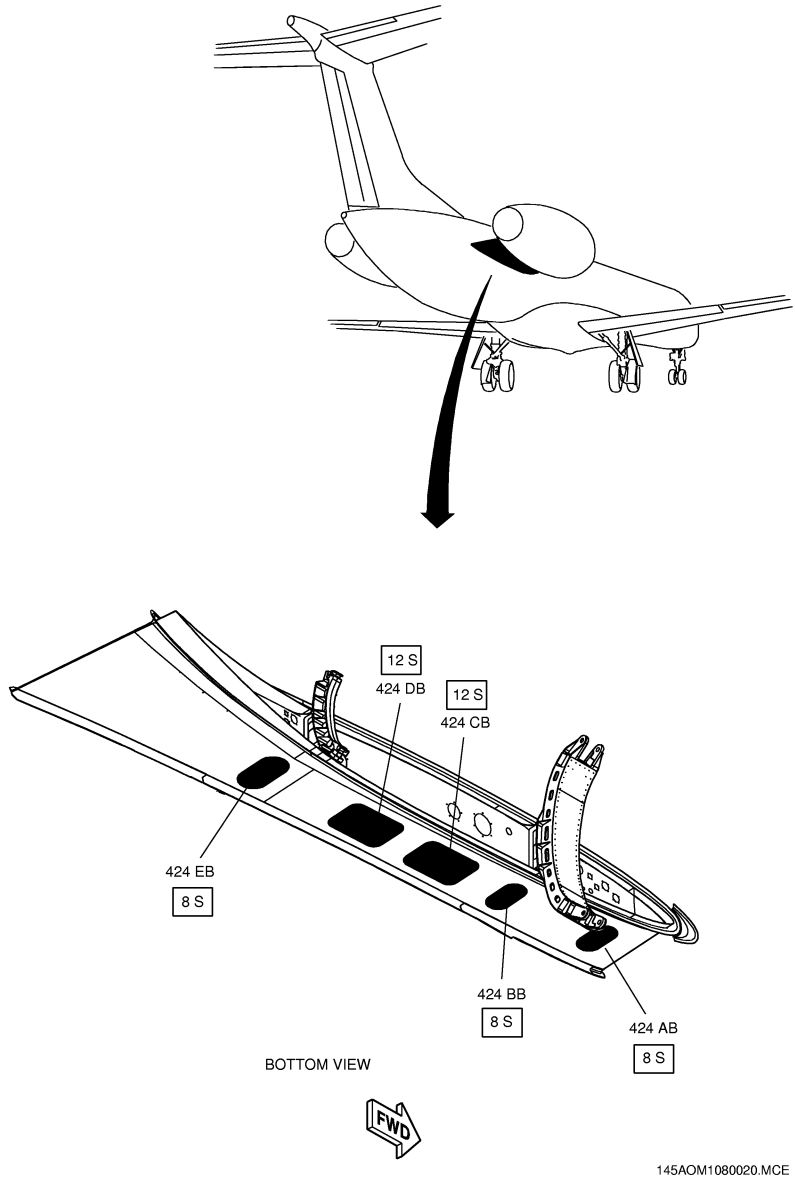

FIGURE 10

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ATA CHAPTER 55 STABILIZERS

System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
55 STABILIZERS				
10-2	Horizontal Stabilizer Access Door (333AB/BB/CB – Figure 11) (334AB/BB/CB – Figure 12)	6	4	A maximum of 1 per side for a total of 2 may be missing with no penalty.
20-2	Spring Tab Control Rod Fairing and Associated Bracket (1 – Figure 15 2 – Figure 15)	4	0	May be missing with no penalty.
20-3	Servo Tab Control Rod Fairing and Associated Bracket (3 – Figure 15)	2	0	May be missing with no penalty.
20-4	Elevator Access Door (335AB/BB/CB/DB/ EB/FB/GB/HB – Figure 11) (336AB/BB/CB/DB/ EB/FB/GB/HB Figure 12)	16	15	One may be missing with no penalty. 335AB/BB/CB/DB/EB and 336AB/BB/CB/DB/EB cannot be missing.
30-1	Vertical Stabilizer Access Door (322AL, 324AL/BL/CL/DL/EL, 325AL/BL/CL/DL/EL, FL – Figure 13) (322BR, 324FR, 325FR/GR/HR/JR/ KR/LR – Figure 14)	20	17	A maximum of 3 in any combination may be missing with no penalty. 324EL/FR and 325EL/LR cannot be missing.

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System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
55 STABILIZERS				
40-1	Rudder Access Door (326AL/BL/CL/DL/EL/ FL/GL/HL, 327AL/BL/CL/DL – Figure 13) (327ER/FR/GR/HR – Figure 14)	16	14	A maximum of 2 in any combination may be missing with no penalty.

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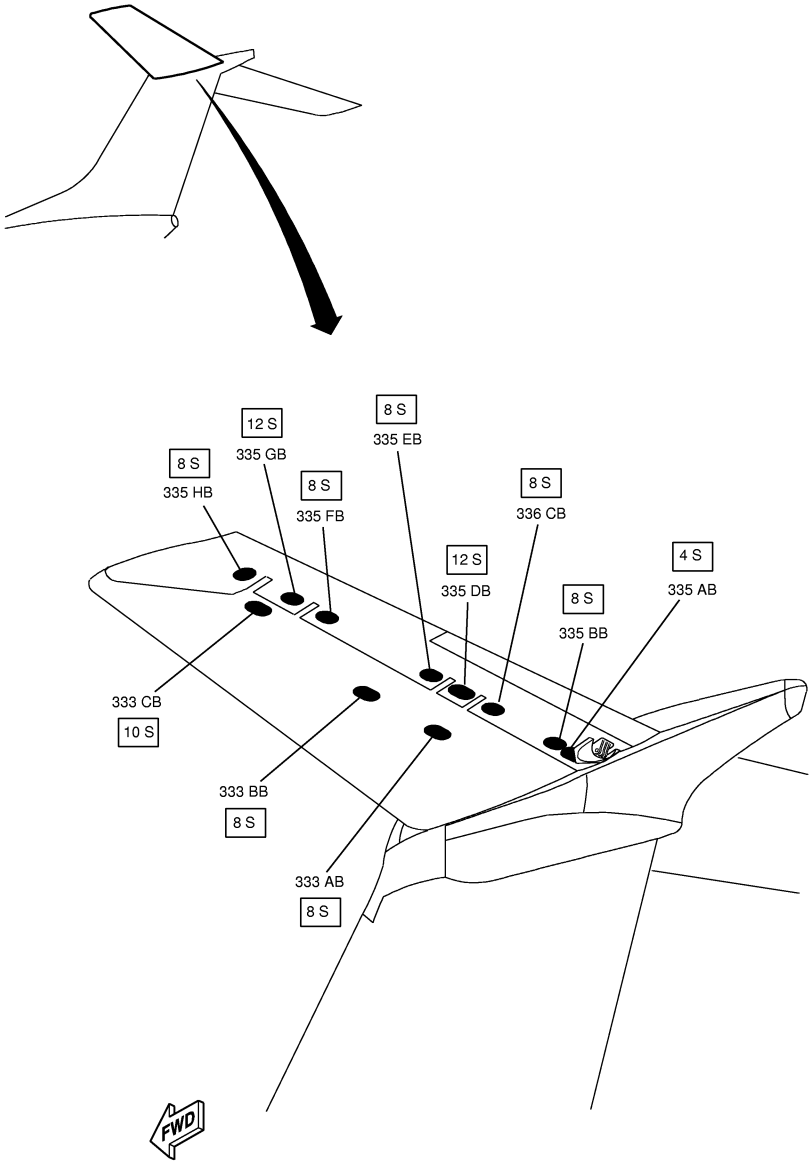

FIGURE 11

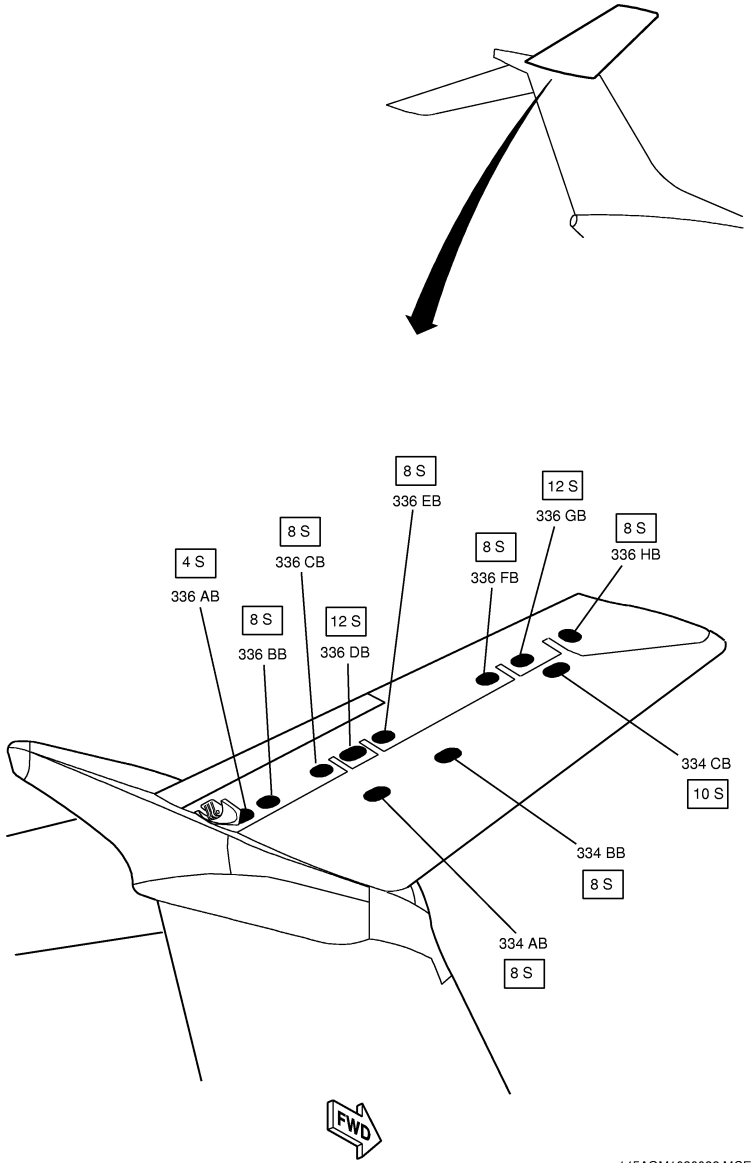

FIGURE 12

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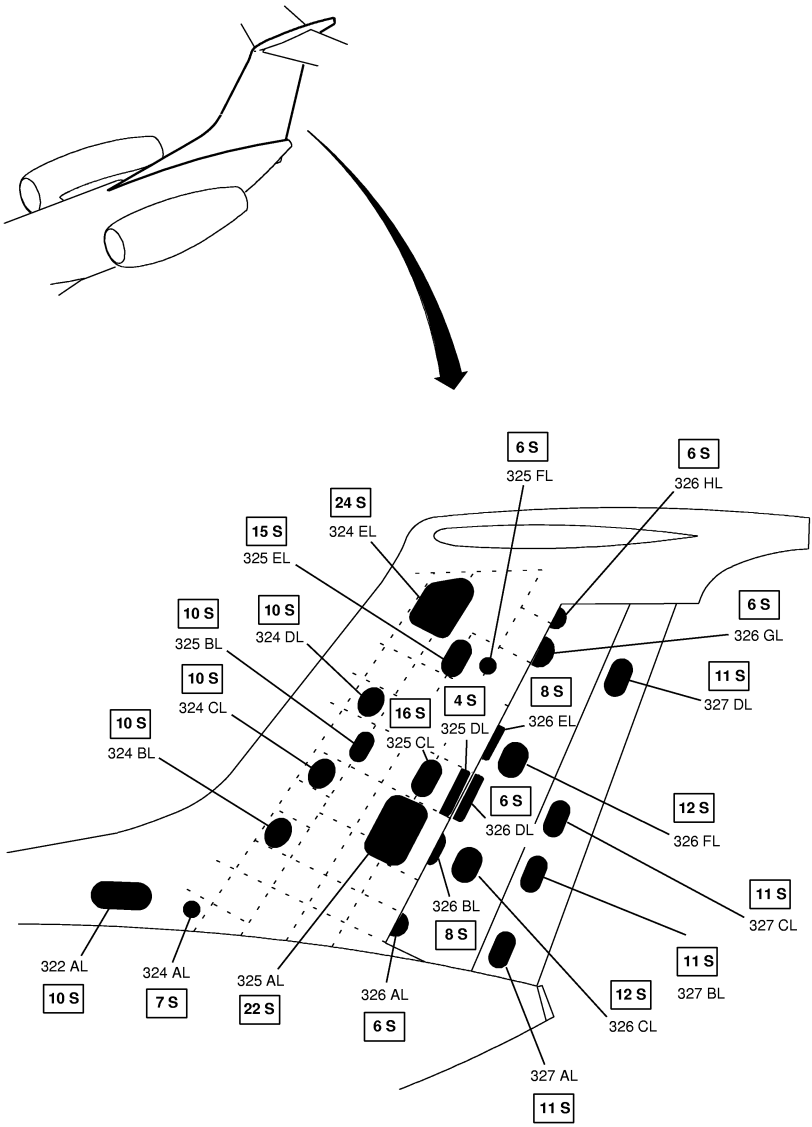
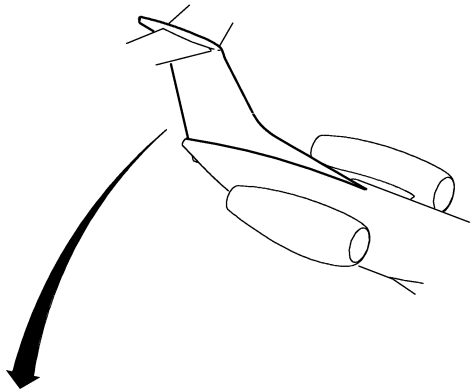


FIGURE 13



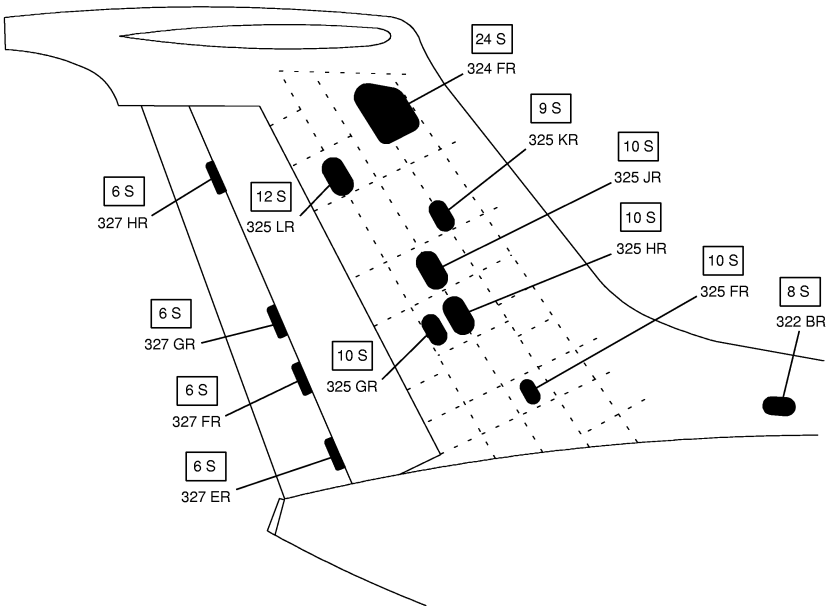


FIGURE 14

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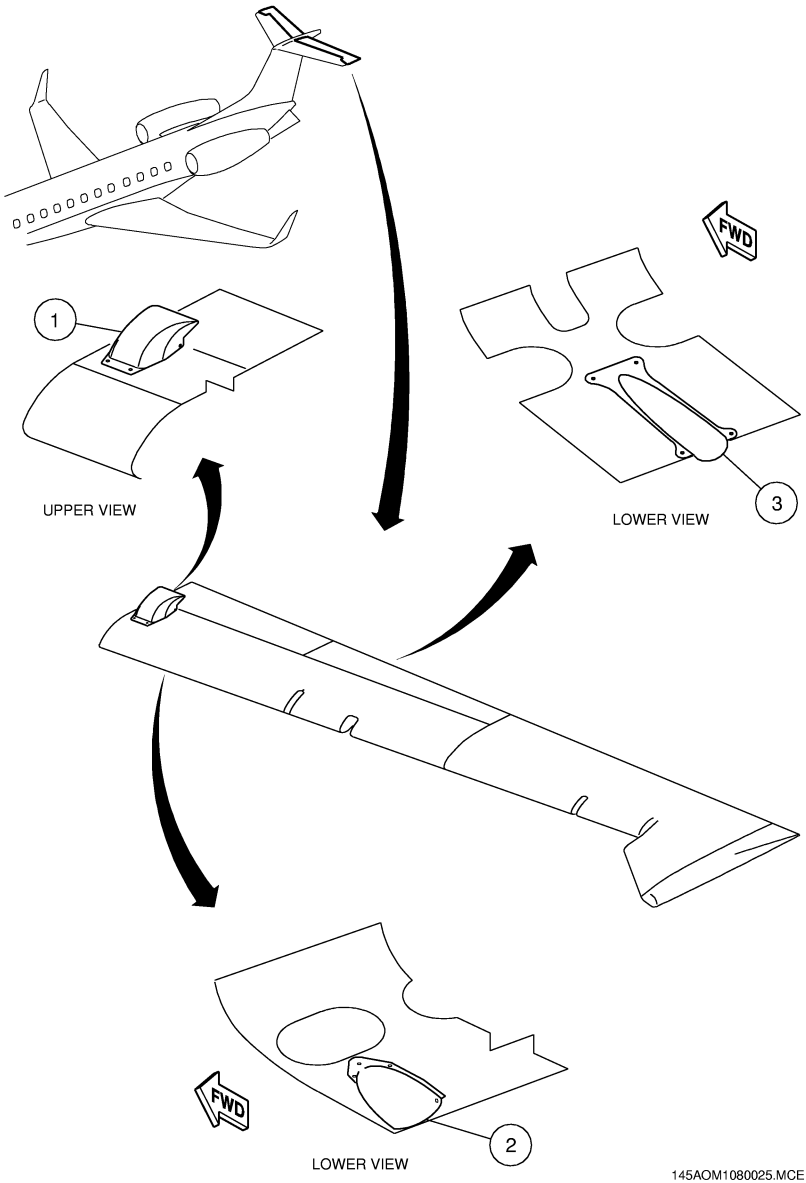

FIGURE 15

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ATA CHAPTER 57 WINGS

System & Sequence Number	1. ITEM	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
57 WINGS				
20-1	Vortex Generator	24	22	A maximum of 1 per wing for a total of 2 may be missing with no penalty.
30-2	Wing Tip Len	2	0	May be missing with no penalty.
52-1	Flap Track Fairing	10	9	One may be missing with no penalty.
52-2	Wing-to-Flap Seal	4	3	One may be missing provided maximum airspeed is limited to 250 KIAS / 0.65M, whichever is lower.

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ATA CHAPTER 78 ENGINE EXHAUST

System & Sequence ITEM Number	1.	2. Number installed	3. Number required for dispatch	4. Remarks and/or exceptions
78 ENGINE EXHAUST				
31-1 Plug Inhibition of the Thrust Reverses		4	0	May be missing with no penalty.

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SECTION 1-09

MINIMUM EQUIPMENT LIST

This Section has been removed from your Airplane Operations Manual. For minimum equipment list, refer to the publication also named Minimum Equipment List Manual.

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SECTION 1-10

EMERGENCY INFORMATION

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Emergency Locator Transmitter (ELT)	1-10-20	01
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Navigation and Communication	1-10-25	01
Least Risk Location	1-10-30	01

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INTRODUCTION

This Section presents emergency information which may be used, at operator discretion to develop customized emergency procedures. Such procedures may be associated to contingencies not related to the airplane.

Emergency equipment includes those items used during in-flight emergencies (such as first-aid kits and fire extinguishers), and to assist in the airplane evacuation (such as crash hatchet and escape ropes).

The information presented herein is focused on its technical aspects. Being so, it is not mandatory.

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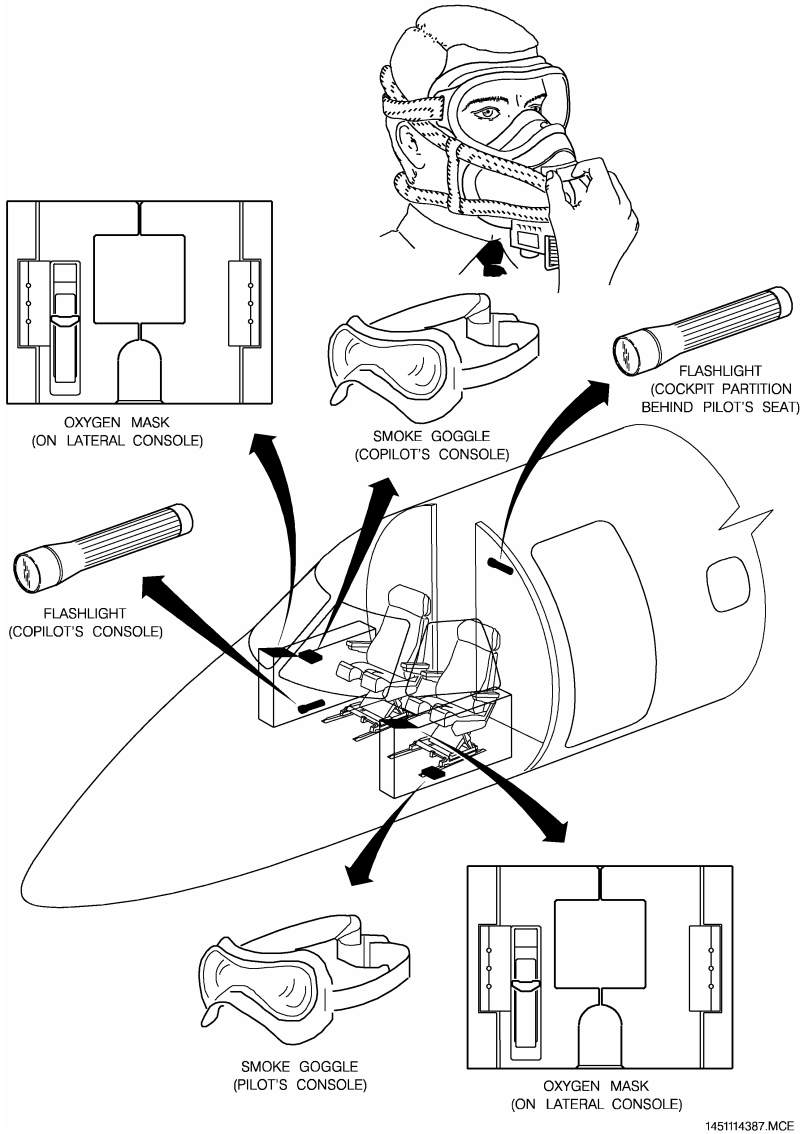
EMERGENCY EQUIPMENT

EMERGENCY EQUIPMENT LOCATION (TYPICAL)



COCKPIT AREA (1 OF 3)

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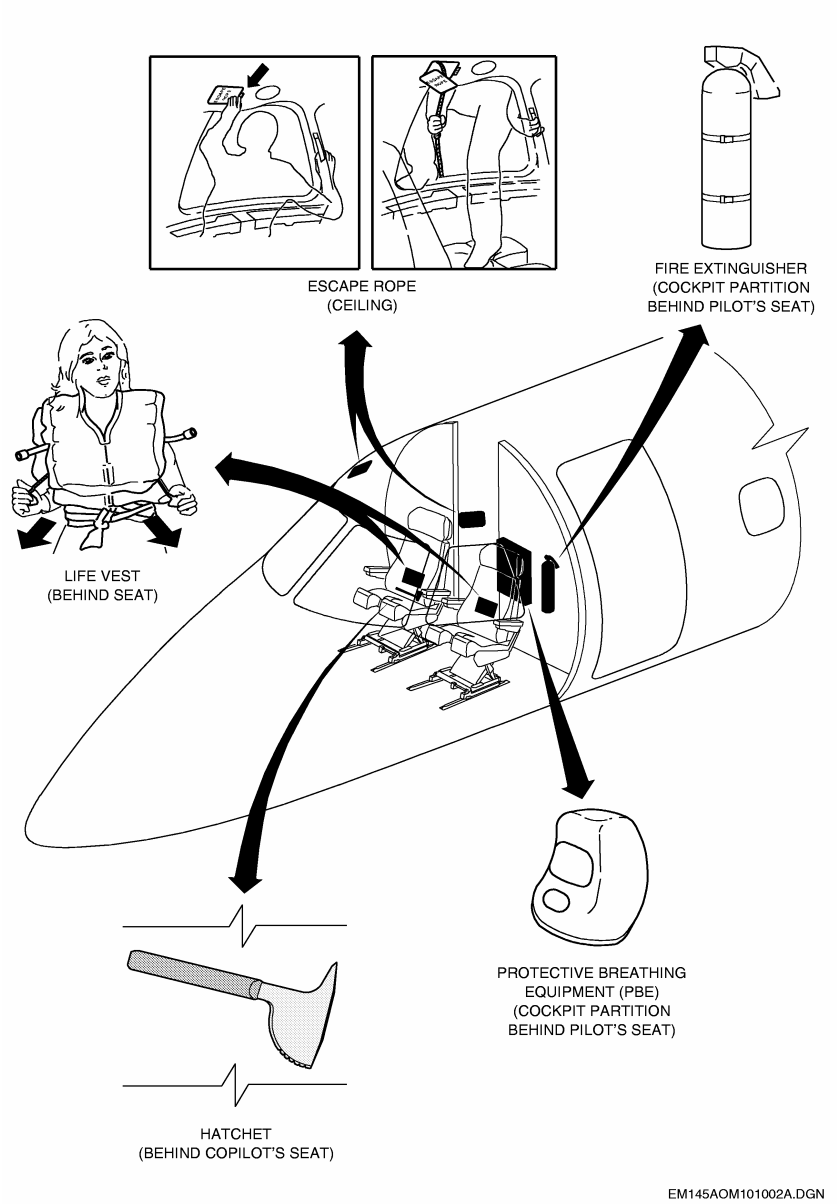

COCKPIT AREA (2 OF 3)

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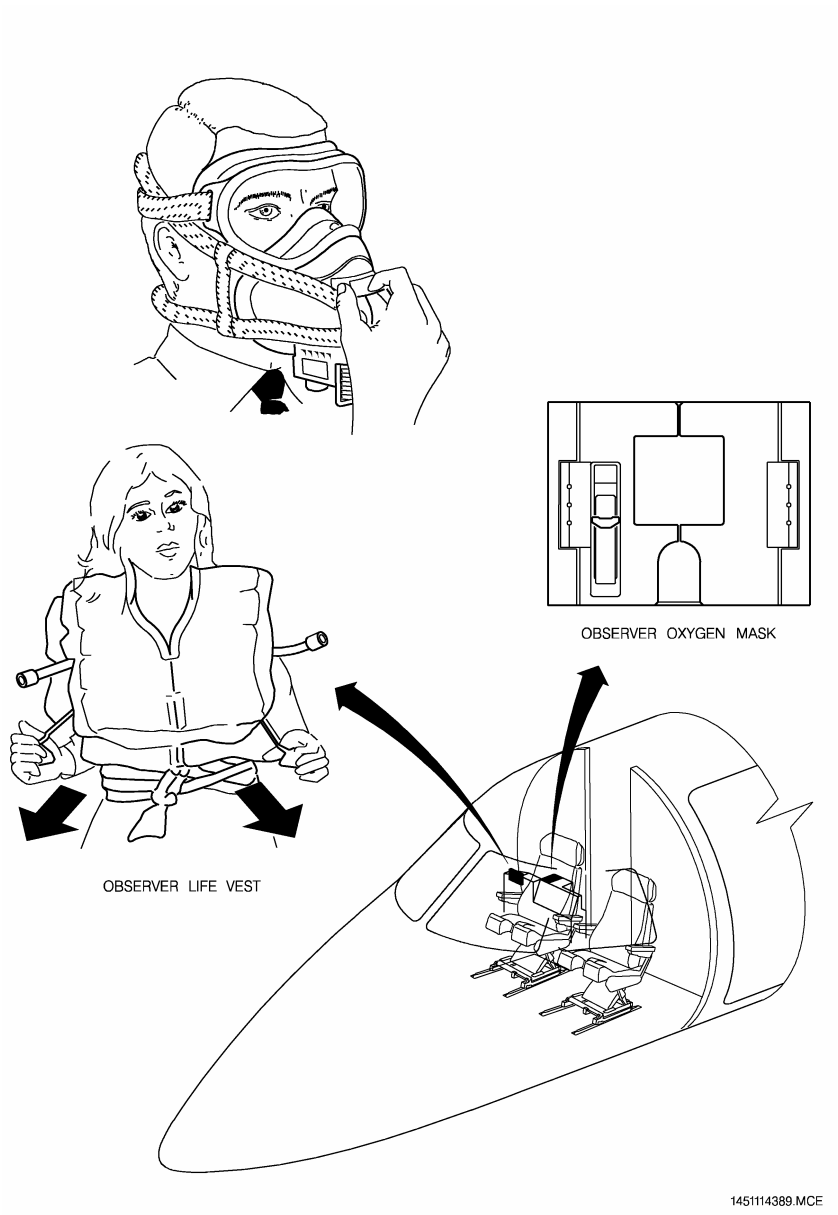

COCKPIT AREA (3 OF 3)

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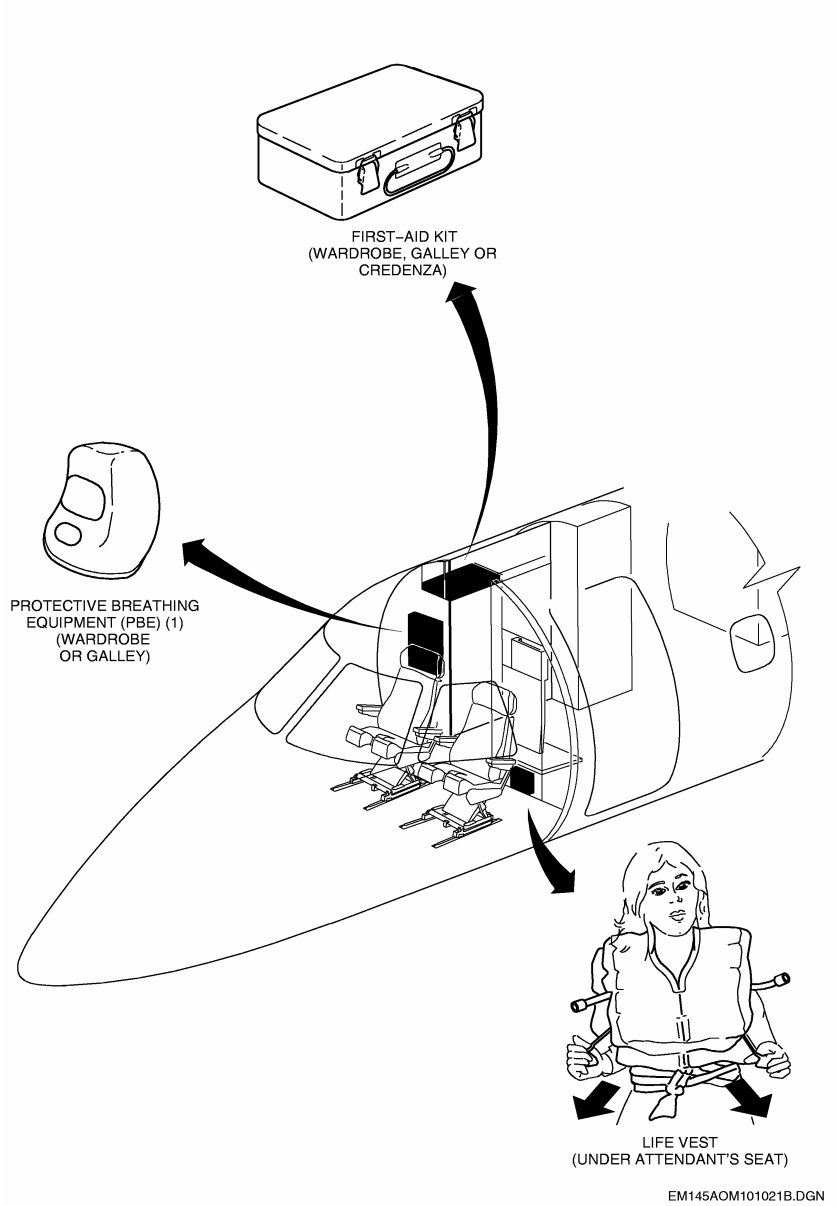
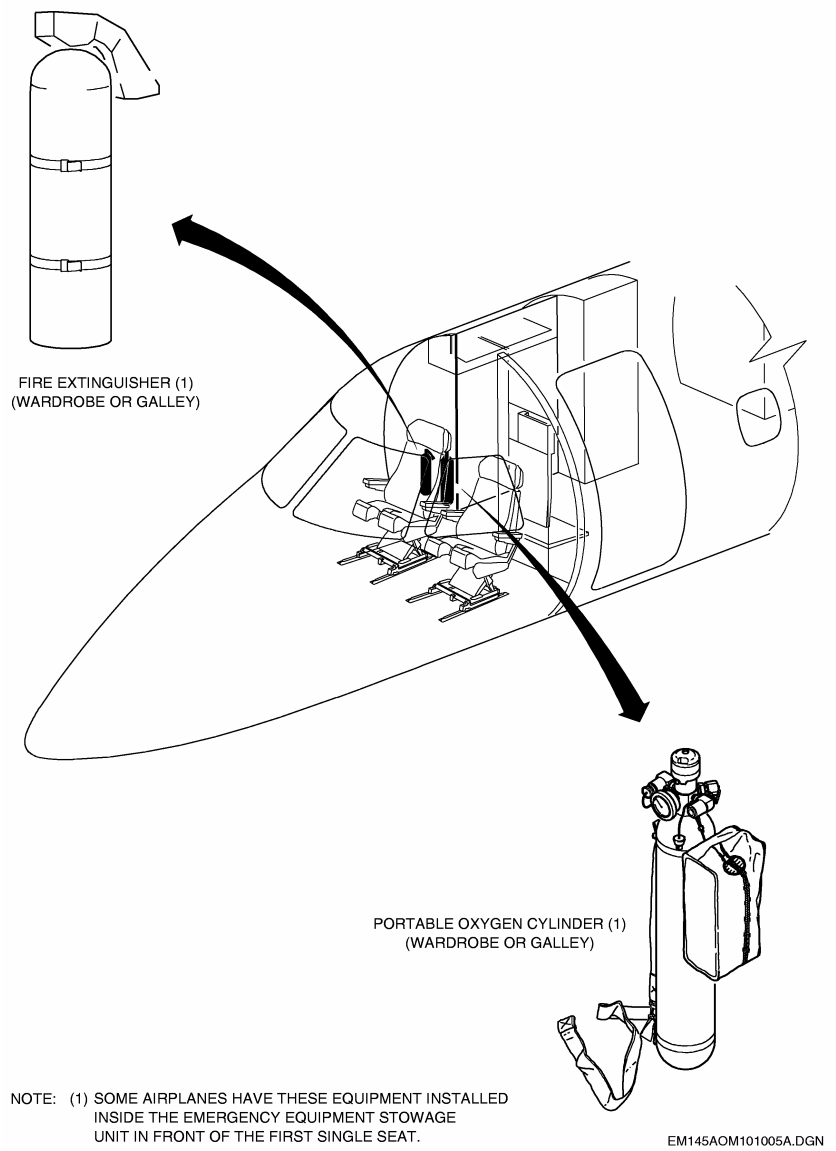


FRONT PASSENGER AREA (1 OF 3)



FRONT PASSENGER AREA (2 OF 3)

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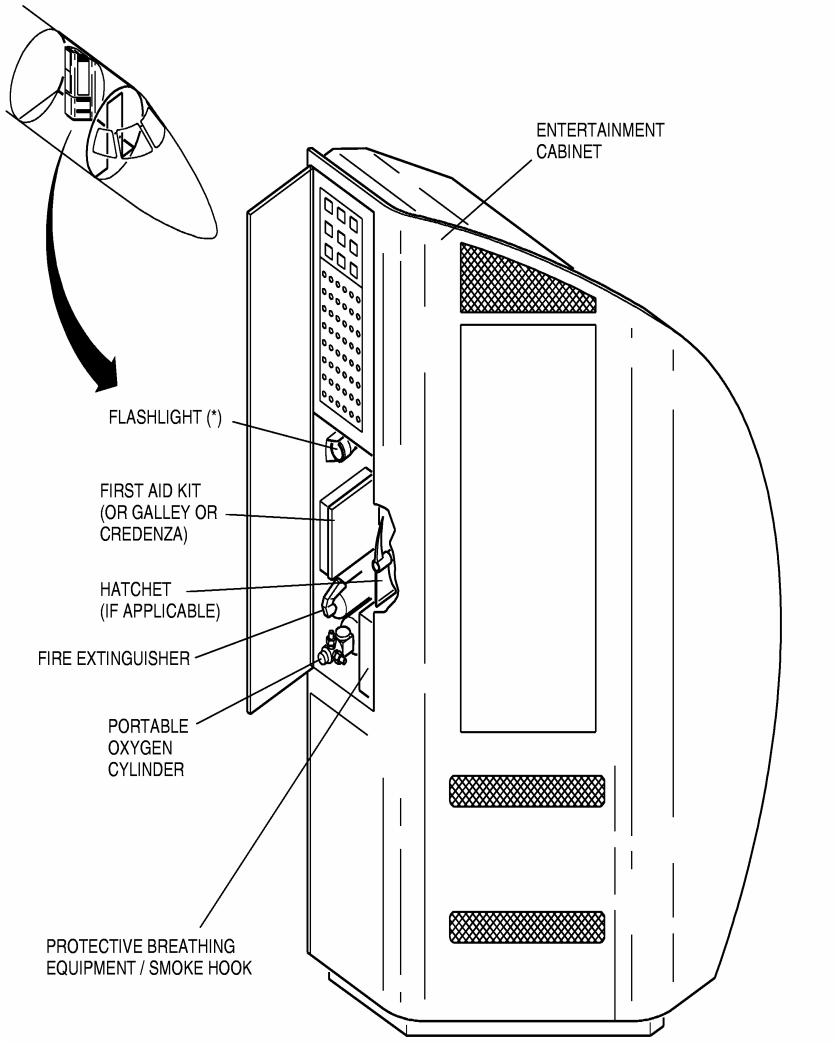

NOTE: (*) SOME AIRPLANES HAVE THE FLASHLIGHT LOCATED INSIDE THE ACOUSTIC COURTAIN COMPARTMENT.

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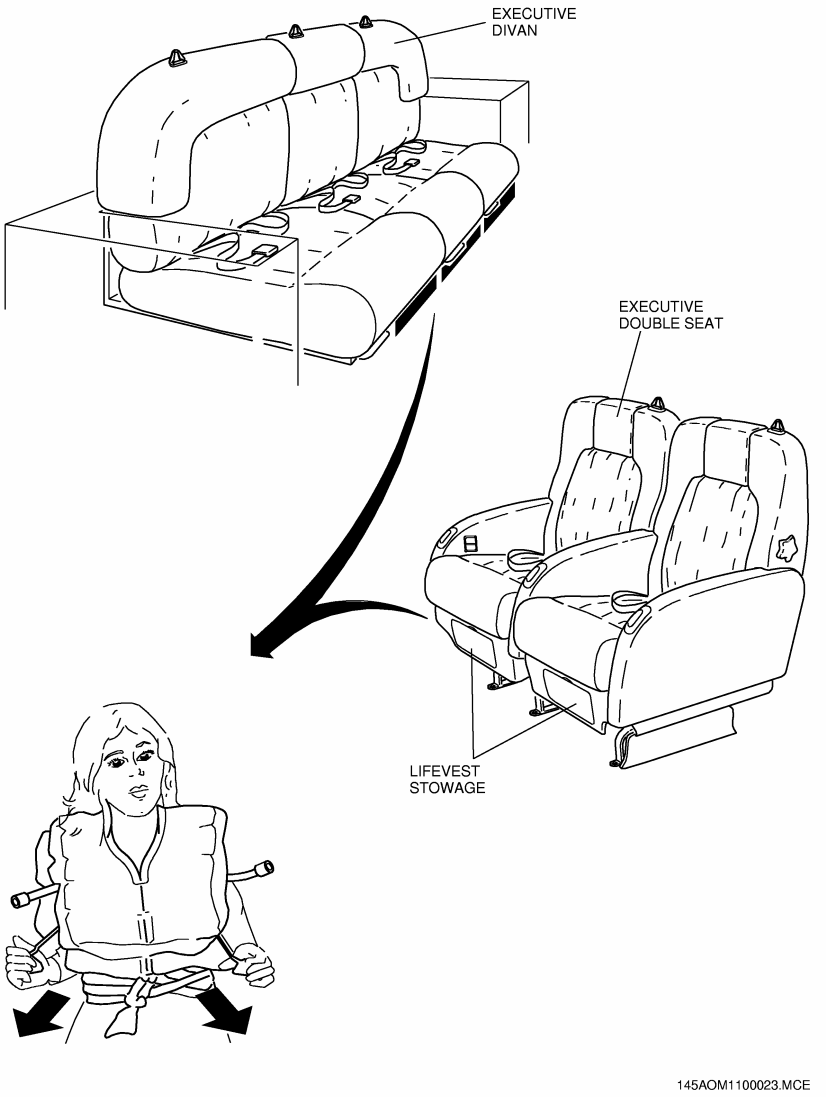
FRONT PASSENGER AREA (3 OF 3)



REAR PASSENGER AREA (1 OF 2)

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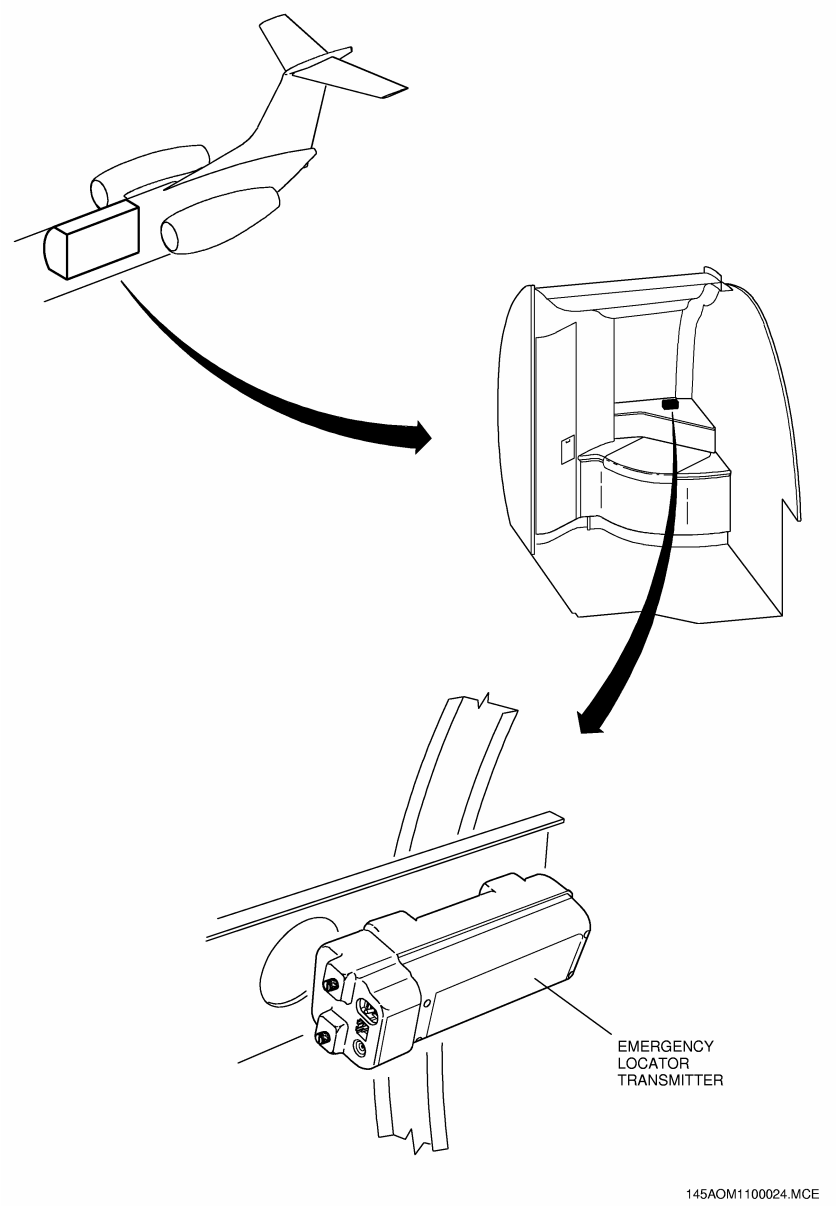

REAR PASSENGER AREA (2 OF 2)

EQUIPMENT CHECKLIST

COCKPIT AREA

Flashlight ..... CHECK RED LIGHT
Life Vest ..... ON BOARD
Hatchet ..... ON BOARD
Smoke Goggle ..... ON BOARD
Oxygen Mask ..... CHECK
Protective Breathing Equipment (PBE) ..... SEALED
Fire Extinguisher ..... CONDITION

GALLEY

Fire Extinguisher Bottle ..... CHECK GREEN RANGE

FRONT PASSENGER CABIN AREA

Flashlight ..... CHECK RED LIGHT

The red light must be on or blinking.

First-Aid Kit ..... CONDITION
Water Extinguisher (optional) ..... CONDITION
Protective Breathing Equipment (PBE) ..... SEALED
Fire Extinguisher ..... CONDITION
Portable Oxygen Cylinder ..... CONDITION
Hatchet (if applicable) ..... ON BOARD
Oxygen Box Deploy Tool ..... ON BOARD
Life Vest ..... ON BOARD
Life Raft (if applicable) ..... ON BOARD

LAVATORY

Fire Extinguisher Bottle ..... CHECK GREEN RANGE

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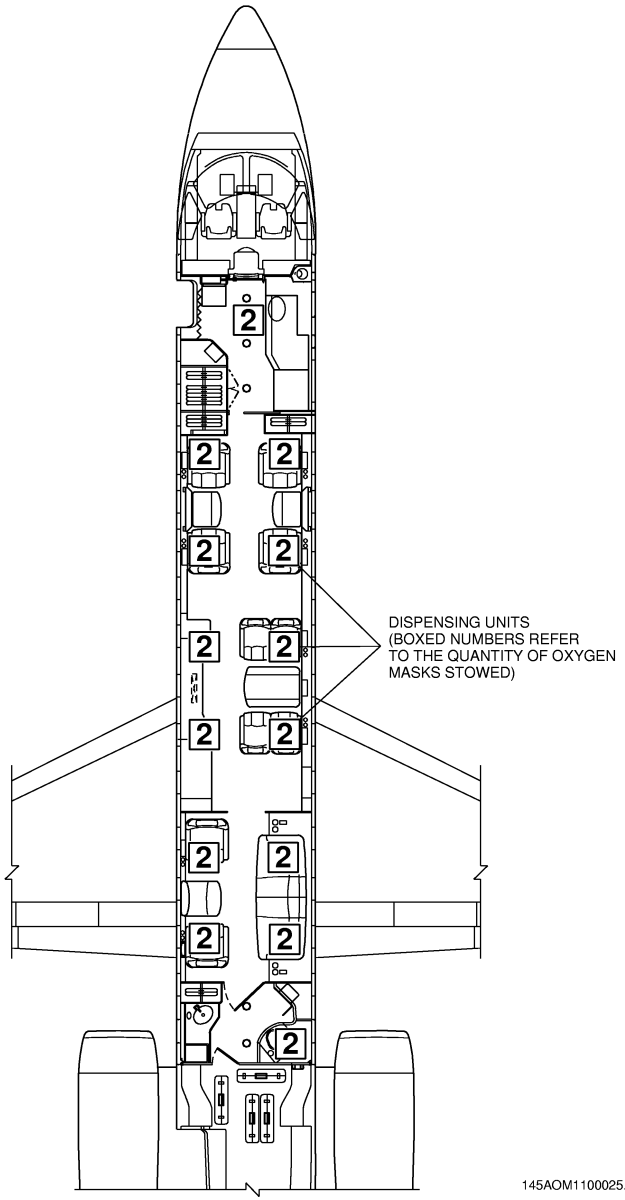
PASSENGER OXYGEN MASKS LOCATION (TYPICAL)



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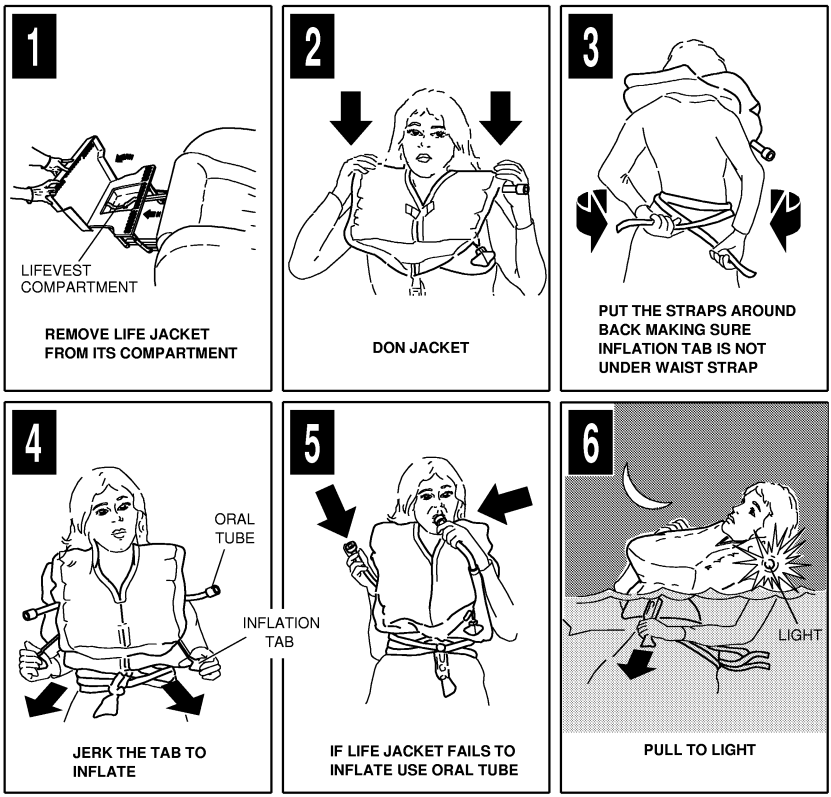
PASSENGER LIFE JACKET

LIFE JACKET OPERATION



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FIRE EXTINGUISHER

HALON FIRE EXTINGUISHER

The 1.5 kg (3.3 lb) Halonite fire extinguisher should be used on classes B and C fire:

– Class B (oils, greases, flammable liquids);

– Class C (electrical or electronic equipment, live electrical).

The 5.5 kg (12 lb) Halonite fire extinguisher should be used on classes A, B and C fire:

– Class A (paper, wood, fabric, rubber);

– Class B (oils, greases, flammable liquids);

– Class C (electrical or electronic equipment, live electrical).

2-BTP FIRE EXTINGUISHER (IF APPLICABLE)

The 1.6 kg (3.52 lb) 2-BTP (Halotron® BrX) non-halon fire extinguisher should be used on classes B and C fire:

– Class B (oils, greases, flammable liquids);

– Class C (electrical or electronic equipment, live electrical).

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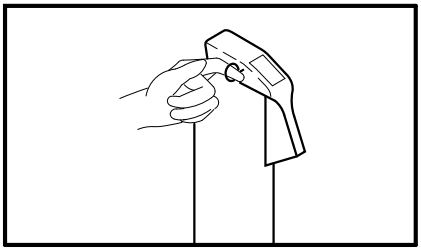
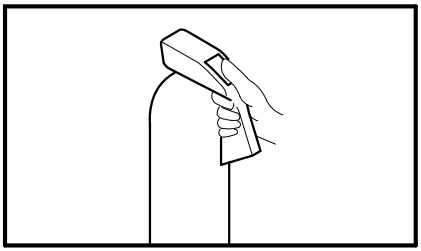
FIRE EXTINGUISHER OPERATION

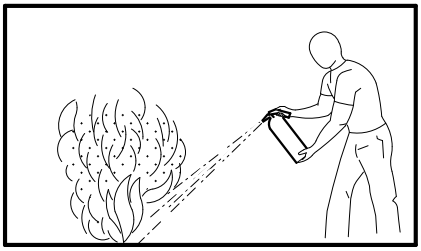


1. UNSNAP "QUICK RELEASE" MOUNTING STRAP AND REMOVE EXTINGUISHER.

2. HOLD UPRIGHT, PULL LOCKING PIN TO UNLOCK SPRAYING LEVER.



3. PRESS LEVER FOR DISCHARGE OPERATION



4. STAND APPROXIMATELLY 2 m (8 ft) AWAY FROM FIRE BEFORE DISCHARGING. AIM DISCHARGE NOZZLE AT FIRE BASE. SPRAY QUICKLY SIDE TO SIDE ACCROSS FIRE WIDTH. MOVE CLOSER AS FIRE IS BEING EXTINGUISHED. DIRECT ALL OF THE DISCHARGING AGENT ONTO THE FIRE AND MAKE SURE THE FIRE IS COMPLETELY EXTINGUISHED.

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Precautions after fire extinguishing:

– Look out for "flashback";

– Ventilate the compartment as promptly as possible.

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EMERGENCY LOCATOR TRANSMITTER (ELT)

ELT ARTEX 110-4 MODEL

The ELT 110-4 Model, when activated, transmits a radio signal on frequencies of 121.5 MHz and 243 MHz, which allows to determine the airplane location during search and rescuing operations.

ELT ARTEX C406-2 MODEL

The ELT C406-2 Model, when activated, transmits the standard swept tone on frequencies 121.5 MHz, 243 MHz and 406 MHz, to the COSPAS-SARSAT satellite system, which allows to determine the airplane location during search and rescuing operations.

Then ARTEX models comprise a transmitter with an ON/OFF switch and an impact switch located behind the lavatory seat, an antenna located on the top rear and a remote panel located on the cockpit.

To get access to the ELT unit the toilet back panel and toilet top cover must be removed.

ELT may be manually or automatically activated. In both cases a red light flashes on the cockpit panel to indicate the ELT activation.

Manual activation may be performed when any switch is set to ON position.

Automatic activation occurs when the transmitter switch is set to OFF position, the cockpit switch is set to ARM position and the airplane suffers a great deceleration.

In both cases (manual and automatic activation) the pilot may deactivate the ELT, performing the TEST/RESET function.

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CONTROLS AND INDICATORS

REMOTE PANEL (COCKPIT)

1 - ELT ALERT LIGHT (RED)

– Flashes when the ELT is transmitting.

2 - ELT SWITCH (GUARDED)

ON Activates the ELT.

ARM Allows the ELT to be automatically activated.

NOTE: - The TEST/RESET function is provided by pressing ON, waiting 1 second and then pressing ARM.

- RESET function allows ELT deactivating, after a manual or automatic activation.
- During TEST/RESET function, the ELT alert light flashes to indicate that the system is transmitting.

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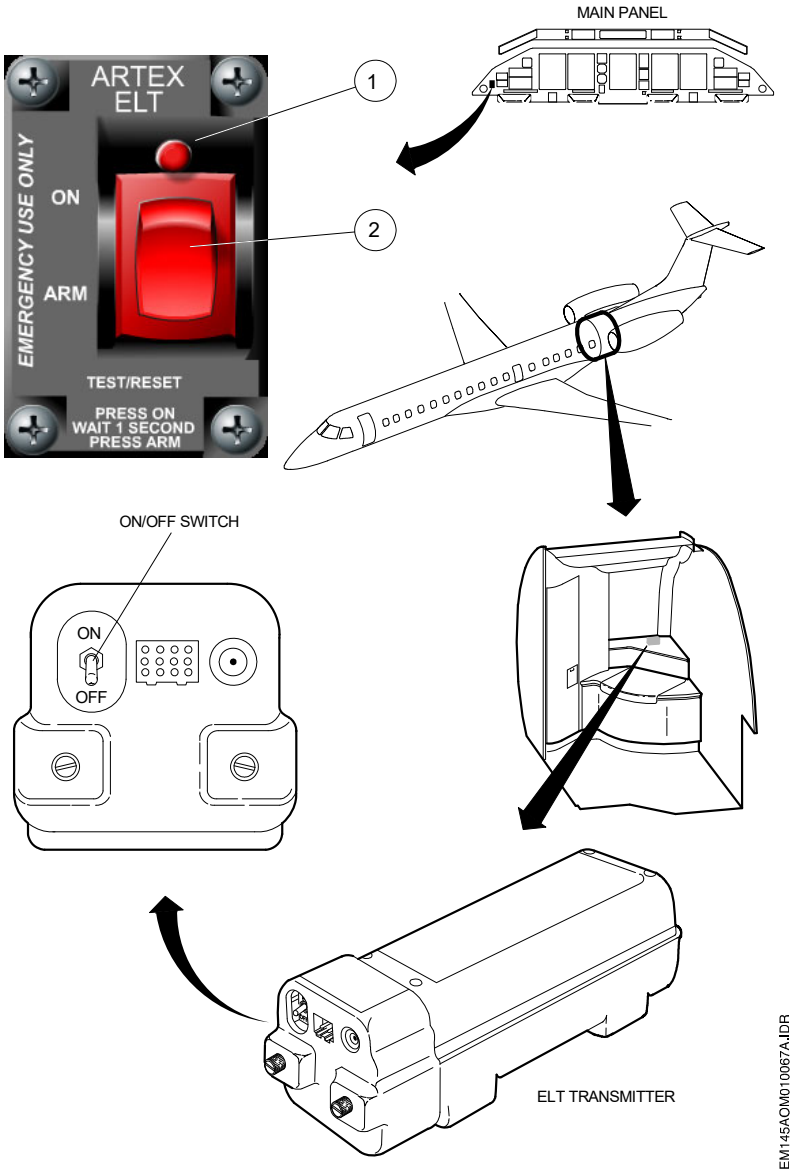

ELT ARTEX 110-4/C406-2 MODELS - REMOTE PANEL AND TRANSMITTER LOCATION

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ELT SATORI 96 MODEL (OR 97 MODEL)

The ELT SATORI Models, when activated, transmit a radio signal on frequencies of 121.5 MHz, 243 MHz and 406 MHz, which allows to determine the airplane location during search and rescuing operations.

The system comprises a transmitter, which also can be used in a portable mode, and an impact switch installed behind the lavatory seat, an antenna located on the top rear and a remote panel located on the cockpit.

To get access to the ELT unit the toilet back panel and toilet top cover must be removed.

ELT may be manually or automatically activated. In both cases a red light flashes on the cockpit panel to indicate the ELT activation, provided the portable mode is not removed for ground operation.

Manual activation may be performed either through the ELT front panel switch or remote switch in cockpit, in both cases setting the switch to MAN position.

Automatic activation occurs when the ELT switch and the remote control switch are set to AUTO position and airplane suffers a deceleration as a function of acceleration/time conditions.

In both cases (manual and automatic activation) the pilot may deactivate the ELT, performing the AUTO TEST/RESET function.

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PORTABLE MODE OPERATION

To operate the ELT 96 or 97 portable mode, perform the following procedures:

- Release the quick-opening fireproof fasteners to remove the ELT from its compartment.
- Disconnect the fixed antenna coaxial plug from the ANT connector.
- Release the auxiliary antenna from its attaching clips and connect it to the ANT connector.
- Set the switch to MAN/RESET position.
- Hold or install the ELT vertically, preferably in a cleared area and as high as possible.

NOTE: When using in temperatures below freezing, keep ELT inside your jacket with antenna outside for longest operations life.

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CONTROLS AND INDICATORS

REMOTE PANEL (COCKPIT)

1 - ELT ALERT LIGHT (RED)

- Comes ON when the ELT is transmitting; or
- Flashes when a failure is detected during the test procedure.

2 - ELT SWITCH

MAN Activates the ELT manually.

AUTO Allows the ELT to be automatically activated.

3 - AUTO TEST/RESET BUTTON

- When pressed allows the ELT to be checked.

  NOTE: The ELT test must be performed only pressing the AUTO TEST/RESET Button.

- During AUTO TEST/RESET function, the ELT alert light illuminates during 2 seconds.
- If a failure is detected during the test, the ELT alert light flashes. For confirmation repeat the operation. If the failure persists set the ELT Switch on transmitter panel to OFF position and report to the maintenance personnel.
- Reset function allows deactivating the ELT, after a manual or automatic activation.

TRANSMITTER PANEL

1 - ELT ALERT LIGHT (RED)

- Flashes when the ELT is transmitting.

2 - ELT SWITCH

MAN/RESET Activates the ELT. Reset function allows deactivating the ELT after an automatic activation.

AUTO Enables the remote control to automatic operation.

OFF Deactivates de ELT.

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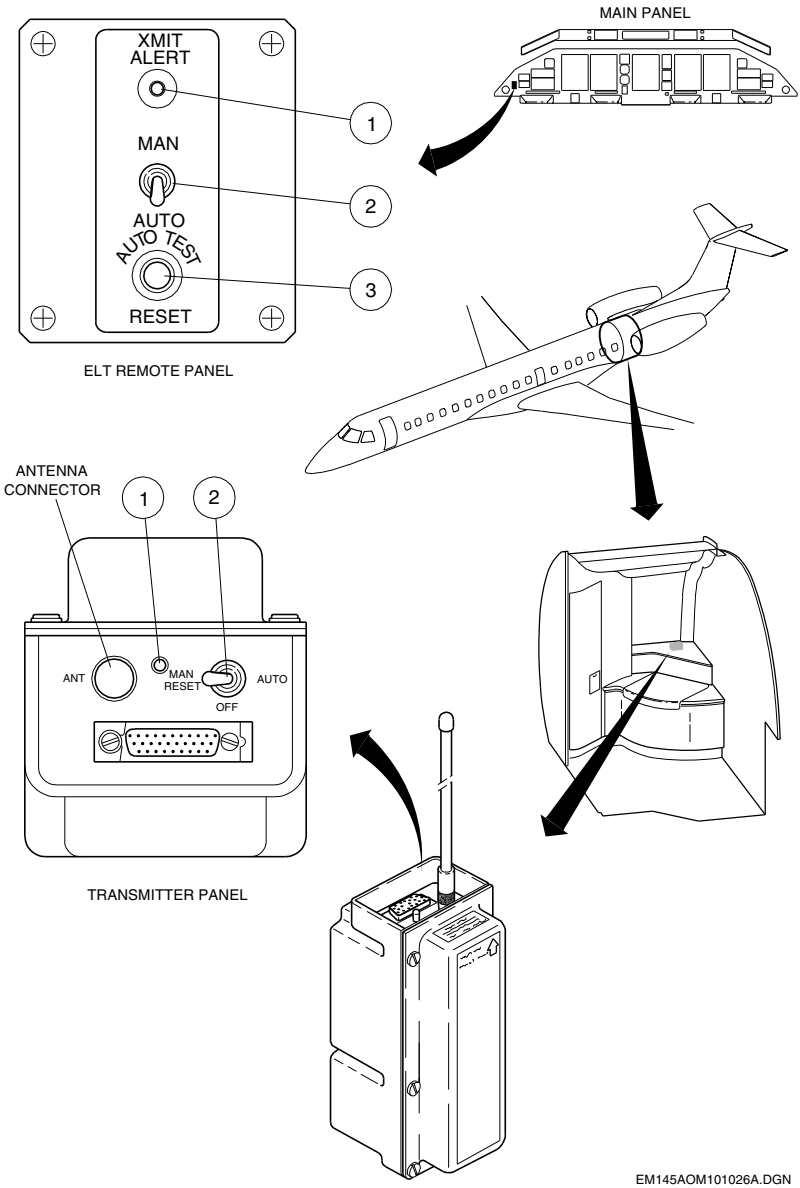

ELT 96 AND 97 MODELS - REMOTE AND TRANSMITTER PANEL LOCATIONS

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LIGHTING

Refer to AOM - VOLUME 2 - Section 2-6 - LIGHTING.

OXYGEN

Refer to AOM - VOLUME 2 - Section 2-16 - OXYGEN.

NAVIGATION AND COMMUNICATION

Refer to AOM - VOLUME 2 - Section 2-18 - NAVIGATION AND COMMUNICATION.

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LEAST RISK LOCATION

The airplane cabin region where a structural or system damage is least prone to jeopardize flight safety is the left side of the airplane, at the rearmost but one window, as close to the window as possible.

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SECTION 1-11

EMERGENCY EVACUATION

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Emergency Evacuation Procedure	1-11-05	01
Provisions for Extended Over Water Operations (If Applicable)	1-11-10	01
Doors and Exits	1-11-40	01
Emergency Rescue Charts	1-11-45	01

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INTRODUCTION

This Section presents information which may be used, at operator discretion, to develop customized evacuation procedures.

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EMERGENCY EVACUATION PROCEDURE

EMERGENCY EVACUATION

Parking Brake (if necessary) ..... APPLY
Cabin..... DEPRESSURIZE
Fire Extinguishing Handles..... PULL
APU Fuel Shutoff Valve..... CLOSE
APU and Engine Fire Extinguishing
Bottles (if necessary)..... DISCHARGE
Electric Fuel Pumps..... OFF
Electric Hydraulic Pumps..... OFF
Cabin Crew ..... NOTIFY
Emergency Lights ..... ON
Evacuation ..... INITIATE

NOTE: - Cockpit door blow-out panels may be broken to be used as an alternative way to leave cockpit.

- In case of the cabin single or dual pocket door becomes jammed, push or kick at the center until door breaks free and then stow it.
- The fwd lavatory bi-fold door must be securely locked to ensure a free pathway.

ATC..... NOTIFY

Before leaving the airplane:
Batteries..... OFF

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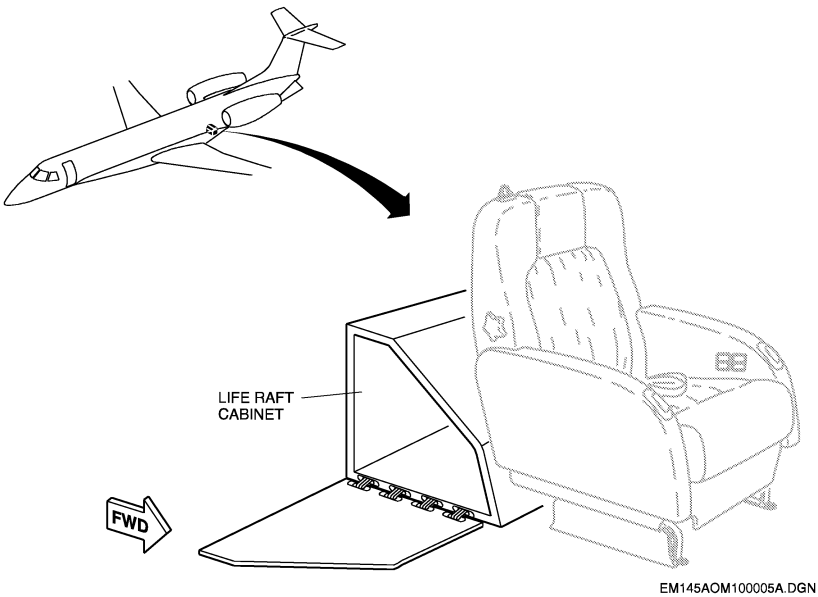
PROVISIONS FOR EXTENDED OVER WATER OPERATIONS (IF APPLICABLE)

LH LIFE RAFT CABINET

One storage compartment is located just forward of the aft lavatory bulkhead, aft of the forward facing seat. It is designed to accommodate a 12-passenger life raft.



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LH LIFE RAFT CABINET

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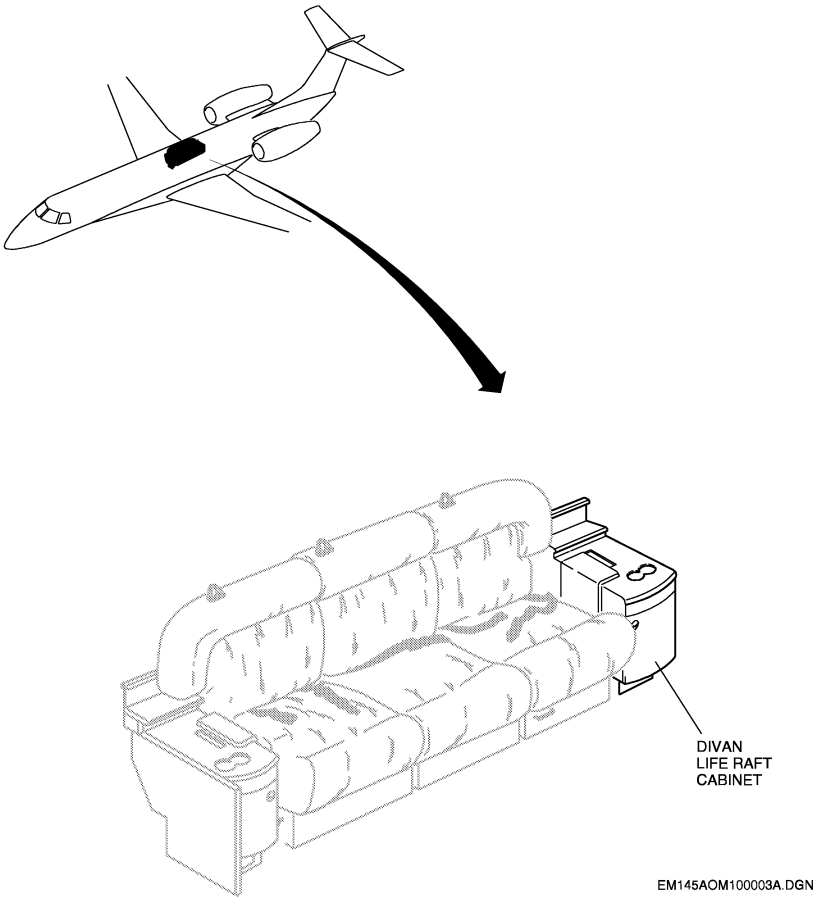
DIVAN LIFE RAFT CABINET

One storage compartment for a life raft is located inside the aft divan surround area. It is designed to accommodate a 6-passenger life raft.



DIVAN LIFE RAFT CABINET

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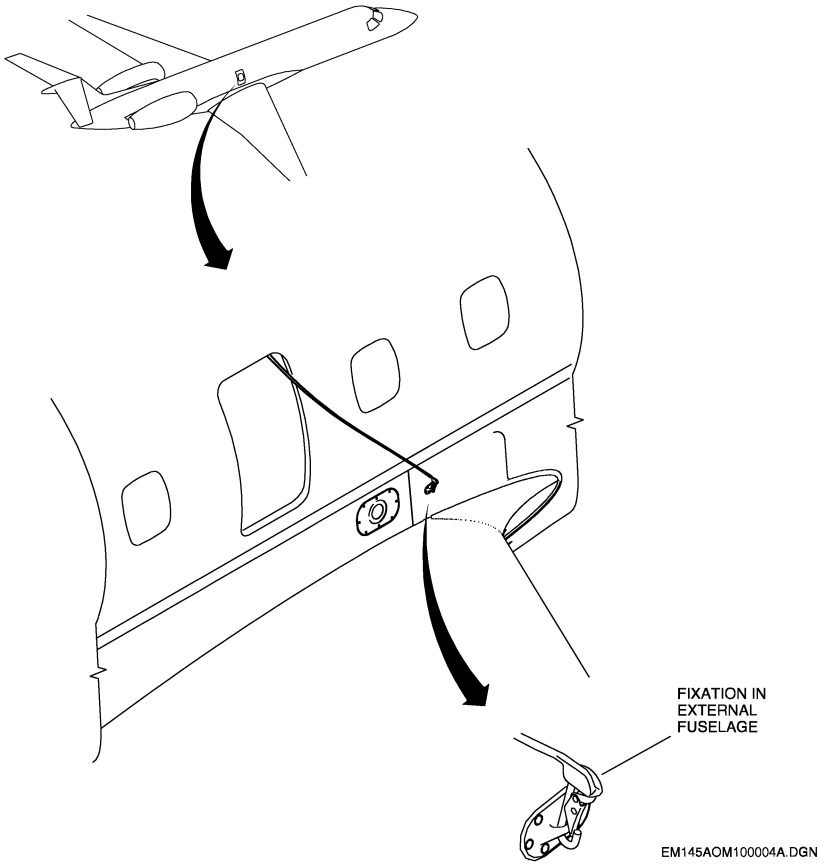
LIFE LINE

The life line is a rope that aids passengers to keep over the wing while boarding the life raft. It is installed in the upper emergency exit frame and can only be operated with the emergency exit open. The life line can be used with either life raft.



LIFE LINE

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PROCEDURE AFTER DITCHING

– Open the overwing emergency exit;
– Pull the life line from the emergency exit frame;
– Engage the life line hook in the specified point on the fuselage;
– Remove one life raft from the stowage and take it to the emergency exit;
– Tie the retention rope of the life raft to the seat belt of the seat; nearest to the overwing emergency exit;
– Take the life raft outside of the airplane;
– Pull the retention rope to inflate the life raft;
– Direct passengers to board one at time;
– After all passengers are onboard, untie or cut the retention rope.

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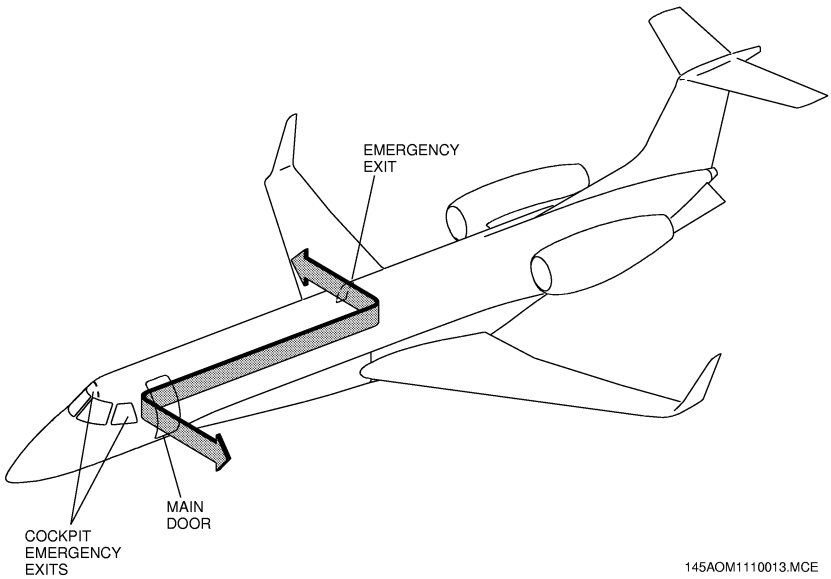
DOORS AND EXITS

There is one forward door (main), one over-wing exit and two cockpit windows, one at each side, that can be used for emergency evacuation.



DOORS AND EXITS LOCATION

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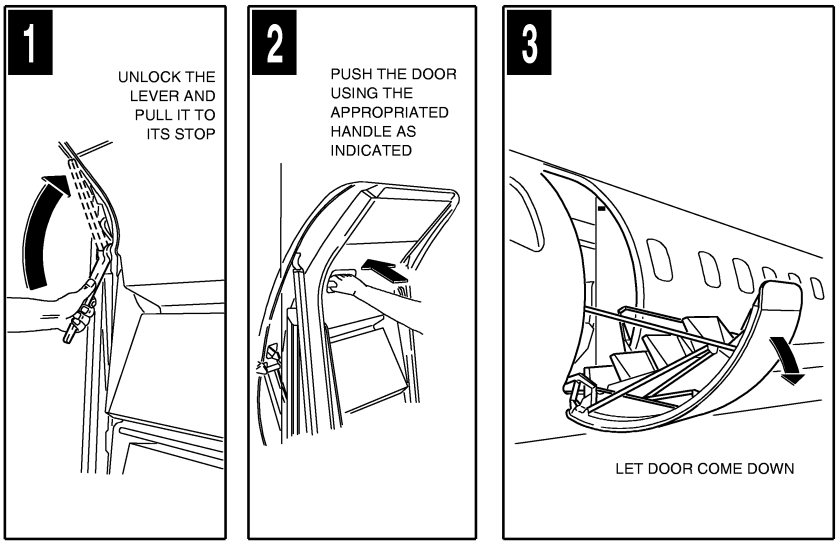
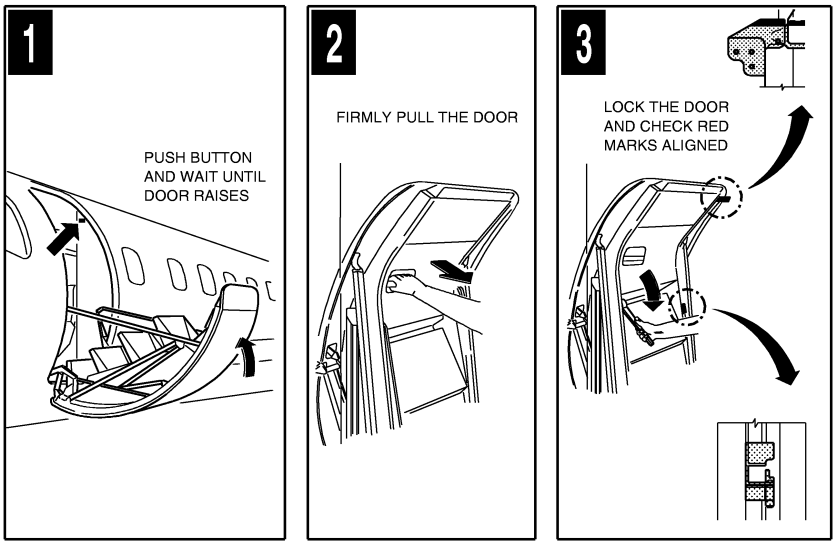
MAIN DOOR

The airstair main door is located at the fore left side of the fuselage.

TO OPEN:



TO CLOSE:



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AIRSTAIR MAIN DOOR OPERATION (INSIDE CABIN)

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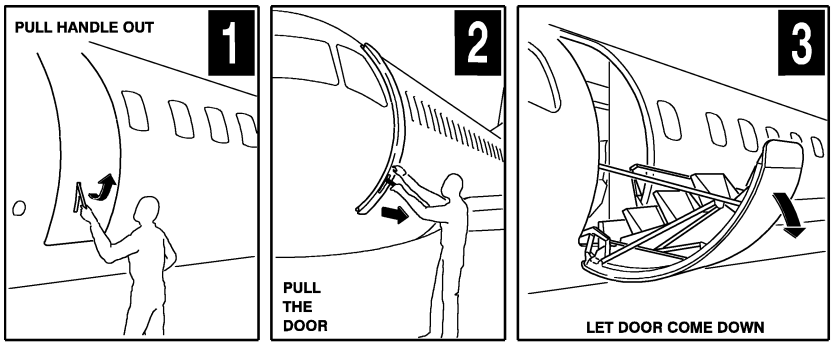
TO OPEN:



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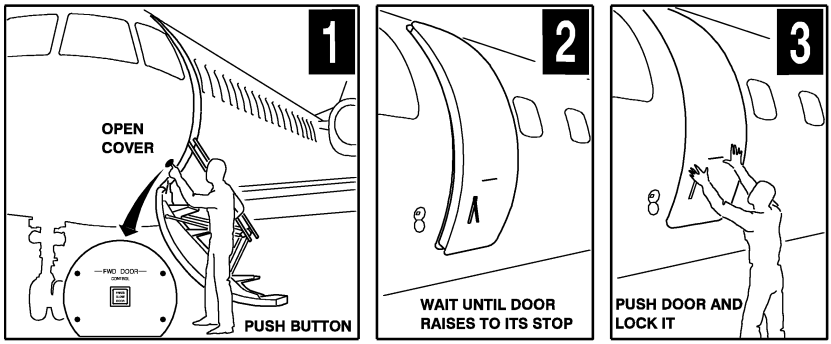

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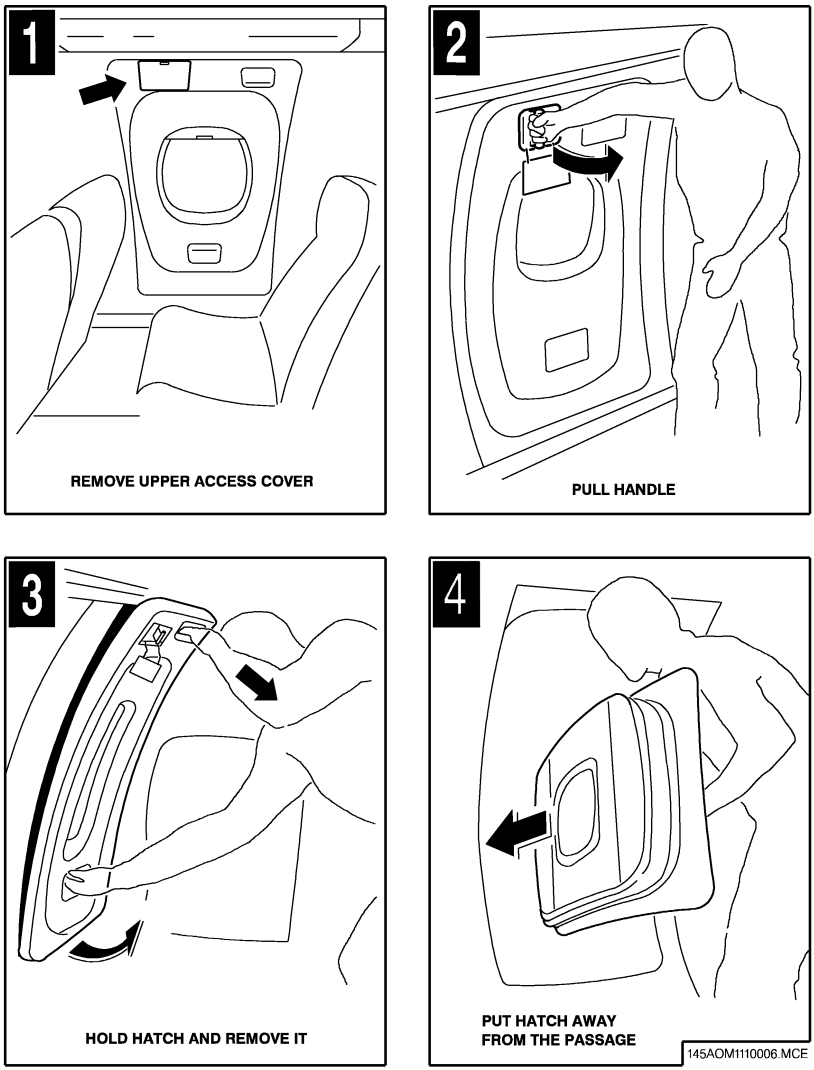
AIRSTAIR MAIN DOOR OPERATION (OUTSIDE CABIN)

EMERGENCY EXIT

EMERGENCY OVERWING EXIT

One emergency exit hatch exist for passenger evacuation in the event of an emergency. It is located on right side of the aircraft, centered over the right wing.



EMERGENCY EXIT OPERATION (INSIDE CABIN)

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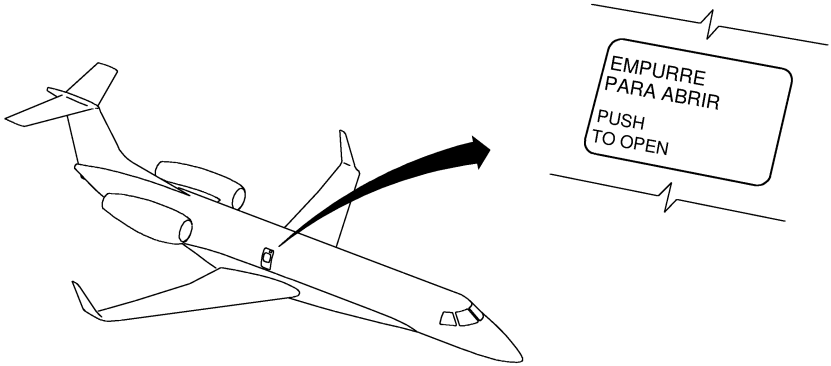

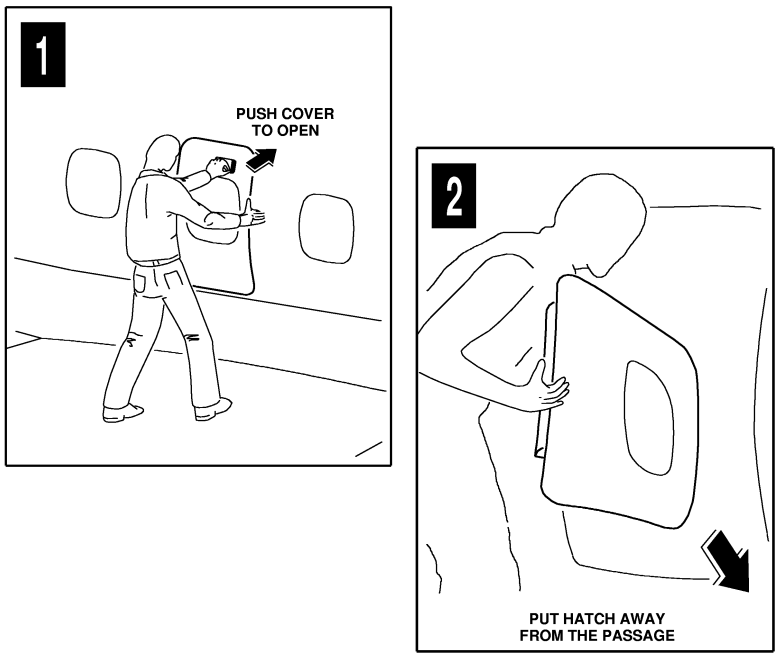

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EMERGENCY EXIT OPERATION (OUTSIDE CABIN)

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COCKPIT EVACUATION

Cockpit windows may be partially open on the ground, and may be totally removed in case of loss of visibility through the windshield or for cockpit emergency evacuation.
If window removal is necessary, facilitate removal by moving the associated pilot seat backward.

NOTE: Windows can not be opened from outside.

A rope is positioned above each window to assist evacuation.

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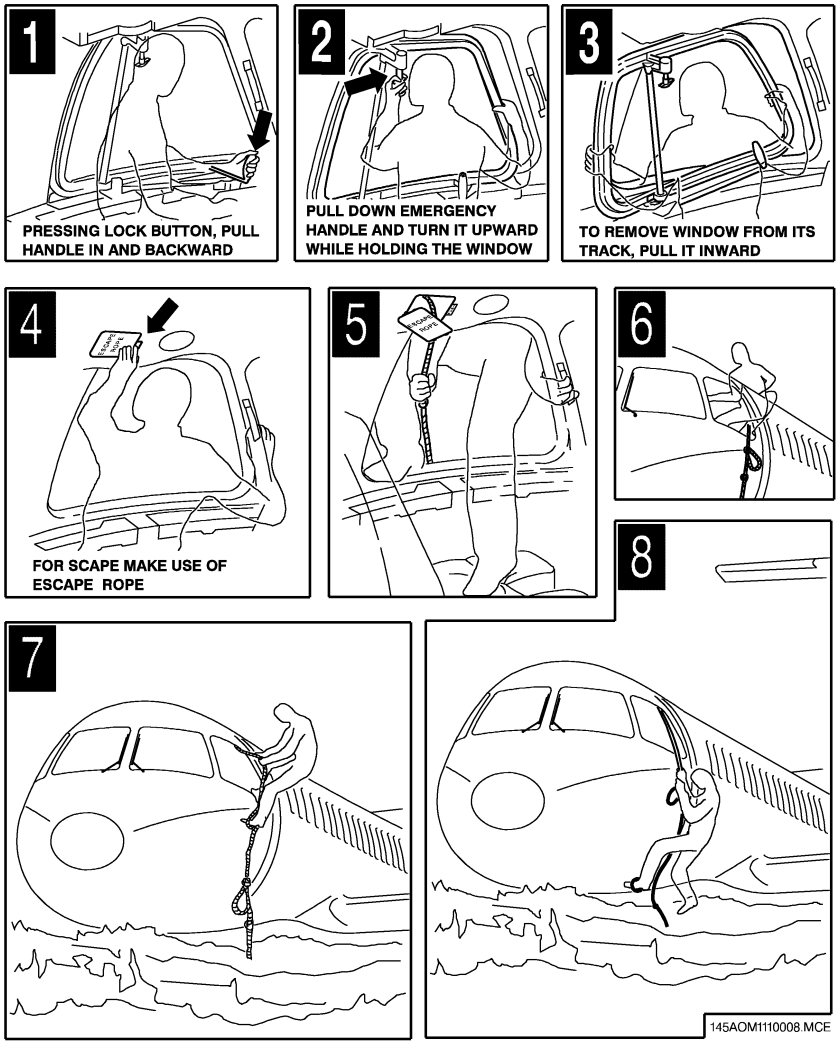

COCKPIT WINDOW REMOVAL AND EVACUATION PROCEDURE

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EMERGENCY RESCUE CHARTS

The Emergency Rescue Charts present emergency equipment location as well as emergency evacuation schematic. These charts may be used, at operator discretion, to develop customized evacuation procedures.

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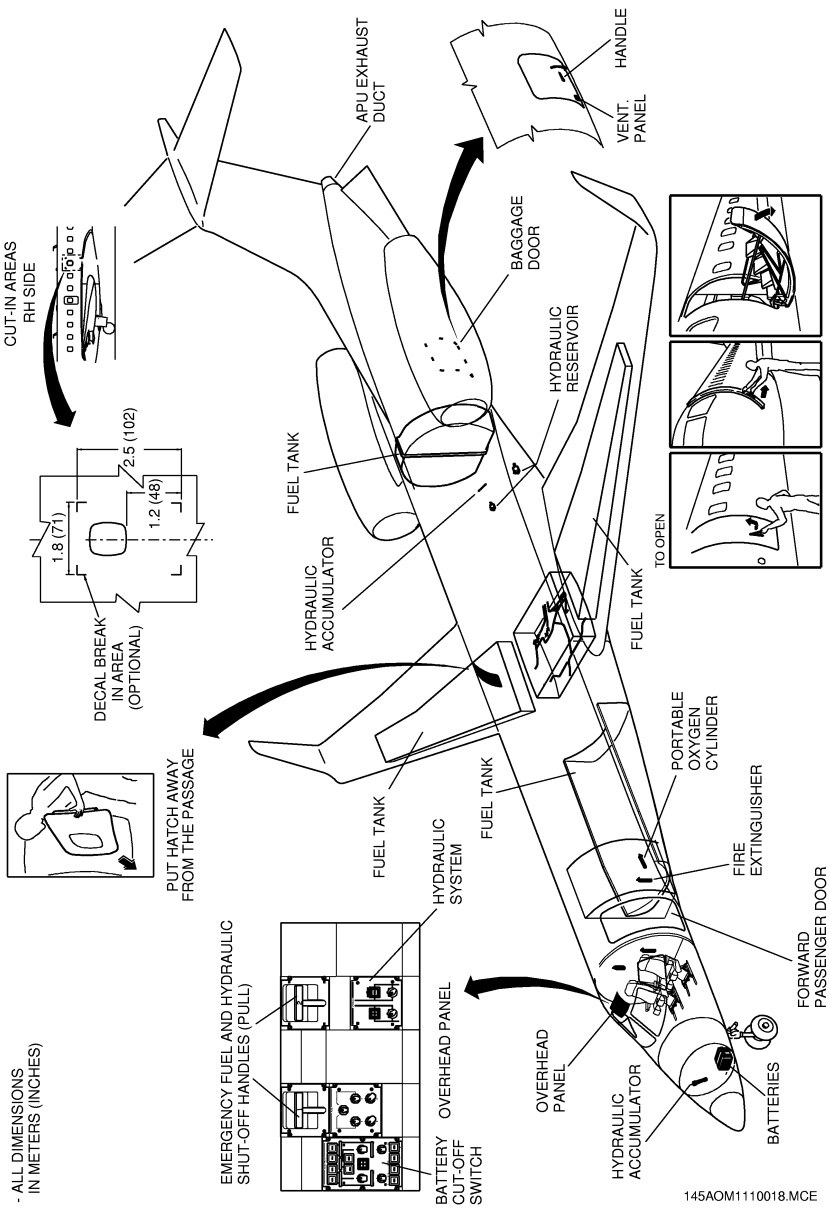

EMERGENCY RESCUE CHART (1 OF 2)

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EMERGENCY RESCUE CHART (2 OF 2)

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SECTION 1-12

GROUND SERVICING

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NOTE: Items marked with an asterisk (*) may not be presented in this manual.

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INTRODUCTION

General guidelines are provided herein related to the ground handling and servicing of the airplane. They are intended to make flight crew familiar with the ordinary aspects of the subject, as those tasks described herein normally are the responsibility of the maintenance personnel.

For further instructions pertaining the subjects covered herein refer to the Aircraft Maintenance Manual.

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EXTERNAL CONNECTIONS

CONNECTING ELECTRICAL GROUND POWER UNIT

A 28 V DC Ground Power Unit (GPU) can be connected to the airplane through the receptacle installed on the left side of the fuselage nose.

It is recommended that the GPU be capable of supplying at least 300 A, with maximal 1% steady-state voltage deviation.

The voltage shown in the MFD electrical page should be 28.0 V (-2.0 V +1.0 V) DC when the GPU status is "AVAILABLE".

The power source must be able to maintain the voltage within this range when the GPU is in use. Connecting a source out of these specifications may lead to electrical problems and therefore should be avoided.

Before energizing the airplane, it must be assured that airplane systems are in a safe condition, and that energizing will not cause any injury to persons or damage to equipment.

When using an AC fed external power source, a ground connection between the hangar structure and the power source, and another one between the power source and the airplane, are necessary. Attach the ground cable to the ground connection before attach it to the airplane.

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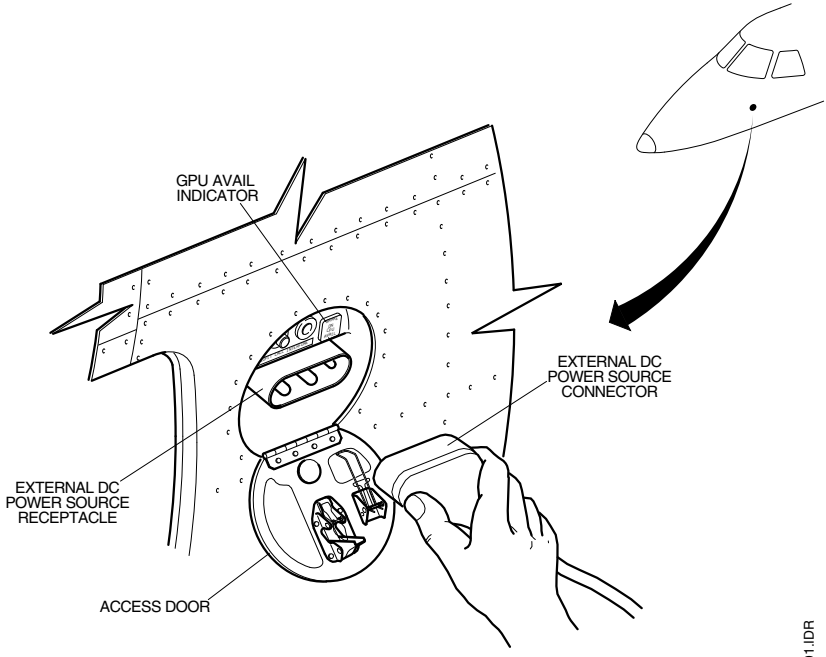

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CONNECTING ELECTRICAL DC GROUND POWER UNIT (GPU)

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CONNECTING THE EXTERNAL PNEUMATIC START UNIT

The external pneumatic start unit is connected to the airplane through the receptacle on the right side of the rear fuselage.

CAUTION: THE OUTPUT OF THE UNIT MUST BE SET BETWEEN 40 AND 45 PSI.

This pressure allows the opening of the valve to let external air in.

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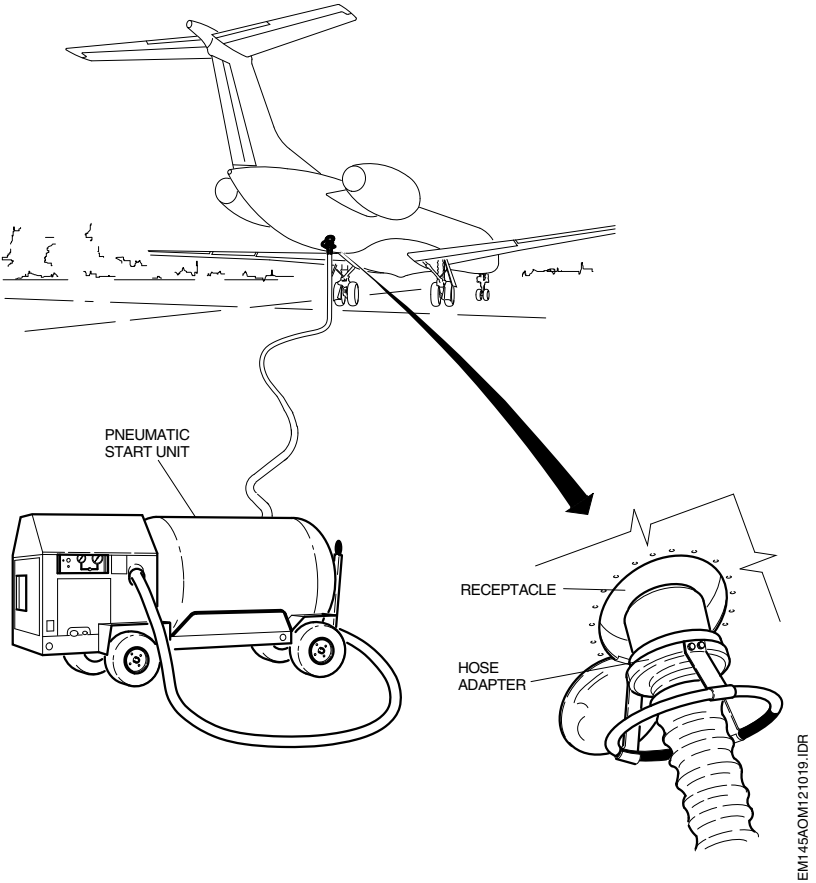

EXTERNAL PNEUMATIC START UNIT CONNECTION

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AIR CONDITIONING GROUND CONNECTION

An external conditioned air-source can be connected to the airplane to supply hot or cold air directly into the cabin.

Airplanes S/N 1035 and on, if equipped with forward lavatory (optional), will not be equipped with air conditioning ground connection.

The operation consists of connecting the source and starting supply to the airplane. Supplied air pressure must not exceed 356 mm H_2O (14 in H_2O), maximum air temperature must not exceed 71°C (160°F) and maximum flow must not exceed 3.5 m^3/min (122 ft^3/min, 92 lbm/min).

The use of external conditioned air does not require any setting of the airplane systems since the external conditioned air goes directly to the distribution ducts. However, it is recommended that the main door be left open when external air is being used, to prevent inadequate external source operation and to avoid cabin bump.

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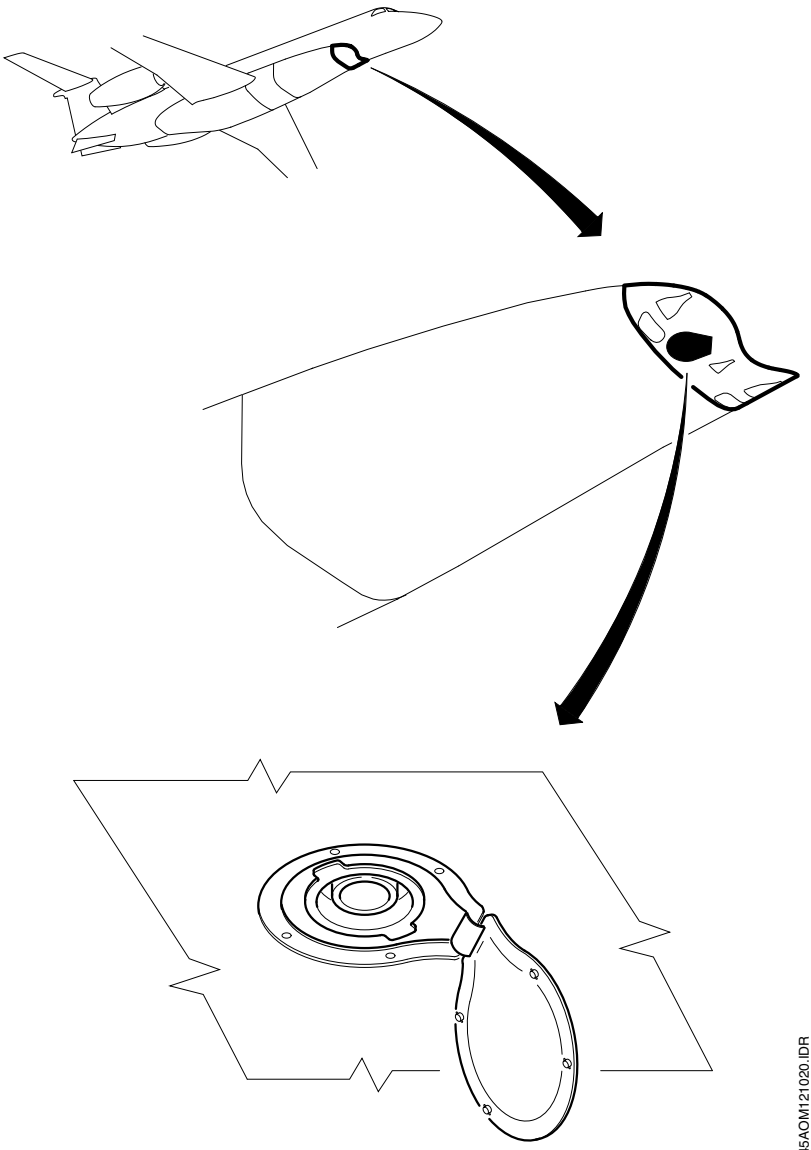

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AIR CONDITIONING GROUND CONNECTION (FOR AIRPLANES UP TO S/N 1034)

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STATIC GROUNDING

There are airplanes with three or four static grounding points.

Two of them are installed on the lower surface of each wing leading edge, one is aft of the nose landing gear and one on the right main landing gear (if applicable).

To ground the airplane properly, proceed as follow:

– Make sure that the airplane is parked adjacent to an approved grounding point.

NOTE: - For general grounding, use a 4-AWG extra-flexible special PVC-insulated, low voltage cable, and a PL-055-type plug (specification MS 3493).

- To ground the refueling nozzle or the oxygen charger adapter, use a 3/32"-diameter steel cable (specification MIL-W-83343, MIL-W-5424 or MIL-W-1511) with plug (specification MIL-C-83413/4) and an alligator clip.

– Examine the static ground cable for damage and to make sure that the end-fittings are correctly attached.

CAUTION:

- ALWAYS ATTACH THE GROUNDING CABLE TO THE GROUND CONNECTION FIRST. NEVER ATTACH THE CABLE TO THE AIRPLANE AND THEN TO THE GROUND CONNECTION.
- USE THE GROUNDING POINTS SHOWN IN FIGURE BELOW ONLY. THE USE OF OTHER POINTS MAY RESULT IN POOR GROUNDING.

– Connect the static ground cable plug to one of the grounding points on the lower surface of each wing leading edge and the other end to an earth grounding point.

– Connect the static grounding cable of the ground support equipment to an earth grounding point.

– Connect static grounding cable plug of ground support equipment to one of the airplane grounding points.

– Connect the applicable ground support equipment.

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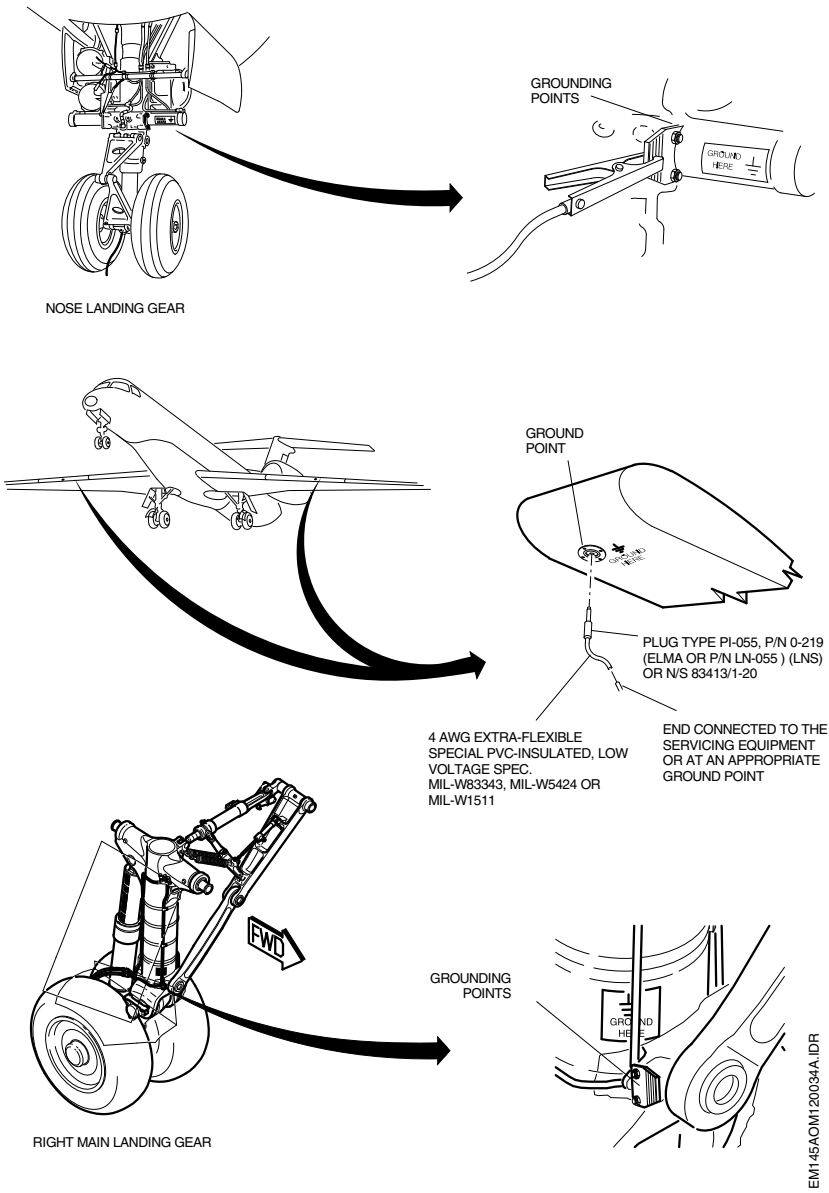

STATIC GROUDING POINTS

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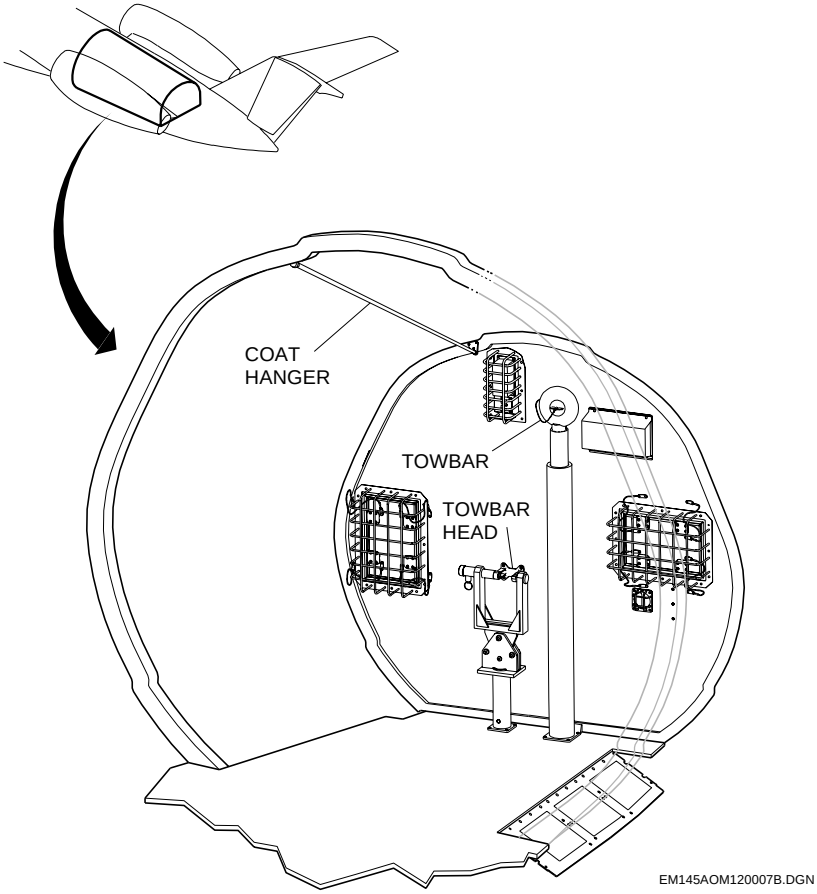
TOWING

Ground towing is normally accomplished by using ground support equipment (towbar and towbar head attachment) coupled to the landing gear. The applicable towbar and towbar attachment are listed on AMM Chapter 9. For airplane EMB-135BJ SN 1001 and on the towbar and towbar head are stowed in the baggage compartment.



TOWBAR AND TOWBAR HEAD LOCATION FOR AIRPLANES S/N 1001 AND ON

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The towbar incorporates breakable sections (fuse) with the purpose of causing the towbar to break in case of any towing abnormality, to protect the airplane structure or the nose landing gear from damage. Maximum towbar fuse push/pull design force is 4418 kgf (9740 lbf). Maximum design torque is 4300 N.m (3171.5 lbf.ft).

Maximum nosewheel displacement during towing is 170° to the left or to the right.

The maximum recommended wind speeds for airplane Towing, Pivoting, Turning and Taxi are:

RUNWAY	WEIGHT – kg (lb)		
	13000 (28660)	18500 (40786)	22270 (49096)
	WIND SPEED (KIAS)		
DRY	55	64	65
WET	47	54	60
SNOW COVERED	32	37	41
ICE COVERED	21	24	27

NOTE: - Towing without the towbar is prohibited, except to airplanes Post-Mod. SB 145-LEG-32-0025 or equipped with an equivalent modification factory incorporated, that can be towed using one of the following towbarless tug vehicles:

- Douglas TBL-50;
- Lektro AP8750B-AL;
- TLD TPX-100E;
- Lektro AP8850SDAAL-100/50;
- Goldhofer AST-3.

- For a safe towing operation, the procedures specified in the AMM chapter 9 must be followed by qualified personnel.

The main landing gear has hard points to attach winch, cables or bars for towing the airplane fore and aft in abnormal conditions such as in soft mud, snow etc.

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TOWING PREPARATION

The following precautions apply when towing the airplane:

- Tow the airplane with the hydraulic system 1 and 2 depressurized. In case it is suspected that Emergency/Parking Brake has no accumulator charge to supply power for an eventual actuation, turn electric hydraulic pump #2 for a few seconds and then turn electric hydraulic pump off again.

  NOTE: Turning on an electric hydraulic pump using batteries only can discharge the batteries. The use of the APU generator to supply electrical power is recommended.

  CAUTION: TOW THE AIRPLANE WITH THE HYDRAULIC SYSTEM 1 DEPRESSURIZED, TO PREVENT STEERING SYSTEM FROM BEING ACTUATED. IF IT IS NECESSARY TO TOW THE AIRPLANE WITH THE SYSTEM 1 PRESSURIZED, KEEP THE STEERING DISENGAGED.

- Disengage the steering system through the Steering Disengage Button located on the control wheel (pilot or copilot). The STEER INOP message appears on the EICAS.
- During the towing operations, a person properly trained must stay in the cockpit to set the emergency/parking brake, if necessary.
- Make sure that the landing gear safety pins are correctly installed.

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TOWING OPERATION

Towing operation is accomplished following the steps below:

- Remove the lock pin from the guide pin on towbar assemblies.
- Install towbar on the nose landing gear.
- Put the guide pin into the towing point of the nose landing gear.
- Lock the guide pin with the lock pin.
- Install the other side of towbar assemblies to the tractor.
- Remove the wheel chocks.
- Release the emergency/parking brake.

After towing operation is finished:

- Apply the emergency/parking brake or install the wheel chocks, as required.
- Make sure that landing gear safety pins are correctly installed.
- Make sure that nose wheel displacement is below the maximum operational limit.
- Remove towbar.
- Remove the lock pin from the guide pin on the towbar assembly.
- Remove the guide pin from the towing point of the nose landing gear.
- Remove the towbar assembly from the nose landing gear.

NOTE: Steering handle actuation with nose wheels beyond their operational limits may cause damage to the nose wheel steering system.

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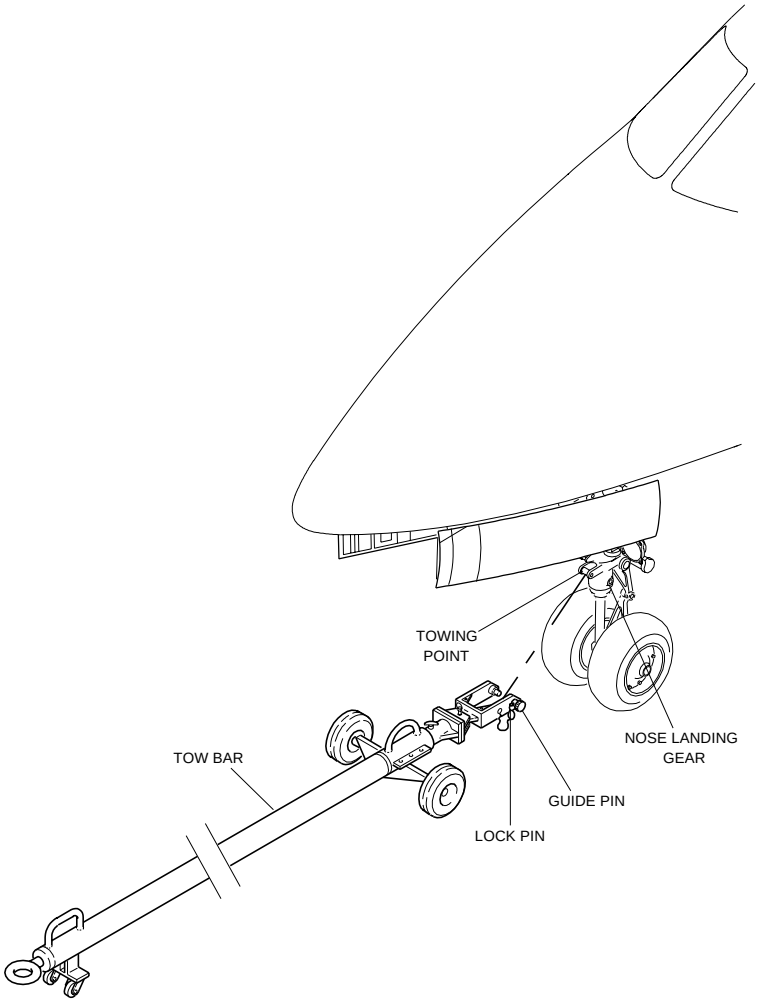

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TOWING EQUIPMENT

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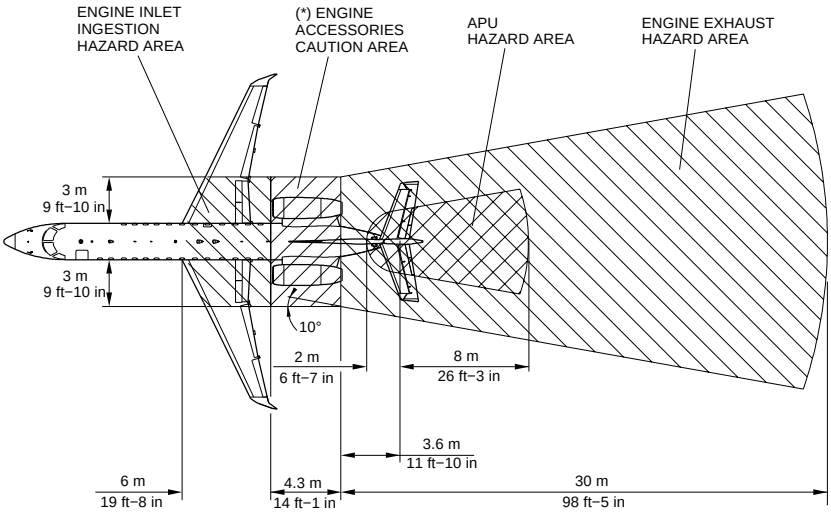

(*) ACCESS TO THIS AREA IS PERMITTED JUST WITH ENGINE RUNNING IN IDLE SPEED.

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HAZARD AREAS

PARKING

Instructions contained herein cover only normal parking, i.e. the parking between flights and the overnight stop. In case of prolonged parking, or parking in an extremely adverse weather condition, assistance of a maintenance technician is required.

PREPARATION

Make sure there is a minimum distance from other parked airplane to permit the airplane movement and that there is a minimum distance of 4.5 meters between APU exhaust port and an adjacent airplane fuel tank vent.

NOTE: - The airplane must be sheltered in a hangar when there are wind speeds higher than 65 kt.

- If the airplane is exposed to wind gusts with the gust lock in the unlocked (FREE) position or the airplane is exposed to winds exceeding the limit specified for the gust lock system, an inspection according to TASK 05-50-04-200-802-A (AMM) should be performed.

PARKING

Normal parking is performed according to the procedure below:

- Make sure that the safety pins are installed to each landing gear.

CAUTION: IF THE RELATED LANDING GEAR SAFETY PINS ARE NOT INSTALLED, INJURY TO PEOPLE AND/OR DAMAGE TO THE AIRPLANE/EQUIPMENT MAY OCCUR.

NOTE: Before parking the airplane, move it approximately three meters in a straight line to remove all torsional stresses applied to the landing gear components and tires during a turn.

- Ground the airplane.
- If there is ice or snow in the parking area, put mat, thick sand or other applicable material under the tires, to prevent them from freezing.

CAUTION: IF THE BRAKES ARE TOO HOT, DO NOT APPLY PARKING BRAKES UNTIL THEY ARE COOLER. THIS WILL PREVENT BRAKE DISCS FROM BONDING.

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- Set the emergency/parking brake.
- Retract the flaps if they are extended.
- Set the gust lock lever.
- Put the chocks against the landing gear wheels.
- To prevent the courtesy light from discharging the battery, pull the COURTESY LIGHT (A22) circuit breaker.
- Install the covers to the pitot tubes, total-air-temperature (TAT) sensor, tail cone, nose cowl, ice detector, engine/APU air intakes and exhaust nozzles, and anemometrical static ports.

RETURN TO SERVICE

- Remove the chocks from the landing gear wheels.
- Remove the covers from the pitot tubes, TAT sensor, tail cone, nose cowl, ice detector, engine/APU air intakes and exhaust nozzles, and anemometrical static ports.
- Make sure that the control handle of the landing gear is at the down position.
- Make sure that the safety pins are installed to each landing gear.

CAUTION: MAKE SURE THE SAFETY PINS ARE REMOVED BEFORE TAXYING THE AIRPLANE FOR TAKEOFF.

- Unground the airplane.
- Release the emergency/parking brake.
- Release the gust lock lever.

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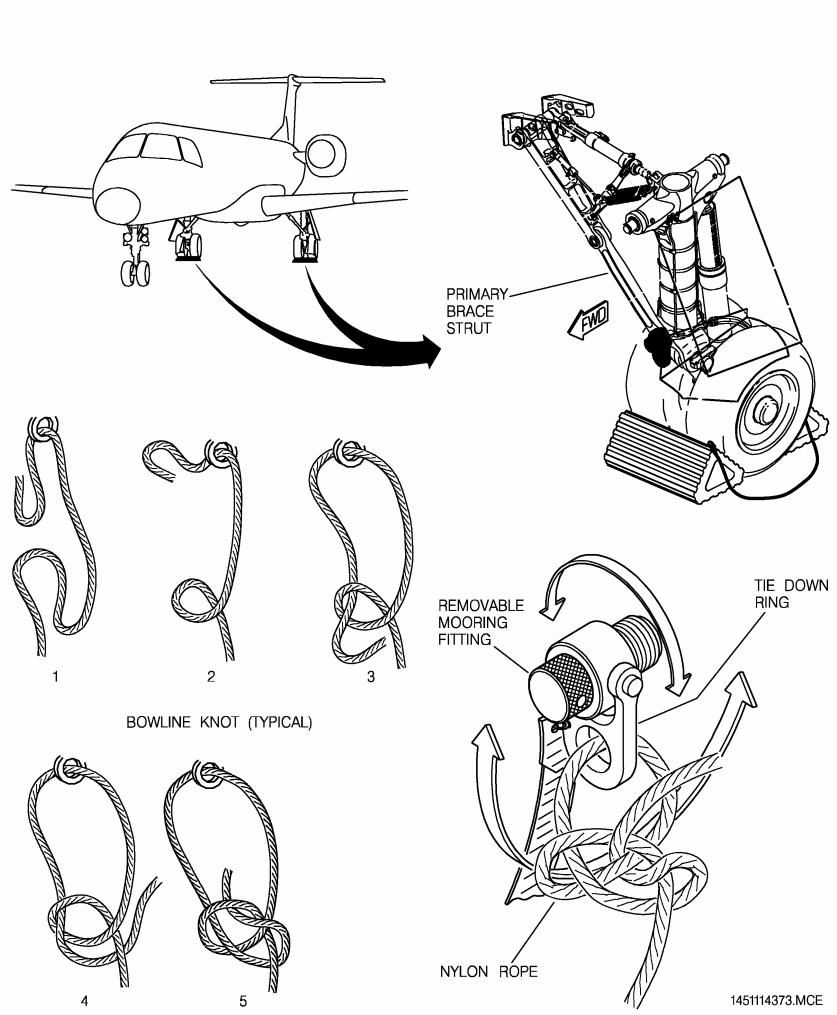
MOORING

Mooring is necessary when the weather conditions are bad or unknown. The area where the airplane is to be parked in and moored must be paved and level, with ground tiedown anchors available.



MOORING THE AIRPLANE

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The following table gives the surface conditions and wind velocities at which mooring is necessary;

Wind Limitation Table

Surface Condition	Wind Velocity
Ice	30 Kt
Snow	50 Kt
Wet Concrete	55 Kt
Dry Concrete	60 Kt

To moor the airplane, proceed as follows:

- Tow the airplane to a parking area where there are tiedown anchors available.
- Carry out the normal parking procedure.
- Install the tiedown rings (two), one in each primary brace strut of the main landing gear.
- Attach a nylon rope to the tiedown ring with a bowline knot, and then attach the other end of the rope to the tiedown anchor on the ground by knotting it with a bowline knot. See the corresponding illustration on the previous page.

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COLD WEATHER OPERATION

The following procedures should be applied by the flight crew in the event of extended airplane exposure at low temperatures.

PREFLIGHT

Although some of the following tasks might be considered a maintenance job, operational circumstances might require flight crew to inspect and prepare themselves areas where ice, snow or temperatures effects claim for additional care.

When approaching the airplane, evaluate it from a reasonable distance, watch the area where the airplane is parked and evaluate if there is a room for the taxi-out or push back maneuver. Make a complete walk around.

Check if Pitot Tubes, TAT probe, AOA vanes and static ports are clear of ice. Check residues of de/anti-icing fluids in theses areas. Ice buildup or gel close to pitot and static ports may disturb airflow over the sensor, resulting in erroneous readings even when sensors themselves are clear.

Check that engine inlet is clear of ice or snow, and that the fan is free to rotate. It will assure a flawless start with proper N2 rpm indication. Failure to properly check engine fan from the ground, can be overridden by stepping into the cabin and checking engine inlet from the last passenger window.

Check air conditioning air inlets, outlets and fuel vents tanks clear of ice. All water storage on toilets and galley must be filled.

Install the batteries if they were removed to be kept warm in order to provide a safe APU start. Batteries installation and removal might require trained manpower and ground support equipment.

Fill all water storage on toilets and galley. In case filling is not possible due to fitting clogging, heat the nipples with hot air. Filling tanks with hot water at a temperature not exceeding 35°C (95°F) will prevent water refreezing which could result in blocking of lines. Alternately, you can fill tanks from inside after the airplane takes off, when it is not possible to wait that water lines get hotter or a rapid depart is required.

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Check tires pressure. Before the flight, the temperatures from the departure and the destination airports must be checked. For detailed information regarding tire pressure when there is a large temperature decrease between the departure and destination airport, refer to Section 1-12-40.

INTERNAL SAFETY INSPECTION AND CABIN PREPARATION

Once the batteries are on and they are currently the only source of electrical power, the pilot must concentrate on starting the APU shortly to save the batteries. Start the APU observing fuel, oil and battery voltage and temperature limitations. If the APU cannot be started, apply heat from a ground cart directly into the APU compartment. Do not allow hot air to exceed 100°C (212°F).

To raise the cabin temperature using both packs, it will take, for example, 10 minutes to raise temperature from 0°C to 21°C (32°F to 70°F). Furniture and seat inside the cabin might follow that rate with just 5 minutes delay, so you can count with a proper boarding condition within 15 minutes after warm up has started. Using only one pack it will double warm up time.

Cockpit and cabin temperature indication may show some difference due to temperature sensor positioning. Use the cockpit indication as the primary temperature reference for warming up.

Crew awareness is required to monitor electrical load and not exceed the APU generator limits. Normally with the APU generator supplying the airplane, only windshield heating 1 is available. Once the shed buses are overridden, heating will be available for windshield 2. Crew awareness is required to monitor electrical load so as not to exceed APU generator limits.

After electric hydraulic pumps are on, check hydraulic pressure. If pressure does not rise, warm up the hydraulic reservoir compartment with hot air.

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ENGINE STARTING AND TAXI-OUT

Setting up for dual ignition will result in successful engine starting if OAT is below 5°C (41°F).

If the engine does not start, ground heating may be necessary to warm the nacelle, air turbine starter and starting control valve. After start and prior to takeoff, the engines must run at idle or taxi thrust for at least 4 minutes for cold engines or 2 minutes for warm engines. An engine is considered cold if it has been shutdown for more than 90 minutes. To increase N2 above 83%, the engine oil temperature must be at 40°C (104°F) minimum.

If flaps were left up during taxi, complete the AFTER START checklist before takeoff.

Engine run up is required should vibration increases. Advance thrust levers, one at a time, to at least 60% N1 for 5 seconds then return to the former setting.

One engine taxi is authorized when OAT is 4°C (39°F) or higher and falling precipitation is not present.

The frequent use of thickened de/anti-icing fluids in one-step process can result in the accumulation of fluid residues in aerodynamically quiet areas. These residues may re-hydrate when exposed to and subsequently freeze at low temperatures, possibly restricting the movement of the airplane's control surfaces.

When inspecting the wing, during your pre-takeoff contamination check, look at the entire upper surface and not just the leading edge or wing tip. Although the wing tips can be seen from the cockpit, almost the entire wing is visible from a cabin window. On ground, do not rely on the ice detectors to tell you ice is accreting on the airframe. Clear ice detectors are a means of sensing only clear ice. Any other type of contamination will go unnoticed. Therefore, it is strongly recommended that a crew member make the visual inspection from the cabin. Additionally, the crew should ask for the assistance of trained and qualified personnel outside the airplane to assist in the pre-takeoff and check to insure that the tail and fuselage, which are not visible from the cockpit or cabin, are free of any ice contamination.

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The minimum fuel temperature published in the AFM and AOM and the fuel related EICAS messages may be somewhat restrictive when flying long routes departing from extremely cold airports. Minimum fuel temperature is -40°C (-40°F), which is a value that represents the fuel freezing point. This limitation stands for the fuel temperature conditions that could result in the precipitation of waxy products in the fuel, which could risk fuel lines and filter becoming blocked.

There are different fuel types approved for the EMB-135BJ, and certainly each one has its own freezing point. You should cope with the same time with the FUEL TANK LOW TEMPERATURE message, which will appear if the temperature in the tank reaches -40°C (-40°F). Another related message is the ENGINE FUEL LOW TEMPERATURE, which should appear when the temperature in the fuel-cooled oil cooler outlet drops below 5°C (41°F).

Remember that fuel anti-icing additives decrease the freezing temperature of the water contained in the fuel but have no effect on the fuel freezing temperature itself. It will give you extra margin to prevent ice crystals from clogging fuel lines, but the EICAS messages will still be there.

AFTER LANDING AND TAXIING IN

Check in the chart how cabin internal temperature can go down if the airplane is left soaking in the weather outside. It can take just 3 hours for the temperature adjacent to water lines to go close to freezing point when the OAT is -30°C (-22°F). In most cases, it is more economical and time-saving to use a hangar than leaving the airplane outside in the harsh weather.

Save time draining it inflight, just by letting the faucet open and opening sink drain till water flow ends. Once on ground, draining by the external service panel is still required to clean up the remains of water left in the system lines.

Proceed to fuel system draining and battery removal to assure a safe APU start after the cold soak period.

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COLD SOAK PREPARATION

The procedures below should be applied in the event of extended airplane exposure at low temperatures. In the event that the airplane is off the maintenance base, the crew should ensure that all actions have been accomplished:

- Put the wheel chocks against the landing gear wheels.
- For an icy ramp, leave Emergency/Parking Brakes applied. Otherwise, Emergency/Parking Brakes must not be applied to avoid freezing of the brakes.
- Install protective covers on engines and APU inlets/outlets, pitot, TAT probes, and wheels.
- Drain water and waste from all water tanks, galley lines (for airplanes up to S/N 678) and coffee maker (if applicable) if temperature is expected to be below the freezing point of water.
- Remove the batteries if temperatures are expected to be below -15°C (5°F). This protects the batteries and ensures their duration in case of electrical emergency.
- All doors and windows must be closed to avoid snow and humidity from entering into the airplane.

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APPLICATION OF DEICING AND ANTI-ICING FLUIDS

ANTI-ICING AND DEICING FLUIDS

When airplane surfaces are contaminated by frozen precipitation or frost before departure, they must be deiced. When the risk of freezing precipitation exists at dispatch or freezing precipitation is actually taking place, the airplane must be anti-iced. While deicing removes ice, anti-icing protects against additional icing for a certain period of time, called hold-over time. A combination of both anti-icing and deicing may be performed based on the judgment of the flight crew and procedures developed by the operator.

Deicing and anti-icing fluids lower the freezing point of frozen precipitation thus delaying the accumulation of contamination on the airplane. When applied to a clean surface, the fluid forms a thin layer that has a lower freezing point in precipitation. The fluid is highly soluble in water, thus the precipitation or ice melts on contact with fluid. These fluids also delay the onset of frost on airplane surfaces. As the ice melts, the fluid dilutes with the water, thereby causing the mixture to become less effective or to run off. Ice can begin to form again after enough dilution has occurred and freezing point begins to rise.

Deicing/anti-icing fluids are not intended to provide icing protection during flight. The fluid must flow-off the surface during takeoff, or they may cause undesirable performance effects. Embraer performed flight tests to investigate the effects of approved fluids on performance and handling characteristics. These tests demonstrated these fluids did not have a measurable effect on takeoff and climb performance.

Fluids are generally mixtures of glycol, water, inhibitors, thickening agents and wetting agents. Glycol lowers the freezing point and prevents the formation of ice contamination at temperatures below freezing. The wetting agent allows the fluid to conform to the airplane surfaces. The inhibitors prevent corrosion and increase the flash point. The thickening agent, normally propylene glycol with polymers, enables the coating of fluid to remain on airplane surfaces for longer periods.

Type I Fluid is unthickened, while fluids from Type II to IV are thickened.

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Type I Fluid characteristically forms a thin wetting film which provides relatively limited holdover time, and provides protection against refreezing when no precipitation is present.

A deicing fluid may be pure heated water, or a mixture of heated water and type I, II, III or IV fluids. Heating is applied to a minimum temperature of 60°C (140°F) to assure maximum deicing efficiency.

Anti-icing fluids include types I, II, III or IV fluids in a mixture with water or undiluted.

Type I fluid is diluted with water to result in a freezing point approximately 10°C (50°F) below ambient temperature. No additional holdover time is obtained by increasing the concentration of this fluid in the fluid/water mixture. However, increasing the concentration of fluids II, III and IV in a fluid/water mixture results in an additional holdover time.

The holdover time of the type IV fluid is greater than that of type II, which in its turn has a longer holdover time than type III fluid.

Type I fluid is normally pink or reddish orange in color, type II fluid is normally straw-colored, type III is bright yellow and type IV is green.

Type IV is an enhanced-performance fluid and offers significant operational advantages in terms of holdover times. However, thickened fluids may dry out during flight and residues may collect in aerodynamically quiet areas. The residues may turn to a gel which can freeze in flight, potentially restricting the movement of flight controls. Operators are reminded to frequently inspect control surfaces, gaps and tab hinges for signs of residual gel. If an approved fluid during actual use shows gelling, poor water wash off or unusual dry-out, Embraer should be notified.

THE USE OF HOLDOVER TIMES

Holdover times for the fluids are derived for each specific fluid brand, under various temperatures, fluid concentration and precipitation category. Note that the lower limit of the published holdover time is used to indicate the estimated time of protection during moderate precipitation, and the upper limit indicates the estimated time during light precipitation. Heavy conditions are not covered. Therefore, crew experience and airline orientation is required to clearly settle what is heavy, moderate or light. It is very important to determine the appropriate holdover time for the prevailing environmental conditions, and apply them on the line.

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Holdover times should be seen as rough approximations. They simply reflect the average, estimated time an anti-icing fluid should prevent the formation of frozen contaminants on the protected surfaces. Actual holdover times can be reduced or extended due to many factors influencing fluid effectiveness, such as high wind velocity, jet blast, heavy precipitation rates or high moisture content. Recommended practice is to use holdover times in conjunction with a pre-takeoff contamination check to ascertain that frozen deposits have not started to accumulate on treated surfaces. In the airplane, only a small portion of the wing is visible from the cockpit.

Conducting a pre-takeoff contamination check requires a crew member to visually inspect the wing surfaces/leading edge and the engine by looking through an appropriate cabin window. The pilot-in-command must ask for the assistance of trained and qualified ground personnel to assist in the pre-takeoff check, so that empennage and fuselage, which are not visible from the cockpit or cabin, can also be inspected. If contamination is suspected, the airplane should be returned for additional deicing or anti-icing. For practical results, the holdover time must be equal to or greater than the estimated time from start of anti-icing to start of takeoff based on existing weather conditions.

Ensure that deicing and anti-icing are performed at the latest possible time before taxiing to the takeoff position. Always takeoff before hold-over time expires, so as to minimize the period when the airplane stays in line for takeoff and is exposed to contamination. Holdover time should not be considered an exact figure. It is just an average time, which can be reduced by many factors affecting the fluid effectiveness. In the case of ice build-up after deicing/anti-icing fluid application, do not assume that ice will be blown off during takeoff roll. Ask for deicing/anti-icing fluid reapplication. If the hold-over time expires, carry out a pre-takeoff contamination check and another deicing/anti-icing fluid application is required.

No holdover time guidelines exist for the conditions of snow pellets, snow grains, ice pellets, moderate and heavy freezing rain and rail. In such, takeoffs in snow pellets, snow grains, ice pellets or hail must be preceded by a careful contamination check shortly before takeoff. Takeoff in conditions of moderate and heavy freezing rain are not approved.

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DEICING AND ANTI-ICING PROCEDURES

Application of deicing and anti-icing fluid must be done by trained and qualified personnel. It is the pilot's responsibility to decide whether or not to accept the airplane for flight. Therefore, it is essential that pilots understand not only how the fluid works and how it is applied, but also the flight crew must be able to determine if the airplane is safe for flight following treatment.

Deicing is required to clean airplane surfaces contaminated by ice, snow, frost or slush. Anti-icing is required to prevent ice accumulation. If both anti-icing and deicing are required, the procedure may be performed in either one or two-step process depending on weather conditions, available equipment, available fluids and the holdover time. However, the frequent use of thickened de/anti-icing fluids in one-step process can result in the accumulation of fluid residues in aerodynamically quiet areas. These residues may re-hydrate when exposed to moisture (e.g., rain or humidity) and subsequently freeze at low temperatures, possibly restricting the movement of the airplane's control surfaces.

Thus, a two-step deicing/anti-icing fluid application is recommended to be performed so that the residues accumulation in the critical areas is minimized. The use of hot water or heated mix of type I fluid/water for the first step of a two step deicing/anti-icing process may also help to clean away residues of thickened fluids from previous applications.

In two separate steps, the airplane is first deiced using heated water only, or a heated mixture of deicing fluid and water. After completion of the deicing operation, anti-icing is performed with diluted or undiluted anti-icing fluid. The second step must be applied before residual liquids from the first deicing step freezes, typically within three minutes. This is especially important where only heated water is used to deicing. Mixing fluids in a two-step procedure may only be performed if approved by the fluid manufacturer.

It is important to keep in mind that in case of a one-step deicing/anti-icing procedure, holdover time starts to run from the beginning of the procedure. With a two-step procedure, the holdover time starts to run at the beginning of the second step.

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Under no circumstances should an airplane that has been previously anti-iced receive a further spray of anti-icing fluid directly on top of the anti-icing contaminated film. If an additional protection is necessary before flight, a complete deicing/anti-icing procedure must be performed. Residues from previous treatment must be flushed off first.

All fluids must be used in accordance with the manufacturer's recommendations.

GROUND DEICING STRATEGY

The flight crew must understand the overall deicing and anti-icing strategies and insure that the procedures are performed properly to assure themselves that they have a safe airplane for flight.

All soft snow can be mechanically removed by blowing cold air across the airplane surface, using brooms, soft hand scrappers or rubber scrappers. Do not use tools to scrape or scratch compacted snow from the airframe surfaces or from the gaps between fixed or movable surfaces.

Flaps should be up and ailerons in neutral position, parking brake and gust lock should be applied. All doors should be closed.

For fluid apply, the following guidelines are recommended:

WINGS

Apply the fluid from the tip inboard to the root, sweeping from the leading edge in the aft direction. No frozen contamination is allowed on the wing upper surface. A 3 mm (1/8 inch) frost layer is permitted on the underwing surfaces.

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HORIZONTAL STABILIZER

It is recommended to set Pitch Trim to any position between 0° and full nose down to prevent APU soft Foreign Object Damage (FOD) ingestion. The best spray is straight in relation to the airplane centerline, in the aft direction (see figure). This is applicable when spraying either over or under the stabilizer surface. Straight spraying (cleaning from the stabilizer tip to the root), will make the fluid flow aft, away from the leading edge area. Spray angles up to 45° are acceptable (see figure), provided the stabilizer is set to full nose down. Back spraying (from trailing edge to leading edge – see figure) is not recommended as it will make spray flow forward and drip from the leading edge into the APU. Side spraying (90° in relation to airplane centerline) has also proved to flow fluid into the APU, either when cleaning the upper or the lower side of the stabilizer.

Cross spraying the upper side of the stabilizer (truck positioned on the left side of the airplane, aiming the spray the right elevator/stabilizer – see figure) has been proven also to be very effective in removing contaminants and preventing fluids from flowing down into the APU.

However, cross spray directs fluid to the stab/elevator gap. It may result in fluid accumulation and subsequent dry out in the quiet areas. Therefore, when cross spraying with fluids Type II, III or IV, additional care is required to comply with the requirements of the SNL 145-30-0001 that prescribes residues inspections on those areas.

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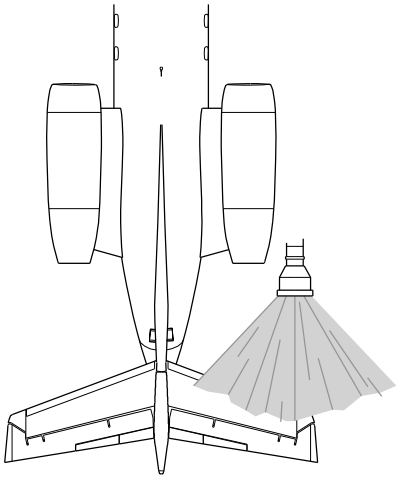

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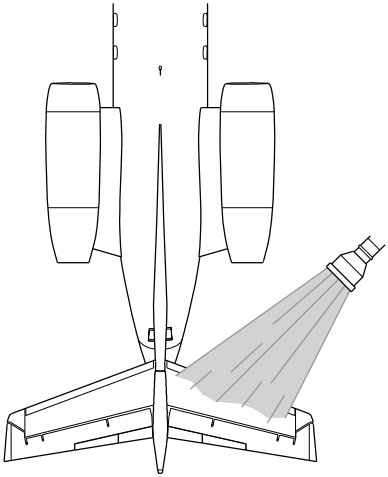
STRAIGHT APPLICATION IN RELATION TO AIRPLANE CENTERLINE



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45° FLUID APPLICATION

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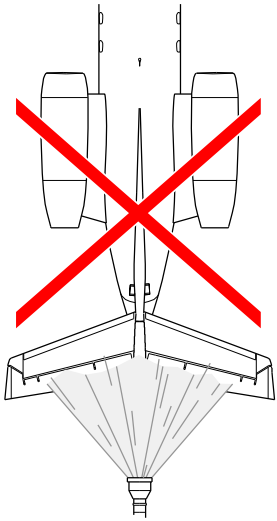

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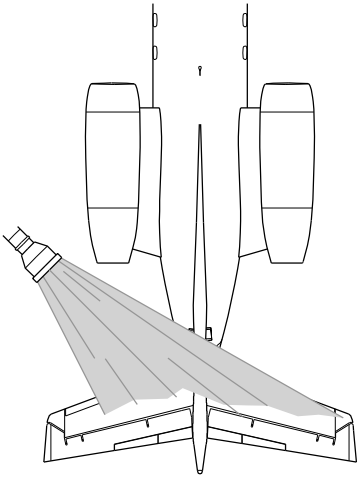
BACK SPRAYING



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CROSS SPRAYING APPLICATION

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VERTICAL STABILIZER

Apply the fluid at a low, side angle (see figure), to prevent fluid spills into the APU. The rudder should be in the neutral position. Application on the rudder surface can also cause the fluid to be ingested by the APU. For the vertical surfaces the application should start at the top and then work down.

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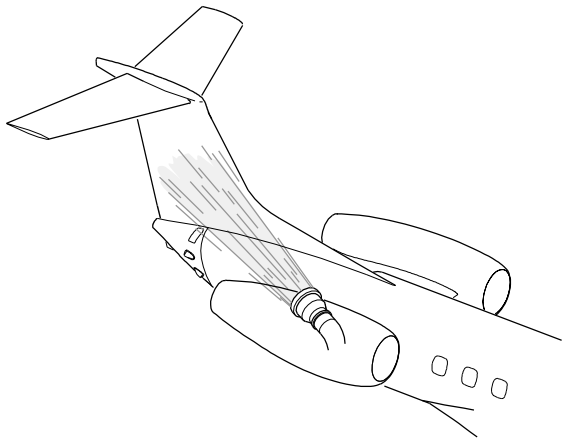

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SPRAYING ON THE VERTICAL STABILIZER AND RUDDER

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FUSELAGE

Remove all snow accumulated on the nose to avoid snow blowing back during takeoff and restricting pilot's visibility. Fluid should be sprayed along the top centerline of the fuselage and then outboard, letting the fluid cascade down and across the windows. Fluid must not be sprayed directly onto windows and window seals, doors and doors seals, air conditioning scoops or NACA air inlets. A thin layer of hoar frost on the fuselage is permitted, but only to the point you can still see the airplane markings. Check the APU air inlet and surrounding area to ensure that it is clear of ice or snow prior to APU starting. Fluid applied close to inlet area may be ingested and cause flameout and result in APU internal parts damage.

Landing gear and wheel bays – application of fluid in this area must be kept to a minimum. Do not allow water or fluid mixture spray on wheels and brakes to avoid damage to carbon brakes. For this part of the airplane, it is preferable to clear snow or slush using a brush.

ENGINES

Deposits of snow should be mechanically removed from engine intakes using either brooms, soft hand scrapers or rubber scrappers. Frozen deposits adhering to either the lower surface of the intake or to the fan blades should be removed by the applying hot air or by the use of a gentle fan spray of heated deicing fluid. To ensure the safety of ground personnel and passengers, this should be carefully coordinated with the flight crew.

It is also important to examine and remove all ice attached to the surface close to the pitot and static sensors, static ports, TAT probes, AOA sensors, and ice detectors. However, deicing or anti-icing fluid should not be applied directly to these devices. The fluids should be sprayed along the top of the sensors, allowing the fluid to cascade down across the sensor and deice it.

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GROUND ANTI-ICING STRATEGY

Once the airplane has been fully deiced, then it is time to consider the prevention of any further ice contamination prior to takeoff by application of an anti-icing treatment. To prevent frozen contamination on airplane surfaces, the anti-icing operation requires that fluids be distributed uniformly over surfaces. In order to control uniformity, all horizontal surfaces must be visually checked during fluid application. The correct amount is indicated by fluid just beginning to drip off the leading edge. The following surfaces must be protected: wing upper surface and leading edge, horizontal stabilizer upper surface and leading edge, elevator upper surface, vertical stabilizer and rudder, fuselage upper surface.

On the wings, the best results are obtained by starting the spraying at the highest part of the wing section and proceeding towards the leading and trailing edges. On vertical surfaces, start at the top and work down.

A check for fluid coverage and residual ice is required immediately following application of the deicing/anti-icing fluids and should be accomplished by a qualified person. It is possible that fluid may not flow evenly over the protected surfaces. It is essential that the wings, horizontal and vertical stabilizer are properly coated with fluid. It is also important that the fluid be applied symmetrically to both wings so as to ensure that the aerodynamic effect of the fluid remaining is the same on both sides of the airplane.

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APPROVED DEICING/ANTI-ICING FLUIDS

Only deicing/anti-icing fluids certified under specifications below are approved to be used in the EMB-135BJ airplane models:

DEICING/ANTI-ICING FLUID	SPECIFICATION
Type I	SAE AMS 1424
Types II, III and IV	SAE AMS 1428

Refer to the fluid manufacturer's recommendations for fluid mixture, if applicable, and holdover times.

NOTE: - For the Type I Fluids – SAE AMS 1424, the use of Alkali Organic Salt-based fluid is not recommended.

- For approved fluid manufacturers, refer to AMM 20-30-06/2.
- Specifications for fluid mixture, if applicable, and holdover times are provided by FAA (Federal Aviation Administration), AEA (Association of European Airlines) and TCCA (Transport Canada Civil Aviation).

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WATER SERVICING FOR AIRPLANES S/N 686 AND ON

WATER DRAINING PROCEDURE

The Water System is drained from both the Galley and Lavatory water service panels located forward and aft respectively and are serviced in the same manner.

With the airplane energized:

– Raise the cabin temperature. Refer to Section 1-02-79 Operation In Icing Conditions – Internal Safety Inspection.

– Carefully open the Water Service Panel doors to drain the galley water tank and/or the aft lavatory water tank.

– Remove the protective caps from both the FILL and VENT/OVERFLOW nipples.

WARNING: BE CAREFUL NOT TO BURN YOURSELF SINCE THE WATER FILL AND OVERFLOW/DRAINAGE NIPPLES MAY BE HOT.

– Install the hose at the water overflow nipple.

WARNING: WAIT A MINIMUM OF 15 MINUTES FOR THE PASSENGER CABIN TEMPERATURE WARM-UP TO AVOID DAMAGE TO THE WATER AND WASTE SYSTEM.

– On the panel service, pull the tank drain cable handle to drain the water system and wait until the water stops to flow from the nipples.

– Pull the tank drain valve handle to drain the remaining water of the galley water system and wait until the water stops to flow from the nipple. For this operation, get access to the handle on the galley bottom, if applicable.

– Open the galley faucet and drain the water.

– Push the handles back to the stowed position to close the drain valves and stop the drainage.

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– For airplanes equipped with touchscreen panel:
  – On the touchscreen panel, on the entertainment cabinet, select the "Water" button.

    NOTE: If the water button is not visible on the home screen, horizontally slide the button bar until you see it.

    CAUTION:
    - DO NOT KEEP WATER PUMPS ON IF WATER SYSTEM IS EMPTY.
    - DURING FULL DRAIN OPERATION DO NOT KEEP THE WATER SYSTEM ON FOR MORE THAN 30 SECONDS.

  – Select the "GALLEY" and/or "AFT LAV" button and touch the icon that turns on the correspondent water system.
  – Let the water system run for 20-30 seconds and keep the faucet and overflow nipple opened. After this period, touch the icon that turns off the correspondent water system to stop the water system.
– For airplanes equipped with galley control panel:
  – On the entertainment cabinet or galley, as applicable, push the GALLEY H2O and/or AFT LAV H2O button to run the water system.
  – Let the water system run for 20-30 seconds and keep the faucet and overflow nipple opened. After this period, push the button that turns off the correspondent water system to stop the water system.
– Pull the handles again to drain the remaining water of the water system.
– Push all the handles back to the stowed position to close the drain valves and stop the draining.
– Close the faucets.

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– Remove the hose from the water overflow nipple.

CAUTION: LET ALL EXCESS WATER DRAIN OUT BEFORE YOU INSTALL THE PROTECTION CAPS.

– Reinstall both the FILL and VENT/OVERFLOW nipples protective caps.

– Close the Service Panel doors.

– De-energize the airplane.

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FUEL SYSTEM SERVICING

PRESSURE REFUELING

Pressure refueling is performed by accessing an adapter in a panel located on the right wing-to-fuselage fairing. The adapter consists of a valve operated by the opening movement of the fueling nozzle lever, which is manually controlled. It is possible to refuel the wing tanks only or the wing plus auxiliary (fuselage) tanks. Refer to the Section 2-8 – Fuel System for detailed description of the system.

NOTE: In cold weather it is necessary to drain the fuel tanks prior to refueling. Drain the fuel tanks again prior to departure, if the airplane has been parked for more than 2 hours.

– Statically ground the airplane.
– Open refueling panel door on the right side of the fuselage.
– Hold the panel door with the Hold-Open Rod (if installed).
– Set the Power Selection switch on the refueling panel to BATTERY, if the airplane is not energized.

NOTE: For airplanes equipped with High Level Exceeding Indication, the "STOP RFL" red light illuminates if the airplane is energized with the refueling panel door open. In this case, press and release the refueling panel door switch.

– Make sure that the WING tank refueling lights are extinguished.
– Make sure that the FUS 1 and FUS 2 refueling lights are illuminated.
– Make sure that the DEFUELING light is extinguished.
– Make sure that the FUS ISOLATION lights are illuminated.
– Make sure that the SELECTED-fuel-quantity indicator shows zero.

WING ONLY REFUELING

– Set the tanks selection toggle switch in WING ONLY position.
– Set the quantity selection toggle switch to WING position.
– Test the quantity indicator.
– Make sure that WING quantity selection light is illuminated.

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– Set the desired wing tank fuel quantity.
– Remove the protection cover from the pressure refueling adapter.
– Connect the fuel nozzle to the pressure refueling adapter.
– Pressurize the system (35-50 psig).

NOTE: To shorten the refueling time during the airplane pressure-refueling procedure, the pressure can be raised up to approximately the maximum pressure of 50 psi.

– Make sure that WING, FUS 1 and FUS 2 tank refueling lights are illuminated and the refueling flow is stopped.
– Set the REFUELING switch to the OPEN position and make sure that the WING refueling lights are extinguished.
– Make sure that the WING refueling lights illuminate, when the desired fuel level is reached.

NOTE: For airplanes equipped with High Level Exceeding Indication, if the "STOP RFL" red light illuminates, stop immediately the refueling operation relieving the pressure of the fueling source and refer to the HLEI dispatch procedure.

– Set the REFUELING switch to the CLOSED position.
– Make sure that the selected quantity was fueled.

After the refueling has been completed:

– Remove the fuel nozzle from the pressure refueling adapter.
– Install the protection cover to the pressure refueling adapter.
– Deenergize the airplane if necessary.

WING + FUS TANKS REFUELING

– Set the selection toggle switch in WING + FUS position.
– Make sure that FUS 1 and FUS 2 tanks refueling lights are extinguished.
– Make sure that FUS ISOLATION lights are extinguished.
– Test the quantity indicator to each tank (FUS 1, FUS 2 and WING).
– Make sure that respective quantity selection light is illuminated.
– Set the desired FUS 1 or/and FUS 2 and WING fuel quantity, in this order.

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NOTE: - Set the wing tank fuel quantity above 4800 kg (10580 lb). The fuel quantity selection switch must be kept in WING position before starting the refueling operation and until the end of wing refueling.

- It is recommended to refuel FUS 1 and FUS 2 systems with the same fuel quantity. However, an asymmetric refueling of the Auxiliary Tanks may be performed as far as it is assured that the airplane's CG is kept within the CG envelope presented in the Limitations Section during all flight phases.
- The maximum allowed fuel load in each auxiliary system is:
  - Airplanes S/N up to 591 and Pre-Mod. SB 145LEG-28-0010: 1460 kg (3219 lb), with 800 kg (1764 lb) in the forward tank and 660 kg (1455 lb) in the aft tank.
  - Airplanes S/N 625 and on or Post-Mod. SB 145LEG-28-0010: 1570 kg (3461 lb), with 900 kg (1984 lb) in the forward tank and 670 kg (1477 lb) in the aft tank.

After completing the previous steps:

– Remove the protection cover from the pressure refueling adapter.

– Connect the fuel nozzle to the pressure refueling adapter.

– Pressurize the system (35-50 psig).

NOTE: - Verify the refueling pressure. The correct refueling pressure assures the proper system functioning.

- To shorten the refueling time during the airplane pressure-refueling procedure, the pressure can be raised up to approximately the maximum pressure of 50 psi.

– Make sure that WING, FUS 1 and FUS 2 tank refueling lights are illuminated and the refueling flow has stopped.

– Set the REFUELING switch to the OPEN position and make sure that the WING refueling lights are extinguished and the FUS 1 and FUS 2 refueling lights remain illuminated, indicating that wing refueling has started.

– Make sure that the WING refueling lights are illuminated and the FUS 1 and FUS 2 refueling lights are extinguished, when wing refueling is completed and the refueling of the auxiliary tanks starts.

– Make sure that the FUS 1 and FUS 2 refueling lights illuminate, when the desired fuel level is reached.

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NOTE: For airplanes equipped with High Level Exceeding Indication, if the "STOP RFL" red light illuminates, stop immediately the refueling operation relieving the pressure of the fueling source and refer to the HLEI dispatch procedure.

– Set the REFUELING switch to the CLOSED position.

– Set the tanks selection toggle switch to WING ONLY position.

NOTE: Make sure about the correct refueling pressure.

After the refueling has been completed:

– Remove the fuel nozzle from the pressure refueling adapter.

– Install the protection cover to the pressure refueling adapter.

– Set the WING + FUS/WING ONLY switch to the WING ONLY position.

– Make sure that the FUS ISOL VALVES lights are on.

– Deenergize the airplane if necessary.

– Check the Wing and FUS Tanks fuel quantities and imbalance (refer to Section 1-01-36 Fuel System limitations for approved values).

If refueling cannot be accomplished (system stops refueling):

– Use the WINGS TO AUXILIARY TANKS – FUEL TRANSFER OPERATION Procedure in order to refuel the auxiliary tanks, transferring fuel from wings to fuselage tanks. Check the Wing and FUS Tanks fuel quantities and imbalance (refer to Section 1-01-36 Fuel System limitations for approved values).

– Set the Tanks Selection toggle switch to WING ONLY position and restart the wing refueling procedure to their maximum capacity.

NOTE: If the Power Selection switch has been used at the BATTERY position, set it back to the NORMAL position and close the switch guard.

– Close the refueling panel door.

WARNING: MAKE SURE THAT ALL THE SWITCH GUARDS ON THE REFUELING PANEL DOOR ARE IN THE CLOSED POSITION.

– Remove the grounding cable from the airplane.

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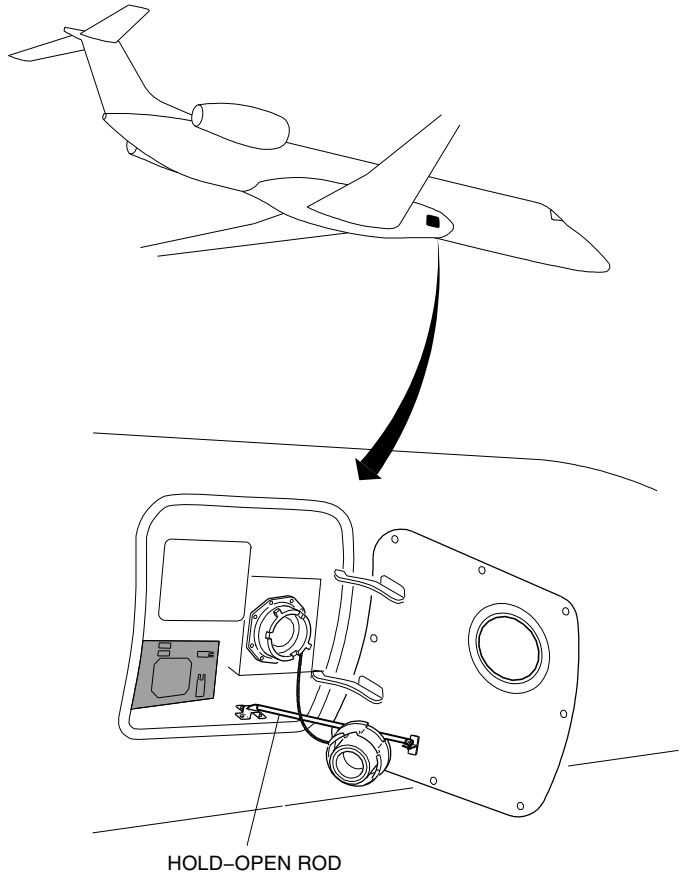

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REFUELING/DEFUELING PANEL DOOR HELD BY HOLD-OPEN ROD

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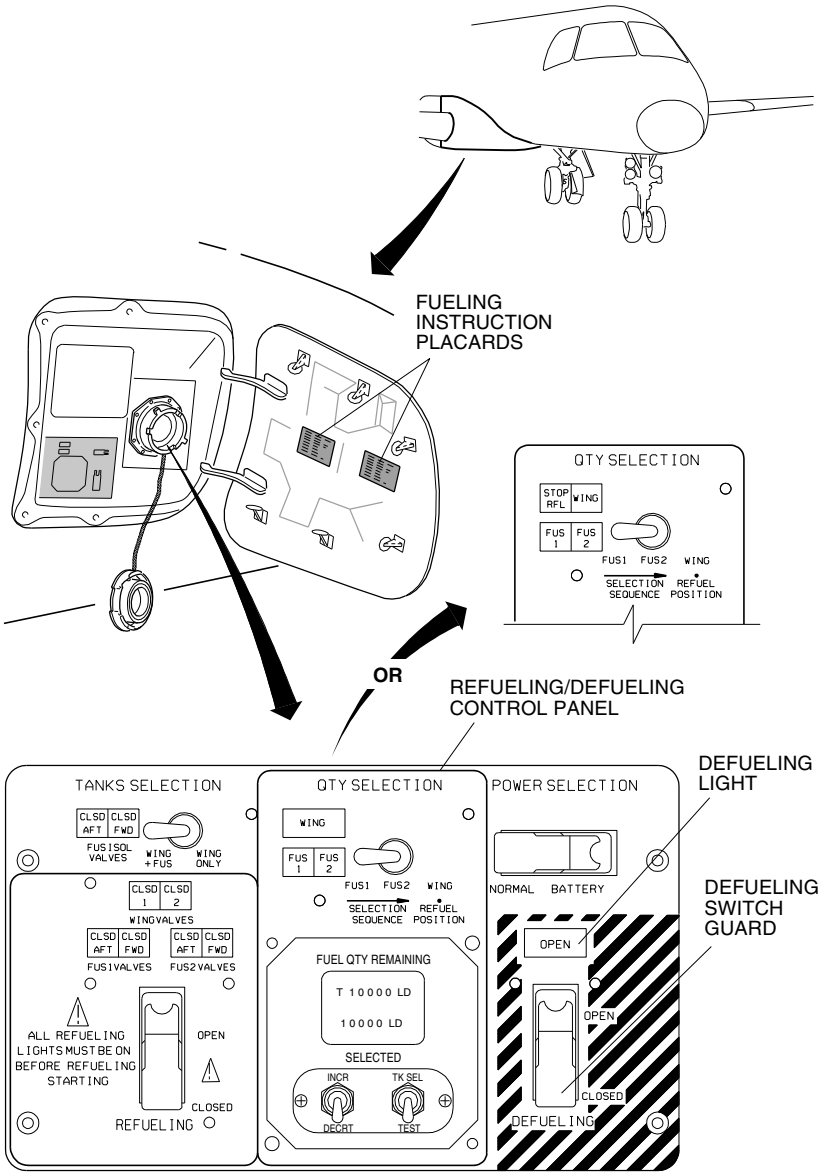

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REFUELING/DEFUELING CONTROL PANEL

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GRAVITY REFUELING

Gravity refueling the wing tanks is performed through the filler caps installed on the upper wing surface. Prior to refueling, the fueling nozzle must be grounded through the grounding point at each under wing surface. The operation consists in opening the filler cap and inserting the fueling nozzle into the filler port. Fuel quantity may be checked through the EICAS indication or through the magnetic measuring sticks should there occur a failure of the normal indication system.

During the gravity refueling, the auxiliary tanks refueling are performed transferring fuel from wing tanks. Do this procedure as follow:

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WING TO AUXILIARY TANKS - FUEL TRANSFER OPERATION

– Energize the airplane.

– Open refueling panel door on the right side of the fuselage.

  – Set WING + FUS on TANKS SELECTION switch and make sure that FUS ISOL VALVES lights are extinguished.

  – Set the DEFUELING switch to the OPEN position and make sure that the defueling OPEN light illuminates.

– Set MFD 1 or MFD 2 to the FUEL page and use the MFD to monitor the fuel quantities.

NOTE: - It is recommended to refuel FUS 1 and FUS 2 systems with the same fuel quantity.

- For airplanes S/N up to 591 and Pre-Mod. SB 145LEG-28-0010, not equipped with increased fuel capacity system:
  - The maximum allowed fuel load in each auxiliary system is 1460 kg (3219 lb), with 800 kg (1764 lb) in the forward tank and 660 kg (1455 lb) in the aft tank.
  - The load difference between forward and aft tanks of each system must be within the limits of the chart presented on Section 1-01-36 Fuel System limitations.
- For airplanes S/N 625 or Post-Mod. SB 145LEG-28-0010, equipped with increased fuel capacity system:
  - The maximum allowed fuel load in each auxiliary system is 1570 kg (3461 lb), with 900 kg (1984 lb) in the forward tank and 670 kg (1477 lb) in the aft tank.
  - The load difference between forward and aft tanks of each system must be within the limits of the chart presented on Section 1-01-36 Fuel System limitations.

CAUTION: DAMAGE TO THE FUEL PUMP WILL OCCUR IF IT OPERATES WITH NO FUEL (DRY OPERATION). THUS, TURN THE PUMP OFF BEFORE THE TANK IS EMPTY.

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Transfer fuel from the RH wing tank to auxiliary tanks as follow:

– Make sure that XFEED switch is OFF.

– Set the PUMP SEL switch to the fuel pump to be used.

NOTE: When transferring from TANK 1, make sure that the XFEED switch is positioned to LOW 2.

– Set the applicable PUMP PWR WING TANK 2 switch to ON position, on the fuel control panel, and wait approximately 15 seconds.

– Remove the access panel located at galley, to get access to the maintenance fuel transfer panel.

– On maintenance fuel transfer panel, set the switch to the tanks that will receive fuel.

Monitor the transference through the quantities of the tanks and, when the necessary fuel quantity has been transferred, move the PUMP PWR TANK 1 or PUMP PWR TANK 2 switch back to OFF.

NOTE: For airplanes equipped with High Level Exceeding Indication, if the "STOP RFL" red light illuminates stop immediately the transfer and refer to the HLEI dispatch procedure.

After transferring has been completed:

– On maintenance fuel transfer panel, set the switch to the NORM position.

Repeat this procedure to transfer fuel from wing to the other desired auxiliary tank.

When the transfers are completed:

– Set the DEFUELING switch to the CLOSED position and make sure its light is extinguished.

– Set WING ONLY on TANKS SELECTION switch and make sure that FUS ISOL VALVES lights illuminate.

– Close the refueling panel door.

– Deenergize the airplane.

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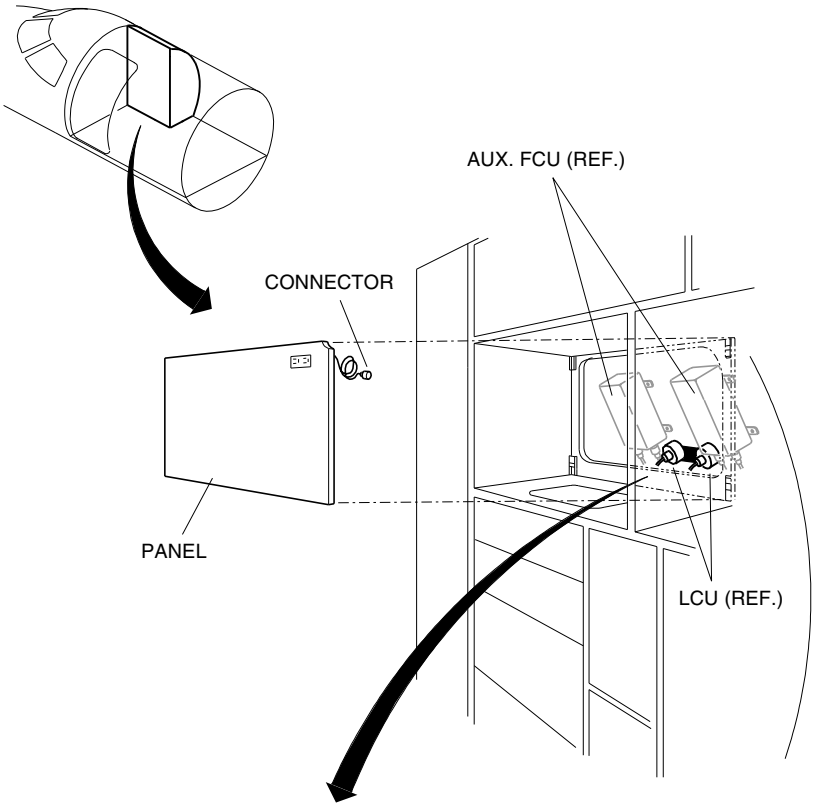

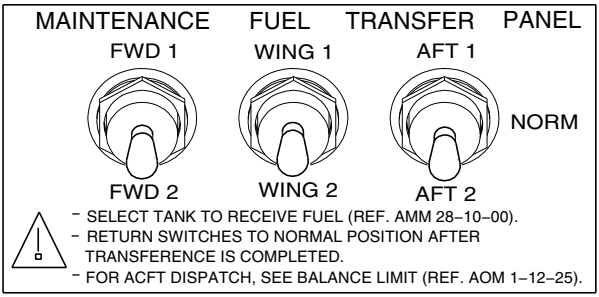

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MAINTENANCE FUEL TRANSFER PANEL (AIRPLANES S/N UP TO 591)

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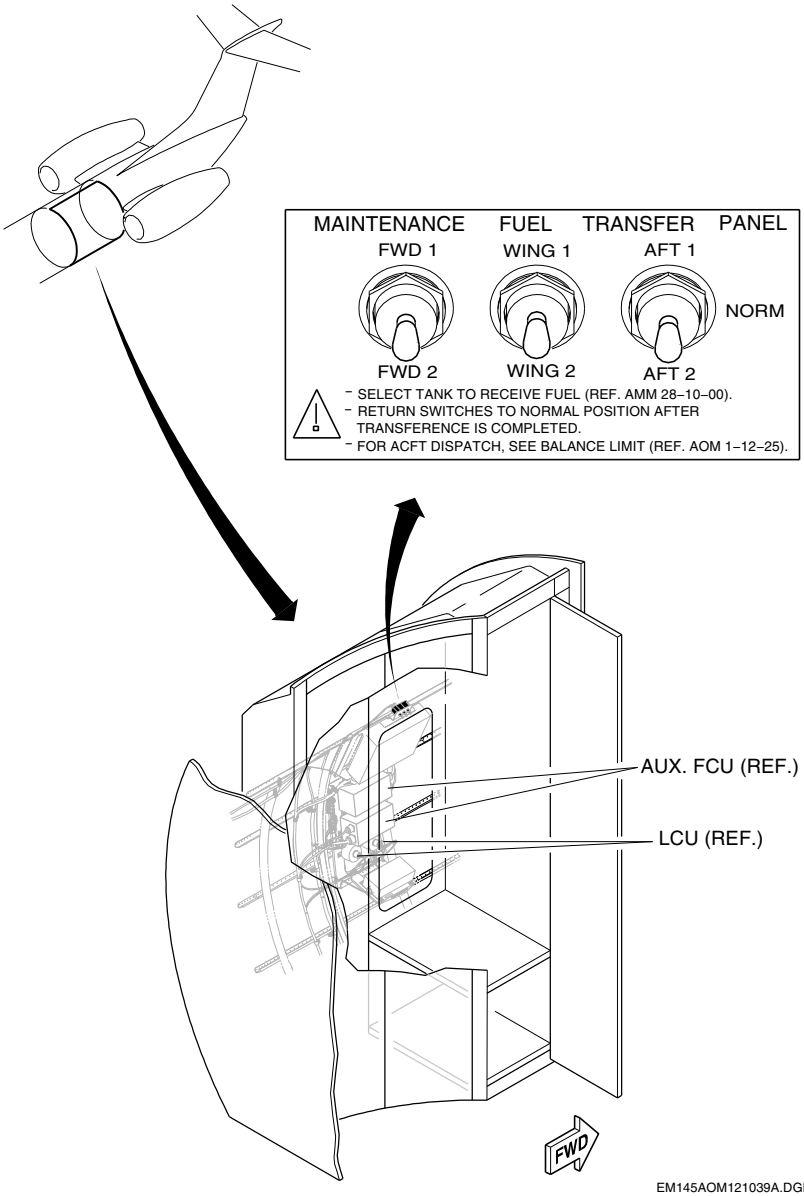

MAINTENANCE FUEL TRANSFER PANEL (AIRPLANES S/N 625 AND ON)

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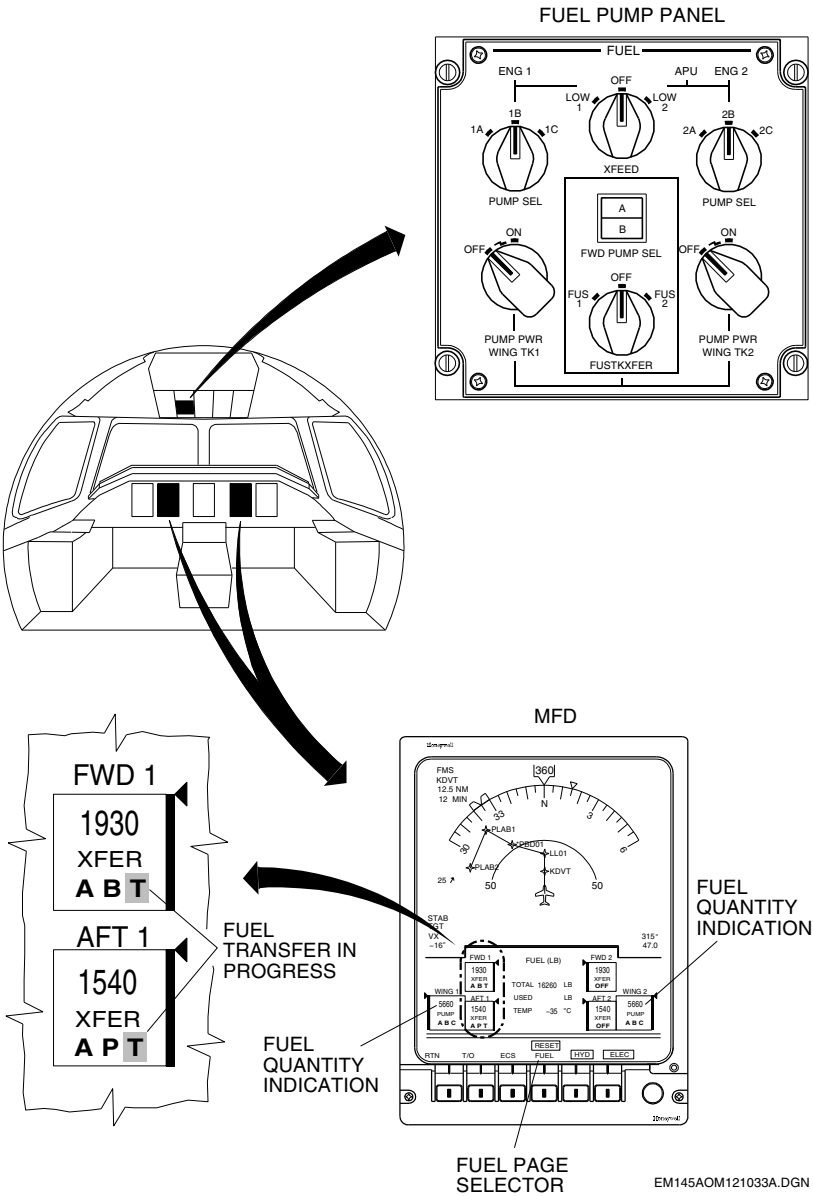

FUEL SYSTEM CONTROLS AND INDICATORS

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FUEL QUALITY CONTROL

Before accepting delivery from the fuel supplier, a check should be made with the purpose of ensuring that fuel intended for use in the airplane is fit for use. Fuel should be considered unsatisfactory for use if a sample shows:

– Trace of sediments;

– Globules of water;

– Cloudiness; and

– Positive reaction to water detector test.

A visual inspection to a sample should be accomplished to ensure that it does not contain excessive sediment. Generally, aviation turbine fuel is clean, and its color is appropriate to its grade (normally undyed and clear). Apart from cases where water is evidently present in the form of globules, only an appropriate check can be conclusive to indicate the presence of water in a fuel sample.

Both free and suspended water may be present in aviation jet fuel. The water finding paste or paper test method is used to show the presence of free water. The chemical water detector test method is designed to detect suspended water and should therefore be used in addition to the paste/paper method when checking fuels.

NOTE: In cold weather it is necessary to drain the fuel tanks prior to refueling. Drain the fuel tanks again prior to departure, if the airplane has been parked for more than 2 hours.

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PRESSURE DEFUELING

Pressure defueling the auxiliary tanks shall be performed by transferring fuel to the wings first, and then performing wing pressure defueling.

– Statically ground the airplane.

– Energize the airplane or set the Power Selection switch to BATTERY.

– Open refueling panel door on the right side of the fuselage.

NOTE: For airplanes equipped with High Level Exceeding Indication, the "STOP RFL" red light illuminates if the airplane is energized with the refueling panel door open. In this case, press and release the refueling panel door switch.

– Make sure that the defueling OPEN light is extinguished.

– Connect the fuel nozzle to the pressure refueling adapter.

– Set the DEFUELING switch to the OPEN position and make sure that the defueling OPEN light illuminates.

– Apply suction (4 psig MAX) to the nozzle or set the Electric Fuel Pumps switches to the ON position.

NOTE: To defuel the LH tank, set the cross-feed switch to the LOW 2 position.

– When desired remaining fuel quantity is reached, set the DEFUELING switch to the CLOSED position and make sure its light is extinguished.

CAUTION: TO PREVENT DAMAGE DO NOT PERMIT THE DRY OPERATION OF THE FUEL PUMPS DURING DEFUELING.

– Set the Electric Fuel Pumps and X-FEED switches to the OFF position.

– Disconnect the fuel nozzle from the pressure-refueling adapter.

– Install the protection cover to the pressure-refueling adapter.

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– Deenergize the airplane if necessary.

NOTE: If Power Selection switch has been used at the BATTERY position, set it back to the NORMAL position and close the switch guard.

– Close the refueling panel door.

WARNING: MAKE SURE THAT ALL THE SWITCH GUARDS ON THE REFUELING PANEL DOOR ARE IN THE CLOSED POSITION.

– Remove the grounding cable from the airplane.

GRAVITY DEFUELING

Gravity defueling is accomplished through the defueling port installed on the wing stub. The auxiliary tanks gravity defueling shall be performed by first transferring fuel to the wing tank and then performing the wing gravity defueling operation.

Gravity defueling is accomplished by installing the defueling valve to the defueling port and putting the other hose end into the defueling cart. The airplane must be previously grounded. Opening the shutoff valve will cause the defueling operation to initiate. When the desired remaining quantity is reached, closing the valve will stop defueling.

After the defueling operation is completed, the defueling valve must be removed from the defueling port, and the defueling cap must be closed.

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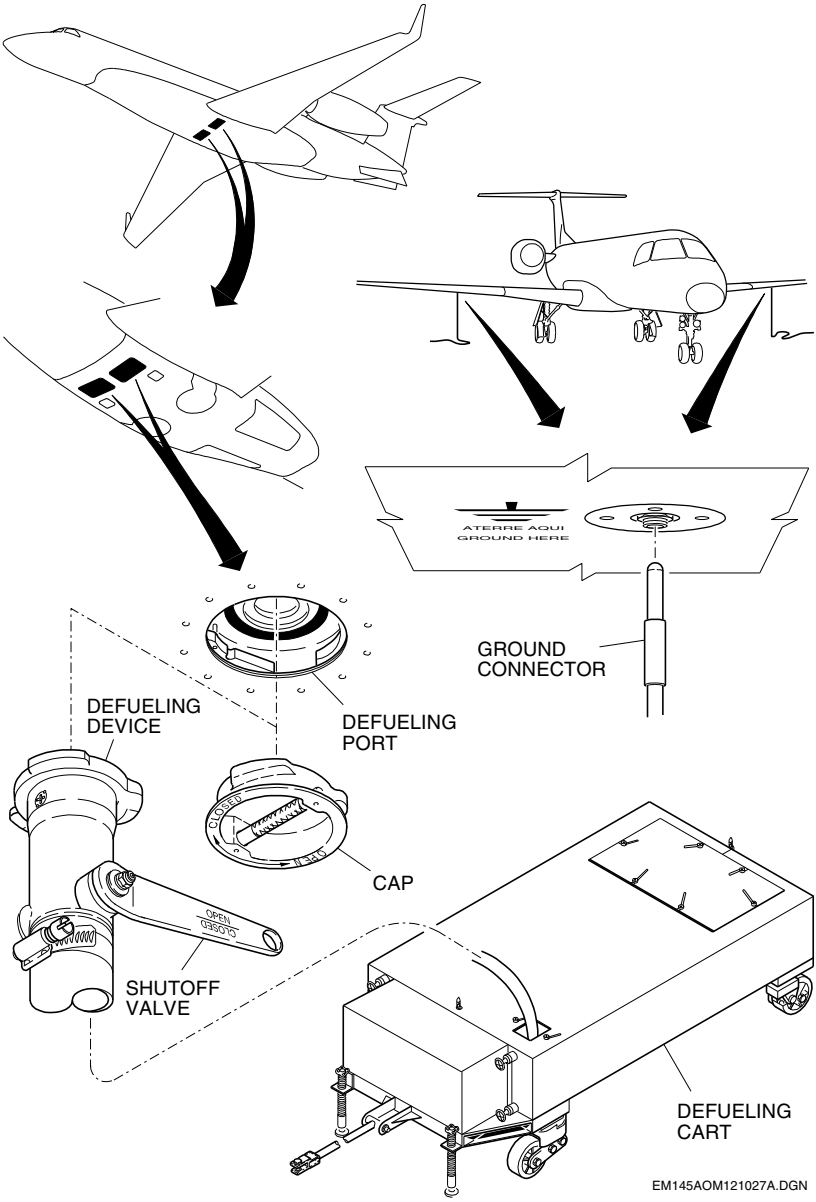

GRAVITY DEFUELING EQUIPMENT

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AUXILIARY TANKS TO WING - FUEL TRANSFER OPERATION

The procedure can be performed on the ground for gravity defueling purpose.

– Energize the airplane.

CAUTION: TO PREVENT DAMAGE DO NOT PERMIT THE DRY OPERATION OF THE FUEL PUMPS DURING DEFUELING.

NOTE: To start the fuel transfer, fuel quantity in each wing must be less then 1900 kg (4190 lb).

– Set MFD 1 or MFD 2 to the FUEL page, to monitor the fuel quantity that is transferred.

– Set the FWD PUMP SEL pushbutton (pump A or B) on the fuel control panel.

– Set the FUSTKXFER switch (FUS 1 or FUS 2) on the fuel control panel.

– Make sure that the "T" indication appears on the MFD panel.

NOTE: Fuel transfer will occur while the fuel quantity is below 2400 kg (5290 lb) in each wing.

– When desired fuel quantity on the auxiliary tank is reached, set the FUSTKXFER switch to OFF.

NOTE: For airplanes equipped with High Level Exceeding Indication, if the "STOP RFL" red light illuminates stop immediately the transfer and refer to the HLEI dispatch procedure.

– Deenergize the airplane.

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FUEL TANK DRAINING

The fuel tank draining procedure is a usual practice at aviation and can be performed by maintenance personal or by the crew according to the operator policy. This procedure is necessary since fuel tanks may collect water during regular operation. There are reports of water ingression in fuel tanks in many different ways, where most significant contributing factors are air moisture and presence of water in the refueled fuel.

The concerning related to presence of water in the fuel involves basically three consequences:

– Airplane refueled with a high quantity of water, which may compromise the operation (engine thrust oscillation, power rollback or flame-out).
– Microbiological contamination.
– Ice formation.

System malfunctions, component failures and tank corrosion can be also attributed to fuel contaminated with water/fungus, such as:

– Unreliable, fluctuating or inoperative fuel quantity indication.
– High incidence of fuel filter clogging.
– High rate of removal of components with "wet" operation (such as valves, sensors, probes, pumps, etc).
– Corrosion of aluminum alloys in airplane fuel tanks promoted by local aggression of microbially produced organic acids and by the oxygen gradients established at aggregations of microbial growth.

Despite the water/fungus contamination can occur in any airplane, field experience has demonstrated that the incidence of the fuel contamination is higher in airplanes associated with:

– Low utilization.
– No quality monitoring of the fuel being refueled nor fuel supplied from other airplane.
– Operation in environment propitious for fungal growth (example: inter tropical areas – refer to IATA "Guidance Material on Microbiological Contamination in Airplane Fuel Tank" 4th Edition).
– Lack of adherence to maintenance tasks.

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DRAINING TIME INTERVAL RECOMMENDATION

Fuel tanks shall be drained periodically and its time interval is to be determined by the operator, taking into consideration the specific airplane operating and environmental conditions. The draining time interval definition shall takes into account several factors listed above and shall consider the operators experience.

If the fuel source is unknown, unreliable or without a previous experience from operator, it is recommended that fuel tanks be drained before each flight, in order to assure the correct refueling, fuel quality and fuel tank without water and/or contaminants.

The draining time interval can be extended at operator's discretion based on own operation characteristics and experience.

For cold weather operation there are the following additional recommendations related to fuel tank draining:

– Drain the tanks that will not be used (auxiliary fuel tanks).
– Drain the tanks prior to refueling.
– Drain again if the airplane will be parked for more than 2 hours.

CAUTION: IN COLD WEATHER, WATER CAN FREEZE AT THE BOTTOM OF THE FUEL TANKS AND THIS WILL CAUSE THE SUMP DRAIN VALVE TO BE STUCK. DO NOT FORCE THE OPERATION OF THE VALVE IN THIS CONDITION, OTHERWISE IT WILL GET DAMAGED. IN THIS CASE, CONTACT MAINTENANCE PERSONNEL FOR DRAIN VALVE HEATING AND ICE MELT, IN ORDER TO DO PROPER FUEL DRAIN.

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FUEL TANKS DRAINING FOR VISUAL ANALYSIS

This routine servicing procedure is applicable to the drainage of small quantities or enough to remove all water.

Drain fuel from each tank and examine it for water and other unwanted matter. You will usually see the water as a layer below the fuel or as small bubbles on the fuel.

Do not drain the tanks while you fill the airplane with fuel or immediately after you fill the airplane with fuel.

It is recommended to let airplane be stable (airplane parked and fuel not being used) for approximately 1.5 hours. This procedure is necessary to let the water go to the bottom of the tank.

DRAIN VALVE DETAIL

Make sure that the draining device is aligned with the drain valve while draining.

Slowly push the valve halfway to the inside with an approved draining device and drain the necessary amount of fuel.

It is not required the rotation of the drain valve stem to collect fuel samples.

Do not sway the draining device while draining; it can cause damage to the drain valve.

If the stem is accidentally pushed into the hard stop, the drain valve may remain in the open position. In this case, turn the stem 30° (maximum) clockwise to close the drain valve.

NOTE: - To manually drain large quantities of fuel perform the AMM TASK 12-11-03-600-801-A.

- In case of prolonged parking of the airplane perform the AMM TASK 10-10-02-500-801-A.
- If during consecutive draining, the presence of sediments or sludge, or water in solution in the fuel is noticed, perform the AMM TASK 28-11-00-200-803-A.

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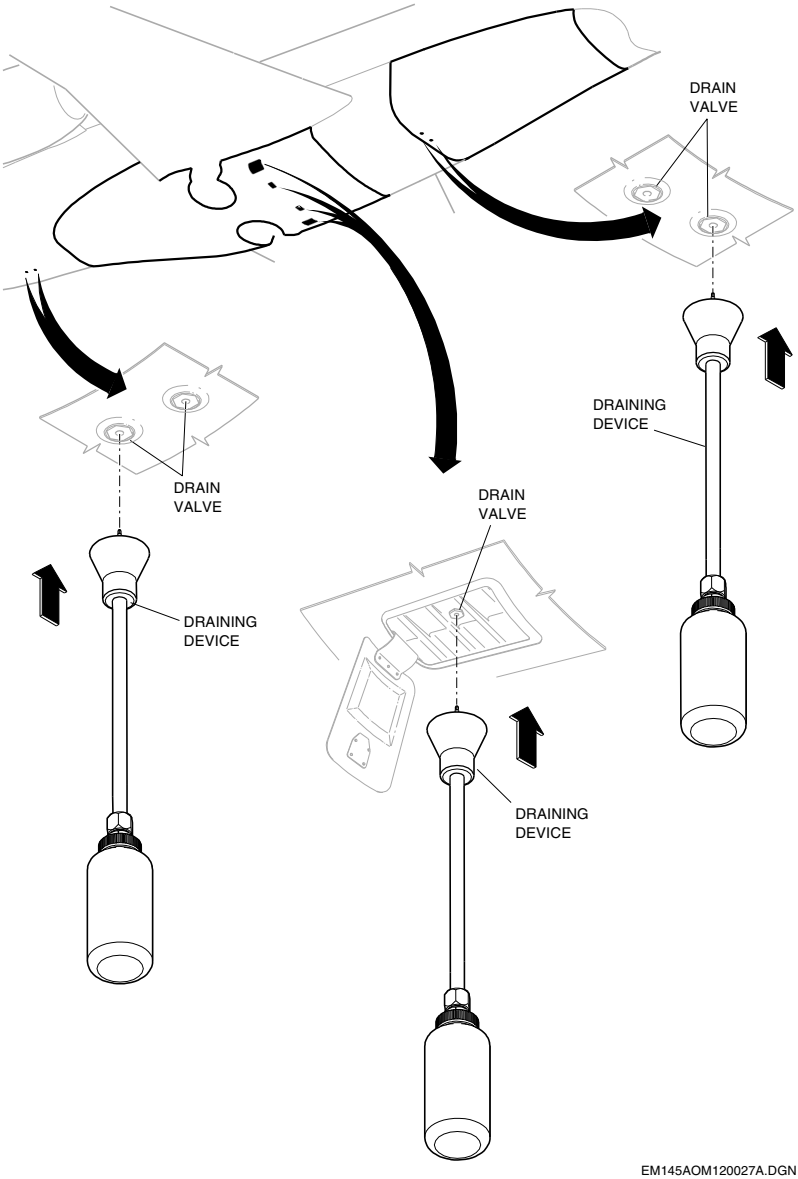

FUEL DRAINING POINTS

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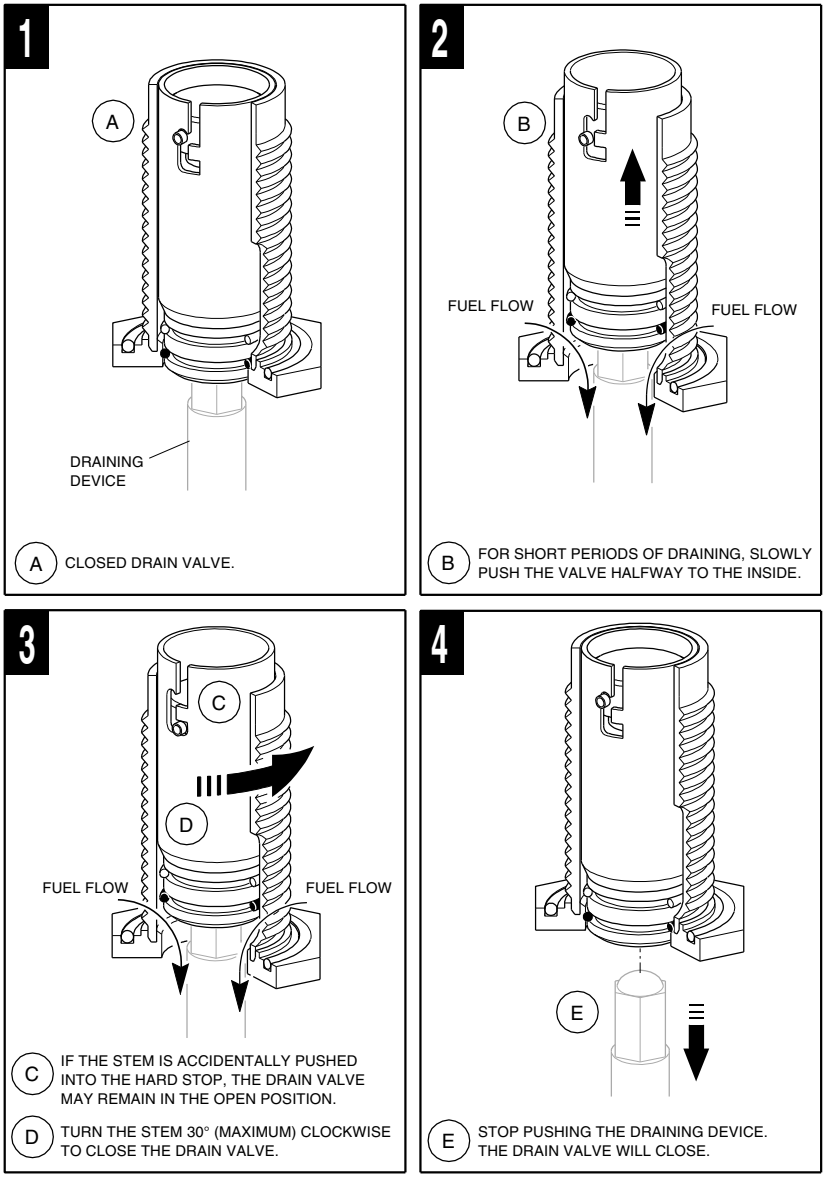

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DRAIN VALVE DETAIL

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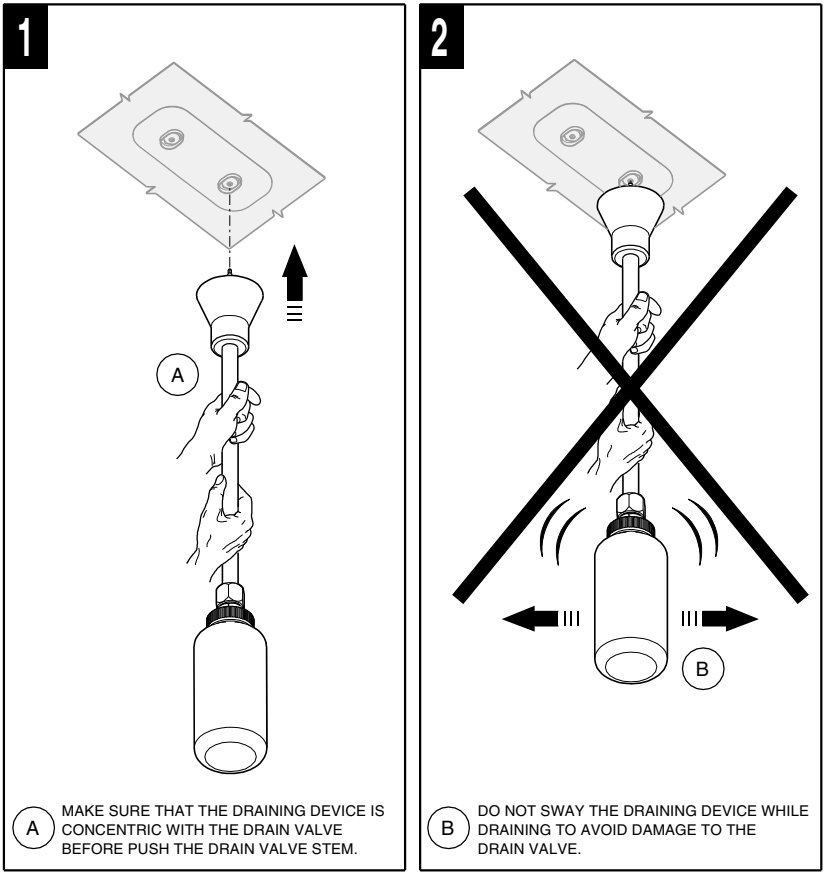

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FUEL DRAINING DETAIL

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REFUELING WITH AN ENGINE RUNNING

Refueling the airplane with an engine running is not recommended. Apart from the risk of fire, there is the risk posed for maintenance and other personnel required to move around the airplane.

There may be circumstances in which an Airport Authority agrees with a detailed procedure that offers an acceptable level of safety to all parties involved. This would, however, be a matter between the Airport Authority and the individual operator. Therefore, contact the Airport Authority prior to performing this operation and/or obtain the necessary approval from the operations inspector.

To refuel the airplane with an engine running, proceed as follows:

– Disembark passengers (refer to the "Deplaning or Boarding with One Engine Running" procedure ahead).
– The airplane must be parked in an area designated by the Airport Authority, with free access to fire fighting equipment and personnel.
– Keep the main door open and the stairs deployed.
– Shut down the right engine.
– Set the left engine to idle power.
– At least one pilot must remain in the cockpit during the refueling. This pilot is responsible for informing all flight and ground crews that the airplane is being refueled and the engine is running.
– The strobe light must be turned on.
– During the refueling procedure, do not turn on switches, except those required to operate the fuel system. Set all airplane systems before initiating refueling, in order to avoid moving controls during refueling. Sparks of any kind must be avoided. The use of mobile phones must not be allowed.
– Smoking is prohibited during the refueling, both inside and outside the cabin.
– Only pressure refueling is recommended and, to avoid the possibility of fuel spillage, fueling should be limited to 90% of the tank capacity.
– In the case of fuel spillage, shut down the operating engine.

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DEPLANING OR BOARDING WITH ONE ENGINE RUNNING

The following precautions are recommended:

– At least one pilot must remain in the cockpit.
– Turn the left engine off.
– Set the right engine to idle power.
– Provide safety precautions for passengers on the ground. Isolate the right side of the airplane so that no passenger can gain access to this area.

REFUELING WITH PASSENGERS ON BOARD OR EMBARKING/DISEMBARKING

The following precautions are recommended:

– At least one pilot must remain in the cockpit during the refueling procedure. This pilot is responsible for informing all the flight and ground crews that the airplane is being refueled with passengers on board or embarking/disembarking.
– Engines must be off.
– Crew, staff, and passengers must be warned that refueling will take place.
– "Fasten Seat Belts" signs must be off.
– "No Smoking" signs must be on together with interior lights to enable the emergency exits to be noticed.
– Passengers must be instructed to unfasten their seat belts and refrain from smoking.
– Sufficient qualified personnel must be on board and be prepared for immediate emergency evacuation.
– If the presence of fuel vapors is detected inside the airplane, or any other hazard arises during refueling, fueling must be interrupted immediately.
– Aisles and emergency doors must be kept unobstructed, as well as the ground area beneath the exits.

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HIGH LEVEL EXCEEDING INDICATION (HLEI)

For airplanes equipped with High Level Exceeding Indication, if a refueling automatic shutoff failure occurs and the fuel level in the affected tank reaches over the maximum quantity for that tank, the "STOP RFL" red light will illuminate. Stop immediately the refueling operation releaving the pressure of the fueling truck.

For dispatch the airplane the following procedures should be done.

WING ONLY REFUELING

– Check the wing tanks for the highest fuel quantity indication.

– Equalize the wing tanks fuel quantity removing fuel from the wing tank with the highest volume.

NOTE: The removal of the exceeding fuel shall be done by transferring it from the wing to the fuselage tanks, pressure defueling or gravity defueling procedures.

– Check if the HLEI light is extinguished.

– In case of the HLEI light remain illuminated remove fuel from both wing tanks until the quantity be equal to the indicated on the "Fuel Temperature versus Wing Tanks Fuel Quantity" table.

NOTE: - If required for dispatch, replenish the wing tanks through the gravity refueling procedure.

- The pressure refueling system shall be considered inoperative.

– Check the fuel quantity and balancing, for all tanks.

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WING + FUS TANKS REFUELING

– Check if all the auxiliary tanks fuel quantities are within the values presented on the above table:
  – If yes, set the Refueling Mode switch to WING ONLY and follow the procedure for HLEI Wings Only Refueling.
  – If no, procedure according to the next steps:
    – Check the highest difference of fuel quantity between the pair of auxiliary tanks (FWD 1 with FWD 2 and AFT 1 with AFT 2).
    – Remove fuel from the tank with the highest volume until the equalization of the pair.

    NOTE: The removal of the exceeding fuel from auxiliary tanks shall be done by gravity defueling or draining procedures.

    – Check the HLEI light is extinguished, if not, repeat the two steps above for the other pair of auxiliary tanks.
    – Check the HLEI light is extinguished, if not, remove fuel from all the auxiliary tanks until the volume is equal or less to the values presented on the "Fuel Temperature versus Auxiliary Tanks Fuel Quantity" table.
    – Check the HLEI light is extinguished, if not, set the Refueling Mode switch to WING ONLY and follow the procedure for HLEI Wings Only Refueling.

    NOTE: - If required for dispatch, replenish the tanks through the gravity refueling procedure.
    - The pressure refueling system shall be considered inoperative.

    – Check the fuel quantity and balancing, for all tanks.

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FUEL TEMPERATURE VERSUS WING TANKS FUEL QUANTITY TABLE

FUEL TEMPERATURE (°C)	WING TANKS FUEL QUANTITY INDICATION	
	kg	lb
-40	2530	5570
-35	2520	5550
-30	2510	5520
-25	2490	5500
-20	2480	5480
-15	2470	5450
-10	2460	5430
-5	2450	5400
0	2440	5380
5	2430	5350
10	2420	5330
15	2400	5300
20	2390	5280
25	2380	5250
30	2370	5230
35	2360	5200
40	2350	5180
45	2340	5150
50	2330	5130
52	2320	5120

NOTE: The fuel temperature data shall be taken from the Fuel Page on the MFD.

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FUEL TEMPERATURE VERSUS AUXILIARY TANKS FUEL QUANTITY TABLE

FUEL TEMPERATURE (°C)	AUXILIARY TANKS FUEL QUANTITY INDICATION			
	FORWARD		AFT	
	kg	lb	kg	lb
-40	800	1760	660	1450
-35	800	1760	660	1450
-30	790	1740	650	1430
-25	790	1740	650	1430
-20	790	1740	650	1430
-15	780	1720	640	1410
-10	780	1720	640	1410
-5	780	1720	640	1410
0	770	1700	630	1390
5	770	1700	630	1390
10	770	1700	630	1390
15	770	1700	630	1390
20	760	1670	620	1370
25	760	1670	620	1370
30	760	1670	620	1370
35	750	1650	610	1340
40	750	1650	610	1340
45	750	1650	610	1340
50	740	1630	600	1320
52	740	1630	600	1320

NOTE: The fuel temperature data shall be taken from the Fuel Page on the MFD.

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FUEL SYSTEM ICING INHIBITORS

As Fuel System Icing Inhibitors (FSII), use:

– Ethylene Glycol Monomethyl Ether (EGME), which obeys MIL-L-27686 (NATO S-748), ASTM-D-4171 or GOST 8313;

or

– Di-Ethylene Glycol Monomethyl Ether (Di-EGME), which obeys MIL-L-85470A.

BIOCIDE FUEL ADDITIVES

As Biocide Fuel additive, use Biobor (MIL-S-53021A) or Kathon FP 1.5 Biocide product AR.

CORROSION/LUBRICITY ADDITIVES

As Corrosion/Lubricity additive, use the Qualified Product List of MIL-L-25017.

NOTE: Obey the fluid manufacturer's specifications to find the additive proportions for each fuel.

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ENGINE OIL SERVICING

The engine oil tank features an oil level sight gage and an oil level/low level warning sensor. To check oil level in the engine, open its access door and observe the sight glass. It must never exceed the FULL mark.

The engine oil consumption rate is considered high when it increases above the typical consumption rate for the engine, or is equal to or more than 10.1 ounces per hour (0.32 quarts per hour or 300 cc per hour). Engine oil consumption rates may increase as engine hours/cycles increase.

High oil consumption indicates something is not functioning properly or possibly a leak which should be addressed by maintenance personnel when convenient. In the absence of other problems associated with the high oil consumption rate there is no mandatory action. Engine oil consumption rates can increase as engine hours/cycles increase.

To fill the tank with oil, remove the filler cap and carefully pour oil through the filler neck observing that the FULL mark on the sight glass is not exceeded. There is an O-ring on the filler cap that must be checked for dents, cracks or breakage. If this O-ring is damaged, it must be replaced. After filling the tank, put the filler cap back in place and make sure that it is properly installed and tightened.

NOTE: The Minimum Dispatch Oil Quantity is 8 quarts before engine start or 6 quarts after engine start.

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APPROVED ENGINE OIL TYPES

SPECIFICATION	COMMERCIAL PRODUCT	SUPPLIER
MIL-L-7808K or MIL-PRF-7808L	Mobil Jet Oil RM248A	Mobil Oil
MIL-L-23699D or MIL-PRF-23699F	Royco 500	Royal
	Aero Shell Turbine Oil 500	Shell
	BP Turbo Oil 2197	Air BP
	BP Turbo Oil 2380	
	Mobil Jet II	Mobil Oil
	Mobil Jet Oil 254	
	Mobil Jet Oil 291	
	Turbonycoil 600	NYCO

CAUTION:

- IF MIXED WITH OTHER OILS, MOBIL JET OIL 254 OR MOBIL JET OIL 291 CAN CAUSE WASHING OR SHEDDING OR CARBON DEPOSITS LEFT BY THOSE OILS. THIS CLEANING PROCESS CAN LEAD TO OIL SYSTEM PROBLEMS, SUCH AS BLOCKED PASSAGEWAYS AND SCREENS. CHANGING FROM BPTO 2380, MOBIL JET II OR AERO SHELL/ROYCO 500, TO MOBIL JET 254 OR MOBIL JET 291 SHOULD ONLY BE DONE WHEN THE ENGINE IS NEW OR OVERHAULED.
- USE OF NON-APPROVED OIL COULD RESULT IN DAMAGE AND PREMATURE ENGINE FAILURE.
- IF OIL BRANDS ARE CHANGED, IT SHOULD BE ACCOMPLISHED GRADUALLY USING THE "TOP-OFF" METHOD.

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CAUTION:
- DO NOT MIX MIL-PRF-23669 AND MIL-PRF-7808 OILS.
- USE OF MIL-PRF-7808 TYPE OIL SHOULD BE LIMITED TO ONLY THOSE TIMES WHEN OPERATING IN EXTREME COLD WITHOUT PREHEAT CAPABILITY (-40°F TO -65°F) OR WHEN MIL-PRF-7808 IS THE ONLY TYPE OF OIL AVAILABLE.

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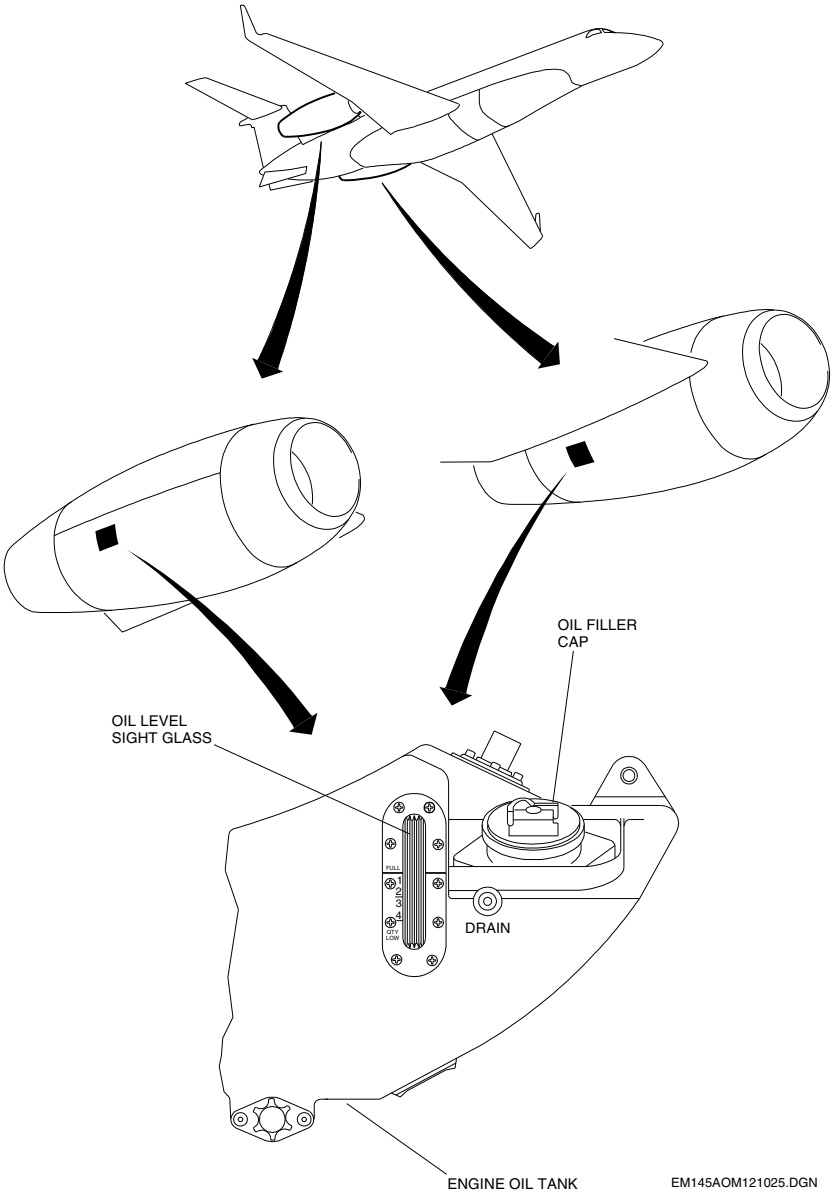

ENGINE OIL FILLING AND OIL LEVEL CHECK

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APU OIL SERVICING

APU oil tank servicing is done through the access at the aircraft tail cone which, when open, provides access to a sight glass and an oil filler cap. The sight glass has a FULL indication which must never be exceeded.

APPROVED APU OIL TYPES

SPECIFICATION	COMMERCIAL PRODUCT	SUPPLIER
MIL-PRF-7808	Aeroshell Turbine Oil 390	Shell
	BPTO 2389	Local supplier
	Castrol 325	Castrol
	Mobil Avrex S Turbo 256	Local supplier
MIL-PRF-23699	Castrol 5000	Castrol
	Castrol 5050	Castrol
	Calstex Sato 5S	Local supplier
	BPTO 2197	Air BP Lubricants
	BPTO 2380	
	Hatcol 3211	Local supplier
	Mobil Jet Oil II	Mobil
	Mobil Jet Oil 254	Mobil
	Aeroshell/Royco Turbine Oil 500	Royal Lubricants Shell Aeropia Aero Hardware
	Aeroshell/Royco Turbine Oil 560	Local supplier
	Total Aero Turbine Oil 535	Local supplier
	Turbonycoil 525-2A	Nyco
	Turbonycoil TN 600	Nyco

CAUTION:
- DO NOT FILL THE APU OIL TANK WITH AN OIL OF A DIFFERENT BRAND FROM THAT WHICH IS IN THE TANK, EVEN IF THE SPECIFICATION IS THE SAME (REFER TO THE PLACARD ATTACHED TO THE ACCESS DOOR).
- DO NOT ALLOW THE OIL LEVEL TO EXCEED THE "FULL" MARK ON THE SIGHT PLUG. AN OVERFILLED TANK WILL RESULT IN OIL FOAMING, HIGH TEMPERATURE, AND LOW OIL PRESSURE.

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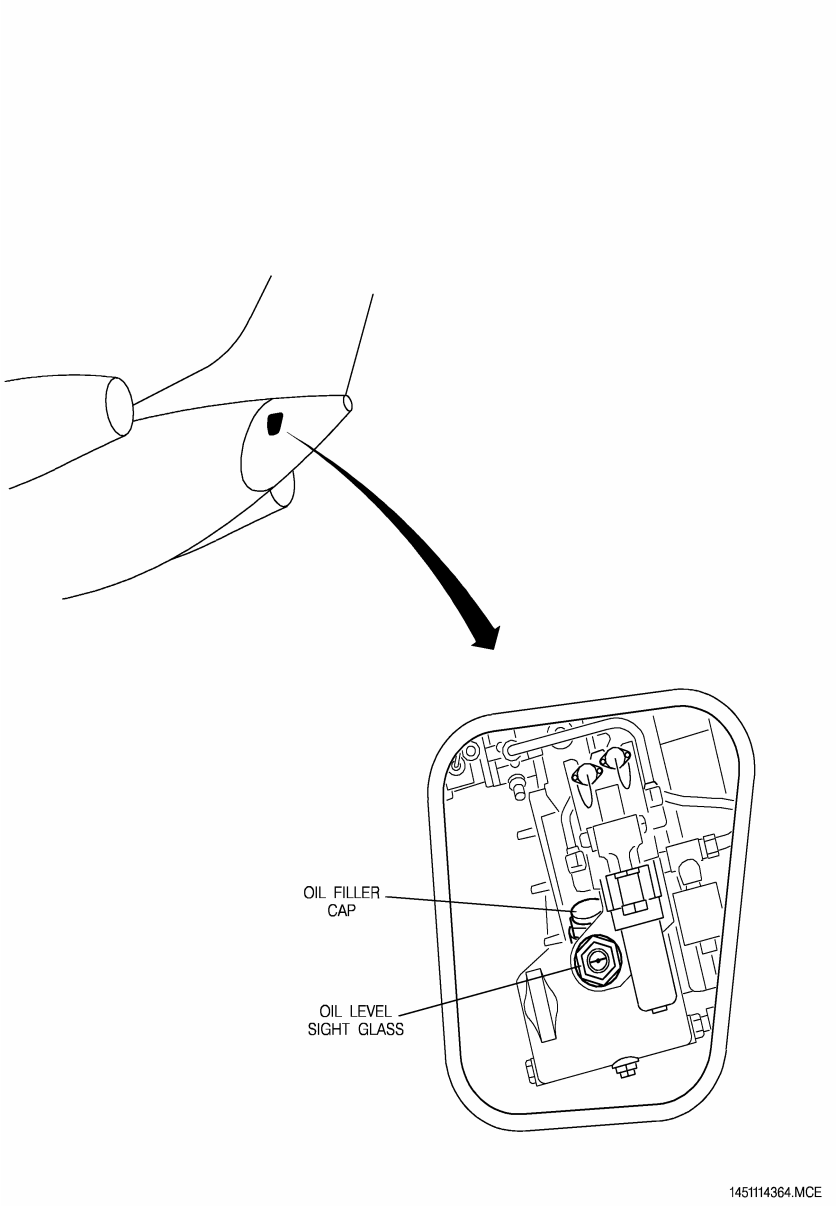

APU OIL FILLING AND OIL LEVEL CHECK

HYDRAULIC SYSTEM SERVICING

HYDRAULIC FLUID LEVEL CHECK

Gain access through the panel located aft of the wing fairing (on both sides of the aircraft). Fully release the pressure of hydraulic systems (AMM TASK 29-10-00-860-802-A). On the hydraulic fluid level indicator, make sure the needle pointer is between the 4.5 and 5.5 liter marks (normal range). The shaded region is the dispatchability range. If the pointer is below the refill mark, fill the reservoir until you have the correct full level mark (AMM TASK 12-13-01-600-802-A). Low oil level in the reservoir can be a sign that there is a leak in the system. After servicing the hydraulic system, close the related hydraulic fluid reservoir access panel.
If level indicator is inoperative, it is still possible to check fluid level, but a maintenance technician is required to do the job.

CAUTION: USE ADEQUATE GOGGLES AND RUBBER GLOVES WHILE SERVICING HYDRAULIC SYSTEM. IN CASE HYDRAULIC FLUID COMES IN CONTACT WITH THE SKIN, FLUSH THE AFFECTED AREA WITH WATER. IN CASE HYDRAULIC FLUID COMES IN CONTACT WITH THE EYES, FLUSH THEM WITH WATER AND SEEK MEDICAL ATTENTION.

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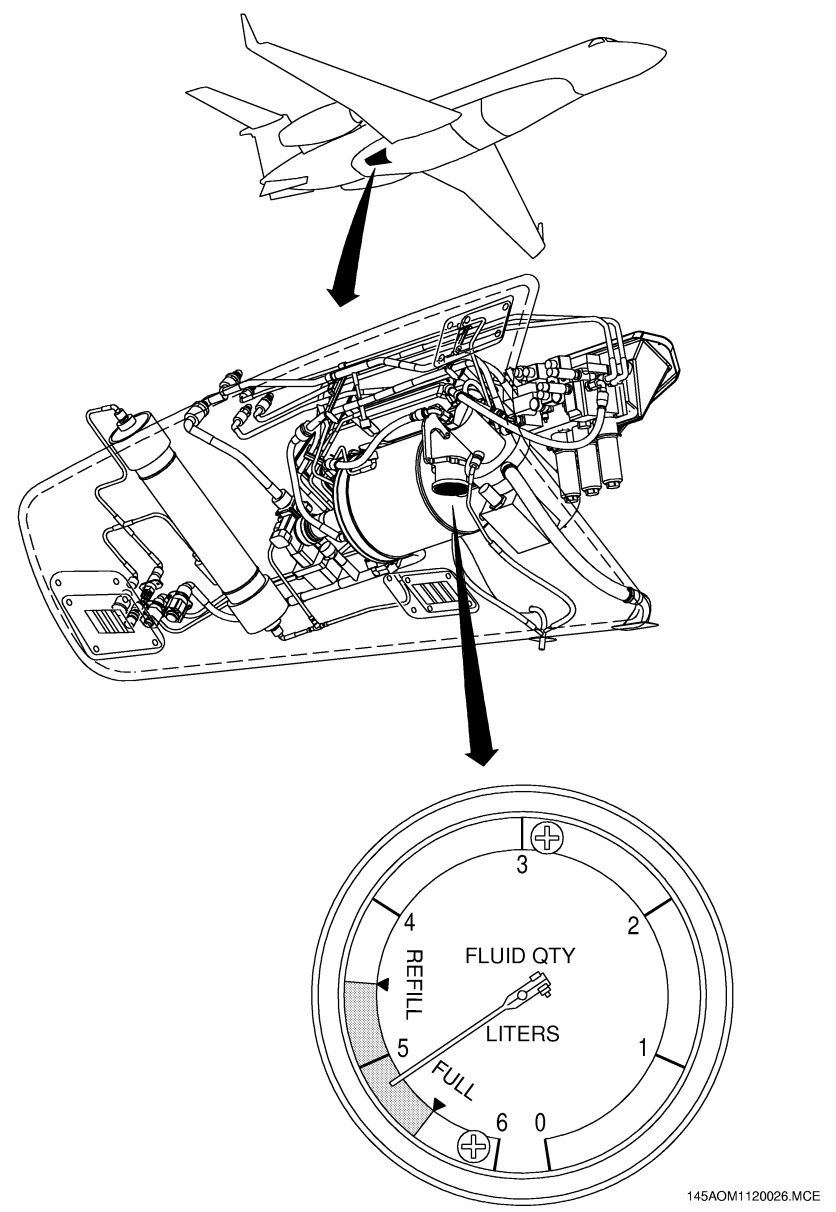
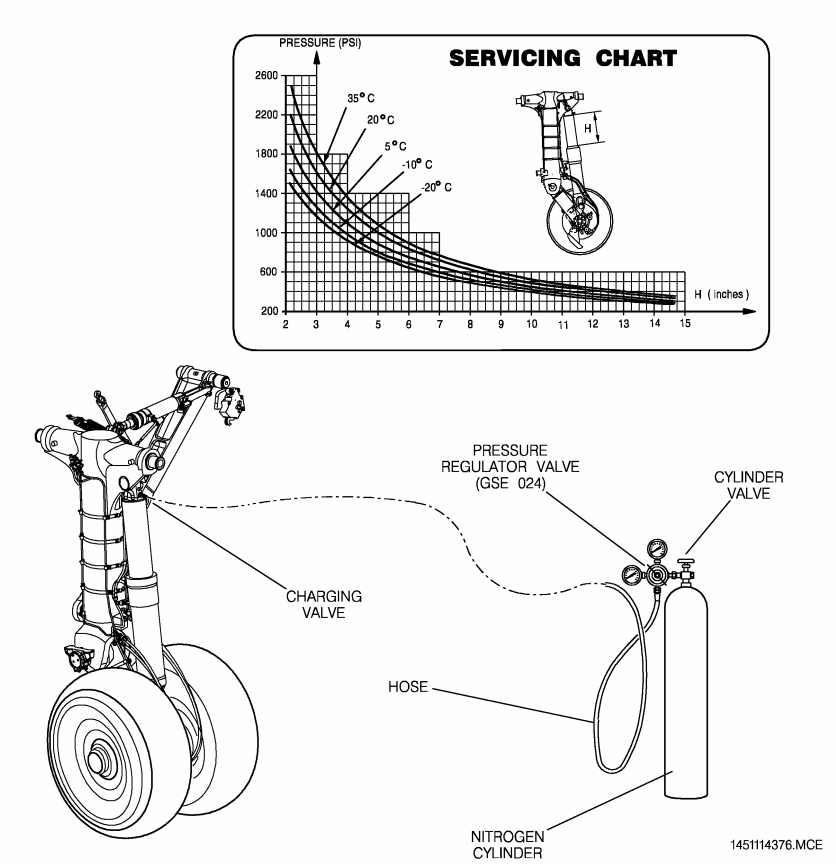


CHECK OF HYDRAULIC FLUID LEVEL

LANDING GEAR SERVICING

MAIN AND NOSE LANDING GEAR SHOCK ABSORBER PRESSURE

The main and nose landing gear shock absorber sometimes need nitrogen to be filled. Nitrogen is filled through a charging valve installed at the landing gear. Filling pressure is a function of the piston height, as checked in the following charts (there are separate charts for nose and main landing gears).



MAIN LANDING GEAR SERVICING

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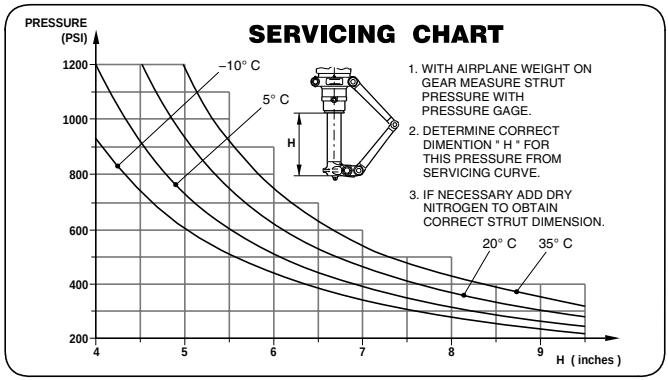

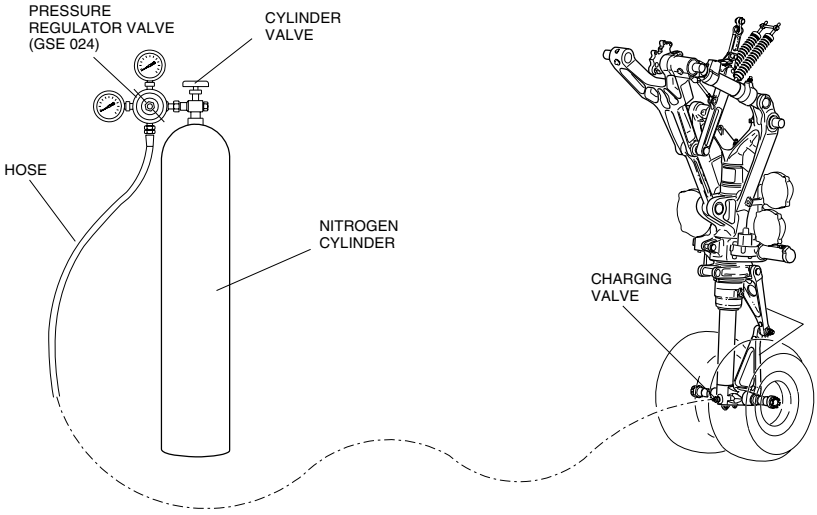

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NOSE LANDING GEAR SERVICING

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TIRE PRESSURE

Nose Tire Pressure: 84 +2/-2 psi

Main Tire Pressure: 160 +4/-4 psi

Before the flight, the temperatures from the departure and the destination airports must be checked. If a large temperature decrease between the departure and the destination airports is observed (equal to or greater than 25°C/54°F), the tire pressure must be adjusted considering the colder airport and the following procedure must be accomplished.
Increase the tire pressure 1% for each 3°C (5.4°F) of temperature difference.

Example:

Temperature at departure airport = 20°C (68°F)

Temperature at arrival airport = -10°C (14°F)

Temperature difference = 30°C (54°F)

Increase the tire pressure:

(30°C/3 x 1%) = 10%

(54°F/5.4 x 1%) = 10%

If the tire pressure is 160 psi, increase the tire pressure:

160 psi + (160 psi x 0.10) = 176 psi

BRAKE WEAR INDICATOR

Checking the brake wear indicators is required during walk-arounds, as prescribed in the approved Airplane Flight Manual, according to the following procedure:

- Operate the emergency/parking brake handle and visually verify all pistons (2) of the brake assembly for operation.
- Brake wear indicator positions must be inspected with brake pressurized (brake applied).
- Inspect the brake wear indicators for visible cracks.
- Inspect the brake wear indicators length. The length of the brake wear indicator for a new brake is 22.86 mm (0.90 in). When the indicator rod is flat with the hexagonal insert, the brakes are full worn out and should be replaced.
- If one or more of the brake wear indicators does not come out of the piston housing, the brake assembly must be replaced.

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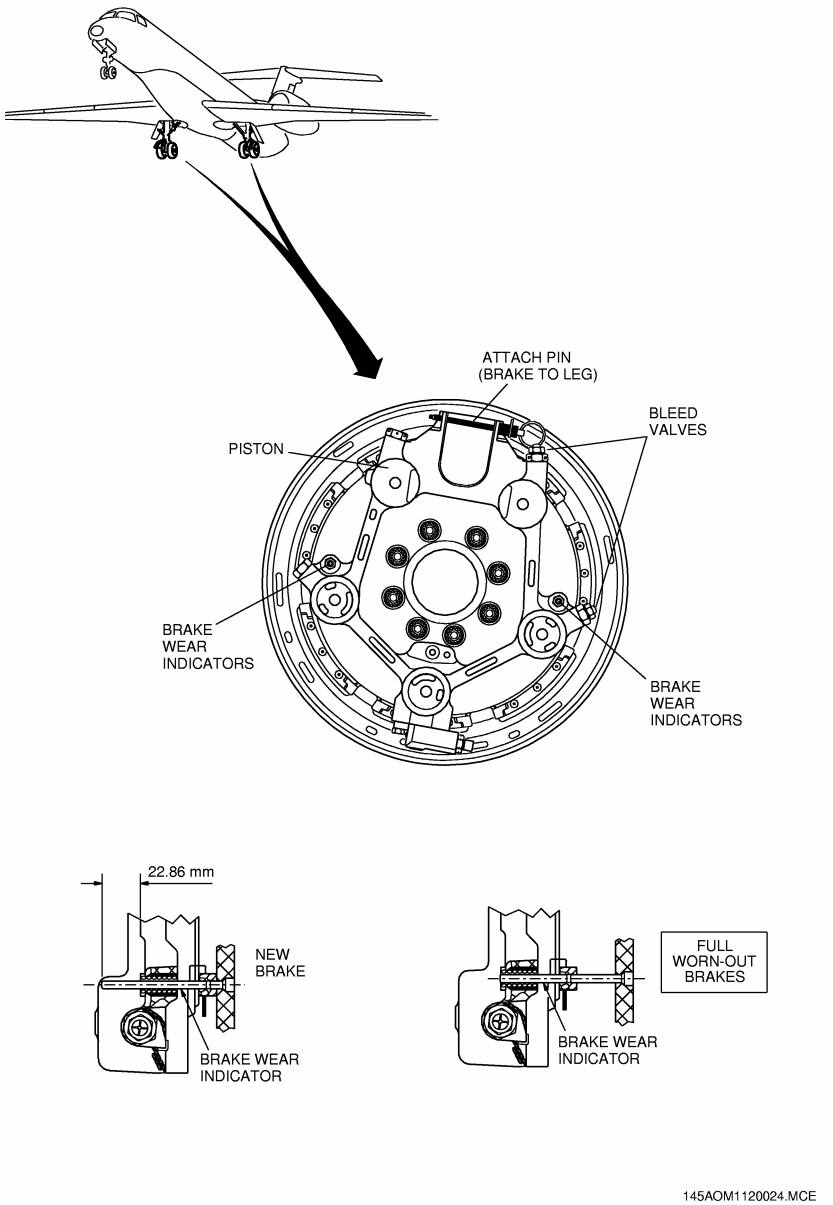

BRAKE WEAR INDICATION

OXYGEN SERVICING

The oxygen system is filled from an external service panel located on the right side of the aircraft nose. The service panel is common for the crew oxygen system and the passenger oxygen system. It has independent fill valve and pressure gauges for each system.

A 50-cu.ft crew oxygen cylinder and one or two 77-cu.ft passenger oxygen cylinders are installed on the right side of the cockpit/passenger cabin partition for use in emergency.

The crew oxygen system is designated for pilot, copilot and observer. The passenger oxygen system configuration with one 77-cu.tf cylinder is available for up 14 passenger cabin occupants and the passenger oxygen system configuration with two 77-cu.ft cylinders is available for up 20 passenger cabin occupants. Their pressure can be checked on the EICAS, inside the cockpit, or in the service panel.

The minimum oxygen pressure in the crew oxygen system for dispatch is:

- Crew made up of pilot and copilot: 1130 psi
- Crew made up of pilot, copilot and observer: 1570 psi

The minimum oxygen pressure in the passenger oxygen system for dispatch is:

Airplane equipped with one cylinder (77 cu.ft): 1730 psi

Airplane equipped with two cylinders (77 cu.ft): 1250 psi

Airplane equipped with one cylinder (115.7 cu.ft): 1570 psi

Airplane equipped with two cylinders (77 cu.ft and 115.7 cu.ft): 1040 psi

Portable oxygen cylinders are distributed along the cabin for passenger and flight attendant emergencies. The minimum pressure for dispatch is 1200 psi.

Dispatching pressures were calculated for an ambient temperature of 21°C (70°F). For other temperatures, a correction chart is available at Section 2-16.

The Protective Breathing Equipment (PBE) is available in the cockpit and passenger cabin.

WARNING: HIGH-PRESSURE OXYGEN CAN CAUSE SUDDEN COMBUSTION BY CONTACT WITH OIL, GREASE, SOLVENTS, HYDROCARBONS IN GENERAL, CLOTH FIBERS, METAL CHIPS, ETC. QUALIFIED PERSONNEL ONLY MUST HANDLE AND SERVICE THE OXYGEN EQUIPMENT.

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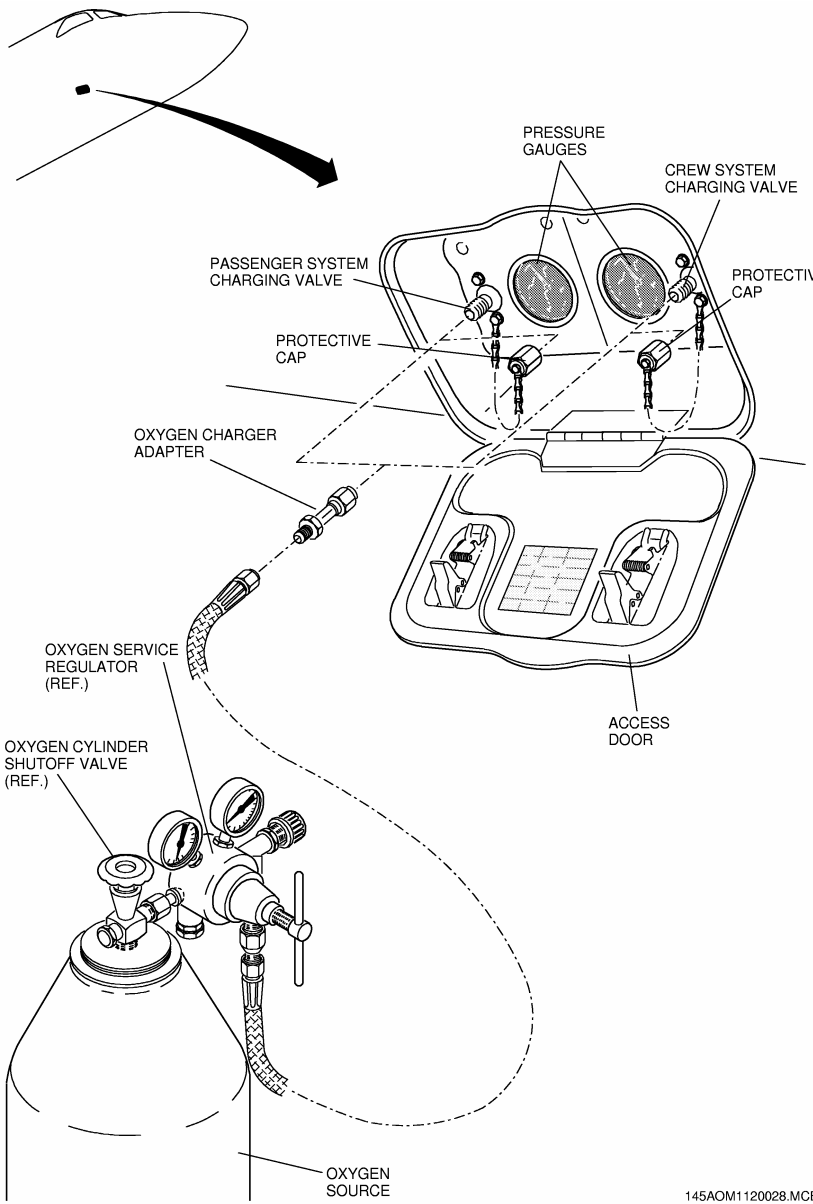

OXYGEN SERVICING

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WATER SERVICING FOR AIRPLANES UP TO S/N 678

WATER SERVICING PROCEDURE

The tank capacity is 50 liters (13.2 US Gal) or 100 liters (26.4 US Gal), depending on the airplane configuration.

Filling and draining of the water tank of aft lavatory is done through the panel installed on the lower right side of the wing-to-fuselage fairing aft section. See figure "WATER SERVICE PANEL".

In the event of extended airplane exposure at low temperatures, the WATER TANK, GALLEY WATER LINES, and COFFEE MAKER (if applicable) must be drained for protection of the water system, since the airplane will be deenergized.

WATER TANK FILLING PROCEDURE

- Open the Water Service Panel doors. See figure "WATER SERVICE PANEL". If the airplane has been exposed to low temperatures for an extended period (refer to Time of Cool-Down Chart on AOM Section 1-02-79), inspect visually the overflow/drainage nipple for any ice formation. The overflow/drainage nipple and line must be free of ice.
- If the airplane has been exposed to low temperatures for an extended period, perform the Internal Safety Inspection and Cabin Preparation tasks for cold weather operation (AOM Section 1-12-20) before filling the water tank. Power up the airplane, and make sure that the lines have been heated for at least 15 minutes.

WARNING: BE CAREFUL NOT TO BURN YOURSELF SINCE THE WATER FILL AND OVERFLOW/DRAINAGE NIPPLES MAY BE HOT.

- Make sure that the drain toggle switch is in the closed position.
- Remove both protective caps from the FILL and VENT/OVERFLOW nipple.

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NOTE: Do not connect the hose of the water service cart to the water overflow nipple. There is a metal stop (tang) installed on it.

- Connect the hose of the Water Service Cart to the FILL nipple connection.
- Pull the handle to the open position.

NOTE: - Use only potable water to fill the water tank.

- The quality of water depends on the appropriate cleaning and maintenance of water tank.
- The maximum filling pressure is 45 psig.

- Fill the water tank with potable water until water starts to flow out from the OVERFLOW nipple.
- Push the handle to the closed position.
- Remove the hose of the water service cart from the water filling nipple.

NOTE: Before you do the next step, let all excess water drain out from both nipples.

- Reinstall both the FILL and VENT/OVERFLOW nipples protective caps.
- Close the Service Panel doors.
- Deenergize the airplane, if applicable.

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WATER DRAINING PROCEDURE

The water draining procedure must be done according to the following sequence:

- WATER TANK;
- GALLEY LINES;
- COFFEE MAKER or ESPRESSO COFFEE MAKER (if applicable).

WATER TANK DRAINING PROCEDURE

With airplane energized:

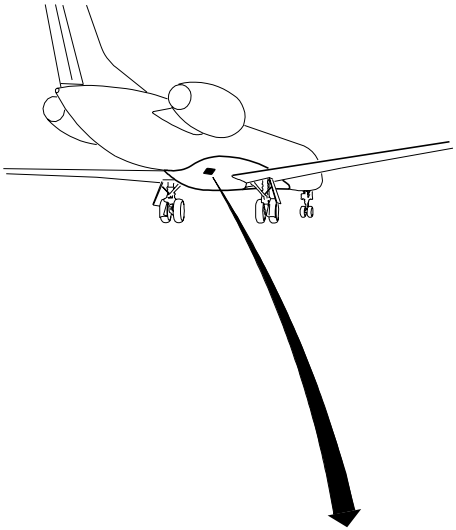
- Open the Water Service Panel doors. See figure "WATER SERVICE PANEL".

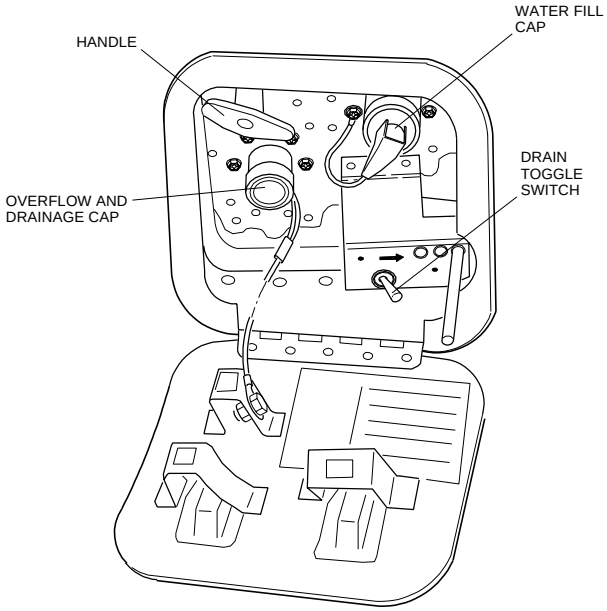
WARNING: BE CAREFUL NOT TO BURN YOURSELF SINCE THE WATER FILL AND OVERFLOW/DRAINAGE NIPPLES MAY BE HOT.

- Make sure that the drain toggle switch is in the closed position.
- Remove both protection caps from the water filling nipple and from the water overflow nipple.
- Install the hose at the water overflow nipple.
- Pull the handle to the open position.
- Put the drain toggle switch in the open position.
- Drain the potable water system until the flow of water from the water overflow nipple stops.
- Push the handle to the closed position.
- Put the drain toggle switch in the closed position.
- Remove the hose from the water overflow nipple.

NOTE: Let all excess drain out before you install the protection caps.

- Reinstall both the FILL and VENT/OVERFLOW nipples protective caps.
- Close the Service Panel doors.
- Deenergize the airplane, if applicable.





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WATER SERVICE PANEL

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GALLEY WATER LINES DRAINING PROCEDURE

NOTE: Make sure that the water tank is drained.

With airplane energized:

- Remove the access panels from the lower cabinet assembly. See figure "GALLEY WATER LINES – DRAINING".

NOTE: Use applicable containers positioned under the drain mast to collect the remaining fluids from the open lines to keep the work area clean and safe.

- Open the galley faucet to drain the water inside it.
- Open the back drain valve of the water drain line. See figure "GALLEY WATER LINES – DRAINING".
- Drain the water from the galley lines until the water flow from the galley drain mast stops.
- Close the back drain valve of the water drain line.
- Close the galley faucet.
- Install the access panel to the lower cabinet assembly.
- Close the galley access door.
- Deenergize the airplane, if applicable.

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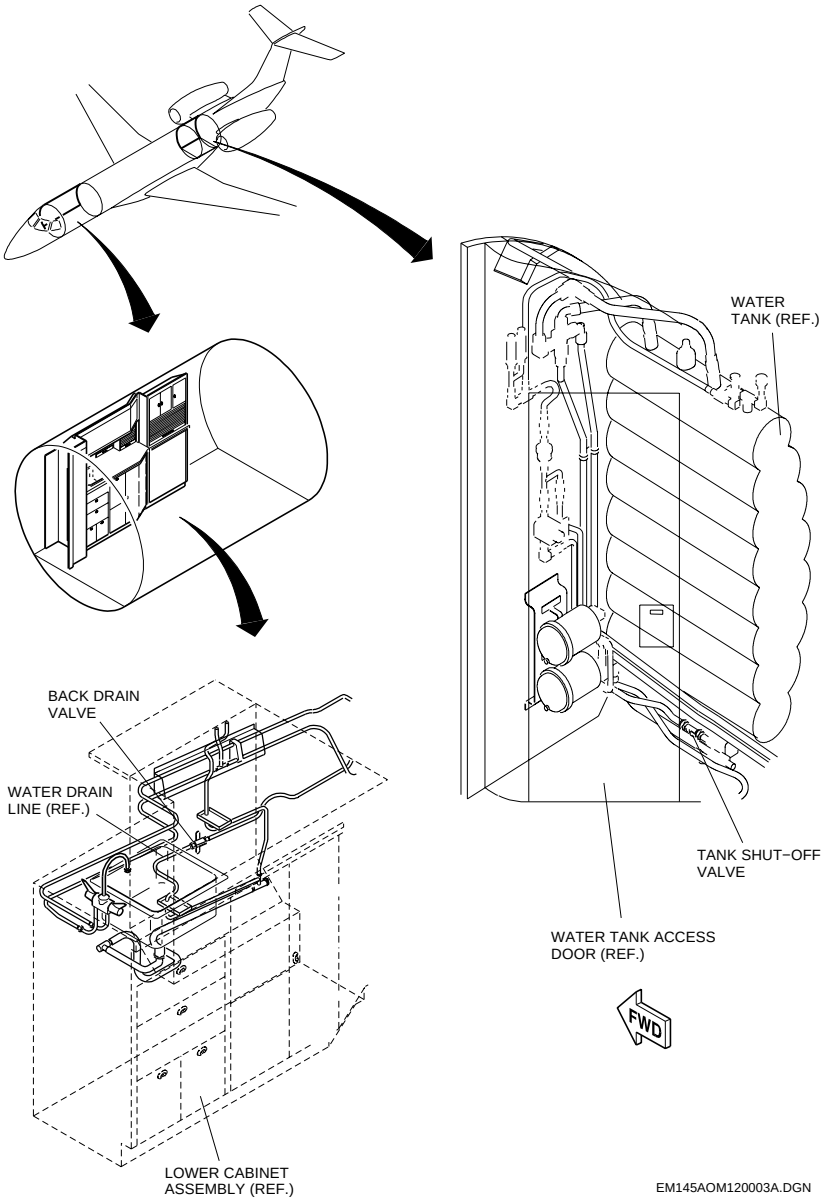

GALLEY WATER LINES – DRAINING

COFFEE MAKER DRAINING PROCEDURE (IF APPLICABLE)

NOTE: Make sure that the water tank and the galley water lines are drained.

With airplane energized:

- Turn on the coffee maker (observe that the red indicator light is illuminated).
- Hold an empty recipient (minimum capacity of 1.4 liters (48 OZ)) under the spigot.

WARNING: BE CAREFUL WITH HOT WATER WHEN DRAINING.

- Push and hold the hot water button and cold water button alternately until no water comes from the spigot (repeat this step until the residual water is totally removed).
- In the galley sink, remove the water from the recipient.
- Inside the coffee maker server cavity, open the drain valve lever to drain the remaining water.
- Turn off the coffee maker (observe that the red indicator light is off).
- Deenergize the airplane, if applicable.

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ESPRESSO COFFEE MAKER DRAINING PROCEDURE (IF APPLICABLE)

NOTE: Make sure that the water tank and the galley water lines are drained.

With airplane energized:

- Turn on the espresso coffee maker (observe that the yellow indicator light is illuminated).
- Wait about 2 minutes until the "READY" indication illuminates.
- Bring the handle down to engage the lock position.
- Put the coffee cups under the coffee pod holder and under the steam spout.

WARNING: BE CAREFUL WITH HOT WATER WHEN DRAINING.

- Press and hold at the same time the "STEAM" and "HOT WATER" buttons (observe the respective lights illuminated). Repeat this step until the "NO WATER" light illuminates.
- Turn off the espresso coffee maker (observe that the yellow indicator light is off).
- Deenergize the airplane, if applicable.

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WATER SERVICING FOR AIRPLANES S/N 686 AND ON

WATER SERVICING PROCEDURE

Filling and draining of the water tanks of galley (15 liters – 3.9 US Gal or 30 liters – 7.9 US Gal) and aft lavatory (35 liters – 9.2 US Gal) are done through two panels, one installed on the forward right side of the airplane; the other installed on the lower right side of the wing-to-fuselage fairing aft section. See figure "WATER SERVICE PANEL".

Both the Galley (FWD) and Lavatory (AFT) are serviced in the same manner.

In the event of extended airplane exposure at low temperatures, the WATER TANK, GALLEY WATER LINES, and COFFEE MAKER (if applicable (1.8 liters – 0.5 US Gal)) must be drained for protection of the water system, since the airplane will be deenergized.

WATER TANK FILLING PROCEDURE

- Open the Water Service Panel doors. If the airplane has been exposed to low temperatures for an extended period (refer to Time of Cool-Down Chart on AOM Section 1-02-79), inspect visually the overflow/drainage nipple for any ice formation. The overflow/drainage nipple and line must be free of ice.
- If the airplane has been exposed to low temperatures for an extended period, perform the Internal Safety Inspection and Cabin Preparation tasks for cold weather operation (AOM Section 1-12-20) before filling the water tank. Power up the airplane, and make sure that the lines have been heated for at least 15 minutes.
- Remove both protective caps from the FILL and VENT/OVERFLOW nipples.
- Connect the coupling from the Water Service Cart to the FILL nipple connection.

WARNING: BE CAREFUL NOT TO BURN YOURSELF SINCE THE WATER FILL AND OVERFLOW/DRAINAGE NIPPLES MAY BE HOT.

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- Pull the nipple to the OPEN position.
- Fill the system with potable water until water starts to flow out through the VENT/OVERFLOW nipple.

CAUTION: THE MAXIMUM FILLING PRESSURE IS 45 PSIG.

- Allow all residual water to completely drain from both FILL and VENT/OVERFLOW nipples.
- Disconnect the water source from the FILL nipple.
- Reinstall both the FILL and VENT/OVERFLOW nipples protective caps.
- Close the Service Panel doors.
- Deenergize the airplane, if applicable.

To verify the quantity of water, energize the airplane and push the appropriate switch selection on the Quantity Indication Panel, located at the upper right side of the galley.

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WATER DRAINING PROCEDURE

The Water System is drained from both the Galley and Lavatory water service panels located forward and aft respectively and are serviced in the same manner.

- Open the Water Service Panel doors.
- Remove the protective caps from both the FILL and VENT/OVERFLOW nipples.
- Install the hose at the water overflow nipple.
- Open the galley faucet.

WARNING: BE CAREFUL NOT TO BURN YOURSELF SINCE THE WATER FILL AND OVERFLOW/DRAINAGE NIPPLES MAY BE HOT.

- Pull the handle to the open position.
- Allow all water to drain from the system prior to installing the protective caps.
- Push the handle to the closed position.
- Close the galley faucet.
- Remove the hose from the water overflow nipple.
- Reinstall both the FILL and VENT/OVERFLOW nipples protective caps.
- Close the Service Panel doors.
- Deenergize the airplane, if applicable.

For airplanes Post-Mod. SB 145LEG-38-0016 or equipped with an equivalent modification factory incorporated, the galley ice drawers were replaced with new ones equipped with new water drain lines.

On ground, at the end of the flight, the water contained in the ice drawers can be drained opening the valves located under it.

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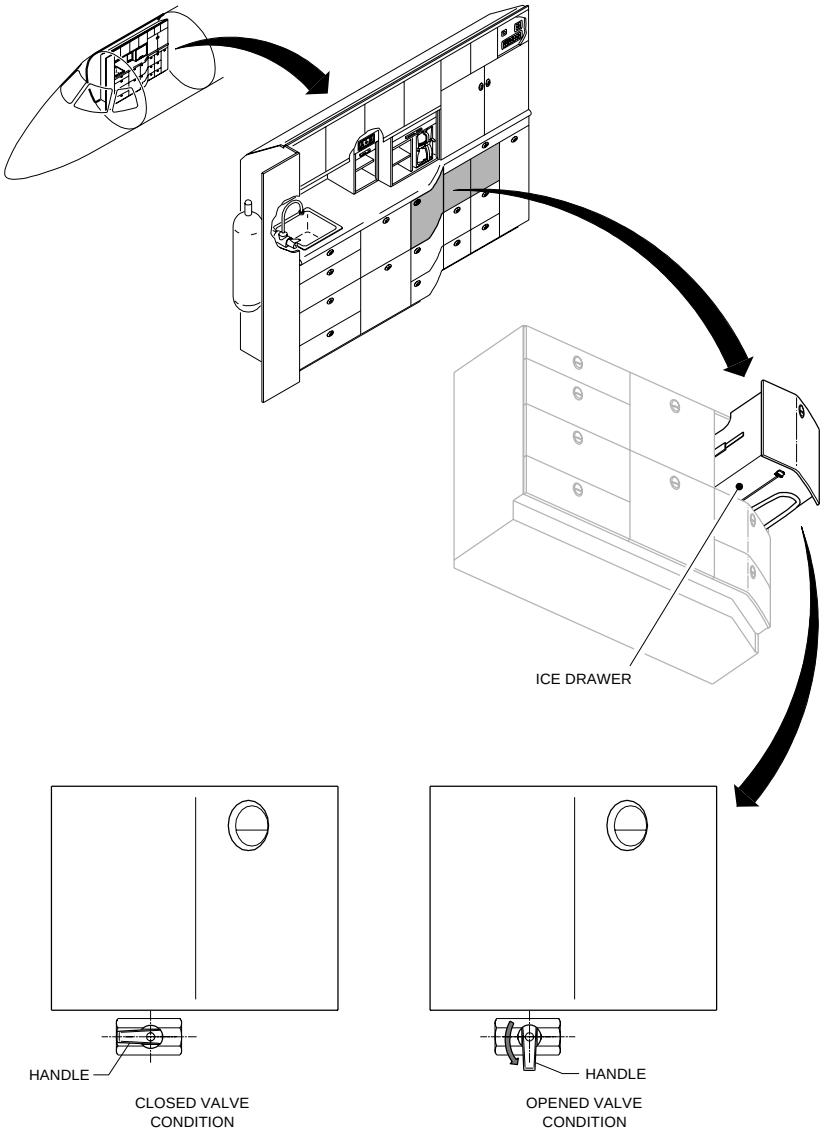

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ICE DRAWERS VALVE

COFFEE MAKER DRAINING PROCEDURE

- Turn ON the coffee maker (make sure that the red indicator light is on).
- After 30 seconds, make sure that the water starts to go through the brew basket and into the carafe.
- Wait about 10 minutes for the brew cycle to be completed (or until the water flow stops).

WARNING: BE CAREFUL WITH HOT WATER WHEN DRAINING.

- Remove the water from the carafe.
- Remove the brew basket.
- Discard the coffee.
- Put the carafe back to the coffee maker.
- Turn OFF the coffee maker.

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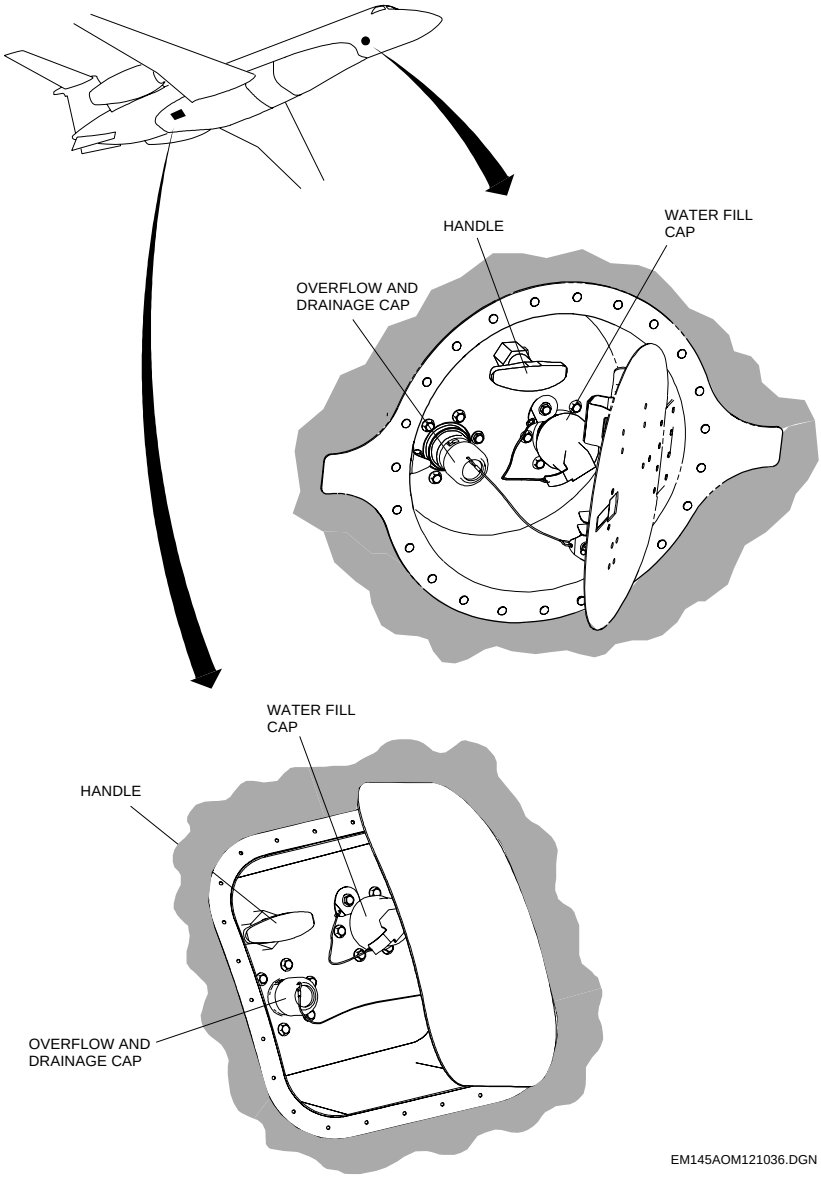
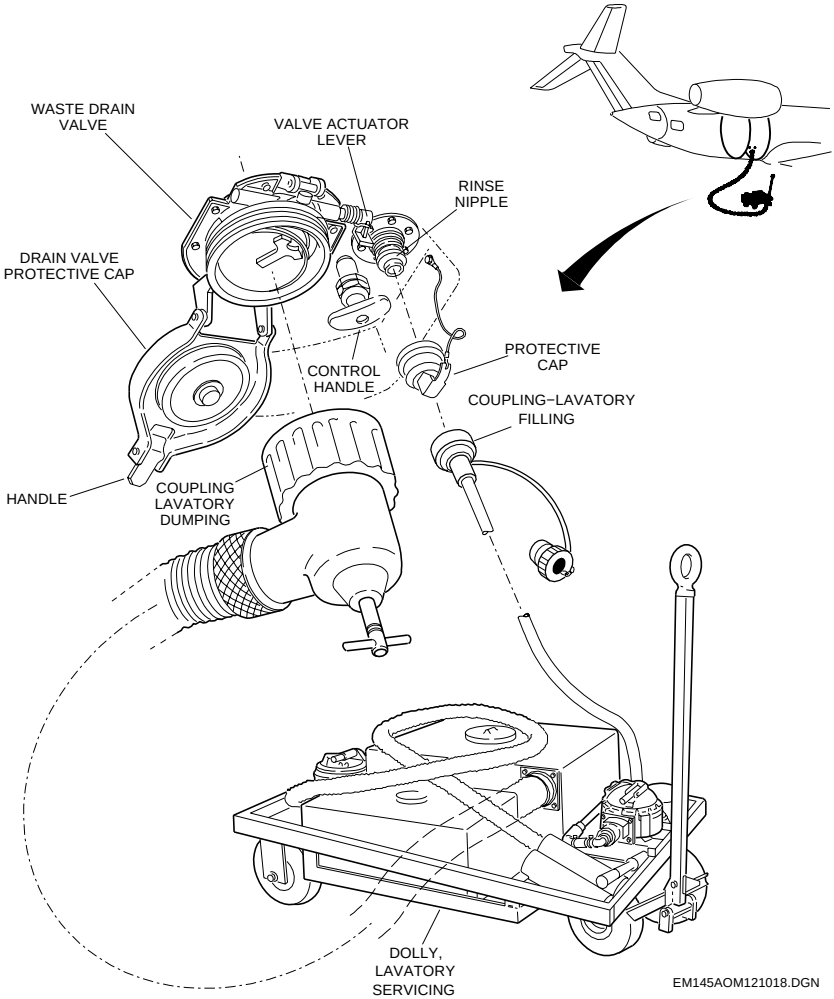


WATER SERVICE PANEL

TOILET SERVICING

Toilet waste disposal servicing is accomplished by accessing a panel at the rear right side of the fuselage. A sanitary service unit must be connected to the airplane service panel.



TOILET SERVICING

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Servicing the toilet waste tank is accomplished as follows:

NOTE: Commercial deodorants and disinfectants can be added to the waste tank, but the tank definitive volume must not contain such material.

- Open waste-service-panel door.
- Remove the protective cap from the toilet rinse nipple.
- Release the handle and open the cap of the waste drain valve.
- Connect the lavatory dumping coupling of the lavatory servicing dolly to the waste drain valve.
- Connect the lavatory filling coupling to the rinse nipple.
- Push the lever of the waste drain-valve actuator to open its internal flapper valve. Do not operate the coupling handle; its operation is not necessary.
- Pull and lock the drain control handle to open the holding-tank drain valve.
- Continue the tank drainage until the waste flow stops.
- Flush with water through the rinse nipple for approximately 3 minutes.
- Release the control cable.
- Fill the waste holding tank with 15 liters (4 US Gal) of water.
- Pull and lock the drain control handle to open the holding-tank drain valve.
- Release the drain control handle after all liquid is drained.
- Fill the waste holding tank with a maximum of 4 liters (1 US Gal) of water and then add:
  - 57 grams (2 OZ) of Monogram MC-2000 germicidal deodorant, or;
  - 170 grams (6 OZ) of Mirabowl "Q" germicidal deodorant.
- Disconnect the lavatory dumping and filling couplings.
- Close the cap and latch the handle of the waste drain valve. The flapper valve will close automatically when the cap is closed.
- Install the cap on the toilet rinse nipple.

NOTE: The access door will close only if the waste drain valve is correctly closed.

- Close waste-service-panel door.

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FORWARD LAVATORY'S WATER SYSTEM (OPTIONAL FOR AIRPLANES S/N 686 AND ON)

The water storage tank must be filled with potable water. Airplane power is not required to service this water tank. Two procedures can be used to service the water tank (see figure "FORWARD LAVATORY WATER TANK"):

WATER FILLING PROCEDURE ONE

- Access the forward lavatory inside airplane.
- Remove the access panel (front panel) from the vanity cabinet, under the sink.
- Remove the FILL cap from the water tank.
- Pull and extend the FILL funnel from the water tank.
- FILL water tank (10 liters – 2.6 US Gal capacity).
- Push and stow the FILL funnel into the water tank.
- Install FILL cap on the water tank.
- Install the access panel (front panel) on vanity cabinet.

WATER FILLING PROCEDURE TWO

- Access the forward lavatory inside airplane.
- Remove the access panel (front panel) from the vanity cabinet, under the sink.
- Disconnect hose from water tank (quick disconnect fitting).
- Pull and open the slide out drawer in the vanity cabinet, to access water tank.
- Remove securing strap from water tank and remove water tank.
- Service water tank as necessary.
- Install water tank and securing strap on the slide out drawer.
- Connect the hose to the water tank (quick disconnect coupling).
- Close the slide out drawer in the vanity cabinet.
- Install the access panel (front panel) on vanity cabinet.

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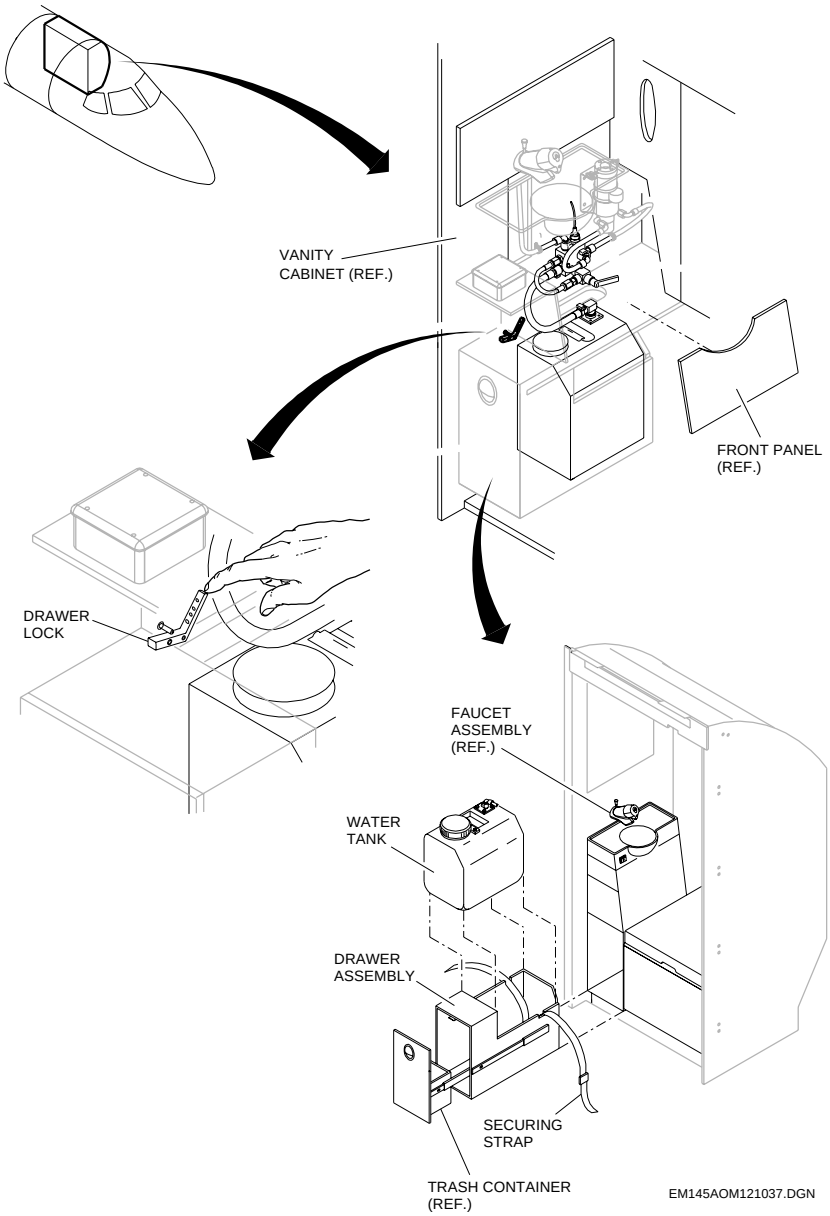

FORWARD LAVATORY WATER TANK

WATER TANK DRAINING PROCEDURE

- Access the forward lavatory inside airplane.
- Remove the access panel from the vanity cabinet, under the sink.
- On the water system manifold, put the water DRAIN valve to OPEN position. Allow a few seconds for water to back drain to the water tank.
- Disconnect hose from water tank (quick disconnect coupling).
- Pull and open the slide out drawer in the vanity cabinet, to access water tank.
- Remove securing strap from water tank and remove water tank.
- Remove water tank and DRAIN outside airplane.
- Install water tank on slide out drawer and secure with strap.
- Connect the hose to water tank (quick disconnect coupling).
- On the water system manifold, put the water DRAIN valve to CLOSED position.
- Close the slide out drawer in the vanity cabinet.
- Install the access panel on vanity cabinet.

NOTE: Airplane power is not required to service the water tank.

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FORWARD LAVATORY TOILET (OPTIONAL FOR AIRPLANES S/N 686 AND ON)

The recirculating toilet is a light weight, compact, completely self contained unit, with electrically operated flush. The toilet uses ordinary tap water, and a germicidal deodorant as a flush fluid. The unit requires connection to 24-28 V DC electrical power. The toilet assembly is designed for permanent installation in the airplane, requiring only the removal of the waste tank when servicing is desired.

FORWARD TOILET SERVICING FOR AIRPLANES S/N 686 UP TO S/N 1034 (INCLUSIVE)

Servicing the forward toilet waste tank is accomplished as follows:

NOTE: The toilet waste tank is a self contained unit. It must be removed from the airplane and drained at proper facility.

- Access the forward lavatory inside airplane.
- Remove the access panel (removable panel) from the toilet shroud cabinet.
- Disconnect the flush hose (quick disconnect coupling) and drain residual flush fluid.
- Close the knife valve (through the actuator handle) at the bottom of the toilet bowl.
- Press the two press fasteners on each side of the knife actuator valve to unlock the tank.
- Grab the carry handle on the toilet tank and pull the toilet tank out of the toilet shroud cabinet, and remove from the airplane.
- At proper facility outside the airplane, service the toilet tank according to service procedure placard on toilet tank.
- At the forward lavatory inside the airplane, install the toilet tank in the toilet shroud cabinet.
- Press the two press fasteners to the first detent to secure the tank.
- Open the knife valve.

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- Connect the flush hose (quick disconnect coupling) to toilet tank.
- Install the access panel (removable panel) on the toilet shroud cabinet.

FORWARD TOILET SERVICING FOR AIRPLANES S/N 1035 AND ON

Servicing the toilet waste tank is accomplished as follows:

NOTE: Commercial deodorants and disinfectants can be added to the waste tank, but the tank definitive volume must not contain such material.

- Open waste-service-panel door located on front right side of the airplane.
- Remove the protective cap from the toilet rinse nipple.
- Release the handle and open the cap of the waste drain valve.
- Connect the lavatory dumping coupling of the lavatory servicing dolly to the waste drain valve.
- Connect the lavatory filling coupling to the rinse nipple.
- Push the lever of the waste drain-valve actuator to open its internal flapper valve. Do not operate the coupling handle; its operation is not necessary.
- Pull and lock the drain control handle to open the holding-tank drain valve.
- Continue the tank drainage until the waste flow stops.
- Flush with water through the rinse nipple for approximately 3 minutes.
- Release the control cable.
- Fill the waste holding tank with 15 liters (4 US Gal) of water.
- Pull and lock the drain control handle to open the holding-tank drain valve.
- Release the drain control handle after all liquid is drained.

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- Fill the waste holding tank with a maximum of 4 liters (1 US Gal) of water and then add:
  - 57 grams (2 OZ) of Monogram MC-2000 germicidal deodorant, or;
  - 170 grams (6 OZ) of Mirabowl "Q" germicidal deodorant.
- Disconnect the lavatory dumping and filling couplings.
- Close the cap and latch the handle of the waste drain valve. The flapper valve will close automatically when the cap is closed.
- Install the cap on the toilet rinse nipple.

NOTE: The access door will close only if the waste drain valve is correctly closed.

- Close waste-service-panel door.

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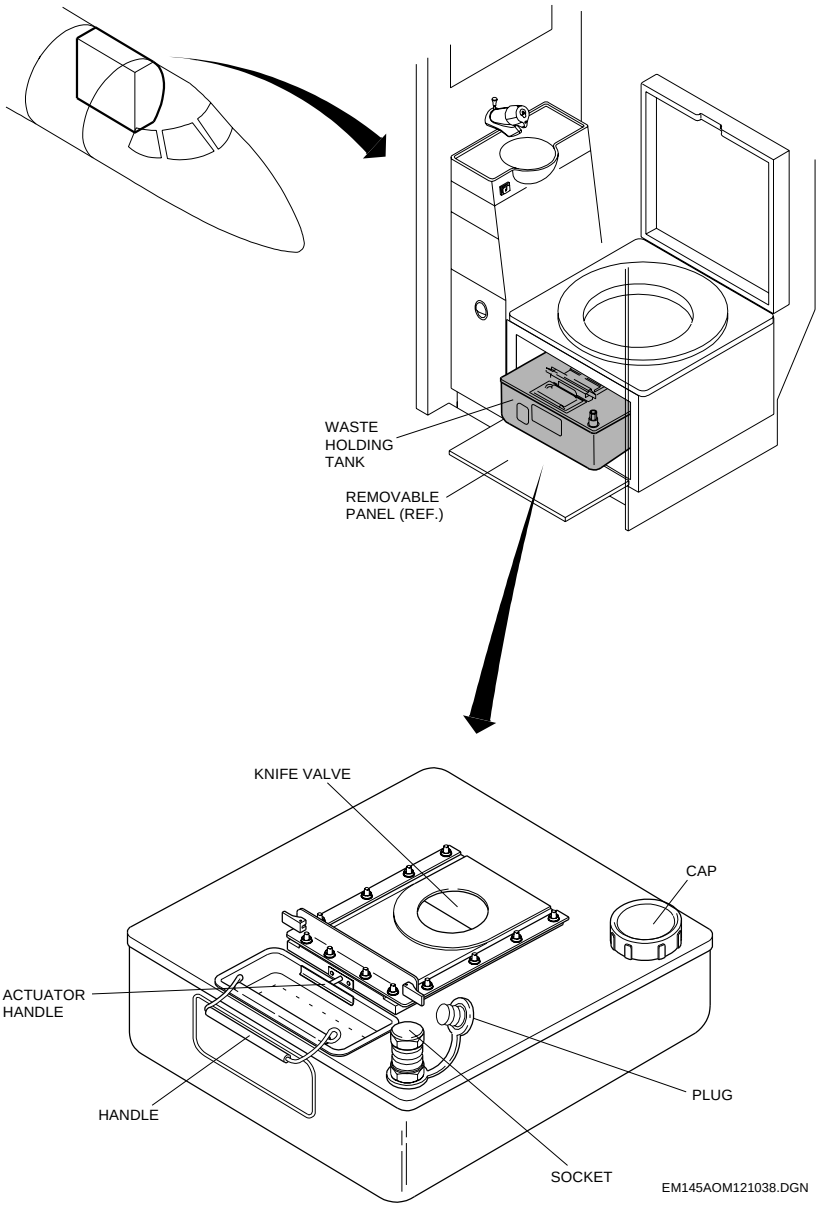

FORWARD TOILET WASTE TANK FOR AIRPLANES S/N 686 UP TO S/N 1034

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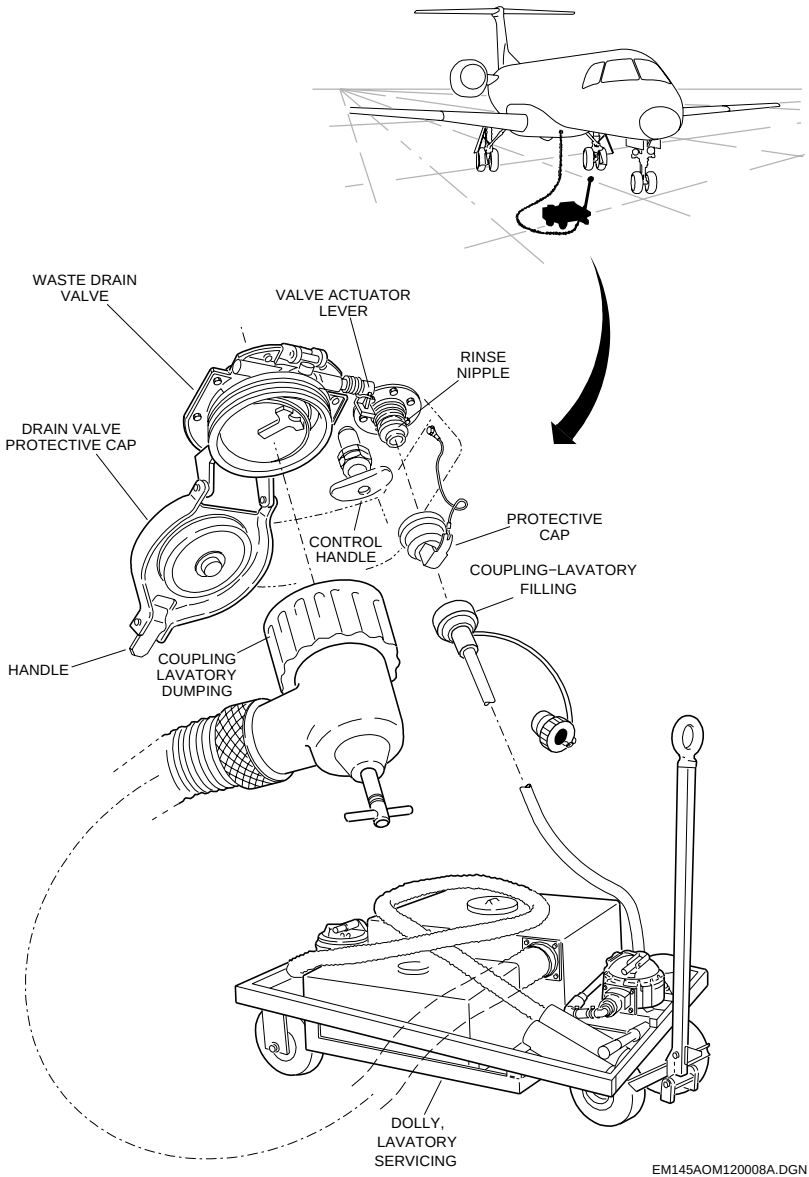

FORWARD TOILET SERVICING FOR AIRPLANES S/N 1035 AND ON

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CHARTS AND MAPS DATABASE PROGRAMMING AND LOADING

This section presents the procedures to prepare and install Charts and Maps databases into the MFDs, through the Data Loader DL-1000. The Charts and Maps databases must be updated periodically. The update is supplied by Integrated Navigation Data Service (INDS) web site at two different formats:

- Preprocessed database (red (NavDB) and blue (Charts) appended databases), identified at ELP format, which is updated at intervals of 14 days; or
- Red database (NavDB) and Blue database (Charts), identified as EL1 format, which must be converted before their installation into the airplane. In order to do this, it is necessary to use the Honeywell Pre-processor Tool, installed in a PC. The charts databases are updated at intervals of 14 days, and the maps databases are updated at intervals of 28 days.

  NOTE: It is recommended to use two identified USB flash drives, or two identified SD cards, to store each database separately.

They have expiration dates based on these intervals.

CHARTS AND MAPS DATABASE PROGRAMMING

The procedures for preparing the Charts and Maps database before their installation in the airplane are given below:

1. Connect to the Internet and access the INDS website: http://inds.epicinds.com/epic/login.

   NOTE: If the databases are in a CD, copy the files from the CD into the computer and go to step 6 at "Processed Database through Pre-Processor Tool".

2. Use your username and password to Login.

   NOTE: If not registered to the site yet, contact the site customer support to obtain an account.

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PREPROCESSED DATABASE

3. Select the database and click on "Download as a Zip File" on the bottom of the page to start the download.

   NOTE: Check if the ELP file is available for download. In case only the EL1 file is available, is necessary to download the red and blue files, and run the Pre-processor Tool prior to update the database (go to step 3 at "Processed Database Through Pre-Processor Tool"). Contact INDS support to request access to ELP file.

4. Extract the ZIP file into the root folder of the USB Flash Drive or SD Card used to update the database.

   NOTE: Make sure the files are not inside any folder.

5. The database is ready for load into the MFDs.

PROCESSED DATABASE THROUGH PRE-PROCESSOR TOOL

3. Select the database and click on "Download". The following options will be available:

   a) Blue CD – It is the Charts database;

   b) Red CD – It is the Maps database.

4. Save the files into the computer. Each database is a single ZIP file.

   NOTE: It is recommended to save each file in different folders in the computer, identified as "BLUE CD – Charts" and "RED CD – Maps", for example. As this is a periodic procedure, it is important to organize the files to prevent the loading of incorrect or out-of-date files.

5. Extract the ZIP file into an identified folder in the computer. The files and folders extracted from the ZIP file will be arranged in a defined order that must not be changed.

6. Execute the Honeywell Pre-processor Tool installed in the computer.

7. Click on the Select Load Type menu to select the type of data to be converted (Red or Blue).

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8. Click on Select Source Directory to select the folder where the extracted files from the ZIP file are located.
9. Click on Select Destination and select the place to store the processed files. Confirm the destination of the USB flash drive or the SD card, as applicable.
10. It is recommended to fill in the fields Comments with proper information to help to identify the processed database when they are loaded into the airplane. For example, Comment 1 = "Charts", Comment 2 = "Blue CD" and Comment 3 = "Pre-processed on mm/dd/yy". This step is not mandatory.
11. Click on Pre-process.

    NOTE: The converting process for the Blue CD database takes longer than the Red CD due to the quantity of information.

12. Wait until a message is displayed indicating the end of the process.

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CHARTS AND MAPS DATABASE LOADING

These databases are loaded into the MFDs through the Data Loader DL-1000, using an USB flash drive or a SD card.

The procedures for loading the Charts and Maps database into the MFDs are given below:

1. Make sure the Data Loader DL-1000 is off.
2. Slide the cover on the Data Loader to connect the USB flash drive, or the SD card, with the database.
3. Push the POWER pushbutton on the Data Loader to turn it on and wait until the LAN light turns on.
4. Do the following steps to load the database into the MFD1:

   a) On the CCD#1 (pilot side), push the MENU pushbutton. The menu with the options CHART, MAP, VIDEO, DATA and MAINT is displayed on the MFD1.

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MENU

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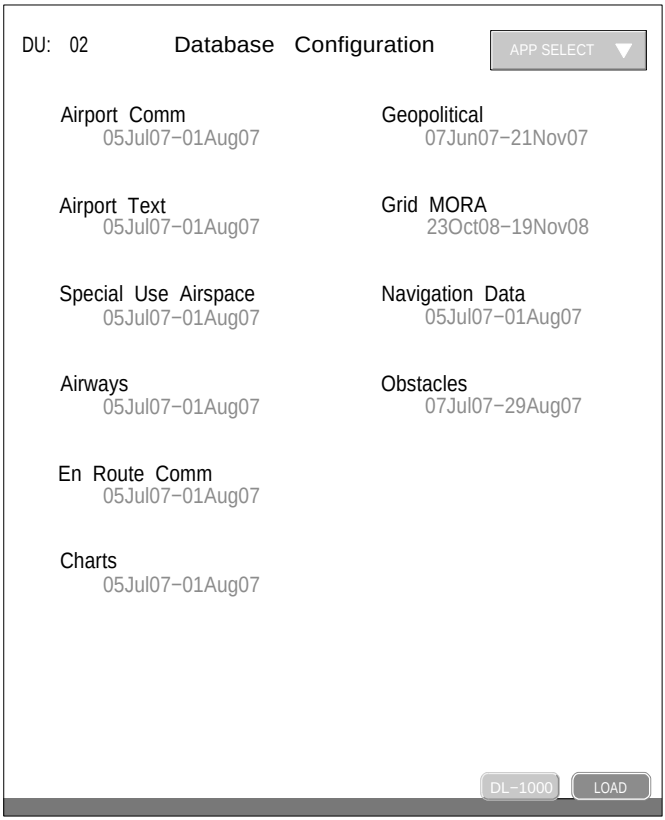
b) At the same CCD, use the joystick to highlight the DATA option and then press enter (SET pushbutton). The page DATABASE CONFIGURATION is displayed on the MFD1. The button DL-1000 is active on this page.

NOTE: When this page is accessed, the start and end dates for "Charts" can take about 30 seconds to be displayed.



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DATABASE CONFIGURATION PAGE

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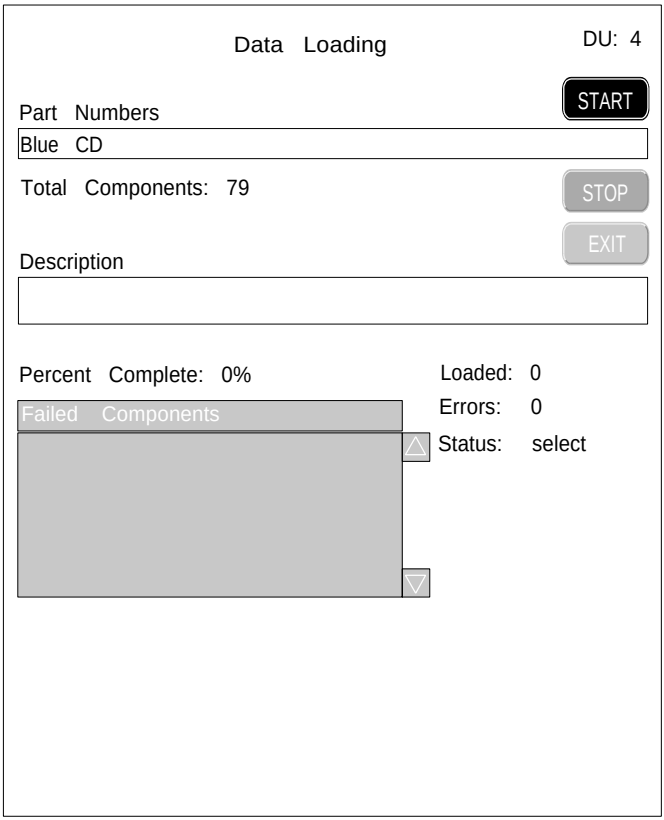
c) Use the joystick to place the cursor over the DL-1000 button to highlight it and press enter (SET pushbutton). The DATA LOADING page is displayed.

NOTE: The Part Numbers field shows the information before entered in the field Comments 1 during the database pre-processing, using the Honeywell Pre-processor Tool. The Description field shows the information before entered in the fields Comments 2 and Comments 3 of the Pre-processor Tool.



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DATA LOADING PAGE

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d) Use the joystick to highlight the START button and press enter (SET pushbutton) to start the data loading process. The progress of the loading is displayed on the field Percent Complete.

NOTE: Do not remove the flash drive or the SD card during the loading process. This requires the procedure to be restarted.

Wait until the field Percent Complete shows 100% and Status shows COMPLETE.

e) Use the joystick highlight the EXIT button and press enter (SET pushbutton) to return to the DATABASE CONFIGURATION page. The databases dates displayed in green (with no error shown) indicate that they are successfully loaded.

5. Repeat the steps listed in item 4 using the CCD#2 to load the same database into MFD2.

NOTE: Both MFD can be uploaded at the same time using the same Data Loader. After the MFD1 update process is started, the MFD2 is available to start the process.

6. Turn off the data loader by pushing the POWER pushbutton on the Data Loader.
7. Remove the USB flash drive, or the SD card, from the data loader.
8. On the circuit breaker panel, cycle (open then close) the MFD1 circuit breaker (location tip: DC BUS 2/NAV/MFD1) and the MFD2 circuit breaker (location tip: DC BUS 1/NAV/MFD2).
9. After the MFDs start-up, push the CHART pushbutton on CCD.

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10. The first time the CHART page is accessed after power-up, the REVISION INFO page is displayed, with a Coverage Map and information about the database loaded in the MFDs. On both MFDs, ensure there is no warning message displayed, indicating that it may contain out-of-date information.

NOTE: If the warning message is displayed, the expiration date of one or more databases is before the airplane present date (indicated on the clock). Thus, redo the Charts and Maps database loading with the other updated database (Charts or Maps) until the message is no longer displayed.

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GROUND RESETS

The purpose of this Section is to provide flight crew with information and procedures to clear nuisance EICAS messages and miscellaneous nuisance faults.

This Section does not cover all messages or faults that may be detected on the airplane. Any message or fault not covered by this document must be reported to the maintenance personnel.

Standards procedures must be established to instruct the flight crew how to proceed when a nuisance message or fault is presented before starting to follow this Section after dispatch. These procedures may vary for different airports.

This Section is organized in a four-column table, as follows:

– ATA column: Gives the ATA number for the related message or fault.

– EICAS MESSAGE or CONDITION column: Provides the messages or fault condition, alphabetically ordered. Messages are referred in capital letters and conditions are referred in plain text.

– LOCATION column: Indicates the location of the fault or annunciation.

– PROCEDURES column: Provides the proper procedures required to clear the nuisance EICAS message or fault. It may also provide the effectivity of the procedure or Fault Condition in which the procedure applies.

NOTE: Local approval from regulatory authorities may be granted to use the information contained herein.

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LIMITATIONS

This Section shall be used under the following condition:

– Airplane on the ground with parking brake set.

– Each procedure may be performed only once per flight leg. If the nuisance EICAS message or fault is not cleared, maintenance personnel must be notified to clear the condition.

– Effectivity and Fault Condition must be observed. Ground Resets procedures should be accomplished only if the applicable effectivity and fault conditions are satisfied. Applicable effectivity and fault conditions are listed preceding the procedures. Those procedures that do not have effectivity and fault conditions listed preceding the procedures can be accomplished to every model and conditions, observing the preceding items.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	Absence of ADF 1 bearing information on the RMU and on the PFD and MFD (Transitory condition of Integrated Navigation Unit 1)	ADF	(1) Set the cursor of RMU 1 to the ADF 1 window. (2) Do the test of the frequency selection: (a) Put the cursor on the selected frequency code. (b) Turn the dual concentric knobs. A frequency code can be set. (3) Do the self-test: (a) Set the RMU 1 to the ADF 1 window. (b) Push and hold the RMU TST function key. On the RMU, the ADF 1 window shows: – TEST and ADF TEST (amber). – TEST (amber) and ADF PASS (green), at the end of the test cycle. **NOTE:** An ADF ERR (red) is the indication that the selected ADF is defective.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	Absence of ADF 2 bearing information on the RMU and on the PFD and MFD (Transitory condition of Integrated Navigation Unit 2)	ADF	(1) Set the cursor of RMU 2 to the ADF 2 window. (2) Do the test of the frequency selection: (a) Put the cursor on the selected frequency code. (b) Turn the dual concentric knobs. A frequency code can be set. (3) Do the self-test: (a) Set the RMU 2 to the ADF 2 window. (b) Push and hold the RMU TST function key. On the RMU, the ADF 2 window shows: – TEST and ADF TEST (amber). – TEST (amber) and ADF PASS (green), at the end of the test cycle. **NOTE:** An ADF ERR (red) is the indication that the selected ADF is defective.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	Absence of DME 1 distance information on the RMU and on the PFD and MFD (Transitory condition of Integrated Navigation Unit 1)	DME	(1) On RMU 1, push the DME function key. (2) Move the cursor of RMU 1 to the DME 1 window. (3) Do the test of frequency selection: (a) Put the cursor on the selected frequency code. (b) Turn the dual concentric knobs. A frequency code can be set. (4) Do the self-test: (a) Set the RMU 1 to the DME 1 window. (b) Push and hold the RMU TST function key. On the RMU, the DME 1 window shows: – TEST and DME TEST (amber). – TEST (amber) and DME PASS (green), at the end of the test cycle. **NOTE:** A DME ERR (red) is the indication that the selected DME is defective.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	Absence of DME 2 distance information on the RMU and on the PFD and MFD (Transitory condition of Integrated Navigation Unit 2)	DME	(1) On RMU 2, push the DME function key. (2) Move the cursor of RMU 2 to the DME 2 window. (3) Do the test of frequency selection: (a) Put the cursor on the selected frequency code. (b) Turn the dual concentric knobs. A frequency code can be set. (4) Do the self-test: (a) Set the RMU 2 to the DME 2 window. (b) Push and hold the RMU TST function key. On the RMU, the DME 2 window shows: – TEST and DME TEST (amber). – TEST (amber) and DME PASS (green), at the end of the test cycle. **NOTE:** A DME ERR (red) is the indication that the selected DME is defective.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
24	Absence of electrical power at some buses (Transitory condition of the electrical circuit)	GPU	(1) Energize airplane with external DC power supply. (2) Check that output voltage of external power is 28 ± 0.5 V DC. (3) Check that BATT 1-2 switches, BUS TIE switch, and ESSENTIAL POWER pushbutton (pushbutton released), on the electrical panel, on the overhead panel, are set at the AUTO position. (4) Check that GPU pushbutton, on the electrical panel, on the overhead panel, is set at ON (GPU pushbutton pushed). (5) Set the ELEC PWR switch, on the maintenance panel, to RESET.
23	ACARS/ DMU failure message in FMS (Transitory condition of the CMU)	ACARS	Make sure the CMU ground service is active and ready to use. Make sure the CMU is correctly installed. Check if the fault occurred during the airplane power-up. **NOTE:** The CMU takes approximately 1 minute or 2 minutes to restart. During this time, the CDU displays ACARS DMU FAILED.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
27	Aileron – No roll control through the switch (Transitory condition of the roll trim electrical circuit)	AILERON	Make sure that the ROLL TRIM circuit breaker is closed. Energize the airplane with hydraulic pressure. Do a roll trim test through the roll trim switch: (1) Push the roll trim switch to the LWD position for approximately 3 seconds. The roll trim system is automatically deactivated in 3 seconds. (2) Push the roll trim switch to the RWD position for approximately 3 seconds. The roll trim system is automatically deactivated in 3 seconds.
34	ALT Flag on the ISIS (SMITHS and THALES)	ISIS	(1) On the circuit breaker panel, open and close the INTEG STBY circuit breaker. **NOTE:** Before turning on the ISIS, make sure that there is no dynamic pressure applied to Pitot/Static 3. It must be equivalent to an airspeed equal to or greater than 60 knots. (2) The airplane must be maintained stationary during the ISIS initialization. (3) The display shows an initialization page for 70 seconds (ISIS SMITHS) or for 90 seconds (ISIS THALES). (4) Wait until the ISIS completes its initialization.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	ATT Flag on the ISIS (SMITHS and THALES)	ISIS	(1) On the circuit breaker panel, open and close the INTEG STBY circuit breaker. **NOTE:** Before turning on the ISIS, make sure that there is no dynamic pressure applied to Pitot/Static 3. It must be equivalent to an airspeed equal to or greater than 60 knots. (2) The airplane must be maintained stationary during the ISIS initialization. (3) The display shows an initialization page for 70 seconds (ISIS SMITHS) or for 90 seconds (ISIS THALES). (4) Wait until the ISIS completes its initialization.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	CAGE Flag on the ISIS (THALES)	ISIS	(1) Push the CAGE button to cage the Integrated Standby Instrument System (ISIS) and do not move the ISIS during this phase. **NOTE: -** The "ATT 10s" indication replaces the ATT CAGE flag to show that the ISIS is in the attitude reset (caging) phase. - In flight, the pilot must maintain the airplane in straight and level flight and at constant speed before pushing the CAGE button during this phase. (2) Make sure that the attitude function has been set to the true value in stabilized condition.
31	CAS Message displayed on the PFD	IC-600	On the copilot's reversionary panel, set the MFD selector to the EICAS position. To check which the discrepant message is, compare the messages on the copilot's MFD with the ones presented on the EICAS. In a discrepant message on the EICAS: (1) Open the IC-600 1 circuit breaker, wait a few seconds, and close it back. Wait for the IC system initialization. Do the comparison again.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
27	Directional Trim Locked	Rudder Trim	(1) Pressurize the hydraulic system. (2) Do the operational check of the yaw trim: (a) Move the YAW TRIM switch to the LEFT position. On the EICAS display, the arrow of the YAW TRIM indication moves to the left. **NOTE:** The system cycle time is limited in 3 seconds, after this time you must to release the switch and move it again to get another cycle. (b) Release the YAW TRIM switch, it goes to neutral position by itself. On the EICAS display, the arrow of the YAW TRIM indication remains at last position. (c) Move the YAW TRIM switch to the RIGHT position. On the EICAS display, the arrow of the YAW TRIM indication goes from LEFT to RIGHT position.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
27	Directional Trim Locked	Yaw Trim	(1) Pressurize the hydraulic system. (2) Do the operational check of the yaw trim: (a) Move the YAW TRIM switch to the LEFT position. On the EICAS display, the arrow of the YAW TRIM indication moves to the left. **NOTE:** The system cycle time is limited in 3 seconds, after this time you must to release the switch and move it again to get another cycle. (b) Release the YAW TRIM switch, it goes to neutral position by itself. On the EICAS display, the arrow of the YAW TRIM indication remains at last position. (c) Move the YAW TRIM switch to the RIGHT position. On the EICAS display, the arrow of the YAW TRIM indication goes from LEFT to RIGHT position.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
28	FCU X ARINC 429 message appears on the repeater indicator panel	FCU	Do the electrical fuel quantity indication check. Transitory condition of the wing fuel conditioning unit. On the repeater indicator panel, set the toggle switch to the TEST position and clear the fault message.
28	FCU X FAIL message on the repeater indicator panel	FCU	Do the electrical fuel quantity indication check. Transitory condition of the wing fuel conditioning unit. On the repeater indicator panel, set the toggle switch to the TEST position and clear the fault message.
34	HDG Flag on the ISIS	ISIS	(1) On the circuit breaker panel, open and close the INTEG STBY circuit breaker. **NOTE:** Before turning on the ISIS, make sure that there is no dynamic pressure applied to Pitot/Static 3. It must be equivalent to an airspeed equal to or greater than 60 knots. (2) The airplane must be maintained stationary during the ISIS initialization. (3) The display shows an initialization page for 90 seconds. (4) Wait until the ISIS completes its initialization.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	M Flag on the ISIS	ISIS	(1) On the circuit breaker panel, open and close the INTEG STBY circuit breaker. **NOTE:** Before turning on the ISIS, make sure that there is no dynamic pressure applied to Pitot/Static 3. It must be equivalent to an airspeed equal to or greater than 60 knots. (2) The airplane must be maintained stationary during the ISIS initialization. (3) The display shows an initialization page for 90 seconds. (4) Wait until the ISIS completes its initialization.
34	MAINT Indication on the ISIS	ISIS	(1) On the circuit breaker panel, open and close the INTEG STBY circuit breaker. **NOTE:** Before turning on the ISIS, make sure that there is no dynamic pressure applied to Pitot/Static 3. It must be equivalent to an airspeed equal to or greater than 60 knots. (2) The airplane must be maintained stationary during the ISIS initialization. (3) The display shows an initialization page for 90 seconds. (4) Wait until the ISIS completes its initialization.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
28	MFD shows dashes instead of wing fuel quantity	FCU	(1) Get access to the maintenance panel. (2) Set the fuel page on the MFD. (3) Move the "FUEL QTY" toggle switch on the maintenance panel. (a) The EICAS display shows these messages and indications: – FUEL 1 (2) LO LEVEL (WARNING). – FWD 1 shows 100 kg ± 10 kg (220 lb). – FWD 2 shows 100 kg ± 10 kg (200 lb). – WING 1 shows 1300 kg ± 10 kg (2870 lb). – WING 2 shows 1300 kg ± 10 kg (2870 lb). – AFT 1 shows 400 kg ± 10 kg (880 lb). – AFT 2 shows 400 kg ± 10 kg (880 lb). – VENTRAL shows 200 kg ± 10 kg (440 lb). (Continued)

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
28	MFD shows dashes instead of wing fuel quantity	FCU	(Continued) (b) The MFD shows these indications: – FWD 1 shows 100 kg ± 10 kg (220 lb). – FWD 2 shows 100 kg ± 10 kg (200 lb). – WING 1 shows 1300 kg ± 10 kg (2870 lb). – WING 2 shows 1300 kg ± 10 kg (2870 lb). – AFT 1 shows 400 kg ± 10 kg (880 lb). – AFT 2 shows 400 kg ± 10 kg (880 lb). – VENTRAL shows 200 kg ± 10 kg (440 lb). – TOTAL – 3800 kg (8380 lb). (c) The warning lights flash. (d) The aural warning operates (bell). **NOTE:** After 10 seconds, the preceding indications go back to the normal condition. (4) Press one of the master warning lights to stop the lights.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	SPD Flag on the ISIS	ISIS	(1) On the circuit breaker panel, open and close the INTEG STBY circuit breaker. **NOTE:** Before turning on the ISIS, make sure that there is no dynamic pressure applied to Pitot/Static 3. It must be equivalent to an airspeed equal to or greater than 60 knots. (2) The airplane must be maintained stationary during the ISIS initialization. (3) The display shows an initialization page for 90 seconds. (4) Wait until the ISIS completes its initialization.
34	SSEC Annunciation on the ISIS	ISIS	(1) On the circuit breaker panel, open and close the INTEG STBY circuit breaker. **NOTE:** Before turning on the ISIS, make sure that there is no dynamic pressure applied to Pitot/Static 3. It must be equivalent to an airspeed equal to or greater than 60 knots. (2) The airplane must be maintained stationary during the ISIS initialization. (3) The display shows an initialization page for 90 seconds. (4) Wait until the ISIS completes its initialization.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
22	The rudder servo motor does not actuate	IC-600	(1) Energize the airplane with the External DC Power supply. (2) Pressurize the hydraulic system. (3) Do the operational check of the Yaw trim: (a) Move the YAW TRIM switch to the LEFT position. On the EICAS display, the arrow of the YAW TRIM indication moves to the left. **NOTE:** The system cycle time is limited in 3 seconds, after this time you must release the switch and move it again to get another cycle. (b) Release the YAW TRIM switch, it goes to neutral position by itself. On the EICAS display, the arrow of the YAW TRIM indication remains at last position. (c) Move the YAW TRIM switch to the RIGHT position. On the EICAS display, the arrow of the YAW TRIM indication goes from LEFT to RIGHT position. (4) Release the pressure of the hydraulic system.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	VMO/MMO Flag on the ISIS	ISIS	(1) On the circuit breaker panel, open and close the INTEG STBY circuit breaker. **NOTE:** Before turning on the ISIS, make sure that there is no dynamic pressure applied to Pitot/Static 3. It must be equivalent to an airspeed equal to or greater than 60 knots. (2) The airplane must be maintained stationary during the ISIS initialization. (3) The display shows an initialization page for 90 seconds. (4) Wait until the ISIS completes its initialization.
23	VOICE RECORDER Record all crew voice communica-tion inoperative	CVR	If the CVR Impact switch lamp on, press the Impact switch RESET pushbutton.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
31	CHECK IC 2 SW	EICAS	On the circuit breaker panel, open the IC 2 circuit breaker and close it after a few seconds.
31	DAU1 A FAIL	EICAS	(1) Check the SG pushbutton on the pilot Reversionary Panel: If the SG pushbutton is pressed when the DAU1 A FAIL message appears: – Open, and then, close the IC 2 circuit breaker on the overhead circuit breakers panel. If the SG pushbutton is NOT pressed when the DAU1 A FAIL message appears: – Open the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box. – Close the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
31	DAU1 B FAIL	EICAS	(1) Check the SG pushbutton on the pilot Reversionary Panel: If the SG pushbutton is pressed when the DAU1 B FAIL message appears: – Open, and then, close the IC 2 circuit breaker on the overhead circuit breakers panel. If the SG pushbutton is NOT pressed when the DAU1 B FAIL message appears: – Open the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box. – Close the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
31	DAU2 A FAIL	EICAS	(1) Check the SG pushbutton on the pilot Reversionary Panel: If the SG pushbutton is pressed when the DAU2 A FAIL message appears: – Open, and then, close the IC 2 circuit breaker on the overhead circuit breakers panel. If the SG pushbutton is NOT pressed when the DAU2 A FAIL message appears: – Open the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box. – Close the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
31	DAU2 B FAIL	EICAS	(1) Check the SG pushbutton on the pilot Reversionary Panel: If the SG pushbutton is pressed when the DAU2 B FAIL message appears: – Open, and then, close the IC 2 circuit breaker on the overhead circuit breakers panel. If the SG pushbutton is NOT pressed when the DAU2 B FAIL message appears: – Open the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box. – Close the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
31	DAU 1 WRN MISCOMP	EICAS	(1) Check the SG pushbutton on the pilot Reversionary Panel: If the SG pushbutton is pressed when the DAU 1 WRN MISCOMP message appears: – Open, and then, close the IC 2 circuit breaker on the overhead circuit breakers panel. If the SG pushbutton is NOT pressed when the DAU 1 WRN MISCOMP message appears: – Open the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box. – Close the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
31	DAU 2 WRN MISCOMP	EICAS	(1) Check the SG pushbutton on the pilot Reversionary Panel: If the SG pushbutton is pressed when the DAU 2 WRN MISCOMP message appears: – Open, and then, close the IC 2 circuit breaker on the overhead circuit breakers panel. If the SG pushbutton is NOT pressed when the DAU 2 WRN MISCOMP message appears: – Open the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box. – Close the IC 1 circuit breaker on the overhead circuit breakers panel and the IC 1 circuit breaker on the backup relay box.
34	DU 1 FAN FAIL	EICAS	On the circuit breaker panel, open and close PFD 1 circuit breaker (D13).
34	DU 2 FAN FAIL	EICAS	On the circuit breaker panel, open and close MFD 1 circuit breaker (D23).
34	DU 3 FAN FAIL	EICAS	On the circuit breaker panel, open and close EICAS/DISPLAY circuit breaker (C9).
34	DU 4 FAN FAIL	EICAS	On the circuit breaker panel, open and close MFD 2 circuit breaker (D12).

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	DU 5 FAN FAIL	EICAS	On the overhead circuit breaker panel, open and close PFD 2 circuit breaker (D22).
34	DU 1 OVHT	EICAS	Check if the DU 1 OVHT message appears for approximately 4 seconds on the EICAS and then disappears.
34	DU 2 OVHT	EICAS	Check if the DU 2 OVHT message appears for approximately 4 seconds on the EICAS and then disappears.
34	DU 3 OVHT	EICAS	(1) On the pilot reversionary panel, rotate the MFD switch to the EICAS position. The EICAS screen shows on the MFD 1 display (DU 2). (2) Check if the DU 3 OVHT message appears for approximately 4 seconds on the EICAS (DU 2) and then disappears. If yes, on the pilot reversionary panel, rotate the MFD switch to the normal position. The EICAS screen shows on the EICAS display (DU 3).
34	DU 4 OVHT	EICAS	Check if the DU 4 OVHT message appears for approximately 4 seconds on the EICAS and then disappears.
34	DU 5 OVHT	EICAS	Check if the DU 5 OVHT message appears for approximately 4 seconds on the EICAS and then disappears.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 1 ATT MODE	EICAS	(1) After the airplane is brought to a stop at the ramp or hangar, power off IRS 1. (2) Reapply power and try to align IRS 1 in a normal fashion.
34	IRS 2 ATT MODE	EICAS	(1) After the airplane is brought to a stop at the ramp or hangar, power off IRS 2. (2) Reapply power and try to align IRS 2 in a normal fashion.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 1 FAIL	EICAS	(1) Set the MSU 1 rotary switch to ALIGN. (2) Enter the correct present position. **NOTE: -** Operator can use either the FMS CDU or the bezel pushbuttons of the pilot's MFD to enter the present position. - The airplane must be kept stationary during the IRS 1 alignment. (a) Using the FMS CDU: (i) Push the NAV mode key and the NEXT function key (the NAV INDEX 2/2 page comes into view). (ii) Push the POS INIT (3L) left line select key (the POS INIT 1/1 page comes into view). (iii) Push the LOAD (2R) right line select key to update the FMS position (the FMS CDU show the LOADED POSITION coordinates). (b) Using the Bezel pushbuttons: (i) Make sure that the airplane is in the ground configuration. (Continued)

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 1 FAIL	EICAS	(Continued) (ii) On main menu of the pilot's MFD, use the bezel pushbuttons to select the PPOS INIT option (pilot's MFD shows the present position initialization menu). **NOTE:** From this menu operator can: - Confirm that the EFIS stored present position (PPOS) is correct, and push the ENT pushbutton, or - Change the present position coordinates via the bezel pushbuttons and the data set knob. (iii) After the present coordinates are set, push the ENT pushbutton to send the coordinates to the IRU. (3) Wait until the alignment is completed. (Continued)

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 1 FAIL	EICAS	(Continued) (4) If the IRS 1 FAIL message disappears: (a) Turn the MSU 1 rotary switch to the NAV position. (i) The ALIGN and NAV RDY annunciators go out of the MSU. (ii) The flags ATT FAIL and HDG FAIL go out of PFD 1 and MFD 1, and a valid attitude and heading data are shown. (5) In case of IRS 1 FAIL message does not disappear: (a) Set the MSU 1 rotary switch to OFF. (b) On the overhead electrical panel, push the BACKUP pushbutton (the striped bar illuminates). (c) On the overhead circuit breaker panel, open IRS 1 circuit breaker. (d) On the overhead circuit breaker panel, open the following CBs: For single FMS installed: CDU, CMPTR, GPS. For dual FMS installed: CDU 1, CDU 2, FMC 1, FMC 2, GPS 1, and GPS 2. (e) Wait at least 3 seconds. (Continued)

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 1 FAIL	EICAS	(Continued) (f) On the overhead electrical panel, push the BACKUP pushbutton again (the striped bar goes off). (g) On the overhead circuit breaker panel, close IRS 1 circuit breaker. (h) On the overhead circuit breaker panel, close the following CBs: For single FMS installed: CDU, CMPTR, GPS. For dual FMS installed: CDU 1, CDU 2, FMC 1, FMC 2, GPS 1, and GPS 2. (i) Set the MSU 1 rotary switch to ALIGN. (j) Enter the correct present position. **NOTE:** The airplane must be kept stationary during the IRS 1 alignment. (k) Wait until the alignment is complete.

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 2 FAIL	EICAS	(1) Set the MSU 2 rotary switch to ALIGN. (2) Enter the correct present position. **NOTE: -** Operator can use either the FMS CDU or the bezel pushbuttons of the pilot's MFD to enter the present position. - The airplane must be kept stationary during the IRS 2 alignment. (a) Using the FMS CDU: (i) Push the NAV mode key and the NEXT function key (the NAV INDEX 2/2 page comes into view). (ii) Push the POS INIT (3L) left line select key (the POS INIT 1/1 page comes into view). (iii) Push the LOAD (2R) right line select key to update the FMS position (the FMS CDU show the LOADED POSITION coordinates). (b) Using the Bezel pushbuttons: (i) Make sure that the airplane is in the ground configuration. (Continued)

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 2 FAIL	EICAS	(Continued) (ii) On main menu of the pilot's MFD, use the bezel pushbuttons to select the PPOS INIT option (pilot's MFD shows the present position initialization menu). **NOTE:** From this menu operator can: - Confirm that the EFIS stored present position (PPOS) is correct, and push the ENT pushbutton, or - Change the present position coordinates via the bezel pushbuttons and the data set knob. (iii) After the present coordinates are set, push the ENT pushbutton to send the coordinates to the IRU. (3) Wait until the alignment is completed. (Continued)

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 2 FAIL	EICAS	(Continued) (4) If the IRS 2 FAIL message disappears: (a) Turn the MSU 2 rotary switch to the NAV position. (i) The ALIGN and NAV RDY annunciators go out of the MSU. (ii) The flags ATT FAIL and HDG FAIL go out of PFD 2 and MFD 2, and a valid attitude and heading data are shown. (5) In case of IRS 2 FAIL message does not disappear: (a) Set the MSU 2 rotary switch to OFF position. (b) On the overhead electrical panel, push the BACKUP pushbutton (the striped bar illuminates). (c) On the overhead circuit breaker panel, open IRS 2 circuit breaker. (d) On the overhead circuit breaker panel, open the following CBs: For single FMS installed: CDU, CMPTR, GPS. For dual FMS installed: CDU 1, CDU 2, FMC 1, FMC 2, GPS 1, and GPS 2. (e) Wait at least 3 seconds. (Continued)

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ATA	EICAS MESSAGE or CONDITION	LOCATION	PROCEDURE
34	IRS 2 FAIL	EICAS	(Continued) (f) On the overhead electrical panel, push the BACKUP pushbutton again (the striped bar goes off). (g) On the overhead circuit breaker panel, close IRS 2 circuit breaker. (h) On the overhead circuit breaker panel, close the following CBs: For single FMS installed: CDU, CMPTR, GPS. For dual FMS installed: CDU 1, CDU 2, FMC 1, FMC 2, GPS 1, and GPS 2. (i) Set the MSU 2 rotary switch to ALIGN position. (j) Enter the correct present position. **NOTE:** The airplane must be kept stationary during the IRS 2 alignment. (k) Wait until the alignment is complete.
27	RUD STOP DISAGREE	EICAS	Energize the airplane with the hydraulic power.

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PREVIOUS

LEGACY® 600

BY EMBRAER

AIRPLANE OPERATIONS MANUAL
VOLUME 2

EMBRAER S.A.

THIS PUBLICATION IS INCOMPLETE WITHOUT AIRPLANE OPERATIONS MANUAL AOM–135/1542 VOLUME 1

AOM–135/1542-07

NOVEMBER 30, 2001

REVISION 23 – MAY 18, 2021

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Airplane Operations Manual
AOM–135/1542

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Airplane Operations Manual
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2-LEP	38	07	*	REVISION 23	
2-LEP	39	07	*	REVISION 23	
2-LEP	40	07	*	REVISION 23	
2-LEP	41	07	*	REVISION 23	
2-LEP	42	07	*	REVISION 23	
2-LEP	43	07	*	REVISION 23	
2-LEP	44	07	*	REVISION 23	
2-LEP	45	07	*	REVISION 23	
2-LEP	46	07	*	REVISION 23	
2-LEP	47	07	*	REVISION 23	
2-LEP	48	07	*	REVISION 23	
2-LEP	49	07	*	REVISION 23	
2-LEP	50	07	*	REVISION 23	
2-TOC	1	01		REVISION 20	ALL
2-TOC	2	01		REVISION 20	
2-01-00	1	01		REVISION 22	ALL
2-01-00	2	01		REVISION 20	
2-01-00	3	01		REVISION 20	
2-01-00	4	01		REVISION 20	
2-01-00	5	01		REVISION 20	
2-01-00	6	01		REVISION 20	
2-01-05	1	01		REVISION 22	Legacy 600
2-01-05	2	01		REVISION 22	
2-01-05	3	01		REVISION 22	
2-01-05	4	01		REVISION 22	
2-01-10	1	01		REVISION 22	Legacy 600
2-01-10	2	01		REVISION 22	
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2-01-15	1	01		NOV 30, 2001	ALL

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2-02-00	3	01	REVISION 22	
2-02-00	4	01	REVISION 21	
2-02-05	1	01	NOV 30, 2001	ALL
2-02-05	2	01	NOV 30, 2001	
2-02-05	3	01	NOV 30, 2001	
2-02-05	4	01	NOV 30, 2001	
2-02-05	5	01	NOV 30, 2001	
2-02-05	6	01	NOV 30, 2001	
2-02-05	7	01	NOV 30, 2001	
2-02-05	8	01	NOV 30, 2001	
2-02-10	1	01	JUN 20, 2002	ALL
2-02-10	2	01	JUN 20, 2002	
2-02-15	1	01	REVISION 21	ALL
2-02-15	2	01	REVISION 21	
2-02-15	3	01	REVISION 21	
2-02-15	4	01	REVISION 21	
2-02-15	5	01	REVISION 21	
2-02-15	6	01	REVISION 21	
2-02-15	7	01	REVISION 21	
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2-02-15	10	01	REVISION 21	
2-02-15	11	01	REVISION 21	
2-02-15	12	01	REVISION 21	
2-02-15	13	01	REVISION 21	
2-02-15	14	01	REVISION 21	
2-02-15	15	01	REVISION 21	
2-02-15	16	01	REVISION 21	
2-02-15	17	01	REVISION 21	
2-02-15	18	01	REVISION 21	
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2-02-15	20	01	REVISION 21	
2-02-15	21	01	REVISION 21	

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2-02-20	1	01	REVISION 18	ALL
2-02-20	2	01	REVISION 18	
2-02-20	3	01	REVISION 18	
2-02-20	4	01	REVISION 18	
2-02-20	5	01	REVISION 18	
2-02-20	6	01	REVISION 18	
2-02-20	7	01	REVISION 18	
2-02-20	8	01	REVISION 18	
2-02-20	9	01	REVISION 18	
2-02-20	10	01	REVISION 18	
2-02-20	11	01	REVISION 18	
2-02-20	12	01	REVISION 18	
2-02-25	1	01	NOV 30, 2001	ALL
2-02-25	2	01	NOV 30, 2001	
2-02-25	3	01	REVISION 13	
2-02-25	4	01	REVISION 13	
2-02-30	1	01	REVISION 22	ALL
2-02-30	2	01	REVISION 22	
2-02-30	3	01	REVISION 22	
2-02-30	4	01	REVISION 22	
2-02-30	5	01	REVISION 22	
2-02-30	6	01	REVISION 22	
2-02-30	7	01	REVISION 22	
2-02-30	8	01	REVISION 22	
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2-02-30	11	01	REVISION 22	
2-02-30	12	01	REVISION 22	
2-02-30	13	01	REVISION 22	
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2-02-35	1	01	REVISION 21	ALL
2-02-35	2	01	REVISION 21	
2-02-35	3	01	REVISION 21	
2-02-35	4	01	REVISION 21	
2-02-35	5	01	REVISION 21	
2-02-35	6	01	REVISION 21	
2-02-35	7	01	REVISION 21	
2-02-35	8	01	REVISION 22	
2-02-35	9	01	REVISION 21	
2-02-35	10	01	REVISION 21	
2-02-35	11	01	REVISION 21	
2-02-35	12	01	REVISION 21	
2-02-35	13	01	REVISION 21	
2-02-35	14	01	REVISION 21	
2-02-35	15	01	REVISION 21	
2-02-35	16	01	REVISION 21	
2-02-40	1	01	REVISION 20	ALL
2-02-40	2	01	REVISION 20	
2-02-40	3	01	REVISION 20	
2-02-40	4	01	REVISION 20	
2-02-40	5	01	REVISION 20	
2-02-40	6	01	REVISION 20	
2-02-40	7	01	REVISION 20	
2-02-40	8	01	REVISION 20	
2-02-40	9	01	REVISION 20	
2-02-40	10	01	REVISION 20	
2-02-40	11	01	REVISION 20	
2-02-40	12	01	REVISION 20	
2-02-45	1	01	REVISION 11	ALL
2-02-45	2	01	REVISION 4	
2-02-45	3	01	ORIGINAL	
2-02-45	4	01	REVISION 11	
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2-02-45	6	01	REVISION 4	
2-02-45	7	01	NOV 30, 2001	
2-02-45	8	01	NOV 30, 2001	
2-02-50	1	01	REVISION 4	ALL
2-02-50	2	01	ORIGINAL	
2-02-50	3	01	REVISION 4	
2-02-50	4	01	ORIGINAL	
2-02-50	5	01	ORIGINAL	
2-02-50	6	01	REVISION 4	
2-02-50	7	01	REVISION 4	
2-02-50	8	01	REVISION 9	
2-02-50	9	01	ORIGINAL	
2-02-50	10	01	REVISION 4	
2-02-50	11	01	REVISION 4	
2-02-50	12	01	REVISION 4	
2-02-50	13	01	REVISION 4	
2-02-50	14	01	REVISION 4	
2-02-55	1	01	REVISION 4	ALL
2-02-55	2	01	ORIGINAL	
2-02-55	3	01	REVISION 4	
2-02-55	4	01	REVISION 4	
2-02-55	5	01	REVISION 4	
2-02-55	6	01	REVISION 13	
2-02-55	7	01	REVISION 13	
2-02-55	8	01	REVISION 13	
2-02-55	9	01	REVISION 13	
2-02-55	10	01	REVISION 13	
2-02-57	1	01	REVISION 4	ALL
2-02-57	2	01	REVISION 4	
2-02-57	3	01	REVISION 4	
2-02-57	4	01	REVISION 4	
2-02-57	5	01	REVISION 4	
2-02-57	6	01	REVISION 4	
2-02-57	7	01	REVISION 4	
2-02-57	8	01	REVISION 4	
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2-02-60	2	01			NOV 30, 2001	
2-02-65	1	01	*		REVISION 23	ALL
2-02-65	2	01			REVISION 22	
2-02-65	3	01	*		REVISION 23	
2-02-65	4	01	*		REVISION 23	
2-02-65	5	01			REVISION 22	
2-02-65	6	01			REVISION 22	
2-02-67	1	01			REVISION 22	ALL
2-02-67	2	01			REVISION 22	
2-02-67	3	01			REVISION 22	
2-02-67	4	01			REVISION 22	
2-02-67	5	01			REVISION 22	
2-02-67	6	01			REVISION 22	
2-02-70	1	01	*		REVISION 23	ALL
2-02-70	2	01	*		REVISION 23	
2-02-70	3	01	*		REVISION 23	
2-02-70	4	01	*		REVISION 23	
2-02-70	5	01	*		REVISION 23	
2-02-70	6	01	*		REVISION 23	
2-02-70	7	01	*		REVISION 23	
2-02-70	8	01	*		REVISION 23	
2-02-70	9	01	*		REVISION 23	
2-02-70	10	01	*		REVISION 23	
2-02-70	11	01	*		REVISION 23	
2-02-70	12	01	*		REVISION 23	
2-02-70	13	01	*		REVISION 23	
2-02-70	14	01	*		REVISION 23	
2-02-70	15	01	*		REVISION 23	
2-02-70	16	01	*		REVISION 23	
2-02-70	1	03	*	del	REVISION 23	Ovation
2-02-70	2	03	*	del	REVISION 23	
2-02-70	3	03	*	del	REVISION 23	
2-02-70	4	03	*	del	REVISION 23	
2-02-70	5	03	*	del	REVISION 23	

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2-02-70	6	03	*	del	REVISION 23	
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2-02-70	8	03	*	del	REVISION 23	
2-02-70	9	03	*	del	REVISION 23	
2-02-70	10	03	*	del	REVISION 23	
2-02-70	11	03	*	del	REVISION 23	
2-02-70	12	03	*	del	REVISION 23	
2-02-70	13	03	*	del	REVISION 23	
2-02-70	14	03	*	del	REVISION 23	
2-02-70	15	03	*	del	REVISION 23	
2-02-70	16	03	*	del	REVISION 23	
2-02-70	17	03	*	del	REVISION 23	
2-02-70	18	03	*	del	REVISION 23	
2-02-70	19	03	*	del	REVISION 23	
2-02-70	20	03	*	del	REVISION 23	
2-02-70	21	03	*	del	REVISION 23	
2-02-70	22	03	*	del	REVISION 23	
2-02-70	23	03	*	del	REVISION 23	
2-02-70	24	03	*	del	REVISION 23	
2-02-70	25	03	*	del	REVISION 23	
2-02-70	26	03	*	del	REVISION 23	
2-02-70	27	03	*	del	REVISION 23	
2-02-70	28	03	*	del	REVISION 23	
2-02-70	29	03	*	del	REVISION 23	
2-02-70	30	03	*	del	REVISION 23	
2-02-70	31	03	*	del	REVISION 23	
2-02-70	32	03	*	del	REVISION 23	
2-02-70	33	03	*	del	REVISION 23	
2-02-70	34	03	*	del	REVISION 23	
2-02-70	35	03	*	del	REVISION 23	
2-02-70	36	03	*	del	REVISION 23	
2-02-75	1	01			NOV 30, 2001	ALL
2-02-75	2	01			NOV 30, 2001	
2-02-80	1	01			REVISION 16	ALL

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2-02-80	4	01		REVISION 16	
2-02-85	1	01		REVISION 20	ALL
2-02-85	2	01		REVISION 20	
2-02-85	3	01		REVISION 20	
2-02-85	4	01		REVISION 20	
2-02-85	5	01		REVISION 20	
2-02-85	6	01		REVISION 20	
2-02-85	7	01	*	REVISION 23	
2-02-85	8	01		REVISION 20	
2-02-85	9	01		REVISION 20	
2-02-85	10	01		REVISION 20	
2-02-85	11	01		REVISION 22	
2-02-85	12	01		REVISION 22	
2-03-01	1	01		NOV 30, 2001	ALL
2-03-01	2	01		NOV 30, 2001	
2-04-00	1	01	*	REVISION 23	ALL
2-04-00	2	01	*	REVISION 23	
2-04-05	1	01		REVISION 22	ALL
2-04-05	2	01	*	REVISION 23	
2-04-05	3	01	*	REVISION 23	
2-04-05	4	01		REVISION 22	
2-04-05	5	01		REVISION 22	
2-04-05	6	01		REVISION 22	
2-04-05	7	01	*	REVISION 23	
2-04-05	8	01		REVISION 22	
2-04-05	9	01		REVISION 22	
2-04-05	10	01		REVISION 22	
2-04-05	11	01		REVISION 22	
2-04-05	12	01		REVISION 22	
2-04-05	13	01	*	REVISION 23	
2-04-05	14	01	*	REVISION 23	
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2-04-05	22	01		REVISION 22	
2-04-05	23	01		REVISION 22	
2-04-05	24	01		REVISION 22	
2-04-05	25	01		REVISION 22	
2-04-05	26	01		REVISION 22	
2-04-05	27	01		REVISION 22	
2-04-05	28	01		REVISION 22	
2-04-05	29	01		REVISION 22	
2-04-05	30	01		REVISION 22	
2-04-05	31	01		REVISION 22	
2-04-05	32	01		REVISION 22	
2-04-05	33	01		REVISION 22	
2-04-05	34	01		REVISION 22	
2-04-05	35	01		REVISION 22	
2-04-05	36	01		REVISION 22	
2-04-05	37	01		REVISION 22	
2-04-05	38	01		REVISION 22	
2-04-05	39	01		REVISION 22	
2-04-05	40	01		REVISION 22	
2-04-05	41	01		REVISION 22	
2-04-05	42	01		REVISION 22	
2-04-05	43	01		REVISION 22	
2-04-05	44	01		REVISION 22	
2-04-05	45	01		REVISION 22	
2-04-05	46	01		REVISION 22	
2-04-05	47	01	*	REVISION 23	
2-04-05	48	01		REVISION 22	
2-04-05	49	01		REVISION 22	
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2-04-05	56	01		REVISION 22	
2-04-05	57	01		REVISION 22	
2-04-05	58	01		REVISION 22	
2-04-05	59	01	*	REVISION 23	
2-04-05	60	01	*	REVISION 23	
2-04-05	61	01	*	REVISION 23	
2-04-05	62	01		REVISION 22	
2-04-05	63	01	*	REVISION 23	
2-04-05	64	01		REVISION 22	
2-04-05	65	01		REVISION 22	
2-04-05	66	01		REVISION 22	
2-04-05	67	01		REVISION 22	
2-04-05	68	01		REVISION 22	
2-04-05	69	01		REVISION 22	
2-04-05	70	01		REVISION 22	
2-04-05	71	01		REVISION 22	
2-04-05	72	01		REVISION 22	
2-04-10	1	01		REVISION 22	ALL
2-04-10	2	01		REVISION 22	
2-04-10	3	01		REVISION 22	
2-04-10	4	01		REVISION 22	
2-04-10	5	01		REVISION 22	
2-04-10	6	01		REVISION 22	
2-04-10	7	01		REVISION 22	
2-04-10	8	01		REVISION 22	
2-04-10	9	01		REVISION 22	
2-04-10	10	01		REVISION 22	
2-04-10	11	01		REVISION 22	
2-04-10	12	01		REVISION 22	
2-04-10	13	01		REVISION 22	
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2-04-10	17	01		REVISION 22	
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2-04-10	19	01	*	REVISION 23	
2-04-10	20	01		REVISION 22	
2-04-10	21	01		REVISION 22	
2-04-10	22	01		REVISION 22	
2-04-10	23	01		REVISION 22	
2-04-10	24	01		REVISION 22	
2-04-13	1	01	*	REVISION 23	ALL
2-04-13	2	01	*	REVISION 23	
2-04-13	3	01		REVISION 20	
2-04-13	4	01		REVISION 22	
2-04-13	5	01		REVISION 20	
2-04-13	6	01		REVISION 20	
2-04-13	7	01		REVISION 20	
2-04-13	8	01		REVISION 22	
2-04-13	9	01		REVISION 20	
2-04-13	10	01		REVISION 22	
2-04-13	11	01		REVISION 22	
2-04-13	12	01		REVISION 20	
2-04-13	13	01		REVISION 20	
2-04-13	14	01		REVISION 22	
2-04-13	15	01		REVISION 22	
2-04-13	16	01		REVISION 20	
2-04-13	17	01		REVISION 22	
2-04-13	18	01		REVISION 20	
2-04-13	19	01		REVISION 20	
2-04-13	20	01		REVISION 20	
2-04-13	21	01		REVISION 22	
2-04-13	22	01		REVISION 20	
2-04-13	23	01		REVISION 20	
2-04-13	24	01		REVISION 22	
2-04-15	1	01		REVISION 20	ALL
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2-04-15	5	01		REVISION 22	
2-04-15	6	01		REVISION 20	
2-04-20	1	01		REVISION 22	ALL
2-04-20	2	01		REVISION 22	
2-04-20	3	01	*	REVISION 23	
2-04-20	4	01		REVISION 22	
2-04-25	1	01		REVISION 22	ALL
2-04-25	2	01	*	REVISION 23	
2-04-25	3	01	*	REVISION 23	
2-04-25	4	01		REVISION 22	
2-04-25	5	01		REVISION 22	
2-04-25	6	01	*	REVISION 23	
2-04-25	7	01	*	REVISION 23	
2-04-25	8	01		REVISION 22	
2-04-25	9	01		REVISION 22	
2-04-25	10	01		REVISION 22	
2-04-30	1	01		REVISION 20	ALL
2-04-30	2	01		REVISION 20	
2-04-30	3	01		REVISION 20	
2-04-30	4	01		REVISION 20	
2-04-30	5	01		REVISION 20	
2-04-30	6	01		REVISION 20	
2-04-30	7	01		REVISION 20	
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2-04-30	9	01		REVISION 20	
2-04-30	10	01		REVISION 20	
2-04-30	11	01		REVISION 20	
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2-04-30	25	01	*	REVISION 23	
2-04-30	26	01	*	REVISION 23	
2-04-30	27	01	*	REVISION 23	
2-04-30	28	01	*	REVISION 23	
2-04-30	29	01	*	REVISION 23	
2-04-30	30	01	*	REVISION 23	
2-04-30	31	01	*	REVISION 23	
2-04-30	32	01	*	REVISION 23	
2-04-30	33	01	*	REVISION 23	
2-04-30	34	01	*	REVISION 23	
2-04-30	35	01	*	REVISION 23	
2-04-30	36	01	*	REVISION 23	
2-04-30	37	01	*	REVISION 23	
2-04-30	38	01	*	REVISION 23	
2-04-30	39	01	*	REVISION 23	
2-04-30	40	01	*	REVISION 23	
2-04-30	41	01	*	REVISION 23	
2-04-30	42	01	*	REVISION 23	
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2-04-35	6	01		REVISION 22	
2-04-35	7	01		REVISION 22	
2-04-35	8	01		REVISION 22	
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2-04-40	7	01	*	REVISION 23	
2-04-40	8	01	*	REVISION 23	
2-04-40	9	01	*	REVISION 23	
2-04-40	10	01	*	REVISION 23	
2-04-40	11	01	*	REVISION 23	
2-04-40	12	01	*	REVISION 23	
2-04-40	13	01	*	REVISION 23	
2-04-40	14	01	*	REVISION 23	
2-04-40	15	01	*	REVISION 23	
2-04-40	16	01	*	REVISION 23	
2-04-40	17	01	*	REVISION 23	
2-04-40	18	01	*	REVISION 23	
2-04-40	19	01	*	REVISION 23	
2-04-40	20	01	*	REVISION 23	
2-04-40	21	01	*	REVISION 23	
2-04-40	22	01	*	REVISION 23	
2-04-40	23	01	*	REVISION 23	
2-04-40	24	01	*	REVISION 23	
2-04-40	25	01	*	REVISION 23	
2-04-40	26	01	*	REVISION 23	
2-04-45	1	01	*	REVISION 23	ALL
2-04-45	2	01	*	REVISION 23	
2-04-45	3	01	*	REVISION 23	
2-04-45	4	01	*	REVISION 23	
2-04-45	5	01	*	REVISION 23	
2-04-45	6	01	*	REVISION 23	
2-04-45	7	01	*	REVISION 23	
2-04-45	8	01	*	REVISION 23	
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2-04-45	15	01	*	REVISION 23	
2-04-45	16	01	*	REVISION 23	
2-04-45	17	01	*	REVISION 23	
2-04-45	18	01	*	REVISION 23	
2-04-45	19	01	*	REVISION 23	
2-04-45	20	01	*	REVISION 23	
2-04-45	21	01	*	REVISION 23	
2-04-45	22	01	*	REVISION 23	
2-04-45	23	01	*	REVISION 23	
2-04-45	24	01	*	REVISION 23	
2-04-45	25	01	*	REVISION 23	
2-04-45	26	01	*	REVISION 23	
2-04-45	27	01	*	REVISION 23	
2-04-45	28	01	*	REVISION 23	
2-04-55	1	01	*	REVISION 23	ALL
2-04-55	2	01	*	REVISION 23	
2-04-55	3	01	*	REVISION 23	
2-04-55	4	01	*	REVISION 23	
2-04-55	5	01	*	REVISION 23	
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2-04-55	7	01	*	REVISION 23	
2-04-55	8	01	*	REVISION 23	
2-04-55	9	01	*	REVISION 23	
2-04-55	10	01	*	REVISION 23	
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2-04-55	19	01	*	REVISION 23	
2-04-55	20	01	*	REVISION 23	
2-04-55	21	01	*	REVISION 23	
2-04-55	22	01	*	REVISION 23	
2-04-55	23	01	*	REVISION 23	
2-04-55	24	01	*	REVISION 23	
2-04-55	25	01	*	REVISION 23	
2-04-55	26	01	*	REVISION 23	
2-04-55	27	01	*	REVISION 23	
2-04-55	28	01	*	REVISION 23	
2-04-55	29	01	*	REVISION 23	
2-04-55	30	01	*	REVISION 23	
2-04-55	31	01	*	REVISION 23	
2-04-55	32	01	*	REVISION 23	
2-04-55	33	01	*	REVISION 23	
2-04-55	34	01	*	REVISION 23	
2-04-55	35	01	*	REVISION 23	
2-04-55	36	01	*	REVISION 23	
2-04-55	37	01	*	REVISION 23	
2-04-55	38	01	*	REVISION 23	
2-04-55	39	01	*	REVISION 23	
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2-04-55	41	01	*	REVISION 23	
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2-04-55	43	01	*	REVISION 23	
2-04-55	44	01	*	REVISION 23	
2-04-55	45	01	*	REVISION 23	
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2-04-55	53	01	*	REVISION 23	
2-04-55	54	01	*	REVISION 23	
2-04-55	55	01	*	REVISION 23	
2-04-55	56	01	*	REVISION 23	
2-05-00	1	01		REVISION 22	Legacy 600
2-05-00	2	01		REVISION 22	
2-05-05	1	01		REVISION 22	ALL
2-05-05	2	01		REVISION 22	
2-05-05	3	01		REVISION 22	
2-05-05	4	01		REVISION 22	
2-05-05	5	01	*	REVISION 23	
2-05-05	6	01	*	REVISION 23	
2-05-05	7	01	*	REVISION 23	
2-05-05	8	01	*	REVISION 23	
2-05-05	9	01	*	REVISION 23	
2-05-05	10	01	*	REVISION 23	
2-05-05	11	01		REVISION 22	
2-05-05	12	01		REVISION 22	
2-05-05	13	01		REVISION 22	
2-05-05	14	01	*	REVISION 23	
2-05-05	15	01		REVISION 22	
2-05-05	16	01		REVISION 22	
2-05-10	1	01	*	REVISION 23	ALL
2-05-10	2	01	*	REVISION 23	
2-05-10	3	01	*	REVISION 23	
2-05-10	4	01	*	REVISION 23	
2-05-10	5	01	*	REVISION 23	
2-05-10	6	01	*	REVISION 23	
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2-05-10	13	01	*	REVISION 23	
2-05-10	14	01	*	REVISION 23	
2-05-10	15	01	*	REVISION 23	
2-05-10	16	01	*	REVISION 23	
2-05-10	17	01	*	REVISION 23	
2-05-10	18	01	*	REVISION 23	
2-05-10	19	01	*	REVISION 23	
2-05-10	20	01	*	REVISION 23	
2-05-10	21	01	*	REVISION 23	
2-05-10	22	01	*	REVISION 23	
2-05-10	23	01	*	REVISION 23	
2-05-10	24	01	*	REVISION 23	
2-05-10	25	01	*	REVISION 23	
2-05-10	26	01	*	REVISION 23	
2-05-10	27	01	*	REVISION 23	
2-05-10	28	01	*	REVISION 23	
2-05-15	1	01	*	REVISION 23	ALL
2-05-15	2	01	*	REVISION 23	
2-05-15	3	01	*	REVISION 23	
2-05-15	4	01	*	REVISION 23	
2-05-15	5	01	*	REVISION 23	
2-05-15	6	01	*	REVISION 23	
2-05-15	7	01	*	REVISION 23	
2-05-15	8	01	*	REVISION 23	
2-05-15	9	01	*	REVISION 23	
2-05-15	10	01	*	REVISION 23	
2-05-15	11	01	*	REVISION 23	
2-05-15	12	01	*	REVISION 23	
2-05-20	1	01	*	REVISION 23	Legacy 600
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2-05-20	8	01	*		REVISION 23	
2-05-20	9	01	*		REVISION 23	
2-05-20	10	01	*		REVISION 23	
2-05-20	11	01	*		REVISION 23	
2-05-20	12	01	*		REVISION 23	
2-05-20	13	01	*		REVISION 23	
2-05-20	14	01	*		REVISION 23	
2-05-20	15	01	*		REVISION 23	
2-05-20	16	01	*		REVISION 23	
2-05-20	17	01	*		REVISION 23	
2-05-20	18	01	*		REVISION 23	
2-05-20	19	01	*	new	REVISION 23	
2-05-20	20	01	*	new	REVISION 23	
2-06-00	1	01	*		REVISION 23	ALL
2-06-00	2	01	*		REVISION 23	
2-06-05	1	01	*		REVISION 23	ALL
2-06-05	2	01	*		REVISION 23	
2-06-05	3	01	*		REVISION 23	
2-06-05	4	01	*		REVISION 23	
2-06-05	5	01	*		REVISION 23	
2-06-05	6	01	*		REVISION 23	
2-06-05	7	01	*		REVISION 23	
2-06-05	8	01	*		REVISION 23	
2-06-10	1	01	*		REVISION 23	ALL
2-06-10	2	01	*		REVISION 23	
2-06-10	3	01	*		REVISION 23	
2-06-10	4	01	*		REVISION 23	
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2-06-15	3	01	*	REVISION 23	
2-06-15	4	01	*	REVISION 23	
2-06-15	5	01	*	REVISION 23	
2-06-15	6	01	*	REVISION 23	
2-06-20	1	01	*	REVISION 23	ALL
2-06-20	2	01	*	REVISION 23	
2-06-20	3	01	*	REVISION 23	
2-06-20	4	01	*	REVISION 23	
2-06-20	5	01	*	REVISION 23	
2-06-20	6	01	*	REVISION 23	
2-07-00	1	01		REVISION 22	ALL
2-07-00	2	01		REVISION 22	
2-07-05	1	01	*	REVISION 23	ALL
2-07-05	2	01		REVISION 22	
2-07-10	1	01		REVISION 22	ALL
2-07-10	2	01		REVISION 22	
2-07-10	3	01		REVISION 22	
2-07-10	4	01		REVISION 22	
2-07-10	5	01	*	REVISION 23	
2-07-10	6	01	*	REVISION 23	
2-07-10	7	01	*	REVISION 23	
2-07-10	8	01	*	REVISION 23	
2-07-10	9	01		REVISION 22	
2-07-10	10	01		REVISION 22	
2-07-15	1	01		REVISION 7	ALL
2-07-15	2	01		REVISION 1	
2-07-15	3	01		JUN 20, 2002	
2-07-15	4	01		JAN 17, 2003	
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2-07-20	7	01	*	REVISION 23	
2-07-20	8	01	*	REVISION 23	
2-08-00	1	01		REVISION 21	Legacy 600
2-08-00	2	01		REVISION 21	
2-08-05	1	01		REVISION 21	Legacy 600
2-08-05	2	01		REVISION 21	
2-08-05	3	01		REVISION 21	
2-08-05	4	01		REVISION 21	
2-08-05	5	01		REVISION 21	
2-08-05	6	01		REVISION 21	
2-08-05	7	01		REVISION 21	
2-08-05	8	01		REVISION 21	
2-08-05	9	01		REVISION 21	
2-08-05	10	01		REVISION 21	
2-08-05	11	01	*	REVISION 23	
2-08-05	12	01		REVISION 21	
2-08-05	13	01		REVISION 21	
2-08-05	14	01		REVISION 21	
2-08-05	15	01		REVISION 21	
2-08-05	16	01		REVISION 21	
2-08-05	17	01		REVISION 21	
2-08-05	18	01		REVISION 21	
2-08-05	19	01		REVISION 21	
2-08-05	20	01		REVISION 21	
2-08-05	21	01		REVISION 21	
2-08-05	22	01		REVISION 21	
2-08-05	23	01	*	REVISION 23	
2-08-05	24	01	*	REVISION 23	
2-08-05	25	01		REVISION 21	
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2-08-10	2	01		REVISION 19	
2-08-10	3	01		REVISION 19	
2-08-10	4	01		REVISION 19	
2-08-10	5	01		REVISION 19	
2-08-10	6	01		REVISION 19	
2-08-10	7	01		REVISION 19	
2-08-10	8	01		REVISION 19	
2-08-15	1	01		NOV 30, 2001	Legacy 600
2-08-15	2	01		NOV 30, 2001	
2-08-15	3	01		NOV 30, 2001	
2-08-15	4	01		NOV 30, 2001	
2-08-15	5	01		NOV 30, 2001	
2-08-15	6	01		NOV 30, 2001	
2-08-15	7	01		NOV 30, 2001	
2-08-15	8	01		NOV 30, 2001	
2-09-00	1	01		REVISION 20	ALL
2-09-00	2	01		REVISION 20	
2-09-05	1	01		REVISION 20	ALL
2-09-05	2	01		REVISION 20	
2-09-05	3	01		REVISION 20	
2-09-05	4	01		REVISION 20	
2-09-05	5	01		REVISION 20	
2-09-05	6	01		REVISION 20	
2-09-05	7	01		REVISION 20	
2-09-05	8	01		REVISION 20	
2-09-05	9	01	*	REVISION 23	
2-09-05	10	01	*	REVISION 23	
2-10-00	1	01		REVISION 20	ALL
2-10-00	2	01		REVISION 22	
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2-10-10	1	01	JAN 17, 2003	ALL
2-10-10	2	01	JAN 17, 2003	
2-10-10	3	01	SEP 30, 2002	
2-10-10	4	01	SEP 30, 2002	
2-10-15	1	01	REVISION 16	ALL
2-10-15	2	01	REVISION 16	
2-10-15	3	01	REVISION 16	
2-10-15	4	01	REVISION 16	
2-10-20	1	01	JAN 17, 2003	ALL
2-10-20	2	01	SEP 30, 2002	
2-10-25	1	01	JAN 17, 2003	ALL
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2-10-30	1	01	REVISION 16	ALL
2-10-30	2	01	REVISION 15	
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2-10-30	4	01	REVISION 15	
2-10-30	5	01	REVISION 15	
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2-10-35	1	01	REVISION 16	ALL
2-10-35	2	01	REVISION 16	
2-10-40	1	01	REVISION 22	ALL
2-10-40	2	01	REVISION 22	
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2-10-50	14	01		REVISION 20	
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2-10-50	20	01		REVISION 20	
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2-10-70	2	01		SEP 30, 2002	
2-10-70	3	01		SEP 30, 2002	
2-10-70	4	01		SEP 30, 2002	
2-10-70	5	01		SEP 30, 2002	
2-10-70	6	01		SEP 30, 2002	
2-11-00	1	01		JUN 20, 2002	ALL
2-11-00	2	01		JUN 20, 2002	
2-11-05	1	01	*	REVISION 23	ALL
2-11-05	2	01	*	REVISION 23	
2-11-05	3	01	*	REVISION 23	
2-11-05	4	01	*	REVISION 23	
2-11-05	5	01	*	REVISION 23	
2-11-05	6	01	*	REVISION 23	
2-11-05	7	01	*	REVISION 23	
2-11-05	8	01	*	REVISION 23	
2-12-00	1	01		REVISION 20	ALL
2-12-00	2	01		REVISION 20	
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2-12-15	1	01		REVISION 1	ALL
2-12-15	2	01		REVISION 14	
2-12-15	3	01		NOV 30, 2001	
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2-12-15	5	01		REVISION 14	
2-12-15	6	01		ORIGINAL	
2-12-15	7	01		NOV 30, 2001	
2-12-15	8	01		NOV 30, 2001	
2-13-00	1	01	*	REVISION 23	ALL
2-13-00	2	01		REVISION 20	
2-13-00	3	01		REVISION 21	
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2-13-05	1	01		NOV 30, 2001	ALL
2-13-05	2	01		NOV 30, 2001	
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2-13-10	1	01	*	REVISION 23	ALL
2-13-10	2	01	*	REVISION 23	
2-13-10	3	01	*	REVISION 23	
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2-13-10	13	01	*	REVISION 23	
2-13-10	14	01	*	REVISION 23	
2-13-15	1	01	*	REVISION 23	ALL
2-13-15	2	01	*	REVISION 23	
2-13-15	3	01	*	REVISION 23	
2-13-15	4	01	*	REVISION 23	
2-13-15	5	01	*	REVISION 23	
2-13-15	6	01	*	REVISION 23	
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2-13-15	8	01	*	REVISION 23	
2-13-15	9	01	*	REVISION 23	
2-13-15	10	01	*	REVISION 23	
2-13-15	11	01	*	REVISION 23	
2-13-15	12	01	*	REVISION 23	
2-13-20	1	01		REVISION 20	ALL
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2-13-35	1	01		REVISION 21	ALL
2-13-35	2	01		REVISION 21	
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2-14-10	16	01		REVISION 20	
2-14-10	17	01		REVISION 20	
2-14-10	18	01		REVISION 20	
2-14-10	19	01		REVISION 20	
2-14-10	20	01		REVISION 20	
2-14-15	1	01	*	REVISION 23	ALL
2-14-15	2	01	*	REVISION 23	
2-14-15	3	01	*	REVISION 23	
2-14-15	4	01	*	REVISION 23	
2-14-15	5	01	*	REVISION 23	
2-14-15	6	01	*	REVISION 23	
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2-14-20	1	01		NOV 30, 2001	ALL
2-14-20	2	01		NOV 30, 2001	
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2-15-10	7	01		REVISION 20	
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2-16-00	1	01		REVISION 22	ALL
2-16-00	2	01		REVISION 20	
2-16-05	1	01		NOV 30, 2001	ALL
2-16-05	2	01		NOV 30, 2001	
2-16-10	1	01		REVISION 22	ALL
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2-16-15	1	01		REVISION 20	ALL
2-16-15	2	01		REVISION 20	
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2-17-10	5	01	REVISION 8	
2-17-10	6	01	ORIGINAL	
2-17-10	7	01	NOV 30, 2001	
2-17-10	8	01	NOV 30, 2001	
2-17-15	1	01	REVISION 8	ALL
2-17-15	2	01	REVISION 8	
2-17-15	3	01	REVISION 8	
2-17-15	4	01	REVISION 8	
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2-17-15	14	01	REVISION 8	
2-17-15	15	01	REVISION 8	
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2-17-20	1	01	REVISION 20	ALL
2-17-20	2	01	REVISION 20	
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2-17-30	6	01		REVISION 19	
2-17-35	1	01		REVISION 12	ALL
2-17-35	2	01		REVISION 1	
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2-17-35	4	01		REVISION 12	
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2-17-40	2	01		REVISION 21	
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2-17-40	4	01		REVISION 21	
2-17-40	5	01		REVISION 21	
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2-17-40	33	01		REVISION 22	
2-17-40	34	01		REVISION 22	
2-18-00	1	01	*	REVISION 23	IRS
2-18-00	2	01	*	REVISION 23	
2-18-00	3	01	*	REVISION 23	
2-18-00	4	01	*	REVISION 23	
2-18-01	1	01		REVISION 22	IRS
2-18-01	2	01		REVISION 22	
2-18-05	1	01		NOV 30, 2001	ALL
2-18-05	2	01		NOV 30, 2001	
2-18-07	1	01		NOV 30, 2001	ALL
2-18-07	2	01		NOV 30, 2001	
2-18-09	1	01		NOV 30, 2001	ALL
2-18-09	2	01		NOV 30, 2001	
2-18-11	1	01		REVISION 22	RMU + KHF-1050
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2-18-11	11	01		REVISION 22	
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2-18-11	18	01		REVISION 22	
2-18-11	19	01		REVISION 22	
2-18-11	20	01		REVISION 22	
2-18-11	21	01		REVISION 22	
2-18-11	22	01		REVISION 22	
2-18-11	23	01		REVISION 22	
2-18-11	24	01		REVISION 22	
2-18-11	25	01		REVISION 22	
2-18-11	26	01		REVISION 22	
2-18-11	27	01		REVISION 22	
2-18-11	28	01		REVISION 22	
2-18-11	29	01		REVISION 22	
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2-18-11	32	01		REVISION 22	
2-18-11	33	01		REVISION 22	
2-18-11	34	01		REVISION 22	
2-18-11	35	01		REVISION 22	
2-18-11	36	01		REVISION 22	
2-18-11	37	01	*	REVISION 23	
2-18-11	38	01		REVISION 22	
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2-18-11	45	01		REVISION 22	
2-18-11	46	01		REVISION 22	
2-18-11	47	01		REVISION 22	
2-18-11	48	01		REVISION 22	
2-18-11	49	01		REVISION 22	
2-18-11	50	01		REVISION 22	
2-18-11	51	01		REVISION 22	
2-18-11	52	01		REVISION 22	
2-18-13	1	01		NOV 30, 2001	ALL
2-18-13	2	01		NOV 30, 2001	
2-18-13	3	01		NOV 30, 2001	
2-18-13	4	01		NOV 30, 2001	
2-18-13	5	01		NOV 30, 2001	
2-18-13	6	01		NOV 30, 2001	
2-18-15	1	01	*	REVISION 23	ALL
2-18-15	2	01	*	REVISION 23	
2-18-15	3	01	*	REVISION 23	
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2-18-15	5	01	*	REVISION 23	
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2-18-20	1	01		REVISION 6	ALL
2-18-20	2	01		REVISION 6	
2-18-20	2A	01		REVISION 6	
2-18-20	2B	01		REVISION 6	
2-18-20	3	01		NOV 30, 2001	
2-18-20	4	01		NOV 30, 2001	
2-18-20	5	01		NOV 30, 2001	
2-18-20	6	01		NOV 30, 2001	
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2-18-21	4	01	REVISION 15	
2-18-21	5	01	REVISION 15	
2-18-21	6	01	REVISION 15	
2-18-21	7	01	REVISION 15	
2-18-21	8	01	REVISION 15	
2-18-21	9	01	REVISION 15	
2-18-21	10	01	REVISION 15	
2-18-21	11	01	REVISION 15	
2-18-21	12	01	REVISION 15	
2-18-21	13	01	REVISION 15	
2-18-21	14	01	REVISION 15	
2-18-21	15	01	REVISION 15	
2-18-21	16	01	REVISION 15	
2-18-21	17	01	REVISION 15	
2-18-21	18	01	REVISION 15	
2-18-21	19	01	REVISION 15	
2-18-21	20	01	REVISION 15	
2-18-21	21	01	REVISION 15	
2-18-21	22	01	REVISION 15	
2-18-22	1	02	JUN 20, 2002	ALL
2-18-22	2	02	NOV 30, 2001	
2-18-22	3	02	NOV 30, 2001	
2-18-22	4	02	NOV 30, 2001	
2-18-22	5	02	NOV 30, 2001	
2-18-22	6	02	NOV 30, 2001	
2-18-22	7	02	JUN 20, 2002	
2-18-22	8	02	JUN 20, 2002	
2-18-22	9	02	JUN 20, 2002	
2-18-22	10	02	JUN 20, 2002	
2-18-22	11	02	JUN 20, 2002	
2-18-22	12	02	JUN 20, 2002	
2-18-23	1	01	NOV 30, 2001	ALL

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2-18-24	2	01	*	REVISION 23	
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2-18-24	4	01	*	REVISION 23	
2-18-24	5	01	*	REVISION 23	
2-18-24	6	01	*	REVISION 23	
2-18-24	7	01	*	REVISION 23	
2-18-24	8	01	*	REVISION 23	
2-18-25	1	01	*	REVISION 23	ALL
2-18-25	2	01	*	REVISION 23	
2-18-25	3	01	*	REVISION 23	
2-18-25	4	01	*	REVISION 23	
2-18-27	1	01		REVISION 22	ALL
2-18-27	2	01		REVISION 22	
2-18-27	3	01	*	REVISION 23	
2-18-27	4	01	*	REVISION 23	
2-18-27	5	01		REVISION 22	
2-18-27	6	01		REVISION 22	
2-18-28	1	01	*	REVISION 23	ALL
2-18-28	2	01	*	REVISION 23	
2-18-28	3	01	*	REVISION 23	
2-18-28	4	01	*	REVISION 23	
2-18-28	5	01	*	REVISION 23	
2-18-28	6	01	*	REVISION 23	
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2-18-29	1	01	*		REVISION 23	ALL
2-18-29	2	01	*		REVISION 23	
2-18-29	3	01	*		REVISION 23	
2-18-29	4	01	*		REVISION 23	
2-18-29	5	01	*		REVISION 23	
2-18-29	6	01	*		REVISION 23	
2-18-29	7	01	*		REVISION 23	
2-18-29	8	01	*		REVISION 23	
2-18-29	9	01	*		REVISION 23	
2-18-29	10	01	*		REVISION 23	
2-18-29	11	01	*		REVISION 23	
2-18-29	12	01	*		REVISION 23	
2-18-29	13	01	*	del	REVISION 23	
2-18-29	14	01	*	del	REVISION 23	
2-18-30	1	01			REVISION 20	ALL
2-18-30	2	01			REVISION 20	
2-18-30	3	01			REVISION 20	
2-18-30	4	01			REVISION 22	
2-18-30	5	01			REVISION 20	
2-18-30	6	01			REVISION 20	
2-18-30	7	01			REVISION 20	
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2-18-30	9	01			REVISION 20	
2-18-30	10	01			REVISION 20	
2-18-30	11	01			REVISION 20	
2-18-30	12	01			REVISION 20	
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2-18-30	22	01	REVISION 20	
2-18-30	23	01	REVISION 20	
2-18-30	24	01	REVISION 20	
2-18-35	1	01	REVISION 22	FMS FMZ2000 Honeywell
2-18-35	2	01	REVISION 20	
2-18-35	3	01	REVISION 20	
2-18-35	4	01	REVISION 20	
2-18-35	5	01	REVISION 20	
2-18-35	6	01	REVISION 20	
2-18-35	7	01	REVISION 20	
2-18-35	8	01	REVISION 20	
2-18-35	9	01	REVISION 20	
2-18-35	10	01	REVISION 20	
2-18-35	11	01	REVISION 20	
2-18-35	12	01	REVISION 20	
2-18-35	13	01	REVISION 20	
2-18-35	14	01	REVISION 20	
2-18-35	15	01	REVISION 20	
2-18-35	16	01	REVISION 20	
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2-18-35	19	01	REVISION 20	
2-18-35	20	01	REVISION 20	
2-18-35	1	02	REVISION 22	FMS FMZ2010 Honeywell
2-18-35	2	02	REVISION 22	
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2-18-35	4	02	REVISION 20	
2-18-35	5	02	REVISION 20	
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2-18-35	14	02		REVISION 20	
2-18-35	15	02		REVISION 20	
2-18-35	16	02		REVISION 20	
2-18-35	17	02		REVISION 20	
2-18-35	18	02		REVISION 20	
2-18-35	19	02		REVISION 20	
2-18-35	20	02		REVISION 20	
2-18-40	1	01		REVISION 22	ALL
2-18-40	2	01	*	REVISION 23	
2-18-40	3	01	*	REVISION 23	
2-18-40	4	01	*	REVISION 23	
2-18-40	5	01		REVISION 22	
2-18-40	6	01		REVISION 22	
2-18-40	7	01		REVISION 22	
2-18-40	8	01		REVISION 22	
2-18-40	9	01		REVISION 22	
2-18-40	10	01		REVISION 22	
2-18-40	11	01		REVISION 22	
2-18-40	12	01		REVISION 22	
2-18-40	13	01		REVISION 22	
2-18-40	14	01		REVISION 22	
2-18-40	15	01		REVISION 22	
2-18-40	16	01		REVISION 22	
2-18-40	17	01		REVISION 22	
2-18-40	18	01		REVISION 22	
2-18-40	19	01		REVISION 22	
2-18-40	20	01		REVISION 22	
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2-18-45	9	01	REVISION 18	
2-18-45	10	01	REVISION 18	
2-18-45	11	01	REVISION 18	
2-18-45	12	01	REVISION 18	
2-18-45	13	01	REVISION 18	
2-18-45	14	01	REVISION 18	
2-18-45	15	01	REVISION 18	
2-18-45	16	01	REVISION 18	
2-18-45	17	01	REVISION 18	
2-18-45	18	01	REVISION 18	
2-18-45	19	01	REVISION 18	
2-18-45	20	01	REVISION 18	
2-18-45	21	01	REVISION 18	
2-18-45	22	01	REVISION 18	
2-18-45	23	01	REVISION 18	
2-18-45	24	01	REVISION 18	
2-18-45	25	01	REVISION 18	
2-18-45	26	01	REVISION 18	
2-18-45	27	01	REVISION 18	
2-18-45	28	01	REVISION 18	
2-18-50	1	01	NOV 30, 2001	ALL
2-18-50	2	01	NOV 30, 2001	
2-18-50	3	01	NOV 30, 2001	
2-18-50	4	01	NOV 30, 2001	
2-18-50	5	01	NOV 30, 2001	
2-18-50	6	01	NOV 30, 2001	
2-18-50	7	01	NOV 30, 2001	
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2-18-55	9	01		REVISION 22	
2-18-55	10	01		REVISION 22	
2-18-55	11	01		REVISION 22	
2-18-55	12	01		REVISION 22	
2-18-55	13	01	*	REVISION 23	
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2-18-55	16	01		REVISION 22	
2-18-55	17	01		REVISION 22	
2-18-55	18	01		REVISION 22	
2-18-55	19	01		REVISION 22	
2-18-55	20	01		REVISION 22	
2-18-55	21	01		REVISION 22	
2-18-55	22	01		REVISION 22	
2-18-55	23	01		REVISION 22	
2-18-55	24	01		REVISION 22	
2-18-55	25	01		REVISION 22	
2-18-55	26	01		REVISION 22	
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2-18-55	30	01		REVISION 22	
2-18-55	31	01		REVISION 22	
2-18-55	32	01		REVISION 22	
2-18-55	33	01		REVISION 22	
2-18-55	34	01		REVISION 22	
2-18-55	35	01		REVISION 22	
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2-18-55	43	01			REVISION 22	
2-18-55	44	01			REVISION 22	
2-18-55	45	01			REVISION 22	
2-18-55	46	01			REVISION 22	
2-18-55	47	01			REVISION 22	
2-18-55	48	01			REVISION 22	
2-18-55	49	01			REVISION 22	
2-18-55	50	01			REVISION 22	
2-18-58	1	01	*	new	REVISION 23	ALL
2-18-58	2	01	*	new	REVISION 23	
2-18-60	1	01			REVISION 22	ALL
2-18-60	2	01	*		REVISION 23	
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2-18-60	5	01			REVISION 22	
2-18-60	6	01			REVISION 22	
2-18-60	7	01			REVISION 22	
2-18-60	8	01			REVISION 22	
2-18-60	9	01			REVISION 22	
2-18-60	10	01			REVISION 22	
2-18-60	11	01			REVISION 22	
2-18-60	12	01			REVISION 22	
2-18-60	13	01			REVISION 22	
2-18-60	14	01			REVISION 22	
2-18-60	15	01			REVISION 22	
2-18-60	16	01			REVISION 22	
2-18-60	17	01			REVISION 22	
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2-18-60	28	01			REVISION 22	
2-18-60	29	01			REVISION 22	
2-18-60	30	01			REVISION 22	
2-18-60	31	01			REVISION 22	
2-18-60	32	01			REVISION 22	
2-18-60	33	01			REVISION 22	
2-18-60	34	01			REVISION 22	
2-18-65	1	01			REVISION 21	ALL
2-18-65	2	01			REVISION 21	
2-18-65	3	01			REVISION 21	
2-18-65	4	01			REVISION 21	
2-18-65	5	01			REVISION 21	
2-18-65	6	01			REVISION 21	
2-18-65	7	01			REVISION 21	
2-18-65	8	01			REVISION 21	
2-18-70	1	01	*		REVISION 23	ALL
2-18-70	2	01	*		REVISION 23	
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SECTION 2-01

AIRPLANE DESCRIPTION

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INTRODUCTION

This Section is intended to present a general overview of the airplane, thus initiating the reader to the EMB-135BJ, which may, then, go through the Sections searching more detailed information on each system.

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AIRPLANE DESCRIPTION

The EMB-135BJ model is a low wing, T-tail pressurized airplane, powered by two high by-pass ratio rear mounted turbofan engines. The tricycle landing gear is all retractable, with twin tires in each leg.

A glass cockpit panel has been developed with highly integrated on-board avionics, thus allowing pilots to better monitor airplane general operation.

There are eleven passenger cabin layout options, with front galley and rear toilet, permitting to carry up to 15 passengers. Convenient accommodation is provided for the flight crew.

For detailed information on each system, refer to the appropriate Section in this manual.

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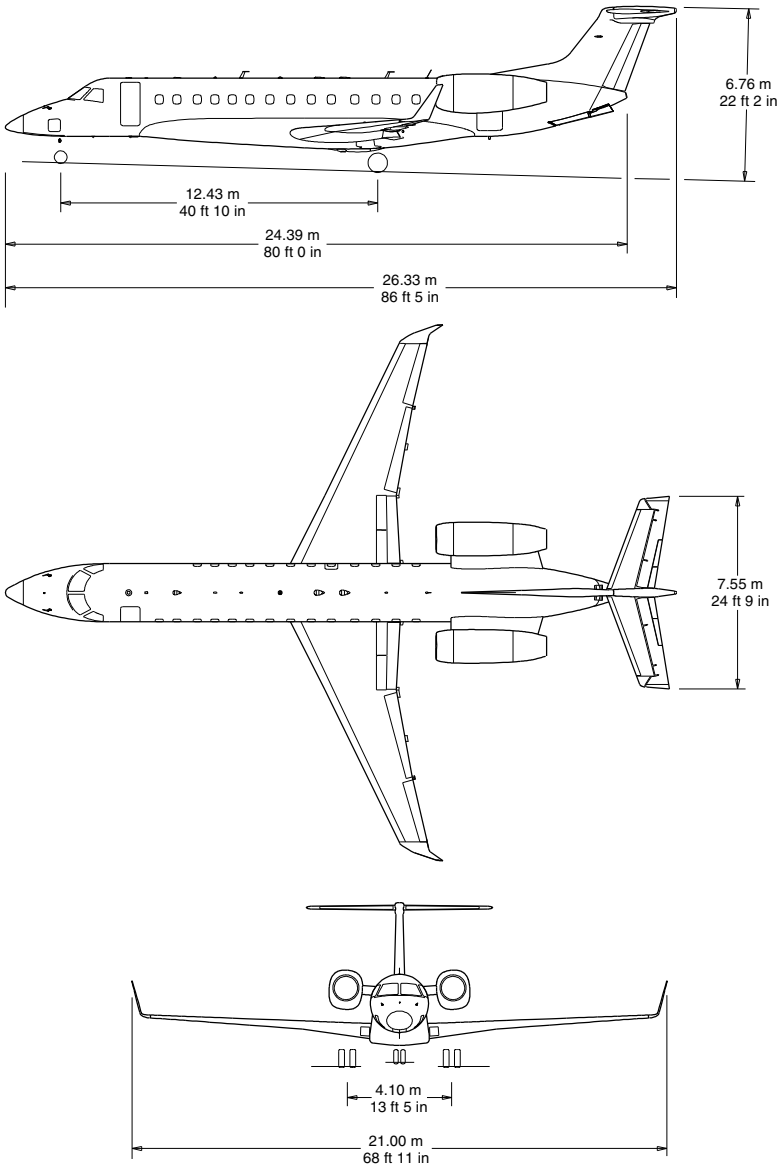
THREE VIEW DRAWING (EMB-135BJ)



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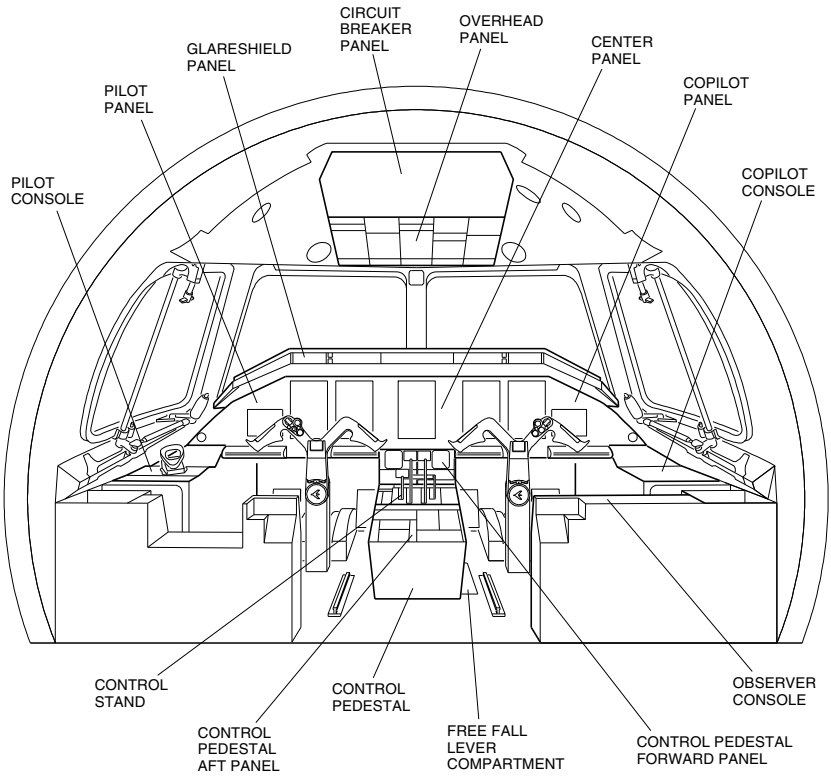
COCKPIT ARRANGEMENT



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INTERIOR ARRANGEMENT

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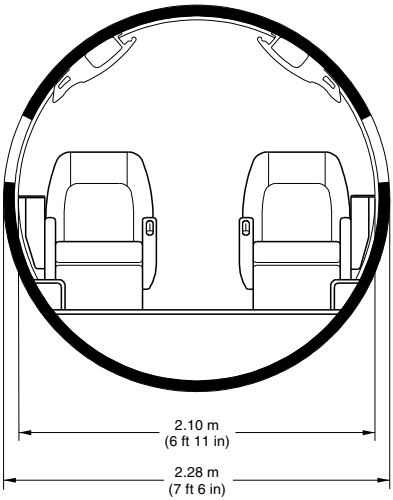

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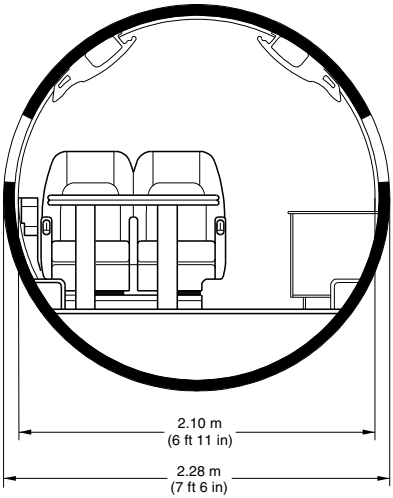

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MAIN/GLARESHIELD PANELS

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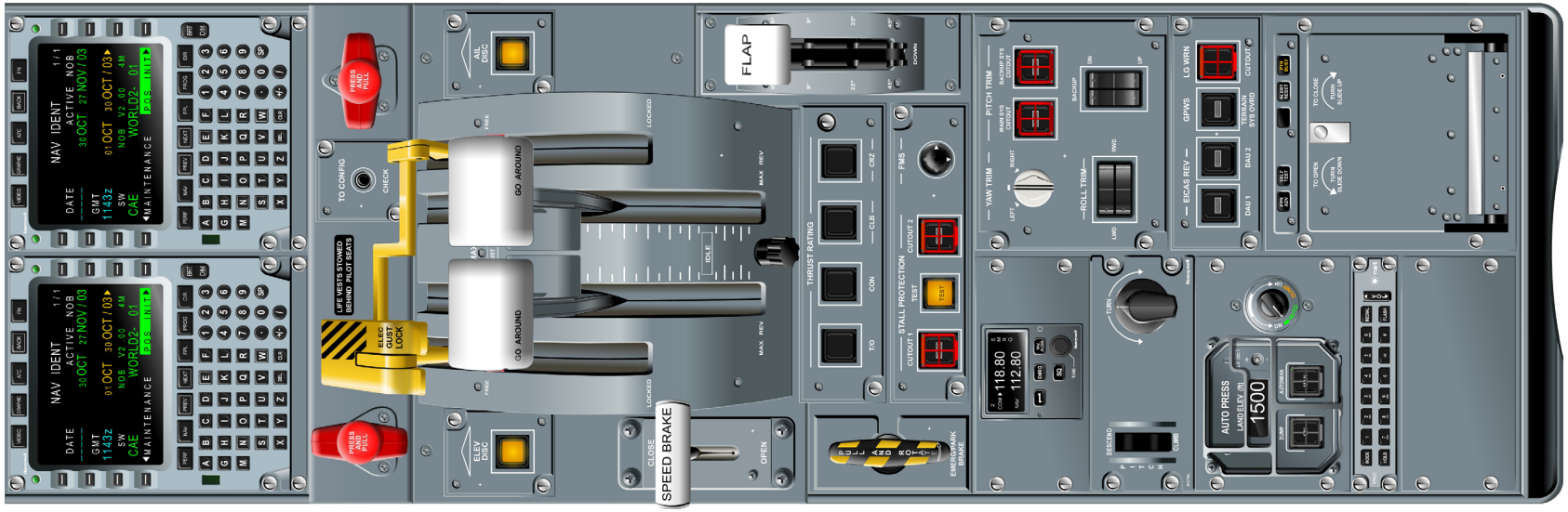
CONTROL PEDESTAL



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OVERHEAD PANEL

LEGACY 600 AIRPLANES UP TO S/N 854

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OVERHEAD PANEL

LEGACY 600 AIRPLANES S/N 863 AND ON

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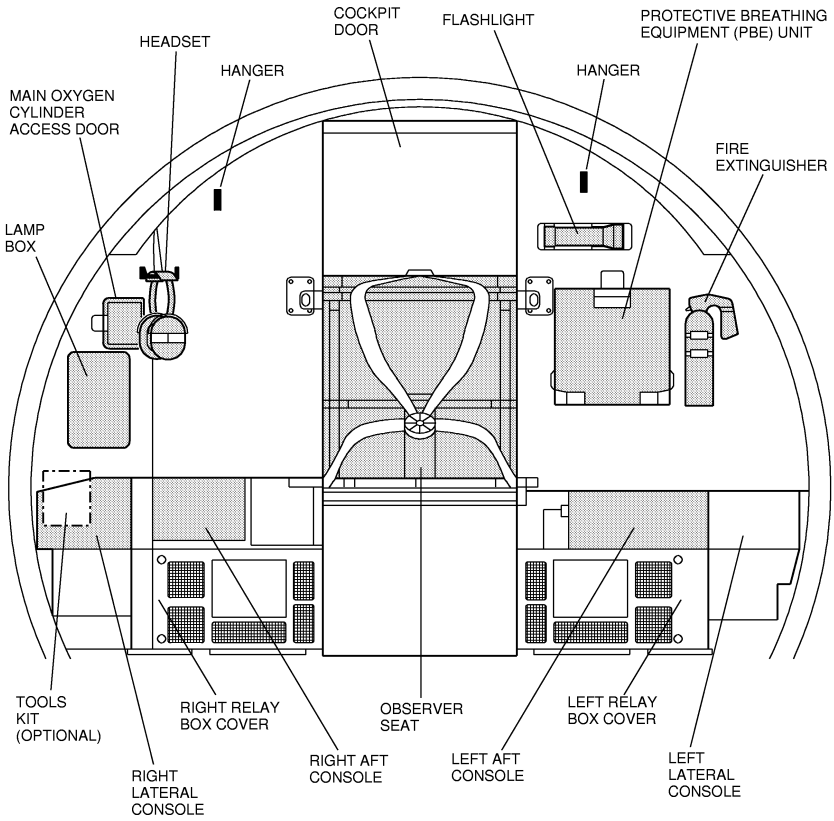
COCKPIT PARTITION



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COCKPIT

PILOT SEATS

The pilot seats are fixed to slide rails which permit fore and aft adjustments. When the seats are in their aft most position, a lateral movement is also available, in order to facilitate crew access to the seat. The seats are fitted with adjustable armrest, seat backs, thigh support and lumbar position, and can also be adjusted for height. Backrest inclination, thigh support and lumbar positions are hydro-mechanically adjusted. The armrest adjustment, and seat fore, aft and lateral adjustments are made mechanically.

The pilot and copilot seats are identical, except for the symmetrical arrangement of the controls. Controls on the pilot's seat are on the opposite side from those on the copilot's seat.

A switch installed in the seat allows height adjustment, which is performed by an electrical actuator. In case of electrical actuator malfunction height adjustment may also be accomplished manually by attaching a crank to the actuator and rotating it. Extension or retraction of the actuator rod connected to the seat structure permits vertical displacement.

The crew seat belts consist of five straps. The left (for the pilot seat) and right (for the copilot seat) lap belt straps are permanently fixed to a rotary buckle, provided with quick-release latch locks that are operated by turning the existing rotary device on the buckle face. The two upper straps are connected to an inertia reel attached to the seat backrest, which allows the pilot to bend forward in normal, slow movements. Abrupt movements or high acceleration locks the upper straps, preventing the pilot from impacting against the instrument panel. The inertia reel can be mechanically locked through a lever installed on the seat.

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PILOT SEAT CONTROLS

1 - SEAT FORE/AFT AND LATERAL ADJUSTMENT LEVER

- Pulling the lever up, the seat is free to slide along its rails. Lateral movement is allowed only when the seat is at the aft stop.
- Releasing the lever, the seat is locked. Fore/aft movement has predetermined fixed positions. Lateral movement has only the left and right stops.

2 - SEAT HEIGHT ADJUSTMENT BUTTON (spring loaded, center off rocker button)

- Pressing the button up or down causes the seat to raise or to lower respectively, provided the airplane is energized.

3 - BACKREST INCLINATION ADJUSTMENT BUTTON

- Pressing the button allows the occupant to select the required inclination by pressure exerted upon the backrest.
- Releasing the button, backrest is retained in the desired position.

4 - LUMBAR ADJUSTMENT WHEEL

- When rotated, provides in and out lumbar adjustment.

5 - THIGH SUPPORT ADJUSTMENT WHEEL

- When rotated, provides thigh support height adjustment.

6 - ARMREST ANGLE ADJUSTMENT WHEEL

- When rotated, allows armrest adjustment to the desired angle.

7 - INERTIA REEL LOCK LEVER

LOCK - Locks the inertia reel in the current position.

UNLOCK - Unlocks the inertia reel, permitting normal belt movement.

8 - HEIGHT ADJUSTMENT LEVER BACK-UP

- When attached to the height adjustment actuator and rotated, it causes the seat to raise or to lower.

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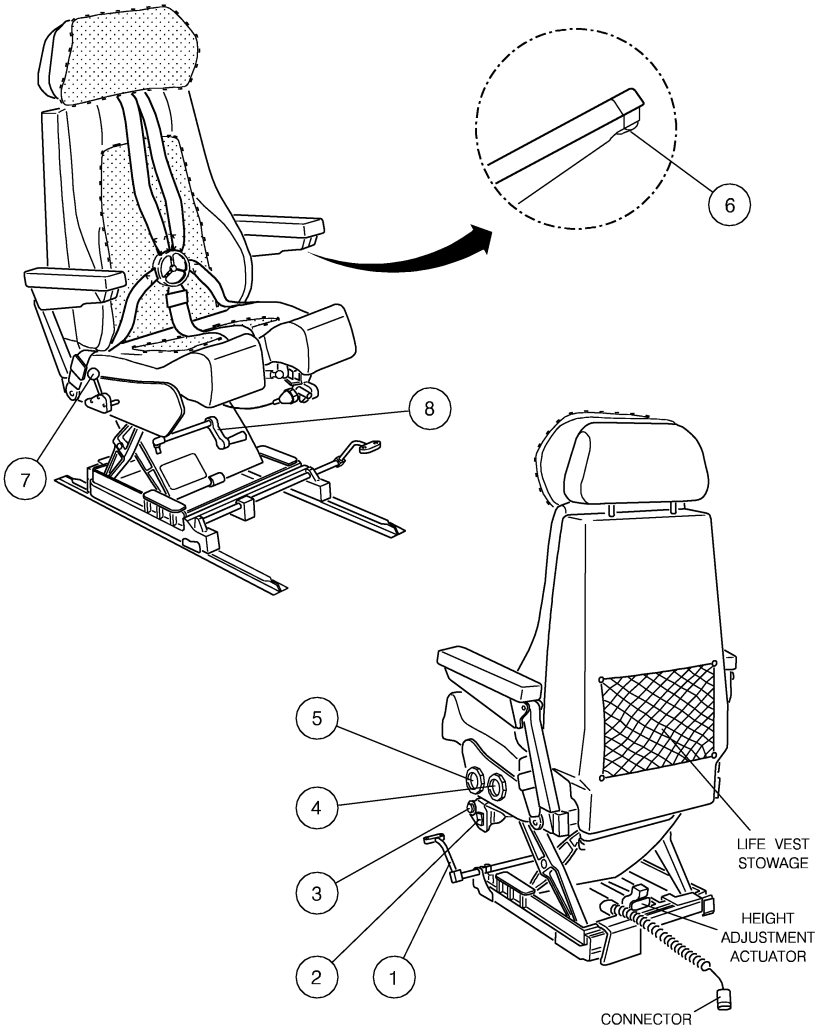

NOTE

Pilot's seat shown. Copilot's seat controls are on the opposite side.

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PILOT SEAT CONTROLS

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PILOT SEAT ADJUSTMENT

Seat adjustment should be accomplished to accommodate the pilot's eye level and position best suited for control column actuation. The seat should be moved up or down until the pilot's line of sight reaches the same horizontal plane of a sight device made up of two white spheres and a black sphere. Then, move the seat fore or aft until the opposite white sphere is aligned with the black one. The seat should not be moved anymore. To adjust the rudder pedals, refer to PEDAL ADJUSTMENT.

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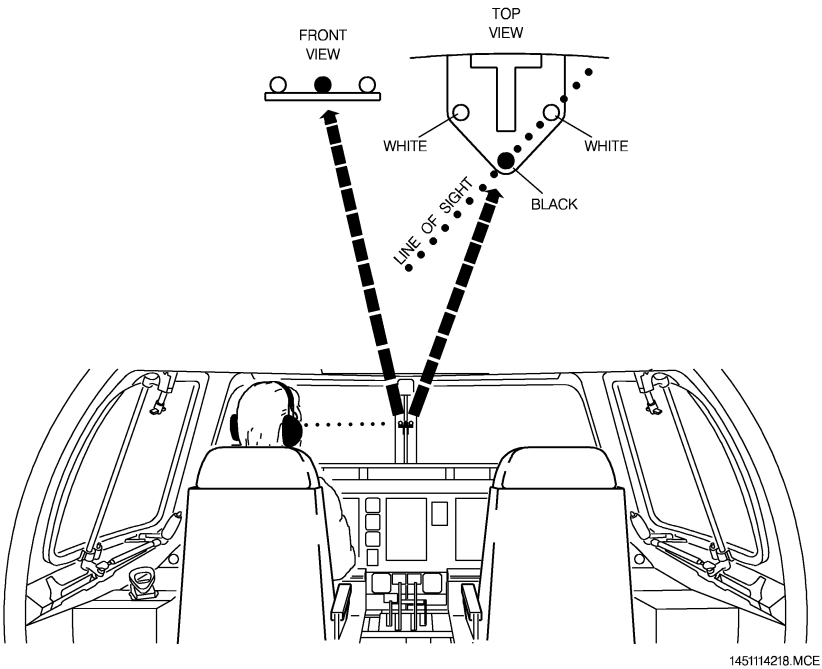

PILOT SEAT ADJUSTMENT

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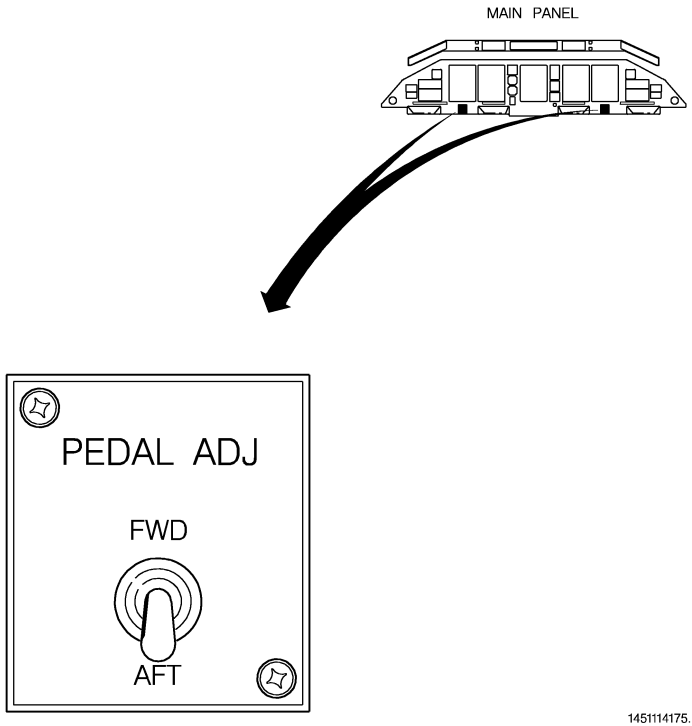
PEDAL ADJUSTMENT

Toggle switches installed on the pilot and copilot's panels allows rudder pedals adjustment, which is performed by electric actuators. Setting the switch up or down signals the actuator to move the pedals fore or aft, to assure the pilot's comfort and a full rudder throw from the adjusted seat position.



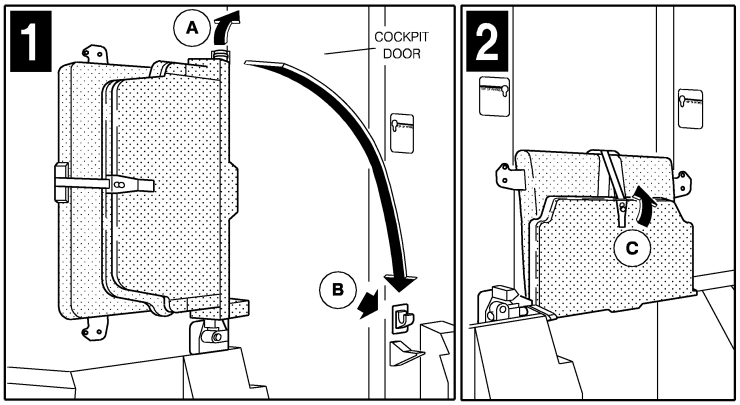
PEDAL ADJUSTMENT SWITCH

OBSERVER SEAT

The observer seat is installed behind the co-pilot seat. When in use, it lies in front of the cockpit door, and when not in use, it folds up and rotates away from the door area, stowing against the right side of the cockpit partition.

The cockpit door can be opened or closed either with the observer seat in use or stowed.

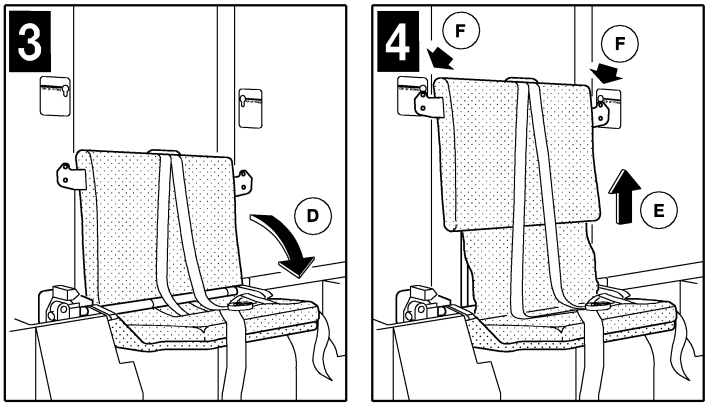
TO FOLD OUT:



A OPERATE THE LOCKING RING TO RELEASE THE SEAT

B LET THE SEAT FOLD DOWN SLOWLY INTO POSITION

C RELEASE THE STRAP



D BRING THE SEAT BOTTOM TO A HORIZONTAL POSITION

E PULL THE BACKREST UP TO TOP-OFF FITTING; AND

F LOCK IT

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OBSERVER SEAT

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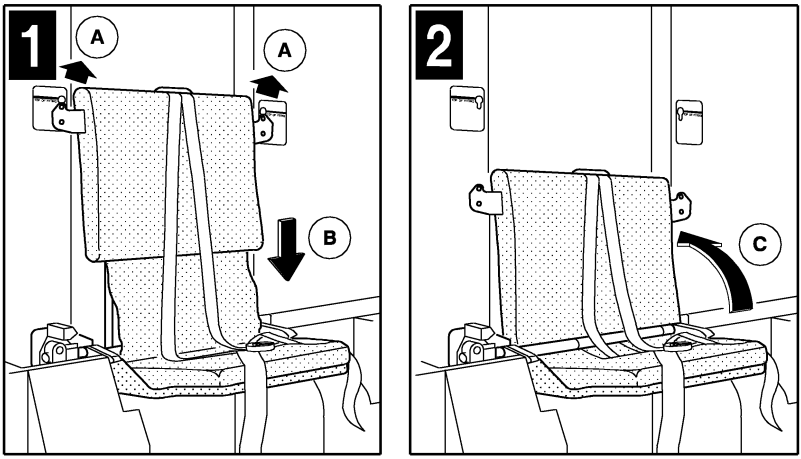
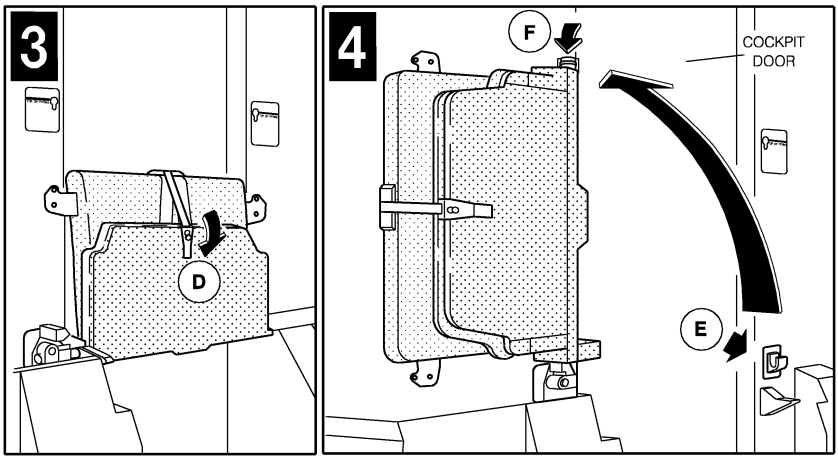
TO FOLD IN:



A UNLOCK THE BACKREST

B PULL IT DOWN

C FOLD THE SEAT BOTTOM



D STRAP THE SEAT

E ROTATE SEAT INTO STOWED POSITION

F LOCK THE RING

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OBSERVER SEAT

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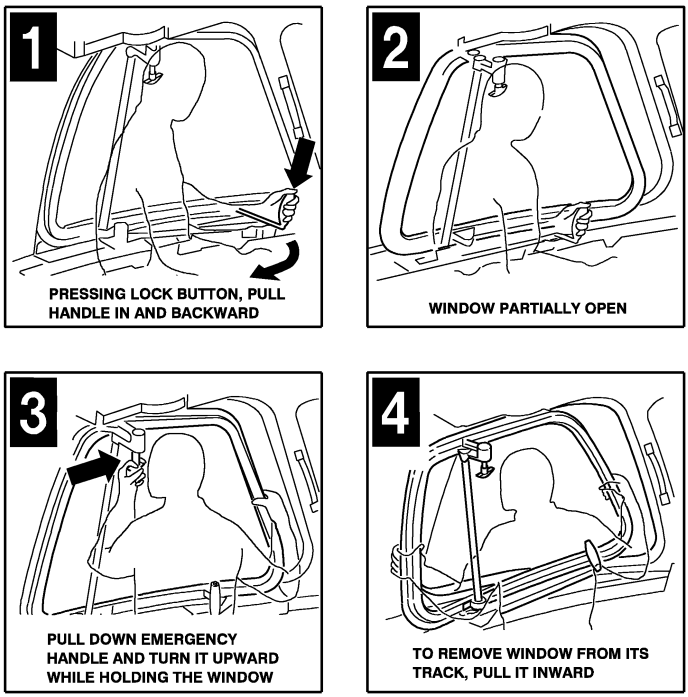
DIRECT VISION WINDOWS

The normal position for the direct vision windows is closed. However, they may be partially opened on the ground, and may be totally removed in case of loss of visibility through the windshield or for cockpit emergency evacuation. Placing respective pilot seat to the aft most position facilitates window removal.

A yellow pin protrudes near the opening handle when the window is not properly locked in the closed position, indicating the unlocked condition.

A WINDOW NOT CLOSED inscription on the window front frame will be visible when the window is not properly closed.



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DIRECT VISION WINDOW REMOVAL

AOM-135/1542

ATTENDANT STATION AND SEAT

The flight attendant station is positioned at the cockpit partition, close to the main door. This fold-away type seat avoids interference with the door passage way.

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FLIGHT ATTENDANT STATION (OPTIONAL)

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GALLEY

A full height forward galley, matching the cabin's contours, provides a central location to perform food and beverage preparation.

The galley is installed in the forward section of the passenger cabin area and includes as standard items an oven, a microwave oven, coffee maker, trash container (13 gal/49.2 liters volume) drawer with fire extinguisher, control panels for the water system, emergency lights, oven and galley, pop-out auxiliary work surface, paper towel roll holder, cutting boards, storage provisions for utensils and napkins, flatware storage, ice compartment drawers, glassware storage, crystal and chinaware storage and carrier, seasoning and spices storage, sink with hot water, bottle and can storage, juice can storage, liquor decanters or miniature storage, work table, work light, electrical circuit breakers panels, miscellaneous storage and in line water heaters and filters.

The forward galley is composed of an aft cabinet assembly, an upper cabinet assembly, a lower cabinet assembly, and a close-out panel assembly. The cabinet structures are made of lightweight honeycomb panel and its exterior is covered with a decorative finish.

The forward galley provides an area to house two oxygen cylinders for passenger main oxygen supply.

The forward galley assembly is provided with an electrical installation, a plumbing installation, an electrical hot water heater and heated overboard drain system.

The electrical installation is provided with a galley control module and electrical installation hardware. The galley control module controls the galley lights, valance lights, wash lights and passenger cabin temperature control.

The plumbing installation allows drainage of liquids from the countertop. The waste compartment is provided for the stowage of food waste. The waste compartment comprises a trash container with trash bag and fire extinguisher.

There is a water system that stores and supplies drinking water for use by cabin occupants and crew members, and both to the galley and lavatory washbasins.

A pullout table assembly is also provided to give extra room for food and beverage preparation.

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FORWARD GALLEY MAIN COMPONENTS

FOR AIRPLANES UP TO S/N 685 (INCLUSIVE)

The following list enumerates the main components found in the forward galley, the figure provided on the next page indicating the location of these components.

1 - GLASS STORAGE RACK COMPARTMENT
2 - VACUUM CARAFE SETS
3 - COFFEE MAKER
4 - MISCELLANEOUS COMPARTMENTS
5 - ROLL DOOR
6 - OVEN CONTROL PANEL
7 - GALLEY CONTROL PANEL
8 - MICROWAVE OVEN
9 - PULL-OUT TABLE ASSEMBLY
10 - WASTE/AUTO FIRE EXTINGUISHING COMPARTMENT
11 - ELECTRIC OVEN
12 - BOTTLES DRAWER
13 - BUS BIN STORAGE
14 - SERVING TRAYS/FLATWARE STORAGE
15 - CE DRAWER
16 - FAUCET ASSEMBLY
17 - OXYGEN CYLINDERS
18 - PAPER TOWEL HOLDERS

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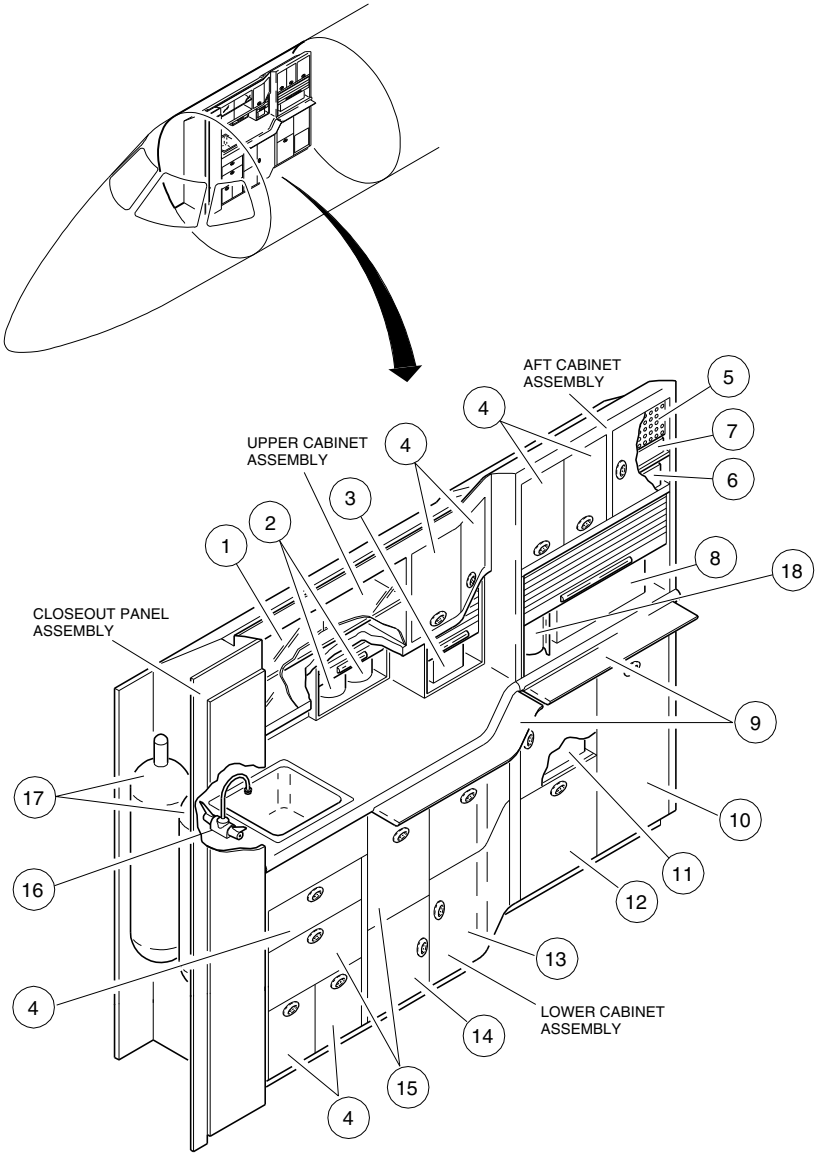

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FORWARD GALLEY MAIN COMPONENTS LOCATION (FOR AIRPLANES UP TO S/N 685 (INCLUSIVE))

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FOR AIRPLANES FROM S/N 686 UP TO S/N 1028 AIRFRAMES (EXCEPT S/N 997)

The following list presents the main components on the forward galley, and the figure provided on the next page shows the location of these components.

1 - CRYSTAL STORAGE COMPARTMENTS
2 - MISCELLANEOUS STORAGE COMPARTMENTS
3 - EMERGENCY LIGHTS CONTROL PANEL
4 - WATER WASTE DRAIN LINES HEATER TEST CONTROL PANEL
5 - GALLEY CONTROL PANEL
6 - DRINK BOTTLES AND SEASONING STORAGE COMPARTMENTS
7 - COFFEE MAKER
8 - FLATWARE STORAGE COMPARTMENT
9 - CLEAN ICE DRAWER
10 - LONG NECK STORAGE COMPARTMENT
11 - WASTE COMPARTMENT
12 - SODA STORAGE COMPARTMENTS
13 - MISCELLANEOUS STORAGE COMPARTMENTS
14 - CHINAWARE STORAGE COMPARTMENTS
15 - WINE STORAGE COMPARTMENT
16 - ELECTRIC OVEN
17 - MICROWAVE OVEN
18 - CRYSTAL STORAGE COMPARTMENT
19 - FOOD TRAYS STORAGE COMPARTMENT
20 - MISCELLANEOUS STORAGE COMPARTMENTS
21 - OXYGEN CYLINDER
22 - FAUCET ASSEMBLY
23 - MUG STORAGE COMPARTMENT
24 - ROLL-UP DOOR
25 - OVEN CONTROL PANEL

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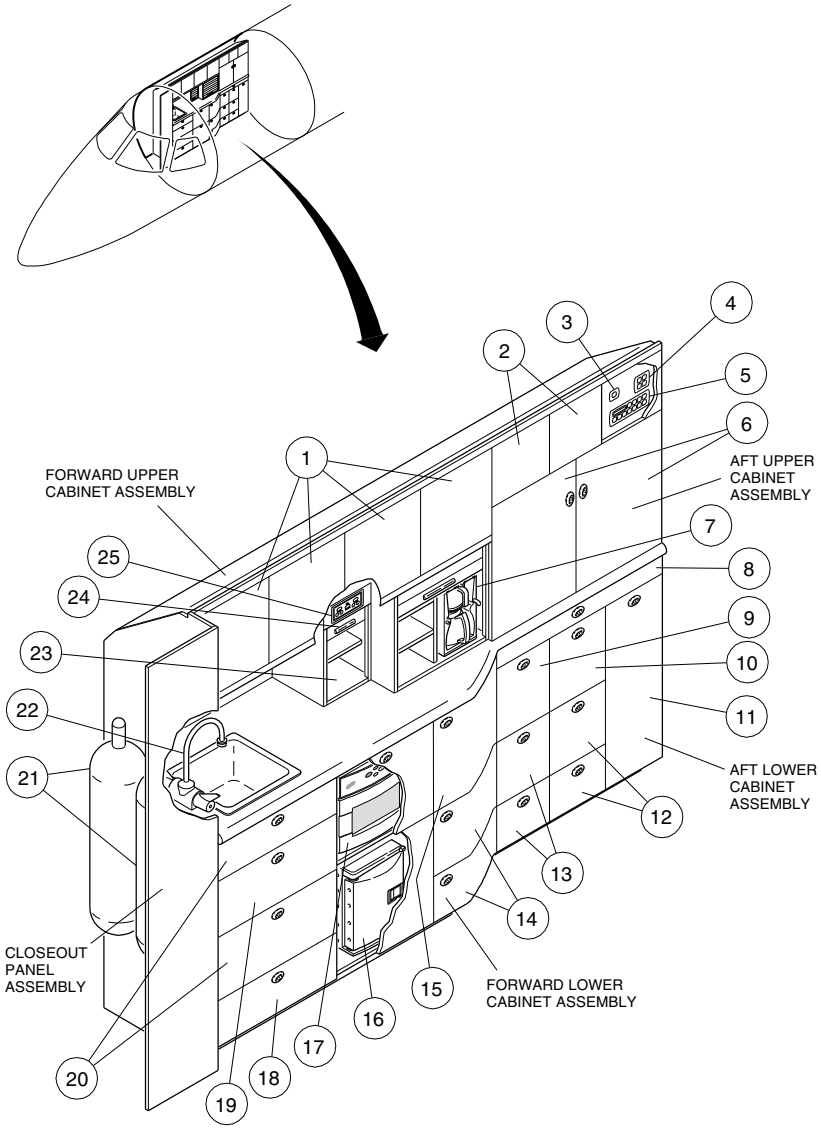

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FORWARD GALLEY MAIN COMPONENTS LOCATION (FOR AIRPLANES FROM S/N 686 UP TO S/N 1028 AIRFRAMES (EXCEPT S/N 997))

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FOR AIRPLANES S/N 997, S/N 1029 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES

The following list presents the main components on the forward galley, and the figure provided on the next page shows the location of these components.

1 - CRYSTAL STORAGE COMPARTMENTS
2 - MISCELLANEOUS STOWAGE COMPARTMENTS
3 - OVEN
4 - MICROWAVE OVEN
5 - FOLDING TABLE
6 - FAUCET ASSEMBLY
7 - MISCELLANEOUS STOWAGE COMPARTMENTS
8 - ICE DRAWER
9 - WASTE COMPARTMENT
10 - MISCELLANEOUS STOWAGE COMPARTMENTS
11 - FOLDING TABLE
12 - OXYGEN CYLINDER
13 - ESPRESSO COFFEE
14 - ESPRESSO COFFEE MAKER WATER TANK
15 - MISCELLANEOUS STOWAGE COMPARTMENTS
16 - REFRIGERATOR
17 - FOOD TRAY STOWAGE COMPARTMENTS

THE GALLEY CONTROL PANEL AND WATER WASTE DRAIN LINES HEATER TEST CONTROL PANEL ARE LOCATED ON ENTERTAINMENT CABINET.

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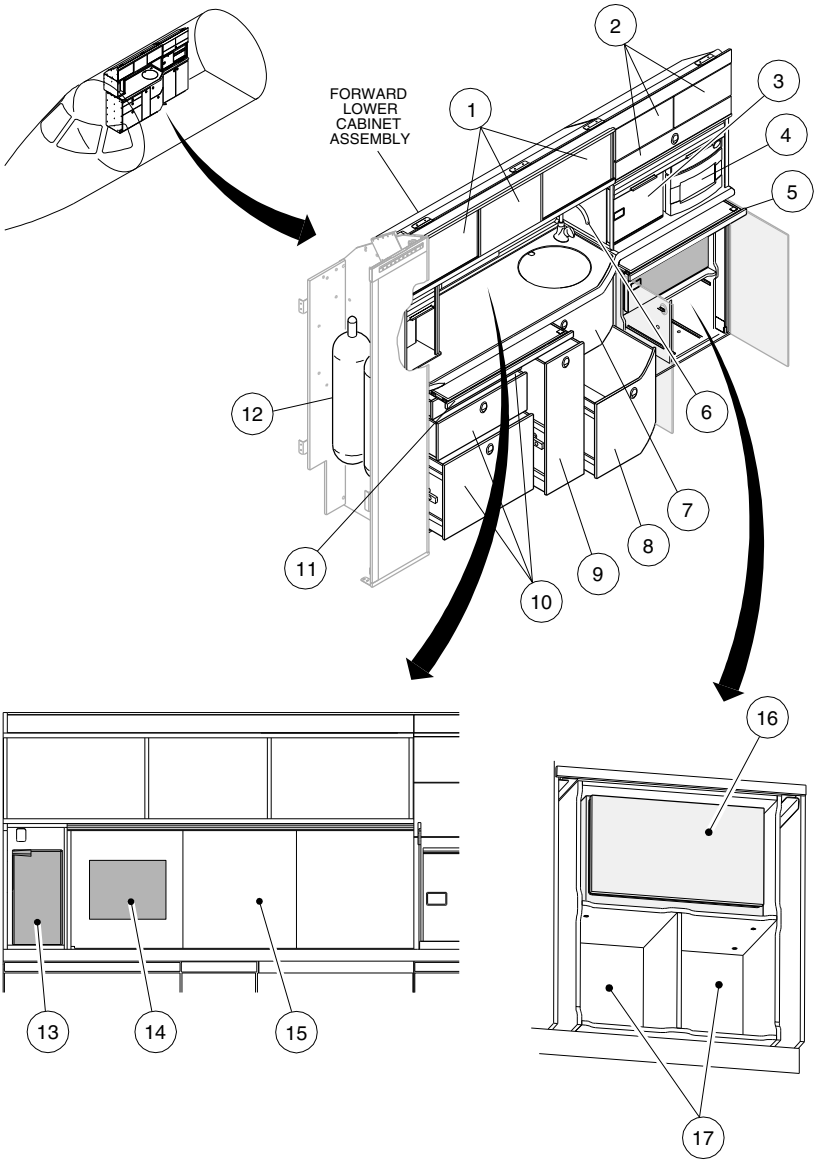

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FORWARD GALLEY MAIN COMPONENTS LOCATION (FOR AIRPLANES S/N 997, S/N 1029 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES)

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GALLEY ELECTRICAL SYSTEM

The galley's electrical installation supplies 28 V DC power to the galley for distribution to the associated components.

The galley electrical installation receives 28 V DC from the RH power control and distribution box, located on the aft console, and supplies electrical power to the main galley's components. The galley's electrical installation also receives 28 V DC from the entertainment cabinet circuit breaker panel, located in the entertainment cabinet. This powers the water heater, 60 Hz outlet GFI (Ground Fault Interrupter), credenza lights and galley lights.

The electric oven, microwave oven and coffee maker are installed in an enclosure with a door. The oven and the microwave oven have a microswitch installed on the door that controls a relay (located inside of each component) to cut their power supply when the door is closed.

The coffee maker has a microswitch installed at the door that controls a relay to cut off the power supply from it when the door is closed.

The galley's electrical installation is also provided with a galley control panel, galley lighting, advisory signs and a fuse box. The fuse box, installed behind the galley's structure, protects the electric oven, microwave oven and coffee maker. The galley also provides a 60 Hz outlet GFI, and electrical connectors to connect the galley components.

The galley's electrical installation includes the following components:

– Microwave oven.

– Electric oven.

– Oven controller.

– Coffee maker.

– Water heater.

– Galley control panel.

– Galley lighting.

The location of these components is presented in the figure on the next page.

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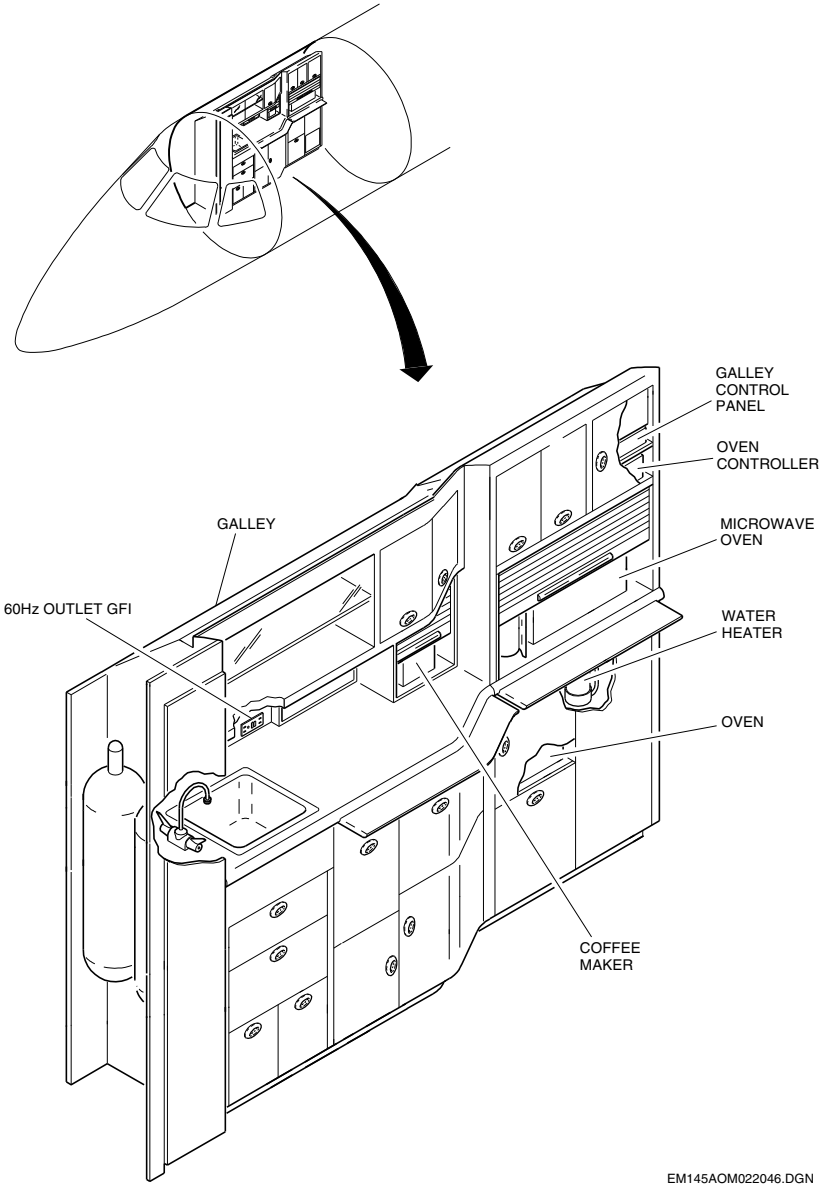

GALLEY ELECTRICAL INSTALLATION MAIN COMPONENTS LOCATION

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GALLEY COMPONENTS

MICROWAVE OVEN

The microwave oven is a device for cooking food, and it needs to be careful operated to do not cause food or food packaging burn.

Food with a high fat content and low water content or foods with paper or plastic containers should never be left unattended in a microwave oven. Some types of food or food packaging can – if left to heat continuously – can become an ignition source.

The cooking cavity size is necessarily small. Items near the waveguide aperture (moisture cover) will receive a greater percentage of cooking energy than those farther from the aperture; therefore it will have a higher likelihood of experiencing localized burning, scorching or even ignition. Also, items very close to the waveguide aperture have a higher likelihood of reflecting energy into the waveguide, causing localized heating within the waveguide and increasing the potential for arcing.

NOTE: - If an item to be cooked is within 1" of the waveguide moisture cover or becomes that way during cooking, the microwave oven should be stopped and the item should be rearranged.

- Use caution and read all warnings when selecting cookware for use in your microwave. It is also advisable that operators monitor the heating progress of food items and not leave the microwave unattended while operating.

Microwave cooking time is set by the controls on the front of the unit. It controls the oven operation and provides an audible signal when the cooking cycle is complete.

The microwave oven door operates a safety interlock switch, which disables the cooking cycle while the door is open or left ajar. There is an additional toggle-type latch installed at the top of the door to further ensure that the door will remain closed during the cooking cycle.

The microwave oven is equipped with a pressure switch that cuts off the microwave oven power supply when the passenger cabin pressure exceeds 10000 ft. The microwave oven power supply will be restored when the pressure falls below 9000 ft. The solid state timer of the oven is not affected by momentary power interruptions.

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ELECTRIC OVEN

The electric oven has a temperature range from 150°F to 450°F (65.5°C to 232.2°C) with overheat protection. A fan circulates air inside the oven for even heat distribution of ± 10°F (± 12.2°C).

An external oven controller controls the electric oven.

COFFEE MAKER

The coffee maker uses standard coffee filters and regular or drip grind coffee.

The brewer basket is locked into the coffee maker and can be removed by lifting up its respective release button. The thermal carafe is locked into the coffee maker and can be removed by pressing its respective release button. The coffee maker has automatic fill and is designed for operation with pressurized water systems. Hot and cold water can be dispensed through a spigot on the coffee maker.

The coffee maker has redundant overheat protection. The water supply must be turned off and the brewer drain valve on the right hand side in the rear of the carafe must be open.

Super fine grinds such as "express" can cause the carafe to overfill. When electrical power is available, a POWER ON red light indicator will glow. The BREW button is used to start heating the water. The flashing green light indicates that the water has not reached the proper temperature. The green HOT WATER light will glow to indicate that the water has reached the proper temperature and the brew process will begin. The entire brewing cycles takes approximately 6 minutes. The green BREW light turns off to indicate that the brewing process is completed.

Press and hold the HOT WATER button. The hot water will come out of the spigot. Press and hold the COLD WATER button. The cold water will come out of the spigot.

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WATER HEATER

The water heater comes on automatically when 28 V DC is applied by the water heater circuit breaker (located in the entertainment cabinet circuit breaker panel) closed. The heater maximum temperature is pre-selected to 115°F (46.1°C). It has a capacity of 1.4 liters. The water heater can not provide continuous hot water supply. Its recovery time is approximately 15 minutes.

The water heater is protected against overtemperature by an overtemperature switch with manual reset and against overpressure by an overpressure switch.

OVEN CONTROLLER

The oven controller time allows for one hour of cooking time.

A red light will come on to indicate that the oven is on (POWER ON). An amber light will come on to indicate that the heaters are on. The amber light will start flashing when the oven reaches the selected temperature.

GALLEY CONTROL PANEL

The galley control panel houses switches that control area for the passenger cabin temperature control switches, galley work light switch, forward upwash lights switch, aft upwash lights switch, lavatory call indicator switch, credenza lights switch, galley accent lights switch, galley area lights switch, forward downwash lights switch and aft downwash lights switch.

For airplanes Post-Mod. SB 145LEG-38-0016 or equipped with an equivalent modification factory incorporated, the galley ice drawers were replaced with new ones equipped with new water drain lines.

On ground, at the end of the flight, the water contained in the ice drawers can be drained opening the valves located under it.

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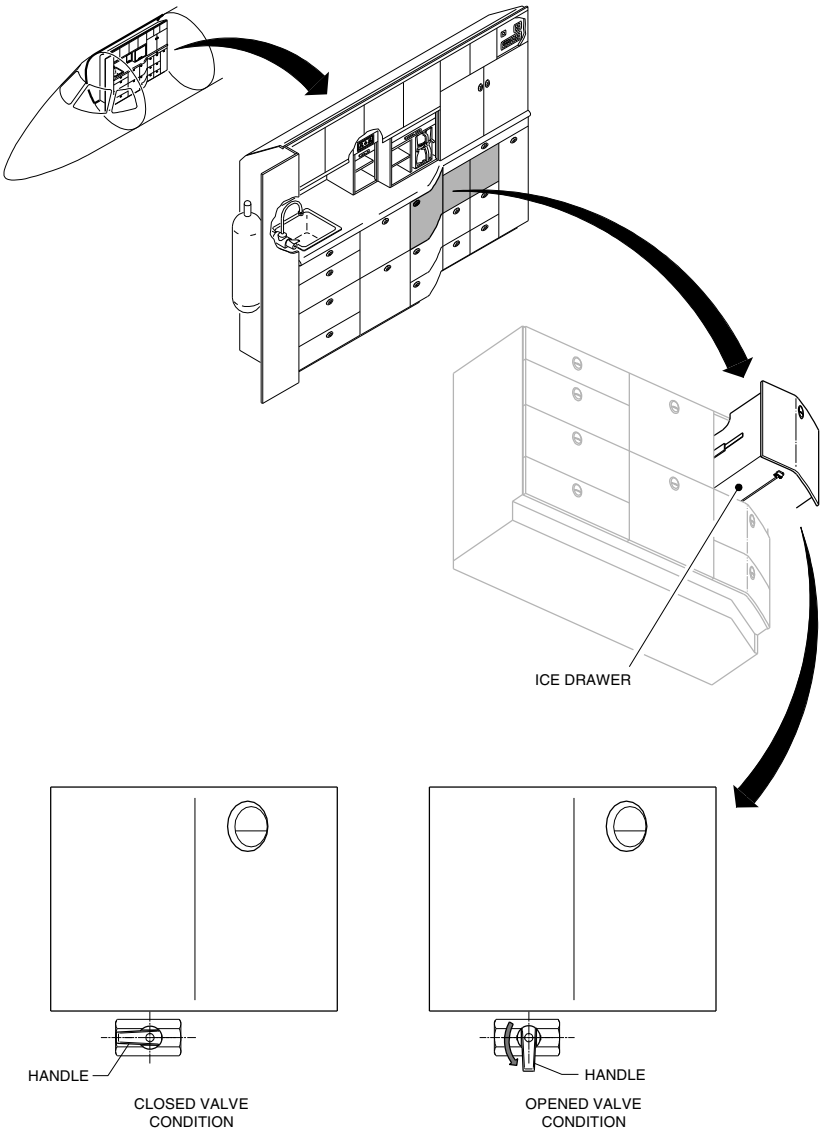

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GALLEY ICE DRAWERS

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GALLEY LIGHTING

Galley lighting consists of a work light installed above the sink area, two accent lights installed in the glass storage rack compartment and three area lights installed in the ceiling above the galley for aisle illumination in front of the galley.

The figure on the next page presents the location of galley lighting components.

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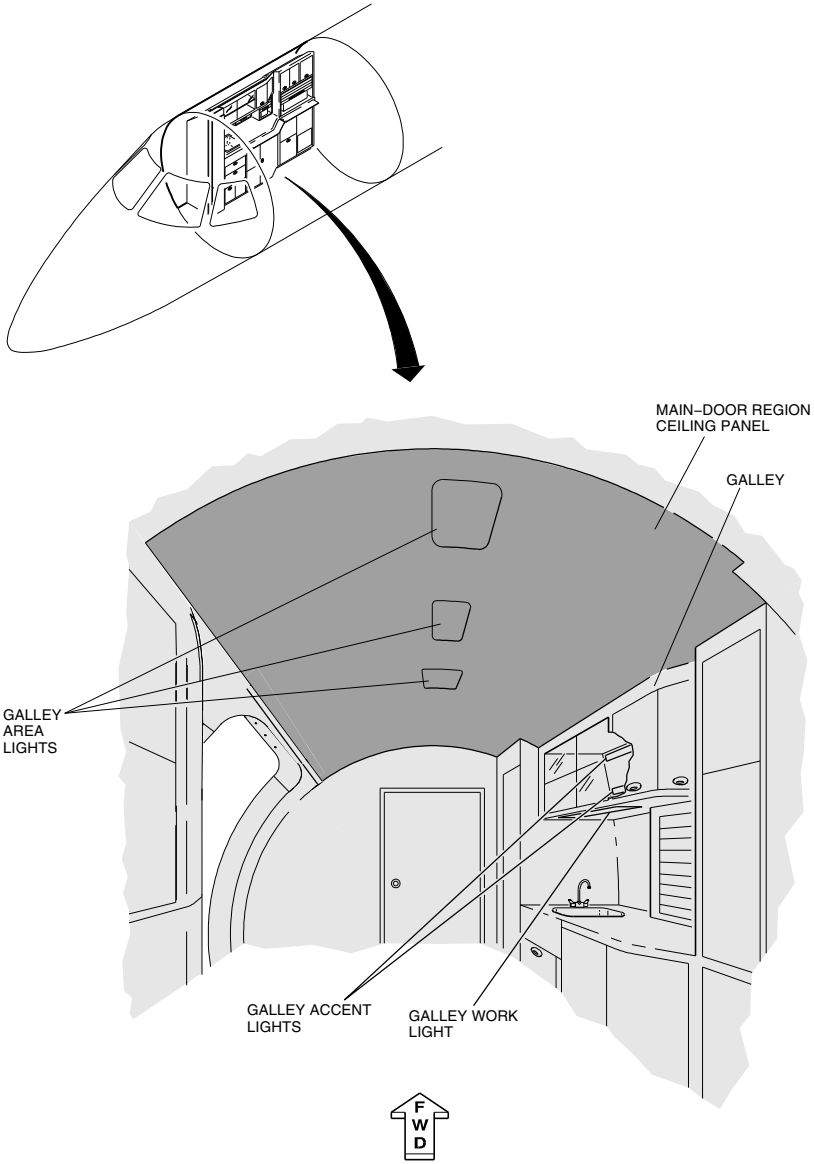

GALLEY LIGHTS

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WATER

The water subsystem includes components and equipment to store and supply drinking water for cabin occupants and crewmembers. It stores water in a pressurized tank and supplies this water to the washbasins in the lavatory and forward galley. In some airplanes the water is stored in two tanks: one in the forward galley and the other in the lavatory. If the airplane is equipped with a forward lavatory, there is another water tank for the washbasin.

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CONTROLS AND INDICATORS

FOR AIRPLANES UP TO S/N 685 (INCLUSIVE)

GALLEY CONTROL PANEL

The galley control panel has the ability to control the following items:

1 - CABIN TEMPERATURE

- The cabin temperature is displayed in bargraph format. The cabin temperature can be raised or lowered with the "Up" or "Down" TEMP buttons.

2 - GALLEY WORK LIGHTS

- When alternately pressed, turns ON or OFF the galley work lights.

3 - CABIN WASH LIGHTS

- There are controls to select the FWD Upwash, FWD Downwash, AFT Upwash and AFT Downwash lights. The selection is DIM/BRIGHT/OFF.

4 - GALLEY AREA LIGHTS

- When alternately pressed, turns ON or OFF the galley area lights.

5 - GALLEY ACCENT LIGHTS

- When alternately pressed, turns ON or OFF the galley accent lights.

6 - CREDENZA LIGHTS

- When alternately pressed, turns ON or OFF the credenza lights.

7 - LAVATORY CALL INDICATION

- When the LAV CALL button is illuminated, it indicates a passenger call in the lavatory.

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POTABLE WATER CONTROL PANEL

The potable water control panel is composed of the following items:

1 - TANK WATER LEVEL INDICATOR

– Indicates existing water level inside the storage tank.

2 - COMPRESSOR RESET SWITCH

– The air compressor will remain off until the tank pressure drops down to or below 20 ± 5 psig (the overpressure switch closes) and the compressor resetting button is pressed.

3 - PUSH TO TEST BUTTON

– Verifies if the indications in the water system control panel illuminate.

4 - TANK OVER PRESSURE INDICATOR

– Provides indication of the tank overpressure condition. If the tank pressure rises to 48 ± 2 psig, the tank overpressure switch opens and removes power from the air compressor.

EMERGENCY LIGHTS CONTROL PANEL

1 - EMERGENCY LIGHTS

– When alternately pressed, turns ON or OFF the emergency lights.

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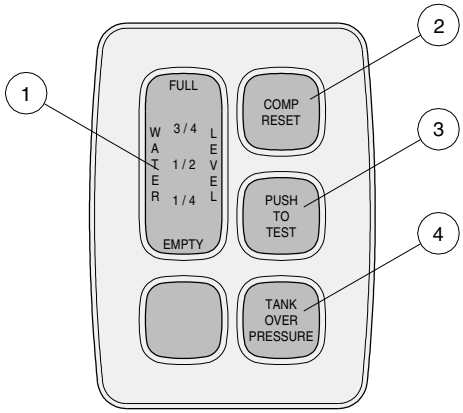
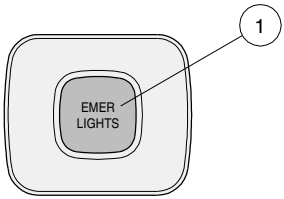
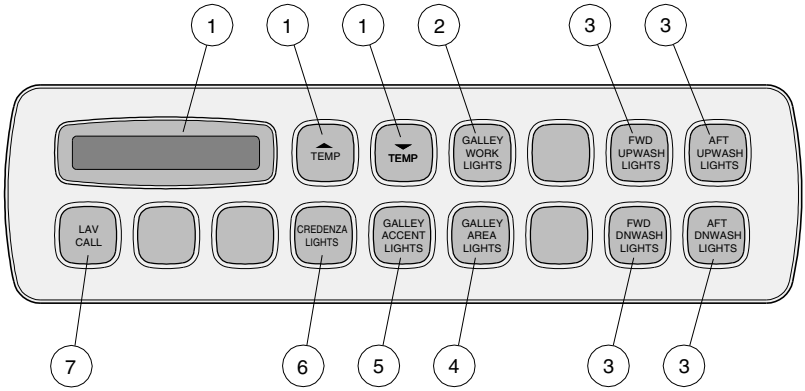


POTABLE WATER CONTROL PANEL



EMERGENCY LIGHTS CONTROL PANEL



GALLEY CONTROL PANEL

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GALLEY, POTABLE WATER AND EMERGENCY LIGHTS CONTROL PANELS (FOR AIRPLANES UP TO S/N 685 (INCLUSIVE))

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CONTROLS AND INDICATORS

FOR AIRPLANES FROM S/N 686 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES

DRAIN HEATER CONTROL PANEL

The drain heater control panel is composed of the following items:

1 - FWD DRN HEATER

- Turns on the forward drain/hose heater.

2 - AFT DRN HEATER

- Turns on the aft drain/hose heater.

3 - AFT HEATER TEST

- Tests the continuity of the aft drain heater.

4 - FWD HEATER TEST

- Tests the continuity of the forward drain heater.

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GALLEY CONTROL PANEL

The galley control panel is composed of the following items:

5 - WATER TANK LEVEL INDICATOR

- Indicates the existing water level inside the water storage tank.

6 - GALLEY WORK LIGHTS

- Turns the galley work lights on/off.

7 - GALLEY AREA LIGHTS

- Turns the galley area lights on/off.

8 - FWD UPWASH LIGHTS

- Selects the forward upwash lights bright/dimmed (DIM)/off.

9 - AFT UPWASH LIGHTS

- Selects the aft upwash lights bright/dimmed (DIM)/off.

10 - AFT DNWASH LIGHTS

- Selects the aft downwash lights bright/dimmed (DIM)/off.

11 - FWD DNWASH LIGHTS

- Selects the forward downwash lights bright/dimmed (DIM)/off.

12 - LAV WATER ON/OFF

- Selects the check carried out by the water system control unit in the lavatory tank.

13 - GALLEY WATER ON/OFF

- Selects the check carried out by the water system control unit in the galley tank.

14 - LAV WATER LEVEL

- Selects the water level indication of the lavatory tank.

15 - GALLEY WATER LEVEL

- Selects the water level indication of the galley tank.

16 - ATTNDNT CALL

- Clears the attendant call indication.

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EMERGENCY LIGHTS CONTROL PANEL

The emergency lights control panel is composed of the following item:

17 - EMERGENCY LIGHTS SWITCH

- When alternately pressed, turns ON or OFF the emergency lights.
- Amber: Indicates that the emergency lights are in normal flight position.
- Green: Indicates that the emergency lights are turned on.

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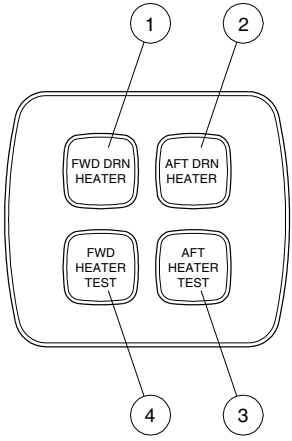
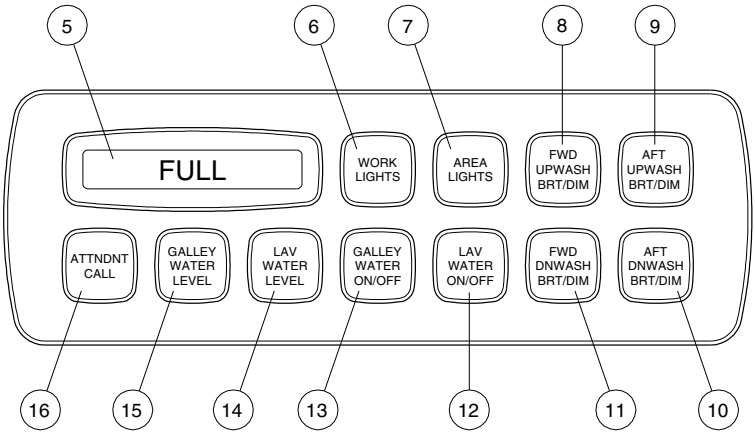
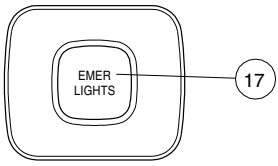


DRAIN HEATER CONTROL PANEL



GALLEY CONTROL PANEL



EMERGENCY LIGHTS CONTROL PANEL

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GALLEY, DRAIN HEATER AND EMERGENCY LIGHTS CONTROL PANELS (FOR AIRPLANES FROM S/N 686 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES)

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PASSENGER SEATS

Passenger seats have a single control lever for base tracking, hidden headrests, color coordinated seat belts webbing, upholstered in leather per customer specification, thigh rest, lumbar support adjustment, armrests, leg and footrest.

Each Executive Single Seat has forward, aft, swivel and lateral movement, limited recline control on inside of inboard arm, footrest, life vest storage in each seat base compartment and escape lighting. The two forward single seats facing the forward bulkhead have berthing capability.

The Executive Divan (3 place) has three color coordinated seat belts, berthing capabilities, one color coordinated sleeper belt, storage for life vests and passengers rafts included.

Each Single or Double Executive Seat (except the inboard club seats when mentioned below) has a control unit in the sideledge which allows the management of the reading/table lights (except the inboard club seats) and have an integrated In-Flight Entertainment System management, also in the sideledge, consisting of a headphone jack with the volume control (all seats), audio (all seats) and video source selection (except the inboard club seats).

Each seat has a 6.5” plug-in type LCD monitor, except the inboard club seats and the divan, that can display the three standard video sources (video cassette player, DVD/CD player and Airshow). All seats have the capability to switch between all video/audio sources listed above except the inboard club seats. The audio amplifiers supply the audio to eight (8) speakers located above the tables throughout the cabin. Two subwoofers are installed within the cabin. Each seat has the ability to select the audio sources and control the volume for their associated headphone jack.

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There are two VIP seats in the passenger cabin. The forward VIP seat is the left single seat facing the forward bulkhead. The aft VIP seat (optional) is the left single seat facing the lavatory bulkhead. The forward VIP seat has the additional capability to control the audio source and volume for the forward cabin, overhead speaker system. Similarly, the aft VIP seat has the capability to control the audio source and volume for the aft cabin, overhead speaker system.

The forward seat on the right side, facing the forward bulkhead, and aside to the VIP seat, is also provided with a SVGA port to display Microsoft™ PowerPoint® presentations on the optional forward 15.1" bulkhead monitor located on the also optional closet placed in the left side of the aircraft. It is necessary to turn on both the aft and forward monitors to show the presentations.

A serial printer port connection, located in the forward seat on the right side, facing the forward bulkhead, allows data to be transferred to an optional serial printer/fax in the credenza.

An air-to-ground telephone system is installed with two handsets. One handset is located at the forward VIP seat and another at the mid-section seating group, in the conference table.

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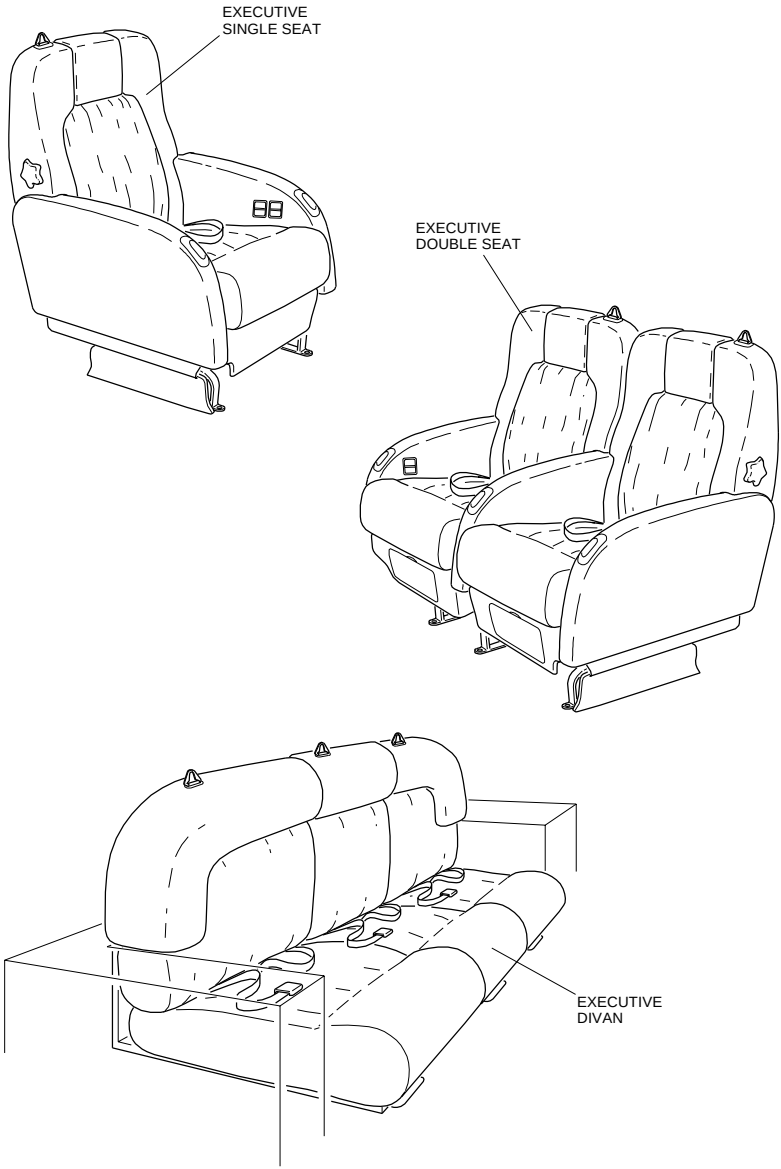

PASSENGER SEATS

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CONTROLS AND INDICATORS

PASSENGER CONTROL PANELS

The passenger control panels are installed on the sideledge for all seats except the VIP seat, or in the inboard club seats. These panels have the ability to control the following items:

1 - READING LIGHT

- The reading light can be turned ON/OFF by pressing the “READ LIGHT” ON/OFF switch (green = ON, amber = OFF) on the passenger control panel at each seat.

2 - TABLE LIGHT

- The table light can be turned ON/OFF by pressing the “TABLE LIGHT” ON/OFF switch (green = ON, amber = OFF) on the passenger control panel at each seat.

3 - PERSONAL VIDEO SELECTION

- In the sideledge, the “PERSONAL VIDEO SELECT” button can be used to select “VCR”, “DVD1” or “DVD2”, which will be displayed on the LED display. The VCR/DVD video will appear clear and sharp on the individual 6.5” monitor installed at the seat location.
- In the inboard club seats, the “UP” and “DOWN” buttons can be used to select “VCR”, “DVD1” or “DVD2”, which will be displayed on the LED display. The VCR/DVD video will appear clear and sharp on the individual 6.5” monitor installed at the seat location.

4 - HEADSET AUDIO SELECTION

- Using the “HEADSET AUDIO SELECT” switch, change the audio until the VCR, DVD1 or DVD2 audio can be heard from headset. The audio source selected will be displayed on the LED display.

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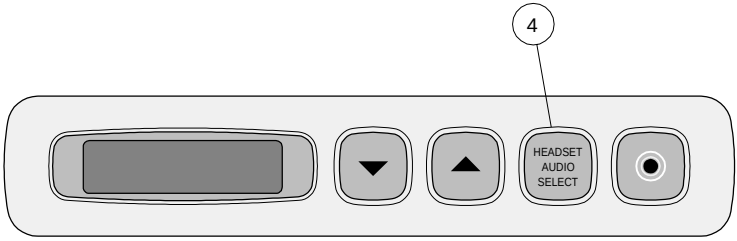
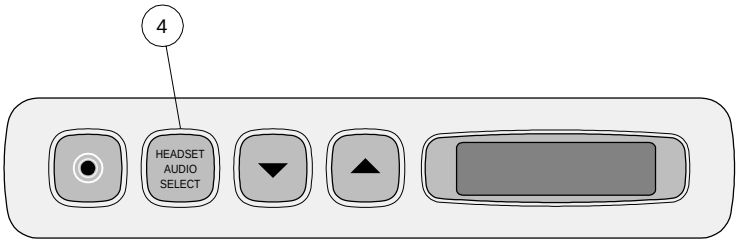


LH PASSENGER CONTROL PANEL (1 X 7 VERSION)



RH PASSENGER CONTROL PANEL (1 X 7 VERSION)

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DOUBLE EXECUTIVE INBOARD CLUB SEATS PASSENGER CONTROL PANELS

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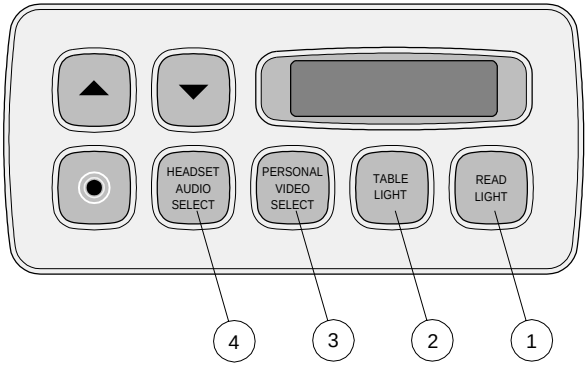
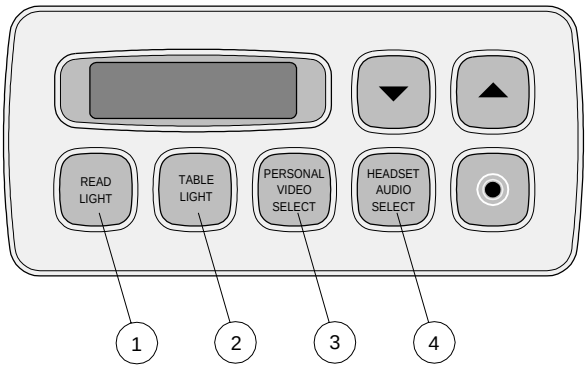


LH PASSENGER CONTROL PANEL (2 X 5 VERSION)



RH PASSENGER CONTROL PANEL (2 X 5 VERSION)

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SINGLE EXECUTIVE SEATS AND DOUBLE EXECUTIVE SEATS SIDELEDGE PASSENGER CONTROL PANEL

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VIP CONTROL PANELS

FORWARD VIP CONTROL PANEL

The forward VIP control panel is located in the left-hand side panel near the forward VIP seat. There is a headset jack and volume/temperature “UP” and “DOWN” control buttons. The audio will correspond to the chosen video selection, however, it can be selected separately from the video. This panel has the ability to control the following items:

1 - FORWARD UPWASH LIGHT

- The forward cabin upwash lights can be turned ON or OFF by pressing the “FWD UPWASH LIGHTS” ON/OFF switch (green = ON, amber = OFF).

2 - AFT UPWASH LIGHTS

- The aft cabin upwash lights can be turned ON or OFF by pressing the “AFT UPWASH LIGHTS” ON/OFF switch (green = ON, amber = OFF).

3 - READING LIGHT

- The reading light can be turned ON or OFF by pressing the “READ LIGHT” ON/OFF switch (green = ON, amber = OFF).

4 - CABIN MONITOR ON/OFF

- Pressing the “CABIN MONITOR ON/OFF” button can turn ON or OFF the forward 15” LCD monitor (green = ON, amber = OFF).

5 - CABIN VIDEO SELECTION

- The “CABIN VIDEO SELECT” button can be used to select “VCR”, “DVD1” or “DVD2”, which will be displayed on the LED display. The VCR/DVD video will appear clear and sharp on the individual 6.5” monitor installed at the seat location.

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6 - SPEAKER AUDIO SELECTION

- Using the “SPEAKER AUDIO SELECT” switch, change the audio until the VCR, DVD1 or DVD2 audio can be heard from the forward cabin speakers. The audio source selected will be displayed on the LED display.

7 - SPEAKER ON/OFF

- Pressing the “SPEAKER ON/OFF” button can turn the forward cabin speakers ON or OFF (green = ON, amber = OFF).

8 - HEADSET AUDIO SELECTION

- Using the “HEADSET AUDIO SELECT” switch, change the audio until the VCR, DVD1 or DVD2 audio can be heard from headset. The audio source selected will be displayed on the LED display.

9 - PERSONAL VIDEO SELECTION

- The “PERSONAL VIDEO SELECT” button can be used to select “VCR”, “DVD1” or “DVD2”, which will be displayed on the LED display. The VCR/DVD video will appear clear and sharp on the individual 6.5” monitor installed at the seat location.

10 - CABIN TEMPERATURE CONTROLLER

- Pressing the “CABIN TEMP CONTROL” button presents the approximate cabin temperature (°F). With the “UP” and “DOWN” buttons cabin temperature can be adjusted.

11 - TABLE LIGHT

- The table light can be turned ON or OFF by pressing the “TABLE LIGHT” ON/OFF switch (green = ON, amber = OFF).

12 - AFT DOWNWASH LIGHTS

- The aft cabin downwash lights can be turned ON or OFF by pressing the “AFT DNWASH LIGHTS” ON/OFF switch (green = ON, amber = OFF).

13 - FORWAED DOWNWASH LIGHTS

- The forward cabin downwash lights can be turned ON or OFF by pressing the “FWD DNWASH LIGHTS” ON/OFF switch (green = ON, amber = OFF).

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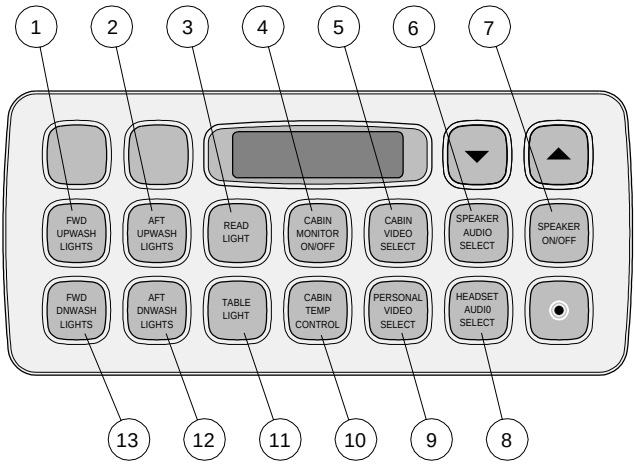

FORWARD VIP CONTROL PANEL (FORWARD VIP SEAT)

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FORWARD VIP SEAT PASSENGER CONTROL PANEL

AFT VIP CONTROL PANEL (OPTIONAL)

The aft VIP control panel is located in the left-hand side panel near the aft VIP seat (optional). There is a headset jack and volume/temperature “UP” and “DOWN” control buttons. The audio will correspond to the chosen video selection, however, it can be selected separately from the video. This panel has the ability to control the following items:

1 - FORWARD UPWASH LIGHTS

- The forward cabin upwash lights can be turned ON or OFF by pressing the “FWD UPWASH LIGHTS” ON/OFF switch (green = ON, amber = OFF).

2 - AFT UPWASH LIGHTS

- The aft cabin upwash lights can be turned ON or OFF by pressing the “AFT UPWASH LIGHTS” ON/OFF switch (green = ON, amber = OFF).

3 - READING LIGHT

- The reading light can be turned ON or OFF by pressing the “READ LIGHT” ON/OFF switch (green = ON, amber = OFF).

4 - SPEAKER AUDIO SELECTION

- Using the “SPEAKER AUDIO SELECT” switch, change the audio until the VCR, DVD1 or DVD2 audio can be heard from the forward cabin speakers. The audio source selected will be displayed on the LED display.

5 - SPEAKER ON/OFF

- Pressing the “SPEAKER ON/OFF” button can turn the forward cabin speakers ON or OFF (green = ON, amber = OFF).

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6 - HEADSET AUDIO SELECTION

– Using the “HEADSET AUDIO SELECT” switch, change the audio until the VCR, DVD1 or DVD2 audio can be heard from headset. The audio source selected will be displayed on the LED display.

7 - PERSONAL VIDEO SELECTION

– The “PERSONAL VIDEO SELECT” button can be used to select “VCR”, “DVD1” or “DVD2”, which will be displayed on the LED display. The VCR/DVD video will appear clear and sharp on the individual 6.5” monitor installed at the seat location.

8 - CABIN TEMPERATURE CONTROLLER

– Pressing the “CABIN TEMP CONTROL” button presents the approximate cabin temperature (°F). With the “UP” and “DOWN” buttons cabin temperature can be adjusted.

9 - TABLE LIGHT

– The table light can be turned ON or OFF by pressing the “TABLE LIGHT” ON/OFF switch (green = ON, amber = OFF).

10 - AFT DOWNWASH LIGHTS

– The aft cabin downwash lights can be turned ON or OFF by pressing the “AFT DNWASH LIGHTS” ON/OFF switch (green = ON, amber = OFF).

11 - FORWARD DOWNWASH LIGHTS

– The forward cabin downwash lights can be turned ON or OFF by pressing the “FWD DNWASH LIGHTS” ON/OFF switch (green = ON, amber = OFF).

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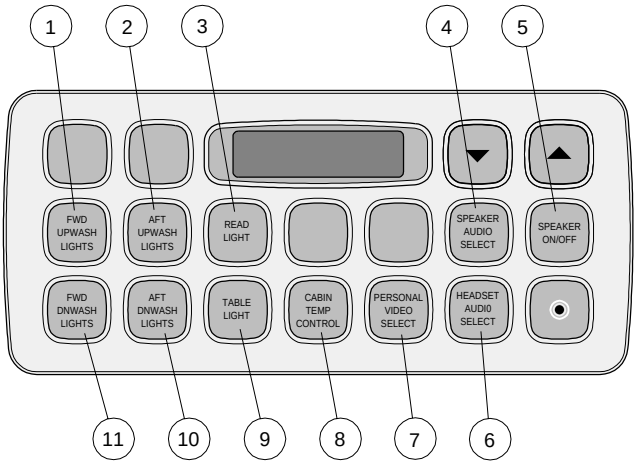

AFT VIP CONTROL PANEL (AFT VIP SEAT)

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AFT VIP SEAT PASSENGER CONTROL PANEL

ESCUTCHEONS

The escutcheons are provided to support the gasper air outlets, the oxygen box assemblies, the speakers and the reading lights.

There are two types of escutcheons. The first assembly comprises two reading lights, a speaker, and a speaker grill, while the second one comprises an oxygen box assembly installed in the middle of the escutcheon, a reading light, and a gasper air outlet. In the left-hand and right-hand escutcheons assemblies, the reading light and the gasper air outlet are positioned to establish symmetry between both sides of the aircraft.

The escutcheons are installed in the left-hand and right-hand valance panels in sets of three units each, one first escutcheon type between two second escutcheon type, above the seats of conference table and executive tables, the executive divan seat, and the credenza, for passengers comfort.

A second escutcheon type is installed in the lavatory valance panel.

The escutcheons provide the following services:

1 - READING LIGHTS.

2 - AIR GASPER.

3 - OXYGEN MASKS DISPENSING.

4 - LOUDSPEAKER FOR INTERNAL COMMUNICATION.

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CONTROLS AND INDICATORS

1 - READING LIGHTS

– Press the “READ LIGHT” button on the passenger seat control panel to turn the reading lights on. To control light direction, push the reading light in the direction illumination is desired.

2 - AIR GASPER

– Turn the nozzle that protrudes from the ball assembly to control the airflow volume. To control airflow direction, push the nozzle in the direction in which the airflow is desired.

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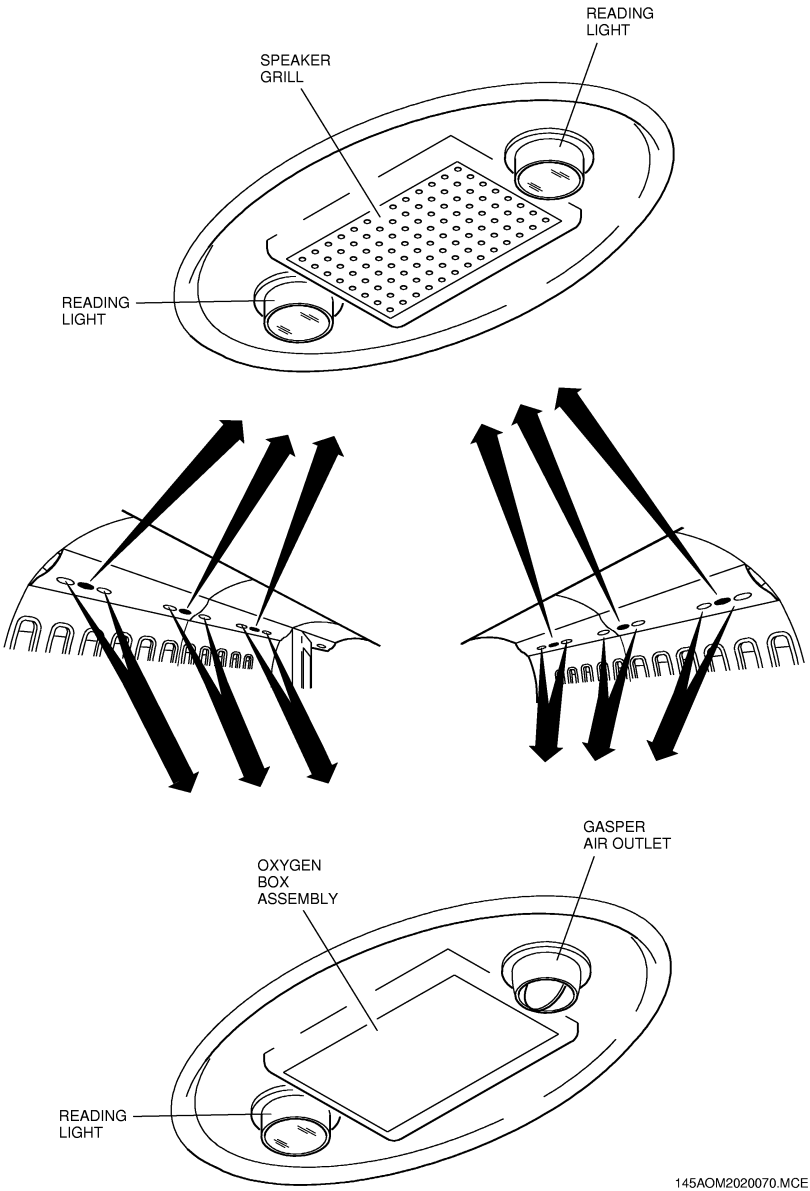
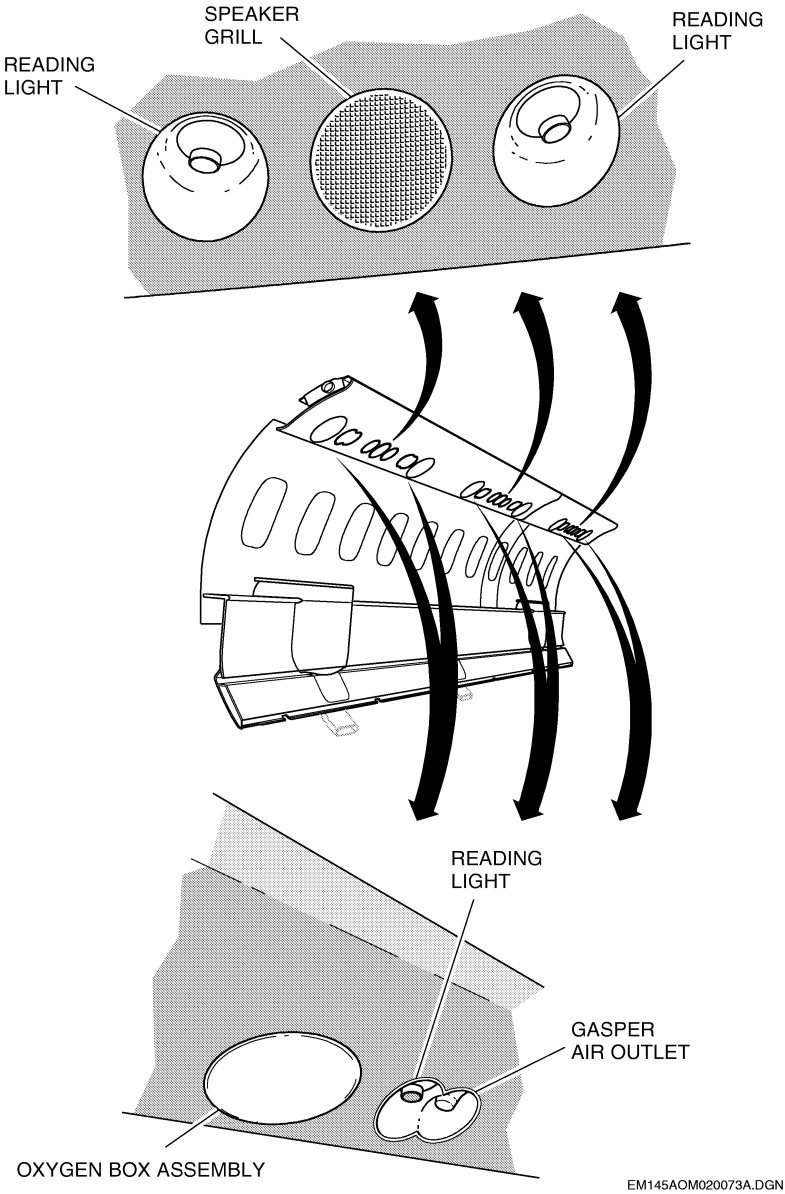


ESCUTCHEONS - COMPONENT LOCATIONS FOR AIPLANES UP TO S/N 1028 INCLUSIVE (EXCEPT S/N 997)



ESCUTCHEONS - COMPONENT LOCATIONS FOR AIPLANES S/N 997, 1029 AND ON

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CLOSETS

The LH (left-hand) forward closet, LH and RH (right-hand) closets, entertainment cabinet and credenza are used for stowage of passenger garments, miscellaneous items, life rafts, pillows, blankets, magazines, plug-in monitors and as a storage area for emergency equipment, umbrella, entertainment equipment and 110 V AC outlets.

The LH forward closet, LH and RH closets, entertainment cabinet and credenza are made of lightweight honeycomb panels and the exterior is covered with a decorative finish and laminate. The LH forward closet is located in the forward section of the passenger cabin area. The LH and RH closets are located in the forward section, next to the pocket door. The entertainment cabinet is located in the forward section in front of the galley. The credenza is located in the mid-section of the passenger cabin area.

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COMPONENTS

LH FORWARD CLOSET

The LH forward closet is composed of two hinged door assemblies, coat rod, life raft storage, and umbrella storage. The LH forward closet can storage a total of six umbrellas shelves. The interior of LH forward closet is accessed by means of two hinged door assemblies. The doors are held closed with latches.

The LCD monitor and the MHR infrared control system may be installed at the LH forward closet depending on the interior configuration.

The figure on the next page presents the LH forward closet components location.

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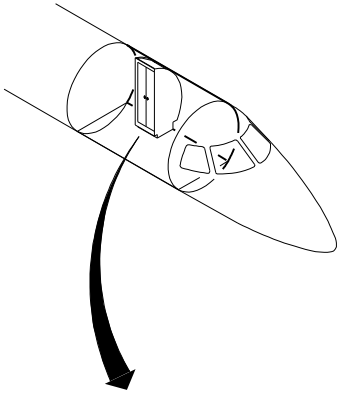

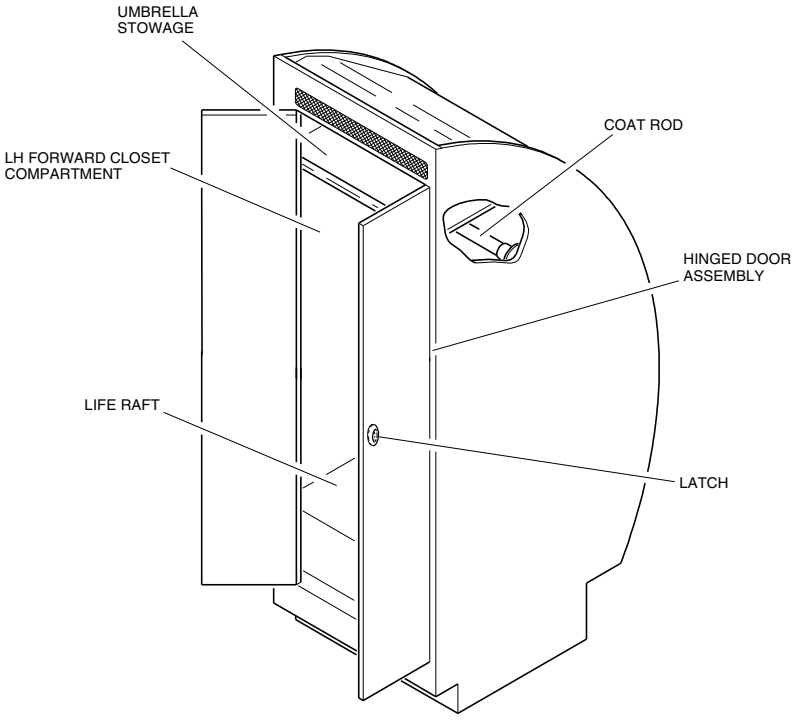

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LH FORWARD CLOSET COMPONENTS LOCATION

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LH AND RH CLOSETS

The LH and RH closets have a hinged door assembly and a coat rod. The door is held closed with a latch. These closets offer room for coats and miscellaneous storage. The LH closet contains LCD monitor, and the MHR infrared control system.

The RH closet is comprised of optional drawers, floor level warm outlets and ECS/decompression airflow outlets.

The figure on the next page presents the LH and RH closet components location.

NOTE: The LH and RH closets are only available for some passenger cabin layouts.

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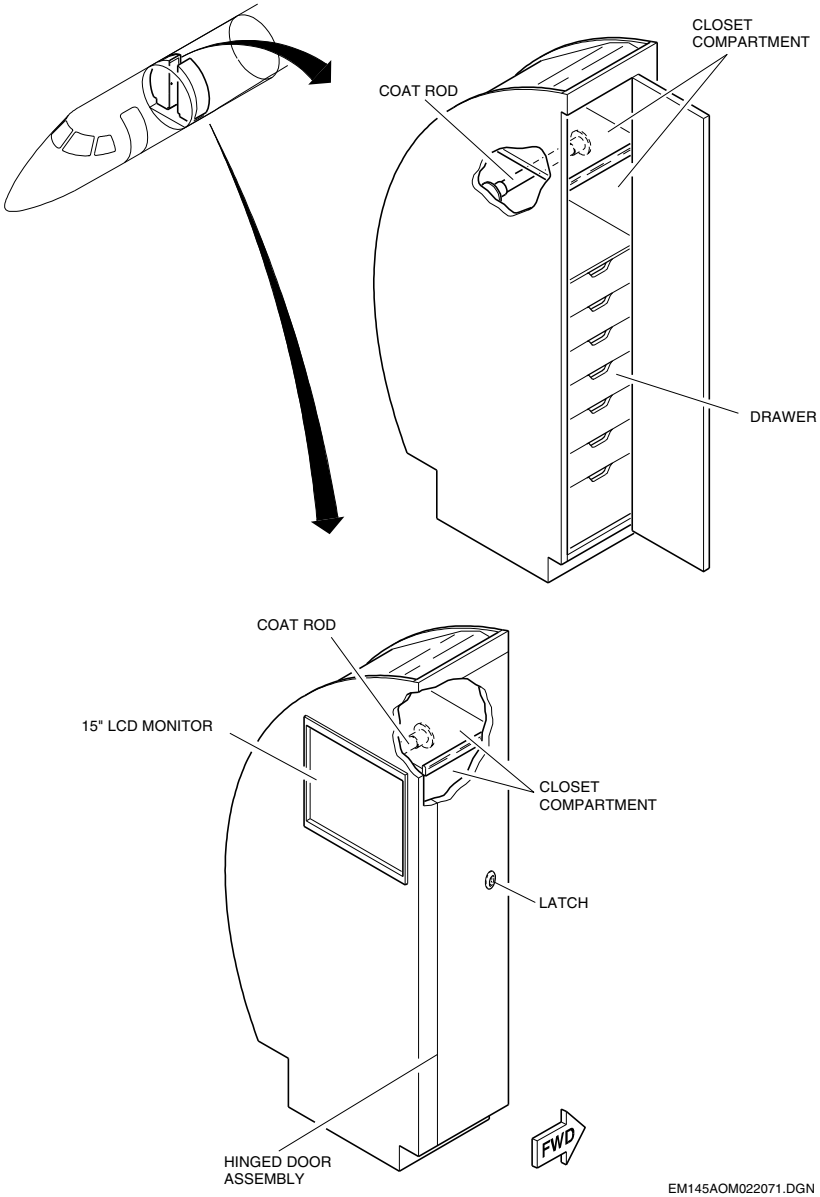

LH AND RH CLOSETS COMPONENTS LOCATION

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CREDENZA

The credenza has a magazine rack assembly and according to the interior arrangement there are three or four hinged door assemblies and eight or ten drawer assemblies installed. The doors and drawers are held closed with latches.

The credenza includes escape path light, room for soft storage (pillows and blankets), miscellaneous items, extra china and flatware storage, printer/fax machine, magazine, headphone, and life raft storage. It also possesses space provisions for a 10.4 inch pop-up LCD monitor, 110 V AC outlet for printer/fax machine, floor level warm air outlets and ECS/decompression airflow outlets.

The figures on the following pages present the credenza's components location.

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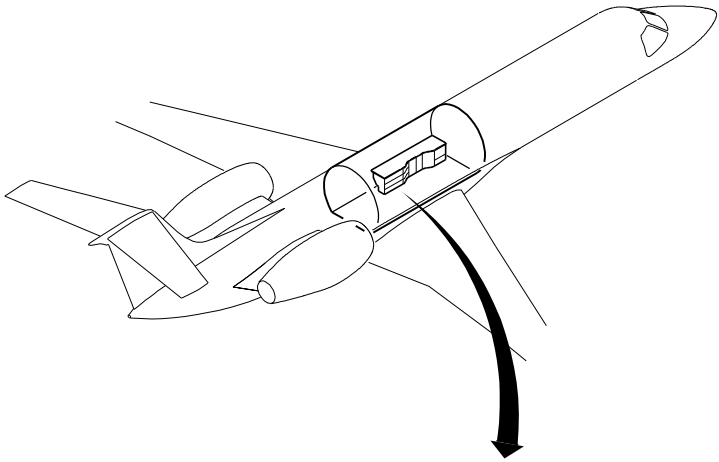

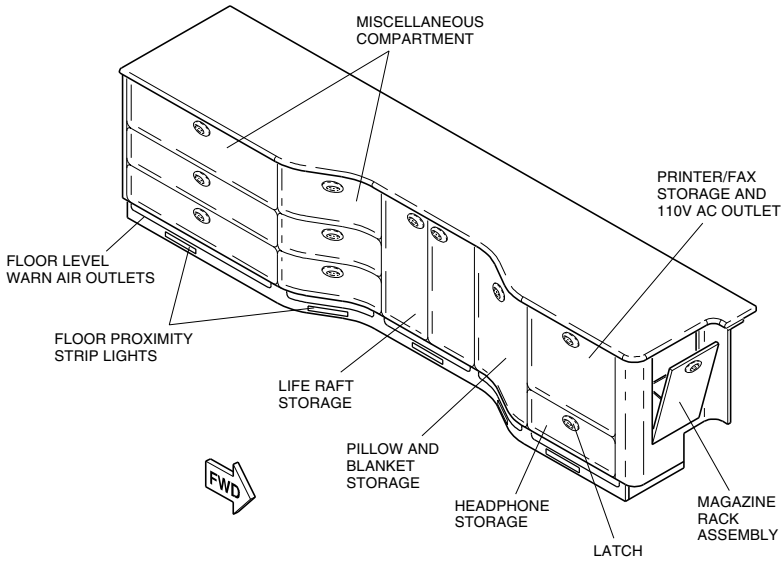

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CREDENZA COMPONENTS LOCATION (WITH THREE HINGED DOORS AND EIGHT DRAWER ASSEMBLIES)

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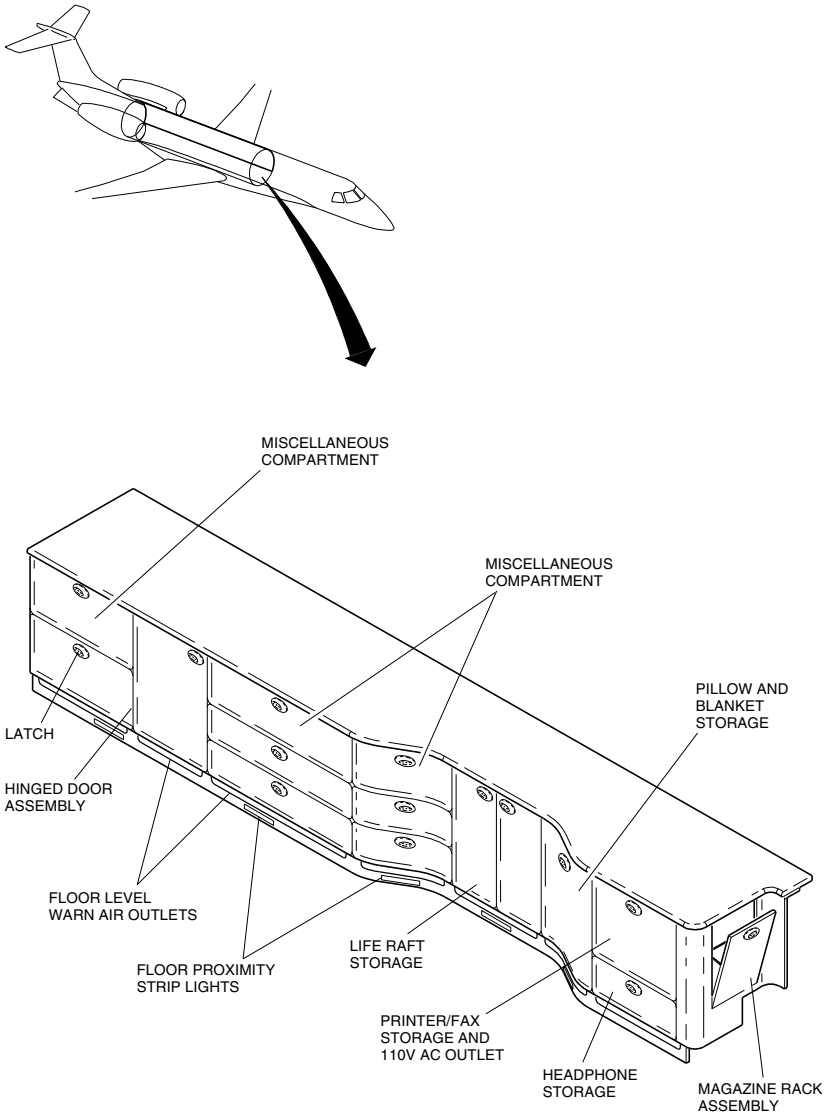

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CREDENZA COMPONENTS LOCATION (WITH FOUR HINGED DOORS AND TEN DRAWER ASSEMBLIES)

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ENTERTAINMENT CABINET

FOR AIRPLANES UP TO S/N 685 (INCLUSIVE)

The entertainment equipment rack, installed in the forward section of the passenger cabin area, has two storage compartments for emergency equipment, a vented storage compartment for AC-power static inverters and laptop controller interface, entertainment circuit breakers panel compartment, systems compartments, two DVD players, a video player, Airshow, SATCOM, clear ice, an entrance control panel, entertainment control panel, a media storage rack, protective breathing equipment (PBE), aisle lights and an area of ECS/decompression air outflow.

Three hinged-door assemblies and a removable panel give access to its interior. The doors are held closed with latches.

The following list presents the main components on the entertainment cabinet, and the figure provided on the next page shows the location of these components.

1 - MEDIA STORAGE RACK
2 - MASTER ENTERTAINMENT CONTROL PANEL
3 - ENTRANCE CONTROL PANEL
4 - MULTI-REGION DIGITAL VIDEO DISK PLAYER
5 - HANDSET
6 - MULTI-STANDARD VIDEO CASSETTE RECORDER
7 - FIRE EXTINGUISHER
8 - CLEAR ICE PROCESSOR
9 - AUDIO AMPLIFIER
10 - TEMPERATURE CONTROLLER
11 - MH PROGRAMMING INTERFACE
12 - PAX AC STATIC INVERTER
13 - MH INTERFACE
14 - PBE/SMOKE HOOK
15 - PORTABLE OXYGEN CYLINDER
16 - CRASH AXE WITH LEATHER POUCH
17 - FIRST AID KIT
18 - FLASHLIGHT
19 - ENTERTAINMENT CABINET CIRCUIT BREAKER PANEL
20 - MH CABIN CONTROLLER
21 - SATCOM
22 - AIRSHOW DIGITAL INTERFACE UNIT
23 - MH ENTERTAINMENT CONTROL PANEL

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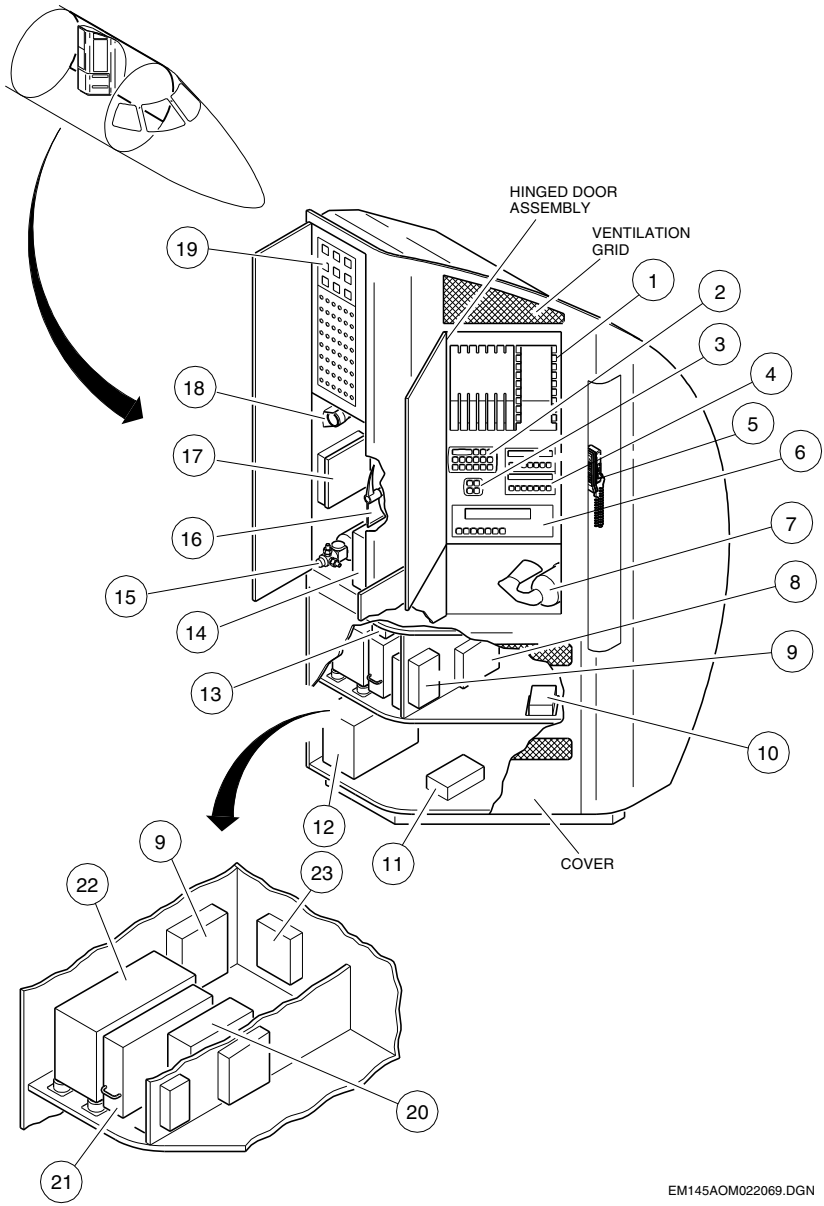

ENTERTAINMENT CABINET COMPONENTS LOCATION (FOR AIRPLANES UP TO S/N 685 (INCLUSIVE))

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FOR AIRPLANES FROM S/N 686 UP TO S/N 1028 AIRFRAMES (EXCEPT S/N 997)

The entertainment equipment rack has a storage compartment for emergency equipment, a vented storage compartment for AC static power inverter, a laptop controller interface, an entertainment circuit breakers panel compartment, system compartments, two DVD players, video player, Airshow, SATCOM, an entrance control panel, an entertainment control panel, a media storage rack, a PBE, and a curtain storage compartment. Three hinged-door assemblies and a removable panel give access to its interior. The doors are held closed with latches. The entertainment equipment rack is installed in the forward section of the passenger cabin area.

The following list presents the main components on the entertainment cabinet, and the figure provided on the next page shows the location of these components.

1 - MASTER ENTERTAINMENT CONTROL PANEL
2 - CD STORAGE RACK
3 - VIDEO STORAGE RACK
4 - ENTRANCE CONTROL PANEL
5 - FIRE EXTINGUISHER
6 - PROTECTIVE BREATHING EQUIPMENT
7 - PORTABLE OXYGEN CYLINDER AND MASK ASSY
8 - MEDICAL KIT
9 - DIGITAL VIDEO DISK PLAYER
10 - VIDEO CASSETE PLAYER
11 - CIRCUIT BREAKERS PANEL
12 - AUDIO AMPLIFIER 1
13 - COOLING FAN
14 - MH ENTERTAINMENT CONTROLLER
15 - SATELLITE DATA UNIT
16 - AIRSHOW DIGITAL INTERFACE UNIT
17 - AUDIO AMPLIFIER 2
18 - MH CABIN CONTROLLER
19 - MHP LAPTOP CONTROLLER
20 - MH INTERFACE CABIN MANAGEMENT
21 - MHR IRS
22 - TEMPERATURE CONTROLLER
23 - AC STATIC POWER INVERTER

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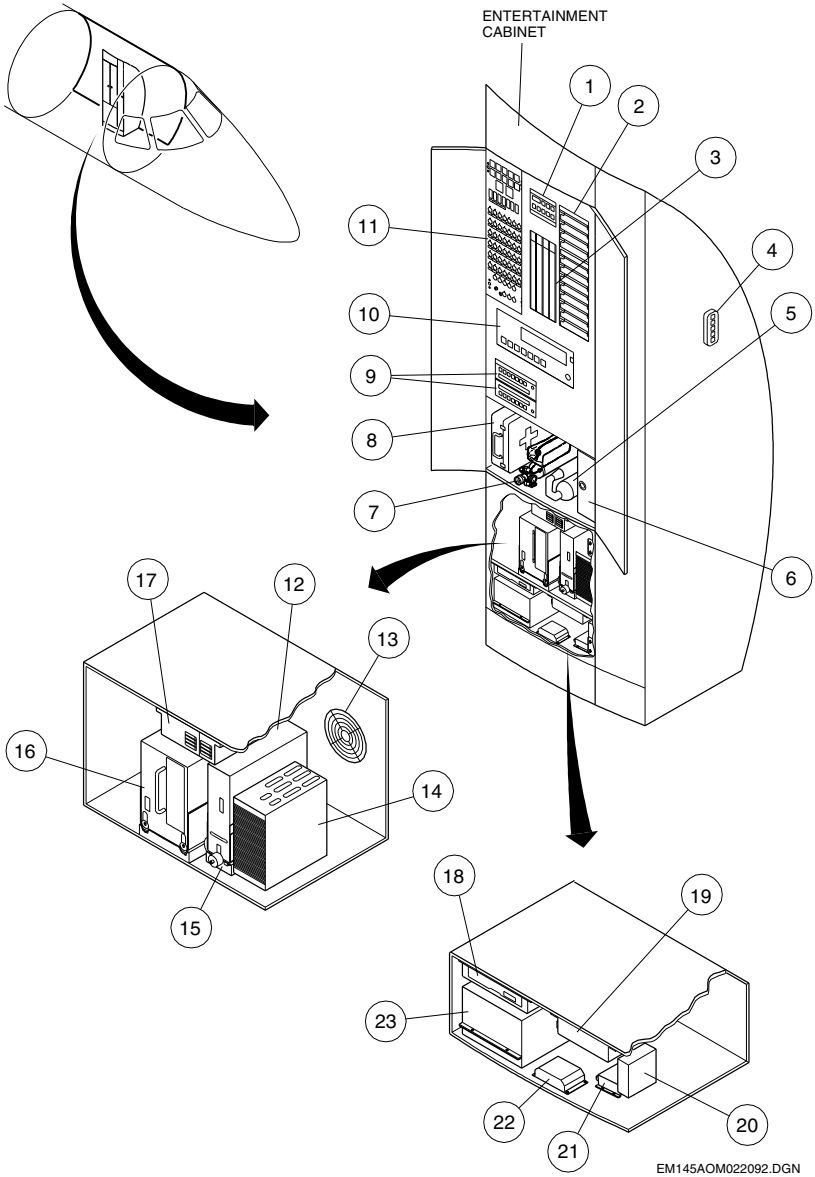

ENTERTAINMENT CABINET COMPONENTS LOCATION (FOR AIRPLANES FROM S/N 686 UP TO S/N 1028 AIRFRAMES (EXCEPT S/N 997))

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FOR AIRPLANES S/N 997, S/N 1029 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES

The entertainment equipment rack has a storage compartment for emergency equipment, a vented storage compartment for AC static power inverter, a laptop controller interface, an entertainment circuit breakers panel compartment, system compartments, two DVD players, video player, Airshow, SATCOM, an entrance control panel, an entertainment control panel, a media storage rack, a PBE, and a curtain storage compartment. Three hinged-door assemblies and a removable panel give access to its interior. The doors are held closed with latches. The entertainment equipment rack is installed in the forward section of the passenger cabin area.

The following list presents the main components on the entertainment cabinet, and the figure provided on the next page shows the location of these components.

1 - EMERGENCY LIGHTS CONTROL PANEL
2 - WATER HEATER TEST CONTROL PANEL
3 - GALLEY CONTROL PANEL
4 - ENTRANCE CONTROL PANEL
5 - MEDIA STORAGE RACK
6 - VIDEO STORAGE RACK
7 - VIDEO CASSETE PLAYER
8 - MASTER ENTERTAINMENT CONTROL PANEL
9 - DIGITAL VIDEO DISK PLAYER
10 - CD PLAYER
11 - CIRCUIT BREAKERS PANEL
12 - AUDIO AMPLIFIER 1
13 - COOLING FAN
14 - MH ENTERTAINMENT CONTROLLER
15 - SATELLITE DATA UNIT
16 - AIRSHOW DIGITAL INTERFACE UNIT
17 - AUDIO AMPLIFIER 2
18 - MH CABIN CONTROLLER
19 - MHP LAPTOP CONTROLLER
20 - MH INTERFACE CABIN MANAGEMENT
21 - MHR IRS
22 - TEMPERATURE CONTROLLER
23 - AC STATIC POWER INVERTER

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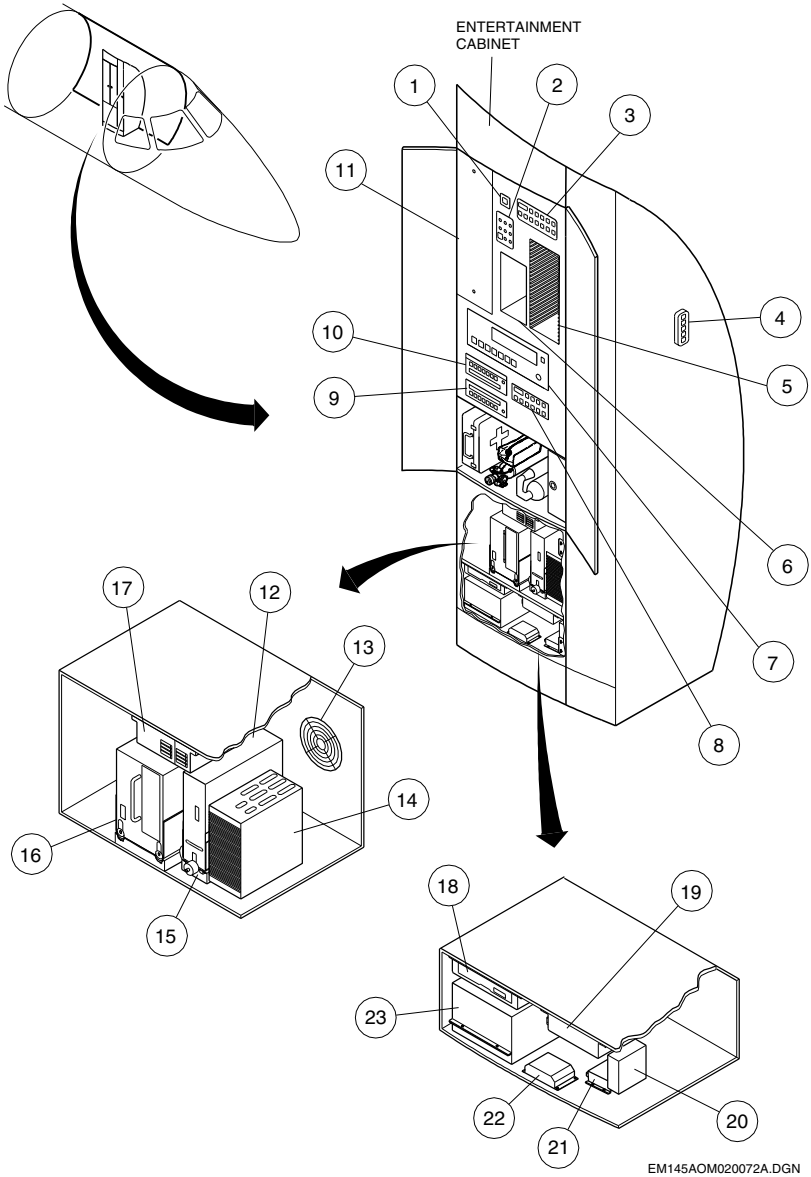

ENTERTAINMENT CABINET COMPONENTS LOCATION (FOR AIRPLANES S/N 997, S/N 1029 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES)

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CONTROLS AND INDICATORS

FOR AIRPLANES UP TO S/N 685 (INCLUSIVE)

ENTRANCE CONTROL PANEL

The entrance control panel controls the main door and entry courtesy lights.

The ENTRY LIGHTS ON/OFF push-button switch can turn ON or OFF the courtesy and stair lights. Pressing the ENTRY LIGHTS AUTO push-button switch, the courtesy and the stair lights will be ON when the main door is open.

The DOOR CLOSED push-button switch commands the main door to close and the DOOR BLOCKED indication shows when the main door is hydraulically blocked.

1 - ENTRY LIGHTS ON/OFF

- Press ENTRY LIGHTS ON/OFF to turn the courtesy and the stair lights ON/OFF.

2 - ENTRY LIGHTS AUTO

- Press ENTRY LIGHTS AUTO to turn the courtesy and the stair lights ON when the door is open.

3 - DOOR CLOSED

- Press DOOR CLOSED button to command the main door to close.

4 - DOOR BLOCKED

- When the DOOR BLOCKED indication becomes amber the main door actuator hydraulic line remains pressurized after door closing. In this case the main door is hydraulically blocked. Otherwise, when it becomes green the hydraulic actuator line is depressurized.

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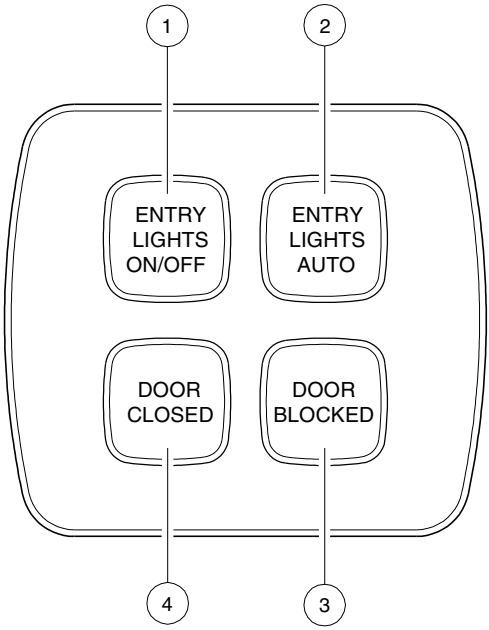

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ENTRANCE CONTROL PANEL CONTROLS AND INDICATORS (FOR AIRPLANES UP TO S/N 685 (INCLUSIVE))

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FOR AIRPLANES FROM S/N 686 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES)

ENTRANCE CONTROL PANEL

The entrance control panel controls the main door and entry lights. The airstair lights on/off push-button switch controls the stair lights; the step light on/off push-button switch controls the step light; and the area light on/off push-button switch controls the door area light. The airstair door close push-button switch controls the main door to close and the door blocked push-button switch commands the main door to block.

1 - AIRSTAIR DOOR CLOSE

– Controls the main door to close.

2 - DOOR BLOCKED

– Controls the main door to block.

3 - AIRSTAIR LIGHTS ON/OFF

– Controls the stair lights on/off.

4 - STEP LIGHT ON/OFF

– Controls the step light on/off.

5 - AREA LIGHT ON/OFF

– Controls the door area light on/off.

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MASTER ENTERTAINMENT CONTROL PANEL

6 - DISPLAY

– Monitors source selection.

7 - SPEAKER SELECTION INDICATION

– Indicates if the speaker is selected.

8 - FORWARD VIDEO SELECTION INDICATION

– Indicates if the forward video is selected.

9 - AFT VIDEO SELECTION INDICATION

– Indicates if the aft video is selected.

10 - TEMPERATURE

– Displayed in degrees Fahrenheit.

11 - MAP DISPLAY MODE (MAP, AUTO, LOGO, INFO)

– Selects the map modes of the Airshow.

12 - AFT LCD ON/OFF SWITCH

– When alternately pressed, turns ON or OFF the aft LCD.

13 - FORWARD LCD ON/OFF SWITCH

– When alternately pressed, turns ON or OFF the forward LCD.

14 - SPEAKER ON/OFF SWITCH

– When alternately pressed, turns ON or OFF the speaker.

15 - VOLUME UP KEY

– Increases the volume on the audio speakers.

16 - VOLUME DOWN KEY

– Decreases the volume on the audio speakers.

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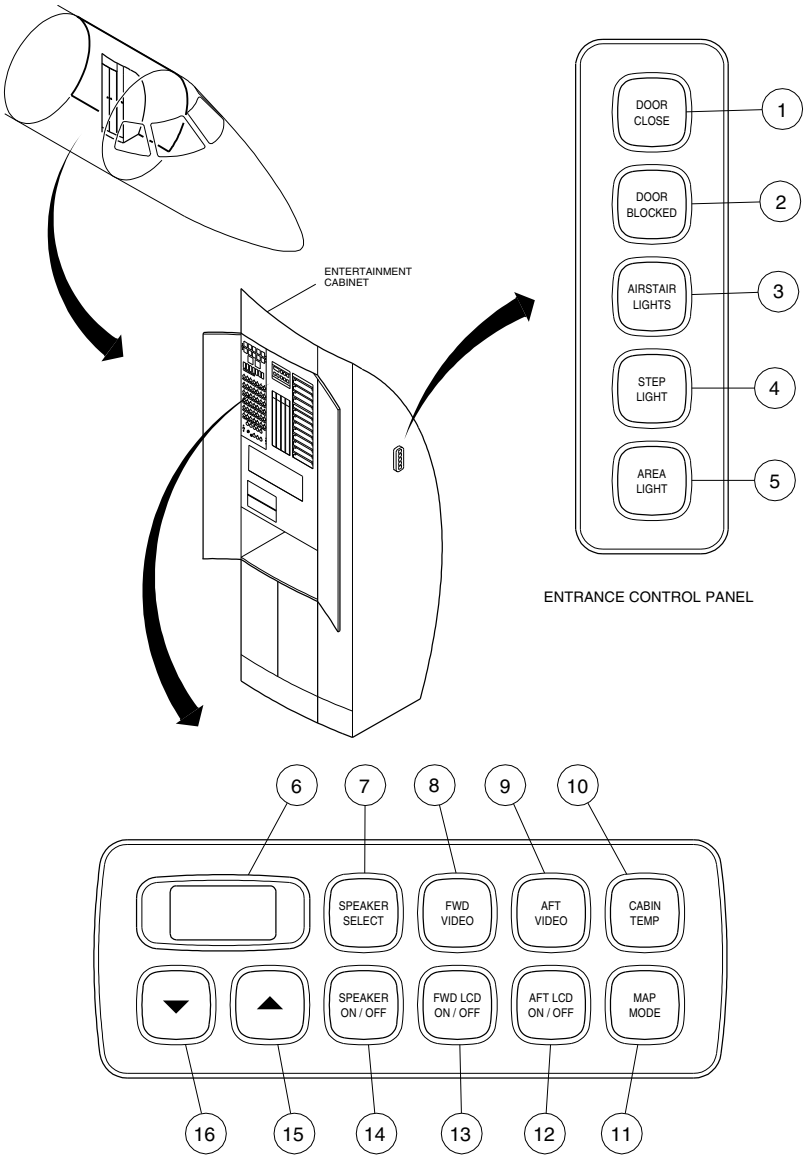

ENTRANCE/MASTER ENTERTAINMENT CONTROL PANELS (FOR AIRPLANES FROM S/N 686 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES)

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PARTITIONS

The partitions are used to separate the cockpit from the passenger cabin area, the forward galley area from forward passenger compartment, the forward passenger compartment from the aft passenger compartment, the lavatory from the passenger cabin area, and the lavatory from the baggage compartment.

The EMB-135BJ is equipped with the following partitions: Cockpit/passenger cabin partition, which separates the cockpit from the passenger cabin area with controllable access door between the two areas; the pocket door partition, which separates the forward galley area from forward passenger compartment and contains a sliding pocket door; the cabin partitions, which separates the forward passenger compartment from the aft passenger compartment; the toilet partition, which separates the lavatory from the passenger cabin area and incorporates a swing door; and the lavatory/baggage compartment partition, which separates the lavatory from the baggage compartment, and is also provided with a swing door that permits passage from one area to another.

The following figure shows the location of the partitions.

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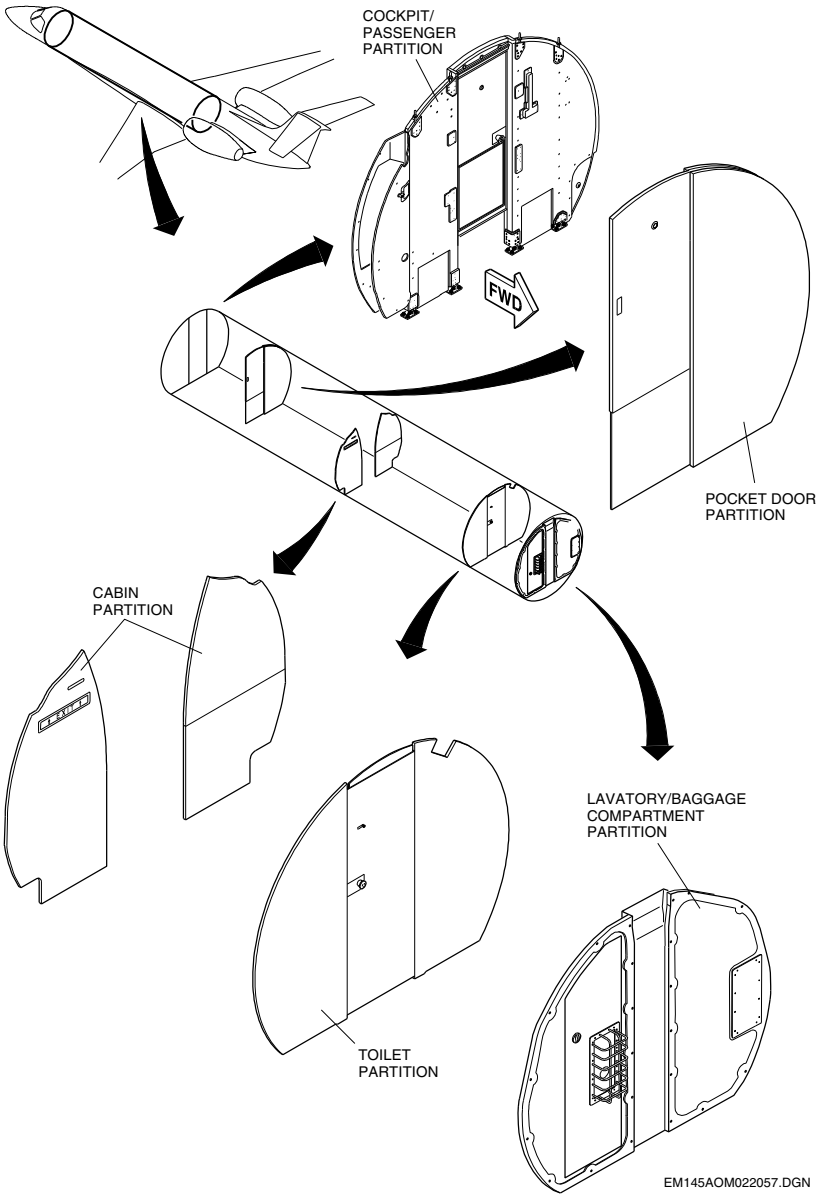

PARTITIONS LOCATION

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COMPONENTS

COCKPIT/PASSENGER CABIN PARTITION

The cockpit/passenger cabin partition possesses a cockpit door, LH and RH partitions.

The cockpit door assembly is composed of a blowout panel assembly and a door assembly. The door assembly contains a locking latch assembly and a viewer. Two strap assemblies keep the blowout panel assembly attached to the door in the event of a significant pressure increase or decrease in the aircraft. The peephole allows the cockpit occupants to see through the door assembly. The locking latch assembly engages a striker on the LH partition to secure the door when it is closed.

The cockpit/passenger cabin LH partition contains a striker and an electrical installation. The electrical installation possesses a harness assembly.

The cockpit/passenger cabin RH partition is provided with an access panel assembly that gives access to the relay box.

One blue light can be provided above the cockpit door to advise when the cockpit is to be shut out. This light is commanded through the STERILE light switch located at the overhead panel.

The figure on the next page presents the location of the cockpit/passenger cabin partition components.

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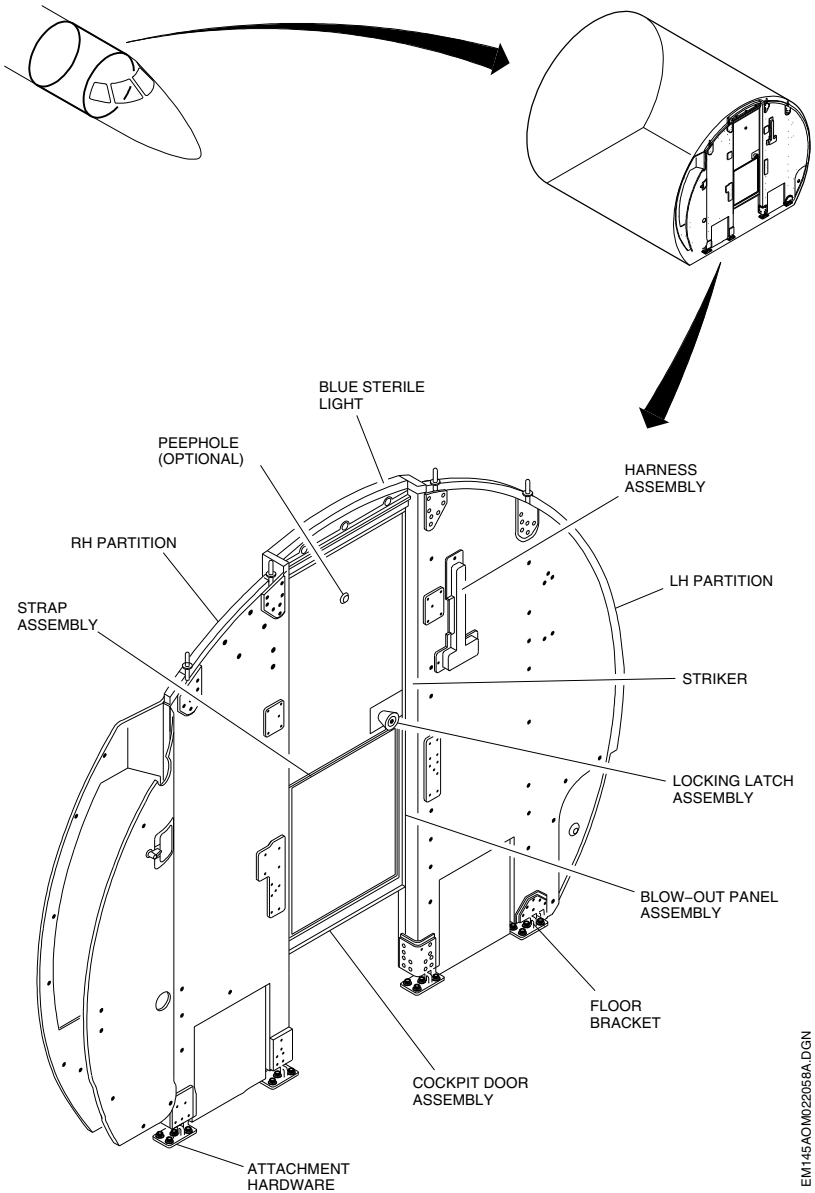

COCKPIT/PASSENGER CABIN PARTITION COMPONENT LOCATIONS

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POCKET DOOR PARTITION

The pocket door partition is a decorative lightweight panel assembly installed with fasteners to the forward galley.

The function of the pocket door is to reduct noise level and to provide privacy to the passenger cabin area.

There are two types of pocket door partitions, which are the single and dual sliding pocket door.

Both pocket doors open by a lateral sliding movement and have a locking mechanism to lock the door in the open position for takeoffs and landings.

The figures on the next pages present the two types of pocket doors and their partition components.

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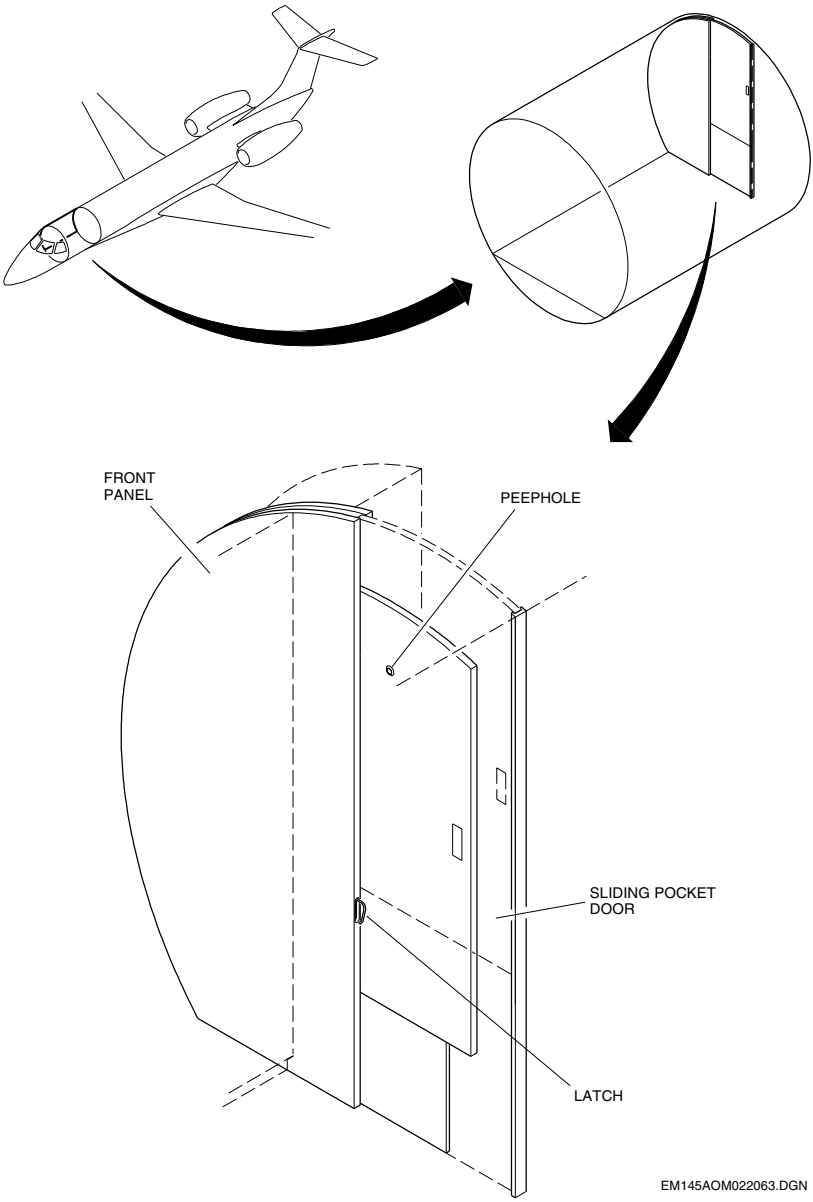

SINGLE POCKET DOOR PARTITION COMPONENT LOCATIONS

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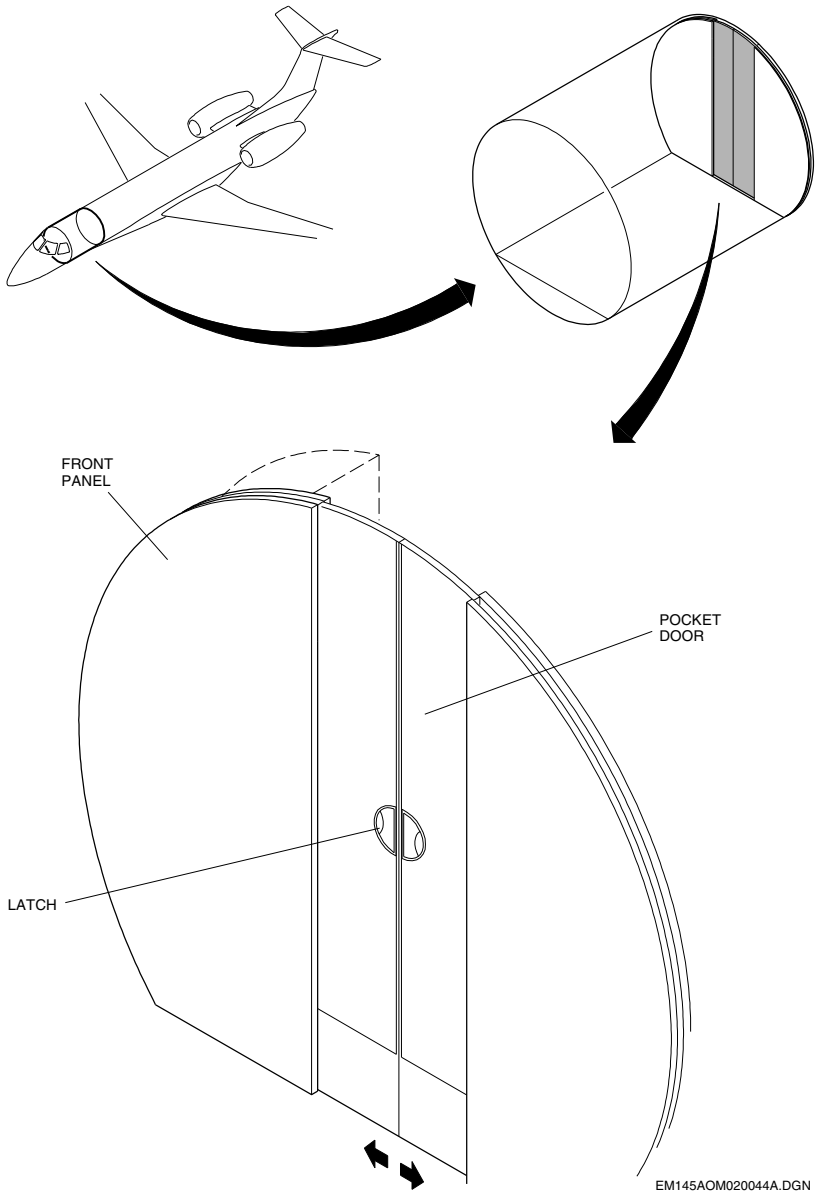

DUAL POCKET DOOR PARTITION COMPONENT LOCATIONS

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CABIN PARTITION

The cabin partition has a LH partition, a RH upper partition, and a RH lower partition made of decorative honeycomb panels. They are also lined with a gloss and veener coat that gives this partition a decorative finish. The panels are tapered at the top to provide an "open" appearance. The LH partition is provided with "EMERGENCY EXIT", "NO SMOKING", and "FASTEN SEATS BELTS" signs on both sides.

The RH partition is removable.

CAUTION: DURING TAXING, TAKEOFF AND LANDING OPERATIONS, THE UPPER CABIN PARTITION MUST BE REMOVED WHEN IT IS EXPECTED TO HAVE A PASSENGER SEATED IN THE DIVAN FORWARDMOST POSITION.

The figure on the next page presents the location of cabin partition components.

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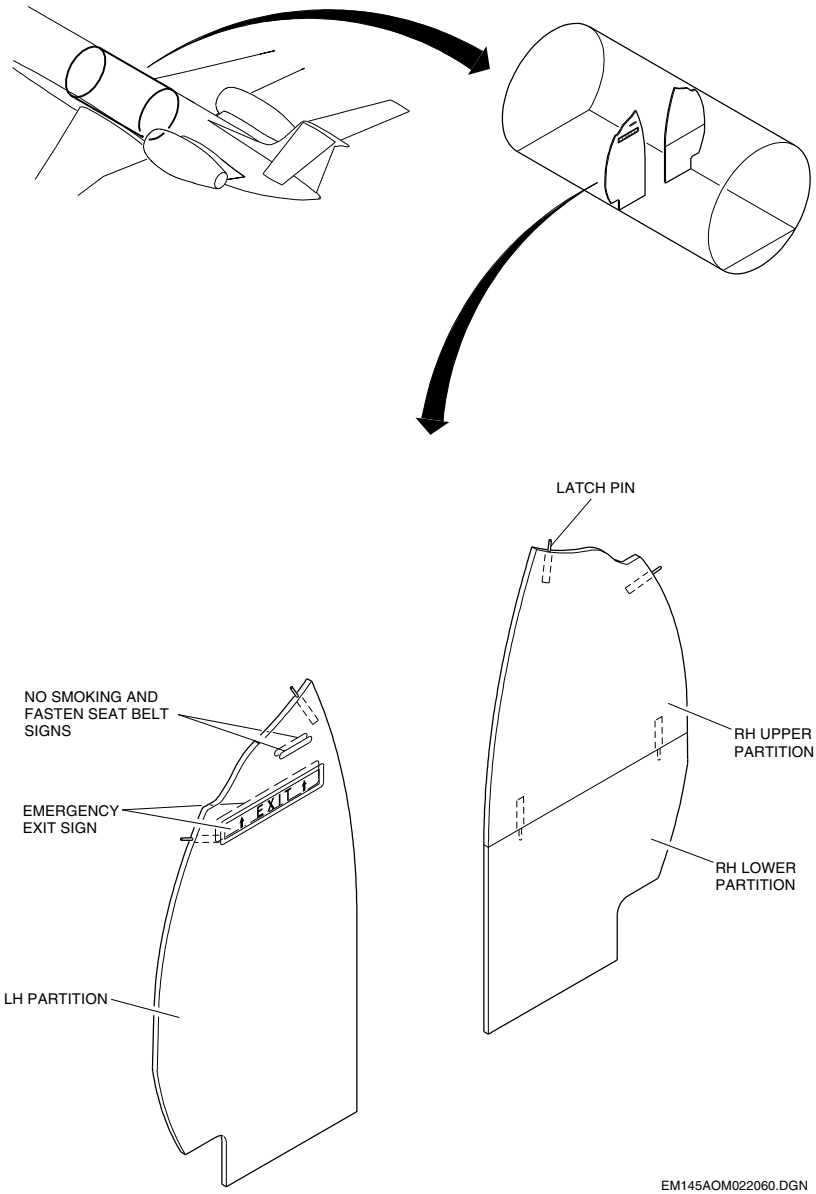

CABIN PARTITION COMPONENT LOCATIONS

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TOILET PARTITION

The toilet partition has a LH partition, a RH partition, and a swing door made of decorative honeycomb panels installed at the rear of the passenger cabin area. The toilet partition is lined with a gloss and veener coat. The doorknobs and latch are gold plated. The double swing door is a two-way operable door and contains a door pop-up header, and a doorknob with "VACANT/OCCUPIED" sign controlled by a slide bolt that can be overridden from the cabin side.

The LH partition includes "NO SMOKING" and "FASTEN SEAT BELTS" signs.

The figure on the next page presents the location of the toilet partition components.

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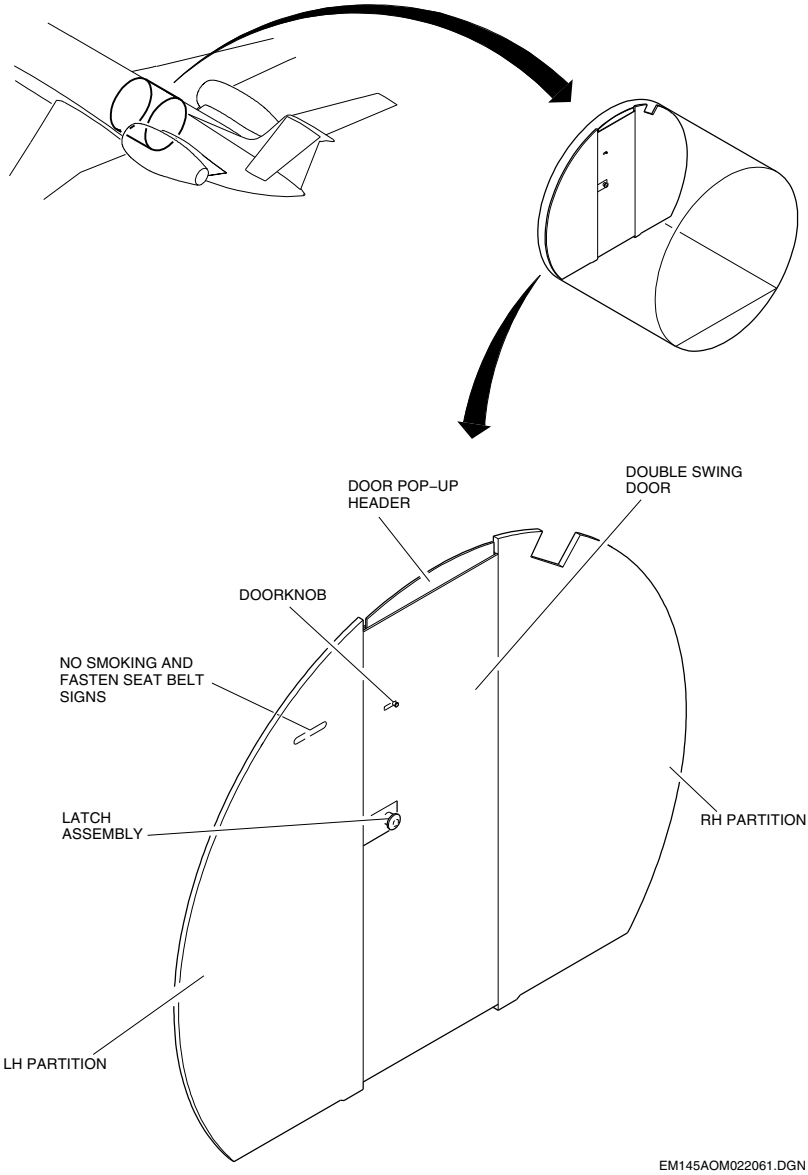

TOILET PARTITION COMPONENT LOCATIONS

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LAVATORY/BAGGAGE COMPARTMENT PARTITION

The lavatory/baggage compartment partition is composed of LH and RH partitions. The LH partition contains a baggage compartment door and a baggage lights control panel that is turned ON/OFF in the lavatory.

The baggage lights control panel controls the two incandescent lights of the baggage compartment.

The forward surface, including the door, lined with a gloss and veneer coat that gives this partition a decorative finish. The aft side of the lavatory/baggage compartment partition is lined with gross-point fabric. The baggage compartment door contains a latch mechanism, a blowout panel assembly, a guard assembly, and a peephole (one-way into the baggage area). The latch mechanism allows the door to be opened from the baggage compartment interior.

The guard assembly is made of a metallic structure and is designed to catch the blowout panel assembly should this panel be blown-out. Within the guard assembly, there are two lanyards that keep the blowout panel attached to the door if a remarkable pressure difference occurs between the lavatory and the baggage compartment.

The lavatory/baggage compartment partition also contains a microswitch that provides an EICAS message indicating door open status.

The figure on the next page presents the location of the lavatory/baggage compartment partition components.

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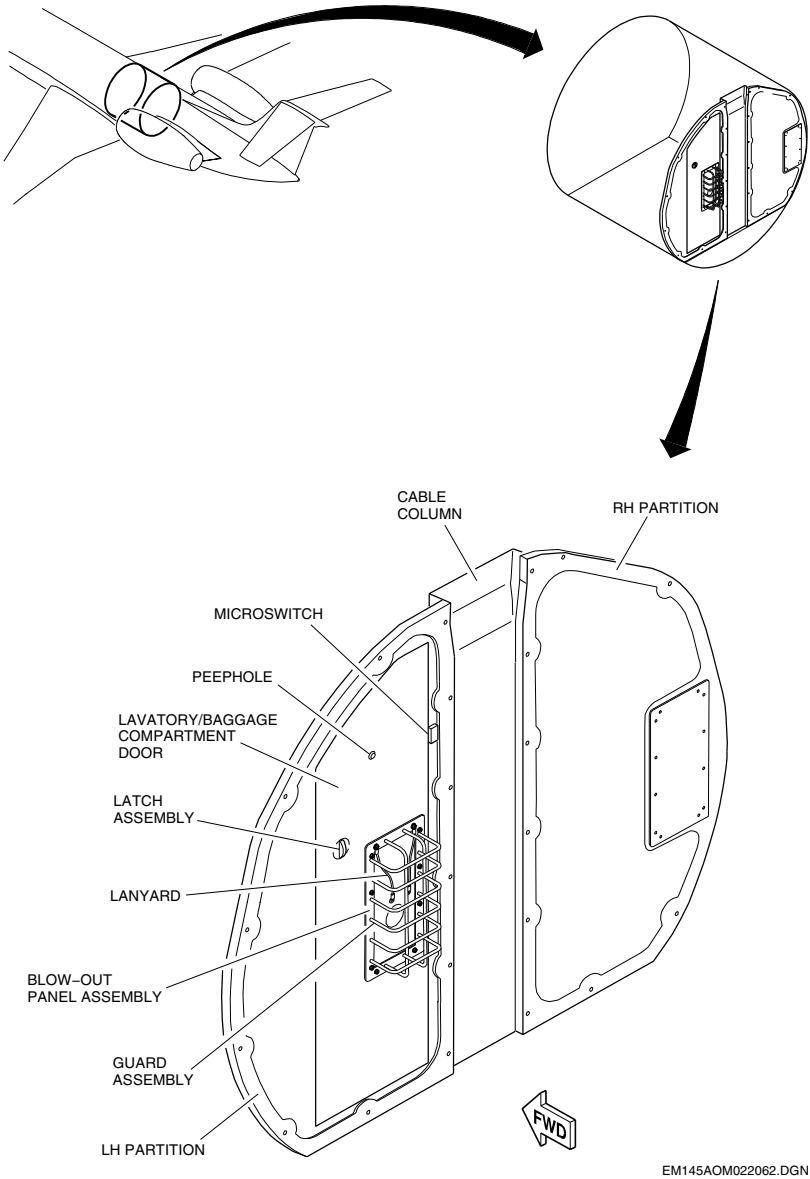

LAVATORY/BAGGAGE COMPARTMENT PARTITION COMPONENT LOCATIONS

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CONTROLS AND INDICATORS

1 - RELAY BOX ACCESS PANEL

- To operate the relay box panel on the LH partition located at the cockpit/passenger cabin partition, access through the life vest compartment is required.
- To operate the relay box panel on the RH partition located at the cockpit/passenger cabin partition, access through the forward galley is required.

2 - POCKET DOOR

- To open the pocket door, release the latch and smoothly slide it through the tracks without binding or hesitation to the RH side.
- To close the pocket door, smoothly slide it through the tracks without binding or hesitation to the LH side and fit the latch.

The figure on the next page presents the operation of the pocket door.

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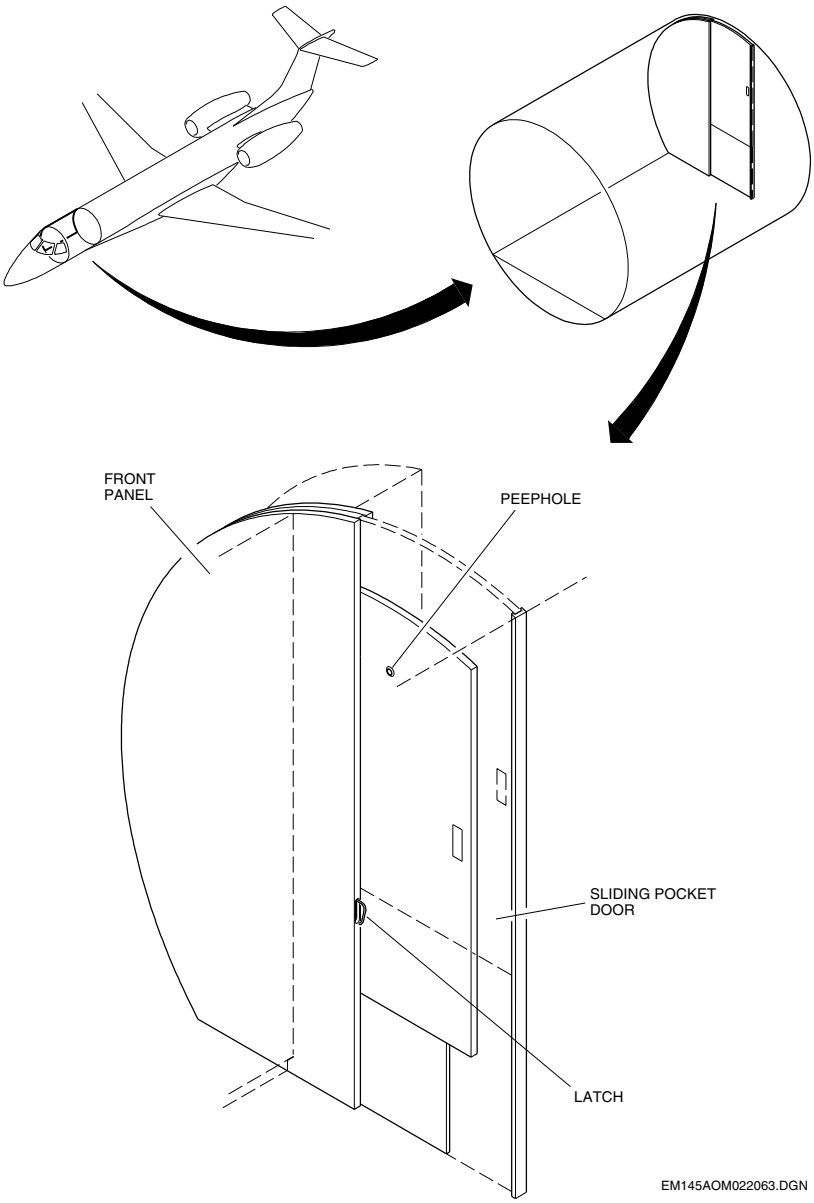

POCKET DOOR OPERATION

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WATER AND WASTE

The water and waste system has three sub-systems:

– The potable water supply system.

– The water/waste drain system.

– The toilet waste system.

In the lavatory compartment there is a washbasin unit and a toilet assembly, while in the forward galley there is a washbasin unit installed. Some airplanes may be equipped with a forward lavatory, where there is a washbasin unit and a toilet assembly, supplied with an independent water system.

Each washbasin unit supplies drinking water through pressurized water lines, and drains wastewater overboard by differential pressure.

The water/waste drain system routes wastewater from the lavatory and galley washbasin units and other sources to the overboard water/waste drain ports.

In the case of forward lavatory, the water/waste is drained to the forward lavatory waste tank. This waste tank is serviced by inside the forward lavatory.

The waste tank unit contains a liquid disinfectant that cleans the bowl through cycling. The system also has an arrangement for odor exhausting from the toilet assembly.

The toilet waste system provides sanitary means to collect toilet waste for proper disposal when the airplane is on the ground.

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WATER

FOR AIRPLANES UP TO S/N 685 (INCLUSIVE)

The water system stores water for drinking and washing purposes in a pressurized and freeze-protected tank. It assures no contamination of the water by being made up of stainless-steel components and using two water filter units installed near the water tank.

It supplies the washbasin with water at ambient cabin temperature and heated water through the supply lines, which connect the tank to the washbasin faucets, every time and while the faucets are in use.

The water system control panel is installed in the forward galley to provide status indication and control for the water system.

Water servicing is done through the external water service panel, on the lower rear right side of the wing-to-fuselage fairing, which allows the supply of water to the tank and drain, if necessary with heated nipples with caps (fill and overflow), switches, drain valve, and a control cable.

The nipples mounted on the external service panel are directly connected to the tank through stainless-steel tube assemblies and hoses.

There is a back drain valve that provides means to drain the water system during ground servicing. A drain switch located on the water service panel actuates the valve.

Each washbasin, one in the galley and the other in the lavatory compartment, has a manual isolation shutoff valve, a water heater, and a hot/cold water faucet. In the event of a water leak, the washbasins can be shut-off by closing the isolation valves. The water heaters provide hot water for the faucets.

In order to prevent freezing during high-altitude, long-duration flights, there is an external electric heater blanket on the water storage tank and two types of electric heaters for the water distribution lines, which are the inner-line heater and the heated hose.

Electric heaters are also installed on the fill and the vent-overflow ports on the water service panel.

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FOR AIRPLANES FROM S/N 686 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES

Before any service is performed on the water system, the operator needs to ensure that the system is de-energized at the water control panel located in the upper aft Galley, upper right hand cabinet door.

NOTE: It is recommended that the Water System be drained if the airplane is expected to stay overnight in an environment below the freezing point of water.

The water system stores water for drinking and washing purposes in two pressurized and freeze-protected tanks, one located in the upper forward galley, the other in the upper portion of the aft lavatory. Both tanks employ stainless-steel components and water filter units, which inhibit water contamination.

The galley and aft lavatory tanks supply the washbasin with water at the ambient cabin temperature and heated water through the supply lines, which connect the tank to the washbasin faucets, every time and while the faucets are in use.

The water system control panel is installed in the forward galley to provide status indication and control for the water system.

Water servicing is done through two external water service panels, one on the lower rear right side of the wing-to-fuselage fairing and the other on the lower front right side of the wing. Both allow the supply of water to the tanks and drain, if necessary with heated nipples with caps (fill and overflow), switches, drain valve, and a control cable.

For the optional forward lavatory, the Water System is serviced from inside the forward lavatory compartment. Water is stored in a water tank that supplies the forward lavatory washbasin.

The nipples mounted on each external service panel are directly connected to the associated tank through stainless-steel tube assemblies and hoses.

There is a back drain valve that provides the means to drain the water system during ground servicing. The valve is actuated by a drain switch located on the water service panel.

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Each washbasin, one in the galley and the other in the lavatory compartment, has a manual isolation shutoff valve, a water heater, and a hot/cold water faucet. In the event of a water leak, the washbasins can be shut-off by closing the isolation valves. The water heaters provide hot water for the faucets.

In order to prevent freezing during high-altitude, long-duration flights, there is an external electric heater blanket on each water storage tank and two types of electric heaters for the water distribution lines, which are the inner-line heater and the heated hose.

Electric heaters are also installed on the fill and the vent-overflow ports on each water service panel.

FOR AIRPLANES FROM S/N 997, 1039 AND SUBSEQUENT AIRFRAMES

The water system is exactly the same as for airplanes S/N 686 (inclusive) and subsequent airframes, except for the increased upper forward galley tank capacity.

For water tank capacity, refer to Section 1-06-20.

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FOR AIRPLANES FROM S/N 686 TO S/N 1143 (POST-MOD. SB 145LEG-38-0035)

In order to check the level of water inside the galley and aft lavatory potable-water tanks, the flight crew have to enable the system via a water-level controller pushbutton, which is installed in the IFE rack. This procedure must always be performed before checking the water level inside potable-water tank.

By pressing and releasing the water-level controller pushbutton, which is a momentary pushbutton, the water level controller will be energized.

NOTE: After pressing the water-level controller pushbutton it will be necessary to wait 5 minutes before checking the water level inside potable water tank.

The water-level controller pushbutton has an illuminated "AVAIL/IN USE" indication, in order to provide to the flight crew the feedback of the action taken, that is, the verification of level of water inside the potable water tank, through water system control panel.

The "AVAIL" indication stays illuminated in standby mode. As soon as the water-controller pushbutton is pressed, consequently, the "IN USE" indication goes on. It will remain illuminated for approximately 10 minutes.

The water level controller will automatically turn off, after 10 minutes, with no additional action from the flight crew. As soon as the water level controller is turned off, the "AVAIL" indication comes on.

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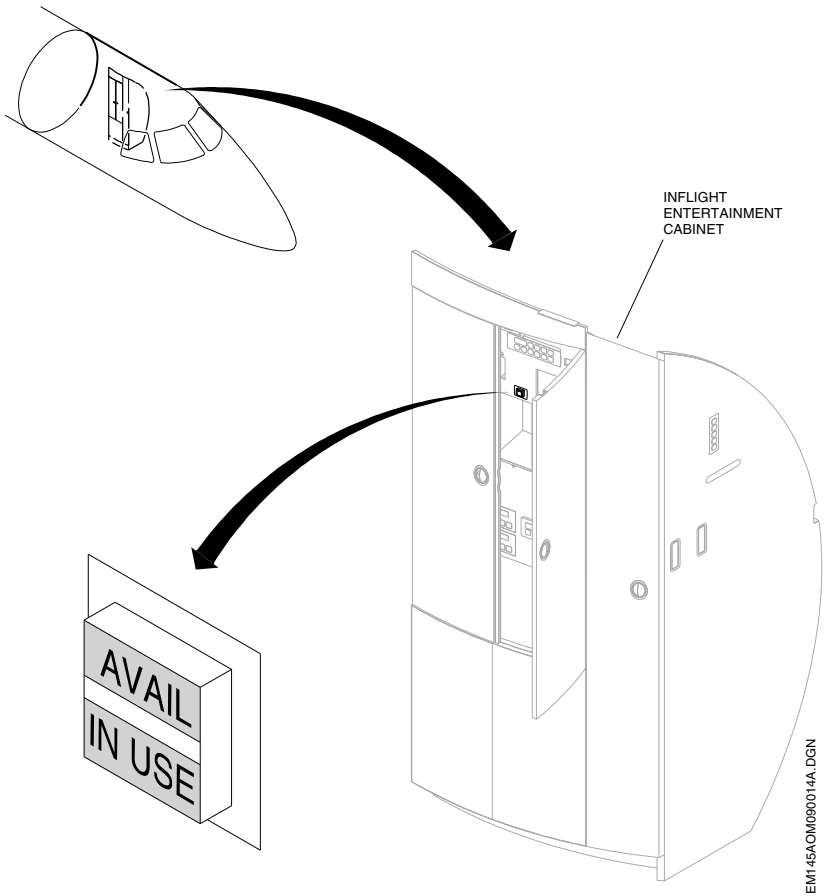

WATER-LEVEL CONTROLLER PUSHBUTTON LOCATION

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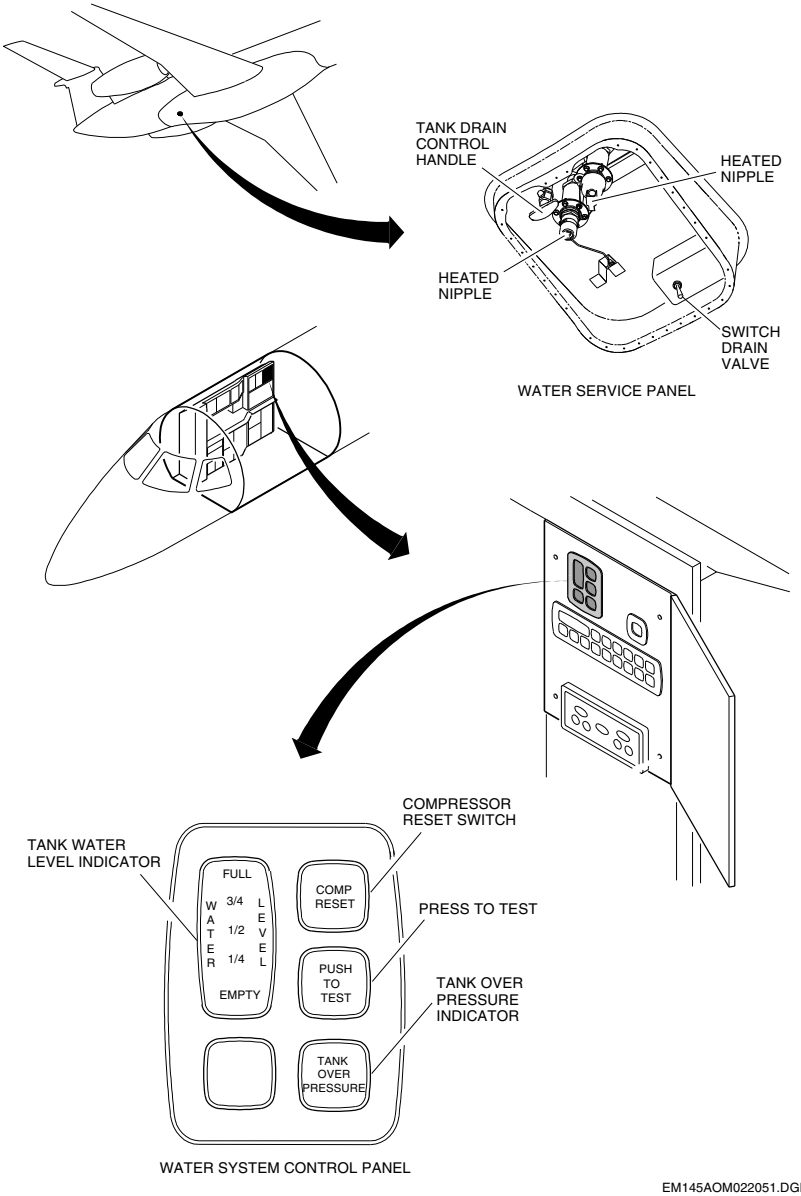

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WATER SYSTEM CONTROL AND SERVICE PANELS

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WASTE DISPOSAL

The waste system consists of an electrically-operated self-contained recirculation toilet unit, which collects and stores human waste in an internal holding tank. Adequate chemical products are used to disinfect and deodorize the waste holding tank.

A vent line connecting the waste holding tank to the exterior performs its ventilation (odors exhaust) by means of differential pressure.

Toilet flushing is initiated by pressing and releasing the flush button adjacent to the toilet. This button actuates a motor-driven pump and filter, which delivers flushing fluid for a pre-timed interval.

A restrictor at the bowl bottom prevents waste material return when it is carried directly to the tank.

A waste service panel on the lower rear right side of the fuselage is equipped with a control cable, a waste drain valve and a rinse nipple with cap, and allows the waste system to be serviced.

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MENU
PREVIOUS
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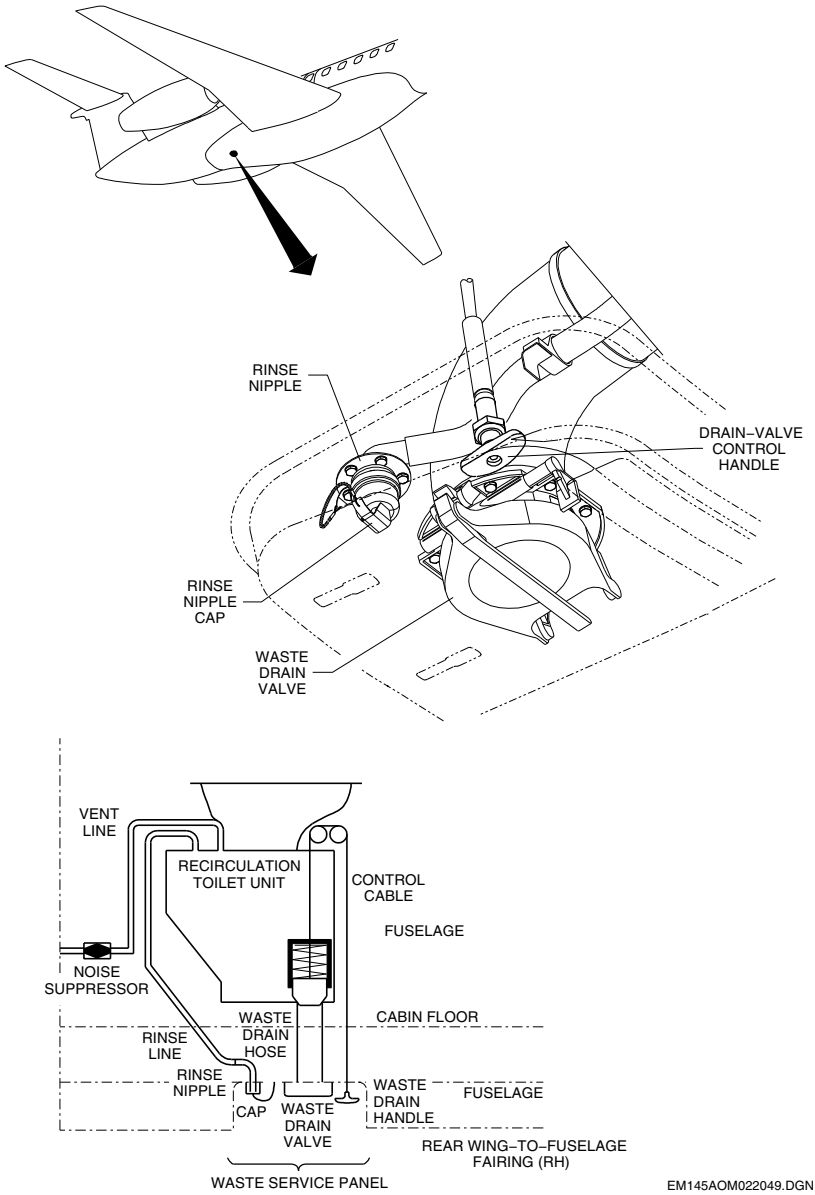

WASTE SERVICE PANEL LOCATION AND SCHEMATIC DIAGRAM

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FORWARD LAVATORY

The optional forward lavatory has its own separated waste system, which consists of an electrically-operated self-contained recirculation toilet unit, which collects and stores human waste in an internal holding tank. Adequate chemical products are used to disinfect and deodorize the waste holding tank.

The forward lavatory waste servicing is done by taking out the waste tank from inside the lavatory.

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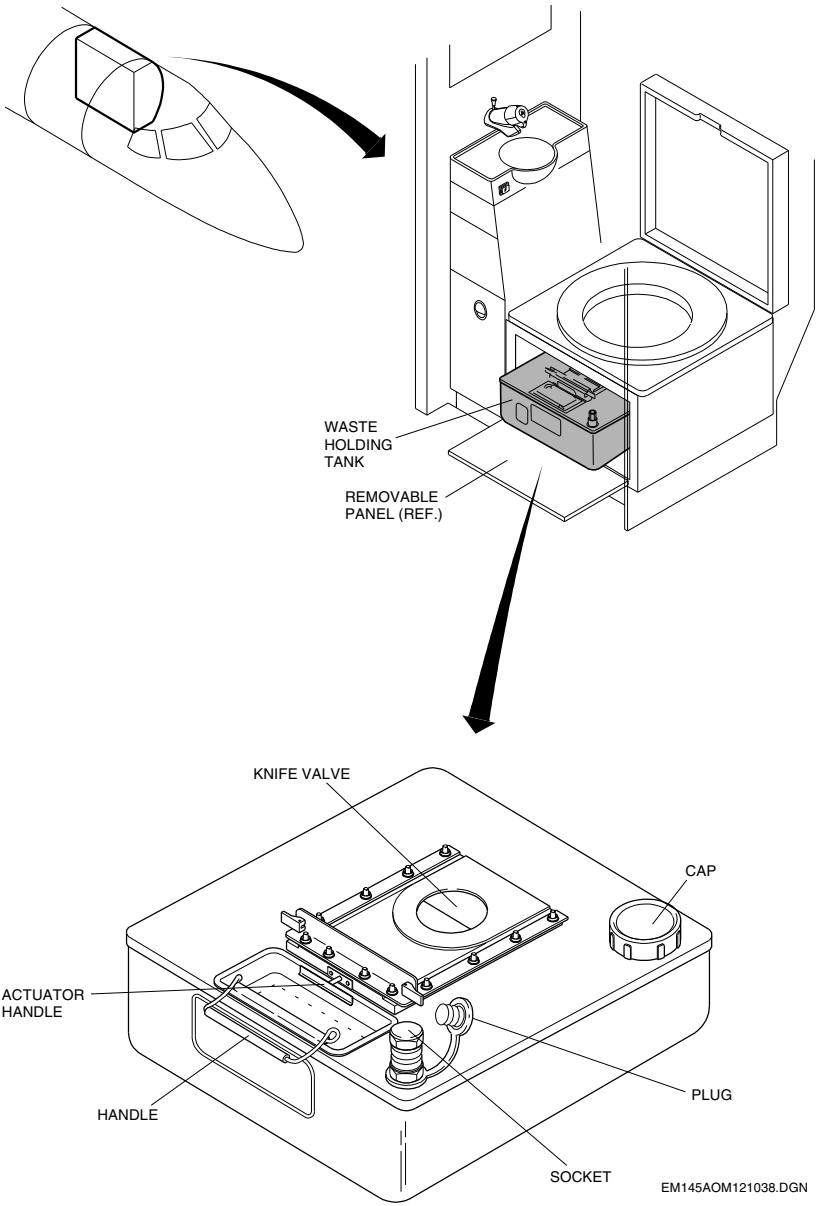

FORWARD LAVATORY (WASTE DISPOSAL)

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AIRSTAIR MAIN DOOR

The airplane is provided with one main entry door located at the left forward fuselage section and is designed as type I door.

The main door, incorporating folding airstairs, is hinged at its lower edge. The door is raised under normal operation conditions by two hydraulic door actuators powered by hydraulic system 1 or by an accumulator with sufficient capacity for three complete door operation cycles.

The door opening operation is manual. The hydraulic circuit damping function allows a smooth operation when the door is lowered.

The system may be controlled from inside or outside the airplane, respectively through the internal main door control panel, which is part of the entrance control panel, or through the exterior main door control panel.

The internal main door control push-button DOOR CLOSED is located in the internal main door control panel. The external main door control push-button PRESS CLOSE DOOR is located behind an access panel on the lower left-hand side of the door´s lower edge.

The door may also be closed and locked by raising it manually, by an outside ground attendant, actuating either the inner or the outer handle.

An alternative main door opening valve is provided in the cockpit to allow the main door to be lowered if it is blocked by hydraulic system pressure (selector valve failure).

NOTE: - No more than three persons should be standing on the doorsteps simultaneously.

- If the need arises, a person may be carried into and out of the airplane by two people provided there is at least one load-free step between the carriers and the sum of the weight of the three people is no more than 231 kg (509 lb). If at least one of the carriers weighs more than 77 kg (169 lb), the heavier one should be the first to step onto the stair when getting in the airplane, and the last one when getting out.

EICAS MESSAGE

TYPE	MESSAGE	MEANING
WARNING	MAIN DOOR OPN	Main door is open or not properly locked either on the ground with engine 1 running or in flight.

CONTROLS AND INDICATORS

1 - EXTERIOR MAIN DOOR CONTROL BUTTON

- When pressed, a solenoid valve is energized, allowing hydraulic power to raise the main door.

2 - INTERIOR MAIN DOOR CONTROL BUTTON - DOOR CLOSED

- When pressed, a solenoid valve is energized, allowing hydraulic power to raise the main door.
- The DOOR BLOCKED indication becomes amber on the internal main door control panel when the main door actuator hydraulic line remains pressurized after door closing. In this case the main door is hydraulically blocked.

3 - ALTERNATE MAIN DOOR OPENING VALVE (EMERGENCY DISCHARGE VALVE)

- Open the access panel of the emergency discharge valve.
- Turn the emergency discharge valve button clockwise to decrease the high pressure in the pressure/return line of the actuators.
- When actuated for 2 minutes, it depressurizes the door close line, allowing the main door to be lowered when blocked by hydraulic system pressure, provided Hydraulic System 1 is depressurized.
- The DOOR BLOCKED indication becomes green on the internal main door control panel, and the main door opens smoothly.

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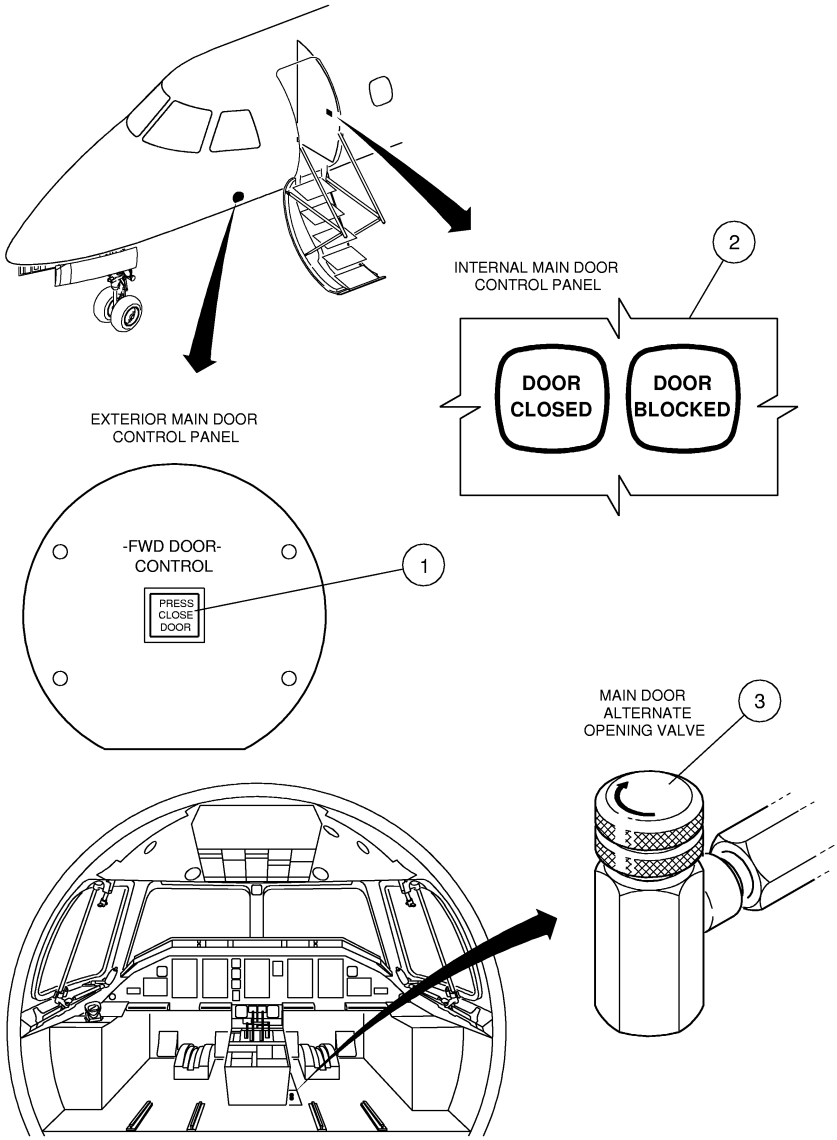

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AIRSTAIR MAIN DOOR CONTROLS AND INDICATORS

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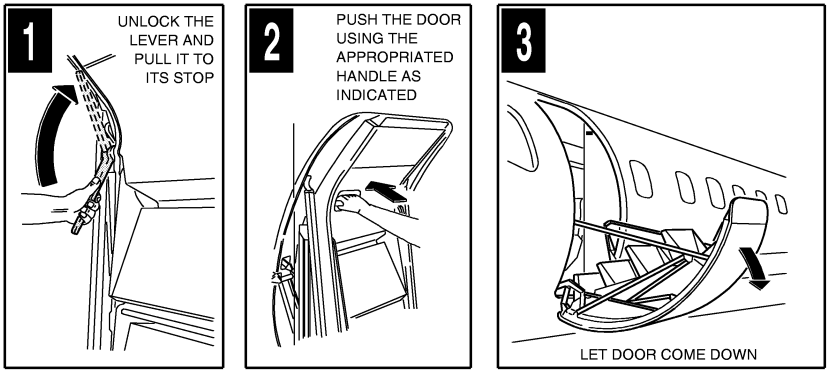
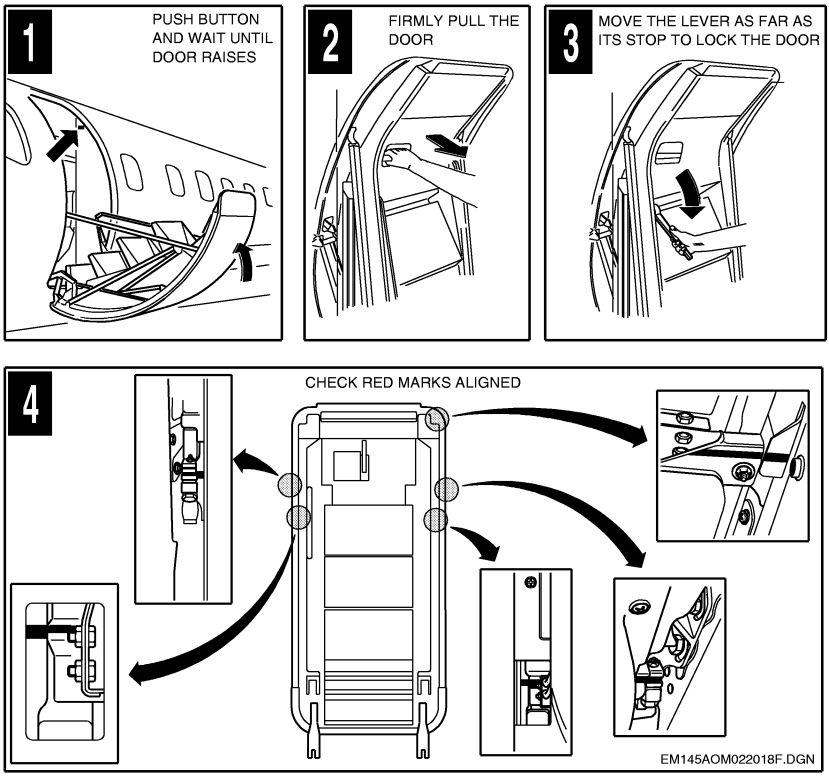
TO OPEN:



TO CLOSE:



AIRSTAIR DOOR OPERATION (INSIDE CABIN)

NOTE: The number of red marks may vary with the airplane configuration.

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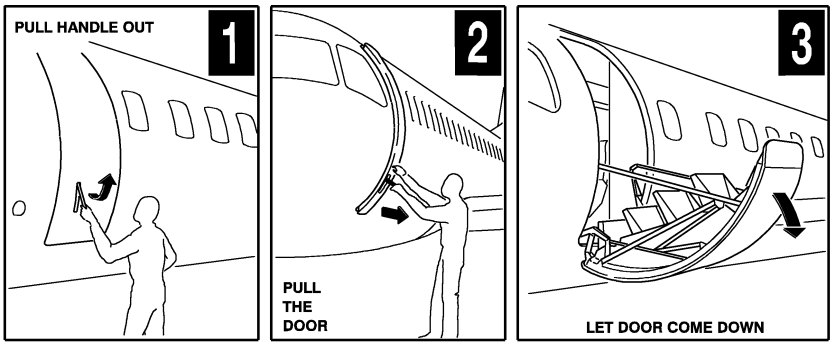
TO OPEN:



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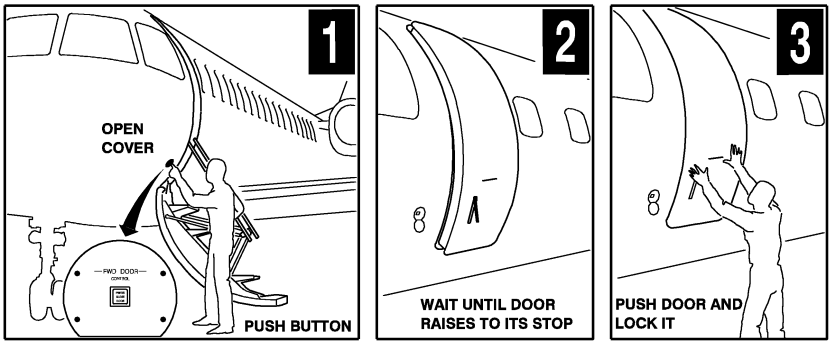

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AIRSTAIR DOOR OPERATION (OUTSIDE CABIN)

MAIN DOOR ACOUSTIC CURTAIN

The airplane is equipped with an acoustic curtain at the main door area. The acoustic curtain reduces noise level in the forward passenger cabin area when it is installed.

NOTE: - The acoustic curtain must be stowed for takeoff and landing.

- The acoustic curtain should be installed during flights for passenger comfort.
- The acoustic curtain should be rolled-up with the ultra-leather facing outward. Thus, in case of rain, snow, wind or other weather conditions, the ultra-leather will be the exposed material.

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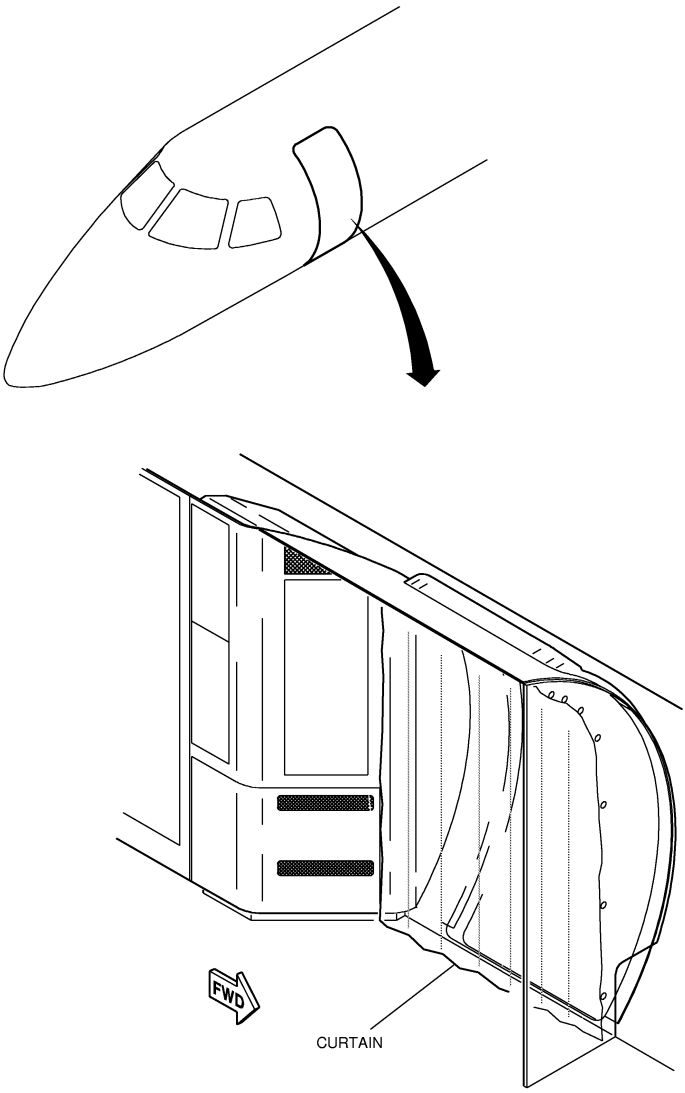

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MAIN DOOR ACOUSTIC CURTAIN

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ACCESS DOORS AND HATCHES

There are some doors that provide access to several airplane systems in the pressurized and in the non-pressurized compartments.

The lavatory/baggage compartment door provides ground or in-flight access to the baggage compartment from the lavatory.

The control rigging door provides access to the airplane´s systems located at the pressurized compartment below the cockpit floor. The rear electronic compartment door provides access to the electronic components located in this pressurized compartment.

The forward electronic compartment door, the pressure-fueling control panel door and the landing gear doors provide access to the non-pressurized compartments.

The baggage door, on the aft left-hand side of the fuselage provides external access to the baggage compartment.

The aircraft is provided with three emergency exits for crew and passenger emergency evacuation, which are as follows 1) Two cockpit emergency exits, and 2) One passenger cabin emergency exit, located over the wing on the right side of the fuselage. This emergency exit is one of the two passenger cabin emergency escape hatches, located over the wings. The other escape hatch, located on the left side of the passenger cabin, is permanently locked and cannot be used as an emergency exit. This hatch, however, can be removed for maintenance purposes. The pilot and copilot direct-vision windows are used as the cockpit emergency exits by unlatching and removing them inward the cockpit.

All doors have a warning system, except for the landing gear doors and the cockpit emergency exits.

Access doors and hatches locations are presented in the figures on the following pages.

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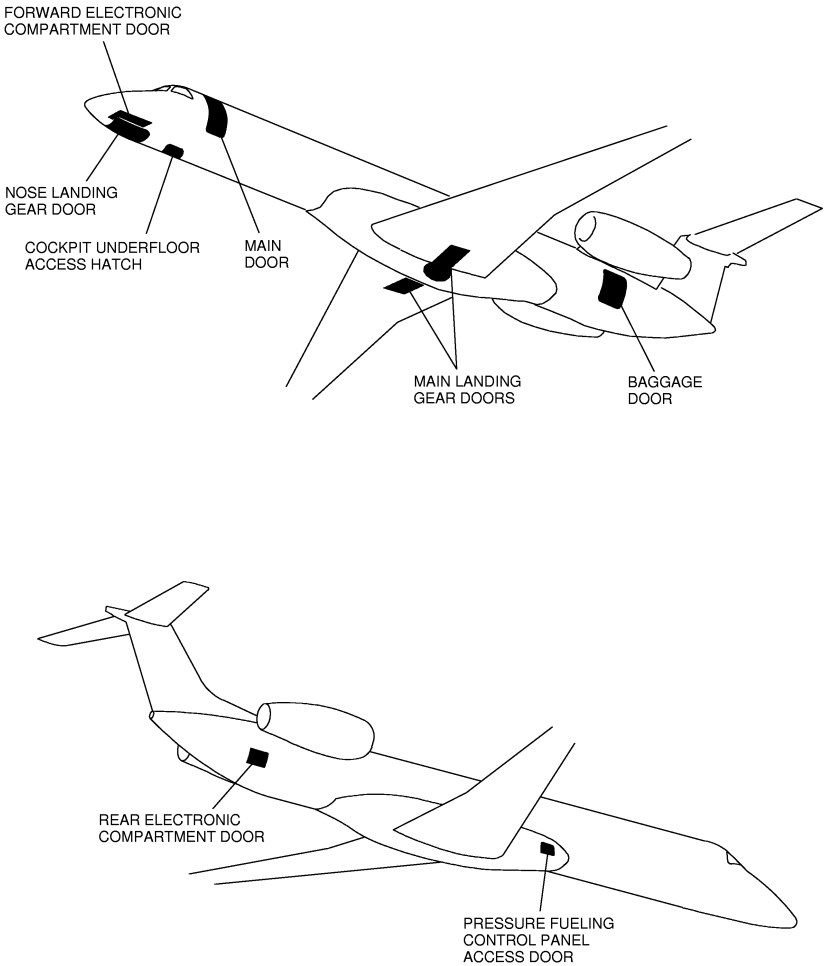

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ACCESS DOORS AND HATCHES LOCATIONS

AOM-135/1542

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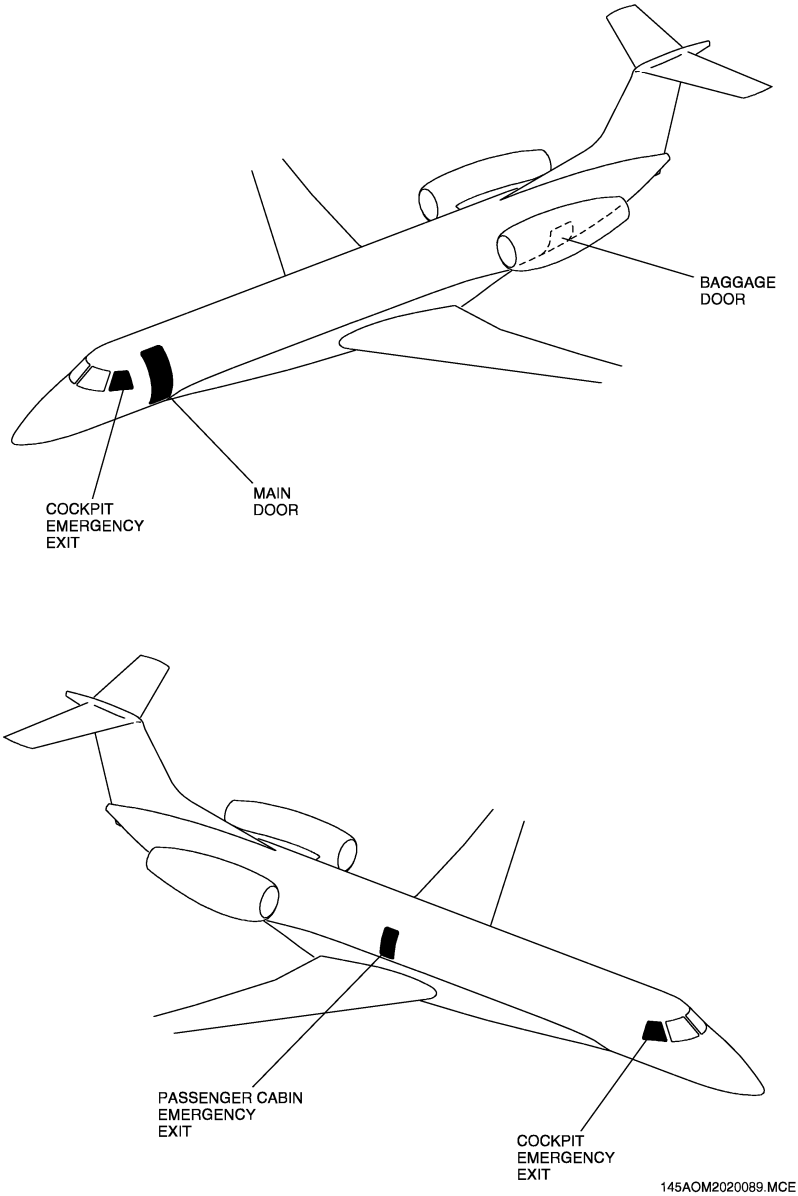

ACCESS DOORS AND HATCHES LOCATIONS 2

BAGGAGE DOOR

The baggage door is located on the rear left side of the fuselage, below the pylon, and is manually operated from the outside. It is provided with a locking mechanism controlled by an external handle that is stowed in a recess in the mid-lower portion of the door. The door is provided with a depressurization vent that allows opening operations.

EICAS MESSAGE

TYPE	MESSAGE	MEANING
CAUTION	BAGGAGE DOOR OPN	Baggage door open or not properly locked.

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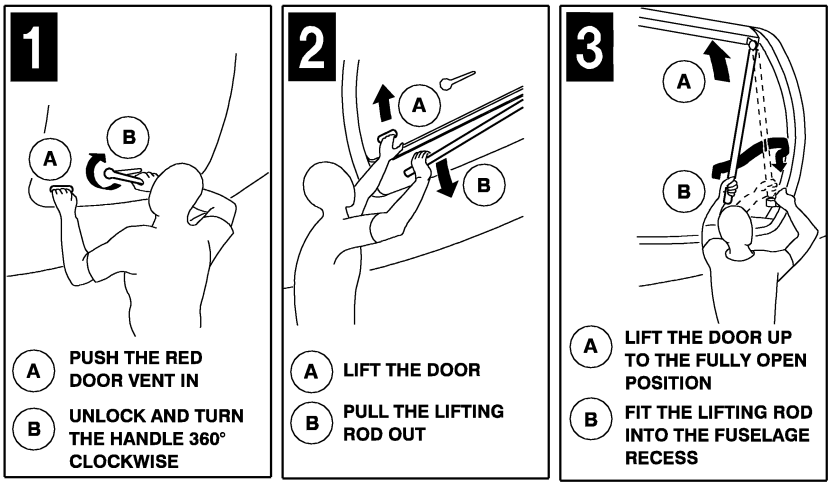
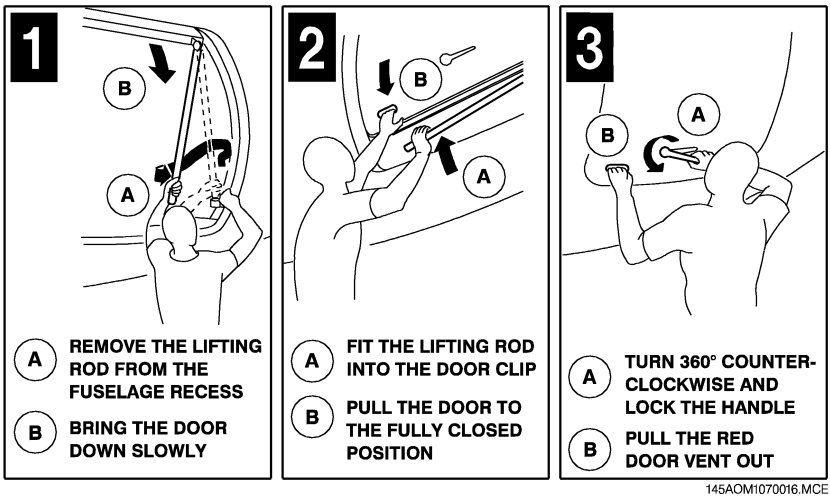
TO OPEN:



TO CLOSE:



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BAGGAGE DOOR OPERATION

COMPARTMENT HATCHES

A number of access doors and hatches for different aircraft systems can be found along the fuselage.

The compartment hatches provide access for servicing the airplane´s systems and equipment.

The ventral cockpit access hatch is located under the fuselage, providing access to the fuselage pressurized compartment.

The forward electronic compartment access hatch is inside the nose landing gear wheel well.

The rear electronic compartment access hatch is located on the rear right side of the fuselage. This hatch provides access to the airplane´s pressurized area, which contains the rear electronic compartment, rudder autopilot servo, rudder control cables and electrical harness, stabilizer electrical harness and elevators control cables.

An unlocked condition of any compartment hatch causes a single caution message on EICAS. In addition, the MFD indicates an open hatch (es) condition through a graphical representation.

EICAS MESSAGE

TYPE	MESSAGE	MEANING
CAUTION	ACCESS DOORS OPN	At least one compartment access hatch is open or not properly locked.

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REFUELING PANEL ACCESS DOOR

The refueling panel access door is located on the forward right side of the wing-to-fuselage fairing (refer to Section 2-8 – Fuel System).

Opening the refueling panel access door causes an EICAS caution message. In addition, the MFD indicates an open-door condition through a graphical representation.

EICAS MESSAGE

TYPE	MESSAGE	MEANING
CAUTION	FUELING DOOR OPN	Refueling panel access door open or not properly closed.

LAVATORY/BAGGAGE COMPARTMENT ACCESS DOOR

The lavatory/baggage compartment access door is located in the lavatory/baggage compartment partition, and provides in-flight access to the baggage compartment.

This access door must be closed for takeoffs and landings.

Opening of the lavatory/baggage compartment access door causes an EICAS caution message. In addition, the MFD indicates the open-door condition through a graphical representation.

EICAS MESSAGE

TYPE	MESSAGE	MEANING
CAUTION	BAGG ACCESS OPN	Lavatory/Baggage compartment access door open or not properly closed.

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EMERGENCY EXIT HATCHES

One passenger cabin emergency escape hatch is located over the right-hand wing. (Refer to Section 1-11 – Emergency evacuation).

DOORS AND HATCHES INDICATION ON MFD

The DOORS section of the Takeoff System Page of the MFD consists of a graphical representation of the airplane (white) with squares located along the fuselage to denote the various doors and hatches that are monitored.

If a door or hatch is ajar, the associated graphical square will change from green to red and a red DOOR OPEN inscription will be presented, boxed in red, in the lower left corner of the DOORS section.

The following doors and hatches are monitored for status:

– Main door;
– Baggage door;
– Lavatory/Baggage compartment access door;
– Fueling panel access door;
– Rear electronic compartment access hatch;
– Forward electronic compartment access hatch;
– Under cockpit access hatch;
– Emergency exit hatch.

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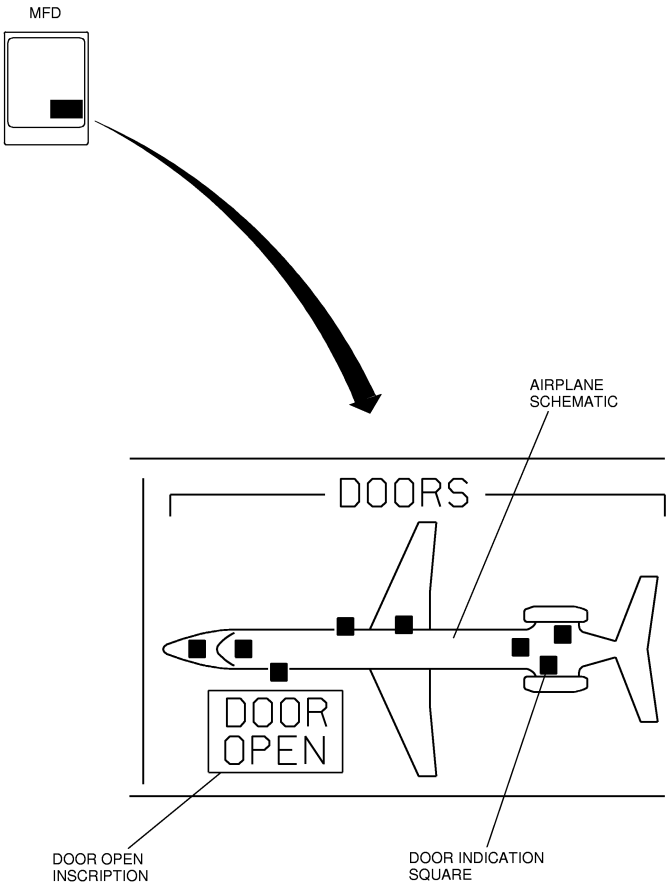

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DOORS AND HATCHES INDICATION ON MFD

FORWARD LAVATORY DOORS

INTRODUCTION

The forward lavatory compartment is located in the service area, which is mainly used by the crewmembers. The forward lavatory offers adequate conditions for the crew´s personal hygiene and amenities.

FORWARD DUAL POCKET DOOR

The forward dual pocket door partition is divided into the LH forward pocket door partition and the RH forward pocket door partition. Each side comprises a door hinge fitting, door latch, and an indicator latch. The forward dual pocket door partition structurally separates the forward lavatory/service area and the seating area of the passenger compartment.

In case of the dual pocket door becomes jammed, push or kick at the center until door breaks free. To ensure a free pathway restow the door as follows:

– Swing back, slowly, each door leaf perpendicular to the aisle.
– Lift up each leaf until it locks.
– Stow each leaf in the pocket as in normal operation.

BI-FOLD FOWARD LAVATORY DOOR

The door on the fwd lavatory is a bi-fold door that when opened 90° locks onto the galley, across the aisle, closing off the forward part of the service area. The bi-fold door is provided with means to unlock the door from outside.

When the bi-fold lavatory door separetes at the center, in order to ensure a free pathway, swing both RH and LH leaves back and secure them as follows:

RH door:

– Locate lanyard underneth galley toe kick
– Attach the lanyard hook to the bracket located underneath the RH door leaf.

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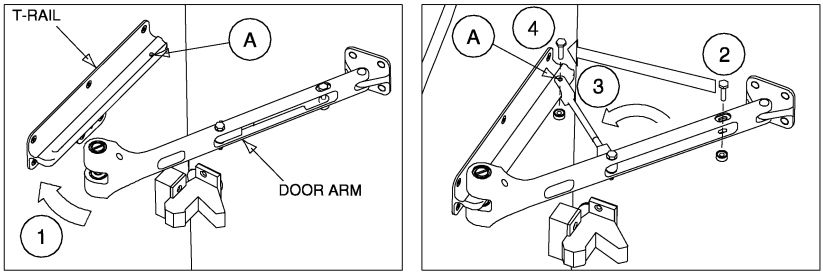
LH door:



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1 - Engage door arm on T-rail.
2 - Remove bolt.
3 - Rotate locking arm and align with hole A.
4 - Install bolt and nut.

OPERATION

To use the fwd lavatory, the forward dual pocket door and the bi-fold forward lavatory door must be operated as follows.

To enter:

- In the service area, slide the RH and LH side of the forward dual pocket door to close and latch them.
- The doors must close smoothly without binding or hesitation and the latch will secure the door in the closed position.
- Unlatch and open the bi-fold forward lavatory door by sliding it to the forward side until it reaches its path limit and release it from its upper track.
- Unfold the door toward the galley and lock it to the galley fittings using the pin locks installed in the door´s upper and lower parts.
- Open the forward and aft close up panels using the knobs of the bi-fold door to close the gap between the upper part of the bi-fold door and the headliner.

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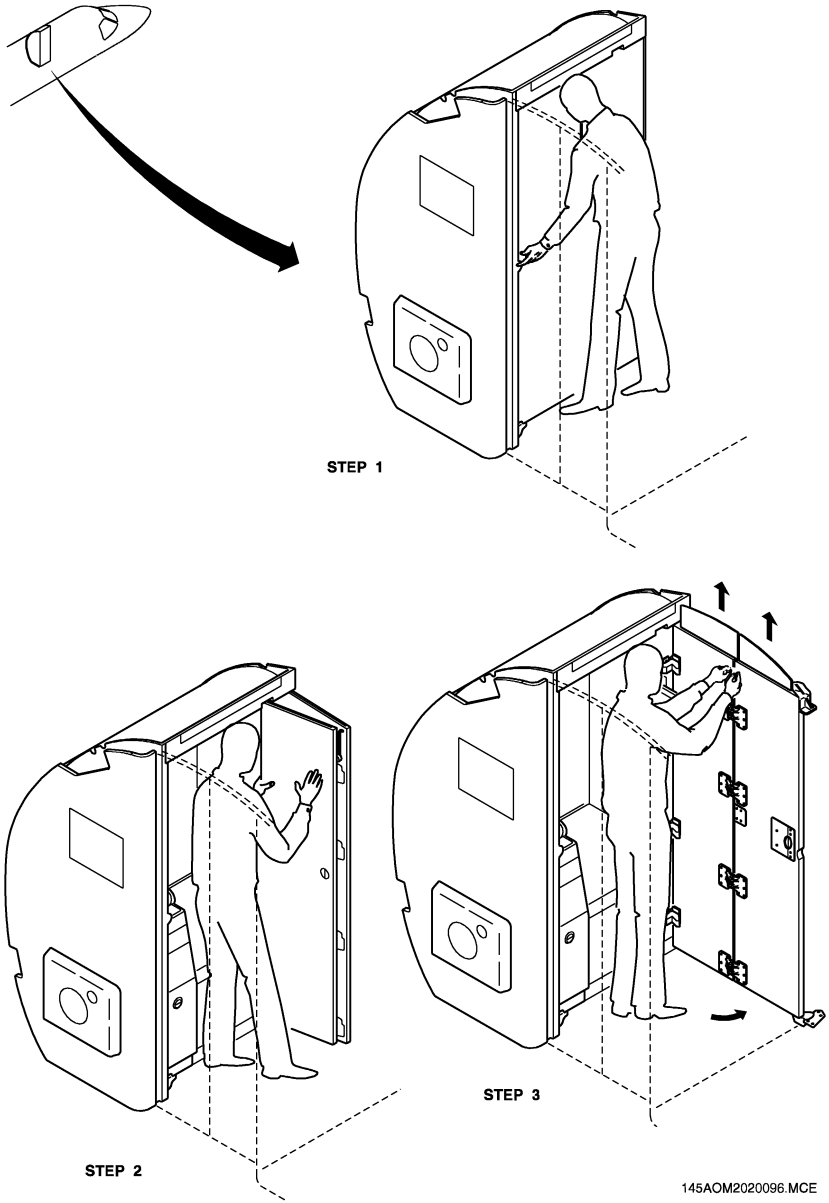

FORWARD LAVATORY BI-FOLD DOOR - OPERATION

To exit:

- Close the forward and aft close up panels using the knobs of the bi-fold door.
- Unlock from the galley fittings the pin locks installed in the bi-fold door´s upper and lower parts and fold the bi-fold door toward the forward lavatory until it fits the upper track.
- Slide the bi-fold door aft and lock it.
- Slide the RH and LH sides of the forward dual pocket door to open them.

The doors must open smoothly, without binding or hesitation, and the latch will secure the door in the open position.

Cabin depressurization:

In the event of inadvertent cabin depressurization, the bi-fold door has two hinges installed with breakable pins that will segregate the door in to two halves.

One half, fixed to the galley, will rotate 90° and the other half, fixed to the lavatory structure, will also rotate to permit airflow between the passenger cabin entrance area and the passenger cabin.

At the same time, the entire forward RH and LH pocket door panels rotate, just one half panel being enough for the airflow to go through.

After the equalization of the pressure cabin , the bi-fold door must be reinstalled in the lavatory structure with two center spring rollers and the door sliding fitted into position. This procedure permits keeping the bi-fold door stowed until it is repaired.

The pins will need to be replaced before any the lavatory operation.

In the case of accidental cabin depressurization, the lavatory has unobstructed and redundant lower air paths that allow airflow from the passenger cabin to the back of the lavatory (fuselage), thereby providing quick cabin air pressure equalization. These air paths, located in the toe kick panel, are screened to avoid the ingestion and trapping of unwanted objects falling into the area around the lavatory/galley.

In the aft lavatory, the aft pocket door provides the same operation as that of the forward dual pocket door in case of depressurization between areas in the aft part of the aircraft.

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AFT LAVATORY

The lavatory compartment is a modular unit that supplies the adequate conditions for the flight crew´s and passenger´s personal hygiene and amenities.

The lavatory is located in the aft section of the passenger cabin. The rear wall of the lavatory is covered by the passenger cabin/baggage compartment partition.

The following figure presents the location of the lavatory´s main components.

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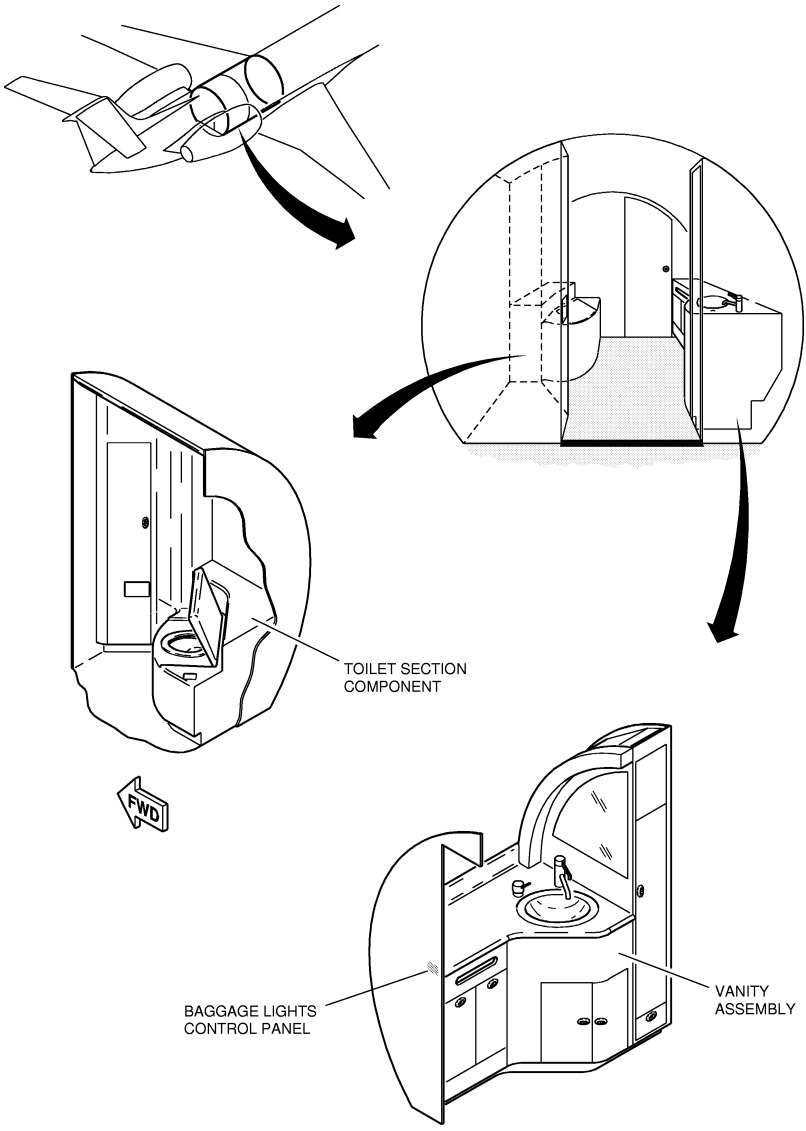

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LOCATION OF THE LAVATORY´S MAIN COMPONENTS

VANITY ASSEMBLY

The vanity assembly is a bonded structure which houses the lavatory closet assembly, the waste container and its automatic fire extinguisher, miscellaneous storage, vanity light shroud and passenger signs NO SMOKING/RETURN TO SEAT. Other accessories for the vanity assembly include a soap dispenser assembly, a mirror, a toilet paper roll housing and potable water supply emergency shutoff valve, electric hot water heater, 110 V GFI outlet, vanity switch panel and a baggage lights control panel.

The baggage lights control panel is turned ON/OFF in the lavatory and is installed on the lavatory/baggage compartment partition.

The lavatory closet is composed of a storage compartment, coat rod and drawer.

TOILET SECTION COMPONENTS

The toilet components of the toilet assembly are the drip pan assembly, the floor section assembly, the toilet floor lining bracket assembly, an electric flush toilet, a padded hinged toilet cover, the potable water system shroud, lid assembly, a toilet tissue dispenser, and a valance panel.

The valance panel is composed of an escutcheon, in which there are two reading lights over the toilet assembly that can be turned ON/OFF by the reading lights switch on the lavatory control panel.

The figure on the next page presents the location of the vanity assembly and the toilet section components.

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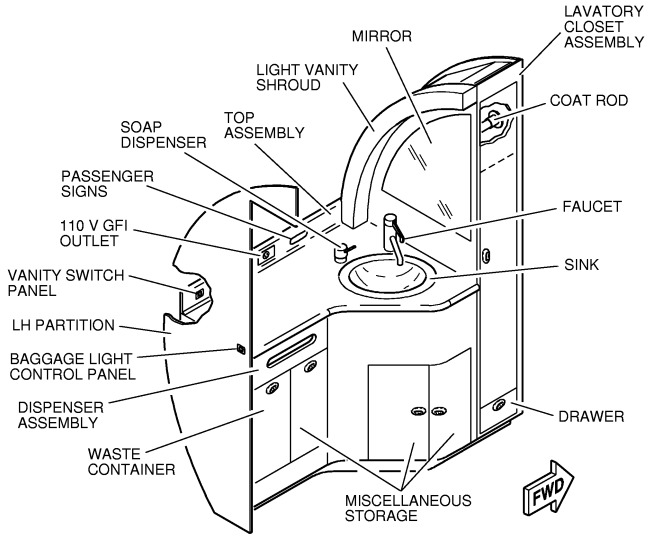
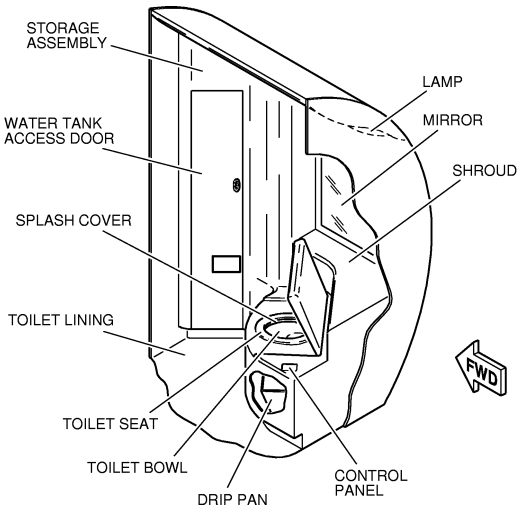


VANITY ASSEMBLY



TOILET SECTION

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LOCATION OF THE VANITY ASSEMBLY AND TOILET SECTION COMPONENTS

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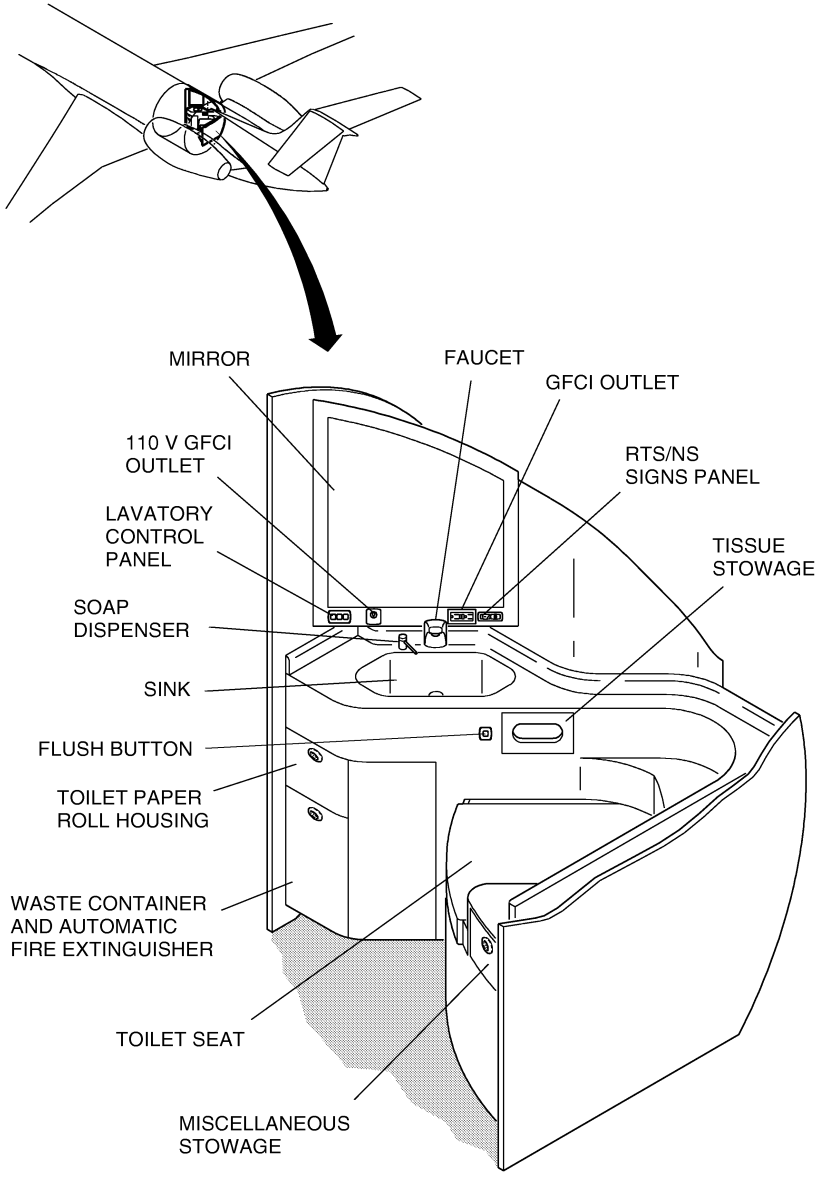

LOCATION OF THE VANITY ASSEMBLY AND TOILET SECTION COMPONENTS FOR AIRPLANES S/N 997,1029 AND ON

AOM-135/1542

LAVATORY ELECTRICAL INSTALLATION

There is a smoke detector installed on the ceiling section assembly. The upwash and downwash lights, two ballasts, an oxygen container, and one dimmer are on the valance.

The upwash and downwash lights turn to the lit condition when the lavatory door is closed, and they are controlled by a microswitch in the door.

An OCCUPIED, EXIT, and NO SMOKING/RETURN TO SEAT signs are installed on the forward face of the lavatory´s forward wall. The NO SMOKING/RETURN TO SEAT sign is operated from the cockpit. The LAV CALL, reading lights and flush switches are installed on the lavatory control panel in the right-hand lavatory closet assembly. When the LAV CALL switch is pressed, a tone will sound and the galley control panel will illuminate the LAV indicator to call the flight attendant.

A flush switch assembly for toilet actuation is located next to the toilet paper roll housing. When the toilet flush switch is pressed, the toilet flush cycle is initiated.

The reading light is installed on the valance panel over the toilet. It is illuminated with a LED module and the beam is adjustable. Pressing the READ LIGHT labeled switch will turn the reading light ON or OFF.

The vanity assembly comprises the vanity light switch, the passenger sign NO SMOKING/RETURN TO SEAT and the 110 V GFI outlet. The vanity light is a fluorescent tube over the vanity mirror, which is controlled by the VANITY LIGHT ON/OFF labeled switch.

The figure on the next page presents the lavatory electrical installation component locations.

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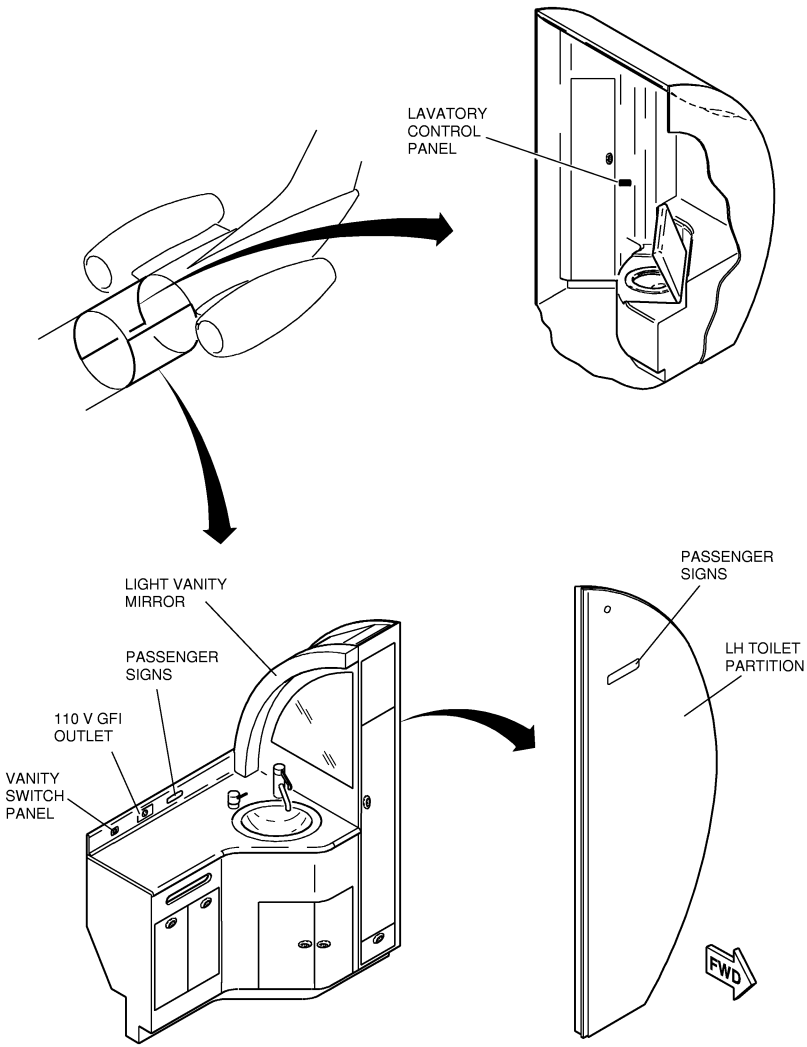

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LAVATORY ELECTRICAL INSTALLATION - COMPONENTS LOCATION

CONTROLS AND INDICATORS

LAVATORY CONTROL PANEL

The lavatory control panel has the ability to control the following items:

1 - FLIGHT ATTENDANT CALL BUTTON

- Press this button to send a signal to call the flight attendant.

2 - LAVATORY READING LIGHTS

- When alternately pressed, turns the lavatory reading light ON or OFF.

3 - TOILET FLUSH BUTTON

- Press this button to flush the toilet after use.

VANITY CONTROL PANEL

The vanity control panel has the ability to control the following item:

1 - VANITY LIGHTS

- When alternately pressed, turns the lavatory vanity lights ON or OFF.

BAGGAGE LIGHTS CONTROL PANEL

1 - BAGGAGE COMPARTMENT LIGHTS

- When alternately pressed, turns the baggage compartment lights ON or OFF.

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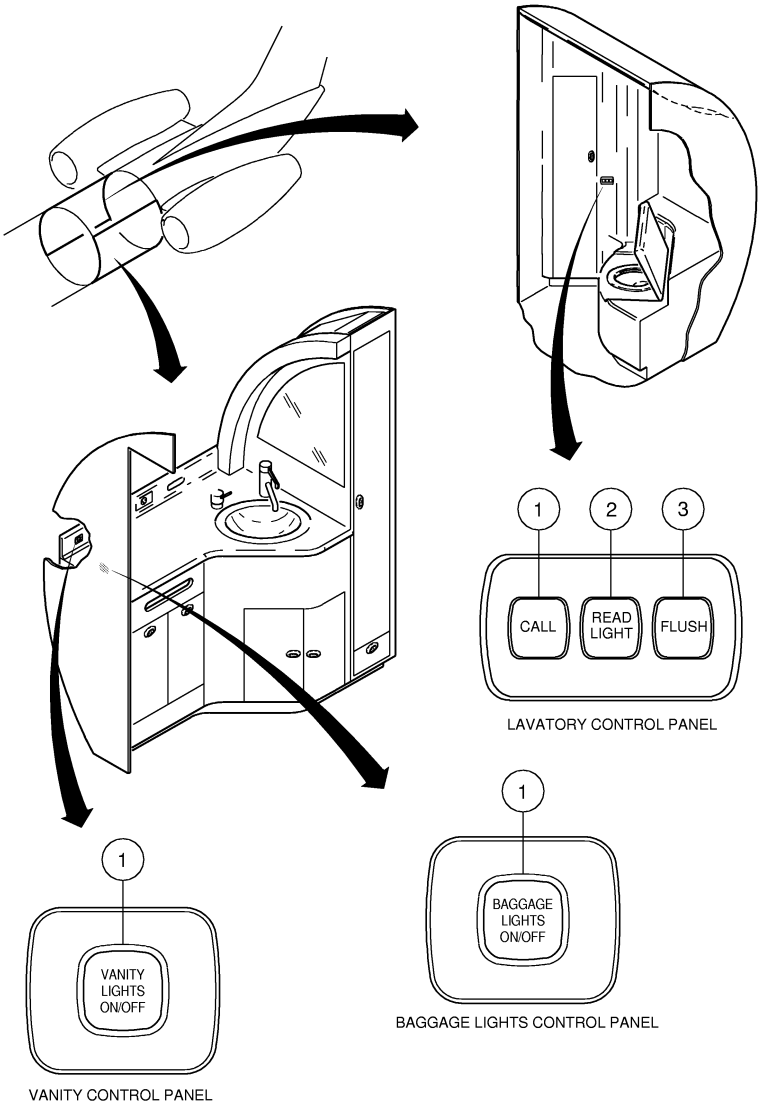

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LAVATORY, VANITY AND BAGGAGE COMPARTMENT LIGHTS CONTROL PANELS

FORWARD LAVATORY

The forward lavatory is optional for airplanes from S/N 686 (inclusive) and subsequent airframes. The lavatory compartment is a modular unit that supplies adequate conditions for the flight crew´s and passenger´s personal hygiene and amenities.

This lavatory is located at the left forward section of the passenger cabin.

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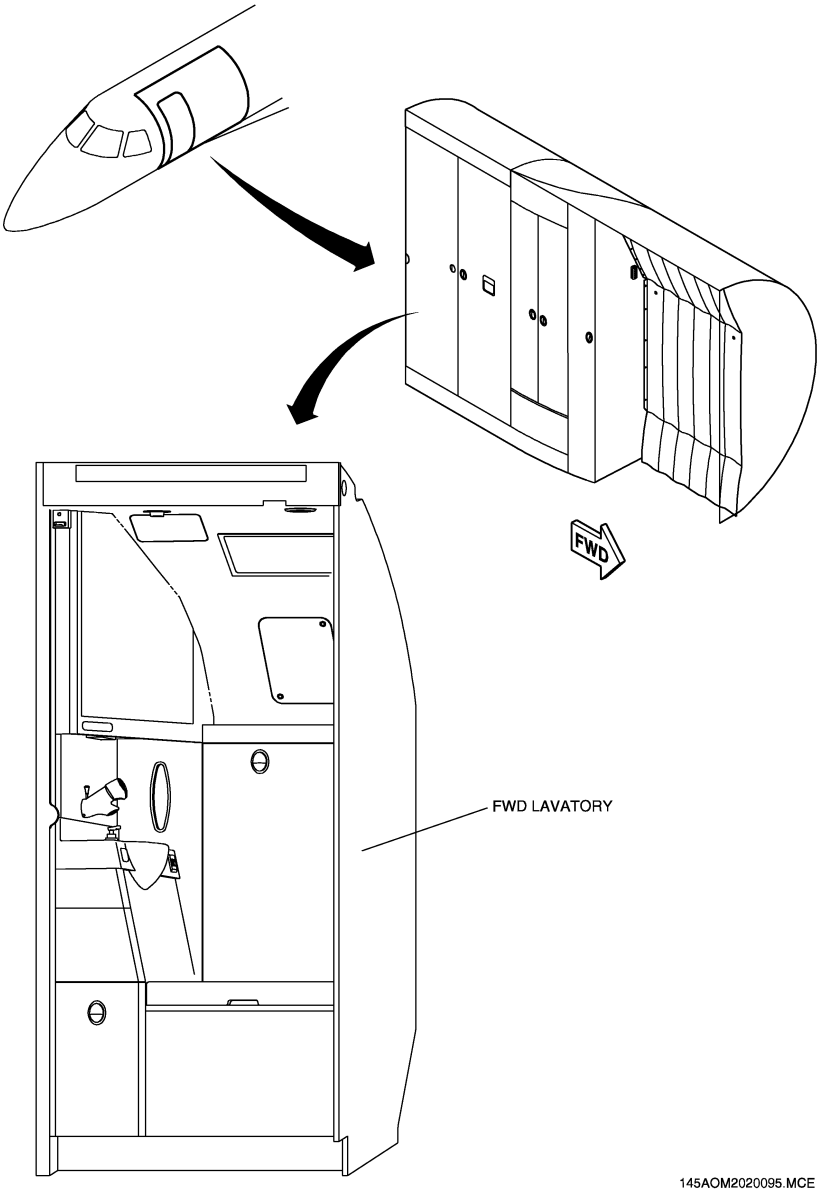

FORWARD LAVATORY

TOILET SECTION COMPONENTS

The Forward Lavatory is installed in a cabinet that includes:

- Vanity/toilet assembly with a bi-fold door.
- LH forward-pocket door.
- Forward lavatory electrical installation.

The rear wall of the lavatory is covered by the LH forward pocket door cover partition and the front wall is attached to the entertainment cabinet.

The lavatory door is a bi-fold type. When swung open 90 degrees, it locks into the galley, across the aisle, closing off the forward part of the service area. The aft area of the lavatory is also closed when the lavatory is in use.

The lavatory bi-fold door and the RH/LH forward pocket door function as a blow-out panel in case of cabin decompression.

The forward lavatory closet houses:

- Self-contained trash receptacle.
- Lavatory light/accent light.
- RTS/NS signs panel (RETURN TO SEAT/NO SMOKING).
- Sink.
- Faucet assembly.
- Soap dispenser assembly.
- Vanity mirror.
- Toilet paper roll housing.
- Potable water tank.
- Water tank shut-off valve.
- Electric hot water heater.
- 110 V GFCI (GROUND FAULT CONTROL ISOLATION) outlet.
- Lavatory indicator panel.
- Miscellaneous storage compartment.
- Self contained toilet.
- Toilet seat.
- Padded hinged toilet cover.
- Lid assembly.

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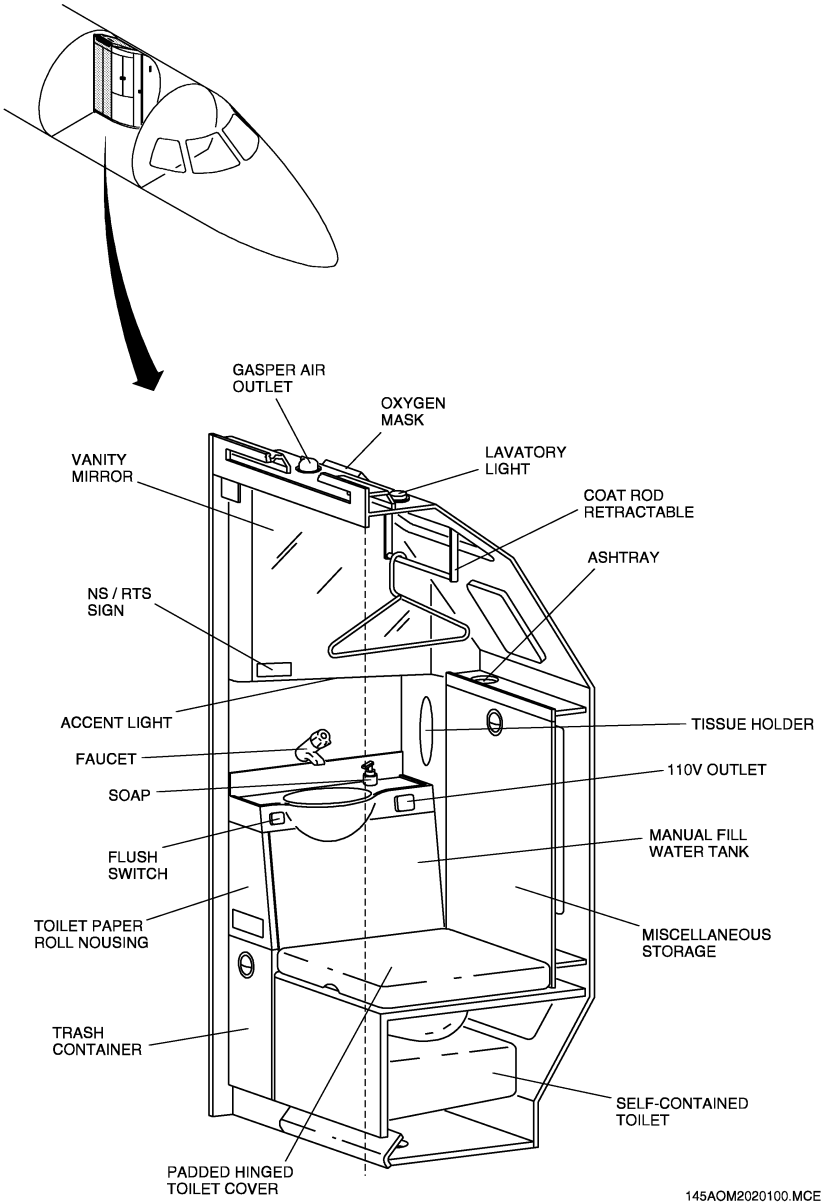

VANITY ASSEMBLY AND TOILET SECTION - COMPONENT LOCATIONS

LAVATORY ELECTRICAL INSTALLATION

The RTS/NS signs panel (RETURN TO SEAT/NO SMOKING) is installed on the vanity assembly and is operated from the cockpit.
The flush switch is installed on the vanity assembly. When the toilet flush switch is pressed, the toilet flush cycle is initiated.
The electrical installation also has a 110 V GFCI outlet installed on the vanity assembly.
The lavatory light is installed at the top of the lavatory and an accent light is installed on the vanity assembly. The lights are controlled by a microswitch installed in the lavatory closet. Both lights are turned on when the lavatory bi-fold door is in the open position and they are turned off when the lavatory bi-fold door is in the closed position.

CONTROLS AND INDICATORS

The lavatory has an indicator panel and a flush switch with the following functions:

- RTS/NS signs panel (RETURN TO SEAT/NO SMOKING)
  These signs are installed on the vanity assembly and are operated from the cockpit.
- FLUSH SWITCH
  This push-button controls the toilet flush. When the toilet flush switch is pressed, the toilet flush cycle is initiated.
- 110V OUTLET
  Detailed in the next figure.

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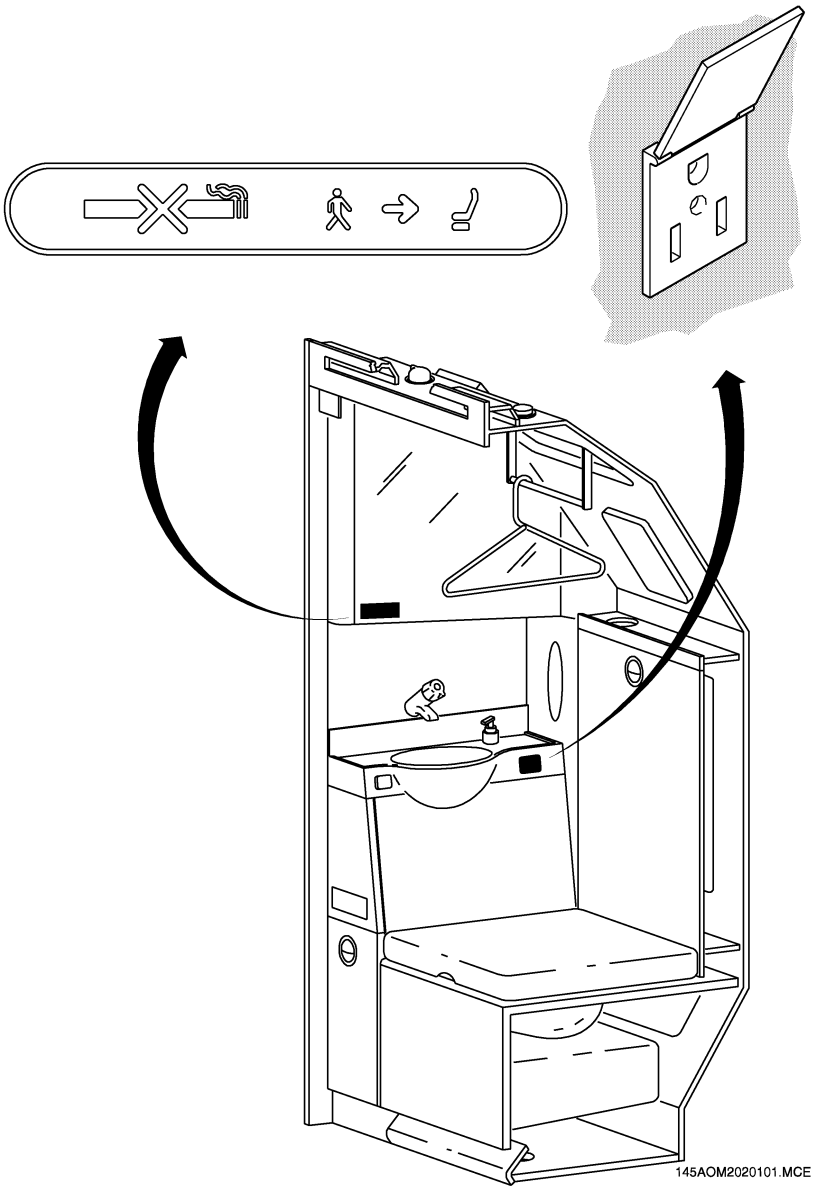

LAVATORY CONTROL PANEL - CONTROLS/INDICATORS

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PILOT AND PASSENGER CONVENIENCE ITEMS

The Pilot and Passenger Convenience Items describe the systems installed on the airplane to provide comfort, facilities and entertainment for passengers and crew members.

The systems described in this section are optional and some of them may not be contained in your manual.

The Pilot and Passenger Convenience Items are:

- PC Power System.
- IFE - In-Flight Entertainment System.
- SATCOM - Satellite Communication System.
- Telephone System.

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PC POWER SYSTEM

The PC Power system is designed to supply passenger and crew cabin AC electric outlets with 115 V (or 220 V) AC/60 Hz power for Personal Electronic Devices (PED), such as laptop computers.

A control switch in the In-flight Entertainment Panel (IFE), installed in the Cockpit Overhead Panel, controls the single-phase AC static inverter, located in the entertainment cabinet, which converts 28 V DC from Shed DC Bus 1 into 115 V (or 220 V) AC/60 Hz. This control switch is the PC POWER Button, which sends a ground signal to start the AC inverter operation.

The PC Power system starts to operate when the PC POWER Button is set to the ON position (pushed in). If the PC POWER Button is set to the OFF position (pushed out), the AC static inverter output is disabled and the striped bar in the push-button comes on.

If Shed DC Bus 1 is deenergized, the AC static inverter is also deenergized. Thus, the AC static inverter does not operate when the airplane has only two or less generators providing power to the electrical system.

The output voltage and frequency are electronically controlled. The AC static inverter is provided with protection against input under/over voltage, output under/over voltage, overcurrent, under/over frequency, input reverse polarity, and short-circuit.

The entertainment cabinet fuse box is installed behind the entertainment cabinet and is connected to the Shed DC Bus 1 through a fuse. An another fuse protects the AC static inverter generation.

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GROUND FAULT CIRCUIT INTERRUPTER

The Ground Fault Circuit Interrupter (GFCI) receptacle is a device which provides personnel protection by interrupting a circuit where a fault current to ground exceeds a predetermined value, and supplies power to the AC electric outlets. It also permits localizing power interruption, provides convenient testing and resetting at the receptacle itself and minimizes nuisance tripping from extraneous causes. There are two GFCI installed in the airplane that can be used as an outlet itself. One is installed in the forward galley, which supplies power to the outlets on the left side of the airplane; and the other in the lavatory, which supplies power to the outlets on the right side of the airplane.

NOTE: The use of the AC electric outlets is restricted during takeoff and landing. On ground, when the airplane is energized with external power source (GPU), the AC static inverter output is available, and when the airplane is energized with only two or less generators, the AC static inverter output is available only if the Shed Bus switch, on the electrical panel, is set to the OVRD position.

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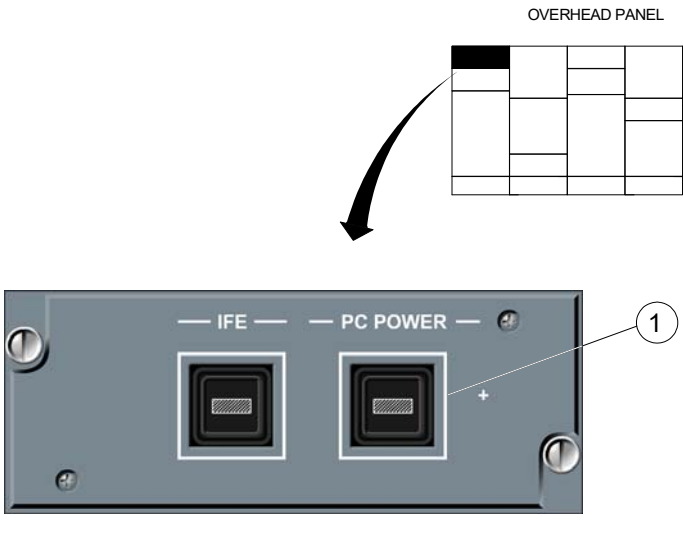
CONTROLS AND INDICATORS

IN-FLIGHT ENTERTAINMENT PANEL

The PC Power System is only activated or deactivated by releasing or pressing the PC POWER Button on the IFE Panel.

1 – PC POWER BUTTON

- ON (pushed in) or OFF/RESET (pushed out) the power supply to the AC-outlet units.
- A striped bar illuminates in the button to indicate that it is OFF (pushed out).



PC POWER BUTTON ON THE IFE PANEL

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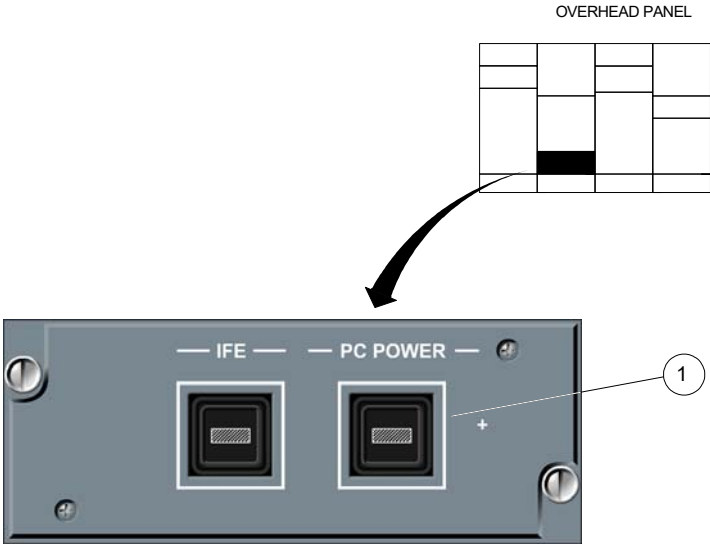

PC POWER BUTTON ON THE IFE PANEL (FOR AIRPLANES S/N 867, 880, 901, 910 AND 919)

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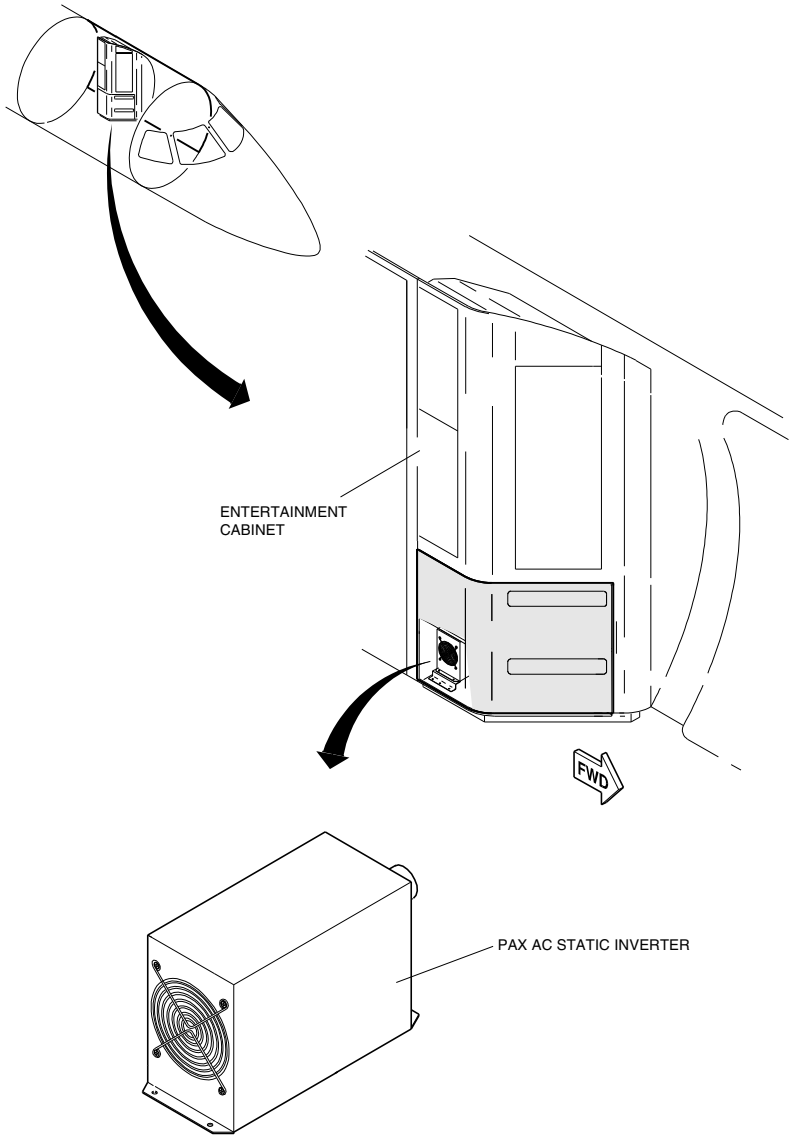

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AC STATIC INVERTER LOCATION

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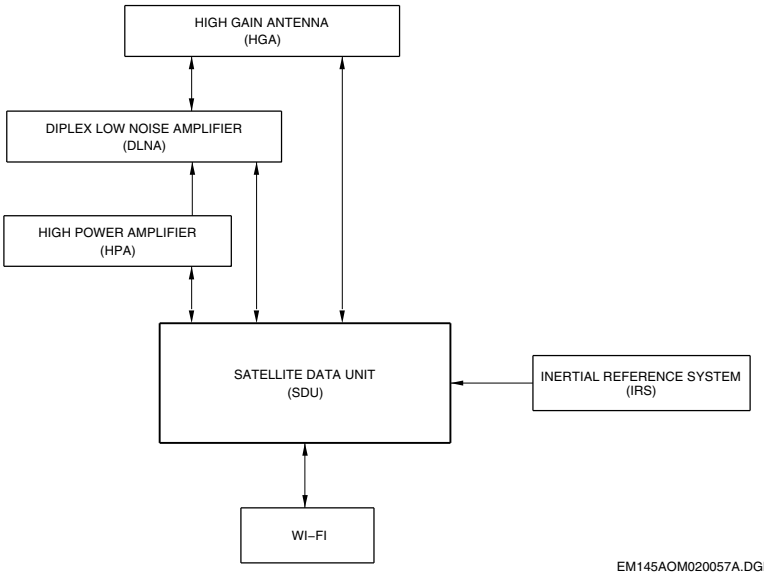
HIGH SPEED DATA SYSTEM

The High Speed Data (HSD) is an aeronautical system that allows to the passenger/crew to access the internet network.

The HSD is composed of a mobile transceiver used to provide air-to-air and air-to-ground internet network connection. When using the system, the High Gain Antenna (HGA) uses the airplane Inertial Reference System (IRS) to locate the satellite constellation.

The Wireless Fidelity (Wi-Fi) equipment is connected on the SDU (Satellite Data Unit) and allows the passenger to get a connection to the internet. The Wi-Fi is a Wireless Local Area Network (WLAN).

See below the HSD and WI-FI LAN Block Diagram.



HSD SYSTEM DIAGRAM

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The HSD provides High Speed Data connection up to 128 Kbps (two channels of 64 Kbps). Their activation depends on the baud rate demand, and can be used to internet access, IP phone calls, data transfer, virtual private network connection, videoconference, and other functionalities involving the internet access.

To get internet access, the passenger must have a lap top equipped with Wi-Fi or a wired access port. For internet access in the cockpit, its necessary a computer Wi-Fi capable, since there is no wired connection in the cockpit area.

The network is composed of 4 geo-stationary satellites. Each satellite covers an Ocean Region, such as the Pacific Ocean Region or the Atlantic East Ocean Region. This footprint is made up of two types of coverage beams, a Global Beam and a number of Spot Beams that allow higher data rates. The satellite tracking is made automatically by the SDU.

It is required a service provider to the internet connection and other Inmarsat services.

The antenna is installed on the upper fuselage section (see figure on the next page).

The High Speed Data system shall be available when the airplane is in the air or on the ground.

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MENU
PREVIOUS
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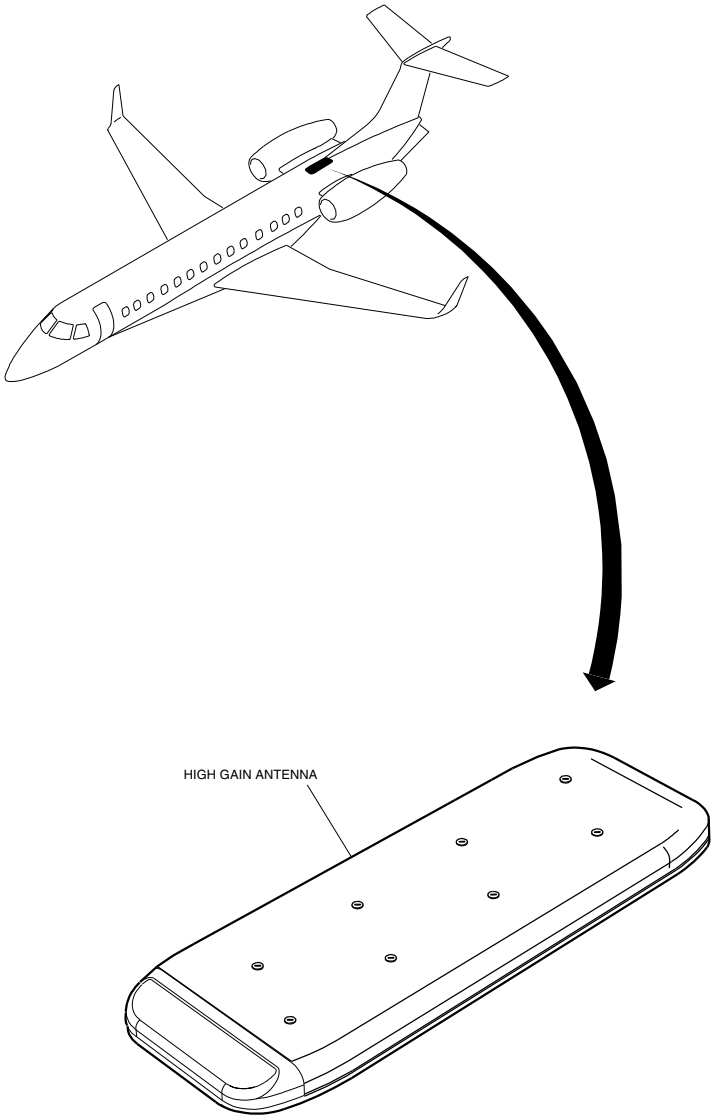

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HIGH GAIN ANTENNA (HGA)

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OPERATION

To the on-board network, it is used 3 wired access points and the wireless concept.

The HSD and Wi-Fi LAN will be powered up while the dedicated circuit breaker per each equipment is switched ON.

The IRS must be aligned, since the HGA uses this system to locate the satellite constellation.

During the initial power up of the HSD and Wi-Fi LAN, the Windows icon will be looking for a LAN/WLAN activity and then after 90 seconds the LAN/WLAN icon will be active.

When the LAN/WLAN is active, the user should open the Internet Explorer and type a URL address in the Internet Explorer Address Bar. The URL Page will be loaded and the internet connection will be established.

The HSD system provides 1 wired access points in the passenger cabin. The wireless connection independs on the LAN ports and can be connected from anywhere of both cockpit and passenger cabin.

When in abnormal operation, the windows LAN Icon will not be active and/or the internet connection will be interrupted. A possible cause may be the Wi-Fi/LAN disabled or the system antenna does not have a satellite line of sight.

COMPONENTS

SATELLITE DATA UNIT (SDU)

The SDU is located in the rear electronic compartment and contains two modems which provide the internet connection and all the user interface. The HPA acts as an amplifier to boost the transmit modem signals to the correct level for transmission via the Inmarsat Network.

HIGH POWER AMPLIFIER (HPA)

The HPA amplifies the RF signal to the full level required by the system link control for an optimum satellite communication. This component operates in association with the SDU that controls and monitors the full functionality of the amplifier.

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HIGH GAIN ANTENNA (HGA)

The HGA is a satcom antenna which performs both transmit and receive functions. It also contains an integrated GPS to provide the global position to the antenna system.

DIPLEXER LOW NOISE AMPLIFIER (DLNA)

The DLNA separates and combines, transmits and receives signals and amplifies the received signal. This component is located on the baggage compartment ceiling.

WIRELESS FIDELITY (WI-FI)

The Wireless Access Service Point (WASP) is a network distribution system designed for use in airborne environments. The WASP utilizes Direct Sequence Spread Spectrum (DSSS) radio technology communicating in the 2.4-GHz Industrial.

The WASP antenna is used in association with the WASP to provide the Wi-Fi Local Area Network inside of the airplane.

LAN/WLAN AND EQUIPMENT LOCATION

The HSD system provides 3 wired access points (LAN), via a standard connector, distributed in the passenger cabin (see figure on the next page).

The wireless connection independs on the LAN ports and can be connected from anywhere of both cockpit and passenger cabin.

To the regular internet connection the system provides up to 16 simultaneous connections (wireless or wired). There is no restrictions regarding the number of intranet connections.

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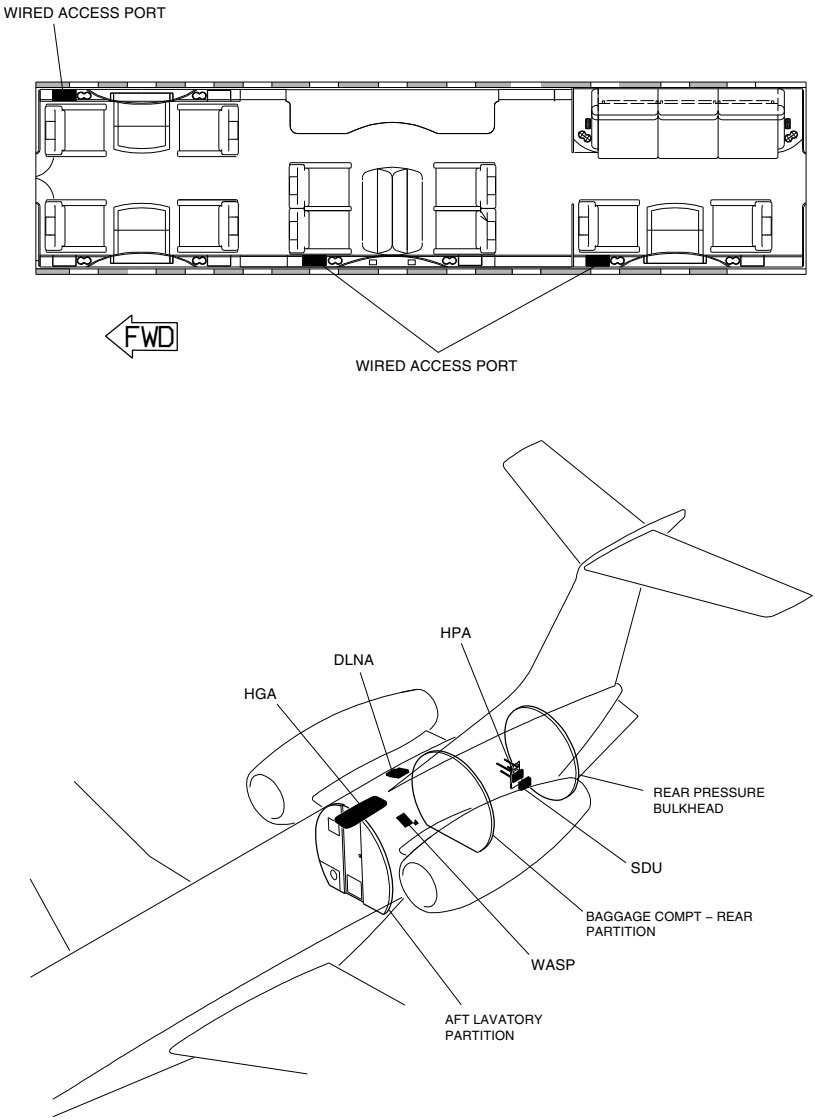

LAN PORT LOCATION AND HSD SYSTEM LOCATION OVERVIEW

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IN-FLIGHT ENTERTAINMENT SYSTEM

The In-Flight Entertainment (IFE) system provides the passengers with real-time flight information through the Airshow system, and video/audio entertainment through two DVD players, a VHS video cassette player, a CD changer and a MP3 player connection (optional).

The IFE button on the IFE Panel, installed in the Cockpit Overhead Panel, controls the IFE system by activating the IFE master relay, which supplies power to the entertainment cabinet circuit breaker through Shed DC Bus 1.

The IFE system is supported by the Magic Happy™ (MH) Data Bus, which, aside the IFE, controls other airborne systems, such as the lighting system and the environmental control system. The MH digital units, such as the control units, are micro-processed and programmable by the MH Programming Interface that enables the use of a laptop with proper configuration software.

The video generation on the IFE system is obtained through a video cassette player, two DVD players and the Airshow digital interface unit. The video signal is distributed to the eight 6.5" monitors and the 15" monitor via the MHE Entertainment Controller, which is commanded by units such as the Master Entertainment control panel, the Forward VIP seat control panel, the Aft VIP seat control panel, the Passenger seat control panels and a remote control unit. These controls enable video selection at passenger monitors and audio volume adjustment at each headset, as well as enable video selection and audio volume adjustment on the 15" monitor and the audio speakers, respectively. Each control unit display indicates which video or audio is selected.

Audio is supplied by the DVD players, which can function as CD players, the video cassette player, the Airshow digital interface unit and also the MP3 player connection (optional). The IFE system provides selectable audio and volume control at each passenger seat location, and with the system offering priority interruption capability that enables passenger address to simultaneously override all audio channels.

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The Airshow digital interface unit generates text and graphic output information obtained from the airplane's long-range navigation system, air data system, a CD-ROM or an USB drive. This information, selected through the Flight Deck Controller (FDC) in the cockpit, includes appropriate maps and points of interest for the passengers and flight crew-members.

MAIN COMPONENTS

AIRSHOW DIGITAL INTERFACE UNIT

The Airshow digital interface unit, powered by the entertainment cabinet CB panel, is a computer that receives digital and analog signals from the on-board airplane avionics systems (FMS and ADC), and data from the MagnaStar connection. The Airshow digital interface unit is controlled through the MH Interface (MHI), which connects the Airshow with the MH data bus. The Airshow supplies the following outputs:

– Geographic Maps of flight routes that show real-time airplane position, previous flight path and planned route.
– Multi-language location names and points of interest on the map.
– Multi-language text pages of real-time flight information (e.g., ground speed, altitude, temperature, distance and times);
– Customized graphics, including customized logos and announcements.
– Audio briefings for safety and/or personal announcements.

There is a dedicated 6.5" LCD Airshow video output monitor that enables the selection of any information before it is presented in the passenger cabin.

FLIGHT DECK CONTROLLER

The flight deck controller, mounted in the cockpit, is responsible for selecting customer-request features in the Airshow digital interface unit, such as time to destination, Greenwich mean time, destination airport, mode display, graphic display, languages and audio announcements.

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MH ENTERTAINMENT CONTROLLER

The MH entertainment (MHE) controller switches and distributes entertainment audio and video, and also provides chime to the passenger cabin. It has eight video inputs switchable to the 24 headphone outputs and four speaker outputs. The MHE is controlled through the MH data bus and supplied by the entertainment cabinet CB panel.

CONTROL PANELS

There are several digital control panels connected to the MH data bus, which enable the audio and video selection at each seat location, and/or audio and video selection in the passenger cabin. The control panels are the Master Entertainment Control Panel, the Forward and Aft VIP Control Panels, and the eight Passenger Control Panels.

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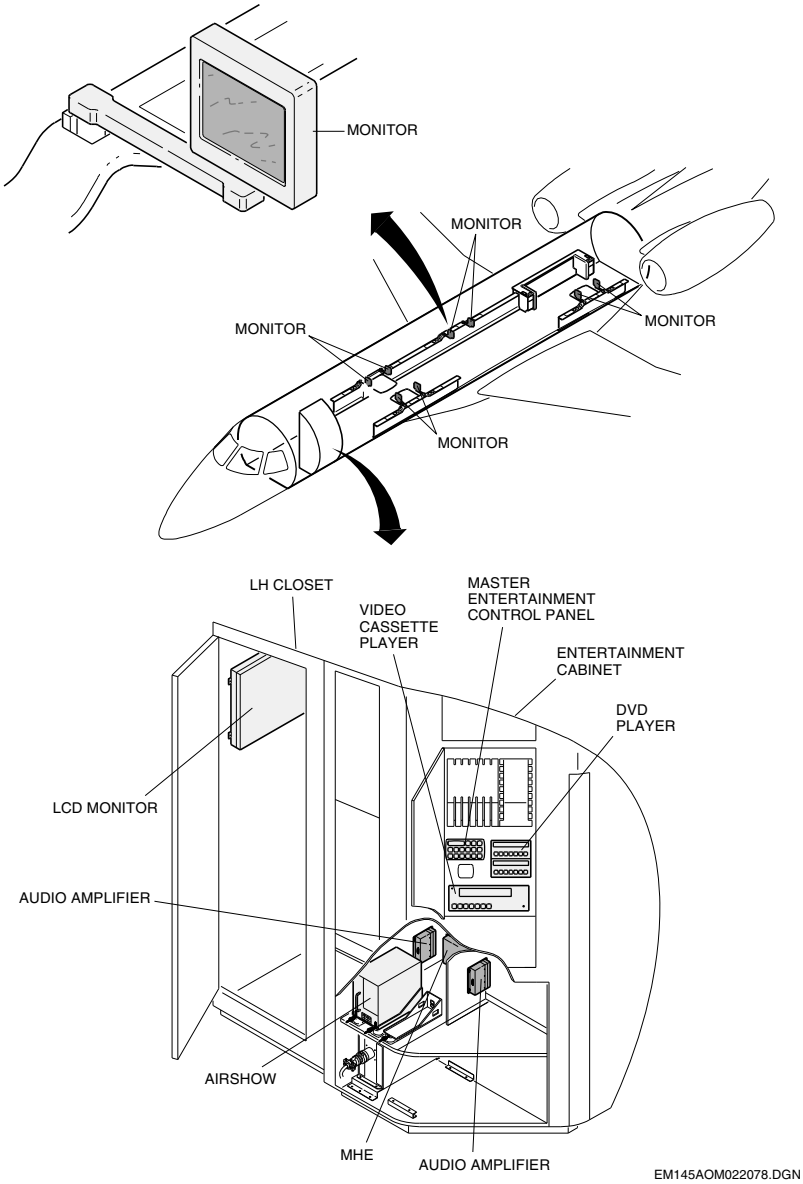

IN-FLIGHT ENTERTAINMENT – COMPONENTS LOCATION

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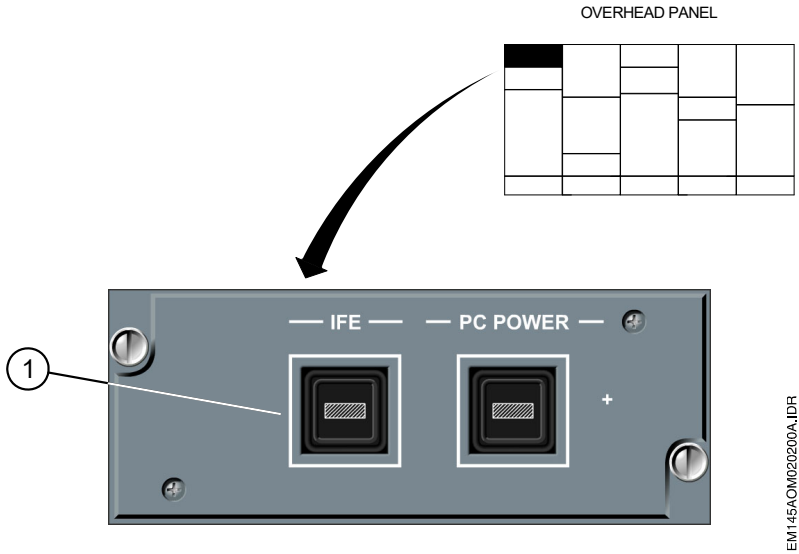
CONTROLS AND INDICATORS

IN-FLIGHT ENTERTAINMENT PANEL

The In-Flight Entertainment (IFE) system should be activated or deactivated if the IFE button is released on the IFE Panel.

1 – IFE BUTTON

- Enables (pressed) or disables (released) the power supply to the In-Flight Entertainment System.
- A striped bar illuminates in the button to indicate that it is released.



IFE BUTTON ON THE IFE PANEL

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MASTER ENTERTAINMENT CONTROL PANEL

FOR AIRPLANES UP TO S/N 685 (INCLUSIVE)

The master entertainment control panel is located on the entertainment cabinet and it has switches to control audio and video functions of in-flight entertainment systems. It also brings a display that presents entertainment-related information.

The figure on the next page presents the functions of each control button of the master entertainment control panel.

1 – DISPLAY

- Shows the video and audio channels to be selected.

2 – MAP MODE BUTTON

- Selects the map modes of the Airshow.

3 – FWD AUDIO BUTTON

- Selects the audio for the forward passenger cabin.

4 – VOLUME UP BUTTON

- Increases the volume on the audio speakers.

5 – VOLUME DOWN BUTTON

- Decreases the volume on the audio speakers.

6 – AFT AUDIO SELECT BUTTON

- Selects the audio for the aft passenger cabin.

7 – AFT SPEAKER ON/OFF BUTTON

- When alternately pressed, turns ON or OFF the aft speakers.

8 – FWD SPEAKER ON/OFF BUTTON

- When alternately pressed, turns ON or OFF the forward speakers.

9 – FWD MONITOR ON/OFF BUTTON

- When alternately pressed, turns ON or OFF the forward monitor.

10 – FWD VIDEO SELECT BUTTON

- Selects the video source to be displayed on the forward monitor.

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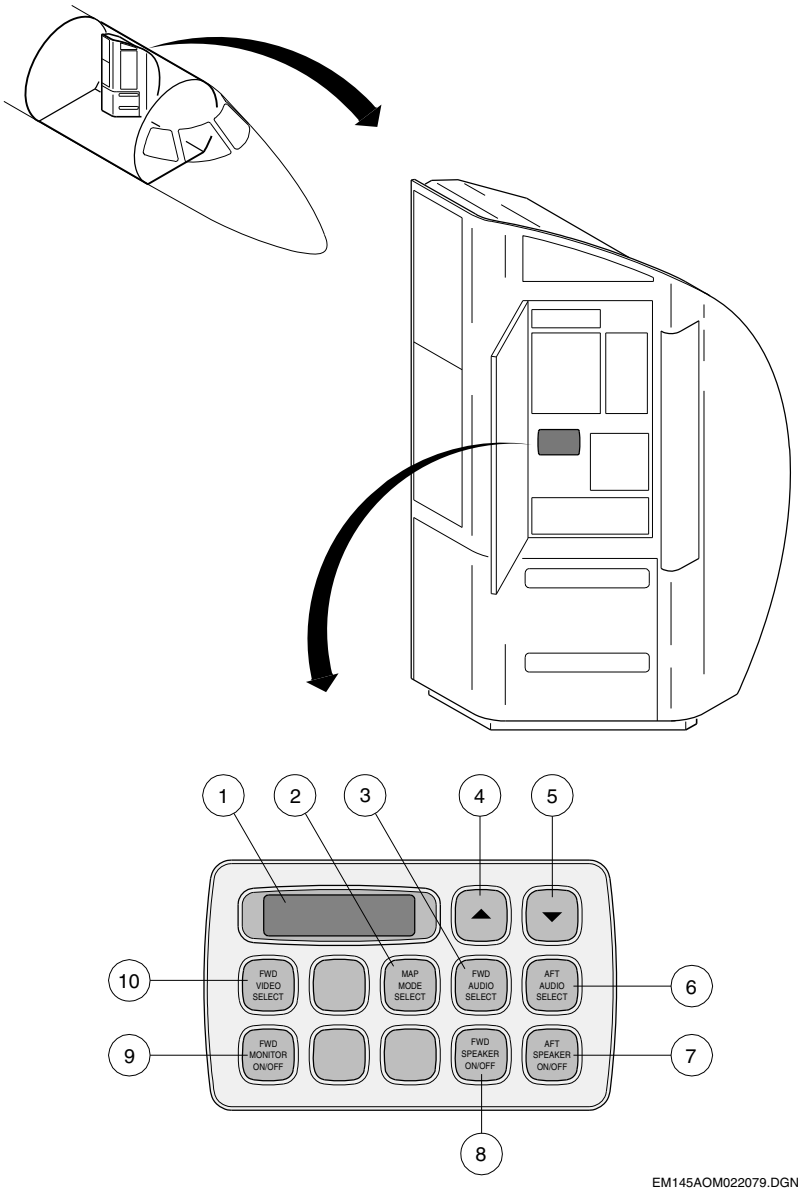

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MASTER ENTERTAINMENT CONTROL PANEL (FOR AIRPLANES UP TO S/N 685 (INCLUSIVE))

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FOR AIRPLANES FROM S/N 686 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES

The master entertainment control panel is located on the entertainment cabinet and it has switches to control audio and video functions of in-flight entertainment systems. It also brings a display that presents entertainment-related information.

The figure on the next page presents the functions of each control button of the master entertainment control panel.

1 – AIRSTAIR DOOR CLOSE BUTTON

- Controls the main door to close.

2 – DOOR BLOCKED INDICATION

- Blocked Main Door indication.

3 – AIRSTAIR LIGHTS ON/OFF BUTTON

- Controls the stair lights on/off.

4 – STEP LIGHT ON/OFF BUTTON

- Controls the step light on/off.

5 – AREA LIGHT ON/OFF BUTTON

- Controls the door area light on/off.

6 – DISPLAY

- Monitors source selection.

7 – SPEAKER SELECTION INDICATION

- Indicates if the speaker is selected.

8 – FORWARD VIDEO SELECTION INDICATION

- Indicates if the forward video is selected.

9 – AFT VIDEO SELECTION INDICATION

- Indicates if the aft video is selected.

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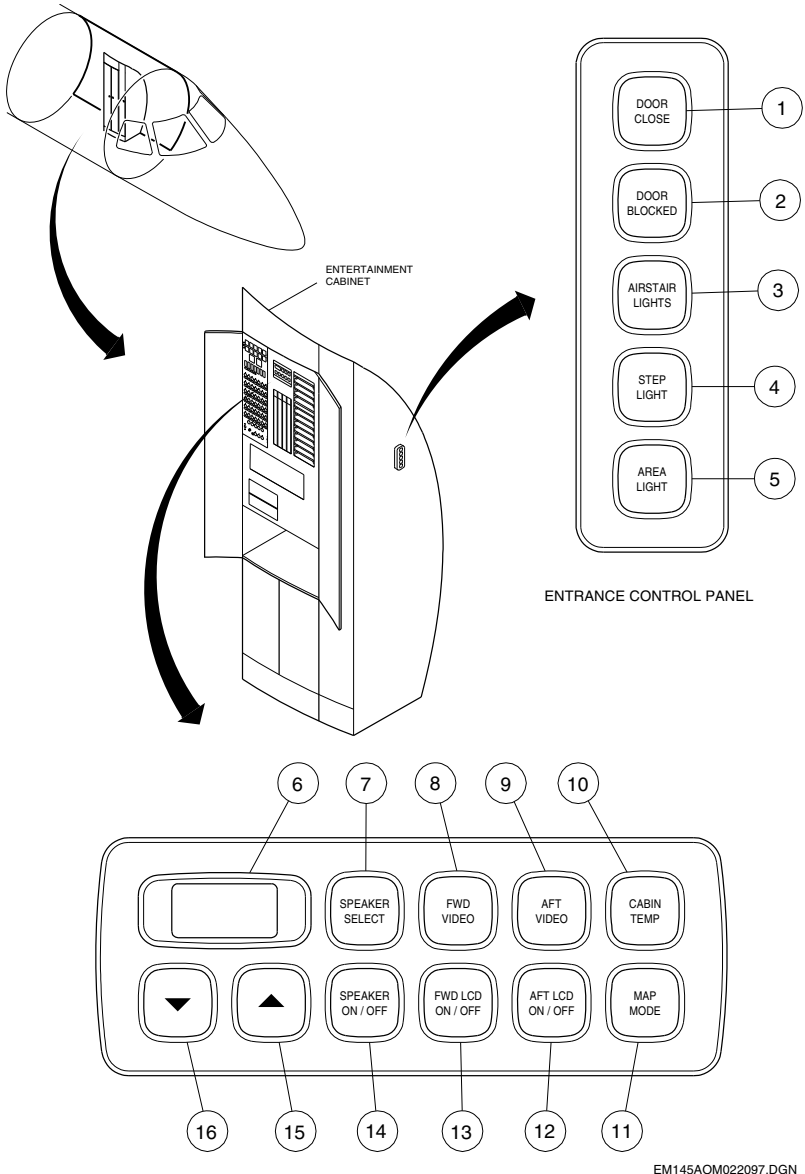

MASTER ENTERTAINMENT CONTROL PANEL (FOR AIRPLANES FROM S/N 686 (INCLUSIVE) AND SUBSEQUENT AIRFRAMES)

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10 – CABIN TEMPERATURE INDICATION

- Displayed in degrees Fahrenheit.

11 – MAP DISPLAY MODE (MAP, AUTO, LOGO, INFO) BUTTON

- Selects the map modes of the Airshow.

12 – AFT LCD ON/OFF BUTTON

- When alternately pressed, turns ON or OFF the aft LCD.

13 – FORWARD LCD ON/OFF BUTTON

- When alternately pressed, turns ON or OFF the forward LCD.

14 – SPEAKER ON/OFF BUTTON

- When alternately pressed, turns ON or OFF the speaker.

15 – VOLUME UP BUTTON

- Increases the volume on the audio speakers.

16 – VOLUME DOWN BUTTON

- Decreases the volume on the audio speakers.

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DVD/CD PLAYER

Two DVD/CD Players are installed in the Entertainment Cabinet, located in the left forward section of the passenger cabin area. They are controlled by the switches located at the front of the unit.

To play a DVD movie or CD audio follow the steps below for one or both players:

1. Press POWER Button to turn unit on;
2. Press the OPEN/CLOSE/STOP Button to open the compartment;
3. Insert a DVD or CD disc into the compartment;
4. Press the OPEN/CLOSE/STOP Button to close the compartment;
5. Press PLAY/PAUSE Button to start playing the disc;
6. From your seat, press the PERSONAL VIDEO SELECT Button on the associated passenger control panel, and select DVD1 or DVD2;
7. Press HEADSET AUDIO SELECT and select the audio source, DVD1 or DVD2;
8. Plug in headphones and press ▲ and ▼ to adjust the volume to the desired level.

DVD/CD PLAYER CONTROLS

1 – OPEN/CLOSE/STOP BUTTON

– Stops playback, and opens and closes the disc compartment.

2 – PLAY/PAUSE BUTTON

– Plays and pauses playback.

3 AND 4 – SCAN/SKIP BUTTON

– Performs playbacks on the scan and skip mode.

5 AND 6 – STILL/STEP BUTTON

– Performs playbacks on the still and step mode.

7 – POWER BUTTON

– Turns DVD/CD Player on and off.

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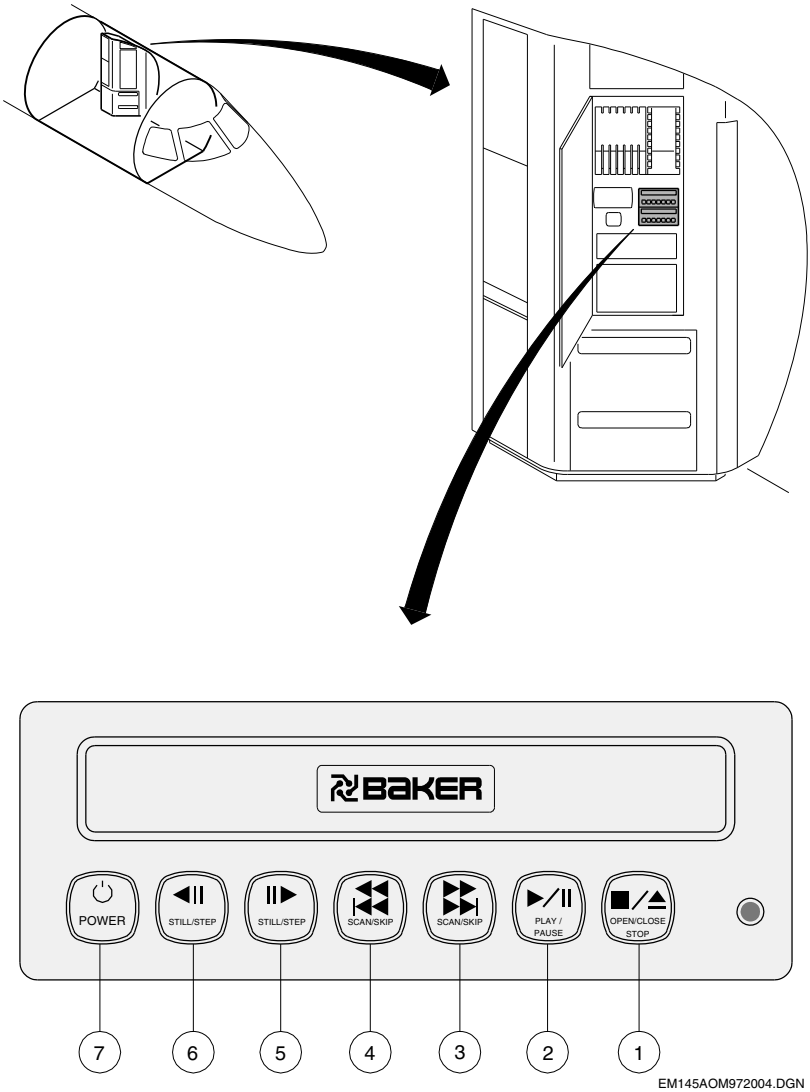

DVD/CD PLAYER CONTROLS

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VIDEO CASSETTE PLAYER

One Video Cassette Player is installed in the Entertainment Cabinet, located in the left forward section of the passenger cabin area. It is controlled by the switches located at the front of the unit.

To play a VHS tape follow the steps below:

1. Press the POWER Button to turn the unit on;
2. Place a VHS tape into the player door and push in to load;
3. Press PLAY/STOP Button to start playing the tape;
4. From your seat, press the PERSONAL VIDEO SELECT button on the associated passenger control panel, and select DVD1 or DVD2;
5. Press HEADSET AUDIO SELECT and select the audio source, DVD1 or DVD2;
6. Plug in headphones and press ▲ and ▼ to adjust the volume to the desired level.

VIDEO CASSETTE PLAYER CONTROLS

1 – EJECT BUTTON

– Ejects the VHS tape.

2 – RECORD BUTTON

– Function not enabled.

3 – FAST FORWARD BUTTON

– When pressed in the playback mode, the unit enters in the forward picture search mode. While pressed in the stop mode, the unit will fast-forward the tape at high speed.

4 – REWIND BUTTON

– When pressed in the playback mode, the unit enters in the reverse picture search mode. While pressed in the stop mode, the unit will rewind the tape at high speed.

5 – STOP BUTTON

– Stops playback.

6 – PLAY BUTTON

– Starts playback mode.

7 – POWER BUTTON

– Turns the player on and off.

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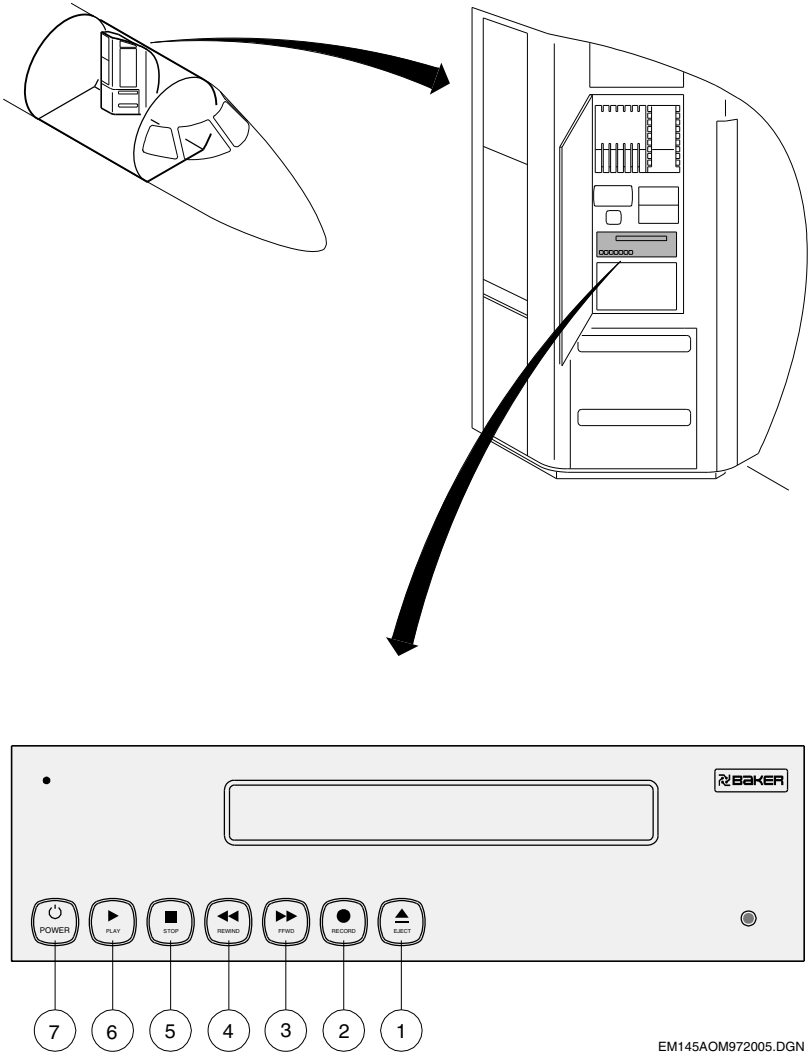

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VIDEO CASSETTE PLAYER CONTROLS

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HANDHELD REMOTE CONTROLS

Turn the unit ON by lightly pressing the touchscreen or by pressing the backlight button on the side of the unit.

CAUTION: USE ONLY A FINGER OR SOFT, DULL INSTRUMENT TO TOUCH THE TOUCHSCREEN.

1 – LEFT/RIGHT BUTTONS

- Used to change function, depending on the device being controlled. The current function is displayed on the touchscreen immediately above the LEFT/RIGHT buttons.

2 – TOUCHSCREEN

- Lightly pressing an item on the touchscreen activates that item or takes you to the control menu for that item.

3 – BACKLIGHT BUTTON

- Turns the touchscreen backlight on. The backlight automatically turns off after a few seconds.

4 – CONTRAST DIAL

- Roll to increase or decrease screen contrast to compensate for ambient lighting conditions.

5 – MUTE BUTTON

- Mutes or restores sound on the selected speaker system.

6 – CHANNEL UP/DOWN BUTTONS

- Increases/decreases the TV or Radio channels (if available).

7 – VOLUME UP/DOWN BUTTONS

- Increases/decreases the volume on the selected speaker system.

NOTE: If the display appears blank after either pressing the touchscreen or the BACKLIGHT button, slowly rotate the contrast dial to approximately mid-range. Once an image appears, slowly rotate the contrast dial to achieve the best image. If no image appears, replace the batteries in the unit.

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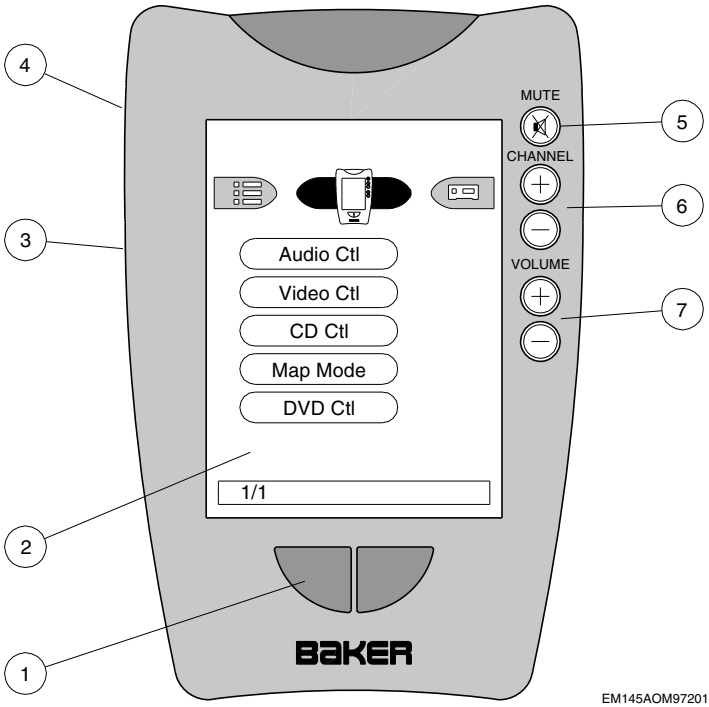

HANDHELD REMOTE CONTROLS

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SATCOM SYSTEM

The SATCOM system is a compact aeronautical system which provides one-channel data/voice/fax for direct satellite communication in the INMARSAT satellite network.

The SATCOM is a single-channel AERO-M INMARSAT standard device, utilizing the spot beams of 3rd generation of INMARSAT satellite to provide a global continental communication. Through its single channel, the SATCOM supplies digital voice service at 4800 bps and data service at 2400 bps.

The SATCOM system includes the following components:

- Satellite Data Unit (SDU).
- High-power/low noise amplifier.
- SATCOM handset #1 and cradle.
- SATCOM handset #2 and cradle (optional).
- SATCOM antenna and NRS system.
- SATCOM pots telephone adapter (optional).

The figure on the next page presents SATCOM system component locations.

For further information about the SATCOM system, refer to Section 2-18 in this volume.

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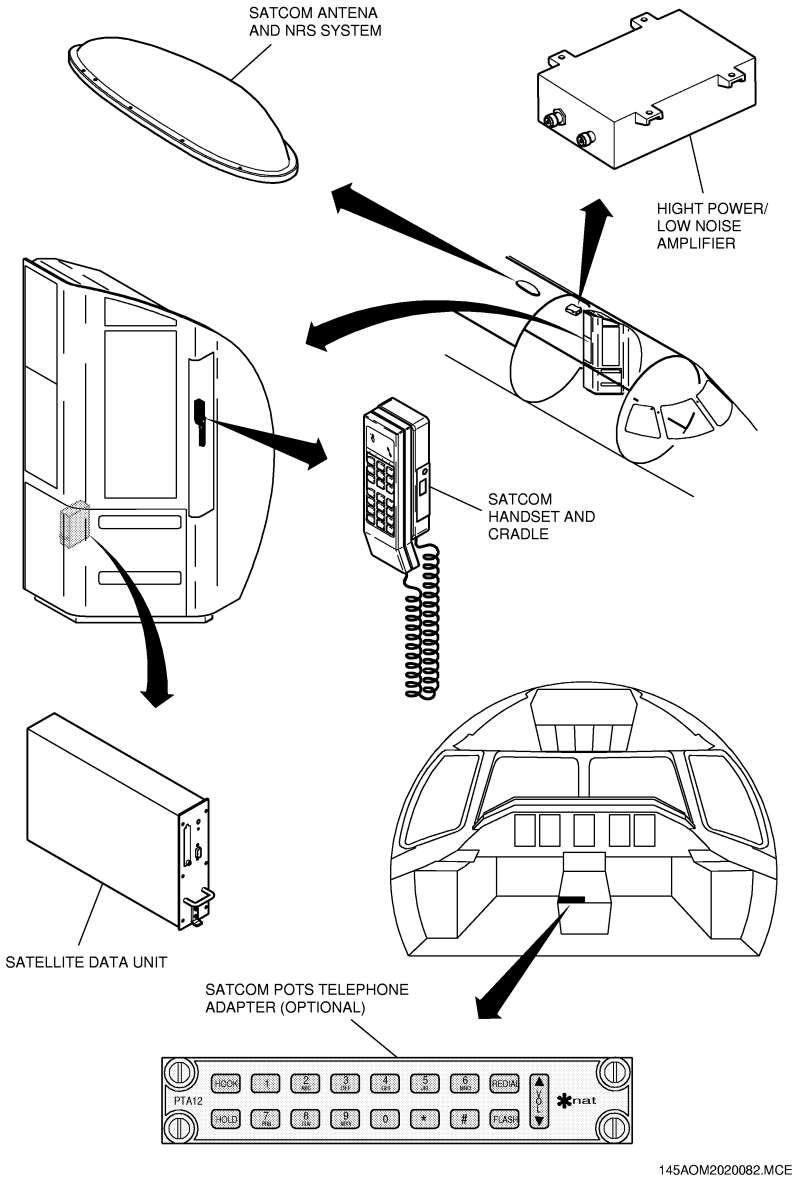

SATCOM SYSTEM - COMPONENT LOCATIONS

AOM-135/1542

TELEPHONE SYSTEM

The MagnaStar™ C-2000 digital airborne telephone system transmits and receives both voice and fax/modem type data to and from the aircraft, using an exclusive cellular-linked technology.

The telephone system has two air-ground voice/fax/data communications channels that can be used simultaneously. The digital airborne telephone system operates over the "GenStar" satellite system, which offers continuous coverage throughout the United States of America, southern section of Canada and most section of Mexico.

The frequency range of operation to transmit is 894 to 896 MHz and to receive is 849 to 851 MHz.

The telephone handsets contain noise-canceling microphones to overcome the aircraft noise environment, and the audio is digitized at the handset to further ensure clear communication. Special function keys and a liquid crystal display (LCD) allow easy use of all options. The handset has an adjustable audio volume, telephone call styles, and selects various options. The LCD display presents useful information and menu style selections.

There is a fax machine with fax/scanner/printer and copier functions installed in the credenza.

The operation of the telephone system is similar to a cellular phone. When in normal operation, the handset works as a normal telephone. To place a call, it is necessary to pick up the handset and dial the desired phone number with all prefix and country codes.

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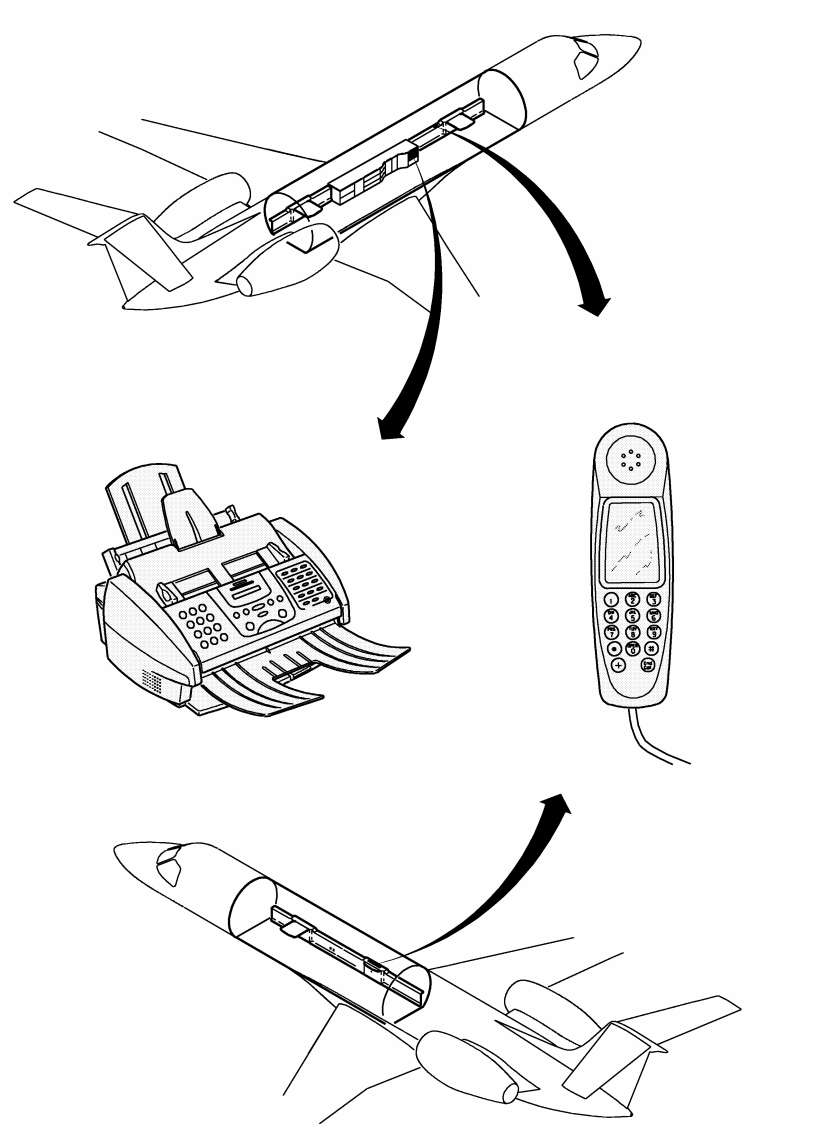

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TELEPHONE HANDSET AND FAX LOCATIONS

To place a voice call:

1. Take the handset off the hook;
2. Press the “1” key (Voice);
3. Using the keypad dial “1” + Area Code + Number, for a domestic call, or “011” + Country Code + Area Code + Number for an international call;
4. Press the “+” (OK) key once the number has been dialed;
5. In case of misdialing, press “∗” to clear the digits and enter the number again;
6. Press “END CALL” when finished.

To receive a voice call:

1. When the phone rings, take the handset off the hook;
2. Speak into the phone;
3. Press “END CALL” when finished.

To send a fax:

1. Turn the fax machine ON;
2. Place a document into the fax machine;
3. Press the “HOOK” key on the fax machine;
4. Using the handset keypad dial “1” + Area Code + Number, for a domestic call, or “011” + Country Code + Area Code + Number for an international call;
5. Press the “+” (OK) key once the number has been dialed;
6. In case of misdialing, press “∗” to clear the digits and enter the number again;
7. Press the “START/SCAN” key to transmit the fax;
8. Press “END CALL” when finished.

To receive a fax:

1. Assure that the fax machine is set to the “FAX TEL MODE” by pressing the “RECEIVE MODE” key in the fax machine, and observe the respective indication in the LCD display;
2. Observe that the fax machine answers the call and receives the fax.

To place a data call:

1. Assure that the PC laptop modem “REDIAL” function is set off;
2. Lift the handset from the side ledge compartment and connect the PC laptop cord to the RJ-11 jack;
3. Set the laptop to dial telephone numbers using DTMF tones;
4. Press “4” key in the handset keypad;
5. Command the laptop to dial;
6. Press the “END CALL” key in the handset to end connection.

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ELECTRONIC FLIGHT BAG (EFB)

The airplane may be optionally equipped with a CMA-1100 PilotView™ Electronic Flight Bag (EFB) System. Additional information on functions and operations can be obtained in the manufacturer's manual.

The PilotView™ EFB significantly enhances the pilot's situational awareness, but should not be used in place of a primary flight display. The information provided by the PilotView™ EFB is for advisory purposes only.

The QRH shall continue being used in paper format.

The PilotView™ EFB is an avionics grade Class 2. Its primary purpose is to provide quick access to specific function, facilitate user navigation and minimize paper documents in the cockpit. The PilotView™ EFB is a Microsoft Windows® based system that can support applications such as: checklists, electronic documents, electronic charts, moving maps, performance calculations and real-time weather.

NOTE: - Windows® XP (Pre-Mod. SB 145LEG-34-0040).

- Windows® 7 (Post-Mod. SB 145LEG-34-0040 or equipped with an equivalent modification factory incorporated).

The PilotView™ EFB consists of 2 Line Replaceable Units (LRU), an Electronic Display Unit (EDU) and companion Enhanced Expansion Module Unit (EEMU) which provides certified airplane power to the EDU and interface connectivity.

The Standard EDU Configuration installed in the Legacy Airplane is 8 Gbytes of solid-state Compact Flash storage (4 Gbytes for C and D drives separately). It is recommended storing the navigation charts on D:\ drive in reason of the operational system be installed on C:\ drive.

The EFB configuration in the airplane includes interfaces to receive:

– USB memory devices.
– Latitude/longitude data from a FMS ARINC output.
– Services received from a wireless high-speed data provider.

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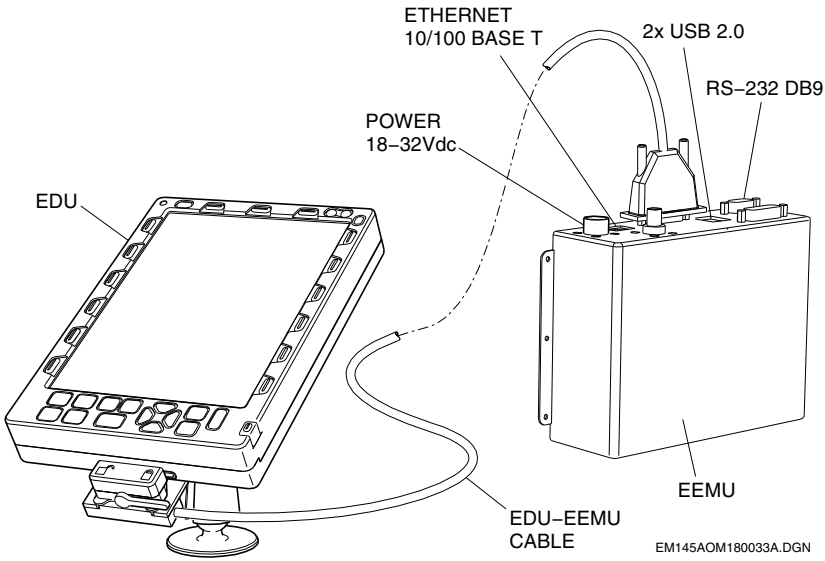

ELECTRONIC FLIGHT BAG SYSTEM

The DC Bus 1 supplies electrical power to EFB 1 (Pilot) and DC Bus 2 to EFB 2 (Copilot). In case of loss of power the EDU is equipped with a battery system that keeps the system powered. Battery endurance is dependant on the display backlight intensity and processor use, duration will range from 30 minutes to almost 2 hours (typically). A complete charge takes approximately 2 hours and the batteries will charge, as needed, whenever the EDU has available DC power from the EMU (DC Bus 1 to the Pilot unit and DC Bus 2 to the Copilot unit) or whenever AC power is connected (ground configuration).

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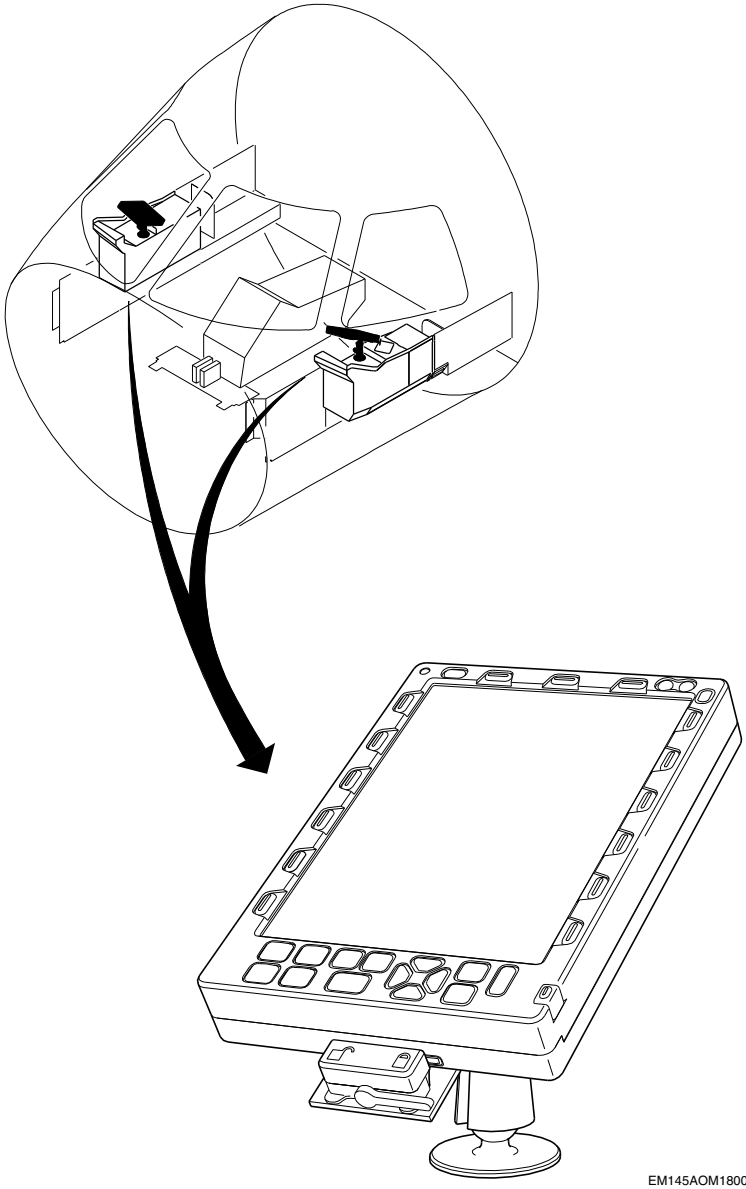

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ELECTRONIC DISPLAY UNIT

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NORMAL OPERATION

POWER UP SEQUENCE

– Press and hold the EDU power button for 1 second.
– The Master Menu will be displayed.

SHUT DOWN SEQUENCE

– Close all active applications that are running.
– On the EDU, press the MAIN key.
– Press SHUTDOWN.
– The unit will completely shut down.

NOTE: If the PilotView™ EFB is on, you can shut it down abruptly by pressing the EDU Power button for 5 seconds. To prevent potential loss of data, it is strongly recommended that you do not use this method.

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CONTROLS AND INDICATORS

ELECTRONIC DISPLAY UNIT

1 – AMBIENT LIGHT SENSOR

– An integrated ambient light sensor adjusts initial brightness level at power up. The EDU Display has very low reflectance and is readable in direct sunlight.

2 – POWER BUTTON - "O/I"

– The "O/I" power button is a multifunction control and indicator. The power button lights up and flashes to indicate seven different states.

STATE		POWER LED INDICATOR
SYSTEM OFF	No External Power	No Light
	With External Power	Flashing Green
STARTUP	Out of Temperature Range	Flashing Amber
SYSTEM ON	External Power	Steady Green
	Battery Powered	Flashing Green
	Battery Low	Flashing Amber

3 – BRIGHTNESS/DIM BUTTON

– These are the sun and moon shaped keys. Press to manually lighten or darken the display screen.

4 – CLOSE BUTTON

– This key is located at the top right corner of the bezel and when pressed closes the currently active application.

5 – BEZEL KEYS

– Bezel keys provide direct access to key navigational functions of the PilotView™. These keys are used to facilitate easy access to information across applications.

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6 – KEYBOARD LATCH - OPEN/CLOSE

– To open the keyboard, pull the latch until it locks, then slide open the unit pushing on the top and bottom parts to separate.

7 – HOTKEY (VERTICAL LINE SELECT KEY)

– The Hotkey is programmed by default to activate a Screen Saver application, to quickly blank the screen by Pilots. To return the previous screen information, just touch the screen, or any of all other buttons. The Hotkey may be programmed by the Customer for other desired application.

8 – APPS

– Shows a list of current active applications. Use the left and right arrow keys to select an application and then press the ENTER key to open the desired application.

9 – VIDEO

– Displays surveillance system video. This key operates as a toggle and opens/closes a configured video application.

10 – ZOOM IN/OUT

– +/- keys enlarge or reduce the image or chart presented on screen.

NOTE: This function applies to properly configured applications.

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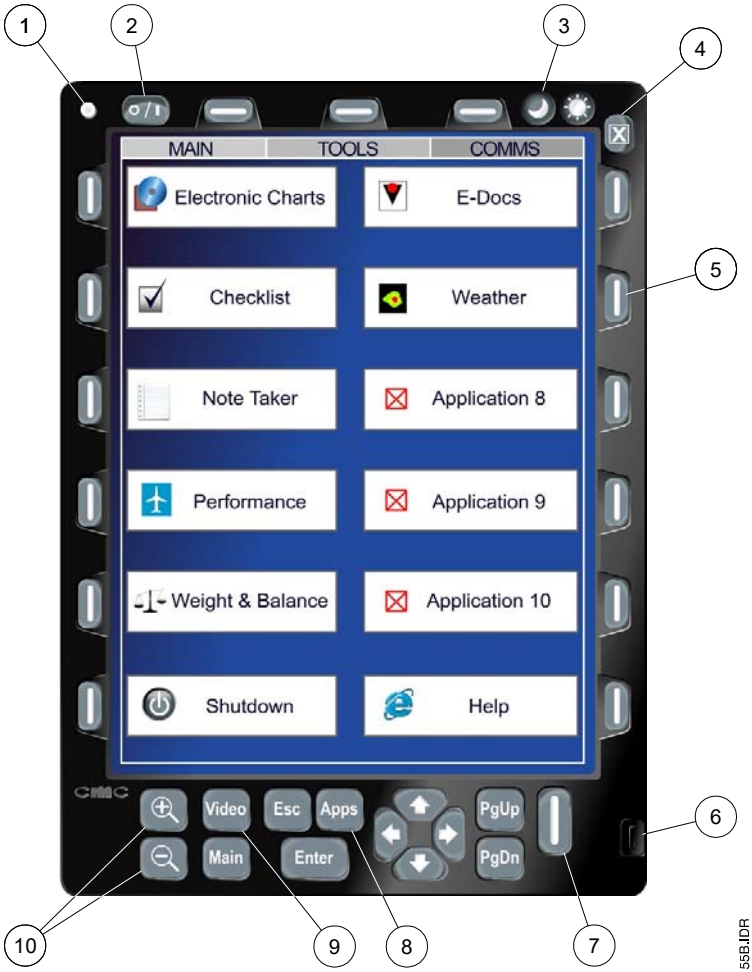

ELECTRONIC DISPLAY UNIT CONTROLS

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MENU

This key returns the user to the MENU previously selected from within the Master Menu user interface (i.e. MAIN, TOOLS, or COMMS).

NOTE: The MAIN is the Menu selected by the Master Menu application upon power up.

TOUCH SCREEN

The touch screen is plastic and can be scratched. Clean using a soft cloth dampened with water. Do not use chemical or abrasive cleaners. A round pointing device can be used if preferred over finger tips provided it has a smooth tip.

EFB MENU BROWSER

Master Menu is an integrated browser, which provides a configurable environment for rapid and consistent access to applications.

TOOLS MENU

The TOOLS Menu provides access to several utilities including password-protected access to Windows®, GPS server configuration, and self-testing utility.

RESET BUTTON

The reset button is located in the small square hole next to the PCMCIA slot. Use a paperclip or other narrow stylus to press the reset. Pressing the reset button is equivalent to a system cold (power disconnected) reboot.

KEYBOARD

The FMS-style keyboard can be accessed by sliding the display up. There are detents that hold the display in the full open and full closed positions.

To open the keyboard, pull the latch located at the lower right end of the bezel until it locks, then slide open the unit pushing on the top and bottom parts to separate.

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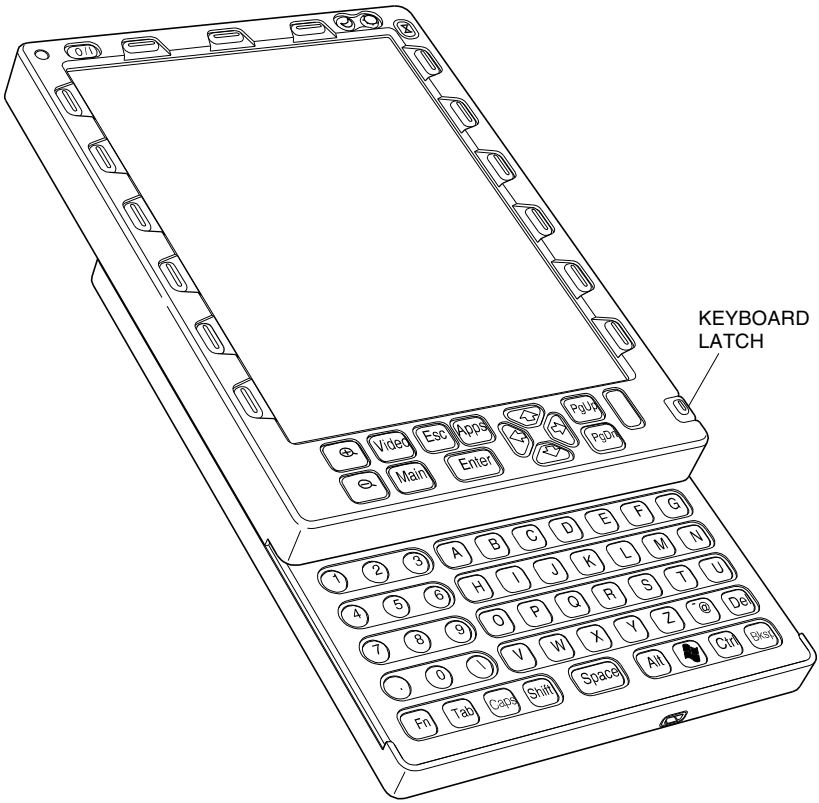

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KEYBOARD

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ABNORMAL OPERATION

FAILURE	ACTION
POWER UP - The unit fails to power up.	Check that the power connections are secure. Verify if the circuit breaker D15 (Pilot) and D20 (Copilot) are closed. Check that the EDU is connected properly to the I/O connector.
BRIGHTNESS - The display is too dark or too light.	To lighten or darken the display, use the top right Brightness buttons of the EDU.
FMS INTERFACE FAILURE - No present position.	Shut down the EDU, after shut down is finished wait 5 seconds and then turn the EDU on.
HARDWARE - USB device not working.	Unplug the USB device, wait 10 seconds and then reconnect it.
WINDOWS - Shut down not functioning.	Press the reset button at the top of the EDU.
WIRELESS COMMUNICATION - Inoperative.	Enable wireless functionality and enter parameters via Windows® Control Panel (Start/Control Panel/Network Connection).
MASTER MENU - Changed Master Menu setting via the Setup application and changes are not active.	Prior to exiting Setup, ensure to select Save and Exit. The PilotView™ EFB will need to be restarted to make the changes active.
PASSWORD - Invalid when trying to exit Master Menu.	Password is case sensitive. Make sure that Caps Lock is not activated.
PASSWORD - Forgot the password.	Contact the manufacturer.

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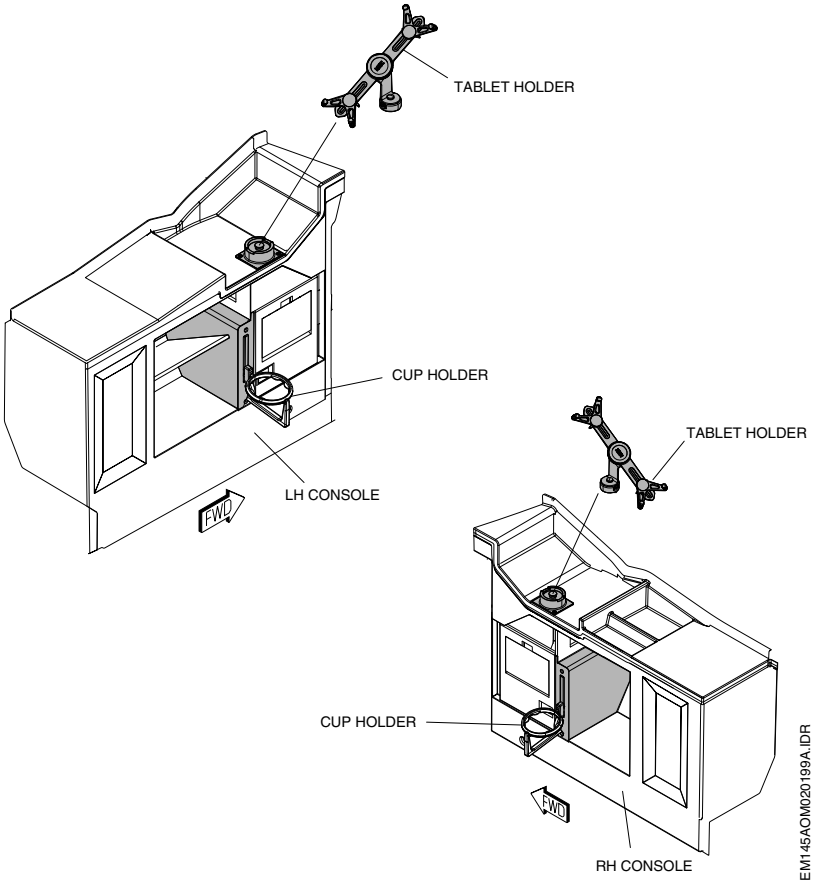
TABLET HOLDER AND/OR A NEW CUP HOLDER

The airplane may be optionally equipped with a Tablet Holder and/or a new Cup Holder.



TABLET HOLDER/NEW CUP HOLDER

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SECTION 2-3

EMERGENCY EQUIPMENT

For emergency equipment information, refer to Section 1-10 in Volume 1

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SECTION 2-04

CREW AWARENESS

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NOTE: Optional equipment are marked with an asterisk (*) and its description may not be present in this manual.

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GENERAL

The EMB-135BJ is provided with a variety of visual, aural, and sensitive warnings to notify crew regarding systems status, malfunctions, and abnormal airplane configurations.

Alarm lights provide indication whether there is an abnormal situation. Some systems also provide indicating lights, for system status indication.

An Engine Indication and Crew Alerting System (EICAS) provides the flight crew with a three-level alerting and indications messages system: warning, caution and advisory. A fourth level is provided exclusively for maintenance purposes. Besides the five displays on the main panel, two back up displays are provided through the RMUs (Radio Management Unit). Some of the more critical messages also generate an aural warning.

Sensitive warning is available through the Stall Protection System (SPS), which shakes the control column, if an imminent stall is detected.

To aid in navigation and approach procedures, the airplane is also provided with an Enhanced Ground Proximity Warning System (EGPWS), a Traffic and Collision Avoidance System (TCAS), and a Windshear Detection and Escape Guidance System.

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AVIONICS INTEGRATION

The EMB-135BJ is equipped with a variety of highly integrated computers and displays, so as to reduce pilots' workload while providing high reliability and redundancy. This feature is achieved by providing different paths to each type of data, thus minimizing the possibility of losing information due to failure in one computer.

The system is composed of:

- Two Integrated Computers (IC-600).
- Two Integrated Computer Configuration Modules (IM-600).
- Two Data Acquisition Units (DAU).
- One Central Maintenance Computer (CMC).
- One Horizontal Stabilizer Control Unit (HSCU).
- Two Primary Flight Displays (PFD), two Multi-Function Displays (MFD) and one Engine Indications and Crew Alerting System (EICAS) display.
- Two Radio Management Units (RMU).
- One Tuning Backup Control Head.
- One Integrated Standby Instruments System (ISIS).
- Two Integrated Navigation Computers.
- Two Integrated Communication Computers.
- Three Digital Audio Panels (DAP).
- Two Inertial Reference Systems (IRS) or two Attitude and Heading Reference Systems (AHRS).
- Two Air Data Computers (ADC).
- One Enhanced Ground Proximity Warning System (EGPWS).
- One Aural Warning Unit (AWU).
- One Cockpit Voice Recorder (CVR).
- One Flight Data Recorder System (FDRS).
- One or two Flight Management Systems (FMS).
- One Traffic and Collision Avoidance System (TCAS).
- One Radar System.
- One Stall Protection System (SPS).

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– One Self Protection System composed by a Radar Warning Receiver (RWR) and a Counter-Measure Dispensing System (CMDS) (only for airplanes S/N 867, 880, 901, 910 and 919).

The primary components of such integration are the IC-600 units, which exchange information with all other components, either directly or through auxiliary computers. The IC-600s are responsible for the interface among many airplane systems, besides managing information presented on the displays. Each IC-600 computes the received data and sends the appropriate information to the displays.

The DAUs are the central data collection points for the EICAS. DAU 1 is dedicated to collect data from the forward airplane systems and left engine. DAU 2 collects data from the aft airplane systems and right engine. Engine data is sent to the DAUs through the FADECs and directly from the engine sensors.

The discrete signals collected by the DAUs are converted into digital signals and sent to the Integrated Computer (IC-600). In the IC-600 there is a symbol generator which provides images to Display Units.

Each DAU is a dual (A and B) channel unit. Channels B on both DAUs are kept as a standby source, which must be manually selected through the DAU Button in case of a channel A DAU failure. Both IC-600s use channel A of on-side DAU as the primary source of information.

During normal operation, the information presented on PFD 1, MFD 1 and EICAS display is provided by IC-600 # 1, while IC-600 # 2 provides information for MFD 2 and PFD 2.

Both computers interact with each other and send outputs to the Aural Warning unit to generate a tone indicating a caution/warning message when there is an abnormal/emergency situation.

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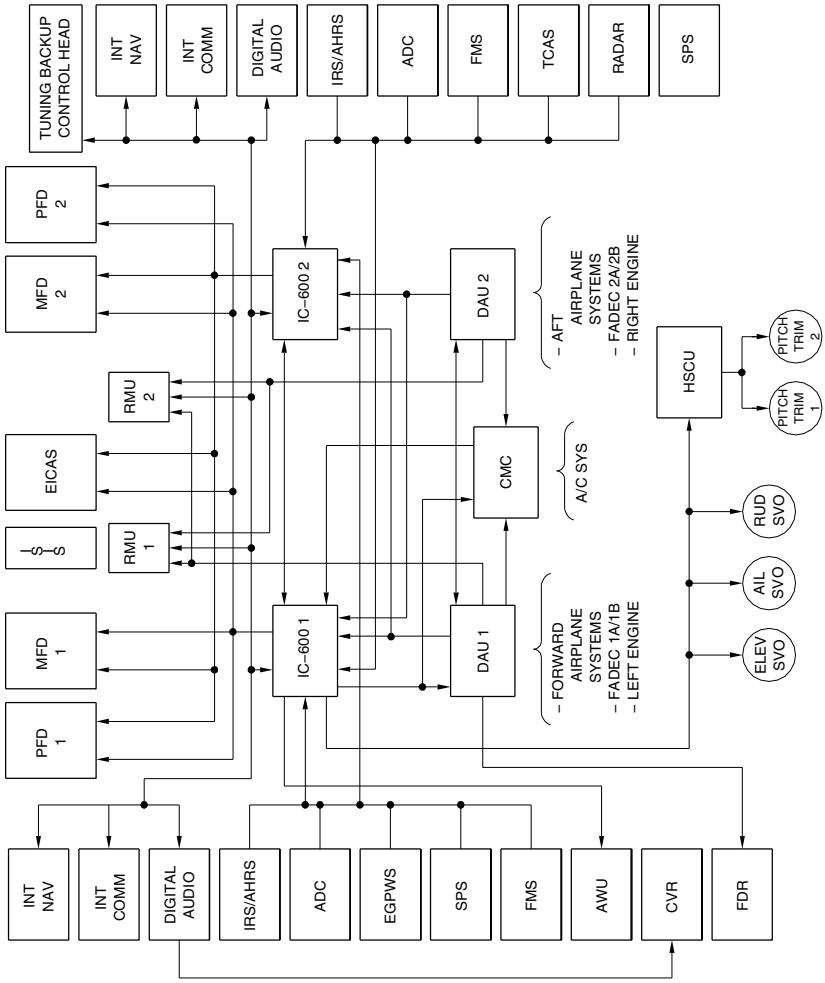

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AVIONICS INTEGRATION SCHEMATIC

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If IC-600 # 1 fails, RMU # 1 displays engine backup page 1 automatically and a red X is presented on PFD 1, MFD 1 and EICAS display. After the IC-600 # 1 failure, IC-600 # 2 can control the five displays if the Symbol Generator ("SG") button on the left reversionary panel is pressed. In this case, RMU # 1 goes back to the normal mode.

If IC-600 # 2 fails, a red X is displayed on PFD 2 and MFD 2. After IC-600 # 2 failure, IC-600 # 1 can control the five displays if the Symbol Generator ("SG") button on the right reversionary panel is pressed. RMU # 1 remains operating normally.

If both ICs fail, besides all displays presenting a red X, RMU # 1 automatically displays engine backup page 1.

Usually, airplane configuration options are set on the IC-600 through straps. If the number of installed options exceeds the maximum adjustable through the IC-600 wiring, a configuration module (IM-600) is installed, which stores information for several airplane configurations.

A caution message CHK IC CONFIG is displayed should any discrepancy occurs in the following data:

– Airplane ID.
– Engine type.
– Long Range configuration.
– English/Metric units.

CONFIG MISMATCH advisory message is still active in case any other parameters discrepancy, which does not trigger the CHK IC CONFIG caution message, occurs.

If an IM-600 failure occurs, the IC-600 will use the last data read from that source (when it was still working), and an IC CONFIG FAIL advisory message will be displayed.

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DISPLAYS

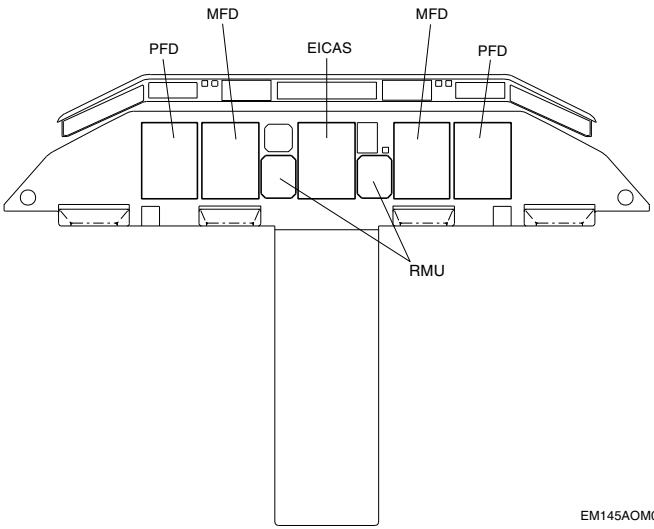
Five Cathode Ray Tube (CRT) displays or five Liquid Crystal Displays (LCD) are provided to present information to the flight crew, as follows:

– Two Primary Flight Displays (PFD) on the pilot and copilot panels.
– Two Multi-Function Displays (MFD) on the pilot and copilot panels.
– One EICAS display on the center panel.

In addition, the Radio Management Unit (RMU) displays on the main panel may be used as a back-up for the PFDs, MFDs and EICAS displays.

The displays themselves are identical and interchangeable. The control panel installed just below each display, except for the RMUs, allows controlling some of the associated display features.

In case of failure of one display, its information may be presented in one of the remaining operative displays.



AIRPLANE DISPLAYS

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PRIMARY FLIGHT DISPLAY (PFD)

The PFD is the primary pilots' instrument. It presents the information formerly presented in a variety of instruments such as airspeed indicator, altitude indicator, EADI, EHSI, vertical speed indicator. The PFD further provides radio aids, autopilot, flight director, yaw damper and radio altitude information. For further information on these parameters, refer to Sections 2-17 – Flight Instruments, 2-18 – Navigation and Communication, and 2-19 – Autopilot.

The PFD is divided into sections, each one presenting one group of information.

The PFD bezel incorporates an inclinometer, buttons and a knob for barometric settings.

In case of a display failure, information may be presented on the MFD by appropriately setting the MFD Knob on the reversionary panel.

The RMU is also able to present PFD information (refer to Section 2-18 – Navigation and Communication for further details about this feature).

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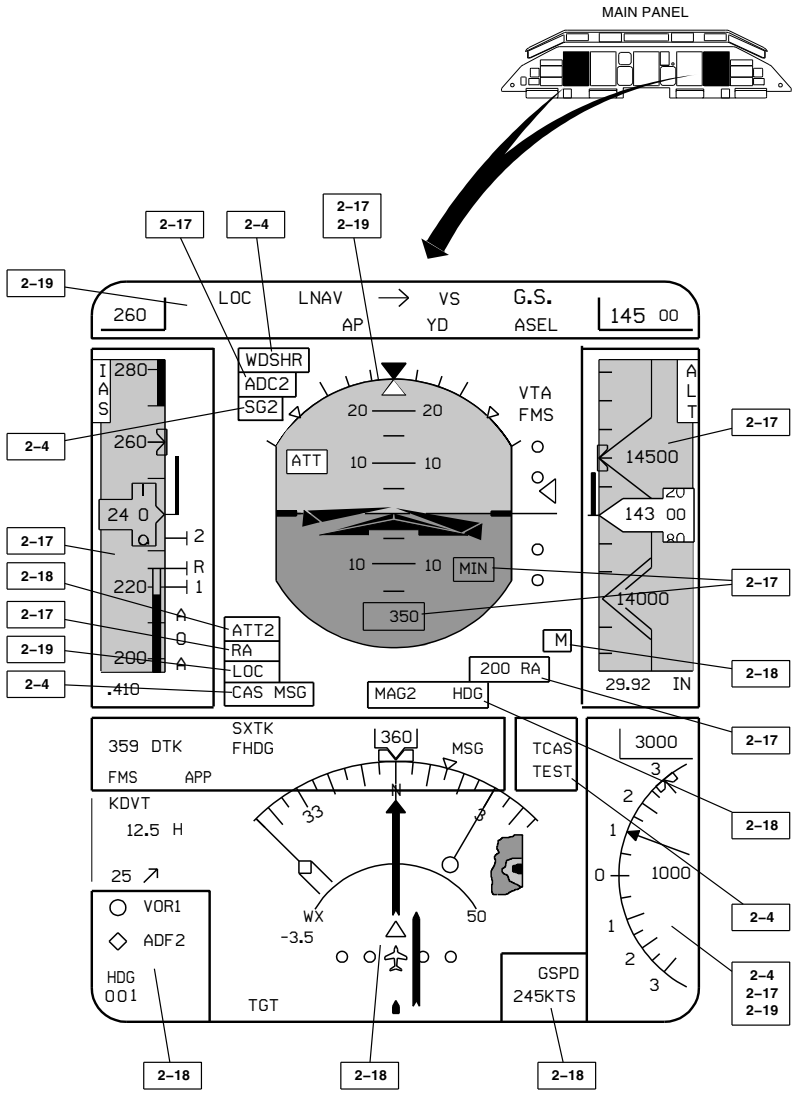

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NOTE: Number inside boxes refers to Operations Manual Section where information concerning the associated item can be found.

PFD DISPLAY SCHEMATIC (V-BAR FORMAT)

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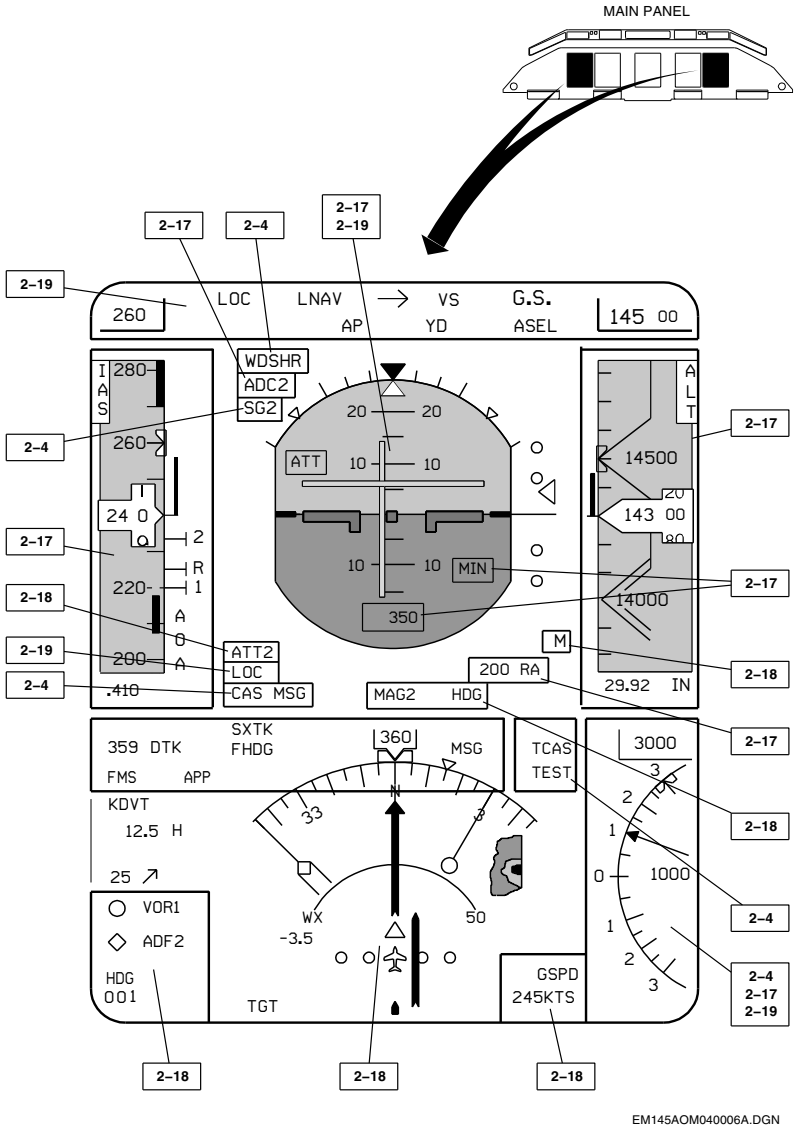

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PFD DISPLAY SCHEMATIC (CROSS-BAR FORMAT)

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MULTI FUNCTION DISPLAY (MFD)

For airplanes equipped with CRT display units, the Multi Function Display (MFD) presents radar, TCAS, FMS, CMC, and other navigation information and systems pages, which are the basic modes of operation. There are five system pages available:

- Fuel: provides fuel system parameters and status.
- Electrical: provides electrical system parameters and status.
- Environmental and Ice Protection: provides air conditioning, pneumatics, oxygen, and ice and rain protection systems parameters and status.
- Hydraulic and Brakes: provides hydraulic and brakes systems and status.
- Takeoff: provides takeoff data settings, oil level and doors status.

For further information on system pages, refer to each associated system description.

The MFD may operate in three different presentation modes, besides the reversionary ones. The Map and Plan modes present navigation information. For further information on them, refer to Section 2-18 – Navigation and Communication. The maintenance mode permits access to maintenance messages, but it is available only on the left MFD for maintenance personnel when the airplane is on ground.

Different modes and pages may be selected by using the controls located on the display bezel. Button functions are indicated in the menus presented in the lower part of the display, just above each button, whose function changes depending on which menu is selected. Menu selection is made by using the buttons themselves. If required, radar modes and TCAS information may be displayed.

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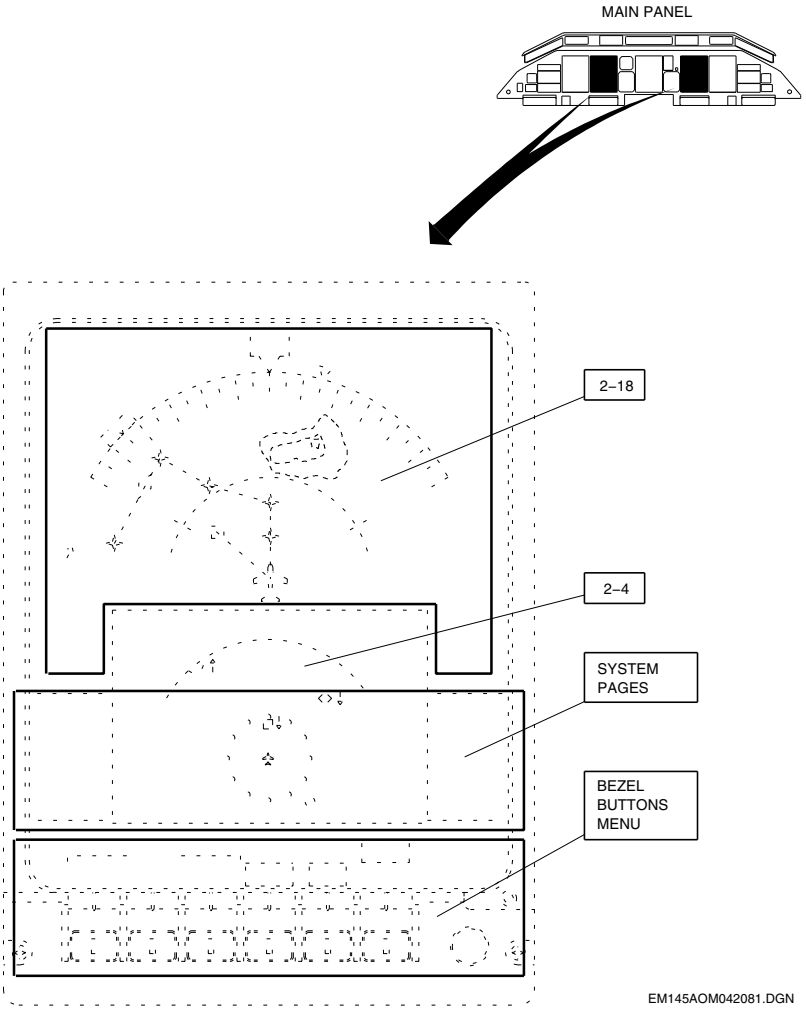

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MFD DISPLAY SCHEMATIC

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For airplanes equipped with LCD units, the MFD operates the same functions of basic modes, besides the enhanced modes. The activation of the enhanced mode is performed through a cursor control device (CCD), one for each MFD, on Control Pedestal Panel. The expansion applications consist of the following items:

– Charts: shows approach charts, airport maps, standard instrument departure (SIDs), standard terminal arrival route (STARs) and noise procedures.
– Maps: shows the flight management system (FMS) moving map over geopolitical boundaries augmented with navigation aides and up-linked weather displays.
– Database configuration: shows database status and allows to upload data for charts and maps.
– DU maintenance: informs airplane type, DU-875 P/N, software version, databank version, display position and selected bus.

For further information on these, refer to Section 2-18 – Navigation and Communication.

The MFD also operates as a back-up display for either PFD or EICAS, in case of such displays failure. Appropriate selections may be made through the reversionary panel.

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CCD PANEL ON CENTRAL CONSOLE

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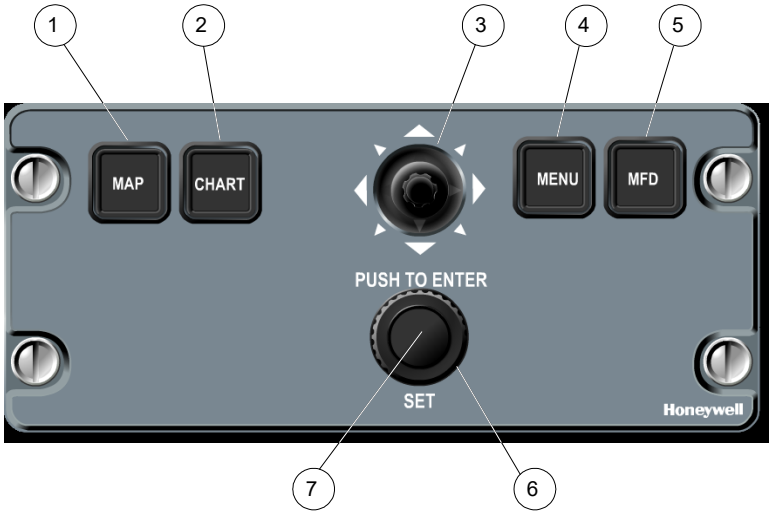

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CCD PANEL

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CCD PANEL

1 – MAP BUTTON

- Calls up the MAP function on the MFD.

2 – CHART BUTTON

- Calls up the CHART function on MFD.

3 – JOYSTICK

- Eight-way joystick allows maneuvering of the cursor in the MAP and CHART functions on the MFD, as well as navigating through menu selection.

4 – MENU BUTTON

- Enables MFD enhanced functions menu display on the classic MFD.

5 – MFD BUTTON

- Returns to classic MFD mode.

6 – SET KNOB

- Zooms ranges in/out. Scrolls through menu or lists.

7 – ENTER

- Selects functions or positions when highlighted by the cursor.
- The conditions that cause the DU to revert from the enhanced mode to the basic (classic) MFD mode are:
  - DU is reverted to PFD.
  - DU is reverted to EICAS.
  - TCAS pop-up occurs.
  - EGPWS pop-up occurs.
  - Any MFD bezel button is pushed.
  - MFD range knob is turned.

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Charts

The primary purpose of the chart function is to present Jeppesen charts on the MFD.

Items displayed through the chart function are:

– Airport charts.
– Standard Instrument Departure (SID) charts.
– Standard Terminal Arrival Route (STAR) charts.
– Approach charts.
– Noise charts.
– Notice To Airmen (NOTAM).
– Airspace charts.

NOTE: - In Charts extended function, the FMS flight plan Alternate Airport is not read nor presented in the CHARTS menu when using FMS version 5.2.

- For OEMs or operators that request credits for paperless cockpit through DU-875 enhanced modes, FMS versions 6.1 and on must be used.

The Revision Info Page is presented the first time the chart function is accessed after power-up. In flight, for the first time the chart function is accessed, the charts take approximately 30 seconds to be loaded.

The Revision Info Page informs the regions covered by the electronic chart dataset subscription, enabled through the entered serial number and access codes. It also displays a warning message if the dataset becomes out-of-date.

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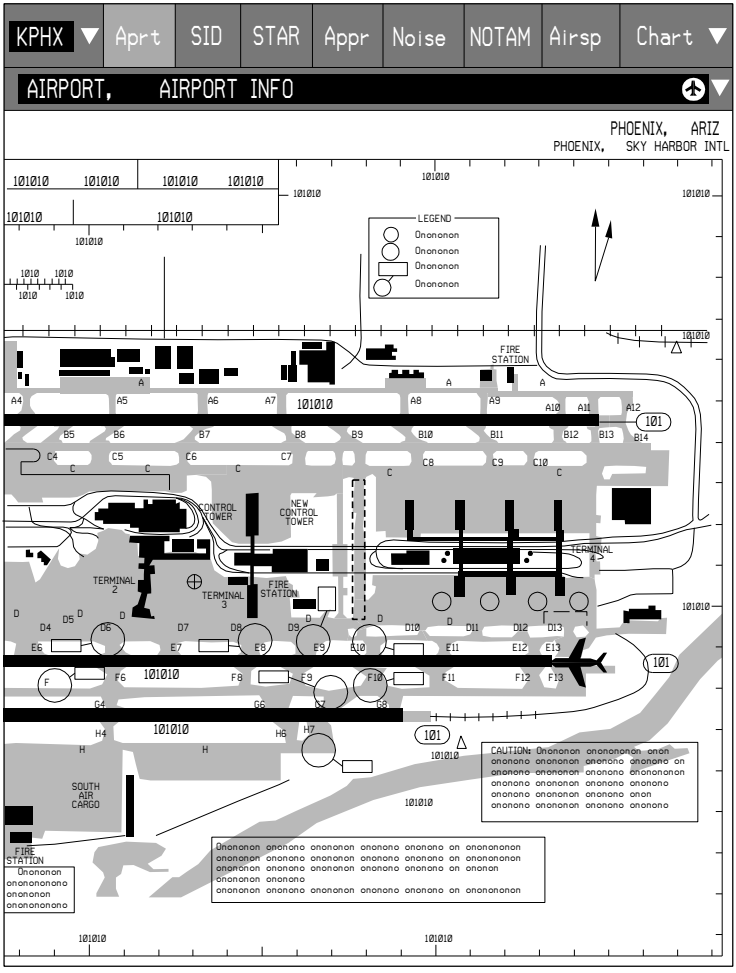

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CHART DISPLAY

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REVISION INFO

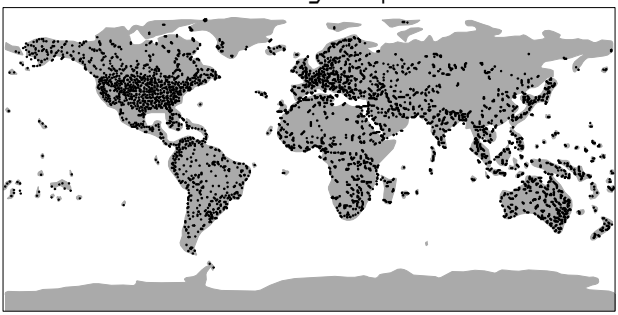
X

Dataset Start Date 10MAR06

May contain outdated information

Consult all applicable NOTAMs prior to flight. The information provided is intended to supplement your normal navigation functions. use the most recent dataset immediately upon receipt.

Coverage Map



Serial Number

JLEETVTIM1U2E3Y4

Valid Access Code

Valid Access Codes

Clear | Enter | Back | Space

A B C D E F G H I

J K L M N O P Q R / -

S T U V W X Y Z

1 2 3

4 5 6

7 8 9

0 9

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REVISION INFORMATION DISPLAY

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Maps

The primary purpose of the Map Extended Function is to present navigation information on a moving map.

Items displayed through the map function are:

- Airports.
- VORs.
- NDBs.
- Intersections.
- Hi Airways.
- Lo Airways.
- Term Airspace.
- Special Use Airspace.
- Up-linked graphical weather.
- Geo-political boundaries.
- Graphical representation of the active flight plan.
- Magnetic heading.
- Navigational aids (NAVAIDS).
- Airways.
- Airspace.
- Miscellaneous annunciators installation.

The map function has two user-selected display modes:

- North-up.
- Heading-up.

NOTE: MFD Navigation Display Heading and Drifting Bug is not totally covered for headings between 071° and 108°.

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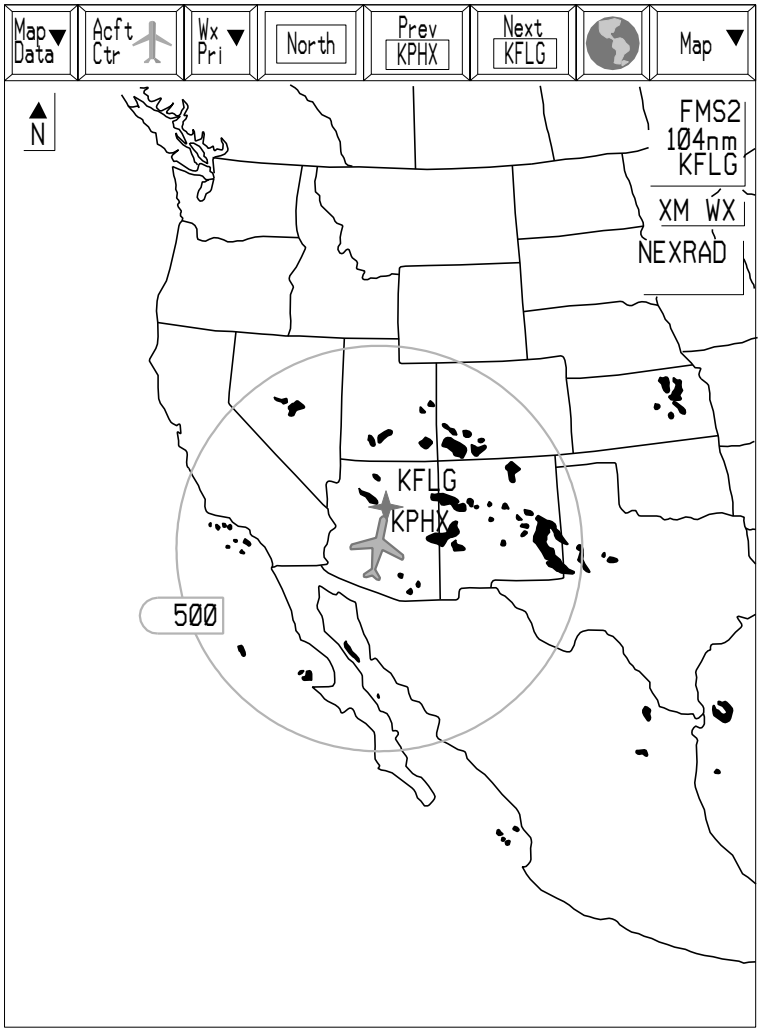

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MAP DISPLAY WITH NORTH-UP

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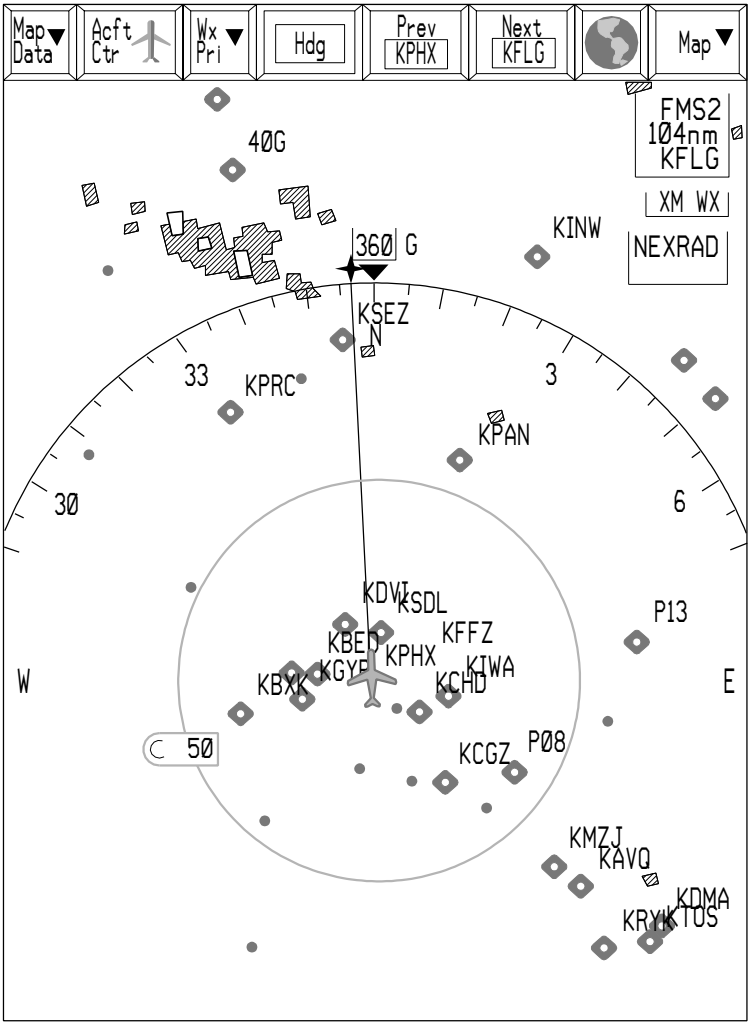

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MAP DISPLAY WITH HEADING-UP

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XM Weather

The XM Weather System is a data-link satellite that is capable of receiving XM Weather data and displaying graphical weather information and associated text on the MFD.

NOTE: In order to have Satellite Weather functioning, it is necessary to activate XMD-157, make a subscription to Weather services and airplane operating on Continental USA, only. To this case a white "XM" notification is being shown on the right side of MFD.

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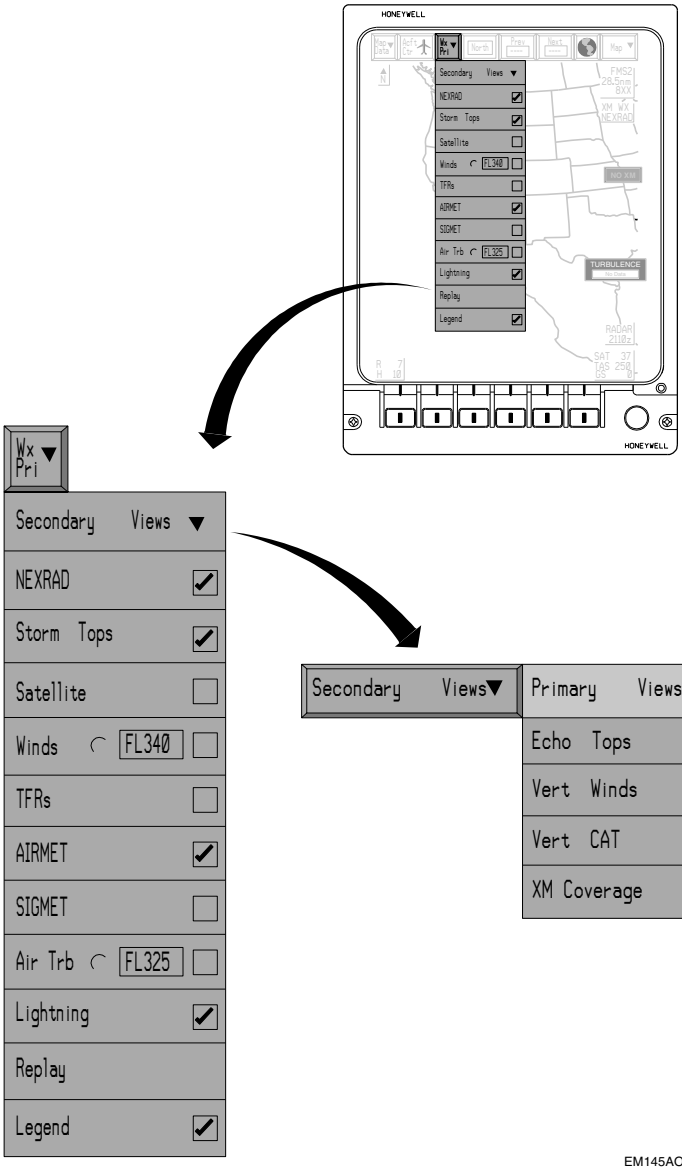

XM WEATHER PULL DOWN MENU

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DISPLAY FUNCTIONS

1 – NEXRAD

- NEXRAD (Next Generation Radar) view is a mosaic of data from all the radar sites in the U.S., color-coded (green, yellow or red) based on radar return to indicate storm severity.
- The NEXRAD data is removed when the airplane range is less than 10 NM with airplane on ground, and less than 50 NM during flight. There is no maximum range.

2 – STORM TOPS

- Storm Top view is only displayed with NEXRAD Radar. Data is displayed as height (in flight level) forecast speed (in kt), and an arrow to indicate direction. The direction arrow begins at the location of the Storm Top. Text and arrows are displayed as white.
- Storm Top data is displayed when the selected airplane range is less than 300 NM, and is removed when the airplane ranges are less than 10 NM with airplane on ground, and less than 50 NM during flight.

3 – SATELLITE

- Satellite view displays cloud cover over the continental United States and hundreds of miles off coastline. A formula estimates cloud temperatures at various altitudes across the country and converts them into estimated cloud height. Clouds below 5000 ft are so close to ground temperatures, so they are not shown.

4 – WINDS ALOFT

- Winds Aloft view displays wind speed and direction information from the surface up to 42000 ft. The Winds data is displayed with arrows showing the relative direction of the wind.

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5 – AIRMET

- Airman's Meteorological Information (AIRMET) advises of weather that may be hazardous. This advisory affects an area of at least 3000 square miles and provides data in ceiling, obscuration and turbulence. AIRMET types include IFR (yellow), mountain obstruction (magenta), icing (blue), strong surface winds (white) and turbulence (green).
- AIRMETs are displayed as a combination of graphical symbolism and text box. AIRMET graphic is attached to an AIRMET type label as a rectangular box drawn in the color of the graphic. The AIRMET Info Box contains the key word AIRMET, followed by the AIRMET Type and the expiration time of the AIRMET.
- The AIRMET graphic is removed and only the AIRMET label is displayed at airplane ranges greater than 300 NM.

6 – SIGMET

- Significant Meteorological Information (SIGMET) advises of potentially hazardous weather, other than convective activity. This advisory affects an area of at least 3000 square miles and provides data on icing (blue), turbulence (green), dust (white), volcanic ash (gray) and convection (orange).
- SIGMETs are displayed as a combination of graphical symbolism and text box. The SIGMET graphic is attached to an SIGMET type label as a rectangular box drawn in the color of the graphic. The SIGMET Info Box contains the key word SIGMET, followed by the SIGMET Type, followed by the expiration time of the SIGMET.
- The SIGMET graphic is removed and only the SIGMET label is displayed at airplane ranges greater than 300 NM.

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7 – TFR

- Temporary Flight Restrictions (TFR) identifies volumes of airspace where all airplane are temporarily restricted from entering unless a waiver has been issued. TFRs are routinely issued for occurrences such as sporting events, dignitary visits, military depots and forest fires.
- TFR graphical representation is attached to a label box, which is dark lavender with white text, small font. The label box is filled with the NID text of the TFR if available; if not, then the TFR number (order sent) and the ID are displayed.
- The TFR Label box is removed when the airplane range is greater than 200 NM and TFRs are removed when the airplane range is less than 50 NM.

8 – CAT

- The Clear Air Turbulence (CAT) data allows crew to monitor conditions by indicating the potential for erratic movement of high-altitude air mass-associated winds.
- CAT is displayed according to a blue color range to identify the turbulence as Light, Moderate, Extreme or Severe. The lighter the color, the less severe is the turbulence represented.
- The Clear Air Turbulence (CAT) is displayed at ranges greater than 50 NM.

9 – ECHO TOPS

- Echo Tops is a radar-derived data product that indicates the highest altitude at which precipitation is falling since severe storms tend to grow vertically.
- The Echo Tops (Storm Tops) are displayed according to a gray and violet range of colors to identify intensity.
- Echo Stops are displayed at ranges greater than 50 NM. All other weather data will be removed while Echo Tops is selected.

10 – VERTICAL WINDS

- Vertical Winds displays the airplane in a vertical profile. Map data and other weather data is removed when Vertical Winds is selected.
- The Winds Legend is displayed when Vertical Winds is selected. Vertical Airplane Symbol is used to indicate airplane on ground (magenta) or during flight (white).

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11 – VERTICAL CAT

- Vertical CAT displays the airplane in a vertical profile. Map data and other weather data is removed when Vertical CAT is selected.
- The Clear Air Turbulence Legend is displayed when Vertical CAT is selected. Vertical Airplane Symbol is used to indicate airplane on ground (magenta) or during flight (white).

12 – LIGHTNING

- Uplink WX displays lightning as a single lightning indicator in the golden color. Depending on distance between the airplane and the Uplink WX, the size of lightning symbol indicator displayed can vary, and bigger symbols represents smaller ranges. Lightning display is removed when airplane range is greater than 200 NM or less than 5 NM.

13 – XM RADAR COVERAGE MASK

- Indicates which NEXRAD radar sites are online, enhancing situational awareness by revealing any gaps in national radar coverage. NEXRAD is the standard reference for the National Weather Service's Doppler radar network. Map data and other weather data is removed when XM Coverage is selected.
- Uplink WX draws, based on airplane range, a light green color circle 140 NM in radius from the latitude/longitude of each contributing station.

14 – DATA REPLAY

- The Uplink WX allows replay of multiple views that are Primary Views and can be displayed together.
- These views are:
  - NEXRAD.
  - Winds Aloft.
  - CAT.
  - Satellite.

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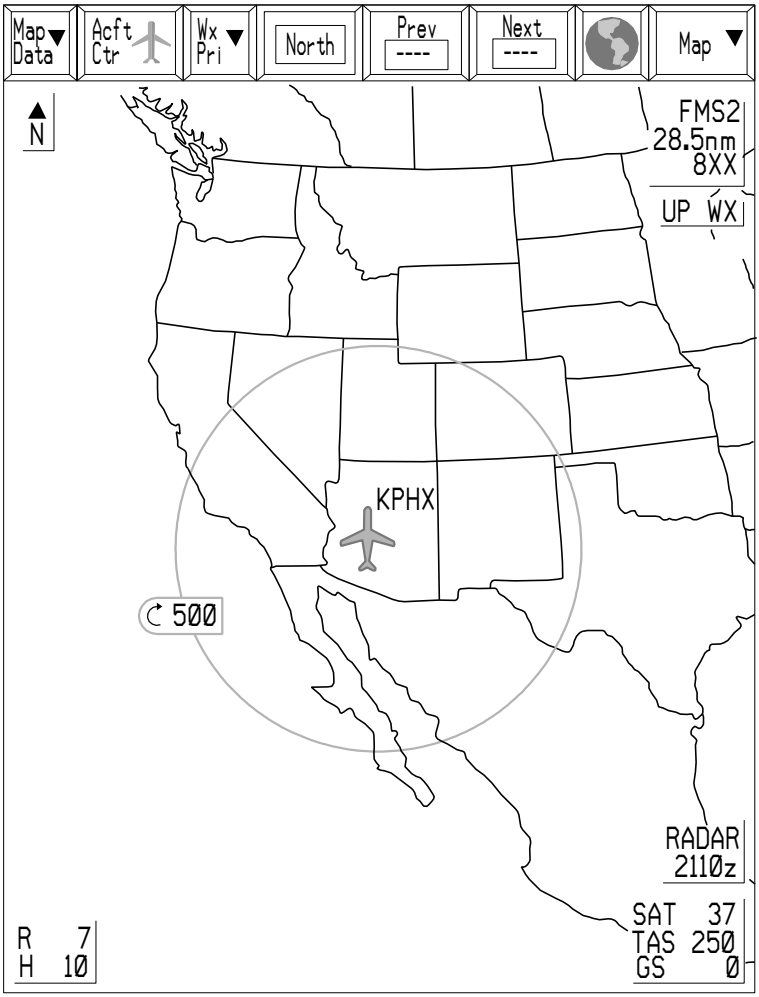

XM WEATHER NEXRAD PAGE

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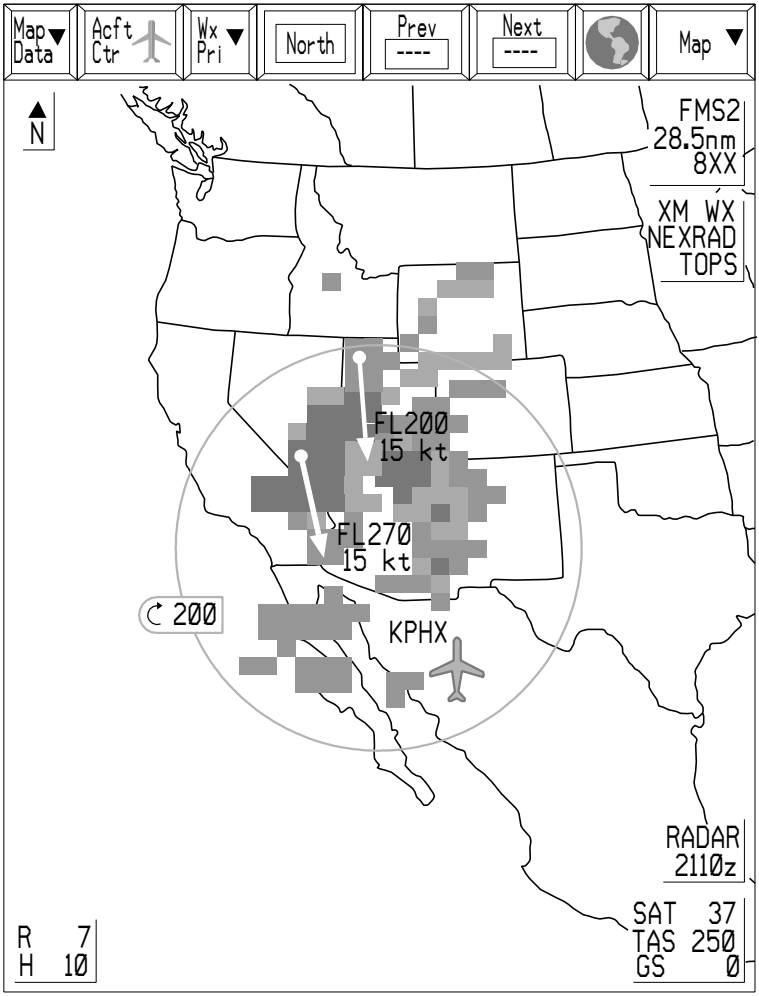

XM WEATHER STORM TOPS PAGE

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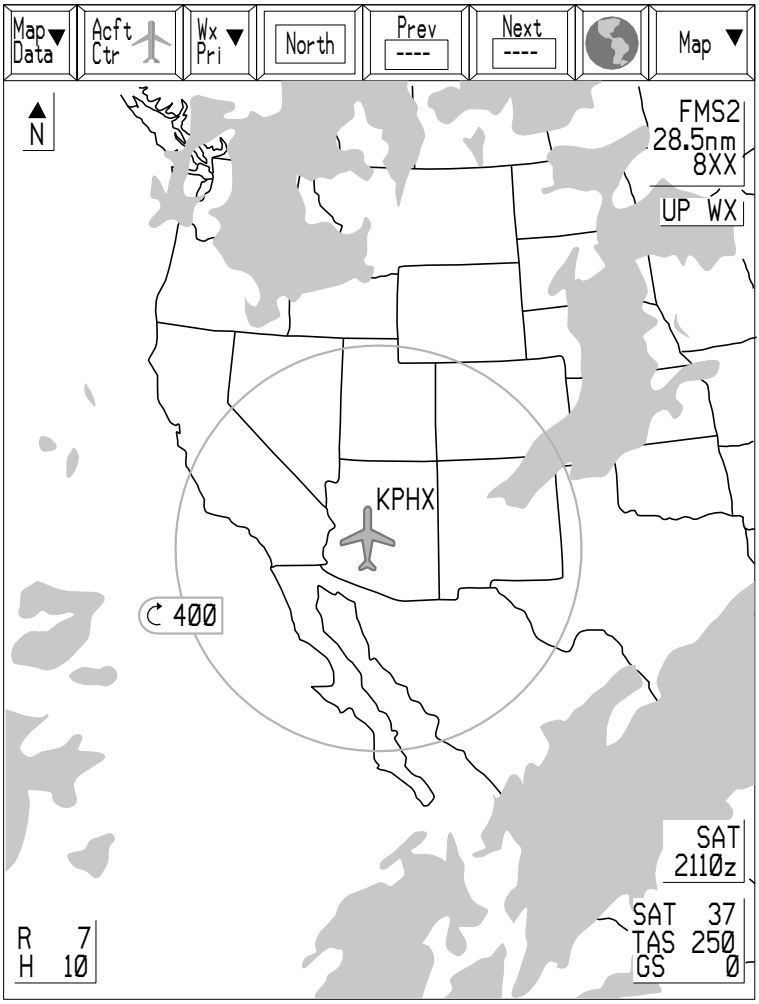

XM WEATHER SATELLITE PAGE

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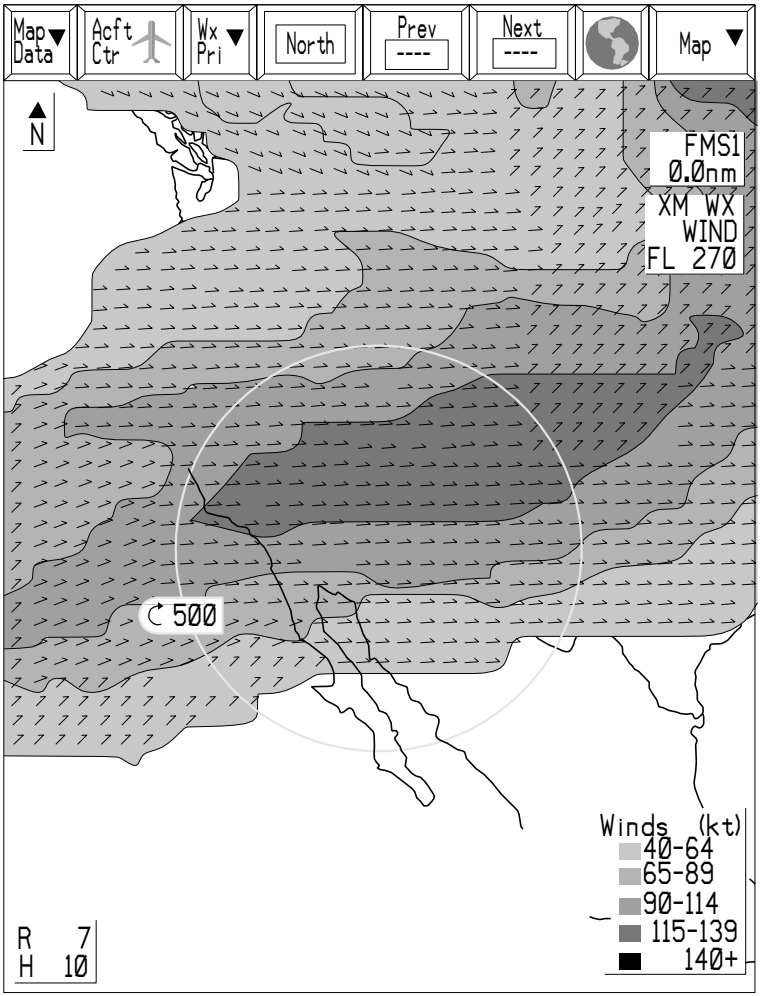

XM WEATHER WINDS ALOFT PAGE

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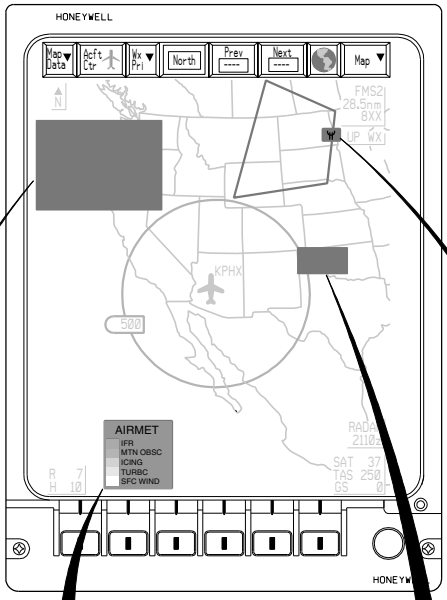
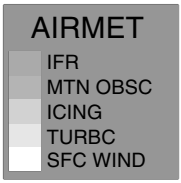
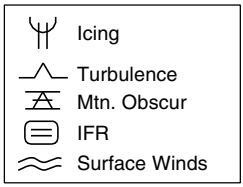


XM WEATHER AIRMET PAGE



AIRMET LEGEND

AIRMET INFO BOX



AIRMET GRAPHICAL SYMBOLOGY

AIRMET TURB . . . OR CA ID WY NV UT CO AZ NM AND CSTL WTRS
BOSS0 BOSS1 SF0T1 SLCTO SFOSO
FROM 60WSW REO TO CYS TO PUB TO CIM TO 20SE TRM TO 40N LAX TO 20NW EHF TO 30WNW PYE TO 70WSW OED TO 60WSW REO MOD TURB BLW FL180. CONDS CONTG BYD 03Z THRU 09Z.

AIRMET FULL TEXT BOX

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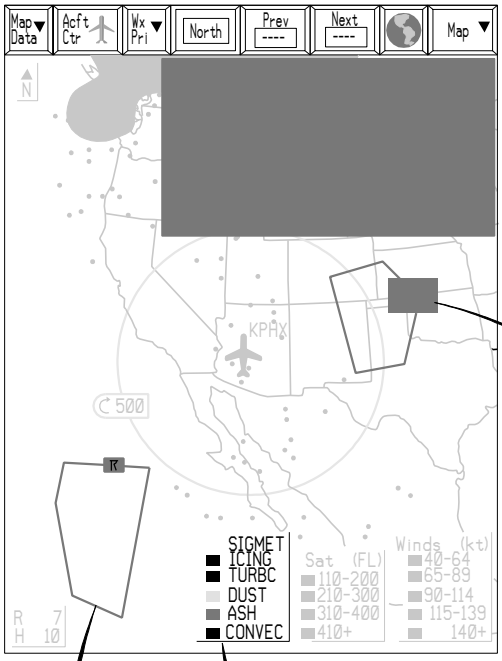


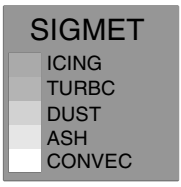
XM WEATHER SIGMET PAGE

SIGMET ICE...NC SC GA FL ME NH VT MA RI CT NY LO NJ PA OH LE WV MD DC DE VA AND CSTL WTRS

MNPT02 SZ01 BISZ02 BILT03

OCNL MOD RIME/MXD ICGICIP BTN FRZLVL AND FL260. FRZLVL 080–140 N SLPG 140–160 S. CONDS ENDG W OF JHW–ETX–CHS BY 20Z. AFT 20Z CONDS DVLPG EWD OVR RMNDR ME AND CSTL WTRS. ELSW CONDS MOV EWD AND CONTG BYD 20Z THRU 02Z. FRZLVL...NR 140 NERN NC AND CSTL WTRS. NR 160 GA FL AND CSTL WTRS.

SIGMET FULL TEXT BOX



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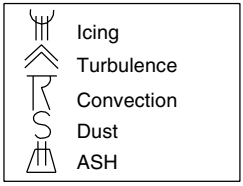

SIGMET GRAPHICAL SYMBOLOGY

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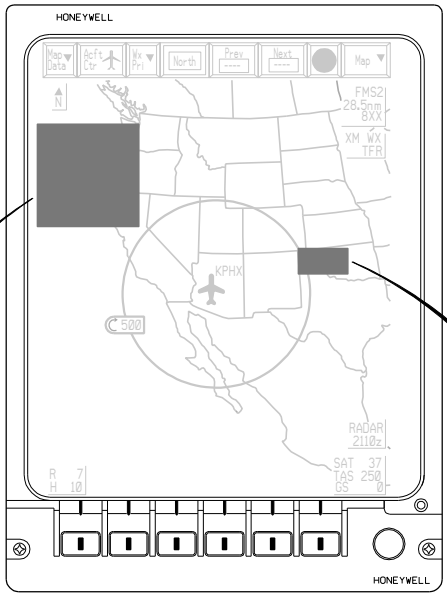

XM WEATHER TEMPORARY FLIGHT RESTRICTIONS PAGE

3/216 – AZ. FLIGHT RESTRICTIONS GRAND CANYON, AZ, EFFECTIVE IMMEDIATELY UNTIL FURTHER NOTICE PURSUANTTO TITLE 14 CFR SECTION 91.137A(1) TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT DUE TO NATIONAL SECURITY ARE NOT AUTHORIZED WITHIN A 3 NAUTICAL MILES RADIUS OF 381840N/1042051W OR THE PUEBLO/PUB/VORTAG 063 DEGREE RADIAL AT 04 NAUTICAL MILES AT AND BELOW 3000 FEET AGL TO PROVIDE FOR A SAFE ENVIRONMENT FOR DOD OPERATIONS. DENVER ACFFS/DEN/720–873–XXXX IS THE FAA COORDINATION FACILITY. NOTE: UNLESS AUTHORIZED BY ATC FOR PURPOSES OF CONDUCTING ARRIVAL/ DEPARTURE OPERATIONS. WIE UNTIL UFN

TRF FULL TEXT BOX

FDC 3/ 1862

TRF GRAPHIC COLOR WITH LABEL

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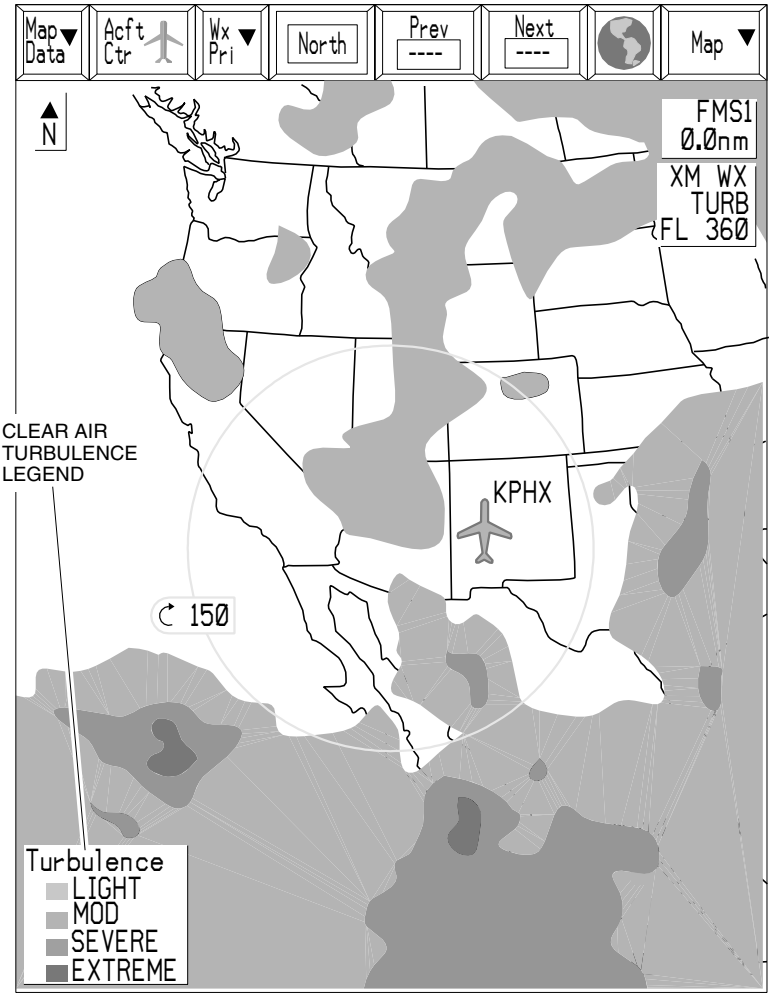

XM WEATHER CLEAR AIR TURBULENCE PAGE

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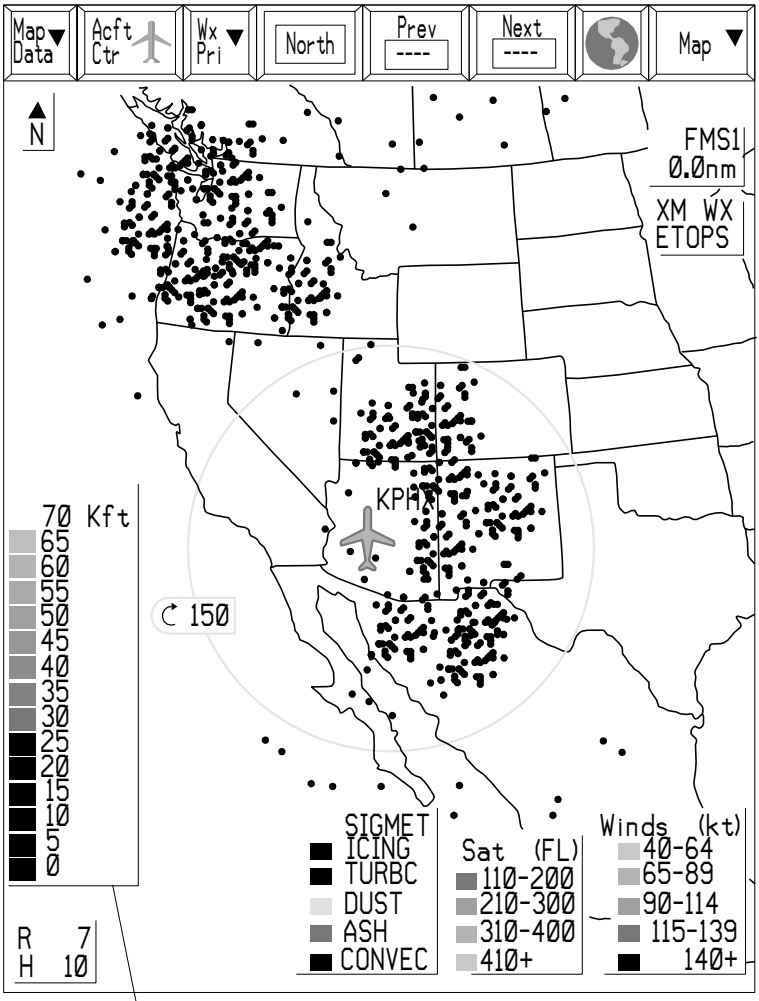

XM WEATHER ECHO TOPS PAGE

XM WEATHER
ECHO TOPS LEGEND

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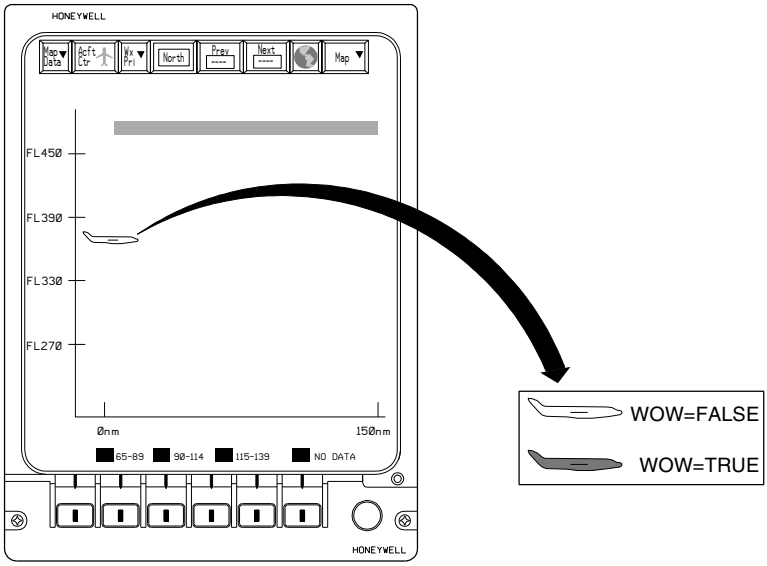

VERTICAL WINDS GRID DISPLAY

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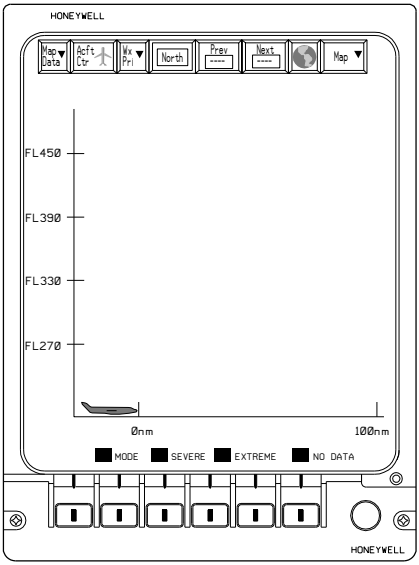

VERTICAL CAT GRID DISPLAY

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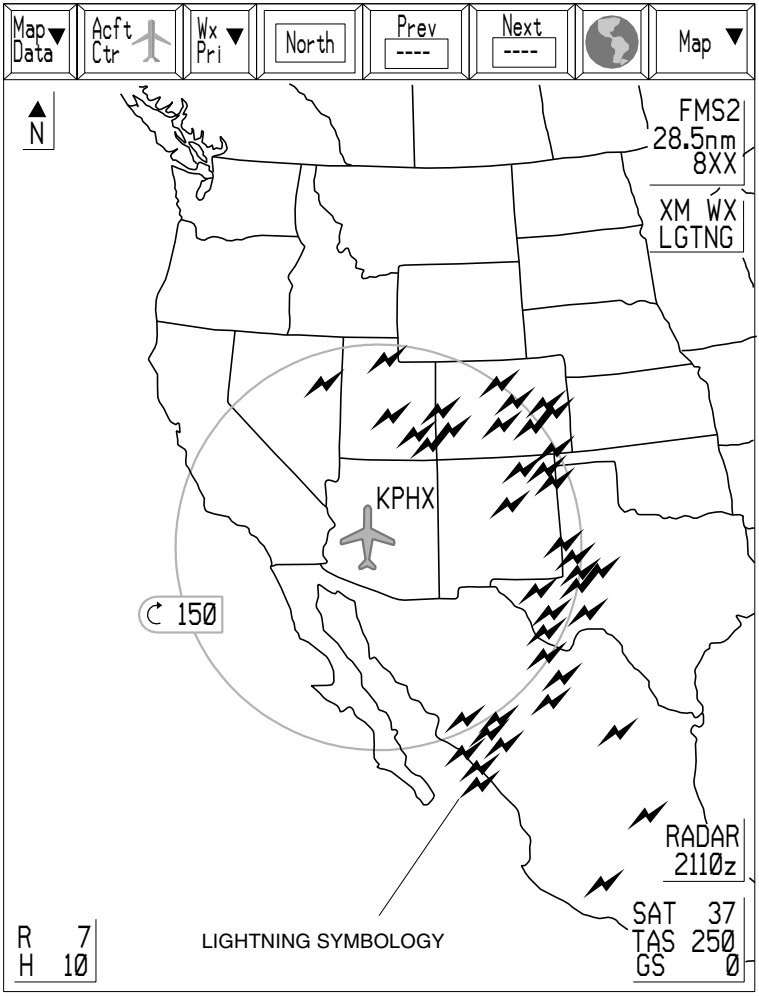

XM WEATHER LIGHTNING PAGE

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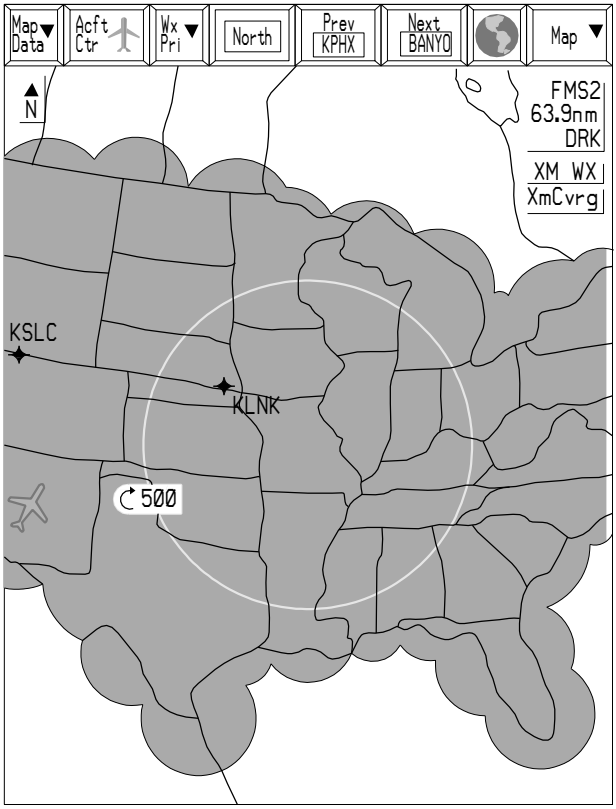
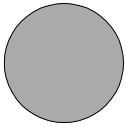


XM WEATHER MAP WITH XM COVERAGE



XM CONUS COVERAGE INDICATOR

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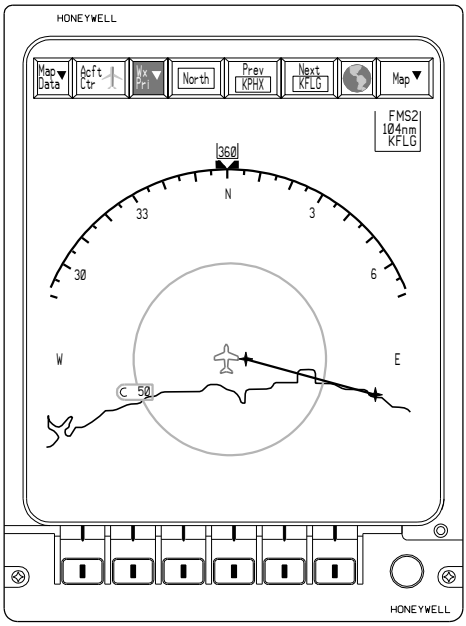

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"NO XM" ANNUNCIATION

The XM FAIL or NO XM annunciator is displayed when there is an antenna failure, or no XM Weather system is installed, or when flying out of the coverage area, or after 10 minutes with no XM data available (XM receiver failure). These annunciations are located at the upper-right side of the up-link graphical weather map display, below the active waypoint identifier.

NOTE: XM Weather functions (menu) are available when there is no XM Weather coverage or even when XM is not installed.

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If the airplane does not have the XM installed, or if the airplane is out of the coverage area (North America), the messages "XM FAIL" or "NO XM" shall be disregarded.

Otherwise, the Master Minimum Equipment List of the airplane shall be consulted.

Database Configuration Page

The primary purpose of the Database Configuration function is to check database status and upload new database. The map and charts database files are verified for start and end dates, and for multi-file set compatibility.

Database Configuration Page information can be accessed through the CCD, enabling selection in the APP SELECT pull-down menu.

If the DL-1000 button is selected, the data loader is enabled to download database files such as charts and maps using a flash drive or a SD card. Downloading capability is enabled only on ground.

If the DL-1000 button is selected, the File Transfer Protocol (FTP) server is enabled and the LOAD button switches to STOP. The FTP server is disabled when STOP button is selected.

The following database files are updated after selecting the LOAD button:

- Airport Comm.
- Airport Text.
- Special Use Airspace.
- Airways.
- En Route Comm.
- Charts.
- Geopolitical.
- Grid MORA.
- Navigation Data.
- Obstacles.

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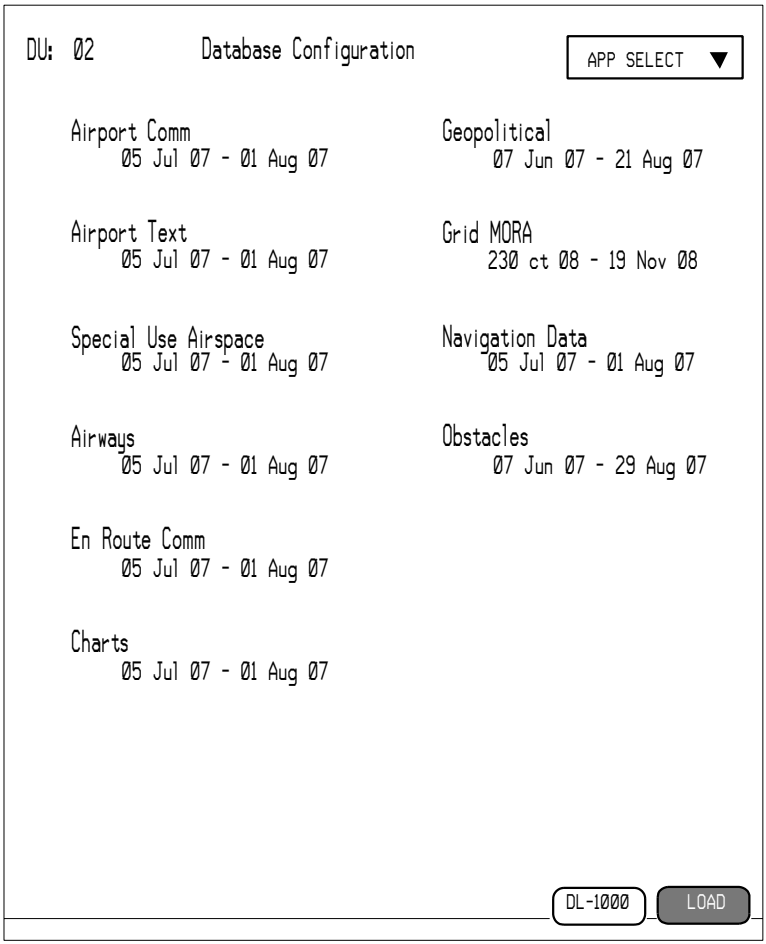

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DATABASE CONFIGURATION PAGE

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Maintenance Page

The primary purpose of the Maintenance Page function is to present the part numbers of both the DU-875 display unit and the associated software. The DU Maintenance page can only be accessed on ground.

The top line of the DU Maintenance page presents the APP SELECT pull-down menu button in the upper right corner. The APP SELECT pull-down menu is used to select different functions in the MFD, such as:

– MFD – Shows the Primus 1000 MFD.
– MAINT – Shows the DU Maintenance page.
– MAP – Shows the Map function.
– CHART – Shows the Chart function.
– DATA – Shows the Database Configuration page.

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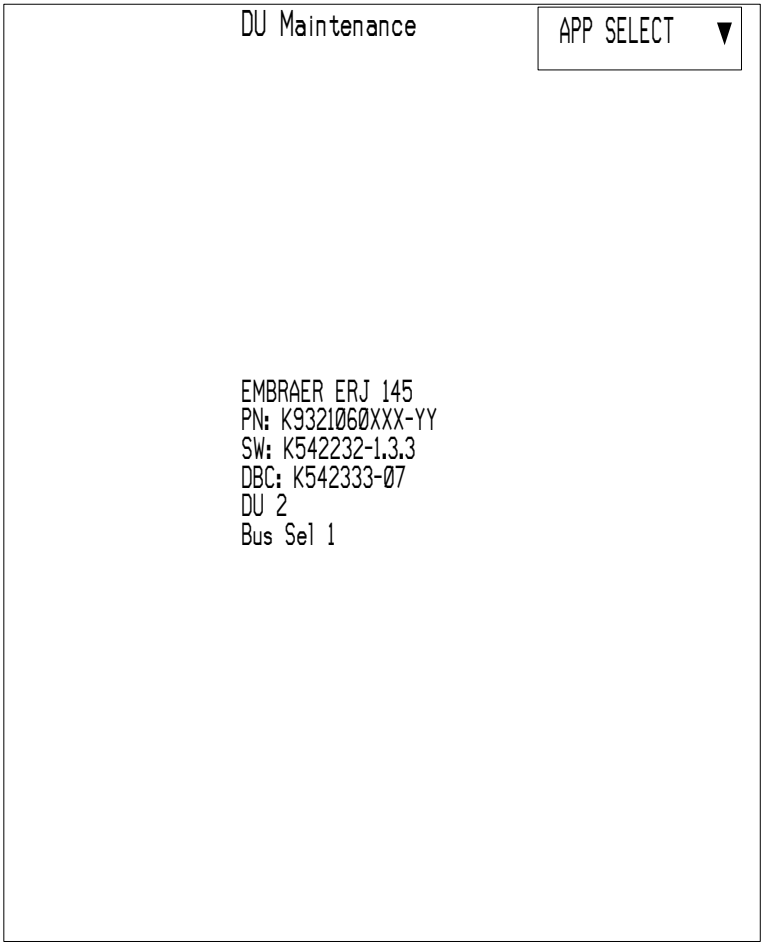

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DISPLAY UNIT MAINTENANCE PAGE

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DL-1000 Data Loader

The DL-1000 is a data loader capable of supporting FMS databases upload, as well as DU-875 databases. It retains the functions of the previous DL-950 data loader, and replaces the existing data loader function without airplane modifications.

The DL-1000 transfers data files between removable media such as secure digital (SD) cards or universal serial bus (USB) flash drives and line replaceable units (LRUs), including up to three FMSs and up to six display units.

In order to load the data for charts and maps, it is necessary to use the Honeywell pre-processor tool, installed in a PC, to pre-process the databases from the red CD/blue CD or by way of the Internet. Once the database is pre-processed into the SD card or USB flash drive, the database is able to be uploaded using the DL-1000.

For Charts and Maps database programming and loading, refer to Section 1-12 – Ground Servicing.

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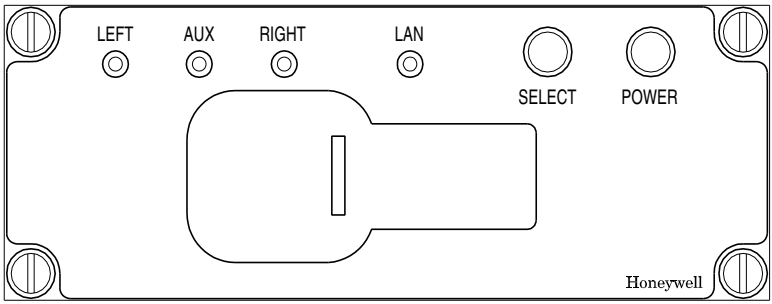

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DL-1000 DATA LOADER FRONT PANEL

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EICAS DISPLAY

The EICAS display presents analogical engine indications and some systems parameters such as flaps, landing gear, spoilers and trim positions, total fuel quantity, APU and environmental information.

In the upper right corner, the EICAS display presents crew awareness messages:

– Warning messages, red colored and always presented on the top of the list.
– Caution messages, amber colored and presented after warning messages.
– Advisory messages, cyan colored and presented after caution messages.

For further information on engine indications presented in the upper left corner, refer to Section 2-10 – Powerplant. For information on EICAS Messages, refer to the item Visual Warnings (Section 2-04-10).

In case of failure in the EICAS display, its information may be presented on the MFD, by appropriately setting the MFD Knob on the reversionary panel. The RMU is also capable of presenting some EICAS information, should the need arise.

The EICAS bezel is provided with a knob to scroll messages if the system generates more messages than the display can present at once.

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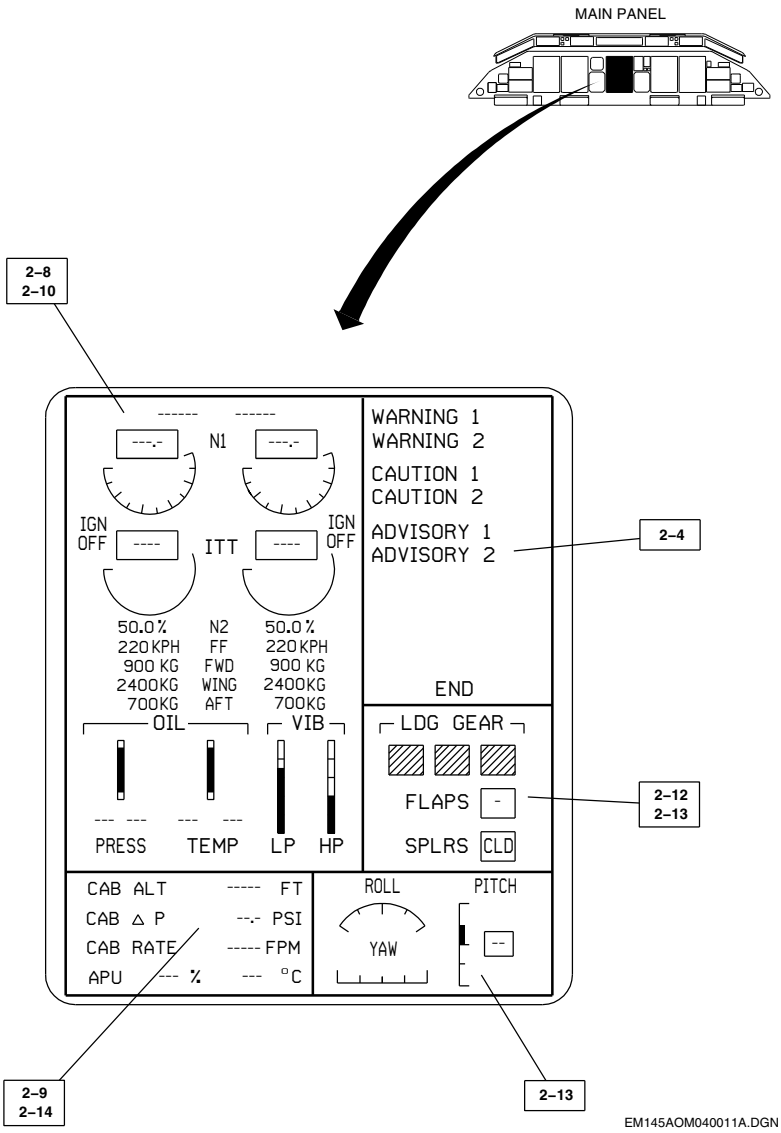

NOTE: Number inside boxes refers to Operations Manual Section where information concerning associated item can be found.

EICAS DISPLAY SCHEMATIC

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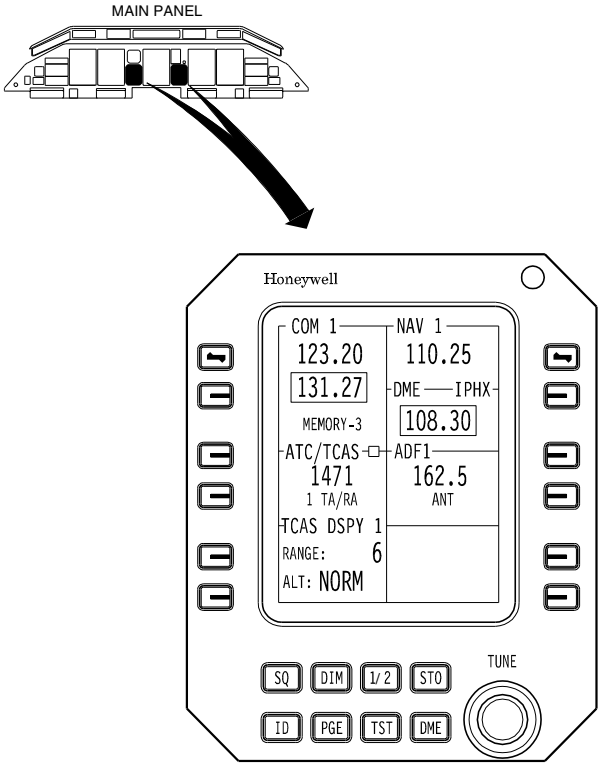
RADIO MANAGEMENT UNIT

The Radio Management Unit (RMU) is provided for radio controlling purposes, but may be used as a back-up for PFDs, MFDs and EICAS. The RMU display presents settings and modes for each radio (NAV and COMM), transponder, and TCAS. In case of failure of the main panel displays, the RMU may be selected to present navigation, engine or systems information, as well as some EICAS messages. The information presentation however may change, due to the size of the RMU display. Also, some items of information may not be presented to avoid display overload. For further information on RMU features, refer to Section 2-18 – Navigation and Communication.



RMU DISPLAY EXAMPLE

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NORMAL OPERATION

When the airplane is first energized, the system performs a self-test to check abnormal conditions in the displays.

On power up, the displays default information are the following:

- PFD: presents EADI, EHSI, airspeed, altitude, radio altitude, vertical speed scales, flight director mode, autopilot and yaw damper status.
- MFD: presents takeoff page, system menu and navigation data in Map format. This information is supplied as follows:
  - MFD 1: supplied by channel A of both DAUs through IC-600 # 1.
  - MFD 2: supplied by channel A of both DAUs through IC-600 # 2.
- EICAS: presents engine and fuel indications, crew awareness messages (if any), landing gear, flaps, spoilers, pressurization, APU and trims status. This information is supplied by channel A of both DAUs through IC-600 # 1.

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FAILURE MODES

The system is developed to avoid absence of information in most of the failure combinations.

The failures that may affect the crew awareness system are associated with electrical power supply or computer malfunctions. In both cases, the system architecture is such that only major failures will lead to loss of information presentation. Even in this condition, crew will still have essential data available to safely continue the flight, using standby instruments.

ELECTRICAL SYSTEM FAILURES

Each display is supplied in such a way that in case of failure in one or more electric buses, the remaining buses will still be supplying one or more displays.

This feature is achieved by supplying all displays with four different buses (two DC Buses and two Essential buses). Furthermore, each pair of duplicated displays (PFDs, MFDs, and RMUs) are supplied by different buses, one for each display.

COMPUTER FAILURES

Since both IC-600s receive data from duplicated sources, a single failure will not lead to loss of information addressed to the flight crew. In case of any source failure, the reversionary panel permits shifting between existing sources, thus using cross side information. This feature may be used only when the system is not capable of providing information through normal means.

DISPLAYS FAILURES

In case of any failure in the PFD or EICAS displays, the corresponding information may be presented in one of the remaining displays, by using the reversionary panel. The MFD may present other display information, but its data may not be presented in the remaining displays.

If all displays are lost, the RMU is capable of providing essential flight data.

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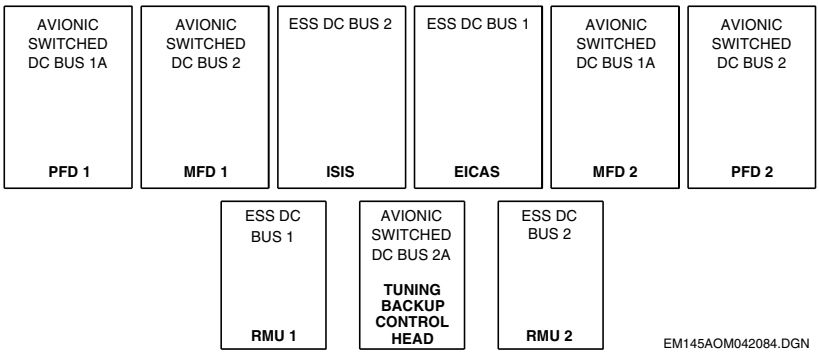

DISPLAYS SUPPLYING SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	DAU 1-2 ENG MISCOMP	N1, N2, ITT engine parameters read from both engines are not matching.
	DAU 1-2 SYS MISCOMP	Systems parameters for system pages generation are not matching.
	DAU 1-2 WRN MISCOMP	Discrete signals for warning messages generation read from the many systems are not matching.
	DAU1 (2) A FAIL	Associated DAU channel A has failed.
	IC 1 (2) OVERHEAT	Associated temperature of the IC-600 is too high.
	IC 1 (2) WOW INOP	ICs/Weight - On - Wheels interface not working properly.
	IC BUS FAIL	A failure in the Interconnection Bus has been detected.
	CHECK IC 1 (2) SW	Updating error on IC-600.
	CHECK PFD 1 (2)	A miscomparison on the associated PFD bus has been detected.
	CHK IC CONFIG	Configuration module mismatch (airplane model, engine type, LR version, and units).

(Continued)

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TYPE	MESSAGE	MEANING
ADVISORY	CONFIG MISMATCH	Mismatch of any of the configurations stored in the IM-600 modules except those considered in the CHK IC CONFIG logic.
	CMC FAIL	CMC has failed.
	DAU 1 (2) REVERSION	Associated DAU has been commanded to operate with channel B mode.
	DAU1 (2) B FAIL	Associated DAU channel B has failed.
	DU 1 (2, 3, 4, 5) FAN FAIL	Associated display fan has failed.
	DU 1 (2, 3, 4, 5) OVHT	Associated display unit temperature is too high.
	IC 1 (2) CONFIG FAIL	A failure in the configuration module of the IC has been detected.
	IC 1 (2) FAN FAIL	Associated IC fan has failed.

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CONTROLS AND INDICATORS

PFD BEZEL

Provides controls that allow barometric settings in the PFD. For further information, refer to Section 2-17 – Flight Instruments.

MFD BEZEL

MAIN MENU

1 – SYSTEM BUTTON

- Selects system menu.
- If TCAS window is being displayed, it will be replaced by the previously selected system page.

2 – MFD BUTTON

- Selects MFD menu.

3 – CHECKLIST BUTTON

- This function is not enabled.

4 – TCAS BUTTON

- Selects TCAS information to be presented on the MFD. For further information refer to item TCAS presented in this section.
- If TCAS is already selected, pressing the button restores the previously selected system page.

5 – WEATHER RADAR BUTTON

- Selects weather radar information to be presented on the MFD. For further information on weather radar, refer to Section 2-18 – Navigation and Communication.

6 – MAP PLAN BUTTON

- When the radar is being displayed, enables the Map format for radar presentation. For further information on weather radar, refer to Section 2-18 – Navigation and Communication.

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7 – MAP/PLAN RANGE KNOB

- Allows setting the Map format range that is displayed on the MFD. For further information on this feature, refer to Section 2-18 – Navigation and Communication.
- Except for the SPDS menu, this knob function is available in all menus.

SYS SUBMENU

1 – RETURN BUTTON

- Returns to the main menu.

2 – TAKEOFF PAGE BUTTON

- Selects the takeoff page to be presented on the MFD. For further information on this page refer to Section 2-2 – Equipment and Furnishings and Section 2-10 – Powerplant.

3 – ENVIRONMENTAL CONTROL SYSTEM AND PNEUMATIC PAGE BUTTON

- Selects the environmental control system and pneumatic page to be presented on the MFD. For further information on this page refer to Sections 2-14 – Pneumatics, Air Conditioning and Pressurization and Section 2-16 – Oxygen.

4 – FUEL SYSTEM PAGE BUTTON

- Selects the fuel system page to be presented on the MFD.
- When fuel system page is being displayed, button function changes.
- For further information on this page refer to Section 2-8 – Fuel.

5 – HYDRAULIC PAGE BUTTON

- Selects the hydraulic page to be presented on the MFD. For further information on this page refer to Section 2-11 – Hydraulic.

6 – ELECTRICAL SYSTEM PAGE BUTTON

- Selects the electrical system page to be presented on the MFD. For further information on this page refer to Section 2-5 – Electrical.

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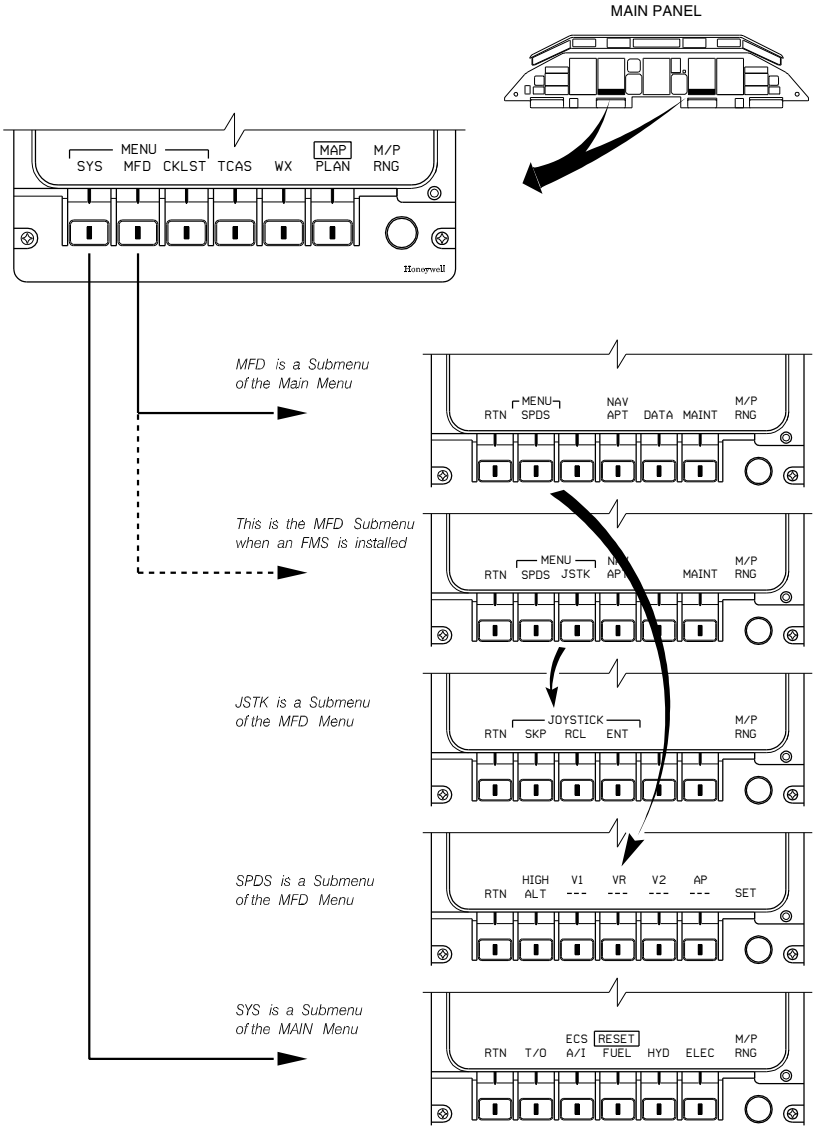

EM145AOM042085.DGN

MFD BEZEL BUTTON MENU TREE

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MFD SUBMENU

1 – RETURN BUTTON

– Returns to the main menu.

2 – REFERENCE SPEEDS BUTTON

– Selects SPDS menu. For further information on this menu, refer to Section 2-17 – Flight Instruments.

3 – JOYSTICK BUTTON

NOTE: This function is available only when the FMS is installed.

– Selects JSTK menu. For further information on this menu, refer to Section 2-18 – Navigation and Communication.

4 – AIRPORT AND NAVIGATION AIDS BUTTON

– Provides selection and toggling of airport and navigation aids displays on the MFD. For further information on this feature, refer to Section 2-18 – Navigation and Communication.

5 – DATA BUTTON

– Provides selection and toggling of waypoint identifier displays on the MFD. For further information on this feature, refer to Section 2-18 – Navigation and Communication.

6 – MAINTENANCE SELECTION BUTTON (LEFT MFD ONLY)

– Presents maintenance messages on MFD.

– Function is available only on the ground.

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EICAS BEZEL

Provides a knob to allow EICAS messages scrolling. For further information, refer to Visual Warnings in this Section.

REVERSIONARY PANEL

1 – MFD KNOB

PFD	Presents on the MFD the information normally presented on the PFD. The PFD bezel button remains their normal function.
NORMAL	Normal MFD operation mode.
EICAS	Presents on the MFD the information normally presented on the EICAS.

2 – ADC BUTTON

- Changes the ADC information from the on-side ADC to the cross-side ADC.
- A striped bar illuminates inside the button to indicate that it is pressed.

3 – IRS/AHRS BUTTON

- Changes the attitude and heading source from the on-side IRS/AHRS to the cross-side IRS/AHRS.
- A striped bar illuminates inside the button to indicate that it is pressed.

4 – SG BUTTON

- Changes the symbol generator from the on-side SG to the cross-side Symbol Generator as well ADC and IRS/AHRS.
- A striped bar illuminates inside the button to indicate that it is pressed.

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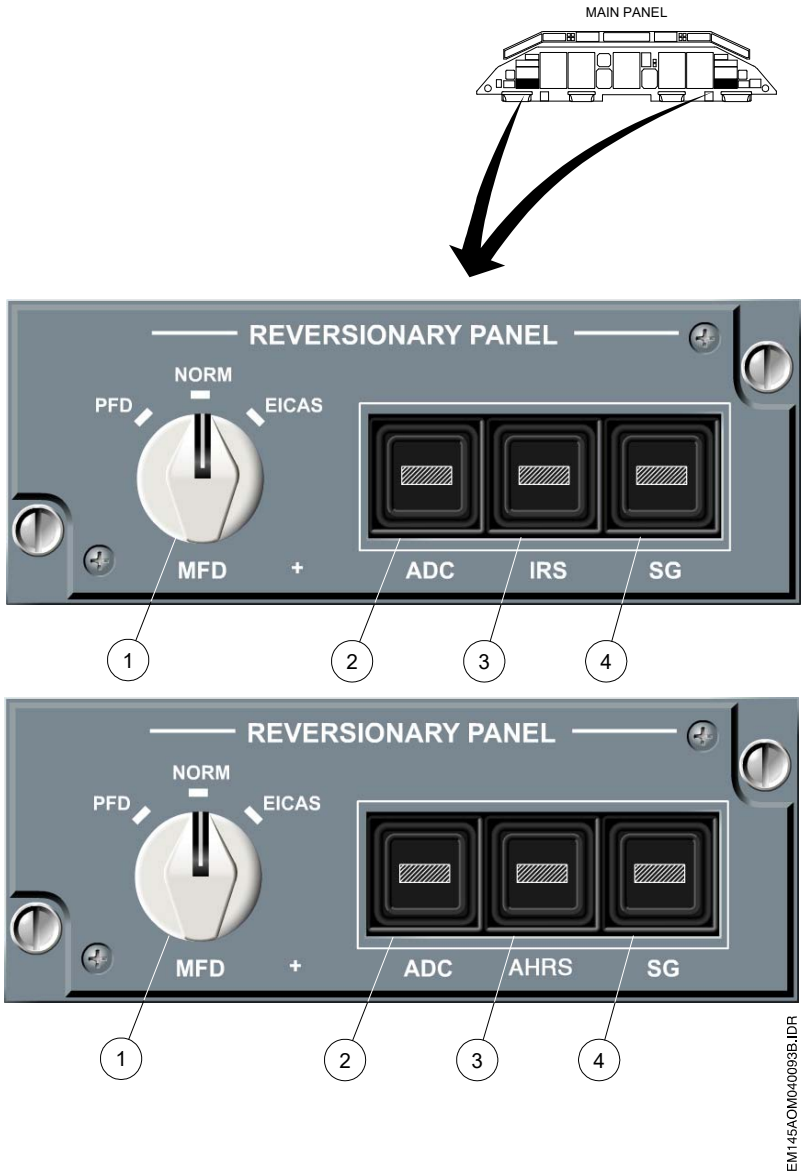

REVERSIONARY PANEL

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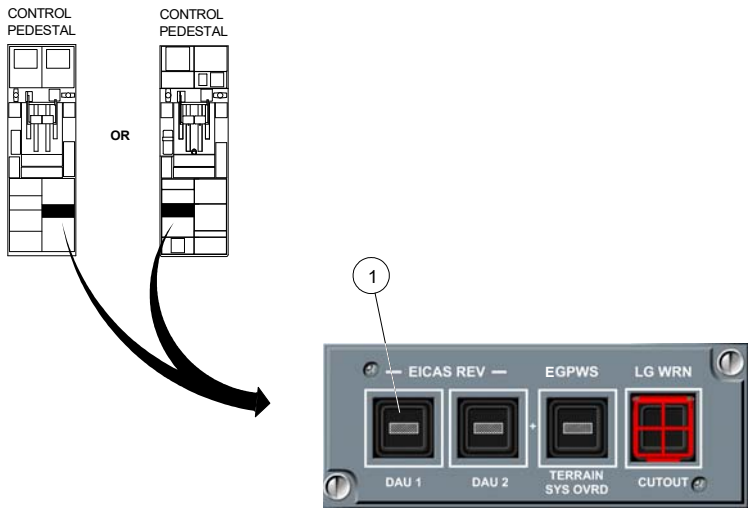
EICAS REVERSIONARY PANEL

1 – DAU BUTTON

- Allows channel B of associated DAU to supply both IC-600s.
- A striped bar is illuminated inside the button to indicate that it is pressed and that channel B is the current data source.



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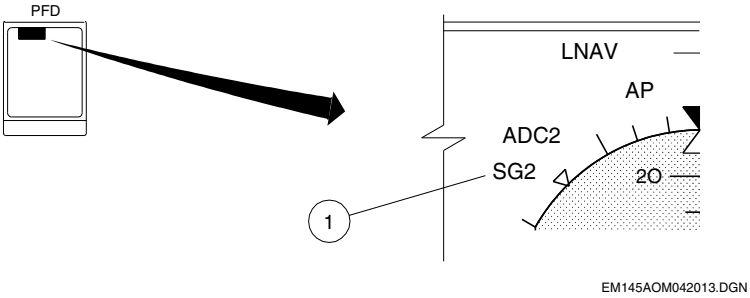
PRIMARY FLIGHT DISPLAY

1 – SYMBOL GENERATOR REVERSION ANNUNCIATION

- Indicates that a symbol generator reversion has been selected on the reversionary panel.
- Displayed on both PFDs.
- Labels: SG1 for IC-600 # 1 and SG2 for IC-600 # 2.
- Color: amber.



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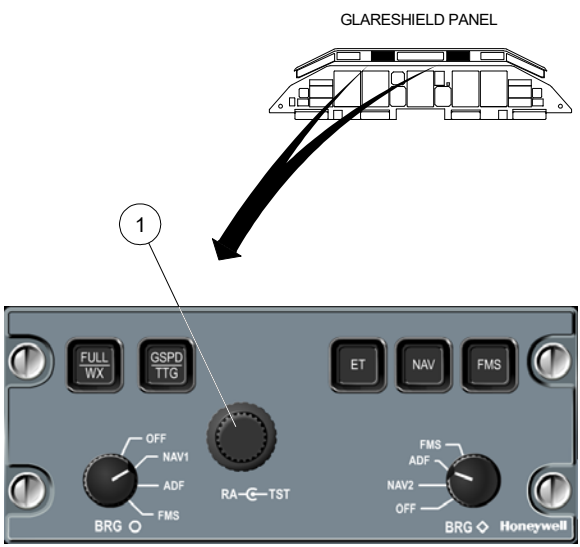
DISPLAYS CONTROL PANEL

NOTE: For further information on displays control panel, refer to Sections 2-17 – Flight Instruments and 2-18 – Navigation and Communication.

1 – TEST BUTTON

- On the ground:
  - When pressed, activates the IC-600s first level test.
  - When pressed for more than 6 seconds activates the IC-600s second level test.
  - When released, normal operation of IC-600s is resumed.
- In flight:
  - Refer to Radio Altimeter description on Section 2-17 – Flight Instruments.



EM145AOM040104A.IDR

DISPLAYS CONTROL PANEL

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BUILT-IN TEST

There are 3 kinds of Built-In-Tests (BIT) that the IC-600 may perform: power up BIT, continuous BIT and pilot initiated BIT. All of them check the software and hardware integrity and operation.

POWER UP BIT

The power up BIT checks the power supply, IC-600 interfaces, memories, autopilot engagement and disengagement, and autopilot servos.

CONTINUOUS BIT

Memories and processors tests are continuously performed after the power up BIT, as well as autopilot functions.

PILOT INITIATED BIT

A pilot initiated BIT may be commanded by pressing the TEST button in the displays control panel. This test may be commanded on the ground only and is divided into two levels. The first level is indicated on airplane displays, which present the failure mode annunciations.

The second level is activated if the TEST button is held pressed for at least 6 seconds, and checks the IC-600 internal interfaces. The test results are displayed on the PFD, which alternates every 10 seconds between internal and external test results pages.

To perform the IC-600 test is necessary to press the TEST button localized at the display control panel.

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The PFD first level test indications are as follows:

– A magenta TEST is displayed in upper left center of the PFD.
– Indications removed: all bugs, flight director information, all pointers, low airspeed awareness, take-off speed bugs and digital readouts, V_{MO}/M_{MO}, and trend vectors.
– Indications forced: all comparison monitors, all marker beacons, and windshear annunciation.
– Indications presented as invalid: pitch and roll, vertical and lateral deviations, barometric correction, vertical speed set digital readout, altitude pre-select, heading, distance digital readout, ground speed (or time to go or elapsed time), selected heading and course (or desired track), Mach, airspeed, airspeed set digital readout, altitude.
– If heading is valid upon test activation, its source annunciation will remain valid (DG1 or 2 or MAG1 or 2). If heading is invalid, its source annunciation will change to HDG1 or HDG2.

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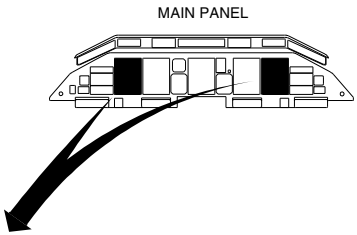

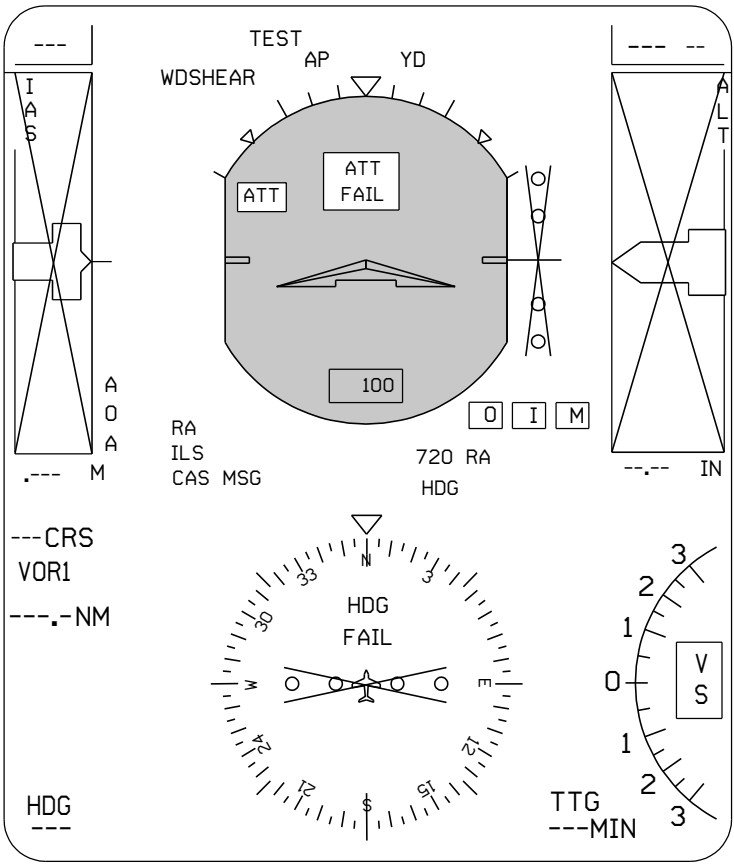

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PFD TEST INDICATIONS – FIRST LEVEL (V-BAR FORMAT)

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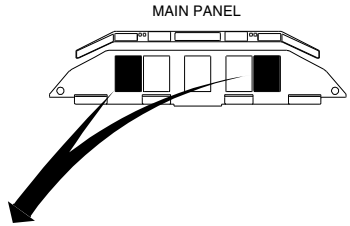

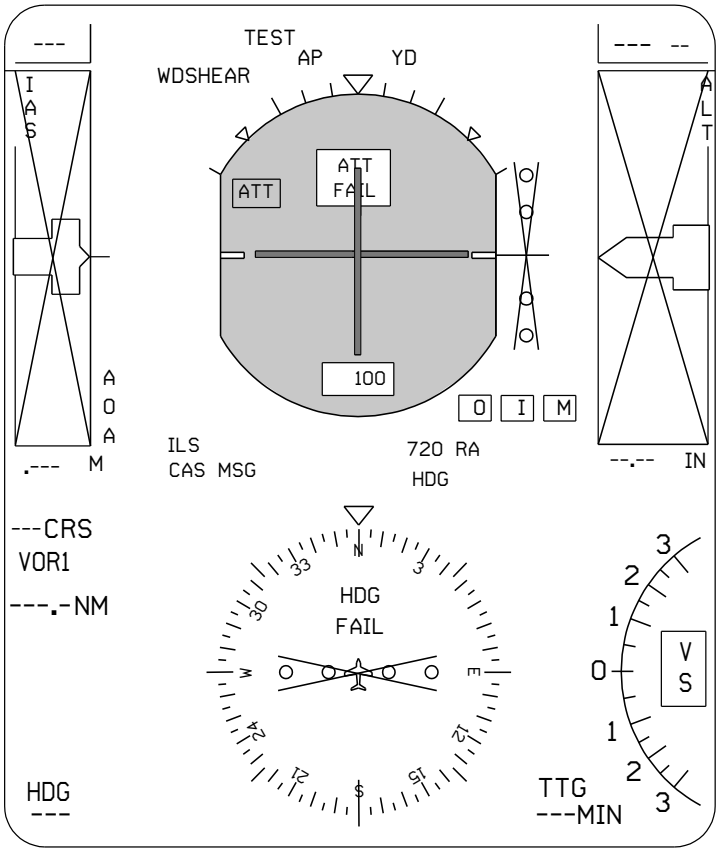

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PFD TEST INDICATIONS – FIRST LEVEL (CROSS-BAR FORMAT)

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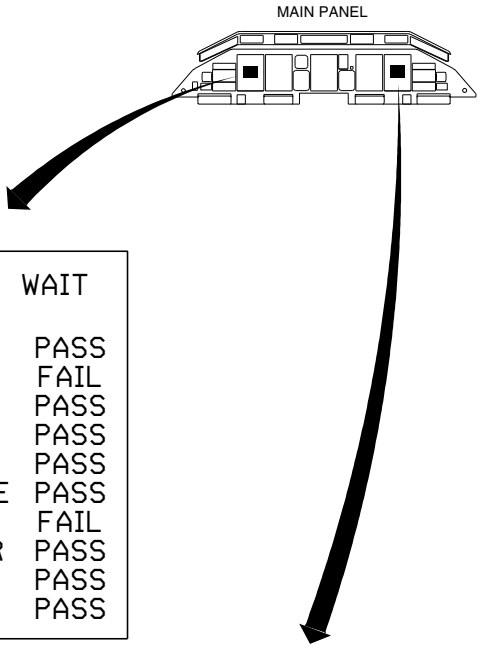

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PFD TEST INDICATIONS – SECOND LEVEL

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The MFD test indications are as follows:

– Indications removed: heading source, TCAS, weather patch, drift bug, wind vector, heading select bug, flight plan data, airports, navaids, designator information.
– Indications forced: TERRAIN FAIL, EICAS CHK, WX TERRAIN, MENU INOP, HDG FAIL.
– Indications presented as invalid: heading, weather radar tilt, SAT, true airspeed, ground speed, distance and time to waypoint.

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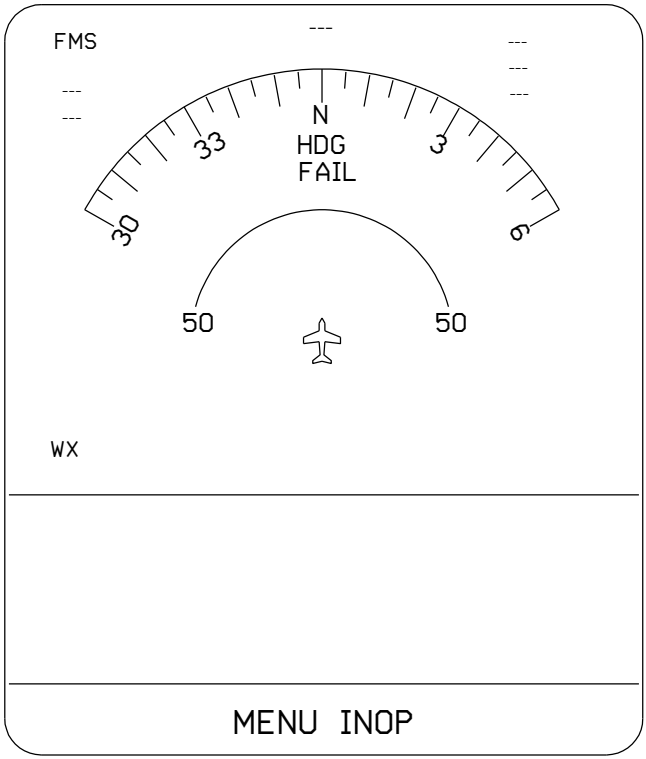
MAIN PANEL



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MFD TEST INDICATIONS

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The EICAS test is commanded only from the pilot's panel, and its indications are as follows:

– Indications removed: reversion, ignition, FADEC in control, all engine and trim bugs.
– Indications forced: the crew awareness field will be filled with a "X".
– Indications presented as invalid: landing gear status, N1, N2, ITT, fuel flow and quantity, oil pressure, temperature and quantity, vibration for LP and HP, flaps, spoilers, all cabin and APU parameters, all trim values.

During IC-600 # 1 first level pilot initiated BIT, RMU 1 will display the first page of standby engine indication. The RMU 2 is not included in the IC-600 # 2 first level pilot initiated BIT.

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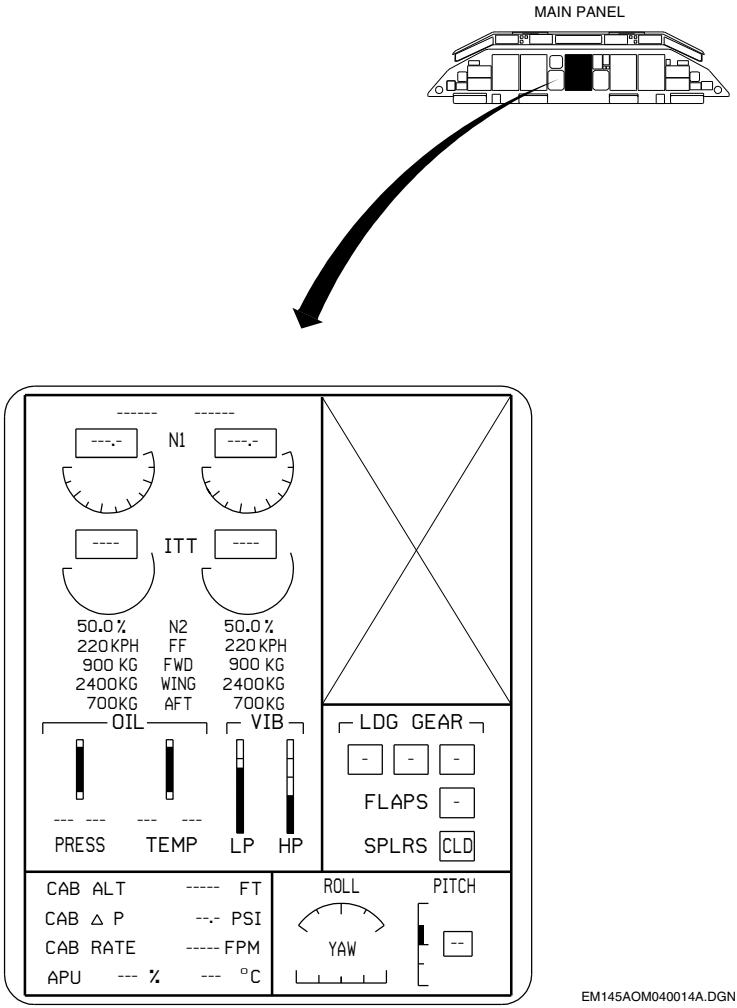

EM145AOM040014A.DGN

EICAS TEST INDICATIONS

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VISUAL WARNINGS

Visual warnings are provided through lights, illuminated buttons, EICAS messages, and displays indications.

WARNING LIGHTS

Some of the airplane systems are commanded using illuminated buttons. When under normal operating conditions, such buttons are not illuminated. If the pilot has commanded the button to a position that requires crew attention, a striped bar is illuminated inside the button. There are some exceptions that are illuminated under normal operating conditions. Some examples of those exceptions are: the GPU, the APU bleed, the ice protection wing and stab buttons.

Some systems also provide indicating lights, for system status indication. Further details on such lights are provided in the associated systems description section.

Master warning and caution lights are installed on each pilot glareshield panel. Such lights blink when any warning or caution message is presented on the EICAS or generated in the Aural Warning Unit (AWU). To stop blinking, pilots must press the associated light. To find information on illuminated buttons and any specific warning light, refer to the associated system description.

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EICAS MESSAGES

EICAS messages are presented in the upper right corner of the EICAS display. If there is a simultaneous failure in the EICAS and MFD displays, the RMUs present some messages.

EICAS MESSAGES LEVELS

There are three message levels: warning, caution, and advisory:

– **Warning** messages are red colored and require immediate crew action. Warning messages are always presented on the top of the list, in the same order they are generated.
– **Caution** messages are amber colored and require immediate crew awareness. They follow warning in criticality level and in display presentation.
– **Advisory** messages are cyan and are dedicated to minor failures or system status. Advisory messages are displayed below caution messages.

A fourth level is provided for maintenance purposes. This fourth level is not presented to the flight crew, and can only be accessed on the ground.

When the message is generated, it is displayed blinking at the top of the associated group. To stop blinking, press the associated master button on the glareshield. Advisory messages will stop blinking after 5 seconds.

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EICAS MESSAGES PRIORITY LOGIC

If more than one message is simultaneously presented, they are organized in the following order: warning, then caution, then advisories messages. The space is provided for the simultaneous display of up to 15 messages. An END label is provided after the last message, to indicate end of message listing. If more than 15 messages are being generated, a knob in the display bezel permits paging through the remaining messages. In this case, a status line is provided in the 16th line, to indicate how many messages are not being currently presented. The status line also indicates where they are (above or below the currently presented messages). END label and warning messages cannot be scrolled out of the display. Due to this characteristic, caution and advisory messages are scrolled in the area left blank below the warning messages. If a new message is generated during a scrolling, it is automatically displayed at the top of the associated group.

INHIBITION LOGIC

To avoid its nuisance effect upon the flight crew, inhibition logic is provided to prevent some messages from being displayed during takeoff and approach/landing phases. The inhibition logic is as follows:

Takeoff Phase

Inhibition is valid when the airplane crosses V_1 –15 KIAS. The inhibition is deactivated when one of the following conditions is accomplished:

– Radio altitude is greater than 400 ft, or
– Calibrated airspeed is less than 60 KIAS, or
– After 1 minute.

Approach/Landing Phase

Inhibition is valid from the point when airplane crosses 200 ft radio altitude. The inhibition is deactivated when one of the following conditions is accomplished:

– Airplane is on the ground for 3 seconds or more.
– After 1 minute.

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IC-600 RESULTS SELF-CHECK

The results of both IC-600 computations are continuously compared to check for any inconsistency between both sides. If any difference between both IC-600s is detected, an amber "CAS MSG" annunciation is presented on the PFDs. This annunciation indicates that some messages are unreliable.

EICAS MESSAGE DICTIONARY

The following table presents all the EICAS messages. Type column indicates whether the nature of the message is Warning (W), Caution (C), or Advisory (A).

The number in column INHIBITION indicates the following:

– (1) Message is inhibited during takeoff.
– (2) Message is inhibited during takeoff and approach/landing.
– (3) Message is not inhibited.
– (4) Message is inhibited during approach/landing.
– (5) Message is inhibited on the ground and on all flight phases excluding takeoff.
– (6) Message is inhibited during takeoff, approach/landing and on the ground.

For further information regarding each message logic, refer to the associated system description.

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SECTION	TYPE	MESSAGE	INHIBITION
2-2 EQUIPMENT AND FURNISHINGS	W	MAIN DOOR OPN	2
	W	SERVICE DOOR OPN	2
	C	ACCESS DOORS OPN	2
	C	BAGG ACCESS OPN	2
	C	BAGGAGE DOOR OPN	2
	C	EMERG EXIT OPN	2
	C	FUELING DOOR OPN	2
2-4 CREW AWARENESS	W	GPWS	3
	W	NO TAKEOFF CONFIG	4
	W	SPS 1 (2) INOP	3
	C	AURAL WARN FAIL	2
	C	CHECK IC 1 (2) SW	2
	C	CHECK PFD 1 (2)	2
	C	CHECK XPDR	6
	C	CHK IC CONFIG	2
	C	DAU AC ID MISCMP	2
	C	DAU1 (2) A FAIL	2
	C	DAU1 (2) ENG MISCOMP	2
	C	DAU1 (2) SYS MISCOMP	2
	C	DAU1 (2) WRN MISCOMP	2
	C	GPWS INOP	3

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SECTION	TYPE	MESSAGE	INHIBITION
2-4 CREW AWARENESS (Cont.)	C	IC 1 (2) OVERHEAT	2
	C	IC 1 (2) WOW INOP	2
	C	IC BUS FAIL	2
	C	SPS ADVANCED	3
	C	STICK PUSHER FAIL	3
	C	WINDSHEAR INOP	3
	A	CONFIG MISMATCH	2
	A	CMC FAIL	2
	A	DAU1 (2) B FAIL	2
	A	DAU 1 (2) REVERSION	2
	A	DU 1 (2, 3, 4, 5) FAN FAIL	2
	A	DU 1 (2, 3, 4, 5) OVHT	2
	A	IC1 (2) CONFIG FAIL	2
	A	IC 1 (2) FAN FAIL	2
	A	RAAS INHIBITED	3
	A	RAAS NOT AVAIL	3
	A	SPS/ICE SPEEDS	1

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SECTION	TYPE	MESSAGE	INHIBITION
2-5 ELECTRICAL	W	BATT 1 (2) OVTEMP	3
	W	ELEC ESS XFR FAIL	3
	C	115 VAC BUS OFF	2
	C	APU CNTOR CLSD	2
	C	APU GEN OFF BUS	2
	C	APU GEN OVLD	2
	C	BATT1 (2) OFF BUS	2
	C	BKUP BATT OFF BUS	2
	C	DC BUS 1 (2) OFF	2
	C	ELEC EMERG ABNORM	2
	C	ESS BUS 1 (2) OFF	2
	C	GEN 1 (2, 3, 4) OFF BUS	2
	C	GEN 1 (2, 3, 4) OVLD	2
	C	SHED BUS 1 (2) OFF	2
	A	GEN1 (2, 3, 4) BRG FAIL	2
2-6 LIGHTING	C	EMERG LT NOT ARMD	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-7 FIRE PROTECTION	W	APU FIRE	3
	W	BAGG SMOKE	2
	W	ENG 1 (2) FIRE	3
	W	LAV SMOKE	2
	C	APU EXTBTL INOP	2
	C	APU FIREDET FAIL	2
	C	BAGG EXTBTL INOP	2
	C	E1 (2) EXTBTLA (B) INOP	2
	C	E1 (2) FIREDET FAIL	2
2-8 FUEL	W	CHECK ACFT LOAD	2
	W	FUEL 1 (2) LO LEVEL	2
	W	FUEL XFER CRITICAL	2
	W	NO TAKEOFF CONFIG	4
	C	APU FUEL LO PRESS	2
	C	APU FUEL SOV INOP	2
	C	DEFUEL NOT CLOSED	2
	C	E1 (2) FUEL LO PRESS	2
	C	E1 (2) FUEL SOV INOP	2
	C	FUEL CONFIG DISAG	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-8 FUEL (Cont.)	C	FUEL TANK LO TEMP	2
	C	FUEL TK VENT OPEN	2
	C	FUEL XFEED FAIL	2
	C	FUEL XFEED MISCMD	2
	C	FUEL XFER 1 (2) INOP	2
	C	FUEL XFER CHECK	2
	C	FUEL XFER OVFLOW	2
	C	FUEL XFR VTR INOP	2
	C	FUS 1 (2) MONIT FAIL	2
	C	FUSELAGE FUEL IMB	2
	C	STOP OVRD XFER	2
	C	WING FUEL IMB	2
	A	APU FUEL SOV CLSD	2
	A	E1 (2) FUELSOV CLSD	2
	A	FUEL XFEED OPEN	2
	A	FUEL XFER OVRD	2
2-9 APU	C	APU FAIL	2
	C	APU OIL HI TEMP	2
	C	APU OIL LO PRESS	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-10 POWERPLANT	W	ATTCS FAIL	5
	W	E1 (2) ATTCS NO MRGN	2
	W	E1 (2) LOW N1	2
	W	E1 (2) OIL LOW PRESS	2
	W	ENG 1-2 OUT	1
	C	E1 (2) ATS SOV OPN	2
	C	E1 (2) CTL FAIL	2
	C	E1 (2) EXCEEDANCE	2
	C	E1 (2) FPMU NO DISP	2
	C	E1 (2) FUEL LO TEMP	2
	C	E1 (2) NO DISP	2
	C	ENG NO TO DATA	2
	C	ENG REF A/I DISAG	2
	C	ENG1 (2) OUT	1
	C	ENG1 (2) REV DISAGREE	2
	C	ENG1 (2) REV FAIL	2
	C	ENG1 (2) TLA FAIL	2
	C	FADEC ID NO DISP	2
	A	CHECK A1E PERF	2
	A	CHECK A1P PERF	2
	A	CHECK A2 PERF	2
	A	E1 (2) FUEL IMP BYP	2
	A	E1 (2) IDL STP FAIL	2
	A	E1 (2) OIL IMP BYP	2
	A	E1 (2) SHORT DISP	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-11 HYDRAULIC	C	HYD SYS 1 (2) FAIL	2
	C	HYD SYS 1 (2) OVHT	2
	A	E1 (2) HYD PUMP FAIL	2
	A	E1 (2) HYDSOV CLSD	2
	A	HYD PUMP SELEC OF	2
	A	HYD1 (2) LO QTY	2
2-12 LANDING GEAR AND BRAKES	W	LG/LEVER DISAGREE	3
	C	BRAKE DEGRADED	1
	C	BRAKE OVERHEAT	3
	C	BRK INBD INOP	1
	C	BRK OUTBD INOP	1
	C	EMRG BRK LO PRES	1
	C	LG AIR/GND FAIL	3
	C	NLG UP/DOOR OPN	2
	C	STEER INOP	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-13 FLIGHT CONTROLS	W	PTRIM BACKUP INOP	2
	W	PTRIM MAIN INOP	2
	C	AIL SYS 1 (2) INOP	2
	C	FLAP FAIL	2
	C	PTRIM BKP SW FAIL	3
	C	PTRIM CPT SW FAIL	3
	C	PTRIM F/O SW FAIL	3
	C	RUD HDOV PROTFAIL	2
	C	RUDDER OVERBOOST	2
	C	RUDDER SYS 1 (2) INOP	2
	C	SPBK LVR DISAGREE	2
	C	SPOILER FAIL	2
	A	FLAP LOW SPEED	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-14 PNEUMATICS, AIR CONDITIONING AND PRESSURIZATION	W	BLD 1 (2) LEAK	2
	W	BLD 1 (2) OVTEMP	2
	W	BLD APU LEAK	2
	C	APU BLD VLV FAIL	2
	C	BLD 1 (2) LOW TEMP	2
	C	BLD 1 (2) VLV FAIL	2
	C	CROSS BLD FAIL	2
	C	CROSS BLD SW OFF	2
	C	ELEKBAY OVTEMP	2
	C	HS VLV 1 (2) FAIL	2
	C	PACK 1 (2) OVHT	2
	C	PACK 1 (2) OVLD	2
	C	PACK 1 (2) VLV FAIL	2
	C	PRESN AUTO FAIL	2
	C	RAM AIR VLV FAIL	2
	A	BLD 1 (2) VLV CLSD	2
	A	CROSS BLD OPEN	2
	A	PACK 1 (2) VLV CLSD	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-15 ICE AND RAIN PROTECTION	W	ICE COND-A/I INOP	2
	C	A/ICE LOW CAPACITY	3
	C	A/ICE SWITCH OFF	2
	C	AOA 1 (2) HEAT INOP	2
	C	CLR ICE 1 (2)	2
	C	CLR/I INOP1 (2)	2
	C	E1 (2) A/ICE FAIL	2
	C	ICE DET1 (2) FAIL	2
	C	ICE DETECTORS FAIL	2
	C	NO ICE-A/ICE ON	2
	C	PITOT 1 (2, 3) INOP	2
	C	STAB A/ICE FAIL	2
	C	TAT 1 (2) HEAT INOP	2
	C	W/S 1 (2) HEAT FAIL	2
	C	WG A/ICE FAIL	3
	A	ENG A/ICEOVERPRES	3
	A	ICE CONDITION	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-16 OXYGEN	C	CREW OXY LO PRESS	2
	C	PAX OXY LO PRESS	2
2-17 FLIGHT INSTRUMENTS	C	DFDR FAIL	2
	A	FDAU FAIL	2
	A	RAD ALT 1 (2) FAIL	1
	A	RAD ALT FAIL	1
2-18 NAVIGATION AND COMMUNICATION	C	AHRS 1 (2) ALN FAULT	2
	C	AHRS 1 (2) FAIL	2
	C	AHRS 1 (2) OVERHEAT	2
	C	IRS 1 (2) ALN FAULT	2
	C	IRS 1 (2) FAIL	2
	C	IRS 1 (2) OVERHEAT	2
	A	ADS-B NOT AVAIL	2
	A	ADS-B NOT ON	2
	A	AHRS 1 (2) ALN	2
	A	AHRS 1 (2) ATT MODE	2
	A	AHRS 1 (2) EXC MOTION	2
	A	AHRS 1 (2) NO MAG HDG	1
	A	AHRS 1 (2) NO PPOS	1
	A	AHRS 1 (2) ON BATT	2

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SECTION	TYPE	MESSAGE	INHIBITION
2-18 NAVIGATION AND COMMUNICATION (Cont.)	A	IRS 1 (2) ALN	2
	A	IRS 1 (2) ATT MODE	2
	A	IRS 1 (2) EXC MOTION	2
	A	IRS 1 (2) NO MAG HDG	4
	A	IRS 1 (2) NO PPOS	1
	A	IRS 1 (2) ON BATT	2
2-19 AUTOPILOT	W	AUTOPILOT FAIL	2
	C	AP AIL MISTRIM	2
	C	AP ELEV MISTRIM	2
	C	AT FAIL	2
	C	AUTO TRIM FAIL	2
	C	ENG TLA NOT TOGA	3
	C	LATERAL MODE OFF	3
	C	VERTICAL MODE OFF	3
	C	YAW DAMPER FAIL	2

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DISPLAYS INDICATIONS

Many of the airplane parameters are indicated on one of the displays, in analogic or digital format.

ANALOGIC INDICATIONS

Analogic indications are provided as pointers moving over a scale, which may be graduated or not. In both cases, if the pointer indicates a value out of the normal range for that parameter, both pointer and scale become amber. If the parameter goes wide out of the range area, both pointer and scale become red. If the parameter signal becomes invalid, the pointers are removed. For some parameters, scale are also removed in this condition. Scale and pointer are not presented for some parameters, when they are not required, as for EADI chevrons, V_1, V_R, V_2 speed bugs, trend vectors, and so on.

DIGITAL INDICATIONS

Digital indications are provided as green characters for normal values. If the associated parameter goes outside its normal range, digits become amber, with an amber box surrounding them. If the parameter goes wide out of the range area, both digits and box become red. If the parameter signal becomes invalid, amber dashes without boxes replace the digits.

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CONTROLS AND INDICATORS

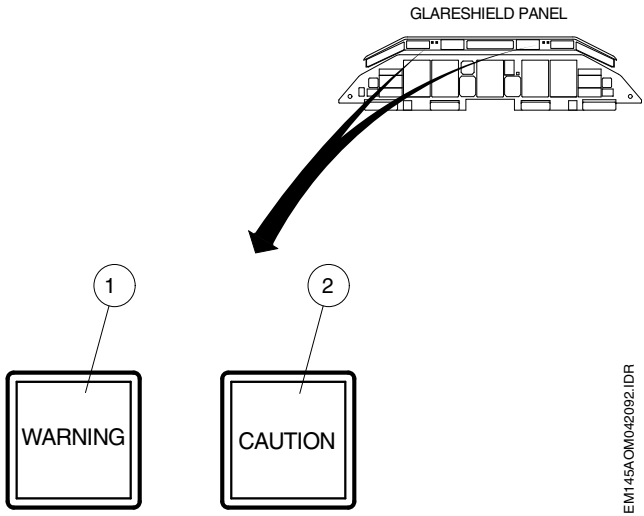
GLARESHIELD PANEL

1 – MASTER WARNING BUTTON

- Acknowledges the warning messages and stops the associated blinking when pressed.
- A red light blinks inside the button when a new warning message is displayed on the EICAS.

2 – MASTER CAUTION BUTTON

- Acknowledges the caution messages and stops the associated blinking when pressed.
- An amber light blinks inside the button when a new caution message is displayed on the EICAS.



GLARESHIELD PANEL

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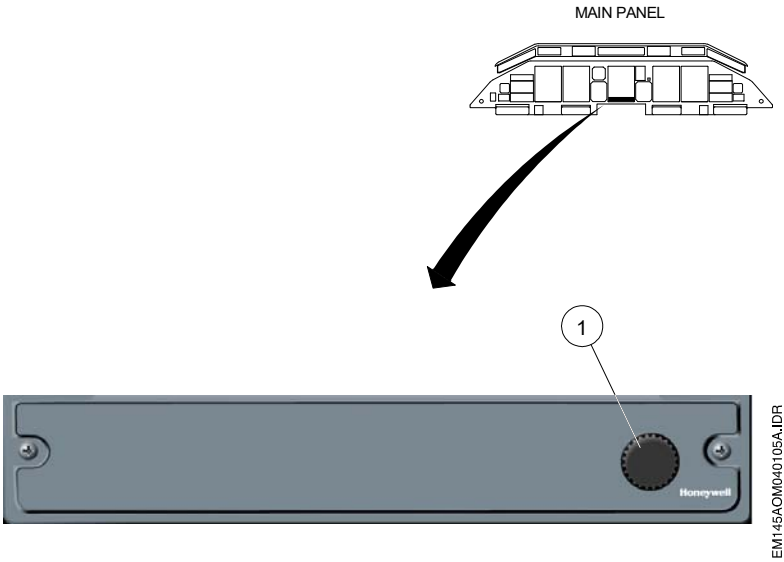
EICAS BEZEL

1 – MESSAGE SCROLLING KNOB

- To be used when displayed EICAS messages cannot be presented at once.
- By rotating the knob clockwise, advances through EICAS messages. Rotated counterclockwise moves backward through EICAS messages.



EICAS BEZEL

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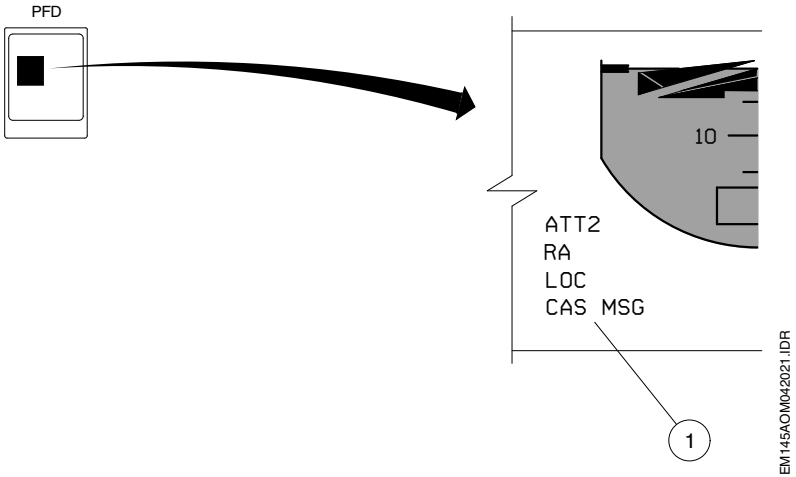
PRIMARY FLIGHT DISPLAY

1 – EICAS CHECK SUM FAIL COMPARISON MONITOR DISPLAY

- Color: amber.
- Label: CAS MSG.
- Displayed when the number of active EICAS messages in each IC-600 is found to be different.



PRIMARY FLIGHT DISPLAY (V-BAR FORMAT)

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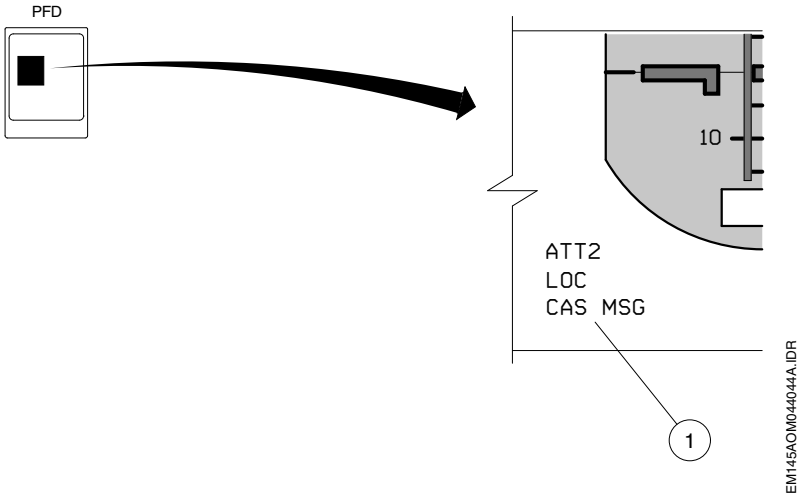

PRIMARY FLIGHT DISPLAY (CROSS-BAR FORMAT)

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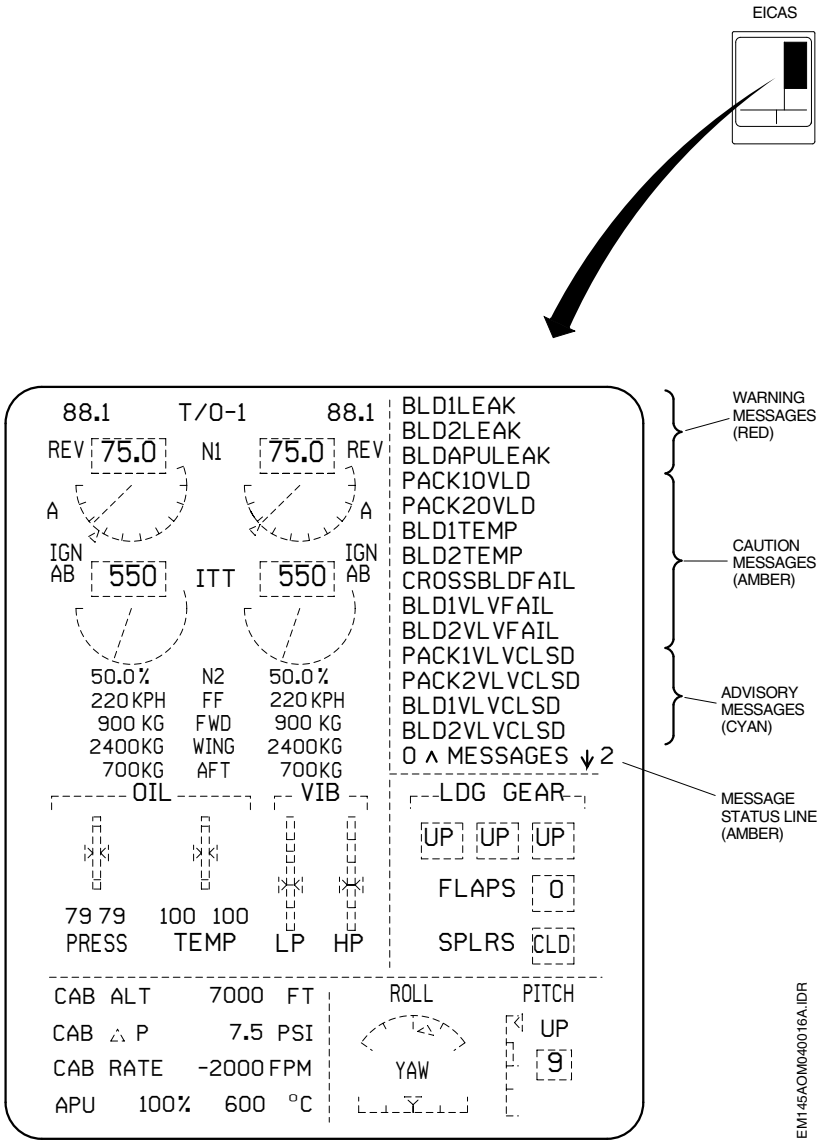
EICAS DISPLAY



EICAS MESSAGES EXAMPLE

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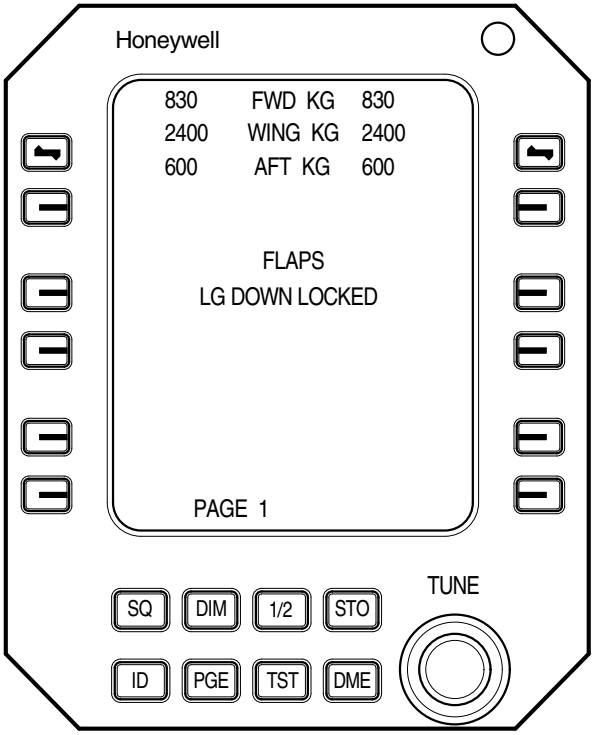
RMU DISPLAY



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RMU MESSAGES EXAMPLE

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PFD PRESENTATIONS

COMPARISON MONITORS

The left and right side area for several critical parameters is monitored by the system. If an excessive difference is detected between left and right side information, a comparison monitor annunciator for data is displayed on the PFD.

Active messages are cleared when the miscompare situation has been corrected.

Comparison monitor annunciators are displayed as follows:

1 – PIT (PITCH ATTITUDE)

- Displayed in the upper left corner of the attitude sphere when pitch attitude data differs by more than ± 5°.

2 – ALT (ALTITUDE)

- Displayed in the upper right corner of the altitude tape when altitude data differs by more than ± 200 ft.

3 – HDG (HEADING)

- Displayed to the upper right of the EHSI compass when heading data differs by more than ± 6° (level flight).

4 – LOC (LOCALIZER)

- Displayed to the lower left of the attitude sphere when localizer deviation differs by more than approximately ½ dot (below 1200 ft AGL).

5 – CAS MSG (CAS MESSAGE)

- Displayed on the lower left of the attitude sphere when a Warning or Caution EICAS Message has been triggered by the on-side IC-600 but not the cross-side IC-600.

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6 – ILS (INSTRUMENT LANDING SYSTEM)

- Displayed to the lower left of the attitude sphere when both localizer and glideslope comparison monitors have been tripped.

7 – GS (GLIDESLOPE)

- Displayed to the lower left of the attitude sphere when glideslope deviation differs by more than approximately 2/3 dot (below 1200 ft AGL).

8 – RA (RADIO ALTITUDE)

- Displayed to the lower left of the attitude sphere when radio altitude data differs by more than the amount calculated by the formula [(RA1+RA2)x0.0625]+10. Available only with two radio altimeters installed.

9 – IAS (AIRSPEED)

- If the on-side and cross-side calibrated airspeed differ by 5 kt or more for longer than 2 seconds, it is displayed in the upper left corner of the airspeed tape first flashing, for 10 seconds, and then steady.

10 – ROL (ROLL ATTITUDE)

- Displayed in the upper left corner of the attitude sphere when roll attitude data differs by more than ± 6°.

11 – ATT (ATTITUDE)

- Displayed in the upper left corner of the attitude sphere when both pitch and roll comparison monitors have been tripped.

NOTE: The comparison monitor is active when the pilot and copilot have the same type of data, but different sources selected for display. For example, if the pilot and copilot both have ILS 1 selected (amber source annunciator), no comparison monitor is active on that data (localizer and glideslope).

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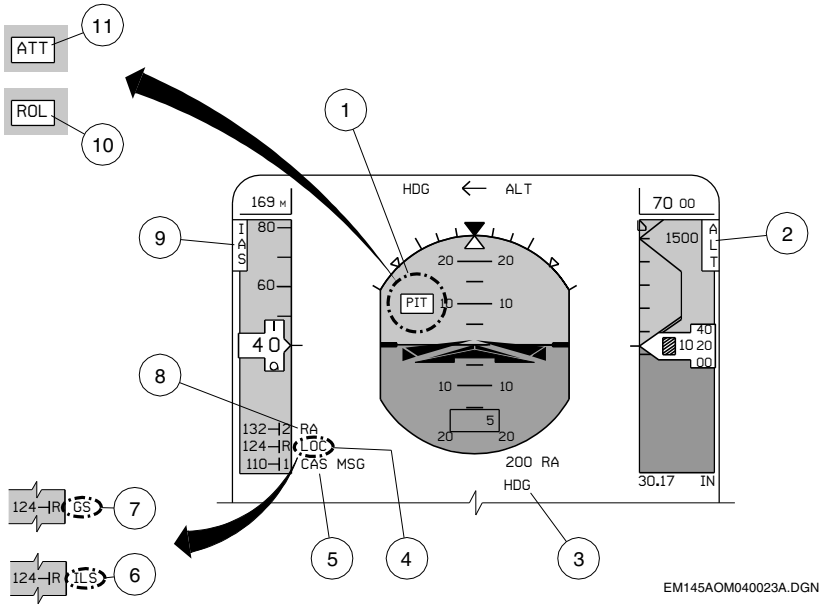

COMPARISON MONITOR ANNUNCIATORS

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CAUTION ANNUNCIATORS

The amber caution annunciators are described as follows:

1 – FD FAIL

- If a flight director fails, **FD FAIL** is displayed in the lateral mode annunciator box, and the flight director mode annunciators and command cue are removed.

2 – AP/YD

- Autopilot and yaw damper caution annunciators. **AP/YD** are displayed above the attitude sphere, below the flight director mode annunciators. Refer to PFD Additional Annunciators for more information.

3 – GND PROX

- When the EGPWS indicates a caution conditions **GND PROX** is displayed in the upper right of the EADI sphere. The following aural alerts are considered cautionary:
  - "SINK RATE".
  - "DON'T SINK".
  - "TOO LOW TERRAIN".
  - "TOO LOW FLAPS".
  - "TOO LOW GEAR".
  - "GLIDESLOPE".
  - "CAUTION TERRAIN".
  - "CAUTION OBSTACLE".

4 – MSG

- The FMS message annunciator (**MSG**) is displayed to the upper right of the EHSI compass. The **MSG** annunciator flashes until the FMS message is cleared from the scratchpad.

5 – TCAS FAIL

- Amber **TCAS FAIL** caution annunciator is displayed to the upper left on the vertical speed display.

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6 – DISTANCE DISPLAY FAILURES

– If the DME or FMS distance signal fails, the digital readout is replaced with amber dashes.

7 – COURSE SELECT FAILURE

– If the course select signal fails, the digital readout is replaced with amber dashes and the course pointer is removed from the display. This indication is also given for an invalid heading display or FMS source.

8 – AOA

– Angle of attack information (and calibrated airspeed) are used to calculate stall speed for low speed awareness. If the angle of attack information or indicated airspeed information is invalid, AOA is displayed to the lower right of the airspeed tape.

9 – ATT1 OR ATT2

– If the pilot and copilot are using their normal onside attitude source, there is no attitude source annunciator. If the pilot and copilot have selected the same attitude source, that attitude source (**ATT1** or **ATT2**) is annunciated to the lower left of the attitude sphere on both PFDs.

10 – RA

– If a radio altimeter fails, **RA** is displayed in the digital radio window.

11 – MAX/MIN SPD

– These annunciators are displayed to the left of the attitude sphere. **MIN SPD** is displayed when the vertical speed or airspeed hold mode is engaged and the indicated airspeed drops below 80 kt. **MAX SPD** is displayed anytime indicated airspeed exceeds V_{MO}/M_{MO}.

12 – SG1 OR SG2

– When the symbol generator reversion is selected and one symbol generator is driving both pilot's and copilot's displays, that symbol generator is annunciated (**SG1** or **SG2**) to the upper left of the attitude sphere on both PFDs.

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13 – ADC1 OR ADC2

- If the pilot and copilot are using their normal onside air data source, there is no air data annunciator. If the pilot and copilot have selected the same air data source (**ADC1** or **ADC2**) is annunciated to the upper left of the attitude sphere on both PFDs.

14 – WDSHEAR

- When the windshear detection system detects windshear, **WDSHEAR** is displayed to the upper left of the attitude sphere. The annunciator flashes for 10 seconds and then goes on steady. The annunciator is **amber** (caution) if the performance is being increased, and **red** (warning) if the performance is being decreased. If the go-around button is pushed during a windshear caution or warning, the flight director vertical mode becomes windshear (WSHR) and vertical flight director guidance directs the airplane.

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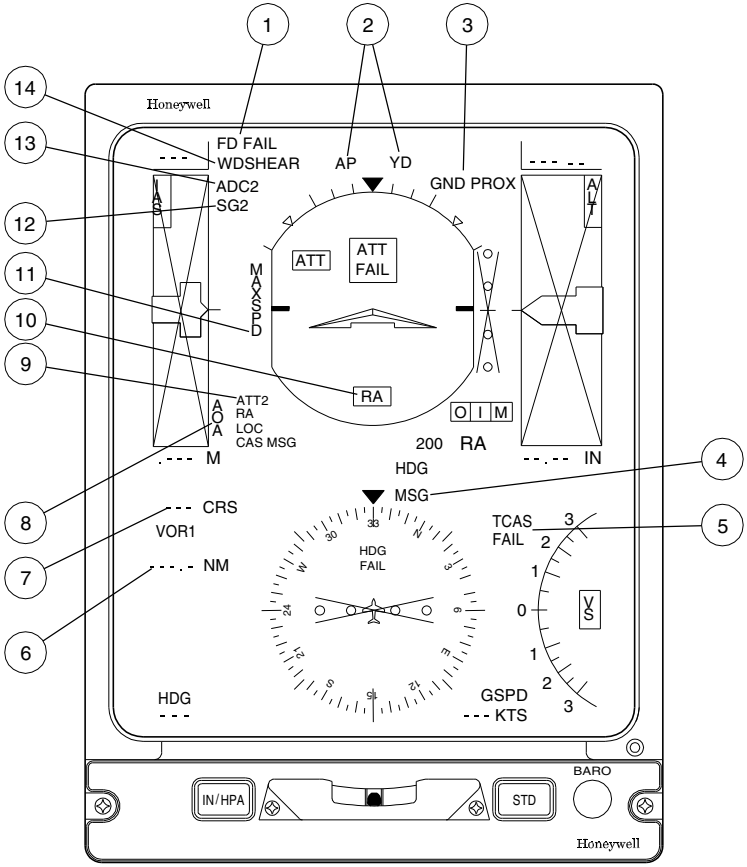

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PFD WITH CAUTION ANNUNCIATORS

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WARNING ANNUNCIATORS

The red warning annunciators are described as follows:

1 – ATT FAIL

– If either the pitch or roll data fails, the pitch scale marking are removed, the attitude sphere turns cyan, and **ATT FAIL** is displayed in the attitude sphere.

2 – PULL UP

– When the EGPWS indicates a warning condition, **PULL UP** is displayed boxed in the upper right corner of the EADI sphere.

3 – AIR DATA COMPUTER FAILURE

– If the ADC fails, the rolling digit displays of airspeed and altitude are removed, the scale marking are removed and an **"X"** is drawn through the scales. If the digital Mach display fails, the digital readout is replaced with amber dashes.

– In the case of the vertical speed, the current value pointer is removed, a boxed **VS** is displayed inside the scale.

4 – VERTICAL DEVIATION FAILURE

– If the radio source driving the vertical navigation scale fails, the deviation pointer is removed and a red **"X"** is drawn through the scale. The scale and pointer are removed for invalid FMS data.

5 – COURSE DEVIATION FAILURE

– If the course deviation data fails, the CDI is removed and a red **"X"** is drawn through the scale. The course digital readout is replaced with amber dashes.

6 – HDG FAIL

– If the heading select signal fails, the heading bug is removed from the display and **HDG FAIL** is displayed inside the EHSI compass. This indication is also given in the event of an invalid heading display.

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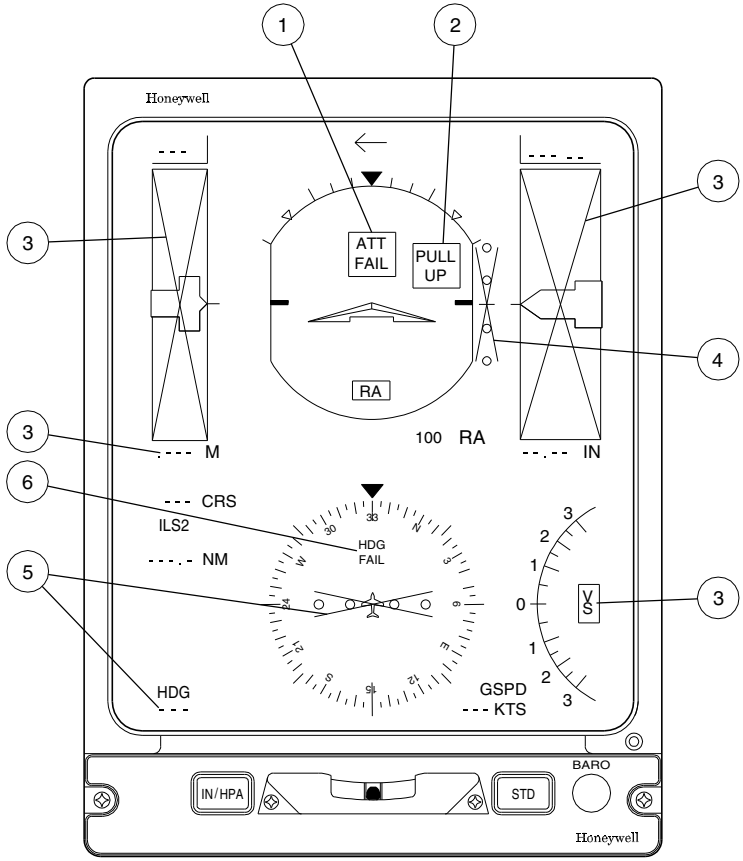

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PFD WITH WARNING ANNUNCIATORS

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PFD ADDITIONAL ANNUNCIATORS

ELECTRONIC ATTITUDE DIRECTOR INDICATOR (EADI) DISPLAY AND MODE ANNUNCIATORS

1 – LATERAL FLIGHT DIRECTOR MODE ANNUNCIATORS

– The **HDG**, **VAPP**, **VOR**, **ROL**, **LOC**, **BC** and **LNAV** mode annunciators are displayed. Armed modes are displayed in white, captured modes are displayed in green and boxed in white for 7 seconds after the transition from armed to captured.

2 – VERTICAL FLIGHT DIRECTOR MODE ANNUNCIATORS

– The **VS**, **MACH**, **PIT**, **ASEL**, **TO**, **CLB**, **ALT**, **WSHR**, **SPD**, **DES**, **GS**, **IAS** and **GA** mode annunciators are displayed. Armed modes are displayed in white, while captured modes are displayed in green and boxed in white for 7 seconds after the transition from armed to captured.

3 – VERTICAL DEVIATION DISPLAY

– A **GS** in white is displayed above the vertical deviation scale when the vertical deviation is from an ILS glideslope, and a **FMS** in white is displayed when the vertical deviation is from an FMS.

– If the glideslope data is invalid, the pointer is removed and a red "X" is displayed through the scale. If the FMS data is invalid, the scale, label and pointer are removed.

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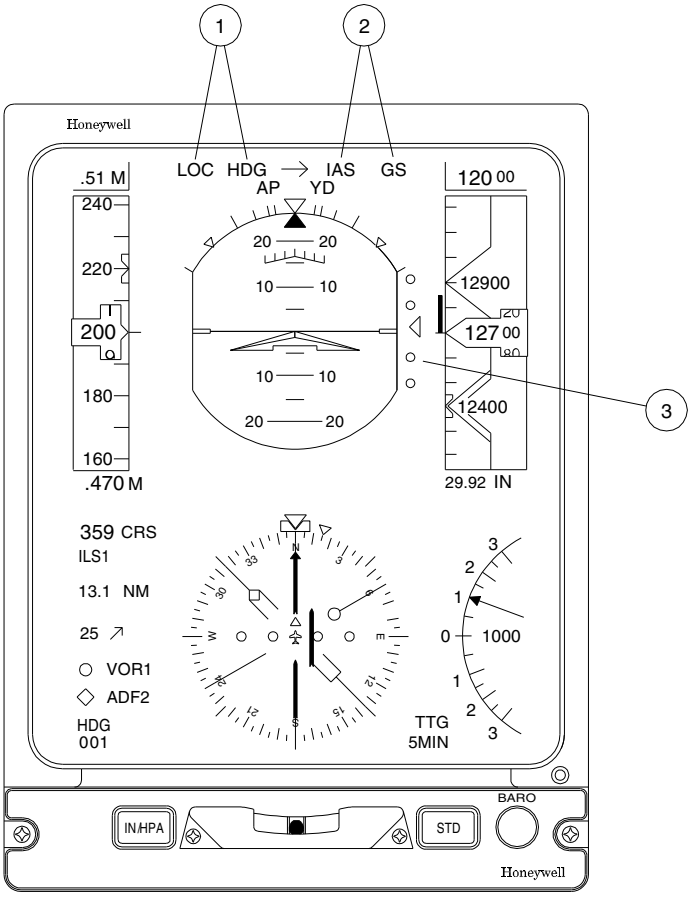

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EADI DISPLAY ON THE PFD

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1 – AUTOPILOT ANNUNCIATORS

MESSAGE	COLOR	TYPE	STATUS
AP	Green	Steady	Engaged
AP Test	Amber	Steady	Autopilot Test
AP	Amber	Flashes for 5s	Normal AP disconnect
AP	Red	Flashes for 5s then steady	Abnormal AP disconnect
AP	Red	Flashes for 5s	Abnormal AP disconnect in CAT II
TCS	White	Steady while TCS switch is pushed	Touch control steering
TKNB	Amber	Steady	TURN knob is out of detent

2 – YAW DAMPER ANNUNCIATORS

MESSAGE	COLOR	TYPE	STATUS
YD	Green	Steady	Engaged
YD	Amber	Flashes for 5s	Normal yaw damper disconnect
YD	Amber	Flashes for 5s then steady	Abnormal yaw damper disconnect

3 – FMS VERTICAL TRACK ALERT (VTA) ANNUNCIATOR

– For Universal FMS, the annunciator **VTA** is displayed in magenta flashing then steady when the FMS advisory VNAV is selected and the airplane is approaching the top of descent point.

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4 – RADIO ALTITUDE MINIMUM ALTITUDE ANNUNCIATOR

- When actual radio altitude decreases to within 100 ft of the set Decision Height value, a white box is displayed. When the actual radio altitude is equal to or less than the set value, **MIN** is displayed in amber (inside the box) and it flashes for 10s.

5 – MARKER BEACON ANNUNCIATOR

- A cyan **O** represents the outer, an amber **M** represents the middle, and a white **I** represents the inner marker. They appear inside a white box, flashing.

6 – RADIO ALTITUDE MINIMUM ALTITUDE (DH) SET DATA

- The range for DH set is 0 ft to 999 ft. The DH is set in 10 ft increments above 200 ft AGL, and in 5 ft increments below 200 ft AGL. Above 999 ft AGL, the DH set value is removed.

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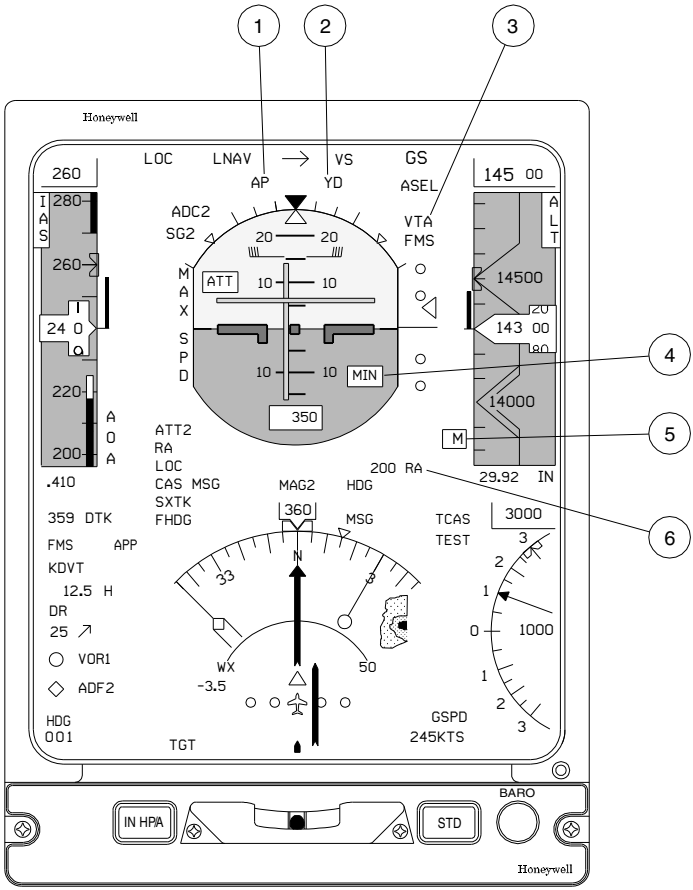

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EADI DISPLAY ON THE PFD

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1 – CAT II ANNUNCIATOR

- **CAT2** is displayed in green when the conditions for a CAT II approach are satisfied. If these conditions are met, but subsequently lost, **CAT1** in amber flashes for 5 seconds and then goes on steady. If the localizer deviation exceeds the CAT II requirements with radio altitude less than 500 ft the green **CAT2** turns amber and flashes.

ELECTRONIC HORIZONTAL SITUATION INDICATOR (EHSI) DISPLAY

FULL COMPASS DISPLAY

The color of the course pointer, distance display, groundspeed, lateral deviation, and navigation source annunciator are green when the source selected is Short Range Navigation, magenta when FMS is selected as navigation source and yellow when the same navigation source on both sides or secondary NAV source is selected.

2 – MEASUREMENTS

- One of the annunciators **TTG** in white, **ET** in green or **GSPD** in green is displayed.

3 – BEARING POINTER ANNUNCIATORS (COPILOT)

- The **OFF**, **NAV2**, **ADF2**, **FMS** or **VOR2** bearing pointer annunciators may be displayed. If the on-side display controler fails, the default sources is VOR2 for the "◊" pointer (copilot's).

4 – BEARING POINTER ANNUNCIATORS (PILOT)

- The **OFF**, **NAV1**, **ADF1**, **FMS** or **VOR1** bearing pointer annunciators may be displayed. If the on-side display controler fails, the default sources is VOR1 for the "O" pointer (pilot's).

5 – DISTANCE DISPLAY

- The display is distance to the station for a short-range NAV and the distance to the TO waypoint for the FMS. The display range is from 0 NM to 409.5 NM for DME and 0 NM to 4096 NM for FMS. If DME hold is selected when VOR is displayed, an amber **H** is displayed.

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6 – NAVIGATION SOURCE ANNUNCIATORS

- One of the Navigation Source Annunciators **VOR1**, **VOR2**, **ILS1**, **ILS2** or **FMS** is displayed.

7 – COURSE POINTER AND DIGITAL DISPLAY

- If short range NAV is selected, the annunciator **CRS** (Course) is displayed. If long range NAV is selected, the annunciator **DTK** (Desired Track) appears.

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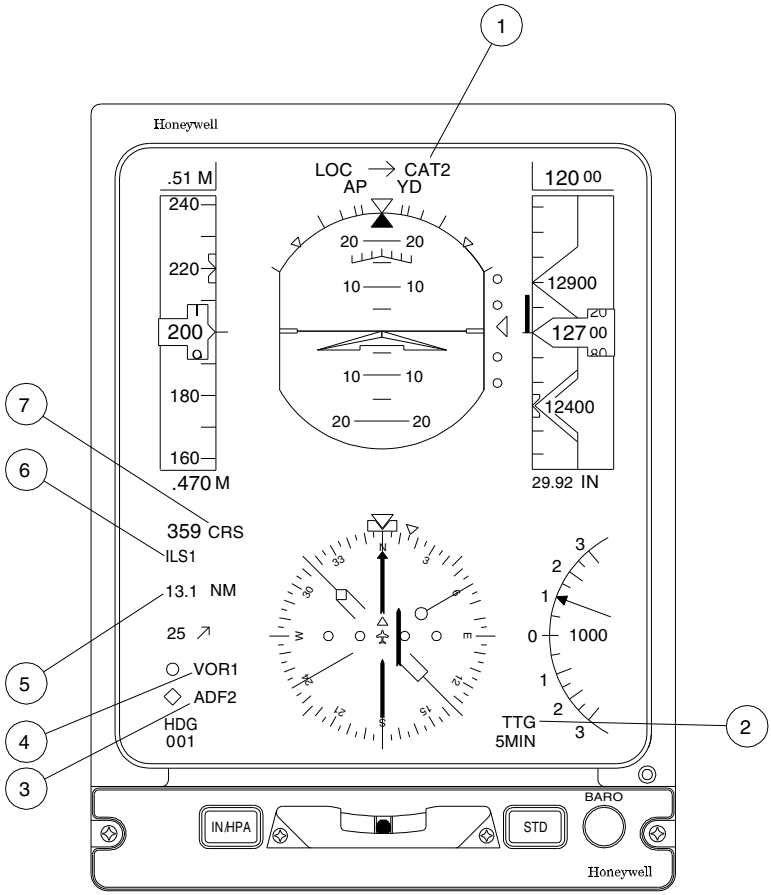

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EHSI DISPLAY ON THE PFD

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COMPASS ARC DISPLAY

1 – HEADING SOURCE ANNUNCIATOR

- When the cross-side heading source is selected, or when the AHRS is in DG mode, the heading source annunciator (**HDG**) is displayed.
- When the AHRS is in DG mode, the on-side heading source annunciators are **DG1** or **DG2** (in white). When the magnetic heading is invalid, the source annunciator is **HDG1** or **HDG2** (in amber).

2 – FMS MESSAGE AND STATUS ANNUNCIATORS

- The FMS message annunciator (**MSG**, in amber) flashes until the FMS condition is cleared.

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3 – WEATHER RADAR MODE ANNUNCIATOR

The mode annunciators are described below:

ANNUNCIATOR	COLOR	R/T MODE
FPLN	green	Flight plan mode.
FSBY	green	Forced standby.
GMAP	green	Ground mapping mode.
R/T	green	RCT and turbulence (1).
RCT	green	REACT mode.
STBY	green	Standby.
TEST	green	Test mode and no faults.
TGT	green	Target alert enabled (2).
TX	green	WX is transmitting but not selected for display, or in STBY or FSTBY (3).
WAIT	green	RTA in warm-up (4).
WX	green	Weather mode (5).
WX/T	green	Weather and turbulence (1).
FAIL	amber	RTA fail - test mode and faults (6).
GCR	amber	Normal WX with ground clutter reduction.
STAB	amber	Stabilization off.
VAR	amber	Variable gain.

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NOTE: (1) Turbulence detection is only available on the PRIMUS® 880.

(2) When target alert is enabled and a level 3 weather return is detected in the forward 15° antenna scan, **TGT** in amber is displayed.

(3) **TX** is displayed in amber when the airplane is on ground and WX is transmitting, but not selected for display, or in STBY and FSTBY.

(4) Early version of the P1000 annunciates **TX** in amber when the radar is in the warm-up mode. In later versions the warm-up is indicated by **WAIT** in green.

(5) When weather radar is invalid **WX** in amber is displayed.

(6) When on the ground and the weather test display is selected, weather failures are indicated by fault codes in the tilt angle field.

4 – WEATHER RADAR TGT/VAR ANNUNCIATORS

– When the target alert mode is armed, the message **TGT** in green appears. It turns amber when a potentially dangerous target is detected. This indicates that the pilot should select a higher range on the weather radar to view the target. When variable radar gain is selected, **VAR** in amber is displayed.

5 – DME HOLD ANNUNCIATOR

– If DME hold is selected when VOR is displayed, **H** in amber is displayed.

6 – FMS HEADING (FHDG) ANNUNCIATOR

– When heading guidance is supplied from the FMS, **FHDG** in magenta is displayed.

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7 – FMS STATUS ANNUNCIATOR

The following FMS status annunciators are displayed in amber:

- **INTEG** (Integrity): The GPS sensor does not meet the required integrity calculations for the current phase of flight.
- **WPT** (Waypoint): The airplane is approaching a flightplan waypoint.
- **DR** (Dead Reckoning): The FMS is in dead reckoning mode.
- **DGR** (Degrade): The ability of the FMS to accurately calculate airplane position is degraded.

The following FMS status annunciators are displayed in cyan:

- **SXTK** (Crosstrack): The airplane is off track.
- **TERM** (Terminal): The FMS is in the terminal phase of the flightplan.
- **APP** (Approach): The FMS is in the approach phase of the flightplan. For RNAV (FMS) approaches, the annunciator is displayed steady and for GPS approaches, the annunciator flashes for ten seconds.

The table below shows the Deviation Scale for FMS Terminal and Approach Modes:

ANNUNCIATOR (IN CYAN)	MODE	2 DOTS LATERAL DEVIATION	2 DOTS VERTICAL DEVIATION
APP	Approach (non-ILS/LOC/LPV)	0.3 NM	150 ft
TERM	Terminal	1.0 NM	500 ft

AIRSPEED DISPLAY

When the FGS enters the MAX SPEED mode, the annunciator **MAX SPEED** is displayed in amber to the left of the EADI sphere.

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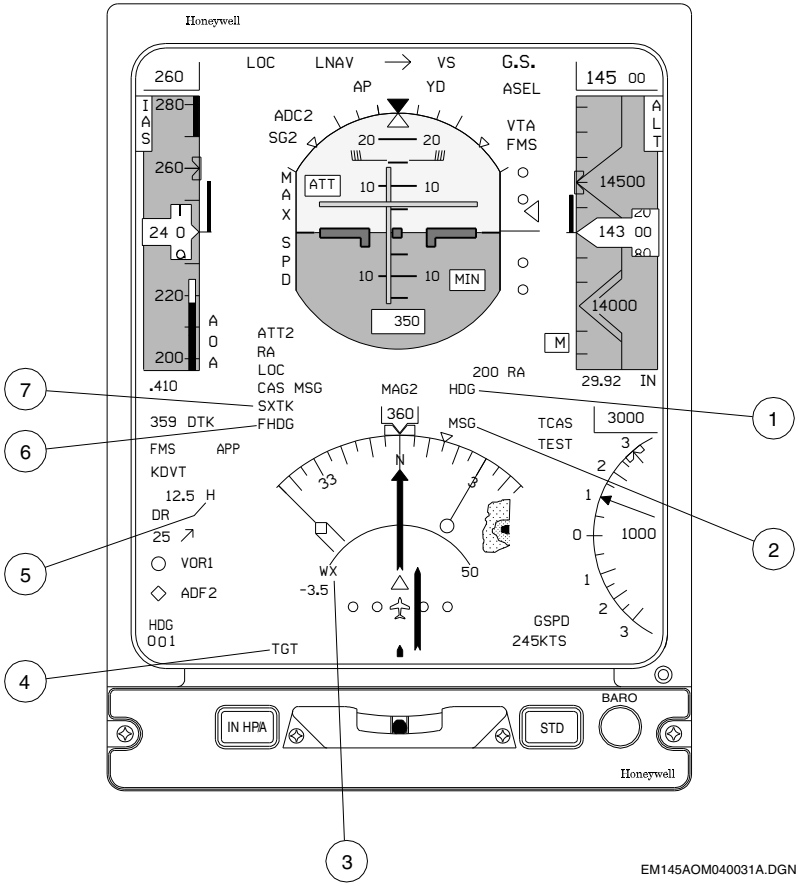

MESSAGES ON THE PFD

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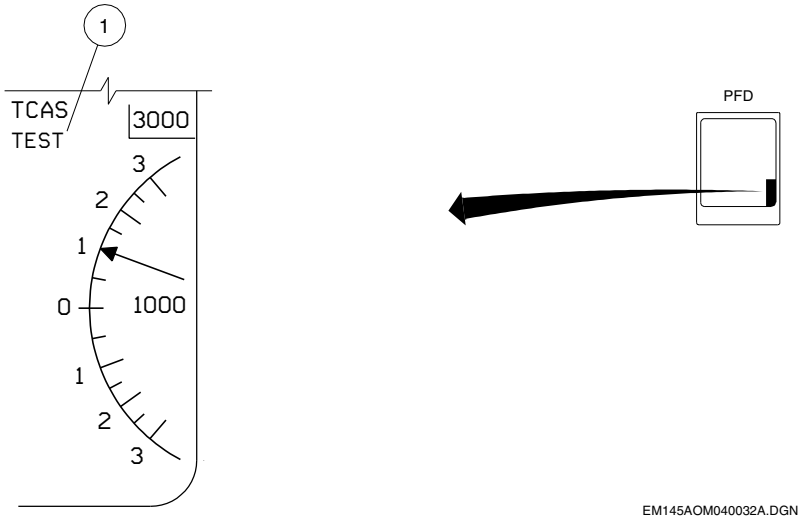
VERTICAL SPEED DISPLAY

It is located at the PFD's down-right side display.

1 – TCAS STATUS ANNUNCIATOR

ANNUNCIATOR	COLOR	TCAS STATUS
TA ONLY	white	TCAS is in traffic advisory mode only.
TCAS OFF	white	TCAS is off.
TCAS TEST	white	TCAS is in self-test.
TCAS FAIL	amber	TCAS data is invalid.
RA FAIL	red	Resolution advisories are not available.



VERTICAL SPEED DISPLAY ON THE PFD

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PFD SELF-TEST DISPLAY

To run the EFIS self-test, push and hold the TEST button on the display controller. The PFD displays the following:

- Course select, heading select, radio altitude set, distance, and groundspeed/time-to-go digital displays are replaced with amber (horizontal) dashes.
- Attitude and heading displays are flagged.
- All pointers/scales are flagged.
- All heading bugs/pointers are removed.
- Flight director command cue is removed.
- Radio altimeter digital readout displays radio altimeter self-test value.
- The comparison monitor annunciators are displayed (in amber) **ATT**, **HDG**, and **ILS** (if ILS sources are selected on both sides).
- **TEST** in magenta is annunciated to the upper left of the EADI.
- The annunciator **WDSHEAR** in red is displayed.
- Flight director mode annunciators are removed.
- Radio altitude minimum is displayed at the last set value.

NOTE: The amber annunciator **FD FAIL** is not displayed during the self test.

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AURAL WARNINGS

There are two kinds of aural warnings: voice messages and tones.

Voice messages are normally associated with warning messages on the EICAS or other warning systems. They are generated whenever a potentially dangerous condition exists, as determined by the EGPWS, TCAS and windshear detection system. There are some voice messages that can be cancelled, but others can only be cancelled when the cause that triggered them has been eliminated.

Tones have different forms and indicate some notable airplane events, sometimes in unison with the voice messages.

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AURAL WARNING UNIT

The AWU is a redundant system divided into two channels, designated Channels "A" and "B".

During the normal operation, channel "A" operates as the primary channel. Channel "B" is kept as a backup, and is automatically activated if channel "A" fails.

In order to generate messages and tones, the Aural Warning Unit (AWU) receives signals from the following airplane systems:

– TCAS.

– Windshear detection system.

– EGPWS.

– IC-600.

– Fire detection system.

– Stall protection system.

– Trims.

– Flaps.

– Brakes.

– Spoilers.

– Radio altimeter.

– Autopilot.

– Landing gear.

– ADC.

– Pressurization.

– SELCAL.

– Autothrottle.

The AWU sends the appropriate audio signal to an audio digital system, which routes the messages to the appropriate speakers.

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AWU POWER SOURCE

The AWU Channel "A" is energized by Essential DC Bus, and the Channel "B" is energized by DC Bus.

AWU POWER-UP TEST

An AWU power-up test is performed and generates aural warnings for one or both channels operating normally. If both channels have failed, the caution message AURAL WARN FAIL is displayed on EICAS.

AURAL WARNINGS LEVELS

The aural warnings are classified into four levels, presented below in a decreasing level order:

– **Emergency** - Associated with situations that may be hazardous. AWU generates a master warning tone (triple chime) before the warning and voice message may be generated. In any case, the aural warning is repeated every second until deactivated through the master warning button or until the condition that generated the warning has been eliminated.

– **Abnormal** - Associated with malfunctions or failures. AWU generates a master caution tone (single chime) every five seconds, until it is removed, canceled or replaced by a higher priority aural warning. Voice messages are generated after each tone.

– **Advisory** - Associated with minor malfunctions or failures that lead to loss of redundancy or degradation of the affected system's performance.

– **Information** - A remarkable event has occurred.

AURAL WARNINGS ANNUNCIATION PRIORITY

When multiple aural warnings are active, aural warnings among the highest level alert groups shall be sounded first.

Once all alerts in the higher group are cancelled or removed, then the second tier group alerts are sounded.

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LEVEL	ASSOCIATED CONDITION/ EICAS MESSAGE	PRIORITY	TONE	VOICE MESSAGE	CANCEL
EMERGENCY	Stall condition.	1	Clacker	None	NO
	Windshear condition (1).	2	None	WINDSHEAR	NO
	Ground proximity condition (1).	3	(1)	(1)	NO
	Traffic proximity condition (1).	4	None	(1)	NO (2)
	Fire in engine or APU. ENG 1 (2) FIRE, APU FIRE.	5	Bell	None	YES
	Airspeed above V_{MO}.	6	Triple Chime (Master Warning)	HIGH SPEED	NO
	Landing gear not locked down for landing.	7	Triple Chime (Master Warning)	LANDING GEAR	NO
	Cabin altitude above 10000 ft.	8	Triple Chime (Master Warning)	CABIN	YES
	Associated with takeoff configuration warning.	9	Triple Chime (Master Warning)	TAKEOFF plus one of the following: BRAKES, FLAPS, FUEL, SPOILER, TRIM	NO
	Associated with emergency failures.	10	Triple Chime (Master Warning)	None	NO
ABNORMAL	Associated with glide slope deviation.	None	None	GLIDE SLOPE	YES
	Traffic proximity condition.	None	None	TRAFFIC	YES
	Associated with abnormal failures.	None	Single Chime (Master Caution)	None	YES

NOTE: 1) Messages are generated outside the AWU. For further details, refer to the associated system description.

2) TCAS resolution advisory warning can not be canceled.

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LEVEL	ASSOCIATED CONDITION/ EICAS MESSAGE	PRIORITY	TONE	VOICE MESSAGE	CANCEL
ADVISORY	Autopilot disengagement during approach.	None	None	AUTOPILOT	NO
	Autothrottle disengagement. (5)	1	None	AUTOTHROTTLE	YES
	Associated with decision height crossing.	None	None	MINIMUM	NO
	Airplane is crossing 1000 ft before the preselected altitude.	None	Triple Horn (1)	None	NO
		None	Single Altitude Tone (2)	None	NO
		None	Double Altitude Tone (3)	None	NO
	Airplane altitude more than 200 ft above or below the altitude hold.	1	Triple Horn (1)	None	Not applicable
		1	Single Altitude Tone (2)	None	Not applicable
		1	Double Altitude Tone (3) or (4)	None	Not applicable
	VTA (Vertical Tracking Alert) FMZ 2010.	1	Single Altitude Tone (4)	None	Not applicable

NOTE: 1) Applicable to airplanes Pre-Mod. SB 145LEG-31-0012.

2) Applicable to airplanes Post-Mod. SB 145LEG-31-0012 or with an equivalent modification factory incorporated.

3) Applicable to airplanes Post-Mod. SB 145LEG-31-0020 or with an equivalent modification factory incorporated.

4) Applicable to airplanes Post-Mod. SB 145LEG-34-0032 or with an equivalent modification factory incorporated.

5) Applicable to airplanes Post-Mod. SB 145LEG-22-0003 or with an equivalent modification factory incorporated.

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LEVEL	ASSOCIATED CONDITION/ EICAS MESSAGE	PRIORITY	TONE	VOICE MESSAGE	CANCEL
INFORMATION	Power up test detected a failure in one channel of AWU.	Not applicable	None	AURAL UNIT ONE CHANNEL	NO
	Associated with incorrect command of pitch trim main or backup channel switches.	None	Single Chime	TRIM	NO
	Associated with SELCAL callings.	None	None	SELCAL	NO
	Associated with ATC messages (CPDLC).	None	None	ATC MESSAGE	NO
	Both AWU channels are operating normally on power up test.	None	None	AURAL UNIT OK	NO
	Takeoff configuration test successful.	None	None	TAKEOFF OK	NO
	Power 1 or 2 fail.	None	None	AURAL UNIT ONE POWER	Not applicable
	When CMU receives a new message.	None	None	INCOMING CALL (1)	NO

NOTE: 1) Applicable to airplanes equipped with CMU.

EICAS MESSAGE

TYPE	MESSAGE	MEANING
CAUTION	AURAL WARN FAIL	Both AWU channels are inoperative.

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TAKEOFF CONFIGURATION WARNING

The Aural Warning Unit (AWU) monitors airplane takeoff configuration using various inputs. A dedicated aural warning indicates that the airplane configuration is not suitable for takeoff.

The takeoff aural warning is activated whenever:

- The airplane is on the ground.
- Any thrust lever angle is above 60°.
- At least one of the following conditions are met:
  - Parking brakes are applied (TAKEOFF BRAKES).
  - Flaps are not in takeoff position (TAKEOFF FLAPS).
  - Any spoiler panel is deployed (TAKEOFF SPOILER).
  - Pitch trim is out of green range (TAKEOFF TRIM).
  - Auxiliary Fuel Tanks Transfer System Knob is not in OFF position (TAKEOFF FUEL).

NOTE: More than one warning may be generated if more than one condition is met.

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TEST BUTTON

The TO CONFIG Button located on the central pedestal is provided to allow checking the airplane takeoff configuration by simulating thrust levers in the advanced position.

If the airplane is in takeoff configuration, the voice message "TAKEOFF OK" is generated.

If the airplane is not set to takeoff configuration, the aural warning related to any of the associated takeoff configuration deviations listed above is generated and a "NO TAKEOFF CONFIG" CAS message is displayed.

NOTE: The aural warning will be annunciated if the test button is pressed for at least 4 seconds.

EICAS MESSAGE

TYPE	MESSAGE	MEANING
WARNING	NO TAKEOFF CONFIG	Airplane is not in takeoff configuration.

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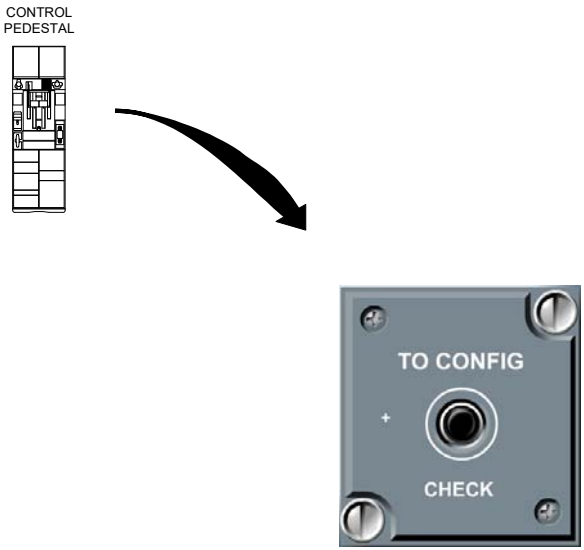
CONTROLS AND INDICATORS

1 – TO CONFIG BUTTON

– Allows checking the takeoff configuration warning.



TO CONFIG PANEL

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STALL PROTECTION SYSTEM

GENERAL

To help detect imminent stalls and to avoid stalling the airplane, the EMB-135BJ is provided with a Stall Protection System (SPS). The SPS is composed of one computer box with two independent channels, the SPS panel, two Angle of Attack (AOA) sensors, two stick shaker actuators, and one stick pusher actuator. The system provides sensitive, visual and aural indications of an impending stall. To avoid spurious actuation, the SPS receives signals from many airplane systems, thus correcting its set point according to flaps and landing gear position, icing and windshear conditions and Mach number.

At higher altitudes, the stall protection system advances its set point to cope with compressibility effects. Therefore, the stall is always defined by the pusher activation, regardless of the altitude. The basic difference between lower and higher levels is that at higher altitudes the pusher and the shaker speeds are higher due to above mentioned stall protection set point advance, preserving the stall margin.

INTERFACES

Each channel receives data from the following on-side airplane systems: IRS/AHRS, ADC, flaps, landing gear, air/ground, windshear detection, ice detection and radio altimeter. Each Stall Protection Computer (SPC) channel receives information from its associated AOA sensor and sends it to the opposite channel in order to compensate side slip influence on angle of attack measurements.

A locked AOA sensor signal is not considered in stall calculations and in this case the channel will be deactivated. If a stall condition is imminent, the system first actuates the stick shaker and disengages the autopilot. If no corrective action is taken and the airplane is on the verge of entering a stall, the stick pusher is actuated, which pitches the nose down. Simultaneously, a clacker is generated in the aural warning system.

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A bug in the airspeed scale on the PFD indicates the stall speed for the associated condition and a pitch limit indicator is presented on EADI to indicate the current margin to the stick shaker angle. When the airplane reaches 0.5 g, the stick pusher is inhibited, stopping its actuation over the control column. A quick disconnect button is provided in the control wheel to permit pilots to cut the system if the need arises. To disconnect the system in case of failure, the SPS panel provides one cutout button for each channel. An EICAS message is presented to indicate that the system has failed or is cutout.

EICAS displays the SPS/ICE SPEEDS message to indicate that the Ice Detection/SPS interface logic (Ice Compensation) is active, and consequently the SPS will actuate at reduced angle of attack values for flaps 9°, 22° and 45°.

NOTE: The first in-flight ice detection, by any ice detector, activates the ice compensation.

– The ice compensation is inhibited during 5 minutes after takeoff.
– The ice compensation is reset only on the ground, by pressing the STALL PROTECTION TEST Button.

SYSTEM INHIBITION

The stick pusher does not actuate in the following conditions:

– On the ground (except during test).
– Below 0.5 g.
– If the quick disconnect button is pressed (except for EASA certification).
– Below 200 ft AGL. If radio altimeter has failed, this condition reverts to a 10-second delay after takeoff.
– If any cutout buttons are released.
– Above 200 KIAS.
– If at least one channel is inoperative.

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SYSTEM TEST

A STALL PROTECTION TEST Button is provided to test the system on the ground. The system operates normally if not tested. STALL PROTECTION TEST Button remains illuminated if the system has not been tested or after unsuccessful tests. It is not possible to test the system in flight. This inhibition is valid for 30 seconds after landing, above 70 KIAS or with landing gear not downlocked.

NOTE: STALL PROTECTION TEST Button remains illuminated if quick disconnect button is pressed during test.

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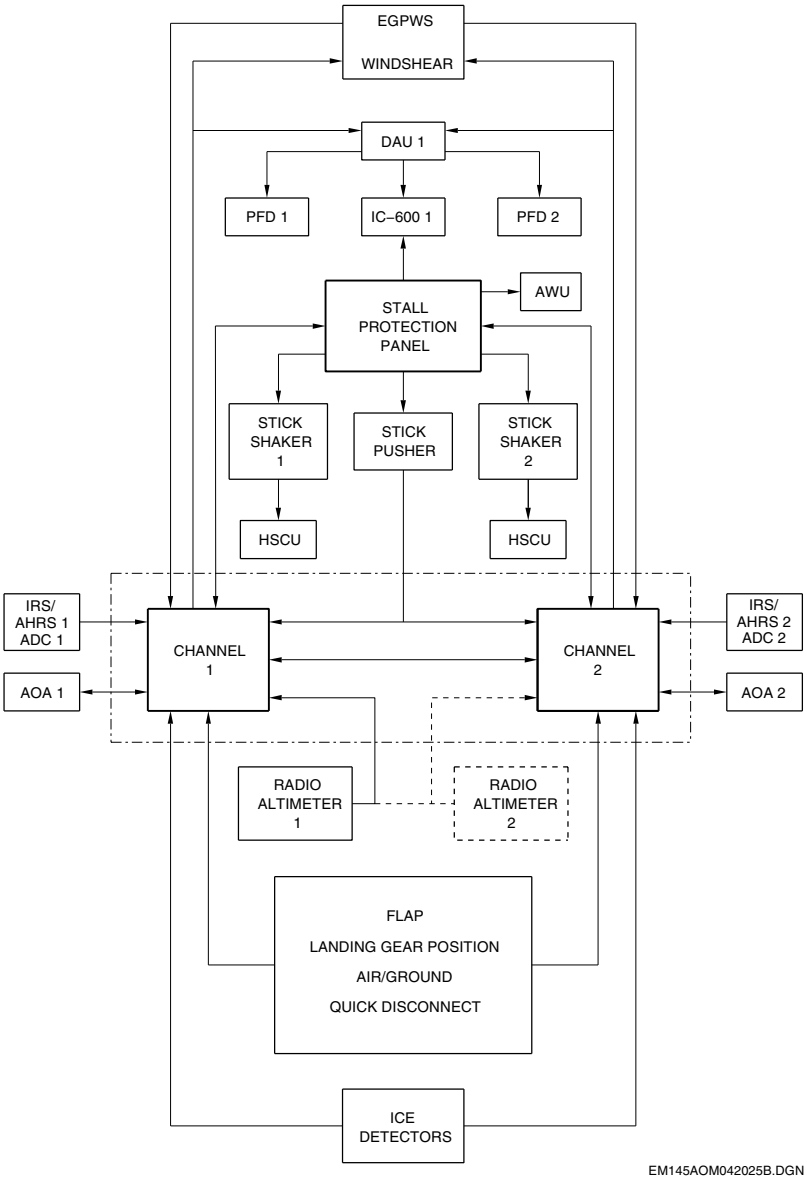

STALL PROTECTION SYSTEM SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	SPS 1 (2) INOP	Associated SPS computer channel has failed or AOA vane failed.
	SPS 1-2 INOP	Both SPS computer channels have failed or both AOA vanes have failed or stick pusher has failed or is cutout.
CAUTION	SPS ADVANCED	Stick shaker and pusher actuation is set to higher speeds due to: – Flap signal disagreement. – Failure in at least one SPS channel. – IRS/AHRS or ADC parameters disagree. – Air/Ground signs disagree. – Landing gear down and locked indications disagree.
	STICK PUSHER FAIL	Stick pusher actuator has been commanded but has not moved.
ADVISORY	SPS/ICE SPEEDS	SPS actuation angle is advanced for flaps 9°, 22° and 45°.

NOTE: Advisory SPS/ICE SPEEDS messages are inhibited for the first 5 minutes after takeoff.

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CONTROLS AND INDICATORS

STALL PROTECTION PANEL

1 – STALL PROTECTION CUTOUT BUTTON (GUARDED)

- Cuts out the associated channel.
- A striped bar illuminates inside the button to indicate that it is in the cutout position.

2 – STALL PROTECTION TEST BUTTON

- Starts the test sequence, as follows:
  - Button illuminates.
  - Both stick shakers actuate.
  - Pusher actuates.
  - Button illumination extinguishes.

  NOTE: - Test sequence is completed within a maximum of 5 seconds.

  - The STALL PROTECTION TEST Button must be released at the first sign of stick shaker actuation.
- Button is kept illuminated after an unsuccessful test or if the system has not been tested.

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STALL PROTECTION PANEL

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PFD INDICATIONS

1 – PITCH LIMIT INDICATOR

- Displayed on the EADI parallel to the airplane symbol.
- Indicates the remaining margin left for the stick shaker angle of attack set point.
- Indication is presented whenever the margin reaches 10°.
- Color:
  - Green for margin from 10° up to 5°.
  - Amber for margin between 5° and 2°.
  - Red for margin below 2°.

Pitch Limit Indicator as well as the pusher and shaker firing angles are corrected for mach compensation at higher altitudes or excessive AOA rate.

2 – LOW AIRSPEED AWARENESS

- Displayed in the airspeed scale when airspeed is near stall speed for the current configuration.
- For further details on Low Airspeed Awareness, refer to Section 2-17 – Flight Instruments.

Low speed awareness cue computation is not corrected for mach compensation at higher altitudes or excessive AOA rate.

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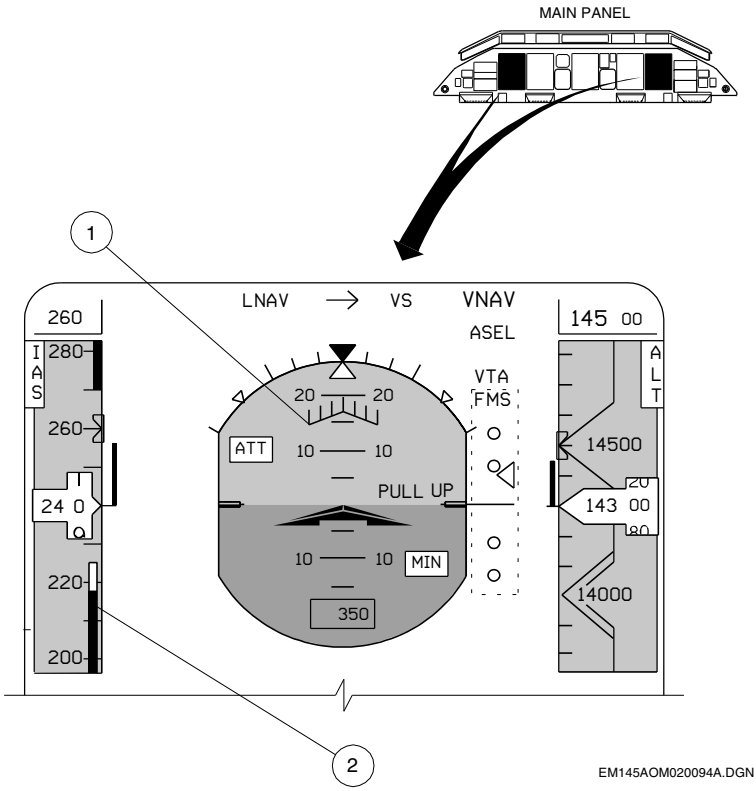

PRIMARY FLIGHT DISPLAY (V-BAR FORMAT)

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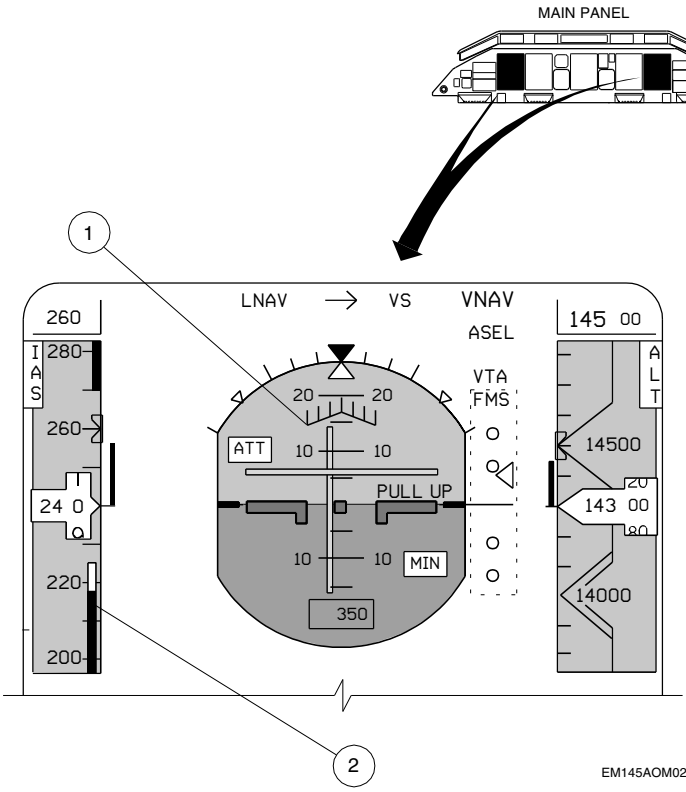

PRIMARY FLIGHT DISPLAY (CROSS-BAR FORMAT)

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ENHANCED GROUND PROXIMITY WARNING SYSTEM

The purpose of the Enhanced Ground Proximity Warning System (EGPWS) is to avoid accidents caused by Controlled Flight Into Terrain (CFIT) and also severe windshear.

The EGPWS incorporates functions like Terrain Clearance Floor, Terrain Look Ahead Alerting and Terrain Awareness Display. These functions use airplane geographic position, airplane altitude and an internal terrain database to predict potential conflicts between the airplane's flight path and terrain, and to provide graphic displays of the conflicting terrain.

NOTE: - Airplanes equipped with EGPWS version 216 incorporate additional features like Peaks Mode, Runway Field Clearance Floor, Obstacle Alerting and Geometric Altitude.

- Geometric Altitude allows continuous EGPWS operations in QFE environments without custom inputs or special operational procedures.

The EGPWS is a useful navigation aids when flying at low altitude, generally within 2500 ft above terrain. It provides voice messages, EICAS message and PFD indication to alert the flight crew, so that they may take appropriate action.

The EGPWS interfaces with the followings systems and equipment:

– Radio Altimeter: The radio altimeter provides altitude above ground, how fast the altitude decreases as a result of airplane sinkage or ground profile change and the validity signal.
– IC-600s: The IC-600s provide glideslope deviation, localizer deviation, selected decision height, selected course, packed discrete and selected terrain range.
– ADCs: The ADCs provide uncorrected barometric altitude, corrected barometric altitude, computed airspeed, true airspeed, barometric altitude rate and static air temperature.
– IRS/AHRS: The IRS/AHRS provides magnetic heading, pitch and roll angle, longitudinal and normal acceleration.

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– FMS: The FMS provides latitude, longitude, ground speed, true tracking, true heading and NAV mode. The same is applicable when the airplane is equipped with dual FMS.
– GPS: The GPS provides latitude, longitude and altitude.
– Landing Gear: The landing gear provides a discrete signal that indicates gear down/locked condition.
– Flap: The Flap Control Unit provides one discrete signal that indicates whether or not flaps are in landing position.
– AWU: The AWU receives the aural messages to be enunciated. It also provides a discrete signal to indicate that the glideslope advisory alert may be canceled without any restriction.
– Terrain Inhibit Switch: It is used in approach mode, in airports not covered by an EGPWS database, assuring protection against unwanted terrain alerts.

Some modes may have their associated envelopes shifted, so as to suit particular airport requirements or to avoid nuisance warnings under some flight situations. This feature is achieved either with calculations or data provided by the FMS, if installed.

The EGPWS provides alerts associated with the following flight conditions:

– Mode 1 - Excessive descent rate.
– Mode 2 - Excessive closure rate to terrain.
– Mode 3 - Altitude loss after takeoff.
– Mode 4 - Insufficient terrain clearance.
– Mode 5 - Excessive deviation below glideslope beam.
– Mode 6 - Callouts.
– Mode 7 - Windshear (refer to Section 2-04-35).
– Terrain awareness alerting and warning.
– Terrain clearance floor.

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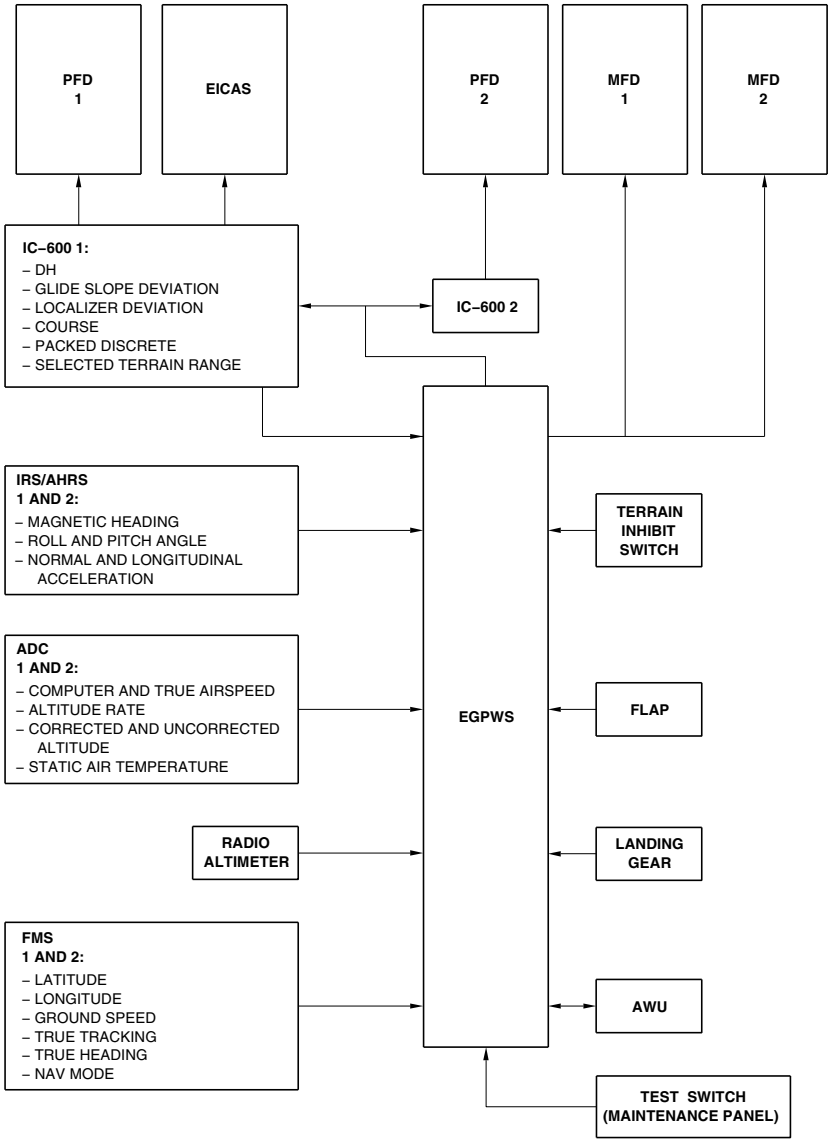

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EGPWS SCHEMATIC

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MODES AND MESSAGES

MODE 1 - EXCESSIVE DESCENT RATE

Mode 1 provides alerts and warnings when the airplane has attained an excessive descent rate in respect to altitude Above Ground Level (AGL) during the descent and approach phases of flight.

This mode has outer (sink rate) and inner (pull up) alert/warning boundaries:

Minimum Terrain Clearance (MTC) for **"SINK RATE"** message triggering:

– Minimum: 30 ft at 1000 ft/min of descent altitude rate.
– Maximum: 2450 ft at 5007 ft/min or greater of descent altitude rate.

Minimum Terrain Clearance (MTC) for **"PULL UP"** message triggering:

– Minimum: 30 ft at 1710 ft/min of descent altitude rate.
– Maximum: 2450 ft at 7125 ft/min or greater of descent altitude rate.

Penetration of the outer (sinkrate) boundary will result in:

– Aural message **"SINK RATE"**. The message will be repeated as long as the penetration increases; and
– Amber **"GND PROX"** indication on the PFD.

Penetration of the inner (pull up) boundary trigger and repeat the following messages until the condition is cleared:

– Aural message **"PULL UP"** and red **"PULL UP"** indication on the PFD.

If a valid ILS Glideslope front course signal is received and the airplane is above the glideslope centerline, the sinkrate boundary is adjusted to prevent unwanted alerts when the airplane is safely capturing the glideslope.

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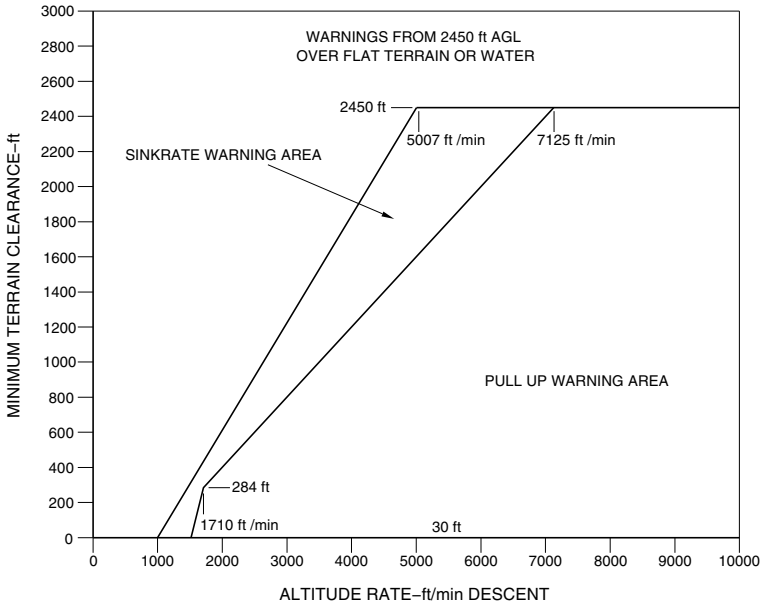

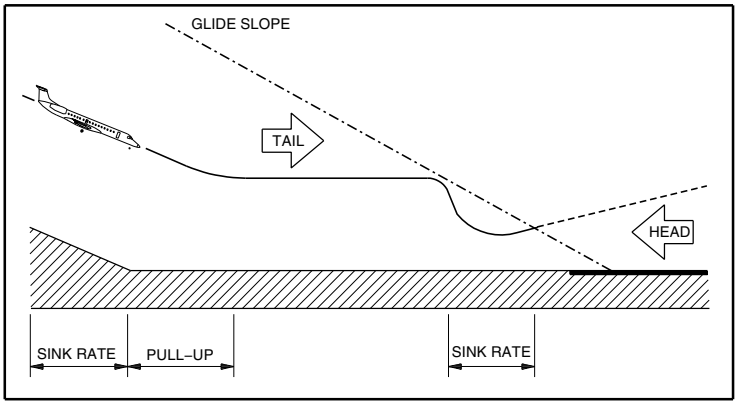

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EGPWS MODE 1 SCHEMATIC

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MODE 2 - EXCESSIVE CLOSURE RATE TO TERRAIN

Mode 2 provides alerts and warnings based on airspeed, airplane gear/flap configuration, radio altitude, and excessive closure rate to terrain. Mode 2 exists in two forms: 2A and 2B.

MODE 2A

Mode 2A is selected when the flaps are not in landing configuration and the airplane is not on the glide slope beam.

Minimum Terrain Clearance (MTC) for **"TERRAIN, TERRAIN"** message triggering:

- Minimum: 30 ft at 2038 ft/min of closure rate.
- Maximum:
  - 1650 ft at 5733 ft/min or greater of closure rate, for an airspeed equal or below 220 KIAS.
  - 2450 ft at 9800 ft/min or greater of closure rate for an airspeed equal or above 310 KIAS.

If the airplane penetrates the Mode 2A envelope, the situation results in:

- Aural message **"TERRAIN, TERRAIN"**; and
- Amber **"GND PROX"** indication on the PFD.

If the airplane continues to penetrate the envelope, the aural message switches to messages described below, until the condition is cleared:

- Aural message **"PULL UP"** and red **"PULL UP"** indication on the PFD.

The visual and aural messages will remain on until the airplane has gained 300 ft of barometric altitude.

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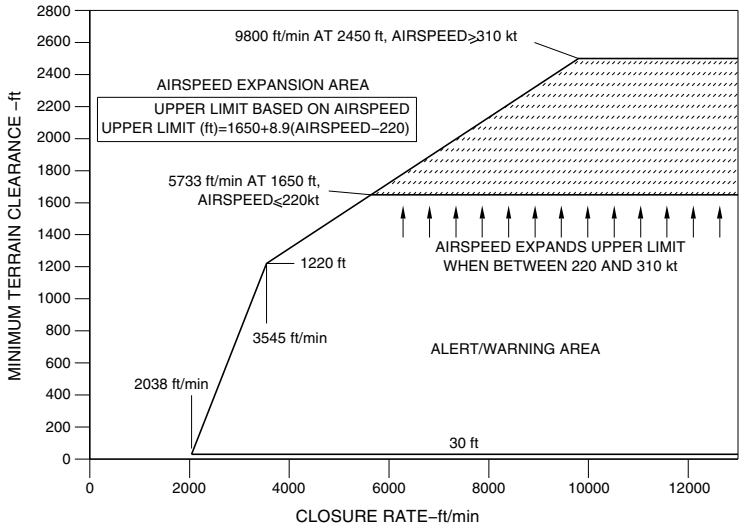
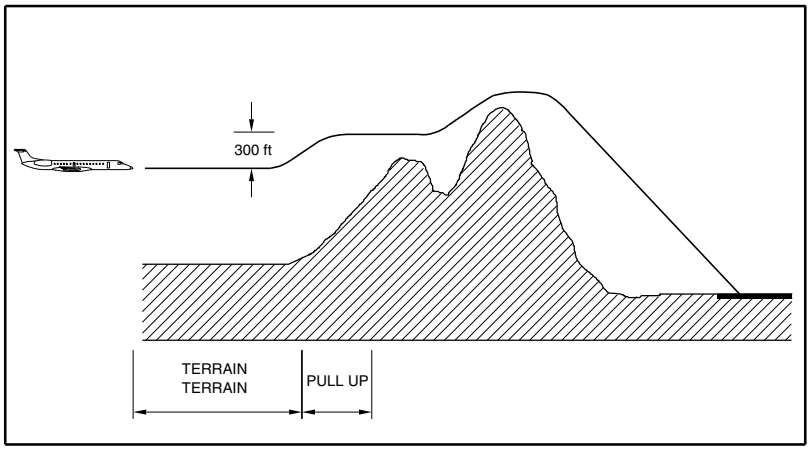
MODE 2A TERRAIN CLOSURE RATE

STATIC ALERT/WARNING ENVELOPE





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EGPWS MODE 2A SCHEMATIC

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MODE 2B

Mode 2B is selected when the flaps are in landing configuration or when making an ILS approach with glide slope and localizer deviations below 2 dots.

Minimum Terrain Clearance (MTC) for **"TERRAIN, TERRAIN"** message triggering:

- Minimum: 30 ft at 2038 ft/min of closure rate.
- Maximum:
  - 789 ft at 3000 ft/min or greater of closure rate. This steady value can also vary from 200 ft up to 600 ft for flaps set to landing configuration.

If the airplane penetrates the Mode 2B envelope with both gear and flaps in the landing configuration, the message **"TERRAIN"** is sounded.

If the airplane penetrates the Mode 2B envelope with either the landing gear UP or flaps not in landing configuration will result in:

- Aural message **"TERRAIN, TERRAIN"**; and
- Amber **"GND PROX"** indication on the PFD.

If the airplane continues to penetrate the envelope, the aural message switches to messages described below, until the condition is cleared:

- Aural message **"PULL UP"** and red **"PULL UP"** indication on the PFD.

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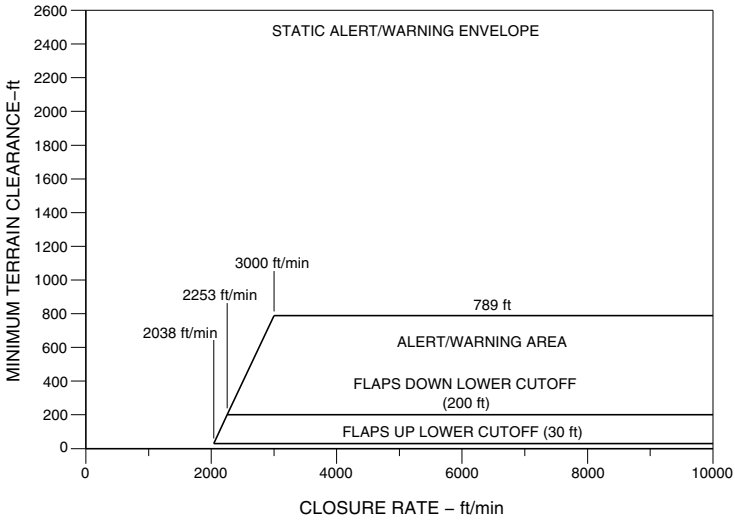

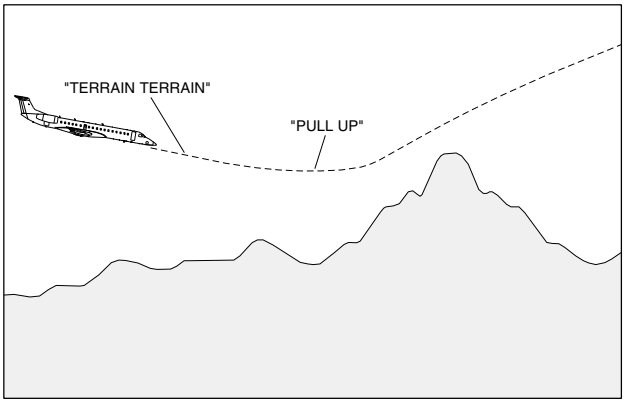

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EGPWS MODE 2B SCHEMATIC

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MODE 3 - ALTITUDE LOSS AFTER TAKEOFF

Mode 3 provides alerts and warnings for a significant altitude loss after takeoff with landing gear UP or flaps in other than landing configuration. The amount of altitude loss required to trigger the warning depends on the height of the airplane above the terrain.

Minimum Terrain Clearance (MTC) for **"DON'T SINK, DON'T SINK"** message triggering:

– Minimum: 30 ft at 5 ft of altitude loss.
– Maximum: 1500 ft at 143 ft or greater of altitude loss.

Significant altitude loss after takeoff or during a low altitude go-around activates the aural message **"DON'T SINK, DON'T SINK"** and:

– Amber **"GND PROX"** indication on the PFD.

The audio message is only annunciated twice, unless excessive altitude loss continues to accumulate.

Once triggered, the visual message can only be cancelled achieving a positive rate of climb relative to the original altitude. Therefore, as long as the original altitude is not crossed, any descent will trigger the aural and visual messages again. After crossing the original altitude, a new altitude value is set every moment.

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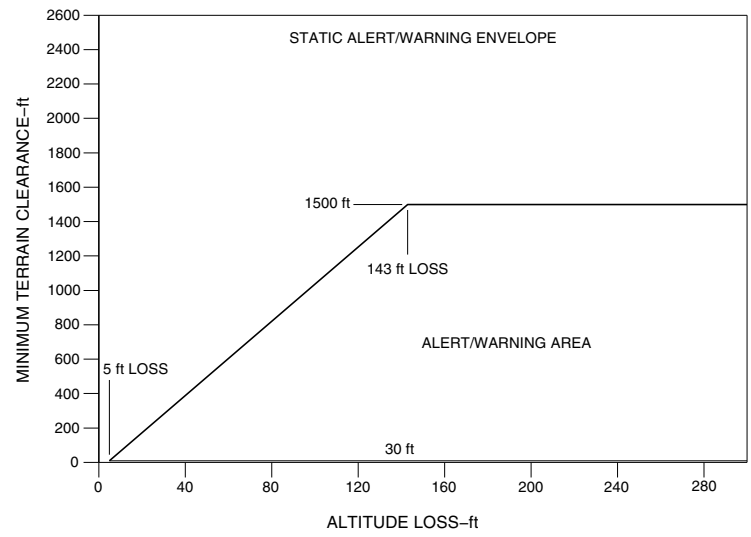

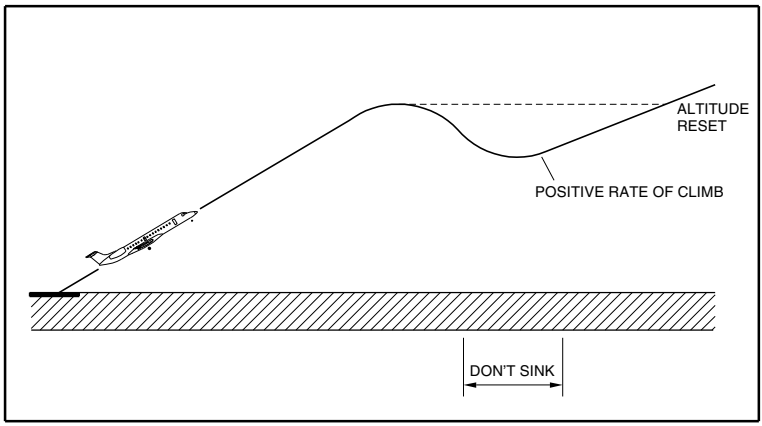

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EGPWS MODE 3 SCHEMATIC

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MODE 4 - INSUFFICIENT TERRAIN CLEARANCE

Mode 4 provides alerts for insufficient terrain clearance with respect to phase of flight and speed. Mode 4 exists in three forms, 4A, 4B and 4C.

MODE 4A

Mode 4A is active during cruise and approach with the landing gear UP.

Minimum Terrain Clearance (MTC) for **"TOO LOW GEAR"** message triggering:

– Minimum: 30 ft.
– Maximum: 500 ft for an airspeed equal or less than 190 KIAS.

Minimum Terrain Clearance (MTC) for **"TOO LOW TERRAIN"** message triggering:

– Minimum: 30 ft.
– Maximum: 1000 ft for an airspeed equal or higher than 250 KIAS.

If during cruise the ground is slowly getting closer and the airplane is not in the landing configuration or during approach with an unintentional gear up landing, the aural message **"TOO LOW TERRAIN"** will be sounded. Once the message has been issued, an additional 20% altitude loss is required for the issuing of a new message.

The amber **"GND PROX"** indication is displayed on the PFD.

If the airplane penetrates below the 500 ft AGL boundary with the landing gear still up, the aural message will be **"TOO LOW GEAR"**. Once a message is issued, an additional 20% altitude loss is required for the issuing of a new message.

The visual and aural messages cease when the Mode 4A is exited.

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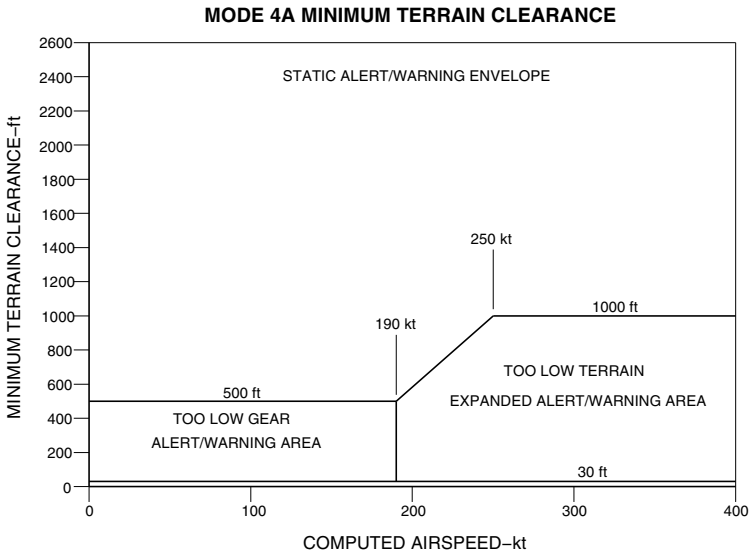

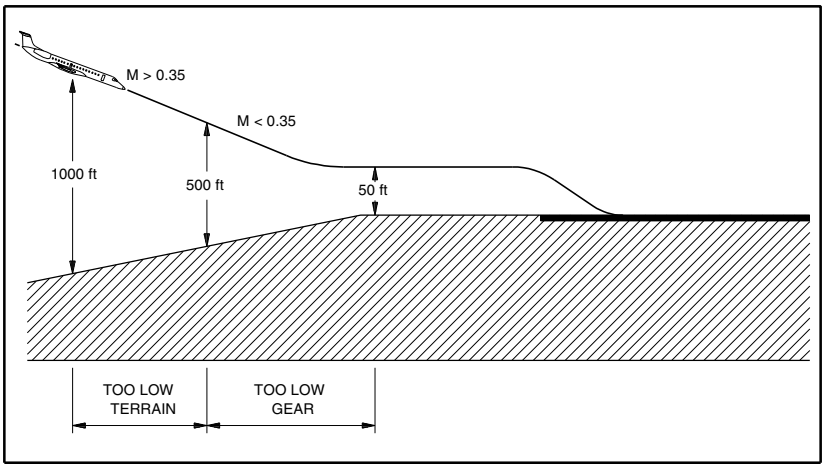

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EGPWS MODE 4A SCHEMATIC

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MODE 4B

Mode 4B is active during cruise and approach with the landing gear down and flaps in other than landing configuration.

Minimum Terrain Clearance (MTC) for **"TOO LOW FLAPS"** message triggering:

– Minimum: 30 ft.
– Maximum: 245 ft for an airspeed equal or less than 159 KIAS.

Minimum Terrain Clearance (MTC) for **"TOO LOW TERRAIN"** message triggering:

– Minimum: 30 ft.
– Maximum: 1000 ft for an airspeed equal or higher than 250 KIAS.

If during cruise the ground is slowly getting closer and the airplane is not in the landing configuration, or during approach with an unintentional gear up landing, the aural message **"TOO LOW TERRAIN"** will be sounded. Once the message is issued, an additional 20% altitude loss is required for the issuing of a new message.

The amber **"GND PROX"** indication is displayed on the PFD.

If the airplane penetrates below the 245 ft AGL boundary with the landing gear down and flaps in other than landing configuration, the aural message will be **"TOO LOW FLAPS"**. Once message is issued, an additional 20% altitude loss is required for the issuing of a new message.

The visual and aural messages cease when the Mode 4B is exited.

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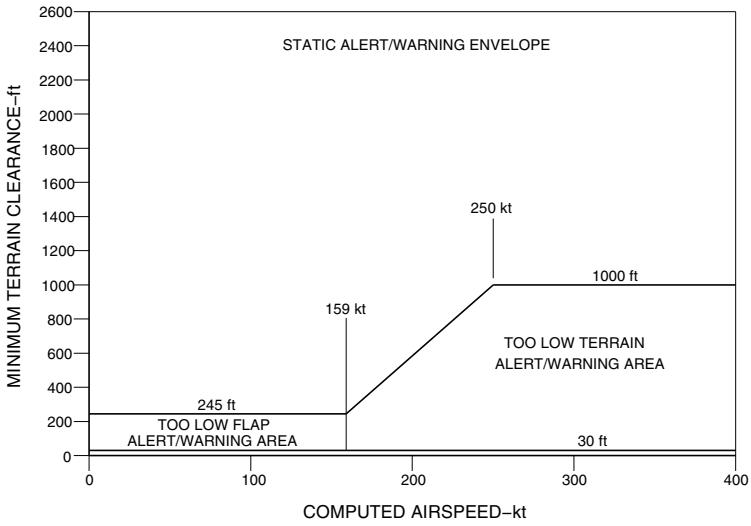
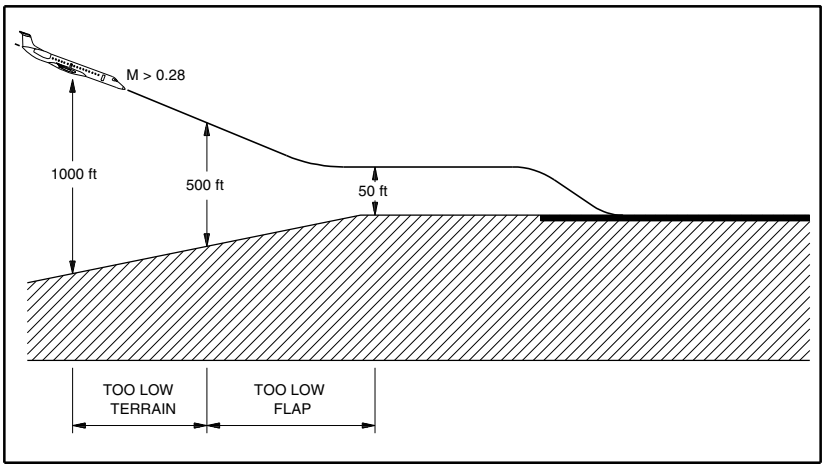
MODE 4B MINIMUM TERRAIN CLEARANCE





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EGPWS MODE 4B SCHEMATIC

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MODE 4C

Mode 4C is active during takeoff phase or low altitude go-around with either the landing gear or flaps in other than landing configuration, when the terrain is rising closer than the airplane is climbing.

Only in this case, the Minimum Terrain Clearance is a function of the Radio Altitude of the airplane.

Minimum Terrain Clearance (MTC) for **"TOO LOW TERRAIN"** message triggering:

- Minimum: 30 ft.
- Maximum:
  - 500 ft at 667 ft or greater of radio altitude for an airspeed less or equal or less than 190 KIAS.
  - 1000 ft at 1333 ft or greater of radio altitude for an airspeed equal or above 250 KIAS.

If during takeoff or low altitude go-around with either the landing gear or flaps in other than landing configuration, when the terrain is rising more steeply than the airplane is climbing, the aural message **"TOO LOW TERRAIN"** will be sounded.

The amber **"GND PROX"** indication is displayed on the PFD.

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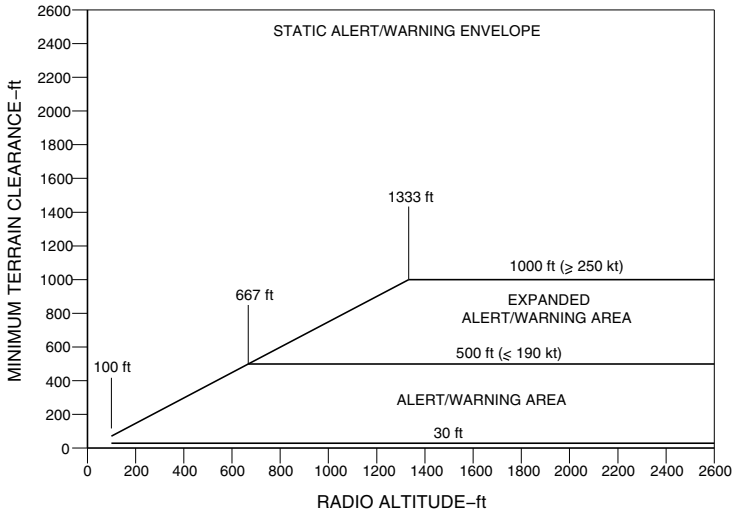
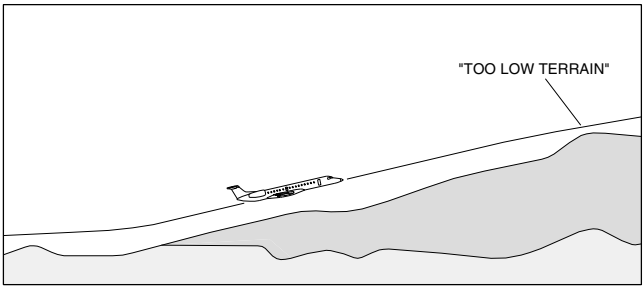
MODE 4C MINIMUM TERRAIN CLEARANCE





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EGPWS MODE 4C SCHEMATIC

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MODE 5 - EXCESSIVE DEVIATION BELOW GLIDESLOPE BEAM

Mode 5 provides two levels of alerting if the airplane's flight path descends below the glideslope on ILS approaches.

Minimum Terrain Clearance (MTC) for **"GLIDESLOPE"** message triggering:

- Minimum:
  - For the Soft Alert Area, 30 ft at 2.98 dots of glideslope deviation.
  - For the Hard Alert Area, 30 ft at 3.68 dots of glideslope deviation.
- Maximum:
  - For the Soft Alert Area 1000 ft.
  - For the Hard Alert Area 300 ft.

The first alert occurs whenever the airplane is more than 1.3 dots below the beam and is called a "soft alert" because the volume level is reduced. A second alert occurs below 300 ft radio altitude with greater than 2 dots deviation from glideslope and is louder or "hard".

The aural message **"GLIDESLOPE"** is sounded once. Follow-on alerts are only allowed when the airplane descends lower on the glideslope beam by approximately 20%. Aural messages are sounded continuously once the airplane exceeds 2 dots.

The amber **"GND PROX"** indication is displayed on the PFD.

The glideslope warning can be canceled by pressing the Master Caution Button.

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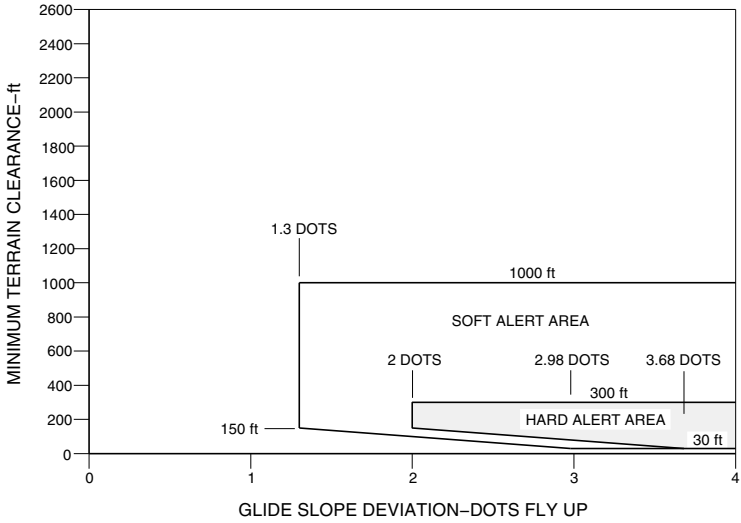
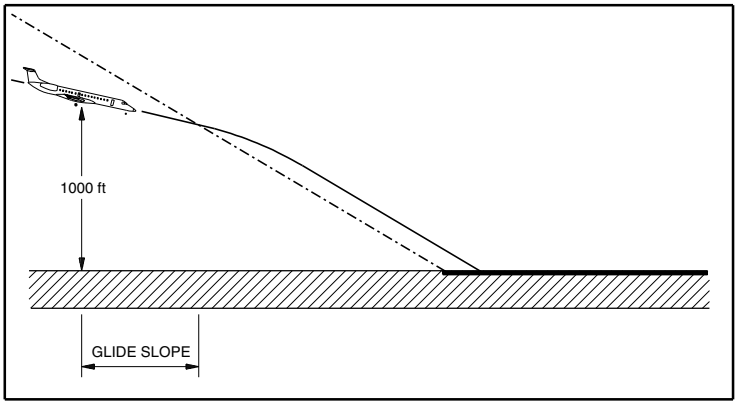
MODE 5 EXCESSIVE GLIDE SLOPE DEVIATION





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EGPWS MODE 5 SCHEMATIC

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MODE 6 - CALLOUTS

Mode 6 provides aural messages for descent below predefined altitudes, decision height, a minimums setting and approaching minimums. Alerts for excessive roll or bank angle are also provided.

MINIMUMS CALLOUTS

The message **"APPROACHING MINIMUMS"** is sounded only once when the airplane is 80 ft above the decision height or another target has been reached, with the landing gear down.

- Radio altitude for message triggering:
  - Minimum: 90 ft.
  - Maximum: 1000 ft.

The message **"MINIMUMS MINIMUMS"** or **"MINIMUMS"** (if applicable) is sounded only once when the airplane is at decision height or another target has been reached, with the landing gear down.

- Radio altitude for message triggering:
  - Minimum: 10 ft.
  - Maximum: 1000 ft.

Visual indication of minimum target is presented on PFD.

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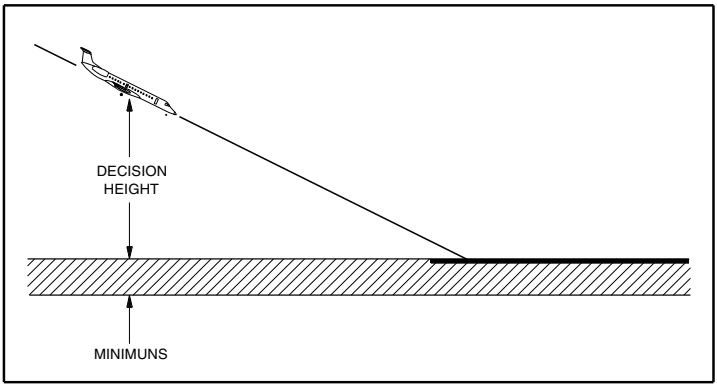

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EGPWS MODE 6 SCHEMATIC MINIMUMS CALLOUTS

The **"FIVE HUNDRED"** (Smart Callout) message will only be sounded whether one or more of the following conditions are satisfied:

– ILS is not tuned or not available.
– ILS is tuned in a valid signal, but with a deviation greater than 2 dots of localizer or glideslope.
– If a backcourse approach is detected.

Radio altitude for message activation:

– Minimum: 50 ft.
– Maximum: 1000 ft.

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ALTITUDE CALLOUTS TABLE
(AIRPLANES PRE-MOD. SB 145LEG-34-0042)

RADIO ALTIMETER	CALLOUT
DECISION HEIGHT + 80 ft	"APPROACHING MINIMUMS"
DECISION HEIGHT	"MINIMUMS MINIMUMS"
500 ft (Smart Callout)	"FIVE HUNDRED"
200 ft	"TWO HUNDRED"
100 ft	"ONE HUNDRED"

ALTITUDE CALLOUTS TABLE
(AIRPLANES POST-MOD. SB 145LEG-34-0042
OR EQUIPPED WITH AN EQUIVALENT MODIFICATION
FACTORY INCORPORATED)

RADIO ALTIMETER	CALLOUT
DECISION HEIGHT + 80 ft	"APPROACHING MINIMUMS"
DECISION HEIGHT	"MINIMUMS"
500 ft	"FIVE HUNDRED"
100 ft	"ONE HUNDRED"
50 ft	"FIFTY"
40 ft	"FOURTY"
30 ft	"THIRTY"
20 ft	"TWENTY"
10 ft	"TEN"

The messages above will be sounded when associated radio altitude has been reached, with the landing gear down.

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BANK ANGLE CALLOUT

Minimum Terrain Clearance (MTC) for message triggering on EGPWS:

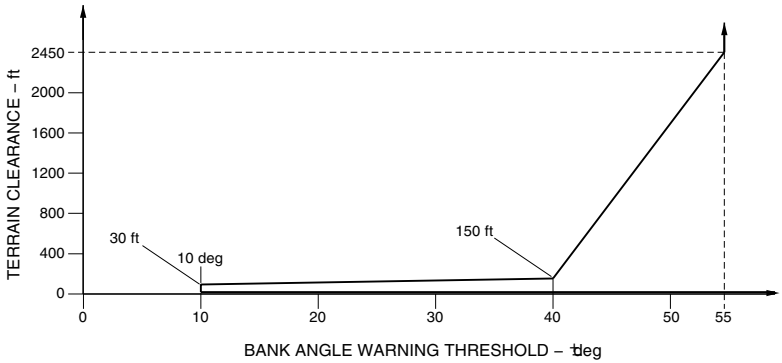
– Minimum: 5 ft.

– Maximum: Increases linearly from 30 ft at 10° of bank angle to 150 ft at 40° then from 150 ft at 40° up to 2450 ft at 55°, remaining constant at 55° above 2450 ft.

The aural message **"BANK ANGLE, BANK ANGLE"** is sounded when the airplane bank angle is too high or roll rate exceeds 1°/sec during all phases of flight.

The message is generated again if bank angle increases by 20%.

When roll attitude increases to 40% above the initial callout angle, the callout will repeat continuously.



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EGPWS MODE 6 SCHEMATIC
BANK ANGLE CALLOUT

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EGPWS ADDITIONAL FEATURES

The EGPWS also includes the Terrain Clearance Floor, Terrain Look Ahead Alerting and Terrain Awareness Display features. Airplanes equipped with EGPWS version 216 incorporates additional features like Peaks Mode, Runway Field Clearance Floor, Obstacle Alerting and Geometric Altitude.

TERRAIN CLEARANCE FLOOR

The Terrain Clearance Floor (TCF) provides a terrain clearance circular envelope around the airport runway, alerting the pilot of a possible premature descent for non-precision approaches regardless of the airplane's configuration. The TCF is active during takeoff, cruise and final approach and is based on current airplane position, nearest runway and radio altitude.

This alert mode complements the Mode 4 by providing an alert based on insufficient terrain clearance even when the airplane is in the landing configuration.

TCF alerts display **"GRND PROX"** on the PFD and the aural message **"TOO LOW TERRAIN"** sounds. This message sounds once when initial envelope penetration occurs and will repeat at every additional 20% decrease in radio altitude. The **"GRND PROX"** annunciator remains on until the TCF envelope is exited.

In the EGPWS version 216, the TCF alert provides an envelope extension for runway sides, which is limited to a minimum value of 245 ft beside the runway, within 1 NM to 2.5 NM from runway end. This feature provides improved alerting when it is determined that the airplane is landing to the side of the runway.

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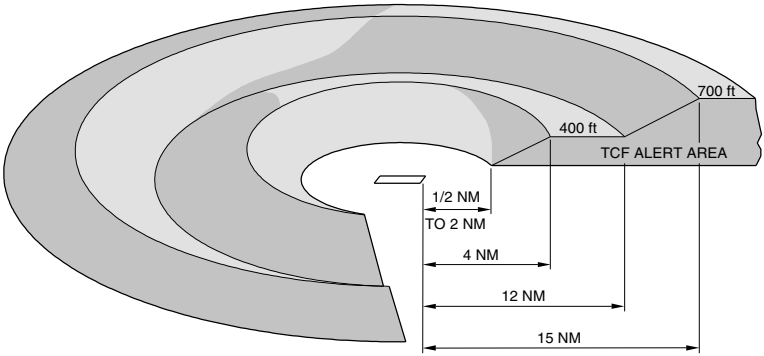

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TCF ALERT ENVELOPE

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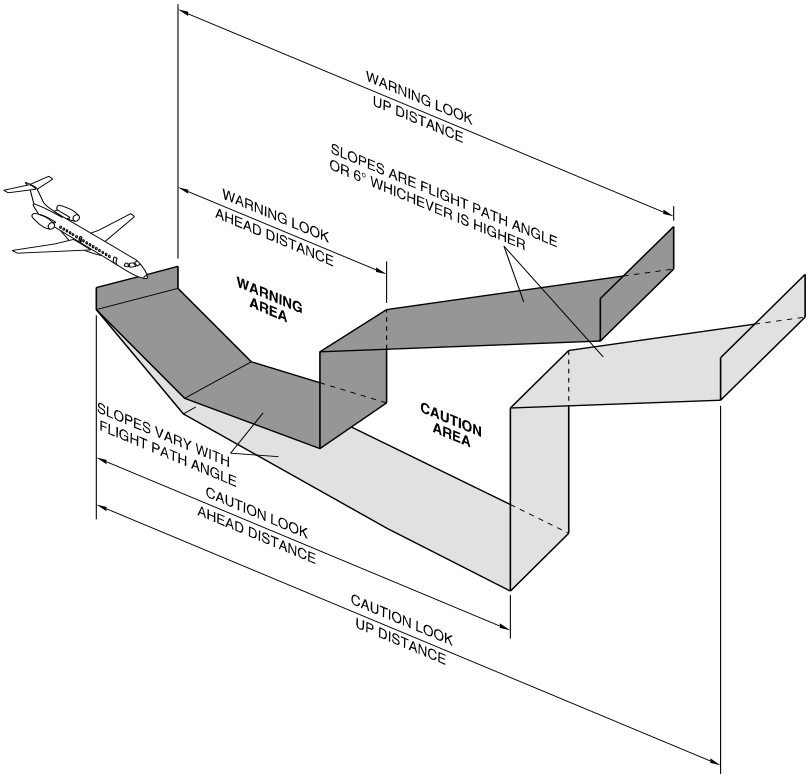
TERRAIN LOOK AHEAD ALERTING

The Terrain Look Ahead Alerting provides a caution/warning level to alert the flight crew about potential terrain conflicts. The alerts are based mainly on the airplane's current position and barometric altitude information. In the event of terrain caution or warning conditions, a specific audio alert and visual alert are triggered and the terrain display image is enhanced to highlight each of the types of terrain threats.



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TERRAIN WARNING AND CAUTION AREAS

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When conditions are such as to generate a Terrain Caution alert (approximately 60 seconds prior to potential terrain conflict), the aural message **"CAUTION TERRAIN, CAUTION TERRAIN"** is sounded and the amber **"GND PROX"** indication is displayed on the PFD. This is repeated every seven seconds as long as the airplane is still in the caution envelope.

When conditions have been met to generate a Terrain Warning alert (approximately 30 seconds prior to potential terrain conflict), the aural message **"TERRAIN, TERRAIN, PULL UP"** is sounded and the red **"PULL UP"** indication is displayed on the PFD.

The terrain image will appear automatically on the MFD when a terrain threat event occurs.

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TERRAIN AWARENESS DISPLAY

The EGPWS terrain display is designed to increase flight crew awareness of the surrounding terrain in varying density dots patterns of green, yellow and red. These dot patterns represent specific terrain separation with respect to the airplane. The following table relates the color that the terrain is displayed with its meaning:

COLOR	MEANING
Solid red	Warning Terrain (approximately 30 seconds from impact).
Solid yellow	Caution Terrain (approximately 60 seconds from impact).
High density red dots	Terrain that is more than 2000 ft above airplane altitude.
High density yellow dots	Terrain that is between 1000 ft and 2000 ft above airplane altitude.
Medium density yellow dots	Terrain that is between 500 ft (250 ft with gear down) to 1000 ft below airplane altitude.
Medium density green dots	Terrain that is between 500 ft (250 ft with gear down) below and 1000 ft below airplane altitude.
Light density green dots	Terrain that is 1000 ft to 2000 ft below airplane altitude.
Black	Terrain below 2000 ft.

NOTE: - Terrain is not shown if its elevation is within 400 ft of runway elevation of the nearest airport.

- To reduce clutter on the display, any terrain more than 2000 ft below the airplane is not displayed.

- Terrain that is not covered in the EGPWS database will be displayed in magenta.

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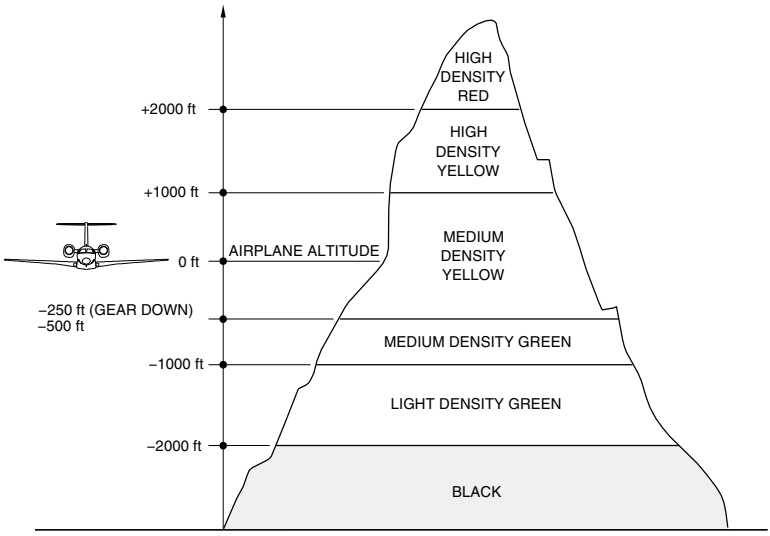

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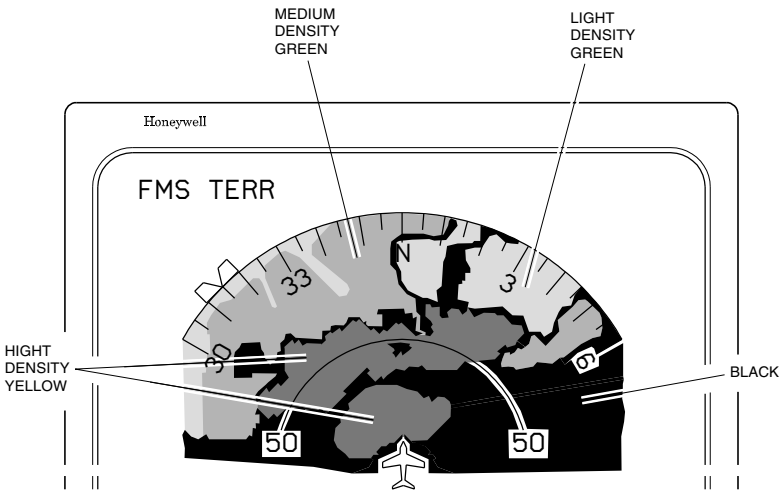
EGPWS DISPLAY COLOR CODING



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EXAMPLE OF EGPWS DISPLAY ON MFD

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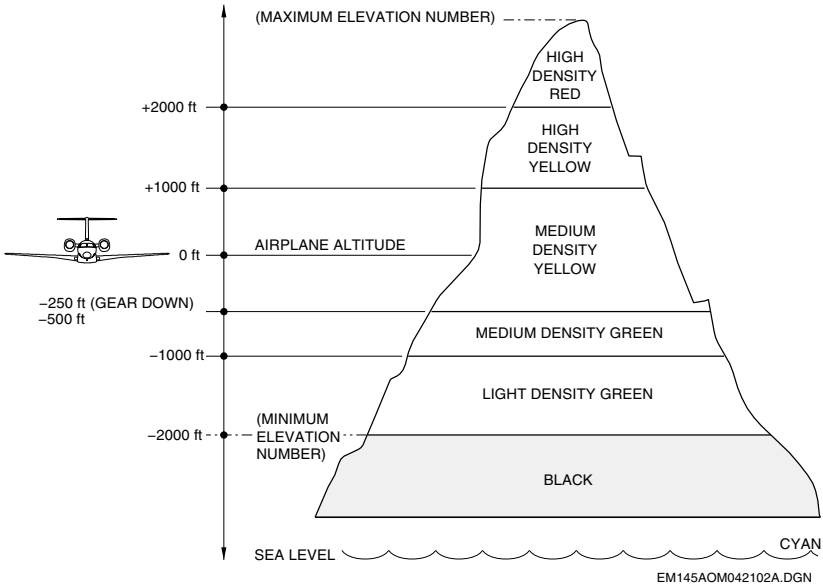
PEAKS MODE

This is a feature provided only by EGPWS version 216 and, when selected, adds additional density patterns and level thresholds to the standard mode display levels and allows the terrain to be displayed during the cruise phase even if it is more than 2000 ft below the airplane.

When the Peaks Display is on, elevation numbers indicating the highest and lowest terrain/obstacle currently being displayed are shown on the display. These elevations are expressed in hundreds of feet above sea level (MSL) with the highest elevation on top and the lowest on the bottom. In the event that there is no appreciable difference in the terrain/obstacle elevations, only the highest value is displayed.

The color of the elevation value displayed matches the color of the terrain displayed.

If the airplane is 500 ft (250 ft with landing gear down) or less above the terrain in the displayed range, the peaks color displayed will be identical to the terrain awareness display mode, with the exception of sea level displayed as cyan.



PEAKS PROFILE AT A LOW RELATIVE ALTITUDE

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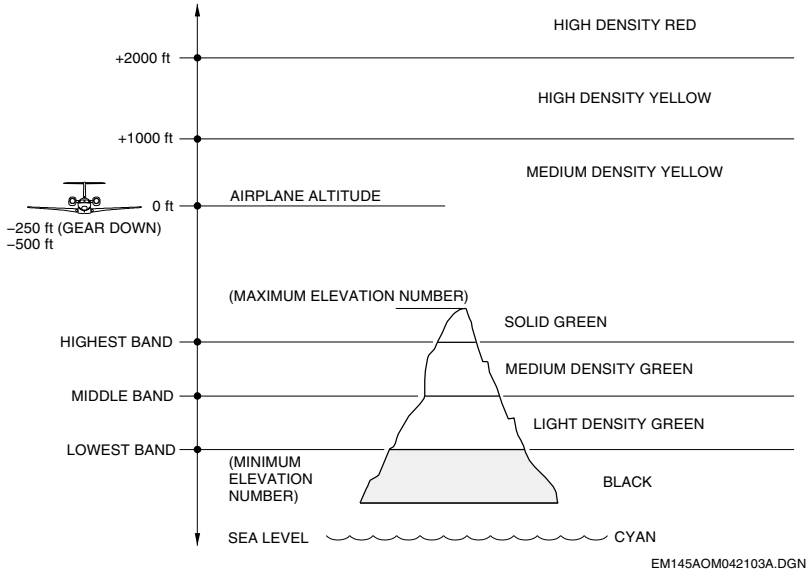
When the airplane is greater than 500 ft (250 ft with landing gear down) above all terrain in the displayed range, no yellow or red bands are displayed and low density green, medium density green and solid green will be displayed as a function of the highest and lowest elevations in view. Moreover, sea level elevations can be displayed as cyan to simulate water.



PEAKS PROFILE AT A HIGH RELATIVE ALTITUDE

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WARNING PRIORITIES

The GPWS/EGPWS warning priorities are listed below. Messages at the top will start before or override a lower priority message even if it is already in progress.

MESSAGE	MODE
PULL UP	1 and 2
TERRAIN TERRAIN	2 and Terrain Look-Ahead
PULL UP	Terrain Look-Ahead
TERRAIN	2
MINIMUMS MINIMUMS	6
MINIMUMS (if applicable)	6
CAUTION TERRAIN	Terrain-Look Ahead
TOO LOW TERRAIN	4 and Terrain Clearance Floor
ALTITUDE CALLOUTS	6
TOO LOW GEAR	4
TOO LOW FLAPS	4
SINKRATE	1
DON'T SINK	3
GLIDESLOPE	5
APPROACHING MINIMUMS	6
BANK ANGLE	6

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EICAS MESSAGES

EGPWS

TYPE	MESSAGE	MEANING
WARNING	GPWS	One GPWS envelope, associated to Modes 1 to 4, has been penetrated.
CAUTION	GPWS INOP	GPWS monitor has detected an internal failure.
	TERR INOP	Terrain mode is not available.

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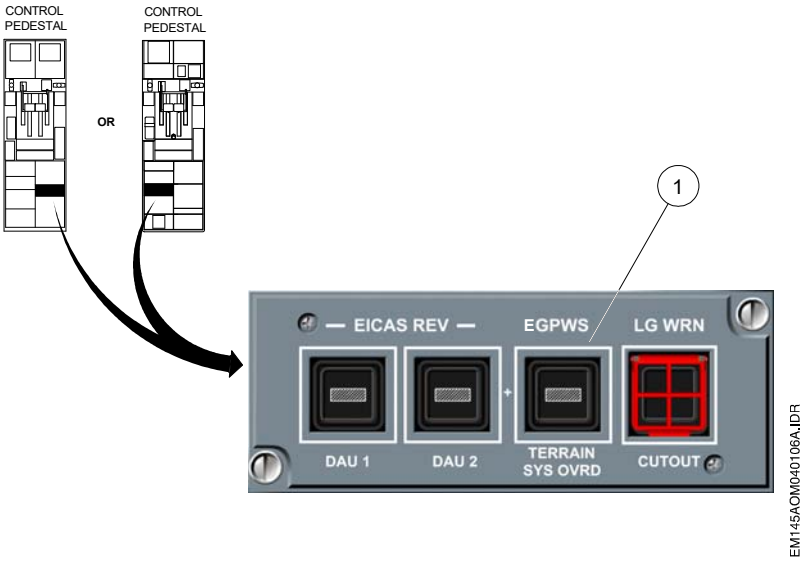
CONTROLS AND INDICATORS

1 – EGPWS TERRAIN SYS OVRD BUTTON

– When pressed, inhibits EGPWS in approach mode, thus avoiding unwanted terrain alerts in airports not covered by EGPWS database.



EGPWS TERRAIN SYS OVRD BUTTON

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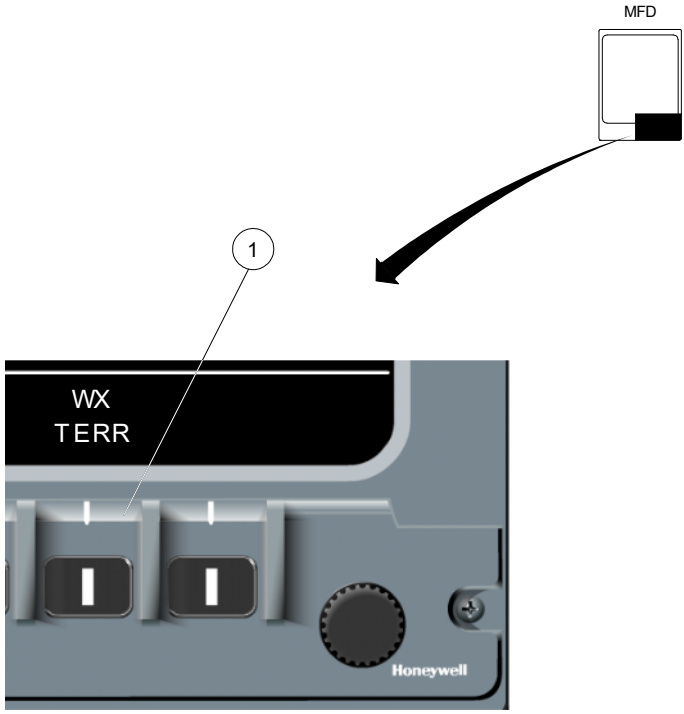
MFD BEZEL PANEL

1 – EGPWS DISPLAY SELECTOR BUTTON

- Alternate pressing will cause the MFD to toggle between the weather radar or terrain to be displayed.
- The ranges available are: 5 NM, 10 NM, 25 NM, 50 NM, 100 NM, 200 NM, 300 NM, 500 NM and 1000 NM.
- When a terrain warning/caution condition exists and the terrain is not selected on the MFD, the terrain will be automatically displayed on the MFD with a range of 10 NM.



MFD BEZEL PANEL

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EGPWS DISPLAY ON MFD

1 – TERRAIN ANNUNCIATIONS

LABEL	COLOR	CONDITION
TERR (Upper left corner)	Cyan	Lit when terrain mode is selected.
TERR FAIL	Amber	Lit when terrain mode is inoperative.
TERR INHIB for Terrain Inhibition	White	Lit when the EGPWS terrain system override button is pressed in approach mode.
TERR N/A	Amber	Lit when EGPWS is uncertain of the airplane's position.
TERR TEST	Red	Lit when the self test is activated.

2 – TERRAIN INDICATION

– Displays an image of surrounding terrain in varying density dot patterns of green, yellow and red. These dot patterns represent specific terrain separation with respect to the airplane. The display is generated from airplane altitude compared to terrain data.

3 – TERRAIN ALERT INDICATION

– Indicates a terrain warning or caution condition.

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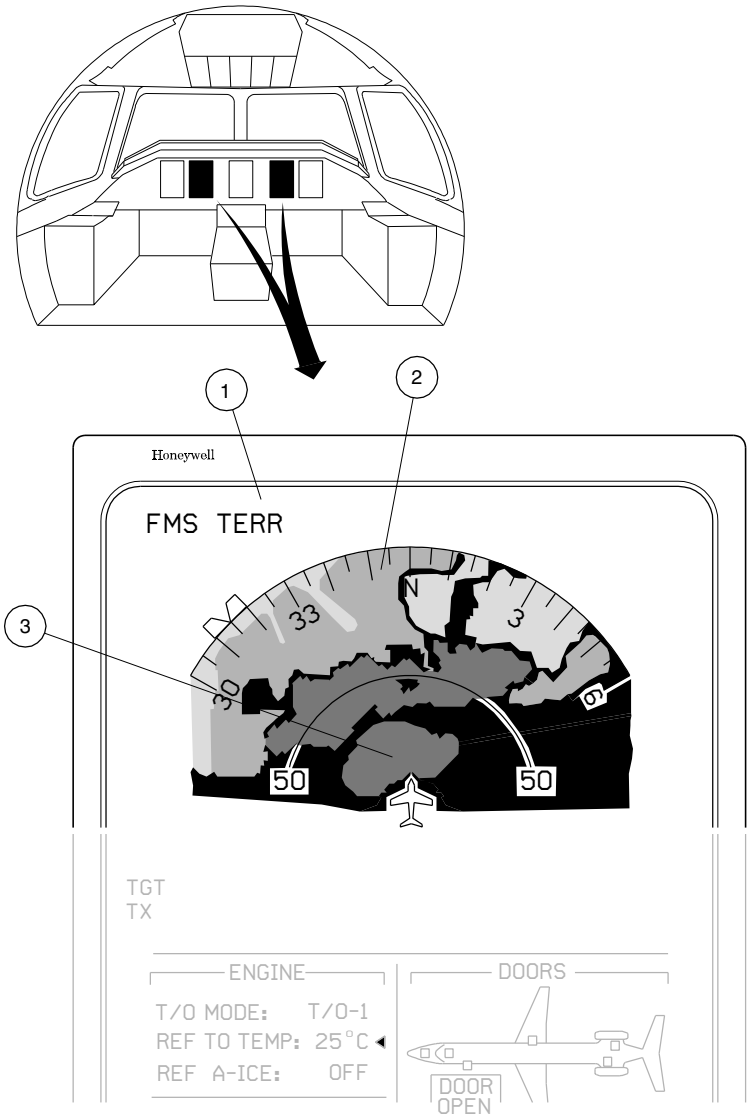

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EGPWS DISPLAY ON MFD

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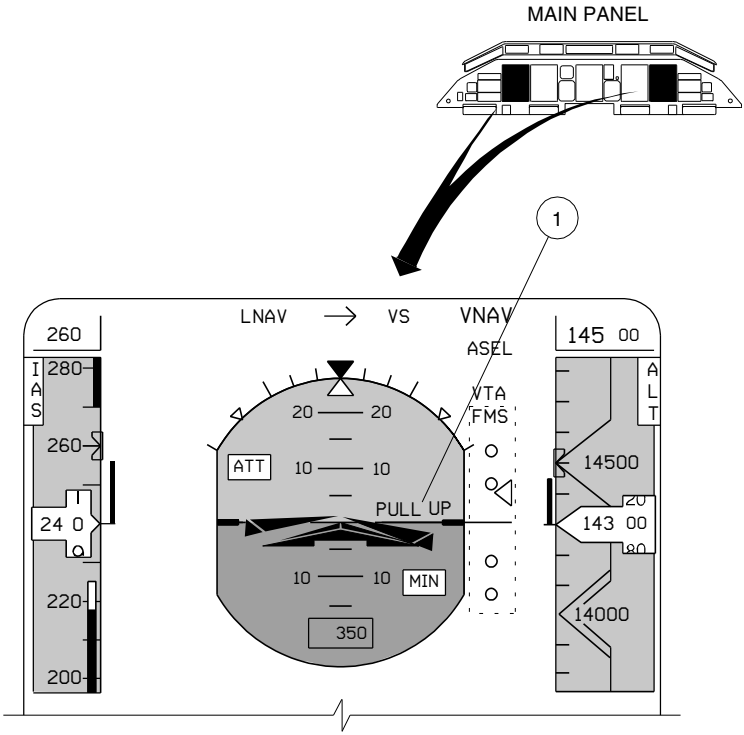
DISPLAY ON PFD

EGPWS

1 – PULL UP/GROUND PROXIMITY ANNUNCIATIONS

- Label: PULL UP (red).
  GND PROX for Ground Proximity (amber).
- PULL UP is lit when either Modes 1 or 2 have been activated in their more critical situation.
- GND PROX is lit when ground is getting closer too fast.



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EGPWS DISPLAY ON PFD (V-BAR FORMAT)

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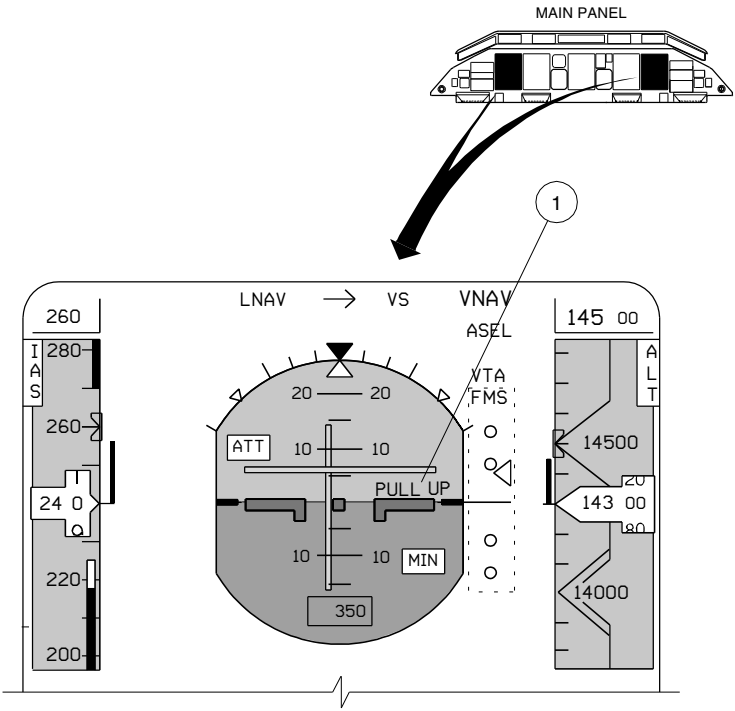

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EGPWS DISPLAY ON PFD (CROSS-BAR FORMAT)

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STEEP APPROACH OPERATION

Some airplanes may be optionally equipped with Steep Approach functions. Steep Approaches are approach operations performed with glide slope angle equal to or above 4.5°. This kind of operation implies to the airplane a vertical speed higher than the normal, requiring means to change the range of the EGPWS Mode 1 envelope in order to avoid nuisance messages.

The Steep Approach mode is selected by means of two buttons installed on the glareshield panel, one at each side. When either button is pressed, an internally preset mode of the EGPWS changes the references to sound the SINK RATE and PULL UP aural warnings.

When the airplane is in flight and the flaps are selected to 45°, the STEEP white light illuminates on the STEEP Approach Button indicating that the Steep Approach mode is available. When either the flaps are retracted to a position other than 45° or airplane lands, the STEEP white light extinguishes indicating that the Steep Approach mode is no longer available.

The button lower portion has two status lights, amber and green. The green light indicates that the Steep Approach mode is engaged and the amber light indicates a failure condition.

If the amber light turns on, it indicates that the Steep Approach mode is failed and Steep Approach Operations must not be performed. In this situation, the Steep Approach mode is not engaged and the airplane must land in an airport that does not require Steep Approach Operation.

In flight, with the STEEP inscription illuminated if the STEEP Approach Button is pressed, the green light illuminates to indicate that the Steep Approach mode is engaged. If the green light does not illuminate, the Steep Approach mode is not engaged and the Steep Approach Operation must not be performed.

The Steep Approach mode is deselected pressing the Button or through automatic deselection. An automatic deselection of the Steep Approach mode is performed when:

– Airplane on the ground.
– Flaps setting other than 45°.

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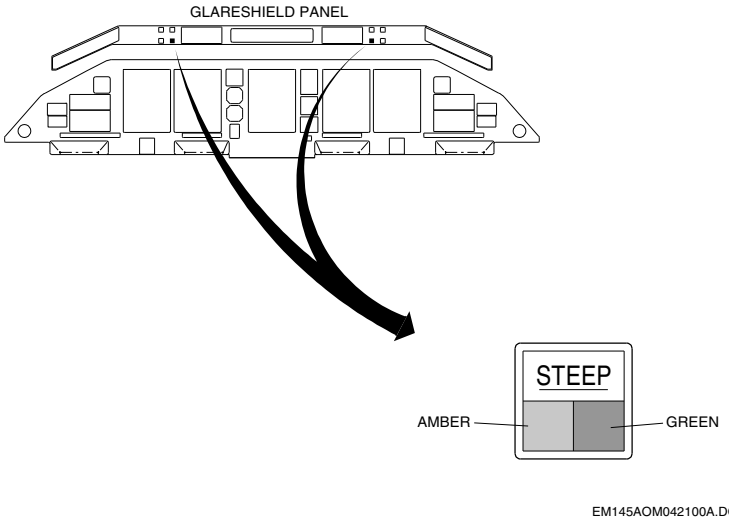

STEEP APPROACH BUTTON

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CONTROLS AND INDICATORS

STEEP APPROACH BUTTON

LIGHT INDICATION	MODE DESCRIPTION
STEEP	Illuminates in white color when the airplane is in the air and the flaps are in 45°. This means that the Steep Approach mode is available.
GREEN LIGHT	Illuminates when the button is pressed with the STEEP light illuminated. This means that the Steep Approach mode is engaged. With the STEEP light illuminated, if the green light does not illuminates when the Button is pressed, means that the Steep Approach is not engaged; in this case, do not perform Steep Approach Operations.
AMBER LIGHT	The Steep Approach mode is failed. Do not perform Steep Approach Operations. In this situation, the Steep Approach mode is not engaged and the airplane must land in an airport that does not require steep approach operation.

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WINDSHEAR DETECTION AND ESCAPE GUIDANCE SYSTEM

The EMB-135BJ is equipped with an additional warning system dedicated to windshear detection. The system provides visual and aural alarms to warn pilots of a windshear occurrence, as well as the most appropriate maneuver to recover from such phenomenon.

The Windshear Detection function is performed by the EGPWS computer, which also performs ground proximity warning functions. The Windshear Escape Guidance is a Flight Director mode provided by the avionics package.

WINDSHEAR GENERAL INFORMATION

Windshear is a sudden change in wind direction or speed, normally caused by thunderstorms, frontal systems or any topographical feature that may affect the wind flow (e.g. hills, mountains, lakes, seas,...).

Due to ground proximity, the most hazardous phases of flight regarding windshear encounters are takeoff, approach and landing. On a windshear, wind may shift from a tailwind to a headwind or to a downdraft or updraft. The consequences may be an abrupt change in airspeed, lift and altitude, upwards or downwards, according to shifting direction. Although quick, windshear is not instantaneous, which may lead pilots to correction attempts in the wrong manner. For instance, an airplane facing a headwind after takeoff, appears to have good performance, characterized by high airspeed, which drives the pilot into rotating the airplane to a pitch higher than usual. When the thunderstorm core is reached, wind shifts to a downdraft and airspeed decreases, as well as vertical speed. The pilot's natural reaction is to lower the airplane's nose in an attempt to maintain airspeed. Further ahead, wind shifts to tailwind component, resulting in a dramatic airspeed reduction with the nose already down. Under such scenario, it is very difficult to maintain a positive rate of climb.

If the takeoff or landing can not be delayed, the correct action is to increase airspeed before being subjected to windshear encounter and to consider flying near stall speeds with high angle of attack if necessary to regain altitude.

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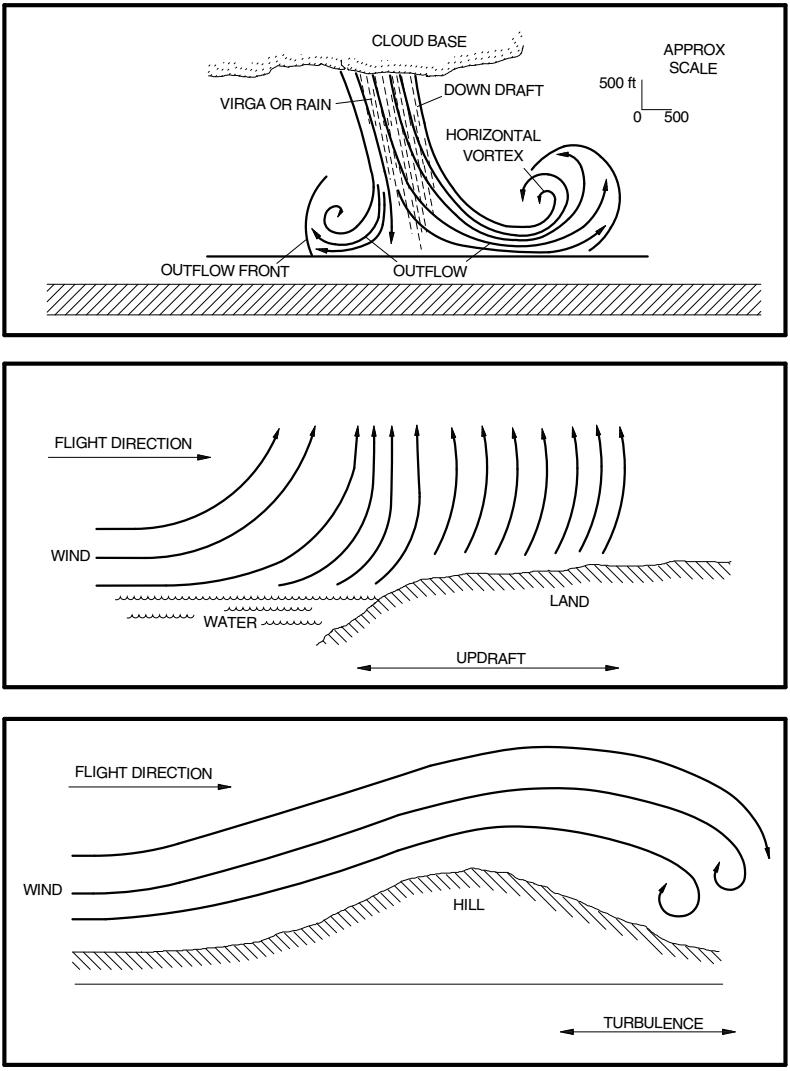

KINDS OF WINDSHEAR

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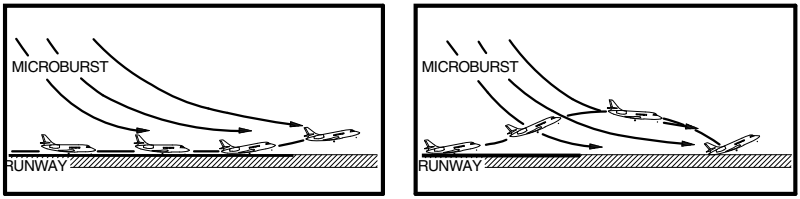
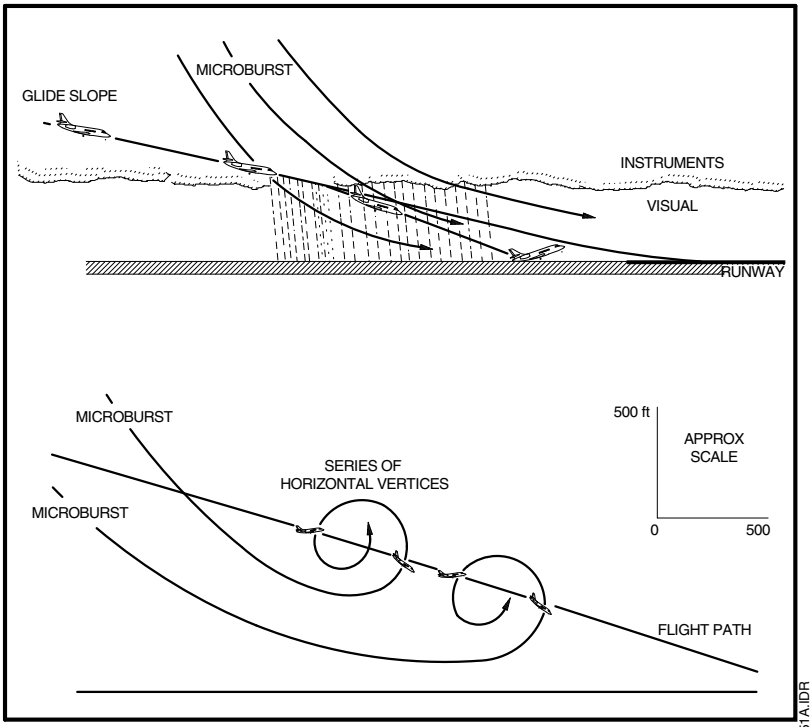


WINDSHEAR EFFECT DURING TAKEOFF



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WINDSHEAR EFFECT DURING LANDING

WINDSHEAR EFFECTS

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WINDSHEAR DETECTION

The windshear detection system is designed to identify the presence of severe windshear phenomenon and to provide timely warnings and adequate flight guidance for approach, missed approach, takeoff and climb out.

The windshear computer exchanges data with IRS/AHRS, ADC, SPS, Radio Altimeter and IC-600s. The system continuously searches for any windshear clue, and then signals the PFD and aural warning unit to provide the appropriate indications.

Windshear Caution alerts are given if the windshear consists of an increasing headwind (or decreasing tailwind) and/or severe updraft, which may precede an encounter with a microburst. Windshear cautions activate the Windshear Caution (WDSHEAR) amber indications on the upper left corner of both PFDs and an aural message "CAUTION WINDSHEAR" is also triggered. Windshear Caution indications remain on for as long as the airplane remains exposed to an increasing headwind and/or updraft condition in excess of the alert threshold.

Windshear Warnings are given if the windshear consists of a decreasing headwind (or increasing tailwind) and/or severe downdraft. Windshear warnings activate the Windshear Warning (WDSHEAR) red indication on both PFDs and trigger an aural message "WINDSHEAR, WINDSHEAR, WINDSHEAR". This message will not be repeated unless another, separate, severe windshear event is encountered. Windshear Warning indications remain on for as long as the airplane remains exposed to a decreasing headwind and/or downdraft in excess of the alert threshold. The threshold is adjusted in function of available climb performance, flight path angle, airspeeds significantly different from normal approach speeds and unusual fluctuations in Static Air Temperature (typically associated with the leading edges of microbursts).

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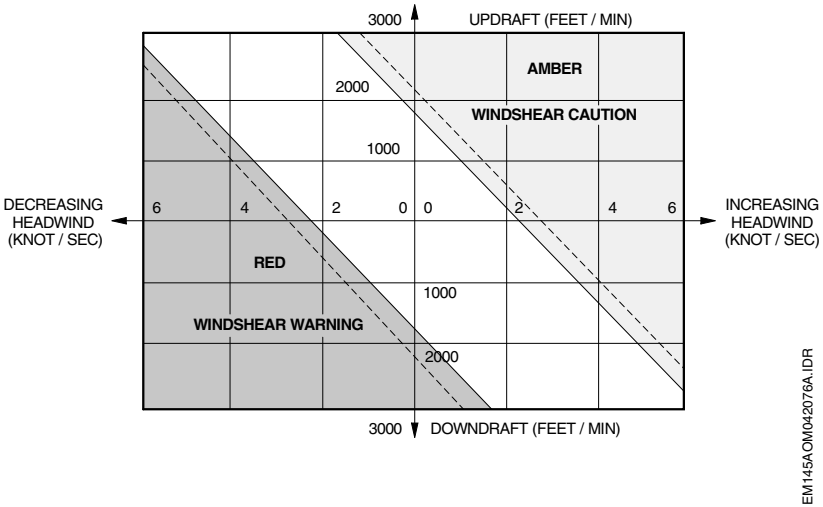

WINDSHEAR DETECTION

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WINDSHEAR ESCAPE GUIDANCE MODE

The Windshear Escape Guidance Mode is used to minimize altitude and speed loss during a windshear encounter. The strategy is to keep the airplane airborne until the windshear conditions subside or are exited.

The Windshear Escape Guidance Mode provides pitch command to recover from a windshear encounter. The amplitude of the pitch command will depend upon the airplane's performance and windshear severity and phase.

The Windshear Escape Guidance is a Flight Director mode activated under the following conditions:

– Manually, by pressing the Go Around Button while a windshear condition (increasing/decreasing performance) is detected.

– Automatically, when in Go Around or Takeoff Mode and a windshear condition (increasing/decreasing performance) is detected.

– Automatically, when Thrust Levers Angle is above 78° and a decreasing performance windshear is detected (windshear warning).

When the windshear escape guidance mode is activated a green "WSHR" indication is displayed on both PFDs in the Vertical Mode field and a "ROLL" indication is displayed in the Lateral Mode field. Whenever the Windshear Escape Guidance mode is activated, the Pitch Limit Indicator (PLI) symbol is drawn directly on the Attitude Display Indicator portion of the PFD. The PLI represents the remaining angle of attack margin before Stick Shaker triggering.

NOTE: For airplanes equipped with autothrottle, the A/T mode is automatically disengaged as soon as the Flight Director Windshear Escape Guidance Mode is activated.

All other Flight Director modes are canceled and the following vertical modes are inhibited when a caution or warning windshear condition is presented:

– Altitude Preselect Mode, Go Around and Takeoff.

No lateral modes are inhibited while in the vertical mode of WSHR.

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The Windshear Escape Guidance mode is designed to meet the following requirements, in the listed order of priorities:

– Prevent the airplane from stalling.

– Prevent the airplane from descending.

– Prevent the airplane from exceeding V_{MO}.

The Windshear Escape Guidance Mode incorporates three control sub-modes:

– Alpha Sub-mode - The airplane can be commanded to descend in order to maintain airspeed when approaching stall conditions. If the flight path angle control results in an angle of attack beyond the stick shaker triggering angle, the windshear control law can keep the airplane angle of attack below the stick shaker threshold.

– Gamma Sub-mode - The airplane can be prevented from descending by commanding a positive flight path angle. A nominal flight path angle is used to allow an airspeed raise during an increasing performance windshear, in anticipation of a decreasing performance windshear, and also to minimize altitude loss during a decreasing performance windshear.

– Speed Target Sub-mode - The airplane is allowed to climb in order to exchange excessive kinetic energy for potential energy. If the control of the flight path angle results in an excessive speed increase, the windshear control law maintains the airplane indicated airspeed at the target speed.

The Windshear Escape Guidance mode will be canceled if any of the following conditions occur:

– FLC, VS, SPD or ALT Mode is selected.

– Invalid IRS/AHRS data.

– Invalid ADC data.

– Invalid Stall Protection Computer (SPC).

– Radio Altitude greater than 1500 ft.

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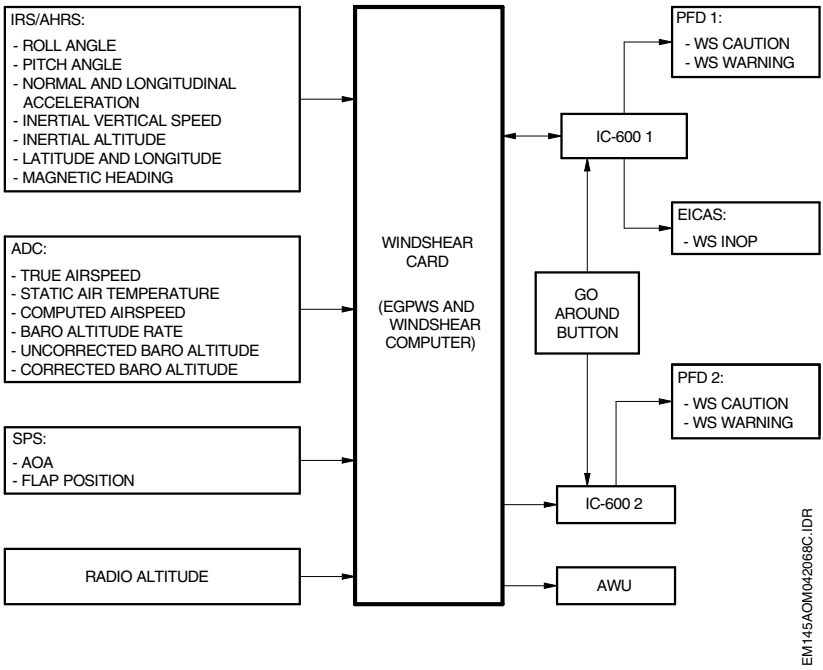

WINDSHEAR DETECTION AND ESCAPE GUIDANCE SYSTEM SCHEMATIC

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EICAS MESSAGE

TYPE	MESSAGE	MEANING
CAUTION	WINDSHEAR INOP	Windshear detection and escape guidance system is inoperative.

CONTROLS AND INDICATORS

PRIMARY FLIGHT DISPLAY

1 - WINDSHEAR INDICATION

- Indicates that a windshear has been detected.
- Color: amber or red depending on windshear severity.

2 - ESCAPE GUIDANCE MODE ENGAGEMENT ANNUNCIATION

- Indicates the Windshear Flight Guidance Escape Mode engagement.

3 - PITCH LIMIT INDICATOR

- Refer to Stall Protection System indicators in Section 2-04-25.

4 - FLIGHT GUIDANCE INDICATION

- Indicates the appropriate pitch to be attained, during a windshear occurrence.

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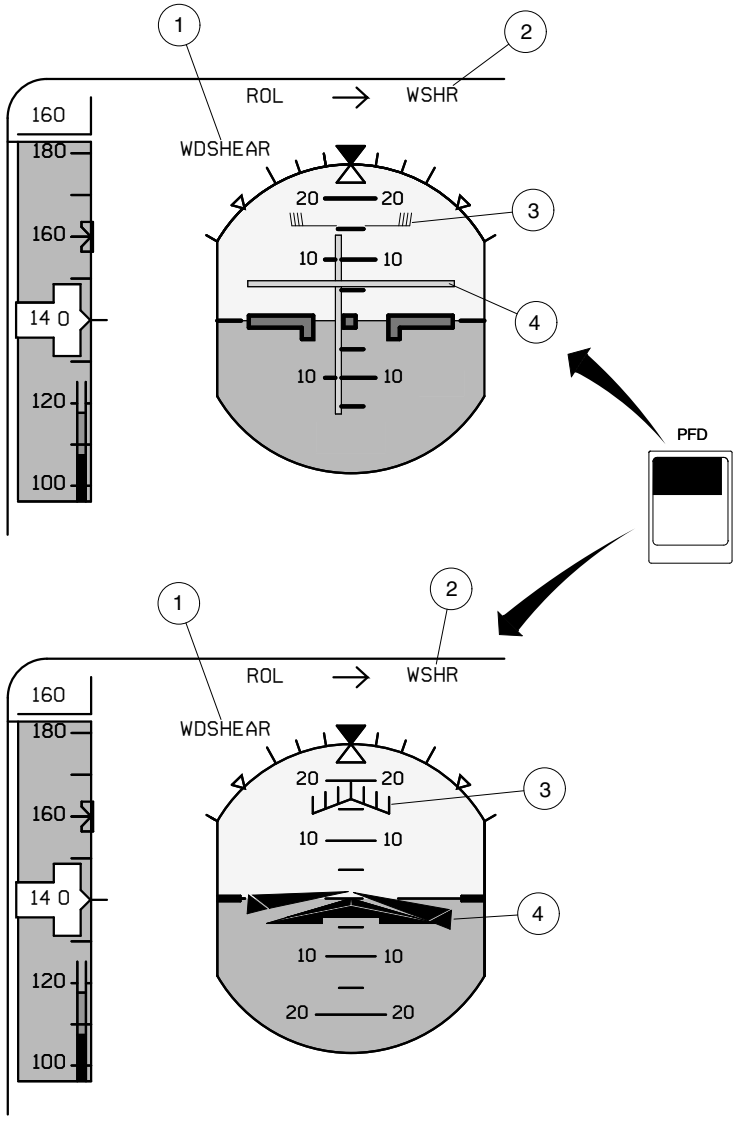

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PRIMARY FLIGHT DISPLAY (V-BAR AND CROSS-BAR FORMAT)

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TRAFFIC AND COLLISION AVOIDANCE SYSTEM

GENERAL

The EMB-135BJ is equipped with a Traffic and Collision Avoidance System (TCAS), which provides the flight crew with an indication of possible in-flight traffic conflict. The system is based upon transponder signals and provides visual and aural warnings, as well as recommended evasive action.

The EMB-135BJ may be equipped with TCAS software version 6.04A, with TCAS software version 7.0 or TCAS software version 7.1.

The TCAS 2000 presents the same operational characteristics of the TCAS II.

The TCAS software version 7.0 presents the following differences when compared to the TCAS software version 6.04A:

– The altitude separation thresholds for issuing Traffic Advisory (TA) and Resolution Advisory (RA) between FL300 and FL420 are reduced for compatibility with RVSM flight operations.
– The thresholds for issuing RA for airplanes closing in altitude are reduced between the FL200 and FL420.
– Reduction in the numbers of RA eliminating those airplanes that are expected to pass with sufficient horizontal range separation.
– Allows RA direction reversion, i.e, change a CLIMB to a DESCENT and vice-versa in coordination with another TCAS equipped airplane.
– Introduction of three additional RA.
– Different set points and range of actuation, as presented in the following text below.

The difference presented by TCAS software version 7.1 when compared to the TCAS software version 7.0 is the replacement of the corrective RA voice message "Adjust Vertical Speed, Adjust" with a single "Level Off, Level Off" RA.

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SYSTEM DESCRIPTION

The TCAS was developed to provide crew awareness regarding possible conflicting air traffic situations. Besides providing awareness, TCAS also displays to the flight crew the recommended vertical maneuver to avoid conflicting traffic. TCAS does not provide recommendations for horizontal maneuvers.

CAUTION: PRIMARY RESPONSIBILITY FOR EVASIVE ACTION LIES WITH THE FLIGHT CREW AND ANY ACTION MUST ALWAYS BE PRECEDED BY A VERY CAREFUL EVALUATION OF THE SITUATION.

The TCAS computer receives data from the installed transponders, radio altimeters and air-ground sensor. The signals transmitted by surrounding airplanes inform their altitude, bearing and identification, thus making it possible to track any traffic that could enter the airplane's protection zone. Based on such data, the TCAS calculates the predicted path of each intruder airplane, determining whether or not it may become a target. To determine that, an alert zone is established, based on separation and speeds of both airplanes. The size of the alert zone is not distance-based but, rather, is based on time. Therefore, the caution area corresponds to the volume in space where a conflict is expected to occur in 35 to 45 seconds, if no action is taken. A warning area corresponds to an imminent conflict in the following 20 to 30 seconds. Such time is calculated by dividing distance between airplanes by their closure rate.

To inhibit the issuing of undesired warnings that constitute a nuisance effect, the system incorporates a series of protections. These apply during approaches to crowded airports, to increase protection against slow closure rates, and to prevent airplanes below 180 ft (380 ft for TCAS software version 7.0), which are about to land or have just taken-off, from creating a nuisance.

When an airplane is tracked by the TCAS, the system periodically interrogates the intruder's transponder. The exchange of data between two subsequent transmissions makes it possible to obtain the distance to the intruder and its altitude, and to predict its path.

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If the predicted path of the intruder enters the airplane's alert area, two kinds of alerts may be generated. If the area to be penetrated is the caution area, a Traffic Advisory (TA) is generated. Pilots are then requested to visually locate the intruder and perform the required preventive action.

If the warning area is penetrated a Resolution Advisory (RA) is generated, as well as the corrective action that must be taken to permit the greatest possible separation at the Closest Point of Approach (CPA). Sometimes, the recommended action may lead to crossing of the intruder's flight level or may change during the maneuver. This situation may occur when the calculation indicates that this is the best way to achieve the greatest possible separation at the CPA. For both advisory cases, a symbol is presented in the MFD to indicate the intruder's relative position, altitude and danger level. A voice message is generated to help the pilots in taking the most suitable action. The PFD provides indication of the recommended vertical speed to clear the conflict. A voice message may be generated to warn the pilot into monitoring the VSI on the PFD. When TCAS computations indicate that the traffic has been cleared, a voice message advises pilots that there is no longer a conflicting situation. In this condition, if no other TA or RA is on course, the intruder's indication changes, indicating that it is a safe nearby traffic.

If the intruder is also equipped with a TCAS, maneuvers are coordinated between both airplanes. If the intruder is only equipped with a transponder, the system may still indicate its position, provided its transponder is at least mode C. For airplanes equipped with mode A transponder, only Traffic Advisories may be generated.

CAUTION: THE TCAS CAN ONLY GENERATE RESOLUTION ADVISORIES FOR INTRUDERS EQUIPPED WITH RESPONDING MODE S OR MODE C TRANSPONDERS. TRAFFIC ADVISORIES CAN BE GENERATED FOR AIRPLANE WITH OPERATIVE MODE S, MODE C OR MODE A TRANSPONDERS. THE TCAS PROVIDES NO INDICATION OF AIRPLANE WITHOUT OPERATING TRANSPONDERS.

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System options may be monitored and set through the RMU. A dedicated window is provided, presenting which TCAS display is being controlled, its range and altitude band. A RMU page permits toggling between options. Controls allow selection of different ranges, either horizontal and vertically, as well as changing the way some parameters are presented.

For airplanes Post-Mod. SB 145LEG-34-0011 or equipped with an equivalent modification factory incorporated, the Mode S Elementary Surveillance Transponder transmits the following parameters:

– Airplane Identification (Call Sign).
– Capability Report.
– Flight Status (airborne/on the ground).
– Pressure Altitude with 25 ft of resolution.

For airplanes equipped with Mode S Enhanced Surveillance Transponder (Post-Mod. SB 145LEG-34-0014 or equipped with an equivalent modification factory incorporated), in addition to the characteristics of the Mode S Elementary, the following Downlink Airplane Parameters (DAP) are transmitted automatically to be used by the ground Air Traffic Management:

– Magnetic Heading.
– Indicated Airspeed and/or Mach Number.
– Vertical Rate.
– Roll Angle.
– True Airspeed.
– True Track Angle.
– Ground Speed.
– Selected Altitude.

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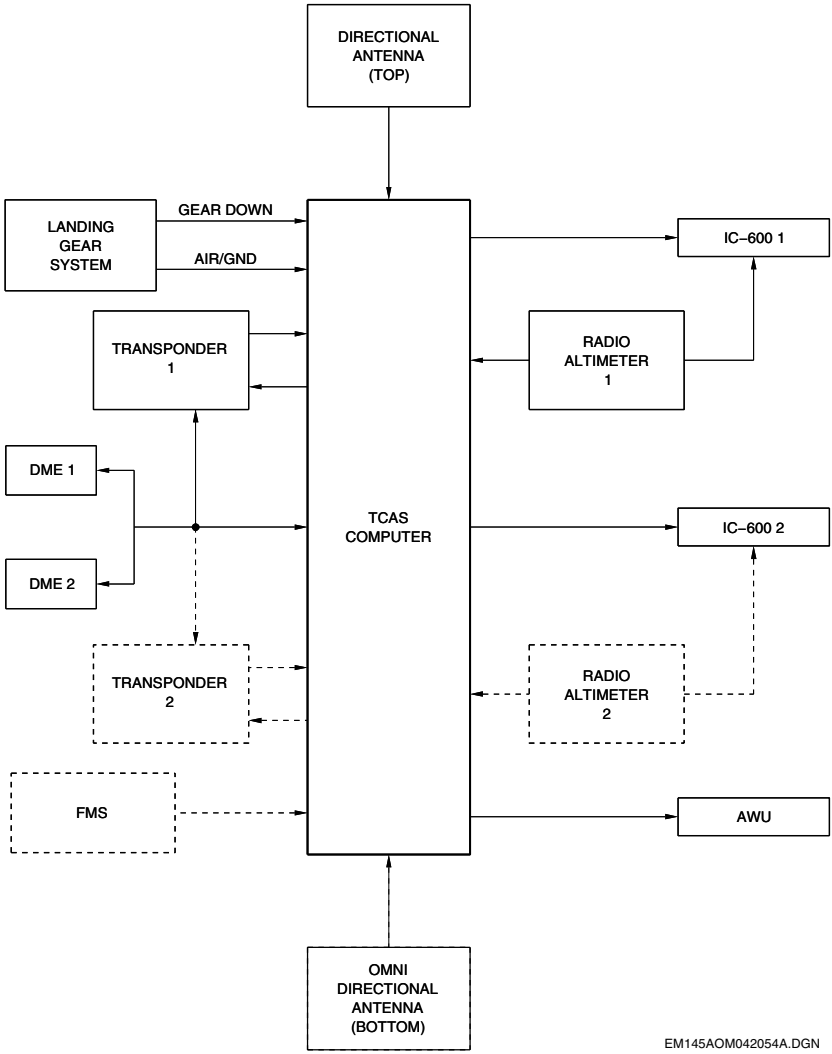

TCAS SCHEMATIC

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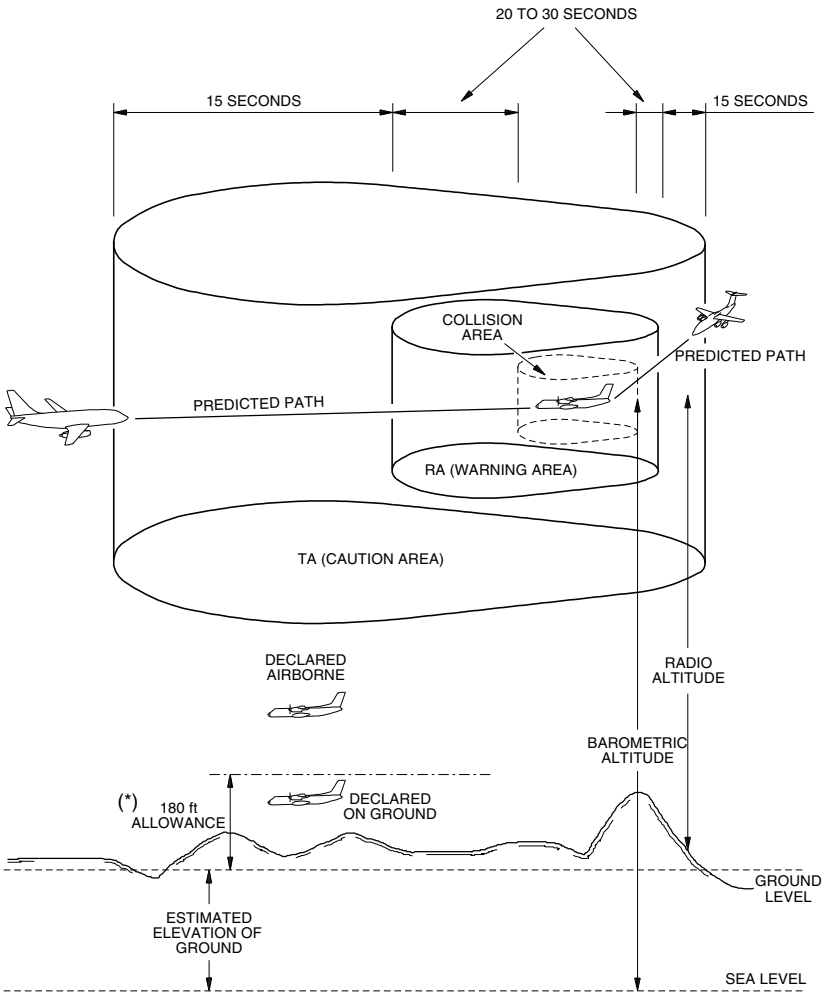

(*) 380 ft FOR TCAS SOFTWARE VERSION 7.0 .

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TCAS PROTECTED AREAS

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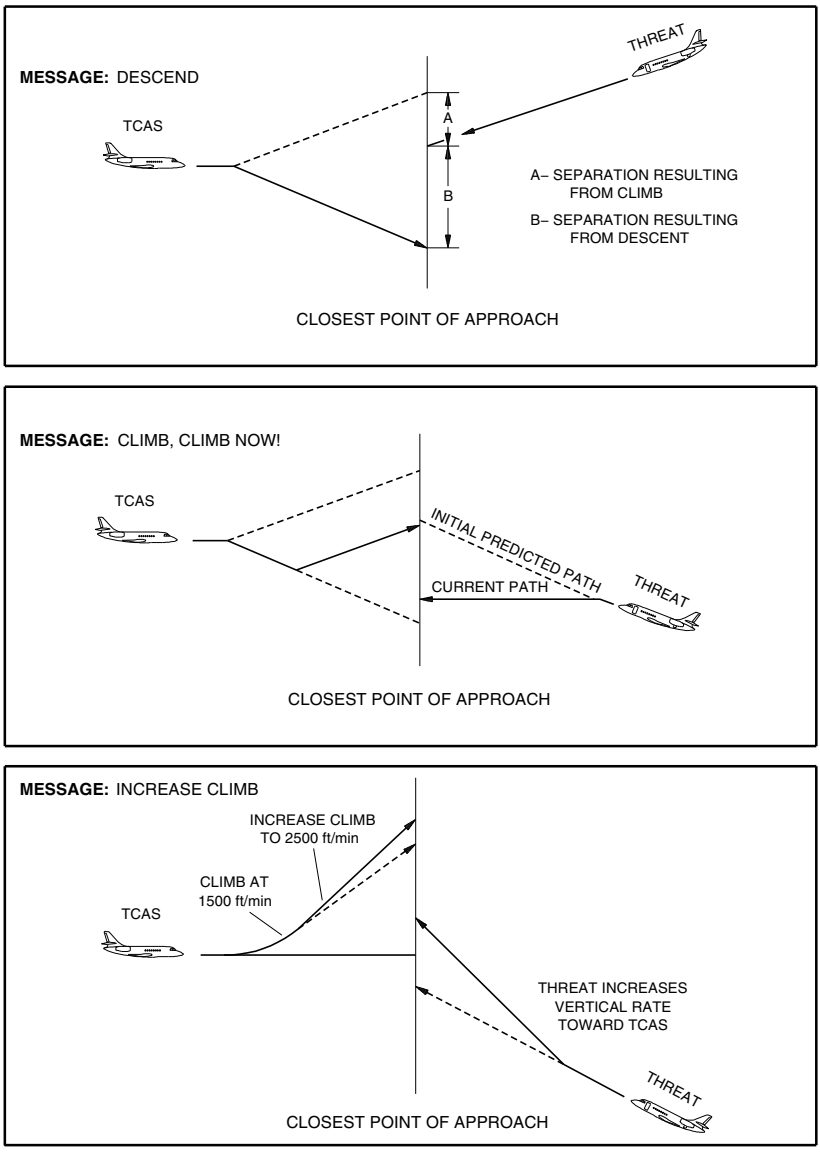

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TCAS SITUATIONS

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TCAS VOICE MESSAGES

TYPE	MESSAGE	MEANING	REMARKS
TA	TRAFFIC, TRAFFIC	An intruder is expected to enter the collision area in 35 to 45 seconds. An indication of it has just been displayed on the MFD.	- For TCAS software version 6.04A, see NOTE 1. - For TCAS software version 7.0, all TA are inhibited below 500 ft AGL.
PREVENTIVE RA	MONITOR VERTICAL SPEED	Vertical speed is changing to a non-recommended value.	-
	ADJUST VERTICAL SPEED, ADJUST	Vertical speed has to be adjusted to the recommended value indicated on the VSI.	TCAS software version 7.0 only.
	MAINTAIN VERTICAL SPEED, MAINTAIN	Maintain the vertical speed indicated on the VSI.	TCAS software version 7.0 only.
	MAINTAIN VERTICAL SPEED, CROSSING MAINTAIN	Maintain the vertical speed indicated on the VSI. During climb or descent, airplane will cross intruder's flight level.	TCAS software version 7.0 only.
CORRECTIVE RA	LEVEL OFF, LEVEL OFF	Vertical speed has to be reduced to 0 fpm.	TCAS software version 7.1 only.
	CLIMB	Climb at the vertical speed indicated on the VSI to clear the possible conflict.	-
	DESCEND	Descend at the vertical speed indicated on the VSI to clear the possible conflict. Vertical Speed will be 1500 ft/min or greater.	See NOTE 1.
	REDUCE CLIMB	Reduce climb speed to clear the possible conflict.	Not valid for TCAS software version 7.0.
	REDUCE DESCENT	Reduce descent speed to clear the possible conflict.	- See NOTE 1. - Not valid for TCAS software version 7.0.
	CLIMB, CROSSING CLIMB	Climb at the indicated vertical speed on the VSI to clear possible conflict. During climb, airplane will cross intruder's flight level.	-

(Continued)

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TYPE	MESSAGE	MEANING	REMARKS
CORRECTIVE RA	DESCEND, CROSSING DESCEND	Descend at the indicated vertical speed on the VSI to clear possible conflict. During descend, airplane will cross intruder's flight level.	See NOTE 1.
	INCREASE CLIMB	Climb speed has to be increased to the recommended value to clear the possible conflict.	Vertical Speed must be 2500 ft/min or greater.
	INCREASE DESCENT	Descent speed has to be increased to the recommended value to clear the possible conflict. Vertical Speed must be 2500 ft/min or greater.	- For TCAS software version 6.04A, this message is inhibited below 1450 ft AGL. - For TCAS software version 7.0, this message is inhibited below 1450 ft AGL while descending and below 1650 ft AGL while climbing.
	CLIMB, CLIMB NOW!	After a descent advisory, TCAS detected a changing situation that requires the need to climb.	-
	DESCEND, DESCEND NOW!	After a climb advisory, TCAS detected a changing in situation that requires the need to descend.	See NOTE 1.
	CLEAR OF CONFLICT	The possible conflict has been cleared. Message is presented only if intruder's transponder signal is valid.	Not presented if the intruder track or altitude information is lost.

NOTE: (1) Inhibited below 1000 ft AGL while descending and below 1200 ft AGL while climbing.

(2) All RAs are inhibited below 400 ft AGL while descending and below 600 ft AGL while climbing.

(3) For TCAS software version 6.04A, RA messages are repeated three times (one-word messages) and twice (two-word messages). For TCAS software version 7.0, all RAs are repeated twice.

(4) TA message sounds once.

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CONTROLS AND INDICATORS

RMU RADIO PAGE – ATC/TCAS WINDOW

Refer to Section 2-18 – Navigation and Communication for further details on RMU controls.

Refer to RMU ATC/TCAS Control Page in this Section for further details on TCAS controls.

1 – TRANSPONDER OPERATING MODE

- Allows selection of TCAS modes:
  - TA ONLY – TCAS traffic advisory mode is selected.
  - TA/RA – TCAS traffic advisory and resolution advisory modes are selected.
- Refer to Section 2-18 – Navigation and Communication for further details.

2 – TCAS CONTROL SIDE IDENTIFICATION

- Indicates which TCAS display (MFD 1 or 2) is being controlled through that RMU. The selection of TCAS DSPY 1 or 2 is accomplished through the cross-side transfer button when the yellow cursor box is placed on this field.
- Color: white for on-side TCAS display and magenta for cross-side.

3 – TCAS RANGE DISPLAY

- Displays the selected TCAS range value.
- Color: green.
- Possible selections are 6, 12, 20, 40 NM. Airplanes equipped with TCAS software version 7.0 also allow 80 and 100 NM selection.

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4 – TCAS ALTITUDE BAND INDICATION

- Indicates the TCAS altitude band according to selected TCAS mode.
  - NORMAL (green) – With the TA display set to AUTO the operational TCAS altitude band will be from 1200 ft below to 1200 ft above the airplane. With the TA display set to MANUAL the operational TCAS altitude band will be from 2700 ft below to 2700 ft above the airplane.
  - ABOVE – The operational TCAS altitude band will be -2700 ft to +7000 ft.
  - BELOW – The operational TCAS altitude band will be -7000 ft to +2700 ft.

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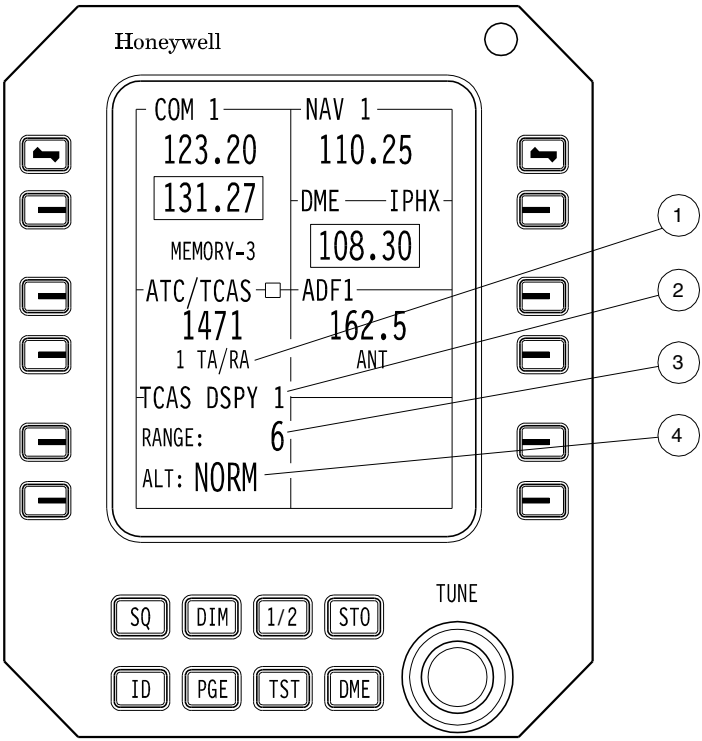

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RMU RADIO PAGE

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RMU ATC/TCAS CONTROL PAGE

1 – INTRUDER ALTITUDE

REL (green) – Intruder's altitude is displayed as a relative altitude to the airplane. Value is preceded by a plus or a minus signal, depending on whether the intruder is above or below the airplane.

FL (cyan) – Intruder's altitude is displayed as its flight level. This selection automatically reverts to REL after 20 seconds.

2 – TA DISPLAY

AUTO – Traffic is displayed only when a TA or RA condition exists.

MANUAL – All traffic detected by the system is displayed.

3 – FLIGHT ID

- Allows Mode S coding to reflect the current flight's call sign. The outer tuning knob moves the character position designator and the inner tuning knob selects the desired alphanumeric character.
- Color: White.

4 – FLIGHT LEVEL 1/2

- Displays the transponder-encoded altitude and the air data source.
  Refer to transponder description (Section 2-18 – Navigation and Communication).

5 – RADIO PAGE RETURN PROMPT

- Pressing the associated Line Select Button will return the RMU display to the RADIO Page.
- Color: Green.

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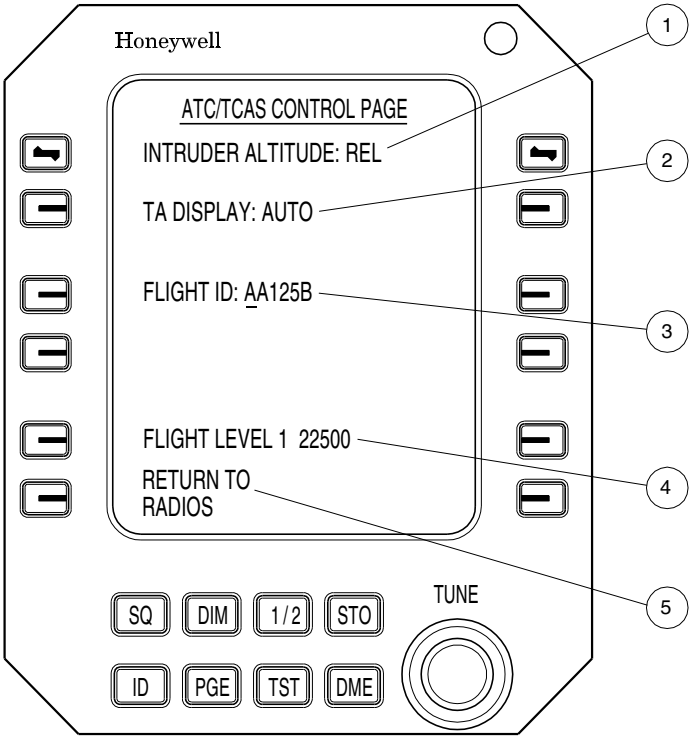

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RMU ATC/TCAS CONTROL PAGE

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TCAS TEST

The TCAS self-test is activated through the RMU TST button and may be performed on the ground or in flight. TCAS will operate normally if not tested.

To test the system proceed as follows:

– On the RMU radio page, set the ATC/TCAS window to the TA/RA mode. On the MFD, set TCAS mode.
– Press and hold for 7 seconds the RMU TST button.
– A white TCAS TEST message will be presented on the MFDs and PFDs.
– A TCAS TEST aural warning will sound.
– The Master Warning lights will flash.
– The MFDs show a traffic test parttern, which permits the checking of each of the existing intruder symbols, i.e., a hollow blue diamond, a solid blue diamond, a solid amber circle and a solid red square.
– On the PFDs, the VSI shows red and green arc zones.
– At the end of the test, the RMU shows a green TCAS PASS message and a TCAS TEST PASS aural warning will sound.

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MULTI FUNCTION DISPLAY

1 – INNER RANGE RING

- Displayed around airplane symbol to indicate a 2 NM range.
- Removed if outer range indicates distance above 20 NM.

2 – OUTER RANGE RING

- May be selected up to 40 NM. Airplanes equipped with TCAS software version 7.0 allow selection up to 100 NM.

3 – NO BEARING ADVISORIES INDICATION

- Indicates data related to a detected intruder, whose bearing cannot be determined.
- Up to two lines may be displayed indicating the kind of advisory, its distance, relative altitude and whether it is climbing or descending in excess of 500 ft/min.
- Colors: No bearings RAs: red.
  No bearings TAs: amber.

4 – PROXIMATE TRAFFIC INDICATION

- Indicated by a solid cyan diamond.
- Represents any airplane within 6.5 NM horizontally and 1200 ft vertically, but whose path is not predicted to penetrate the Collision Area.

5 – INTRUDER'S VERTICAL MOVEMENT

- Indicated by an arrow next to the symbol that indicates if the intruder is climbing or descending in excess of 500 ft.
- Color: Same as of the associated symbol.

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6 – INTRUDER'S ALTITUDE

- Indicated by a solid two-digit number below or above the intruder's symbol.
- Color: Same as of the associated symbol.
- Normal presentation is relative altitude, which displays the intruder's relative altitude in hundreds of feet. A plus or minus signal indicates if the intruder is above (+) or below (-) the airplane.
- Two question marks ("??") are displayed if the intruder's relative altitude is greater than 9900 ft, below or above.
- If intruder is below the airplane, intruder's altitude is displayed below its symbol.
- If intruder is above the airplane, intruder's altitude is displayed above its symbol.

7 – RESOLUTION ADVISORY INDICATION

- Indicated by a solid red square.

8 – TRAFFIC ADVISORY INDICATION

- Indicated by a solid amber circle.

9 – OTHER TRANSPONDER REPLYING TRAFFIC INDICATION

- Indicated by a hollow cyan diamond.
- Indicates other airplanes equipped with transponder within the specified range and 2700 ft of vertical separation.
- Not displayed if a TA or RA is in process.

10 – OUT OF RANGE INTRUDER

- Indicates detected intruders that are out of display range.
- Indicated as half the associated symbol.

11 – INTRUDER'S ALTITUDE MODE INDICATION

- Indicates whether the selected intruder's altitude is relative or flight level.

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12 – TCAS BAND SELECTED

- Indicates whether the selected band for TCAS is below or above.

13 – TCAS MODE ANNUNCIATIONS

- Indicates current TCAS mode.
- Colors and labels are as follows, in the order of priority:
  - TCAS TEST - white.
  - TCAS OFF - white.
  - TCAS FAIL - amber.
  - TA ONLY - white.
  - TCAS - white.
  - TCAS AUTO - white.

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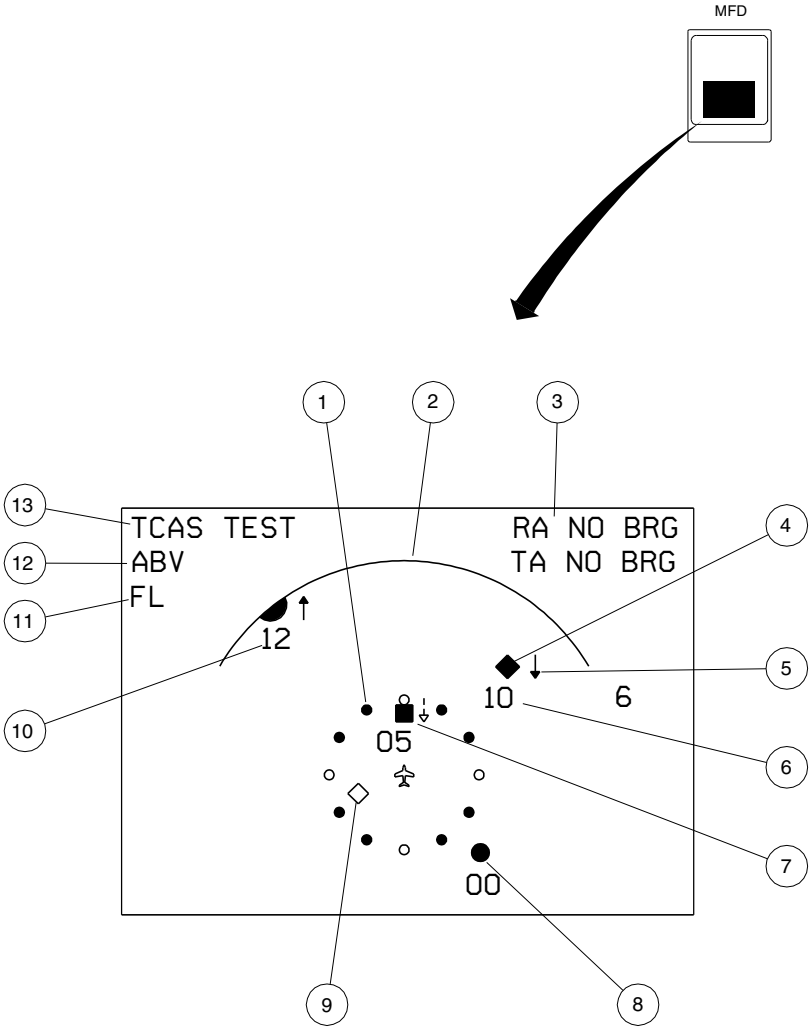

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MULTI FUNCTION DISPLAY

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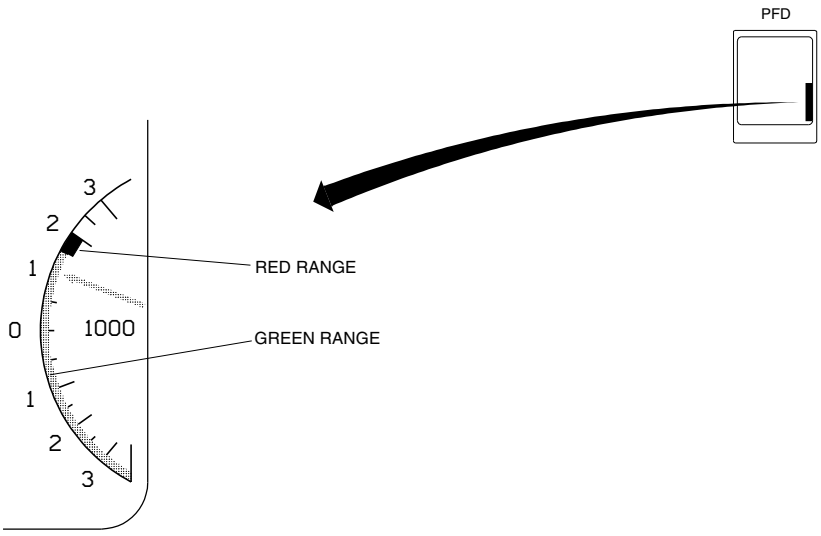
PRIMARY FLIGHT DISPLAY

For further information on Vertical Speed Indicator, refer to Section 2-17 – Flight Instruments.

VSI

- Indicates the recommended vertical speed to avoid a possible conflict.
- Green range – displayed along the scale, indicates the range of vertical speeds to be attained to avoid a conflict situation.
- Red range – displayed along the scale, indicates the range of vertical speeds prohibited for the current situation.
- Green range may be displayed together with the red range or split in two parts, depending on situation.
- Red range may be displayed alone, together with the green range, or split in two parts, depending on the situation.



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PRIMARY FLIGHT DISPLAY

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AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST OUT – ADS-B OUT (IF APPLICABLE)

For airplanes equipped with transponder Mode S (and Post-Mod. SB 145LEG-34-0035 or equipped with an equivalent modification factory incorporated), the ADS-B Out function allows the transponder to transmit several additional airplane information, including its three dimensional position and three dimensional velocity.

These information are received by the ATC and by other airplane equipped with ADS-B In capability.

In order to generate the required information to be transmitted, the ADS-B Out system receives signals from the following airplane systems:

– GPS.
– ADC.
– FMS.
– IC-600.
– IRS/AHRS.
– TCAS.
– RMU.
– Integrated Communication Unit.

The ADS-B Out functionality does not alter the existing transponder functions, such as Mode A/C, Mode S and Enhanced Surveillance, and its functionality may be accessed through RMU ATC/TCAS Control Page.

The system is automatically enable when the transponder is active and may be turned off through ON/OFF switch (optional) located on the ATC/TCAS page of the RMU.

Once activated, the transponder starts broadcasting the ADS-B Out parameters. The ON/OFF switch has no effect on the other transponder functions (Mode A/C, Mode S and Enhanced Surveillance) nor does it have any effect on the TCAS broadcasted or received information.

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In order to allow the transponder to broadcast the ADS-B Out parameters, the first must in a different mode that Standby, ATC ON or ATC ALT modes.

An EICAS Message is presented if the selected transponder is failed or degraded. If the GPS connected to the active transponder is failed or degraded other EICAS Message may be presented.

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ADS-B OUT EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	CHECK XPDR	Active transponder is failed or on standby mode.
ADVISORY	ADS-B NOT AVAIL	The active/selected transponder source is failed or degraded.
	ADS-B NOT ON	The ADS-B ON/OFF switch is on the OFF position.

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CONTROLS AND INDICATORS

RMU ATC/TCAS CONTROL PAGE

1 – ADS-B ON/OFF (OPTIONAL)

ON (green) – Start broadcasting the ADS-B Out Information.

OFF (green) – Stop broadcasting the ADS-B Out Information.

2 – ADS-B STATUS

- NORMAL (white): GPS data is received on the active transponder.
- FAIL (yellow): No GPS data is received on the active transponder.
- DGR (yellow): GPS navigation integrity or accuracy parameters do not meet ADS-B standards, as recognized by the active transponder.

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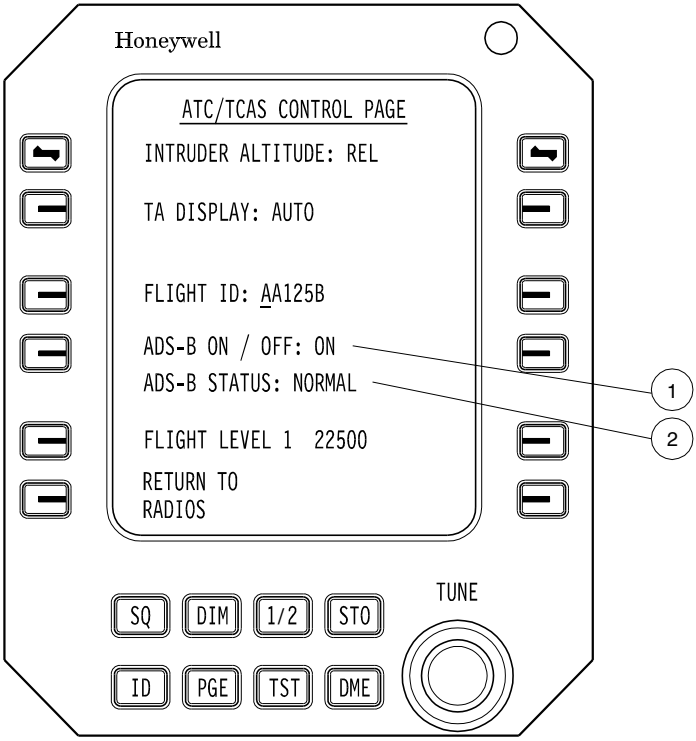

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RMU ATC/TCAS CONTROL PAGE

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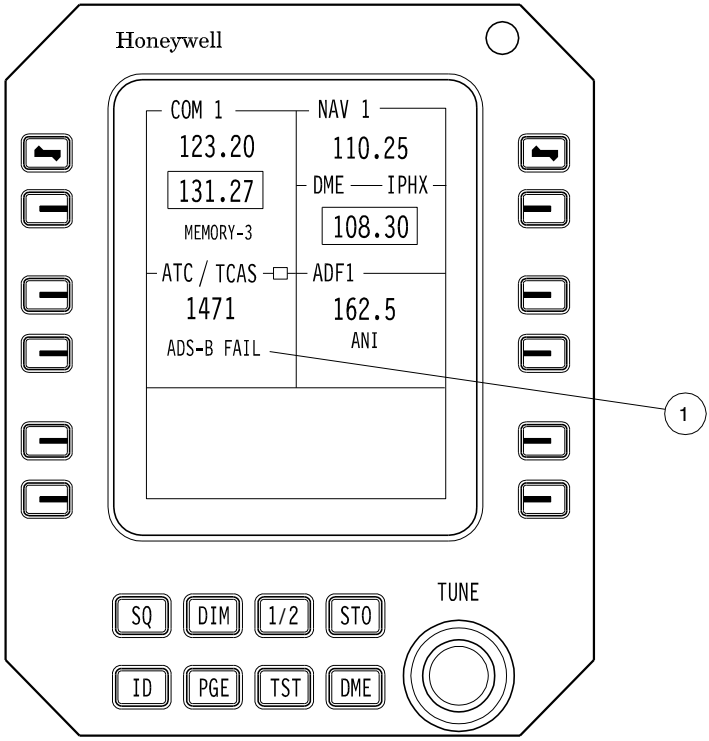
RMU RADIO PAGE – ATC/TCAS WINDOW

1 – ADS-B STATUS

- FAIL (yellow): No GPS data is received on the active transponder.
- DGR (yellow): GPS navigation integrity or accuracy parameters do not meet ADS-B standards, as recognized by the active transponder.



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RMU RADIO PAGE – ATC/TCAS WINDOW

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RUNWAY AWARENESS AND ADVISORY SYSTEM

The Runway Awareness and Advisories System (RAAS) provides short and discrete pieces of aural information designed to improve situational awareness and break the link in the sequence of events leading to runway incursions, but cannot be used to guide an airplane in or around the terminal area.

The RAAS has four distinct sub-modes:

– RAAS (Runway Awareness and Advisory System) sub-mode: provides the flight crew with messages related to the runway itself, from where the airplane is on a landing or takeoff operation. This function has routine and non-routine messages.
– SAM (Stabilized Approach Monitor) sub-mode: provides a significant safety advancement to supplement flight crew awareness of unstabilized approaches.
– Altimeter Monitor: provides the flight crew with a message that increases the awareness of problems with the pressure altitude system.
– Long Landing Monitor: this function enhances the flight crew awareness of airplane along-track position relative to the runway end.

The advisory aural messages are provided to the flight crew during taxi, takeoff, final approach and landing/roll-out operations. These aural messages cannot be used for navigation purposes.

The design of RAAS does not include knowledge of ATC clearance and/or flight crew intent, and therefore factors such as clearance misunderstandings; incorrect/inappropriate clearances cannot necessarily be mitigated by use of RAAS.

RAAS is not designed to enhance traffic awareness and therefore its use does not ensure protection for loss of separation with other traffic.

RAAS may become not available at any time due to loss of accuracy of GPS signals.

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RAAS advisories have the lowest priority over the airplane aural warnings and tones. RAAS advisories may be issued during ATC radio communications, flight crew/cockpit communications, or during other aural messages provided in the cockpit by other airplane systems.

RAAS advisories do not ensure that the airplane will, or can be, stopped before hold lines, the runway edges or the runway end. RAAS distance advisories do not imply that the airplane can or cannot be safely landed, stopped, or taken off from a runway.

Not all airports/runways in the EGPWS Terrain Threat Database are RAAS enabled. RAAS advisories will not occur at an airport located in the EGPWS Terrain Threat Database unless it is RAAS enabled.

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SYSTEM DESCRIPTION

RAAS SUB-MODE AURAL ADVISORIES

ROUTINE ADVISORIES

RAAS Routine Advisories are those which will be provided during normal operation:

APPROACHING RUNWAY (ON GROUND)

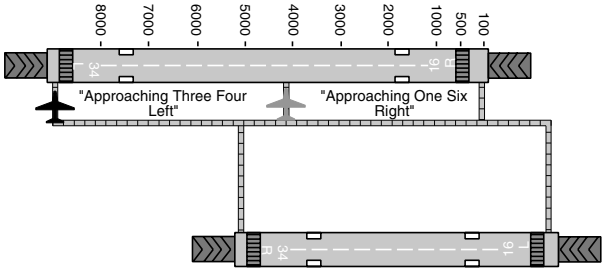
The Approaching Runway (On Ground) advisory is intended to enhance flight crew situational awareness on which runway being approached by the airplane every time the airplane approaches a runway edge, during taxi.

The aural message consists of the word "Approaching" followed by the runway identifier, for example, "Approaching One Six Right".

The Approaching Runway (On Ground) advisory shall be enabled when all the following conditions are met:

– Airplane is on ground.
– Airplane ground speed is less than 40 kt.
– Airplane is within a specified distance from the runway.

If more than one runway meets the qualifying conditions (for example, two runways within ±20° of heading of each other), then the message "Approaching Runways" is generated.



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APPROACHING RUNWAY – ON GROUND

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ON RUNWAY (ON GROUND)

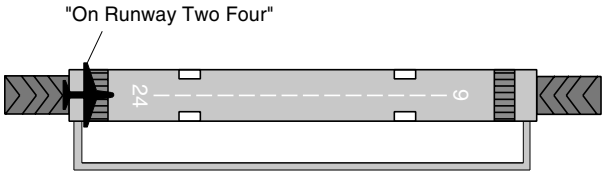
The On Runway (On Ground) advisory is intended to enhance flight crew situational awareness on which runway the airplane is lined-up with during ground operations.

The aural message consists of the word "On Runway" followed by the runway identifier, for example, "On Runway Three Four Left".

The On Runway (On Ground) advisory shall be enabled when all the following conditions are met:

– Airplane enters onto a runway.
– Airplane heading is within approximately 20° from runway centerline.

If more than one runway meets the qualifying conditions (for example, two runways within ±20° of heading of each other), then the message "On Runway Runways" is generated.



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APPROACHING RUNWAY (IN AIR)

The Approaching Runway (In Air) advisory is intended to enhance flight crew situational awareness on which runway the airplane is lined-up with during approach.

The aural message consists of the word "Approaching" followed by the runway identifier, for example, "Approaching Two Five Left".

The Approaching Runway (In Air) advisory shall be enabled when all the following conditions are met:

– Airplane is between 750 ft and 300 ft above landing field elevation.
– Airplane is within 3 NM of the runway.
– Airplane heading is within approximately 20° from runway centerline.
– Airplane position is within approximately 200 ft laterally of the runway centerline plus the runway width.

The Approaching Runway (In Air) message is suppressed between 550 ft and 450 ft above runway elevation to allow normal 500 ft altitude callouts and/or crew procedures without conflict. If the advisory is triggered while the airplane is between 550 ft and 450 ft Above Field Elevation (AFE), the advisory is suppressed until the airplane descends below 450 ft AFE, where the message will be annunciated.

If more than one runway meets the qualifying conditions (for example, two runways within ±20° of heading of each other), then the message "Approaching Runways" is generated. When the system is able to resolve which runway the airplane is approaching the advisory will be issued again with the runway identifier.

The absence of an Approaching Runway In Air advisory does not necessarily imply that the airplane is approaching a surface other than a runway.

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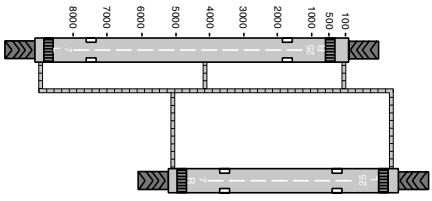

"Approaching Two Five Right"

"Approaching Two Five Left"

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APPROACHING RUNWAY – IN AIR

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DISTANCE REMAINING (LANDING AND ROLLOUT)

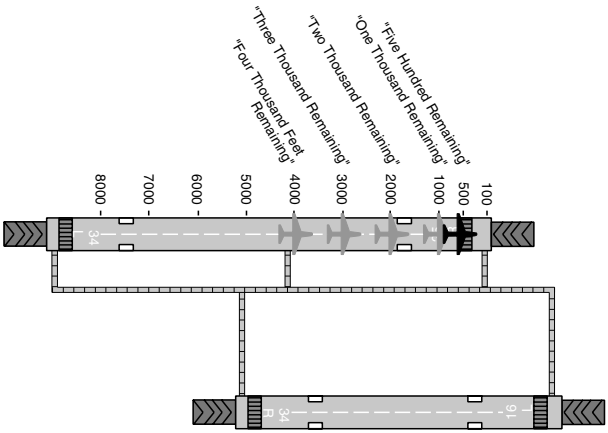
The Distance Remaining (Landing and Rollout) advisory provides the flight crew with awareness of airplane a long track position relative to the runway end.

The first aural message consists of the "Calculated Distance" with the unit of length (feet or meters) followed by the word "Remaining". The following aural messages consist of the "Calculated Distance" followed only by the word "Remaining".

For airplanes equipped with systems using feet as the unit of length, these advisories are generated at whole thousand-foot intervals, except that the last possible advisory occurs at 500 ft (for example, "four-thousand feet remaining", "three thousand remaining"). For airplanes equipped with systems using meters as the unit of length, these advisories are generated at multiples of 300-meter intervals, except that the last possible advisory occurs at 100 m (for example, "nine-hundred meters remaining", "three hundred remaining").

The Distance Remaining (Landing and Rollout) advisory shall be enabled when:

– Airplane is within 100 ft of the ground, over the last half of the runway or a specified distance from the runway end; or
– Airplane is on the ground, on the last half of the runway; and
– Airplane ground speed is greater than 40 kt.



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DISTANCE REMAINING – LANDING AND ROLLOUT

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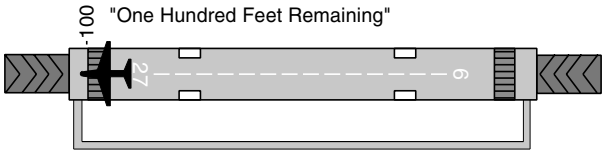
RUNWAY END

The Runway End advisory provides the flight crew with awareness of the airplane position relative to the runway end during low visibility conditions.

For airplanes equipped with systems using feet as the unit of length, the aural message consists of the words "One Hundred Feet Remaining". For airplanes equipped with systems using meters as the unit of length, the aural message consists of the words "Thirty Meters Remaining".

The Runway End advisory shall be enabled when all the following conditions are met:

– Airplane is on a runway.
– Airplane heading is within approximately 20° from runway centerline.
– Airplane approaches within 100 ft (or 30 m) of the runway end.
– Airplane ground speed is less than 40 kt.



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NON-ROUTINE ADVISORIES

RAAS Non-Routine Advisories are those which will seldom be provided during normal operations:

INSUFFICIENT RUNWAY LENGTH (ON GROUND)

Insufficient Runway Length (on Ground) advisory provides the flight crew with awareness of which runway the airplane is lined-up with and that the runway length available for takeoff is less than the defined nominal takeoff runway length (3100 ft).

The available runway length is determined by comparing the position of the airplane on the runway with the distance available as defined in the EGPWS Runway Database.

The aural message consists of the word "On Runway" followed by the runway identifier plus the runway length remaining followed by the word "Remaining", for example, "On Runway Three Four Left, Two Thousand Feet Remaining" (for airplanes equipped with systems using feet as the unit of length) or "On Runway Three Four Left, Eight Hundred Meters Remaining" (for airplanes equipped with systems using meters as the unit of length).

The Insufficient Runway Length (on Ground) advisory shall be enabled when all the following conditions are met:

– Airplane enters onto a runway.
– Airplane heading is within approximately 20° from runway centerline.
– Available distance for takeoff is less than the defined nominal takeoff runway length.

NOTE: This advisory does not take into account airplane performance factors (for example, airplane weight, wind, runway condition, slope, air temperature, or altitude of airport). It simply performs a comparison between the nominal runway length with the runway database value correspondent to the runway the airplane is lined-up with.

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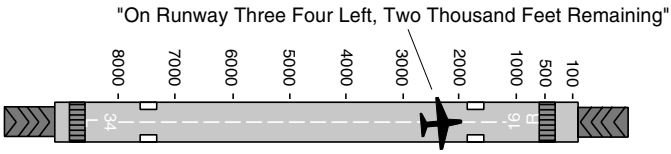

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INSUFFICIENT RUNWAY LENGTH – ON GROUND

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DISTANCE REMAINING - REJECTED TAKEOFF

Distance Remaining - Rejected Takeoff advisory provides the flight crew with position awareness during a rejected takeoff. When the ground speed decreases below 40 kt, these advisories will terminate.

For airplanes equipped with systems using meters as the unit of length, these advisories are generated at multiples of 300 m intervals, except that the last possible advisory occurs at 100 m. For airplanes equipped with systems using feet as the unit of length, these advisories are generated at multiples of 1000 ft intervals, except that the last possible advisory occurs at 500 ft. For example, a RAAS equipped airplane landing on a 3000 m runway would generate the following advisories: "One-Thousand-Two-Hundred Meters Remaining", "Nine-Hundred Remaining", "Six-Hundred Remaining", "Three-Hundred Remaining", and "One-Hundred Remaining".

The Distance Remaining -Rejected Takeoff advisory shall be enabled when all the following conditions are met:

– Airplane is on the last half of the runway.
– Ground speed of the airplane is greater than or equal to 40 kt.
– Airplane ground speed during the takeoff roll decreases by 7 kt from its maximum.

NOTE: If a Rejected Take-Off is performed, the Runway Awareness messages will be unavailable until the airplane leaves the runway. This can be checked by performing an EGPWS level 1 self-test. The message "Runway Awareness R-T-O" shall be announced.

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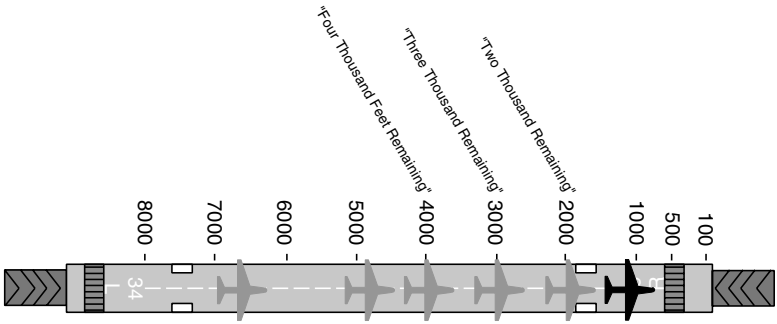

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DISTANCE REMAINING – REJECTED TAKEOFF

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APPROACHING SHORT RUNWAY (IN AIR)

The Approaching Short Runway (In-Air) advisory provides the flight crew with awareness of which runway the airplane is lined-up with, and that the available runway length for landing is less than the defined nominal landing runway length (3900 ft).

The available runway length is determined by comparing runway length as defined in the EGPWS Runway Database with the nominal runway length required for the airplane.

The aural message consists of the word "Approaching" followed by the runway identifier plus the available runway length information followed by the word "Available", for example, "Approaching Two Five Left, Three Thousand Feet Available" (for airplanes equipped with systems using ft as the unit of length) or "Approaching Two Five Left, Nine Hundred Meters Available" (for airplanes equipped with systems using meters as the unit of length).

The Approaching Runway (In Air) advisory shall be enabled when all the following conditions are met:

– Airplane is between 750 ft and 300 ft above field elevation.
– Airplane is within approximately 3 NM of the runway.
– Airplane heading is within approximately 20° from runway centerline.
– Airplane position is within approximately 200 ft laterally of the runway centerline plus the runway width.
– Aligned runway is shorter than 3900 ft.

If more than one runway meets the qualifying conditions (for example, two runways within ±20° of heading of each other), then the message "Approaching Runways" is generated.

NOTE: This advisory does not take into account airplane performance factors (for example, airplane weight, wind, runway condition, slope, air temperature, or altitude of airport). It simply performs a comparison between the nominal runway length with the runway database value correspondent to the runway the airplane is lined-up with.

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"Approaching Two Five Left,
Three Thousand Eight Hundred
Feet Available"

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APPROACHING SHORT RUNWAY – IN AIR

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INSUFFICIENT RUNWAY LENGTH (ON GROUND) CAUTION

Insufficient Runway Length (on Ground) caution provides the flight crew with immediate awareness of which the runway length available for takeoff is still less than the defined nominal takeoff runway length when the takeoff is continued after the remaining runway length for takeoff has been provided.

While performing a takeoff procedure, the flight crew would receive the "Insufficient Runway Length – On Ground Advisory" annunciation, where the available runway length for takeoff is announced. If the takeoff procedure continues, when the airplane reaches 40 kt Ground Speed, the following indications are presented:

– Aural message "Caution, Short Runway, Short Runway".
– Master Caution will be illuminated.
– The visual alert "SHORT RUNWAY" (in amber) on MFD (Terrain Page – if selected).
– The visual alert "GND PROX" (in amber) on PFD.

The Insufficient Runway Length (on Ground) caution shall be enabled when all the following conditions are met:

– Airplane enters onto a runway.
– Airplane heading is within approximately 20° from runway centerline.
– Available distance for takeoff is less than the predefined nominal takeoff runway length (3100 ft).
– Airplane ground speed transitions to above 40 kt.

NOTE: This advisory does not take into account airplane performance factors (for example, airplane weight, wind, runway condition, slope, air temperature, or altitude of airport). It simply performs a comparison between the nominal runway length with the runway database value correspondent to the runway the airplane is lined-up with.

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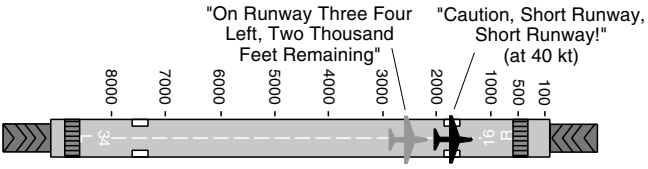

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INSUFFICIENT RUNWAY LENGTH – ON GROUND CAUTION

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TAXIWAY TAKEOFF

Taxiway Takeoff advisory provides flight crew awareness of excessive taxi speeds or an inadvertent takeoff on a taxiway.

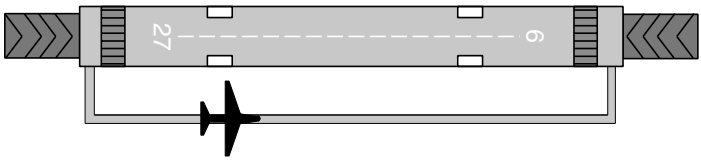
The following indications are presented:

– Aural message "Caution OnTaxiway! OnTaxiway!".
– Master Caution will be illuminated.
– The visual alert "ON TAXIWAY" (in amber) on MFD (Terrain Page – if selected).
– The visual alert "GND PROX" (in amber) on PFD.

The Taxiway Takeoff advisory shall be enabled when all the following conditions are met:

– Airplanes is on a surface other than a runway.
– Ground Speed of the airplane is greater than 40 kt.

On Taxiway advisory does not insure that the airplane is actually on a taxiway. For example, excessive Ground Speeds in areas such as ramps will also trigger the On Taxiway advisory.



"Caution On Taxiway! On Taxiway!"
(once ground Speed exceeds 40 Knots)

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TAXIWAY LANDING

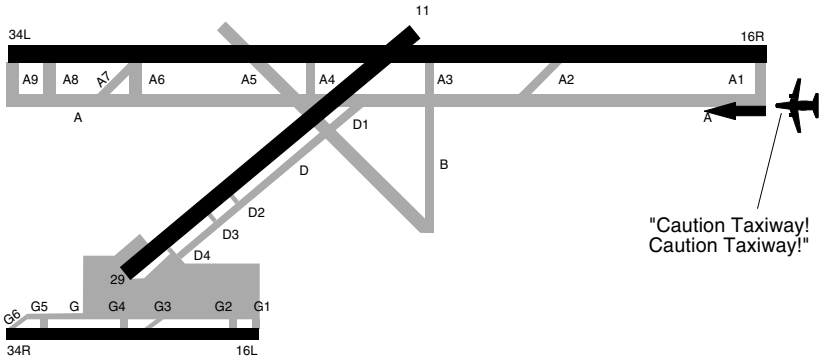
Taxiway Landing advisory provides flight crew awareness of an inadvertent landing on a taxiway.

The following indications are presented:

– Aural message "Caution,Taxiway! Caution,Taxiway!".
– Master Caution will be illuminated.
– The visual alert "TAXIWAY" (in amber) on MFD (Terrain Page – if selected).
– The visual alert "GND PROX" (in amber) on PFD.

The Taxiway Landing advisory shall be enabled when all the following conditions are met:

– Airplane is between 150 ft and 250 ft above ground level.
– Airplane climb rate is less than 450 ft/min.
– Airplane is within 5 NM of a runway and is not lined up with a runway.



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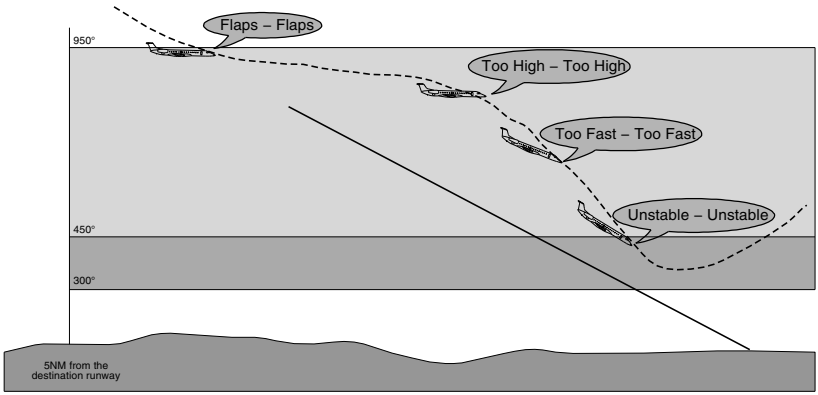
SAM SUB-MODE AURAL ADVISORIES

The Stabilized Approach Monitor Sub-mode is intended to inform the flight crew awareness of unstabilized approaches reducing landing risks and potential runway excursions.

The SAM has four distinct sub-monitors:

– Landing Flaps Monitor.
– Excessive Approach Angle Monitor.
– Excessive Approach Speed Monitor.
– Unstable Approach Monitor.



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STABILIZED APPROACH MONITOR AURAL MESSAGES

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LANDING FLAPS MONITOR

Landing Flaps Monitor advisory provides flight crew awareness of a possible unstabilized approach due to flaps not in landing configuration.

Although the existing EGPWS Mode 4 envelope already provides a landing flaps annunciation (for example, "Too Low Flaps" annunciation at 245 ft radio altitude), there are advantages of being advised at much higher altitude from a stabilized approach point of view. Therefore, Stabilized Approach Monitor is designed to provide a landing flaps annunciation independent from Mode 4.

The aural message consists of the words "Flaps-Flaps".

The Landing Flaps Monitor advisory shall be enabled when all the following conditions are met:

– Flaps are not in a landing configuration.
– Height above field elevation is less than or equal to 800 ft AFE.
– Airplane is lined up with a runway (airplane is within approximately 3 NM of the runway and airplane track is aligned with the runway within ±20°).

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EXCESSIVE APPROACH ANGLE MONITOR

Excessive Approach Angle Monitor advisory provides flight crew awareness of a possible unstabilized approach if the approach angle to the destination runway becomes too steep.

The comparison is made between the airplane glideslope angle and the nominal glideslope angle to runway end from the runway database (each runway has its own approach angle on the EGPWS database).

The aural message consists of "Too High, Too High".

The Excessive Approach Angle Monitor advisory shall be enabled when all the following conditions are met:

– The airplane approaching angle is approximately 1° or higher than the approaching angle for the runway.
– Airplane is lined up with a runway (airplane is within approximately 3 NM of the runway and airplane track is aligned with the runway within ±20°).
– Height above field elevation is less than or equal 950 ft with gear and flaps in landing configuration or height above field elevation is less than or equal to 600 ft regardless of gear and flap configuration.
– Glideslope Deviation is more than 2 dots or Localizer Deviation is more than 1 dot.

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EXCESSIVE APPROACH SPEED MONITOR

Excessive Approach Speed Monitor advisory provides flight crew awareness of a possible unstabilized approach due to excessive approach speeds.

The comparison is made between the computed airspeed and the v_{ap} when the airplane is on an approaching phase.

The aural message consists of "Too Fast, Too Fast".

The Excessive Approach Speed Monitor advisory shall be enabled when all the following conditions are met:

– Height above field elevation is less than or equal 950 ft with gear and flaps in landing configuration or height above field elevation is less than or equal to 600 ft regardless of gear and flap configuration.
– Airplane is lined up with a runway (airplane is within approximately 3 NM of the runway and airplane track is aligned with the runway within ±20°).
– Airplane airspeed exceeds v_{ap} by 30 kt to 40 kt.

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UNSTABLE APPROACH MONITOR

Unstable Approach Monitor advisory provides flight crew awareness of a possible unstabilized approach if the airplane is not stabilized by the 450 ft gate.

The following indications are presented:

– Aural message "Unstable, Unstable".
– Master Caution will be illuminated.
– The visual alert "UNSTABLE" (in amber) on MFD (Terrain Page – if selected).
– The visual alert "GND PROX" (in amber) on PFD.

The Unstable Approach Monitor advisory shall be enabled when all the following conditions are met:

– Height above field elevation is less than or equal 450 ft greater than 300 ft.
– One of the Approach Monitor triggers has been annunciated (Landing Flap Monitor, Excessive Approach Angle Monitor, or Excessive Approach Speed Monitor).

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ALTIMETER MONITOR SUB-MODE AURAL ADVISORY

Altimeter Monitor (or Below Transition Altitude Monitor) Sub-mode is intended to inform the flight crew awareness of improper corrected altitude setting while operating below the transition altitude on an incorrect baro adjustment setting.

The aural message consists of "Altimeter Setting".

The Below Transition Altitude Monitor advisory shall be enabled when all the following conditions are met:

– Airplane altitude is less than the Transition Altitude for more than 30 seconds or Height Above Field is less than 1500 ft. The transition altitude is obtained from the EGPWS runway database for the destination runway.
– Airplane is within 20 NM of the EGPWS Selected destination runway.
– Height above field is less than 5000 ft.
– Radio height is greater than 600 ft.

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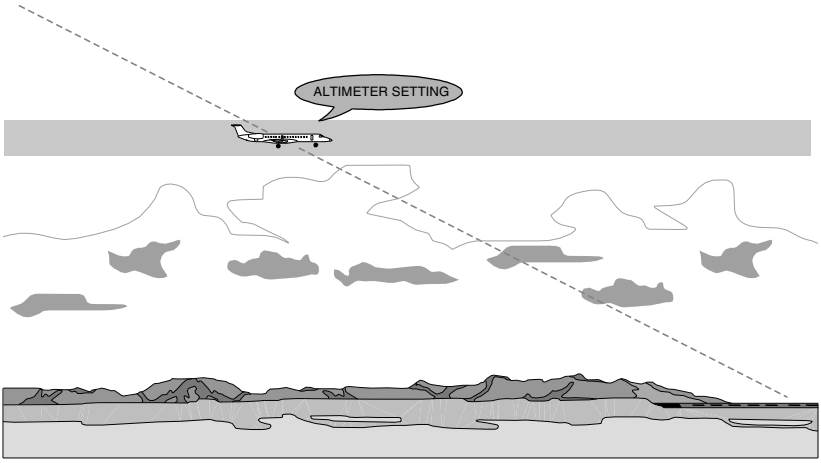

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ALTIMETER MONITOR

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LONG LANDING MONITOR SUB-MODE AURAL ADVISORY

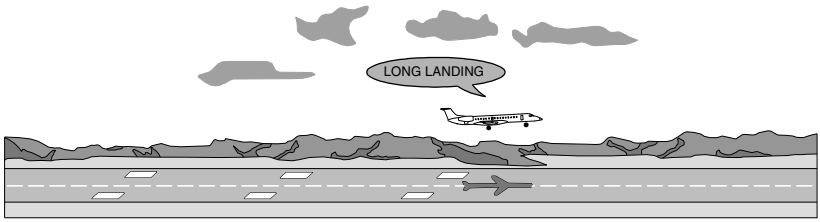
Long Landing Monitor Sub-mode advises the flight crew of their position during a landing when the airplane has not touched down in a nominal amount of time or distance.

The following indications are presented:

– Aural message "Long Landing, Long Landing".
– Master Caution will be illuminated.
– The visual alert "LONG LANDING" (in amber) on MFD (Terrain Page – if selected).
– The visual alert "GND PROX" (in amber) on PFD.

The Long Landing Monitor advisory shall be enabled when all the following conditions are met:

– Airplane is within 100 ft and 5 ft above ground level and past 2000 ft (for runway higher than 8000 ft) or 25% of the runway (for runway shorter than 8000 ft) from the threshold.
– Weight on wheels is not detected.



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LONG LANDING MONITOR

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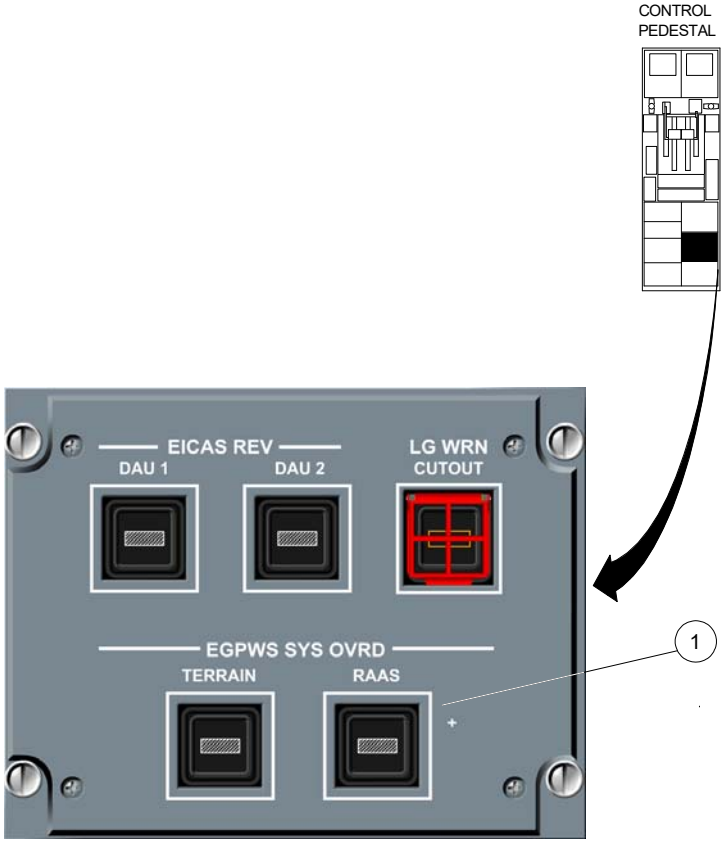
CONTROLS AND INDICATORS

RAAS PANEL

1 – RAAS BUTTON

PUSH IN: deactivates RAAS functionality.

PUSH OUT: activates RAAS functionality.



RAAS PANEL

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
ADVISORY	RAAS NOT AVAIL	RAAS function is not available.
	RAAS INHIBIT	RAAS function inhibited by pressing RAAS Button.

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CHARTS AND MAPS

GENERAL

The airplane may optionally be equipped with Honeywell's Charts and Maps function. Additional information on functions and operations can be obtained in the manufacturer's manual.

The chart function displays Jeppesen charts on the MFD and the Map Extended Function displays navigation information on a moving map on the MFD.

CURSOR CONTROL DEVICE (CCD)

The activation of the Charts and Maps function is performed through a cursor control device (CCD), one for each LCD MFD, on Control Pedestal Panel. The expansion applications consist of the following items:

– Charts: shows approach charts, airport maps, standard instrument departure (SIDs), standard terminal arrival route (STARs) and noise procedures.
– Maps: shows the flight management system (FMS) moving map over geopolitical boundaries augmented with navigation aids and up-linked weather displays.
– Database configuration: shows database status and allows to upload data for charts and maps.
– DU maintenance: informs aircraft type, DU-875 P/N, software version, databank version, display position and selected bus.

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CCD PANEL ON CENTRAL CONSOLE

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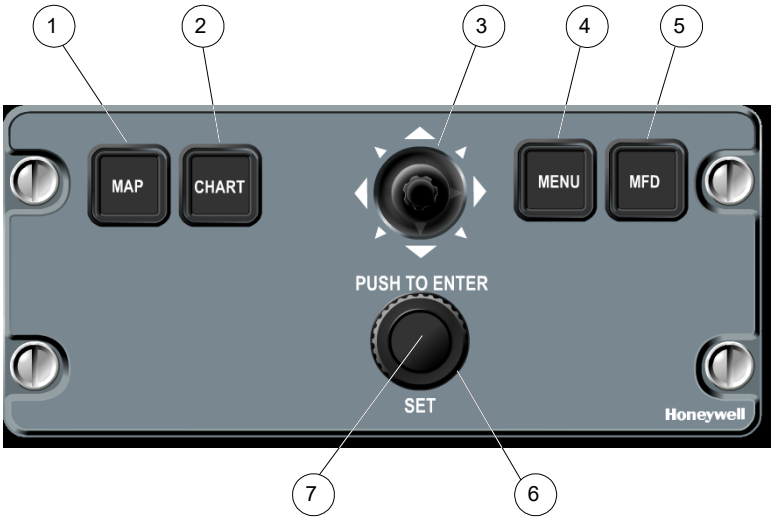

EM145AOM020204AJDR

CCD PANEL

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CURSOR CONTROL DEVICE PANEL

1 – MAP BUTTON

- Calls up the MAP function on the MFD.

2 – CHART BUTTON

- Calls up the CHART function on MFD.

3 – JOYSTICK

- Eight-way joystick allows maneuvering of the cursor in the MAP and CHART functions on the MFD, as well as navigating through menu selection.

4 – MENU BUTTON

- Enables MFD enhanced functions menu display on the classic MFD.

5 – MFD BUTTON

- Returns to classic MFD mode.

6 – SET KNOB

- Zooms ranges in/out. Scrolls through menu or lists.

7 – ENTER

- Selects functions or positions when highlighted by the cursor.

The conditions that cause the DU to revert from the enhanced mode to the basic (classic) MFD mode are:

- DU is reverted to PFD.
- DU is reverted to EICAS.
- TCAS pop-up occurs.
- EGPWS pop-up occurs.
- Any MFD bezel button is pushed.
- MFD range knob is turned.

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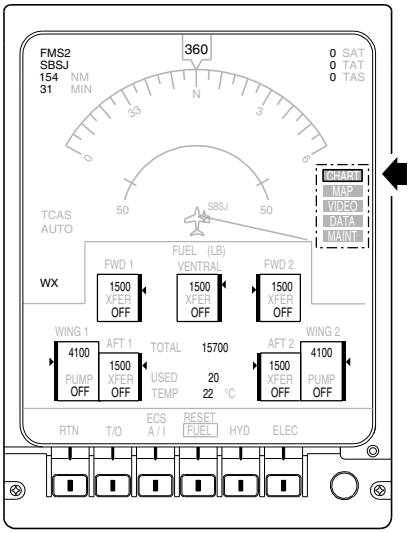
CCD MENU

The activation of menu displays the CCD options on MFD.



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CCD MENU

CHART

- Calls up the CHART function on MFD.

MAP

- Calls up the MAP function on MFD.

VIDEO

- Not available on Legacy 600 and Legacy 650.

DATA

- Calls up the DATABASE function on MFD.

MAINT

- Calls up the MAINTENANCE function on MFD.

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CHART

The primary purpose of the chart function is to present Jeppesen charts on the MFD. To display the chart window push the chart button on the CCD.

Items displayed through the chart function are:

- Airport charts.
- Standard Instrument Departure (SID) charts.
- Standard Terminal Arrival Route (STAR) charts.
- Approach charts.
- Noise charts.
- Notice To Airmen (NOTAM).
- Airspace charts.

NOTE: In Charts extended function, the FMS flight plan Alternate Airport is not read nor presented in the CHARTS menu when using FMS version 5.2.

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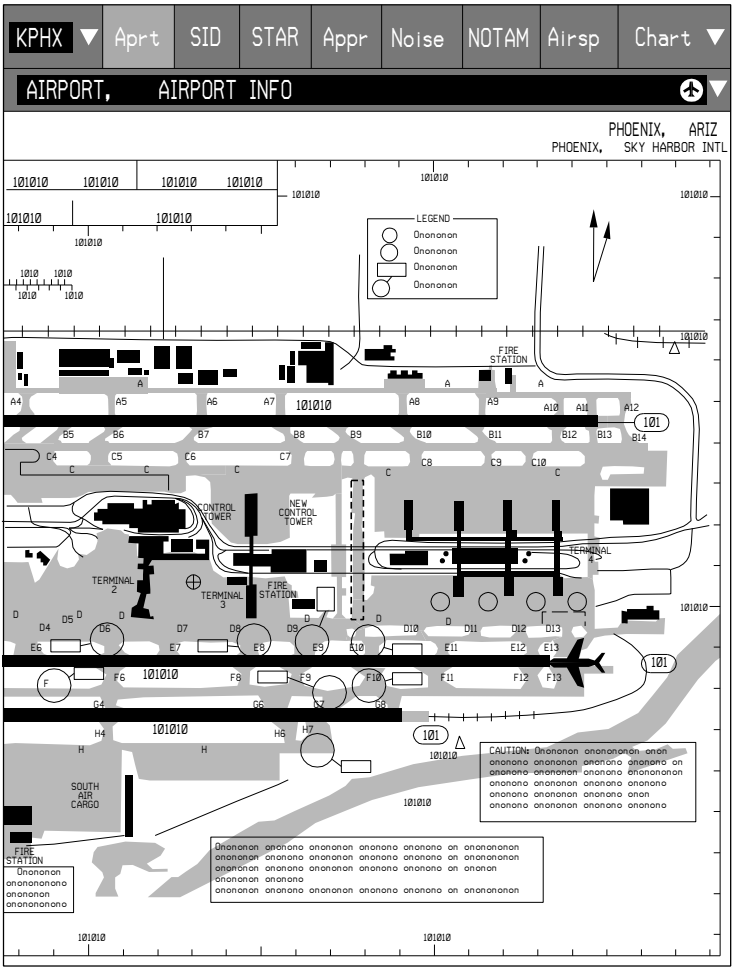

CHART DISPLAY

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CCD

CCD operation for the chart format provides selection on LCD MFD and chart control bars, selection of the CHART menu button, and selection of the pull-down menu buttons, virtual keyboard, scrolling and zooming.

Activation of the cursor is accomplished by the CCD, or by pushing the display selection button. Selection of the chart window is accomplished by positioning the cursor on the CHART menu button, and pushing the ENTER button on the CCD.

The control bar buttons and pull-down menu buttons are selected/deselected by positioning the cursor on the desired button and pushing the ENTER button on the CCD.

Buttons that are not available for selection are highlighted in dark gray with the text label and/or symbol highlighted in light gray. Buttons that are available for selection are highlighted in blue when the cursor is pointing within the interactive region of the button.

Control bar buttons with a pull-down menu are indicated by a white downward pointer. Highlighting and selecting the button displays the pull-down menu. The first option of any pull-down menu is automatically highlighted upon activation.

Activated pull-down menus are automatically deactivated when the CCD cursor is off the pull-down menu for more than 1 second or by pushing the ENTER button on the CCD when the cursor is off the activated pull-down menu.

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SCROLLING

Chart Scroll Bars

The scroll bars that appear around the outer edge of the chart permit the scrolling or lateral movement of the chart within the display window.

The scrolling function is active when any part of the chart is no longer viewable in the display window, regardless of the scale or zoom factor of the displayed chart. Scroll bars appear when the cursor is placed at the edge of the chart, and disappear when the cursor is moved away from the scroll bars.

The scroll function is not active when the complete chart is displayed or when the chart viewing is in the split mode and the section is displayed in its entirety.

Pushing the ENTER button on the CCD, when the cursor is on the center of a scroll bar scrolls the map in the direction indicated by the pointer on the bar. When the cursor is placed off-center on the scroll bar, the chart scrolls diagonally in the direction of the placement of the cursor.

Scrolling is limited to the chart edge in any direction. When the chart is scrolled to the maximum position in any direction, the pointer for that direction is removed from the scroll bar. The scrolling function in that direction is disabled.

When the cursor is placed over one of the scroll bars and the ENTER button is pushed once, the chart moves in the direction specified by the scroll bar pointer.

When the cursor is placed over one of the scroll bars and the ENTER button on the CCD is held down for more than 1 second, the chart continues to move in the direction specified by the scroll bar pointer.

Data List Scroll Bar

When the number of available items displayed in a data window is exceeded, and additional viewing area is needed to view the complete list, a data list scroll bar is displayed to the right of that window. An example of a data list scroll bar is presented in Figure x-x.

The data list scroll bar is used to display and control the portion of a data list field currently visible in a window.

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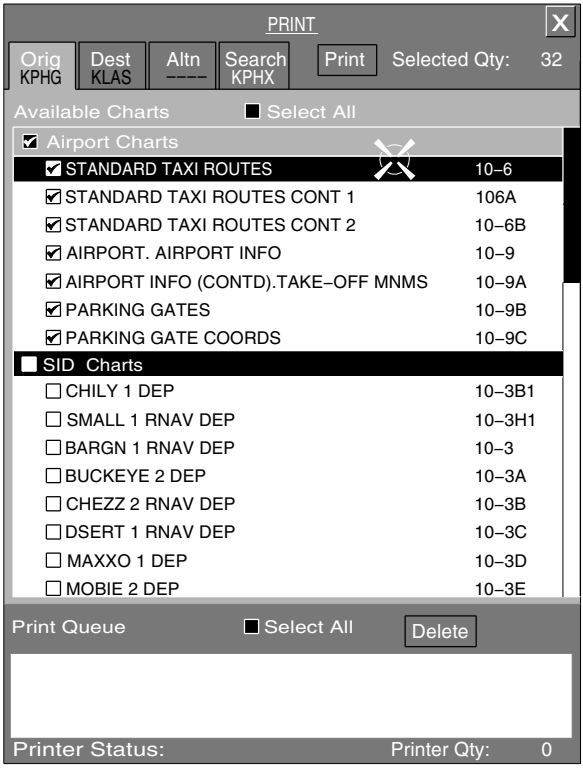

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PRINT WINDOW WITH DATA LIST SCROLL BARS

When a data list scroll bar is located on a window, the scroll bar is active when the cursor is placed on the scroll bar or is placed in the list viewing area and is highlighted in blue.

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A data set knob active symbol is displayed above the scroll bar. This symbol indicates that the pilot can scroll through the list by turning the concentric knob on the CCD. Each click of the concentric knob scrolls through one item at a time on the list. An inactive scroll bar is highlighted in gray.

A scroll bar is not displayed when the data does not exceed the displayed field.

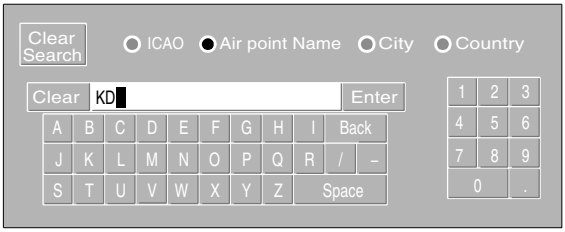
ZOOMING

When a chart is initially displayed on MFD in the profile view, the chart is fit to width. When a chart is initially displayed on MFD in the landscape view, the chart is fit to height. The zoom function permits the pilot to enlarge or reduce the apparent viewing distance from the chart.

The concentric knob on the CCD is used to control the zoom function. The chart is enlarged or reduced in size around the center of the display window. Each click of the CCD concentric knob enlarges or reduces the chart by 25%. Zooming the chart from the initial size to the maximum size takes eight clicks on the concentric knob.

VIRTUAL KEYBOARD

The virtual keyboard is presented in Figure x-x and is displayed on the bottom of the SEARCH APRT and REVISION INFO pages.



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SEARCH AND REVISION PAGES VIRTUAL KEYBOARD

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Buttons that are available for selection on the virtual keyboard are highlighted in blue when the cursor is pointing within the interactive region of the button. The following is a list of items that can be selected on the virtual keyboard:

– Letters: "A" to "Z".
– Numbers: "0" to "9".
– Symbols: ".", "/" and "-".
– Clear Search button.
– Clear button.
– Enter button.
– Back button.
– Space button.

A cursor is displayed on the scratchpad of the virtual keyboard in the location of the placement of the next selected letter, number, or symbol. The scratchpad can contain a maximum of 20 characters.

When a letter, number, or symbol is selected by highlighting the character and pushing the ENTER button on the CCD, the corresponding character is placed to the right side of the last character in the scratchpad. The cursor is moved one position to the right, unless the maximum number of characters has been entered.

When the Clear Search button is selected, the scratchpad and the search results window are cleared.

When the Clear button is selected, the scratchpad is cleared and the cursor moves to the first character position on the left.

The Enter button is used to initiate the search for a desired airport when selected on the virtual keyboard in the SEARCH APRT window. The Enter button is used to initiate validation and entry of the serial number and access codes when selected on the virtual keyboard in the REVISION INFO window.

When the Back button is selected, the character on the right side of the search string is deleted and the cursor is moved one position to the left.

When the Space button is selected, a space is placed to the right side of the last character in the scratchpad. The cursor is moved one position to the right unless the maximum number of characters has been entered.

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When one or more characters or spaces exist in the scratchpad, the Clear and Back buttons are selectable. When these buttons are non-selectable, the buttons are displayed in gray (Clear/Back).

AIRPORT PULL-DOWN MENU

When the airport control bar button has been highlighted and selected, a pull-down menu is displayed as presented below.

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AIRPORT PULL-DOWN MENU

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The menu contains the following selections:

– Origin Airport.
– Destination Airport.
– Alternate Destination Airport.
– Search Airport.
– Print.
– Revision Information.

Deactivation of the pull-down menu occurs when the cursor is moved off the menu for more than 1 second, when a point is selected outside of the menu, or when an item from the pull-down menu is selected.

The airport selection window is blank when the airport pull-down menu is first selected and the FMS is determining availability of any airport information or settings. On initialization, the airport selection window displays the airport identifier of the Orig ICAO identifier until another airport is selected. When there is no Orig identifier from the FMS flight plan, the identifier in the airport selection window is replaced with four green dashes. If the FMS information is invalid, the dashes are white.

When there is a valid FMS airport identifier for the origin, destination, and alternate airports, the ICAO identifier is displayed in green, and the button is selectable. The ICAO airport identifier for the selected airport button (Orig, Dest, Altn, Search Aprt…) is displayed in the airport selection window until another airport is selected.

Origin Airport

The airport pull-down menu displays the origin airport ICAO identifier to the left of the Orig label when there is a valid FMS origin airport. When the Orig airport button is selected, the airport identifier is displayed in the airport selection window.

Destination Airport

The airport pull-down menu displays the destination airport ICAO identifier to the left of the Dest label when there is a valid FMS destination airport. When the Dest airport button is selected, the airport identifier is displayed in the airport selection window.

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Alternate Destination Airport

The airport pull-down menu displays the alternate destination airport ICAO identifier to the left of the Altn label, when there is a valid FMS alternate destination airport. When the Altn airport button is selected, the airport identifier is displayed in the airport selection window.

Search Airport

The search airport window is presented in Figure x-x and is used to search for airports within the coverage area of the airplane. The search airport window is displayed by placing the cursor over the Search Aprt menu button and pushing either of the ENTER buttons on the CCD.

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SEARCH AIRPORT WINDOW

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On initial selection of the Search Aprt menu button, the SEARCH APRT window opens. A Search Results label is displayed at the top of the window. The radio buttons for the search window are located at the bottom of the display, above the virtual keyboard. The radio buttons displayed for selection are ICAO, Airport Name, City, and County. The radio buttons are mutually exclusive. When a search window button is selected, the circle next to the button is filled to indicate that the button has been selected for display and only the airports fitting the criteria for that button are searched for. The first time after power-up, the search window is blank and the selected button defaults to the ICAO button.

When the search information is entered in the scratchpad by use of the virtual keyboard, the Enter button is used to activate the search. The minimum number of characters entered for the search is one character. When an invalid character or no character is entered in the scratchpad, and the Enter button is selected, the message Invalid Search String is displayed on the scratchpad. Entering a valid character removes this message from the scratchpad. When an airport or airports are located as the result of the search criteria entered, the cursor highlights the first airport on the list.

NOTE: Several seconds may go by before any airports that match the search criteria are displayed.

When an airport or airports have been located that fit the search criteria, they are listed on the search airport window, along with the following information for search airport listed:

– ICAO.
– Airport name.
– City.
– County.

The following table lists the number of characters displayed for each item for a given airport listed in the search window.

ICAO	AIRPORT NAME	CITY	COUNTRY
4	22	16	3

AIRPORT SEARCH RESULTS CHARACTER DISPLAY FORMAT

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When the actual airport name or city contains more characters than allowed per the above table, the remaining right-side characters of the item are not displayed.

Selecting an airport is accomplished by highlighting the desired airport on the search airport window and pushing either ENTER button on the CCD. When the selected airport is different from the currently displayed airport, the chart tab bar defaults to the airport tab button for the selected airport, and the settings for the other tab buttons on the chart control bar are set to the default settings. When the selected airport is the same as the current search airport, the search airport is returned to and all the current settings are unchanged. The ICAO identifier of the selected search airport is displayed in the airport selection window.

Selecting the Clear Search button clears the scratchpad and the search results window. When the search result data and scratchpad data are not manually cleared before exiting the search airport window, the same data is displayed when the search airport window is re-entered. When the search airport window is exited by selecting an airport, the selected airport is the default airport highlighted when the search airport window is re-entered.

An exit button X is located in the upper-right hand corner of the SEARCH APRT window. When the X is highlighted and selected, the window the search page was entered from is the window returned to when exiting the search airport window. When the exit button is used to exit the SEARCH APRT window, and a search airport had previously been selected, airport remains as the selected search airport. When the exit button is used to exit the search window, and no search airport had previously been selected, there is no selected search airport.

Revision Information

The REVISION INFO window, presented in Figure x-x, gives the operator a general idea of the coverage regions covered by the entered serial number and access codes, displays a warning message to the operator when the dataset is out of date with respect to the airplane date, and a way for the operator to enter serial numbers and access codes to access the electronic chart dataset. The REVISION INFO window is displayed the first time the chart function is accessed after power-up or by placing the cursor over the Revision Info… menu button and pushing the ENTER button on the CCD, once the chart function is accessed.

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REVISION INFO

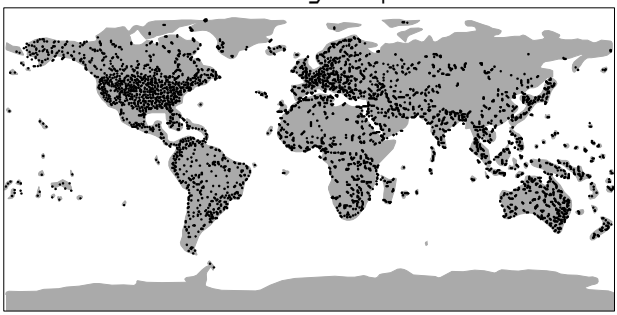
X

Dataset Start Date 10MAR06

May contain outdated information

Consult all applicable NOTAMs prior to flight. The information provided is intended to supplement your normal navigation functions. use the most recent dataset immediately upon receipt.

Coverage Map



Serial Number

JLEETVTIM1U2E3Y4

Valid Access Code

Valid Access Codes

Clear Enter

A B C D E F G H I Back

J K L M N O P Q R / -

S T U V W X Y Z Space

1 2 3

4 5 6

7 8 9

0 9

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REVISION INFORMATION WINDOW

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Each time the REVISION INFO window is accessed, a Dataset Start Date label is displayed below the page title.

NOTE: Several minutes may go by after loading a new chart dataset before the DATASET START DATE message changes from amber to white.

The following is a list of messages that can be displayed in the start date label:

– Dataset Start date DDMMMYY

NOTE: When the data is current, the DATASET START DATE DDMMMYY message is displayed in white.

For further information on these, refer to Section 2-18 – Navigation and Communication.

The MFD also operates as a back-up display for either PFD or EICAS, in case of such displays failure. Appropriate selections may be made through the reversionary panel.

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MAP

The primary purpose of the Map Extended Function is to present navigation information on a moving map. Pushing the UpWx menu button on MFD displays the uplink weather map on the MFD.

The map mode can be accessed through CCD either selecting map button or selecting menu button and map mode on MFD.

Items displayed through the map function are:

- Airports.
- VORs.
- NDBs.
- Intersections.
- Hi Airways.
- Lo Airways.
- Term Airspace.
- Special Use Airspace.
- Up-linked graphical weather.
- Geo-political boundaries.
- Graphical representation of the active flight plan.
- Magnetic heading.
- Navigational aids (NAVAIDS).
- Airways.
- Airspace.
- Miscellaneous annunciators installation.

The map function has two user-selected display modes:

- North-up.
- Heading-up.

These display modes allow the user to display the above mentioned information on a moving map in relation to the current aircraft position.

NOTE: MFD Navigation Display Heading and Drifting Bug is not totally covered for headings between 071° and 108°.

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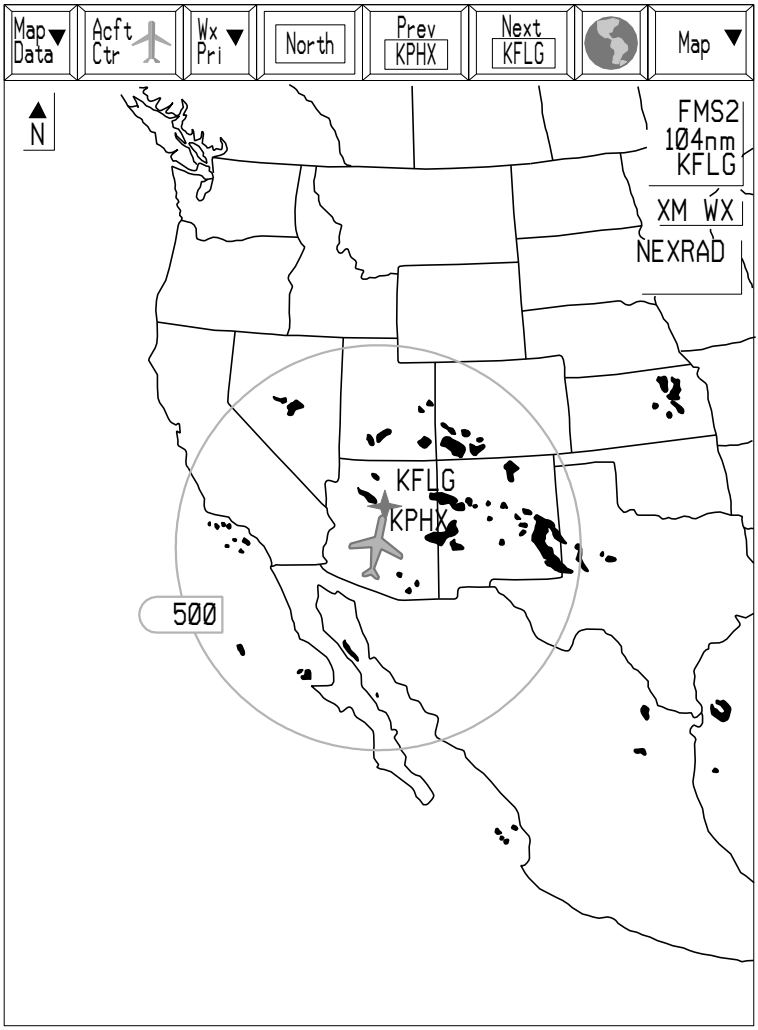

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MAP DISPLAY IN NORTH-UP MODE

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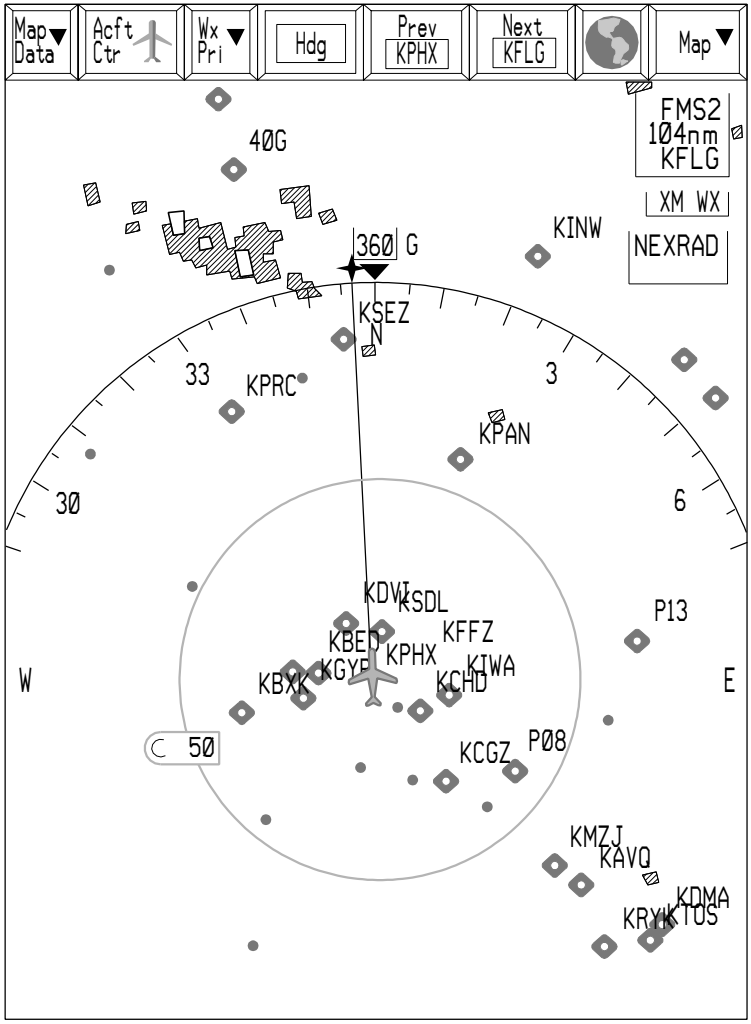

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MAP DISPLAY IN HEADING-UP MODE

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CCD

When the map function is installed on the airplane, the menu button is displayed as a selection on the top of the MFD. In a two MFD system, when Map or Charts are being viewed on one MFD, the CHARTS and MAP buttons on the other MFD are grayed and unselectable.

CCD operation for the uplink weather map permits selection on the MFD and map control bars, selection of the button, selection of the pull-down menu buttons, map scrolling, and cursor focus highlight.

Activation of the cursor is accomplished by the CCD, or by pushing the display selection button. Selection of the chart window is accomplished by positioning the cursor on the CHART menu button, and pushing the ENTER button on the CCD.

The control bar buttons and pull-down menu buttons are selected/deselected by positioning the cursor on the desired button and pushing the ENTER button on the CCD.

Buttons that are not available for selection are highlighted in dark gray with the text label and/or symbol highlighted in light gray. Buttons that are available for selection are highlighted in blue when the cursor is pointing within the interactive region of the button.

Control bar buttons with a pull-down menu are indicated by a white downward pointer. Highlighting and selecting the button displays the pull-down menu. The first option of any pull-down menu is automatically highlighted upon activation.

Activated pull-down menus are automatically deactivated when the CCD cursor is off the pull-down menu for more than 1 second or by pushing the ENTER button on the CCD when the cursor is off the activated pull-down menu.

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SCROLLING

The scroll bars around the outer edge of the map permit scrolling or laterally moving of the map. Scroll bars appear when the cursor is placed at the edge of the map and disappear when the cursor is moved away from the scroll bars. The scroll bars appear in either the north-up or heading-up mode.

Pushing either the ENTER button on the CCD when the cursor is on the center of a scroll bar scrolls the map in the direction indicated by the pointer on the bar. When the cursor is placed off-center on the scroll bar, the map scrolls in the direction of the placement of the cursor.

When the cursor is placed over one of the scroll bars and either the ENTER button is pushed once, the map moves a distance of 1/10 of the map range in the direction specified by the scroll bar pointer When the cursor is placed over one of the scroll bars and the ENTER button is held down for more than 1/2 second, the map continues to move a distance of 1/10 of the map range in the direction specified by the scroll bar pointer until the button is released.

When the scrolling function is in use and the map range is greater than 50 NM, the following display layers are removed:

– Airports.
– VOR.
– NDB.
– Intersections.
– Airways.
– Airspace.

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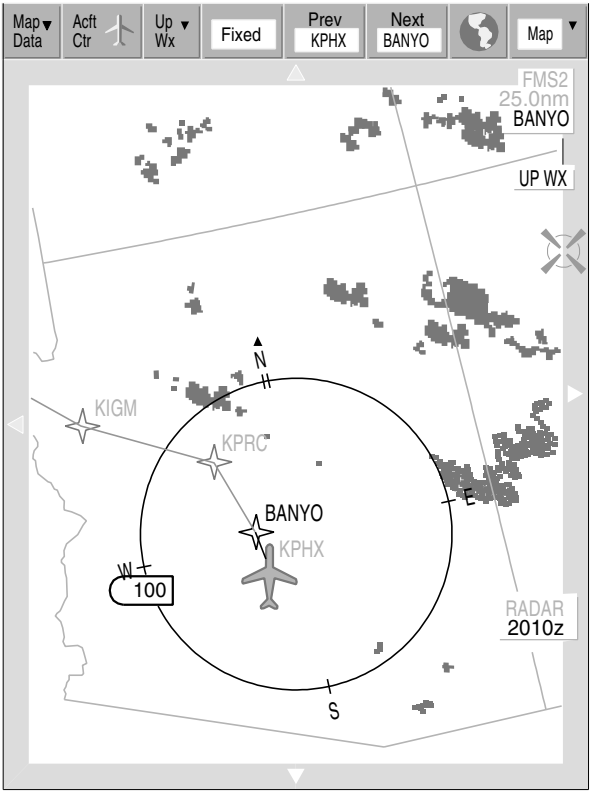

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MAP SCROLL BARS

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CURSOR FOCUS HIGHLIGHT

As the cursor is moved around the map display, the nearest selectable object to the cursor position is highlighted. Selectable point-type objects include:

- Airports.
- NAVAIDS.
- Non-directional beacons (NDBs).
- Intersections and waypoints.
- Airplane symbol.
- Airways.

The cursor focus highlight for selectable objects is a blue halo surrounding the object, centered on the latitude/longitude of the selectable object and an identifier text box.

Airways are the only selectable line-type objects to be highlighted. When an airway is highlighted, the line segment turns blue and a text box indicating the jet route or airway identifier is displayed. Since an airway segment can be shared by several airways, up to seven airway identifiers can appear in the text box.

Only one object can be highlighted at a time. When the cursor is placed over a point-type object and an airway is displayed through the object, only the point-type object is highlighted. When more than one object is in cursor focus, only the object closest to the cursor position is highlighted.

The identifier text box displays the identifier and three periods (PXR) to indicate there are multiple objects in cursor focus.

AIRPORT AIRWAY

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AIRPORT AND AIRWAR CURSOR FOCUS

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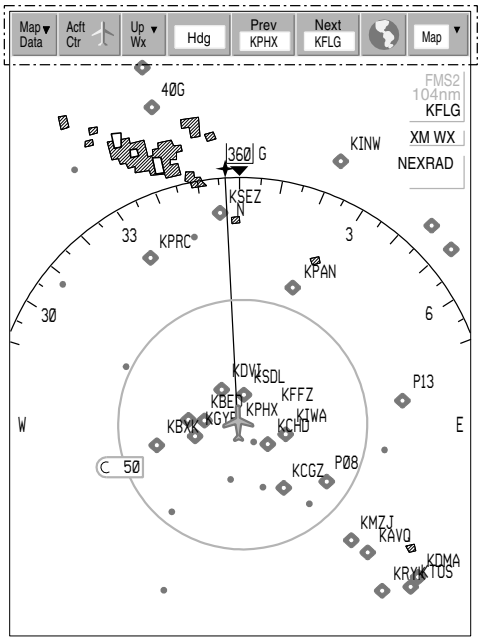
MAP CONTROL BAR LAYOUT

When the menu button has been selected on the MFD the map page is displayed. The buttons displayed for selection on the map control bar are the following:

– Map data.
– Airplane center.
– Uplink weather.
– Map mode.
– Previous waypoint.
– Next waypoint.
– Hot map.



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MAP CONTROL BAR

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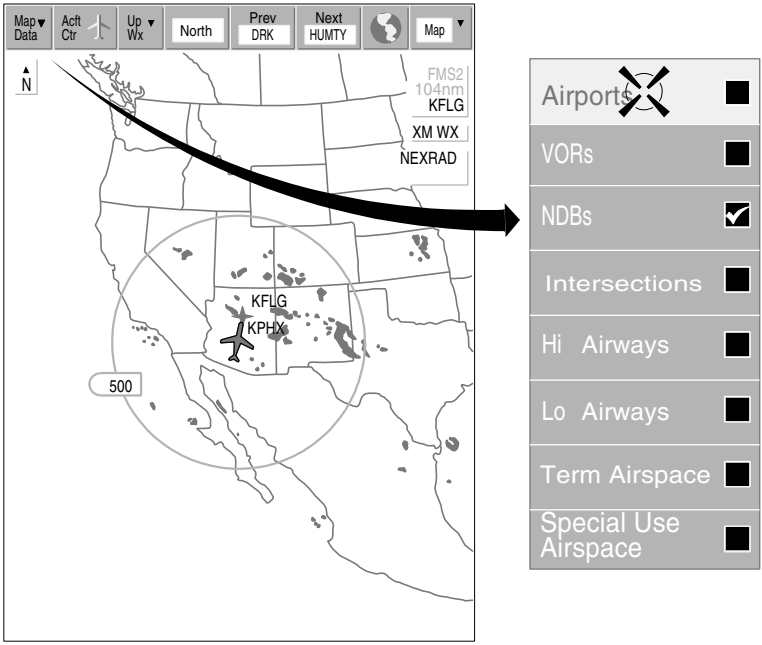
MAP DATA MENU

The map data menu button is on the uplink weather map control bar. Different data can be presented on the uplink weather map display based on selections made using the map data pull-down menu button. When the map data control bar button has been highlighted and selected, a pull-down menu is displayed as shown below.



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MAP DATA MENU BAR

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Check boxes on the pull-down menus are non-exclusive in selection capability and indicate a feature is either ON or OFF. Pull-down menus with check boxes can be selected in any combination of ON or OFF. An ON indication is displayed when a white check mark is in the check box of the button, and an OFF indication is displayed by the removal of the check mark.

MAP DATA MENU BAR

AIRPORT

– The airport symbols are positioned on the uplink weather map display at the location corresponding to the airports latitude and longitude location obtained from the navigation database. Orientation of the airports on the map display depends on which display mode has been selected. When the north-up mode is selected, the airports are oriented to 360°. When the heading-up mode is selected, the airports are oriented to the airplane heading. To reduce the amount of clutter, airports are displayed on the map based on airport category and the map range selected. Airports are divided into two categories, Major airports (when the airport has a runway with a length equal to or greater than 4000 ft) and Minor airports (when the longest runway at the airport has a length of less than 4000 ft).

VOR

– VOR symbols are positioned on the map display at the location corresponding to the VHF NAVAIDS latitude and longitude location obtained from the navigation database. VORs include all VHF NAVAIDS, such as VOR, VORTAC, VOR/DME, DME and TACAN.

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NDB

– NDBs are selectable for display from the pull-down menu on the map menu bar. NDB symbols are positioned on the map display at the location corresponding to the NDBs latitude and longitude location obtained from the navigation database. Orientation of NDBs on the map display depends on the selected display mode. When the north-up mode is selected, the NDBs are oriented to 360°. When the heading-up mode is selected, the NDBs are oriented to the airplane heading.

INTERSECTION

– Intersection symbols are positioned on the map display at the location corresponding to the latitude and longitude location of the intersection obtained from the navigation database. Orientation of intersections on the map display depends on the selected display mode. When the north-up mode is selected, the intersections are oriented to 360°. When the heading-up mode is selected, the intersections are oriented to the aircraft heading.

HI AND LO AIRWAYS

– High airways are also known as high-altitude Jet airways in the USA. Low airways are also known as low-altitude Victor airways in the USA. Other airways are non USA airways. Jet airways and other airways categorized as high airways are displayed when the button is selected. Victor airways and other airways categorized as low airways are displayed when the button is selected. Airway symbology is positioned on the map display at the location corresponding to the series of latitude and longitude locations obtained from the navigation database. All airway segments are displayed in thin gray lines.

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TERMINAL AND SPECIAL USE AIRSPACE

– Both airspace types can be displayed simultaneously on the map. Airspace symbology is positioned on the map display at the location corresponding to the airspaces series of latitude and longitude locations, obtained from the navigation database.

Terminal airspace consists of the classes CLASS B, CLASS C, CLASS D, Military terminal area or control, Oceanic control area (OCA), Terminal control area (TCA), Upper control area, Upper control area (non-airport), Air route traffic control center (ARTCC), Area control center, Flight information region (FIR), and Upper flight information region (UIR), FIR + UIR.

Special use airspace consists of the classes Air defense identification zone (ADIZ), Buffer zone (BZ), Alert area, Danger area, Military operations area (MOA), National security area, Prohibited area, Restricted area, Temporary reserved airspace (TRA), Temporary flight restriction (TFR), and Warning area.

Orientation of terminal airspace on the map display depends on which display mode has been selected. When the north-up mode is selected, both terminal and special airspace are oriented to 360°. When the heading-up mode is selected, both terminal and special airspace are oriented to the airplane heading.

ACFT CTR

The Airplane Center menu button is on the uplink weather map control bar. Selecting the button centers the map display on the FMS present position of the aircraft in either the north-up or the heading-up modes. The button re-centers the map display on the airplane without changing display modes.

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UPLINK WEATHER

The uplink weather button is on the uplink weather map control bar. When the control bar button is highlighted and selected, a pull-down menu is displayed.

UPLINK WEATHER MAP SYMBOLOGY

NAVIGATION SOURCE ANNUNCIATOR

– The navigation source annunciator is displayed as a digital readout in the upper-right corner of the map display. The navigation source used for this display is limited to either FMS1 or FMS2. The annunciator digits are displayed in white (FMS1/FMS2) when the navigation source for the pilot and copilot are different. The annunciator digits are displayed in amber (FMS1/FMS2) when the navigation source for the pilot and copilot are the same. When the navigation source is anything other than FMS1 or FMS2, the navigation source annunciator is not displayed.

ACTIVE WAYPOINT DISTANCE TO GO

– The FMS distance to the next waypoint is displayed as a digital readout located directly below the navigation source annunciator. When the distance-to-go is less than 100 NM, the digital readout resolution is 0.1 NM. When the distance-to-go is 100 NM or more, the digital readout resolution is 1 NM. The range of the digital readout is 0-9999. When the FMS distance-to-go information is valid, the digits are displayed in white. When the FMS distance-to-go information is not valid, the numerical digits are replaced with four amber dashes.

ACTIVE WAYPOINT IDENTIFIER

– When there is a valid active waypoint, the waypoint identifier is displayed in magenta directly below the active waypoint distance-to-go. When there is no valid active waypoint, the digits are six amber dashes.

NORTH-UP SYMBOL

– When the north-up mode is selected, a North symbol is displayed in the upper-left hand portion of the map under the map Data button.

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120° PARTIAL COMPASS HEADING (ARC) SCALE

– When the map mode is selected to the heading-up mode, a 120° partial compass arc is displayed. The arc is displayed 60° to either side of the current heading. The 120° partial compass heading scale rotates counterclockwise for an increasing heading and clockwise for a decreasing heading relative to the center of the aircraft symbol.

DIGITAL HEADING READOUT

– When the map mode is selected to the heading-up mode, a digital heading readout is displayed. The heading readout is a digital representation of the actual heading of the airplane. The heading readout is displayed above the lubber line with three white numerical digits, using leading zeros as necessary, and rounds to a resolution of 1°. When the heading information is no longer valid, the numerical digits are replaced with three amber dashes.

SELECTED HEADING BUG

– When the map mode is selected to the heading-up mode, a magenta heading bug is displayed on the 120° compass arc. When the heading bug is set to a heading not displayed on the 120° compass arc, a magenta left or right off-scale arrow is displayed. This arrow points to the shortest direction to the heading bug. When the heading status or the selected heading bug data is invalid, the heading bug and arrow are removed.

HEADING FAILURE ANNUNCIATOR

– When the heading information is not valid, a HDG FAIL annunciator is displayed on the map display.

ACTUAL TRACK LINE

– The current flight path of the aircraft is displayed as a dashed magenta line from the nose of the aircraft symbol to the outer edge of the heading scale. This line will not be displayed when the aircraft symbol has been scrolled off the boundaries of the map.

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FIXED MODE COMPASS

– Fixed mode occurs when the display is in the heading-up mode and the airplane is not centered. When this occurs, a 360° compass is centered on the map display. The compass circle is the heading mode half range circle, with the addition of tick marks and heading labels corresponding to the cardinal directions.

Single tick marks are displayed on the compass circle at the 90° points corresponding to the cardinal directions of East, South, and West. Cardinal heading labels (E, S and W), are displayed at the end of the tick mark of each cardinal heading.

Double tick marks are displayed on the compass circle at the point corresponding to the cardinal direction of North. A cardinal heading label of N is displayed at the end of the double tick marks corresponding to the cardinal heading of North.

RANGE DISPLAY

– The range display consists of a white half-range arc and a digital readout at the lower-left portion of the range arc. A cyan tuning curl is displayed to the left of the half-range digital readout when the cursor is on map range display.

The range display is located on both north-up and heading-up modes, as well as the heading-up mode when the aircraft is not centered (Fixed mode). The half range display values are the same for the heading-up mode and the north-up mode. The half range value remains the same when one display mode is toggled to the other.

The half-range values for the heading-up and the north-up displays are 1, 2, 3, 4, 5, 10, 25, 50, 100, 150, 200, 300, 400, and 500. To change the half-range value on the display, the cursor must be highlighting the half-range box. Once the tuning curl appears, the value can be changed by turning the concentric knob on the CCD until the desired half-range is displayed in the digital readout box.

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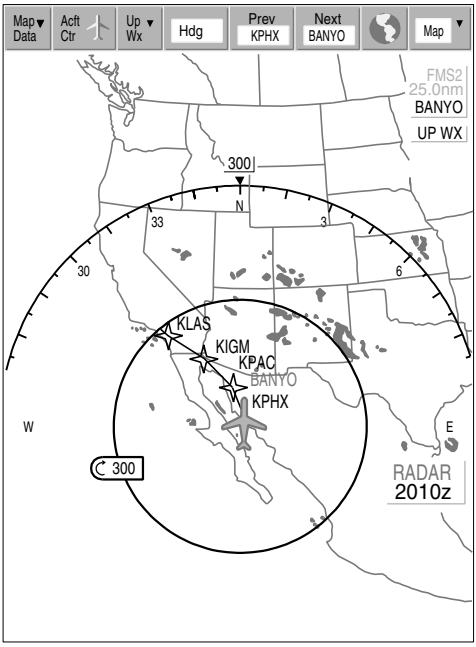
FMS FLIGHT PLAN DATA

– Flight plan information is obtained from the FMS. Each flight plan is transmitted in a map display. The map display contains all the waypoints, NAVAIDS, airports, vectors, and symbols needed to depict the flight plan.

FLIGHT PLAN DISPLAY

The FMS flight plan is drawn referenced to the heading mode selected for display on the map.
When the map mode is in the heading-up mode, the display rotation is oriented to the current heading of the aircraft.



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MAP FLIGHT PLAN IN HEADING-UP MODE

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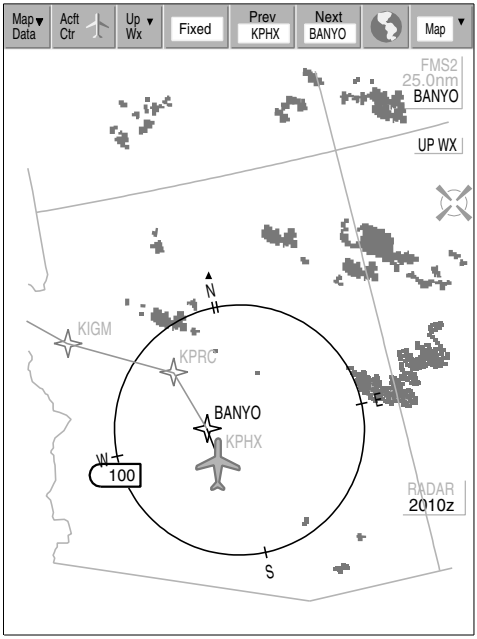
When the map mode is in the fixed mode, the FMS map display rotation is oriented to the last heading the aircraft had prior to scrolling off center.



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MAP FLIGHT PLAN IN FIXED MODE

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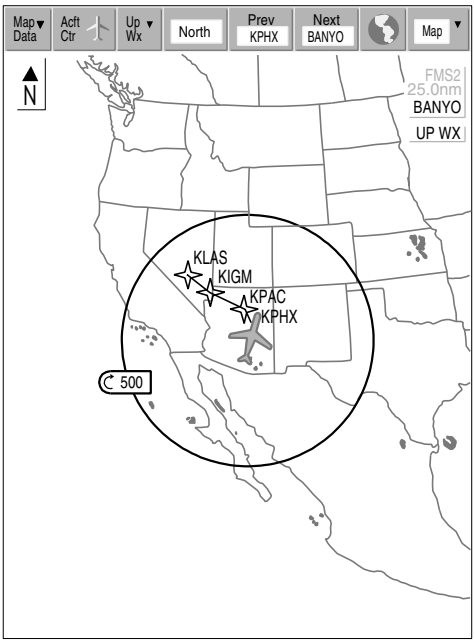
When the map mode is in the north-up mode, the FMS map display rotation is oriented to 360°.



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MAP FLIGHT PLAN IN NORTH-UP MODE

FMS flight plan display data is removed when there is no valid flight plan information from the FMS.

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FLIGHT PLAN WAYPOINTS

Each waypoint symbol is positioned on the map display according to the latitude and longitude of the waypoint. The waypoint identifier is positioned in the upper-right quadrant next to the symbol. The waypoint symbols and identifiers are oriented straight up regardless of the map rotation.

The TO waypoint and its identifier on the current route segment being flown are displayed in magenta. The FROM waypoint and all other waypoints are displayed in white.

Waypoint symbols and identifiers are removed from the map when the FMS data is invalid.

FLIGHT PLAN TRACK LINES

There are two types of flight plan track lines, vectors and curves. Vector lines are drawn on the flight plan to connect successive waypoints and display radials. Curves are drawn on the flight plan to display holding patterns, procedures turns, orbits, and turn icons.

When a TO waypoint is the current route segment being flown, the track line is displayed as solid magenta. When a FROM waypoint is the current route segment being flown, the track line is displayed as solid yellow. All other track lines are displayed as solid white lines.

Track lines are removed from the map when the FMS data is invalid.

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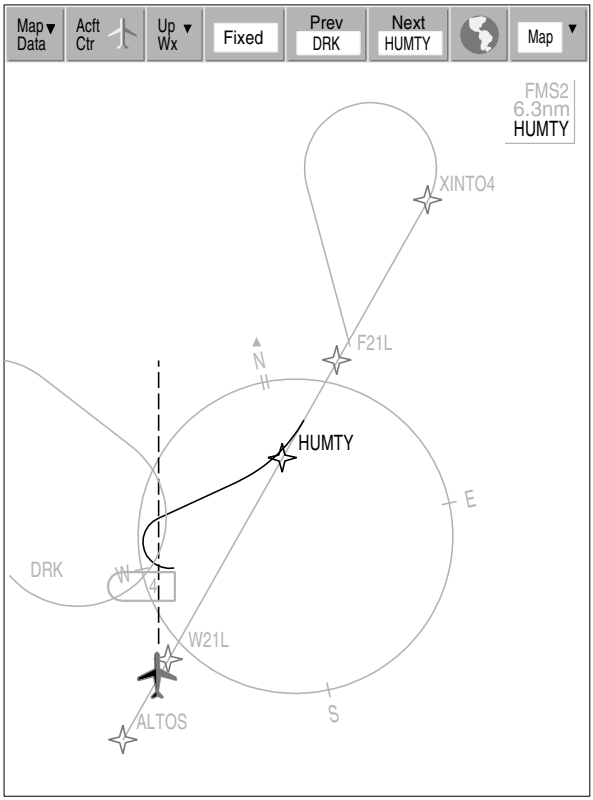

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MAP FLIGHT PLAN TRACK LINES

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AIRPLANE SYMBOL

– The airplane symbol gives a quick visual representation of the present position of the airplane in relation to true North and the active flight plan.

When the map mode is selected to the heading-up mode, the airplane symbol is located in the center of a 360° half-range arc and is fixed in a straight up orientation. When the map mode is selected to the north-up mode, the airplane symbol is oriented to 360°. When the map mode is in the fixed mode, the airplane symbol is oriented to the last heading the airplane had prior to scrolling off center.

When the location of the airplane symbol falls outside the viewable display area of the map, the airplane symbol is displayed in magenta. The airplane symbol is placed on the edge of the map in the relative direction of the airplane position.

The airplane symbol is removed from the map display when the FMS heading data is invalid.

GEO-POLITICAL

– Geo-political symbols are positioned on the map display at the location corresponding to the country or states latitude and longitude obtained from the FMS navigation database. Geo-political symbols shows a visual outline of Countries/States and Coastlines.

The geo-political symbols for countries and states consist of international country boundaries and state boundaries for Canada and USA.

When the FMS data for geo-political boundaries is valid, the geo-political symbols are displayed on the uplink weather map display as a thin gray line. The geo-political symbols are displayed at all ranges selected on the range display.

When the map display is in the heading-up mode and the heading information is not valid, the geo-political boundaries are oriented to 360°. In all other modes, the geo-political boundaries are oriented to the display orientation of a particular map.

The geo-political symbols are removed from the map display when the FMS data for geo-political boundaries is invalid.

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UPLINK WEATHER DISPLAY

The uplink weather function shows graphical displays of weather information overlaid on the uplink weather map. Graphical weather is received from a ground station over datalink by way of VHF, HF, or by Satcom data transmissions. The weather products available are RADAR, satellite, and winds aloft:

- NEXRAD.
- Satellite Cloud Height.
- Winds Aloft.
- Temporary Flight Restrictions.
- AIRMET.
- SIGMET.
- Clear Air Turbulence.
- Echo Tops & Storm Movement.

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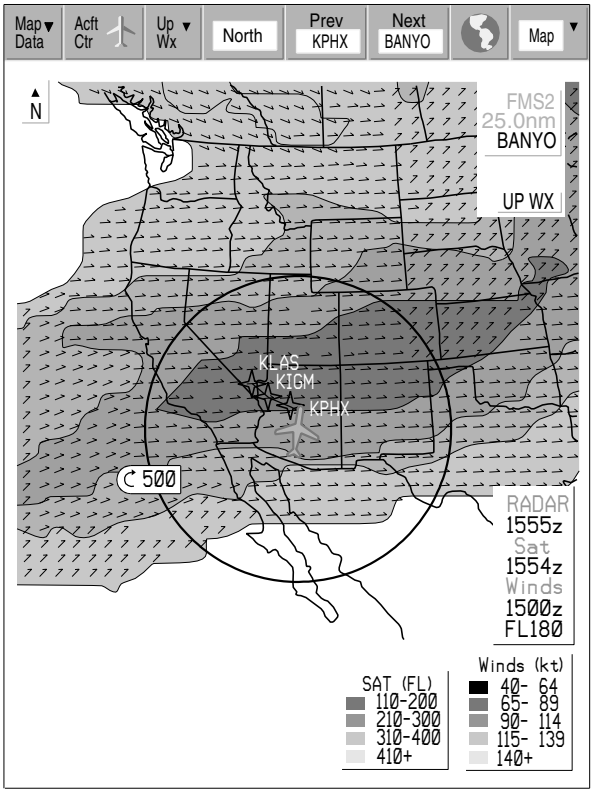

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MAP DISPLAY WITH WEATHER

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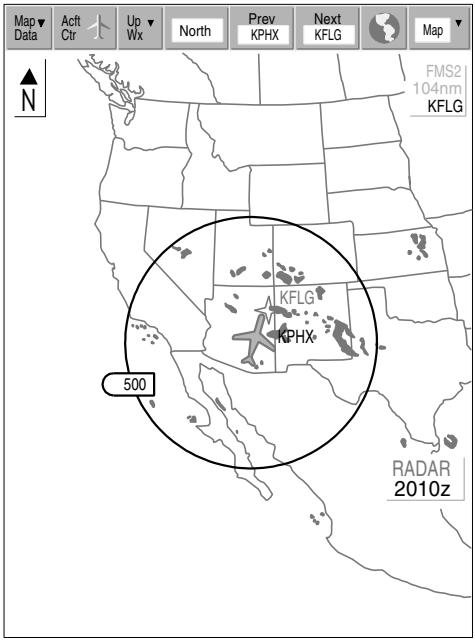
WX PRI

The Uplink Weather menu button is used to select different types of graphical weather products displayed on the uplink weather map, turn the legends ON or OFF, and open the uplink weather dialog box. This menu contains the following selections:

RADAR

Selection of the RADAR button displays a check mark in the check box. This permits the displaying of uplinked radar weather on the uplink weather map.



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WX PRI DISPLAY WITH RADAR

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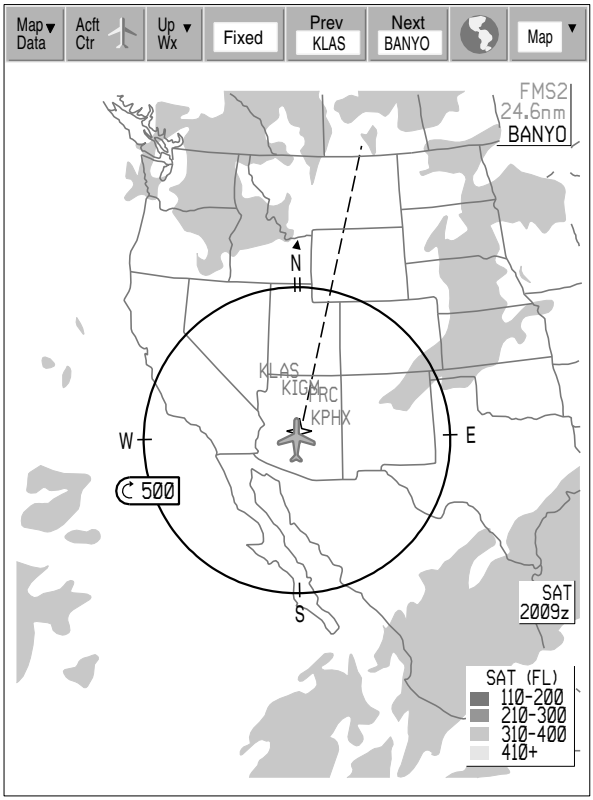
SATELLITE

Selection of the SATELLITE button displays a checkmark in the check box. This permits the displaying of uplinked satellite weather on the uplink weather map.



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WX PRI DISPLAY WITH SATELLITE

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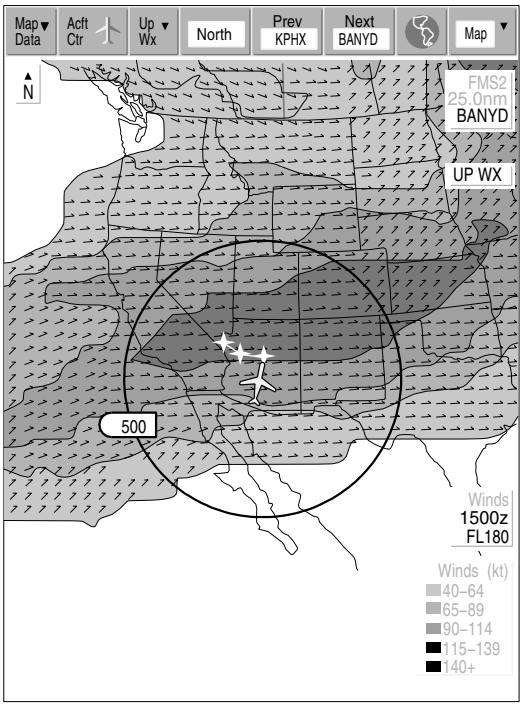
WINDS AND ALTITUDE RANGE

Selection of the WINDS button displays a check mark in the check box. This permits the displaying of uplinked winds aloft on the uplink weather map. Displaying the winds aloft at a specific altitude is accomplished by rotating the inner knob of the CCD to select the altitude on the altitude range display. The altitude in the range display is given in flight levels (FL180).



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WX PRI DISPLAY WITH WIND ALOFT

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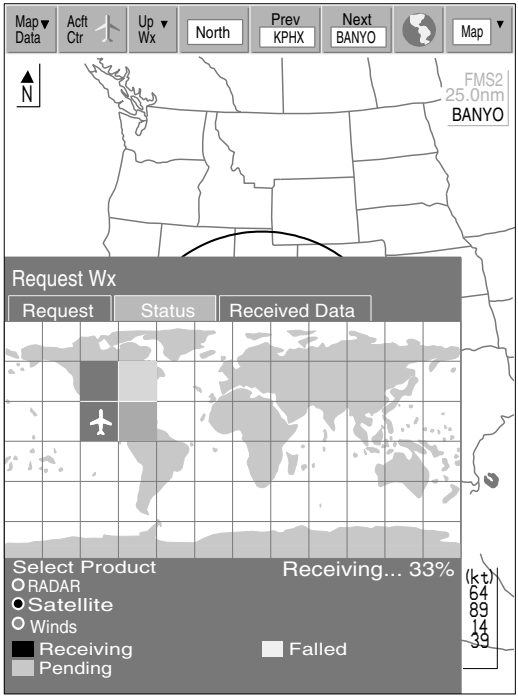
UPLINK WEATHER STATUS PAGE

The uplink weather Status page displays the status of the files being uplinked to the aircraft. The Status page displays the same grid map as the Requested page map, along with an airplane symbol. The tiles selected from the Requested page are highlighted on this map.

The Status page has a Select Product label on the left side of the display and directly below the map. There are three buttons displayed for selection below this label:

– RADAR.
– Satellite.
– Winds.



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WX PRI DIALOGUE BOX STATUS PAGE WITH SATELLITE SELECTED

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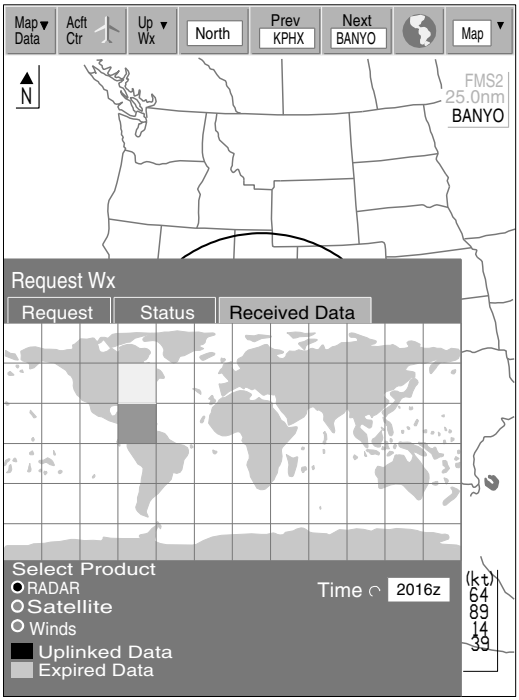
UPLINK WEATHER RECEIVED DATA PAGE

The uplink weather Received Data page allows the pilot to select a specified time stamp of the uplinked weather data. The Received Data page displays the same grid map as the Request page map along, with an airplane symbol.

The Received Data page has a Select Product label on the left side of the display and directly below the map. There are three buttons displayed for selection below this label:

– RADAR.
– Satellite.
– Winds.



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WX PRI DIALOGUE BOX RECEIVED DATA PAGE

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MAP MODE BUTTON

The map mode button is on the uplink weather map control bar. The uplink weather map defaults to the heading-up display mode on power-up. Selecting the map mode button toggles between the heading-up and north-up display modes.

Pushing the map mode button initially, when the airplane is not centered in either mode, automatically centers the airplane in the heading-up mode. Normal toggling between heading-up and north-up modes resumes.

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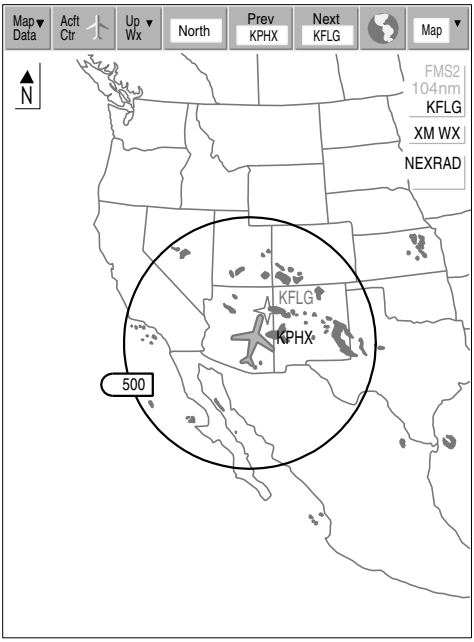
NORTH

– When the map mode button is selected and the map is in the heading-up mode and the airplane is centered, the north-up mode is displayed, and the map is oriented to 360°. The map mode button text changes to NORTH.



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MAP IN THE NORTH-UP MODE

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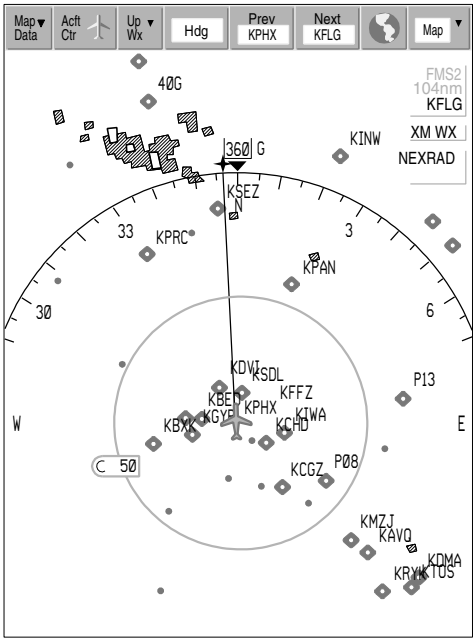
HDG

– When the map is in the north-up mode, and the map mode button is selected, the heading-up mode is displayed on the map. The airplane is centered, and the map is oriented to the current heading of the airplane. The map mode button text changes to HDG.



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MAP IN THE HEADING-UP MODE

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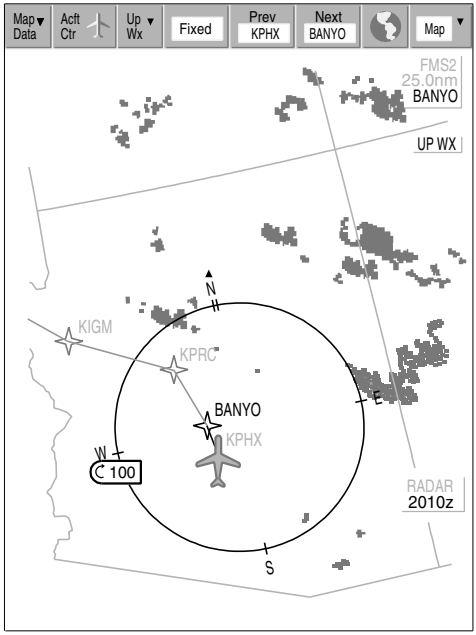
FIXED

– The map mode button text changes to FIXED anytime the airplane is not centered on the map. This occurs when the scroll bar is used or the PREV/NEXT waypoint buttons are selected.



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MAP IN THE FIXED MODE

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PREVIOUS/NEXT WAYPOINT BUTTONS

The PREV/NEXT waypoint buttons are on the uplink weather map control bar. The PREV/NEXT buttons give the pilot the ability to step through the flight plan using the map. Each time a button is pushed, the map moves to the next waypoint or the previous waypoint in the flight plan. The map is then centered on that waypoint. The order of the waypoints within the flight plan is determined by the FMS. Both north-up and heading-up modes have this capability. The map mode changes to the FIXED mode when the PREV/NEXT buttons are selected in the heading-up mode.

The name of the previous or next waypoint is located underneath the button. When the TO waypoint identifier is displayed under the buttons, the identifier is in magenta. All other waypoint identifiers under the buttons are white.

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PREVIOUS

– Upon initial selection of the uplink weather map, or when the map is not centered on a waypoint, the identifier below the PREV button is the preceding waypoint from the current position. Pushing the PREV button centers the map on the selected waypoint.

When the map is centered on a waypoint and the PREV button is selected, that waypoint is identified under the NEXT button. The preceding waypoint identifier in relation to the centered waypoint is now displayed under the PREV button.

When all of the FROM waypoints have been selected through, by pushing the PREV button, the destination waypoint identifier is displayed under the PREV button. When the destination waypoint has been centered on the map, the TO identifier starting at the end of the flight plan is displayed underneath the PREV button.

When the flight plan data does not indicate a valid previous waypoint, or there is no flight plan in the FMS, the PREV button is non-selectable and the ident field displays six gray dashes.

NEXT

– Upon initial selection of the uplink weather map, or when the map is not centered on a waypoint, the identifier below the NEXT button is the nearest TO waypoint from the current position. Pushing the NEXT button centers the map on the selected waypoint.

When the map is centered on a waypoint and the NEXT button is selected, that waypoint is identified under the PREV button. The nearest TO waypoint identifier in relation to the centered waypoint is now displayed under the NEXT button.

When all of the TO waypoints have been selected through by pushing the NEXT button, the destination waypoint identifier is displayed under the NEXT button. When the destination waypoint has been centered on the map, the FROM identifier starting at the beginning of the flight plan is displayed underneath the NEXT button.

When the flight plan data does not indicate a valid previous waypoint, or there is no flight plan in the FMS, the NEXT button is non-selectable and the ident field displays six gray dashes.

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HOT MAP BUTTON

The hot map button is on the uplink weather map control bar. The hot map button is used to bring up a map of the world for map display repositioning. After pushing the hot map button, the cursor is displayed as a magnifying window on the world map. The magnified area of the hot map opens to the current airplane position on the map display. The area around the current cursor position gives a two-times magnification of the hot map.

A green box is displayed on the world map highlighting the current map position displayed on the uplink weather map. An airplane symbol is displayed in the middle of the green box at the current airplane position and orientation. When the FMS heading information is not valid, the airplane symbol is oriented to 360°. When the FMS present position information is not valid, the airplane symbol is removed.

The bottom of the hot map shows the current cursor latitude and longitude position. As the cursor is moved around the hot map display, the latitude and longitude is updated to display the current latitude and longitude location of the cross hairs on the cursor. Pushing the ENTER button on the CCD, once the cursor is over the desired location on the hot map, causes the uplink weather map to center on the selected latitude/longitude position in the north-up mode, and the hot map disappears.

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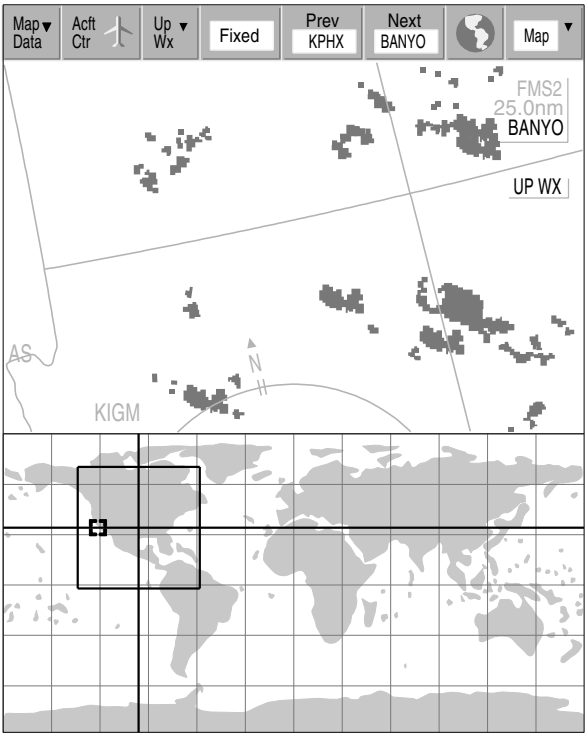

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HOT MAP

MAP WINDOW MENU CONTROL BUTTON

The map window menu control button is located to the right of the hot map button. The map window menu control button is unselectable.

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SECTION 2-05

ELECTRICAL

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GENERAL

The electrical power system supplies AC and DC voltage to all loads during normal or emergency operation.

Two different types of sources provide electrical power supply:

– DC Power.
– AC Power.

NOTE: Airplanes S/N 863 and on are not supplied with AC power.

The DC power system supplies 28 V DC for all airplane electrical loads and recharges the batteries. It is the primary electrical power supply system. The DC power system is comprised of:

– Four independent generators (28 V DC/400 A/engine driven).
– One APU starter-generator (28 V DC/400 A).
– Two Nickel-Cadmium batteries (24 V DC/44 Ah/1 hour rate).
– One lead-acid backup battery (24 V DC/5 Ah/10 hour rate).
– External power source.

AC power is supplied by one 250 VA/400 Hz single-phase static inverter, which converts 28 V DC into 115 V AC.

A dedicated page on the MFD (electrical page) provides, on request, information regarding system configuration, load and voltage conditions as well as battery temperatures. Furthermore, warning and caution messages are presented on the EICAS to indicate an electrical system failure.

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DC SYSTEM

The 28 V DC electrical power system automatically controls power contactors, fault protection, load shedding and emergency system operation. This reduces pilot workload during normal operation, external power supply or system failures. The Electrical Distribution Logic (EDL) and Generator Control Units (GCU) perform system management. Detected system failures are automatically isolated, causing some bus(es) to be deenergized.

Under normal operation, the electrical DC system is divided into isolated left and right electrical networks. The left network includes generators 1 and 3, driven by engine 1. Operated in parallel, generators 1 and 3 are connected to DC BUS 1 to supply ESSENTIAL DC BUS 1, SHED DC BUS 1 and HOT BUS 1. Battery 1 is charged by the generators connected to DC BUS 1. Similarly, generators 2 and 4 power the right network and are driven by engine 2.

Both networks are interconnected through Bus Tie Contactors (BTC) in case of operation with less than four generators. APU generator may replace any inoperative generator, or may be used before engine starting when the APU generator or Ground Power Unit (GPU) may supply the electrical system.

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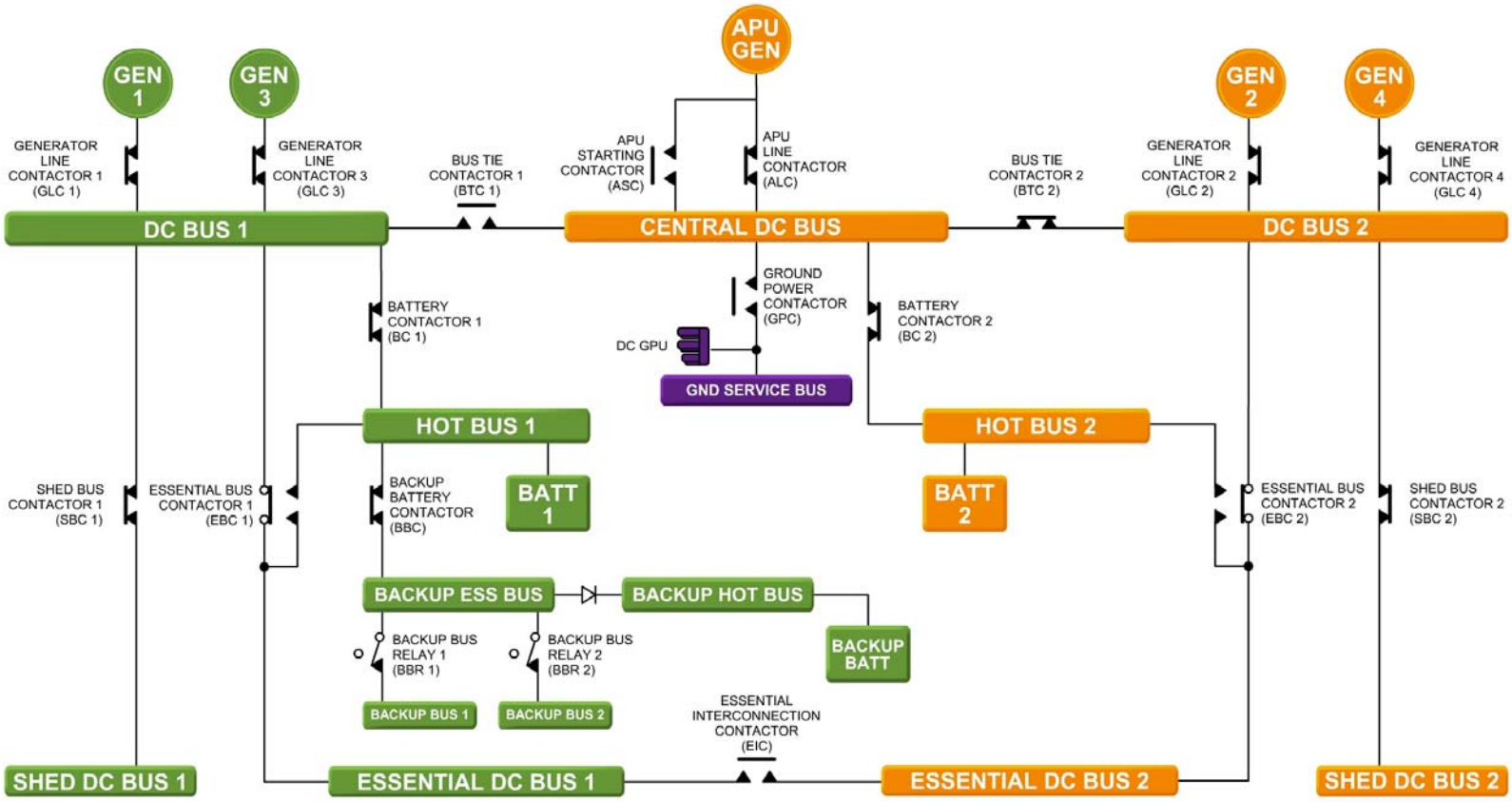

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DC ELECTRICAL DISTRIBUTION SYSTEM SCHEMATIC

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DC SYSTEM PROTECTION

The system monitors generators current and voltage to the electrically supplied equipment to protect it from a control unit failure, such as an overvoltage or a bus failure. If an overvoltage is detected, the associated GCU deenergizes the generator, disconnecting it from the bus.

A bus failure produces an overcurrent condition to one or more generators. Upon sensing this overcurrent, the GCU isolates the system networks, opening the BTCs. If any generator remains overloaded due to the failure, it is then deenergized and disconnected from the bus.

As long as the generator current exceeds 400 A, a caution message is presented on the EICAS, indicating that manual load shedding is required. If no action is taken, the system will be isolated and some buses may be deenergized.

System protections are designed so that normal transients will not cause generators to be disconnected from the bus inadvertently.

Resetting of the generator after a failure is accomplished by releasing the associated GEN Button and then pressing it again.

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EXTERNAL POWER SOURCE

The Ground Power Unit (GPU) is connected to the airplane through an external receptacle. The GPU supplies 28 V DC to the load buses for ground operation and APU starting, independently of the internal batteries.

The GPU has priority over any battery and generator when energizing the airplane. Thus, the generators and the batteries cannot operate in parallel with the GPU.

The GPU Button, located on the overhead panel, controls the External power supply. As soon as the Ground Power Unit is energized, properly connected to the airplane receptacle, ready to supply power but not connected to the buses, the GPU AVAIL inscription illuminates on the GPU Button. A identical inscription above the GPU receptacle simultaneously illuminates.

When GPU AVAIL is illuminated and the batteries are not connected to the buses, only the GROUND SERVICE BUS is supplied through the external power supply. When the GPU Button is pressed, the Ground Power Contactor (GPC) will close, allowing the external power to feed the load buses. When the external power comes on line, the GPU AVAIL inscription on the GPU Button extinguishes itself and the white stripe on the button lower half illuminates.

An overvoltage circuit isolates the GPU from the airplane's electrical buses if the GPU voltage is incorrect. External power inverse polarity protection is also provided. To reset the system, release the GPU Button and then press it again. If the GPU overvoltage persists, GPC will be kept open.

The external power voltage can be monitored through the electrical page, on the MFD. The electrical system page shows the GPU box and its voltage. The GPU voltage indication is removed in flight.

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BATTERIES

Two 24 V DC, 44 Ampere-hour, nickel-cadmium batteries supply essential loads in case of an in-flight failure of all generators or if both engines are shut down simultaneously and the APU is not available. Both batteries can supply at least 40 minutes of power for essential loads in an all-generator-failure condition.

During normal operation, Battery 1 is connected in parallel with generators 1 and 3 (network 1). Battery 2 is connected in parallel with generators 2 and 4 (network 2). Battery 2 also supplies power for APU starting.

During APU starting, battery 1 is isolated from the load buses. While battery 2 provides power for APU start, battery 1 provides stable electrical power to the equipment that can be adversely affected by voltage transients.

A selector switch on the overhead panel controls each battery. When set to the AUTO position, battery contactors (BC 1 or BC 2) actuation is controlled according to the Electrical Distribution Logic (EDL). When the GPU is connected, the battery contactors open so that only the GPU can supply the load buses. When on the ground, with the batteries as the only electrical power source, EDL deenergizes the shed buses for battery conservation. When the BATT Knob is switched to the OFF position, the battery contactor opens, isolating the battery from the system.

The batteries are installed in the battery compartment, on the left side of the airplane nose section. They are ventilated in flight by forced airflow to prevent overheating. Temperature sensors installed in each battery provide temperature indication to the MFD. If battery internal temperature rises above 70°C, a warning message is presented on the EICAS. If a battery is isolated from the load buses, a caution message is displayed on the EICAS.

In case of Loss of All Generators, battery duration is 40 minutes, even considering that three APU start were attempted. This is not valid in case the batteries were used on ground for an APU and/or Engine Start and the airplane did not remain for 30 minutes on ground with generators on.

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BACKUP BATTERY

A 24 V DC, 5 Ampere-hour sealed lead-acid battery provides stabilized power for operation of the GCUs protective function, even in case of short-circuit, when system voltage may drop near zero volts.

The BACKUP Battery Button, on the overhead panel controls the backup battery. Pressing the button when the BATT 1 or 2 Knob is set to the AUTO position connects the backup battery to the electrical system for charging. If the BACKUP Battery Button is released, a caution message is displayed on the EICAS.

GENERATORS

The primary source of electrical power are the four 28 V DC, 400 Amperes, independent engine-driven brushless generators, two installed on each engine accessory gearbox.

Each generator is automatically controlled and protected by a dedicated Generator Control Unit (GCU), provided the GEN Button on the overhead panel is pressed.

The generators will come on line when engine speed stabilizes above 56.4% N2. If a failure occurs and the Generator Line Contactor (GLC) opens, a reset may be attempted once by releasing the associated GEN Button and then pressing it again.

Anytime the Generator Line Contactor is inadvertently opened or generator current is above 400 A, a caution message is displayed on the EICAS. The generator voltage and current can be monitored through the electrical page, on the MFD.

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APU STARTER-GENERATOR

A 28 V DC, 400 Amperes, APU-driven starter-generator supplies electrical power during ground operation or in flight, as an alternative source of electrical power. The APU starter generator is controlled and protected by its dedicated GCU.

The APU GEN Button, on the Electrical System Panel, must be pressed for normal operation. The APU line contactor is actuated on and off by APU speed. If a failure occurs on the APU generator, a reset may be attempted releasing the APU GEN Button and pressing it again. Only one reset may be attempted.

The APU generator, when operating, is connected in parallel with the generators supplying DC Bus 2. If needed, the APU generator can replace an inoperative left network generator. After starting, and with an engine driven generator inoperative, the APU generator automatically replaces the inoperative generator.

Three electrical sources may be used to power an APU start: ground power unit, battery 2 or battery 2 assisted by the main generators. Battery 1 cannot be used for APU starting. Instead, it is isolated from the load buses to provide stable electrical power to supply equipment that may be affected by voltage fluctuation.

During starting, the APU Starting Contactor (ASC) is closed, allowing the APU starter-generator to operate as a starter, energized through the Central DC Bus. When the APU starting cycle is completed, the ASC opens. A caution message is displayed on the EICAS if the ASC does not open.

At 95% RPM plus seven seconds, the APU starter generator is available to supply electrical power to the system. In this condition, the APU Line Contactor (ALC) is closed, connecting the APU starter generator to the load buses. If the ALC does not close due to contactor failure or button not pressed, a caution message is displayed on the EICAS.

The APU starter generator voltage and current may be monitored on the MFD.

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ELECTRICAL DISTRIBUTION LOGIC

Many different configurations are available in the Electrical Distribution Logic (EDL) to suit any particular situation. The EDL's architecture is symmetrical and the operational logic sequence for EDL 1 is the same as for EDL 2. EDL 1 is composed of DC Bus 1, Shed DC Bus 1, Essential DC Bus 1 and Hot Bus 1. The EDL 2 is composed of DC Bus 2, Shed DC Bus 2, Essential DC Bus 2 and Hot Bus 2.

The Central DC Bus primary function is to connect the APU generator or GPU to the load buses through the Bus Tie Contactors (BTC). The Central DC Bus also provides bus interconnections in case of symmetrical configuration, such as generators failure or engine shutdown.

EDL logic differs depending on whether the airplane is on the ground or in flight. In flight, some buses are deenergized, depending on the power source available.

On the ground, all the DC buses are energized if at least one of the following conditions occurs:

– At least three generators are on.
– The GPU is on and connected to the airplane.
– At least one generator is on, and the SHED BUSES Selector is set to OVRD position.

The DC distribution table below shows the Electrical Distribution Logic configuration according to the conditions of the generators.

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DC DISTRIBUTION TABLE

CONDITION	RESULTS
4 or 5 Generators On	Two isolated left and right electrical networks with all buses energized.
3 Generators On	Both electrical networks interconnected through Bus Tie Contactors with all buses energized.
1 or 2 Generators On	Both electrical networks interconnected through Bus Tie Contactors with shed buses deenergized.
Loss of all Generators	Batteries to supply the Essential Buses (in-flight condition only).

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GROUND SERVICE BUS

The Ground Service Bus is energized by connecting the GPU connector to the airplane receptacle and provided the batteries and generators are not connected to the buses (GPC, BC 1 and BC 2 are open).

The Ground Service Bus supplies electrical power for airplane servicing and maintenance while on the ground. It functions independently of the Electrical Distribution Logic and does not energize all electrical distribution buses.

The following lights will be powered by the Ground Service Bus:

– Passenger cabin lights;
– Lavatory lights;
– Galley lights;
– Courtesy/stairs lights;
– Cockpit dome lights;
– Baggage/service compartment lights.

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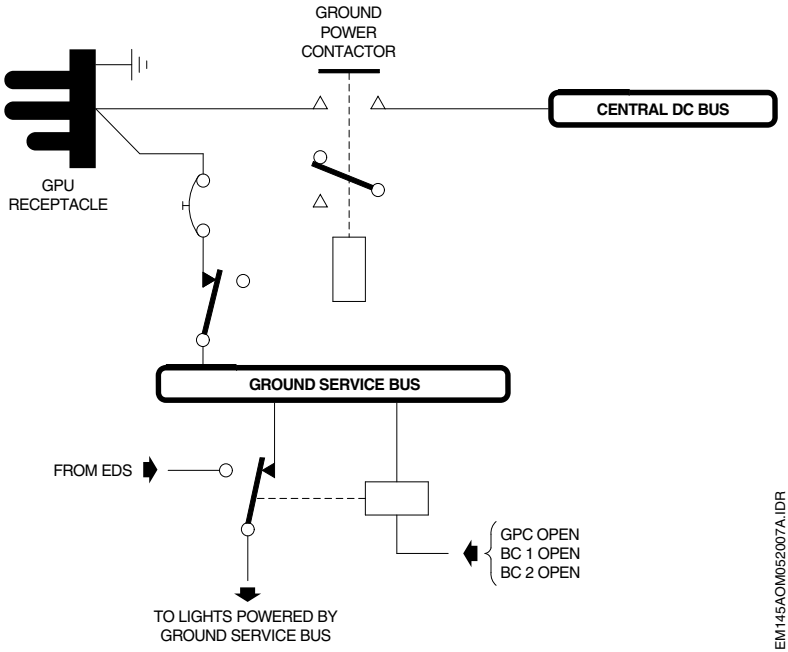

GROUND SERVICE SCHEMATIC

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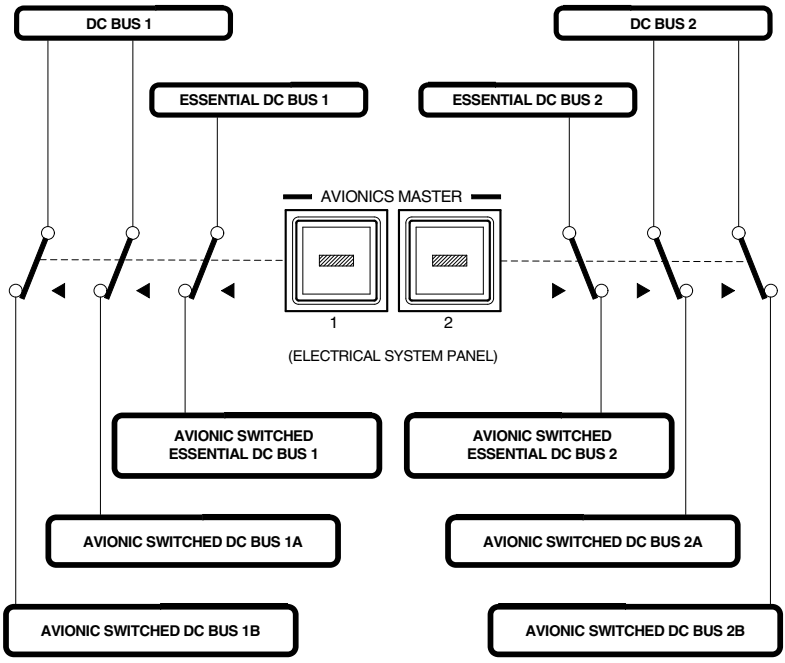
AVIONICS MASTER

The avionics master system allows manual disconnection of some navigation and communication equipment from the load buses. This prevents undesirable voltage transients during APU starting on the ground.

The avionics master system consists of six buses: Avionics Switched DC Buses 1A, 1B, 2A, 2B and Avionics Switched Essential DC Buses 1 and 2. These buses are supplied by their associated DC buses. Two AVIONICS MASTER Buttons, located on the overhead panel, control switching the buses.



AVIONICS MASTER SCHEMATIC

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AC SYSTEM (APPLICABLE TO AIRPLANES UP TO S/N 854)

One 250 VA/400 Hz single phase static inverter converts 28 V DC electrical power into 115 V AC for airplane systems requiring AC power. The avionics system is the primary user of AC power.

The inverter is power supplied by the DC Bus 1 and controlled by the AC Power Button, on the overhead panel. If DC Bus 1 is energized and the AC Power Button is pressed, the 115 V AC BUS is automatically energized. If the DC Bus 1 is deenergized, the inverter becomes inoperative.

To reduce pilot workload, the AC Power Button should remain pressed, even after engine shutdown. If the AC Power Button is released, a striped bar illuminates to indicate that the button is out of normal operating condition.

During normal airplane operation, if 115 V AC BUS is deenergized, a caution message is displayed on the EICAS. An inverter reset may be attempted through the AC Power Button, by releasing and then pressing it again.

Under electrical emergency conditions the inverter stops the operation.

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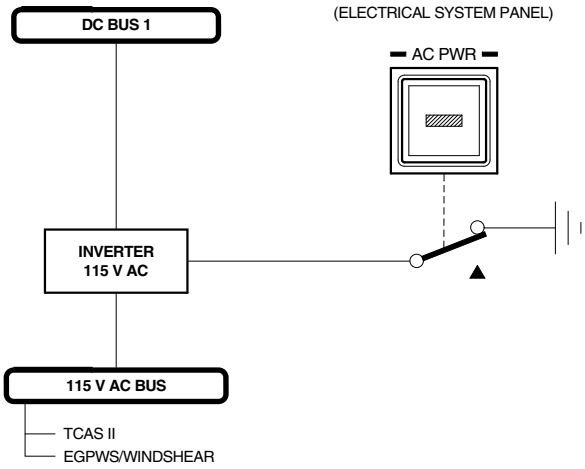

AC GENERATION AND DISTRIBUTION SCHEMATICS FOR AIRPLANES UP TO S/N 854

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ELECTRICAL DISTRIBUTION LOGIC (EDL) CONFIGURATIONS AND DIAGRAMS

ABNORMAL OPERATION CONFIGURATIONS

For the Electrical Distribution Logic configurations presented here, the initial control positions on the Electrical System Panel are the following:

– GEN Buttons pressed.
– GPU Button released.
– BATT Knobs set to AUTO position.
– ESSENTIAL POWER Button released.
– BUS TIES Selector set to AUTO position.
– SHED BUSES Selector set to AUTO position.
– BACKUP Battery Button pressed.
– AVIONICS MASTER Buttons pressed.

NOTE: - All abnormal conditions considered below are in-flight conditions.

- In the schematic configurations, the continuous boxes indicate energized buses while dashed boxes indicate deenergized buses.

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CONFIGURATION 1

Loss of one left side generator (network 1):

- **Without APU generator available:**
  - GLC 1 or GLC 3 is open.
  - ALC is open.
  - BTC 1 is closed.
- **With APU generator available:**
  - GLC 1 or GLC 3 is open.
  - ALC is closed.
  - BTC 1 is closed and BTC 2 is open.

Loss of one right side generator (network 2):

- **Without APU generator available:**
  - GLC 2 or GLC 4 is open.
  - ALC is open.
  - BTC 2 is closed.
- **With APU generator available:**
  - GLC 2 or GLC 4 is open.
  - ALC is closed.
  - BTC 2 is closed and BTC 1 is open.

Loss of two generators with APU generator available:

- GLCs from affected generators are open.
- ALC is closed.
- BTC 1 and BTC 2 are closed.

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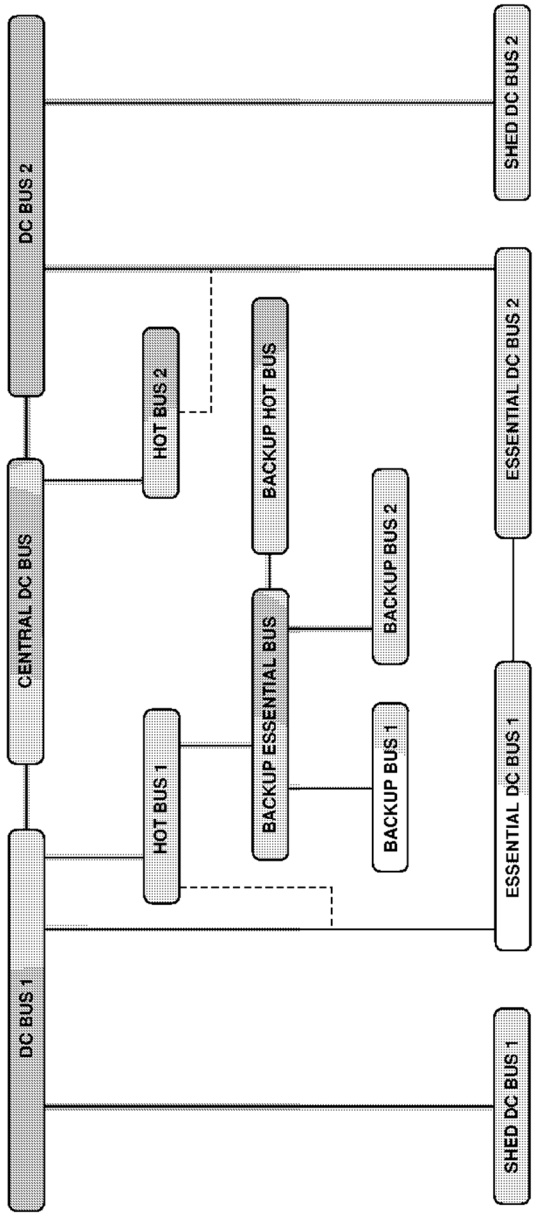

CONFIGURATION 1

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CONFIGURATION 2

Loss of two generators without APU generator available:

- GLCs from affected generators are open.
- ALC is open.
- BTC 1 and BTC 2 are closed.
- SBC 1 and SBC 2 are open.

Loss of three generators without APU generator available:

- GLCs from affected generators are open.
- ALC is open.
- BTC 1 and BTC 2 are closed.
- SBC 1 and SBC 2 are open.

NOTE: Depending on the amount of load on the remaining buses, an overload condition may occur. In this case, pilots are required to perform an additional load shedding.

Loss of three generators with APU generator available:

- GLCs from affected generators are open.
- ALC is closed.
- BTC 1 and BTC 2 are closed.
- SBC 1 and SBC 2 are open.

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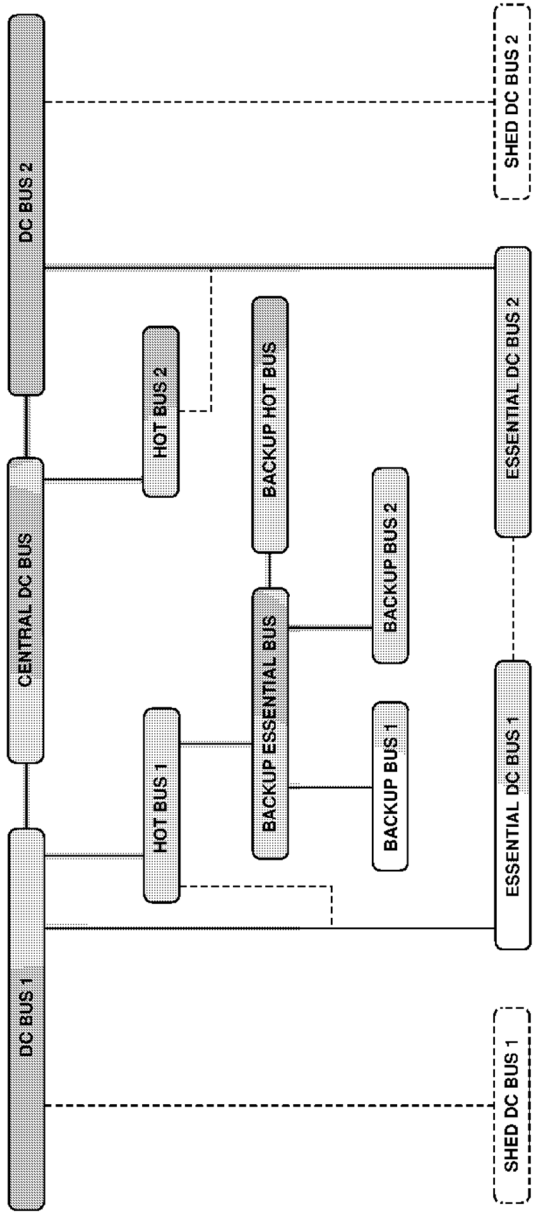

CONFIGURATION 2

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CONFIGURATION 3

Loss of all generators:

- When the last generator fails, the operational logic configures the system to dedicate the batteries to supply the Essential Buses only (electrical emergency condition). In this configuration, the Central DC Bus is also powered to allow the APU to be started.
- BTC 1, BTC 2, BC 1, SBC 1, SBC 2, BBR 1 and BBR 2 are open.
- EIC, EBC 1, EBC 2 and BC 2 are closed.

NOTE: - This operational mode is activated for in-flight condition only.

- A 1-second time delay is provided to avoid inadvertent switching to emergency configuration due to electrical transients.
- If the automatic transfer fails, perform this function manually by pressing the ESSENTIAL POWER Button.
- While In-flight, the electrical system is automatically reset if at least one generator is reset and supplying its associated bus.
- On the ground, the system can be reset by switching both BATT Knobs from AUTO to OFF and then back to AUTO.

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MENU
PREVIOUS
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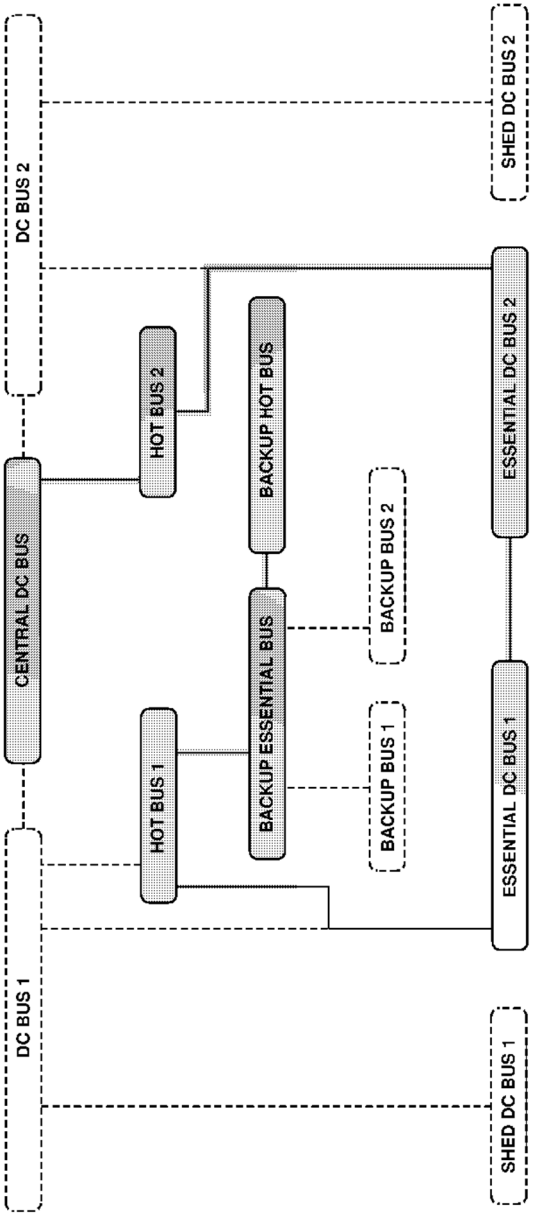

CONFIGURATION 3
(ELECTRICAL EMERGENCY CONDITION)

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CONFIGURATION 4

Short circuit at one DC Bus with all generators on:

- Associated battery is removed from affected DC bus through a fuse.
- BTC 1 and BTC 2 are open.
- Both GLCs of the affected DC Bus are open, isolating the bus.
- Cross-side BTC and EIC are closed and affected side EBC is energized to maintain both Essential DC Buses energized and batteries charged.

Short circuit at one DC Bus with loss of one associated generator and with APU generator:

- Associated battery is removed from the affected DC bus through a fuse.
- BTC 1 and BTC 2 are open.
- Remaining GLC of the affected DC Bus opens, isolating the bus.
- Cross-side BTC and EIC are closed, and affected side EBC is energized to maintain both Essential DC Buses energized and batteries charged.

Short circuit at one DC Bus with loss of associated generators and with APU generator:

- Both batteries are removed from the affected DC bus through the fuses.
- BTC 1 and BTC 2 are open.
- EIC closes and EBC of affected side is energized to maintain the associated Essential DC Bus energized and associated battery charged.

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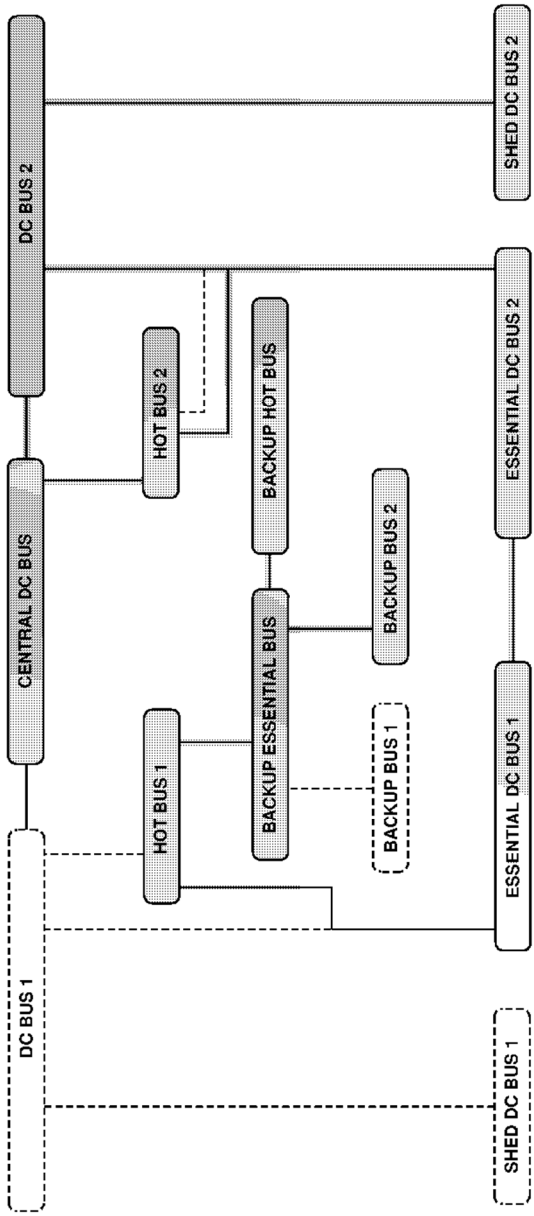

CONFIGURATION 4
(ONLY EDL 1 FAILURE SHOWN)

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CONFIGURATION 5

Short circuit at one DC Bus with loss of one associated generator and without APU generator:

- Both batteries are removed from the affected DC bus through the fuses.
- BTC 1 and BTC 2 are open.
- Remaining GLC of the affected DC Bus opens, isolating the bus.
- Cross-side BTC and EIC close, and EBC of the affected side is energized to maintain both Essential DC Buses energized and associated battery charged.
- Both SBCs are open.

Short circuit at one DC Bus with loss of associated generators and without APU generator:

- Both batteries are removed from the affected DC bus through the fuses.
- BTC 1 and BTC 2 are open.
- EIC closes and EBC of the affected side is energized to maintain the associated Essential DC Bus energized and associated battery charged.
- Both SBCs are open.

Short circuit at one DC Bus with loss of associated generators plus one generator of the other side, with or without APU generator:

- The EDL operational sequence is the same as in the previous condition.

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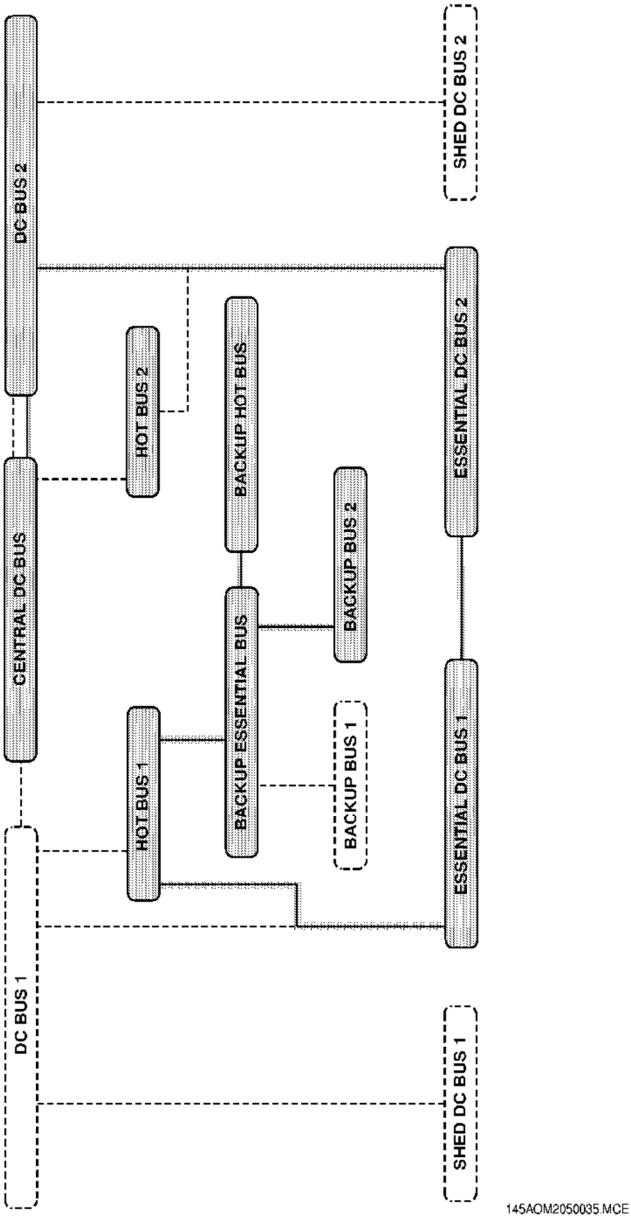

CONFIGURATION 5
(ONLY EDL 1 FAILURE SHOWN)

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NORMAL, ABNORMAL AND EMERGENCY OPERATION DIAGRAMS

The following diagrams present the Electrical System layout when operating in normal, abnormal and emergency condition.

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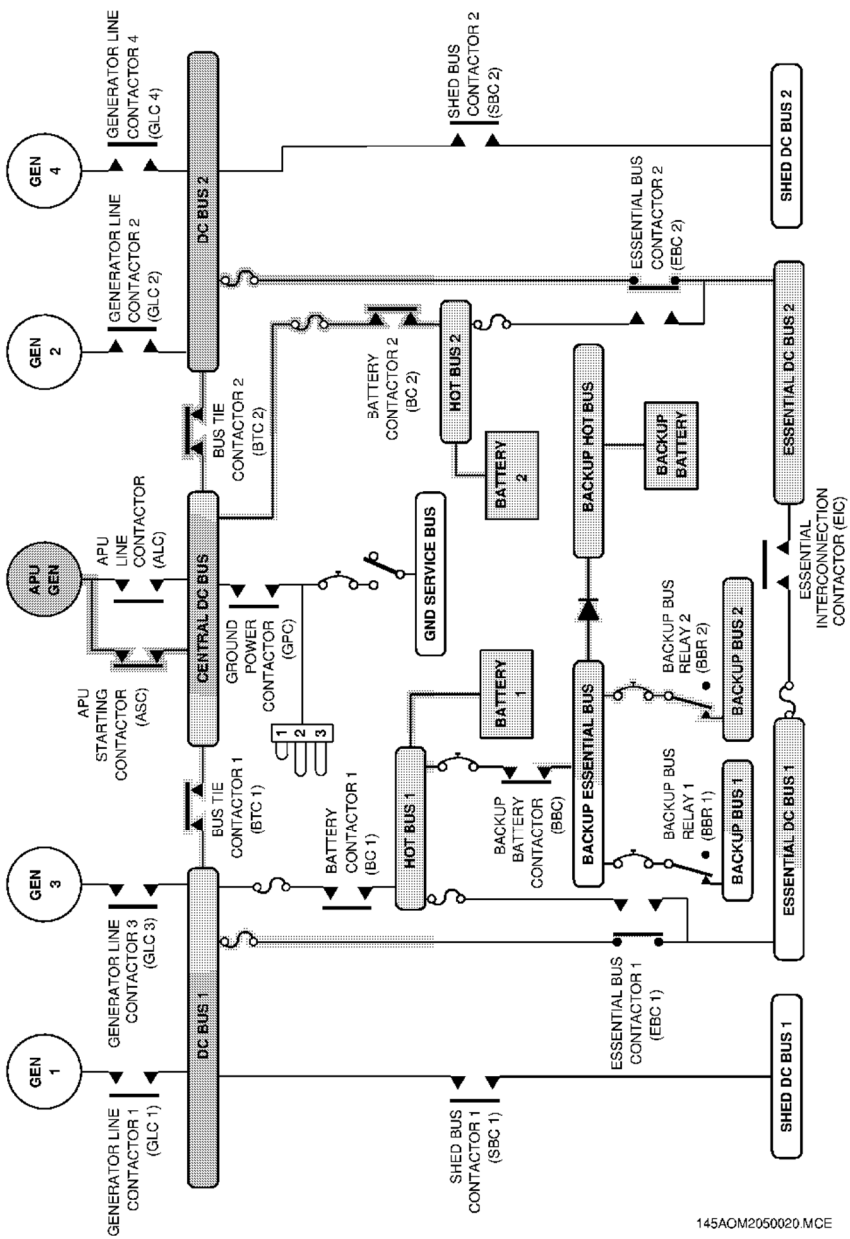

EDL STATUS DURING APU STARTING WITH BATTERIES

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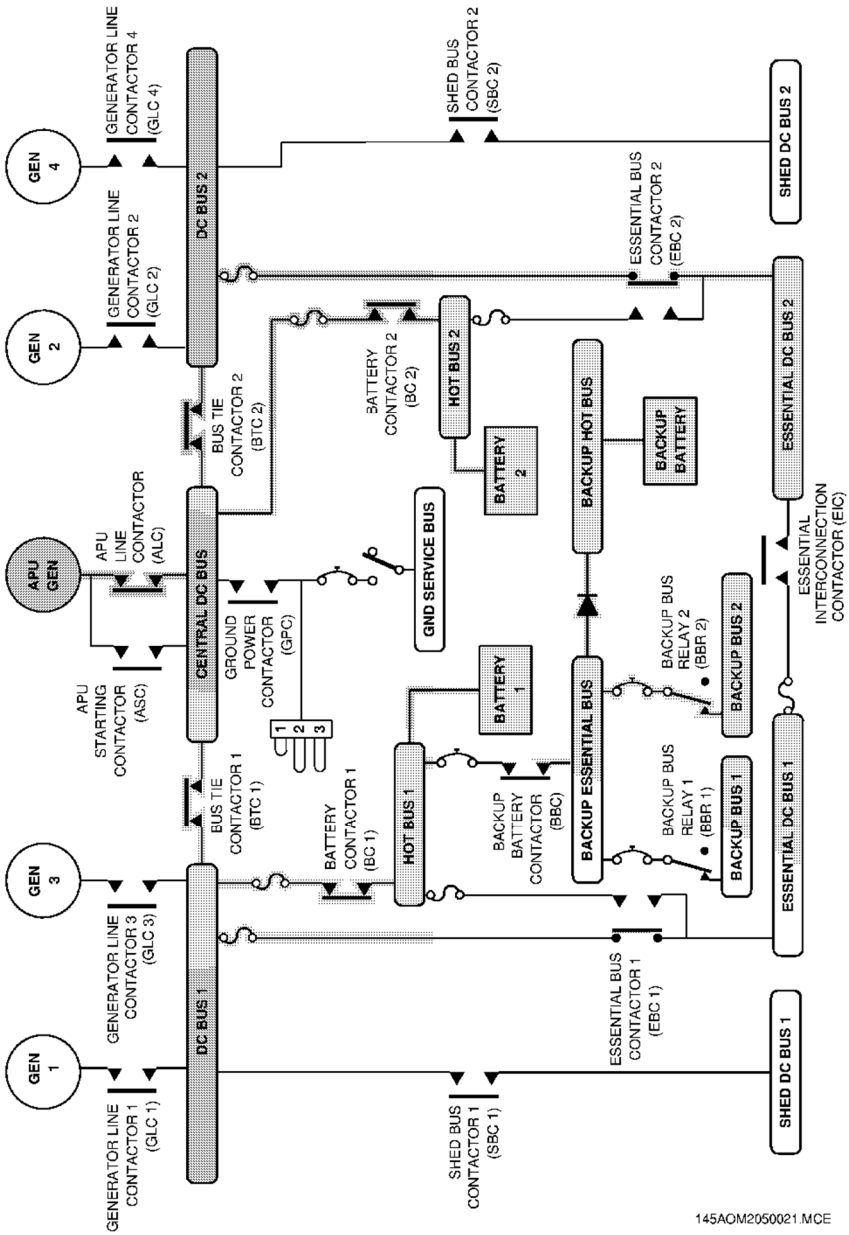

EDL STATUS AFTER APU STARTING WITH BATTERIES

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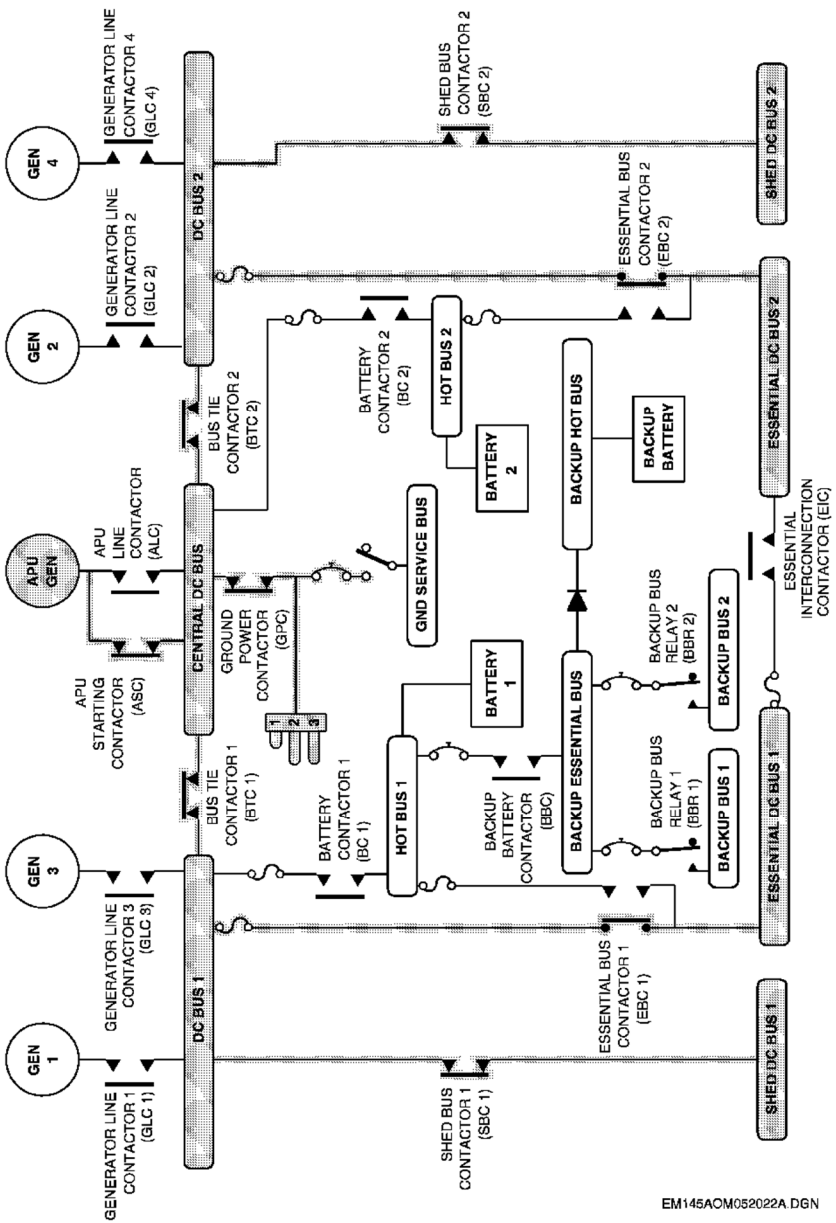

EDL STATUS DURING APU STARTING WITH GPU

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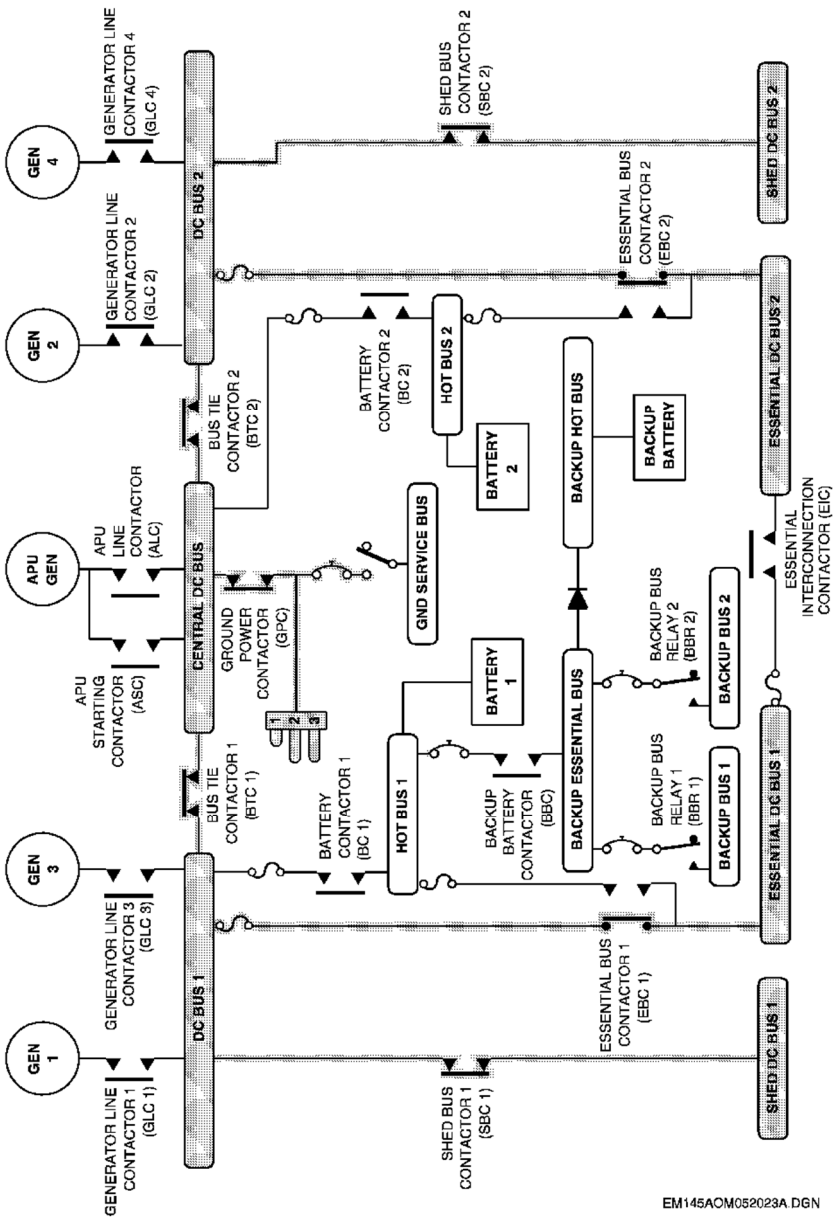

EDL STATUS AFTER APU STARTING WITH GPU

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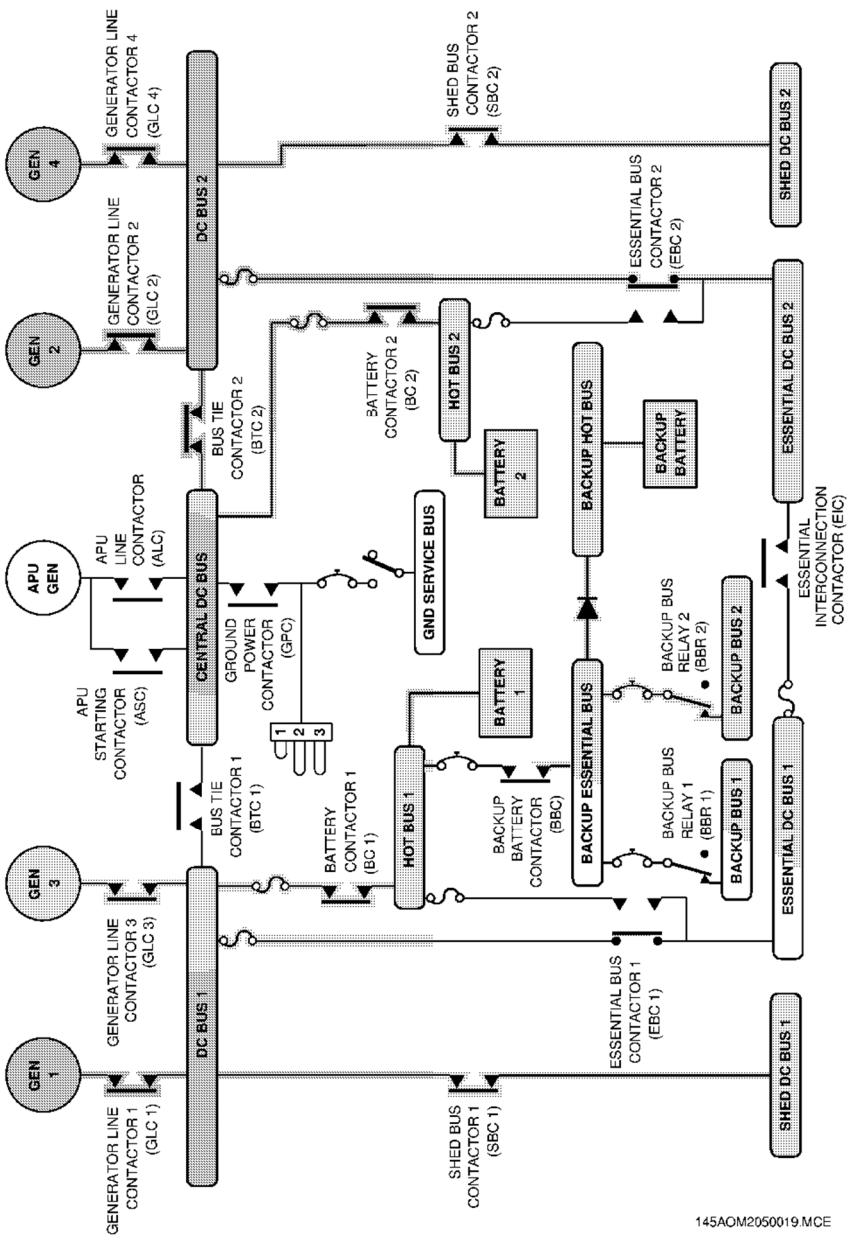

EDL STATUS DURING NORMAL OPERATION

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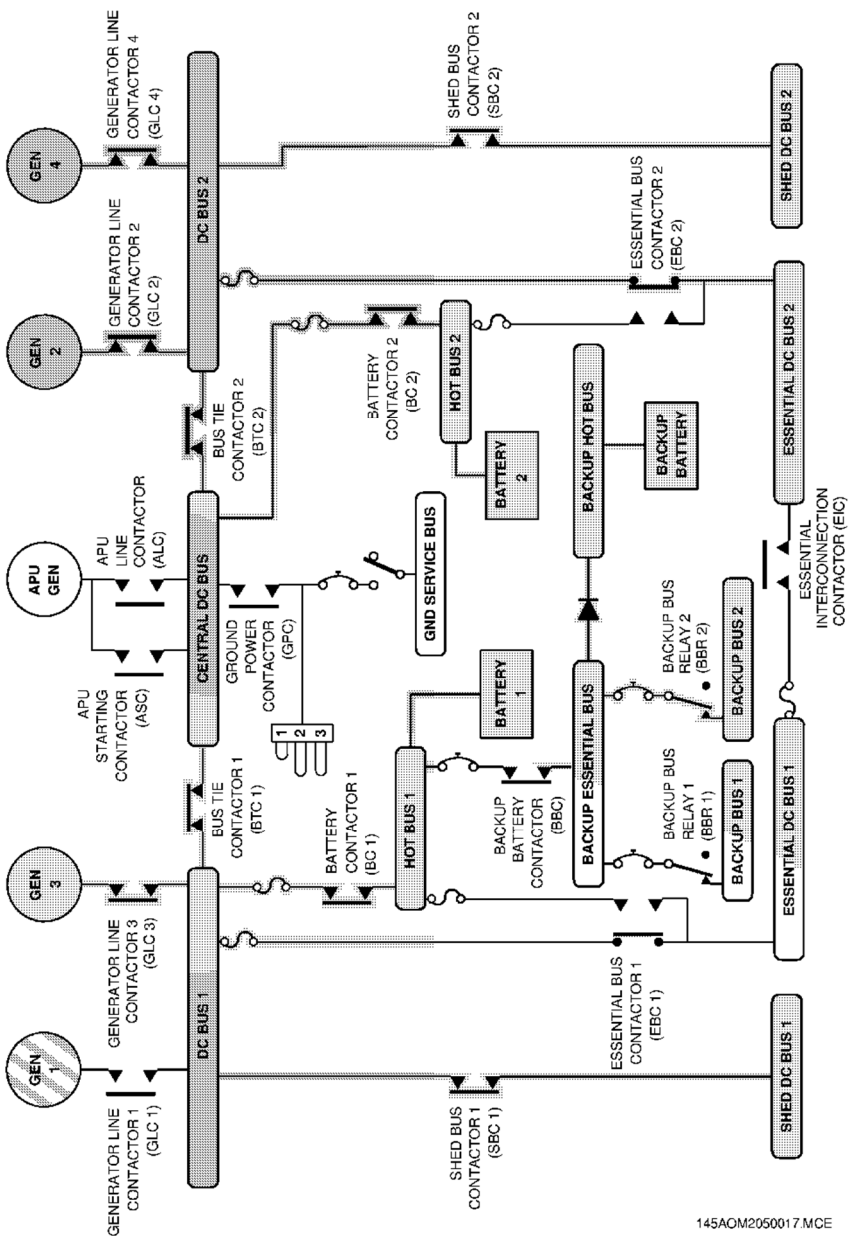

EDL STATUS AFTER LOSS OF GENERATOR 1 WITHOUT APU GENERATOR

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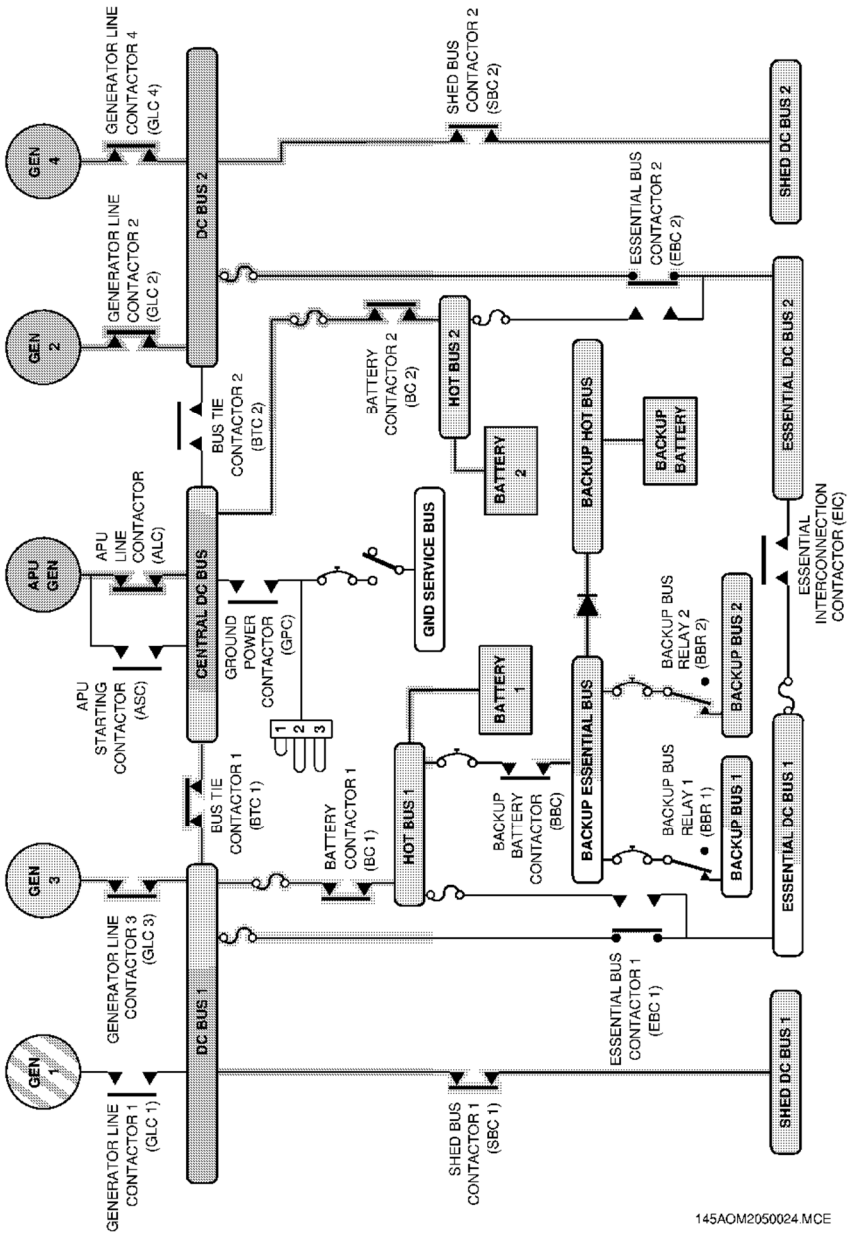

EDL STATUS AFTER LOSS OF GENERATOR 1 WITH APU GENERATOR

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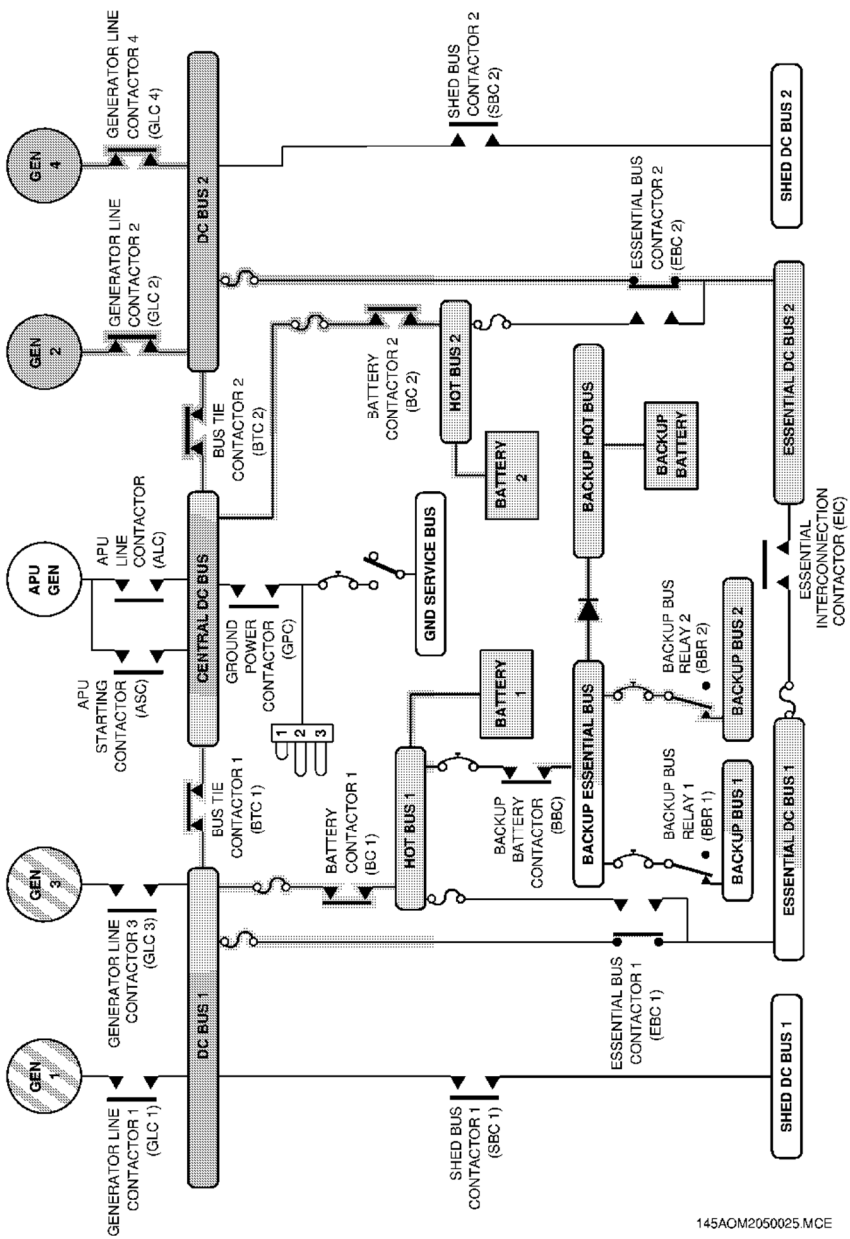

EDL STATUS AFTER LOSS OF GENERATORS 1 AND 3 WITHOUT APU GENERATOR

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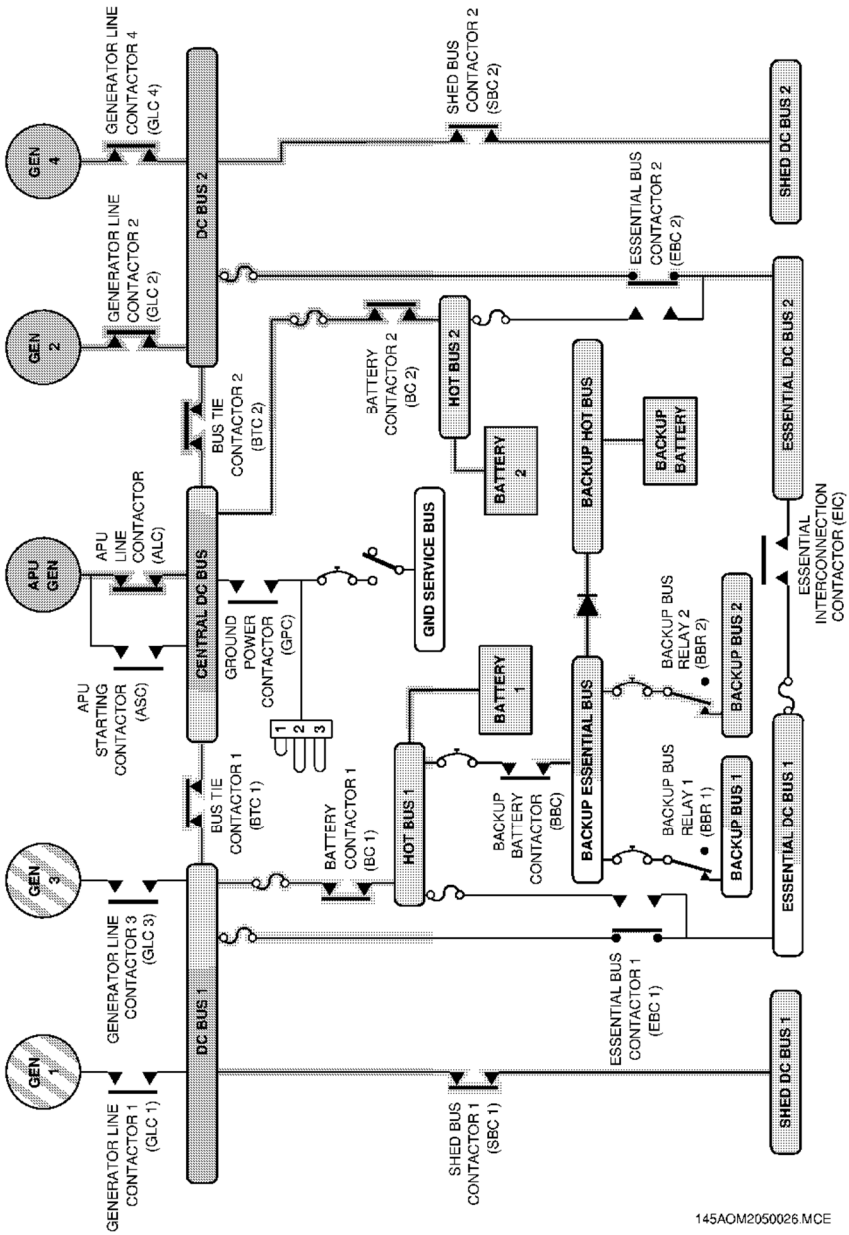

EDL STATUS AFTER LOSS OF GENERATORS 1 AND 3 WITH APU GENERATOR

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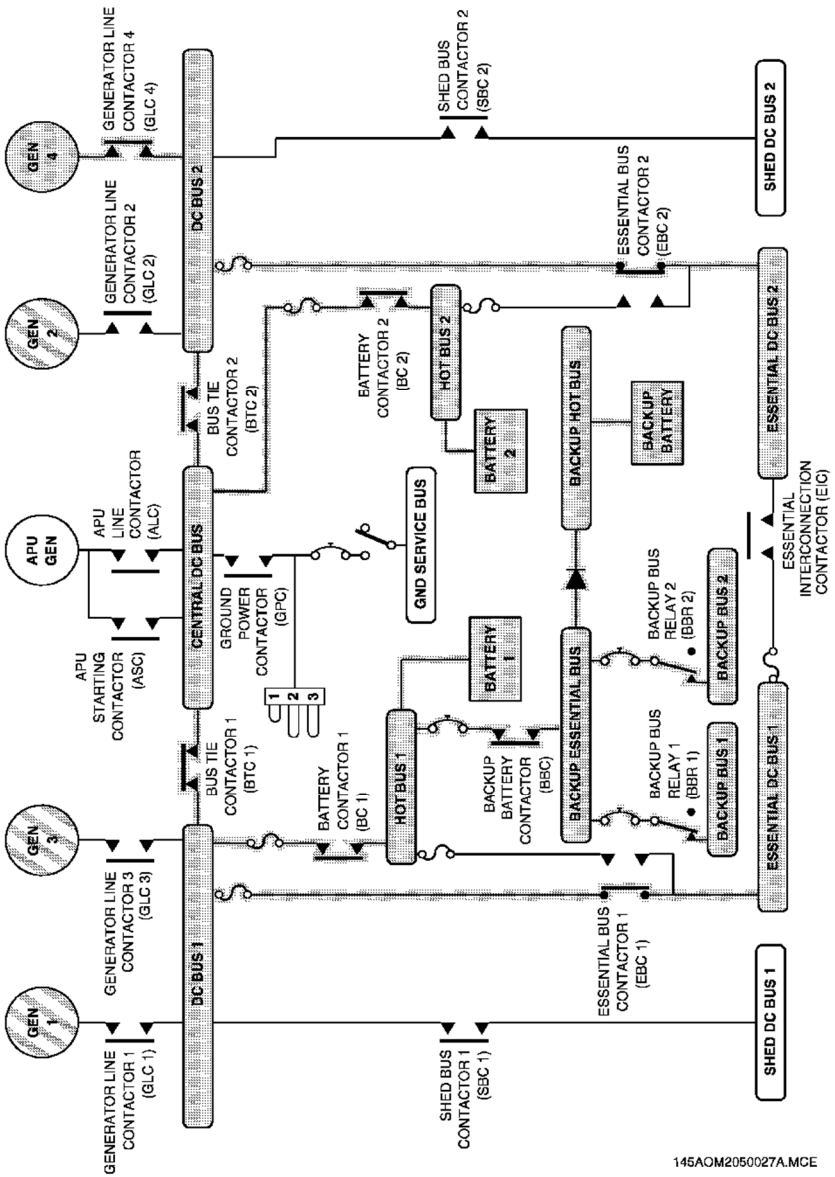

EDL STATUS DURING LOSS OF THREE ENGINE GENERATORS WITHOUT APU GENERATOR

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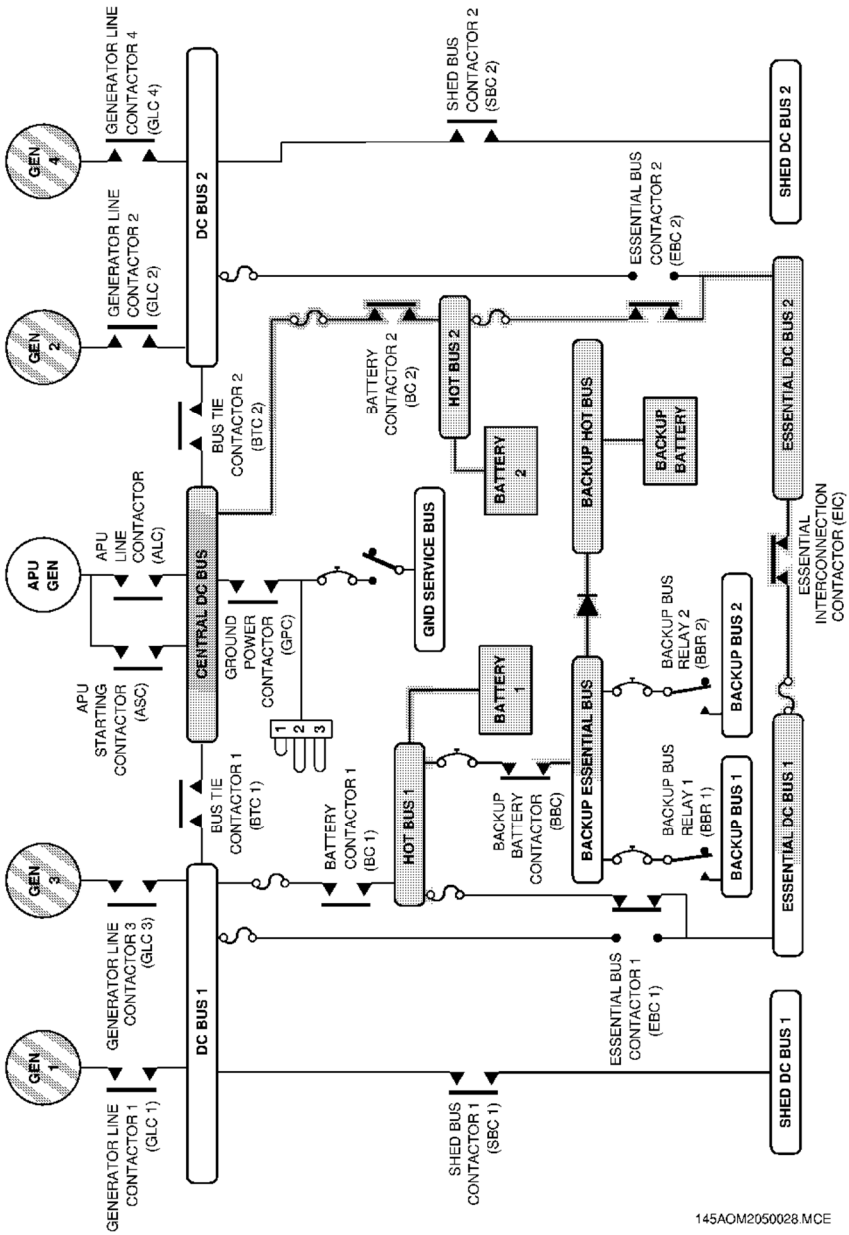

EDL STATUS AFTER LOSS OF ALL THE GENERATORS (ELECTRICAL EMERGENCY CONDITION)

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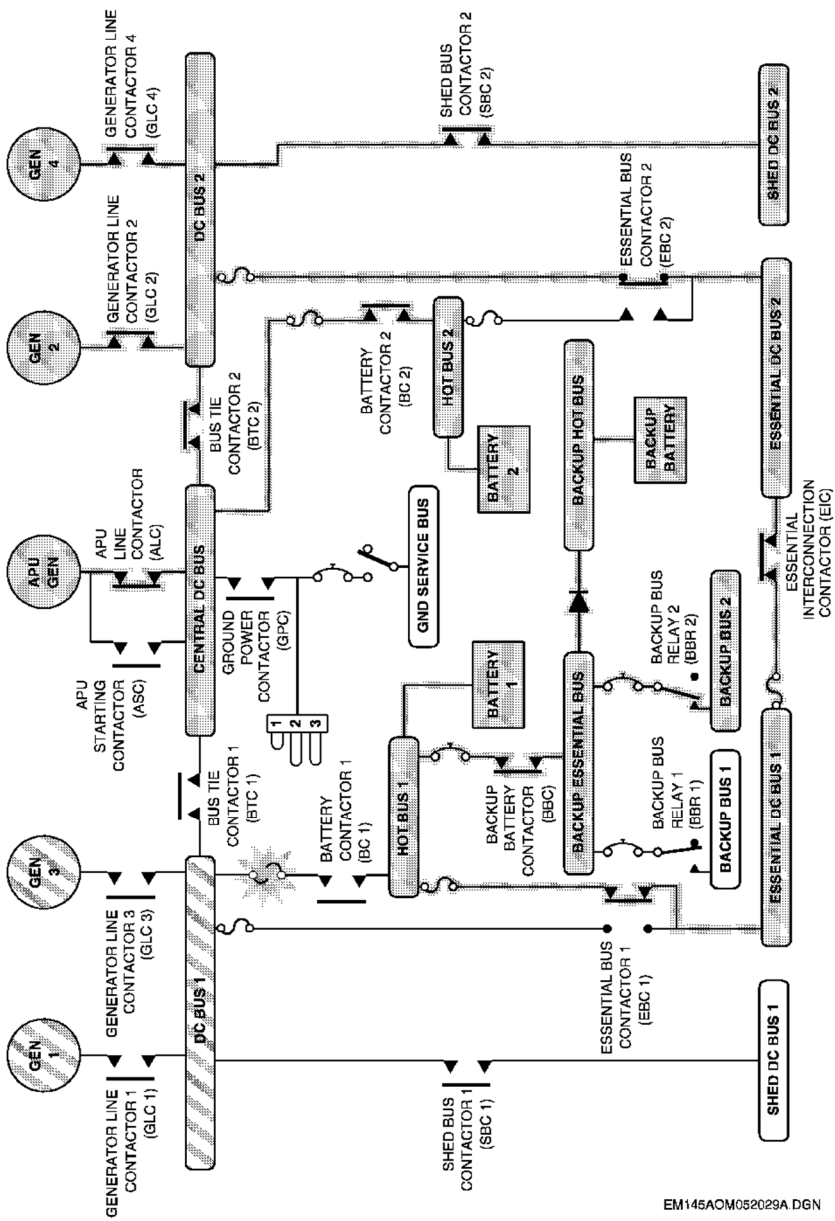

EDL STATUS AFTER A SHORT CIRCUIT AT DC BUS 1 WITH ALL GENERATORS ON

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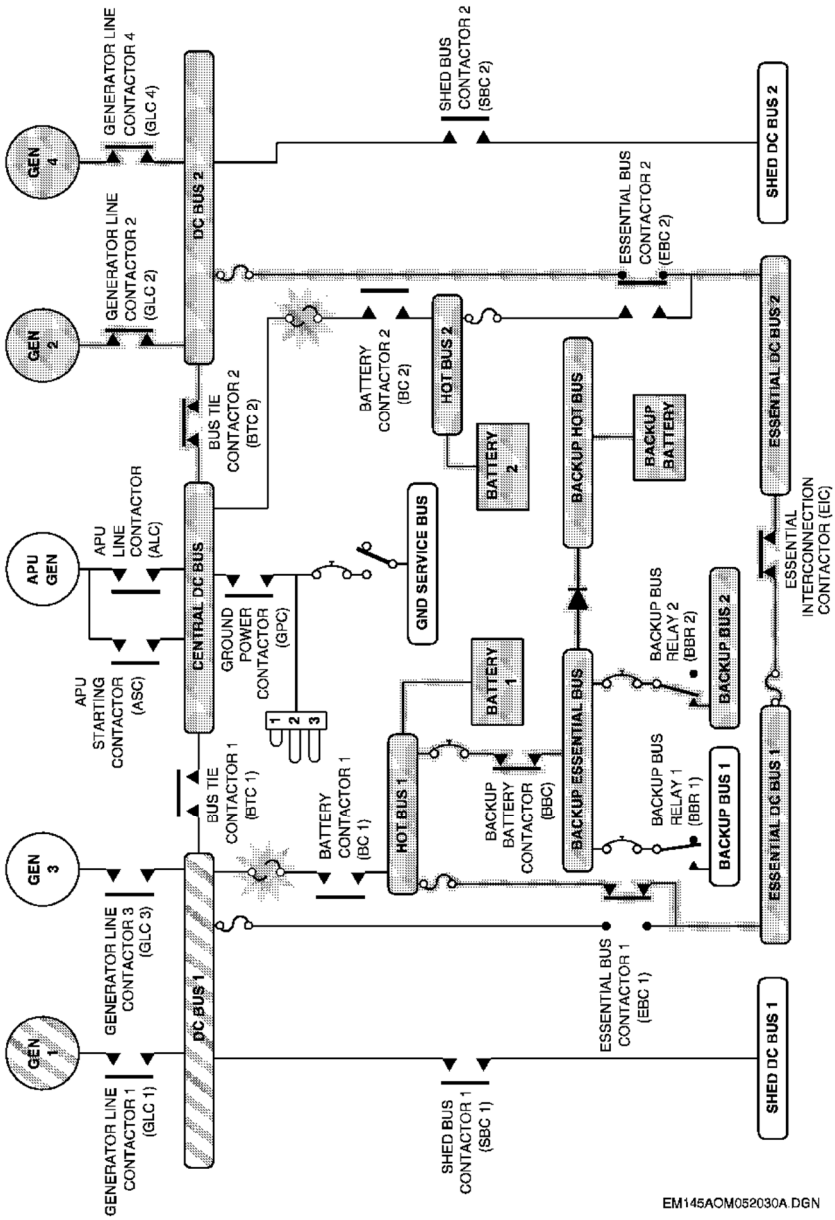

EDL STATUS AFTER A SHORT CIRCUIT AT DC BUS 1 WITH LOSS OF GENERATOR 1 AND WITHOUT APU GENERATOR

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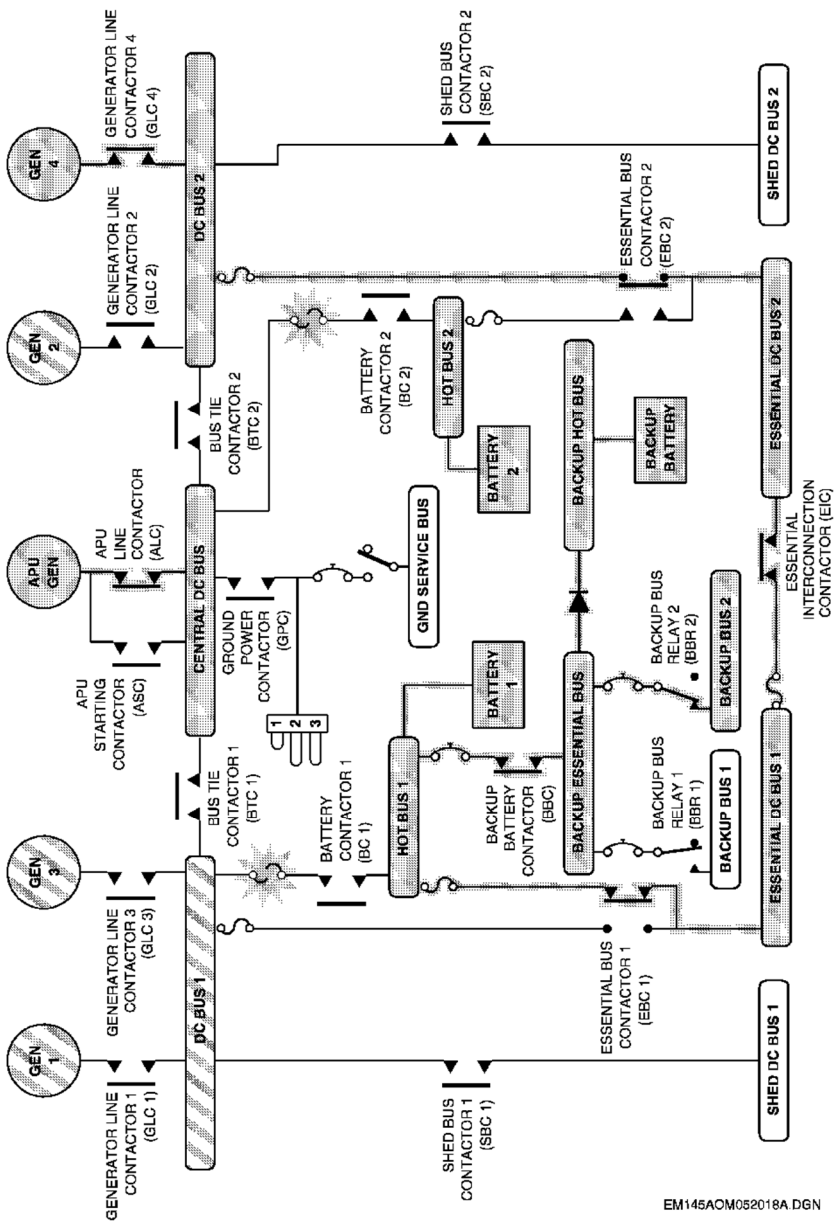

EDL STATUS AFTER A SHORT CIRCUIT AT DC BUS 1 WITH LOSS OF GENERATORS 1, 2 AND 3 WITH APU GENERATOR ON

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	BATT 1 (2) OVTEMP	Associated battery temperature is above 70°C.
	ELEC ESS XFR FAIL	Automatic transfer to electrical emergency condition has failed.
CAUTION	115 VAC BUS OFF	115 V AC bus is deenergized (applicable to airplanes up to S/N 854).
	APU CNTOR CLSD	APU Starting Contactor (ASC) or Line Contactor (ALC) is inadvertently closed.
	APU GEN OFF BUS	APU generator is disconnected from electrical network, due to open ALC, with APU RPM above 95% plus seven seconds. This is caused by generator channel failure or button released.
	APU GEN OVLD	APU generator current is above 400 A.
	BATT 1 (2) OFF BUS	Associated battery is disconnected from the electrical network.
	BKUP BATT OFF BUS	Backup battery is disconnected from the electrical network.

(Continued)

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TYPE	MESSAGE	MEANING
CAUTION	DC BUS 1 (2) OFF	Associated DC Bus is deenergized. For airplanes up to S/N 854, if DC Bus 1 is deenergized the inverter becomes inoperative.
	ELEC EMERG ABNORM	Improper transfer to electrical emergency condition has occurred.
	ESS BUS 1 (2) OFF	Associated Essential Bus is deenergized.
	GEN 1 (2, 3, 4) OFF BUS	Associated generator is disconnected from the electrical network after engine stabilization due to generator channel failure or button released.
	GEN 1 (2, 3, 4) OVLD	Associated generator current is above 400 A.
	SHED BUS 1 (2) OFF	Associated Shed Bus is deenergized.
ADVISORY	GEN1 (2, 3, 4) BRG FAIL	Associated generator bearing has failed.

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CONTROLS AND INDICATORS

ELECTRICAL SYSTEM PANEL

AIRPLANES UP TO S/N 854

1 – GEN BUTTONS

- Connects (pressed) or disconnects (released) the associated generator to/from the respective DC Bus.
- Pressing and depressing the GEN Button causes all GCU latches protection circuits to be reset if the associated generator is running.
- A striped bar illuminates inside the button when it is released.

2 – GPU BUTTON

- Connects (pressed) or disconnects (released) the GPU to/from the electrical system.
- A GPU AVAIL inscription illuminates, in the upper half of the button, when the GPU is properly connected to the airplane receptacle and ready to supply power. The GPU AVAIL inscription extinguishes when the button is pressed and the external power is connected to the electrical network.
- A striped bar illuminates inside the button when it is pressed.

3 – APU GEN BUTTON

- Connects (pressed) or disconnects (released) the APU starter generator, when APU RPM is above 95%, plus 7 seconds.
- A striped bar illuminates inside the button when it is released.

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4 – BATT KNOBS

OFF – Respective battery contactor is kept open, disconnecting the associated battery from the electrical system.

AUTO – The actuation of the respective battery contactor is controlled according to the Electrical Distribution Logic.

5 – ESSENTIAL POWER BUTTON (GUARDED)

- When pressed the system overrides the automatic transfer to the electrical emergency circuitry, connecting the batteries directly to essential buses, regardless of any other command from the Electrical Distribution Logic.
- When released, the power contactors operate automatically according to the Electrical Distribution Logic.
- A striped bar illuminates inside the button when it is pressed.

6 – SHED BUSES SELECTOR

OVRD – Closes the Shed Buses Contactors, provided the airplane is on ground and at least one generator is operative.

AUTO – Controls the operation of Shed Buses Contactors according to the Electrical Distribution Logic.

OFF – Deenergizes the Shed Buses manually regardless of any other command from the Electrical Distribution Logic.

7 – AVIONICS MASTER BUTTONS

- Connect (pressed) or disconnect (released) the navigation and communication equipment supplied by the avionics switched buses.
- A striped bar illuminates inside the button when it is released.

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8 – BACKUP BATTERY BUTTON

- Connects (pressed) or disconnects (released) the backup battery to/from the electrical system.
- A striped bar illuminates inside the button when it is released.

9 – AC POWER BUTTON

- Connects (pressed) or disconnects (released) the inverter to/from the system.
- A striped bar illuminates inside the button when it is released.

10 – BUS TIES SELECTOR

OVRD – Bus Tie Contactors (BTCs) are kept closed regardless of Electrical Distribution Logic, provided that no overcurrent is detected by one of the five GCUs.

AUTO – Controls the operation of the BTCs according to the Electrical Distribution Logic.

OFF – Opens the BTCs and EIC regardless of any other command from the Electrical Distribution Logic.

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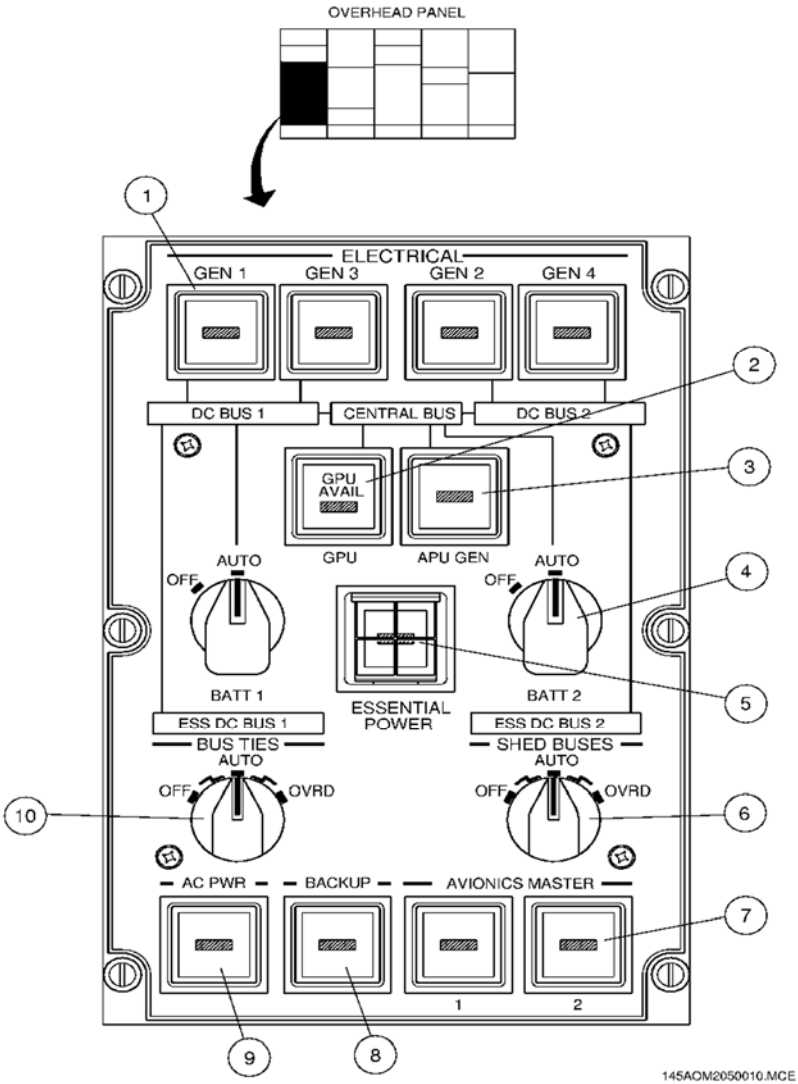

ELECTRICAL SYSTEM PANEL FOR AIRPLANES UP TO S/N 854

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AIRPLANES S/N 863 AND ON

1 – GEN BUTTONS

- Connects (pressed) or disconnects (released) the associated generator to/from the respective DC Bus.
- Pressing and depressing the GEN Button causes all GCU latches protection circuits to be reset if the associated generator is running.
- A striped bar illuminates inside the button when it is released.

2 – GPU BUTTON

- Connects (pressed) or disconnects (released) the GPU to/from the electrical system.
- A GPU AVAIL inscription illuminates, in the upper half of the button, when the GPU is properly connected to the airplane receptacle and ready to supply power. The GPU AVAIL inscription extinguishes when the button is pressed and the external power is connected to the electrical network.
- A striped bar illuminates inside the button when it is pressed.

3 – APU GEN BUTTON

- Connects (pressed) or disconnects (released) the APU starter generator, when APU RPM is above 95%, plus 7 seconds.
- A striped bar illuminates inside the button when it is released.

4 – BATT KNOBS

OFF – Respective battery contactor is kept open, disconnecting the associated battery from the electrical system.

AUTO – The actuation of the respective battery contactor is controlled according to the Electrical Distribution Logic.

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5 – ESSENTIAL POWER BUTTON (GUARDED)

- When pressed the system overrides the automatic transfer to the electrical emergency circuitry, connecting the batteries directly to essential buses, regardless of any other command from the Electrical Distribution Logic.
- When released, the power contactors operate automatically according to the Electrical Distribution Logic.
- A striped bar illuminates inside the button when it is pressed.

6 – SHED BUSES SELECTOR

OVRD – Closes the Shed Buses Contactors, provided the airplane is on ground and at least one generator is operative.

AUTO – Controls the operation of Shed Buses Contactors according to the Electrical Distribution Logic.

OFF – Deenergizes the Shed Buses manually regardless of any other command from the Electrical Distribution Logic.

7 – AVIONICS MASTER BUTTONS

- Connect (pressed) or disconnect (released) the navigation and communication equipment supplied by the avionics switched buses.
- A striped bar illuminates inside the button when it is released.

8 – BACKUP BATTERY BUTTON

- Connects (pressed) or disconnects (released) the backup battery to/from the electrical system.
- A striped bar illuminates inside the button when it is released.

9 – BUS TIES SELECTOR

OVRD – Bus Tie Contactors (BTCs) are kept closed regardless of Electrical Distribution Logic, provided that no overcurrent is detected by one of the five GCUs.

AUTO – Controls the operation of the BTCs according to the Electrical Distribution Logic.

OFF – Opens the BTCs and EIC regardless of any other command from the Electrical Distribution Logic.

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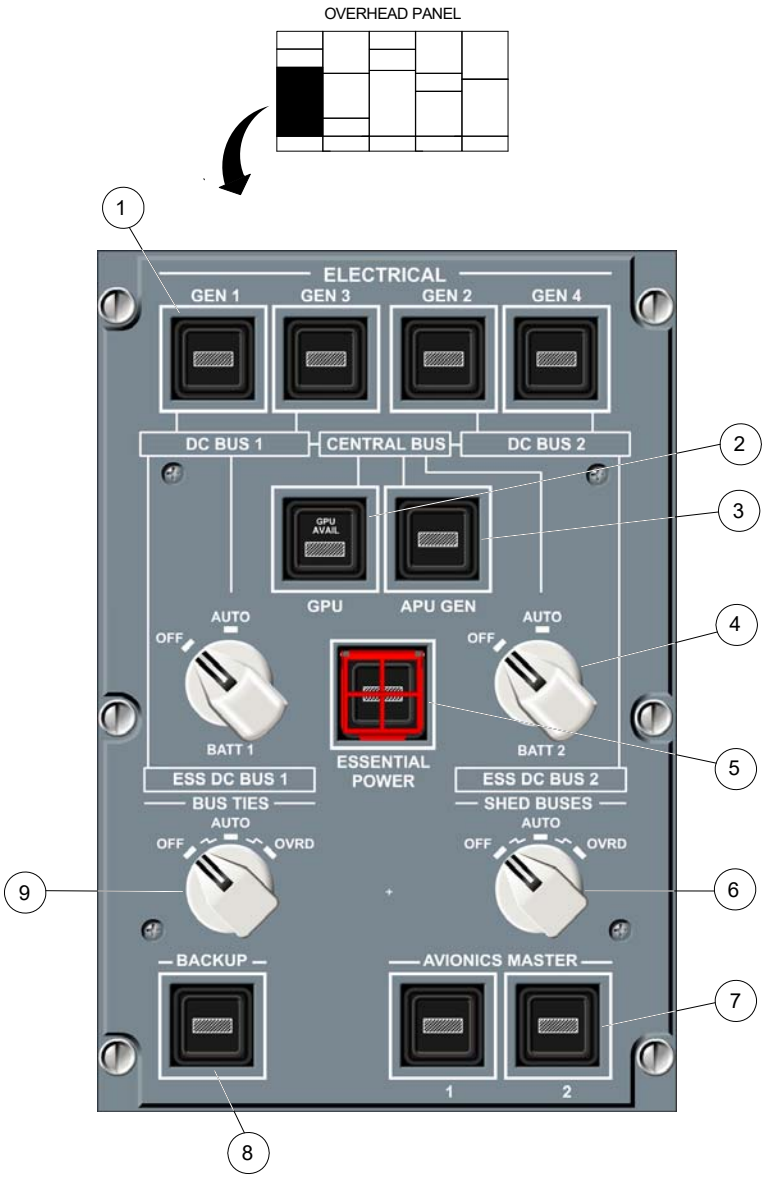

ELECTRICAL SYSTEM PANEL FOR AIRPLANES S/N 863 AND ON

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MFD ELECTRICAL PAGE

1 – LABELS AND UNITS

– Labels and units are always white.

2 – GENERATOR VOLTAGE AND CURRENT INDICATION

VOLTAGE:

– Digits are green and boxes are white during normal operation.
– Digits and boxes are amber when the generator is inadvertently off bus.
– Ranges from 0 to 40.0 V, with a resolution of 0.1 V.

CURRENT:

– Digits are green and boxes are white during normal operation.
– Digits and boxes are amber when the generator is inadvertently off bus or when the current is higher than 400 A.
– Ranges from 0 to 600 A, with a resolution of 5 A.

NOTE: The APU indication is removed when the APU is not available and/or the APU Master Selector is set to the OFF position with APU RPM below 10%.

3 – DC BUS INDICATION

– Green when bus is energized.
– Amber when bus is off.

4 – GPU VOLTAGE INDICATION

– Digits are always green.
– Box is always white.
– Ranges from 0 to 40.0 V, with resolution of 0.1 V.

NOTE: GPU voltage indication is removed in flight.

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5 – BUS LINES INDICATION

- Bus lines are always white.

6 – BATTERY VOLTAGE AND TEMPERATURE INDICATION

VOLTAGE:

- Digits are green and boxes are white during normal battery operation.
- Digits and boxes are amber when the battery is inadvertently off bus.
- Ranges from 0 to 40.0 V, with a resolution of 0.1 V.

TEMPERATURE:

- Boxes are white during battery normal operation.
- Boxes are amber when the battery is off bus.
- Digits are green when the temperature is below 70°C.
- Ranges from -40°C to 150°C, with a resolution of 1°C.
- Digits and boxes are red when the temperature is greater than 70°C.

NOTE: The red alerts supersede any other condition.

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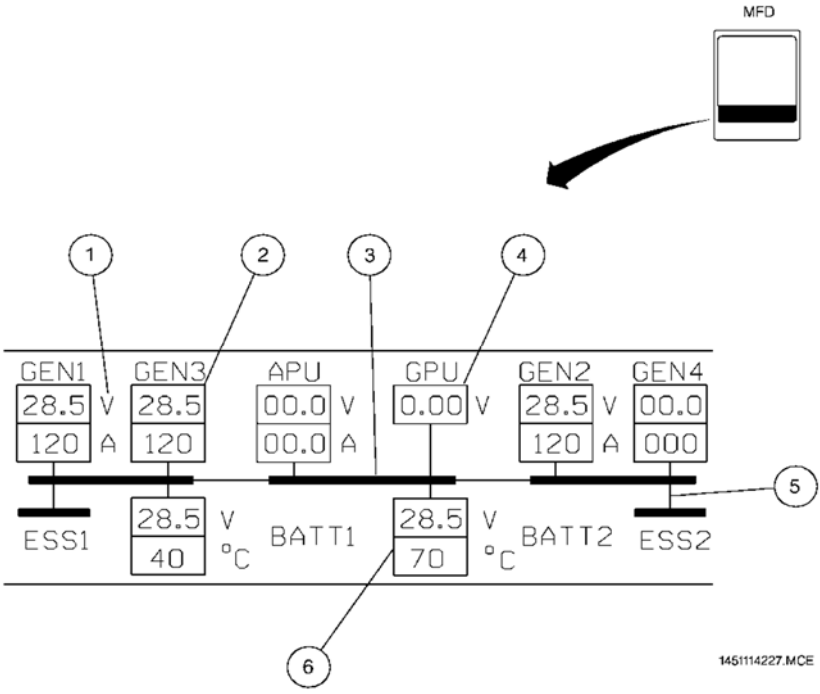

ELECTRICAL PAGE ON MFD

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CIRCUIT BREAKER PANEL AND LOAD DISTRIBUTION

CIRCUIT BREAKER PANEL

The Circuit Breaker Panel is divided in areas associated to electrical system buses.

Columns and lines on the circuit breaker panel are identified through an alphabetic (for the lines) and numeric (for the columns) code.

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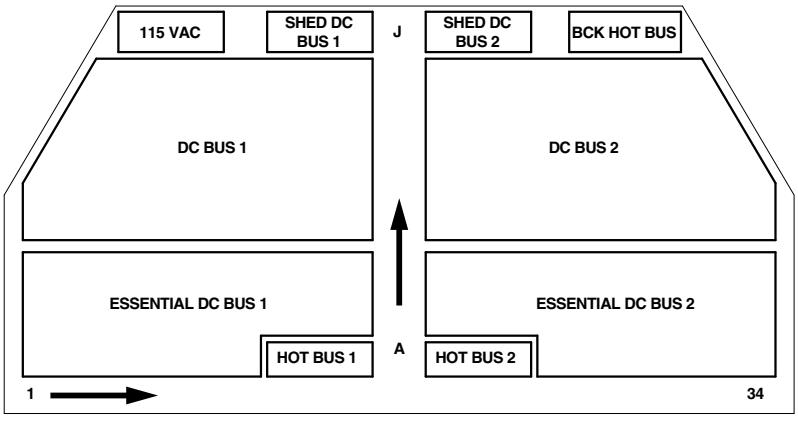

CIRCUIT BREAKER PANEL MAP FOR AIRPLANES UP TO S/N 854

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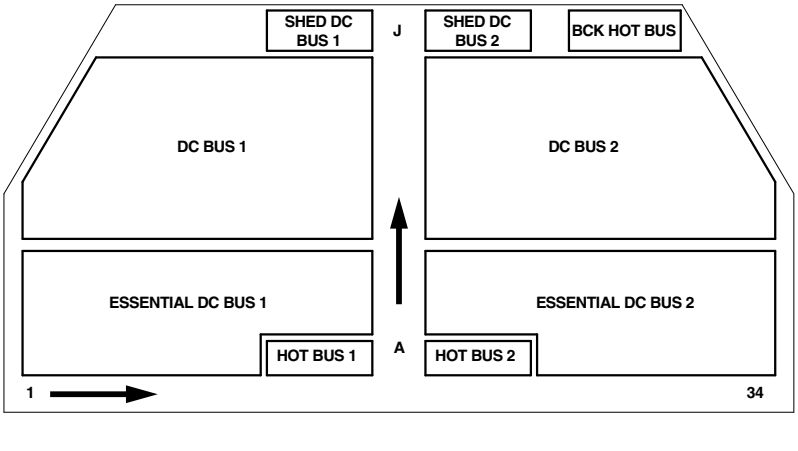

CIRCUIT BREAKER PANEL MAP FOR AIRPLANES S/N 863 AND ON

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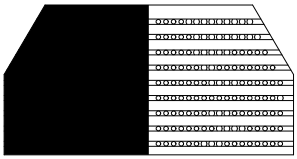
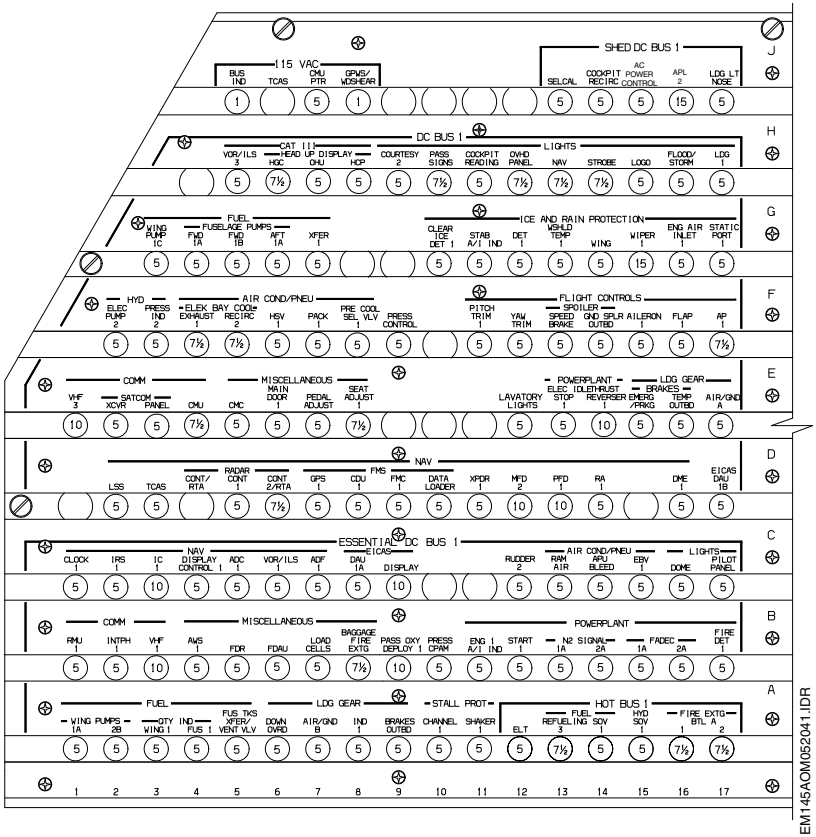
CIRCUIT BREAKER PANEL



NOTE: THE CIRCUIT BREAKER PANEL CONFIGURATION PRESENTED HEREIN IS TYPICAL, THE SPECIFIC CONFIGURATIONS CAN BE FOUND IN THE FAULT ISOLATION MANUAL (FIM).



CIRCUIT BREAKER PANEL FOR AIRPLANES UP TO S/N 854 (TYPICAL I)

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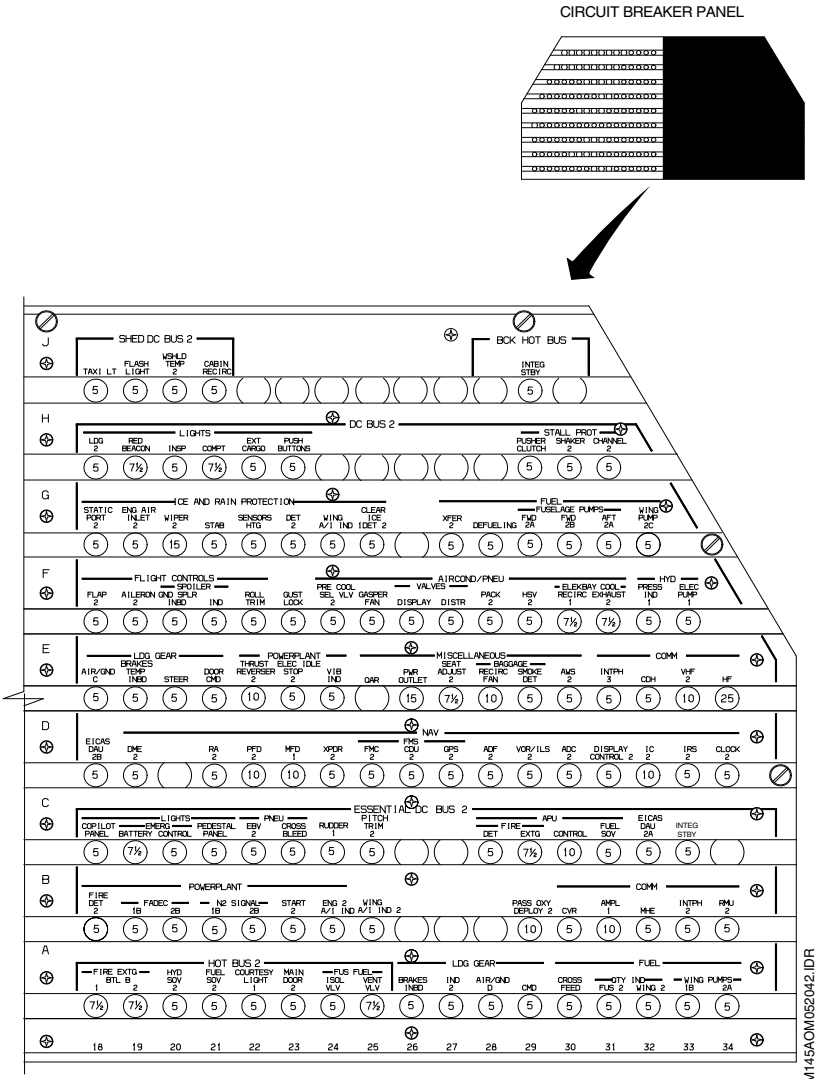

CIRCUIT BREAKER PANEL FOR AIRPLANES UP TO S/N 854 (TYPICAL I)

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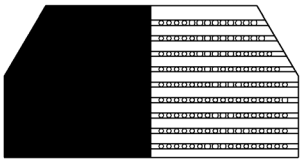
CIRCUIT BREAKER PANEL



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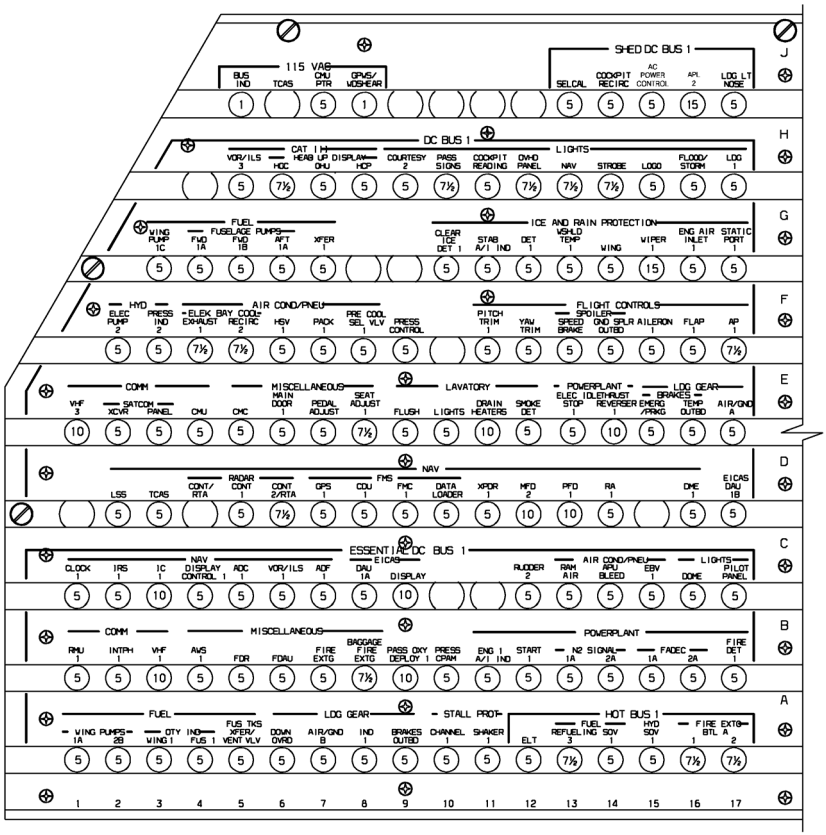

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CIRCUIT BREAKER PANEL FOR AIRPLANES UP TO S/N 854 (TYPICAL II)

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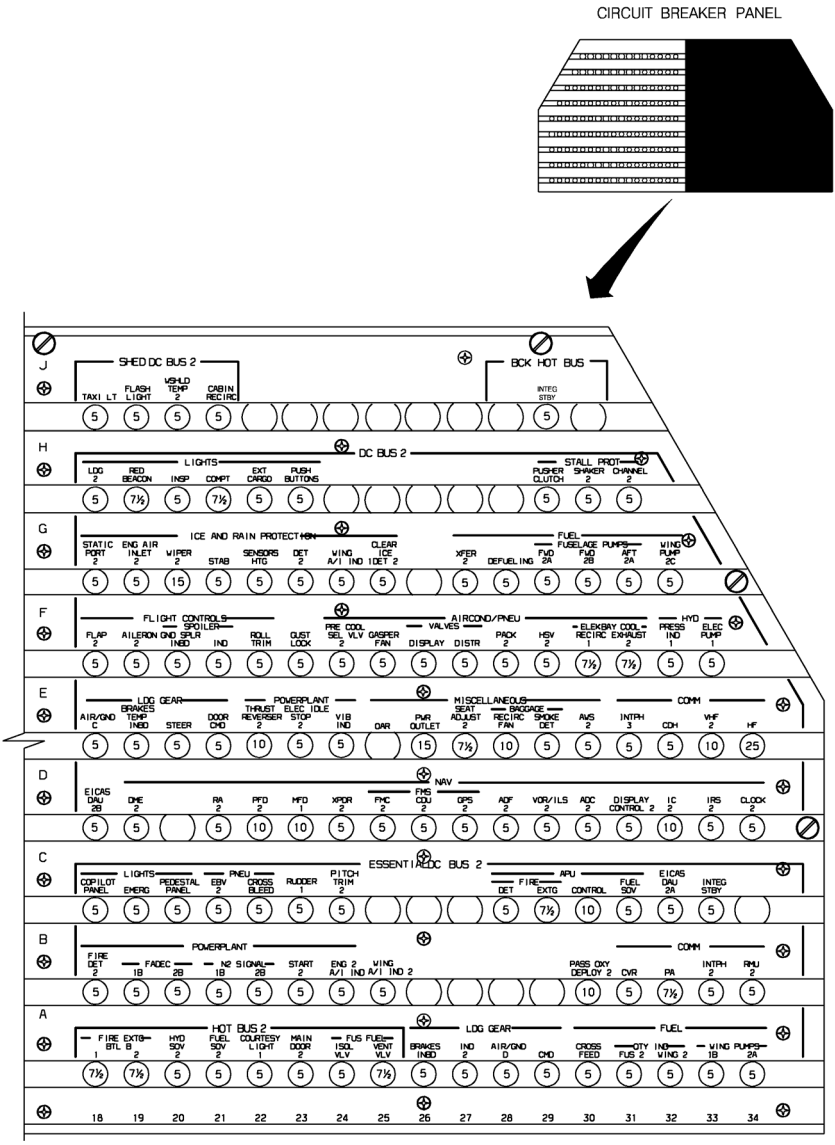

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CIRCUIT BREAKER PANEL FOR AIRPLANES UP TO S/N 854 (TYPICAL II)

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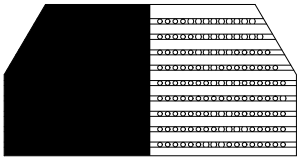
CIRCUIT BREAKER PANEL



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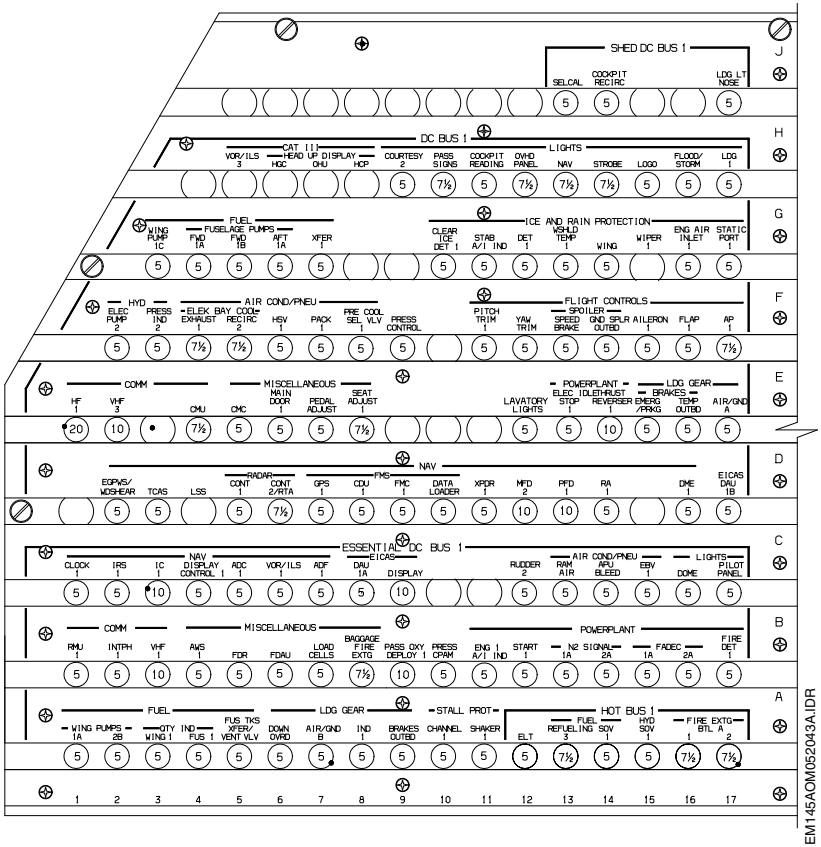

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CIRCUIT BREAKER PANEL FOR AIRPLANES S/N 863 AND ON

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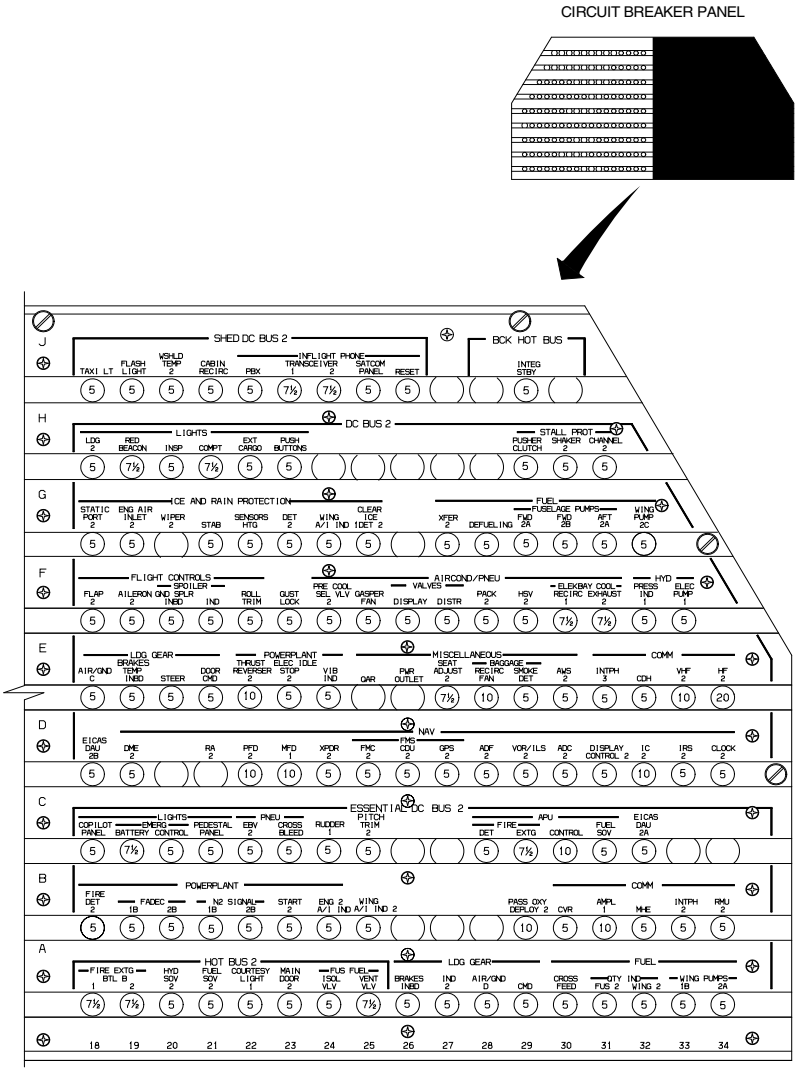

CIRCUIT BREAKER PANEL FOR AIRPLANES S/N 863 AND ON

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DC BUS LOAD DISTRIBUTION (TYPICAL)

The following tables identify the main airplane systems and the respective electrical bus bars power.

Optional equipment is preceded by an asterisk (*).

DC BUS 1
AILERON CONTROL SYSTEM 1
AIR/GND POSITION SYSTEM A
AOA 1 SENSOR HEATING
AUTO PILOT
AUTOMATIC PRESSURIZATION CONTROL
BRAKES TEMPERATURE INDICATION OUTBD
CENTRAL MAINTENANCE COMPUTER
CLEAR ICE DETECTION SYSTEM – LEFT WING
CREW LEFT/RIGHT PEDALS ADJUSTMENT
CREW LEFT SEAT ADJUSTMENT
DAU 1 CHANNEL B
EGPWS
ELECTRICAL FLIGHT IDLE STOP 1
ELECTRONIC BAY COOLING (EXHAUST 1)
ELECTRONIC BAY COOLING (RECIRC 2)
EMERG/PARKING BRAKE
ENG 1 LIP ANTI-ICE
ENG 1 THRUST REVERSER COMMAND
FLAP POWER/COMMAND 1
FUEL – AFT 1 TK PUMP
FUEL – FUS 1 XFER SYSTEM
FUEL – FWD TK PUMPS 1A/1B
FUEL – PRESSURE REFUELING FWD/AFT A1
FUEL – PRESSURE REFUELING FWD 1
FUEL – WING TK PUMP 1C
GROUND SPOILER OUTBD
HYD ELECTRIC PUMP 2
HYD SYSTEM 2 INDICATION (MFD/EICAS)
ICE DETECTOR 1
* INVERTER
LAVATORY FLUSH AFT/FORWARD
LAVATORY WATER DRAIN HEATER

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DC BUS 1
LIGHT – LEFT WING LANDING
LIGHT – NOSE TAXI UPPER
LIGHTS – CHART HOLDER – PILOT/CO-PILOT
LIGHTS – COCKPIT READING – PILOT/CO-PILOT/OBSERVER
LIGHTS – COURTESY/MAIN DOOR STAIR
LIGHTS – FLOOD/STORM
LIGHTS – LAVATORY
LIGHTS – LOGO
LIGHTS – NAVIGATION
LIGHTS – OVERHEAD PANEL
LIGHTS – PASSENGER CABIN 1
LIGHTS – NO SMOKING/FASTEN SEAT BELT SIGNS
LIGHTS – STROBE
MAIN DOOR CONTROL 1
MFD 2 DISPLAY
PACK VALVE 1
PFD 1 DISPLAY
PITCH TRIM 1
PITOT 1 HEATING
PNEUMATIC HSV 1
SPEED BRAKE
STABILIZER ANTI-ICE INDICATION
STATIC PORT HEATING 1
TAT 1 SENSOR HEATING
TCAS
WINDSHIELD HEATING 1
* WINDSHIELD WIPER SYSTEM 1
WING ANTI-ICE SYSTEM
YAW TRIM SYSTEM

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DC BUS 2
ADC 2 POWER
* AHRS 2 POWER
AILERON CONTROL SYSTEM 2
AIR/GND POSITION SYSTEM C
AOA 2 SENSOR HEATING
AURAL WARNING UNIT – CHANNEL B
BAGGAGE RECIRCULATION FAN
BAGGAGE SMOKE DETECTOR
BRAKES TEMPERATURE INDICATION INBD
CABIN RECIRCULATION
CLEAR ICE DETECTION SYSTEM – RIGHT WING
COPILOT'S CLOCK
CREW RIGHT SEAT ADJUSTMENT
DAU 2 CHANNEL B
DISPLAY CONTROLLER (RIGHT DC-550)
ELECTRICAL FLIGHT IDLE STOP 2
ELECTRONIC BAY COOLING (EXHAUST 2)
ELECTRONIC BAY COOLING (RECIRC 1)
ENG 2 LIP ANTI-ICE
ENG 2 THRUST REVERSER COMMAND
ENGINE VIBRATION SENSORS
FLAP POWER/COMMAND 2
FUEL – AFT 2 TK PUMP
FUEL – DEFUELING
FUEL – FUS 2 XFER SYSTEM
FUEL – FWD TK PUMPS 2A/2B
FUEL – WING PUMP 2C

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DC BUS 2
GASPER FAN
GROUND SPOILER INBD
GUST LOCK
HYD ELECTRIC PUMP 1
HYD SYSTEM 1 INDICATION (MFD/EICAS)
INTEGRATED COMPUTER IC-600 # 2
ICE DETECTOR 2
IRS 2 POWER
LANDING GEAR DOOR COMMAND
LIGHT – NOSE TAXI LOWER
LIGHT – RIGHT WING LANDING
LIGHTS – COMPARTMENT
LIGHTS – WING INSPECTION
LIGHTS – OVERHEAD PUSH BUTTONS
LIGHTS – PASSENGER CABIN 2/3
LIGHTS – RED BEACON
MFD 1 DISPLAY
OBSERVER AUDIO (INTPH 3)
PACK VALVE 2
PFD 2 DISPLAY
PITOT 2 HEATING
PNEUMATIC HSV 2
ROLL TRIM SYSTEM
SENSORS HEATING CONTROL
SPOILER INDICATION
SPS (SHAKER 2/CHANNEL 2)
SPS PUSHER
STABILIZER ANTI-ICE SYSTEM
STATIC PORT HEATING 2
STEERING SYSTEM
TAT 2 SENSOR HEATING
* WINDSHIELD WIPER SYSTEM 2
WING ANTI-ICE 1 INDICATION

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ESSENTIAL DC BUS 1

ADC 1 POWER/CONTROL
* AHRS 1 POWER
AIR/GND POSITION SYSTEM B
APU BLEED
AURAL WARNING UNIT – CHANNEL A
BRAKE CONTROL UNIT (OUTBOARD SYSTEM)
CABIN PRESSURE ACQUISITION MODULE (CPAM)
DAU 1 CHANNEL A
DISPLAY CONTROLLER (LEFT DC-550)
EICAS DISPLAY
ENG 1 FIRE DETECTION 1
ENG 1 FADEC A POWER
ENG 2 FADEC A POWER
ENG N2 SIGNALS 1A
ENG N2 SIGNALS 2A
ENG 1 STARTING
FLIGHT DATA RECORDER (FDR)
FUEL QUANTITY INDICATION FUS 1/WING 1
FUEL TKS XFER/VENT VALVE
FUEL WING TK PUMPS 1A/2B
INTEGRATED COMPUTER IC-600 # 1
IRS 1 POWER
LANDING GEAR CONTROL (DOWN/LOCK OVRD)
LANDING GEAR NOSE INDICATION 1
LIGHTS – COCKPIT DOME
LIGHTS – PILOT'S PANEL
PASSENGER OXYGEN SYSTEM 1
PILOT/COPILOT AUDIO SYSTEM (INTPH 1)
PILOT'S CLOCK
PNEUMATIC 1 (EBV 1)
RAM AIR DISTRIBUTION
RMU 1 POWER/CONTROL
RUDDER CONTROL SYSTEM 2
SPS (SHAKER 1/CHANNEL 1)
VHF SYSTEM 1

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ESSENTIAL DC BUS 2
AIR/GND POSITION SYSTEM D
APU CONTROL
APU FIRE DETECTION
APU FIRE EXTINGUISHING
COCKPIT/ATTENDANT INTERCOMM
COCKPIT VOICE RECORDER (CVR)
CROSSBLEED
DAU 2 CHANNEL A
ENG 1 FADEC B POWER
ENG 2 FADEC B POWER
ENG 2 FIRE DETECTION 2
ENG 2 ANTI-ICE INDICATION
ENG 2 STARTING
ENG N2 SIGNALS 1B
ENG N2 SIGNALS 2B
FUEL APU FEED
FUEL CROSSFEED
FUEL QUANTITY INDICATION FUS 2/WING 2
FUEL FUS 2 XFER SYSTEM
FUEL WING TK PUMPS 1B/2A
ISIS (AIRPLANES S/N 484, 495, 528, 540, 555)
LANDING GEAR BRAKES INBOARD
LANDING GEAR CONTROL
LANDING GEAR NOSE INDICATION 2
LIGHTS – CO-PILOT'S PANEL
LIGHTS – EMERGENCY
LIGHTS – PEDESTAL
PASSENGER OXYGEN SYSTEM 2
PILOT/COPILOT AUDIO SYSTEM (INTPH 2)
PITCH TRIM 2
PITOT HEATING 3
PNEUMATIC 2 (EBV 2)
PUBLIC ADDRESS (#)
RMU 2 POWER/CONTROL
RUDDER CONTROL SYSTEM 1
STANDBY ALTIMETER
STANDBY ATTITUDE INDICATOR
WING ANTI-ICE INDICATION 2

(#) Applicable for airplanes with AMPL 1 not supplied by ESSENTIAL DC BUS 2.

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SHED DC BUS 1
COCKPIT IFE & PC POWER PANEL
COCKPIT RECIRCULATION
ENTERTAINMENT CABINET CB PANEL
GALLEY OVEN POWER
LIGHT – NOSE LANDING CONTROL
LIGHTS – READING/ATTENDANT CALL 1
* MUSIC
PC POWER INVERTER
* PRE RECORD ANNOUNCEMENTS (PRA)
PUBLIC ADDRESS (#)
* SELCAL SYSTEM
WATER HEATING INVERTER 1
* XM WEATHER

SHED DC BUS 2
AIR COMPRESSOR
CABIN RECIRCULATION
CONVECTION OVEN
FLASHLIGHTS – PILOT/CO-PILOT
* GALLEY
* GALLEY COFFEE MAKER POWER
LIGHTS – NOSE TAXI CONTROL
LIGHTS – READING/ATTENDANT CALL 2/3
MICROWAVE OVEN
SATCOM PANEL
WATER HEATING INVERTER 2
WINDSHIELD HEATING 2

(#) Applicable for airplanes with AMPL 1 not supplied by ESSENTIAL DC BUS 2.

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HOT BUS 1
EMERGENCY LOCATOR TRANSMITER (ELT)
ENG 1 FIRE EXTINGUISHING (BTL A1)
ENG 2 FIRE EXTINGUISHING (BTL A2)
FUEL PRESSURE REFUELING 3
FUEL SHUTOFF VALVES 1
HYDRAULIC SHUTOFF VALVE 1

HOT BUS 2
ENG 1 FIRE EXTINGUISHING (BTL B1)
ENG 2 FIRE EXTINGUISHING (BTL B2)
FUEL FUSELAGE ISOLATION VALVE
FUEL FUSELAGE VENT VALVE
FUEL SHUTOFF VALVES 2
HYDRAULIC SHUTOFF VALVE 2
LIGHTS – COCKPIT DOME
LIGHTS – COURTESY/MAIN DOOR STAIR
MAIN DOOR CONTROL 2

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BACKUP ESSENTIAL BUS
* AHRS 1 POWER
DAU 1 CHANNEL A
DAU 2 CHANNEL A
INTEGRATED COMPUTER IC-600 # 1
EICAS DISPLAY
IRS 1 POWER

BACKUP HOT BUS
APU GENERATION
DC DISTRIBUTION
DC GENERATION 1
DC GENERATION 2
DC GENERATION 3
DC GENERATION 4
ISIS (EXCEPT AIRPLANES S/N 484, 495, 528, 540, 555)

BACKUP BUS 1
NONE

BACKUP BUS 2
* AHRS 2 POWER
IRS 2 POWER

115 V AC
GPWS (AIRPLANES UP TO S/N 854)

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AVIONIC SWITCHED DC BUS 1A
DME 1
HF 1
RADIO ALTIMETER 1

AVIONIC SWITCHED DC BUS 1B
* CURSOR CONTROL DEVICE – CCD 2
* CMU MARK III
* FLITEFONE
FMS CDU 1
FMS COMPUTER 1
FMS SYSTEM DATA LOADER
GPS 1
MFD 2 DISPLAY
PFD 1 DISPLAY
WEATHER RADAR SYSTEM
XPDR 1 POWER/CONTROL
* VHF SYSTEM 3

AVIONIC SWITCHED DC BUS 2A
* CURSOR CONTROL DEVICE – CCD 1
DME 2
FMS CDU 2
FMS COMPUTER 2
GPS 2
MFD 1 DISPLAY
PFD 2 DISPLAY
* RADIO ALTIMETER 2
TUNING BACKUP CONTROL HEAD (TBCH)
VHF SYSTEM 2

AVIONIC SWITCHED DC BUS 2B
* ADF 2
HF 2
XPDR 2 POWER/CONTROL
VOR/ILS/MB 2

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AVIONIC SWITCHED ESSENTIAL DC BUS 1
ADF 1 VOR/ILS/MB 1

AVIONIC SWITCHED ESSENTIAL DC BUS 2
NONE

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SECTION 2-06

LIGHTING

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GENERAL

This airplane is equipped with a lighting system in order to illuminate all essential parts located inside and outside of the fuselage and to assure a proper and safe operation of the airplane.

The cockpit is illuminated by dome, chart, fluorescent/flood and reading lights.

The passenger cabin lighting is provided by the upward and downward fluorescent lights installed in the left and right valance panels, passenger reading lights, lavatory lights and galley lights.

External lighting consists of navigation, anticollision (strobe and red beacon), landing, taxi, inspection and logotype lights.

Emergency lights are provided inside and outside the airplane to assure, for the crewmembers and passengers, a safe night evacuation, under emergency condition.

The system also provides lighting for baggage and service compartments.

COCKPIT LIGHTING

The lighting system inside the cockpit is composed of five different types of lights, which are as follows:

– Dome lights.
– Reading lights.
– Chart lights.
– Fluorescent flood/storm light.
– Instruments and panels lights.

DOME LIGHTS

Cockpit illumination is provided by two dome lights of fixed intensity, commanded by a switch on the overhead panel. One light is located above the pilot's seat and the other is located above the copilot's seat.

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READING LIGHTS

In order to provide adequate light distribution for the reading of maps, check lists and manuals there are three reading lights inside the cockpit, one for the pilot, a second for the copilot and a third for the observer.

By rotating the inner bezel of each of these three light installations, lighting intensity can be adjusted from off to full bright according to crew preference. The aperture or size of the light pattern is independently adjustable from a small to a large square pattern by rotating the outer bezel.

CHART LIGHTS

Chart lights are provided to illuminate the chart holders located at the pilot's and copilot's control wheel.

The chart light is turned on when the chart holder assembly is lifted. Light intensity is controlled by potentiometer knobs located on each side of the glareshield panel and may be selected from dim to full bright.

FLUORESCENT FLOOD/STORM LIGHT (OPTIONAL)

Three flood/storm lights provide a proper lighting level in the cockpit and assures instrument readability when the ambient lighting is too intense with lightning flashes.

The lights are located under the glareshield panel, two for the pilot's and central side and the other for the copilot's side. Light intensity is controlled by potentiometer knobs located on each side of the glareshield panel and may be selected from off to full bright.

INSTRUMENTS AND PANELS LIGHTS

The instrument and control panel lights system provides lighting for instruments, control panels, and pushbuttons. Light intensity is controlled by potentiometer knobs located on each side of the glareshield panel and on the overhead panel.

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MENU
PREVIOUS
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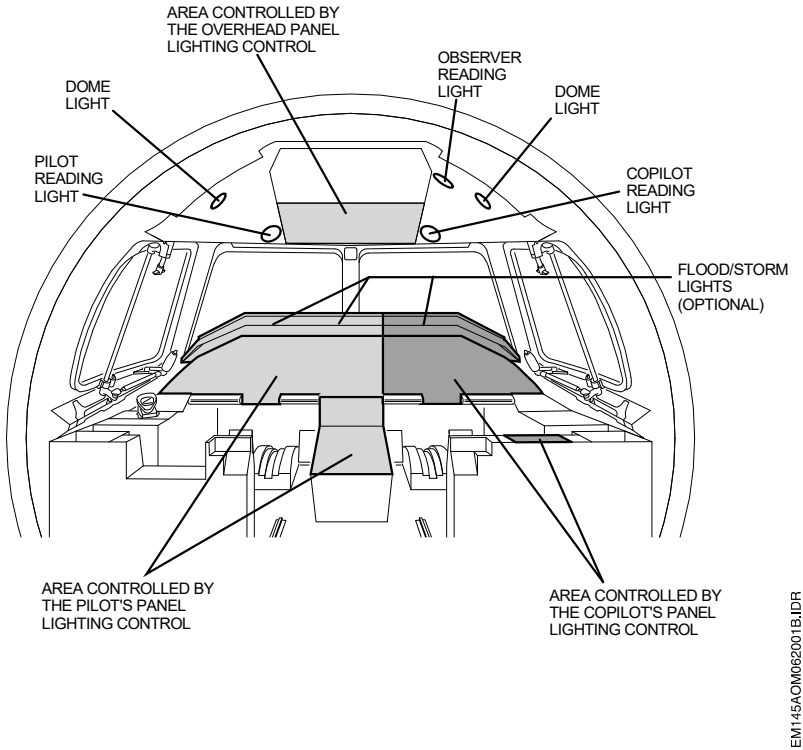

COCKPIT LIGHTING

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CONTROLS AND INDICATORS

GLARESHIELD PANEL

1 – FLOODLT CONTROLLERS

- Turn on/off and regulate the brightness of flood lighting.
- Pilot's knob controls pilot's panel, center panel and control pedestal.
- Copilot's Knob controls copilot's panel.

2 – CHART HLDR CONTROLLERS

- Regulate the brightness of associated chart holder lighting.

NOTE: Chart light is turned on when the chart holder assembly is lifted.

3 – DISPLAYS CONTROLLERS

- Regulate the brightness of Electronic Display.
- Pilot's knobs control pilot's PFD and MFD.
- Copilot's knobs control EICAS and copilot's PFD and MFD.

4 – PANEL LIGHTS CONTROLLERS

- Turn on/off and regulate the brightness of panels lighting.
- Pilot's knobs control pilot's panel, center panel and control pedestal.
- Copilot's knob controls copilot's panel and observer panel.

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GLARESHIELD PANEL

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OVERHEAD PANEL

1 – PB LT SWITCH (IF INSTALLED)

- When actuated to the TEST position (momentary position) allows checking of the striped bars and caption indications.
- The striped bars and caption indications in all pushbuttons located on the main panel, overhead panel, control pedestal and right lateral console will illuminate, allowing verification of lamps integrity.
- The fire handles, APU fire extinguish button, BAGG EXTG button, electromechanical GUST LOCK indication lights, GPU AVAIL annunciator and digital pressurization control button will not illuminate and will not be tested.

2 – OVHD PNL LT CONTROLLER

- Turns on/off and regulates the brightness of the overhead panel lighting.

3 – DOME SWITCH

- Turns on/off the two cockpit dome lights.

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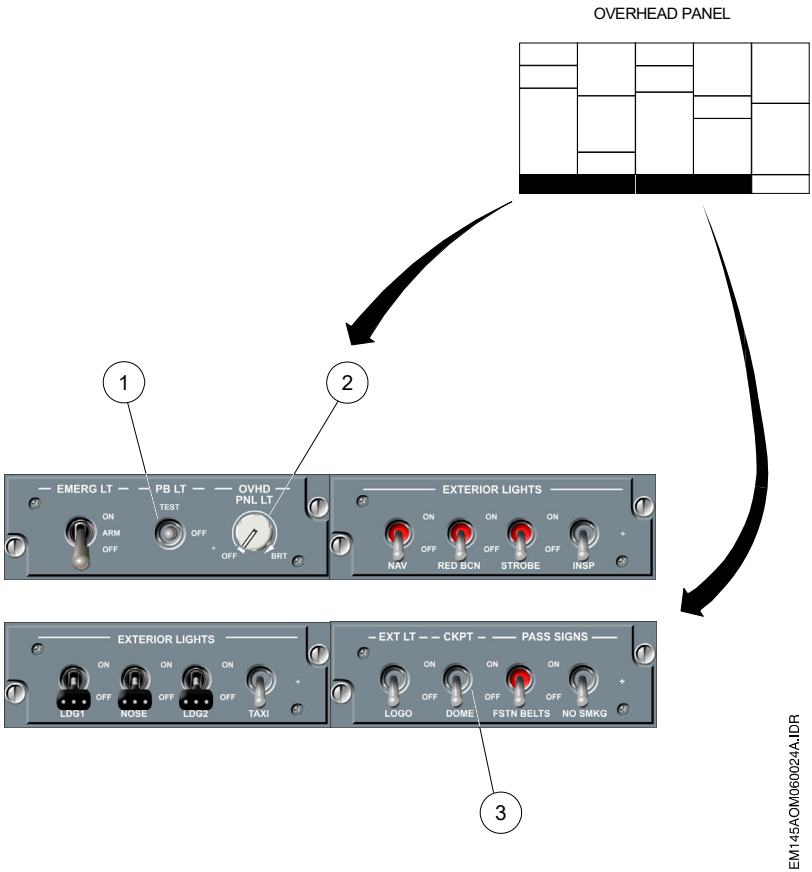

OVERHEAD PANEL

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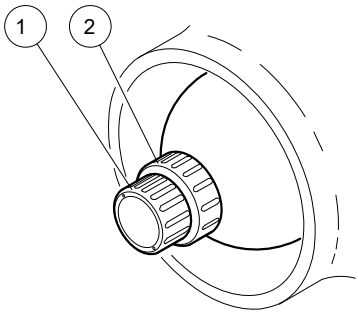
FLIGHT CREW READING LIGHTS

1 – INNER RING

– Provides turn on/off and dimming control.

2 – OUTER RING

– Provides reading area adjustment, allowing light beam orientation up to 35 degrees from the vertical axis in any direction.



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PASSENGER CABIN LIGHTING

Passenger cabin lighting includes general illumination, reading and table lights, lavatory, cabin signs and galley lights.

GENERAL PASSENGER CABIN ILLUMINATION

General passenger cabin illumination is provided by upwash and downwash fluorescent lights mounted in the left and right valance panels. The forward and aft cabins can be switched independently from both VIP Control Panels and from the Galley Control Panel. Pressing one of the switches alternates the lights between Bright, Dim and Off.

READING AND TABLE LIGHTS

The cabin reading and table lights are located in the escutcheons above the seats and tables. These lights are controlled by the switches installed on the control panels beside each passenger seat, on the divan surround and on the VIP Control Panels. The direction of the light beam is fully adjustable.

LAVATORY

The Lavatory lighting consists of upwash, downwash, vanity, reading and call lights. The lavatory upwash and downwash lights installed in the valance panels are automatically controlled through a microswitch installed in the latch assembly of the door. When the door is not latched (lavatory not in use), the valance lights illuminate in reduced brightness mode, switching to full brightness mode when the door is closed and latched. The vanity light consists of a fluorescent tube installed over the vanity mirror. A switch located in the vanity console turns the vanity light on or off. A switch on the lavatory control panel controls the reading light, located above the toilet unit. The reading light beam is fully adjustable.

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PASSENGER CABIN SIGNS

The passenger warning signs are illuminated signs that will be clearly visible under normal daylight lighting conditions. They provide passengers with NO SMOKING, FASTEN SEAT BELTS, RETURN TO SEAT and DO NOT OPEN DOOR instructions. An aural signal sounds whenever any passenger sign is turned on or off by the pilot.

The NO SMOKING and FASTEN SEAT BELTS signs are controlled through respective switches located on the overhead panel. These signs are installed along the cabin in a way they can be seen from all the seats, in the Galley area and in the Lavatory.

In addition, a RETURN TO SEAT sign is provided only in the Galley area and in the Lavatory and is activated in conjunction with the Fasten Seat Belts sign.

The NO SMOKING, FASTEN SEAT BELTS and RETURN TO SEAT signs are also activated when the oxygen dispensing units are open and when the cabin pressure reaches 14500 ft above sea level.

The DO NOT OPEN DOOR sign is installed beside the lavatory-to-baggage compartment access door (inside the lavatory) to warn passengers against opening the door, whenever smoke is detected in the baggage compartment.

GALLEY LIGHT

The galley lights are divided into three subsystems controlled through three switches on the Galley Control Panel. These switches turn lights on or off in each subsystem.

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STERILE LIGHT (OPTIONAL)

A blue sterile light, located on the cockpit/pax partition, indicates, when lit, that entry into the cockpit is not allowed. It is commanded through a switch located at the overhead panel.

COURTESY AND STAIRS LIGHTING

The courtesy and stair lights provide lighting for safe boarding of crewmembers and passengers. The courtesy and stair lights consist of the main door light (entry area), service door light (galley area), stairway lights and cockpit step light as follows:

– Main door light: A light is installed on the main door ceiling panel, above the entry area of the airplane, to illuminate the stair, entry area, aisle toward cockpit and passenger cabin.
– Stairway lights: Airplanes equipped with airstair main doors have stair lights installed in each step of the main door stair to provide adequate step illumination.
– Cockpit step light: A red light is installed in the step between the passenger cabin and the cockpit to provides light for safe entry into the cockpit. This light is illuminated simultaneously with the main door light.

These lights are controlled by a main door microswitch and by two membrane switches of the Entrance Control Panel, located in the Entertainment Cabinet, beside the main door.

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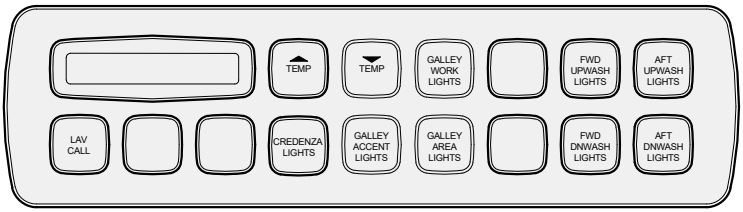
CONTROLS AND INDICATORS

GALLEY CONTROL PANEL

– CABIN LIGHTING CONTROL SWITCHES

The cabin lighting switches on the Galley Panel control forward and aft upwash and downwash lighting. Pressing each of these switches alternates the lights between Bright, Dim and Off modes.



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GALLEY CONTROL PANEL

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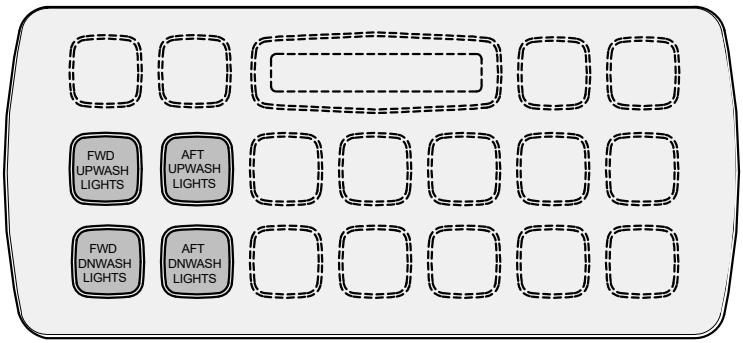
VIP CONTROL PANEL

– CABIN LIGHTING SWITCHES

Cabin lighting can be controlled from both VIP Control Panels. Pressing any of the light control switches on these panels alternates the upwash and downwash lights between Bright, Dim and Off modes.



VIP CONTROL PANEL (FORWARD AND AFT)

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COURTESY LIGHTING PANEL

– COURTESY AND STAIRS LIGHTING CONTROL SWITCHES

ENTRY LIGHTS ON/OFF SWITCH

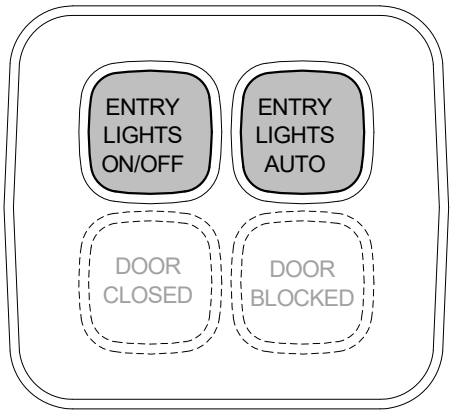
OFF (Amber) – All courtesy and stairs lights are turned off.

ON (Green) – All courtesy and stairs lights are turned on, when the main door is open. When the main door is closed, only the overdoor light remains on, to illuminate the main door area in flight.

ENTRY LIGHTS AUTO SWITCH

ON (Green) – All courtesy and stairs lights are extinguished when the main door is closed and illuminate when the main door is open.

NOTE: The cockpit dome lights may be commanded through the Courtesy and Stairs Lighting Control Switch provided the airplane is deenergized and the Cockpit Dome Lights Switch is set to ON position.



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COURTESY LIGHTING PANEL

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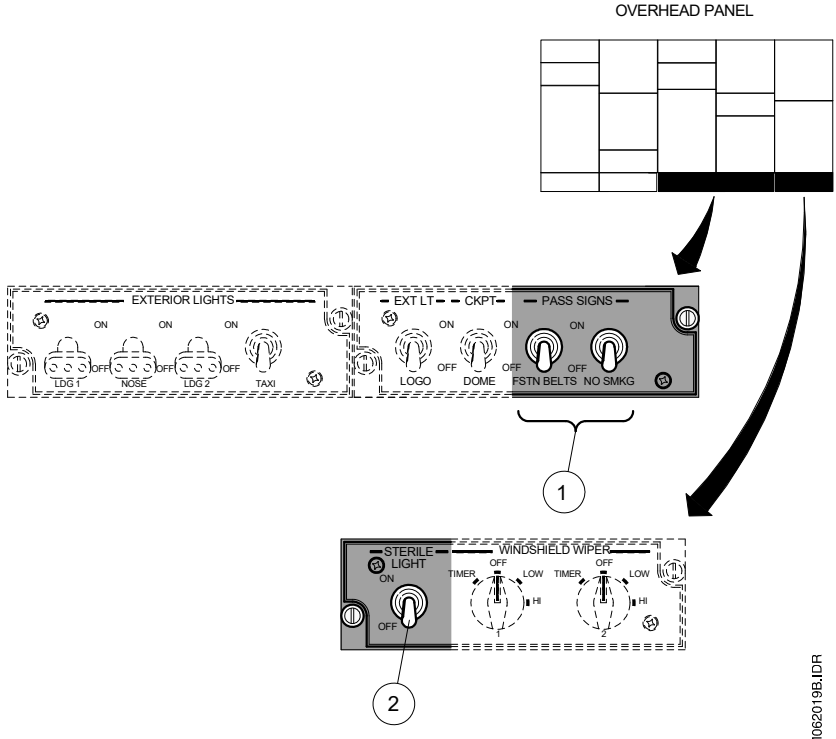
OVERHEAD PANEL

1 – FSTN BELTS AND NO SMKG SWITCHES

– Turns on/off the associated passenger signs.

2 – STERILE LIGHT SWITCH

– Turns on/off the sterile light.



OVERHEAD PANEL

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EXTERNAL LIGHTING

The external lights necessary to a proper and safe operation of the airplane are:

– Landing lights.
– Taxi lights.
– Navigation lights.
– Anti-Collision lights.
– Wing inspection lights.
– Logotype lights.

LANDING LIGHTS

The landing lights provide adequate lighting during final approach, flare-out and take-off. Two landing lights are fitted in the wing leading edge close to the fuselage and a third landing light is mounted on the nose landing gear strut. The switches located on the overhead panel are responsible for the control of the landing lights.

TAXI LIGHTS

The taxi light provides sufficient intensity and beam spread to aid pilots during all taxi operation phases, covering the runway and adjacent areas.

Two taxi lights are fitted on the nose landing gear strut and are commanded by a single switch located on the overhead panel.

NAVIGATION LIGHTS

The navigation lights, red on the left and green on the right, are fitted to the leading edge of each wing tip. A white navigation light is fitted to the cone top of the horizontal stabilizer. The navigation lights are controlled by a switch located on the overhead panel.

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ANTI-COLLISION LIGHTS

The anti-collision lights provide illumination for visual recognition and collision avoidance during all flight/taxi operations. White strobe (anti-collision) lights are fitted to each wing tip and cone top of the horizontal stabilizer. Red beacon lights are mounted on the upper fuselage. Two different switches, one for strobe lights and another for the red beacon lights are located on the overhead panel.

NOTE: The airplane may be equipped with a second underbelly red beacon.

WING INSPECTION LIGHTS

Two inspection lights, one on each side of the fuselage, provide lighting of the wing leading edge to allow the crew to verify ice formation. The inspection lights are controlled by a switch located on the overhead panel.

LOGOTYPE LIGHTS (OPTIONAL)

The logo lights are installed on the underside of the horizontal stabilizer and are aimed at the vertical fin. They provide adequate illumination of the airplane's logo during operation on the ground and in flight. A switch located on the overhead panel controls the logotype lights.

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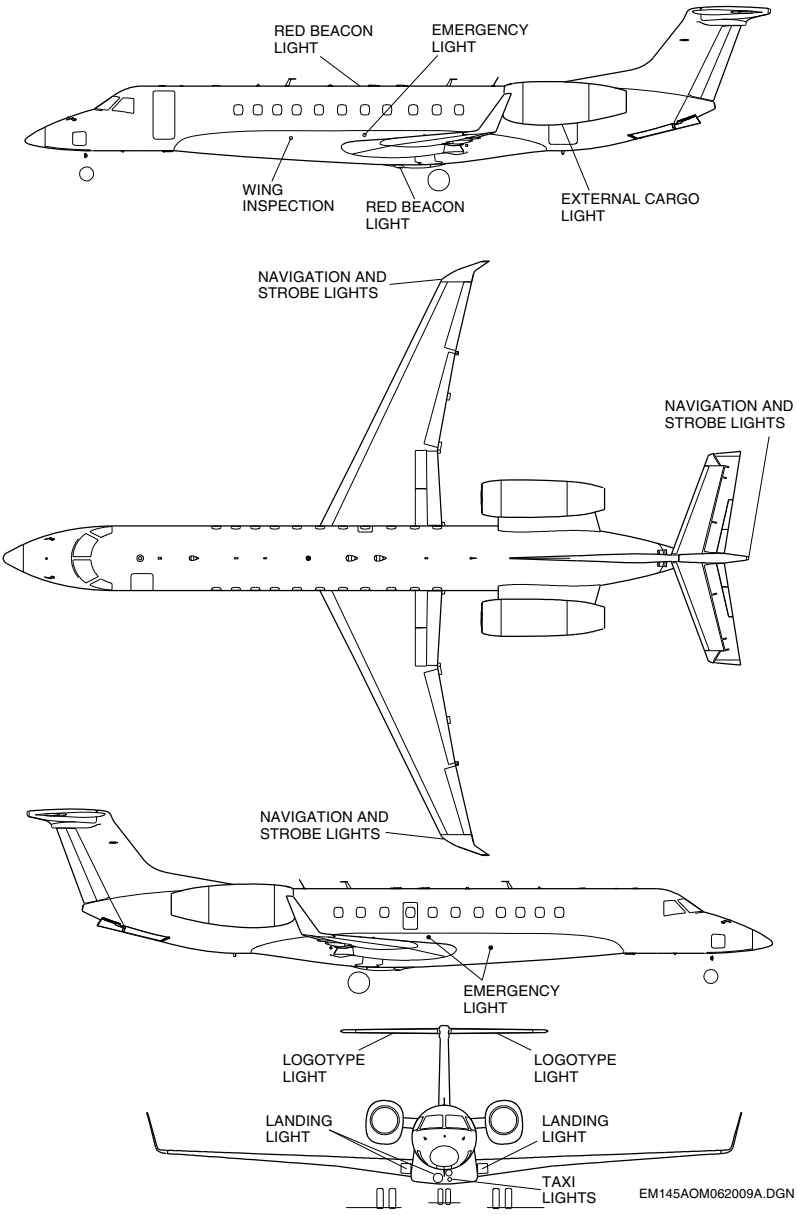

EXTERNAL LIGHTS

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SERVICE COMPARTMENTS LIGHTING

The system provides lighting in the service compartments for quick inspection and accomplishment of several tasks. Service lights are installed in the nose landing gear, rear and forward electronic bays, tail cone and forward flight control compartments. The lights are controlled by a door microswitch, that turns on the associated light when the access doors is open, or by dedicated switches, installed in the compartment.

BAGGAGE COMPARTMENT LIGHTING

The baggage compartment is equipped with lights installed on the ceiling panel. These lights are controlled by a microswitch installed at the door structure and they are turned on whenever the baggage compartment is open. The baggage lights also can be turned on/off in flight by the crew to provide condition to visually check through a sight hole, on the baggage compartment/toilet partition, the presence of smoke in the baggage compartment in case of smoke warning. The baggage control panel is installed on the baggage compartment/toilet partition and it has a switch label "BAGGAGE LIGHTS ON/OFF" when the membrane switch is pressed, the baggage light is activated.

In addition, The airplane is equipped with a cargo door light installed in the left pylon. The cargo door light provides lighting externally of the cargo compartment and is controlled by a microswitch when the access door of the cargo compartment is open.

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CONTROLS AND INDICATORS

OVERHEAD PANEL

1 – NAV, RED BCN, STROBE AND INSP SWITCHES

– Turns on/off the associated light.

2 – LOGO SWITCH (OPTIONAL)

– Turns on/off the logotype lights.

3 – TAXI SWITCH

– Turns on/off the taxi lights.

NOTE: Taxi lights are not turned on if nose landing gear is not down and locked, regardless of the Taxi Lights Switch position.

4 – LANDING LIGHTS SWITCHES

– Turn on/off the associated landing light.

NOTE: Nose landing light is not turned on if nose landing gear is not down and locked, regardless the of Nose Landing Light Switch position.

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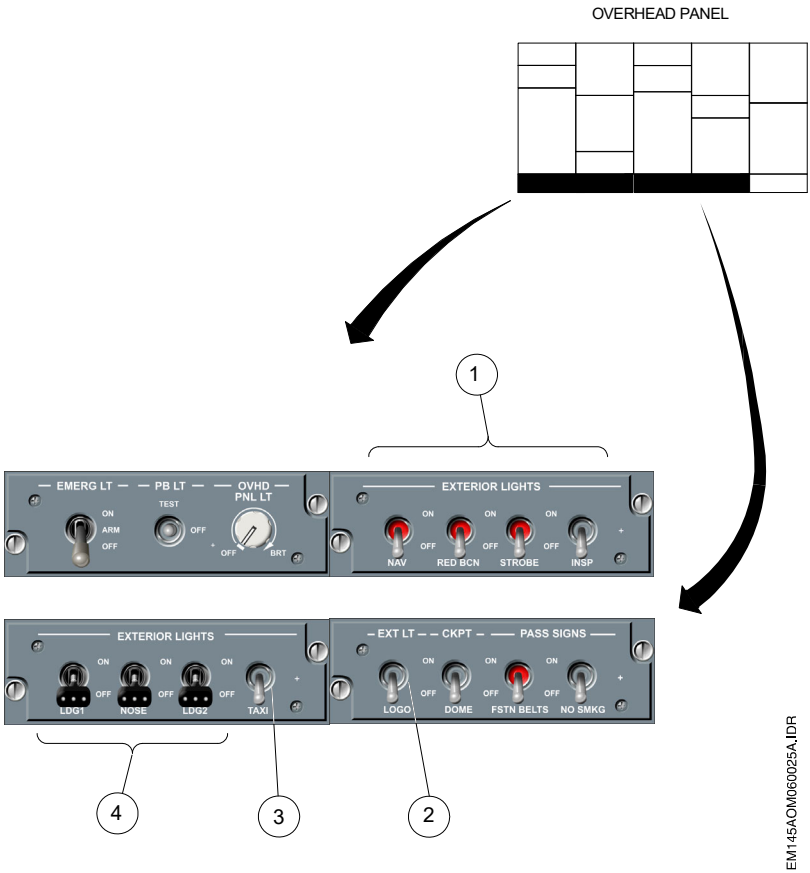

OVERHEAD PANEL

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EMERGENCY LIGHTING

The emergency lighting consists of internal and external lights that provide proper illumination for emergency cabin evacuation. These lights are powered by two dedicated batteries charged through the Essential Bus. Batteries power is sufficient to supply all internal and external emergency lights for approximately 10 minutes.

The exterior emergency lights installed are as follows:

– Two lights are installed on the right hand wing to fuselage fairing, in order to illuminate the wing escape route and the ground area.
– One light is installed on the handrail support of the main door in order to illuminate the outside area where the evacuee is likely to make first contact with the ground.

Internal emergency lights consist of the cockpit light, aisle lights, main door lights, overwing emergency exit lights, floor proximity lights and EXIT signs as follows:

– Cockpit light: This light is located on the cockpit ceiling to provide general cockpit emergency illumination.
– Aisle lights: Four dome lights are located along the aisle for general emergency cabin illumination.
– Main door and overwing emergency exit lights: One light is installed in the ceiling panel over the main exit door illuminating the main exit door area and the outside area. An emergency light is installed behind the valance panel, above the overwing emergency exit, providing illumination over the exit handle instructions.
– Floor proximity emergency lights: Electro-luminescent strip indicators are installed on the inboard side of the seats, in the toe kick area of the credenza and cabinets to provide a means of identifying the emergency escape path even in conditions of dense smoke.
– Illuminated EXIT signs: One emergency Exit sign is installed near the main door and two others are installed near the overwing exit door. In addition, Exit locator signs are located on the forward right hand bulkhead and aft left hand bulkhead of the forward cabin. The aft cabin exit locator sign is located on the forward left hand bulkhead.

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Emergency lighting is controlled through the Emergency Lights Switch, located on the overhead panel, and through the equivalent membrane switch located on the Galley Emergency Lights Control Panel.

A caution message is presented on the EICAS if the system is not armed.

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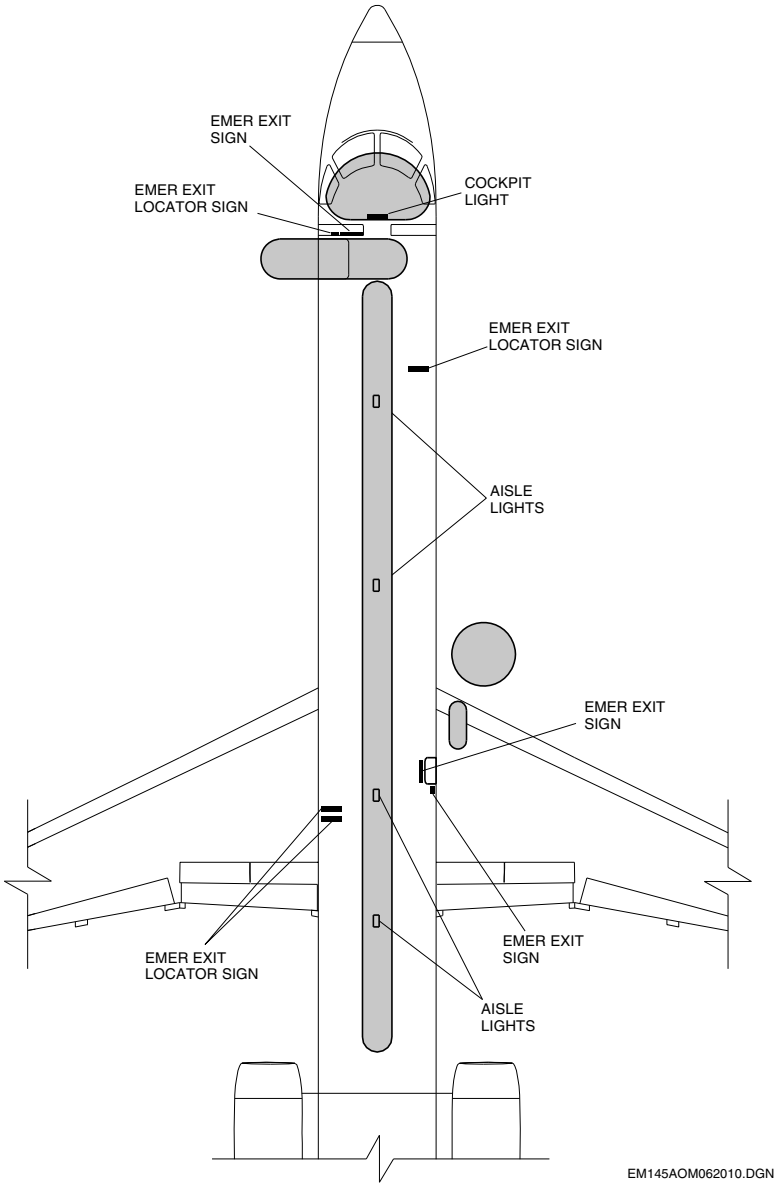

AREA ILLUMINATED BY EMERGENCY LIGHTING

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	EMERG LT NOT ARMD	Emergency lighting system is not armed.

CONTROLS AND INDICATORS

OVERHEAD PANEL

1 – EMERG LT SWITCH

ON – Emergency lights illuminate with power supplied by the dedicated batteries.

ARM – Emergency lights are in standby mode (lights turned off and the batteries being charged) and illuminate automatically in case of an electrical emergency, with power supplied by the dedicated batteries.

OFF – Emergency lights are turned off. Emergency lighting dedicated batteries are not charged.

NOTE: The EMERG LT Switch located on overhead panel controls the emergency lights only when the Galley Emergency Lights Switch color is amber (normal flight position), when its color is green the Emergency Lights are on, regardless of the switch position selected by the Flight Crew on overhead panel.

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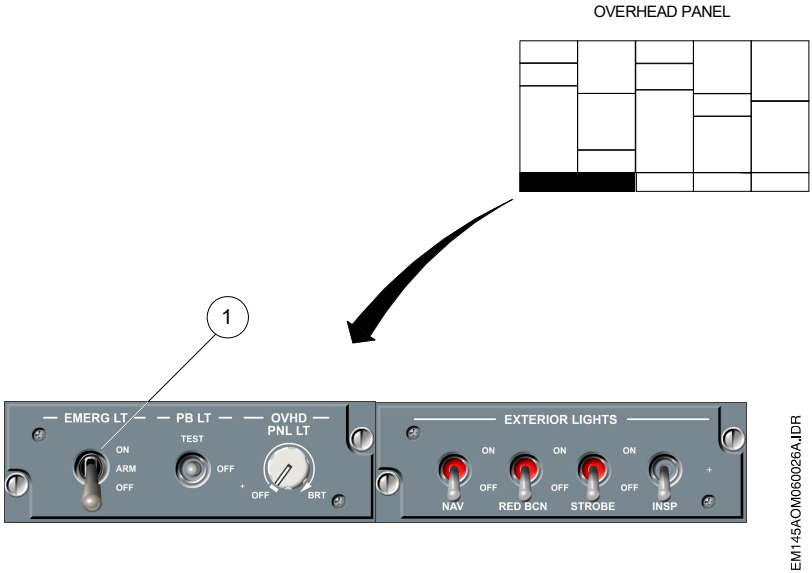

OVERHEAD PANEL

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GALLEY EMERGENCY LIGHTS CONTROL PANEL

AMBER – Emergency lights remain in the mode selected by the Emergency Lighting Selector Knob position on the cockpit (normal flight position).

GREEN – Emergency lights are turned on with power supplied by dedicated batteries, regardless of the Emergency Lighting Selector Knob position on the cockpit.

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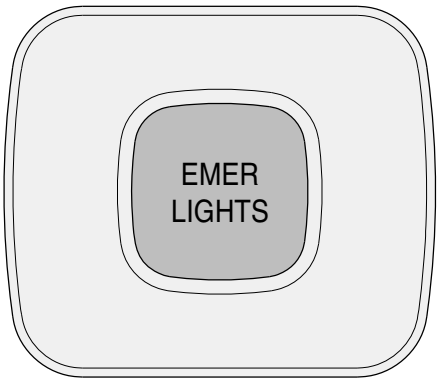

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GALLEY EMERGENCY LIGHTS CONTROL PANEL

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SECTION 2-07

FIRE PROTECTION

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GENERAL

The engine and APU fire protection system consists of fire/overheat detection and a fire extinguishing system.

The fire protection for the lavatory compartment is equipped with a dedicated smoke detection system (if applicable) and the lavatory waste container as well as the forward galley are equipped with a fire extinguishing system.

In addition, the baggage compartment is also provided with a smoke detection system and with a fire extinguishing system.

The detection system provides visual and aural (except in the baggage compartment) means of detecting a localized fire, smoke or general overheating. Also, a Monitoring circuitry is provided to continuously check the fire and smoke detection systems and the fire extinguishing system and in case of failure, to signal the EICAS display.

Extinguisher bottles are installed to extinguish the fire in the airplane's engines, APU, lavatory waste container, forward galley and baggage compartment. Portable fire extinguishers installed at the front and rear of the airplane can be used to extinguish small fires in the cockpit or main cabin area. A single water extinguisher is an additional option.

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ENGINE AND APU FIRE PROTECTION SYSTEM

FIRE/OVERHEAT DETECTION

The engines and the APU are protected against the occurrence of fire by means of fire detection and fire extinguishing systems.

Essential DC bus 1 powers the engine 1 fire detection system and essential DC bus 2 powers the engine 2 and the APU fire detection system. Hot battery bus 1 and 2 power the engine fire extinguishing system, whereas the APU fire extinguishing system is powered by essential DC bus 2.

The fire/overheat detection system is provided with independent sensor tubes installed in the engines and APU. The sensor tube contains a fixed volume of inert gas (Helium) and a gas-impregnated (Hydrogen) core material. The inert gas provides sensing of overheating. The core element provides sensing of localized fire or high-intensity heating. Overheating causes the sensor tube's internal gas pressure to increase. This closes a switch on the fire/overheating detection system's electrical circuit and activates the warning system. Localized fire or high-intensity heating increases the central core's gas volume, raising the sensor tube's internal pressure, thus activating the alarm switch in the same manner as described above.

Manual resetting of the fire detection system is not available. Upon removal of the fire or overheat condition, a reversible process takes place, and the system automatically returns to the normal standby operation mode.

An integrity switch continuously monitors the sensor tube's integrity. The integrity switch is held closed by the sensor's internal pressure. Should this pressure be lost the integrity switch opens, generating a signal to indicate that the system is inoperative.

Upon detection of a fire/overheat signal in the engine or APU, the associated handle (for the engines) illuminates, an aural warning is generated and a warning message is presented on the EICAS. The visual warning remains activated as long as the fire signal exists. The aural warning may be canceled by pressing the master warning light.

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In the case of failure of any fire detector, a caution message is presented on the EICAS.

The APU fire detection system provides a signal to shut down the APU automatically in case of fire warning during ground operation.

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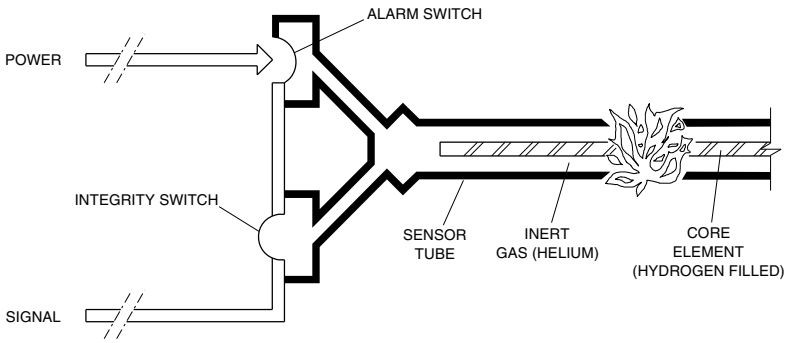

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FIRE OVERHEAT DETECTION SCHEMATIC

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FIRE EXTINGUISHING

Two fire extinguishing bottles for the engines and one for the APU are installed in the airplane's tail cone.

The extinguishing agent discharge is accomplished by braking the extinguisher bottle's seal through an electrically actuated cartridge in the discharge valve.

Each engine fire extinguisher bottle contains two discharge valves, a pressure gauge with a pressure switch and a fill/safety relief valve. The engine bottles are cross-connected by two double check tees to provide dual shot capability, thus one or both bottles can be discharged into one or the other engine. The double-check tee prevents the extinguishing agent of the remaining bottle from filling the emptied bottle in case of a second shot of the system. The engine extinguisher bottles are discharged by pulling and rotating the Fire Extinguishing Handle, which is located on the overhead panel.

CAUTION: DO NOT DISCHARGE THE SAME EXTINGUISHER BOTTLE TWICE. ACTUATING THE FIRE HANDLE INTO AN EMPTY BOTTLE MAY CAUSE STRUCTURAL DAMAGE TO THE BOTTLE.

The APU bottle contains only one discharge valve, a pressure gauge with a pressure switch, and a fill/safety relief valve. It provides single shot capability for the APU. The APU extinguisher bottle is discharged by pressing the APU Fire Extinguishing Button, located on the overhead panel.

A caution message is presented on the EICAS should any bottle be discharged or be inoperative for any reason (failed cartridge, loss of pressure, or loss of power).

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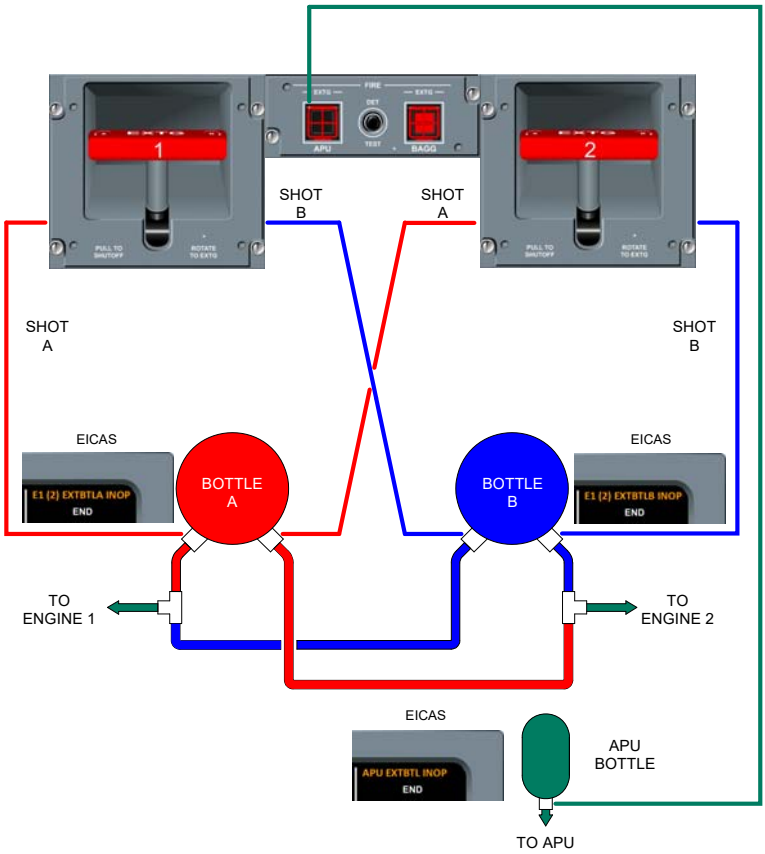

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ENGINE AND APU FIRE EXTINGUISHING SYSTEM SCHEMATIC

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CONTROLS AND INDICATORS

ENGINE AND APU FIRE DETECTION/EXTINGUISHING SYSTEM PANEL

1 – ENGINE FIRE EXTG HANDLE

- During normal flight conditions, the handle remains flush with the panel.
- A red light illuminates inside the handle upon detection of fire or overheating.
- When pulled, it closes the fuel, hydraulic, bleed air, and lip anti-icing shutoff valves of the associated engine.
- When rotated counterclockwise or clockwise, it respectively discharges extinguisher bottles A or B into the associated engine.

2 – APU FIRE EXTG BUTTON (GUARDED)

- When pressed, it closes the APU fuel shutoff valve and discharges the APU fire extinguisher bottle.

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3 – FIRE DET TEST BUTTON

– When pressed and held (for at least 2 seconds) it permits the fire detection system to be checked.

The EMB-135BJ is equipped with class "C" baggage compartment, and the fire test is successfully completed if the conditions below occur simultaneously:

– Aural Fire Warning (Bell).
– Engine Fire Extinguishing handles illuminated.
– BAGG EXTG button illuminated.
– WARNING/CAUTION Lights flashing.
– Baggage compartment fan deactivates.
– EICAS messages:
  – Warning: APU FIRE, ENG 1 (2) FIRE, BAGG SMOKE.
  – Caution: APU FIREDET FAIL, E1 (2) FIREDET FAIL.

NOTE: - On the ground and with the APU running, if Fire Detection Test button is held pushed for more than 10 seconds, the APU will automatically shutdown.

- If it is necessary to repeat the test, wait at least 6 seconds to press the test button again.

- If Fire Detection Test button is held for less than 2 seconds the BAGG EXTG button may remain illuminated. Should this happen, just repeat the test by pressing and holding the Fire Detection Test button for at least 2 seconds. After that the BAGG EXTG button should be not illuminated.

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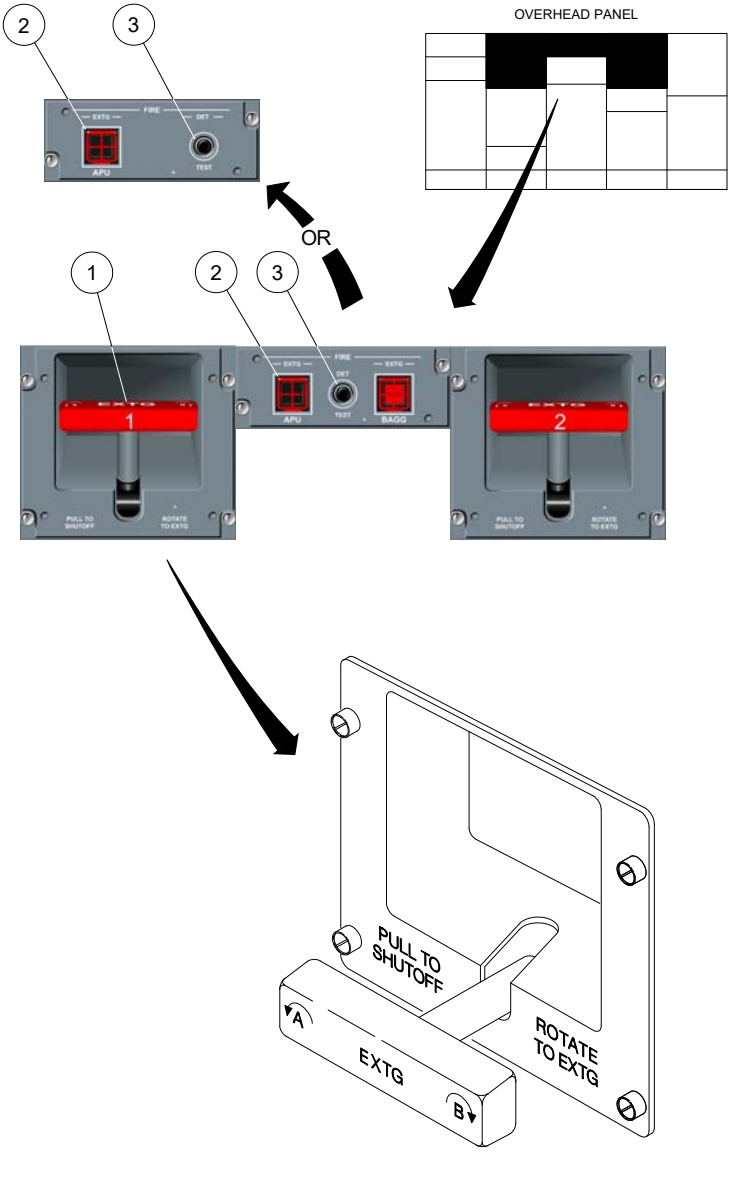

ENGINE AND APU FIRE DETECTION/EXTINGUISHING PANEL

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	APU FIRE	Fire in the APU.
	ENG 1 (2) FIRE	Fire in associated engine.
CAUTION	APU EXTBTL INOP	Associated bottle has been discharged or is inoperative.
	APU FIREDET FAIL	APU fire detection system failed.
	E1 (2) EXTBTLA INOP E1 (2) EXTBTLB INOP	Associated bottle has been discharged or is inoperative.
	E1 (2) FIREDET FAIL	Associated engine fire detection system failed.

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LAVATORY AND GALLEY FIRE PROTECTION SYSTEM

LAVATORY AND GALLEY FIRE EXTINGUISHING

The lavatory and forward galley fire extinguishing system consists of two autodischargeable fire extinguisher bottles. Each bottle is attached to a waster container, one in the lavatory vanity assembly and the other one in the forward galley.

The bottle is mounted with the discharging tubes extended into the waste container. The end of each discharge tube has a tip which has a melting temperature of approximately 77°C (170°F). The tips will melt to discharge the agent totally into the waste container when a fire overheat condition occurs.

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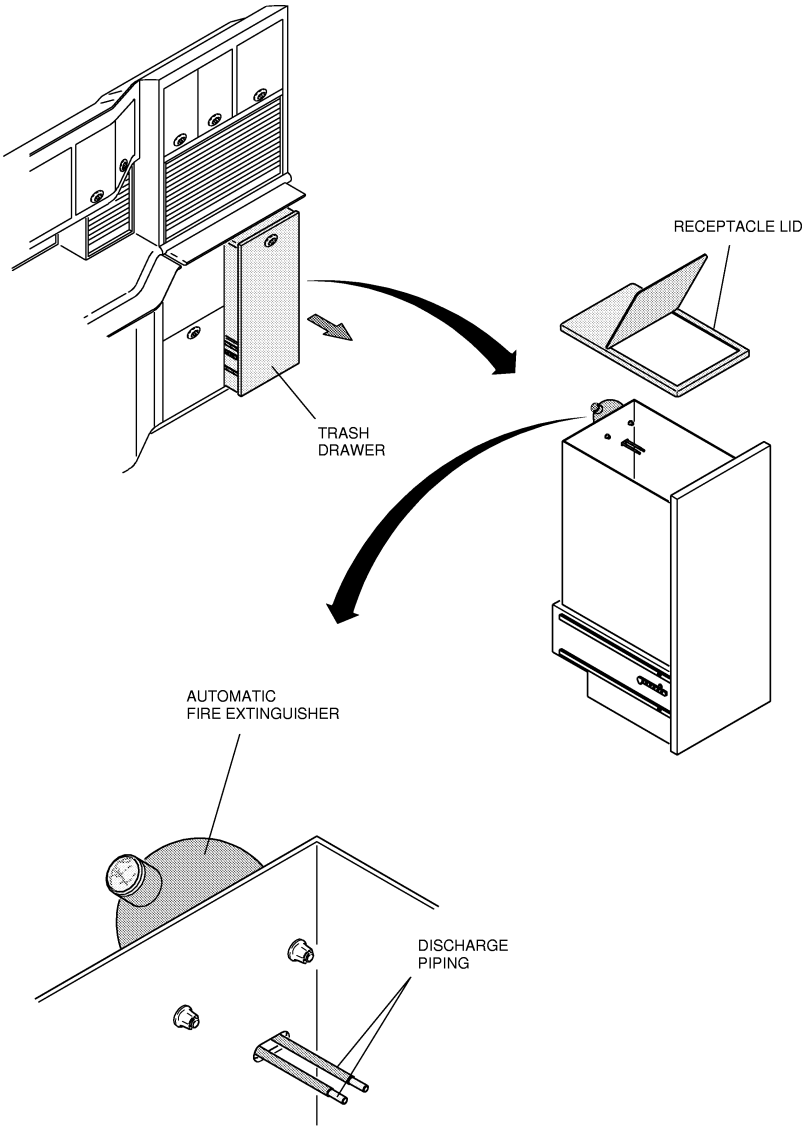

FORWARD GALLEY FIRE EXTINGUISHER BOTTLE

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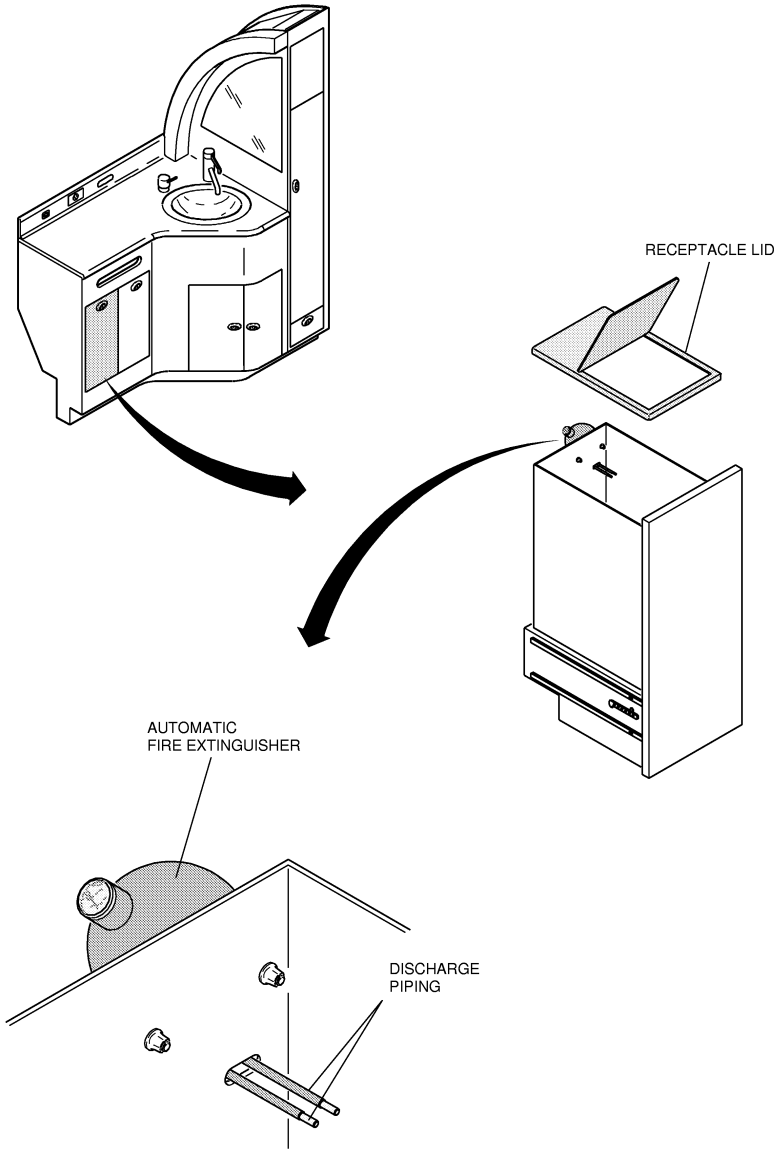

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LAVATORY FIRE EXTINGUISHER BOTTLE

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BAGGAGE COMPARTMENT FIRE PROTECTION SYSTEM

BAGGAGE COMPARTMENT SMOKE DETECTION SYSTEM

A smoke detection system is provided in the baggage compartment. The system consists of two smoke detection modules, one installed in the compartment ceiling and the other one in the baggage compartment aft bulkhead.

A warning message is presented on the EICAS to indicate smoke detection inside the baggage compartment.

The smoke sensor resumes the normal operation when the fire is extinguished, the smoke has been cleared and the smoke sensor is reset through the power reset button, located on each smoke detection module.

NOTE: The Smoke Detector Modules are normally handled by the maintenance personnel.

In order to avoid inadvertent occurrences of smoke detection messages due to humidity in the smoke sensors, an integral heater raises the temperature of the optical components of the smoke detector. In addition, a fan with brushless DC motor provides air perturbation in the vicinity of the detector.

An alarm condition may also be triggered by high temperature conditions in the absence of high smoke levels.

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BAGGAGE COMPARTMENT FIRE EXTINGUISHING SYSTEM

Two fire extinguishing bottles (High-rate Discharge Bottle and Metering Discharge Bottle) are installed in the rear electronic compartment for fire baggage compartment protection.

The High-rate Discharge Bottle is intended to fill the baggage compartment instantaneously while the Metering Discharge Bottle provides the concentration fire level extinguishing agent for at least 75 minutes.

Upon smoke detection inside the baggage, the smoke detectors send a signal to deactivate the baggage compartment fan (refer to Section 2-2 – Equipment and Furnishings). Also, they illuminate the baggage fire extinguishing button on the Fire Detection/Extinguishing Panel and the "DO NOT OPEN DOOR" warning on the lavatory aft bulkhead.

EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	BAGG SMOKE	Smoke has been detected inside the baggage compartment.
CAUTION	BAGG EXTBTL INOP	Any of the bottles have been discharged or are inoperative.

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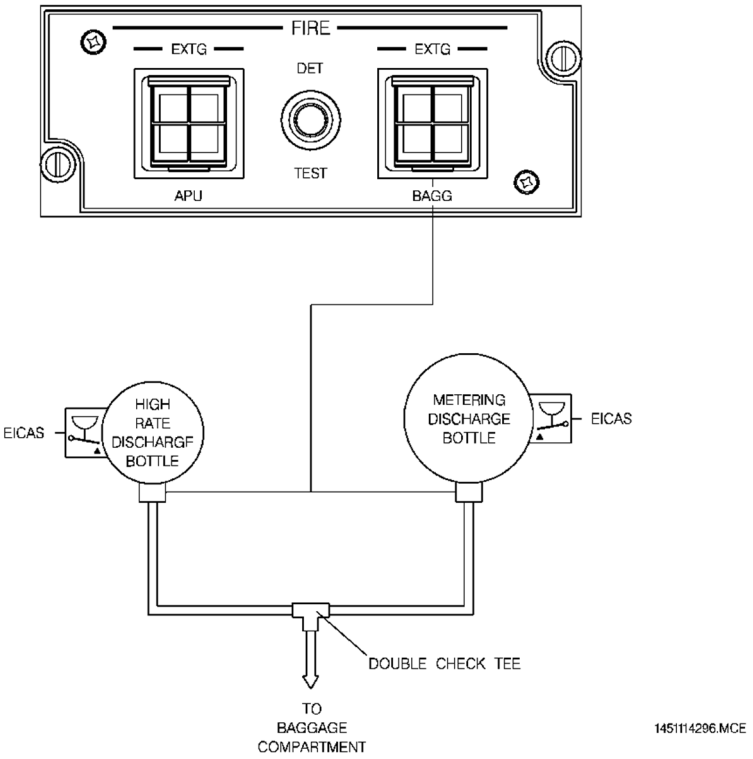

BAGGAGE FIRE EXTINGUISHING SCHEMATIC

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CONTROLS AND INDICATORS

BAGGAGE DETECTION/EXTINGUISHING PANEL

1 – BAGG FIRE EXTG BUTTON (GUARDED)

- When lit, button indicates that smoke was detected inside the baggage compartment or that the fan has been deactivated.
- Button remains lit as long as there is smoke inside baggage compartment.
- If the airplane is parked, the pilot must check the baggage compartment, through the peephole, before pushing the BAGG EXTG SW.
- When pressed:
  - Discharges the baggage fire extinguishing bottles.
  - Deactivates the baggage compartment fan.

NOTE: Fire extinguishing agent may activate the smoke detector.

2 – FIRE DET TEST BUTTON

- Refer to ENGINE AND APU FIRE DETECTION/EXTINGUISHING PANEL.

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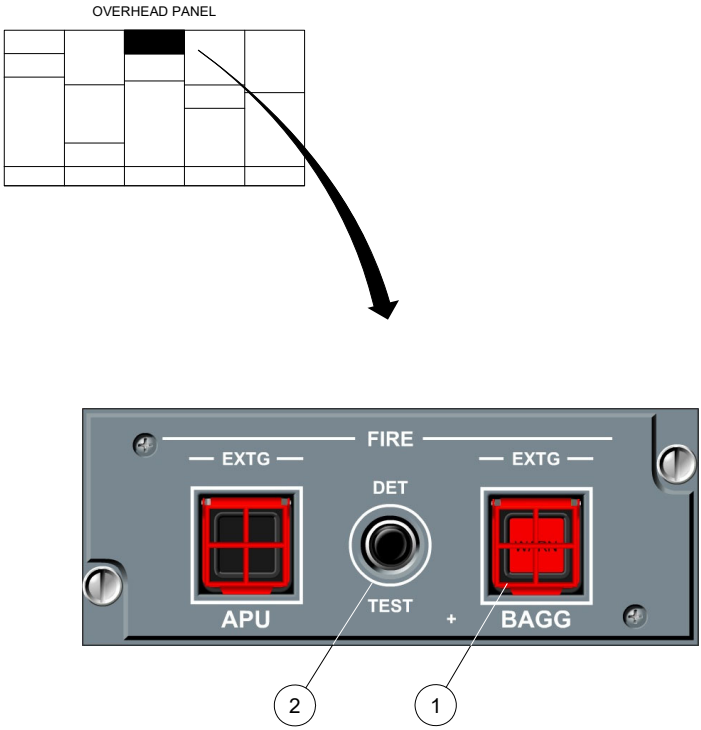

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BAGGAGE DETECTION/EXTINGUISHING PANEL

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BAGGAGE COMPARTMENT SMOKE DETECTOR

– Detectors are tested during Fire Detection System test.

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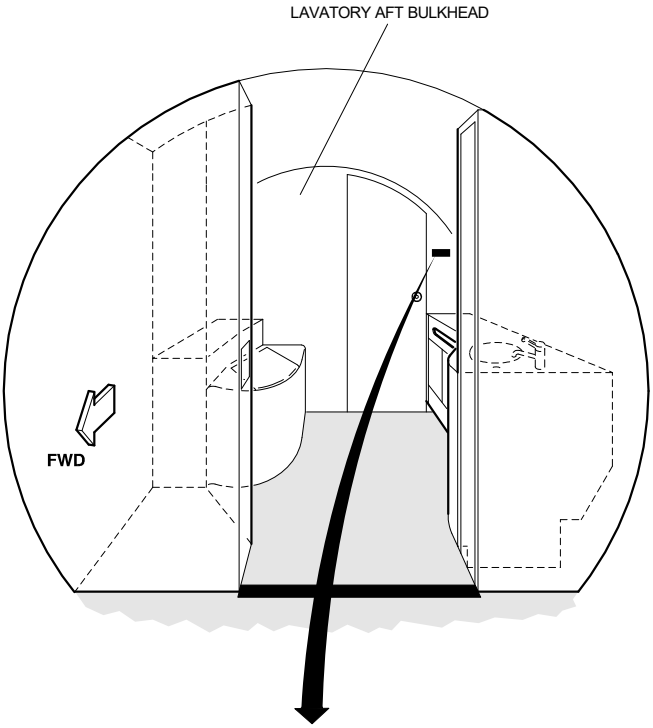

DO NOT OPEN DOOR

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SMOKE INDICATION ON THE LAVATORY AFT BULKHEAD

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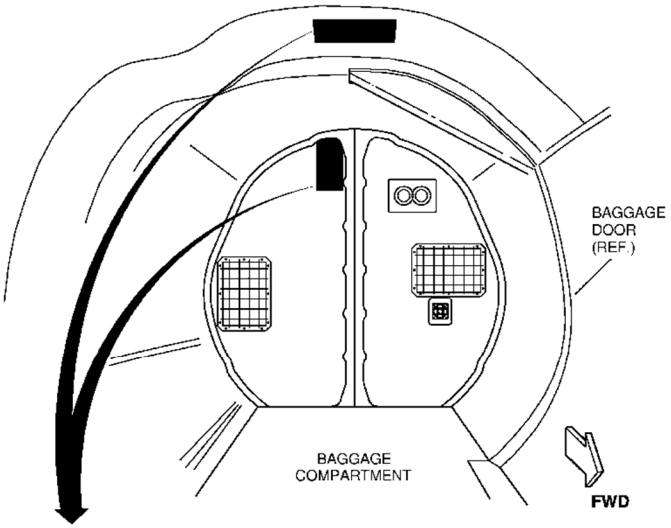

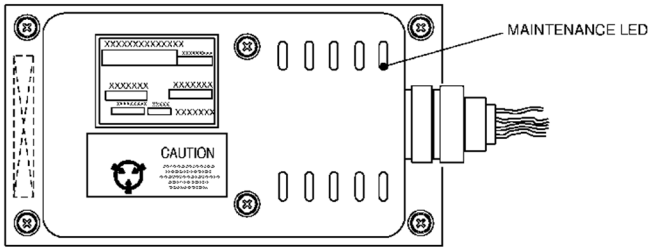

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BAGGAGE COMPARTMENT SMOKE DETECTOR

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SECTION 2-08

FUEL SYSTEM – LEGACY 600

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FUEL SYSTEM – LEGACY 600

GENERAL

The fuel system of the EMB-135BJ uses fuel stored in the Wing and Fuselage Tanks to supply the engines and the APU.

The fuel from the Fuselage Tanks is first transferred to the Wing Tanks, and then used by the engines and APU.

Additional accessories provide means for refueling, defueling, advisory, caution and warning messages, and proper EICAS indication.

NOTE: The fuel weight values presented in this Section are based on a fuel density of 0.809 kg/ℓ (6.751 lb/US Gal).

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FUEL TANKS

The fuel tanks are installed one in each wing (Wing Tanks), two fuselage tanks in the forward of the fuselage-to-wing fairing (FWD Tanks), and two fuselage tanks (AFT Tanks) in a pressurized area, between the baggage and the rear electronic compartments.

WING TANKS

The Wing Tanks are located at each wing and extend to the wing stub. The fuel flows from the wing tip to the wing root by gravity. A collector box inside the wing stub contains three electrical pumps. To keep the electrical pumps inlets submerged, preventing pump cavitation, an ejector pump and flap valves ensure that there is enough fuel in the collector box during wing-down or uncoordinated maneuvers.

Two manually operated drain valves are installed in each Wing Tank: one in the lowest region of the wing-stub wet area and another in the lowest region of the semi-wing root to allow complete drainage of fuel and water.

A dump valve is installed in the lowest region of each wing-stub area to allow gravity defueling.

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FUSELAGE TANKS

The fuselage tanks are divided into two separated sub-systems: FUS 1, composed by FWD Tank 1 and AFT Tank 1, and FUS 2, composed by FWD Tank 2 and AFT Tank 2.

FORWARD TANKS

The FWD Tanks are constituted by an aluminum structure, divided in two totally separated compartments, operating as independent fuel tanks. The LH tank is designated as FWD Tank 1 and the RH tank as FWD Tank 2.

The fuel flows from the forward to the rear section of both FWD Tanks by gravity.

A collector box in the rearmost region of the tanks contains two electrical pumps. Flap valves ensure that there is enough fuel in the collector box during nose-down or uncoordinated maneuvers to keep the electrical pumps submerged, thus preventing pump cavitation.

A manually operated drain valve is symmetrically installed in each FWD Tank, in the lowest region of the collector box to allow complete drainage of fuel and water.

AFT TANKS

The AFT Tanks are composed by two independent tanks, each one constituted by a rubber bladder cell installed inside a composite container. The left side tank is designated as AFT Tank 1 and the right side tank as AFT Tank 2.

There is one electrical pump in each tank, and in case of failure the cabin air pressurization is employed as a backup.

A manually operated drain valve for each AFT Tank is provided in the fuselage skin to allow complete drainage of fuel and water. The fuel is routed from the respective AFT Tank to the valve through a dedicated shrouded line.

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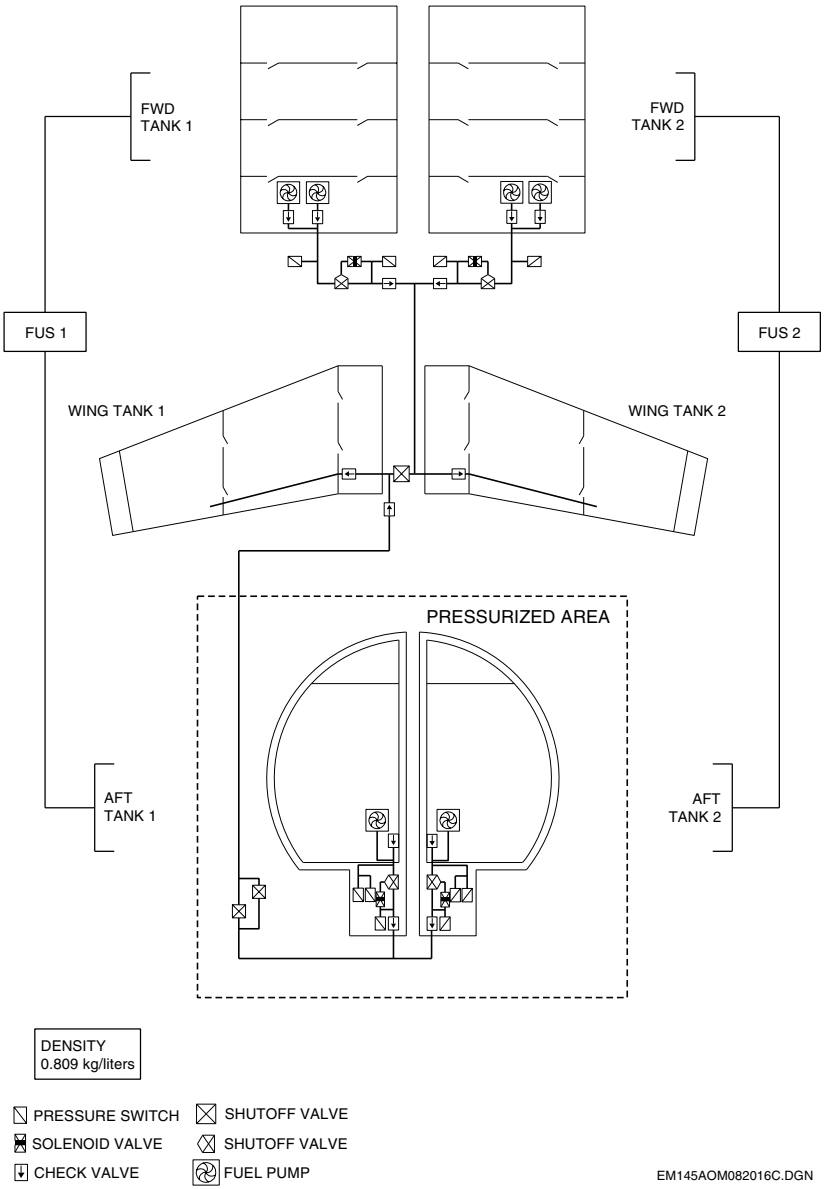

FUEL TANKS SYSTEM SCHEMATIC

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FUEL TANKS CAPACITIES (USABLE FUEL)

AIRPLANES UP TO S/N 591 AND PRE-MOD. SB 145LEG-28-0010

		FUEL TANKS CAPACITIES (1)			
		LITERS	**US GAL**	**KG**	**LB**
WING TANK 1 (3)		3198	845	2587	5703
WING TANK 2 (3)		3198	845	2587	5703
FUS 1	**FWD TANK 1 (2)**	989	261	800 (2)	1764
	AFT TANK 1 (2)	816	216	660 (2)	1455
FUS 2	**FWD TANK 2 (2)**	989	261	800 (2)	1764
	AFT TANK 2 (2)	816	216	660 (2)	1455
TOTAL		**10006**	**2644**	**8094**	**17844**

Reference values:

– 3.785412 liter/US gallon or 0.264172 US gallon/liter
– 1.236 liter/kg or 0.809 kg/liter
– 0.4536 kg/lb or 2.2046 lb/kg

NOTE: (1) The values above have been determined for an adopted fuel density of 0.809 kg/ℓ (6.751 lb/US Gal).

(2) The FWD and AFT tanks are limited by weight according to the table above.

(3) When performing pressure refueling, the usable fuel quantity in each Wing Tank may be reduced by 50 liters (40 kg) or 13.2 US Gal (88.2 lb) maximum.

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AIRPLANES S/N 625 AND ON OR POST-MOD. SB 145LEG-28-0010 OR EQUIPPED WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

		FUEL TANKS CAPACITIES (1)			
		LITERS	US GAL	KG	LB
WING TANK 1 (3)		3198	845	2587	5703
WING TANK 2 (3)		3198	845	2587	5703
FUS 1	FWD TANK 1 (2)	1112	294	900 (2)	1984
	AFT TANK 1 (2)	828	217	670 (2)	1477
FUS 2	FWD TANK 2 (2)	1112	294	900 (2)	1984
	AFT TANK 2 (2)	828	217	670 (2)	1477
TOTAL		**10276**	**2712**	**8314**	**18328**

Reference values:

- 3.785412 liter/US gallon or 0.264172 US gallon/liter
- 1.236 liter/kg or 0.809 kg/liter
- 0.4536 kg/lb or 2.2046 lb/kg

NOTE: (1) The values above have been determined for an adopted fuel density of 0.809 kg/ℓ (6.751 lb/US Gal).

(2) The FWD and AFT tanks are limited by weight according to the table above.

(3) When performing pressure refueling, the usable fuel quantity in each Wing Tank may be reduced by 50 liters (40 kg) or 13.2 US Gal (88.2 lb) maximum.

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FUEL TANKS VENT SYSTEM

The purpose of the vent system is to prevent damage to the fuel tanks due to excessive build-up of positive or negative internal pressures, and to provide ram air pressure within the tanks. The vent system also prevents fuel spillage during flight maneuvers and hard braking.

WING TANKS VENT SYSTEM

Each Wing Tank is vented by a system that consists of a vent tank and a NACA air intake. The vent tank is located in the wing tip and is connected to the fuel tank through two float vent valves. These float valves allow at least one venting point to remain open between the vent tank and the fuel tank, under any flight condition. The vent tanks are connected to the outside air through a NACA air intake, installed under the wing.

FORWARD TANKS VENT SYSTEM

Each FWD Tank is vented by a system that consists of float vent valves connected to a dedicated NACA air intake. The vent lines for the tanks are interconnected, avoiding lack of tank venting in case of a NACA air intake blockage. These float valves allow at least one venting point at each FWD Tank to remain open between the NACA air intake and the fuel tank.

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AFT TANKS VENT SYSTEM

Each AFT Tank is vented by a system that consists of one float vent valve and one relief valve connected to a vent line that receives pressure from the cabin. The relief valve and the float vent valve line discharge excess pressure into the atmosphere through a port installed on the bottom of the fuselage. For negative differential pressure between the interior of the tank to the atmosphere, a negative relief valve actuates as a backup means to equalize the pressure within acceptable values. When the airplane is on ground and during refueling operations, the ventilation is performed by a float vent valve, whose line is maintained open to the atmosphere.

For airplanes Post-Mod. SB 145LEG-28-0019 or equipped with an equivalent modification factory incorporated, the float vent valve is replaced by a dedicated vent port assembly that allows proper tank ventilation during refueling operations and provides a secondary means for tank relief.

Each AFT Tank is pressurized with air from the cabin by a dedicated pressurization line. The applicable float vent valve or vent port is installed at the end of this pressurization line to avoid the entry of fuel into it during uncoordinated maneuvers.

The relief valve assures a maximum differential pressure between the interior of the tank and the cabin, discharging excess pressure into the atmosphere through the port at the bottom of the fuselage.

An electrical shutoff vent valve, installed in the vent line, allows tank ventilation when the airplane is on the ground and during pressure refueling. This valve is also open when the air conditioning packs are turned off or the airplane is not energized. For airplanes Post-Mod. SB 145LEG-28-0019 or equipped with an equivalent modification factory incorporated, the electrical shutoff vent valve provides a secondary means for tank relief.

During depressurized flights the shutoff vent valve is open and the AFT Tank ventilation is provided by the float vent valve and by the vent port at the bottom of the fuselage.

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ENGINE AND APU FUEL DISTRIBUTION AND CONTROL

FUEL PUMPS

For each Wing Tank there are three electric pumps, which provide pressurized fuel to the engines and APU.

A single pump is capable of supplying fuel for both engines and for the APU under all flight phases, except for takeoff and go-around. During these phases, at least one electric pump in each Wing Tank is required to supply fuel for both engines and for the APU. The operating pumps are the ones selected in the knobs in the overhead panel. The other fuel pumps remain on standby. If fuel pressure in the respective engine inlet drops below 6.5 psi, the remaining pumps are automatically switched on and start cycling until the pilots select one of them.

Engine-driven fuel pumps provide suction feed in case the electric fuel pumps operation are not available.

The electric fuel pumps 1A and 2B are fed by the ESSENTIAL DC BUS 1, the fuel pumps 1B and 2A are fed by the ESSENTIAL DC BUS 2, the 1C is fed by the DC BUS 1 and the 2C is fed by the DC BUS 2.

Fuel from the FWD Tanks is transferred to Wing Tanks through electrical pumps A or B.

The fuel transfer flow rate of the electric pump is optimized for use in the cruise condition, above the altitude of 10000 ft. The rate from each fuselage tank is adjusted to provide a transfer flow around 900 kg/h (2000 lb/h).

Fuel from the AFT Tanks is transferred to Wing Tank 1 through an electrical pump (A) and, in case of failure, cabin air pressurization is employed as a backup (indicated on the MFD by "P"). The minimum altitude for this operation is 20000 ft and the fuel transfer rate is about the same as the electric pump when flying at the maximum operational ceiling.

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CROSSFEED OPERATION

The XFEED knob controls the crossfeed operation and the FUS TK XFER knob controls the fuel transfer operation.

Crossfeed operations should be performed in case of fuel imbalance between Wing Tanks. Selecting the XFEED knob to LOW 1 or LOW 2 deenergizes the pump associated to the wing tank side selected as having the lower fuel quantity and opens the crossfeed valve. This allows the connection of the engine 1 and 2 fuel feed lines to consume fuel from the wing with the highest fuel quantity.

The fully opened crossfeed valve position is indicated on the EICAS by an advisory message. In case of valve failure, the EICAS displays a caution message.

NOTE: - The Crossfeed knob must be in the OFF position during takeoff and landing.

- Crossfeed operation does not allow fuel transfer between the Wing Tanks.
- The crossfeed valve is electrically fed by the ESSENTIAL DC BUS 2.

APU

Fuel for APU operation is supplied by Wing Tank 2. Fuel from Wing Tank 1 may be used by selecting the crossfeed knob to LOW 2.

The APU fuel shutoff valve closes under the following conditions:

– APU master knob positioned to the OFF position.

– By pressing the APU fuel shutoff button.

– By pressing the APU fire extinguisher button.

– Automatically, through the APU fire detection system in case of APU fire on ground.

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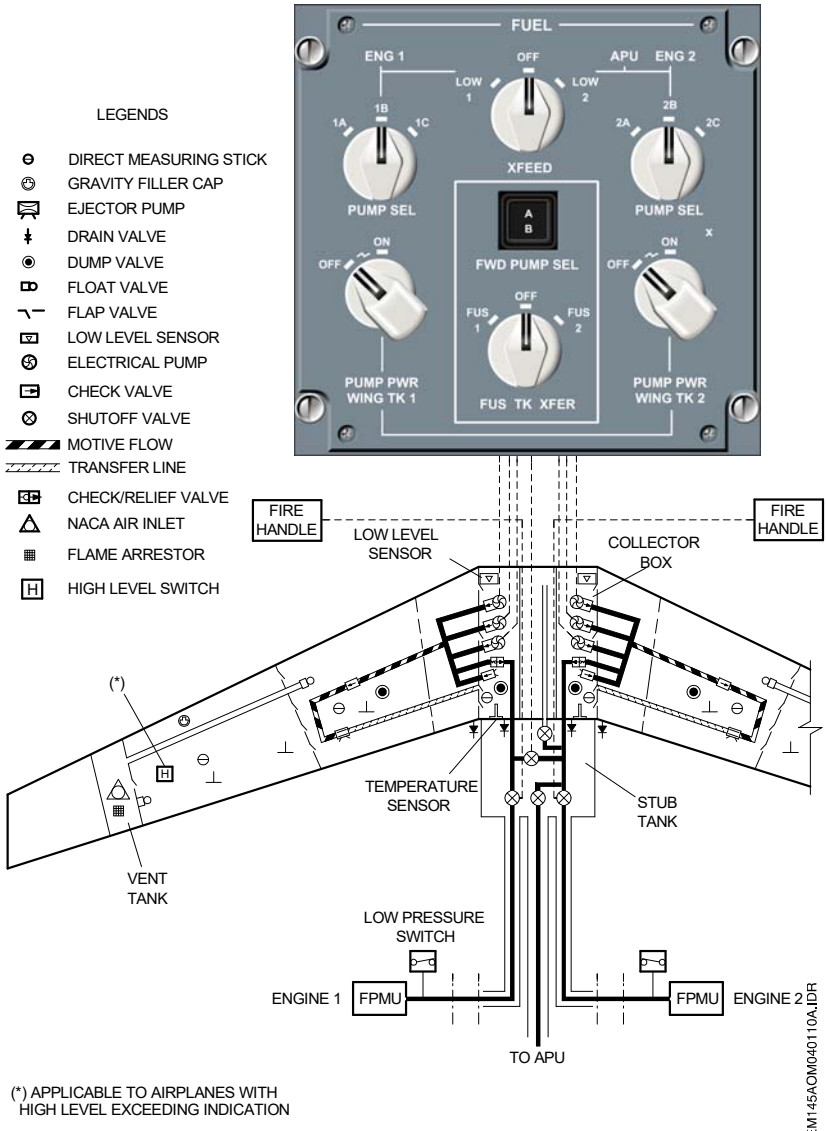

(*) APPLICABLE TO AIRPLANES WITH HIGH LEVEL EXCEEDING INDICATION

FUEL SYSTEM SCHEMATIC

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FUSELAGE TO WING TANKS FUEL TRANSFER

The EMB-135BJ is equipped with a fuel transfer system to transfer fuel from the FUS Tanks to the Wing Tanks. This system also manages the longitudinal balance.

Provided the FUS TK XFER knob is set to FUS 1 or FUS 2, the fuel transfer logic is automatic. In this case, the fuel starts to be transferred when the fuel level in the Wing Tank lowers to Start Level (approximately 1900 kg or 4198 lb) and stops when it reaches the Stop Level (approximately 2400 kg or 5292 lb).

If the FUS TK XFER knob is set to off, the EICAS caution message FUEL XFER CHECK is displayed after:

– 7 seconds if either fuel wing tank level reaches 1800 kg (3969 lb), for EICAS version up to 18.5 or;
– 4 minutes if either fuel wing tank level reaches 1850 kg (4079 lb), for EICAS version 20.5 and on.

The MFD displays "A", "B" or "P" do indicate the pump selected for operation, and the "T" symbol is only displayed when the fuel is being transferred from the referred tank to the Wing Tank.

If the fuel transfer system is not interrupted up to 30 seconds after at least one Wing Tank has reached approximately 2450 kg (or 5402 lb), the EICAS caution message FUEL XFER OVFLOW is displayed.

Also, if the selected fuselage fuel transfer system has failed, the EICAS caution message FUEL XFER 1 (2) INOP is displayed. This message is inhibited if the fuel quantity in either Wing Tank is equal or greater than approximately 1850 kg (4079 lb).

During the entire flight, if total fuel quantity in all Fuselage Tanks contains at least 800 kg (1764 lb) and at least one Wing Tank fuel quantity contains 1000 kg (2205 lb) or less, the EICAS warning message FUEL XFER CRITICAL or CHECK ACFT LOAD is displayed.

NOTE: Once the Starting Level is reached and the fuel transfer of one of the systems (FUS 1 or FUS 2) has started, the other system, when selected, starts the fuel transfer above the starting point level. This scenario occurs if the previous selected system did not reach the stopping level.

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There are two different fuel system and transfer logic, each presented separately:

– Airplanes up to S/N 591 or Pre-Mod. SB 145LEG-28-0010;

– Airplanes S/N 625 and on or Post-Mod. SB 145LEG-28-0010 or equipped with an equivalent modification factory incorporated.

FUEL TRANSFER LOGIC FOR AIRPLANES UP TO S/N 591 OR PRE-MOD. SB 145LEG-28-0010

The fuel transfer logic uses the fuel to keep CG within limits, keeping FWD Tank always heavier than the AFT Tank, such that the difference between FWD and AFT Tanks is 140 kg (309 lb) with a tolerance of 100 kg (221 lb).

For example, if the FWD Tank reaches the condition of 240 kg (529 lb) heavier than the AFT Tank, fuel transfer from AFT Tank is momentarily held until the difference gets back to 140 kg (309 lb). And, if the FWD Tank is only 40 kg (88 lb) heavier than the AFT Tank, fuel transfer from FWD Tank is momentarily held until the difference gets back to 140 kg (309 lb).

In a normal operation, if the FUS TK XFER knob is switched to FUS 1, when the associated Wing Tank reaches the Start Level, fuel is transferred from FWD 1 to WING 2 and from AFT 1 to WING 1.

Likewise, if the FUS TK XFER knob is switched to FUS 2, when the associated Wing Tank reaches the Start Level, fuel is transferred from FWD 2 to WING 2 and from AFT 2 to WING 1.

When the AFT Tank is empty (indicated by "OFF" on the MFD), the remaining fuel from the FWD Tank is transferred to both Wing Tanks.

NOTE: A slight wing fuel imbalance may occur during this fuel transference step, due to fuel system components arrangement and their associated tolerances.

As soon as the "OFF" inscription is displayed for the FWD and AFT Tanks on the MFD fuel page, the FUS TK XFER knob should be switched to the other side. Even if the "0" quantity is displayed it is required to wait for the total fuel transfer, which is confirmed with the "OFF" indication on the associated fuselage tank.

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It is recommended to keep the FUS TK XFER knob at the OFF position for at least 3 seconds prior to alternate the fuel transfer system.

The fuel transfer logic may lead to some special cases, exemplified below:

CASE 1 – Fuel quantity lowers to Start Level in Wing Tank 1 and Wing Tank 2 is above Start Level.

The AFT Tank transfers fuel to Wing Tank 1, while the FWD Tank holds transfer until Wing Tank 2 reaches the Start Level.

If the Wing Tank 2 does not reach the Start Level and the FWD Tank gets 240 kg (529 lb) heavier than the AFT Tank, the AFT Tank holds transfer. When Wing Tank 2 lowers to the Start Level, the FWD Tank starts transferring.

The AFT Tank restarts the fuel transfer when the FWD Tank is 140 kg (309 lb) heavier than the AFT Tank.

CASE 2 – Fuel quantity lowers to Start Level in Wing Tank 2 and Wing Tank 1 is above Start Level.

AFT Tank holds transfer until the Wing Tank 1 reaches the Start Level. If the Wing Tank 1 does not reach the Start Level and the FWD Tank gets only 40 kg (88 lb) heavier than the AFT Tank, the FWD Tank holds transfer. When Wing Tank 1 lowers to Start Level, the AFT Tank starts transferring.

The FWD Tank restarts the fuel transfer when it is 140 kg (309 lb) heavier than the AFT Tank.

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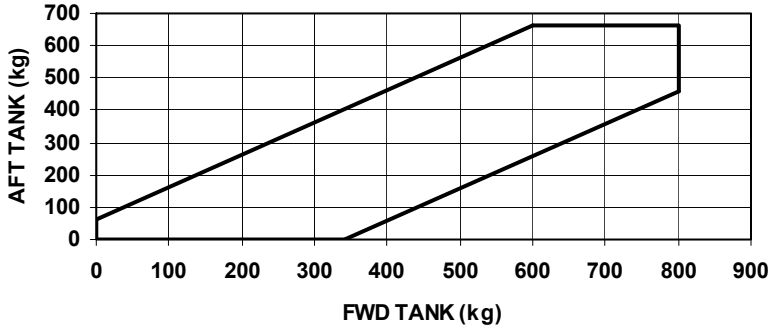
The system manages the fuel transfer process to keep the fuel quantities within the envelope as presented below:

FUSELAGE TANKS LOAD CHART – KG



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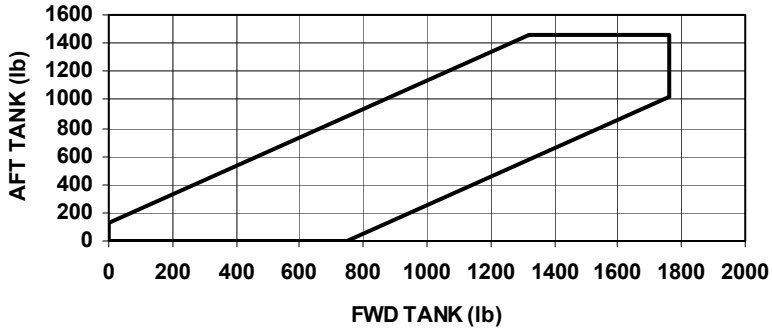
FUSELAGE TANKS LOAD CHART – LB



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FUEL TRANSFER LOGIC FOR AIRPLANES S/N 625 AND ON OR POST-MOD. SB 145LEG-28-0010 OR EQUIPPED WITH AN EQUIVALENT MODIFICATION FACTORY INCORPORATED

The fuel transfer logic starts the transfer whenever the difference between the FWD and AFT tanks is greater than 100 kg (221 lb). As the transfer knob is switched on and the FWD Tank is at least 100 kg (221 lb) heavier than the AFT Tank, the FWD Tank starts transferring fuel to both Wing Tanks simultaneously.

NOTE: A slight wing fuel imbalance may occur during this fuel transference step, due to fuel system components arrangement and their associated tolerances.

In case the transfer knob is already turned on and the FWD Tank has more fuel than the AFT Tank, the fuel starts to be transferred from the FWD Tank to Wing Tank 2.

After the difference between the FWD and AFT Tanks is zero, the fuel transference from the AFT Tank is also activated.

In a normal operation, if the FUS TK XFER knob is switched to FUS 1, when the respective Wing Tank reaches the Start Level, fuel is transferred from FWD 1 to WING 2 and from AFT 1 to WING 1.

Likewise, if the FUS TK XFER knob is switched to FUS 2, when the respective Wing Tank reaches the Start Level, fuel is transferred from FWD 2 to WING 2 and from AFT 2 to WING 1.

The fuel transfer stops when the fuel in the Wing Tank reaches the Stop Level. The fuel transfer restarts when the fuel in the Wing Tank lowers to Start Level again.

As soon as the "OFF" inscription is displayed for the FWD and AFT Tanks on the MFD fuel page, the FUS TK XFER knob should be switched to the other side. Even if "0" quantity is displayed, it is required to wait for the total fuel transfer, which is confirmed with the "OFF" indication on the associated fuselage tank.

It is recommended to keep the FUS TK XFER knob at the OFF position for at least 3 seconds prior to alternate the fuel transfer system.

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The fuel transfer logic may lead to some special cases, exemplified below:

CASE 1 – Fuel quantity lowers to Start Level in Wing Tank 1 and Wing Tank 2 is above Start Level.

Since the Wing Tank 1 is fed by the AFT Tank, the 100 kg (221 lb) longitudinal balance priority logic prevents the transfer, which would increase imbalance. So, no fuel is transferred until the Wing Tank 2 also lowers to Start Level.

When it happens, only the fuel from the FWD Tank is transferred, to equalize longitudinal imbalance. Once the fuel in AFT and FWD Tanks is equalized, then the fuel is transferred from both fuselage tanks.

CASE 2 – Fuel quantity lowers to Start Level in Wing Tank 2 and Wing Tank 1 is above Start Level.

The FWD tank starts the transfer to both wing tanks.

In case the initial fuel difference between the FWD and AFT tanks is above 100 kg (220 lb) the AFT tank will start the transfer when wing tank 1 reaches starting level and the difference between FWD and AFT tanks is equalized.

In case the fuel difference between the FWD and AFT tanks is below 100 kg (220 lb) the AFT tank will start the transfer when wing tank 1 reaches the starting level.

After the AFT tank starts the transference, the AFT tank will transfer only to wing tank 1 and the FWD tank will transfer only to wing tank 2.

CASE 3 – None of the Wing Tanks lowered to Start Level and there is a difference of 100 kg (221 lb) or more between FWD and AFT Tank.

If the AFT Tank is heavier than the FWD Tank, no fuel transfer is made until Wing Tank 1 lowers to Start Level, when the AFT Tank starts the transfer. Then, when the AFT and FWD Tank fuel quantity equalizes, the FWD Tank also starts the transfer.

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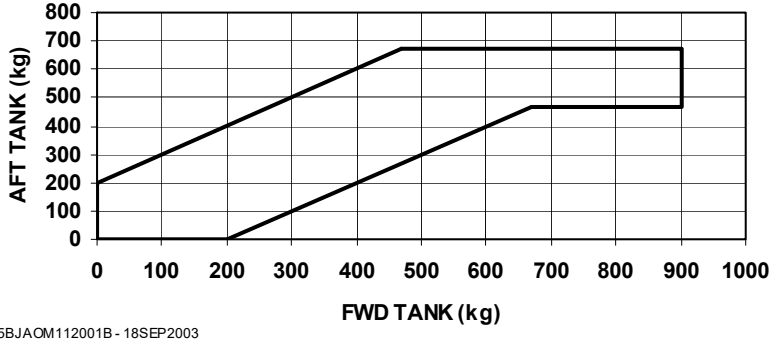
The system manages the fuel transfer process to keep the fuel quantities within the envelope as presented below:

FUSELAGE TANKS LOAD CHART – KG



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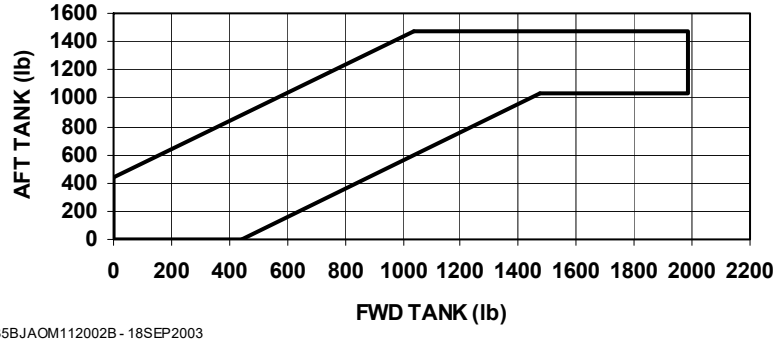
FUSELAGE TANKS LOAD CHART – LB



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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	CHECK ACFT LOAD or FUEL XFER CRITICAL	Total fuel quantity in all fuselage tanks contains at least 800 kg (1764 lb) and at least one Wing Tank fuel quantity contains 1000 kg (2205 lb) or less.
	FUEL 1 (2) LO LEVEL	The remaining fuel quantity in the associated Wing Tank ranges from 210 kg (463 lb) to 265 kg (584 lb), for leveled flight condition.
	NO TAKEOFF CONFIG	Fuel transfer system is switched on at takeoff configuration setting. Message associated to aural warning TAKEOFF FUEL.
CAUTION	APU FUEL LO PRESS	Fuel pressure is below 6.5 psi with APU operating (disabled when pressure reaches 9.5 psig).
	APU FUEL SOV INOP	Associated shutoff valve is not in the commanded position.
	E1 (2) FUEL LO PRESS	Fuel pressure in the associated engine is below 6.5 psig (disabled when pressure reaches 9.5 psig).
	E1 (2) FUEL SOV INOP	Associated shutoff valve is not in the commanded position.
	FUEL TANK LO TEMP	Fuel temperature inside Wing Tank 1 is equal or below -40°C.

(Continued)

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TYPE	MESSAGE	MEANING
CAUTION	FUEL TK VENT OPEN	Vent valve is commanded to close but it is not in the fully closed position. This message is displayed only for airplanes Pre-Mod. SB 145LEG-28-0019 when the aft relief valve failure occurs. For airplanes Post-Mod. SB 145LEG-28-0019 or equipped with an equivalent modification factory incorporated, this message is not associated to the aft relief valve failure condition.
	FUEL XFEED FAIL	Disagreement between crossfeed valve and knob position.
	FUEL XFEED MISCMD	Crossfeed valve remains open for 1 minute after wing imbalance is less than 45 kg (100 lb), or the crew activated the wing fuel imbalance correction to the wing tank with higher fuel (increasing fuel imbalance).
	FUEL XFER 1 (2) INOP	Selected auxiliary fuel transfer system has failed.

(Continued)

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TYPE	MESSAGE	MEANING
CAUTION	FUEL XFER CHECK	Fuel transfer system is not activated and fuel level has reached, in at least one Wing Tank: – 1850 kg (4079 lb) after 4 minutes for airplanes equipped with EICAS version up to 20.5, or – 1800 kg (3969 lb) after 7 seconds for airplanes equipped with EICAS version 18.5 and on.
	FUEL XFER OVFLOW	Fuel transfer system was not interrupted 30 seconds after at least one Wing Tank has reached 2450 kg (5401 lb).
	FUELING DOOR OPEN	Refueling panel access door is open (inhibited during take-off and approach).
	FUSELAGE FUEL IMB	Difference of fuel quantity in the FWD and AFT Tanks of each transfer system is outside the approved limits (refer to AOM Section 1-01-36).
	WING FUEL IMBALANCE	Fuel quantity in one Wing Tank differs by 363 kg (800 lb) from the other Wing Tank. Message is removed when the difference between Wing Tanks decreases to below 45 kg (100 lb).

(Continued)

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TYPE	MESSAGE	MEANING
ADVISORY	APU FUEL SOV CLSD	APU fuel shutoff valve is closed. Message remains on for 10 seconds after APU Master Knob is set to off. If valve has been commanded to close through APU Fuel Shutoff Button or APU Fire Extinguishing Button the message remains on.
	E1 (2) FUEL SOV CLSD	Associated shutoff valve is closed.
	FUEL XFEED OPEN	Crossfeed valve is open.

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CONTROLS AND INDICATORS

FUEL SYSTEM PANEL

1 – XFEED KNOB

LOW 1 Turns off the Wing Tank 1 electric fuel pump and opens the crossfeed valve.

OFF Closes the crossfeed valve.

LOW 2 Turns off the Wing Tank 2 electric fuel pump and opens the crossfeed valve.

NOTE: The remaining electrical pumps continue on the standby mode and, in case of a pressure drop in the respective Wing Tank, they take over regardless of the selected wing electrical pump, which is turned off due to the crossfeed operation.

2 – ENG PUMP SEL KNOBS

- Selects which electric Wing Tank pump will be placed into operation.
- The non-selected pumps remain on standby.

3 – PUMP PWR TK KNOBS

ON Energizes the associated fuel pump's circuit.

OFF Deenergizes the associated fuel pump's circuit.

4 – FUS TK XFER KNOB

FUS 1 Energizes fuel transfer system 1 (FWD 1 and AFT 1).

FUS 2 Energizes fuel transfer system 2 (FWD 2 and AFT 2).

OFF Deenergizes the fuel transfer systems.

NOTE: It is recommended to keep the FUS TK XFER knob at the OFF position for at least 3 seconds prior to alternate the fuel transfer system.

5 – FWD PUMP SEL BUTTON

- Selects which electric FWD Tank pump is placed into operation.
- The non-selected pump remains as a backup.

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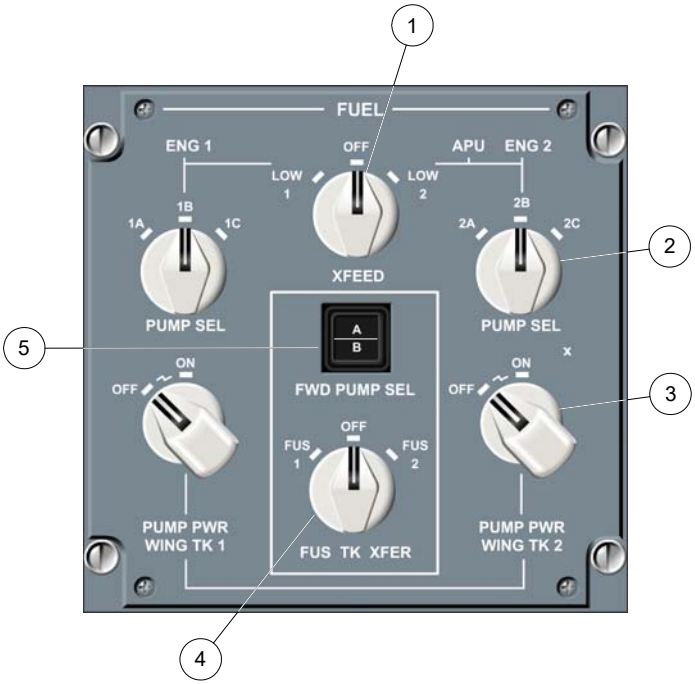

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FUEL SYSTEM PANEL

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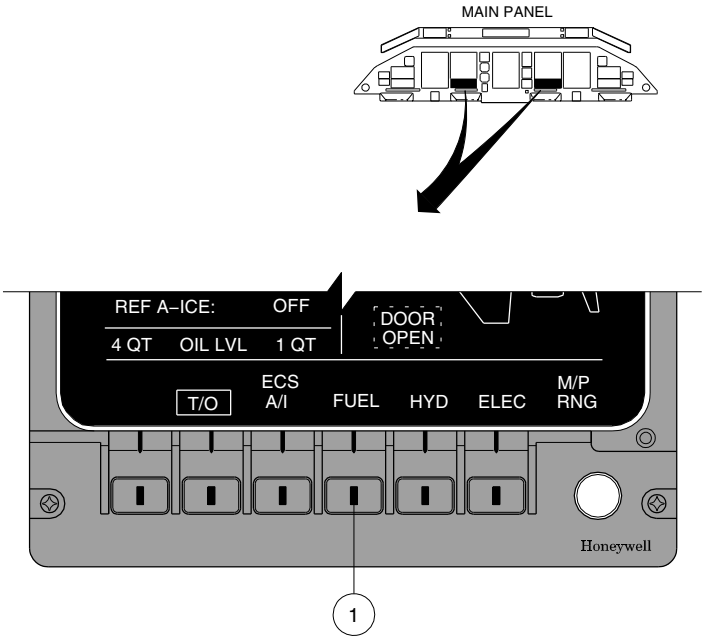
MFD BEZEL

1 - FUEL SYSTEM AND RESET BUTTON

– Pressing the FUEL button selects the fuel system page on the MFD. Pressing the button a second time resets the fuel used to zero. Fuel used must be reset individually on each MFD.



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MFD BEZEL

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FUEL PAGE ON MFD

1 - DIGITAL WING TANK QUANTITY INDICATION (WING TANK 1 AND WING TANK 2)

- The digital Wing Tank fuel quantity indicator ranges from 0 to 7500 kg (0 to 15000 lb), with a digital resolution of 10 units, regardless of the unit being used (kg or lb).
- Colors:
  - Green above 400 kg (880 lb).
  - Amber and boxed from 210 to 400 kg (450 to 880 lb).
  - Red and boxed below 210 kg (450 lb).

2 - DIGITAL FWD TANK QUANTITY INDICATION (FWD TANK 1 AND FWD TANK 2)

- The digital FWD Tank fuel quantity indicator ranges from 0 to 1000 kg (0 to 2200 lb), with a digital resolution of 10 units, regardless of the unit being used (kg or lb).
- Color: green.

3 - DIGITAL TOTAL FUEL QUANTITY INDICATION

- Indicates the total fuel quantity in all the tanks.

4 - ANALOGICAL FUEL QUANTITY INDICATION

- Quantity is indicated by a vertical bar and a pointer.
- The colors used are the same as for digital fuel quantity indication.

5 - WING TANK OPERATING PUMP INDICATION

- This indicator displays A, B, C or OFF, depending on which electric Wing Tank fuel pump is selected and whether it is on or off.
- Color: green.
- The indication blinks when the pump is cycling until the pilot selects another pump.

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6 - DIGITAL TOTAL FUEL USED INDICATION

- Indicates the total fuel used.
- Color: Green under normal operation. Replaced by Amber dashes (in flight) or amber zero (on ground) if any problem is verified.

7 - DIGITAL WING TANK FUEL TEMPERATURE INDICATION

- Ranges from -60°C to +60°C with a resolution of 1°C.
- Colors:
  - Green above -40°C.
  - Amber and boxed below -40°C.

8 - DIGITAL AFT TANK QUANTITY INDICATION (AFT TANK 1 AND AFT TANK 2)

- The digital AFT Tank fuel quantity indicator ranges from 0 to 1000 kg (0 to 2200 lb), with a digital resolution of 10 units, regardless of the unit being used (kg or lb), for FWD 1 and FWD 2.
- Color: green.

9 - AFT TANK FUEL TRANSFER INDICATION

- This indicator displays A, P, T or OFF.
- A indicates that electric fuel pump is operating.
- P indicates that cabin air pressurization is being used to accomplish fuel transfer.
- T indicates that fuel transfer operation is in progress.
- Color: green.

10 - FORWARD TANK FUEL TRANSFER INDICATION

- This indicator displays A, B, T or OFF.
- A or B indicates which pump is in operation.
- T indicates that fuel transfer is in progress.
- Color: green.
- The indication blinks when the pump is cycling until the pilot selects another pump.

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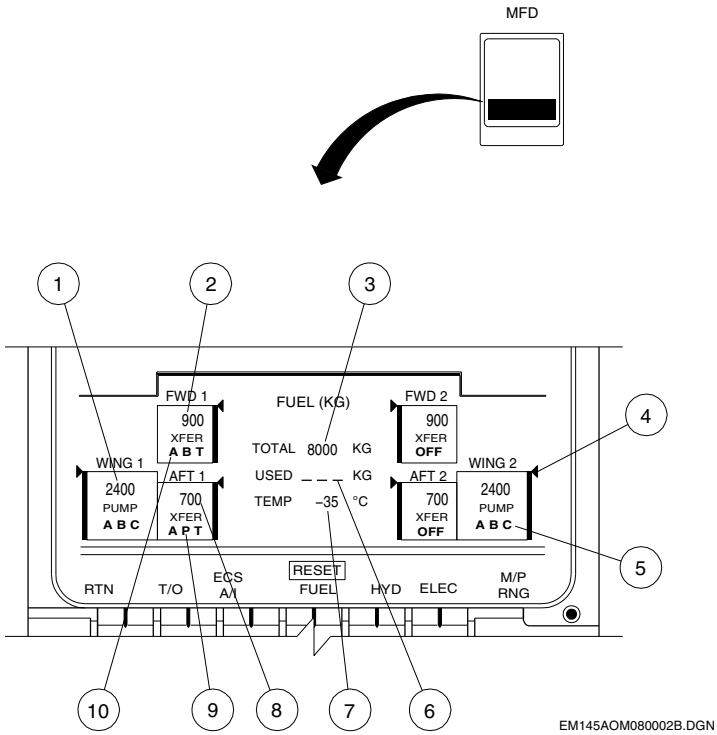

MFD FUEL PAGE

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EICAS INDICATIONS

1 – FWD TANK FUEL QUANTITY (FWD TANK 1 AND FWD TANK 2)

- The digital FWD Tank fuel quantity indicator ranges from 0 to 1000 kg (0 to 2200 lb), with a digital resolution of 10 units, regardless of the unit being used (kg or lb).
- Color: green.

2 – AFT TANK FUEL QUANTITY (AFT TANK 1 AND AFT TANK 2)

- The digital FWD Tank fuel quantity indicator ranges from 0 to 1000 kg (0 to 2200 lb), with a digital resolution of 10 units, regardless of the unit being used (kg or lb).
- Color: green.

3 – WING TANK FUEL QUANTITY (WING TANK 1 AND WING TANK 2)

- The digital Wing Tank fuel quantity indicator ranges from 0 to 7500 kg (0 to 15000 lb), with a digital resolution of 10 units, regardless of the unit being used (kg or lb).
- Colors:
  - Green above 400 kg (880 lb).
  - Amber and boxed from 210 to 400 kg (450 to 880 lb).
  - Red and boxed below 210 kg (450 lb).

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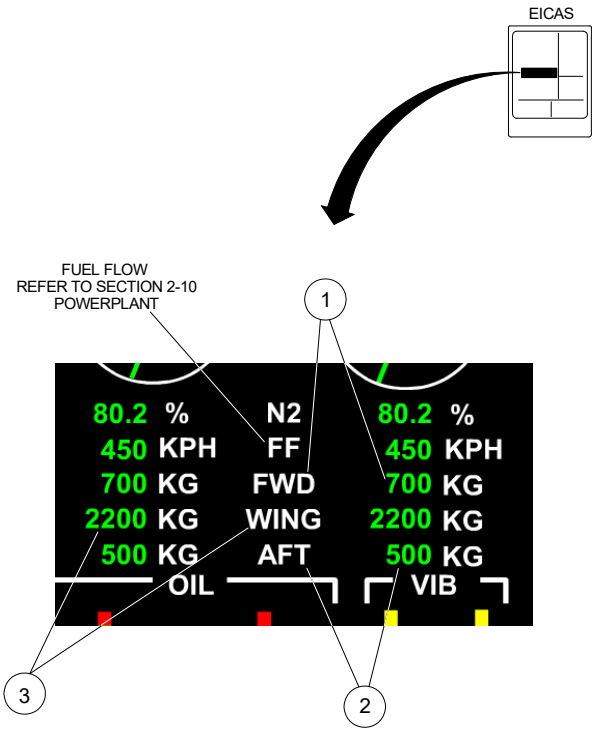

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EICAS INDICATIONS

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REFUELING AND DEFUELING

Refueling and defueling operations may be performed either by pressure or by gravity. The refueling panel on the right side of the wing-to-fuselage fairing allows pressurized refueling/defueling operations. A gravity filler cap on the upper side of each wing allows gravity filling. Dump valves and drain valves are used for gravity defueling.

PRESSURIZED REFUELING

Pressurized refueling operations require an energized system. This can be accomplished by either selecting the power selection switch to NORMAL or BATTERY.

The system allows pressure refueling operation for the wing tanks only or for the wing tanks followed by the auxiliaries, in a totally automatic sequence. Refueling is performed at a pressure range from 35 psi to 50 psi.

NOTE: - To shorten the refueling time during the airplane pressure-refueling procedure, the pressure can be raised up to approximately the maximum pressure of 50 psi.

- For airplanes with High Level Exceeding Indication incorporated, a refueling automatic shutoff failure will be identified by the HLEIS (High Level Exceeding Indication System), that will sense, via one HLS (High Level Switch) in each wing and auxiliary tanks, that the fuel level in the failed tank reached over the maximum quantity approved for that tank and will advise the operator by illuminating, on the refueling panel, the "STOP RFL" red indicating light. The operator shall interrupt immediately the refueling operation, relieving the pressure of the fueling source, avoiding an overfilling and consequently a fuel spillage, and shall follow the procedure to remove the extra fuel of the associated tank.
- Avoid start the APU during the fuel pressure refueling procedure. It may cause the voltage drop during the APU start and can disable the refueling process. If necessary, start the APU before the pressure refueling procedure is initiated.

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PRESSURIZED REFUELING OF WING AND AUXILIARY TANKS

With the refueling system energized, WING + FUS position should be selected in the TANKS SELECTION switch. As fuel pressure is applied on the adapter, the CLSD 1, CLSD 2, CLSD AFT and CLSD FWD lights pertaining to the WING, FUS 1 and FUS 2 refueling shutoff valves will illuminate to indicate that these valves are closed. Selecting the REFUELING switch to OPEN will open the wing tank refueling shutoff valves, turning off CLSD 1 and CLSD 2 lights and starting refueling operations. After wing tanks fuel level reaches 30 liters (7.9 US Gallons) below the tank full capacity, the respective shutoff valves will close, turning the lights on again. The FUS 1 and FUS 2 refueling shutoff valves will open, turning off the CLSD AFT and CLSD FWD lights, thus starting auxiliary tanks refueling. After the auxiliary fuel tanks attain their selected quantities, FUS 1 and FUS 2 shutoff valves will close, turning the lights on again. The refueling operation can be stopped at any time by commanding the REFUELING switch to the CLOSED position.

NOTE: FUS 1 and FUS 2 auxiliary fuel tanks systems cannot be filled with more than:

- 1460 kg each (2920 kg total for both systems) for airplanes S/N up to 591 and Pre-Mod. SB 145LEG-28-0010.
- 1570 kg each (3140 kg total for both systems) for airplanes S/N 625 and on or Post-Mod. SB 145LEG-28-0010.

PRESSURIZED REFUELING OF WING TANKS ONLY

With the refueling system energized, WING position should be selected to the TANKS SELECTION switch. As fuel pressure is applied on the adapter, the CLSD 1 and CLSD 2 lights pertaining to the WING refueling shutoff valves will illuminate to indicate that these valves are closed. Selecting the REFUELING switch to the OPEN position will open the wing tank refueling shutoff valves, turning off CLSD 1 and CLSD 2 lights and starting refueling operations. After wing tanks attain a fuel level of either 30 liters (7.9 US Gallons) below the tank full capacity or the selected quantity, the respective shutoff valves will close, turning the lights on again. The refueling operation can be stopped at any time by commanding the REFUELING switch to the CLOSED position.

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DEFUELING

The system is designed to allow pressurized defueling of the wing tanks, using the same adapter as pressure refueling. This operation can be performed using the electric fuel pumps installed in the wing tanks or by suction (4 psi max.) provided by an external source. Selecting the DEFUELING switch to OPEN will open the defueling shutoff valve, thus allowing defueling operation. To defuel wing tank 1, the XFEED knob must be positioned to LOW 2. The auxiliary tanks defueling can be accomplished by transferring fuel to the wing tanks and then performing pressurized wing tanks defueling.

Gravity defueling of the wing tanks may be achieved by using the dump valves and opening the associated gravity refueling cap. The remaining fuel can be totally drained through the drain valves. Defuling the auxiliary tanks can be accomplished by transferring fuel to the wing tanks and then performing wing tank gravity defueling or by using the auxiliary tanks drain valves.

CAUTION: DO NOT RUN ELECTRIC PUMPS WITH FUEL QUANTITY IN EACH TANK BELOW 30 LITERS (8 US GAL) OR 37 KG (54 LB).

NOTE: Avoid start the APU during the fuel pressure defueling procedure. It may cause the voltage drop during the APU start and can disable the defueling process. If necessary, start the APU before the pressure defueling procedure is initiated.

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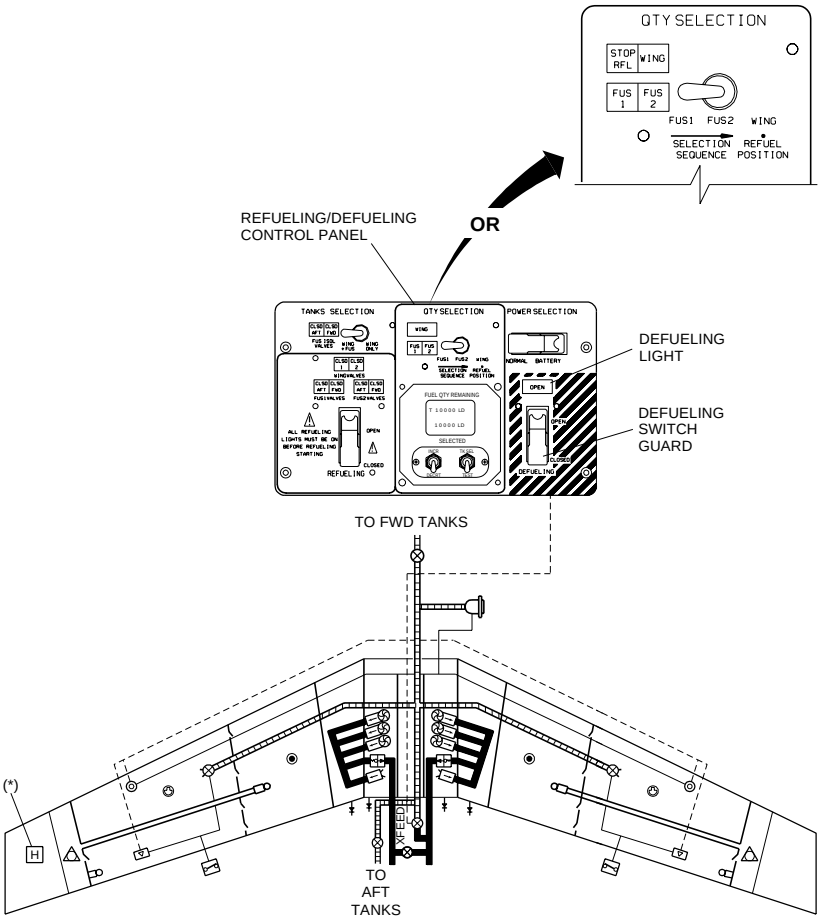

- GRAVITY FILLER CAP
- REFUELING ADAPTER
- PILOT VALVE
- SHUT-OFF VALVE
- DRAIN VALVE
- DUMP VALVE
- PRESSURE SWITCH
- FLOAT VALVE
- FLAP VALVE
- VENT VALVE
- ELECTRICAL PUMP
- HIGH LEVEL SWITCH
- FUELING/DEFUELING
- ENG FUEL SUPPLY
- PILOT LINE
- VENT LINE
- ELECTRICAL WIRING

(*) APPLICABLE TO AIRPLANES WITH HIGH LEVEL EXCEEDING INDICATION

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PRESSURE REFUELING/DEFUELING SYSTEM SCHEMATIC

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REFUELING PANEL

1 - POWER SELECTION SWITCH (GUARDED)

NORMAL – Refueling system is energized by DC Bus 1.

BATTERY – Refueling system is connected to Hot Bus 1.

2 - DEFUELING OPEN LIGHT (WHITE)

- Illuminates when the defueling shutoff valve is open.

3 - DEFUELING SWITCH (GUARDED)

- Actuates the defueling shutoff valve to open or close.

4 - FUEL QUANTITY REMAINING INDICATOR

- Displays fuel remaining as selected by the TK SEL/TEST Switch.
- The tank selected is identified by the letters L, R and T (L for the left tank, R for the right tank and T for both sides).
- The unit of measurement (kg or lb) is also displayed.
- In case of failure, a FAIL inscription is displayed and the refueling/defueling operation is interrupted.
- The established accuracy of the EMB-135BJ airplane Fuel Quantity Gauging System is:
  - For the wing tanks: ± 2% of the provided indication plus ± 0.75% of the total usable fuel, considering the approved fuels and normal flight attitudes;
  - For the auxiliary tanks: ± 4% of the provided indication plus ± 2% of the total usable fuel, considering the approved fuels and normal flight attitudes.

5 - TK SEL/TEST SWITCH (SPRING LOADED TO CENTER POSITION)

TEST – Initiates indicator built-in and probes conditions test. All light segments illuminate and a failure code is presented, if a failure is detected.

TK SEL – Selects which fuel quantity is going to be displayed in the upper display. When the indicator is energized, the total wings fuel quantity is shown. Sequentially actuating the switch will select Wing Tank 1, Wing Tank 2, FUS 1 Tanks and FUS 2 Tanks fuel quantity.

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6 - INCR/DECRT SWITCH (SPRING LOADED TO CENTER POSITION)

- Increases or decreases fuel quantity selected value.
- If moved from the neutral position during refueling, it interrupts the operation. The refueling operation will be restored 4 seconds after switch release.

7 - FUEL QUANTITY SELECTED INDICATOR

- Displays total fuel quantity set through the Quantity Select Switch.
- If a FAIL inscription is displayed in the FUEL QTY REMAINING, this indicator shows the failure code.
- The indicator displays zero as the refueling compartment door is opened.

8 - REFUELING SWITCH (GUARDED)

- Acts over the pilot valves to open or close the refueling shutoff valves.

9 - REFUELING CLOSED LIGHTS (WHITE)

- Illuminate when the associated refueling line is pressurized and the associated shutoff valve is closed.

10 - AUXILIARY TANKS ISOLATION VALVES LIGHTS (WHITE)

- Illuminate when the associated isolation valve is closed.

11 - WING + FUS/WING ONLY SWITCH

WING + FUS – Selects the wing tanks followed by the auxiliary tanks to be refueled.

WING ONLY – Selects only the wing tanks to be refueled.

12 - TANK INDICATION LIGHT (WHITE)

- Illuminates when the associated tank is selected.

13 - STOP REFUELING LIGHTS (RED)

- Illuminate when fuel level in the failed tank reached over the maximum quantity approved for that tank (For airplanes with High Level Exceeding Indication incorporated).

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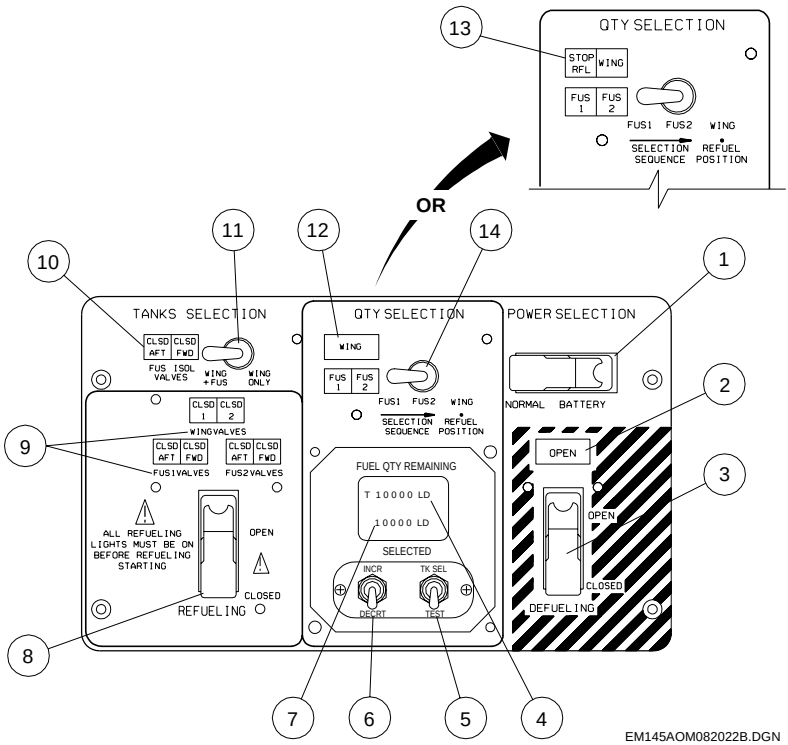
14 - FUS 1/FUS 2/WING SWITCH

FUS 1 – Selects FUS 1 tanks, showing its data in the refueling panel.

FUS 2 – Selects FUS 2 tanks, showing its data in the refueling panel.

WING – Selects the wing tanks, showing its data in the refueling panel.

NOTE: When the refueling panel door is closed, all the switches are pushed to the NORMAL or CLOSED position by their guards.



REFUELING PANEL

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FUEL MEASURING STICK

Two direct quantity measuring sticks under each wing and one in the wing stub permit to separately check the fuel quantity in each wing tank. Each measuring stick provides visual indication of the total fuel quantity of the associated side.

The table below provides minimum and maximum stick values:

STICK POSITION		FUEL QUANTITY	
		LITERS	US GAL
Wing Stub Tank	Min	7	2
	Max	783	207
Internal Point	Min	781	206
	Max	2168	573
External Point	Min	2163	571
	Max	2791	737

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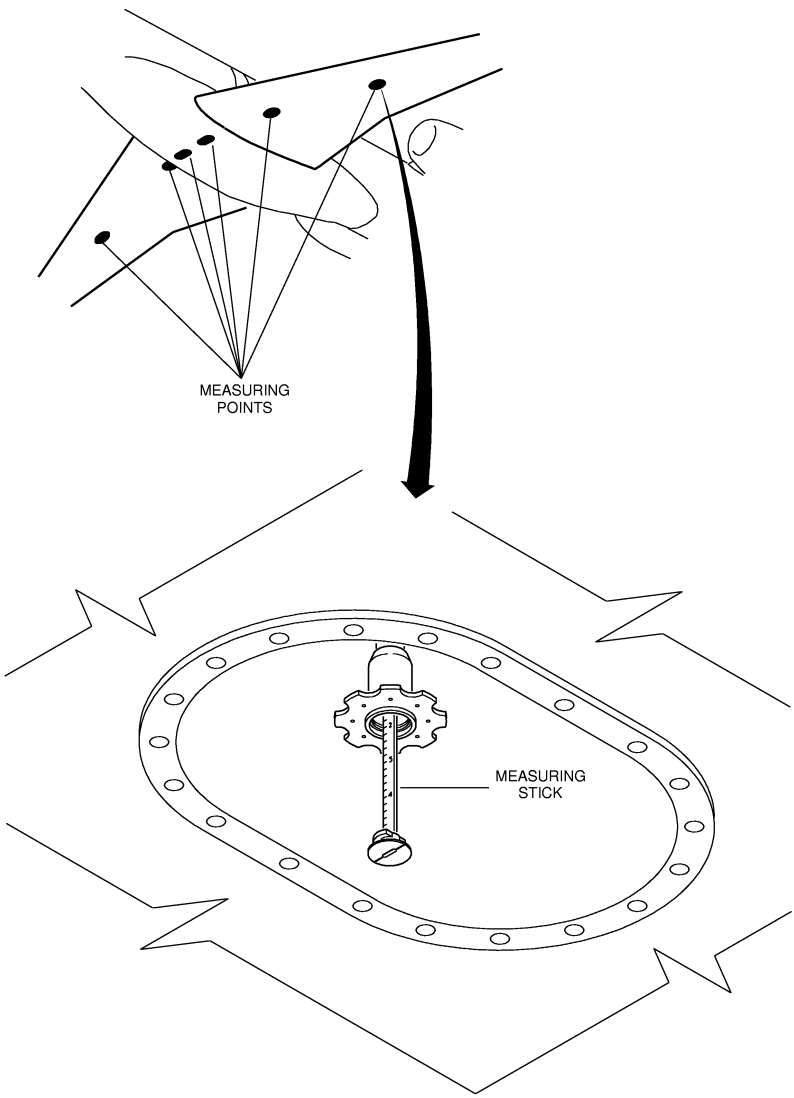

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MEASURING STICK POINTS

MEASURING STICK TABLES

To determine the fuel quantity using the direct quantity measuring sticks, the airplane must be laterally leveled with roll and pitch angles between 0° to -2°. After refueling the airplane, start with the external measuring stick, closest to the wing tip. On EMB-135 BJ airplanes, between 2163 and 2791 liters (571 and 737 US gal), the external measuring stick provides a correct fuel quantity indication. Above 2791 liters (737 US gal), it is not possible to measure the fuel quantity through the sticks. If the external measuring stick provides a zero indication, use the internal measuring stick to obtain the fuel quantity. Between 781 and 2168 liters (206 and 573 US gal) the internal measuring stick provides a correct fuel quantity indication. If the internal measuring stick provides a zero indication, use the wing stub stick to obtain the fuel quantity. It is not possible to measure the fuel level through the measuring sticks if it is below 7 liters (2 US gal) either.

Enter the following measuring stick tables with the value read on the stick to obtain the fuel quantity (liters or US gallons). To find the fuel mass in kg (lb) multiply the volume in liters (US gal) by the actual fuel density in kg/l (lb/US gal).

NOTE: Do not add measuring sticks values.

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STICK IND	FUEL QUANTITY					
	INTERNAL STICK		EXTERNAL STICK		WING STUB STICK	
	LITERS	*US GAL*	*LITERS*	*US GAL*	*LITERS*	*US GAL*
0.1	781	206	2163	571	7	2
0.2	794	210	2184	577	14	4
0.3	805	213	2203	582	22	6
0.4	817	216	2220	586	29	8
0.5	827	219	2235	590	36	10
0.6	838	221	2249	594	43	11
0.7	848	224	2263	598	50	13
0.8	858	227	2276	601	56	15
0.9	868	229	2288	605	63	17
1.0	878	232	2301	608	69	18
1.1	888	235	2314	611	74	20
1.2	898	237	2327	615	80	21
1.3	907	240	2340	618	85	23
1.4	917	242	2354	622	90	24
1.5	927	245	2368	626	95	25
1.6	937	248	2383	630	100	26
1.7	947	250	2398	633	104	28
1.8	957	253	2413	638	109	29
1.9	968	256	2429	642	113	30
2.0	978	258	2445	646	116	31
2.1	989	261	2461	650	120	32
2.2	1000	264	2477	654	123	33
2.3	1011	267	2493	659	129	34
2.4	1022	270	2508	663	136	36
2.5	1034	273	2524	667	140	37
2.6	1045	276	2539	671	144	38
2.7	1057	279	2553	674	148	39

MEASURING STICK TABLES (SHEET 1 OF 4)

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STICK IND	FUEL QUANTITY					
	INTERNAL STICK		EXTERNAL STICK		WING STUB STICK	
	LITERS	*US GAL*	*LITERS*	*US GAL*	*LITERS*	*US GAL*
2.8	1069	282	2567	678	155	41
2.9	1081	286	2580	682	164	43
3.0	1093	289	2593	685	173	46
3.1	1105	292	2604	688	181	48
3.2	1118	295	2615	691	188	50
3.3	1130	299	2625	693	195	51
3.4	1143	302	2634	696	201	53
3.5	1156	305	2643	698	207	55
3.6	1169	309	2651	700	213	56
3.7	1182	312	2658	702	218	58
3.8	1194	316	2666	704	224	59
3.9	1208	319	2673	706	229	60
4.0	1221	322	2680	708	234	62
4.1	1234	326	2687	710	239	63
4.2	1247	329	2696	712	244	64
4.3	1260	333	2706	715	249	66
4.4	1273	336	2717	718	254	67
4.5	1286	340	2731	721	259	68
4.6	1300	343	2747	726	265	70
4.7	1313	347	2767	731	270	71
4.8	1326	350	2791	737	276	73

MEASURING STICK TABLES (SHEET 2 OF 4)

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STICK INDICATION	FUEL QUANTITY			
	INTERNAL STICK		WING STUB STICK	
	LITERS	*US GAL*	*LITERS*	*US GAL*
4.9	1339	354	281	74
5.0	1352	357	287	76
5.1	1365	361	293	78
5.2	1378	364	300	79
5.3	1391	368	306	81
5.4	1404	371	313	83
5.5	1418	374	320	85
5.6	1431	378	327	86
5.7	1444	381	334	88
5.8	1457	385	342	90
5.9	1470	388	350	92
6.0	1483	392	357	94
6.1	1496	395	365	97
6.2	1509	399	374	99
6.3	1522	402	382	101
6.4	1535	405	390	103
6.5	1548	409	399	105
6.6	1561	412	408	108
6.7	1574	416	416	110
6.8	1588	419	425	112
6.9	1601	423	434	115
7.0	1615	427	443	117
7.1	1629	430	452	119
7.2	1642	434	461	122
7.3	1656	438	470	124
7.4	1670	441	479	126
7.5	1685	445	488	129
7.6	1699	449	497	131

MEASURING STICK TABLES (SHEET 3 OF 4)

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STICK INDICATION	FUEL QUANTITY			
	INTERNAL STICK		WING STUB STICK	
	LITERS	*US GAL*	*LITERS*	*US GAL*
7.7	1714	453	505	134
7.8	1729	457	514	136
7.9	1744	461	523	138
8.0	1759	465	532	141
8.1	1774	469	541	143
8.2	1790	473	550	145
8.3	1806	477	558	147
8.4	1822	481	567	150
8.5	1838	486	576	152
8.6	1855	490	585	154
8.7	1872	494	593	157
8.8	1889	499	602	159
8.9	1906	503	611	161
9.0	1923	508	620	164
9.1	1941	513	629	166
9.2	1958	517	639	169
9.3	1976	522	648	171
9.4	1994	527	658	174
9.5	2012	531	668	176
9.6	2030	536	679	179
9.7	2048	541	689	182
9.8	2065	546	701	185
9.9	2083	550	713	188
10.0	2101	555	725	192
10.1	2118	560	738	195
10.2	2135	564	752	199
10.3	2152	568	767	203
10.4	2168	573	783	207

MEASURING STICK TABLES (SHEET 4 OF 4)

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SECTION 2-09

AUXILIARY POWER UNIT

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GENERAL

The APU is a source of pneumatic and electrical power to be used either simultaneously with or independent of airplane sources, while on the ground or in flight. Basically, it is a constant-speed gas turbine engine, consisting of a single-stage centrifugal compressor, a reverse-flow annular combustion chamber, and a single-stage radial turbine.

The airplane is equipped with APU Hamilton Sundstrand model T-62T-40C14, which is controlled by the Full Authority Digital Electronic Control (FADEC). The control system provides automatic, full-authority, fuel scheduling from start to full load operation, under all ambient conditions and operating modes. In addition, the FADEC automatically controls the APU to shut down on the occurrence of certain failures or events during start or operation.

An automatic APU shutdown may occur either on the ground or in flight, and takes place under the following conditions:

On the ground:

– Fire,
– Overtemperature,
– Overspeed,
– Underspeed,
– Failure to start,
– Failure to accelerate,
– Failure to light,
– Loss of speed data,
– External short,
– Loss of FADEC signal,
– FADEC failure,
– Bleed valve opening,
– Low oil pressure,
– High oil temperature,
– Oil pressure switch short,
– Loss of EGT.

NOTE: In the event of fire, a 10 second delay is allowed before an automatic APU shutdown is initiated.

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In flight:

– Overspeed,
– Underspeed,
– Failure to start,
– Failure to accelerate,
– Failure to light,
– Loss of speed data,
– External short,
– Loss of FADEC signal,
– FADEC failure.

The APU compartment is located in the airplane's tailcone, isolated by a titanium firewall. On the left side of the APU compartment, an inspection door allows access and inspection of the APU's components.

The APU starter-generator shaft drives an air-cooling fan. Air is drawn through a NACA air inlet located on the left side of the tailcone. APU draining is ducted to the airplane skin on the right side of the tailcone.

Control switches, alarms, and emergency shutdown means are provided on the cockpit overhead panel.

The normal APU indications and caution/warning messages are presented on the EICAS.

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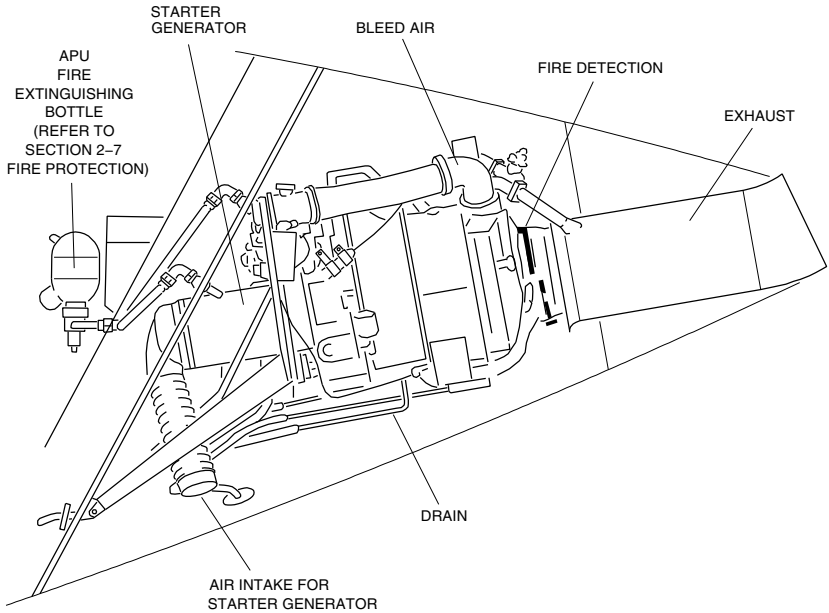

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APU INSTALLATION

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CONTROL SYSTEM

The APU control systems include the electrical, fuel, ignition, lubrication, and pneumatic systems.

On APU Model T-62T-40C14, the electrical control system consists of the Full-Authority Digital Electronic Control (FADEC). The control system incorporates the APU starting system, control logic, and failure indication. Electric accessories provide FADEC inputs and execute output commands.

For airplanes Pre-Mod. SB 145-49-0004, the APU control is fed by the APU starter-generator itself (CENTRAL DC BUS) and by the ESS DC BUS 2. The APU shuts down if both buses are lost, but it remains on if only one is lost.

For airplanes Post-Mod. SB 145-49-0004 or equipped with an equivalent modification factory incorporated, the APU control system is electrically fed by ESS DC BUS 2 and HOT BUS 1. The APU shuts down immediately if the HOT BUS 1 is lost, or shuts down after 6 seconds if the ESS DC BUS 2 is lost.

The fuel system is composed of fuel pump, main fuel solenoid valves, acceleration control, purge valve, fuel nozzles, fuel filter and manifold. Acceleration control provides fuel in accordance to a preprogrammed schedule. Fuel from the right wing tank is normally used to supply the APU. Alternatively, fuel from the left wing tank may be used by means of the crossfeed valve.

NOTE: The fuel system for the Model T-62T-40C14 APU does not include a start and maximum fuel solenoid valves.

The ignition system provides the electrical power necessary during the APU starting sequence. It consists of an exciter, igniter plugs, and wiring.

The APU has a self-contained lubrication system totally integrated into the accessory gearbox. In addition to lubrication functions, the system provides the required oil cooling, with no need for an external heat exchanger. A thermostat, installed in the oil tank, sends a signal to the EICAS in case the oil temperature exceeds 166°C (331°F).

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The pneumatic control system consists of a modulating bleed valve and an anti-surge valve. The modulating bleed valve maintains the bleed flow below a set value, depending on the air conditioning system requirements and atmospheric conditions, thus maintaining the EGT within acceptable levels. The anti-surge valve is controlled by the FADEC, which monitors the signal from the APU bleed valve, the Air Turbine Starter (ATS) valve, and the Environmental Control System (ECS) valve.

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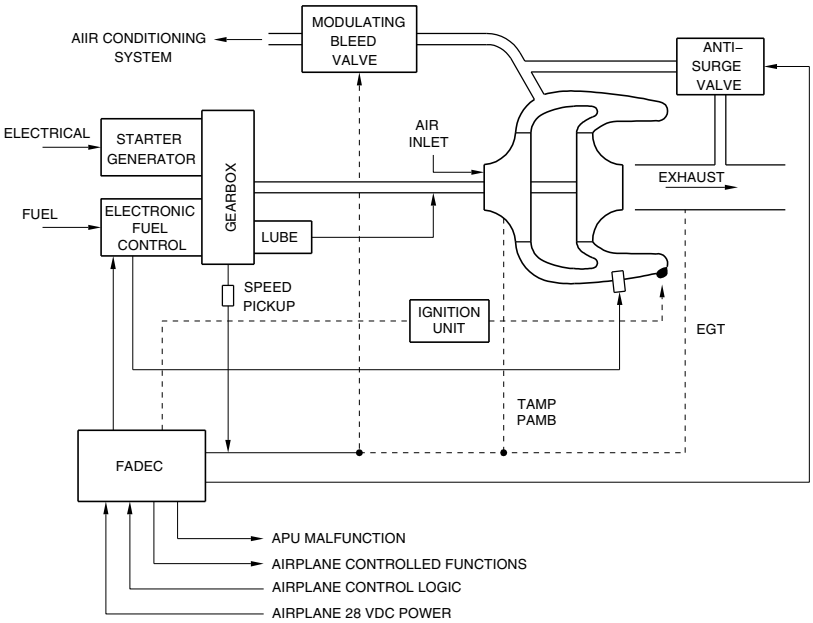

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APU MODEL T-62T-40C14 SCHEMATIC

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APU STARTING/OPERATION

The APU starting cycle is initiated when the APU Master knob, located on the APU control panel, is moved to the ON position. At this moment, an EGT valid value is showed on EICAS. When the Master switch is momentarily set to START, DC power is applied to the starter-generator, which will drive the APU compressor up to a speed high enough to obtain sufficient airflow for combustion. On APU Model T-62T-40C14, at this time, the airframe fuel shutoff valve is energized to open.

On APU Model T-62T-40C14, at approximately 3% rotor speed on the ground (or 0% in flight), the FADEC supplies power to the ignition unit as well as power to open the Main Fuel Solenoid Valve, allowing fuel flow to the combustion chamber. The APU continues accelerating and, when rotor speed exceeds 50%, the FADEC deenergizes the ignition and at 70% rotor speed the FADEC commands starter disengagement.

The APU acceleration continues by the APU own means and, 7 seconds after having reached 95% rotor speed, the Maximum Fuel Solenoid Valve is energized and the FADEC circuits allow electrical and pneumatic power extraction through the starter-generator and the bleed valve.

If a failure in the control system occurs, associated with an APU overspeed, the APU Model T-62T-40C14 will automatically shutdown after the rotating parts reach 104% speed.

The APU is shut down by pressing the APU Stop Button or by setting the Master switch to the OFF position, whenever, a stop request signal is sent to the FADEC in order to execute the APU shutdown procedure; the FADEC overspeed protection is tested during the FADEC power-up.

NOTE: - The APU FUEL SHUTOFF BUTTON when pressed, also shuts the APU down by closing shutoff valve of the APU fuel feed-line.

- The APU should be shutdown while loaded, that is, with APU BLEED and APU GEN ON, or immediately after the load is removed (within 10 seconds) – (Hamilton Sundstrand – SIL 352-APU Turbine Wheel Life Enhancement – Legacy 600/650).

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	APU FAIL	APU has been automatically shut down.
	APU OIL HI TEMP	Oil temperature is above 166°C (331°F).
	APU OIL LO PRESS	Oil pressure is below 6 psi.

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CONTROLS AND INDICATORS

APU CONTROL PANEL

1 – APU MASTER SELECTOR

OFF Deenergizes the FADEC, closes the APU fuel shutoff valve, turns off the APU indications and alarms whenever APU RPM is below 10%, and commands the APU shutdown.

ON Energizes the FADEC, commands the fuel shutoff valve to open, enables indication and alarms on the EICAS and allows the APU to keep running after starting.

START (momentary position) Initiates start cycle.

2 – APU STOP BUTTON

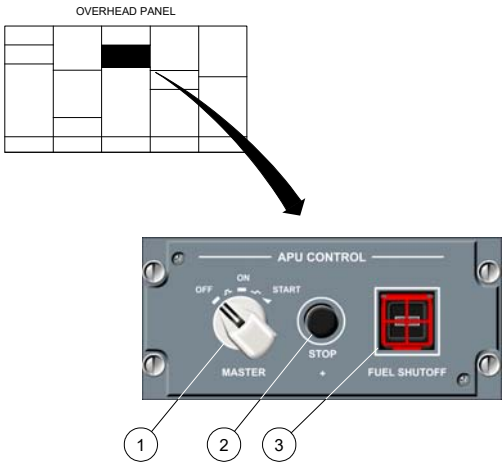
– Shuts the APU down.

NOTE: APU EICAS indications remain operational.

3 – APU FUEL SHUTOFF BUTTON (GUARDED)

– Cuts off fuel to the APU.

– A striped bar illuminates inside the button to indicate that it is pressed.



APU CONTROL PANEL

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EICAS INDICATIONS

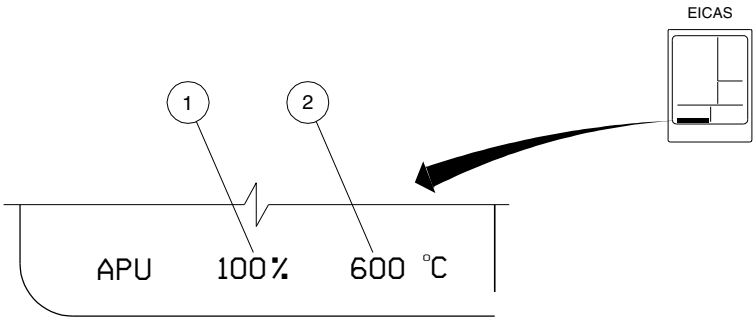
1 – APU RPM INDICATION

- Ranges from 0% to 120% speed.
- Green from 96% to 104%.
- Amber and boxed from 0% to 95% and from 105% to 110%.
- Red and boxed above 110%.

2 – APU EGT INDICATION

- NORMAL OPERATION
  - Ranges from -54°C to 927°C.
  - Green from -54°C to 680°C.
  - Amber and boxed from 681°C to 717°C.
  - Red and boxed above 717°C.
- START SEQUENCE
  - Ranges from -54°C to 927°C.
  - Green from -54°C to 838°C.
  - Amber and boxed from 839°C to 884°C.
  - Red and boxed above 884°C.

NOTE: After pressing the APU Shutdown button, the RPM and EGT APU indications, on the EICAS Display, will decrease. When the APU Speed reaches 10% RPM, the pilot should select APU MASTER Selector to OFF. The RPM and EGT indications will be replaced by OFF inscription.



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EICAS INDICATIONS

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SECTION 2-10

POWERPLANT

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GENERAL

The airplane is powered by two fuselage-mounted Rolls-Royce turbofan engines. Engine denominations, thrust (installed, static sea level) and flat rates are as follows:

ENGINE	MODEL	MAX. T/O THRUST	FLAT RATE
AE3007A1E	EMB-135 BJ	8810 lb	ISA+19°C
AE3007A1P	EMB-135 BJ	8169 lb	ISA+19°C
AE3007A2	EMB-135 BJ	9278 lb	ISA+15°C

NOTE: - Max T/O thrust and flat rate values for AE3007A1P are based on T/O RSV thrust.
- Max T/O thrust and flat rate values for AE3007A1E are based on E T/O RSV thrust.
- Max T/O thrust and flat rate values for AE3007A2 are based on A2 TO RSV thrust.

The AE3007 is a high bypass ratio, two-spool axial flow turbofan engine. The main design features include:

- A single stage fan,
- A 14-stage axial-flow compressor with inlet guide vanes and five variable-geometry stator stages,
- A 2-stage high pressure turbine to drive the compressor,
- A 3-stage low pressure turbine to drive the fan,
- Dual, redundant, Full Authority Digital Electronic Controls (FADEC),
- Accessory gearbox,
- Air system for airplane pressurization and engine starting.

Each engine is controlled by redundant FADECs. The FADECs also provide information to the EICAS, although some parameters signals are provided directly from engine sensors. All powerplant parameters are indicated on the EICAS, which also provides warning, caution and advisory messages.

The cockpit control stand incorporates two thrust levers, one for each engine, and four buttons for engine thrust rating selection.

Controls for ignition, FADEC, takeoff data setting, takeoff rating selection and engine Start/Stop are located on the overhead panel.

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MAIN ASSEMBLIES

FAN MODULE

Air enters the engine through the fan case inlet and is compressed by a 24-blade, single-stage fan on the AE3007A1P, AE3007A1E engines or a 22-blade single-stage fan on the AE3007A2 engine. The compressed air is split into a bypass stream, which bypasses the core through the outer bypass duct, and a core stream that enters the high-pressure compressor.

HIGH-PRESSURE COMPRESSOR

The compressor rotor consists of 14 stages of individual wheel assemblies, compressor shaft, compressor-to-turbine shaft, and compressor tiebolt. Compressor Variable Geometry (CVG) stators are provided for stages 1 through 5 and for the inlet guide vanes. These stators are driven by servo actuators controlled by the FADECs. High-pressure compressor bleed air tappings are available at the 9^{th} and 14^{th} stages (compressor discharge).

A combustion liner assembly mixes air and fuel to support combustion, and delivers a uniform, high-temperature gas flow to the turbine.

HIGH-PRESSURE TURBINE (HPT)

The High Pressure Turbine converts the gas flow coming from the combustion liner into usable mechanical energy to drive the compressor.

LOW-PRESSURE TURBINE (LPT)

The Low-Pressure Turbine is located downstream of the High-Pressure Turbine and extracts energy from the gas path to drive the fan. The LPT is connected to the fan by means of a shaft extending through the entire high-pressure spool and the compressor assembly. Air exiting the LPT mixes with the bypass air and provides thrust.

EXHAUST CONE AND MIXER

The mixer provides the mixing chamber for the engine bypass and core gas-flow streams and sets the fan operating line for all operating envelope conditions. The Thrust Reversers deflect the exhaust providing reverse thrust.

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ACCESSORY GEARBOX

An accessory gearbox is driven by the high-pressure spool and provides driving pads for the following engine and airplane accessories:

- Engine accessories: Fuel Pump and Metering Unit (FPMU), Permanent Magnet Alternator (PMA), and oil pump.
- Airplane accessories: hydraulic pump, electrical generators, and pneumatic starter.

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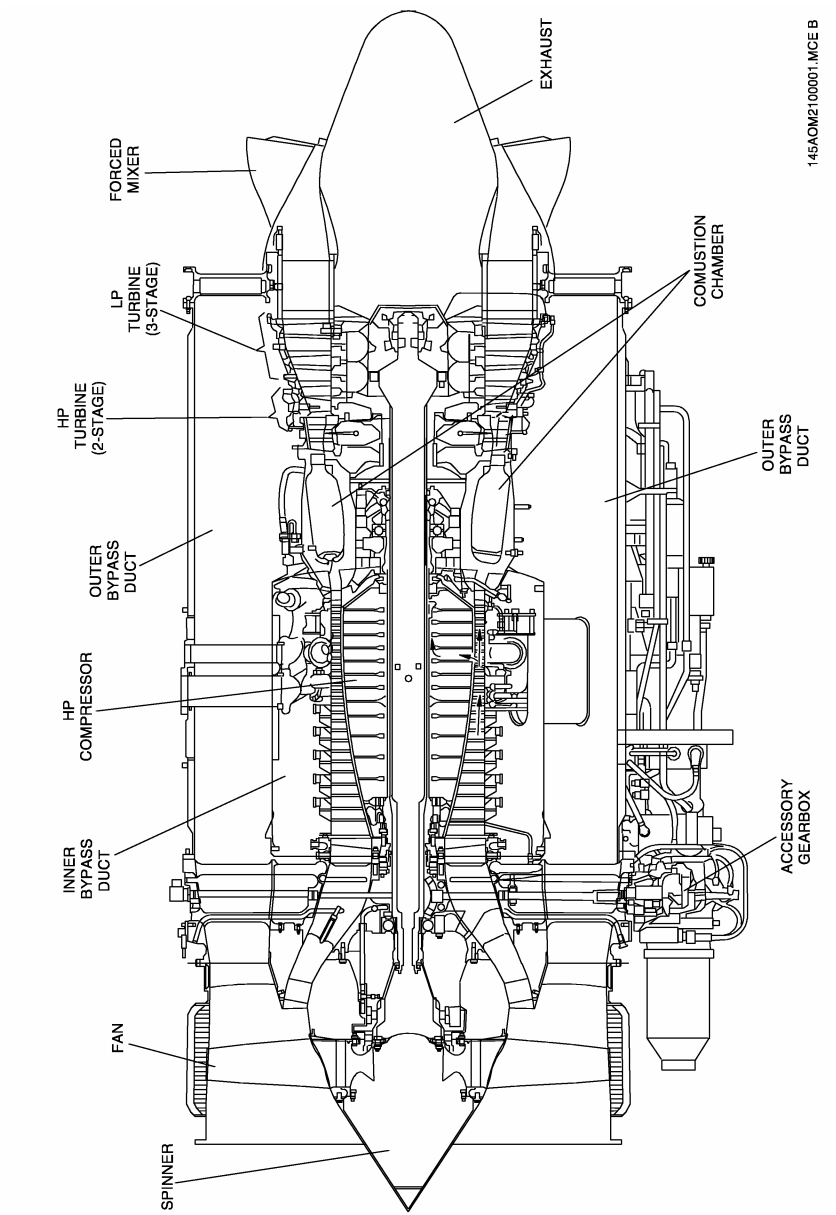

ROLLS-ROYCE AE 3007 ENGINE

ENGINE FUEL SYSTEM

The Engine Fuel System has a distribution and an indicating system. The distribution system supplies filtered and metered fuel for combustion. Secondary functions include providing pressurized fuel to activate the Compressor Variable Geometry (CVG) system, and providing a cooling medium for lubrication oil. The indicating system components monitor the fuel supply and are located on the engines.

The engine fuel system comprises a Fuel Pump and Metering Unit (FPMU), a Fuel Cooled Oil Cooler (FCOC), a Compressor Variable Geometry (CVG) actuator and fuel nozzles.

FUEL PUMP AND METERING UNIT (FPMU)

The FPMU is an electrical-mechanical, fully-integrated line replaceable unit which incorporates the engine fuel pumping, filtering, and metering functions, and operates under authority of the engine FADECs. The FPMU controls and supplies fuel to the engine nozzles at correct pressure and flow rate for engine start, correct engine operation, engine stop, and also controls the compressor variable-geometry vanes.

The pump system contains a low-pressure centrifugal pump and a high-pressure gear pump. The centrifugal pump raises the pressure of incoming fuel high enough to meet the inlet pressure requirements of the high-pressure pump, with allowances for pressure losses in the fuel filter and the FCOC. The centrifugal pump also provides vapor-free fuel to the gear pump.

The main fuel filter, located upstream of the gear pump, protects the pump metering unit components and fuel nozzles from fuel contaminants. A fuel flow bypass valve allows continued operation in the event of complete filter blockage.

A fuel flow pressure relief valve across the pump protects the fuel system from overpressure conditions.

An air vent valve provides automatic venting of entrapped air or fuel vapor at the gear pump discharge during engine starting and/or motoring. The vent valve remains closed whenever the vent solenoid is not energized, thus preventing fuel leakage through the vent system if the airplane boost pumps are turned on while the engine is not running.

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The fuel-metering valve is controlled by the FADEC and controls fuel distribution from the gear pump to the engine fuel nozzles.

Downstream of the metering valve, a pressurizing valve (PRV) generates adequate system pressure for the proper functioning of the main metering valve and pressure drop servos and CVG hydraulic actuator. The PRV also provides the primary means for engine fuel shutoff, commanded through the Latching Shutoff Valve, that receives a Stop cockpit input through the FADEC.

FUEL-COOLED OIL COOLER (FCOC)

The FCOC is installed externally on the botton of the outer bypass duct, aft region. Fuel flows from the FPMU's centrifugal pump to the FCOC where it simultaneously cools the engine's lubrication oil and warms the fuel. A thermal/pressure bypass valve bypasses oil flow to prevent fuel leaving the FCOC from being heated above 93.3°C (200°F). The oil is also bypassed if the differential oil pressure is greater than 50 psi due to hung or cold starts. After the FCOC, the fuel goes to the filter.

COMPRESSOR VARIABLE GEOMETRY (CVG) ACTUATION SYSTEM

The high-pressure compressor has a variable geometry vane system on its five stages to provide maximum engine performance over a wide range of engine speeds. The FADEC contains a schedule of vane positions versus corrected gas generator speed (N2) that has been selected to provide the optimum compressor efficiency of steady-state conditions and adequate stall margins during transients.

The FADEC senses the vane position and, by means of fuel pressure from the FPMU, commands the CVG actuator movement to position the compressor-inlet guide vanes and the first five rows of compressor vanes to the desired setting.

FUEL NOZZLES

Each engine has 16 fuel nozzles, that furnish atomized fuel to the combustor at the proper spray angle and pattern, for varying airflow conditions.

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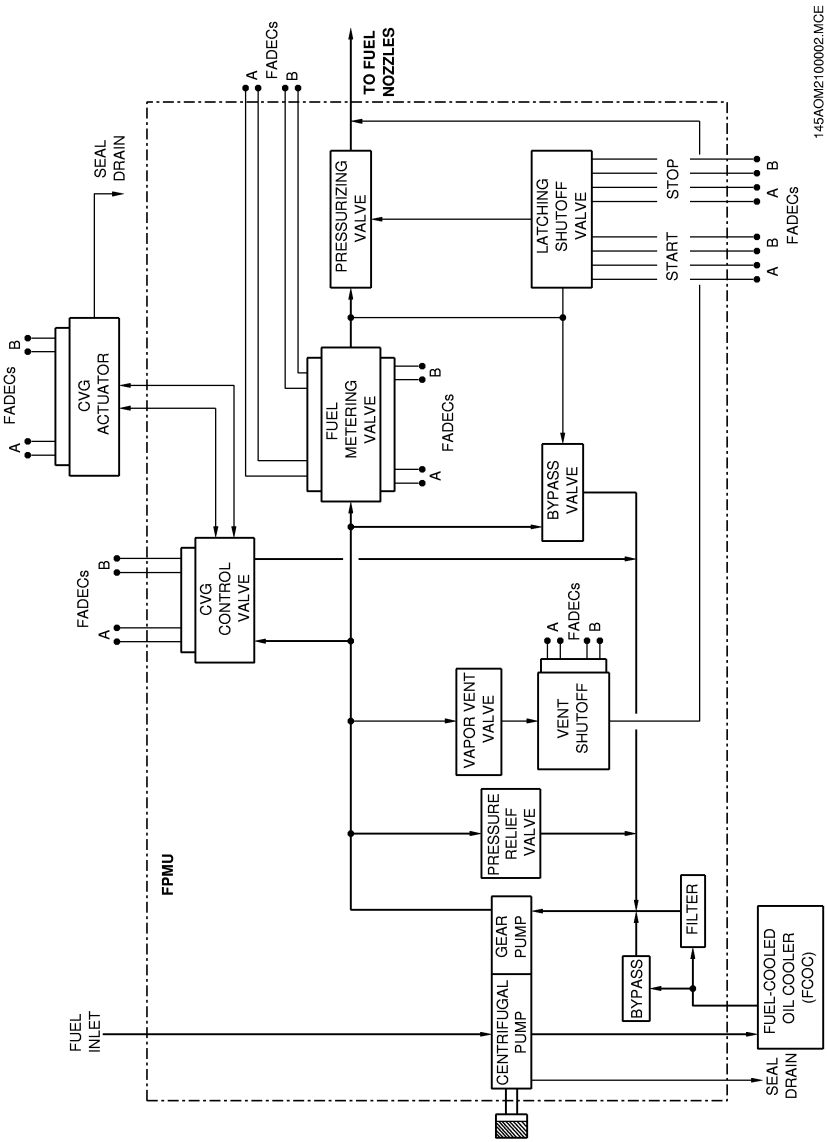

ENGINE FUEL SYSTEM SCHEMATIC

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LUBRICATION SYSTEM

The engine lubrication system is a self-contained, pressure-regulated and recirculating dry sump system. The system supplies filtered and pressurized oil to the various engine oil coolers, engine sumps and the accessories gearbox, at the proper temperature, to cool and lubricate the bearings, seals, and gear meshes.

The main subsystems of the oil system are: lubricating oil-supply, engine sumps, lubricating oil scavenge and lubricating oil vent.

LUBRICATING OIL-SUPPLY SYSTEM

Oil is supplied to the lube and scavenge pump from a pressurized oil tank and is pumped through an oil filter. The oil is then cooled while passing through two heat exchangers (ACOC and FCOC). Oil pressure is controlled by a pressure-regulating valve in the pump housing. A tank pressurizing valve maintains positive pressure in the oil tank to ensure an adequate oil supply to the lube and scavenge pump, and proper oil pressure at altitude. A separate Tank Vent Valve protects the tank from over-pressurization. Oil to the accessory gearbox is distributed through cast passages to the various gear meshes and bearings. Pressurized oil is divided inside the front frame and routed to the fan and front sumps. An external tube delivers oil from the front frame to the compressor diffuser and the rear turbine-bearing support.

The main components of this subsystem are as follows: oil tank, lube and scavenge pump, oil filter unit, air-cooled oil cooler (ACOC) and fuel-cooled oil cooler (FCOC).

OIL TANK

The oil tank is designed to store a sufficient amount of oil (12 quarts) for lubrication of the engine and the accessory gearbox. The tank has an oil level sight gage and an oil level/low level warning sensor. These sensors allow the oil level to be continuously read remotely, and includes a switch that is actuated when there are 6 quarts or less of usable oil remaining in the tank. A screen on the oil outlet and a chip collector plug at the tank bottom are protective devices that prevent debris from recirculating. The tank is protected from over-pressurization by the externally vented Pressure Relief Valve.

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LUBE AND SCAVENGE PUMP

The pressure and scavenge pumps are all mounted in a single integral unit. A single shaft drives six pumping elements. One pressure pumping element pumps oil from the tank to the system and five scavenge pumping elements pump oil from the sumps and the gearbox to the oil tank. The pump assembly also includes a pressure regulating valve which controls oil pressure. Main Oil Pressures varies with the center sump air pressure. A line connecting one side of the regulating valve to the center sump enables the regulating valve to compensate for the air pressure inside the sump.

OIL FILTER UNIT

The filter unit includes a replaceable filter element, and mechanical and electrical impending-bypass indicators. A bypass valve opens and allows oil to bypass the filter during cold starts, or when the filter becomes excessively contaminated. A screen is located in the bypass inlet to prevent passage of particles. The electrical impending-bypass indicators provide the remote monitoring of the system.

AIR-COOLED OIL COOLER (ACOC)

The ACOC is a surface-type heat exchanger with a single plate-fin oil section. Filtered, pressurized oil enters a manifold and flows through the air-cooled heat exchanger. A thermal/pressure bypass valve senses ACOC outlet temperature. When open, this valve allows cold oil to bypass the ACOC and, once closed, forces hot oil to flow through the cooler. The bypass valve also opens if the cooler is obstructed.

FUEL-COOLED OIL COOLER (FCOC)

The FCOC is a heat exchanger that simultaneously cools the engine lubrication oil and warms the fuel upstream of the FPMU filter. A thermal/pressure bypass valve prevents fuel overheat. This valve also opens in case of cooler obstruction or cold starts.

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ENGINE SUMPS

There are four engine sumps that encompass five main-shaft bearings, four bevel-gear bearings, and six carbon seals. These sumps are as follows: fan sump, front sump, center sump and aft sump.

LUBRICATING OIL SCAVENGE SYSTEM

Air and oil are removed from each of the sumps and directed to individual scavenge inlets on the oil pump. The scavenge section of the pump includes five pumping elements and has separate inlets for each of the engine sumps and the accessory gearbox. Each of the sump inlets to the pump includes a debris monitor with magnetic chip collector and screen in order to protect the pumping elements. The gearbox sump inlet to the pump contains only a screen.

LUBRICATING OIL VENT SYSTEM

All the engine sumps are vented to the accessory gearbox. The oil tank also vents to the gearbox through a core-external line that contains a tank-pressurizing valve. A Tank Vent Valve is located upstream of the pressurizing valve and is vented to the atmosphere.

The gearbox acts as an air/oil separator removing any oil contained in the vent air. The air vented by the gearbox breather is conducted through a transfer tube and dumped to the core exhaust.

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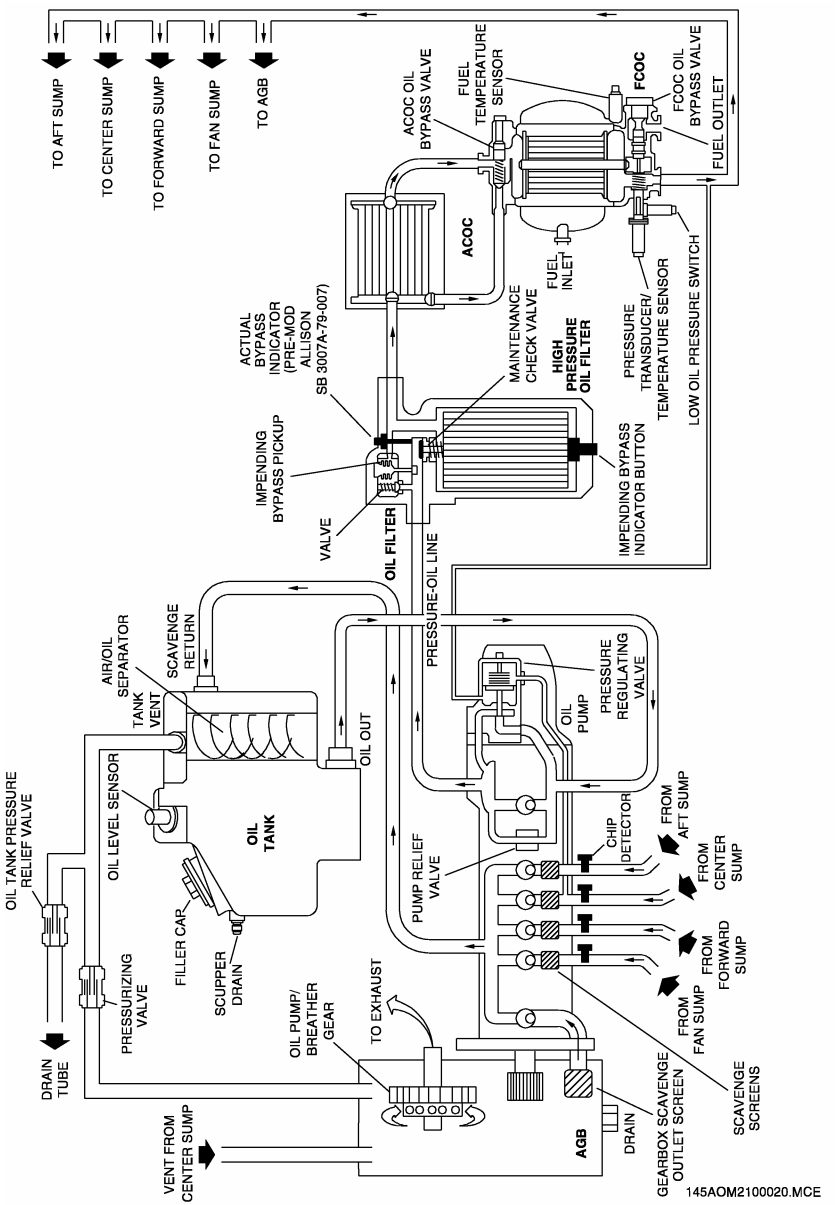

LUBRICATION SYSTEM SCHEMATIC

ENGINE BLEED

Air is bled from the compressor 9th stage during engine starting to assist with accelerating to idle rpm.

There are two different types of compressor acceleration bleed valves (CABV). The original type used two valves per engine located externally on the HP compressor at approximately the 12:00 and 6:00 O´clock positions. The second type is a single valve at 6:00 O´clock position.

The engine also provides bleed air to the Pressurization and Air Conditioning system through the Engine Bleed Valve (EBV), Bleed air for this system is extracted from the 9th or 14th stages depending on the request. Refer to section 2-14-05 for more information.

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ENGINE ELECTRICAL SYSTEM

ELECTRICAL POWER SOURCES

Primary electrical power for engine control and the ignition system is provided by a permanent magnet alternator (PMA) that is driven by the engine accessory gearbox. Before the PMA attains sufficient speed to generate electrical power, the airplane 28 V DC system is used to power the FADEC. Aircraft 28 V DC is also used to energize a fail-safe ignition relay, so that in the event of aircraft power loss the ignition is turned on and the air vent valve is closed, thus preventing fuel leakage through the vent port.
The PMA is the only source of power for the igniters. If a PMA failure occurs there will not be any spark from the igniters.

PERMANENT MAGNET ALTERNATOR (PMA)

The PMA provides electrical power for both engine FADECs and to the redundant ignition systems.
The PMA provides sufficient power to drive the ignition system at all speeds above 10% N2, and powers the FADECs at a minimum of 50% N2. The PMA also provides power to the Thrust Rating Mode Buttons, in case of electrical emergency.
For starting and emergency backup, the engine control system requires aircraft supplied 28 V DC (GPU and/or batteries) power.

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IGNITION SYSTEM

The engine has a dual redundant ignition system composed of two ignition exciters, two high-tension igniter leads and two igniters.

The ignition system is turned on by the FADEC during engine starting cycle or when an engine flameout condition is detected (auto-relight).

Each ignition exciter is controlled by a separate FADEC and powered by a separate electrical winding of the PMA.

Continuous ignition or ignition off can be manually selected through the Ignition Selector Knob, located on the Powerplant Control Panel and connected to the FADECs. Ignition control is performed according to Ignition Selector Knob position, as follows:

- Ignition Selector Knob set to ON:
  - Both FADECs command associated ignition channel during start, as soon as the PMA provides sufficient power.
  - The ignition is not automatically deactivated when the start cycle is completed.
  - If the engine is already running, both FADECs activate their ignition channels.
- Ignition Selector Knob set to AUTO:
  - During ground start, only the FADEC in control activates the ignition system at the proper time. The engine start will be performed with only one exciter. The exciters will be alternately selected for each subsequent ground start.
  - The FADEC deactivates the ignition system when the engine starting cycle is completed.
  - The auto-relight function activates the ignition system.

NOTE: Engines with FADEC B8 software version may not turn off igniters during on-ground deceleration to IDLE.

- Ignition Selector Knob set to OFF:
  - If the engine is not running, the FADEC neither activates the ignition system nor actuates the engine fuel valve from closed to open position.
  - If the engine is already running, at least in IDLE thrust, the FADEC does not close the engine fuel valve.

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PNEUMATIC STARTING SYSTEM

The engine starting system comprises the Air Turbine Starter and the Starting Control Valve. The starting system has the function of supplying airflow for pneumatic engine starting, converting the pneumatic energy into gearbox driving torque.

Pneumatic power source can be selected from the APU, ground air supply source, or cross bleed from the opposite engine.

AIR TURBINE STARTER (ATS)

The ATS is installed in a dedicated engine accessory gearbox pad and consists basically of an air inlet, an impeller turbine, a reduction gearset, a clutch, and an output shaft.

The ATS converts pneumatic energy into driving torque for engine gas generator spool acceleration up to the self-sustained speed during the starting cycle. The air exhaust from the turbine is discharged into the engine nacelle compartment.

STARTING CONTROL VALVE (SCV)

The SCV regulates the pressure supplied to the ATS and provides isolation from the pneumatic system following start completion. The valve is electrically controlled and pneumatically actuated.

A SCV visual position indication is available on the valve housing.

A manual override adapter is available on the valve housing, enabling engine start in the case of a valve or associated electrical system failure. The valve is spring-loaded to the closed position.

If the ATS shutoff valve remains open after 53% N2, a caution message is presented on the EICAS.

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STARTING BY USING GROUND EQUIPMENT

The system is pressurized by pneumatic ground equipment connected to start the engine 2.

The SCV energizes to open when a starting switch ground signal energizes the engine 2 start relay.

When the engine gas generator attains 53% N2, a validation time of 10 seconds elapses before the message “E2 ATS SOV OPN” appears on the EICAS. At 56.4% N2 the FADEC sends a signal to engine 2 start relay be de-energized, thus the SCV is also de-energized and the airflow stops flowing to the ATS turbine. In normal operation conditions, 56.4% N2 is reached in less than 10 seconds.

The ATS stops operating and the engine gas generator speed increases.

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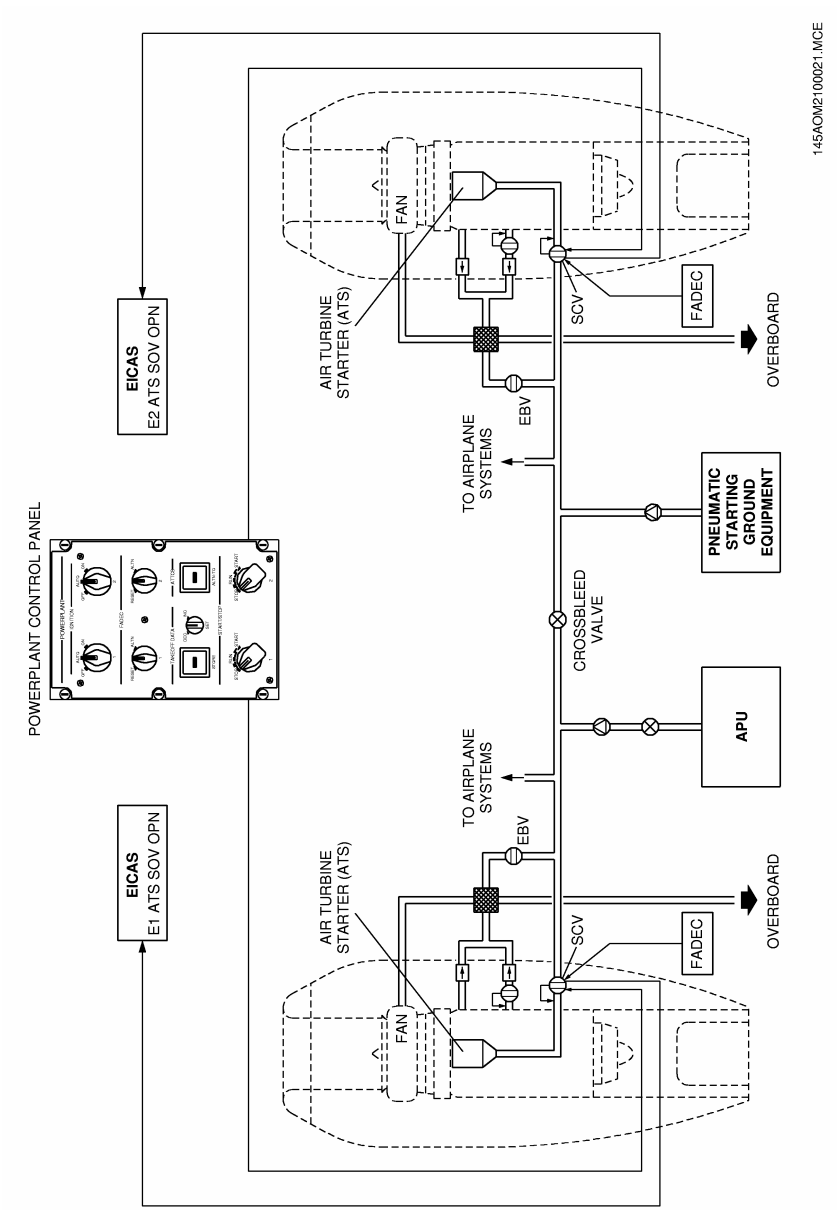

PNEUMATIC STARTING SYSTEM SCHEMATIC

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ENGINE INDICATING SYSTEM (EIS)

The EIS is composed of a wiring harness and a set of engine-mounted sensors. This system is directly connected to the EICAS, providing real time monitoring of the engine oil, fuel, and mechanical systems.

ENGINE SENSORS

PRESSURE/TEMPERATURE TRANSDUCER SENSOR

This sensor combines engine oil pressure and temperature transducers in a single housing, mounted on the Fuel-Cooled Oil Cooler (FCOC). The pressure and temperature transducers are electrically independent and require separate signal conditioning.

Due to the characteristic of some pressure sensors, the EICAS may display approximately 90 psi for a 2 minutes period, for actual pressures between 90.5 and 155 psi. Considering this characteristic, pressure indication may jump suddenly from approximately 90 psi to the actual pressure value, after the 2 minutes period is expired.

LOW OIL-PRESSURE SENSOR

The function of the low oil-pressure sensor is to give an indication when oil pressure is low. This sensor is also mounted on the FCOC. A warning message is presented on the EICAS in case of low oil pressure.

OIL-LEVEL AND LOW-LEVEL SENSOR

The engine oil-level sensor is a transducer located in the oil tank that gives continuous and accurate oil level readings from 3 quarts to 12 quarts. The low-level switch is electrically open with 6 quarts or less of oil remaining in the tank and remains closed otherwise. An indication of oil-level is provided on the Takeoff page on the MFD. The indication turns amber when oil level is at 5 quarts or below.

ELECTRICAL OIL-FILTER IMPENDING-BYPASS INDICATOR

The engine electrical oil-filter impending-bypass indicator is located in the oil-filter assembly. An advisory message is presented on the EICAS if the differential pressure across the oil filter exceeds its set point.

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FUEL TEMPERATURE SENSOR

The engine fuel-temperature sensor has an indication range of -54° to 176°C (-65° to 350°F) and is located on the FCOC. A caution message is presented on the EICAS in case of fuel low temperature (below 5°C in the engine).

ELECTRICAL FUEL-FILTER IMPENDING-BYPASS INDICATOR

The engine electrical fuel-filter impending-bypass indicator is located on the engine fuel pump and metering unit (FPMU). An advisory message is presented on the EICAS if the differential pressure across the filter exceeds its set point.

MAGNETIC INDICATING PLUG

The magnetic indicating plug is located in the oil tank. The magnetic plug contacts are normally open and are electrically closed when conductive material bridges the gap between them.

IGNITER SPARK-RATE DETECTOR

The engine igniter spark-rate detectors are outputs from the ignition exciters that indicate that an electric field has collapsed in the exciter circuit. A signal is available for each igniter circuit on the engine.

VIBRATION SENSORS

The engine vibration sensors are accelerometers that detect abnormal fan rotor and turbine rotor vibration. The transducers are connected through the engine wiring harness to the EICAS.

FUEL FLOWMETER

The fuel flowmeter is a turbine, mass flow sensor. A given fuel flow through the sensor causes the turbine to move to a calibrated position, providing a specific voltage output to the Data Acquisition Unit (DAU). The DAU converts the voltage signal from the sensor into a flow-rate value (pounds or kilograms per hour) for cockpit display. The fuel flowmeter is calibrated for a range between 130 to 4300 pph. During some starts, fuel flow may drop to values out of the flowmeter range. In this case a zero fuel flow will be displayed on EICAS for a few seconds.

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POWERPLANT CONTROL SYSTEM

Each AE3007A engine series features a dual redundant electronic control system. The main components of the powerplant control system are the Full Authority Digital Electronic Controls (FADECs), the FPMU, the Permanent Magnetic Alternator (PMA), the Control Pedestal and the Powerplant Control Panel.

Thrust management logic schedules a corrected fan speed (N1) based on a signal from the ADC and cockpit, sending it to engine control logic, which controls the engine fuel flow and Compressor Variable Geometry (CVG) to attain the required engine steady-state and transient response.

Engine control logic also incorporates engine protection logic that prevents engine damage attributable to excessive rotor speed at all times, and temperature limits after the engine has completed a start.

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FULL AUTHORITY DIGITAL ELECTRONIC CONTROL (FADEC)

Each engine is controlled by one of two FADECs that are named FADEC A and FADEC B. All signals between each FADEC and its respective engine and between the FADECs and the airplane are completely redundant and isolated. This allows either A or B FADEC to control the engine independently.

The FADECs are interconnected by dedicated Cross-Channel Data Links. These buses are used to transmit engine data and FADEC status between the two FADECs.

Each FADEC is connected to one of the two FADECs on the opposite engine via data bus. Across this bus, the FADECs communicate the information necessary to implement thrust reverser interlock and Automatic Takeoff Thrust Control System (ATTCS).

Airplane electrical power is fed to the FADEC for engine start as a sole power source until N2 is approximately 50%. Primary electrical power source for each FADEC is generated by a dedicated set of windings in the PMA. The airplane power source is fed the FADEC as a backup in the event of a failure in the PMA. In the event of total loss of airplane power the pilot would control the engine normally.

Each FADEC receives command signals from the Control Pedestal and from the Powerplant Control Panel and sends a command signal to the FPMU, which meters the fuel flow to the engine in order to reach the fan spool speed calculated by the FADEC thrust management section.

Both FADECs alternate powerplant control. While one FADEC controls the powerplant, the other remains in standby mode. The standby FADEC monitors all inputs, performs all computations, and performs built-in-test and fault detection. However, the output drivers (fuel flow and CVG control), that command the engine, are powered off.

The active FADEC is alternated at each engine ground start in order to minimize the probability of latent failure within the powerplant control system/airplane interface.

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The selection logic resides within the FADECs that memorize which FADEC was used for the last engine start and commands the other one to perform the next start, regardless of which FADEC is used in flight.

For example: If FADEC B was used for the last start, when the pilot actuates the next start, the selection logic will select FADEC A, as shown in the following table:

START	IN FLIGHT (ALTERNATED)	FOLLOWING START
FADEC A	FADEC B or A	FADEC B
FADEC B	FADEC A or B	FADEC A

Transfer from active FADEC to standby FADEC may also be accomplished automatically, in response to a detected fault, or manually, through the FADEC Selector Knob, located on the overhead panel. The manual selection overrides the automatic selection of the controlling FADEC unless the manually selected FADEC is not capable of safely controlling the engine.

For engines equipped with FADEC software B9.2 and on, the FADEC will be automatically alternated after each on ground start is accomplished.

If a fault condition is detected in the engine sensor, actuator interface, or airplane interface of the controlling FADEC, it will maintain control by using data borrowed from the standby FADEC. If required data is not available, the controlling FADEC will use default data or switch to reversionary control mode.

Control will be transferred to the standby FADEC only when the controlling FADEC detects a fault that will result in degraded engine operation or will render it unable to control the engine.

All measured powerplant control parameters, control system faults and status information are presented on the EICAS.

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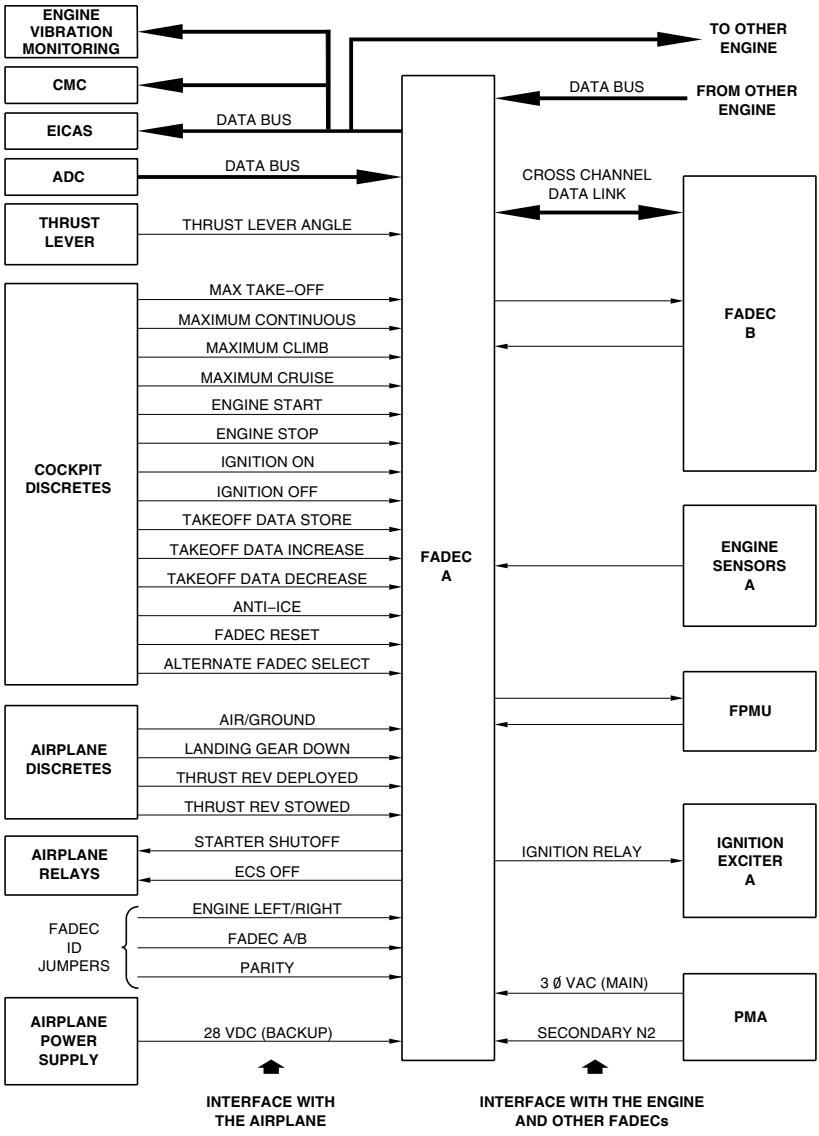

FADEC SCHEMATIC

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N1TARGET CALCULATION

The FADEC calculates the maximum available engine thrust for a given thrust rating mode, airspeed and ambient conditions, and bleed air configuration. Maximum thrust corresponds to N1TARGET displayed on the EICAS as a cyan bug on the N1 analogic indicator arc.

When the Thrust Lever is set to the THRUST SET position, the FADEC controls the engine at N1TARGET.

In normal mode (with no ADC faults) the following data are used as primary reference for the N1TARGET calculation:

– Pressure Altitude and Mach Number reference from ADCs.

– Temperature references (REF TO TEMP during takeoff and ADC TAT in flight).

– A-ICE condition (REF A-ICE during takeoff and actual A-ICE system feedback in flight).

– Takeoff mode.

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N1REQUEST CALCULATION

The N1REQUEST is a function of N1TARGET and Thrust Lever Angle. The FADEC controls the engine to N1REQUEST at steady state, except if the thrust lever is at Ground Idle position. In this case, the engine is controlled according to the Ground Idle N2 schedule.

The table below presents the main Thrust Lever positions, corresponding Thrust Lever Angle bands, and N1REQUEST for ground operation.

POSITION	TLA	N1REQUEST
MAX REVERSE	0° to 4°	N1REV
MIN REVERSE	14° to 22°	N1IDLE
IDLE	22° to 28°	N1IDLE
THRUST SET	72° to 78°	N1TARGET
MAX THRUST	Above 78°	N1TARGET

N1REV is the N1 value for MAX REVERSE thrust.

Each thrust lever modulates engine thrust linearly between IDLE and THRUST SET position. There is no thrust modulation between IDLE and MIN REVERSE.

N1REQUEST is shown as a green bug on the N1 analogic indication arc on the EICAS.

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GROUND/FLIGHT IDLE THRUST SCHEDULE

There is only one IDLE position on the thrust lever control pedestal. However, there are two different IDLE ratings (ground and flight Idle), set as a function of the Air/Ground input to the FADEC:

GROUND IDLE SPEED

During ground operations, the FADEC commands the engine to Ground Idle Speed, which is scheduled in order to:

– Avoid engine flameout, overtemperature or inability to accelerate.

– Provide the required air bleed flow pressure and temperature for the ECS.

– Provide the required gas generator speed to drive the accessories.

Ground Idle Speed is scheduled as a function of ambient temperature.

FLIGHT IDLE THRUST

In flight operation, the FADEC will command the engine to Flight Idle Thrust, which is scheduled in order to:

– Avoid engine flameout, overtemperature or inability to accelerate.

– Provide the required bleed airflow pressure and temperature for the ECS and for the Anti-Icing System. If the FADECs receive an indication that the anti-icing system is on, Flight Idle thrust is rescheduled in order to provide the required air bleed flow, pressure and temperature. This automatic A-ICE Flight Idle rescheduling is inhibited below 15000 ft if the landing gear is down and locked.

– Enable the FADEC to accelerate the engine from Flight Idle Thrust to 100% of the GO-around thrust mode in 8 seconds or less, at or below 9500 ft.

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CLOSED-LOOP FAN SPEED CONTROL

The primary control mode of the engine is closed-loop fan speed control. The fan speed requested by thrust lever is compared to the measured fan speed. An error signal proportional to the difference between the request and measured fan speed is used to adjust the commanded fuel flow to the engine to drive the fan speed error to zero.

N1/N2 OVERSPEED/UNDERSPEED PROTECTION

The FADEC limits fuel flow to prevent the excessive rotor speed on both the low-pressure rotor (N1) and the high-pressure rotor (N2). If the fuel flow commanded by the closed-loop results in the surpassing of established rotor speed limits, fuel flow will be limited to that value which will result in rotor speed limit.

The FADEC also incorporates a logic to initiate an engine shutdown if the upper limits of N1 and N2 are exceeded, in order to avoid a potentially destructive overspeed condition.

Logic within the FADEC incorporates a high-pressure rotor (N2) underspeed shutdown. This logic prevents damaging the turbine via an overtemperature condition if the engine attempts to operate at sub-idle speed. If N2 drops below 54% the FADEC will command a shutdown.

The maximum steady-state rotor speeds are 100% N1 for A1P and A1E engines (97.7% N1 for A2 engines) and 102.5% N2 for A1P engine (105.0% N2 for A1E and A2 engines). There is no minimum N1 speed.

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INTERSTAGE-TURBINE TEMPERATURE (ITT) LIMITING

The FADEC has provisions for limiting engine fuel flow to prevent exceeding ITT limits. If the fuel flow commanded by the closed-loop fan speed control exceeds established ITT limits, the FADEC will limit the fuel flow to that value that will result in operation within the ITT limit.

ACCELERATION/DECELERATION LIMITING

Acceleration and deceleration limits within the FADEC logic restrict the rate of commanded engine fuel flow to prevent surge during acceleration or lean blow out during deceleration.

FLAMEOUT DETECTION/AUTORELIGHT

Flameout and autorelight detection logic within the FADEC detects an engine flameout and attempts an automatic relight before the engine loses power, if N2 is higher than 53%. In the event that a relight cannot be successfully executed, the FADEC commands an engine shutdown.

During in-flight restarts, both ignition systems are energized.

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N1 REVERSIONARY CONTROL MODE

The FADEC provides a reversionary control mode to accommodate a total loss of fan-speed (N1) signal.

The FADEC stores data on the correlation between N1 and N2 of an average engine in its non-volatile memory, and in the event that all N1 signals are lost, it will control thrust governing N2 speed.

The engine control system is capable of modulating thrust in response to thrust lever movement in the reversionary control mode. However, transient response times may be greater, minimum thrust may exceed flight idle thrust and maximum thrust may be less than that expected during normal control operation.

This mode is evident to the pilot due to the absence of N1 indication on the EICAS.

FADEC INPUTS SELECTION AND FAULT ACCOMMODATION

For every FADEC input, there is a selection and fault accommodation logic, based on the inputs to both FADECs of the same engine.

The engine control system is highly fault tolerant. Because of redundant sensor inputs and outputs, the control system can accommodate multiple faults with no degradation in engine response. The fault accommodation philosophy is to maintain operation on the controlling FADEC for as long as possible before transferring control to the standby FADEC.

For every detectable fault, the FADEC provides a signal to the EICAS for the alerting message and/or to the Central Maintenance Computer for the maintenance message.

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FADEC DISCRETE OUTPUTS

Each FADEC provides two discrete output signals, as follows:

– N2 Speed Switch - Each FADEC activates a discrete output whenever the engine is assumed to be running, based on N2. This signal is activated whenever N2 reaches (accelerating) 56.4% and is deactivated whenever N2 drops below 53%.

– ECS OFF signal.

UNCONTROLLED HIGH THRUST (UHT)

During ground operations if the TLA is commanded to idle or below and an elevated levels of N1 is detected (UHT event) the FADEC will automatically shutdown the engine. This feature is applicable to FADEC software B9.4 and on.

ALTERNATE FADEC SELECTION

AUTOMATIC SELECTION

– Whenever the FADEC in control is unable to safely control the engine, it signals the alternate FADEC to automatically take over engine control.

– For engines equipped with FADEC software B9.2 and on, the FADEC will be automatically alternated after each on ground start was accomplished.

MANUAL SELECTION

– The alternate FADEC may be manually selected to control the engine, by momentarily setting the FADEC Control Knob, located on the overhead panel, in the ALTN position.

The FADEC that is in control (A or B) is indicated on the EICAS.

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FADEC RESET

The FADEC may be reset through the FADEC Control Knob. Upon receiving the FADEC Control Knob input, the FADEC clears recorded inactive faults (faults not currently being detected).

In case any fault persists after the RESET command, it is not cleared.

Reset does not mean electrical power interruption to the FADEC.

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ENGINE OPERATION

The Rolls-Royce AE3007 engine uses an electronic control system based on two Full Authority Digital Electronic Controls (FADECs) that control the engine. These FADECs interface with the engine, airframe and flight deck. A complete description of the engine control system was presented in the previous Section.

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THRUST RATINGS

The engine control system schedules the corrected fan speed as a function of pressure altitude, Mach number, ambient temperature, anti-ice system condition, thrust mode and thrust lever angle to achieve the rated thrust conditions.

Thrust ratings for the AE3007 engine are:

ENGINES	A1P		A1E		A2	
THRUST RATINGS	SELECTABLE	ATTCS	SELECTABLE	ATTCS	SELECTABLE	ATTCS
A2 Takeoff Reserve	-	-	-	-	-	A2 TO RSV*
A2 Takeoff	-	-	-	-	A2 TO*	A2 TO RSV*
E Takeoff Reserve	-	-	-	E T/O RSV*	-	-
E Takeoff	-	-	E T/O*	E T/O RSV*	-	-
Takeoff Reserve	-	T/O RSV*	-	T/O RSV*	-	T/O RSV*
Takeoff	T/O*	T/O RSV*	T/O*	T/O RSV*	T/O*	T/O RSV*
Maximum Takeoff-1	-	T/O-1*	-	T/O-1*	-	T/O-1*
Alternate Takeoff-1	ALT T/O-1*	T/O-1*	ALT T/O-1*	T/O-1*	ALT T/O-1*	T/O-1*
Maximum Continuous	CON	-	CON	-	CON	-
A2 Maximum Climb	-	-	-	-	A2 CLB	-
E Maximum Climb	-	-	E CLB	-	-	-
Maximum Climb	CLB	-	CLB	-	CLB	-
Maximum Cruise	CRZ	-	CRZ	-	CRZ	-

* Restricted to 5 minutes

For A1E engines, E T/O RSV and T/O RSV modes are not intended for normal operation. Their use must be recorded in the maintenance logbook.

For A2 engines, A2 TO RSV and T/O RSV modes are not intended for normal operation. Their use must be recorded in the maintenance logbook.

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For the respective takeoff rating, altitude, and Mach-number condition, fan speed is controlled to maintain constant thrust at any given ambient temperature below the flat-rated ambient temperature.

ENGINE CONTROL

The engine control system controls the operation of the engine throughout its operating envelope. The system modulates the fuel flow rate to the engine and the position of the variable geometry vanes (CVG) in response to inputs from the airplane's sensors and measurements of engine operating conditions. The engine control system will not command a fuel flow that would result in exceeding rotor speed or temperature operating limits.

The engine control system is designed in such a manner that a single electrical failure will not cause significant thrust changes, result in an uncommanded engine shutdown or prevent a commanded engine shutdown. In case of loss of both FADECs, the engine control system will shut off fuel flow and move the CVGs to the closed position.

The engine control system performs two categories of functions: thrust management and engine control. Thrust management logic interfaces with the airframe and schedules a corrected thrust based on air data and cockpit inputs. The fan speed request is passed to the engine control logic, which controls the engine fuel flow and Compressor Variable Geometry (CVG) in response to the measured parameters in order to attain the required engine response.

THRUST MANAGEMENT

This section of the FADEC software is responsible for functions directly involved in the required thrust computation and management logic.

Thrust management logic is provided to reduce flight crew workload and enhance the airplane's operation.

Thrust management functions are as follows: thrust mode selection, fan speed (N1) scheduling, Automatic Takeoff Thrust Control (ATTCS), Takeoff Data Setting (TDS), and thrust reverser interlock.

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THRUST MODE SELECTION

Thrust logic management includes several thrust-rating modes that are controlled through associated buttons on the cockpit, set during the takeoff data setting procedure, automatically triggered by the ATTCS or by advancing the Thrust Lever Angle (TLA) above the thrust set position.

Thrust-rating mode defines the available engine thrust at the existing ambient conditions. The following thrust modes are available:

ALTERNATE TAKEOFF (ALT T/O-1)

– All engines:

This mode is the normal all engines operating takeoff mode and is available only through the use of the Takeoff Data Setting procedure.
Selection of this mode ensures the best engine durability and economy of operation. In this mode the ATTCS is active, so that T/O-1 mode is triggered in case of engine failure.

MAXIMUM TAKEOFF-1 (T/O-1)

– A1P engine:

This is the One Engine Inoperative (OEI) mode for the normal, all engines operating, ALT T/O-1 mode. In addition to being selected by an ATTCS trigger, it may also be selected from ALT T/O-1 mode, at or below 1700 ft above takeoff pressure altitude, by pushing the T/O thrust-rating button. It is not a normal pilot selectable takeoff mode.

– A1E and A2 engines:

This is the One Engine Inoperative (OEI) mode for the normal, all engines operating, ALT T/O-1 mode. The FADECs will select T/O-1 mode if the T/O switch is pressed and the current mode is ALT T/O-1 during takeoff phase, if the ATTCS is triggered and the current mode is ALT T/O-1 or if the thrust lever is moved beyond Thrust Set position and the current mode is ALT T/O-1.

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TAKEOFF (T/O)

– A1P engine:

This mode is the maximum, all engines operating takeoff mode. For engine durability and economy of operation, this mode should only be selected when ALT T/O-1 is not authorized.
ATTCS is active in this mode, so that ATTCS triggers upon detection of an engine failure, commanding a thrust increase to T/O RSV mode. The T/O mode is automatically selected at FADEC power up, and at the initialization of the Takeoff Data Setting procedure. T/O is also automatically selected in flight below or descending through 15000 ft provided the landing gear is down and locked. T/O is selected if there is weight on wheels, the TLA is at 50° or less and the T/O thrust-rating button is pushed. This mode is also selected when the T/O thrust-rating button is pushed and the pressure altitude is greater than 1700 ft above takeoff altitude.

– A1E and A2 engines:

This is a medium thrust lever, selectable through the Takeoff Data Setting procedure, for all engines operating. For engine durability and economy this mode should be selected if conditions do not permit use of ALT T/O-1 but do not require E T/O mode (for A1E engine) or A2 TO (for A2 engine).

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EXTENDED TAKEOFF (E T/O) AND A2 TAKEOFF (A2 TO)

– A1E and A2 engines:

The E T/O and A2 TO modes are the highest level, all engines operating, takeoff mode for A1E and A2 engine, respectively. For engine durability and economy of operation, this mode should only be selected when T/O mode is not authorized. In case of engine failure the ATTCS triggers the E T/O RSV (or A2 TO RSV) mode. The E T/O (or A2 TO) is automatically selected at FADEC power-up and also at initiation of the Takeoff Data Setting procedure. E T/O (or A2 TO) is also automatically selected in flight, at or below 15000 ft, when the landing gear down and locked is received by the FADECs on both engines. This mode is also selected when the T/O button is pushed and the pressure altitude is greater than 1700 ft above takeoff altitude. The FADECs will select E T/O (or A2 TO) mode if the T/O switch is pressed after takeoff phase, if the T/O switch is pressed and the current mode is T/O-1 or if the thrust lever is moved beyond Thrust Set position in flight or after takeoff phase.

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TAKEOFF RESERVE (T/O RSV)

– A1P engine:

This mode is the corresponding OEI mode for all engines operating in T/O mode. The engine will produce the maximum rated thrust for the existing ambient conditions in this mode.
T/O RSV is automatically selected when ATTCS is triggered during operation in T/O mode. T/O RSV is also selected if both engines do not agree on the thrust mode or when the thrust mode of the remote engine cannot be determined. This mode will also be selected from the T/O mode, at or below 1700 ft above takeoff altitude, when the T/O thrust-rating button is pushed.

NOTE: T/O RSV is manually selected by advancing one or both TLA above Thrust Set position, regardless of any mode previously selected.

– A1E and A2 engines:

This is the corresponding OEI mode for all engines operating in T/O mode. This mode is accessible through a FADEC command in response to an ATTCS triggering event. The FADECs will select T/O RSV mode if the T/O switch is pressed and the current mode is T/O during takeoff phase, if the ATTCS is triggered and the current mode is T/O or if the thrust lever is moved beyond Thrust Set position and the current mode is T/O. This mode is also accessible by pressing the takeoff button while in T/O and the airplane is in post takeoff condition or on the ground.

NOTE: The use of this mode requires a notation in the airplane maintenance log.

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EXTENDED TAKEOFF RESERVE (E T/O RSV) AND A2 TAKEOFF RESERVE (A2 TO RSV)

– A1E and A2 engines:

The E T/O RSV and A2 TO RSV modes are the corresponding OEI mode for all engines operating in E T/O and A2 TO modes, respectively. E T/O RSV (or A2 TO RSV) is automatically selected when ATTCS is triggered during operation in the E T/O (or A2 TO) mode.

The FADECs will select E T/O RSV (or A2 TO RSV) mode if the T/O switch is pressed and the current mode is E T/O (or A2 TO) or T/O RSV during takeoff phase, if the ATTCS is triggered and the current mode is E T/O (or A2 TO), if the thrust lever is moved beyond Thrust Set position and the current mode is E T/O (or A2 TO) or if the thrust lever is moved beyond the Thrust Set position and the takeoff button is pressed. Use of this mode requires a notation in the airplane maintenance log.

MAXIMUM CONTINUOUS (CON)

– All engines:

This mode is selected by pushing the CON push button. CON mode is available when the pressure altitude is greater than 300 ft above takeoff altitude and there is no landing gear down and locked, or when the pressure altitude is greater than 1700 ft above takeoff altitude. The CON mode switch inputs to the FADECs are inhibited on ground.

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MAXIMUM CLIMB (CLB)

– All engines:

This mode is selected by pushing the CLB push button. CLB mode is enabled when the pressure altitude is greater than 500 ft above takeoff altitude, there is no landing gear down and locked signal and there is no OEI signal, or when pressure altitude is greater than 1700 ft above takeoff altitude and there is no OEI signal. The CLB mode switch inputs to the FADECs are inhibited on ground. For A1E and A2 engines CLB is the default mode when T/O or ALT T/O-1 is selected for takeoff.

EXTENDED CLIMB (E CLB) AND A2 CLIMB (A2 CLB)

– A1E and A2 engines:

The E CLB and A2 CLB modes are enabled under the same CLB conditions described above. However, E CLB (or A2 CLB) is the default mode when E T/O (or A2 TO) is selected. Pressing the CLB button while in CLB mode toggles the climb thrust to E CLB (or A2 CLB) and vice-versa.

MAXIMUM CRUISE (CRZ)

– All engines:

This mode is selected by pushing the CRZ push button. CRZ mode is enabled when the pressure altitude is greater than 500 ft above takeoff altitude, there is no landing gear down and locked signal, and there is no OEI signal, or when pressure altitude is greater than 1700 ft above takeoff altitude and there is no OEI signal.

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AE3007A1E AND AE3007A2 THRUST MODE SELECTION

Thrust mode selection on A1E and A2 engines is a bit more complex than on the other engines. The following tables illustrate how the thrust modes can be selected by pressing the T/O button, by advancing Thrust Levers above thrust Set or by the ATTCS.

PRESSING TAKEOFF BUTTON

CURRENT MODE	DURING TAKEOFF PHASE (1)	POST TAKEOFF PHASE
ALT T/O-1	T/O-1	E T/O (or A2 TO)
T/O-1	E T/O (or A2 TO)	E T/O (or A2 TO)
T/O	T/O RSV	E T/O (or A2 TO)
T/O RSV	E T/O RSV (or A2 TO RSV)	E T/O (or A2 TO) (2)
E T/O (or A2 TO)	E T/O RSV (or A2 TO RSV)	E T/O (or A2 TO)

(1) Takeoff phase is configured when altitude is less than 1700 ft above takeoff altitude, five minutes or less time has been elapsed since thrust set selection for takeoff and current thrust mode is one of the takeoff modes.

(2) For A1E engine, T/O RSV to E T/O will result in a thrust decrease. For A2 engine, T/O RSV to A2 TO will result in a same thrust.

(3) If current thrust is E T/O RSV (or A2 TO RSV), flight altitude is between 1700 ft above takeoff altitude and 15000 ft and the takeoff button is pressed, thrust will decrease to E T/O (or A2 TO).

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ADVANCING THRUST LEVERS ABOVE THRUST SET POSITION

THRUST LEVER ANGLE ABOVE THRUST SET (TLA > 78°) ATTCS NOT TRIGGERED		
CURRENT MODE	**DURING TAKEOFF PHASE**	**POST TAKEOFF PHASE**
ALT T/O-1	T/O-1	E T/O (or A2 TO)
T/O	T/O RSV	E T/O (or A2 TO)
E T/O (or A2 TO)	E T/O RSV (or A2 TO RSV)	E T/O (or A2 TO)
CON, CLB, E CLB or A2 CLB, CRZ	-	E T/O (or A2 TO)
T/O-1 (1)	T/O-1	E T/O (or A2 TO)
T/O RSV (1)	T/O RSV	E T/O RSV (or A2 TO RSV)
E T/O RSV (or A2 TO RSV) (1)	E T/O RSV (or A2 TO RSV)	E T/O RSV (or A2 TO RSV)

(1) If the ATTCS is not triggered, these three modes are only accessible by pressing the T/O button after selecting normal engine takeoff modes through the Takeoff Data Setting procedure.

THRUST LEVER ANGLE ABOVE THRUST SET (TLA > 78°) - ATTCS TRIGGERED			TLA > 78° AND T/O BUTTON PRESSED
CURRENT MODE	**AFTER ATTCS TRIGGER**	**TLA > 78°**	
ALT T/O-1	T/O-1	T/O-1	E T/O RSV (or A2 TO RSV)
T/O	T/O RSV	T/O RSV	E T/O RSV (or A2 TO RSV)
E T/O (or A2 TO)	E T/O RSV (or A2 TO RSV)	E T/O RSV (or A2 TO RSV)	E T/O RSV (or A2 TO RSV)

Pushing the Takeoff Button with the Thrust Lever above Thrust Set will select E T/O RSV (or A2 TO RSV) mode regardless of the current takeoff mode or flight phase.

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FAN-SPEED SCHEDULING

The thrust management logic calculates the corrected fan-speed request at any point in the flight envelope. The scheduled, corrected fan speed is computed as a function of pressure altitude, Mach number, air temperature and other airplane signals.

The thrust lever quadrant has five significant thrust positions defined as:

THRUST LEVER POSITION	THRUST LEVER ANGLE
MAXIMUM REVERSE	0-4°
MINIMUM REVERSE	14-22°
IDLE	22-28°
THRUST SET	72-78°
MAXIMUM THRUST	78-85°

Maximum reverse and maximum thrust are defined by mechanical stops at either extremes of the thrust lever movement. Idle is defined by a mechanical gate that must be lifted to allow the trust lever to transition from forward flight to the reverse flight region. The thrust set position on the thrust lever is delineated by a detent at 75°. For any given pressure altitude, Mach number and air temperature the FADEC computes a corrected fan speed corresponding to the thrust lever position. The fan speed computed for the thrust lever position is dependent upon the selectable thrust mode. The Target Thrust (N1 Target) is defined as the thrust corresponding to the corrected fan speed scheduled with the thrust lever at the Thrust Set position. A target thrust is computed for each thrust mode. Flight idle thrust corresponds to the corrected fan speed with the TL at the idle position and is independent of the thrust mode.

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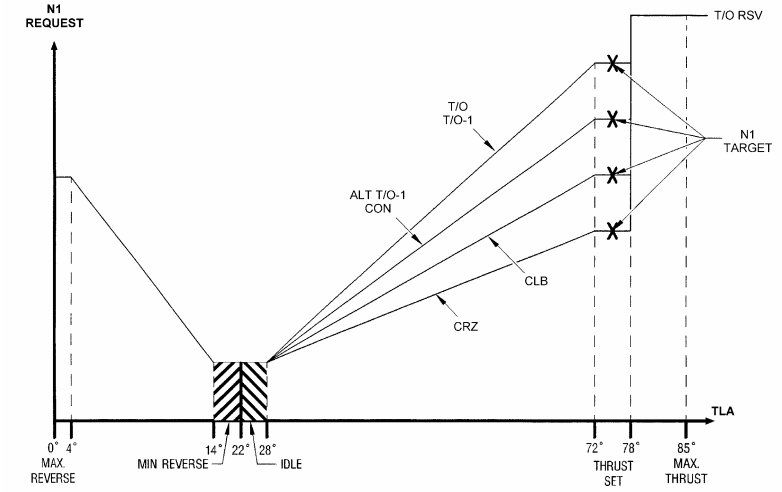
The FADEC schedules the corrected fan speed as a function of the thrust lever angle and the thrust mode to result in the linear relationships:



A1P ENGINES

Any movement of the thrust levers above the Thrust Set position results in the scheduling of the maximum takeoff thrust, regardless of the current thrust mode except for A1E and A2 engines (Refer to A1E and A2 Thrust Mode Selection). A thrust lever position below the idle gate schedules reverse thrust provided such action is enabled by the thrust reverser interlock logic.

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ALTERNATE TAKEOFF THRUST CONTROL SYSTEM (ATTCS)

During a takeoff, if an engine failure is detected, the ATTCS automatically resets thrust on the remaining engine from Alternate Takeoff thrust to Maximum Takeoff thrust. In addition, depending on takeoff thrust setting and ambient conditions, the FADECs generate an ECS OFF signal to close the Pack Valves (Refer to ECU operation on Section 2-14).

ATTCS ARMING CONDITIONS

ATTCS is armed when:

– Both engines are ATTCS capable.
– Associated thrust lever angle is equal to or higher than 45°.

NOTE: ATTCS capable is defined as A2 TO (A2 engine). E T/O (A1E engine), T/O (All engines) or ALT T/O-1 (All engines) mode selected, with the airplane on ground and the engine running.

ATTCS TRIGGERING CONDITIONS

After being armed, the ATTCS is triggered under any of the following conditions:

– The thrust lever for the opposite engine is reduced to below 38° TLA.
– Either FADEC for the on-side engine receives an opposite engine or on-side engine inoperative condition, or a Thrust Lever Angle limited to idle signal.
– The opposite engine does not indicate ATTCS being armed, within 2 seconds after the on-side engine ATTCS has armed.
– The opposite engine disarms ATTCS and the on-side engine does not disarm within 2 seconds.

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If ATTCS is armed and either FADEC A or B detects an opposite engine inoperative condition, the controlling FADEC commands the on-side engine to a higher takeoff thrust, as shown in the table:

ENGINE	TAKEOFF SELECTION TWO ENGINES OPERATION	ATTCS TRIGGERED ONE ENGINE OPERATION
A1P	T/O	T/O RSV
	ALT T/O-1	T/O-1
A1E	ALT T/O-1	T/O-1
	T/O	T/O RSV
	E T/O	E T/O RSV
A2	ALT T/O-1	T/O-1
	T/O	T/O RSV
	A2 TO	A2 TO RSV

ATTCS DISARMING CONDITIONS

The ATTCS disarms if any of the following conditions is met:

– After being armed, the Thrust Lever Angle is reduced below 42°.

– ATTCS is triggered on either engine.

– No ATTCS capable takeoff mode is selected.

NOTE: If thrust lever is moved beyond the THRUST SET position the FADEC automatically commands the engine to the maximum available thrust, disregarding the takeoff mode selected, except for A1E and A2 engines (see A1E and A2 engines Thrust Mode Selection Section).

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TAKEOFF DATA SETTING

The Takeoff Data Setting function is provided in order to enable the pilot to input reference data into the FADEC prior to takeoff. Such data will be used to calculate N1TARGET during takeoff. The following data has to be inputted:

– Takeoff Mode (T/O MODE), which corresponds to:
  – T/O or ALT T/O-1 (A1P engine).
  – E T/O, T/O or ALT T/O-1 (A1E engine).
  – A2 TO, T/O or ALT T/O-1 (A2 engine).
– Reference Takeoff Temperature (REF TO TEMP), which shall correspond to the Static Air Temperature (SAT) on the ground provided by the Air Traffic Control Tower, ATIS (Automatic Terminal Information Service) or other accurate source.
– Reference Takeoff Anti-Ice Condition (REF A-ICE), which is the anti-ice system condition (ON/OFF) that the FADEC will consider to calculate N1TARGET.

This function is enabled during ground operations only and with thrust lever angle below 50°, before or after engine start.

The takeoff data setting is performed through the Takeoff Data Setting controls (STORE button and SET control) on the overhead panel.

After selecting the takeoff page on the MFD, the Takeoff Data Setting procedure shall be as follows:

a) After the first pressing of the STORE button, the MFD indicates the following initial values for the three takeoff data:
  – T/O MODE: T/O for A1P engine;
    E T/O for A1E engine;
    A2 TO for A2 engine.
  – REF TO TEMP: T2SYN (if engine is running) or
    ISA Temperature (otherwise).

  NOTE: - T2SYN is the synthesized total air temperature at the engine fan inlet.

  - T2.5 is the fan discharge total air temperature.

  – REF A-ICE: OFF.

  An arrow points to T/O MODE line. Through the SET Control the takeoff mode ALT T/O-1 may be selected.

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b) At the second pressing of the STORE button, the arrow points to REF TO TEMP, indicating that this parameter may be adjusted. Through the SET control, the initial value may be adjusted to the required temperature. Each momentary command of the SET control will increase (INC) or decrease (DEC) the current value by 1°C. If the SET control is held at the command position for more than 1 second, the REF TO TEMP is changed by 5°C/sec.

NOTE: The acceptable REF TO TEMP value range is limited to T2SYN ± 10°C.

c) At the third pressing of the STORE button, the arrow points to REF A-ICE line, indicating that this parameter may be adjusted. Through the SET control, the initial condition (OFF) can be switched to ON and back to OFF alternately.

d) At the fourth pressing of the STORE button:

- If the engines are running and the REF TO TEMP is within limits (T2SYN ± 10°C):
  - The FADECs accept the takeoff data and successfully terminate the procedure.
  - The MFD displays the takeoff data.
  - The FADEC begins to calculate and display the N1TARGET based on the takeoff data.
- If the engines are not running, the adjusted takeoff data will remain displayed in amber color, which means that they have not been accepted yet. Then:
  - After engines start, if the adjusted REF TO TEMP is within limits, the FADECs accept the takeoff data and successfully terminate the procedure, the MFD displays the takeoff data, and the FADEC begins to calculate and display the N1TARGET based on the takeoff data.
  - Otherwise, the takeoff data will not be accepted by the FADECs and the MFD will display dashed lines for all takeoff data in amber color, and a caution message (ENG NO TO DATA) is presented on the EICAS if TLA > 45°.
  - In order to enter the correct takeoff data, the procedure must be started again, through the STORE button.

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e) If, after takeoff data had been successfully entered, the pilot needs to correct any of them, the STORE button must be commanded again in order to restart the procedure.

f) In case of disagreement between the REF A-ICE condition selected by the pilot and the actual Anti-Ice system condition, a caution message (ENG REF A/I DISAG) is displayed on the EICAS, provided the Parking Brake is released (OFF) or with any Thrust Lever Angle above 45°.

g) If any thrust lever is set to an angle above 45° before takeoff data successfully entered, a caution message (ENG NO TO DATA) is presented on the EICAS.

ENGINE START

Engine start, commanded through the Start/Stop Knob, is automatically managed by the FADEC as follows:

– The FADECs A and B alternate as FADEC in control on every subsequent ground start, if the Ignition Selector Knob is set to AUTO position, as a single ignition system, corresponding to the FADEC in control, will be used.

– The FADEC activates the ignition system when N2 is at approximately 14% and commands the fuel solenoid valve to open when N2 is at approximately 31.5% (28.5% for airplanes equipped with FADEC B7.4 and on) or 12 seconds after ignition is activated, if the Ignition Selector Knob is set to AUTO or ON position.

– Whenever the start cycle is completed, the FADEC deactivates the ignition system and provides a discrete signal to command the Starting Control Valve (SCV) to close.

– If the Ignition Selector Knob is set to OFF position, the FADEC neither activates the ignition system nor actuates the fuel valve from closed to open position, in order to enable ground/flight dry motoring.

NOTE: If the engine is already running with TLA above IDLE thrust, the fuel valve is not closed, even if the Ignition Selector Knob is set to OFF position.

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– When the engine is started on ground, only the FADEC in control commands ignition, if the Ignition Selector Knob is set to AUTO position. During an in flight start, both FADECs command ignition.

– If a flameout is detected, the FADEC turns on the ignition system, provided the ignition switch is in the AUTO position, until the engine is restarted.

– During ground starts, the FADEC B7.5 and on monitors N2 speed start limit override. If the N2 speed exceeds 500 rpm, the FADEC starts a timer and if a successful start is not declared within 113 seconds, the FADEC commands an engine shutdown.

NOTE: This is a backup protection only and does not preclude crew to monitor N2 and timely comply with Abnormal Engine Start procedure.

– During ground starts, the FADEC B8.0 and on monitors Interturbine Temperature (ITT) start limit override. If the combination of temperature and time exceedance achieves the reference value, the FADEC shuts the engine down. Therefore, if the temperature exceedance is higher, the command to shut the engine down will be shorter in time. The FADEC also reduces the fuel flow to maintain or reduce ITT below the maximum operating temperature limit.

NOTE: - This is a backup protection only and does not preclude crew to monitor ITT and timely comply with Abnormal Engine Start procedure.

- For airplanes equipped with FADEC older than B8.0, there is no automatic shut-down by the FADEC for an over-temperature on start.

ENGINE DRY MOTORING

An Engine Dry Motoring must be performed for at least 30 seconds after any aborted start to assure that no unburned fuel remains in the combustion chamber and/or to reduce residual ITT prior to attempting another start.

Ignition switch must be rotated to Off position in order to disable ignition and fuel flow prior to rotating the Stop/Run/Start switch to the start position.

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ENGINE SHUTDOWN

Normal engine shutdown, through the Start/Stop Knob, is managed by the FADEC, which commands the engine fuel solenoid valve to close. The normal sequence only occurs with the thrust levers positioned at Idle. Thrust levers should be positioned at IDLE before the Start/Stop knob is positioned at Stop.

A shutdown sequence is also performed whenever N2 is below 54%.

NOTE: The Engine Fire Extinguishing Handle, when actuated, also shuts the engine down by closing the respective fuel shutoff valve, interrupting fuel supply from the wing tanks.

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	ATTCS FAIL	ATTCS failure associated with a low N1.
	ENG 1-2 OUT	N2 from both the engines has dropped below 8500 rpm (underspeed shutdown limit) uncommanded.
	E1 (2) ATTCS NO MRGN	The engine has no ITT or N2 margin to achieve higher thrust if ATTCS is trigged.
	E1 (2) LOW N1	Engine does not achieve requested N1.
	E1 (2) OIL LOW PRESS	Oil pressure has dropped below 34 psi and the engine is running or the pressure switch has failed at the closed position and the engine is not running.
CAUTION	ENG NO TO DATA	Takeoff Data has not been successfully entered with engine running and above 53% N2.
	ENG REF A/I DISAG	Disagreement between the REF A-ICE condition selected by the pilot and the actual anti-icing system condition has been detected by the engine control associated with Parking Brake released (OFF) or with any TLA above 45°.
	ENG1 (2) OUT	N2 has dropped below 8500 rpm (underspeed shutdown limit) uncommanded.

(Continued)

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TYPE	MESSAGE	MEANING
CAUTION	ENG1 (2) TLA FAIL	Thrust Lever Angle sensor has failed.
	FADEC ID NO DISP	There are different FADEC applications installed in the airplane.
	E1 (2) ATS SOV OPN	The engine ATS shutoff valve (SCV) remained open above 53% N2.
	E1 (2) CTL FAIL	A failure in the Engine control system has been detected.
	E1 (2) EXCEEDANCE	ITT or N2 exceeded the current ITT or N2 limit during an interval of the flight leg.
	E1 (2) FPMU NO DISP	An incompatible FPMU was installed on a A1E or A2 engine.
	E1 (2) FUEL LO TEMP	The fuel temperature in the engine has dropped below 5°C.
	E1 (2) NO DISP	Associated FADEC has detected a non-dispatch failure condition.
ADVISORY	CHECK XXX PERF (XXX = A1P, A1E, A2)	Inform the FADEC application installed in the airplane. Displayed only on ground with flaps 0° and parking brakes applied.
	E1 (2) FADEC FAULT	A dispatchable MMEL category B FADEC fault was detected.

(Continued)

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TYPE	MESSAGE	MEANING
ADVISORY	E1 (2) FUEL IMP BYP	The differential pressure across the fuel filter has exceeded the normal range.
	E1 (2) OIL IMP BYP	The differential pressure across the oil filter has exceeded the normal range.
	E1 (2) SHORT DISP	A dispatchable MMEL category B FADEC fault was detected.

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CONTROLS AND INDICATORS

CONTROL PEDESTAL

1 – GUST LOCK LEVER

- Limits thrust lever movement and locks the elevator control surfaces when set in LOCKED position.
- Refer to Section 2-13 – Flight Controls.

2 – THRUST LEVER

MAX	Provides maximum takeoff thrust.
THRUST SET	Provides N1TARGET thrust setting.
IDLE	Provides ground and flight idle thrust settings.
MAX REV	Provides maximum reverse thrust.

NOTE: Protection against inadvertent thrust reverser command in flight is provided through the mechanical idle stop and the electrical flight idle stop.

3 – FRICTION LOCK

- Rotated clockwise, thrust lever movement becomes progressively more resistant, so that thrust levers will not slip.

4 – THRUST RATING MODE BUTTONS

T/O	Selects maximum takeoff thrust-rating mode.
CON	Selects maximum continuous thrust-rating mode.
CLB	Selects maximum climb thrust-rating mode.
CRZ	Selects maximum cruise thrust-rating mode.

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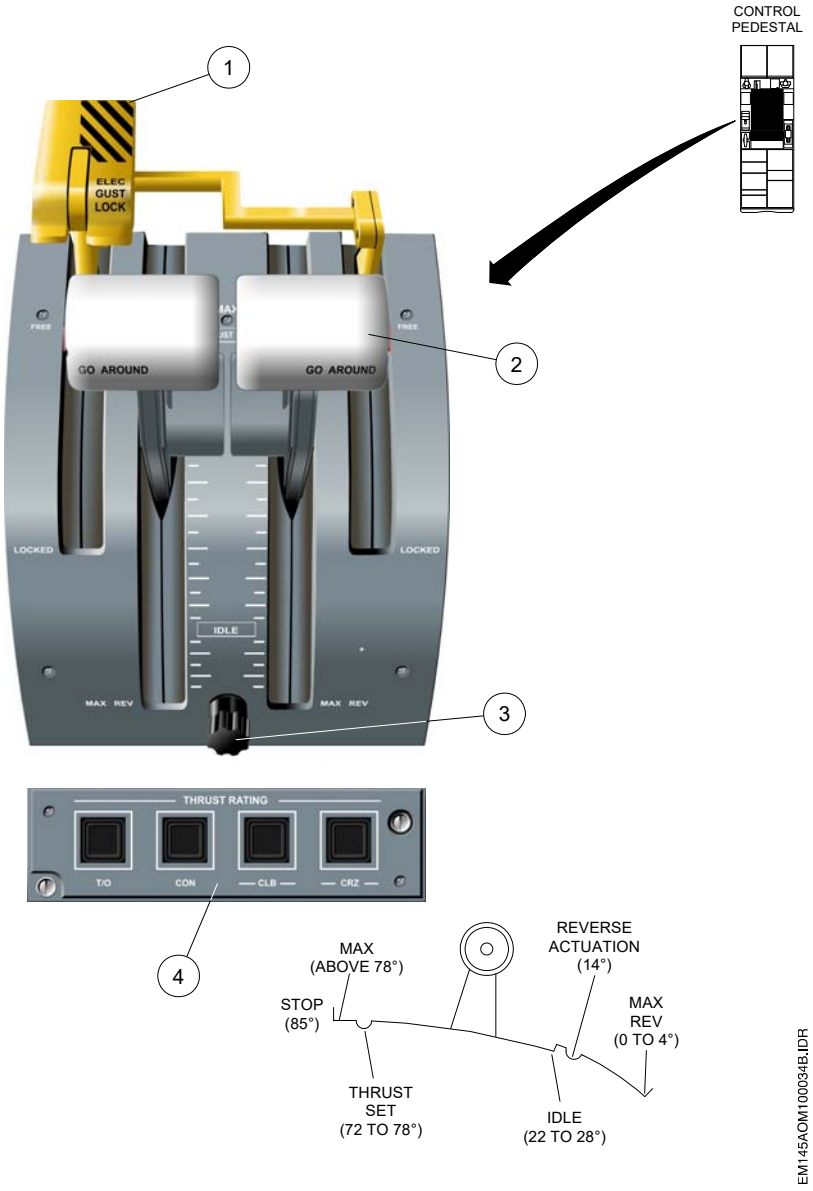

CONTROL PEDESTAL

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POWERPLANT CONTROL PANEL

1 – IGNITION KNOBS

OFF Deenergizes the ignition system.

AUTO FADECs control the ignition system automatically, depending on the engine requirement.

ON Commands the FADEC to activate continuously the two ignition channels.

2 – FADEC CONTROLLERS (SPRING-LOADED TO NEUTRAL)

RESET Resets the FADECs, and clears faults.

ALTN Alternates the FADEC in control.

NOTE: The knob becomes inoperative if held in any position for more than 3 seconds.

3 – TAKEOFF DATA STORE BUTTON

- Initiates and terminates takeoff data setting.
- At the first pressing, an arrow points to T/O MODE line.
- At the second pressing allows REF TO TEMP adjustment.
- At the third pressing allows REF A-ICE to be input.
- At the fourth pressing, if REF TO TEMP is within limits, the takeoff data is accepted and the procedure is successfully accomplished.
- For complete procedures refer to Takeoff Data Setting paragraph.

NOTE: The button becomes inoperative if held pressed for more than 3 seconds.

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4 – TAKEOFF DATA SET CONTROLLER

- When turned, selects the T/O MODE, increases (INC) or decreases (DEC) the REF TO TEMP value and also switches the A-ICE condition state presented on the MFD during takeoff data setting.
- Momentary actuation changes the REF TO TEMP values by 1°C. If the control is held for more than 1 second at the INC or DEC position, REF TO TEMP is charged by 5°C/sec.
- The mode T/O can be switched to ALT T/O-1 and back to T/O alternately (A1P engine).
- The mode E T/O, T/O and ALT T/O-1 can be switched alternately (A1E engine).
- The mode A2 TO, T/O and ALT T/O-1 can be switched alternately (A2 engine).
- The A-ICE initial condition (OFF) can be switched to ON and back to OFF alternately.

5 – ENG START/STOP SELECTORS

STOP Commands the FADEC to shut the engine down, provided associated Thrust Lever is at IDLE.

RUN Allows normal engine operation.

START This is a momentary position that initiates the engine start cycle. If the knob is held in this position for more than 3 seconds, it becomes inoperative. In this case, a FADEC reset command is required.

NOTE: The Start/Stop selector knobs are equipped with a transparent protection guard over the knob for better engine identification.

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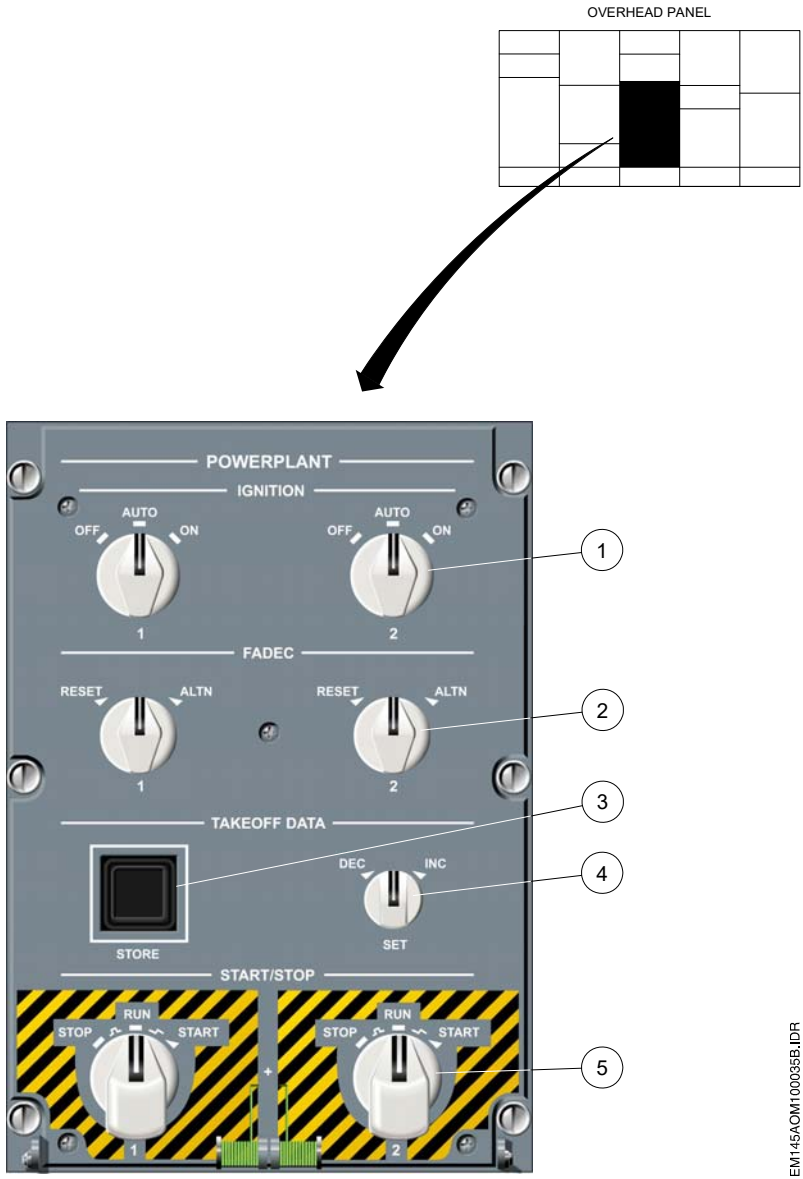

POWERPLANT CONTROL PANEL

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FIRE HANDLE

The Fire Handle, located on the Fire Protection Control Panel, allows engine emergency shutdown. For further information on fire controls, refer to Section 2-07 – Fire Protection.

ENGINE INDICATION ON EICAS

1 – N1TARGET INDICATION

- Corresponds to the maximum available engine thrust for a given thrust-rating mode, airspeed, ambient condition, and bleed air status.
- Digits are cyan.
- Ranges from 0 to 100% RPM for A1P and A1E engines with a resolution of 0.1%.
- Ranges from 0 to 97.7% RPM for A2 engines with a resolution of 0.1%.
- Indicated by a cyan T-shaped bug.
- Indication is removed from the display for request values greater than 100% for A1P and A1E engines (97.7% for A2 engines) or less than 0%.

2 – THRUST-RATING MODE ANNUNCIATION

- Indicates the current thrust-rating mode.
- Labels: T/O or ALT T/O-1 (A1P engine).
  E T/O, T/O or ALT T/O-1 (A1E engine).
  A2 TO, T/O or ALT T/O-1 (A2 engine).
  CON, CLB and E CLB (A1E) or A2 CLB (A2), or CRZ.
- Color: cyan.
- When engines operate in alternate takeoff mode a green ATTCS annunciation is presented below the takeoff label to indicate that the ATTCS system is armed.

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3 - THRUST REVERSER ANNUNCIATION

- Indicates the position of the upper and lower Thrust Reverser doors.
- Label: REV.
- Color:
  - Fully open: green.
  - In transition: amber (if applicable).

4 - N1 INDICATION

- Displays N1 in RPM percentage.
- Scale:
  - For A1P and A1E engines:
    - Ranges from 0 to 100%. Extends up to 110% if exceeding the red line.
    - Colors: green from 0 to 99.9%.
      red line at 99.9%.
  - For A2 engines:
    - Ranges from 0 to 97.7%. Extends up to 110% if exceeding the red line.
    - Colors: green from 0 to 97.6%.
      red line at 97.7%.
- Digits:
  - For A1P and A1E engines:
    - Ranges from 0 to 120% RPM, with a resolution of 0.1%.
    - Colors: green from 0 to 99.9%.
      red at 100.0% and above.
  - For A2 engines:
    - Ranges from 0 to 120% RPM, with a resolution of 0.1%.
    - Colors: green from 0 to 97.6%.
      red at 97.7% and above.

5 - FADEC IN CONTROL ANNUNCIATION

- Indicates the FADEC channel that is controlling the engine.
- Labels: A or B.
- Color: green.

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6 - IGNITION CHANNEL ANNUNCIATION

- Indicates the ignition channel that is enabled.
- Labels: IGN A, IGN B, IGN AB, or IGN OFF.
- Color: green.

7 - INTERTURBINE TEMPERATURE INDICATION

- Scale:
  - During engine start:
    - green from 300 to 800°C.
    - red line at 801°C.
  - Takeoff mode:
    - green from 300 to 947°C (A1P engine).
      from 300 to 992°C (A1E engine).
      from 300 to 994°C (A2 engine).
    - red line at 948°C (A1P engine).
      at 993°C (A1E engine).
      at 995°C (A2 engine).
  - CON, CLB and CRZ modes:
    - green from 300 to 900°C (A1P engine).
      from 300 to 935°C (A1E engine).
      from 300 to 937°C (A2 engine).
    - amber from 901 to 947°C (A1P engine).
      from 936 to 970°C (A1E engine).
      from 938 to 970°C (A2 engine).
    - red line at 948°C (A1P engine).
      at 971°C (A1E and A2 engines).

    If the red line is exceeded, the scale extends a further 50°C.
- Digits:
  - Ranges from -65 to 1999°C with a resolution of 1°C.
  - Color: corresponds to the color of the scale.

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8 - N2 INDICATION

- Displays N2 in RPM percentage.
- Digits:
  - Ranges from 0 to 120% RPM with a resolution of 0.1%.
  - Colors:

    A1P engines:
    - green from 0 to 102.4%.
    - red line at 102.5%.

    A1E engines with FADEC B7.6 and before:
    - green from 0 to 103.8%.
    - red line at 103.9%.

    A1E/A2 engines with FADEC B8 and on:
    - green from 0 to 105%.
    - red line at 105.1%.

9 - FUEL FLOW INDICATION

- Ranges from 0 to 2020 KPH (or 4450 PPH) for A1P and A1E engine or 2090 KPH (or 4600 PPH) for A2 engines with a resolution of 10 KPH (or 10 PPH).
- Color: green.

10 - LOW-PRESSURE AND HIGH-PRESSURE TURBINE VIBRATION INDICATION

- Ranges from 0 to 2.5 inches per second (IPS).
- Low-pressure scale and pointer colors:
  - green from 0 to 1.8 IPS.
  - amber above 1.8 IPS.
- High-pressure scale and pointer colors:
  - green from 0 to 1.1 IPS.
  - amber above 1.1 IPS.

11 - OIL TEMPERATURE INDICATION

- Ranges from 0 to 180°C with a resolution of 1°C.
- Scale, pointer, and digit colors:
  - amber below 21°C.
  - green from 21 to 126°C.
  - red above 126°C.

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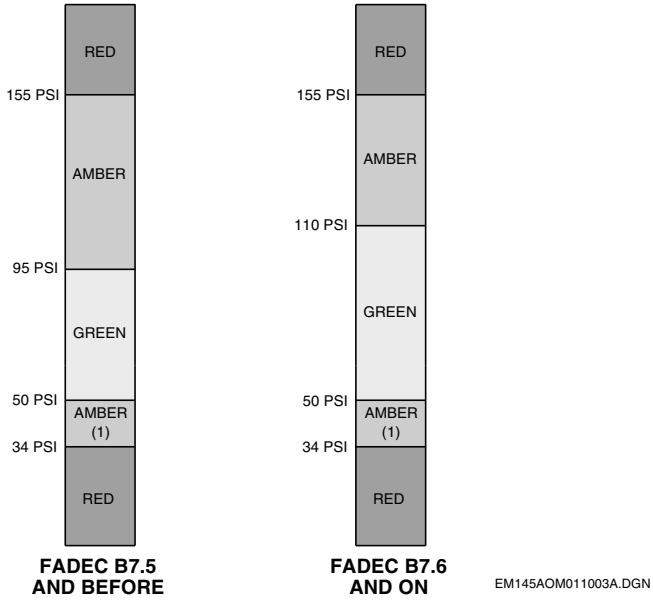
12 - OIL PRESSURE INDICATION

– Scale, pointer, and digit colors depend on the FADEC version as shown below:



(1) For N2 < 88% the amber band between 34 psi and 50 psi does not exist, and the green band lower limit is 34 psi.

13 - N1 REQUEST BUG

– Indicates N1 requested by the Thrust Lever position.
– Indicated by a green filled triangle.
– Ranges from 0 to 100% RPM for A1P and A1E engines.
– Ranges from 0 to 97.7% RPM for A2 engines.
– Indication is removed from the display for request values greater than 100% for A1P and A1E engines (97.7% for A2 engines) or less than 0%.

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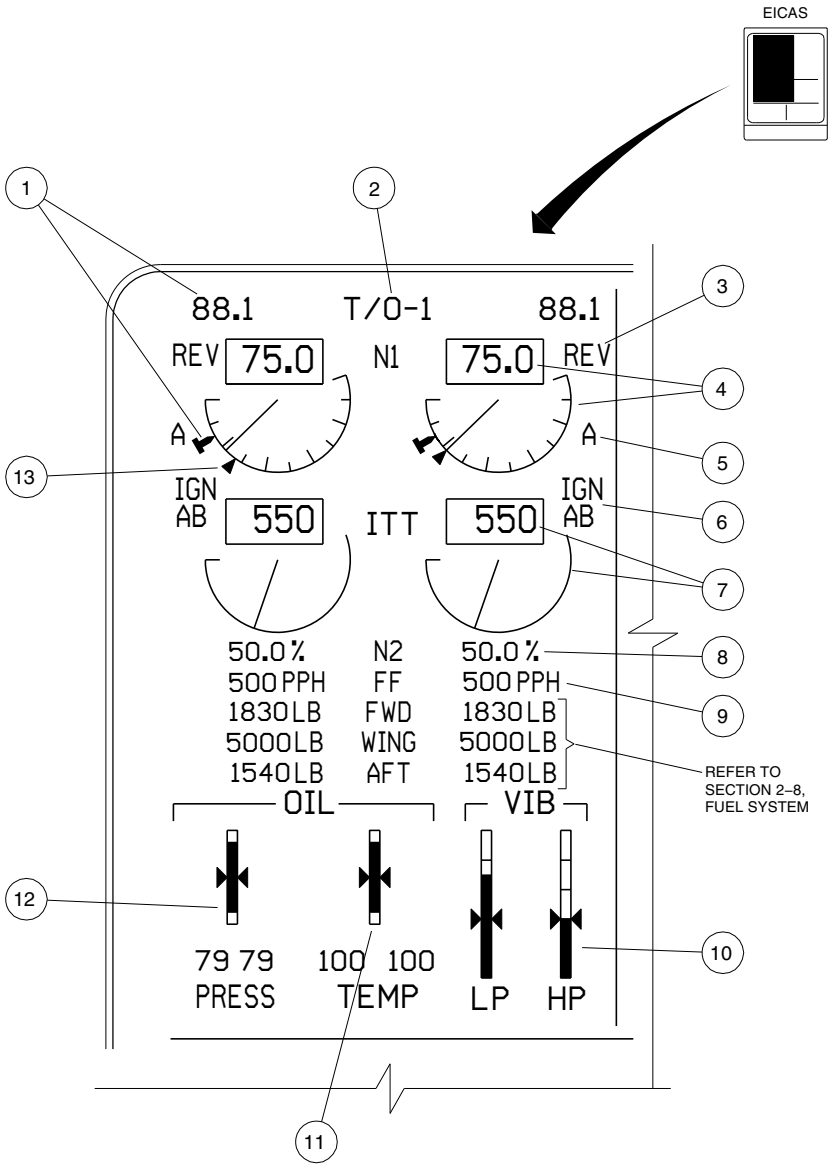

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ENGINE INDICATION ON EICAS

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TAKEOFF PAGE ON MFD

1 - TAKEOFF MODE INDICATION

- Indicates Takeoff Mode as selected through the Takeoff Data Set Control.
- Label: T/O or ALT T/O-1 (A1P engine).
  E T/O, T/O or ALT T/O-1 (A1E engine).
  A2 TO, T/O or ALT T/O-1 (A2 engine).
- In flight, the indication is removed from the display.

2 - REFERENCE TAKEOFF TEMPERATURE INDICATION

- Indicates reference takeoff temperature as adjusted through the takeoff data set control.
- In flight, the indication is removed from the display.

3 - REFERENCE ANTI-ICE STATUS INDICATION

- Indicates reference anti-ice status as selected through the takeoff data set control.
- Labels: ON or OFF.
- In flight, the indication is removed from the display.

4 - OIL LEVEL INDICATION

- Ranges from 0 to 13 US Quarts for left engine and from 0 to 14 US Quarts for right engine with a resolution of 1 US Quart.
- Digits:
  - green from 6 to 14 US Quarts.
  - amber below 6 US Quarts.

NOTE: The right engine is capable of measuring a higher oil level due to sensor position.

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MENU
PREVIOUS
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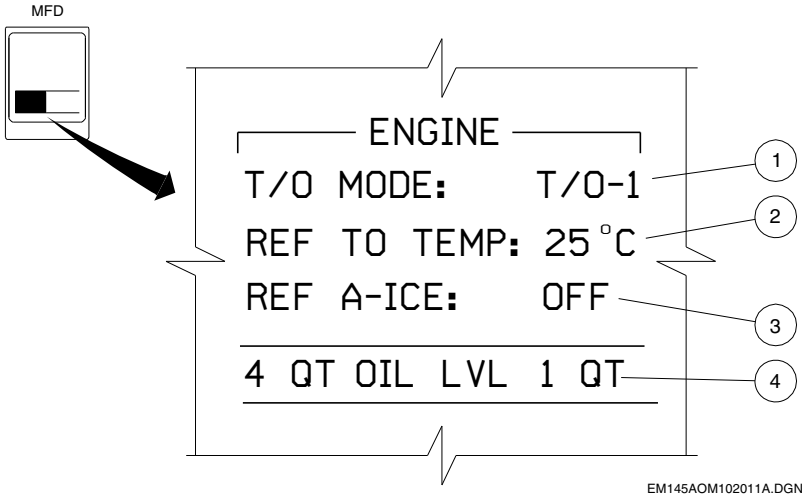

TAKEOFF PAGE ON MFD

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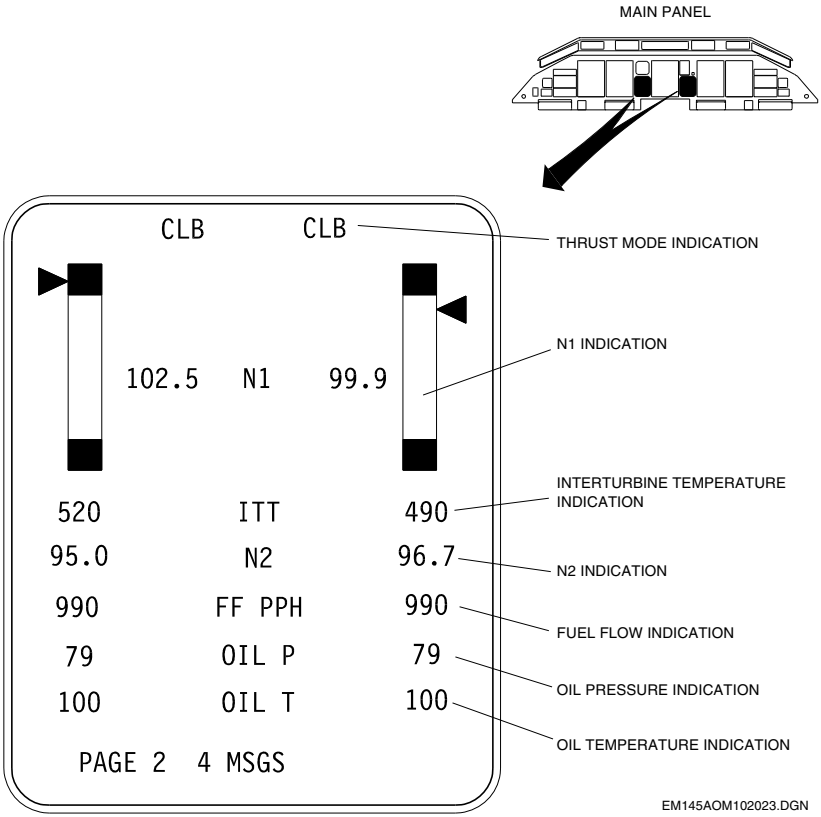
FIRST ENGINE BACKUP PAGE ON RMU

- Contains thrust modes, N1, ITT, N2, Fuel Flow, Oil Pressure and Oil Temperature indications.
- Only the N1 indication contains analog and digital indication. The other indications are in digital format.
- Label and legend color: white.
- Data color limits: same as the EICAS display.



FIRST ENGINE BACKUP PAGE ON RMU

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THRUST REVERSER

GENERAL

Each engine is equipped with thrust reverser.

The thrust reverser is for ground operation only, and its function is to direct engine exhaust gases forward and outwards to produce deceleration of the airplane.

The thrust reverser system consists of an electric control/indication, an hydro-mechanical actuation system, and two pivoting doors.

When stowed, the thrust reverser is part of the exhaust nozzle.

LOCK PROTECTION

The system incorporates three locking systems to avoid inadvertent in-flight deployment. The actuators and doors are mechanically locked in the stowed position through the primary and secondary locks. In case the primary and secondary reverser locks fail, the tertiary lock prevents the door from deploying. In the stowed position, the doors are held by the primary lock only, with the secondary and tertiary locks remaining unloaded. The primary and secondary locks are electrically commanded/controlled and hydraulically powered to unlock. The tertiary lock is electrically commanded/controlled and electrically powered to unlock, thus providing a separate and fully independent locking system.

OPERATION

The thrust reverser is commanded by the backward movement of the Thrust Lever. Upon selection, the mechanical locks are removed and hydraulic pressure is applied to deploy the thrust reverser doors. In reverser mode, the doors rotate about a fixed axis. Rotation of the doors is controlled by extension and retraction of the hydraulic door actuators.

After pivoting, the rearmost part of the doors blocks the normal nacelle discharge path and directs the flow through the aperture created by its rotation.

The loss of electrical and/or hydraulic power does not result in inadvertent deployment.

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OPERATION LOGIC

Each FADEC will command Maximum Reverse thrust on ground only, when the associated thrust reverser is deployed and associated thrust lever is requesting reverse thrust whenever either of the following conditions are met:

- Airplane on the ground indication from both main landing gears, and main landing gear wheels running above 25 kt, or
- Airplane on the ground indication from both main landing gears and from nose landing gear.

During landing, when the Thrust Levers are set to below IDLE, the FADEC commands reverse thrust only after the Thrust Reverser doors (both engines) are completely deployed. If the Thrust Lever is requesting forward thrust, the FADEC will command IDLE thrust if the associated engine thrust reverser indicates that there is a “not stowed” or a “deployed” condition.

If one engine is inoperative or one thrust reverser is not deployed, the FADEC of the operative side will only command Reverse Thrust if the associated Thrust Lever is requesting reverse thrust and the Thrust Lever of the affected side is set to IDLE. Such a feature is provided to avoid uncommanded thrust asymmetry.

EICAS INDICATION

An indication of right and left thrust reversers deployed is presented on the EICAS. If a failure or a disagreement is detected, a caution message is presented on the EICAS.

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THRUST REVERSER INTERLOCK

The FADECs interface with the thrust reverser system of the corresponding engine.

Each FADEC receives two pieces of information from the thrust reverser system:

– Stowed: If all doors of the corresponding engine are stowed.
– Deployed: If all doors of the corresponding engine are deployed.

For flight operation there is also a flat between IDLE and MAX REVERSE position. The FADEC enables reverse thrust depending on the position of the reverser doors and on the position of the engine thrust lever, and reduces the engine thrust to IDLE, if there is an indication of an inadvertent thrust reverser deployment in flight, which normally is not possible due to the Flight Idle electrical stop.

EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	ENG1 (2) REV FAIL	-Thrust reverser doors not stowed and in transit with Thrust Levers set at or above IDLE, or -Thrust Levers set below IDLE in flight.
	ENG1 (2) REV DISAGREE	-At least one thrust reverser door not fully open, or -Thrust reverser system not isolated from hydraulic system (Thrust Lever set at or above IDLE), or -Door locking or position switch signal failure with Thrust Levers set at or above IDLE (ground only).
ADVISORY	E1 (2) IDL STP FAIL	Idle stop has failed.

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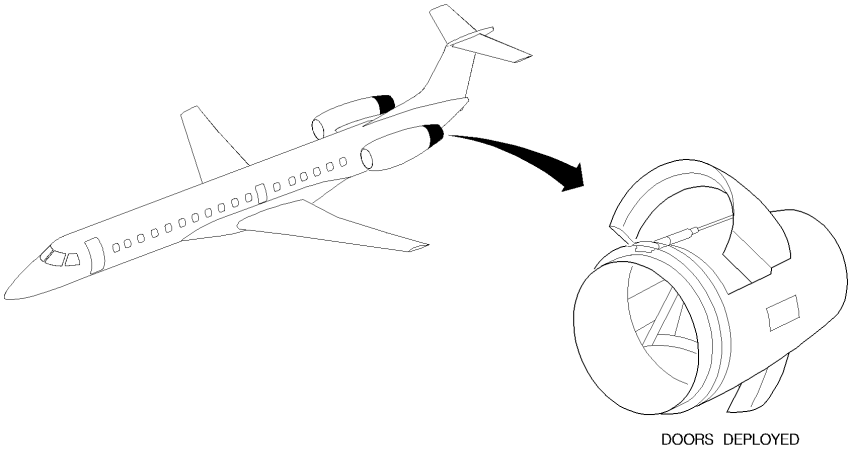

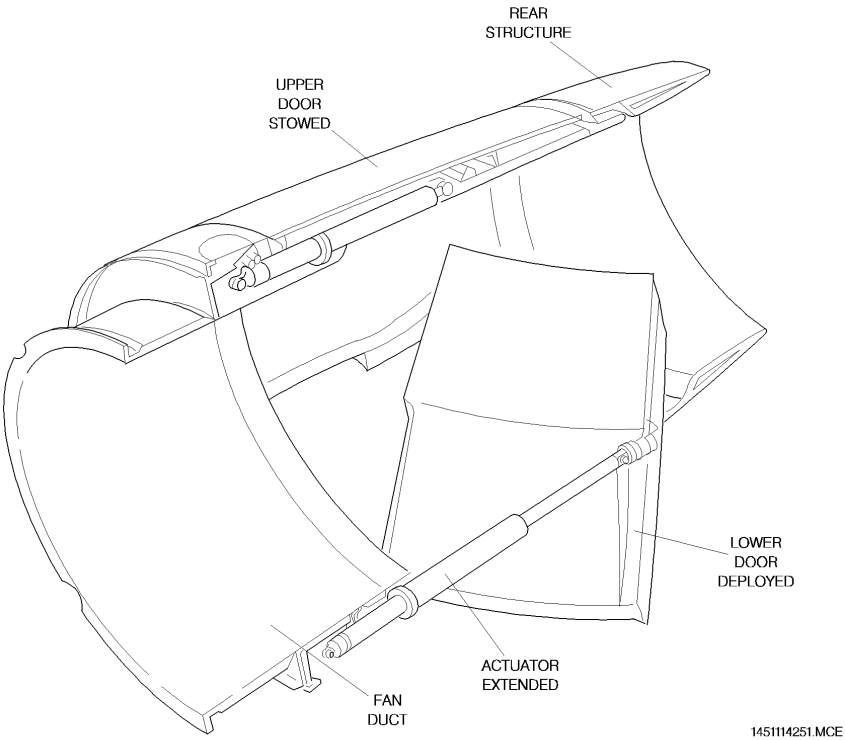

THRUST REVERSER

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SECTION 2-11

HYDRAULIC

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GENERAL

The airplane is equipped with two independent hydraulic systems, each powered by one engine driven-pump and one electric motor-driven pump. Both hydraulic systems are identical, except for the services each system provides and a priority valve installed in the hydraulic system 1.

There are ground connections for refilling and ground tests purposes.

Indications of hydraulic system parameters are provided on the MFD and EICAS displays.

The services provided by each hydraulic system are presented below:

SYSTEM	HYDRAULIC POWER SUPPLY
Ailerons	SYSTEM 1 and 2
Rudder	SYSTEM 1 and 2
Landing Gear	SYSTEM 1
Main door	SYSTEM 1
Steering	SYSTEM 1
Brakes (Outboard Wheels)	SYSTEM 1
Brakes (Inboard Wheels)	SYSTEM 2
Emergency/Parking Brake	SYSTEM 2
Thrust Reverser 1	SYSTEM 1
Thrust Reverser 2	SYSTEM 2
Outboard Spoilers	SYSTEM 2
Inboard Spoilers	SYSTEM 1

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SYSTEM DESCRIPTION

Each hydraulic system consists of a hydraulic fluid reservoir, a manifold, one engine-driven pump, one electric motor-driven pump, one shutoff valve, one accumulator and a priority valve installed in the hydraulic system 1.

RESERVOIR

The hydraulic fluid stored in the reservoir is pressurized, to avoid pump cavitation. This pressurization function is performed by fluid drained from the pressure line. The reservoir is equipped with a quantity indicator which transmits information to the MFD and EICAS displays for indication and warning purposes. A thermal switch is responsible for the high temperature message, if the fluid temperature increases above 90°C.

SHUTOFF VALVE

A shutoff valve is installed between the reservoir and the engine-driven pump. It cuts the hydraulic fluid supply to the engine-driven pump, if there is a fire on the related engine or in case of hydraulic fluid overheat. This valve may be closed either through the engine fire extinguishing handle or through a dedicated button on the overhead panel.

ENGINE-DRIVEN PUMP

The engine-driven pump provides continuous fluid flow at 3000 psi for operation of the various airplane hydraulically-powered systems. The pump is connected to the engine accessory gearbox and, as long as engine is running, it generates hydraulic pressure. During engine start, the fluid remaining in the suction line is sufficient to avoid pump cavitation and provide reservoir pressurization.

ELECTRIC MOTOR-DRIVEN PUMP

The electric motor-driven pump has the same connections as the engine-driven pump, but has a lower flow capacity. The pump normally operates in the automatic setting mode, turning on when the associated hydraulic pressure drops below 1600 psi or the associated engine N2 drops below 56.4%.

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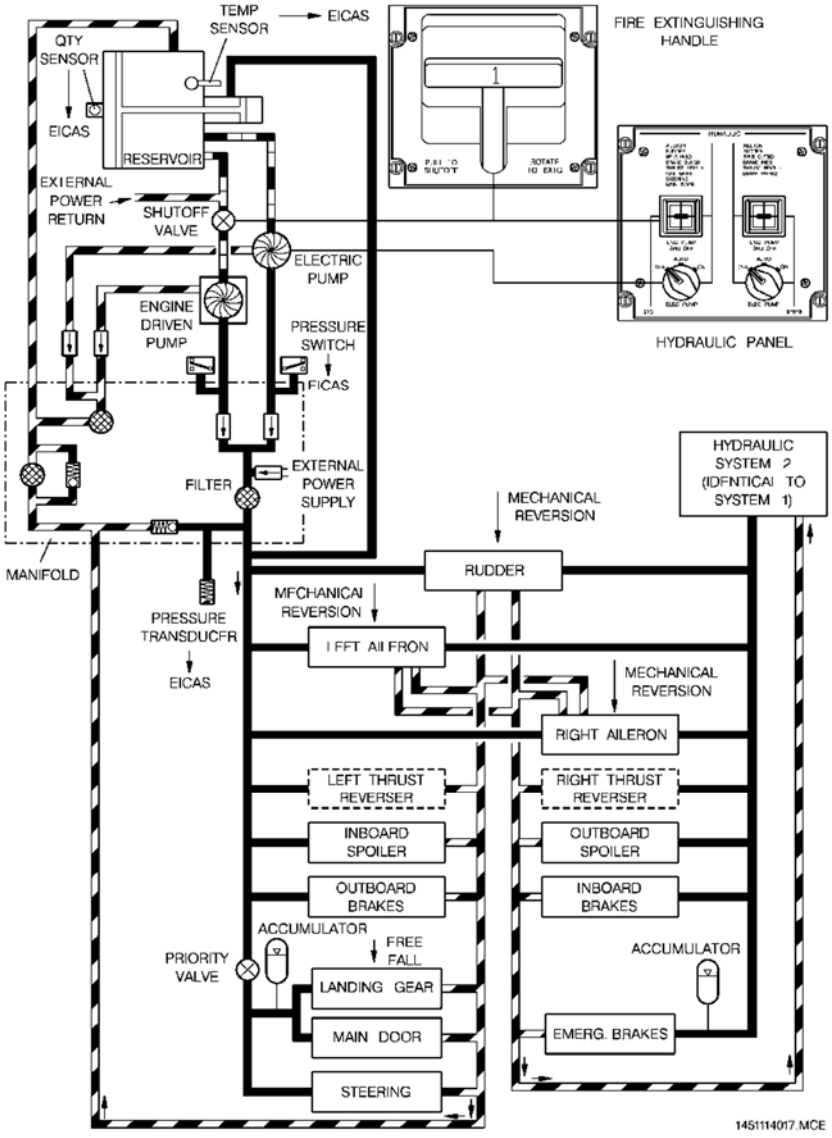

HYDRAULIC SYSTEM SCHEMATIC

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If the pump starts operating in the automatic mode, it will be turned off after the pressure or N2 are reestablished to normal values. The electric pump may be turned on at pilot command, through the selector knob on the overhead panel, furnishing continuous fluid flow at 2900 psi.

MANIFOLD

The manifold provides the following functions:

– Fluid filtering (pressure and return lines).
– Overpressure relief (main and electrical pumps).
– Pressure indications (main and electrical pumps).

Fluid leaving the pump flows to the manifold, where it is filtered and then routed to the airplane systems. Inside the manifold, a check valve prevents the fluid from returning to the pump, while a relief valve diverts the excess fluid to the return line. The return line is supplied by the fluid coming from the airplane systems, fluid drained from the pump, fluid from the relief valve, and fluid refilled by the maintenance personnel. Under any situation the fluid is filtered and returned to the reservoir. The manifold incorporates two pressure switches to detect low hydraulic pressure, and a pressure transducer to indicate system pressure. Signals from the pressure switches and pressure transducer are sent to the MFD and EICAS displays.

PRIORITY VALVE

The hydraulic system 1 incorporates a priority valve. If the system is powered by the electric motor-driven pump and the landing gear is commanded to retract, the valve will provide minimum flow to the landing gear system and give priority to the flight control services. In this case, the landing gear will operate through the accumulator pressure.

ACCUMULATOR

Each hydraulic system has one accumulator. The function of the accumulator is to keep the surges of the hydraulic pumps at a minimum, and to keep a 3000 psi pressure available for operation of the landing gear and main door (system 1) or operation of the emergency parking brake (system 2).

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	HYD SYS 1 (2) FAIL	Associated hydraulic system is not pressurized (inhibited when the airplane is on the ground, engine is shut down and parking brake is applied).
	HYD SYS 1 (2) OVHT	Associated hydraulic system fluid temperature is above 90°C.
ADVISORY	E1 (2) HYD PUMP FAIL	Engine-driven pump is not generating pressure with associated engine running.
	E1 (2) HYDSOV CLSD	Associated hydraulic shutoff valve is closed.
	HYD1 (2) LO QTY	Fluid level in the associated reservoir is below one liter. Report to the maintenance personnel if the hydraulic reservoir operates empty.
	HYD PUMP SELEC OFF	Associated electric pump selected OFF with the parking brake released.

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CONTROLS AND INDICATORS

HYDRAULIC SYSTEM PANEL

1 – ENG PUMP SHUTOFF BUTTONS (GUARDED)

- Closes (pressed) or opens (released) the associated engine pump shutoff valve.
- A striped bar illuminates in the button to indicate that it is pressed.

2 – ELEC HYD PUMP KNOBS

OFF – Associated pump is turned off.

AUTO – Associated pump is kept in standby mode, ready to operate if the engine-driven pump outlet pressure drops below 1600 psi or the associated engine N2 drops below 56.4%.

ON – Associated pump is turned on.

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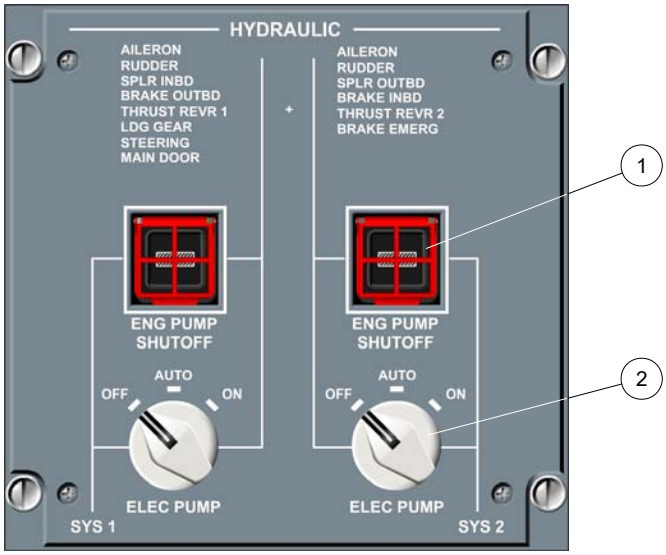
OVERHEAD PANEL



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NOTE: For airplanes not equipped with Thrust Reverser, the THRUST RVR 1 and THRUST REVR 2 inscriptions are not presented on the Hydraulic System Panel.

HYDRAULIC SYSTEM PANEL

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HYDRAULIC PAGE ON MFD

1 – FLUID QUANTITY INDICATION

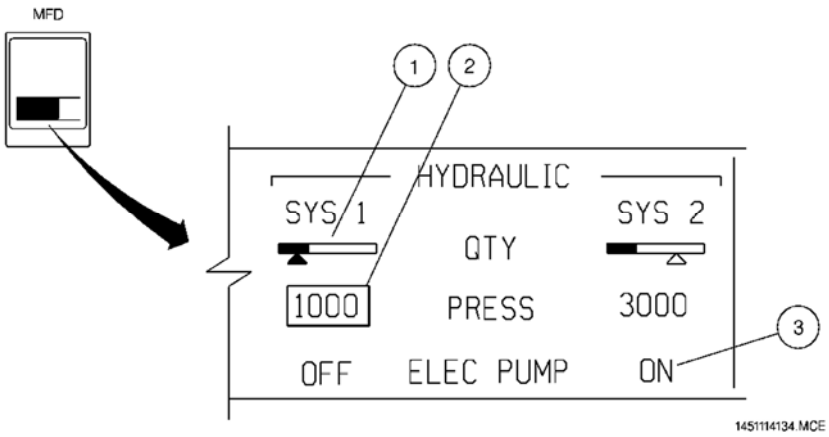
- Ranges from zero to maximum hydraulic fluid quantity.
- Scale (horizontal line) and pointer:
  - green when greater than 1 liter.
  - amber when equal to or less than 1 liter.
- Pointer disappears if data is invalid.

2 – PRESSURE INDICATION

- Ranges from 0 to 4000 psi, with a resolution of 100 psi.
- Digits:
  - green from 1300 to 3300 psi.
  - amber and boxed below 1300 and above 3300 psi.
- Digits are replaced by amber dashes if data is invalid.

3 – ELECTRIC PUMP STATUS

- Indicated by the green label ON or OFF.



HYDRAULIC PAGE ON MFD

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SECTION 2-12

LANDING GEAR AND BRAKES

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GENERAL

The EMB-135BJ landing gear incorporates braking and steering capabilities. The extension/retraction, steering and braking functions are hydraulically assisted, electronically controlled and electronically monitored. EICAS indications and messages alert crew to system status and failures. Each landing gear is equipped with alternate means of actuation in case of normal actuation system failure.

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AIR/GROUND INDICATION SYSTEM

Air/ground indication is determined by a system that detects landing gear shock absorber compression and relays information to the landing gear electronic unit for gear control. The system consists of five weight-on-wheel proximity switches. Two of them are installed on each main landing gear leg and one on the nose landing gear leg.

The Landing Gear Electronic Unit (LGEU) processes the main landing gear proximity switches' signals information in four independent channels and controls various equipment operations. Logic processing includes the position signal and its validity. If all proximity switch signals are valid, four signals are processed to assure that at least three signals indicate identical status for releasing the air/ground signal output.

Should one proximity switch signal be invalid, the logic will process the remaining three signals so that at least two indicate the same status. If a second proximity switch is invalid, the two remaining signals are processed only if both send the same signal. Disagreement between these two remaining proximity switches causes the Landing Gear Electronic Unit to de-energize the channels and provide a default output signal.

The nose landing gear proximity switch signal is sent only to the thrust reverser logic and steering control.

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LANDING GEAR OPERATION

Landing gear retraction and extension are powered by the hydraulic system 1. An accumulator prevents pressure fluctuations and assists gear retraction after takeoff. The main landing gear legs retract inboard, while the nose landing gear retracts forward. Each main gear leg is mechanically linked to its respective door, which remains open when the gear is down. The doors close automatically when the main landing gear is retracted. The nose landing gear doors are hydraulically actuated and operate in sequence with the nose gear.

Gear retraction and extension are electrically commanded. If normal extension fails, the landing gear can be extended through an electrical override system. If the electrical override is not available, a free-fall system allows gear extension. Gear position is indicated on the EICAS display.

LANDING GEAR RETRACTION

Landing gear retraction is commanded through the Landing Gear Lever, installed on the main panel. Positioning the lever to the UP position signals the LGEU to command the Nose Gear Door Solenoid Valve and the Landing Gear Electrovalve. This allows pressure from the hydraulic system 1 to simultaneously reach landing gear and down unlock actuators. All gear legs are then retracted into their respective wheel wells.

The LGEU logic only allows the nose gear doors to close after the nose landing gear is locked in the UP position. When the uplock boxes are actuated, the proximity switches signal the LGEU that the gear is up and locked and that the Landing Gear Electrovalve may be deenergized. Nose landing gear door actuators are kept pressurized, but the gear actuator lines are connected to the return.

To preclude an inadvertent retraction command while on the ground, the air/ground system provides a signal to a solenoid inside the Landing Gear Lever. This locks the lever and prevents movement towards the UP position. For emergency purposes only, a lock release button is provided beside the lever, allowing this protection to be overriden.

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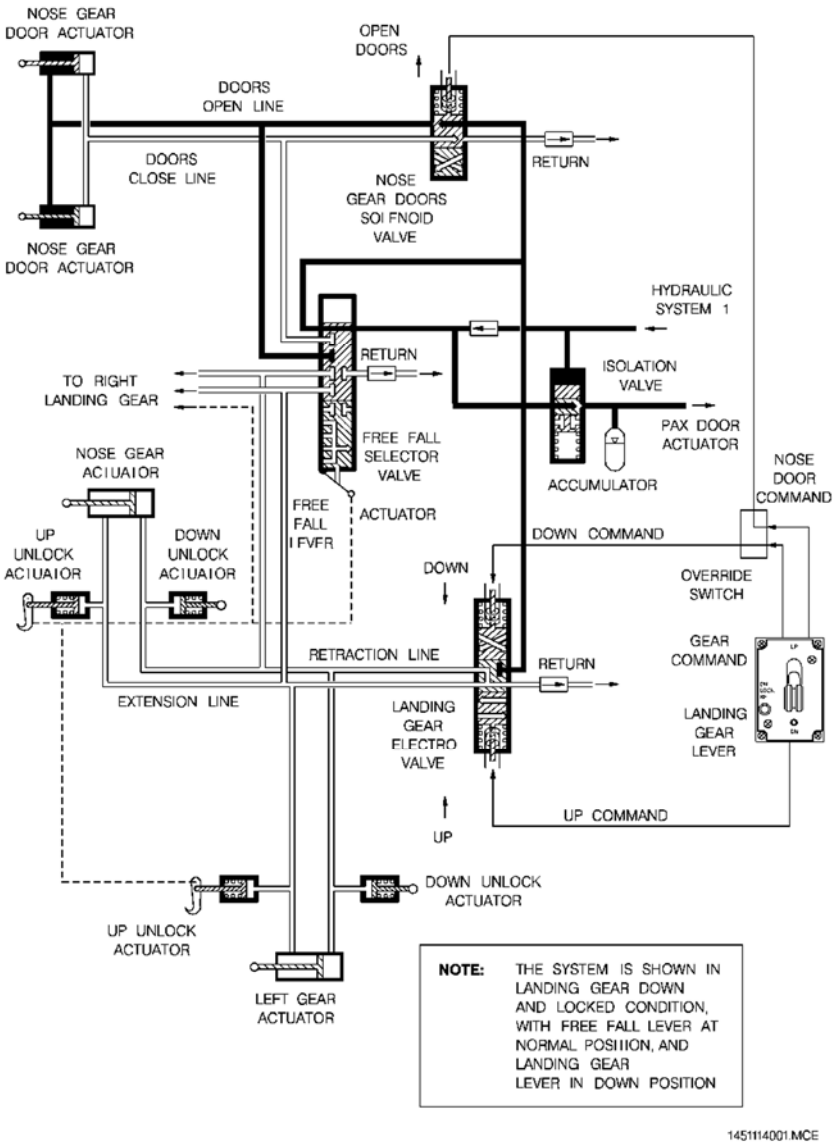

LANDING GEAR SCHEMATIC

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LANDING GEAR EXTENSION

NORMAL EXTENSION

Positioning the Landing Gear Lever to the DOWN position signals the LGEU to command the Landing Gear Electrovalve and the Nose Gear Doors Solenoid Valve. This allow pressure from the hydraulic system 1 to simultaneously reach the landing gear and door actuators, and also the up unlock actuators.

When the gear legs reach the down position, the down lock boxes are actuated. The proximity switches signal the LGEU that the gear is down and locked and that the Landing Gear Electrovalve may be de-energized.

ELECTRICAL OVERRIDE EXTENSION

The Electrical Override system is used to extend the landing should there occur a normal landing gear extension failure. This system bypasses the LGEU and actuates directly the Landing Gear Electrovalve and the Nose Gear Doors Solenoid Valve. The control switch is installed inside the free-fall lever compartment, on the floor, beside the copilot's seat. Extension through override is made in steps, first opening the doors and then extending the gear. When extension is completed, selecting the override switch to normal position deenergizes the Landing Gear Electrovalve and depressurizes all lines. The switch is safeguarded, being in the non-actuated position whenever the compartment door is closed.

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FREE-FALL EXTENSION

Free-Fall extension is available in case of failure of both normal extension and electrical override extension. Actuation of free-fall landing gear extension is performed by pulling up the lever installed inside the free-fall lever compartment, on the floor, beside the copilot's seat.

This mechanically actuates the Free-Fall Selector Valve and unlocks the three landing gear legs uplocks. The Free-Fall Selector Valve isolates the hydraulic system pressure and connects the landing gear system hydraulic lines to the return. With the system unpressurized and the uplocks deactivated, all gear legs fall by gravity until they reach their downlock devices. If one main gear does not lock down, increase the aerodynamic drag by side slipping the airplane to help lock the affected leg.

Once actuated, the free-fall lever remains locked in the vertical position until mechanically released.

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LANDING GEAR WARNING

A LANDING GEAR voice message is provided to alert pilots any time the airplane is in a landing configuration and the gear legs are not locked down. The warning may be activated under one of three conditions:

1. Radio Altitude below 1200 ft, Flap Selector Lever set below 22°, one thrust lever set below 59° and the other thrust lever set below 45° (or the associated engine inoperative).

   NOTE: In case of Radio Altimeter loss, the message may be activated at any altitude, but may be canceled through the Landing Gear Warning Cutout Button.

2. Radio Altitude below 1200 ft, Flap Selector Lever between 22° and 45°, one thrust lever set below 59° and the other thrust lever set below 45° (or the associated engine inoperative).

   NOTE: - The Voice message cannot be canceled.

   - In case of Radio Altimeter loss, the message may be activated at any altitude.

3. Flap Selector Lever set at 45°.

   NOTE: The Voice message cannot be canceled.

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	LG/LEVER DISAGREE	After 20 seconds of gear command, at least one landing gear is not in the selected position.
CAUTION	LG AIR/GND FAIL	LGEU failure or failure of two weight-on-wheel proximity switches.
	NLG UP/DOOR OPN (if applicable)	Nose LG is locked up and nose LG door is open.

CONTROLS AND INDICATORS

LANDING GEAR CONTROL BOX

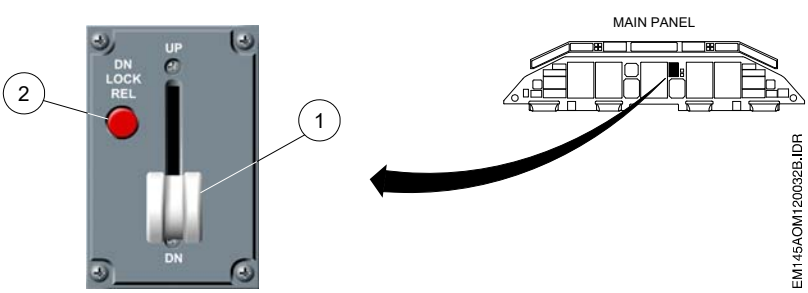
1 – LANDING GEAR LEVER

UP – Selects landing gear retraction.

DOWN – Selects landing gear extension.

2 – DN LOCK REL BUTTON

– Mechanically releases the lever lock, allowing the landing gear lever to be moved to the UP position when on the ground or in case it cannot be moved to the UP position after takeoff.



LANDING GEAR CONTROL BOX

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FREE-FALL LEVER COMPARTMENT

1 – FREE-FALL LEVER

- When pulled up, depressurizes the landing gear hydraulic line and releases all gear uplocks.
- The lever is kept at the actuated position by a mechanical lock.

2 – FREE-FALL LEVER UNLOCK BUTTON

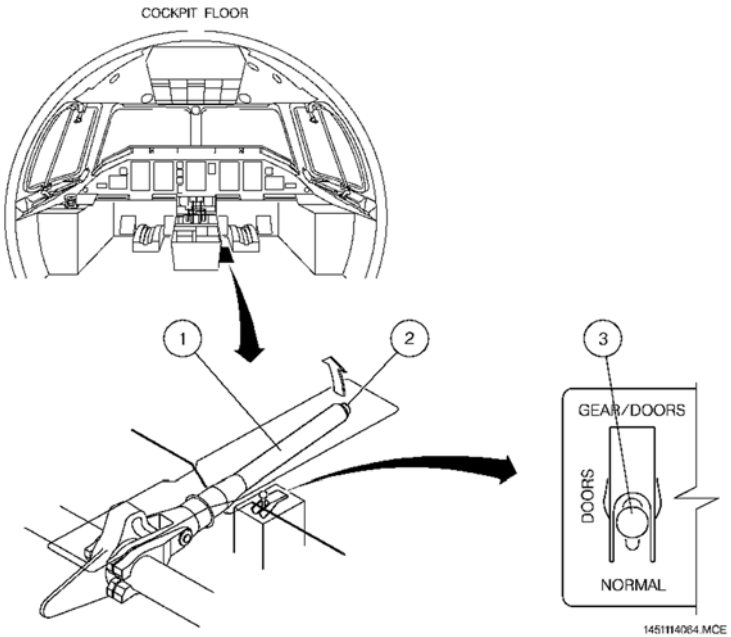
- When pressed, unlocks the free-fall lever, allowing it to be returned to the normal position, thus restoring the hydraulic operation of the landing gear.

3 – ELECTRICAL OVERRIDE SWITCH (GUARDED)

NORMAL – Landing gear retraction and extension are automatically performed and controlled by the Landing Gear Electronic Unit.

DOORS – Opens the nose landing gear doors.

GEAR/DOORS – Extends the landing gear.



FREE-FALL LEVER COMPARTMENT

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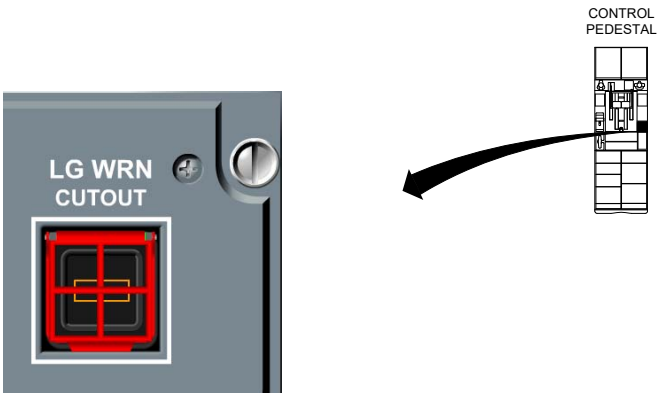
LG WRN CUTOUT BUTTON (GUARDED)

– When pressed, this button cancels the landing gear warning voice message if the Radio Altimeter is inoperative.
– An amber indication bar illuminates inside the button and remains illuminated to indicate that a cancel action was performed.
– The amber indication bar extinguishes if the Thrust Levers are advanced or Flap Selector Lever is set above 22° or landing gear is down and locked.



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NOTE: THE LANDING GEAR WARNING CUTOUT BUTTON MAY ALSO BE LOCATED ON THE MAIN PANEL.

LANDING GEAR WARNING CUTOUT BUTTON

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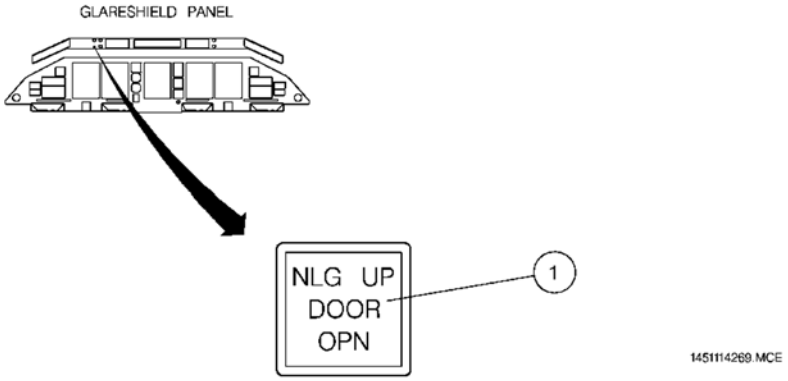
GLARESHIELD PANEL

1 – NOSE LANDING GEAR DOORS INDICATION LIGHT (IF INSTALLED)

– Illuminates to indicate that the nose landing gear is locked in the retracted position and at least one door is not closed.



GLARESHIELD PANEL

EICAS INDICATIONS

1 – LANDING GEAR POSITION

– Position is indicated by three boxes, one for each gear.

– Landing gear down and locked is indicated by a green DN label inside a green box.

– Landing gear in transit is indicated when the box is cross-hatched in amber and black.

– Landing gear up and locked is indicated by a white UP label inside a white box.

– Landing gear lever disagreement (landing gear is not in the selected position after 20 seconds) is indicated by a box cross-hatched in red and back or by a red label (UP or DN) inside a red box.

– Indication of landing gear downlocked is also presented on the RMU through the green LG DOWN LOCKED legend.

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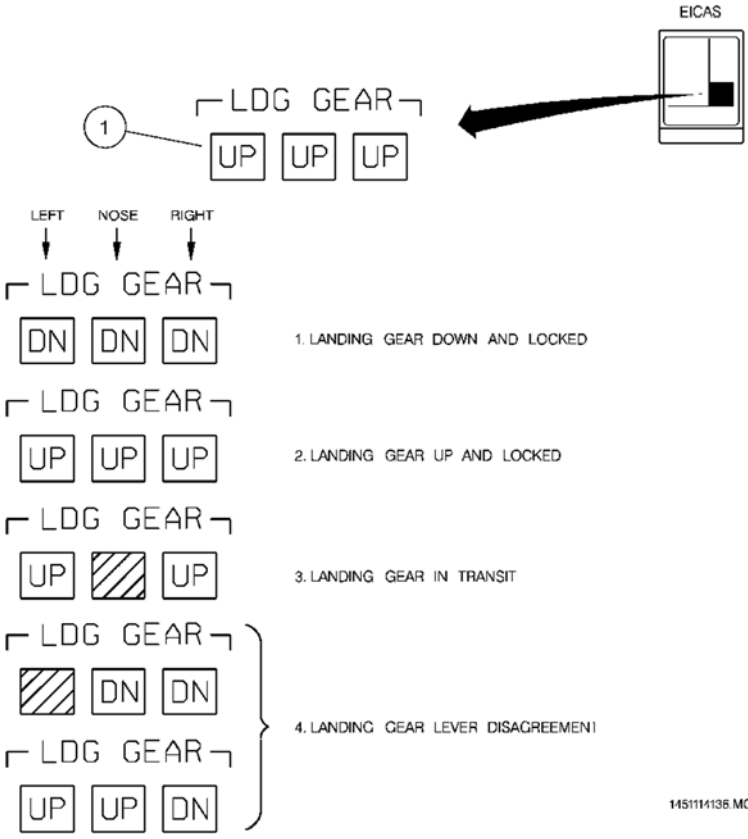

LANDING GEAR POSITION INDICATION ON EICAS

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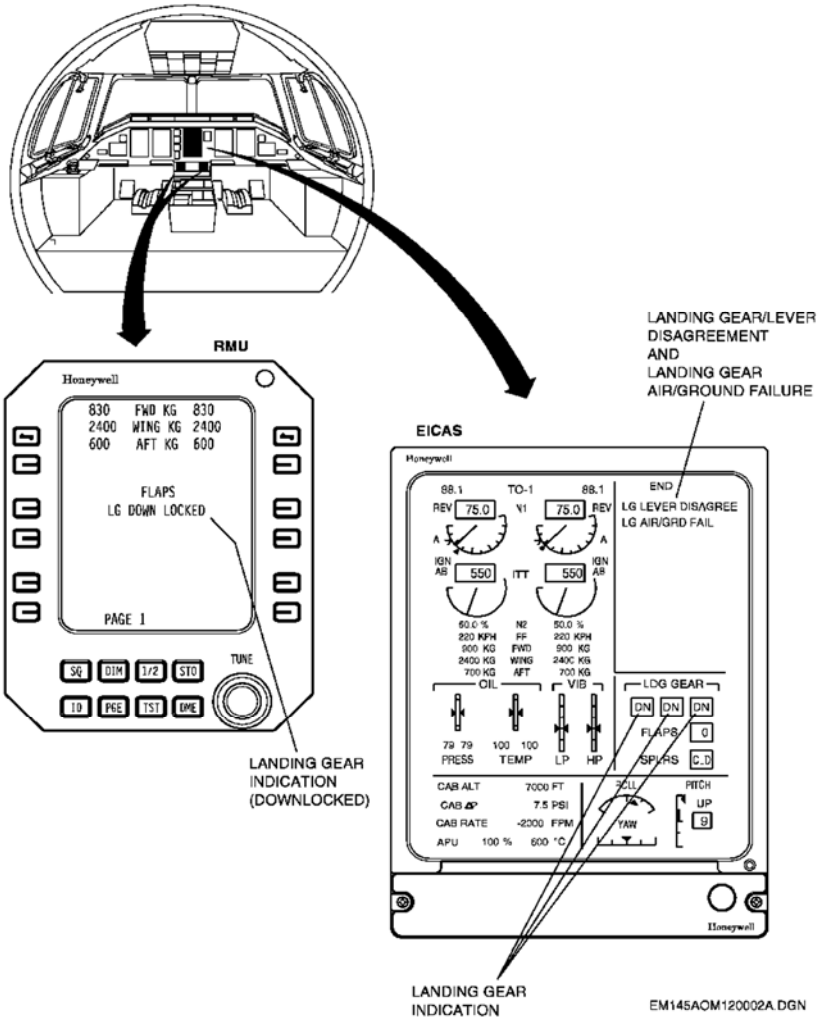

LANDING GEAR INDICATIONS

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BRAKE SYSTEM

The braking system consists of the normal brake system, emergency/parking brake system, and gear-retracting-in-flight braking.

The normal brake system is supplied by hydraulic systems 1 and 2. It is electronically commanded and monitored. The emergency/parking brake system is supplied only by hydraulic system 2 and is mechanically actuated. Normal braking is controlled by the pedals. Emergency braking is controlled by the emergency/parking brake handle. Gear-retracting-in-flight braking is controlled by both hydraulic systems and by a mechanical stop within the nose gear wheel well. This braking is electronically commanded and monitored.

Braking through the pedals incorporates some protections not available when using the emergency brake handle. Brake temperature is shown on the MFD Hydraulic Page.

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NORMAL BRAKE SYSTEM

Normal brake system is operated by rudder pedal inputs. The brakes are powered by two independent hydraulic systems. It is controlled and monitored by the Brake Control Unit (BCU). The BCU receives signals from the pedal position transducers and commands the four Brake Control Valves (BCV) to modulate required pressure to the wheel brakes. BCVs 1 and 4 control the hydraulic pressure from system 1 to the outboard wheels. BCVs 2 and 3 control the hydraulic pressure from system 2 to the inboard wheels.

Pressure and wheel speed transducers send signals to the BCU so that it can monitor brake performance and send the appropriate signals to the crew alerting system and other systems. The BCU also receives signals from the landing gear position and condition, air/ground situation, and hydraulic system status. The system displays messages on the EICAS to indicate a failure in one pair of brakes or a failure in a single wheel brake (brake degraded performance). In the event of brake system failure, the BCU will shut down the affected hydraulic system through the shutoff valves. The shutoff valves are energized whenever the landing gear is extended and de-energized after landing gear retraction.

Protective functions controlled by the normal braking system include anti-skid protection, locked wheel protection, and touch-down protection.

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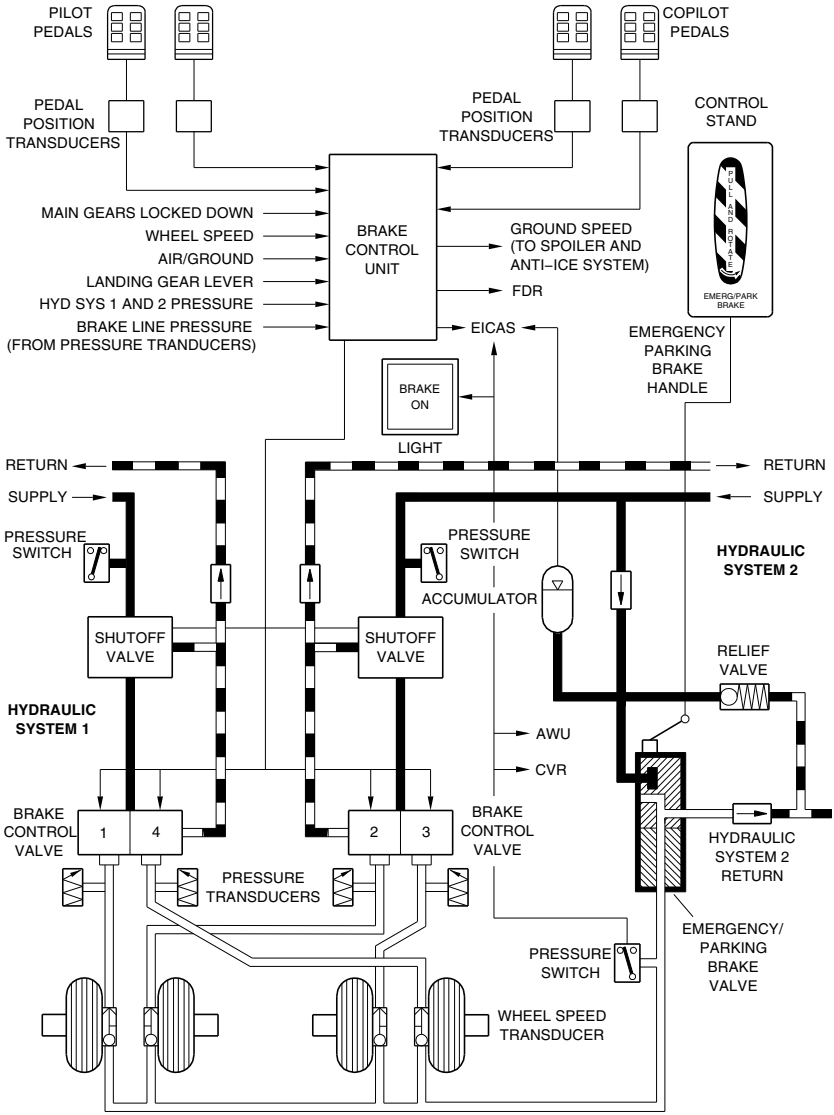

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BRAKE SYSTEM SCHEMATIC

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ANTI-SKID PROTECTION

The anti-skid protection controls the amount of hydraulic pressure applied by the pilots on the brakes. The anti-skid provides the maximum allowable braking effort for the runaway surface in use. It minimizes tire wear, optimizes braking distance, and prevents skidding.

To perform this function, the BCU computes the wheel speed signals from the four speed transducers. If one signals falls below the wheel speed average, a skid is probably occurring, and braking pressure is released on that side. After that wheel speed has returned to the average speed, normal braking operation is restored.

The anti-skid does not apply pressure on the brakes, but only relieves it. So, to perform a differential braking technique, the pilot should reduce pressure on the side opposite to the turn, instead of applying pressure to the desired side.

The anti-skid system incorporates the locked wheel protection and touchdown protection features.

LOCKED WHEEL PROTECTION

Locked wheel protection is activated for wheel speeds above 30 kt. It compares wheel speeds signals. If one wheel speed is 30% lower than that of another, a full brake pressure relief is commanded to the associated wheel, allowing wheel speed recovery. The 30% tolerance between the wheel speeds is provided to permit an amount of differential braking, for steering purposes.

For wheel speeds below 30 kt, the locked wheel protection is deactivated and the brake system actuates without the wheel speed comparator. For wheel speeds below 10 kt, the anti-skid protection is deactivated, allowing the pilot to lock and pivot on a wheel.

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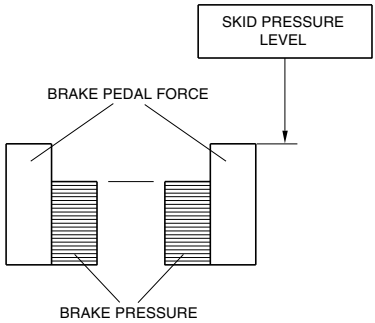
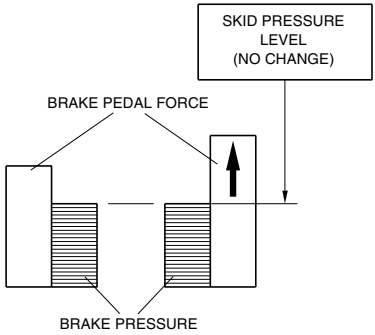
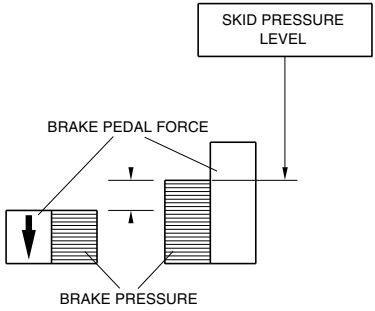
THE ANTI–SKID FUNCTION MODULATES THE BRAKE PRESSURE TO A LEVEL WHICH PREVENTS THE WHEELS FROM SKIDDING. IF ONE OF THE WHEELS LOCKS, THE ANTI–SKID FUNCTION REDUCES THE BRAKE PRESSURE OF THE ASSOCIATED PAIR, THUS ELIMINATING THE SKIDING.



IF THE PILOT APPLIES DIFFERENTIAL PEDAL FORCE TO STEER THE AIRPLANE THROUGH DIFFERENTIAL BRAKING, THE ANTI–SKID FUNCTION MAINTAINS THE SKID PRESSURE LEVEL, THUS PRECLUDIND THE AIRPLANE FROM TURNING.



THE CORRECT ACTION CONSISTS IN A REDUCTION OF THE OPPOSITE PEDAL FORCE TO A POINT BELOW THE SKID LEVEL, WHICH PERMITS THE REDUCTION OF THE CORRESPONDING BRAKE PRESSURE.



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DIFFERENTIAL BRAKING TECHNIQUE

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TOUCHDOWN PROTECTION

The touchdown protection system inhibits brake actuation before the main wheels spin up during landing. Brake actuation will be allowed only after 3 seconds from the latest touchdown or after the wheels have spun-up to 50 kt. In bouncing landings, the countdown is reset after each runway contact.

Touchdown protection is provided by the brake system receiving signals from main landing gear weight-on-wheel proximity switches. If one landing gear proximity switch fails at the air position, the brake system will operate normally. However, if both proximity switches fail at the air position, braking capacity will be available only for wheel speeds above 10 kt.

Below 10 kt, a loss of the main brake capacity will occur, but emergency braking is still available.

GEAR-RETRACTING-IN-FLIGHT BRAKING

Gear-retracting-in-flight braking prevents the landing gear from being retracted when the wheels are turning. This system computes signals from the air/ground indicating system and from the landing gear lever position. As soon as the airplane is airborne and the gears are commanded to retract, it applies braking pressure to the main wheels. The nose wheels are braked by a stop within the nose landing gear wheel well.

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EMERGENCY/PARKING BRAKE SYSTEM

The emergency/parking brake system is used when parking the airplane or when the normal braking system has failed. The emergency/parking brake system is mechanically commanded and hydraulically actuated. It is totally independent of the BCU, so it has none of the normal braking system protections.

The emergency/parking brake is controlled through a handle located on the left side of the control pedestal. This modulates the Emergency/Parking Brake Valve. When the Emergency/Parking Brake Valve is actuated, hydraulic pressure coming from a dedicated accumulator is equally applied to the four main landing gear brakes. Braking capacity is proportional to the handle displacement. A BRAKE ON indicating light illuminates to indicate that pressure is being applied to the wheel brakes. A locking device allows the handle to be held in the actuated position, for parking purposes.

The accumulator is supplied by hydraulic system 2. A caution message is displayed on the EICAS in case of accumulator hydraulic low pressure. After the message is displayed, if no leakage exists, at least one full emergency/parking brake application is available. If overpressure occurs due to overheating, a thermal relief valve allows hydraulic system communication with the return. A refilling connection is provided to allow pressurization of the accumulator.

The accumulator allows 6 complete emergency actuation or at least 24 hours of parking brake actuation.

NOTE: To prevent transfer of hydraulic fluid from one system to the other, normal braking should be applied and held while the parking brake is fully applied or released.

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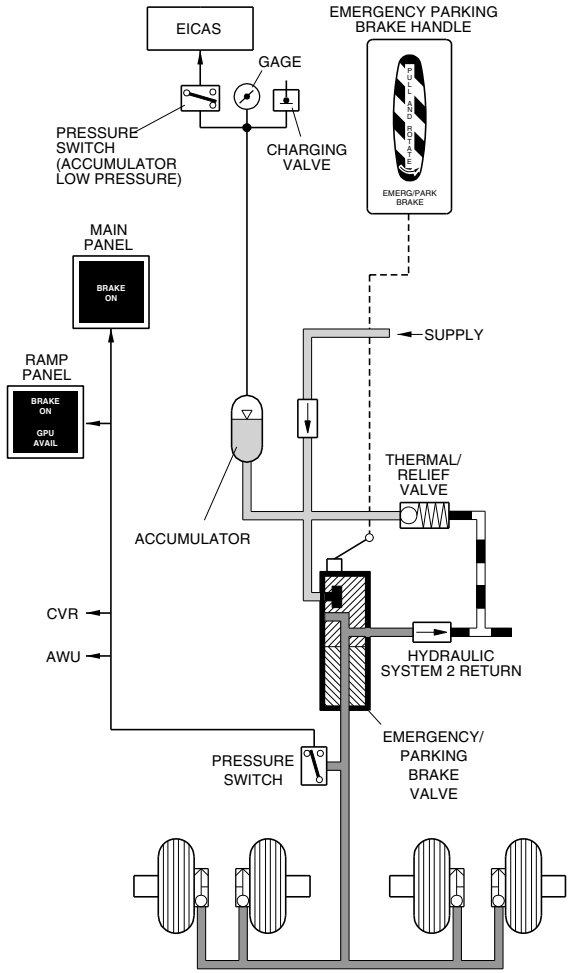

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EMERGENCY/PARKING BRAKE SYSTEM SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	BRAKE DEGRADED	Total or partial loss of braking capability of one outboard wheel (1 or 4) and/or one inboard wheel (2 or 3), or internal BCU failure.
	BRAKE OVERHEAT	Any brake temperature has exceeded 420°C. (*)
	BRK OUTBD (INBD) INOP	Outboard and/or inboard pair of brakes is inoperative.
	EMRG BRK LO PRES	Emergency/parking brake accumulator presents a low pressure condition.

NOTE: (*) For EMB-135BJ airplanes equipped with LR brakes, the brake overheat set point is 450°C.

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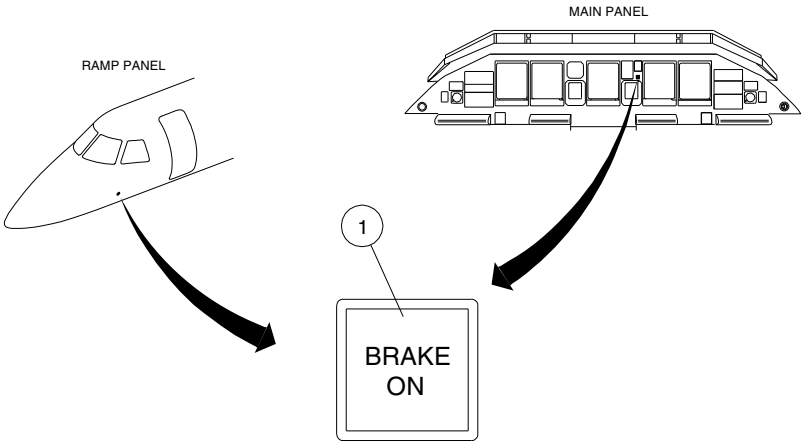
CONTROLS AND INDICATORS

MAIN PANEL/RAMP PANEL

1 - BRAKE ON LIGHT

– Illuminates when emergency/parking brake is applied.



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BRAKE ON LIGHT

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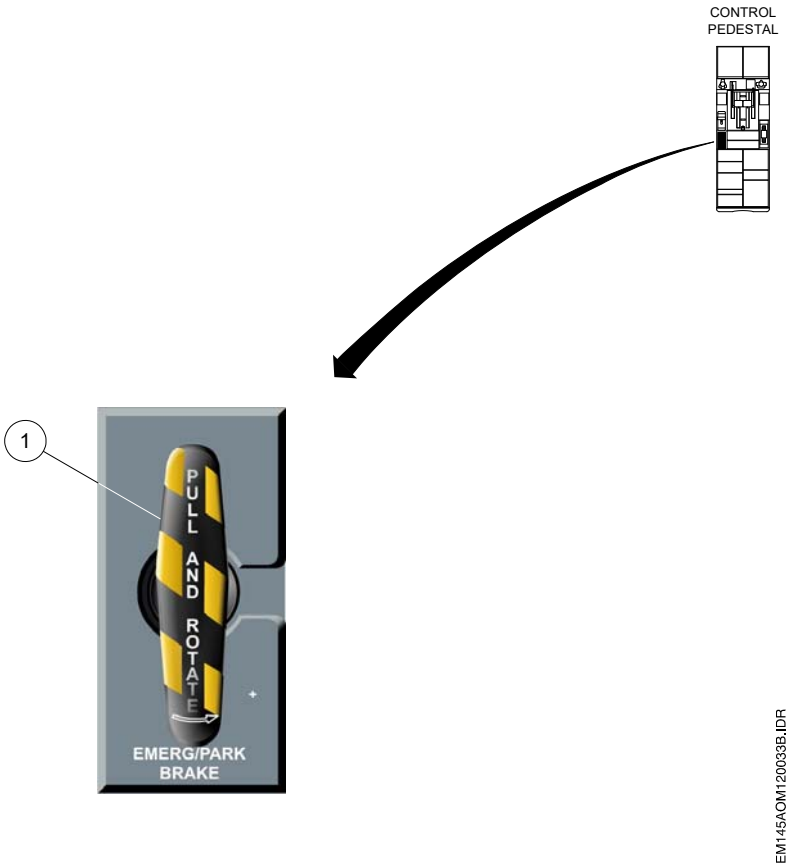
CONTROL PEDESTAL

1 – EMERG/PARK BRAKE HANDLE

- Actuates the emergency/parking brake valve.
- Pull the handle and rotate to lock in the fully-actuated position.



EMERG/PARK BRAKE HANDLE

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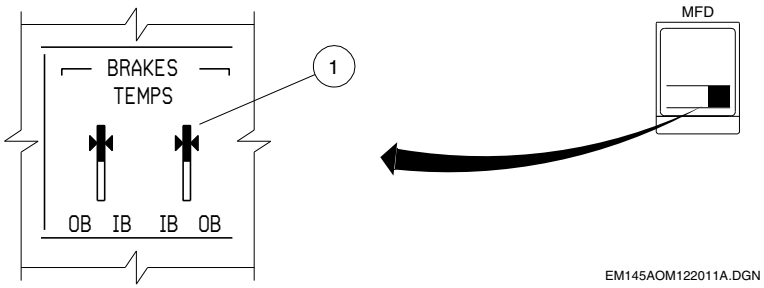
MFD INDICATIONS

1 – BRAKE TEMPERATURE INDICATION

- Temperature is indicated by two vertical bars (one for each main landing gear) and four pointers (one for each brake).
- The scale ranges from 0°C to 500°C.
- The scale and pointer are green when temperature is below 200°C, and amber when equal or greater than 200°C.
- The temperature indication pointer is removed from the display in case of loss of temperature sensor signal.

NOTE: For EMB-135BJ airplanes equipped with LR brakes, the scale and pointer are green when temperature is below 250°C, and amber when equal or greater than 250°C.



BRAKE TEMPERATURE INDICATION

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NOSE WHEEL STEERING SYSTEM

The nose wheel steering system is electronically controlled and hydraulically operated. It is powered by the hydraulic system 1. The Electronic Control Module is energized when the landing gear is down and locked, with the airplane on ground. In this condition, steering can be controlled by either the pedals or the steering handle. In either case, the commanded displacement is measured by a potentiometer box, which transmits the signal to the Electronic Control Module. The Electronic Control Module signals the hydraulic manifold to pressurize the steering actuator in the commanded direction. For monitoring purpose, a feedback potentiometer in the nose landing gear leg transmits nose wheel displacement information to the Electronic Control Module.

Maximum nose wheel displacement values due to actuation of the steering handle and pedals are presented in the table below in degrees:

CERTIFICATION	PEDALS ONLY	STEERING HANDLE ONLY	HANDLE AND PEDALS
ANAC/JAA/FAA	5°	71°	76°

NOTE: Steering handle actuation with nose wheels beyond their operational limits may cause damage to the nose wheel steering system.
Check if the nose wheel position indication mark is within the nose wheel position indication scale limits.

A position sensor set to 7° disengages the system if the nose wheel is rotated above this limit by using the rudder pedals. To reengage the system, resume command through the handle.

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The steering system may be manually disengaged through buttons located on the pilots' control wheels and allows free steer of the nose wheel. The STEER INOP message appears when the Steering Disengage Button is pressed. This is a system characteristic and not a malfunction. Automatic system disablement occurs as soon as the airplane is airborne. Nose wheel centering with the nose gear shock absorber extension is provided by a cam. The nose wheel is also centered by caster effect whenever the system is disengaged.

If the Electronic Control Module detects a failure, the EICAS is signaled to present a caution message. In these cases, for airplanes Post-Mod. SB 145LEG-32-0020 or with an equivalent modification factory incorporated, the tiller commands will be inhibited if ground speed is above 25 kt.

Optionally, some airplanes are equipped with an external Steering Disengagement Switch which allows ground personnel to disengage steering prior to towing operations. The switch actuates directly on the steering system, shutting its power down. The disengagement switch inhibits the steering actuation commanded by the steering handle and the rudder pedals. A caution message is displayed on the EICAS whenever the steering system is disengaged by the external switch. Steering Disengagement Switch is installed in an compartment on the left front fuselage.

EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	STEER INOP	Steering system is inoperative. Message is presented only on ground.

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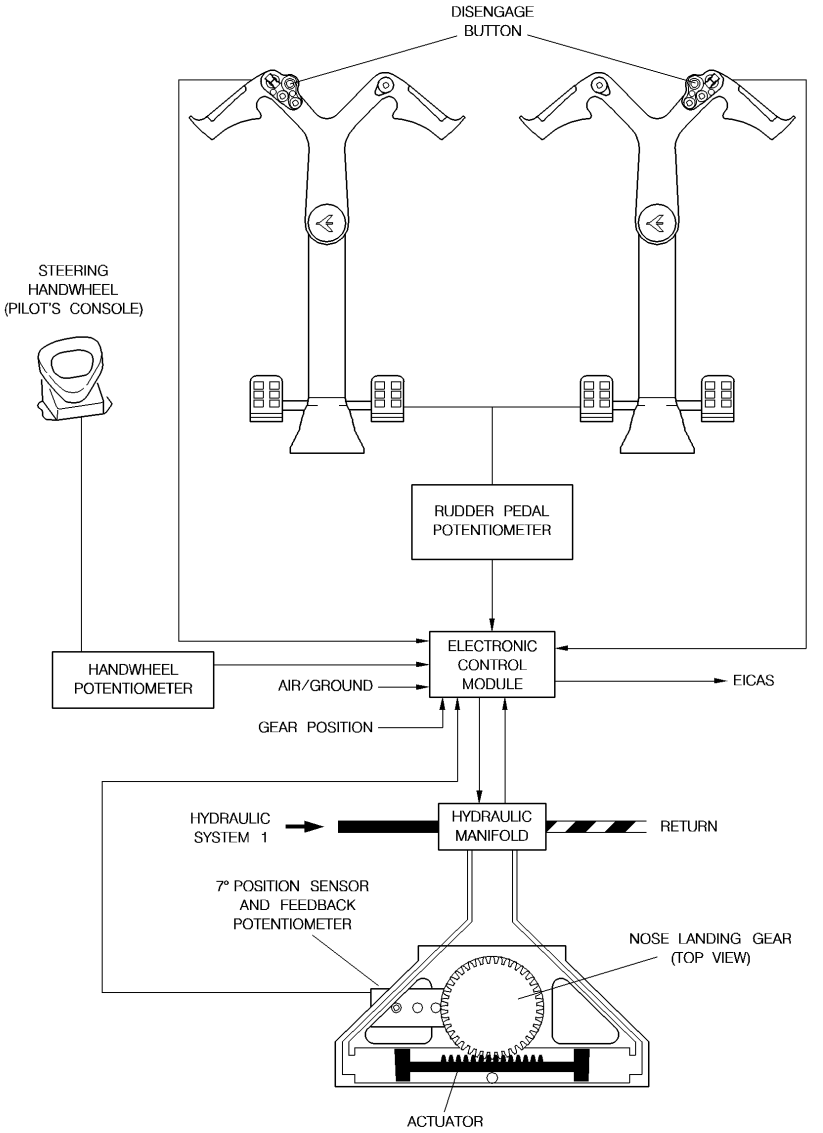
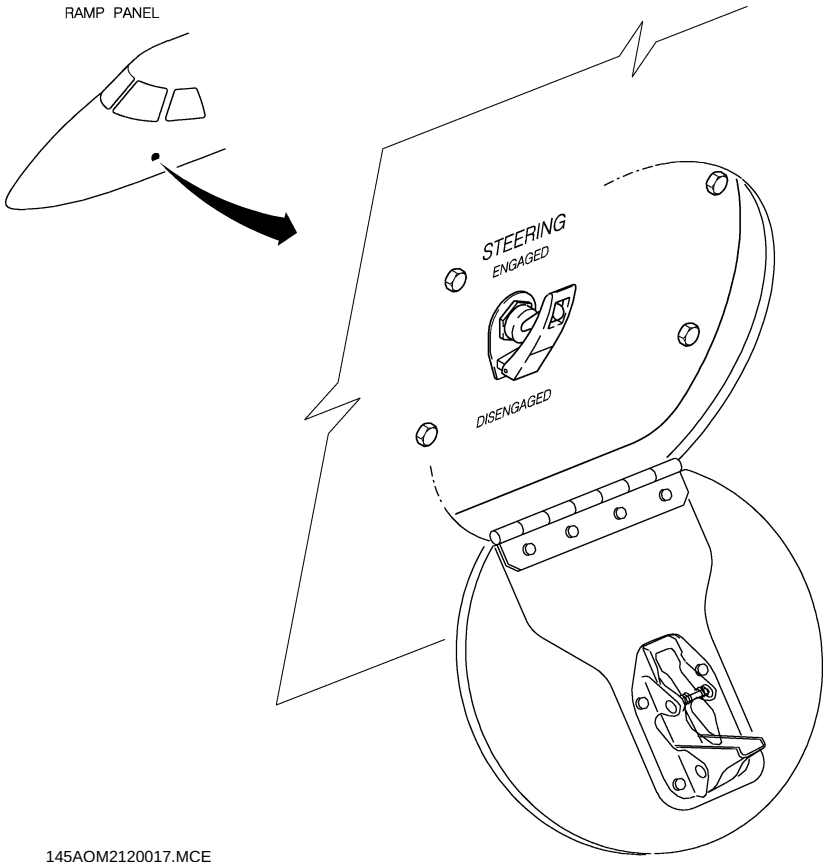


NOSE WHEEL STEERING SCHEMATIC

CONTROLS AND INDICATORS

STEERING DISENGAGEMENT SWITH (guarded)

ENGAGED - Allows normal steering system operation.
DISENGAGED - Disables steering system operation.



STEERING DISENGAGEMENT SWITCH COMPARTMENT

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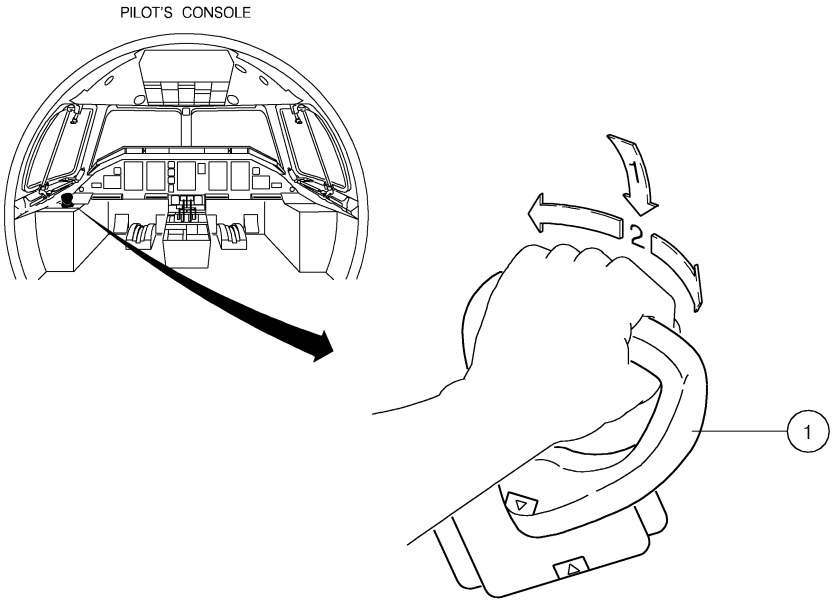
PILOT'S CONSOLE

1 - STEERING HANDLE

- Commands nose wheel steering, allowing 71° deflection to either sides.
- The steering handle can be moved downward and to either sides. When steering handle is moved downward the handle potentiometer output signal is connected to the Electronic Control Module. Push the handle down (step 1) to enable the command or to reset the steering system after disconnection. Rotate left or right (step 2), with the steering handle on down position, to command steering.

NOTE: - For airplanes operating under FAA certification and Pre-Mod. SB 145-32-0002 the nose wheel steering deflection is limited to 50° to either sides.

- The Steering Handle has priority over the Steering Disengage Button when both are pressed (in case of jammed rudder, the Steering Handle is used to control the airplane and the pilot must keep the Steering Disengage Button pressed to avoid undesired pedal command once on ground).



STEERING HANDLE

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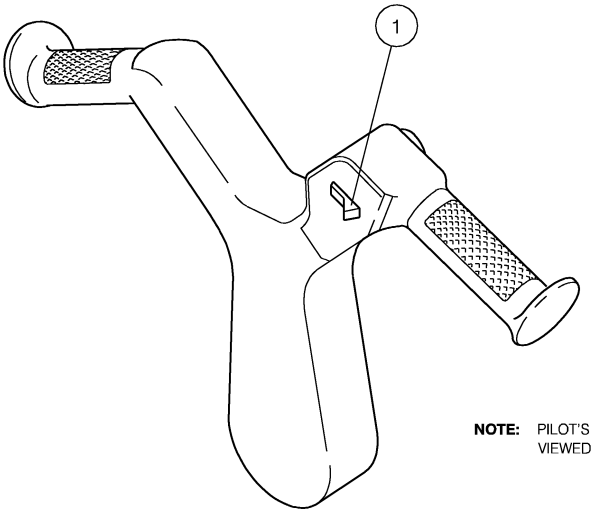
CONTROL WHEEL

1 - STEERING DISENGAGE BUTTON

– When pressed disengages the nose wheel steering system.



NOTE: PILOT'S CONTROL WHEEL SHOWN, VIEWED FROM BEHIND.

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STEERING DISENGAGE BUTTON

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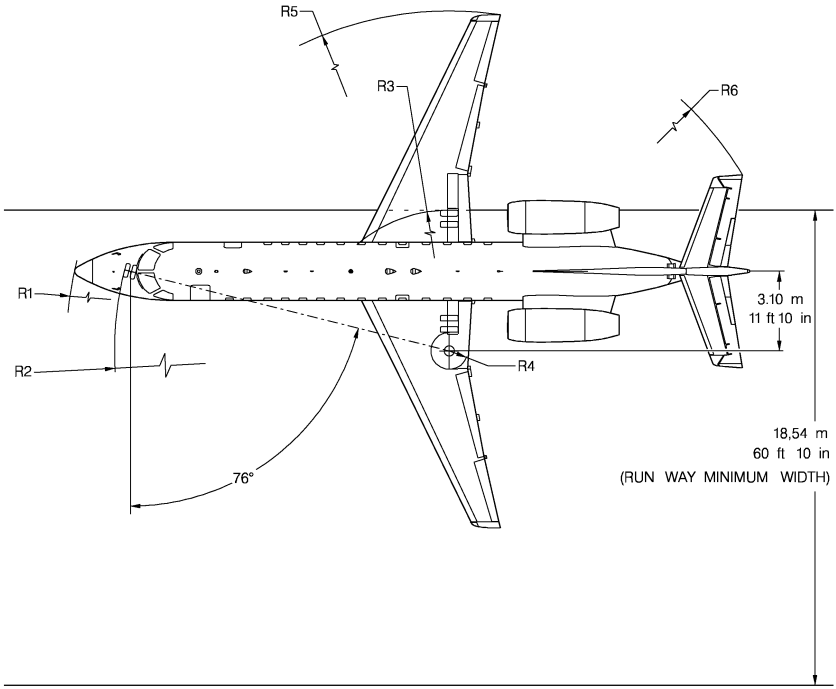
EMB-135 BJ MINIMUM TURNING RADII



STEERING STEEL	NOSE R1	NOSE GEAR R2	OUTBOARD GEAR R3	INBOARD GEAR R4	RIGHT WINGTIP R5	RIGHT TAILTIP R6
76°	14.94 m	13.05 m	5.49 m	0.72 m	13.27 m	13.34 m
	49 ft 0 in	42 ft 10 in	18 ft 0 in	2 ft 4 in	43 ft 7 in	43 ft 9 in

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SECTION 2-13

FLIGHT CONTROLS

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GENERAL

The primary flight control system consists of elevators, ailerons and rudder. Elevators are mechanically actuated. The ailerons and rudder are hydraulically powered and may also be mechanically actuated in case of loss of both hydraulic systems.

Trim system is provided in all axis. Tabs are provided for pitch control only, and are not available for ailerons and rudder.

A gust lock system blocks elevator controls on the ground, avoiding damage to the control systems in case of strong wind gusts. The rudder and ailerons are hydraulically damped for the same purpose.

An electrically operated flap system is provided with five discrete positions.

Speed brakes installed overwing allow increased descent rate and help in decelerating the airplane. Ground spoilers destroy lift, thus providing better braking effectiveness.

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FLIGHT CONTROL SURFACES

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PITCH CONTROL

GENERAL

Pitch control is provided by mechanically-actuated elevators and an electrically-positioned horizontal stabilizer which is commanded through the Pitch Trim System. Tabs are automatically positioned, thus reducing pilots effort.

ELEVATOR

GENERAL

The primary pitch control system is performed by the elevators, which are actuated through a fully duplicated set of command circuits.

JAMMED ELEVATOR

In case of jamming of one of the circuits (left or right), both elevator panels may be disconnected through a handle located on the control pedestal. This procedure will release the free elevator panel from its jammed counterpart, allowing the free panel to be commanded.

When disconnected, an amber light illuminates on the control stand. Controls cannot be reconnected during flight, requiring maintenance action.

JAMMED ELEVATOR OPERATION

The autopilot elevator servo and the stick pusher servo are connected on the left side of the disconnection device. Once disconnection is actuated, the stick pusher will actuate only on the left side and autopilot must not be used.

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TABS

GENERAL

There are four tabs, two on each elevator panel, located near the elevator root. The outer tabs are servo tabs and the inner tabs are spring tabs.

SERVO TABS

The deflection of the servo tabs is proportional to the elevator deflection. Since the servo tabs proportionally deflects in the opposite direction to the elevators, it promotes a reduction in the forces required.

SPRING TABS

The spring tabs are connected in such a way that elevator deflection in one direction causes the spring tab to move in the opposite direction, thus reducing the amount of force required to move the elevator.

Spring tab deflection is proportional to the control column force and, therefore, to the aerodynamic load imposed on the elevator. At low speeds, the spring tab remains in the neutral position. At high speeds, where the aerodynamic load is greater, the tab functions as an aid in moving the elevator.

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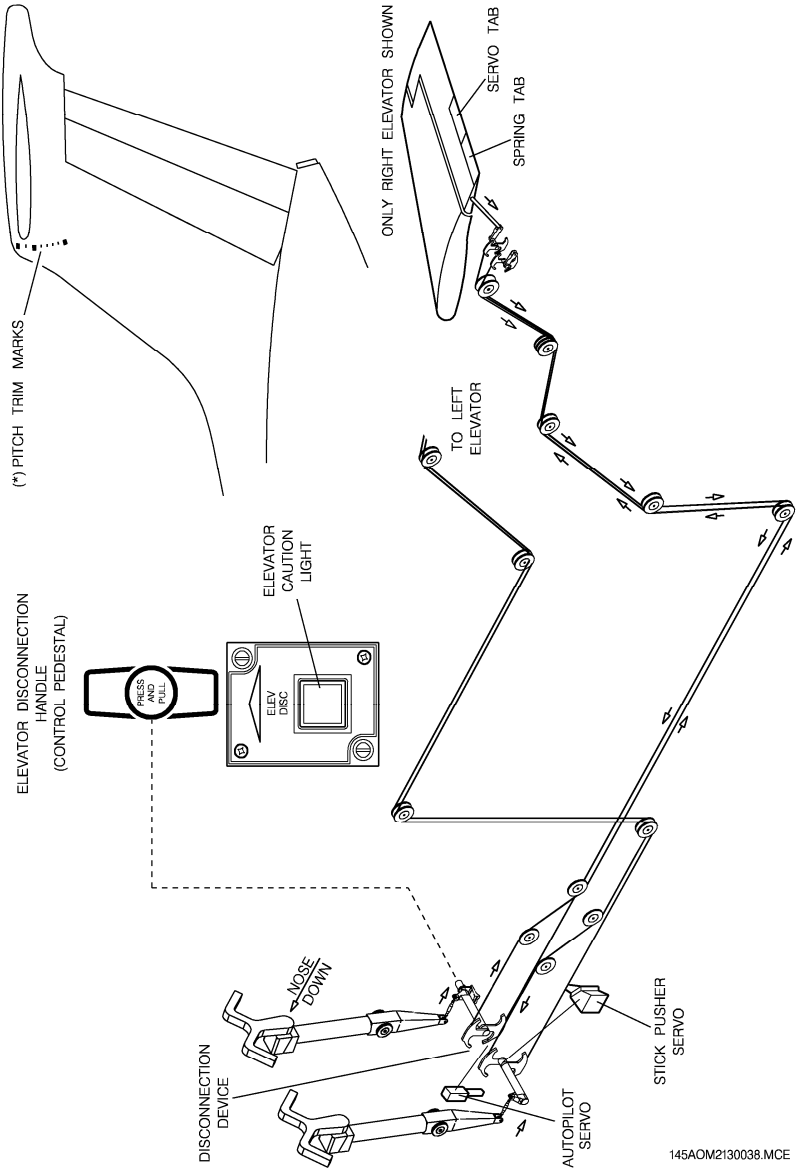

ELEVATOR SCHEMATIC

(*) The thick marks represent, respectively, 4° nose down (top of the scale), neutral, and 10° nose up (bottom of the scale) and each intermediate marks represent a 2° variation.

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PITCH TRIM SYSTEM

GENERAL

Pitch trim is accomplished by an electrically-actuated movable horizontal stabilizer. The system may be either automatically or manually commanded. In both cases, the pitch trim signal is sent to the Horizontal Stabilizer Control Unit (HSCU) channels, which after processing it, command the electric motor in the Horizontal Stabilizer Actuator (HSA).

SYSTEM COMPONENTS

Horizontal Stabilizer Control Unit (HSCU)

The Horizontal Stabilizer Control Unit (HSCU) is located in the rear electronic compartment at the rear fuselage. It incorporates two identical control channels, main and backup. These channel operations are totally independent from each other. If the pitch trim main channel is inoperative, the horizontal stabilizer can still be commanded through the backup channel.

The HSCU controls the trimming rate (in degrees/second) based upon the airplane airspeed. The trimming rate reduces as the airspeed increases. The HSCU also checks the stabilizer surface position. When the Takeoff Configuration Check Button is pressed, if the surface is not within the takeoff green band limits, an aural warning message is sounded to the crew.

Horizontal Stabilizer Actuator (HSA)

The Horizontal Stabilizer Actuator (HSA) consists of an electromechanical actuator driven by two DC motors. One of the motors is driven by the main control channel of the Horizontal Stabilizer Control Unit (HSCU) and the other motor is driven by the backup channel of the HSCU. Only one motor will be driven at a time.

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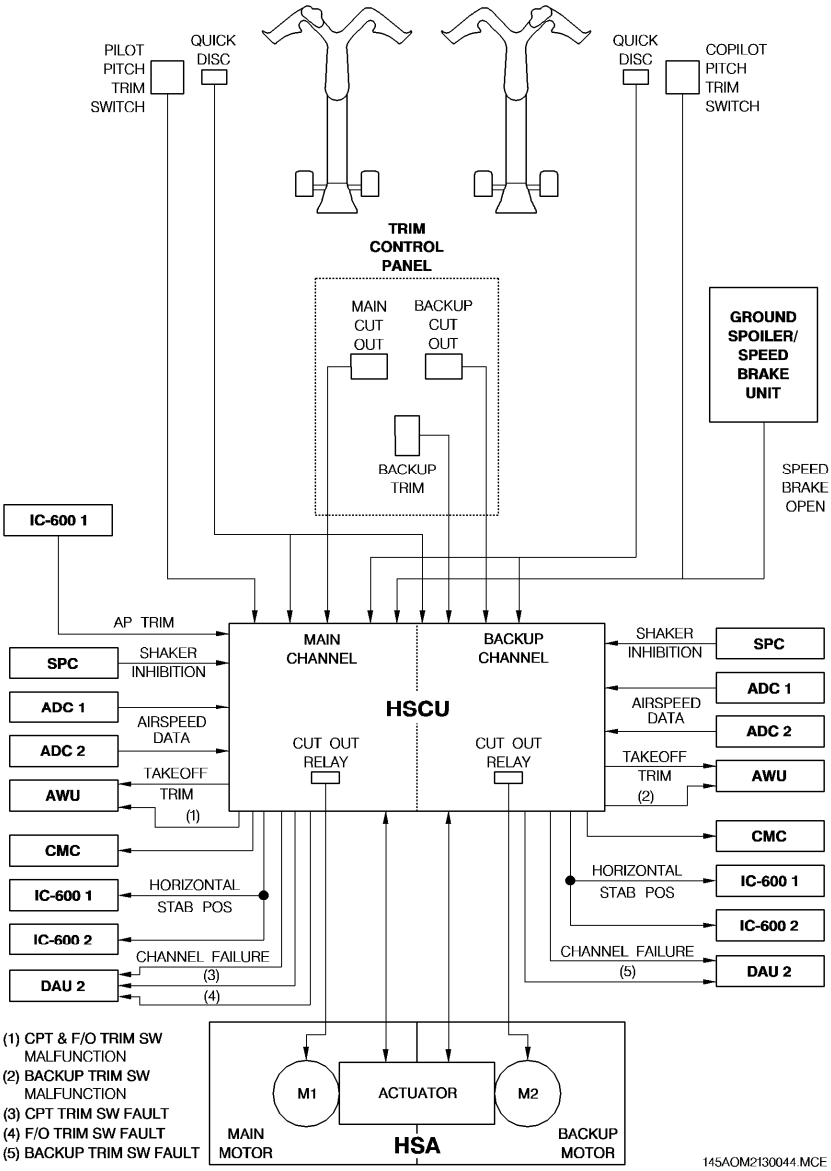

PITCH TRIM SCHEMATIC

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SYSTEM OPERATION

Pitch trim commands may be done manually through the main switches on the control wheels or through backup switch on the control pedestal aft panel and automatically commanded through the autopilot or speed brake actuation.

When using the main control wheel trim switches or the backup trim switch, it is necessary to command both halves simultaneously because, if just one half is commanded, the control unit will not provide any command to the actuator.

In the case of activation of any stick shaker, the pitch trim up command will be inhibited.

PITCH TRIM CHANNELS PRIORITY

Command priorities are: LH switch actuation overcomes the RH switch actuation, which, in turn, overcomes the autopilot. There is no priority with respect to the actuation of the main pitch trim switches and the backup pitch trim switches, the first being commanded takes priority. The main and backup pitch trim switches should not be commanded simultaneously. For the case of a simultaneous command of both channels, the message PTRIM MAIN INOP or PTRIM BACKUP INOP will be displayed on the EICAS, associated to the second switch commanded. This message will disappear around 4 seconds after the second pitch trim switch is released.

PITCH TRIM SYSTEM PROTECTION

Switch Protection

When only one half of the main control wheel trim switch or backup trim switch is commanded for more than 7 seconds continuously, the control unit will recognize that one half of the switch is failed stuck at the commanded position and will disregard any other command coming from that faulty switch. A TRIM voice message is provided to alert pilots that just one half of switch is being commanded and the messages PTRIM CPT SW FAIL, PTRIM F/O SW FAIL and PTRIM BKP SW FAIL will be displayed on the EICAS.

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Runaway Protection

A quick-disconnect button on each control wheel allows disconnection from the entire pitch trim system. In case of a runaway horizontal stabilizer, the button must be kept pressed until a definite disengagement is accomplished through the cutout buttons on the control pedestal.

Inadvertent Actuation Protection

A continuous command of any trim switch is limited to 3 seconds, even if the trim switch is pressed longer than 3 seconds. As a result, when manually actuating the trim, it is necessary to release the switch after a 3-second actuation, then actuate it again to continue the trim command. This feature intends to minimize the effects of an inadvertent trim command of the main and backup trim switches or Ground Spoiler/Speed Brake Unit. The autopilot command is not limited in time and has another logic to preclude inadvertent actuation.

NOTE: For airplanes equipped with an HSCU -5009 MOD.2 or newer and AWU -5 a TRIM voice message is provided to alert pilots that the trim switch is being pressed for more than 3 seconds.

HSA Excessive Load Protection

The crew should keep the airplane trimmed to avoid excessive loads on the Horizontal Stabilizer Actuator (HSA), especially after takeoff. High loads on horizontal stabilizer may stall the HSA, inducing a temporary loss of pitch trim command. If the pitch trim switches are actuated during the period when the Horizontal Stabilizer Actuator is stalled, the message PTRIM MAIN INOP or PTRIM BACKUP INOP will be displayed on the EICAS. The message will disappear if the trim switch is released or any horizontal stabilizer motion is detected. If the trim switches are actuated for a period of time that totalizes 16 seconds during the period when the horizontal stabilizer actuator is stalled, the control unit will switch the associated system (main or backup) off and the message PTRIM MAIN INOP or PTRIM BACKUP INOP will be permanently displayed on the EICAS.

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	PTRIM MAIN INOP	Pitch trim main system is inoperative, or Quick Disconnect button is kept pressed for more than 11 seconds. This message will disappear after the button is released, or Main trim switch(es) actuation associated with the horizontal stabilizer being commanded by the backup switch, or Main trim switch being actuated with the HSA stalled.
	PTRIM BACKUP INOP	Pitch trim backup system is inoperative, or Quick Disconnect button is kept pressed for more than 11 seconds. This message will disappear after the button is released, or Backup trim switch actuation associated with horizontal stabilizer being commanded by the main channel, or Backup trim switch being actuated with the HSA stalled.
CAUTION	PTRIM CPT SW FAIL	Pilot's pitch trim switch is inoperative.
	PTRIM F/O SW FAIL	Copilot's pitch trim switch is inoperative.
	PTRIM BKP SW FAIL	Pitch trim backup switch is inoperative.

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CONTROLS AND INDICATORS

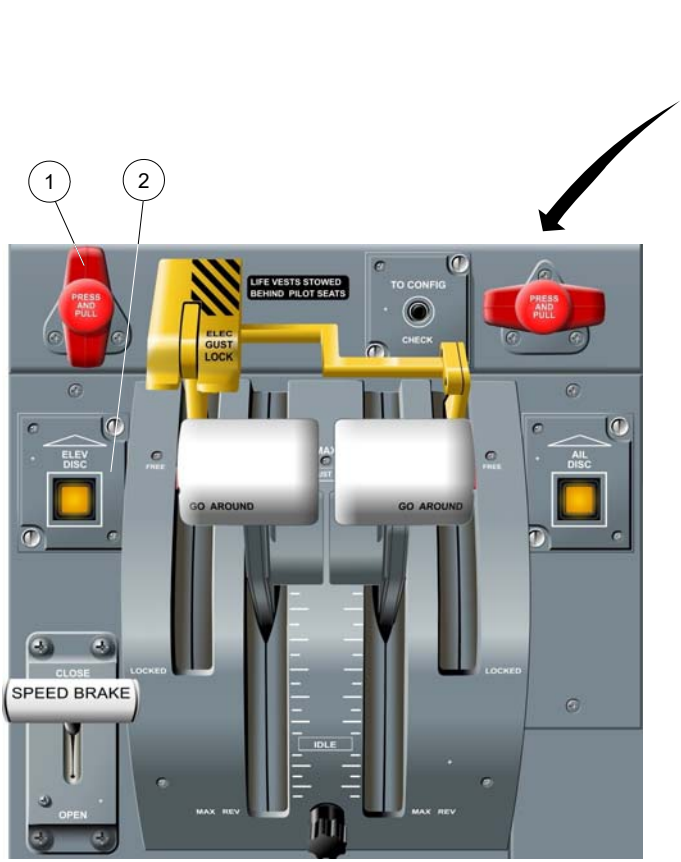
CONTROL STAND

1 – ELEV DISC HANDLE

- When pulled, disconnects pilot's from copilot's controls.
- To pull the handle, the safety lock button must be pressed.

2 – ELEV DISC LIGHT

- Illuminates to indicate that the elevator mechanism is disconnected.



CONTROL STAND

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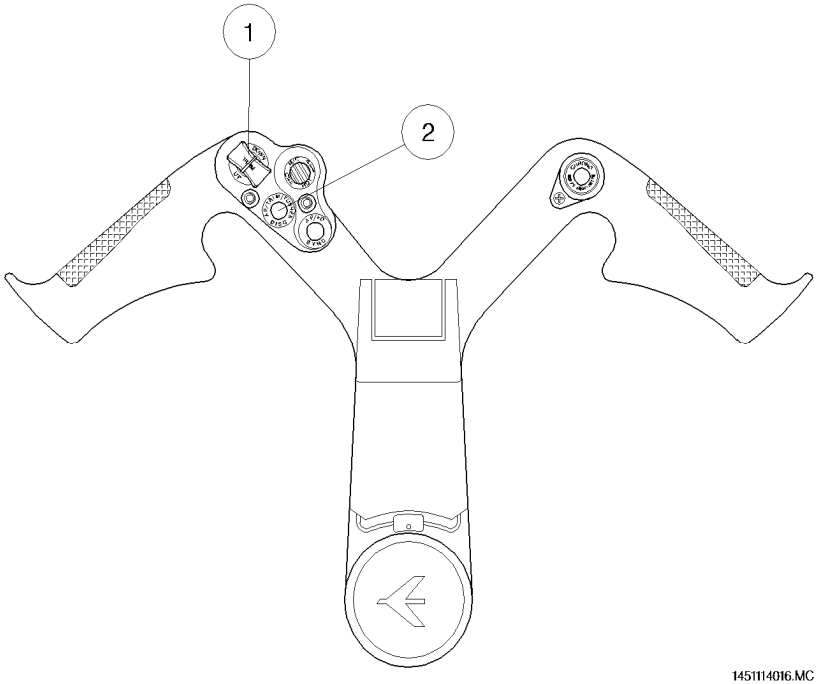
CONTROL WHEEL

1 – PITCH TRIM SWITCH (SPRING-LOADED TO NEUTRAL)

- Allows trimming the airplane when the autopilot is not engaged. The trim switch is a 3-position (UP/OFF/DN) rocker switch.
- Operating the switch while the autopilot is engaged causes the autopilot to disengage.
- It is divided into two segments, which have to be actuated together to provide command.

2 – QUICK-DISCONNECT BUTTON (MOMENTARY ACTION)

- When pressed, disconnects all trim systems.



CONTROL WHEEL

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CONTROL PEDESTAL AFT PANEL

1 – PITCH TRIM MAIN SYS CUTOUT BUTTON (SAFETY GUARDED)

- Cuts out (push out) or enables (push in) the Main Pitch Trim system.
- A striped bar illuminates inside the button to indicate that it is pressed.
- Autopilot is not available.

2 – PITCH TRIM BACKUP SYS CUTOUT BUTTON (SAFETY GUARDED)

- Cuts out (push out) or enables (push in) the Backup Pitch Trim system.
- A striped bar illuminates inside the button to indicate that it is pressed.
- Autopilot is available.

3 – PITCH TRIM BACKUP SWITCHES (SPRING-LOADED TO NEUTRAL)

- Pressed forward or backward actuates the pitch trim through the backup channel.
- Operation of the switch while the autopilot is engaged causes the autopilot to disengage.
- It is divided into two segments, which have to be actuated together to provide command.

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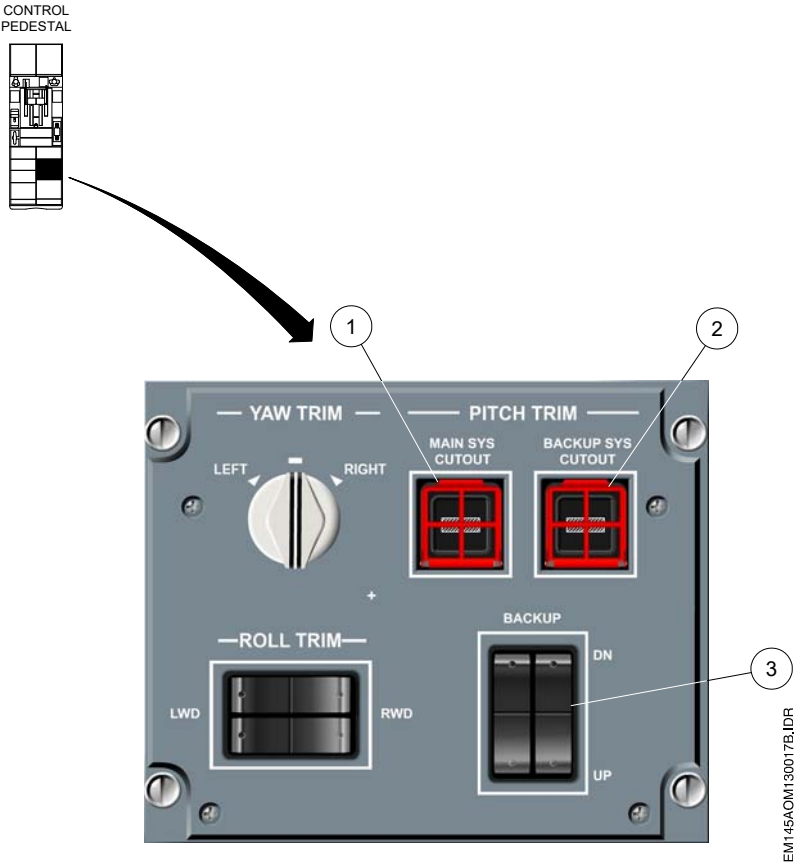

CONTROL PEDESTAL AFT PANEL

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EICAS INDICATION

1 – PITCH TRIM INDICATION

- A green pointer moving on a white vertical scale represents the amount of pitch compensation.
- Trim position is indicated digitally in a white box.
- The letters UP or DN are presented above the box to indicate that the airplane is trimmed up or down.
- Scale ranges from 4° nose down (bottom of scale) to 10° nose up (top of scale). Every thick mark on the scale represents 3.5° of pitch.
- A green band is provided on the analog scale from 4° to 8° nose up to indicate the allowable takeoff position range for the horizontal stabilizer.

NOTE: Due to the system's resolution, it's possible to have the digits, box and pointer turning amber, in spite of the fact that the pitch trim indication is displayed at 4° or 8°. The trim setting color displayed on the EICAS depends on the horizontal stabilizer surface position. For the unit 8 displayed on the EICAS the surface position can be between 7.7° and 8.7° going upward and between 8.3° and 7.3° going downward. The color change would occur when the surface position is 8.1°. For this reason, when setting pitch trim to 8, first select 7. Then, increase slowly and stop trimming immediately when the value 8 is displayed. For the unit 4 displayed on the EICAS, the surface position can be between 3.7° and 4.7° going upward and between 4.3° and 3.3° going downward. The color change would occur when the surface position is 3.9°. For this reason, when setting pitch trim to 4, first select 5. Then, decrease slowly and stop trimming immediately when the value 4 is displayed. This procedure prevents to set the trim at the top or bottom of the green band in order to avoid the possibility of encountering takeoff config warnings.

- In the event of a pitch trim miscomparison, the pointer, digital value, and the direction indication are removed from display.
- If the pitch trim is out of the green band and the airplane is on the ground, the pointer and digital indications will turn amber.

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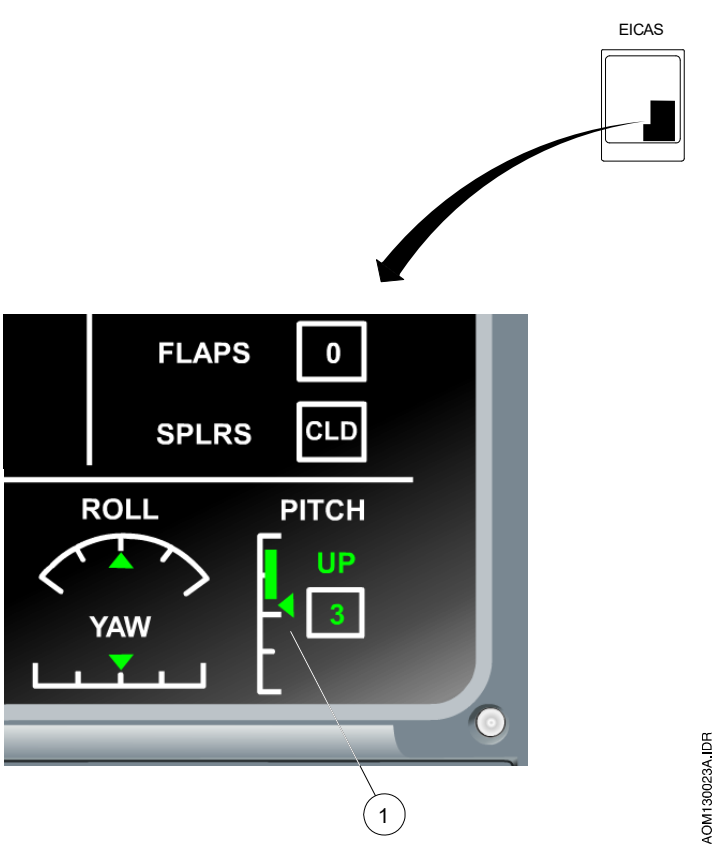
– If the airplane is on the ground, any thrust lever angle is above 60° and pitch trim is outside the green band, the digits, box, and pointer turn red, the aural warning TAKEOFF TRIM sounds and the EICAS warning message NO TAKEOFF CONFIG is displayed.



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EICAS INDICATIONS

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ROLL CONTROL

Roll control is provided by hydraulically-actuated ailerons controlled by either control wheel.

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AILERON CONTROL SYSTEM

The ailerons are positioned by the pilot's control wheels, which are linked together by a torque tube and cables to supply mechanical input to two separate hydraulic actuators.

Each aileron actuator is supplied by both hydraulic systems. Either hydraulic system is capable of providing full power control. If necessary, each hydraulic system supply can be shut off, by means of a button installed on the overhead panel. In case of loss of both hydraulic systems, rotation of the pilot's control wheels mechanically positions the ailerons.

In case of jamming of either aileron, both panels may be disconnected through a handle located on the control pedestal. This procedure will release the free aileron from its jammed counterpart allowing the free panel to be commanded. When disconnected, an amber light illuminates on the control stand. Controls cannot be reconnected during flight, requiring maintenance action.

An autopilot servo is installed on the left side of the torque tube. The roll trim servo and the artificial feel unit are installed on the right side of the torque tube. In case of system disconnection, the artificial feel unit will actuate on the right aileron only and the autopilot must not be used. The artificial feel unit is provided to give pilots a aerodynamic load feedback imposed on the aileron surface.

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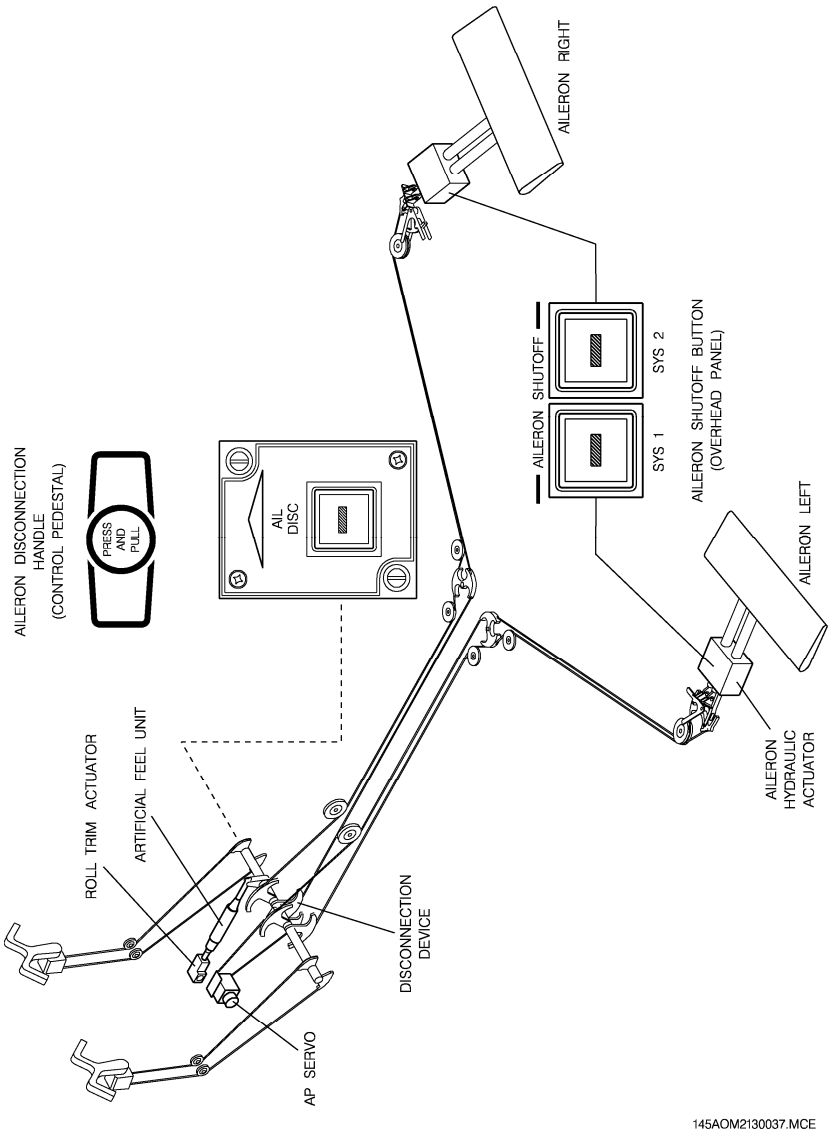

AILERON SCHEMATIC

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ROLL TRIM SYSTEM

Roll trim is performed by relocating the aileron's neutral position. It is provided through an electromechanical actuator linked to the artificial feel unit and commanded through a switch on the control pedestal aft panel. If the aileron trim switches are activated with the autopilot engaged, the aileron neutral point is repositioned. When the autopilot is disengaged, the ailerons move to the repositioned aileron neutral point.

A continuous command of the roll trim switch is limited to 3 seconds, even if the trim switch is pressed longer than 3 seconds. As a result, when manually actuating the trim, it is necessary to release the switch after a 3-second actuation, then actuate it again to continue the trim command. This feature intends to minimize the effects of an inadvertent trim command failure.

When using the roll trim switch, it is necessary to command both segments simultaneously since, if just one segment is commanded, the control unit will not provide any command for the actuator.

A quick-disconnect button installed on the control wheels allows, while kept pressed, to disconnect the roll trim.

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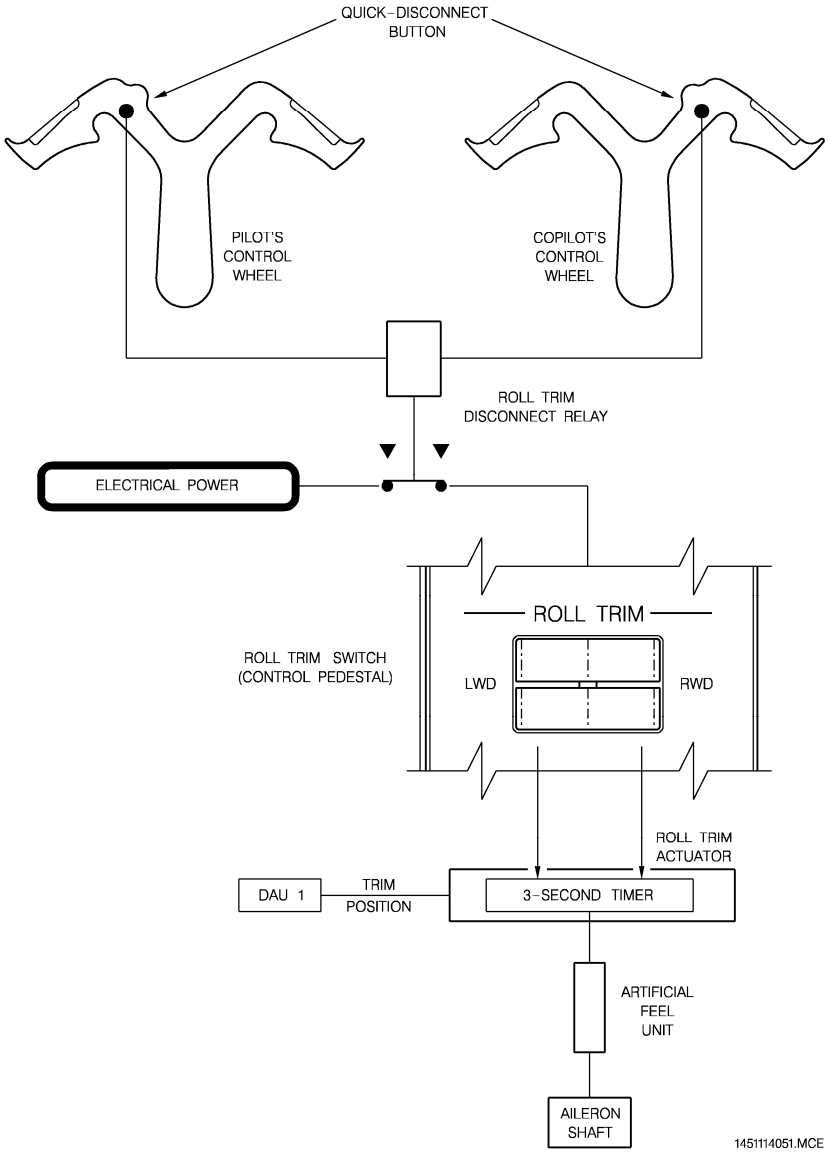

ROLL TRIM SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	AIL SYS 1 (2) INOP	Aileron actuation through hydraulic power is inoperative.

CONTROLS AND INDICATORS

FLIGHT CONTROLS PANEL

1 – AILERON SHUTOFF SYS BUTTONS

- Enables (pressed) or disables (released) the associated aileron hydraulic actuator.
- A striped bar illuminates in the button to indicate that it is released.

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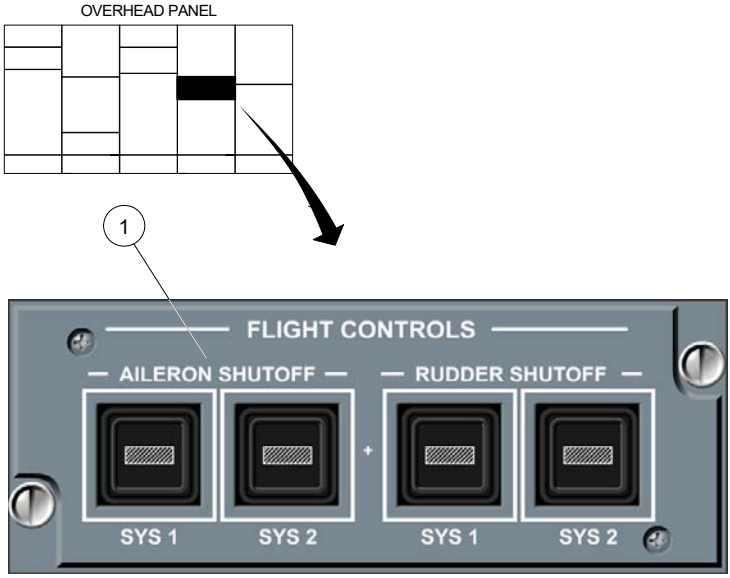

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FLIGHT CONTROLS PANEL

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CONTROL STAND

1 – AIL DISC HANDLE

- When pulled, disconnects pilot's from copilot's controls.
- To pull the handle, the safety lock button must be pressed.

2 – AIL DISC LIGHT

- When the striped bar is illuminated, indicates that the aileron disconnection mechanism is actuated.

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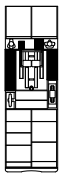
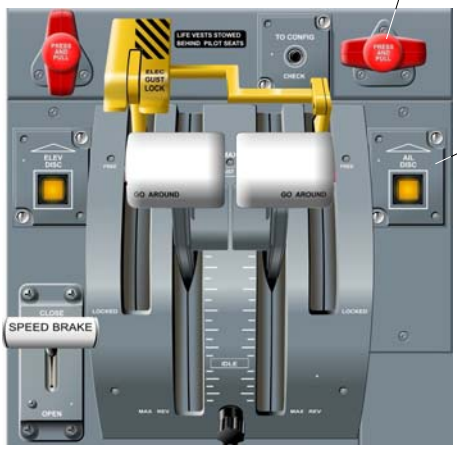
CONTROL PEDESTAL





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CONTROL STAND

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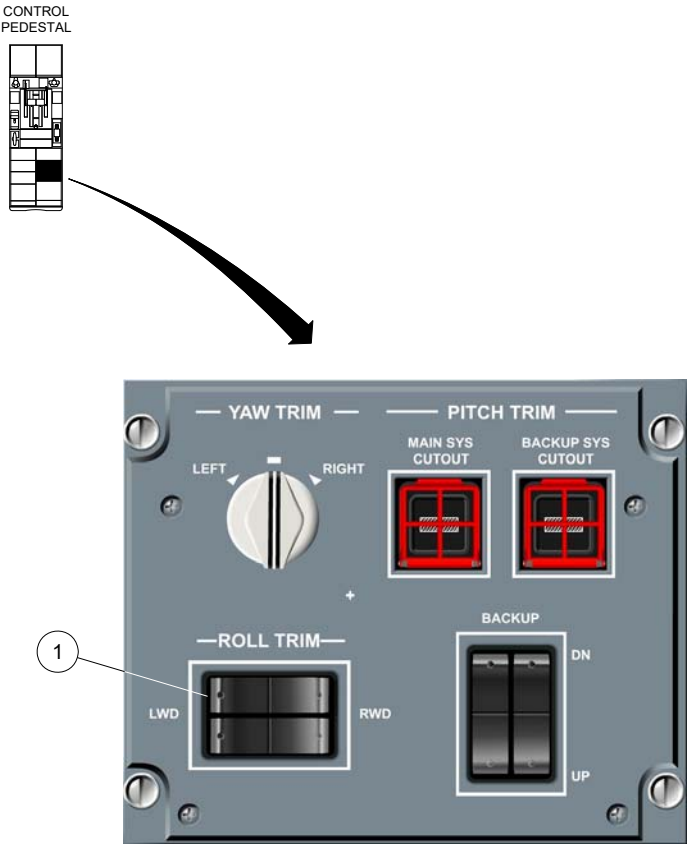
CONTROL PEDESTAL AFT PANEL

1 – ROLL TRIM SWITCHES (SPRING-LOADED TO NEUTRAL)

– Pressed left or right actuates the roll trim to roll left or right.



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CONTROL PEDESTAL AFT PANEL

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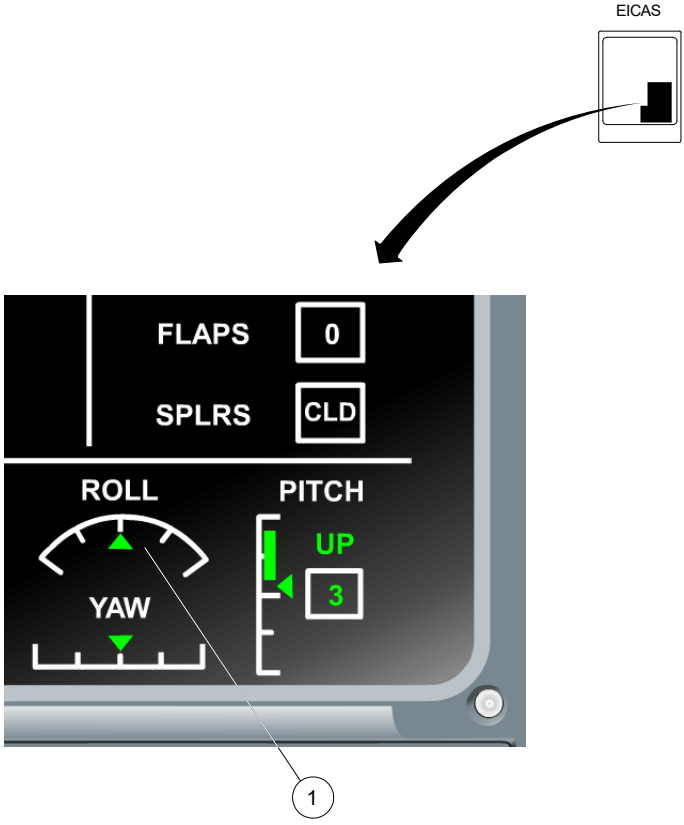
EICAS INDICATIONS

1 – ROLL TRIM POSITION

- Indicated by a green pointer moving on a white semicircle scale.
- Center of the scale is zero trimming.
- Each mark represents 50% of trimming range for the associated side.



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YAW CONTROL

Yaw control is provided through hydraulically-powered rudders, which may also be mechanically commanded. A yaw trim system assists in moving and holding the rudder in the desired position.

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RUDDER CONTROL SYSTEM

Directional control about the yaw axis is provided by two in-tandem rudders. Forward rudder is driven by the control system, while the aft rudder is linked to the forward rudder and deflected as a function of forward rudder deflection. Either set of rudder pedals will position the rudder through a Power Control Unit (PCU). The mechanical control is fully duplicated, consisting of cables running from the pedals in the cockpit to the rear fuselage, where the PCU is commanded to position the forward rudder. The rudder can also be commanded through the autopilot.

The rudder PCU is a dual hydraulic unit, simultaneously powered by both hydraulic systems. Each PCU hydraulic circuit controls the hydraulic power to one respective rudder actuator. Therefore, the rudder system is divided into Rudder System 1 and Rudder System 2.

The PCU also incorporates an artificial feel device that provides the pedals with an artificial feel of the aerodynamic load imposed on the rudder.

Rudder System 1 and/or Rudder System 2 may be either manually or automatically shut off. The manual shut off operation is provided through the Rudder Shutoff Buttons, located on the Overhead Panel. The automatic shut off operation is provided through the speed switch and through the hardover protection function.

When operating under mechanical mode the aerodynamic loads on the rudder are directly transmitted to the pedals and, therefore, to the pilots. Since no rudder hydraulics control is available, artificial feel and trim functions will also not be available. Some characteristics can be observed:

– Greater control forces.

– Sluggish response of rudder to pedals inputs.

– Backlash of rudder pedals around neutral position when changing the force application from one to the other pedal.

If either or both rudder systems are inoperative, caution messages are presented on the EICAS.

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MENU
PREVIOUS
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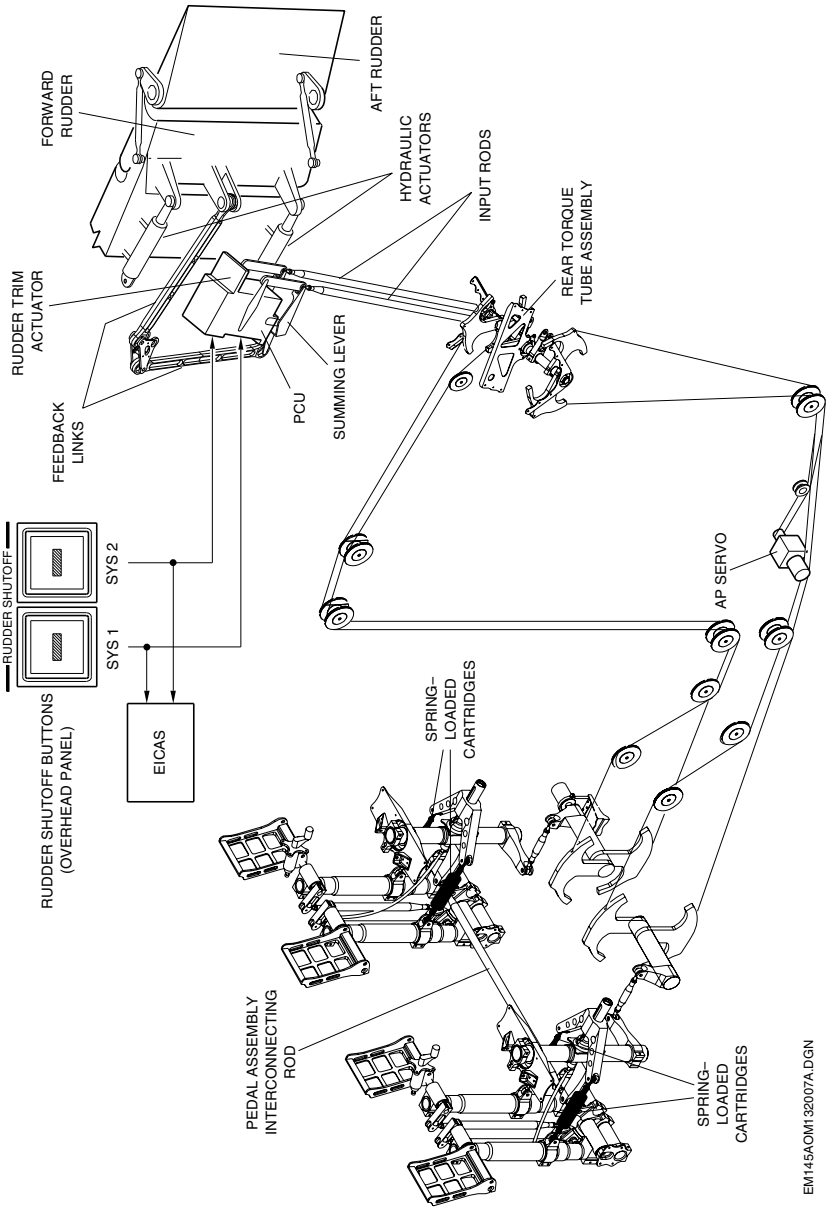

RUDDER SCHEMATIC

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AUTOMATIC SHUTOFF THROUGH THE SPEED SWITCH

During normal operation both systems are powered at speeds below 135 KIAS. Above 135 KIAS, Rudder System 1 is automatically shut off.

If the automatic shut off fails to shut off a system above 135 KIAS, a caution message is presented on the EICAS. In this case, it is necessary to manually shut off system 1 or 2, according to the checklist.

If Rudder System 2 hydraulic power supply fails, Rudder System 1 automatically takes over the rudder and an associated caution message is presented on the EICAS.

RUDDER HARDOVER PROTECTION

This feature is applicable in the case of a runaway rudder.

The rudder hardover protection function automatically selects the mechanical reversion mode as a function of pedal input force, rudder deflection, and airplane engine operation (two or single-engine operation). This feature is applicable in the case of a runaway rudder and a caution message is presented on the EICAS.

The rudder systems are automatically shut off if all conditions below are met simultaneously:

– Rudder deflected above 5° ± 1°.

– Force above 59 kg (130 lb) on the pedal to counteract rudder deflection.

– Both engines running above 56% N2.

The RUDDER SYS 1-2 INOP EICAS Caution message is generated alerting the crew that the rudder system is on the mechanical reversion mode.

CAUTION: DO NOT RESET THE RUDDER SYSTEMS IF THE MECHANICAL REVERSION MODE WAS RESULTANT OF A RUDDER RUNAWAY FOLLOWED BY THE HARDOVER PROTECTION ACTIVATION.

If mechanical reversion mode was not resultant of rudder runaway followed by hardover protection, a reset function is available on the Overhead Panel, by pressing both Rudder Shutoff Buttons off and on again.

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The following remarks are applicable to the rudder hardover protection:

- The signal from the Pedal Spring-Loaded Cartridges to shut off the rudder systems are applicable only if the pilots are applying force to one side with the rudder deflected above 5° ± 1° to the opposite side. If pilot command input and the rudder deflection are in the same direction, the system will not be shut off, regardless of how strong the pilot input.
- The rudder hardover protection is disabled at high airspeeds, when the rudder deflection authority decreases to less than 5°.
- During single-engine operation, when the rudder system is more significantly required, the rudder hardover protection is disabled and the RUD HDOV PROTFAIL caution message may be presented on the EICAS.
- If a disagreement between FADECs from the same engine occurs, rudder hardover protection is deactivated and the RUD HDOV PROTFAIL caution message is presented on the EICAS.

RUDDER DEFLECTION

AIRPLANES UNDER CTA AND FAA CERTIFICATION

The rudder's main control primary stops, limit rudder deflection at ± 15° on ground or in flight.

AIRPLANES UNDER JAA CERTIFICATION

These airplanes are equipped with movable rudder primary stops, which provide two different ranges of rudder deflection:

- On ground: maximum rudder deflection is ± 15°.
- In flight: maximum rudder deflection is ± 10°.

The Movable Rudder Primary Stops System comprises a hydraulic actuation system, which operates according to the air/ground logic and will limit rudder deflection to 10° in the extended position and to 15° in the retracted position.

An amber indication light is provided on the main panel to alert the crew in case of a disagreement between the actuator position and the air/ground condition.

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YAW TRIM SYSTEM

Yaw trim is accomplished by an electromechanical actuator, which receives signals from the yaw trim knob.

A continuous command of the yaw trim knob is limited to 3 seconds, even if the trim knob is actuated longer than 3 seconds. As a result, when manually actuating the trim, it is necessary to release the knob after a 3-second actuation, then actuate it again to continue the trim command. This feature intends to minimize the effects of an inadvertent trim command failure.

Yaw trim position is presented on EICAS display.

A quick-disconnect button installed on the control wheels allows, while kept pressed, disconnecting the yaw trim.

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MENU
PREVIOUS
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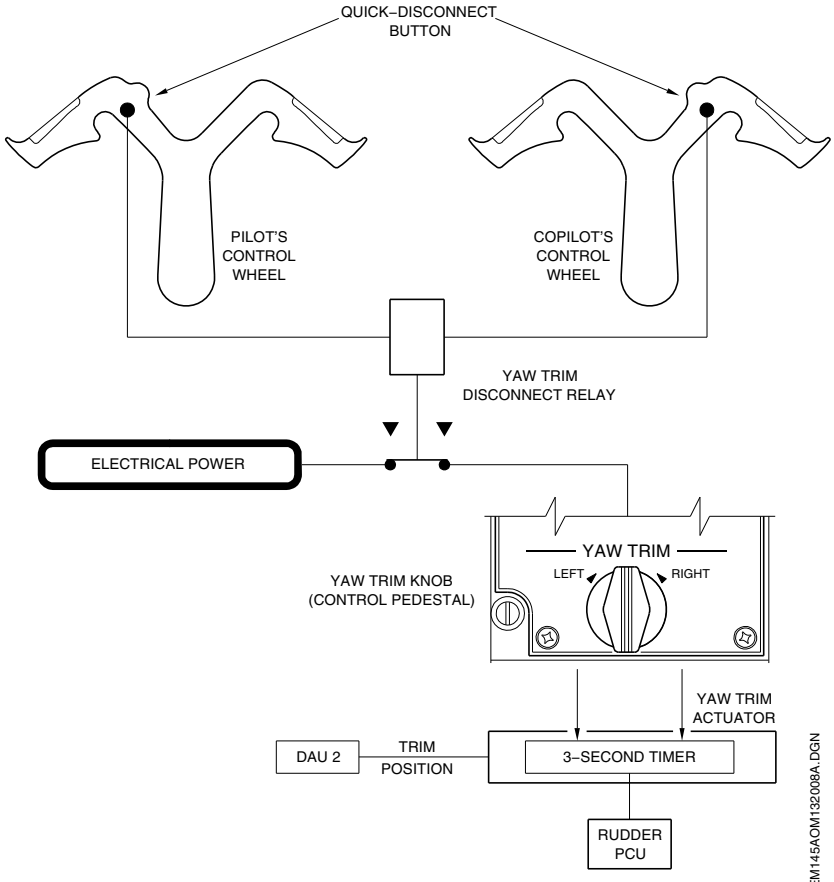

YAW TRIM SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	RUD HDOV PROTFAIL	– Disagreement between both FADECs of a same engine. – Rudder position microswitches indicate rudder to right and left simultaneously.
	RUD STOP DISAGREE (*)	The rudder's movable stop presents disagreement: 15° in flight or 10° on ground.
	RUDDER SYS 1 INOP	Rudder System 1 is inoperative. Message is presented under the following conditions: – Below 135 KIAS. – Above 135 KIAS if airspeed of both ADC's is invalid.
	RUDDER SYS 2 INOP	Rudder System 2 is inoperative.
	RUDDER SYS 1-2 INOP	Both Rudder Systems are inoperative.
	RUDDER OVERBOOST	Both rudder systems hydraulic actuators are pressurized above 135 KIAS.

NOTE: (*) Applicable to airplanes operating under JAA certification and not equipped with rudder movable stops indication light.

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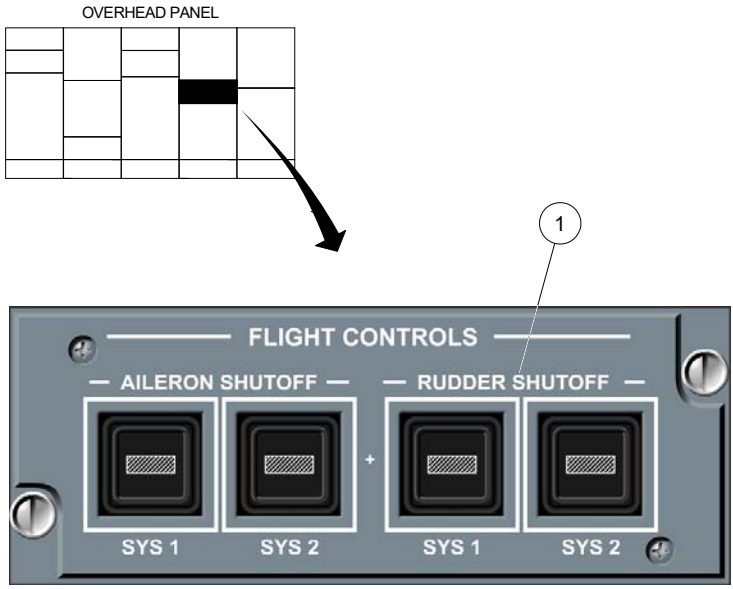
CONTROLS AND INDICATORS

FLIGHT CONTROLS PANEL

1 – RUDDER SHUTOFF SYS BUTTONS

- Enables (pressed) or disables (released) the associated rudder hydraulic actuator.
- A striped bar illuminates in the button to indicate that it is released.



FLIGHT CONTROLS PANEL

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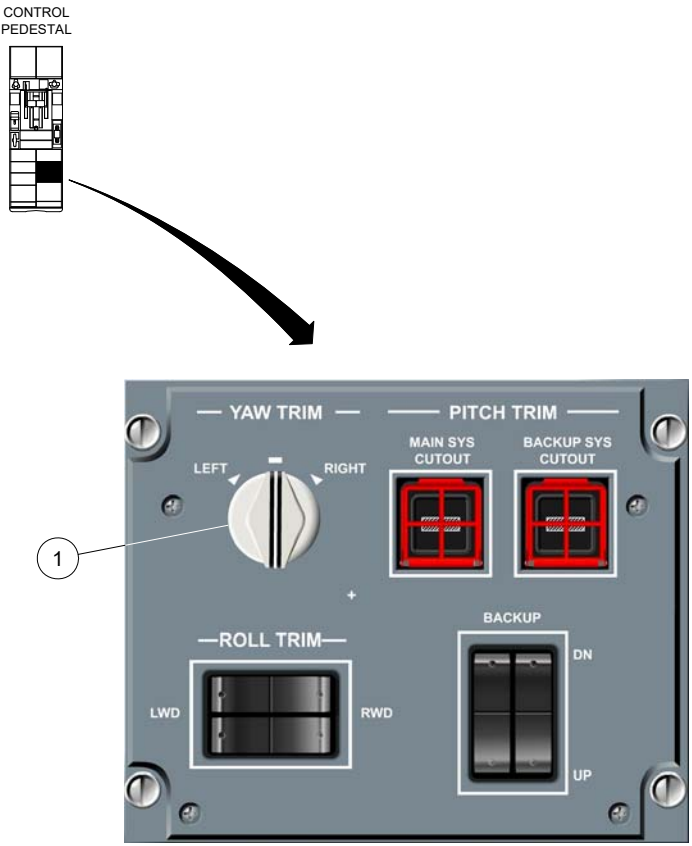
CONTROL PEDESTAL AFT PANEL

1 – YAW TRIM CONTROLLER (SPRING-LOADED TO NEUTRAL)

– Rotated clockwise or counterclockwise actuates the yaw trim, right or left.



CONTROL PEDESTAL AFT PANEL

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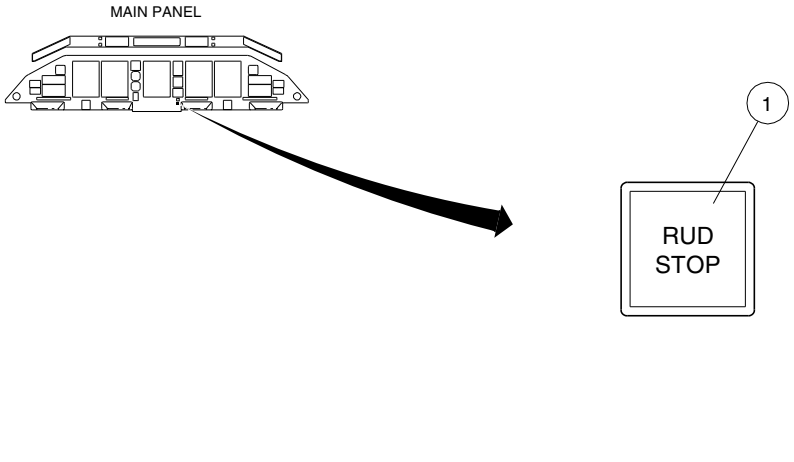
MAIN PANEL

1 – MOVABLE RUDDER STOPS INDICATION LIGHT (APPLICABLE TO AIRPLANES OPERATING UNDER JAA CERTIFICATION)

- Color: amber.
- Illuminates to indicate an incorrect position of at least one hydraulic actuator of the movable rudder stops system, as follows:
  - Airplane in flight with movable rudder stops at 15° position.
  - Airplane on ground with movable rudder stops at 10° position.
- A time delay of 5 seconds is provided to prevent fault indication during transient.

NOTE: For some airplanes, the indication light will be replaced by the EICAS message RUD STOP DISAGREE.



MAIN PANEL

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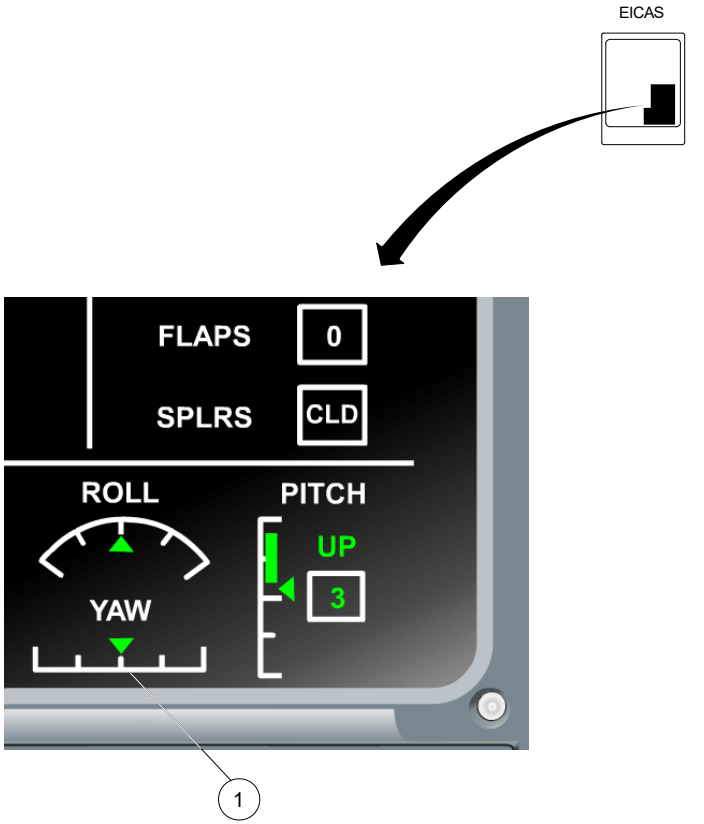
EICAS INDICATIONS

1 – YAW TRIM POSITION

- Indicated by a green pointer moving on a horizontal scale.
- Center of the scale is zero trimming.
- Each mark represents 50% of trimming range for the associated side.



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GUST LOCK SYSTEM

A gust lock system is provided to lock the elevator to avoid damage to elevator components in the case the airplane is subject to strong gusts on the ground. The aileron and rudder surfaces do not need to be mechanically locked since their actuation systems naturally damp any undesired movement.

ELECTROMECHANICAL GUST LOCK SYSTEM

The electromechanical gust lock can be identified by a yellow and black striped safety lock device on the control pedestal with the inscription ELEC GUST LOCK, and by two indication lights on the glareshield panel.

The electromechanical gust lock acts directly on the elevator panels, preventing them from moving. Basically, the system is composed of locking pins driven by an electromechanical actuator, which is commanded by the gust lock lever. Gust lock system operation (locking and unlocking) is possible on the ground only. Once airborne, the system is deenergized to prevent gust lock lever movement and inadvertent actuation.

The gust lock indication lights located on the glareshield panel illuminate to indicate the unlocking cycle or when a failure in the system occurs or when it is pressed for test. For airplanes Post-Mod. SB 145LEG-27-0011 or with an equivalent modification factory incorporated, when the TLA is higher than 59° and the gust lock system is still locked, the light will illuminate indicating that an unlocking cycle has initiated.

When the gust lock lever is at locked position, the thrust levers are prevented from moving beyond the thrust setting needed for ground maneuvering. However, the gust lock lever was designed to allow extra travel for one of the thrust levers to be used during taxi.

The system is fed by DC Bus 2 and has a dedicated circuit breaker, located on the overhead circuit breaker panel.

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LOCKING OPERATION

To lock the elevator proceed as follows:

A. Pull the control column backwards to any position from neutral to full nose up.

B. Lift the safety lock device (1) and move the gust lock lever from the unlocked (FREE) to the locked position (2).

C. Push the control column fully forward until the control column movement is restricted. Locking is completed.

NOTE: During the locking operation, indication lights remain off.

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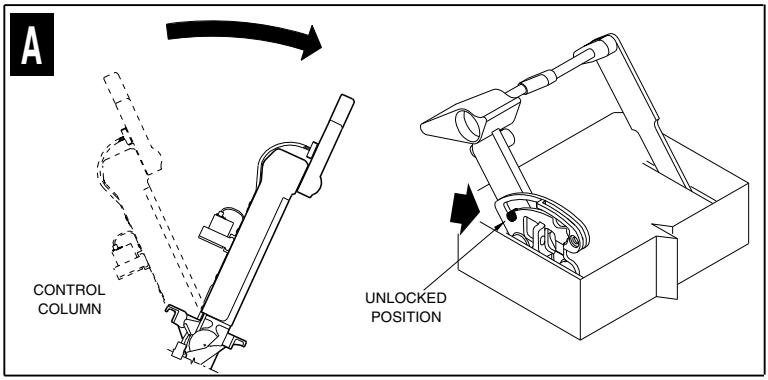
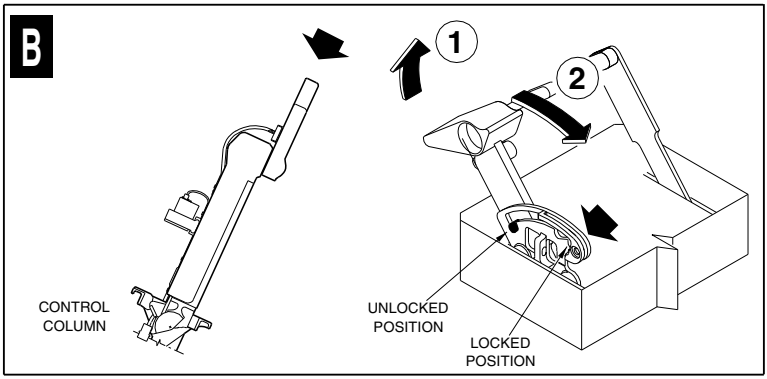
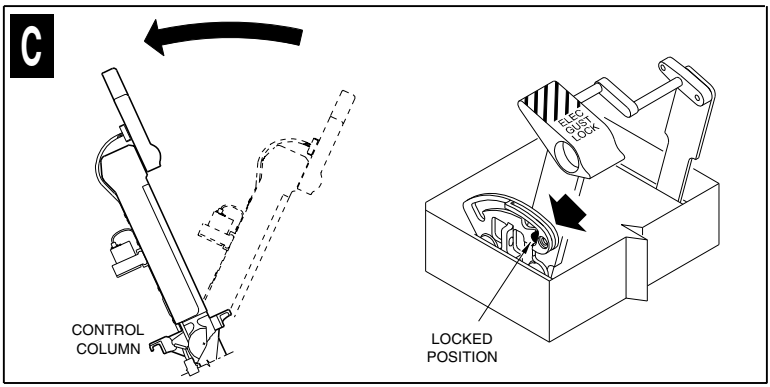
TO LOCK:







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UNLOCKING OPERATION

To unlock the elevator proceed as follows:

A. Lift the safety lock device (1) and move the gust lock lever to its intermediate detent position (2).

B. At this position, the locking pins are commanded to open and the elevators will be unlocked within approximately 10 seconds. The indication lights will illuminate during the unlocking cycle, remaining off after that.
After the indication lights go off, pull the control column backwards to any position from neutral to full nose up.

C. Lift the safety lock device (3) and pull the gust lock lever from the intermediate position to its full forward inflight resting position (4), completing the unlocking cycle.

NOTE: Gust lock lever command from the intermediate to the unlocked (FREE) position is not possible prior to pulling column rearward.

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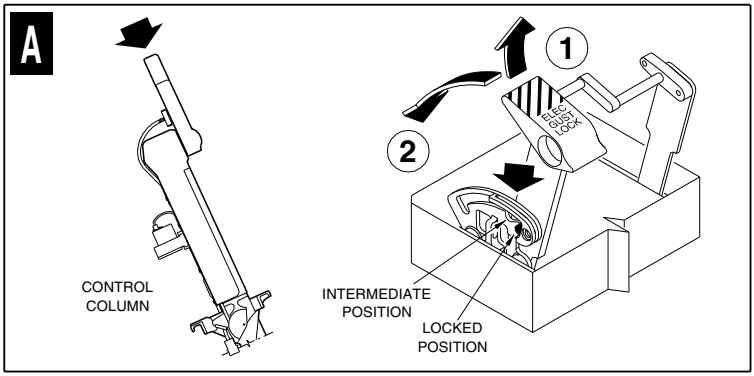
TO UNLOCK:



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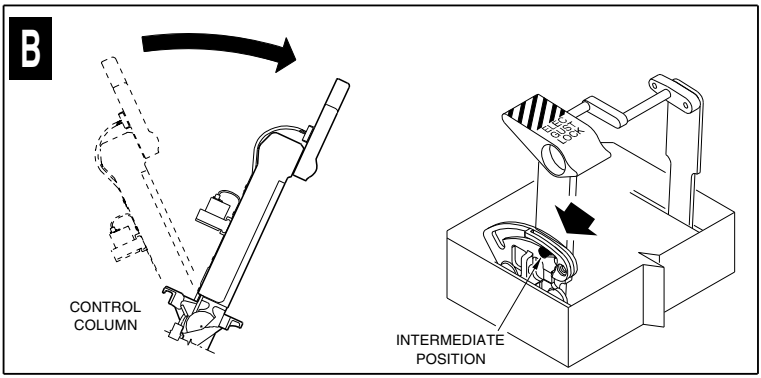

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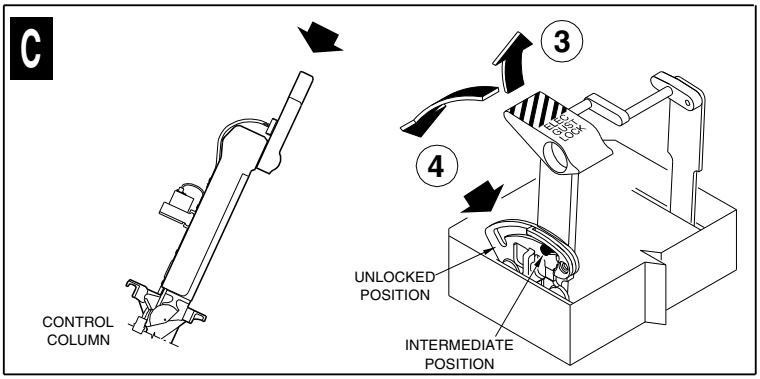

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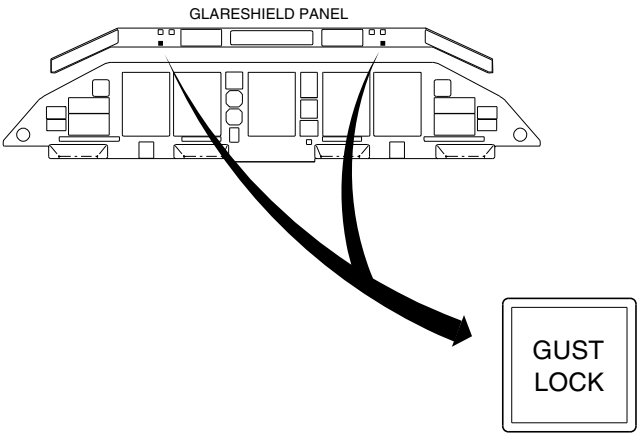
CONTROLS AND INDICATORS

GLARESHIELD PANEL

GUST LOCK INDICATION LIGHTS

- Color: amber.
- Illuminates during the unlocking cycle to indicate that the locking pins were commanded to unlock the elevator surfaces.
- Illuminates in case of failure.
- Illuminates when it is pressed.



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GUST LOCK INDICATION LIGHTS

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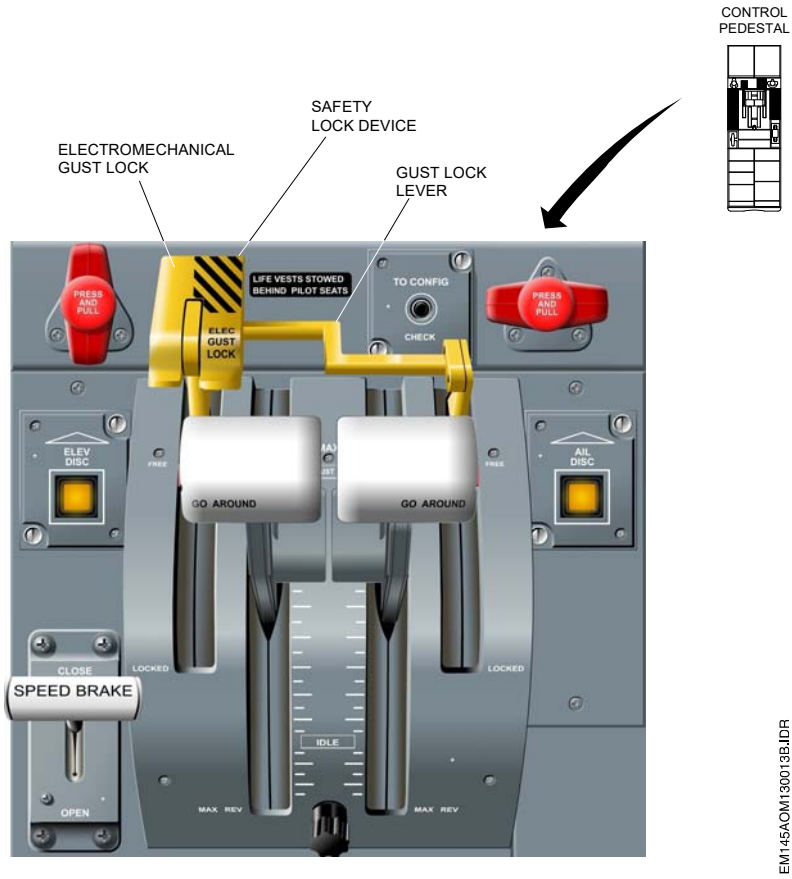
CONTROL STAND

GUST LOCK LEVER

- Actuated backward, locks both elevator and thrust control levers.
- The safety lock has to be lifted to move the lever.



CONTROL STAND

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FLAP SYSTEM

The flaps are electrically operated, consisting of two double-slotted flap panels installed to each wing.

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FLAP SYSTEM OPERATION

The Flap Selector Lever provides four detent settings at 0°, 9°, 22° and 45° positions. Intermediate positions cannot be selected. When any position is selected, the selector lever signals to the Flap Electronic Control Unit (FECU) to move the flap panels. The FECU also monitors system failures and flap position, sending signals to the EICAS and other related systems.

Flap Power and Drive Unit (FPDU) drive the flap panels. The FPDU is a gearbox with two electric motors connected to that unit. Each motor is controlled by the FECU through one independent channel. Both motors drive all the flap actuators through flexible shafts. If a motor, or its associated FECU control channel, or associated velocity sensor or transmission brake fail, the affected channel is disengaged and its associated motor actuation is interrupted. The remaining motor can drive all flap panels at half speed. An EICAS message is presented to indicate that flaps are being moved at a lower speed. If both motors or control channels fail, an EICAS message is presented to indicate that the system is inoperative.

Flap actuators are torque-limited to safeguard structure against excessive loading should flaps or actuators jam. Velocity sensors installed at the end of the flexible shafts detect panels asymmetry. In such cases, the system is disabled.

On the ground a protection circuit prevents flap movement when the airplane is energized and a disagreement is detected between flap position and flap selector lever. To override such protection, it is necessary to lift up and release the flap selector lever.

Two switches on the Flap Selector Lever send signals to the Landing Gear Warning System to alert pilots any time the airplane is in a landing configuration and the gear legs are not locked down.

Flap position is shown on the EICAS display. There are also flap marks on the wing trailing edge, indicating 9° and 22°, which becomes visible when flap moves to those positions.

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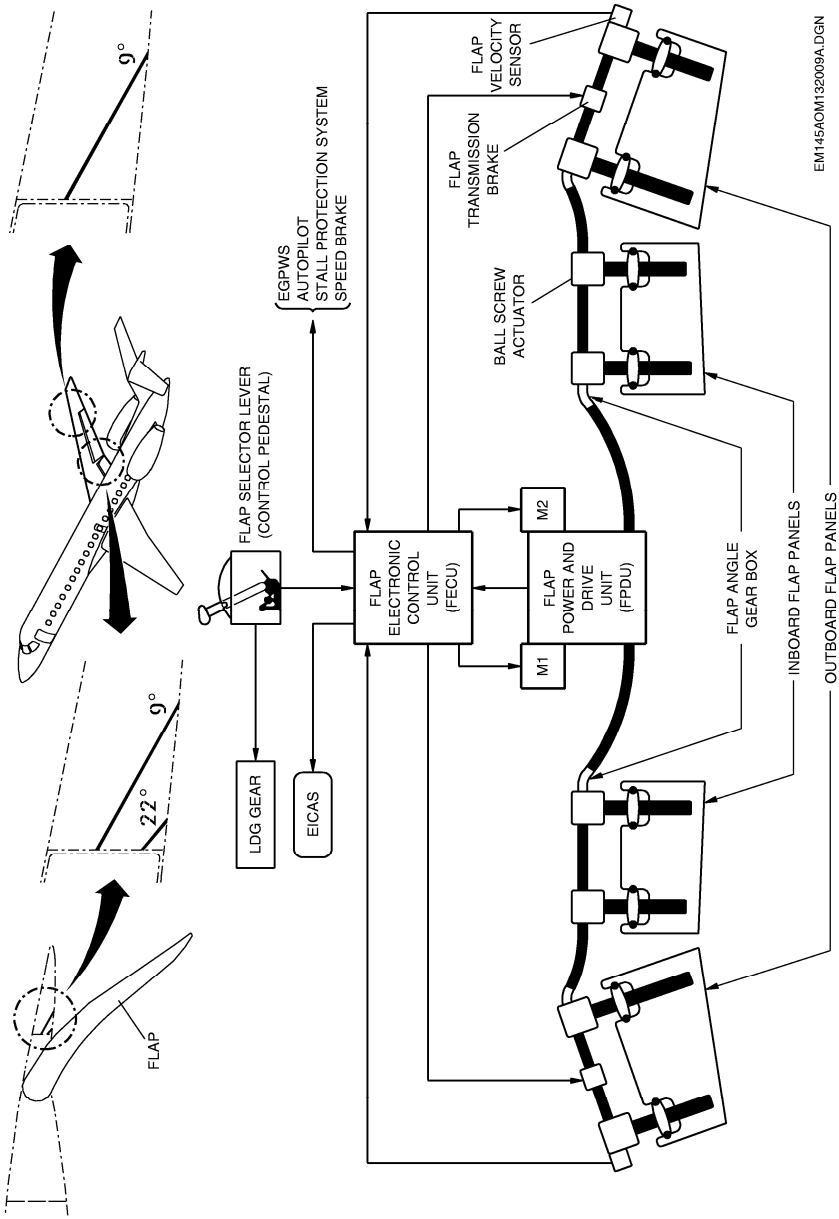

FLAP SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	FLAP FAIL	Both flap channels are inoperative or flap asymmetry is 2° or more.
ADVISORY	FLAP LOW SPEED	One flap channel is inoperative.

FLAP AURAL WARNING (TAKEOFF FLAPS)

If the airplane is on the ground, any thrust lever angle is above 60° and the flaps are not in the certified takeoff position, the digits, box, and pointer turn red, and the aural warning TAKEOFF FLAPS sounds. In addition, only for flaps position of 0° and 45°, the EICAS warning message NO TAKEOFF CONFIG is displayed.

CONTROLS AND INDICATORS

CONTROL PEDESTAL AFT PANEL

1 – FLAP LEVER

- Moved to the detent positions, selects each discrete flap position.
- To move the lever it is necessary to pull it up.
- Intermediate positions are not enabled.

NOTE: The flap position 18° can not be selected.

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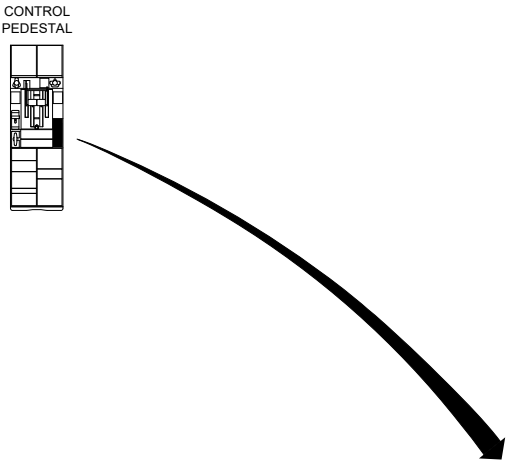

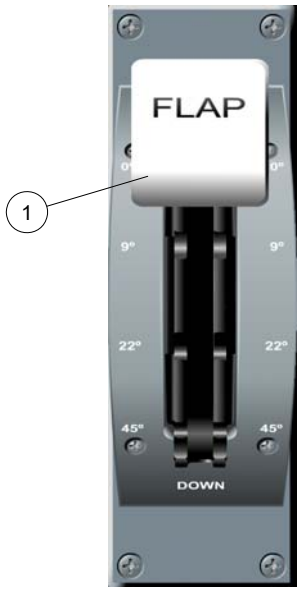

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CONTROL PEDESTAL AFT PANEL

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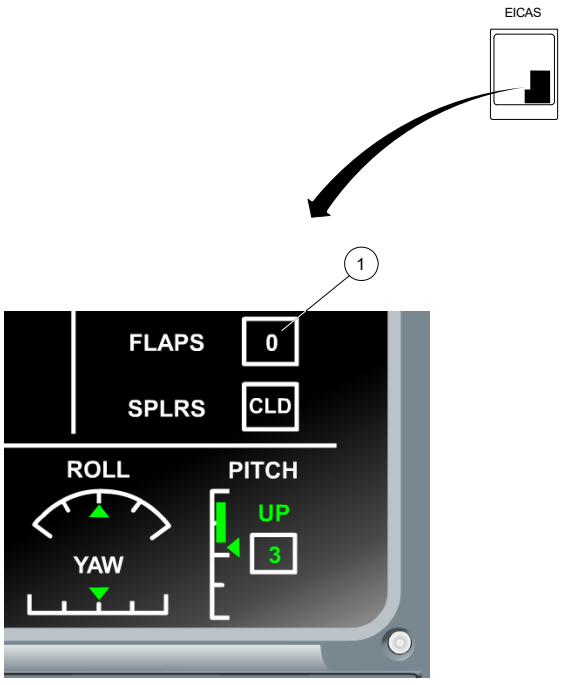
EICAS INDICATIONS

1 – FLAPS POSITION

- Ranges from 0° to 45°, with discrete indication on 0°, 9°, 22° and 45°.
- Colors:
  - Box: white.
  - Digits: - green (except 0, which is white).
    - changes to a green dash when flaps are in transit.
- In-transit flap position is replaced by the actual flap position if flap fails.
- If data is invalid, digits are replaced by amber dashes and box becomes amber.

NOTE: The Flap position can be seen on RMU display.



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EICAS INDICATIONS

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SPOILER SYSTEM

Spoiler system consists of Speed Brake and Ground Spoiler subsystems.

The Speed Brake function is commanded by the pilot through the speed brake lever and is used during flight to reduce airspeed or increase rate of descent by dumping the wing lift and increasing the aerodynamic drag.

The ground spoiler function is commanded automatically during landing and rejected takeoff procedures and is used during landing roll to reduce the stopping distance by increasing the wheel braking efficiency (reducing the residual lift generated by each wing) and aerodynamic drag.

There are two spoiler panels at each wing, inboard and outboard, symmetrically actuated. The outboard panels are deployed in response to speed brake command and all panels are deployed in response ground spoiler command.

A Spoiler Control Unit (SCU) is responsible for permitting the spoiler panels to open or close.

The actuation of either subsystem is fully independent.

Spoilers are electrically commanded and hydraulically actuated.

GROUND SPOILER

The SCU enables the ground spoilers to open whenever the following conditions are met:

– Airplane on the ground.

– Main landing gear wheels running above 25 kt.

– Both engines thrust lever angles set to below 30° or both engines N2 below 56%.

If any of those conditions is not met, the ground spoilers will not open.

A status indication is presented on the EICAS to indicate that the spoilers are open or closed. If a failure is detected, a caution message is presented on the EICAS.

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SPEED BRAKE

The outboard spoiler panels will open when the speed brake lever is set to OPEN and the following conditions are met:

– Thrust lever angle of both engines set to below 50°.

– Flaps at 0° or 9°.

When the speed brake lever is commanded to OPEN with autopilot engaged, the auto pitch trim is provided through the autopilot system.

When the autopilot is not engaged, the SCU provides the auto pitch trim command. In this case, when the speed brake lever is set to OPEN position, the SCU automatically commands the pitch trim to UP. When the speed brake lever is set to return to the CLOSE position, there is another automatic command from the SCU Unit to the pitch trim to DOWN.

If the speed brake lever is commanded to the OPEN position and any of the speed brake open logic conditions are not met, the spoiler panels are kept closed and a caution message "SPBK LVR DISAGREE" is presented on the EICAS.

If the spoiler panels are open and any of the speed brake open logic conditions are not met, the spoilers panels automatically close and a caution message "SPBK LVR DISAGREE" is presented on the EICAS.

In both cases, the speed brake lever must be moved to the CLOSE position to remove the EICAS message.

NOTE: It is not a common operational practice to employ high thrust lever angles with the speed brake deployed.

If the thrust levers are moved to a position greater than 50° and the speed brake lever is in the OPEN position, the spoiler panels will close and there will not be an automatic command to set the pitch trim to DOWN.

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Conversely, whenever the thrust levers are moved to a position below 50°, with the speed brake lever in the OPEN position, the spoiler panels will open and an automatic command to set the pitch trim to UP will occur.

To summarize, if the thrust levers are moved forward and aft around 50° with the speed brake lever in the OPEN position, a sequence of automatic commands will only set the pitch trim to UP, increasing the aircraft pitch attitude.

In such case, the pilots' pitch trim switches must be used to override the automatic pitch trim command.

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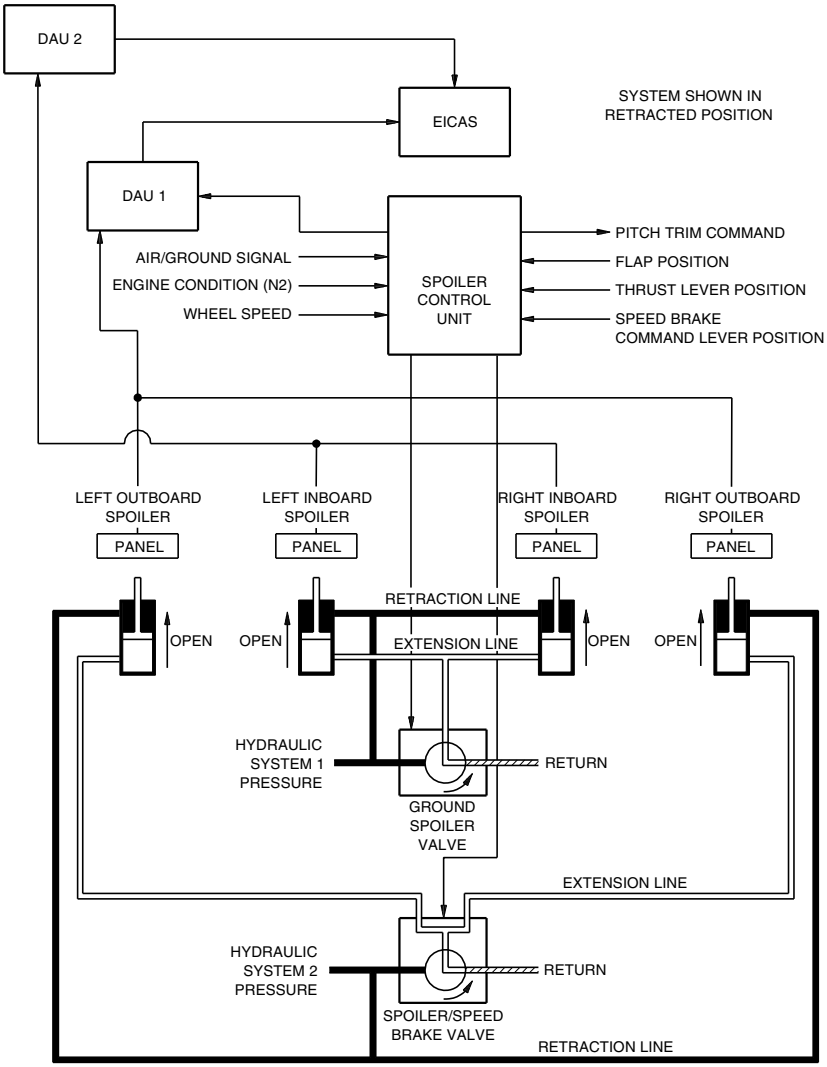

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SPOILER SYSTEM SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	SPBK LVR DISAGREE	Speed Brake Lever commanded to OPEN but opening logic is not satisfied.
	SPOILER FAIL	Any spoiler panel open inadvertently, failed to open or any failure in the input signals.

SPOILER AURAL WARNING (TAKEOFF SPOILERS)

If the airplane is on the ground, any thrust lever angle is above 60° and any spoiler/speed brake panel is deployed, the digits, box, and pointer turn red, the aural warning TAKEOFF SPOILERS sounds and the EICAS warning message NO TAKEOFF CONFIG is displayed.

CONTROLS AND INDICATORS

CONTROL STAND

1 – SPEED BRAKE LEVER

- Actuated to the OPEN position commands outboard spoiler panels to open, provided enabling conditions are met.

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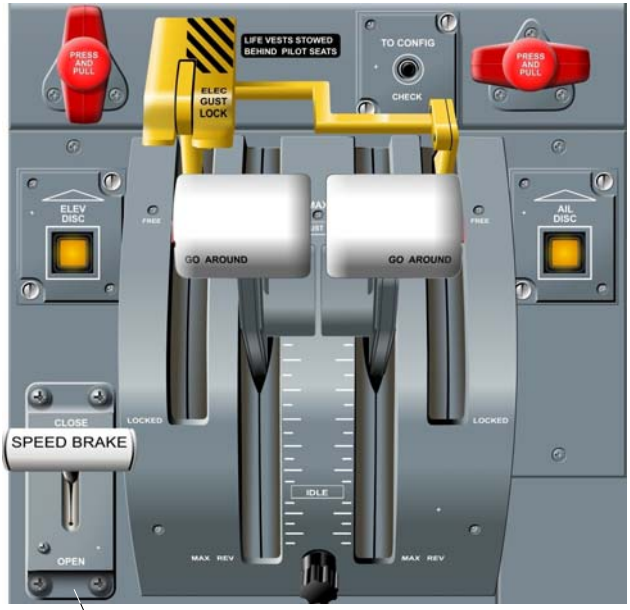
CONTROL PEDESTAL



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CONTROL STAND

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EICAS INDICATIONS

1 – SPOILERS INDICATION

- Displays OPN when any of the surfaces are open, or CLD when all of the surfaces are closed.
- Colors:
  - Box: white.
  - CLD: white.
  - OPN: - green in normal condition.
    - red if any surfaces are open during takeoff.

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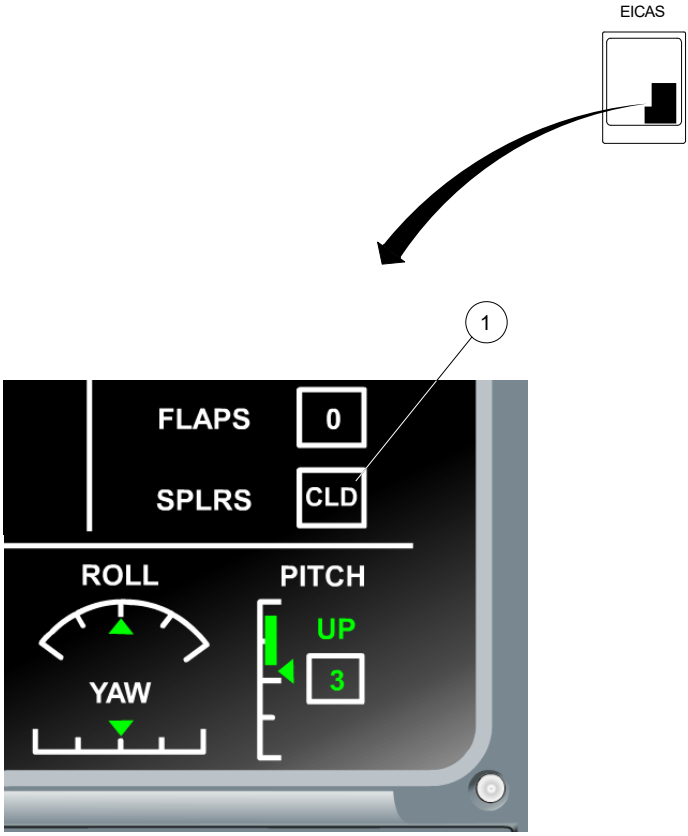

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EICAS INDICATIONS

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SECTION 2-14

PNEUMATICS, AIR CONDITIONING AND PRESSURIZATION

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GENERAL

The pneumatic system can be supplied by the engines, APU or a ground pneumatic source.

The APU or ground pneumatic source supplies the system prior to the engine start. The engines normally supply bleed air for pneumatics after engine start.

The air conditioning system receives air from the pneumatic system and provides conditioned air to the cabin. The system is controlled by two Environmental Control Units (ECU).

The pressurization system uses bleed air from the air conditioning system to pressurize the airplane. Cabin pressure is controlled by modulating the outflow valves. The system is controlled by an automatic mode and has a manual back-up mode.

Cooling for rear and forward electronic compartments is provided by the ventilation system.

System information and messages are presented on the EICAS.

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PNEUMATIC SYSTEM

The pneumatic system receives compressed and hot air from the following sources:

– Engines compression stage;

– APU;

– Ground pneumatic source.

The pneumatic system is used for: engine start, air conditioning, pressurization and anti-ice system.

Engine bleed air comes from the 9th (low pressure) and 14th (high pressure) engine stages.

The 14th stage High Stage Valve (HSV), which is electrically controlled and pneumatically-actuated, opens automatically during low engine thrust operations, engine cross bleed start and anti-ice operation.

As thrust increases, the HSV closes and the 9th BACV (Bleed Air Check Valve) opens supplying bleed air to the system.

Bleed air for engine anti-ice system is provided through the tapping upstream of the HSV.

An Engine Bleed Valve (EBV), which is electrically controlled through the Bleed Air Button and pneumatically-actuated, is installed downstream of the pre-cooler.

Bleed air for the Air Turbine Starter (refer to Section 2-10 – Powerplant) is provided through the tapping downstream of the EBV.

Each engine supplies air to its corresponding air conditioning pack and anti-ice system.

A Cross-Bleed Valve (CBV), which is electrically controlled through the Cross Bleed Knob and pneumatically actuated, provides the segregation or interconnection between both sides in case of APU operation or one engine pneumatic supply.

The pneumatic system's functional logic opens or closes automatically the CBV, if the Cross Bleed Knob is on AUTO position, during engine start, in order to select the available pneumatic source: APU, ground pneumatic source or opposite engine.

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PREVIOUS
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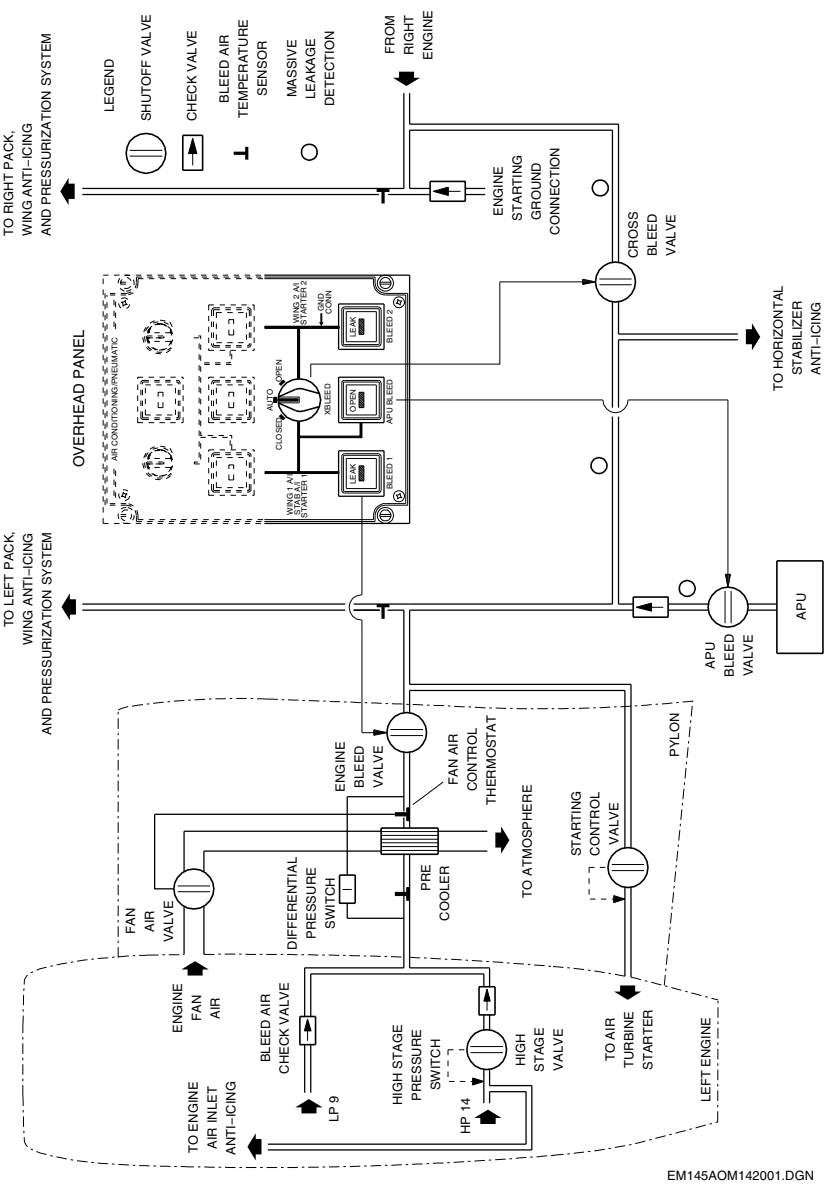

PNEUMATIC SYSTEM SCHEMATIC

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The functional logic also opens automatically the CBV and both HSV whenever the anti-icing system is operating.

Bleed air from the APU, that is used primarily as a auxiliary pneumatic source, is provided in the left side of the pneumatic system to supply the air conditioning and engine starting either on ground or inflight.

An APU Bleed Valve (ABV), which is electrically controlled through the APU Bleed Button and pneumatically-actuated, provides APU bleed control.

The pneumatic system functional logic automatically closes the ABV whenever any engine is supplying bleed air to the left pneumatic side.

An APU Check Valve is installed downstream of the APU bleed valve.

A ground pneumatic source connection, including a check valve, is installed on the right side of the pneumatic system. Its main purpose is to supply pressurized air to start the engines.

Leak detectors (thermal switches) are installed along all the pneumatic lines. Should a duct leakage occur, these detectors activates a warning message in the EICAS.

Should any hot air leakage occur, the bleed sensors and/or three Massive Leakage Detectors (thermal switches – the former located along the pneumatic system ducting and the latter in the rear electronic compartment area) will close the EBV and the HSV of the affected side, as well as the CBV.

Bleed temperatures upstream and downstream of the pre-cooler are monitored through temperature sensors. Temperature downstream of the pre-cooler is presented on a vertical bar indication on the MFD.

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	BLD 1 (2) LEAK	Duct leakage in the associated bleed line. Temperature in the duct region exceeds 91°C (195°F). The switch deactivates at 79°C (175°F).
	BLD 1 (2) OVTEMP	Associated pre-cooler downstream temperature above 305°C (581°F).
	BLD APU LEAK	Duct leakage in the associated bleed line. Temperature in the duct region exceeds 91°C (195°F). The switch deactivates at 79°C (175°F).
CAUTION	APU BLD VLV FAIL	Disagreement between actual position and commanded position of the APU Bleed Valve.
	BLD 1 (2) LOW TEMP	Abnormal low or asymmetric bleed temperature, or pre-cooler outlet temperature sensor failure.
	BLD 1 (2) VLV FAIL	Disagreement between actual position and commanded position of the associated Engine Bleed Valve.
	CROSS BLD FAIL	Disagreement between actual position and commanded position of the Cross-Bleed Valve.

(Continued)

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TYPE	MESSAGE	MEANING
CAUTION	CROSS BLD SW OFF	Cross Bleed Knob selected CLOSED with at least one engine running after brake release.
	HS VLV 1 (2) FAIL	Disagreement between actual position and commanded position of the associated High Stage Valve.
ADVISORY	BLD 1 (2) VLV CLSD	Associated Engine Bleed Valve position. This message is inhibited on ground or during associated engine start.
	CROSS BLD OPEN	Cross Bleed Valve open.

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AIR CONDITIONING SYSTEM

Airplane air conditioning is provided by two the Environmental Control Units (ECU) supplied by the Pneumatic System.

Each side is provided with independent controls, protection devices, and cross-connected air distribution lines for the various modes of operation.

Cockpit and passenger cabin temperature selections are independent and may be controlled either manually or automatically. The left ECU controls the temperature in the cockpit and the right ECU controls the temperature passenger cabin.

The system is normally operated in the automatic mode. In case of automatic mode failure, a manual mode is available.

The pilots may transfer the passenger cabin temperature control to the Attendant Panel.

The air conditioning distribution is performed by the gasper system and general outlets with cross-connection between the cockpit and passenger cabin lines.

This feature, associated with the ram air inlets, allows the cockpit and passenger cabin to be supplied with fresh air, in case of failure of both ECUs.

Recirculating air, driven by two electrical fans, is mixed to fresh air in order to improve passenger and crewmembers' comfort.

A ground cart connection is available at the right-hand duct, connected to the outside through a check valve in the fuselage. The pre-conditioned air from the ground cart is delivered to the cabin directly through the distribution lines.

The air conditioning system incorporates protection features in the temperature controllers which shut off the system in case of malfunctions (duct leakage, duct overtemperature, and pack overtemperature).

The cockpit and passenger cabin temperature indications are presented on the MFD. Caution and advisory messages are presented on the EICAS.

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ECU OPERATION

Each ECU consists of a dual heat exchanger, an air cycle machine (compressor, turbine, and fan), a condenser, a water separator and related control and protective devices, installed forward of the airplane wing root, inside the wing-to-fuselage fairing.

The automatically-controlled bleed air from the pneumatic system supplies the ECU. Downstream pressure is regulated by the Pack Valve (Pressure Regulating and Shutoff Valve).

After the Pack Valve, the airflow is divided into two lines:

– One cold line that passes through to the Air Cycle Machine.

– One hot line that bypasses the Air Cycle Machine.

Both airflow lines are gathered at the expansion turbine discharge.

In the Air Cycle Machine (ACM), air is cooled in the primary heat exchanger and passes through the compressor, thus causing a pressure increase. The air then goes to the secondary heat exchanger where it is cooled again.

After leaving the secondary heat exchanger, the high-pressure cooled air passes through a condenser and a water separator for condensed water removal. Spray nozzles uses the separated water to improve the heat exchanger efficiency.

The main airstream is ducted to the turbine and expanded to provide power for the compressor and cooling fan. This energy removal produces very low turbine discharge temperatures, achieving adequate low temperatures in the process.

The cold exit air is mixed with warm air supplied by the recirculation fan and/or with the hot bypass air immediately upon leaving the turbine.

A check valve is provided in the recirculation duct to prevent reverse flow if the recirculation fan is inoperative.

The ECU outlet air temperature is controlled through the dual temperature control valve. One valve adds hot bleed air to the turbine discharge while the other valve restricts the compressor inlet flow.

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The ECUs are cooled in flight by external the ACM fans, using the external ram air. On the ground, the ECUs are cooled by the ACM fans only.

The system has emergency ventilation, as an alternate means to allow the outside air into the cabin. The impact air passes through the same ram air inlets that are used to cool the dual heat exchangers.

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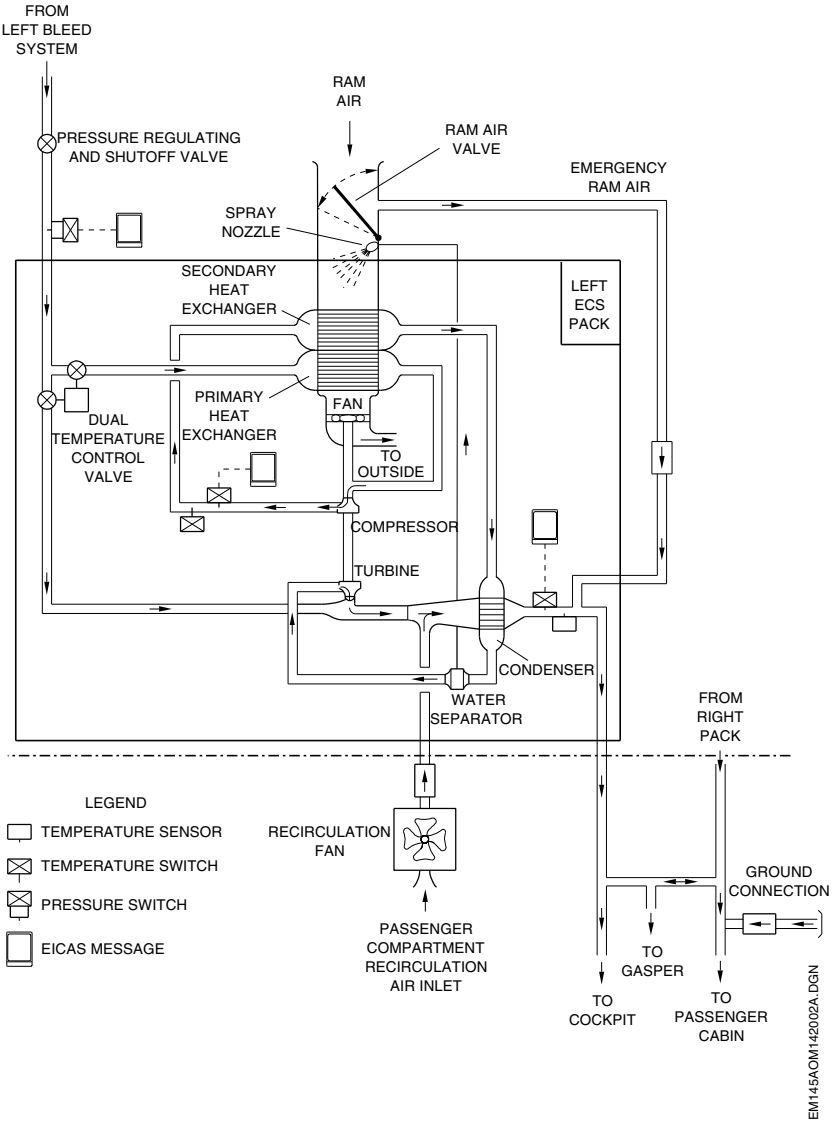

AIR CONDITIONING SYSTEM SCHEMATIC

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When the ECUs air supply is shut off in flight, the emergency ram air is activated and the ram air valves are opened automatically, allowing ram air to be routed to the distribution lines. Ram air may also be used to ventilate the airplane interior for cabin smoke evacuation and cabin ventilation purposes with the airplane depressurized and the ECUs turned off.

NOTE: The Pneumatic System automatic logic closes the left Pack Valve whenever the anti-icing system is operating below 24600 ft.

CABIN TEMPERATURE CONTROL

AUTO MODE

In the automatic mode (temperature knobs pressed), the temperatures in the passenger cabin and in the cockpit are controlled by the digital temperature controllers that receive information from the temperature sensors (ducts, passenger cabin, or cockpit), maintaining the temperature set on the associated temperature knob.

MANUAL MODE

In manual mode (temperature knobs pulled), the temperature in the passenger cabin and in the cockpit are controlled by the temperature control module, that receives information from the temperature knobs and the duct temperature sensor.

The manual mode should be used only if a failure occurs in the automatic mode and may be noticed when the temperature is not maintained within the temperature limits of the automatic mode (between 18°C and 29°C) after cabin temperature stabilization.

If switching from auto mode to manual mode is required, proceed as follows:

– Set the knob to mid range position (12 o'clock).
– Wait for system to stabilize (approximately 30 seconds).
– Switch to manual.
– Smoothly turn the knob to the required point.

Once in the manual mode, the pilot must continuously monitor the temperature and actuate on the Temperature and Mode Selector Knob.

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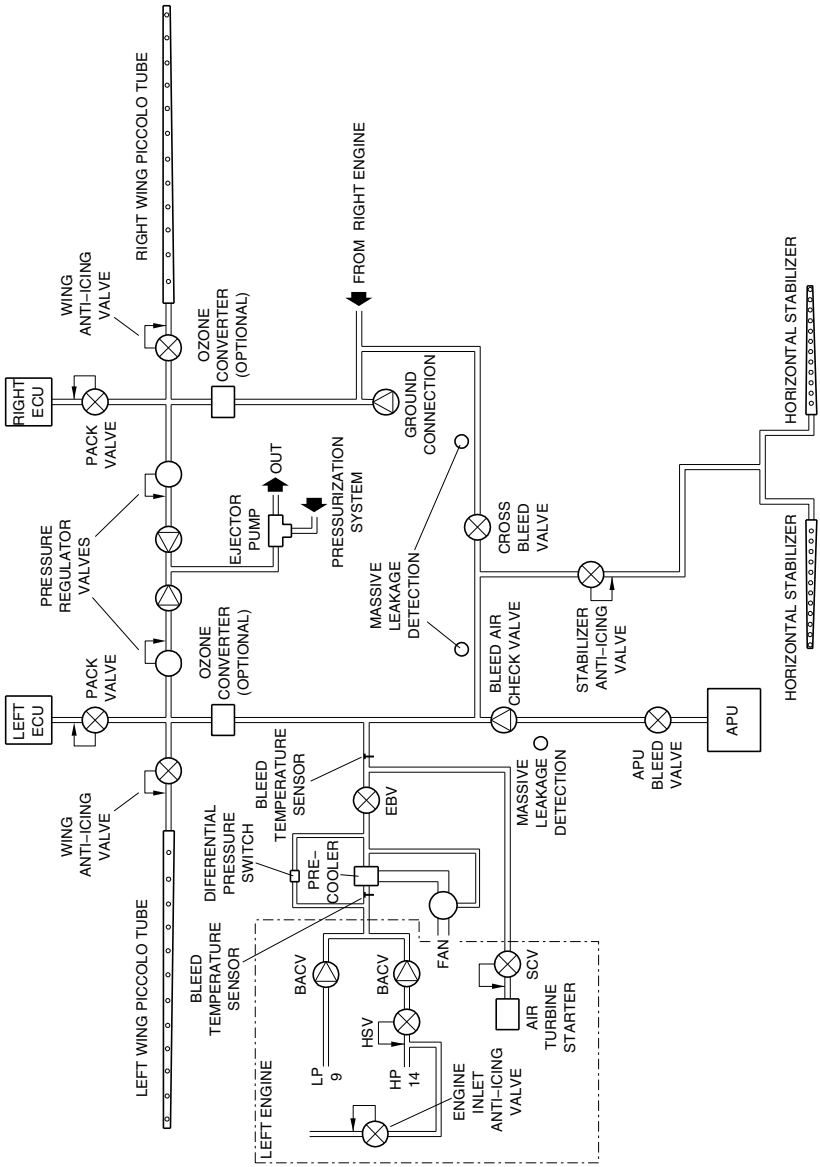

INTEGRATED PNEUMATIC SYSTEM SCHEMATIC

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AIR CONDITIONING DISTRIBUTION

The air conditioning distribution system provides conditioned air to the cockpit and passenger cabin.

The main source of conditioned air to the cockpit is the left pack, with a single distribution system for cooling or heating air.

The cockpit is provided with two FEET AIR handles and air outlets, allowing each pilot to individually control the airflow.

For CRT displays ventilation, a shutoff valve on each side, electrically-driven and independently controlled by a thermal switch, allows cold air to be supplied for this function only.

The main source of conditioned air to the passenger cabin is the right pack and partially by the left pack, through a cross connection duct.

The air distribution system for the passenger cabin is divided into three lines. One line is distributed to the lower ducts, installed at the foot level on both cabin sidewalls. The second line is for the upper ducts of both sidewalls. The third line is dedicated to the gasper. If the duct temperature is below 24°C (75°F), the associated temperature switches command the recirculation fans to increase airflow.

The gasper air subsystem provides air to individual air outlets (gasper), as well as for the rear electronic compartment, oxygen cylinder compartment and relay box ventilation. The air to the gasper is provided by a gasper fan and by one branch from the cross connection of the general distribution system. The gasper fan is similar to the recirculation fan, but it is operated in normal condition only. One thermal switch is installed in the branch line to close fresh air in case of heating condition (above 24°C). In this case, only air from the gasper fan is available.

The recirculation air subsystem, consists of two recirculation fans, and is usually operated to save the engine bleed. It must be kept off should there be smoke in the cabin, or on hot days while on the ground. This reduces the pull-down period and should be turned on in cold soak conditions to reduce pull-up period.

The operational logic to open the Engine Bleed, Cross-bleed, APU Bleed, and Pack Valves will be analyzed herein separately, for better system comprehension. This system also actuates on the Anti-icing System Valves. For further information, refer to Section 2-15 – Ice and Rain Protection.

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PNEUMATIC SYSTEM FUNCTIONAL LOGIC

The pneumatic system functional logic provides automatic control and protection for itself and the user systems, giving priority according to the airplane operation or condition.

ENGINE BLEED VALVE LOGIC

The Engine Bleed Valve (EBV) receives an electrical input to open when the following conditions occur simultaneously:

– Bleed Air Button is pressed to open the valve;

– Respective Essential Bus is energized;

– There is no massive leakage on the respective side of the rear electronic compartment;

– There is no leakage along the pneumatic system ducting;

– Respective engine N2 is above 56.4%; and

– Respective engine fire extinguishing handle is not pulled.

APU BLEED VALVE OPERATIONAL LOGIC

The APU Bleed Valve (ABV) receives an electrical input to open when the following conditions occur simultaneously:

– APU Bleed Button is pressed to open the valve;

– Essential DC Bus 1 is energized;

– Engine 1 bleed valve is closed (no pressure from the left side);

– Engine 2 bleed valve or cross-bleed valve is closed (no pressure from the right side);

– APU rpm above 95%, plus 7 seconds; and

– There is no massive leakage on the APU line.

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PACK VALVE OPERATIONAL LOGIC

The Pack Valve receives an electrical input to open when the following conditions occur simultaneously:

– Air Conditioning Pack Button is pressed to open the valve;

– Respective DC Bus is energized;

– Respective engine is not starting;

– No engine is starting using the APU as pneumatic source;

– No failure in the related pack is detected (overpressure, overtemperature or duct leakage downstream of the Pack Valve); and

– No discrete ECS (Environmental Control System) OFF signal is sent from any related FADEC (A or B).

The FADEC's discrete ECS OFF signals are produced according to the following conditions:

1 - DURING TAKEOFF OR GO AROUND

ACTIVATION CONDITIONS FOR ECS OFF SIGNALS				
ENGINE	FADEC	MODE	PRESSURE ALTITUDE/TAT °C	
			ALL ENGINES OPERATIVE (TAKEOFF ONLY)	ONE ENGINE INOPERATIVE (3)
A1P	ALL	T/O-1, T/O or T/O RSV	Up to 1700 ft above takeoff altitude (1)	Lower than 9700 ft (2)
A1E	ALL	T/O-1, T/O, E T/O, T/O RSV or E T/O RSV	Up to 1700 ft above takeoff altitude (1)	Lower than 9700 ft (2)
A2	ALL	A2 TO RSV, A2 TO, T/O, T/O-1 or T/O RSV	Up to 1700 ft above takeoff altitude (1)	Lower than 9700 ft (2)

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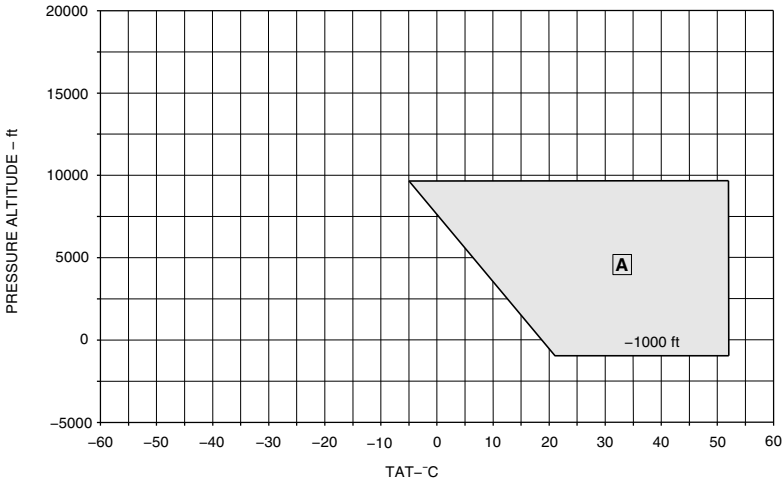
NOTE: (1) TAT above 19°C (66°F) at sea level, decreasing linearly to -5°C (23°F) at 9700 ft.

(2) The ECS OFF signal is activated for the Pack associated with the operating engine if the pressure altitude is lower than 9700 ft and TAT is above 19°C at sea level, decreasing linearly to -5°C at 9700 ft (area A in the following envelope).

(3) A Low N1 condition (actual N1 does not achieve requested N1) is considered one engine inoperative.



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FADEC'S ECS OFF ENVELOPE

The ECS OFF logic is valid only when the packs are using engine bleed. If APU bleed is being used, the ECS OFF logic is inhibited and the pack valves will not shut down.

The FADEC's discrete ECS OFF signal is not produced when using ALT T/O-1 mode during takeoffs with all engines operative.

If a FADEC commands its associated pack to close, through the ECS OFF signal, the pilot must reset the pack when the conditions for the automatic shut down of the pack cease to exist, i.e., an automatic restart of the pack does not exist.

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For airplanes S/N 145462, 145516, 145591, 145644 and on, the packs are automatically reset when the conditions for the ECS OFF signal cease to exist. When both packs are automatically reset, pack 2 will be commanded to open 10 seconds after pack 1 opening, to avoid passenger discomfort due to packs return.

2 - DURING REVERSER USE

The ECS OFF signal is not activated during reverse use.

CROSS BLEED VALVE OPERATIONAL LOGIC

The Cross-Bleed Valve (CBV) receives an electrical input to open when the following conditions occur:

- Essential DC Bus 2 is energized;
- There is no leakage along the pneumatic system ducting or a massive leakage in the Rear Electronic Compartment; and
- Cross-Bleed Knob is set to OPEN; or
- Cross-Bleed Knob is set to AUTO and one of the following conditions occurs:
  - Horizontal Stabilizer Anti-Icing System is operating; or
  - Engine 2 is starting; or
  - Engine 1 is starting assisted by engine 2 or external pneumatic source (with APU Bleed Valve manually commanded to the close position).

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	PACK 1 (2) OVHT	Associated ECU outlet temperature above 93°C (200°F).
	PACK 1 (2) OVLD	Associated ECU compressor temperature above 243°C (470°F) or ECU inlet pressure above 55 psig.
	PACK 1 (2) VLV FAIL	Disagreement between associated valve actual position and commanded position.
	RAM AIR VLV FAIL	
ADVISORY	PACK 1 VLV CLSD	Left pack valve closed with no icing condition, or Left pack valve closed with airplane above 24600 ft.
	PACK 2 VLV CLSD	Right pack valve closed.

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CONTROLS AND INDICATORS

AIR CONDITIONING AND PNEUMATIC CONTROL PANEL

1 – CKPT TEMPERATURE CONTROLLER

- PRESSED – Controls the left pack in automatic mode through the Digital Temperature Controller. The cockpit temperature may be set between 18°C (65°F) and 29°C (85°F).
- PULLED – Controls the left pack in manual mode through the temperature control module. No temperature range is established.

2 – PASS CABIN TEMPERATURE CONTROLLER

- PRESSED – Controls the right pack in automatic mode through the Digital Temperature Controller. The passenger cabin temperature may be set between 18°C (65°F) and 29°C (85°F).
- PULLED – Controls the right pack in manual mode through the manual mode circuit in the temperature control module. No temperature range is established.
- ATTD – The passenger cabin temperature control is transferred to the attendant's panel in automatic mode only.

3 – RECIRC BUTTON

- Turns on (pressed) or turns off (released) both recirculation fans.
- A striped bar illuminates inside the button to indicate that it is released.

4 – PACK BUTTONS

- Opens (pressed) or closes (released) the Pressure Regulating and Shutoff Valve of the associated ECU.
- A striped bar illuminates inside the button to indicate that it is released.

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5 – GASPER BUTTON

- Turns on (pressed) or turns off (released) the gasper fan inflight only.
- A striped bar illuminates inside the button to indicate that it is released.
- On ground, the gasper fan is turned on as soon as the associated DC Bus is energized.

6 – ENG XBLEED KNOB

CLOSED	Closes the Cross-bleed Valve.
AUTO	Selects automatic operation mode of the Cross-bleed Valve.
OPEN	Opens the Cross-bleed Valve.

7 – ENG BLEED BUTTONS

- Opens (pressed) or closes (released) the associated Engine Bleed Valve.
- A striped bar illuminates inside the button to indicate that it is released.
- A LEAK inscription illuminates inside the button to indicate a duct leakage in the associated bleed line.

NOTE: The LEAK inscription is not available on some airplanes.

8 – APU BLEED BUTTON

- Opens (pressed) or closes (released) the APU Bleed Valve.
- A striped bar illuminates inside the button to indicate that it is pressed.
- An OPEN inscription illuminates inside the button to indicate that the APU Bleed Valve is in the open position.

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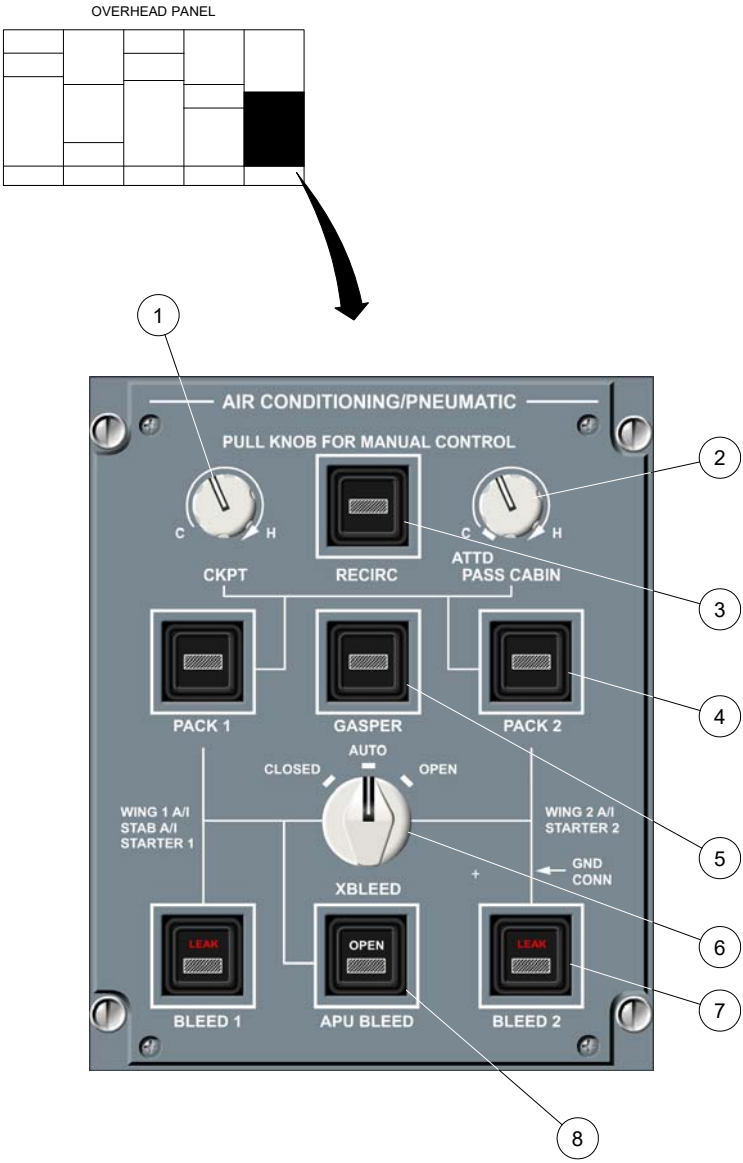

AIR CONDITIONING AND PNEUMATIC CONTROL PANEL

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ENVIRONMENTAL CONTROL SYSTEM (ECS) AND PNEUMATIC PAGE ON MFD

1 – PASSENGER CABIN TEMPERATURE INDICATION

- Indicates the temperature inside the passenger cabin.
- Digits are green.
- Legends are white.
- Ranges from -10°C to 50°C (14°F to 122°F).

2 – COCKPIT TEMPERATURE INDICATION

- Indicates the temperature inside the cockpit.
- Digits are green.
- Legends are white.
- Ranges from -10°C to 50°C (14°F to 122°F).

3 – BLEED TEMPERATURE INDICATION

- Indicates the bleed air temperature downstream of the pre-cooler on the left and right engine.
- Scale and Pointer:
  - White for the scale, below 260°C (500°F) to indicate potentially low thermal energy availability to the anti-icing system. Amber for the pointer, only if the pointer is in the white band of the scale and the message "BLD 1 (2) LOW TEMP" is shown on EICAS.
  - If the pointer is in the white band of the scale and the message "BLD 1 (2) LOW TEMP" is not presented in the EICAS, the pointer will be green.
  - Green from 260°C to 305°C (500°F to 581°F) to indicate the acceptable range.
  - Red above 305°C (581°F) to indicate an overtemperature condition.
  - In case of an outlet temperature sensor failure, the respective pointer is removed from the vertical temperature bar.

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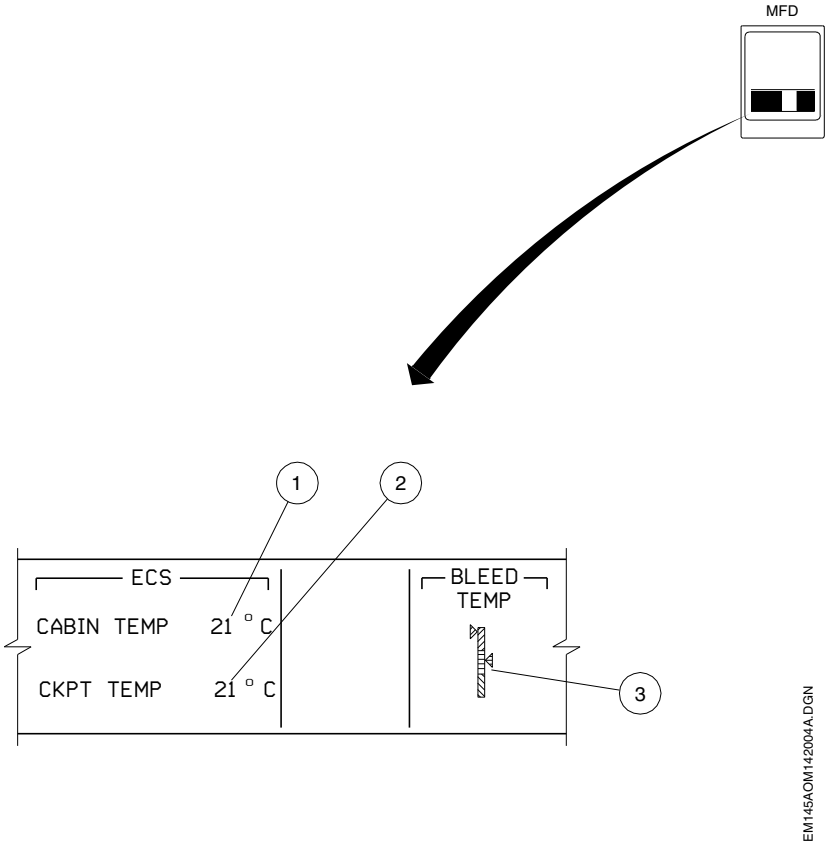

ENVIRONMENTAL CONTROL SYSTEM (ECS) AND PNEUMATIC PAGE ON MFD

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GALLEY CONTROL PANEL

1 - CABIN TEMPERATURE INDICATION

– Indicates the cabin temperature in bargraph format.

2 - CABIN TEMPERATURE CONTROL

– Increase or decrease the cabin temperature through the ▲ and ▼ keys.

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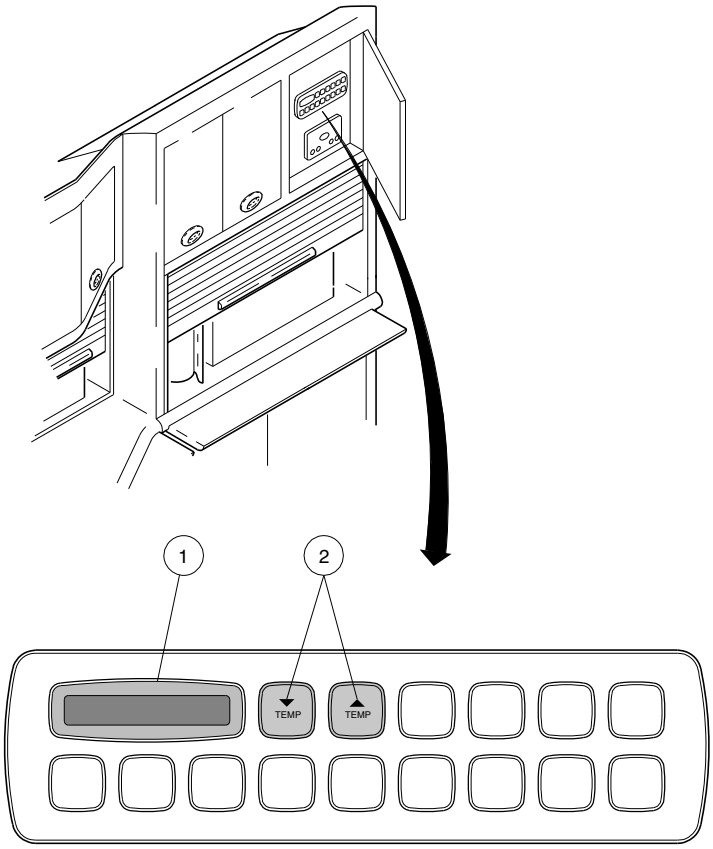

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GALLEY CONTROL PANEL

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PRESSURIZATION SYSTEM

The Cabin Pressure Control System (CPCS) controls the cabin pressure by regulating the cabin air exhaust rate supplied by the ECUs.

The CPCS comprises two subsystems:

– One digital electropneumatic subsystem (automatic mode).
– One pneumatic subsystem (manual mode).

The Cabin Pressure Control System comprises a digital controller, a manual controller, an electropneumatic outflow valve, a pneumatic outflow valve, an air filter, two pressure regulator valves, an ejector pump, two static ports, and a Cabin Pressure Acquisition Module (CPAM).

Both outflow valves receive static pressure signals from static ports for overpressure relief and negative pressure relief functions, actuating pneumatic devices to inhibit airplane structural damage or injury in case of improper system operation.

The safety devices provide the following features:

Airplanes up to S/N 854 and Pre-Mod. SB 145LEG-00-0007:

– Positive cabin differential pressure relief: 8.4 psi maximum.
– Negative cabin differential pressure relief: -0.3 psi.
– Cabin altitude limitation (when in the auto mode): 15000 ft maximum.

Airplanes S/N 863 and on or Post-Mod. SB 145LEG-00-0007:

– Positive cabin differential pressure relief: 8.6 psi maximum.
– Negative cabin differential pressure relief: -0.3 psi.
– Cabin altitude limitation (when in the auto mode): 15000 ft maximum.

The system is normally operated in the automatic mode. The manual mode is used in case of automatic mode failure.

The cabin air filter is provided to prevent nicotine and dust to enter the outflow valve chamber.

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Indications of cabin altitude, cabin differential pressure, and cabin altitude rate of change are presented on the EICAS.

A caution message is presented on the EICAS in case of automatic mode failure, requiring the crew to select the manual mode.

The CPAM and CPCS have internal tolerances of ± 100 ft and ± 200 ft, respectively. Then, depending on these tolerances accumulation, the displayed cabin altitude may be increased up to 300 ft.

If, however, the cabin altitude indication continuously increases and the system is out of its normal range of operation, causing a cabin depressurization, the CPAM sends a signal to the aural warning system to alert the crew when cabin altitude is above 9900 ± 100 ft.

OPERATION IN AUTOMATIC MODE

The automatic mode maintains minimum cabin altitude according to the airplane operating altitude, imposing minimum cabin altitude rate of change.

The automatic mode is controlled by the digital controller and requires a landing altitude to be entered prior to takeoff. According to the landing altitude, the measured cabin pressure, ADC inputs (airplane altitude, altitude rate of change and barometric correction), air/ground position, and thrust lever position, the digital controller determines the adequate opening of the electropneumatic outflow valve.

On airplanes up to S/N 854 and Pre-Mod. SB 145LEG-00-0007, the pneumatic outflow valve is slaved to the electropneumatic outflow valve and both operate simultaneously, maintaining the same position while in the automatic mode.

On airplanes S/N 863 and on or Post-Mod. SB 145LEG-00-0007, during the operation on the automatic mode only the electropneumatic outflow valve is actuated, being the pneumatic outflow valve closed.

Different operation sequences are automatically initiated by the Digital Controller following the received inputs.

The Digital Controller schedules a cabin altitude that is the value that the measured cabin altitude must be equal to.

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Cabin altitude rate of change varies according to the different operation sequences.

Proper operation of the pressurization system in the automatic mode requires that the following conditions be met:

– Automatic mode is selected on the Digital Controller (button not pressed and MAN inscription not illuminated). The pressurization system is in the automatic mode when electrical power is first applied.
– Landing altitude is entered in the Digital Controller prior to the takeoff. Should the landing altitude not be entered, the system will automatically consider 8000 ft as the landing altitude.
– Manual Controller is set to DN position (full counterclockwise). If the Manual Controller is out of the DN position, the pneumatic valve tends to open causing inappropriate automatic mode operation.

DETERMINATION OF THE THEORETICAL CABIN ALTITUDE

The theoretical cabin altitude is a function of the airplane operating altitude. It is calculated in such a way that the maximum cabin differential pressure is reached at the lowest possible airplane altitude considering a minimum cabin altitude rate of climb and a maximum airplane rate of climb.

The maximum cabin differential pressure is 8.1 psi for airplanes up to S/N 854 and Pre-Mod. SB 145LEG-00-0007 and 8.4 psi for airplanes S/N 863 and on or Post-Mod. SB 145LEG-00-0007.

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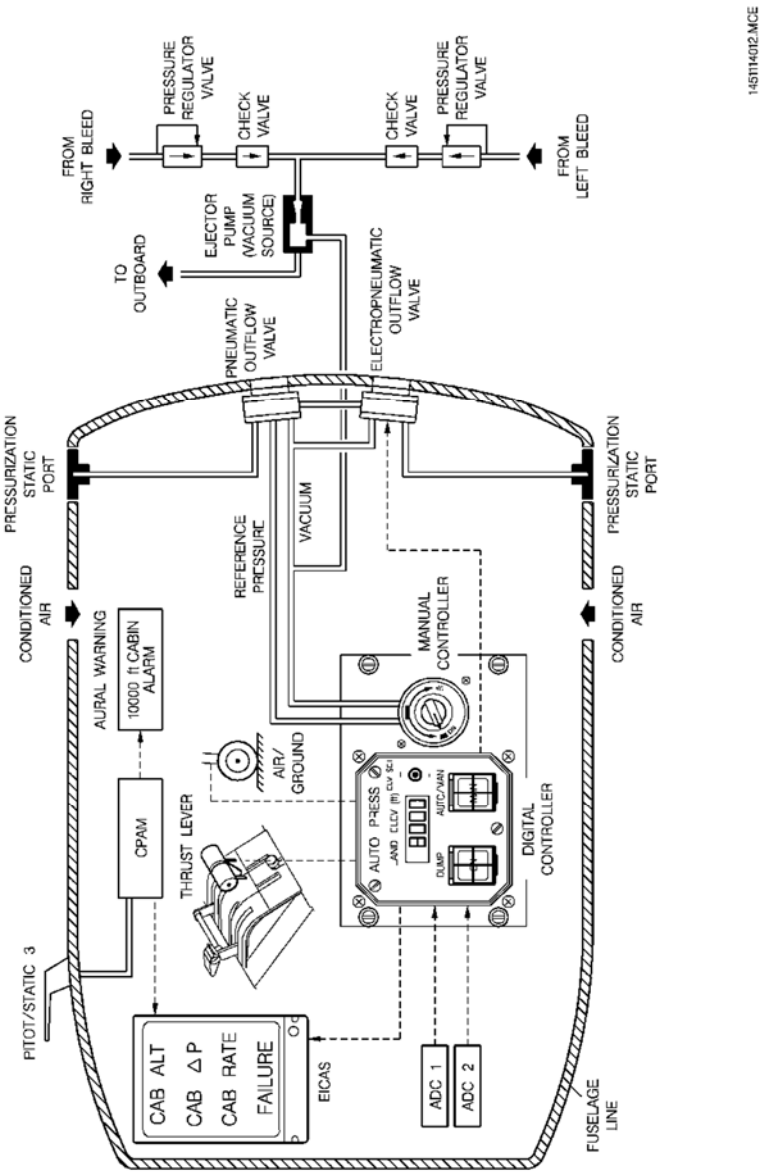

CABIN PRESSURE CONTROL SYSTEM SCHEMATIC APPLICABLE TO AIRPLANES UP TO S/N 854 AND PRE-MOD. SB 145LEG-00-0007

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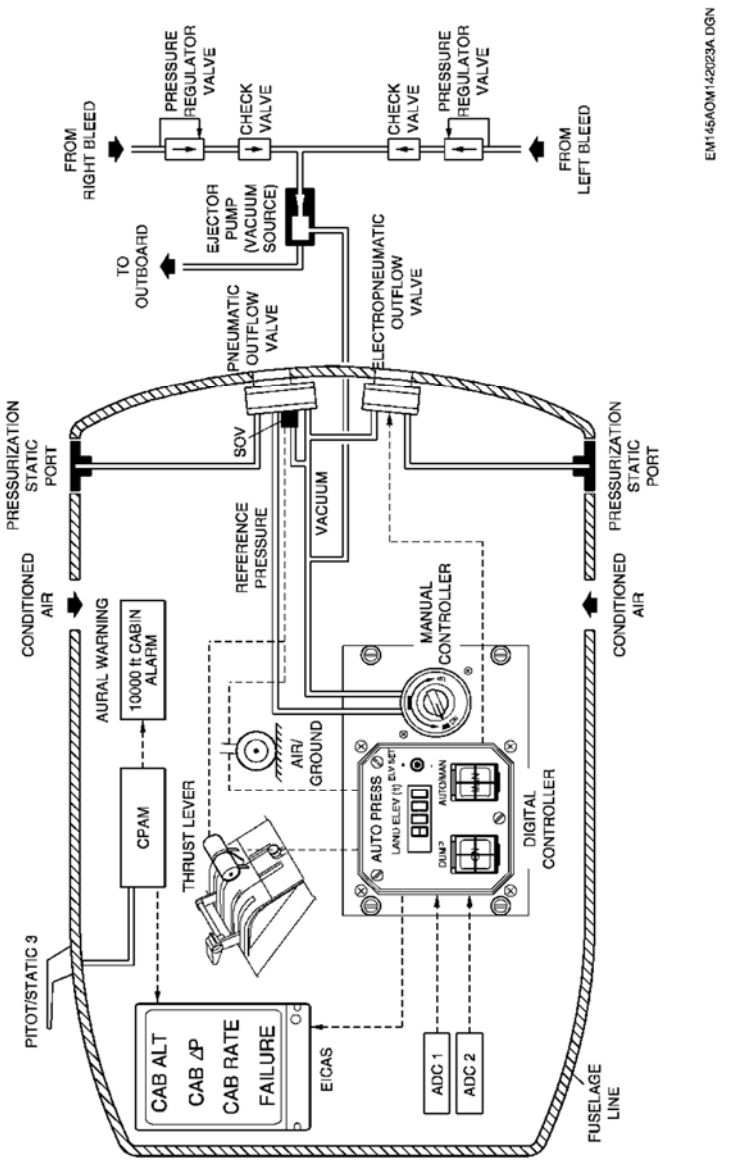

CABIN PRESSURE CONTROL SYSTEM SCHEMATIC APPLICABLE TO AIRPLANES S/N 863 AND ON OR POST-MOD. SB 145LEG-00-0007

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AUTOMATIC PREPRESSURIZATION SEQUENCE ON GROUND

This sequence is initiated and maintained as long as the airplane is on the ground and the thrust lever is set to THRUST SET position or above.

For airplanes up to S/N 854 and Pre-Mod. SB 145LEG-00-0007, it causes the cabin altitude to descend toward an altitude equivalent to 400 ft (0.2 psi) below the takeoff altitude.

For airplanes S/N 863 and on or Post-Mod. SB 145LEG-00-0007, it causes the cabin altitude to descend toward an altitude equivalent to 750 ft (0.4 psi) below the takeoff altitude.

The purpose of the automatic pre-pressurization is to avoid cabin bumps due to the irregular airflow on the fuselage during rotation and takeoff and also to keep a controlled cabin altitude just after rotation, as the cabin altitude tends to follow the airplane altitude.

In the case of takeoff with air conditioning supply, the cabin altitude is controlled with an altitude rate of descent equal to -450 ft/min.

In the case of takeoff without air conditioning supply, the outflow valves are closed, also avoiding cabin bump.

TAKEOFF SEQUENCE

This sequence is initiated after the airplane leaves the ground with the purpose of avoiding reselecting the landing altitude, in case it is necessary to return to the takeoff airport.

For airplanes up to S/N 854 and Pre-Mod. SB 145LEG-00-0007, it causes the cabin altitude to continue descending towards the altitude equivalent to 400 ft below the takeoff altitude. If an altitude of 400 ft below the takeoff altitude has already been reached during the pre-pressurization sequence, the cabin altitude does not change.

For airplanes S/N 863 and on or Post-Mod. SB 145LEG-00-0007, it causes the cabin altitude to continue descending towards the altitude equivalent to 750 ft below the takeoff altitude. If an altitude of 750 ft below the takeoff altitude has already been reached during the pre-pressurization sequence, the cabin altitude does not change.

The takeoff sequence lasts until the theoretical cabin altitude becomes greater than the actual cabin altitude, or until 15 minutes have elapsed since the sequence initiation, whichever occurs first.

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FLIGHT SEQUENCE

This sequence is initiated after the takeoff sequence is finished, to establish a cabin altitude and a cabin altitude rate of change during flight.

For airplanes up to S/N 854 and Pre-Mod. SB 145LEG-00-0007, the Digital Controller schedules a cabin altitude that is the greatest value between the theoretical cabin altitude and the selected landing altitude minus 300 ft.

For airplanes S/N 863 and on or Post-Mod. SB 145LEG-00-0007, the Digital Controller schedules a cabin altitude that is the greatest value between the theoretical cabin altitude and the selected landing altitude minus 650 ft.

The cabin altitude rate of change is controlled at different values depending on the scheduled cabin altitude and the airplane vertical speed, but is limited to -450 ft/min during descent and 700 ft/min while climbing.

Barometric correction, when required, is automatically provided by the Air Data Computer (ADC).

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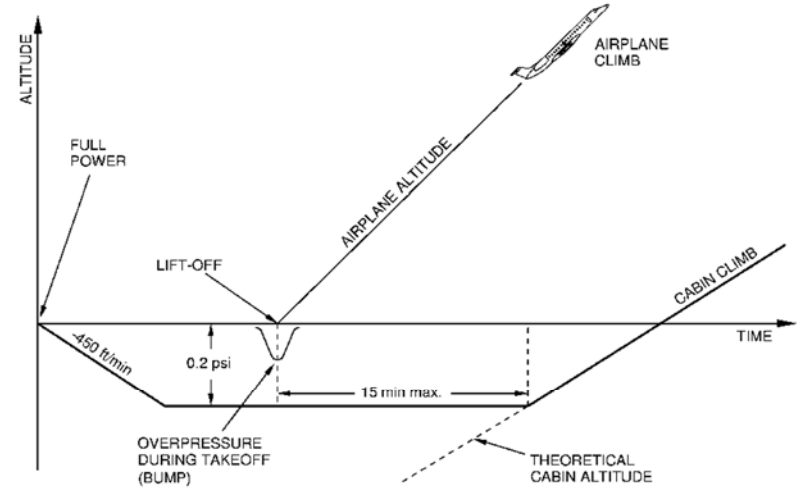
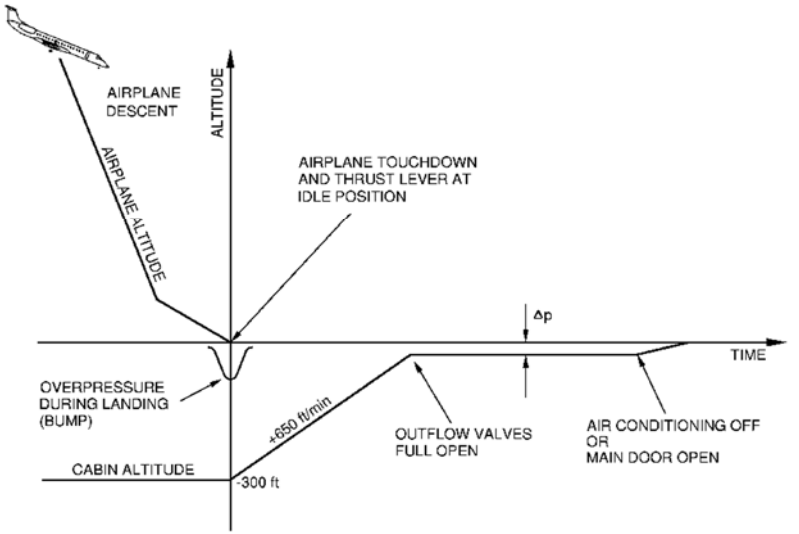


AUTOMATIC PREPRESSURIZATION AND TAKEOFF SEQUENCE



AUTOMATIC DEPRESSURIZATION SEQUENCE ON GROUND

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AUTOMATIC MODE OPERATION SCHEMATIC APPLICABLE TO AIRPLANES UP TO S/N 854 AND PRE-MOD. SB 145LEG-00-0007

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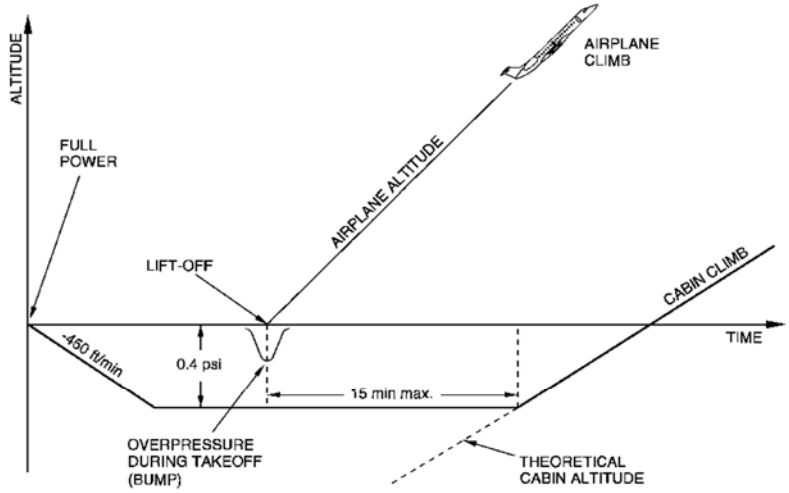
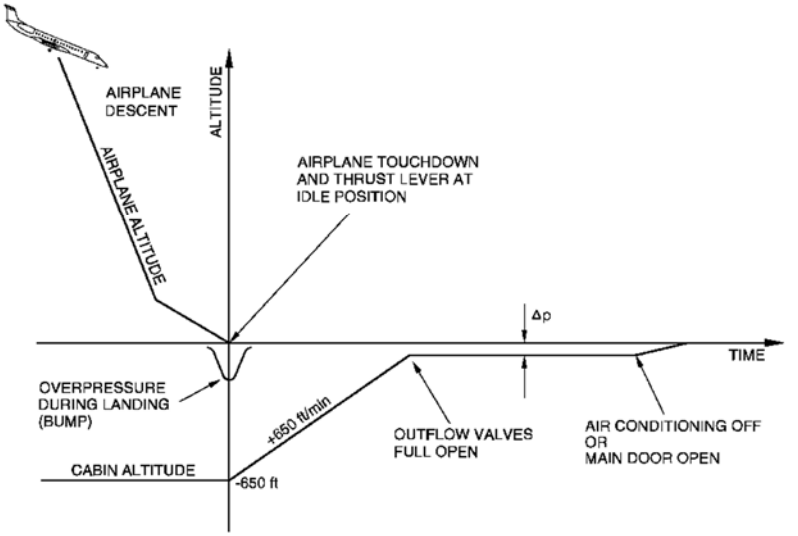


AUTOMATIC PREPRESSURIZATION AND TAKEOFF SEQUENCE



AUTOMATIC DEPRESSURIZATION SEQUENCE ON GROUND

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AUTOMATIC MODE OPERATION SCHEMATIC APPLICABLE TO AIRPLANES S/N 863 AND ON OR POST-MOD. SB 145LEG-00-0007

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AUTOMATIC INCREASED RATE OF DESCENT SEQUENCE

This sequence is initiated when the airplane descent rate is greater than 200 ft/min, in order to satisfy all airplane rapid descent cases. The cabin altitude rate of change limits may be accordingly increased, depending on the remaining flight time which is calculated considering the airplane operating altitude, airplane vertical speed and the selected landing altitude.

Therefore, the cabin altitude rate of descent limit may be increased to a value between -450 ft/min and -500 ft/min. In case the selected landing altitude is higher than 8000 ft, the cabin altitude rate of descent limit may be increased to a value between +700 ft/min and +1500 ft/min.

AUTOMATIC DEPRESSURIZATION SEQUENCE ON GROUND

This sequence is initiated when the airplane is on the ground and the thrust lever is in the IDLE position.

To avoid a cabin bump during the landing, it is necessary that the airplane land with the cabin being submitted to a small differential pressure.

For that reason, the automatic mode always controls, for landing, a cabin altitude equal to the selected landing altitude minus 300 ft (for airplanes up to S/N 854 and Pre-Mod. SB 145LEG-00-0007) or 650 ft (for airplanes S/N 863 and on or Post-Mod. SB 145LEG-00-0007). This sequence cancels this differential pressure corresponding to 300 ft or 650 ft, as well as reduces cabin bump when the air conditioning is turned off or the main door is open.

Cabin depressurization is controlled at a rate of climb equal to 650 ft/min, up to the full opening of the outflow valves.

In automatic mode, the rapid cabin depressurization is commanded by the Dump Button.

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OPERATION IN MANUAL MODE

Manual operation is accomplished through the manual controller which actuates only the pneumatic outflow valve, while the electropneumatic outflow valve is kept closed, by selecting MAN in the Pressurization Mode Selector Button and rotating the Manual Controller until the desired cabin rate of change is reached. The crew is responsible for monitoring cabin differential pressure within acceptable values.

In manual mode, the DUMP button is not effective and a rapid cabin depressurization is commanded by turning the manual controller to the UP position (clockwise stop). In this mode, the cabin altitude limitation at 15000 ft does not exist as it does in the automatic mode.

EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	PRESN AUTO FAIL	Automatic pressurization mode failure.

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CONTROLS AND INDICATORS

DIGITAL CONTROLLER

1 – LANDING ALTITUDE INDICATOR

- Displays the selected landing altitude.
- Displays a failure code if any failure is detected during power-up and continuous monitoring tests . In this case, the selection of the landing altitude is disabled.
- Successful power-up test is displayed (all light segments illuminated) until a landing altitude is selected.
- Displays blanks when Dump button or Mode Selector Button is pressed.

2 – ELV SET SWITCH

- Sets the landing altitude in the Landing Altitude Indicator.
- Altitude changes in 100-ft steps. Holding the selector for more than 5 seconds changes the altitude in a 1000 ft/sec rate.
- Landing altitude setting from -1500 ft to +14000 ft.

3 – AUTO/MAN BUTTON (GUARDED)

- Provides selection of either automatic mode (button released) or manual mode (button pressed) of operation.
- When pressed, the MAN inscription illuminates inside the button.

NOTE: In case of electrical failure that leads to the complete turning off of the automatic mode turning off, manual mode should be selected by pressing the Pressurization Mode Selector Button, but the MAN inscription will not be illuminated.

4 – DUMP BUTTON (GUARDED)

- Provides rapid cabin depressurization up to 14500 ft.
- When pressed, an ON inscription illuminates inside the button.
- This button is effective in the automatic mode only.

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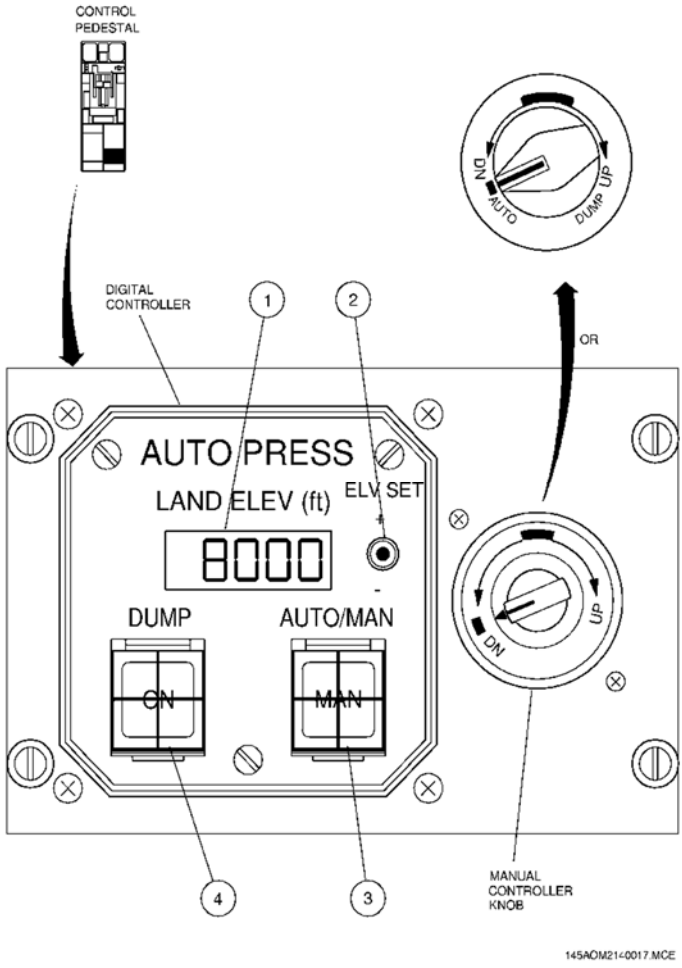
MANUAL CONTROLLER KNOB

– Selects cabin rate of change between -1500 ft/min (at DN position) and approximately +2500 ft/min (at UP position), when in the manual operating mode.

– When operating in the AUTO mode, it must be set to the DN position.



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PRESSURIZATION CONTROLS AND INDICATORS

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PRESSURIZATION INDICATION ON EICAS

AIRPLANES UP TO S/N 854 AND PRE-MOD. SB 145LEG-00-0007

1 – CABIN ALTITUDE INDICATION

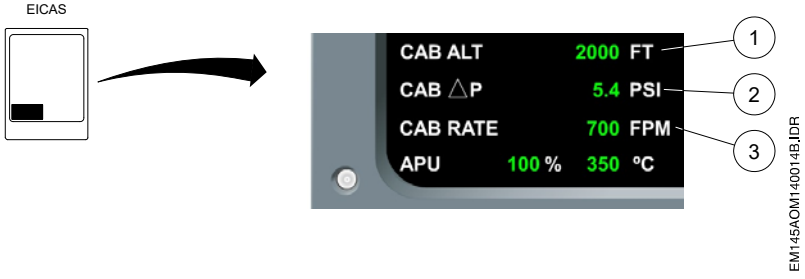
- Displays cabin altitudes, regardless of the operating mode.
- Ranges from -1500 to 39000 ft, with a resolution of 100 ft.
- Green: from -1500 to 8300 ft.
- Amber: from 8400 to 9900 ft.
- Red: from 10000 to 39000 ft.

2 – DIFFERENTIAL PRESSURE INDICATION

- Displays the differential pressure between the cabin interior and the outside, regardless of the operating mode.
- Ranges from -0.5 to 10.0 psi, with a resolution of 0.1 psi.
- Green: from 0.0 to 8.2 psi.
- Amber: from -0.3 to -0.1 psi and from 8.3 to 8.6 psi.
- Red: from -0.5 to -0.4 psi and from 8.7 to 10.0 psi.

3 – CABIN RATE OF CHANGE INDICATION

- Displays the cabin rate of change, regardless of the operating mode.
- Ranges from -2000 to 2000 ft/min, with a resolution of 50 ft/min.
- Green full range.
- For rates out of range the indication is replaced by amber dashes.



PRESSURIZATION INDICATION ON EICAS

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AIRPLANES S/N 863 AND ON OR POST-MOD. SB 145LEG-00-0007

1 – CABIN ALTITUDE INDICATION

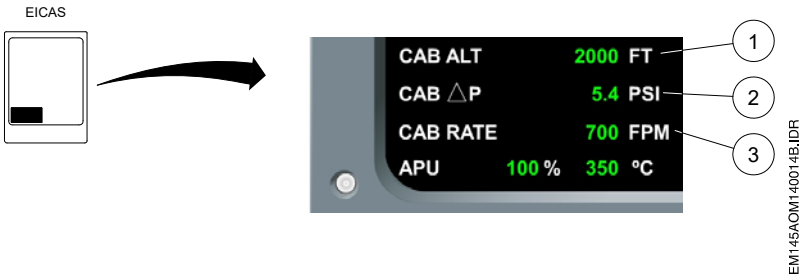
- Displays cabin altitudes, regardless of the operating mode.
- Ranges from -1500 to 41000 ft, with a resolution of 100 ft.
- Green: from -1500 to 8300 ft.
- Amber: from 8400 to 9900 ft.
- Red: from 10000 to 41000 ft.

2 – DIFFERENTIAL PRESSURE INDICATION

- Displays the differential pressure between the cabin interior and the outside, regardless of the operating mode.
- Ranges from -0.5 to 10.0 psi, with a resolution of 0.1 psi.
- Green: from 0.0 to 8.5 psi.
- Amber: from -0.3 to -0.1 psi and from 8.6 to 8.9 psi.
- Red: from -0.5 to -0.4 psi and from 9.0 to 10.0 psi.

3 – CABIN RATE OF CHANGE INDICATION

- Displays the cabin rate of change, regardless of the operating mode.
- Ranges from -2000 to 2000 ft/min, with a resolution of 50 ft/min.
- Green full range.
- For rates out of range the indication is replaced by amber dashes.



PRESSURIZATION INDICATION ON EICAS

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ELECTRONIC BAY COOLING SYSTEM

FORWARD ELECTRONIC BAY

An automatic cooling system is provided in the nose electronic bay, where most of the electronic equipment is installed. This system maintains the temperature inside the bay within the avionics operational limits.
The system comprises two NACA air inlets, two shutoff valves, two recirculation fans, two exhaust fans, two check valves, four control thermostats, and two overtemperature thermostats.

The NACA air inlets are provided with water separators and drains to deter water ingestion by the air inlets into the compartment.

All the fans are powered by four dedicated Inverter Modules.
When the airplane is energized, the inverter modules are turned on, supplying power to the recirculation fans.
The electrical power supply to the recirculation fan 2, exhaust fan 1 and shutoff valve 1 is completely segregated from the remaining components, to prevent a total loss of the system in case of an electrical system single failure. Each recirculation fan operates continuously when its associated bar is energized.

A check valve is installed on each exhaust duct (left and right) to avoid water ingestion through the exhaust fans.

If the forward electronic bay internal temperature exceeds 24°C (75°F) the control thermostats open the shutoff valves and turn the exhaust fans on. When the temperature drops below 19°C (66°F), the shutoff valves are closed and the exhaust fans are turned off.

In the event that the temperature limit is reached, two overtemperature thermostats are actuated and a caution message is presented on the EICAS.

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REAR ELECTRONIC BAY

In flight or during operation with the doors closed, rear electronic bay cooling is performed by conditioned air discharged from the cabin. When this air flows from the underfloor area to the outflow valves, installed on the rear pressure bulkhead, it passes through this compartment, cooling it.

During ground operation, with the airplane unpressurized, an air outlet blows air from the gasper fan line towards the rear electronic bay.

EICAS MESSAGE

TYPE	MESSAGE	MEANING
CAUTION	ELEKBAY OVTEMP	Temperature inside the forward bay exceeds 71ºC (160°F) maximum.

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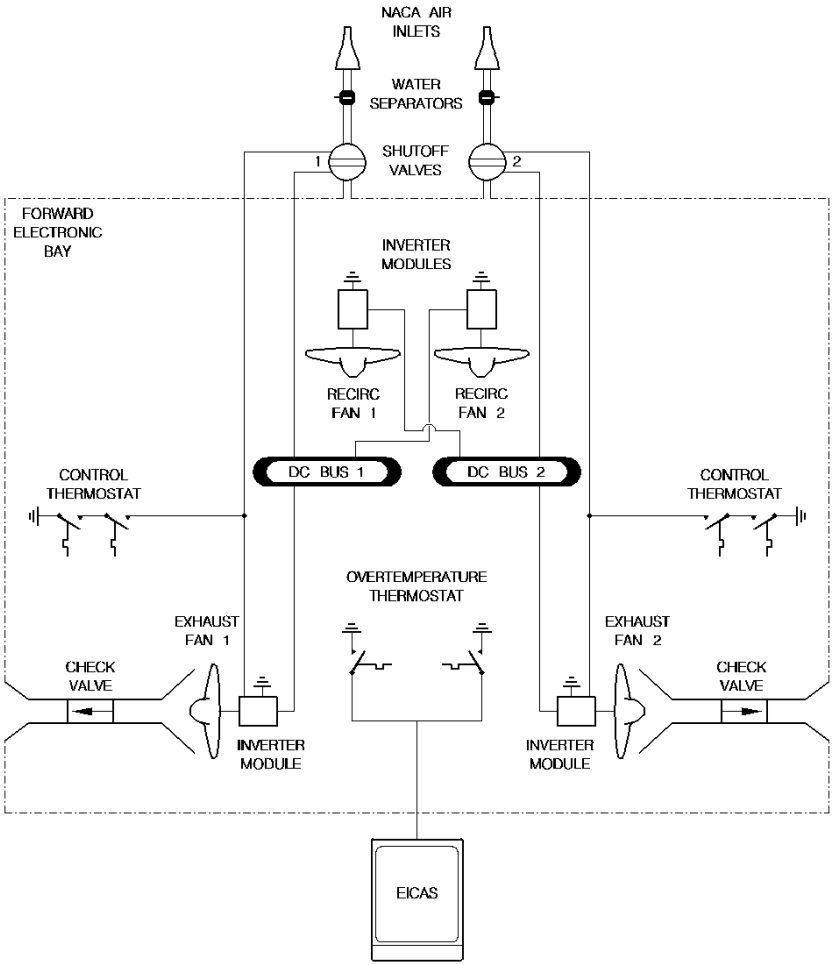

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FORWARD ELECTRONIC BAY COOLING SCHEMATIC

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BAGGAGE VENTILATION SYSTEM

Airplanes equipped with "class-C" baggage compartment have a Baggage Ventilation System installed. Although no dedicated temperature control is available (the "class-C" baggage compartment is heated by the passenger cabin air flowing into it), the Baggage Ventilation System provides an adequate environment for carrying live animals in the compartment.

The Baggage Ventilation System is composed of two ambient check valves and a baggage compartment fan.

Whenever the recirculation fan is off, the forward check valve prevents reverse flow into the passenger cabin and the two check valves prevent smoke or fire extinguishing agent penetration into the passenger cabin or into the rear electronic compartment (refer to Section 2-7 – Fire Protection).

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SECTION 2-15

ICE AND RAIN PROTECTION

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GENERAL

Airplane ice protection system is provided by heating critical ice build up areas through the use of either hot air or electrical power. The system is fully automatic and under icing conditions, activates the entire protection system (the only exception is the windshield heating system).

The hot air-heated areas are:
– Wing and horizontal stabilizer leading edges.
– Engine air inlet lips.

The electrically heated areas are:
– Windshields.
– Pitot tubes, Pitot-static tube, AOA sensors, TAT probes, ADCs and pressurization static ports.
– Lavatory water drain and potable water service nipples.

Two fully independent wiper systems remove rain from the windshields.

All ice protection systems provide signals to the EICAS for malfunctioning system display.

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ICE AND RAIN PROTECTION SYSTEM

BLEED AIR THERMAL ANTI-ICING SYSTEM

The bleed air thermal anti-icing system is supplied with hot air tapped from the engines. In the automatic mode, the system is turned on through activation of either ice detector. Manually, setting the OVERRIDE Knob to the ALL position activates the system.

Adequate ice protection for the wing and horizontal stabilizer leading edges and engine air inlet lips is ensured by heating these surfaces. Hot air supplied by the Pneumatic System is ducted through perforated tubes, known as Piccolo tubes. Each Piccolo tube is routed along the surface, so that hot air jets flowing through the perforations heats the surface. Dedicated slots are provided for hot air exhaustion after the surface has been heated.

During night flights, inspection lights, installed on the wing-to-fuselage fairing, illuminate the wing leading edges, allowing the crew to check for ice accumulation.

Each subsystem comprises an anti-icing valve (pressure regulating/shutoff valve). A restrictor limits the airflow rate supplied by the Pneumatic System. It is monitored by pressure sensors, which indicate abnormal low and high air pressure conditions. The pressure sensors protect the respective subsystem against either insufficient or excessive airflow rate.

The wing and stabilizer low pressure protection mode has a redundant detection by means of a second low pressure sensor on the stabilizer system and a differential pressure switch (± 2 psi) that compares root pressure on the left and right half-wing Piccolo tubes.

Air leakage is detected by thermostats installed close to each duct connection. Low pressure switches provide an additional protection against unacceptable leakage level.

The Piccolo tubes integrity is monitored as follows:

– Horizontal stabilizer: By one differential pressure switch comparing the left and right Piccolo tubes pressure.

– Half-wing: It depends on the airplane model. By one differential pressure switch in each Piccolo tube comparing the root and tip pressures or, by manometric switches measuring the tip pressure only.

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Engine ice protection is provided by heating the engine air inlet lip, through the use of non-temperature-controlled hot air tapped directly upstream of each high stage valve. As the engine air inlet has enough airflow surrounding the lip when the engine is running, the engine air inlet lip anti-icing system can be operated on the ground normally and with no limitations. Each engine has its own protection system independent of the airplane's pneumatic system.

The left hand Pneumatic System supplies the horizontal stabilizer anti-icing subsystem. Each half-wing anti-icing subsystem is supplied by its respective side of the Pneumatic System.

The bleed air thermal anti-icing system may be deactivated by buttons, located on the overhead panel.

On the ground, the FADEC incorporates an automatic logic to reduce the maximum available thrust to avoid a sudden engine thrust loss during lift-off, even with the thrust lever set at MAX position.

In flight, the FADEC allows the engines to deliver the maximum rated thrust to compensate for the effect of the high bleed air consumption by the wing and horizontal stabilizer thermal anti-icing subsystems. Moreover, the FADEC provides an automatic logic to ensure a minimum available thrust during icing conditions, even during low thrust setting conditions. This logic is automatically inhibited when the landing gear is extended, in order to improve the airplane's rate of descent and glide slope path adjusting capability.

The APU bleed air is not hot enough to perform anti-icing functions. Therefore it must not be used for such applications.

A caution message is presented on the EICAS if the thermal anti-icing system is turned on during non-icing conditions.

WING, STABILIZER AND ENGINE ANTI-ICING VALVES OPERATIONAL LOGIC

Since the Bleed Thermal Anti-icing System is supplied by the Pneumatic System, it is integrated to the functional logic that provides automatic control and protection for the system.

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The Wing and Stabilizer Anti-icing Valves receive an electrical input that open when the following conditions occur:

– The Ice Detection Test Knob is set to 1 or 2, or

– The airplane is in-flight or attained a ground speed above 25 kt, and

– The Ice Detection Override Knob is set to ALL, or

– The Ice Detection Override Knob is set to AUTO or ENG and any ice detector is activated.

NOTE: - The Wing and Stabilizer Anti-icing Valves are inhibited from opening on the ground and at a ground speed below 25 kt to prevent structural damage caused by surface heating, except during ice detection testing. The ice detection test should not be activated for more than 15 seconds.

- An ICE COND-A/I INOP message may be displayed on the ground in icing conditions at a ground speed below 25 kt. For the logic of this message, refer to Section 2-15-10. If the message is displayed, the associated procedure must be accomplished.

The Engine Anti-icing Valves receive an electrical input to open when the following conditions occur:

– The Ice Detection Override Knob is set to ALL or ENG, or

– The Ice Detection Override Knob is set to AUTO position and any ice detector is activated, or

– The Ice Detection Test Knob is set to 1 or 2.

The engine anti-ice system logic has a narrow range between normal operating pressures and a low pressure value that, if reached, would trigger an E1 (2) A/ICE FAIL message on the EICAS. This message may be presented in flight whenever the engines are set at low thrust settings. This message may be cleared increasing the engine anti-ice system pressure by advancing the thrust levers with Ice Detection Override Knob in AUTO. If the message does clear and the related Engine Air Inlet OPEN inscription remains illuminated, the system is operating normally and the flight may be continued.

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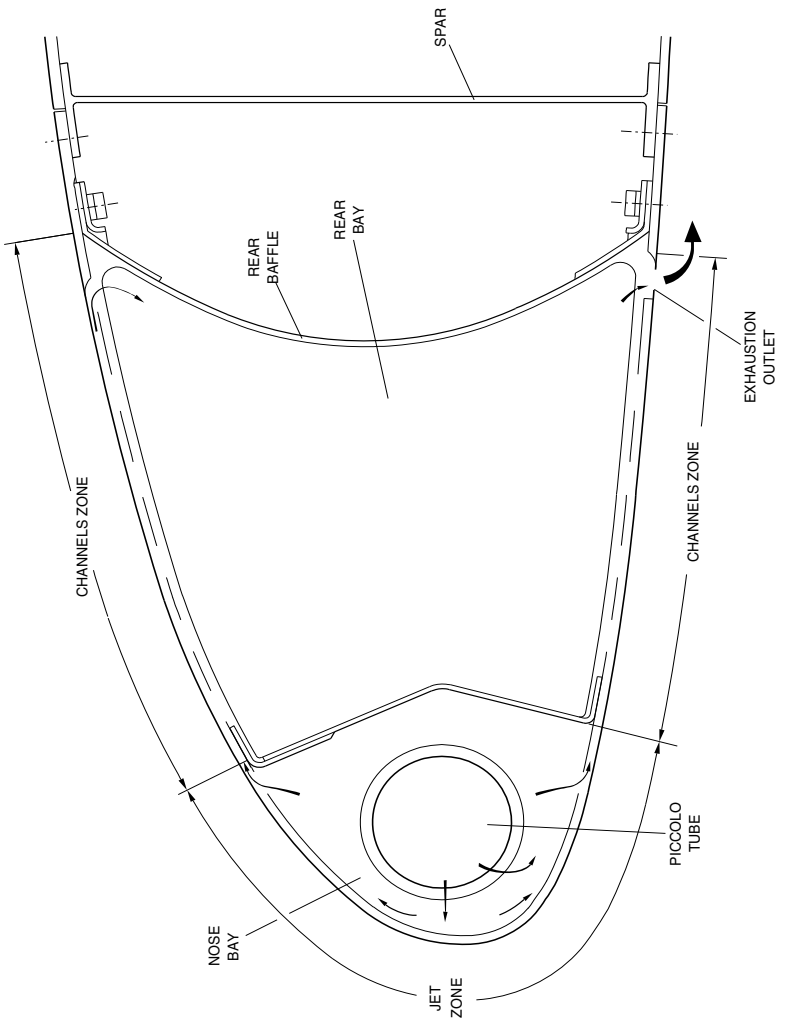

WING ANTI-ICING SYSTEM SCHEMATIC (1 OF 2)

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MEU
PREVIOUS
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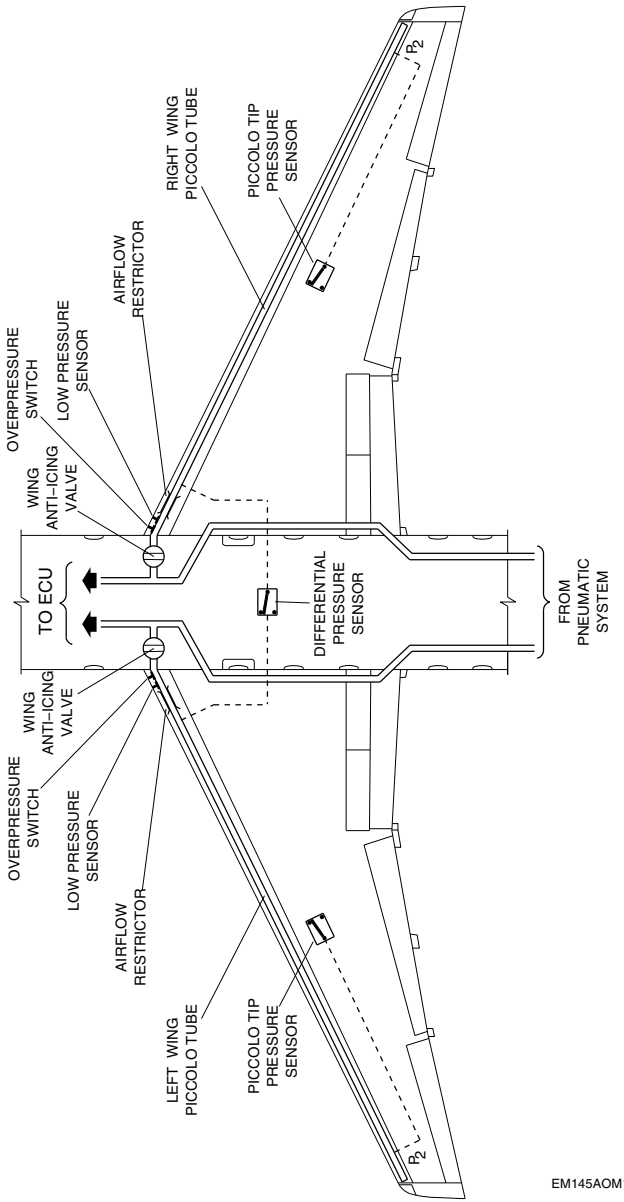

WING ANTI-ICING SYSTEM SCHEMATIC (2 OF 2)

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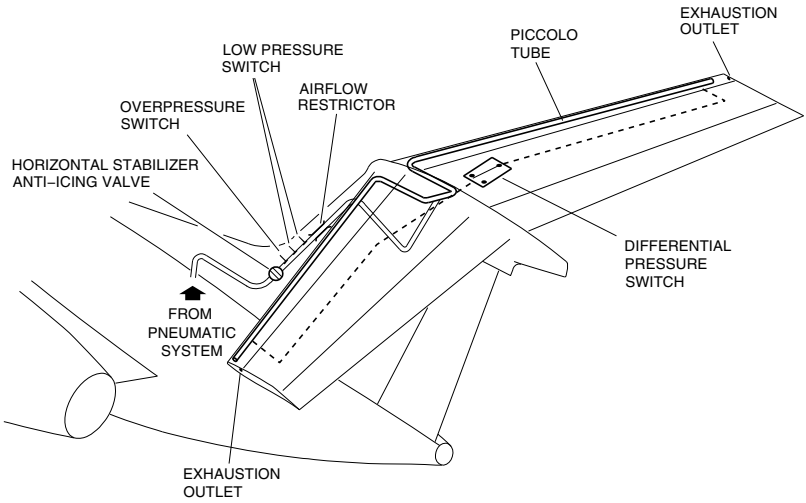
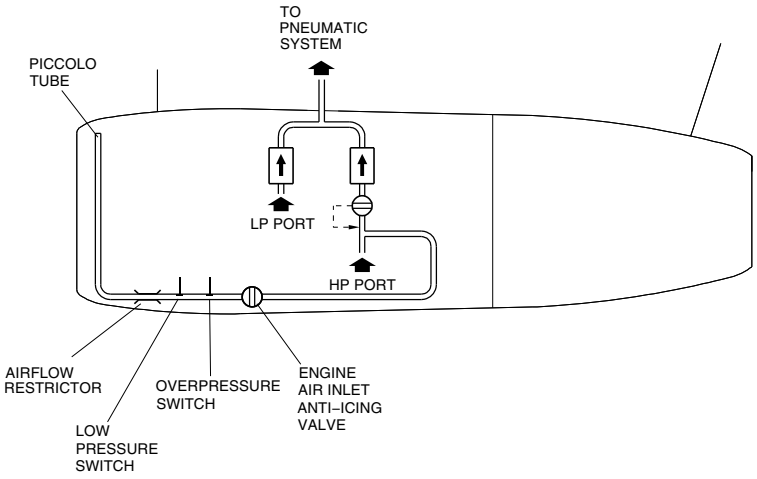


HORIZONTAL STABILIZER ANTI–ICING SYSTEM SCHEMATIC



ENGINE AIR INLET ANTI–ICING SYSTEM SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	ICE COND-A/I INOP	Any Bleed Air Thermal anti-icing subsystem not functioning properly under icing conditions.
CAUTION	A/ICE LOW CAPACITY	Low pressure condition downstream of any wing or stabilizer anti-ice valve or wing pressure asymmetry.
	A/ICE SWITCH OFF	Any Bleed Air Thermal anti-icing button turned off.
	E1 (2) A/ICE FAIL (if applicable)	– Low pressure condition. – Valve failure. – Any switch failure. – Overpressure condition. – Any system failure.
	ENG1 (2) A/ICE FAIL (if applicable)	– Low pressure condition (on ground or inflight), or – Disagreement between valve position and system command.
	NO ICE-A/ICE ON	Any anti-icing valve opened in flight out of icing conditions.

(Continued)

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TYPE	MESSAGE	MEANING
CAUTION	STAB A/ICE FAIL	– Low pressure condition. – Valve failure. – Any switch failure. – Duct leakage. – Any system activation device failure.
	WG1 (2) A/ICE FAIL (if applicable)	– Low pressure condition. – Valve failure. – Any switch failure. – Duct leakage. – Any system activation failure.
	WG A/ICE ASYMETRY	Asymmetrical degradation of half-wings anti-ice systems thermal performance.
	WG A/ICE FAIL (if applicable)	– Low pressure condition, or – Disagreement between valve position and system command, or – Piccolo tube failure.
ADVISORY	ENG A/ICE OVERPRES	Inflight overpressure condition detected.

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WINDSHIELD HEATING SYSTEM

The windshields are electrically heated to prevent ice and fog formation or for deicing and defogging purposes. Due to a higher thermal inertia to bring heat to windshield inner layer, when Descent phase is initiated the system must be turned ON to prevent fogging. During all the others flight phases, the system must be kept OFF except when icing conditions are anticipated or if situation requires.

The outer glass layer has no structural significance but provides a rigid, hard and protected surface.

Windshield heating is accomplished through an electric conductive grid embedded in its interlayer, which functions as an electric resistor.

The left windshield heating is supplied by DC Bus 1 and the right windshield heating is supplied by Shed DC Bus 2. Shed Buses must be set to OVRD to operate the windshield heating system.

Individual buttons located on the overhead panel control left and right windshield heating. Separate power supplies are provided for each windshield heating element and its control circuit.

Each windshield element is provided with three temperature sensors. One sensor is used for temperature control and a second sensor is used for overheat protection. A third sensor is provided as a spare for use by maintenance personnel, should a failure occur in any of the two sensors.

For airplanes Pre-Mod. SB 145LEG-30-0010, each windshield element has a dedicated temperature controller that receives a signal from the associated temperature sensors and controls the windshield temperature. When the temperature reaches the upper limit (45°C), power supply to the heater is interrupted. When the temperature is below the lower limit (40°C), power supply is automatically restored. A caution message W/S 1 (2) HEAT FAIL is presented on the EICAS when a system failure is detected or the windshield temperature exceeds 55°C.

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For airplanes Post-Mod. SB 145LEG-30-0010 or with an equivalent modification factory-incorporated, the temperature controller has two modes of operation, defog heat and anti-ice heat mode. When the windshield heating push button is set to ON, the controller continuously monitors the windshield temperature. As temperature drops below 26°C (defog mode), it modulates power input to the electric conductive grid and maintains this temperature. If ice detectors sense ice formation, the controller automatically increase power input to maintain the temperature at 43°C (anti-ice mode). If both ice detectors are inoperative, the Override knob on the Overhead Panel set to ALL position provides manual means to put both systems into anti-ice mode automatically increasing power input to maintain the temperature at 43°C. A caution message W/S 1 (2) HEAT FAIL is presented on the EICAS when a system failure is detected or the windshield temperature exceeds 65°C.

EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	W/S 1 (2) HEAT FAIL	For airplanes Pre-Mod. SB 145LEG-30-0010, associated windshield heating system failure (< 38°C) or associated overheat condition (> 55°C). For airplanes Post-Mod. SB 145LEG-30-0010, associated windshield heating system failure or associated overheat condition (> 65°C).

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SENSOR HEATING SYSTEM

The Sensor Heating System provides automatic operation for the heater elements of Pitot tubes 1 and 2, Pitot/Static 3, Pressurization System and ADS Static Ports, TAT sensors 1 and 2, and AOA vanes 1 and 2, thus providing constant temperature and ice-free operation during all flight phases.

All the sensors are electrically heated and controlled by three buttons, located on the overhead panel.

In the automatic mode, the sensor heating system operates according to three functional logics:

– Pitot 1 and 2 and Pitot/Static 3, AOA 1 and 2, ADS Static Ports 1, 2, 3 and 4, and Pressurization Static Ports 1 and 2 are heated whenever at least one engine is running (N2 above 54.6%).

NOTE: Do not touch the probes immediately after airplane power up (APU or GPU) because during FADEC initialization the heaters are activated for 20 seconds and touching them may cause injuries.

– A separated logic assures Pitot/Static 3 and Pressurization System Static Port 2 heating in any flight condition.

– TAT 1 and 2 are heated provided any of Engine 1 or 2 anti-icing subsystem is functioning or airplane is in flight.

Heater deactivation is accomplished either when the above conditions are not met or when the associated control button is manually pressed.

Caution messages are presented on the EICAS to indicate that the sensor heating is inoperative. These messages are inhibited during the takeoff and approach phases.

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	AOA 1 (2) HEAT INOP	– Associated sensor heating inoperative with any engine running (N2 above 60%) and airplane airborne. – Both engines N2 below 50%.
	PITOT 1 (2, 3) INOP	– Associated sensor heating inoperative with any engine running (N2 above 60%). – Both engines N2 below 50%.
	TAT 1 (2) HEAT INOP	Associated sensor heating inoperative in icing conditions and airplane airborne.

LAVATORY WATER DRAIN AND NIPPLE HEATING SYSTEM

The lavatory waste water drain and potable water service nipples (overflow and fill) are heated by electric resistors to prevent clogging by water freezing under any atmospheric conditions on the ground and in flight.

The heating is automatically turned on when the DC Bus 1 is powered.

Refer to Section 2-2 – Equipment and Furnishings.

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ICE PROTECTION CONTROLS AND INDICATORS

ICE PROTECTION CONTROL PANEL

1 – ENG AIR INLET BUTTONS

- Turns off (released) or permits (pressed) the automatic activation of the associated engine air inlet anti-icing subsystem.
- A striped bar illuminates inside the button to indicate that it is released.
- An OPEN inscription illuminates inside the button to indicate that the associated engine air inlet anti-icing valve is open.

2 – WING BUTTON

- Turns off (released) or selects the automatic mode (pressed) of the half-wing anti-icing subsystems.
- A striped bar illuminates inside the button to indicate that it is released.
- An OPEN inscription illuminates inside the button to indicate the following conditions:
  - Both valves are open with the system commanded to open.
  - At least one valve is open with the system not commanded to open.

3 – STAB BUTTON

- Turns off (released) or permits (pressed) the automatic activation of the horizontal stabilizer anti-icing subsystem.
- A striped bar illuminates inside the button to indicate that it is released.
- An OPEN inscription illuminates inside the button to indicate that the horizontal stabilizer anti-icing valve is open.

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4 – SENSORS BUTTONS

- The left button controls Pitot tube 1, AOA 1 vane, TAT 1 probe, ADC Static Ports 1 and 3, and pressurization static port 1.
- The central button controls Pitot/Static tube 3 and pressurization static port 2.
- The right button controls the Pitot tube 2, AOA 2 vane, TAT 2 probe and ADC static ports 2 and 4.
- When pressed, the associated sensor heating system operates in the automatic mode according to its functional logic. When released, the associated sensor heating system is turned off.
- A striped bar illuminates inside the button to indicate that it is released.

5 – ICE DETECTION TEST CONTROLLER

- Permits the half-wing, horizontal stabilizer and engine air inlet anti-icing subsystems to operate for test purposes, by simulating an icing condition on ice detectors 1 and 2. The adequate system operation is confirmed by the illumination of the OPEN inscriptions in the anti-icing buttons, which indicate the current valve position.

NOTE: The ICE CONDITION, ICE DET1 (2) FAIL and BLD 1 (2) LOW TEMP messages are displayed during test. The CLR ICE 1, CLR ICE 2, CLR/I INOP1 and CLR/I INOP2 caution messages are displayed on the EICAS and the lights CLR ICE 1 and CLR ICE 2 illuminate only when the Ice Detection Test Knob is selected to 1.

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6 – ICE DETECTION OVERRIDE KNOB

ENG Allows the manual operation of the bleed air anti-icing system.

- Below 25 knots turns ON the engine air inlet anti-icing subsystems only.
- Above 25 knots and icing condition is detected turns ON the complete bleed air anti-icing system.

AUTO Allows the automatic operation of the bleed air anti-icing system.

- In Flight:
  - Turns ON the complete bleed air anti-icing system as soon as an icing condition is detected.
- On Ground:
  - Above 25 knots and an icing condition is detected, turns ON the complete bleed air anti-icing system.
  - Below 25 knots an icing condition is detected turns ON the engine anti-icing subsystem.

ALL Allows the manual operation of the bleed air anti-icing system.

- In Flight:
  - Turns ON the complete bleed air anti-icing system regardless of icing condition.
- On Ground:
  - Below 25 knots turns ON the engine air inlet anti-icing subsystems only.
  - Above 25 knots turns ON the complete bleed air anti-icing system.

7 – WINDSHIELD HEATING BUTTONS

- Turns on (pressed) or turns off (released) the windshield heating system.
- A striped bar illuminates inside the button to indicate that it is released.

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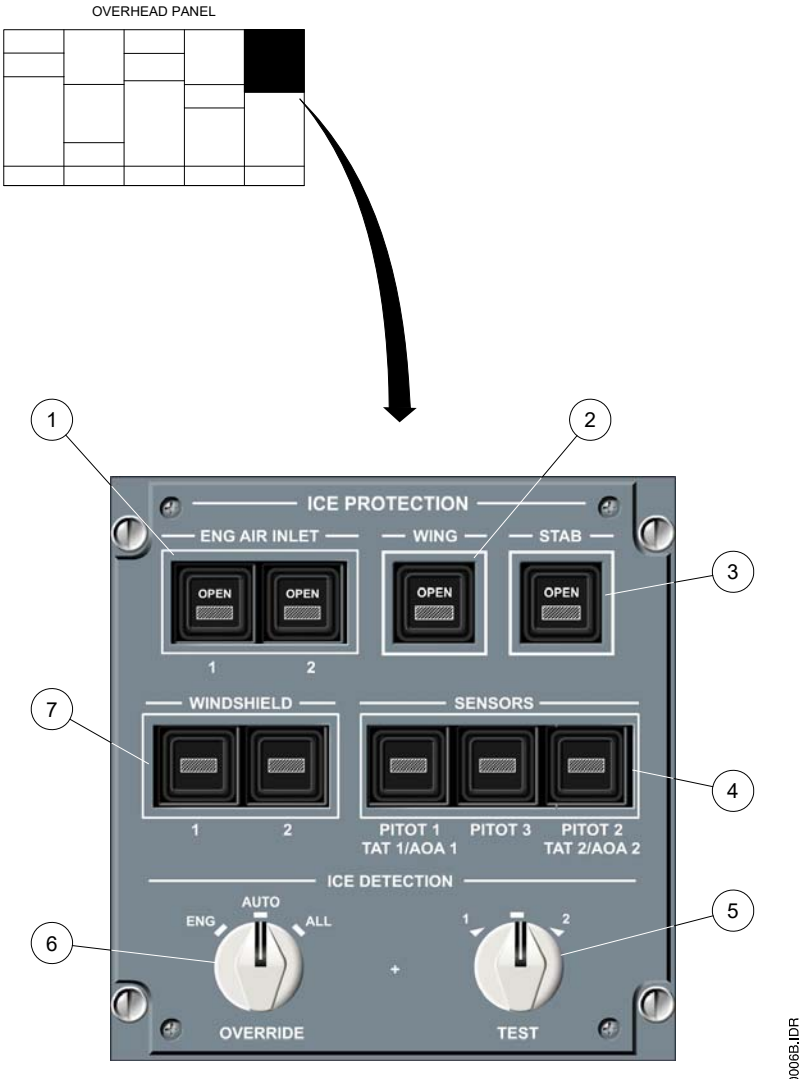

ICE PROTECTION CONTROL PANEL

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ICE DETECTION SYSTEM

Ice detectors 1 and 2 are respectively installed at the airplane's left and right nose section, to provide icing condition detection.

The ice detector was designed to pick up ice quickly. Therefore, in the most cases, ice will be detected before it can be noticed by the crew.

NOTE: Closely monitor the SAT indication and presence of moisture. If environmental ice conditions exist, even intermittent, check the windshield, windshield wiper, and wing surface for ice accumulation. To visualize ice formation, if necessary, use a flashlight on the windshield and the wing inspection light on the wing. If any ice formation is detected or suspected, select the anti-ice protection system override knob to ALL. When flying in detected or suspected ice conditions, use ice speeds as reference.

A 0.5 mm (0.020 inch) ice thickness, on any probe, causes bleed air anti-icing system automatic mode activation, a SPS angle of attack set values reduction (refer to Stall Protection System on Section 2-4 – Crew Awareness), and an advisory message to be presented on the EICAS.

During ice encounters, the icing signal remains active during 60 seconds. Simultaneously, an internal ice detector heater is activated to de-ice the unit and probe. When the probe's natural frequency is recovered, heating is de-energized. Once deiced, the sensing probe cools within a few seconds and is ready to once more monitor ice build-up. Then a new detection cycle begins and remains as long as the ice condition persists.

In case of failure of any or both ice detectors, a caution message is presented on the EICAS and the bleed air thermal anti-icing system may be activated through the OVERRIDE knob on the Ice Detection panel.

The system's normal operation may be checked through the TEST knob on the Ice Protection panel.

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WING CLEAR ICE DETECTION SYSTEM

The clear ice phenomena may occur on the wing upper surfaces when the airplane performs a prolonged operation in high altitude with the wing fuel tanks quantity is kept above 70% until ground. Then, if the airplane is exposed to conditions of high humidity, rain, drizzle, or fog even at ambient temperatures above freezing, the water contained in the atmosphere, when in contact with the cold wing, may condense and freeze.

Once the clear ice accumulation is difficult to be detected visually, clear ice detectors 1 and 2 are respectively installed on the airplane's left and right wing upper surface.

Each sensor is flush mounted with the surface and consists of a vibrating diaphragm. Any ice build-up is sensed by the diaphragm and a caution message is presented on the EICAS and the Clear Ice Indication Light illuminates.

In case of failure of any or both ice detectors, a caution message is also presented on the EICAS.

The system's normal operation may be checked through the TEST knob on the Ice Protection panel.

EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	CLR ICE 1 (2)	Ice build-up over the left or right wing upper surface.
	CLR/I INOP1 (2)	Associated clear ice detector has failed.
	ICE DETECTORS FAIL	Both ice detectors have failed.
	ICE DET1 (2) FAIL	Associated ice detector has failed.
ADVISORY	ICE CONDITION	At least one of the probes has detected ice.

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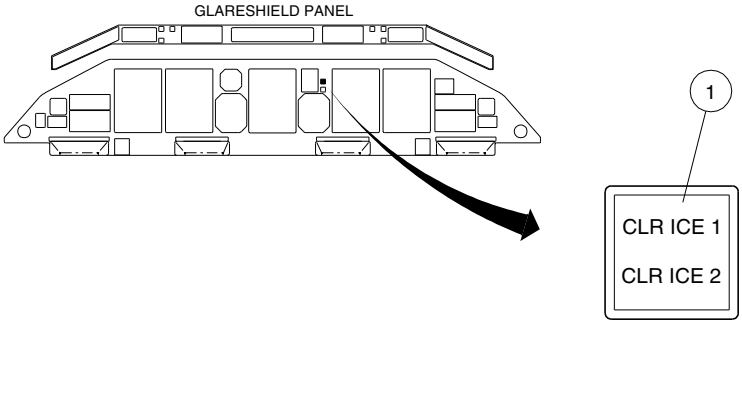
CONTROLS AND INDICATORS

MAIN PANEL

1 - CLEAR ICE LIGHT

- Color: amber.
- Illuminates CLR ICE 1 to indicate that there is ice build-up over the left wing upper surface.
- Illuminates CLR ICE 2 to indicate that there is ice build-up over the right wing upper surface.



CLEAR ICE LIGHT

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WINDSHIELD WIPER SYSTEM (IF INSTALLED)

A two-speed windshield wiper is provided for the left and right windshields. Each system comprises a motor-converter, a wiper arm, and blades. A control box provides speed control, synchronization, and off-screen park functions for both systems through independent channels.

Each system has its own independent power supply and a four-position knob on the overhead panel.

WINDSHIELD WIPER CONTROL PANEL

1 - WINDSHIELD WIPER SELECTOR KNOB

TIMER Provides intermittent operation of the associated windshield wiper in single cycles (two strokes) with an 8 second time interval between two cycles, in high speed.

OFF Associated wiper blades travel to the windshield inboard position, parking out of pilots vision.

LOW Associated wiper operates at approximately 80 ± 10 strokes per minute.

HIGH Associated wiper operates at approximately 140 ± 10 strokes per minute.

NOTE: Dry windshield operation leads the motor-converter to a stall condition, due to the high friction level. The controller senses the motor-converter current surge and drives the arm directly to the parked position. The system remains inoperative until the Windshield Wiper Selector Knob is set to OFF position and a new operation mode is selected.

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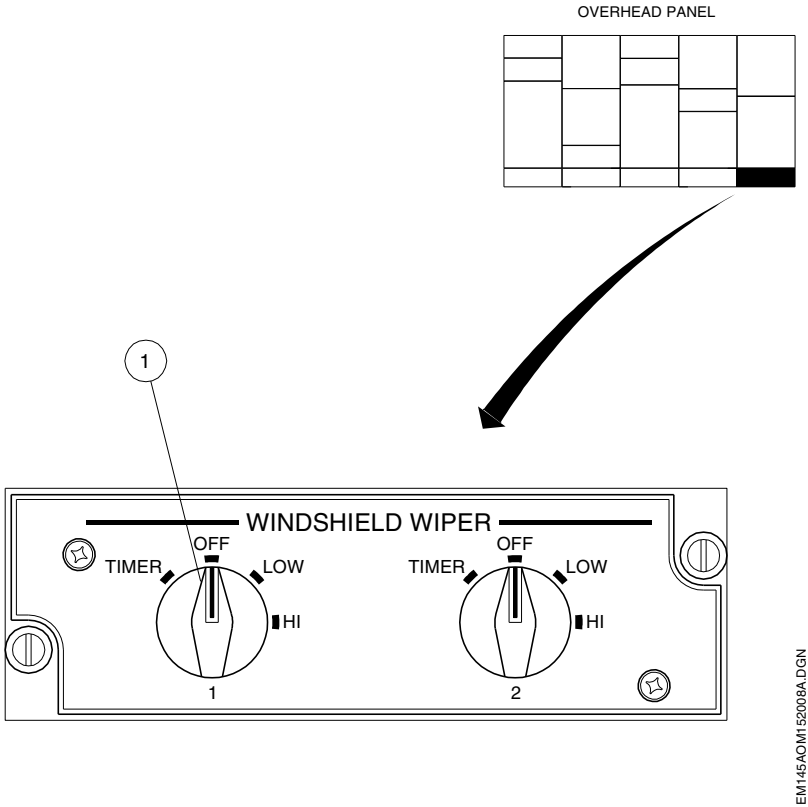

WINDSHIELD WIPER CONTROL PANEL

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SECTION 2-16

OXYGEN

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GENERAL

The oxygen system supplies, in case of cabin decompression, protective and supplemental oxygen for the crew and only supplemental oxygen for the passengers. It is a conventional, high-pressure gaseous type system, in which the oxygen is stored in a cylinder at high pressure and distributed at low pressure to the masks.

The system is composed of three subsystems that operate independently: The Flight crew oxygen subsystem, the Passenger oxygen subsystem and the portable oxygen subsystem.

The first two subsystems are monitored so that all the necessary parameters are informed to the flight crew and flight attendants.

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FLIGHT CREW OXYGEN

The flight crew oxygen subsystem employs a 50-cu.ft cylinder, installed on the right side of the cockpit/passenger cabin partition, in which the oxygen is stored at high pressure (1850 psi) to supply the cockpit crew members (Pilot, Copilot and Observer) masks.

The system is protected from overpressurization by a safety disc located on the lower right side of the airplane's nose. Discharge through the safety disc may be visually verified when the discharge indicator (green disc) has been blown out.

If the cylinder pressure drops below 400 psi (for airplanes equipped with EICAS prior to version 20.5) or 450 psi (for airplanes equipped with EICAS version 20.6 and on), a caution message is presented on the EICAS.

The cylinder is provided with an integrated shutoff/regulator valve, that controls oxygen outlet pressure. The regulator valve at the ON position supplies the crew distribution lines at a low-pressure rate (70 psi). A relief valve opens if the pressure exceeds 90 psi.

On the left side of the oxygen service panel, located on the right side of the front fuselage, there is a crew charging valve and a pressure gauge to check oxygen quantity. Some airplanes may have a factory installed removable panel located behind the copilot's seat that provides access to the oxygen cylinder and its replacement. The cylinder pressure is also indicated on the MFD (ECS page).

The cockpit is provided with a quick donning diluter/demand-type mask (or a pressure/demmand type for 41000 ft operation), available inside mask stowage boxes adjacent to each crew station, and a smoke protection kit, which consists of two smoke goggles to be used by the pilot and copilot with the diluter/demand masks (or pressure/demmand masks for 41000 ft operation).

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There are two different types of flight crew oxygen masks, as follows:

– Flight crew oxygen mask with dilution demand regulator type, required for airplanes with altitude ceiling of 39000 ft;

– Flight crew oxygen mask with pressure demand regulator type, required for airplanes with altitude ceiling of 41000 ft.

NOTE: The two types of flight crew oxygen masks presents no differences in its size and operation.

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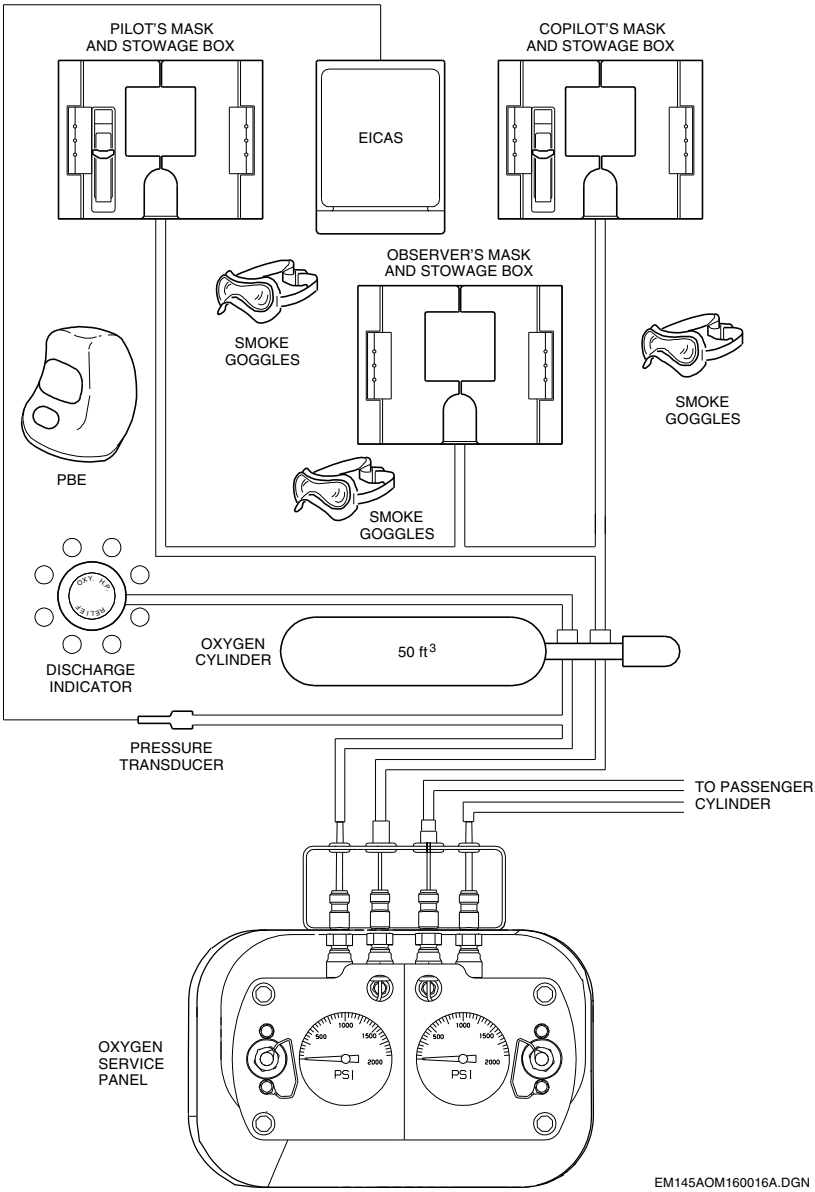

FLIGHT CREW OXYGEN SYSTEM SCHEMATIC

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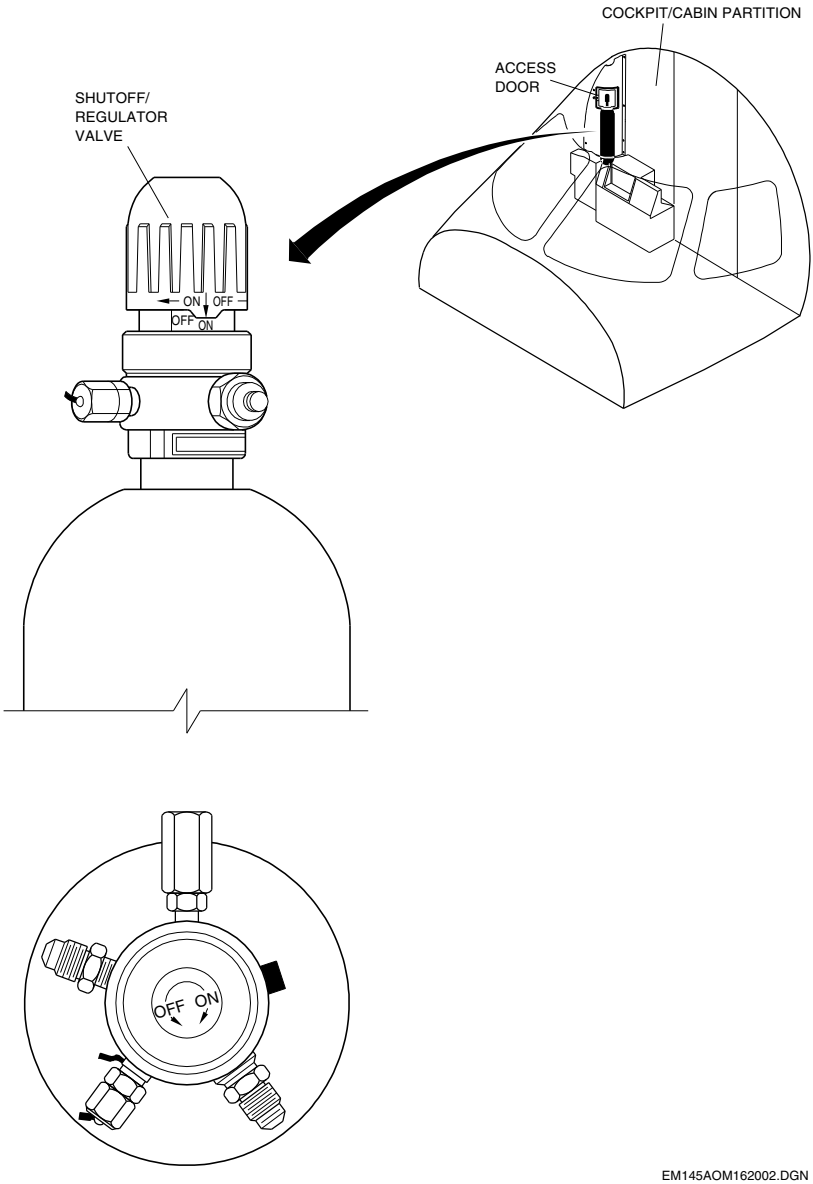

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CREW OXYGEN CYLINDER

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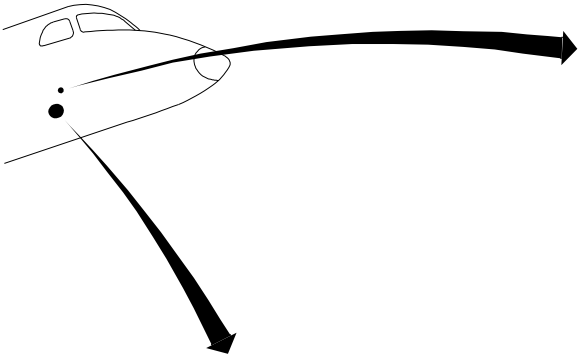
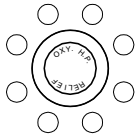
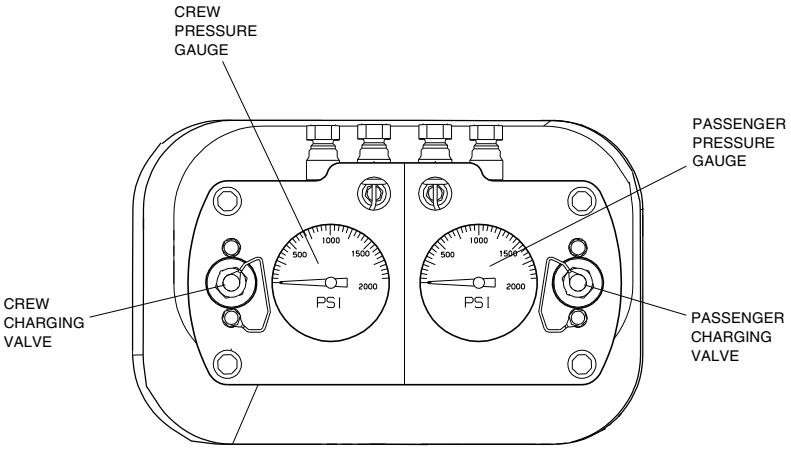




DISCHARGE INDICATOR



OXYGEN SERVICE PANEL

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OXYGEN SERVICE PANEL

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EICAS MESSAGE

TYPE	MESSAGE	MEANING
CAUTION	CREW OXY LO PRESS	Crew oxygen cylinder pressure below 400 psi (for airplanes equipped with EICAS prior to version 20.5) or 450 psi (for airplanes equipped with EICAS version 20.6 and on). Remaining oxygen sufficient for approximately 12 minutes for pilot, copilot, and observer.

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ECS PAGE ON MFD

1 - ANALOGIC OXYGEN PRESSURE INDICATION

AIRPLANES EQUIPPED WITH EICAS PRIOR TO VERSION 20.5

- Pointer:
  - Green between 410 to 1850 psi.
  - Amber between 250 to 400 psi.
  - Red between 0 to 240 psi.

AIRPLANES EQUIPPED WITH EICAS VERSION 20.6 AND ON

- Pointer:
  - Green between 460 to 1850 psi.
  - Amber between 260 to 450 psi.
  - Red between 0 to 250 psi.

2 - DIGITAL OXYGEN PRESSURE INDICATION

AIRPLANES EQUIPPED WITH EICAS PRIOR TO VERSION 20.5

- Digits are green between 410 to 1850 psi.
- Digits are amber between 250 to 400 psi.
- Digits are red between 0 to 240 psi.

(Ranges from 0 to 1850 psi, with a resolution of 10 psi).

AIRPLANES EQUIPPED WITH EICAS VERSION 20.6 AND ON

- Digits are green between 460 to 1850 psi.
- Digits are amber between 260 to 450 psi.
- Digits are red between 0 to 250 psi.

(Ranges from 0 to 1850 psi, with a resolution of 10 psi).

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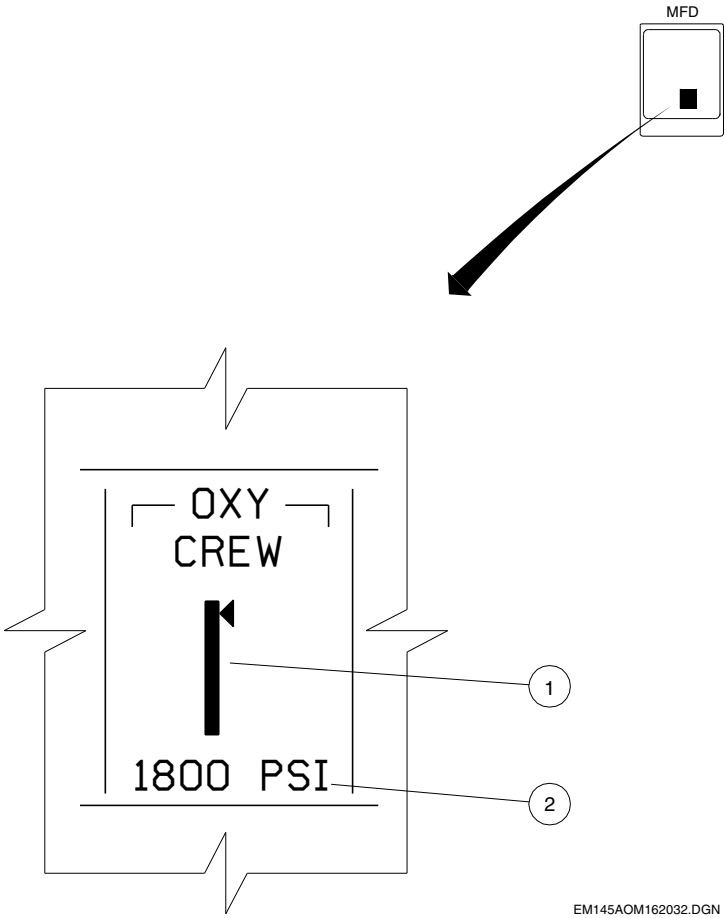

CREW ECS PAGE ON MFD

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CREW MASK STOWAGE BOXES

The crew mask stowage boxes are directly connected to the oxygen distribution line and to the communications system. The pilot and copilot boxes incorporate a shutoff valve, which keeps the mask regulator unpressurized while in the stowed position.

When the box doors are opened, the shutoff valve is brought to the open position, thus allowing oxygen to flow to the mask.

After the mask has been taken out of the stowage box, the doors can be closed without interrupting oxygen supply to the mask. To stop the oxygen flow, it is necessary to close the left door and activate the Test/Shutoff Sliding Control.

Pilot and copilot mask stowage boxes are also provided with a flow indicator.

NOTE: The observer's mask stowage box is not provided with Test/Shutoff Sliding Control (EROS Mask) and, although the mask is permanently pressurized, oxygen will flow only on demand.

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CREW MASK

The crew mask is a quick donning oro-nasal mask assembly that can supply breathing protection up to 39000 ft or 41000 ft and allows oxygen flow on demand or under pressure, as required.

The mask is provided with an automatic oxygen dilution system that supplies pure oxygen at a cabin altitude of over 33000 ft. It can also be manually selected to the 100% position to provide pure oxygen at all altitudes or to the EMERGENCY position to maintain in the venting orifice 100% pure oxygen (or positive pressure if it is an oxygen mask with pressure demand regulator type).

The quick donning operation is as follows:

– Hold the mask with one hand by the mask regulator and the inflation control valve (red ears).

– Pull the mask out of the box.

– Press the inflation control valve (red ears) firmly. The harness inflates rapidly, and takes a round shape large and rigid enough to allow the user to don it quickly.

– Release the regulator ears. The harness will then deflate, securing the mask to the user's face.

NOTE: The EROS Mask is provided with two red ears. One inflates the harness when pressed and the other is fixed.

The oxygen mask with dilute demand regulator type (applicable to airplanes with altitude ceiling of 39000 ft) is equipped with a flow indicator only for the observer mask. The flow indicator for the pilot and copilot is located in the respective crew mask stowage boxes.

The oxygen mask with pressure demand regulator type (applicable to airplanes with altitude ceiling of 41000 ft) is equipped with a flow indicator for the pilot, copilot and observer.

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CONTROLS AND INDICATORS (EROS MASK)

MASK STOWAGE BOX/CREW MASK

1 - TEST/SHUTOFF SLIDING CONTROL (SPRING-LOADED IN THE PILOT AND COPILOT BOXES ONLY)

- When pressed, with the mask stowed, allows testing of the oxygen mask. Flow indicator turns yellow for a short time. The OXY ON flag appears on the lid face.
- When pressed, with the mask not stowed and the left door closed, shuts off oxygen to the mask. The OXY ON flag disappears on the lid face.

2 - OXY ON FLAG (WHITE)

- Appears when the box shutoff valve is open and oxygen is supplied to the mask.

3 - FLOW INDICATOR (PILOT AND COPILOT BOXES ONLY)

- A yellow star appears when oxygen is flowing.

4 - VENTING VALVE CONTROL (PILOT AND COPILOT MASKS ONLY)

- When actuated forward, opens the venting valve.
- A red band is visible to indicate that the control is actuated.

5 - HARNESS INFLATION CONTROL VALVE (RED EAR)

- When pressed, inflates the harness and allows mask donning.

6 - FLOW INDICATOR

- The black shutter disappears when pressure is applied to the mask.

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7 - TEST/EMERGENCY SELECTOR KNOB

- When rotated clockwise, 100% oxygen is supplied under positive pressure at all cabin altitudes. This mode must be selected when using smoke goggles.
- When pressed, tests if the regulator demand mechanism operates satisfactorily.

8 - NORMAL/100% SELECTOR

N — Oxygen/air mixture is supplied on demand. Mixture ratio depends on the cabin altitude. Above 33000 ft, pure oxygen is supplied.

100% — Pure oxygen is supplied at all cabin altitudes on demand (or on positive pressure if it is an oxygen mask with pressure demand regulator type). This mode must be selected in conjunction with the EMERGENCY position, when protective breathing is required.

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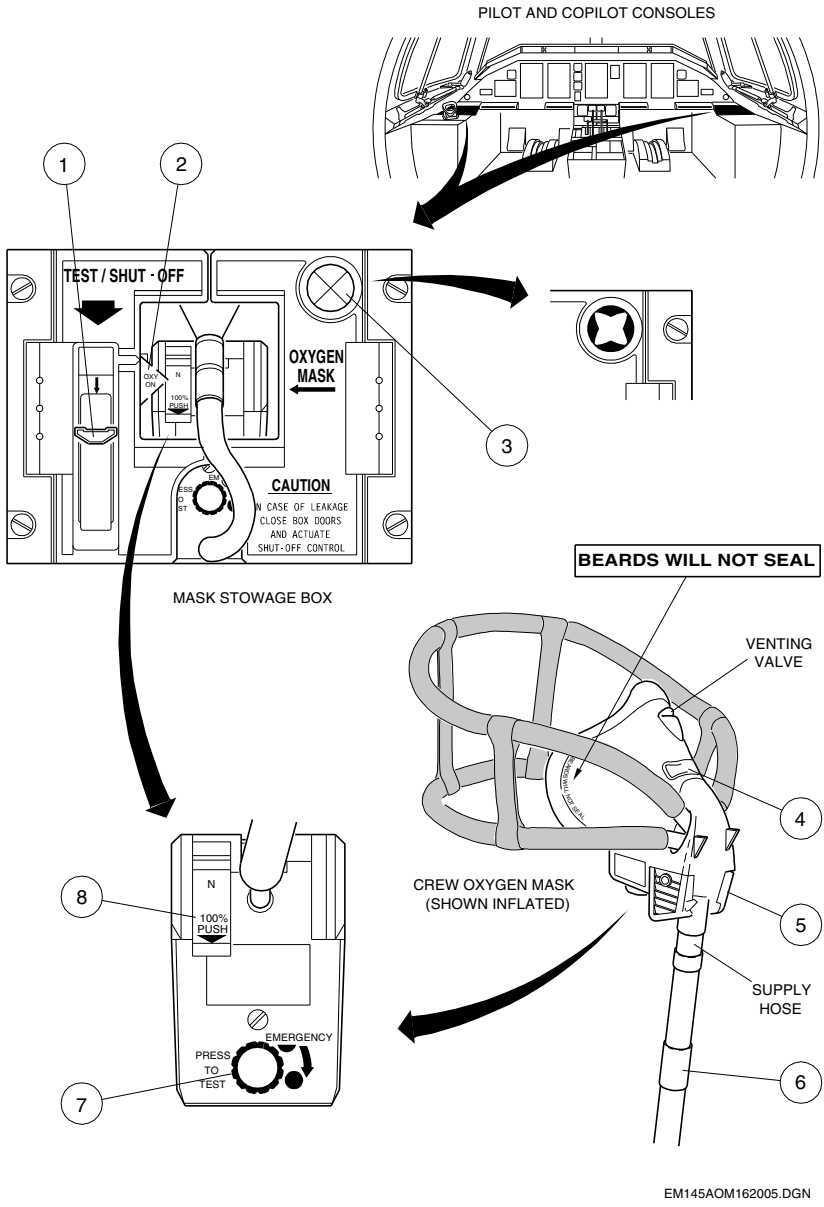

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MASK STOWAGE BOX/CREW MASK (EROS MASK)

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SMOKE GOGGLES

The smoke goggles were designed for use with the crew mask assembly, matching the mask face cone. The venting valve, located on the mask shell and manually actuated by the user, allows direct communication between venting orifice and goggles.

When mask regulator is selected to emergency position, a metered oxygen flow will be directed to the goggles' cavity so as to allow continuous venting and preventing any infiltration of harmful gases.

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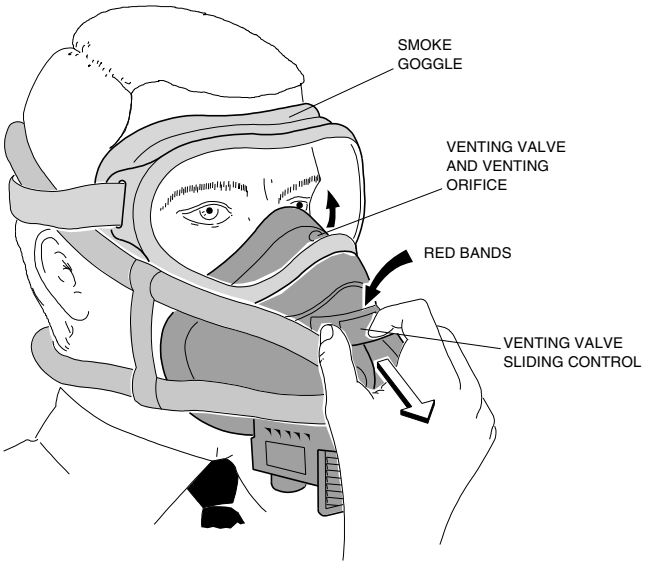

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SMOKE GOGGLES

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PASSENGER OXYGEN

The passenger oxygen subsystem employs one or two oxygen cylinder(s), installed in the closeout panel near the galley, in which the oxygen is stored at high pressure (1850 psi) to supply the passenger oxygen masks.

The subsystem shares with the crew oxygen subsystem the overpressure discharge indicator (safety disk), located on the lower left side of airplane's nose. For that reason, in case of over pressurization the same indicator blows out and can be visually inspected. If the cylinder pressure drops below 750 psi, a caution message is presented on the EICAS.

The Passenger Oxygen Control Panel is located on the right lateral console, above the copilot's mask stowage box.

Under normal operating conditions, when the "AUTO" mode is selected on the passenger oxygen control panel and the cabin altitude reaches 14000 ft, the altimetric switch energizes a time delay relay, which energizes the passenger oxygen on-off solenoid valve to initiate the oxygen flow and pressurize the oxygen distribution manifold. The pressure, in the distribution line, activates the pneumatic latch, opening the door and dropping the masks from their dispensing units. At the same time, the "OXYGEN" indicator light, on the passenger oxygen control panel, as well as the "NO SMOKING" and "FASTEN SEAT BELTS" signs in the passenger cabin are turned on.

The "MANUAL" selection on the passenger oxygen control panel activates the system when the automatic system fails or at any time as required.

On the right side of the oxygen service panel, are the passenger charging valve and the passenger pressure gauge, which allows access to charge the passenger oxygen cylinder and monitoring of passenger oxygen quantity.

NOTE: The addition of a second oxygen cylinder, will not effect or change any of the controls, indications or safety features of the Passenger Oxygen subsystem.

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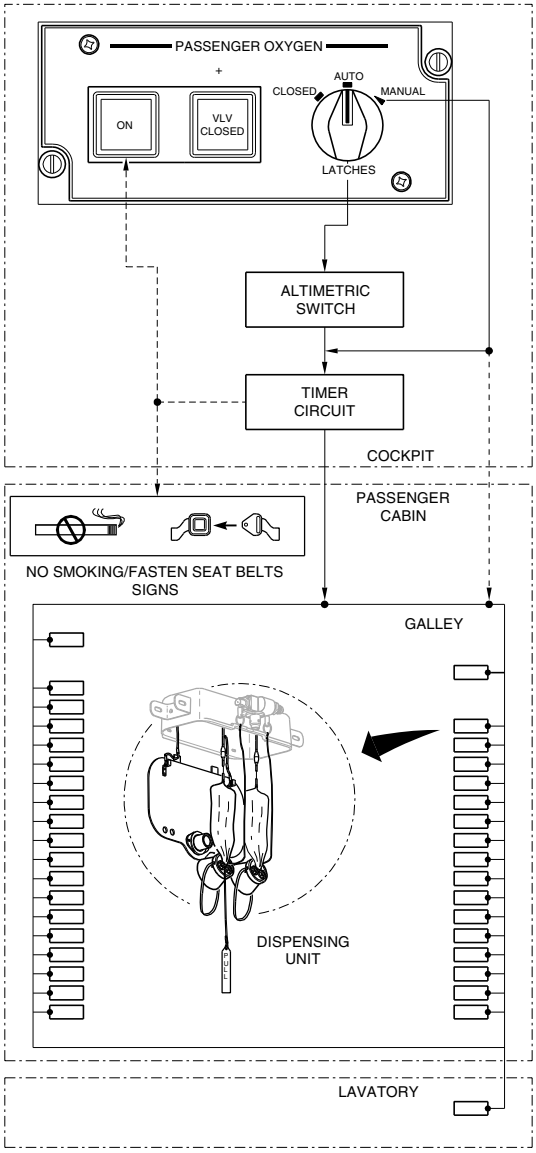

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PASSENGER OXYGEN SYSTEM SCHEMATIC

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	PAX OXY LO PRESS	Passenger Oxygen cylinder(s) pressure below 750 psi.

ECS PAGE ON MFD

1 - ANALOGIC OXYGEN PRESSURE INDICATION

AIRPLANES EQUIPPED WITH EICAS PRIOR TO VERSION 20.5

- Pointer:
  - Green between 760 to 1850 psi.
  - Amber between 210 to 750 psi.
  - Red between 0 to 200 psi.

AIRPLANES EQUIPPED WITH EICAS VERSION 20.6 AND ON

- Pointer:
  - Green between 760 to 1850 psi.
  - Amber between 310 to 750 psi.
  - Red between 0 to 300 psi.

2 - DIGITAL OXYGEN PRESSURE INDICATION

AIRPLANES EQUIPPED WITH EICAS PRIOR TO VERSION 20.5

- Digits are green between 760 to 1850 psi.
- Digits are amber between 210 to 750 psi.
- Digits are red between 0 to 200 psi.

(Ranges from 0 to 1850 psi, with a resolution of 10 psi).

AIRPLANES EQUIPPED WITH EICAS VERSION 20.6 AND ON

- Digits are green between 760 to 1850 psi.
- Digits are amber between 310 to 750 psi.
- Digits are red between 0 to 300 psi.

(Ranges from 0 to 1850 psi, with a resolution of 10 psi).

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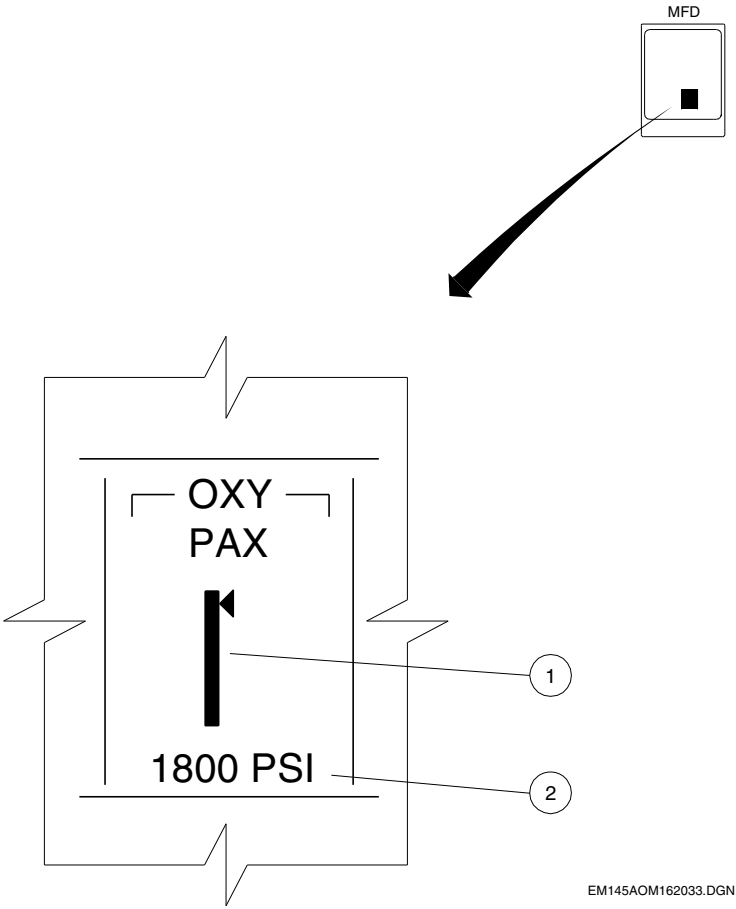

ECS PAGE ON MFD

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PASSENGER DISPENSING UNIT AND MASK

The passenger oxygen masks dispensing units are located on the right and left overhead valance panels in the passenger seating area, at the flight attendant station, at the galley and in the lavatory. Each unit is equipped with two continuous flow masks and a lanyard valve per mask.

The passenger oxygen mask assembly possesses a reservoir bag, a flow indicator, an oxygen supply tubing and a head strap for securing the mask to the passenger's face. In addition, one lanyard and one "PULL" streamer is fitted to each oxygen mask.

In the event of a decompression, the mask and the "PULL" streamer remain attached to the oxygen flow valve by the lanyard The passenger must pull the mask to his face or pull the "PULL" streamer to release the lanyard valve pin to obtain oxygen flow.

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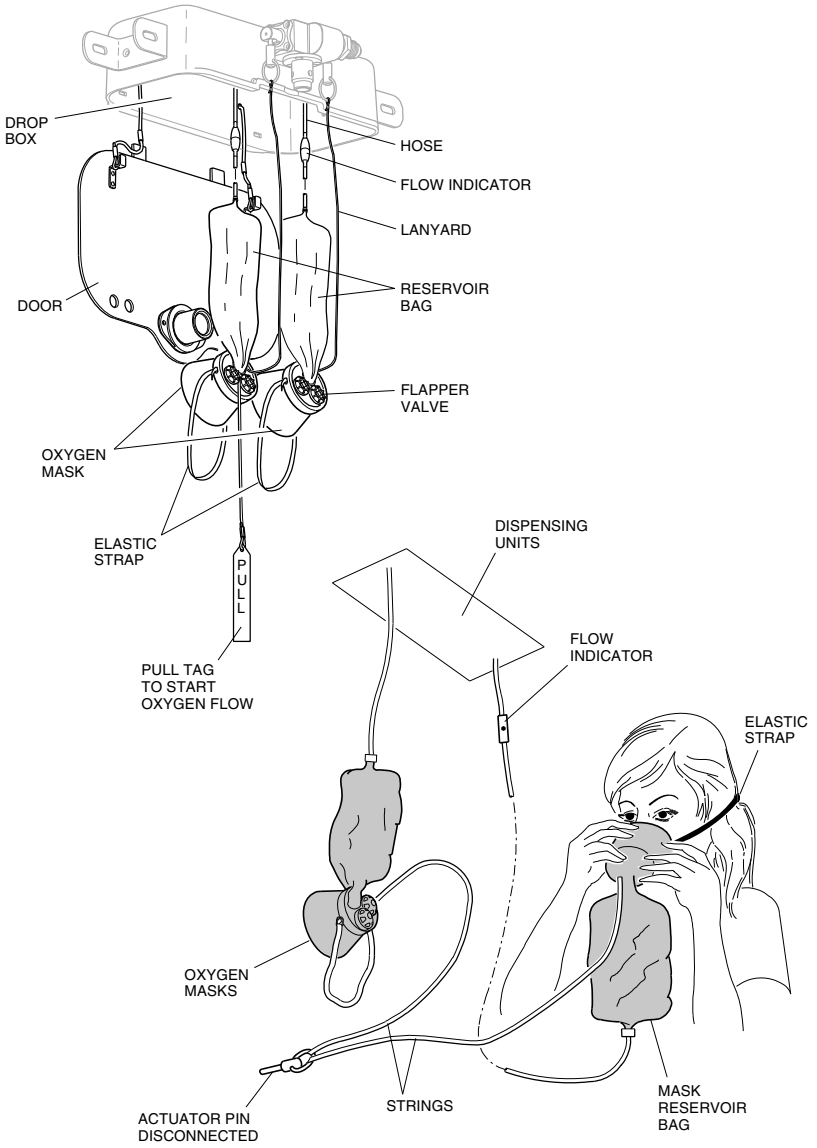

DISPENSING UNITS/PASSENGER MASKS

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CONTROLS AND INDICATORS

PASSENGER OXYGEN CONTROL PANEL

1 – OXYGEN ON INDICATOR LIGHT

– Indicates that the passenger oxygen system is ON, and the distribution manifold pressure is at or above 45 psig.

2 – OXYGEN VLV CLOSED INDICATOR LIGHT

– Indicates that the passenger oxygen pressure regulator is "OFF" or if the pressure at the outlet of the oxygen regulator drops below 50 to 55 psi.

3 – PASSENGER OXYGEN KNOB

CLOSED Disables the automatic deployment of passenger masks. Also resets oxygen ON indicator and passenger cabin signs after system activation either on automatic or manual mode.

AUTO Automatically deploys the passenger masks provided that cabin pressure altitude is above 14000 ft.

MANUAL (momentary position) Actuates the passenger oxygen system at any altitude, overriding the altimetric switch, and may be used in case of AUTO mode failure.

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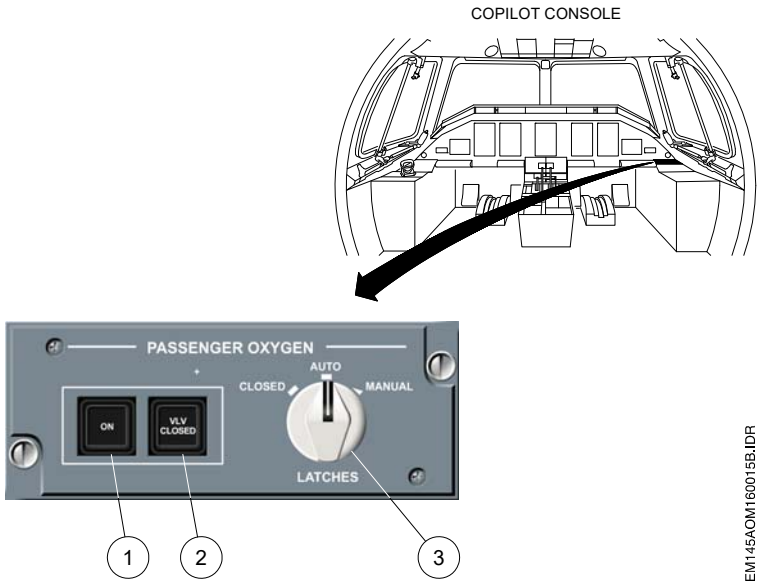

PASSENGER OXYGEN CONTROL PANEL

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PORTABLE OXYGEN

The portable oxygen subsystem includes one portable oxygen cylinder and two Protective Breathing Equipment (PBE).

PORTABLE OXYGEN CYLINDER

The portable oxygen cylinder is located in the passenger cabin entertainment rack and is used for passenger first-aid therapeutic treatment only. The cylinder, with 11-cu.ft and 2 flow outlets, provides a constant flow breath for up to 2 passengers or crew members. Also, it is equipped with a pressure gauge indicating supply, a high-pressure safety relief device, a carrying strap and an on-off pressure regulator.

To get specified flow, the mask must be connected to one of the cylinder outlets and the handle turned to the "FULL ON" position.

NOTE: This equipment is intended to be used only for aviation applications and is to be used only by, or under the supervision of, a pilot or crew member trained and qualified in its use.

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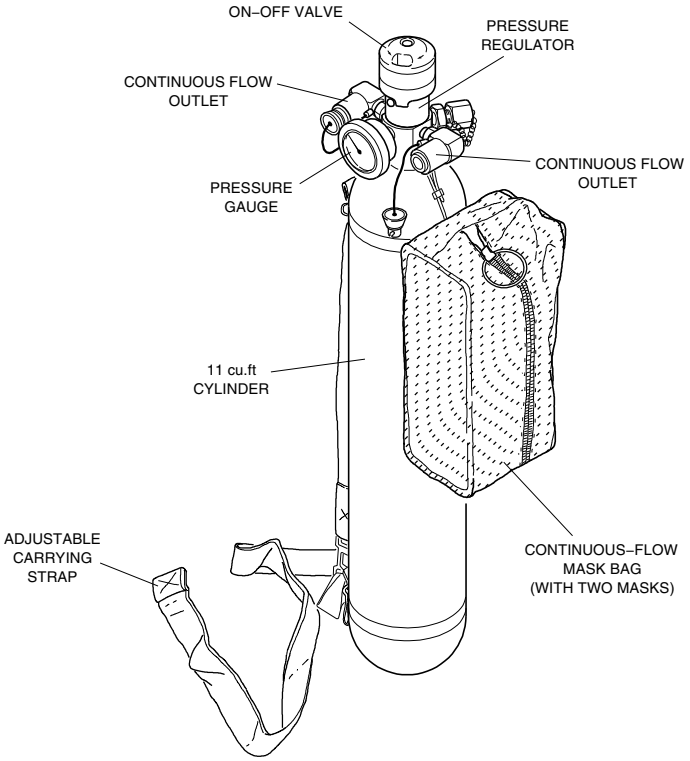

PORTABLE OXYGEN CYLINDER

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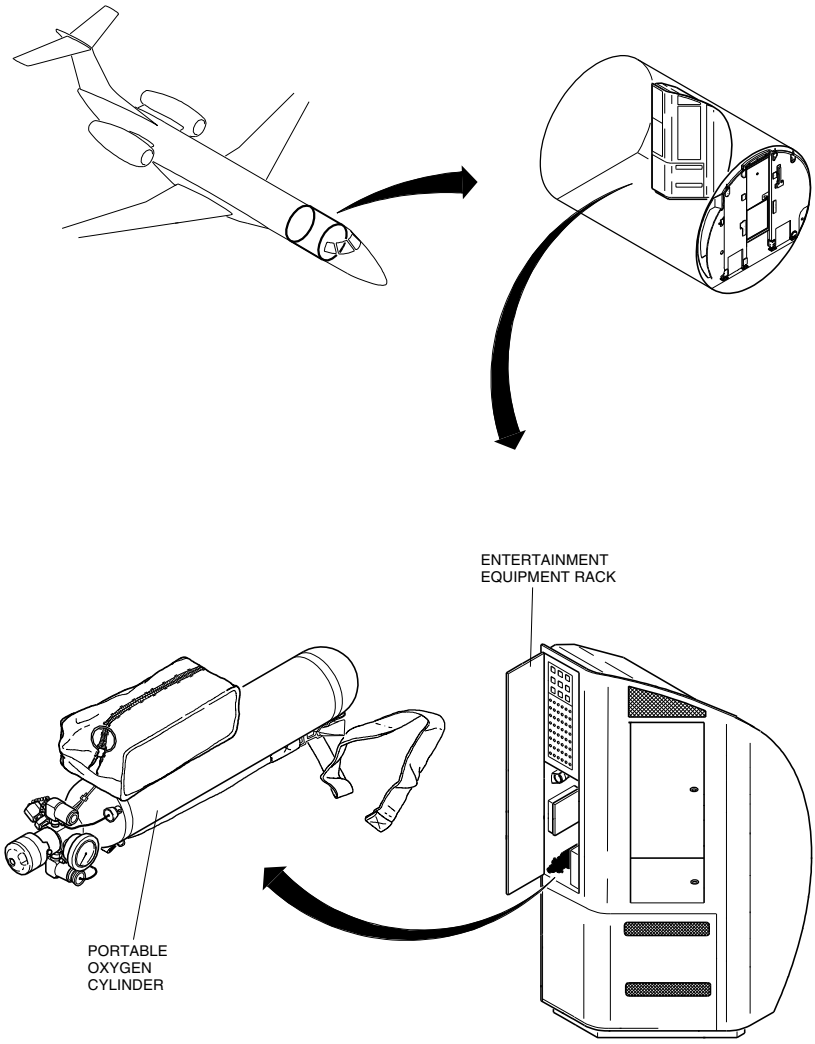

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PORTABLE OXYGEN CYLINDER LOCATION

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PROTECTIVE BREATHING EQUIPMENT (PBE)

The PBE unit is used for respiratory and visual protection against effects of smoke and harmful gases while fighting fire in the airplane. It is designed to provide breathing protection for a minimum duration of 15 minutes.

There are two EROS PBE installed in the airplane, one is installed in the entertainment equipment rack and the otherone is installed in the LH cockpit/passenger cabin partition, behind the pilot seat.

The device features a hood which encloses the entire head and an integrated life support unit which uses a solid state oxygen supply (chemical generator).

OPERATION

– Take the box, push the spring lock.

– Pull the box cover upward.

– Extract the hood and deploy the hood by a brisk downward movement.

– Put the hood on head (it can accommodate bears, long hair and glasses when properly worn).

– Pull to actuate ring from the unit.

The over-hood gives protection to the head from flames or incandescent objects which may fall from burning structures or interiors.

The end of autonomy is felt when oxygen flow noise can not be heard anymore. Hood has then to be removed.

CAUTION: THE OXYGEN PRODUCED BY PBE UNIT WILL VIGOROUSLY ACCELERATE COMBUSTION. DO NOT INTENTIONALLY EXPOSE THE PBE UNIT TO DIRECT FLAME CONTACT OR REMOVE IT IN THE IMMEDIATE PRESENCE OF FIRE OR FLAME, DUE TO OXYGEN SATURATION OF THE AIR. DO NOT SMOKE OR BECOME EXPOSED TO FIRE OR FLAME IMMEDIATELY AFTER REMOVING PBE UNIT.

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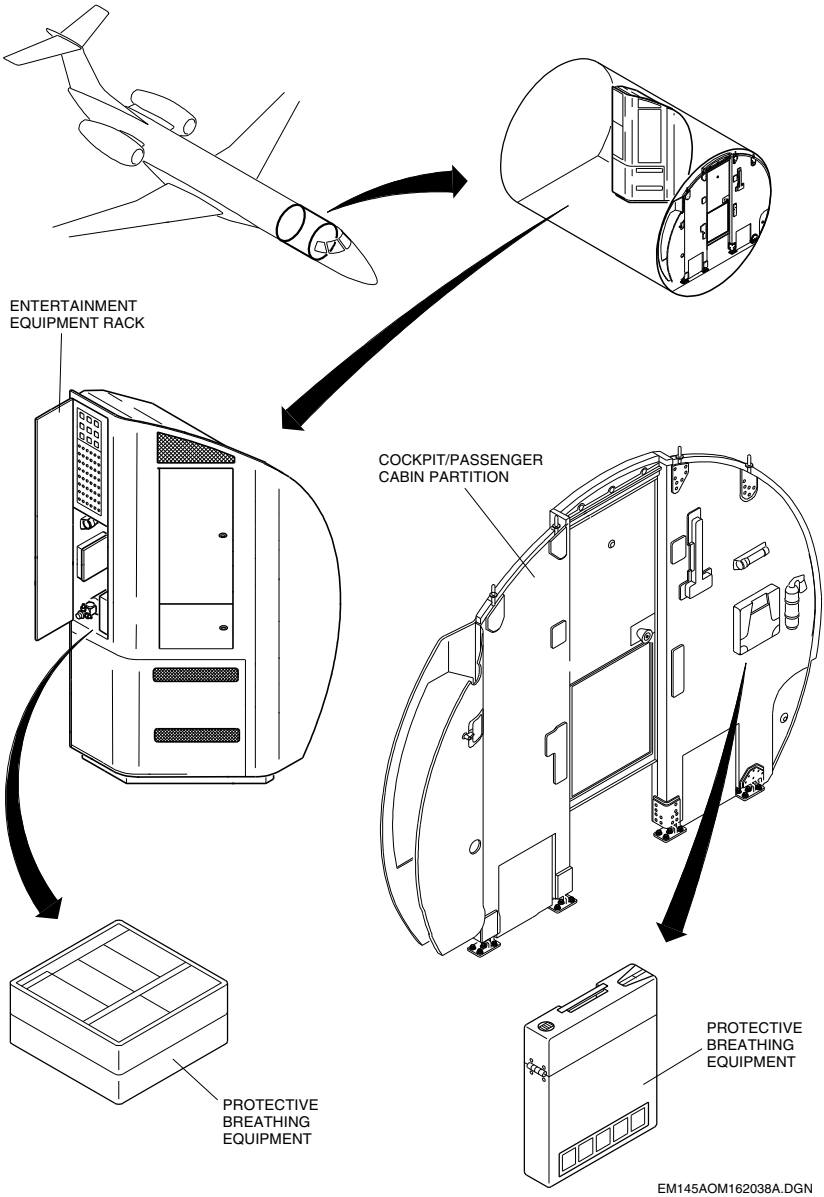

PROTECTIVE BREATHING EQUIPMENT LOCATION

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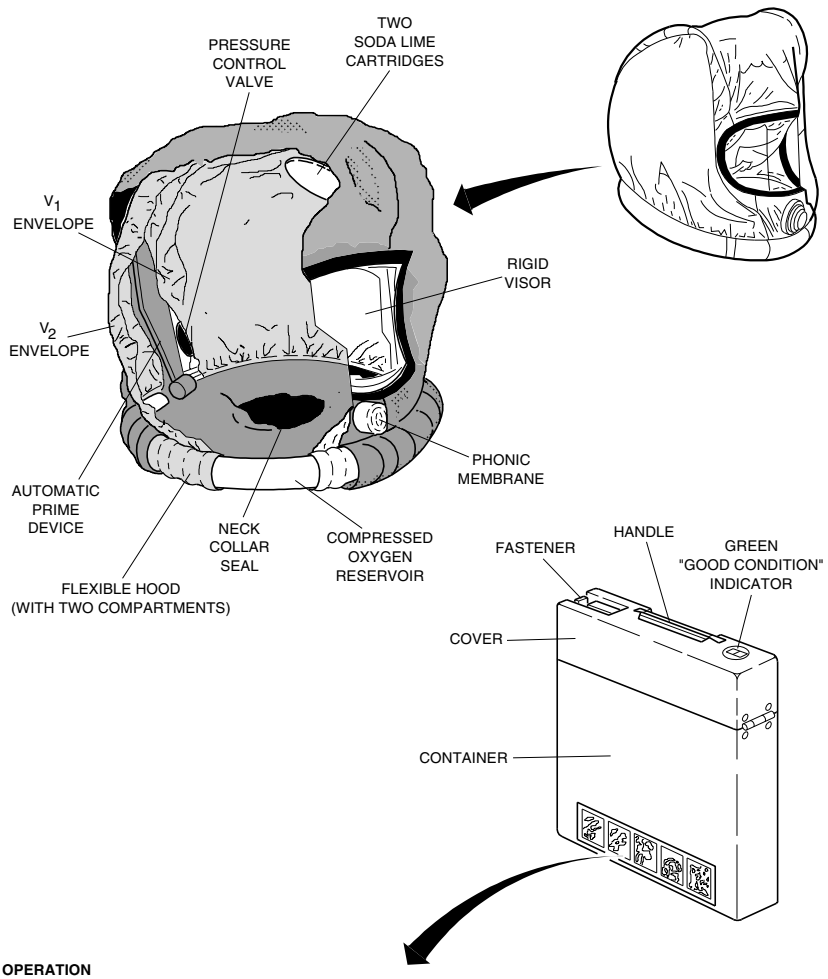

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HOOD SCHEMATIC AND STOWAGE - EROS

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MINIMUM OXYGEN PRESSURE FOR DISPATCH

FLIGHT CREW OXYGEN SUBSYSTEM

The minimum oxygen pressures for dispatch for the normal descent profile are:

– Crew comprising Pilot and Copilot: 1087 psi.

– Crew comprising Pilot, Copilot and Observer: 1495 psi.

NOTE: This is the approved AFM quantity of oxygen dispensed for each cabin flight crewmember, for normal descent profile, for 6.3 minutes mountain clearance at 18000 ft and total flight of 2 hours.

The minimum oxygen pressures for dispatch for the special descent profile are:

– Crew comprising Pilot and Copilot: 1130 psi.

– Crew comprising Pilot, Copilot and Observer: 1570 psi.

NOTE: This is the quantity of oxygen dispensed for each cabin flight crewmember, for normal descent profile, for 54.3 minutes mountain clearance at 18000 ft and total flight of 2 hours.

PASSENGER OXYGEN SUBSYSTEM

Airplane equipped with one cylinder (77cu.ft): 1730 psi.

Airplane equipped with two cylinders (77 cu.ft) (Optional): 1250 psi.

Airplane equipped with one cylinder (115.7 cu.ft): 1570 psi.

Airplane equipped with two cylinders (77 cu.ft and 115.7 cu.ft): 1040 psi.

NOTE: The minimum oxygen pressure for dispatch was calculated at an ambient temperature of 21°C (70°F). For other temperatures, refer to Oxygen Pressure Correction Chart as a function of the cylinder compartment temperature.

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PORTABLE OXYGEN CYLINDER

The minimum portable oxygen cylinder pressure for dispatch is 1200 psi (calculated for a maximum utilization period of 30 minutes).

OXYGEN PRESSURE CORRECTION CHART

An Oxygen Pressure Correction Chart is provided for the maintenance personnel's use when recharging the oxygen cylinder. Additionally, it may be used by the crew to check if the oxygen cylinder's pressure is above the minimum oxygen pressure for dispatch.

To use the chart for recharging purposes:

Enter the chart with the cylinder compartment temperature (cockpit temperature) and go vertically up to the desired pressure at 21°C. From the intersection point, trace to the left to read the indicated gauge pressure to be attained.

To use the chart for dispatching purposes:

Enter the chart simultaneously with the cylinder compartment temperature (cockpit temperature) and indicated gauge oxygen pressure (on MFD or oxygen service panel). The intersection determines the oxygen cylinder's equivalent pressure at 21°C, by interpolating the two adjacent standard curves.

EXAMPLE

Associated condition:

Crew..... PILOT, COPILOT, AND OBSERVER

Indicated Gauge Pressure..... 1650 PSI

Cylinder Compartment Temperature..... 30°C

As the intersection is above the dashed line for the associated condition, the airplane may be dispatched.

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1 MINIMUM FOR 3 CREWMEMBERS

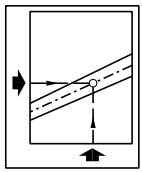
2 MINIMUM FOR 2 CREWMEMBERS

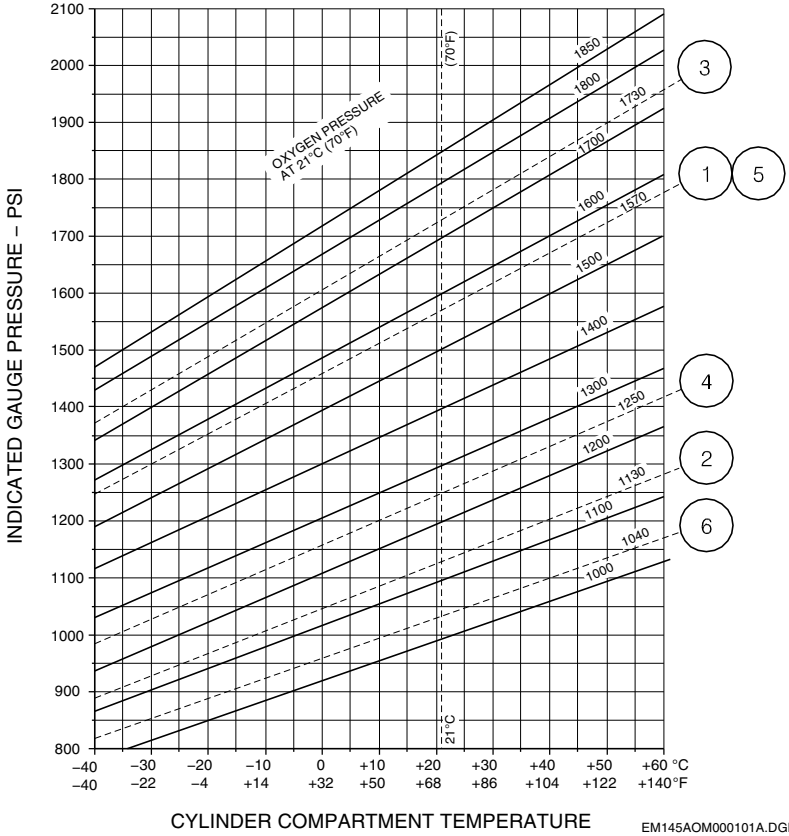
3 MINIMUM FOR PASSENGERS SYSTEM WITH ONE CYLINDER (77 ft³)

4 MINIMUM FOR PASSENGERS SYSTEM WITH TWO CYLINDERS (2x77 ft³)

5 MINIMUM FOR PASSENGERS SYSTEM WITH ONE CYLINDER (115 ft³)

6 MINIMUM FOR PASSENGERS SYSTEM WITH TWO CYLINDERS (115 ft³ + 77 ft³)





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OXYGEN PRESSURE CORRECTION CHART

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OXYGEN CONSUMPTION CHART

The Oxygen Consumption Chart is provided to allow the Flight Crew to know the remaining number of pre-flight oxygen mask tests available before the oxygen cylinder recharging is necessary. This chart should be used by the maintenance personnel to choose the best moment to recharge the oxygen cylinder.

The Oxygen Consumption chart has been plotted for 21°C (70°F) conditions. For different temperatures, the Oxygen Pressure Correction chart must be used to obtain the pressure at 21°C and then see what is the number of the remaining oxygen mask tests.

EXAMPLE

Associated condition:

Crew ..... PILOT, COPILOT, AND OBSERVER

Indicated Gauge Pressure ..... 1750 PSI

Cylinder Compartment Temperature ..... 30°C

According to the Oxygen Pressure Correction chart, for the associated conditions, the pressure for 21°C is 1700 psi.

According to the Oxygen Consumption chart, for 1700 psi there are approximately 22 remaining pre-flight tests before recharging the oxygen cylinder becomes necessary. The airplane's dispatch being therefore allowed.

NOTE: The oxygen consumption chart is used only for the crew oxygen subsystem, since there is no test for the passenger oxygen subsystem.

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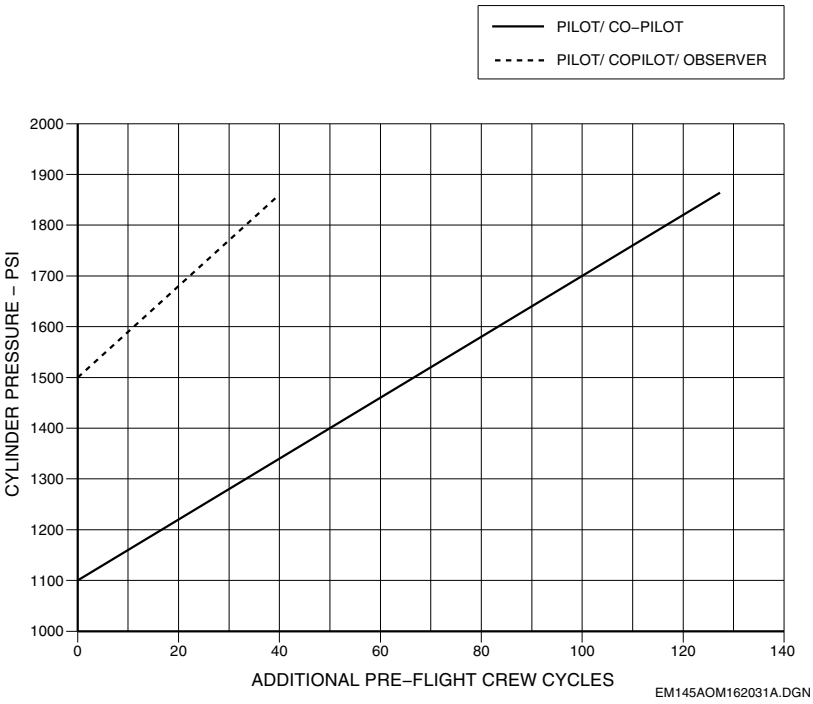

OXYGEN CONSUMPTION CHART

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OXYGEN DURATION TABLES

When an event of lack of oxygen supply occurs on board, the following oxygen duration tables allow the Fight Crew to estimate the time available for flying above 10000 ft to do a mountain clearance.

The values presented in the following tables were obtained considering the airplane flying at 41000 ft when the decompression occurs, followed by an emergency descent to a terrain clearance altitude (all engines in idle, landing gear down, flaps at 0°, and speed brakes open).

After the time allowed for the terrain clearance, there will be sufficient oxygen to continue the airplane descent to 10000 ft.

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AIRPLANES EQUIPPED WITH ONE 77 FT³ OXYGEN BOTTLE

ALTITUDE (ft)	CREW MEMBERS	PASSENGERS ON BOARD						
		0 pax	1 pax	3 pax	5 pax	7 pax	9 pax	11 pax
15000	WITH OBSERVER	128	128	115	89	73	60	51
	WITHOUT OBSERVER	195	158	115	89	73	60	51
18000	WITH OBSERVER	120	120	119	92	75	62	53
	WITHOUT OBSERVER	183	163	119	92	75	62	53
20000	WITH OBSERVER	114	114	114	96	77	64	54
	WITHOUT OBSERVER	175	169	123	96	77	64	54

ALTITUDE (ft)	CREW MEMBERS	PASSENGERS ON BOARD						
		13 pax	14 pax	15 pax	16 pax	17 pax	18 pax	19 pax
15000	WITH OBSERVER	44	41	38	36	34	31	30
	WITHOUT OBSERVER	44	41	38	36	34	31	30
18000	WITH OBSERVER	45	43	39	37	35	33	31
	WITHOUT OBSERVER	45	43	39	37	35	33	31
20000	WITH OBSERVER	47	44	41	38	36	34	32
	WITHOUT OBSERVER	47	44	41	38	36	34	32

NOTE: - The values above are in minutes.

- The calculation of the terrain clearance time was based on a dispatch pressure of 1730 psig or above for crew and passenger systems. Also it was considered the presence of one flight attendant in all calculations.

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AIRPLANES EQUIPPED WITH TWO 77 FT³ OXYGEN BOTTLE

ALTITUDE (ft)	CREW MEMBERS	PASSENGERS ON BOARD						
		0 pax	1 pax	3 pax	5 pax	7 pax	9 pax	11 pax
15000	WITH OBSERVER	128	128	128	128	128	128	124
	WITHOUT OBSERVER	195	195	195	195	169	143	124
18000	WITH OBSERVER	120	120	120	120	120	120	120
	WITHOUT OBSERVER	183	183	183	183	175	148	128
20000	WITH OBSERVER	114	114	114	114	114	114	114
	WITHOUT OBSERVER	175	175	175	175	175	153	132

ALTITUDE (ft)	CREW MEMBERS	PASSENGERS ON BOARD						
		13 pax	14 pax	15 pax	16 pax	17 pax	18 pax	19 pax
15000	WITH OBSERVER	109	102	96	91	86	82	78
	WITHOUT OBSERVER	109	102	96	91	86	82	78
18000	WITH OBSERVER	112	106	100	94	89	85	81
	WITHOUT OBSERVER	112	106	100	94	89	85	81
20000	WITH OBSERVER	114	109	103	97	92	88	84
	WITHOUT OBSERVER	116	109	103	97	92	88	84

NOTE: - The values above are in minutes.

- The calculation of the terrain clearance time was based on a dispatch pressure of 1730 psig or above for crew and passenger systems. Also it was considered the presence of one flight attendant in all calculations.

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AIRPLANES EQUIPPED WITH ONE 115 FT³ OXYGEN BOTTLE

ALTITUDE (ft)	CREW MEMBERS	PASSENGERS ON BOARD						
		0 pax	1 pax	3 pax	5 pax	7 pax	9 pax	11 pax
15000	WITH OBSERVER	128	128	128	128	116	98	84
	WITHOUT OBSERVER	195	195	181	142	116	98	84
18000	WITH OBSERVER	120	120	120	120	120	101	87
	WITHOUT OBSERVER	183	183	183	147	120	101	87
20000	WITH OBSERVER	114	114	114	114	114	104	90
	WITHOUT OBSERVER	175	175	175	152	124	104	90

ALTITUDE (ft)	CREW MEMBERS	PASSENGERS ON BOARD						
		13 pax	14 pax	15 pax	16 pax	17 pax	18 pax	19 pax
15000	WITH OBSERVER	73	69	64	61	57	54	52
	WITHOUT OBSERVER	73	69	64	61	57	54	52
18000	WITH OBSERVER	76	71	67	63	59	56	53
	WITHOUT OBSERVER	76	71	67	63	59	56	53
20000	WITH OBSERVER	78	73	69	65	61	58	55
	WITHOUT OBSERVER	78	73	69	65	61	58	55

NOTE: - The values above are in minutes.

- The calculation of the terrain clearance time was based on a dispatch pressure of 1730 psig or above for crew and passenger systems. Also it was considered the presence of one flight attendant in all calculations.

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AIRPLANES EQUIPPED WITH ONE 115 FT³ AND ONE 77 FT³ OXYGEN BOTTLES

ALTITUDE (ft)	CREW MEMBERS	PASSENGERS ON BOARD						
		0 pax	1 pax	3 pax	5 pax	7 pax	9 pax	11 pax
15000	WITH OBSERVER	128	128	128	128	128	128	128
	WITHOUT OBSERVER	195	195	195	195	195	178	154
18000	WITH OBSERVER	120	120	120	120	120	120	120
	WITHOUT OBSERVER	183	183	183	183	183	183	159
20000	WITH OBSERVER	114	114	114	114	114	114	114
	WITHOUT OBSERVER	175	175	175	175	175	175	165

ALTITUDE (ft)	CREW MEMBERS	PASSENGERS ON BOARD						
		13 pax	14 pax	15 pax	16 pax	17 pax	18 pax	19 pax
15000	WITH OBSERVER	128	128	121	114	109	103	98
	WITHOUT OBSERVER	136	128	121	114	109	103	98
18000	WITH OBSERVER	120	120	120	118	112	107	102
	WITHOUT OBSERVER	140	132	125	118	112	107	102
20000	WITH OBSERVER	114	114	114	114	114	110	105
	WITHOUT OBSERVER	145	137	129	122	116	110	105

NOTE: - The values above are in minutes.

- The calculation of the terrain clearance time was based on a dispatch pressure of 1730 psig or above for crew and passenger systems. Also it was considered the presence of one flight attendant in all calculations.

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SECTION 2-17

FLIGHT INSTRUMENTS

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GENERAL

The Flight Instruments System comprises the Air Data System (ADS), the attitude, altitude, airspeed, and vertical speed indications on the Primary Flight Display (PFD), the Flight Data Recorder System (FDRS), and the Digital Clock.

The conventional flight data information is presented on the Primary Flight Display (PFD).

Integrated Standby Instrument System (ISIS) is provided as backup, should there occur a complete failure in the electronic flight instrument system. It indicates Airspeed, Altitude and Attitude in a single display.

The Synthetic Vision System (SVS) provides pilots increased situation awareness of the terrain and obstacles in the vicinity through the use of 3D synthetic terrain representations while maintaining the existing PFD functions.

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AIR DATA SYSTEM (ADS)

The Air Data Systems are designed for sensing, processing, and transmitting air data information to various systems and instruments of the airplane.

The ADS 1 (LH) consists of one Air Data Computer (ADC), one Pitot Tube, one Total Air Temperature Probe (TAT) and two Static Ports.

The ADS 2 (RH) consists of one Air Data Computer (ADC), one Pitot Tube, one Total Air Temperature Probe (TAT) and two Static Ports.

The Standby System consists of one Pitot/Static Tube, one Standby Altimeter and one Standby Airpeed Indicator.

The Pitot and Pitot/Static tubes, TAT probes and Static Ports are heated for anti-icing purposes. For further information about the anti-icing system, refer to Section 2-15, Ice and Rain Protection.

The ADSs 1 and 2 interface with the airplane's systems through the ADCs, as follows:

- IC-600 - Both ADCs supply pressure altitude, barometrically corrected altitude, true airspeed, calibrated airspeed, vertical speed, Mach number, static air temperature, V_{MO} and total air temperature to both IC-600.
- FADEC - The ADC 1 supplies the FADEC 1A and 2A, and the ADC 2 supplies the FADEC 1B and 2B with total pressure, Mach number, and total air temperature.
- HSCU - The ADCs provide calibrated airspeed for the HSCUs.
- TRANSPONDER - Both ADCs provide pressure altitude information for both transponders/TCAS.
- AHRS (AH-900 only) - The ADC 1 supplies AHRS 1 and ADC 2 supplies AHRS 2 with true airspeed.
- FMS - The ADC 1 provides true airspeed for the FMS.
- WEATHER RADAR - The ADC 2 provides altitude data for the weather radar.
- SPS - Both ADCs provide Mach number information for the Stall Protection System.
- EGPWS - The ADC 1 provides airspeed (CAS and TAS), altitude, and vertical speed information for the EGPWS.

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- CPCS - Both ADCs provide pressure altitude, barometric correction, and altitude rate of change data for the pressurization Digital Controller.
- ICE PROTECTION - Both ADCs provide altitude trip point for the ice protection system.
- RUDDER SYSTEM - Both ADCs supply the rudder system with the calibrated airspeed trip point.
- AWU - Both ADCs supply the AWU with the overspeed warning output.

The ADCs functional test mode is entered when the momentary ADC Test Switch, located on the Maintenance Panel, is commanded to test, provided the airplane speed is below 50 kt and the airplane is on the ground.

The barometric pressure data discrete inputs to the ADCs are set on the PFD Bezel (barometric pressure selection and correction).

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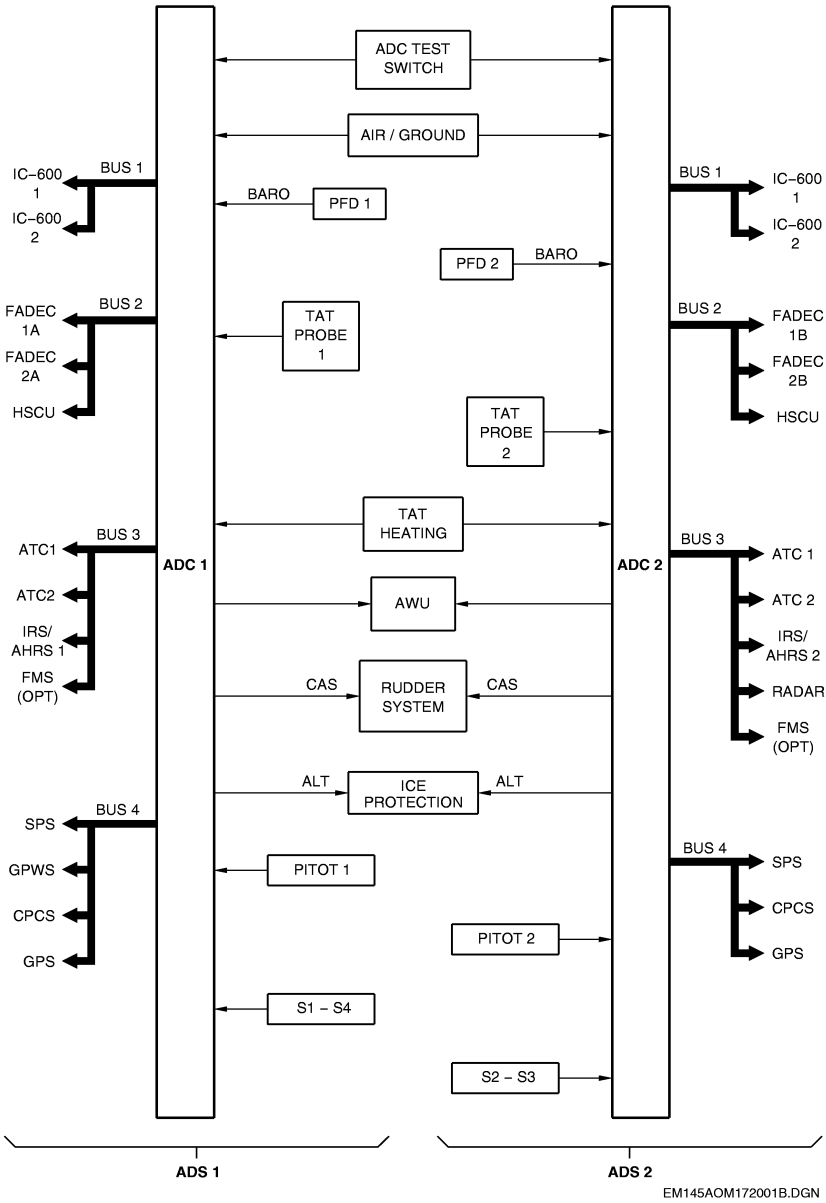

AIR DATA SYSTEM SCHEMATIC

ADS SENSORS

Pitot tubes 1 and 2 are positioned on the top of the airplane's nose. Pitot/Static tube 3 is positioned on the right side of the airplane's nose.

Pitot tubes 1 and 2 supply total air pressure to the respective ADC.

Four Static ports supply static pressure to both ADCs.

The Pitot/Static tube 3 supplies total and static air pressure to the Integrated Standby Instrument System. Furthermore, Pitot/Static tube 3 supplies static pressure to the Cabin Pressure Acquisition Module (CPAM).

The TAT probe 1 is installed on the left side of the airplane's nose, and the TAT probe 2 is installed at the right side of the airplane's nose.

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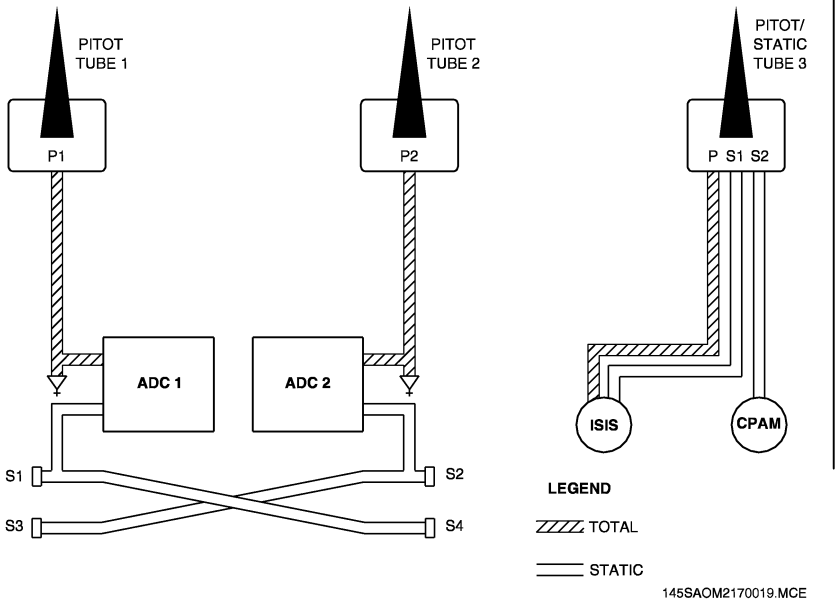
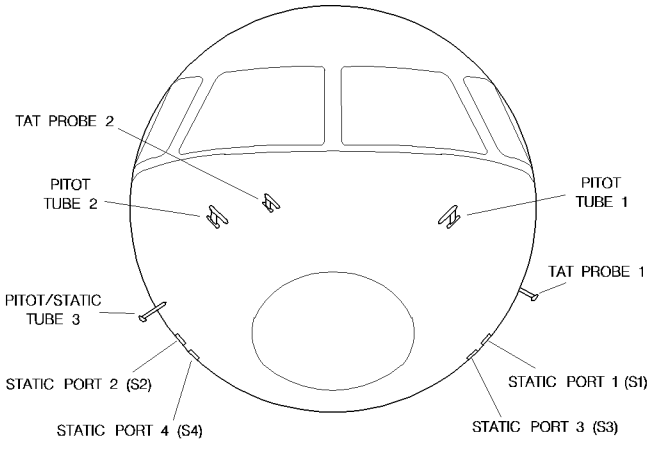


ADS SENSORS SCHEMATIC



ADS SENSORS POSITIONING

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ADS INDICATIONS

MFD

1 - STATIC AIR TEMPERATURE (SAT) INDICATION

- The SAT is presented as a digital readout in degrees Celsius.
- Colors:
  - Digits: green
  - Labels: white
- Ranges from –99 to +99°C with a resolution of 1°C.
- In the event of ADC failure or invalid SAT, the digits are replaced by three amber dashes.

2 - TOTAL AIR TEMPERATURE (TAT) INDICATION

- The TAT is presented as a digital readout in degrees Celsius.
- Colors:
  - Digits: green
  - Labels: white
- Ranges from –99 to +99°C with a resolution of 1°C.
- In the event of ADC failure or invalid TAT, the digits are replaced by three amber dashes.

3 - TRUE AIRSPEED (TAS) INDICATION

- The TAS is presented as a digital readout in knots.
- Colors:
  - Digits: green
  - Labels: white
- Ranges from 0 to 999 kts with a resolution of 1 kt.
- In the event of ADC failure or invalid TAS, the digits are replaced by three amber dashes.

PFD

1 - AIR DATA SOURCE ANNUNCIATION

- Label: ADC1 or ADC2.
- Color: amber when only one ADC is supplying both sides or each ADC is supplying opposite side systems (ADC or SG pressed on the Reversionary Panel - refer to section 2-4, Crew Awareness).
- Annunciation is removed when each ADC is supplying the respective side systems (ADC 1 supplying captain's side and ADC 2 supplying copilot's side).

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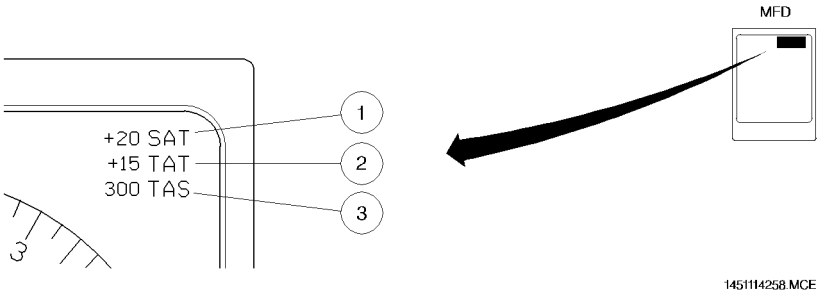
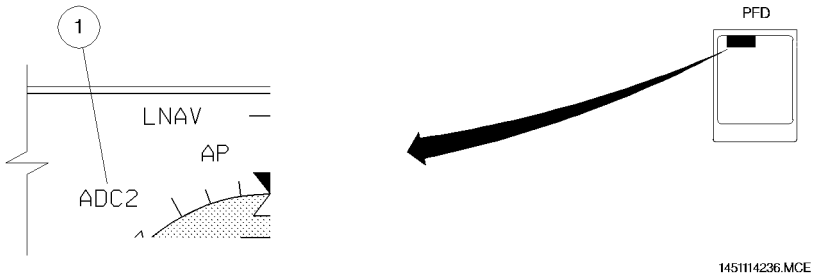


ADS INDICATIONS ON THE MFD



ADS INDICATION ON THE PFD

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FLIGHT INSTRUMENTS

The primary flight instruments are presented on the PFDs.

Indicated airspeed (1), altitude (2) and vertical speed (4) are provided by the ADS.

Attitude (3) and heading (5) information are provided by the IRS (or AHRS, depending on the airplane configuration). For further information on these systems and indications, refer to section 2-18, Navigation and Communication.

Slip/Skid indicator (6) is a purely mechanical system.

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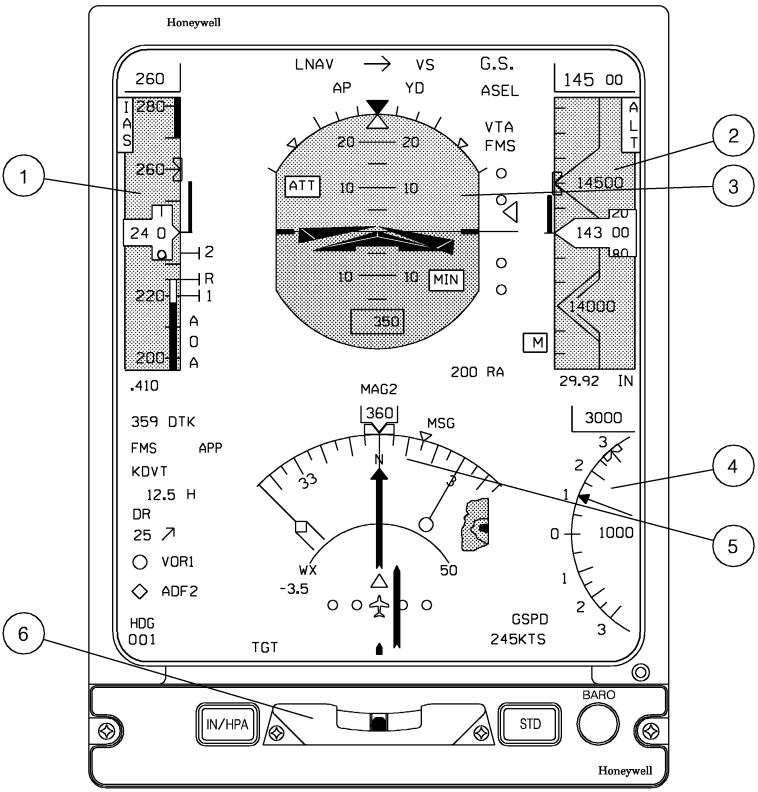

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PRIMARY FLIGHT INSTRUMENTS ON THE PFD (V-BAR FORMAT)

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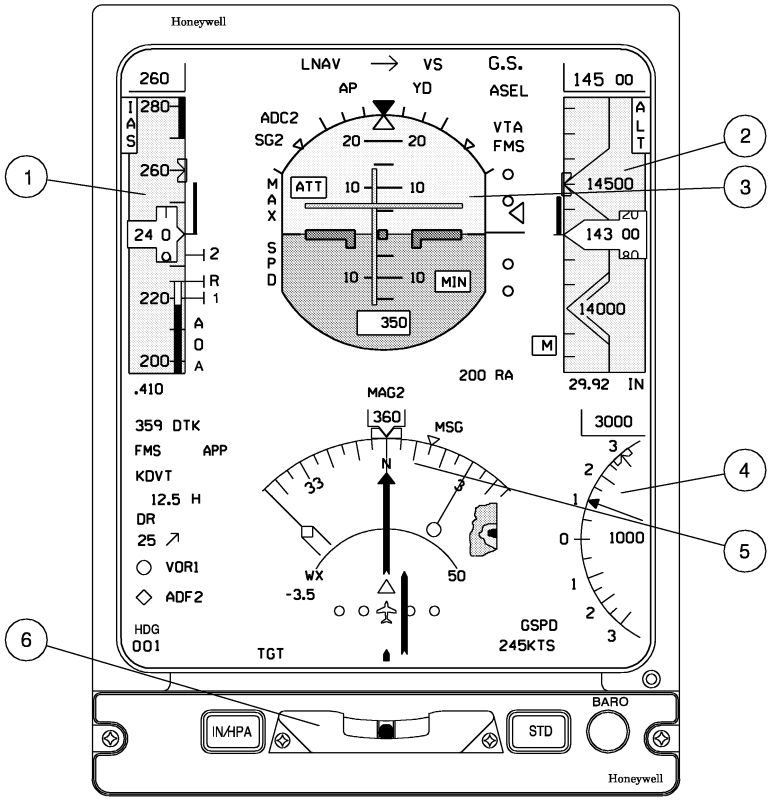

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PRIMARY FLIGHT INSTRUMENTS ON THE PFD (CROSS-BAR FORMAT)

AIRSPEED INDICATION

SPEED INDICATION ON THE PFD

The KIAS and Mach number are displayed in tape format on the PFDs. The speed tape also displays target speed and respective speed bug, set through the Flight Guidance Controller (refer to section 2-19, Autopilot), reference speed bugs, to be used during takeoff and landing operations (refer to “speed bugs setting through MFD”, in this section), speed trending vector and overspeed visual warnings.

1 - OVERSPEED INDICATION BAR

- Color: red.
- Extends from V_{MO}/M_{MO} to higher airspeeds on the scale. If the airplane exceeds V_{MO}/M_{MO}, the digits in the airspeed window and the digital Mach readout will be displayed in red, and an aural warning will be triggered. If the acceleration trend vector exceeds V_{MO} or M_{MO}, the digits in the airspeed window and the digital Mach readout are displayed in amber.

2 - AIRSPEED SCALE AND VERTICAL TAPE

- Color:
  - Scale: white.
  - Tape: gray.
- Ranges from 40 to 400 KIAS with a resolution of 10 KIAS.
- The vertical tape provides a trend indication of IAS and displays digital airspeed each 20 KIAS.

3 - AIRSPEED TREND VECTOR

- Color: magenta.
- The airspeed trend vector is an indication of the acceleration direction and it represents the airspeed that the airplane would attain in 10 seconds if the current airplane acceleration is maintained.
- The trend vector extends vertically from the center of the airspeed vertical tape.
- Extends upward for positive acceleration and downward for negative acceleration.
- Disabled during takeoff.

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4 - REFERENCE SPEED BUGS (V_1, V_R, V_2, AP)

- Color:
  - V_1: magenta.
  - V_R: cyan.
  - V_2: white.
  - AP: green.
- Presented when the associated digital indication is selected or above 40 KIAS on the ground.
- Removed above V_2 + 42 kt.
- May be out of view, if airspeed is reduced below 230 KIAS followed by an increase above 230 KIAS. To display the speeds again, press the reference speed buttons.
- When the airplane speed is below 40 knots, V_1, V_R, and V_2, as set on the MFD, are displayed in the bottom portion of the airspeed tape in the form of a digital indication. Upon power up, the digital indications for the set bugs are dashes.

5 - MACH NUMBER DIGITAL INDICATION

- Color:
  - Green for normal airspeeds.
  - Amber for V_{MO}/M_{MO}.
  - Red from V_{MO}/M_{MO} to higher airspeeds.
- Ranges from 0.05 to 1.000 M with a resolution of 0.001 M.
- Mach number and label are displayed when speed exceeds 0.45 M and remains until it drops below 0.40 M.

6 - LOW AIRSPEED AWARENESS

- Displayed in the airspeed scale when the airspeed is near stall speed for the current configuration.
- Colors:
  - White: indicates the speed range from 1.23 V_S to 1.13 V_S.
  - Amber: indicates the speed range from 1.13 V_S to V_S. Stick shaker may be activated in this range.
  - Red: indicates V_S. Stick pusher is activated.

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7- CURRENT AIRSPEED DISPLAY

- Color:
  - Green for normal airspeeds.
  - Amber for V_{MO} /$M_{MO.}$
  - Red from V_{MO}/M_{MO} to higher airspeeds.
- Ranges from 40 to 400 KIAS with a resolution of 1 KIAS.

8 - AIRSPEED COMPARISON MONITOR DISPLAY

- Color: amber.
- Label: IAS.
- Displayed in case of a difference of 5 KIAS between the airspeed indication on the PFDs.
- Flashes for 10 seconds and then becomes steady.

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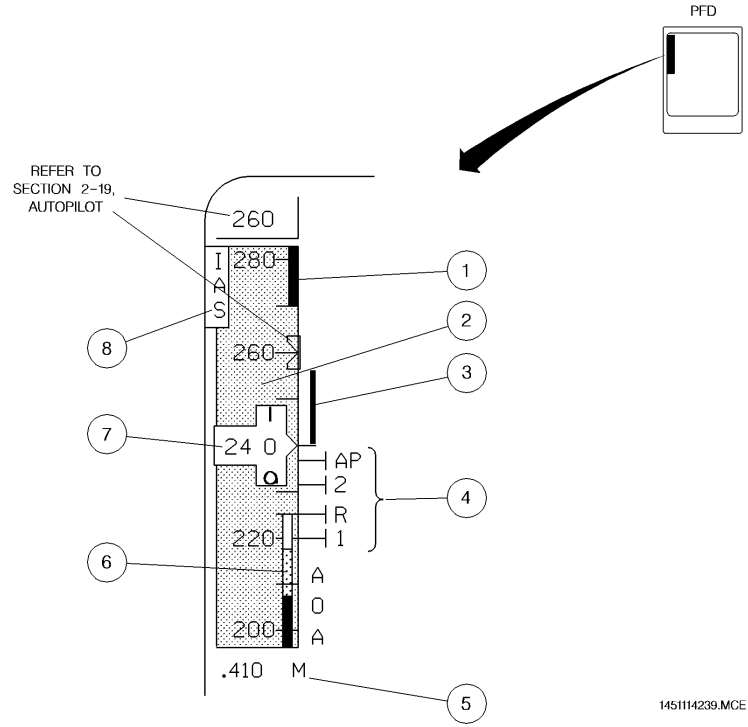

AIRSPEED INDICATION ON THE PFD

SPEED BUGS SETTING THROUGH MFD

The MFD SPDS submenu allows setting speed bugs on the PFD speed tape. This submenu is accessed by selecting the MFD submenu, then the SPDS submenu.

1 - REFERENCE SPEED DIGITAL INDICATIONS

- Minimum value is:
  - V_1 : 89 kt.
  - V_R : 89 kt or V_1, whichever is higher.
  - V_2 : 89 kt or V_R, whichever is higher.
  - AP : 89 kt.
- Values are removed from the PFD when airplane is airborne.
- Displays dashes on power-up system.
- When selected, dashes are replaced by speed value.
- Selected Reference Speed is surrounded by two white boxes.

2 - REFERENCE SPEED SET KNOB

- When rotated clockwise or counterclockwise, increments or decrements the associated airspeed value and moves the associated bug accordingly (if the bug is in view).

3 - REFERENCE SPEED BUTTONS (V1, VR, V2, AP)

- Allows selection of V_1, V_2, V_R or AP speeds, for setting purposes.
- Enables movement of the associated speed bug on the PFD.
- Sequentially pressing each button causes the following:
  - First pressing causes the associated speed indication dashes to be replaced by the speed value and two white boxes to be displayed around the indication.
  - Next pressing removes the inner box and displays the associated bug on the PFD.
  - Next pressing removes the outer box and the associated bug on the PFD.

4 - RETURN BUTTON

- Returns the MFD to the MAIN Menu.
- If any of the speeds are displayed with both surrounding inner and outer boxes, pressing the RTN Button removes the inner box before returning the menu to the MFD Bezel Menu.

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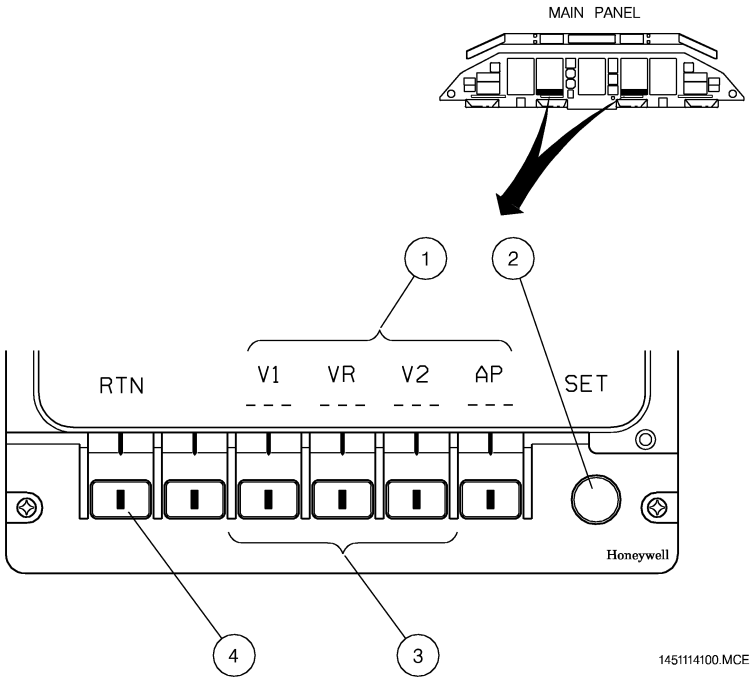

MFD SPDS SUBMENU

ALTITUDE INDICATION

ALTITUDE INDICATIONS ON THE PFD

The altitude is displayed in tape format on the PFD. The altitude tape also displays the Flight Guidance Controller preselected altitude (ASEL), respective preselected altitude bug (refer to section 2-19, Autopilot), and altitude trending vector.

1 - ALTITUDE SCALE AND VERTICAL TAPE

- Color:
  - Scale: white.
  - Tape: gray.
- Ranges from –1000 to 60000 ft, with a resolution of 100 ft.
- The vertical tape moves behind the current altitude window and displays a range of ± 550 ft from the actual altitude.
- The vertical tape displays digital altitude every 200 ft for altitudes from zero up to 10000 ft and every 500 ft for altitudes above 10000 ft.

2 - ALTITUDE COMPARISON MONITOR DISPLAY

- Color: amber.
- Label: ALT.
- Displayed in case of a difference of 200 ft or more between the altitude indications on PFDs.
- Flashes for 10 seconds and then becomes steady.

3 - ALTITUDE CHEVRON

- Color: white.
- The double line chevron indicates multiples of 1000 ft. The single line chevron indicates every 500 ft increments.

4 - CURRENT ALTITUDE DISPLAY

- Color: green.
- Ranges from –1000 to 60000 ft with a resolution of 20 ft.

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5 - ALTITUDE TREND VECTOR

- Color: magenta.
- The altitude trend vector represents the altitude that the airplane should attain in 6 seconds if the current altitude rate (Vertical Speed) is maintained.
- Displayed as a vertical bar that extends from the center of the altitude tape upward for positive vertical speeds and downward for negative vertical speeds.

6 - LOW ALTITUDE AWARENESS

- Color:
  - band: brown.
  - limiting line: yellow.
- Provided through a raster band that will be displayed on the bottom of the altitude tape in case the radio altitude is below 550 ft.
- Covers the lower half of the altitude tape when the airplane is on ground.

7 - BAROMETRIC ALTITUDE CORRECTION DISPLAY

- Color:
  - digits: cyan.
  - label: white.
- Ranges from 542 to 1083 hPa (16.00 to 32.00 inHg) with a resolution of 1 hPa (0.01 inHg).

8 - BARO KNOB

- Allows setting barometric altitude correction value.
- Rotating clockwise or counterclockwise increments or decrements barometric altitude correction.

9 - STANDARD BUTTON

- Adjusts barometric altitude correction to standard setting (29.92 inHg or 1013.25 hPa).

10 - IN/HPA BUTTON

- Selects barometric pressure unit between inches of mercury (inHg) and hectopascals (hPa).

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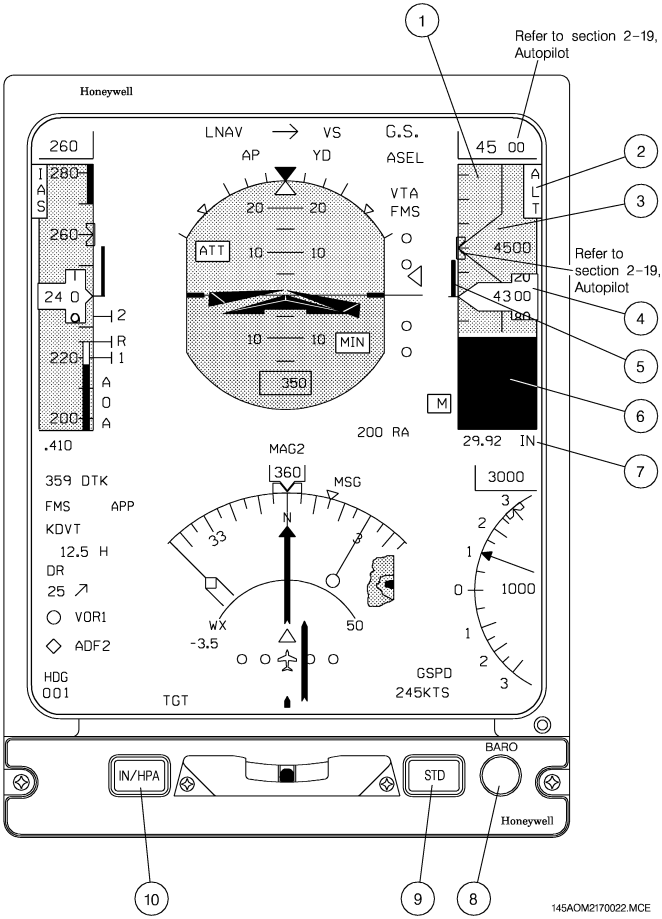

ALTITUDE INDICATION ON THE PFD (V BAR FORMAT)

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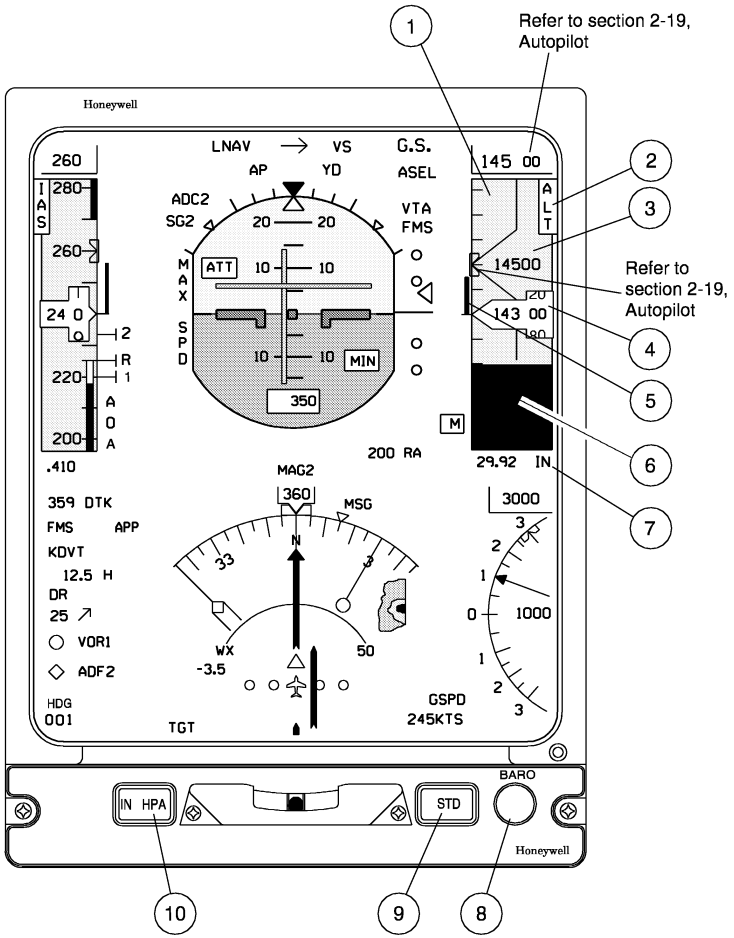

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ALTITUDE INDICATION ON THE PFD (CROSS BAR FORMAT)

VERTICAL SPEED INDICATION

The vertical speed is displayed in analogic and digital formats on the PFD.

Besides presenting the current vertical speed, the Vertical Speed Indicator (VSI) also displays target vertical speed and respective bug, set through the Flight Guidance Controller (refer to section 2-19, Autopilot).

The PFD VSI also indicates vertical direction and minimum vertical speed to be attended during evasive maneuvers, according to TCAS commands. For further information on TCAS, refer to Section 2-4, Crew Awareness.

1 - ANALOGIC VERTICAL SPEED INDICATION

- Color:
  - Scale: white.
  - Pointer: green.
- Ranges from –3000 to +3000 ft/min.
- Scale has marks every 500 ft/min up to 3000 ft/min, with labels every 1000 ft/min.
- The scale is non-linear to provide increased resolution around zero vertical speed.

2 - DIGITAL VERTICAL SPEED INDICATION

- Color: green.
- Ranges from –9999 to +9999 ft/min with a resolution of 50 ft/min.
- Indication is displayed in the center of the scale.
- Indication is removed from the display when vertical speed exceeds –550 ft/min or +550 ft/min, and remains until it returns to –500 ft/min or +500 ft/min.

NOTE: For invalid vertical speed, the pointer and the digital indication are removed from the display and replaced by a red boxed V over S.

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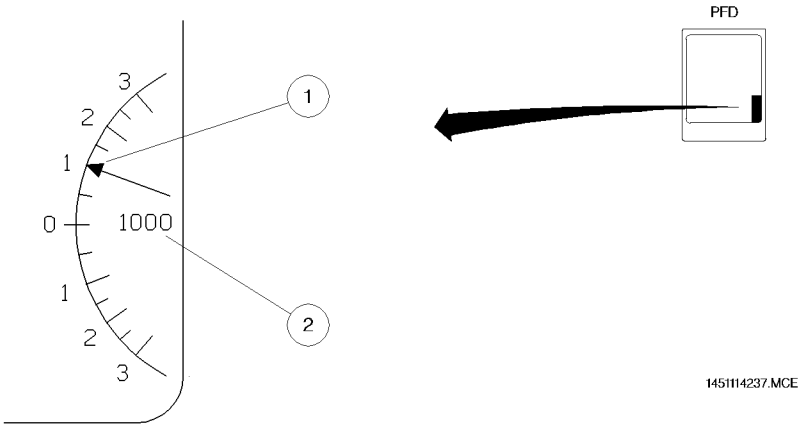

VERTICAL SPEED INDICATION ON PFD

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STANDBY INSTRUMENTS

Standby instruments are provided to supply flight data information in case of PFD and MFD loss.

The Integrated Standby Instrument System comprises the following functions: pitch and roll attitudes, airspeed and altitude on a single display.

As the magnetic heading displayed by this equipment is received from the IRS 1, the conventional Magnetic Compass is provided as a back-up unit.

The pilot is responsible for checking the Integrated Standby Instrument System and the Magnetic Compass indications against PFD indications, in order to ensure that the back-up units will present reliable indication in an emergency situation.

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MAGNETIC COMPASS

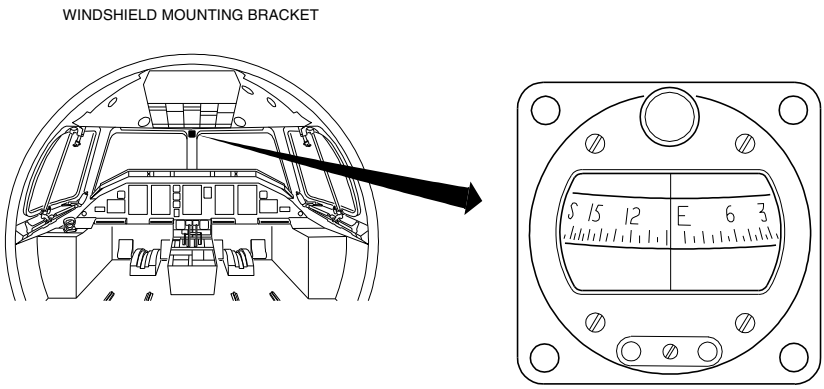
The Standby Magnetic Compass indicates the airplane's magnetic heading by sensing the earth's magnetic field. The magnetic heading is indicated by reading a graduated horizontally-mounted card against a fixed lubber line, which represents the airplane's longitudinal axis.

This card is graduated as follows:

– Half dots between the tens dots (005°, 015°, 025°,...).
– Full dots every ten degrees (010°, 020°,...).
– Full dots and respective magnetic heading indication every 030° (030°, 060°,...).
– Full dots and the N, E, S and W characters at the respective cardinal points (North, East, South and West).

Two calibration cards are supplied for the compass, one for normal operational condition (pitots on and windshield heating off) installed above the compass, and one for electrical emergency condition, installed on the main panel left corner.

The Standby Magnetic Compass receives 5 V DC for internal lighting.



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INTEGRATED STANDBY INSTRUMENT SYSTEM (ISIS)

The ISIS provides the following parameters:

– Attitude (pitch and roll).
– Standard or barometric-corrected altitude and associated barometric pressure.
– Indicated airspeed.
– Indicated Mach number.
– V_{MO} (Maximum Operating Speed).
– Skid/Slip information.
– Magnetic heading (from IRS 1).

The ISIS relies on 28 V DC power, provided by the Backup Hot Bus. In case of an electrical emergency, it will operate solely on the airplane batteries for approximately 240 minutes.

NOTE: For airplanes S/N 484, 495, 528, 540 and 555, the ISIS battery duration is 40 minutes.

The system is powered as soon as the airplane batteries are switched to AUTO. Then, the ISIS starts its alignment phase, which takes about 90 seconds to be completed and can be identified on the screen by the "INIT 90s" flag.

NOTE: The airplane must not be moved during the first 90 seconds after power-up, while the ISIS is undergoing alignment. Moving the airplane during this period can cause in-flight attitude indication errors that are not noticeable on ground.

ATTITUDE

Using the data from the respective sensors after its conversion to digital format, the system computes and displays attitude.

The CAGE button resets attitude to provide a fast erection function. The CAGE function is not operational during the initialization mode and must only be used in stabilized flight conditions.

If a failure of the attitude function is detected by internal monitoring, attitude display information, e.g. brown and blue background, pitch scale, roll scale and roll pointer is removed and replaced by black background, and an ATT flag is displayed.

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ALTITUDE

Altitude data is provided by processing static pressure sensed by Pitot/Static tube 3.

Altitude is displayed in tape format. Pushing the STD button sets the ISIS reference barometric pressure to standard (QNE). The barometric pressure can be adjusted, starting from the standard value, by using the rotary BARO knob.

In case a failure of the altitude function is detected by the internal monitoring system, the altitude tape is removed and an ALT flag is displayed.

INDICATED AIRSPEED

Airspeed data is provided by processing dynamic pressure sensed by Pitot/Static tube 3.

Airspeed is presented in tape format. In case a failure is detected by the internal monitoring system, the airspeed tape and pointer are removed and a SPD flag is displayed.

SECONDARY PARAMETERS

In addition to primary parameters, the system computes and displays the following secondary parameters:

– Magnetic heading.
– Mach number.
– V_{MO}.
– Lateral acceleration/Slip indication.

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ISIS CONTROLS AND INDICATORS

1 - BRIGHTNESS ADJUSTMENT

- Push buttons labelled + and - adjust brightness.

2 - AIRSPEED INDICATION

- Airspeed tape positioned vertically on the upper left segment of the display.
- Ranges from 40 to 520 kt and the scale is graduated every 5 kt between 40 and 250 kt. From 250 to 520 kt the scale is graduated every 20 kt with digital indications every 20 kt. The indications and graduations are displayed in white.

3 - V_{MO}/M_{MO}

- V_{MO} is indicated by a red tape associated to the airspeed tape.
- Digits of the airspeed tape and Mach Number display are green when the airspeed and Mach Number are lower than V_{MO}/M_{MO} and red when the airspeed and Mach Number are equal or greater than V_{MO}/M_{MO}.

4 - ROLL INDICATION

- Roll scale graduated at 0°, 10°, 20°, 30°, 45° and 60°, to provide bank angle measurement, indicated by the roll pointer.

5 - STD BUTTON

- Pushing the button sets the barometric setting to Standard Atmospheric Pressure.

6 - REFERENCE BAROMETRIC PRESSURE

- Displayed in cyan on a digital read-out in hPa or inHg.
- When Standard Atmospheric Pressure is selected, the 29.92 inHg or 1013 hPa value is displayed in cyan instead of barometric pressure value.
- HPA or IN displayed in white and in upper case.

7 - LATERAL ACCELERATION

- The range is ± 0.2 g.
- Symbol displayed in black surrounded in white, just below the roll reference triangle.

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8 - ALTITUDE INDICATION

- Altitude tape positioned vertically on the upper right segment of the display.
- Ranges from -2000 to 50000 ft with 5 digits green display read-out in a yellow frame. A NEG indication is displayed vertically in white in case of negative altitude.

9 - PITCH INDICATION

- The pitch scale comprises white reference lines every 2.5° between -30° and +30°, and the associated pitch angle values, in white, every 10° between -50° and +50° and at ± 80°. The sector above the horizon line of the screen is blue and the sector below is brown.
- Beyond ± 30°, red chevrons are displayed to indicate excessive pitch angle and the direction to follow in order to reduce it.

10 - BARO ROTARY KNOB

- Allows performing QNH (QFE if applicable) settings.
- When the knob is turned at a slow rate, the value increases in 0.01 inHg or 1 hPa increments. When turned at a faster rate, the increment is in 0.05 inHg or 5 hPa steps.

11 - MAGNETIC HEADING

- Given by the horizontal displacement of the heading scale.
- Indication symbol yellow and heading scale graduated by white dots every 5°, with a white two-digit indication every 20°. The last digit (0) is not shown (e.g., 320° is thus presented as 32). The visible range is 50°.

12 - CAGE BUTTON

- Resets attitude to provide a fast erection function.
- When it is maintained pressed for more than two seconds, resets the horizon function to zero and warning a "ATT 10s" flag is displayed.

13 - MACH NUMBER INDICATION

- The range is from 0.1 to 1 M and is displayed for Mach above 0.45 and when decreasing until Mach 0.40.
- The decimal point and the two digits on the lower left corner of the display are green when the airspeed and Mach Number are lower than V_{MO}/M_{MO} and red when the airspeed and Mach Number are equal or greater than V_{MO}/M_{MO}.

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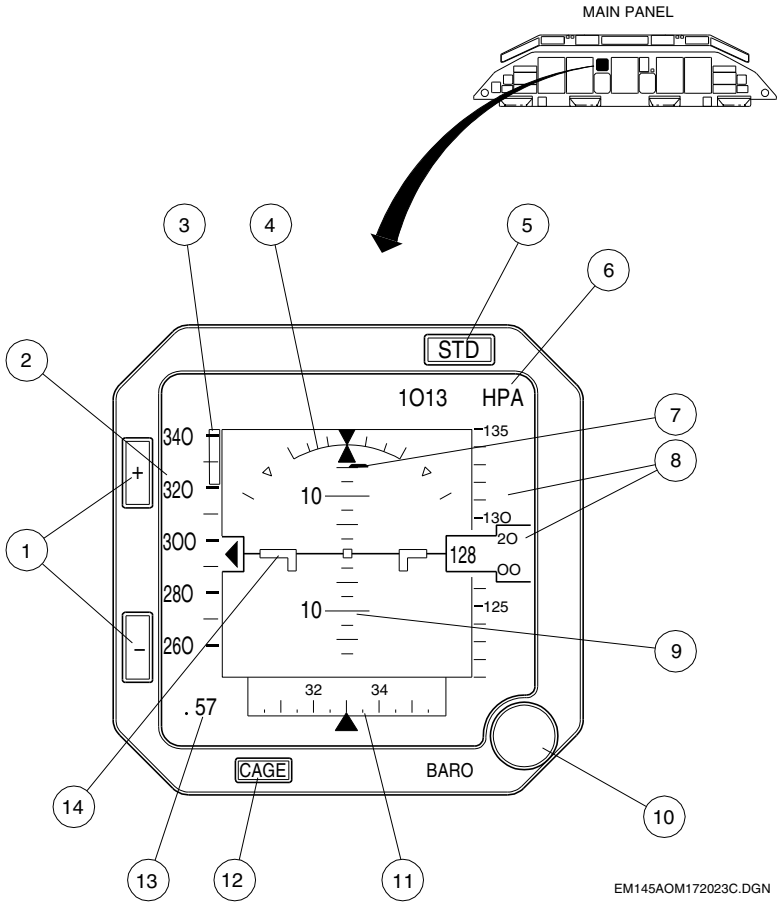
14 - AIRPLANE SYMBOL

- Displayed on the center of the horizon area.
- Black symbol surrounded by a yellow area.



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INTEGRATED STANDBY INSTRUMENT SYSTEM

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ISIS CONTROLS AND INDICATORS (WITH OPTIONAL DIGITAL ALTITUDE READ-OUT IN METERS)

1 - V_{MO}/M_{MO}

- V_{MO}/M_{MO} is indicated by a red tape associated to the airspeed tape.
- The airspeed tape and Mach number digits in the readout box are white on a black background. When the airspeed and Mach number are equal to or greater than V_{MO}/M_{MO}, the box background becomes red.

2 - ROLL INDICATION

- Roll scale graduated at ± 10°, ± 20°, ± 30°, ± 45° and ± 60°, to provide bank angle measurement, indicated by the roll pointer.

3 - DIGITAL ALTITUDE READ-OUT IN METERS

- The readout box with altitude indication in meters is optional and is selected by straps configuration. It is followed by the character "m", is displayed horizontally at the middle top of the screen with a resolution of 5 m.

4 - REFERENCE BAROMETRIC PRESSURE

- Displayed in white on a digital read-out in hPa, mbar or inHg.
- Select the Standard Pressure value by pressing the STD push button, and check that the standard pressure 1013 hPa (or 1013 mbar or 29.92 inHg) is displayed at the upper right area.
- The BARO knob adjusts the barometric pressure. Clockwise rotation will increase the barometric pressure and counter clockwise rotation will decrease the barometric pressure.

5 - LATERAL ACCELERATION

- The range is ± 0.128 g.
- Symbol displayed in white, just below the roll reference triangle.

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6 - ALTITUDE INDICATION

- Altitude tape positioned vertically on the upper right segment of the display.
- Ranges from -2000 to 53000 ft.
- The altitude symbology consists of two parts: a moving altitude tape with numbered denominations of 200 ft and unnumbered denominations at every 100 ft intervals, and a readout box with rolling digits incremented each 20 ft, with 5 digits white display read-out in a white frame.
- For altitude below 0 ft, the numbers on the tape are prefixed by a minus sign.

7 - BARO ROTARY KNOB

- Allows performing QNH (QFE if applicable) settings.
- When the knob is turned at a slow rate, the value increases in 0.01 inHg or 1 hPa increments. When turned at a faster rate, the increment is in 0.05 inHg or 5 hPa steps.
- In normal mode allows setting the baroset value for the Barometric Altitude.
- Rotating clockwise (increments) or counter clockwise (decrements) Barometric Altitude Correction.
- When the BRT mode is selected, the BARO knob sets the screen brightness.
- In MENU mode allows to scroll through the menu options.
- Turn the BARO Knob to adjust the barometric pressure reference, the adjusted value is displayed on the screen above the altitude tape.
- Press the STD Button to instantly set the barometric reference to the standard pressure setting (1013.25 hPa).

8 - STD BUTTON

- In normal mode allows setting the barometric pressure to the Standard Atmospheric Pressure Value (1013.25 mbar).
- In BRT mode allows entering the MENU mode. This option will be annunciated on the screen.
- At other times this button may be used for other purposes. In these cases its function will be annunciated.

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9 - BRT BUTTON

- In normal mode this is used to enter BRT mode.
- In BRT mode allows to return to normal mode.
- At other times this button may be used for other purposes. In these cases its function will be annunciated.

10 - MAGNETIC HEADING

- Given by the horizontal displacement of the heading scale.
- Indication symbol white and heading scale graduated by white dots every 5°, with a white three-digit indication every 10°.
- The AHRS 1 and IRS 1 provide the magnetic heading.

11 - PITCH INDICATION

- The pitch ladder has numbered denominations every 10°, with unnumbered sub-denominations at every 5°. Between ± 27.5°, the unnumbered sub-denominations are presented every 2.5°. The sector above the horizon line of the screen is blue and the sector below is brown.

12 - AIRPLANE SYMBOL

- Displayed on the center of the horizon area.
- Black symbol surrounded by a white area.

13 - AIRSPEED INDICATION

- Airspeed tape positioned vertically on the upper left segment of the display.
- Ranges from 40 to 490 kt.
- The airspeed symbology consists of two parts: a moving airspeed tape with numbered denominations of 20 kt and unnumbered denominations at every 10 kt intervals, and a red readout box with rolling digits incremented each 1 kt, indicating the airplane current airspeed value. The indications and graduations are displayed in white.
- The airspeed display is inactive below 40 kt.

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14 - MACH NUMBER INDICATION

- The range is from 0.40 to 0.99 M with a resolution of 0.01 M.
- The Mach Number will not appear until 0.40 is reached, and will be removed when 0.35 is reached.
- The Mach readout is displayed in the top left-hand corner, accompanied by an "M" legend with decimal point and three white digits. When the Mach number is greater than V_{MO}/M_{MO} the box background becomes red.

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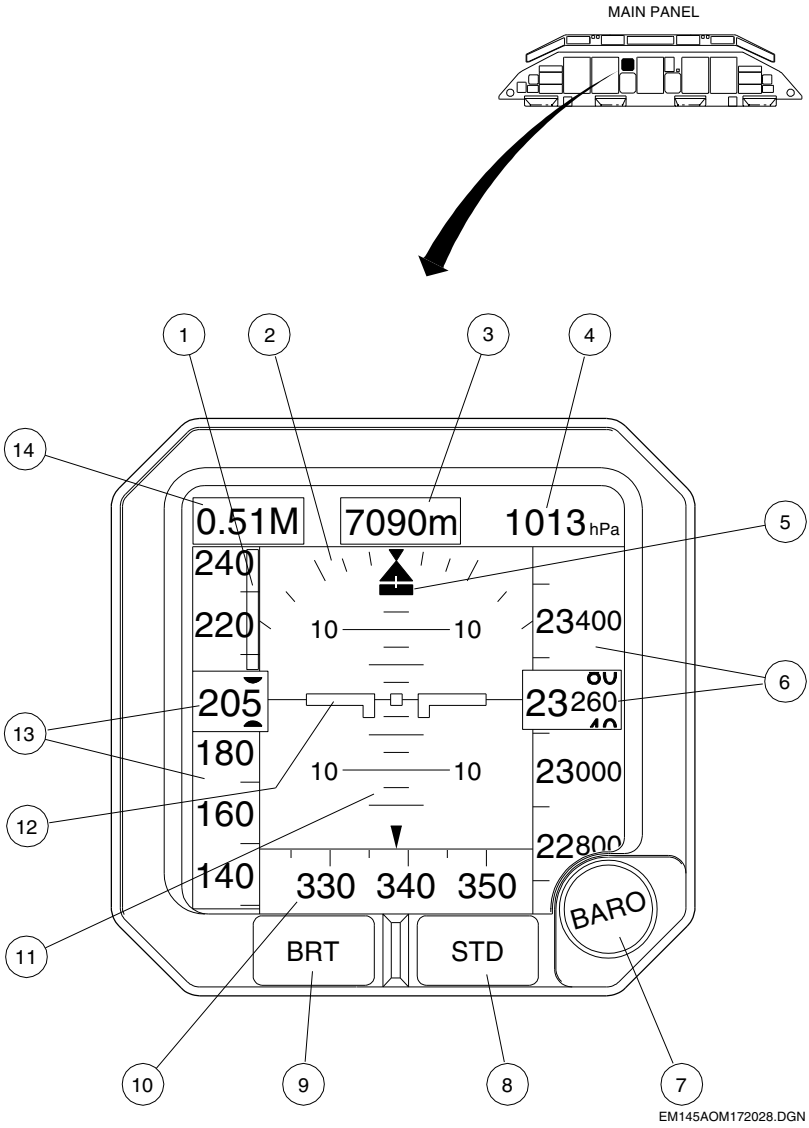

INTEGRATED STANDBY INSTRUMENT SYSTEM

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ISIS ABNORMAL OPERATION

In case of abnormal operation or failure detection in one or several ISIS functions, the following flags are displayed:

LABEL	MEANING	ACTION
ALT (white digits inside a red filled box).	Indicates loss of altitude function. It is displayed instead of the altitude scale.	Report to maintenance.
ATT (white digits inside a red filled box).	If during alignment phase, indicates an ISIS failure to align.	The system's electrical power must be reset. Make sure the airplane is stationary during subsequent ISIS alignment.
	If during any other phase of operation, indicates loss of attitude function.	Report to maintenance.
ATT: CAGE (black digits inside an yellow filled box).	Indicates that ISIS has to be caged. It is displayed in the upper mid-section of the screen.	Press the CAGE Button for at least 2 seconds and hold the airplane steady, straight and level, until the ATT 10s flag is removed.
HDG (white digits inside a red filled box).	Indicates loss of magnetic heading function. It is displayed in place of the heading scale.	Report to maintenance.

(Continued)

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LABEL	MEANING	ACTION
M (white digit inside a red filled box).	Indicates loss of Mach number function. It is displayed instead of the Mach number.	Report to maintenance.
MAINT (white digits).	Indicates a parity error presented by the discrete inputs. In this case, the previous discrete input configuration is maintained.	Report to maintenance.
OUT OF ORDER (white digits).	Indicates failure detection with loss of integrity. It is displayed with the associated code failure. The associated parameters are saved in memory for future equipment maintenance.	Report to maintenance.
SPD (white digits over a red filled box).	Indicates loss of airspeed function. It is displayed instead of the airspeed scale.	Report to maintenance.
V_{MO} (white digits over a red filled box).	Indicates V_{MO} error. It is displayed in the upper left corner of the screen, in lieu of the "MAINT" flag.	Report to maintenance.
WAIT ATT (black digits over an yellow filled box).	Indicates that IMU is out of domain attitude. In this case, the roll and pitch scale, the lateral acceleration, and the airplane symbol are not displayed. It is displayed in the upper mid-section of the screen.	Report to maintenance.

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RADIO ALTIMETER SYSTEM

The Radio Altimeter system is a high-resolution, short-pulse radio altitude indicator designed for automatic continuous operation, providing radio altitude, low altitude awareness, and decision height information on the PFD.

The system consists of a radio altimeter transceiver and two flush-mounted antennas (RA 1), and is controlled through the Display Control Panels. Optionally a second Radio Altimeter Subsystem (RA 2) can be installed.

The decision height setting is provided through the decision height setting knob on the Displays Control Panel. The decision height and the associated RA label are displayed adjacent to the lower right side of the attitude sphere.

The Radio Altimeter interfaces with the Aural Warning Unit to provide a warning audio signal for autopilot disconnection. For further information, refer to Section 2-18 – Autopilot.

EICAS MESSAGES

TYPE	MESSAGE	MEANING
ADVISORY	RAD ALT FAIL	Indicates the RA has failed on airplanes equipped with a single unit, or both RAs have failed, on airplanes equipped with two RAs.
	RAD ALT 1 (2) FAIL	On airplanes equipped with two RA, the associated unit has failed.

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CONTROLS AND INDICATORS

DISPLAYS CONTROL PANEL

1 – RA KNOB

When rotated, allows decision height setting.

2 – TST BUTTON

In flight conditions only, this button allows testing the associated Radio Altimeter.

To perform the Radio Altimeter test the DH may be set to the destination airport DH and the button must be kept pressed. The following indications are presented on the PFD:

– A magenta TEST annunciation is presented adjacent to the upper left side of the attitude sphere.
– An amber MIN label is displayed in the RA Minimum annunciator. The label flashes for 5 seconds, and then becomes steady.
– An amber RA comparison label is displayed in the down left side of the attitude sphere.
– The Radio Altitude field indicates 100 ± 10 ft.

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Additionally, the following EICAS messages are presented according to the following configuration:

- For airplanes equipped with one Radio Altimeter:
  - If tested at LH side:
    - (E)GPWS INOP;
    - WINDSHEAR INOP;
    - RAD ALT 2 FAIL.
  - If tested at RH side:
    - (E)GPWS INOP;
    - WINDSHEAR INOP;
    - RAD ALT 1 FAIL.
- For airplanes equipped with two Radio Altimeters with RA 1 connected to the EGPWS:
  - If tested at LH side:
    - (E)GPWS INOP;
    - WINDSHEAR INOP.
  - If tested at RH side:
    - No message associated.
- For airplanes equipped with two Radio Altimeters both connected to the EGPWS:
  - If LH or RH side are tested separately:
    - No message associated.
  - If both sides are tested at the same time:
    - (E)GPWS INOP;
    - WINDSHEAR INOP.

When released, the PFD indications resume the initial condition and the EGPWS voice message may occur:

- TOO LOW TERRAIN.

On the ground, pressing this button allows testing the IC-600 computers. For more details, refer to Section 2-4 – Crew Awareness.

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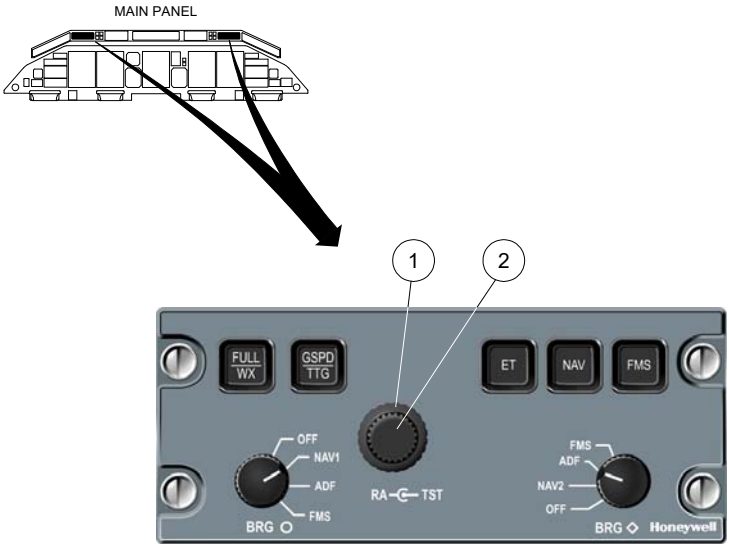

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DISPLAYS CONTROL PANEL

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PFD

1 - RA MINIMUM ANNUNCIATOR

- Color:
  - Box: white.
  - MIN label: amber.
- Indicates that the airplane radio altitude is within a certain range of the decision height.
- When an armed RA Minimum condition occurs and the radio altitude is in the range of 100 ft above the decision height setting, a black box appears on the annunciator field.
- At radio altitudes equal to or below the decision height setting, a MIN label is displayed inside the box. The label will flash for 10 seconds, and then becomes steady.
- The RA Minimum annunciator is armed when the following conditions occur simultaneously:
  - Airplane in flight.
  - Radio Altitude and decision height are valid.
  - Radio Altitude greater than 100 ft above the decision height setting for at least 5 seconds.
  - A decision height is being displayed.
- In the event of a Radio Altimeter failure, the RA Minimum annunciator is removed from the display.

2 - RADIO ALTITUDE INDICATION

- Color:
  - Digits: green.
  - Box: white.
- Ranges from -20 to 2500 ft.
- Resolution: 5 ft below 200 ft, 10 ft above 200 ft.
- Displayed inside a box on the bottom center of the attitude sphere.
- In the event of a Radio Altimeter failure, the radio altitude digits will be replaced by an amber label RA inside an amber box.

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3 - DECISION HEIGHT INDICATION

- Color:
  - Digits: cyan.
  - RA label: white.
- Range from 5 to 999 ft.
- Resolution: 5 ft below 200 ft, 10 ft above 200 ft.
- If the decision height is set to zero, the indication is removed from the display.
- In the event of a Radio Altimeter failure, the decision height digits are replaced by amber dashes.

4 - RADIO ALTITUDE COMPARISON MONITOR DISPLAY

- Label: RA.
- Color: amber.
- Displayed when the difference between the on-side and cross-side radio altitude is greater than a set point which is variable with radio altitude.

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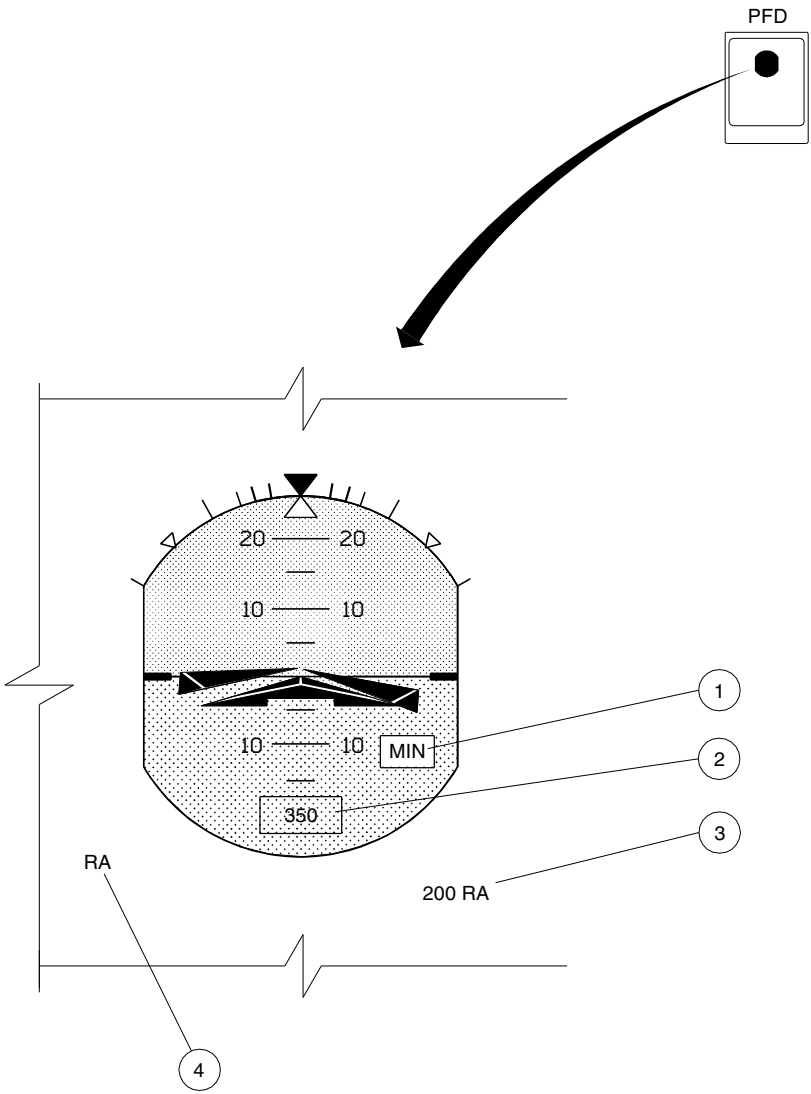

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RADIO ALTIMETER INDICATIONS ON THE PFD (V-BAR FORMAT)

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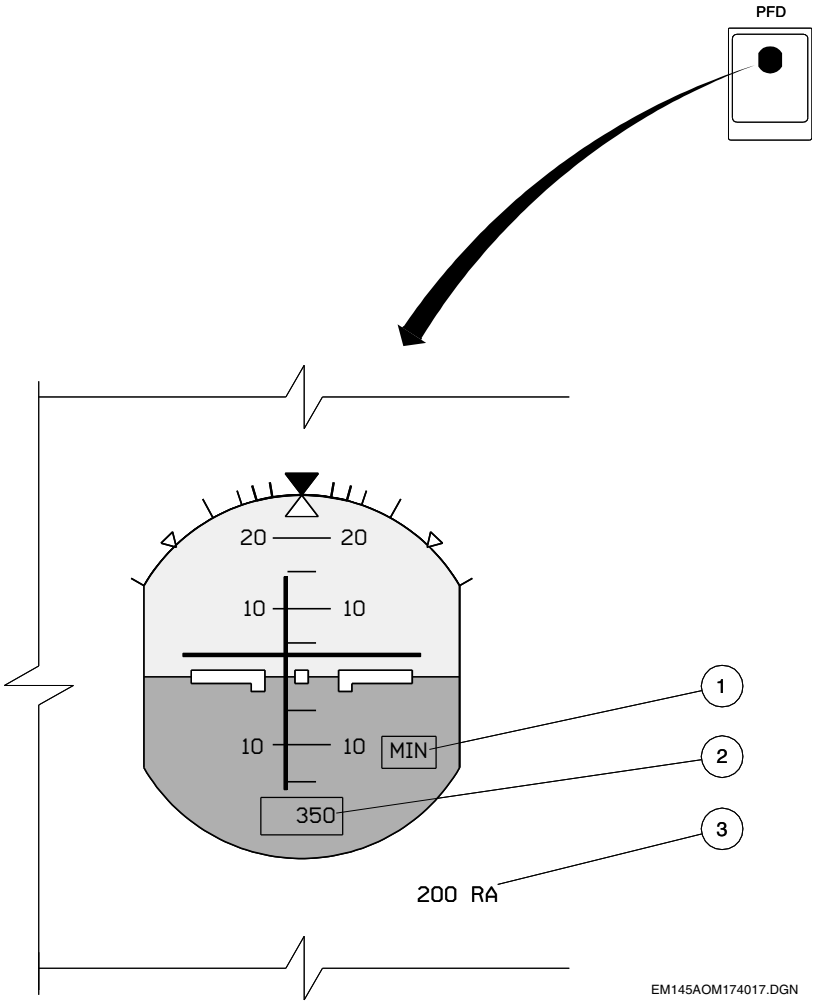

RADIO ALTIMETER INDICATIONS ON THE PFD (CROSS-BAR FORMAT)

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CHRONOMETER/CLOCK (TYPICAL)

The chronometer/clock provides the flight crew with Greenwich Mean Time (GMT), local time (LOC), elapsed time (ET), chrono time (CHR), DATE, and flight number. The instrument is powered by the airplane's electrical system and an internal battery. When the airplane is deenergized, the displays are blanked, although the functions continue to be updated in the memories with exception of the ET and chronometer functions. Display may also blank when a failure exists in the instrument.

CONTROLS AND INDICATORS

1 - CHRONOMETER BUTTON

- Successive pressings control start, stop, and reset of the chronometer indicator and pointer providing the following:
  - START: Replaces elapsed time by chronometer indications, starting its counting.
  - STOP: Freezes chronometer indicator and pointer.
  - RESET: Returns the chronometer pointer to zero and replaces chronometer indication by elapsed time.

NOTE: A chronometer button is also provided on each control wheel.

2 - GMT, LOC, DATE, AND FLIGHT NUMBER INDICATOR

- Displays Greenwich Mean Time in the 24-hour format. A fixed dot appears between the two-hour digits, above the GMT inscription.
- Displays local time in the 24-hour format. A fixed dot appears between the two minute digits, above the LOC inscription.
- Displays the date, alternating between month/day and year every second.
- Displays the flight number from 0000 to 9999.

3 - CHRONOMETER POINTER

- Indicates chronometer seconds against an analog scale.

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4 - ELAPSED TIME AND CHRONOMETER INDICATOR

- Displays elapsed time (ET), which corresponds to the flight time (from 0 to 99 hours and 59 minutes). Elapsed time reading starts only when the airplane takes off and can only be reset to zero when the airplane is on the ground.
- Displays chronometer minutes from 0 to 99. When CHR is used, accumulated elapsed time is not affected.

5 - ELAPSED TIME BUTTON

- Successive pressings supply the following:
  - On ground: Displays ET.
    Resets ET to zero.
    Displays chronometer minutes.
  - In flight: Displays ET.
    Displays chronometer minutes.

6 - MULTIPLE SELECTOR

SET - Allows time setting. When in the SET position, successive pressings of the ET button causes the selector to cycle between GMT minutes, GMT hours, LOC minutes, LOC hours, days, months, and years (with power up, the year is preselected to 90). Once the function is selected (it flashes on and off), the CHR button may be used to increment the selected digit at a rate of one unit every half second (continuous pressing) or manually, step by step.

GMT - Selects Greenwich Mean Time to be displayed on the associated indicator.

LOC - Selects the local time to be displayed on the associated indicator.

DATE - Selects the date to be displayed on the associated indicator.

FLT NR - Selects the FLIGHT NUMBER to be displayed on the associated indicator.

- To set the flight number, proceed as follows:
  - With the selector in the FLT NR position, repeatedly press the ET button to select the digit to be set in the following order: thousands, hundreds, tenths, and units.
  - Press the CHR button to increment the selected digit at a rate of one unit per half second or manually, step by step.

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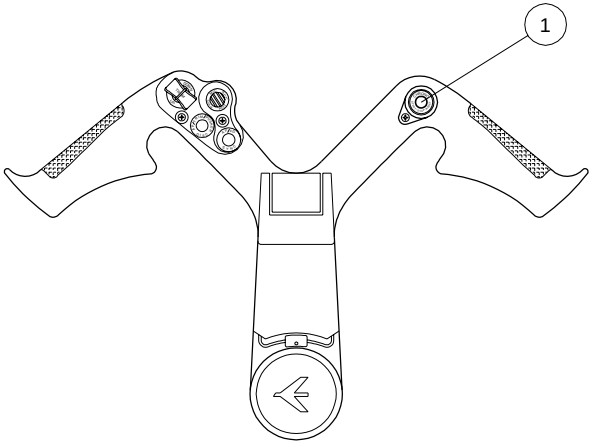

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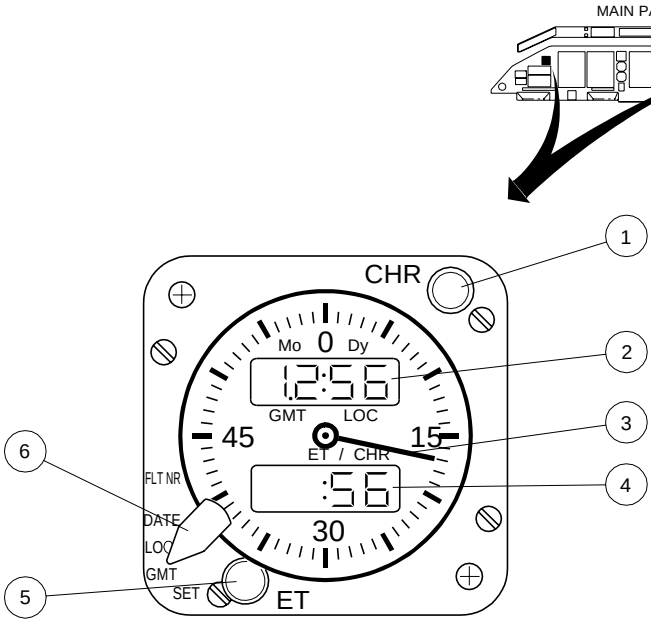
CONTROL WHEEL



EM145AOM172019A.DGN

CLOCK

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DIGITAL CHRONOMETER/CLOCK (OPTIONAL)

The digital chronometer/clock provides the flight crew with Greenwich Mean Time (GMT), local time (LOC), elapsed time (ET), chrono time (CHR), Date, and flight number. It includes tactile dome switches and an additional functionality: the synchronization with GPS. Also, the chronometer time – minutes and seconds – is presented in digital form (instead of indicating seconds in analog form by a sweep hand).

The instrument is powered by the airplane's electrical system and an internal battery. When the airplane is deenergized, the displays are blanked, although the functions continue to be updated in the memories with exception of the ET and chronometer functions. Display may also blank when a failure exists in the instrument.

The digital clock memory holds its settings during 40 hours. Whenever the airplane is de-energized longer than 40 hours, the flight crew shall adjust the digital clock settings again prior to take-off.

For airplanes Post-Mod. SB 145LEG-31-0019 or featuring an equivalent modification factory incorporated, the digital clock is connected to GPS for time and date synchronization during the system start-up.

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DIGITAL CHRONOMETER/CLOCK CONTROLS AND INDICATORS

1 - SEL ET PUSH-BUTTON

- This push-button selects Elapsed Time to be displayed.

2 - RST ET PUSH-BUTTON

- This push-button resets Elapsed Time displayed.

3 - 6-DIGIT DISPLAY

- Displays Universal Time Coordinated (UTC) in hours, minutes and seconds.
- Date (DT) in months, days and years.
- Local time (LT) in hours, minutes and seconds.
- GPS time (GPS) in hours, minutes and seconds.
- Flight number format: XX XX Fn.

4 - 4-DIGIT DISPLAY

- Displays chronometric time (CHR) in minutes and seconds.
- Displays elapsed time (ET) in minutes and hours.

5 - CHRONOMETER PUSH-BUTTON

- This push-button selects Chronometer to be displayed.

6 - PUSH-BUTTON MODE SELECTOR

- This push-button selects the following features: Date (DT).
- GPS.
- Internal computed (INT).
- Local time (LT).
- Flight number (F/N).

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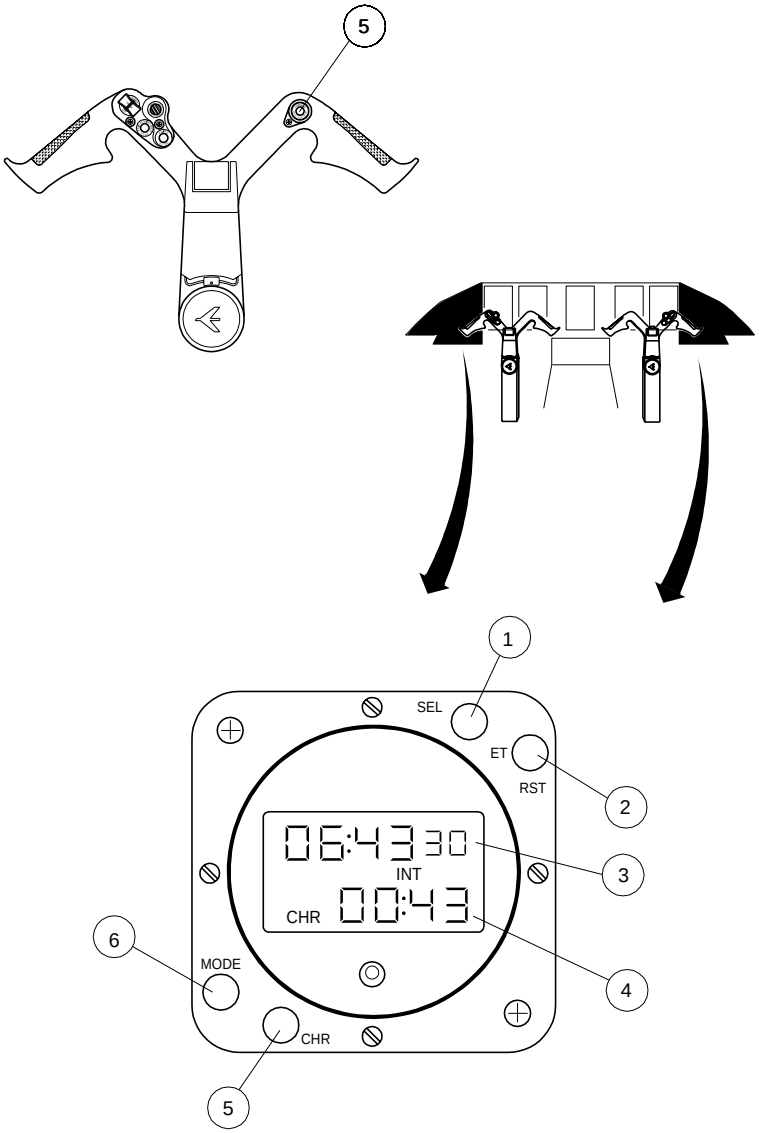

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DIGITAL CLOCK

FLIGHT DATA RECORDER SYSTEM

The Flight Data Recorder System (FDRS) has been designed to automatically acquire and record several airplane and system parameters, without pilot action, from engine start to engine shutdown on every flight.

The FDRS comprises the following units and components:

- One solid-state Flight Data Recorder.
- One underwater locator beacon attached to the Crash Survivable Memory Unit (CSMU) case.
- One triaxial accelerometer.
- Five wirewound precision potentiometers.
- One impact switch.
- Two Data Acquisition Units (DAUs).
- Auxiliary Flight Data Acquisition Unit (AFDAU) (optional).
- Five surface position sensors (optional).
- Eight load cells sensors to measure the pilot/copilot force into control commands (optional).
- One Analog Digital Converter dedicated to load cells sensors (optional).

An FDR malfunction is detected by means of the power-up built-in test or the continuous self-checking test. An EICAS message is generated to indicate the failure.

The CSMU is a shock-and-heat-resistant container, which records all inputs in the last 25 hours, in a high-density solid-state memory.

The DAUs interface with various airplane systems, in order to supply data to the FDRS.

The AFDAU is solely used for the FDRS and is the unit responsible for receiving all airplane inputs (data to be recorded from DAU's, etc.) and sending them to the DFDR unit.

Operational data is recorded when the Red Beacon is switched ON or the airplane is airborne.

The setting of the required flight number to be recorded, along with the system data, is made on the clock as described in this section.

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QUICK ACCESS RECORDER SYSTEM

The airplane may be equipped with an Extended Quick Access Recorder (EQAR) or an Optical Quick Access Recorder (OQAR), which have been designed to automatically acquire and record the flight data sent from DAU 1 and DAU 2 to FDR and CMC, without pilot action, as soon as the airplane is energized.

All the information is recorded in a removable rewritable magnetic optical disk, thus reducing the time for ground data analysis to a minimum. No provision has been made to warn flight crew about system status; consequently, there is no EICAS message associated with this equipment.

EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	DFDR FAIL	Flight Data Recorder System failure.
ADVISORY	FDAU FAIL	Auxiliary Flight Data Acquisition Unit failure.

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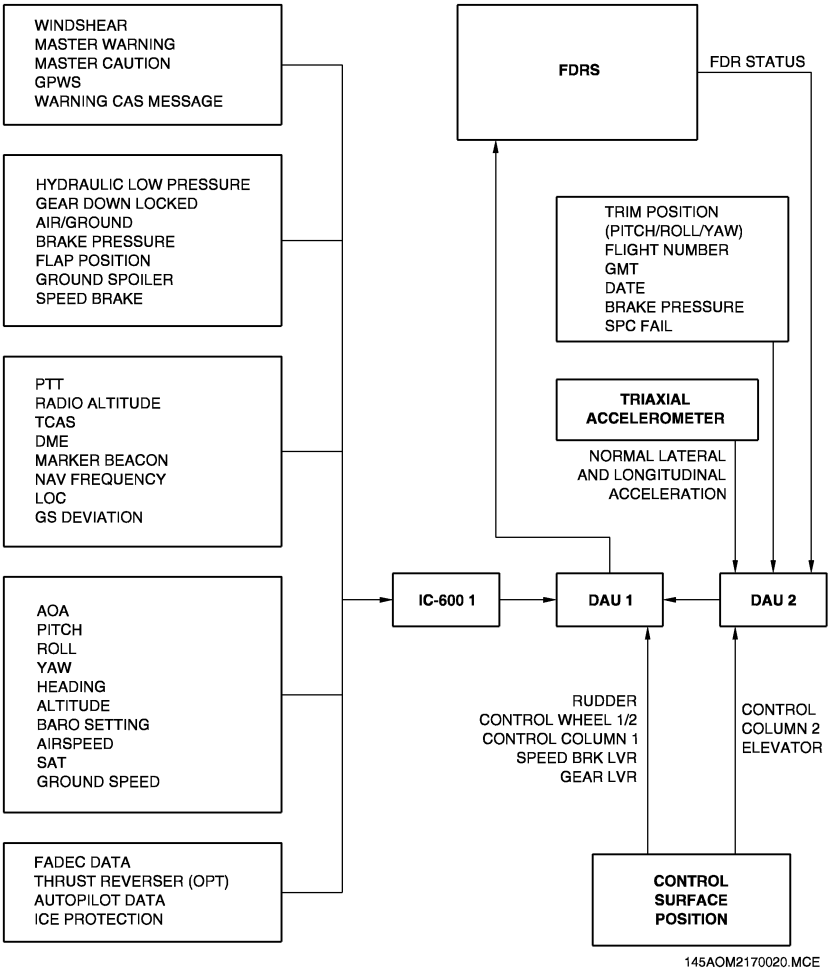

FLIGHT DATA RECORDER SYSTEM SCHEMATIC

(for airplanes not equipped with AFDAU)

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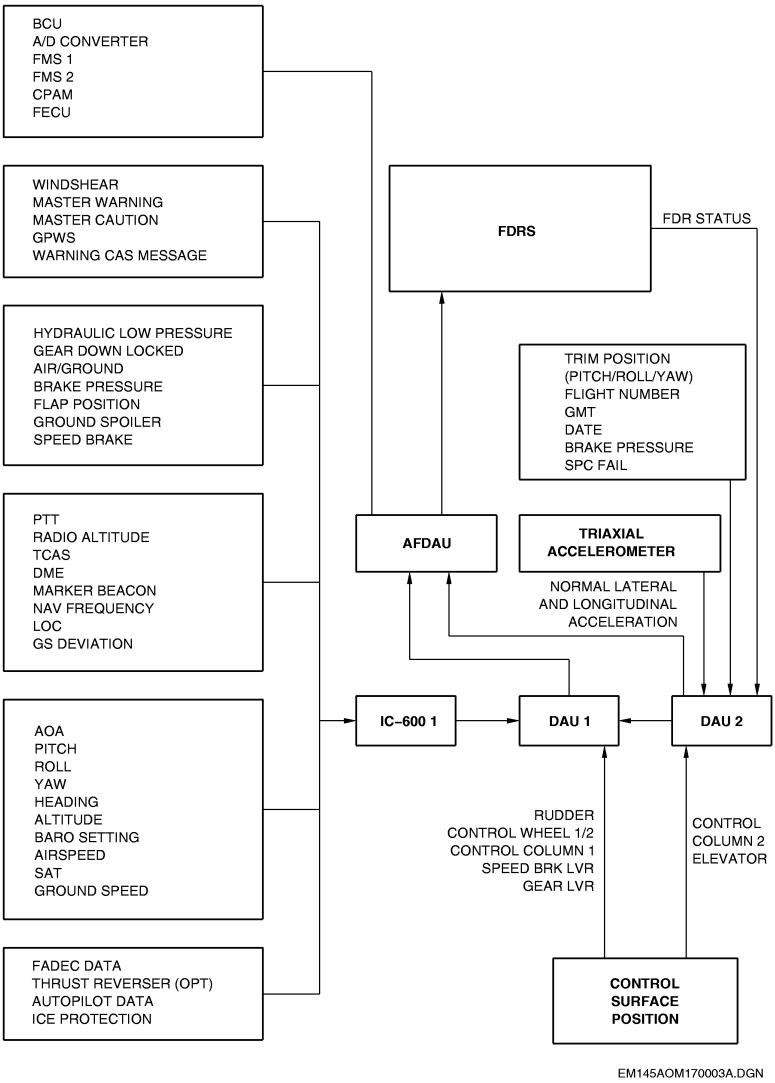

FLIGHT DATA RECORDER SYSTEM SCHEMATIC

(for airplanes equipped with AFDAU - FDR 88 parameters)

AOM-135/1542

PRIMUS ELITE ADVANCED FEATURES (PEAF)

The Primus Elite Advanced Features by Honeywell installed on the EMB-135BJ comprises the following elements:

– PEAF/Synthetic Vision System (SVS) displayed on the Primary Flight Display (PFD).

– Traffic Collision and Avoidance System (TCAS) Resolution Advisory Guidance (RA) displayed on the PFD.

– Traffic Collision and Avoidance System (TCAS) overlay on the MFD Enhanced Map (Charts & Maps) providing a traffic awareness layer.

– XM Meteorological Aviation Report (METAR) and Terminal Area Forecast (TAF) functionality on the MFD Enhanced Map (Charts & Maps).

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PEAF/SYNTHETIC VISION SYSTEM (SVS)

The EMB-135BJ is equipped with the Honeywell Synthetic Vision System that provides pilots increased situation awareness of the terrain and obstacles in the vicinity through the use of 3D synthetic terrain representations while maintaining the existing PFD functions.

This 3D synthetic terrain representation serves as a background for the standard PFD symbols to create an ambient, natural, and continuous presentation of the terrain environment along with obstacles and airports in front of the airplane.

The SVS displays a computer-generated image of the applicable external terrain from the perspective of the flight deck that is derived from airplane attitude, altitude, position, and a coordinate-referenced database.

The SVS requires GPS and IRS data to depict the image:

– GPS data is used for position and height.

– IRS data is used for height, attitude and heading.

The PFD is displayed in two background formats:

– Standard Blue-Over-Brown (SVS OFF).

– Synthetic Vision System (SVS ON).

The SVS image display can be turned ON or OFF through the button SVS on the PFD bezel.

NOTE: If one of the sources, GPS or IRS, is failed, the SVS will not be available and the PFD reverts to Blue-Over-Brown format.

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PEAF/SYNTHETIC VISION SYSTEM DISPLAY

1 - SLIP-SKID INDICATOR

- The trapezoid symbol below the roll pointer indicates the airplane slip/skid flight condition.

2 - PITCH TAPE SCALE

- The PEAF PFD Pitch Tape presents markers at every 2.5° (positive and negative) and labels at every 5° (positive and negative) from 0° to 90°.
- The PEAF PFD has a minimum displayable range of -10° to +10° for all roll conditions.
- The Pitch Tape Scale is the same for SVS ON and OFF.

3 - METRIC ALTITUDE WINDOW

- When the metric altitude is selected on the PFD bezel, two metric altitude windows marked as "M" will be displayed on the altitude tape.
- A metric selected altitude readout, in blue color, will be displayed below the selected feet altitude readout and the metric altitude readout, in white color, will be displayed below the feet altitude rolling digits.

4 - GRID LINES

- Grid lines are a pattern on the terrain that conform to the landscape on the SVS terrain and helps get a sense of movement in flight, particularly when flying near ground.
- The grid lines are approximately TRUE north/south and east/west orientated and are spaced at distances of 1 NM by 1 NM.

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5 - WATER DEPICTION

– Large amounts of water such as oceans, major rivers, and large lakes are depicted in dark blue color. The reason of the dark color is to avoid confusion with the blue sky depiction.

6 - TERRAIN DEPICTION

– The SVS image is the perspective depiction of the terrain based on the terrain database with elevations with respect to Mean Sea Level (MSL). The depicted imagery is derived from the airplane attitude, heading, GNSS three-dimensional position, and terrain database.

7 - OBSTACLE DEPICTION

– Obstacles with a height of more than 100 ft are displayed on the terrain view.

8 - ZERO PITCH REFERENCE LINE (ZPRL)

– The Zero Pitch Reference Line represents the zero pitch line on the PFD and replaces the classic EADI horizon line since the "natural" horizon in the terrain picture (where the terrain meets the sky) does not necessarily indicate the actual zero pitch point for the airplane (figure below).
– When the ZPRL reaches the display limits (upper or lower), it is displayed as a dashed black and white line (Ground/Sky Veil figure).

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PFD/SVS ON DISPLAY

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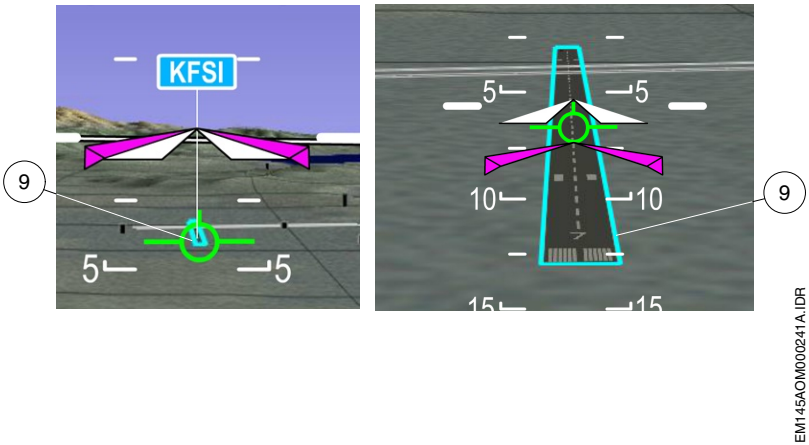
9 - RUNWAY DEPICTION

- The SVS has the capability to depict the runway presenting the identification, centerline, threshold markings and chevrons.
- The runway pavement is displayed in dark gray. Runway designation and centerlines are displayed in light gray to resemble the appearance of actual runway markings.
- The destination runway is displayed highlighted in cyan.



PFD - RUNWAY DEPICTION

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The SVS also has the capability to depict the nearest airports with symbols and identifiers.

10 - NON-TOWERED AIRPORT DEPICTION

- Non-towered airports are depicted with magenta background.

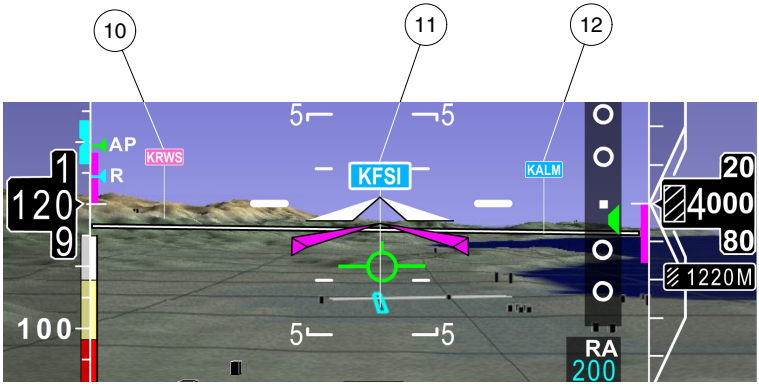
11 - DESTINATION AIRPORT DEPICTION

- Destination airport is depicted with a wider rectangular outline.

12 - TOWERED AIRPORT DEPICTION

- Towered airports are depicted with a blue background.

NOTE: The Nearest Airports with symbols and identifiers can be disabled in maintenance task.



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PFD - AIRPORT IDENTIFICATION DEPICTION

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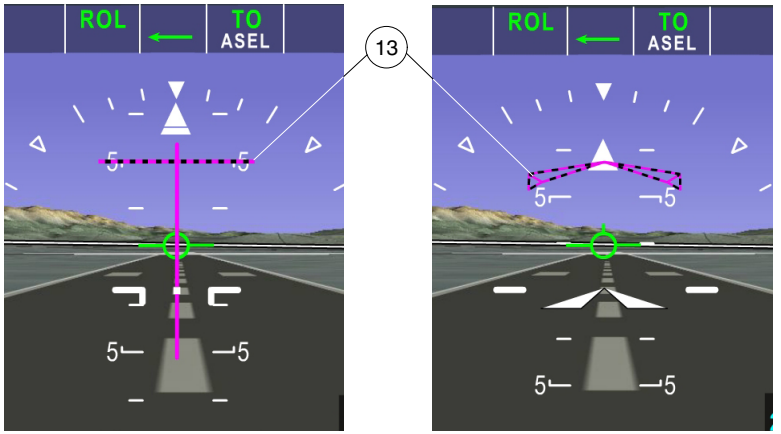
13 - FLIGHT DIRECTOR COMMAND BAR

– The flight director pitch command bar display becomes "dashed" due to the limited pitch scale. This occurs only during takeoff when TO mode is active. After liftoff the command bar goes to 14° Pitch UP (Flaps 9°) and becomes normal.



PFD/FLIGHT DIRECTOR COMMAND BARS

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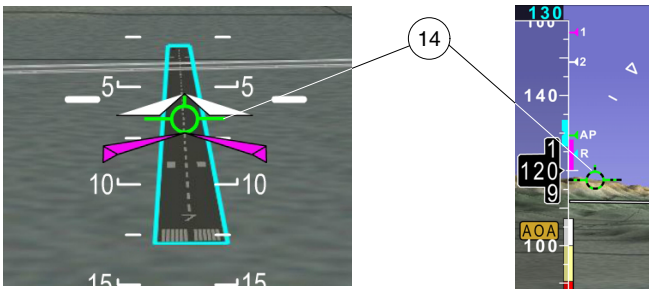
14 - FLIGHT PATH VECTOR SYMBOL

- The Flight Path Vector (FPV) is a green symbol that provides a two-dimensional display of the drift angle and flight path angle of the airplane.
- The PEAF FPV symbol is depicted when the SVS image is displayed, except when any one of the following conditions exists, during which the SVS FPV is removed from the SVS display:
  - Pitch Angle or Roll Angle is invalid.
  - TCAS "Up Advisory" or "Down Advisory" or "Fly to Zone" is actived.
  - Lateral or Vertical position components of the flight path vector are invalid.
- When the FPV position exceeds the display limits on the SVS PFD, the FPV becomes striped and is placed at the edge of the EADI area, indicating that the FPV is not currently showing the actual path of the airplane.



PFD/FLIGHT PATH VECTOR

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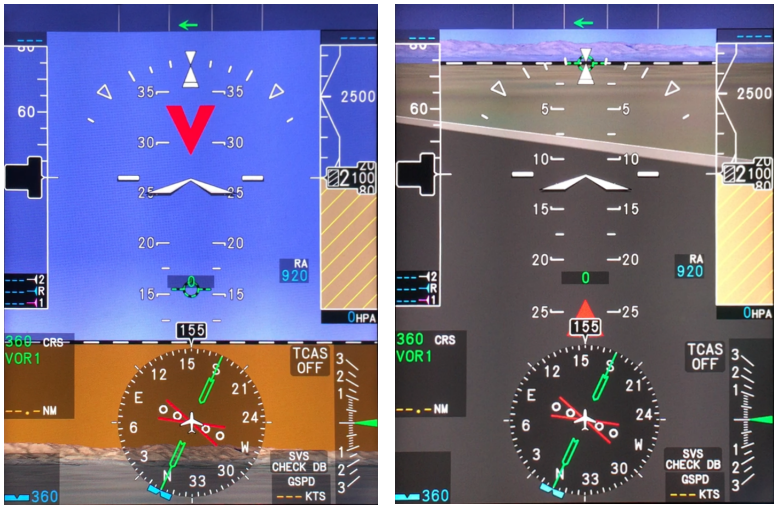
15 - EXCESSIVE ATTITUDE

- Because the SVS terrain/sky is drawn conformal to the outside scene, it is possible to orient the airplane such that the entire rendered SVS terrain/sky imagery is displayed outside the viewable region of the display.
- To address situations where there is a limited amount of SVS terrain visible on the display, a ground veil fills the area between the zero-pitch reference line and the top of the terrain horizon. The ground veil ensures that a clear and unambiguous presentation of ground direction is always provided to the pilot.
- To address situations where there is a limited amount of sky visible on the display, a sky veil fills the area between the zero-pitch reference line and the top of the horizon.



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GROUND/SKY VEIL

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SVS - TAKEOFF

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SVS - CRUISE

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SVS - APPROACHING

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SVS OFF - BLUE-OVER-BROWN FORMAT

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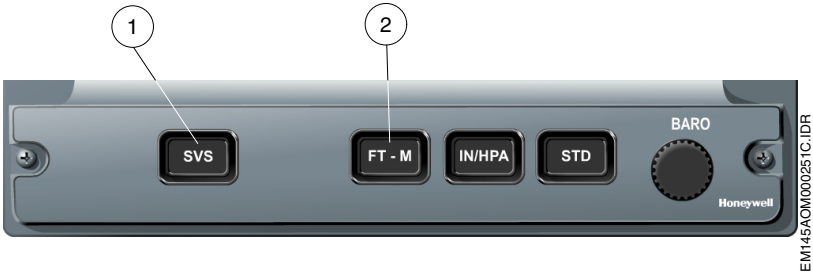
PEAF/SVS CONTROL

PFD BEZEL

The PFD bezel accommodates the SVS ON/OFF button and the FT-M Metric Altitude button.



PFD BEZEL

1 - SVS BUTTON

- Pushing the SVS button turns the SVS ON/OFF.
- If the SVS is ON and the SVS button is pushed, the PFD Display selects the blue-over-brown format.

2 - FT-M BUTTON

- Pushing the FT-M button enables or disables the Metric Altitude Windows on the PFD.

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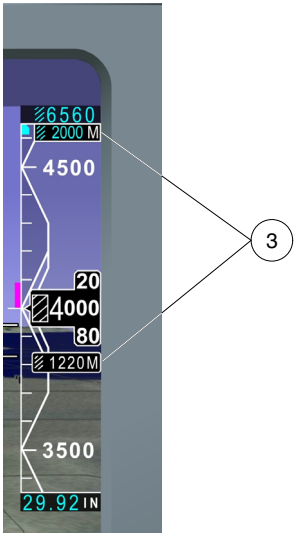
3 - METRIC ALTITUDE WINDOWS

- When metric altitude windows are active, the altitude and preselected altitude readouts in meters (m) are displayed below the altitude and preselected altitude in imperial unit (ft).
- The preselected altitude is set on the imperial unit window.
- The preselected altitude and altitude in metric unit (m) are converted from the respective altitudes in imperial units (ft).

For airplanes Post-Mod. SB 145LEG-22-0003 or equipped with an equivalent modification factory incorporated.

- The preselected altitude is set in meters, using the metric window with a resolution of 50 m.
- The preselected altitude and altitude in imperial unit (ft) are converted from the respective altitudes in metric unit (m).



EM145AOM170014AIDR

METRIC ALTITUDE WINDOW

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PEAF/SVS ANNUNCIATIONS

PEAF ANNUNCIATION

The EGPWS annunciations are displayed in the upper-left portion of the EADI, below the FMA, according to the following priority order if more than one annunciation is active:

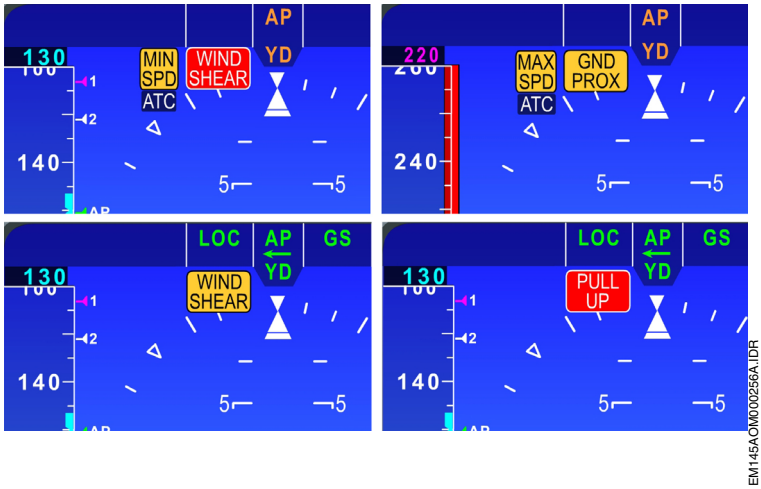
– WIND SHEAR (priority 1).

– PULL UP (priority 2).

– GND PROX (priority 3).

– WIND SHEAR (priority 4).

The MAX/MIN speed annunciation is displayed in the upper-left portion of the EADI next to the EGPWS and WindShear annunciation.



PFD ANNUNCIATIONS

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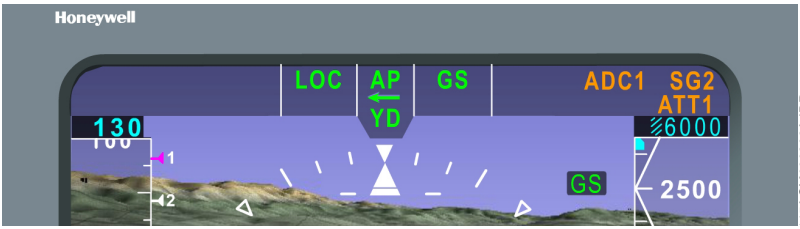
CAUTION ANNUNCIATIONS

The Caution Annunciations (ADC 1 (2); SG 1 (2); ATT 1 (2)) will be presented on the Flight Mode Annunciations (FMA).



PFD - CAUTION ANNUNCIATION

FMS MESSAGE

When there is a message on the FMS CDU scratchpad a MSG annunciation appears on the PFD, inside the navigation source annunciators window.

PFD - FMS MSG ANNUNCIATION

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PFD TEST MODE

The PFD test provides a failure mode annunciation and orientation of the PFD format. It is initiated with the display controller when the airspeed is less than 60 kt and the airplane is on the ground.

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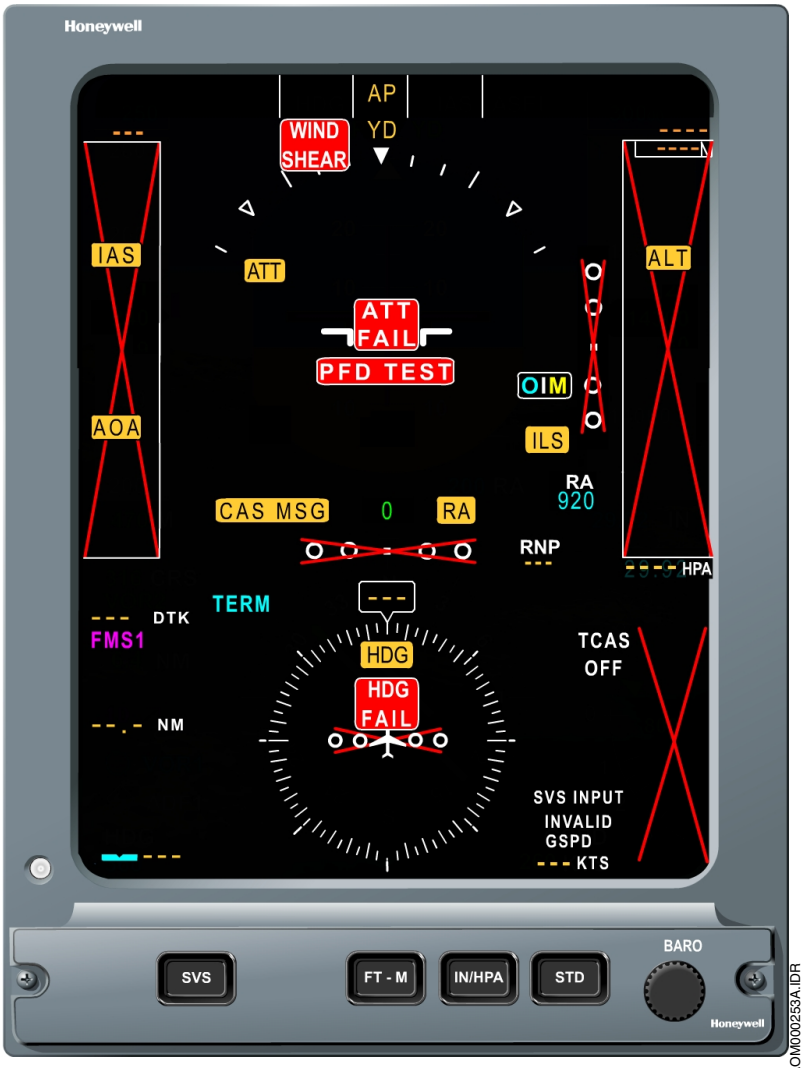

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PFD TEST MODE WITH FULL COMPASS

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ABNORMAL OPERATION

The PEAF/PFD removes the SVS image and reverts to blue-over-brown symbology when the SVS is not operational.

The SVS is NOT operational in the following conditions:

– Present position is in the Polar region (beyond 70° north and south latitudes).
– The SVS is initializing.
– The SVS is not available (SVS FAIL, SVS INPUT INVALID, or SVS NO COVG).

In the event of a DU reversion, the time taken to display usable data for the following symbologies is about 3 seconds after the reversion begins:

– Blue-Over-Brown background and horizon line.
– Airplane symbol.
– Pitch scale.
– Roll scale and pointer.
– Airspeed Tape.
– Altitude Tape.
– Heading.

In the event of a DU reversion, the target time to display the terrain including other synthetic vision features is about 2 minutes after the reversion begins.

In the event of IRS failures, the pitch scale markings are removed, the entire background turns black, and ATT FAIL is displayed in the top center of the attitude display.

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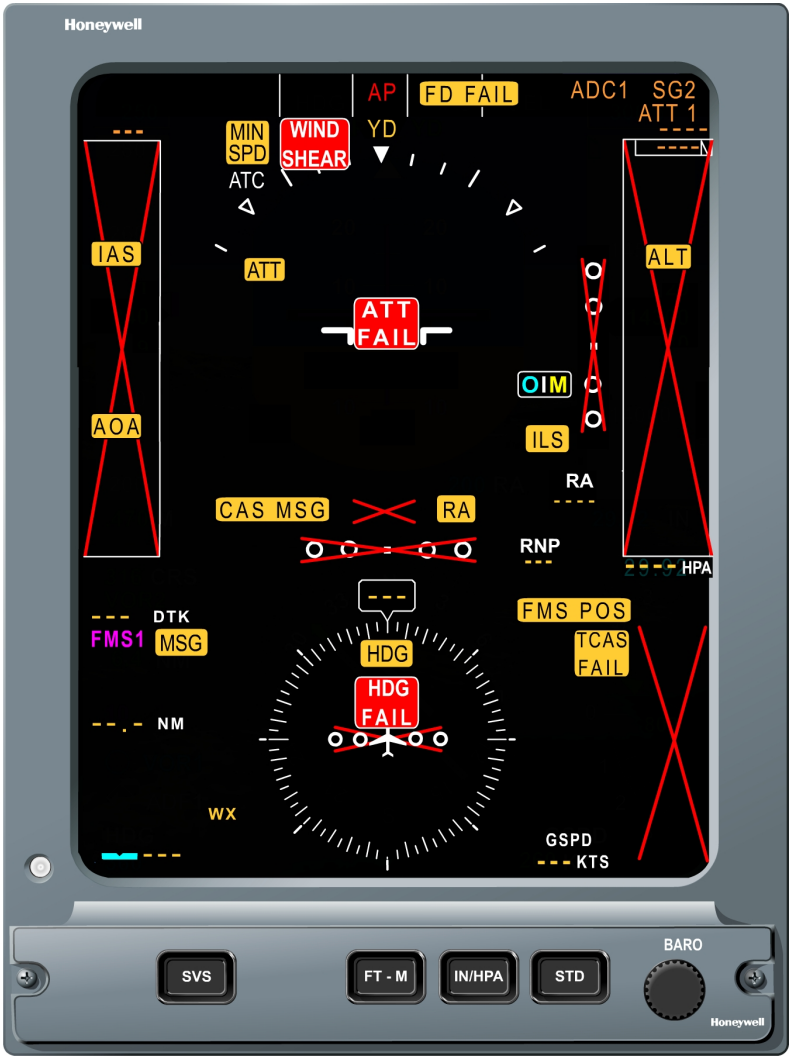

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PEAF PFD CAUTION AND WARNING ANNUNCIATORS

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SVS ANNUNCIATIONS - PFD

The system provides the following annunciations related to the SVS status in white color on the PFD, as described on table below.

ANNUNCIATION	DESCRIPTION	PILOT ACTION
SVS FAIL	- The SVS cannot be displayed due to an internal failure. - Blue-over-Brown is displayed.	NONE. Message can be inhibited by turning the SVS OFF.
SVS INPUT INVALID	- The SVS cannot be displayed due to the current validity and/or integrity of inputs from airplane sensors. - SVS will return if input validity and integrity return. - Blue-over-Brown is displayed.	NONE. Message can be inhibited by turning the SVS OFF.
SVS NO COVG	- The system has no coverage for the current area. - Blue-over-Brown is displayed.	NONE. Message can be inhibited by turning the SVS OFF.
SVS INIT	- The SVS has not completed loading terrain tiles. - Blue-over-Brown is displayed.	Wait for the system initialization.
SVS OBST + APT FAIL	- The SVS Navigation Database is invalid. - Airports, runways and obstacles are NOT displayed. - Terrain is displayed.	Determine whether or not to disable the SVS.
SVS OBST INOP	- The SVS cannot display obstacles due to an obstacle density issue. - Terrain, airports and runways are displayed.	Determine whether or not to disable the SVS.

(Continued)

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ANNUNCIATION	DESCRIPTION	PILOT ACTION
SVS APT INOP	- The SVS cannot display airports due to an airport and/or runway density issue. - Terrain and obstacles are displayed.	Determine whether or not to disable the SVS.
SVS CHECK DB	- The SVS Navigation Database is out-of-date. - SVS is displayed. - This message is only displayed on ground.	Request database update.
SVS POS INTEG	- The GNSS position uncertainty has exceeded the normal threshold for the current phase of flight or AGL altitude.	Determine whether or not to disable the SVS.

The SVS annunciations are removed from the PFD when the SVS is OFF.

The SVS annunciation windows are located on the bottom right side of the PFD, as shown in figure below.

PFD/SVS ANNUNCIATIONS

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EICAS MESSAGES

There are no CAS messages related to the Synthetic Vision System.

SVS LIMITATIONS

The SVS image displayed on the Primary Flight Display (PFD) is intended to increase situational awareness only. If crew notice misbehavior, missing or excessive information, the SVS shall be turned OFF.

The use of the SVS as primary information as base to decisions and/or plan maneuvers to navigate or to avoid terrain and obstacles is prohibited.

The use of the SVS to take credit for IFR operations below published minimums is prohibited.

SVS DATABASE

The navigation and obstacles database are updated once every 28 days synchronized with an AIRAC (Aeronautical Information Regulation and Control) cycle.

The Terrain database is not periodically updated.

Both are available on INDS (Integrated Navigation Data Service) website.

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TCAS RESOLUTION ADVISORY GUIDANCE/PFD

A Resolution Advisory (RA) is a display indication given to the pilot to guide a maneuver to prevent hazardously close encounters with intruder airplane.

The PFD TCAS Resolution Advisory (RA) Guidance introduced by the PEAF consists of one or two Avoidance Zones and up to one Fly-to-Zone symbology.

The Avoidance Zone indicates pitch targets that should be avoided when the advisory is a preventive RA or pitch targets that should be departed from when the advisory is a corrective RA and will be displayed in red.

The Fly-to-Zone will provide the representation of the pitch target command for the crew during corrective RAs and will be displayed in green.

The TCAS Fly-to-Zone and Avoidance Zones rotate with the pitch scale according to the roll angle.

The color of the airplane symbol matches the TCAS Avoidance or Fly-to-Zone colors during resolution advisories.

The flight director command bar is removed during a RA.

The PEAF/PFD provides the same TCAS Resolution Advisory Guidance symbology for SVS ON or SVS OFF.

NOTE: The Vertical Speed readout color does not change according to the TCAS alert as in the previous Primus Elite PFD.

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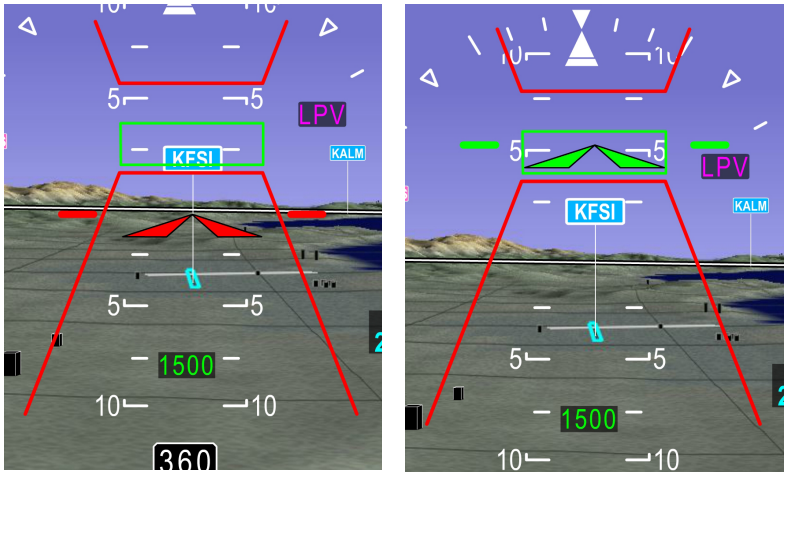

PFD/SVS - TCAS RESOLUTION ADVISORY GUIDANCE

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For airplanes with Post-Mod. SB 145LEG-22-0003 or equipped with an equivalent modification factory incorporated.

VFE/VLE INDICATION ON PFD

1 - MAXIMUM FLAP EXTENDED SPEED INDICATION BAR (VFE)

- Color: red.
- Displayed on the airspeed tape from VFE up to the top of the scale, when the flap 9°, 22° or 45° is set.

MAXIMUM FLAP EXTENDED SPEED (VFE)

FLAPS 9°	250 KIAS
FLAPS 22°	200 KIAS
FLAPS 45°	160 KIAS

If the airplane exceeds VFE, the digits in the current airspeed window and the digital Mach readout are displayed in red, and an aural warning "HIGH SPEED" is triggered.

If the acceleration trend vector exceeds VFE, the digits in the current airspeed window and the digital Mach readout are displayed in amber.

2 - MAXIMUM LANDING GEAR EXTENDED SPEED INDICATION BAR (VLE)

- Color: red.
- Displayed on the airspeed tape from 250 KIAS up to the top of the scale, when the Landing Gear is down and locked.

  If the airplane exceeds VLE, the digits in the current airspeed window and the digital Mach readout are displayed in red, and an aural warning "HIGH SPEED" is triggered.

  If the acceleration trend vector exceeds VLE, the digits in the current airspeed window and the digital Mach readout are displayed in amber.

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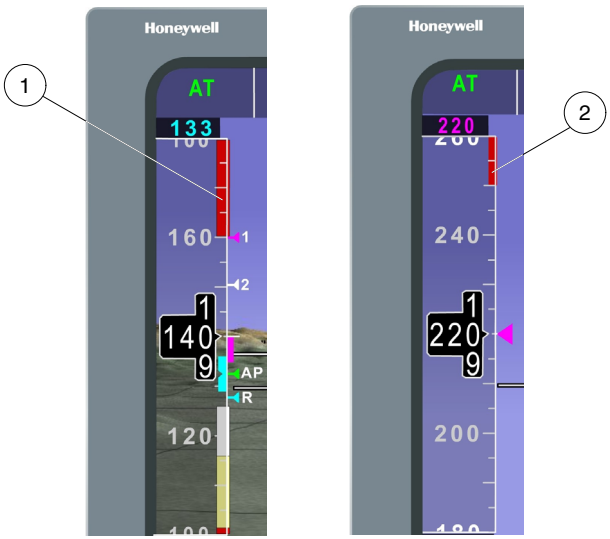

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VFE/VLE INDICATION BAR

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TCAS OVERLAY/MFD

The intended function of Traffic overlay on the MFD Enhanced Map is to improve the crew awareness of the traffic situation, such that the crew is cognizant of surrounding traffic without switching to basic MFD TCAS window when no pop-up conditions exist.

1 - MFD/TCAS TRAFFIC LAYER SELECTION

– The Traffic overlay display can be activated/deactivated on the MFD Charts & Maps "Map Data" drop-down menu through the options of "TCAS Hdg-Up" or "TCAS North-Up" modes.

2 - MFD/TCAS TRAFFIC OVERLAY

– The TCAS Overlay presentation provides information about the bearing and distance to other Mode C and Mode S transponder equipped airplane in the area.

When there is a resolution Advisory (RA) the page automatically returns to the Basic MFD page - TCAS window.

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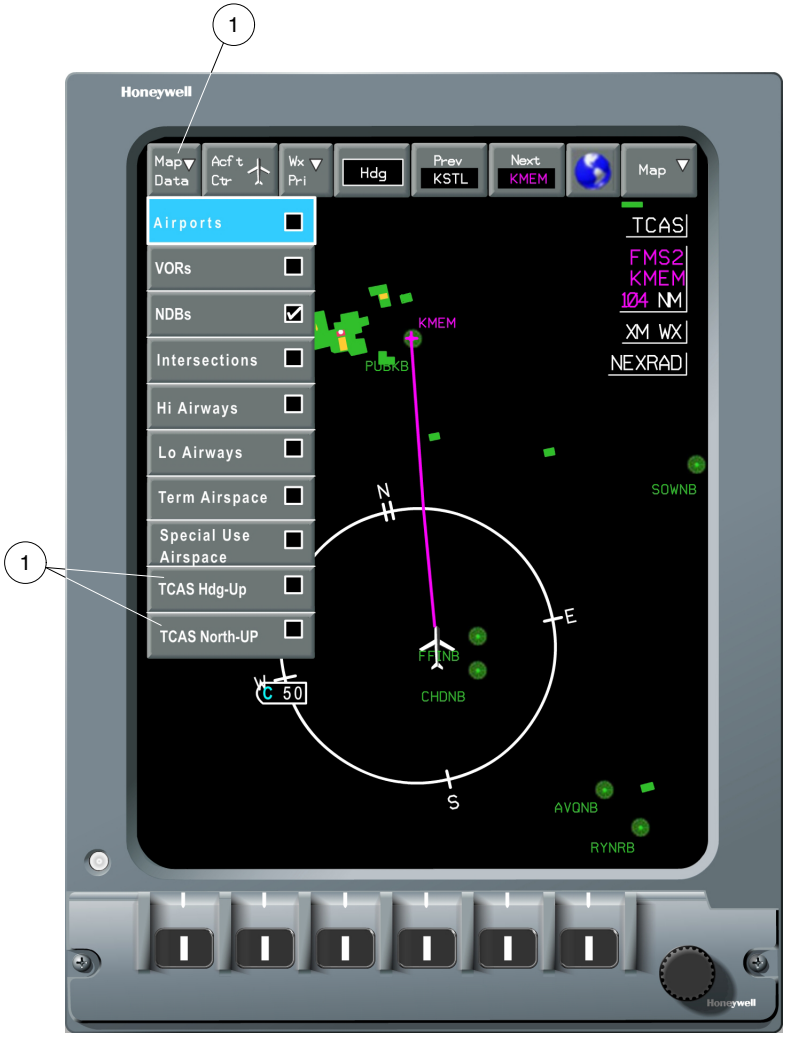

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MFD/TCAS TRAFFIC LAYER SELECTION

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MFD/TCAS TRAFFIC OVERLAY

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MFD ENHANCED MAP (CHARTS & MAPS)

The MFD Enhanced Map is an expression used by Embraer to indicate that the Crew has selected the Charts & Maps mode to be displayed on the MFD.

BASIC MFD

The basic MFD is an expression used by Embraer to indicate that the Crew has not selected the Charts & Maps mode to be displayed on the MFD.

MFD ENHANCED MAP - TCAS & XM METAR/TAF

The MFD Enhanced Map can display the TCAS Overlay and XM METAR/TAF.

XM METAR/TAF

The intended function of the XM Weather METAR and TAF on the MFD Enhanced Map is to improve the crew awareness of the weather information and forecast near the airports and weather stations.

The METAR and TAF pop-up menu will be displayed next to a given airport symbol when the cursor is placed over it and selected using the CCD.

The "METAR" and "TAF" options in the pop-up menu will be "Active" and selectable when the corresponding data is received for the airport selected, otherwise displayed as "De-activated".

Once the METAR or TAF information has been selected, an upper left side box will open to display the respective data.

The METAR and TAF are provided by the XM Weather system.

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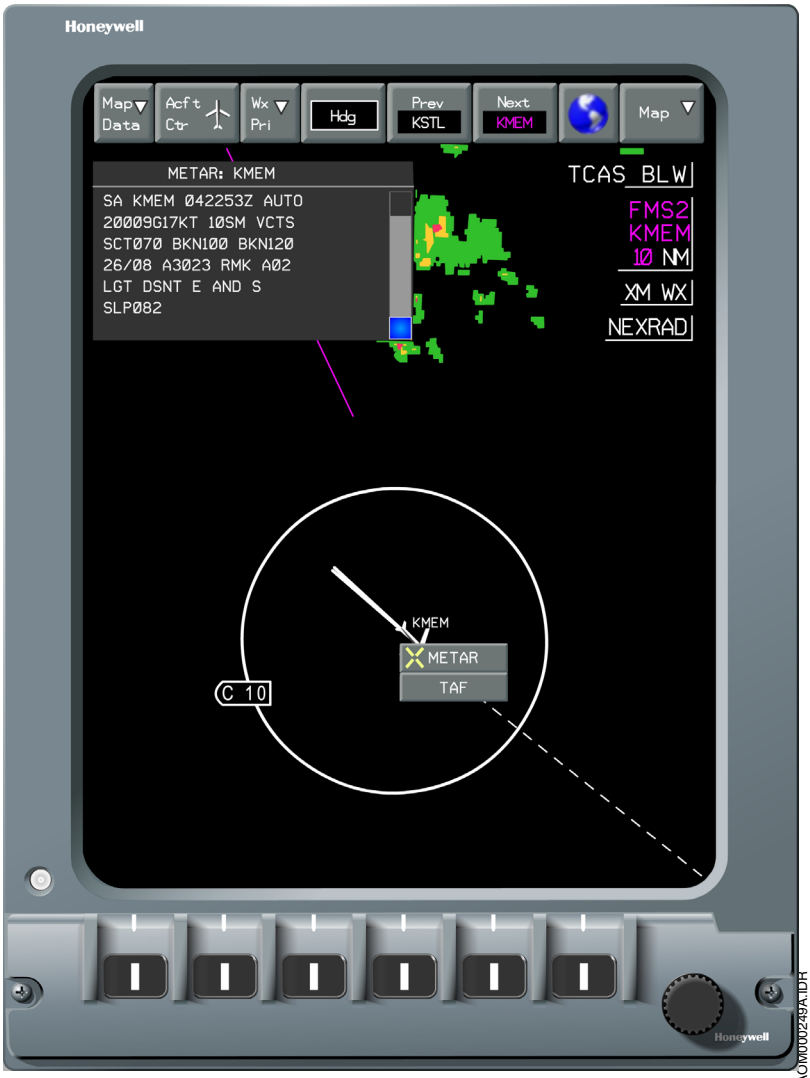

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MFD - METAR/TAF

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SECTION 2-18

NAVIGATION AND COMMUNICATION

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NOTE: Optional equipment are marked with an asterisk (*) and its description may not be present in this manual.

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GENERAL

The standard EMB-135BJ navigation and communication resources are provided by the Radio Management System (RMS). The RMS is controlled through two Radio Management Units (RMU 1 and RMU 2), an auxiliary control unit, the Tuning Backup Control Head (TBCH), and three individual Digital Audio Panels (DAP).

The two RMUs provide radio frequency and mode control. Alternatively, the RMU 2 frequencies may be selected through the TBCH.

The Audio System is controlled via three individual Digital Audio Panels, available for the captain, copilot and observer.

The Radio Management System also provides interface with the Passenger Address System, Aural Warning Unit and Cockpit Voice Recorder.

Optional communication equipment includes an HF transceiver, Third VHF NAV/COM, SELCAL and Aircraft Communication Addressing and Reporting System (ACARS).

The Flight Management System (FMS) is an equipment that uses the standard navigation radio sensors, GPS (Global Positioning System) sensors, and the IRS (Inertial Reference System) for positioning and navigation. The IRS provides heading inputs to the Integrated Navigation Unit and roll and pitch attitudes for the Electronic Attitude Director Indicator (EADI).

The navigation information is normally presented on the PFD and MFD and may also be available on the RMU, through its navigation backup page.

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RADIO MANAGEMENT SYSTEM (RMS)

The EMB-135 BJ models are equipped with a Radio Management System (RMS) that provides management of the following equipment and associated functions:

– Dual VHF COM;
– Dual VHF NAV (VOR, LOC, GS and Marker Beacon);
– Single or dual (optional) ADF;
– Single or dual (optional) Transponder (ATC and Mode S);
– TCAS;
– MLS (optional);
– Single or dual (optional) DME (including DME Hold);
– Digital Audio Panel.

The RMS consists basically of the following major components:

– Remote mounted:
  – Integrated Navigation Unit (INU);
  – Integrated Communication Unit (ICU).
– Cockpit Mounted:
  – 2 Radio Management Unit (RMU);
  – 1 Tuning Backup Control Head (TBCH);
  – 3 Digital Audio Panel (DAP).

With the exception of the Digital Audio Panel, all components of the RMS are connected through the digital Radio System Buses (RSB) that allows complete control and information exchange between the units of the entire RMS. Audio switching control is provided by means of the controls on the Digital Audio Panel itself. The audio signals are transmitted from the remote units to the Digital Audio Panel through dedicated digital audio buses.

The navigation and communication data are displayed on the RMU, PFD and MFD displays.

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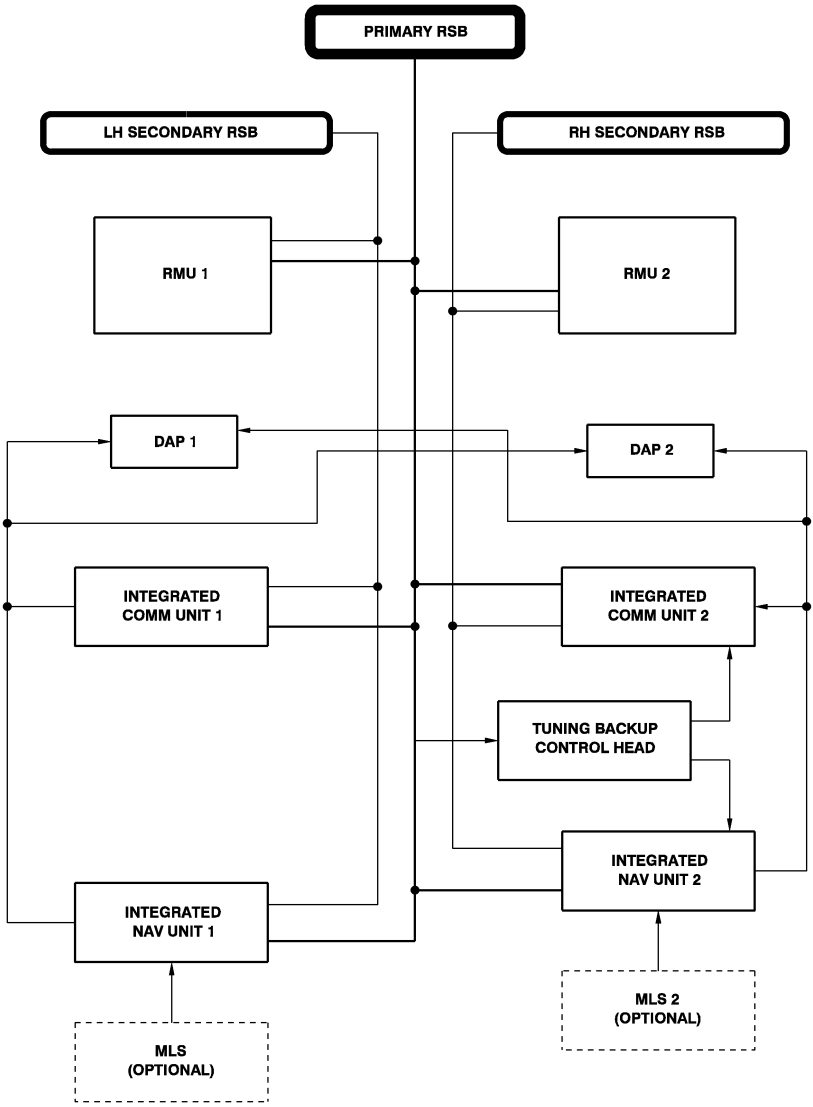

RMS SCHEMATIC

AOM-135/1542

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INTEGRATED COMMUNICATION UNIT (RCZ-851E)

The Integrated Communication Unit incorporates an internal VHF communication transceiver module and the ATC transponder module which interfaces through a cluster module to the Radio System Bus for operation.

This unit provides digitized audio signals to the Digital Audio Panel and conventional analog audio interfaces to other systems. The following modules are provided in this unit:

– VHF Communication Transceiver Module (TR-850) - This module is a conventional VHF COM transceiver that operates in the frequency range of 118 to 136.975 MHz.
– ATC Mode S Transponder Module (XS-850) - The Mode S Transponder module has the encoding and decoding capability required for Mode S operation in addition to the capability to operate as a conventional Air Traffic Control Radio Beacon Service (ATCRBS) transponder. The Mode S operation allows digital addressing of an individual airplane and the transmission of messages back and forth between the air and the ground.
– ATCRBS Transponder Module (XS-850A) - This transponder module provides only conventional ATC Radio Beacon System transponder capabilities.
– Mode S Diversity Transponder Module (XS-852) - This transponder module provides full ATCRBS, Mode S and TCAS data communications capability.
– TCAS Interface Module (XI-851) - The Interface Module allows the Integrated Communication Unit (ICU) to interface with separate Mode S diversity transponder and TCAS. The TCAS interface module replaces the XI-851 Mode S transponder module when installed in the ICU.

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INTEGRATED NAVIGATION UNIT (RNZ-851)

The Integrated Navigation Unit is a complete self-contained navigation system. The system consists of the VOR, localizer, glide slope and marker beacon receiver modules, the ADF module, a six-channel scanning DME module, and audio digitizers. The system also incorporates two L-Band antenna (optional), two ADF antenna (optional), two MB antenna, two VOR/ILS antenna and one GS dual antenna.

The following modules are provided in this unit:

– VHF NAV Receiver Module (NV-850) - The VHF NAV receiver is a module of the Integrated Navigation Unit and houses the major navigation functions of the VOR/LOC receiver, glide slope receiver and marker beacon receiver.
The ILS meets Category II instrument landing requirements.
Housed within the NAV receiver is a glideslope receiver which provides 40 channels of glideslope information for the conventional ILS. Also includes a 75 MHz marker beacon receiver which detects and transmits the tones of the marker beacons to the Audio System.

– DME Transceiver Module (DM-850) - The DME module is a six-channel DME that simultaneously tracks four selected channels for distance, groundspeed and time to station as well as monitoring two additional channels for the ident functions. This feature gives the system the capability of tracking four channels and having the decoded identifier readily available from two additional channels. The unit dedicates two of the four selected channels to the FMS (if installed). Thus, with the FMS installed, there are two remaining channels to control and display ident, distance, time to station and ground speed. Even with the FMS installed, the preset or standby VOR channel, when selected, provides instant station identification since it was one of the two additional channel being monitored.

– ADF Receiver Module - The ADF System comprises the ADF receiver (DF-850) and the companion ADF antenna (AT-860). The ADF receiver operates in the frequency ranges of 100 to 1799.5 kHz and 2181 to 2183 kHz (marine emergency frequency range).

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RADIO MANAGEMENT UNIT (RMU)

The Radio Management Unit consists of a display and a bezel panel that provide control of the communications and radio navigation equipment. Additional airplane systems information is also available on specific RMU selectable pages.

The EMB-135BJ is equipped with two RMUs, each one responsible for controlling the on-side radio equipment (e.g., RMU 1 controls the NAV/COM 1). However, through the cross-side operating mode, it is possible to select the opposite side radio frequencies.

There is no master switch for the RMUs: when the airplane is energized, both RMUs (and the EICAS) are automatically turned ON. However, only the COM 1 radio is available (dashes on the remaining RMUs fields) until the AVIONICS MASTER is switched ON.

Additionally, in the event of an electrical emergency, the RMU is a backup display for the main panel (PFDs and MFDs). In this condition the main panel is turned off and the NAVIGATION Backup Page, which presents basic navigation information, may be accessed through RMU page.

RMU PAGES

Available RMU pages are as follows: RADIO Page, NAV and COM Pages, ATC/TCAS Control Page, NAVIGATION Backup Page, ENGINE Backup Pages 1 and 2, SYS SELECT Page (COM band options) and MAINTENANCE Page. For airplanes equipped with KHF-1050, HF MEMORY Page and HF Control Page are also available.

Pressing the Page Control Button (PGE) selects the Page Menu. Pressing the Line Select Button associated with the desired page will cause the respective page to be displayed. The RADIO Page will be displayed again when the Line Select Button associated with the RETURN TO RADIOS label is pressed.

RADIO PAGE

Normally presented after power up, the RADIO Page is divided into five dedicated windows. Each window groups the data associated with a particular function: COM, NAV, ATC/TCAS, ADF. HF and MLS may also be available. In addition, the windows provide complete control of the frequency and operating modes of the associated function.

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NAVIGATION/COMMUNICATION MEMORY PAGES

The Memory Page presents two similar displays called First Memory Page and Second Memory Page. The First Memory Page shows memory locations 1 through 6 and the Second Memory Page shows memory location 7 through 12. Both the COM and NAV Memory Pages are functionally identical.

HF MEMORY PAGE (ONLY FOR KHF-1050)

The HF Memory Page manages the 12-channel non-volatile memory frequencies and their transmission/reception mode, mode of operation and squelch level.

HF CONTROL PAGE (ONLY FOR KHF-1050)

The HF Control Page allows the pilot to select and adjust the active and preset frequency, transmission/reception mode, mode of operation, squelch level and Transmission (TX) power.

ATC/TCAS CONTROL PAGE

The ATC/TCAS Control Page allows the pilot to select various TCAS operational features:

– Intruder Altitude

REL Target's altitude displayed relative to one's own airplane (default).

FL Target's altitude displayed as flight level (reverts to REL after 20 seconds).

– TA Display

AUTO Traffic targets displayed only when TA or RA target conditions exist.

MANUAL All traffic targets displayed within the viewing airspace.

– Flight ID

Allows Mode S coding to reflect the current flight's call sign.

– ADS-B (See NOTE)

ON Start broadcasting the ADS-B Out Information.

OFF Stop broadcasting the ADS-B Out Information.

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– ADS-B STATUS (See NOTE)

NORMAL GPS data is received on the active transponder.

FAIL No GPS data is received on the active transponder.

DGR GPS navigation integrity or accuracy parameters do not meet ADS-B standards, as recognized by the active transponder.

– Flight Level 1/2

Display of the transponder's encoded altitude and the air data source for that altitude.

NOTE: For airplanes equipped with transponder Mode S (and Post-Mod. SB 145LEG-34-0035 or equipped with an equivalent modification factory incorporated).

NAVIGATION BACKUP PAGE

The NAVIGATION Backup Page consists of a backup navigation display that presents EHSI, MB, DME, NAV (VOR) and ADF information.

ENGINE BACKUP PAGE

The ENGINE Backup Page displays information normally presented on the EICAS, as engine and systems indications, as well as EICAS messages. The ENGINE Backup Page is divided into two pages. The first presents only engine indications, while the second presents systems indications and EICAS messages. For further information on Engine Backup Page refer to Section 2-10 – Powerplant and 2-4 – Crew Awareness.

SYSTEM SELECT PAGE

The SYS SELECT Page allows the selection of COM 1 and COM 2 between Narrow and Wide bands.

MAINTENANCE PAGE

This page displays test results information depending on the type of test that is being carried out (power on self-test or pilot activated self-test). Two pages may be presented if a failure is detected, depending on whether the failure is in the RMS or in one of the radios. This page is not available in flight.

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RMU NORMAL OPERATION

RMU SELF-TEST

On the ground, the RMS performs a self-test each time power is applied after power off periods greater than 10 seconds. This test monitors the primary and secondary radio buses as well as the individual Radio Systems for proper operation. Each function test status is displayed in its respective window.

Under normal conditions, the COM will be operational within 7 seconds after power on and the remaining radio equipment units within 50 seconds. The test can be terminated by pressing the Test Button in the RMU Bezel Panel.

If any bus or radio test parameter failure occurs, an associated error message will be displayed on the test failure window, below the COM and NAV windows. Radio System failures are displayed in the first failure window and function failures in a second failure window. The failure windows may be removed by pressing and holding the Test Button. If the test is successfully completed the RMU will display the RADIO Page with the same radio configuration prior to the last power down.

NOTE: Any radio equipment that is not powered up when the test is initiated by the RMU will generate an error message.

Additionally, the pilot may perform a test by pressing the Test Button on the RMU Bezel Panel, which causes the activation of the self-test of the component associated with the window in which the yellow cursor is located. Upon successful completion of this test, a PASS message will be displayed for a short time in the window, indicating the successful completion of the test. If this test is not successfully completed, an error message (ERR) will be displayed in the window.

NOTE: Errors detected by the self-test indicate one or more parameter outside their self-test limit, but may not necessarily indicate non-operation of the function. The pilot should verify the operation of the function.

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CROSS-SIDE OPERATION

The RMU is provided with a feature called cross-side operating mode. This feature allows the RMU to be changed from its normal operating mode of tuning the on-side radio equipment to the mode of tuning the opposite side radio equipment.

The cross-side operation is selected by pressing the cross-side Transfer Button, labeled 1/2, on the RMU Bezel Panel, with the yellow cursor box in any window, except the ATC/TCAS window. The entire RMU display and operation is transferred from the opposite side to the side that has commanded the Cross-side Operating Mode. If the yellow cursor box is in the ATC/TCAS window, pressing the cross-side Transfer Button selects which transponder (1 or 2) will be in operation.

In the cross-side operation, the RMU Window/Control Side Ident will be displayed in magenta on the side that has selected the operation and any change made will be displayed in yellow on the opposite side RMU to indicate that the change was carried out remotely.

COM OPERATION

The normal COM operation is enabled with the RMU RADIO Page displayed. The COM window has two frequency lines. The upper line displays the active COM frequency while the lower line displays the preset frequency. Pressing the Line Select Button associated with the preset frequency will cause the yellow cursor box to move to enclose that frequency. In this condition, the enclosed preset frequency may be changed through the Frequency Tuning Knobs. When the Frequency Tuning Knobs are actuated, the label MEMORY and the associated memory location number, both below the lower frequency line, will change to a TEMP label indicating that the new preset frequency is not yet stored in the memory of the RMU. Frequency storage may be accomplished by pressing the Memory Storage Button, labeled STO, on the RMU Bezel Panel. This action will also provide the previous MEMORY label and the associated memory location number to replace the TEMP label, indicating that the new preset frequency has been stored in the indicated memory location.

Placing the yellow cursor box to enclose the MEMORY label, by pressing a second time the Line Select Button beside the COM window, will allow scrolling through the entire RMU stored memory. This may be performed by rotating the Frequency Tuning Knob either clockwise to memory location increment or counterclockwise to decrement.

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The exchange between the active frequency displayed in the upper line of the window and the preset frequency displayed in the lower line may be accomplished by pressing the Frequency Transfer Button on the upper left corner of the RMU Bezel Panel. This effectively causes the COM to change to the new active frequency that previously was the preset frequency. In this condition, the previous active frequency drops down to the second line of the COM window and becomes a temporary preset frequency. This is indicated by the TEMP label displayed under that frequency. The TEMP label also indicates, in this case, that the frequency displayed in the second line has not been stored in a memory location.

NOTE: The RMU controls the third VHF for airplanes equipped with Honeywell Third VHF System RCZ-833/853 models.

– Direct COM Tuning

Direct COM tuning is accomplished by pressing and holding for approximately 3 seconds the Line Select Button beside the COM preset frequency line. The yellow cursor box will enclose the active frequency, allowing direct COM tuning to that frequency, and the preset frequency line will be blank.

To exit from direct COM tuning, press and hold the Line Select Button beside the preset frequency line, until the preset frequency appears on the COM window.

– Squelch Function

The COM squelch function is controlled through the Squelch Control Button, labeled SQ, on the RMU control bezel. Pressing this button will cause the COM radio to open its squelch and allow any noise or signal present in the receiver to be heard in the Audio System. The squelch open condition is indicated by the SQ label displayed on the top of the COM window. Pressing the Squelch Control Button again will close the radio squelch immediately.

– Automatic Time-Out

After approximately two minutes of continuous transmission, the transceiver turns its transmitter off and a beep sound in the audio system alerts the pilot to the fact. The transceiver then reverts to receiver mode in order to prevent a stuck microphone button from blocking the communications channel. Should the time-out occur, the pilot can reset it by simply releasing the push to talk button and pressing it again.

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NAV OPERATION

The NAV operation is identical to the COM operation. However, NAV controls are accomplished by actuation of the Frequency Transfer Button and the Line Select Button located on the upper RH of the RMU Bezel Panel. Furthermore, the NAV window has an additional function called DME Split Tuning Mode. The operation in the DME Split Tuning Mode is similar to the operation in the DME Hold Mode.

The NAV system also incorporates FMS auto-tuning capability. Through the NAV Memory Page it is possible for the FMS to perform automatic tuning of the navigation radios (raw data) along the route by pressing the upper RH Frequency Transfer Button, which enables or disables the FMS auto-tuning capability. When the VOR or the ILS frequency is auto-tuned by the FMS, a magenta VOR or ILS frequency and a magenta AUTO label will be displayed on the top border of the RADIO Page NAV window.

DME OPERATION

In normal DME operations only one of the six DME channels is paired with the VOR active frequency and one other with the preset VOR frequency. However, pressing the DME Select Button, labeled DME, on the RMU Bezel Panel, will enable the DME to be tuned independently of the VOR active frequency.

Pressing the DME Select Button once will cause the NAV window to split into two windows. The top window will display the active VOR frequency and the lower window, with the DME label, will display the active DME frequency in VHF format. When the NAV window is split, an H (DME Hold) label is displayed in the DME window to indicate that the DME is not paired with the active VOR/ILS frequency. In this case the DME hold condition will also be announced on the PFD. In this condition, the DME may be tuned directly by simply pressing the associated Line Select Button beside the DME window and tuning the new DME channel through the Frequency Tuning Knobs.

Pressing the DME Select Button again will cause the frequency to be displayed in the channel format (TACAN).

Pressing the DME Select Button for the third time will cause the NAV window to resume its normal mode with the active and preset frequencies being displayed while returning the DME to the condition of channeling with the active VOR frequency.

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HF OPERATION (ONLY FOR KHF-1050)

The KHF-1050 High-Frequency Communications System operates in a frequency range of 2.0 to 29.9999 MHz with resolution of 100 Hz, and has different operating modes: Amplitude modulation (AM), upper side-band voice (UV), lower side-band voice (UL), upper side-band data (UD), lower side-band data (LD) and continuous wave (CW).

The AM, UV and UL operating modes may be used, and the UV operating mode is highly recommended due to its quality and range. The UD, LD and CW operating modes are inoperative and its use will take no effect. Therefore, the UD, LD and CW modes should not be selected.

Simplex Operation means that the transmission and reception frequencies are the same, while Split (or Semi-duplex) Operation means transmission (TX) and reception (RX) on different frequencies. International Telecommunication Union (ITU) is a Split Operation, and Emergency is a Simplex Operation, both with defined frequencies and selected by a channel number.

NOTE: - The use of Lower Side-band is legal for some international and off-shore communications, but is not authorized for use in the United States and most European countries.

- Be sure all personnel are clear of the HF antenna when performing radio checks. Serious RF burns can result from direct contact with the antenna and its terminals when the system is transmitting.

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During normal operation, the following annunciators may display:

COLOR	MESSAGE	MEANING
YELLOW	ERR	HF radio is annunciating a fault.
	RX INH	HF reception with one system is inhibited because the other system is transmitting or has just finished a transmission.
	SQ	Squelch is opened with the SQ function key (squelch test mode).
	TX	HF is keyed and transmit power setting is maximum.
	TX INH	One system is keyed, but the other system was keyed first.
	TX MED	HF is keyed and transmit power setting is medium.
	TX MIN	HF is keyed and transmit power setting is minimum.

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ADF OPERATION

The tuning of ADF frequencies is similar to that performed on the airplane's other radio equipment. Pressing the Line Select Button beside the ADF frequency display will move the yellow cursor box to surround the ADF frequency in the RMU display. Then, slowly turning the Frequency Tuning Inner Knob clockwise causes the ADF frequencies to advance in 0.5 kHz increments, while slowly turning the outer knob clockwise will cause the frequencies to advance in 10 kHz increments. ADF tuning through the Frequency Tuning Knobs is accomplished using proportional rate. If the knobs are turned in slow deliberate steps, the frequency will follow likewise. However, if the knob is turned rapidly, the frequency will skip several steps, depending upon the speed at which the knob is turned. This allows accomplishing large frequency changes with a very slight rotation of the knob.

The RMU also has the capability of storing an ADF frequency. This is accomplished by selecting the desired ADF frequency and then pressing the Memory Storage Button on the RMU Bezel Panel. To retrieve the stored frequency from memory, the ADF frequency Line Select Button must be pressed for 2 seconds.

The ADF is provided with a mode control capability. ADF operational modes can be selected by moving the yellow cursor box to the ADF modes field in the ADF window and then pressing the Line Select Button beside the ADF modes field or rotating the Frequency Tuning Knobs. Repeatedly pressing the Line Select Button will cause the modes to step in one direction while rotating the Frequency Tuning Knobs will select the modes either up or down the current location.

The ADF operational modes are the following:

– ANT The ADF receives signal only.

– ADF The ADF receives signal and calculates relative bearings to station.

– BFO The ADF adds a beat frequency oscillator for reception of CW signals.

– VOICE The ADF opens width of IF bandwidth for better aural reception.

NOTE: Bearing information is available in the ADF and BFO modes only.

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TRANSPONDER AND TCAS OPERATION

Transponder operation is similar to other radio equipment since it requires moving the yellow cursor box to a desired function. In order to tune a desired ATC code, press the Line Select beside the ATC code display. This action will enable the Frequency Tuning Knobs to change the ATC codes. The outer knob sets the thousands and hundreds digits and the inner knob sets the tens and ones digits.

Pressing and holding the code Line Select Button will recall the stored preset code (typically used for VFR). A new code may be stored by setting the code and then pressing the Memory Storage Button on the RMU Bezel Panel.

Pressing the Line Select Button associated with the transponder operating mode display will move the yellow cursor box to surround the mode annunciation in the ATC/TCAS window allowing to set a new transponder mode if a non-standby mode is selected. Once the mode annunciation is surrounded, pressing the Transfer Button 1/2 will select which transponder will be in operation (e.g., 1 ATC ON to 2 ATC ON).

The transponder operational modes are the following:

– ATC ON Replies on Modes S and A, no altitude reporting.

– ATC ALT Replies on Modes A, C and S, with altitude reporting.

– TA ONLY TCAS Advisory Mode is selected.

– TA/RA TCAS Traffic Advisory/Resolution Advisory Mode is selected.

RMU ABNORMAL OPERATION

Loss of the Primary Radio Bus will disable the cross-side control capability and also the TBCH. However, no radio functions will be lost. The radios on both sides will still be functional through the Secondary Radio Buses.

Loss of the left and/or right Secondary Radio Bus will not disable the radio functions. The radios may be tuned, in this condition, through the Primary Radio Bus or through the cross-side control feature.

As a safety feature of the RMU, if any component of the Radio System fails to respond to the commands from the RMU, the frequencies or the operating commands associated with that particular function will be removed from the RMU display and replaced with dashes.

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RMU CONTROLS AND INDICATORS

RMU BEZEL PANEL

1 - FREQUENCY TRANSFER BUTTON

– When pressed, the active frequency (upper line) and the preset frequency (lower line) in the COM or NAV windows exchange location and function.

2 - LINE SELECT BUTTONS

– The first press of the button moves a yellow cursor box to surround the data field associated with that particular Line Select Button. This enables the Frequency Tuning Knobs to change the data or the mode marked by the cursor. For some functions, additional pressing of the Line Select Button will toggle modes or recall stored frequencies. The Line Select Buttons, if kept pressed, allows ADF and ATC memories to be recalled, and to enter or exit Direct Tune Mode for COM and NAV.

3 - FREQUENCY TUNING OUTER KNOB

– Allows the data field enclosed by the cursor to be modified. The data may be frequency setting, stored frequencies or mode, depending upon the data field. When setting a frequency, this knob controls the digits to the left of the decimal point. Furthermore, this knob also controls the RMU brightness, which is enabled by pressing the Dimming Button.

4 - FREQUENCY TUNING INNER KNOB

– Is functionally similar to the Frequency Tuning Outer Knob except that when setting the frequency, this knob controls the digits to the right of the decimal point.

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5 - MEMORY STORAGE BUTTON

– Pressing this button will cause a temporary (TEMP) COM or NAV pre-select frequency to be stored in the memory and assigned numbered location, provided the cursor has first been placed around that frequency.

NOTE: - ADF and ATC have only one memory location.

- For HF memory operation, refer to HF Memory Page description.

6 - DME SELECT BUTTON

– Allows selection of the DME Hold Mode, tuning a different DME channel, not paired with the VOR/ILS frequency, without changing the active VOR frequency. Repeated pressing of this button enables display and selection of the DME channels in VHF and TACAN formats, and then back to the paired VOR/DME mode.

7 - CROSS-SIDE TRANSFER BUTTON

– With the cursor in any window, except the ATC, TCAS or HF display, pressing this button will transfer the entire RMU operation and display from the cross-side system.

– With the cursor in the ATC or TCAS window, pressing this button selects which transponder will be in operation.

– With enhanced TCAS, the button allows control of TCAS data in the cross-side display.

– With the cursor in the HF window, pressing this button toggles the display between HF1 and HF2 tuning pages. There will be dashes in the window if the HF in view is not the selected HF.

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8 - TEST BUTTON

- When pressed, causes the component associated with the present position of the yellow cursor box to activate its internal self-test circuits for a complete end-to-end test of the function. To properly accomplish the equipment self-test, the Test Button must be pressed and held down as follows:
  - About 2 seconds for COM transceiver self-test.
  - From 5 to 7 seconds for DME, ATC and ADF self-test.
  - About 20 seconds for NAV (VOR/ILS) self-test.
- Releasing the Test Button at any time immediately returns the equipment to its normal operation in the actual function.
- If the Test Button is held pressed for 30 seconds or more, the radios are automatically commanded back into normal operation.

9 - PAGE CONTROL BUTTON

- Provides access to the page menu.

10 - DIMMING BUTTON

- The RMU features an automatic screen brightness adjustment, within a limited range, to keep the display visibility optimized. The Dimming Button enables RMU brightness to be controlled manually through the Frequency Tuning Outer Knob. The manual dimming control can be disabled by pressing the Dimming Button again or any Line Select Button.

11 - TRANSPONDER IDENTIFICATION MODE BUTTON

- Selects the Transponder Identification Response Mode. The ident squawk will stop after 18 seconds.

12 - SQUELCH CONTROL BUTTON

- Causes the COM radio to open its squelch allowing any noise or signal present in the radio to be heard in the Audio System. The label SQ is displayed on the top line of the COM window when the squelch is open. When pressed a second time the Squelch Control Button closes the squelch.

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RMU BEZEL PANEL

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RMU DISPLAY

PAGE MENU

1 - PAGE MENU IDENTIFICATION

- Indicates that PAGE MENU is selected.
- Color: white.

2 - NAVIGATION PAGE LABEL

- To access the NAVIGATION Page, press the Line Select Button adjacent to this label.
- Color: green.

3 - ENGINE PAGE LABEL

- To access the ENGINE Page, press the Line Select Button adjacent to this label.
- Color: green.

4 - SYS SELECT PAGE LABEL

- To access the SYS SELECT Page, press the Line Select Button adjacent to this label.
- Color: green.

5 - MAINTENANCE PAGE LABEL

- To access the MAINTENANCE Page, press the Line Select Button adjacent to this label.
- Color: green.

6 - RETURN TO RADIOS PAGE LABEL

- To access the RETURN TO RADIOS Page, press the Line Select Button adjacent to this label.
- Color: green.

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7 - ATC/TCAS PAGE LABEL

- To access the ATC/TCAS Page, press the Line Select Button adjacent to this label.
- Color: green.

8 - HF MEMORY (ONLY FOR KHF-1050)

- To access the HF MEMORY Page, press the Line Select Button adjacent to the desired page.
- Color: green.

9 - HF CONTROL (ONLY FOR KHF-1050)

- To access the HF CONTROL Page, press the Line Select Button adjacent to the desired page.
- Color: green.

10 - COM AND NAV MEMORY PAGE LABEL

- To access the COM or NAV MEMORY Pages, press the Line Select Button adjacent to the desired page.
- Color: green.

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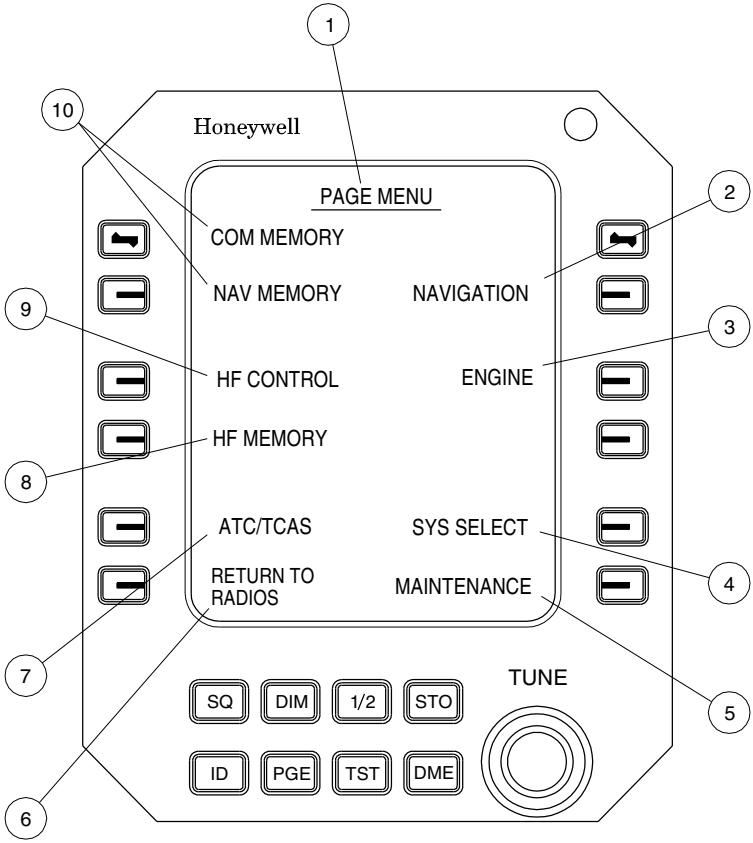

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PAGE MENU

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RADIO PAGE

1 - PRESET FREQUENCY MEMORY LOCATION (ONLY FOR NAV AND COM WINDOWS)

- Identifies the preset frequency as temporary (TEMP label) or retrieved from the memory (MEMORY label followed by its memory location).
- Colors:
  - Cyan for on-side operation.
  - Yellow for cross-side operation.
- When marked by the yellow cursor box, the memory location labels and their associated stored frequencies can be scrolled by using the Frequency Tuning Knobs.

2 - COM WINDOW/CONTROL SIDE IDENTIFICATION

- Identifies the window and which source equipment (side 1 or 2) is active in that RMU.
- Colors:
  - White for on-side source.
  - Magenta for cross-side source.

3 - VHF COM ACTIVE FREQUENCY

- Indicates the active frequency for that window.
- Colors:
  - White for on-side operation.
  - Yellow for cross-side operation.
- Digits are replaced by dashes in case of any failure in the associated source.

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4 - VHF COM PRESET FREQUENCY

- Indicates the preset frequency.
- Colors:
  - Cyan for on-side operation.
  - Yellow for cross-side operation.

NOTE: When DME Hold is not selected, the NAV Window also presents a similar preset frequency field.

5 - NAV WINDOW/CONTROL SIDE IDENTIFICATION

- Identifies the window and which source equipment (side 1 or 2) is active in that RMU.
- Colors:
  - White for on-side source.
  - Magenta for cross-side source.

6 - VHF NAV ACTIVE FREQUENCY

- Indicates the active frequency for that window.
- Colors:
  - White for on-side operation.
  - Yellow for cross-side operation.
- Digits are replaced by dashes in case of any failure in the associated source.

7 - DME HOLD MODE ANNUNCIATION

- Indicates that the DME is in Hold Mode and the active DME channel is selected separately from the active VOR/ILS frequency.
- Color: yellow.

8 - DME STATION IDENTIFICATION CODE

- Displays the digital identification code of the ground station to which the DME is tuned with.
- Color: white.

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9 - DME HOLD MODE FREQUENCY

- Indicates the active frequency in DME Hold Mode operation, in VHF (represented) or TACAN formats.
- Color: white.

10 - ADF WINDOW/CONTROL SIDE IDENTIFICATION

- Identifies the window and which source equipment (side 1 or 2) is active in that RMU.
- Colors:
  - White for on-side source.
  - Magenta for cross-side source.

11 - ADF ACTIVE FREQUENCY

- Indicates the active frequency for that window.
- Colors:
  - White for on-side operation.
  - Yellow for cross-side operation.
- Digits are replaced by dashes in case of any failure in the associated source.

12 - ADF MODES FIELD

- Displays the ADF modes as selected either through the second ADF Line Select Button (achieved by repeated pressing) or through the Frequency Tuning Knobs when the yellow cursor box is located in this field.
- Color: green.

13 - HF WINDOW (ONLY FOR KHF-1050)

- Identifies the window and which source equipment (side 1 or 2) is active in that RMU.
- Colors:
  - White for on-side source.
  - Magenta for cross-side source.

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14 - HF ACTIVE FREQUENCY (ONLY FOR KHF-1050)

- Indicates the active frequency for that window.
- Colors:
  - White for on-side operation.
  - Yellow for cross-side operation.

15 - RADIO FREQUENCY TRANSMISSION MODE

- Indicates the HF Transmission Mode.
- Color: green.

16 - HF PRESET FREQUENCY (ONLY FOR KHF-1050)

- Indicates the active frequency for that window.
- Colors:
  - White for on-side operation.
  - Yellow for cross-side operation.

17 - TRANSPONDER OPERATING MODE ANNUNCIATION

- Displays the active transponder operating mode as selected through the Frequency Tuning Knobs when the yellow cursor box is located in this field. Pressing the Line Select Button beside this field will alternate between the pre-selected transponder mode and the standby mode.
- Color: green.

18 - ATC CODE

- Displays the active ATC code number.
- Color: white.

19 - ATC/TCAS WINDOW

- Identifies the window as the ATC/TCAS window.
- Color: white.

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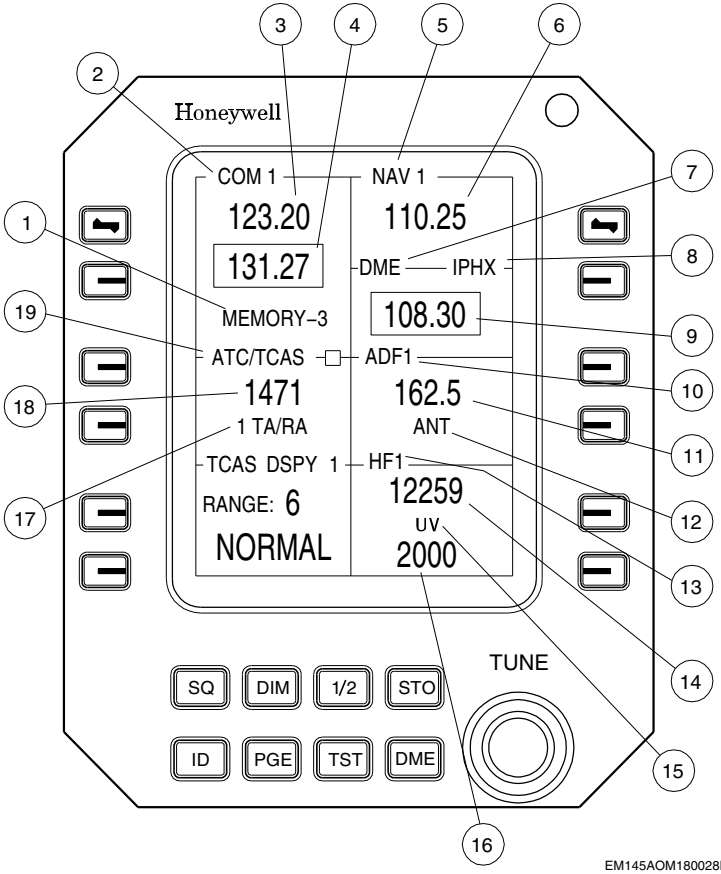

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RMU RADIO PAGE

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COM MEMORY PAGE

1 - MEMORY PAGE IDENTIFICATION

- Identifies the page as a COM Memory Page.
- Color: white.

2 - ACTIVE COM FREQUENCY

- Identifies the COM frequency that is currently active.
- Color: white.

3 - SQUELCH MODE INDICATION

- Indicates if squelch is open.
- Color: yellow.

4 - MEMORY PAGE SELECTED ANNUNCIATION

- Indicates that the Memory Page is selected.
- Color: green.

5 - MEMORIES DISPLAY

- Displays the preset frequencies and their associated locations.
- When there is no frequency stored in a memory location only the location number will be displayed in the associated memory display line.
- Colors:
  - Memory identifications are green.
  - Frequency is cyan.

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6 - MEMORY INSERT PROMPT

- If it is desirable to insert a new frequency in a particular memory location, simply press the Line Select Button beside the location line, moving the yellow cursor box to that line. Then press the Line Select Button beside the Insert prompt label. This will cause all the data in memory from the insert location downward to shift one position down. The cursor will remain in the insertion selected location allowing the new frequency to be tuned and stored in that memory location. A MEM FULL (Memory Full) annunciation will be displayed in the RMU display if the 12 memory locations are filled and the Line Select Button associated with the Insert prompt is pressed.
- Color: green.

7 - MEMORY DELETE PROMPT

- To delete a frequency from the memory, press the Line Select Button adjacent to the line associated with the frequency to be deleted. Then press the Line Select Button adjacent to the Delete prompt. The frequency enclosed by the cursor will be deleted from the memory. Higher numbered memory locations will then move upward to fill the empty memory location.
- Color: green.

8 - RADIO PAGE RETURN PROMPT

- Pressing the associated Line Select Button will return the RMU display to the RADIO Page.
- Color: green.

9 - MEMORY MORE PROMPT

- The More prompt allows to display memory locations 7 through 12, by pressing the associated Line Select Button. All actions described for memory locations 1 through 6 are also applicable to memory locations 7 through 12. If locations 1 through 6 are not filled, the Second Memory Page will not be accessible.
- Color: green.

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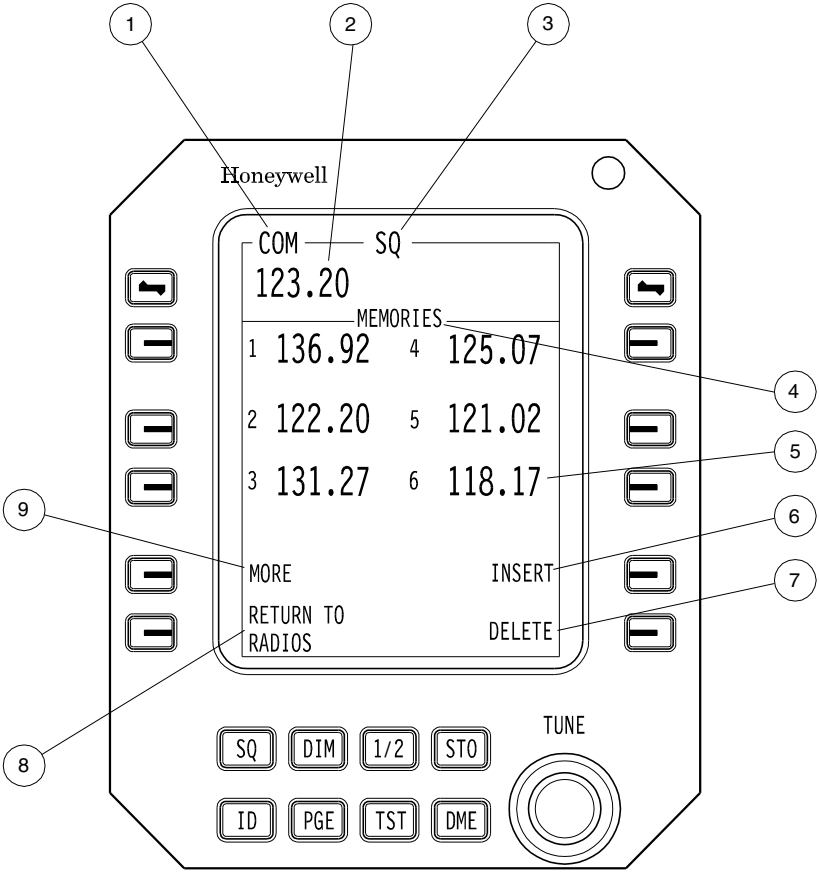

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RMU COM MEMORY PAGE

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NAV MEMORY PAGE

1 - MEMORY PAGE IDENTIFICATION

- Identifies the page as a NAV Memory Page.
- Color: white.

2 - ACTIVE NAV FREQUENCY

- Identifies the NAV frequency that is currently active.
- Color: white.

3 - NAV FMS STATUS ANNUNCIATION

- In the NAV Memory Page, this field displays the FMS ENABLED or DISABLED annunciation. This will be present whether or not the Radio System interfaces with the FMS.
- Color: yellow.

NOTE: When the VOR or the ILS frequency is auto-tuned by the FMS, a magenta VOR or ILS frequency and a magenta AUTO label will be displayed on the top border of the RADIO Page NAV window.

4 - MEMORY PAGE SELECTED ANNUNCIATION

- Indicates that the Memory Page is selected.
- Color: green.

5 - MEMORIES DISPLAY

- Displays the preset frequencies and their associated locations.
- When there is no frequency stored in a memory location only the location number will be displayed in the associated memory display line.
- Colors:
  - Memory identifications is green.
  - Frequency is cyan.

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6 - MEMORY INSERT PROMPT

- If it is desirable to insert a new frequency in a particular memory location, simply press the Line Select Button beside the location line, moving the yellow cursor box to that line. Then press the Line Select Button beside the Insert prompt label. This will cause all the data in memory from the insert location downward to shift one position down. The cursor will remain in the insertion selected location allowing the new frequency to be tuned and stored in that memory location. A MEM FULL (Memory Full) annunciation will be displayed in the RMU display if the 12 memory locations are filled and the Line Select Button associated with the Insert prompt is pressed.
- Color: green.

7 - MEMORY DELETE PROMPT

- To delete a frequency from the memory, press the Line Select Button adjacent to the line associated with the frequency to be deleted. Then press the Line Select Button adjacent to the Delete prompt. The frequency enclosed by the cursor will be deleted from the memory. Higher numbered memory locations will then move upward to fill the empty memory location.
- Color: green.

8 - RADIO PAGE RETURN PROMPT

- Pressing the associated Line Select Button will return the RMU display to the RADIO Page.
- Color: green.

9 - MEMORY MORE PROMPT

- The More prompt allows to display memory locations 7 through 12, by pressing the associated Line Select Button. All actions described for memory locations 1 through 6 are also applicable to memory locations 7 through 12. If locations 1 through 6 are not filled, the Second Memory Page will not be accessible.
- Color: green.

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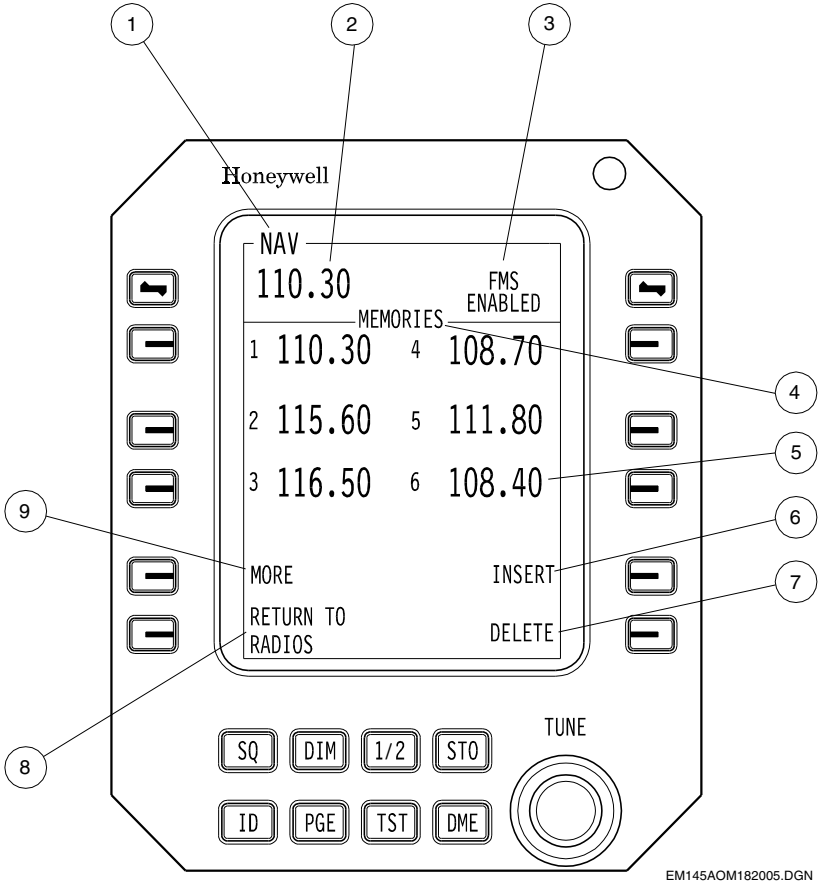

RMU NAV MEMORY PAGE

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HF MEMORY PAGE (ONLY FOR KHF-1050)

1 - MEMORY PAGE IDENTIFICATION

- Identifies the page as an HF Memory Page.
- Color: white.

2 - MEMORY POSITION

- Identifies the Memory Position.
- Color: green.

3 - MEMORY FREQUENCY

- Identifies the Memory Frequency.
- Color: blue.
- Pressing the Upper Line Select Button positions the cursor around the active frequency.
- If in Split Mode, pressing the Upper Line Select Button positions the cursor around the Receive Frequency. It also toggles between the active Receive and Transmission frequency.
- If in Emergency or ITU mode, holding the Upper Line Select Button displays the corresponding frequency and emission mode, and releasing it returns the display to the active channel.

4 - MEMORY EMISSION MODE

- Identifies the HF emission mode (UV, LV, UD, LD, AM or CW) that is in Memory.
- Color: green.

5 - SPLIT MODE MEMORY

- Example of a Split Mode Memory identifying the Receiving (RX) and Transmitting (TX) Modes and Frequencies.

6 - RADIO PAGE RETURN PROMPT

- Pressing the associated Line Select Button will return the RMU display to the RADIO Page.
- Color: green.

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7 - MEMORY MORE PROMPT

- Pressing the associated Line Select Button toggles the memory window through the 12 memory locations, displaying three memory locations at a time.
- Color: green.

8 - ACTIVE HF MODE OF OPERATION

- Pressing the associated Line Select Button changes the mode for the channel that is selected by the cursor box.
- Color: green.

9 - LOAD PROMPT

- Pressing the associated Line Select Button loads the information from the memory location selected by the cursor box into the active channel.
- Color: green.

10 - ACTIVE HF EMISSION MODE

- Identifies the HF transmission mode (UV, LV, UD, LD, AM or CW) that is currently active.
- Color: green.

11 - ACTIVE HF FREQUENCY

- Identifies the HF frequency that is currently active.
- Color: white.

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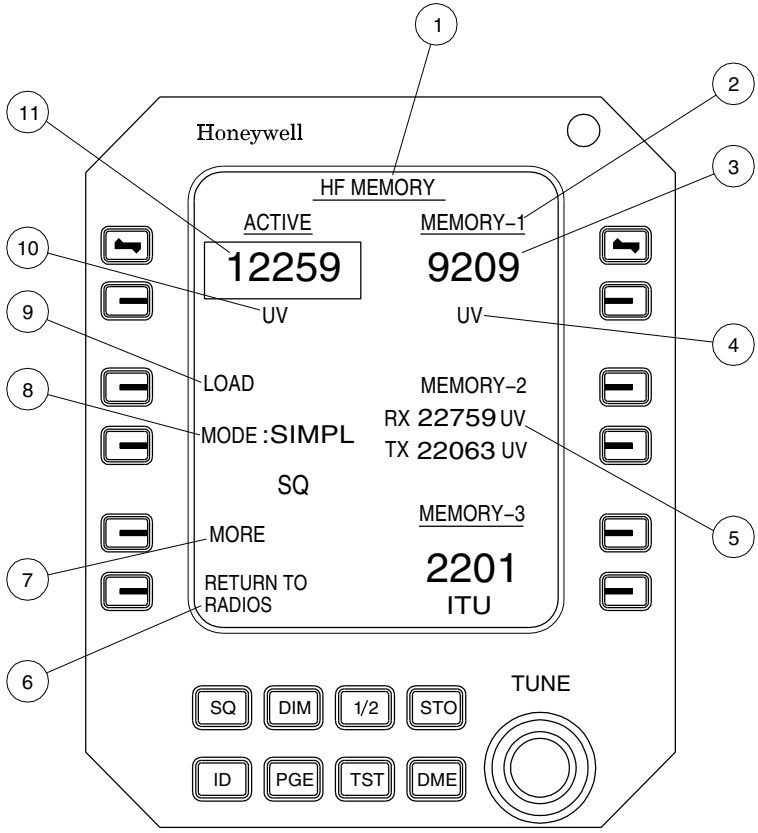

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HF MEMORY PAGE (ONLY FOR KHF-1050)

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HF CONTROL PAGE (ONLY FOR KHF-1050)

1 - CONTROL PAGE IDENTIFICATION

- Identifies the page as an HF Control Page.
- Color: white.

2 - PRESET HF TRANSMISSION FREQUENCY

- Identifies the page as an HF Control Page.
- Color: white.
- Pressing the Upper Line Select Button positions the cursor around the preset frequency.
- If in Split Mode, pressing the Upper Line Select Button positions the cursor around the Receive Frequency. It also toggles between the preset Receive and Transmission frequency.
- If in Emergency or ITU mode, holding the Upper Line Select Button displays the corresponding frequency and emission mode, and releasing it returns the display to the preset channel.
- Pressing the Lower Line Select Button positions the cursor around the preset frequency.
- If the cursor is already positioned in the preset frequency, the Lower Line Select Button toggles through the different emission modes (UV, LV, UD, LD, AM and CW).
- If in Split Mode, pressing the Lower Line Select Button positions the cursor around the Transmission Frequency. It also toggles between the preset Receive and Transmission frequency.
- If in Emergency or ITU mode, holding the Lower Line Select Button displays the corresponding frequency and emission mode, and releasing it returns the display to the preset channel.

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3 - TRANSMIT POWER

- Identifies the Transmit Power level. Available levels are MIN, MED and MAX.
- Pressing the associated Line Select Button changes the Transmit Power level.

4 - MEMORY STORAGE BUTTON

- Stores the information in the preset channel into the selected memory location.

5 - SQUELCH LEVEL

- Identifies the Squelch Level. Available levels are MIN, MED and MAX.
- Pressing the associated Line Select Button changes the Squelch Level.

6 - ACT MODE (ACTIVE MODE)

- Pressing the associated Line Select Button changes the active mode of operation (Simple, Split, Emergency and ITU).

7 - TRANSFER FUNCTION

- Pressing the associated Line Select Button switches the information in the preset and active windows. The STO key must be pushed in order to save the information in the memory location.

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8 - ACTIVE HF TRANSMISSION FREQUENCY

- Identifies the Active HF Transmission Frequency.
- Color: green.
- Pressing the Upper Line Select Button positions the cursor around the active frequency.
- If in Split Mode, pressing the Upper Line Select Button positions the cursor around the Receive Frequency. It also toggles between the active Receive and Transmission frequency.
- If in Emergency or ITU mode, holding the Upper Line Select Button displays the corresponding frequency and emission mode, and releasing it returns the display to the active channel.
- Pressing The Lower Line Select Button positions the cursor around the active frequency.
- If the cursor is already positioned in the active frequency, the Lower Line Select Button toggles through the different emission modes (UV, LV, UD, LD, AM and CW).
- If in Split Mode, the Lower Line Select Button positions the cursor around the Transmission Frequency. It also toggles between the active Receive and Transmission frequency.
- If in Emergency or ITU mode, holding the Lower Line Select Button displays the corresponding frequency and emission mode, and releasing it returns the display to the active channel.
- After setting the frequency, pushing the PPT button momentarily initiates the antenna tuning.

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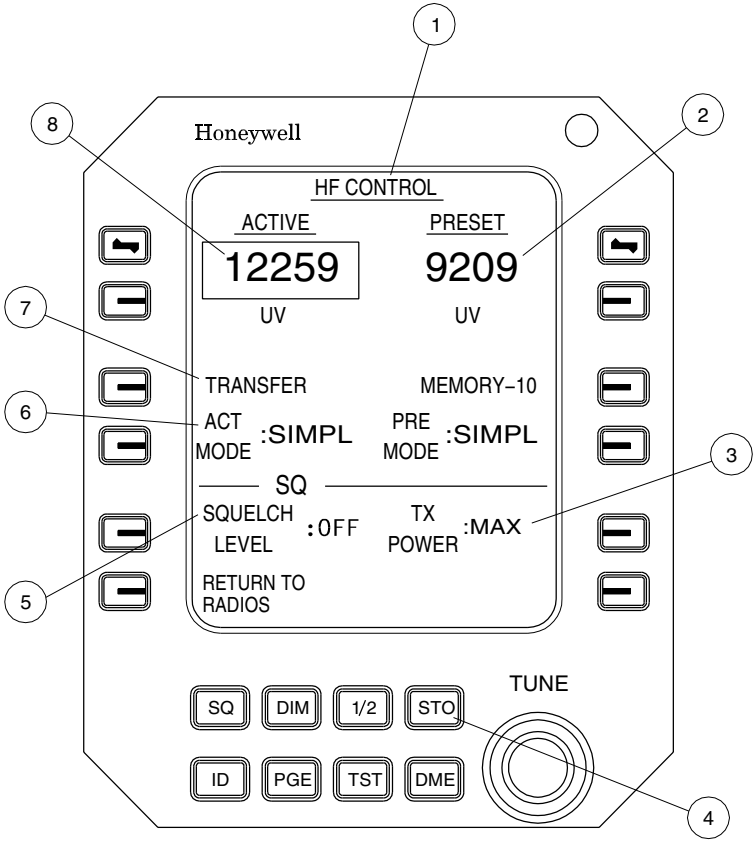

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HF CONTROL PAGE (ONLY FOR KHF-1050)

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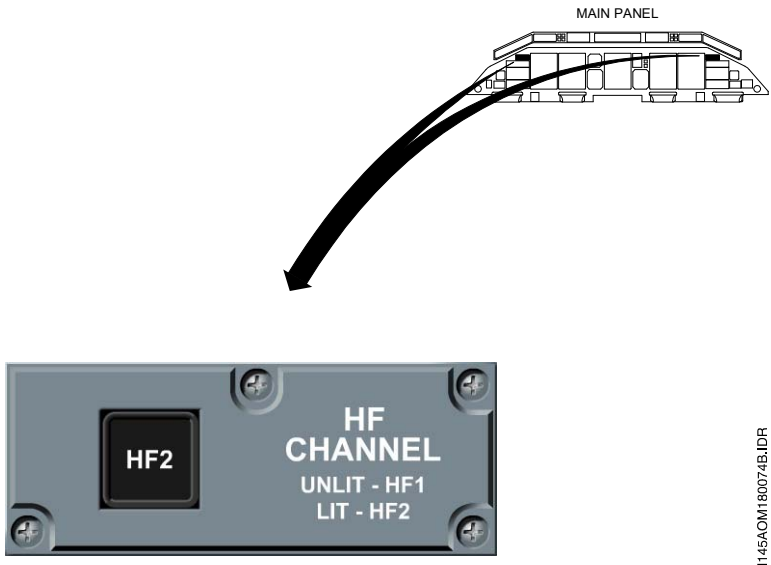
HF SELECTOR PANEL (ONLY FOR KHF-1050)

The airplane may be equipped with one (Single installation) or two (Dual installation) HF systems.

In case of Dual installation, press the HF2 button (on the Pilot or Copilot position) to toggle between HF1 and HF2 radio system. The HF1 radio system is selected when the button is unlit, and the HF2 is selected when the button is lit. The HF2 buttons always assume the same state (both unlit or both lit).

To toggle between HF1 and HF2 Tuning pages, press the Cross-side Transfer Button (1/2).



HF SELECTOR PANEL WITH DUAL INSTALLATION

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ATC/TCAS CONTROL PAGE

1 - INTRUDER ALTITUDE DISPLAY

- REL (green): target's altitude displayed relative to one's own airplane (default).
- FL (cyan): target's altitude displayed as flight level (reverts to REL after 20 seconds).

2 - TA DISPLAY

- AUTO (green): traffic targets displayed only when TA or RA target condition exists.
- MANUAL (cyan): all traffic targets displayed within the viewing airspace.

3 - FLIGHT ID

- Allows Mode S coding to reflect the current flight's call sign. The outer tuning knob moves the character position designator and the inner tuning knob selects the desired alphanumeric character.
- Color: white.

4 - ADS-B ON/OFF (OPTIONAL) (SEE NOTE)

- ON: start broadcasting the ADS-B Out Information.
- OFF: stop broadcasting the ADS-B Out Information.
- Color: green.

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5 - ADS-B STATUS (SEE NOTE)

- NORMAL (white): GPS data is received on the active transponder.
- FAIL (yellow): no GPS data is received on the active transponder.
- DGR (yellow): GPS navigation integrity or accuracy parameters do not meet ADS-B standards, as recognized by the active transponder.

6 - FLIGHT LEVEL 1/2

- Display of the transponder's encoded altitude and the air data source for that altitude.
- Color: green.

7 - RADIO PAGE RETURN PROMPT

- Pressing the associated Line Select Button will return the RMU display to the RADIO Page.
- Color: green.

NOTE: For airplanes equipped with transponder Mode S (and Post-Mod. SB 145LEG-34-0035 or equipped with an equivalent modification factory incorporated).

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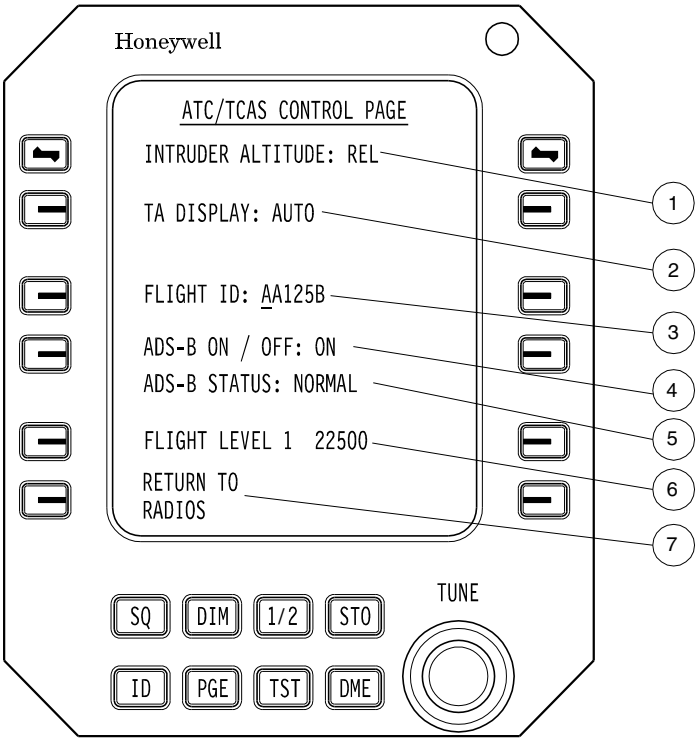

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RMU ATC/TCAS CONTROL PAGE

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NAVIGATION BACKUP PAGE

NOTE: - Navigation information presented on the Navigation Backup Page is operationally identical to that normally presented on the PFD.

- The compass card is presented only in arc partial format.

- The selected course and the DME distance to station are boxed.

- NAV and ADF active frequencies are also presented.

1 - ACTIVE NAV FREQUENCY

2 - BEARING 1 POINTER

3 - BEARING 2 POINTER

4 - ACTIVE ADF FREQUENCY

5 - COURSE DEVIATION BAR

6 - COURSE DEVIATION SCALE

7 - DME DISTANCE TO STATION

8 - MARKER BEACON DISPLAY

9 - SELECTED COURSE

10 - BEARING 2 SOURCE ANNUNCIATION

11 - BEARING 1 SOURCE ANNUNCIATION

12 - COMPASS CARD DISPLAY

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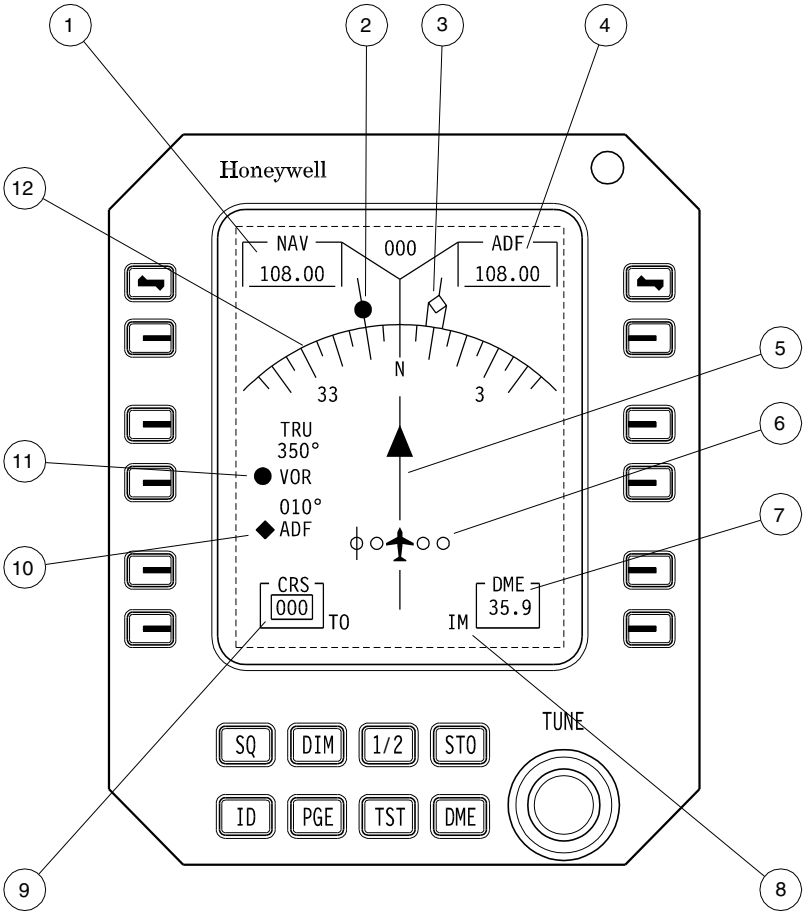

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RMU NAV BACKUP PAGE

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RMU ENGINE BACKUP PAGES

1 - THRUST MODES

- This is the thrust mode when both engines are operating in the same mode. If the engines are operating in different modes, it is displayed above each N1 indication with its respective thrust mode.
- Labels:
  - ALT T/O-1 or T/O (A1P engines);
  - ALT T/O-1, T/O or E T/O (A1E engines);
  - ALT T/O-1, T/O or A2 TO (A2 engines);
  - CON, CLB or CRZ.

2 - N1 INDICATION (FAN SPEED)

- Displays N1 speed in RPM percentage both digitally and on an analog scale.

3 - INTERSTAGE TURBINE TEMPERATURE (ITT)

- Indicates the temperature in degrees Celsius.

4 - N2 INDICATION (CORE SPEED)

- Displays N2 speed in RPM percentage.

5 - FUEL FLOW INDICATION (FF)

- Indicates fuel flow in PPH or KPH.

6 - OIL PRESSURE

- Indicates engine oil pressure in psi. For further information refer to Section 2-10 – Powerplant.

7 - OIL TEMPERATURE

- Oil temperature indication ranges from 0°C to 180°C.

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8 - FUEL QUANTITY (FQ)

- Indicates the fuel quantity for each tank in lb or kg.
  Legacy 600: FWD/WNG/AFT.
  Legacy 650: FWD/WNG/AFT/VTR.

9 - FLAPS

- Flaps indication ranges from 0° to 45°, with discrete indications on 0°, 9°, 22°, 45°.
- In-transit, flap position is replaced by the actual flap position.

10 - LANDING GEAR DOWN LOCKED

- Landing gear down locked is presented on the RMU through the green indication LG DOWN LOCKED.

11 - SPOILER OPEN

- Displays SPOILER OPEN when any of the surfaces are open.

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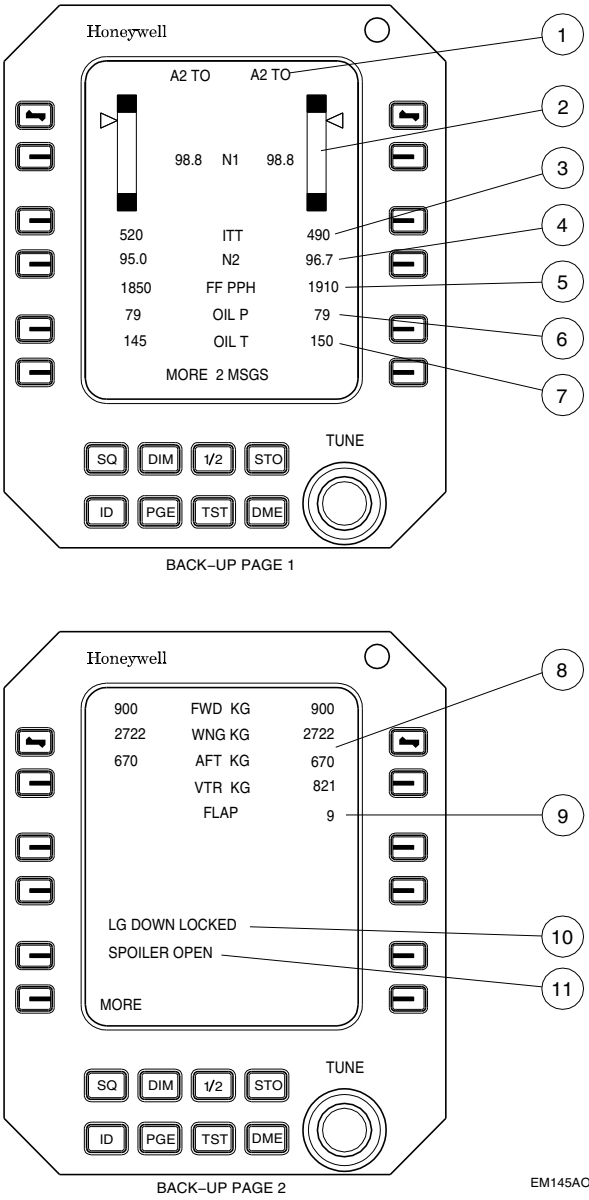

RMU ENGINE BACKUP PAGES

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SYSTEM SELECT PAGE

1 - SYSTEM SELECT PAGE IDENTIFICATION

- Identifies the SYS SELECT Page.
- Color: white.

2 - COM 1 AND COM 2 BANDWIDTH SELECTION FIELD

- Indicates the current COM 1 and COM 2 status regarding bandwidth selection. Pressing the Line Select Button beside the COM 1/COM 2 line field will toggle the receiver bandwidth from WIDE (2 digits at the right of the decimal point) to NARROW (3 digits at the right of the decimal point) or vice-versa.
- Colors:
  - Cyan for COM 1 (2) BNDWD label.
  - Green for WIDE/NARROW indication.

3 - RADIO PAGE RETURN PROMPT

- Pressing the associated Line Select Button will return the RMU display to the RADIO Page.
- Color: green.

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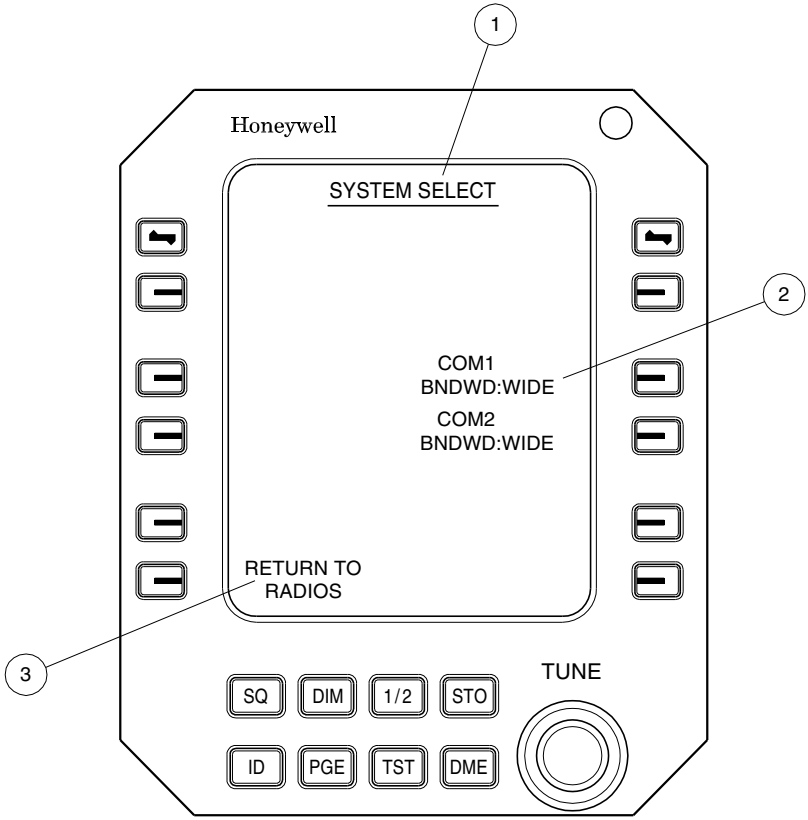

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RMU SYSTEM SELECT PAGE

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MAINTENANCE PAGE (POWER ON SELF-TEST)

1 - TEST PAGE IDENTIFICATION

- Indicates where a failure has been detected.
- Color: white.

2 - FAILURE SIDE IDENTIFICATION

- Indicates the side of the detected failure.
- Color: green.

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3 - FAILURE IDENTIFICATION

- Identifies the detected failure according to the table below.
- Color: red.

ERROR MESSAGE	MEANING	ACTION	DECISION
RMU ERR	One or more internal parameters were measured and found to be outside their self-test limit.	1. Check that CDH is not in EMERG Mode. 2. On main tuning page, perform tuning test on all radios by setting frequency and determining that radio is operating.	If tuning test fails, the RMU is not fully operable.
PRI BUS	Full RMU communications with all COMs, NAVs, and cross-side RMU cannot be established on the primary bus.	1. Check that all radio circuit breakers are on. 2. Check RMU ON/OFF Page for all functions ON. 3. Check that CDH is not in EMERG Mode. 4. If 1 or 2 (or 3 if installed) are sources, correct and turn RMU power off for 10 seconds. Reapply power to start new POST. 5. If error persists, perform on-side and cross-side tuning off all radios and activate auxiliary tuning sources to determine which functions are still available.	Any of these messages indicate that system redundancy has been reduced.
SEC BUS	Full RMU communications with the on-side COM and NAV cannot be established using the secondary bus.		
NAV UNIT/ COM UNIT	The NAV units and/or COM units cannot fully communicate with both RMUs over primary bus and/or the on-side RMU over secondary bus.		

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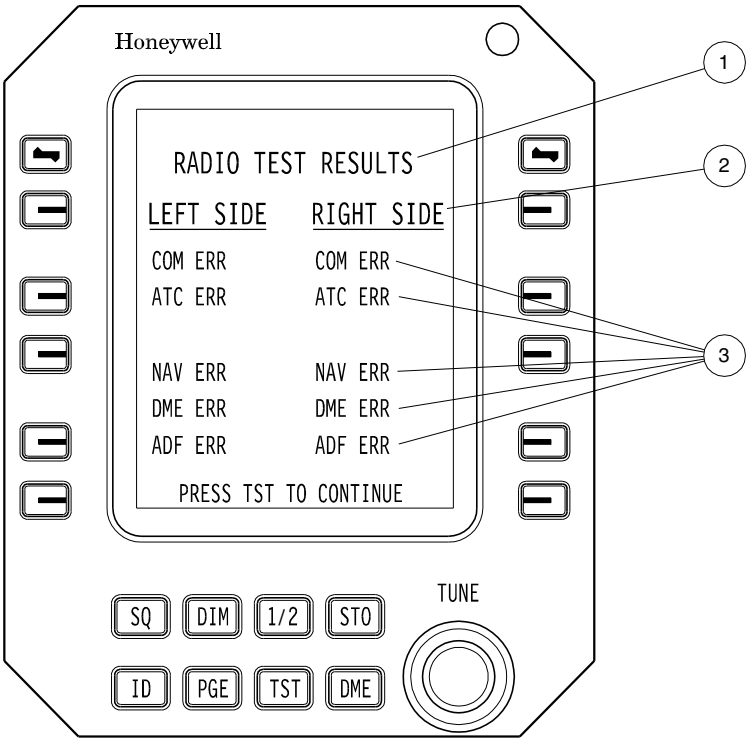

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RMU MAINTENANCE PAGE (POWER ON SELF TEST)

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MAINTENANCE PAGE (PILOT-ACTIVATED SELF TEST)

1 - SYSTEM TEST IDENTIFICATION

- Indicates which unit is being tested.
- Color: amber.

2 - TEST RESULT INDICATION

- Indicates whether the tested system is operating normally or not.
- Colors:
  - Green for successful tests.
  - Red for unsuccessful tests.

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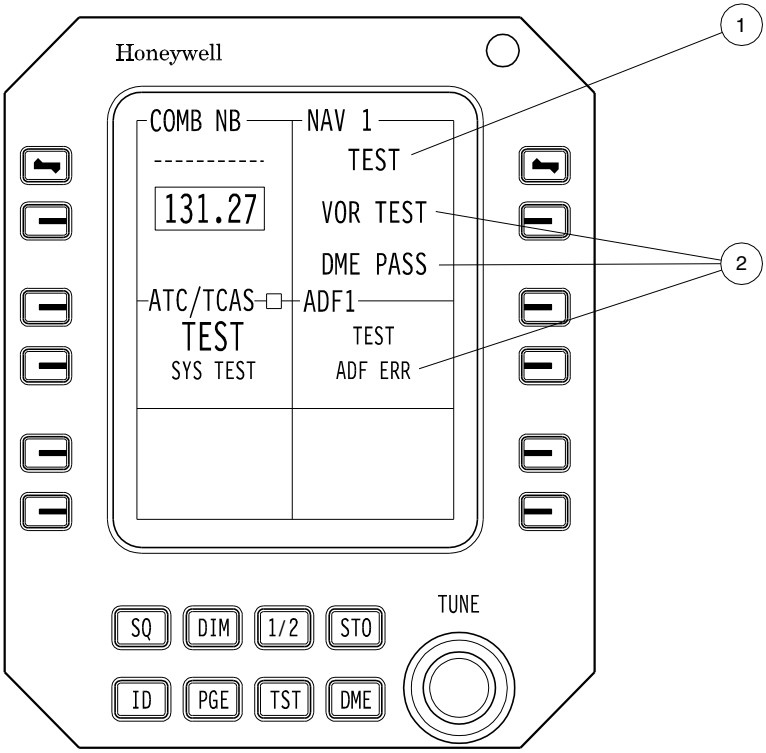

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RMU MAINTENANCE PAGE (PILOT-ACTIVATED SELF TEST)

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TUNING BACKUP CONTROL HEAD

The Tuning Backup Control Head is a unit that provides an alternative means of tuning the NAV 2 and COM 2.

The TBCH is energized only when the AVIONICS MASTER is switched ON, and in normal operation it displays the RMU 2 NAV and COM active frequencies (NAV 2 and COM 2).

NORMAL MODE

In the Normal Mode, the TBCH displays the RMU 2 NAV and COM active frequencies. Each time these frequencies are tuned via RMU, the TBCH display is updated automatically. The same occurs when these frequencies are tuned via TBCH, the RMU 2 NAV and COM active frequencies being also updated automatically.

It is also possible to tune the RMU 1 NAV and COM active frequencies using the RMU cross-side operational mode (see 2-18-11).

EMERGENCY MODE

When the TBCH is set to the Emergency Mode, the Radio Management System will accept only the NAV and COM tuning via TBCH, ignoring the RMUs control.

The RMUs will recover their capability of tuning the radio frequencies only when the TBCH is set to the Normal Mode again.

SELF TEST

After power up, the Tuning Backup Control Head performs a self-test. This test consists of saving the frequencies that the COM and NAV units are tuned to as indicated by the Radio System Bus (RSB), and then changing the frequency outputs to the COM and NAV and verifying that they have changed on the RSB. Failures are announced in the display line associated with the function as an error message followed by an error code “ERXX”, with the “XX” showing a two-digit error code.
This test is performed only on the ground, when the unit is turned on.

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TBCH CONTROLS AND INDICATORS

1 - SYSTEM INSTALLATION ANNUNCIATION

– Indicates to which Radio System the Tuning Backup Control Head is connected.

2 - TUNING CURSOR

– Indicates which frequency may be changed by the Tuning Knobs.

3 - NAV AUDIO ON ANNUNCIATION

– Indicates that the NAV audio is selected on.

4 - EMERGENCY MODE ANNUNCIATION

– Indicates when the unit has been selected to the Emergency Mode, which inhibits RMU tuning capability.

NOTE: This annunciation is not related to the emergency COM frequency of 121.5 MHz.

5 - SQUELCH ANNUNCIATION

– Indicates that the squelch is opened by the SQ Switch.

6 - TRANSMIT ANNUNCIATION

– Indicates that the COM transmitter is ON.

7 - NAV AUDIO BUTTON

– Toggles NAV audio on and off.

8 - SQUELCH BUTTON

– Toggles the COM squelch on and off.

9 - TUNING KNOBS

– Change the frequency indicated by the tuning cursor.

– Inner knob changes the frequency decimal digits in steps of 0.025 MHz for VHF and 0.050 MHz for VOR/LOC.

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It also changes the frequencies in the VHF sub-band that contains the 8.33 kHz spaced channels according to appropriate selection on the RMU. These frequencies are identified in voice communications by the channel names as exemplified below:

Frequency (MHz)	Spacing	Channel Name
132,0000	**25**	**132,000**
132,0000	8.33	132,005
132,0083	8.33	132,010
132,0166	8.33	132,015
132,0250	**25**	**132,025**
132,0250	8.33	132,030
132,0333	8.33	132,035
132,0416	8.33	132,040
132,0500	**25**	**132,050**
132,0...	8....	132,...

- Outer knob changes the frequency non-decimal digits in steps of 1 MHz for both VHF and VOR/LOC.

10 - NORMAL/EMERGENCY MODE SELECTOR BUTTON

- When knob rotated clockwise selects normal Mode.
- When knob rotated counterclockwise selects Emergency Mode.
- EMRG button toggles the Emergency mode on and off.

11 - TRANSFER BUTTON

- Alternately selects between the COM frequency (top) or the NAV frequency (bottom) to be connected to the Tuning Knobs.
- In the NAV only or COM only configurations, toggles the active (top) frequency with the preset (bottom) frequency. In addition, holding the button down for two seconds will remove the preset frequency and place the unit in the Direct Tuning Mode. To return to the Active/Preset Tuning Mode, hold down the transfer key for two seconds.

12 - RADIO TUNING ANNUNCIATION

- Identifies the frequency at the top and bottom lines.

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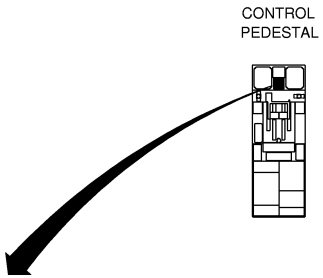

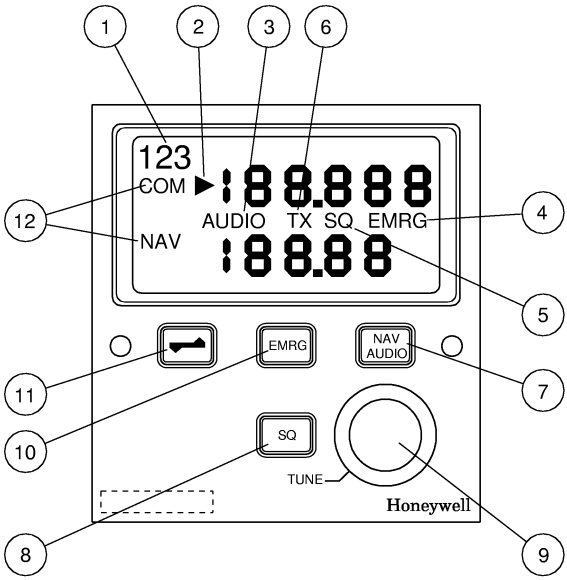

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TUNING BACKUP CONTROL HEAD

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DIGITAL AUDIO PANEL

The EMB-135BJ is equipped with three individual Digital Audio Panels (DAP), one for each pilot and another for the observer.

This unit allows each flight crew member to select an individual transceiver, the intercommunication function further permitting individual selection and audio level adjustment of the following communications equipment:

– VHF communication.
– Crew/ramp station intercommunication.
– Passenger address.
– Reception and amplification of the NAV/COM audio signals.

NORMAL MODE

In the normal mode, each flight crew member may select one COM transceiver (VHF COM 1, VHF COM 2, VHF COM 3 or HF), the interphone function and, simultaneously, several audio receivers (COM 1, 2 and 3, HF, NAV 1 and 2, ADF 1 and 2, and DME 1 and 2).

Also, the unit may provide volume control for each radio equipment, microphone selection between Boom and Mask (Oxygen Masks), and audio output selection between Speakers and Headphones.

Other features are the capability to filter the NDB/VOR audio signals, attenuating morse code or voice signals. Finally, Normal Mode allows marker beacon audio sensitivity control, which also may silence temporarily that type of signal.

EMERGENCY MODE

The emergency mode must be selected in case of Digital Audio Panel power loss. In this case the captain will be directly connected to the COM 1 and NAV 1 and the copilot to the COM 2 and NAV 2.

The interphone function will also be lost.

If power is recovered the Digital Audio Panel may be returned to the normal mode of operation by selecting another MICROPHONE button (COM 1, 2, 3 or HF).

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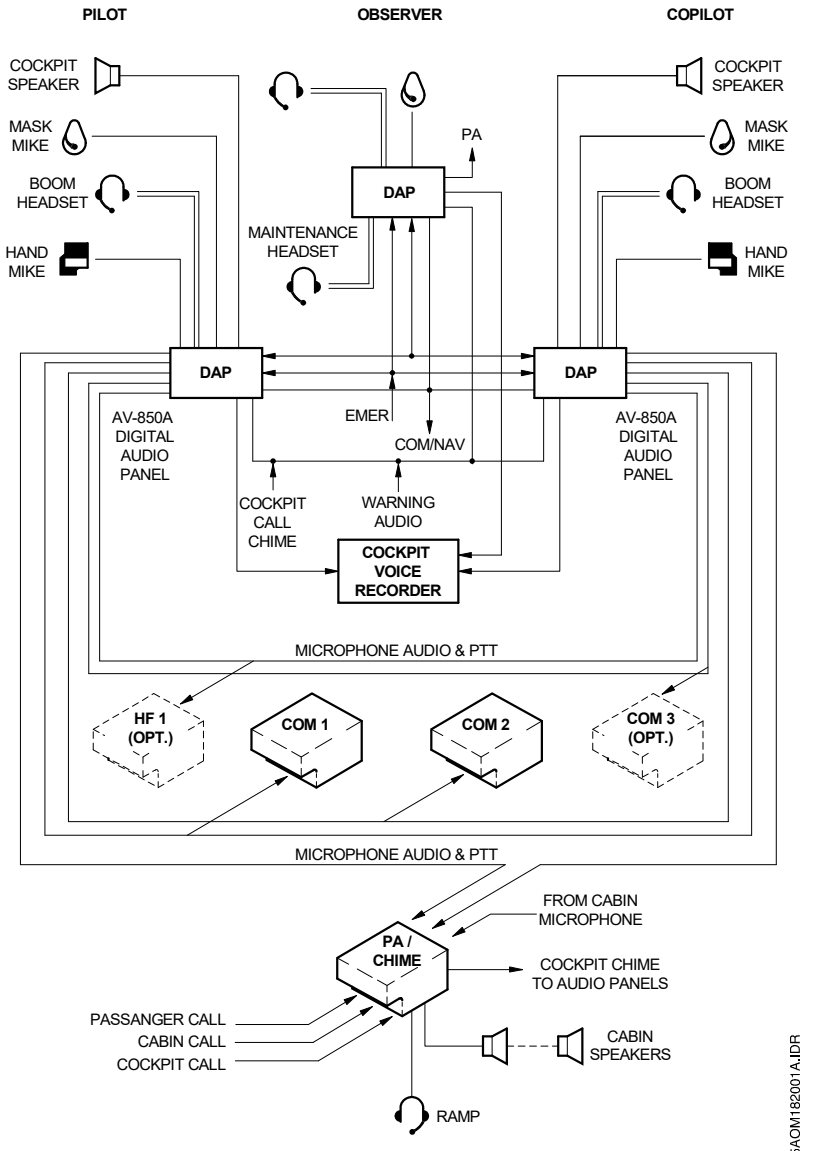

COMMUNICATION SYSTEM SCHEMATIC

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DIGITAL AUDIO PANEL CONTROLS AND INDICATORS

1 – MICROPHONE SELECTOR BUTTONS

- When pressed enables transmission and reception of radio signals through the respective COM unit:
  - COM 1 - Selects VHF 1.
  - COM 2 - Selects VHF 2.
  - COM 3 - Selects VHF 3.
  - HF - Selects HF.
- Simultaneous selection of more than one microphone selector button is not possible. Pressing a different microphone selector button will cause the previously selected button to be deselected.
- A bar illuminates inside the button to indicate that it is pressed.

2 – AUXILIAR BUTTON

- When depressed enables pilot's communication through the SATCOM (if installed).

3 – PASSENGER BUTTON

- When pressed enables the crew to make the speech to the passenger cabin while simultaneously deselecting the previously selected COM transmitter.

4 – EMERGENCY BUTTON

- In case of power loss to the Digital Audio Panel, connects microphone directly to the emergency COM mic outputs and headphone unit to COM and NAV audio.
- The captain is connected to COM 1 and NAV 1 and the copilot to COM 2 and NAV 2. Observer radio communications capability is lost.

5 – BOOM/MASK BUTTON

- Alternates selection between the boom (pressed) and the mask (released) microphones.

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- ID/VOICE BUTTON
- When pressed (ID position), NDB and VOR audio signals are filtered in order to enhance morse code identification.
- When depressed (VOICE position), VOR/ILS audio signals are filtered in order to reduce morse code signal, enhancing the VOR/ILS voice associated messages (e.g., ATIS messages).

6 – HEADPHONE MASTER VOLUME CONTROL KNOB

- Allows adjustment of headphone amplifier volume.

7 – INTERPHONE SELECTOR KNOB

- When depressed, enables communications between captain, copilot, observer, and ramp station via airplane interphone.
- When rotated, provides interphone volume control.

NOTE: To enable the interphone function the respective control wheel and observer communications switch must also be set at the HOT position.

8 – MARKER BEACON SENSITIVITY/MUTE KNOB

- The mute function is enabled by pressing the marker beacon sensitivity/mute knob and it is used to temporarily silence the marker beacon audio signal. The audio signal will be automatically re-enabled according the following schedule:
  - If the mute function was selected when the marker beacon audio level was above a certain threshold setting, the audio will be re-enabled 5 seconds after the audio level descends below that threshold setting.
  - If the mute function was selected when the marker beacon audio level was below that threshold setting, the audio signal will be mute during 20 seconds, and then it will be re-enabled.
- The marker beacon sensitivity/mute knob, when rotated, also controls the sensitivity of the Marker Beacon receiver.

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9 – MARKER BEACON VOLUME KNOB

- When rotated, allows to control the marker beacon audio volume.

NOTE: Does not allow volume settings below a certain level in order to prevent the marker beacon audio from being adjusted too low to be heard, that the marker signal could be missed.

10 – SIDETONE KNOB

- This knob selects the speaker ON (depressed) or OFF (pressed). It must be pressed when the headphones are used.
- The sidetone control is made by rotating the sidetone knob, which prevents undesirable feedback of speaker sidetone audio into the transmitting microphone.

11 – SPEAKER MASTER VOLUME CONTROL KNOB

- When rotated, allows adjustment of speaker volume.

12 – AUDIO CONTROL KNOBS

- When depressed, turns on the associated COM/NAV audio.
- When rotated, provides volume control for the associated COM/NAV audio.

NOTE: The COM 3 can be used for data transmission. When it is not being used for voice transmissions, the COM 3 Audio Control Knob should remain pressed on all audio panels.

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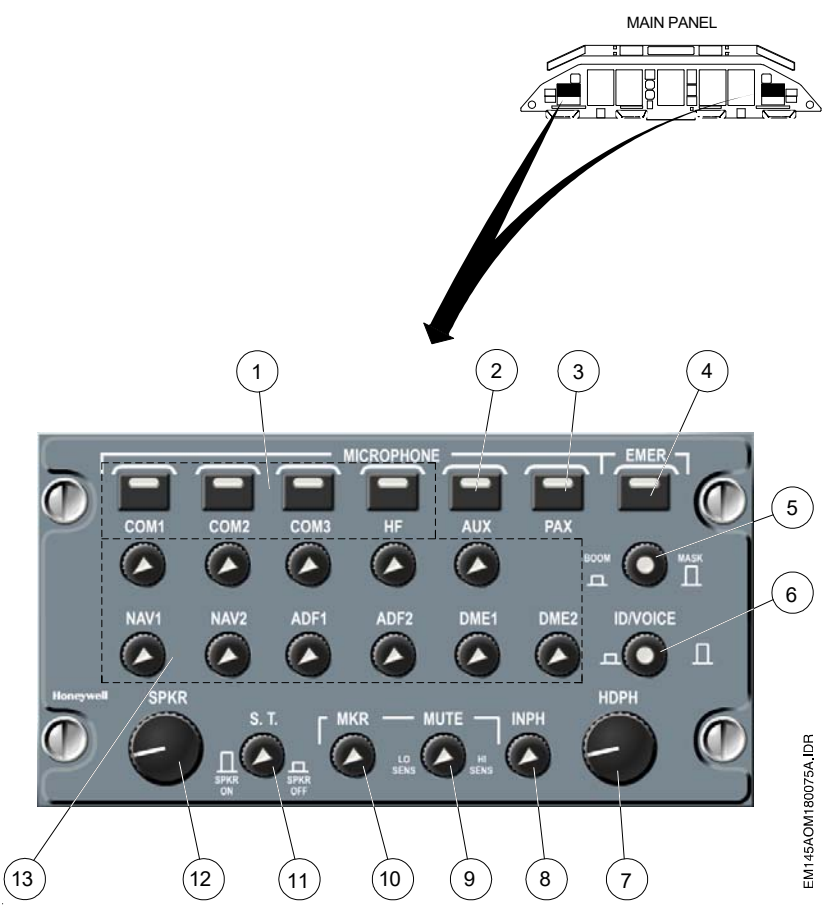

DIGITAL AUDIO PANEL

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COMMUNICATION CONTROLS AND INDICATORS

COCKPIT

CONTROL WHEEL COMMUNICATIONS SWITCH (PTT)

1 - CONTROL WHEEL COMMUNICATIONS SWITCH

PTT POSITION - Momentary position. When pressed allows VHF and HF transmissions and speech to the passengers through Passenger Address System. Releasing this button, it returns to the HOT position and VHF, HF or passenger cabin transmissions will be interrupted.

NOTE: For VHF transmissions, a continuous command of PTT switch is limited to 2 minutes. If the PTT switch is pressed longer than 2 minutes, the message MIC STK will be displayed on RMU, and the microphone will be disabled.

HOT POSITION - Allows communication between crew members and between crew members and ramp station.

OFF POSITION - Allows only audio reception.

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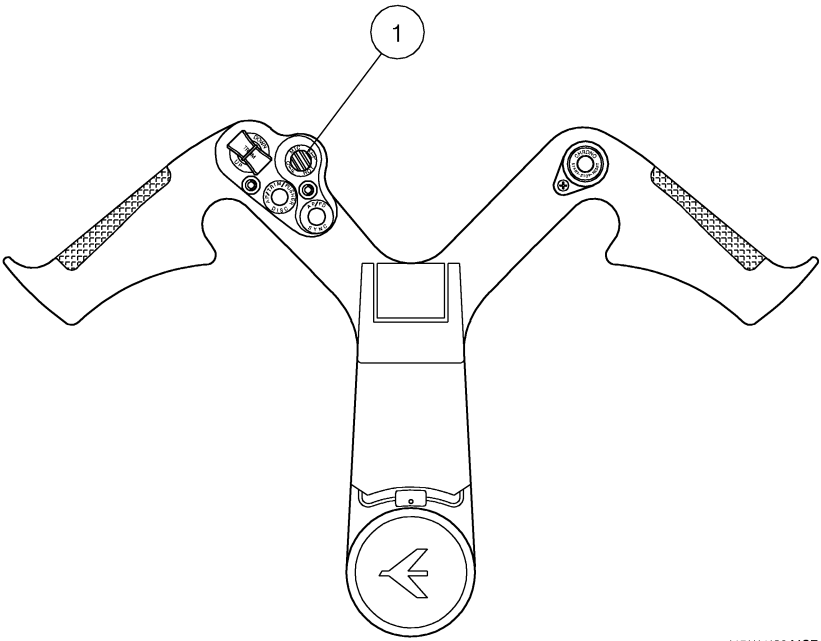

CONTROL WHEEL

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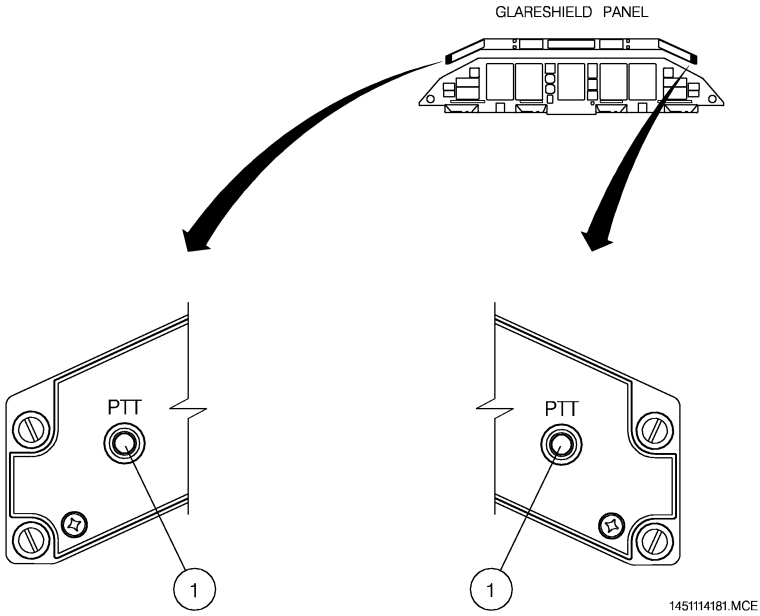
GLARESHIELD COMMUNICATION SWITCH (PTT)

1 - GLARESHIELD MIC PTT BUTTON

– When pressed allows VHF and HF transmission and speech to passengers through the Passenger Address System. Releasing this button will interrupt transmission.



GLARESHIELD PANEL

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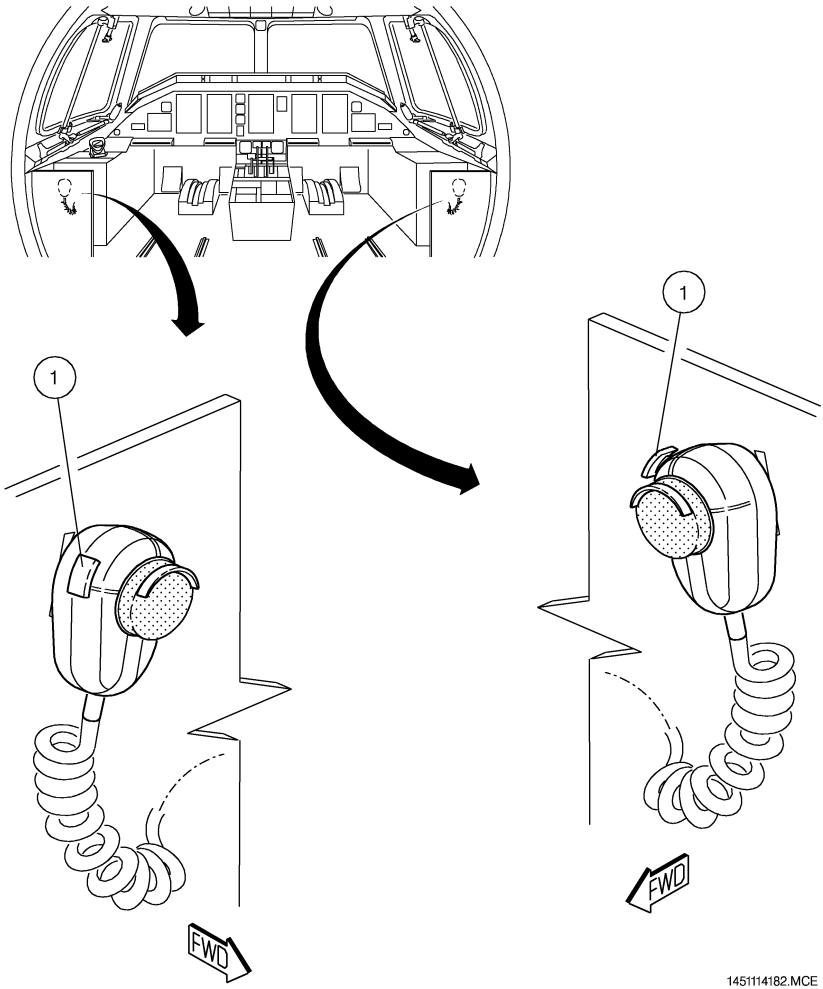
CAPTAIN AND COPILOT HAND MICROPHONE

1 - HAND MIC PTT BUTTON

– When pressed allows VHF and HF transmission and speech to passengers through the Passenger Address System. Releasing this button will interrupt transmission.

PILOT AND COPILOT CONSOLES



PILOT AND COPILOT CONSOLE

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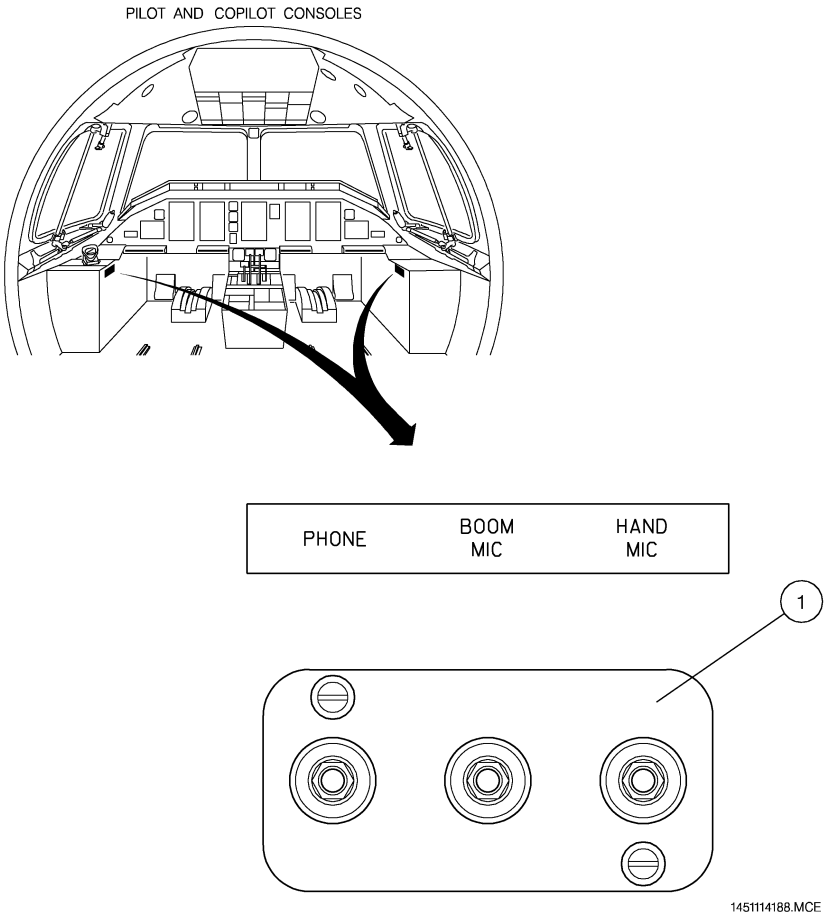
CAPTAIN AND COPILOT JACK PANELS

1 - CAPTAIN AND COPILOT JACKS

– Allows to plug in headphone, boom microphone, and hand microphone.



PILOT AND COPILOT JACK PANELS

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OBSERVER JACK PANEL AND COMMUNICATION SWITCH (PTT)

1 - BOOM JACK

– Allows to plug in the boom microphone.

2 - HEADPHONE JACK

– Allows to plug in the headphone.

3 - OBSERVER MICROPHONE SWITCH

HOT POSITION - Allows communication with crew members and ramp station.

OFF POSITION - Allows only audio reception.

PTT POSITION - Momentary position. When pressed allows VHF and HF transmissions and speech to passengers through the Passenger Address System. Releasing this button, it returns to the OFF position and transmissions will be interrupted, remaining only in audio reception.

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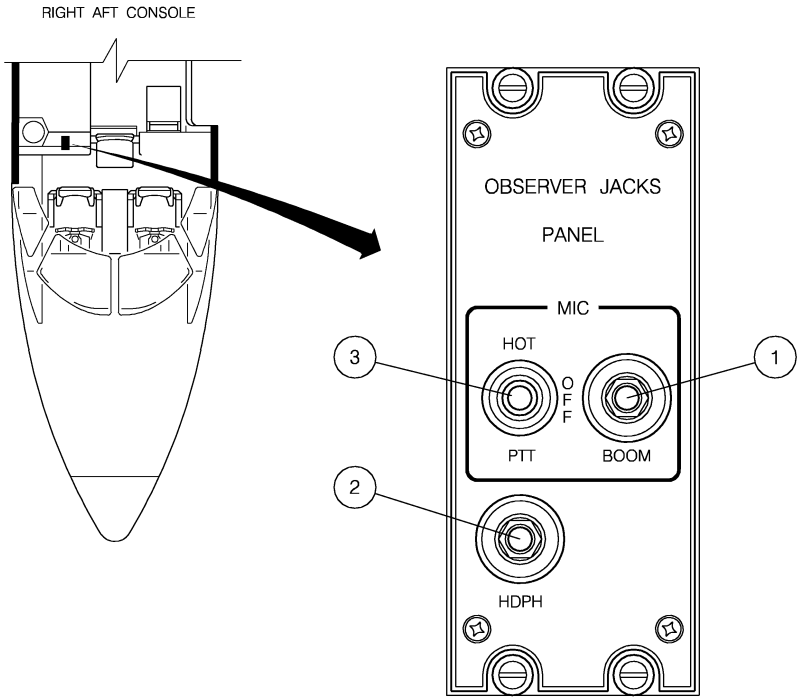

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OBSERVER JACK PANEL

RAMP STATION

FRONT AND REAR RAMP PANELS

1 - COCKPIT CALL BUTTON (momentary action)

- When pressed, generates a tone in the headphones and cockpit speakers.

2 - MICROPHONE/HEADPHONE JACK

- Allows ramp crew to plug in a headphone and a microphone equipped with a PTT Button.

NOTE: Ground crew panel is linked to the Hot Mic.

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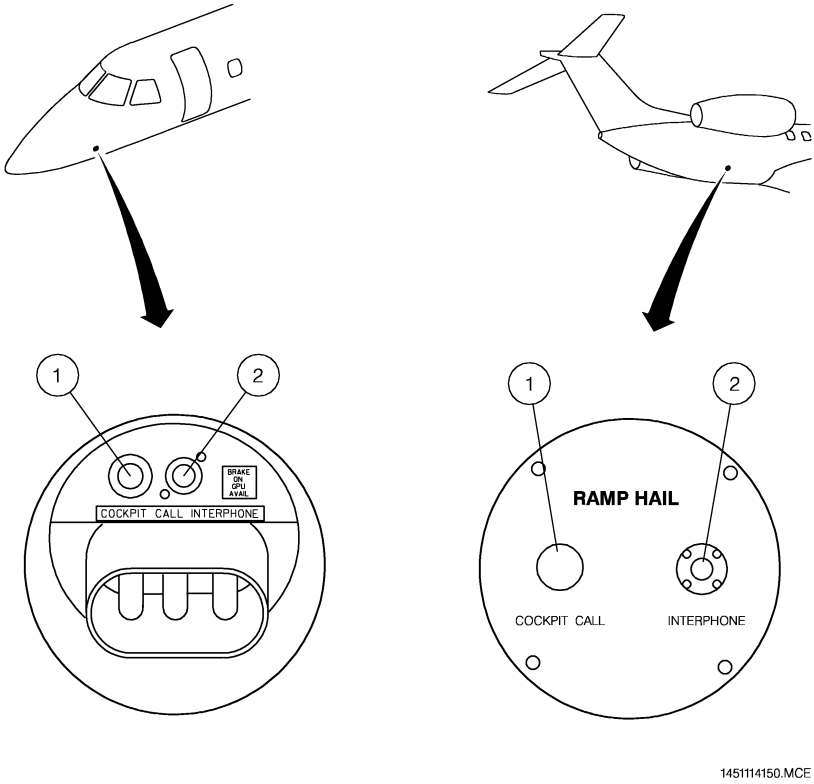

FRONT AND REAR RAMP PANELS

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HF COMMUNICATION SYSTEM

The airplane may be equipped with a KHF-950 or KHF-1050 High-Frequency Communication System. All functions of the KHF-950 System are controlled by the KCU-951 or KFS-594 Control Panel located at the control pedestal. For airplanes equipped with KHF-1050, refer to section 2-18-11.

HF OPERATING MODES

The KHF-950 High-Frequency Communications System provides the following operating modes:

AMPLITUDE MODULATION

Amplitude modulation (AM) is a transmission process in which a selected frequency (called carrier frequency) and two side-bands (frequencies above and below the carrier) are generated and transmitted. The upper side-band (USB) is the sum of the carrier frequency and the voice, while the lower side-band (LSB) is the difference between the two. The disadvantages of AM are that it occupies a wide spectrum and is inefficient in the sense that a great deal of unneeded carrier is generated, as well as redundant information in the unused side-band.

SINGLE SIDEBAND

Single side-band operation achieves the same function as AM with considerably greater efficiency. The SSB transmitter electronically eliminates most or all of the carrier wave and one of the side-bands. The major advantages of SSB (either USB or LSB) as opposed to AM are greater talking power (about eight times that of AM for a given power input), reduced power drain, longer range and conservation of the spectrum (since only one side-band is required to transmit the message).

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SUPPRESSED CARRIER AND REDUCED CARRIER (OPTIONAL)

The SSB operation with the carrier frequency eliminated is referred to as single side-band suppressed carrier and is designated as the A3J mode in the KHF-950.
If a small portion of the carrier frequency is transmitted along with the side-band, then the operation is referred to as single side-band reduced carrier, and is designated as the A3A mode in the KHF-950.

SIMPLEX, SEMI-DUPLEX AND RECEIVE-ONLY OPERATION

Simplex operation means that the transmission and reception frequencies are the same. An example of simplex operation would be communications with a control tower using a VHF COMM transceiver. Semi-duplex means transmit on one frequency and reception on another frequency.
Receive-only operation allows the system to operate as a receptor only.
The 99 user programmed channels can be programmed for either simplex, semi-duplex or receive only operation, and can operate in any of the available modes (AM, USB or LSB).

NOTE: The use of LSB is legal for some international and off-shore communications, but is not authorized for use in the United States and most European countries.

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HF NORMAL OPERATION KCU-951 CONTROL UNIT

There are two types of operation:

- Discrete frequency tuning.
- Programmable channel.

DISCRETE FREQUENCY TUNING OPERATION

In the discrete frequency mode of operation, the user may directly tune any one of 280,000 frequencies over the range of 2.0 to 29.9999 MHz.

1 - Access discrete frequency operation.

Apply power to the system by rotating the volume (V) knob clockwise from the OFF position. Wait for about two minutes, until the system has warmed up. Until then, no frequency is displayed. Make sure that the FREQ/CHAN button is depressed, in the FREQ position. Confirm this by seeing that no channel number is annunciated in the frequency display. If the button is pressed, a momentary press unlatches it and engages FREQ (direct tune) operation.

2 - Select the transmission mode.

Press the mode button to select the transmission mode (USB, LSB or AM).

3 - Enter the frequency.

Each digit in a frequency is selected individually. The large concentric knob on the lower right of the control unit may be rotated in either direction and causes one of the displayed frequency digits to flash. This flashing “cursor” indicates which frequency digit will be changed by rotating the smaller concentric knob. Rotate the larger knob until the digit you wish to change flashes, and then select the desired number into view by rotating the smaller knob.

4 - Tune the antenna.

Momentarily key the PTT to initiate the antenna coupler tuning cycle. During the tuning process the TX annunciator will flash and the frequency numbers will blank. When the TX stops flashing and the frequency reappears, the antenna tuning cycle is complete and you are ready to transmit on the selected frequency.

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NOTE: - The discrete frequency mode always provides simplex operation (transmit and receive frequencies are the same).

- Always key the PTT after selecting a new frequency to initiate antenna tuning, otherwise you may experience poor reception or miss an important call.

PROGRAMMABLE CHANNEL OPERATION

In the channel mode operation, the user may select user programmed channels by their channel numbers. For user programmed channels:

1 - Access channelized operation.

Apply power to system (rotate the VOLUME knob from the OFF position). Wait for about two minutes, until the system has warmed up. Until then, no frequency is displayed. Make sure that the FREQ/CHAN button is pressed, in the CHAN position.

2 - Select the channel.

Rotate the small inner concentric knob to select the desired channel number.

3 - Tune the antenna.

Momentarily key the PTT to initiate antenna coupler tuning cycle. Adjust volume and squelch controls, as desired.

THE 99 USER CHANNELS PROGRAMMING PROCEDURE

The 99 user programmable channels available in the KHF-950 system can be programmed on the ground or in flight. All programmed information is stored in a nonvolatile memory and can be recalled by selecting the desired user channel number.

There are three types of channels that can be programmed:

1 - Semi-duplex

The user programs two different frequencies, one for receive and one for transmit. The user also assigns one of the available operating modes (USB, LSB or AM) to the selected channel. Semi-duplex operation is available only when the KHF-950 is being operated in the CHAN mode.

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2 - Simplex

The user programs the same frequency for receive and for transmit. The user also assigns one of the available operating modes (USB, LSB or AM) to the selected channel. Simplex operation is used by ARINC, ATC (Air Traffic Control), and others.

3 - Receive-only

The user programs a frequency for reception and assigns one of the available operating modes (USB, LSB or AM), but leaves the transmit portion of the preset channel blank.
The transmitter and power amplifier are locked out and cannot be used when a channel has been programmed for receive-only operation.
Receive-only channels are used to listen to frequency standards (WWV) for example, time, weather, Omega status, and geophysical alert broadcasts.

SEMI-DUPLEX CHANNEL PROGRAMMING PROCEDURE

1 - Access channelized and program mode.

Apply power to the system by rotating the VOLUME (V) knob clockwise from the OFF position. Make sure that the FREQ/CHAN button is pressed, in the CHAN position. Activate the program mode by pressing the PGM switch with a pointed object.

2 - Select the desired user channel.

Rotate the inner concentric knob to select the channel number to be programmed.

3 - Select emission mode.

Use the MODE button to select emission mode (USB, LSB or AM). Press the MODE button until the desired mode appears.

4 - Enter the receive frequency.

Use the outer larger concentric knob to position the flashing “cursor” on each digit of the receive frequency and use the smaller inner knob to select the desired number in each position.

5 - Store the receive frequency and mode of operation.

Push the STO button once and the receive frequency is entered in the electronic memory. The TX annunciator will begin to flash in the display window indicating the receive frequency is stored and you are ready to program the transmit frequency.

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6 - Enter and store the transmit frequency.

Use the outer larger concentric knob to position the flashing “cursor” on each digit of the transmit frequency and use the smaller inner knob to select the desired number in each position.

7 - Store the transmit frequency.

Push the STO button again and the transmit frequency is now stored. If additional user channels are to be programmed, repeat steps 2 through 7 at this time.

8 - Exit the program mode.

Press the PGM switched with pointed object.

9 - Tune the antenna.

Momentarily key the PTT to initiate the antenna coupler tuning cycle. Adjust the volume (V) and squelch (S) controls, as desired.

SIMPLEX CHANNEL PROGRAMMING PROCEDURE

When you program a channel for simplex operation, both the receive and the transmit frequencies will be the same. Programming a simplex channel is similar to programming a semi-duplex channel, except the STO button is pressed twice after the receive frequency and mode of operation are entered to store the frequency in both the receive and the transmit positions.

RECEIVE-ONLY CHANNEL PROGRAMMING PROCEDURE

1 - Access channelized and program mode.

Apply power to the system by rotating the VOLUME (V) knob clockwise from the OFF position. Make sure that the FREQ/CHAN button is pressed, in the CHAN position. Activate the program mode by pressing the PGM switch with a pointed object.

2 - Stow the cursor.

Stow the “cursor” if a frequency digit is flashing. The cursor is stowed by rotating the larger concentric knob until no frequency digit is flashing. With the cursor stowed in the program mode, the smaller inner knob is now used to select a channel number to be programmed.

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3 - Select channel number.

Use the smaller inner concentric knob to select the channel number you wish to program. Simply rotate the smaller knob until the desired channel appears on the right side of the display.

4 - Select operating mode.

Push the MODE button until the appropriate mode (USB, LSB or AM) appears in the lower part of the display window.

5 - Set the frequency.

Move the “cursor” into position by rotating the larger concentric knob, and then use the smaller concentric knob to set the desired number under each “cursor” position.

6 - Store the information.

Push the STO (store) switch with a pointed object. The information you have entered will be stored in the electronic memory. After you push the STO button, the TX annunciator will flash indicating that the frequency you have just entered is stored in the receive position, but nothing is entered in transmit. Since a receive-only is being set, ignore the flashing TX.

7 - Exit the program mode.

Press the PGM switched with pointed object. All information you have stored is locked into CHANNEL memory.

FAULT INDICATION

If the system detects a fault during transmission or during the tuning of the antenna coupler, the frequency digits on the display begin to flash. Simply key the PTT button and the automatic antenna coupler begins a new tuning cycle to clear the fault.

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HF CONTROLS AND INDICATORS

KCU-951 CONTROL PANEL

1 - FREQUENCY DISPLAY

– Displays the operation frequency, in either FREQ or CHAN mode.

2 - MODE DISPLAY

– Displays emission mode, transmit indicator and program mode indication.

3 - CHANNEL DISPLAY

– Displays the set channel. If in FREQ mode, the channel display will not show numbers.

4 - PHOTOCELL

– Automatically adjusts the display brightness.

5 - MODE SWITCH

– Selects transmission and reception mode. Momentary depression cycles the KHF-950 from upper sideband (USB) to lower sideband (LSB) to AM.

6 - FREQ/CHAN SWITCH

– Allows the user to select between the two methods of frequency selection. In the FREQ mode (depressed switch) the user may direct tune any of the 280,000 available frequencies, simplex operation only. In the CHAN mode (pressed switch), the user presets the transmit and receive frequencies in up to 99 available channels.

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7 - PROGRAM SWITCH

– Used on the 99 user-programmed channels programming.

8 - LARGER CONCENTRIC KNOB

– Moves the “cursor” which selects the digit of the frequency to be changed.

9 - SMALLER CONCENTRIC KNOB

– Increments or decrements the frequency digit under the “cursor” (flashing digit).

10 - STORE SWITCH

– Used to store data when programming the user programmable channels.

11 - POWER AND VOLUME KNOB

– Turns the system on and off and controls volume. Clockwise rotation past the first click turns the system on. Further rotation increases audio level. After turning on, the system takes about two minutes to warm up. Until then, no frequencies are displayed.

12 - SQUELCH KNOB

– Reduces background noises when rotated counterclockwise. Must be set by rotating the knob clockwise until background noise can be heard and then turning it counterclockwise until background noise is eliminated or barely audible.

13 - CLARIFIER KNOB

– Clarifier is used only in SSB communications, and is not applicable to AM mode;
– It must be used when due to off frequency ground station transmissions the audio voice quality from KHF-950 may sound unnatural;

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– To operate the clarifier, pull the knob out and rotate the knob in either direction until the audio quality is optimized. When the knob is pushed in, the clarifier has no effect. When voice quality is good and natural, the clarifier knob should remain pushed in.

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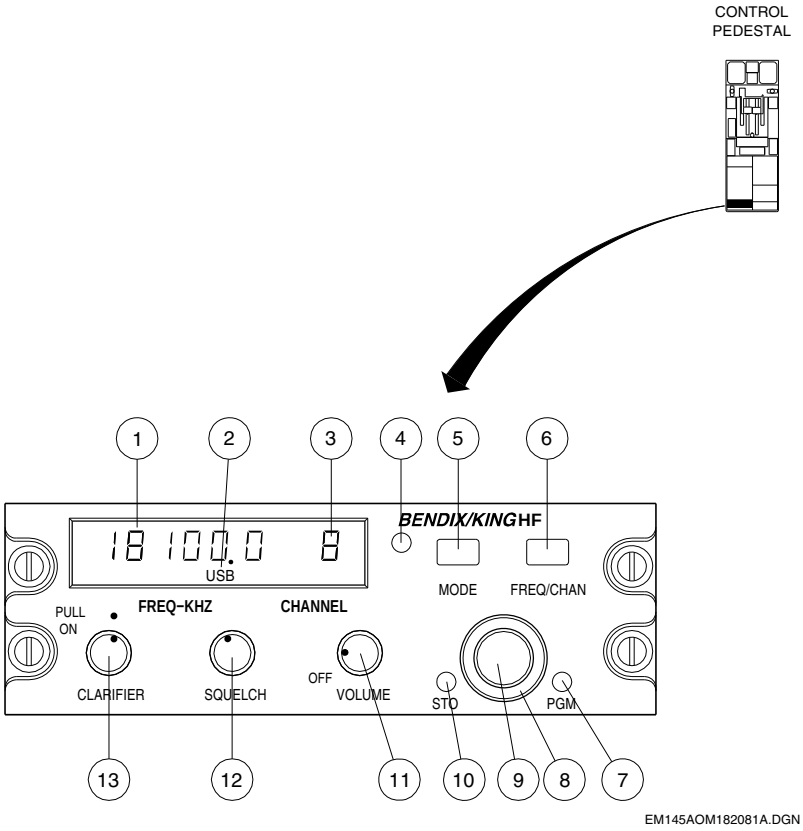

KCU-951 CONTROL PANEL

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HF NORMAL OPERATION KFS-594 CONTROL UNIT

There are two types of operation:

- Discrete frequency tuning.

- Programmable channel.

DISCRETE FREQUENCY TUNING OPERATION

In the discrete frequency mode of operation, the user may directly tune any one of 280,000 frequencies over the range of 2.0 to 29.9999 MHz.

1 - Access discrete frequency operation.

Apply power to the system by rotating the volume knob clockwise from the OFF position. Wait for about two minutes, until the system has warmed up. Until then, no frequency is displayed. Make sure that the EMMISSION MODE switch is in LSB, USB or AM position. The last frequency or the last channel used is displayed. In order to change the last used channel into a discrete frequency, check first to see that the display is showing a flashing zero in the channel position or is blank in that position. If a channel number other than zero is displayed, it will be necessary to move the “cursor” by depressing the Frequency/Channel control knob. A digit on the display will begin to flash. This flashing “cursor” indicates which digit in the display will be changed by twisting the Frequency/Channel control knob. Each additional time you depress the knob the “cursor” will move one digit. Move the “cursor” until it is on the channel number. Rotate the Frequency/Channel control knob until the channel number is set to zero.

2 - Select the transmission mode.

Select the EMMISION MODE switch to the transmission mode (USB, LSB or AM).

3 - Enter the frequency.

Press the Frequency/Channel control knob to cycle the “cursor” until the first digit in the frequency to be changed is flashing. (notice that the channel number has changed from “0” to blank.) Rotate this knob until have selected the desired number. Using the Frequency/Channel control knob in this same manner, change all the digits necessary to display the desired frequency.

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NOTE: The first one or two digits (MHz) of the frequency are displayed in the upper right of the display while the last four digits (kHz) of the frequency are displayed at the bottom of the display. To stow the “cursor”, depress the Frequency/Channel control knob repeatedly until no digit on the display is left flashing, or key the PTT momentarily.

4 - Tune the antenna.

Momentarily key the PTT to initiate the antenna coupler tuning cycle. During the tuning process the TX annunciator will flash and the frequency numbers will blank. When the TX stops flashing and the frequency reappears, the antenna tuning cycle is complete and you are ready to transmit on the selected frequency.

NOTE: - The discrete frequency mode always provides simplex operation (transmit and receive frequencies are the same).

- Always key the PTT after selecting a new frequency to initiate antenna tuning, otherwise you may experience poor reception or miss an important call.

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PROGRAMMABLE CHANNEL OPERATION

In the channel mode operation, the user may select user programmed channels by their channel numbers. For user programmed channels:

1 - Access channelized operation.

Apply power to the system by rotating the volume knob clockwise from the OFF position). Wait for about two minutes, until the system has warmed up. Until then, no frequency is displayed. Make sure that the mode selector knob is in the desired position (USB, LSB or AM) and that a channel number is showing in the display. If one is not showing (discrete frequency tuning operation), or if you wish to change the channel, move the “cursor” by pressing the Frequency/Channel control knob until the channel number is flashing.

2 - Select the channel.

Change the channel number by rotating the Frequency/Channel control knob until the desired channel number appears. The previously programmed receive frequency associated with that channel will appear in the display.

3 - Tune the antenna.

Momentarily key the PTT to initiate antenna coupler tuning cycle. Adjust volume and squelch controls, as desired.

THE 19 USER CHANNELS PROGRAMMING PROCEDURE

The 19 user programmable channels available with the KFS 594 Control Display Unit can be easily programmed by the pilot on the ground or in flight. Each of the 19 channels can be assigned a separate frequency or frequencies (semi-duplex operation). The operating mode (USB, LSB or AM) of the stored channel is determined by the position of the EMMISION MODE selector knob at the time the pilot is using the channel.

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There are two types of channels that can be programmed:

1 - Simplex
The user programs the same frequency in receive and transmit.

2 - Semi-duplex
The pilot programs two different frequencies, one for receive and one for transmit.

All programmed information is stored in a nonvolatile memory and can be recalled by selecting the desired user channel number.

SIMPLEX CHANNEL PROGRAMMING PROCEDURE

1 - Change the first frequency digit to enter the program mode.

Pushing the Frequency/Channel control knob move the “cursor” to the first digit in the frequency to be changed. Twist the Frequency/Channel control knob until the desired number has been selected for this frequency digit. As the knob is twisted, a flashing dash will appear to the right of the channel number to signify that you are in the program mode. You will be unable to receive or transmit on the frequency displayed as long as the dash is flashing to indicate you are in the program mode. It is possible to change the last digit (one tenth kHz) of the frequency without entering the program mode.

2 - Select the rest of the desired frequency.

Use the “cursor” by pressing the Frequency/Channel control knob to address each additional digit you want to change. Once the digit is flashing, again twist the knob to select the desired number.

NOTE: You may exit the program mode at any time and return to the previously stored frequency simply by keying the PPT.

3 - Store the frequency in the receive portion of memory.

Once the user have selected the desired frequency, press the STO button to enter the displayed frequency in the receive portion of memory. The TX light will begin to flash indicating that memory is ready to receive the transmit frequency.

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4 - Store the same frequency in the transmit portion of memory.

This is a simplex channel. Press the STO button a second time to store the same frequency in the transmit portion of memory. After the STO button is pressed the second time, the “cursor” will stow and the flashing dash will disappear to indicate the KFS 594 is no longer in the program mode. Additional channels can be programmed by continuing to use the “cursor” and Frequency/Channel control knob in this manner.

5 - Tune the antenna.

Key the PTT to tune the antenna. After tuning is completed you are ready to transmit.

SEMI-DUPLEX CHANNEL PROGRAMMING PROCEDURE

1 - Change the first frequency digit to enter the program mode.

Pushing the Frequency/Channel control knob, move the “cursor” to the first digit in the frequency to be changed. Twist the Frequency/Channel control knob until the desired number has been selected for this frequency digit. As the knob is twisted, a flashing dash will appear to the right of the channel number to signify that you are in the program mode. You will be unable to receive or transmit on the frequency displayed as long as the dash is flashing to indicate you are in the program mode. It is possible to change the last digit (one tenth kHz) of the frequency without entering the program mode.

2 - Select the rest of the desired frequency.

Use the “cursor” by pressing the Frequency/Channel control knob to address each additional digit you want to change. Once the digit is flashing, again twist the knob to select the desired number.

NOTE: You may exit the program mode at any time and return to the previously stored frequency simply by keying the PPT.

3 - Store the frequency in the receive portion of memory.

Once the user have selected the desired frequency, press the STO button to enter the displayed frequency in the receive portion of memory. The TX light will begin to flash indicating that memory is ready to receive the transmit frequency.

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4 - Select the desired transmit frequency.

Use the “cursor” and the Frequency/Channel control knob again to select a new transmit frequency.

5 - Store the transmit frequency in memory.

Press the STO button again to store the transmit frequency. After the STO button is pressed the second time the “cursor” will stow and the TX light will go out. The flashing dash will also disappear to indicate the KFS 594 is no longer in the program mode. Additional channels may be programmed by continuing to use the “cursor” and Frequency/Channel control knob in the same manner.

6 - Press the PTT button to tune the antenna.

After tuning is complete you are ready to transmit. Before keying the PTT to talk, you may want to press the STO button momentarily. This will allow you to listen momentarily to the transmit frequency to avoid overriding someone else’s transmissions.

FAULT INDICATION

If the system detects a fault during transmission or during the tuning of the antenna coupler, the frequency digits on the display begin to flash. Simply key the PTT button and the automatic antenna coupler begin a new tuning cycle to clear the fault.

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HF CONTROLS AND INDICATORS

KFS-594 CONTROL PANEL

1 - OFF/VOLUME KNOB (inner concentric)

– Turns system on and adjusts audio volume.

2 - LAST FOUR DIGITS (kHz)

– Operating frequency are displayed in this area with EMISSION MODE switch in LSB, USB or AM position.

3 - READOUT DISPLAY

– All frequencies and present channel numbers are displayed.

4 - USER PROGRAMED CHANNEL NUMBER DISPLAY

– Channel number is displayed in this area when using one of the 19 programmable channels.

5 - DASH

– Indicates unit is in the PROGRAM MODE.

6 - FIRST ONE OR TWO DIGITS (MHz)

– With EMMISSION MODE switch in LSB, USB or AM position, the first one or two digits (MHz) of the operating frequency are displayed.

7 - TRANSMITION INDICATION

– Indicates unit is transmitting.

8 - PHOTOCELL

– Dims display automatically.

9 - STO (store) SWITCH

– Stores frequency in memory when pressed.

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10 - FREQUENCY/CHANNEL CONTROL KNOB (inner concentric)

– Allows the user to perform a variety of channel and frequency changing functions. Depressing switch causes flashing "cursor" to move to the digit that the user desires to change. Appropriate frequency or channel is then selected with rotary action. This switch also serves as the clarifier function to adjust receive frequency and improve speech quality in SSB operating mode.

11 - EMMISION MODE SWITCH

– Selects transmission and reception mode.

12 - SQUELCH KNOB (outer concentric)

– Reduces background noises when rotated counterclockwise. Must be set by rotating the knob clockwise until background noise can be heard and then turning it counterclockwise until background noise is eliminated or barely audible.

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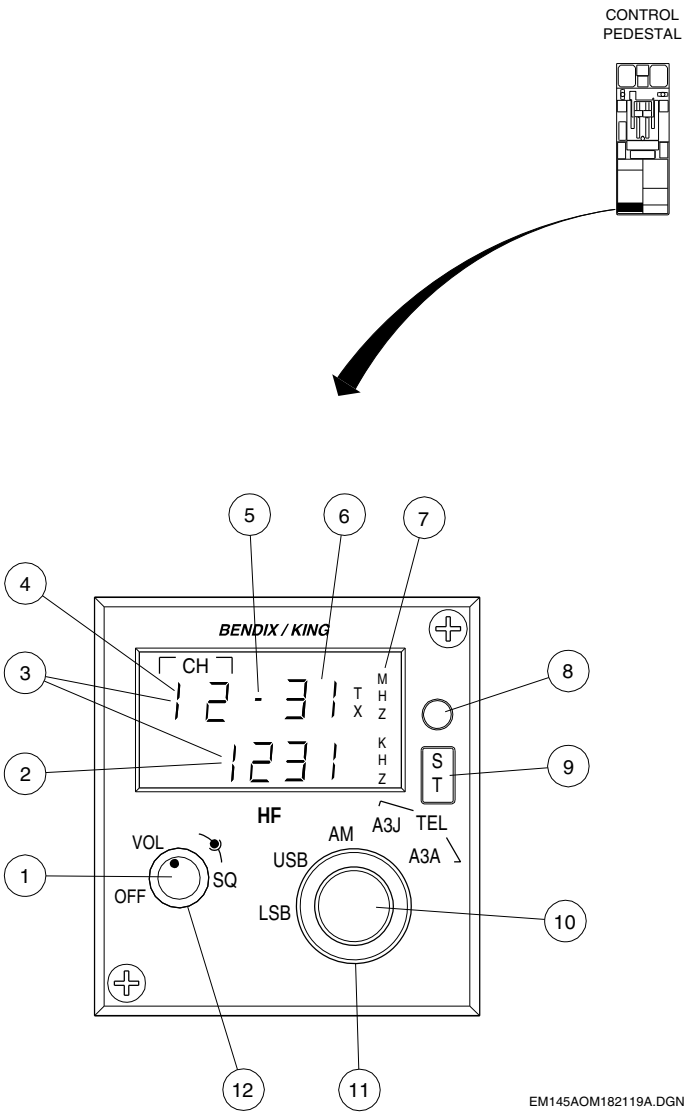
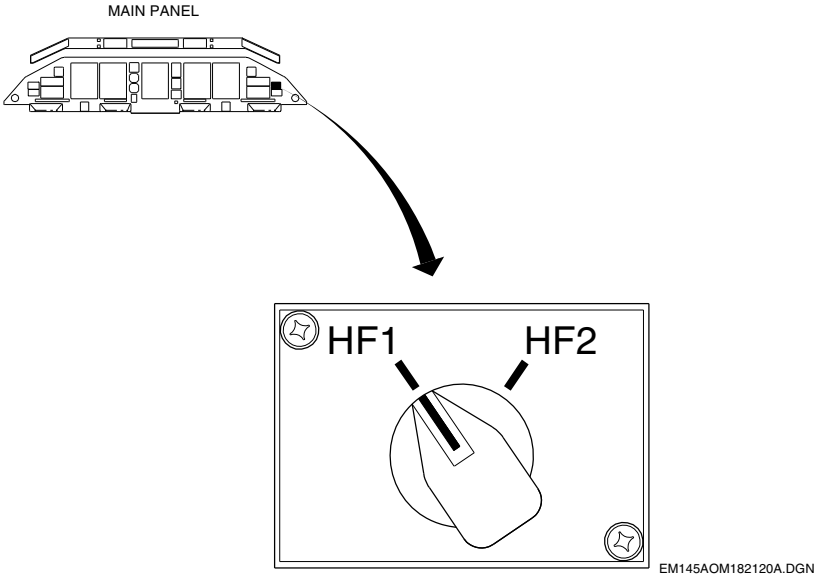


KFS-594 CONTROL PANEL

HF SELECTION PANEL

Airplanes equipped with two HF equipments have a HF selection panel on the glareshield panel. This panel has a knob that allows to switch from HF1 and HF2 and vice-versa. This procedure turns off the previous selected HF Control Panel turning automatically the other on.



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THIRD VHF COMMUNICATIONS SYSTEM - COLLINS 22A

The airplane may be equipped with a third VHF Communications System. All functions of the Collins VHF-22A System are controlled by the CTL-22 VHF Control Panel located at the control pedestal.

The Avionics Master DC Bus 1 supplies the third VHF Communications System with a protective 5A circuit breaker.

THIRD VHF COM CONTROLS AND INDICATORS

1 - ACTIVE FREQUENCY DISPLAY

- Displays the active frequency (frequency to which the equipment is tuned) and diagnostics messages.

2 - XFR/MEM SWITCH

- This is a 3-position, spring-loaded toggle switch.
- When held to the XFR position, the preset frequency is transferred up to the active display and the equipment retunes. The previously active frequency becomes the new preset frequency and is displayed in the lower window.
- When held to the MEM position, one of the six stacked memory frequencies is loaded into the preset display.
- Successive pushes cycle the six memory frequencies through the display.

3 - FREQUENCY SELECT KNOBS

- Two concentric knobs control the preset or active frequency displays.
- The large knob changes the digits to the left of the decimal point in 1 MHz steps.
- The smaller knob changes the digits to the right of the decimal point in 0.005 MHz steps.
- Numbers roll over at the upper and lower frequency limits.

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4 - ACTIVE BUTTON

- Push the ACT button for about 2 seconds to enable the frequency select knobs to directly retune the VHF-22A (active frequency).
- The bottom window will display dashes and the upper window will continue to display the active frequency.
- Push the ACT button a second time to return the control to the normal 2-display mode.

5 - TEST BUTTON

- The self-test diagnostic routine is initiated in the transceiver by pushing the TEST button.
- The active and preset display intensity will flash, modulating its brightness from minimum to maximum indicating self-test in progress.
- The active frequency display will show four dashes and the preset frequency display will show “00”.
- An audio tone will be heard from the audio system.
- At the completion of the self-test program, the display will return to its normal operation if no problem occurs.
- In case of a detected failure, “diAG” (diagnostic) letters will be displayed in the active and a 2-digit diagnostic code will be displayed in the preset display.
- Record any diagnostic codes displayed to help maintenance personnel in locating the problem.

6 - STORE BUTTON

- The STO button allows up to six preset frequencies to be selected and entered into the controls non-volatile memory.
- After presetting the frequency to be stored, push the STO button. The upper window displays the channel number of available memory (CH1 through CH6); the lower window continues to display the frequency to be stored. For approximately 5 seconds, the MEM switch may be used to advance through channel numbers without changing the preset display. Push the STO button a second time to commit the preset frequency to memory in the selected location. After approximately 5 seconds, the control will return to normal operation.

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7 - POWER AND MODE KNOB

OFF - Turns off the system.
ON - Turns on the system.
SQ OFF - Disables the receiver squelch circuits. Use this position to set volume control or, if necessary, to try to receive a very weak signal that cannot operate the squelch circuits.

8 - ANNUNCIATORS

- The COM control contains MEM (memory) and TX (transmit) annunciators.
- The MEM annunciator illuminates whenever a preset frequency is being displayed in the lower window.
- The TX annunciator illuminates whenever the VHF-22A is transmitting.

9 - PRESET FREQUENCY DISPLAY

- Displays the preset (inactive) frequency and diagnostics messages.
- The frequencies displayed on the COM control show only five of the six digits.

10 - COMPARE ANNUNCIATOR

- ACT momentarily illuminates when active and preset frequencies are being switched.
- ACT flashes if the actual radio frequency is not identical to the frequency shown in the active frequency display.

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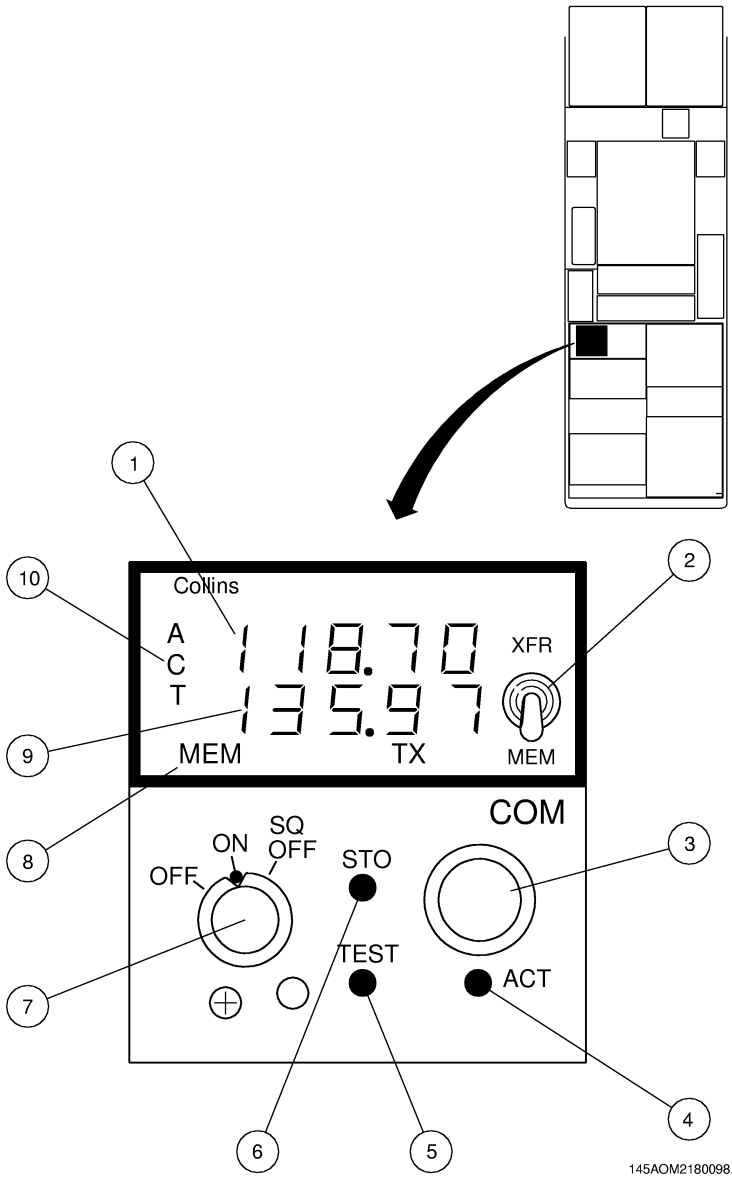

CTL-22 VHF CONTROL PANEL

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THIRD VHF COMMUNICATIONS SYSTEM - HONEYWELL RC-833/853

The airplane may be equipped with a third VHF communications system. All functions of the Honeywell RC-833/853 System are controlled by the RMU and by the DMU, if installed.

The active frequency will appear in the third COM window of the RMU display when operating in voice mode. The desired frequency should be selected by the pilot using the RMU select knob. Communication can be established pressing the third COM button on the audio panel and the PTT button.

When in data mode, the third VHF transmits the data on the frequency selected by the DMU unit, while on the RMU's third COM window the active frequency will display "DATA".

The third VHF has a pilot-activated self-test that performs a check of individual parts. A self-test is initiated when power is supplied to the RMU.

The Avionics Master DC Bus 1A supplies the third VHF Communications System.

THIRD VHF COM NORMAL OPERATION

In order to operate the third COM unit for voice communications, it is necessary to properly set the RMU. By pressing the PGE bezel button on the RMU, the page menu will be displayed. On the page menu the "SYS SELECT" option should be chosen. Once selected, the System Select page will be displayed containing the available COM pairs (1/2, 1/3 and 2/3), bandwidth of each COM unit and the COM3 operating mode.

After selecting the COM pair to the corresponding RMU, the change between each COM mode of the selected pair is achieved by pressing the "1/2" bezel button.

The switch between data and voice modes can be accomplished by means of the "SYS SELECT" page. The voice mode can also be entered selecting the COM3 window and turning the RMU knob. The data mode cannot be entered during a voice transmission. If a DMU is installed and connected to the third VHF, it will enter the data mode and "DATA" will be displayed in active frequency window when the third VHF starts a data transmission.

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It is possible to enter a frequency, store it, and perform a self-test using the same procedures applicable to regular COM units. The announcements also will be the same.

Should any radio component fail or a disagreement occur between the frequency selection and the subsequent transmission, the frequency or operating command will be removed from the RMU and replaced by dashes. This is an indication that the operation of that radio system is not normal.

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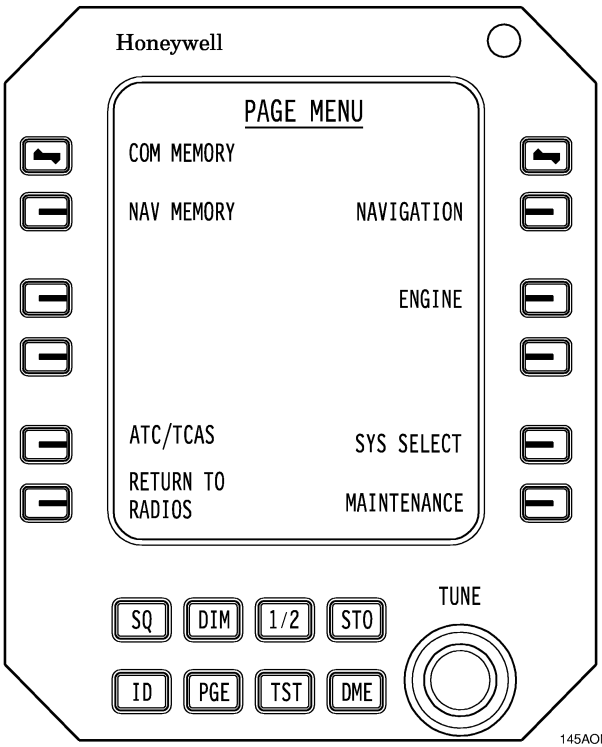

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RMU PAGE MENU

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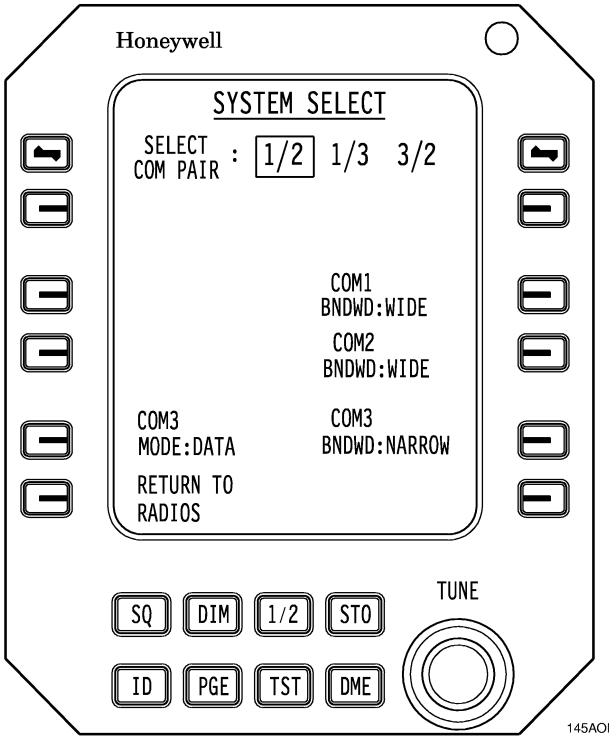

RMU SYSTEM SELECT PAGE

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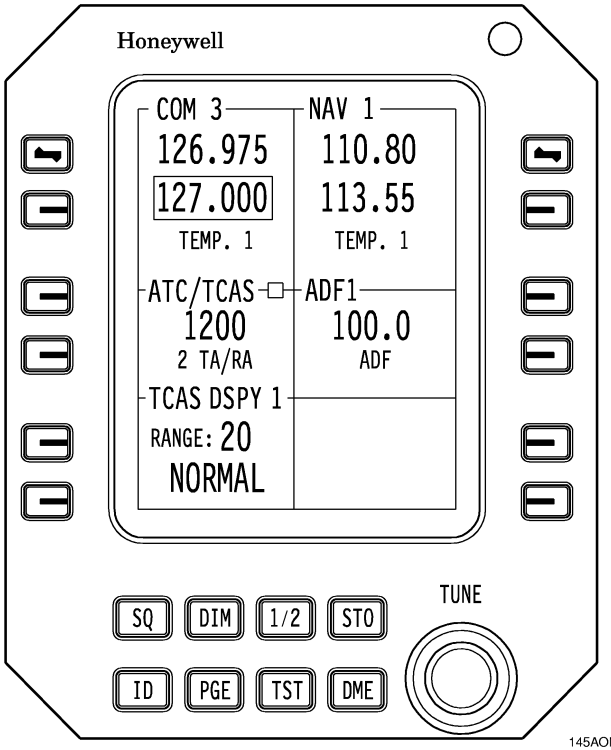

RMU RADIO PAGE WITH THIRD VHF IN VOICE MODE

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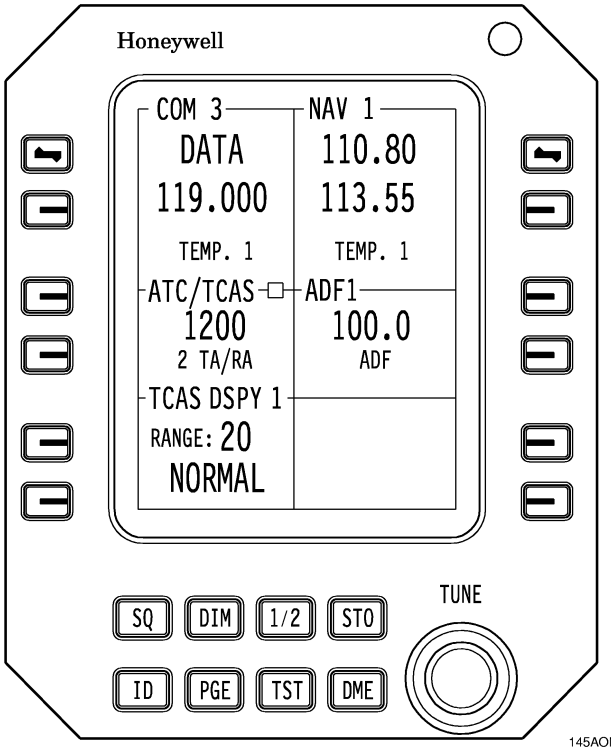

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RMU RADIO PAGE WITH THIRD VHF IN DATA MODE

AOM-135/1542

SELCAL SYSTEM

The Ground-to-Air Selective Calling (SELCAL) System operates in conjunction with the communication radios. The SELCAL provides continuous monitoring of a pre-set frequency, eliminating the need to continuously monitor the communication frequencies by the flight crew.

The SELCAL permits ground stations, equipped with encoding equipment, to call individual airplane by transmitting a coded signal. This coded signal will activate only one SELCAL unit to respond to that particular coded signal. In this case, a SELCAL voice message is activated through the Aural Warning Unit. Once activated, the system is reset for further monitoring by pressing the SELCAL Button, located on the Main Panel, or actuating the PTT function (on Control Wheel or glareshield panel).

NOTE: - For some airplanes the SELCAL enables only the VHF 2 operation or only the HF operation.

- SELCAL will recognize the coded signal from ground stations only if the associated system (HF or VHF2) is powered on and its frequency is adjusted to the ground station frequency.

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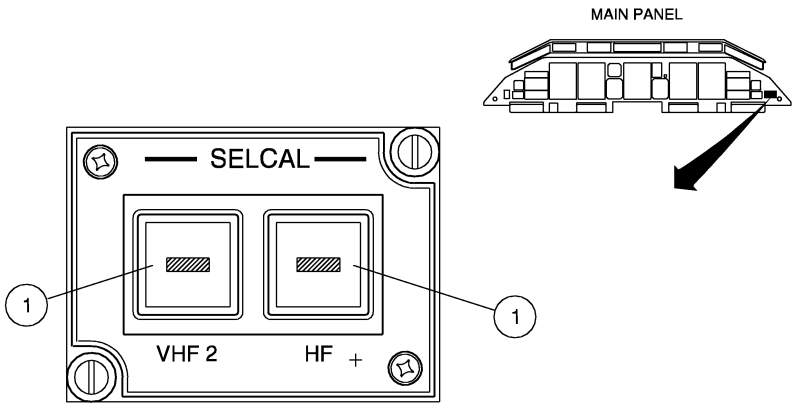
SELCAL CONTROLS AND INDICATORS

1 - SELCAL BUTTON

- A striped bar illuminates inside the associated button to alert the crew that communication is desired on VHF 2 or HF. A SELCAL voice message sounds simultaneously.
- When pressed, after a system activation, the striped bar extinguishes and the system is reset.



NOTE: FOR SOME AIRPLANES THE SELCAL PANEL IS PROVIDED WITH ONLY ONE BUTTON (EITHER VHF2 OR HF).

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SELCAL PANEL

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HONEYWELL MARK III COMMUNICATIONS MANAGEMENT UNIT (CMU)

The airplane may optionally be equipped with Honeywell's Mark III Communications Management Unit (CMU). Additional information on functions and operations can be obtained in the manufacturer's manual.

The Mark III Communications Management Unit (CMU) is an airborne communications router that supports data link service access between the following airplane data link applications and their corresponding ground service providers:

– Aeronautical Operational Communication (AOC)/Airborne Flight Information System (AFIS).
– Controller Pilot Data Link Communication (CPDLC).
– Automatic Dependent Surveillance (ADS).

The CMU is based on ARINC Characteristic 758 and can be upgraded, by software download, to an Aeronautical Telecommunications Network (ATN) router when protocols and application infrastructure are available to support Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) data link applications. The CMU provides an Aeronautical Radio, Inc. (ARINC) 724B compatible data link router through which all character-oriented data are transmitted to and from the ground Aircraft Communications Addressing and Reporting System (ACARS) network.

There are several levels of user interfacing. The CMU's operational crew interface is provided through a Control Display Unit (CDU), printer, and data loaders.

Access to the ground network is provided via several ACARS air-ground sub-networks listed below:

– Satellite Communications (SATCOM).
– Very High Frequency (VHF).
– High Frequency (HF).
– Mode-S (future).
– Ultrahigh Frequency (UHF) (future).

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The CMU functions as a router, with growth capacity as a gateway and an end system for hosting data link applications. As a gateway, the CMU can implement future protocols and provide the appropriate protocol conversions to support airborne systems whose architectures do not allow updates to future communication protocols but host the data link applications.

Currently, the CMU is compliant with ARINC 758 level 0, which means that the CMU is able to perform ACARS functions. The other ARINC 758 levels will be available in the equipment as soon as the software upgrades are released by the manufacturer.

The CMU is powered by the Avionic Switched DC Bus 1B.

The CMU interfaces with other airplane systems and equipment through the following equipments:

– FMS	The pilot → CMU interface is accomplished through the Honeywell FMS (NZ-2000) Control and Display Units (CDU). It may be utilized with single or dual FMS installation.
– VHF #3	Transmit and receive data with ground bases.
– Printer	Provides a hard copy data printout.
– Portable Data Loader	Used to upload and to download information, customized configurations and messages.
– CMC	Sends maintenance information to the ACARS.
– OOOI	Used to inform if the airplane is in one of the following situations: OUT - parking brake released and doors closed; OFF - airplane lift-off (Weight Off Wheels); ON - airplane has landed (Weight On Wheels); IN - parking brake applied and doors opened.

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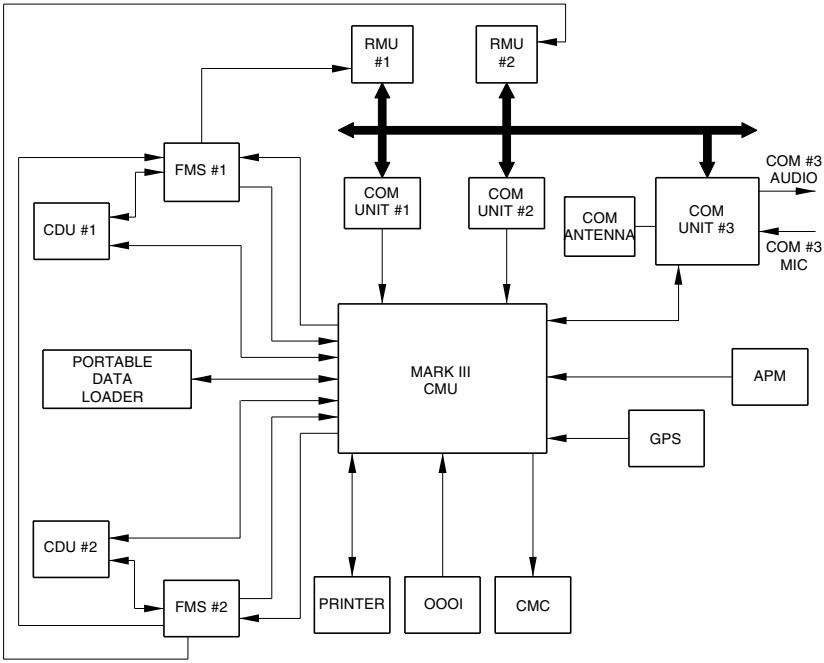

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CMU ARCHITECTURE

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CMU NORMAL OPERATION

The pilot interfaces with the CMU through the FMS Control and Display Unit (CDU).

In order to access the DATALINK section, the user must go to the NAV section on the CDU and then press the line select key next to DATALINK.

The data inside this section can be inserted and edited according to normal FMS procedures.

It is important to state that data can only be sent from and to the CMU at an area or airport covered by a DSP (Data link Service Provider), outside of which the communication may not work.

CMU ABNORMAL OPERATION

The CMU has a Built-In Test (BIT) function that contains a continuous monitor and self-test monitor. The continuous monitor function monitors critical system parameters and record faults found during normal operation.

The self-test monitor function is activated upon command from the system controller, external discrete input, front test panel switch, maintenance computer or a power-up event. The self-test monitor will exercise various system functions, record faults found, and annunciate the results of the test.

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CMU CONTROLS AND INDICATORS

CONTROL DISPLAY UNIT (CDU)

1 – LINE SELECT BUTTONS

- There are four line selection buttons on each side of the Control Display Unit (CDU) that provide selection of submodes within major modes when in an indexed display.

2 – PREV/NEXT BUTTONS

- PREV - Changes the current page to the previous page.
- NEXT - Changes the current page to the next page.

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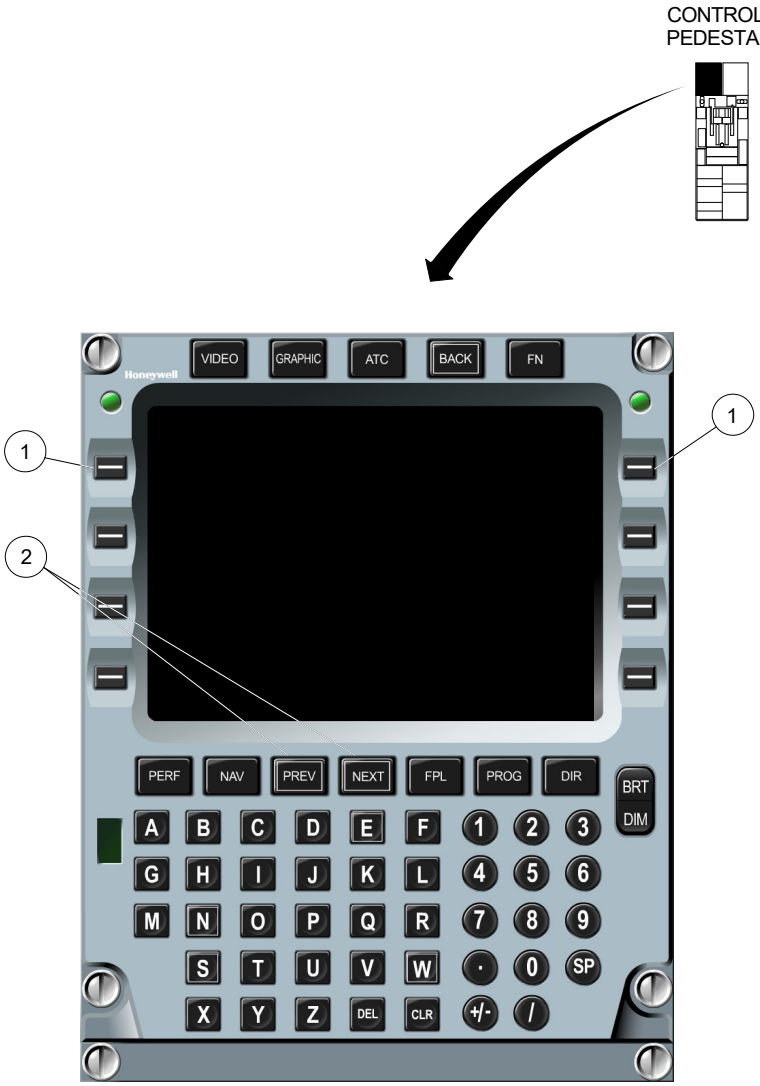

CMU FMS CONTROL PANEL

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PRINTER CONTROLS AND INDICATORS

The CMU may be optionally equipped with a Printer. The Printer will provide a hard copy printout of data collected by the CMU including uplinked printer messages. For additional information on functions and operations, refer to the manufacturer's manual.

1 – PAPER ADVANCE

- When pressed, advances paper.

2 – SELF-TEST

- When pressed, it produces a test pattern, comprising full character complement of printer, and activates both external aural/visual alert functions. If button is pressed and held, printer will successively print 40-, 60-, 80-column test patterns. Otherwise, each time the button is pressed, printer will print the next test pattern in sequence.

3 – POWER ON

- A green light indicator illuminates when power is on.

4 – ALERT RESET

- Will reset the aural/visual alert function and causes Printer Busy indicator to go out.

5 – PRINTER BUSY

- An amber indicator illuminates upon receipt of first text character and will remain on until the paper has advanced three lines beyond tear-off edge. The indicator will flash continuously after paper advance until the reset button is depressed.

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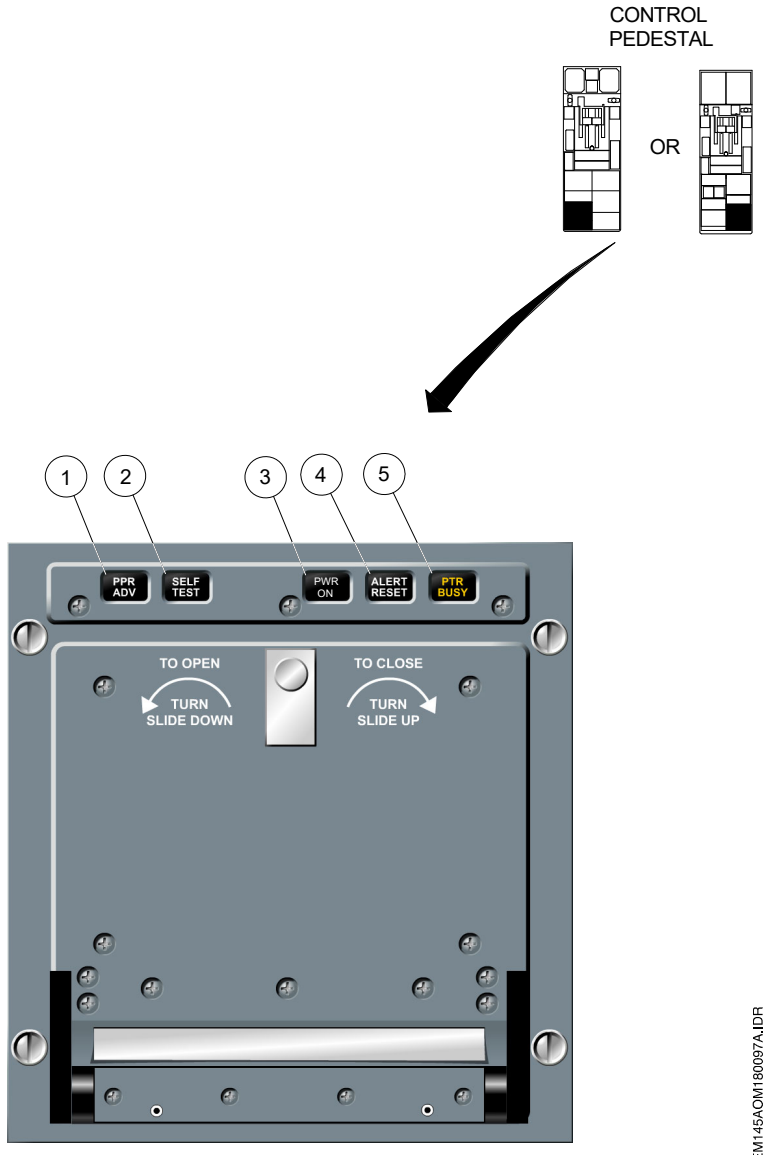

PRINTER PANEL

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COCKPIT VOICE RECORDER

The Solid State Cockpit Voice Recorder System records all audio signals transmitted and received by the crew members via the Digital Audio Panels, and any audible noise in the cockpit, through an area microphone installed below the standby compass.

The CVR is in operation whenever the essential DC Bus 2 is energized, storing the last 2 hours of recorded information in a solid state crash survivable memory unit. Any data older than 2 hours is automatically overwritten by the most recent audio inputs.

A crash impact switch cuts off power to the CVR immediately after experiencing a 5 G impact in order to preserve the recorded data.

The CVR also incorporates an Underwater Locator Beacon (ULB). Powered by a dedicated battery, the ULB starts transmitting an acoustic signal in the 37.5 kHz frequency once it senses contact with water, thus easing wreckage site location of a submerged airplane. The signal is transmitted during approximately 30 days.

A signal from the captain's clock allows timing correlation between CVR and FDRS.

SELF TEST

When the TEST button is pressed the unit performs a functional self-test to verify the integrity of the system. A successful self-test results in a one-second activation of the status LED on the control panel and a two-second 800 Hz tone that may be heard if a headphone is plugged to the CVR control panel jack. If a failure is detected during the test, the status LED will not be activated and the 800 Hz aural tone will not be heard.

ERASE FUNCTION

Previously recorded CVR data may be made unavailable if the ERASE button on the CVR control panel is pressed, provided the airplane is on the ground and with the parking brake applied. In this case, only the CVR manufacturer will be able to recover the "erased" data.

When the ERASE button is pressed, a two-second 400 Hz tone may be heard if a headphone is plugged to the CVR control panel jack, confirming that the erase command was successful.

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COCKPIT VOICE RECORDER CONTROLS AND INDICATORS

1 – STATUS LED

– Illuminates during one second to indicate a successful test.

2 – HEADPHONE JACK

– Allows plugging a headphone to monitor the 800 Hz test tone, 400 Hz erase tone and recorded audio signals.

3 – TEST BUTTON

– Tests system integrity.

– A successful self-test results in a one second activation of the status LED.

– In case of failure, the status LED on the control panel is not activated.

4 – ERASE BUTTON

– Erases previously recorded data from the crash survivable memory.

– Function is available only on the ground, with the parking brake applied.

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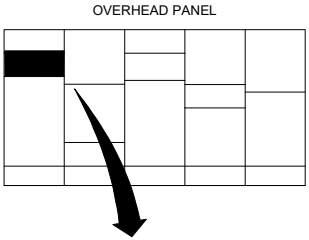

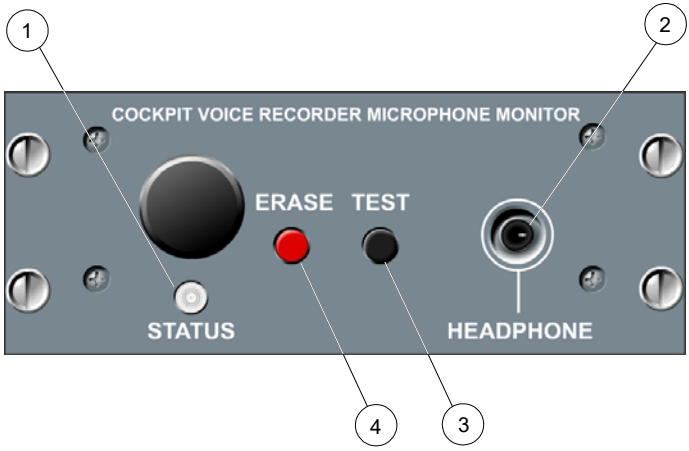

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COCKPIT VOICE RECORDER PANEL

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PASSENGER ADDRESS SYSTEM

The Passenger Address System (PAS) provides communication and announcements from cockpit to the passenger cabin.

Some airplanes also provide communication between cockpit and flight attendants and announcements from flight attendants to the passenger cabin.

The PAS also interfaces with the audio entertainment and prerecorded announcement systems to provide music and safety briefing/flight information through the passenger loudspeakers.

The following functions are available through the PAS:

– Voice announcement transmission (speech) to the PAX cabin.
– Call function from passenger to attendant, through chime tone.
– Chime tone for NO SMOKING and FASTEN SEAT BELTS signals.
– Interface to boarding music and passenger briefing.
– Some airplanes also have a call function from flight attendant to cockpit through chime tone and another from cockpit to flight attendant through PILOT light on the Attendant's Call Panel.

The PAS component responsible for sending signals from cockpit or flight attendant handset (if applicable) to passenger entertainment, and prerecorded announcement systems is the Passenger Address Amplifier (PAA), located in the airplane electronic compartment.

The PAA establishes the priority among the input signals from the several sources and then drives these signals to the proper cabin loudspeakers. The PAA also provides the logic for generation of the aural and visual annunciators, chimes for cockpit calls (if applicable), passenger and attendant, and for NO SMOKING/FASTEN SEAT BELTS signals.

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PASSENGER ADDRESS OPERATING MODES

MUTED MODE

The Muted Mode is automatically selected during power up and when no other mode is selected. In this mode there will be no chimes, no lights and no microphones enabled during power up or power supply transients.

PILOT-TO-PASSENGER MODE

The Pilot-to-Passenger Mode is enabled by momentarily pressing the Passenger Button, labeled PAX, on the Digital Audio Panel. When this mode is enabled the captain, copilot or observer may transmit announcements to the passengers, by pressing the respective PTT/HOT-MIC switches. The priority of the transmission through the system is the following: captain, copilot, observer. There are no chimes in this mode.

ATTENDANT-TO-PASSENGER MODE (IF APPLICABLE)

The Attendant-to-Passenger Mode is enabled by pressing the PA Button in the Attendant Handset. When this mode is enabled the flight attendant may transmit announcements to the passengers, by pressing the Attendant Handset PTT. If the PAX Button is selected on the Digital Audio Panel in the cockpit, besides listening the attendant announcements in the cockpit speaker or headphones, the pilots and observer take priority over the attendant announcements.

Some airplanes have a knob installed in the main panel or in the control pedestal which allows adjusting the volume of the PA announcements in the flight deck.

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PASSENGER ADDRESS CONTROLS AND INDICATORS (IF APPLICABLE)

INTERPHONE CONTROL UNIT

1 – CABIN BUTTON

- Allows interphone communication between pilots and flight attendant.
- When pressed by a flight attendant, it generates a "ding-dong" chime on cockpit through the Passenger Address Amplifier and when pressed by a pilot it illuminates the PILOT light on the Attendant's Call Panel.
- A striped bar illuminates inside the button to indicate that it is pressed.

2 – CAB EMER BUTTON

- Provides the same functions as the Cabin Button, except that it illuminates the Pilot Emergency Light, labeled EMER PILOT, on the Attendant's Call Panel.
- A striped bar illuminates inside the button to indicate that it is pressed.

3 – BACKUP INPH BUTTON

- Allows interphone communication between pilots and attendant, in case of normal mode failure.
- Illuminates CABIN and CAB EMERG buttons on the ICU, and PILOT and EMERG PILOT annunciators on the Attendant's Call Panel.
- A striped bar illuminates inside the button to indicate that it is pressed.
- (For airplanes Post-Mod. SB 145LEG-23-0027) When ATTD CALL pushbutton is pushed and held, a tone sounds in the galley area.

4 – ATTD CALL BUTTON

- Generates a chime in the passenger address, to call a flight attendant.
- During backup operation generates a tone in the chime located in the passenger cabin ceiling, near the emergency exits.

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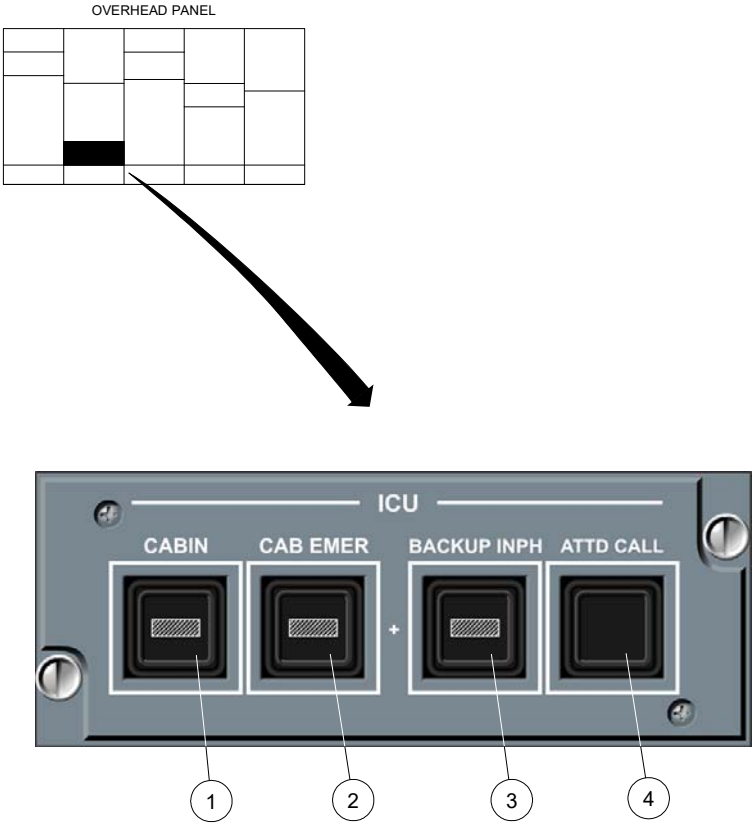

INTERPHONE CONTROL UNIT

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ATTENDANT HANDSET

1 – PRESS TO TALK BUTTON

- When pressed allows flight attendant to address the passengers, or communicate with the other flight attendant station or pilots, depending on the channel selected.

2 – BUTTONS AND ANNUNCIATORS

- When pressed and according to the selected channel it allows the flight attendant to address the passengers (PA), or to communicate with the other attendant station (ATTD) or pilots (PILOT and EMER PILOT). The associated annunciator illuminates to indicate which button is pressed.
- Annunciator colors:
  - ATTD, PILOT and PA: green.
  - EMER PILOT: red.

3 – BACKUP INTERPHONE BUTTON

- When pressed, establishes a permanent communication between pilots and flight attendant, in case of normal mode failure.
- When pressed, BKUP INPH, EMER PILOT, and PILOT annunciators of the station which commanded the backup mode remains illuminated.
- BKUP INPH annunciator is amber.

ATTENDANT'S CALL PANEL

Refer to Section 2-2 – Equipment and Furnishings.

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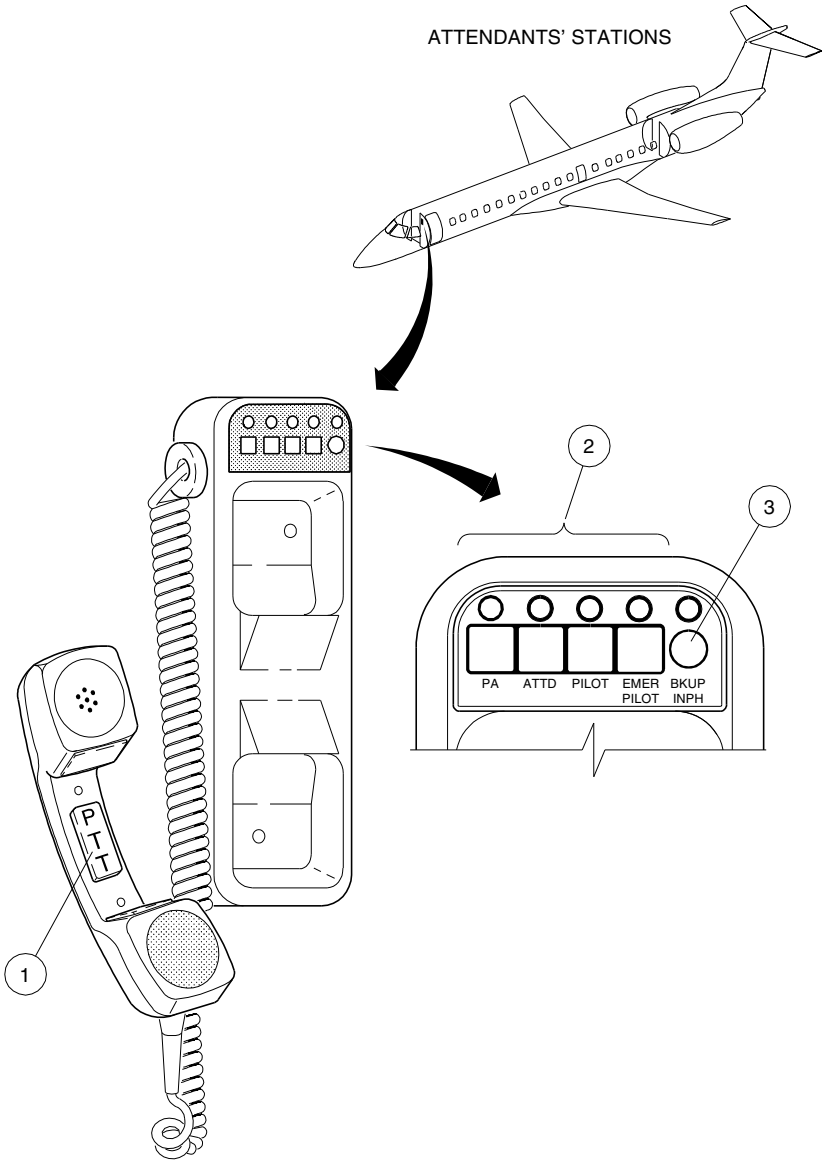

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ATTENDANT HANDSET

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SATCOM SYSTEM

INTRODUCTION

The airplane may be equipped with a TT-3000 Series Aero-M SATCOM, that is capable of performing global communication through the INMARSAT satellite network. The system provides one channel voice 4800 BPS AMBE coding, fax 2400 BPS on 2 wire RJ-11 type interface, circuit mode data 2400 BPS, and can be interfaced with a PC via a RS-232 serial port for data communication.

NOTE: The information presented in this manual has the purpose of assisting the user to perform basic operations on the SATCOM system. For advanced operation refer to the manufacturer's user manual.

SATCOM OPERATION

When the Aero-M system is powered-up, after a short pause the handset will display the initialization page.

Once that has occurred, the display will shift to the Wait for GPS page. This means that the system is acquiring GPS (Global Positioning System) satellite signals and determining the systems position.

The display will then shift to the Wait for NCS (Network Coordinating Station) page, indicating that the system is attempting to logon to a satellite network and acquire a bulletin board.

Finally, the display will then shift to the Logon Display and the user is now ready to proceed with Pre-Operational Requirements.

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PRE-OPERATIONAL REQUIREMENTS

Before attempting to initiate or receive a call, the user must verify that the Aero-M System has logged on to the satellite network. There are two indications that the system has power applied and the system has logged onto the satellite network:

– Both the left and green handset LED indicators will be illuminated and the signal strength indicator will display a measurement.
– The Aero-M logon display will appear in the handset display.

The top line of the display will indicate which Ocean Region Satellite is in use followed by a colon. This will be:

– AORW: Atlantic Ocean Region West Satellite.
– AORE: Atlantic Ocean Region East Satellite.
– POR: Pacific Ocean Region Satellite.
– IOR: Indian Ocean Region Satellite.

NOTE: The Aero-M system requires the user to determine the ocean region in which the aircraft is currently located. The user must enter the user menu and setup the system for that ocean region.

SELECTION OF OCEAN REGION SATELLITE

From Logon display, or Wait for NCS display, enter Area Menu, by pressing "2nd" and "3" keys. The "∗" indicates the current ocean region selected. Scroll through menu to the correct region, using the "↓" key. Select correct ocean region pressing the "OK" key.

The display will revert to Wait to NCS page and when NCS is acquired the display will return to Logon Display with the new ocean region used.

After the colon, the display will indicate what Land Earth Station (LES) is in use for routing your calls. If the LCD display is on another display, you can always return to the Logon display by pressing the "Exit" key repeatedly to step back from MENU operation. Many functions require starting from the Logon display.

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OPERATION

This section contains information on types of calls and procedures for dialing and completing calls.

GROUND CALLS

All ground-to-air calls must be placed as international calls. Each INMARSAT Satellite has an assigned three digit code that is, for all practical purposes, the country code for the satellite. It is necessary to first dial the international access code that is used in your country, followed by the satellite country code and the number issued by the Ground Service Provider for the Airborne Earth Station (AES). In some countries, call routing by the Public Switched Telephone Network can be routed to the "870" country code. "870" is the Single Network Access Code (SNAC). SNAC is a special country code that contacts the Network Coordinating Station for INMARSAT Aero-M services and automatically routes the call to the satellite that Airborne Earth Station is logged on to.

In countries where calls do not route to 870, it is necessary to manually include the appropriate country code for the INMARSAT Satellite that is serving the Airborne Earth Station. If the incorrect satellite/country code is dialed, an automatic response will inform that the station you are calling is not currently logged onto this ocean region. If you are sure the AES is logged on to a satellite, you can redial the number using another satellite country code in order to contact the AES.

Country codes for the INMARSAT Satellites:

AREA/OCEAN REGION		INTERNATIONAL ACCESS CODE
Single Network Access Code	SNAC	870
Atlantic Ocean Region East	AORE	871
Pacific Ocean Region	POR	872
Indian Ocean Region	IOR	873
Atlantic Ocean Region West	AORW	874

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VOICE CALLS

– Receiving calls

  If a handset is receiving a call, the handset will ring and the Yellow Ring LED will flash. To establish a connection the user can either press the Toggle Hook key (key 5 on HANDSET KEY FUNCTIONS figure) or lift handset from cradle. When a connection has been established the Yellow Ring Led will be illuminated.

– Standard telephone calls

  Dial a telephone number by entering call prefixes, country and area codes and number, then press the "#" key or the Toggle Hook key (key # 5 on HANDSET KEY FUNCTIONS figure) in the handset keypad. To finish the call press the the Toggle Hook key (key # 5 on HANDSET KEY FUNCTIONS figure).

– Calls from handset #2 and #3

  Handset #2 can initiate short code, service code, handset to handset, as well as standard telephone calls.

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SATCOM CONTROLS AND INDICATORS

The TT-3000 Series Aero-M SATCOM System uses the TT-5621A Handset as the main user interface. The handset contains a keypad with 21 separate function keys, a 2X12 character Liquid Crystal Display (LCD), four indicator LEDs, and a volume control.

The handset allows the user to:

– Navigate the user menu.
– Place and receive calls.
– Save and recall phonebook entries.
– Configure system parameters.
– View phone log.
– Monitor system operations.
– View system errors as they occur.

HANDSET #1 KEYS FUNCTIONS

The handset #1 keypad consists of 21 keys (12 numeric and nine function keys). These keys are designed to perform multiple functions, that are dependent on the selected mode.

The handset has three modes that determine the function of the keys:

– Normal mode: keys perform their primary functions.
– Alpha mode: keys perform alphanumeric functions.
– 2nd mode: keys perform their alternate functions.

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The following table lists all the handset #1 keys and defines their functions:

	MODE		
FIGURE NUMBER	**NORMAL**	**ALPHA**	**2nd**
1	Accept selection		
2	Toggles handset audio mode		
3	Enable alpha mode	Disable alpha mode	Delete entry
4	Move one selection up		Edit entry
5	Toggle hook		
6	Move one selection down		Mute
7	3		
8	2		
9	6		
10	5		
11	9		
12	8		
13	#		
14	0		
15	*		
16	7		
17	4		
18	1	- ? ! , . : " ' $ ( ) + / 1	Access user menu
19	Enable 2nd mode	Enable 2nd mode	Disable 2nd mode
20	Delete/Back space one character/ Delete display (hold 2 seconds)		Insert entry
21	Exit menu/ Cancel selection		

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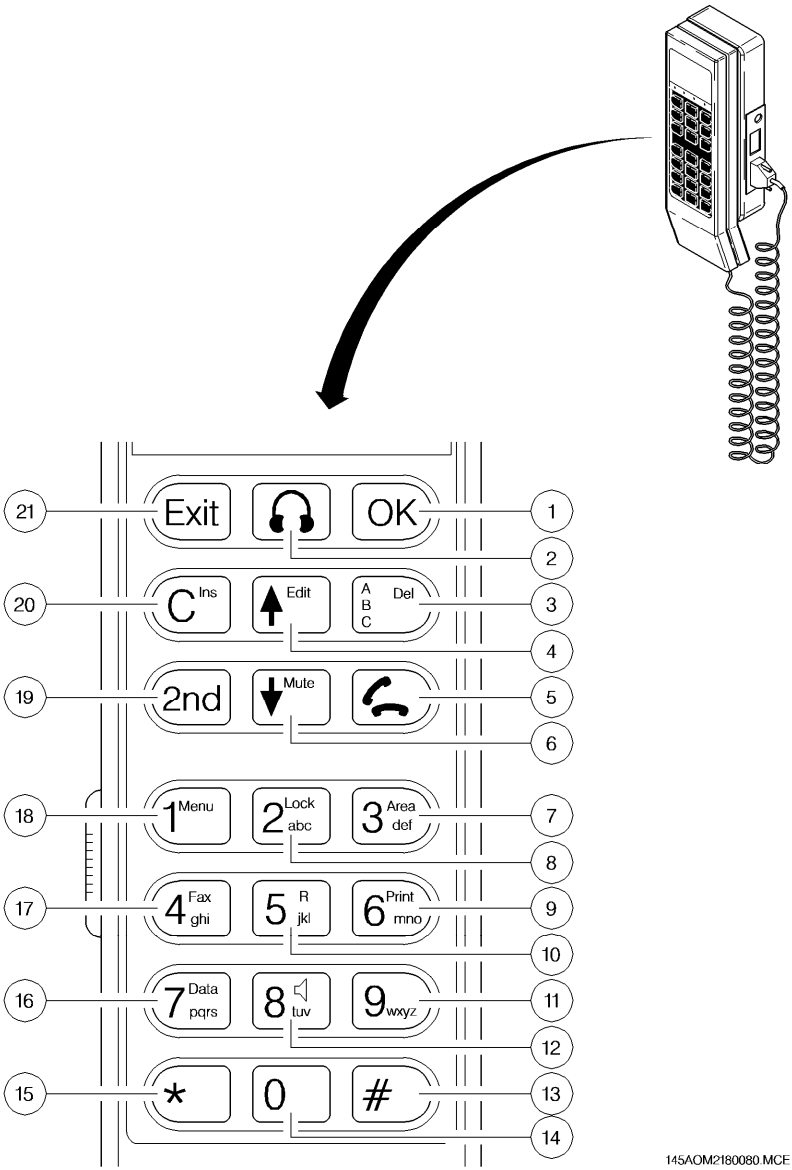

HANDSET #1 KEYS

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HANDSET #2 AND #3 KEYS FUNCTIONS (OPTIONAL)

The handset #2 and #3 are optional and are installed on the connected in parallel. Their keypad consists of 21 keys (12 numeric and nine function keys). These keys are designed to perform multiple functions, that are dependent on the selected mode.

The handsets #2 and #3 have two modes that determine the function of the keys:

– Normal mode: keys perform their primary functions.
– Alpha mode: keys perform alphanumeric functions.

The following table lists all the handset #2 and #3 keys and defines their functions:

	MODE	
FIGURE NUMBER	**NORMAL**	**ALPHA**
1	Transfer call	
2	Memory	
3	Memory location 3	
4	Memory location 2	
5	Toggle hook	
6	Microphone mute	
7	3	D E F 3
8	2	A B C 2
9	6	M N O 6
10	5	J K L 5
11	9	W X Y Z 9
12	8	T U V 8
13	#	
14	0	
15	*	
16	7	P Q R S 7
17	4	G H I 4
18	1	- ? ! , . : " ' $ ( ) + / 1
19	Last number redial	
20	Memory location 1	
21	Storage	

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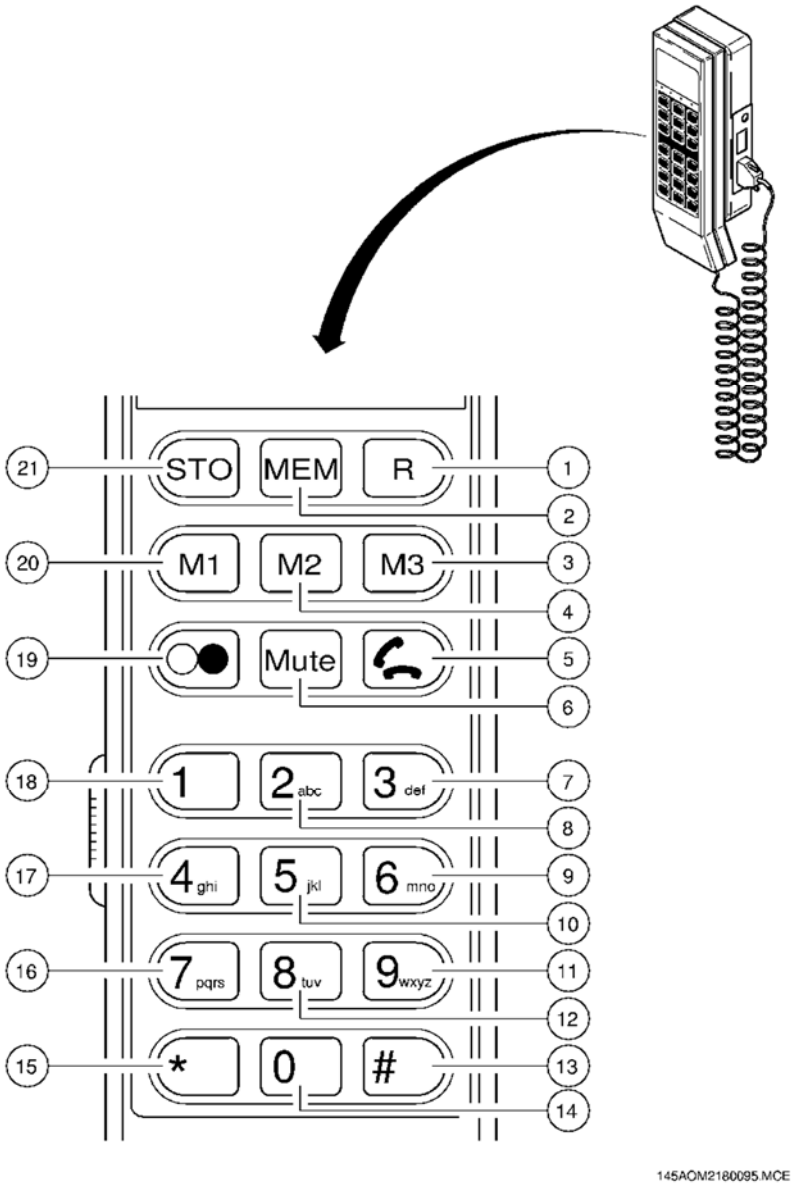

HANDSET #2 AND #3 KEYS

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HANDSET #1 LCD DISPLAY

The handset uses a LCD to display all data. The LCD is a 2X12 character alphanumeric display. Additionally, the LCD will display ten symbols to indicate operating status and alert the user of any errors that may occur. The following table lists all display symbols, referring to the figure in the next page, and defines their meaning.

FIGURE NUMBER	NAME	DESCRIPTION
1	More entries above flag	Indicates that additional entries are available above and can be displayed by pressing the "Edit" key.
2	New AES messages flag	A recorded MES message for the SDU/SIM is waiting at the LES.
3	Signal strength indicator	Indicates the strength of the signal being received by the system.
4	Hook off flag	Indicates that a call is in progress.
5	Speaker active flag	The speaker in the cradle is active.
6	Toggle field flag	Indicates that pressing "↑" or "↓" keys can change the current selection.
7	Alpha mode flag	Indicates that the "Del" key was pressed and the alpha mode is active. The next key pressed will perform its alpha mode function.

(Continued)

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FIGURE NUMBER	NAME	DESCRIPTION
8	Security enabled flag	Indicates that the handset has been locked and can only be accessed by entering a valid PIN code.
9	2nd mode flag	Indicates the "2nd" key was pressed and the 2nd mode is active. The next key pressed will perform its alternate function.
10	More entries below flag	Indicates that additional entries are available below and can be displayed by pressing the "↓" key.

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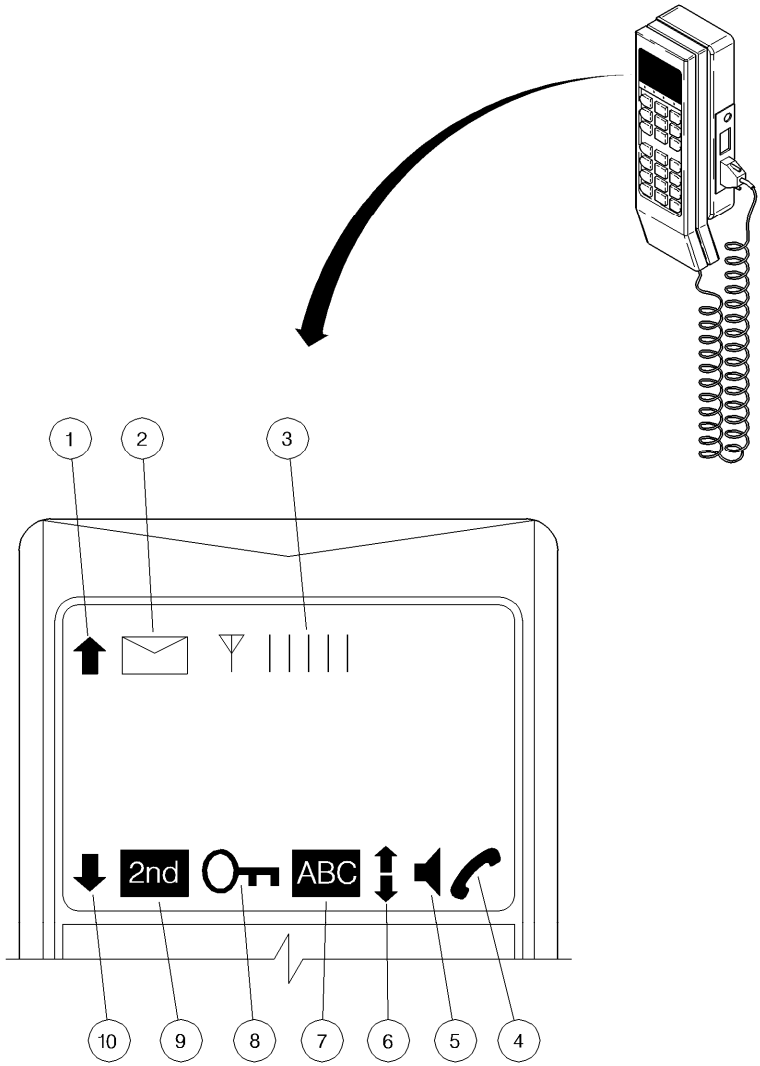
The figure below shows all the symbols found on the handset display.



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HANDSET DISPLAY

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HANDSET #1 LED INDICATORS

The handset uses four colored LEDs as indicators. These LEDs alert the user of the following indications:

FIGURE NUMBER	LED	DESCRIPTION
1	Left Green	Indicates power to handset.
2	Right Green	System is logged or is logging into the satellite network. When on, the antenna strength indicator will show a measurement.
3	Yellow	When on, indicates call in progress, the LED will flash when a call is received.
4	Red	Illuminates when an error has occurred in the system.

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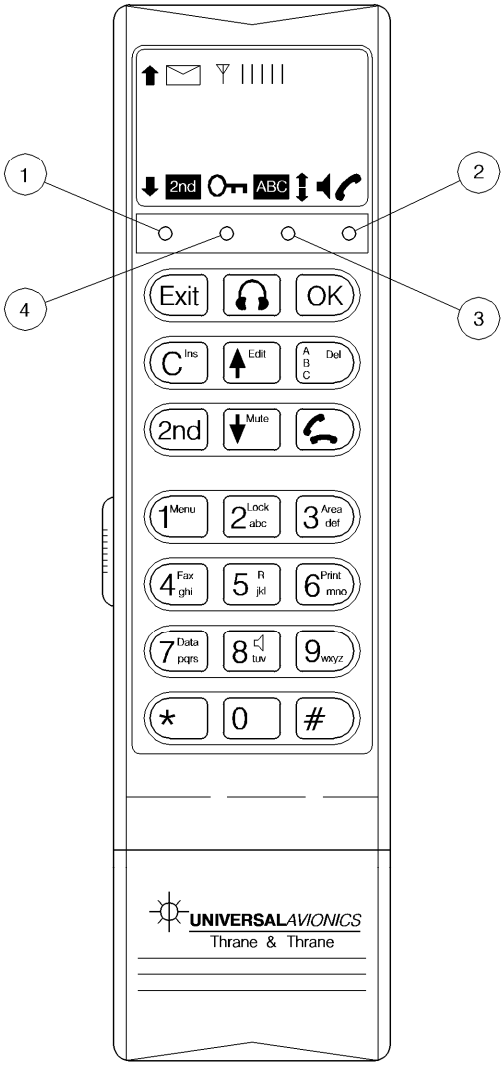

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HANDSET #1 LED INDICATORS

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HANDSET #2 AND #3 LED INDICATORS

The handset uses two colored LEDs as indicators. These LEDs alert the user of the following indications:

FIGURE NUMBER	LED	DESCRIPTION
1	Left Green	Indicates power to handset.
2	Right Green	Ring indicator.

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MENU
PREVIOUS
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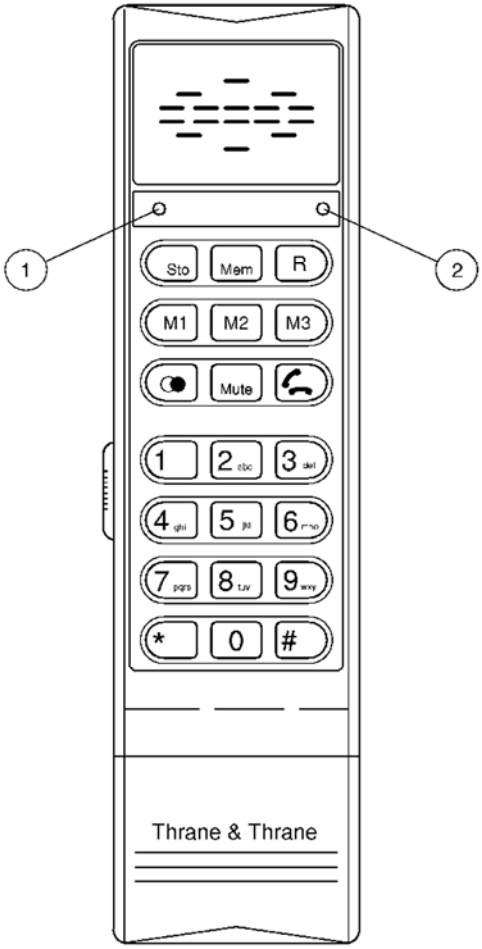

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HANDSET #2 AND #3 LED INDICATORS

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POTS TELEPHONE ADAPTER (OPTIONAL)

The pots telephone adapter provides the interface between the SATCOM system and the airplane cockpit headset audio system. This equipment provides remote dialing capability for the SATCOM system.

This interface allows the cockpit to maintain full headset utilization for SATCOM calls or normal headset operation at the touch of the AUX button on the pilot's or copilot's digital audio panel.

The pots telephone adapter keypad consists of 17 keys (12 numeric and 5 function keys).

The following table lists all pots keys and their functions.

FIGURE NUMBER	CONTROL	FUNCTION
1	HOOK	Hook switch key
2	1	
3	2	
4	3	
5	4	
6	5	
7	6	
8	REDIAL	Redial key
9	VOL	Volume control key
10	FLASH	Flash key
11	#	Send key
12	*	
13	0	
14	9	
15	8	
16	7	
17	HOLD	Hold key

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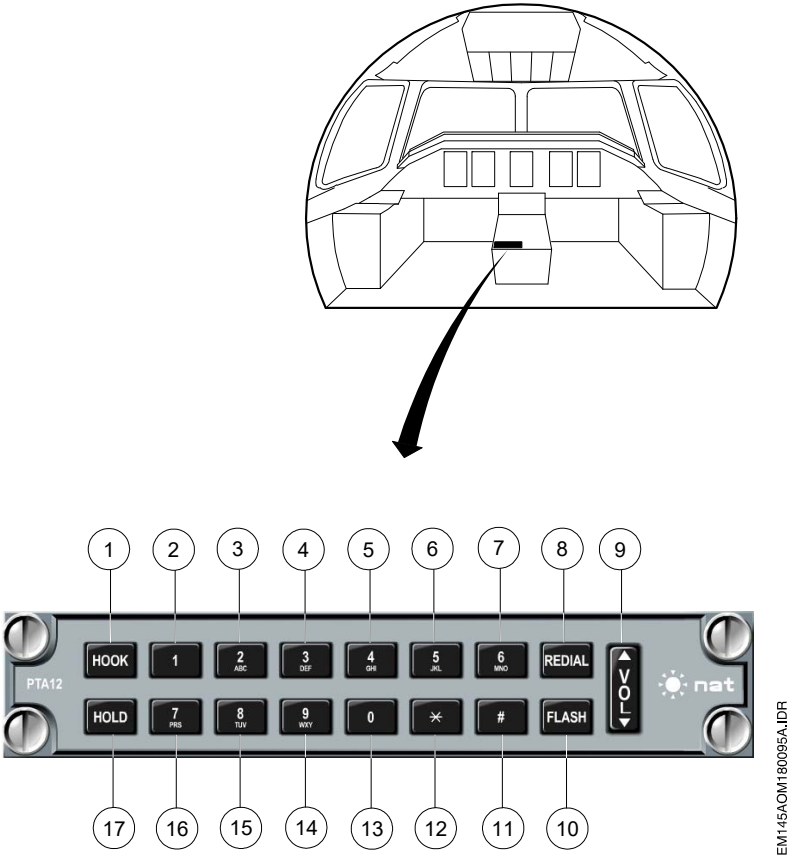

SATCOM POTS KEYS

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IRIDIUM SATELLITE TELECOMMUNICATION SYSTEM

Two SATCOM Iridium ST3100 and one Cabin Telecomunication Unit (AeroCom 1100) provides two channels for direct satellite communication through the Iridium Satellite Network, which is composed of 66 Low Earth Orbit (LEO) satellites and operates in the frequency range of 1616 MHz to 1625.5 MHz. The Sigma 7 handset operates similar to a standard telephone device and the POTS telephone adapter at cockpit allow the crew use the Iridium telephone system.

When in use, the telephone system controls the power level at which the phone transmits. The transmission power level of the ST 3100 can range up to a maximum of 7 watts.

All calls to-and-from Iridium telephone systems are considered international calls which are billed by long distance providers. These rates can vary greatly. Callers may wish to consult their long distance provider for rate information prior to making a call. As a cost-effective alternative to Direct-Dialing, callers may wish to use Two-Stage Dialing that is also explained in this section.

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CONTROLS AND INDICATORS

HANDSET

1 – OPERATING DISPLAY AND STATUS INDICATORS

- Provide a visual indication of telephone numbers and system operational status.

2 – ON/ANSWER KEY

- Answer an incoming call or take the phone off-hook to place a new call.

3 – OFF/END KEY

- Terminate a call and turns off the phone.

4 – FLASH KEY

- The FLASH key provides a momentary line interruption for transferring or conferencing calls without terminating the current call.

5 – VOLUME KEY

- Adjust ear piece volume.

6 – DIGIT KEY

- Dial the numbers to call external destination or cabin phone.

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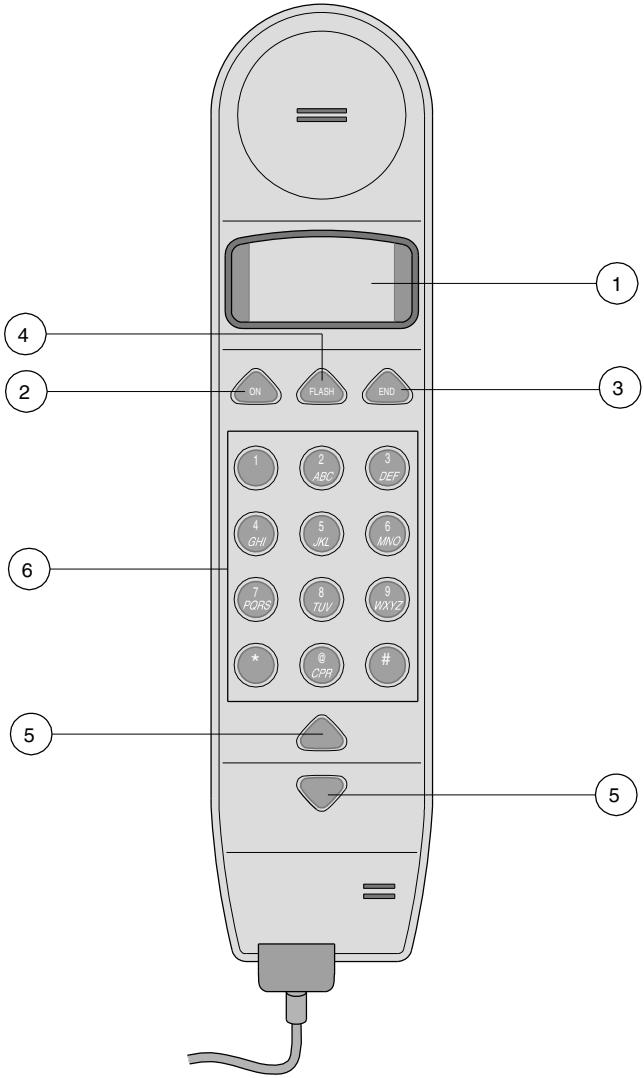

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HANDSET – MAIN KEYS AND INDICATORS

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HANDSET OPERATION

RECEIVING A CALL

When the telephone rings, remove the handset from the cradle and press the ON key at least one second to answer the phone.

END A CALL

Always press the OFF key to terminate the current call.

DIALING FROM THE AIRPLANE TO GROUND

Press the ON key at least one second. Dial the number that you would like to call (USA/Canada Only-001+Area Code+Number) or (International Calls-00+Country Code+Number).

The caller may hear up to five "beeps" in the 10-25 seconds required for the system to complete the call.

NOTE: - If a call is missed or successful ended wait at least 5 seconds to attempt another call.

- If a new call is attempted in an interval shorter than 5 seconds, the telephone system may assume this action as a "FLASH" and hold the trunk, which gives a false perception of busy/inoperative system. In case the 5 seconds is disregarded twice, the telephone system might lock both telephone lines.

DIALING FROM THE AIRPLANE TO ANOTHER AIRPLANE (IRIDIUM-TO-IRIDIUM)

To place an Iridium-to-Iridium call, press On at least one second, dial 00 + 8816 + XXX.XXXXX (other subscriber's Iridium phone number).

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DIALING TO ANOTHER AIRPLANE PHONE EXTENSION

Press ON at least one second. Dial the extension number (XX).

NOTE: - (11) VIP Handset Extension Phone Number.

- (12) Cockpit Extension Phone Number.

- (13) Conference Table Extension Phone Number.

TRANSFERRING A CALL TO ANOTHER AIRPLANE PHONE EXTENSION

Press the FLASH. Dial the extension number (XX) of the position which the call should be transferred. Wait the answer then press OFF to complete the transferring.

NOTE: If the extension destination is busy or no answer, press FLASH again to reconnect to the caller.

SETTING CONFERENCE CALLS

To bring another party into the conversation, press the FLASH. Dial #7 + Extension Phone Number (XX) to be added to the conference. Wait the answer then FLASH again for connecting in conference.

NOTE: For four-party conference, the second phone extension just connected has to repeat the procedure above to the third phone extension.

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DIRECT DIALING FROM GROUND TO THE AIRPLANE

– Placing a call from a ground phone (USA/Canada) to an Iridium-equipped airplane, dial: 011 (International Direct Dial access code prefix) + 8816 (Iridium Country Code) + XXX.XXXXX (the X's denote the Iridium Network Number). Caller may hear a pause of up to 25 seconds as the system completes the call.

– Placing a call from a ground phone (outside the USA/Canada) to an Iridium-equipped airplane, dial: **00 (International Direct Dial access code prefix of the country from which the call is being placed) + 8816 (Iridium Country Code) + XXX.XXXXX (the X's denote the Iridium Network Number). Caller may hear a pause of up to 25 seconds as the system completes the call.

NOTE: Direct dialing may not always be possible, as some long-distance providers may not recognize the Iridium Country Code (8816).

MAKING TWO-STAGE DIALING FROM GROUND TO THE AIRPLANE

Two-Stage Dialing may provide the most cost-effective method of calling an AirCell ST 3100-equipped airplane. Utilizing this dialing method, the calling party is charged by their long distance telephone provider for a long distance call to Tempe, Arizona, USA for the duration of the call. The called party (in the airplane), is charged AirCell per minute charges for airtime from the time the call connects in Tempe, Arizona, USA until the call is terminated.

NOTE: When a Ground-To-Airplane call is placed or even if the cockpit is being called by the VIP or Conference Table phone extension, a voice announcement advice the crew that there is a telephone call to be answered. Per airplane system design, the "Incoming Call" synthetic voice is inhibited to crew when the airplane is in-flight with altitude below 10000 ft.

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- When placing a call from a ground phone to an AirCell ST 3100-equipped airplane, dial the automated Iridium Call Routing Center 480.768.2500. Note that the Call Routing Center is located in Tempe, Arizona, USA. As a result, long distance charges will be billed to the caller as if they were dialing someone in Tempe, Arizona, USA.
  - Placing a call from a ground phone (USA/Canada) to the Iridium Call Routing Center, dial: 1.480.768.2500.
  - Placing a call from a ground phone (outside the USA/Canada) to the Iridium Call Routing Center, dial: **00 (International Direct Dial access code prefix) + 1 (USA Country Code) + 480.768.2500.
- An automated recording will answer and instruct the caller to dial the Iridium Phone Number 8816 + XXX.XXXXX.
- The call will be routed to the AirCell ST 3100-equipped airplane. If the system is registered on the network, in four to six seconds the system will ring.

POWER OFF

Power off can be achieved by switching off the IFE push-button. This action will also power off the many others IFE systems as Airshow, DVD, etc.

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CONTROLS AND INDICATORS

POTS (PLAN OLD TELEPHONE SERVICE)

1 – HOOK KEY

– Press the HOOK key to initiate a new call or receive a call.

2 – HOOK LIGHT

– The light is off when there is no calls, flashing when receiving a call, and on when a call is ongoing.

3 – HOLD KEY

– Press HOLD key to put a call on hold by muting the mic and phones audio. Press HOLD key again to unhold the call.

4 – HOLD LIGHT

– If no calls on hold, the light is off. If a call is held, the light is on.

5 – DIGIT KEY

– Dial the numbers to call external destination or cabin phone.

6 – REDIAL KEY

– The REDIAL key recalls and dials the last number dialed (up to 32 digits). The POTS telephone adapter is volatile memory, so the last number is cleared when the unit is powered down.

7 – FLASH KEY

– The FLASH key provides a momentary line interruption for transferring or conferencing calls without terminating the current call.

8 – VOLUME KEY

– The VOL key is used to increase or decrease the phones output volume. There are 32 steps from minimum to maximum and each step requires a separate action on the key. The POTS telephone adapter is volatile memory, so it is always returning to factory volume level when it is powered down.

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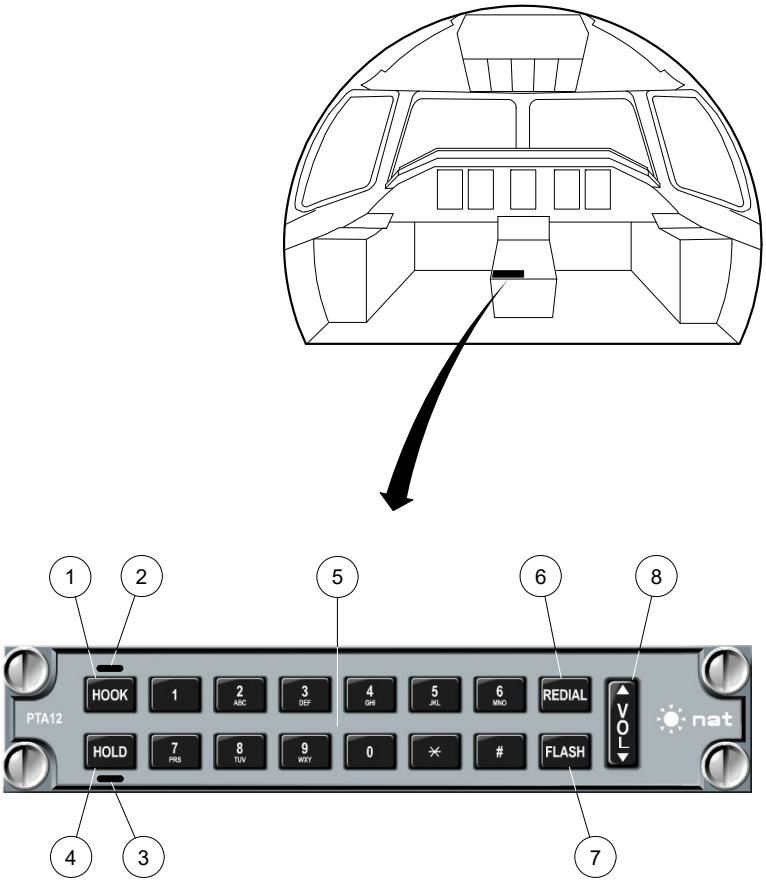

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POTS – MAIN KEYS AND INDICATORS

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POTS OPERATION

RECEIVING A CALL

When the telephone is receiving a call, the HOOK light is also flashing. Set the DAP 1 and/or 2 to AUX position. Press the HOOK key (the HOOK light which was flashing should become permanently on). Finally press the PTT button to answer the call.

NOTE: When a Ground-To-Airplane call is placed or even if the cockpit is being called by the VIP or Conference Table phone extension, a voice announcement advice the crew that there is a telephone call to be answered. Per airplane system design, the "Incoming Call" synthetic voice is inhibited to crew when the airplane is in-flight with altitude below 10000 ft.

AUTOMATIC REDIAL

To redial the last number that was called, press the REDIAL key.

END A CALL

Always press the HOOK key to terminate the current call. The HOOK light should turn off when the call is ended.

HOLD A CALL

To hold a call, press the HOLD button (this action mutes the mic and phone audios). The HOLD light should turn on. To unhold the call, press the HOLD key again. The HOLD light should turn off.

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DIALING FROM THE AIRPLANE TO GROUND

Make sure the DAP 1 and/or 2 is(are) in AUX position. Press the HOOK key (the HOOK light should turn on). Dial the number that you would like to call (USA/Canada Only-001+Area Code+Number) or (International Calls-00+Country Code+Number). The caller may hear up to five "beeps" in the 10-25 seconds required for the system to complete the call, then press the PTT button to talk.

NOTE: - If a call is missed or successful ended wait at least 5 seconds to attempt another call.

- If a new call is attempted in an interval shorter than 5 seconds, the telephone system may assume this action as a "FLASH" and hold the trunk, which gives a false perception of busy/inoperative system. In case the 5 seconds is disregarded twice, the telephone system might lock both telephone lines.

DIALING FROM THE AIRPLANE TO ANOTHER AIRPLANE (IRIDIUM-TO-IRIDIUM)

Make sure the DAP 1 and/or 2 is(are) in AUX position. Press the HOOK key (the HOOK light should turn on). Dial the Iridium number that you would like to call (00 + 8816 + XXX.XXXXX).

The caller may hear up to five "beeps" in the 10-25 seconds required for the system to complete the call, then press the PTT button to talk.

DIALING TO ANOTHER AIRPLANE PHONE EXTENSION

Make sure the DAP 1 and/or 2 is(are) in AUX position. Press the HOOK key (the HOOK light should turn on). Dial the extension phone number (XX), then press the PTT button to talk.

NOTE: - (11) VIP Handset Extension Phone Number.

- (12) Cockpit Extension Phone Number.

- (13) Conference Table Extension Phone Number.

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TRANSFERRING A CALL TO ANOTHER AIRPLANE PHONE EXTENSION

Press the FLASH. Dial the extension number (XX) of the position which the call should be transferred, then press HOOK key (the HOOK light should turn off). Wait the answer then press HOOK key to complete the transferring.

NOTE: If the extension destination is busy or no answer, press FLASH again to reconnect to the caller.

SETTING CONFERENCE CALLS

To bring another party into the conversation, press the FLASH. Dial #7 + Extension Phone Number (XX) to be added to the conference. Wait the answer then press FLASH again.

NOTE: For four-party conference, the second phone extension just connected has to repeat the procedure above to the third phone extension.

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INERTIAL REFERENCE SYSTEM (IRS)

The Inertial Reference System (IRS) is responsible for generating attitude and heading data on EMB-135BJ. The airplane is equipped with two identical and independent IRS. The dual IRS installation is used as an additional navigation sensor for the FMS.

Basically, the IRS provides attitude and heading reference data for the airplane displays and navigation data for the FMS by sensing linear motion and angular rates through inertial sensors.

The IRS interface with the airplane's systems and equipment is as follows:

- Air Data Computers (ADC 1 and ADC 2): The IRS 1 and IRS 2 receive altitude, altitude rate and true airspeed information from the ADC 1 and ADC 2 respectively, to improve the precision of computed navigation data.
- Integrated Computers (IC 1 and IC 2): The IRS 1 and IRS 2 provide pitch, roll and heading information to the respective PFD, and heading information to the respective MFD, through the IC-600s. Data is transmitted separately to both sides, to ensure that a single IC failure does not compromise the data path.
- Radio Management Units (RMU 1 and RMU 2): The IRS 1 provides heading information to both RMUs via DAU 2.
- Autopilot System: The IRS 1 provides pitch, roll and acceleration information to the Autopilot System via IC-600-1.
- Weather Radar: The IRS 2 provides attitude information to the Weather Radar for antenna stabilization.
- Flight Management System (FMS): The IRS provides attitude, heading and navigation information to the FMS. The IRS receives position, magnetic heading, UTC time and date from the FMS.
- EGPWS: The IRS 1 provides attitude and heading information to the EGPWS.
- Stall Protection System (SPS): The IRS provides attitude rate variation and vertical acceleration information to the SPS.

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- Integrated Standby Instrument System (ISIS): The IRS 1 provides heading information to the ISIS.
- Windshear Detection and Escape Guidance System: The IRS 1 provides attitude rate variation and vertical acceleration information to the windshear computer.
- Flight Data Recorder (FDR): The IRS 1 provides attitude and heading information to the FDR via DAU 2 and IC-600.

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MENU
PREVIOUS
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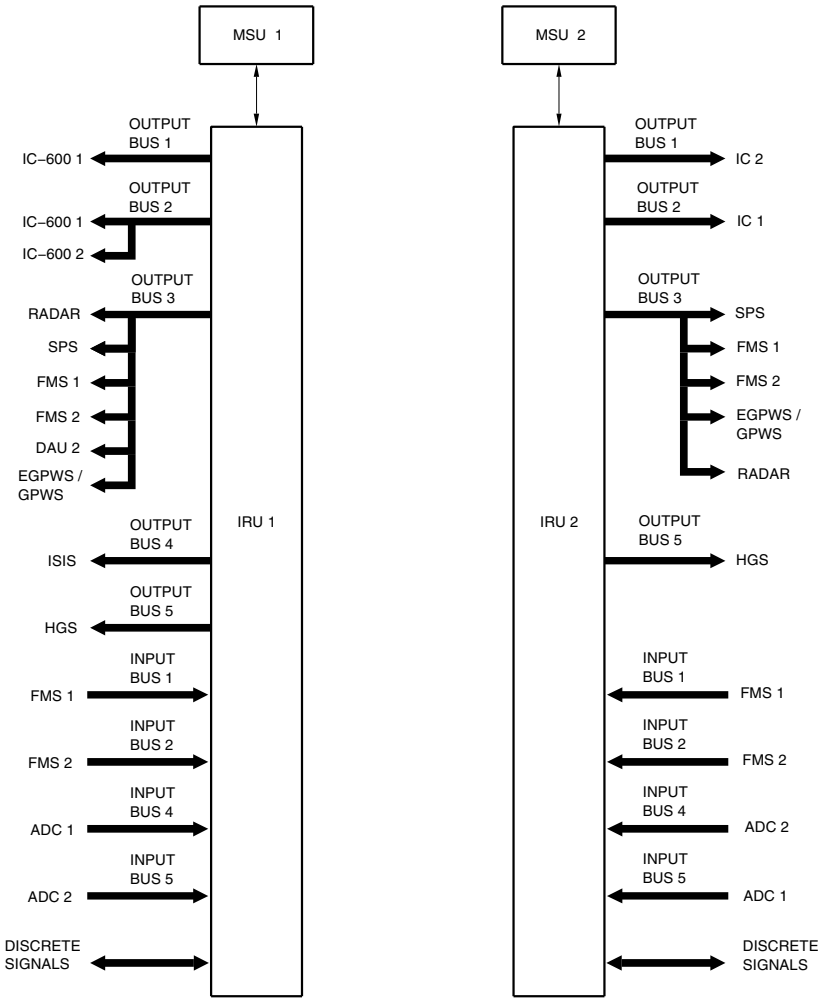

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IRS INTERFACES WITH OTHER SYSTEMS

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INERTIAL REFERENCE SYSTEM COMPONENTS

Each IRS consists of an Inertial Reference Unit (IRU) and a Mode Select Unit (MSU).

Each IRU uses two 28 V DC power inputs, one for normal power (primary source) and the other for backup power (airplane batteries). The IRU 1 primary power source is the Essential DC Bus 1 and its backup power source is the Backup Essential Bus. The IRU 2 primary power source is the DC Bus 2 and its backup power source is the Backup Bus 2. If the IRU loses the primary power, it automatically switches to backup power.

When the IRU operates solely on backup power, it will operate for 40 minutes and the ON BATT annunciator on the Mode Selector Unit will illuminate. The IRS 1 (2) ON BATT advisory message will be presented on the EICAS.

INERTIAL REFERENCE UNIT (IRU)

The Inertial Reference Unit contains three laser gyros and three accelerometers that are mounted on each of the three axis inside the IRU, which it uses to measure inertial motion.

The IRU requires initialization data from the Flight Management System and Air Data Computer. From the inertial measurements, initialization data, and air data inputs, the IRU performs the calculations necessary to provide position, velocity, heading and attitude data to the airplane.

The IRUs are located in the forward electronics compartment.

MODE SELECTOR UNIT (MSU)

The Mode Selector Unit is a cockpit-mounted control panel that provides mode selection, status indication and test initialization for the associated IRU. It has a four-position mode select switch and status and fault annunciators.

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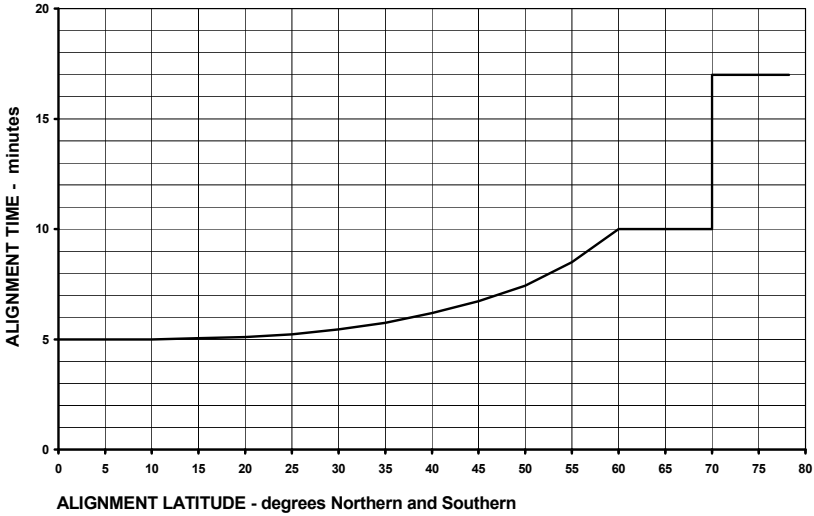
IRS OPERATING MODES

The IRS operating modes may be selected by setting the MSU mode select switch to the desired mode. Under certain conditions the IRU may automatically revert to specific modes and sub-modes.

ALIGNMENT MODES

MSU SET FROM OFF TO ALIGN OR NAV

In the alignment mode, the IRU aligns its reference axis to the local vertical and true north, and estimates the horizontal earth rate components to compute latitude. The latitude at which the IRU is aligned affects the alignment time. The relationship between alignment time and latitude is shown in the chart below.



The airplane must remain stationary during alignment, while the MSU ALIGN annunciator is lit and IRS 1 (2) ALN advisory message presented on the EICAS. If the IRU detects excessive airplane motion IRS 1 (2) EXC MOTION advisory message is presented on the EICAS and it starts an automatic full realignment 30 ± 1 seconds after the motion stops. Normal passenger-loading or cargo-loading activities should not cause an excessive airplane motion condition.

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NOTE: To complete the alignment, the IRU requires a valid input of the airplane's present position (latitude and longitude) from the FMS.

While the present position is not entered on FMS the IRS 1 (2) NO PPOS caution message will be presented on EICAS. If the present position is not entered during the normal alignment time, the MSU ALIGN annunciator flashes and the IRS 1 (2) ALN FAULT caution message will be presented on the EICAS. The IRU will not complete the alignment phase and/or will not enter the NAV mode until it receives a valid position input from the FMS.

The IRU accepts multiple entries of latitude and longitude. More than one entry may be necessary to confirm, update or correct the position. However, the IRU does not accept new position inputs until 2 seconds after the previous input. A new position entry overwrites the previous entry, and the IRU uses only the latest entry for its calculations. The IRU conducts a position comparison test on latitude and longitude immediately after each data has been entered. To pass the test, the entered data must compare within 1 degree of the stored latitude/longitude from the last power down from the NAV mode. If the test fails, the MSU ALIGN annunciator flashes and an IRS 1 (2) ALN FAULT caution message will be presented on the EICAS. If a second present position entry do not pass in the test the IRS 1 (2) FAIL will be presented on the EICAS.

No attitude and heading is displayed during align mode.

MSU SET FROM NAV TO ALIGN OR NAV TO ALIGN AND BACK TO NAV (TO BE USED ON THROUGH FLIGHTS):

This command will revert the IRU to the align down-mode, which zeroes residual velocity errors accumulated during the previous navigation mode operation. The fine leveling process of the align mode is reactivated, and heading accuracy is updated. When the IRU enters the align down-mode, the ALIGN annunciator illuminates and an IRS 1 (2) ALN advisory message is presented on the EICAS.

The airplane must be stationary (ground speed less than 20 knots) during the align down-mode otherwise an automatic full realignment will begin in 30 seconds after an excessive airplane motion stops.

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AUTOMATIC NAVIGATION REALIGNMENT (ANR):

The ANR is entered automatically and concurrently with normal mode operations, when the IRU senses that the airplane has completed a "no motion period" (between 7.5 and 15 minutes, as a function of latitude). In the ANR sub-mode, the IRU applies corrections by zeroing velocities, resetting the attitude platform, and correcting heading errors accumulated during the previous navigation mode operation. When the IRU enters the ANR sub-mode, the ALIGN annunciator illuminates and an IRS 1 (2) ALN advisory message is presented on the EICAS.

NAVIGATION MODE

The IRU enters the NAV mode after completing its alignment when the IRU MSU switch is set to NAV. In the NAV mode, the IRU uses the last valid position data entered during the align mode or align down-mode as its initial present position and updates the present position based only on inertial data while it remains in the NAV mode. The IRU algebraically adds computed magnetic variations from a magnetic variation topographical map (MAGVAR) to true heading and true track to produce magnetic heading and track magnetic angle. The magnetic heading and magnetic tracking angle outputs are set to no computed data (NCD) inside a northern and southern latitude cutout area.

ATTITUDE MODE

The attitude mode is the IRU's reversionary mode. It is automatically entered by the IRU if it experiences in-flight loss of power, or it may be selected by the crew if the FAULT annunciator lights and an IRS 1 (2) FAIL caution message is presented on the EICAS, indicating a critical fault, that invalidates all outputs.

CAUTION: THE MSU SWITCH MUST NOT BE SET TO ATTITUDE MODE INADVERTENTLY. IF THIS OCCURS ON THE GROUND, IT IS NECESSARY TO SET THE MSU SWITCH TO OFF FOR AT LEAST 3 SECONDS, THEN BACK TO ALIGN OR NAV. IF ATTITUDE MODE IS SET IN-FLIGHT, IT IS NOT POSSIBLE TO RECOVER THE NAV MODE.

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This mode provides a quick attitude restart: during the first 20 seconds the IRU enters the erect attitude transitional mode. In this transitional mode the IRU computes a new level axis set. The airplane must be held steady, straight and level until the MSU ALIGN annunciator extinguishes itself and an IRS 1 (2) ALN advisory message disappears from the EICAS.

When operating in the attitude mode the IRS 1 (2) ATT MODE caution message is presented on the EICAS. In this mode, attitude outputs are not as accurate as when operating in the NAV mode, and magnetic heading must be entered periodically through the FMS Control Display Unit.

POWER-OFF MODE

The IRU enters the power-down mode when the MSU switch is set to OFF and remains in that position for 3 seconds (to prevent inadvertent selection). After that, power continues for 10 to 15 seconds to transfer the last calculated latitude and longitude and other IRS parameters to its non-volatile memory. The ALIGN annunciator illuminates when the IRU is in the power-down mode (and an IRS 1 (2) ALN advisory message is presented on the EICAS).

NOTE: The airplane must not be de-energized before the ALIGN annunciator light extinguishes.

De-energizing the airplane before the ALIGN annunciator extinguishes itself (and an IRS 1 (2) ALN advisory message is removed from the EICAS) may interrupt the transferring process of the IRU's last calculated position and other IRS parameters to its non-volatile memory, which will affect the next alignment.

TEST MODE

The test mode is selected by pressing the MSU test switch. The test mode can be selected in either the align mode or the NAV mode without affecting basic IRS function. The test mode is inhibited in the attitude mode and in the NAV mode when airplane ground speed exceeds 20 knots.

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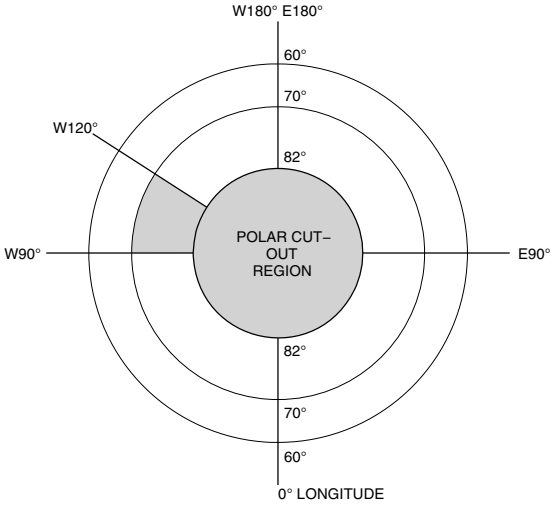
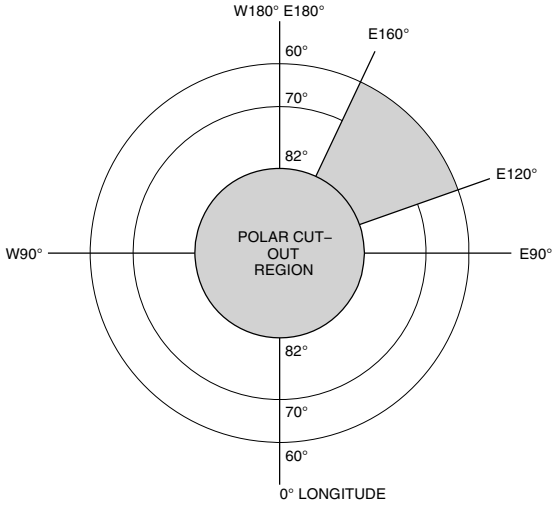


NORTHERN LATITUDE CUTOUT



SOUTHERN LATITUDE CUTOUT

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MAGNETIC VARIATION LATITUDE CUTOUTS

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IRS OPERATING PROCEDURES

POWER-ON AND ALIGNMENT

– Check the MSU switch set to OFF.

– After energizing the airplane press the AVIONICS MASTER Buttons.

– Set the MSU switch to ALIGN or NAV ALIGN annunciator illuminates (ON BATT and NO AIR annunciators may illuminate briefly). An IRS 1 (2) ALN advisory message is displayed on the EICAS.

– Through the FMS initial position page, accept one of the present position options.

– Wait for completion of alignment. When selecting NAV directly, the IRU automatically enters the NAV mode after successful completion of alignment.

NAVIGATION MODE ENTRY

– If the MSU switch was set to NAV, make sure that the ALIGN annunciator goes out and an IRS 1 (2) ALN advisory message disappears from the EICAS.

– If the MSU switch is set to ALIGN, set the MSU switch to NAV when the NAV RDY annunciator lights.

– The IRU outputs inertial data to all displays and systems.

ALIGNMENT DOWNMODE ("FAST ALIGNMENT" - TO BE USED ON THROUGH FLIGHTS)

– The airplane must be stationary.

– Pull the MSU switch out of NAV detent and set it from NAV to ALIGN. The ALIGN annunciator will illuminate and an IRS 1 (2) ALN advisory message displayed on the EICAS.

– If the IRU position is the same as the known position, set MSU switch to NAV after the ALIGN annunciator illuminates and an IRS 1 (2) ALN advisory message is presented on the EICAS. The IRU automatically enters NAV mode after 30 seconds.

– If the IRU position is different from the known position, re-initialize the IRU with a new position entry through the FMS CDU.

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ATTITUDE MODE SELECTION

The following procedure applies to the selection of the ATT mode after the FAULT annunciator has illuminated and an IRS 1 (2) FAIL caution message is presented on the EICAS:

– Set the MSU switch to ATT.

– If the FAULT annunciator extinguishes itself, the ALIGN annunciator will illuminate for 20 seconds and an IRS 1 (2) ALN advisory message is presented on the EICAS.

– Hold the airplane steady, straight and level until the ALIGN annunciator extinguishes itself and an IRS 1 (2) ALN advisory message disappears from the EICAS.

– Initialize the IRU with magnetic heading through the FMS CDU.

– Update heading periodically through the FMS CDU.

– When operating in the attitude mode the IRS 1 (2) ATT MODE caution is presented on the EICAS.

CAUTION: WHEN OPERATING IN THE ATTITUDE MODE, ATTITUDE OUTPUTS ARE NOT AS ACCURATE AS WHEN OPERATING IN THE NAV MODE, AND MAGNETIC HEADING MUST BE ENTERED PERIODICALLY, THROUGH THE FMS CDU.

POWER DOWN

– Set the MSU switch to OFF. The ALIGN annunciator illuminates and an IRS 1 (2) ALN advisory message is presented on the EICAS.

– After the ALIGN annunciator extinguishes itself and an IRS 1 (2) ALN advisory message is removed from the EICAS, de-energize the airplane.

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IRS EICAS MESSAGES

TYPE	MESSAGE	MEANING
CAUTION	IRS 1 (2) ALN FAULT	The associated IRS did not complete the alignment phase successfully.
	IRS 1 (2) ATT MODE	The associated IRS is selected to attitude mode.
	IRS 1 (2) FAIL	The associated IRS has failed.
	IRS 1 (2) NO PPOS	The present position has not been entered.
	IRS 1 (2) OVERHEAT	The associated IRS is overheated.
ADVISORY	IRS 1 (2) ALN	The associated IRS is in the alignment phase or the IRU mode select switch is set at ALIGN position.
	IRS 1 (2) EXC MOTION	The associated IRS detected excessive motion during the alignment phase.
	IRS 1 (2) NO MAG HDG	There is no magnetic heading available.
	IRS 1 (2) ON BATT	The associated IRS is being powered by the airplane batteries.

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IRS CONTROLS AND INDICATORS

MSU CONTROL PANEL

1 - TEST SWITCH

TEST	When the TEST switch is pressed the IRU enters the self-test sub-mode.

2 - ANNUNCIATORS

ALIGN	Indicates that the IRU is in the align mode. A flashing ALIGN annunciator indicates that latitude/longitude was not accepted by the IRU.
FAULT	Indicates an IRU fault.
ON BATT	Indicates that the IRU is being powered by the airplane batteries.
BATT FAIL	Indicates that the airplane batteries are incapable of sustaining IRS operation on backup power operation.
NAV RDY	Indicates that alignment is complete, if the MSU switch is set to ALIGN.
NO AIR	Indicates that cooling air is inadequate to cool the IRU.

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3 - MODE SELECTOR SWITCH

OFF The IRU circuitry is OFF. However, when the IRU is operating and the MSU switch is moved from another position to OFF, there will be a delay of 3 seconds before the IRU starts the power-down routine, in order to prevent its inadvertent selection.

ALIGN Once this mode is selected the IRU starts the full alignment or alignment down-mode. ALIGN annunciator is ON and an IRS 1 (2) ALN advisory message is presented on the EICAS.

NAV There is a detent in the NAV position. The switch must be pulled out of the detent to be moved to another position.

ATT If the MSU switch is placed at this position, after 2 seconds (time delay incorporated to prevent inadvertent selection of the ATT mode) the IRU enters the erect attitude sub-mode for 20 seconds, during which the ALIGN annunciator illuminates. Then the IRU enters the attitude mode and the IRS 1 (2) ATT MODE caution message will be presented on the EICAS. On the ground, the MSU switch must be set to OFF for at least 3 seconds before the ALIGN or NAV mode can be re-established.

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MENU
PREVIOUS
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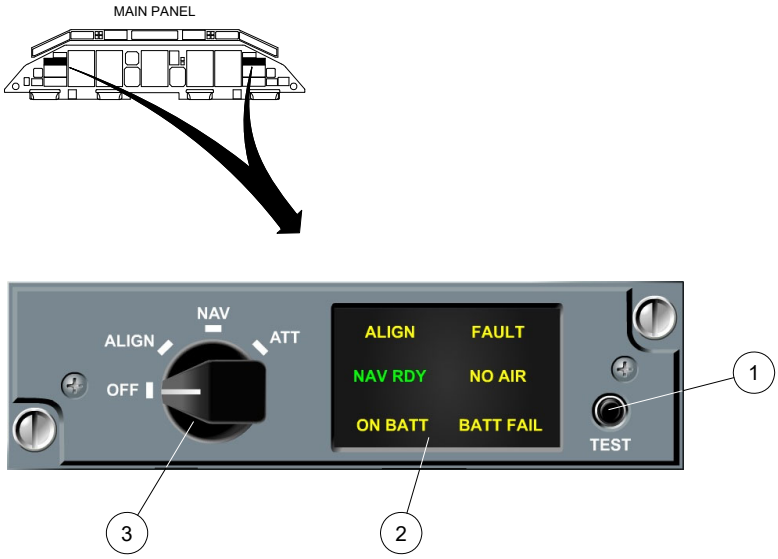

IRS MODE SELECTOR UNIT

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IRS INDICATIONS ON THE PFD

ELECTRONIC ATTITUDE DIRECTOR INDICATOR (EADI)

1 – ATTITUDE SPHERE

- Color:
  - Sky: blue.
  - Ground: brown.

2 – ROLL SCALE

- Color: white.
- Range: 360 degrees.
- Resolution: 10, 20, 30 and 60 degrees for left and right roll attitudes.
- Fixed pointers (unfilled triangles) are located at zero degrees and 45 degrees (LH and RH).

3 – ROLL POINTER

- Color: white.
- Provides the roll angular indication against the roll scale.

4 – EXCESSIVE PITCH CHEVRONS

- Color: red.
- Marks -45 and 65 degrees pitch up, and 35, 50 and 65 degrees pitch down.

5 – PITCH SCALE

- Color: white.
- Range: 0 to 90 degrees (pitch up and pitch down).
- Marks:
  - Pitch up: 0, 5, 10, 15, 20, 25, 30, 40, 60 and 90 degrees.
  - Pitch down: 5, 10, 15, 20, 25, 30, 45, 60 and 90 degrees.

6 – GROUND/SKY REFERENCE EYEBROW

- Color: blue or brown.
- The eyebrow provides a quick ground/sky reference for attitudes where the horizon line is out of the display.

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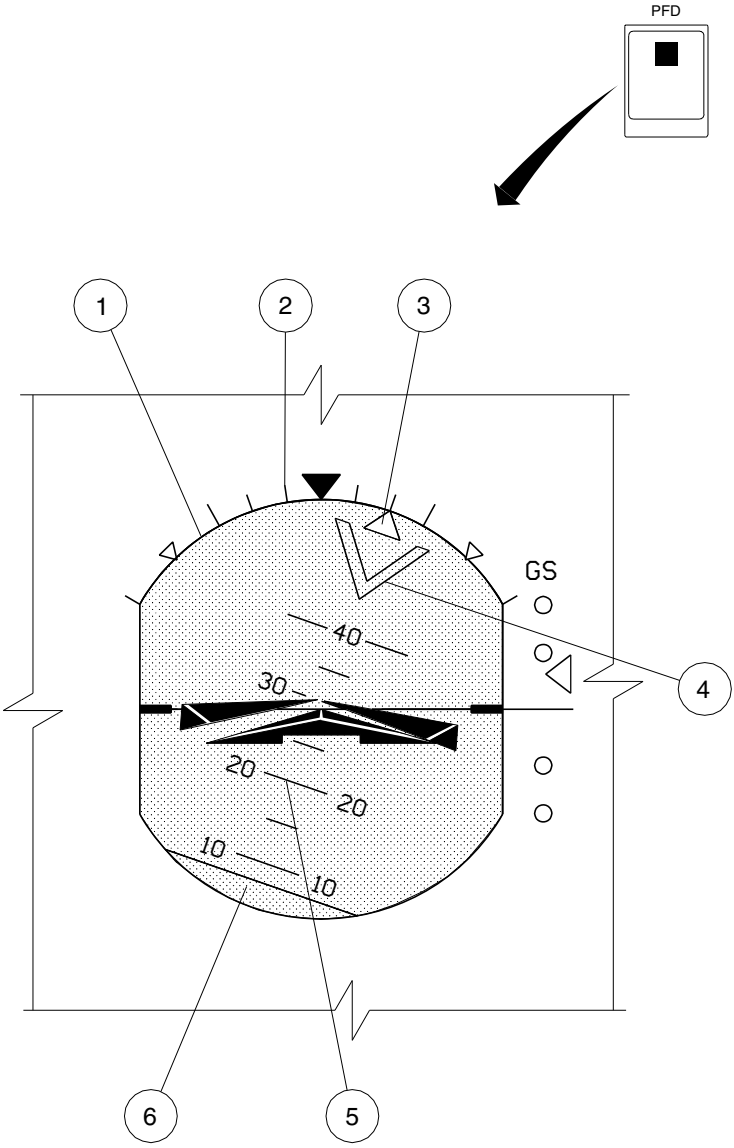

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ELECTRONIC ATTITUDE DIRECTOR INDICATOR

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ATTITUDE DECLUTTER

When there is an excessive attitude situation, certain indicators are removed in order to declutter the PFD.

Excessive attitude situation occurs when roll attitude is greater than 65 degrees, or pitch attitude greater than 30 degrees nose up or 20 degrees nose down.

In this case, the following symbology shall be removed from the display:

- Flight Director couple arrow.
- Low Bank limit arc.
- Flight Director command bars.
- Vertical Deviation scale, pointer and label.
- Radio Altitude digits, label and box.
- Marker beacons indicators.
- Decision Height digits and labels.
- Selected Airspeed bug and indicators.
- Vertical Speed bug and indicators.
- Selected Altitude bug, indicators and box.
- All failure flags associated with the items listed above.
- The Heading, Radio Altitude, LOC, GS, and ILS comparison monitor displays.

The PFD indicators will be restored when the two conditions below are met:

- Roll attitude less than 63 degrees left and right.
- Pitch less than 28 degrees nose up and greater than 18 degrees nose down.

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ELECTRONIC HORIZONTAL SITUATION INDICATOR (EHSI)

1 - COMPASS CARD DISPLAY

May be displayed in the Full Compass or Arc formats, selected via the Display Control Panel (Refer to Section 2-18-40).

- Color: white.
- Range: 360 degrees.
- Resolution: 5 degrees.

2 - HEADING LUBBER LINE (FULL COMPASS FORMAT)

- Color: white.
- Provides the current heading reading against the heading scale.

3 - CURRENT HEADING DIGITAL DISPLAY (ARC FORMAT)

- Color:
  - Open box: white.
  - Digits: white.
- Range: 0 to 360 degrees.
- Resolution: 1 degree.

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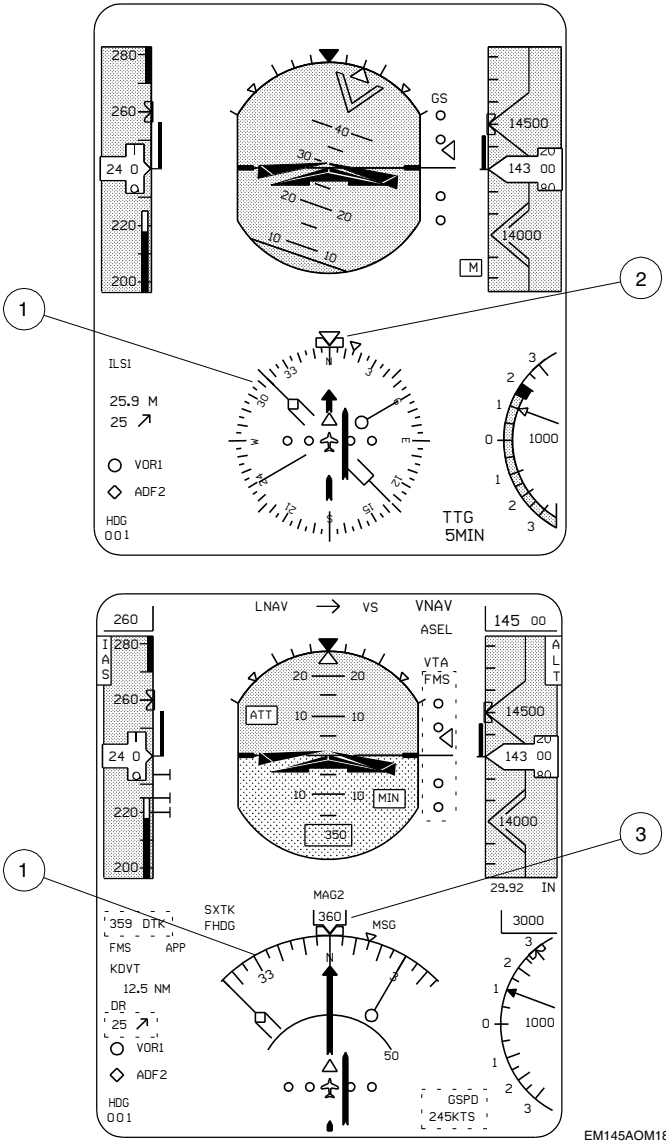

EHSI – FULL COMPASS AND ARC FORMATS

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COMPARISON MONITORS

1 - ATTITUDE COMPARISON MONITOR DISPLAY

- Label: ROL, PIT or ATT.
- Color: amber.
- If roll information deviates by more than 6 degrees between the PFD 1 and PFD 2, a ROL comparison monitor will be displayed inside the attitude sphere.
- If pitch information deviates by more than 5 degrees between the PFD 1 and PFD 2, a PIT comparison monitor will be displayed in the upper-left portion of the attitude sphere.
- Simultaneous activation of the both pitch and roll comparison monitors will be announced by an ATT label displayed in the upper-left portion of the attitude sphere, in the same field of the ROL and PIT comparison monitors.

2 - ATTITUDE FAILURE DISPLAY

- Removal of the pitch scale and roll pointer.
- Coloring the attitude sphere overall blue.
- A red ATT FAIL label is displayed on the top center of the attitude sphere.

3 - ATTITUDE SOURCE ANNUNCIATION

- Label: ATT1 for IRS 1 and ATT2 for IRS 2.
- Color: amber when one AHRS supplies both sides or both IRS are supplying cross-side.
- Annunciations are removed when both IRS are supplying on-side PFDs.

4 - HEADING SOURCE ANNUNCIATION

- Label:
  - MAG1 or MAG2 when cross-side IRS source is selected.
- Color:
  - For MAG: amber when the same IRS is supplying both sides or both IRS are supplying cross-side.
- When both IRS are supplying on-side, annunciation is removed.
- If a heading source becomes invalid the heading source annunciation will refer to the invalid heading source, HDG 1 or HDG 2, as applicable.

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5 - HEADING COMPARISON MONITOR DISPLAY

- Color: amber.
- Label: HDG.
- Activated when a difference of 6 degrees between both PFDs is found and the airplane roll is less than 6 degrees.
- For airplane rolls greater than 6 degrees, annunciation will be displayed if the difference between both PFDs is greater than 12 degrees.
- The HDG threshold will be restored to 6 degrees if the airplane roll is less than 5 degrees for 90 seconds. Otherwise, a 12 degrees HDG threshold will be maintained.

6 - HEADING FAILURE DISPLAY

- Digital heading bug symbol is removed and a red HDG FAIL annunciation is displayed on the PFD and MFD compass cards.
- The bearing pointers, map display, To/From, selected heading bug, drift angle, selected course/track and course deviation displays will be removed.
- Heading source annunciation will be HDG 1 or HDG 2.
- Heading select and course select/desired track digital display will be replaced by amber dashes.

7 - COURSE DEVIATION FAILURE

- Pointer is removed.
- Red X displayed over the scale.

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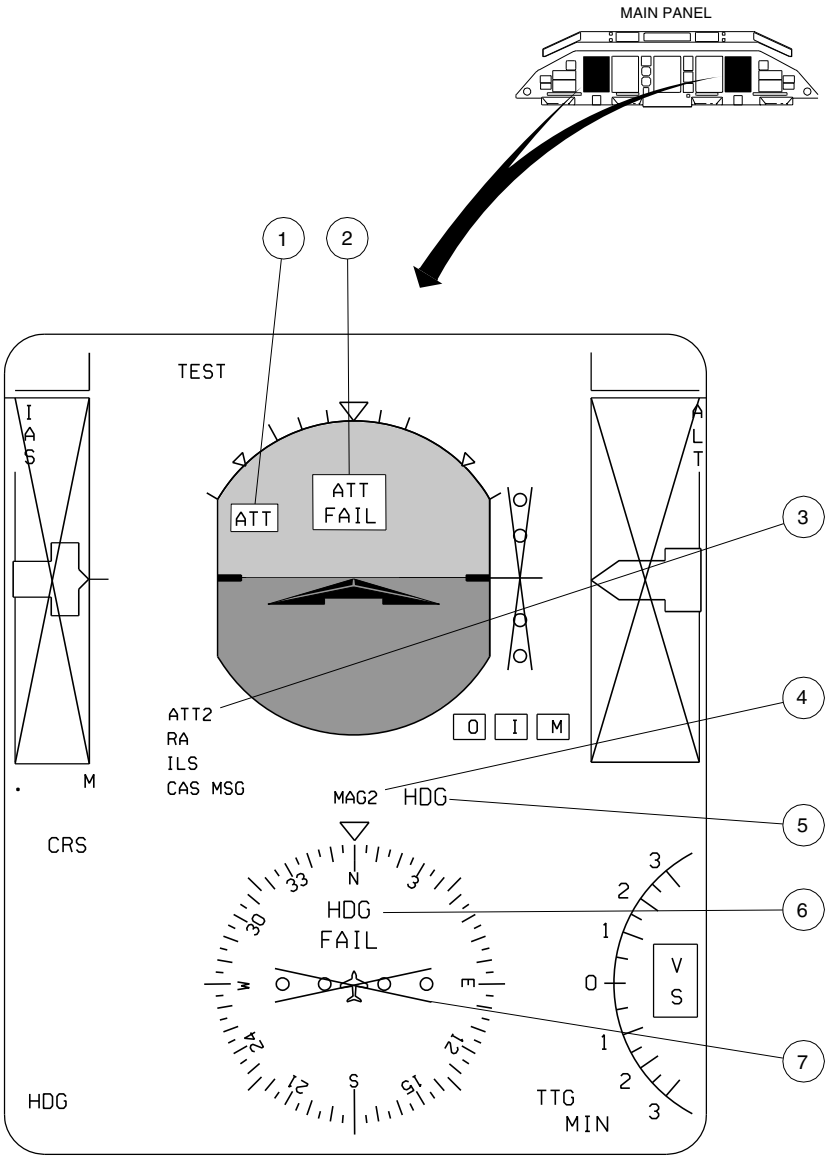

EM145AOM182022.DGN

IRS FAIL INDICATION ON THE PFD

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FLIGHT MANAGEMENT SYSTEM (FMZ2000)

The FMZ2000 Flight Management System (FMS) controls a complete range of navigation functions. Its primary purpose is to provide high accuracy in long range lateral and vertical navigation. The system may be installed with a single or dual configuration. Should the airplane have a dual configuration, each unit can provide navigation data to the other unit. For additional information on functions and operation, refer to the manufacturer's manual.

The FMS is mainly composed of the following components:

– Control Display Unit (CDU).

– Navigation Computer (NZ).

– Data Loader (DL) or Portable Data Transfer Unit (PDTU).

The FMS operates in the following situations: Oceanic, Remote, North Atlantic High Level Airspace, North Atlantic Minimum Navigation Performance Specification Airspace, Enroute, Terminal, Non-Precision Approach and Required Navigation Performance 10.

The FMS interfaces with the followings systems and equipment:

– GPS sensor(s), ADC 1 and ADC 2: The GPS receives satellite data through the passive GPS antenna, processing and blending collected data with ADC data and sends the resulting information to the FMS computer.

– IRS 1 and IRS 2: Provides the necessary data to compute wind and for Dead Reckoning Mode, when the subsystem is not capable of navigating by itself.

– MFD and PFD: The FMS provides data for display navigation guidance on the PFD and navigation map data on the MFD.

– RMU 1 and RMU 2: The RMU interfaces with the FMS computer to control the operating frequencies, modes and channels of the various radios. For the dual configuration, each RMU supplies each respective on-side NZ.

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– COM 1 and COM 2, NAV 1 and NAV 2: The FMS includes a radio-tuning page on which the pilot can manually select the VHF NAV and COM frequencies. Only the NAV frequency is fed back to the FMS computer for verification of the tuning action. COM 1 and COM 2 interface with FMS through the RMUs. The FMS can also automatically select the NAV radio frequencies.

– The FMS also provides latitude and longitude to TCAS.

The Control Display Unit (CDU), located on the control pedestal, provides control functions management and operating modes for proper FMS operation.

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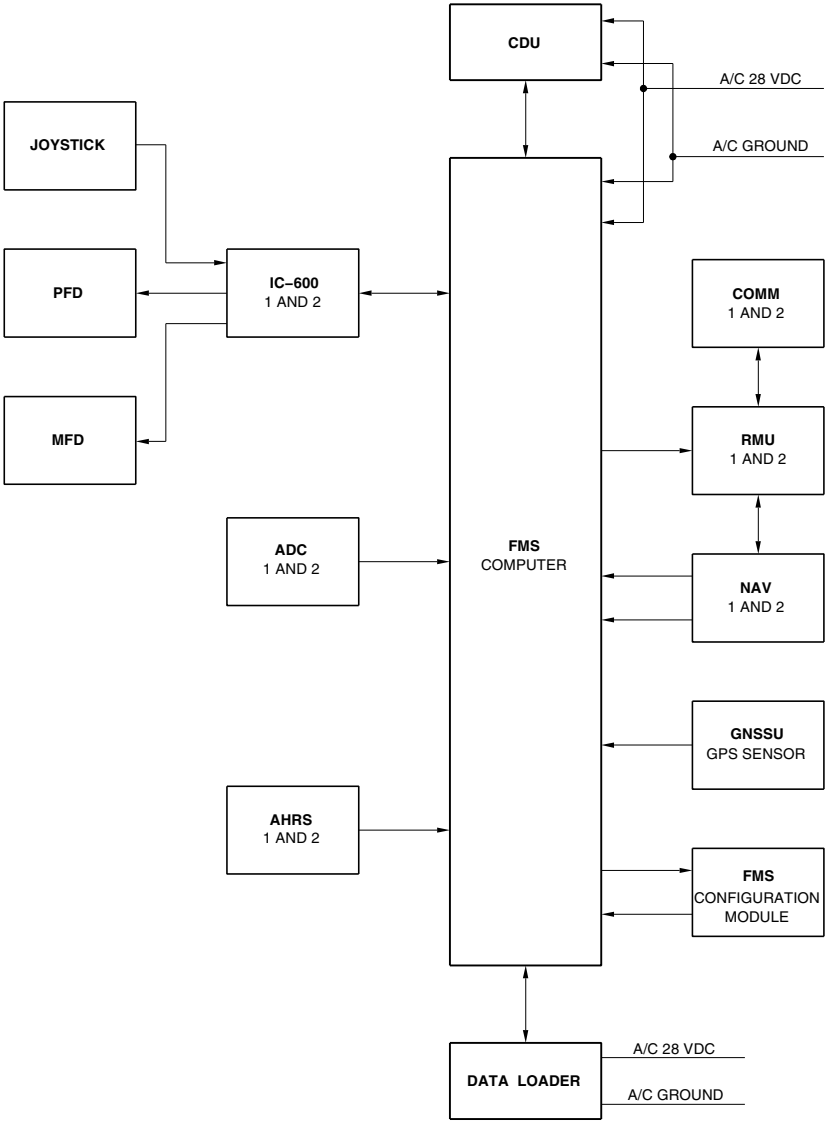

FMS SCHEMATIC

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FMS OPERATING MODES

FMS FUNCTIONS

NAVIGATION

The navigation function computes the airplane position and velocity for all phases of flight. The navigation priority modes, based on sensor accuracy, are as follows:

– GPS;

– DME/DME;

– VOR/DME;

– IRS (if installed).

The GPS is the most accurate sensor. When the GPS is in use, the other sensors are still monitored for position differences, but they do not contribute to FMS position, unless the GPS becomes inaccurate, unavailable or is manually deselected. In this case, the FMS automatically tunes the DME/DME in order to provide position. When DME/DME is not accurate, the VOR/DME is selected.

On airplanes equipped with dual Inertial Reference System (IRS), replacing the AHRS, the IRS is used as a primary navigation sensor when other navaid are not available.

If all position sensors and radios are lost, the FMS shifts to Degrade Mode (DGRAD) and in approximately 2 minutes it enters the Dead Reckoning Mode (DR). In this mode, the position is calculated using the last known airplane position. The ground speed and track are estimated with IRS heading, ADC TAS and the last known wind data.

The dual FMS configuration may operate with dual IRS and dual GPS providing four long-range navigation sensors. The sensors status may be accessed in the NAV INDEX 1/2 page.

In this configuration, on-side FMS outputs and flight plan information are available to the opposite-side FMS through an interconnecting bus.

The automatic tuning is made through the RMU for computing an optimum position. The FMS also includes a radio-tuning page on which the pilot can manually select VHF NAV, COM, ADF and transponder frequencies. The FMS has the capability of tuning communication frequencies in the 8.33 kHz channel spacing.

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FLIGHT PLANNING

The flight planning function computes the active flight plan with both lateral and vertical definition.

When the FMS long-range navigation is selected, the flight director command bars will provide the visual command to bank the airplane to the desired track.

The VNAV is applicable only for the descent path and it is not coupled to the flight director, being only a reference information displayed on the PFD glide slope scale.

Additionally the navigation computer can be programmed by the operator to automatically fly different types of holding patterns.

DATA BASE

The database contains worldwide coverage of navaids, airways, departure procedures, approach procedures, Standard Terminal Arrival Routes (STARs), airports and runways. This information is updated every 28 days. The database can also store up to 200 pilot-defined flight plans and waypoints, which are only updated when changed by the pilot.

In single configuration, the Data Loader (DL) is used to update the Database, transfering data to and from the Navigation Computer. In this configuration, this unit can be installed on the left lateral console, close to the pilot's mask stowage box.

In dual configuration, the Portable Data Transfer Unit (PDTU) is used to reload entire information package at each update by using a 3 1/2" floppy disk or an USB drive.

NOTE: USB Drive must be formatted for (file allocation table) FAT File System (MS-DOS compatible). The communications protocols will operate on any file located in the root directory. The USB drive capacity should be at least 16 Megabytes (MB).

NAVIGATION DISPLAY

A multiple waypoints map, based on the airplane's present position, can be displayed on the MFD. It comprises the Waypoints connected by white lines defining a pre-planned route, and also navaids and airports.

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FMS MODES

The dual FMS configuration provides four operating modes that may be accessed through the FMS MAINTENANCE 1/3 page:

DUAL MODE

In this mode, the following information is automatically transferred to the cross-side FMS: flight plan, performance data, waypoints defined by the pilot, flight plans created in one system and radio tuning.

NOTE: For the proper operation in DUAL mode it is necessary to use the same software version, same NAV and CUSTOM data bases and same settings for both systems in the Configuration Modules. The initial position difference between both systems shall not be more than 10 NM.

INITIATED TRANSFER MODE

In this mode the flight plan and performance data entry will only be transferred to the cross-side FMS through the prompt command available in the last page of the ACTIVE FLT PLAN pages. Waypoints defined by the pilot, created flight plans and radio tuning are automatically transferred to the cross-side FMS.

NOTE: For the proper operation in INITIATED TRANSFER mode it is necessary to use the same software version, same NAV and CUSTOM data bases and same settings for both systems in the Configuration Modules. The initial position difference between both systems shall not be more than 10 NM.

INDEPENDENT MODE

In this mode, only the radio tuning is automatically transferred to the cross-side FMS.

NOTE: To operate in the INDEPENDENT mode, it is necessary to use the same software version and same settings in the Configuration Modules. If any of these requirements is not accomplished, the system automatically passes for the possible operating mode. For instance, if only the CUSTOM database differs in both systems, the operating mode automatically switches from DUAL to INDEPENDENT.

SINGLE MODE

No information is exchanged between both systems.

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FMS CONTROLS AND INDICATORS

CONTROL DISPLAY UNIT (CDU-820)

1 - ANNUNCIATORS

The annunciators are located on the top of the LCD display.

- Colors:
  - White: indicating advisory annunciation.
  - Amber: indicating alerting annunciation.

DSPLY (white)	Illuminates when the CDU displays a page that is not relative to the current airplane lateral or vertical flight path. This annunciator is not shown on the PFD.
DR (amber)	Illuminates when a radio updating loss occurs, as well as all other position sensors, for a period longer than 2 minutes.
DGRAD (amber)	Illuminates when the FMS cannot guarantee the position accuracy for the present phase of the flight.
MSG (white)	Illuminates when there is a message (advisory or alert) on the scratchpad. The annunciator turns off when the message is cleared from the scratchpad.
OFFSET (white)	Illuminates when a lateral offset path has been entered in the FMS. The annunciator turns off when the offset is removed.
APRCH (white)	Illuminates when the FMS is selected as navigation source and the following conditions are valid: a non-precision instrument approach has been activated from the navigation database, the airplane position is between 2 NM outside the final approach fix and the missed approach point, the DGRAD must be off and FMS using approved sensors for non-precision approach.

NOTE: The FMS transmits all the annunciators to the PFD, except the DSPLY annunciator, so the pilot must not trust only on the FMS CDU for checking the FMS system status.

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2 - LINE SELECT BUTTONS

There are four line select buttons on each side of the CDU that provide the following functions:

- Select submodes within major modes when in an indexed display.
- Used as direct access to the other FMS modes when in a non-indexed display.
- Enter data to the scratchpad.

3 - BRIGHTNESS CONTROL BUTTON

- Used to manually control the brightness of the display.
- Using this button, the photo sensors are activated and maintain the brightness level through a wide range of lighting conditions. The brightness is adjusted pressing up or down the Bright/Dim button, and a control bar will be displayed in the scratchpad.
- The brightness can be adjusted so that, during daylight conditions, the display cannot be seen.

4 - MODE BUTTONS

PERF Displays the performance pages.

NAV Displays the NAV index pages.

FPL It may be used to display the first page of the active flight plan, if the flight plan was previously entered, to manually create a flight plan, to select a stored flight plan and to create a flight plan for storage.

PROG Displays the first progress page, the current status of the flight.

DIR Displays the active flight plan with the DIRECT and INTERCEPT prompts.

5 - ALPHANUMERIC BUTTONS

- Consist of alphabet letters, the numbers 0 through 9, a decimal and a slash. It is used to enter inputs to the FMS. A SP (Space) key is used to insert a space following a character in the scratchpad, and a +/- (Plus/Minus) key will result in a - being entered, changing to + in a subsequent press.
- The alphanumeric keys make entries only on the scratchpad.

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6 - FUNCTIONS BUTTONS

PREV Changes the current page to the previous page.

NEXT Changes the current page to the next page.

CLR Clears alphanumeric entries in the scratchpad or a scratchpad message.

DEL Works together with line select buttons in order to delete waypoints and other items displayed on the CDU. This button is inhibited when a message is displayed.

The CDU has five function buttons directly above the LCD display that will not work if pressed. The following messages will be displayed in the scratchpad:

VIDEO	VIDEO NOT AVAILABLE.
GRAPHIC	GRAPHIC NOT AVAILABLE.
ATC	ATC NOT AVAILABLE.
BACK	BACK COMPLETE.
FN	FN NOT AVAILABLE.

7 - SCRATCHPAD

- It is the working area, located on the bottom line of the display, where the pilot can enter data and/or verify data before line selecting the data into its proper position.
- Data is retained on the scratchpad throughout all mode and page changes.
- The scratchpad also provides advisory and alerting messages to be displayed.

The colors are designed to highlight important information. Color assignments are coordinated as much as possible with other displays. See below the parameters associated to each color:

Vertical	Cyan (Blue)
Atmospheric Data	Cyan (Blue)
Lateral	Green
FROM Waypoint	Yellow
TO Waypoint	Magenta
Prompts and Titles	White
Flight Plan Names	Orange
Index Selections	Green

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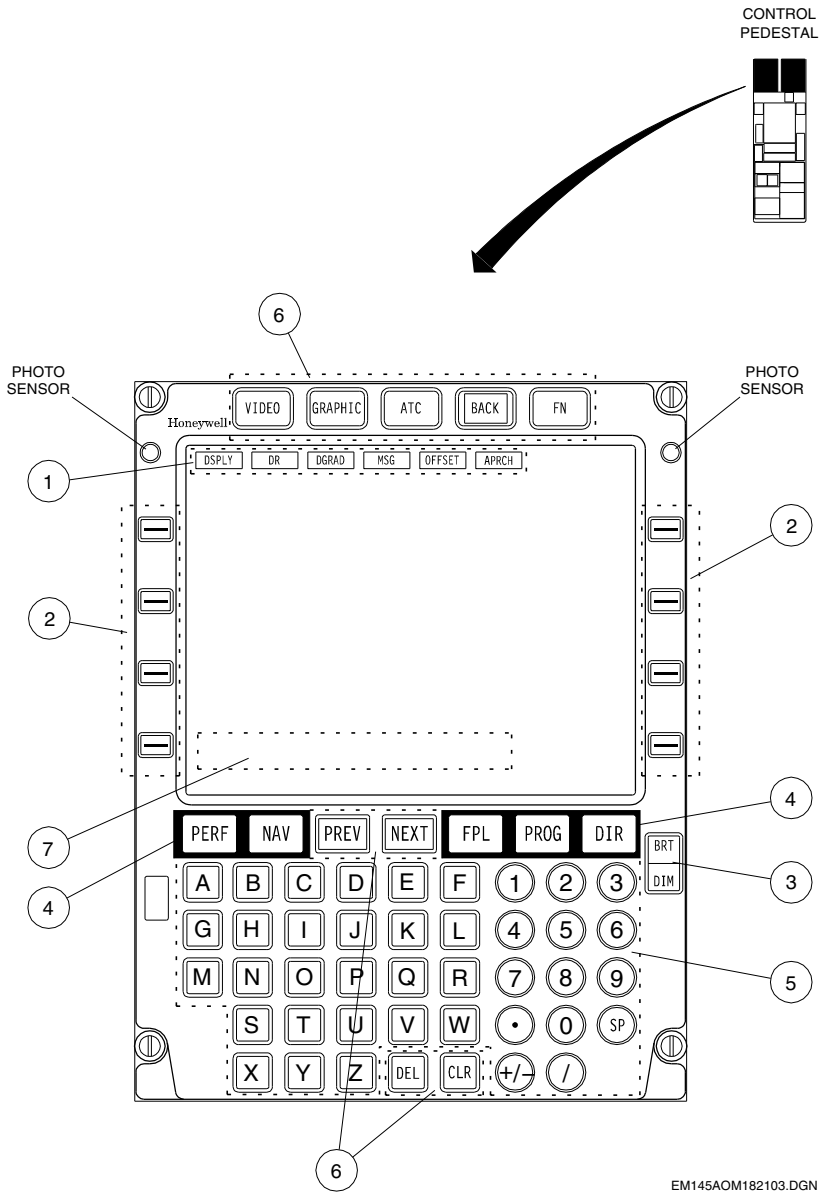

FMZ2000 - FMS CDU-820 CONTROL PANEL

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CONTROL DISPLAY UNIT (CDU-830)

1 - ANNUNCIATORS

The annunciators are located on the top of the LCD display.

- Colors:
  - White: indicating advisory annunciation.
  - Amber: indicating alerting annunciation.

DSPLY (white)	Illuminates when the CDU displays a page that is not relative to the current airplane lateral or vertical flight path. This annunciator is not shown on the PFD.
FMS MSG (white)	Illuminates when there is a FMS message on the scratchpad. The annunciator turns off when the message is cleared from the scratchpad.
DR (amber)	Illuminates when a radio updating loss occurs, as well as all other position sensors, for a period longer than 2 minutes.
DGRAD (amber)	Illuminates when the FMS cannot guarantee the position accuracy for the present phase of the flight.
OFFSET (white)	Illuminates when a lateral offset path has been entered in the FMS. The annunciator turns off when the offset is removed.
APRCH (white)	Illuminates when the FMS is selected as navigation source and the following conditions are valid: a non-precision instrument approach has been activated from the navigation database, the airplane position is between 2 NM outside the final approach fix and the missed approach point, the DGRAD must be off and FMS using approved sensors for non-precision approach.

NOTE: The FMS transmits all the annunciators to the PFD, except the DSPLY annunciator, so the pilot must not trust only on the FMS CDU for checking the FMS system status.

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2 - LINE SELECT BUTTONS

There are four soft line selectable buttons (touchscreen) on each side of the CDU that provide the following functions:

- Select submodes within major modes when in an indexed display.
- Used as direct access to the other FMS modes when in a non-indexed display.
- Enter data to the scratchpad.

3 - BRIGHTNESS CONTROL BUTTON

- Used to manually control the brightness of the display.
- Using this button, the photo sensors are activated and maintain the brightness level through a wide range of lighting conditions. The brightness is adjusted pressing BRT or DIM button, and a control bar will be displayed in the scratchpad.
- The brightness can be adjusted so that, during daylight conditions, the display cannot be seen.

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4 - MODE BUTTONS

ATC Air Traffic Control Key: Pushing the ATC function key permits access to ATC applications. If ATC applications (FANS) are not configured on the airplane, the scratchpad message ATC NOT AVAILABLE is displayed when pushing the ATC function key.

BACK Touch Screen Button: Pushing the BACK touch screen button displays the last selected FMS page.

MENU Permits access to the VIDEO, GRAPHIC, CLEAN TS (Clean touchscreen) and MAINT functions.

NOTE: The CLEAN TOUCH SCREEN page gives the pilot the ability to clean the touch screen without accidentally accessing other pages. To exit this page pilots can wait the timeout (30 seconds) to expire or press any key button. Touching the screen resets the countdown time.

PERF Displays the performance pages.

NAV Displays the NAV index pages.

FPL It may be used to display the first page of the active flight plan, if the flight plan was previously entered, to manually create a flight plan, to select a stored flight plan and to create a flight plan for storage.

PROG Displays the first progress page, the current status of the flight.

DIR Displays the active flight plan with the DIRECT and INTERCEPT prompts.

5 - ALPHANUMERIC BUTTONS

- Consist of alphabet letters, the numbers 0 through 9, a decimal and a slash. It is used to enter inputs to the FMS. A SP (Space) key is used to insert a space following a character in the scratchpad, and a +/- (Plus/Minus) key will result in a - being entered, changing to + in a subsequent press.
- The alphanumeric keys make entries only on the scratchpad.

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6 - FUNCTIONS BUTTONS

PREV Changes the current page to the previous page.

NEXT Changes the current page to the next page.

CLR Clears alphanumeric entries in the scratchpad or a scratchpad message.

DEL Works together with line select buttons in order to delete waypoints and other items displayed on the CDU. This button is inhibited when a message is displayed.

7 - SCRATCHPAD

- It is the working area, located on the bottom line of the display, where the pilot can enter data and/or verify data before line selecting the data into its proper position.
- Data is retained on the scratchpad throughout all mode and page changes.
- The scratchpad also provides advisory and alerting messages to be displayed.

The colors are designed to highlight important information. Color assignments are coordinated as much as possible with other displays. See below the parameters associated to each color:

Vertical	Cyan (Blue)
Atmospheric Data	Cyan (Blue)
Lateral	Green
FROM Waypoint	Yellow
TO Waypoint	Magenta
Prompts and Titles	White
Flight Plan Names	Orange
Index Selections	Green

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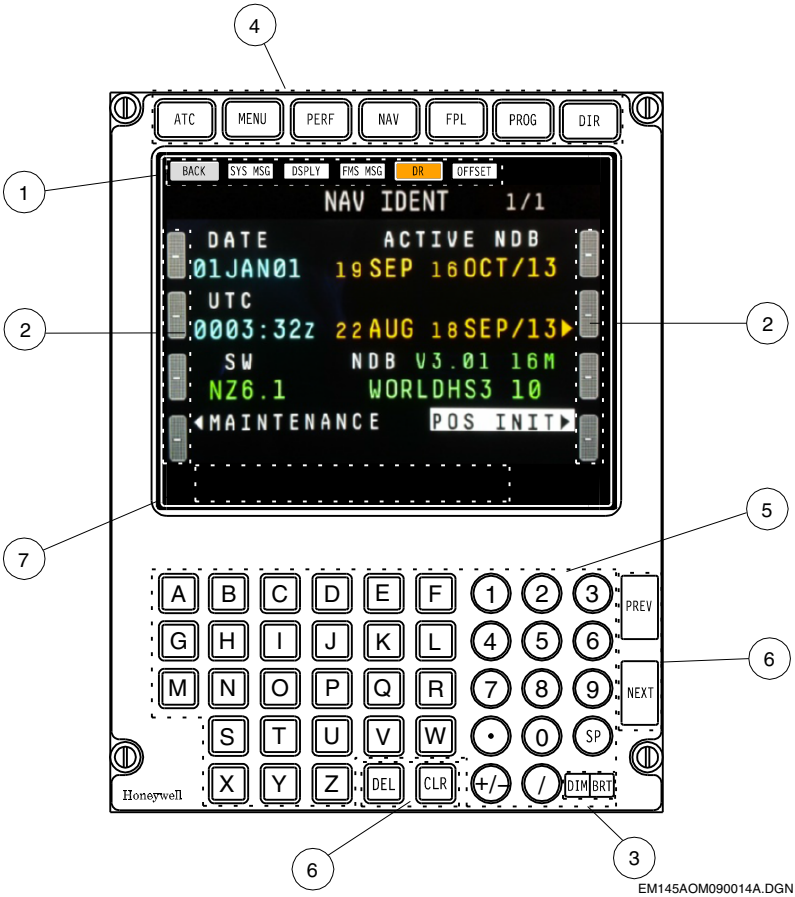

FMZ2000 - FMS CDU-830 CONTROL PANEL

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JOYSTICK (OPTIONAL)

The joystick functions are available through the joystick controller that is located on the control pedestal and through the selection of the MFD JSTK menu.

When the MFD joystick menu is selected, the joystick controller is available to control the Designator Symbol movement on the MFD FMS flight plan.

JOYSTICK OPERATION

On power-up, the designator is co-located with the present flight plan waypoint position.

If MAP mode is selected, moving the joystick controller, will cause the Designator Symbol to be displayed in blue color with a broken line which moves in the same direction from its last waypoint position.

If PLAN mode is selected, moving the joystick controller, the flight plan moves to the opposite direction from its last position, while the Designator Symbol remains fixed at the center of the plan format.

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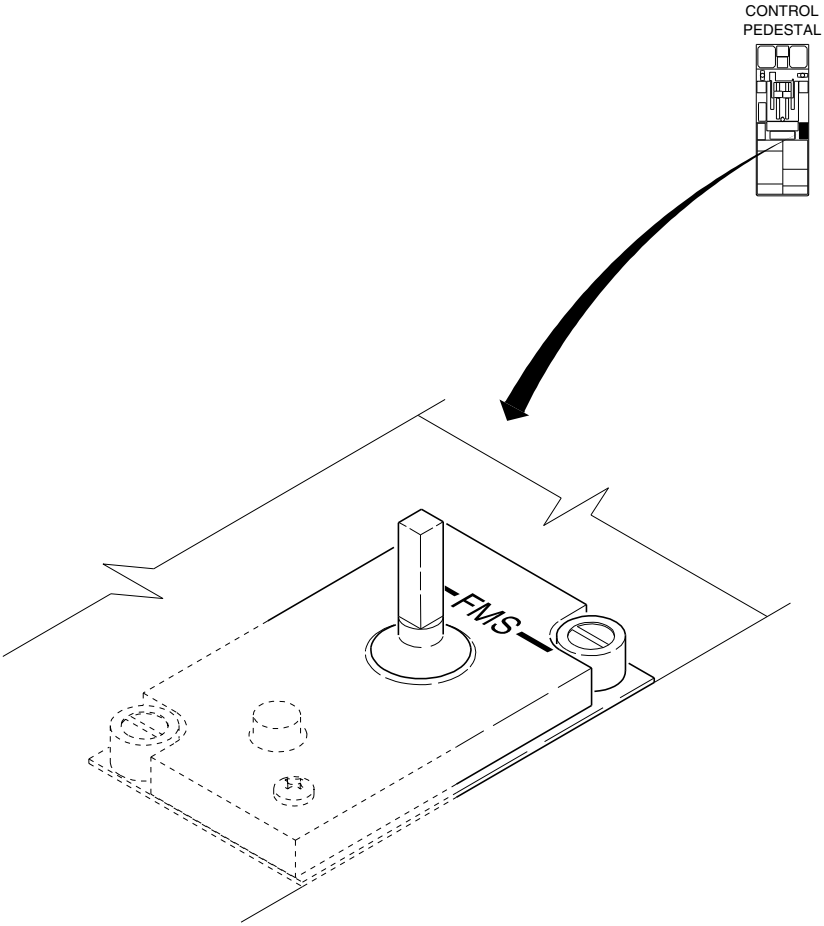

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JOYSTICK CONTROLLER

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JOYSTICK MENU BUTTONS FUNCTION AT MAP MODE

– SKIP ("SKP") button: Skips the designator to the position of the next waypoint in the flight plan in case of the designator is co-located with a plan waypoint. Otherwise, the designator broken line tail skips to the next waypoint in the flight plan.

– RECALL ("RCL") button: Positions the designator at the present position of the airplane and removes the designator box from the display in case of the designator is co-located with the flight plan waypoint. Otherwise, the designator is positioned over the waypoint from which the designator line is extended and the designator line is removed from the display.

– ENTER ("ENT") button: The latitude and longitude coordinates of the designator are transmitted to the selected FMS scratchpad as a requested waypoint.

JOYSTICK MENU BUTTONS FUNCTION AT PLAN MODE

– SKIP ("SKP") button: Positions the flight plan so the next waypoint is displayed over the designator in case of the designator is co-located with a flight plan waypoint. Otherwise, skips the tail of the designator line to the next waypoint in the flight plan.

– RECALL ("RCL") button: Positions the designator at the present position of the airplane and removes the designator box from the display in case of the designator is co-located with a flight plan waypoint. Otherwise, it positions the designator over the waypoint from which the designator line is extended and removes the designator line from the display.

– ENTER ("ENT") button: The latitude and longitude coordinates of the designator are transmitted to the selected FMS scratchpad as a requested waypoint.

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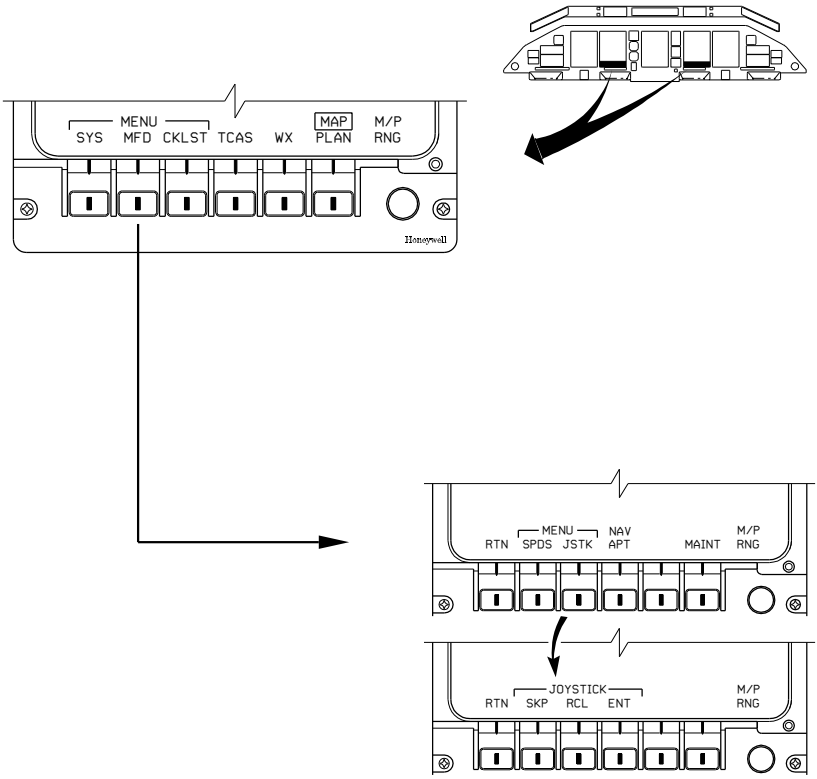

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MFD JOYSTICK MENU

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FLIGHT MANAGEMENT SYSTEM (FMZ2010)

The FMZ2010 Flight Management System (FMS) operates with the FMS NZ6.1 software, indicated on its NAV IDENT page. The FMS NZ6.1 controls a complete range of navigation functions. The primary purpose of a FMS is to manage navigation sensors to produce a composite lateral position and provide lateral flight path guidance together with performance predictions for trip planning. For additional information on functions and operation, refer to the manufacturer's manual.

The FMS consists of the following components:

– NZ-2010 Navigation Computer (NZ).

– IM-803 Configuration Module.

– CD-820 or CD-830 Control Display Unit (CDU).

– DL-950 or DL-1000 Data Loader (DL).

The FMS operates in the following situations: Oceanic, Remote, North Atlantic High Level Airspace, North Atlantic Minimum Navigation Performance Specification Airspace, Enroute, Terminal, Non-Precision Approach, Required Navigation Performance 10, Barometric Vertical Navigation, and Required Navigation Performance.

The FMS interfaces with the followings systems and equipment:

– GPS sensor(s): The GPS receives satellite data through the active GPS antenna, and provides latitude, longitude, and ground speed for FMS navigation.

– ADC 1 and ADC 2: Air data computer provides barometric altitude and airspeed to FMS computer.

– IRS 1 and IRS 2: Provides latitude, longitude, ground speed, and heading information for FMS navigation, FMS wind computation and for FMS Dead Reckoning Mode.

– VOR and DME radios: Provides track angle to VOR stations and distance to DME stations, allowing FMS to compute navigation data.

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– MFD and PFD: The FMS provides navigation guidance on the PFD EHSI, when FMS is selected as navigation source on DC-550 panel, and also next waypoint, distance to waypoint and lateral flight plan on navigation MAP data on the MFD.

– RMU 1 and RMU 2: The RMU interfaces with the FMS computer to control the operating frequencies, modes and channels of the various radios. For the dual configuration, each RMU supplies each respective on-side NZ.

– COM 1 and COM 2, NAV 1 and NAV 2: The FMS includes a radio-tuning page on which the pilot can manually select the VHF NAV and COM frequencies. Only the NAV frequency is fed back to the FMS computer for verification of the tuning action. COM 1 and COM 2 interface with FMS through the RMUs. The FMS can also automatically select the NAV radio frequencies.

– The FMS also provides latitude and longitude to TCAS and EGPWS.

The Control Display Unit (CDU), located on the control pedestal, provides control functions management and operating modes for proper FMS operation.

The FMS Part Number may be identified following the steps below:

1. Push the NAV key to access the NAV INDEX 1/2 page;
2. Push NEXT to access the NAV INDEX page 2/2;
3. Push the MAINTENANCE key to access the maintenance page;
4. Push NEXT key twice to access the Return To Service page;
5. Read the FMS PN according to the following table:

FMS PN	RELATED FMS PN OBTAINED VIA RETURN TO SERVICE PAGE
7018879-03036	FMS_NZ_GEN11002
7018879-03038	FMS_NZ_GEN12002

Both FMS PN are related to FMS NZ6.1. However, for airplanes equipped with FMS PN 7018879-03036 the operation of Saving Flight Plan is limited to two Flight Plans and only allowed if the Custom Database have been cleared via Maintenance page.

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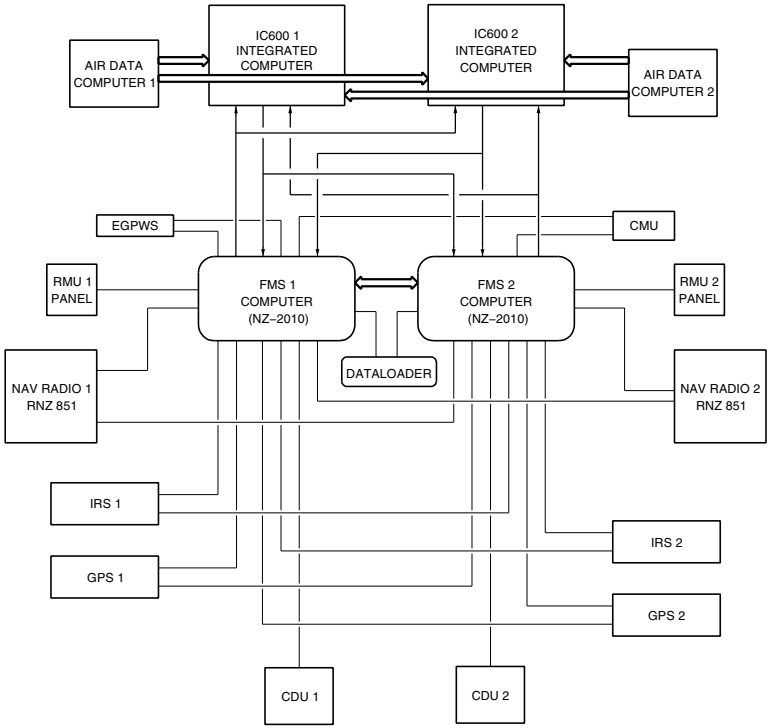

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FMS SCHEMATIC

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FMS OPERATING MODES

FMS FUNCTIONS

NAVIGATION

The position determination function computes the airplane position and velocity for all phases of flight. The FMS receives navigation data from various sensors on board the airplane. The priority of the navigation modes is as follows:

– GPS;

– DME/DME;

– VOR/DME;

– IRS.

The GPS is the most accurate sensor. When GPS is in use, the other sensors are still monitored for position differences, but they do not contribute to FMS position, unless the GPS becomes inaccurate, unavailable or is manually deselected. In this case, the FMS automatically tunes the DME/DME in order to provide position. When DME/DME is not accurate, the VOR/DME is selected.

If all position sensors and radios are lost, the FMS shifts to Degrade Mode (DGRAD) and in approximately 2 minutes it enters the Dead Reckoning Mode (DR). In this mode, the position is calculated using the last known airplane position. The ground speed and track are estimated with IRS heading, ADC TAS and the last known wind data.

FLIGHT PLANNING

The flight planning function computes the active flight plan with both lateral and vertical definition.

The navigation computer has the ability to store and retrieve information of navaids and earth reference points such as airports, navaids, intersections, runways and routes. This information is stored in a database, which is updated every 28 days from a USB drive via the data loader. A reserved area of the internal database memory is used to store up to 1000 pilot-defined waypoints, which are only updated when changed in memory by the operator.

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The operation of saving a Flight Plan may prevent the Speed Intervention function on the FMS, depending on how many waypoints on all Flight Plans have been stored in the Custom Database.

DATA BASE

The database contains worldwide coverage of navaids, airways, departure procedures, approach procedures, Standard Terminal Arrival Routes (STARs), airports and runways. This information is updated every 28 days.

FMS MODES

The dual FMS configuration provides four operating modes that may be accessed through the FMS MAINTENANCE 1/3 page:

DUAL MODE

In this mode, the following information is automatically transferred to the cross-side FMS: flight plan, performance data, waypoints defined by the pilot, flight plans created in one system and radio tuning.

INITIATED TRANSFER MODE

In this mode the flight plan and performance data entry will only be transferred to the cross-side FMS through the prompt command available in the last page of the ACTIVE FLT PLAN pages. Waypoints defined by the pilot, created flight plans and radio tuning are automatically transferred to the cross-side FMS.

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INDEPENDENT MODE

In this mode, only the radio tuning is automatically transferred to the cross-side FMS.

NOTE: To operate in the INDEPENDENT mode, it is necessary to use the same software version and same settings in the Configuration Modules. If any of these requirements is not accomplished, the system automatically passes for the possible operating mode. For instance, if only the CUSTOM database differs in both systems, the operating mode automatically switches from DUAL to INDEPENDENT.

SINGLE MODE

No information is exchanged between both systems.

The lateral navigation (LNAV) function of the FMS calculates navigation information relative to selected geographical points. The pilot can define flight plan routes worldwide. The system outputs information and steering signals that show the pilot or flight guidance system (FGS/Autopilot/Flight Director) how to guide the airplane along the desired route. Routes are defined from the present position of the airplane to a destination waypoint along a great circle route or through a series of great circle legs defined by intermediate waypoints. The vertical navigation (VNAV) provides vertical guidance with steering targets to FGS to guide the airplane in the vertical profile. A deviation scale for the VNAV is located on the PFD, on the same place where the glide slope scale.

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FMS CONTROLS AND INDICATORS

CONTROL DISPLAY UNIT (CDU-820)

1 - ANNUNCIATORS

The annunciators are located on the top of the LCD display.

- Colors:
  - White: indicating advisory annunciation.
  - Amber: indicating alerting annunciation.

DSPLY (white)	Illuminates when the CDU displays a page that is not relative to the current airplane lateral or vertical flight path. This annunciator is not shown on the PFD.
DR (amber)	Illuminates when a radio updating loss occurs, as well as all other position sensors, for a period longer than 2 minutes.
DGRAD (amber)	Illuminates when the FMS cannot guarantee the position accuracy for the present phase of the flight.
MSG (white)	Illuminates when there is a message (advisory or alert) on the scratchpad. The annunciator turns off when the message is cleared from the scratchpad.
OFFSET (white)	Illuminates when a lateral offset path has been entered in the FMS. The annunciator turns off when the offset is removed.
APRCH (white)	Illuminates when the FMS is selected as navigation source and the following conditions are valid: a non-precision instrument approach has been activated from the navigation database, the airplane position is between 2 NM outside the final approach fix and the missed approach point, the DGRAD must be off and FMS using approved sensors for non-precision approach.

NOTE: The FMS transmits all the annunciators to the PFD, except the DSPLY annunciator, so the pilot must not trust only on the FMS CDU for checking the FMS system status.

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2 - TEXT COLORS

The colors are designed to highlight important information. Color assignments are coordinated as much as possible with other displays. See below the parameters associated to each color:

Vertical	Cyan (Blue)
Atmospheric Data	Cyan (Blue)
Lateral	Green
FROM Waypoint	Yellow
TO Waypoint	Magenta
Prompts and Titles	White
Flight Plan Names	Orange
Index Selections	Green

3 - LINE SELECT BUTTONS

There are four line select buttons on each side of the CDU that provide the following functions:

- Select submodes within major modes when in an indexed display.
- Used as direct access to the other FMS modes when in a non-indexed display.
- Enter data to the scratchpad.

4 - BRIGHTNESS CONTROL BUTTON

- Used to manually control the brightness of the display.
- Using this button, the photo sensors are activated and maintain the brightness level through a wide range of lighting conditions. The brightness is adjusted pressing up or down the Bright/Dim button, and a control bar will be displayed in the scratchpad.
- The brightness can be adjusted so that, during daylight conditions, the display cannot be seen.

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5 - GROUP OF FUNCTIONS BUTTONS

PERF Displays the performance pages.

NAV Displays the NAV index pages.

FPL It may be used to display the first page of the active flight plan, if the flight plan was previously entered, to manually create a flight plan, to select a stored flight plan and to create a flight plan for storage.

PROG Displays the first progress page, the current status of the flight.

DIR Start the DIRECT-TO function and displays the FLPN page with the prompts for the PATTERN and INTERCEPT functions.

6 - ALPHANUMERIC BUTTONS

- Consist of alphabet letters, the numbers 0 through 9, a decimal and a slash. It is used to enter inputs to the FMS. A SP (Space) key is used to insert a space following a character in the scratchpad, and a +/- (Plus/Minus) key will result in a - being entered, changing to + in a subsequent press.
- The alphanumeric keys make entries only on the scratchpad.

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7 - EDITION BUTTONS

PREV Changes the current page to the previous page.

NEXT Changes the current page to the next page.

CLR Clears alphanumeric entries in the scratchpad or a scratchpad message.

DEL Works together with line select buttons in order to delete waypoints and other items displayed on the CDU. This button is inhibited when a message is displayed.

The CDU has five function buttons directly above the LCD display that have specific functions associated with other systems in general. The FN key is used for UNDO the DIRECT-TO function, when an DIRECT-TO is performed on FMS. The UNDO DIRECT-TO function shall not be used for Departure, Arrival, or Hold procedures.

If a Video camera, Graphic weather or ATC (FANS) interface is installed, the associated CDU key will be mentioned on another AOM Section. If not installed they will return a message that the function is not available.

8 - SCRATCHPAD

- It is the working area, located on the bottom line of the display, where the pilot can enter data and/or verify data before line selecting the data into its proper position.
- Data is retained on the scratchpad throughout all mode and page changes.
- The scratchpad also provides advisory and alerting messages to be displayed.

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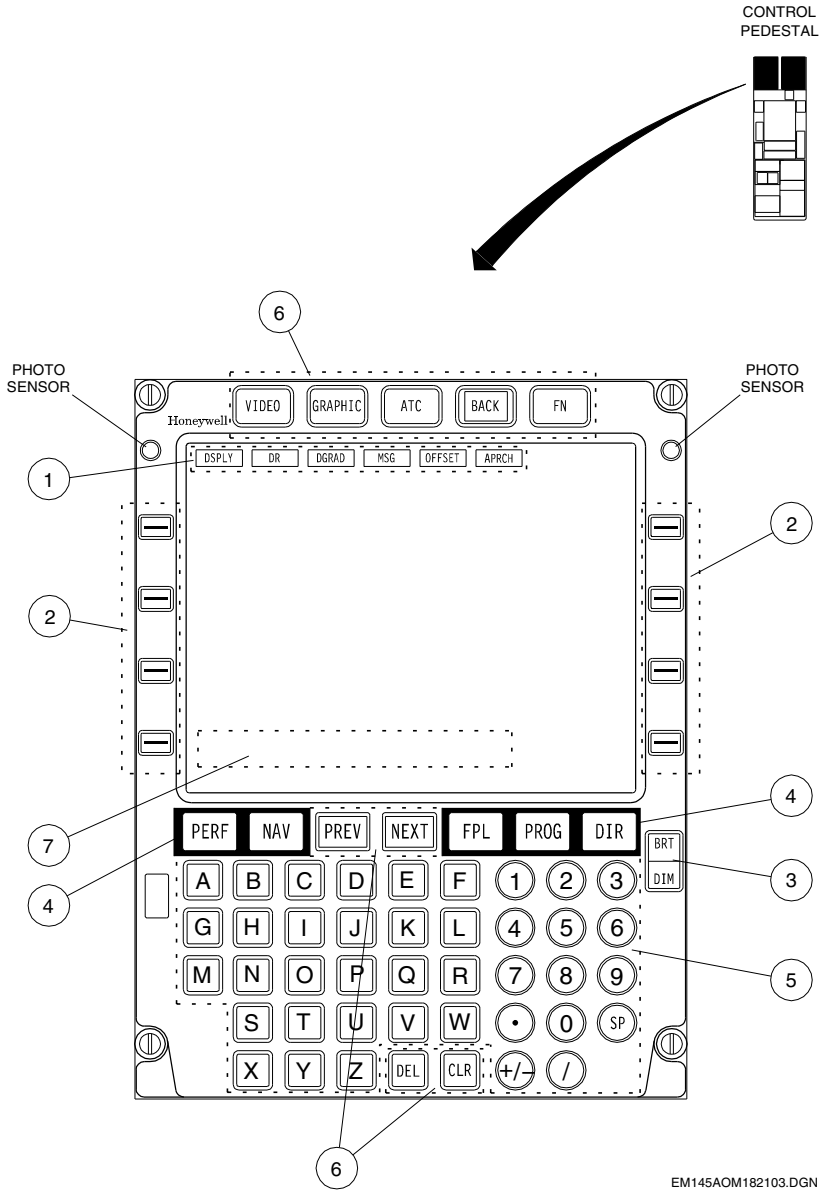

FMZ2010 - FMS CDU-820 CONTROL PANEL

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CONTROL DISPLAY UNIT (CDU-830)

1 - ANNUNCIATORS

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- Colors:
  - White: indicating advisory annunciation.
  - Amber: indicating alerting annunciation.

DSPLY (white)	Illuminates when the CDU displays a page that is not relative to the current airplane lateral or vertical flight path. This annunciator is not shown on the PFD.
FMS MSG (white)	Illuminates when there is a FMS message on the scratchpad. The annunciator turns off when the message is cleared from the scratchpad.
DR (amber)	Illuminates when a radio updating loss occurs, as well as all other position sensors, for a period longer than 2 minutes.
DGRAD (amber)	Illuminates when the FMS cannot guarantee the position accuracy for the present phase of the flight.
OFFSET (white)	Illuminates when a lateral offset path has been entered in the FMS. The annunciator turns off when the offset is removed.
APRCH (white)	Illuminates when the FMS is selected as navigation source and the following conditions are valid: a non-precision instrument approach has been activated from the navigation database, the airplane position is between 2 NM outside the final approach fix and the missed approach point, the DGRAD must be off and FMS using approved sensors for non-precision approach.

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3 - BRIGHTNESS CONTROL BUTTON

- Used to manually control the brightness of the display.
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4 - MODE BUTTONS

ATC Air Traffic Control Key: Pushing the ATC function key permits access to ATC applications. If ATC applications (FANS) are not configured on the airplane, the scratchpad message ATC NOT AVAILABLE is displayed when pushing the ATC function key.

BACK Touch Screen Button: Pushing the BACK touch screen button displays the last selected FMS page.

MENU Permits access to the VIDEO, GRAPHIC, CLEAN TS (Clean touchscreen) and MAINT functions.

NOTE: The CLEAN TOUCH SCREEN page gives the pilot the ability to clean the touch screen without accidentally accessing other pages. To exit this page pilots can wait the timeout (30 seconds) to expire or press any key button. Touching the screen resets the countdown time.

PERF Displays the performance pages.

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PROG Displays the first progress page, the current status of the flight.

DIR Displays the active flight plan with the DIRECT and INTERCEPT prompts.

5 - ALPHANUMERIC BUTTONS

- Consist of alphabet letters, the numbers 0 through 9, a decimal and a slash. It is used to enter inputs to the FMS. A SP (Space) key is used to insert a space following a character in the scratchpad, and a +/- (Plus/Minus) key will result in a - being entered, changing to + in a subsequent press.
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CLR Clears alphanumeric entries in the scratchpad or a scratchpad message.

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FROM Waypoint	Yellow
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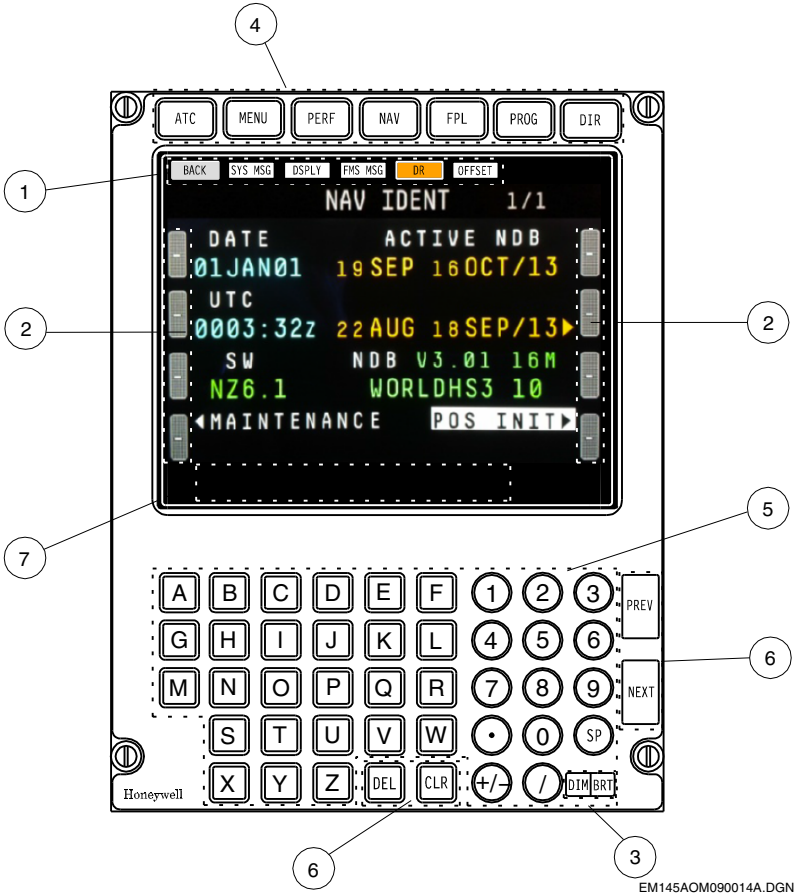

FMZ2010 - FMS CDU-830 CONTROL PANEL

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JOYSTICK (OPTIONAL)

The joystick functions are available through the joystick controller that is located on the control pedestal and through the selection of the MFD JSTK menu.

When the MFD joystick menu is selected, the joystick controller is available to control the Designator Symbol movement on the MFD FMS flight plan.

JOYSTICK OPERATION

On power-up, the designator is co-located with the present flight plan waypoint position.

If MAP mode is selected, moving the joystick controller will cause the Designator Symbol to be displayed in blue color with a broken line which moves in the same direction from its last waypoint position.

If PLAN mode is selected, moving the joystick controller, the flight plan moves to the opposite direction from its last position, while the Designator Symbol remains fixed at the center of the plan format.

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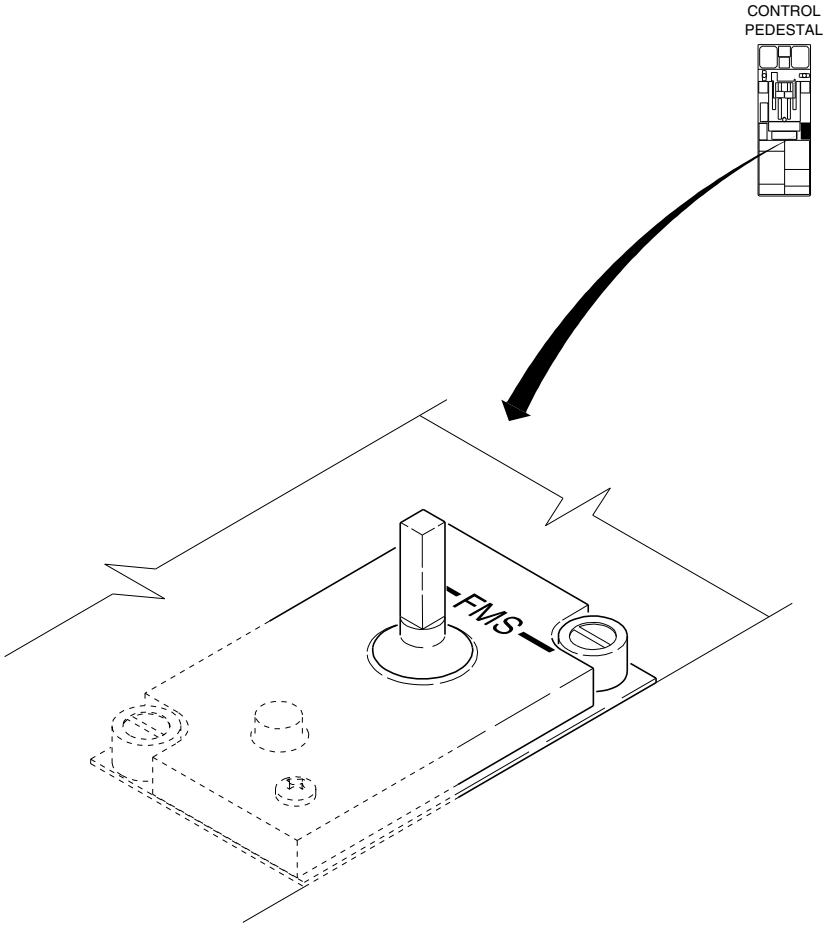

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JOYSTICK CONTROLLER

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JOYSTICK MENU BUTTONS FUNCTION AT MAP MODE

– SKIP ("SKP") button: Skips the designator to the position of the next waypoint in the flight plan in case of the designator is co-located with a plan waypoint. Otherwise, the designator broken line tail skips to the next waypoint in the flight plan.

– RECALL ("RCL") button: Positions the designator at the present position of the airplane and removes the designator box from the display in case of the designator is co-located with the flight plan waypoint. Otherwise, the designator is positioned over the waypoint from which the designator line is extended and the designator line is removed from the display.

– ENTER ("ENT") button: The latitude and longitude coordinates of the designator are transmitted to the selected FMS scratchpad as a requested waypoint.

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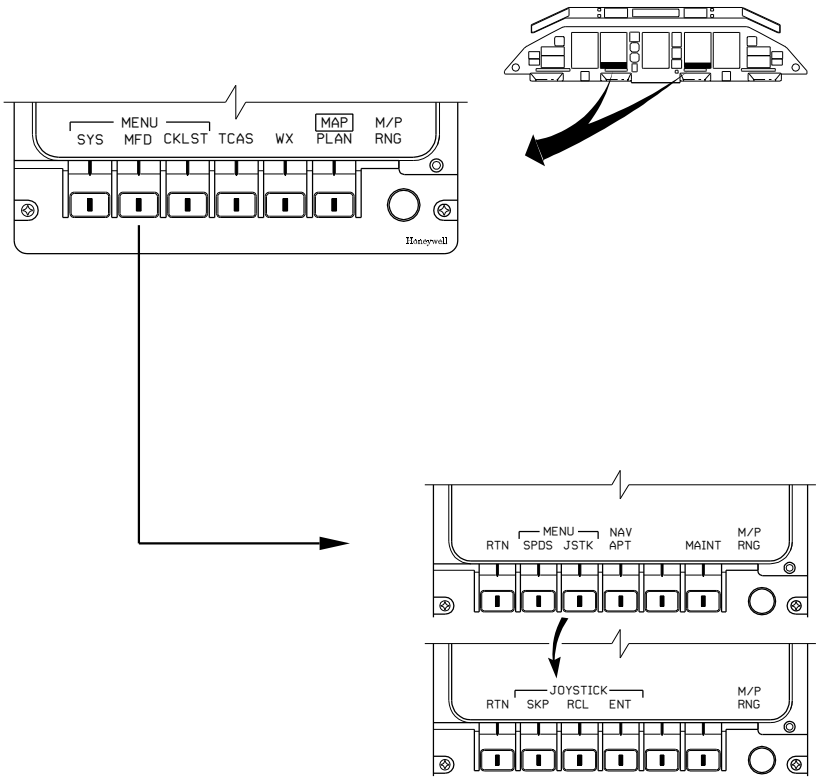

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MFD JOYSTICK MENU

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NAVIGATION DISPLAYS

The navigation data provided by the Radio Management System and Flight Management System are displayed to the crew through the PFDs, MFDs and RMUs.

ADF and/or VHF NAV bearings and VHF NAV or FMS CDI (Course Deviation Indicator) are displayed on the PFD in an Electronic Horizontal Situation Indicator (EHSI). The EHSI navigation sources as well as the display format (Full Compass or Arc) may be selected by the crew via the Display Control Panel (DCP).

Several other navigation data are also presented on the PFDs: GS (Glide Slope) pointer, DME distance, Ground Speed/Time-to-go, marker beacon indicators, wind intensity and direction vector, etc.

The MFDs present Weather Radar, TCAS and the route selected on the FMS. Additional information is also presented on the MFD: wind intensity and direction vector, TAS, Time-to-go, etc.

The RMUs NAV Backup Page also present the EHSI, in the Arc format only (Refer to Section 2-18-11).

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DISPLAYS CONTROLS AND INDICATORS

DISPLAY CONTROL PANEL (DCP)

1 – FULL/WX BUTTON

- Pressing the FULL/WX Button alternates the EHSI presentation on the PFD between Full Compass format and Arc format.
- In Arc format the Weather Radar Display is also presented whenever the Weather Radar is operating.

2 – GSPD/TTG BUTTON

- Pressing the GSPD/TTG Button alternates the respective information on the PFD between ground speed and time-to-go.

3 – ET BUTTON

- The first actuation enters the Elapsed Time Mode on the PFD respective field. The subsequent actuation provides the following sequence of control: RESET, ELAPSED TIME, STOP, REPEAT.

4 – NAV BUTTON

- Provides the selection of the VHF NAV (VOR, ILS and MLS) as navigation source for the EHSI. If the VHF NAV is already selected, pressing the NAV Button selects the opposite VHF NAV as navigation source for the on-side EHSI. Pressing the NAV Button once again will restore the normal operation: VHF NAV 1 information presented on the PFD 1 and VHF NAV 2 information presented on the PFD 2.

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5 – FMS BUTTON

- Provides the selection of the FMS as navigation source for the EHSI.
- Pressing the FMS Button for the second time selects the opposite FMS as navigation source for the on-side EHSI (and for the on-side MFD MAP). Pressing the FMS Button once again will restore the normal operation: FMS 1 information presented on the PFD 1 (and MFD 1) and FMS 2 information presented on the PFD 2 (and MFD 2).

6 – BRG KNOBS

OFF	The associated PFD bearing pointers are disabled.
NAV 1 (2)	Selects the respective VHF NAV as source for the associated bearing pointer.
ADF	Selects the respective ADF as source for the associated bearing pointer.
FMS 1 (2)	Selects the respective FMS as source for the associated bearing pointer.

7 – RA CONTROLLER AND IC-600 TST BUTTON

- Provides the Radio Altimeter (RA) decision height setting.
- When pressed on ground provides the IC-600 and RA test activation. Refer to Section 2-4 – Crew Awareness for further information on test function and Section 2-17 – Flight Instruments for further information on decision height setting and RA test in flight.

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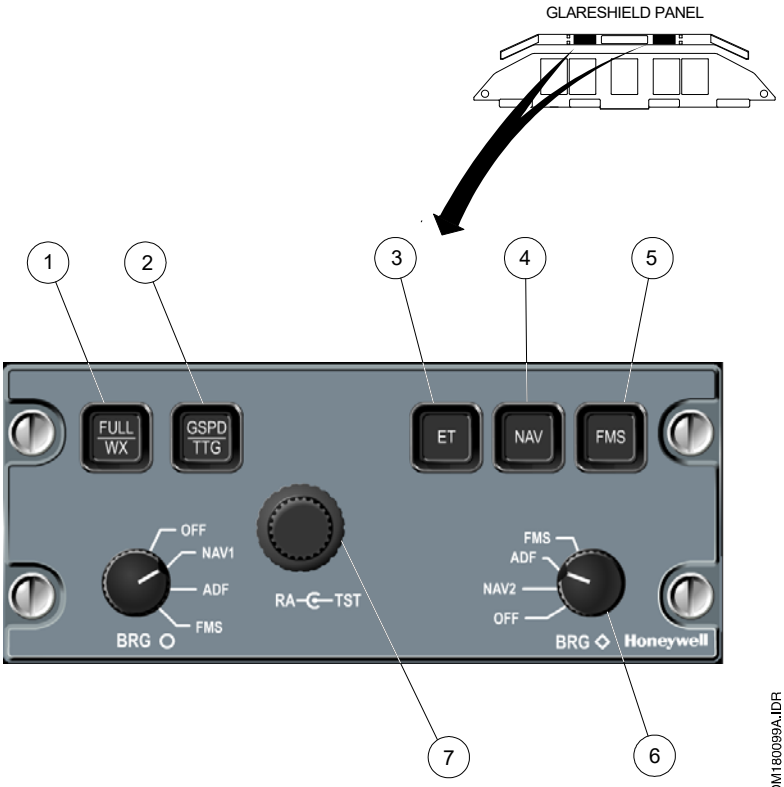

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DISPLAYS CONTROL PANEL

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FMS SOURCE SELECTION ON THE MFD

As explained on the Display Control Panel (DCP) description, pressing the FMS Button on that panel selects the FMS as navigation source for the PFD and MFD.

Pressing the FMS Button (on the Display Control Panel) for the second time selects the opposite side FMS as navigation source for the on-side EHSI (and for the on-side MFD MAP). Pressing the FMS Button once again will restore the normal operation: FMS 1 information presented on the PFD 1 (and MFD 1) and FMS 2 information presented on the PFD 2 (and MFD 2).

However, on airplanes equipped with dual FMS it is possible to select the opposite side FMS as MFD navigation source even if the FMS is not selected as navigation source for the PFD.

In this case, pressing the MFD Bezel Button adjacent to the MFD SRC label (presented on the MFD submenu), the on-side MFD will display the opposite side FMS data. This label is not presented if the FMS is already selected as navigation source for the PFD.

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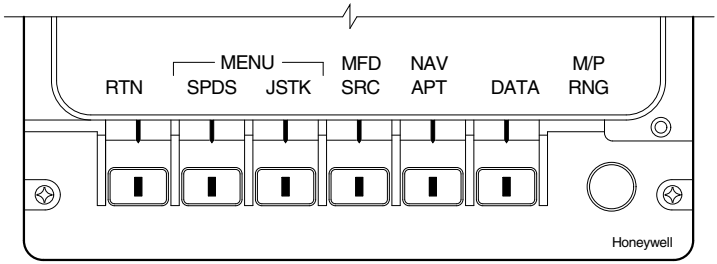

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CROSS-SIDE FMS SOURCE SELECTION ON THE MFD

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ADF, VHF NAV AND DME INDICATIONS ON THE PFD

1 - VERTICAL DEVIATION DISPLAY

- Color:
  - Scale: white.
  - GS Pointer: Green.
    Yellow if the same source is supplying both sides.
  - GS label: green.
- For glide slope presentation the pointer will be parked up or down of the deviation display when the deviation exceeds the external dots.
- Glide slope information will be displayed when SRN NAV is selected for display and tuned to LOC is active.

2 - MARKER BEACON DISPLAY

- Color:
  - O label: cyan.
  - M label: amber.
  - I label: white.
  - Box: white.
- An O, an M or an I flashing annunciation is displayed when the outer marker, the middle marker or the inner marker is detected, respectively.
- A beacon box surrounding the MB flashing annunciations will be shown when a SRN is displayed, tuned-to-localizer is active and a marker is also active.

3 - BEARING POINTER

- Color:
  - Cyan for Bearing 1.
  - White for Bearing 2.
- Circle coded for #1 source {VOR 1, ADF (for single installation) or ADF 1 (for dual installation)}.
- Diamond coded for #2 source {VOR 2, ADF (for single installation) or ADF 2 (for dual installation)}.
- Pointer is removed if the selected source signal is invalid.

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4 - TO/FROM POINTER

- Color: white.
- Displayed towards the nose or the tail of the airplane to indicate, respectively, "TO" or "FROM" the navigation aid.

5 - DME FIELD

- Displays Ground Speed, Time-to-go, and Elapsed Time.
- GROUND SPEED DISPLAY
  - Color: Digits: green.
    GSPD label: white.
  - Range: 0 to 550 KIAS.
  - Resolution: 1 KIAS.
- TIME TO GO DISPLAY
  - Color: Digits: the same of the NAV source color.
    TTG label: white.
  - Range: 0 to 399 min.
  - Resolution: 1 minute.
- ELAPSED TIME
  - Color: Digits: green.
    ET label: green.
  - Range: 00:00 to 09:59 h.
  - Resolution: Displayed in the format minutes: seconds (for less than one hour), and hours (minutes for more than one hour).

6 - COURSE DEVIATION SCALE

- Color: white.

7 - COURSE DEVIATION BAR

- Color:
  - Green: when the source is the on-side VOR.
  - Yellow: when the source is the cross-side VOR.
- Indicates against the course deviation scale, the difference between the selected course and the VOR bearing.

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8 - BEARING SOURCE ANNUNCIATIONS

- Label: VOR1, VOR2, ADF1 or ADF2.
- Color:
  - Cyan for Bearing 1.
  - White for Bearing 2.
- Circle coded for #1 source {VOR 1, ADF (for single installation) or ADF 1 (for dual installation)}.
- Diamond coded for #2 source {VOR 2, ADF (for single installation) or ADF 2 (for dual installation)}.
- Indicates the current source of input to the bearing pointers.
- Source annunciation will be retained on the PFD, even in case of an invalid bearing signal.

9 - DME HOLDING AND DISTANCE ANNUNCIATION

- Color:
  - Digits: green.
  - NM label: white.
  - H label: amber.
- Range:
  - Short Range NAV: 0 to 300 NM.
- Resolution: 0.1 NM.
- When the DME hold is active an H label is displayed on the RH of the DME distance digital readout. In this condition the H label replaces the distance NM label.

10 - COURSE DEVIATION NAV SOURCE ANNUNCIATION

- Label: VOR1, VOR2, ILS1, ILS2 or FMS (optional)
- Color:
  - Yellow: when the same source is selected for both sides or is supplying cross-side.
  - Green: when both sides present on-side sources, even if they are different.

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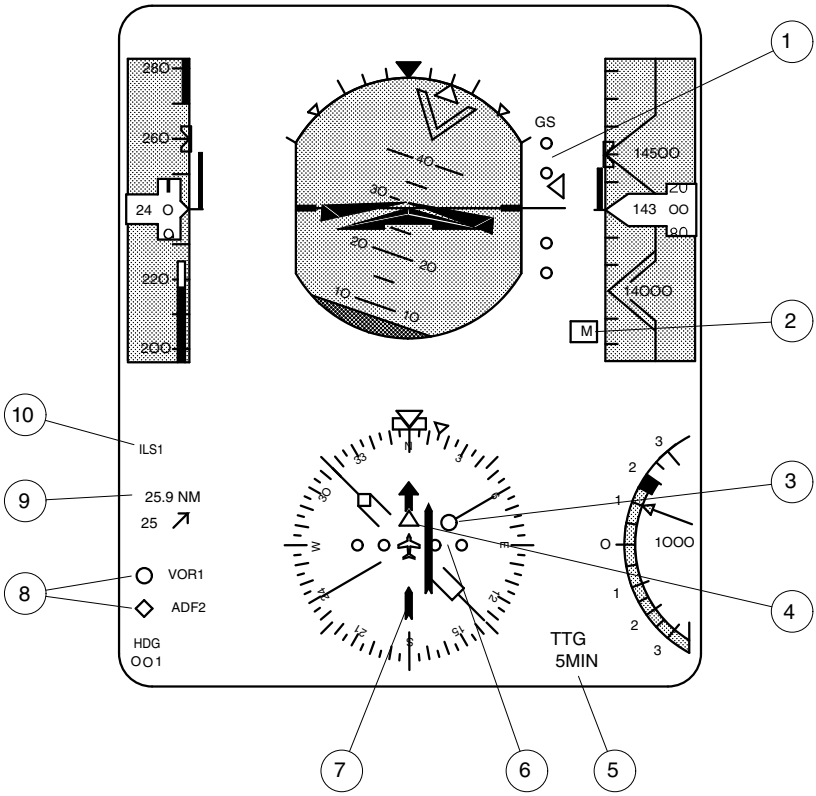

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ADF, VHF NAV AND DME INDICATIONS ON THE PFD (EHSI IN FULL COMPASS FORMAT)

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MENU
PREVIOUS
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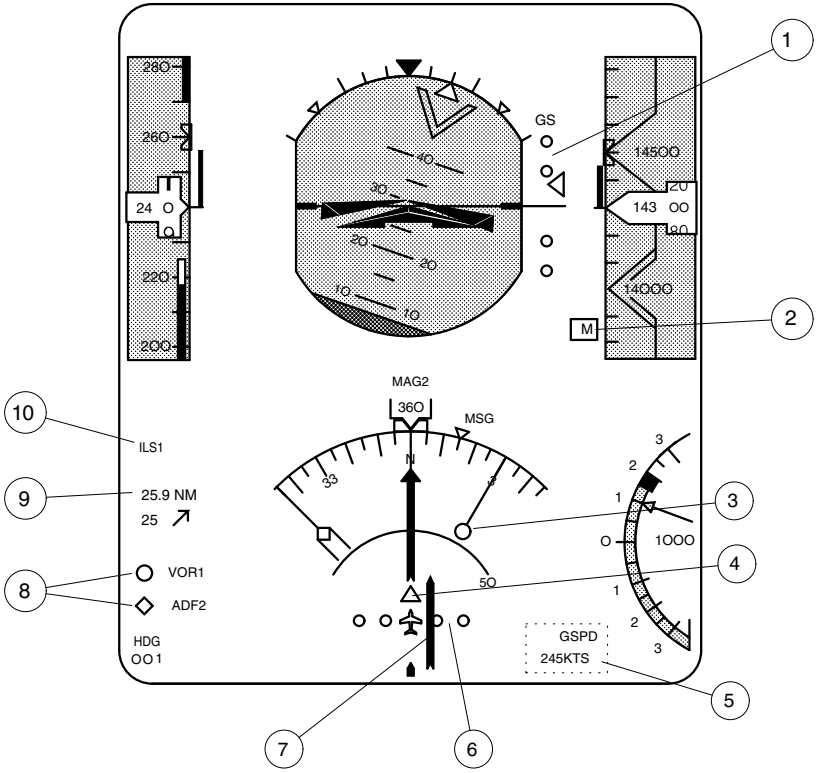

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ADF, VHF NAV AND DME INDICATIONS ON THE PFD (EHSI IN ARC FORMAT)

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FMS INDICATION ON THE PFD

1 - VERTICAL ALERT ANNUNCIATION

- Label: VTA.
- Color: amber.
- The VTA is displayed when the vertical alert bit is received from the FMS.

2 - VERTICAL DEVIATION DISPLAY

- When the FMS VNAV is selected the Vertical Deviation is activated.
- The Vertical Deviation Display indicates the vertical deviation between the airplane and the selected vertical path.
- Label: FMS.
- Color: amber.
  - The FMS label and the scale are white.
  - If the FMS is the navigation source for only one side, the pointer will be magenta, otherwise it will be amber.

3 - MESSAGE ANNUNCIATION

- Label: MSG.
- Color: amber.
- The MSG is displayed when a message is available on the FMS Panel.

4 - GROUND SPEED/TIME TO GO DATA

- Label: GSPD for Ground Speed.
  TTG for Time To Go.
- Color: labels and units are white.
  - For single configuration, if the FMS is the navigation source for only one side, the GSPD and TTG readouts will be magenta, otherwise, they will be amber.
  - For dual configuration, if each FMS is the navigation source of the respective side, the GSPD and TTG readouts will be magenta. Otherwise, they will be amber.
- The Ground Speed unit is knots (KTS) and the Time To Go unit is minutes (MIN).
- The resolution of the digital values is 1 unit.
- For invalid values, the digits will be replaced with three amber dashes.

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5 - DRIFT ANGLE BUG

- Color: magenta.
- The Drift Angle Bug rotates around the compass card, providing the reading of the airplane tracking.

6 - COURSE DEVIATION BAR

- Color: if the FMS is the navigation source for only one side, the Course Deviation Bar will be magenta, otherwise, it will be amber.

7 - TO/FROM POINTER

- Color: white.

8 - BEARING POINTER

- Color: Cyan for Bearing 1 (circle shaped).
  White for Bearing 2 (diamond shaped).

9 - BEARING SOURCE ANNUNCIATIONS

- Color: Cyan for Bearing 1 (circle shaped).
  White for Bearing 2 (diamond shaped) in single FMS configuration.
  In dual configuration there will be an indication if FMS 1 or FMS 2 is being used.

10 - WIND VECTOR DISPLAY

- Color: magenta.
- A single vector shows the direction of the wind relative to the airplane symbol. The digits indicate the wind intensity in knots.

11 - DEGRADE MODE/DEAD RECKONING MODE/WAYPOINT ANNUNCIATIONS

- Label: DGRAD for Degrade Mode (single FMS configuration only).
  DR for Dead Reckoning mode.
  WPT for waypoint.
- Color: amber.
- WPT is lit when the airplane is approaching the next waypoint.

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12 - DISTANCE DISPLAY

- Color:
  - In single configuration, if the FMS is the navigation source for only one side, the distance readout will be magenta. Otherwise, it will be amber.
  - In dual configuration, if each FMS is the navigation source of the respective side, the distance readout will be magenta, otherwise it will be amber.
  - The unit is white.
- The distance unit is nautical miles (NM).

13 - TO WAYPOINT SYMBOL

- Label: waypoint identifier name (ex: KDVT).
- Color: magenta. For dual configuration, when using cross-side information, the color is amber.
- In the sequence established, the TO waypoint is the next one from the current airplane position.

14 - APPROACH/TERMINAL AREA ANNUNCIATIONS

- Label: APP for Approach.
  TERM for Terminal Area.
- Color: cyan.
- When APP is displayed it indicates that the FMS is in the flight approach phase and also can indicate that the lateral deviation scaling has been set to approach scale factor.
- In the APP mode the deviation indicator sensitivity and FMS tracking gains are increased.
- The TERM annunciator is displayed when the airplane enters in the terminal area or when the lateral deviation scaling has been set to the enroute scale factor.
- Priority is given to the APP message.

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15 - FMS SOURCE ANNUNCIATION

- Label: FMS.
- Color:
  - For single configuration, if the FMS is the navigation source for only one side, the FMS label will be magenta. Otherwise, it will be amber.
  - For dual configuration, if each FMS is the navigation source for the respective side, the FMS label will be magenta, otherwise it will be amber.
- FMS is displayed only when a single source is installed.

16 - HEADING ANNUNCIATION

- Label: HDG SEL (for dual FMS configuration).
- Color: white. For dual configuration, if each FMS is the navigation source for the respective side the color will be white, otherwise it will be amber.

17 - SELECTED COURSE/DESIRED TRACK ANNUNCIATIONS AND READOUTS

- Label: DTK for Desired Track.
  CRS for Selected Course.
- Color:
  - For single configuration, if the FMS is the navigation source for only one side, the CRS label will be green and DTK will be magenta. Otherwise, both labels will be amber.
  - For dual configuration, if each FMS is the navigation source for the respective side, the CRS and DTK labels will be magenta. Otherwise they will be amber.
  - The readouts will have the same color as the CRS and DTK annunciations.
- DTK is displayed when the FMS is the selected navigation source.

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18 - CROSSTRACK ANNUNCIATION

- Label: SXTK.
- Color:
  - For single configuration, if the FMS is the navigation source for only one side the label will be magenta, otherwise it will be amber.
  - For dual configuration, the color will be ever amber.
- SXTK is displayed to indicate that the airplane is off track.

19 - CAPTURED LATERAL MODE

- Refer to Section 2-19 – Autopilot.

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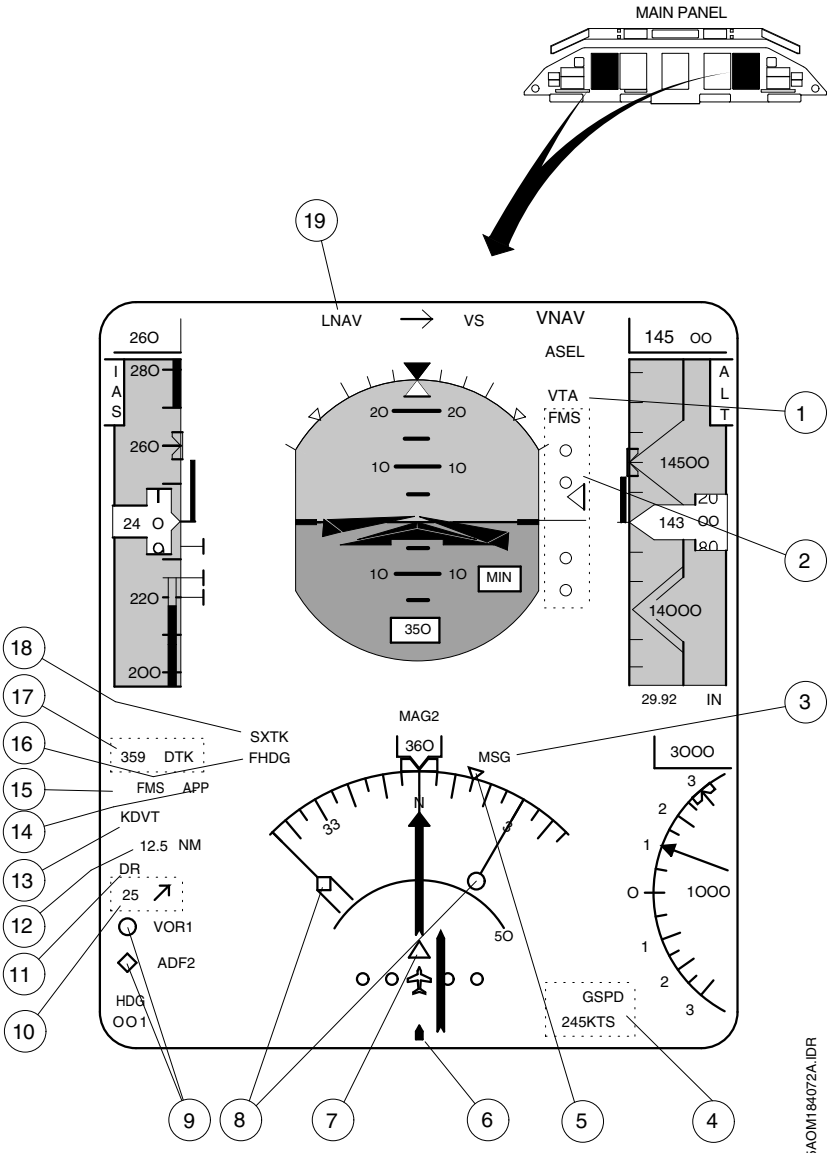

FMS INDICATION ON THE PFD

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FMS INDICATION ON THE MFD

1 - FMS SOURCE ANNUNCIATION

- Label: FMS for single configuration.
  FMS1 or FMS2 for dual configuration.
- Color:
  - Magenta: when the source is the on-side FMS.
  - Yellow: when the source is the cross-side FMS.

2 - DRIFT ANGLE BUG

- Color:
  - Magenta: when the source is the on-side FMS.
  - Yellow: when the source is the cross-side FMS.
- The Drift Angle Bug rotates around the compass card, providing the reading of the airplane tracking.

3 - WAYPOINT SYMBOL

- Label: waypoint identifier name (ex: KDVT).
- Color: all Waypoints are white except the TO waypoint.
- Waypoint is displayed as a four pointed star at the geographical locations, referenced to the current present position, where the selected transitions of the flight plan occur.
- A maximum of 10 Waypoints can be displayed, including the FROM waypoint.
- A navigation aid or airport can also be located on the flight plan at a transition point and is accounted in the maximum allowable number of Waypoints.

4 - AIRPORT ANNUNCIATION

- Label: APT.
- Color: cyan.
- Appears when an airport symbol is shown along the route.

5 - NAVAID ANNUNCIATION

- Label: NAV.
- Color: cyan for single or green for dual configuration.
- Appears when a navaid symbol is shown along the route.

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6 - DESIGNATOR RANGE AND BEARING READOUT

- Color: cyan.
- The range readout indicates the distance between the airplane and the Designator Symbol.
- The bearing readout bearing location of the Designator Symbol related to the airplane position.

7 - TO WAYPOINT SYMBOL

- Color:
  - Magenta: when the source is the on-side FMS.
  - Yellow: when the source is the cross-side FMS.
- In the sequence established, the TO Waypoint is the next one from the current airplane position.

8 - LATERAL DEVIATION DISPLAY

- Color: white.
- Right after the values there is a letter which may be L or R standing for Left and Right respectively.

9 - WIND VECTOR DISPLAY

- Color:
  - Magenta: when the source is the on-side FMS.
  - Yellow: when the source is the cross-side FMS.
- A single vector shows the direction of the wind relative to the airplane symbol. The digits indicate the wind intensity in knots.

10 - DESIGNATOR SYMBOL

- Color:
  - Same color of the Waypoint: if the Designator is co-located with a connected Waypoint.
  - Cyan: if it is not connected.
- The Designator symbol is displayed as an unfilled rectangle applied in two distinct methods: co-located with a Waypoint or positioned with the joystick.
- Designator will not be displayed if it represents the current position.

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11 - TO WAYPOINT DATA ANNUNCIATIONS

- It is composed of the annunciators and presented as follows:
  - Identification.
  - Distance in nautical miles (NM).
  - Time to the TO Waypoint in minutes (MIN).
- Color:
  - For single FMS configuration, the identification is magenta. The distance and the time are white.
  - For dual FMS configuration, the identification, distance and time are magenta, when the source is the on-side FMS, or yellow, when the source is the cross-side FMS.

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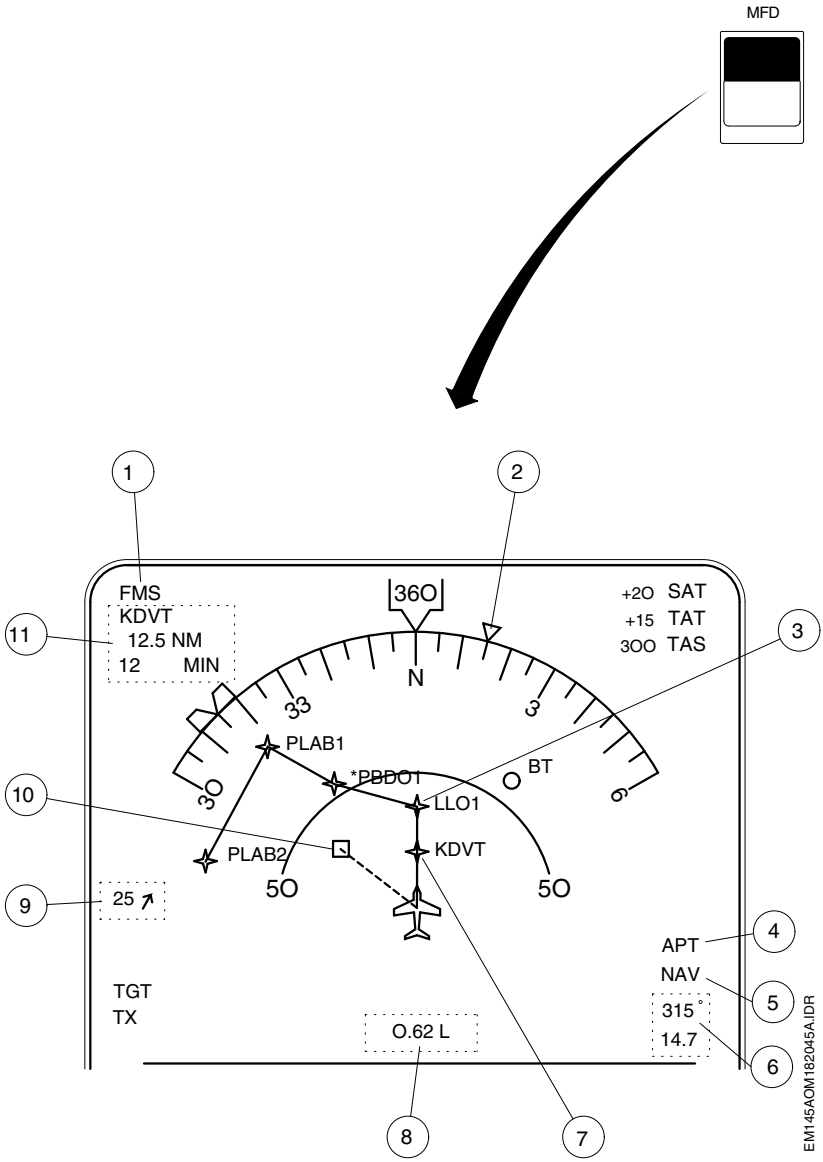

FMS INDICATION ON THE MFD

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WEATHER RADAR SYSTEM

The airplane can be equipped with P-660 or P-880 weather radar models and 12 or 15 inches antenna. For additional information on functions and operations, refer to the manufacturer's manual.

The weather radar system is designed for detection and analysis of precipitation in storms along the flight path of the airplane. The system provides the flight crew with visual indications regarding turbulence content (P-880 only) and rainfall intensity.

Precipitation intensity level is displayed in four bright colors (magenta, red, yellow and green) contrasted against a deep black background on the PFDs' and MFDs' radar mode field. Magenta represents the heaviest rainfall intensity while green indicates the lightest.

The radar may also be used for ground mapping. When operating in ground mapping mode, prominent landmarks are displayed, which allows identification of coastlines, mountainous regions, cities or even large structures.

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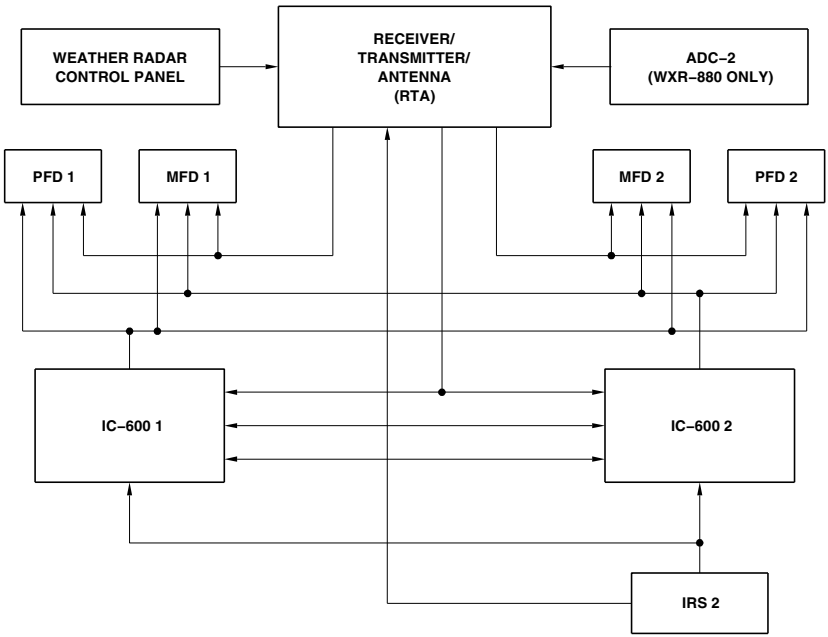
GENERAL

The weather radar system consists of an integrated Receiver/Transmitter/Antenna unit (RTA) and a dedicated control panel. The RTA transmits and receives on the X-band radio frequency. The RTA processes radar echoes received by the antenna. The scan-converted data are displayed on PFDs' and MFDs' radar mode field.

The weather radar system run on 28 V DC powered by one of the Avionics Switched DC Buses. Should a power supply failure occur, the weather radar system will become inoperative, as there is no backup power source for this system.

The weather radar interfaces with other airplane systems and equipment as presented in the schematic diagram below:



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WEATHER RADAR SCHEMATIC

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WEATHER RADAR NORMAL OPERATION

The weather radar is controlled through the weather radar control panel and via the MFD Bezel Buttons. The weather radar control panel provides control functions and operating modes management for proper weather radar operation. The airplane is equipped with two weather radar control panels located on the glareshield panel.

INTERPRETING WEATHER RADAR IMAGES

The weather radar is a water detector. It is calibrated to best see water in its liquid form and with an ideal raindrop diameter. The weather radar can see rain, wet snow, wet hail and dry hail (depending on its diameter). The radar can not see water vapor, ice crystals and small dry hail.

At higher altitudes, there is less humidity in the air and consequently there is less water condensation. It means that heavy precipitation and dense cells are less likely to occur. As a result, flight level 200 (FL200) is defined as "FREEZING LEVEL", i.e., presence of water in its liquid form is not forecast above this level. However, CBs and other phenomena may push humidity and water, sometimes supercooled water, to higher altitudes due to convective activity.

WARNING: DRY HAIL CAN BE PREVALENT AT HIGHER ALTITUDES. SINCE ITS RADAR REFLECTIVE RETURN IS POOR, IT MAY NOT BE DETECTED.

Use increased gain when flying near storm tops in order to display the normally weaker returns that could be associated with hail.

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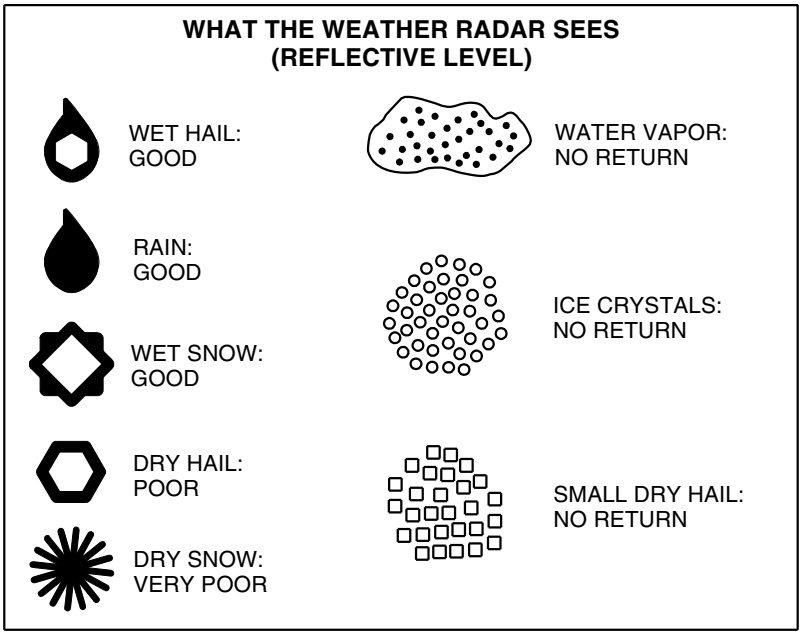

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RADAR WARM UP PERIOD

When power is first applied to the radar, a period of 40 to 100 seconds is required to allow its magnetron to warm up. The radar displays the WAIT message on the PFDs' and MFDs' radar mode field and does not transmit or perform an antenna scan. After the completion of warm-up period, the radar automatically become operational in the selected mode or goes to forced standby (FSBY) if the airplane is on the ground.

GROUND OPERATION PRECAUTIONS

If the radar system is to be operated in any mode other than standby or forced standby while the airplane is on the ground, the following precautions should be taken:

- Direct nose of airplane so that antenna scan sector is free of large metallic objects such as hangars or other airplanes for a distance of 30 meters (100 ft).The antenna must be tilted fully upwards.
- Avoid using the weather radar during airplane refueling or within 30 meters (100 ft) of any other airplane undergoing refueling operations.
- Avoid using the weather radar if personnel are standing too close to the 270° forward sector of airplane.

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WEATHER RADAR OPERATING MODES AND FUNCTIONS

TEST MODE (TST)

After the radar warm-up period is over, the TEST mode may be selected. A special test pattern made up of color bands is displayed. A series of green/yellow/red/magenta/white bands indicate that the signal to color conversion circuits are operating normally. A 100 mile range is automatically selected. A green TEST label will be displayed on the PFDs' and MFDs' radar mode field.

When the airplane is on the ground and the TEST mode is entered, the first page always includes RADAR OK or RADAR FAIL to indicate the current state of the radar, as follows:

RADAR OK: indicates that no faults were found and the radar is ready for service. It is combined with the END OF LIST page.

RADAR FAIL: indicates a radar fault.

During the weather radar test, several fault messages may be presented to the crew. The POC (Power On Counter), aside recording an existing fault, also stores fault information from previous power-on cycles. However, if the first page announces "RADAR OK", the radar is ready for service.

STANDBY MODE (SBY)

The standby mode should be selected any time it is desired to keep the system powered without transmitting. When SBY mode is selected the WX radar remains in a ready state, with the antenna scan motionless and stowed in a tilt-up position. In addition, the transmitter is inhibited and the display memory is erased.

Placing only one controller in SBY does not shut the transmitter OFF. Instead, the no-SBY controller governs radar operation. If both controllers are placed in SBY, the transmitter is shut OFF.

In standby mode a STBY label is displayed on the PFDs' and MFDs' radar mode field.

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FORCED STANDBY MODE (FSBY)

The FSBY is an automatic, non-selectable radar mode, that forces the radar into standby when the airplane is on the ground (weight-on-wheels logic) regardless of the selected active radar mode. This is a safety feature that inhibits the transmitter on the ground to eliminate X-band microwave radiation hazards. In FSBY mode, the transmitter and the antenna scan are both inhibited, memory is erased and a FSBY label is displayed on the PFDs' and MFDs' radar mode field.

The forced standby mode may be overridden on the ground by pushing the STAB button 4 times in 3 seconds.

CAUTION: IF FSBY MODE IS OVERRIDEN ON THE GROUND AND ANY RADAR ACTIVE MODE IS SELECTED, THE TRANSMITTER IS TURNED ON. THE RADAR MUST NOT BE OPERATED UNDER THIS CONDITION WHILE REFUELING, NEAR FUEL SPILLS OR PEOPLE.

WEATHER DETECTION MODE (WX)

The WX mode is used to detect areas of severe weather. This will allow the pilots to avoid dangerous weather conditions and possible turbulence areas. WX may be used on the ground, often prior to takeoff, in order to monitor the weather in the immediate vicinity. In this case, the forced standby mode may be overridden.

In WX Mode, the weather radar system is fully operational and all internal parameters are set for enroute weather detection. A WX label is displayed on the PFDs' and MFDs' radar mode field.

The levels and colors associated with the storm category are as follows:

LEVEL	COLOR	RAINFALL CATEGORY
4	Magenta	Extreme/Intense
3	Red	Very Strong/Strong
2	Amber	Moderate
1	Green	Moderate/Weak
0	Black	Weak

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RAIN ECHO ATTENUATION COMPENSATION TECHNIQUE FUNCTION (REACT or RCT)

The REACT is a sub mode of the weather detection mode and when selected activates three separate but related functions:

- **Attenuation Compensation** - Storms with high rainfall rates can attenuate the radar energy making it impossible to see a second cell hidden behind the first cell.

  In the REACT mode, the radar incorporates a function that automatically adjusts receiver gain by an amount equal to the amount of attenuation, i.e., the greater the amount of attenuation, the higher the receiver gain and thus, the more sensitive the receiver.

- **Cyan REACT Field** - Since there is a maximum limit to receiver gain, strong targets (high attenuation levels) cause the receiver to reach its maximum gain value and weather targets can no longer be calibrated. The point where red level weather target calibration is no longer possible is highlighted by changing the background field from black to cyan.

  Cyan areas should be avoided. Any target detected inside a cyan area should be considered very dangerous. All targets in the cyan field are displayed as a magenta-colored 4th level precipitation.

- **Shadowing** - This is an operating technique similar to the Cyan REACT Field. To use the shadowing technique, tilt the antenna down until the ground is being painted just in front of the storm cell(s). An area characterized by no ground returns behind the storm cell has the appearance of a shadow. The cell that produces radar shadowing is a very strong and dangerous cell and should be avoided by 20 NM.

FLIGHT PLAN MODE (FP)

When the Flight Plan Mode is selected a singular display of navigation data and a FLTPLAN label are presented on the PFDs' and MFDs' radar mode field. The radar is put in standby and there is no radar data displayed in this mode.

GROUND MAPPING MODE (GMAP)

This mode is used to alert the flight crew regarding hazards caused by ground targets. This is especially useful in areas of rapidly changing terrain, such as mountainous regions. In this mode the system is fully operational and all internal parameters are set to enhance returns from ground targets.

The TILT control should be turned down until the desired amount of terrain is displayed. The degree of down-tilt depends upon airplane altitude and the selected range. Receiver characteristics are altered to provide equalization of ground-target reflection versus range. The selection of calibrated GAIN will generally provide the desired mapping display. If required, variable gain may be used to reduce the level of strong returns.

In the ground mapping mode a GMAP label is displayed on the PFDs' and MFDs' radar mode field, and the color scheme is changed to cyan, yellow and magenta. Cyan represents the least reflective return, yellow is a moderate return and magenta represents the most highly reflective target return.

It is possible to have one pilot working the GMAP while the other one is using the regular WX mode.

CAUTION: WEATHER TYPE TARGETS ARE NOT CALIBRATED WHEN THE RADAR IS IN THE GMAP MODE. THEREFORE, THE PILOT SHOULD NOT USE THE GMAP MODE FOR WEATHER DETECTION.

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TURBULENCE DETECTION FUNCTION (TRB) (P-880 MODEL ONLY)

When this mode is selected, the radar processes return signals in order to determine if a turbulence condition is present. Areas of potentially hazardous turbulence are displayed as white. Any areas shown as turbulence should be avoided.

Turbulence detection function may only be engaged in the WX mode and at selected ranges of 50 NM or less. When the TRB function is active, a T letter will be displayed on the PFDs' and MFDs' radar mode field.

CAUTION: ALTHOUGH TURBULENCE MAY EXIST WITHIN ANY STORM CELL, WEATHER RADAR CAN ONLY DETECT TURBULENCE IN AREAS OF RAINFALL.

TARGET ALERT (TGT)

Target alert is selectable in all but the 300 mile range. When selected, target alert monitors for red or magenta weather beyond the selected range and 7.5° on either side of the airplane's heading. If such weather is detected within the monitored area and outside the selected range, the target alert annunciation TGT label changes from a green armed condition to an yellow TGT alert condition on the PFDs' and MFDs' radar mode field. This annunciation advises the flight crew that potentially hazardous targets lie directly in front and outside of the selected range. When this warning is received, the flight crew should select longer ranges to view the questionable target.

The target alert is inactive within the selected range. Selecting target alert forces the system to calibrate gain, and turns off the variable gain mode. Target alert can only be selected in WX and FP modes.

NOTE: Keep TGT alert enabled when using short ranges. This allows the issuing of an alert if a new storm cell develops ahead of the airplane's flightpath.

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ANTENNA STABILIZATION (STAB or STB)

The antenna is normally pitch and roll-stabilized by using attitude information from the IRS. Momentarily pushing the STAB (or STB) button disables antenna stabilization and an amber "STAB" annunciation label is presented on the PFDs' and MFDs' radar mode field.

RECEIVER GAIN (GAIN)

The GAIN knob is a rotary control and push/pull switch that controls radar receiver gain. Two gain modes are available: calibrated or variable.

Calibrated: When the GAIN knob is pushed in, receiver gain is preset and calibrated, which is the normal mode of operation. In calibrated gain, the rotary function of the GAIN knob is disabled.

Variable (VAR): When the GAIN knob is pulled out, the system enters the variable gain mode. Variable gain is used for additional weather analysis and for ground mapping. In the WX mode, variable gain can increase receiver sensitivity over the calibrated level to show very weak targets or can be reduced below the calibrated level to eliminate weak returns. In the GMAP mode, variable gain is used to reduce the level of strong returns from ground targets.

Rotation of the knob counter-clockwise reduces receiver sensitivity. Rotating clockwise increases receiver sensitivity until its maximum. A digital readout and gain setting label are displayed on the PFDs' and MFDs' radar mode field.

NOTE: When REACT or TGT modes are selected, the system will be forced into calibrated gain.

CAUTION: VARIABLE GAIN MAY BE USED ONLY FOR SHORT PERIODS OF TIME. DO NOT LEAVE THE RADAR IN VARIABLE GAIN SINCE SIGNIFICANT WEATHER TARGETS MAY NOT BE DISPLAYED.

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TILT

Tilt management is crucial to the safe operation of weather radar. If improperly managed, weather targets can be missed or underestimated. Proper tilt management demands that tilt be changed continuously.

To find the best tilt angle after the airplane is airborne, adjust the TILT antenna downward until a few ground targets are visible at the edge of the display. The table below gives the approximate tilt settings for minimal ground target display for different altitudes and ranges. If the altitude changes or a different range is selected, adjust the tilt control as required to minimize ground returns.

When flying at high altitudes, tilt downward frequently to avoid flying above storm tops. When in low altitude or approaching for landing, tilt management must be performed manually, with the radar beam vertically sweeping from up to down to avoid flying above or below a storm line.

During takeoff, the radar must be adjusted to a minimum range scale, with a horizontal RH and LH scan and with the antenna positioned upwards (climbing angle).

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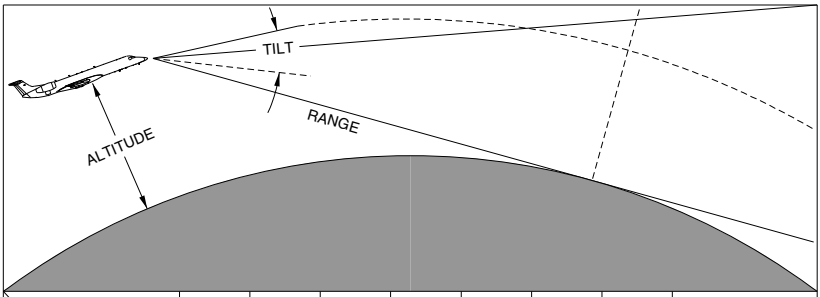

RANGE SCALE – nm / ALTITUDE – ft	5	10	25	50	100	200	300	LINE OF SIGHT – nm
40000	(TILT LIMITED REGION)		–12	–4	–1	+1	(LINE OF SIGHT LIMITED REGION)	246
35000			–10	–3	0	+1		230
30000			–8	–2	0	+1		213
25000			–6	–1	+1			195
20000			–4	0	+1			174
15000		–11	–2	+1	+2			151
10000		–6	0	+2	+2			123
5000	–5	–1	+2	+2				87
4000	–4	0	+2	+3				78
3000	–2	+1	+3	+3				67
2000	0	+2	+3	+3				55
1000	+2	+3	+3					39

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TILT SETTINGS FOR MINIMAL GROUND TARGET DISPLAY (12 inch antenna)

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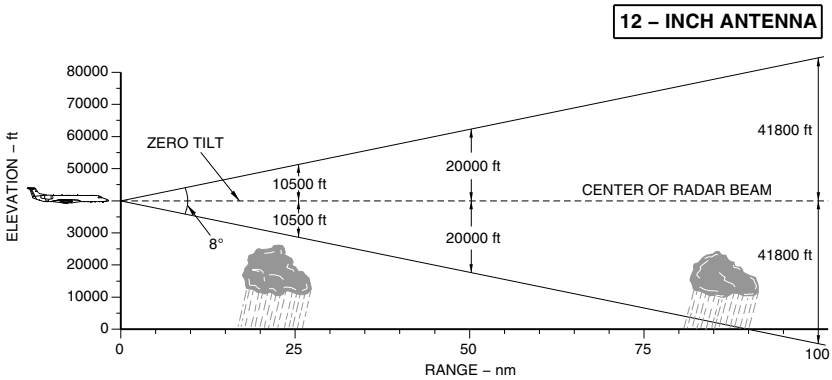
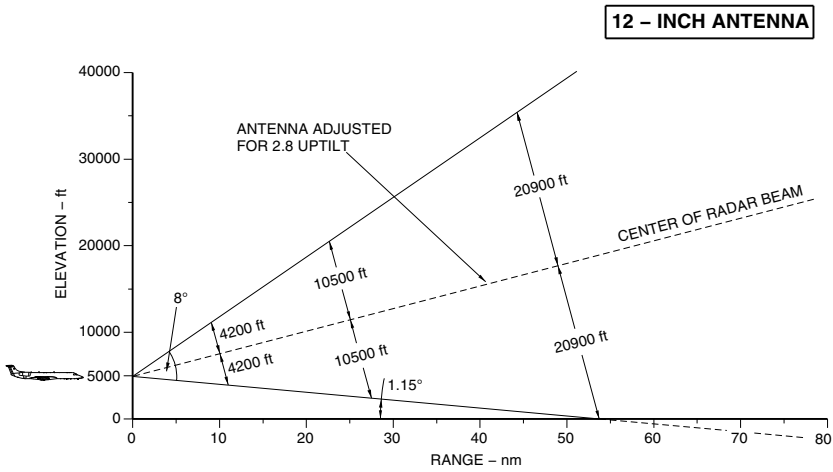
The figure below helps to visualize the relationship between tilt angle, flight altitude and selected range. It shows the distance above and below airplane altitude that is illuminated by the radar during level flight with 0° tilt (high altitude) and a low altitude situation, with antenna adjusted for 2.8° up-tilt.



RADAR BEAM ILLUMINATION HIGH ALTITUDE



RADAR BEAM ILLUMINATION LOW ALTITUDE

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ALTITUDE COMPENSATED TILT (ACT) (P-880 MODEL ONLY)

In ACT, the antenna tilt is automatically adjusted with regard to the selected range and airplane altitude. ACT adjusts the tilt to show a few ground targets at the edge of the display. The TILT knob can be used for fixed offset corrections of up to 2°.

NOTE: Proper tilt management demands that tilt be changed continuously, even in airplanes equipped with ACT.

SLAVE (SLV)

One controller can be slaved to the other by selecting OFF on that controller only. This condition is annunciated by the illumination of SLV on the control panel. The slave mode allows one controller to set the radar modes for both sides. In the slave mode, the PFDs and MFDs radar information are identical and simultaneously updated.

NOTE: In the slaved condition, both control panels must be set to off before the radar system turns off.

RADOME

The radome is the primary factor behind degraded weather radar performance. The problems affecting the radome are as follows:

- A water film over the radome's surface when flying in rain.
- Greased radome.
- Cracked radome.
- Holes caused by lightning strike/electrostatic discharges.
- Excessive application of antistatic paint.

Water Film Over The Radome's Surface: When flying in rain, there is indication that at some specific altitudes and speeds a water film is formed on the radome, altering the weather radar indications. The radar display may disappear or turn red. To avoid this problem, there is a hydrophobic coating product named Cytonix® that can be applied to the radome surface.

Greased Radome: The presence of grease or dirt over the radome's surface also impairs radar transmission. These should be reported immediately to maintenance personnel for cleaning or corrective action.

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Electrostatic Discharges: Static electricity influences radar performance. The right bonding is necessary. Bonding is accomplished through two metallic meshes that link the radome's metallic bulkhead (diverters) to the airplane's airframe. It is important to make sure that they are in good condition and not painted. If both the metallic meshes and screws are painted, this will isolate the static power generated in the radome, resulting in electrical discharges that will follow towards the radar antenna and/or generate noise in the audio system.

Cracked Radome: Small holes caused by electrostatic discharges, minor damage to structure or paint can cause water infiltration in the radome's honeycomb composite structure. Pin Holes on the radome are responsible for water bubles under the first layer of its structure. These bubles do not block the radar emission but they partially obstruct the flow beam as a dirty glass obstructs the light resulting in significant radar signal attenuation, distortion and in some cases, can cause dark spots on the radar screen.

External inspections can be performed to check the radome conditions and integrity. These are necessary to garantee no water penetration on the radomes layers. If signs of water are encountered the radome needs repairs or need to be replaced. Do not forget the radome is a component of the radar system and need some care. The lightning stripes that are incorporated to the radome body are important. There is one main emission beam as well as four other secondary beams. One of these reflects all the lightning stripes and goes direct to the ground. When it returns reflected by the ground surface it appears on the display as a green arc and it is proportional as the conic rate of the radome. The narrow the radome is the bigger will be the arc display. This is an airplane installation characteristic, not a radar failure.

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WEATHER RADAR CONTROLS AND INDICATORS

WEATHER RADAR CONTROL PANEL

1 - RANGE SELECT BUTTONS

- Allow selection of the radar's operating range, from 5 to 300 NM full scale in WX, REACT, or GMAP mode. In FP mode, additional ranges of 500 and 1000 NM are available. In test mode the range is automatically set to 100 NM.
- The up-arrow button selects increasing ranges, while the down-arrow button selects decreasing ranges. Upon reaching maximum or minimum range, further pushing of the button causes the range to rollover to minimum or maximum range, respectively.

2 - TURBULENCE DETECTION FUNCTION BUTTON (P-880 Model Only)

- Alternate pressings turns on or off the radar's turbulence detection function.
- Function can be used only in WX or RCT mode, with selected range of 50 NM or less.

3 - STABILIZATION FUNCTION BUTTON

- When momentarily pressed, disables antenna stabilization function. The STAB OFF annunciator will illuminate on the control panel.
- On the ground, after warm-up period, pressing the STB button four times within 3 seconds will inhibit the forced standby (FSBY) function.

4 - SLAVE ANNUNCIATOR

- Illuminates to indicate that one controller is slaved to the other.

5 - TARGET ALERT CONTROL BUTTON

- Alternate pressing selects or cancels the target alert feature.
- Selectable only in the WX and FP Modes.

6 - SECTOR SCAN BUTTON (SECT)

- When momentarily pressed, selects either the radar's normal 12 sweeps per minute for a 120° full scan or the faster update 24 sweeps per minute for a 60° sector scan.

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7 - ANTENNA TILT CONTROL KNOB

- The TILT knob is a rotary control that allows manual control of the antenna's tilt angle. Clockwise rotation tilts the beam upward 0° to +15°. Counter-clockwise rotation tilts beam downward 0° to –15°. A digital readout of the antenna tilt angle is displayed on the MFD.
- The range between +5° and -5° is expanded for setting ease.

ALTITUDE COMPENSATED TILT (PULL ACT) (P-880 Model Only)

- Pulling out the TILT knob activates the auto tilt control, which automatically readjusts tilt between ± 2° based on changes in barometric altitude and/or selected range.

8 - RADAR MODES CONTROL KNOB

OFF - Turns off the weather radar.

SBY - Selects the weather radar standby operating mode.

WX - Selects the weather radar detection operating mode.

RCT - Selects the REACT function (P-880 Model only).

GMAP - Selects the weather radar ground mapping operating mode.

FP - Selects the weather radar flight plan operating mode.

TST - Selects the weather radar test mode.

9 - GAIN CONTROL KNOB

- Allows receiver gain control.
- When pushed in, receiver gain is preset and calibrated. Rotary function of the GAIN knob is disabled.
- When pulled out, sets receiver gain to variable (VAR) mode.

10 - RAIN ECHO ATTENUATION COMPENSATION TECHNIQUE FUNCTION BUTTON (P-660 Model Only)

- When pressed (momentarily), enables the REACT.
- REACT is always selected in test mode.
- REACT is available in all modes except MAP.

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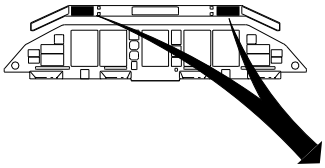
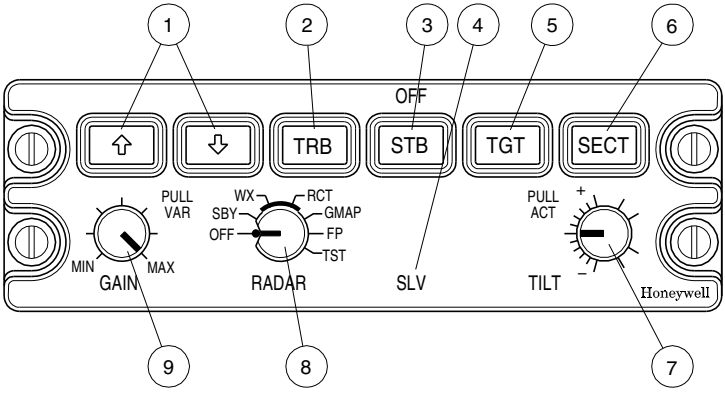
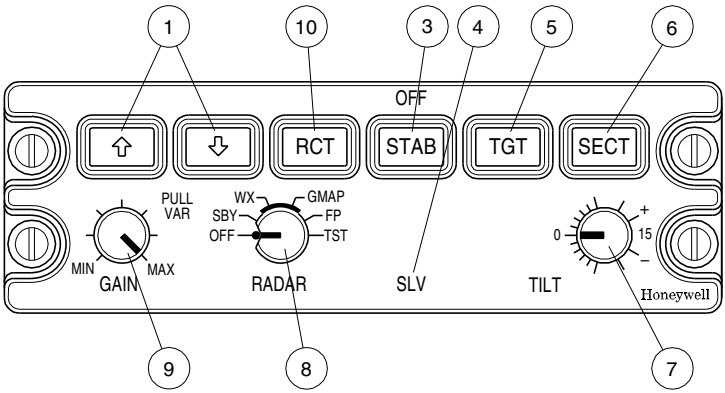
GLARESHIELD PANEL





P – 880 MODEL



P – 660 MODEL

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WEATHER RADAR CONTROL PANEL

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MFD BEZEL PANEL

1 - WEATHER RADAR DISPLAY SELECTOR BUTTON

- Alternate pressing of the weather radar display selector button allows the weather radar to be displayed or removed from the MFD. Control of all other weather radar functions is accomplished by the radar control panel. When the weather radar is selected, the WX label on the MFD menu, above this button, will be highlighted by a white box.
- The weather radar can only be selected for display in map format. If the weather radar is selected with plan format already selected on the MFD, it will force the display to revert to map format.

2 - MAP/PLAN FORMATS CONTROL BUTTON

- Alternate pressing of the map/plan formats control button will cause the MFD to toggle between map and plan formats. A white box around will highlight the selected MFD format.
- If the weather radar is displayed on the MFD and the plan format is selected, the weather radar will be removed from the display. However, if the MFD map format is selected again, the weather radar display will be restored on the MFD.

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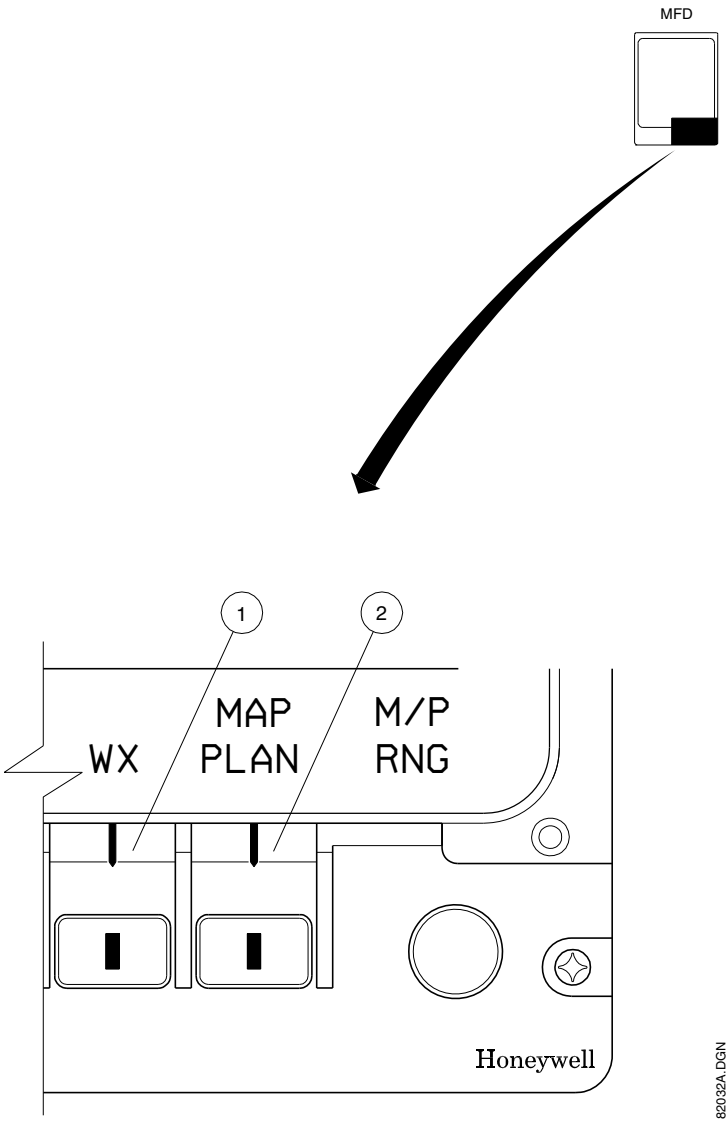

MFD BEZEL PANEL

WEATHER RADAR DISPLAY ON THE PFD AND MFD

1 - ANTENNA POSITION INDICATOR (API)

- Color: Amber.
- The API is displayed as an arc at the current range outer limit.
- Indicates the radar antenna alternate sweep position and provides a picture bus activity indication.

2 - WEATHER RADAR PATCH

- Indicates an area of radar reflection.
- Color:
  - Magenta: high intensity reflection.
  - Red: medium-high intensity reflection.
  - Yellow: medium intensity reflection.
  - Green: low intensity reflection.

3 - WEATHER RADAR TURBULENCE INDICATION (P-880 Model Only)

- Indicates an area of detected turbulence.
- Color: white.

4 - WEATHER RADAR REACT INDICATION

- Indicates an area where radar receiver gain compensation has reached its maximum value.
- Color: cyan.

5 - WEATHER RADAR RANGE ARC VALUE

- Color: white.
- Indicates half of the radar range selected in the weather radar control panel.

6 - WEATHER RADAR ANTENNA TILT ANGLE DISPLAY

- Color: green.
- Range: –15 to +15°.
- Resolution: 1°.

7 - WEATHER RADAR TARGET MODE AND ALERT ANNUNCIATION

- Color:
  - TGT label: green or amber.
  - VAR label: amber.
- The VAR label will be displayed in the same field as that used for TGT annunciation to indicate a variable gain indication. Priority is given to TGT annunciation.

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8 - WEATHER RADAR MODES ANNUNCIATION DISPLAY

– Indicates the selected mode in the weather radar control panel.

DISPLAY		MODE DESCRIPTION
ANNUNCIATION	COLOR	
STAB	AMBER	Stabilization off.
TGT	GREEN	Target alert enable.
TGT	AMBER	Target alert enable and level 3 WX return detected in the forward 15° of antenna scan.
VAR	AMBER	Variable gain.
WX	GREEN	Normal WX ON and selected for display.
WX	AMBER	Invalid WX control bus.
TX	GREEN	WX is transmitting but not selected for display, or in STBY or FSTBY.
TX	AMBER	WX is transmitting and weight on wheels indicates on ground, but not selected for display, or in STBY and FSTBY.
WAIT	GREEN	Warm up period of approximately 40 to 100 seconds.
STBY	GREEN	Normal standby.
FSBY	GREEN	Forced standby.
TEST	GREEN	Test mode and no faults.
FAIL	AMBER	Test mode and faults.
RCT	GREEN	Normal WX with REACT.
FPLN	GREEN	Flight plan mode.
GMAP	GREEN	Ground map mode.
GCR	AMBER	Normal WX with ground clutter reduction.
R/T	GREEN	WX with REACT and turbulence.
WX/T	GREEN	Normal WX with turbulence.

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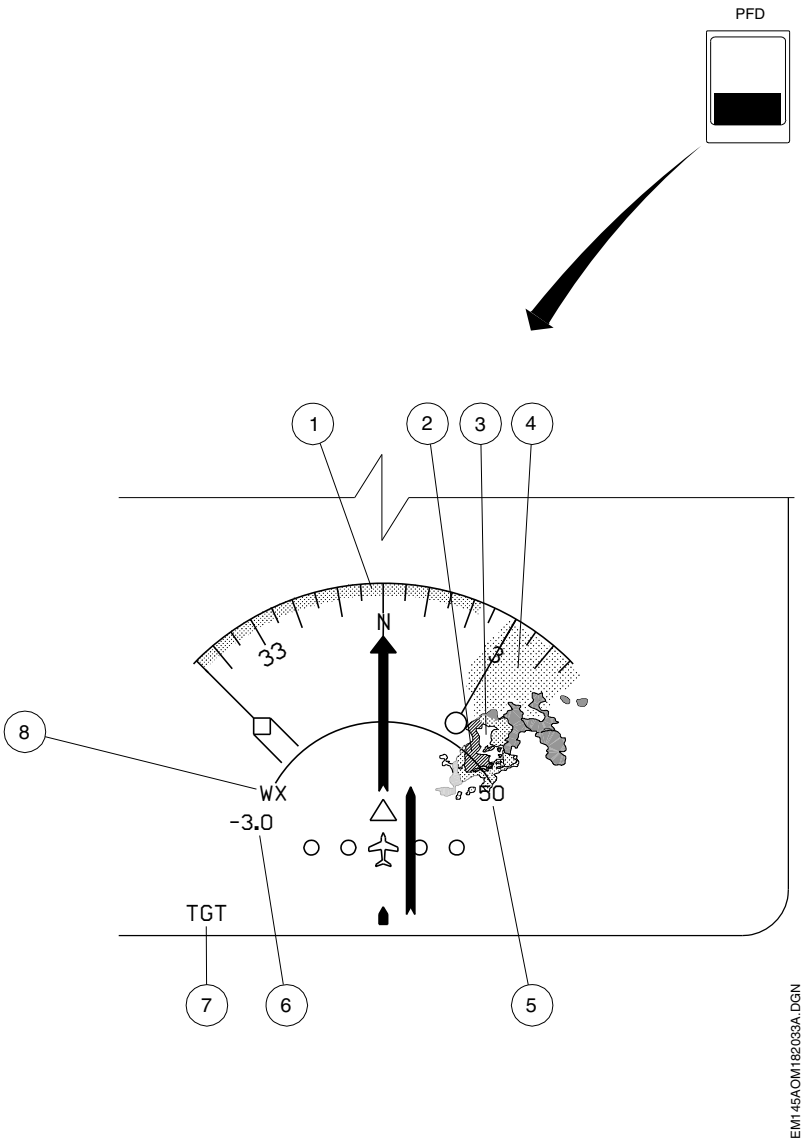
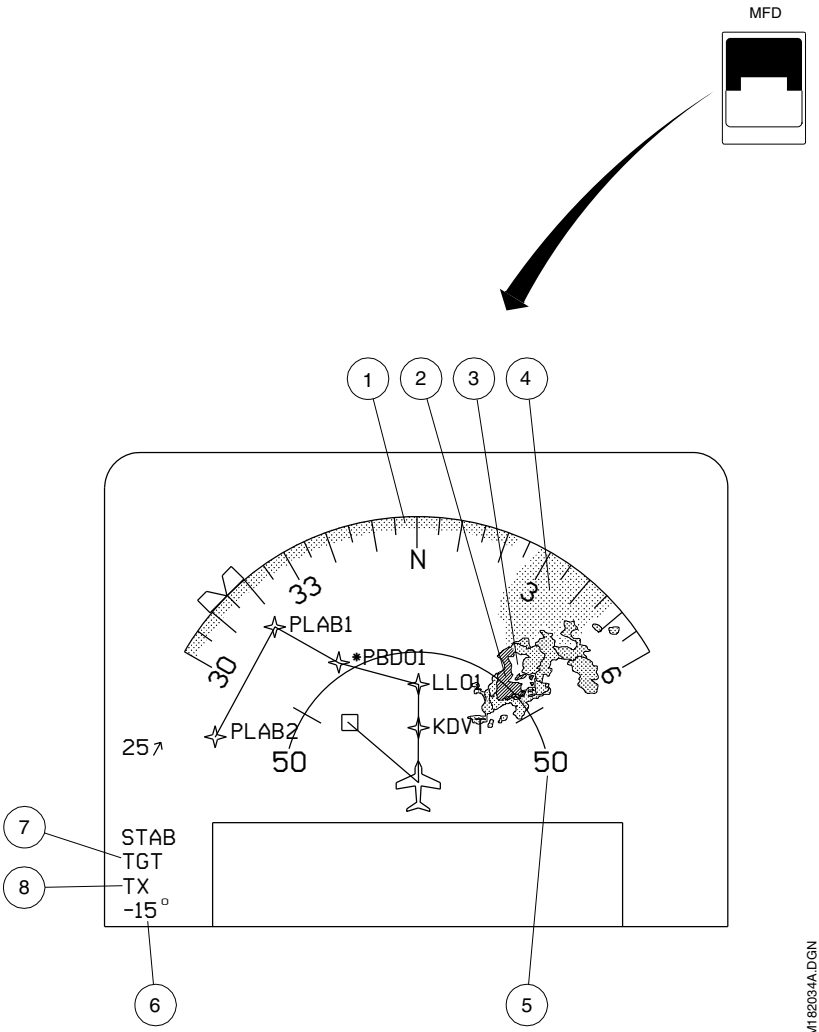


WEATHER RADAR DISPLAY ON PFD



WEATHER RADAR DISPLAY ON MFD

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LIGHTNING SENSOR SYSTEM (LSS)

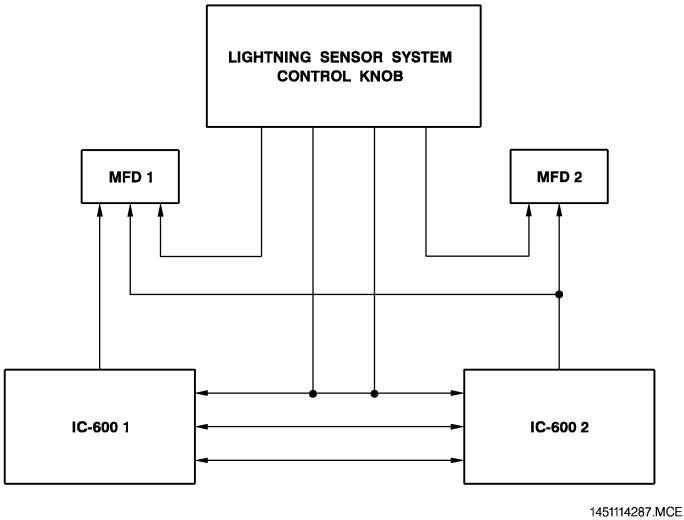
The P-880 Weather Radar Model may be optionally equipped with a Lightning Sensor System (LSS). For additional information on functions and operations, refer to the LSZ-850 Lightning Sensor System Pilot's Handbook.

The Lightning Sensor System is designed to detect and locate areas of lightning activity, in a 100-nautical-mile radius around the aircraft, and to give the operator a visual display of its position and rate-of-occurrence on the MFDs.

The Lightning Sensor System is inhibited on the ground and during HF transmission (HF PTT), being powered by one of the 28 V DC Avionics Switched DC Buses. Should a power supply failure occur, the Lightning Sensor System will be inoperative, as there is no backup power to it.

The Lightning Sensor System interfaces with other airplane systems and equipment as follows:

– MFDs - The LSS provides lightning activity data to the MFDs.
– IC-600s - Signals between the LSS and the IC-600s are transmitted through a Serial Data Bus.



LIGHTNING SENSOR SYSTEM SCHEMATIC

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LSS OPERATION

The Lightning Sensor System is controlled through a dedicated control knob, located on the Weather Radar Control Panel. The Lightning Sensor System Control knob provides control functions and operating modes management for proper Lightning Sensor System operation.

The Lightning Sensor System detects both visible and invisible high energy electromagnetic discharges (lightning), indicating areas of turbulent activity and displaying such information on the MFDs.

The Lightning Sensor System may be operated with the Weather Radar System turned on or off. If the Weather Radar is turned off, the LSS Range Selection is done through the MFDs knobs.

When power is first applied to the system, a self-test is automatically performed and, in the event of failure, an amber LX/F will be displayed on the MFDs. The LSS also performs self-calibration each time the system is turned on. The green LX/C annunciation is removed after calibration is completed. Strong interfering signals outside the aircraft, or equipment malfunction may prevent the calibration of the system, in which case the ¨C¨ will not be removed from the display. If the ¨C¨ is removed after takeoff, this means that only outside interference was preventing calibration. In this case the LSS should be switched off and set back to LX mode to force recalibration for greater accuracy. If the ¨C¨ persists after takeoff, a test should be performed.

LSS OPERATING MODES AND FUNCTIONS

STANDBY MODE (STBY)

When the Standby Mode is selected, no lightning data is shown on the MFDs. However, the receiving and processing equipment is active and lightning strikes are being counted and accumulated into areas.

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LIGHTNING DETECTION MODE (LX)

When operating in Lightning Detection Mode, the Lightning Sensor System is fully operational and lightning strikes are collected, processed, and displayed.

The LSS shows areas of lightning activity with white lightning symbols, which represents the center of a circular area with a radius of nine nautical miles. Three different lightning symbols are used to represent three different lightning rates-of-occurrence within each 18-mile diameter cycle.

Because of the large variation in lightning electromagnetic discharge, sometimes the system can not determine, within its occurring criteria, lightning bearing and distance. Rather, only the bearing is measured. Activity that only provides bearing information is presented in magenta lightning symbols near the outer range marks.

When operating the LSS with the Radar in STBY Mode, 360º of data is displayed.

A green LX will be displayed on normal operation.

Lightning Sensor Display symbology is as follows:

LEVEL	LIGHTNING CATEGORY
1	white headless lightning symbol
2	white single-headed lightning symbol
3	white double-headed lightning symbol
ALERT	magenta headless lightning symbol

CLEAR/TEST MODE (CLR/TST)

When the Clear/Test mode is selected, all lightning rate symbols are erased from the display and a special pattern is displayed to allow verification of the Lightning Sensor System operation.
The Test must be accomplished by selecting 50 NM or a greater display range and the CLR/TST Mode. The LSS CLR/TST Mode can be selected in any radar mode.
In the event of a failure, an amber LXmn will be displayed, where mn is a failure code, which will help the technician in troubleshooting the system.
When CLR/TST mode is selected, a green LX/CL is displayed on the MFDs and, after three seconds, LX/CL is replaced by LX/T.

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LSS CONTROLS AND INDICATORS

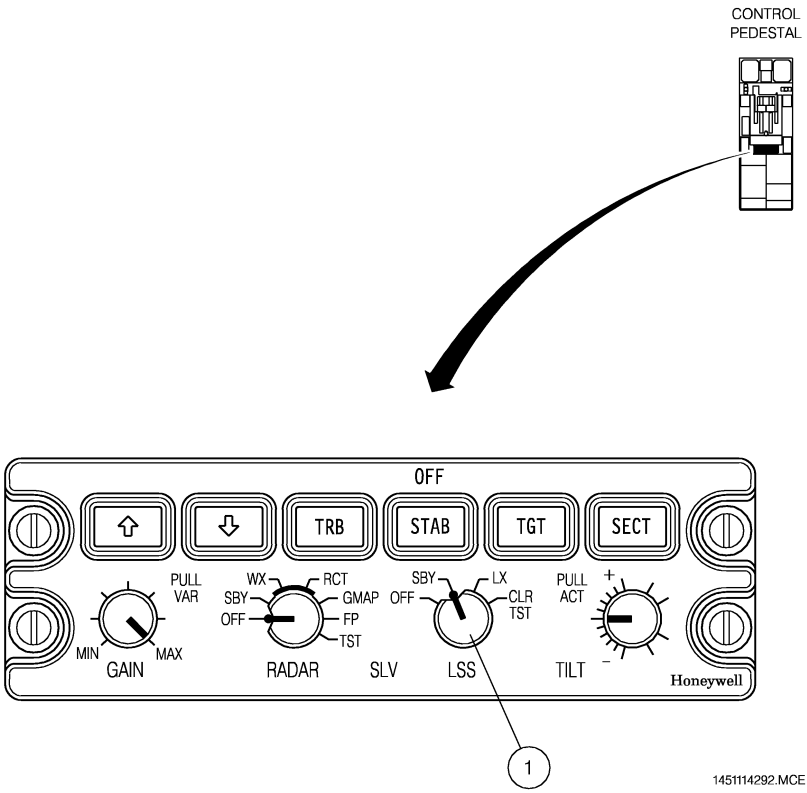
1- LIGHTNING SENSOR SYSTEM CONTROL KNOB

OFF - Turns off the Lightning Sensor System.

SBY - Selects the Lightning Sensor System Standby Mode.

LX - Selects the Lightning Sensor System Detection Operating Mode.

CLR/TST- Selects the Lightning Sensor System Test Mode.



WEATHER RADAR CONTROL PANEL WITH LSS

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LIGHTNING SENSOR SYSTEM DISPLAY ON THE MFD

1 - LEVEL 1 LIGHTNING ACTIVITY INDICATION

- Color: White
- Indicates the center of an 18-mile diameter area of lightning activity with 1 strike every 2 minutes.

2 - LEVEL 2 LIGHTNING ACTIVITY INDICATION

- Color: White
- Indicates the center of an 18-mile diameter area of lightning activity with 2 strikes every 2 minutes.

3 - LEVEL 3 LIGHTNING ACTIVITY INDICATION

- Color: White
- Indicates the center of an 18-mile diameter area of lightning activity with 3 strikes every 2 minutes.

4 - LEVEL 4 (ALERT) LIGHTNING ACTIVITY INDICATION

- Color: Magenta
- Indicates only the bearing of lightning activity, without determining the distance.

5 - LIGHTNING SENSOR SYSTEM MODES AND FAULTS ANNUNCIATION DISPLAY

- Indicates, above the Weather Radar annunciation display, the selected mode in the Lightning Sensor System Control Knob .

DISPLAY		MODE DESCRIPTION
ANNUNCIATION	COLOR	
LX/OFF	GREEN	LX Power is off.
LX	AMBER	LX Power is on and LX Communication Bus is Inactive.
LXmn	AMBER	LX Fault Code Enabled.
LX/F	AMBER	LX Fault
STBY	GREEN	LX Standby
LX/CL	GREEN	LX Clear
LX/T	GREEN	LX Test Mode
LX/I	GREEN	LX Antenna Inhibit
LX/C	GREEN	LX Auto Calibrate
LX	GREEN	LX Normal

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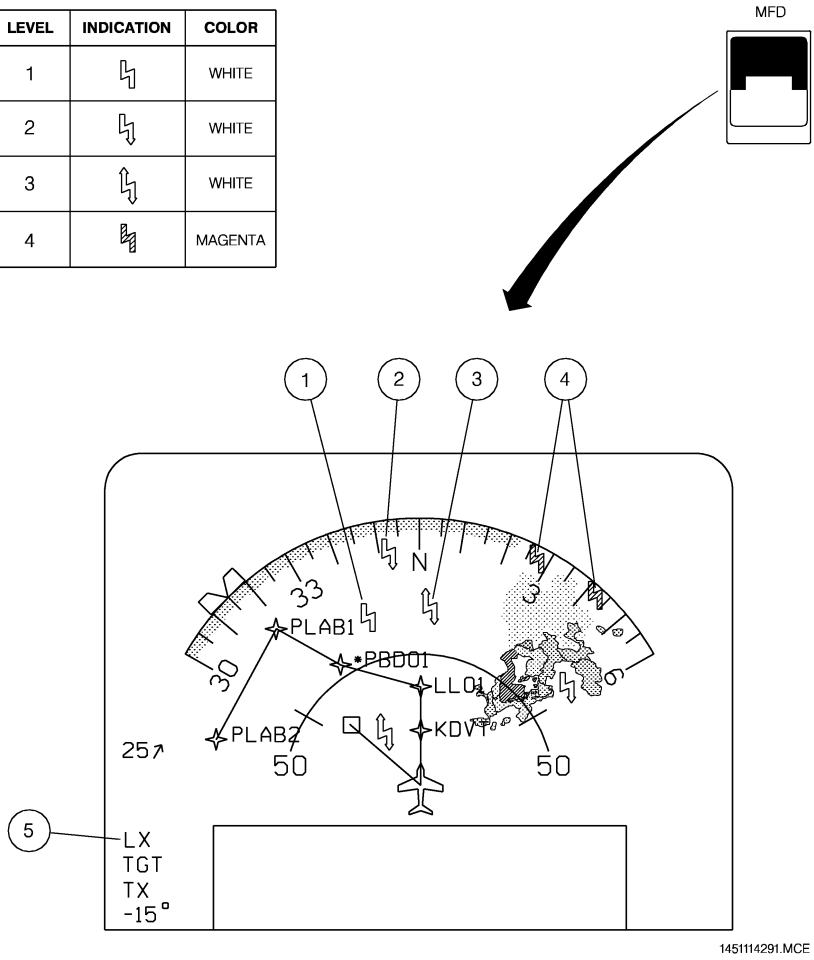
LEVEL	INDICATION	COLOR
1		WHITE
2		WHITE
3		WHITE
4		MAGENTA



LIGHTNING SENSOR SYSTEM DISPLAY ON MFD

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FUTURE AIR NAVIGATION SYSTEM (FANS)

GENERAL

The airplane may optionally be equipped with Honeywell's Future Air Navigation System (FANS). Additional information on functions and operations can be obtained in the manufacturer's manual.

The FANS is an avionics system which allows direct data link communication in remote areas between Air Traffic Control (ATC) and Pilots through the following functions:

– AFN – Air Traffic Services Facility Notification.

– ADS-C – Automatic Dependent Surveillance – Contract.

– CPDLC – Controller to Pilot Data Link Communication.

Communications provided by FANS include ATC clearances, pilot requests, and position reporting. The AFN connects the airplane to an ATC Center. The ADS-C sends data link protocols requested by ATC from the airplane to the respective ATC. The CPDLC receives and sends data link messages that can replace voice communication between flight crew and ATC.

The communication is made via data link protocols in the existing ACARS network, either by SATCOM or VHF3. ACARS data link end-to-end communication requires a Data Link Service Provider (DSP). The DSP operates the network of VHF and/or satellite ground stations, which are access points to the ACARS network for ground sub-networks.

FANS operational environment extends beyond the airplane to include satellite, ground-based stations and the CPDLC to manage air traffic. The last 2 hours of ADS reports and CPDLC messages are recorded in the CVR.

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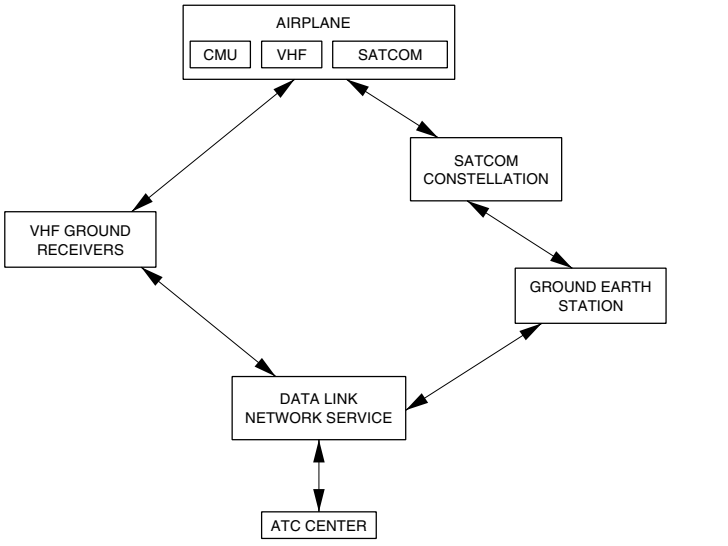
The following illustration represents the communications channel paths for FANS:



FANS COMMUNICATIONS CHANNEL PATHS

Some of the benefits offered by FANS are:

- Reduced separation between airplanes.
- More efficient route changes.
- Satellite communication.
- No altitude loss when crossing tracks.
- More direct routings.
- Reduced user charges for using the FANS infrastructure.
- Reduced fuel burn.
- Increased payload.

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FANS OPERATING MODES

AIR TRAFFIC SERVICES FACILITY NETWORK (AFN)

To FANS work properly, the airplane must be connected to an ATC Center. The AFN function connects the airplane to the Air Traffic Service (ATS) in order the airplane can communicate with the ATC via ADS and CPDLC.

The connection is made through the CDUs. Both CDUs can be used independently from one another, so the flight crew can alternate CDUs functions.

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To connect the airplane to the ATS is necessary to push the ATC key on the CDU.

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CDU ATC KEY

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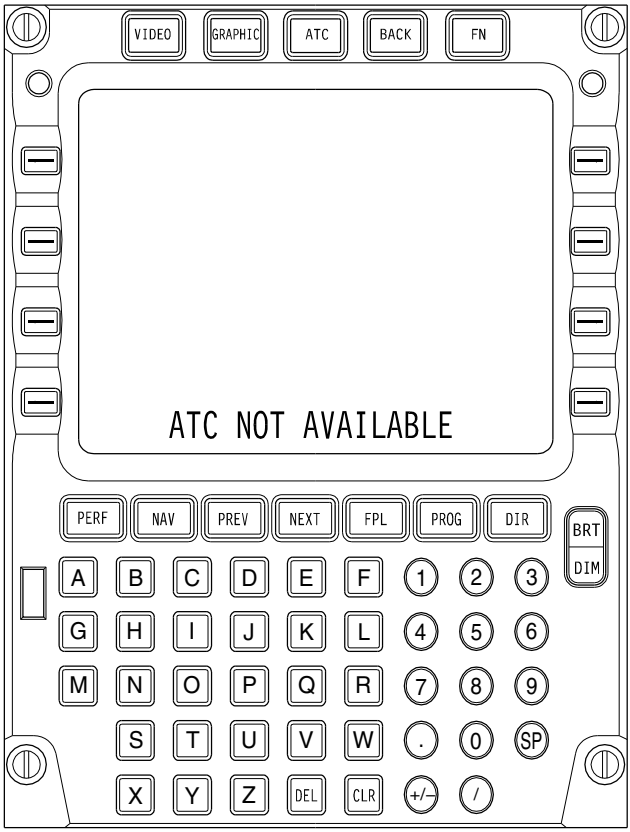
When the ATC key is selected and the ATC NOT AVAILABLE message is displayed on the lower portion of the screen, the connection cannot be done with ATC.



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ATC NOT AVAILABLE

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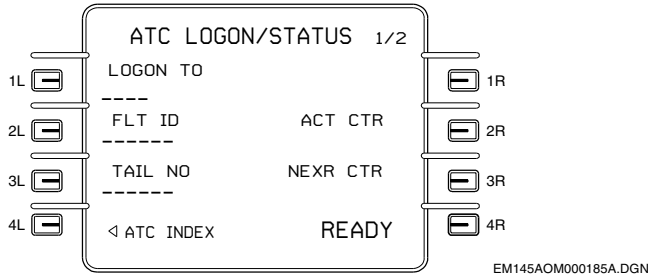
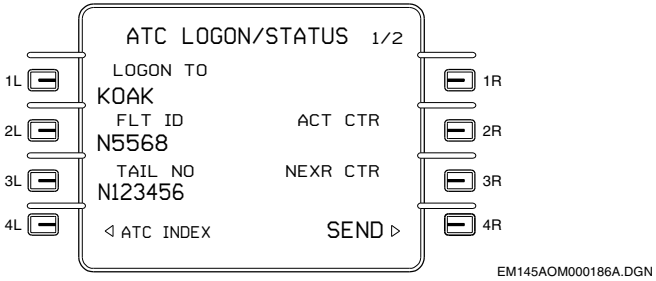
The ATC LOGON/STATUS page 1/2 is displayed on the CDU with dashes in the unfilled fields. The information required should be inputted in the LOGON TO, FLT ID and TAIL NO fields.



ATC LOGON/STATUS PAGE BLANK

Once the information has been inputted, the flight crew should send the information to connect the airplane to the ATS.



ATC LOGON/STATUS PAGE 1/2

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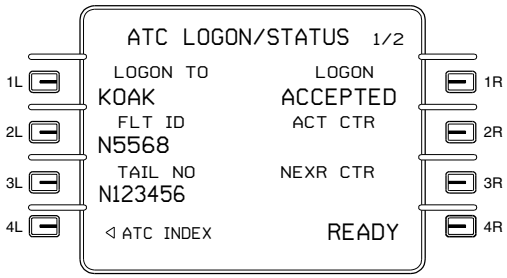
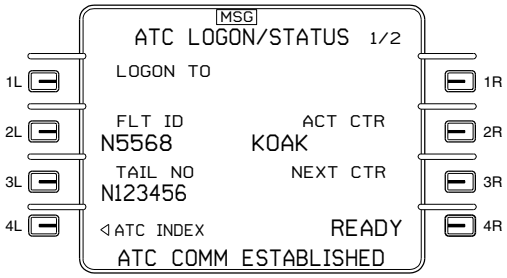
When providing the ATS with the datalink applications supported by the airplane and addressing information of the airplane, the flight identification information and airplane registration included in the AFN displays positive identification of the airplane on the CDU and the ACCEPTED status is displayed in the logon field.



ATC LOGON/STATUS PAGE FILLED

When the connection is made with the ATS, the ATC COMM ESTABLISHED message is displayed together with the MSG indication and the ATC Center is displayed on the ACT CTR field.



COMMUNICATION ESTABLISHED MESSAGE

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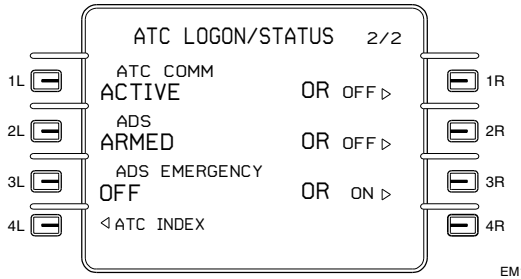
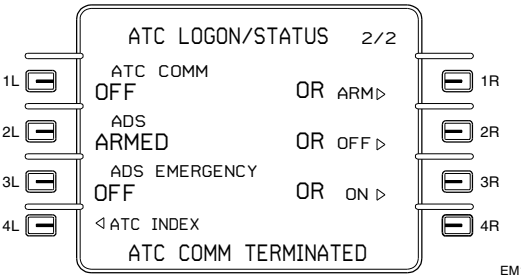
The ATC LOGON/STATUS page 2/2 shows the ATC COMM status for CPDLC communication and ADS status for ADS protocols.



ATC LOGON/STATUS PAGE 2/2

When the ATC COMM field is ACTIVE, the communication has been established. To terminate the communication, the OFF field should be selected and the ATC COMM field will turn to OFF. The ATC COMM TERMINATED will be displayed and the option will change to ARM.



ATC COMM OFF

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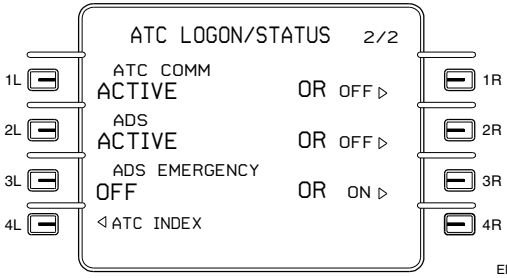
When an ADS contract is requested by the ATC, the ADS field is ACTIVE meaning that the communication with ATC has been established and ADS messages are being sent to ATC. To terminate the communication, the OFF field should be selected and the ATC COMM field will turn to OFF.



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ADS ACTIVE

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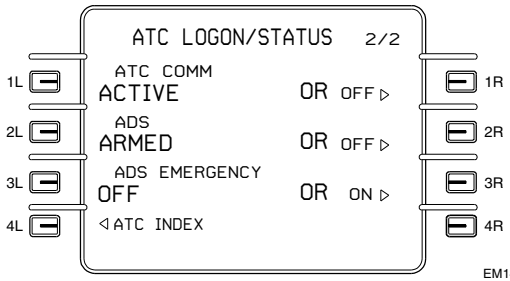
When an ADS contract is not requested by the ATC, the ADS field is ARMED meaning that the communication with ATC has been established and ADS messages are not being sent to ATC. To terminate the communication, the OFF field should be selected and the ATC COMM field will turn to OFF.



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ADS ARMED

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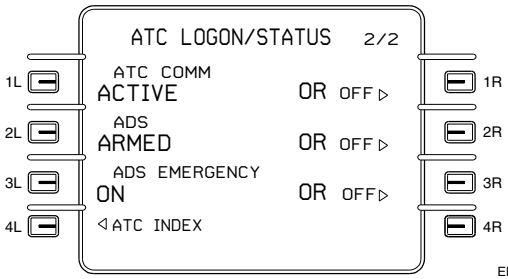
When the ADS EMERGENCY field is OFF, the emergency communication by ADS is not established. To start the communication, the ON field should be selected and the ADS EMERGENCY field will turn to ON. When an CPDLC emergency message is sent containing the MAYDAY MAYDAY MAYDAY element, the ADS EMERGENCY field is changed automatically to ON.



ADS EMERGENCY ON

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The following messages are displayed on the lower part of CDU when the communication with ATC is available:

- READY – Displayed when a datalink network is available.
- FAILED – Displayed when communications between the FMS and ACARS MU has failed.
- SEND OR RESEND – Selection initiates transmission if an AFN logon downlink message to the specified ATC Center.
- VOICE – Displayed when the only link available is VHF and it is currently in voice mode.
- SENDING – Displayed after selecting SEND or RESEND and prior to receiving an acknowledgement from the network that the information has been received.
- NOCOMM – Displayed when the ACARS MU indicates that all datalink paths has failed.
- SENT – Displayed after receiving an acknowledgement that the network has received the AFN downlink information.

Once the addressing information is sent by flight crew to the ATS Facility successfully, the ADS-C and CPDLC functions are ready to be used. The flight crew and ATC Center can decide when to start and when to terminate communications. Once in-air, if connected, the communication link is updated automatically.

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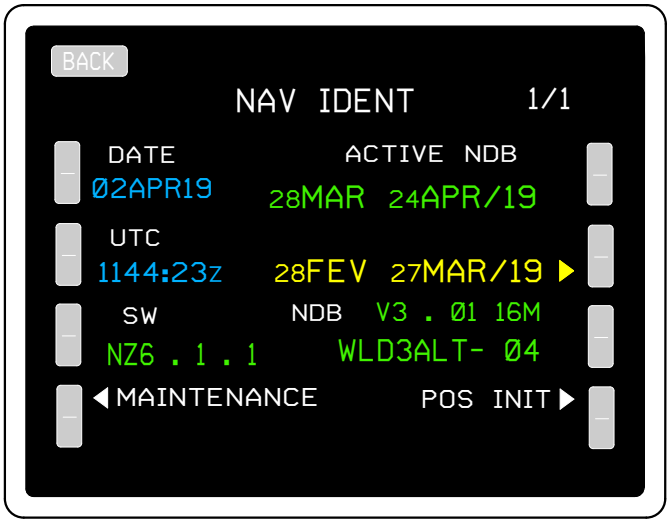
FANS 1/A +

For airplanes equipped with FMZ2010 version 6.1.1 and on, the Latency Timer configuration is performed on the ATC LOGON/STATUS page 3/3.

The ATC Uplink Max Delay Time default value is 600 seconds, but the value can be set from 1 to 999 seconds. The flight crew configure the uplink maximum delay time according to ATC instructions. The MAX UPLINK DELAY time can be turned off by entering 0.

When the difference between the uplink message timestamp and the current FMS timer is greater than the ATC Uplink Max Delay Time and the uplink status is OPEN or NEW, the message "-UPLINK DELAY EXCEEDED-" is displayed in amber.



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NAV IDENT 1/1 (FMZ2010 V 6.1.1)

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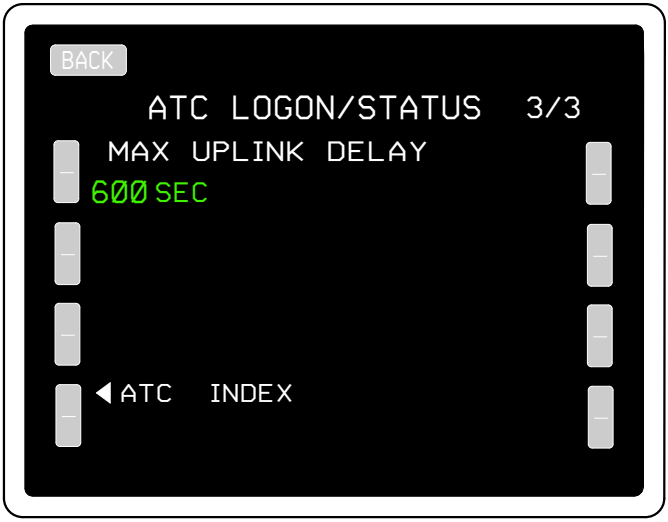
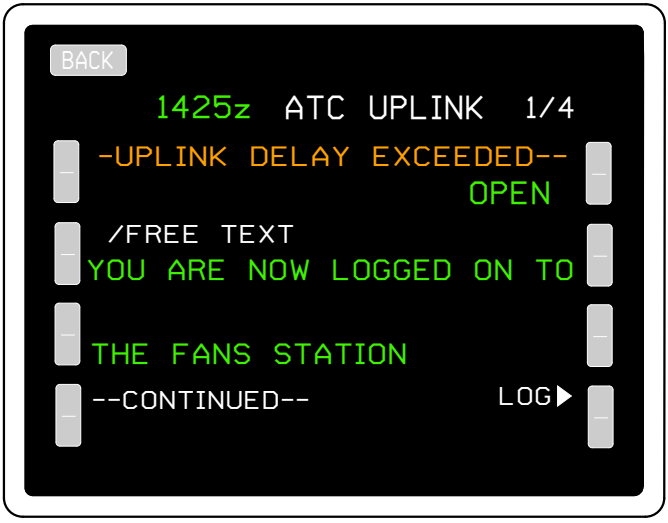


EM145AOM180087A.IDR

ATC LOGON/STATUS 3/3 (FMZ2010 V 6.1.1)



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UPLINK DELAY EXCEEDED MESSAGE

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AUTOMATIC DEPENDANT SURVEILLANCE - CONTRACT (ADS-C)

Once the airplane is connected to an ATC Center via AFN, the ADS reports the current airplane flight parameters via satellite or VHF data link to the ATC Center. ADS reporting, coupled with improved pilot/controller communication by voice and/or data link increases safety and air space utilization.

The reports may be used by ATS authorities to allow position determination outside of the range of the radar. The reports may also be used by Airline Operational Control (AOC) and meteorological service applications.

The airborne ADS function (ADSF) obtains navigational and meteorological data from FMS and processes the information into reports for ADS ground-based peer applications (ADSP).

Information required by the ADSF includes latitude, longitude, altitude, time, identification, waypoint information, track or heading, airspeed, wind speed, wind direction and static air temperature. The ATC defines in the contract what kind of information the FMS should send to the ATC Center and the intervals of each information sent.

The ADSF has the capability of communicating with one or more ground ADSP simultaneously. The dialogue on each association is unique, and is not dependent on the dialogue on any of the other associations. The ADSF can simultaneously communicate with up to 5 ground based ATC facilities.

The flight crew has no action on sending ADS protocols messages. All messages requested from ATC are automatically sent from FMS when the airplane is connected to the ATC Center. The only action attributed to the flight crew is to connect or disconnect the ADS to the AFN system.

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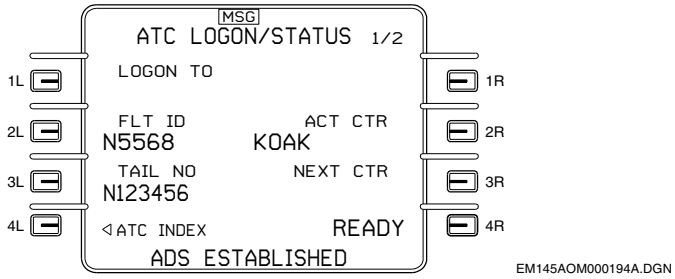
When the airplane is connected to an ATN facility, the ADS is armed to send the reports. If the ATC does not request an ADS contract, the ADS remains armed and the reports are not sent. Once the ATC Center requests an ADS contract, the ADS ESTABLISHED message is displayed in the CDU together with the MSG indication.



ADS ESTABLISHED MESSAGE

The ATC can request an ADS contract at any time. If ATC cancels the contract, the ADS status changes from ACTIVE to ARMED. Whenever a contract is initiated, the ADS ESTABLISHED message appears.

If the flight crew selects the ADS to OFF, the contract is cancelled. To have a new contract it is necessary to change the ADS status to armed and wait the ATC requests a new contract.

The ADS status may be in emergency mode either selected directly by the flight crew or if a CPDLC emergency message is sent containing the MAYDAY MAYDAY MAYDAY element. Sending a CANCEL EMERGENCY in CPDLC automatically turns the ADS emergency status to OFF.

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The ATC can request several protocol messages from ground ADS to the airplane FMS, such as:

– Normal Periodic Contract Request.

– Emergency Periodic Contract Request.

– Event Contract Request.

– Cancel Contract Request.

– Cancel All Contracts and Terminate Connection Request.

– Cancel Emergency Mode Request.

The airplane FMS can send several protocol messages requested from ATC, such as:

– Normal Periodic Report.

– Emergency Periodic Report.

– Demand Report.

– Event Report.

– Acknowledgement.

– Negative Acknowledgement.

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CONTROLLER TO PILOT DATA LINK COMMUNICATION (CPDLC)

CPDLC provides to flight crew data communication with ATC, giving the capability to accept, manage, and terminate connections with ATC Center. The intent of CPDLC is to reduce voice frequency congestion.

Once the airplane is connected to an ATC Center, the CPDLC provides the means for the flight crew to exchange messages with the established ATC authority (controller).

The CPDLC function allows tactical communication through messages between the flight crew and air traffic controller, allowing the flight crew to request deviations to or replacements of the filed flight plan. The air traffic controller also has the ability to directly request tactical changes to the airplane flight plan.

The messages include a set of clearance, information and request message elements, which correspond to existing phraseology employed by current ATC procedures.

The message elements encompass altitude assignments, crossing constraints, lateral deviations, route changes and clearances, speed assignments, radio frequency assignments, and various requests for information. The pilot is provided with the capability to respond to messages, to request clearances and information, to report information, and to declare/rescind an emergency. A "free text" capability is also provided to exchange information not available in the defined formats.

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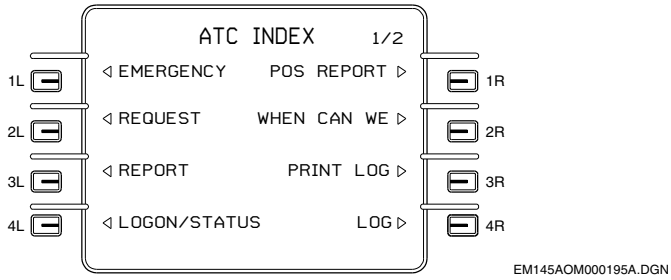
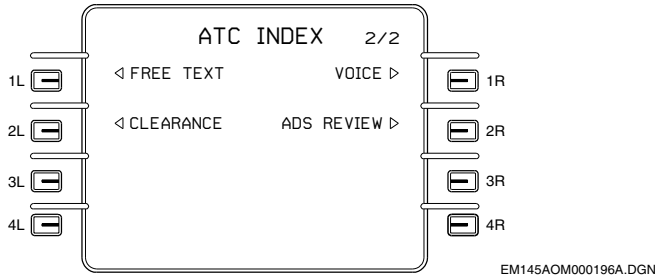
To operate CPDLC, the flight crew should press the ATC INDEX key. The ATC INDEX pages 1/2 and 2/2 display the CPDLC message options available.



ATC INDEX PAGE 1/2



ATC INDEX PAGE 2/2

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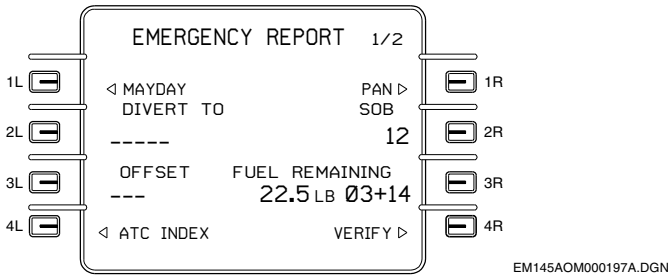
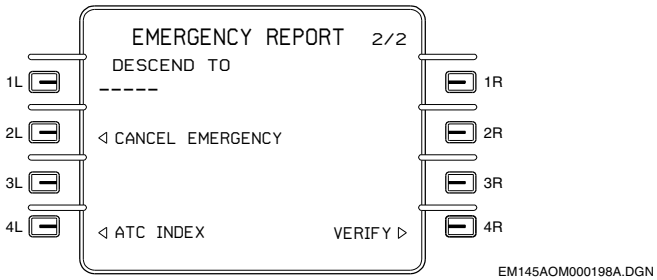
EMERGENCY

The EMERGENCY REPORT allows flight crew to send emergency messages in order to alert the ATC of an airplane emergency.



ATC INDEX PAGE 1/2



ATC INDEX PAGE 2/2

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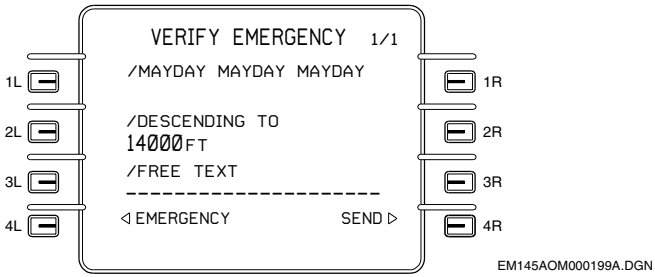
Flight crew can choose MAYDAY or PAN messages with the option to write a free text. If the MAYDAY option is selected, the ADS EMERGENCY option on LOGON/STATUS page automatically changes to ON.

Selecting the MAYDAY option enables the MAYDAY MAYDAY MAYDAY message element and an abbreviated POSITION REPORT message element (when available) in the emergency report downlink message. Selecting the PAN option enables the PAN PAN PAN message element in the emergency report downlink message. Selection of MAYDAY or PAN results in the page display changing to the VERIFY EMERGENCY page.



VERIFY EMERGENCY PAGE

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The flight crew can also input the number of souls on board (SOB) before sending the emergency message to ATC. The number of souls on board (SOB) the airplane is entered when less than five elements are selected for inclusion in the emergency report. To display the fuel remaining is required a valid entry for SOB.

EMERGENCY REPORT messages also include reporting with lateral and vertical maneuvers that flight crew intends to execute during an emergency.

The default identifier of the destination airport for the active flight plan is displayed on the DIVERT TO option. Entry of a DIVERT TO position is permitted when less than five elements are selected for inclusion in the emergency report. Selection results in inclusion of the message text DIVERTING TO (position) VIA ROUTE CLEARANCE in the emergency report downlink.

When a valid entry is made to the OFFSET option, the entry is displayed. When a valid entry does not exist, dashes are displayed.

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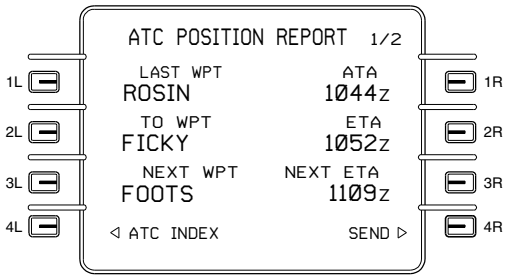
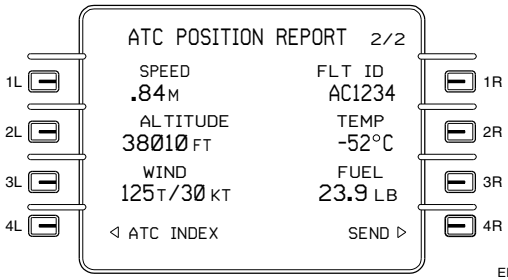
POS REPORT

The POSITION REPORT option allows flight crew send position report messages to the ATC. The FMS inputs the data in the fields; therefore the flight crew can only send the reports to the ATC. If there is no valid data, the field remains blank.



EM145AOM000200A.DGN

POSITION REPORT PAGE 1/2



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POSITION REPORT PAGE 2/2

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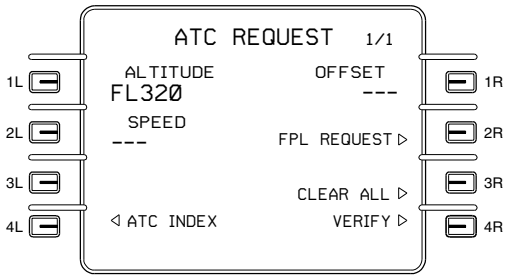
REQUEST

The ATC REQUEST page is the initial page that gives access to the detailed request pages.



ATC REQUEST PAGE

The ATC altitude request pages allow flight crew request to change the altitude due to weather or performance. The flight crew can request to step at a flight level during the altitude change, maintaining own separation and VMC, or at pilots' discretion. Entry of a valid altitude creates a message element requesting a block altitude, a level altitude, or a climb or descent clearance. Altitude block format is: altitude/altitude. The message should be verified before sent.

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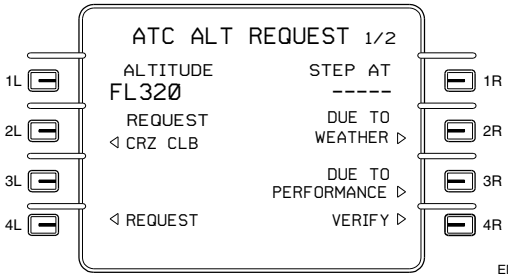
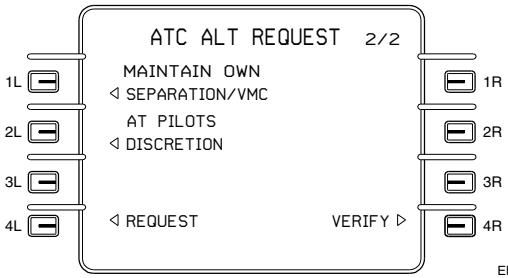


ATC ALTITUDE REQUEST PAGE 1/2



ATC ALTITUDE REQUEST PAGE 2/2

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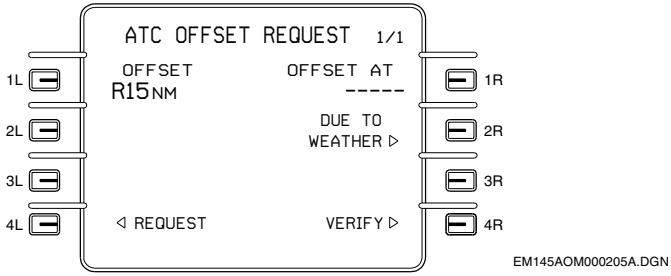
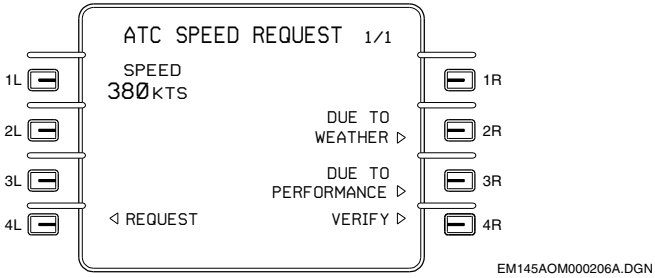
The ATC offset request allows flight crew to request offset in the flight path to the left or to the right due to weather.



ATC OFFSET REQUEST PAGE

The ATC speed request allows flight crew to request speed changes due to weather or performance.



ATC SPEED CHANGE REQUEST PAGE

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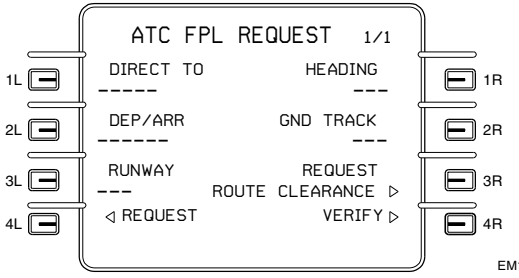
The ATC flight plan request allows flight crew to request flight plan changes such as direct to clearances, full flight plans, departure and arrival procedures with transitions, and heading and ground track clearances.



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ATC FLIGHT PLAN CHANGE REQUEST PAGE

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The following table provides the recommended identifiers for approach when a flight plan change is requested:

RECOMMENDED ID	TYPE OF APPROACH
VORDME	VOR DME
NDBDME	NDB DME
DGPS	Differential GPS
ILS	ILS
BAC	Backcourse
LOC	LOC
MLS	MLS
SDF	Simplified Directional Facility
LDA	Localizer-type Directional Aid
IGS	Instrument Guidance System
GPS*	GPS
RNAV*	RNAV
VOR*	VOR
NDB*	NDB
TAC*	TAC
*Indicates characters, that are an option, are permitted to follow. For example: RNAV-X.	

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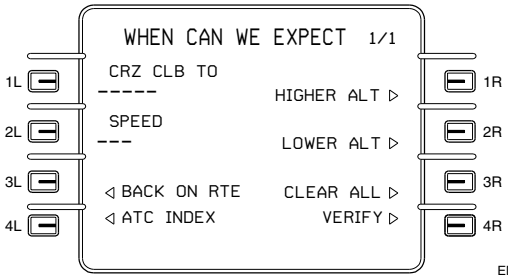
WHEN CAN WE

The WHEN CAN WE EXPECT option allows flight crew ask to ATC at what time or position they can expect make an authorized change.



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WHEN CAN WE EXPECT REQUEST PAGE

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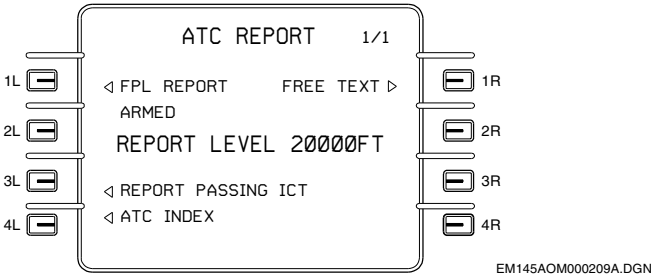
REPORT

The REPORT option allows flight crew to send flight plan report to the ATC. Pushing the FPL REPORT shows the VERIFY REPORT page with the message text ASSIGNED ROUTE in the downlink request in order to send the flight plan report to the ATC. This field is blank until an active flight plan exists. It is also possible to send free text messages to the ATC.



ATC REPORT PAGE

Report list entries are stacked with the oldest entry displayed on line 2 and each succeeding report list entry displayed in the next available line.

When a report is armed for automatic transmission, ARMED is displayed in the data field of the line corresponding to the armed report. Some report uplinks are armable (e.g., REPORT LEVEL [alt] and REPORT REACHING [alt]), while other reports are not armable (e.g., REPORT PASSING [pos]).

Selection of the left line select adjacent to a report list entry results in display of the VERIFY REPORT page corresponding to the report list entry.

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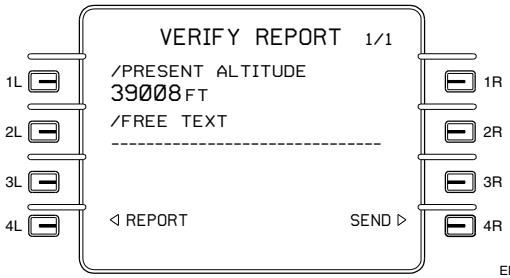
DELETE of an ARMED report deselects the armed status. DELETE of an unarmed report removes the report from the list.

When the uplink of an armable report is accepted/sent, it is automatically armed. For a report that is not armable, after the accept/send action, a REPORT prompt is displayed in the message (when selected from the ATC LOG), and when selected, shows the VERIFY REPORT page. This can also be accessed through the ATC REPORT page by selecting the message there, and then shows the VERIFY REPORT page.

The format of the VERIFY REPORT page is dependent on the nature of the report type. The VERIFY REPORT page shows requests in clearance language, permits review of the message before being sent, and accepts entry of free text in the downlink message.



VERIFY REPORT PAGE

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PRINT LOG

The PRINT LOG option allows flight crew to print the messages that are stored in the log of messages.

LOGON/STATUS

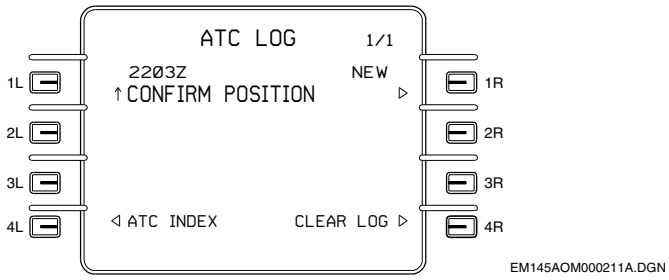
The LOGON/STATUS option returns to logon/status page of the AFN connection.

LOG

The LOG option displays the history of sent and received messages.

When the communication is started by the ATC and a message is sent to the flight crew, the CDU displays the status NEW in the ATC LOG option. The kinds of uplink messages sent by ATC are:

– Responses/Acknowledgements.
– Vertical Clearances.
– Lateral Offsets.
– Route Modifications.
– Speed Changes.
– Air Traffic Advisories.
– Report Confirmation Requests.
– Negotiations requests.



MESSAGE WITH THE STATUS NEW

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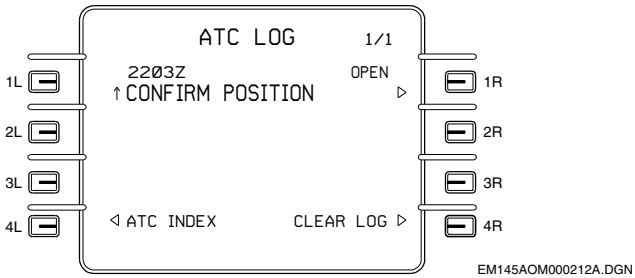
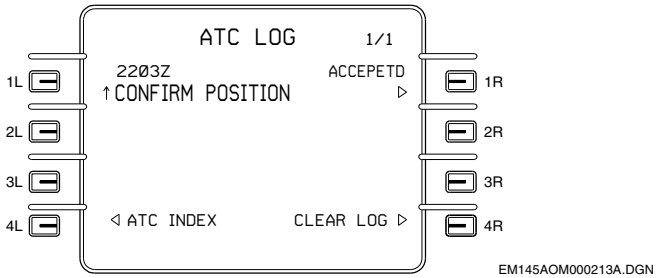
When the message is read by the flight crew and it requires an answer to be sent to the ATC, the message status is changed to OPEN.



MESSAGE WITH THE STATUS OPEN

If the message sent by the ATC requires an answer and the flight crew choose to let the message in STANDBY, its status remains OPEN until the message is answered either with REJECT OR ACCEPT.



MESSAGE WITH THE STATUS ACCEPTED

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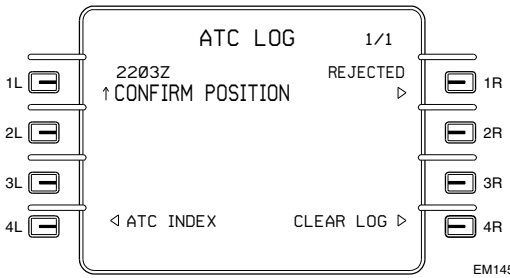
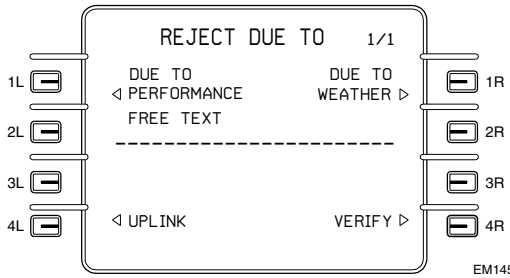


MESSAGE WITH THE STATUS REJECTED

If the flight crew rejects the message, it must be answered with data in the page DUE TO and, if applicable, a free text.



MESSAGE REJECTED DUE TO

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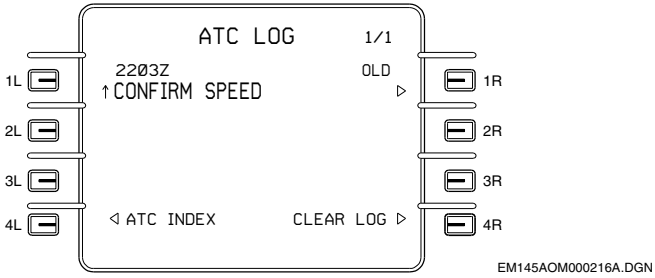
If the message sent by the ATC does not require an answer, once the flight crew reads the message its status is changed to OLD.



MESSAGE WITH THE STATUS OLD

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When the communication is started by the flight crew and a message is sent to the ATC, the CDU displays the message OPEN. The kinds of downlink messages sent by flight crew are:

– Reports.

– Vertical Requests.

– Lateral Offsets Requests.

– Route Modification Requests.

– Speed Requests.

– Voice Contact Requests.

– Responses.

– Emergency Messages.

– Pre-Formatted free text.

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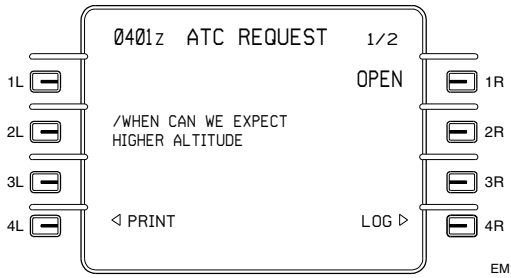

MESSAGE WITH THE STATUS OPEN

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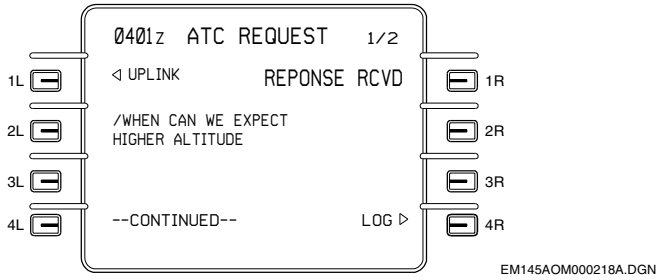
When the message is received by the ATC, the status is changed to RESPONSE RCVD.



MESSAGE WITH THE STATUS RESPONSE RCVD

When a message has the status RESPONSE RCVD, a new message is sent from ATC to flight crew with the status NEW. If this message is read, its status is changed to OPEN. Flight crew can REJECT, ACCEPT or let the message in STANDBY.

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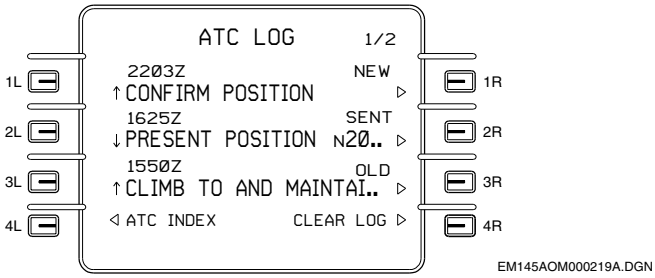
The uplink messages (sent by ATC) are displayed with an up arrow before the message in the LOG page. The downlink messages (sent by flight crew) are displayed with a down arrow before the message in the LOG page.



ARROWS BEFORE THE MESSAGES

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FREE TEXT

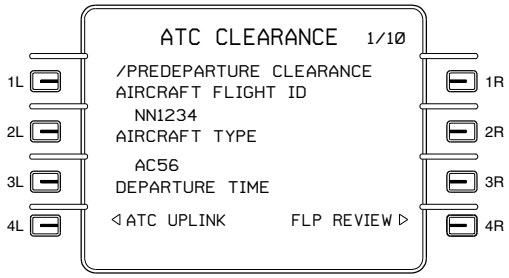
The FREE TEXT option allows flight crew to send free text messages to ATC.

VOICE

The VOICE option allows flight crew to request voice communication with ATC.

CLEARANCE

The CLEARANCE option allows flight crew to request clearance to ATC.



EM145AOM000220A.DGN

ATC CLEARANCE PAGE

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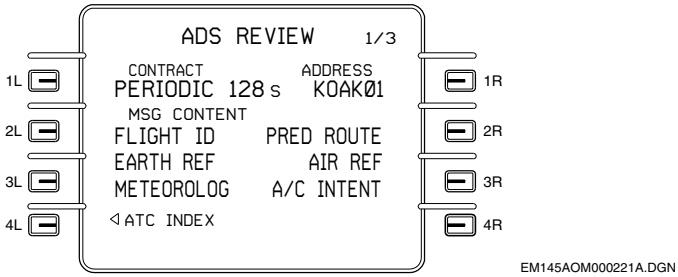
ADS REVIEW

The ADS REVIEW option displays to the flight crew the ADS contract sent to ATC. The three types of ADS contracts are Periodic, Emergency Periodic, and Event. The information displayed on each page is dependent on the ADS content requested by the ATC. If no ADS contract with the ATC exists, the prompt ADS REVIEW is not displayed. The pages are ordered with the newest contract first and the oldest contract last. No entry or deletion is allowed in the fields.



ADS REVIEW PERIODIC CONTRACT PAGE

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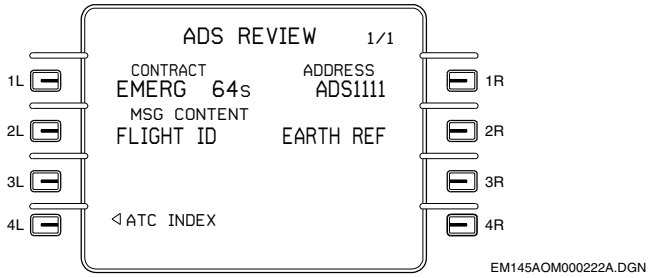
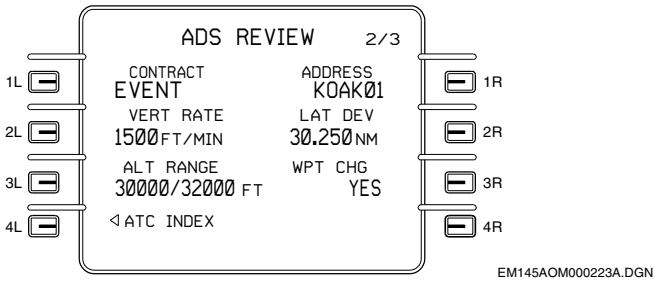


ADS REVIEW EMERGENCY PERIODIC CONTRACT PAGE



ADS REVIEW EVENT CONTRACT PAGE

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MESSAGES

The A/D messages displayed in the CDU are:

- IMMEDIATELY CLIMB TO [ALTITUDE]
- IMMEDIATELY DESCEND TO [ALTITUDE]
- IMMEDIATELY STOP CLIMB AT [ALTITUDE]
- IMMEDIATELY STOP DESCENT AT [ALTITUDE]
- IMMEDIATELY TURN [DIRECTION] HEADING [DEGREES]
- [FREETEXT] (A/D freetext only – the common freetext is not A/D).

The other messages displayed in the CDU are:

- UNABLE
- STANDBY
- REQUEST DEFERRED
- ROGER
- AFFIRM
- NEGATIVE
- EXPECT [ALTITUDE]
- EXPECT CLIMB AT [TIME]
- EXPECT CLIMB AT
- [POSITION]
- EXPECT DESCENT AT [TIME]
- EXPECT DESCENT AT [POSITION]
- EXPECT CRUISE CLIMB AT [TIME]
- EXPECT CRUISE CLIMB AT [POSITION]
- AT [TIME] EXPECT CLIMB TO [ALTITUDE]
- AT [POSITION] EXPECT CLIMB TO [ALTITUDE]
- AT [TIME] EXPECT DESCENT TO [ALTITUDE]
- AT [POSITION] EXPECT DESCENT TO [ALTITUDE]
- AT [TIME] EXPECT CRUISE CLIMB TO [ALTITUDE]
- AT [POSITION] EXPECT CRUISE CLIMB TO [ALTITUDE]
- MAINTAIN [ALTITUDE]
- CLIMB TO AND MAINTAIN [ALTITUDE]
- AT [TIME] CLIMB TO AND MAINTAIN [ALTITUDE]
- AT [POSITION] CLIMB TO AND MAINTAIN [ALTITUDE]
- DESCEND TO AND MAINTAIN [ALTITUDE]
- AT [TIME] DESCEND TO AND MAINTAIN [ALTITUDE]
- AT [POSITION] DESCEND TO AND MAINTAIN [ALTITUDE]
- CLIMB TO REACH [ALTITUDE] BY [TIME]

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- CLIMB TO REACH [ALTITUDE] BY [POSITION]
- DESCEND TO REACH [ALTITUDE] BY [TIME]
- DESCEND TO REACH [ALTITUDE] BY [POSITION]
- MAINTAIN BLOCK [ALTITUDE] TO [ALTITUDE]
- CLIMB TO AND MAINTAIN BLOCK [ALTITUDE] TO [ALTITUDE]
- DESCEND TO AND MAINTAIN BLOCK [ALTITUDE] TO [ALTITUDE]
- CRUISE [ALTITUDE]
- CRUISE CLIMB TO [ALTITUDE]
- CRUISE CLIMB ABOVE [ALTITUDE]
- EXPEDITE CLIMB TO [ALTITUDE]
- EXPEDITE DESCENT TO [ALTITUDE]
- IMMEDIATELY CLIMB TO [ALTITUDE]
- IMMEDIATELY DESCEND TO [ALTITUDE]
- IMMEDIATELY STOP CLIMB AT [ALTITUDE]
- IMMEDIATELY STOP DESCENT AT [ALTITUDE]
- EXPECT TO CROSS [POSITION] AT [ALTITUDE]
- EXPECT TO CROSS [POSITION] AT OR ABOVE [ALTITUDE]
- EXPECT TO CROSS [POSITION] AT OR BELOW [ALTITUDE]
- EXPECT TO CROSS [POSITION] AT AND MAINTAIN [ALTITUDE]
- CROSS [POSITION] AT [ALTITUDE]
- CROSS [POSITION] AT OR ABOVE [ALTITUDE]
- CROSS [POSITION] AT OR BELOW [ALTITUDE]
- CROSS [POSITION] AT AND MAINTAIN [ALTITUDE]
- CROSS [POSITION] BETWEEN [ALTITUDE] AND [ALTITUDE]
- CROSS [POSITION] AT [TIME]
- CROSS [POSITION] AT OR BEFORE [TIME]
- CROSS [POSITION] AT OR AFTER [TIME]
- CROSS [POSITION] BETWEEN [TIME] AND [TIME]
- CROSS [POSITION] AT [SPEED]
- CROSS [POSITION] AT OR LESS THAN [SPEED]
- CROSS [POSITION] AT OR GREATER THAN [SPEED]
- CROSS [POSITION] AT [TIME] AT [ALTITUDE]
- CROSS [POSITION] AT OR BEFORE [TIME] AT [ALTITUDE]
- CROSS [POSITION] AT OR AFTER [TIME] AT [ALTITUDE]
- CROSS [POSITION] AT AND MAINTAIN [ALTITUDE] AT [SPEED]
- AT [TIME] CROSS [POSITION] AT AND MAINTAIN [ALTITUDE]
- AT [TIME] CROSS [POSITION] AT AND MAINTAIN [ALTITUDE] AT [SPEED]
- OFFSET [DIRECTION][DISTANCEOFFSET]

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- AT [POSITION] OFFSET [DIRECTION][DISTANCEOFFSET]
- AT [TIME] OFFSET [DIRECTION][DISTANCEOFFSET]
- PROCEED BACK ON ROUTE
- REJOIN ROUTE BY [POSITION]
- REJOIN ROUTE BY [TIME]
- EXPECT BACK ON ROUTE BY [POSITION]
- EXPECT BACK ON ROUTE BY [TIME]
- RESUME OWN NAVIGATION
- PREDEPARTURE CLEARANCE
- PROCEED DIRECT TO [POSITION]
- WHEN ABLE PROCEED DIRECT TO [POSITION]
- AT [TIME] PROCEED DIRECT TO [POSITION]
- AT [POSITION] PROCEED DIRECT TO [POSITION]
- AT [ALTITUDE] PROCEED DIRECT TO [POSITION]
- CLEARED TO [POSITION] VIA ROUTE CLEARANCE
- CLEARED ROUTE CLEARANCE
- CLEARED [PROCEDURENAME]
- CLEARED TO DEVIATE UP TO [DIRECTION][DISTANCEOFFSET]
- AT [POSITION] CLEARED ROUTE CLEARANCE
- AT [POSITION] CLEARED [PROCEDURENAME]
- EXPECT ROUTE CLEARANCE
- AT [POSITION] EXPECT ROUTE CLEARANCE
- EXPECT DIRECT TO [POSITION]
- AT [POSITION] EXPECT DIRECT TO [POSITION]
- AT [TIME] EXPECT DIRECT TO [POSITION]
- AT [ALTITUDE] EXPECT DIRECT TO [POSITION]
- [1]HOLD AT [POSITION] MAINTAIN [ALTITUDE] INBOUND TRACK [DEGREES] TURN DIRECTION [DIRECTION] [LEG TIME OR LEG DIST] [LEG TIME/DISTANCE VALUE]
- [2]HOLD AT [POSITION] MAINTAIN [ALTITUDE] INBOUND TRACK [DEGREES] TURN DIRECTION [DIRECTION]
- HOLD AT [POSITION] AS PUBLISHED MAINTAIN [ALTITUDE]
- EXPECT FURTHER CLEARANCE AT [TIME]
- TURN [DIRECTION] HEADING [DEGREES]
- TURN [DIRECTION] GROUND TRACK [DEGREES]
- FLY PRESENT HEADING
- AT [POSITION] FLY HEADING [DEGREES]
- IMMEDIATELY TURN [DIRECTION] HEADING [DEGREES]
- EXPECT [PROCEDURENAME]

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- AT [TIME] EXPECT [SPEED]
- AT [POSITION] EXPECT [SPEED]
- AT [ALTITUDE] EXPECT [SPEED]
- AT [TIME] EXPECT [SPEED] TO [SPEED]
- AT [POSITION] EXPECT [SPEED] TO [SPEED]
- AT [ALTITUDE] EXPECT [SPEED] TO [SPEED]
- MAINTAIN [SPEED]
- MAINTAIN PRESENT SPEED
- MAINTAIN [SPEED] OR GREATER
- MAINTAIN [SPEED] OR LESS
- MAINTAIN [SPEED] TO [SPEED]
- INCREASE SPEED TO [SPEED]
- INCREASE SPEED TO [SPEED] OR GREATER
- REDUCE SPEED TO [SPEED]
- REDUCE SPEED TO [SPEED] OR LESS
- DO NOT EXCEED [SPEED]
- RESUME NORMAL SPEED
- CONTACT [ID] [FUNCTION] ON [FREQUENCY]
- AT [POSITION] CONTACT [ID] [FUNCTION] ON [FREQUENCY]
- AT [TIME] CONTACT [ID] [FUNCTION] ON [FREQUENCY]
- MONITOR [ID] [FUNCTION] ON [FREQUENCY]
- AT [POSITION] MONITOR [ID] [FUNCTION] ON [FREQUENCY]
- AT [TIME] MONITOR [ID] [FUNCTION] ON [FREQUENCY]
- SQUAWK [BEACONCODE]
- STOP SQUAWK
- SQUAWK ALTITUDE
- STOP ALTITUDE SQUAWK
- REPORT BACK ON ROUTE
- REPORT LEAVING [ALTITUDE]
- REPORT LEVEL [ALTITUDE]
- REPORT PASSING [POSITION]
- REPORT REMAINING FUEL SOULS ON BOARD
- CONFIRM POSITION
- CONFIRM ALTITUDE
- CONFIRM SPEED
- CONFIRM ASSIGNED ALTITUDE
- CONFIRM ASSIGNED SPEED
- CONFIRM ASSIGNED ROUTE
- CONFIRM TIME OVER REPORTED WPT
- CONFIRM REPORTED WAYPOINT

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- CONFIRM NEXT WAYPOINT
- CONFIRM NEXT WAYPOINT ETA
- CONFIRM ENSUING WAYPOINT
- CONFIRM REQUEST
- CONFIRM SQUAWK
- CONFIRM HEADING
- CONFIRM GROUND TRACK
- REQUEST POSITION REPORT
- WHEN CAN YOU ACCEPT [ALTITUDE]
- CAN YOU ACCEPT [ALTITUDE] AT [POSITION]
- CAN YOU ACCEPT [ALTITUDE] AT [TIME]
- WHEN CAN YOU ACCEPT [SPEED]
- WHEN CAN YOU ACCEPT [DIRECTION][DISTANCEOFFSET] OFFSET
- ALTIMETER [ALTIMETER]
- RADAR SERVICES TERMINATED
- RADAR CONTACT [POSITION]
- RADAR CONTACT LOST
- CHECK STUCK MICROPHONE [FREQUENCY]
- ATIS [ATISCODE]
- DOWNLINK ERROR
- SERVICE UNAVAILABLE
- WHEN READY
- THEN
- DUE TO TRAFFIC
- DUE TO AIRSPACE RESTRICTION
- DISREGARD
- [FREETEXT]
- CLIMB AT [VERTICALRATE] MINIMUM
- CLIMB AT [VERTICALRATE] MAXIMUM
- DESCEND AT [VERTICALRATE] MINIMUM
- DESCEND AT [VERTICALRATE] MAXIMUM
- REPORT REACHING [ALTITUDE]
- MAINTAIN OWN SEPARATION AND VMC
- AT PILOTS DISCRETION
- SQUAWK IDENT
- REPORT REACHING BLOCK [ALTITUDE] TO [ALTITUDE]
- REPORT DISTANCE [TOFROM] [POSITION]
- CONFIRM ATIS CODE

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INDICATIONS

Whenever a new CPDLC message is received from the ATC, an ATC message indication is displayed flashing on the PFDs and an aural warning message "ATC MESSAGE" is annunciated.

If the message status is NEW or OPEN in the CDU, the ATC message indication in the PDF remains flashing until the flight crew answers the messages on CDU.

The ATC message indication is displayed in amber if the message is an A/D message (messages which require immediate awareness of the crew).

The ATC message indication is displayed in white for all other CPDLC messages.

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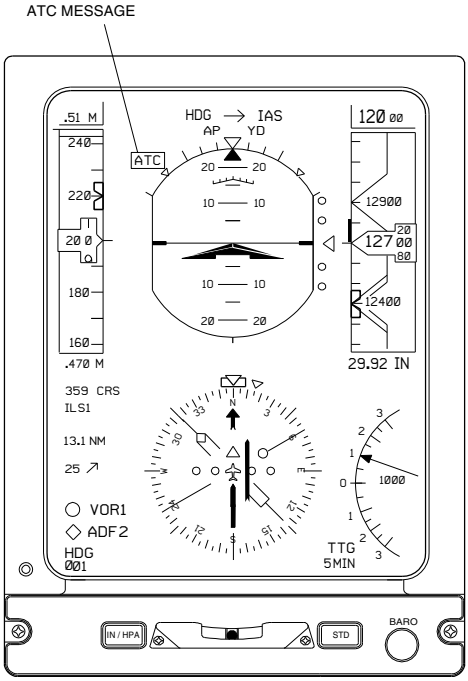

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ATC MESSAGE INDICATION ON PFD

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
ADVISORY	DATALINK FAIL	DATALINK communication cannot be performed and must be replaced by voice communication.
	SATCOM FAIL	A failure in SATCOM radio has been detected and ATC communication cannot be performed via SATCOM.
	VHF 3 FAIL	A failure in VHF3 radio has been detected and ATC communication cannot be performed via VHF3.

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SATELLITE-BASED AUGMENTATION SYSTEM (SBAS)

SBAS is intended to enable airplane to rely on GPS for all phases of flight, including precision approaches to any airport within its coverage area.

Each country can have its own satellite constellations (SBAS). In United States is WAAS (Wide Area Augmentation System), in Europe is EGNOS (European Geostationary Navigation Overlay Service) and in India is GAGAN (GPS Aided Geo Augmented Navigation).

The GPS GD04 (PN HG2021GD04) is compliant with the requirements of TSO C145c. Therefore, all airplane airplanes equipped with the referenced system (SB 145LEG-034-0031 or factory incorporated) are capable to operate with compatible Satellite Based Augmentation System (SBAS), including WAAS, EGNOS, and GAGAN.

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BARO-VERTICAL NAVIGATION (BARO-VNAV)

Vertical Navigation is the function in the FMS (version 6.1 and on) that provides vertical targets to the Flight Guidance Computer (FGC) for the vertical control of the airplane during climb, cruise, descent, approach and go-around.

VNAV is engaged when the all the following conditions are satisfied:

– Each FMS Position is initialized.
– Performance is initialized.
– Flight plan is closed by entering the destination waypoint as the last waypoint in the flight plan.
– Altitude Preselect is set.
– FMS is the primary source of navigation.
– VNV pushbutton is pressed on the Flight Guidance Controller Panel.

BARO-VNAV COMPONENTS

The VNAV feature is mainly composed of the following components:

– Flight Guidance Controller (GC-550).
– Integrated Computer (IC-600).
– Flight Management System (FMS).

The selection of VNV pushbutton, located on the Flight Guidance Panel, arms the VNAV and disengages the VNAV if it is already engaged. Selection of VS, ALT or SPD vertical submodes also disengages the VNAV.

NOTE: - For airplanes equipped with autothrottle, the SPD mode button is suppressed.

- The A/T mode pushbutton on FGC panel does not cancel the VNAV mode.

- The VNAV engages automatically if already armed and the conditions for engagement are satisfied.

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GUIDANCE CONTROLLER PANEL (GC-550) WITH VNV BUTTON

The Flight Director uses the existing Flight Guidance Computer Vertical Mode control logic with the following targets and information supplied by the FMS:

– VNAV submode.
– Altitude targets.
– Airspeed/Mach targets.
– Vertical speed/angle targets.

The FMS determines which targets the FGC will fly. The FMS CDU and the PFD are used to display the VNAV information.

For VNAV operation, at least one ADC and one IRS data must be valid.

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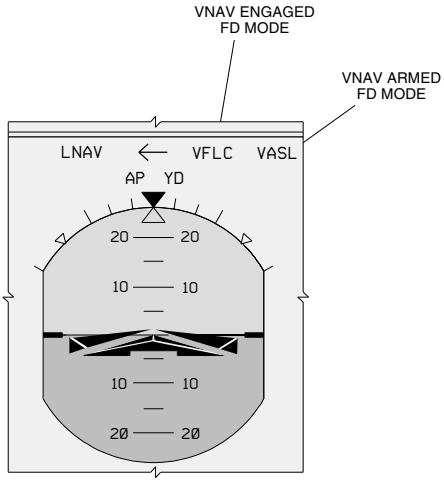
VNAV INDICATIONS

The VNAV related indications are located in the PFD, MFD, EICAS and CDU.

PFD INDICATIONS

The following figures show PFD indications.



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VNAV ARMED AND ENGAGED ON PFD

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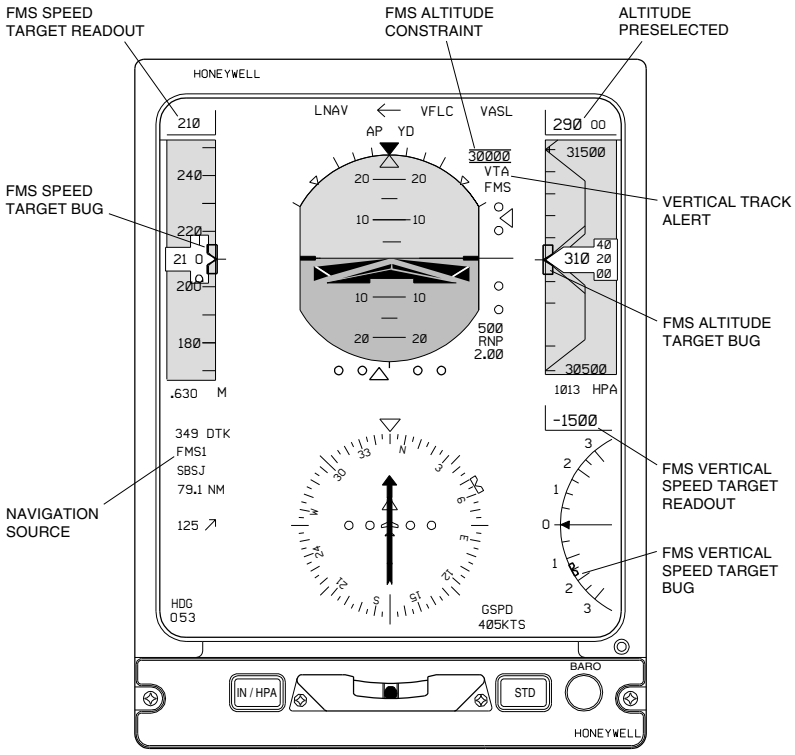

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FMS TARGET BUGS AND READOUTS

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The annunciation associated with the VNAV on PFD is displayed in white for "VNAV Armed Mode" and magenta for "VNAV Engaged Mode". When VNAV is engaged, the speed target readout is also presented in magenta and its control is done by the FMS, not by the Speed Knob.

The altitude preselected is set via ASEL Knob on Guidance Controller Panel.

Altitude constraints can be "AT", "AT or ABOVE", or "AT or BELOW". They are displayed in Magenta, with up to 5 digits and resolution of 1 ft, and they are defined according to Navigation database procedures, or according to pilots commands on CDU, if they plan to be at a certain altitude, or have a limitation at, below or above a certain altitude.

NOTE: The altitude constraint is not displayed in the PFD when it is equal or above the preselector altitude during climb, or equal or below preselector altitude during descent.

A vertical track alert (VTA) is issued anytime the FMS commands a vertical track change. A VTA is issued 60 seconds before changing from level flight to either a climb or descent. When the airplane is completing a climb or descent, the vertical alert is issued 1000 ft before the level-off altitude. When the VTA (Amber) indication is displayed in the PFD, the VTA aural alert is also activated. The VTA aural alert consists in a Single Tone.

NOTE: The VTA alert is not issued when the level-off altitude is equal to the preselected altitude.

The altitude alert is activated 1000 ft before the FMS altitude constraint, when this altitude is equal to the altitude constraint. The altitude alert consists in a Double Tone.

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The next table shows the type of altitude constraints, their description and indications on the PFD.

ALTITUDE CONSTRAINT	VNAV COMMAND	INDICATION ON PFD (I.E. 10000 FT)
AT	Fly to a specific altitude.	10000
AT or ABOVE	Fly to a specific altitude or higher, not below.	10000
AT or BELOW	Fly to a specific altitude or below, not higher.	10000
WINDOW constraint (during climb)	Fly to a specific range of altitude, not higher than upper limit, nor below lower limit.	10000
WINDOW constraint (during descent)		10000

NOTE: WINDOW Constraints can not be manually input on the flight plan, but they are present in specific departure procedures and SID, and also in specific approach procedures and STAR.

The FMS vertical deviation indication represents linear the deviation in feet from the airplane current position to the planned descent path. It has two dots above and two dots below the center mark. When the pointer is above the center mark, it indicates that the airplane is below the path and when the pointer is below the center mark, it indicates that the airplane is above the path.

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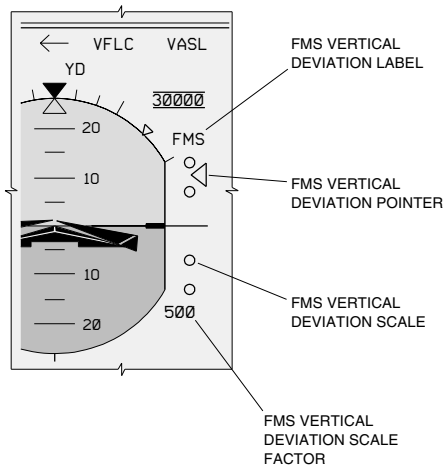
The FMS Vertical Deviation Scale Factor changes as function to the FMS Phase on Flight Plan, according to the table below. That means if the scale factor is equal to 500 ft and the pointer is over the second dot above the center mark, the airplane is 500 ft below the planned descent path.

FMS PHASE ON FLIGHT PLAN	FMS VERTICAL DEVIATION SCALE FACTOR (FT)
Approach	150
Other phases	500



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FMS VERTICAL DEVIATION INDICATION

EICAS

In case of VNAV failure, the CAS message "VERTICAL MODE OFF" (caution) is displayed. If already on final approach, the pilot will need to execute a missed approach procedure.

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CDU

The scratchpad messages related to the VNAV are presented in the table below.

SCRATCHPAD MESSAGE	CONDITION
PERF-VNAV NOT AVAILABLE	When any of the PERFORMANCE INIT data is incomplete and VNAV armed is attempted. This message is displayed only in air.
RESET ALT SEL?	The FMS is commanding a change of altitude but the altitude selector has not been reset. The airplane cannot change altitude until the selector has been reset.
UNABLE NEXT ALT	If the airplane is unable to meet the altitude constraint.
VERT DIR OVER MAX ANG	The angle computed during a VERTICAL DIRECT TO exceeds the limit (6°).
VERT DIR UNDER MIN ANG	The angle computed during a VERTICAL DIRECT TO is under the limit (1°).

The altitude constraint indication on the CDU is presented as following:

– An entry of 10000A (letter "A" following the altitude) indicates AT or ABOVE.

– An entry of 10000B (letter "B" following the altitude) indicates AT or BELOW.

– An entry of 10000 (no letter following the altitude) indicates AT.

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VNAV SUBMODES

NOTE: For airplanes equipped with autothrottle, the A/T mode is selected depending on the selected FD Vertical mode. Refer to Section 2-19-30.

A summary with FGC target and correlation from green to magenta mode is provided for the VNAV submodes:

FD MODES (GREEN)	FGC GREEN TARGETS	VNAV FD MODES (MAGENTA)	FGC MAGENTA TARGETS
ALT	ALT (1)	VALT	ALT (1)
ASEL		VASL	
FLC (Climb)	ALT + CAS/Mach fixed profile (2)	VFLC (Climb)	ALT + target CAS/Mach
FLC (Descent)	ALT + VS fixed profile (2)	VFLC (Descent)	
N/A	N/A	VPTH	ALT + VS (1)
GS	GS (1)	VGP	VS (1)
VS	VS (1)		
PIT	Attitude (1)	N/A	N/A
N/A	N/A	VNAV	N/A

(1) For airplanes equipped with autothrottle, the A/T SPD mode follows the target CAS/Mach (FMS or FGC pre-selected).

(2) For airplanes equipped with the autothrottle, the FLC green mode works as the VFLC magenta mode and target the FGC preselected CAS/Mach and ALT instead of fixed pre-programmed profile.

NOTE: Flight Director Vertical Modes (Green) are described on Section 2-19-10.

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VNAV ARM (VNAV)

VNAV ARM becomes the active mode when the VNV button is pressed and the conditions for VNAV engagement are set. Using the position and altitude data, the FMS determines when to capture and which VNAV submode is correct. While in the armed mode, the FMS does not vertically control the airplane.

VNAV ALTITUDE HOLD (VALT)

This mode is the same as altitude hold (green ALT mode – refer to Section 2-19-10). The FGC maintains altitude by controlling pitch. When VNAV is disengaged while in VALT, and lateral mode is not ROL, the flight director mode becomes PITCH HOLD, not altitude hold.

VNAV ALTITUDE CAPTURE (VASL)

This mode is used to level the airplane at the VNAV supplied altitude target. The altitude target is either an altitude constraint or the altitude preselector setting. This mode is equivalent to ASEL green mode – refer to Section 2-19-10. Preselector Altitude modification while in VASL results in a Flight Director Mode transition to VALT.

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VNAV FLIGHT LEVEL CHANGE (VFLC)

In this mode the flight guidance computer (FGC) follows the FMS speed target readout, controlling the pitch of the airplane for both climb and descent.

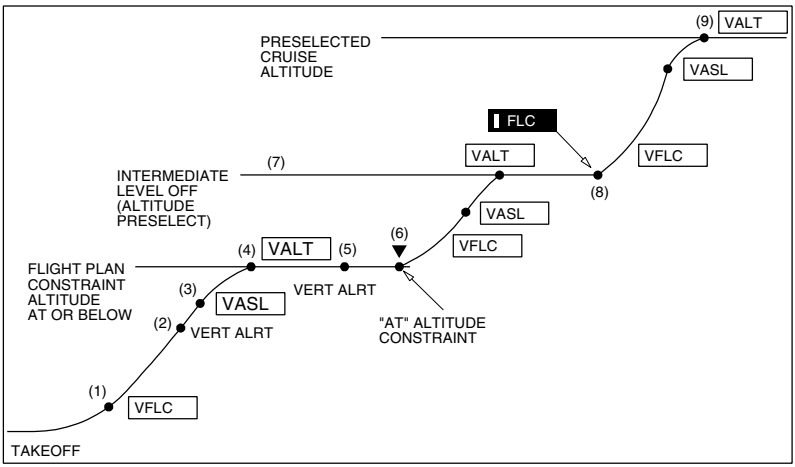
Altitude constraints are respected, including the altitude preselected at FGC. The next waypoint is not necessarily achieved, as the crew still controls:

– Vertical speed by the thrust set.

– Starting point for VFLC.

When in other modes of VNAV, a transition to VFLC occurs by setting the altitude preselector to other than current altitude and pushing the FLC button on the Guidance Controller Panel.

The elements of a VNAV climb profile are shown on the following figure.



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VNAV CLIMB PROFILE

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An example of a VNAV climb profile consists of the following:

– VNAV is engaged in a VFLC airspeed climb after takeoff (1).

– One thousand feet before reaching the constraint altitude, a VTA is given (2).

– The flight guidance computer changes to VASL to capture the altitude constraint (3).

– The flight guidance computer switches to VALT at the constraint altitude (4).

– One minute before the constrained lateral waypoint is reached, a VTA is given indicating an automatic climb begins at the waypoint. The altitude preselector is set higher than the constraint altitude (5).

– The FMS directs the Flight Guidance Computer to switch to VFLC as the waypoint is passed (6).

– The flight guidance computer performs a normal level off at the intermediate altitude preselector switching from VFLC to VASL to VALT with the normal 1000 ft selector alert (7).

– ATC clearance is received to the cruise altitude and the selector is dialed to the cleared altitude. The FLC button is pushed to resume the climb (8).

– The flight guidance computer performs a normal level off at the cruise altitude switching from VFLC to VASL to VALT with the normal 1000 ft selector alert and the speed command changes to the cruise value (9).

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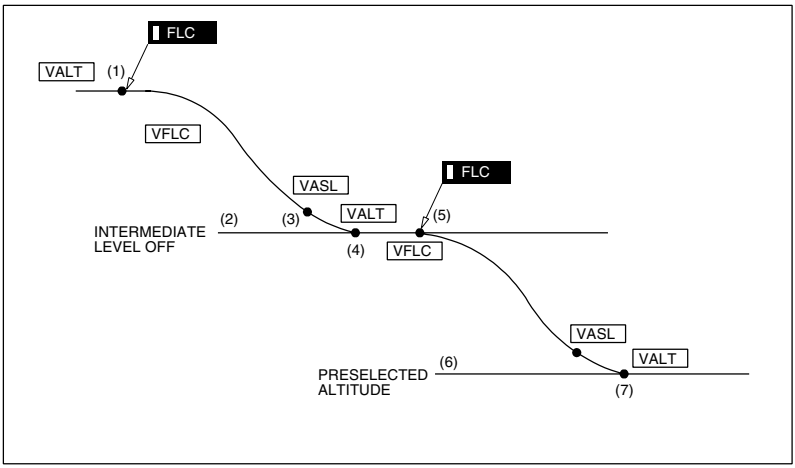
The elements of a VNAV FLC (IAS or MACH hold) descent profile are shown on the following figure.



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VNAV FLIGHT LEVEL CHANGE DESCENT

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A VFLC descent can be engaged at any time by using the following steps:

– From cruise altitude (1), dial down the altitude preselector to the ATC cleared altitude (2).

– Press FLC if already engaged in a VNAV mode or VNV if not already in VNAV. The flight guidance computer switches to VFLC and begins a descent (1).

– One thousand feet before the altitude preselected (2) is reached, the normal altitude alert is given and the flight guidance computer does a normal level off switching from VFLC to VASL (3) to VALT (4).

– An ATC clearance (5) is received to a lower altitude and the altitude preselector is lowered (6). FLC is pressed (5) and the airplane begins a descent.

– One thousand feet before the altitude preselector (6), the normal altitude alert is given and the flight guidance computer does a normal level off switching from VFLC to VASL to VALT (7).

CAUTION: THE CREW MUST MANAGE THE AIRPLANE ENERGY TO AVOID EXCESSIVE PITCH COMMANDS FROM THE FD.

NOTE: For airplanes equipped with autothrottle, the A/T DES mode is activated. The thrust levers are commanded to 10° lower than the initial descent TLA position. Depending on the difference from cruise to descent speeds, the crew might still need to manage thrust to avoid excessive pitch commands.

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VNAV PATH (VPTH)

In this mode, VNAV controls the airplane along a geometric path downward to a waypoint altitude constraint. The path angle can be either an FMS computed value, procedure specified, or pilot entered. The airplane will not fly below the altitude preselected.

VPTH default descent angle is part of performance initialization. However, after the angle is displayed for each waypoint, the flight crew can change it as required, from 1° to 6°.

CAUTION: HIGH DESCENT ANGLES MAY REQUIRE HIGH PITCH COMMANDS.

The LNAV must be engaged for VPTH to be operational.

A VNAV path descent will be automatically engaged from VALT when the altitude preselector has been dialed down before the TOD point is reached.

The VNAV path descent mode is used to descend to a new flight level at a calculated or prescribed angle (between 1° and 6°).

The VNAV angle is always displayed on CDU for path descents.

The path is always followed except when the airplane speed approaches the following:

– V_{MO}/M_{MO}.

– Landing gear or flap placard speed.

– V_{REF}.

CAUTION: THE CREW MUST MANAGE THE AIRPLANE ENERGY TO AVOID EXCESSIVE PITCH COMMANDS FROM THE FD.

NOTE: For airplanes equipped with autothrottle, the A/T SPD mode is activated. Depending on the descent path angle, the crew might still need to manage thrust to avoid excessive pitch commands.

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VNAV tries to satisfy both the altitude preselector and the waypoint constraint altitude. However, VNAV never flies through the altitude preselector.

When using VPTH and a missed approach is executed, it is necessary to reset the altitude preselector to the missed approach altitude.

The elements of a VNAV path descent profile are shown below.

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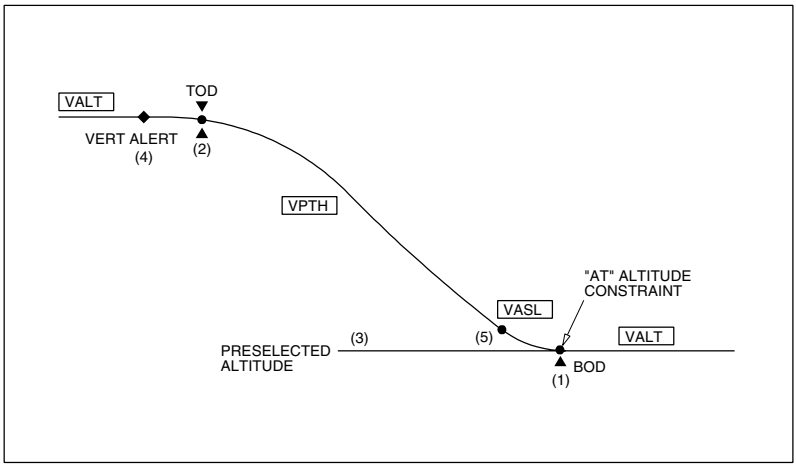

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VNAV PATH DESCENT PROFILE

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The following steps apply:

- An altitude constraint is entered at a waypoint (1).
- The FMS calculates an angle and TOD (2) for the path descent.
- The altitude preselector is set to the ATC cleared altitude (3).
- One minute before reaching the TOD, a VTA is given (4) and the vertical deviation scale is displayed on the EFIS. If the altitude preselector is not at a lower altitude, the message "RESET ALT SEL?" is displayed on the FMS CDU.
- At the TOD, the flight guidance computer switches from VALT to VPTH and begins a descent (2).
- The flight guidance computer does a normal level off switching from VPTH to VASL (5) to VALT (1).

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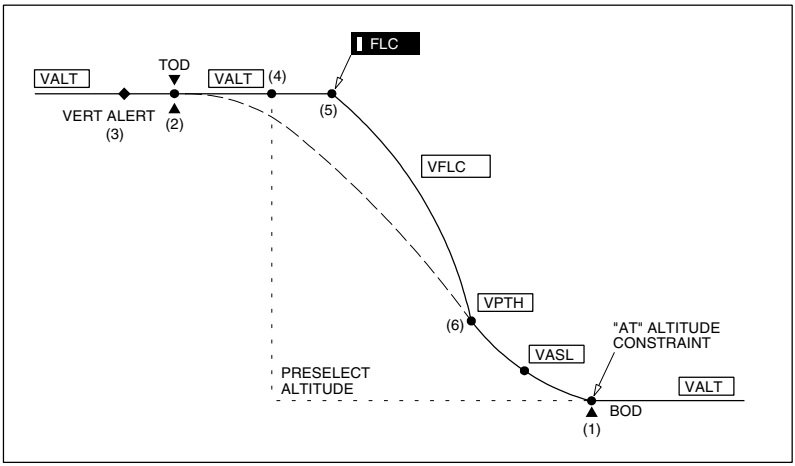
A VNAV late path descent is shown below.



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VNAV LATE PATH DESCENT

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This scenario can occur if ATC has not given descent clearance by the time the TOD is reached. The steps are as follows:

– An altitude constraint is entered at a waypoint (1).

– The FMS calculates an angle and TOD (2) for the path descent.

– One minute before reaching the TOD, a VTA is given (3) and the vertical deviation scale is displayed on the PFD.

– If the altitude preselector is not at a lower altitude, the message "RESET ALT SEL?" is displayed.

– When past the TOD and more than 500 ft above the path, the flight guidance computer remains in VALT.

– The altitude preselector is then set (4) to the ATC cleared altitude.

– Pressing the FLC button (5) begins descent.

– The FMS issues a mode request to the Flight Director from to VALT to VFLC to begin the descent once engine thrust is reduced sufficiently. The descent rate in VFLC mode is governed by engine thrust and descent speed target (as specified in the Performance Initialization page). If the airplane is less than 500 ft from the path when the FLC button is pushed, the FMS switches directly to VPTH mode.

– When the path intercept criteria are satisfied the FMS will issue a mode request to the flight director to switch from VFLC mode to VPTH mode and continues the decent along the path (6).

– The flight guidance computer does a normal level off switching from VPTH to VASL and finally to VALT (1).

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VNAV EARLY DESCENT TO CAPTURE PATH

An early descent scenario is typical, when ATC instructs a descent before the established TOD point is reached.

An early descent to capture a path is shown below.

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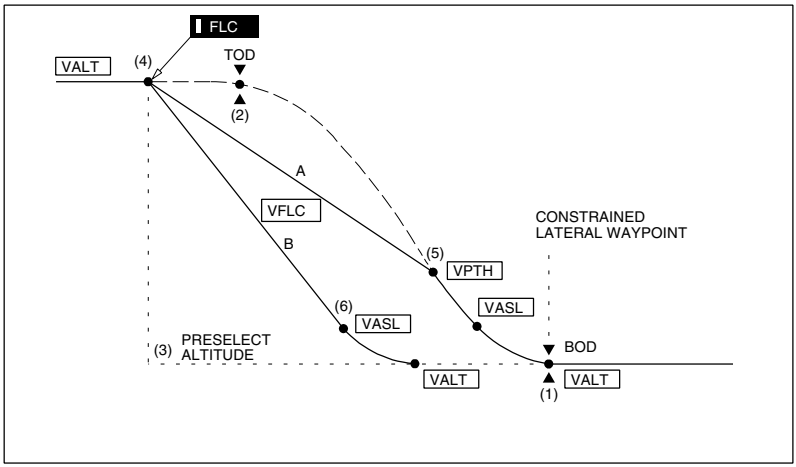

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VNAV EARLY DESCENT TO CAPTURE PATH

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The steps are as follows:

– An altitude constraint is entered at a waypoint (1).

– The FMS calculates an angle and TOD (2) for the path descent.

– The altitude preselector is set to the ATC cleared altitude (3).

– Pressing the FLC button (4) begins the descent.

– The FMS issues a mode request to the Flight Director from VALT to VFLC and begins to descend once engine thrust is reduced sufficiently. The descent rate in VFLC is governed by engine thrust and speed target (as specified in the Performance initialization pages).

– If the airplane is less than 500 ft from the path when the FLC button is pushed, the FMS switches directly to VPTH mode.

  – VFLC path "A" is followed when the airplane descent rate is relatively small (engine thrust is nearly proportional to the thrust required to maintain level flight at target airspeed).

    – Path intercept criteria are satisfied; the FMS issues a mode request to the flight director to switch from VFLC to VPTH mode and continues descending along the path (5).

  – VFLC path "B" is followed when the airplane descent rate is high (engine thrust is low relative to the thrust required to maintain level flight at target airspeed).

    – Path intercept criteria are not satisfied the FMS continues descending in FLC mode until VASL is captured (6).

– A normal level off is preformed switching from a VPTH or VFLC to VASL and finally to VALT (1).

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VERTICAL DIRECT-TO

A vertical direct-to is performed to an altitude constraint at a waypoint in the flight plan and can be used for climbs and descents. The altitude constraint must be in the flight plan before the vertical direct-to is executed. The airplane does not respond to the vertical DIRECT-TO unless the altitude selector is properly set above for climbs and below for descents.

When VNAV is engaged, the VNAV submode remains in VALT for climbs or changes to VPTH for descents. All altitude constraints between the airplane and the selected constraint are removed from the flight plan. No lateral changes are made to the flight plan.

FMS 1 and FMS 2 have independent calculations, but while in Dual Mode, they automatically synchronize in less than 30 seconds if they have different values. If the crew prefer, a Vertical Direct-To can be performed in case of Vertical Deviation Indications are different on PFD 1 and PFD 2, in order to anticipate the synchronization.

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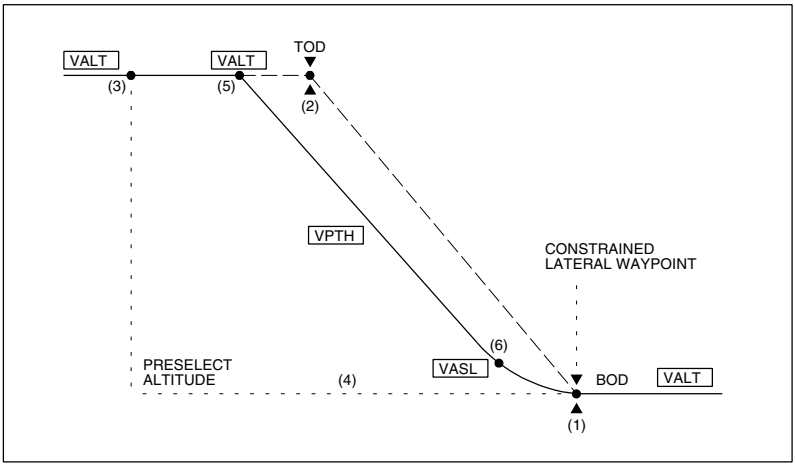
VNAV EARLY DESCENT USING DIRECT-TO TO CAPTURE PATH

The VNAV early path descent using vertical DIRECT-TO is shown below.



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VNAV EARLY PATH DESCENT USING VERTICAL DIRECT-TO

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The following steps apply to an early descent using vertical Direct-To:

– An altitude constraint is entered at a waypoint (1).

– The FMS calculates an angle and TOD (2) for the path descent.

– The altitude preselector is set (3) to the ATC cleared altitude (4).

– A vertical direct-to is performed (5) to the constrained waypoint (1).

– The FMS calculates the new descent path angle and the flight guidance computer transitions to VPTH.

– The calculated angle is limited between 1° and 6°. When the actual angle is less than 1° or greater than 6°, the FMS begins a descent to intercept the limiting angle of 1° or 6°.

– The flight guidance computer does a normal level off, switching from VPTH to VASL (6) to VALT (1).

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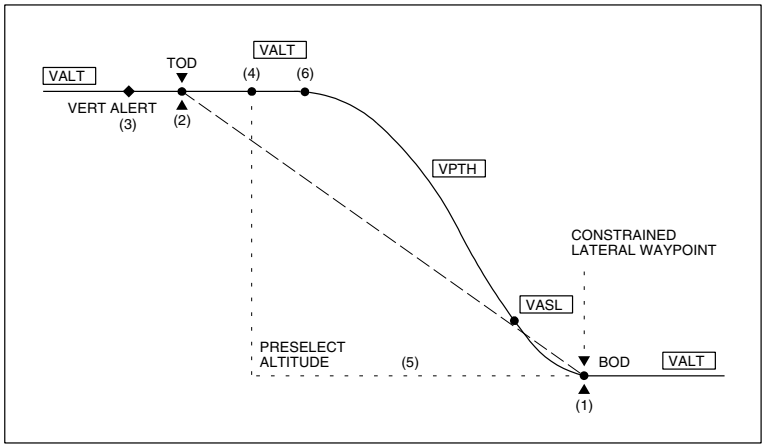
VNAV LATE DESCENT USING DIRECT-TO TO CAPTURE PATH

A VNAV late path descent using vertical DIRECT-TO is presented in the following figure.



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VNAV LATE PATH DESCENT USING VERTICAL DIRECT-TO

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In this scenario, descent clearance is not received before the TOD is reached. The following steps apply to a late descent using Direct-To:

- An altitude constraint is entered at a waypoint (1).
- The FMS calculates an angle and TOD (2) for the path descent.
- One minute before reaching the TOD, a VTA is given (3) and the vertical deviation scale is displayed on the PFD.
- If the altitude preselector is not at a lower altitude, the message "RESET ALT SEL?" is displayed on the FMS CDU.
- At the TOD (2), the flight guidance computer remains in VALT and remains level through the TOD.
- The altitude preselector is set (4) to the ATC cleared altitude (5).
- A vertical direct-to is performed (6) to the constrained waypoint (1).
- The FMS calculates the angle and the flight guidance computer transitions to VPTH.
- The flight guidance computer does a normal level off, switching from VPTH to VASL to VALT (1).

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VNAV VERTICAL GLIDE PATH (VGP)

The Vertical Glide Path (VGP) permits crew management of the altitude preselector during FMS managed non-precision approaches. Lateral and Vertical guidance are provided to the runway threshold or missed approach point, whichever occurs first.

VGP mode is armed by pressing the approach APR button on the Flight Guidance Panel, however the following conditions need to be satisfied:

– FMS1 or FMS2 selected as the primary navigation source on the Master Flight Director.

– An FMS based approach has been selected in the active flight plan.

– The FMS is not in dead reckoning (DR) mode.

– A NDB angle to the MAP exists.

– Altitude and angle constraint values from the NAV DB have not been changed.

– When there is an altitude constraint on the final approach fix (FAF), the airplane must be in ALT HOLD at the FAF altitude.

– No Direct-To the MAP has been executed.

– FMS is not in degraded state of operation.

– Vertical path intercept occurs.

– The airplane is within 30 NM of the destination.

VGP mode is captured when the following conditions occur:

– The VGP mode is armed.

– LNAV is active.

– The airplane, when holding, must be established on the inbound course to the FAF.

– The active waypoint is the FAF or along track distance to the FAF is less than 5 NM.

– The airplane is able to capture the final approach slope.

– With a course reversal hold leg (HF) on the FAF, the airplane must be established inbound to the FAF and be exiting the hold.

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VGP is not captured until LNAV and VNAV are captured.

Preselector Altitude modification is permitted while VGP is captured, however change while VGP is armed may result in a transition to VASL (VNAV equivalent of ASEL) and ultimately VALT.

While VNAV respects the altitude preselector and levels off appropriately at the value set in the altitude preselector window, when VGP is engaged and the airplane descends, the FD ignores the preselected altitude (if below current altitude) and continues the descent to the runway. The preselector altitude can then be set to the missed approach altitude.

Descents in the VGP mode allow the flight crew to set the altitude preselector to the missed approach altitude without affecting the descent path.

VNAV is cancelled by selecting any of the following modes:

– VNV.

– ALT.

– VS.

– SPD.

NOTE: For airplanes equipped with autothrottle, the SPD mode button is suppressed. The A/T button does not cancel the VNAV mode.

– GA.

VGP mode is automatically canceled when any of the VGP arming conditions is no longer true. A scratchpad message "VGP UNAVAILABLE" is displayed when the APR button is pushed and the arming criterion mentioned previously is not met. The message is self-clearing when the FAF is sequenced.

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VNAV AND HOLDING OR ORBIT PATTERNS

There are some special considerations for holding and orbits during VNAV operation:

- When the holding or orbit pattern is entered while in VFLC, the airplane remains in VFLC and continues the climb or descent.
- When the holding or orbit pattern is entered while in VALT, the airplane remains in VALT.
- When a present position (PPOS) holding pattern is entered while in a path descent (VPTH), the VNAV changes to VFLC while in holding.
- Path descents are not used during holding pattern operations. When the hold is entered while in VPTH, VNAV changes to VALT. To continue the descent, the pilot must manually select VFLC.
- If VNAV is engaged while executing a holding pattern course reversal on an approach, VNAV operates with VS targets (VPTH or VGP) to satisfy altitude constraints.
- Once established inbound on the final approach course, VNAV will disregard the holding altitude constraint.
- VNAV guidance is provided in holding patterns and procedure turns to arrive at the Final Approach Fix (FAF) on the final approach descent path.

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GO-AROUND OPERATIONS (MISSED APPROACH PROCEDURE)

The Go-Around is initiated through the TOGA buttons located on the throttles. If either button is pushed, the following sequence will occur:

- FMS outputs the missed approach waypoints to the EFIS.
- The FD vertical engaged mode cancels VNAV mode and transition to the GA mode.
- The FD lateral engaged mode transition to ROL (Wings Level) and LNAV arm unless:
  - Radar Altitude < 200 ft (LNAV arm is delayed until RA > 200 ft).
  - LNAV is already the active lateral mode (if LNAV is previously engaged, it remains engaged upon GA activation).
- Once engaged, the ROL mode remains as the active mode until the LNAV captured logic is satisfied. If the current heading is divergent to the FMS flight plan, the pilot must change the airplane heading manually to intercept the FMS flight plan.

NOTE: When LNAV arms and the FMS is the primary source of navigation, the LNAV engages as soon as the engagement criteria are satisfied.

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SPEED COMMAND

The FMS is capable of controlling the airplane speed during departure, climb, cruise, descent, approach, and go-around.

The Speed Command manages the airplane speed under the following methods:

– Automatic: The FMS automatically changes the speed command throughout the flight to accommodate each phase of flight. However it does not compensate any airplane configuration change such as flaps, ice, landing gear or spoiler.

– Waypoint Speed Constraint: The FMS changes the speed command to cross a waypoint at a specified speed constraint.

– Speed Intervention: Allows the pilot to enter into the FMS a specified speed to fly. While flying the specified speed, the FMS continues to provide Speed Protection.

SPEED PROTECTION

The FMS provides two types of speed protection:

– Speed Reversion: Automatic transition from VPTH to VFLC.

– Latched speed: Automatic transitions from one sub mode of VNAV to another.

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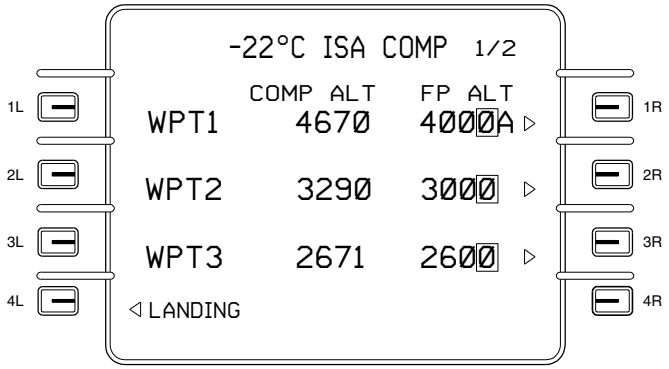
TEMPERATURE COMPENSATION

The FMS includes VNAV temperature compensation for approaches and also contains a similar VNAV temperature compensation calculation for departures and missed approaches.

The flight crew must compensate for temperature effects on minimum altitude or decision altitude. If temperature compensation is not activated, the flight crew must adhere to temperature limits of the procedure.

NOTE: Prior to employing temperature compensation, the flight crew must coordinate the use of the feature with ATC. Failure to do so could result in a loss of vertical separation with other traffic.

The following figures show FMS pages.



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ISA COMP 1/2 PAGE

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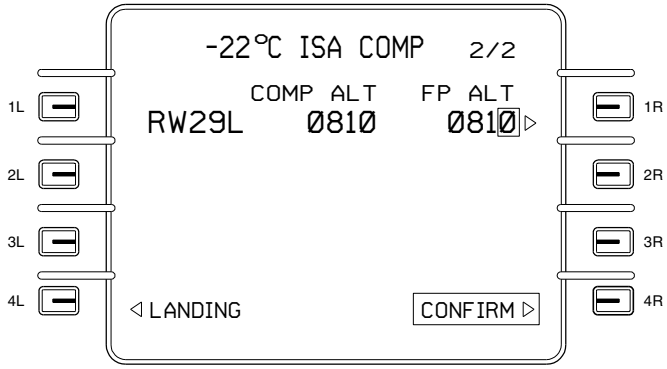

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ISA COMP 2/2 PAGE

The following FMS pages list the waypoints in the flight plan that has altitude temperature correction applied. All approach waypoints from the initial approach fix (IAF) to the missed approach point (MAP) plus any legs in the missed approach segment with altitude constraints within 1000 ft. of the airport elevation are included on these pages.

The altitudes in the COMP ALT column show the altitude the altimeter indicates when crossing the waypoint. Using the DELETE key removes compensation from a waypoint backward into the list. Waypoints without a compensated altitude have a carat displayed on the right line select key to call on temperature compensation. Temperature compensation is activated by pushing 4R (CONFIRM) on the last ISA COMP page. When temperature compensation is active, the CONFIRM prompt is replaced by a CANCEL prompt at 4R. Pushing the 4L key returns the display to the LANDING page.

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REQUIRED NAVIGATION PERFORMANCE (RNP)

RNP operation is the ability of the airplane navigation system to monitor the navigation performance it achieves and inform the crew if the requirement is not met during an operation. The FMS receives navigation data from various sensors on board the airplane and chooses the sensors providing the most accurate airplane position. The sensors used by the FMS are listed in priority order as follows: GPS, DME-DME, VOR-DME and IRS. In case of sensor failure, the FMS will automatically switch to the next available sensor following the priority order as described.

The FMS includes pages where the flight crew can set and/or monitor the progress of RNP parameters and new messages for RNP operations, which will be displayed on CDU scratchpad together with an amber annunciation "MSG" on the PFD.

The user interface is achieved through system controls (CDU scratchpad), displays (PFD) and alerting functions (PFD, CDU). These functions provide the means for system initialization, flight planning and progress monitoring, active guidance control and presentation of navigation data for flight crew situational awareness.

RNP INDICATIONS

The RNP functionality includes indications on PFD and on FMS CDU scratchpad.

PFD INDICATIONS

Label: The RNP label is displayed always in white on PFD whenever the RNP indications are displayed.

Lateral Deviation Scale Factor: The Lateral Deviation Scale Factor (RNP value) represents a designation for the navigational performance accuracy required (e.g., RNP 4, RNP 1.0, RNP 0.3, etc) at any given time. It is displayed in magenta on PFD under normal conditions. The Lateral Deviation Scale Factor is provided by FMS or entered manually. When the Lateral Deviation Scale factor is invalid, it will be displayed as four amber dashes.

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Vertical Deviation Scale Factor: The Vertical Deviation Scale Factor indicates the airplane vertical current position relative to the desired track and is displayed in magenta every time the vertical deviation scale is displayed.

Lateral Deviation Scale: The lateral deviation scale is comprised of one centered tick mark and two dots on each side of the center tick mark and is displayed in white under normal conditions. The center tick mark represents the center of the airplane desired track. The two dots represent the lateral deviation in NM in relation to the lateral deviation scale factor (i.e.: 2x dots = 1x RNP).

Lateral Deviation Pointer: The Lateral Deviation Pointer represents the current airplane lateral deviation in relation to the central tick mark. The pointer is displayed as a magenta "triangle" that moves in relation to the center tick mark to the right or to the left corresponding to the airplane lateral deviation. The FMS also sets the Course Deviation Indicator (CDI) sensitivity based on the RNP value. The CDI is set such that two dots of cross track deflection are equal to the RNP value.

Estimated Positioning Uncertainty (EPU): The EPU is a measure in NM which conveys the current position estimation performance. The EPU is not an estimate of the actual error, but a defined statistical indication of potential error. The EPU is displayed graphically on PFD as magenta horizontal lines and winglets attached to the lateral deviation pointer. The initial position of the winglets is the center of the lateral deviation pointer and it expands to the left and right or retracts as the EPU value increases or decreases. The Lateral Deviation Pointer and EPU move as a group to the left or right in accordance to the airplane lateral deviation in NM. If EPU is invalid, the Lateral Deviation Pointer will be displayed as a red X.

FMS POS Monitor: The FMS position comparison monitor provides an indication to the pilot or copilot that there is a difference between the pilot and copilot FMS present position. The FMS position monitor is activated when the FMS position difference in nautical miles exceeds the RNP value. The FMS POS annunciation is displayed in amber on PFD.

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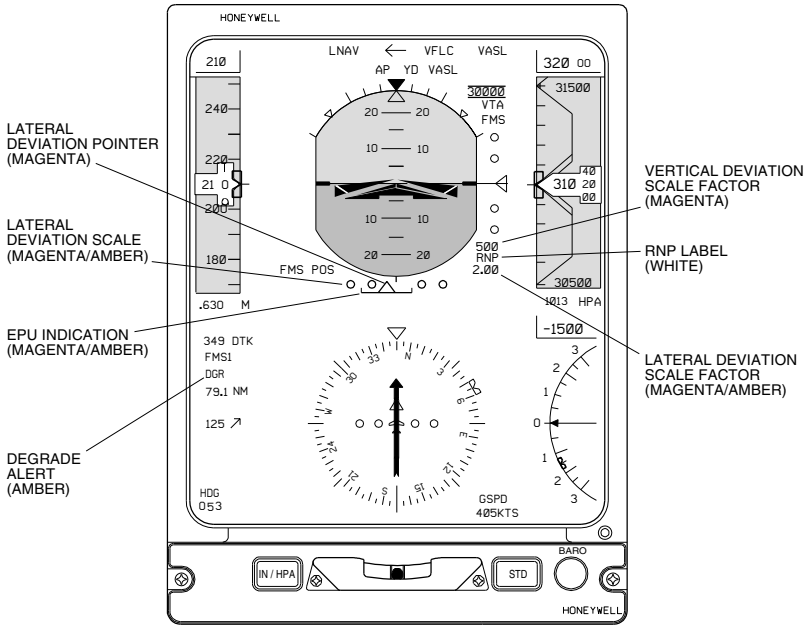
The RNP indications on PFD are illustrated below:



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RNP INDICATIONS ON PFD

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Exceedance Indications: When the EPU value is higher than the current applicable RNP value, the Lateral Deviation Scale, Lateral Deviation Scale Factor, EPU and Lateral Deviation Pointer turn into amber and flashes for 5 seconds than become steady on PFD.

An example of exceedance condition and indication in the following figures:

RNP = 1.0, EPU = 0.5, LAT DEV = 0.3

RNP = 1.0, EPU = 1.0, LAT DEV = 0

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RNP SYMBOLOGY IN NORMAL AND EPU EXCEEDANCE CONDITIONS

NOTE: The same indications return to the original colors when the exceedance condition is not present anymore.

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FMS CDU INDICATIONS AND ALERTS

The FMS provides the following RNP alerts and advisories on the CDU scratchpad and triggers the MSG annunciation on PFD:

– DEGRADE Alert – The degrade annunciation will be triggered when the EPU reaches a value higher than the RNP. The indication DGR is lit on CDU and displayed in amber on PFD.

– UNABLE RNP Alert – The UNABLE RNP message is displayed and the DEGRADE annunciator is lighted when EPU is greater than RNP or when horizontal integrity limit (i.e., RAIM) receiver autonomous integrity monitoring is greater than the integrity alarm limit.

The maximum time required for the FMS to annunciate Degrade and Unable RNP alerts is based on the phase of flight. These times are described on the table below:

PHASE OF FLIGHT	TIME TO ALARM
Approach	6 seconds
Departure/Arrival/Missed Approach	6 seconds
En Route	24 seconds
Remote	54 seconds

– UNABLE RNP NEXT WP Alert – This message alerts the crew that the current EPU exceeds the RNP required at the next waypoint.

– PILOT RNP CANCEL NEXT WP Alert – The alert PILOT RNP CANCEL NEXT WP is displayed when the pilot entered (i.e., manual) RNP is automatically canceled. This occurs when the airplane is within the waypoint sequence alert distance and the RNP on the next leg is less than the current, pilot entered RNP.

– PILOT RNP CANCELED Alert – The alert PILOT RNP CANCELLED is displayed when the active waypoint has a smaller RNP than the pilot entered RNP.

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– GPS RAIM ABOVE LIMIT Alert – The alert GPS RAIM ABOVE LIMIT is displayed when Global Positioning System (GPS) is required and the RAIM value is above the limit.

NOTE: The FMS does not provide an indication to the crew of an excessive lateral (cross-track) deviation. Lateral deviation is not considered in the display of the RNP integrity alert. It is the pilot's responsibility to monitor lateral deviation, and take appropriate action to ensure the airplane follows the flight plan with minimal error.

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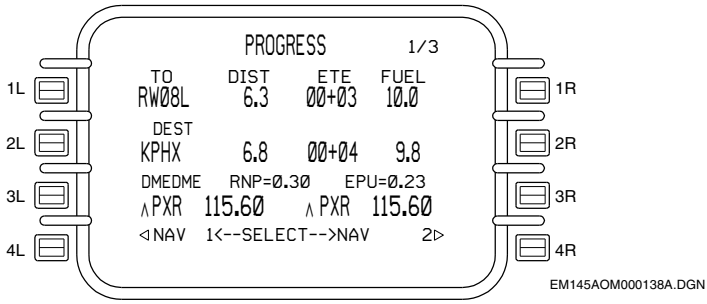

FMS PROGRESS WITH RNP INFORMATION

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RNP OPERATION

The RNP value used by the system is based on the following priority order:

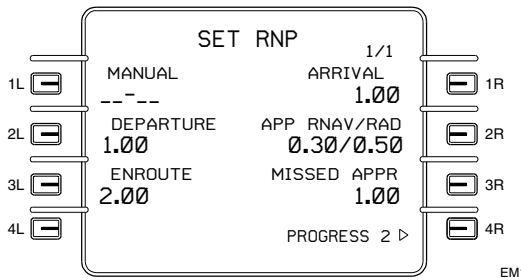
– Manual entry;

– Navigation database specified;

– Phase of flight default.

The RNP number can be manually entered on FMS by accessing the SET RNP page. If a valid manually entered RNP value is greater than the RNP value for the current phase of flight results in display of the CONFIRM ENTRY reverse video prompt at CDU.

Manual entries are automatically canceled when the next leg requires a numerically smaller RNP. A PILOT RNP CANCEL NEXT WP alerting message is displayed before the manual RNP is automatically canceled. The manually entered RNP will not be canceled when executing a go-around.



SET RNP PAGE

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The FMS provides the default RNP values for each phase of flight as follows:

– Departure = 1.0;

– En Route = 2.0;

– Arrival = 1.0;

– Approach = 0.3;

– Missed Approach = 1.0;

– Oceanic/Remote = 2.0.

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LOCALIZER PERFORMANCE WITH VERTICAL GUIDANCE (LPV)

The LPV system is optionally installed on the Legacy 600/650.

This does not constitute an operational approval.

Localizer Performance with Vertical Guidance (LPV) are approach procedures based on SBAS (Satellite-Based Augmentation System), also known by WAAS (Wide Area Augmentation System) and EGNOS (European Geostationary Navigation Overlay Service).

SBAS is intended to enable airplane to rely on GPS for all phases of flight, including precision approaches to any airport within its coverage area.

When LPV approach mode is active, the SBAS-enabled GPSs calculate the path deviations (lateral and vertical axes) which are displayed on the PFD.

The lateral and vertical deviation data for LPV approaches are the angular deviations of the airplane from the glide path for the approach defined by the Final Approach Segment (FAS) data block. The angular deviation is calculated from the Runway Threshold to simulate the angular deviation provided by an ILS glideslope. The lateral and vertical deviation data provided by the GPS will also be utilized by the FMS to compute the lateral and vertical steering commands necessary for the guidance to capture and track the LPV path.

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LPV APPROACH LOADING

The LPV approach information is stored in the FMS Navigation Database (NDB) and selected through FMS CDU.

When an LPV approach is available for a runway, the FMS indicates the SBAS/LPV approach in the CDU ARRIVAL page by displaying:

1. The SBAS Channel
2. The Selected Approach Reference ID and
3. The ACTIVATE prompt.

The flight crew shall load the LPV approach to be flown and press the VNV button then press the APR button on guidance controller (GC-550) to arm and perform the LPV approach.

Once active, the LPV indications (status, lateral and vertical deviations) can only be removed by performing a Go-Around or proceeding to land. Selecting another RNAV approach type on arrival page does not deactivate LPV and its indications.

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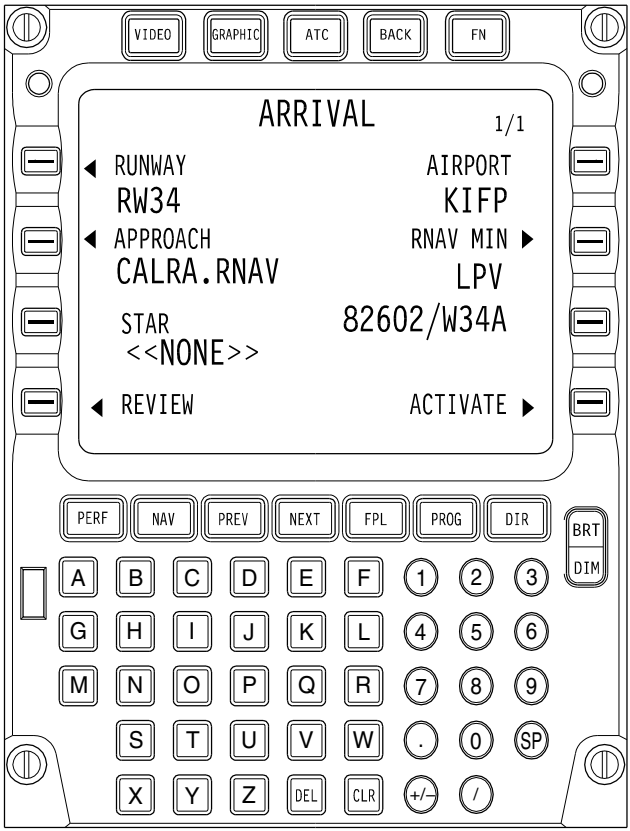

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CDU ARRIVAL PAGE

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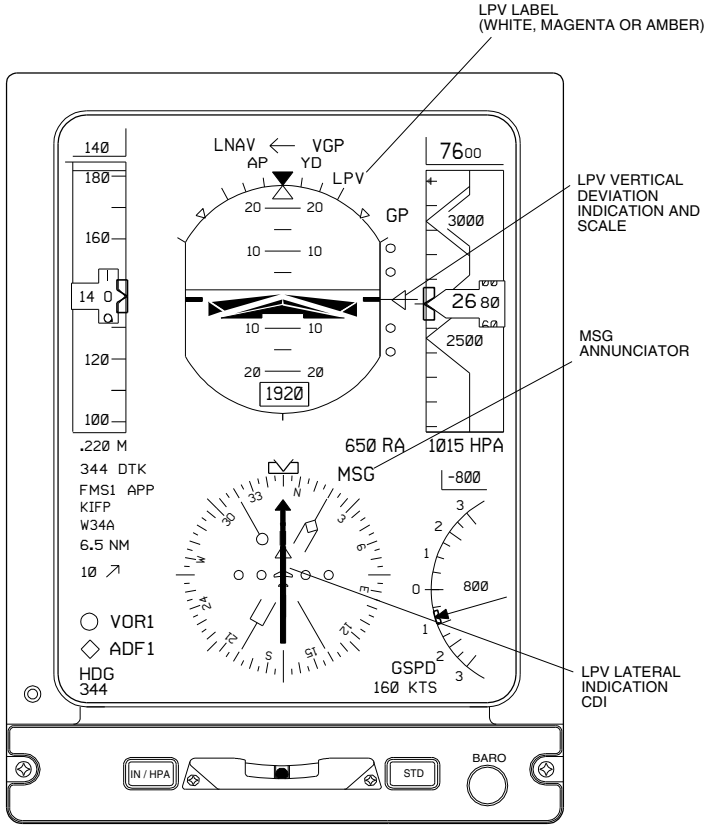
LPV INDICATIONS

The following figures show PFD indications:



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LPV INDICATIONS ON PFD

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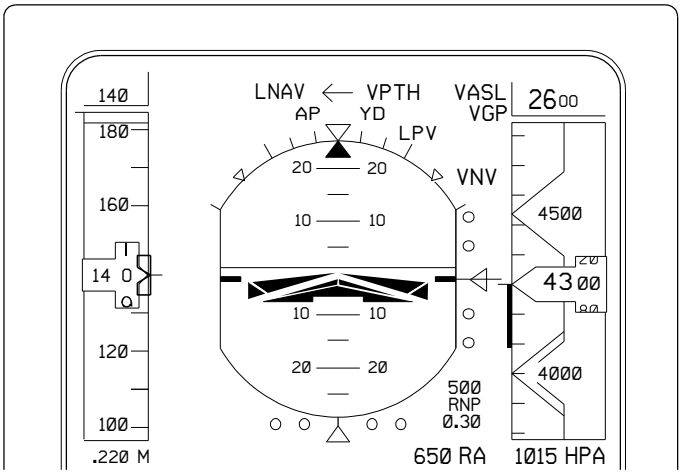
LPV ARMED ANNUNCIATION

The LPV Approach Annunciation "LPV" is displayed in White, indicating LPV Armed, when the airplane is within 30 NM of the destination. No crew action is required in this mode.



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LPV ACTIVE ANNUNCIATION

The LPV Approach Annunciator "LPV" is displayed in magenta, on PFD indicating LPV is active when the FMS sets the Approach annunciator approximately 2 NM prior to the Final Approach Fix (FAF). The magenta "LPV" annunciation flashes for 5 seconds and then remains steady. The LPV active indication alert the flight crew that the computed lateral and vertical deviations for the final approach segment are being provided by the SBAS sensor.

When the LPV is Active, all RNP symbology (when applicable) is removed from the PFD.

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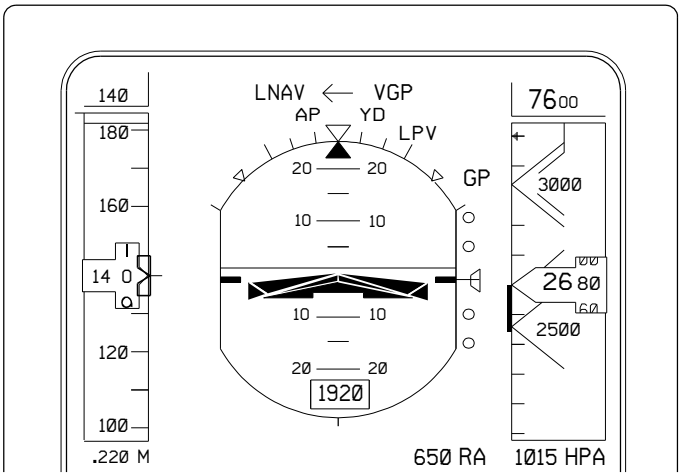

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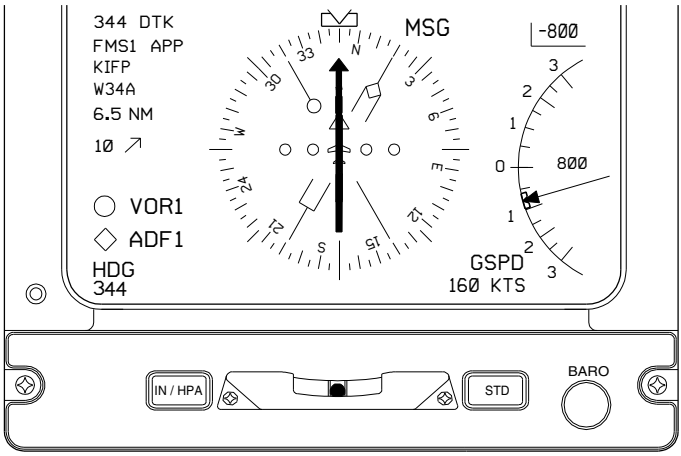
FINAL APPROACH SEGMENT (FAS) DATA BLOCK

The Airport Identifier, Approach Reference ID and the distance to the Runway Threshold are displayed in magenta when LPV is active, and positioned below the FMS APP annunciation in the lower left portion of the PFD.

The Channel Identifier is not displayed on the PFD. It is only presented in the arrival page in the CDU.



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FAS APPROACH AND AIRPORT IDENTIFIER

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LPV UNAVAILABLE ANNUNCIATION

The LPV Approach Annunciator "LPV" is displayed in Amber on the PFD to indicate that the LPV approach is unavailable. When the LPV mode is unavailable, the annunciator turns Amber and flashes for 10 seconds and then remains steady. The Flight Director will change to basic mode (ROL and PIT) and the CAS messages "LATERAL MODE OFF" and "VERTICAL MODE OFF" will be displayed.

If LPV status transitions to "Unavailable", the system displays the vertical deviation scale with a red-X, regardless of FMS vertical deviation data validity.

NOTE: Due to the system architecture, when the LPV becomes unavailable, the LPV amber indication and vertical deviation with Red-X may not be displayed (LPV indication is removed and Vertical deviation shows the baro VNAV linear deviations), however the flight director will change to basic mode and CAS messages "LATERAL MODE OFF" and "VERTICAL MODE OFF" will be displayed. The associated Master warning and Master caution will be issued as well.

If LPV is Unavailable on the Coupled PFD, AFCS will disallow guidance panel selection of the APR or VNV buttons by the flight crew in order to prevent re-entry into VNAV.

When the "LPV" is unavailable, the pilot will need to reload an approach with non-LPV minima. If already on approach, the pilot will need to execute a missed approach.

It is possible to select the FMS1/GPS1 or FMS2/GPS2 as source for the Flight Director Guidance using the CPL pushbutton on the Guidance Controller Panel (GC-550). However, LPV indications will not be displayed if the navigation source is copied (FMS2 is selected on PFD1 or FMS1 is selected on PFD2).

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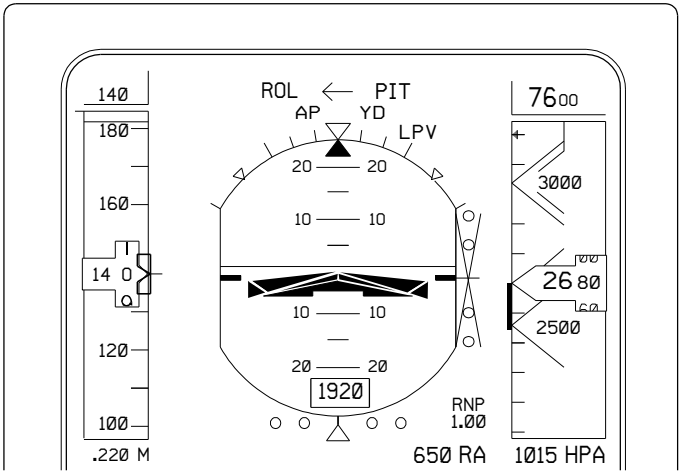

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LPV UNAVAILABLE ANNUNCIATION ON PFD

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LPV ALERTS AND ADVISORY MESSAGES

The following LPV Alerts/Advisory CDU scratchpad messages illuminate the "MSG" annunciator on the PFD. The situations that generate the scratchpad messages are indicated below:

– **LPV UNAVAIL-USE LNV/VNV:** The LPV UNAVAIL-USE LNV/VNV message is displayed in white in the CDU scratchpad when:
  – The Approach Mode is "LPV Approach" and
  – All GPS are reporting SBAS invalid.

  Pilot must select and use an approach with non-LPV minimum. If already on approach execute a missed approach.

– **LPV UNAVAIL-LPV LOAD-1:** The LPV UNAVAIL-LPV LOAD-1 message is displayed in white in the CDU scratchpad when all the following conditions are met:
  – FAS data block message from FMS is not received by GPS (FAS data block transmission from FMS not successful).

  Pilot must select and use an approach with non-LPV minimum. If already on approach execute a missed approach.

– **LPV UNAVAIL-LPV LOAD-2:** The LPV UNAVAIL-LPV LOAD-2 message is displayed in white in the CDU scratchpad when either of the following conditions are met:
  – The SBAS Service Provider ID in the FAS Data Block does not match the SBAS Service Provider ID from the source selected GPS receiver.
  – The Channel ID in the FAS Data Block does not match the Channel ID from the source selected GPS receiver.

  Pilot may attempt to reload the approach a second time. If second attempt is not successful, select and use an approach with non-LPV minimum. If already on approach execute a missed approach.

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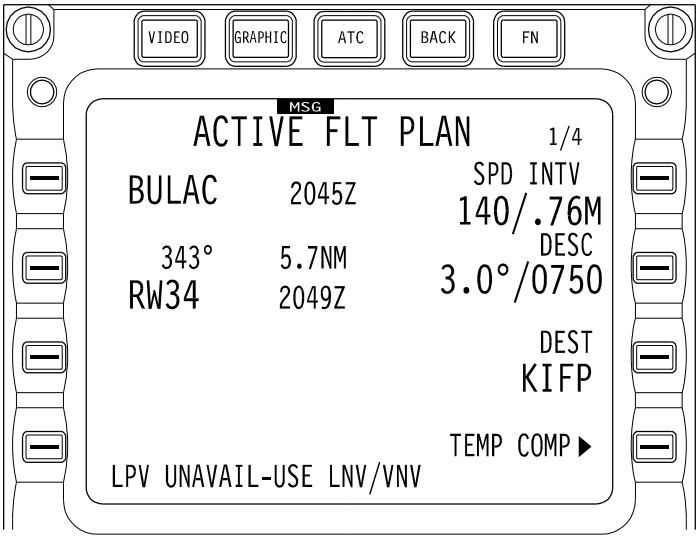

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LPV CDU SCRATCHPAD MESSAGES

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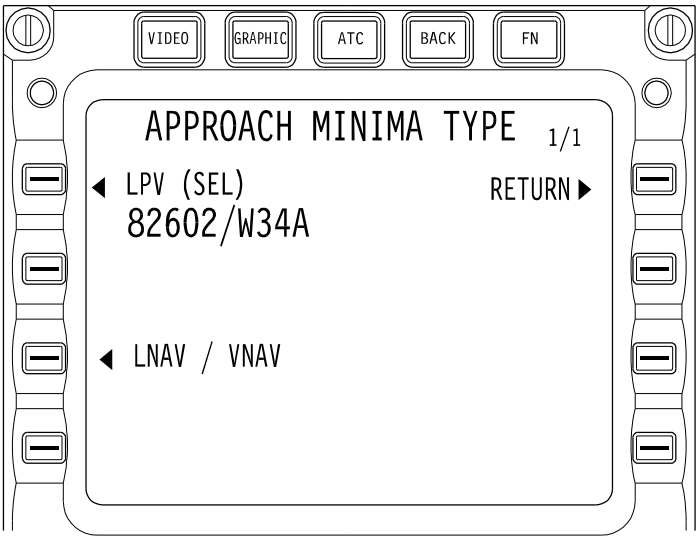

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APPROACH MINIMA TYPE PAGE

MISSED APPROACH FOLLOWING AN LPV APPROACH

During an LPV approach, a missed approach is selected by pushing the GA button or selecting the missed approach prompt on the CDU.

The following takes place when a missed approach is initiated:

– The FMS becomes the source for lateral and vertical deviation indications.
– The LPV approach status display is removed.
– The FAS data block is cleared from memory.

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LPV INACTIVE STATUS

When an LPV approach is inactive, no "LPV" annunciation is displayed on the PFD. LPV inactive provides indication to the crew that the LPV approach is either not loaded (if an LPV approach was not selected on the CDU), or that the distance to destination for the loaded LPV approach is greater than 30 NM.

If, for any reason, the LPV is operationally not available or operationally not allowed to be used, the pilot will need to select RNAV MIN at Line Select Key (LSK) 2R, and then select a different type for the approach with non-LPV minima.

EGPWS MODE 5 ALERTING

An EGPWS Mode 5 alerting for the LPV Approach is also generated in case of an excessive downward vertical deviation within the mode 5 alerting window.

LPV MISCOMPARE MONITORS

The LPV system incorporate lateral and vertical deviation miscompare monitor that will check for mis-comparisons between displayed deviation data on each PFD, where a miscompare results in an amber alert message on the PFD.

If either the LPV lateral deviation or the LPV vertical deviation miscompare monitor trip, the annunciation GPS in amber will be displayed in the same location as the existing LOC/GS/ILS indications on the PFD (for the localizer/glideslope comparison monitors).

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PRECISION AREA NAVIGATION (P-RNAV)

P-RNAV defines European RNAV operations, which satisfy a required track-keeping accuracy of ±1 NM for at least 95% of the flight time, path coding in accordance with ARINC 424 (or an equivalent standard), and the automatic selection, verification and, where appropriate, de-selection of navigation aids.
P-RNAV operations determines aircraft position in the horizontal plane using inputs from the following types of positioning sensors (in no specific order of priority):

– Distance Measurement Equipment (DME) giving measurements from two or more ground station (DME/DME);
– VHF Omni-directional Range (VOR) with a co-located DME (VOR/DME), where it is identified as meeting the requirements of the procedures;
– Global Navigation Satellite System (GNSS);
– Inertial Navigation System (INS) or Inertial Reference System (IRS), with automatic updating from suitable radio based navigation equipment.

P-RNAV is used for departures, arrivals and approach (FAWP - Final Approach Waypoint), and not used on final approach, i.e. from FAWP to RWY and missed approach.

LIMITATIONS

– For P-RNAV operations in terminal airspace, obstacle clearance protection, up to the FAWP, will assume that aircraft comply with the P-RNAV accuracy requirements;
– Obstacle clearance altitude has been based upon the infrastructure giving the poorest precision;
– The minimum flight crew are 2 Pilots;
– It is not permissible to use, for any period of time, data from an inertial system as the only means of positioning;
– The system must display essential information in the Pilot's primary field of view such as:
  – Lateral Deviation;
  – TO/FROM waypoints;
  – Failure flag (failure of P-RNAV system);

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- Unless automatic updating of the actual departure point is provided, the flight crew must ensure initialization on the runway either means of a manual runway threshold or intersection update, as applicable. This is to preclude any inappropriate or inadvertent position shift after take-off;
- Where reliance is placed on the use of radar to assist contingency procedures, its performance has been shown to be adequate for that purpose, and the requirement for a radar service is identified in the AIP;
- P-RNAV operations must use FMS to control all lateral navigation functions. For FMS limitations, refer to Limitations Section 1-01-60 (System: FMS) of AOM;
- The system must have means to display to the flight crew the following items:
  - The active (TO) waypoint and distance/bearing to this point;
  - Ground speed or time to the active (TO) waypoint;
  - Automatic tuning of VOR and DME navigation aids used for position updating together with the capability to inhibit individual navigation aids;
  - RNAV system failure;
  - Alternate means of displaying navigation information, sufficient to perform cross-checks procedures.

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P-RNAV SYSTEM

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NORMAL PROCEDURES

- Verify NOTAM (Notice to Airman) for non-available P-RNAV procedure, if navigational aids, identified in the AIP as critical for a specific P-RNAV procedure, are not available;
- Use phraseology appropriate to P-RNAV operations;
- When the VOR or DME is not available or shutdown, the flight crew have to inhibit the navigation aid from the automatic selection process;
- The flight crew must notify ATC of any problem with the RNAV system that results in loss of the required navigation capability, together with the proposed course of action;
- Discrepancies that invalidate a procedure must be reported to the navigation database supplier and affected procedures must be prohibited by an operator´s notice to its flight crew.

PRE-FLIGHT PLANNING

- Verify the required navigation aids critical to the operation of specific procedure, and if they are identified in the AIP (Aeronautical Information Publication) and on the relevant charts;
- Check availability of the navigation infrastructure and onboard equipment for the period of intended operation;
- The navigation database must be appropriate for the region of the intended operation and must include the navigation aids, waypoints, and coded terminal airspace procedures for the departure, arrival and alternate airfields;
- When specified in the AIP that dual P-RNAV procedure are required for specific terminal P-RNAV procedure, the availability of dual P-RNAV system must be confirmed;
- If a stand-alone GPS is to be used for P-RNAV, the availability of RAIM must be confirmed;

DEPARTURE

- Both Pilots must verify if the navigation database is current and if aircraft position has been entered correctly;
- The PNF (Pilot Not Flying) must verify the desired path and the aircraft position relative to the path;
- The active flight plan should be checked by comparing the charts with the MAP display and the MCDU;

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- A procedure shall not be used if doubt exists as to the validity of the procedure in the navigation database;
- The creation of new waypoints by manual entry into the RNAV system by the flight crew is not permitted;
- Route modifications in the terminal area may take form of radar headings or direct to clearances;
- Prior to take off, the flight crew must verify that the R-NAV system is available and operating correctly and, where applicable, the correct airport and runway data have been loaded;
- Unless automatic updating of the actual departure point is provided, the flight crew must ensure initialization on the runway either by means of a manual runway threshold or intersection update, as applicable. This is to preclude any inappropriate or inadvertent position shift after take-off. Where GNSS is used, the signal must be acquired before the take-off roll commences and GNSS position may be used in place of the runway update;
- During the procedure and where feasible, flight progress should be monitored for navigational reasonableness, by cross-checks, with conventional aids using the primary displays in conjunction with the MCDU;
- When automatic update for departure is not available, the procedure should be flown by conventional navigation means. A transition to the P-RNAV structure should be made at the point where the aircraft has entered DME/DME coverage and has had sufficient time to achieve an adequate input. If a procedure is designed to be started conventionally, then the latest point of transition to the P-RNAV structure will be marked on the charts. If a Pilot elects to start a P-RNAV procedure using conventional methods, there will not be any indication on the charts of the transition point to the P-RNAV structure.

ARRIVAL

Prior to the arrival phase, the flight crew should verify that the correct terminal procedure has been loaded. The active flight plan should be checked by comparing the charts with the MAP display and the MCDU. This includes confirmation of the waypoint sequence, reasonableness of track angles and distances, any altitude or speed constraints, and, where possible, which waypoints are fly-by and which are fly-over.

- If required by procedure, a check will need to be made to confirm that updating will exclude a particular navigation aid. A procedure shall not be used if doubt exists as to the procedure in the navigation database;
- Where the contingency to revert to a conventional arrival procedure the flight crew must make the necessary preparation;
- During the procedure and where feasible, flight progress should be monitored for navigational reasonableness by cross-checks with conventional navigation aids using the primary displays in conjunction with the MCDU. In particular, for a VOR/DME RNAV procedure, the reference VOR/DME used for the construction of the procedure must be displayed and checked by the flight crew. For RNAV systems without GNSS updating, a navigation reasonableness check is required during the descent phase before reaching the Initial Approach Waypoint (IAWP). For GNSS based systems, absence of an integrity alarm is considered sufficient. If the check fails, a conventional procedure must then be flown;
- Route modifications in the terminal area may take the form of radar headings or direct to clearances and the flight crew must be capable of reacting in a timely fashion. This may include the insertion of tactical waypoints loaded from the database. Manual entry or modification by the flight crew of a loaded procedure, using temporary waypoints or fixes not provided in the data base, is not permitted;
- Although a particular method is not mandated, any published altitude or speed constraints must be observed.

CONTINGENCY PROCEDURES

- The flight crew must notify ATC of any problem with the RNAV system that results in the loss of required navigation capability, together with the proposed course of action;
- In the event of communication failure, the crew should continue with the RNAV procedure in accordance with the published lost communication procedure;
- In case of loss of P-RNAV capability, the flight crew should navigate using an alternative means of navigation. The alternate means need not be an RNAV system;
- Cautions and warnings for the following conditions:
  - Failure of the RNAV system components including those affecting flight technical error;

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- Flight director – discontinue the P-RNAV procedure following the approved missed approach procedure or if feasible revert to a conventional or IRS procedure and inform ATC;
- Automatic Flight – continue the approach using manual flight, and if the flight path cannot be followed perform a approved missed approach procedure and inform ATC;

– Multiple system failures – If a multiple system failures occurs such as affecting GNSS, Flight Director, and any other used for P-RNAV procedure, a missed approach procedure must be performed and inform ATC;
– Failure of navigation sensors - discontinue the P-RNAV procedure following the approved missed approach procedure or if feasible revert to a conventional or IRS procedure and inform ATC.

INCIDENT REPORTING

Significant incidents associated with the operation of the aircraft which affect or could affect the safety of RNAV operations, need to be reported on the appropriate report manifest.
Specific examples may include:

– Aircraft system malfunctions during P-RNAV operations which lead to:
  – Navigations errors not associated with transitions between different navigation modes;
  – Significant navigation errors attributed to incorrect data or a navigation database coding error;
  – Unexpected deviations in lateral or vertical flight path not cause by Pilot input;
  – Significant misleading information without a failure warning;
  – Total loss or multiple navigation equipment failure;
– Problems with ground navigational facilities leading to significant navigational errors not associated with transitions between different navigation modes.

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AUTOPILOT

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GENERAL

The Primus 1000 (P-1000) Automatic Flight Control System (AFCS) is a fully integrated, fail passive three-axis flight control system which incorporates lateral and vertical guidance, yaw damper and automatic pitch trim functions.

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AUTOMATIC FLIGHT CONTROL SYSTEM

The Automatic Flight Control System (AFCS) consists of dual IC-600s, autopilot servos, a flight guidance controller (GC-550), a pitch and turn controller (PC-400) and a display controller (DC-550), as follows:

– IC-600 Computer: The primary component of the Automatic Flight Control System (AFCS). Controls the symbol generator, monitors, flight director and autopilot. Only the IC-600 #1 incorporates the autopilot functions.

– Flight Guidance Controller (GC-550): Consists of a panel that allows control of both Flight Director systems and autopilot functions. The GC-550 provides means for engaging the autopilot and the yaw damper, selecting the flight director modes and the flight director coupling. The Flight Guidance Controller also provides the means for the remote selection of course, heading, vertical speed target, indicated airspeed target, Mach targets and preselected altitude.

– Pitch and Turn Controller (PC-400): Consists of a panel with a Turn Control Knob and a Pitch Control Wheel. These controls allow the pilot to manually maneuver the airplane with the autopilot engaged.

– Display Controller Panel (DC-550): The DC is used to select various features on the PFD. These include Electronic Horizontal Situation Indicator (EHSI) formats, navigation sources, weather display and bearing pointer selection.

The Automatic Flight Control System interfaces with the following systems:

– Inertial Reference System (IRS): Provides pitch, roll and acceleration information to the autopilot system via IC-600-1.

– Radio Management System: Provides navigation data to the IC-600, including short range navigation data, VOR bearings, ILS approach data, marker beacon tone detection and transmission, DME features and ADF.

– Air Data Computers (ADCs): Supply pressure altitude, barometrically corrected altitude, true airspeed, calibrated airspeed, vertical speed, Mach number, static air temperature and total air temperature to both IC-600.

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– Radio Altimeter System: Provides radio altitude, low altitude awareness and decision height information on the PFD.

– Stall Protection System: Provides sensitive, visual and aural indications of an impending stall. If a stall condition is near to occur, the system actuates the stick shaker, disengages the autopilot and, if necessary, actuates the stick pusher.

– Enhanced Ground Proximity Warning System (EGPWS/GPWS): Receives, from IC-600-1, the glideslope deviation, localizer deviation, selected decision height, selected course, packed discrete and selected terrain range.

– Electronic Flight Instrument System (EFIS): Present information to the flight crew. Consists of two Primary Flight Displays (PFD), two Multi Function Displays (MFD) and one EICAS display.

– Horizontal Stabilizer Control Unit (HSCU): Provides, to both IC-600 #1 and #2, the horizontal stabilizer position. It also receives, from IC-600, the autopilot command, when the autopilot is engaged, and the amount of trim demanded.

– Aural Warning Unit (AWU): Receives signal from the autopilot, generates the appropriate messages and tones and send the audio signal to the Audio Digital System, which routes the messages to the speakers.

– Flap Electronic Control Unit (FECU): Moves the inboard and outboard flap panels and sends flap position signal to the autopilot system.

– Flight Management System (FMS): Provides high accuracy in long range lateral navigation.

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FLIGHT GUIDANCE SYSTEM

The Flight Guidance System may perform three separate functions: the Flight Director, Autopilot and Autopilot Monitoring.

FLIGHT DIRECTOR

The Flight Director function provides pitch and roll attitude commands based on data from a variety of sensors, including attitude, heading, air data, radio altimeter, navigation and pilot inputs. These attitude commands are sent to the PFD for pilot display, to the autopilot for automatic airplane control and to the autopilot monitors.

AUTOPILOT

The autopilot provides yaw stabilization and follows pitch and roll attitude commands from the flight director.

The autopilot/yaw damper monitors continuously check autopilot functions and operation. In case of failure, they are capable of disengaging the autopilot and yaw damper, independent of the autopilot processor hardware.

For airplanes Post-Mod. SB 145LEG-31-0014 or equipped with an equivalent modification factory-incorporated, the autopilot/yaw damper automatically controls the rudder offset in order to minimize the roll oscillation and increase the yaw damper efficiency at high altitudes. The offset is applied above 30000 ft and removed below 29500 ft. A slight yaw offset may be presented on the slip skid indicator. No pilot action is required.

FLIGHT MODE ANNUNCIATIONS (FMA)

The Flight Mode Annunciation display, also referred as FMA, is located on the top of the PFD screen and it displays annunciations for autopilot, yaw damper, approach status, lateral and vertical modes.

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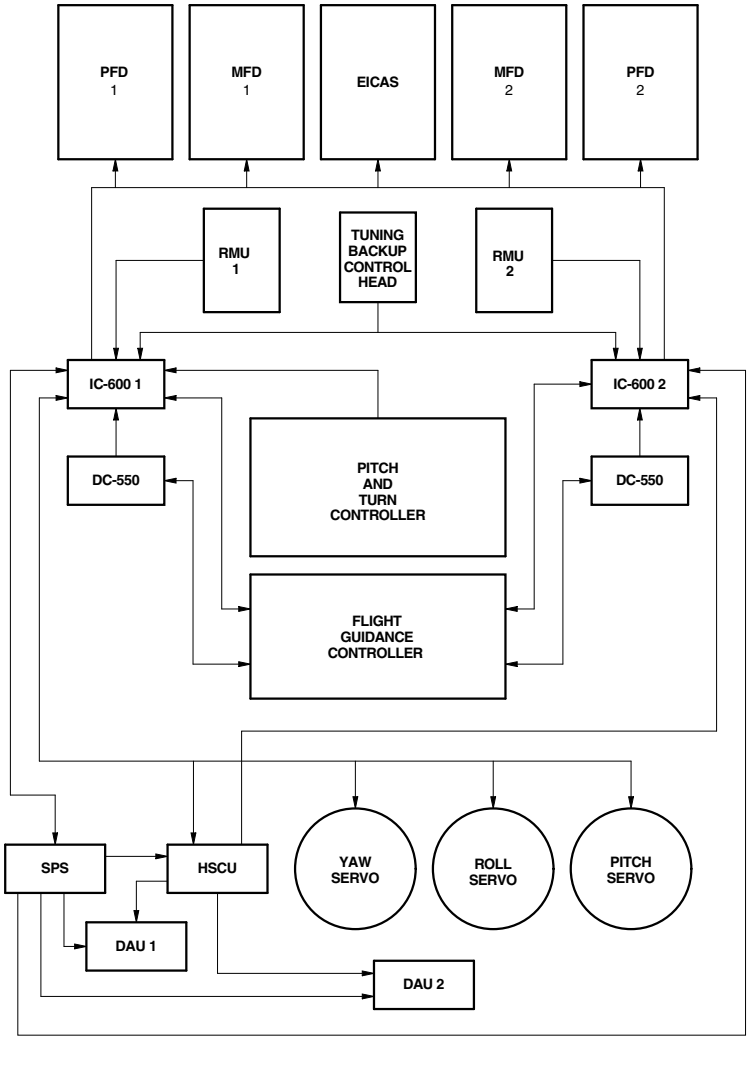

AUTOFLIGHT SYSTEM SCHEMATIC

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FLIGHT DIRECTOR MODES

The selection for the Flight Director mode is accomplished through the Flight Guidance Controller. Each mode selector button is illuminated for the armed and captured mode. Also, each active mode is annunciated on the PFD FMA and this annunciation differentiates between armed and captured modes. The various modes are into two categories: Lateral and Vertical modes.

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LATERAL MODES

Lateral modes are those modes related to heading or roll control. They normally provide commands based on navigation sources.

HEADING HOLD MODE (GREEN)

Heading Hold mode is the default FD mode when no other lateral mode is selected. The Heading Hold mode provides roll commands to maintain the heading at the moment of mode engagement. Once this mode is selected, the heading reference is established one second after the system detects a bank angle of less than 6°. A bank angle command of 0° is used (wings level) until the heading reference is established.

The ROL green label is displayed on the PFD to indicate that the mode is engaged. This mode uses only the primary heading from the left side. If this data is invalid, the Wings Level submode is used.

The Heading Hold mode is divided into Roll Hold submode, Turn Knob submode and Wings Level submode.

ROLL HOLD SUBMODE (GREEN)

The Roll Hold submode is entered from Heading Hold mode: with the autopilot engaged, the Touch Control Steering Button (TCS) is used to fly the airplane manually to a bank angle greater than 6°.

The system maintains the bank angle at the time the TCS button is released.

Roll Hold submode is cancelled by any of the following actions:

– Manually flying the airplane to less than 6° with the TCS button,

– Moving the Turn Control Knob out of detent, or

– Selecting another lateral mode.

This mode is annunciated on the PFD by the ROL green label.

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TURN KNOB SUBMODE (GREEN)

The Turn Knob submode allows the pilot to generate a roll attitude command manually with the Turn Control Knob. Moving the Turn Control Knob out of detent, with the autopilot engaged, cancels all other lateral modes including Heading Hold mode in both Flight Directors.

When the Turn Control Knob is out of detent, the autopilot maintains a roll attitude proportional to the displacement of the knob. The autopilot reverts back to Heading Hold mode when the turn knob is placed in the detent position. Turn Knob submode is annunciated on the PFD by the ROL green label when out of detent and the autopilot is engaged. When the autopilot is disengaged and the Turn Control Knob is out of detent, the TKNB label is displayed in the PFD. With TKNB label displayed, the autopilot engagement is inhibited.

WINGS LEVEL SUBMODE

The Wings Level submode provides a roll command of 0°. This mode is active in the Go Around mode, Windshear mode or if the primary heading data is invalid. Therefore, this mode is available even if either attitude source is invalid. This mode is annunciated on the PFD by the ROL green label.

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HEADING SELECT MODE (HDG) (GREEN)

The HDG mode is selected by pressing the HDG button on the flight guidance controller or by arming LOC, VOR, VAPP, or BC. This mode allows the Flight Director to track the EHSI heading bug, as set by the heading select knob. The Heading Select mode is annunciated on the PFD by the green HDG label.

The mode is inhibited when any of the following conditions occurs:

– Turn Control Knob out of detent with autopilot engaged.

– Displayed heading invalid.

The mode is canceled when any of the following conditions occurs:

– Pressing the HDG button.

– Changing the displayed heading source on the PFD.

– LOC & BC mode capture.

– VOR & VAPP capture.

– Pressing the Go Around button.

LOW BANK MODE

The Low Bank mode allows the pilot to select reduced bank angle for the HDG mode. Bank angle limit is reduced from 27° to 14° whenever this mode is active. The Low Bank mode is selected by pressing the BNK button in the Flight Guidance Controller when the Heading Select mode is active. The mode remains selected when the Heading Select mode is deactivated. If the Heading mode is selected again, the Low Bank mode is then reactivated and annunciated. The Low Bank mode is automatically selected when climbing above 25000 ft and automatically canceled when descending below 24750 ft.

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VOR NAV MODE (VOR) (GREEN)

The VOR NAV mode allows automatic capture and tracking of both inbound and outbound VOR radials. The VOR mode is selected by pressing the NAV button in the Flight Guidance Controller, with VOR selected on the PFD. Upon selection of VOR NAV mode, the HDG select mode is automatically engaged. HDG engagement triggers the green HDG and white VOR NAV annunciations on the PFD.

At the proper time, based on course error and beam deviation, the capture of VOR mode cancels the HDG selected mode.

The mode is canceled or inhibited when any of the following conditions occur:

– Pressing the NAV button.

– Selecting VAPP or HDG modes.

– Changing the displayed NAV source on the PFD.

– Changing the displayed heading source on the PFD.

– When the displayed heading is invalid.

– When the displayed NAV source is invalid for more than 5 seconds.

– Pressing the Go Around Button.

– Turn Control Knob out of detent with autopilot engaged.

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VOR APPROACH MODE (VAPP) (GREEN)

The VOR Approach mode provides the same capabilities as the VOR NAV mode, with higher gain for operation close to the station.

It is recommended to select VAPP mode only on the final approach segment. Therefore, the outbound segment should be flown using some other mode.

This mode is selected by pressing the APR button on the Flight Guidance Controller, with VOR displayed on the PFD. This mode is canceled or inhibited by the same conditions as the VOR NAV mode.

When the VOR Approach mode is selected, the HDG select mode is automatically engaged. HDG engagement triggers the green HDG and white VOR NAV annunciations on the PFD.

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LOCALIZER MODES (LOC/BC) (GREEN)

The Localizer Modes allow automatic capture and tracking of localizer transmitters. Both front course (LOC) and back course (BC) approaches are supported.

The back course approach operates similar to the front course approach, except that the beam deviation is inverted. This exception allows the system to approach the runway 180° from the front-course.

Select the Localizer mode by pressing the NAV or APR buttons on the flight guidance controller with ILS as the selected navigation source. In this case, the HDG select mode is automatically selected and the localizer is armed. On an ILS approach, when the localizer is armed and the APR button is pressed, the Glide Slope mode is also armed.

The localizer mode captures are based on course error and beam deviation. At the point of capture, the current armed mode (LOC or BC) is selected and locked, while HDG select mode is canceled. The LOC mode capture or BC mode capture is annunciated on the PFD by a green LOC or green BC label, respectively.

After captured, the mode is canceled or inhibited if any of the following conditions occur:

– Pressing the NAV or APR buttons.

– Selecting HDG mode.

– Changing the displayed NAV source on the PFD.

– Changing the displayed heading source on the PFD.

– When the displayed heading is invalid.

– When the displayed NAV source is invalid for more than 5 seconds.

– When the displayed glideslope deviation is invalid for more than 5 seconds, with GS mode captured.

– When the on-side attitude is invalid.

– When the selected air data source is invalid.

– Pressing Go Around button.

– Turn Control Knob out of detent with autopilot engaged.

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LNAV MODE (MAGENTA)

The LNAV mode allows the Flight Director to capture and track the roll steering signal from the long range navigation system (FMS/GPS).

With FMS selected on the PFD, select LNAV mode by pressing the NAV button on the Flight Guidance Controller. This mode automatically engages HDG select mode, which triggers a green HDG and a white LNAV annunciations on the PFD.

The mode is canceled or inhibited when any of the following conditions occur:

– Pressing the NAV button.

– Selecting HDG mode.

– Changing the displayed NAV source on the PFD.

– Changing the displayed heading source on the PFD.

– When the displayed heading is invalid.

– When the lateral steering command is invalid.

– Pressing the Go Around button.

– Turn Control Knob out of detent with autopilot engaged.

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VERTICAL MODES

Vertical modes are those modes related to pitch control. Due to the necessity of maintaining the wings leveled during Go Around, this vertical maneuver is also considered as a lateral mode.

NOTE: For airplanes equipped with the autothrottle, the A/T mode is selected depending on the selected FD Vertical mode. Refer to Section 2-19-30.

PITCH HOLD MODE

The Pitch Hold mode is the default mode that controls the airplane when no other Flight Director mode is selected.

The Pitch Hold mode is synchronized to the existing pitch attitude and provides an error signal to the command bars and autopilot function.

By pressing the Touch Control Steering Button (TCS), the pilot may manually change the pitch attitude and then allow the system to resynchronize to the new attitude when the button is released.

If the autopilot is engaged and the Flight Director is in the pitch hold mode, pitch attitude reference changes by rotating the pitch control wheel on the Pitch and Turn Controller.

The pitch control wheel allows continuous variable rates and amplitudes of the pitch reference. A PIT label is displayed on the PFD to indicate mode engaged.

NOTE: For airplanes equipped with autothrottle, the A/T SPD mode is engaged and the thrust is modulated to the target speed on FD.

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ALTITUDE HOLD MODE (ALT)

The Altitude Hold mode generates an altitude error signal from a reference altitude and provides a pitch command, which allows the autopilot to maintain altitude.

The Altitude Hold mode is selected by either:

– Pressing the ALT button on the Flight Guidance Controller, or

– Automatically by the Altitude Preselect mode.

This mode is annunciated on the PFD by the ALT label.

The ALT mode is canceled or inhibited when any of the following conditions occur:

– Deselecting the ALT mode (by pressing the ALT button - light OFF).

– Selecting any other mode (FLC, VS, or SPD modes).

NOTE: For airplanes equipped with autothrottle, the SPD mode button is suppressed. The A/T button does not cancel the ALT mode.

– When the air data is invalid.

– Glide slope capture.

– Pressing the Go Around Button.

– Pitch control wheel moved with autopilot engaged.

VNAV ALTITUDE HOLD (VALT)

Refer to Section 2-18-60.

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ALTITUDE PRESELECT MODE (ASEL)

The Altitude Preselect mode provides means for the system to climb or descend to a predetermined altitude and then level off and maintain the preselected altitude.

Preselected altitude is set through the ASEL knob on the Flight Guidance Controller and is displayed on the top right corner of the PFD. This mode is annunciated by the white ASEL label on the PFD.

Pitch Hold, Speed Hold or Vertical Speed Hold must be used to climb or descend towards the preselected altitude or Flight Level Change (FLC).

The ASEL mode arms automatically if the airplane climbs or descends towards a preselected altitude. The ASEL mode will automatically capture and cancel any existing mode at the appropriate point based on preselected altitude error and vertical speed. The system will automatically switch to altitude hold mode after the airplane has leveled off at the selected altitude.

The mode is canceled and/or inhibited if any of the following conditions occur:

– Selecting any other mode (ALT, FLC, VS, or SPD modes).

NOTE: For airplanes equipped with autothrottle, the SPD mode button is suppressed. The A/T button does not cancel the ALT mode.

– When the air data is invalid.

– Glide slope capture.

– Pressing the Go Around Button.

– Changing the preselected altitude.

VNAV ALTITUDE CAPTURE (VASL)

Refer to Section 2-18-60.

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FLIGHT LEVEL CHANGE MODE (FLC)

For airplanes equipped with autothrottle, the FLC mode works exactly the same as VFLC mode (refer to Section 2-18-60).

For airplanes not equipped with autothrottle, the Flight Level Change mode (FLC) provides means of climbing or descending to a preselected altitude at a pre-programmed schedule.

When the preselected altitude is above the current altitude and the flight level change mode is selected, the Flight Director provides a speed command at the predetermined climb speed schedule. When the preselected altitude is below the current altitude and FLC is selected, the FD provides a command to descend at a determined rate of descent. The PFD will display the current IAS, Mach or vertical speed bug as appropriate and the target speed can be adjusted only by deselecting the flight level change mode.

As the airplane approaches the preselected altitude, the Flight Director will cycle among ASEL ARM, ASEL CAP, and ALT HOLD to capture the preselected altitude.

The following protections are provided with this mode:

– Maximum normal and longitudinal acceleration: 0.1 G.

– Maximum airspeed: V_{MO} or M_{MO}.

– System will maintain the preselected altitude.

The Flight Level Change mode may be activated by selecting an altitude and pressing the FLC button in the Flight Guidance Controller. This mode is annunciated on the PFD by the CLB label, when following the IAS/MACH climb profile, or by the DES label when following a vertical descent profile of -2000 ft/min.

The mode is canceled or inhibited if any of the following conditions occur:

– De-selecting the FLC mode (by pressing the FLC button - light OFF).

– Selecting any other mode (ALT, VS, or SPD modes).

NOTE: For airplanes equipped with autothrottle, the SPD mode button is suppressed. The A/T button does not cancel the ALT mode.

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The mode is canceled or inhibited if any of the following conditions occur (continued):

– When the air data is invalid.

– Glide slope capture.

– Pressing the Go Around Button.

– Changing the preselected altitude.

DESCENT RATE SCHEDULE:

For all EICAS versions:

From 41000 ft to 12000 ft, the descent rate schedule is -2000 ft/min.

From 12000 ft to 10000 ft the descent rate schedule is -2000 ft/min to -1000 ft/min.

From 10000 ft and below the descent rate schedule is -1000 ft/min.

CLIMB SPEED SCHEDULE:

For EICAS versions up to 20.5:

From 10000 ft and below the climb speed schedule is 240 KIAS.

From 10000 ft to 12000 ft the climb speed schedule is increased linearly from 240 KIAS to 290 KIAS.

From 12000 ft to 21600 ft the climb speed schedule is 290 KIAS.

From 21600 ft to 39000 ft, the climb speed schedule is 0.65 Mach.

For EICAS versions 20.6 and on:

From 8000 ft and below the climb speed schedule is 240 KIAS.

From 8000 ft to 14000 ft the climb speed schedule is increased linearly from 240 KIAS to 270 KIAS.

From 14000 ft to 25051 ft the climb speed schedule is 270 KIAS.

From 25051 ft to 41000 ft, the climb speed schedule is 0.65 Mach.

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VNAV FLIGHT LEVEL CHANGE (VFLC)

Refer to Section 2-18-60.

VNAV PATH (VPTH)

Refer to Section 2-18-60.

SPEED HOLD MODE (SPD) (GREEN)

The Speed Hold mode is used to maintain airspeed or Mach number while flying to a new altitude. Indicated airspeed should be used below 25000 ft and Mach number above 25100 ft.

The Speed Hold mode is also designed to provide overspeed and underspeed protections.

Speed hold mode is selected by pressing the SPD button on the Flight Guidance Controller. This mode is annunciated on the PFD by the SPD label, when maintaining IAS, or by the MACH label when maintaining Mach number. Selection of Speed Hold mode cancels other vertical modes, except the altitude preselect arm mode and Glide Slope arm mode.

Speed Hold mode is automatically selected when the FLC button is pressed and the preselected altitude is above the current altitude.

Different Speed Target can be selected by using the Speed Set knob in the Flight Guidance Controller. Pressing the SPD knob allows the pilot to toggle between IAS target and MACH target to set airspeed.

The following protections are provided with this mode:

– Maximum normal acceleration: 0.1 G.

– Maximum normal acceleration on entering overspeed: 0.3 G.

– Maximum airspeed: V_{MO} or M_{MO}.

– Minimum airspeed: Shaker actuation speed.

– System maintains the preselected altitude and airspeed.

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The mode is canceled or inhibited if any of the following conditions occur:

– Deselecting the SPD mode (by pressing the SPD button - light OFF).

NOTE: For airplanes equipped with autothrottle, the SPD mode button is suppressed. The A/T button does not cancel the ALT mode.

– Selecting any other mode (ALT, FLC, or VS modes).

– When the air data is invalid.

– Glide slope capture.

– Pressing the Go Around Button.

– Altitude preselect capture.

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VERTICAL SPEED HOLD MODE (VS) (GREEN)

The Vertical Speed hold mode is used to maintain or to make changes to the vertical speed. The Vertical Speed hold mode ranges from -6000 to +6000 ft/min, with a resolution of 100 ft/min.

The Vertical Speed Hold mode is selected by pressing the VS button on the Flight Guidance Controller or automatically, when FLC button is pressed and the preselected altitude is below the current altitude. This mode is annunciated on the PFD by the VS label.

Selection of this mode cancels other vertical modes, except the altitude preselect arm and Glide Slope arm.

Vertical speed may be changed by using the Speed Set knob, on the flight guidance controller.

The following protections are provided with this mode:

– Maximum airspeed: V_{MO}.

– Minimum airspeed: Shaker actuation speed.

The mode is canceled or inhibited if any of the following conditions occur:

– Deselecting the VS mode (by pressing the VS button - light OFF).

– Selecting any other mode (ALT, FLC, or SPD modes).

NOTE: For airplanes equipped with autothrottle, the SPD mode button is suppressed. The A/T button does not cancel the ALT mode. In this case, the SPD mode for A/T engages and the A/T follows the Speed Target. Speed target is either the current speed, or the pre-selector speed setting.

– When the air data is invalid.

– Glide slope capture.

– Pressing the Go Around Button.

– Altitude preselect capture.

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GLIDE SLOPE MODE (GS)

The Glide Slope mode allows automatic capture and tracking to Glide Slope transmitters. Select Glide Slope mode by pressing the APR button with ILS as a navigation source.

Selecting Glide Slope mode automatically arms GS (with LOC). The PFD displays a white localizer LOC and a white Glide Slope GS annunciation. The localizer mode capture occurs with a green LOC annunciation on the PFD. The Glide Slope mode capture, with a green GS annunciation on the PFD, will occur only after Localizer mode has been captured.

After captured, the GS mode is canceled or inhibited if any of the following conditions occur:

– De-selecting the GS mode (by pressing the APR or NAV buttons - lights OFF).

– Selecting any other mode (ALT, FLC, VS, or SPD modes).

NOTE: For airplanes equipped with autothrottle, the SPD mode button is suppressed. The A/T button does not cancel the ALT mode.

– Glide slope deviation invalid for a period greater than 5 seconds.

– Lost Localizer mode.

– Pressing the Go Around Button.

VNAV VERTICAL GLIDE PATH (VGP)

Refer to Section 2-18-60.

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GO AROUND MODE (GREEN)

The Go Around mode may be engaged only at radio altitudes below 2500 ft, or below 15000 ft pressure altitude for an invalid Radio Altimeter signal. This feature is provided to protect against inadvertent Go Around selections during cruise.

While this mode is engaged, the Speed knob is inhibited.

The airspeed bug is displayed on the airspeed tape on the PFD and a pitch limit indicator is displayed on the EADI. If the Stall Protection Computer signal becomes invalid, the pitch limit indicator is removed.

The Go Around mode is divided into two submodes.

– The Takeoff Submode: Engaged by pressing the Go Around button when the airplane is on the ground (weight on wheels), or in flight up to 400 ft Radio Altitude after the takeoff.

– The Go Around Submode: Engaged by pressing the Go Around button in flight above 400 ft Radio Altitude after takeoff.

In any submode, wings level is the active lateral mode and the ROL label is displayed on the PFD, in addition to the applicable vertical mode.

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TAKEOFF SUBMODE

The Takeoff submode provides fixed pitch up attitude command indicated by the Flight Director command bars on the EADI. The pitch angle is the same as described in Takeoff - Normal Procedures (Section 1-02-40).

This submode is annunciated by the TO label on the PFD, and it is canceled if any of the following conditions occur:

– The TCS button is pushed.

– Selecting any other mode (ALT, FLC, VS, or SPD modes).

NOTE: For airplanes equipped with autothrottle, the SPD mode button is suppressed. The A/T button does not cancel the ALT mode.

– Transition to capture Altitude Preselect mode occurs.

– Air data computer source selection is changed.

If the autopilot is selected with the Takeoff submode engaged, this submode drops into Pitch Hold mode and synchronizes to the current attitude. This submode does not couple to the autopilot, which may be used after climbing above the airplane Minimum Engagement Height (MEH).

A Pitch Limit Indicator (PLI) is displayed on the EADI sphere when the margin before the stick shaker set point is lower than or equal to 10°. In the case of an invalid Stall Protection Computer signal, the PLI is biased out of view and an amber AOA annunciation is displayed on the PFD.

The Go Around submode, as well as the Vertical Speed Control knob, are inhibited while Takeoff Submode is engaged.

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GO AROUND SUBMODE

The Go Around Submode is selected once the decision to discontinue the approach has been taken. Although commanding a nose up attitude, the need to maintain wings leveled causes this submode to incorporate both lateral and vertical modes features.

The autopilot may be coupled to the Go Around Submode above the Minimum Use Height (MUH). However, the crew is not alerted in case of coupling this submode below the MUH.

This submode is annunciated by the ROL label and GA label, both on the PFD, and it is canceled when any of the following conditions occur:

– Glide slope capture.

– The ALT, SPD, VS, or FLC mode is selected.

– Transition to capture Altitude Preselect mode occurs.

– Air data computer source selection is changed.

Once a positive rate of climb has been achieved, this submode commands a pitch angle of 10° nose up.

The Go Around Submode ignores a preselected altitude below the airplane. If a preselected altitude is higher than the Go Around submode engagement altitude plus 400 ft (pressure altitude), this altitude is then captured. This feature is provided to avoid the airplane leveling off when the pilot has not readjusted the preselected altitude to the new missed approach altitude.

The Speed knob is inhibited while GA mode is engaged.

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When the IAS preselected speed bug is used on the go-around, the GA label switches to the Speed Target submode. If transition to Speed Hold Mode occurs, IAS mode annunciator replaces the GA mode annunciator. Transition from Go Around Submode to Speed Hold Mode automatically occurs:

– If, at anytime, the speed is lower than 1.23 V_S. In this case, 1.23 V_S is targeted, replacing the pre-selected speed target. If this speed can not be maintained, altitude is held.

– If, 20 seconds after Go Around engagement, the speed is higher than 170 KIAS. In this case, 170 KIAS is targeted, replacing the pre-selected speed target.

– If, 20 seconds after Go Around engagement, the speed is up to 5 KIAS higher or lower than the preselected speed target. In this case, the current speed is maintained. The Speed Target submode is indicated by IAS label on the PFD. On this submode the system provides the pitch command based on the IAS Hold mode. The Speed Target submode disengages on selection of a new vertical mode. The submode ignores a preselected altitude below the airplane and does not fly away from a preselected altitude above the airplane. Altitude Preselect mode is inhibited if the preselect altitude is less than Speed Target submode engagement altitude plus 400 ft (pressure altitude). This feature is provided to avoid the airplane leveling off when the pilot has not readjusted the preselected altitude to the new missed approach altitude.

NOTE: For airplanes equipped with Autothrottle:

- During a Go-Around procedure, the Speed V_{APP} CLB replaces the Speed reference in Cyan (Speed Target Bug) after the TOGA Button is pressed, regardless of the previous active vertical mode.
- In case of not programming the Speed V_{APP} CLB on the MFD Bezel, the avionics assumes either 170 KIAS, or the V_{FE} for Flaps Full (160 KIAS).

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WINDSHEAR ESCAPE GUIDANCE MODE

To recover from a windshear situation, the Windshear Escape Guidance mode is provided.

For further information on windshear detection and escape guidance system, refer to Section 2-4 – Crew Awareness.

AUTOPILOT DISENGAGEMENT

The autopilot is normally disengaged through the Autopilot Engage/Disengage button or through the quick disconnect button on the control wheel.

A voice message AUTOPILOT is generated when the autopilot is disengaged.

This message is presented at any altitude in case of intentional disengagement or due to an autopilot failure. The message is canceled according to the following associated conditions:

ASSOCIATED CONDITIONS	CANCELLATION
Above 2500 ft radio altitude with a valid Radio Altimeter signal.	Self canceled.
Below 2500 ft radio altitude with a valid Radio Altimeter signal.	Pressing the Autopilot Quick Disconnect Button twice.
Invalid signal for Radio Altimeter.	Pressing the Autopilot Quick Disconnect Button twice.

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EICAS MESSAGES

TYPE	MESSAGE	MEANING
WARNING	AUTOPILOT FAIL	Autopilot has failed and has been automatically disengaged.
CAUTION	AP AIL MISTRIM	A roll mistrim condition exists.
	AP ELEV MISTRIM	A pitch mistrim condition exists.
	AUTO TRIM FAIL	Automatic pitch trim has failed.
	LATERAL MODE OFF	Inadvertent loss of the Lateral Flight Director mode.
	VERTICAL MODE OFF	Inadvertent loss of the Vertical Flight Director mode.
	YAW DAMPER FAIL	Yaw Damper has failed and has been automatically disengaged.

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CONTROLS AND INDICATORS

FLIGHT GUIDANCE CONTROLLER

NOTE: All the mode selector buttons described below are illuminated to indicate whether the associated mode is armed or captured.

1 – FD1 BUTTON

- Allows the Flight Director bars to be displayed on the associated PFD.

2 – LATERAL MODE SELECTOR BUTTONS

- Select lateral operating modes of the autoflight system, as follows:
  - HDG: selects heading hold and heading select modes.
  - NAV: selects VOR NAV mode and allows selection of LOC/BC and LNAV modes.
  - APR: selects VOR approach mode and allows selection of LOC/BC and GS modes.
  - BNK: selects Low Bank submode.

3 – AP BUTTON

- Pressed once engages the autopilot and the yaw damper. Pressed again, disengages the autopilot only, keeping the yaw damper engaged.

4 – VERTICAL MODE SELECTOR BUTTONS

- Select vertical operating modes of the autoflight system, as follows:
  - SPD: selects Speed Hold mode.
  - FLC: selects Flight Level Change mode.
  - VS: selects Vertical Speed hold mode.
  - ALT: selects Altitude Hold mode.

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5 – ASEL KNOB

- Allows preselection of altitude in 100 ft increments.

6 – CRS KNOBS

- Allows selection of course in 1° increments.
- Pressing the knob synchronizes the selected course to the VOR bearing.

7 – VS CONTROLLER AND IAS/M BUTTON

- Pressing the knob toggles between the speed modes MACH and IAS.
- When in SPD mode, rotation of this knob allows selection of indicated airspeed in one-knot increments or Mach Number in 0.01 increments.
- When in VS mode, rotation of this knob allows selection of vertical speed in 100 ft/min increments.

8 – YD BUTTON

- Pressed once, engages only the Yaw Damper. Pressed again disengages the yaw damper and the autopilot, if it is engaged.

9 – CPL BUTTON

- Allows the pilot's or copilot's Flight Director commands to control the autopilot. The couple button can be pressed with the autopilot engaged or disengaged. However, if the Flight Director is switched, the modes will drop out and the autopilot will remain engaged (if already engaged) and revert to basic autopilot mode (pitch and roll).

10 – HDG CONTROLLER

- Allows selection of heading in 1° increments.
- Pressing this knob synchronizes the heading selection to the current displayed heading.

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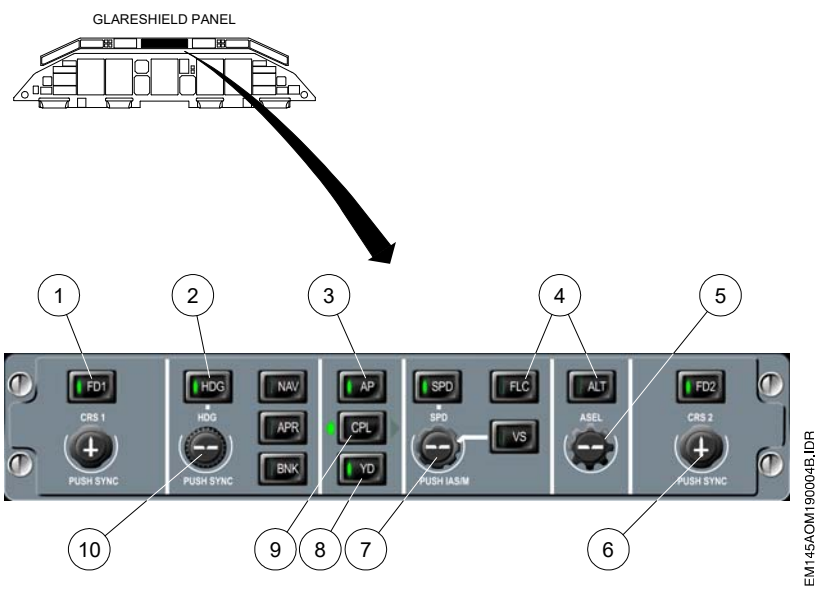

FLIGHT GUIDANCE CONTROLLER

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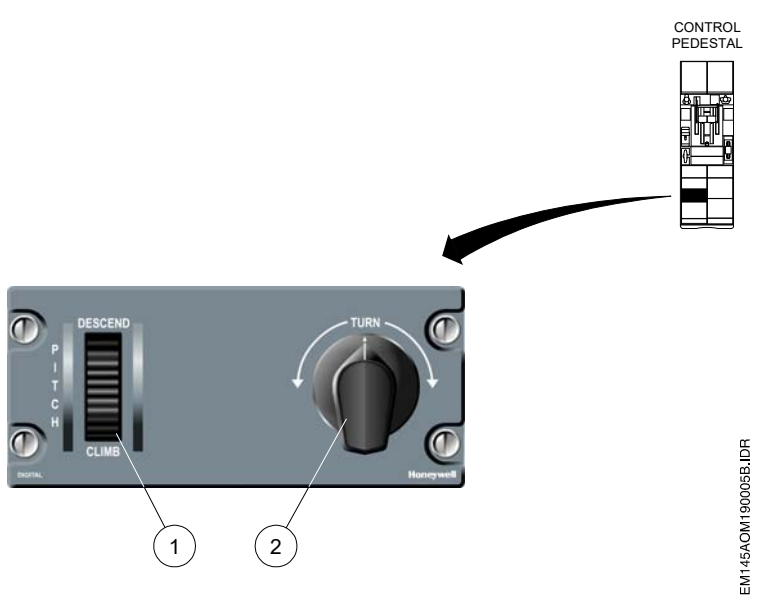
PITCH AND TURN CONTROLLER

1 – PITCH CONTROL WHEEL

- Manually controls the pitch when the autopilot is engaged and the Pitch Hold mode is selected.
- Pitch control wheel operation is inhibited if any vertical mode, except the Pitch Hold mode, is selected in the Flight Director.

2 – TURN CONTROLLER

- Manually controls the roll attitude when the autopilot is engaged.
- The control has a center detent position at the wings leveled position. The control remains at the current position when released.



PITCH AND TURN CONTROLLER

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CONTROL WHEEL

1 – TOUCH CONTROL STEERING BUTTON (TCS)

- Allows manual maneuvering of the airplane without disengaging the autopilot. The airplane may be maneuvered to any desired pitch attitude while the TCS button is pressed. When the button is released, the following occurs:
  - Primary servos reengage.
  - The computer synchronizes itself to the new pitch attitude and vertical mode and maintain it.
  - Lateral control is returned to the previously selected lateral mode (return to the lateral mode is filtered to prevent rapid maneuvers).
- After glide slope capture in APR mode with the autopilot engaged, if the TCS button is pressed and released, the autopilot will resume the controls and turn the airplane to the ILS center beam.

2 – QUICK DISCONNECT BUTTON

- Provides the means to disengage autopilot and yaw damper.
- The pilot's and copilot's buttons are interconnected to allow autopilot cancellation from either seat.
- In case of the autopilot is disengaged and the button is pressed, the voice message AUTOPILOT will be canceled in 2 seconds.

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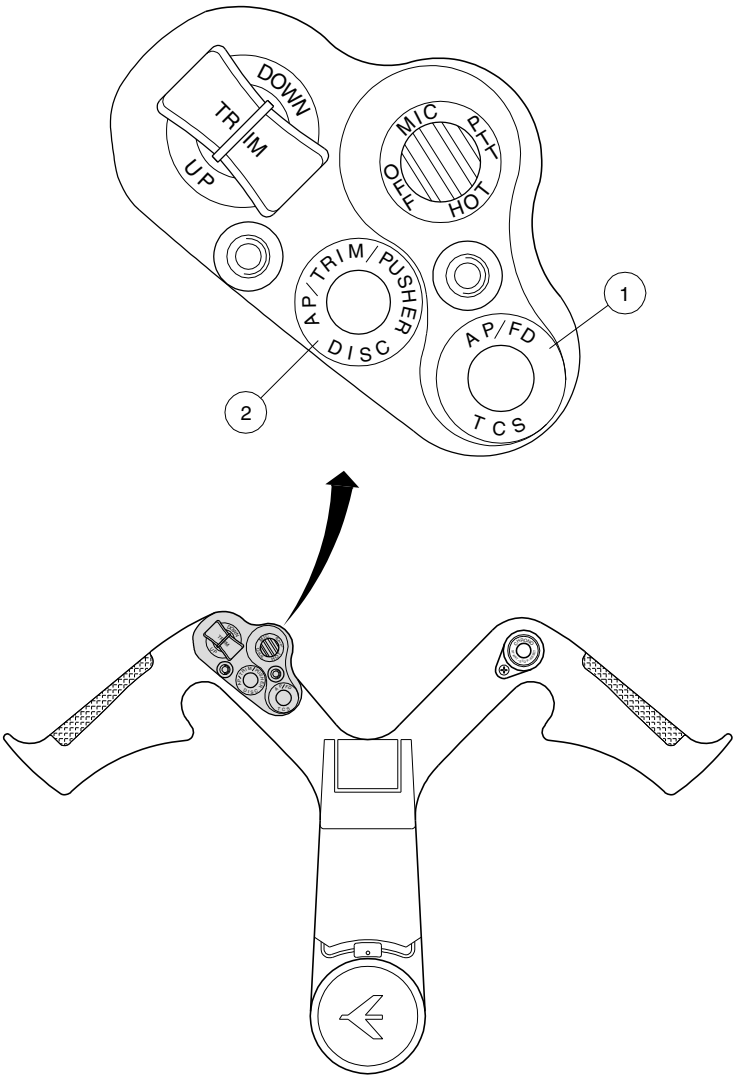

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CONTROL WHEEL

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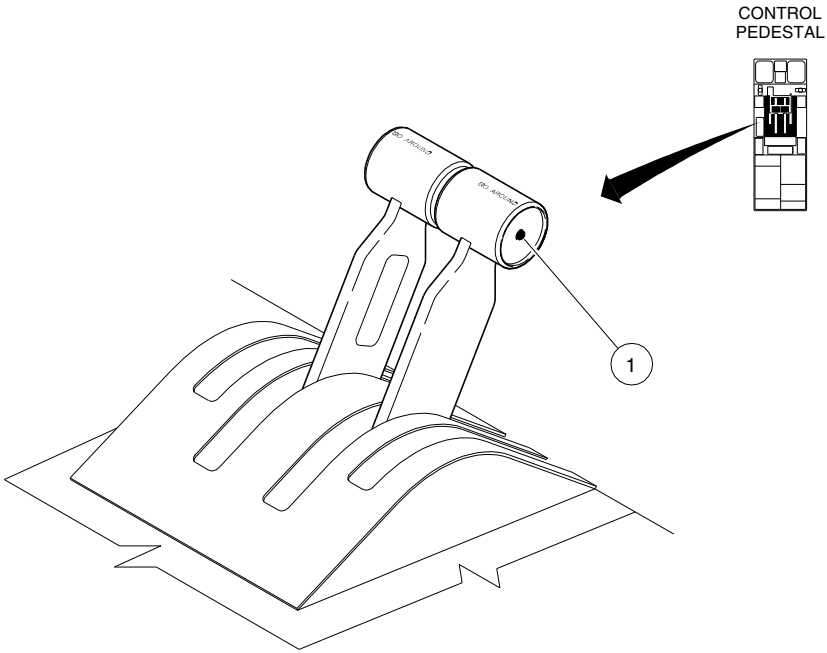
THRUST LEVERS

1 - GO AROUND BUTTON

- Selects the Go Around mode (Takeoff submode, Go Around Speed Target submode and Windshear mode).
- The button also forces the Flight Director into either the Go Around mode or the Windshear mode, depending on the windshear signal.



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DISPLAY CONTROLLER (DC-550)

1 – NAV BUTTON

- Provides the selection of the VHF NAV (VOR, ILS and MLS) as navigation source for the EHSI. If the VHF NAV is already selected, pressing the NAV Button selects the opposite VHF NAV as navigation source for the on-side EHSI. Pressing the NAV Button once again will restore the normal operation: VHF NAV 1 information presented on the PFD 1 and VHF NAV 2 information presented on the PFD 2.

2 – FMS BUTTON (OPTIONAL)

- Provides the selection of the FMS as navigation source for the EHSI.
- On airplanes equipped with dual FMS, pressing the FMS Button for the second time selects the opposite FMS as navigation source for the on-side EHSI (and for the on-side MFD MAP). Pressing the FMS Button once again will restore the normal operation: FMS 1 information presented on the PFD 1 (and MFD 1) and FMS 2 information presented on the PFD 2 (and MFD 2).

3 – BRG KNOBS

OFF: The associated PFD bearing pointers are disabled.

NAV 1 (2): Selects the respective VHF NAV as source for the associated bearing pointer.

ADF: Selects the respective ADF as source for the associated bearing pointer.

FMS: Selects the FMS as source for the associated bearing pointer.

4 – RA KNOB AND IC-600 TST BUTTON

- Provides the Radio Altimeter (RA) decision height setting.
- When pressed on ground provides the IC-600 and RA test activation. Refer to Section 2-4 – Crew Awareness for further information on test function and Section 2-17 – Flight Instruments for further information on decision height setting and RA test in flight.

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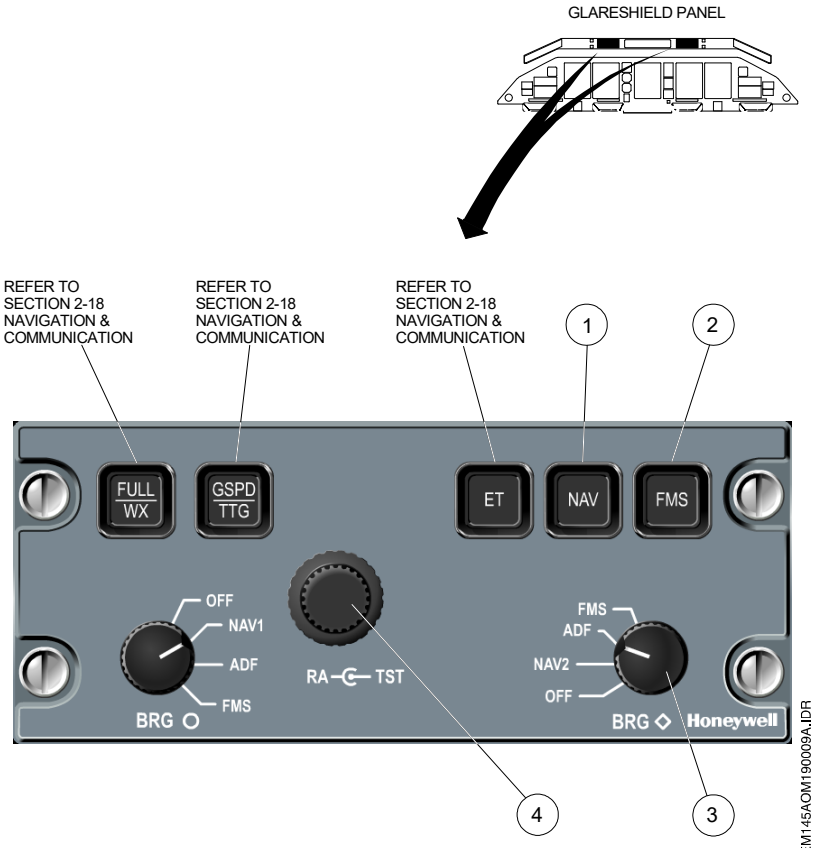

DISPLAY CONTROLLER PANEL (DC-550)

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PFD INDICATORS

1 – ARMED LATERAL MODE (WHITE)

- Indicates which lateral mode is armed.
- The mode annunciation is removed if the Flight Director fails.

2 – CAPTURED LATERAL MODE (GREEN)

- Indicates which lateral mode is captured.
- An amber FD FAIL is displayed in this field to indicate Flight Director failed.
- The mode annunciation is removed if the Flight Director fails.

3 – AUTOPILOT MESSAGE FIELD

- Indicates autopilot status.
- Messages are mutually exclusive and therefore only one message can be displayed at a time.
- The following messages may be displayed:

FMA	COLOR	MEANING
AP	Green	Autopilot engaged.
AP TEST		Autopilot test mode is active immediately after power up.
TCS	White	TCS submode is engaged (autopilot is engaged).
TKNB	Amber	Turn control knob is out of detent position (autopilot is disengaged).
AP		When the autopilot is normally disengaged, the green AP annunciation turns amber and flashes for 5 seconds, then becomes steady.
AP	Red	If the autopilot is engaged and a failure occurs, the green AP annunciation turns red and flashes for 5 seconds, then becomes steady. The AP annunciation appears in conjunction with the AUTOPILOT FAIL message on the EICAS and is removed when the autopilot is disengaged through the Quick Disconnect Button.

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4 – FLIGHT DIRECTOR COUPLE ARROW

- Indicates which Flight Director the autopilot is coupled to.
- The mode annunciation is removed if the Flight Director fails.

5 – YAW DAMPER ENGAGED ANNUNCIATION

- Color:
  - Green: indicates the yaw damper is engaged.
  - Amber: when the yaw damper is normally disengaged the annunciation flashes for 5 seconds and then extinguishes itself.
- If the yaw damper is engaged and a failure occurs, the annunciation flashes for 5 seconds then becomes steady until it is disengaged through the Quick Disconnect Button.

6 – CAPTURED VERTICAL MODE (GREEN)

- Indicates which vertical mode is captured.
- The mode annunciation is removed if the Flight Director fails.

7 – MODE TRANSITION ANNUNCIATOR

- Each transition is annunciated by a box around the mode that is being transitioned. The box will highlight the new mode for 5 seconds and then disappear.

8 – ARMED VERTICAL MODE (WHITE)

- Indicates which vertical mode is armed.
- The mode annunciation is removed if Flight Director fails.

9 – ALTITUDE PRESELECT DISPLAY

- Ranges from -900 to +45000 ft with a resolution of 100 ft.
- The digits and bug are cyan and the box is white. They become amber 1000 ft prior to reaching the preselected altitude. Once the airplane is within 250 ft of the preselected altitude, the box returned to white. If the airplane exceeds the preselected altitude by more than 250 ft, the box turns amber.

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- Large digits display hundreds, thousands and tens of thousands. Smaller digits, which are always zeros, display tens and ones.
- The bug moves according to the digital altitude preselect value.
- If the preselected altitude value is not within the displayed range of the altitude scale, the bug will stay at the respective end of scale, half-visible and unfilled.

10 – COMMAND BAR AND AIRPLANE SYMBOL

- Color: magenta.
- Indicates pitch and roll Flight Director commands.
- Command bar is removed if the Flight Director fails or if the opposite side Flight Director selected source or tuned frequency is different.

NOTE: The command bar and airplane symbol may be presented in either V-bar or cross-bar formats, depending on operator selection.

11 – SELECTED HEADING BUG

- Color: magenta.
- Displayed full time on the PFD, unless when the PFD is in arc format.
- When setting the selected heading value, the bug will move around the heading scale.

12 – VERTICAL SPEED TARGET DISPLAY

- Color: cyan.
- Ranges from 0 to 9900 ft/min with a resolution of 100 ft/min.
- Displayed only when Vertical Speed Hold mode is selected in either Flight Director.

13 – SELECTED HEADING DIGITAL READOUT

- Color:
  - Digits: cyan.
  - Label: white.
- Indicates the heading selected through the Flight Guidance Controller panel.

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14 – GS/LOC/ILS COMPARISON MONITOR DISPLAYS

- Label: GS, LOC or ILS.
- Color: amber.
- Glide Slope comparison monitor (GS label) is displayed while in GS CAP and below 2500 ft if there is a difference of 0.7 dot deviation between the PFDs indication. If the radio altitude output is invalid, the monitor will then be activated by GS CAP only.
- Localizer comparison monitor (LOC label) is displayed while in approach mode, below 2500 ft if there is a difference of 0.5 dot deviation between the PFDs indication. If the radio altitude output is invalid, the monitor will then be activated by GS CAP only.
- ILS comparison monitor display is annunciated when both GS and LOC comparison monitors are displayed simultaneously.

15 – AOA INDICATION

- Color: amber.
- Indicates loss of PLI indication due to an invalid Stall Protection Computer signal.

16 – OVERSPEED/UNDERSPEED WARNING DISPLAY

- Color: amber.
- Label: MAX SPD for overspeed condition.
  MIN SPD for underspeed condition.
- Activated by the Flight Director.
- Remains displayed as long as the condition exists.

17 – INDICATED AIRSPEED/MACH TARGET DISPLAY

- Color: digits are cyan and box is white.
- Ranges from 80 KIAS to V_{MO} with a resolution of 1 KIAS or from 0.2 Mach to M_{MO} with a resolution of 0.01 Mach.
- Displayed full time.
- Bug moves according to the indicated airspeed/Mach target value set.
- If the indicated airspeed/Mach value is not within the displayed range of the airspeed scale, the bug will stay at the respective end of the scale, half-visible and unfilled.

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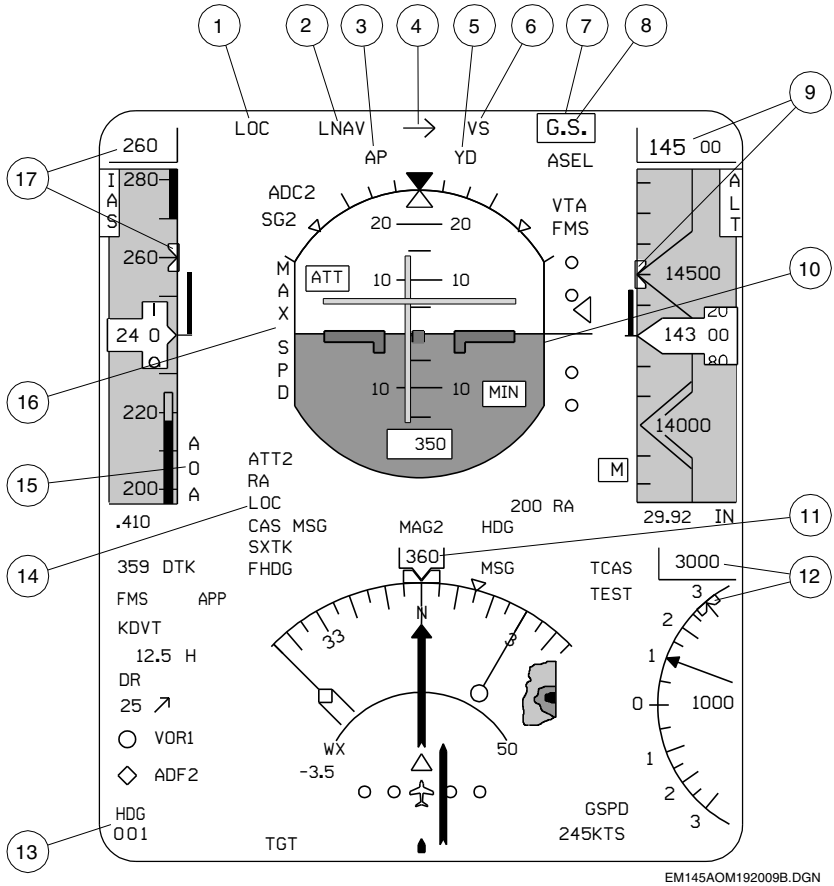

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PFD INDICATORS (CROSS-BAR FORMAT)

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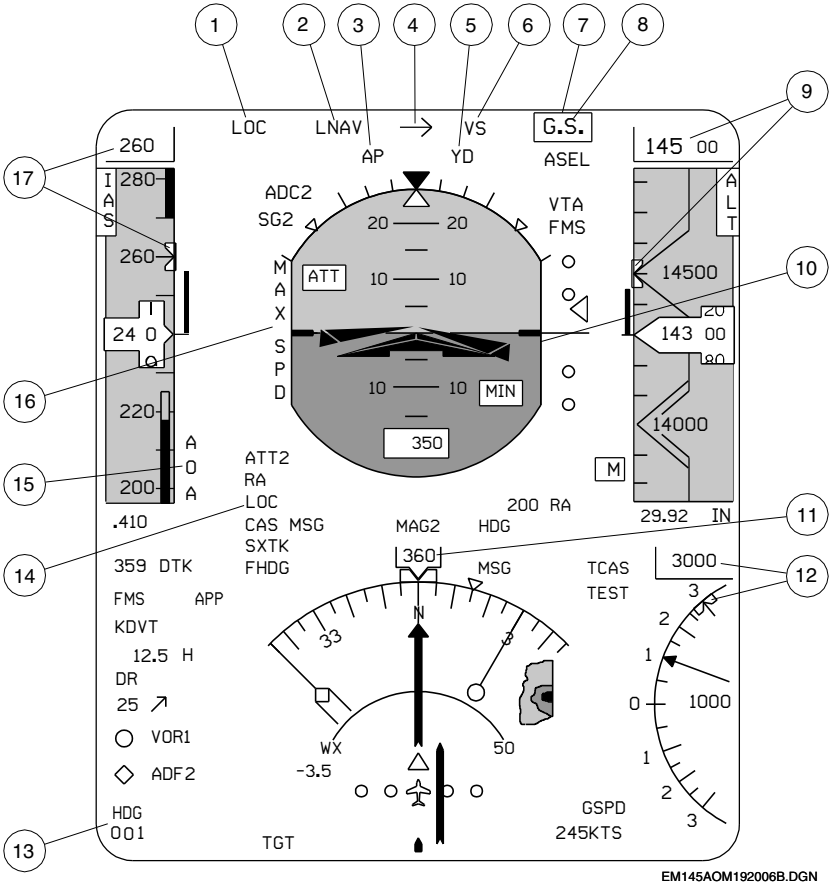

PFD INDICATORS (V-BAR FORMAT)

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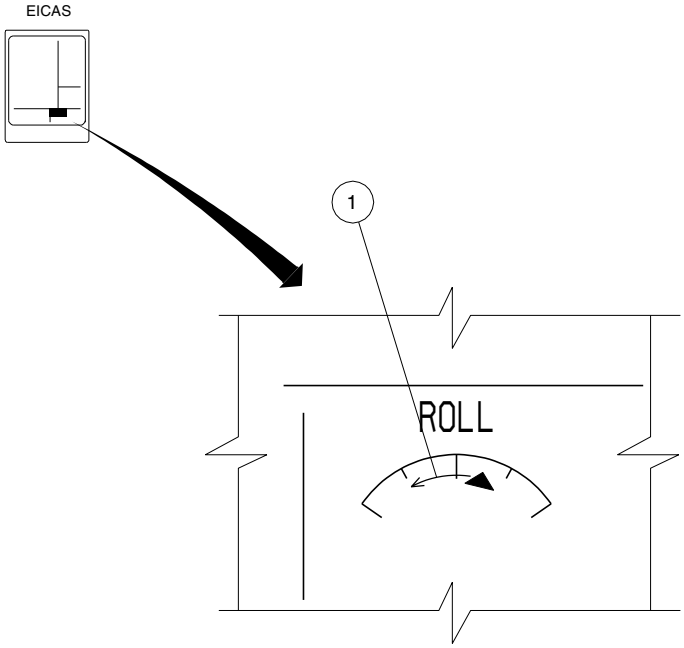
EICAS INDICATORS

1 – ROLL MISTRIM ANNUNCIATION

- Color: amber.
- Indicates that a roll mistrim exists, which may cause an abrupt roll command at the time the autopilot is disengaged.
- Direction of arrow indicates the side the roll trim must be commanded to eliminate the condition.
- It is displayed in conjunction with the AP AIL MISTRIM message on the EICAS.



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ROLL MISTRIM ANNUNCIATION

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CATEGORY II APPROACH (OPTIONAL)

The IC-600 may be optionally equipped with a Category II checklist logic warning which is automatically activated whenever the Decision Height is selected between 80 and 200 ft through the RA knob on the Display Control Panel.

CATEGORY II CONDITIONS

The required conditions to obtain a Cat II valid conditions are:

- Radio altitude between 2500 and 80 ft.
- Flaps 22°.
- NAV 1 on pilot's side and NAV 2 on copilot's side, both tuned to the same frequency.
- An active approach mode selected.
- Both Flight Directors operational (command bars visible).
- Attitude and heading valid on both PFDs.
- Glide slope and localizer deviation valid on both PFDs.
- No reversions (SG, IRS or ADC) modes selected on both PFDs.
- Valid airspeed and barometric altitude on both PFDs.
- No comparison monitors are tripped (attitude, heading, airspeed, barometric altitude, localizer, glide slope and radio altitude) on both PFDs.
- No back course selected.
- Autopilot engaged.
- Cat II Decision Height setting on both Display Control Panels (greater than 80 ft and less than 200 ft).

NOTE: CAT II approaches are allowed using either the Autopilot or Flight Director for guidance**.**

If all conditions are met, a green CAT 2 annunciation is displayed on the PFDs. If any of the required conditions for establishing CAT 2 goes invalid, the green CAT 2 will be replaced by flashing amber CAT 2 annunciation. It will flash for ten seconds and then go steady.

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LOCALIZER EXCESSIVE DEVIATION WARNING

The Localizer Excessive Deviation Warnings are active when CAT II is valid. It is triggered between 500 ft and 80 ft of Radio Altimeter height, when the ILS lateral deviation is greater than 1/3 dot. The pilots will be alerted by:

- The lateral deviation bar on the EHSI are changed from green to amber.
- The lateral deviation scale changing from white to amber and flashing with a duty cycle of 0.5 second on followed by a 0.5 second off.

NOTE: The on-side excessive deviation warning is also displayed when the cross-side system has detected an excessive deviation.

GLIDESLOPE EXCESSIVE DEVIATION WARNING

The Glideslope Excessive Deviation Warnings are active when CAT II is valid. It is triggered between 500 ft and 80 ft of Radio Altimeter height, when the ILS vertical deviation is greater than one dot or when the glideslope deviation warning is invalid for more than five seconds. The pilots will be alerted by:

- The GS pointer on the EADI changing from green to amber.
- The GS scale on the EADI changing from white to amber and flashing with a duty cycle of 0.5 second on followed by 0.5 second off.

NOTE: The on-side excessive deviation warning is also displayed when the cross-side system has detected an excessive deviation.

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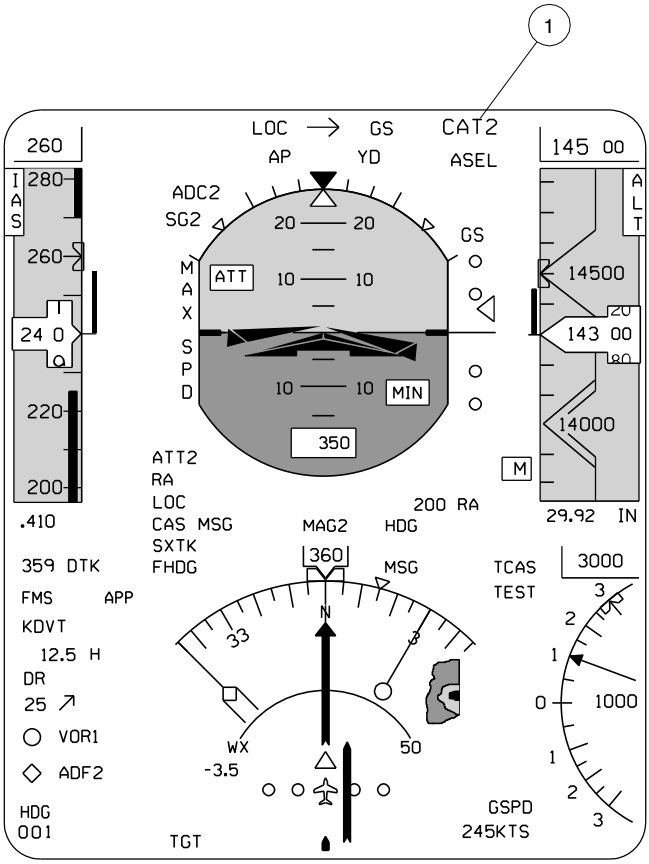
CONTROLS AND INDICATORS

PFD INDICATORS

1 - CAT 2 ANNUNCIATION

- Indicates the Cat II condition.
- Label: CAT 2.
- Color:
  - Normal condition: green.
  - Abnormal condition: amber.



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PFD INDICATORS

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