Crafted in Switzerland

PC-12 NGX

PILOT'S INFORMATION MANUAL
PC-12/47E MSN 2001 AND UP

PILATUS

PILOT'S INFORMATION MANUAL

WARNING

- This PC-12 Pilot's Information Manual is published for general and familiarization purposes only.
- This Pilot's Information Manual does NOT meet FAA, FOCA or any other civil aviation authority regulations for operation of ANY Aircraft.
- This Pilot's Information Manual is a reproduction of a PC-12 Airplane Flight Manual, however, it is NOT revised or updated.
- This Pilot's Information Manual does NOT reflect the configuration or operating parameters of any actual aircraft.
- Only the Approved Airplane Flight Manual/Pilot's Operating Handbook issued for a specific serial number aircraft may be used for actual operation of that serial number aircraft.

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PC-12

PILOT'S OPERATING HANDBOOK
AND
EASA APPROVED AIRPLANE FLIGHT MANUAL

PC-12/47E - MSN 1720, 2001 and up - Report number 02406

EASA Type Certification No.: EASA.A.089
FAA Type Certification No.: A78EU

Manufacturer's Serial Number: __________ Registration Number: __________

APPROVED IN THE NORMAL CATEGORY BASED ON FAR 23 THROUGH AMENDMENT 42.
THIS DOCUMENT MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.
THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER AND CONSTITUTES THE EASA APPROVED AIRPLANE FLIGHT MANUAL (AFM).

The AFM is EASA approved under Approval Number: 10071186.

The technical content of this document is approved under the authority of the DOA ref. EASA.21J.357.

This Handbook is also FAA approved for U.S. registered aircraft in accordance with FAR 21.29.

This Handbook meets General Aviation Manufacturer's Association (GAMA) Specification No. 1, Specification for Pilot's Operating Handbook, issued 15 February 1975, revised 1 September 1984.

Pilatus Aircraft Ltd, CH-6370 Stans, Switzerland

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Front Matter

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List of Effective Data Modules

All DMC are preceded with 12-C but for clarity this has been left out

C = Changed data module

N = New data module

	Data module code (DMC)	Document title	N/C	Issue date
	A15-00-0000-00A-002A-A	List of Effective Data Modules	C	24.04.2023
	A15-00-0000-00A-003A-A	Change Highlights	C	24.04.2023
	A15-00-0000-00A-003B-A	Log of Revisions	C	24.04.2023
	A15-00-0000-00A-002B-A	Log of Temporary Revisions		06.03.2020
	A00-00-0000-00A-930A-A	List of Service Bulletins		06.03.2020
	A15-00-0001-00A-030A-A	List of APEX Builds	C	29.03.2023
	A15-00-0010-00A-018A-A	Introduction		18.12.2020
	A15-00-0101-00A-010A-A	General		06.03.2020
	A15-00-0102-00A-018A-A	Introduction		06.03.2020
	A15-00-0103-00A-030A-A	Top Level Illustrations		06.03.2020
	A15-00-0104-00A-030A-A	Descriptive Data		06.03.2020
	A15-00-0105-00A-005A-A	Symbols, Abbreviations, and Terminology		06.03.2020
	A15-10-0201-00A-010A-A	General		06.03.2020
	A15-10-0202-00A-043A-A	Airspeed Limitations		06.03.2020
	A15-10-0203-00A-043A-A	Airspeed Indication Markings		06.03.2020
*	A15-10-0204-00A-043A-A	Power Plant Limitations	C	29.03.2023
*	A15-10-0205-00A-043A-A	Power Plant Window Markings	C	29.03.2023
*	A15-10-0206-00A-043A-A	Miscellaneous Instrument Markings		06.03.2020
*	A15-10-0207-00A-043A-A	Weight Limits		06.03.2020
*	A15-10-0208-00A-043A-A	Center of Gravity Limits		06.03.2020
*	A15-10-0209-00A-043A-A	Maneuver Limits		06.03.2020
*	A15-10-0210-00A-043A-A	Flight Load Factor Limits		06.03.2020
*	A15-10-0211-00A-043A-A	Flight Crew Limits		06.03.2020
*	A15-10-0212-00A-043A-A	Kinds of Operation		06.03.2020
*	A15-10-0213-00A-043A-A	Pneumatic Deicing Boot System		06.03.2020
*	A15-10-0214-00A-043A-A	Icing Limitations		06.03.2020
*	A15-10-0215-00A-043A-A	Kinds of Operation Equipment List		06.03.2020
*	A15-10-0216-00A-043A-A	Fuel Limitations		06.03.2020
*	A15-10-0217-00A-043A-A	Maximum Operating Altitude Limits		06.03.2020
*	A15-10-0218-00A-043A-A	Outside Air Temperature Limits		06.03.2020
*	A15-10-0219-00A-043A-A	Cabin Pressurization Limits		06.03.2020
*	A15-10-0220-00A-043A-A	Maximum Passenger Seating Limits		18.12.2020
*	A15-10-0221-00A-043A-A	Systems and Equipment Limits		18.12.2020
*	A15-10-0222-00A-043A-A	Other Limitations	C	29.03.2023
*	A15-10-0223-00A-067A-A	Placards	C	29.03.2023
*	A15-40-0301-00A-010A-A	General	C	29.03.2023
*	A15-40-0302-00A-043U-A	Airspeeds for Emergency Operations		06.03.2020

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Data module code (DMC)	Document title	N/C	Issue date
* A15-40-0303-00A-141U-A	Rejected Takeoff (Not engine related)		06.03.2020
* A15-40-0304-00A-141U-A	Engine Failure		18.12.2020
* A15-40-0305-00A-141U-A	Air Start		06.03.2020
* A15-40-0306-00A-141A-A	Engine Emergencies		06.03.2020
* A15-40-0307-00A-141X-A	Fire, Smoke or Fumes		06.03.2020
* A15-40-0308-00A-141U-A	Emergency Descent		06.03.2020
* A15-40-0309-00A-141U-A	Emergency Landing		06.03.2020
* A15-40-0310-00A-141A-A	Landing Gear System Failure		18.12.2020
* A15-40-0311-00A-141A-A	Flaps Failure		06.03.2020
* A15-40-0312-00A-141A-A	Stick Pusher Failure		06.03.2020
* A15-40-0313-00A-141U-A	Inadvertent Pusher/Shaker Operation		06.03.2020
* A15-40-0314-00A-141A-A	Electrical Trim	C	29.03.2023
* A15-40-0315-00A-141A-A	Electrical System Failures		06.03.2020
* A15-40-0316-00A-141A-A	Fuel System		06.03.2020
* A15-40-0317-00A-141A-A	Cabin Environment Failures		18.12.2020
* A15-40-0318-00A-141A-A	Deice Systems	C	29.03.2023
* A15-40-0319-00A-141A-A	Passenger and Cargo Door		06.03.2020
* A15-40-0320-00A-141U-A	Cracked Window in Flight		06.03.2020
* A15-40-0321-00A-141U-A	Wheel Brake Failure		06.03.2020
* A15-40-0322-00A-141A-A	APEX Failures		06.03.2020
* A15-48-0301-00A-010A-A	General		06.03.2020
* A15-48-0302-00A-014A-A	CAS Advisories		06.03.2020
* A15-48-0303-00A-141A-A	CAS Status	C	29.03.2023
* A15-48-0304-00A-014U-A	Primary Altimeter Diverge by 200 ft or More		06.03.2020
* A15-48-0305-00A-141U-A	Loss of Autopilot Altitude Hold Function in RVSM Airspace		06.03.2020
* A15-48-0306-00A-141U-A	Flight Training		06.03.2020
* A15-48-0307-00A-141U-A	Smartview		06.03.2020
* A15-48-0308-00A-141U-A	LPV/LP Approach (Optional)		06.03.2020
* A15-48-0309-00A-141A-A	Engine Dry Motoring		06.03.2020
* A15-30-0401-00A-010A-A	General		06.03.2020
* A15-30-0402-00A-043A-A	Airspeeds for Normal Operations		06.03.2020
* A15-30-0403-00A-131A-A	Preflight Inspection		06.03.2020
* A15-30-0404-00A-131A-A	Before Starting Engine		06.03.2020
* A15-30-0405-00A-131A-A	Engine Starting		06.03.2020
* A15-30-0406-00A-131A-A	Before Taxiing		06.03.2020
* A15-30-0407-00A-131A-A	Taxiing		06.03.2020
* A15-30-0408-00A-131A-A	Before Takeoff		29.10.2021
* A15-30-0409-00A-131A-A	Takeoff		29.10.2021
* A15-30-0410-00A-131A-A	Flight into Known Icing Conditions		18.12.2020
* A15-30-0411-00A-131A-A	Climb		06.03.2020
* A15-30-0412-00A-131A-A	Cruise		06.03.2020
* A15-30-0413-00A-131A-A	Descent		06.03.2020
* A15-30-0414-00A-131A-A	Before Landing		06.03.2020

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	Data module code (DMC)	Document title	N/C	Issue date
*	A15-30-0415-00A-131A-A	Balked Landing (Go-Around)		06.03.2020
*	A15-30-0416-00A-131A-A	Landing		06.03.2020
*	A15-30-0417-00A-131A-A	After Landing		06.03.2020
*	A15-30-0418-00A-131A-A	Shutdown		06.03.2020
*	A15-30-0419-00A-131A-A	Parking		06.03.2020
*	A15-30-0420-00A-131A-A	Oxygen System		06.03.2020
*	A15-30-0421-00A-131A-A	Noise Level		06.03.2020
*	A15-30-0422-00A-131A-A	Automatic Flight Control System Operation		06.03.2020
*	A15-30-0423-00A-131A-A	Crosswind Operation		06.03.2020
*	A15-30-0424-00A-131A-A	Flight in Icing Conditions		06.03.2020
*	A15-30-0425-00A-131A-A	Severe Icing Conditions		06.03.2020
*	A15-30-0426-00A-131A-A	CPCS Low Cabin Mode Operation		06.03.2020
*	A15-30-0427-00A-131A-A	SV Selection and Brightness Control		18.12.2020
*	A15-30-0428-00A-131A-A	LPV/LP Detailed Operating Procedures		06.03.2020
*	A15-60-0501-00A-030A-A	Standard Tables		06.03.2020
*	A15-60-0503-01A-030A-A	Performance Data - Stall Speeds		06.03.2020
*	A15-60-0503-02A-030A-A	Performance Data - Takeoff Performance		06.03.2020
*	A15-60-0503-03A-030A-A	Performance Data - Climb Performance		06.03.2020
*	A15-60-0503-04A-030A-A	Performance Data - Cruise Performance		06.03.2020
*	A15-60-0503-05A-030A-A	Performance Data - Specific Air Range		06.03.2020
*	A15-60-0503-06A-030A-A	Performance Data - Holding Time and Fuel		06.03.2020
*	A15-60-0503-07A-030A-A	Performance Data - Descend Performance		06.03.2020
*	A15-60-0503-08A-030A-A	Performance Data - Power-off Glide Performance		18.12.2020
*	A15-60-0503-09A-030A-A	Performance Data - Balked Landing Performance		06.03.2020
*	A15-60-0503-10A-030A-A	Performance Data - Landing Performance		06.03.2020
*	A15-60-0504-01A-030A-A	Flight in Icing Conditions - General		06.03.2020
*	A15-60-0504-02A-030A-A	Flight in Icing Conditions - Flaps		06.03.2020
*	A15-60-0504-03A-030A-A	Flight in Icing Conditions - Stall Speeds		06.03.2020
*	A15-60-0504-04A-030A-A	Flight in Icing Conditions - Engine Torque		06.03.2020
*	A15-60-0504-05A-030A-A	Flight in Icing Conditions - Takeoff Performance		18.12.2020
*	A15-60-0504-06A-030A-A	Flight in Icing Conditions - Accelerate-Stop Performance		06.03.2020

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Data module code (DMC)	Document title	N/C	Issue date
* A15-60-0504-07A-030A-A	Flight in Icing Conditions - Maximum Rate of Climb		06.03.2020
* A15-60-0504-08A-030A-A	Flight in Icing Conditions - Holding Endurance		06.03.2020
* A15-60-0504-09A-030A-A	Flight in Icing Conditions - Balked Rate of Climb		06.03.2020
* A15-60-0504-10A-030A-A	Flight in Icing Conditions - Landing Performance		06.03.2020
* A15-60-0505-00A-043A-A	Flight Planning Example		06.03.2020
* A15-30-0601-00A-010A-A	General		06.03.2020
* A15-30-0602-00A-169A-A	Preparations for Airplane Weighing		06.03.2020
* A15-30-0603-00A-169A-A	Airplane Weighing with Load Plates		06.03.2020
* A15-30-0604-00A-169A-A	Airplane Weighing with Jacks and Load Cells		29.10.2021
* A15-30-0605-00A-169A-A	Weight and Balance Determination for Flight		06.03.2020
* A15-30-0606-00A-169A-A	Weight and Balance Records		06.03.2020
* A15-30-0607-00A-169A-A	General Loading Recommendations		06.03.2020
* A15-30-0608-00A-169A-A	Interior Configurations		29.10.2021
A15-00-0701-00A-010A-A	General		06.03.2020
A15-00-0702-00A-043A-A	Airframe		06.03.2020
A15-00-0703-00A-043A-A	Flight Controls	C	29.03.2023
A15-00-0704-00A-043A-A	Landing Gear	C	29.03.2023
A15-00-0705-00A-043A-A	Baggage Compartment		06.03.2020
A15-00-0706-00A-043A-A	Cargo Tie-Downs		06.03.2020
A15-00-0707-00A-043A-A	Seats / Restraint Systems		29.10.2021
A15-00-0708-00A-043A-A	Doors, Windows and Exits		06.03.2020
A15-00-0709-00A-043A-A	Control Locks		06.03.2020
A15-00-0710-00A-043A-A	Engine	C	29.03.2023
A15-00-0711-00A-043A-A	Propeller	C	29.03.2023
A15-00-0712-00A-043A-A	Fuel	C	29.03.2023
A15-00-0713-00A-043A-A	Electrical		18.12.2020
A15-00-0714-00A-043A-A	Lighting	C	29.03.2023
A15-00-0715-00A-043A-A	Environmental Control System	C	29.03.2023
A15-00-0716-00A-043A-A	Foot Warmer System (Optional)		06.03.2020
A15-00-0717-00A-043A-A	Cabin Pressure Control System		06.03.2020
A15-00-0718-00A-043A-A	Oxygen System		06.03.2020
A15-00-0719-00A-043A-A	Cockpit Arrangement		06.03.2020
A15-00-0720-00A-043A-A	Pitot Static Systems		06.03.2020
A15-00-0721-00A-043A-A	Stall Warning / Stick Pusher System		29.10.2021
A15-00-0722-00A-043A-A	Airfoil De-ice System		06.03.2020
A15-00-0723-00A-043A-A	Comfort Features		06.03.2020
A15-00-0724-00A-043A-A	Cabin Features		29.10.2021
A15-00-0725-00A-043A-A	Emergency Locator Transmitter		06.03.2020

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Data module code (DMC)	Document title	N/C	Issue date
A15-00-0726-00A-010A-A	Primus APEX - Avionics Installation General		06.03.2020
A15-00-0727-00A-043A-A	Primus APEX		06.03.2020
A15-00-0728-00A-043A-A	Primus APEX - Attitude and Heading		06.03.2020
A15-00-0729-00A-043A-A	Primus APEX - Communication and Navigation		06.03.2020
A15-00-0730-00A-043A-A	Primus APEX - Situation Awareness		18.12.2020
A15-00-0731-00A-043A-A	Primus APEX - Monitor Warning System (MWS)	C	29.03.2023
A15-00-0732-00A-043A-A	Primus APEX - Automatic Flight Control System		06.03.2020
A15-00-0733-00A-043A-A	Primus APEX - Flight Management System	C	29.03.2023
A15-00-0734-00A-043A-A	Primus APEX - Aircraft Condition Monitoring System (ACMS)		06.03.2020
A15-00-0735-00A-043A-A	Primus APEX - Aircraft Diagnostic and Maintenance System (ADMS)		06.03.2020
A15-00-0736-00A-043A-A	Primus APEX - Optional Electronic Charts		06.03.2020
A15-00-0737-00A-043A-A	Primus APEX - Optional Electronic Checklist		06.03.2020
A15-00-0738-00A-043A-A	Primus APEX - Coupled VNAV Approach		18.12.2020
A15-00-0739-00A-043A-A	Primus APEX - Optional LPV/LP Approach		06.03.2020
A15-00-0740-00A-043A-A	Lightweight Data Recorder (If Installed)	C	29.03.2023
A15-20-0801-00A-010A-A	General		06.03.2020
A15-20-0802-00A-043A-A	Ground Handling		06.03.2020
A15-20-0803-00A-173A-A	Mooring		06.03.2020
A15-20-0804-00A-172A-A	Jacking		06.03.2020
A15-20-0805-00A-043A-A	Passenger Seat Removal and Installation		06.03.2020
A15-20-0806-00A-200A-A	Servicing	C	29.03.2023
A15-20-0807-00A-200A-A	Cleaning and Care	C	29.03.2023
A15-20-0808-00A-800A-A	Extended Storage	C	29.03.2023
A15-20-0809-00A-280A-A	Corrosion Inspection		29.10.2021
A15-20-0810-00A-043A-A	Geographical Location and Environment		06.03.2020
A15-00-0901-00A-010A-A	General	C	29.03.2023
A15-20-1001-00A-010A-A	General		06.03.2020
A15-20-1002-00A-043A-A	Safety Tips		06.03.2020
A15-20-1003-00A-043A-A	Operational Tips		06.03.2020
A15-20-1004-00A-043A-A	Flammable Materials, Pressure Vessels and Equipment Locations		06.03.2020

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Data module code (DMC)	Document title	N/C	Issue date
A15-20-1005-00A-043A-A	Removal of Snow, Ice and Frost from the Aircraft		06.03.2020
A15-20-1006-00A-043A-A	Operations from Prepared Unpaved Surfaces		06.03.2020
A15-20-1007-00A-043A-A	Passenger Briefings		06.03.2020

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Change Highlights

This change highlights section shows all changes to PC-12 Pilot's Operating Handbook (POH) (No.02406), Issue 003 Revision 03, Dated 24 April 2023.

All DMC are preceded with 12-C but for clarity this has been left out

C = Changed data module. Replace the data module in the relevant section of the POH.

N = New data module. Insert this data module in the relevant section of the POH.

	Data module code Document title	Type	Reason for Update (RFU)
	A15-00-0000-00A-002A-A List of Effective Data Modules	C	24505 - Updated for Issue 003 Revision 03.
	A15-00-0000-00A-003A-A Change Highlights	C	24505 - Updated for Issue 003 Revision 03.
	A15-00-0000-00A-003B-A Log of Revisions	C	24505 - Updated for Issue 003 Revision 03. Note: TR 09 is cancelled. Record TR 09 as "not issued" in the Log of Temporary Revisions.
	A15-00-0001-00A-030A-A List of APEX Builds	C	24505 - Incorporated TR 18. Remove and destroy TR 18 and record the removal in the Log of Temporary Revisions. 24505 - Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
*	A15-10-0204-00A-043A-A Power Plant Limitations	C	24505 - Incorporated TR 15. Remove and destroy TR 15 and record the removal in the Log of Temporary Revisions. 23634 - Updated table 2-4-1.
*	A15-10-0205-00A-043A-A Power Plant Window Markings	C	23634 - Updated table 2-5-1.
*	A15-10-0222-00A-043A-A Other Limitations	C	24505 - Incorporated TR 21. Note: TR 21 was not issued, record the incorporation in the Log of Temporary Revisions.
*	A15-10-0223-00A-067A-A Placards	C	24505 - Incorporated TR 14. Remove and destroy TR 14 and record the removal in the Log of Temporary Revisions. 24505 - Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions. 24922 - Corrected location of exit placard in the cabin for the emergency exit.
*	A15-40-0301-00A-010A-A General	C	24505 - Incorporated TR 20. Note: TR 20 was not issued, record the incorporation in the Log of Temporary Revisions.
*	A15-40-0314-00A-141A-A Electrical Trim	C	24505 - Incorporated TR 22. Remove and destroy TR 22 and record the removal in the Log of Temporary Revisions.

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12-C-A15-00-0000-00A-003A-A

Data module code Document title	Type	Reason for Update (RFU)
* A15-40-0318-00A-141A-A Deice Systems	C	23514 - Propeller De Ice (3-18-01) - Updated waiting period from 5 to 20 seconds. 24230 - De Ice Boots (3-18-02) - Corrected BOOTS DE-ICE CB location to RH2.
* A15-48-0303-00A-141A-A CAS Status	C	24505 - Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
A15-00-0703-00A-043A-A Flight Controls	C	24505 - Incorporated TR 22. Remove and destroy TR 22 and record the removal in the Log of Temporary Revisions.
A15-00-0704-00A-043A-A Landing Gear	C	24505 - Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
A15-00-0710-00A-043A-A Engine	C	23392 - Updated caution.
A15-00-0711-00A-043A-A Propeller	C	23514 - Updated Indication/Warning description. 24505 - Incorporated TR 15. Remove and destroy TR 15 and record the removal in the Log of Temporary Revisions.
A15-00-0712-00A-043A-A Fuel	C	23353 - Updated fuel gauging tolerances. 23520 - Updated fuel balancing and fuel booster pump operation description.
A15-00-0714-00A-043A-A Lighting	C	24505 - Incorporated TR 17. Remove and destroy TR 17 and record the removal in the Log of Temporary Revisions.
A15-00-0715-00A-043A-A Environmental Control System	C	23973 - Updated ACS auto off to Ng below 58%.
A15-00-0731-00A-043A-A Primus APEX - Monitor Warning System (MWS)	C	24505 - Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
A15-00-0733-00A-043A-A Primus APEX - Flight Management System	C	24505 - Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
A15-00-0740-00A-043A-A Lightweight Data Recorder (If Installed)	C	24505 - Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
A15-20-0806-00A-200A-A Servicing	C	23415 - Added reference to AMM fuel contamination check procedure. 23777 - Updated oil servicing procedure.
A15-20-0807-00A-200A-A Cleaning and Care	C	24152 - Updated the Brake Care information with the brake lining procedure for new brake discs.
A15-20-0808-00A-800A-A Extended Storage	C	23415 - Added fuel contamination check and biocide treatment to stage 3 and 4 storage. 24505 - Updated fuel contamination check and removed notes introduced with task 23415.

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Data module code Document title	Type	Reason for Update (RFU)
A15-00-0901-00A-010A-A General	C	24505 - Updated list of AFMS.

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Log of Revisions

1 Issue 002 - Revision 00 - Dated: 14 October 2019

Re-issue of the PC-12/47E Pilot's Operating Handbook to include technical changes and conversion of the manual to a new layout.

The Issue 002 Revision 00 of the AFM ref. 02406 is approved under EASA approval number 10071186.

Approval date: 11.10.2019

Table 1-3-1: Issue 002 - Revision 00 - List of changes

Section	PTS Number	Description of Change
All	19595	PC-12 Pilot's Operating Manual Issue 002 Revision 00.

2 Issue 003 - Revision 00 - Dated: 06 March 2020

Re-issue of the PC-12/47E Pilot's Operating Handbook to include technical changes for Entry-Into-Service.

The Issue 003 Revision 00 of the AFM ref. 02406 is approved under the authority of DOA ref. EASA.21J.357.

Approval date: 06.03.2020

Table 1-3-2: Issue 003 - Revision 00 - List of changes

Section	PTS Number	Description of Change
All	20936	PC-12 Pilot's Operating Manual Issue 003 Revision 00. TR 01 thru 06 are integrated in this Issue 003 Revision 00.

3 Issue 003 - Revision 01 - Dated: 18 December 2020

Revision of the PC-12/47E Pilot's Operating Handbook.

The Issue 003 Revision 01 of the AFM ref. 02406 is approved under the authority of DOA ref. EASA.21J.357.

Approval date: 18.12.2020

Table 1-3-3: Issue 003 - Revision 01 - List of changes

Section	PTS Number	Description of Change
List of Applicable Data Modules	21999	Updated for Issue 003 Revision 01.
Change Highlights	21999	Updated for Issue 003 Revision 01.
Log of Revisions	21999	Updated for Issue 003 Revision 01.

Table 1-3-3: Issue 003 - Revision 01 - List of changes (continued from previous page)

Section	PTS Number	Description of Change
List of APEX Builds	21999	Incorporated TR-11. Remove and destroy TR 11 and record the removal in the Log of Temporary Revisions.
Section 0		
0	21766	Added new para “Supplements”.
Section 2		
2-4	21999	Incorporated TR 08. Remove and destroy TR 08 and record the removal in the Log of Temporary Revisions.
2-20	21999	Incorporated TR 07. Remove and destroy TR 07 and record the removal in the Log of Temporary Revisions.
2-21	21357	Added “Primus Apex - TCAS II” limitation.
2-22	21709	Updated front (passenger) and back (cargo) door terminology (editorial).
2-23	21999	Incorporated TR 07. Remove and destroy TR 07 and record the removal in the Log of Temporary Revisions.
Section 3		
3-4	21184	Added “not below DSB (1.3 V_S)” for final approach speed.
3-10	21514	Updated location of LDG CTL SEC circuit breaker.
3-17	21298	Updated "ACS Low Inflow" procedure.
	21495	Updated ECS CB location to $_L$E2.
Section 4		
4-10	21514	Updated Note (editorial).
4-27	21514	Changed "SYS BRT" to "SVS BRT" (editorial).
Section 5		
5-3-8	21514	21514 - Power-off Glide Distance graph X-axis updated (editorial).
5-4-5	21777	Added Note.
Section 6		
6-8	21999	Incorporated TR 07. Remove and destroy TR 07 and record the removal in the Log of Temporary Revisions.
Section 7		
7-10	22164	Added caution.
7-12	21631	Updated “Fuel Filter Replace” description.
7-13	21514	"PGDS Emergency Operation Condition" figures updated (removed Hydr Pwr from figures).
7-30	21357	Updated “TCAS II Operation” description.
7-38	21514	Updated "VNAV - Example Indications" figure (editorial).
Section 8		
8-6	21514	Updated oil replenishment information.

4 Issue 003 - Revision 02 - Dated: 29 October 2021

Revision of the PC-12/47E Pilot's Operating Handbook.

The technical content of this document is approved under the authority of the DOA ref. EASA.21J.357.

Approval date: 29.10.2021

Table 1-3-4: Issue 003 - Revision 02 - List of changes

Section	PTS Number	Description of Change
List of Effective Data Modules	23225	Updated for Issue 003 Revision 02.
Change Highlights	23225	Updated for Issue 003 Revision 02.
Log of Revisions	23225	Updated for Issue 003 Revision 02.
List of APEX Builds	23225	Incorporated TR 12. Remove and destroy TR 12 and record the removal in the Log of Temporary Revisions.
Section 2		
2-4	22908	Removed altitude limit of engine inlet for engine operation.
	23225	Incorporated TR 10. Remove and destroy TR 10 and record the removal in the Log of Temporary Revisions.
2-23	22187	Updated location of cabin pressurization placards to state "Below the RH Primary Flight Display".
Section 4		
4-8	23221	Changed "Takeoff power setting" to "Target takeoff torque".
4-9	23221	Changed "MONITOR: Torque" to "MONITOR: Torque (reaching the target)".
Section 6		
6-4	22046	Editorial - Corrected typo.
	22935	Editorial - Corrected figure reference to paragraph reference.
6-8	22242	Added caution to STD-9S, EX-6S-STD-2S and EX-4S-STD-4S configurations.
Section 7		
7-7	22242	Added caution.
7-10	23221	Updated engine indications, cautions and warnings. Updated position of torque bug, fuel flow, and added note to Figure 7-10-3.
7-21	23146	Updated pusher interrupt switch operating description.
7-24	22778	Added short description on location of optional second fire extinguisher located in the cabin.
Section 8		

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Table 1-3-4: Issue 003 - Revision 02 - List of changes (continued from previous page)

Section	PTS Number	Description of Change
8-6	22618	Updated Fuel Anti-Icing Additive information.
8-7	23043	Updated recording of deice boots treatment to include "any other maintenance recording system".
	23225	Incorporated TR 13. Remove and destroy TR 13 and record the removal in the Log of Temporary Revisions.
8-9	23225	Incorporated TR 13. Remove and destroy TR 13 and record the removal in the Log of Temporary Revisions.

5 Issue 003 - Revision 03 - Dated: 24 April 2023

Revision of the PC-12/47E Pilot's Operating Handbook.

The technical content of this document is approved under the authority of the DOA ref. EASA.21J.357.

Approval date: 24.04.2023

Table 1-3-5: Issue 003 - Revision 03 - List of changes

Section	PTS Number	Description of Change
List of Effective Data Modules	24505	Updated for Issue 003 Revision 03.
Change Highlights	24505	Updated for Issue 003 Revision 03.
Log of Revisions	24505	Updated for Issue 003 Revision 03.
List of APEX Builds	24505	Incorporated TR 18. Remove and destroy TR 18 and record the removal in the Log of Temporary Revisions. Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
Section 2		
2-4	24505	Incorporated TR 15. Remove and destroy TR 15 and record the removal in the Log of Temporary Revisions.
	23634	Updated table 2-4-1.
2-5	23634	Updated table 2-5-1.
2-22	24505	Incorporated TR 21. Note: TR 21 was not issued, record the incorporation in the Log of Temporary Revisions.
2-23	24505	Incorporated TR 14. Remove and destroy TR 14 and record the removal in the Log of Temporary Revisions. Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.

Table 1-3-5: Issue 003 - Revision 03 - List of changes (continued from previous page)

Section	PTS Number	Description of Change
	24922	Corrected location of exit placard in the cabin for the emergency exit.
Section 3		
3-1	24505	Incorporated TR 20. Note: TR 20 was not issued, record the incorporation in the Log of Temporary Revisions.
3-14	24505	Incorporated TR 22. Remove and destroy TR 22 and record the removal in the Log of Temporary Revisions.
3-18	23514	Propeller De Ice (3-18-01) - Updated waiting period from 5 to 20 seconds.
	24230	De Ice Boots (3-18-02) - Corrected BOOTS DE-ICE CB location to RH2.
Section 3A		
3A-3-1	24505	Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
Section 7		
7-3	24505	Incorporated TR 22. Remove and destroy TR 22 and record the removal in the Log of Temporary Revisions.
7-4	24505	Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
7-10	23392	Updated caution.
7-11	23514	Updated Indication/Warning description.
	24505	Incorporated TR 15. Remove and destroy TR 15 and record the removal in the Log of Temporary Revisions.
7-12	23353	Updated fuel gauging tolerances.
	23520	Updated fuel balancing and fuel booster pump operation description.
7-14	23842	Incorporated TR 17. Remove and destroy TR 17 and record the removal in the Log of Temporary Revisions.
7-15	23973	Updated ACS auto off to Ng below 58%.
7-31	24505	Incorporated TR 16. Remove and destroy TR 16 and record the removal in the Log of Temporary Revisions.
7-33	24505	Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
7-40	24505	Incorporated TR 23. Remove and destroy TR 23 and record the removal in the Log of Temporary Revisions.
Section 8		

Table 1-3-5: Issue 003 - Revision 03 - List of changes (continued from previous page)

Section	PTS Number	Description of Change
8-6	23415	Added reference to AMM fuel contamination check procedure.
	23777	Updated oil servicing procedure.
8-7	24152	Updated the Brake Care information with the brake lining procedure for new brake discs.
8-8	23415	Added fuel contamination check and biocide treatment to stage 3 and 4 storage.
	24505	Updated fuel contamination check and removed notes introduced with task 23415.
Section 9		
9-1	24505	Updated list of AFMS.

Note

TR 09 is cancelled. Record TR 09 as “not issued” in the Log of Temporary Revisions.

Log of Temporary Revisions

No.	Temporary Revision Title	Date of Issue	Cancelled by
01	Fuel Anti-Icing Additive	28 Nov 2019	Issue 003 Revision 00
02	APEX Builds	10 Dec 2019	Issue 003 Revision 00
03	EX-6S-2 Placards	10 Dec 2019	Issue 003 Revision 00
04	Emergency Gear Extension	06 Dec 2019	Issue 003 Revision 00
05	EPECS Update	14 Feb 2020	Issue 003 Revision 00
06	Feather Inhibit (option)	10 Feb 2020	Issue 003 Revision 00
07	No Cabin Interior (Option)	18 May 2020	Issue 003 Revision 01
08	Approved Fuels	15 Sep 2020	Issue 003 Revision 01
09	Not issued	Not issued	Not issued
10	Approved Fuels	23 Mar 2021	Issue 003 Revision 02
11	APEX Builds	27 Oct 2020	Issue 003 Revision 01
12	APEX Builds	19 May 2021	Issue 003 Revision 02
13	APEX Builds	07 Jul 2021	Issue 003 Revision 02
14	Emergency Exit Markings	22 Nov 2021	Issue 003 Revision 03
15	Propeller Pitch in Flight	14 Dec 2021	Issue 003 Revision 03
16	APEX Build 12.7	16 May 2022	Issue 003 Revision 03
17	Cabin Flood Lights	31 May 2022	Issue 003 Revision 03
18	APEX Builds	31 May 2022	Issue 003 Revision 03
19	Approved Fuels	20 Sep 2022	
20	Not issued	Not issued	Not issued
21	Not issued	Not issued	Not issued
22	Trim Runaway	22 Dec 2022	Issue 003 Revision 03
23	APEX Build 12.7.1	21 Mar 2023	Issue 003 Revision 03

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No.	Temporary Revision Title	Date of Issue	Cancelled by

List of Service Bulletins

This list of Service Bulletins provides the owner a means of recording the applicable SBs that are mentioned in the various Sections of the POH.
It is not a complete list of SBs. The purpose is to show the modification status of the aircraft to assist the pilot in the correct understanding of the procedures and the system description.

SB No.	SB Title

SB No.	SB Title

SB No.	SB Title

SB No.	SB Title

List of APEX Builds

An overview of the various APEX builds, the corresponding Honeywell part number and the associated Electronic Checklist (ECL) version is given in the table below.

APEX Build	Honeywell part number	ECL version number	ECL software version
Build 12.6.1	EB60003299-0116	1212-01	PC1200102.ecl
Build 12.6.1	EB60003299-0116	1212-02 (MSN 1720, 2001-2100 pre SB 45-024)	PC1200103.ecl (MSN 1720, 2001-2100 pre SB 45-024)
Build 12.6.1	EB60003299-0116	1212-03 (MSN 1720, 2001-2100 post SB 45-024 and MSN 2101 and up)	PC1200104.ecl (MSN 1720, 2001-2100 post SB 45-024 and MSN 2101 and up)
Build 12.6.1	EB60003299-0116	1212-04 (MSN 2001 - 2210 post SB 45-028 and MSN 2211 and up)	PC1200105.ecl
Build 12.7.1	EB60003299-0119	1212-04	PC1200105.ecl

APEX Build	Honeywell part number	ECL version number	ECL software version

SECTION 0

Introduction

Table of Contents

Subject **Page**

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Introduction

1 General

This Pilot's Operating Handbook (POH) is designed to provide the information required for the operation of the airplane. Each airplane is delivered with a POH that reflects the standard airplane with all of the approved options plus any special equipment installed on an individual basis.

2 Warnings, Cautions, and Notes

The following definitions apply to the warnings, cautions, and notes as used in this manual:

WARNING

ANY OPERATING PROCEDURE, PRACTICE, OR CONDITION WHICH, IF NOT STRICTLY COMPLIED WITH, MAY RESULT IN PERSONAL INJURY OR LOSS OF LIFE.

CAUTION

Any operating procedure, practice, or condition which, if not strictly complied with, may result in damage to the airplane or equipment.

Note

Any operating procedure, practice, or condition that requires emphasis.

3 Data Modules

To facilitate the most accurate and effective distribution of the latest information contained in this POH, Pilatus Aircraft Ltd. publishes the content of the POH from a collection of electronically stored publication components called Data Modules (DM). DMs contain various amounts of information depending on the subject they address. However, when any of the content inside a DM changes, the entire DM is up-issued and distributed as the sum total of, or as a portion of a POH revision.

Each DM is identified by a unique 22 character, hyphen de-limited Data Module Code (DMC). When a DM is published in printed form, each page is marked with the DMC oriented vertically along the outer margin of the bottom of each page.

4 Revision Markings

Additions, technical changes and revisions to existing POH material will be identified by a vertical revision bar (black line) in the outside margin of the applicable page, next to the change.

The revision bar will only indicate the current change on each page. Physical relocation of material or the correction of typographical or grammatical errors, outside of the material revised, will not be identified by a revision bar.

5 Revision / Issue Dates

At the title page, there will be the original issue date of the POH. At the bottom of each page, opposite the page number, there will be the issue date of the Data Module (DM).

6 Revision Procedure

To keep this POH current, revisions will be issued to the latest registered owner of airplane. Revisions to this POH will consist of:

- List of Applicable Data Modules (LOADM)
- Change Highlights
- Log of Revisions
- New or Revised DMs
- Temporary Revisions.

The Equipment List is not included in the Revision Procedure. The Equipment List is a separate report and was current at the time of license at the manufacturer and must be maintained by the airplane owner.

6.1 List of Applicable Data Modules

The List of Applicable Data Modules (LOADM) shows the revision number and date. All current POH DMs will be listed with the applicable issue date along with instructions which DM needs to be inserted in (new DM), replaced (changed DM) or deleted from the POH with the applicable revision.

6.2 Change Highlights

The Change Highlights provides a dedicated overview of the changed, added and/or removed DMs with each revision.

6.3 Log of Revisions

The Log of Revisions provides a brief description of each change that is introduced with a revision.

Note
The 5-digit Publication Task Sheet (PTS) number in the change column is for Pilatus internal use only.

6.4 New or Revised Data Modules

In accordance with the instructions of the LOADM, new or revised DMs must be incorporated into the POH and superseded DMs destroyed.

CAUTION

It is the responsibility of the owner or operator to maintain this Pilot's Operating Handbook in a current status and incorporate successive revisions.

6.6 Temporary Revisions

Temporary Revisions are issued when the POH must be revised between the regular formal revisions. They are issued on yellow paper and must be recorded on the Log of Temporary Revisions. Temporary Revisions should normally be put at the front of the POH, apart from Section 9 Temporary Revisions which should be put in front of the applicable Supplement. Temporary Revisions must only be removed from the POH when instructed to do so by the Change Highlights of the next issue of a formal revision, when superseded by another temporary revision and sometimes by the incorporation of a Service Bulletin. The Log of Temporary Revisions must be kept up to date by the owner or operator of the aircraft.

7 Supplements

Information required to operate the airplane when equipped with specific functions is given in Supplements. A Supplement supersedes or substitutes the basic information given in the POH in the areas listed, with all else functioning as per the POH. A Supplement is identified by its own report number. A list of available Supplements at the release date of the POH is given in Section 9 of the POH. All applicable Supplements are to be inserted in this Section 9 of the POH. Section 1 of the Supplement contains a list of POH to which the Supplement is applicable.

8 Copyright and Legal Statement

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SECTION 1

General

Table of Contents

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1-1 General

This section contains basic data and information of general interest to the pilot. It also contains definitions and explanations of symbols, abbreviations, and terminology that is used throughout this POH.

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1-2 Introduction

This POH includes the material required to be furnished by the Federal Aviation Regulations and additional information provided by the manufacturer and constitutes the:

- EASA Approved Airplane Flight Manual
- FAA Approved Airplane Flight Manual for operation in the U.S. in accordance with FAR 21.29.

This POH must be read, and thoroughly understood, by the owner and operator in order to achieve maximum utilization as an operating guide for the pilot.

This POH is divided into numbered sections which are separated by tabs. Section 3, Emergency Procedures, is further highlighted by the use of a red tab to facilitate quick recognition.

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1-3 Top Level Illustrations

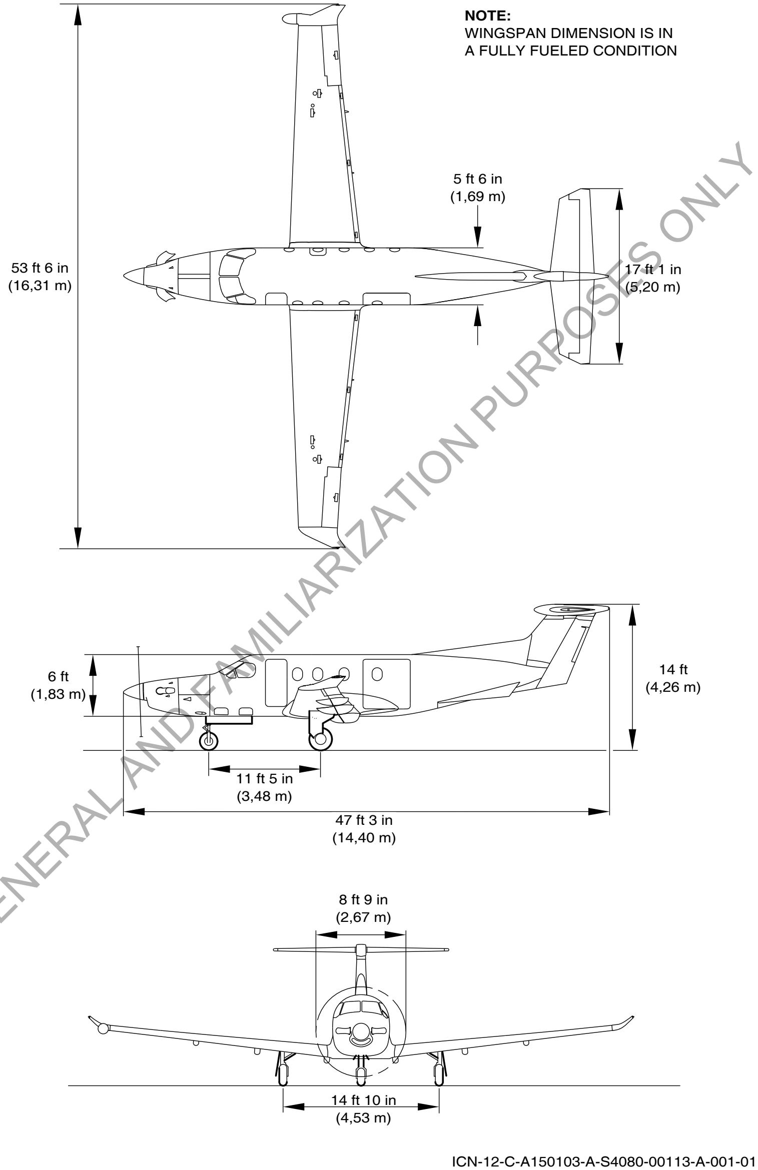

Figure 1-3-1: Airplane - Three-view Diagram and Dimensions

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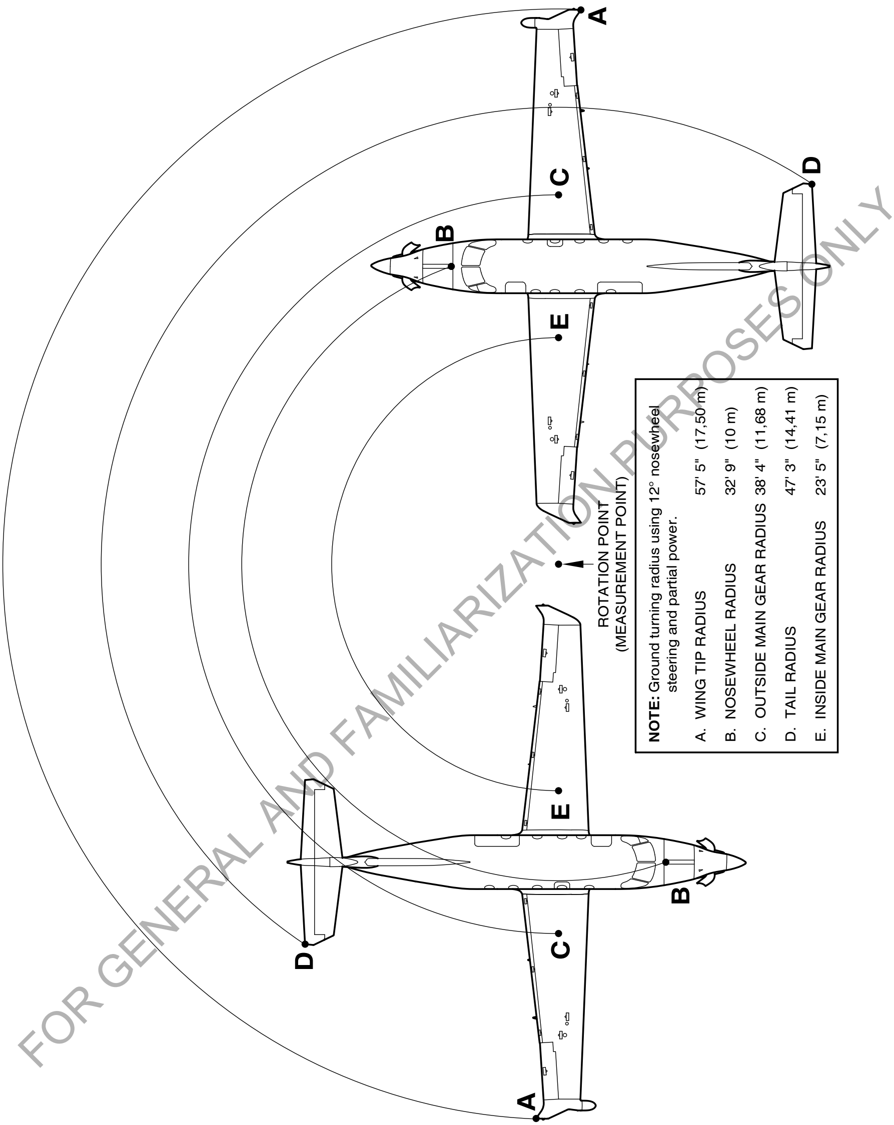

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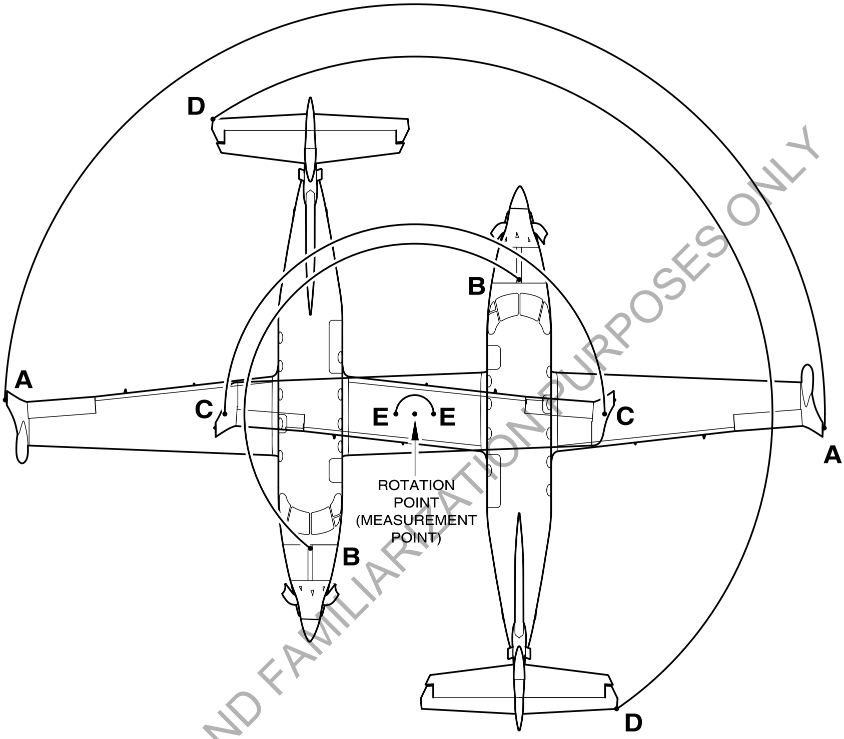
Figure 1-3-2: Airplane - Ground Turning Clearance - NWS only (No Braking)



NOTE: Ground turning radius using nosewheel steering, inside brake and partial power.

A.	WING TIP RADIUS	35' 7"	10,864 m
B.	NOSEWHEEL RADIUS	14' 10"	4,513 m
C.	OUTSIDE MAIN GEAR RADIUS	16' 6"	5,03 m
D.	TAIL RADIUS	31' 1"	9,475 m
E.	INSIDE MAIN GEAR RADIUS	19.5"	0,5 m

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Figure 1-3-3: Airplane - Ground Turning Clearance - NWS and Braking

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1-4 Descriptive Data

1-4-1 Engine

Number of Engines	1
Engine Manufacturer	Pratt & Whitney Canada
Engine Model Number	PT6E-67XP
Engine Type	This airplane incorporates a twin shaft turboprop engine with 4 axial and 1 centrifugal compressor stages, an annular combustion chamber, and a 3 stage turbine where one stage drives the compressor and two stages power the propeller.
Horsepower Rating and Engine Speed:	
Takeoff Power	1,200 shp
Maximum Climb/Cruise Power	1,200 shp
Compressor Turbine (N_g) Speed (104%)	38,967 rpm
Propeller Speed (N_p)	1,700 rpm
Prop Low Speed Mode (optional)	1,550 rpm

1-4-2 5-Bladed Propeller

Number of Propellers	1
Propeller Manufacturer	Hartzell
Propeller Model Number	HC-E5A-31A/NC10245B
Number of Blades	5
Propeller Diameter	105" (2.67 m)
Propeller Type	The propeller assembly consists of a hub unit and five composite blades, and is a hydraulically actuated, constant speed, full feathering and reversible type.

1-4-3 Fuel

Approved Fuels

Any fuel which complies with Section 2, Limitations, Power Plant Limitations, of this POH.

Total Capacity

- 406.8 US gal, 2,736.5 lb (1,540 liters, 1,241.3 kg).

Usable Fuel

- 402 US gal, 2,703.6 lb (1,521.5 liters, 1,226.4 kg).

Anti-Icing Additive

If anti-icing additive is to be used, then use anti-icing additives in compliance with Section 2, Limitations, Power Plant Limitations, of this POH.

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1-4-4 Oil

Oil Grade or Specification

- Any oil specified in Section 2, Limitations, Power Plant Limitations, of this POH.

Oil Quantity

- Total Oil Capacity 3.6 US gal (13.6 liters)
- Drain and Refill Quantity 2.0 US gal (7.6 liters)
- Oil Quantity Operating Range 1.0 US gal (3.8 liters).

1-4-5 Maximum Weights

Maximum Ramp Weight	10495 lb (4760 kg)
Maximum Takeoff Weight	10450 lb (4740 kg)
Maximum Landing Weight	9921 lb (4500 kg)
Maximum Zero Fuel Weight	9039 lb (4100 kg)
Maximum Cargo Weight:	
- Baggage Area	400 lb (180 kg)
- Cabin Area	3300 lb (1500 kg)

1-4-6 Typical Airplane Weights

Empty Weight (approx)	6173 lb (2800 kg) *
Useful Load	4277 lb (1940 kg)

**Empty weight of standard airplane with standard interior, 9 passenger seats and cabin floor covering.*

1-4-7 Cabin and Entry Dimensions

Maximum Cabin Width	5' 0" (1.52 m)
Cabin Floor Width	4' 3" (1.30 m)
Maximum Cabin Length	16' 11" (5.16 m)
Cabin Floor Length	15' 4" (4.68 m)
Maximum Cabin Height	4' 9" (1.45 m)
Passenger Door:	
- Width	2' 0" (0.61 m)
- Height	4' 5" (1.35 m)
Cargo Door:	
- Width	4' 5" (1.35 m)
- Height	4' 4" (1.32 m)
Overwing Emergency Exit:	
- Width	1' 6" (0.49 m)
- Height	2' 2" (0.68 m)
Compartment Volume:	
- Baggage	34.3 ft^3 (0.97 m^3)

- Cabin	326 ft^3 (9.23 m^3)

1-4-8 Specific Loadings

Wing Loading	37.6 lb/sq ft (183.7 kg/sq m)
Power Loading	8.71 lb/shp (3.95 kg/shp)

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1-5 Symbols, Abbreviations, and Terminology

1-5-1 General Airspeed Terminology and Symbols

CAS	Calibrated Airspeed means the indicated airspeed of an aircraft, corrected for position and instrument error. Calibrated Airspeed is equal to True Airspeed in standard atmosphere at sea level.
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed means the speed of an aircraft as shown on its airspeed indicator.
KCAS	Calibrated Airspeed expressed in knots.
KIAS	Indicated Airspeed expressed in knots. In APEX KIAS is corrected for position error.
M	Means Mach number. Mach number is the ratio of true airspeed to the speed of sound.
M_{MO}	Maximum Operating Limit Speed is the speed limit that may not be deliberately exceeded in normal flight operations. M is expressed in Mach number.
TAS	True Airspeed means the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature, and compressibility.
V_{FE}	Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
V_{LE}	Maximum Landing Gear Extended Speed is the maximum speed at which an airplane can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{MO}	Maximum Operating Speed is the speed limit that may not be exceed at any time. V is expressed in knots.
V_O	Maximum Operating Maneuvering Airspeed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.

Note

V_O is defined in accordance with FAR 23 Amendment 45.

V_R	Rotation Speed used for takeoff.
V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
V_{SO}	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration at maximum gross weight.
V_{S1}	Stalling Speed or the Minimum Steady Flight Speed at which the airplane is controllable in the specified configuration at the specified weight.
V_X	Best Angle of Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.

V_Y	Best Rate of Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible time.

1-5-2 Meteorological Terminology

Indicated Altitude	The number actually read from an altimeter when the barometric subscale has been Pressure set to 29.92 in hg (1013.2 mbar).
ISA	International Standard Atmosphere in which: − the air is a dry, perfect gas − the temperature at sea level is 59 °F (15 °C) − the pressure at sea level is 29.92 in hg (1013.2 mbar) − the temperature gradient from sea level to the altitude at which the temperature is -69.7 °F (-56.5 °C) is -0.003564 °F (-0.00198 °C) per foot and zero above that altitude.
SAT	Static Air Temperature is the temperature of the air the aircraft is flying through. SAT indication on the ground may not be accurate.
Pressure Altitude	Pressure Altitude measured from standard sea level pressure. (29.92 in hg/1013.2 mbar) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this AFM, altimeter instrument errors are assumed to be zero.
Station Pressure	Actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as variables on the charts of this AFM are to be understood as the headwind or tailwind components of the reported winds.
ELEV	Geographical altitude of landing field.
Icing Conditions	Can exist when the Outside Air Temperature (OAT) on the ground and for takeoff, or Total Air Temperature (TAT) in flight, is 10 °C or colder, and visible moisture in any form is present (such as clouds, fog or mist with visibility of one mile or less, rain, snow, sleet and ice crystals). Can exist when the OAT on the ground and for takeoff is 10 °C or colder when operating on ramps, taxiways or runways, where surface snow, ice, standing water, or slush may be ingested by the engine, or freeze on the engine, or the engine nacelle. Can exist when there are visible signs of ice accretion on the aircraft.
Severe Icing Conditions	Severe icing may result from environmental conditions during flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) which may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces.

1-5-3 Power Terminology

Cruise Climb Power	The power recommended to operate the airplane in a cruise climb (a continuous, gradual climb) profile.
Flight Idle Power	The power required to run an engine, in flight, at the lowest speed that will ensure satisfactory engine and systems operation and airplane handling characteristics. Power setting is achieved with the Power Control Lever at the Flight Idle Detent position.
Ground Idle Power	The power required to run an engine on the ground, as slowly as possible, yet sufficient to ensure satisfactory engine, engine accessory, and airplane operation with a minimum of thrust. Power setting is achieved with the Power Control Lever at or immediately aft of the Idle Detent position.
Maximum Climb Power	The maximum power approved for climb.
Maximum Cruise Power	The maximum power approved for cruise.
Reverse Thrust	The thrust of the propeller directed opposite the usual direction, thereby producing a braking action. Power setting is achieved with the Power Control Lever in the Reverse position.
Takeoff Power	The maximum power permissible for takeoff (limited to 5 minutes).
Zero Thrust	The absence of appreciable thrust, in either direction.

1-5-4 Engine Controls and Instruments Terminology

Beta Range	Range where the propeller blade angle is a function of Power Control Lever (PCL) input. The Engine Electronic Control (EEC) utilizes the Np/Beta sensor and beta ring position to calculate blade angle, which is controlled and commanded by the PCL. Below flight regime, i.e. aft of the idle detent, the Propeller Control Unit (PCU) limits the propeller speed to an underspeed condition and the PCL directly controls the propeller pitch.
Constant Speed Range	The engine operating range where the propeller is out of Beta range and operating at a constant rpm.
Engine and Propeller Electronic Control System (EPECS)	The system that controls the engine's output torque at a reference propeller speed by scheduling fuel flow.
ITT Gauge	A temperature measuring system that senses gas temperature in the turbine section of the engine.
Minimum Blade Angle	When in forward mode, the minimum blade angle is fixed in order to prevent the propeller from going into reverse. When reverse is commanded (throttle quadrant input to the EEC) the minimum blade angle will vary, allowing the propeller to go into reverse. Minimum blade angle protection is achieved by momentarily commanding the feather solenoid.
Power Control Lever	The lever used to control engine power, from reverse (see Beta Range) to maximum power (see Power Terminology).
Propeller Control Unit (PCU)	The PCU is an electro-hydro-mechanical device that modulates the blade angle of a single acting propeller over the entire flight regime of the engine.

Propeller Feather	This is a propeller pitch condition which produces minimum drag in a flight condition (engine shutdown).
Propeller Speed Control Mode	Propeller speed control is the principle operating mode of the propeller control system while the aircraft is operating in flight. The propeller control system modulates the propeller blade angle in order to govern on the selected propeller reference speed.
T1	Indicated T1 temperature is used to calculate the engine power. On ground and during initial takeoff/climb T1 is based on the engine inlet temperature sensor reading, corrected to represent ambient temperature. 400 ft above ground level T1 is based on average data from aircraft Outside Air Temperature (OAT) sensors.
Tachometer	An instrument that indicates rotational speed. Gas generator tachometers measure speed as a percentage of the nominal maximum speed of the turbine(s), while propeller tachometers measure actual propeller rpm.
Torquemeter	An indicating system that displays the output torque available on the propeller shaft. Torque is shown in reference terms, such as the oil pressure generated by the engine torquemeter piston.

1-5-5 Airplane Performance and Flight Planning Terminology

Climb Gradient	The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.
Demonstrated Crosswind Velocity	The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests. The value shown may or may not be limiting. Whether or not the value shown is limiting will be stated.
MEA	Minimum Enroute IFR Altitude.
Route Segment	A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

1-5-6 Weight and Balance Terminology

A.O.D.	Aft of Datum
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Basic Empty Weight	Standard empty weight plus optional equipment.
Center of Gravity (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.

Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Maximum Landing Weight (MLW)	Maximum weight approved for the landing touchdown.
Maximum Ramp Weight (MRW)	Maximum weight approved for ground maneuver. It includes weight of start, taxi, and run-up fuel.
Maximum Takeoff Weight (MTOW)	Maximum weight approved for the start of the takeoff run.
Maximum Zero Fuel Weight (MZFW)	Maximum weight exclusive of usable fuel.
Moment	The product of the weight of an item multiplied by its arm. Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.
Payload	Weight of occupants, cargo, and baggage.
Standard Empty Weight	Weight of a standard airplane, standard interior, 9 passenger seats and cabin floor covering including unusable fuel, full operating fluids, and full oil.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Tare Weight	The weight indicated by a scale before it is loaded.
Unusable Fuel	Fuel which may not be considered usable for flight planning.
Usable Fuel	Fuel available for flight planning.
Useful Load	Difference between takeoff weight, or ramp weight if applicable, and basic empty weight.

1-5-7 General Abbreviations and Symbols

C	Celsius
cu	Cubic
F	Fahrenheit
FAA	Federal Aviation Administration (U.S.A.)
FOCA	Federal Office for Civil Aviation (Switzerland)
fpm	Feet per Minute
ft	Feet
g	Unit of acceleration measured against the force of gravity
gal	Gallon (US)
hg	Mercury
IFR	Instrument Flight Rules
in	Inches
kg	Kilogram
KTAS	Knots True Airspeed
lb	Pound (mass)
m	Meter
MAC	Mean Aerodynamic Chord
max	Maximum
mbar	Millibar
mkg	Moment in meters/kilograms
min	Minimum
mm	Millimeters

nm	Nautical Mile
N/A	Not Applicable
psi	Pounds per Square Inch
rpm	Revolutions Per Minute
sec	Second
shp	Shaft Horsepower
sm	Statute Mile
TBD	To Be Determined
TBO	Time Between Overhauls
VFR	Visual Flight Rules
°	Degrees
'	Feet
"	Inches

Note

Refer to Section 7, Airplane and Systems Descriptions, Primus APEX - Avionics Installation General for Avionic acronyms and abbreviations.

1-5-8 Conversion Information

All numerical data contained in this AFM is shown in standard format with the metric equivalent immediately following in parenthesis, eg. 7' 3" (2.1 m). The following formulas can be used to make required conversions.

1-5-8.1 General

Fahrenheit (°F) = (°C x 1.8) + 32

Celsius (°C) = (°F - 32) x 0.556

Statute Mile (sm) = Nautical Mile (nm) x 1.151

Nautical Mile (nm) = Statute Mile (sm) x 0.869

Jet Fuel (JET A) Standard Weights at 15 °C (Relative Density 0.806)

One (1) Liter = 1.777 lb

One (1) U.S. Gallon (US gal) = 6.73 lb

One (1) Imperial Gallon (IMP gal) = 8.078 lb

1-5-8.2 Standard to Metric

Millimeters (mm) = Inches (in) x 25.4

Centimeters (cm) = Inches (in) x 2.54

Meters (m) = Feet (ft) x 0.305

Meters (m) = Yards (yd) x 0.914

Kilometers (km) = Statute Miles (sm) x 1.61

Kilometers (km) = Nautical Miles (nm) x 1.852

Liters = US Gallons (US gal) x 3.785

Liters = Imperial Gallons (IMP gal) x 4.546

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Kilograms (kg) = Pounds (lb) x 0.454

Bar = psi x 0.069

1-5-8.3 Metric to Standard

Inches (in) = Millimeters (mm) x 0.039

Inches (in) = Centimeters (cm) x 0.393

Feet (ft) = Meters (m) x 3.281

Yards (yd) = Meters (m) x 1.094

Statute Miles (sm) = Kilometers (km) x 0.621

Nautical Miles (nm) = Kilometers (km) x 0.54

US Gallons (US gal) = Liters x 0.264

Imperial Gallons (IMP gal) = Liters x 0.22

Pounds (lb) = Kilograms (kg) x 2.205

psi = Bar x 14.504

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SECTION 2

Limitations (EASA Approved)

Table of Contents

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2-1 General

This section contains the EASA approved operating limitations, instrument markings, color coding, and basic placards necessary for the operation of the airplane, its engine, systems, and equipment. Compliance with approved limitations is mandatory.

Limitations associated with systems or equipment which require POH Supplements are included in Section 9, Supplements.

With the exception of circuit breakers on the Essential Bus, and if not detailed otherwise in procedures, all tripped open circuit breakers are not allowed to be reset in flight. Circuit breakers on the Essential Bus, if tripped, may be reset once only in flight providing:

1 At least one minute has elapsed from the time of the circuit breaker trip

2 There is no remaining smoke or burning smell.

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2-2 Airspeed Limitations

Table 2-2-1: Airspeed Limitations

AIRSPEED	KIAS	SIGNIFICANCE
Maximum operating speed		Do not exceed this speed in any operations.
V_{MO}	240	Maximum speed at or below 16,300 ft.
M_{MO}	0.49	Refer to V_{MO} / M_{MO} schedule for maximum speed above 16,300 ft. (See Fig. 2-2-1, V_{MO} Schedule).
Maximum Operating Maneuvering Speed - V_O		Do not make full or abrupt control movements above this speed.
10450 lb (4740 kg)	166	
9921 lb (4500 kg)	161	
9480 lb (4300 kg)	158	
9039 lb (4100 kg)	154	
8380 lb (3800 kg)	148	
7940 lb (3600 kg)	144	
7500 lb (3400 kg)	140	
7060 lb (3200 kg)	136	
6610 lb (3000 kg)	132	
6170 lb (2800 kg)	127	
5730 lb (2600 kg)	123	
Maximum flap extended speed - V_{FE}		Do not exceed this speed with flaps extended.
≤ 15°	165	
> 15°	130	
Maximum landing gear operating speed - V_{LO}	180	Do not retract or extend landing gear above this speed.
Maximum landing gear extended speed - V_{LE}	240	Do not exceed this speed with landing gear extended.

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Figure 2-2-1: VMO / MMO Schedule

2-3 Airspeed Indication Markings

Table 2-3-1: Airspeed Indication Markings

INDICATION	KIAS VALUE OR RANGE	REMARKS
Red/White Barber Pole across and upwards on right side of tape	240 or 0.49 M whichever is lower	Maximum operating limit (V_{MO}/M_{MO})
Red (high speed) strip on right side of tape	180 V_{LO} 165 V_{FE} 15° 130 V_{FE} 30/40°	Extends downwards from V_{MO}/M_{MO} to the valid V_{LO} or V_{FE} as applicable. Not shown in clean config or with gear extended only
Labeled Placards on right side of tape	180 V_{LO} 165 V_{FE} 15° 130 V_{FE} 30/40°	Maximum flap operating and extended speed (V_{FE}: 15 /30/40°) and maximum landing gear operating speed (V_{LO})
Red low speed awareness tape overlaid on right side of tape	Shaker speed	Extends upwards from bottom of tape to the shaker speed in the current configuration. Not shown on ground.

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2-4 Power Plant Limitations

2-4-1 Engine

Number of Engines	1
Engine Manufacturer	Pratt & Whitney Canada
Engine Model Number	PT6E-67XP

2-4-2 Oil

Approved oils are:

- AeroShell Turbine Oil 500
- AeroShell Turbine Oil 560 (ASTO 560)
- Royco Turbine Oil 500
- Royco Turbine Oil 560
- Mobil Jet Oil II
- Eastman Turbo Oil 2380
- Turbonycoil 600.

CAUTION

Mixing oil of different viscosities is not permitted.

Note

The oils listed are approved to MIL-PRF-23699 Type II.

2-4-3 Oil Quantity

Total Oil Capacity	3.6 US gal (13,6 liters)
Drain and Refill Quantity	2.0 US gal (7,6 liters)
Oil Quantity Operating Range	1.0 US gal (3,8 liters)

An oil quantity check is required for takeoff. Takeoff is not approved with ENGINE OIL LEVEL illuminated.

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2-4-4 Engine Operating Limits

The limits presented in each column shall be observed. The limits presented do not necessarily occur simultaneously. Refer to the Pratt & Whitney Engine Maintenance Manual for specific action if limits are exceeded.

Table 2-4-1: Engine Operating Limits

OPERATING CONDITION (1)	SHP	TORQUE (PSI) (2) (3)	MAX ITT (°C)	Ng (%)	Np (RPM) (11) (12)	OIL PRESS (PSI) (4) (5)	OIL TEMP (°C) (9)
TAKEOFF (7) (10)	1200	44.84	850	104	1700	90 to 135	15 to 110
MAX. CLIMB (7)	1200	44.84	825	104	1700	90 to 135	15 to 105
CRUISE (7)	1100	40.63	820	104	1700	90 to 135	15 to 105
MIN. IDLE (8)			750	64.5		60 MIN	-40 to 110
STARTING (6)			1000			175 MAX	-40 MIN
TRANSIENT (10)		61.00	900	104.3	1870	40 to 175	0 to 110
MAX. REVERSE (7) (11)	900	34.26	820	104	1650	90 to 135	15 to 105

1 Engine inlet condition limit for the operation of the engine is:

- Temperature: 57.2 °C (135 °F) at the engine inlet connection.

2 The torque limit is in the propeller operation range of 1000 to 1700 RPM. At less than 1000 RPM the torque limit is 23.92 psi.

3 Maximum recommended torque at 1700 rpm is 44.34 psi. Torque limit of 44.84 psi is provided to allow operation at reduced NP speed at quoted power setting.

4 Usual oil pressure is between 90 and 135 psi at Ng speeds of more than 72%. If engine torque is less than 35.87 psi the minimum oil pressure is 85 psi with an oil temperature of between 60 and 70 °C.

5 Oil pressures of less than 90 psi are not recommended. A low oil pressure of 60 psi is permitted at torques of less than 23.92 psi. Oil pressures less than 60 psi are not safe and it will be necessary to stop the engine.

6 The time limit for maximum start engine Inter Turbine Temperature (ITT) is 5 seconds.

7 Engine oil temperature must be 15 °C or above prior to setting takeoff power on ground.

Engine oil temperature must be 10 °C or above when operating with anti-icing additives.

8 For the Np range of 900 RPM or more.

9 Takeoff power rating is limited to 5 minutes duration. The limit for oil temperatures between 105 and 110 °C is 10 minutes for all operations.

10 The time limit for transient torque, ITT, Np and oil pressure is 20 seconds.

11 The usual maximum ground reverse limit is an Np of 1615 RPM ± 20 RPM.

12 During steady state operation a variation of ± 30 rpm is permitted to account for power governing accuracy.

2-4-5 Fuel

Refer to Table 2-4-2 for approved fuels.

Table 2-4-2: Approved Fuels

APPROVED FUEL	SPECIFICATION
Unrestricted use(1)	
JET A	ASTM-D1655 CAN/CGSB-3.23
JET A-1	ASTM-D1655 IATA JFSCL GOST R 52050 QAV-01 CAN/CGSB-3.23 DEF STAN 91-91
JP-5	MIL-DTL-5624 DEV STAN 91-86

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Table 2-4-2: Approved Fuels (continued from previous page)

APPROVED FUEL	SPECIFICATION
JP-8 (F-34)	DEF STAN 91-87 MIL-DTL-83133
F-35 JP-8+100 (F-37)	MIL-DTL-83133
Jet A-50(2)	-
MSN 1720, 2001 - 2040 Post SB 28-013, and MSN 2041 and up	
RT	GOST 10227-86 GSTU 320.00149943.007-97
TS-1	GOST 10227-86 + Russian Decree #118
End of effectivity	
Restricted use(3)	
Diesel grades(4)(5): − No. 2-D S500 − No. 2-D S5000 − No. 1-D S500 − No. 1-D S5000	ASTM-D975
Automotive Diesel Fuel(4)(6): − Type B − Type A	CAN/CGSB-3.517

Note

1 Fuel meeting the requirements of ASTM D7566 revision 19 (Annex 1 to 5) Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons, redesignated as ASTM D1655, is acceptable for use.

2 This is a brand blend sold in Alaska. It is Jet A with a lower freezing point.

3 Unless otherwise specified, continued use of these fuels for more than 1000 hours is allowed provided periodic fuel nozzle inspections are found acceptable by P&WC.

4 Not allowed for use when cloud point is lower than +5 °C.

5 Shall not contain a biodiesel component.

6 Unless otherwise specified, intermittent or continued use of these fuels for up to 1000 hours is allowed provided satisfactory fuel nozzle inspection results are achieved at the approved intervals.

2-4-6 Anti-Icing Additive

The PC-12/47E fuel system design (MSN 1720, 2001 and up) is such that anti-icing additive is not required.

If anti-icing additive is to be used, then use anti-icing additive conforming to the specifications given in Table 2-4-3.

Table 2-4-3: Anti-Icing Additive

ADDITIVE	SPECIFICATION	MAXIMUM CONCENTRATION
Diethylene Glycol Monomethyl Ether (DieGME)	ATSM D4171 Type II MIL-DTL-85470	0.15% by volume
Liquid I	GOST 8313	0.30% by volume
Liquid I-M 50/50 blend of Liquid I with Methyl Alcohol	TU-6-10-1458	0.30% by volume

Additive concentration must be below the maximum as indicated in the table above. Additive concentration must be within additive supplier recommendations.

CAUTION

The correct mix of anti-icing addictive with the fuel is important. Concentrations of more than the maximum (see Table 2-4-3) will cause damage to the protective primer and sealants of the fuel tanks. Damage will occur in the fuel system and engine components.

Refer to Section 8, Handling, Servicing, and Maintenance, Fuel Anti-Icing Additive for blending instructions.

2-4-7 Propeller

Propeller Manufacturer	Hartzell
Propeller Model Number	HC-E5A-31A/NC10245B
Number of Propellers	1
Number of Propeller Blades	5
Propeller Diameter	
Minimum	104 in (2.642 m)
Maximum	105 in (2.667 m)
Propeller Operating Limits (Np)	
Maximum Normal Operation	1700 rpm ±30 rpm
Maximum transient (20 sec)	1870 rpm
Maximum reverse	1650 rpm

Stabilized operation on the ground between 350 and 900 rpm is not permitted.

Blade Angles at Station 42:	
- Fine Pitch	14.7° -±0.2°
- Maximum Reverse Pitch	-17.5° ± 0.5°
- Feather	80.0° ± 0.5°
- Minimum pitch in flight	1°

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2-4-8 Starter

The engine starting cycle shall be limited to the following intervals:

- Sequence, 60 seconds OFF
- Sequence, 60 seconds OFF
- Sequence, 30 minutes OFF.

Note

A dry motoring cycle is to be counted as a sequence. In case of start abort and automatic dry motoring commanded by EPECS, wait for an additional 10 minutes before a new start is attempted.

2-4-9 Generator

Maximum generator load limits are given in Table 2-4-4.

Table 2-4-4: Maximum Generator Load Limit

GENERATOR	MAX CONTINUOUS LOAD	MAX LOAD FOR 2 MINUTES *
Generator 1	300 AMP	450 AMP
Starter/Generator 2	300 AMP	450 AMP
**Maximum load permitted for a 2 minute period per each one hour of operation.*		

2-4-10 Power Control Lever Operation

Power Control Lever operation aft of the idle detent is prohibited during flight. Such operation may lead to loss of airplane control and total power loss.

2-4-11 Chip Detector

Takeoff is not approved with ENGINE CHIP caution annunciator illuminated.

2-4-12 Feather Inhibit (optional)

After nine consecutive engine shutdowns using the propeller feather inhibit function, the next engine shutdown must be a normal shutdown.

2-5 Power Plant Window Markings

Table 2-5-1: Power Plant Window Markings

	RED MARK Min. Limit	AMBER Low Limit	GREEN ARC Norm Ops.	AMBER High Limit	RED MARK Max. Limit
Torque (psi)	N/A	N/A	0 to 40.63	40.63	44.84
ITT (°C)	N/A	N/A	400 to 820	820	850 / 1000 (1)
Engine Speed Ng (%)	N/A	64.5	64.5 to 103.5	103.5	104.3
Oil Temperature (°C)	N/A	15	15 to 105	105	110
Oil Pressure (psi)	60	90	90 to 135	N/A	135

Note

1 During starting, the ITT limit is at 1000°C. Once Ng is at Ground Idle or above, the ITT limit is at 850°C.

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2-6 Miscellaneous Instrument Markings

Table 2-6-1: Miscellaneous Instrument Markings

Instrument	RED RADIAL Min. Limit	YELLOW ARC Caution	GREEN ARC Norm Ops.	YELLOW ARC Caution	RED RAD/DIA Max. Limit
Oxygen Pressure (psi)	N/A	N/A	N/A	N/A	1850 to 2000

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2-7 Weight Limits

Maximum Ramp Weight	10,495 lb (4760 kg)
Maximum Takeoff Weight	10,450 lb (4740 kg)
Maximum Landing Weight	9921 lb (4500 kg)
Maximum Zero Fuel Weight	9039 lb (4100 kg)
Maximum Baggage Weight	400 lb (180 kg)
Maximum Floor Loading:	
- On Seat Rails	205 lb/ft^2 (1000 kg/m^2)
- On Cabin Floor	125 lb/ft^2 (600 kg/m^2)

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2-8 Center of Gravity Limits

Table 2-8-1: Center of Gravity Limits

Weight Pounds (kilograms)	Forward Limit A.O.D.: in (m)	Aft Limit A.O.D.: in (m)
10,450 (4740)	232.20 (5.898)	240.43 (6.107)
9921 (4500)	232.20 (5.898)	240.94 (6.120)
8158 (3700)	224.13 (5.693)	-
7938 (3600)	-	242.99 (6.172)
6615 (3000)	-	242.99 (6.172)
5733 (2600)	220.75 (5.607)	225.47 (5.727)

Note

Straight line variation between points given.
The datum is 118 in (3.0 m) forward of firewall.
It is the responsibility of the pilot to ensure that airplane is loaded properly.
See Section 6, Weight and Balance, Weight and Balance Determination for Flight for proper loading instructions.

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2-9 Maneuver Limits

This airplane is certificated in the Normal Category. The normal category is applicable to aircraft intended for non-aerobatic operations. These include any maneuvers incidental to normal flying, stalls (except whip stalls), lazy eights, chandelles, and turns in which the bank angle does not exceed 60°.

Aerobatic maneuvers, including spins, are not approved.

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2-10 Flight Load Factor Limits

Flight load limits with flaps up	+3.3 g	-1.32 g
Flight load limits with flaps down	+2.0 g	-0.0 g

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2-11 Flight Crew Limits

Minimum required flight crew is one pilot in the left hand seat.

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2-12 Kinds of Operation

The Pilatus PC-12 is approved for the following types of operation when the required equipment is installed and operational:

1 VFR Day.

2 VFR Night.

3 IFR Day incl. CAT 1 approaches, single pilot.

4 IFR Night incl. CAT 1 approaches, single pilot.

5 Flight into known icing conditions.

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2-13 Pneumatic Deicing Boot System

The pneumatic de-ice boot system is required to be installed for all flights.

Preflight function test required before takeoff and flight into known icing conditions.

The system is required to function properly for flight into known icing conditions.

Operation of the pneumatic de-ice boot system in ambient temperatures below -40 °C and above +40 °C may cause permanent damage to the boots.

The wing and tail leading edge pneumatic de-icing boot system must be activated at the first sign of ice formation anywhere on the aircraft.

The wing and tail leading edge pneumatic de-icing boot system may be deactivated only after leaving icing conditions and after the aircraft is determined to be clear of ice.

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2-14 Icing Limitations

2-14-1 Limitations

Flight in icing conditions is only approved with all ice protection systems, generator 1 and generator 2 serviceable.

Flight in icing conditions is prohibited when the Propeller De-ice caution is active.

During flight in icing conditions, if there is a failure of any of the aircraft ice protection systems exit icing conditions. Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.

During flight in icing conditions or flight with any visible ice accretion on the airframe, the following flap maximum extension limits apply:

With operational airframe pneumatic de-ice boots	15° FLAP
After failure of the airframe pneumatic de-ice boots	0° FLAP

In the event of a balked landing go-around with residual ice on the airframe, the flaps should not be retracted from the 15° position.

Flight in freezing rain, freezing fog, freezing drizzle and mixed conditions causing ice accretion beyond the protected areas of the pneumatic boots is not approved.

The aircraft must be clear of all deposits of snow, ice and frost adhering to the lifting and control surfaces immediately prior to takeoff.

In the event of a balked landing (go around) with residual ice on the airframe, the landing gear and flaps may not fully retract after selection.

The left wing inspection light must be operative prior to flight into forecast icing conditions at night.

2-14-2 Icing Conditions

Icing conditions can exist when:

- The Outside Air Temperature (OAT) on the ground and for takeoff, or Static Air Temperature (SAT) in flight, is 10 °C or colder, and visible moisture in any form is present (such as clouds, fog or mist with visibility of one mile or less, rain snow, sleet and ice crystals)
- The OAT on the ground and for takeoff is 10 °C or colder when operating on ramps, taxiways or runways, where surface snow, ice, standing water, or slush may be ingested by the engine, or freeze on the engine, or the engine nacelle
- There are visible signs of ice accretion on the aircraft.

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2-14-3 Severe Icing Conditions

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions:

- Unusually extensive ice accumulation on the airframe and windshield areas not normally observed to collect ice
- Acumulation of ice beyond the active portions of the wing pneumatic boots.

Care must be taken when using the autopilot that tactile cues, such as increased aileron forces, are not masked by the autopilot function. Periodically disengage the autopilot to check for abnormal forces.

2-15 Kinds of Operation Equipment List

This airplane is approved for operations under day and night VFR, day and night IFR and flight into known icing conditions when the required equipment is installed and operating properly. The following systems and equipment list does not include specific flight and radio/ navigation equipment required by any particular country's operating regulations. The pilot in command is responsible for determining the airworthiness of the aircraft and assuring compliance with current operating regulations for each intended flight.

The zeros (0) used in the list below mean that the system and/or equipment was not required for type certification for that kind of operation. When (AR) appears for the number required it indicates As Required.

Deviations from this KOEL may be approved for the operation of a specific aircraft if a proper MEL (Minimum Equipment List) has been authorized by the appropriate regulatory agency.

Table 2-15-1: Kinds of Operation Equipment List

SYSTEM / EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING	RVSM
PRIMUS APEX:						
Pilot PFD	1	1	1	1	1	1
MFD	1	1	1	1	1	1
MAU (Channel A & B)	1	1	1	1	1	1
PFD Controller	2	2	2	2	2	2
Touch Screen Controller / MF Controller	0	0	1	1	1	1
Audio Marker Panel	1	1	1	1	1	1
ADAHRS (Channel A & B)	1	1	1	1	1	1
Magnetometer	0	0	1	1	1	1
MMDR (COM/NAV)	0	1	1	1	1	1
Mode S Transponder	0	0	1	1	1	1
GPS	0	0	1	1	1	1
DME	0	0	1	1	1	1
Miscellaneous:						
Electronic Standby Instrument (ESIS)	1	1	1	1	1	1
Engine:						
No.1 Generator	1	1	1	1	1	1
No. 2 Generator	1	1	1	1	1	1
Inertial Separator	1	1	1	1	1	1
Electric Wing Tank Fuel Boost Pump	2	2	2	2	2	2
Firewall Fuel Shutoff Valve	1	1	1	1	1	1
Fuel Ejector Pumps	1	1	1	1	1	1
Fuel Venting System	1	1	1	1	1	1
Ignition System	1	1	1	1	1	1
Fire Detect System	1	1	1	1	1	1

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Table 2-15-1: Kinds of Operation Equipment List (continued from previous page)

SYSTEM / EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING	RVSM
Engine and Propeller Electronic Control System	1	1	1	1	1	1
Electrical:						
No. 1 Battery	1	1	1	1	1	1
No. 2 Battery	1	1	1	1	1	1
Stall Warning/Stick Pusher System	1	1	1	1	1	1
AOA Probes	2	2	2	2	2	2
CAS	1	1	1	1	1	1
Primary Pitch Trim System	1	1	1	1	1	1
Alternate Stab Trim System	1	1	1	1	1	1
Aileron Trim System	1	1	1	1	1	1
Rudder Trim System	1	1	1	1	1	1
Trim Interrupt System	1	1	1	1	1	1
Windshield Heat	2*	2*	2*	2*	2*	2*
Navigation Lights	0	4	4	4	4	4
Strobe Lights	0	2	2	2	2	2
Landing Lights	0	2	2	2	2	2
Taxi Light	0	1	1	1	1	1
Instrument and Panel Lighting	0	AR	AR	AR	AR	AR
Audio System	1	1	1	1	1	1
Cockpit Speaker	1	1	1	1	1	1
Cabin Speaker	1	1	1	1	1	1
De-ice Boot Timer	0	0	0	0	1	0
AOA Heater LH	1	1	1	1	1	1
AOA Heater RH	1	1	1	1	1	1
Probe Current Monitor	1	1	1	1	1	1
Propeller De-ice Timer	0	0	0	0	1	0
Propeller De-ice Brush	0	0	0	0	1	0
Propeller De-ice MOV	0	0	0	0	1	0
Propeller De-ice Boots	0	0	0	0	**	0
Propeller De-ice OAT	0	0	0	0	2	0
Left Wing Inspection	0	0	0	0	1	0
Emergency Power Supply	0	1	1	1	1	0
Mechanical Systems:						
Landing Gear Actuating System	1	1	1	1	1	1
Emergency Gear Extension System	1	1	1	1	1	1
Flap Control	1	1	1	1	1	1
Seat Restraints (each occupant)	AR	AR	AR	AR	AR	AR

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Table 2-15-1: Kinds of Operation Equipment List (continued from previous page)

SYSTEM / EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING	RVSM
Firewall ACS Shutoff Valve	1	1	1	1	1	1
Emergency Ram Air Scoop	1	1	1	1	1	1
Negative Pressure Relief Valve	2	2	2	2	2	2
Oxygen System	1	1	1	1	1	1
De-ice Boot PRV	1	1	1	1	1	1
De-ice Boot EFCVs	1	1	1	1	5	1
De-ice Boot Pressure Switches	0	0	0	0	5	0
De-ice Boot, Inner Wing LH	1	1	1	1	1	1
De-ice Boot, Outer Wing LH	1	1	1	1	1	1
De-ice Boot, Inner Wing RH	1	1	1	1	1	1
De-ice Boot, Outer Wing RH	1	1	1	1	1	1
De-ice Boot, Tail LH	1	1	1	1	1	1
De-ice Boot, Tail RH	1	1	1	1	1	1
Fuel Control & Monitoring System	1	1	1	1	1	1
For Pressurized Flight:						
ACS	1	1	1	1	1	1
Cabin Pressure Control Unit	1	1	1	1	1	1
Outflow Valve	1	1	1	1	1	1
Safety valve	1	1	1	1	1	1

* Refer to Section 2, Limitations, Systems and Equipment Limits for the actual limitation.

** Flight into known icing conditions is prohibited if the Propeller De-ice Caution is active.

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2-16 Fuel Limitations

Total Fuel Capacity	406.8 US gal, 2,736.5 lb (1,540 liters, 1,241.3 kg)
Total Usable Fuel	402 US gal, 2,703.6 lb (1,521.5 liters, 1,226.4 kg)
Total Unusable Fuel	4.8 US gal, 32.9 lb (18.5 liters, 14.9 kg)
Maximum Fuel Imbalance	26.4 US gal, 178 lb (100 liters, 80.6 kg) (Maximum 3 segments on indicator)

Note
Usable fuel can be safely used during all Normal Category airplane maneuvers.

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2-17 Maximum Operating Altitude Limits

Maximum Operating Altitude	30,000 ft (9144 m)

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2-18 Outside Air Temperature Limits

Minimum Outside Air Temperature	-55 °C (-67 °F)
Maximum Outside Air Temperature	+50 °C (122 °F)

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2-19 Cabin Pressurization Limits

Maximum cabin pressure differential is 5.75 psi (400 mbar).
Pressurized landing is approved up to 0.7 psid.

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2-20 Maximum Passenger Seating Limits

Maximum number of occupants is 9 passengers plus pilot(s).

During single pilot operation, the pilot occupies the left hand cockpit seat and an additional passenger may occupy the right hand cockpit seat.

For aircraft with the optional No Cabin Interior configuration installed: No persons are allowed in the cabin during operation.

Refer to Section 6, Weight and Balance, Interior Configurations, for seat locations.

The PC-12 is certified with two basic cabin interior configurations, a Corporate Commuter and an Executive interior. Variations to the two basic interior configurations that have been approved together with general limitations are given below:

- Corporate Commuter Interior Code STD-9S nine standard seats
- Executive Interior Code EX-6S-2 six executive seats
- Executive Interior Code EX-8S eight executive seats
- Executive Interior Code EX-6S-STD-2S six executive seats and two standard seats
- Executive Interior Code EX-4S-STD-4S four executive seats and four standard seats
- For layouts EX-8S, EX-6S-STD-2S and EX-4S-STD-4S: Leave seats 5, 6, 7 and 8 vacant during takeoff and landing unless seat in front is occupied.

Pilatus must be contacted to determine the modification work required to the aircraft, before any change to an interior configuration is made.

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2-21 Systems and Equipment Limits

2-21-1 Stall Warning / Stick Pusher System

Preflight function test required before takeoff.

System is required to function properly in normal mode for all flights and in ice mode for flight into known icing conditions.

2-21-2 Brakes

To allow adequate cooling of the wheels and brakes the aircraft must remain on the ground for at least 45 min following the two events:

- Rejected takeoff with brake on speed greater than V_R -20 kts and heavy brake usage
- 0° flap full stop landing and heavy brake usage.

2-21-3 Trim Systems

Stabilizer normal and alternate, and rudder trim systems must function properly for all flights.

2-21-4 Heated Windshield

Left Hand and Right Hand Heated Windshields must function properly for all flights. Exception, for IFR flights conducted into no known or forecast icing conditions at least one heating zone of the windshield on the side of the pilot in command must function properly.

2-21-5 Fire Detection System

Preflight Function Test is required for takeoff.

System must function properly for all flights.

2-21-6 Engine Ice Protection

Preflight Function Test is required for takeoff.

2-21-7 Oxygen System

A minimum oxygen supply of 10 minutes duration for each occupant is required for dispatch for pressurized flight above FL250.

Note
Some National Operating Requirements may require that a larger quantity of oxygen be carried on the aircraft.

The oxygen system shutoff valve handle in the cockpit must be selected to ON prior to engine start and throughout the duration of flight.

The oxygen masks for the crew must be connected for all flights.

For aircraft with the Corporate Commuter side wall paneling, oxygen masks must be connected and properly stowed for each passenger prior to takeoff when the aircraft is to be operated above 10,000 feet.

Note
In the executive interior configurations the oxygen masks are permanently connected.

2-21-8 Probe Heat

Preflight function test required before takeoff.

The system is required to function properly for IFR flight and flight into known icing condition.

2-21-9 Flap System Cycle Limits

A flap cycle is defined as movement from 0° to 15° to 0° and from 0° to 15° to 40° to 0°. Maximum number of cycles per hour:

Up to 25 °C OAT	10
25 °C to 50 °C OAT	8

2-21-10 Primus Apex

The Pilots Guide for the Advanced Cockpit Environment (ACE™) (powered by Honeywell) for the Pilatus PC-12/47E must always be carried on board the aircraft.

2-21-11 Primus Apex - Automatic Flight Control System

During autopilot operation, a pilot must be seated in a pilot position with seat belt fastened.

The Autopilot (AP) and Yaw Damper (YD) must be OFF during takeoff and landing.

The Autothrottle (AT) must be OFF during landing.

Minimum engagement height after takeoff is 400 ft Above Ground Level (AGL).

Do not engage autopilot while the Tactile Feedback (TF) system is active.

With the exception of the approaches defined below, the autopilot must be disengaged below 1000 ft AGL.

For non-precision and visual approaches (at airspeeds <150 KIAS and VS <1500 ft/min) the autopilot must be disengaged below 400 ft AGL.

For instrument approach procedures with vertical guidance (APV) and Instrument Landing System (ILS), the autopilot must be disengaged below 200 ft AGL.

The system is approved for Category 1 operation (Approach mode selected) and autopilot coupled go-arounds initiated at decision altitude or minimum descent altitude.

Maximum approved glideslope angle for all coupled approaches is 4°.

During normal operation:

- Do not override the autopilot and Yaw Damper in any axis
- Hold the throttle at the required position for at least 3 seconds if you intend to override the engaged AT system and confirm the AT disconnect by pressing the AT Quick-Disconnect button on the PCL
- ASEL is not overspeed protected. Avoid AFCS altitude capturing close to V_{MO}/M_{MO}

The autopilot servos may be temporarily disengaged without disengaging the autopilot to allow manual flight path control. The TCS switch on the control wheel must be pushed and held for the desired duration.

CAUTION

In accordance with FAA recommendation (AC 00- 24C), the use of "PITCH ATTITUDE HOLD" mode is recommended during operation in severe turbulence.

2-21-12 Primus Apex - Flight Management System

From an airworthiness perspective, the PC-12/47E with APEX-FMS is certified for:

Use of GNSS	AMC 20-5 Guidance Material on Airworthiness Approval and Operational Criteria for the use of the NAVSTAR Global Positioning System (GPS). AC 90-100A U.S. Terminal and En Route Area Navigation (RNAV) Operations.
B-RNAV	AMC 20-4 Guidance Material on Airworthiness Approval and Operational Criteria for the use of navigation Systems in European Airspace Designated for basic RNAV Operations. AC 90-96A Approval of U.S. Operators and Aircraft to operate under Instrument Flight Rules (IFR) in European Airspace designated for Basic Area Navigation (B-RNAV) and Precision Area Navigation (P-RNAV). **Note** B-RNAV is also termed ICAO RNAV 5.
P-RNAV	JAA TGL 10 Rev 1 Airworthiness and Operational Approval for Precision RNAV Operations in Designated European Airspace. AC 90-100A U.S. Terminal and En-route Area Navigation (RNAV) Operation. AC 90-96A Approval of U.S. Operators and Aircraft to operate under IFR in European Airspace designated for Basic Area Navigation (B-RNAV) and Precision Area Navigation (P-RNAV). **Note** Compliance with both P-NAV (TGL 10) and U.S. RNAV (AC 90-100A) assures compliance with ICAO RNAV 1 and RNAV 2.

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BARO-VNAV	AMC 20-27 Airworthiness Approval and Operational Criteria for RNP Approach (RNP APCH) Operations including APV BARO-VNAV Operations. AC 90-105 Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System. AC 20-129 Airworthiness Approval of Vertical Navigation (VNAV) Systems for the use in the U.S. National Airspace System (NAS) and Alaska.
RNP 1	AC 90-105 Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System.
RNP APCH	AMC 20-27 Airworthiness Approval and Operational Criteria for RNP Approach (RNP APCH) Operations including APV BARO-VNAV Operations. AC 90-105 Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System.
MNPS	AC20-138A. The APEX FMS and KGS200 GNSSU as installed has been found to comply with the requirements for GPS oceanic and remote navigation (AC20-138A, Appendix 1), when used in conjunction with the onboard GPS RAIM and FDE. Full redundancy for the GPS navigation system is only provided if second Flight Management System (FMS), second GPS and Cursor Control Device (CCD) are installed. This does not constitute an operational approval.
RNP 4 & RNP 10	AC20-138D. The APEX FMS and KGS200 GNSSU complies with the requirements for GPS oceanic and remote navigation (AC20-138D), when used in conjunction with the onboard GPS RAIM and FDE. Full redundancy for the GPS navigation system is only provided if second FMS, second GPS and CCD are installed. This does not constitute an operational approval.

Note

Installation of relevant equipment and aircraft certification does not guarantee operational approval. It is the responsibility of the operator to apply for operational approval at the local authorities.

The PC-12/47E with APEX-FMS has satisfied only the airworthiness requirements, this does not constitute an operational approval.

The FMS data base must incorporate the current update cycle for IFR operation.

FMS instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the FMS data base.

1 Instrument approaches must be conducted in the FMS approach mode and GPS integrity monitoring must be available at the Final Approach Fix.

2 APP (approach active) mode indication must be displayed on the Primary Flight Display (PFD) at the Final Approach Fix (FAF).

3 Accomplishment of ILS, LOC, LOC-BC, LDA, SDF and MLS approaches using the FMS is prohibited.

4 RNAV approaches are prohibited in non-WGS-84 airspace. Radio based (VOR, NDB, etc.) approaches are authorized using GPS updating provided the underlying NAVAID is tuned and monitored to ensure aircraft position accuracy relative to the published procedure. If at any time during the approach the GPS position does not match the radio based data, the radio based data shall be used for navigation (Refer to AC 90-108 for additional information).

The use of the FMS to perform RNAV operations in the designated European airspace is limited as follows:

Given a GPS constellation of 23 satellites or less (22 or less when the FMS incorporates automatic pressure altitude aiding) is projected to be operational, the availability of RAIM must be confirmed for the intended flight (route and time). Dispatch for RNAV must not be made in the event of predicted continuous loss of RAIM of more than 5 minutes for any part of the intended flight. For RAIM prediction the Honeywell Program “Preflight” or equivalent approved software must be used.

Traditional approved navigation equipment (e.g. VOR, DME, ADF) adequate for the route to be flown must be installed and serviceable for use of the FMS in accordance with the operational approval.

Dead reckoning mode of navigation based on AHRS is not available in the high latitude regions (approximately north of 82° north latitude and south of 82° south latitude) since the ADAHRS magnetometers do not provide accurate information near the poles.

When using the VNAV system, the altimeter must be used as the primary altitude reference for all operations.

When using the VNAV path deviation indicator during approach the LNAV/VNAV minimums apply as published on the approach charts. Below the minimum the crew must fly the aircraft based on visual references. Due to the large tolerances of the VNAV system the deviation indicator must not be relied on below the minimum.

If flying on LNAV approach using the vertical guidance provided by the FMS, the crew must at no point allow the aircraft to descend below the published LNAV MDA, unless required visibility of the runway is provided.

Barometric VNAV guidance during approach including the approach transition, final approach segment, and the missed approach procedure can be temperature compensated and minimum IFR altitudes will provide terrain and obstacle clearance for temperatures below ISA. Temperature can be compensated by the pilot by: entering the destination airport Outside Air Temperature (OAT) into the Flight Management Window (FMW) Tab for temperature compensation, calculate and crosscheck the corrected altitudes on the Waypoints lists before activating the changes.

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2-21-13 RVSM

This aircraft has been evaluated in accordance with JAA Administrative and Guidance Material, Section One, General Part 3, Temporary Guidance Leaflet No.6, Revision 1 and FAA document No. 91-RVSM, change 2 and is qualified for RVSM operations as a group aircraft.

Note

Airworthiness Approval alone does not authorize flight into airspace for which an RVSM Operational Approval is required by an ICAO regional navigation agreement. Operational Approval must be obtained in accordance with applicable operating rules.

The following equipment must be operational to enter RVSM airspace:

- Both ADC channels of ADAHRS KSG 7200 (channel 1 & 2)
- One (1) flight controller KMC 9200 with altitude preselector
- One (1) Automatic Flight Control System (AFCS) with altitude hold
- One (1) altitude reporting transponder KXP 2290.

The ESIS does not meet RVSM performance requirements and shall only be used for emergency procedures.

The RVSM option in the PRIMUS APEX option file has to be activated. Contact Pilatus customer support for further proceeding.

2-21-14 Primus Apex - TCAS

2-21-14.1 TCAS I

The flight crew must not use a TA on the PFD traffic display to initiate evasive maneuvering. ATC procedures and visual acquisition of the intruder prior to initiation of evasive maneuvers must continue to be the primary means of ensuring aircraft separation.

2-21-14.2 TCAS II (optional)

When an RA occurs, the pilot flying shall respond immediately to RA displays and aural alerts, manoeuvring as indicated, unless doing so would jeopardize the safe operation of the aircraft.

Note

Visually acquired traffic may not be the same traffic causing an RA. The visual perception of an encounter may be misleading, particularly at night.

2-21-15 Primus Apex - Transponder

The KXP 2290A ATC Transponder System with ADS-B Out (1090 MHz Extended Squitter ADS-B Out) supports the 1090ES equipment operating on the radio frequency of 1090MHz. The transponder system complies with the criteria of ICAO Doc 7030/4 Regional Supplementary Procedures for operations where enhanced surveillance is required.

The installed ADS-B OUT system has been shown to meet the equipment requirements of 14 CFR 91.227. The installed ADS-B system is compliant with the requirements of:

- FAA TSO-C166b
- FAA AC 20-165A
- EASA ETSO-C166b
- CS-ACNS.ADS (1090 MHz Extended Squitter ADS-B Out)
- EASA AMC 20-24
- CASA AC 21-45(1).

The transponder FL ID should never be cleared by the pilot without entering a legal FL ID or recycling the power to the XPDR (if a Blank ID is desired). The XPDR reads the FL ID at power up and if the FL ID is invalid it will default to the TAIL No.

Note
It is the operator's responsibility to ensure that the aircraft configuration meets the local airworthiness requirements to obtain operational approval. Be aware that flight in ADS-B equipped airspace is only allowed with ADS-B Out functionality operational.

2-21-16 Primus Apex - ADAHRS

If CAS message "HSI IS MAG TRK" or "HSI IS TRU TRK" is displayed, then the system accuracy does not allow VOR, VOR/DME and NDB non-precision approaches. The flight crew must use (GPS) VOR/DME or (GPS) NDB overlay approaches, LNAV or LNAV/VNAV approaches, RNAV (GPS) approaches, RNAV (RNP) approaches or LPV and ILS precision approaches instead. CAS message "HSI IS MAG TRK" or "HSI IS TRU TRK" is displayed if operating north of approximately of 82° north latitude and south of 82° south latitude as well as in the following two regions:

- North of approximately 73° north latitude between longitude 80° west and 130° west (Northern Canadian Domestic Airspace).
- South of approximately 60° south latitude between longitude 120° east and 160° east (Region south of Australia and New Zealand).

2-21-17 Primus Apex - Use of SmartView

SmartView (SV) does not provide the accuracy or reliability upon which the flight crew can solely base decisions and/or plan maneuvers to avoid terrain or obstacles.

The use of SV alone for navigation is prohibited.

The use of SV alone for obstacle and/or terrain avoidance is prohibited.

The use of SV alone for aircraft control without reference to the APEX primary flight indications or Electronic Standby Instrument System (ESIS) is prohibited.

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2-21-18 Yaw Damper

Above FL155 (15,500 ft), when the yaw damper is not operating, the aircraft must be flown only in balanced flight (slip-skid indicator +/- 1 trapezoid).

2-21-19 Primus Apex - Electrionic Checklist

The Electronic Checklist functionality allows implementation of a user defined Electronic Checklist database. With respect to airworthiness approval the AFM remains the primary reference for checklists.

Implementation of an Electronic Checklist Database is the responsibility of the aircraft owner/ operator, use and operational approval is dependent on the rules of operation.

Implementation of Electronic Checklist functionality does not constitute operational approval.

2-21-20 Primus Apex - Electrionic Charts

The APEX Electronic Charts provide supplemental situational awareness only and do not allow “blind taxi” procedures or flight navigation by use of these charts. At any time the pilot shall remain responsible for taxiing by external visual references and for flying by airborne navigation by the use of primary navigation instruments.

The position accuracy of the aircraft symbol on the charts can decrease in the case of insufficient GPS signal reception or GPS sensor failure. The aircraft symbol is not in-scale with the APEX Electronic Charts.

The APEX Electronic Charts do not replace approved published paper or approved electronic systems for aeronautical charts, which must remain available as a backup reference for chart data.

Note
It is the responsibility of the operator to apply for specific operational approval at the local authority for the use of external electronic charts (e.g. Electronic Flight Bags Class 1 and Class 2) instead of paper charts. Class 3 EFBs require a Supplemental Type Certificate (STC) or certification design approval as part of the aircraft equipment.

2-21-21 Primus Apex - Video Input

It is the responsibility of the operator to make sure that no interference with the installed avionics systems results from the connection of a camera device to the Video Input Module.

2-21-22 Primus Apex - XM Sat Weather

The XM Weather System does not work in PDC mode (STBY bus). Even though the layers can be selected, no data will be transmitted until the aircraft is powered by the batteries (or external power or the engine) and re-selection of the required XM layers is performed.

2-21-23 Primus Apex - Weather Radar

When the weather radar system is operated while the aircraft is on the ground, direct the nose of the aircraft so that the antenna scan sector is free of large metallic objects, such as hangars or other aircraft for a minimum distance of 15 feet (5 meters), and tilt the antenna fully upwards.

Do not operate the weather radar system during aircraft refueling or during refueling operations within 15 feet (5 meters).

Do not operate the weather radar system when personnel are standing within 15 feet (5 meters) of the 270° forward sector of the aircraft.

2-21-24 Primus Apex - INAV Map

The INAV topographical map shall not be used for navigation. The display of airspaces shall not be used as the sole means of reference.

2-21-25 Primus Apex - Vertical Situation Display

The Vertical Situation Display provides situational awareness only and shall not be used for navigation purposes.

2-21-26 Primus Apex - LPV Approach

A valid and compatible database must be installed and contain current data.

For autopilot coupled LPV/LP approaches the autopilot must be disengaged below 200 ft (61 m) AGL.

If NAV preview is selected, LPV/LP approach will not be available. Use of NAV preview functionality will cause an amber “LPV UNVL” or “LP UNVL” message to be displayed.

Additional limitations for operation within EGNOS coverage area:

- When an alternate airport is required by the applicable operational rules, it must be served by an approach based on other than GPS navigation.

2-21-27 Primus Apex - Terrain Database

Approval of the Honeywell Apex System is based on databases being provided from a database provider who has obtained a Type 2 Letter of Acceptance (LoA) (or an equivalent means of compliance as defined by airworthiness authorities) for the processing of the databases shown below. This approval also requires that the operator / end-user will comply with the requirements of FAA AC 20-153B, paragraph 13, for the databases listed. Databases which satisfy the same data quality requirements as the databases listed may be used as an alternative when these compliance requirements have been satisfied.

- EGPWF Threat Database, part number: DO69002412-xxxx
- EPIC/APEX Terrain Server Database, part number: 996-0146-xxx

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2-22 Other Limitations

2-22-1 All Passenger Seats

For takeoff and landing the seat lap and shoulder belts must be fastened, the lap belt tightened, and the seat headrest positioned to support the head.

2-22-2 Luggage Limitations

The luggage area maximum load is given in Table 2-22-1. The load is dependent on the aircraft interior configuration and the Part No. of the luggage net installed.

Table 2-22-1: Luggage Limitations

Interior Configuration	Maximum load with luggage net 525.25.12.043 installed
STD-9S	265 lb (120 kg)
EX-6S-STD-2S	265 lb (120 kg)
EX-4S-STD-4S	265 lb (120 kg)
EX-6S-2	400 lb (180 kg)
EX-8S	400 lb (180 kg)

A Luggage Net must be installed at frame 34 when luggage is stowed.

The luggage area maximum load is 500 lb (225 kg) with an extendable luggage net installed. The extendable luggage net Part No. 525.25.12.026 and/or any luggage may not extend in front of frame 32. If the extendable luggage net is used, there must be a clear area in front of the net as follows:

- At least 280 mm forward of frame 32, when the net floor attachments are placed at frame 32 (the most forward position of the net)
- At least 340 mm forward of frame 34, when the net floor attachments are placed at frame 34.

2-22-3 Cargo Limitations

Maximum Freight Load 3300 lbs (1500 kg).

Cargo must be arranged to permit free access to the passenger door and the right hand emergency overwing exit. No cargo must be placed on the seats.

All cargo must be secured by approved cargo restraints as described in Section 6, General Loading Recommendations. Tie Down Straps with a breaking strength of at least 1800 lb per strap must be used.

All Cargo/Containers must be located against a retaining bar secured laterally to the seat rails.

Items up to a total weight of 66 lb (30 kg) can be stowed in the cabin area without being strapped down providing a cargo net is installed in front of the items.

Cargo nets may only be installed on the attachments at Frames 24 and 27.

No passengers must be seated rearward of a cargo net.

If an extendable baggage net is used the tie down fittings and the cargo strap fittings must have a minimum space of 5 inches between the fittings.

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2-22-4 Structural Limitations

Refer to Chapter 4 of the PC-12/47E Aircraft Maintenance Manual, Pilatus Report Number 02436.

2-22-5 Smoking

Smoking is not permitted in the cabin of aircraft equipped with a standard interior unless ashtrays are installed.

2-22-6 Portable Electronic Devices

The aircraft is Wi-Fi and Bluetooth frequency tolerant and tested according to RTCA/DO-307 - Aircraft design and Certification for Portable Electronic Device (PED) Tolerance.

Front door coupling susceptibility was tested in accordance with DO-307 (including Change 1), Section 4.

Back door coupling susceptibility was tested in accordance with DO-307 (including Change 1), Section 3.

There are no restrictions resulting from DO-307 testing therefore it is in the responsibility of the operator to define during which phases of flight PED usage is allowed.

No test has been performed to check if the aircraft is Global System Mobile (GSM) frequency tolerant.

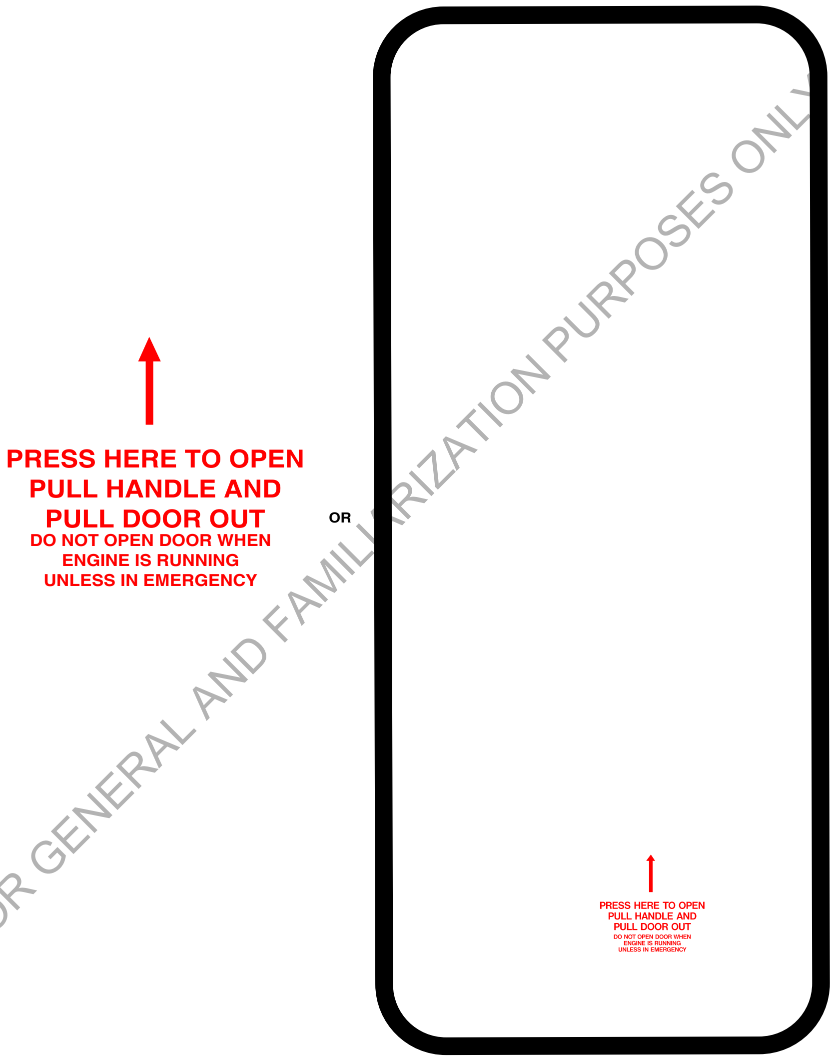
Note
If electromagnetic interference is suspected, PED use should be discontinued or terminated.

2-22-7 Reduced Landing Distances

The PC-12/47E is eligible for application of the reduced required landing distance operations as per CAT.POL.A.255. It is the responsibility of the operator to apply for and obtain prior operational approval of the competent authority.

2-23 Placards

On exterior Passenger Door:
(Not to Scale)
NOTE: Color of passenger door marking may differ and must comply with local regulations.



ICN-12-C-A150223-A-S4080-00117-A-002-01

Figure 2-23-1: Placards - Exterior (Sheet 1 of 7)

12-C-A15-10-0223-00A-067A-A

On exterior Cargo Door:

ICN-12-C-A150223-A-S4080-00118-A-001-01

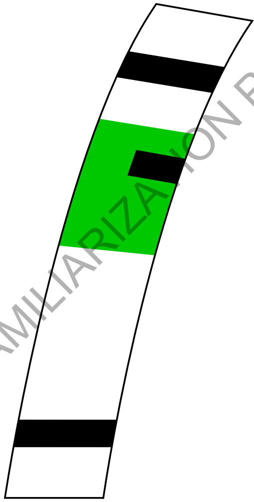
Figure 2-23-1: Placards - Exterior (Sheet 2 of 7)

12-C-A15-10-0223-00A-067A-A

Near Static Ports:

STATIC PRESSURE
KEEP CLEAR

On left side Vertical Tail forward of Horizontal Stabilizer:



On Rudder (each side):

DO NOT PUSH

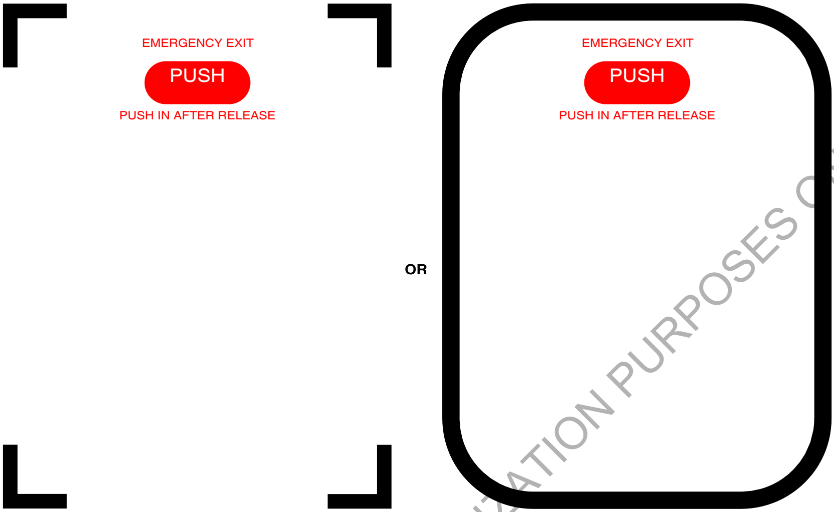
ICN-12-C-A150223-A-S4080-00119-A-001-01

Figure 2-23-1: Placards - Exterior (Sheet 3 of 7)

12-C-A15-10-0223-00A-067A-A

On exterior Emergency Exit:
(Not to Scale)

NOTE: Color of emergency exit marking may differ and must comply with local regulations.



Inside left Engine Cowling:

TURBINE OIL

ACCEPTABLE OILS SEE PILOT'S OPERATING HANDBOOK

TOTAL SYSTEM CAPACITY

14,5 QRT 13,6 LTR

ENGINE OIL TYPE USED,

____

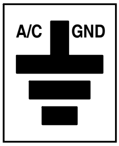
NOTE: The engine oil type used will be added to the placard prior to delivery of the aircraft.

ICN-12-C-A150223-A-S4080-00120-A-002-01

Figure 2-23-1: Placards - Exterior (Sheet 4 of 7)

12-C-A15-10-0223-00A-067A-A

On Nose Landing Gear (each side):



On Nose Landing Gear:

← DO NOT TURN BEYOND RED MARKS →

Near Fuel Filler:

JET-A-FUEL
TOTAL CAPACITY
770 LTR. 203 US. GAL.

SEE PILOT'S OPERATING HANDBOOK
FOR APPROVED FUELS AND QUANTITY

REFUELING BONDING POINT

Near Fuel Vent:

FUEL VENT

On top surface of each Aileron and three places on top surface of each flap:

DO NOT PUSH

On the main landing gear doors:

TYRE PRESSURE 60 psi (4,1 bar)

On the nose landing gear doors:

TYRE PRESSURE 60 psi (4,1 bar)

ICN-12-C-A150223-A-S4080-00121-A-002-01

Figure 2-23-1: Placards - Exterior (Sheet 5 of 7)

12-C-A15-10-0223-00A-067A-A

On each side of Engine Lower Front Cowling:

VERY HOT AREA
DO NOT TOUCH →

On Forward Fuselage RH side Access Door:

OXYGEN SERVICE POINT
USE NO LUBRICANTS

Note: When the optional larger oxygen bottle is installed, this placard is installed inside the battery compartment and outside on Rear Fuselage Bottom Access Door.

On Nose Landing Gear Doors:

NOSE LANDING GEAR SHOCK STRUT
N2 CHARGE PRESSURE

1st. STAGE	**50 psi (3,5 bar)**
2nd. STAGE	**834 psi (57,5 bar)**

ICN-12-C-A150223-A-S4080-00122-A-001-01

Figure 2-23-1: Placards - Exterior (Sheet 6 of 7)

12-C-A15-10-0223-00A-067A-A

On Main Landing Gear Doors:

MAIN LANDING GEAR SHOCK STRUT
N2 CHARGE PRESSURE

1st. STAGE 141 psi (9,7 bar)
2nd. STAGE 1668 psi (115 bar)

On Rear Fuselage Bottom Access Door:

BATTERY COMPARTMENT

ELT
INSTALLED INSIDE

On Rear Fuselage Bottom LH side:

28 VOLT DC
EXTERNAL POWER POINT

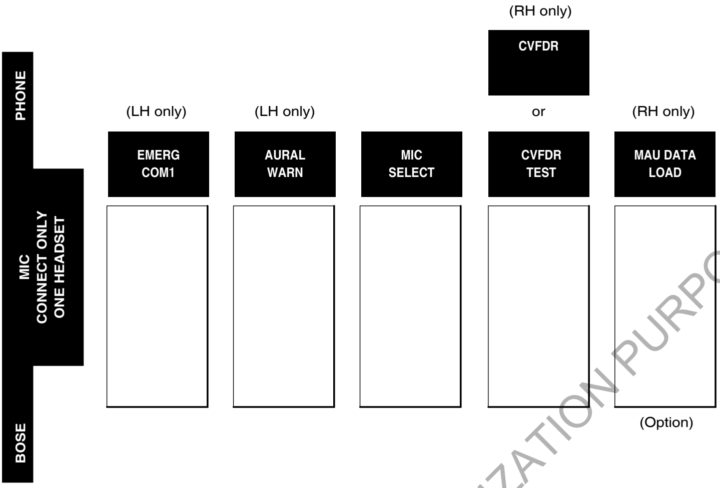
ICN-12-C-A150223-A-S4080-00123-A-001-01

Figure 2-23-1: Placards - Exterior (Sheet 7 of 7)

12-C-A15-10-0223-00A-067A-A

PLACARDS - COCKPIT

On Cockpit LH and RH Rear Panels:



On Cockpit LH Side Panels near oxygen system controls:

On Cockpit LH and RH Side Panels:

ICN-12-C-A150223-A-S4080-00124-A-002-01

Figure 2-23-2: Placards - Cockpit (Sheet 1 of 6)

12-C-A15-10-0223-00A-067A-A

On left Cockpit Side Panel and right Cockpit Side Panel
(LH Shown, RH Opposite):

OPERATIONAL LIMITATIONS

THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.

NO ACROBATIC MANEUVERS INCLUDING SPINS ARE APPROVED.

THIS AIRPLANE APPROVED FOR VFR, IFR, DAY & NIGHT OPERATION & ICING CONDITIONS

EMERGENCY GEAR EXTENSION

-AIRSPEED 120 KIAS
-ENSURE LANDING GEAR SELECTOR DOWN
IF 3 GREENS NOT ILLUMINATED AFTER 30 SECONDS
-EMERGENCY GEAR EXTENSION SYSTEM (AFT END OF CENTRE PEDESTAL)
-OPEN COVER
-PULL EMERGENCY GEAR EXTENSION LEVER FIRMLY TO HARD STOP.
CHECK 3 GREENS ARE OBTAINED. IF 3 GREENS STILL NOT ILLUMINATED
-TO LOCK LH & RH GEAR: CONDUCT LEVEL TURNS LEFT AND RIGHT AT ANGLES OF BANK UP TO 30°, MAINTAIN CONSTANT SPEED
-TO LOCK NOSE GEAR: REDUCE AIRSPEED (POWER IDLE)
-KEEP EMERGENCY GEAR EXTENSION LEVER IN PULLED POSITION

WARNING: DURING FLIGHT IN ICING CONDITIONS OR FLIGHT WITH ANY VISIBLE ICE ACCRETION ON THE AIRFRAME THE FOLLOWING FLAP MAXIMUM EXTENSION LIMITS APPLY:
-WITH OPERATIONAL AIRFRAME PNEUMATIC DE-ICE BOOTS 15° FLAP.
-AFTER FAILURE OF THE AIRFRAME PNEUMATIC DE-ICE BOOTS 0° FLAP.

FIRE EXTINGUISHER LOCATED
BEHIND THE CO-PILOT SEAT

Near DV Window:

**DV WINDOW
PRESS BUTTON
AND PULL INWARDS**

On the front side of the right cockpit bulkhead:

ICN-12-C-A150223-A-S4080-00125-A-002-01

Figure 2-23-2: Placards - Cockpit (Sheet 2 of 6)

12-C-A15-10-0223-00A-067A-A

On the LH and RH Instrument Panel:

V_O (4740 KG)	166 KIAS
V_O (2600 KG)	123 KIAS
V_{MO}	240 KIAS
M_{MO}	0.49 M
V_{FE} (UP TO 15°)	165 KIAS
V_{FE} (ABOVE 15°)	130 KIAS

RADIO-CALL
. . . . .

Near Landing Gear Selector Handle:

V_{LO}	180 KIAS
V_{LE}	240 KIAS

Near TS/MF Controller:

TOTAL USABLE CAPACITY: 1521 LTR 402 US.GAL (2704 LBS JET-A1)

Below the RH Primary Flight Display:

ENSURE CABIN △P MAX. 0.7PSI
BEFORE LANDING

MAXIMUM CABIN
DIFF. PRESS. = 5.75 PSID

On LH Crosspanel (optional):

COM 3

Near AFCS Control Panel (if AT not installed):

AT NOT INSTALLED

ICN-12-C-A150223-A-S4080-00126-A-002-01

Figure 2-23-2: Placards - Cockpit (Sheet 3 of 6)

On Cockpit LH Instrument Panel:

ELT

ON

Near optional Standby Magnetic Compass (if installed):

STANDBY COMPASS
FOR CORRECT READING SWITCH:
GENERATORS & BATTERIES ON
AVIONICS ON
NAV & INSTRUMENT LIGHTS AS REQUIRED
WINDSHIELD DE-ICE LH & RH OFF
PROBES DE-ICE OFF
ELECTRICAL HEAT/COOL SWITCH INHIBIT
FOOT WARMER OFF (IF INST.)

On Left and Right Control Wheel:

DN
LH RH
UP

A/P DISC

TRIM ENGAGE

PUSHER INTR

PTT

TCS

INOP
OR
CKLST

When optional electronic checklist installed

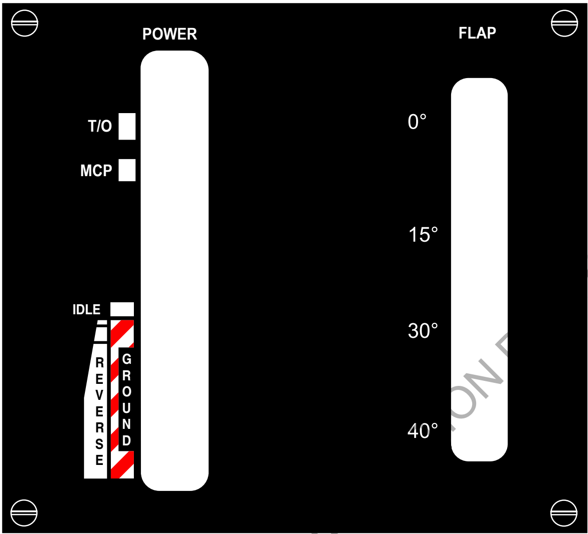
MAP LIGHT

ICN-12-C-A150223-A-S4080-00127-A-001-01

Figure 2-23-2: Placards - Cockpit (Sheet 4 of 6)

12-C-A15-10-0223-00A-067A-A

On Center Console:



STABILIZED PROPELLER OPERATION ON GROUND (NOT FEATHERED) BETWEEN 350 AND 950 rpm IS PROHIBITED

At aft end of Center Console:

CAUTION
PCL OPERATION AFT OF THE IDLE DETENT
IS PROHIBITED WHEN IN FLIGHT

ICN-12-C-A150223-A-S4080-00128-A-001-01

Figure 2-23-2: Placards - Cockpit (Sheet 5 of 6)

12-C-A15-10-0223-00A-067A-A

On the PCL:

TO/GA

VHF1
XFER

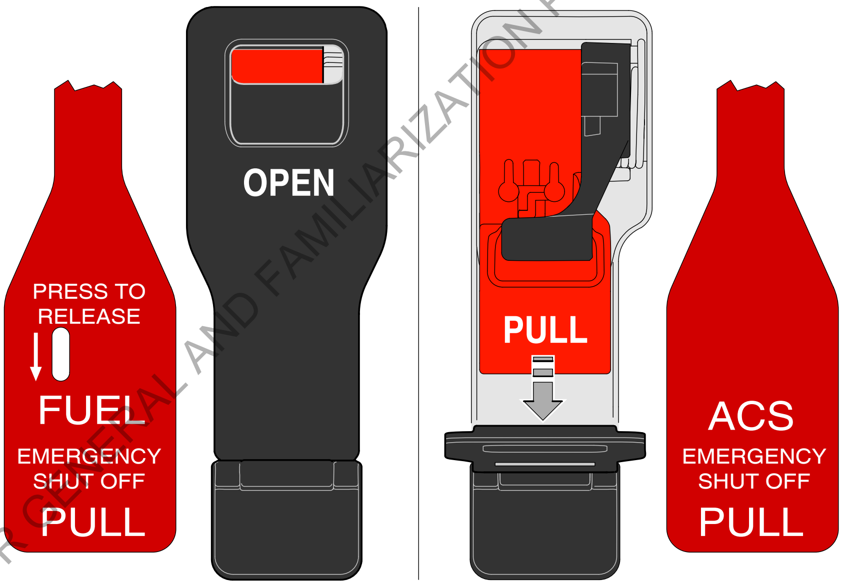
RUD TRIM

AT DISC

At rear of Center Console:

FUEL EMER SOV HANDLE | EMERGENCY GEAR EXTENSION | ACS EMER SOV HANDLE

On Fuel and ACS Firewall Shut off Valve and Emergency Gear Extension Handles:



Behind Crew Seats:

PULL

SMOKE
GOGGLE

ICN-12-C-A150223-A-S4080-00129-A-001-01

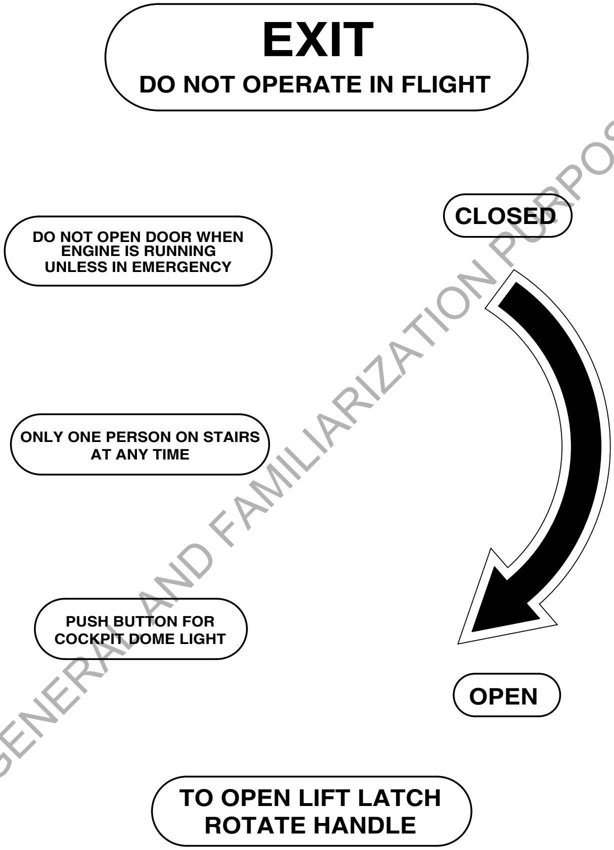
Figure 2-23-2: Placards - Cockpit (Sheet 6 of 6)

12-C-A15-10-0223-00A-067A-A

PLACARDS - CABIN

The following standard placards are installed in all aircraft.

On Interior Passenger Door:



ICN-12-C-A150223-A-S4080-00130-A-001-01

Figure 2-23-3: Placards - Cabin (Sheet 1 of 3)

12-C-A15-10-0223-00A-067A-A

On or above Interior Emergency Exit:

EXIT

On Interior Emergency Exit Handle:

PULL

On Interior Cargo Door Handle Cover:

DO NOT REMOVE COVER IN FLIGHT

On Interior Cargo Door Handle:

**LIFT LOCKING LEVER AND
PULL HANDLE PUSH DOOR OUT**

On Interior Cargo Door:

**DO NOT OPEN DOOR WHEN
ENGINE IS RUNNING
UNLESS IN EMERGENCY**

On Cabin to Baggage Area Step:

KEEP GRILL CLEAR

ICN-12-C-A150223-A-S4080-00131-A-002-01

Figure 2-23-3: Placards - Cabin (Sheet 2 of 3)

12-C-A15-10-0223-00A-067A-A

On forward and rear Cargo Door Frame:

MAX FREIGHT LOAD = 1500 kg / 3300 lb	
Max Load on Seat Rails	**Max Load on Floor Panels**
1000 kg/m² 205 lb/ft²	**600 kg/m² 125 lb/ft²**
CARGO MUST NOT OBSTRUCT ACCESS TO CABIN DOOR AND EMERGENCY EXIT	

On lower Cargo Door Frame:

INSTALL TAIL SUPPORT STAND BEFORE LOADING CARGO

Above Baggage Area:

MAX BAGGAGE LOAD = 120 kg / 265 lb

or

MAX BAGGAGE LOAD = 180 kg / 400 lb

At interior fuselage cargo net attachment points:

FR 24	**FR 27**	**FR 34**

ICN-12-C-A150223-A-S4080-00132-A-001-01

Figure 2-23-3: Placards - Cabin (Sheet 3 of 3)

PLACARDS - 9 SEAT CORPORATE COMMUTER (Interior Code STD-9S).

The cabin placards plus the following additional placards are those required for this interior.

On the rear of the left and right cockpit bulkheads, and on the rear of each seat:

FOR TAKEOFF AND LANDING
- SEAT BACK MUST BE FULLY UPRIGHT
- ADJUST HEADREST TO SUPPORT HEAD
- FASTEN SEAT LAP AND SHOULDER BELT

On the rear of each seat,
except seat No.5:

OXYGEN MASK LOCATED UNDER YOUR SEAT

On the rear of the seat No.5:

OXYGEN MASK LOCATED UNDER SEAT IN FRONT

On the rear of the left cockpit bulkhead:

FIRE EXTINGUISHER LOCATED
ON COCKPIT SIDE RH BULK-
HEAD BEHIND CO-PILOT SEAT ➡

NO SMOKING

Near each Passenger Oxygen Outlet and Cover:

OXYGEN

On the forward Cargo Door Frame:

INTERIOR CODE:
STD-9S
(SEE AFM/POH SECTION 6)

ICN-12-C-A150223-A-S4080-00133-A-001-01

Figure 2-23-4: Placards - 9 Seat Corporate Commuter (Interior Code STD-9S)

PLACARDS - 6 SEAT EXECUTIVE (Interior Code EX-6S-2).

The cabin placards plus the following additional placards are those required for this interior.

On the rear of the left bulkhead:

FIRE EXTINGUISHER LOCATED ON COCKPIT SIDE RH BULK-HEAD BEHIND CO-PILOT SEAT

On the inside of the lavatory doors:

NO SMOKING IN LAVATORY

TO CLOSE PULL HERE

OXYGEN MASK INSIDE

TOILET COMPARTMENT NOT TO BE OCCUPIED DURING TAKEOFF/LANDING AND TURBULENCE

TO CLOSE PULL HERE

PULL TAPE FOR OXYGEN MASK

On the inside of the left and right cabinet drawers:

	Upper	Lower
Right cabinet	**WEIGHT LIMIT 2,2 kg / 5 lb**	**WEIGHT LIMIT 3,2 kg / 7 lb**
Left cabinet	**WEIGHT LIMIT 4,5 kg / 10 lb**	**WEIGHT LIMIT 11,5 kg / 25 lb**

Near each executive seat:

FOR TAKEOFF AND LANDING
- SEAT MUST BE FULLY UPRIGHT, FULLY TO THE BACK OF SEAT AND FULLY OUTBOARD
- ADJUST HEADREST TO SUPPORT HEAD
- FASTEN SEAT LAP AND SHOULDER BELT
- TABLE MUST BE STOWED

ICN-12-C-A150223-A-S4080-00134-A-002-01

Figure 2-23-5: Placards - 6 Seat Executive (Interior Code EX-6S-2) (Sheet 1 of 2)

12-C-A15-10-0223-00A-067A-A

On each Passenger Oxygen Mask Cover:

OXYGEN MASK INSIDE

On the armrest near each Passenger Oxygen Mask:

PULL TAPE FOR OXYGEN MASK ➡	or	⬅ **PULL TAPE FOR OXYGEN MASK**

Near the optional coat rail in the baggage compartment:

MAX COAT RAIL 5 kg / 11 lb

On the forward cargo door frame:

INTERIOR CODE:
EX - 6S-2
(SEE AFM/POH SECTION 6)

ICN-12-C-A150223-A-S4080-00135-A-001-01

Figure 2-23-5: Placards - 6 Seat Executive (Interior Code EX-6S-2) (Sheet 2 of 2)

12-C-A15-10-0223-00A-067A-A

PLACARDS - 8 SEAT EXECUTIVE (Interior Code EX-8S)
- 6 SEAT EXECUTIVE AND 2 SEAT CORPORATE COMMUTER (Interior Code EX-6S-STD-2S)
- 4 SEAT EXECUTIVE AND 4 SEAT CORPORATE COMMUTER (Interior Code EX-4S-STD-4S)

The cabin placards, the 6 seat executive placards and the following replacement/additional placards are required for this interior.

Near seats 5, 6, 7 and 8:

LEAVE THIS SEAT VACANT DURING TAKEOFF AND LANDING UNLESS SEAT IN FRONT IS OCCUPIED

On the forward cargo door frame:

INTERIOR CODE:
EX - 8S
(SEE AFM/POH SECTION 6)

or

INTERIOR CODE:
EX - 6S - STD - 2S
(SEE AFM/POH SECTION 6)

or

INTERIOR CODE:
EX - 4S - STD - 4S
(SEE AFM/POH SECTION 6)

On the armrest near Passenger Oxygen Mask for seats 7 and 8:

PULL TAPE FOR OXYGEN MASK ➡

or

⬅ **PULL TAPE FOR OXYGEN MASK**

ICN-12-C-A150223-A-S4080-00136-A-001-01

Figure 2-23-6: Placards - 8 Seat Executive (Interior Code EX-8S), 6 Seat Executive and 2 Seat Corporate Commuter (Interior Code EX-6S-STD-2S) and 4 Seat Executive and 4 Seat Corporate Commuter (Interior Code EX-4S-STD-4S)

12-C-A15-10-0223-00A-067A-A

PLACARDS - NO CABIN INTERIOR (OPTION)

The following cockpit and cabin placards are required for this interior.

On the overhead panel, covering the "NO SMOKING" and "SEAT BELTS" markings and on the instrument panel, covering the "CAB FLOOD" marking:

INOP

On the left rear side of the ferry flight compartment bulkhead:

LIMITATIONS:
- NO PERSON(S) ALLOWED IN CABIN
- BAGGAGE OR LUGGAGE IN THE CABIN MUST BE TIED DOWN AS DEFINED IN THE AFM/POH

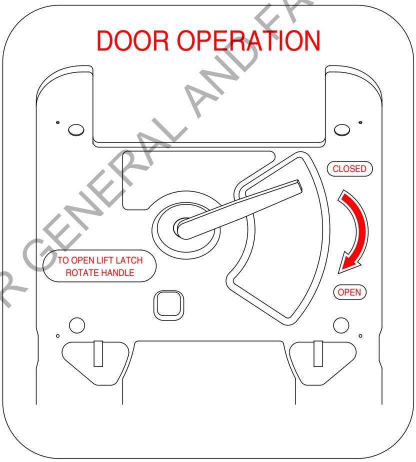
CAUTION:
- EXTREME CAUTION MUST BE APPLIED NOT TO CONTACT THE SIDEWALLS AS NO PROTECTIVE INTERIOR SHELLS ARE INSTALLED

PUSH BUTTON FOR COCKPIT DOME LIGHT

ONLY ONE PERSON ON STAIRS AT ANY TIME

DO NOT OPERATE ANY EXIT IN FLIGHT

FIRE EXTINGUISHER LOCATED ON COCKPIT SIDE RH BULK-HEAD BEHIND CO-PILOT SEAT



NO SMOKING

DO NOT OPEN ANY DOOR WHEN ENGINE IS RUNNING UNLESS IN EMERGENCY

FIRST AID KIT LOCATED ON COCKPIT SIDE L.H. BULKHEAD BEHIND PILOT SEAT

ICN-12-C-A150223-A-S4080-02037-A-001-01

Figure 2-23-7: Placards - No Cabin Interior (Option) (Sheet 1 of 2)

12-C-A15-10-0223-00A-067A-A

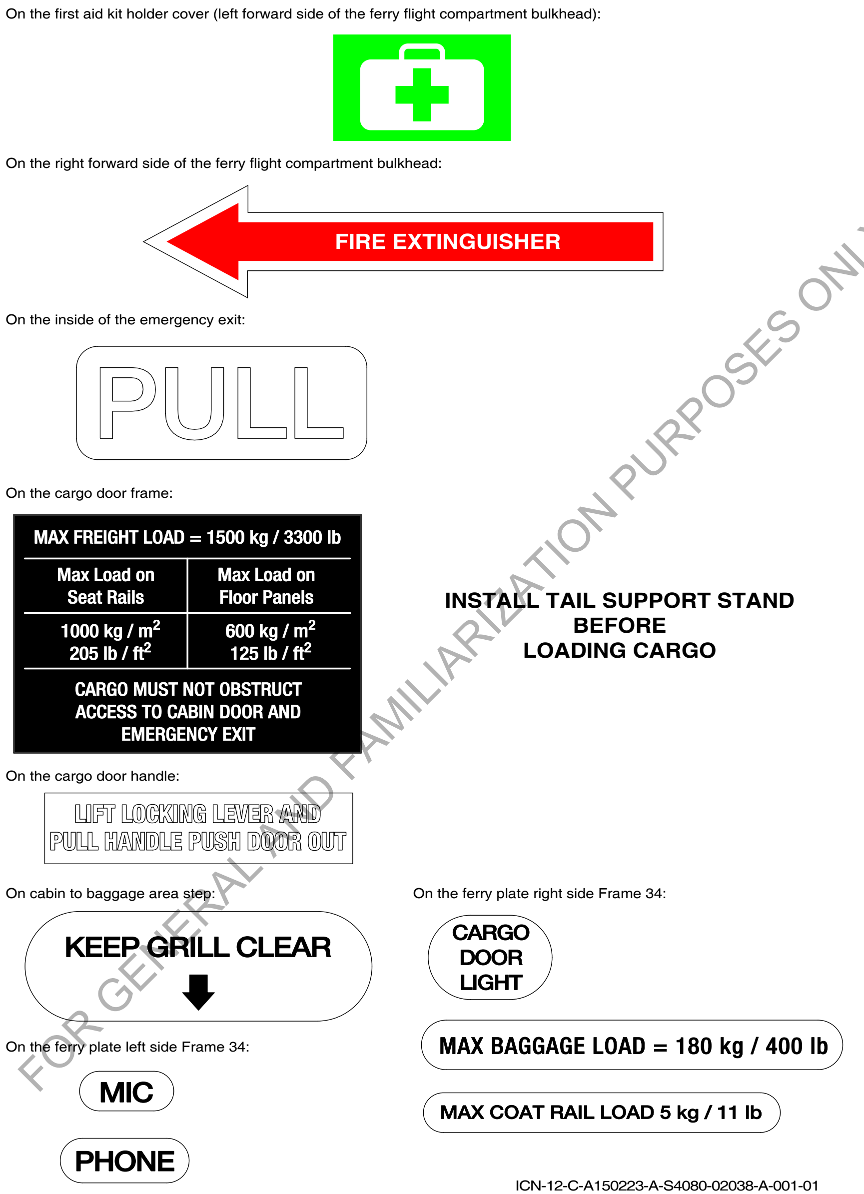


Figure 2-23-7: Placards - No Cabin Interior (Option) (Sheet 2 of 2)

12-C-A15-10-0223-00A-067A-A

SECTION 3

Emergency Procedures (EASA Approved)

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3-1 General

3-1-1 General

The recommended action to be taken in case of failure or in emergency situations are contained in this section.

Emergency procedures alone cannot protect against all situations. Good airmanship be used in conjunction with the emergency procedures to manage the emergency. The general rule for priorities in normal and abnormal operations always applies: Aviate, navigate, communicate. Fly the aircraft first (power, attitude, speed), then navigate (flight path) and finally communicate.

Some situations require rapid action, leaving little time to consult the emergency procedures. Prior knowledge of these procedures and a good understanding of the aircraft system is a prerequisite for safe aircraft handling.

KNOW YOUR AIRCRAFT AND BE THOROUGHLY FAMILIAR WITH IMPORTANT EMERGENCY PROCEDURES.

Upon detection of an abnormal situation or any indication of malfunction, the drill procedure “PPAA” is highly recommended to initiate a structured working process:

P	Power	Check engine power setting versus actual power
P	Performance	Check speed, flight path and aircraft configuration
A	Analysis	Analyze the situation within the time available using all means of other indications to verify initial cue (e.g. cross reference CAS message with other system parameters or indications, check circuit breaker panel for CAS related CB status)
A	Action	Immediate and subsequent actions guided by airmanship and given checklist procedures

The emergency procedures use the terms “Land as soon as possible” and “Land as soon as practical”. For the purpose of these procedures the meanings are as follows:

- Land as soon as possible – Land without delay at the nearest airport where a safe approach and landing is reasonably assured.
- Land as soon as practical – Landing airport and duration of flight are at the discretion of the pilot. Extended flight beyond the nearest suitable airport is not recommended.

If not detailed otherwise in the procedures, circuit breakers on the Essential Bus which trip in flight, one attempt only is allowed to reset the circuit breaker if the pilot in command determines that the system/equipment is needed for safe completion of that flight. The open circuit breaker can be reset after at least one minute has elapsed since the circuit breaker trip and if there is no remaining smoke or burning smell.

If an emergency procedure requires a circuit breaker to be reset, this means to open (pull out) the circuit breaker, wait for approx. 2 seconds and then close (push in) the circuit breaker. If a circuit breaker is found open, reset means close the circuit breaker.

3-1-2 Crew Alerting System

The Crew Alerting System (CAS) gives:

- **RED Warning** messages which require immediate corrective action by the pilot.
- **AMBER Caution** messages which requires the pilots attention but not an immediate action.
- **CYAN Advisory** messages which indicate a system condition, which requires pilot awareness and may require action.
- **WHITE Status** messages which are only shown on the ground and indicate a maintenance action is required.

Whenever a red or amber message illuminates on the systems Multi Function Display (MFD), the MASTER WARNING or CAUTION lamp will illuminate. A triple chime will sound, a voice callout will be given with some red annunciations in place of the triple chime. A single chime will sound with all amber messages.

CAS warnings and cautions will remain illuminated as long as the initiating condition exists. The MASTER WARNING and CAUTION lamps should be pressed to reset them for further failures once the failure is identified.

3-1-3 Flight Alerting System

Flight Alerting System (FAS) messages are given when necessary on the pilot's PFD to warn of a condition that requires immediate action from the pilot. FAS messages are directly related to the operation of the aircraft. All the FAS messages are accompanied by a voice callout and can only be cancelled by correcting the aircraft condition.

3-1-4 FAS Messages and Actions

Table 3-1-1: FAS Messages and Actions

FAS MESSAGE TEXT	AURAL MESSAGE	REQUIRED ACTION
STALL	Stall	Reduce AOA
GEAR	Gear	Extend Landing Gear
CAB PRESS(on ground only)	Cabin	Check Systems MFD ENVIRONMENT window, if shows $\Delta P \geq 0.072$ psi: CPCS CABIN PRESSURE switch DUMP

Table 3-1-1: FAS Messages and Actions (continued from previous page)

FAS MESSAGE TEXT	AURAL MESSAGE	REQUIRED ACTION
GND PROX / PULL UP	PULL UP, PULL UP	Do these actions immediately: 1 Disconnect AP if engaged 2 Rotate initially to 15° pitch 3 Set PCL to TO (fully forward) 4 *If alert still present:* Rotate to maximum pitch, respect stick shaker, avoid pusher activation When clear of terrain, follow standard missed approach procedure, remaining clear of terrain.
NO TAKEOFF	No Takeoff	Check aircraft configuration is correct for Takeoff: − Flaps: Set 15° or 30° − Aileron, Rudder, Stabilizer Trim: Set green range
OVERSPEED	Speed	Reduce airspeed
TCAS RA	Various (climb, descend, level off, or maintain vertical speed)	Do these actions immediately: 1 Disconnect AP if engaged 2 Immediately comply with RA commands indicated on the PFD 3 Inform ATC of TCAS RA 4 *When clear of conflict:* Return to previously assigned altitude and advise ATC

12-C-A15-40-0301-00A-010A-A

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3-2 Airspeeds for Emergency Operations

3-2-1 Airspeeds for Emergency Operations

All airspeeds shown are with airplane in clean configuration under ISA conditions.

Operating Maneuvering Speed (V_O):

Aircraft Mass	Airspeed
10450 lb (4740 kg)	166 KIAS
9921 lb (4500 kg)	161 KIAS
9480 lb (4300 kg)	158 KIAS
9039 lb (4100 kg)	154 KIAS
8380 lb (3800 kg)	148 KIAS
7940 lb (3600 kg)	144 KIAS
7500 lb (3400 kg)	140 KIAS
7060 lb (3200 kg)	136 KIAS
6610 lb (3000 kg)	132 KIAS
6170 lb (2800 kg)	127 KIAS
5730 lb (2600 kg)	123 KIAS

Best Glide (Propeller feathered):

Aircraft Mass	Airspeed
10450 lb (4740 kg)	119 KIAS
9920 lb (4500 kg)	116 KIAS
9040 lb (4100 kg)	110 KIAS
8160 lb (3700 kg)	105 KIAS
7280 lb (3300 kg)	99 KIAS
6400 lb (2900 kg)	93 KIAS

Landing Approach Speeds with ice accretion on the airframe:

After failure of:	Minimum Approach Speed
Pneumatic Deice Boots (flap position limit 0°)	130 KIAS
AOA Probe Deice and/or	105 KIAS
Pitot and Static Probe Deice and/or	105 KIAS
Pusher Ice Mode(flap position limit 15°)	105 KIAS

Balked Landing (Go Around):

After failure of:	Minimum Approach Speed
Pneumatic Deice Boots (flap position limit 0°) (TO/Pwr, flaps 0°, LG down,Pusher Ice Mode)	130 KIAS

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3-3 Rejected Takeoff (Not engine related)

Rejected Takeoff (Not engine related) 3-3-01

1.	PCL..	Idle
2.	Braking......................................	As required
3.	Reverse.....................................	As required

CAUTION

If any further taxiing is required soft brake pedals and/or wheel fusible plugs release may occur due to overheating.

If the aircraft cannot be stopped on the remaining runway:

4.	PCL..	Idle
5.	Engine switch............................	OFF
6.	FUEL EMERG shut off................	Press latch down and pull lever up
7.	MASTER POWER switch...........	EMERG OFF

After the aircraft has stopped:

8.	Aircraft......................................	Evacuate

CAUTION

A rejected takeoff may cause overheating of wheel and brake assembly components. The main wheels and brakes should be inspected for damage in accordance with the respective component manuals before the next flight.

---------- END -----------

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3-4 Engine Failure

Engine failure before rotation — 3-4-01

1.	PCL...	Idle
2.	Braking......................................	As required

If runway overrun or collision is likely, then:

3.	Engine switch............................	OFF
4.	FUEL EMERG shut off...............	Press latch down and pull lever up
5.	MASTER POWER switch...........	EMERGENCY OFF

After the aircraft has stopped:

6.	Aircraft.......................................	Evacuate

---------- END -----------

Engine failure after rotation - Landing gear down — 3-4-02

If total power loss:

If altitude is not sufficient to select a runway or field:

1.	Aircraft.......................................	Land straight ahead, turning only to avoid obstructions (maximum recommended bank angle 30° L/R)
2.	Flaps..	40º
3.	Final Approach Speed for 10450 lb (4740 kg)..............................	88 KIAS. Not below Dynamic Speed Bug (1.3 V_S)
4.	PCL...	Idle
5.	Engine switch............................	OFF
6.	FUEL EMERG shut off...............	Press latch down and pull lever up

After touch down:

7.	MASTER POWER switch...........	EMERGENCY OFF

After the aircraft has stopped:

8.	Aircraft.......................................	Evacuate

--------- END -----------

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Engine failure after rotation - Landing gear up 3-4-03

If total power loss:

1. Landing gear............................. Down, if landing site allows, otherwise keep landing gear up
2. Flaps... 40º
3. Aircraft....................................... Final Approach Speed for 10450 lb (4740 kg), not below DSB (1.3 V_S):

Speed	Flap setting
101 KIAS	Flaps 15º
91 KIAS	Flaps 30º
88 KIAS	Flaps 40º

4. PCL.. Idle
5. Engine switch............................ OFF
6. FUEL EMERG shut off............... Press latch down and pull lever up

After touch down:

7. MASTER POWER switch........... EMERGENCY OFF

After the aircraft has stopped:

8. Aircraft....................................... Evacuate

---------- END -----------

Engine Failure in Flight - Total Power Loss 3-4-04

1. Autopilot.................................... Use FLC (best glide speed) and HDG/T or NAV mode

   Best glide (propeller feathered):

weight	speed
10,450 lb (4740 kg)	119 KIAS
9920 lb (4500 kg)	116 KIAS
9040 lb (4100 kg)	110 KIAS
8160 lb (3700 kg)	105 KIAS
7280 lb (3300 kg)	99 KIAS
6400 lb (2900 kg)	93 KIAS

2. PCL.. Idle

Continued on next page

Engine Failure in Flight - Total Power Loss — 3-4-04

continued

3.	Aircraft.......................................	Proceed to nearest airfield or landing site avoiding high terrain
4.	Remaining fuel..........................	Check

If no mechanical damage suspected and time permits:

5.	Aircraft.......................................	Carry out Air Start

If cabin altitude is above 10,000 ft:

6.	Aircraft.......................................	Make an Emergency Descent

If no air start:

7.	Aircraft.......................................	Make a Forced Landing - 3-9-02

---------- END -----------

Engine Surging — 3-4-05

1.	PCL...	Reduce to minimum to sustain flight

If engine surge persists:

2.	ACS Bleed Air switch.................	OFF for 5 seconds, reset to ON

If engine surge persists:

3.	Electrical HEAT/COOL switch.....	INHIBIT

If engine surge persists:

4.	PCL...	Set to IDLE and descent to denser air, if required to 15,000 ft

If engine surge persists and flight altitude cannot be maintained:

5.	ACS Bleed Air switch.................	OFF

If engine surge persists:

6.	Aircraft.......................................	Land as soon as possible. If possible always retain glide capability, to the selected landing airfield, in case of total engine failure

Note

Water/ice ingestion can produce effects similar to an engine surge, potentially resulting in momentary surge.

---------- END -----------

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3-5 Air Start

Air Start Envelope 3-5-01

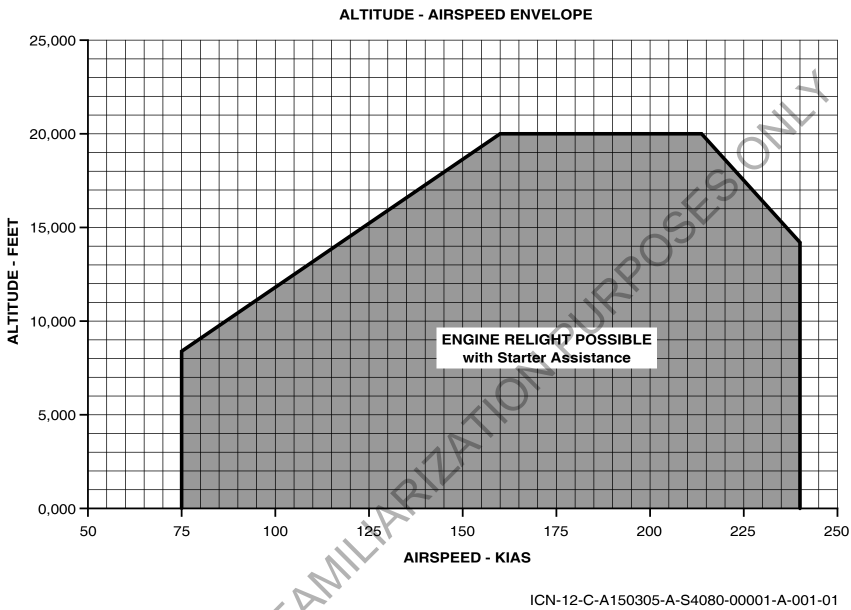

Figure 3-5-1: Engine Relight

---------- END -----------

Air Start - With starter 3-5-02

WARNING

IF THE ENGINE RUNS AT FLIGHT IDLE WITH THE PROPELLER FEATHERED ABOVE FL200 KEEP ENGINE RUNNING UNTIL WITHIN AIR START ENVELOPE TO MINIMIZE EXPOSURE TIME WITHOUT BLEED AIR AND GENERATOR SUPPORT.

1. Engine switch.............................. OFF
2. Ignition switch............................ AUTO

If EPECS Fail *displayed:*

Continued on next page

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Air Start - With starter — 3-5-02

continued

3.	NG..	Check NG < 5%
4.	EEC CH A (Essential Bus $_{L}$C3) circuit breaker...........................	PULL
5.	EEC CH B (Avionic 1 Bus $_{L}$R1) circuit breaker...........................	PULL
6.	EEC CH A (Essential Bus $_{L}$C3) circuit breaker...........................	PUSH, wait for 1 second
7.	EEC CH B (Avionic 1 Bus $_{L}$R1) circuit breaker...........................	PUSH

If EPECS Fail *persists:*

8.	Aircraft.......................................	Make a Forced Landing - 3-9-02

WARNING

DO NOT ATTEMPT AN ENGINE START WITH EPECS FAIL DISPLAYED.

If no EPECS Fail *displayed:*

9.	PCL..	Idle
10.	PROP LOW SPEED switch........ (if installed)................................	PUSH (set to ON, if not active)
11.	Engine switch.............................	RUN
12.	FUEL EMERG shut off.................	Full in
13.	BAT 1 and BAT 2 switches...........	ON
14.	Air start envelope.........................	Check (Refer to Fig. 3-5-1)
15.	IGNITION switch..........................	ON
16.	STARTER switch...........................	PUSH momentarily
17.	ITT and NG..................................	Monitor

When engine has relit NG >64.5%:

18.	IGNITION switch........................	AUTO
19.	FUEL PUMP switches.................	AUTO
20.	GEN 1 and GEN 2......................	Check volts and amps
21.	Electrical equipment....................	As required

Continued on next page

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Air Start - With starter 3-5-02

continued

If no air start:

WARNING

DO NOT ATTEMPT MORE THAN ONE AIR START. REPEATED AIR START ATTEMPTS COULD DISCHARGE THE BATTERY TO A LEVEL THAT WOULD NOT BE ABLE TO SUPPORT ESSENTIAL ELECTRICAL SERVICES.

22. Aircraft.. Make a Forced Landing - 3-9-02

---------- END -----------

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3-6 Engine Emergencies

Propeller Low Pitch — 3-6-01

Propeller Low Pitch warning and voice callout “Propeller Low Pitch”.

1. PCL.. Ensure forward of idle detent

If it is not possible to maintain speed and height:

2. Engine switch............................ OFF
3. Aircraft...................................... Carry out Emergency Descent and Emergency Landing procedures

---------- END -----------

Engine Np — Engine Np — 3-6-02

On ground:

1. NP.. Check PROP RPM

If propeller RPM is below 900 (steady state in reverse region):

2. PCL.. Modulate power until Np is above 900 rpm

If propeller RPM is below 900 (steady state in forward region):

3. Engine...................................... Shutdown as soon as possible

If propeller RPM is above 1760 (steady state):

4. PCL.. IDLE
5. Engine...................................... Shutdown

--- END ---

In flight:

1. NP.. Check PROP RPM

If propeller RPM is below 1640 (steady state):

2. PCL.. Increase power
3. Aircraft speed............................ Increase

If propeller RPM is above 1760 (steady state):

4. PCL.. Reduce power
5. Aircraft speed............................ Reduce

If propeller RPM remains above 1760 (steady state):

6. Aircraft...................................... Continue flight, at low aircraft speed, using minimum possible power.

Continued on next page

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Engine Np — Engine Np — 3-6-02

continued

WARNING

THE ENGINE WILL BE COMMANDED TO FEATHER/IDLE IF NP EXCEEDS 1845 RPM.

---------- END -----------

Engine Ng — Engine Ng — 3-6-03

1. NG.. Check NG % indication

If NG is above 104%:

2. PCL.. Reduce power

If NG is above 104.3% or above 104% after 20 seconds:

3. PCL.. Reduce power
4. Aircraft speed............................ Reduce to 120 KIAS or below
5. Aircraft....................................... Land as soon as possible, using minimum power. If possible always retain glide capability, to the selected landing airfield, in case of total engine failure

--- END ---

If NG is below 64.5%:

On ground

1. PCL.. IDLE
   Engine....................................... Shutdown

--- END ---

In flight

1. PCL.. Increase power
2. Aircraft speed............................ Increase

If engine does not respond to PCL inputs:

3. Aircraft....................................... Carry out Engine Failure in Flight - Total Power Loss - 3-4-04

---------- END -----------

Engine Torque — Engine Torque — 3-6-04

1. TORQUE.................................. Check torque indication

Continued on next page

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Engine Torque continued — Engine Torque — 3-6-04

If torque above 44.3 psi:

2. PCL... Reduce power

If **Engine Torque** *or* **Engine Torque** *remains:*

3. Aircraft.. Land as soon as possible, using minimum power. If possible always retain glide capability, to the selected landing airfield, in case of total engine failure

---------- END -----------

Engine ITT — Engine ITT — 3-6-05

1. ITT... Check ITT indication

If ITT above 850 °C:

Note
For hot/high environment ground operations, momentary ITT peak in the transient range may be expected during engine acceleration.

2. PCL... Reduce power

If **Engine ITT** *or* **Engine ITT** *remains:*

3. Aircraft.. Land as soon as possible, using minimum power. If possible always retain glide capability, to the selected landing airfield, in case of total engine failure

---------- END -----------

Engine Oil Press — Engine Oil Press — 3-6-06

1. Oil... Check OIL P PSI indication

If **Engine Oil Press** *or* **Engine Oil Press** *is confirmed:*

2. NG... Check NG above 72%
3. Torque.. Reduce to below 24 PSI

If **Engine Oil Press** *or* **Engine Oil Press** *remains:*

4. Aircraft.. Land as soon as possible, using minimum power. If possible always retain glide capability, to the selected landing airfield, in case of total engine failure

---------- END -----------

Engine Oil Temp | Engine Oil Temp | 3-6-07

On ground:

1.	Oil...	Check OIL T °C indication

If oil temperature is high:

2.	Aircraft.......................................	Position into wind
3.	PCL...	Increase power

If oil temperature does not return to normal:

4.	ELECTRICAL HEAT/COOL switch.......................................	INHIBIT

If **Engine Oil Temp** *or* **Engine Oil Temp** *remains:*

5.	Engine.......................................	Shut down engine. Maintenance required.

If oil temperature is low (below -40 °C):

6.	Engine.......................................	Do not start. Preheating is required.

If oil temperature is -40 °C or above:

7.	PCL...	Use low power settings (maximum 72% NG steady state) until oil temperature is above 15°C.

--- END ---

In flight:

1.	Oil...	Check OIL T ºC indication

If oil temperature is high:

2.	PCL...	Reduce power

If oil temperature does not return to normal:

3.	Landing gear................................	Extend

If **Engine Oil Temp** *or* **Engine Oil Temp** *remains:*

4.	Aircraft.......................................	Land as soon as practical

After landing:

5.	Engine.......................................	Shut down engine. Maintenance required

---------- END -----------

Starter Engaged | 3-6-08

On ground (during an engine start):

1.	Engine switch.............................	OFF

Continued on next page

Starter Engaged — 3-6-08

continued

2.	STARTER circuit breaker (Essential Bus $_L$L1)....................	PULL
3.	EXT PWR (if available)...............	OFF
4.	BAT 1 and BAT 2 switches..........	OFF
5.	Aircraft..	Maintenance action required

--- END ---

In flight (following an air start):

1.	BUS TIE circuit breaker (Electrical Power Management panel)...	Pull
2.	STARTER circuit breaker (Essential Bus $_L$L1)....................	Pull
3.	GEN 1 and GEN 2 switches........	OFF

If **Starter Engaged** *extinguised:*

4.	GEN 1 and GEN 2 switches........	RESET then ON
5.	BUS TIE circuit breaker (Electrical Power Management panel)...	Reset

If **Starter Engaged** *remains:*

6.	BAT 2 switch..................................	OFF
7.	GEN 1 switch..................................	RESET then ON
8.	BAT 1 switch..................................	Check ON

Note

Starter Engaged will remain on.

---------- END -----------

Engine Oil Level — 3-6-09

Low engine oil level on ground

1.	Engine..	Servicing required as per POH Section 4, Preflight Inspection, Nose Section - 4-3-04, Engine area, step 13

---------- END -----------

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Engine Chip 3-6-10

On ground: Before engine start:

1. Do not start engine...................... Maintenance required

--- END ---

On ground: After engine start or after landing:

1. Aircraft.. Return to parking area
2. Engine.. Shut down engine. Maintenance required

--- END ---

In flight:

1. Aircraft.. Check and monitor engine parameters
2. PCL.. Reduce power to minimum required for safe flight
3. Aircraft.. Land as soon as practical

After landing:

4. Engine.. Maintenance required.

---------- END -----------

EPECS Fail 3-6-11

On ground:

1. Engine.. Do not start engine, shut down engine
2. Engine.. Maintenance required

--- END ---

In flight with total or partial loss of engine control:

Note

In certain EPECS Fail conditions, the system commands flight idle and feathers the propeller. The engine continues to provide bleed air for cabin pressurization, airframe anti/de-icing and generator power.

If engine running in idle and propeller feathered or engine stopped:

1. Aircraft.. Carry out Engine Failure in Flight - Total Power Loss - 3-4-04 procedure

If engine running and propeller not feathered:

2. PCL.. Do not make fast PCL movements
3. Aircraft.. Land as soon as possible. Retain glide capability, to the selected landing airfield, in case of total engine failure

---------- END -----------

EPECS Degraded 3-6-12

On ground:

1.	Engine..	Do not start engine, shut down engine when possible
2.	Engine..	Do an aircraft power reset

If fault remains:

3.	Engine..	Maintenance required

--- END ---

In flight:

1.	Aircraft..	Check and monitor engine parameters. Possible degraded engine response. Prepare for uncommanded change in engine power.
2.	Autothrottle................................	Disconnect (if active)
3.	PCL...	Do not make fast PCL movements
4.	Torque..	If indication is invalid, slowly reduce power to idle prior to further engine power changes (10 sec. rate from MCP to IDLE). If flight conditions permit, avoid high power settings
5.	Aircraft..	Land as soon as practical

---------- END -----------

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3-7 Fire, Smoke or Fumes

Fire Detector		**3-7-01**
A fault in the Fire detection system has occurred.		
On ground		
1.	Engine......................	Do not start engine, shut down engine
2.	Engine......................	Maintenance action required
--- END ---		
In flight		
1.	Engine......................	Check indications
2.	Aircraft......................	Land as soon as practical
---------- END -----------		

Engine Fire		**3-7-02**
Engine Fire warning and voice callout “Fire”. Possible smoke and/or fumes.		
On ground		
1.	PCL........................	Idle
2.	Engine switch...........	OFF
3.	ACS EMER shut off...	PULL
4.	FUEL EMER shut off.	Press latch down and pull lever up
5.	Radio........................	Emergency call
6.	MASTER POWER switch.......................	EMERGENCY OFF

Continued on next page

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Engine Fire 3-7-02

continued

7.	Parking brake............	OFF (if possible)
8.	Aircraft.......................	Evacuate
9.	Fire............................	Extinguish

--- END ---

In flight

1.	Engine power............	Reduce to minimum acceptable according to flight situation
2.	ACS EMER shut off...	PULL
3.	Main OXYGEN lever.	Confirm ON
4.	Crew oxygen masks and smoke goggles (if equipped)..............	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on.

3 Put the smoke goggles on.

4 Put the normal headset back on.

5 Set MIC SELECT switch on rear left panel to MASK.

5.	Crew Oxygen.............	EMGCY

Continued on next page

Engine Fire 3-7-02

continued

6.	Vent valve (if smoke goggles worn)............	Open
7.	PASSENGER OXYGEN selector.....	ON
8.	Systems MFD **PAX OXY** advisory...........	Confirm ON
9.	Passengers...............	Instruct to don masks
10.	Aircraft.......................	Check fire

If confirmed that fire exists:

11.	FUEL EMER shut off.	Press latch down and pull lever up
12.	Engine switch............	OFF

If smoke evacuation is required:

13.	CABIN PRESSURE switch........................	DUMP

When cabin differential pressure is zero:

14.	DV window................	Open
15.	FANS VENT switch...	LOW
16.	Aircraft.......................	Carry out Emergency Descent and/or Emergency Landing procedures

---------- END -----------

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Cockpit/Cabin Fire, Smoke or Fumes, Smoke Evacuation 3-7-03

1.	Main OXYGEN lever.	Confirm ON
2.	Crew oxygen masks and smoke goggles (if equipped).............	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on.

3 Put the smoke goggles on.

4 Put the normal headset back on.

5 Set MIC SELECT switch on rear left panel to MASK.

3.	Crew Oxygen.............	EMGCY
4.	Vent valve (if smoke goggles worn)...........	OPEN
5.	PASSENGER OXYGEN selector.....	ON
6.	Systems MFD **PAX OXY** advisory...........	Confirm ON
7.	Passengers...............	Instruct to don masks
8.	Aircraft......................	Initiate descent to below 10,000 ft or to minimum safe altitude if higher

Continued on next page

Cockpit/Cabin Fire, Smoke or Fumes, Smoke Evacuation **3-7-03**

continued

9.	Aircraft......................	Proceed to nearest Airfield

If smoke evacuation is required:

10.	ACS EMER shut off...	PULL
11.	CABIN PRESSURE switch.......................	DUMP

When cabin pressure differential is zero:

12.	DV window................	Open
13.	VENT FANS.............	LOW
14.	Fire Extinguisher.......	Use if required

As soon as time permits and source is known electrical:

15.	Associated electrical equipment..................	Off (circuit breakers)

Continued on next page

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Cockpit/Cabin Fire, Smoke or Fumes, Smoke Evacuation **3-7-03**

continued

WARNING

DO NOT PULL THE FOLLOWING CIRCUIT BREAKERS ASSOCIATED WITH THE AUXILIARY HEATING SYSTEM:

- **COND HTR CTL**
- **CABIN FAN**
- **U/F FAN**

If smoke/fumes still persist and source is suspected electrical:

16. BUS TIE circuit breaker (overhead panel)........................ PULL
17. GEN 2 switch............. OFF
18. BAT 2 switch.............. OFF
19. CABIN HEATER, circuit breaker 1 (LHPJB).................... PULL

If smoke/fumes still persist and source is suspected electrical:

20. Aircraft....................... Attempt to regain VMC conditions if possible
21. EPS switch................ CHECK ARMED

Commence flying with reference to the ESIS

Continued on next page

Cockpit/Cabin Fire, Smoke or Fumes, Smoke Evacuation **3-7-03**

continued

22. GEN 1 switch............. OFF
23. BAT 1 switch.............. OFF

If smoke/fumes still persist and source is suspected electrical:

24. MASTER POWER switch........................ EMERGENCY OFF

Refer to Emergency Gear Extension - 3-10-02.

---------- END -----------

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3-8 Emergency Descent

General 3-8-01

The type of emergency descent will depend on the kind of failure and the aircraft situation. Two types of descent are considered:

1 Engine failure, aircraft flown for maximum range.

2 Engine running, maximum descent rate.

The factors to be considered are:

1 Cabin altitude and oxygen duration.

2 Electrical power endurance.

3 Distance to suitable landing area.

4 Flight conditions IMC, VMC, ICING.

5 Minimum safe altitude.

6 Fuel reserves.

The pilot must consider the situation and priorities and adjust his actions accordingly.

---------- END -----------

Maximum Range Descent - After Engine Fail 3-8-02

(Refer to Fig. 3-8-1)

1. PCL.. IDLE
2. Engine switch............................. OFF (to feather propeller)
3. Aircraft configuration.................. Landing gear up and flaps to 0°

Continued on next page

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Maximum Range Descent - After Engine Fail 3-8-02

continued

CAUTION

If landing gear and/or flaps are extended glide range will be severely reduced. Retracting landing gear and flaps will reduce battery endurance significantly and may prejudice subsequent flaps lowering. ADAHRS and APEX displays may fail during landing gear / flap operation.

4. Airspeed.................................... Best glide (propeller feathered):

Airspeed	Aircraft Mass
119 KIAS	10450 lb (4740 kg)
116 KIAS	9920 lb (4500 kg)
110 KIAS	9040 lb (4100 kg)
105 KIAS	8160 lb (3700 kg)
99 KIAS	7280 lb (3300 kg)
93 KIAS	6400 lb (2900 kg)
In icing conditions: 137 KIAS	

5. All occupants.............................. Check seat lap and shoulder belts are fastened and the lap belt tightened
6. Main OXYGEN lever.................. Confirm ON
7. Crew oxygen masks................... Prepare. Put on before cabin altitude exceeds 10,000 ft

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the smoke goggles on.

4 Put the normal headset back on.

5 Set MIC SELECT switch on the rear left panel to MASK.

If cabin altitude exceeds 10,000 ft:

8. PASSENGER OXYGEN selector ON. Check contents. Calculate Oxygen duration
9. Systems MFD **PAX OXY** advisory...................................... Confirm ON
10. Passengers................................ Instruct to don masks
11. Electrical load............................. Monitor battery amps

Continued on next page

Maximum Range Descent - After Engine Fail 3-8-02

continued

CAUTION

Monitor BAT 1 and BAT 2 amps. If one indication is positive, switch OFF affected battery. After 5 minutes battery can be switched ON again. If indication still positive switch battery OFF.

Note

During extended glide period **Engine Oil Level** and/or **Engine Oil Temp** may appear - disregard for air start.

12. Engine.. Restart as soon as possible (if applicable) (refer to Air Start)

If engine restart was not successful or not applicable:

13. Rate of descent.......................... Adjust to achieve cabin altitude of 10,000 ft before oxygen supply exhausted

Below 10,000 ft:

14. ACS EMER shut off..................... PULL (cabin ventilation)
15. Aircraft.. Carry out Forced Landing - 3-9-02

---------- END -----------

Maximum Rate Descent 3-8-03

(Refer to Fig. 3-8-1)

1. PCL.. IDLE
2. Landing gear.............................. Below 180 KIAS, down
3. Aircraft speed............................ M_{MO}/V_{MO}
4. All occupants............................. Check seat lap and shoulder belts are fastened and the lap belt tightened.
5. Main OXYGEN lever.................. Confirm ON

Continued on next page

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Maximum Rate Descent 3-8-03

continued

6.	Crew oxygen masks....................	Prepare. Put on before cabin altitude exceeds 10,000 ft

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the smoke goggles on.

4 Put the normal headset back on.

5 Set MIC SELECT switch on the rear left panel to MASK.

If cabin altitude exceeds 10,000 ft:

7.	PASSENGER OXYGEN selector	ON. Check contents. Calculate Oxygen duration
8.	Systems MFD **PAX OXY** advisory......................................	Confirm ON
9.	Passengers................................	Instruct to don masks

CAUTION

In turbulence reduce speed to 170 KIAS.

10.	Left windshield heat....................	As required

---------- END -----------

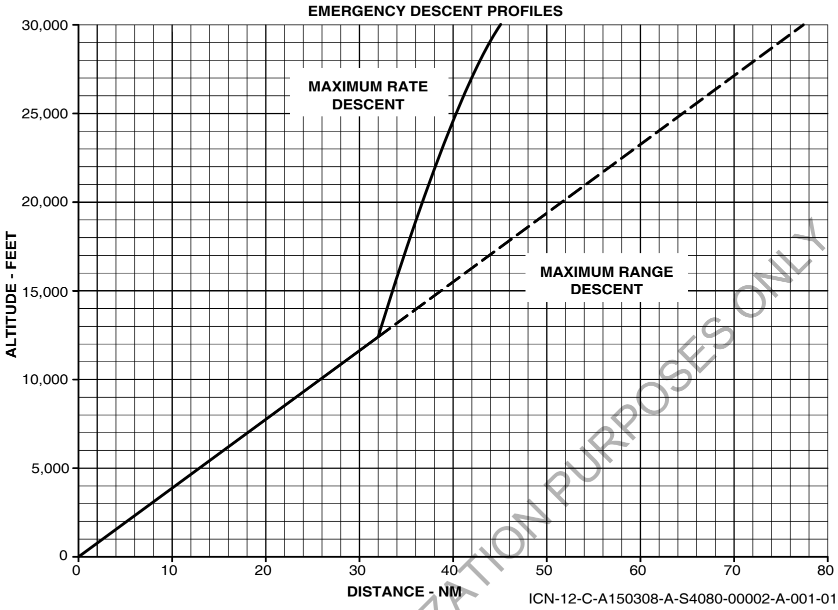

Figure 3-8-1: Emergency Descent Profiles

Emergency Descent 3-8-04

Emergency Descent and **Cabin Altitude** are indicated on the CAS window and **EDM** is displayed on the PFD.

If above FL200 (EDM armed) and if autopilot is engaged, the Emergency Descent Mode (EDM) will be triggered by a Cabin Altitude warning. Autopilot will command the aircraft to turn 90° to the left, descend at V_{MO} / M_{MO} to FL150, level off and maintain 160 KIAS. Descent will be initiated using FLC and HDG Hold Mode. If autothrottle is installed it will automatically move the PCL back to IDLE. If autothrottle is not installed the PCL will remain in the position last selected by the pilot, the descent will be slower and the speed target of 160 KIAS after level off will not be maintained.

If **Cabin Altitude** *displayed:*

1. Aircraft.. Carry out Cabin Altitude - 3-17-03 procedure

To cancel EDM for manually flown descent or if **Cabin Altitude** *is NOT displayed and cabin altitude/pressure is within normal limits:*

2. Autopilot and autothrottle............ DISCONNECT (use AP Quick Disconnect button and AT button on FGP)

Note

EDM can only be cancelled by pressing and holding the AP Quick Disconnect button or the TCS switch for 1 second. To cancel autothrottle during EDM the AT button on the FGP must be used.

CAUTION

While EDM is active, only the disengage selections for AP, YD and AT are available on the FGP.

---------- END -----------

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3-9 Emergency Landing

Glide Distance and Speed 3-9-01

(Refer to Fig. 3-8-1)

Configuration:

1. Landing gear.............................. UP
2. Flaps.. 0°
3. Airspeed.................................... Best glide speed:

Airspeed	Aircraft Mass
119 KIAS	10450 lb (4740 kg)
116 KIAS	9920 lb (4500 kg)
110 KIAS	9040 lb (4100 kg)
105 KIAS	8160 lb (3700 kg)
99 KIAS	7280 lb (3300 kg)
93 KIAS	6400 lb (2900 kg)

Note
Two fully charged batteries will last for 33 minutes with the Automatic Load Shedding.

---------- END -----------

Forced Landing 3-9-02

1. PCL.. IDLE
2. Engine switch............................ OFF
3. FUEL EMERG shut off................ PULL
4. CABIN PRESSURE switch......... DUMP
5. Airspeed.................................... Best glide speed:

Airspeed	Aircraft Mass
119 KIAS	10450 lb (4740 kg)
116 KIAS	9920 lb (4500 kg)
110 KIAS	9040 lb (4100 kg)
105 KIAS	8160 lb (3700 kg)
99 KIAS	7280 lb (3300 kg)
93 KIAS	6400 lb (2900 kg)

Continued on next page

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Forced Landing 3-9-02

continued

6.	Seat backs	Upright
7.	Seat belts	Fastened. Tighten lap straps
8.	Passengers	Brief. Instruct to sit upright
9.	ELT	Set to ON

If landing site allows:

10.	Landing gear	DOWN

If landing site not suitable for gear down landing:

11.	Landing gear	Keep UP
12.	Flaps	40°
13.	Final approach speed	88 KIAS for 10450 lb (4740 kg). Not below Dynamic Speed Bug (1.3 V_S)

After touchdown:

14.	MASTER POWER switch	EMERGENCY OFF

After the aircraft has stopped:

15.	Aircraft	Evacuate

---------- END ----------

Landing with Main Landing Gear Unlocked 3-9-03

1.	Aircraft	Confirm landing gear position by control tower or other aircraft

CAUTION

If one main landing gear is not down, it is recommended to land with gear up.

Note

It is possible to verify the down position of the right main landing gear from the rear right cabin window.

If failed landing gear is down but not locked:

2.	Fuel weight	Reduce
3.	Passengers	Brief
4.	Flaps	40°

Continued on next page

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Landing with Main Landing Gear Unlocked — 3-9-03

continued

5.	Final approach speed................	85 KIAS for 9921 lb (4500 kg). Not below Dynamic Speed Bug (1.3 V_S)
6.	Touchdown................................	Gently, avoid sideslip during touchdown
7.	Landing....................................	Lower nose wheel immediately to maintain lateral control
8.	Roll out....................................	Use full aileron during rollout to lift the wing with the failed landing gear
9.	PCL..	IDLE
10.	Engine switch............................	OFF
11.	MASTER POWER switch...........	EMERGENCY OFF

After the aircraft has stopped:

12.	Aircraft......................................	Evacuate
13.	Aircraft......................................	Do not move the aircraft before deficiency is rectified

---------- END -----------

Landing with Nose Landing Gear Unlocked — 3-9-04

1.	Fuel weight................................	Reduce
2.	Passengers................................	Brief
3.	Flaps..	40°
4.	Final approach speed................	85 KIAS for 9921 lb (4500 kg). Not below Dynamic Speed Bug (1.3 V_S)
5.	Landing....................................	Land on main wheels, keep nose high
6.	Engine switch............................	OFF
7.	MASTER POWER switch...........	EMERGENCY OFF
8.	Landing....................................	Lower nose wheel slowly
9.	Aircraft......................................	Avoid braking

After the aircraft has stopped:

10.	Aircraft......................................	Evacuate

---------- END -----------

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Landing with Gear Up 3-9-05

1. Fuel weight.................................. Reduce
2. Passengers................................ Brief
3. Approach.................................... Standard
4. Flaps.. 40°
5. Final approach speed................. 85 KIAS for 9921 lb (4500 kg). Not below Dynamic Speed Bug (1.3 V_S)
6. CABIN PRESSURE switch......... DUMP

When runway is assured:

7. PCL.. IDLE
8. Engine switch............................. OFF
9. FUEL EMERG shut off................ PULL
10. Aircraft....................................... Flare out

After touchdown:

11. MASTER POWER switch........... EMERGENCY OFF

After the aircraft has stopped:

12. Aircraft....................................... Evacuate

---------- END ----------

Landing without Elevator Control 3-9-06

1. Passengers................................ Brief
2. Landing gear.............................. Down
3. Flaps.. 40°
4. Final approach speed................. 90 KIAS
5. Power... Set power as necessary to maintain speed and 300 to 500 ft/min rate of descent
6. Aircraft....................................... Use stab trim to adjust pitch

When closing to ground:

7. Aircraft....................................... Reduce Rate of Descent by increasing pitch and/or power
8. Power... Reduce power progressively

Continued on next page

Landing without Elevator Control 3-9-06

continued

WARNING

STALLS ARE NOT PROTECTED WITH THE STICK PUSHER INOPERATIVE.

STALLS MUST BE AVOIDED WHEN THE STICK PUSHER IS INOPERATIVE. EXCESSIVE WING DROP AND ALTITUDE LOSS MAY RESULT DURING STALL WITH FLAPS DOWN AND/OR WHEN POWER IS APPLIED.

---------- END -----------

Landing with Immobilized Horizontal Stabilizer 3-9-07

1.	Aircraft..	Fly at indicated airspeed which reduces elevator forces to minimum
2.	Flaps...	At a safe altitude select flap required for landing
3.	Landing......................................	Land using normal procedures holding elevator forces

---------- END -----------

Landing without Flaps 3-9-08

1.	Aircraft..	Proceed as for normal approach
2.	Landing gear................................	DOWN
3.	Final approach speed.................	120 KIAS for 9921 lb (4500 kg). Not below Dynamic Speed Bug (1.3 V_S)
4.	Landing......................................	Normal
5.	Reverse......................................	As required
6.	Braking.......................................	As required

CAUTION

Landing distance will increase by 80%.

In the case of heavy brake usage, soft brake pedals and/or wheel fusible plugs release may occur during a following taxi. Limitation in Section 2, Systems and Equipment Limits, Brakes applies.

---------- END -----------

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Ditching 3-9-09

1.	Landing gear...............................	UP

CAUTION

Heavy swell with light wind, ditch parallel to the swell. Strong wind, ditch into the wind.

2.	Passengers................................	Brief
3.	ELT..	Set to ON
4.	Flaps...	40°
5.	Final approach speed................	88 KIAS for 9921 lb (4500 kg). Not below Dynamic Speed Bug (1.3 V_S)
6.	CABIN PRESSURE switch.........	DUMP
7.	PCL...	IDLE
8.	Engine switch............................	OFF

If time permits: CPCS

9.	CABIN PRESSURE switch.........	AUTO
	CPCS SYSTEM MODE switch....	MANUAL
	MANUAL CONTROL switch........	Set and hold to DESCENT for 30 sec (to close OFV)
10.	FUEL EMERG shut off................	Press latch down and pull lever up
11.	Ditching.....................................	Ditch with a low rate of descent
12.	MASTER POWER switch............	EMERGENCY OFF
13.	Aircraft......................................	Evacuate through the overwing emergency exit only

---------- END -----------

3-10 Landing Gear System Failure

Landing Gear Fails to Retract — 3-10-01

All Landing Gear Indicator Lights do not change to UP.

1. Airspeed.................................... Below 180 KIAS

Note
To cycle the landing gear for troubleshooting is not recommended. However, if during landing gear retraction moderate turbulence and/or considerable G-load was present, the pilot may consider cycling the landing gear once, at his own discretion.

2. Landing Gear Selector................ Select DN

If 3 green lights not illuminated within 30 sec:

3. Aircraft....................................... Carry out Emergency Gear Extension - 3-10-02

If 3 green lights illuminated:

4. Aircraft....................................... Land as soon as practical

---------- END ----------

Emergency Gear Extension — 3-10-02

Incorrect Indication on landing gear indicator lights.
Red unlocked lights on and/or green lights not illuminated.

1. Airspeed.................................... 120 KIAS
2. Landing Gear Selector................ Select DN

If 3 green lights not illuminated within 30 sec:

3. Emergency Gear Extension Lever Cover.............................. Open
4. Emergency Gear Extension Lever... PULL FIRMLY TO HARD STOP

If 3 green lights still not illuminated:

To lock the main landing gear:

5. Aircraft....................................... Conduct level turns left and right at angles of bank up to 30°, maintaining constant airspeed, until main landing gears indicate locked down

Continued on next page

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Emergency Gear Extension 3-10-02

continued

To lock the nose landing gear:

6. Airspeed.................................... Reduce power to idle and airspeed to minimum safe airspeed

If 3 green lights illuminated:

7. Aircraft.. Land as soon as practical
8. Aircraft.. Maintenance required

If 3 green lights still not illuminated:

9. Aircraft.. Carry out
   Landing with Main Landing Gear Unlocked - 3-9-03 and/or
   Landing with Nose Landing Gear Unlocked - 3-9-04 and/or
   Landing with Gear Up - 3-9-05.

---------- END -----------

Gear Actuator Cntl 3-10-03

On ground:

1. Aircraft.. Do not take off
2. Aircraft.. Maintenance required

--- END ---

In flight:

1. Landing gear................................. Do not cycle

Before landing:

2. Airspeed.................................... Below 180 KIAS
3. Landing Gear Selector................ Select DN

If 3 green lights not illuminated within 30 sec:

4. Aircraft.. Refer to Emergency Gear Extension - 3-10-02

---------- END -----------

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Invalid Gear Config 3-10-04

On ground:

1. Aircraft.. Do not take off
2. Aircraft.. Maintenance required

---------- END -----------

Gear Power Fail 3-10-05

On ground:

1. LDG CTL SEC circuit breaker (Essential Bus $_L$A2).................... Check. Do not reset unless tripped
2. LDG CTL PRI circuit breaker (Essential Bus $_L$B2).................... Check. Do not reset unless tripped
3. LDG GEAR PWR circuit breaker (RH PJB).................................... Check. Do not reset unless tripped

If caution remains:

4. Aircraft.. Do not takeoff. Maintenance requried

--- END ---

In flight:

1. LDG CTL SEC circuit breaker (Essential Bus $_L$A2).................... Check. Do not reset unless tripped
2. LDG CTL PRI circuit breaker (Essential Bus $_L$B2).................... Check. Do not reset unless tripped
3. LDG GEAR PWR circuit breaker (RH PJB).................................... Check. Do not reset unless tripped

If caution remains:

4. Landing gear.............................. Do not cycle

Before landing:

5. Airspeed.................................... Below 180 KIAS
6. Landing Gear Selector................ Select DN

If 3 greens not illuminated within 30 sec:

7. Aircraft.. Refer to Emergency Gear Extension - 3-10-02

---------- END -----------

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3-11 Flaps Failure

Flaps **3-11-01**

On ground:

1.	FLAP circuit breaker (LH Rear $_L$P4)...	Check circuit breaker

If tripped:

2.	FLAP circuit breaker (LH Rear $_L$P4)...	Wait 5 minutes, reset circuit breaker (max. 2 attempts) and continue normal operation if **Flaps** goes off

If not tripped:

3.	FLAP RESET switch (on maintenance panel, right sidewall behind copilot seat).......	Push (max. 1 attempt)

If unsuccessful:

4.	Aircraft.......................................	No flight permitted.
5.	Aircraft.......................................	Maintenance action required

--- END ---

In flight:

1.	FLAP circuit breaker (LH Rear $_L$P4)...	Check circuit breaker

If tripped:

2.	FLAP circuit breaker (LH Rear $_L$P4)...	Wait 5 minutes, reset circuit breaker (max. 2 attempts) and continue normal operation if **Flaps** goes off

If unsuccessful:

3.	Aircraft.......................................	Land with flaps at the failed position

--- END ---

Continued on next page

Flaps 3-11-01

continued

In flight - With potential flap asymmetry:

Flaps shortly followed by **Pusher** and **Pusher Safe Mode** illuminating.

Flap system failed asymmetrically and stick pusher remains available in "safe" mode.

CAUTION

The approach speed must be increased for indicated flap position 12° or greater. No speed increase is needed if the flap position is less than 12°.

1.	Airspeed....................................	Reduce to below 121 KIAS for indicated flaps position 30° or greater
2.	Aircraft.......................................	Land as soon as practical - with flaps at the failed position
3.	Approach...................................	For indicated flaps position 12° or greater: Approach at approximately 10 knots above AOA based Dynamic Speed Bug in PFD (1.3 V_{STALL})

CAUTION

Landing distance will increase.

Wheels and brakes may overheat. Limitations in Section 2, Systems and Equipment Limits, Brakes applies.

---------- END -----------

3-12 Stick Pusher Failure

Pusher 3-12-01

On ground:

1. Pusher Test................................ Carry out

If **Pusher** *caution persists:*

2. Aircraft.. No flight permitted. Maintenance required

--- END ---

In flight:

1. Pusher Test................................ Carry out

If Shaker 1 and 2 active and **Pusher** *caution extinguished:*

2. Aircraft.. No further action required

If Shaker 1 or 2 not active or **Pusher** *caution persists:*

WARNING

THE AIRCRAFT IS NOT STALL PROTECTED.

3. Airspeed.................................... Not below 1.3 V_S for 10450 lb (4740 kg):

Flap setting	Airspeed (KIAS)
0°	120
15°	101
30°	90
40°	88

WARNING

STALLS MUST BE AVOIDED WHEN THE STICK PUSHER IS INOPERATIVE. EXCESSIVE WING DROP AND ALTITUDE LOSS MAY RESULT DURING STALL WITH FLAPS DOWN AND/OR WHEN POWER IS APPLIED.

CAUTION

Stall speeds in turns are higher.

Dynamic speed bug may not be reliable.

If in icing conditions:

4. Aircraft.. Carry out the Pusher - 3-18-09 procedure

---------- END -----------

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3-13 Inadvertent Pusher/Shaker Operation

Pusher 3-13-01

Non-commanded pusher operation, rapid nose pitch-down motion.

Note
Control wheel force to stop pusher operation is 60 to 65 pounds.

1. Control wheel.............................. Hold against pusher action
2. PUSHER INTR switch................. Press and hold
3. PUSHER SYS GND circuit breaker (RH Rear $_R$P3).............. PULL
4. PUSHER SYS circuit breaker (Essential Bus $_L$L3).................... PULL
5. If shaker continues to operate..... Carry out the Shaker - 3-13-02 procedure

WARNING
THE AIRCRAFT IS NOT STALL PROTECTED.

6. Airspeed.................................... Not below 1.3 V_S for 10450 lb (4740 kg)

Flap setting	Airspeed (KIAS)
0°	120
15°	101
30°	90
40°	88

WARNING
NATURAL STALLS ARE NOT PREVENTED WITH THE STICK PUSHER INOPERATIVE.

STALLS MUST BE AVOIDED WHEN THE STICK PUSHER IS INOPERATIVE. EXCESSIVE WING DROP AND ALTITUDE LOSS MAY RESULT DURING STALL WITH FLAPS DOWN AND/OR WHEN POWER IS APPLIED.

CAUTION
Stall speeds in turns are higher.

Dynamic speed bug may not be reliable.

7. Pusher test................................. Carry out to check shaker availability

If Shaker 1 or 2 not active:

Continued on next page

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Pusher 3-13-01

continued

WARNING

APPROACHES TO STALLS ARE NOT WARNED AND NATURAL STALLS ARE NOT PREVENTED WITH THE STICK SHAKER INOPERATIVE.

---------- END -----------

Shaker 3-13-02

Non-commanded shaker operation.

1. AOA.. Decrease
2. IAS... Increase

If shaker continues to operate:

3. STALL WARN 1 circuit breaker (Essential Bus $_L$K3).................... PULL
4. STALL WARN 2 circuit breaker (Main Bus $_R$H3)......................... PULL

WARNING

THE AIRCRAFT IS NOT STALL PROTECTED.

5. Airspeed.................................... Not below 1.3 V_S for 10450 lb (4740 kg)

Flap setting	Airspeed (KIAS)
0°	120
15°	101
30°	90
40°	88

Continued on next page

Shaker 3-13-02

continued

WARNING

APPROACHES TO STALLS ARE NOT WARNED AND NATURAL STALLS ARE NOT PREVENTED WITH THE STICK SHAKER INOPERATIVE.

STALLS MUST BE AVOIDED WHEN THE STICK PUSHER IS INOPERATIVE. EXCESSIVE WING DROP AND ALTITUDE LOSS MAY RESULT DURING STALL WITH FLAPS DOWN AND/OR WHEN POWER IS APPLIED.

CAUTION

Stall speeds in turns are higher.

Dynamic speed bug may not be reliable.

---------- END -----------

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3-14 Electrical Trim

Pitch Trim Runaway 3-14-01

Pitch Trim Runaway warning and voice callout “Trim Runaway”.

1.	TRIM INTERRUPT switch..........	ON
2.	Aircraft..	Reduce speed if control forces are high
3.	PITCH TRIM circuit breaker (Essential Bus $_L$A1)....................	PULL

CAUTION

Setting the TRIM INTERRUPT switch to OFF may allow the runaway to continue. If runaway continues in step 4, immediately set TRIM INTERRUPT switch to ON.

4.	TRIM INTERRUPT switch..........	OFF

If trim runaway stopped:

5.	Pitch trim..................................	Use ALTERNATE STAB TRIM

If trim runaway continues:

6.	TRIM INTERRUPT switch..........	ON
7.	PITCH TRIM ALTN circuit breaker (Main Bus $_R$A1)...............	PULL
8.	PITCH TRIM circuit breaker (Essential Bus $_L$A1)....................	CLOSE
9.	TRIM INTERRUPT switch..........	OFF

Note

Do not attempt to re-engage the Autopilot/Yaw Damper following a trim malfunction.

---------- END -----------

Yaw Trim Runaway 3-14-02

Yaw Trim Runaway warning and voice callout “Trim Runaway”.

1.	TRIM INTERRUPT switch..........	ON
2.	Aircraft..	Reduce speed if control forces are high
3.	RUD TRIM circuit breaker (Essential Bus $_L$B1)....................	PULL

Continued on next page

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Yaw Trim Runaway 3-14-02

continued

4. TRIM INTERRUPT switch........... OFF

Note

Do not attempt to re-engage the Autopilot/Yaw Damper following a trim malfunction.

---------- END -----------

Trim Runaway 3-14-03

Non-commanded trim operation, rapidly increasing out of trim forces.

1. TRIM INTERRUPT switch........... ON
2. Aircraft.. Reduce speed if control forces are high
3. Circuit breaker of failed trim:....... PULL

Circuit Breaker	Location
PITCH TRIM	Essential Bus $_L$A1
PITCH TRIM ALTN	Main Bus $_R$A1
AIL TRIM	Essential Bus $_L$C1
RUD TRIM	Essential Bus $_L$B1

4. TRIM INTERRUPT switch........... OFF

Note

Do not attempt to re-engage the Autopilot/Yaw Damper following a trim malfunction.

---------- END -----------

No Main Stabilizer Trim 3-14-04

1. TRIM INTERRUPT...................... Check OFF
2. ALTERNATE STAB TRIM............ Operate as required

---------- END -----------

No Stabilizer Trim, Main or Alternate 3-14-05

1. Aircraft.. Carry out Landing with Immobilized Horizontal Stabilizer - 3-9-07

---------- END -----------

3-15 Electrical System Failures

Electrical Power Loss 3-15-01

1. MASTER POWER switch............ Check ON and guarded
2. BAT and GEN switches............... Check ON

If indication remains:

3. Aircraft... Land as soon as possible

---------- END -----------

Essential Bus 3-15-02

Essential bus voltage is below 22 V.

1. Overhead panel......................... Confirm EPS switch is in ARMED position and EPS ON caption is on
2. Pitch Trim.................................. Use ALTERNATE STAB TRIM
3. Aircraft... At pilots discretion, continue flight without services of failed bus or land as soon as possible. Do not fly in icing conditions

CAUTION

There will be no normal landing gear operation.

Refer to Emergency Gear Extension - 3-10-02

Note

It is possible to verify the down position of the right main landing gear from the rear right cabin window.

---------- END -----------

Avionics 1 Bus 3-15-03

Avionics 1 Bus voltage is below 22 V.

1. AV 1 BUS switch........................ Confirm set to ON
2. AV 1 circuit breaker (LH Power Junction Box)............................ Confirm set

Continued on next page

Avionics 1 Bus — 3-15-03

continued

3. STBY BUS switch...................... Confirm set to ON

Note

The systems connected to the Standby bus on the left rear circuit breaker panel will be operative.

4. Aircraft.. At pilots discretion, continue flight without services of failed bus or land as soon as possible

CAUTION

The systems connected to the Avionic 1 Bus, on the left rear circuit breaker panel, are inoperative.

---------- END -----------

Avionics 2 Bus — 3-15-04

Avionics 2 Bus voltage is below 22 V.

1. AV 2 BUS switch........................ Confirm set to ON
2. AV 2 circuit breaker (RH Power Junction Box)............................ Confirm set
3. Aircraft.. At pilots discretion, continue flight without services of failed bus or land as soon as practical

CAUTION

The systems connected to the Avionic 2 Bus, on the right rear circuit breaker panel, are inoperative.

---------- END -----------

Main Bus — 3-15-05

Main Bus voltage is below 22 V.

1. MAIN circuit breaker (RH Power Junction Box)............................ Confirm set

Continued on next page

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Main Bus 3-15-05

continued

2.	Aircraft.......................................	At pilots discretion, continue flight without services of failed bus or land as soon as practical. Depart icing conditions to positive SAT atmosphere if possible. Do not fly in icing conditions.

CAUTION

The systems connected to the Main Bus, on the right forward circuit breaker panel, are inoperative.

---------- END -----------

Generator 1 Bus 3-15-06

Generator 1 Bus voltage is below 22 V.

1.	GEN 1 circuit breaker (LH Power Junction Box).............................	Confirm set
2.	Aircraft.......................................	At pilots discretion, continue flight without services of failed bus or land as soon as practical.

CAUTION

The systems connected to the Generator 1 Bus, on the left rear circuit breaker panel, are inoperative.

---------- END -----------

Generator 2 Bus 3-15-07

Generator 2 Bus voltage is below 22 V.

1.	GEN 2 circuit breaker (RH Power Junction Box)..................	Confirm set
2.	Aircraft.......................................	At pilots discretion, continue flight without services of failed bus or land as soon as practical.

CAUTION

The systems connected to the Generator 2 Bus, on the right rear circuit breaker panel, are inoperative.

---------- END -----------

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Standby Bus 3-15-08

Standby Bus voltage is below 22 V.

1.	AV 1 BUS and STBY BUS switches....................................	Confirm set to ON
2.	AV STBY PWR circuit breaker (LH Power Junction Box)...........	Confirm set
3.	Aircraft.......................................	At pilots discretion, continue flight without services of failed bus or land as soon as practical.

CAUTION

The systems connected to the STBY Bus, on the left rear circuit breaker panel, are inoperative.

---------- END -----------

Non Essential Bus 3-15-09

Non Essential Bus voltage is below 22 V.

1.	NON ESS circuit breaker (RH Power Junction Box)..................	Confirm set
2.	Aircraft.......................................	At pilots discretion, continue flight without services of failed bus or land as soon as practical.

CAUTION

The systems connected to the Non Essential Bus, on the right forward circuit breaker panel, are inoperative.

---------- END -----------

Bus Tie 3-15-10

BUS TIE in wrong state.

If GEN 1 and GEN 2 switches are ON and volts/amps normal:

1.	BUS TIE circuit breaker (overhead panel)........................	PULL

If a generator is off:

2.	BUS TIE circuit breaker (overhead panel)........................	Check if tripped

Continued on next page

Bus Tie — 3-15-10

continued

3.	BUS TIE circuit breaker (overhead panel)........................	Reset (max 1 attempt only)
4.	Aircraft.......................................	Land as soon as possible

CAUTION

Buses are being powered only from a battery. Possible battery current caution.

---------- END -----------

Generators — 3-15-11

GEN 1 and GEN 2 are off and engine running.

1.	Systems MFD - ELECTRICAL window......................................	Confirm the failures
2.	GEN 1 switch............................	RESET then ON
3.	GEN 2 switch............................	RESET then ON

If generators do not reset (Generators *remains on):*

4.	Systems MFD - ELECTRICAL window......................................	Monitor BAT 1 and BAT 2
5.	Aircraft.......................................	Land as soon as possible. Do not fly in icing conditions.

Note

Two fully charged batteries will last for 33 minutes with the automatic load shedding.

Continued on next page

Generators — 3-15-11

continued

CAUTION

The following buses are automatically load shed (no additional Cautions will be shown) and the systems connected to them will be inoperative:

- **Generator 1 bus (Left rear CB panel)**
- **Main bus (Right forward CB panel)**
- **Avionic 2 bus (Right rear CB panel)**
- **Non Essential Bus (Right front CB panel)**
- **Cabin bus (Right rear CB panel)**
- **Generator 2 bus (Right rear CB panel)**

CAUTION

The following high current consumption systems are automatically load shed:

- **Cabin heater**
- **Under floor heater**
- **RH windshield de-ice**
- **Propeller de-ice**
- **LH AOA plate heater**
- **RH AOA plate heater**
- **VCCS compressor**
- **Footwarmer (optional system)**
- **Logo lights (optional system)**

Note

If further load reduction is desired to extend battery endurance beyond 33 minutes, consider manually switching off all exterior lights and if conditions allow all ice protection.

---------- END -----------

Generator 1 Off — 3-15-12

Generator 1 is OFF line and engine running.

1. Systems MFD - ELECTRICAL window.. Confirm the failure

Continued on next page

Generator 1 Off — 3-15-12

continued

2.	GEN 1 switch..............................	RESET then ON

If GEN 1 does not reset:

3.	Aircraft...	At pilots discretion, continue flight without the services of the load shed systems and buses

CAUTION

The following buses are automatically load shed (no additional Cautions will be shown) and the systems connected to them will be inoperative:

- **Generator 1 bus (Left rear CB panel)**
- **Non Essential Bus (Right front CB panel)**
- **Cabin bus (Right rear CB panel)**

CAUTION

The following high current consumption systems are automatically load shed:

- **Cabin heater**
- **Under floor heater**
- **VCCS compressor**
- **Footwarmer (optional system)**
- **Logo lights (optional system)**

---------- END -----------

Generator 2 Off — 3-15-13

Generator 2 is OFF line and engine running.

1.	Systems MFD - ELECTRICAL window......................................	Confirm the failure
2.	GEN 2 switch..............................	RESET then ON

If GEN 2 does not reset:

3.	Aircraft...	At pilots discretion, continue flight without the services of the load shed systems and buses

Continued on next page

Generator 2 Off 3-15-13

continued

CAUTION

The following buses are automatically load shed (no additional Cautions will be shown) and the systems connected to them will be inoperative:

- **Generator 2 bus (Right rear CB panel)**
- **Non Essential Bus (Right front CB panel)**
- **Cabin bus (Right rear CB panel)**

CAUTION

The following high current consumption systems are automatically load shed:

- **Cabin heater**
- **Under floor heater**
- **VCCS compressor**
- **Footwarmer (optional system)**
- **Logo lights (optional system)**

---------- END ----------

Generator 1 Volts 3-15-14

GEN 1 voltage is low or high.

1. Systems MFD - ELECTRICAL window.. Confirm the failure
2. GEN 1 switch.............................. RESET then ON

If **Generator 1 Volts** *remains:*

3. GEN 1 switch.............................. OFF
4. Aircraft.. At pilots discretion, continue flight without the services of the load shed systems and buses

Continued on next page

Generator 1 Volts 3-15-14

continued

CAUTION

The following buses are automatically load shed (no additional Cautions will be shown) and the systems connected to them will be inoperative:

- **Generator 1 bus (Left rear CB panel)**
- **Non Essential Bus (Right front CB panel)**
- **Cabin bus (Right rear CB panel)**

CAUTION

The following high current consumption systems are automatically load shed:

- **Cabin heater**
- **Under floor heater**
- **VCCS compressor**
- **Footwarmer (optional system)**
- **Logo lights (optional system)**

---------- END -----------

Generator 2 Volts 3-15-15

GEN 2 voltage is low or high.

1. Systems MFD - ELECTRICAL window.................................... Confirm the failure
2. GEN 2 switch............................ RESET then ON

If **Generator 2 Volts** *remains:*

3. GEN 2 switch............................ OFF
4. Aircraft....................................... At pilots discretion, continue flight without the services of the load shed systems and buses

Continued on next page

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Generator 2 Volts — 3-15-15

continued

CAUTION

The following buses are automatically load shed (no additional Cautions will be shown) and the systems connected to them will be inoperative:

- **Generator 2 bus (Right rear CB panel)**
- **Non Essential Bus (Right front CB panel)**
- **Cabin bus (Right rear CB panel)**

CAUTION

The following high current consumption systems are automatically load shed:

- **Cabin heater**
- **Under floor heater**
- **VCCS compressor**
- **Footwarmer (optional system)**
- **Logo lights (optional system)**

---------- END ----------

Battery 1 Hot / Battery 2 Hot / Battery 1 + 2 Hot — 3-15-16

Battery temperature is excessive.

1.	Systems MFD - ELECTRICAL window..	Check battery 1 and 2 charge current

If charge current high:

2.	BAT 1 or BAT 2 switch................	OFF (Do not select ON again)

If charge current normal:

3.	BAT 1 or BAT 2 switch................	OFF

If battery hot warning extinguishes, wait 5 minutes, then:

4.	BAT 1 or BAT 2 switch................	ON (Once only)

If Battery 1 and 2 hot:

5.	BAT 1 and BAT 2 switch.............	OFF

Continued on next page

Battery 1 Hot / Battery 1 + 2 Hot / Battery 2 Hot — 3-15-16

continued

6.	Aircraft..	Land as soon as possible

Note

The **Battery 1 Hot** and **Battery 2 Hot** warnings are inoperative on aircraft with lead acid batteries installed.

---------- END -----------

Battery 1 / Battery 2 — 3-15-17

Battery discharge is above 60 Amps or battery voltage is below 22 V or above 30.1 V.

1.	Systems MFD - ELECTRICAL window......................................	Check GEN 1 or 2 and BAT 1 or 2 current and voltage

If indications are normal:

2.	BAT 1 or BAT 2 switch................	OFF

If indications are not normal:

3.	Aircraft..	Carry out Generator 1 Volts - 3-15-14 or Generator 2 Volts - 3-15-15 procedure

---------- END -----------

Battery 1 Off / Battery 2 Off — 3-15-18

1.	BAT 1 or BAT 2 switch................	Check ON. Reset

---------- END -----------

External Power — 3-15-19

External power on with GEN 1 and GEN 2 and AV 1 BUS and AV 2 BUS on.

1.	External power unit.....................	Disconnect

---------- END -----------

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3-16 Fuel System

Fuel Pressure Low 3-16-01

Fuel Pressure Low or both green PUMP indications on the MFD Fuel Window are cycling on and off every 10 seconds.

On ground:

1.	Fuel filter faults............................	Check
2.	Fuel temperature.........................	Monitor

If indicated fuel temperature below 12 °C:

3.	Engine oil temperature................	Monitor

If **Fuel Pressure Low** *persists:*

4.	Aircraft..	Do not take off

--- END ---

In flight:

If **Fuel Pressure Low** *and* **Fuel TEMP** *are displayed and fuel temperature is low:*

1.	RH FUEL PUMP switch.............	ON
2.	Fuel temperature.........................	Monitor

Note
Consider to retract landing gear if extended. A retracted landing gear helps to reduce oil cooling.

3.	Engine..	Decrease power to increase fuel temperature
4.	Aircraft..	Descend to warmer air
5.	Engine oil temperature................	Monitor
6.	Fuel state (imbalance)................	Monitor

Every 5 minutes:

7.	FUEL PUMP switches................	AUTO
8.	Fuel pump operation..................	Monitor

If fault persists:

9.	FUEL PUMP switches................	ON
10.	CAS window...............................	Check for fuel filter faults

If **Fuel Pressure Low** *is displayed and* **Fuel TEMP** *is not displayed:*

11.	Power..	Reduce to minimum to sustain flight

Continued on next page

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Fuel Pressure Low — 3-16-01

continued

12. Fuel pumps................................ Monitor automatic switching

Note
When the system switches FUEL PUMPs automatically to ON at lower engine power, this is a result of degraded ejector pump performance.

If **Fuel Pressure Low** *persists:*

13. FUEL PUMP switches................. ON

If there are 2 segments or more difference between the left and right:

14. FUEL PUMP switch (emptier side)... AUTO
15. Fuel state.................................. Monitor

When fuel balanced:

16. FUEL PUMP switches................. ON

If **Fuel Pressure Low** *stays ON and the FUEL PUMP switches are set to ON:*

17. Aircraft....................................... Land as soon as possible. If possible always retain glide capability to the selected airfield in case of total engine failure

---------- END -----------

Fuel PRESS SENS Fail — 3-16-02

Fuel PRESS SENS Fail or both FUEL PUMPs on continuously

1. Aircraft....................................... Carry out Fuel Balance Fault and/or Fuel Imbalance - 3-16-04 procedure

---------- END -----------

LH Fuel Low / RH Fuel Low / LH + RH Fuel Low — 3-16-03

1. FUEL indications........................ Check

If fuel leak from one wing is suspected:

2. Aircraft....................................... Carry out Suspected Fuel Leak - 3-16-05 procedure

Continued on next page

LH Fuel Low / RH Fuel Low / LH + RH Fuel Low — 3-16-03

continued

If **LH Fuel Low** *or* **RH Fuel Low** *is on:*

3.	FUEL PUMP switch (fuller side)..	ON
4.	Fuel state..................................	Monitor

If no fuel leak is suspected and both **LH Fuel Low** *and* **RH Fuel Low** *are on:*

5.	FUEL PUMP switches................	ON
6.	Power..	Reduce to minimum to sustain flight
7.	Aircraft......................................	Land as soon as possible. If possible always retain glide to the selected landing airfield in case of total engine failure

---------- END -----------

Fuel Balance Fault / Fuel Imbalance — 3-16-04

On ground:

1.	Fuel L and R indications............	Check for difference

WARNING

IF THERE ARE 4 SEGMENTS OR MORE DIFFERENCE BETWEEN LEFT AND RIGHT DO NOT TAKE OFF.

If fuel pump on fuller side is not running:

2.	FUEL PUMP switch (fuller side)..	ON
3.	Fuel state..................................	Monitor

If difference cannot be balanced:

4.	Aircraft......................................	Do not take off

When fuel balanced:

5.	FUEL PUMP switch...................	AUTO

--- END ---

In flight:

1.	Fuel L and R indications............	Check for difference

Continued on next page

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Fuel Balance Fault — Fuel Imbalance — 3-16-04

continued

CAUTION

If there are 3 segments or more difference between left and right, possible aileron deflection required for wings level flight, especially at low speed.

If fuel leak from one wing is suspected:

2.	Aircraft..	Carry out Suspected Fuel Leak - 3-16-05 procedure

If no fuel leak is suspected:

3.	FUEL PUMP circuit breaker (on fuller side) (Essential Bus $_L$J1 or $_L$H1)...	Reset
4.	FUEL PUMP switch (fuller side)..	ON
5.	FUEL PUMP circuit breaker (on emptier side) (Essential Bus $_L$J1 or $_L$H1).......................................	PULL

Note

Do not pull the FUEL PUMP CB when **Fuel Pressure Low** was displayed with a large imbalance.

6.	Fuel state..................................	Monitor
7.	Engine parameters......................	Monitor

If fuel is balanced:

8.	FUEL PUMP circuit breakers (Essential Bus $_L$J1 and $_L$H1)........	Reset
9.	FUEL PUMP switches.................	AUTO

If difference cannot be balanced and fuel flow was above 400 LB/H with fuller side FUEL PUMP switch to ON:

10.	Power..	Reduce to approx. 300 LB/H fuel flow

If fault clears:

11.	Fuel flow.....................................	Maintain below 400 LB/H
12.	Fuel temperature........................	Monitor

Continued on next page

Fuel Balance Fault — Fuel Imbalance — 3-16-04

continued

If difference cannot be balanced:

13. Aircraft.. Land as soon as possible

Note

If a prompt landing is not possible, keep high IAS to nearest airfield and consider burning off fuel until the fuel imbalance is not greater than 5 segments for landing. Use flaps up to keep approach speed high.

---------- END -----------

Suspected Fuel Leak — 3-16-05

If fuel imbalance is 3 segments or less:

1. FUEL PUMP switch (on leaking side)... ON
2. FUEL PUMP circuit breaker (on good side) (Essential Bus $_L$J1 or $_L$H1)... PULL
3. Fuel state.................................. Monitor

If fuel state is more than 3 segments

4. FUEL PUMP switch (on fuller side)... ON
5. FUEL PUMP switch (on leaking side)... AUTO
6. FUEL PUMP circuit breaker (on leaking side) (Essential Bus $_L$J1 or $_L$H1)... PULL

Note

Do not pull the FUEL PUMP CB when **Fuel Pressure Low** was displayed with a large imbalance.

7. Fuel state.................................. Monitor
8. Engine parameters..................... Monitor

Continued on next page

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Suspected Fuel Leak 3-16-05

continued

If fuel imbalance persists:

9. Aircraft.. Land as soon as practical

Note

If a prompt landing is not possible, keep high IAS to nearest airfield and consider burning off fuel until the fuel imbalance is not greater than 5 segments for landing. Use flaps up to keep approach speed high.

---------- END -----------

Fuel Quantity Fault 3-16-06

Fuel Quantity Fault and/or one or both MFD analogue displays go blank or indication amber crossed out

CAUTION

The automatic fuel balancing system will not be operative.

Fuel reset will not be operative.

Fuel Balance Fault and Fuel Imbalance will not be indicated.

1. Fuel Quantity.............................. Monitor digital Fuel Quantity indication

If fuel imbalance is suspected:

Note

To check fuel imbalance, disengage the autopilot regularly to check for roll trim changes.

2. Aircraft.. Land as soon as possible

---------- END -----------

Loss of Digital Fuel Quantity Indication 3-16-07

Digital fuel quantity digits replaced by amber dashes.

If Fuel Flow digital indication is available, attempt to perform a fuel reset:

1. Aircraft.. Make sure wings are level, pitch within ± 3°, with unaccelerated flight and no turbulence present
2. Fuel Reset soft key..................... Press

Note

The Fuel Used will be reset to zero with fuel reset.

Continued on next page

Loss of Digital Fuel Quantity Indication — 3-16-07

continued

If Fuel Flow digital indication is invalid:

3. Fuel state.................................. Monitor analogue Fuel Quantity on Fuel window or the digital fuel indication on Systems Summary window

Note

Continued flight is possible without digital Fuel Quantity (QTY) providing analogue fuel quantity is operating correctly.

---------- END -----------

LH Fuel Pump — RH Fuel Pump — 3-16-08

On ground:

1. Aircraft....................................... Do not take off

--- END ---

In flight:

1. FUEL PUMP switches................ AUTO
2. FUEL PUMP circuit breaker (on affected side) (Essential Bus $_L$J1 or Essential Bus $_L$H1)................... Reset
3. FUEL PUMP switch (on affected side)... ON

After 10 seconds:

4. FUEL PUMP switch (on affected side)... AUTO
5. Fuel state.................................. Monitor

If fuel imbalance with affected pump failed ON and affected tank lower:

6. Aircraft....................................... Carry out Fuel Balance Fault and/or Fuel Imbalance - 3-16-04 procedure

If fuel imbalance with affected pump failed OFF and affected tank lower:

7. Aircraft....................................... Both automatic and manual fuel balancing available

Continued on next page

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LH Fuel Pump RH Fuel Pump 3-16-08

continued

If fuel imbalance with affected pump failed OFF and affected tank higher:

8. Aircraft.. Land as soon as possible. Fuel imbalance correction not possible

Note

If a prompt landing is not possible, keep high IAS to nearest airfield and consider burning off fuel until the fuel imbalance is not greater than 5 segments for landing. Use flaps up to keep approach speed high.

---------- END -----------

LH + RH Fuel Pump 3-16-09

On ground:

1. Aircraft.. Do not take off

--- END ---

In flight:

1. Fuel state.................................. Monitor

If fuel pumps failed ON:

2. FUEL PUMP circuit breaker (Essential Bus $_L$J1 and Essential Bus $_L$H1)..................................... PULL
3. Fuel state.................................. Monitor

If fuel pumps failed OFF:

4. Aircraft.. Land as soon as possible. Fuel imbalance correction not possible

Note

If a prompt landing is not possible, keep high IAS to nearest airfield and consider burning off fuel until the fuel imbalance is not greater than 5 segments for landing. Use flaps up to keep approach speed high.

---------- END -----------

Fuel Pump Failure (Unannunciated) 3-16-10

– Fuel pump(s) on for more than 10 seconds with fuel balanced and no **Fuel Pressure Low** and no **Fuel PRESS SENS Fail**, or

Continued on next page

Fuel Pump Failure (Unannunciated) 3-16-10

continued

- Both fuel pumps on for more than 10 seconds with 2 or more segments difference between left and right and no **Fuel Pressure Low** and no **Fuel PRESS SENS Fail**, or
- Fuel pumps not running with green PUMP advisory on, or
- No **Fuel Pressure Low** and no **Fuel PRESS SENS Fail** and fuel pumps not running.

1.	FUEL PUMP(S)..........................	AUTO
2.	FUEL CTL circuit breaker (Essential Bus $_L$K1)....................	Reset
3.	LH FUEL PUMP circuit breaker (Essential Bus $_L$J1).....................	Reset
4.	RH FUEL PUMP circuit breaker (Essential Bus $_L$H1)....................	Reset

If failure is still present:

5.	Fuel state..................................	Monitor

If fuel imbalance:

6.	Aircraft.......................................	Carry out Fuel Balance Fault and/or Fuel Imbalance - 3-16-04 procedure

---------- END -----------

Fuel IMP Bypass 3-16-11

On ground:

If engine started with cold fuel (below 0 °C):

1.	Oil temperature..........................	CHECK. Operate engine with oil temperature above 8 °C for at least 5 minutes prior to take-off

If engine started with warm fuel (0 °C or above) or if indication remains active:

2.	Engine.......................................	Shut down
3.	Aircraft.......................................	Maintenance required

--- END ---

In flight:

1.	Fuel flow....................................	Monitor
2.	Fuel temperature........................	Monitor
3.	Oil temperature..........................	Monitor

Continued on next page

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Fuel IMP Bypass 3-16-11

continued

If fuel icing suspected:

4. FUEL PUMP switches................. AUTO

Note

Consider to retract landing gear if extended. A retracted landing gear helps to reduce oil cooling.

5. Engine.. Decrease power to increase fuel temperature

If failure is still present and fuel icing is suspected:

6. CAS Window.............................. Check for fuel filter faults
7. Aircraft....................................... Plan for diversion

If fuel icing not suspected:

8. Aircraft....................................... Continue flight

If indicated fuel temperature below 12 °C or **Fuel Balance Fault***:*

9. Engine.. Reduce power for balancing (approx. 300 LB/H fuel flow)

---------- END -----------

Fuel Filter Blocked 3-16-12

On ground:

1. Engine.. Shut down
2. Aircraft....................................... Maintenance required

--- END ---

In flight:

1. Fuel flow.................................... Monitor
2. Fuel temperature......................... Monitor
3. Oil Temperature......................... Monitor
4. Aircraft....................................... Land as soon as possible. If possible always retain glide, to the selected landing airfield, in case of total engine failure

---------- END -----------

Fuel TEMP 3-16-13

On ground:

If indicated fuel temperature low (less than 12 °C):

1.	Oil Temperature..........................	Monitor increasing
2.	Fuel temperature.........................	Monitor increasing
3.	Engine...	Increase power slightly if necessary to increase oil heating

If indicated fuel temperature high (at or above 105 °C):

4.	Engine...	Shut down
5.	Aircraft..	Maintenance required

--- END ---

In flight:

1.	Fuel temperature.........................	Monitor

If indicated fuel temperature low (less than 12 °C):

2.	FUEL PUMP switches.................	AUTO

Note

Consider to retract landing gear if extended. A retracted landing gear helps to reduce oil cooling.

3.	Engine...	Decrease power to increase fuel temperature
4.	Aircraft..	Descend to warmer air if necessary

If indicated fuel temperature remains low (less than 12 °C):

5.	CAS Window................................	Check for fuel filter faults

If indicated fuel temperature decreases and remains below 0 °C:

6.	Aircraft..	Land as soon as practical

If indicated fuel temperature high (at or above 105 °C):

7.	FUEL PUMP switches.................	ON
8.	Fuel temperature.........................	Monitor
9.	Aircraft..	Climb to cooler air if necessary

If fuel temperature normalizes:

10.	FUEL PUMP switches.................	AUTO

If indicated fuel temperature high (at or above 105 °C):

11.	Aircraft..	Land as soon as practical

---------- END -----------

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3-17 Cabin Environment Failures

Cabin Pressure 3-17-01

Cabin pressure differential of less than -0.25 psi or greater than 6.35 psi is exceeded.

1. Systems MFD ENVIRONMENT window.. Check ΔP psi indication

If ΔP less than -0.25 psi:

2. Aircraft.. Reduce descent rate
3. CABIN PRESSURE switch......... DUMP

If ΔP more than 6.35 psi:

4. CABIN PRESSURE switch......... DUMP
5. ACS EMERG shut off.................. PULL
6. Main OXYGEN lever................... Confirm ON
7. Crew oxygen masks................... ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

8. PASSENGER OXYGEN selector AUTO or ON
9. Systems MFD PAX OXY advisory.. Confirm ON
10. Passengers................................ Instruct to don masks
11. Aircraft.. Carry out Maximum Rate Descent - 3-8-03 procedure

---------- END -----------

Cabin Pressure 3-17-02

Cabin pressure differential is greater than 6.0 psi.

1. CPCS SYSTEM MODE switch.... MANUAL
2. MANUAL CONTROL switch........ Push intermittently to CLIMB to reduce pressure differential to below 5.75 psi

Continued on next page

Cabin Pressure 3-17-02

continued

If unsuccessful:

3.	CABIN PRESSURE switch.........	DUMP
4.	ACS EMERG shut off..................	PULL
5.	Main OXYGEN lever...................	Confirm ON
6.	Crew oxygen masks....................	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

7.	PASSENGER OXYGEN selector	AUTO or ON
8.	Systems MFD PAX OXY advisory......................................	Confirm ON
9.	Passengers................................	Instruct to don masks
10.	Aircraft.......................................	Carry out Maximum Rate Descent - 3-8-03 procedure

Prior to landing:

11.	CABIN PRESSURE switch.........	DUMP (if not selected earlier)

---------- END -----------

Cabin Altitude 3-17-03

Note

If above FL200 (EDM armed) and if autopilot is engaged, the Emergency Descent - 3-8-04 Mode (EDM) will be triggered by a Cabin Altitude warning.

1.	Main OXYGEN lever...................	Confirm ON

Continued on next page

Cabin Altitude — 3-17-03

continued

2.	Crew oxygen masks....................	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

3.	PASSENGER OXYGEN selector	AUTO or ON
4.	Systems MFD **PAX OXY** advisory......................................	Confirm ON
5.	Passengers................................	Instruct to don masks
6.	CPCS MODE switch..................	MANUAL
7.	MANUAL CONTROL switch........	Push DESCENT intermittently to reduce cabin altitude to required level

If unsuccessful:

8.	Aircaft..	Limit flight altitude to maintain cabin altitude below 10,000 ft

If necessary:

9.	Aircraft.......................................	Carry out Maximum Rate Descent - 3-8-03 procedure

Prior to landing:

10.	CABIN PRESSURE switch.........	DUMP

---------- END -----------

ACS Low Inflow — 3-17-04

1.	ACS BLEED AIR switch.............	INHIBIT
2.	ACS BLEED AIR switch.............	AUTO

If unsuccessful:

3.	Aircraft.......................................	Limit Flight Altitude to maintain cabin altitude below 10,000 ft MSL or MSA

If cabin altitude climbs above 10,000 ft:

4.	ACS BLEED AIR switch.............	INHIBIT

Continued on next page

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ACS Low Inflow — 3-17-04

continued

5.	ACS EMERG shut off..................	PULL
6.	Main OXYGEN lever....................	Confirm ON
7.	Crew oxygen masks....................	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

8.	PASSENGER OXYGEN selector	AUTO or ON
9.	Systems MFD **PAX OXY** advisory......................................	Confirm ON
10.	Passengers..................................	Instruct to don masks
11.	Aircraft...	Carry out Maximum Rate Descent - 3-8-03 procedure

When cabin altitude below 10,000 ft:

12.	CABIN PRESSURE switch.........	DUMP (cabin ventilation)

---------- END -----------

CPCS Fault — 3-17-05

On ground:

1.	CPCS MODE switch....................	MANUAL for at least 1 sec then AUTO
2.	CAS...	Check

If **CPCS Fault** *remains:*

3.	CPCS AUTO circuit breaker (ESS Bus $_L$E1) and CPCS MON circuit breaker (EPS Bus $_L$R2).....	Open for 4 secs, then close
4.	CAS...	Check
5.	CPCS MODE switch....................	MANUAL for at least 1 sec then AUTO
6.	CAS...	Check

--- END ---

Continued on next page

CPCS Fault 3-17-05

continued

In flight and if ΔP and CAB ALT indications are available:

1.	CPCS MODE switch..................	MANUAL for at least 1 sec then AUTO
2.	CAS..	Check

If **CPCS Fault** *remains:*

3.	CPCS MODE switch..................	MANUAL
4.	MANUAL CONTROL switch........	Push intermittently to increase or reduce cabin altitude to required level
5.	Aircraft..	Land as soon as practical

Prior to landing:

6.	CABIN PRESSURE switch.........	DUMP

--- END ---

In flight and if ΔP not displayed (***ADC A+B Fail*** *):*

1.	CPCS MODE switch..................	MANUAL
2.	MANUAL CONTROL switch........	Push DESCENT for 30 seconds to close OFV

If **Cabin Altitude** *shows:*

3.	Main OXYGEN lever..................	Confirm ON
4.	Crew oxygen masks...................	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

5.	PASSENGER OXYGEN selector	AUTO or ON
6.	Systems MFD **PAX OXY** advisory......................................	Confirm ON
7.	Passengers................................	Instruct to don masks
8.	CPCS MODE switch..................	MANUAL
9.	MANUAL CONTROL switch........	Push intermittently to increase or reduce cabin altitude to required level
10.	Aircraft..	Land as soon as practical

Continued on next page

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CPCS Fault — 3-17-05

continued

Prior to landing:

11. CABIN PRESSURE switch......... DUMP

--- END ---

In flight and if ΔP and **Cabin Altitude** *not displayed:*

1. Main OXYGEN lever.................. Confirm ON
2. Crew oxygen masks.................... ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

3. PASSENGER OXYGEN selector AUTO or ON
4. Systems MFD **PAX OXY** advisory...................................... Confirm ON
5. Passengers............................... Instruct to don masks
6. Aircraft.. Descend below 10,000 ft or to minimum safe altitude if higher
7. Aircraft.. Land as soon as practical

Prior to landing:

8. CABIN PRESSURE switch......... DUMP

---------- END -----------

ECS Fault — 3-17-06

1. ECS circuit breaker (Essential Bus $_L$E2)................................... Reset

If not successful:

2. ACS BLEED AIR switch............. INHIBIT if cabin temperature is unacceptable

Note

If ACS bleed air switch is set to inhibit, the aircraft will depressurize and **ACS Low Inflow** will come on.

Continued on next page

ECS Fault 3-17-06

continued

If ACS BLEED AIR switch is inhibited and aircraft altitude is > 10,000 ft:

3.	ACS EMER shut off....................	PULL
4.	Aircraft..	Carry out Maximum Rate Descent - 3-8-03 procedure
5.	Aircraft..	Land as soon as practical (depending on cabin/cockpit environment)

---------- END -----------

Uncontrolled Cabin Pressure 3-17-07

Uncontrolled fluctuations of cabin pressure.

1.	CPCS MODE switch..................	MANUAL
2.	CPCS MANUAL CONTROL switch..	Push intermittently to increase or reduce cabin altitude to required level

If unsuccessful:

3.	Main OXYGEN lever..................	Confirm ON
4.	Crew oxygen masks....................	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

5.	PASSENGER OXYGEN selector	AUTO or ON
6.	Systems MFD **PAX OXY** advisory......................................	Confirm ON
7.	Passengers...............................	Instruct to don masks
8.	CABIN PRESSURE switch.........	DUMP
9.	ACS EMERG shut off..................	PULL
10.	Aircraft..	Descend below 10,000 ft or to minimum safe altitude if higher
11.	Aircraft..	Land as soon as practical

Continued on next page

Uncontrolled Cabin Pressure 3-17-07

continued

Prior to landing:

12. CABIN PRESSURE switch......... DUMP (if not selected earlier)

---------- END -----------

3-18 Deice Systems

Propeller De Ice 3-18-01

WARNING

THE LOSS OF PROPELLER DEICE IN ICING CONDITIONS CAN CAUSE SEVERE DEGRADATION IN AIRCRAFT SPEED AND CLIMB PERFORMANCE.

1.	PROP LOW SPEED switch........ (if installed)................................	Confirm OFF
2.	PROPELLER switch..................	Set to OFF and wait 10 seconds
3.	PROPELLER switch..................	Set to ON
4.	PROP DE ICE circuit breaker (LH PJB)..................................	Check. Do not reset unless tripped

If caption stays off after 20 seconds:

5.	Aircraft.......................................	Continue flight and monitor system

If caption comes back on after 20 seconds:

6.	PROPELLER switch..................	Maintain ON (together with INERT SEP OPEN) to maintain PUSHER ICE MODE
7.	Aircraft.......................................	DEPART ICING CONDITIONS to positive SAT atmosphere, if possible

If propeller vibration occurs:

8.	PCL..	Increase or decrease power as required to minimize vibration and sustain level flight
9.	Aircraft.......................................	Avoid further icing conditions

If propeller vibrations continue or attained performance degrades:

10.	Aircraft.......................................	Land as soon as possible

---------- END -----------

12-C-A15-40-0318-00A-141A-A

De Ice Boots 3-18-02

De Ice Boots with **BOOTS** off

WARNING

A BOOT DEICE FAILURE IN ICING CONDITIONS CAN CAUSE DEGRADATION OF AIRCRAFT SPEED AND CLIMB PERFORMANCE AND A PREMATURE STALL. FLAP POSITION IS LIMITED TO 0° WITH THIS FAILURE.

1.	PCL..	Increase power
2.	BOOTS switch..........................	Set to OFF and wait until caution resets (1 min approx.)
3.	BOOTS switch..........................	Set ot 3 MIN or 1 MIN and let run for at least one full cycle
4.	BOOTS DE-ICE circuit breaker (Main Bus $_R$H2).........................	Check. Do not reset unless tripped

If caption returns to normal operation:

5.	Aircraft......................................	Continue flight and monitor system. Avoid low power settings if possible

If captions stay in failure status:

6.	Aircraft......................................	DEPART ICING CONDITIONS to positive SAT atmosphere, if possible
7.	BOOTS switch..........................	Set to OFF
8.	Aircraft......................................	Avoid large or sudden changes in aircraft directional, longitudinal and lateral control until airframe is judged to be free of residual ice
9.	Aircraft......................................	Avoid further icing conditions

If airframe is free of ice accretion:

10.	Flap position..............................	As required

If airframe is not free of ice accretion:

11.	Flap position..............................	Limited to 0°
12.	Landing approach for 9921 lb (4500 kg) (MLW).......................	Keep minimum landing approach speed above 130 KIAS

Continued on next page

De Ice Boots 3-18-02

continued

CAUTION

On landing approach after boot failure (flaps 0°), the PFD dynamic speed bug will not be correct and should not be used as reference.

CAUTION

The total landing distance will be longer by up to 160%. Refer to Section 5, Performance, Flight in Icing Conditions, Flight in Icing Conditions - Landing Performance for the exact landing distance calculation.

CAUTION

In the case of heavy brake usage, soft brake pedals and/or wheel fusible plugs release may occur during a following taxi. Limitation in Section 2, Systems and Equipment Limits, Brakes applies.

---------- END -----------

Inertial Seperator 3-18-03

WARNING

AN INERTIAL SEPARATOR FAILURE IN ICING CONDITIONS CAN CAUSE DEGRADATION OF THE AIRCRAFT ENGINE PERFORMANCE (AN INCREASE IN ITT).

AN INERTIAL SEPARATOR FAILURE DURING OPERATIONS IN FOREIGN OBJECT DAMAGE (FOD) ENVIRONMENTS MAY CAUSE LONG TERM ENGINE DETERIORATION AND SHOULD BE REPORTED FOR POST FLIGHT MAINTENANCE.

1.	INERT SEP switch.....................	Set to CLOSED and wait 30 seconds
2.	INERT SEP switch.....................	Set to OPEN
3.	INERT SEP circuit breaker (Essential Bus $_L$F2)....................	Check. Do not reset unless tripped

If caption returns to normal operation after 45 seconds:

4.	Aircraft..	Continue flight and monitor system

If caption stays in failure status after 45 seconds:

5.	INERT SEP switch.....................	Maintain OPEN (together with ICE PROP PROTECTION PROPELLER ON) to maintain PUSHER ICE MODE

Continued on next page

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Inertial Seperator 3-18-03

continued

6.	Aircraft..	DEPART ICING CONDITIONS to positive SAT atmosphere, if possible
7.	Aircraft..	Avoid further icing conditions

If any attained performance degradation continues:

8.	Aircraft..	Land as soon as possible

---------- END -----------

LH Windshield Heat RH Windshield Heat 3-18-04
LH + RH Windshield Heat

1.	LH W/SHLD circuit breaker (LH PJB)...	Check. Do not reset unless tripped
2.	LH WSHLD switch.....................	Set to OFF then to LIGHT or HEAVY
3.	RH W/SHLD circuit breaker (RH PJB)...	Check. Do not reset unless tripped
4.	RH WSHLD switch.....................	Set to OFF then to LIGHT or HEAVY

If caption returns to normal operation:

5.	Aircraft..	Continue flight and monitor system

If caption stays in failure status and forward visibility through LH windshield is lost:

6.	Windshield..................................	Use RH windshield

If total forward visibility is lost:

7.	Aircraft..	DEPART ICING CONDITIONS to positive SAT atmosphere, if possible. Interior fogging can be cleared by hand
8.	Aircraft..	Avoid further icing conditions

If windshield has not cleared by time of landing:

9.	Cabin pressure...........................	Make sure depressurized
10.	DV window.................................	Use, if required

---------- END -----------

Probes Off 3-18-05

Probes not on with static air temperature below 10 °C.

1.	PROBES switch.........................	Set to ON

---------- END -----------

AOA De Ice 3-18-06

WARNING

AN AOA PROBE DEICE FAILURE IN ICING CONDITIONS CAN CAUSE A FALSE ACTIVATION OF THE STALL PROTECTION SYSTEM.

1.	PROBES switch........................	Set to OFF and wait 3 minutes
2.	PROBES switch........................	Set to ON
3.	LH AOA SENS DE-ICE circuit breaker (Essential Bus $_{L}$L2)........	Check. Do not reset unless tripped
4.	LH AOA PLATE HEAT circuit breaker (Essential Bus $_{L}$K2)........	Check. Do not reset unless tripped
5.	RH AOA SENS DE-ICE circuit breaker (Main Bus $_{R}$C2).............	Check. Do not reset unless tripped
6.	RH AOA PLATE HEAT circuit breaker (Main Bus $_{R}$D2).............	Check. Do not reset unless tripped

If caption returns to normal operation:

7.	Aircraft.......................................	Continue flight and monitor system

If caption stays in failure status:

8.	Aircraft.......................................	DEPART ICING CONDITIONS to positive SAT atmosphere, if possible

CAUTION

Stick shaker may activate at higher speeds than normal. If this occurs, increase speed until shaker stops.

9.	Aircraft.......................................	Avoid further icing conditions
10.	Flap position..............................	Limited to 15°
11.	Landing approach for 9921 lb (4500 kg) (MLW)........................	Keep minimum landing approach speed above 105 KIAS or shaker activation speed, whichever is highest

CAUTION

On landing approach after AOA deice failure, the PFD Dynamic Speed Bug will not be correct and should not be used as reference.

CAUTION

The total landing distance will be longer by up to 71%. Refer to Section 5, Performance, Flight in Icing Conditions, Flight in Icing Conditions - Landing Performance for the exact landing distance calculation.

---------- END -----------

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Pitot 1 Heat | Pitot 2 Heat | 3-18-07

WARNING

A PITOT AND STATIC DEICE FAILURE IN ICING CONDITIONS CAN CAUSE AN INCORRECT INDICATION ON THE ASI AND/OR ALTIMETER AND VSI.

1.	PROBES switch.........................	Set to OFF then ON again
2.	LH PITOT DE-ICE circuit breaker (Essential Bus $_L$J2)........	Check. Do not reset unless tripped
3.	RH PITOT DE-ICE circuit breaker (Main Bus $_R$E2).............	Check. Do not reset unless tripped

If caption returns to normal operation:

4.	Aircraft..	Continue flight and monitor system

If caption stays in failure status:

5.	Autopilot....................................	Disconnect
6.	Aircraft..	DEPART ICING CONDITIONS to positive SAT atmosphere, if possible
7.	Aircraft..	Avoid further icing conditions
8.	Aircraft..	Land as soon as possible
9.	Landing approach......................	Keep speed as indicated by Dynamic Speed Bug (1.3 V_S) with PUSHER ICE MODE and flaps 15°

CAUTION

The total landing distance will be longer by up to 71%. Refer to Section 5, Performance, Flight in Icing Conditions, Flight in Icing Conditions - Landing Performance for the exact landing distance calculation.

---------- END -----------

Static Heat | 3-18-08

WARNING

A PITOT AND STATIC DEICE FAILURE IN ICING CONDITIONS CAN CAUSE AN INCORRECT INDICATION ON THE ASI AND/OR ALTIMETER AND VSI.

1.	PROBES switch.........................	Set to OFF then ON again
2.	LH STATIC DE-ICE circuit breaker (Essential Bus $_L$H2)........	Check. Do not reset unless tripped

Continued on next page

Static Heat — 3-18-08

continued

3.	RH STATIC DE-ICE circuit breaker (Main Bus $_R$F2).............	Check. Do not reset unless tripped

If caption returns to normal operation:

4.	Aircraft..	Continue flight and monitor system

If caption stays in failure status:

5.	Autopilot....................................	Disconnect
6.	Aircraft..	DEPART ICING CONDITIONS to positive SAT atmosphere, if possible
7.	Aircraft..	Avoid further icing conditions
8.	Aircraft..	Land as soon as possible
9.	Landing approach.......................	Keep speed as indicated by Dynamic Speed Bug (1.3 V_S) with PUSHER ICE MODE and flaps 15°. Maintain speed above shaker activation

CAUTION

The total landing distance will be longer by up to 71%. Refer to Section 5, Performance, Flight in Icing Conditions, Flight in Icing Conditions - Landing Performance for the exact landing distance calculation.

----------- END -----------

Pusher — 3-18-09

WARNING

A FAILURE OF THE STALL WARNING/STICK PUSHER SYSTEM TO RE-DATUM TO ICE MODE WHEN IN ICING CONDITIONS CAN LEAVE THE AIRCRAFT UNPROTECTED AGAINST THE NATURAL STALL WITH RESIDUAL ICE ON THE AIRFRAME.

1.	STICK PUSHER test switch........	Press and hold for duration of Pusher test sequence (approx. 5 seconds) (this identifies Pusher ice mode computer or selection failure)

If failure stays during test go to Step 7.

If failure disappears during test but returns after completion of test:

2.	PROPELLER switch...................	Cycle from OFF to ON
3.	INERT SEP switch......................	Cycle from CLOSED to OPEN

Continued on next page

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Pusher — 3-18-09

continued

4.	PROP DE-ICE circuit breaker (LH PJB)....................................	Check. Do not reset unless tripped
5.	INERT SEP circuit breaker (Essential Bus $_L$F2)....................	Check. Do not reset unless tripped

If captions return to normal operation within 30 seconds:

6.	Aircraft..	Continue flight and monitor system

If caption stays in failure status:

7.	Aircraft..	DEPART ICING CONDITIONS to positive SAT atmosphere, if possible
8.	Aircraft..	Avoid further icing conditions
9.	Flap position................................	Limited to 15°
10.	Landing approach for 9921 lb (4500 kg) (MLW).........................	Keep minimum landing approach speed above 105 KIAS

CAUTION

The total landing distance will be longer by up to 71%. Refer to Section 5, Performance, Flight in Icing Conditions, Flight in Icing Conditions - Landing Performance for the exact landing distance calculation.

CAUTION

On landing approach after Pusher Ice Mode failure, the PFD Dynamic Speed Bug will not be correct and should not be used as reference.

---------- END -----------

Boots TEMP Limit 3-18-10

De ice boots switch has been inadvertently left in the ON position during climb or descent through the boots temperature limit, or the boots switch has been inadvertently switched ON without observing the boots temperature limits.

CAUTION

Operation of the pneumatic de-ice boot system in ambient temperatures below -40 °C and above +40 °C may cause permanent damage to the boots.

1. BOOTS switch............................ Set to OFF

Note

Initial boot inflation sequence begins 20 seconds after deice boots activation, the deice timer/controller allows deactivation of the deice boots in this initial 20 seconds dwell timer before inflation sequence starts, this to prevent damage to the pneumatic de-ice boots due to inflation outside of their operating envelope (-40 °C - +40 °C).

---------- END -----------

Flaps EXT Limit 3-18-11

Flaps have been inadvertently extended more than 15° during de-ice boots operation or flaps have been inadvertently extended with failed boots.

1. FLAPS...................................... Retract to previous position

---------- END -----------

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3-19 Passenger and Cargo Door

Passenger Door Pax + Cargo Door	Cargo Door	3-19-01

On ground:

1.	Passenger and/or Cargo Door....	Visually check for the correct locking of the door latches (green indicators visible)
2.	Passenger Door.........................	Check the handle lock pin for freedom of movement

--- END ---

In flight:

CAUTION

Do not adjust the position of the door handles in flight.

1.	All occupants.............................	Check seat lap and shoulder belts are fastened and the lap belt tightened
2.	Airspeed....................................	Reduce IAS to practical minimum
3.	Aircraft.......................................	Start a slow descent to 10,000 ft, or minimum safe altitude if higher
4.	CPCS SYSTEM MODE..............	AUTO
5.	Aircraft.......................................	Land as soon as possible

----------- END -----------

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3-20 Cracked Window in Flight

Cracked Window in Flight — 3-20-01

1.	All occupants..............................	Check seat lap and shoulder belts are fastened and the lap belt tightened
2.	Airspeed....................................	Reduce IAS to practical minimum
3.	Aircraft......................................	Start a slow descent to 10,000 ft, or minimum safe altitude if higher
4.	CPCS SYSTEM MODE..............	AUTO
5.	Aircraft......................................	Land as soon as practical

Note

When left hand front winshield is cracked and the visibility impaired, use direct vision window for landing.

---------- END -----------

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3-21 Wheel Brake Failure

Wheel Brake Failure	**3-21-01**
Wheel brakes ineffective and/or pedal excessively soft when pressed.	
1. Landing + Taxi............................	Use reverse power, BETA and Nose Wheel steering
---------- END -----------	

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3-22 APEX Failures

All APEX display units indicate a red X or blank: 3-22-01

1.	Primary flight information...........	Use ESIS to control safe aircraft flight path continuation
2.	Autopilot....................................	Use the autopilot (if available) with mode annunciations on the flight controller

Note

Basic autopilot operation is independent of display unit availability.
If failure remains, wait 10 seconds before continuing with the procedure. This gives the system time to reconfigure.

If above 10,000 feet:

3.	Main OXYGEN lever..................	Confirm ON
4.	Crew oxygen masks...................	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

5.	PASSENGER OXYGEN selector	AUTO or ON
6.	Systems MFD **PAX OXY**	Confirm ON
7.	Passengers..............................	Instruct to don masks
8.	Aircraft....................................	Descend below 10,000 ft or to minimum safe altitude if higher. If required, inform ATC, ask for assistance to maintain safe aircraft flight path and traffic separation

If failure remains:

9.	MAU CH A1 circuit breaker (Essential Bus $_L$B3) and MAU CH B1 circuit breaker (Standby Bus $_L$Z3)....................................	Open, wait two seconds and close. Wait approximately 30 seconds for the system to reboot

If DU 1 and DU 2 remain blank or indicate red X, but DU 3 and/or DU 4 have recovered:

10.	Reversion Controller..................	Set PILOTS PFD control knob to AGM2
11.	Reversion Controller..................	Set UPPER MFD control knob to OFF/REV

Continued on next page

All APEX display units indicate a red X or blank: 3-22-01

continued

12. Aircraft.. Refer to CAS captions to cross check that all issues are addressed

If failure remains:

13. Aircraft.. Land as soon as practical using minimum engine power to avoid exceeding engine limits

Prior to landing:

14. CABIN PRESSURE switch......... DUMP

---------- END -----------

Check DU 1 / Check DU 2 / Check DU 3 / Check DU 4 — 3-22-02

Note
Or any other combination of 2 or 3 Check DU failure indications.

1. Display.. Check relevant display

Note
If two or more DU have failed (blank or red X), wait 10 seconds to allow the system to reconfigure before switching off DUs for display reversionary formatting.

If display unit indicates red X or blank:

2. Reversion Controller.................. Set DU control knob to OFF/REV

Note
If the MFD swap button is used for DU 2 or 3, the optional single charts can only be accessed on DU 2 (not applicable if the Dual Charts option is installed).
Basic Autopilot operation is independent of DU availability. Use annunciations on the Flight Controller and attempt to continue using the Autopilot.

---------- END -----------

Check DU 1 / AGM 1 Fail / Check DU 4 / AGM 2 Fail — 3-22-03

Check DU 1 with **AGM 1 Fail** or **Check DU 4** with **AGM 2 Fail**

1. DU 1 or 4.................................... Check red X

Continued on next page

Check DU 1 / Check DU 4 — AGM 1 Fail / AGM 2 Fail — 3-22-03

continued

If red X on display:

2. Reversion Controller.................. For DU 1 set control knob to AGM 2

   For Du 4 set control knob to AGM 1

---------- END -----------

Check DU 1+2+3+4 — 3-22-04

Displays suspect.

1. Aircraft.. Use Electronic Standby Instrument System (ESIS)

If above 10,000 ft:

2. Main OXYGEN lever.................. Confirm ON
3. Crew oxygen masks................... ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

4. PASSENGER OXYGEN selector AUTO or ON
5. Systems MFD **PAX OXY**......... Confirm ON
6. Passengers............................... Instruct to don masks
7. Aircraft.. Descend below 10,000 ft or to minimum safe altitude if higher. If required, inform ATC, ask for assistance to maintain safe aircraft flight path and traffic separation
8. Aircraft.. Land as soon as practical using minimum engine power to avoid exceeding engine limits

Prior to landing:

9. CABIN PRESSURE switch......... DUMP

---------- END -----------

DU 1 Overheat / DU 2 Overheat / DU 3 Overheat / DU 4 Overheat — 3-22-05

Note
Or any other combination of 2 or 3 DU Overheat failure indications.

1.	Displays....................................	Check relevant display and treat as suspect
2.	Reversion Controller...................	Set DU control knob to OFF/REV
3.	Relevant PFD or MFD circuit breaker.......................................	PULL
4.	Displayed data...........................	Cross check PFD with Electronic Standby Instrument System (ESIS) Check Engine Instruments Check Environment Window

Note
If the MFD swap button is used for DU 2 or 3, the optional single charts can only be accessed on the upper DU 2 (not applicable if the Dual Charts option is installed).

5.	Displays....................................	Monitor for remainder of flight

---------- END ----------

DU 1+2+3+4 Overheat — 3-22-06

Displays suspect

1.	Aircraft..	Use Electronic Standby Instrument System (ESIS)
2.	PFD and/or MFD circuit breakers....................................	PULL

If above 10,000 ft:

3.	Main OXYGEN lever..................	Confirm ON

Continued on next page

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DU 1+2+3+4 Overheat 3-22-06

continued

4. Crew oxygen masks.................... On

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

5. PASSENGER OXYGEN.............. AUTO or ON
6. Systems MFD **PAX OXY** .... Confirm ON
7. Passengers.................................. Instruct to don masks
8. Aircraft... Descend below 10,000 ft or to minimum safe altitude if higher
9. Aircraft... Land as soon as practical using minimum engine power to avoid exceeding engine limits

Prior to landing:

10. CABIN PRESSURE switch.......... DUMP

---------- END -----------

LH PFD CTRL Fail 3-22-07

1. RH PFD Controller...................... Push PFD button to operate LH PFD

Note

X PFD CTRL ACTIVE annunciation will be displayed in amber along bottom right of the ADI on pilot PFD. PFD CTRL INACTIVE will be displayed on copilot PFD (if installed).

---------- END -----------

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RH PFD CTRL Fail 3-22-08

1. LH PFD Controller...................... Push PFD button to operate RH PFD

Note

X PFD CTRL ACTIVE annunciation will be displayed in amber along bottom right of the ADI on copilot PFD (if installed). PFD CTRL INACTIVE will be displayed on pilot PFD.

---------- END -----------

LH+RH PFD CTRL Fail 3-22-09

1. PFD Controller functions............ Cross check PFD data with Electronic Standby Instrument System (ESIS). Use Touch Screen Controller / MF Controller or CCD to operate PFD

---------- END -----------

Check Pilot PFD 3-22-10

Pilot PFD data suspect.

1. Display....................................... Cross check pilot PFD data with copilot PFD data, or with Electronic Standby Instrument System (ESIS)

If data confirmed to be suspect:

2. Reversion Controller.................. Set pilot PFD control knob to AGM2

---------- END -----------

Check Copilot PFD 3-22-11

Copilot PFD data suspect.

1. Display....................................... Cross check copilot PFD data with pilot PFD data

If data confirmed to be suspect:

2. Reversion Controller.................. Set copilot PFD control knob to AGM1

---------- END -----------

Check Engine Display 3-22-12

PFD engine data suspect.

1.	Display......................................	Cross check pilot PFD data with copilot PFD data

If data confirmed to be suspect:

2.	Reversion Controller..................	Set pilot PFD control knob to AGM2

If data remains suspect:

3.	Aircraft.......................................	Land as soon as practical using minimum engine power to avoid exceeding engine limits

---------- END -----------

ATT FAIL 3-22-13

1.	PFD pitch and roll......................	Check

If shading is all blue and red crosses are shown, data has become invalid:

2.	Pitch and Roll data.....................	Use Electronic Standby Instrument System (ESIS)
3.	ADHRS pushbutton on PFD Controller.................................	Press to bring the other ADAHRS channel data onto PFD

---------- END -----------

RAD 3-22-14

Radar Altimeter data has become invalid.

Note

Autothrottle does not disconnect automatically when radar altimeter data is invalid and/or the radar altimeter system has failed.

1.	Altitude data..............................	Use Altimeter Indicator

---------- END -----------

HDG FAIL 3-22-15

Heading data has become invalid.

1.	Heading data.............................	Use Standby Magnetic Direction Indicator

Continued on next page

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HDG FAIL — 3-22-15

continued

2.	ADHRS pushbutton on PFD Controller..................................	Press to bring the other ADAHRS channel Heading data onto PFD

---------- END -----------

Airspeed Display Replaced with Red X — 3-22-16

Airspeed Tape data has become invalid.

1.	Airspeed data............................	Use Electronic Standby Instrument System (ESIS)
2.	ADHRS pushbutton on PFD Controller..................................	Press to bring the other ADAHRS channel Airspeed data onto PFD

---------- END -----------

Altitude Display Replaced with Red X — 3-22-17

Altitude Tape data has become invalid.

1.	Altitude data..............................	Use Electronic Standby Instrument System (ESIS)
2.	ADHRS pushbutton on PFD Controller..................................	Press to bring the other ADAHRS channel Altitude data onto PFD

---------- END -----------

Vertical Speed Replaced with Red X — 3-22-18

Vertical Speed Tape data has become invalid.

1.	Vertical Speed...........................	Monitor altitude
2.	ADHRS pushbutton on PFD Controller..................................	Press to bring the other ADAHRS channel Vertical Speed data onto PFD

---------- END -----------

IAS?	**ALT?**	**3-22-19**

Airspeed and/or barometric Altitude miscompare between ADAHRS 1 and ADAHRS 2 by more than 10 KIAS / 200 feet.

Note

ADAHRS Channel A receives dynamic and static pressure information form the LH pitot static system, ADAHRS Channel B and the ESIS from he RH pitot static system.

Note

A failed pitot static system may cause erroneous Altitude and Airspeed indications.

1.	Baro setting................................	Check correct setting on Electronic Standby Instrument System (ESIS), Pilot PFD and Copilot PFD
2.	Airspeed and Altitude..................	Crosscheck with Electronic Standby Instrument System (ESIS) and Copilot PFD

If erroneous pitot / static system cannot be determined:

3.	Pilot..	Advise ATC that the aircraft could be somewhere between both altitudes and the transponder altitude may be wrong
4.	PCL...	Set maximum cruise power torque and cross check resulting IAS from Max cruise table (See Section 5-3-4, Performance Data - Cruise Performance) against cockpit indications
5.	ADAHRS pushbutton on PFD controller..................................	If determined which source is NOT correct press to bring the good ADAHRS channel Airspeed / Altitude data onto PFD
6.	L/R AFCS mode selector...........	Check coupled arrow pointing towards the selected PFD
7.	Aircraft.......................................	Land as soon as practical

If erroneous system cannot be determined:

If Airspeed malfunctions:

8.	Cruise and descent....................	Use only known power settings and aircraft attitudes
9.	Approach....................................	Keep speed as indicated by Dynamic Speed Bug (1.3 V_S) with PUSHER ICE MODE and flaps 15°

Continued on next page

IAS? ALT? 3-22-19

continued

CAUTION

The total landing distance will be longer by up to 71%. Refer to Section 5, Performance, Flight in Icing Conditions, Flight in Icing Conditions - Landing Performance for the exact landing distance calculation.

10.	Aircraft..	Land as soon as practical

If Altimeter malfunctions:

Below 10,000 feet:

11.	Depressurize aircraft..................	Select CPCS System Mode switch to MANUAL and Manual Control switch to CLIMB

When cabin pressure differential approaches zero:

12.	CABIN PRESS switch.................	DUMP
13.	Cabin altimeter...........................	Use to give approximate aircraft altitude
14.	Aircraft..	Land as soon as practical

---------- END -----------

HDG? 3-22-20

Heading data between pilot and copilot PFD miscompares more than 6°.

1.	Heading..	Cross check with the magnetic heading indication on the Electronic Standby Instrument System (ESIS)
2.	ADHRS pushbutton on PFD Controller..	If required press to bring the other ADAHRS channel Heading data onto Pilot PFD and confirm a similar reading to the magnetic heading indication on the ESIS

If magnetic heading indication on the ESIS is not reliable:

3.	GPS Sensors page....................	Cross check magnetic heading on the ESIS with the GPS TRK heading on the GPS Sensors page. If required select the other ADAHRS channel for display on the Pilot PFD

Continued on next page

HDG? 3-22-20

continued

If flight condition and pilot workload permit, attempt to realign the ADAHRS channels:

4. Aircraft.. Fly straight and level for 2 minutes

Note
In regions where magnetic inclination (dip angle) exceeds 80°, erroneous magnetic heading indications may be experienced.

---------- END -----------

PITCH? 3-22-21

Pitch angle miscompares more than 5°.

1. Pitch... Cross check with Electronic Standby Instrument System (ESIS), Copilot PFD and Pilot PFD
2. ADHRS pushbutton on PFD Controller.................................. If required press to bring the other ADAHRS channel Pitch data onto PFD

---------- END -----------

ROLL? 3-22-22

Roll angle miscompares more than 6°.

1. Roll... Cross check with Electronic Standby Instrument System (ESIS), Copilot PFD and Pilot PFD
2. ADHRS pushbutton on PFD Controller.................................. If required press to bring the other ADAHRS channel Roll data onto PFD

---------- END -----------

BARO? 3-22-23

Pilot and Copilot PFD Altimeter settings are not synchronized.

1. Baro... Cross check with Electronic Standby Instrument System (ESIS), Copilot PFD and Pilot PFD
2. ADHRS pushbutton on PFD Controller.................................. If required press to bring the other ADAHRS channel Baro data onto PFD

---------- END -----------

APEX Miscellaneous - On Ground Only 3-22-24

Indication:

- **APM 1 Fail**, or
- **APM 2 Fail**, or
- **APM 1+2 Fail**, or
- **CMS 1+2 Fail**, or
- **System Config Fail**, or
- **Validate Config**, or
- **APM Miscompare**, or
- **Gear Actuator Cntl**, or

1.	Aircraft..	Terminate procedure for flight and inform maintenance

---------- END -----------

MAU A Fail 3-22-25

1.	MAU CH. A1 circuit breaker (Essential Bus $_L$B3)....................	Open, wait 2 seconds and close

If failure remains, to access serviceable FMS 1:

2.	Co-pilot PFD controller................	Set NAV SEL to FMS 1

Note

For dual FMS installations, selecting NAV SEL to FMS 1 ensures that FMS 1 remains available on INAV after AGM2 reversion of the pilot PFD.
During LP approach, if either Flight Director (FD) fails, both the VNAV Pre-Approach Pointer and the Vertical Deviation Pointer will be removed from the Vertical Deviation Information (VDI) scale (scale remains). VDI will be unavailable.

3.	Display Reversion Control Panel	Set UPPER MFD control knob to OFF/REV
4.	Display Reversion Control Panel	Set PILOTS PFD control knob to AGM2
5.	PFD Radio window XPDR detail.	Select XPDR 2

Note

If MAU Channel A cannot be reset, Autopilot, Flight Director and XPDR 1 are not available for remainder of the flight.

Continued on next page

MAU A Fail 3-22-25

continued

6.	Landing......................................	Engine power may remain at flight idle. Reverse operation is not affected by this fault.

---------- END -----------

MAU B Fail 3-22-26

1.	MAU CH. B1 circuit breaker (Standby Bus $_L$Z3)......................	Open, Wait 2 seconds and close

If failure remains:

2.	Display Reversion Control Panel	Set LOWER MFD control knob to OFF/REV
3.	Display Reversion Control Panel	Set CO-PILOTS PFD control knob to AGM1

If dual FMS is installed and access to FMS is desired:

4.	Pilot PFD controller....................	Set NAV SEL to FMS 2

> **Note**
> If MAU Channel B cannot be reset, Autopilot, Flight Director, Yaw Damper and XPDR 2 are not available for remainder of the flight.
> For single FMS installations: FMS is not available for the remainder of the flight.

5.	Landing......................................	Engine power may remain at flight idle. Reverse operation is not affected by this fault.

---------- END -----------

Air/Ground Fail 3-22-27

On ground:

1.	Aircraft..	Do not fly, maintenance required

--- END ---

In flight:

1.	Aircraft..	All systems will default to “In Air”

---------- END -----------

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Aural Warning Fail 3-22-28

Note

All aural warnings except TCAS and TAWS are inhibited, including FAS and CAS.

1. Aural Warning Inhibit switch (left rear panel).................................. Check in ON position

---------- END -----------

DME 1 Fail 3-22-29

1. PFD Controller........................... Press DME button

If DME HOLD is ON:

2. PFD DME window....................... Press soft key and set to OFF.

   Press DME PAIR soft key and change NAV association

If unsuccessful:

3. DME circuit breaker (Avionic 1 bus $_L$U1).................................... Reset

CAUTION

Autopilot performance on coupled approaches will be reduced. For autopilot limitations refer to Section 2, Primus Apex - Automatic Flight Control System.

---------- END -----------

Rad Alt 1 Fail 3-22-30

1. PFDs.. Confirm amber RAD annunciations are on

CAUTION

Rad Alt data has become invalid.

2. Altimeter.................................... Use Altimeter Indicator

---------- END -----------

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ADC A Fail — 3-22-31

1. Pilot PFD Controller.................... Press ADHRS button to select ADAHRS B
2. Pilots PFD Window..................... Confirm ADAHRS 2 flag which indicates attitude, heading and air data same source as copilot PFD. Compare with Electronic Standby Instrument System (ESIS)

CAUTION

The autopilot will disengage.

Do not use VNAV function of the FMS.

3. Autopilot..................................... Re-engage, after PFD data displayed
4. Altitude....................................... Determine using ADAHRS 2 source
5. Altitude....................................... Cross-check aircraft altitude using ESIS. Record each altimeter reading. The differences between the operating ADAHRS 2 altimeter and the standby altimeter readings should be noted for use in additional contingency situations. Repeat procedure each hour
6. Air Traffic Control......................... Inform to facilitate a route or an altitude change to exit RVSM airspace.

Note

Pilots should be aware of any national RVSM contingency procedures for loss of redundancy of primary altimetry systems.

---------- END -----------

ADC B Fail — 3-22-32

1. Copilot PFD Controller................ Press ADHRS button to select ADAHRS A
2. Copilots PFD Window................. Confirm ADAHRS 1 flag which indicates attitude, heading and air data same source as pilot PFD. Compare with Electronic Standby Instrument System (ESIS)

Continued on next page

ADC B Fail — 3-22-32

continued

CAUTION

The autopilot will disengage.

Do not use VNAV function of the FMS.

3.	Autopilot....................................	Re-engage, after PFD data displayed
4.	Altitude......................................	Determine using ADAHRS 2 source
5.	Altitude......................................	Cross-check aircraft altitude using ESIS. Record each altimeter reading. The differences between the operating ADAHRS 2 altimeter and the standby altimeter readings should be noted for use in additional contingency situations. Repeat procedure each hour
6.	Air Traffic Control.......................	Inform to facilitate a route or an altitude change to exit RVSM airspace.

Note

Pilots should be aware of any national RVSM contingency procedures for loss of redundancy of primary altimetry systems.

---------- END ----------

ADC A+B Fail — 3-22-33

Loss of primary altitude and airspeed data:

1.	Aircraft......................................	Use Electronic Standby Instrument System (ESIS)
2.	Altitude......................................	Monitor and maintain assigned altitude by using ESIS
3.	Air Traffic Control.......................	Inform to facilitate a route or an altitude change to exit RVSM airspace.

Note

Pilots should be aware of any national RVSM contingency procedures for loss of redundancy of primary altimetry systems.

If loss of cabin pressure automatic control and ΔP display:

4.	CPCS MODE switch..................	MANUAL
5.	MANUAL CONTROL switch........	Press DESCENT for 30 seconds to close OFV

Continued on next page

ADC A+B Fail 3-22-33

continued

CAUTION

The following services will be inoperative:

- **Autopilot (abnormal disengage)**
- **Overspeed warning**
- **Altitude Alert Monitor**
- **Air data to other systems**

Do not use VNAV functions of the FMS.

If Cabin Altitude *comes on:*

6.	Main OXYGEN lever..................	Confirm ON
7.	Crew oxygen masks....................	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

8.	PASSENGER OXYGEN selector	AUTO or ON
9.	Systems MFD PAX OXY	Confirm ON
10.	Passengers................................	Instruct to don masks
11.	CPCS MODE switch..................	Confirm MANUAL
12.	MANUAL CONTROL switch........	Push intermittently to DESCENT to reduce cabin altitude below 10,000 ft

If unsuccessful:

13.	Aircraft.......................................	Limit flight altitude to maintain cabin altitude below 10,000 ft

If necessary:

14.	Aircraft.......................................	Carry out emergency descent
15.	Aircraft.......................................	Land as soon as practical

Prior to landing:

16.	CABIN PRESSURE switch.........	DUMP

---------- END -----------

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AHRS A Fail — 3-22-34

1. Pilot PFD Controller.................... Press ADHRS button to select ADAHRS B
2. Pilot PFD window........................ Confirm ADAHRS 2 flag which indicates attitude, heading and air data same source as copilot PFD. Compare with Standby Instrument System

CAUTION

The autopilot will revert to roll and pitch mode.

3. Autopilot....................................... Re-select as required after PFD data displayed

---------- END -----------

AHRS B Fail — 3-22-35

1. Copilot PFD Controller................ Press ADHRS button to select ADAHRS A
2. Copilot PFD window.................... Confirm ADAHRS 1 flag which indicates attitude, heading and air data same source as pilot PFD. Compare with Standby Instrument System

CAUTION

The autopilot will revert to roll and pitch mode.

3. Autopilot....................................... Re-select as required after PFD data displayed

---------- END -----------

AHRS A+B Fail — 3-22-36

Loss of primary attitude and heading data:

1. Aircraft... Use Standby Instrument System

Continued on next page

AHRS A+B Fail — 3-22-36

continued

CAUTION

The following services will be inoperative:

- **Autopilot (abnormal disengage)**
- **INAV map.**

Do not use VNAV function of the FMS.

If flight conditions and pilot workload permits, attempt to realign AHRS 1 and/or AHRS 2:

2.	ADHRS CH. A circuit breaker (Essential Bus $_L$D3)....................	Open, wait 5 seconds, then close

If unsuccessful:

3.	ADHRS CH. B circuit breaker (Main Bus $_R$M1)..........................	Open, wait 5 seconds, then close
4.	Aircraft..	Fly strictly wings level and do not change pitch attitude for 1 minute

If realignment is successful:

5.	PFD Controller...........................	Push ADHRS button to select required ADHRS

If realignment is not successful:

6.	Aircraft..	Land as soon as practical using Standby Instrument System

---------- END -----------

FLT CTRL Ch A Fail   FLT CTRL Ch B Fail — 3-22-37

Note

FLT CTRL CAS messages are amber on the ground, but cyan in the air.

Loss of Flight Controller channel redundancy.

Note

No loss of functionality. No pilot action.

---------- END -----------

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FLT CTRL Ch A+B Fail — 3-22-38

Note

FLT CTRL CAS messages are amber on the ground, but cyan in the air.

Loss of both Flight Controller channels.

CAUTION

Loss of Autopilot.

Loss of Flight Director.

Loss of Yaw Damper.

Loss of Minimums Selection/Reporting.

Loss of Heading/Track selection.

---------- END -----------

FMS1-GPS1 Pos Misc FMS1-GPS2 Pos Misc FMS2-GPS1 Pos Misc FMS2-GPS2 Pos Misc — 3-22-39

1.	GPS vs FMS position.................	Check manually
2.	GPS...	Confirm alternate GPS (if second GPS installed) is selected on SENSORS GPS page
3.	Aircraft......................................	Inform ATC of any loss of RNAV capability

Note

For dual GPS with a single GPS failure - no loss of position will occur. With single GPS sensor failed system goes to DEGRADE and then Dead Reckoning (DR) mode. DEGRADE and DR modes will be annunciated on the PFD HSI.

---------- END -----------

FMS1-GPS1+2 Pos Misc FMS2-GPS1+2 Pos Misc — 3-22-40

FMS PPOS position invalid, GPS position valid:

1.	Display.......................................	Monitor position on Map and on SENSORS GPS page
2.	Aircraft.......................................	Inform ATC of any loss of RNAV capability

Continued on next page

FMS1-GPS1+2 Pos Misc FMS2-GPS1+2 Pos Misc 3-22-40

continued

CAUTION

Loss of GPS or FMS navigation

RAIM unavailable

Note
With dual FMS, if only one FMS shows a position miscompare, select the other FMS to avoid loss of navigation and RAIM functionality.

Note
With both GPS sensors failed system goes to DEGRADE and then Dead Reckoning (DR) mode. DEGRADE and DR modes will be annunciated on the PFD HSI.

---------- END -----------

Unable FMS-GPS Mon 3-22-41

Note
Monitor Warning System continuously compares the position between each FMS and each GPS and annunciates miscompares between any if the threshold is exceeded.

1. SENSORS GPS page................. Check GPS navigation mode
2. If FMS or GPS has failed............ Use other means of navigation

If aircraft is SBAS capable and the GPS shows problems with the GPS (GNSS) reception:

3. SBAS sensor page...................... Swap to systems. Select sensor pages on multipurpose window and select GPS. On drop-down menu, select SBAS tab and switch “Enroute SBAS” from Enable to Disable

Note
Disabling Enroute SBAS does not disable using SBAS for LPV approaches.
If Enroute SBAS has been disabled due to SBAS problems, LPV approach capability may be affected. Plan an alternative IFR approach for the destination and alternate airports.

4. GPS 1 Circuit Breaker (Standby Bus $_L$V3)..................................... Open, wait 2 seconds and close

Continued on next page

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Unable FMS-GPS Mon — 3-22-41

continued

If GPS 2 is installed:

5. GPS 2 Circuit Breaker (Avionic 2 Bus $_R$X1).................................... Open, wait 2 seconds and close

If **Unable FMS-GPS Mon** *remains and the DR flag is shown on the PFD:*

6. Aircraft (If in flight)....................... Inform ATC of any loss of required navigation performance and use other means of navigation

CAUTION

RAIM unavailable.

Note

In the case of an FMS failure the CPCS will default to 10,000 ft Landing Field Elevation (LFE). Manually re-select the LFE to prevent over or under pressurization.

In flight (while conducting an FMS based approach):

7. Aircraft.. Terminate approach and execute a missed approach if required

In flight (during RNP operation):

8. Aircraft.. Terminate and revert to other means of navigation

In flight (during RNAV operation):

9. FMS information.......................... Cross check with VOR, DME and/or NDB information

If FMS shows an acceptable level of navigation performance:

10. Aircraft.. Navigation may continue using the FMS

If FMS does not show an acceptable level of navigation performance:

11. Aircraft.. Revert to alternative navigation as required

---------- END -----------

MMDR 1 Fail — 3-22-42

1. MMDR 1 Circuit Breaker (Avionic 1 Bus $_L$P1).................... Reset

Continued on next page

MMDR 1 Fail — 3-22-42

continued

If COM 1, NAV 1 and ADF remain not available:

2. COM and NAV.......................... Use COM 2 and NAV 2

---------- END -----------

MMDR 2 Fail — 3-22-43

1. MMDR 2 PRI Circuit Breaker (Main Bus $_R$H1)......................... Reset

If COM 2 and NAV 2 remain not available:

2. COM and NAV.......................... Use COM 1 and NAV 1

---------- END -----------

MMDR 1+2 Fail — 3-22-44

1. MMDR 1 Circuit Breaker (Avionic 1 Bus $_L$P1).................... Reset
2. MMDR 2 PRI Circuit Breaker (Main Bus $_R$H1)......................... Reset

If all COM, NAV and ADF radios are not available, attempt communication with:

3. EMERG COM 1 switch............... Set to 121.5 MHz

If communication not successful:

4. XPDR....................................... Set to 7600 and follow national communication loss procedures

If all VHF and ADF navigation capabilities are lost:

5. Aircraft...................................... Continue flight with FMS/GPS

---------- END -----------

MMDR 1 Overheat — 3-22-45

Note

MMDR 1 transmit capability is reduced because internal temperature of unit is too high. MMDR 1 may become operative again after a period of time.

1. COM and NAV.......................... Use COM 2 and NAV 2

---------- END -----------

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MMDR 2 Overheat — 3-22-46

Note
MMDR 2 transmit capability is reduced because internal temperature of unit is too high. MMDR 2 may become operative again after a period of time.

1. COM and NAV............................ Use COM 1, NAV 1 and ADF

---------- END -----------

MMDR 1+2 Overheat — 3-22-47

Note
MMDR 1 and 2 transmit capabilities are reduced because internal temperature of units is too high. MMDR 1 and 2 may become operative again after a period of time.

If communication is lost, attempt communication with:

1. EMERG COM 1 switch................ Set to 121.5 MHz

If communication not successful:

2. XPDR.. Set to 7600 and follow national communication loss procedures

If all VHF and ADF navigation capabilities are lost:

3. Aircraft.. Continue flight with FMS/GPS

---------- END -----------

ADS-B Out — 3-22-48

ADS-B Out or removed ADS-B Out annunciation

Single Transponder Installation (or single ADS-B Out)

If **XPDR Fail** *is on:*

1. XPDR 1 Circuit Breaker (Avionic 1 Bus $_L$V1)................................. Reset

If ***XPDR Fail*** *remains:*

2. Aircraft.. Proceed according to ATC instructions, expect descent below controlled airspace or diversion to next suitable airfield

--- END ---

Continued on next page

ADS-B Out — 3-22-48

continued

Dual Transponder installation

If **XPDR 1 Fail** *is on:*

1. PFD radio window........................ Press bezel button adjacent to XPDR 1 window
2. PFD Controller............................ Press DETAIL button
3. XPDR detail page....................... Press XPDR SEL bezel button to change to XPDR 2

If **XPDR 2 Fail** *is on:*

4. PFD radio window........................ Press bezel button adjacent to XPDR 2 window
5. PFD Controller............................ Press DETAIL button
6. XPDR detail page....................... Press XPDR SEL bezel button to change to XPDR 1

If **XPDR 1+2 Fail** *is on:*

7. XPDR 1 Circuit Breaker (Avionic 1 Bus $_L$V1).................................. Reset
8. XPDR 2 Circuit Breaker (Avionic 2 Bus $_R$U1).................................. Reset

If **XPDR 1+2 Fail** *remains:*

9. Aircraft.. Proceed according to ATC instructions, expect descent below controlled airspace or diversion to next suitable airfield

---------- END -----------

ASCB Fail — 3-22-49

Note

By checking available data the crew can determine if the caution is for a single or dual ASCB bus failure.

Single ASCB Failure

1. Cockpit data.............................. Continues to be displayed (Flight data looks normal)
2. Displayed data........................... Cross check PFD with Electronic Standby Instrument System (ESIS)

   Check Engine Instruments

   Check Environment Window

Continued on next page

ASCB Fail — 3-22-49

continued

3.	Displays....................................	Monitor for remainder of flight

--- END ---

Dual ASCB Failure

1.	Displays suspect (Loss of displayed data)...........................	Use Electronic Standby Instrument System (ESIS)

If above 10,000 ft and ΔP and CAB ALT indications are suspect or lost:

2.	Main OXYGEN lever..................	Confirm ON
3.	Crew oxygen masks...................	ON

Note

Procedure to don the crew oxygen masks:

1 Remove the normal headset.

2 Put the oxygen mask on. Check 100%.

3 Put the normal headset back on.

4 Set MIC SELECT switch on the rear left panel to MASK.

4.	PASSENGER OXYGEN selector	AUTO or ON
5.	Systems MFD **PAX OXY**.........	Confirm ON
6.	Passengers...............................	Instruct to don masks
7.	Aircraft..	Descend below 10,000 ft or to minimum safe altitude if higher
8.	Aircraft..	Land as soon as practical using minimum engine power to avoid exceeding engine limits

Prior to landing:

9.	CABIN PRESSURE switch.........	DUMP

---------- END -----------

Automatic Flight Control System Failures 3-22-50

AFCS uncommanded deviation from flight path

Abrupt control and/or airplane motion

Accomplish steps 1 and 2 simultaneously.

1.	Airplane Control Wheel..............	GRASP FIRMLY and regain aircraft control
2.	Autopilot Disengage switch.........	PRESS to disengage the autopilot (pilot or copilot yoke)
3.	Aircraft......................................	RETRIM manually as necessary
4.	A/P SERVO circuit breaker (Avionic 1 Bus $_L$Z2)....................	PULL

WARNING

DO NOT ATTEMPT TO RE-ENGAGE THE AUTOPILOT FOLLOWING AN AUTOPILOT OR AUTOTRIM MALFUNCTION.

Abnormal disconnect

Flashing red AP on PFD and continuous “Cavalry Charge” aural warning

1.	Airplane Control Wheel..............	GRASP FIRMLY and regain aircraft control
2.	Autopilot Disengage switch.........	PRESS to disengage the autopilot (pilot or copilot yoke)
3.	Aircraft......................................	RETRIM manually as necessary
4.	Aircraft......................................	If no AFCS associated CAS messages attempt to re-engage autopilot once

--- END ---

CAS Caution messages

AP HOLD LH (RH) WING DN, or **AP HOLD NOSE UP (DN)**, or **YD HOLD NOSE LEFT (RIGHT)**

1.	Airplane Control Wheel and rudder pedals............................	Grasp and position feet to gain aircraft control
2.	Autopilot Disengage switch.........	PRESS to disengage the autopilot (pilot or copilot yoke)
3.	Aircraft......................................	RETRIM manually as necessary

Note

When the AFCS is manually disengaged, an aural warning is given and the PFD AP flashes red for 2.5 seconds.

Continued on next page

Automatic Flight Control System Failures — 3-22-50

continued

If no AFCS associated CAS messages:

4. Aircraft.. Attempt to re-engage autopilot once

Maximum Altitude losses due to autopilot malfunction:

Configuration	Altitude Loss
Cruise, Climb, Descent	480 ft
APR 3°	90 ft

--- END ---

Yaw damper has failed above 15,500 ft:

YD Fail shows on the CAS window.

Note

The two step procedure that follows should be among the basic aircraft emergency procedures that are committed to memory. It is important that the pilot be proficient in accomplishing the two steps without reference to the POH or the QRH.

1. Airplane control wheel and rudder pedals............................ Grasp and position feet to gain aircraft control
2. Aircraft.. Minimize side slip, do not make abrupt or large rudder or aileron control deflections. Keep the slip-skid indicator centered to +/- 1 trapezoid.

CAUTION

Above 15,500 ft: Fly smoothly and as soon as practical increase speed above 140 KIAS and make only gentle control deflections and small power changes.

Reset the AFCS as follows:

3. A/P SERVO circuit breaker (Avionic 1 Bus $_L$Z2) and A/P SERVO ENABLE circuit breaker (Avionic 1 Bus $_L$Y2).................... Open, wait 2 seconds, and close (max. 1 attempt per flight only)
4. CAS window............................... Check for AFCS faults

If no AFCS related CAS messages:

5. Aircraft.. Attempt to re-engage Yaw Damper and Autopilot (max. 1 attempt)

Continued on next page

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Automatic Flight Control System Failures 3-22-50

continued

If failure persists:

6. Aircraft.. At pilot's discretion continue flight without the yaw damper or land as soon as practical

--- END ---

Yaw damper is OFF above 15,500 ft:

YD Off shows on the CAS window.

Note

The two step procedure that follows should be among the basic aircraft emergency procedures that are committed to memory. It is important that the pilot be proficient in accomplishing the two steps without reference to the POH or the QRH.

1. Airplane control wheel and rudder pedals............................. Grasp and position feet to gain aircraft control
2. Aircraft...................................... Minimize side slip, do not make abrupt or large rudder or aileron control deflections. Keep the slip-skid indicator centered to +/- 1 trapezoid.

CAUTION

Above 15,500 ft: Fly smoothly and as soon as practical increase speed above 140 KIAS and make only gentle control deflections and small power changes.

3. Yaw Damper switch..................... Press to engage Yaw Damper

---------- END -----------

12-C-A15-40-0322-00A-141A-A

HSI1 is MAG TRK | HSI2 is MAG TRK | HSI1+2 is MAG TRK — 3-22-51

The Primus APEX system has switched the long term reference source for the HSI heading from a gyro based magnetically corrected heading output to a magnetically compensated Track based display.

Note

The main difference is that the drift angle, i.e. difference between aircraft heading and track is not shown. The card shows actual track (related to Magnetic North) being made.

1. Flight Guidance Control Panel Heading/Track selector............... Switch to Track

---------- END -----------

HSI1 is TRU TRK | HSI2 is TRU TRK | HSI1+2 is TRU TRK — 3-22-52

The Primus APEX system has switched the long term reference source for the HSI heading from a gyro based magnetically corrected heading output to a Track based display.

Note

The main difference is that the drift angle, i.e. difference between aircraft heading and track is not shown. The card shows actual track (related to True North) being made.
The autopilot will switch to ROL/PIT modes when the system switches to TRUE automatically. Other AFCS modes can be re-engaged as required.

1. Flight Guidance Control Panel Heading/Track selector............... Switch to Track

---------- END -----------

CAS Miscompare — 3-22-53

MW shows on left side of CAS window.

Monitor Warning Function Channels A and B miscompare.

1. CAS Window.............................. Toggle MW soft key to see alternatively Channel A or B of the MWF to find out which message is triggering the MW miscompare condition

Continued on next page

CAS Miscompare — 3-22-53

continued

2.	Aircraft.......................................	Ascertain the reason for the miscompare flag and take appropriate action, using the affected CAS message and Abnormal Procedures

---------- END -----------

Stuck Mic — 3-22-54

Continuous transmit indication on one of the MMDRs and/or a “Stuck Mic” indication on the Radio Window.

If “Stuck Mic” is annunciated on the radio window:

1.	Affected MMDR..........................	Check “T” is removed by the “Stuck Mic” detection

If “T” is not removed and affected MMDR continues to transmit:

2.	Affected audio panel..................	Select PA to disconnect PTT to MMDR
3.	Other audio panel......................	Use 2nd audio panel, 2nd headset and 2nd PTT to re-establish ATC communication

---------- END -----------

ATC Datalink Fail — 3-22-55

PM-CPDLC datalink with ATC failed

1.	Aircraft.......................................	Use voice to communicate with ATC

---------- END -----------

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SECTION 3A

Abnormal Procedures (EASA Approved)

Table of Contents

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3A-1 General

3A-1-1 General

This section provides a description and any actions that can be taken for the Crew Alerting System (CAS) cyan advisory and white status messages. There are failures of system module or element parts that are not of an emergency nature.

The information is given in the form of a list of all the cyan CAS Advisories and the white CAS Status messages and their meaning, any effect on flight and where possible any actions that can be taken, they are not readily adaptable to a checklist format.

In addition, abnormal procedures are given for the following:

- Primary Altimeter Diverge by 200 ft or More
- Loss of Autopilot Altitude Hold Function in RVSM Airspace
- Flight Training
- Smartview
- LPV/LP Approach (Optional)
- Engine Dry Motoring.

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3A-2 CAS Advisories

3A-2-1 CAS Advisories

This section provides a description and any actions that can be taken for the Crew Alerting system (CAS) cyan advisory messages.

* These cyan advisory messages require maintenance action if they cannot be cleared before flight, or dispatch the aircraft under the provisos of an approved and permissible PC-12 aircraft MEL.
During flight, continue with remaining operational equipment and report on landing.

CAS Advisory Message	Meaning, Effects and Possible Actions
* MWF A Fail * MWF B Fail	A failure has been detected in either Monitor Warning Function A or B. No effect on flight. An amber “MW” miscompare annunciation will be displayed on the left of the CAS window, in the event of the MWF determining a miscompare of MW lists in the two MWF Channels. Pressing the MW bezel button allows toggle between the MWF source. The displayed source is shown below the CAS annunciation in larger white font. The pilot should select the source determined to be correct.
* AIOP A Module Fail * AIOP B Module Fail	Actuator I/O Processor module A or B has failed. The AFCS monitoring function between modules is inoperative. Effect on flight, loss of AFCS, FD and YD. Loss of corresponding MWF Channel.
* CSIO A Fail * CSIO B Fail * CSIO A+B Fail	Custom I/O module A or B or A and B failed. A single A or B failure will have no effect on flight, an A and B failure will result in some invalid data on PFD/MFD windows.
* MAU A Overheat * MAU B Overheat * MAU A+B Overheat	An overheat condition has been detected for MAU CH A and/or B. Auto-shutdown of the MAU is possible if temperature continues to rise. When temperature returns to a safe level, the MAU will reset automatically. Effect on flight, loss of MAU CH A or B.
MAU Fan Fail	No flight crew action required. Corresponding MAU Overheat advisory may occur.
* GIO A Fail * GIO B Fail * GIO A+B Fail	Generic I/O module A or B or A and B failed. A single A or B failure will have no effect on flight, an A and B failure will result in some invalid data on PFD/MFD windows.
* AGM 1 Fail * AGM 2 Fail	Advanced Graphics Module 1 or 2 failed. AGM 1 (MAU Ch. A) drives the Pilot PFD and upper MFD. AGM 2 (MAU Ch. B) drives the Copilot (when installed) and lower MFD. Refer to Section 3, APEX Failures for more information.
CMS 1 Fail CMS 2 Fail	Configuration Management System has detected a failure in the monitoring software of CMS 1 or 2. No effect on flight.

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CAS Advisory Message	Meaning, Effects and Possible Actions
YD Fail	Yaw Damper has failed below 15,500 ft PA. Minimize sideslip by using rudder pedals and manual rudder trim. Above 15,500 ft PA, refer to the Automatic Flight Control System Failures - 3-22-50 procedure. Reset the AFCS as follows: Open the A/P SERVO (Avionic 1 Bus $_{L}$Z2) and A/P SERVO ENABLE (Avionic 1 Bus $_{L}$Y2) circuit breakers for 2 secs, then close. Check CAS. Only one reset attempt per flight.
AP Fail	Autopilot is not available. Reset the AFCS as follows: Open the A/P SERVO (Avionic 1 Bus $_{L}$Z2) and A/P SERVO ENABLE (Avionic 1 Bus $_{L}$Y2) circuit breakers for 2 secs, then close. Check CAS. Only one reset attempt per flight.
FD Fail	Flight Director is not available Reset the AFCS as follows: Open the A/P SERVO (Avionic 1 Bus $_{L}$Z2) and A/P SERVO ENABLE (Avionic 1 Bus $_{L}$Y2) circuit breakers for 2 secs, then close. Check CAS. Only one reset attempt per flight.
AFCS Fault	Fault detected in the AFCS system. Reset the AFCS as follows: Open the A/P SERVO (Avionic 1 Bus $_{L}$Z2) and A/P SERVO ENABLE (Avionic 1 Bus $_{L}$Y2) circuit breakers for 2 secs, then close. Check CAS. Only one reset attempt per flight.
All on together: FD Fail AP Fail YD Fail	Reset the AFCS as follows: Trim the aircraft straight and level. Wait two minutes. If the CAS messages go off, re-engage autopilot. ADAHRS reset can only be achieved in stable pitch and no bank condition, also only light turbulence. Only one reset attempt per flight. If the CAS messages stay on or recur, trim the aircraft straight and level with autopilot and yaw damper disengaged. Open the ADAHRS CH B circuit breaker (Main Bus $_{R}$M1), wait 5 seconds then close the circuit breaker. Wait two minutes. If the CAS messages go off, engage the autopilot. If the CAS messages reoccur, and autopilot is required for continued safe flight, open the ADAHRS CH B circuit breaker (Main Bus $_{R}$M1) and leave open for the rest of the flight.
* FMS Fail, or * FMS1+2 Fail (if dual FMS installed)	Flight management System is not available, use remaining operational navigation equipment as required. The CPCS will use the default Landing Field Elevation (LFE) of 10,000 ft to determine the target cabin altitude. Therefore, the flight crew must manually re-select the LFE early enough to prevent over or under pressurization. Alternatively, the CPCS SYSTEM MODE switch may be selected to MANUAL for manual control of the cabin altitude.
FMS1 Fail, or FMS2 Fail	If required use the NAV source select button on the PFD Controller to select the cross-side FMS for navigation.

CAS Advisory Message	Meaning, Effects and Possible Actions
FMS Synch Error	FMS1 and FMS2 are operating independently (not synchronized). Non-coupled FMS will not receive any changes made to the flight plan. See Section 7-33, FMS Synchronization, for a description of how to synchronize FMS1 and FMS2.
* Gear Control Fault	Indicates loss of redundancy in landing gear control system, such as a stuck landing gear selector position switch. Gear will still function normally with a single fault.
Takeoff Config	Takeoff configuration incorrect. Correct prior to takeoff.
* Pusher Safe Mode	Stick pusher computer has gone into pusher safe mode. Stall warning trigger thresholds operate at the 0° flap position settings irrespective of the flap position.
* LH OAT Fail * RH OAT Fail * LH+RH OAT Fail	Loss of total and static air temperature from ADAHRS Channel A or B or A and B. Refer to Section 3, APEX Failures for more information.
* LH PFD CTRL Fail * RH PFD CTRL Fail * LH+RH PFD CTRL Fail	Cross check PFD data with Electronic Standby Instrument System (ESIS). Use Touch Screen Controller / MF Controller to operate Radio window. Use PFD knob on serviceable PFD Controller to set up both Pilot and Copilot PFD.
(In Flight Only) FLT CTRL Ch A Fail FLT CTRL Ch B Fail FLT CTRL Ch A+B Fail	Single channel failure has no effect. Dual channel failure results in loss of AP/FD/YD.
* GPS 1 Fail * GPS 2 Fail * GPS 1+2 Fail	GPS has no satellite signal reception or GPS unit failed. If CAS message does not clear after approx. 2 mins: For Single GPS installation: Use remaining operational navigation equipment as required. For Dual GPS installation: If single GPS fail, the FMS will automatically select the alternate GPS. If needed, select alternate GPS on Sensors page. For Dual GPS installation: If dual GPS fail: Use remaining operational navigation equipment as required. Open the circuit breaker of the failed GPS (GPS 1 Standby Bus $_{L}$V3 and/or GPS 2 Avionic 2 Bus $_{R}$X1), wait 5 seconds then close the circuit breaker. **Note** The FMS will use ADAHRS data to dead reckon, based on the previously known GPS position prior to the failure.
Traffic Fail	Loss of TCAS.
TAWS Fail	Loss of TAWS.
Terr Inhib Active	Terrain alerting Inhibit selected.
Terr Inhib not Avail	Terrain alerting visual and aural inhibit is not available.
No Altitude Reporting	XPDR not transmitting altitude. Select TA on Radio window or ALT if no TCAS system is installed.
Flameout	Indicates an uncommanded engine flameout has been detected.

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CAS Advisory Message	Meaning, Effects and Possible Actions
* EPECS Fault	*On ground:* Engine data from one EEC channel is not available for display. *In flight:* Monitor engine parameters. Consider diversion to an airfield with appropriate maintenance capability. Dispatch in subsequent flight is prohibited.
Prop Reverse Fail	A failure has been detected in the propeller system. Propeller reverse is not available. Plan landing with reverse not available.
AT Fail	Auto throttle not available. Control PCL manually.
TF Fail	Tactile feedback not available.
CIO 1 Fail	Internal hardware/software failures leading to loss of Datalink, CPDLC and ADS-B IN.
PROC 1 Fail	Internal hardware/software failures leading to loss of Datalink, CPDLC and EGPWS.
TCAS Fail	TCAS hardware/software fault leading to loss of Traffic Collision Avoidance System (TCAS) and Cockpit Display of Traffic Information (CDTI).
ADS-B In Fail	TCAS hardware/software fault leading to loss of CDTI.
VSA Unavailable	Required parameter levels not available leading to loss of Vertical Separation Approach (VSA).
SURF Traffic UNAVAIL	Required parameter levels not available leading to loss of Surface Traffic function.
TERR INHIB Active	Terrain Inhibit selected by pilot.
G/S INHIB Active	Glide slope inhibited for EGPWF while flying backcourse approach.
FLAP OVRD Active	Flap Override selected for EGPWF.
STEEP APR Active	Steep Approach Active.
Terrain Fail	Terrain Awareness inoperative leading to loss of display.
RAAS Fail	Internal hardware / software or input failures leading to loss of Runway Awareness and Advisory System (RAAS) function.
RAAS Inhibit	RAAS inhibit selected by pilot.
RAAS Not Available	Missing RAAS Parameter (e.g. Airport not in Database) leading to loss of RAAS function.
AOC Uplink	Datalink Airline Operational Control incoming message. Accept/acknowledge message to delete PFD amber message box.
ATS Uplink	Datalink Air Traffic Services incoming message. Accept/acknowledge message to delete PFD amber message box.
ATC Uplink	Datalink Air Traffic Control incoming message. Accept/acknowledge message to delete PFD amber message box.

CAS Advisory Message	Meaning, Effects and Possible Actions
TSC Fail	The Touch Screen Controller is turned off or has failed. 1 Make sure that the TSC is turned on using the TSC dimming knob on the display reversionary control panel. 2 If the TSC has been turned on for at least 1 minute and TSC Fail remains, reset the TSC as follows: – Open and close the TSC circuit breaker (Standby Bus $_L$R3). – If reset unsuccessful, use remaining operational navigation equipment as required.
TSC Fan Fail	One or both of the two internal TSC fans have failed. Unless TSC Fail is shown, no flight crew action is required. Touch screen may be hot. If TSC not required it can be turned off temporarily using the TSC dimming knob on the display reversionary control panel.

On Ground CAS Advisory Message	Meaning, Effects and Possible Actions
Maintenance Fail	The Aircraft Diagnostic and Maintenance System (ADMS) has failed. Does not prevent the aircraft from dispatching, may impact mechanic's ability to diagnose and repair the aircraft in a timely manner.
ACMF Logs Full	One or more of the Aircraft Condition Monitoring Function - Aircraft, Navigation or Engine data logs are full. Data will be lost if not transferred.
ACMF Logs >80% Full	One or more of the Aircraft Condition Monitoring Function - Aircraft, Navigation or Engine data logs are more than 80% full. Data may be lost if not transferred.
Engine Log Full	The Engine Trend Recording Stable Cruise data log is full. Data will be lost if not transferred.
Engine Log >80% Full	Engine Trend Recording Stable Cruise data log is more than 80% full. Data may be lost if not transferred.
* Aural Warning Fault	One of the two aural drivers is inhibited or has failed. There is a loss of redundancy in the aural warning system. No effect on flight.

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3A-3 CAS Status

3A-3-1 CAS Status

This section provides a description and any actions that can be taken for the Crew Alerting system (CAS) white status messages.

* These white status messages require maintenance action if they cannot be cleared before flight, or dispatch the aircraft under the provisos of an approved and permissible PC-12 aircraft MEL.
During flight, continue with remaining operational equipment and report on landing.

Airborne CAS Status Message	Meaning, Effects and Possible Actions
Event	A 5 second airborne indication, to show that a crew initiated event, by pressing the EVENT button on the Touch Screen Controller (TSC) / MF Controller, has been recorded.
Function Unavailable	Indicates that an unavailable function has been selected by the crew.

On Ground CAS Status Message	Meaning, Effects and Possible Actions
* FCMU Fault	The Fuel Control and Monitoring computer has a fault condition. Automatic fuel balancing, analog fuel quantity and low level indication may be suspect.
* Low Lvl Sense Fault	The fuel low level sensing part of the Fuel Control and Monitoring computer has a fault condition. Fuel low level CAS cautions may be inoperative.
* Fuel Filter Replace	The fuel filter is contaminated and should be serviced/ replaced within 150 flying hours.
Maint Memory Full	The Fault History Database for the aircraft member systems has become full. Fault History will be lost if not transferred.
No Engine Trend Store	Indicates that a Stable Cruise flight data store condition was not achieved. Will remain on until a Stable Cruise flight data store is successful.

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On Ground CAS Status Message	Meaning, Effects and Possible Actions
Engine Exceedance	Reminds on the ground that during flight a WARNING was displayed for an exceedance of one or more of the following engine parameters: − Oil Pressure − Oil Temperature − ITT − TORQUE − NG − NP − Fuel Temperature High The message is cleared by the next power cycle. The exceedance is permanently recorded on the ACMS file for periodic maintenance analysis.
Aircraft Exceedance	Reminds on the ground that during flight an Airspeed WARNING was displayed or, an acceleration parameter (g limit) was exceeded. If no exceedances were noted by the pilot, continue flight and report to maintenance personnel. If an exceedance was noted, maintenance action may be required before continued flight, depending on the extent of the exceeded parameter. The CAS message will always be displayed on the ground as a reminder. The message is cleared by the next power cycle. The exceedance is permanently recorded on the ACMS file for periodic maintenance analysis.
Crew Event Store	Indicates that a crew initiated event has been recorded.
* **LH WOW Fault** * **RH WOW Fault** * **LH+RH WOW Fault**	Indicates that the Modular Avionics Unit (MAU) has determined that either of the main landing gear proximity switches is in disagreement with the aircraft Air/Ground determination.
* **AGM 2/FMS1 GFP inop**	Indicates graphical Flight Planning function failed in Aircraft Graphics Module.
* **AGM 1 DB Error** * **AGM 2 DB Error** * **AGM 1+2 DB Error**	Indicates an error has been detected in the navigation or charts database on one or both Advanced Graphics Module (AGM).
* **AGM 1 DB Old** * **AGM 2 DB Old** * **AGM 1+2 DB Old**	Indicates the navigation or charts database in one or both Advanced Graphics Module (AGM) is out of date.
EPECS MAINT Mode	Indicates the EPECS is in maintenance mode. In maintenance mode the following functions are available: − Dry motoring − Wet motoring − EPECS fault clearing − ITT trim update.

On Ground CAS Status Message	Meaning, Effects and Possible Actions
* EPECS TLD	The engine is cleared for Time Limited Dispatch (TLD), follow the applicable time limits.
Dry Motoring	Indicates that a dry motoring run is in progress.
Maintenance Feather	Indicates the propeller is feathered for maintenance purposes.
Wet Motoring	Indicates that a wet motoring run is in progress.
Prop Feather Inhibit	Indicates propeller feathering is inhibited during engine shutdown.
* CVFDR Fail	**APEX Build 12.7.1 and higher:** If installed, the LDR is turned off or has failed.

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3A-4 Primary Altimeter Diverge by 200 ft or More

If able to identify defective altimetry system[(1)]:

1 Determine aircraft altitude using operating ADAHRS channel.

2 Disengage autopilot and flight director.

3 Select operating ADAHRS channel, using the flight director couple select switch (L/R).

4 Re-engage autopilot and flight director.

5 Perform appropriate national RVSM contingency procedures for loss of redundancy of primary altimeters.

If unable to determine accuracy of either altimetry system, perform appropriate national RVSM contingency procedures for loss of all primary altimetry systems.

Note
[(1)]The copilot's and ESIS share a common static source. Therefore the ESIS should not be used in determining which altimetry system is defective.

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3A-5 Loss of Autopilot Altitude Hold Function in RVSM Airspace

3A-5-1 Procedure: Loss of Autopilot Altitude Hold Function in RVSM Airspace

Loss of Autopilot Altitude Hold Function in RVSM Airspace **3A-5-01**

1. Autopilot.................................... Make sure altitude hold function is disengaged
2. Altitude....................................... Maintain assigned altitude manually
3. Appropriate national RVSM contingency procedure for loss of altitude hold capability............. Perform

---------- END -----------

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3A-6 Flight Training

Emergency Gear Extension Lever Reset — 3A-6-01

If Emergency Gear Extension Lever has been pulled in flight:

1.	Landing Gear Selector................	DN
2.	Emergency Gear Extension Lever..	Press black release latch and push red lever down
3.	Emergency Gear Extension Lever cover.................................	Close

---------- END -----------

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3A-7 Smartview

3A-7-1 Smartview Procedures

Smartview abnormal procedures 3A-7-01

If Smartview information is inconsistent with APEX primary flight indications:

1. PFD.. Select OVRLY menu
2. SV.. OFF

Note

SV can be set to OFF by deselecting the checkmark “SVS ON”.

3. PFD.. Verify SV is removed
4. Aircraft.. Use APEX primary flight indications

--- END ---

If APEX operation in reversionary mode is required due to a DU 1 failure:

Note

If APEX operation in reversionary mode (due to DU 1 or AGM failure), the PFD format reverts to SV off (blue over brown) and to the default flight director cross pointer (X-Ptr). After approximately 2.5 minutes the SV is displayed automatically and the pilot can reselect the preferred flight director mode on the FCS tab.

Example:

– Indication: **Check DU 1**

– Condition: Pilot PFD is blank or suspect

1. Reversion Controller.................. Set DU 1 control knob to OFF/REV
2. Aircraft.. PPFD is shown on upper MFD in SV off format (blue over brown) and pitch based X Ptr default flight director is active

After 2.5 minutes:

3. Aircraft.. SV is automatically re-displayed
4. Pilot.. Re-select preferred flight director mode on FCS Tab

---------- END -----------

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3A-7-2 Smartview status and failure indications

Smartview related status and failure indications on the SV Status / Failure field:

SV Indication	Description
SV	Position and altitude used to position the synthetic scenery meets the integrity requirements. SV is selected ON and displayed.
SV OFF	Position and altitude used to position the synthetic scenery meets the integrity requirements, but SV is not selected ON.
SV RATE	SV is selected but not being displayed due to a too low refresh rate.
SV POS	SV is selected but not being displayed due to position/altitude failure, or SV is being displayed but a position integrity error was detected.
SV FPS	SV is selected but not being displayed due to the Flight Path Symbol (FPS) being invalid.
SV TER	SV is selected but not being displayed due to a terrain rendering failure.
SV TRK	SV is selected but not being displayed because APEX has been switched to track mode (e.g. at high latitudes).
SV REV	SV is selected but not being displayed due to the PFD being switched to composite mode.

Note

The SV related status and failure indications are for information only. No pilot action is required.

3A-8 LPV/LP Approach (Optional)

1 If PRIMUS APEX avionics suite GPS navigation information is not available or invalid, utilize remaining operational navigation equipment as appropriate.

2 Degradation of Approach Capability (LPV UNVL or LP UNVL) in the terminal or initial approach phase of flight (prior to FAF). Descent to LPV/LP minima is not allowed

LPV Approach:

- On STAR/Landing page (RNAV tab) select LNAV/(VNAV) minima
- Brief new LNAV or LNAV/VNAV approach (or different approach type), as applicable
- Set minimum accordingly.

LP Approach:

- Choose different navigation type/source, or initiate a Go-Around

3 Degradation of Approach Capability (LPV UNVL or LP UNVL) on the final approach segment (after FAF). Descent to LPV/LP minima is not allowed. Vertical guidance information is not provided.

- If runway threshold is visible continue approach by using visual references
- If runway threshold is not visible proceed as follows:

  LPV Approach:

  - Descent to LNAV minimum is allowed if “DGRD” message is not displayed
  - If below LNAV minimum, initiate a Go-Around and follow published standard missed approach procedure as long as “DGRD” message is not displayed. If “DGRD” message is displayed, avoid obstacles with remaining operational navigation equipment as applicable.

  LP Approach:

  - Initiate a Go-Around and follow published standard missed approach procedure as long as “DGRD” message is not displayed. If “DGRD” message is displayed, avoid obstacles with remaining operational navigation equipment as applicable.

4 Predicted Degradation of Approach capability (“PREDICT LPV UNAVAIL” or “PREDICT LP UNAVAIL” message on the INAV). The predicted performance of the navigation system is not sufficient to conduct approach to LPV/LP minimum.

- Select other approach or continue with LPV/LP approach
- If LPV/LP approach is continued then monitor the LPV/LP status indication. Revert to applicable procedures in case the LPV UNVL or LP UNVL message is displayed.

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3A-9 Engine Dry Motoring

Dry Motoring Run 3A-9-01

Note
This procedure is used to remove internally trapped smoke, fuel and vapor within the engine gas path. Do a dry motoring cycle once the ITT has stabilized.

Note
A dry motoring run can always be aborted by setting the Master Power switch to EMERGENCY OFF.

Allow min 30 sec draining period, then:

1.	Engine switch............................	OFF
2.	POWER CONTROL LEVER.......	IDLE DETENT
3.	EPECS MAINTENANCE MODE switch.. (on maintenance panel, right sidewall behind co-pilot seat)......	ON
4.	CAS window..............................	CHECK **EPECS MAINT Mode** is on
5.	BAT 1 and BAT 2 indicators........	CHECK 24 VDC min
6.	EXT PWR switch..........................	ON (if available)
7.	STARTER switch..........................	PUSH momentarily (less than 2 seconds) To crank for a pilot determined amount of time, hold the push button for longer than 2 seconds
8.	CAS window..............................	CHECK **Dry Motoring** comes on
9.	Engine..	CHECK dry motoring run is performed for 30 seconds
10.	EPECS MAINTENANCE MODE switch.. (on maintenance panel, right sidewall behind co-pilot seat)......	OFF
11.	Engine..	If required, do an Engine Start (With or Without External Power) - 4-5-01

CAUTION
Observe engine starting cycle limits. Refer to Section 2, Limitations, Power Plant Limitations, Starter.

Continued on next page

Dry Motoring Run 3A-9-01

continued

12. EXT PWR switch........................ OFF

For shutdown, refer to Section 4-18, Shutdown.

---------- END -----------

SECTION 4

Normal Procedures (EASA Approved)

Table of Contents

Subject		Page

4-1 General

This section provides the normal operating procedures. All of the procedures required by regulation as well as those procedures which have been determined as necessary for the operation of this airplane are provided.

Normal operating procedures associated with optional systems or equipment which require supplements are contained in Section 9, Supplements, General.

Pilots must familiarize themselves with these procedures to become proficient in the normal operation of the airplane.

It is recommended that these procedures be followed for the normal operation of the aircraft. When the aircraft has been in extended storage, had recent major maintenance or been operated from prepared unpaved surfaces the full preflight inspection procedure given in this section is recommended.

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4-2 Airspeeds for Normal Operations

Airspeeds for normal operations are listed below. Unless otherwise noted, all airspeeds are based on a maximum takeoff weight of 10,450 lb (4740 kg) at sea level under ISA standard day conditions.

Takeoff (V_R):	
Flaps 15°	82 KIAS
Flaps 30º	76 KIAS
Maximum Climb:	
Best Angle (V_X)	120 KIAS
Best Rate (V_Y) Flaps 0º:	
Sea level	130 KIAS
5000 ft	125 KIAS
10,000 ft	125 KIAS
15,000 ft	125 KIAS
20,000 ft and above	120 KIAS
Recommended Climb Speed with Flaps retracted and Pusher Ice Mode	135 KIAS
Maximum Operating Maneuvering Speed (V_O) (10,450 lb/ 4740 kg)	166 KIAS
Maximum Flaps Extended (V_{FE}):	
Flaps 15°	(≤ 15º) 165 KIAS
Flaps 30º / 40º	(> 15º) 130 KIAS
Maximum Landing Gear:	
Extension (V_{LO})	180 KIAS
Retraction (V_{LO})	180 KIAS
Extended (V_{LE})	240 KIAS

Landing Approach Speed (based on Maximum Landing Weight of 9921 lb / 4500 kg):

Flaps 0º	120 KIAS
Flaps 15º	99 KIAS
Flaps 30º	89 KIAS
Flaps 40º	85 KIAS
with residual ice on the airframe	
Flaps 15º, Pusher Ice Mode	105 KIAS

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Balked Landing (Go-Around):

TO/Pwr, Flaps 15º, LG down	98 KIAS
TO/Pwr, Flaps 30º, LG down	89 KIAS
TO/Pwr, Flaps 40º, LG down	85 KIAS
TO/Pwr, Flaps 15º, LG down, Pusher Ice Mode	105 KIAS

Maximum Demonstrated Crosswind for Takeoff and Landing (not a limitation):

Flaps 0º	30 kts
Flaps 15º	25 kts
Flaps 30º	20 kts
Flaps 40º (landing only)	15 kts

4-3 Preflight Inspection

Empennage 4-3-01

1.	Luggage....................................	CHECKED and SECURED
2.	Cargo (Combi Interior)...............	CHECK that cargo is located against retainer angles installed on seat rails
3.	Tie Down Straps (Combi Interior)	CHECK fittings properly inserted into seat rails and that the straps are tight
4.	Cargo Door................................	After cargo loading / unloading: CHECK lower attachment lugs for condition
5.	Cargo Door................................	CLOSED and LOCKED (check for green flags)
6.	Static ports and skin inspection..	CHECKED

Note

Visually inspect the static port plates and an area 18" fwd, 6" aft, 8" above, 6" below the plates (static port RVSM critical area). No paint ridges or flanking shall be allowed near the static port plate. Verify that there is no corrosion, elongation, deformation of the static port areas and ensure that no foreign matter is found within the static port orifice.

7.	Tail tie-down................................	DISCONNECTED
8.	External Power Door..................	CLOSED / AS REQUIRED
9.	Oxygen rupture disc....................	INTACT (if a larger capacity oxygen system is installed in the rear fuselage)
10.	Rudder and trim tab....................	CHECK VISUALLY
11.	Vertical stabilizer........................	CHECK VISUALLY
12.	Elevator assembly......................	CHECK VISUALLY
13.	Horizontal stabilizer....................	CHECK VISUALLY, Stabilizer Trim Mark within green range
14.	Deicing boots.............................	CHECK VISUALLY
15.	Static discharge wicks.................	CHECK
16.	Dorsal and ventral fairings..........	CHECK
17.	General condition........................	CHECK

Battery compartment:

18.	LDR Circuit Breaker...................	CHECK IN
19.	ELT..	CHECK CONDITION
20.	Autopilot servos and cables........	CHECK CONDITION

Continued on next page

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Empennage 4-3-01

continued

21.	Power junction box circuit breakers....................................	CHECK IN
22.	Steering bar...............................	STOWED and SECURED
23.	Battery.......................................	CONNECTED
24.	Battery compartment..................	CHECK CLOSED

---------- END -----------

Right Wing Trailing Edge 4-3-02

1.	Flaps...	CHECK CONDITION
2.	Aileron and flettner tab...............	CHECK CONDITION
3.	Fuel tank vents (three)...............	CLEAR of OBSTRUCTIONS
4.	Static discharge wicks................	CHECK SECURITY and CONDITION
5.	General condition.......................	CHECK

---------- END -----------

Right Wing Leading Edge 4-3-03

1.	Nav/Strobe light..........................	CHECK CONDITION
2.	Fuel quantity and filler cap.........	CHECK and SECURE
3.	Pitot probe....................................	COVER REMOVED and CHECKED
4.	AOA probe....................................	COVER REMOVED and CHECK FREE MOVEMENT
5.	Wing tie-down / wheel chocks.....	DISCONNECTED and REMOVED
6.	De-icing boot..............................	CHECK GENERAL CONDITION
7.	Right main lading gear...............	CHECK
8.	Right brake assembly................	CHECK
9.	Two fuel drains...........................	SAMPLE and SECURE
10.	General condition.......................	CHECK

---------- END -----------

Nose Section 4-3-04

Service Bay (right) (If a standard oxygen system is installed):

1.	Oxygen Press............................	CHECK
2.	Oxygen and ECS Doors.............	CLOSED
3.	Oxygen rupture disc....................	INTACT

--- END ---

Engine Area:

1.	Cowling RH................................	CHECK and SECURE
2.	Propeller - Blade Anchor............	REMOVED and STOWED
3.	Propeller - Blade........................	CHECK

Note

It is recommended to keep a copy of Hartzell Service Letter 61-360 (latest issue) in the aircraft for reference and damage assessment recording during the blade check.

4.	Propeller - De-icing Boots...........	CHECK GENERAL CONDITION
5.	Propeller - Spinner.....................	CHECK
6.	Air Inlet and Exhaust Covers......	REMOVED and STOWED
7.	Air Inlets....................................	CHECK ENGINE AIR INTAKE, OIL COOLER, ECS and GENERATOR for OBSTRUCTIONS
8.	Exhaust system..........................	CHECK
9.	Nose Gear and Doors..................	CHECK
10.	Wheel Chocks.............................	REMOVED
11.	Engine drain mast (LH)...............	CHECK. No leaks permitted
12.	Engine drain (LH)........................	SAMPLE and SECURE

Continued on next page

Nose Section — 4-3-04

continued

WARNING

DO NOT TOUCH OUTPUT CONNECTORS OR COUPLING NUTS OF IGNITION EXCITER WITH BARE HANDS.

13.	Oil Quantity................................	CHECK SIGHT GLASS AND DIPSTICK FOR SECURITY (green markings aligned) Check oil level in green range of sight glass within 10 to 20 minutes after engine shut down. If engine has been shut down for more than 30 minutes, check dipstick indication and if it indicates that oil is needed, check for oil leaks in the engine bay, start the engine and run at ground idle for 5 minutes. Recheck oil level using dipstick and refill if necessary. For a better view, the check of the dipstick security may be conducted from the RH cowling.
14.	General Condition......................	CHECK
15.	Cowling LH................................	CHECK and SECURE
16.	Windshield................................	CHECK CLEAN

--- END ---

Service Bay (left)

1.	Service Bay Doors......................	CLOSED

---------- END -----------

Left Wing Leading Edge — 4-3-05

1.	Two fuel drains...........................	SAMPLE and SECURE
2.	Left main lading gear..................	CHECK
3.	Left brake assembly....................	CHECK
4.	De-icing boot..............................	CHECK GENERAL CONDITION
5.	Pitot probe..................................	COVER REMOVED and CHECKED
6.	AOA probe...................................	COVER REMOVED and CHECK FREE MOVEMENT
7.	Wing tie-down / wheel chocks.....	DISCONNECTED and REMOVED
8.	Fuel quantity and filler cap..........	CHECK and SECURE

Continued on next page

Left Wing Leading Edge 4-3-05

continued

9.	Nav/Strobe light..........................	CHECK CONDITION
10.	General condition........................	CHECK

---------- END -----------

Left Wing Trailing Edge 4-3-06

1.	Static discharge wicks.................	CHECK SECURITY and CONDITION
2.	Fuel tank vents (three)................	CLEAR of OBSTRUCTIONS
3.	Aileron and trim tab.....................	CHECK CONDITION
4.	Flaps..	CHECK CONDITION
5.	General condition........................	CHECK

---------- END -----------

Cabin 4-3-07

1.	Passenger Door..........................	CLOSED and LOCKED (check for 6 green flags)
2.	Hand luggage.............................	SECURED / STOWED
3.	Passenger Seat...........................	CHECK backrests in upright position (for takeoff and landing)
4.	Passenger Seat Belts.................	FASTENED
5.	Overwing Emergency Exit...........	LOCK PIN REMOVED, EXIT CHECKED and LOCKED
6.	Fire Extinguisher.........................	CHECK ATTACHMENT and PRESSURE

For flights above 10,000 ft altitude:

7.	Passenger Oxygen Masks..........	CONNECTED and STOWED (for each passenger)

---------- END -----------

Cockpit — 4-3-08

Note
Items marked thus: * only necessary on first flight of day.

1.	Flight Control Lock......................	REMOVED and placed in STOWAGE POINT
2.	EMERG COM 1 switch................	NORM
3.	Aural Warning Inhibit Switch.......	ON
4.	* LH MASK/MIC switch...............	CHECK MIC
5.	ELT..	ARMED / GUARDED
6.	LH Circuit Breakers.....................	CHECK IN
7.	Parking Brake Handle.................	SET / PUSH BRAKE PEDALS
8.	ICE PROTECTION switches.......	OFF
	INERT SEP switch......................	AS REQUIRED
9.	Landing Gear Selector................	DN
10.	Main OXYGEN lever...................	ON
11.	* Crew Oxygen Masks................	CHECK 100%
12.	Environmental (ACS, ELECTRICAL, FANS) and CPCS switches..........................	AUTO
13.	* RH MASK/MIC switch...............	CHECK MIC
14.	RH Circuit Breakers.....................	CHECK IN
15.	TRIM INTERRUPT switch............	Check OFF
16.	FLAP INTERRUPT switch...........	Check NORM/GUARDED
17.	POWER CONTROL LEVER.......	IDLE DETENT
18.	Flap Lever..................................	0°
19.	Cockpit / Instrument / Cabin Light switches............................	OFF
20.	Fuel Firewall Shut-off lever.........	FULLY IN
21.	Emergency Gear Extension lever...	STOWED
22.	ACS Firewall Shut-off lever.........	FULLY IN
23.	FUEL PUMPS switches..............	AUTO
24.	Engine switch.............................	OFF
25.	IGNITION switch.........................	AUTO
26.	EXTERNAL LIGHTS switches....	OFF

Continued on next page

Cockpit **4-3-08**

continued

27.	PASSENGER WARNING switches......................................	OFF
28.	EPS switch.................................	OFF
29.	MASTER POWER switch...........	ON and GUARDED. Check condition of guard
30.	BAT 1, BAT 2, STBY BUS..........	CHECK OFF
31.	EXT PWR..................................	CHECK CENTER
32.	AV 2 BUS, CABIN BUS, AV 1 BUS, GEN 1, GEN 2..................	CHECK ON

---------- END -----------

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4-4 Before Starting Engine

Before Starting Engine 4-4-01

1.	Preflight inspection.....................	COMPLETE
2.	STBY BUS switch......................	ON wait until MFD powers up (30 secs) prior to switching batteries on
3.	Display reversion control panel...	PILOTS PFD NORM, CO-PILOTS PFD NORM (if installed) Adjust lower MFD brightness and set other DU's brightness control similarly
4.	ATIS and start up clearance........	RECEIVED
5.	FMS programming.....................	COMPLETED
6.	Seats...	ADJUSTED and LOCKED
7.	Seat belts..................................	FASTENED
8.	EPS switch.................................	TEST (minimum 5 seconds)
9.	EPS - Green TEST indicator.......	ON during test
10.	EPS - EPS switch......................	ARMED
11.	EPS - Red EPS ON indicator......	ON
12.	EPS - ESIS..............................	ALIGNING
13.	BAT 1 and BAT 2 switches.........	ON
14.	Red EPS ON indicator................	Check OFF
15.	BAT 1 and BAT 2 indicators........	CHECK 24 VDC min

External power (if available):

16.	External power unit....................	ON. Check 28 VDC
17.	External power unit....................	CONNECT. Check OHP AVAIL is on
18.	EXT PWR switch........................	ON
19.	BAT 1 and BAT 2 indicators........	CHECK 28 VDC

Note

The external power control unit on the aircraft will disconnect the EPU if the output voltage is above 29.5 or below 22 VDC.

20.	Landing Gear 3 greens..............	CHECK
21.	FUEL quantity...........................	SUFFICIENT for flight, balanced within 3 segments for departure

Continued on next page

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Before Starting Engine 4-4-01

continued

22.	FIRE WARN test switch..............	PUSH. (CAS Engine Fire and Fire Detector annunciations ON while switch is pushed, callout heard if powered from GPU)
23.	LAMP test switch........................	PUSH. (Master Warning and Caution and Trim Interrupt)
24.	Oxygen pressure gage................	CHECK 1,850 psi MAX
25.	PASSENGER OXYGEN selector	AUTO. SET switch to OFF if no passengers on board
26.	Direct Vision Window..................	CLOSED and LOCKED
27.	Radios / Avionics.........................	SET as required, ESIS aligned

---------- END -----------

4-5 Engine Starting

Engine Start (With or Without External Power) 4-5-01

1. External lights............................ AS REQUIRED

Note

Avoid prolonged use of the beacon and logo lights (if installed), as this can cause a decrease in battery power and affect the engine starting.

2. Propeller area............................ CLEAR. Confirm CLEAR of obstructions
3. CAS window............................... CHECK no door warnings, no oil temperature warning and no cyan autopilot messages

Note

It is essential that the autopilot pre-start servo calibration is not affected by any control inputs or an engine start before the CAS cyan autopilot messages are extinguished. Failure to follow this procedure will possibly affect the autopilot system availability in the air.

Note

The EPECS will automatically abort an engine start if any of the following cases occur:

- ITT exceedance
- Hung start
- No light-off
- The starter switch is pushed during the starting sequence.

In this event the EPECS will immediately command a 30 second dry motor run, the green STARTER annunciator in the PFD engine window comes on.

Note

The engine starting sequence or an automatic dry motoring run can always be aborted by setting the engine switch to OFF.
A Dry Motoring Run - 3A-9-01 is required prior to a subsequent start attempt.

4. Engine switch............................. RUN
5. Fuel window............................... CHECK two green PUMP indications
6. STARTER switch........................ PUSH momentarily
7. Oil pressure................................ CHECK rising
8. Ng approx. 16%......................... CHECK light up

Continued on next page

Engine Start (With or Without External Power) 4-5-01

continued

9. ITT... MONITOR
   - MAXIMUM 1000 °C
   - 900 - 1000 °C for max 5 sec.
   - 850 - 900 °C for max 20 sec.

If there is a rapid increase in ITT towards 1000 °C and the start is not automatically aborted, then:

10. STARTER switch........................ PUSH momentarily

If ITT stays within limits:

11. Ng... STABLE at 64.5%

If Ng stays below 50% and the start is not automatically aborted:

12. STARTER switch........................ PUSH momentarily

If NG stable:

13. Starter sequence........................ COMPLETED
14. Engine instruments.................... STABLE in green range
15. GEN 1 and GEN 2..................... Check volts and amps
16. FUEL RESET soft key................ Push to reset
17. External Power Unit (if used)...... Disconnect

---------- END -----------

4-6 Before Taxiing

Before Taxiing 4-6-01

1.	Flaps Lever................................	15°

If icing conditions expected or first flight of the day:

2.	ICE PROTECTION switches.......	Set all on for 1 minute (windshield heavy)
3.	CAS window..............................	No cautions. Check **PROPELLER**, **INERT SEP** and **BOOTS** are on
4.	ICE PROTECTION switches.......	Set as required
5.	Inertial Separator........................	OPEN, if operating on unprepared surface or for bird strike protection

Stick Pusher test:

6.	PCL..	SET 5 - 10 psi
7.	STICK PUSHER test switch (Overhead Panel)......................	PUSH and HOLD
8.	PCL..	SET to idle
9.	Elevator Control.........................	PULL
10.	Shaker for 2 sec......................... Break for 1 sec.......................... Shaker for 2 sec......................... Break for 1 sec.......................... Pusher, Shaker..........................	CHECK correct operation
11.	ICE PROTECTION PUSHER ICE MODE advisory..................	CHECK ON

When pusher operates:

12.	PUSHER INTR switch (control wheel)......................................	PRESS and HOLD, check pusher interrupts
13.	STICK PUSHER test switch........	RELEASE
14.	**Pusher**	CHECK OFF
15.	**Pusher**	CHECK ON (visual and aural) after 3 seconds
16.	PUSHER INTR switch................	RELEASE
17.	**Pusher**	CHECK OFF (visual and aural)
18.	Elevator control..........................	CHECK FULL and FREE movement
19.	PFD, MFD, CAS, ESIS...............	No flags or red warning captions, all aligned

Continued on next page

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Before Taxiing — 4-6-01

continued

20. PFD Engine Window.................. Check T1

Note

Engine takeoff power is calculated based on displayed T1.

---------- END -----------

4-7 Taxiing

Taxiing 4-7-01

1.	EXTERNAL LIGHTS switches....	AS REQUIRED
2.	PASSENGER WARNING switches (if installed)..................	ON
3.	Parking Brake............................	RELEASE
4.	Brakes.......................................	CHECK
5.	PCL...	CHECK beta is available, return to IDLE
6.	Display units..............................	Compare ADIs, speeds, Altitude, Heading and check no flags

CAUTION

To avoid possible propeller damage, do not allow stabilized propeller operation between 350 and 900 RPM (propeller not feathered).

CAUTION

Do not leave the PCL stationary for more than 30 seconds in the beta range (aft of idle detent) to avoid an EPECS Degraded message on the CAS window.

Note

If operating conditions allow, use the beta range (aft of the idle detent) to control taxi speed and reduce wear on brakes.
For the periodical brake conditioning procedure, refer to the Brake Care Paragraph in Section 8.

---------- END -----------

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4-8 Before Takeoff

Before Departure — 4-8-01

1.	Target takeoff torque..................	CALCULATED
2.	Engine instruments....................	CHECK
3.	Flaps..	15° (for reduced takeoff distance flap 30° may be used)
4.	Trim...	SET GREEN range
	If CG is 236 inches (6 meters) or further aft of datum.....................	SET GREEN DIAMOND
5.	Fuel quantity..............................	CHECK
6.	CPCS..	Check FMS identifier and ELEV, if no FMS ELEV adjust landing ELEV, check mode. Check no CPCS faults. If identifier and ELEV miscompare, select and deselect DEST ELEV
7.	DC Amps Batteries....................	CHECK both BAT 1 and BAT 2 indicate less than 30 amps. If greater than 30 amps is indicated, delay takeoff until indications are at or below 30 amps
8.	Flight controls.............................	FULL, FREE and CORRECT
9.	Radios / Navigation / FD / clearance..................................	SET and checked
10.	Departure and emergency briefing.......................................	COMPLETED

---------- END -----------

Line Up Check — 4-8-02

1.	PROBES switch.........................	ON
2.	Windshield Heat.........................	AS REQUIRED
3.	INERT SEP................................	AS REQUIRED
4.	External light switches................	AS REQUIRED
5.	Transponder...............................	AS REQUIRED
6.	Runway......................................	IDENTIFIED. Heading verified and Heading Bug synchronized
7.	CAS window...............................	CHECK

---------- END -----------

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4-9 Takeoff

Takeoff 4-9-01

1. ACS BLEED AIR switch............. INHIBIT

   (If static takeoff torque is below flat rating and additional torque should be achieved.)

2. POWER CONTROL LEVER....... SET to T/O

   (EPECS sets power to ambient conditions)

CAUTION

Monitor for exceedances. EPECS will not protect against all possibilities of exceedance.

3. Engine instruments.................... MONITOR:
   - Torque (reaching the target)
   - ITT
   - Ng
   - Oil Temp / Pressure

4. Aircraft.. Rotate at V_R, initial climb at V_X or V_Y as required

After lift-off and positive rate of climb:

5. Brakes.. PRESS to stop wheel rotation
6. Landing Gear Selector................ UP
7. Yaw Damper................................ ON
8. Flaps.. 0° above 100 KIAS
9. Taxi and Landing Lights.............. OFF

---------- END -----------

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4-10 Flight into Known Icing Conditions

Flight into Known Icing Conditions 4-10-01

WARNING

FLIGHT IN ICING CONDITIONS IS PROHIBITED IF THERE IS A KNOWN FAILURE OF ANY OF THE ICE PROTECTION SYSTEMS.

WARNING

DURING FLIGHT IN ICING CONDITIONS OR FLIGHT WITH ANY VISIBLE ICE ACCRETION ON THE AIRFRAME, THE FOLLOWING FLAP EXTENSION LIMITS APPLY:

- **WITH OPERATIONAL AIRFRAME PNEUMATIC DEICE BOOTS = 15° FLAP.**
- **AFTER FAILURE OF THE AIRFRAME PNEUMATIC DEICE BOOTS = 0° FLAP.**

Note

Flight in icing conditions is only permitted with full operational status of all aircraft deicing systems. The deicing systems may be activated before takeoff.

Note

Icing conditions are defined in Symbols, Abbreviations, and Terminology.

Before entering icing conditions set the deicing switches as follows:

1. PROP.. ON
2. INERT SEP.................................. OPEN
3. BOOTS.. ON and 3 MIN or 1 MIN as required

Note

A deice boots failure indication can occur at low power settings while in high pressure altitudes. Refer to De Ice Boots - 3-18-02 Emergency Procedure for system reset.

4. LH and RH WHSLD switches..... ON and LIGHT or HEAVY as required

Note

When DE ICING switch PROP is set to ON and INERT SEP is set to OPEN, the stick shaker/pusher system is automatically reset to provide stall protection at lower angles of attack. The ICE PROTECTION advisory caption PUSHER ICE MODE comes on to inform the aircrew of this mode change. In this mode the shaker and pusher are activated at higher airspeeds.

During icing conditions:

5. Wing leading edge..................... MONITOR for continual shedding of ice

Continued on next page

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Flight into Known Icing Conditions 4-10-01

continued

6.	MFD ICE PROTECTION window	MONITOR for correct function of ice protection systems

WARNING

IF ANY OF THE AIRCRAFT ICE PROTECTION SYSTEMS FAIL DURING FLIGHT IN ICING CONDITIONS, EXIT ICING CONDITIONS. CONTACT ATC FOR PRIORITY ASSISTANCE IF REQUIRED.

WARNING

IF SEVERE ICING CONDITIONS ARE ENCOUNTERED, REQUEST PRIORITY HANDLING FROM AIR TRAFFIC CONTROL TO FACILITATE A ROUTE OR AN ALTITUDE CHANGE TO EXIT THE ICING CONDITIONS.

After departure of icing conditions with residual airframe ice:

7.	PROP..	Maintain ON
8.	INERT SEP................................	Maintain OPEN

Note

This ensures that the stick shaker/pusher system is maintained in PUSHER ICE MODE.

9.	BOOTS....................................	ON and 3 MIN or 1 MIN as required
10.	LH and RH WHSLD...................	ON and LIGHT or HEAVY as required
11.	Flaps..	Do not extend beyond 15° or if extended do not retract to 0°

After removal of residual airframe ice:

12.	PROP..	OFF
13.	INERT SEP................................	CLOSED
14.	BOOTS....................................	OFF
15.	LH or RH WHSLD......................	LIGHT or HEAVY as required
16.	FLAPS.......................................	AS REQUIRED

---------- END -----------

4-11 Climb

Climb 4-11-01

1.	Ice Protection System.................	AS REQUIRED
2.	Autopilot.....................................	AS REQUIRED
3.	FMS Auto speed (if selected)......	Verify and confirm correct
4.	POWER CONTROL LEVER.......	SET to MCP (EPECS sets power to ambient conditions)

CAUTION

Monitor for exceedances. EPECS will not protect against all possibilities of exceedance.

5.	ACS BLEED AIR switch..............	AUTO (if selected INHIBIT for takeoff)
6.	Cabin pressure...........................	Monitor

Engine instruments:

7.	Torque...	MONITOR (max. 44.8)
8.	ITT...	MONITOR (max. 825)
9.	Ng...	MONITOR (max. 104)

When passing transition altitude:

10.	Baro...	SET STD and cross check

CAUTION

If autothrottle is installed and engaged and FD/AP is set to OFF, monitor for engine torque exceedances.

If the aircraft is levelled off below 18,000 ft with autothrottle engaged and FD/AP set to OFF, the autothrottle can command the engine torque to exceed the max cruise limitation of the engine.

---------- END -----------

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4-12 Cruise

Cruise 4-12-01

1.	Cabin Pressurization..................	Monitor
2.	POWER CONTROL LEVER.......	SET as required
3.	Engine instruments....................	MONITOR
4.	Fuel state..................................	MONITOR

Note

On longer flights the digital fuel quantity value can be updated to the actual fuel content by pressing the FUEL RESET soft key, on Systems MFD FUEL window. Reset only when wings are level, pitch within ±3°, with unaccelerated flight and no turbulence present.

5.	FMS Auto speed (if selected)......	Verify and confirm correct
6.	Ice Protection System................	AS REQUIRED

---------- END -----------

Cruise within RVSM Airspace 4-12-02

1.	Cross check altimeters................	Maximum differences 200 feet (1)
2.	Altimeters..................................	Record indicated altitudes (2)
3.	Autopilot / Altitude Hold..............	Verify altitude hold within ±65 feet (3)

Note

(1) Ensure matched altimeter baro-settings (STD).
(2) Record pilot, co-pilot and ESIS readings in the flight plan master log upon entering RVSM airspace and each hour thereafter while in RVSM airspace for contingency situations.
(3) The flight director couple select switch (L/R) ensures that the autopilot and transponder are coupled to the same ADAHRS channel.

---------- END -----------

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4-13 Descent

Descent		4-13-01
1.	ATIS / Briefing............................	RECEIVED / PERFORMED
2.	Ice Protection System................	AS REQUIRED
3.	POWER CONTROL LEVER.......	SET to desired torque
4.	FMS Auto speed (if selected)......	Verify and confirm correct
5.	CPCS system window................	CHECK landing field elevation set
6.	Passengers................................	Brief
7.	Passenger Warning Switches (if installed)....................................	ON

---------- END -----------

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4-14 Before Landing

Approach Check 4-14-01

1.	Altimeter....................................	SET
2.	Ice Protection system..................	AS REQUIRED
3.	Inertial Separator........................	OPEN, if operating on unprepared surface or for birdstrike protection
4.	Fuel Quantity..............................	CHECK
5.	Landing Gear..............................	DOWN (below 180 KIAS)
6.	Taxi and Landing Lights..............	(AS REQUIRED)
7.	Flaps..	AS REQUIRED
	With residual airframe ice...........	SET maximum 15°
	Boot failure................................	Maintain at 0°

Note

For flap settings for crosswind operation, icing conditions and associated landing performance refer to Airspeeds for Normal Operations and Section 5 - Performance.

Note

If the optional TAWS Class A or RAAS are installed, activate FLAP OVRD for approaches and landing where flap settings are intentionally at less than 40° to avoid an aural flaps annunciation during final approach.

8.	Speed..	As indicated by Dynamic Speed Bug (1.3 V_S)
9.	FMS Auto speed (if selected)......	Verify and confirm correct

---------- END -----------

Final Check 4-14-02

1.	Landing Gear..............................	3 Green Lights
2.	Flaps..	40° or AS REQUIRED
	With residual airframe ice...........	SET maximum 15°
	Boot failure................................	Maintain at 0°

Continued on next page

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Final Check 4-14-02

continued

3.	Speed..	REDUCE to Dynamic Speed Bug (1.3 V_S) and STABILIZED
	Boot failure.................................	130 KIAS
	AOA Deice or PUSHER ICE MODE failure............................	105 KIAS
4.	Cabin Pressurization..................	Diff Pressure below 0.7 psi decreasing
5.	AP, AT (if installed), YD (prior to landing).....................................	DISENGAGED (use red AP QD button on the yoke)

Note

For minimum Autopilot heights, refer to Systems and Equipment Limits.
For crosswind information, refer to Airspeeds for Normal Operations and Section 5 - Performance.

---------- END -----------

4-15 Balked Landing (Go-Around)

Balked Landing (Go-Around) 4-15-01

1.	Go Around switch (if Autopilot engaged)...................................	PRESS
2.	POWER CONTROL LEVER.......	SET to T/O (EPECS sets power to ambient conditions)

CAUTION

Monitor for exceedances. EPECS will not protect against all possibilities of exceedance.

3.	Climb airspeed...........................	85 KIAS
4.	Flaps - Normal...........................	SET 15° (max 165 KIAS)
	Flaps - With residual airframe ice...	Maintain at 15°
	Flaps - Boot failure.....................	Maintain at 0°
5.	Climb airspeed - Pusher Normal Mode..	95 KIAS
	Climb airspeed - Pusher Ice Mode..	105 KIAS
	Climb airspeed - Boot failure.......	130 KIAS
6.	Landing Gear Selector.............	Up with positive rate-of-climb
7.	Yaw Damper................................	ON
8.	Flaps - Normal...........................	AS REQUIRED
	Flaps - With residual airframe ice...	Maintain at 15°
	Flaps - Boot failure.....................	Maintain at 0°
9.	Ice Protection System................	AS REQUIRED

CAUTION

In the event of a balked landing (go-around) with residual ice on the airframe, the flaps should not be retracted. The landing gear may not fully retract after selection (remaining red/white hatched indication).

---------- END -----------

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4-16 Landing

Normal 4-16-01

1.	Aircraft..	Touch down main wheels first
2.	Aircraft..	Do not flare with high pitch angle
3.	Power Control Lever...................	IDLE DETENT
4.	Braking..	AS REQUIRED

---------- END -----------

Short Field 4-16-02

1.	Aircraft..	Touch down main wheels first
2.	Aircraft..	Do not flare with high pitch angle
3.	Power Control Lever...................	REVERSE
4.	Braking..	FIRM
5.	Power Control Lever...................	IDLE

---------- END -----------

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4-17 After Landing

After Landing		4-17-01
When runway vacated:		
1.	Flaps..	UP
2.	Trims..	SET GREEN RANGE
3.	External Lights..........................	AS REQUIRED
4.	Ice Protections switches............	OFF or as required
5.	Transponder...............................	STBY or check GND
6.	WX Radar..................................	STBY
	---------- END -----------	

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4-18 Shutdown

Shutdown 4-18-01

WARNING

IN CASE OF ENGINE FIRE, DO THE ENGINE FIRE - 3-7-02 PROCEDURE.

Note

- Allow ITT to stabilize at least two minutes at ground idle
- Monitor compressor deceleration after shutdown for possible engine damage
- In case of an unusual amount of smoke from the engine exhaust after shutdown, allow ITT to stabilize and then conduct a Dry Motoring Run - 3A-9-01.

Note

If a shutdown is commanded with indicated T1 temperature at or above approximately 23 °C, the EPECS will command a momentary (15 second) dry motoring cycle during the shutdown sequence, indicated by **STARTER** on the PFD engine window and **DRY MOTORING** on the CAS window.
A dry motoring run at shutdown can always be aborted by setting the Master Power switch to EMERGENCY OFF.

1. Power Control Lever.................... IDLE DETENT
2. Parking Brake............................. SET / PEDALS PUSH
3. ICE PROTECTION switches....... OFF
4. Inertial Separator....................... OPEN, if operating on unprepared surface
5. Feather Inhibit switch (if installed)..................................... PUSH and HOLD (if desired, refer to note)

Note

After 9 consecutive engine shutdowns using the propeller feather inhibit function, a normal engine shutdown must be performed (refer to Section 2, Limitations, Power Plant Limitations, Feather Inhibit (optional)).

6. Engine switch............................ OFF

Note

The optional Feather Inhibit function activates when the Feather Inhibit switch is pushed and held while at the same time the Engine switch is set to OFF. Once the Feather Inhibit status message shows on the CAS, the pilot can release the Feather Inhibit switch and the function will continue to execute automatically.

Continued on next page

Shutdown 4-18-01

continued

7.	CAS Feather Inhibit status.......... (if installed and activated)...........	CHECK
8.	Feather Inhibit switch.................. (if installed and activated)...........	Release
9.	External Lights switches.............	OFF
10.	PASS-Warning switches (if installed).....................................	OFF
11.	Main OXYGEN lever...................	OFF
12.	**Engine Oil Level** (60 sec. minimum after shutdown)...........	CHECK. Refill engine with an approved oil
13.	CPCS.......................................	CHECK cabin depressurized
14.	STBY BUS switch.......................	OFF
15.	EPS switch................................	OFF
16.	Battery 1 and 2 switches.............	OFF
17.	Crew oxygen masks....................	CHECK 100% (if oxygen system is used)

---------- END ----------

4-19 Parking

Parking	4-19-01

1. Flight Control Lock...................... INSTALLED
2. Wheel Chocks............................ AS REQUIRED
3. Tail Stand................................... AS REQUIRED

Note

Install the tail stand when the aircraft is parked outside and wet snow fall is expected.

4. Tie Downs.................................. AS REQUIRED

CAUTION

Make sure the propeller anchor is properly installed to prevent possible engine damage due to windmilling with zero oil pressure.

Note

Make sure that the rudder/nose wheel is centered.

5. Propeller Anchor......................... INSTALLED
6. External Covers.......................... INSTALLED

----------- END -----------

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4-20 Oxygen System

Oxygen System 4-20-01

1. Oxygen Pressure Gauge............ NOTE READING
2. Outside Air Temperature............. NOTE READING
3. Percentage of Full Bottle............. DETERMINE (refer to Fig. 4-20-1)
4. COMPUTE................................. Oxygen Duration in minutes
   - Determine the Oxygen Duration in minutes for a full bottle for the number of connected passenger oxygen masks and pilots from the "Oxygen Duration with Full Bottle" graph (Fig. 4-20-1).
   - Multiply the Full Bottle Duration by the percent of Usable Capacity to obtain the available oxygen duration in minutes.

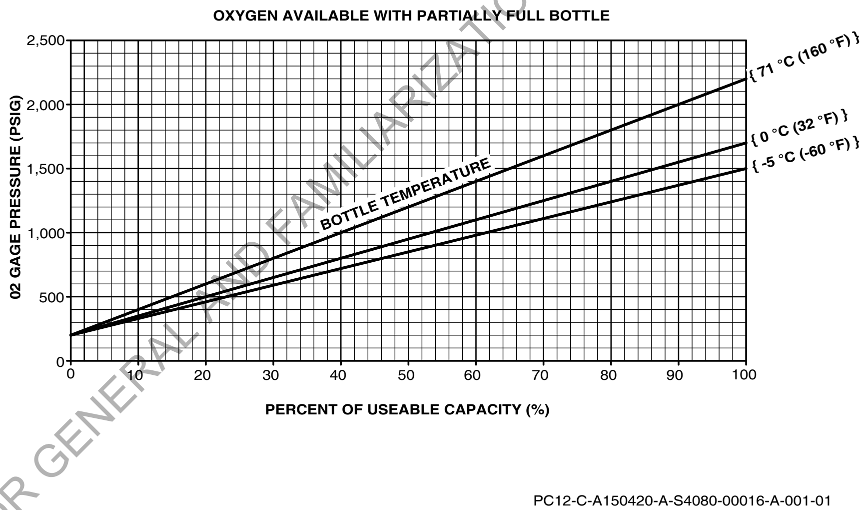

Figure 4-20-1: Oxygen Available with Partially Full Bottle

5. OXYGEN SHUT-OFF lever......... ON

Continued on next page

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Oxygen System 4-20-01

continued

6. Passenger Oxygen control valve — ON

Insert the connector of each mask into an outlet and verify proper oxygen flow to the mask. For flights above 10,000 feet leave the masks connected to the outlets and turn the Oxygen Control Valve to AUTO.

Table 4-20-1: Oxygen Duration with Full Bottle (Standard Oxygen System)

No. of Pax Oxygen Masks Connected	Oxygen Duration Pax plus 1 Crew Mask on		Oxygen Duration Pax plus 2 Crew Mask on	
	Diluter / Demand (min)	100% (min)	Diluter / Demand (min)	100% (min)
0	141	59	71	29
1	70	42	47	24
2	47	32	35	21
3	35	26	28	18
4	28	22	23	16
5	23	19	20	14
6	20	17	17	13
7	17	15	16	12
8	16	13	14	11
9	14	12	13	10

Table 4-20-2: Oxygen Duration with Full Bottle (Large Capacity Oxygen System)

No. of Pax Oxygen Masks Connected	Oxygen Duration Pax plus 1 Crew Mask on		Oxygen Duration Pax plus 2 Crew Mask on	
	Diluter / Demand (min)	100% (min)	Diluter / Demand (min)	100% (min)
0	477	200	240	98
1	237	142	159	81
2	159	108	118	71
3	118	88	95	61
4	95	74	78	54
5	78	64	68	47

Continued on next page

Oxygen System 4-20-01

continued

Table 4-20-2: Oxygen Duration with Full Bottle (Large Capacity Oxygen System) (continued from previous page)

No. of Pax Oxygen Masks Connected	Oxygen Duration Pax plus 1 Crew Mask on		Oxygen Duration Pax plus 2 Crew Mask on	
	Diluter / Demand (min)	100% (min)	Diluter / Demand (min)	100% (min)
6	68	57	57	44
7	57	51	54	41
8	54	44	47	37
9	47	41	44	34

---------- END -----------

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4-21 Noise Level

The noise levels stated below have been verified and approved by FOCA in noise level test flights conducted on the PC-12/47E. The PC-12/47E model is in compliance with all ICAO Annex 16 and Swiss VEL noise standards applicable to this type.

No determination has been made by EASA (FOCA) for the FAA that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

ICAO Annex 16, Chapter 10	77.0 dB(A)
Swiss VEL	77.0 dB(A)
FAR Part 36 Appendix G	77.0 dB(A).

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4-22 Automatic Flight Control System Operation

The flight director uses the data displayed on either PFD for calculation of the guidance commands. The pilot may toggle his selection by pressing the L/R button on the flight controller. The AFCS transmits the pilots selection to the display. The display will indicate the PFD data selected for use, by displaying the couple arrow pointing toward the selected PFD (left/right). At power up, the default setting is L pilot side PFD.

A brief description of the AFCS is given in Section 7 of this POH. Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE^{TM}) (powered by Honeywell) for the Pilatus PC-12/47E for complete information on the description and operation of the AFCS.

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4-23 Crosswind Operation

CAUTION

On runways with pools of standing water and/or poor braking action it may not be possible to maintain centerline and/or the correct alignment of the aircraft on the runway in conditions of strong crosswind.

The maximum demonstrated crosswind for takeoff and landing for all flap configurations is shown in Section 4-2 - Airspeeds for Normal Operations.

For further information on crosswind operation refer to Section 10-3 - Operational Tips.

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4-24 Flight in Icing Conditions

Icing conditions can exist when:

- The Outside Air Temperature (OAT) on the ground and for takeoff, or Static Air Temperature (SAT) in flight, is 10°C or colder, and visible moisture in any form is present (such as clouds, fog or mist with visibility of one mile or less, rain snow, sleet and ice crystals).
- The OAT on the ground and for takeoff is 10°C or colder when operating on ramps, taxiways or runways, where surface snow, ice, standing water, or slush may be ingested by the engine, or freeze on the engine, or the engine nacelle.
- There are visible signs of ice accretion on the aircraft.

Severe icing may result from environmental conditions during flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) which may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces.

Information on the removal of snow, ice and frost from the aircraft is provided in Section 10, Safety and Operational Tips, Removal of Snow, Ice and Frost from the Aircraft.

Freezing rain, freezing fog, freezing drizzle and mixed conditions and descent into icing clouds from above freezing temperatures can result in excessive accretion of ice on the protected surfaces. They may also result in runback ice forming beyond the protected surfaces over a large percentage of the chordwise extent of the lifting surfaces. This ice cannot be shed and it may seriously degrade performance and control of the aircraft.

Flight in severe icing conditions should be avoided, as this may exceed the capabilities of the aircraft ice protection systems. Severe icing conditions can be identified by excessive ice accretion on the visible parts of the airframe including the protected surfaces. This might affect the aircraft performance and handling qualities, and cause significant loss in powerplant performance. If this occurs request priority assistance from ATC to facilitate a route or an altitude change to exit the icing conditions.

Operation on deep slush or snow covered runways greater than 1 inch (2.5 cm) may result in contamination of the flap drive mechanism resulting in failure to retract. If possible operation on deep slush and snow compacted runways should be avoided.

CAUTION

For flight in heavy precipitation the inertial separator must be open.

For takeoff and landing on runways covered with surface snow, ice, standing water, or slush, the inertial separator must be open.

Detection of icing conditions and ice accretion on the aircraft is by pilot visual identification on the left hand wing leading edge. A wing inspection light is provided for night time operations.

Prior to entering icing conditions, activate all ice protection systems as required. If not already activated, select all systems as required, immediately icing conditions are identified.

The procedures for selection of the ice protection systems are provided in Section 4, Normal Procedures, Flight into Known Icing Conditions.

During all icing encounters or times with visible ice accretion on any part of the airframe the flaps must not be extended beyond certain limits. These limits eliminate the possibility of tailplane stall which results in an uncontrolled aircraft pitch down moment.

- With operational airframe pneumatic deice boots 15° flap
- After failure of the airframe pneumatic deice boots 0° flap.

For the minimum recommended speeds for icing encounters and with residual ice on the airframe, refer to Table 4-24-1.

Table 4-24-1: Minimum Recommended Speeds for Icing Encounters and with Residual Ice on the Airframe

Configuration	Minimum recommended speed (KIAS)
Climb, Flaps 0°, Pusher Ice Mode	135
Holding Pattern, Flaps 0°	145 to 175
Landing Approach, Flaps 15°, Pusher Ice Mode	105
Landing Approach, Flaps 0°, Boot Failure, Pusher Ice Mode	130
Balked Landing (Go-Around) Flaps 15°, LG down, Pusher Ice Mode	105
Balked Landing (Go-Around) Boot failure, Flaps 0°, LG down, Pusher Ice Mode	130

Flight in icing conditions is only permitted with full operational status of all aircraft de-icing systems. This includes:

- Propeller Deice
- Wing and Horizontal Tail Deice Boots
- Inertial Separator
- Windshield Deice
- Probes Deice
- Stick Pusher Ice Mode

The propeller de-ice is activated from the ICE PROTECTION switch panel by the switch labeled PROPELLER being pushed to ON. In this mode the propeller de-ice system will be automatically selected to the correct cycle with reference to outside air temperature. No further aircrew input is required. The green ICE PROTECTION caption PROPELLER will be continuously illuminated. If a system failure occurs when activated, the green PROPELLER caption will go off and the CAS caption **Propeller De Ice** will be illuminated and an aural gong will sound.

The wing and horizontal tail de-ice boots are activated from the ICE PROTECTION switch panel by the switch labeled BOOTS being pushed to either 3MIN or 1MIN. 3MIN is to be selected in icing conditions with moderate ice accretion rates as judged by the aircrew. 1MIN is to be selected in icing conditions with high ice accretion rates. When activated in either 1MIN or 3MIN mode and operating correctly, the green ICE PROTECTION caption BOOTS will be continuously illuminated. If a system failure occurs when activated, the green BOOTS caption will go off and the CAS **De Ice Boots** caption will be illuminated and an aural gong will sound.

The engine inertial separator is activated to its open (icing encounter) position from the ICE PROTECTION switch panel by the switch labeled INERT SEP being pushed to OPEN. Once activated the inertial separator door will reach its fully open position in approximately 30 seconds and the green ICE PROTECTION caption INERT SEP will be continuously illuminated. If the door does not reach its fully open position or moves away from its fully open position when still selected, the green INERT SEP caption will go off and the CAS caption **Inertial Separator** will be illuminated and an aural gong will sound.

The LH side and RH side windshield deice is activated from the ICE PROTECTION switch panel by two switches labeled LH WSHLD and RH WSHLD respectively, being pushed to either LIGHT or HEAVY depending on the severity of the icing encounter.

Deicing of all probes, AOA (vane and mounting plate), pitot and static, is activated from the ICE PROTECTION switch panel by a switch labeled PROBES being pushed to ON. If deicing of the left pitot or right pitot probes fails when selected, then either the CAS caption **Pitot 1 Heat** or **Pitot 2 Heat** will be illuminated and an aural gong will sound. If the static ports fail a CAS **Static Heat** caption will be illuminated and an aural gong will sound. If deicing of the AOA probes fails when selected, then the CAS caption **AOA De Ice** will be illuminated and an aural gong will sound.

When the propeller de-ice is selected to ON and the inertial separator selected to OPEN, the stall protection system, stick pusher/shaker system is re-datumed to provide both shake and push functions at lower angles of attack and higher speeds. This is to protect against the natural stall through the effects of residual ice on the protected surfaces of the airfoil leading edges. When the system is in the re-datum mode, the aircrew are alerted by illumination of the green ICE PROTECTION caption PUSHER ICE MODE. Failure of the system in ice mode will result in the caption being extinguished and the CAS caption **Pusher** will be illuminated and an aural gong will sound.

Night time flight in icing conditions is only authorized with full operational status of all the aircraft de-icing systems above, plus the wing inspection light.

The wing inspection light is activated from the overhead EXTERNAL LIGHTS switch panel by the switch labeled WING being moved to on. No functional or failure indications are provided.

A full description of all of the de-ice systems, their switch terminology and caution and warning logic is provided in Section 7, Airplane and Systems Description, Airfoil De-ice System.

The probes de-ice should be selected to on, prior to, and during all flights.

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During the icing encounter the pneumatic de-ice boots will operate continuously in either 3min or 1min cycle mode as selected by the aircrew. During this time the aircrew should frequently monitor the continual shedding of ice from the wing leading edge and the airframe for ice accretion on all visible surfaces that could affect aircraft controllability. It should be noted that some residual ice will be maintained on the wing leading edge during cycling of the boots.

During the icing encounter continue to monitor the ICE PROTECTION window and the CAS for correct function of the ice protection systems.

During flight in icing conditions the aircraft may be subject to a slight degradation in aircraft performance and engine performance. This may be recognized by a required increase in engine power to maintain a constant indicated airspeed and an increased engine ITT to maintain a constant power respectively. If failure of any of the ice protection systems occurs this degradation may become more severe. After such failure the pilot should make immediate arrangements for departure of icing conditions as soon as practicable. If required ATC priority assistance should be requested.

The emergency procedures, concerning failure of the ice protection systems during flight in icing conditions, are provided in Section 3, Emergency Procedures, Deice Systems.

On departure from icing conditions the inertial separator (INERT SEP) and the propeller deice system (PROPELLER) should be kept OPEN and ON respectively until all visible and unprotected areas of the aircraft are observed as being free of ice. This protects the engine from possible ice ingestion and maintains the stick shaker/pusher computer in PUSHER ICE MODE therefore protecting the aircraft against the onset of natural stall. The flaps are not to be extended beyond 15° or in the case of deice boot failure, left at 0°. If the flaps are in an extended position, do not retract them until the airframe is clear of ice.

If flaps are extended to positions that are not allowed, the CAS caption **Flaps EXT Limit** will be displayed and an aural gong will sound.

On departure of icing conditions the deice boots are to be selected OFF and the windshield heat is to be selected as required for good visibility, irrespective of the presence of residual ice.

Once all visible protected and unprotected areas are observed as being free of ice then the inertial separator and the propeller deice system can be selected CLOSED and OFF respectively. This will return the stick shaker/pusher computer to its normal mode. The flaps can be extended or retracted to any required position.

When performing a landing approach after an icing encounter and with residual ice on the airframe the minimum landing speeds defined above should be observed. This will prevent stick shaker activation in PUSHER ICE MODE.

When performing a landing approach after an icing encounter and with residual ice on the airframe the flap limitations defined above must be observed.

Of note, the tailplane may have residual ice that is not visible to the pilot. The speeds listed as minimum recommended speeds for icing encounters should be adhered to and recognized as MINIMUM recommended speeds following any icing encounter where there is even the slightest suspicion that the airframe may have residual ice. As additional operational guidance and, if possible, the pilot should maintain a minimum airspeed of 150 KIAS, in the clean configuration, throughout the IFR approach procedures, including initial and intermediate segments. It is also recommended to fly the approach segment clean as well as to establish the landing configuration with gear down and flaps 15° (pusher ice mode DSB centered) not later than passing through 1000 ft. AGL.

After you have encountered, or suspect you have encountered, severe icing, you should apply the procedures as given in Section 4, Normal Procedures, Severe Icing Conditions.

In case of a balked landing go around after an icing encounter, the climb speeds defined above should be maintained. This will prevent stick shaker activation in PUSHER ICE MODE. In case of a balked landing go around after an icing encounter, the flap position should not be changed and should be maintained at the approach position.
The landing gear can be retracted but a locked indication may not be achieved due to ice contamination of the up position switch striker.

Use of ICE X (B.F. Goodrich Brand Name) improves the shedding capability of the pneumatic de-ice boots. Its use (see Aircraft Maintenance Manual) is recommended but not mandatory.

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4-25 Severe Icing Conditions

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.
The following weather conditions may be conductive to severe in-flight icing:

- Visible rain at temperatures below 0 degrees Celsius ambient air temperature
- Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature

The following procedures are for exiting the severe icing environment and are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature. While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues specified in Section 2, Limitations, Icing Limitations for identifying severe icing conditions are observed, accomplish the following:

- Report the weather conditions to Air Traffic Control
- Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.

It should be recalled that flight in severe icing conditions may exceed the capabilities of the aircraft ice protection systems. If severe icing has been encountered or suspected, even after having exited icing conditions, the pilot should consider maintaining speeds higher than the minimum recommended speeds to account for the possibility of degraded flying qualities due to excessive residual ice.

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4-26 CPCS Low Cabin Mode Operation

A semi-automatic mode called ‘Low Cabin’ is available, whereby the pilot can use Landing Field Elevation (LFE) as the target cabin altitude. The targeted cabin altitude can be the automatic LFE value from the FMS or the manually entered LFE. Low Cabin mode can be selected on the ENVIRONMENT window of the systems MFD. As soon as the LOW CAB annunciator comes on, the cabin altitude is controlled to maintain the LFE selected value, limited only by the maximum pressure differential of 5.75 psi (depending on cruise altitude). From this cruise altitude upwards, the cabin altitude will increase to maintain max Dp.

The following Table gives the aircraft altitude for a selected LFE from which upwards the maximum pressure differential of 5.75 psid will be reached and maintained.

Selected LFE (ft)	**Aircraft altitude with max Dp 5.75 psid**
-2000	10000
-1500	10700
-1000	11400
-500	12100
SL	12900
500	13600
1000	14400
1500	15200
2000	16000
2500	16800
3000	17600
3500	18400
4000	19250
4500	20100
5000	20900
5500	21800
6000	22600
6500	23500
7000	24400
7500	25300
8000	26200
8500	27100
9000	28100
9500	29000
10000	30000

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4-27 SV Selection and Brightness Control

If installed, SV is automatically activated at start-up.

SV can be turned ON/OFF by selecting or deselecting the “SVS ON” checkbox from the OVRLY menu, which is located just above the HSI on the outboard side of either PFD (Refer to Fig. 4-27-1).

The SV brightness control “SVS BRT” is available if SV is selected ON. With “SVS BRT” the terrain and sky dimming can be controlled by placing the cursor over SVS BRT and using the Cursor Control Device (CCD) or Touch Screen Controller (TSC) rotary knobs / MF Controller scroll wheel to set the brightness.

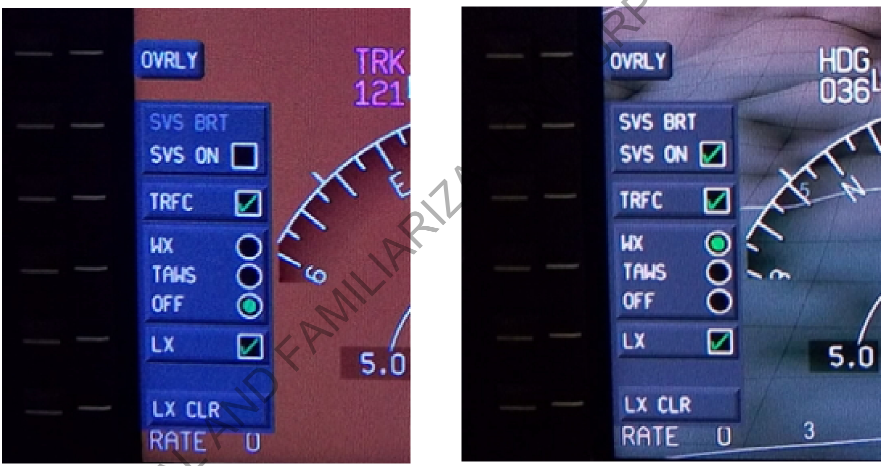

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Figure 4-27-1: PFD OVRLY Menu

Note

When pointing directly towards the sun, or with the sun shining directly onto the PFD and during night operations, it is important to adjust the SV dimming to achieve a good level of contrast and readability on the PFD.

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4-28 LPV/LP Detailed Operating Procedures

4-28-1 Introduction

Normal operating procedures for LPV/LP Approach are described in the Pilot's Guide for the Advanced Cockpit Environment (ACE™) (powered by Honeywell) for the Pilatus PC-12/47E.

4-28-2 Operating Procedures for Approach to LPV Minimum

- Retrieve approach chart for the RNAV approach
- Select RNAV approach on the STAR/Landing FMW page
- Verify LPV/LP minimum is selected in the RNAV minimum field
- Compare FMS Flightplan to approach charts (Approach name, Waypoints, Altitudes, Missed Approach)

Note
If INAV message "FMS-LPV miscompare" or "FMS-LP miscompare" is displayed reloading of the approach is required.

- Set Minimums for the selected approach
- Verify FMS is selected as Primary NAV source
- Verify NAV preview is deselected
- If terminal area is entered, a white LPV or LP status indicator will appear on PFD
- If the FAF is the active waypoint or the present position is within 5 nm from the FAF, the vertical deviation pointer (right hand side of the vertical deviation scale) will be displayed as hollow or a solid pointer (Refer to Section 7 for System Description)
- Arm the approach mode by pressing the APR button on the Flight Guidance Panel as required

Note
The autopilot lateral approach mode (NAV) must be captured before the vertical approach mode (VGP).

- Intercept Final Approach Course
- Capture LPV/LP approach using the lateral and vertical deviation pointers. The LPV/LP status indicator will flash for 5 seconds and turn green.

Note
LPV/LP can be captured within 2 nm miles from the FAF. Green APP indication will be displayed on the HSI.

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- Verify NAV and VGP are the active autopilot modes (if required)
- LPV Approach:

  Continue approach to LPV minimum by using lateral and vertical deviation pointers
- LP Approach:

  Continue approach to LP minimum by using lateral deviation pointer and baro altitude to comply with published approach procedure (vertical deviation pointer is advisory only)
- Monitor the LPV/LP status indicator
- Disengage autopilot below 200ft

4-28-3 Flight Director/Autopilot Coupled Operation

The LPV/LP approach mode can be armed via the APR button on the Flight Guidance Panel as soon as the vertical deviation pointer “LPV” or “LP” is displayed on the PFD. The autopilot approach modes are displayed as NAV (lateral) and VGP (vertical).

SECTION 5

Performance (EASA Approved)

Table of Contents

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5-1 Standard Tables

5-1-1 General

This section contains all of the required and complementary performance data for airplane operation. Aircraft performance associated with optional equipment and systems which require supplements is provided in Section 9, Supplements.

The performance information presented in this section is derived from actual flight test data corrected to standard day conditions and analytically expanded for the different parameters such as weight, altitude, and temperature, etc. This information does not account for many factors that the pilot must evaluate before each takeoff such as pilot proficiency, aircraft condition, runway surface and slope other than that specified, or the effect of winds aloft. When necessary, a performance chart (table) will specify the aircraft configuration and the procedure to achieve the published performance.

Note
The takeoff, accelerate-stop and landing distance performance chart data is based on a **DRY TARMAC RUNWAY** surface. Runways that are wet, or contaminated with slush or snow will adversely affect the runway coefficient of friction and subsequently increase the takeoff, accelerate-stop and landing distance.

A Flight Planning Example is provided to assist the pilot in the preflight performance calculations as required by the operating regulations. Each performance chart (table) has an example plotted to indicate the proper sequence in which to use the chart and determine accurate performance data.

All performance data is limited to between the -55 °C (-67 °F) and +50 °C (122 °F) outside air temperature limits. Some tables presented in this section show data for temperatures below -55 °C (-67 °F) which is purely for ease of interpolation between data points. These temperature areas in the tables are shaded.

Performance data regarding takeoff, landing and accelerate-stop distances is presented up to 14,000 ft. This does not, however, imply an operational limitation of the aircraft. Field performance data at higher altitudes can be supplied under special request.

The stall speeds shown in the performance charts are achieved at an entry rate of 1 knot/second. Maximum altitude loss observed during the stall was 300 feet. During an accelerated stall, a rapid pitch-down in excess of 30° may result with an altitude loss of up to 500 feet.

When landing with flaps set to less than 40°, the total landing distances will be increased by the following factors:

Flap Setting	Factor
0°	1.83
15°	1.31
30°	1.22

The ADAHRS removes most of the error due to static pressure source measurements. A small residual error exists; this error is typically no more than 1 knot on airspeed or 30 ft on altimeter readings for retracted flaps at all airspeeds and for extended flaps below 100 KIAS.

The ADAHRS SAT indication in the air may be treated as OAT for reading the performance graphs and/or table entries. SAT indication on the ground may not be accurate.

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The formulas for the conversion of standard format to metric equivalent and vice versa are given in Section 1, Conversion Information.

5-1-2 Standard Tables

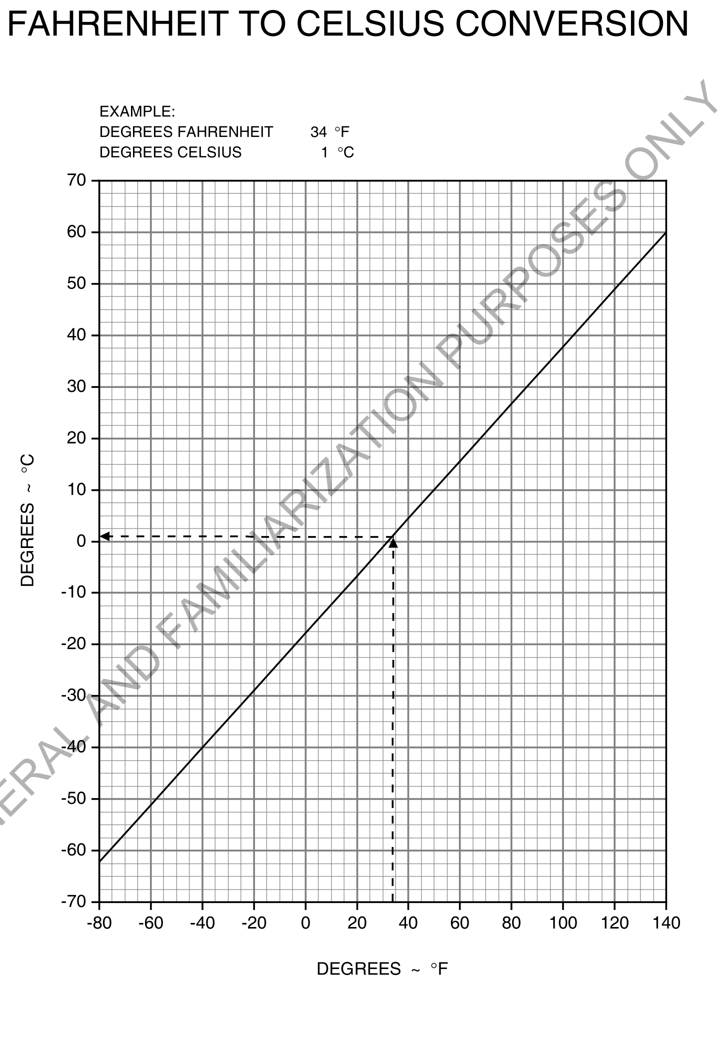

Figure 5-1-1: Performance - Fahrenheit to Celsius Conversion

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ISA TEMPERATURE CONVERSION

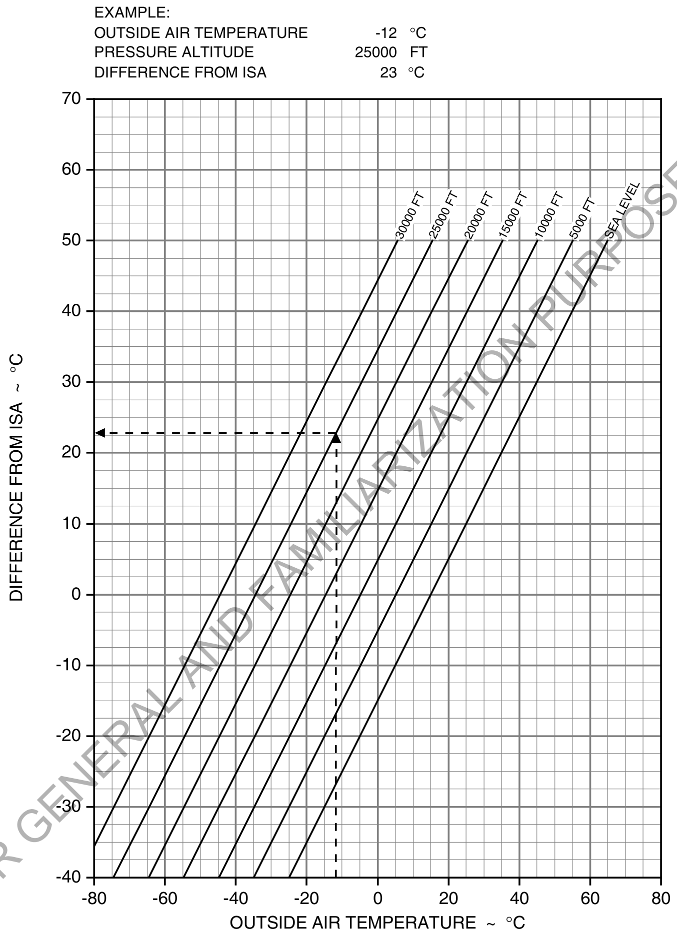

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Figure 5-1-2: Performance - ISA Conversion

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US GALLONS TO LITERS CONVERSION

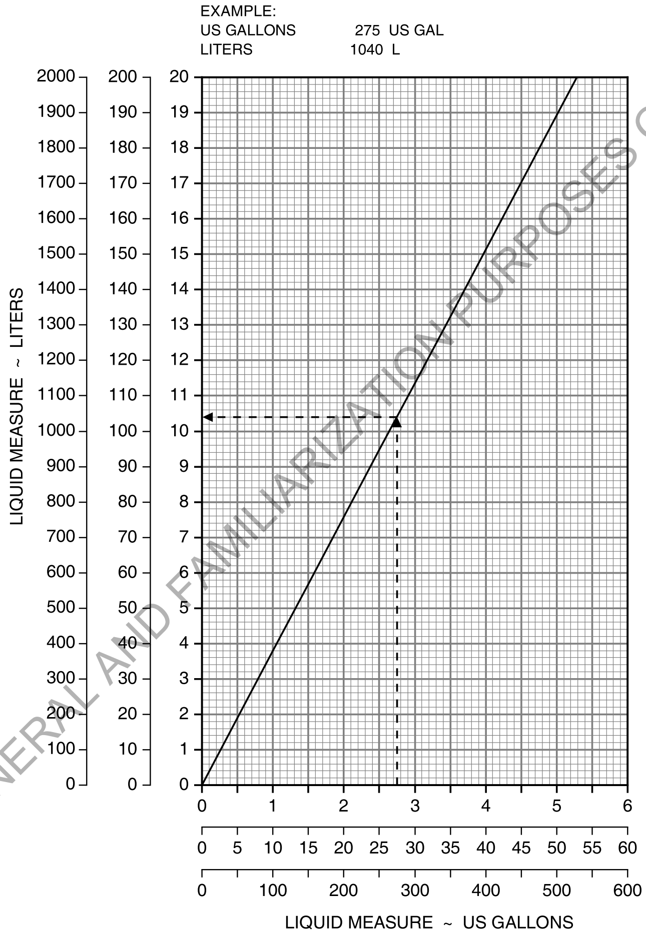

Figure 5-1-3: Performance - U.S. Gallons to Liters Conversion

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FEET TO METERS CONVERSION

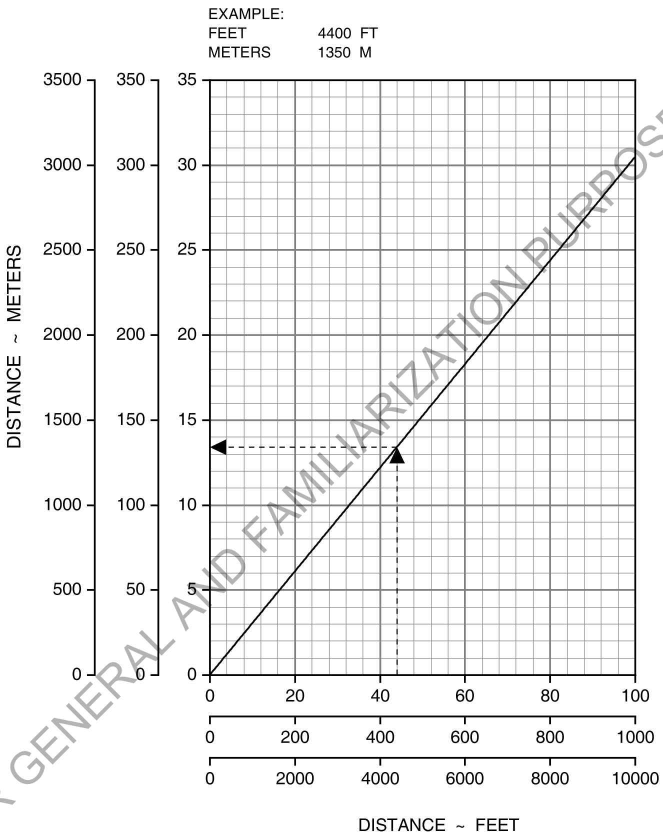

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Figure 5-1-4: Performance - Feet to Meters Converion

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POUNDS TO KILOGRAMS CONVERSION

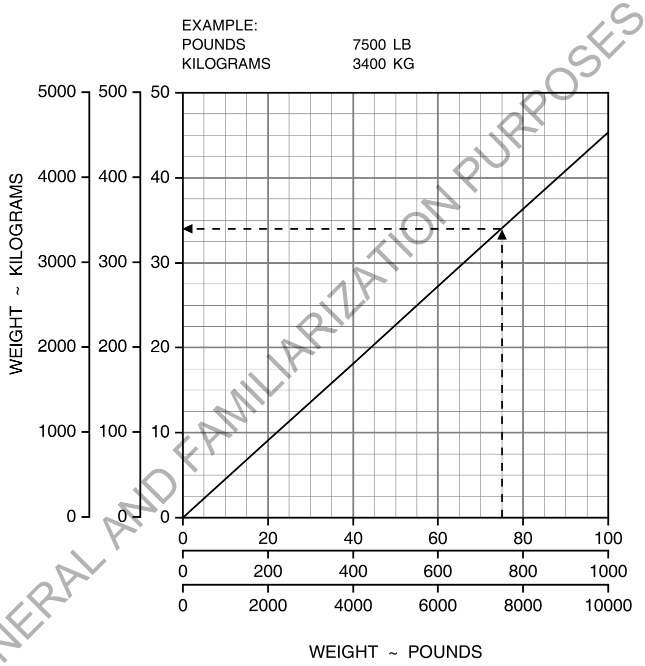

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Figure 5-1-5: Performance - Pounds to Kilograms Conversion

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INCHES TO MILLIMETERS CONVERSION

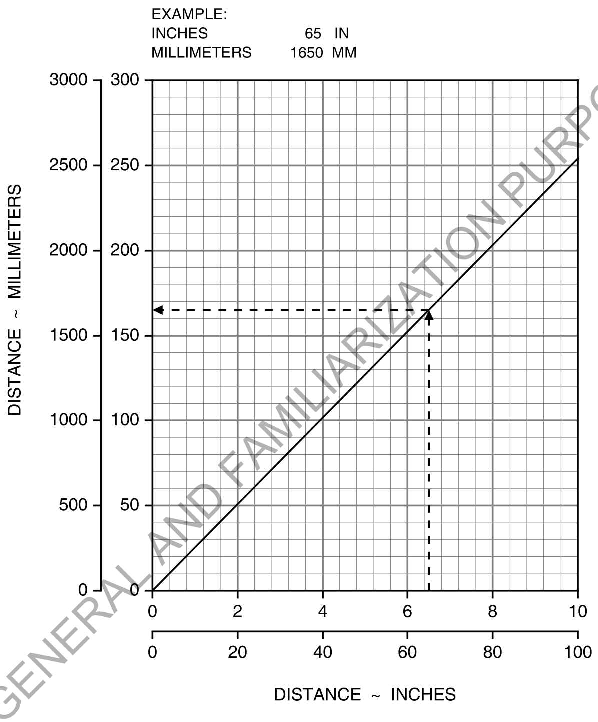

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Figure 5-1-6: Performance - Inches to Millimeters Conversion

TAKEOFF AND LANDING

CROSSWIND COMPONENT

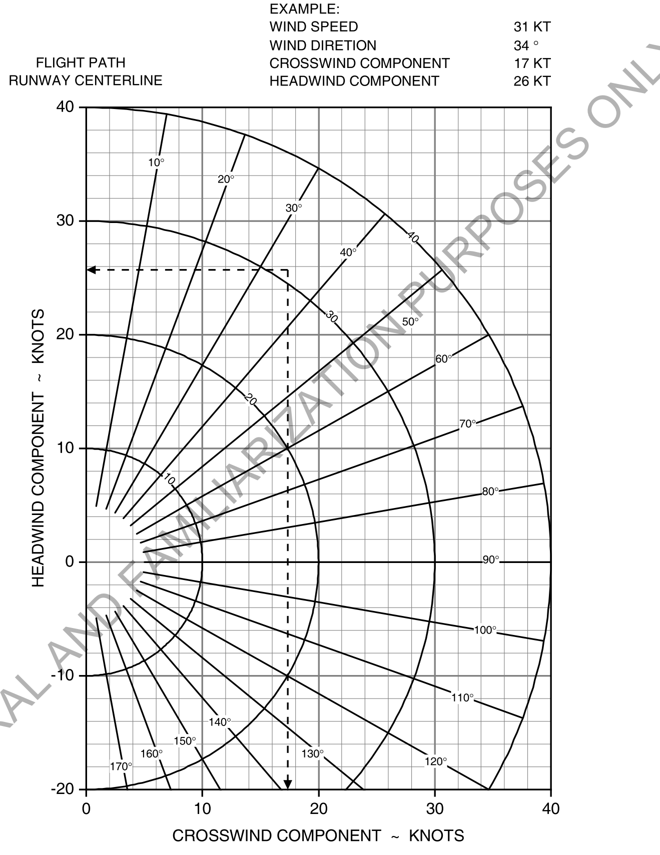

Figure 5-1-7: Performance - Wind Components

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AIRSPEED CALIBRATION

(SEA LEVEL TO 10000 FEET)

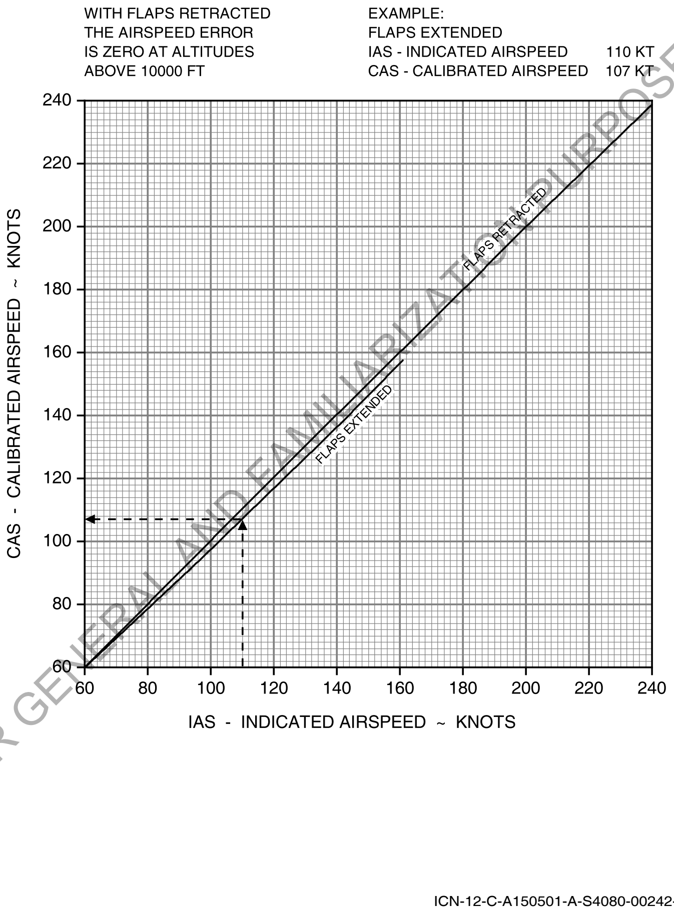

Figure 5-1-8: Performance - Airspeed Calibration

ALTIMETER CALIBRATION

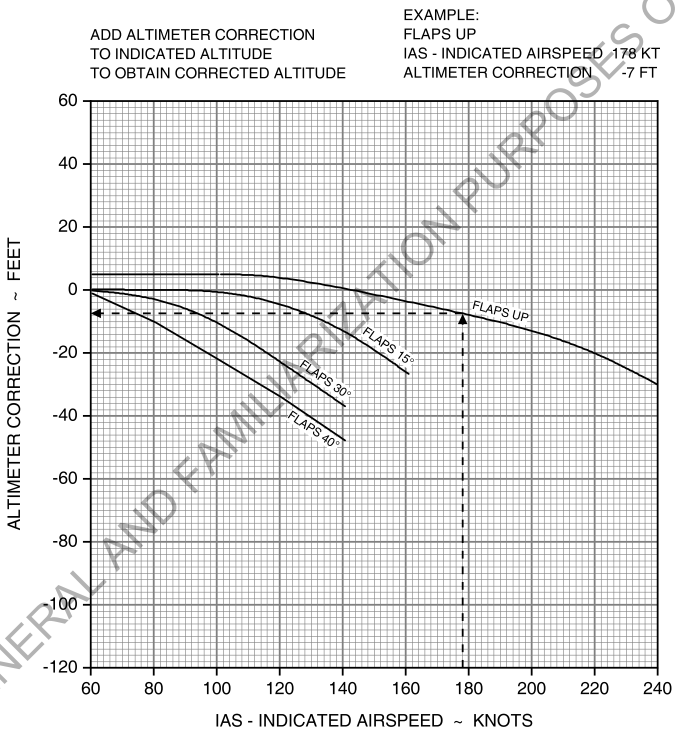

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Figure 5-1-9: Performance - Altimeter Correction

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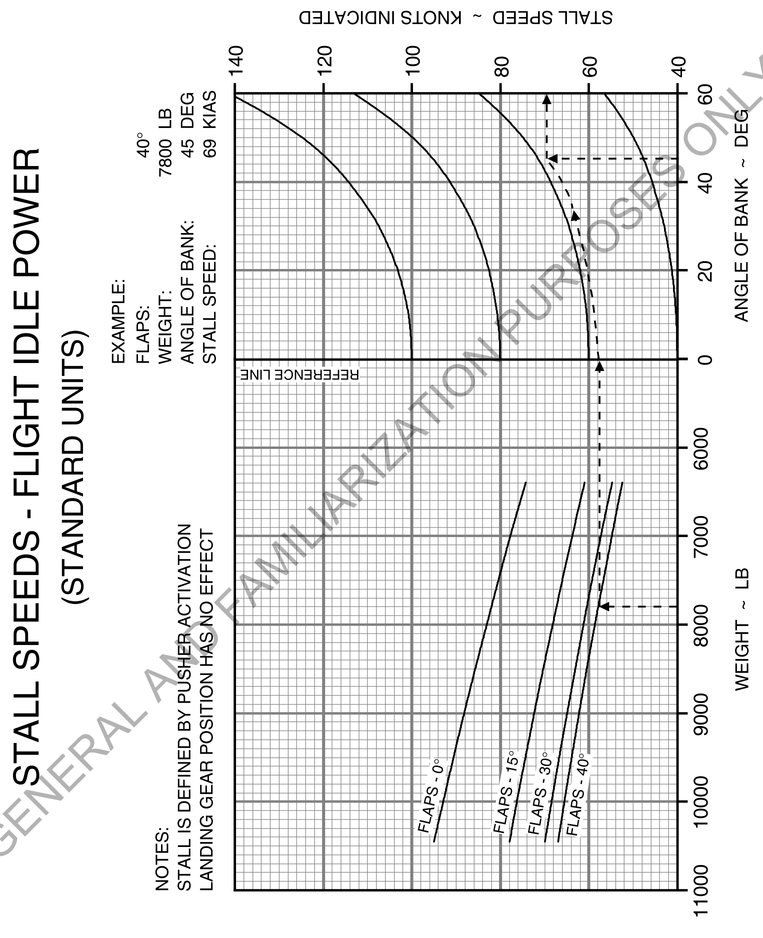
5-3-1 Performance Data - Stall Speeds



See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00245-A-001-01

Figure 5-3-1-1: Performance - Stall Speeds KIAS - Flight Idle Power (standard units)

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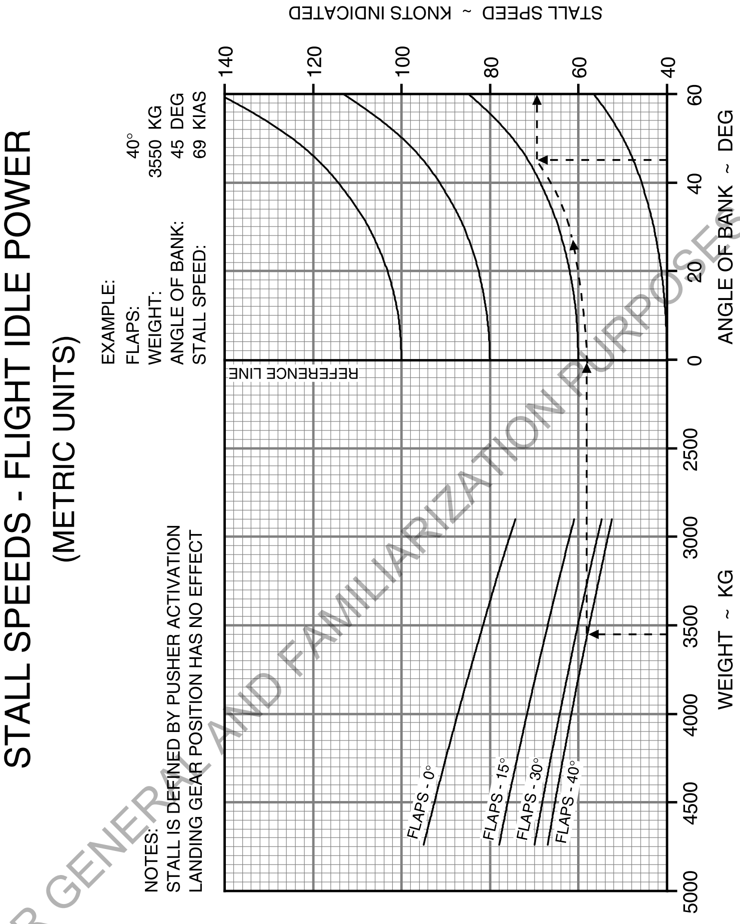

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

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Figure 5-3-1-2: Performance - Stall Speeds KIAS - Flight Idle Power (metric units)

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5-3-2 Performance Data - Takeoff Performance

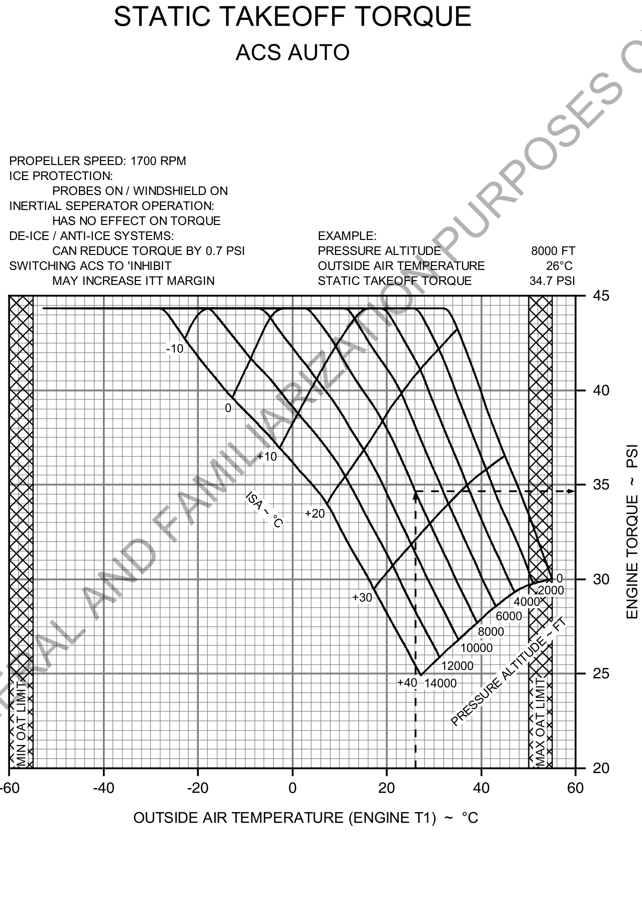

Figure 5-3-2-1: Performance - Static Takeoff Torque

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STATIC TAKEOFF TORQUE

ACS INHIBIT

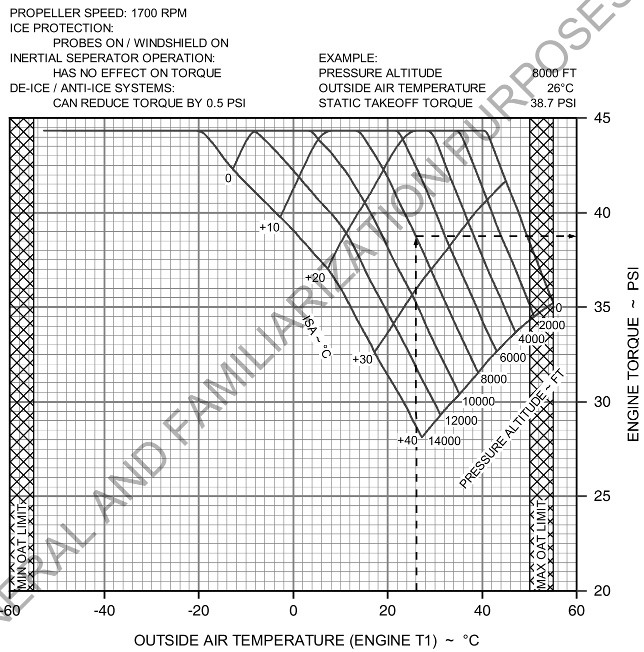

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Figure 5-3-2-2: Performance - Static Takeoff Torque - ACS OFF

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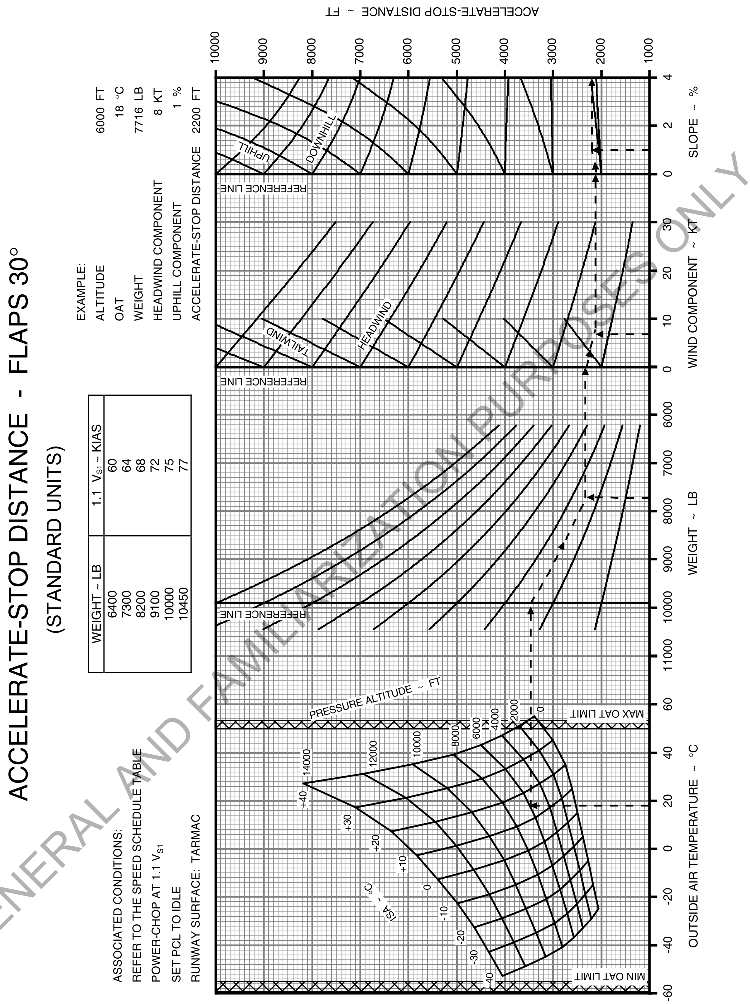


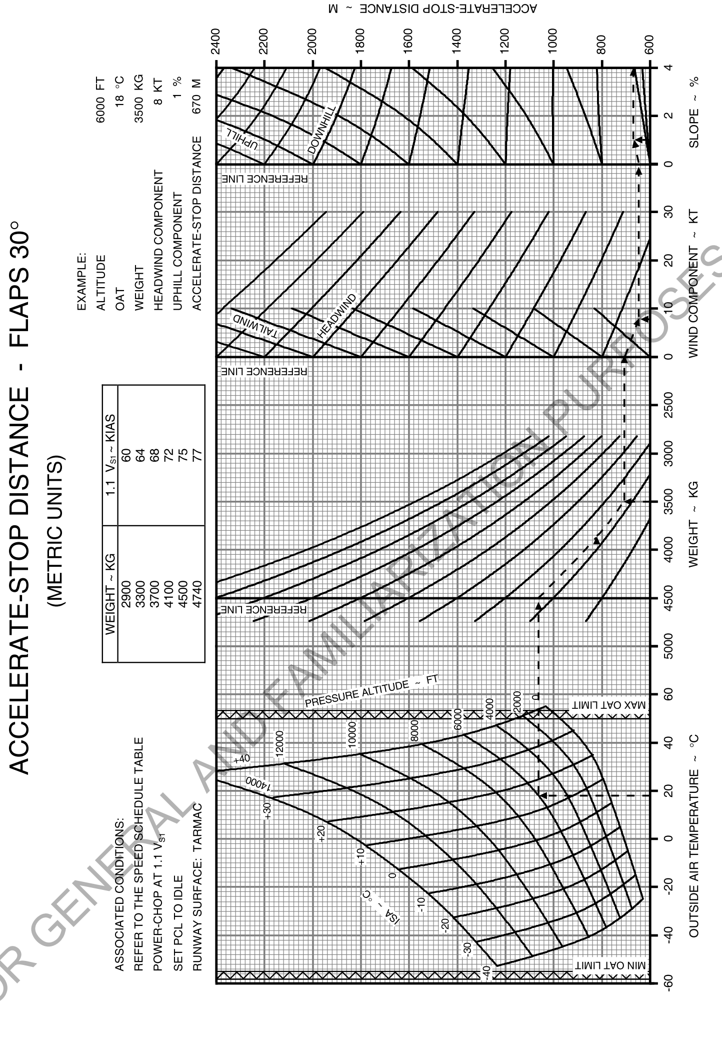
WEIGHT ~ LB	1.1 V_{S1} ~ KIAS
6400	60
7300	64
8200	68
9100	72
10000	75
10450	77

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00249-A-001-01

Figure 5-3-2-3: Performance - Accelerate-Stop Distance - Flaps 30° (standard units)

12-C-A15-60-0503-02A-030A-A



WEIGHT ~ KG	1.1 V_{S1} ~ KIAS
2900	60
3300	64
3700	68
4100	72
4500	75
4740	77

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

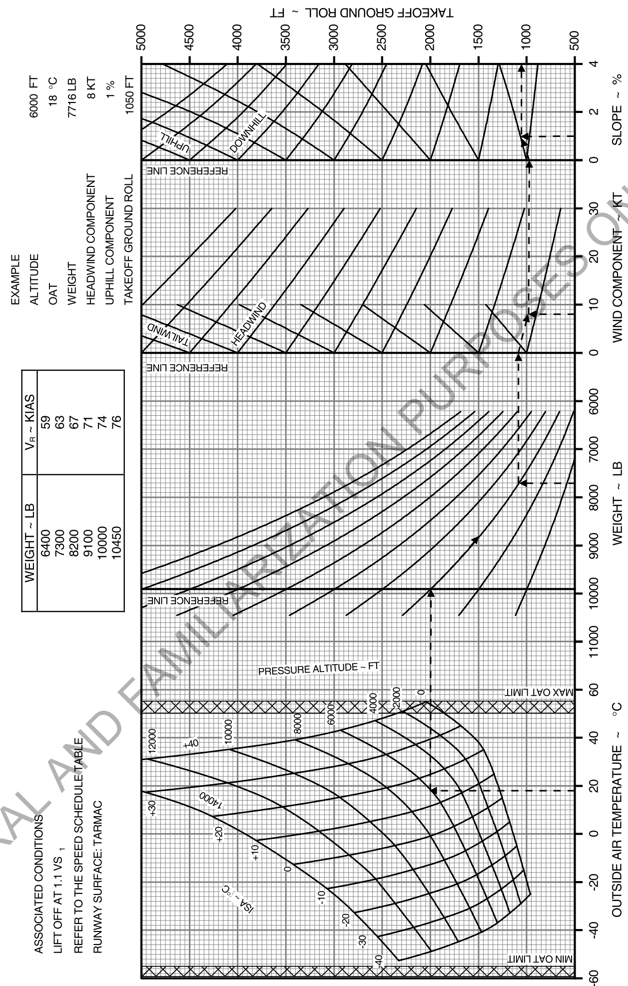
ICN-12-C-A150503-A-S4080-00250-A-001-01

Figure 5-3-2-4: Performance - Accelerate-Stop Distance - Flaps 30° (metric units)

12-C-A15-60-0503-02A-030A-A

TAKEOFF GROUND ROLL - FLAPS 30 °
(STANDARD UNITS)

WEIGHT ~ LB	V_R ~ KIAS
6400	59
7300	63
8200	67
9100	71
10000	74
10450	76

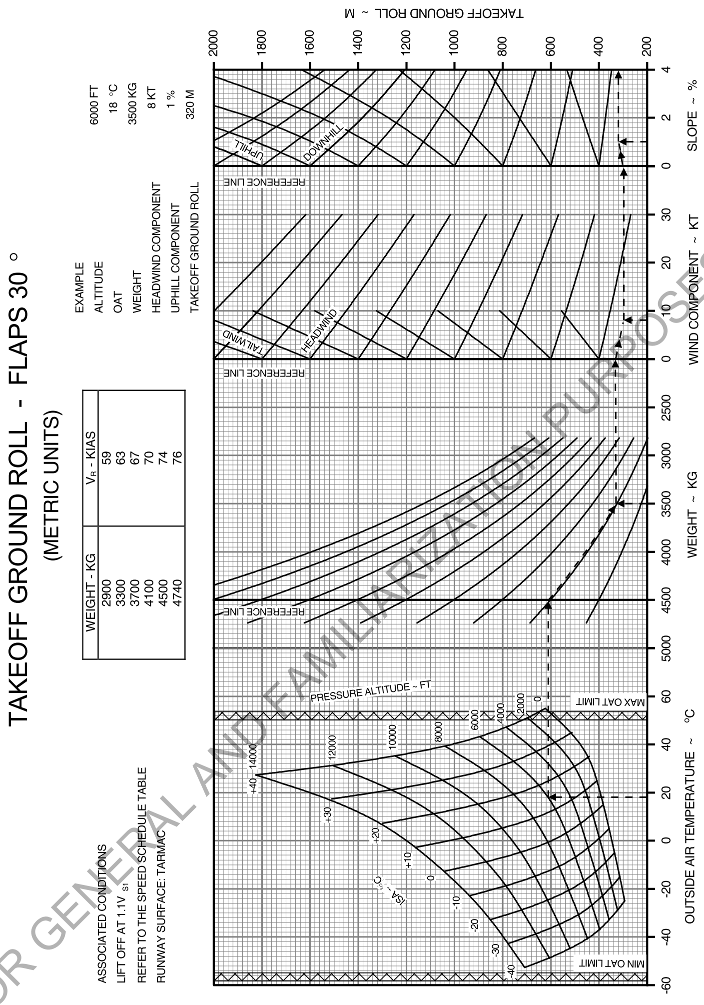


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00253-A-001-01

Figure 5-3-2-5: Performance - Takeoff Ground Roll - Flaps 30° (standard units)

12-C-A15-60-0503-02A-030A-A

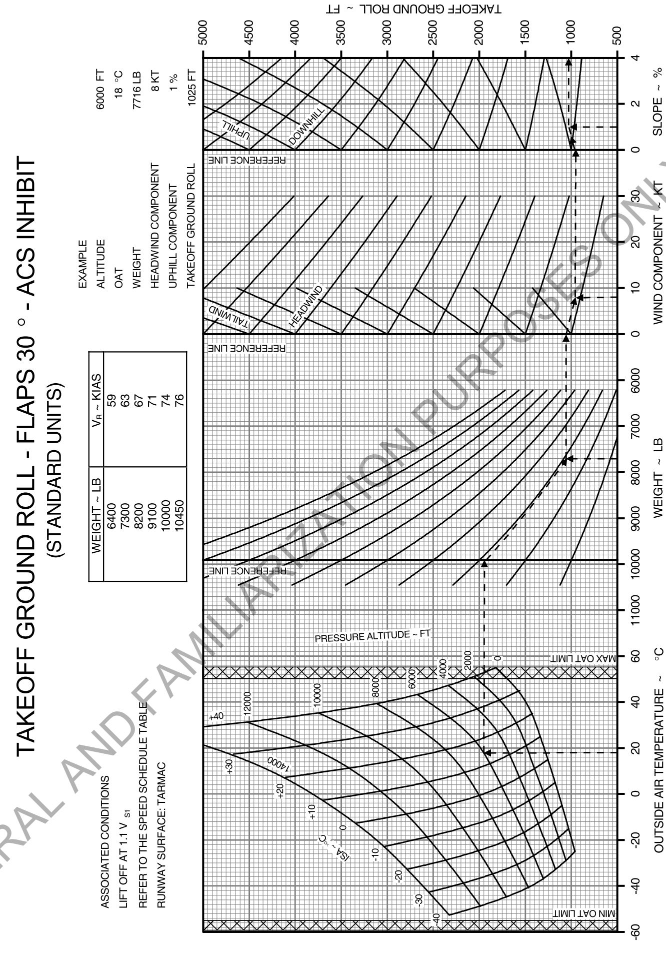


WEIGHT - KG	V_R - KIAS
2900	59
3300	63
3700	67
4100	70
4500	74
4740	76

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00254-A-001-01

Figure 5-3-2-6: Performance - Takeoff Ground Roll - Flaps 30° (metric units)

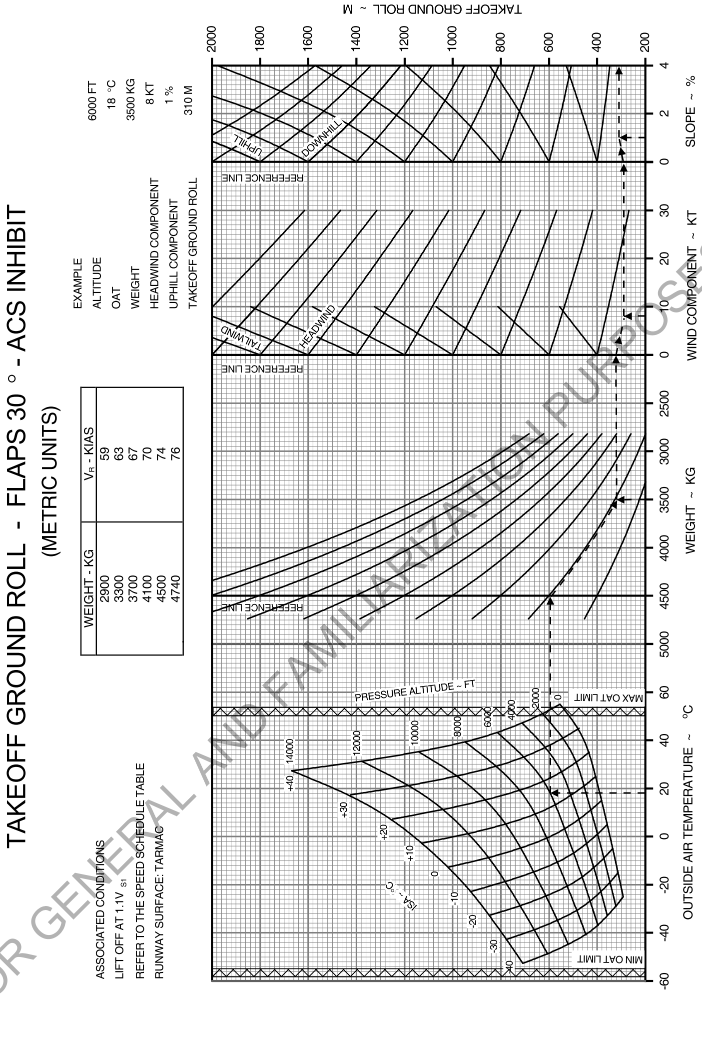


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00255-A-001-01

Figure 5-3-2-7: Performance - Takeoff Ground Roll - Flaps 30° - ACS OFF (standard units)

12-C-A15-60-0503-02A-030A-A

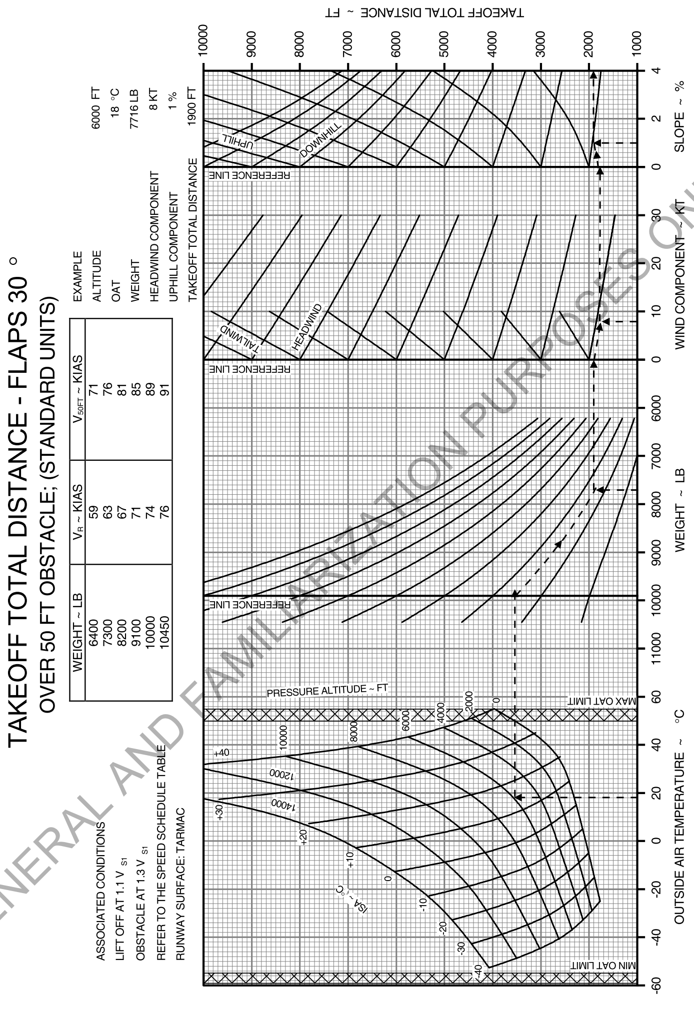


WEIGHT - KG	V_R - KIAS
2900	59
3300	63
3700	67
4100	70
4500	74
4740	76

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00256-A-001-01

Figure 5-3-2-8: Performance - Takeoff Ground Roll - Flaps 30° - ACS OFF (metric units)

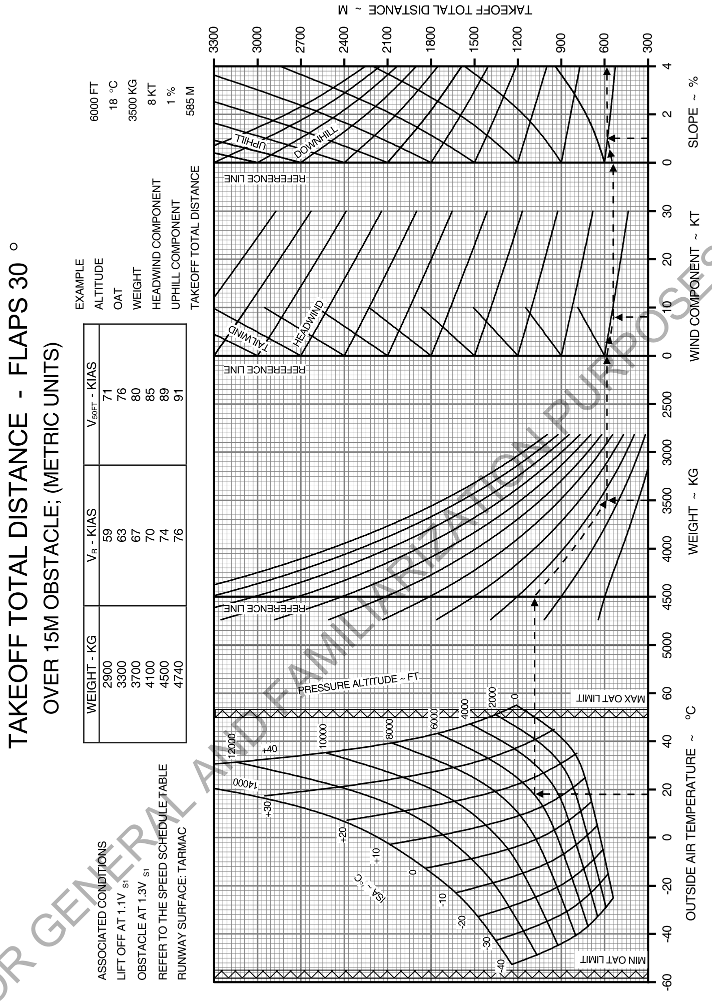


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00257-A-001-01

Figure 5-3-2-9: Performance - Takeoff Total Distance - Flaps 30° (standard units)

12-C-A15-60-0503-02A-030A-A



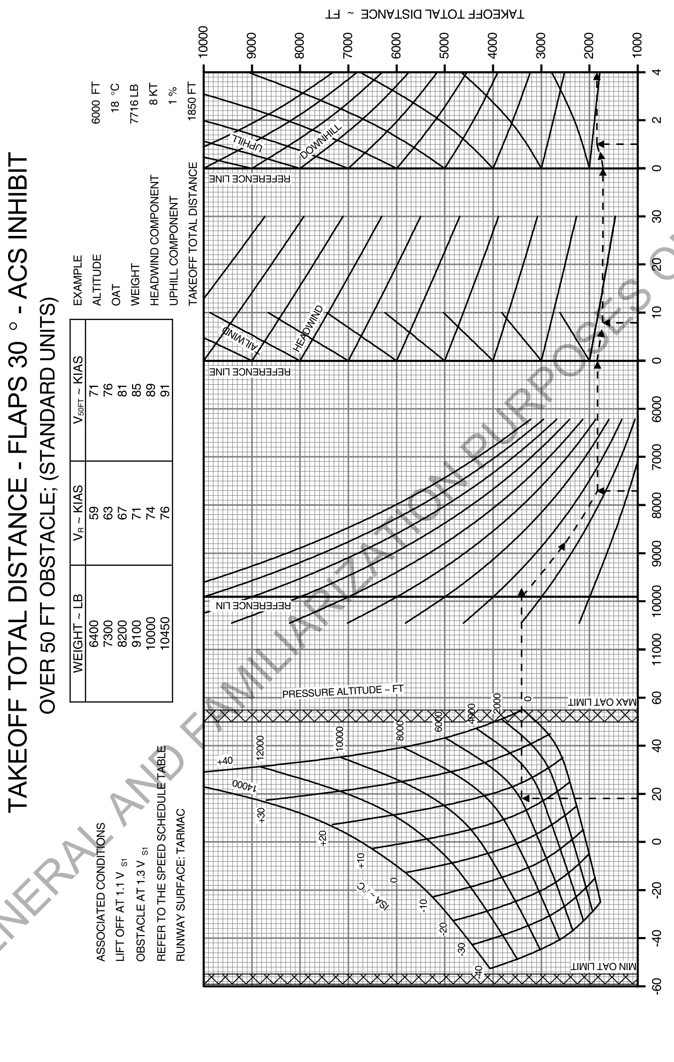
WEIGHT - KG	V_R - KIAS	V_{50FT} - KIAS
2900	59	71
3300	63	76
3700	67	80
4100	70	85
4500	74	89
4740	76	91

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00258-A-001-01

Figure 5-3-2-10: Performance - Takeoff Total Distance - Flaps 30° (metric units)

12-C-A15-60-0503-02A-030A-A

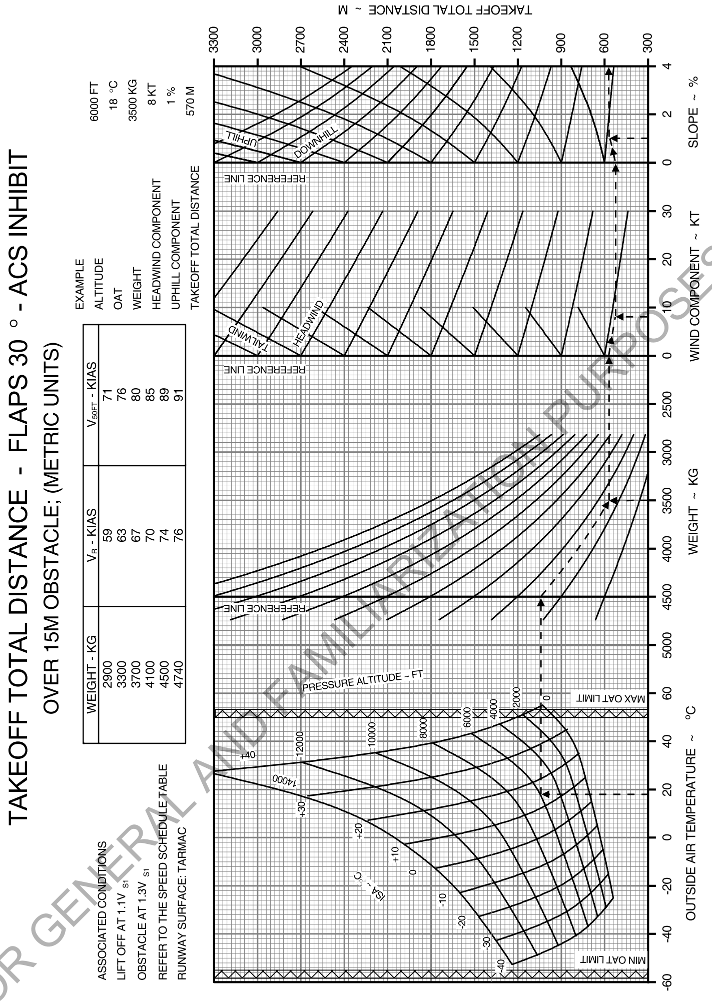


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00259-A-001-01

Figure 5-3-2-11: Performance - Takeoff Total Distance - Flaps 30° - ACS OFF (standard units)

12-C-A15-60-0503-02A-030A-A



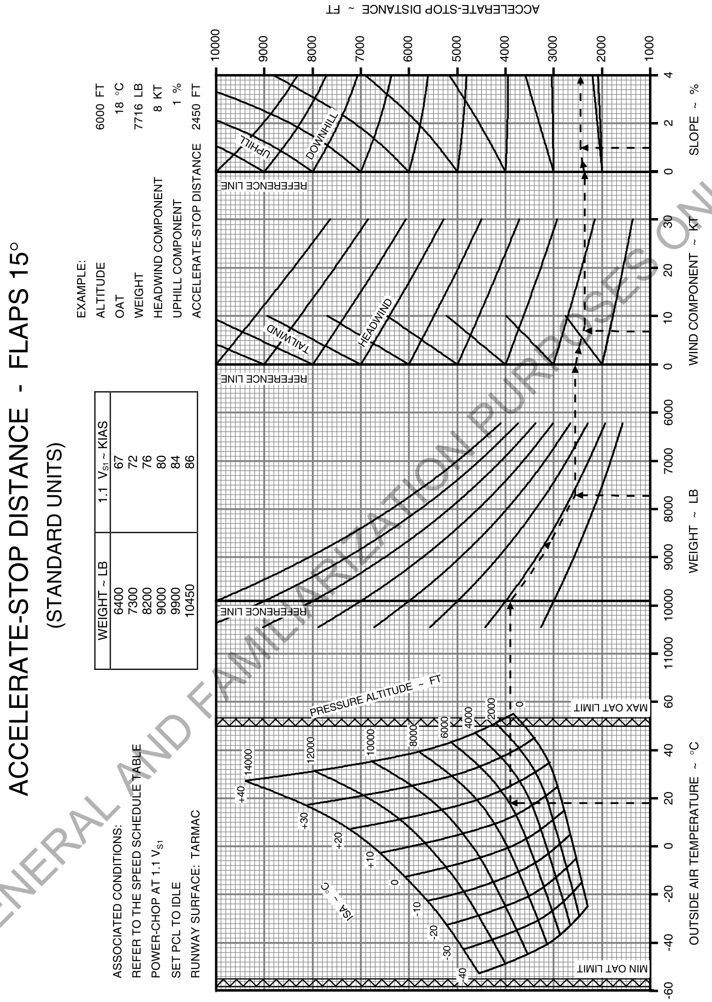
WEIGHT - KG	V_R - KIAS	V_{50FT} - KIAS
2900	59	71
3300	63	76
3700	67	80
4100	70	85
4500	74	89
4740	76	91

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00260-A-001-01

Figure 5-3-2-12: Performance - Takeoff Total Distance - Flaps 30° - ACS OFF (metric units)

12-C-A15-60-0503-02A-030A-A

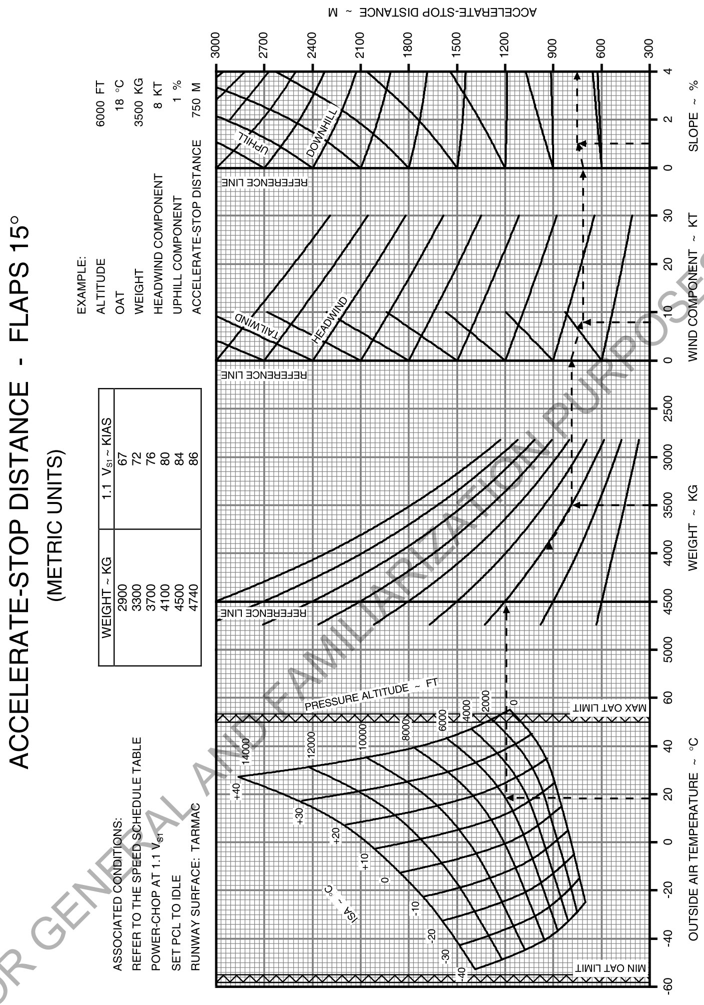


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00261-A-001-01

Figure 5-3-2-13: Performance - Accelerate-Stop Distance - Flaps 15° (standard units)

12-C-A15-60-0503-02A-030A-A

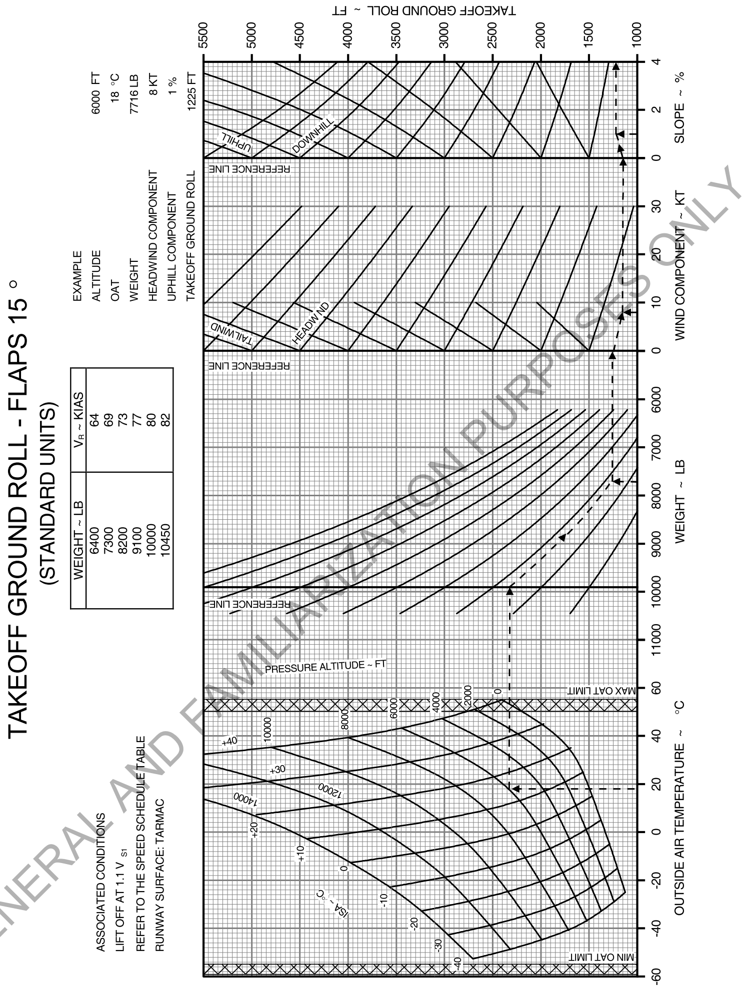


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00262-A-001-01

Figure 5-3-2-14: Performance - Accelerate-Stop Distance - Flaps 15° (metric units)

12-C-A15-60-0503-02A-030A-A

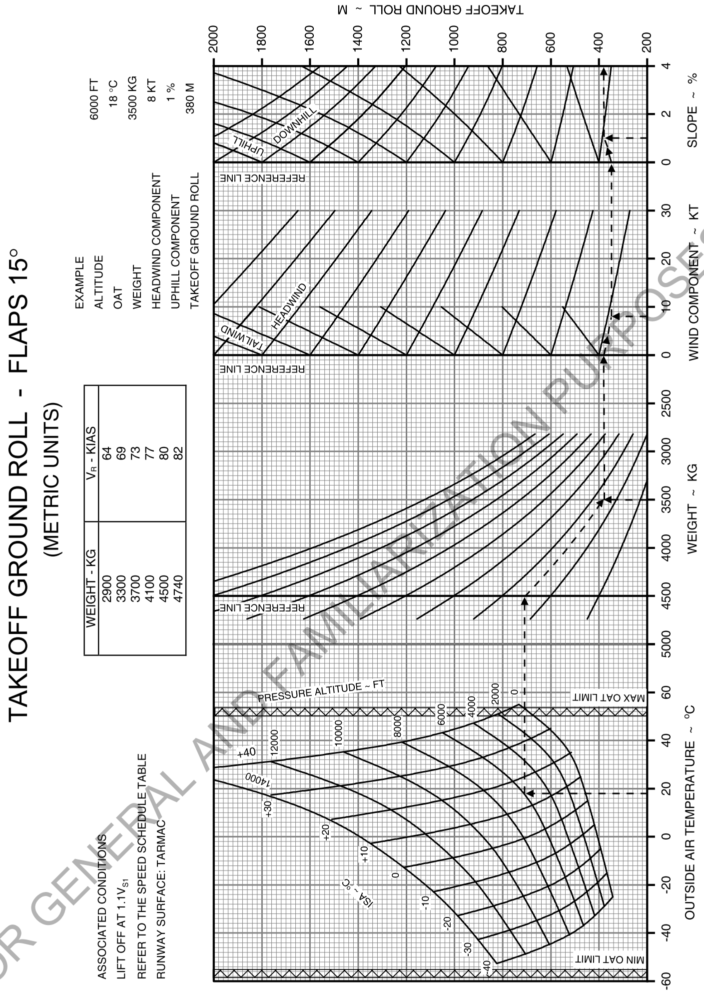


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00265-A-001-01

Figure 5-3-2-15: Performance - Takeoff Ground Roll - Flaps 15° (standard units)

12-C-A15-60-0503-02A-030A-A

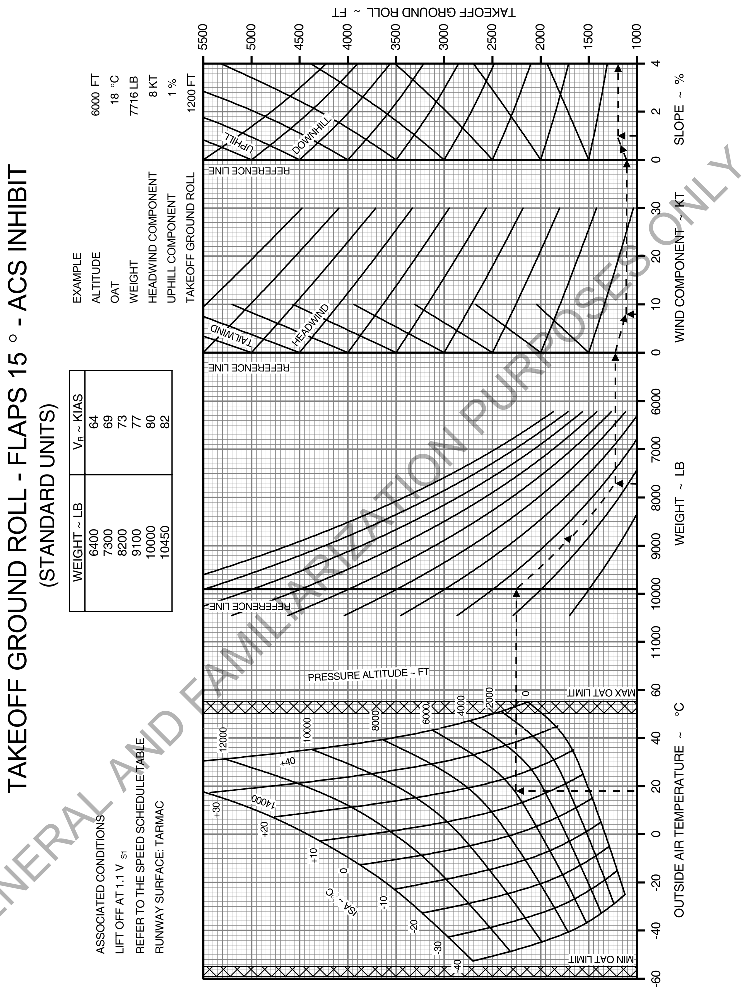


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00266-A-001-01

Figure 5-3-2-16: Performance - Takeoff Ground Roll - Flaps 15° (metric units)

12-C-A15-60-0503-02A-030A-A

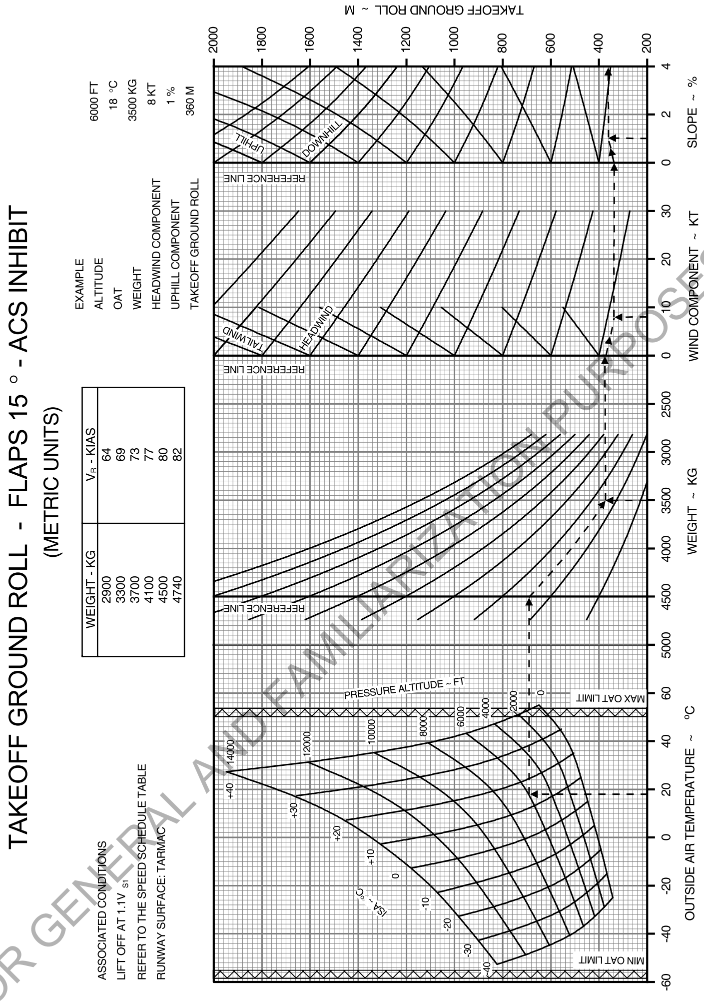


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00267-A-001-01

Figure 5-3-2-17: Performance - Takeoff Ground Roll - Flaps 15° - ACS OFF (standard units)

12-C-A15-60-0503-02A-030A-A



WEIGHT - KG	V_R - KIAS
2900	64
3300	69
3700	73
4100	77
4500	80
4740	82

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00268-A-001-01

Figure 5-3-2-18: Performance - Takeoff Ground Roll - Flaps 15° - ACS OFF (metric units)

12-C-A15-60-0503-02A-030A-A

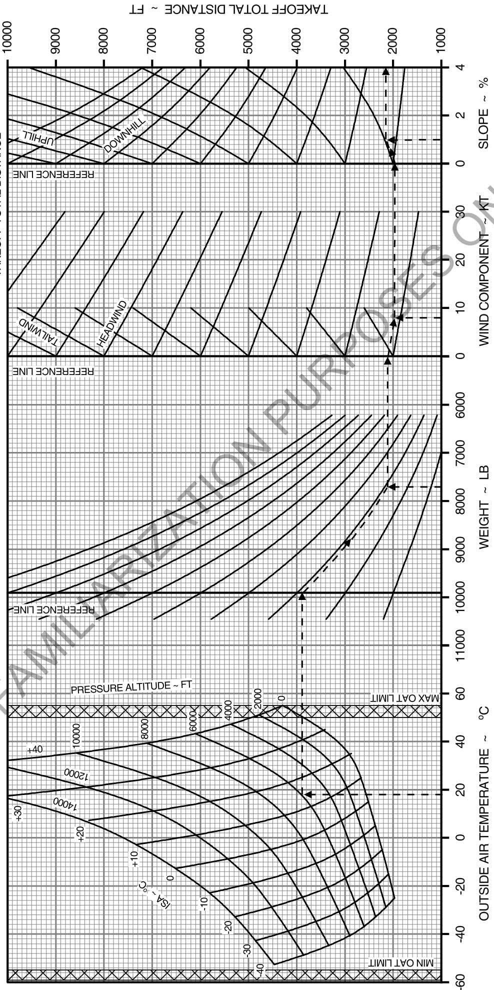
TAKEOFF TOTAL DISTANCE - FLAPS 15 °

OVER 50 FT OBSTACLE; (STANDARD UNITS)

WEIGHT ~ LB	V_R ~ KIAS	V_{50FT} ~ KIAS
6400	64	79
7300	69	85
8200	73	90
9100	77	95
10000	80	99
10450	82	101

EXAMPLE	
ALTITUDE	6000 FT
OAT	18 °C
WEIGHT	7716 LB
HEADWIND COMPONENT	8 KT
UPHILL COMPONENT	1 %
TAKEOFF TOTAL DISTANCE	2150 FT

ASSOCIATED CONDITIONS
LIFT OFF AT 1.1 V_{S1}
OBSTACLE AT 1.3 V_{S1}
REFER TO THE SPEED SCHEDULE TABLE
RUNWAY SURFACE: TARMAC

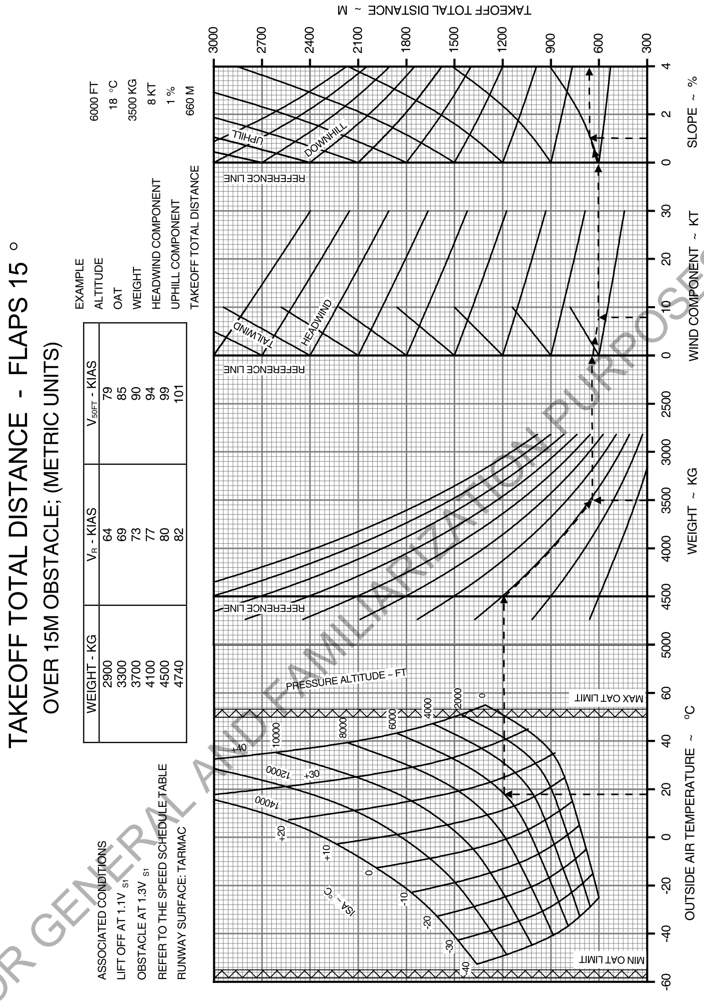


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00269-A-001-01

Figure 5-3-2-19: Performance - Takeoff Total Distance - Flaps 15° (standard units)

12-C-A15-60-0503-02A-030A-A



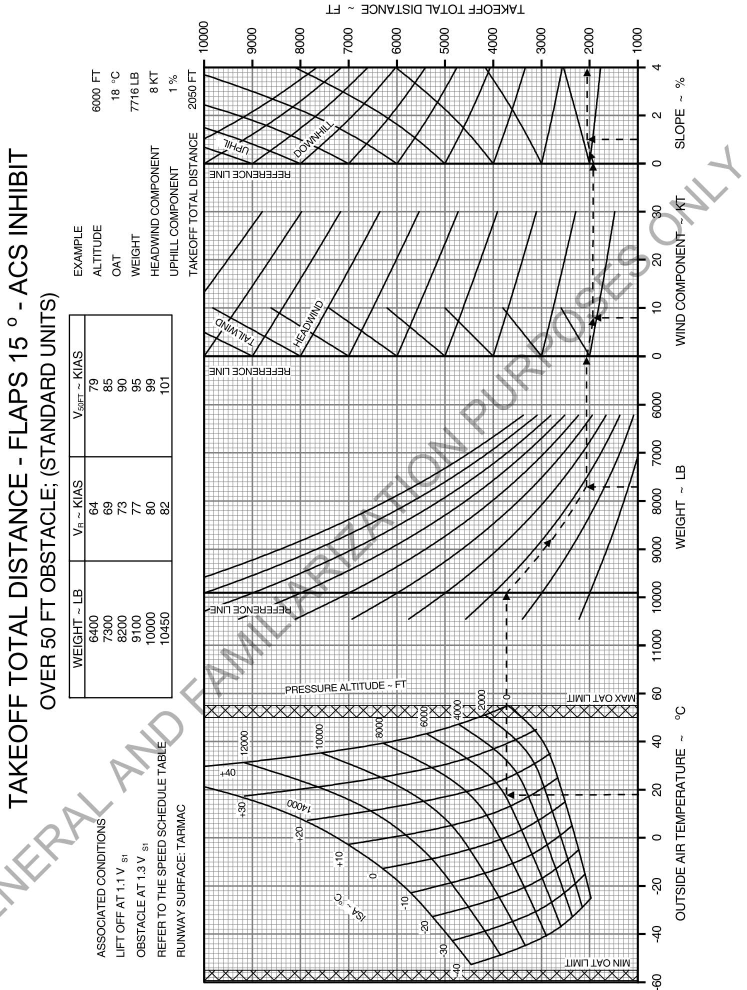
WEIGHT - KG	V_R - KIAS	V_{50FT} - KIAS
2900	64	79
3300	69	85
3700	73	90
4100	77	94
4500	80	99
4740	82	101

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00270-A-001-01

Figure 5-3-2-20: Performance - Takeoff Total Distance - Flaps 15° (metric units)

12-C-A15-60-0503-02A-030A-A



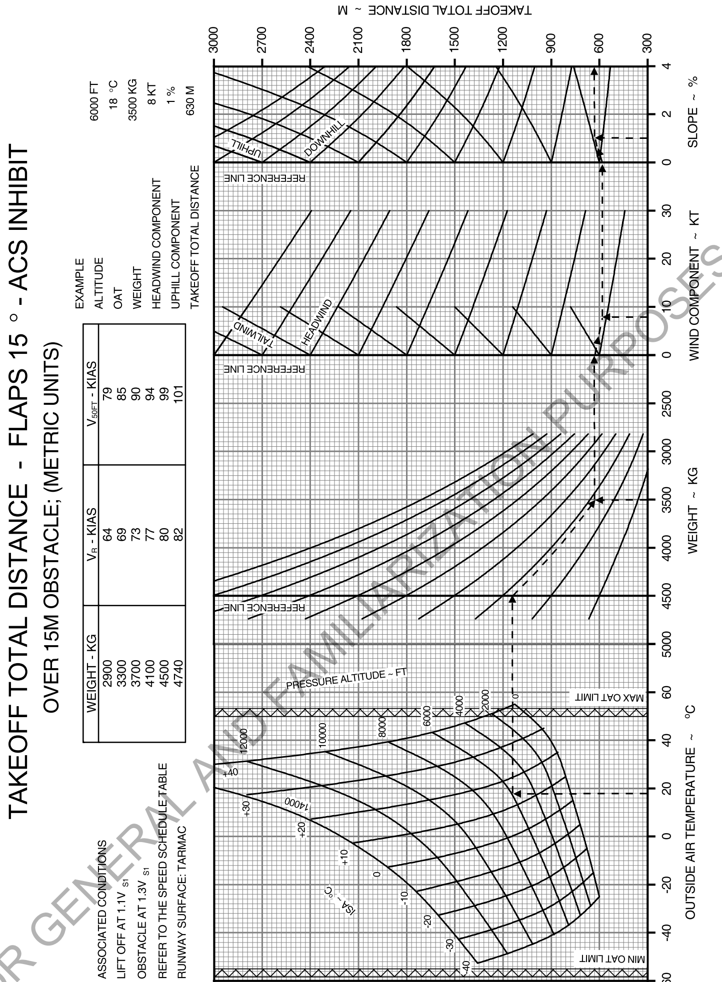
WEIGHT ~ LB	V_R ~ KIAS	V_{50FT} ~ KIAS
6400	64	79
7300	69	85
8200	73	90
9100	77	95
10000	80	99
10450	82	101

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00271-A-001-01

Figure 5-3-2-21: Performance - Takeoff Total Distance - Flaps 15° - ACS OFF (standard units)

12-C-A15-60-0503-02A-030A-A



WEIGHT - KG	V_R - KIAS	V_{50FT} - KIAS
2900	64	79
3300	69	85
3700	73	90
4100	77	94
4500	80	99
4740	82	101

See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00272-A-001-01

Figure 5-3-2-22: Performance - Takeoff Total Distance - Flaps 15° - ACS OFF (metric units)

12-C-A15-60-0503-02A-030A-A

5-3-3 Performance Data - Climb Performance

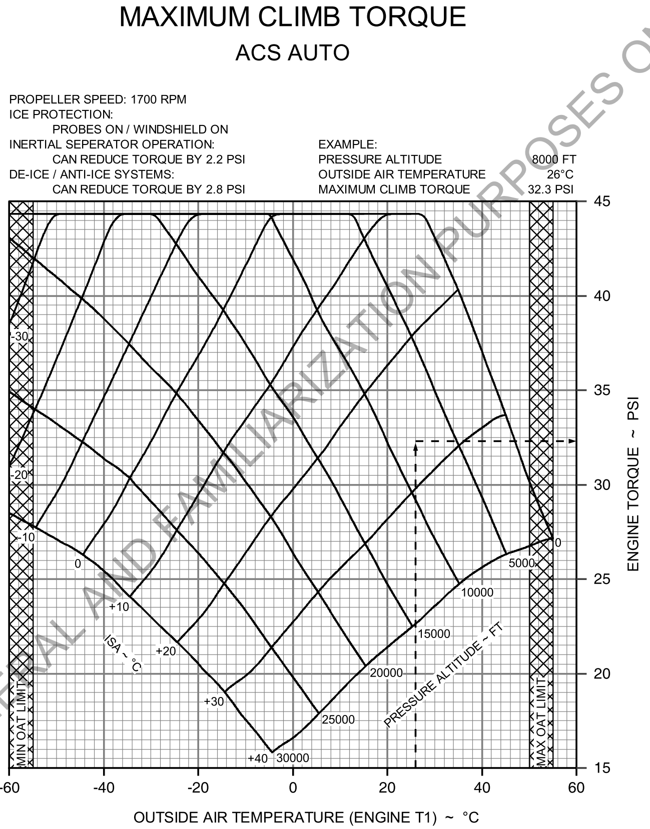
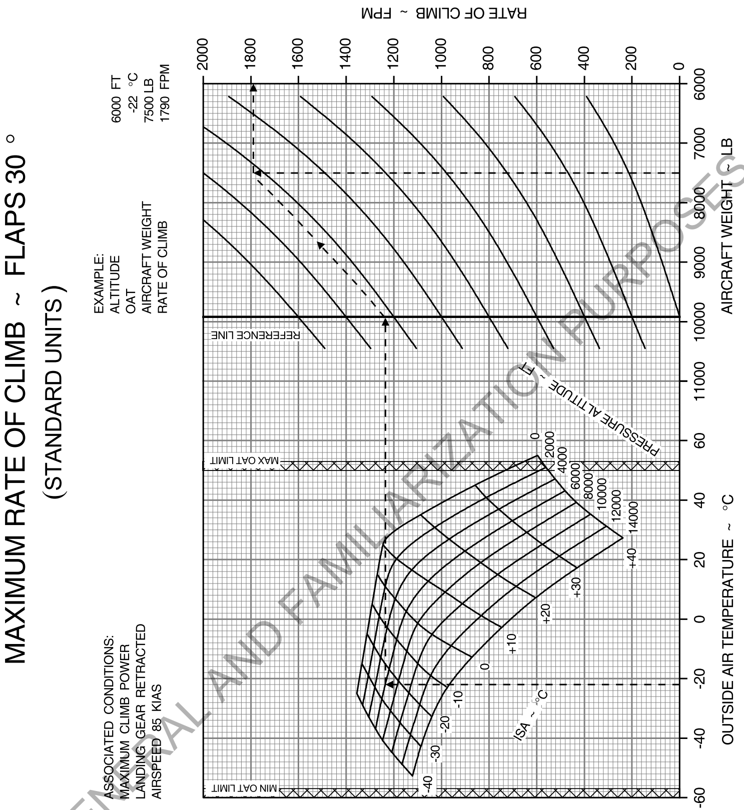


Figure 5-3-3-1: Performance - Maximum Climb Torque

12-C-A15-60-0503-03A-030A-A

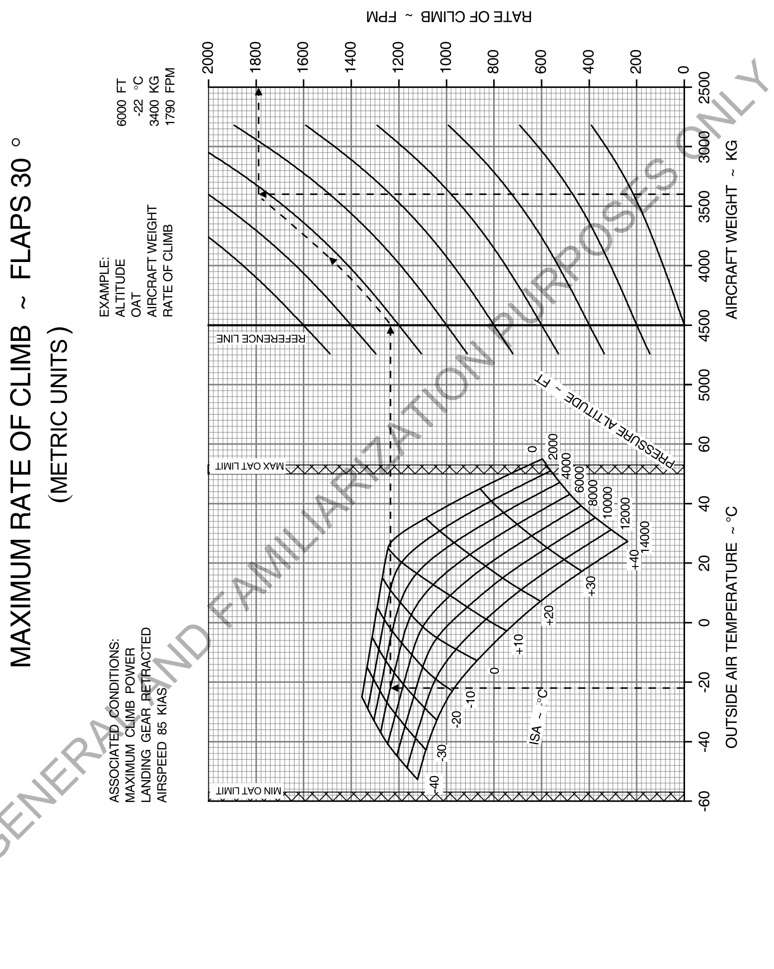


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00274-A-001-01

Figure 5-3-3-2: Performance - Maximum Rate Of Climb - Flaps 30° (standard units)

12-C-A15-60-0503-03A-030A-A

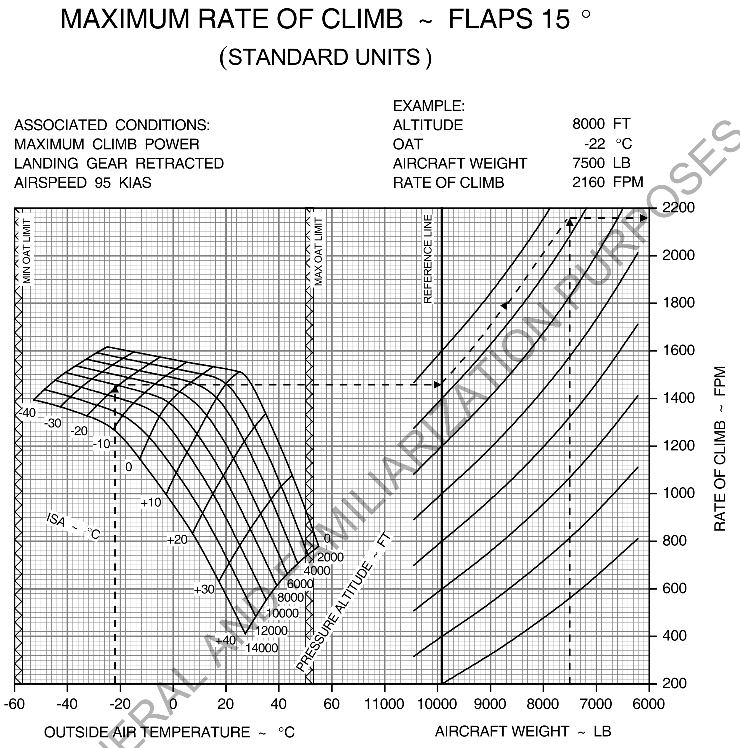


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00275-A-001-01

Figure 5-3-3-3: Performance - Maximum Rate Of Climb - Flaps 30° (metric units)

12-C-A15-60-0503-03A-030A-A



See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00276-A-001-01

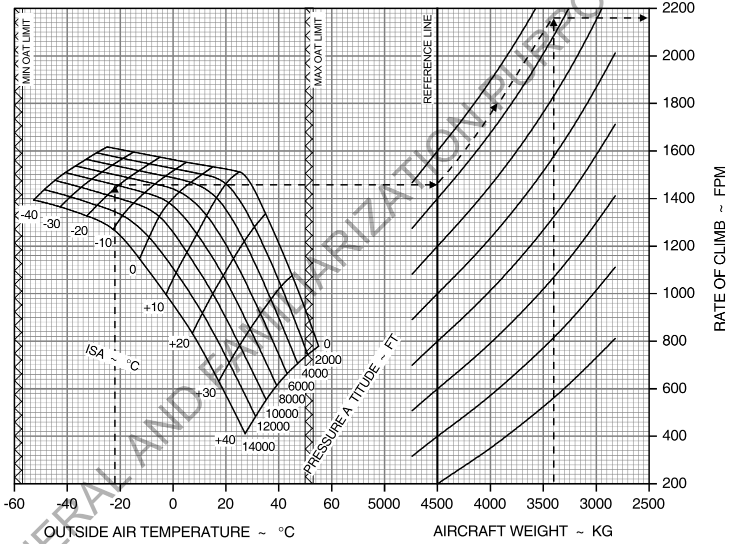
Figure 5-3-3-4: Performance - Maximum Rate Of Climb - Flaps 15° (standard units)

MAXIMUM RATE OF CLIMB ~ FLAPS 15 °
(METRIC UNITS)

ASSOCIATED CONDITIONS:
MAXIMUM CLIMB POWER
LANDING GEAR RETRACTED
AIRSPEED 95 KIAS

EXAMPLE:

ALTITUDE	8000 FT
OAT	-22 °C
AIRCRAFT WEIGHT	3400 KG
RATE OF CLIMB	2160 FPM

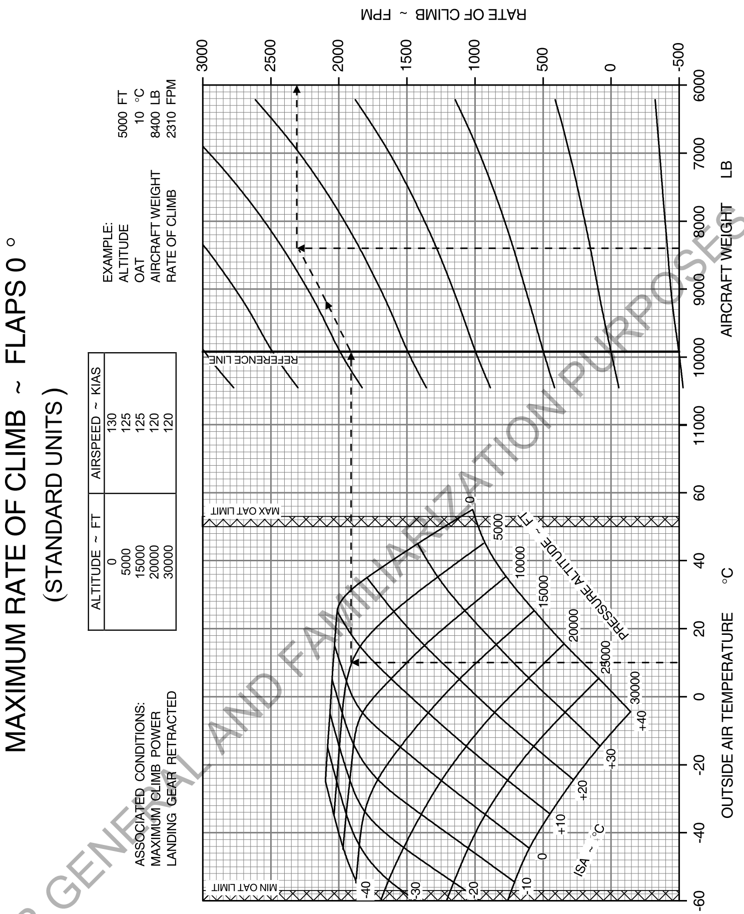


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00277-A-001-01

Figure 5-3-3-5: Performance - Maximum Rate Of Climb - Flaps 15° (metric units)

12-C-A15-60-0503-03A-030A-A

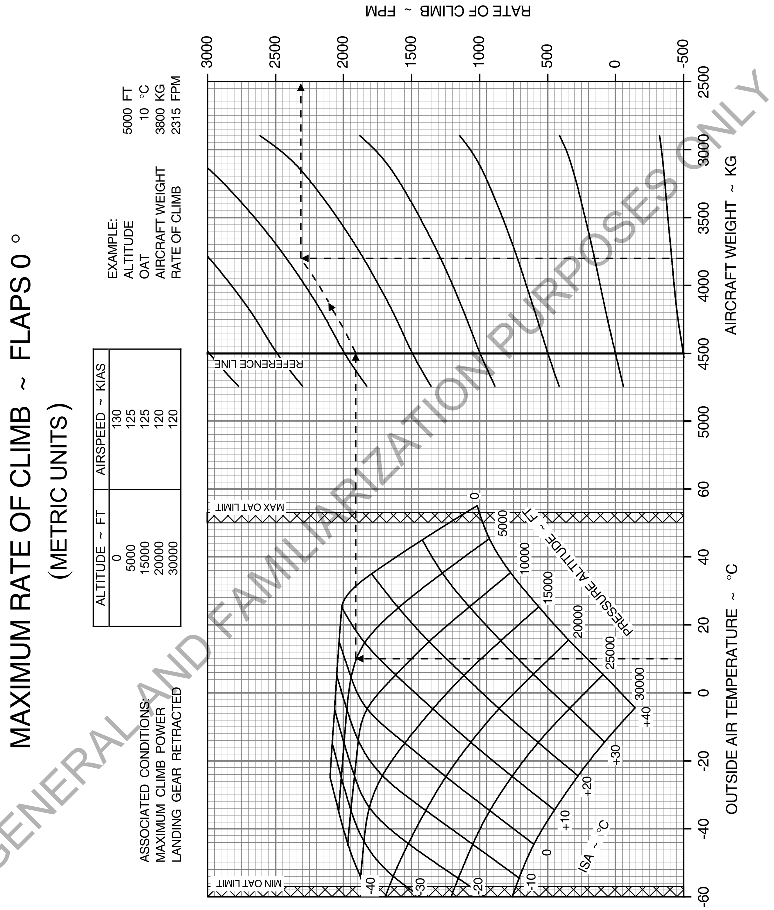


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00278-A-001-01

Figure 5-3-3-6: Performance - Maximum Rate Of Climb - Flaps 0° (standard units)

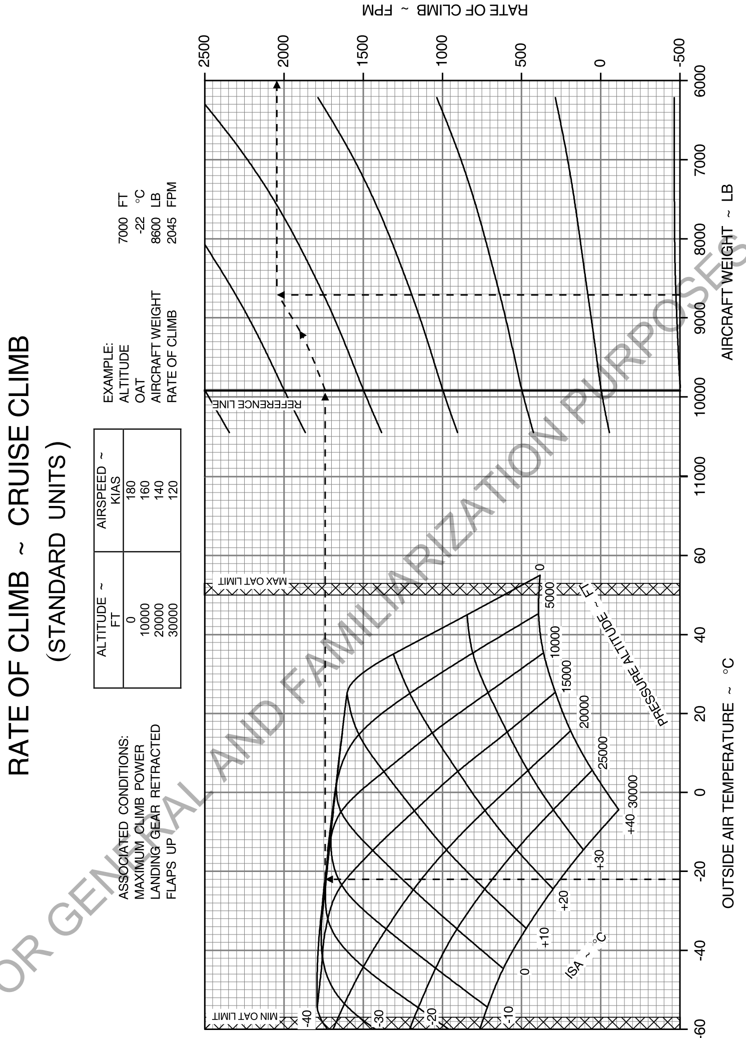
12-C-A15-60-0503-03A-030A-A



ICN-12-C-A150503-A-S4080-00279-A-001-01

Figure 5-3-3-7: Performance - Maximum Rate Of Climb - Flaps 0° (metric units)

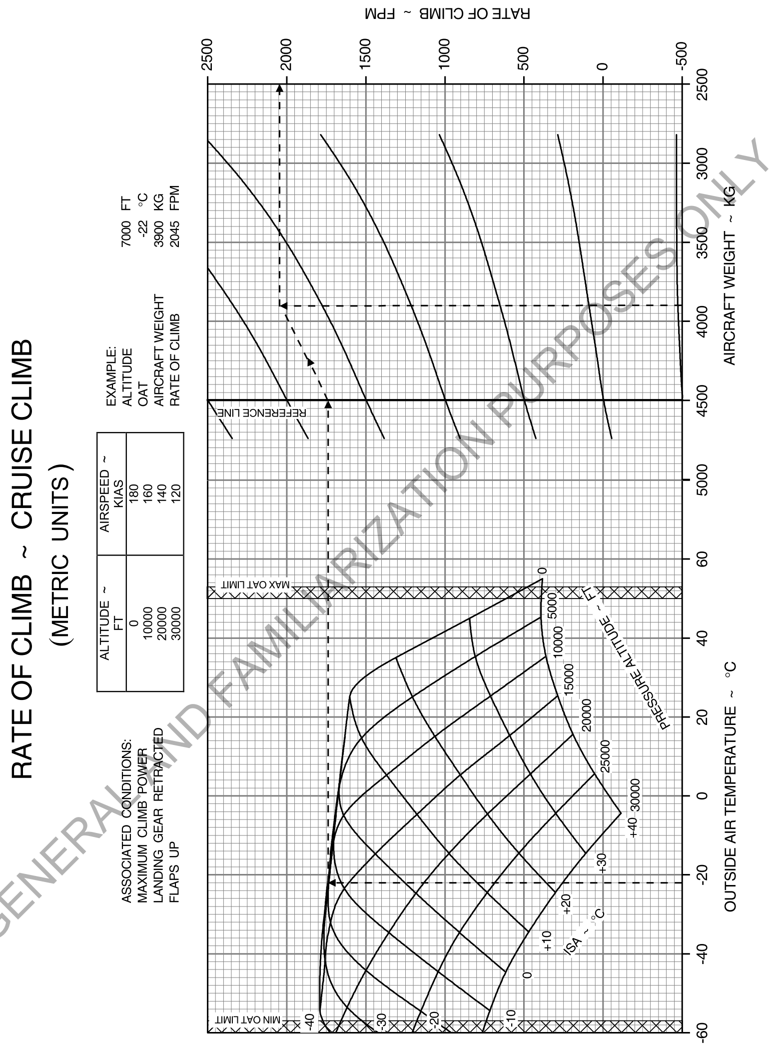
12-C-A15-60-0503-03A-030A-A



ICN-12-C-A150503-A-S4080-00280-A-001-01

Figure 5-3-3-8: Performance - Rate Of Climb - Cruise Climb (standard units)

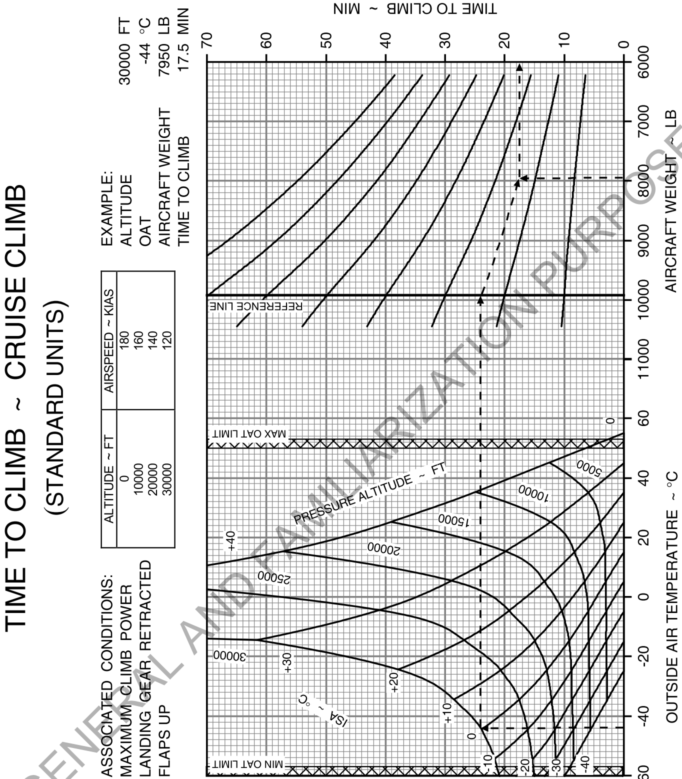
12-C-A15-60-0503-03A-030A-A



ICN-12-C-A150503-A-S4080-00281-A-001-01

Figure 5-3-3-9: Performance - Rate Of Climb - Cruise Climb (metric units)

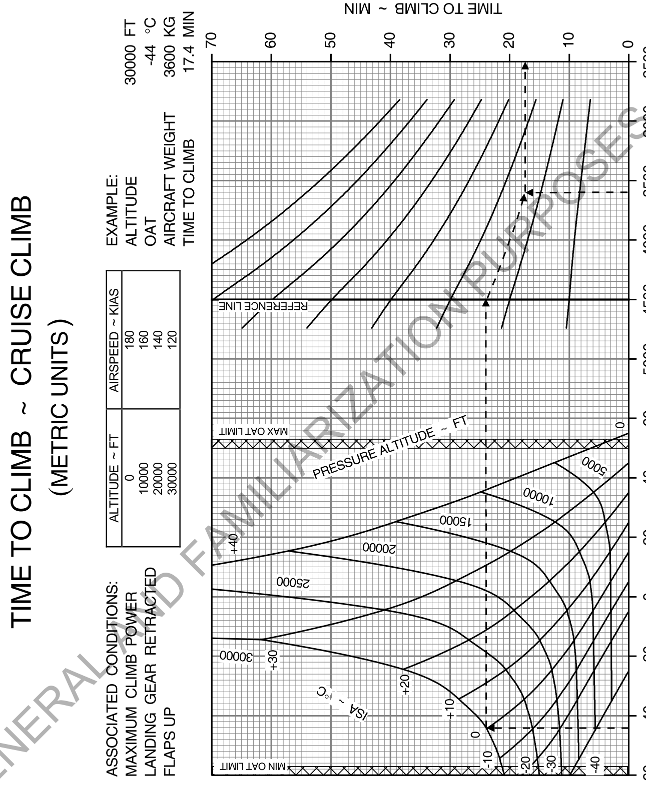
12-C-A15-60-0503-03A-030A-A



ICN-12-C-A150503-A-S4080-00282-A-001-01

Figure 5-3-3-10: Performance - Time To Climb - Cruise Climb (standard units)

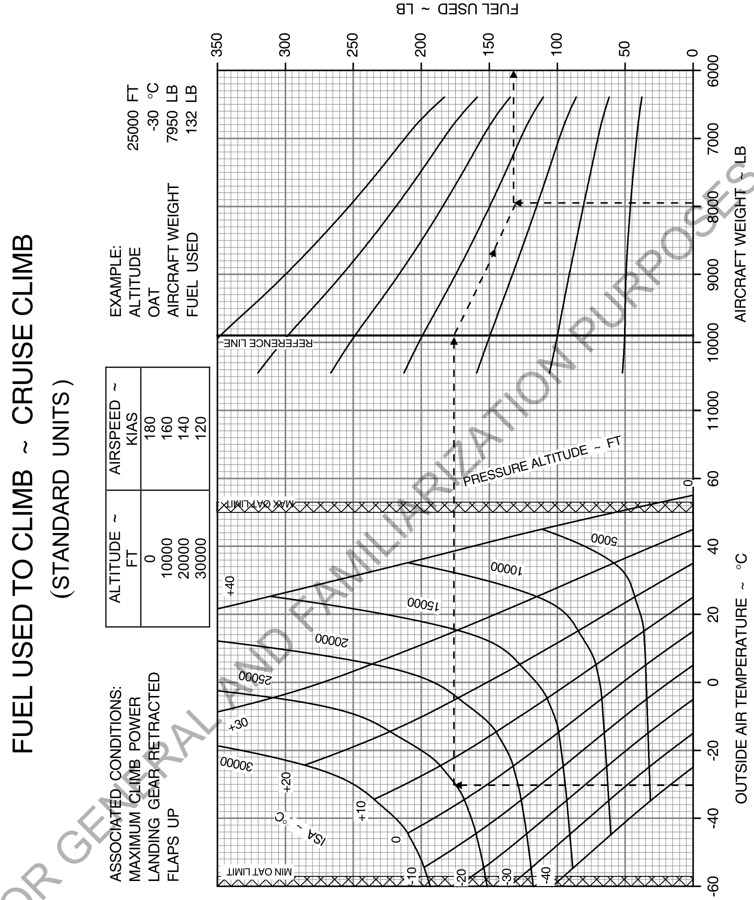
12-C-A15-60-0503-03A-030A-A



ICN-12-C-A150503-A-S4080-00283-A-001-01

Figure 5-3-3-11: Performance - Time To Climb - Cruise Climb (metric units)

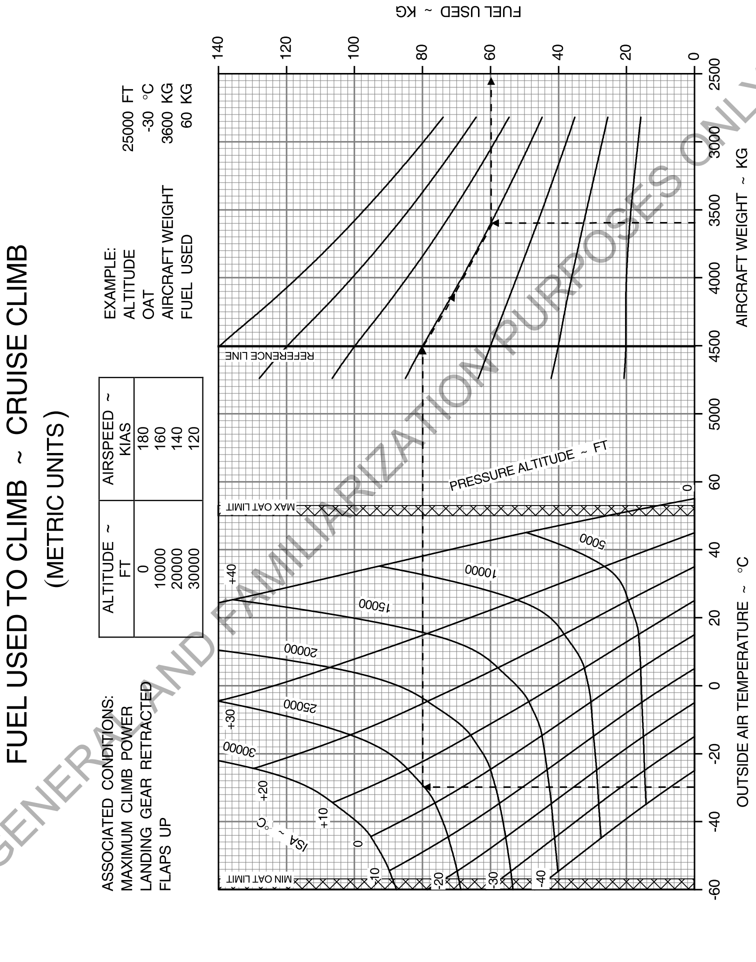
12-C-A15-60-0503-03A-030A-A



ICN-12-C-A150503-A-S4080-00284-A-001-01

Figure 5-3-3-12: Performance - Fuel Used To Climb - Cruise Climb (standard units)

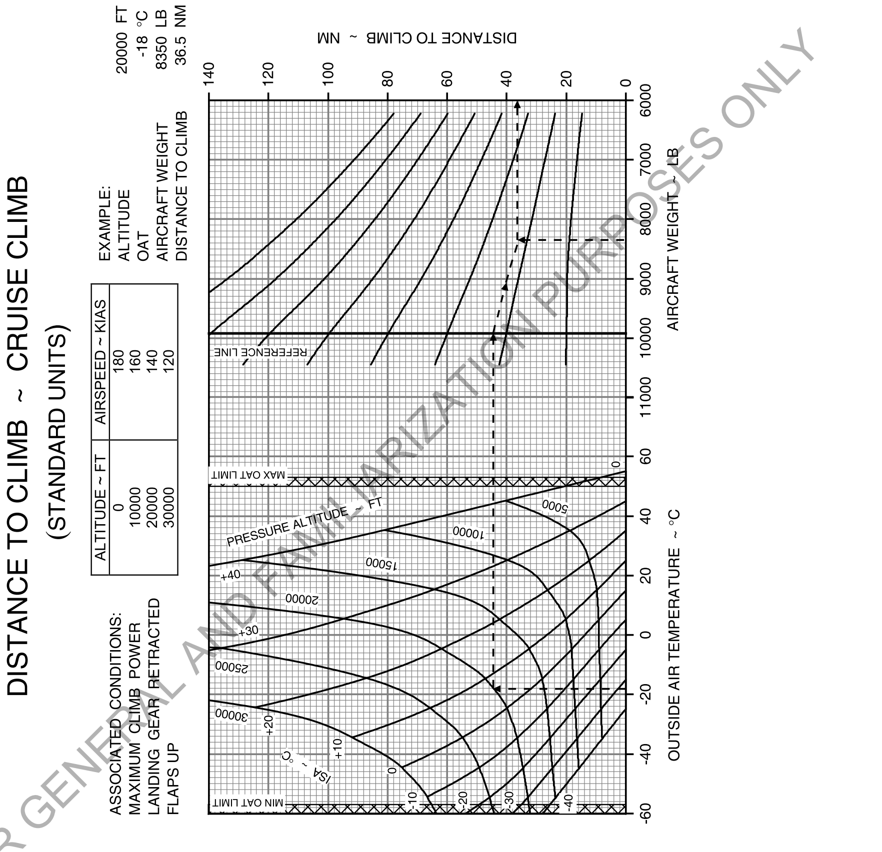
12-C-A15-60-0503-03A-030A-A



ICN-12-C-A150503-A-S4080-00285-A-001-01

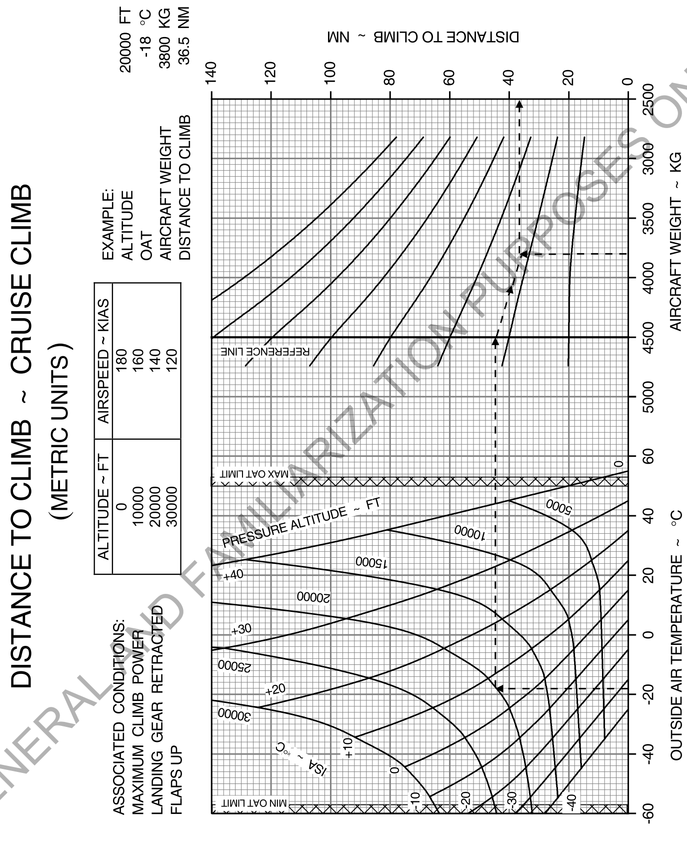
Figure 5-3-3-13: Performance - Fuel Used To Climb - Cruise Climb (metric units)

12-C-A15-60-0503-03A-030A-A



ICN-12-C-A150503-A-S4080-00286-A-001-01

Figure 5-3-3-14: Performance - Distance To Climb - Cruise Climb (standard units)



ICN-12-C-A150503-A-S4080-00287-A-001-01

Figure 5-3-3-15: Performance - Distance To Climb - Cruise Climb (metric units)

12-C-A15-60-0503-03A-030A-A

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5-3-4 Performance Data - Cruise Performance

MAXIMUM CRUISE POWER

NOTE: TORQUE AND FUEL FLOW BASED ON 8000 lb (3629 kg)

						@ 7000 lb (3175 kg)		@ 8000 lb (3629 kg)		@ 9000 lb (4082 kg)		@ 10000 lb (4536 kg)		@ 10400 lb (4717 kg)	
ISA (ºC)	Altitude (ft)	SAT (ºC)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)
-40	0	-25	36.9	608	276	241	223	241	223	241	223	241	223	241	223
	2000	-29	36.9	589	267	241	229	241	229	241	229	241	229	241	229
	4000	-33	36.9	572	259	241	236	241	236	241	236	241	236	241	236
	6000	-37	36.9	555	252	242	243	242	243	241	242	240	241	239	240
	8000	-41	40.6	577	262	240	248	239	247	239	247	237	245	237	245
	10000	-45	40.6	564	256	238	253	237	252	236	251	235	250	234	249
	12000	-49	40.6	556	252	235	258	234	257	234	256	232	254	232	254
	14000	-53	40.6	550	249	233	262	232	261	231	261	230	259	229	258
	16000	-57	40.6	543	246	230	267	230	266	229	265	227	264	227	263
	18000	-61	40.6	536	243	228	272	227	271	226	270	224	268	224	268
	20000	-65	36.9	487	221	224	276	224	276	223	275	222	273	221	273
	22000	-69	36.9	481	218	215	273	215	273	215	273	215	273	215	273
	24000	-73	34.2	446	202	206	270	206	270	206	270	206	270	206	270
	26000	-77	31.6	414	188	197	268	197	268	197	268	197	268	197	268
	28000	-81	29.3	383	173	189	265	189	265	189	265	189	265	189	265
	30000	-84	27.2	357	162	181	262	181	262	181	262	181	262	181	262
-30	0	-15	36.9	614	278	241	227	241	227	241	227	241	227	241	227
	2000	-19	36.9	595	270	241	234	241	234	241	234	241	234	241	234
	4000	-23	36.9	577	262	241	241	241	241	241	240	240	239	239	239
	6000	-27	40.6	598	271	240	246	239	245	238	245	237	243	237	243
	8000	-31	40.6	583	264	238	251	237	250	236	249	235	248	234	248
	10000	-35	40.6	569	258	236	256	235	255	234	254	233	253	232	252
	12000	-39	40.6	561	254	234	261	233	261	232	260	231	258	230	257
	14000	-43	40.6	555	252	232	267	231	266	230	265	228	263	228	263
	16000	-47	40.6	548	248	229	272	228	271	227	270	226	268	225	267
	18000	-51	40.6	541	245	227	277	226	276	225	275	223	273	222	272
	20000	-55	40.6	534	242	224	282	223	282	222	280	220	278	220	277
	22000	-59	37.0	486	220	215	280	215	280	215	280	215	280	215	280
	24000	-63	34.9	458	208	206	277	206	277	206	277	206	277	206	277
	26000	-67	32.3	426	193	197	275	197	275	197	275	197	275	197	275
	28000	-71	30.0	394	179	189	272	189	272	189	272	189	272	189	272
	30000	-74	27.8	367	166	181	269	181	269	181	269	181	269	181	269

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Figure 5-3-4-1: Performance - Maximum Cruise Power (Sheet 1 of 4)

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MAXIMUM CRUISE POWER

NOTE: TORQUE AND FUEL FLOW BASED ON 8000 lb (3629 kg)

						@ 7000 lb (3175 kg)		@ 8000 lb (3629 kg)		@ 9000 lb (4082 kg)		@ 10000 lb (4536 kg)		@ 10400 lb (4717 kg)	
ISA (ºC)	Altitude (ft)	SAT (ºC)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)
-20	0	-5	36.9	620	281	241	232	241	232	241	232	241	232	241	232
	2000	-9	36.9	601	273	241	238	241	238	241	238	240	237	239	237
	4000	-13	40.6	620	281	240	244	239	244	239	243	238	242	237	241
	6000	-17	40.6	604	274	238	249	237	249	237	248	235	247	235	246
	8000	-21	40.6	589	267	236	254	235	254	235	253	233	251	233	251
	10000	-25	40.6	575	261	234	260	233	259	232	258	231	256	230	256
	12000	-29	40.6	567	257	232	265	231	264	230	263	229	261	228	261
	14000	-33	40.6	560	254	230	271	229	270	228	268	227	267	226	266
	16000	-37	40.6	553	251	228	276	227	275	226	274	224	272	224	271
	18000	-41	40.6	545	247	225	282	225	281	223	279	222	278	221	277
	20000	-45	40.6	539	244	223	288	222	287	221	285	219	283	218	282
	22000	-49	36.9	490	222	215	286	215	286	215	286	215	286	215	286
	24000	-53	35.6	471	214	206	284	206	284	206	284	206	284	206	284
	26000	-57	33.0	438	199	197	281	197	281	197	281	197	281	197	281
	28000	-61	30.6	406	184	189	278	189	278	189	278	189	278	189	278
	30000	-64	28.4	377	171	181	276	181	276	181	276	181	276	181	276
-10	0	5	36.9	627	284	241	236	241	236	241	236	240	235	240	235
	2000	1	40.6	644	292	241	243	240	242	239	241	238	240	238	240
	4000	-3	40.6	626	284	239	247	238	247	237	246	236	245	236	244
	6000	-7	40.6	610	277	237	252	236	252	235	251	234	250	233	249
	8000	-11	40.6	594	270	235	258	234	257	233	256	232	255	231	254
	10000	-15	40.6	581	263	232	263	232	262	231	261	229	260	229	259
	12000	-19	40.6	572	260	230	269	230	268	229	267	227	265	227	264
	14000	-23	40.6	566	257	228	274	227	273	226	272	225	270	224	270
	16000	-27	40.6	558	253	226	280	225	279	224	278	222	276	222	275
	18000	-31	40.6	550	250	224	286	223	285	221	283	220	281	219	280
	20000	-35	40.6	544	247	221	292	220	291	219	289	217	287	217	286
	22000	-39	39.2	521	236	215	292	214	292	213	290	211	288	210	287
	24000	-43	36.4	485	220	206	290	206	290	205	289	203	287	203	286
	26000	-47	33.8	451	205	197	287	197	287	197	287	195	284	194	283
	28000	-51	31.3	419	190	189	285	189	285	189	285	186	281	185	279
	30000	-54	29.1	389	176	181	282	181	282	180	282	177	277	176	275

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Figure 5-3-4-1: Performance - Maximum Cruise Power (Sheet 2 of 4)

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MAXIMUM CRUISE POWER

NOTE: TORQUE AND FUEL FLOW BASED ON 8000 lb (3629 kg)

						@ 7000 lb (3175 kg)		@ 8000 lb (3629 kg)		@ 9000 lb (4082 kg)		@ 10000 lb (4536 kg)		@ 10400 lb (4717 kg)	
ISA (ºC)	Altitude (ft)	SAT (ºC)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)	IAS (kt)	TAS (kt)
0	0	15	40.6	670	304	241	240	240	240	240	239	239	238	238	238
	2000	11	40.6	651	295	239	246	239	245	238	244	237	243	236	242
	4000	7	40.6	632	286	237	250	236	250	236	249	235	248	234	247
	6000	3	40.6	615	279	235	256	234	255	234	254	232	253	232	252
	8000	-1	40.6	600	272	233	261	232	260	231	259	230	258	229	257
	10000	-5	40.6	585	265	231	266	230	265	229	264	228	263	227	262
	12000	-9	40.6	578	262	229	272	228	271	227	270	225	268	225	267
	14000	-13	40.6	570	259	227	278	226	277	224	275	223	273	222	273
	16000	-17	40.6	563	255	224	283	223	282	222	281	220	279	220	278
	18000	-21	40.4	552	251	221	289	220	288	219	285	217	283	216	282
	20000	-25	38.5	524	238	215	290	214	288	212	286	210	284	210	283
	22000	-29	36.3	493	223	208	290	207	288	205	285	203	283	202	282
	24000	-33	34.3	463	210	201	290	200	288	198	285	196	282	194	280
	26000	-37	32.2	434	197	194	289	192	286	190	284	187	280	186	278
	28000	-41	30.2	407	185	186	288	184	285	182	281	179	277	178	275
	30000	-44	28.2	381	173	179	286	177	283	174	278	170	273	169	271
10	0	25	40.6	677	307	240	243	239	243	238	242	237	241	237	240
	2000	21	40.6	657	298	238	248	237	248	236	247	235	246	235	245
	4000	17	40.6	638	290	236	253	235	253	234	252	233	251	233	250
	6000	13	40.6	621	282	234	259	233	258	232	257	231	255	230	255
	8000	9	40.6	606	275	232	264	231	263	230	262	229	261	228	260
	10000	5	40.6	591	268	229	269	229	269	228	267	226	266	225	265
	12000	1	40.6	583	265	227	275	226	274	225	273	223	271	223	270
	14000	-3	39.3	562	255	222	277	221	276	220	274	218	272	217	272
	16000	-7	37.8	537	244	217	279	216	278	214	276	212	274	211	273
	18000	-11	36.4	512	232	211	281	210	279	208	277	206	275	206	274
	20000	-15	34.8	486	220	206	283	204	281	202	278	200	276	199	274
	22000	-19	33.1	459	208	199	283	197	281	195	278	193	275	192	273
	24000	-23	31.2	431	196	192	283	190	280	188	277	185	273	184	271
	26000	-27	29.3	404	183	185	282	183	279	180	275	177	270	176	268
	28000	-31	27.4	378	172	178	281	175	277	172	272	169	267	167	264
	30000	-34	25.5	353	160	170	279	167	274	164	269	160	262	158	260

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Figure 5-3-4-1: Performance - Maximum Cruise Power (Sheet 3 of 4)

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MAXIMUM CRUISE POWER

NOTE: TORQUE AND FUEL FLOW BASED ON 8000 lb (3629 kg)

ISA (°C)	Altitude (ft)	SAT (°C)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	@ 7000 lb (3175 kg) IAS (kt)	@ 7000 lb (3175 kg) TAS (kt)	@ 8000 lb (3629 kg) IAS (kt)	@ 8000 lb (3629 kg) TAS (kt)	@ 9000 lb (4082 kg) IAS (kt)	@ 9000 lb (4082 kg) TAS (kt)	@ 10000 lb (4536 kg) IAS (kt)	@ 10000 lb (4536 kg) TAS (kt)	@ 10400 lb (4717 kg) IAS (kt)	@ 10400 lb (4717 kg) TAS (kt)
20	0	35	40.6	684	310	239	246	238	245	237	245	236	244	236	243
	2000	31	40.6	664	301	237	251	236	250	235	250	234	248	233	248
	4000	27	40.6	645	293	234	256	234	255	233	255	232	253	231	253
	6000	23	40.1	622	282	231	260	231	260	230	259	228	257	227	256
	8000	19	38.8	593	269	226	262	225	261	224	260	223	258	222	258
	10000	15	37.5	565	256	221	265	220	264	219	262	217	260	217	259
	12000	11	36.2	542	246	216	267	215	265	213	263	212	261	211	260
	14000	7	34.9	521	236	211	269	210	267	208	265	206	263	206	262
	16000	3	33.3	494	224	205	270	204	268	202	265	200	263	199	262
	18000	-1	32.1	470	213	200	272	198	269	196	267	194	264	193	263
	20000	-5	30.7	445	202	194	273	192	270	190	267	188	264	186	262
	22000	-9	29.2	420	191	188	273	186	270	184	267	181	263	179	261
	24000	-13	27.6	395	179	181	273	179	270	176	265	173	261	172	259
	26000	-17	26.0	371	168	175	272	172	268	169	263	165	258	164	256
	28000	-21	24.3	347	157	167	271	164	265	161	260	157	254	155	252
	30000	-24	22.8	325	147	160	269	157	263	153	257	148	250	146	246
30	0	45	34.9	636	288	225	236	224	235	223	234	221	232	220	231
	2000	41	35.0	614	279	223	241	222	240	221	238	219	236	218	236
	4000	37	34.6	591	268	220	245	219	244	217	242	216	240	215	239
	6000	33	33.8	565	256	216	247	215	246	213	244	211	242	211	241
	8000	29	32.8	538	244	211	250	210	248	208	246	206	244	206	243
	10000	25	31.7	513	232	207	252	205	250	203	248	202	246	201	245
	12000	21	30.7	492	223	202	254	200	252	198	250	197	247	195	246
	14000	17	29.6	470	213	197	255	195	253	193	251	191	248	190	246
	16000	13	28.5	449	204	192	257	190	255	188	252	185	248	184	247
	18000	9	27.4	426	193	186	258	184	255	182	252	179	248	178	247
	20000	5	26.3	403	183	181	259	179	256	176	252	173	248	171	246
	22000	1	25.1	380	173	175	259	173	256	169	252	166	247	165	245
	24000	-3	23.6	357	162	169	259	165	254	162	249	158	244	157	242
	26000	-7	22.3	335	152	162	258	159	253	155	247	151	241	149	238
	28000	-11	21.0	314	142	155	256	152	251	148	244	142	236	140	233
	30000	-14	19.7	294	133	148	254	144	248	140	241	134	230	130	225

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Figure 5-3-4-1: Performance - Maximum Cruise Power (Sheet 4 of 4)

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LONG RANGE CRUISE

			@ 7000 lb (3175 kg)					@ 8000 lb (3629 kg)					@ 9000 lb (4082 kg)					@ 10000 lb (4536 kg)					@ 10400 lb (4717 kg)				
ISA (ºC)	Altitude (ft)	SAT (ºC)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)
-40	0	-25	20.0	446	202	189	175	20.0	446	202	187	173	20.0	446	202	187	172	20.0	446	202	183	169	20.0	446	201	182	168
	2000	-29	19.6	425	193	186	177	19.7	426	193	185	176	19.9	428	194	185	175	19.9	428	194	181	172	19.9	428	193	180	171
	4000	-33	19.2	404	183	183	179	19.5	407	184	182	179	19.7	409	186	182	178	19.7	410	186	179	175	19.9	411	185	178	175
	6000	-37	18.8	384	174	180	181	19.2	388	176	180	181	19.6	392	178	180	181	19.6	392	178	177	178	19.8	394	178	176	178
	8000	-41	18.4	365	166	177	184	18.9	370	168	177	184	19.5	376	170	177	184	19.5	376	171	174	181	19.7	378	171	174	181
	10000	-45	18.0	348	158	174	186	18.7	354	161	175	187	19.3	360	163	175	187	19.3	361	164	172	184	19.7	364	164	172	184
	12000	-49	17.6	334	151	171	188	18.4	341	155	172	189	19.2	349	158	172	190	19.2	349	158	170	187	19.6	353	160	170	187
	14000	-53	17.2	320	145	167	190	18.1	329	149	169	191	19.1	338	153	169	193	19.1	339	154	167	189	19.5	343	155	168	190
	16000	-57	16.8	306	139	164	192	17.9	316	143	166	194	18.9	326	148	166	196	18.9	327	148	164	192	19.5	332	150	165	193
	18000	-61	16.4	291	132	161	194	17.6	302	137	163	196	18.8	314	142	163	199	18.8	314	143	162	195	19.4	320	145	163	197
	20000	-65	16.0	277	125	157	195	17.3	289	131	160	199	18.7	302	137	160	202	18.7	303	137	159	198	19.3	309	140	161	200
	22000	-69	15.6	263	119	153	197	17.1	278	126	157	201	18.5	292	132	157	205	18.5	292	132	156	201	19.3	299	136	158	203
	24000	-73	15.2	251	114	149	198	16.8	266	121	153	203	18.4	282	128	153	208	18.4	282	128	153	203	19.2	290	132	155	206
	26000	-77	14.8	239	108	145	200	16.5	256	116	150	205	18.3	273	124	150	210	18.3	273	124	150	205	19.1	282	128	152	208
	28000	-81	14.4	228	104	141	201	16.3	247	112	146	207	18.1	265	120	146	213	18.1	266	120	146	207	19.1	275	124	148	210
	30000	-84	14.0	218	99	137	201	16.0	238	108	142	209	18.0	259	117	142	216	18.0	259	117	142	209	19.0	269	122	145	212
-30	0	-15	20.0	451	204	188	177	20.0	451	204	186	176	20.0	451	205	186	174	20.0	451	205	182	172	20.0	451	203	181	171
	2000	-19	19.6	429	195	185	180	19.7	431	195	184	178	19.9	432	196	184	177	19.9	433	196	180	175	19.9	433	195	179	174
	4000	-23	19.2	408	185	182	182	19.5	411	187	181	181	19.7	414	188	181	180	19.7	414	188	178	178	19.9	416	187	177	177
	6000	-27	18.8	389	176	179	184	19.2	393	178	179	184	19.6	397	180	179	183	19.6	397	180	175	180	19.8	399	180	175	180
	8000	-31	18.4	370	168	176	186	18.9	375	170	176	186	19.5	380	172	176	186	19.5	380	173	173	183	19.7	383	173	173	183
	10000	-35	18.0	352	160	172	188	18.7	358	162	173	189	19.3	365	165	173	189	19.3	365	166	170	186	19.7	368	166	171	186
	12000	-39	17.6	338	153	169	190	18.4	345	157	170	191	19.2	353	160	170	192	19.2	353	160	168	189	19.6	357	161	168	189
	14000	-43	17.2	324	147	166	192	18.1	333	151	167	194	19.1	342	155	167	195	19.1	342	155	165	192	19.5	347	157	166	192
	16000	-47	16.8	310	140	162	194	17.9	320	145	164	196	18.9	330	150	164	198	18.9	330	150	163	194	19.5	335	152	164	196
	18000	-51	16.4	294	133	159	196	17.6	306	139	161	199	18.8	317	144	161	201	18.8	318	144	160	197	19.4	323	147	161	199
	20000	-55	16.0	280	127	155	198	17.3	293	133	158	201	18.7	306	139	158	205	18.7	306	139	157	200	19.3	312	142	159	202
	22000	-59	15.6	266	121	152	200	17.1	281	127	155	204	18.5	295	134	155	208	18.5	295	134	154	203	19.3	302	137	156	205
	24000	-63	15.2	254	115	148	201	16.8	269	122	152	206	18.4	285	129	152	211	18.4	285	129	151	206	19.2	293	133	153	208
	26000	-67	14.8	242	110	144	202	16.5	259	117	148	208	18.3	276	125	148	214	18.3	276	125	148	208	19.1	285	129	150	211
	28000	-71	14.4	231	105	140	203	16.3	249	113	144	210	18.1	268	122	144	216	18.1	268	122	144	210	19.1	278	126	146	213
	30000	-74	14.0	221	100	135	204	16.0	241	109	141	212	18.0	261	118	141	219	18.0	262	119	140	211	19.0	272	123	143	215

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Figure 5-3-4-2: Performance - Long Range Cruise (Sheet 1 of 4)

LONG RANGE CRUISE

ISA	Altitude	SAT	@ 7000 lb (3175 kg)					@ 8000 lb (3629 kg)					@ 9000 lb (4082 kg)					@ 10000 lb (4536 kg)					@ 10400 lb (4717 kg)				
			Torque	Fuel flow		IAS	TAS	Torque	Fuel flow		IAS	TAS	Torque	Fuel flow		IAS	TAS	Torque	Fuel flow		IAS	TAS	Torque	Fuel flow		IAS	TAS
(ºC)	(ft)	(ºC)	(psi)	(lb/h)	(kg/h)	(kt)	(kt)	(psi)	(lb/h)	(kg/h)	(kt)	(kt)	(psi)	(lb/h)	(kg/h)	(kt)	(kt)	(psi)	(lb/h)	(kg/h)	(kt)	(kt)	(psi)	(lb/h)	(kg/h)	(kt)	(kt)
-20	0	-5	20.0	455	207	187	180	20.0	456	207	185	178	20.0	456	207	185	176	20.0	456	207	181	174	20.0	456	205	180	173
	2000	-9	19.6	434	197	184	182	19.7	435	197	183	181	19.9	437	198	183	179	19.9	437	198	178	177	19.9	438	197	178	176
	4000	-13	19.2	413	187	181	184	19.5	416	189	180	184	19.7	419	190	180	182	19.7	419	190	176	180	19.9	421	189	176	179
	6000	-17	18.8	393	178	178	186	19.2	397	180	177	186	19.6	401	182	177	185	19.6	402	182	174	182	19.8	404	182	174	182
	8000	-21	18.4	374	170	174	189	18.9	379	172	175	189	19.5	385	174	175	188	19.5	385	175	171	185	19.7	388	175	171	185
	10000	-25	18.0	356	161	171	191	18.7	362	164	172	191	19.3	369	167	172	191	19.3	369	167	169	188	19.7	372	168	169	188
	12000	-29	17.6	342	155	168	193	18.4	350	159	169	194	19.2	357	162	169	194	19.2	358	162	166	191	19.6	361	163	167	191
	14000	-33	17.2	328	149	165	195	18.1	337	153	166	196	19.1	346	157	166	197	19.1	346	157	164	194	19.5	351	159	164	195
	16000	-37	16.8	313	142	161	197	17.9	324	147	163	199	18.9	334	151	163	200	18.9	334	152	161	197	19.5	339	154	162	198
	18000	-41	16.4	298	135	157	199	17.6	309	140	160	201	18.8	321	146	160	204	18.8	321	146	158	199	19.4	327	148	159	201
	20000	-45	16.0	283	128	154	200	17.3	296	134	156	204	18.7	309	140	156	207	18.7	309	140	155	202	19.3	316	143	157	204
	22000	-49	15.6	269	122	150	202	17.1	284	129	153	206	18.5	298	135	153	210	18.5	298	135	152	205	19.3	306	139	154	207
	24000	-53	15.2	257	116	146	203	16.8	272	124	150	208	18.4	288	131	150	213	18.4	288	131	149	207	19.2	296	134	151	210
	26000	-57	14.8	244	111	142	205	16.5	262	119	146	210	18.3	279	126	146	216	18.3	279	127	145	210	19.1	288	130	147	212
	28000	-61	14.4	233	106	138	206	16.3	252	114	143	213	18.1	271	123	143	219	18.1	271	123	142	212	19.1	281	127	144	215
	30000	-64	14.0	223	101	134	207	16.0	243	110	139	215	18.0	264	120	139	221	18.0	264	120	138	214	19.0	275	124	141	217
-10	0	5	20.0	460	209	186	182	20.0	460	209	184	180	20.0	461	209	184	178	20.0	461	209	179	176	20.0	461	207	178	175
	2000	1	19.6	439	199	183	184	19.7	440	200	181	183	19.9	442	200	181	181	19.9	442	200	177	179	19.9	443	199	176	178
	4000	-3	19.2	418	190	179	186	19.5	421	191	179	186	19.7	424	192	179	184	19.7	424	192	175	182	19.9	425	192	174	181
	6000	-7	18.8	398	180	176	189	19.2	402	182	176	188	19.6	406	184	176	187	19.6	406	184	172	184	19.8	408	184	172	184
	8000	-11	18.4	379	172	173	191	18.9	384	174	173	191	19.5	389	177	173	190	19.5	390	177	170	187	19.7	392	177	170	187
	10000	-15	18.0	360	163	170	193	18.7	367	166	170	193	19.3	373	169	170	193	19.3	373	169	167	190	19.7	377	170	167	190
	12000	-19	17.6	346	157	167	195	18.4	354	160	167	196	19.2	361	164	167	196	19.2	362	164	165	193	19.6	366	165	165	193
	14000	-23	17.2	332	151	163	197	18.1	341	155	164	198	19.1	350	159	164	200	19.1	351	159	162	196	19.5	355	160	163	197
	16000	-27	16.8	317	144	160	199	17.9	328	149	161	201	18.9	338	153	161	203	18.9	338	153	159	199	19.5	343	155	160	200
	18000	-31	16.4	302	137	156	201	17.6	313	142	158	203	18.8	325	147	158	206	18.8	325	148	156	201	19.4	331	150	157	203
	20000	-35	16.0	287	130	152	202	17.3	300	136	154	206	18.7	313	142	154	209	18.7	313	142	153	204	19.3	320	145	155	206
	22000	-39	15.6	272	124	148	204	17.1	287	130	151	208	18.5	301	137	151	212	18.5	302	137	150	207	19.3	309	140	151	209
	24000	-43	15.2	260	118	144	205	16.8	275	125	148	210	18.4	291	132	148	215	18.4	292	132	146	209	19.2	299	136	148	211
	26000	-47	14.8	247	112	140	207	16.5	264	120	144	212	18.3	282	128	144	218	18.3	282	128	143	211	19.1	290	132	145	214
	28000	-51	14.4	236	107	136	208	16.3	255	116	141	215	18.1	274	124	141	221	18.1	274	124	140	213	19.1	284	128	142	216
	30000	-54	14.0	225	102	132	209	16.0	246	111	137	217	18.0	267	121	137	223	18.0	267	121	136	215	19.0	277	126	138	218

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Figure 5-3-4-2: Performance - Long Range Cruise (Sheet 2 of 4)

LONG RANGE CRUISE

ISA (ºC)	Altitude (ft)	SAT (ºC)	@ 7000 lb (3175 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	@ 8000 lb (3629 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	@ 9000 lb (4082 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	@ 10000 lb (4536 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	@ 10400 lb (4717 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)
0	0	15	20.0	464	211	184	184	20.0	464	211	183	182	20.0	464	211	183	180	20.0	465	211	178	178	20.0	465	209	177	177
	2000	11	19.6	443	201	181	186	19.7	444	202	180	185	19.9	446	202	180	183	19.9	446	202	176	181	19.9	447	201	175	180
	4000	7	19.2	422	191	178	189	19.5	425	193	178	188	19.7	428	194	178	186	19.7	428	194	173	183	19.9	429	193	173	183
	6000	3	18.8	402	182	175	191	19.2	406	184	175	190	19.6	410	186	175	189	19.6	410	186	171	186	19.8	413	186	171	186
	8000	-1	18.4	382	173	172	193	18.9	388	176	172	193	19.5	394	178	172	192	19.5	394	179	168	189	19.7	396	178	168	189
	10000	-5	18.0	364	165	169	195	18.7	370	168	169	196	19.3	377	171	169	195	19.3	377	171	166	192	19.7	380	171	166	192
	12000	-9	17.6	349	158	165	197	18.4	357	162	166	198	19.2	365	166	166	199	19.2	365	166	163	195	19.6	369	166	163	195
	14000	-13	17.2	335	152	162	199	18.1	345	156	163	201	19.1	354	160	163	202	19.1	354	161	160	198	19.5	359	162	161	198
	16000	-17	16.8	321	145	158	201	17.9	331	150	159	203	18.9	341	155	159	205	18.9	342	155	157	200	19.5	347	157	158	201
	18000	-21	16.4	305	138	154	203	17.6	317	144	156	205	18.8	328	149	156	207	18.8	329	149	154	203	19.4	335	151	155	204
	20000	-25	16.0	289	131	150	204	17.3	302	137	153	208	18.7	316	143	153	210	18.7	316	143	151	206	19.3	323	146	152	207
	22000	-29	15.6	275	125	146	206	17.1	290	131	149	210	18.5	304	138	149	213	18.5	305	138	148	208	19.3	312	141	149	210
	24000	-33	15.2	262	119	142	207	16.8	278	126	146	212	18.4	294	133	146	216	18.4	294	133	144	210	19.2	302	137	146	213
	26000	-37	14.8	250	113	138	209	16.5	267	121	142	214	18.3	284	129	142	220	18.3	285	129	141	212	19.1	293	133	143	215
	28000	-41	14.4	238	108	134	210	16.3	257	117	139	217	18.1	276	125	139	222	18.1	277	125	137	214	19.1	286	129	139	217
	30000	-44	14.0	227	103	130	211	16.0	248	112	135	219	18.0	269	122	135	225	18.0	269	122	133	216	19.0	280	126	136	219
10	0	25	20.0	469	213	183	186	20.0	469	213	182	184	20.0	469	213	182	182	20.0	470	213	177	180	20.0	470	211	176	179
	2000	21	19.6	447	203	180	188	19.7	449	204	179	187	19.9	451	204	179	185	19.9	451	204	174	182	19.9	451	203	174	182
	4000	17	19.2	426	193	177	191	19.5	429	195	176	190	19.7	432	196	176	188	19.7	432	196	172	185	19.9	434	195	171	185
	6000	13	18.8	406	184	174	193	19.2	410	186	173	192	19.6	415	188	173	191	19.6	415	188	170	188	19.8	417	188	169	188
	8000	9	18.4	387	175	171	195	18.9	392	178	170	195	19.5	398	180	170	194	19.5	398	180	167	191	19.7	401	180	167	191
	10000	5	18.0	368	167	167	197	18.7	375	170	167	198	19.3	382	173	167	197	19.3	382	173	164	194	19.7	385	173	164	194
	12000	1	17.6	353	160	164	200	18.4	361	164	164	200	19.2	369	167	164	200	19.2	369	168	161	196	19.6	373	168	162	197
	14000	-3	17.2	339	154	160	201	18.1	349	158	161	202	19.1	358	162	161	203	19.1	358	162	158	199	19.5	363	163	159	200
	16000	-7	16.8	324	147	156	203	17.9	335	152	158	205	18.9	345	157	158	206	18.9	346	157	155	202	19.5	351	158	156	203
	18000	-11	16.4	308	140	152	205	17.6	320	145	154	207	18.8	332	151	154	209	18.8	332	151	152	205	19.4	338	153	153	206
	20000	-15	16.0	293	133	148	206	17.3	306	139	151	209	18.7	319	145	151	212	18.7	320	145	149	207	19.3	326	148	150	209
	22000	-19	15.6	278	126	145	208	17.1	293	133	147	212	18.5	308	139	147	215	18.5	308	140	146	209	19.3	315	143	147	211
	24000	-23	15.2	265	120	141	209	16.8	281	127	144	214	18.4	297	135	144	218	18.4	297	135	142	212	19.2	305	138	144	214
	26000	-27	14.8	252	114	137	211	16.5	270	122	140	216	18.3	287	130	140	221	18.3	288	131	139	214	19.1	296	134	140	216
	28000	-31	14.4	241	109	133	212	16.3	260	118	137	219	18.1	279	126	137	224	18.1	279	127	135	215	19.1	289	131	137	218
	30000	-34	14.0	230	104	129	213	16.0	250	114	133	220	18.0	271	123	133	226	18.0	272	123	131	217	19.0	283	128	133	220

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Figure 5-3-4-2: Performance - Long Range Cruise (Sheet 3 of 4)

LONG RANGE CRUISE

ISA (°C)	Altitude (ft)	SAT (°C)	@ 7000 lb (3175 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	@ 8000 lb (3629 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	@ 9000 lb (4082 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	@ 10000 lb (4536 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)	@ 10400 lb (4717 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	IAS (kt)	TAS (kt)
20	0	35	20.0	474	215	182	188	20.0	474	215	181	186	20.0	475	215	181	184	20.0	475	215	176	181	20.0	475	214	175	180
	2000	31	19.6	452	205	179	191	19.7	454	206	178	189	19.9	455	206	178	187	19.9	455	207	173	184	19.9	456	205	172	183
	4000	27	19.2	431	195	176	193	19.5	434	197	175	192	19.7	437	198	175	190	19.7	437	198	171	187	19.9	439	197	170	186
	6000	23	18.8	411	186	173	195	19.2	415	188	172	194	19.6	420	190	172	193	19.6	420	190	168	190	19.8	422	190	168	189
	8000	19	18.4	391	177	169	197	18.9	397	180	169	197	19.5	402	183	169	196	19.5	402	183	165	193	19.7	405	182	165	192
	10000	15	18.0	372	169	166	199	18.7	379	172	166	199	19.3	386	175	166	199	19.3	386	175	163	195	19.7	390	176	163	195
	12000	11	17.6	357	162	162	201	18.4	365	166	163	202	19.2	373	169	163	202	19.2	373	169	160	198	19.6	377	170	160	198
	14000	7	17.2	343	156	159	203	18.1	352	160	159	204	19.1	362	164	159	205	19.1	362	164	157	201	19.5	367	165	157	201
	16000	3	16.8	328	149	155	205	17.9	339	154	156	206	18.9	349	158	156	208	18.9	350	159	154	203	19.5	355	160	155	204
	18000	-1	16.4	312	141	151	206	17.6	324	147	153	209	18.8	336	152	153	211	18.8	336	152	151	206	19.4	342	154	151	207
	20000	-5	16.0	296	134	147	208	17.3	310	140	149	211	18.7	323	147	149	214	18.7	324	147	147	208	19.3	330	149	148	210
	22000	-9	15.6	282	128	143	210	17.1	296	134	146	213	18.5	311	141	146	217	18.5	312	141	144	211	19.3	319	144	145	212
	24000	-13	15.2	268	122	139	211	16.8	284	129	142	216	18.4	300	136	142	220	18.4	301	136	140	213	19.2	309	140	142	215
	26000	-17	14.8	255	116	135	212	16.5	273	124	139	218	18.3	291	132	139	223	18.3	291	132	137	215	19.1	300	136	138	217
	28000	-21	14.4	243	110	131	214	16.3	263	119	135	220	18.1	282	128	135	225	18.1	283	128	133	216	19.1	292	132	135	219
	30000	-24	14.0	233	106	127	214	16.0	253	115	131	222	18.0	274	124	131	228	18.0	275	125	129	217	19.0	286	129	131	221
30	0	45	20.0	479	217	181	190	20.0	479	217	179	188	20.0	480	217	179	186	20.0	480	218	174	183	20.0	480	216	173	182
	2000	41	19.6	457	207	178	192	19.7	458	208	177	191	19.9	460	209	177	189	19.9	460	209	172	186	19.9	461	208	171	185
	4000	37	19.2	436	198	175	195	19.5	439	199	174	194	19.7	442	200	174	192	19.7	442	200	169	189	19.9	443	200	169	188
	6000	33	18.8	415	188	172	197	19.2	420	190	171	196	19.6	424	192	171	195	19.6	424	192	167	192	19.8	426	193	166	191
	8000	29	18.4	395	179	168	199	18.9	401	182	168	199	19.5	407	185	168	198	19.5	407	185	164	194	19.7	410	186	164	194
	10000	25	18.0	376	171	165	201	18.7	383	174	164	201	19.3	390	177	164	201	19.3	390	177	161	197	19.7	394	178	161	197
	12000	21	17.6	361	164	161	203	18.4	369	167	161	203	19.2	377	171	161	204	19.2	378	171	158	199	19.6	382	173	158	200
	14000	17	17.2	347	157	157	205	18.1	356	162	158	206	19.1	366	166	158	207	19.1	366	166	155	202	19.5	371	168	156	203
	16000	13	16.8	332	150	153	206	17.9	342	155	155	208	18.9	353	160	155	209	18.9	353	160	152	205	19.5	359	162	153	206
	18000	9	16.4	315	143	149	208	17.6	327	149	151	211	18.8	339	154	151	212	18.8	340	154	149	207	19.4	346	156	150	208
	20000	5	16.0	300	136	145	210	17.3	313	142	148	213	18.7	327	148	148	215	18.7	327	148	145	210	19.3	334	151	146	211
	22000	1	15.6	285	129	142	211	17.1	300	136	144	215	18.5	315	143	144	219	18.5	315	143	142	212	19.3	323	146	143	214
	24000	-3	15.2	271	123	138	213	16.8	287	130	141	218	18.4	303	138	141	222	18.4	304	138	138	214	19.2	312	141	140	216
	26000	-7	14.8	258	117	134	214	16.5	276	125	137	220	18.3	294	133	137	224	18.3	295	134	135	216	19.1	303	137	136	218
	28000	-11	14.4	246	112	129	215	16.3	266	120	133	222	18.1	285	129	133	227	18.1	286	130	130	217	19.1	296	134	132	220
	30000	-14	14.0	235	107	125	215	16.0	256	116	129	222	18.0	277	126	129	229	18.0	278	126	125	216	19.0	289	130	128	220

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Figure 5-3-4-2: Performance - Long Range Cruise (Sheet 4 of 4)

MAXIMUM ENDURANCE CRUISE

NOTE: INDICATED AIRSPEED IS 115 KTS CONSTANT

ISA (ºC)	Altitude (ft)	SAT (ºC)	TAS (kt)	@ 7000 lb (3175 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	@ 8000 lb (3629 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	@ 9000 lb (4082 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	@ 10000 lb (4536 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	@ 10400 lb (4717 kg) Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)
-40	0	-25	107	9.4	324	147	9.9	329	149	10.4	336	152	10.9	342	155	11.1	345	157
	2000	-29	110	9.3	307	139	9.7	313	142	10.3	319	145	10.9	327	148	11.1	330	150
	4000	-33	113	9.2	292	132	9.6	297	135	10.2	305	138	10.9	313	142	11.1	316	143
	6000	-37	117	9.0	277	126	9.6	284	129	10.2	292	132	10.9	300	136	11.1	302	137
	8000	-41	120	9.0	265	120	9.6	272	123	10.2	279	127	10.9	287	130	11.1	290	131
	10000	-45	124	9.0	254	115	9.6	260	118	10.2	268	121	10.9	275	125	11.2	278	126
	12000	-49	127	9.0	245	111	9.6	251	114	10.2	259	117	11.0	267	121	11.3	270	122
	14000	-53	131	9.0	236	107	9.6	243	110	10.3	251	114	11.1	260	118	11.4	263	119
	16000	-57	135	9.0	228	103	9.7	235	106	10.5	243	110	11.3	252	114	11.7	255	116
	18000	-61	140	9.1	219	99	9.8	227	103	10.7	235	107	11.5	244	111	11.9	247	112
	20000	-65	144	9.2	212	96	10.0	219	99	10.9	228	103	11.8	237	107	12.1	241	109
	22000	-69	149	9.4	204	93	10.2	212	96	11.1	221	100	12.1	231	105	12.4	234	106
	24000	-73	154	9.6	198	90	10.4	205	93	11.4	215	98	12.4	225	102	12.8	229	104
	26000	-77	159	9.8	192	87	10.6	200	91	11.6	210	95	12.7	221	100	13.1	225	102
	28000	-81	164	10.0	187	85	10.9	196	89	12.0	206	94	13.1	217	98	13.5	221	100
	30000	-84	170	10.2	183	83	11.2	192	87	12.4	204	92	13.5	215	98	14.0	220	100
-30	0	-15	109	9.4	327	148	9.8	332	151	10.3	339	154	10.9	346	157	11.2	350	159
	2000	-19	112	9.3	310	141	9.7	316	143	10.3	323	147	10.9	331	150	11.2	334	152
	4000	-23	116	9.1	295	134	9.6	301	137	10.3	309	140	10.9	317	144	11.2	320	145
	6000	-27	119	9.0	281	128	9.6	288	131	10.3	296	134	10.9	304	138	11.2	306	139
	8000	-31	123	9.0	269	122	9.6	275	125	10.3	283	128	10.9	291	132	11.2	293	133
	10000	-35	126	9.0	257	117	9.6	263	119	10.2	271	123	10.9	279	126	11.2	282	128
	12000	-39	130	9.0	248	112	9.6	255	115	10.3	262	119	11.1	271	123	11.4	275	125
	14000	-43	134	9.0	240	109	9.6	247	112	10.4	255	116	11.3	264	120	11.6	268	122
	16000	-47	138	9.1	232	105	9.8	239	108	10.6	248	112	11.5	257	117	11.8	261	118
	18000	-51	143	9.2	223	101	9.9	231	105	10.8	240	109	11.7	249	113	12.1	253	115
	20000	-55	147	9.4	216	98	10.1	223	101	11.0	232	105	12.0	242	110	12.4	246	112
	22000	-59	152	9.5	208	94	10.3	216	98	11.3	226	103	12.3	236	107	12.7	240	109
	24000	-63	157	9.7	202	92	10.6	210	95	11.6	220	100	12.6	231	105	13.1	235	106
	26000	-67	163	9.9	196	89	10.8	205	93	11.9	216	98	13.0	226	103	13.4	231	105
	28000	-71	168	10.2	192	87	11.1	201	91	12.3	212	96	13.4	223	101	13.9	228	103
	30000	-74	174	10.4	187	85	11.4	197	89	12.6	209	95	13.8	221	100	14.3	225	102

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Figure 5-3-4-3: Performance - Maximum Endurance Cruise (Sheet 1 of 4)

MAXIMUM ENDURANCE CRUISE

NOTE: INDICATED AIRSPEED IS 115 KTS CONSTANT

				@ 7000 lb (3175 kg)			@ 8000 lb (3629 kg)			@ 9000 lb (4082 kg)			@ 10000 lb (4536 kg)			@ 10400 lb (4717 kg)		
ISA (ºC)	Altitude (ft)	SAT (ºC)	TAS (kt)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)
-20	0	-5	111	9.3	329	149	9.8	335	152	10.3	342	155	11.0	350	159	11.2	353	160
	2000	-9	114	9.2	313	142	9.7	319	145	10.3	327	148	11.0	335	152	11.2	338	153
	4000	-13	118	9.1	298	135	9.7	305	138	10.3	313	142	11.0	321	146	11.2	324	147
	6000	-17	121	9.1	284	129	9.6	291	132	10.3	299	136	10.9	307	139	11.2	310	141
	8000	-21	125	9.0	272	123	9.6	278	126	10.3	286	130	10.9	294	133	11.2	297	135
	10000	-25	129	9.0	260	118	9.6	267	121	10.3	275	125	11.1	284	129	11.4	287	130
	12000	-29	133	9.0	251	114	9.6	258	117	10.4	267	121	11.2	276	125	11.6	280	127
	14000	-33	137	9.1	243	110	9.7	251	114	10.6	260	118	11.4	269	122	11.8	273	124
	16000	-37	141	9.2	235	107	9.9	243	110	10.8	252	114	11.7	262	119	12.0	266	120
	18000	-41	146	9.3	227	103	10.1	235	107	11.0	244	111	11.9	254	115	12.3	258	117
	20000	-45	151	9.5	219	100	10.3	227	103	11.3	237	108	12.2	247	112	12.6	251	114
	22000	-49	156	9.7	212	96	10.5	221	100	11.5	231	105	12.6	241	109	13.0	246	111
	24000	-53	161	9.9	206	93	10.8	215	97	11.8	225	102	12.9	236	107	13.4	240	109
	26000	-57	167	10.1	201	91	11.1	210	95	12.2	221	100	13.3	232	105	13.8	237	107
	28000	-61	172	10.4	196	89	11.4	206	93	12.6	217	99	13.8	229	104	14.2	234	106
	30000	-64	178	10.7	192	87	11.7	202	92	13.0	215	97	14.2	227	103	14.7	232	105
-10	0	5	113	9.3	332	150	9.7	337	153	10.4	346	157	11.0	354	161	11.2	357	162
	2000	1	117	9.2	315	143	9.7	322	146	10.4	331	150	11.0	339	154	11.3	342	155
	4000	-3	120	9.1	301	136	9.7	308	140	10.3	316	143	11.0	324	147	11.2	327	148
	6000	-7	124	9.1	287	130	9.7	294	133	10.3	302	137	11.0	310	141	11.2	313	142
	8000	-11	127	9.0	275	125	9.6	282	128	10.3	290	131	11.0	298	135	11.4	302	137
	10000	-15	131	9.0	263	119	9.6	270	122	10.4	279	126	11.2	288	131	11.5	292	132
	12000	-19	136	9.1	254	115	9.7	262	119	10.6	271	123	11.4	281	127	11.7	285	129
	14000	-23	140	9.2	247	112	9.9	255	116	10.7	264	120	11.6	274	124	12.0	278	126
	16000	-27	144	9.3	239	108	10.0	247	112	10.9	257	116	11.9	267	121	12.2	271	123
	18000	-31	149	9.4	231	105	10.2	239	108	11.2	249	113	12.2	259	118	12.6	263	119
	20000	-35	154	9.6	223	101	10.4	232	105	11.5	242	110	12.5	253	115	12.9	257	116
	22000	-39	159	9.8	216	98	10.7	225	102	11.8	236	107	12.8	247	112	13.3	251	114
	24000	-43	165	10.1	210	95	11.0	219	99	12.1	231	105	13.2	242	110	13.7	246	112
	26000	-47	170	10.3	205	93	11.3	215	97	12.5	226	103	13.7	238	108	14.1	242	110
	28000	-51	176	10.6	201	91	11.6	211	96	12.9	223	101	14.1	235	107	14.6	240	109
	30000	-54	183	11.0	197	89	12.0	207	94	13.3	220	100	14.6	233	106	15.2	239	108

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Figure 5-3-4-3: Performance - Maximum Endurance Cruise (Sheet 2 of 4)

MAXIMUM ENDURANCE CRUISE

NOTE: INDICATED AIRSPEED IS 115 KTS CONSTANT

				@ 7000 lb (3175 kg)			@ 8000 lb (3629 kg)			@ 9000 lb (4082 kg)			@ 10000 lb (4536 kg)			@ 10400 lb (4717 kg)		
ISA (ºC)	Altitude (ft)	SAT (ºC)	TAS (kt)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)	Torque (psi)	Fuel flow (lb/h)	Fuel flow (kg/h)
0	0	15	115	9.2	333	151	9.8	340	154	10.4	348	158	11.0	357	162	11.3	360	163
	2000	11	119	9.2	318	144	9.7	325	147	10.4	333	151	11.0	342	155	11.3	345	156
	4000	7	122	9.1	303	138	9.7	310	141	10.4	319	145	11.0	327	148	11.2	330	150
	6000	3	126	9.1	290	131	9.7	297	135	10.3	305	138	11.0	313	142	11.3	317	144
	8000	-1	130	9.1	277	126	9.7	284	129	10.4	293	133	11.2	302	137	11.5	306	139
	10000	-5	134	9.1	265	120	9.7	272	124	10.5	282	128	11.4	292	132	11.7	296	134
	12000	-9	138	9.2	257	117	9.9	266	120	10.7	275	125	11.6	285	129	11.9	289	131
	14000	-13	143	9.3	250	113	10.0	258	117	10.9	268	122	11.8	279	126	12.2	283	128
	16000	-17	147	9.4	242	110	10.2	251	114	11.1	261	118	12.1	272	123	12.5	276	125
	18000	-21	152	9.6	234	106	10.4	243	110	11.4	254	115	12.4	264	120	12.8	269	122
	20000	-25	157	9.8	227	103	10.6	235	107	11.7	246	112	12.7	257	117	13.2	261	119
	22000	-29	163	10.0	220	100	10.9	229	104	12.0	241	109	13.1	252	114	13.6	256	116
	24000	-33	168	10.3	214	97	11.2	224	101	12.4	235	107	13.5	247	112	14.0	252	114
	26000	-37	174	10.6	209	95	11.6	219	99	12.8	231	105	14.0	243	110	14.5	248	113
	28000	-41	180	10.9	205	93	11.9	215	98	13.2	228	103	14.5	241	109	15.0	246	112
	30000	-44	187	11.2	201	91	12.3	212	96	13.7	225	102	15.1	239	108	15.6	245	111
10	0	25	117	9.2	336	152	9.8	344	156	10.4	352	160	11.1	360	163	11.3	364	165
	2000	21	121	9.2	321	145	9.8	328	149	10.4	336	153	11.0	345	156	11.3	348	158
	4000	17	124	9.2	306	139	9.7	313	142	10.4	322	146	11.0	330	150	11.3	334	151
	6000	13	128	9.1	292	133	9.7	300	136	10.4	308	140	11.1	318	144	11.4	322	146
	8000	9	132	9.1	280	127	9.7	287	130	10.5	297	135	11.3	307	139	11.6	311	141
	10000	5	136	9.1	268	122	9.8	277	125	10.6	287	130	11.5	297	135	11.8	301	136
	12000	1	141	9.3	261	118	10.0	269	122	10.8	279	127	11.7	290	131	12.1	294	133
	14000	-3	145	9.4	254	115	10.1	262	119	11.0	273	124	12.0	284	129	12.4	288	131
	16000	-7	150	9.5	246	112	10.3	255	116	11.3	266	120	12.3	277	126	12.7	281	128
	18000	-11	155	9.7	238	108	10.6	247	112	11.6	258	117	12.6	270	122	13.0	274	124
	20000	-15	160	9.9	231	105	10.8	240	109	11.9	251	114	13.0	263	119	13.4	267	121
	22000	-19	166	10.2	224	102	11.1	234	106	12.2	245	111	13.4	257	117	13.9	262	119
	24000	-23	172	10.5	218	99	11.4	228	104	12.6	240	109	13.8	253	115	14.3	258	117
	26000	-27	178	10.8	214	97	11.8	224	102	13.1	236	107	14.3	249	113	14.9	254	115
	28000	-31	184	11.2	210	95	12.3	221	100	13.6	234	106	14.9	247	112	15.4	253	115
	30000	-34	191	11.6	207	94	12.7	218	99	14.1	232	105	15.5	246	112	16.1	252	114

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Figure 5-3-4-3: Performance - Maximum Endurance Cruise (Sheet 3 of 4)

MAXIMUM ENDURANCE CRUISE

NOTE: INDICATED AIRSPEED IS 115 KTS CONSTANT

ISA (ºC)	Altitude (ft)	SAT (ºC)	TAS (kt)	@ 7000 lb (3175 kg) Torque (psi)	@ 7000 lb Fuel flow (lb/h)	@ 7000 lb Fuel flow (kg/h)	@ 8000 lb (3629 kg) Torque (psi)	@ 8000 lb Fuel flow (lb/h)	@ 8000 lb Fuel flow (kg/h)	@ 9000 lb (4082 kg) Torque (psi)	@ 9000 lb Fuel flow (lb/h)	@ 9000 lb Fuel flow (kg/h)	@ 10000 lb (4536 kg) Torque (psi)	@ 10000 lb Fuel flow (lb/h)	@ 10000 lb Fuel flow (kg/h)	@ 10400 lb (4717 kg) Torque (psi)	@ 10400 lb Fuel flow (lb/h)	@ 10400 lb Fuel flow (kg/h)
20	0	35	119	9.2	340	154	9.8	347	157	10.4	356	161	11.1	364	165	11.3	367	167
	2000	31	123	9.2	324	147	9.7	331	150	10.4	340	154	11.0	348	158	11.3	351	159
	4000	27	127	9.1	309	140	9.7	316	143	10.4	325	147	11.1	334	152	11.4	338	153
	6000	23	130	9.1	295	134	9.7	303	137	10.4	312	142	11.2	323	146	11.6	327	148
	8000	19	135	9.2	283	128	9.8	291	132	10.6	301	137	11.4	312	141	11.8	316	143
	10000	15	139	9.2	272	123	9.9	281	127	10.8	291	132	11.6	302	137	12.0	306	139
	12000	11	143	9.4	265	120	10.1	273	124	11.0	284	129	11.9	295	134	12.3	299	136
	14000	7	148	9.5	258	117	10.2	266	121	11.2	278	126	12.2	289	131	12.6	294	133
	16000	3	153	9.7	250	113	10.5	259	118	11.5	271	123	12.5	282	128	12.9	287	130
	18000	-1	158	9.9	242	110	10.7	252	114	11.8	263	119	12.9	275	125	13.3	280	127
	20000	-5	163	10.1	235	107	11.0	245	111	12.1	256	116	13.2	268	122	13.7	273	124
	22000	-9	169	10.4	229	104	11.4	239	108	12.5	251	114	13.7	263	119	14.2	268	122
	24000	-13	175	10.7	224	101	11.7	234	106	13.0	246	112	14.2	259	118	14.7	264	120
	26000	-17	181	11.1	219	99	12.1	230	104	13.4	243	110	14.8	256	116	15.3	261	119
	28000	-21	188	11.5	215	98	12.6	227	103	14.0	240	109	15.3	254	115	15.9	260	118
	30000	-24	195	11.9	213	96	13.1	224	102	14.5	239	108	15.9	254	115	16.5	260	118
30	0	45	121	9.2	343	156	9.8	350	159	10.4	359	163	11.1	368	167	11.3	371	168
	2000	41	125	9.2	327	148	9.8	334	152	10.4	343	156	11.1	352	160	11.4	356	161
	4000	37	129	9.2	312	142	9.7	320	145	10.4	329	149	11.2	339	154	11.5	343	156
	6000	33	133	9.2	299	135	9.7	306	139	10.5	317	144	11.4	327	148	11.7	332	150
	8000	29	137	9.2	287	130	9.9	295	134	10.7	306	139	11.6	317	144	11.9	321	146
	10000	25	141	9.3	276	125	10.0	285	129	10.9	296	134	11.8	307	139	12.2	311	141
	12000	21	146	9.5	269	122	10.2	278	126	11.1	289	131	12.1	300	136	12.4	305	138
	14000	17	151	9.6	262	119	10.4	271	123	11.4	283	128	12.4	295	134	12.8	299	136
	16000	13	156	9.8	254	115	10.6	264	120	11.7	276	125	12.7	288	131	13.1	293	133
	18000	9	161	10.0	247	112	10.9	257	116	12.0	269	122	13.1	281	128	13.5	286	130
	20000	5	166	10.3	240	109	11.3	250	113	12.4	262	119	13.6	275	125	14.0	280	127
	22000	1	172	10.6	234	106	11.6	244	111	12.8	257	117	14.0	270	122	14.5	275	125
	24000	-3	178	11.0	229	104	12.0	240	109	13.3	253	115	14.6	266	121	15.1	271	123
	26000	-7	185	11.4	224	102	12.5	236	107	13.8	249	113	15.1	263	119	15.7	269	122
	28000	-11	192	11.8	221	100	12.9	233	106	14.3	247	112	15.7	262	119	16.3	268	121
	30000	-14	199	12.2	218	99	13.4	231	105	14.9	246	111	16.4	262	119	17.0	268	122

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Figure 5-3-4-3: Performance - Maximum Endurance Cruise (Sheet 4 of 4)

5-3-5 Performance Data - Specific Air Range

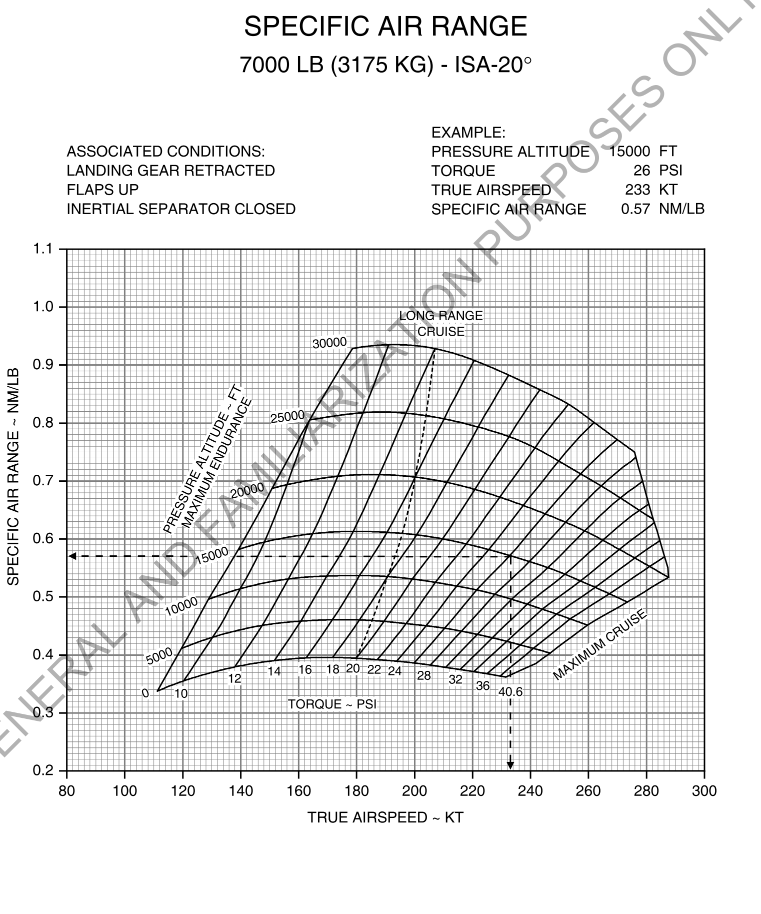

Figure 5-3-5-1: Performance - Specific Air Range (7000 lb) (Sheet 1 of 3)

12-C-A15-60-0503-05A-030A-A

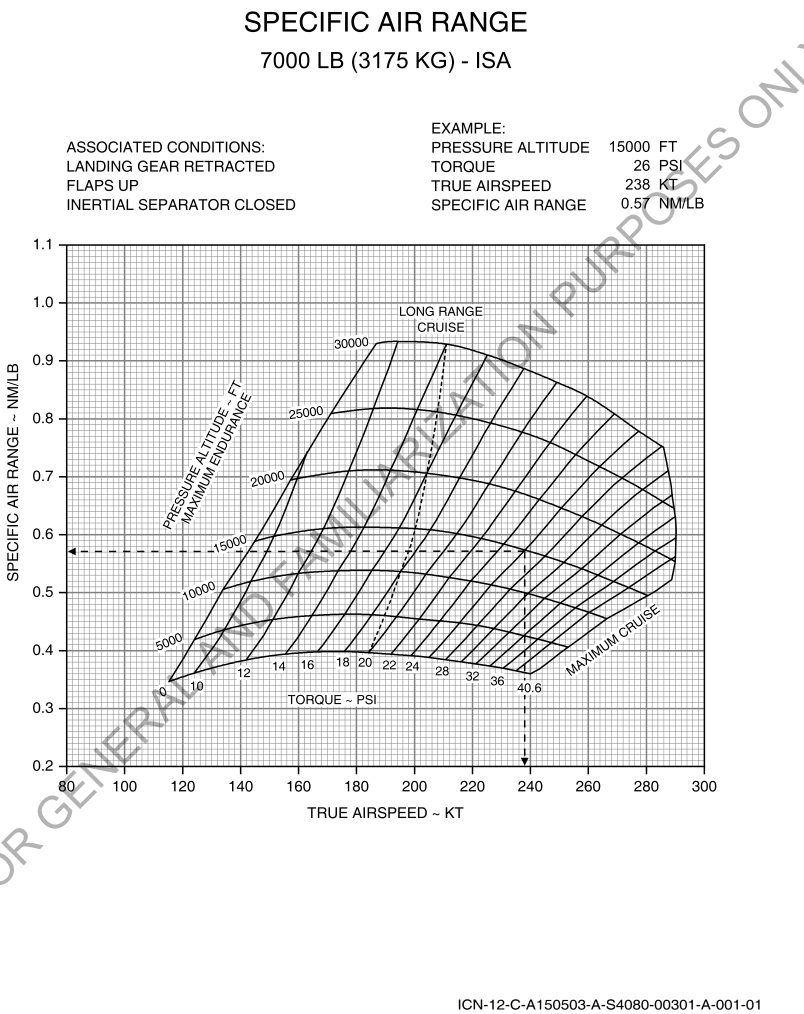

Figure 5-3-5-1: Performance - Specific Air Range (7000 lb) (Sheet 2 of 3)

SPECIFIC AIR RANGE

7000 LB (3175 KG) - ISA+20°

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:		
PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	243	KT
SPECIFIC AIR RANGE	0.57	NM/LB

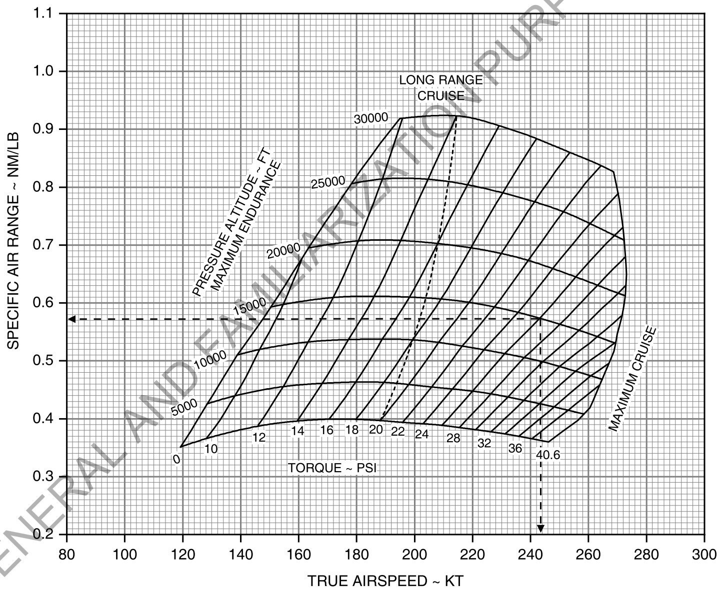

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Figure 5-3-5-1: Performance - Specific Air Range (7000 lb) (Sheet 3 of 3)

12-C-A15-60-0503-05A-030A-A

SPECIFIC AIR RANGE

8000 LB (3629 KG) - ISA-20°

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:		
PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	231	KT
SPECIFIC AIR RANGE	0.57	NM/LB

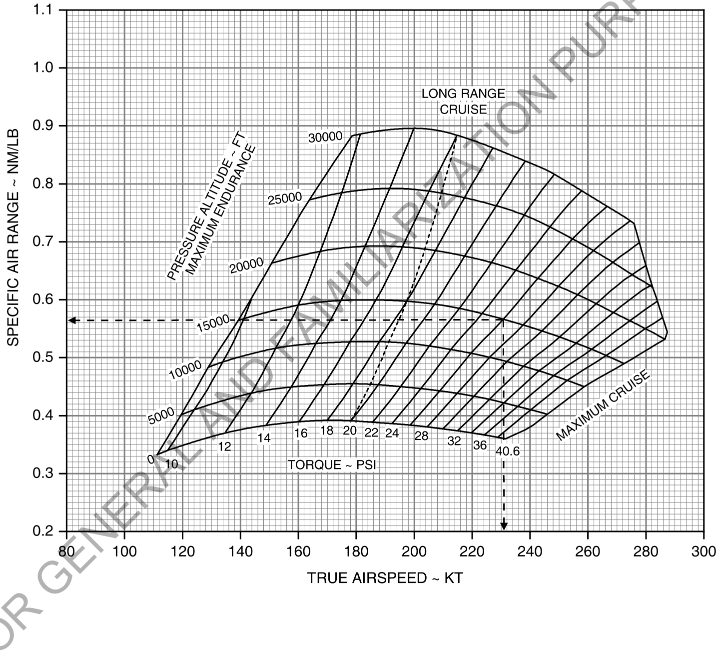

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Figure 5-3-5-2: Performance - Specific Air Range (8000 lb) (Sheet 1 of 3)

12-C-A15-60-0503-05A-030A-A

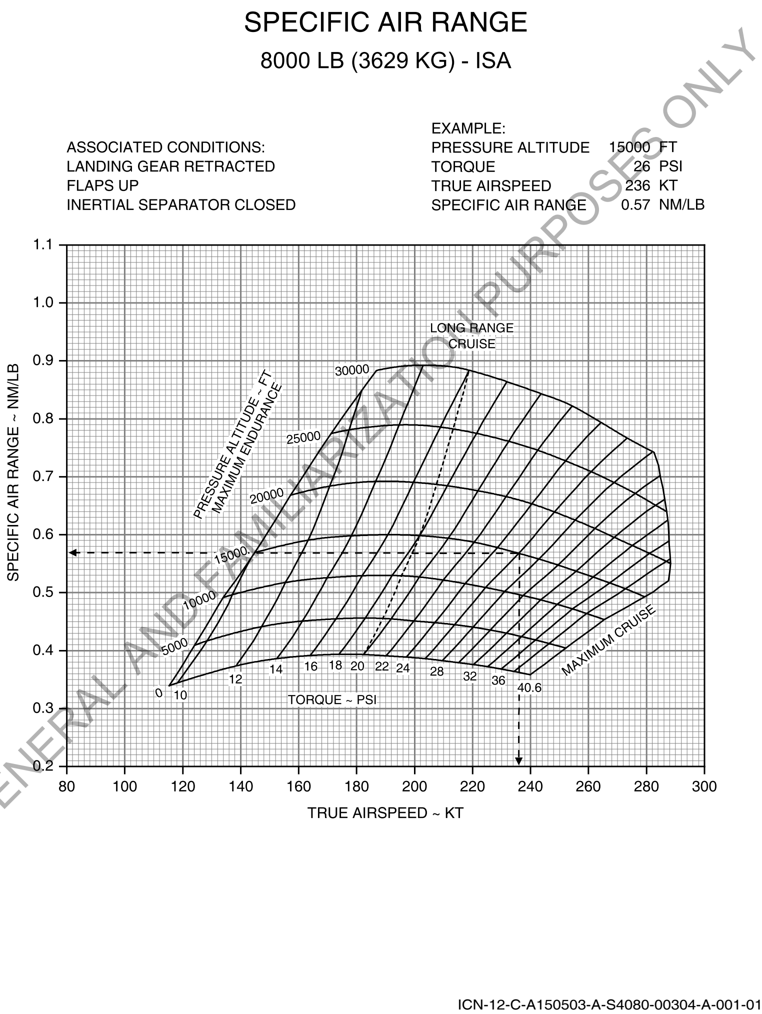


Figure 5-3-5-2: Performance - Specific Air Range (8000 lb) (Sheet 2 of 3)

12-C-A15-60-0503-05A-030A-A

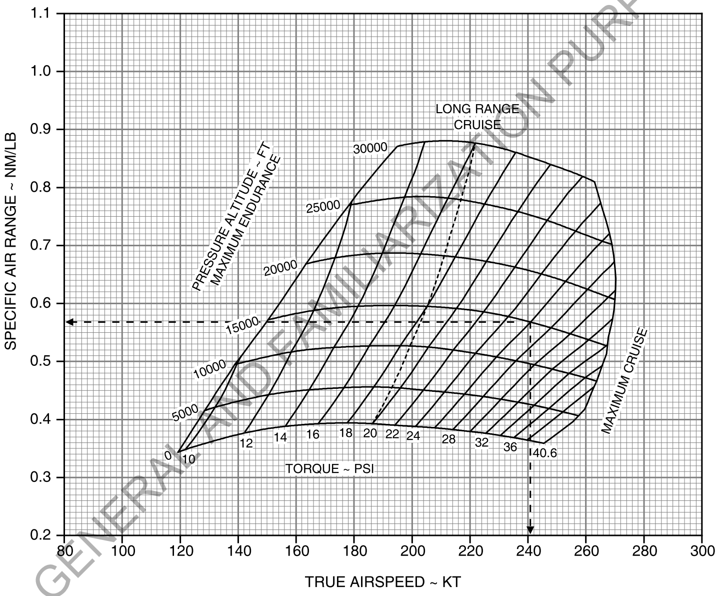
SPECIFIC AIR RANGE

8000 LB (3629 KG) - ISA+20°

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:

PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	241	KT
SPECIFIC AIR RANGE	0.57	NM/LB



ICN-12-C-A150503-A-S4080-00305-A-001-01

Figure 5-3-5-2: Performance - Specific Air Range (8000 lb) (Sheet 3 of 3)

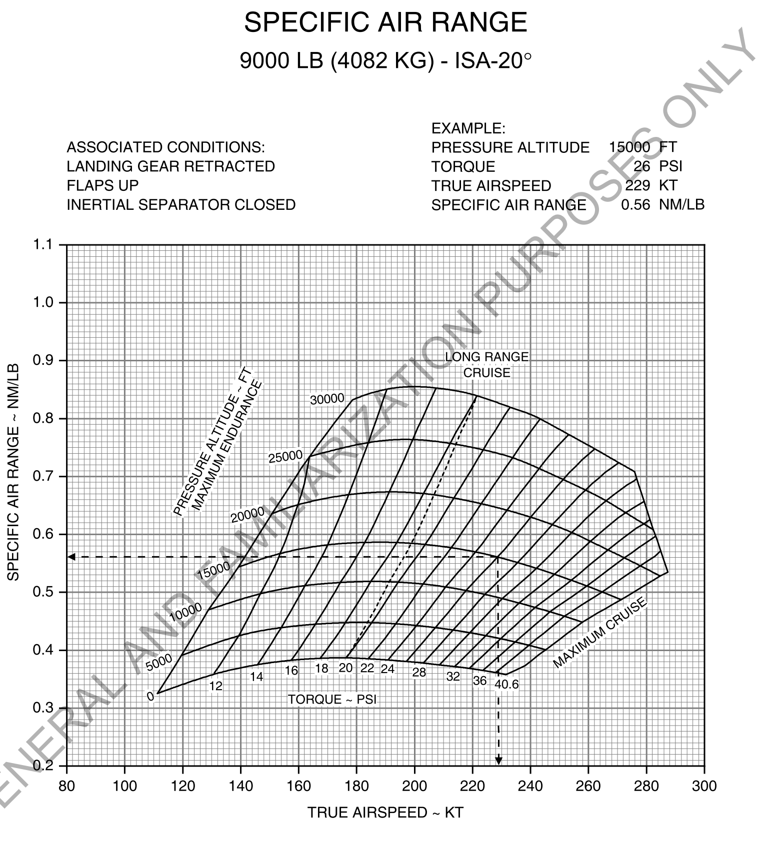


Figure 5-3-5-3: Performance - Specific Air Range (9000 lb) (Sheet 1 of 3)

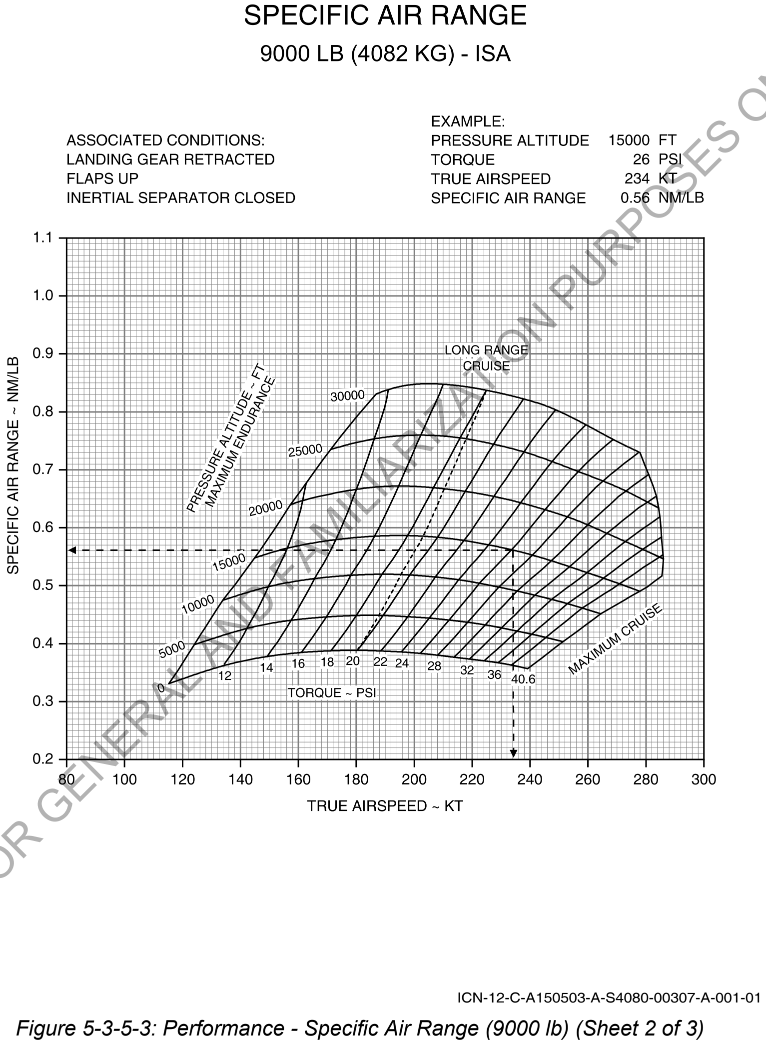


Figure 5-3-5-3: Performance - Specific Air Range (9000 lb) (Sheet 2 of 3)

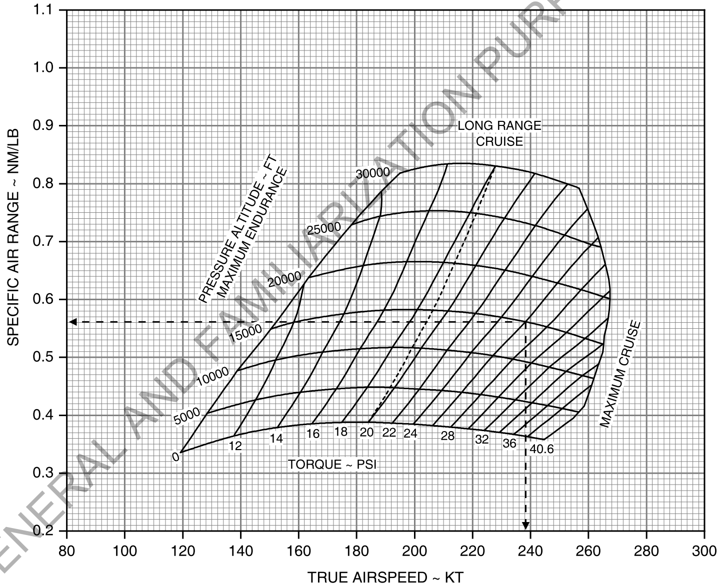
SPECIFIC AIR RANGE

9000 LB (4082 KG) - ISA+20°

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:

PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	238	KT
SPECIFIC AIR RANGE	0.56	NM/LB



ICN-12-C-A150503-A-S4080-00308-A-001-01

Figure 5-3-5-3: Performance - Specific Air Range (9000 lb) (Sheet 3 of 3)

12-C-A15-60-0503-05A-030A-A

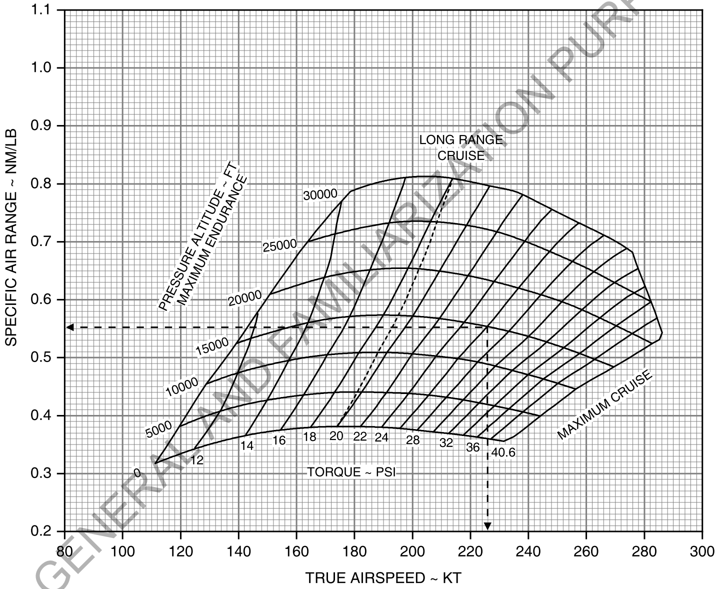
SPECIFIC AIR RANGE

10000 LB (4536 KG) - ISA-20°

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:

PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	226	KT
SPECIFIC AIR RANGE	0.55	NM/LB



ICN-12-C-A150503-A-S4080-00309-A-001-01

Figure 5-3-5-4: Performance - Specific Air Range (10,000 lb) (Sheet 1 of 3)

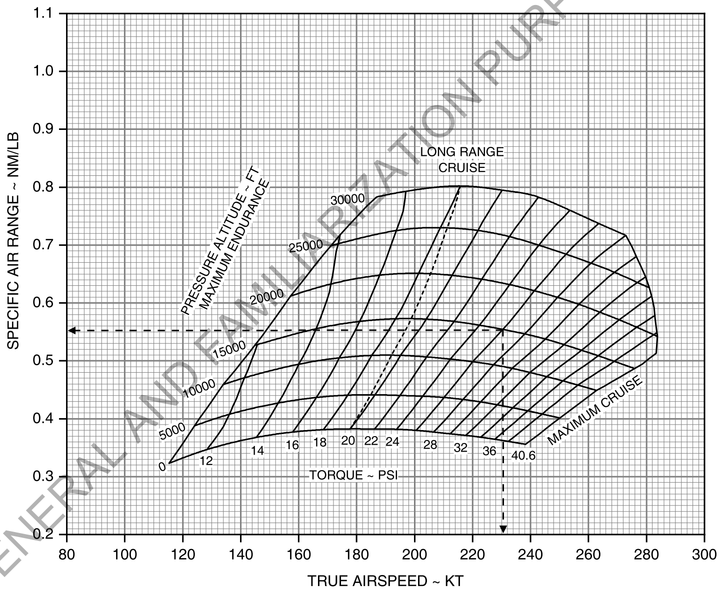
12-C-A15-60-0503-05A-030A-A

SPECIFIC AIR RANGE

10000 LB (4536 KG) - ISA

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:		
PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	230	KT
SPECIFIC AIR RANGE	0.55	NM/LB



ICN-12-C-A150503-A-S4080-00310-A-001-01

Figure 5-3-5-4: Performance - Specific Air Range (10,000 lb) (Sheet 2 of 3)

12-C-A15-60-0503-05A-030A-A

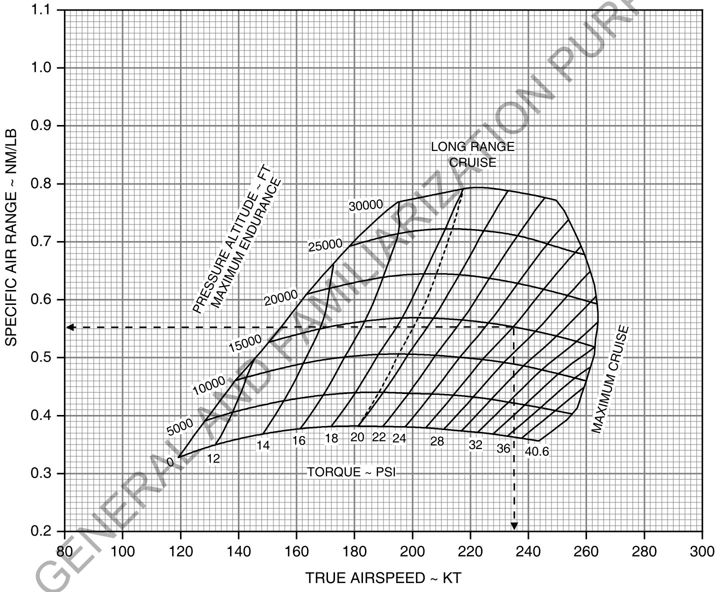
SPECIFIC AIR RANGE

10000 LB (4536 KG) - ISA+20°

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:

PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	235	KT
SPECIFIC AIR RANGE	0.55	NM/LB



ICN-12-C-A150503-A-S4080-00311-A-001-01

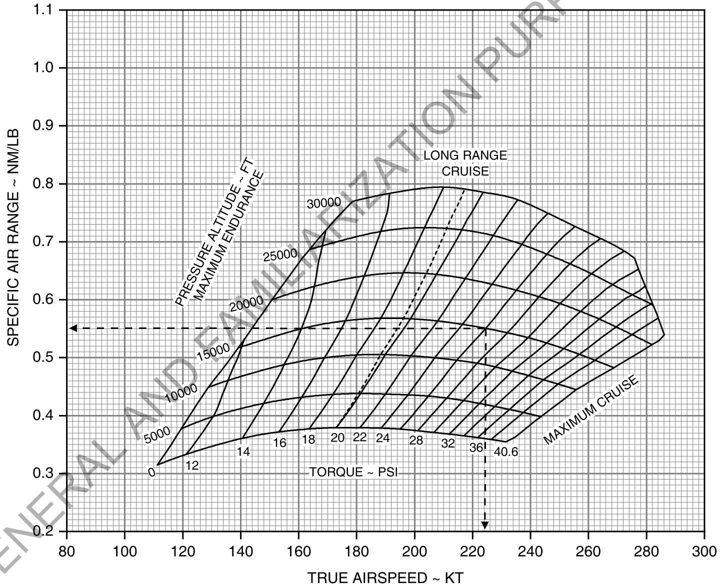
Figure 5-3-5-4: Performance - Specific Air Range (10,000 lb) (Sheet 3 of 3)

SPECIFIC AIR RANGE

10400 LB (4717 KG) - ISA-20°

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:		
PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	225	KT
SPECIFIC AIR RANGE	0.55	NM/LB



ICN-12-C-A150503-A-S4080-00312-A-001-01

Figure 5-3-5-5: Performance - Specific Air Range (10,400 lb) (Sheet 1 of 3)

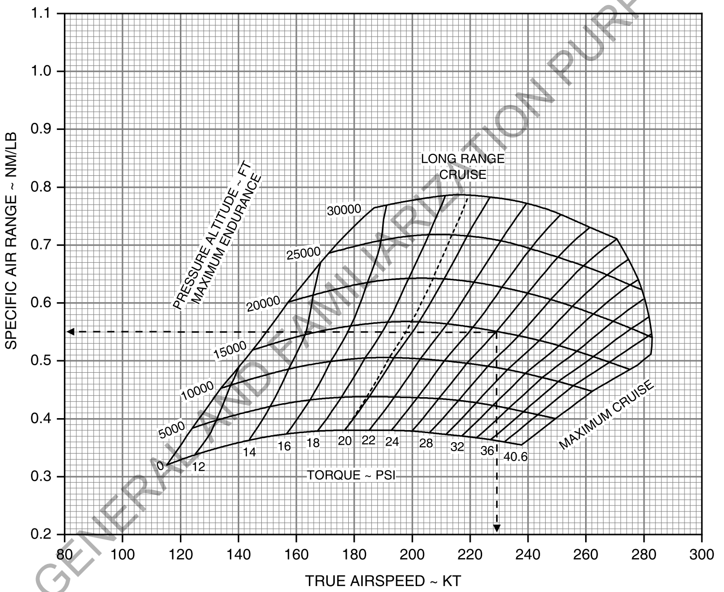
12-C-A15-60-0503-05A-030A-A

SPECIFIC AIR RANGE

10400 LB (4717 KG) - ISA

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:		
PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	229	KT
SPECIFIC AIR RANGE	0.55	NM/LB



ICN-12-C-A150503-A-S4080-00313-A-001-01

Figure 5-3-5-5: Performance - Specific Air Range (10,400 lb) (Sheet 2 of 3)

12-C-A15-60-0503-05A-030A-A

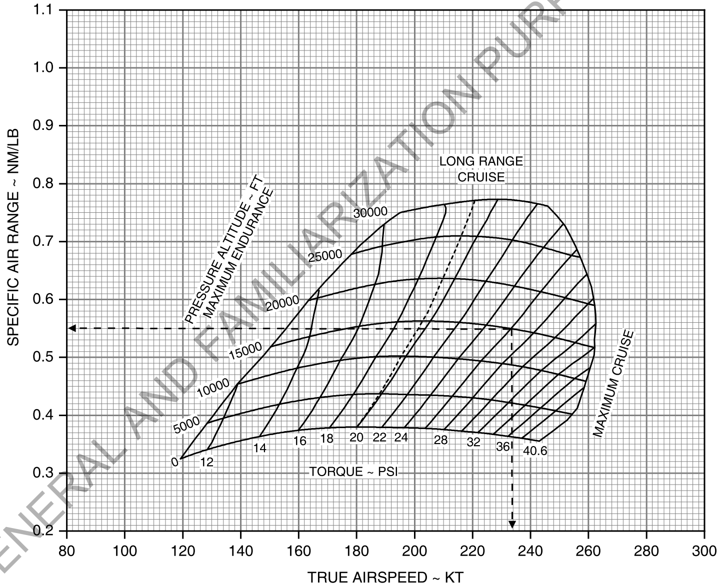
SPECIFIC AIR RANGE

10400 LB (4717 KG) - ISA+20°

ASSOCIATED CONDITIONS:
LANDING GEAR RETRACTED
FLAPS UP
INERTIAL SEPARATOR CLOSED

EXAMPLE:

PRESSURE ALTITUDE	15000	FT
TORQUE	26	PSI
TRUE AIRSPEED	233	KT
SPECIFIC AIR RANGE	0.55	NM/LB



ICN-12-C-A150503-A-S4080-00314-A-001-01

Figure 5-3-5-5: Performance - Specific Air Range (10,400 lb) (Sheet 3 of 3)

12-C-A15-60-0503-05A-030A-A

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5-3-6 Performance Data - Holding Time and Fuel

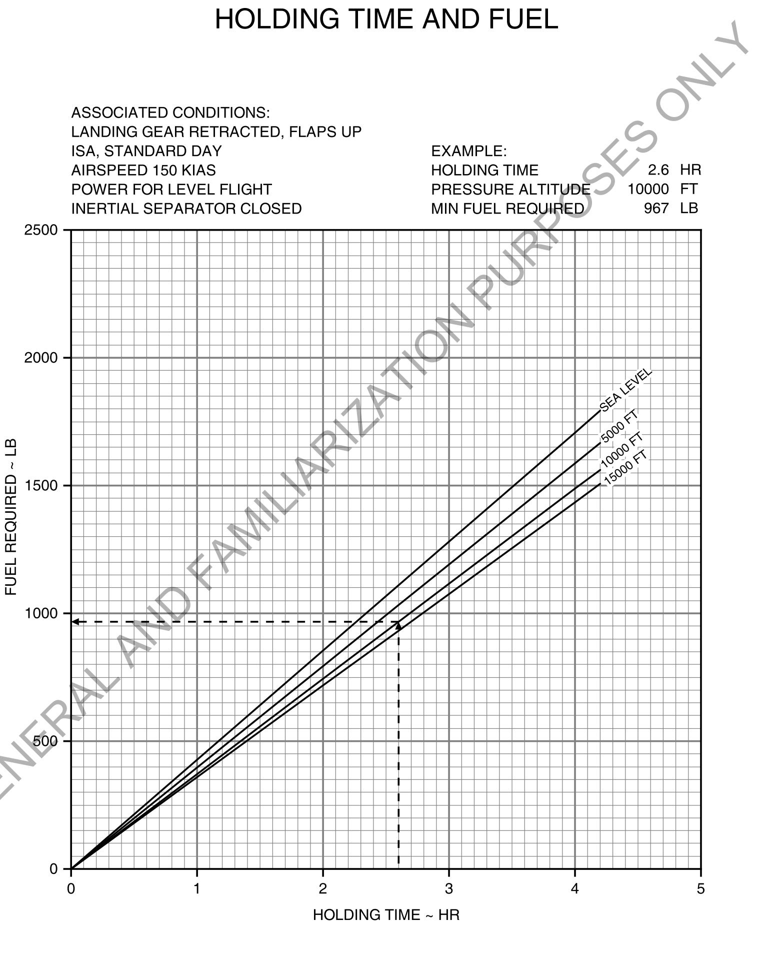

Figure 5-3-6-1: Performance - Holding Time and Fuel

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5-3-7 Performance Data - Descend Performance

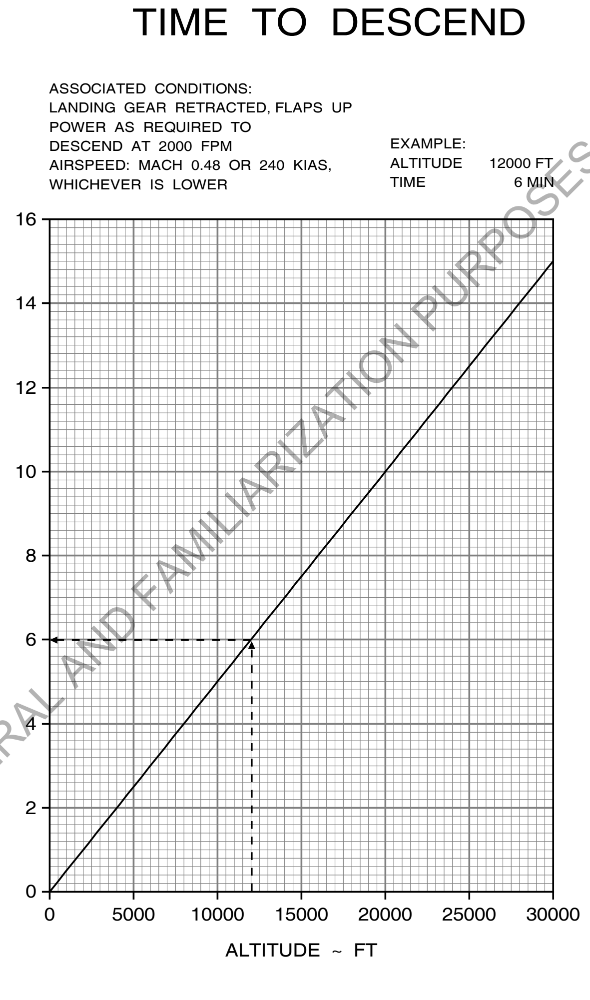
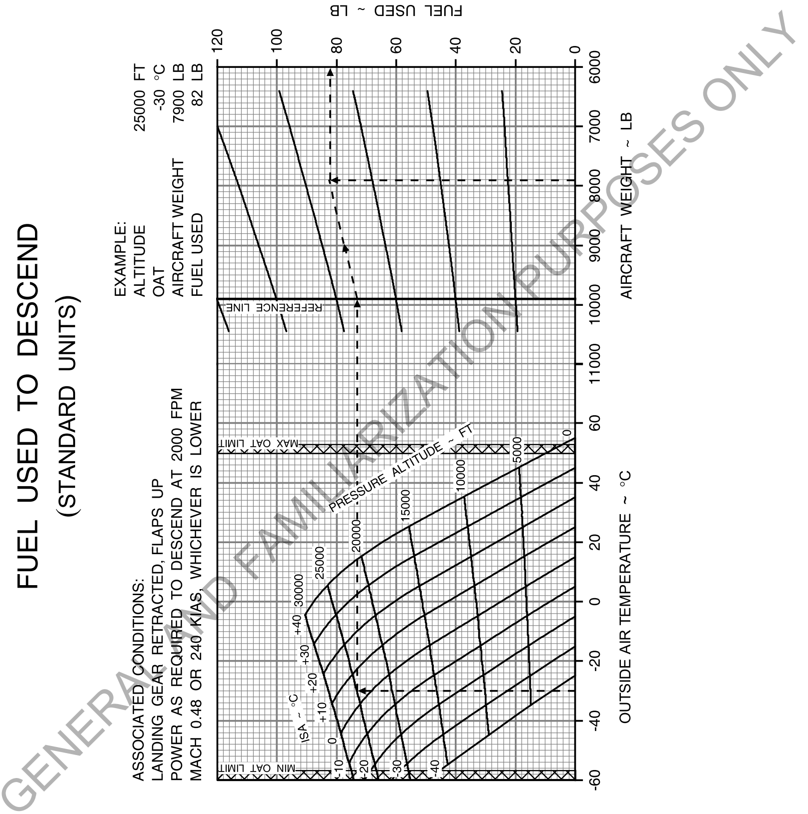


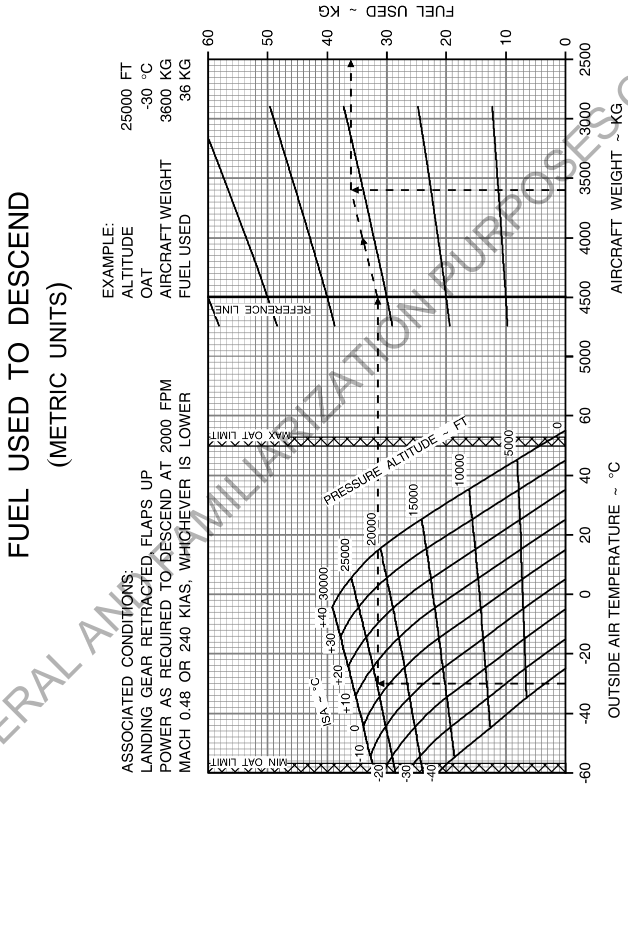
Figure 5-3-7-1: Performance - Time to Descend



ICN-12-C-A150503-A-S4080-00317-A-001-01

Figure 5-3-7-2: Performance - Fuel Used To Descend (standard units)

12-C-A15-60-0503-07A-030A-A

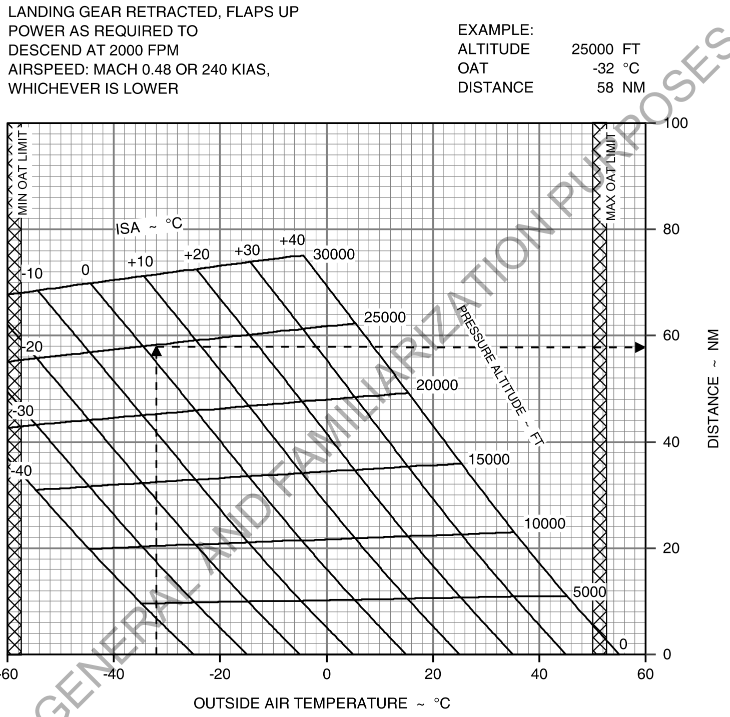


ICN-12-C-A150503-A-S4080-00318-A-001-01

Figure 5-3-7-3: Performance - Fuel Used To Descend (metric units)

12-C-A15-60-0503-07A-030A-A

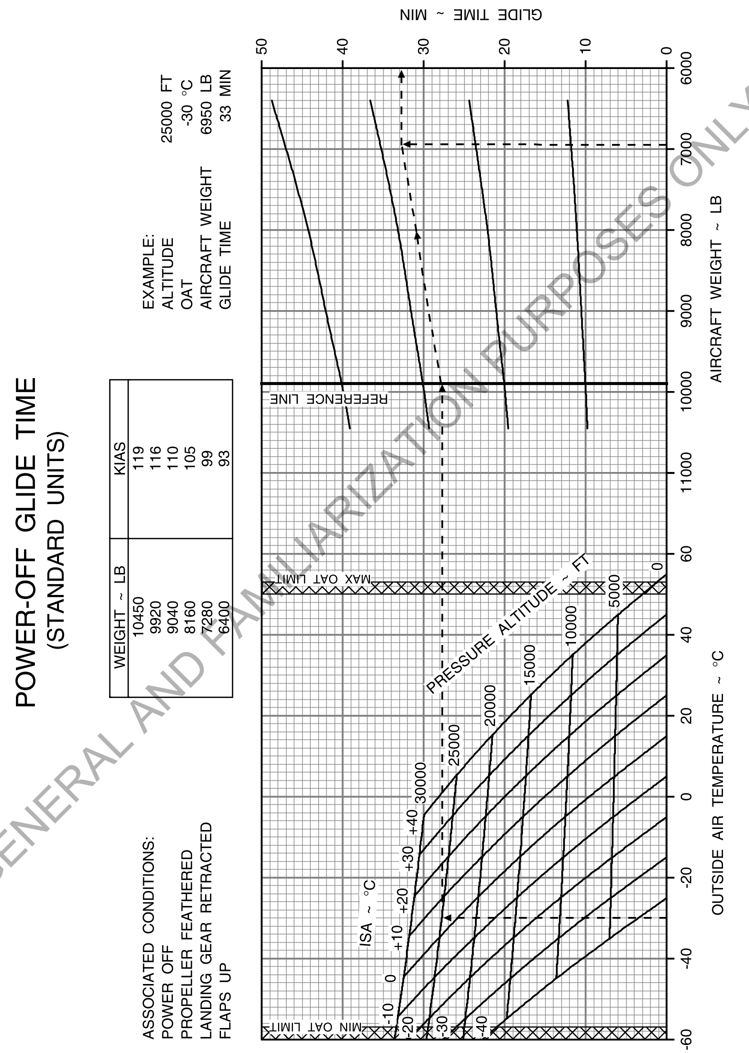
DISTANCE TO DESCEND



ICN-12-C-A150503-A-S4080-00319-A-001-01

Figure 5-3-7-4: Performance - Distance to Descend

5-3-8 Performance Data - Power-off Glide Performance

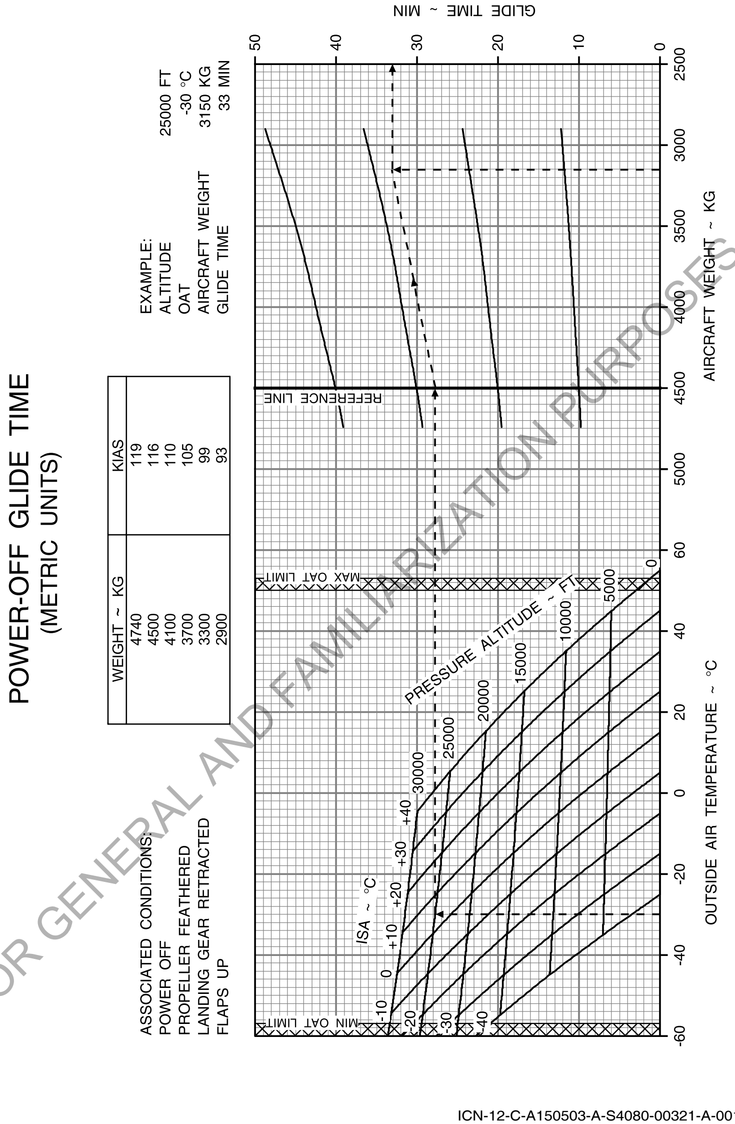


WEIGHT ~ LB	KIAS
10450	119
9920	116
9040	110
8160	105
7280	99
6400	93

ICN-12-C-A150503-A-S4080-00320-A-001-01

Figure 5-3-8-1: Performance - Power-off Glide Time (standard units)

12-C-A15-60-0503-08A-030A-A



WEIGHT ~ KG	KIAS
4740	119
4500	116
4100	110
3700	105
3300	99
2900	93

ICN-12-C-A150503-A-S4080-00321-A-001-01

Figure 5-3-8-2: Performance - Power-off Glide Time (metric units)

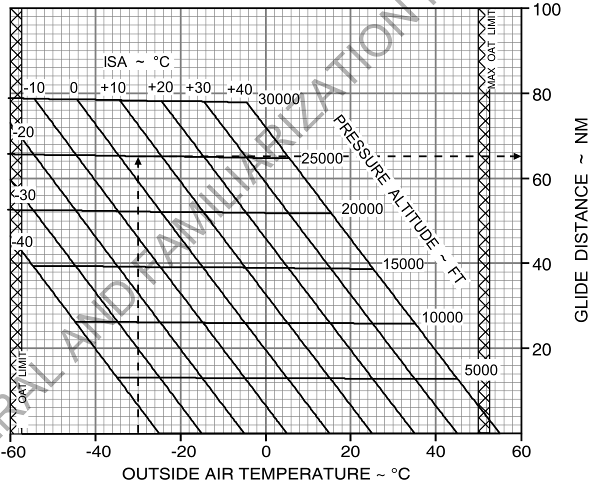
12-C-A15-60-0503-08A-030A-A

POWER-OFF GLIDE DISTANCE
(VALID FOR ALL AIRCRAFT WEIGHTS)

ASSOCIATED CONDITIONS:
POWER OFF, PROP FEATHERED
GEAR RETRACTED, FLAPS UP

EXAMPLE:
ALTITUDE 25000 FT
OAT -30 °C
GLIDE DISTANCE 65 NM

WEIGHT ~ LB	WEIGHT ~ KG	SPEED ~ KIAS
10450	4740	119
9920	4500	116
9040	4100	110
8160	3700	105
7280	3300	99
6400	2900	93



ICN-12-C-A150503-A-S4080-00322-A-002-01

Figure 5-3-8-3: Performance - Power-off Glide Distance

12-C-A15-60-0503-08A-030A-A

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5-3-9 Performance Data - Balked Landing Performance

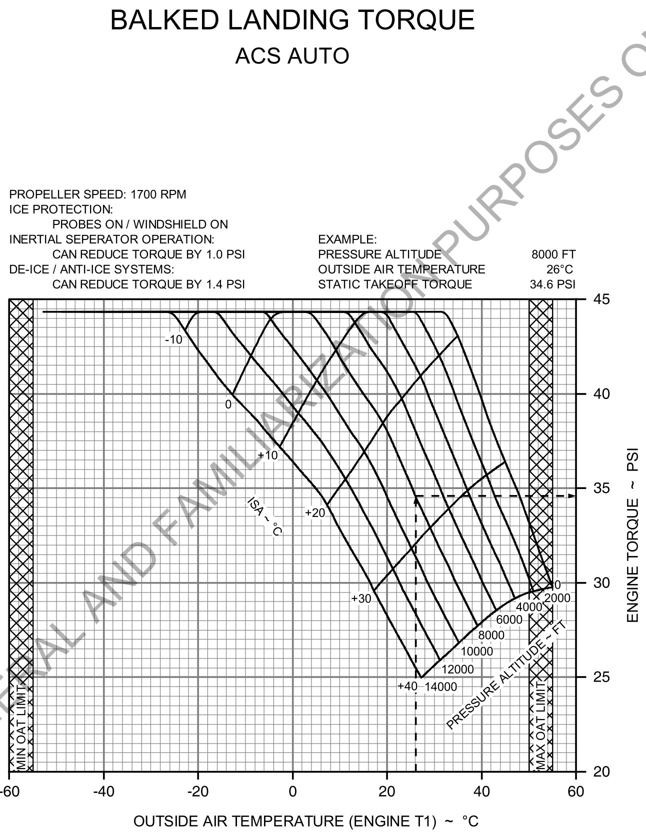


Figure 5-3-9-1: Performance - Balked Landing Torque

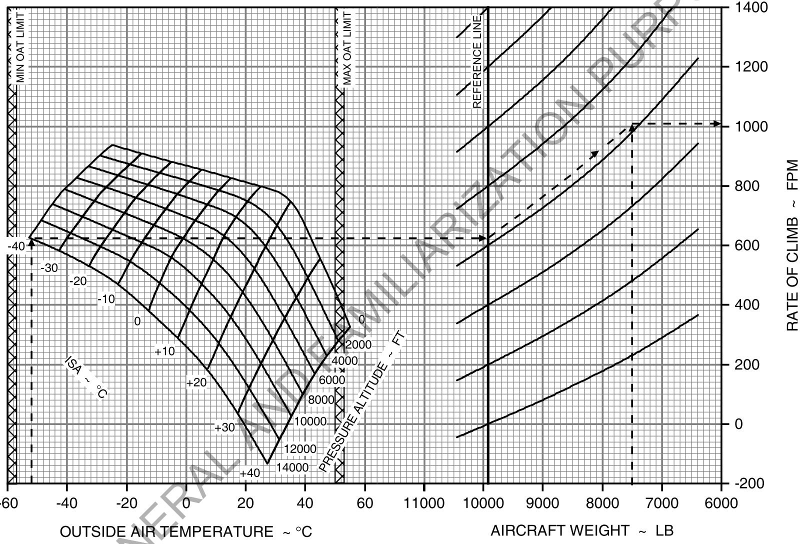
12-C-A15-60-0503-09A-030A-A

RATE OF CLIMB ~ BALKED LANDING
(STANDARD UNITS)

ASSOCIATED CONDITIONS:
TAKEOFF POWER
LANDING GEAR EXTENDED
FLAPS 40°
AIRSPEED 85 KIAS

EXAMPLE:

ALTITUDE	14000 FT
OAT	-52 °C
AIRCRAFT WEIGHT	7500 LB
RATE OF CLIMB	1010 FPM

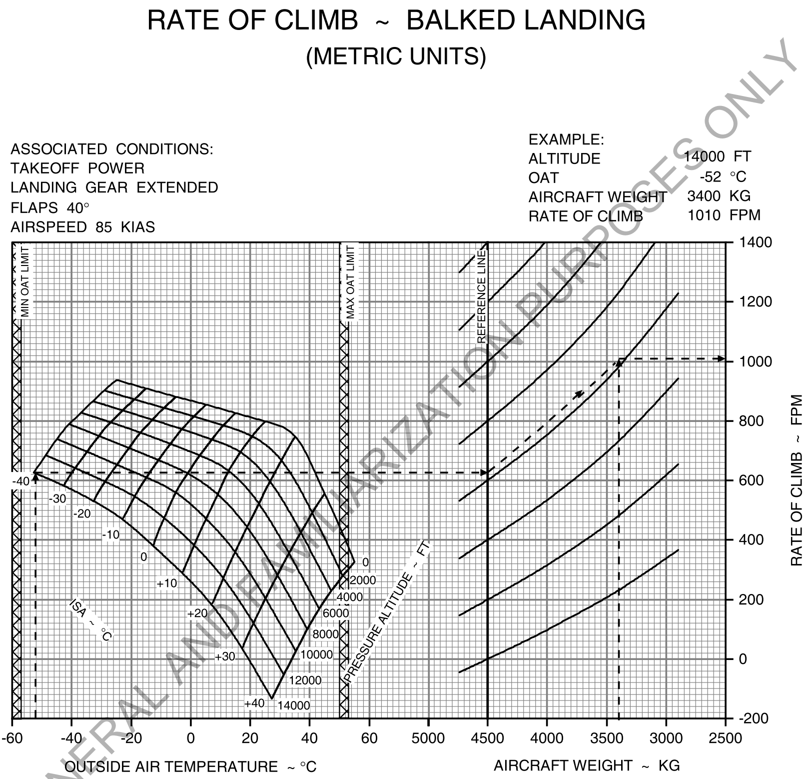


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00324-A-001-01

Figure 5-3-9-2: Performance - Rate Of Climb - Balked Landing (standard units)

12-C-A15-60-0503-09A-030A-A



See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00325-A-001-01

Figure 5-3-9-3: Performance - Rate Of Climb - Balked Landing (metric units)

12-C-A15-60-0503-09A-030A-A

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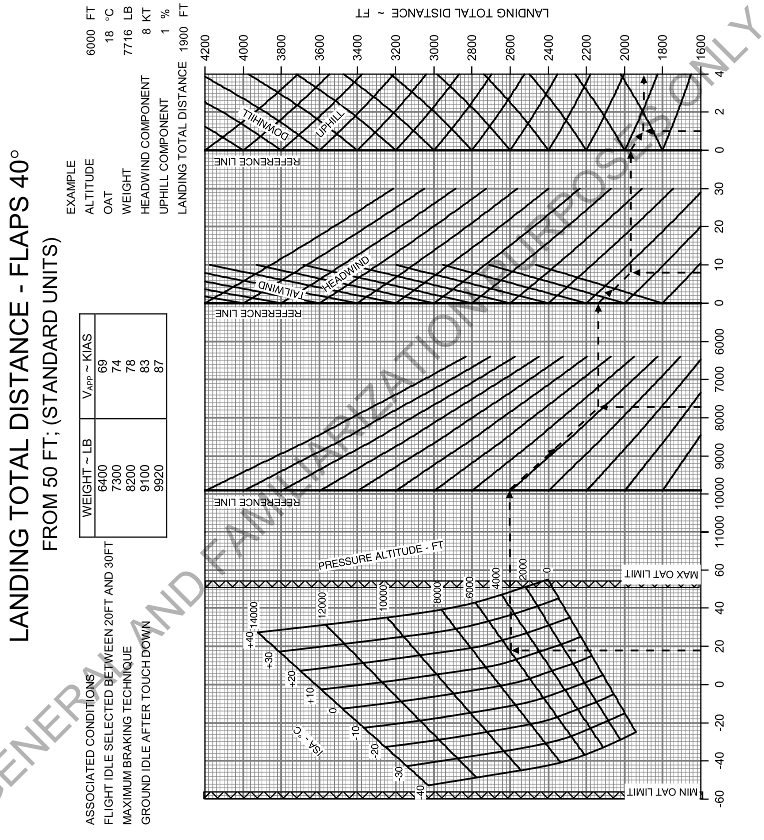
5-3-10 Performance Data - Landing Performance

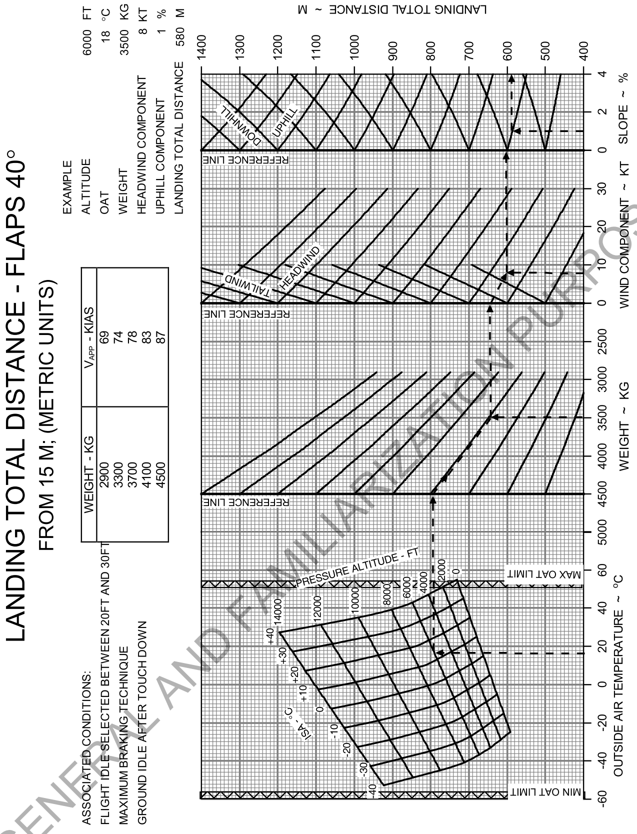


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00326-A-001-01

Figure 5-3-10-1: Performance - Landing Total Distance - Flaps 40° (standard units)

12-C-A15-60-0503-10A-030A-A

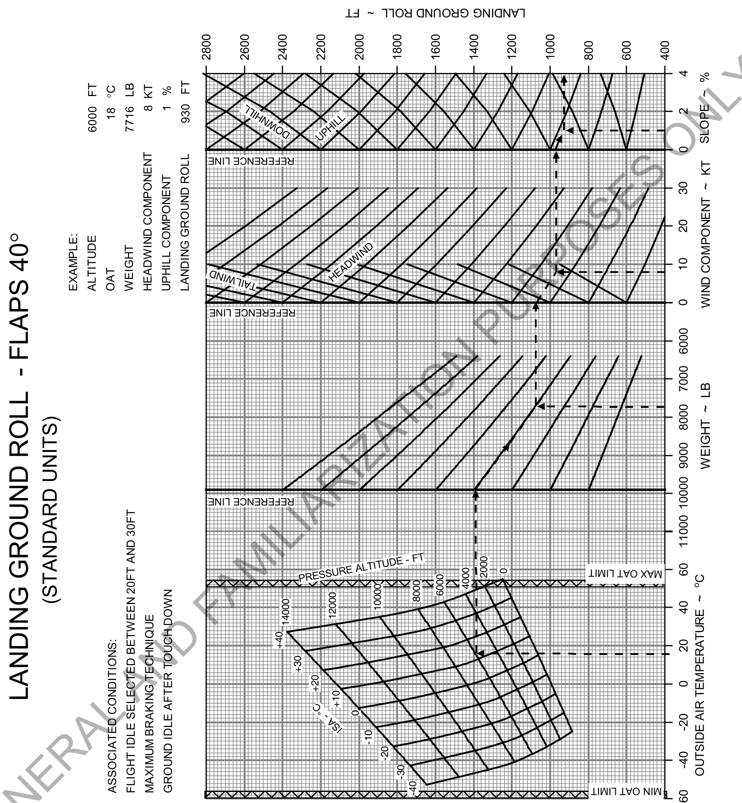


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00327-A-001-01

Figure 5-3-10-2: Performance - Landing Total Distance - Flaps 40° (metric units)

12-C-A15-60-0503-10A-030A-A

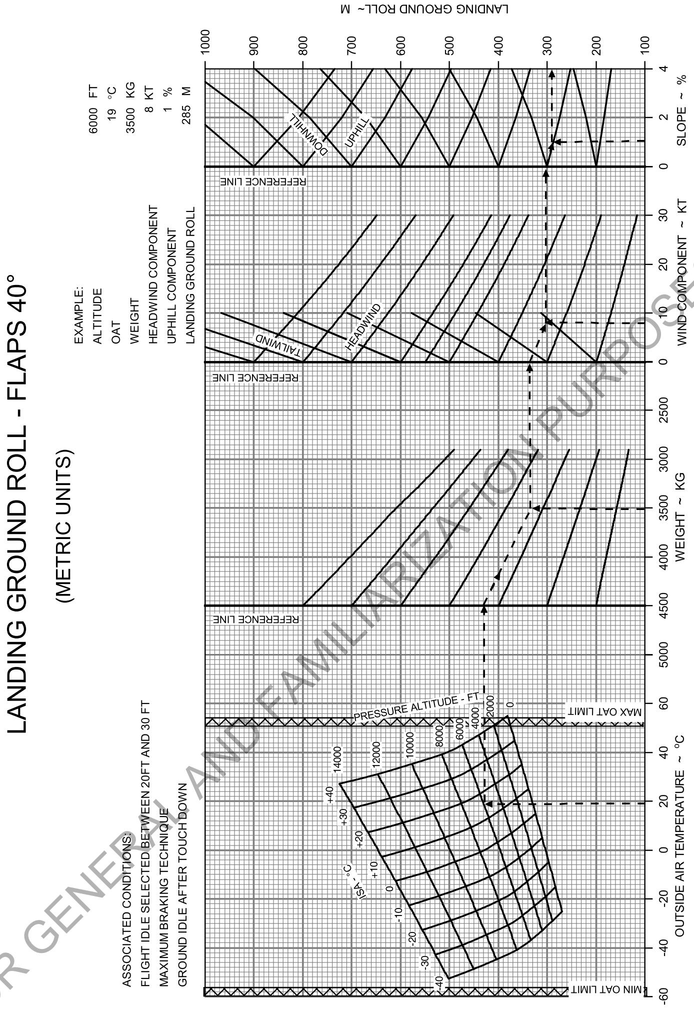


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00328-A-001-01

Figure 5-3-10-3: Performance - Landing Ground Roll - Flaps 40° (standard units)

12-C-A15-60-0503-10A-030A-A

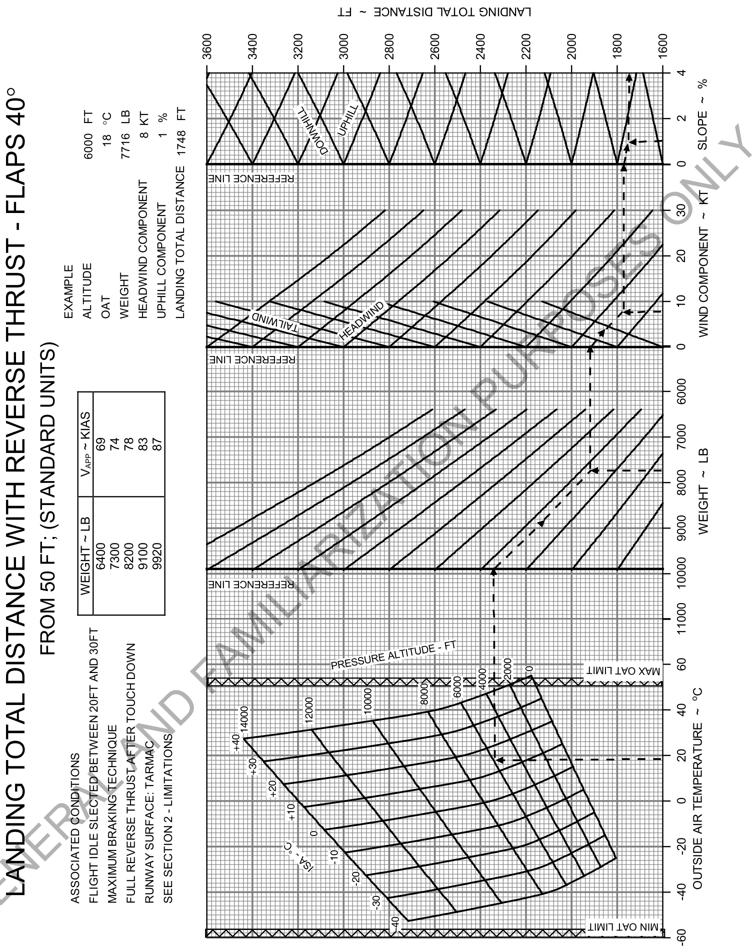


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00329-A-001-01

Figure 5-3-10-4: Performance - Landing Ground Roll - Flaps 40° (metric units)

12-C-A15-60-0503-10A-030A-A

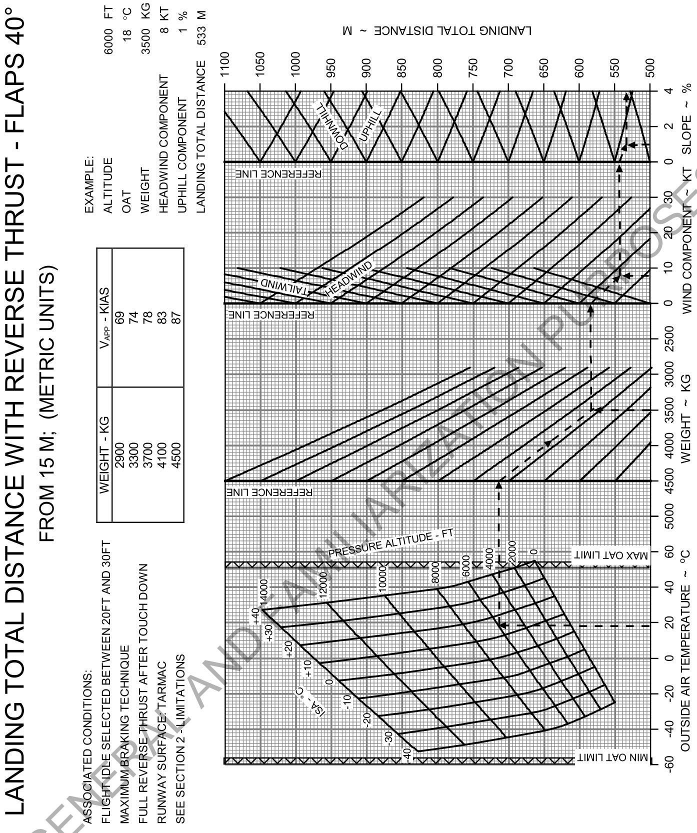


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00330-A-001-01

Figure 5-3-10-5: Performance - Landing Total Distance with the use of Reverse Thrust - Flaps 40° (standard units)

12-C-A15-60-0503-10A-030A-A

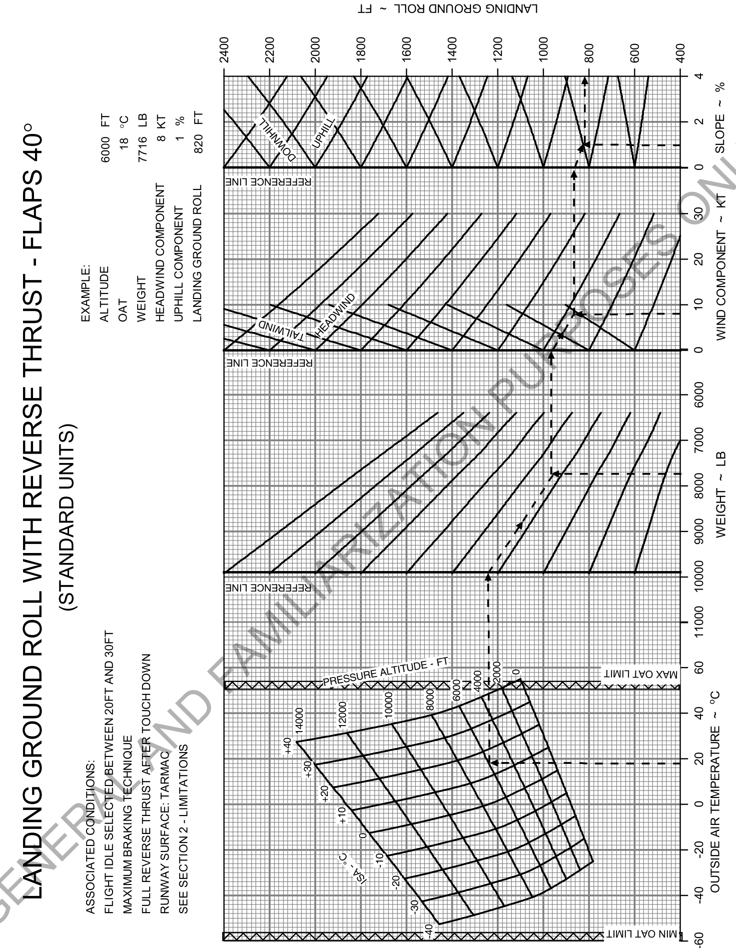


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00331-A-001-01

Figure 5-3-10-6: Performance - Landing Total Distance with the use of Reverse Thrust - Flaps 40° (metric units)

12-C-A15-60-0503-10A-030A-A

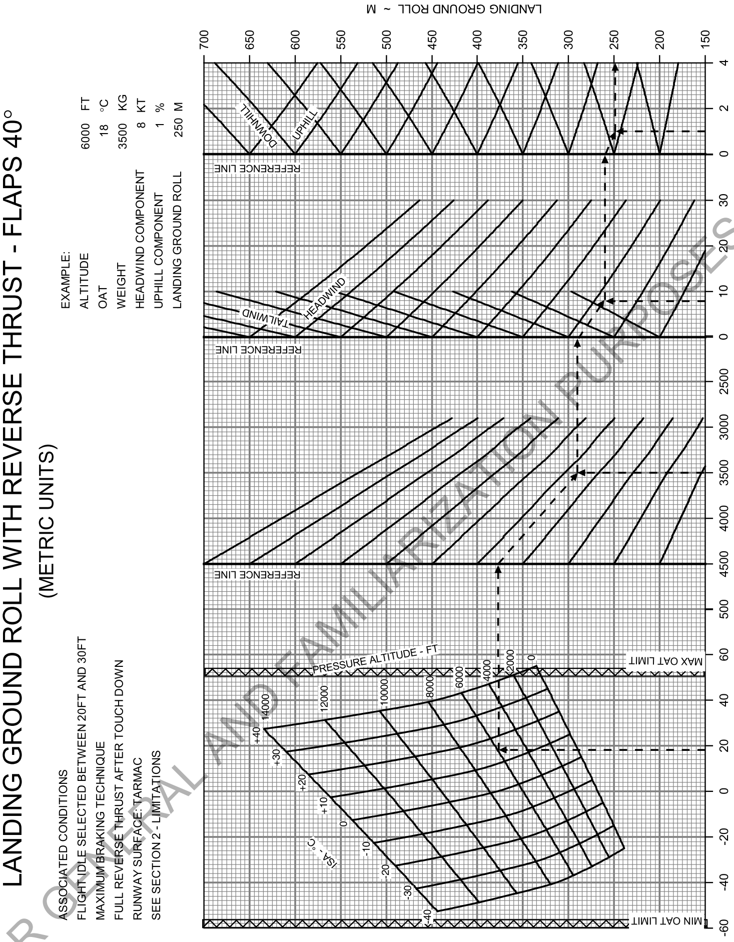


See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00332-A-001-01

Figure 5-3-10-7: Performance - Landing Ground Roll with the use of Reverse Thrust - Flaps 40° (standard units)

12-C-A15-60-0503-10A-030A-A



See FLIGHT IN ICING CONDITIONS para for info on effect of icing

ICN-12-C-A150503-A-S4080-00333-A-001-01

Figure 5-3-10-8: Performance - Landing Ground Roll with the use of Reverse Thrust - Flaps 40° (metric units)

12-C-A15-60-0503-10A-030A-A

5-4-1 Flight in Icing Conditions - General

The following section presents performance information related to the operation in or into known icing conditions. This information was derived analytically from actual wind tunnel tests with natural ice. The following cases are considered:

- 45 minutes holding in moderate icing conditions with fully operational pneumatic de-ice boots and substantial ice accretion on unprotected surfaces
- 20 minutes holding in moderate icing conditions with ice accretion on the total airframe due to inoperative pneumatic de-ice boots.

Besides these aerodynamic degradations, performance losses to the aircraft's propulsion system have been considered (increased bleed air extraction, inertial separator open, less ram recovery, and ice-build up on unprotected parts of the propeller blades).

12-C-A15-60-0504-01A-030A-A

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5-4-2 Flight in Icing Conditions - Flaps

When operating in or into known icing conditions, the use of Flaps 30° or 40° is prohibited.

When operating in or into known icing conditions with fully operational pneumatic de-ice boots, the flap position is limited to a maximum of 15°.

When operating in or into known icing conditions with failed operational pneumatic de-ice boots, the flap position is limited to a maximum of 0°.

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5-4-3 Flight in Icing Conditions - Stall Speeds

When operating in STICK PUSHER ICE MODE the stick pusher computer automatically reduces the shaker and pusher settings as measured by the angle of attack vanes, by 8°. With operational pneumatic de-ice boots, this results in an increase of the stall speed at the maximum takeoff weight of 12 kts with flaps set to 0° and 9 kts with flaps set to 15°.

The wings level stall speeds at the maximum takeoff weight of 10450 lb (4740 kg) and with flight idle power are summarized in Table 5-4-3-1.

Table 5-4-3-1: Stall Speeds in accordance with ICE Mode Set

FLAPS	STALL SPEED (PUSHER ACTIVATION) AT MTOW - KIAS	
0°	Non icing	95
	Icing conditions (STICK PUSHER ICE MODE)	107
	Pneumatic de-ice boots failure (unprotected)	110
15°	Non icing	78
	Icing conditions (STICK PUSHER ICE MODE)	87

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5-4-4 Flight in Icing Conditions - Engine Torque

When the engine inlet inertial separator is open and during flight, the maximum torque available can be reduced by up to 2.2 psi in non-icing conditions, and up to 2.8 psi in icing conditions.

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5-4-5 Flight in Icing Conditions - Takeoff Performance

The flaps must be set to 15° for takeoff. The use of flaps 30° for takeoff is prohibited.

When de-icing / anti-icing fluids are applied to the aircraft before departure, and/or when the stick pusher is in ICE mode: The takeoff reference speeds must be adjusted to the values indicated by the corresponding correction table.

Takeoff Total Distance

The total takeoff distance is calculated by first computing the total takeoff distance in non-icing conditions from Fig. 5-3-2-19 (standard units), Fig. 5-3-2-20 (metric units), Fig. 5-3-2-21 (ACS OFF, standard units) and Fig. 5-3-2-22 (ACS OFF, metric units) and then correcting that distance for takeoff in or into known icing conditions by using the corrections in Table 5-4-5-1, Table 5-4-5-2 and Table 5-4-5-3.

Icing correction (%) = A + B + C

Note
Due to the increased reference speed associated with icing conditions, the relative effect of wind on field performance becomes less pronounced. Thus, the wind effect given by the performance graphs (for non-icing conditions) needs to be attenuated (weakened). That is why a headwind component leads to an increase in the required field length, and a tailwind leads to a decrease (as illustrated by Table 5-4-5-2).

Table 5-4-5-1: Icing Corrections to Takeoff Total Distance - Altitude Correction (Table A)

Table A	**Takeoff Weight (kg (lb))**					
Altitude Correction (%)	**2900 (6393)**	**3300 (7275)**	**3700 (8157)**	**4100 (9039)**	**4500 (9921)**	**4740 (10450)**
V_R / V_{50ft} (KIAS)	**72 / 88**	**77 / 94**	**81 / 100**	**86 / 105**	**90 / 110**	**92 / 113**
0 ft	+21	+26	+27	+28	+29	+30
2000 ft	+23	+26	+27	+28	+30	+31
4000 ft	+26	+26	+27	+29	+30	+32
6000 ft	+26	+26	+28	+29	+31	+32
8000 ft	+26	+27	+28	+30	+32	+33
10000 ft	+25	+27	+28	+30	+32	+33
12000 ft	+26	+27	+29	+30	+32	+33
14000 ft	+27	+29	+30	+31	+33	+33

Table 5-4-5-2: Icing Corrections to Takeoff Total Distance - Wind Correction (Table B)

Table B	**Takeoff Weight (kg (lb))**
Wind Correction (%)	**2900 - 4740 (6393 - 10450)**
10 kts Tailwind	-3
No Wind	0
10 kts Headwind	+1
20 kts Headwind	+3
30 kts Headwind	+5

Table 5-4-5-3: Icing Corrections to Takeoff Total Distance - Slope Correction (Table C)

Table C	**Takeoff Weight (kg (lb))**					
Slope Correction (%)	**2900 (6393)**	**3300 (7275)**	**3700 (8157)**	**4100 (9039)**	**4500 (9921)**	**4740 (10450)**
4% down	+2	+2	+1	-1	-2	-2
2% down	+2	+2	-1	-1	-1	-1
No Slope	0	0	0	0	0	0
2% up	+4	+2	+2	+3	+4	+4
4% up	+7	+5	+5	+7	+9	+10

Takeoff Ground Roll

Analogically, the takeoff ground roll is derived correcting the distances obtained from Fig. 5-3-2-15 (standard units), Fig. 5-3-2-16 (metric units), Fig. 5-3-2-17 (ACS OFF, standard units) or Fig. 5-3-2-18 (ACS OFF, metric units) by using the corrections in Table 5-4-5-4, Table 5-4-5-5 and Table 5-4-5-6.

Icing correction (%) = A + B + C

Table 5-4-5-4: Icing Corrections to Takeoff Ground Roll - Altitude Correction (Table A)

Table A	Takeoff Weight (kg (lb))					
Altitude Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)	4740 (10450)
V_R / V_{50ft} (KIAS)	72 / 88	77 / 94	81 / 100	86 / 105	90 / 110	92 / 113
0 ft	+28	+28	+29	+29	+30	+30
2000 ft	+28	+28	+29	+29	+30	+30
4000 ft	+28	+28	+29	+29	+30	+30
6000 ft	+28	+28	+29	+29	+30	+30
8000 ft	+28	+28	+29	+29	+30	+30
10000 ft	+28	+28	+29	+29	+30	+30
12000 ft	+28	+28	+29	+29	+30	+30
14000 ft	+28	+29	+30	+30	+31	+32

Table 5-4-5-5: Icing Corrections to Takeoff Ground Roll - Wind Correction (Table B)

Table B	Takeoff Weight (kg (lb))
Wind Correction (%)	2900 - 4740 (6393 - 10450)
10 kt Tailwind	-4
No Wind	0
10 kt Headwind	+2
20 kt Headwind	+5
30 kt Headwind	+8

Table 5-4-5-6: Icing Corrections to Takeoff Ground Roll - Slope Correction (Table C)

Table C	Takeoff Weight (kg (lb))					
Slope Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)	4740 (10450)
4% down	0	0	-1	-1	-1	-1
2% down	0	0	0	0	0	-1
No Slope	0	0	0	0	0	0
2% up	+1	+1	+1	+2	+2	+3
4% up	+1	+2	+3	+4	+6	+6

Example:

- Pressure Altitude = 6000 ft
- Outside Air Temperature = -10 °C
- Weight = 3500 kg
- Headwind Component = 8 kt
- Uphill Component = 1%
- Takeoff Ground Roll = 300 m (from Fig. 5-3-2-16)
- Icing Correction (A + B + C) = 28.5% + 1.6% + 0.5% = 30.6%
- Takeoff Ground Roll in Icing Conditions = 300 m * 1.306 = 392 m.

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5-4-6 Flight in Icing Conditions - Accelerate-Stop Performance

The flaps must be set to 15° for takeoff. The use of flaps 30° for takeoff is prohibited.

The maximum speed for power chop is assumed to be 10 kt higher than that for non-icing conditions.

The total accelerate-stop distance is calculated by first computing the total accelerate-stop distance in non-icing conditions from Fig. 5-3-2-13 (standard units), Fig. 5-3-2-14 (metric units) and then correcting that distance for takeoff in or into known icing conditions by using the corrections in Table 5-4-6-1, Table 5-4-6-2 and Table 5-4-6-3.

Icing correction (%) = A + B + C

Table 5-4-6-1: Icing Corrections to Accelerate-Stop Distance - Altitude Correction (Table A)

Table A	Takeoff Weight (kg (lb))					
Altitude Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)	4740 (10450)
Power Chop Speed (KIAS)	76	81	86	90	95	97
0 ft	+25	+26	+27	+28	+28	+29
2000 ft	+25	+26	+27	+28	+29	+29
4000 ft	+26	+27	+28	+28	+29	+29
6000 ft	+26	+27	+28	+29	+29	+30
8000 ft	+26	+27	+28	+29	+30	+30
10000 ft	+27	+28	+28	+29	+30	+30
12000 ft	+27	+28	+29	+29	+30	+30
14000 ft	+28	+29	+30	+30	+31	+32

Table 5-4-6-2: Icing Corrections to Accelerate-Stop Distance - Wind Correction (Table B)

Table B	Takeoff Weight (kg (lb))
Wind Correction (%)	2900 - 4740 (6393 - 10450)
10 kts Tailwind	-3
No Wind	0
10 kts Headwind	+2
20 kts Headwind	+3
30 kts Headwind	+5

Table 5-4-6-3: Icing Corrections to Accelerate-Stop Distance - Slope Correction (Table C)

Table C	Takeoff Weight (kg (lb))					
Slope Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)	4740 (10450)
4% down	+2	+2	+2	+2	+2	+2
2% down	+1	+1	+1	+1	+1	+1
No Slope	0	0	0	0	0	0
2% up	0	0	0	+1	+1	+2
4% up	0	+1	+1	+2	+4	+6

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5-4-7 Flight in Icing Conditions - Maximum Rate of Climb

The use of Flaps 30° is prohibited in or into known icing conditions. After icing encounters, and with visible ice accretion on the airframe, a climb is performed with the flaps retracted and a climb speed based on the schedule as given in Table 5-4-7-1.

Table 5-4-7-1: Climb Speed in Icing Conditions

Flaps UP	Non-Icing	Icing	Pneumatic De-Ice Boot Failure
Altitude (ft)	KIAS	KIAS	KIAS
0	130	135	140
5000	125		
10000	125		
15000	125		
20000	120		
25000	120		
30000	120		

The total climb performance is calculated by first computing the Rate of Climb in non-icing conditions from Fig. 5-3-3-6 (standard units) or Fig. 5-3-3-7 (metric units) and then correcting the Rate of Climb in or into known icing conditions by using the corrections in Table 5-4-7-2 (with operational pneumatic de-ice boots) or Table 5-4-7-3 (with the pneumatic de-ice boots inoperative).

Table 5-4-7-2: Icing Corrections to Maximum Rate of Climb with Operational Pneumatic De-ice Boots

Altitude (ft)	Rate of Climb Correction (feet per minute)			
	Takeoff Weight (kg (lb))			
	2900 (6393)	3500 (7716)	4500 (9921)	4740 (10450)
0	-1230	-1030	-790	-750
5000	-1280	-1060	-800	-760
10000	-1320	-1090	-830	-780
15000	-1330	-1100	-840	-790
20000	-1380	-1140	-850	-800
25000	-1400	-1150	-870	-820
30000	-1430	-1180	-880	-840

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Table 5-4-7-3: Icing Corrections to Maximum Rate of Climb with Pneumatic De-ice Boots Inoperative

Rate of Climb Correction (feet per minute)				
Altitude (ft)	**Takeoff Weight (kg (lb))**			
	2900 (6393)	**3500 (7716)**	**4500 (9921)**	**4740 (10450)**
0	-1510	-1270	-970	-920
5000	-1590	-1330	-1010	-950
10000	-1650	-1380	-1050	-990
15000	-1700	-1410	-1080	-1010
20000	-1810	-1500	-1130	-1060
25000	-1870	-1540	-1170	-1100
30000	-1940	-1600	-1210	-1150

Example:

- Pressure Altitude = 5000 ft
- Outside Air Temperature = -10 °C
- Aircraft Weight = 3800 kg
- Rate of Climb (non-icing) = 2400 fpm (from Fig. 5-3-3-7)
- Icing Correction = -982 fpm (interpolated from Table 5-4-7-2)
- Max. Rate of Climb in Icing Conditions = 2400 fpm - 982 fpm = 1418 fpm.

5-4-8 Flight in Icing Conditions - Holding Endurance

During holding flight in icing conditions, a higher engine torque is required to maintain level flight. Table 5-4-8-1 and Table 5-4-8-2 give the increases in fuel flow with respect to non-icing conditions. Refer to Fig. 5-3-6-1.

Table 5-4-8-1: Icing Conditions to Holding Fuel Flow with Operational Pneumatic De-ice Boots

Fuel Flow Correction (%)	
Altitude (ft)	Aircraft Weight (kg (lb))
	2900 - 4740 (6393 - 10450)
0	+29
5000	+33
10000	+37
15000	+45

Table 5-4-8-2: Icing Conditions to Holding Fuel Flow with Pneumatic De-ice Boots Inoperative

Fuel Flow Correction (%)	
Altitude (ft)	Aircraft Weight (kg (lb))
	2900 - 4740 (6393 - 10450)
0	+36
5000	+41
10000	+48
15000	+57

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5-4-9 Flight in Icing Conditions - Balked Rate of Climb

The use of Flaps 30° or Flaps 40° is prohibited in or into known icing conditions.

After icing encounters and with visible ice accretion on the airframe, a balked landing climb is performed with Flaps 15° and a climb speed of 105 KIAS. The total climb performance is calculated by first computing the Rate of Climb in non-icing conditions from Fig. 5-3-9-2 (standard units) or Fig. 5-3-9-3 (metric units) and then correcting the Rate of Climb in or into known icing conditions by using the corrections in Table 5-4-9-1.

Table 5-4-9-1: Icing Corrections to Balked Landing Climb with Operational Pneumatic De-ice Boots

Rate of Climb Correction (feet per minute)			
Altitude (ft)	Landing Weight (kg (lb))		
	2900 (6393)	3500 (7716)	4500 (9921)
0	-140	-100	-80
2000	-140	-100	-80
4000	-150	-100	-80
6000	-150	-100	-80
8000	-150	-110	-90
10000	-160	-110	-90
12000	-150	-110	-80
14000	-150	-110	-80

After failure of the airframe pneumatic boots in icing conditions, a balked landing climb is performed with Flaps 0° and a climb speed of 130 KIAS. The total climb performance is calculated by first computing the Rate of Climb in non-icing conditions from Fig. 5-3-9-2 (standard units) or Fig. 5-3-9-3 (metric units) and then correcting the Rate of Climb in or into known icing conditions by using the corrections in Table 5-4-9-2.

Table 5-4-9-2: Icing Corrections to Balked Landing Climb with Pneumatic De-ice Boots inoperative

Rate of Climb Correction (feet per minute)			
Altitude (ft)	Landing Weight (kg (lb))		
	2900 (6393)	3500 (7716)	4500 (9921)
0	-580	-450	-320
2000	-620	-480	-340
4000	-670	-520	-360
6000	-700	-540	-380
8000	-740	-580	-400
10000	-780	-610	-420
12000	-800	-630	-440
14000	-950	-750	-530

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5-4-10 Flight in Icing Conditions - Landing Performance

The flaps must be set to 15° for landing. The use of Flaps 30° or 40° for landing is prohibited. With pneumatic de-ice boots failed; a flaps-up-landing must be performed. For both flap configurations, the landing reference speed must be adjusted to the values indicated by the corresponding correction table. The landing distance is calculated by first computing the landing distance in non-icing conditions and then correcting that distance for landing in or into known icing conditions by using the correction tables below (see Table 5-4-10-1).

Icing correction (%) = A + B + C

Table 5-4-10-1: Landing in Icing Conditions - Overview

Reverse Thrust	Pneumatic De-ice Boots	Flap Setting	Landing Performance Information	Non-icing Figure No.	Icing Correction Table
No	Operational	Flaps 15°	Landing Total Distance	Fig. 5-3-10-1 Fig. 5-3-10-2	Table 5-4-10-2 (A) Table 5-4-10-3 (B) Table 5-4-10-4 (C)
			Landing Ground Roll	Fig. 5-3-10-3 Fig. 5-3-10-4	Table 5-4-10-5 (A) Table 5-4-10-6 (B) Table 5-4-10-7 (C)
	Inoperative	Flaps 0°	Landing Total Distance	Fig. 5-3-10-1 Fig. 5-3-10-2	Table 5-4-10-8 (A) Table 5-4-10-9 (B) Table 5-4-10-10 (C)
			Landing Ground Roll	Fig. 5-3-10-3 Fig. 5-3-10-4	Table 5-4-10-11 (A) Table 5-4-10-12 (B) Table 5-4-10-13 (C)
Yes	Operational	Flaps 15°	Landing Total Distance	Fig. 5-3-10-5 Fig. 5-3-10-6	Table 5-4-10-14 (A) Table 5-4-10-15 (B) Table 5-4-10-16 (C)
			Landing Ground Roll	Fig. 5-3-10-7 Fig. 5-3-10-8	Table 5-4-10-17 (A) Table 5-4-10-18 (B) Table 5-4-10-19 (C)
	Inoperative	Flaps 0°	Landing Total Distance	Fig. 5-3-10-5 Fig. 5-3-10-6	Table 5-4-10-20 (A) Table 5-4-10-21 (B) Table 5-4-10-22 (C)

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Table 5-4-10-1: Landing in Icing Conditions - Overview (continued from previous page)

Reverse Thrust	Pneumatic De-ice Boots	Flap Setting	Landing Performance Information	Non-icing Figure No.	Icing Correction Table
			Landing Ground Roll	Fig. 5-3-10-5 Fig. 5-3-10-6	Table 5-4-10-23 (A) Table 5-4-10-24 (B) Table 5-4-10-25 (C)

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Table 5-4-10-2: Icing Corrections to Landing Total Distance - Flaps 15° - No Reverse Thrust - Altitude Correction (Table A)

Table A	Landing Weight (kg (lb))				
Altitude Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
V_{APP} (KIAS)	84	90	95	100	105
0 ft	+38	+41	+43	+45	+47
2000 ft	+39	+42	+44	+46	+48
4000 ft	+41	+44	+46	+48	+49
6000 ft	+42	+45	+47	+49	+50
8000 ft	+44	+46	+48	+50	+52
10000 ft	+45	+47	+50	+51	+53
12000 ft	+46	+49	+51	+52	+53
14000 ft	+48	+50	+52	+52	+52

Table 5-4-10-3: Icing Corrections to Landing Total Distance - Flaps 15° - No Reverse Thrust - Wind Correction (Table B)

Table B	Landing Weight (kg (lb))				
Wind Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
10 kt Tailwind	-5	-5	-5	-5	-5
No Wind	0	0	0	0	0
10 kt Headwind	+3	+3	+3	+3	+3
20 kt Headwind	+6	+6	+6	+6	+6
30 kt Headwind	+11	+10	+10	+10	+9

Table 5-4-10-4: Icing Corrections to Landing Total Distance - Flaps 15° - No Reverse Thrust - Slope Correction (Table C)

Table C	Landing Weight (kg (lb))
Slope Correction (%)	2900 - 4500 (6393 - 9921)
4% down	+1
2% down	0
No Slope	0
2% up	0
4% up	0

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Table 5-4-10-5: Icing Corrections to Landing Ground Roll - Flaps 15° - No Reverse Thrust - Altitude Correction (Table A)

Table A	**Landing Weight (kg (lb))**				
Altitude Correction (%)	**2900 (6393)**	**3300 (7275)**	**3700 (8157)**	**4100 (9039)**	**4500 (9921)**
V_{APP} (KIAS)	**84**	**90**	**95**	**100**	**105**
0 ft	+64	+59	+56	+57	+58
2000 ft	+61	+57	+57	+58	+59
4000 ft	+59	+56	+58	+59	+60
6000 ft	+56	+57	+58	+59	+60
8000 ft	+57	+58	+59	+61	+62
10000 ft	+57	+59	+60	+61	+63
12000 ft	+58	+59	+61	+62	+64
14000 ft	+59	+61	+62	+64	+65

Table 5-4-10-6: Icing Corrections to Landing Ground Roll - Flaps 15° - No Reverse Thrust - Wind Correction (Table B)

Table B	**Landing Weight (kg (lb))**				
Wind Correction (%)	**2900 (6393)**	**3300 (7275)**	**3700 (8157)**	**4100 (9039)**	**4500 (9921)**
10 kt Tailwind	-7	-7	-6	-5	-5
No Wind	0	0	0	0	0
10 kt Headwind	+6	+5	+4	+4	+4
20 kt Headwind	+14	+11	+9	+9	+8
30 kt Headwind	+23	+19	+16	+15	+14

Table 5-4-10-7: Icing Corrections to Landing Ground Roll - Flaps 15° - No Reverse Thrust - Slope Correction (Table C)

Table C	**Landing Weight (kg (lb))**
Slope Correction (%)	**2900 - 4500 (6393 - 9921)**
4% down	-3
2% down	-1
No Slope	0
2% up	+2
4% up	+4

Table 5-4-10-8: Icing Corrections to Landing Total Distance - Flaps 0° - No Reverse Thrust - Altitude Correction (Table A)

Table A	Landing Weight (kg (lb))				
Altitude Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
V_{APP} (KIAS)	104	111	118	124	130
0 ft	+86	+92	+97	+101	+104
2000 ft	+89	+94	+99	+103	+106
4000 ft	+93	+98	+103	+107	+110
6000 ft	+95	+100	+105	+109	+113
8000 ft	+99	+104	+109	+113	+118
10000 ft	+101	+107	+112	+116	+121
12000 ft	+104	+109	+115	+120	+120
14000 ft	+108	+114	+120	+119	+117

Table 5-4-10-9: Icing Corrections to Landing Total Distance - Flaps 0° - No Reverse Thrust - Wind Correction (Table B)

Table B	Landing Weight (kg (lb))				
Wind Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
10 kt Tailwind	-12	-11	-11	-11	-11
No Wind	0	0	0	0	0
10 kt Headwind	+7	+6	+6	+6	+6
20 kt Headwind	+15	+14	+14	+13	+13
30 kt Headwind	+25	+24	+23	+22	+21

Table 5-4-10-10: Icing Corrections to Landing Total Distance - Flaps 0° - No Reverse Thrust - Slope Correction (Table C)

Table C	Landing Weight (kg (lb))				
Slope Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
4% down	-2	-3	-4	-4	-3
2% down	-1	-1	-1	-1	-1
No Slope	0	0	0	0	0
2% up	+2	+2	+2	+2	+2
4% up	+3	+3	+3	+3	+3

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Table 5-4-10-11: Icing Corrections to Landing Ground Roll - Flaps 0° - No Reverse Thrust - Altitude Correction (Table A)

Table A	**Landing Weight (kg (lb))**				
Altitude Correction (%)	**2900 (6393)**	**3300 (7275)**	**3700 (8157)**	**4100 (9039)**	**4500 (9921)**
V_{APP} (KIAS)	**104**	**111**	**118**	**124**	**130**
0 ft	+117	+112	+111	+113	+115
2000 ft	+114	+110	+112	+115	+117
4000 ft	+111	+112	+115	+1118	+121
6000 ft	+110	+114	+117	+121	+124
8000 ft	+113	+117	+121	+125	+129
10000 ft	+115	+120	+124	+129	+133
12000 ft	+118	+122	+127	+132	+138
14000 ft	+122	+127	+134	+137	+137

Table 5-4-10-12: Icing Corrections to Landing Ground Roll - Flaps 0° - No Reverse Thrust - Wind Correction (Table B)

Table B	**Landing Weight (kg (lb))**				
Wind Correction (%)	**2900 (6393)**	**3300 (7275)**	**3700 (8157)**	**4100 (9039)**	**4500 (9921)**
10 kt Tailwind	-13	-12	-11	-10	-10
No Wind	0	0	0	0	0
10 kt Headwind	+12	+10	+9	+8	+8
20 kt Headwind	+26	+22	+19	+18	+17
30 kt Headwind	+46	+38	+33	+30	+28

Table 5-4-10-13: Icing Corrections to Landing Ground Roll - Flaps 0° - No Reverse Thrust - Slope Correction (Table C)

Table C	**Landing Weight (kg (lb))**				
Slope Correction (%)	**2900 (6393)**	**3300 (7275)**	**3700 (8157)**	**4100 (9039)**	**4500 (9921)**
4% down	-7	-7	-6	-7	-6
2% down	-3	-3	-3	-2	-2
No Slope	0	0	0	0	0
2% up	+6	+6	+6	+6	+6
4% up	+12	+11	+11	+11	+10

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Table 5-4-10-14: Icing Corrections to Landing Total Distance - Flaps 15° - With Reverse Thrust - Altitude Correction (Table A)

Table A	**Landing Weight (kg (lb))**				
Altitude Correction (%)	**2900 (6393)**	**3300 (7275)**	**3700 (8157)**	**4100 (9039)**	**4500 (9921)**
V_{APP} (KIAS)	**84**	**90**	**95**	**100**	**105**
0 ft	+32	+36	+38	+40	+41
2000 ft	+34	+37	+39	+40	+42
4000 ft	+36	+38	+40	+42	+43
6000 ft	+37	+39	+41	+42	+44
8000 ft	+39	+41	+42	+44	+43
10000 ft	+40	+41	+43	+43	+45
12000 ft	+40	+42	+43	+45	+46
14000 ft	+42	+42	+45	+46	+47

Table 5-4-10-15: Icing Corrections to Landing Total Distance - Flaps 15° - With Reverse Thrust - Wind Correction (Table B)

Table B	**Landing Weight (kg (lb))**
Wind Correction (%)	**2900 - 4500 (6393 - 9921)**
10 kt Tailwind	-5
No Wind	0
10 kt Headwind	+3
20 kt Headwind	+6
30 kt Headwind	+11

Table 5-4-10-16: Icing Corrections to Landing Total Distance - Flaps 15° - With Reverse Thrust - Slope Correction (Table C)

Table C	**Landing Weight (kg (lb))**
Slope Correction (%)	**2900 - 4500 (6393 - 9921)**
4% down	0
2% down	0
No Slope	0
2% up	0
4% up	+1

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Table 5-4-10-17: Icing Corrections to Landing Ground Roll - Flaps 15° - With Reverse Thrust - Altitude Correction (Table A)

Table A	Landing Weight (kg (lb))				
Altitude Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
V_{APP} (KIAS)	84	90	95	100	105
0 ft	+55	+52	+49	+50	+50
2000 ft	+53	+50	+50	+50	+50
4000 ft	+52	+50	+50	+50	+51
6000 ft	+50	+50	+50	+50	+51
8000 ft	+50	+50	+51	+51	+51
10000 ft	+50	+50	+51	+51	+51
12000 ft	+50	+51	+51	+51	+52
14000 ft	+50	+51	+51	+52	+52

Table 5-4-10-18: Icing Corrections to Landing Ground Roll - Flaps 15° - With Reverse Thrust - Wind Correction (Table B)

Table B	Landing Weight (kg (lb))				
Wind Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
10 kt Tailwind	-7	-7	-7	-6	-6
No Wind	0	0	0	0	0
10 kt Headwind	+5	+5	+4	+4	+4
20 kt Headwind	+12	+10	+9	+8	+8
30 kt Headwind	+21	+18	+15	+14	+13

Table 5-4-10-19: Icing Corrections to Landing Ground Roll - Flaps 15° - With Reverse Thrust - Slope Correction (Table C)

Table C	Landing Weight (kg (lb))
Slope Correction (%)	2900 - 4500 (6393 - 9921)
4% down	-2
2% down	-1
No Slope	0
2% up	+2
4% up	+3

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Table 5-4-10-20: Icing Corrections to Landing Total Distance - Flaps 0° - With Reverse Thrust - Altitude Correction (Table A)

Table A	Landing Weight (kg (lb))				
Altitude Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
V_{APP} (KIAS)	104	111	118	124	130
0 ft	+77	+84	+88	+91	+94
2000 ft	+80	+86	+89	+93	+95
4000 ft	+84	+89	+92	+95	+98
6000 ft	+86	+90	+94	+97	+99
8000 ft	+89	+93	+96	+99	+99
10000 ft	+91	+95	+98	+98	+103
12000 ft	+93	+96	+97	+102	+105
14000 ft	+95	+95	+102	+105	+107

Table 5-4-10-21: Icing Corrections to Landing Total Distance - Flaps 0° - With Reverse Thrust - Wind Correction (Table B)

Table B	Landing Weight (kg (lb))				
Wind Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
10 kt Tailwind	-13	-13	-14	-14	-9
No Wind	0	0	0	0	0
10 kt Headwind	+6	+6	+6	+6	+6
20 kt Headwind	+14	+14	+14	+13	+13
30 kt Headwind	+24	+23	+23	+22	+21

Table 5-4-10-22: Icing Corrections to Landing Total Distance - Flaps 0° - With Reverse Thrust - Slope Correction (Table C)

Table C	Landing Weight (kg (lb))
Slope Correction (%)	2900 - 4500 (6393 - 9921)
4% down	-3
2% down	-1
No Slope	0
2% up	+2
4% up	+3

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Table 5-4-10-23: Icing Corrections to Landing Ground Roll - Flaps 0° - With Reverse Thrust - Altitude Correction (Table A)

Table A	Landing Weight (kg (lb))				
Altitude Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
V_{APP} (KIAS)	104	111	118	124	130
0 ft	+103	+99	+96	+97	+98
2000 ft	+101	+97	+97	+98	+98
4000 ft	+99	+97	+98	+99	+99
6000 ft	+97	+98	+99	+99	+100
8000 ft	+98	+99	+100	+101	+102
10000 ft	+98	+100	+101	+102	+104
12000 ft	+99	+100	+102	+103	+105
14000 ft	+100	+102	+104	+106	+105

Table 5-4-10-24: Icing Corrections to Landing Ground Roll - Flaps 0° - With Reverse Thrust - Wind Correction (Table B)

Table B	Landing Weight (kg (lb))				
Wind Correction (%)	2900 (6393)	3300 (7275)	3700 (8157)	4100 (9039)	4500 (9921)
10 kt Tailwind	-14	-13	-13	-13	-12
No Wind	0	0	0	0	0
10 kt Headwind	+11	+9	+8	+8	+7
20 kt Headwind	+24	+21	+18	+17	+16
30 kt Headwind	+42	+36	+31	+29	+27

Table 5-4-10-25: Icing Corrections to Landing Ground Roll - Flaps 0° - With Reverse Thrust - Slope Correction (Table C)

Table C	Landing Weight (kg (lb))
Slope Correction (%)	2900 - 4500 (6393 - 9921)
4% down	-6
2% down	-3
No Slope	0
2% up	+4
4% up	+8

5-5-1 Flight Planning Example

5-5-1-1 General

This section gives an example of flight planning for aircraft with a five bladed propeller. Before performance calculations can begin, it will be necessary to determine the aircraft loading. Refer to Section 6, Weight and Balance to calculate the actual aircraft loading.

Table 5-5-1-1: Aircraft Configuration

Aircraft Configuration:	
Takeoff Weight Usable Fuel	8798 lb 1650 lb

Table 5-5-1-2: Airport Conditions

Departure Airport Conditions:		**Destination Airport Conditions:**	
Field Pressure Altitude	4000 ft	Field Pressure Altitude	2000 ft
OAT	+17 °C (ISA +10 °C)	OAT	+16 °C (ISA +5 °C)
Wind Component	9 kt (headwind)	Wind Component	6 kt (headwind)
Runway Slope	1% (uphill)	Runway Slope	1.5% (downhill)
Field Length	3690 ft	Field Length	2550 ft
Total Trip Distance	765 nm		

Table 5-5-1-3: Cruise Conditions

Cruise Conditions:	
Pressure Altitude	FL 280
Forecast Temperature	-31 °C (ISA +10 °C)
Forecast Wind Component	10 kt (headwind)

5-5-1-2 Takeoff

Apply the departure airport conditions and the aircraft weight to the appropriate takeoff performance charts and check that the corresponding distances are less than the available field length at the departure airport.

Apply the departure airport conditions to the Takeoff Power Chart to determine maximum torque to be applied before brake release.

5-5-1-3 Climb

Note

The climb performance chart assumes a no wind condition. The pilot must consider the effect of the winds aloft when computing time, fuel, and distance to climb. The fuel to climb includes the fuel consumed during the takeoff run.

Apply the cruise conditions of pressure altitude and temperature (respectively 28000 ft and ISA +10 °C in this case) to the appropriate chart to determine the time, fuel, and distance to climb from sea level to the cruise altitude at the specified takeoff weight (8798 lb in this case). Next, apply the departure airport conditions (respectively 4000 ft and ISA +10 °C in this case) to the same chart to determine those same values to climb from sea level to the departure airport. Subtract the values for the departure airport from those for the cruise altitude. The remaining values are the time, fuel, and distance to climb from the departure airport to the cruise altitude.

Table 5-5-1-4: Time, Fuel and Distance to climb from Departure Airport to Cruise Altitude

Climb	Time	Fuel	Distance
From S.L. to 28000 ft	21 min	190 lb	68 nm
From S.L. to departure airport	2 min	30 lb	6 nm
Departure airport to 28000 ft	19 min	160 lb	62 nm

5-5-1-4 Descent

Note

The descent performance chart assumes a no wind condition. The pilot must consider the effect of the winds aloft when computing time, fuel, and distance to descend.

Apply the cruise conditions of pressure altitude and temperature (respectively 28000 ft and ISA +10 °C in this case) to the appropriate chart to determine the time, fuel, and distance to descend from cruise altitude to sea level. The weight at the beginning of the descent is not known exactly at this stage, but it can be estimated in practice as shown below:

Takeoff weight	-	Usable fuel	+	Fuel reserve*	+	Allowance for descent	=	Weight at beginning of descent
8798	-	1650	+	300	+	100	=	7548 lb

** As required by operating regulations, here a reserve corresponding to 45 min hold at 5000 ft is assumed.*

Next, apply the destination airport conditions (respectively 2000 ft and ISA + 5°C in this case) to the same chart to determine those same values to descend from the destination airport to sea level. Subtract the values for the destination airport from those for the cruise altitude. The remaining values are the time, fuel, and distance to descend from the cruise altitude to the destination airport.

Table 5-5-1-5: Time, Fuel and Distance to descent from Cruise Altitude to Destination Airport

Descent	Time	Fuel	Distance
From 28000 ft to S.L.	14 min	88 lb	66 nm
From destination airport to S.L.	1 min	9 lb	4 nm
From 28000 ft to destination airport	13 min	79 lb	62 nm

5-5-1-5 Cruise

Calculate the cruise distance by subtracting the climb and descent distances from the total trip distance. Select a cruise power setting and refer to the appropriate chart to determine the true airspeed and fuel flow for the forecast cruise conditions. Adjust the true airspeed for the winds aloft headwind component to determine the ground speed. Divide the cruise distance by the ground speed to determine the cruise time. Calculate the cruise fuel required by multiplying the fuel flow by the cruise time.

Cruise distance

Total trip distance	-	Climb distance	-	Descent distance	=	Cruise distance
765	-	62	-	62	=	641

Cruise power setting

By assuming an average cruise weight of 8500 lb, Maximum Cruise Power setting for 28000 ft. at ISA +10°C yields 275 KTAS at 378 lb/hr.

Ground speed

Cruise speed	±	Headwind component	=	Ground speed
275	-	10	=	265 KTAS

Cruise time

Cruise distance	/	Ground speed	=	Cruise time
641 nm	/	265 kt	=	2.42 hr (2 hr 25 min)

Cruise fuel

Cruise time	*	Fuel flow	=	Cruise flow
2.42 hr	*	378 lb/hr	=	914 lb

5-5-1-6 Landing

Calculate the estimated landing weight by the subtracting the weight of the fuel for climb, descent, and cruise from the takeoff weight.

Takeoff weight	- Climb fuel	- Descent fuel	- Cruise fuel	= Landing weight
8798	- 160	- 79	- 914	= 7645 lb

Apply the destination airport conditions and the calculated aircraft weight to the appropriate landing performance charts and check that the corresponding distances are less than the available field length at the destination airport.

5-5-1-7 Total flight time

The total flight time is the sum of the time to climb, descent, and cruise.

Climb time	+ Descent time	+ Cruise time	= Total time
19 min	+ 13 min	+ 2 hr 25 min	= 2 hr 57min

5-5-1-8 Total fuel required

The total fuel required is the sum of the fuel consumed during engine start and ground operation, takeoff and climb, descent, and cruise.

Ground ops	+ TO & Climb	+ Descent	+ Cruise	+ Reserve	= Total fuel required
40	+ 160	+ 79	+ 914	+ 300	= 1489 lb

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SECTION 6

Weight and Balance (EASA Approved)

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6-1 General

This section contains the information required to determine the Basic Empty Weight and Moment of the aircraft, adjust the B.E.W. & M as equipment is added or removed, and calculate aircraft loading for various flight operations. Sample loading forms are provided.

To achieve the performance designed for the aircraft it must be flown with approved weight and center of gravity limits.

It is the responsibility of the pilot in command to make sure that the aircraft does not exceed the maximum weight limits and is loaded within the center of gravity range before takeoff.

Weight in excess of the maximum takeoff weight may be a contributing factor to an accident, especially with other factors of temperature, airfield elevation and runway conditions. The aircraft's climb, cruise and landing performance will also be affected. Loads that the aircraft was not designed for may be put on the structure, particularly during landing.

The pilot should routinely determine the balance of the aircraft since it is possible to be within the maximum weight limit and still exceed the center of gravity limits. Information regarding the Basic Empty Weight can be found on the Weight and Balance Records in this section.

Installed equipment information can be found in the Equipment List at the back of this manual. Using the basic empty weight and moment together with the Loading Form the pilot can determine the weight and moment for the loaded aircraft by computing the total weight and moment and then determine whether they are within the Center of Gravity Envelope.

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6-2 Preparations for Airplane Weighing

1. Make sure that all applicable items listed on the airplane equipment list are installed in their proper locations.
2. Clean airplane. Remove dirt, excessive grease, water, and foreign items.
3. Completely defuel the fuel tanks. Use the wing fuel drain ports for the completion of the task.
4. Fill oil, hydraulic fluid, and all other operating fluids to full capacity.
5. Make sure that the flaps are fully retracted and that the flight controls are in the neutral position.
6. Place crew seats in the center position and make sure the cabin passenger seats are in the correct positions. Refer to the relevant Interior Configuration Code Seat Location Chart in this Section.
7. Close access panels and passenger door.
8. Make sure that all tires are inflated to normal operating pressure.
9. Place airplane in a closed hangar to prevent scale reading errors due to wind.

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6-3 Airplane Weighing with Load Plates

6-3-1 Leveling

Open the cargo door and place a level across the seat tracks. Adjust the main gear tire pressure (do not exceed the recommended maximum tire pressure) until the airplane is laterally level. Place the level along the top of the inboard seat track and adjust the nose tire pressure until the airplane is longitudinally level. Refer to Section 8, Levelling of this Handbook for more information concerning airplane leveling. Remove the level and carefully close the cargo door.

6-3-2 Weighing

1. Record the tare weight for each applicable scale on Fig. 6-3-1 Airplane Weighing Form.
2. Refer to the manufacturer's instructions and position the aircraft on the load plates.
3. With the airplane level and brakes released, record the weight shown on each scale in the appropriate section on Fig. 6-3-1 Airplane Weighing Form.
4. Subtract the tare weight from the applicable scale reading. Record the resulting net weights in the appropriate section on Fig. 6-3-1 Airplane Weighing Form.
5. Refer to Fig. 6-3-2 and Fig. 6-3-3, Sheet 2 and 3. Record the strut extensions of the nose gear (a), the left main gear (b) and the right main gear (c) on Fig. 6-3-2 Sheet 2 Airplane Weighing Form. Calculate the average of the main gear strut extensions (b) and (c) and record the average (B) on Fig. 6-3-2 Sheet 2 Airplane Weighing Form.
6. Calculate the arm of the nose gear (A) from the extension of the nose gear strut (a) using the table in Fig. 6-3-2 Sheet 2. If the extension of the nose gear strut (a) is in between two values in the table, the arm of the nose gear (A) must be calculated by linear interpolation. Record the arm of the nose gear (A) in the appropriate section on Fig. 6-3-2 Sheet 2 Airplane Weighing Form.
7. Calculate the arm of the main gear (B) from the average extension of the main gear struts (b) and (c) using the table in Fig. 6-3-3 Sheet 3. If the average extension of the main gear struts is in between two values in the table, the arm of the main gear (B) must be calculated by linear interpolation. Record the arm of the main gear (B) in the appropriate section on Fig. 6-3-2 Sheet 2 Airplane Weighing Form.
8. Calculate the airplane C.G. arm using the formula in Fig. 6-3-3 Sheet 3 and record it in the appropriate section on Fig. 6-4-2, Airplane Basic Empty Weight.
9. Refer to Fig. 6-4-2. Adjust weight and moment for unusable fuel and optional equipment installed after airplane weighing to determine airplane Total Basic Empty Weight and Moment.
10. Update Fig. 6-6-1, Weight and Balance Record, as required.
11. After weighing return tire pressures to operational values. Refer to Section 8, Fuel Anti-Icing Additive for instructions.

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Scale Position	Symbol	Scale Reading lb (kg)	Tare lb (kg)	Net Weight lb (kg)
Nose Landing Gear	N			
Left Main Landing Gear	L			
Right Main Landing Gear	R			
TOTAL AIRCRAFT WEIGHT				

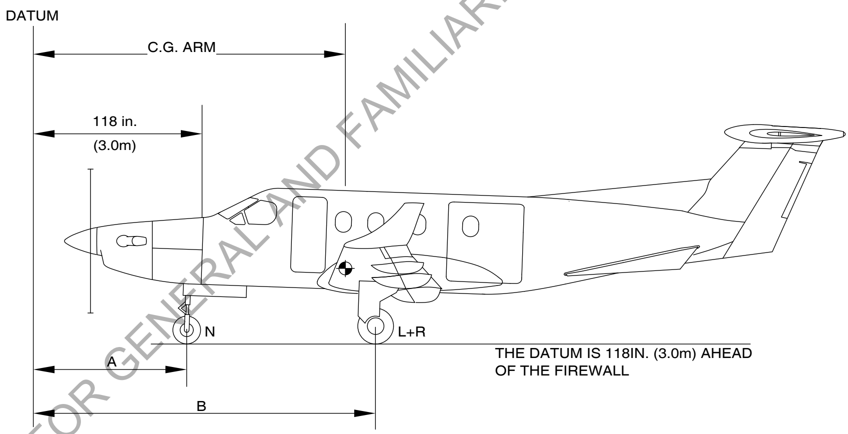

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Figure 6-3-1: Airplane Weighing Form

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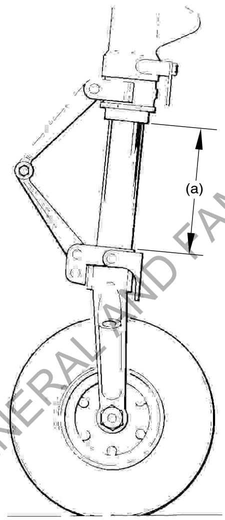
Landing Gear	Symbol	Dimension mm	Average (b) mm	Arm in (mm)	
Nose	(a)		- -		(A)
Left Main	(b)		(L+R) / 2		(B)
Right Main	(c)				

NOSE GEAR ARM



Dimension (a) is strut extension

Dimension (a) (mm)	Arm (A) (in)	Arm (A) (mm)
0	111.90	2842
20	111.82	2840
40	111.74	2838
60	111.62	2835
80	111.54	2833
100	111.46	2831
120	111.34	2828
140	111.27	2826
160	111.19	2824
180	111.07	2821
200	110.99	2819
220	110.91	2817
240	110.79	2814

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Figure 6-3-2: Airplane Weighing Form

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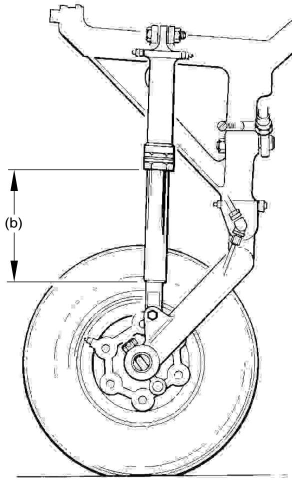
MAIN GEAR ARM



Dimension (b) is strut extension

Dimension (b) (mm)	Arm (B) (in)	Arm (B) (mm)
110	254.78	6471
130	254.46	6463
150	254.07	6453
170	253.60	6441
190	253.04	6427
210	252.41	6411
230	251.71	6393
250	250.88	6372
270	249.97	6349
290	248.91	6322
310	247.73	6292

Calculate the airplane C.G. arm as weighed:

$$\text{C.G. Arm (In or m)} = \frac{N \times A + (L + R) \times B}{T}$$

Where:
- A = Nose Landing gear arm
- B = Main Landing gear arm
- N = Nose Landing gear weight
- L = Left main landing gear weight
- R = Right main landing gear weight
- T = Total weight of N + L + R

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Figure 6-3-3: Airplane Weighing Form

6-4 Airplane Weighing with Jacks and Load Cells

6-4-1 Leveling

Put the jacks in position below the wing and tail jacking points. The fuselage jacking points must not be used. Refer to the manufacturer's instructions for the use of the load cell equipment. Position the load cells and adapters and slowly raise the aircraft clear of the ground.

Open the cargo door and place a level across the seat tracks. Place the level along the top of the inboard seat track and adjust the tail jack until the airplane is longitudinally level. Refer to Section 8, Levelling of this Handbook for more information concerning airplane leveling. Remove the level and carefully close the cargo door.

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6-4-2 Weighing

1 With the airplane level, record the weight shown on each load cell in the appropriate section on Fig. 6-4-1, Airplane Weighing Form.

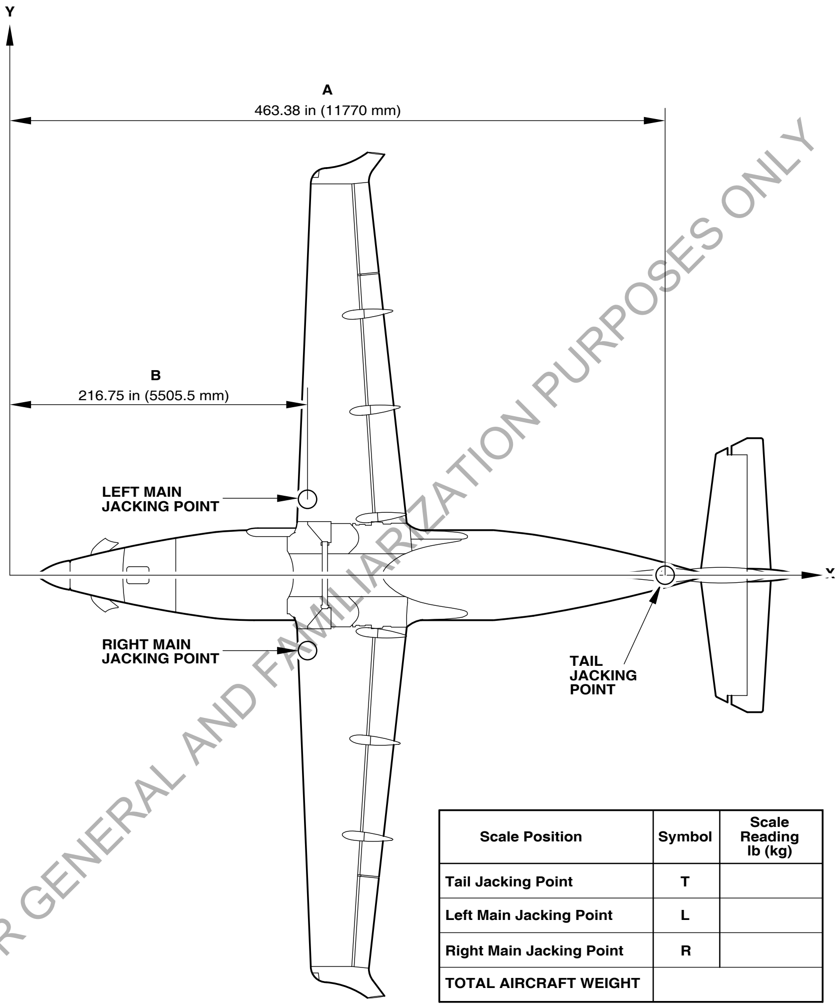
2 Calculate airplane C.G. Arm and record on Fig. 6-4-2, Airplane Basic Empty Weight. The C. G. Arm calculation formula is:

C. G. Arm in (m) = ((L + R) x B + T x A) / (L + R + T)

3 Adjust weight and moment for unusable fuel and optional equipment installed after airplane weighing to determine airplane Total Basic Empty Weight and Moment.

4 Calculate Basic Empty Weight C.G.

5 Update Fig. 6-6-1, Weight and Balance Record, as required.



Scale Position	Symbol	Scale Reading lb (kg)
Tail Jacking Point	T	
Left Main Jacking Point	L	
Right Main Jacking Point	R	
TOTAL AIRCRAFT WEIGHT		

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Figure 6-4-1: Airplane Weighing Form

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Model:	Serial No:	Registration No:	Date:

Item	Weight		C.G. Arm		Moment	
	lb	kg	in	m	lb-in	mkg
1. Airplane Weight, C.G. arm, and moment (As weighed in paragraph 6-3-2 or 6-4-2)						
2. Unusable Fuel	32.9	14.9	225.6	5.73	7422	85.39
3. Optional equipment, if applicable						
4. Optional equipment, if applicable						
5. Optional equipment, if applicable						
6. TOTAL BASIC EMPTY WEIGHT AND MOMENT (Sum of 1 thru 5)						

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

Ramp Weight		- Basic Empty Weight		= Useful Load	
lb	kg	lb	kg	lb	kg
		-	-	=	=

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Figure 6-4-2: Airplane Basic Empty Weight

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The Basic Empty Weight, C.G., and Useful Load are for the airplane as licensed at the factory. These figures are only applicable to the specific airplane serial number and registration number shown. Refer to Fig. 6-6-1. Weight and Balance Record when modifications to the airplane have been made.

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6-5 Weight and Balance Determination for Flight

6-5-1 General

This section contains the crew seats, baggage, fuel load moments charts and C of G envelopes in LB-IN and KG-M.

Refer to the Interior Configurations section for the passenger seat moments. Find the correct Moment Chart for the Interior Code No. of the aircraft.

An Example Loading Form and a blank Loading Form for owners/operators use are given in Fig. 6-5-1 and Fig. 6-5-2. Instructions on how to use the charts, complete the loading form and to determine if center of gravity is within approved limits are given below.

6-5-2 Completion of the Loading Form

Enter the current Running Basic Empty Weight and Total Moment from Fig. 6-6-1 in the appropriate space on the Loading Form, Fig. 6-5-2 (be careful to factor the moment by 1000 if appropriate).

Enter the weights of all of the crew, passengers, items stowed in cabinets and baggage to be loaded, in the appropriate space on the Loading Form, Fig. 6-5-2.

Use the Moment Charts in Table 6-5-2, Table 6-5-3, Table 6-5-4, Table 6-5-5, Table 6-5-6, and Table 6-5-7, to determine the moment for the crew and baggage.

Use the correct Interior Code No. Moment Chart in the Interior Configurations section, to determine the moment for the passengers.

Enter the moment of each item in the appropriate space on the Loading Form, Fig. 6-5-2.

Add the weight and moment of all of the items to the Basic Empty Weight and Moment of the airplane to determine the Zero Fuel Weight and Moment. Divide the moment by the weight to determine the c.g. arm.

Locate this point in the C.G. Envelope, Fig. 6-5-3. If the point falls within the envelope, the loading meets the weight and balance requirements.

Use the Moment Chart in Table 6-5-8 and Table 6-5-9, to determine the moment of the fuel load.

Enter the weight and moment of the fuel in the appropriate space on the Loading Form, Fig. 6-5-2.

Add the fuel weight and moment to the calculated Zero Fuel Weight and Moment to determine the Ramp Weight and Moment. Divide the moment by the weight to determine the c.g. arm.

Locate this point in the C.G. Envelope, Fig. 6-5-3. If the point falls within the envelope, the loading meets the weight and balance requirements.

Subtract the weight and moment of the fuel allowance for engine start and ground operations to determine Takeoff Weight and Moment. Divide the moment by the weight to determine the c.g. arm. Nose and main landing gear retraction or extension and flap retraction or extension weight and balance effects need not to be considered by the pilot for the weight and balance calculation.

Locate this point in the C.G. Envelope, Fig. 6-5-3. If the point falls within the envelope, the loading meets the weight and balance requirements for takeoff.

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6-5-3 Combi Conversion

A Combi Conversion can be made from the removal of cabin seats from a Corporate Commuter and the removal of cabin seats and furnishings from an Executive Interior aircraft. The Combi Interior consists of 2 crew seats and payload or a combination of seats and payload. Cargo nets can be installed to attachment points at frames 24 and 27. Refer to Section 2, Limitations, Other Limitations for the Cargo Limitations.

The airplane is weighed at the factory before the time of delivery. When other interior configurations are required, adjust the Basic Empty Weight and Moment and complete the landing form as follows:

- Make a temporary mark on the seat rail at the forward edge of the Corporate Commuter Seat(s) or mark position of the Executive Seat attachment fittings of the seat(s) to be removed with masking tape or similar material to expedite reinstallation. Remove the passenger seats and furnishings as required
- Use the passenger seats and furnishings weight and moment data in the relevant Interior Code section and determine the total weight and moment difference of the interior items removed from the aircraft.

Table 6-5-1: Example: EX-6S-2 Conversion Seat 5/6 removed. Frame 27 Cargo Net installed.

ITEM	WEIGHT LB (KG)	MOMENT LB-IN (KG-M)
Passenger Seat 5	- 60.09 (- 27.26)	- 19764.40 (- 227,70)
Passenger Seat 6	- 60.09 (- 27.26)	- 20485.50 (- 236,00)
Frame 27 Cargo Net	+ 3.60 (+ 1,65)	+ 1049.00 (+ 12,21)
Total Value	- 116.58 (- 52,87)	- 39200.90 (- 451,49)

Note

The figures are taken from the “Passenger Seats and Furnishings Weight and Moment Chart”.

Enter the Total Value on line 2 of the Loading Form, Fig. 6-5-2.

Calculate the cargo moment as follows:

1. Locate one of the luggage net floor attachment points at frame 34.
2. Measure distance from the attachment point to the center of the cargo i.e. 35 in (0,889 m).
3. The fuselage station dimension at the luggage net attachment point is 361.15 in (9,170 m)
4. The arm of the cargo is the fuselage station dimension of the net attachment point minus the distance to the center of the cargo.
5. Example:
   - Distance to cargo center = 35 in (0,889 m)
   - Net Fuselage Station = 361.15 in (9,170 m)
   - Cargo Arm = 361.15 in - 35 in = 326.15 in (9,170 m - 0,889 m = 8,281 m).
6. Enter the cargo arm and the weight of the cargo plus tie down straps and cargo arm on the Loading Form.

Complete the remainder of the Loading Form as given above.

When re-installing the passenger seats, return the seats to their original positions and verify the dimensions as shown in the Seat Location Chart for the aircraft configuration. Secure the arresting pin on the Corporate Commuter Seat(s) or install the locking needles on the Executive Seat(s). Remove the temporary seat rail marks.

Table 6-5-2: Moment Chart - Crew Occupant Moments (imperial)

CREW OCCUPANT MOMENTS (LB-IN) ARM 160.27 IN*							
WEIGHT lb	**MOMENT** lb-in*	**WEIGHT** lb	**MOMENT** lb-in*	**WEIGHT** lb	**MOMENT** lb-in*	**WEIGHT** lb	**MOMENT** lb-in*
50	8014	**100**	16027	**150**	24040	**200**	32054
60	9616	**110**	17630	**160**	25643	**210**	33657
70	11219	**120**	19232	**170**	27246	**220**	35259
80	12822	**130**	20835	**180**	28849	**230**	36862
90	14424	**140**	22438	**190**	30451	**240**	38465
* Arm for center position only. Adjust arm 0.69 inch for each hole from center position. Maximum seat travel is +/- 4 holes or +/- 2.76 inches from center position.							

Table 6-5-3: Moment Chart - Crew Occupant Moments (metric)

CREW OCCUPANT MOMENTS (KG-M) ARM 4.071 m*							
WEIGHT kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m
25	101,78	**50**	203,55	**75**	305,33	**100**	407,10
30	122,13	**55**	223,91	**80**	325,68	**105**	427,46
35	142,49	**60**	244,26	**85**	346,04	**110**	447,81
40	162,84	**65**	264,62	**90**	366,39	**115**	468,17
45	183,20	**70**	284,97	**95**	386,75	**120**	488,52
* Arm for center position only. Adjust arm 0.018 meter for each hole from center position. Maximum seat travel is +/- 4 holes or +/- 0.070 meters from center position.							

Table 6-5-4: Moment Chart - Rear Baggage Area Moments - Standard Net at Frame 34 (imperial)

REAR BAGGAGE AREA MOMENTS (LB-IN) STANDARD NET AT FRAME 34 - ARM 371.0 IN							
WEIGHT lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in
10	3710	110	40810	210	77910	310	115010
20	7420	120	44520	220	81620	320	118720
30	11130	130	48230	230	85330	330	122430
40	14840	140	51940	240	89040	340	126140
50	18550	150	55650	250	92750	350	129850
60	22260	160	59360	260	96460	360	133560
70	25970	170	63070	270	100170	370	137270
80	29680	180	66780	280	103880	380	140980
90	33390	190	70490	290	107590	390	144690
100	37100	200	74200	300	111300	397	147287

Table 6-5-5: Moment Chart - Rear Baggage Area Moments - Standard Net at Frame 34 (metric)

REAR BAGGAGE AREA MOMENTS (KG-M) STANDARD NET AT FRAME 34 - ARM 9.420 M							
WEIGHT Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m
5	47,10	55	518,10	105	989,10	155	1460,10
10	94,20	60	565,20	110	1036,20	160	1507,20
15	141,30	65	612,30	115	1083,30	165	1554,30
20	188,40	70	659,40	120	1130,40	170	1601,40
25	235,50	75	706,50	125	1177,50	175	1648,50
30	282,60	80	753,60	130	1224,60	180	1695,60
35	329,70	85	800,70	135	1271,70		
40	376,80	90	847,80	140	1318,80		
45	423,90	95	894,90	145	1365,90		
50	471,00	100	942,00	150	1413,00		

Table 6-5-6: Moment Chart - Rear Baggage Area Moments - Extendable Net at Frame 32 (imperial)

REAR BAGGAGE AREA MOMENTS (LB-IN) EXTENDABLE NET AT FRAME 32 - ARM 361.0 IN							
WEIGHT lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in
10	3610	140	50543	270	97476	400	144409
20	7220	150	54154	280	101087	410	148020
30	10831	160	57764	290	104697	420	151630
40	14441	170	61374	300	108307	430	155240
50	18051	180	64984	310	111917	440	158850
60	21661	190	68594	320	115528	450	162461
70	25272	200	72205	330	119138	460	166071
80	28882	210	75815	340	122748	470	169681
90	32492	220	79425	350	126358	480	173291
100	36102	230	83035	360	129969	490	176902
110	39713	240	86646	370	133579	500	180512
120	43323	250	90256	380	137189		
130	46933	260	93866	390	140799		

Table 6-5-7: Moment Chart - Rear Baggage Area Moments - Extendable Net at Frame 32 (metric)

REAR BAGGAGE AREA MOMENTS (KG-M) EXTENDABLE NET AT FRAME 32 - ARM 9.17 M							
WEIGHT Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg- m	**WEIGHT** Kg	**MOMENT** Kkg-m
5	45,85	70	641,90	135	1237,95	200	1834,00
10	91,70	75	687,75	140	1283,80	205	1879,85
15	137,55	80	733,60	145	1329,65	210	1925,70
20	183,40	85	779,45	150	1375,50	215	1971,55
25	229,25	90	825,30	155	1421,35	220	2017,40
30	275,10	95	871,15	160	1467,20	225	2063,25
35	320,95	100	917,00	165	1513,05		
40	366,80	105	962,85	170	1558,90		
45	412,65	110	1008,70	175	1604,75		
50	458,50	115	1054,55	180	1650,60		
55	504,35	120	1100,40	185	1696,45		
60	550,20	125	1146,25	190	1742,30		
65	596,05	130	1192,10	195	1788,15		

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Table 6-5-8: Moment Chart - Fuel Load Moments (imperial)

FUEL LOAD MOMENTS (LB-IN)							
WEIGHT lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in	**WEIGHT** lb	**MOMENT** lb-in
100	22572	800	183555	1500	347656	2200	511463
200	45161	900	207111	1600	371079	2300	534839
300	67776	1000	230572	1700	394500	2400	558130
400	90443	1100	253974	1800	417912	2500	581450
500	113351	1200	277441	1900	441347	2600	604724
600	136538	1300	300811	2000	464746	2700	628029
700	159955	1400	324221	2100	488120		

Table 6-5-9: Moment Chart - Fuel Load Moments (metric)

FUEL LOAD MOMENTS (KG-M)							
WEIGHT Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m	**WEIGHT** Kg	**MOMENT** Kg-m
50	286,64	400	2337,14	750	4419,61	1100	6497,53
100	573,59	450	2635,13	800	4717,33	1150	6793,90
150	860,84	500	2932,34	850	5014,59	1200	7090,37
200	1149,27	550	3230,45	900	5312,14	1250	7385,69
250	1441,88	600	3526,99	950	5608,06		
300	1738,40	650	3824,03	1000	5905,10		
350	2037,52	700	4122,29	1050	6201,26		

Note

Unusable fuel is considered in empty weight. The chart shows only additional fuel.

PC-12/47E EXAMPLE LOADING FORM	INTERIOR CODE: STD-9S		
ITEM	**WEIGHT lb**	**ARM AFT OF DATUM in**	**MOMENT lb-in**
1. **Basic Empty Weight**	5613	225.16	1263823
2. Combi Interior Conversion	NA	NA	NA
3. Pilot	170	160.27	27246
4. Copilot (Right Seat Passenger)	170	160.27	27246
5. Passenger 1	170	210.35	35760
6. Passenger 2	170	207.35	35250
7. Passenger 3	170	243.35	41370
8. Passenger 4	170	240.35	40860
9. Passenger 5	170	276.35	46980
10. Passenger 6	170	273.35	46470
11. Passenger 7	170	309.35	52590
12. Passenger 8	170	306.35	52080
13. Passenger 9	170	339.35	57690
14. Optional Wardrobe		191.00	
15. LH Cabinet		212.10	
16. RH Cabinet		211.19	
17. a. Rear Baggage (net at frame 32) b. Rear Baggage (net at frame 34)	215	361.00 371.00	79765
18. Cargo			
19. **Zero Fuel Weight** MZFW 9039 lb (Sum of 1 thru 18)	7698	235.68	1814269
20. Fuel	1650	-	382790
21. **Ramp Weight** MRW 10495 lb (Sum of 19 + 20)	9348	235.03	2197059
22. Less Fuel for Ground Operations	-40	-	
23. Fuel at Takeoff (Sum of 20 + 22)	1610	-	373421
24. **Takeoff Weight** MTOW 10450 lb (Sum of 19 + 23)	9308	235.03	2187690

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Figure 6-5-1: Example Loading Form - Imperial Units

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PC-12/47E LOADING FORM INTERIOR CODE: STD-9S			
ITEM	**WEIGHT lb**	**ARM AFT OF DATUM in (m)**	**MOMENT lb-in (kg-m)**
1. **Basic Empty Weight**			
2. Combi Interior Conversion			
3. Pilot		160.27 (4.071)	
4. Copilot (Right Seat Passenger)		160.27 (4.071)	
5. Passenger 1			
6. Passenger 2			
7. Passenger 3			
8. Passenger 4			
9. Passenger 5			
10. Passenger 6			
11. Passenger 7			
12. Passenger 8			
13. Passenger 9			
14. Optional Wardrobe		191.00 (4.851)	
15. LH Cabinet		212.10 (5.387)	
16. RH Cabinet		211.19 (5.364)	
17. a. Rear Baggage (net at frame 32) b. Rear Baggage (net at frame 34)		361.00 (9.170) 371.00 (9.423)	
18. Cargo			
19. **Zero Fuel Weight** MZFW 9039 lb (4100 kg) (Sum of 1 thru 18)			
20. Fuel		-	
21. **Ramp Weight** MRW 10495 lb (4760 kg) (Sum of 19 + 20)			
22. Less Fuel for Ground Operations		-	-
23. Fuel at Takeoff (Sum of 20 + 22)			
24. **Takeoff Weight** MTOW 10450 lb (4740 kg) (Sum of 19 + 23)			

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Figure 6-5-2: Loading Form

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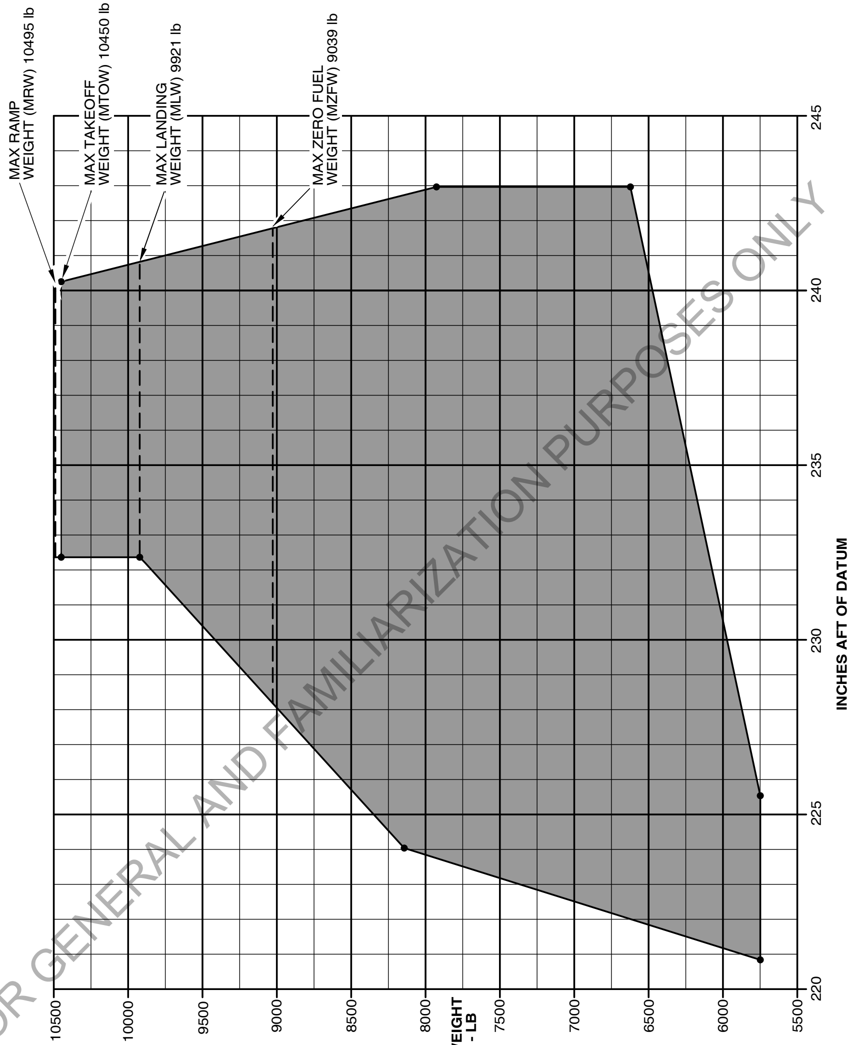

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Figure 6-5-3: C. G. Envelope (Sheet 1 of 2)

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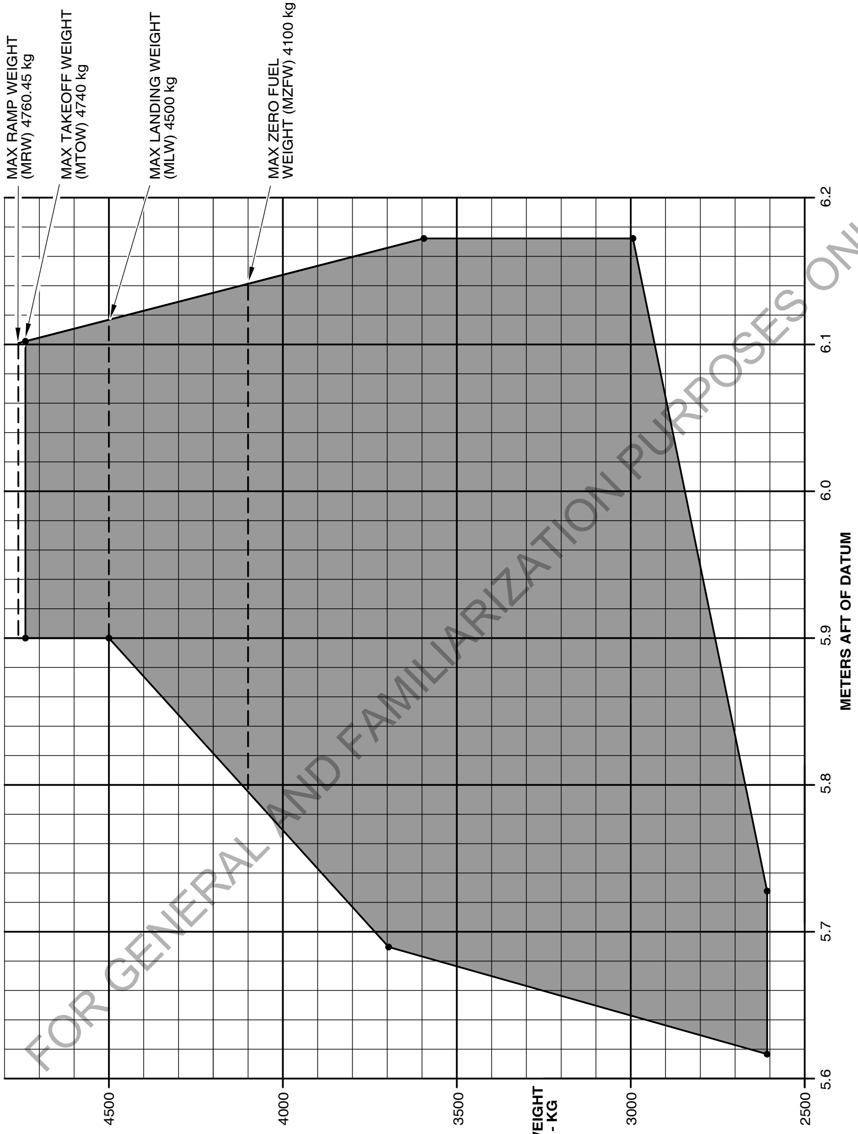

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Figure 6-5-3: C. G. Envelope (Sheet 2 of 2)

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6-5-4 Equipment List

Refer to Pilatus Report No. 02047, Airplane equipment List, attached to the back of this report. The equipment list itemizes the installed equipment included in the Basic Empty Weight indicated in the Airplane Basic Empty Weight figure Fig. 6-4-2 of this Airplane Flight Manual.

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6-6 Weight and Balance Records

Fig. 6-6-1 Weight and Balance Record is a log of the modifications that occurred after the airplane was licensed at the factory. Any change to the permanently installed equipment or airplane modifications which effect the airplane Basic Empty Weight or Total Moment must be entered in Fig. 6-6-1 Weight and Balance Record. The last entry on the Weight and Balance Record will be the current airplane Basic Empty Weight and Total Moment.

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Serial Number				Registration Number			Page Number	
Date	Item No.	Description of Article or Modification	Add (+) Rem (-)	Weight Change			Running Basic Empty Weight	
				Wt lb (kg)	Arm in (m)	Moment lb-in / 1000 (mkg)	Wt lb (kg)	Moment lb-in / 1000 (mkg)
		As Delivered						

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Figure 6-6-1: Weight and Balance Record (Sheet 1 of 2)

Serial Number				Registration Number			Page Number	
Date	Item No.	Description of Article or Modification	Add (+) Rem (-)	Weight Change			Running Basic Empty Weight	
				Wt lb (kg)	Arm in (m)	Moment lb-in / 1000 (mkg)	Wt lb (kg)	Moment lb-in / 1000 (mkg)

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Figure 6-6-1: Weight and Balance Record (Sheet 2 of 2)

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6-7 General Loading Recommendations

6-7-1 General

The following general loading recommendation is intended as only a guide. Refer to Section 2, Limitations, Other Limitations for Seating and Cargo Limitations. The pilot in command must refer to the appropriate moment charts, loading form, and the C.G. Envelope to determine that the airplane is properly loaded.

Fuel load may be limited by maximum weight.

Load fuel equally between the left and right wing fuel tanks.

6-7-2 Cargo

Before loading the airplane, attach the tail support stand to prevent the tail from contacting the ramp surface while ground personnel are in the aft cabin during the loading process.

Observe the maximum floor and seat rail load limits given on the placard on the forward and rear cargo door frame. Fig. 6-7-1 gives the cabin dimensions and loading areas.

Cargo having a total weight less than 66 lbs (30 kg) may be stowed aft of the cargo net. Heavier cargo is to be secured in the cabin area with tie-down straps attached to seat rail anchor points. Refer to Fig. 6-7-2, Fig. 6-7-3, Fig. 6-7-4, Fig. 6-7-5, Fig. 6-7-6, Fig. 6-7-7, Fig. 6-7-9, Fig. 6-7-10, Fig. 6-7-11 and Fig. 6-7-12 for cargo weight calculation, restraining bar installation and tie-down strap installation. Refer to Fig. 6-7-13 for cargo net installation.

Refer to the Illustrated Parts Catalog (IPC) Chapter 25 for the part numbers of the approved cargo restraint nets, tie down straps, load carriers and retaining bars.

6-7-3 Hazardous Materials

Protection against the damaging effects of leakage of hazardous materials has not been provided in the cargo area. Provisions should be made for protection if carriage of these materials is planned.

In addition to the pilot in command, other personnel used for loading and unloading should be properly trained concerning the handling, storage, loading and unloading of hazardous materials if they are to be carried.

Information and regulations pertaining to the air transportation of hazardous materials is outlined in the Code of Federal Regulations (CFR) Title 49 and in the International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air.

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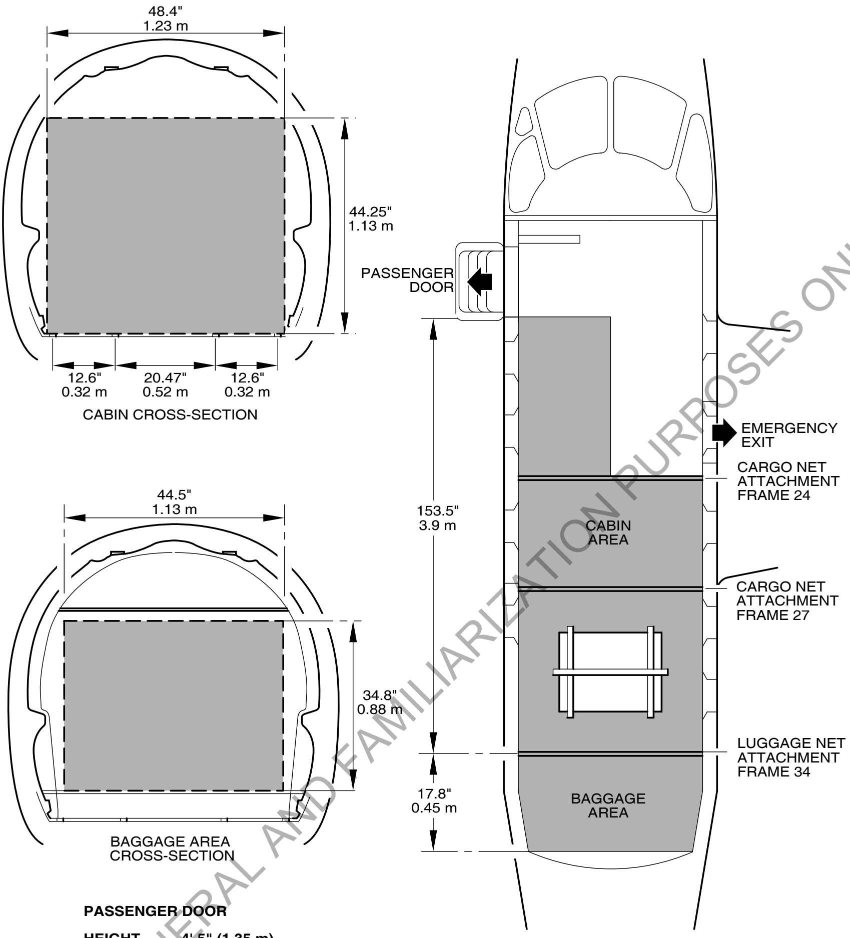

PASSENGER DOOR

HEIGHT 4' 5" (1.35 m)
WIDTH 2' 0" (0.61 m)

CARGO DOOR

HEIGHT 4' 4" (1.32 m)
WIDTH 4' 5" (1.35 m)

COMPARTMENT VOLUME (WITHIN DIMENSIONED AREAS)

CABIN 190.25 ft^3 (5.4 m^3)
BAGGAGE 16.0 ft^3 (0.45 m^3)

CARGO MAY BE LOCATED ANYWHERE IN SHADED AREA

ALL CARGO MUST BE ARRANGED TO PERMIT FREE ACCESS TO THE PASSENGER DOOR AND EMERGENCY OVERWING EXIT

ALL CARGO MUST BE SECURED BY APPROVED CARGO RESTRAINTS

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Figure 6-7-1: Loading Areas

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6-7-4 Maximum Allowable Weight Per Single Container (Without Special Equipment)

The maximum allowable weight is based on the package dimensions, vertical c.g. and the number of seat rails used to secure the fore-aft tie-down straps.

The flowcharts below can be used to determine whether the weight of a cargo item is acceptable, which Restraint Bars are to be used, and how the cargo is to be loaded.

The cargo dimensions are defined as shown in Fig. 6-7-2.

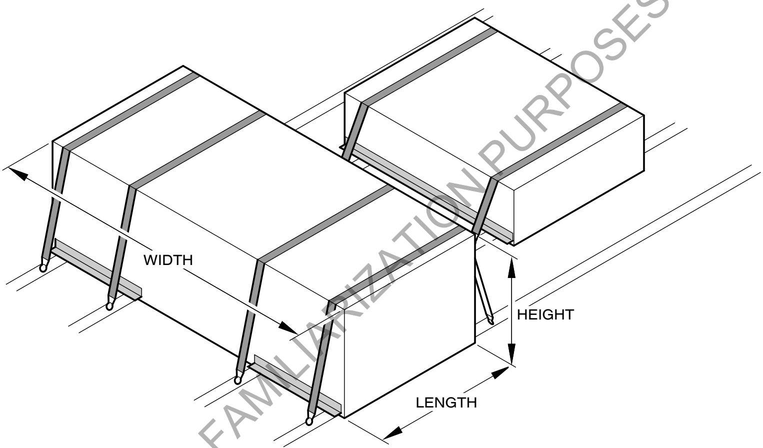

Figure 6-7-2: Cargo Dimensions

The process to decide whether and how cargo can be tied down follows the following 4 steps

1 Determine the cargo size and orientation.

2 Determine the correct restraint bars.

3 Determine the correct cargo tie-down configuration chart and curve.

4 Determine allowable cargo weight.

These steps are explained in the following flowcharts, followed by an example to demonstrate their use.

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**MAXIMUM ALLOWABLE WEIGHT PER SINGLE CONTAINER
(WITHOUT SPECIAL EQUIPMENT)**

Step One

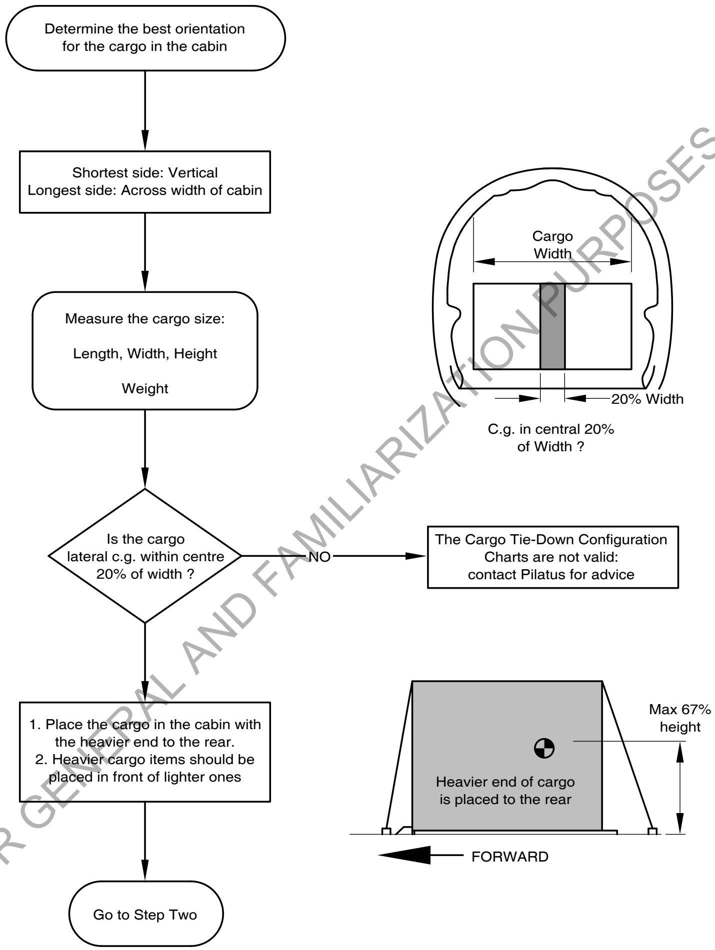

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Figure 6-7-3: Step One - Cargo Size and Orientation

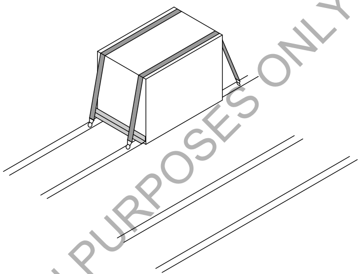
Step Two

Choose the correct Restraint Bar(s) based on the cargo width

↓

Cargo width between 14.5'' and 15.75''
(between 370 mm and 400 mm)
Use a single, short Restraint Bar
(525.25.12.072 or 525.25.12.171 or 525.25.12.276)
at one side of the aircraft

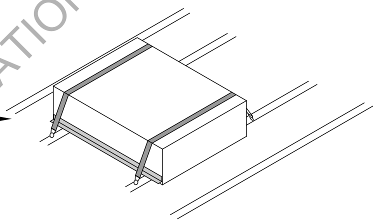
→



↓

Cargo width between 22.5'' and 33''
(between 570 mm and 840 mm)
Use a single, long Restraint Bar
(525.25.12.073 or 525.25.12.172 or 525.25.12.277)
in the centre of the aircraft

→



↓

Cargo width between 33'' and 48.4''
(between 840 mm and 1,230 mm)
Use both short Restraint Bars
(525.25.12.072 or 525.25.12.171 or 525.25.12.276)
one either side of the aircraft

→

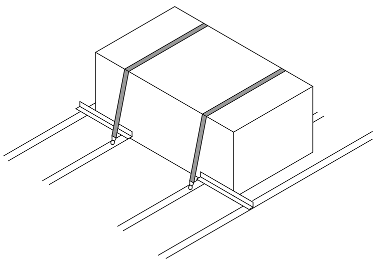


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Figure 6-7-4: Step Two - Determine the Correct Cargo Restraint Bars

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MAXIMUM ALLOWABLE WEIGHT PER SINGLE CONTAINER (WITHOUT SPECIAL EQUIPMENT)

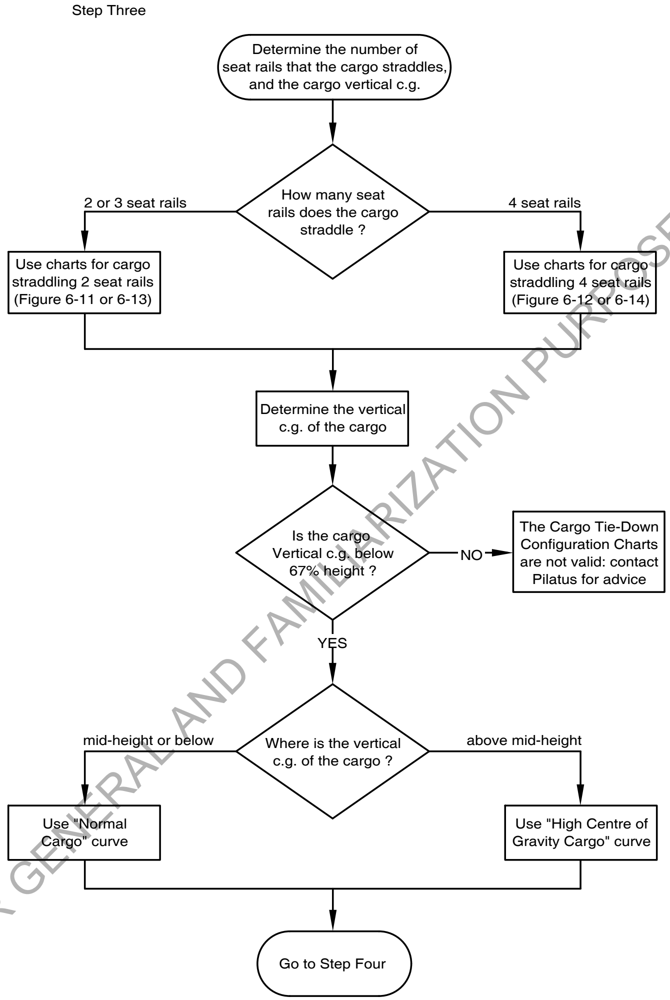

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Figure 6-7-5: Step Three - Determine the number of Seat Rails that the Cargo straddles, and the Cargo vertical c.g.

MAXIMUM ALLOWABLE WEIGHT PER SINGLE CONTAINER (WITHOUT SPECIAL EQUIPMENT)

Step Four

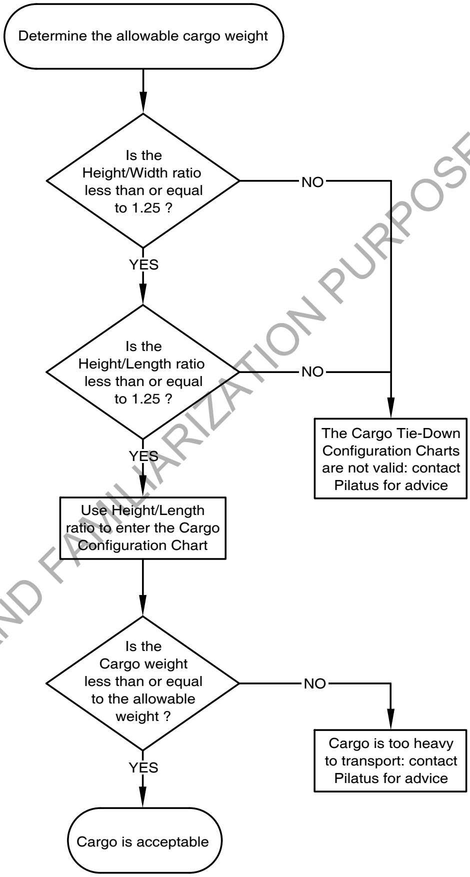

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Figure 6-7-6: Step Four - Determine Allowable Cargo Weight

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6-7-4.1 Restrain Cargo in Cabin

Fit the Restraint Bars and the Load Carrier Assemblies to the aircraft. If there is more than one cargo item, try to place the heavier items forward of the lighter ones.

Place cargo in cabin: ensure cargo is firmly against Restraint Bar(s).

Restrain cargo with straps attached to the seat rails.

- The straps shall be placed in the fore-aft direction: do not place diagonally
- Place front strap fitting as close as feasible to Restraint Bar. Place rear fitting to give a strap angle of 10° to 20°, as shown in Fig. 6-7-7.
- Additional straps may be placed laterally on cargo straddling the centre two seat rails, if desired.

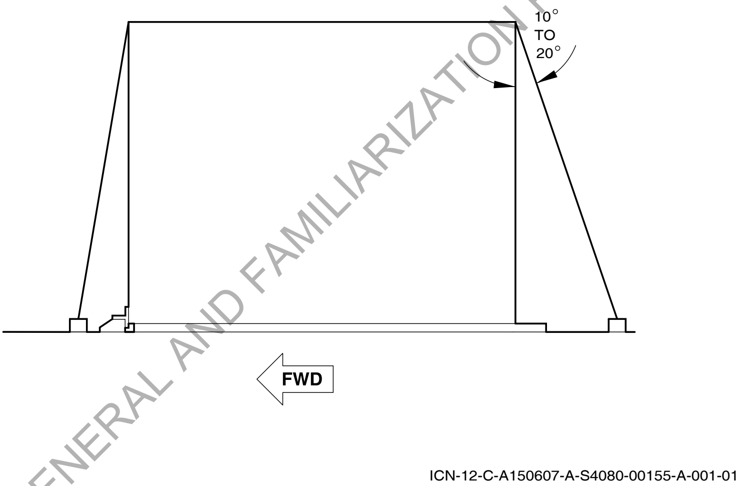

Figure 6-7-7: Fore-aft Strap Angles

Perform the Weight and Balance check to verify that the Maximum Takeoff Weight (MTOW) and aircraft c.g. position are within the limits given in Section 2, Limitations, Weight Limits and Center of Gravity Limits.

6-7-4.2 Example

The cargo to be transported is shown below. Looking down, the c.g. is roughly in the centre of the box, but its height is unknown.

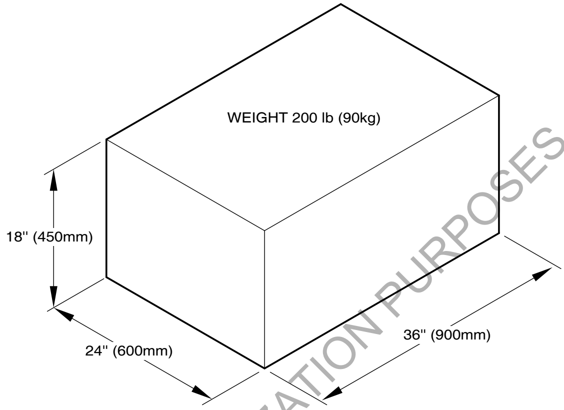

Figure 6-7-8: Maximum Allowable Weight Per Single Container (Without Special Equipment)

1 Determine the cargo size and orientation

1.1 The best orientation in the cabin is with the shortest side (18”) vertical and the longest side (36”) across the cabin width. Fig. 6-7-1 shows that this will fit in the cargo area.

1.2 Using the definitions of Fig. 6-7-2, the cargo dimensions are:

- Height: 18” (450 mm)
- Length: 24” (600 mm)
- Width: 36” (900 mm).

1.3 The cargo lateral c.g. is approximately in middle of the box: the charts are valid.

2 Determine the correct restraint bars

2.1 The cargo width is 36” (900mm). Both short restraining bars are used.

2.2 Two cargo-restraining straps, fitted to the inner seat rails, are required.

3 Determine the correct cargo tie-down configuration chart and curve

3.1 The front stop is attached to 4 seat rails, but cargo tie down straps can only be fitted to the inner seat tracks. This cargo straddles 2 seat rails. The restraining Bars are angle shaped (not “T”-section) and thus Fig. 6-7-9 is used.

3.2 The cargo vertical c.g. position is unknown: use the “high centre of gravity” curve.

4 Determine allowable cargo weight

4.1 Height/Width = 18”/36” = 0.33. Less than 1.25, therefore OK.

4.2 Height/Length = 18”/24” = 0.75. Less than 1.25, therefore OK.

4.3 From Fig. 6-7-9, the allowable cargo weight is 214 lb (97kg): cargo weight is acceptable.

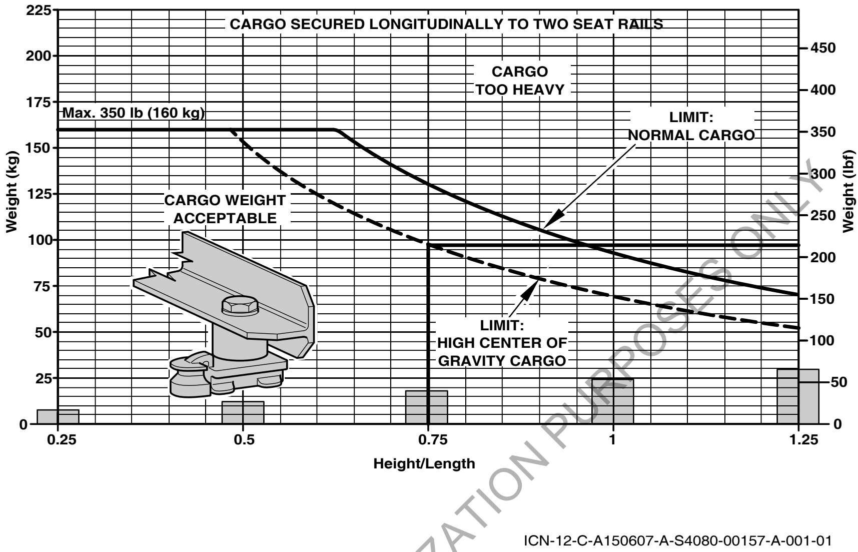

Figure 6-7-9: Cargo straddling two (2) seat rails: Angle Restraining Bar

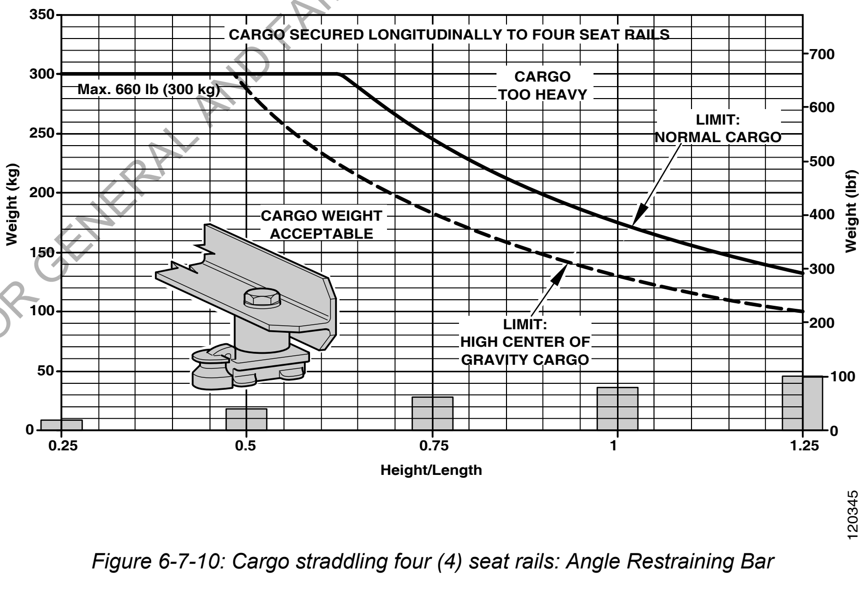

Figure 6-7-10: Cargo straddling four (4) seat rails: Angle Restraining Bar

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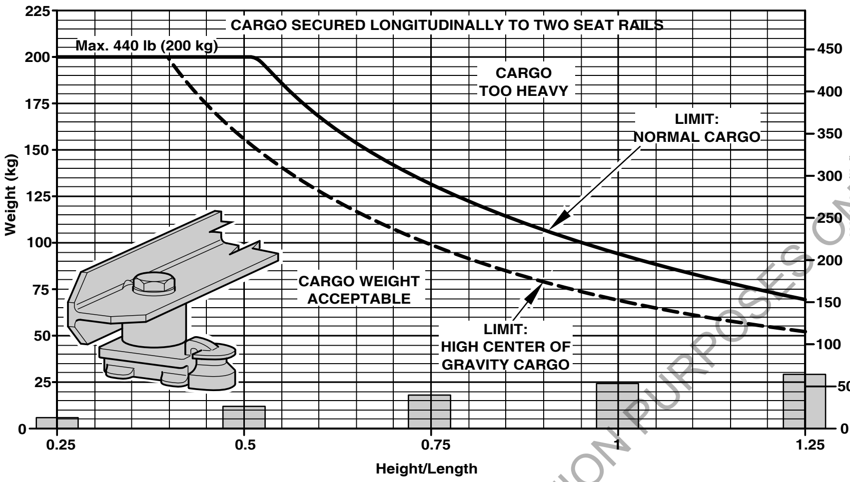

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Figure 6-7-11: Cargo straddling two (2) seat rails: "T" Restraining Bar

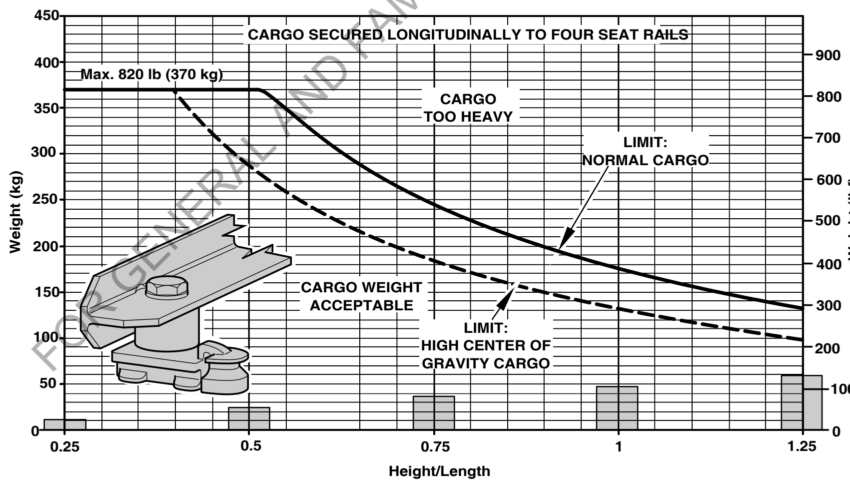

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Figure 6-7-12: Cargo straddling four (4) seat rails: "T" Restraining Bar

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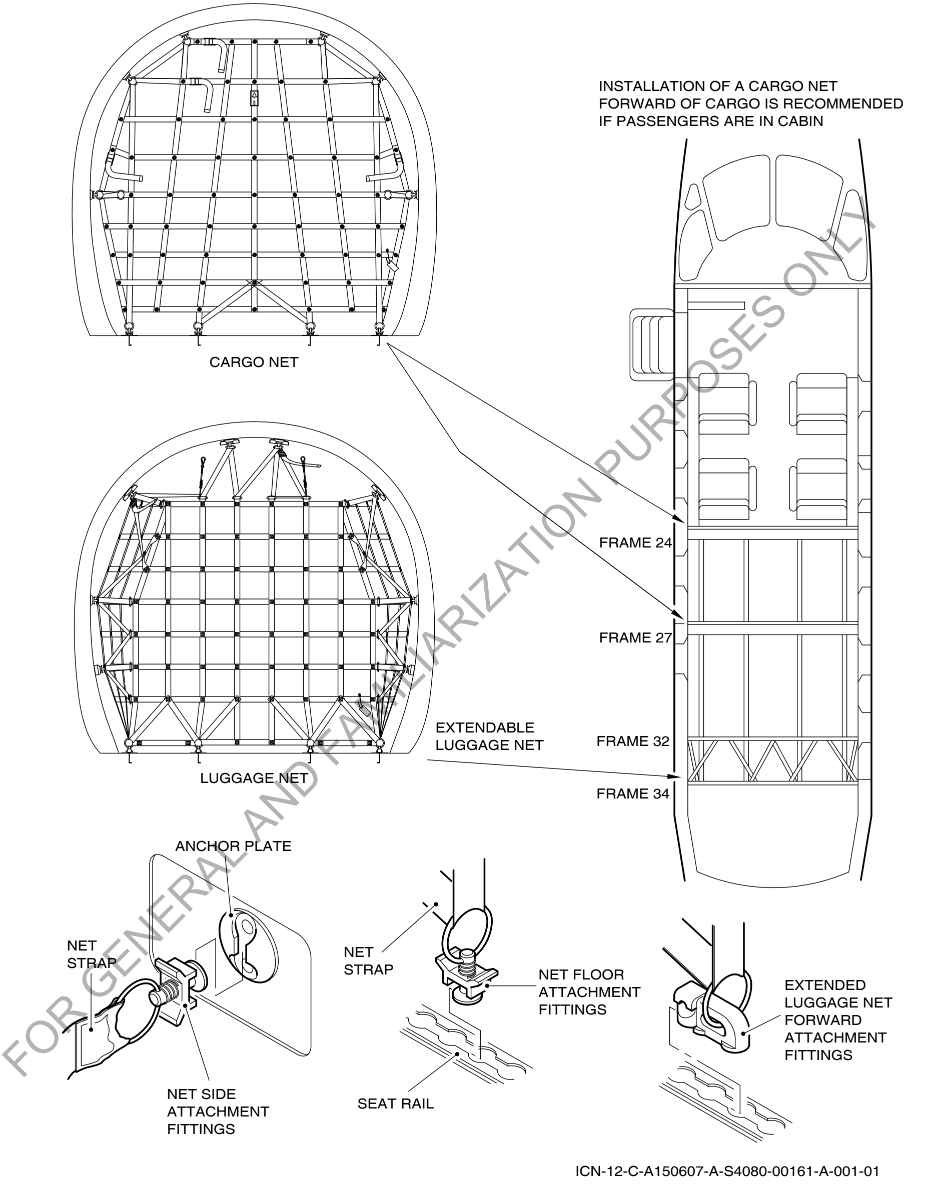

Figure 6-7-13: Cargo and Luggage Restraint Installation

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6-8 Interior Configurations

6-8-1 General

The PC-12 was designed and certified initially with two basic cabin interior configurations, a Corporate Commuter (Code STD-9S) and an Executive interior (Code EX-6S). The Corporate Commuter interior consists of two crew seats and 9 standard passenger seats. Two versions of standard passenger seats are available: with or without a literature pocket installed. The Executive interior consists of two crew seats and 6 executive seats with forward storage cabinets and a toilet.

Variations to the two basic interior configurations are continuously being developed. The various configurations that have been approved are given below. Before using them it is the operators responsibility to check whether they require authorization by their regulatory authority. Some of the configurations require structural and system modifications, check with the Service Bulletin Index for the applicable SB's.

A Code Number is given to each interior configuration. The code is shown on a placard which is installed on the cargo door frame. The placard code gives the type and number of seats that are installed in the aircraft. Before making any changes to the interior configuration, contact Pilatus to make sure that any modification work or SB's are identified for embodiment. The placard must then be changed to show the correct code for the new configuration.

It is possible for aircraft with the executive interior to have more than one placard installed on the cargo door frame. The removal or installation of the rear seats must be done in accordance with an approved configuration. The correct weight and moment charts for the configuration must then be used for weight and balance determination for flight.

The following code numbers have been allocated and the seat locations, if applicable, are given in the following sub-sections:

- CORPORATE COMMUTER Interior Layout CODE STD-9S (nine standard seats)
- EXECUTIVE Interior Layout CODE EX-6S-2 (six executive seats)
- EXECUTIVE Interior Layout CODE EX-8S (eight executive seats)
- EXECUTIVE Interior Layout CODE EX-6S-STD-2S (six executive seats and two standard seats)
- EXECUTIVE Interior Layout CODE EX-4S-STD-4S (four executive seats and four standard seats)
- No Cabin Interior Configuration.

All distances on the passenger seat locating charts given in this section are based on the first seat track locating hole (refer to Fig. 6-8-1).

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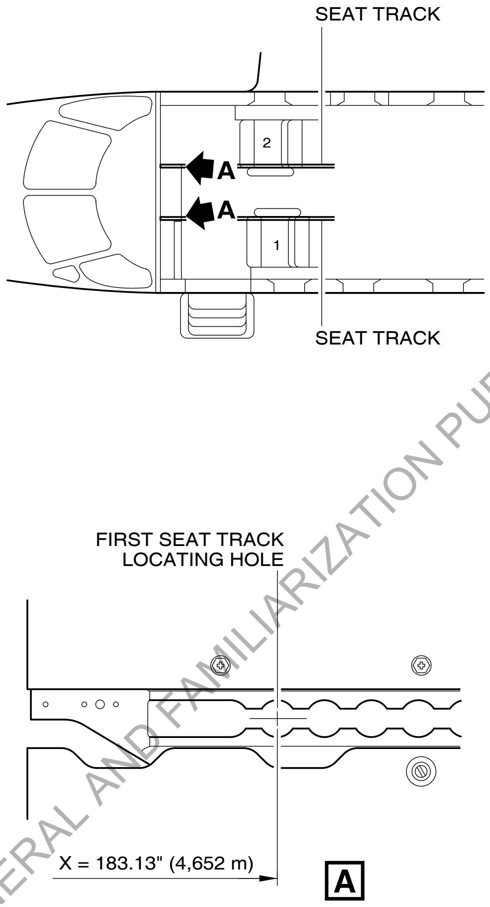

NOTE:

CABIN SEAT LOCATION IS DEFINED AS THE DISTANCE FROM THE CENTER OF THE FIRST SEAT TRACK LOCATING HOLE TO THE CENTER OF THE CENTER ARRESTING PIN ON EACH SEAT.

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Figure 6-8-1: Interior Configurations - First Seat Track Locating Hole

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6-8-2 Corporate Commuter Interior Code STD-9S

6-8-2.1 General

The basic Corporate Commuter Interior consisting of 9 standard passenger seats.

CAUTION

Do not lift the commuter seat by the seat pan or the cushion when you remove or install the commuter seat. The commuter seat must be lifted by the rigid metallic structure only. If you do not, you can cause permanent damage to the commuter seat.

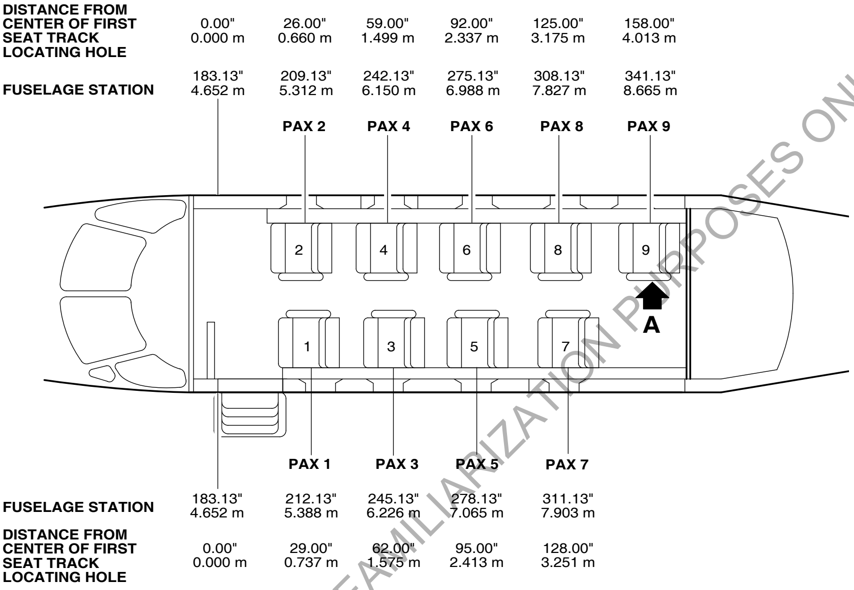
The section contains the following information:

- passenger seat location chart
- permitted passenger seat Part Numbers that can be installed
- passenger seat and furnishings weight and moment chart (standard and metric units)
- passenger seat occupant moment charts (standard and metric units).

All distances on the passenger seat locating chart are based on the first seat track locating hole (refer to Fig. 6-8-1).

CORPORATE COMMUTER INTERIOR CODE STD-9S

SEAT LOCATIONS



NOTE: PAX 9 SEAT INSTALLATION IS NOT PERMITTED ON THE LEFT HAND SIDE OF THE AIRPLANE CABIN.

NOTE:
CABIN SEAT LOCATION IS DEFINED AS THE DISTANCE FROM THE CENTER OF THE FIRST SEAT TRACK LOCATING HOLE TO THE CENTER OF THE CENTER ARRESTING PIN ON EACH SEAT.

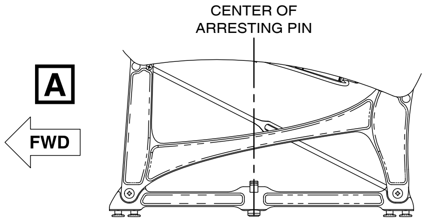


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Figure 6-8-2: Corporate Commuter Interior Code STD-9S Seat Locations

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6-8-2.2 Permitted Passenger Seat Part Numbers That Can Be Installed

Table 6-8-1: STD-9S - Permitted Passenger Seat Part Numbers That Can Be Installed

SEAT NO.	SEAT PART NUMBER
1,3,5,7	959.30.01.445 (with literature pocket) 959.30.01.447 (without literature pocket)
2,4,6,8,9	959.30.01.446 (with literature pocket) 959.30.01.448 (without literature pocket)

Note

The CARES™ child restraint system (part number 959.30.01.591), for children older than 24 months and weight between 22 - 44 lb (10 - 20 kg), can be used on all of the above seats.

6-8-2.3 Passenger Seats and Furnishings Weight and Moment Chart

Table 6-8-2: STD-9S - Passenger Seats and Furnishings Weight and Moment Chart

ITEM	WEIGHT lb (kg)	MOMENT lb-in (kg-m)
PASS SEAT 1	31.6 (14,3)	6890 (79,38)
PASS SEAT 2	31.6 (14,3)	6795 (78,29)
PASS SEAT 3	31.6 (14,3)	7933 (91,40)
PASS SEAT 4	31.6 (14,3)	7838 (90,30)
PASS SEAT 5	31.6 (14,3)	8975 (103,41)
PASS SEAT 6	31.6 (14,3)	8881 (102,32)
PASS SEAT 7	31.6 (14,3)	10018 (115,42)
PASS SEAT 8	31.6 (14,3)	9923 (114,33)
PASS SEAT 9	31.6 (14,3)	10966 (126,35)
FR 24 CARGO NET	3.6 (1,65)	941 (10,96)
FR 27 CARGO NET	3.6 (1,65)	1049 (12,21)
FR 32 EXTENDABLE BAGGAGE NET	6.44 (2,92)	2325 (26,78)
FR 34 BAGGAGE NET	5.13 (2,325)	1855 (21,38)

Adjust the aircraft Basic Empty Weight on the Loading Form Fig. 6-5-2 for items removed/ added when converting to or from a Combi Interior Conversion.

When installing the extendable baggage net refer to Section 2, Limitations, Other Limitations for the Luggage Limitations.

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6-8-2.4 Passenger Seat Occupant Moment Charts (Standard and Metric Units)

Table 6-8-3: STD-9S - Passenger Seat Occupant Moment Chart (imperial)

PASSENGER SEAT OCCUPANT MOMENTS (LB - IN)									
WEIGHT (lb)	**PAX 1 (210.35 in)**	**PAX 2 (207.35 in)**	**PAX 3 (243.35 in)**	**PAX 4 (240.35 in)**	**PAX 5 (276.35 in)**	**PAX 6 (273.35 in)**	**PAX 7 (309.35 in)**	**PAX 8 (306.35 in)**	**PAX 9 (339.35 in)**
50	10517	10367	12167	12017	13817	13667	15467	15317	16967
60	12621	12441	14601	14421	16581	16401	18561	18381	20361
70	14724	14514	17034	16824	19344	19134	21654	21444	23754
80	16828	16588	19468	19228	22108	21868	24748	24508	27148
90	18931	18661	21901	21631	24871	24601	27841	27571	30541
100	21035	20735	24335	24035	27635	27335	30935	30635	33935
110	23138	22808	26768	26438	30398	30068	34028	33698	37328
120	25242	24882	29202	28842	33162	32802	37122	36762	40722
130	27345	26955	31635	31245	35925	35535	40215	39825	44115
140	29449	29029	34069	33649	38689	38269	43309	42889	47509
150	31552	31102	36502	36052	41452	41002	46402	45952	50902
160	33655	33175	38935	38455	44215	43735	49495	49015	54295
170	35759	35249	41369	40859	46979	46469	52589	52079	57689
180	37862	37322	43802	43262	49742	49202	55682	55142	61082
190	39966	39396	46236	45666	52506	51936	58776	58206	64476
200	42069	41469	48669	48069	55269	54669	61869	61269	67869
210	44173	43543	51103	50473	58033	57403	64963	64333	71263
220	46276	45616	53536	52876	60796	60136	68056	67396	74656
230	48380	47690	55970	55280	62560	62870	71150	70460	78050
240	50483	49763	58403	57683	66323	65603	74243	73523	81443

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Table 6-8-4: STD-9S - Passenger Seat Occupant Moment Chart (metric)

PASSENGER SEAT OCCUPANT MOMENTS (KG - M)									
WEIGHT (kg)	**PAX 1 (5,343 m)**	**PAX 2 (5,267 m)**	**PAX 3 (6,181 m)**	**PAX 4 (6,105 m)**	**PAX 5 (7,019 m)**	**PAX 6 (6,943 m)**	**PAX 7 (7,857 m)**	**PAX 8 (7,781 m)**	**PAX 9 (8,619 m)**
25	133,57	131,67	154,53	152,62	175,48	173,58	196,44	194,53	215,49
30	160,28	158,00	185,43	183,14	210,58	208,29	235,72	233,44	258,58
35	187,00	184,33	216,34	213,67	245,67	243,01	275,01	272,34	301,68
40	213,71	210,66	247,24	244,19	280,77	277,72	314,30	311,25	344,78
45	240,43	237,00	278,15	274,72	315,86	312,44	353,58	350,15	387,87
50	267,14	263,33	309,05	305,24	350,96	347,15	392,87	389,06	430,97
55	293,85	289,66	339,96	335,76	386,06	381,87	432,16	427,97	474,07
60	320,57	316,00	370,86	366,29	421,15	416,58	471,44	466,87	517,16
65	347,28	342,33	401,77	396,81	456,25	451,30	510,73	505,78	560,26
70	374,00	368,66	432,67	427,34	491,34	486,01	550,02	544,68	603,36
75	400,71	395,00	463,58	457,86	526,44	520,73	589,31	583,59	646,46
80	427,42	421,33	494,48	488,38	561,54	555,44	628,59	622,50	689,55
85	454,14	447,66	525,39	518,91	596,63	590,16	667,88	661,40	732,65
90	480,85	473,99	556,29	549,43	631,73	624,87	707,17	700,31	775,75
95	507,57	500,33	587,20	579,96	666,82	659,59	746,45	739,21	818,84
100	534,28	526,66	618,10	610,48	701,92	694,30	785,74	778,12	861,94
105	560,99	552,99	649,01	641,00	737,02	729,02	825,03	817,03	905,04
110	587,71	579,33	679,91	671,53	772,11	763,73	864,31	855,93	948,13
115	614,42	605,66	710,82	702,05	807,21	798,45	903,60	894,84	991,23
120	641,14	631,99	741,72	732,58	842,30	833,16	942,89	933,74	1034,33

6-8-3 Executive Interior Code EX-6S-2

6-8-3.1 General

The basic Executive Interior consisting of 6 executive passenger seats. The section contains the following information:

- passenger seat location chart
- permitted passenger seat Part Numbers that can be installed
- passenger seats and furnishings weight and moment chart (standard and metric units)
- passenger seat occupant moment charts (standard and metric units).

All distances on the passenger seat locating chart are based on the first seat track locating hole (refer to Fig. 6-8-1).

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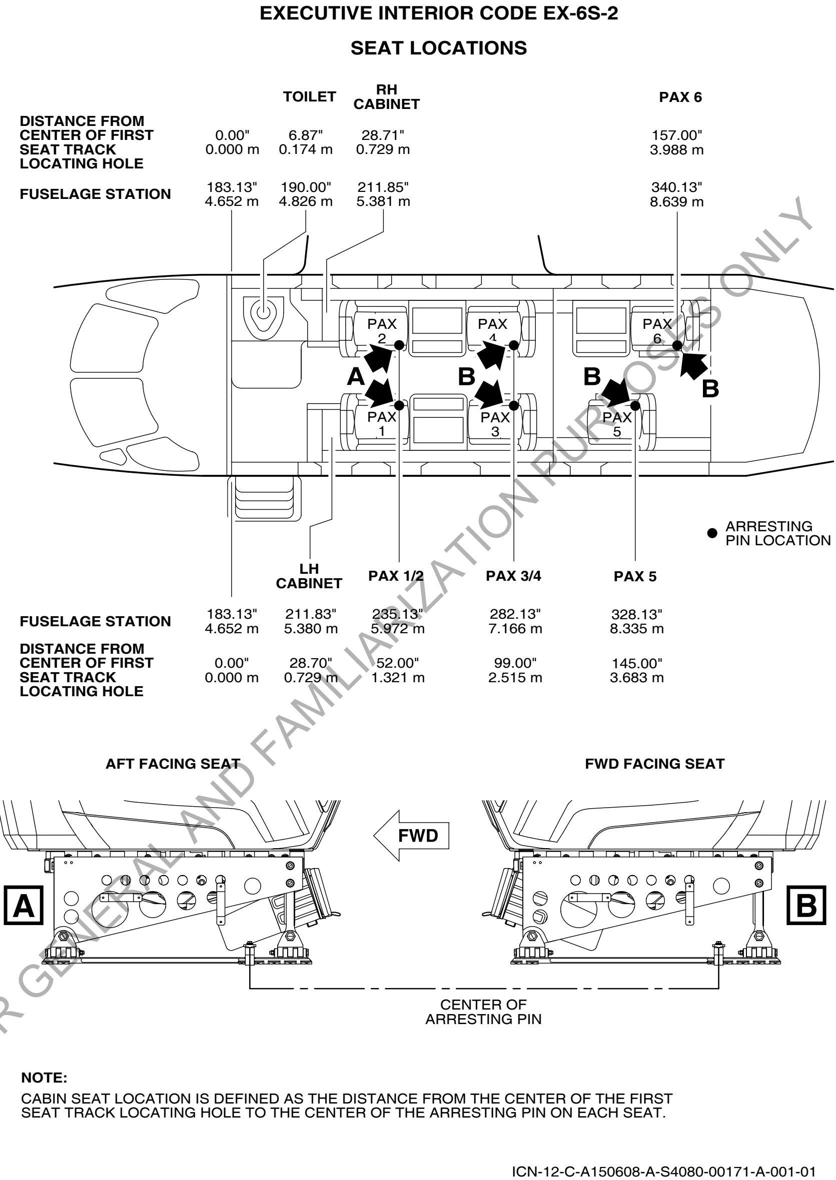

Figure 6-8-3: Executive Interior Code EX-6S-2 Seat Locations

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6-8-3.2 Permitted Passenger Seat Part Numbers That Can Be Installed

Table 6-8-5: EX-6S-2 - Permitted Passenger Seat Part Numbers That Can Be Installed

SEAT NO.	Seat Part Number
1	959.30.00.017 959.30.00.019 959.30.00.081 959.30.00.083
2	959.30.00.049 959.30.00.051 959.30.00.113 959.30.00.115
3, 5	959.30.00.001 through 959.30.00.016 959.30.00.065 through 959.30.00.080
4, 6	959.30.00.033 through 959.30.00.048 959.30.00.097 through 959.30.00.112

Note

The CARES™ child restraint system (part number 959.30.01.591), for children older than 24 months and weight between 22 - 44 lb (10 - 20 kg), can be used on seats 3 to 6. Additional limitations apply when the optional Drop-Down Oxygen Mask system is installed, refer to AFMS 02415.

6-8-3.3 Passenger Seats and Furnishings Weight and Moment Chart

Table 6-8-6: EX-6S-2 - Passenger Seats and Furnishings Weight and Moment Chart

ITEM	WEIGHT lb (kg)	MOMENT lb-in (kg-m)
PASS SEAT 1 OR 2	56.28 (25,53)	12682.9 (146,1)
PASS SEAT 3 OR 4	57.71 (26,18)	16327 (188,1)
PASS SEAT 5	57.71 (26,18)	18981.6 (218,7)
PASS SEAT 6	57.71 (26,18)	19674.1 (226,7)
TOILET	81.0 (36,7)	15390.0 (177,3)
LH CABINET	31.3 (14,2)	6630.3 (76,5)
RH CABINET	27.0 (12,3)	5720 (66,0)
FR 24 CARGO NET	3.6 (1,65)	941 (10,96)
FR 27 CARGO NET	3.6 (1,65)	1049 (12,21)
FR 32 EXTENDABLE BAGGAGE NET	6.44 (2,92)	2325 (26,78)
FR 34 BAGGAGE NET	5.13 (2,325)	1855 (21,38)

Adjust the aircraft Basic Empty Weight on the Loading Form Fig. 6-5-2 for items removed/added when converting to or from a Combi Interior Conversion.

When installing the extendable baggage net refer to Section 2, Limitations, Other Limitations for the Luggage Limitations.

6-8-3.4 Passenger Seat Occupant Moment Charts (Standard and Metric Units)

Table 6-8-7: EX-6S-2 - Passenger Seat Occupant Moment Chart (imperial)

PASSENGER SEAT OCCUPANT MOMENTS (LB - IN)				
WEIGHT (lb)	**PAX 1/2 (232.22 in)**	**PAX 3/4 (276.04 in)**	**PAX 5 (322.04 in)**	**PAX 6 (334.04 in)**
50	11611	13802	16102	16702
60	13933	16563	19323	20043
70	16256	19323	22543	23383
80	18578	22083	25763	26723
90	20900	24844	28984	30064
100	23222	27604	32204	33404
110	25545	30365	35425	36745
120	27867	33125	38645	40085
130	30189	35886	41866	43426
140	32511	38646	45086	46766
150	34834	41406	48306	50106
160	37156	44167	51527	53447
170	39478	46927	54747	56787
180	41800	49688	57968	60128
190	44123	52448	61188	63468
200	46445	55209	64409	66809
210	48767	57969	67629	70149
220	51089	60729	70849	73489
230	53412	63490	74070	76830
240	55734	66250	77290	80170

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Table 6-8-8: EX-6S-2 - Passenger Seat Occupant Moment Chart (metric)

PASSENGER SEAT OCCUPANT MOMENTS (KG - M)				
WEIGHT (kg)	**PAX 1/2 (5,899 m)**	**PAX 3/4 (7,011 m)**	**PAX 5 (8,180 m)**	**PAX 6 (8,485 m)**
25	147,5	175,3	204,5	212,1
30	177,0	210,3	245,4	254,5
35	206,4	245,4	286,3	297,0
40	235,9	280,5	327,2	339,4
45	265,4	315,5	368,1	381,8
50	294,9	350,6	409,0	424,2
55	324,4	385,6	449,8	466,7
60	353,9	420,7	490,8	509,1
65	383,4	455,7	531,7	551,5
70	412,9	490,8	572,6	593,9
75	442,4	525,9	613,5	636,4
80	471,9	560,9	654,4	678,8
85	501,4	596,0	695,3	721,2
90	530,9	631,0	736,2	763,6
95	560,4	666,1	777,1	806,0
100	589,9	701,1	818,0	848,5
105	619,3	736,2	858,9	890,9
110	648,8	771,3	899,8	933,3
115	678,3	806,3	940,7	975,7
120	707,8	841,4	981,6	1018,2

6-8-4 Executive Interior Code EX-8S

6-8-4.1 General

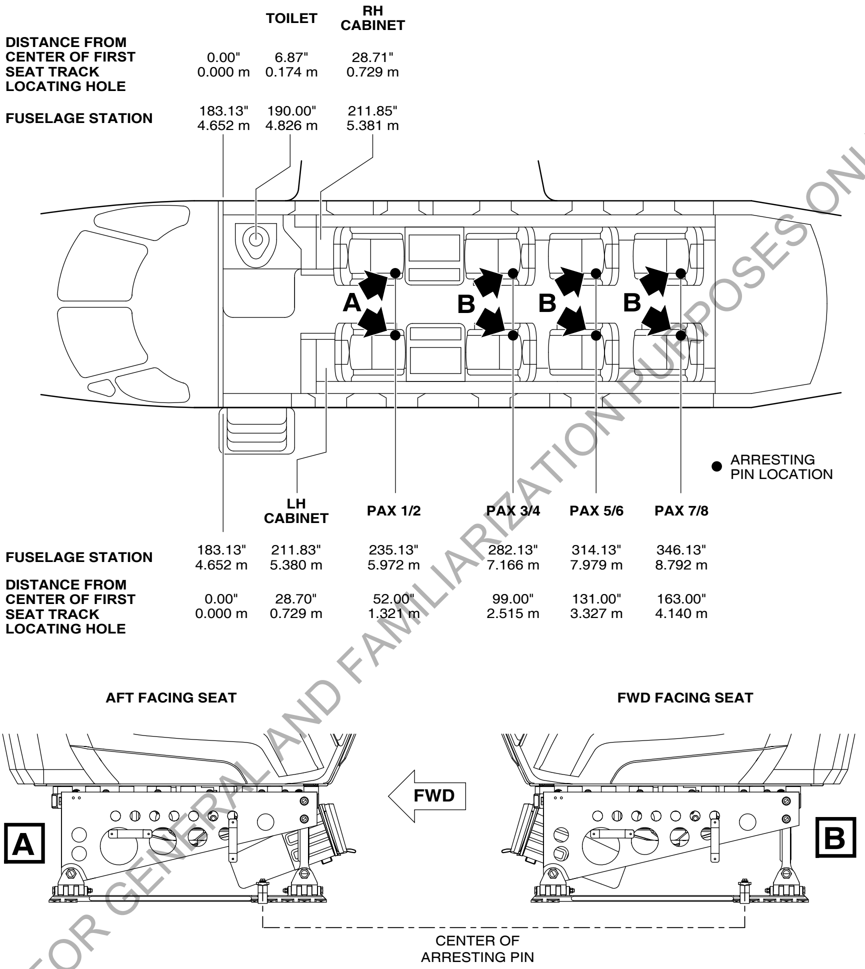
This configuration is a variation of the basic executive interior and consists of 8 executive passenger seats. It is the operator’s responsibility to check before using this configuration whether they require authorization by their regulatory authority. The following information is given:

- passenger seat location chart
- permitted passenger seat Part Numbers that can be installed
- passenger seats and furnishings weight and moment chart (standard and metric units)
- passenger seat occupant moment charts (standard and metric units).

All distances on the passenger seat locating chart are based on the first seat track locating hole (refer to Fig. 6-8-1).

EXECUTIVE INTERIOR CODE EX-8S

SEAT LOCATIONS



NOTE:

CABIN SEAT LOCATION IS DEFINED AS THE DISTANCE FROM THE CENTER OF THE FIRST SEAT TRACK LOCATING HOLE TO THE CENTER OF THE ARRESTING PIN ON EACH SEAT.

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Figure 6-8-4: Executive Interior Code EX-8S Seat Locations

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6-8-4.2 Permitted Passenger Seat Part Numbers That Can Be Installed

Table 6-8-9: EX-8S - Permitted Passenger Seat Part Numbers That Can Be Installed

SEAT NO.	PART NO.
1	959.30.00.017 959.30.00.019 959.30.00.081 959.30.00.083
2	959.30.00.049 959.30.00.051 959.30.00.113 959.30.00.115
3, 5, 7	959.30.00.001 through 959.30.00.016 959.30.00.065 through 959.30.00.080
4, 6, 8	959.30.00.033 through 959.30.00.048 959.30.00.097 through 959.30.00.112

Note

The CARES™ child restraint system (part number 959.30.01.591), for children older than 24 months and weight between 22 - 44 lb (10 - 20 kg), can be used on seats 3 to 8. Additional limitations apply when the optional Drop-Down Oxygen Mask system is installed, refer to AFMS 02415.

6-8-4.3 Passenger Seats and Furnishings Weight and Moment Chart

Table 6-8-10: EX-8S - Passenger Seats and Furnishings Weight and Moment Chart

ITEM	WEIGHT lb (kg)	MOMENT lb-in (kg-m)
PASS SEAT 1 OR 2	56.28 (25,53)	12682.9 (146,1)
PASS SEAT 3 OR 4	57.71 (26,18)	16327.0 (188,1)
PASS SEAT 5 OR 6	57.71 (26,18)	18173.68 (209,4)
PASS SEAT 7 OR 8	57.71 (26,18)	19975.4 (230,1)
TOILET	81.0 (36,7)	15390.0 (177,3)
LH CABINET	31.3 (14,2)	6630.3 (76,5)
RH CABINET	27.0 (12,3)	5720 (66,0)
FR 24 CARGO NET	3.6 (1,65)	941 (10,96)
FR 27 CARGO NET	3.6 (1,65)	1049 (12,21)
FR 32 EXTENDABLE BAGGAGE NET	6.44 (2,92)	2325 (26,78)
FR 34 BAGGAGE NET	5.13 (2,325)	1855 (21,38)

Adjust the aircraft Basic Empty Weight on the Loading Form Fig. 6-5-2 for items removed/added when converting to or from a Combi Interior Conversion.

When installing the extendable baggage net refer to Section 2, Limitations, Other Limitations for the Luggage Limitations.

6-8-4.4 Passenger Seat Occupant Moment Charts (Standard and Metric Units)

Table 6-8-11: EX-8S - Passenger Seat Occupant Moment Chart (imperial)

PASSENGER SEAT OCCUPANT MOMENTS (LB - IN)				
WEIGHT (lb)	**PAX 1/2 (232.22 in)**	**PAX 3/4 (276.04 in)**	**PAX 5/6 (308.04 in)**	**PAX 7/8 (340.04 in)**
50	11611	13802	15402	17002
60	13933	16563	18483	20403
70	16256	19323	21563	23803
80	18578	22083	24643	27203
90	20900	24844	27724	30604
100	23222	27604	30804	34004
110	25545	30365	33885	37405
120	27867	33125	36965	40805
130	30189	35886	40046	44206
140	32511	38646	43126	47606
150	34834	41406	46206	51006
160	37156	44167	49287	54407
170	39478	46927	52367	57807
180	41800	49688	55448	61208
190	44123	52448	58528	64608
200	46445	55209	61609	68009
210	48767	57669	64689	71409
220	51089	60729	67769	74809
230	53412	63490	70850	78210
240	55734	66250	73930	816110

Table 6-8-12: EX-8S - Passenger Seat Occupant Moment Chart (metric)

PASSENGER SEAT OCCUPANT MOMENTS (KG - M)				
WEIGHT (kg)	**PAX 1/2 (5,899 m)**	**PAX 3/4 (7,011 m)**	**PAX 5/6 (7,824 m)**	**PAX 7/8 (8,637 m)**
25	147,5	175,3	195,6	215,9
30	177,0	210,3	234,7	259,1
35	206,4	245,4	273,9	302,3
40	235,9	280,5	313,0	345,5
45	265,4	315,5	352,1	388,7
50	294,9	350,6	391,2	431,9
55	324,4	385,6	430,3	475,0
60	353,9	420,7	469,5	518,2
65	383,4	455,7	508,6	561,4
70	412,9	490,8	547,7	604,6
75	442,4	525,9	586,8	647,8
80	471,9	560,9	625,9	691,0
85	501,4	596,0	665,1	734,2
90	530,9	631,0	704,2	777,3
95	560,4	666,1	743,3	820,5
100	589,9	701,1	782,4	863,7
105	619,3	736,2	821,6	906,9
110	648,8	771,3	860,7	950,1
115	678,3	806,3	899,8	993,3
120	707,8	841,4	938,9	1036,5

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6-8-5 Executive Interior Code EX-6S-STD-2S

6-8-5.1 General

This configuration is a variation of the basic Executive interior and consists of 6 executive passenger seats and 2 standard seats. It is the operator's responsibility to check before using this configuration whether they require authorization by their regulatory authority. The following information is given:

- passenger seat location chart
- permitted passenger seat Part Numbers that can be installed
- passenger seats and furnishings weight and moment chart
- passenger seat occupant moments (standard and metric units).

CAUTION

Do not lift the commuter seat by the seat pan or the cushion when you remove or install the commuter seat. The commuter seat must be lifted by the rigid metallic structure only. If you do not, you can cause permanent damage to the commuter seat.

All distances on the passenger seat locating chart are based on the first seat track locating hole (refer to Fig. 6-8-1).

SIX EXECUTIVE AND TWO STANDARD INTERIOR CODE EX-6S-STD-2S

SEAT LOCATIONS

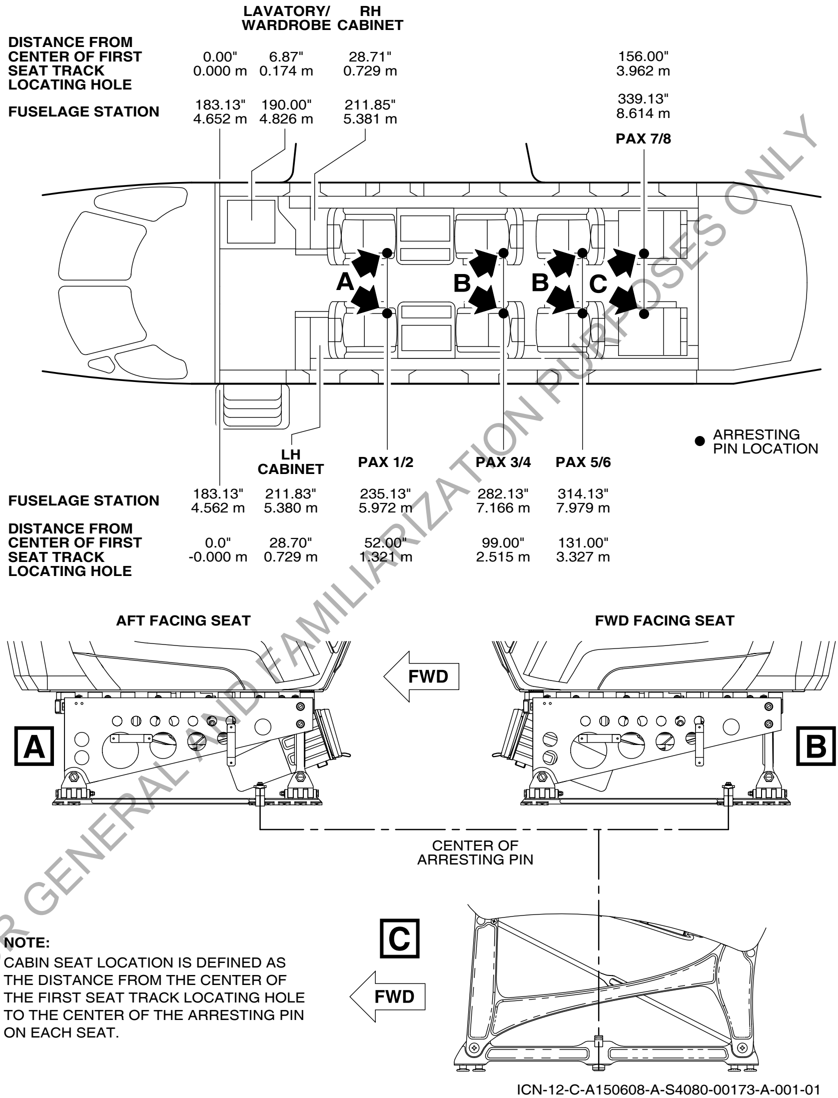

Figure 6-8-5: Six Executive and Two Standard Interior Code EX-6S-STD-2S Seat Locations

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6-8-5.2 Permitted Passenger Seat Part Numbers That Can Be Installed

Table 6-8-13: EX-6S-STD-2S - Permitted Passenger Seat Part Numbers That Can Be Installed

SEAT NO.	PART NO.
1	959.30.00.017 959.30.00.019 959.30.00.081 959.30.00.083
2	959.30.00.049 959.30.00.051 959.30.00.113 959.30.00.115
3, 5	959.30.00.001 through 959.30.00.016 959.30.00.065 through 959.30.00.080
4, 6	959.30.00.033 through 959.30.00.048 959.30.00.097 through 959.30.00.112
7	959.30.01.445 (with literature pocket) 959.30.01.447 (without literature pocket)
8	959.30.01.446 (with literature pocket) 959.30.01.448 (without literature pocket)

Note

The CARES™ child restraint system (part number 959.30.01.591), for children older than 24 months and weight between 22 - 44 lb (10 - 20 kg), can be used on seats 3 to 8. Additional limitations apply when the optional Drop-Down Oxygen Mask system is installed, refer to AFMS 02415.

6-8-5.3 Passenger Seats and Furnishings Weight and Moment Chart

Table 6-8-14: EX-6S-STD-2S - Passenger Seats and Furnishings Weight and Moment Chart

ITEM	WEIGHT lb (kg)	MOMENT lb-in (kg-m)
PASS SEAT 1 OR 2	56.28 (25,53)	12682.9 (146,1)
PASS SEAT 3 OR 4	57.71 (26,18)	16327.0 (188,1)
PASS SEAT 5 OR 6	57.71 (26,18)	18173.7 (209,4)
PASS SEAT 7 OR 8	31.60 (14,30)	10903 (125,62)
TOILET or WARDROBE	81.0 (36,7) 45.0 (20,4)	15390 (177,3) 8595 (98,97)
LH CABINET	31.3 (14,2)	6630.3 (76,5)
RH CABINET	27.0 (12,3)	5720 (66,0)
FR 24 CARGO NET	3.6 (1,65)	941 (10,96)
FR 27 CARGO NET	3.6 (1,65)	1049 (12,21)
FR 32 EXTENDABLE BAGGAGE NET	6.44 (2,92)	2325 (26,78)
FR 34 BAGGAGE NET	5.13 (2,325)	1855 (21,38)

Adjust the aircraft Basic Empty Weight on the Loading Form Fig. 6-5-2 for items removed/ added when converting to or from a Combi Interior Conversion.

When installing the extendable baggage net refer to Section 2, Limitations, Other Limitations for the Luggage Limitations.

6-8-5.4 Passenger Seat Occupant Moment Charts (Standard and Metric Units)

Table 6-8-15: EX-6S-STD-2S - Passenger Seat Occupant Moment Chart (imperial)

PASSENGER SEAT OCCUPANT MOMENTS (LB - IN)				
WEIGHT (lb)	**PAX 1/2 (232.22 in)**	**PAX 3/4 (276.04 in)**	**PAX 5/6 (308.04 in)**	**PAX 7/8 (337.35 in)**
50	11611	13802	15402	16867
60	13933	16563	18483	20241
70	16256	19323	21563	23614
80	18578	22083	24643	26988
90	20900	24844	27724	30361
100	23222	27604	30804	33735
110	25545	30365	33885	37108
120	27867	33125	36965	40482
130	30189	35886	40046	43855
140	32511	38646	43126	47229
150	34834	41406	46206	50602
160	37156	44167	49287	53975
170	39478	46927	52367	57349
180	41800	49688	55448	60722
190	44123	52448	58528	64096
200	46445	55209	61609	67469
210	48767	57969	64689	70843
220	51089	60729	67769	74216
230	53412	63490	70850	77590
240	55734	66250	73930	80963

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Table 6-8-16: EX-6S-STD-2S - Passenger Seat Occupant Moment Chart (metric)

PASSENGER SEAT OCCUPANT MOMENTS (KG - M)				
WEIGHT (kg)	**PAX 1/2 (5,899 m)**	**PAX 3/4 (7,011 m)**	**PAX 5/6 (7,824 m)**	**PAX 7/8 (8,569 m)**
25	147,5	175,3	195,6	214,2
30	177,0	210,3	234,7	257,1
35	206,4	245,4	273,9	299,9
40	235,9	280,5	313,0	342,7
45	265,4	315,5	352,1	385,6
50	294,9	350,6	391,2	428,4
55	324,4	385,6	430,3	471,3
60	353,9	420,7	469,5	514,1
65	383,4	455,7	508,6	557,0
70	412,9	490,8	547,7	599,8
75	442,4	525,9	586,8	642,6
80	471,9	560,9	625,9	685,5
85	501,4	596,0	665,1	728,3
90	530,9	631,0	704,2	771,2
95	560,4	666,1	743,3	814,0
100	589,9	701,1	782,4	856,9
105	619,3	736,2	821,6	899,7
110	648,8	771,3	860,7	942,5
115	678,3	806,3	899,8	985,4
120	707,8	841,4	938,9	1028,2

6-8-6 Executive Interior Code EX-4S-STD-4S

6-8-6.1 General

This configuration is a variation of the basic Executive interior and consists of 4 executive passenger seats and 4 standard seats. It is the operator's responsibility to check before using this configuration whether they require authorization by their regulatory authority. The following information is given:

- passenger seat location chart
- permitted passenger seat Part Numbers that can be installed
- passenger seats and furnishings weight and moment chart
- passenger seat occupant moments (standard and metric units).

CAUTION

Do not lift the commuter seat by the seat pan or the cushion when you remove or install the commuter seat. The commuter seat must be lifted by the rigid metallic structure only. If you do not, you can cause permanent damage to the commuter seat.

All distances on the passenger seat locating chart are based on the first seat track locating hole (refer to Fig. 6-8-1).

FOUR EXECUTIVE AND FOUR STANDARD INTERIOR CODE EX-4S-STD-4S

SEAT LOCATIONS

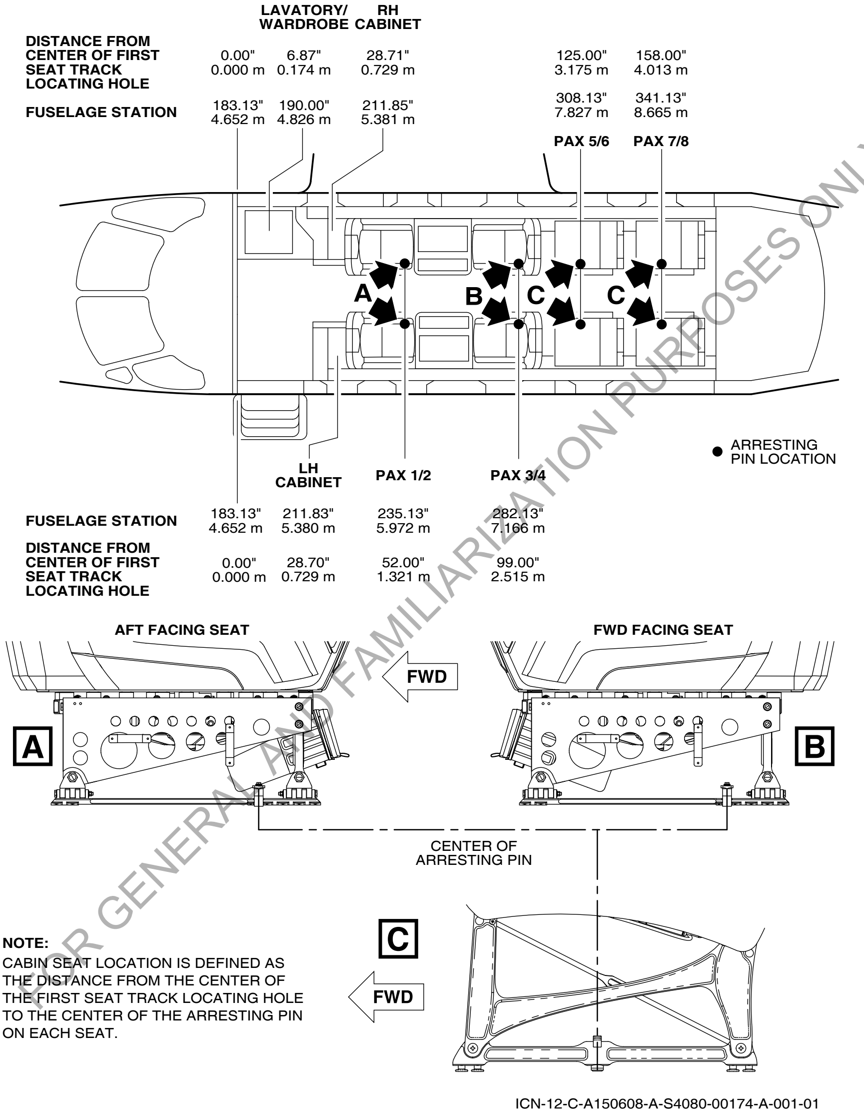

Figure 6-8-6: Four Executive and Four Standard Interior Code EX-4S-STD-4S Seat Locations

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6-8-6.2 Permitted Passenger Seat Part Numbers That Can Be Installed

Table 6-8-17: EX-4S-STD-4S - Permitted Passenger Seat Part Numbers That Can Be Installed

SEAT NO.	PART NO.
1	959.30.00.017 959.30.00.019 959.30.00.081 959.30.00.083
2	959.30.00.049 959.30.00.051 959.30.00.113 959.30.00.115
3	959.30.00.001 through 959.30.00.016 959.30.00.065 through 959.30.00.080
4	959.30.00.033 through 959.30.00.048 959.30.00.097 through 959.30.00.112
5, 7	959.30.01.445 (with literature pocket) 959.30.01.447 (without literature pocket)
6, 8	959.30.01.446 (with literature pocket) 959.30.01.448 (without literature pocket)

Note

The CARES™ child restraint system (part number 959.30.01.591), for children older than 24 months and weight between 22 - 44 lb (10 - 20 kg), can be used on seats 3 to 8. Additional limitations apply when the optional Drop-Down Oxygen Mask system is installed, refer to AFMS 02415.

6-8-6.3 Passenger Seats and Furnishings Weight and Moment Chart

Table 6-8-18: EX-4S-STD-4S - Passenger Seats and Furnishings Weight and Moment Chart

ITEM	WEIGHT lb (kg)	MOMENT lb-in (kg-m)
PASS SEAT 1 OR 2	56.28 (25,53)	12682.9 (146,1)
PASS SEAT 3 OR 4	57.71 (26,18)	16327.0 (188,1)
PASS SEAT 5 OR 6	31.60 (14,30)	9923 (114,33)
PASS SEAT 7 OR 8	31.60 (14,30)	10966 (126,35)
TOILET or WARDROBE	81.0 (36,7) 45.0 (20,4)	15390 (177,3) 8595 (98,97)
LH CABINET	31.3 (14,2)	6630.3 (76,5)
RH CABINET	27.0 (12,3)	5720 (66,0)
FR 24 CARGO NET	3.6 (1,65)	941 (10,96)
FR 27 CARGO NET	3.6 (1,65)	1049 (12,21)
FR 32 EXTENDABLE BAGGAGE NET	6.44 (2,92)	2325 (26,78)
FR 34 BAGGAGE NET	5.13 (2,325)	1855 (21,38)

Adjust the aircraft Basic Empty Weight on the Loading Form Fig. 6-5-2 for items removed/ added when converting to or from a Combi Interior Conversion.

When installing the extendable baggage net refer to Section 2, Limitations, Other Limitations for the Luggage Limitations.

6-8-6.4 Passenger Seat Occupant Moment Charts (Standard and Metric Units)

Table 6-8-19: EX-4S-STD-4S - Passenger Seat Occupant Moment Chart (imperial)

PASSENGER SEAT OCCUPANT MOMENTS (LB - IN)				
WEIGHT (lb)	**PAX 1/2 (232.22 in)**	**PAX 3/4 (276.04 in)**	**PAX 5/6 (306.35 in)**	**PAX 7/8 (339.35 in)**
50	11611	13802	15317	16967
60	13933	16563	18381	20361
70	16256	19323	21444	23754
80	18578	22083	24508	27148
90	20900	24844	27571	30541
100	23222	27604	30635	33935
110	25545	30365	33698	37328
120	27867	33125	36762	40722
130	30189	35886	39825	44115
140	32511	38646	42889	47509
150	34834	41406	45952	50902
160	37156	44167	49015	54295
170	39478	46927	52079	57689
180	41800	49688	55142	61082
190	44123	52448	58206	64476
200	46445	55209	61269	67869
210	48767	57969	64333	71263
220	51089	60729	67396	74656
230	53412	63490	70460	78050
240	55734	66250	73523	81443

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Table 6-8-20: EX-4S-STD-4S - Passenger Seat Occupant Moment Chart (metric)

PASSENGER SEAT OCCUPANT MOMENTS (KG - M)				
WEIGHT (kg)	**PAX 1/2 (5,899 m)**	**PAX 3/4 (7,011 m)**	**PAX 5/6 (7,781 m)**	**PAX 7/8 (8,619 m)**
25	147,5	175,3	194,5	215,5
30	177,0	210,3	233,4	258,6
35	206,4	245,4	272,3	301,7
40	235,9	280,5	311,2	344,8
45	265,4	315,5	350,2	387,9
50	294,9	350,6	389,1	431,0
55	324,4	3856,	428,0	474,1
60	353,9	420,7	466,9	517,2
65	383,4	455,7	505,8	560,3
70	412,9	490,8	544,7	603,4
75	442,4	525,9	583,6	646,5
80	471,9	560,9	622,5	689,6
85	501,4	596,0	661,4	732,6
90	530,9	631,0	700,3	775,7
95	560,4	666,1	739,2	818,8
100	589,9	701,1	778,1	861,9
105	619,3	736,2	817,0	905,0
110	648,8	771,3	855,9	948,1
115	678,3	806,3	894,8	991,2
120	707,8	841,4	933,7	1034,3

6-8-7 No Cabin Interior Configuration

6-8-7.1 General

The No Cabin Interior Configuration does not have any seats, interior panels, interior lighting, PSU panels, or O_2 masks.

No persons are allowed in the cabin.

Cargo may be placed in the cabin using the loading procedures given in Section 6-7, General Loading Recommendations. Baggage and cargo items ≤66 lb (30 kg) may be placed in the baggage area aft of the luggage net.

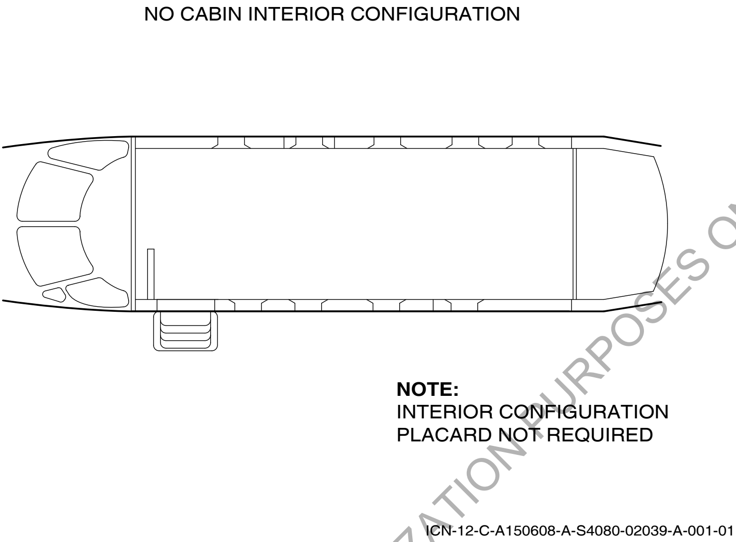

Figure 6-8-7: No Cabin Interior Configuration

6-8-7.2 Furnishings Weight and Moment Chart

Table 6-8-21: No Cabin Interior Furnishings Weight and Moment Chart

ITEM	WEIGHT lb (kg)	MOMENT lb-in (kg-m)
FR 24 CARGO NET	3.6 (1,65)	941 (10,96)
FR 27 CARGO NET	3.6 (1,65)	941 (10,96)
FR 34 BAGGAGE NET	5.13 (2,325)	1341 (15,44)

SECTION 7

Airplane and Systems Description

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7-1 General

The airplane is a low wing, T-tail, single engine, retractable landing gear type designed to transport passengers, cargo, or various combinations of both passengers and cargo.

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7-2 Airframe

7-2-1 General

The aircraft construction is conventional semimonocoque, primarily incorporating aluminum alloy, but composite structures are used in certain areas. Flush riveting is used where appropriate to minimize drag. Access panels are installed to facilitate inspection and maintenance. The complete airframe is electrically bonded to eliminate electromagnetic interference and static discharge wicks are used to reduce static charges while in flight.

7-2-2 Fuselage

The fuselage consists of the engine area, nose gear assembly, cockpit, cabin, and aft fuselage. The engine area contains the powerplant and associated accessories. The engine cowling is constructed from a carbon/nomex honeycomb material and is covered by a copper foil for lightning protection. The engine mount is welded steel tubing and bolted to the firewall in four places. The firewall is titanium and protected by insulation material.

A left and a right windshield, two side windows, and a Direct Vision (DV) window provide cockpit visibility. The windshield is made of two glass layers with an interlayer, while the two side windows and the DV window are made of two stretched acrylic layers with an interlayer. All windows are made of two ply laminated design.

The cabin area is aft of the cockpit to the aft pressure bulkhead and contains the passenger door, the cargo door, and an emergency overwing exit. The nine cabin windows are two ply laminated monolithic stretched acrylic and incorporate dry neoprene seals. Airplane avionics are mounted under the cabin floor, running the length of the center cabin, and are accessible through quick release panels. The cabin carry-through spar attachment fittings are one-piece machined aluminum. Fuselage fairings are constructed from either carbon/nomex or aramid/ nomex honeycomb material.

A safety net is installed aft of the rear pressure bulkhead to protect the bulkhead from damage during maintenance.

7-2-3 Empennage

The empennage is a T-tail design with the horizontal stabilizer mounted on top of the vertical stabilizer. The vertical and horizontal stabilizer assemblies are conventional aluminum construction. The horizontal stabilizer is a trimmable structure. The dorsal fin is made of glass fiber honeycomb and the ventral fin is made of kevlar honeycomb material.

7-2-4 Wings

The wings are of conventional construction incorporating front and rear spars, ribs, and skin. The front and rear spars are mainly from machined aluminum alloy plate. Both spars include fuselage and integral landing gear attachment points, while the rear spar also integrates flap actuator attachment points. Main load carrying ribs are machined from aluminum alloy plate. All other ribs are formed sheet metal. The ribs incorporate lightening holes to reduce weight and integral beads for stiffening. The wing skin is stiffened clad aluminum alloy sheet riveted to the spars and ribs. Access panels are in the wing bottom only.

Each wing is attached to the fuselage using three titanium shear bolts and, at the aft upper fitting, one steel tension bolt.

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Each wing contains an integral fuel tank, aileron, flaps, de-ice boot, and main landing gear. The fuel tanks are located between ribs 3 and 16, forward of the main spar to the nose rib and between ribs 6 and 16 behind the main spar to the rear spar.

The ailerons are conventional construction with a single spar and ribs. The aileron access panels are a carbon/nomex honeycomb construction. The ailerons are mass balanced and the aileron/wing gap is sealed.

Each wing incorporates a single piece Fowler flap of conventional construction, with three support arms and associated linkages. The wing trailing edges above the flaps are foam core covered with carbon laminate while the flap fairings are a carbon laminate with nomex honeycomb reinforcement strips.

A surface mounted de-ice boot is attached to the nose skin of each wing. Each wing has a main landing gear attached to the front and rear spar, with a carbon fiber/nomex honeycomb gear door attached to the leg. The wing tips are constructed of carbon fiber/honeycomb with a top layer of copper foil for lightning protection.

7-3 Flight Controls

7-3-1 General

Refer to Fig. 7-3-1. Flight Controls - General, for system controls and flap operation.

The flight control system is conventional using push-pull rods and carbon steel cables. Electric trim systems are provided for the aileron, rudder, and elevator. All trim systems can be disconnected in the event of a runaway condition.

An aileron/rudder interconnect system is installed to improve lateral stability and turn coordination.

When the pilot initiates a turn by giving a roll control input, the spring package in the interconnect systems applies a force to the rudder cables that tends to deflect the rudder in the direction of the turn. Alternatively, when the pilot gives a yaw control input by pushing one of the rudder pedals, the spring package applies a force to the aileron control system which tends to roll the aircraft in the direction of turn.

7-3-2 Aileron

The ailerons are connected to the cockpit control wheels by control cables in the fuselage and push-pull rods in the wings. Each aileron is attached to the wing at two hinge points.

Each aileron has a trim tab which is connected to a geared lever (Flettner) mechanism. The mechanism is installed inside the aileron and makes the trim tabs act as balance tabs when the ailerons are moved. They move in the opposite direction to the ailerons. The left aileron trim tab is also operated electrically from the cockpit. Refer to Trim system, for more information.

7-3-3 Elevator

The elevator is a two piece unit attached to the horizontal stabilizer at a total of five hinge points and is connected to the cockpit control wheel by carbon steel control cables. A down spring is installed in the control circuit to improve longitudinal stability. The elevator is equipped with static discharge wicks to dissipate static charges to the atmosphere.

Pitch trim is provided by positioning the horizontal stabilizer. Refer to Trim System, for more information.

7-3-4 Rudder

The rudder is a single piece unit attached to the vertical stabilizer at two hinge points and is connected to the cockpit rudder pedals by carbon steel control cables. Both pilot and copilot rudder pedals are adjustable by use of a crank located between each set of rudder pedals. Clockwise rotation of the crank moves the pedals aft. The rudder is equipped with static discharge wicks to dissipate static charges to the atmosphere.

The rudder incorporates a trim tab that is electrically operated from the cockpit. Refer to Trim Trim system, for more information.

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7-3-5 Trim

The aileron, horizontal stabilizer and rudder trim are electrically operated. Aileron and horizontal stabilizer trim operation is controlled by a switch on the outboard yoke of each control wheel, rudder trim operation is controlled by a switch on the Engine Power Control Lever. Before selecting pitch or aileron trim, press and hold the trim engage switch located on the forward side of each outboard control wheel yoke. A display for aileron, horizontal stabilizer and rudder trim position is shown on the systems Multi-Function Display (MFD).

Pitch trim is accomplished by an electrically controlled actuator connected to the moveable horizontal stabilizer. The actuator has two separate motors: a manual stabilizer trim motor (controlled by the manual trim switch) and an alternate stabilizer trim motor (controlled by the autopilot and the ALTERNATE STAB TRIM switch). The manual stabilizer trim motor and the alternate stabilizer trim motor, when controlled by the autopilot trim adapter, are both powered from the essential bus (PITCH TRIM circuit breaker $_{L}$A1). The alternate stabilizer trim motor can also be used as a back-up system by the pilot to regain pitch trim control in the event of an essential bus pitch trim power supply malfunction. To activate alternate Stabilizer trim, which is powered through the main bus (PITCH TRIM ALTN circuit breaker $_{R}$A1), press the ALTERNATE STAB TRIM switch on the center console to NOSE UP or NOSE DOWN as needed.

The leading edge of the horizontal stabilizer moves down for nose-up trim and moves up for nose-down trim. At the root of the left horizontal stabilizer leading edge are trim range indicator markings to show full travel in either direction and the takeoff trim range. As part of the pre-flight inspection these trim indicator markings should be used to verify the cockpit trim position indication.

If there is uncommanded trim operation, all trim operation (manual and auto trim) can be stopped by lifting the switch guard and pressing the TRIM INTR switch located in front of the Engine Control quadrant on the center console.

7-3-6 Flaps

Each wing trailing edge has a single piece Fowler type flap supported by three flap arms. The flaps are controlled by a selector handle located to the right of the power controls on the center console. The flaps may be set to one of the four preset positions 0°, 15°, 30° and 40° by moving the handle to the appropriate position. If the flap lever is not at one of the four preset positions, the Flap Control and Warning Unit (FCWU) will drive the flaps to the nearest preset position.

The flaps are electrically actuated. There is a single flap Power Drive Unit (PDU) installed below the cabin floor at the rear main frame. It drives screw actuators at the inboard and middle stations through flexible shafts. The screw actuators are connected to the flap actuating arms.

The flap control system incorporates a failure detection system. The system can detect a failure of a flexible shaft by disconnection or jamming, potentially resulting in flap asymmetry or failure of the system to achieve the selected flap position. The system can detect a failure of a single actuator, potentially resulting in single flap panel twisting. If a failure is detected, the FCWU disconnects the power to the PDU and the Crew Alerting System (CAS) window will show **Flaps**. This condition cannot be reset by pilot action, a landing should be made, refer to Section 3, Emergency Procedures, Flaps Failure.

A rotation sensor is installed on each of the outer flap screw actuators. These sense the rotation of the flexible shafts and give signals to the FCWU. The FCWU monitors these signals for asymmetrical flexible shaft rotation of more than 20 rotations (caused by a broken inner flap drive shaft). If failure is detected, the FCWU disconnects the power to the PDU and the CAS window will show a Flaps caution. This condition cannot be reset by pilot action. To detect satisfactory system operation, the FCWU monitors the left sensor for 10 rotations of the flexible shaft in the first 7 seconds of a flap up or down selection. If the selected flap position is not achieved the FCWU disconnects the power to the PDU and **Flaps** will be shown.

There are five position sensors in the flap system, one at each center flap actuating arm, one at each inner flap actuating arm and one on the flap position lever, which give signals to the FCWU. The FCWU monitors the signals from the left and right flap sensors for flap asymmetry (caused by a broken inner flap drive shaft). If an asymmetry is detected, power to the PDU is disconnected and **Flaps** will come on. Flap panel asymmetry occurs when the difference between the left and right flap angle exceeds a specific angle in accordance with the table below.

Table 7-3-1: Flap Position Symmetry Limits

Flap position between:	**Asymmetry occurs when the left and right flap panel difference is at least:**
0° and 15°	1.6°
15° and 30°	4.3°
30° and 40°	5°

The FCWU also monitors the signals from the left and right flap sensors for twisting of the left or right flap (caused by a broken outer flap drive shaft or unequal movement of the flap screw actuators). If a failure is detected, the FCWU disconnects the power to the PDU and the CAS window will show a Flaps caution.

Additionally if flap asymmetry or twist is detected and the flap angle is greater than 2° after 10 seconds, the **Pusher** will show and the stick pusher will default to 'safe' mode. **Pusher Safe Mode** will show in the CAS window. In the 'safe' mode the stick pusher will operate at the flap 0° flap speed setting.

If the PDU motor overheats or a stalled motor condition is detected, a signal from the PDU will open the FLAP circuit breaker on the Generator 1 Bus circuit breaker panel. The FCWU then removes the up or down command to the PDU and the CAS window will show **Flaps**. After waiting for a period of 5 minutes the FLAP circuit breaker can be reset (max. 2 attempts) and normal flap operation resumes. This is the only pilot resettable failure and cycling the flap circuit breaker, if it has not opened, will not reset any other failure mode detected.

To avoid an inadvertent flap down command at high speed, flap down enable is disabled when the flap selector handle is in the 0° position.

Flap system operation may be stopped at any time by lifting the switch guard and pressing the INTERRUPT FLAP switch on the center console to INTR. The CAS window will show **Flaps**. If the switch is moved back to the NORM position, normal operation will not resume, even if the FCWU does not detect any failures.

A FLAP GROUND RESET switch is installed on the maintenance test panel (right sidewall behind the copilot seat). The FLAP GROUND RESET switch is only operational on the ground for maintenance purposes.

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7-3-7 Indication / Warning

Symbolic aircraft views of the trim positions for the aileron trim tab (roll), rudder trim tab (yaw) and horizontal stabilizer (pitch) are shown in the TRIM window of the systems MFD. In flight, the trim indications are shown in white. An invalid trim status will be shown with an amber cross. On the ground, the trim logic changes and the colors change based on the trim position. The neutral trim positions change to green and the pitch trim also has a green diamond (aft cg). The aircraft symbols change to green when each trim position is correctly set for takeoff. If the trim position is not correctly set, the aircraft symbol will be white and a CAS **Takeoff Configuration** will be displayed on the CAS window. A green trim in motion indicator will show when the autopilot is moving the rudder and horizontal stabilizer trim. An invalid autopilot trim parameter will be shown with an amber cross over the indicator.

Flap position is shown in the FLAP window of the systems MFD by a white symbolic flap pointer which moves in relation to flap movement. The window is marked in white with the positions 0, 15, 30 and 40. The pointer and the degree position mark will change to green when the pointer reaches the selected flap position and is adjacent to the mark. When the aircraft is on ground and flaps are at 40° the pointer will show white and a CAS **Takeoff Configuration** will be displayed on the CAS window. When airborne and the flaps are up, the flap indications change from their default white to a grey color after 20 seconds. An invalid flap condition or status related to the flap position will be shown by an amber cross.

If the airspeed goes above the maximum limit for the current flap setting, the Flight Alerting System (FAS) will initiate an “Overspeed” warning on the Primary Flight Display (PFD) and a “Speed” voice callout will be heard. A red Vconstraint bar will be shown on the right side of the PFD ASI tape and the airspeed digital readout will change to red.

If a stabilizer trim runaway of the main system is sensed, a CAS **Pitch Trim Runaway** will be displayed and a “Trim Runaway” voice callout will be heard.

If a rudder trim runaway is sensed, a CAS **Yaw Trim Runaway** will be displayed and a “Trim Runaway” voice callout will be heard. However, the pilot will mute the runaway alerts with a simultaneous manual trim command during the onset of a pitch trim runaway. For this reason, it is essential to interrupt the trim system after the first sign of a runaway in accordance with the published Pitch Trim Runaway - 3-14-01 procedure in Section 3 of this POH.

In case of a pitch or yaw trim runaway, take action in accordance with Section 3, Emergency Procedures, Electrical Trim

On the ground and with weight on the wheels the aircraft is monitored for Takeoff Configuration by the Monitoring Warning System (MWS). The MWS monitors the position of the trim tabs, horizontal stabilizer, flaps, and the engine and airspeed conditions. If any of the trims or the flap position are not in the takeoff range with the engine running, **Takeoff Configuration** will be shown in the CAS window of the systems MFD. If any of the trims or the flap position are not in the takeoff range, and the engine torque is increased more than 20 psi with an airspeed of less than 50 KIAS, the FAS will initiate a NO TAKEOFF warning on the PFD and a “No Takeoff” voice callout will be heard.

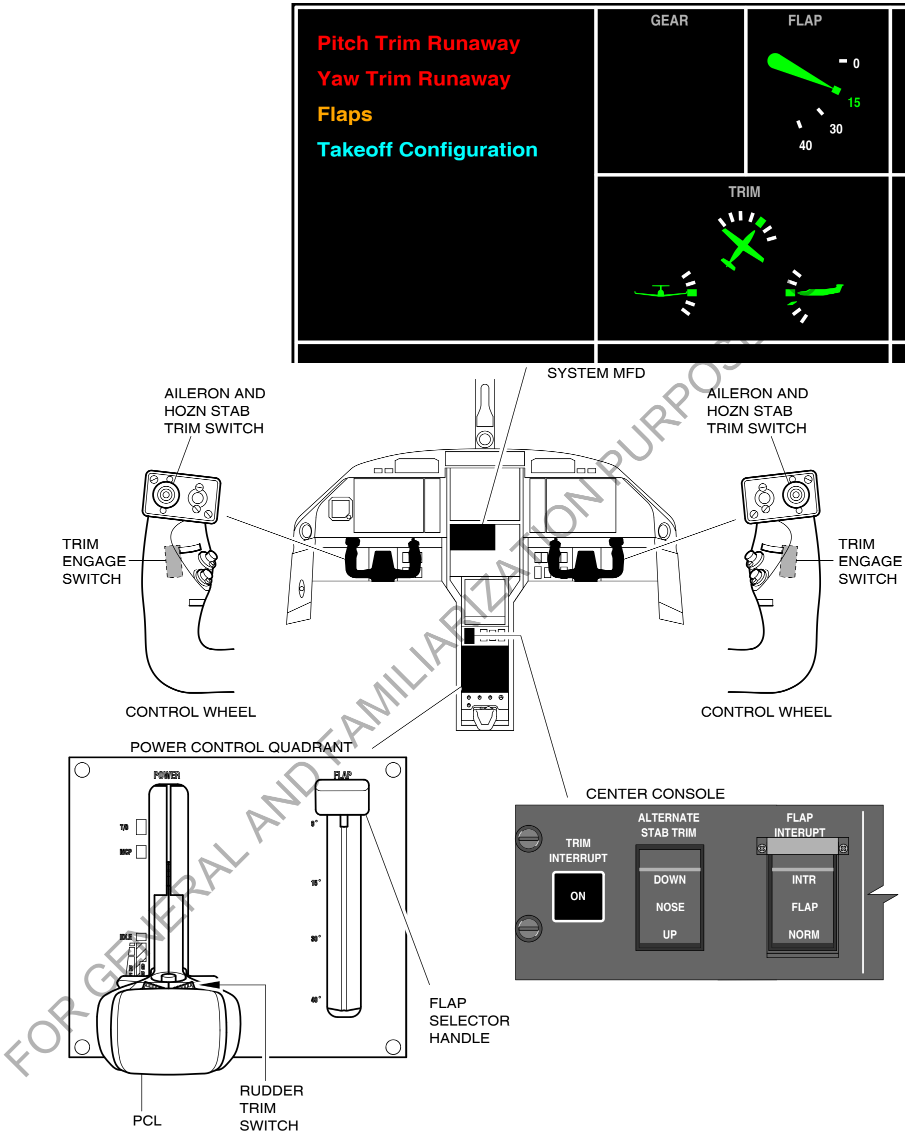

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Figure 7-3-1: Flight Controls - General

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7-4 Landing Gear

7-4-1 General

Refer to Fig. 7-4-2. Landing Gear System, for system operation.

The landing gear is a conventional tricycle configuration that is extended and retracted using electromechanical actuators. Landing gear operation is completely automatic upon pilot gear selection.

All landing gear are held in the fully retracted position by a mechanical brake internal to the actuators. No mechanical uplocks are installed.

Landing gear position is shown on three icons in the GEAR window of the systems Multi Function Display (MFD).

Nosewheel steering is accomplished by mechanical nosewheel steering and by differential braking.

Aircraft braking is controlled by toe pedals that operate brake assemblies attached to the left and right landing gear. Propeller reverse also contributes to aircraft braking. Refer to Section 7-11, Propeller, for more information.

7-4-2 Description

The nose gear is a hydraulic fluid and nitrogen filled shock strut. The shock strut consists of a piston and fork assembly that slides inside a cylinder. A torque link connects the piston/fork assembly to the cylinder. The cylinder is mounted inside the nosewheel well. The nose gear is locked in the extended position by putting the folding strut in an overcenter position. A spring is attached to the nose gear to assist in free fall during emergency extension. The nose gear doors are spring loaded to the open position and are mechanically closed during nose gear retraction. The nose gear retracts rearward into the nosewheel well and is completely enclosed by the gear doors when the landing gear is retracted. Proximity switches give the up or down signal to the Modular Avionics Unit (MAU).

Both main landing gear are trailing link types. A hydraulic fluid and nitrogen filled shock strut connects the trailing link to the main leg hinge point. The main gears are locked in the extended position by putting the folding strut in an overcenter position. A spring is attached to the main gears to assist in free fall during emergency extension. The main landing gear doors consist of a single door that is attached to the main gear leg and the outside edge of the main gear wheel well. Each main gear retracts inward into the main gear wheel well. With the landing gear retracted the main landing gear wheel and tire assemblies are not enclosed and protrude out of the main gear wheel well approximately one inch (25.4 mm). Proximity switches give the up signal to the MAU. Microswitches give the down signal to the MAU.

All landing gear are held in the fully retracted position by a mechanical brake internal to the actuators. No mechanical uplocks are required.

Nose wheel steering is accomplished using the rudder pedals which are mechanically connected to the nosewheel. Additional nosewheel steering is done through differential braking. Use of rudder pedal only will turn the nosewheel ± 12 degrees from center while differential braking will turn the nosewheel ± 60 degrees from center. A shimmy damper is installed on the nose landing gear strut to eliminate nosewheel oscillations.

The tires are a low pressure type that allow operations from soft and unimproved fields.

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7-4-3 Electromechanical Actuators

7-4-3.1 Description

Both nose landing gear and main landing gear actuators have the same functionality and are electromechanical, self-rigging type actuators. The actuator motor control and monitoring electronics are incorporated within the actuator. Control is provided by the landing gear selector handle and the landing gear control system (including the Gear Relay Unit).

The actuator consists of an electric motor connected to a series of gears which reduce speed. The gear train has a thrust bearing connected to a ball screw and shaft. The ball screw transforms the rotation of the gear to the linear movement necessary to extend and retract the landing gear.

The motor brake is engaged when actuator movement is stopped.

An emergency gear extension system is a cable-operated system to disengage the gear train from the electric motor. Once initiated, the emergency free fall is damped by a centrifugal brake within the actuator to avoid damage to the structure.

Electrical power supply for the actuators is provided from the SECONDARY POWER LINE. Power is applied to the actuators for 30 seconds following gear handle movement.

Cockpit controls consist of the following:

- A landing gear selector handle is located on the pilot's lower right panel and facilitates extension or retraction of the landing gear. It activates up and down switches situated directly on the handle system. The handle is equipped with an electrical spring loaded solenoid which prevents it from moving to the retracted position when the airplane is on the ground. The airplane on ground status is sensed by the MAU
- An emergency gear extension (release cable) system, actuated with a handle, located at the rear of the center console, is used to disengage the gear train in the actuator and enables emergency free fall of the landing gear if the electric drive system fails.

7-4-3.2 Operation

When the landing gear handle is set to the up (or down) position a command signal is sent to the actuator to move to the retracted/extended position. At the same time the actuators are powered for 30 seconds.

The main and nose landing gears are held in its extended position by an overcenter two piece drag link and an overcenter spring.

The actuators are of the linear type with the main landing gear actuators also incorporating the down locking mechanism.

7-4-4 Indication/Warning

Extended position indication is provided by micro switches situated at the main landing gear drag link and a proximity switch on the nose landing gear door. Retraction position indication is provided by proximity switches on the main and nose landing gear doors.

Landing gear position is shown by three icons (one for each gear) in the GEAR window of the systems MFD. Each icon can show gear displays for various conditions (refer to Fig. 7-4-1).

Condition of left main gear, right main gear and nose gear	Color and Font	Gear Display
State is 'undetermined'	Amber cross on black background	
State is 'Gear Up' normal	White UP with white box outline	
State is 'Gear Up' declutter (flaps up)	Grey UP with grey box outline	
State is 'Gear Up' warning	White UP in red box	
State is 'Gear Down'	Black DN with green background	
State is 'Gear in Transit'	White hatched lines with black background	
State is 'Gear in Transit Warning'	White hatched lines with red background	

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Figure 7-4-1: Landing Gear Position Icons

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The Flight Alerting System (FAS) will initiate a Gear warning message on the Primary Flight Display (PFD) and an aural warning will sound if the landing gear is not down and locked whilst in the air with:

- an airspeed of less than 130 KIAS and the PCL at idle (**APEX Build 12.6.1 and below**), or
- a radar altitude of less than 800 ft, and an airspeed of less than 130 KIAS and the PCL at idle (**APEX Build 12.7.1 and higher**), or
- the flaps set to 30 or 40°, or
- a radar altitude of less than 200 ft and a power setting of less than 10 psi.

The Crew Alerting System (CAS) displays the following cautions and advisory messages for the Electric Landing Gear System:

Gear Actuator Cntl	Indicates a failure reported by one of the landing gear actuators. Gear should not be cycled unnecessarily. Gear can be lowered if it is raised. Maintenance action required.
Gear Control Fault	Indicates loss of redundancy in landing gear control system, such as a stuck gear handle position switch. Gear will still function normally with a single fault.

7-4-5 Emergency Extension System

To manually extend the landing gear set the landing gear selector handle to DN with airspeed 120 KIAS. Open the Emergency Gear Extension Lever cover and pull the Emergency Lever. This will allow the landing gear to free fall. If the landing gear does not completely extend and show three green indicators, banking the airplane left and right to use the G-load may assist the emergency extension of the main landing gear. Reducing airspeed and engine power to reduce aerodynamic load may assist the emergency extension of the nose landing gear.

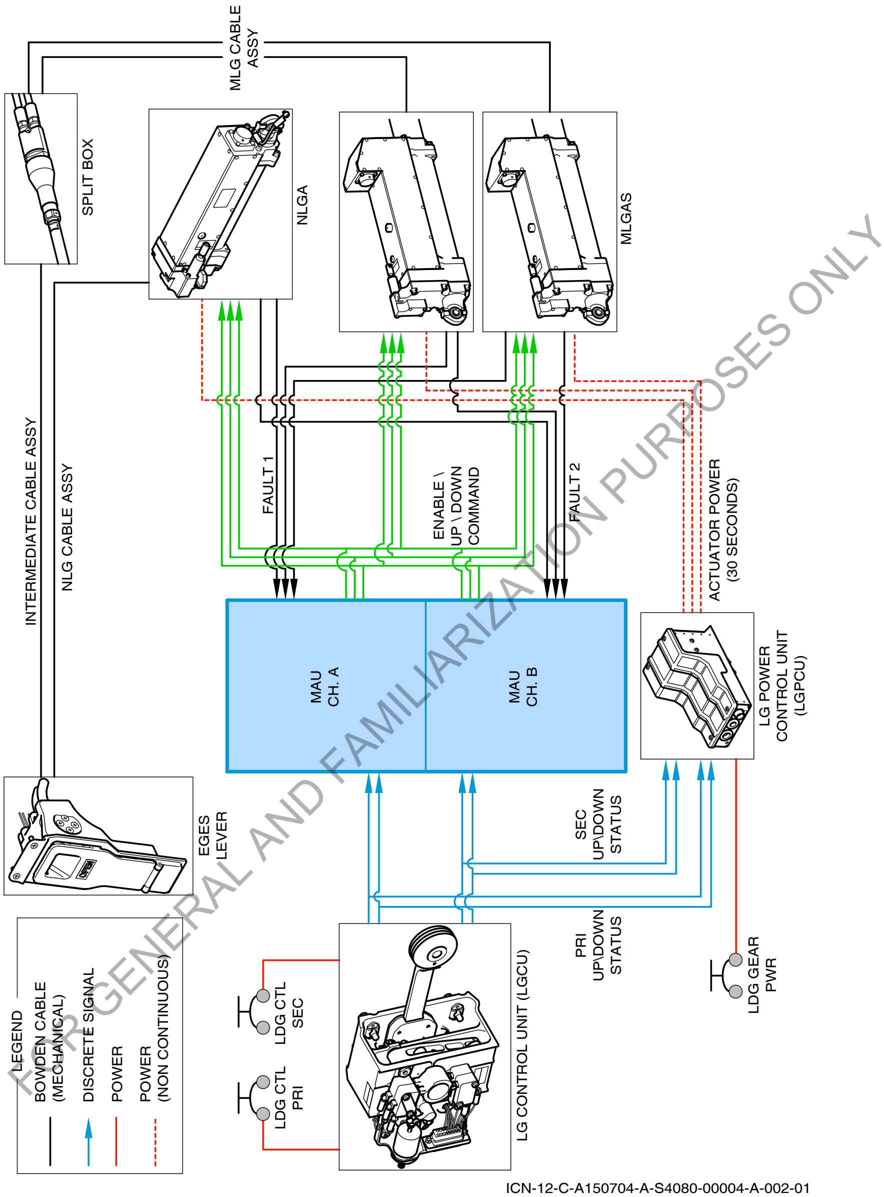

Figure 7-4-2: Landing Gear System (Sheet 1 of 3)

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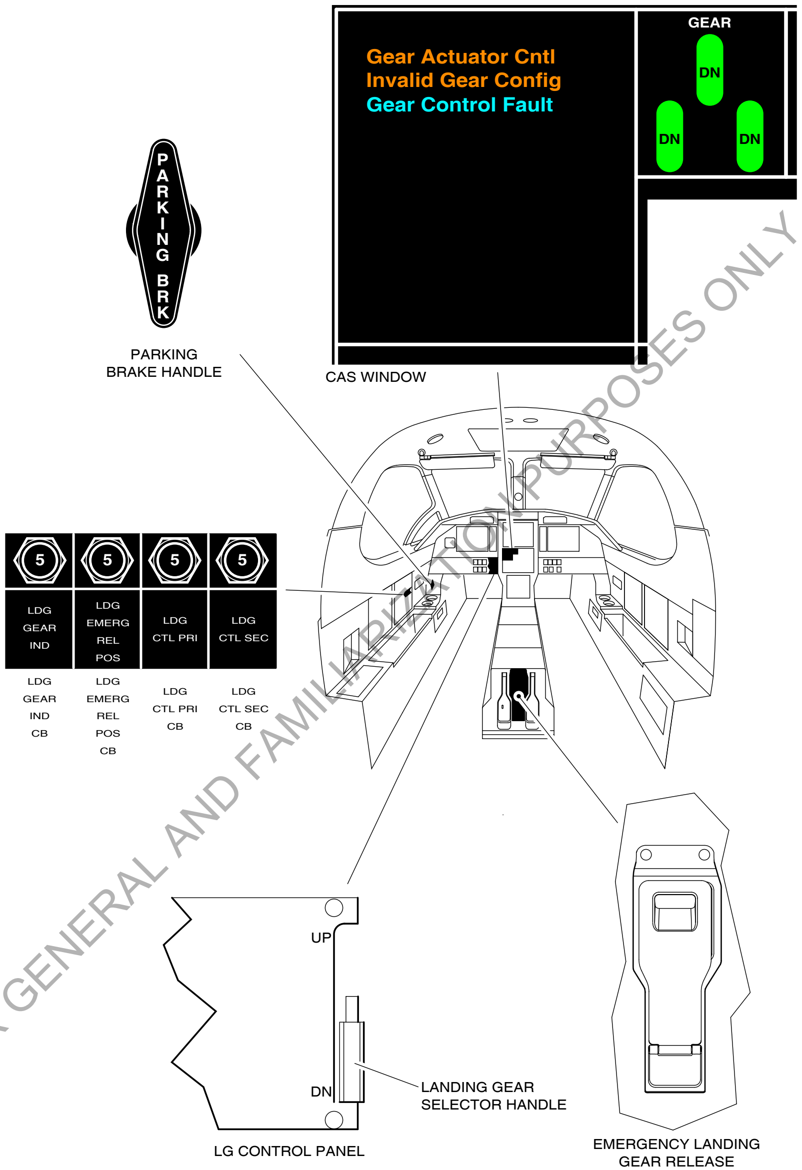

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Figure 7-4-2: Landing Gear System (Sheet 2 of 3)

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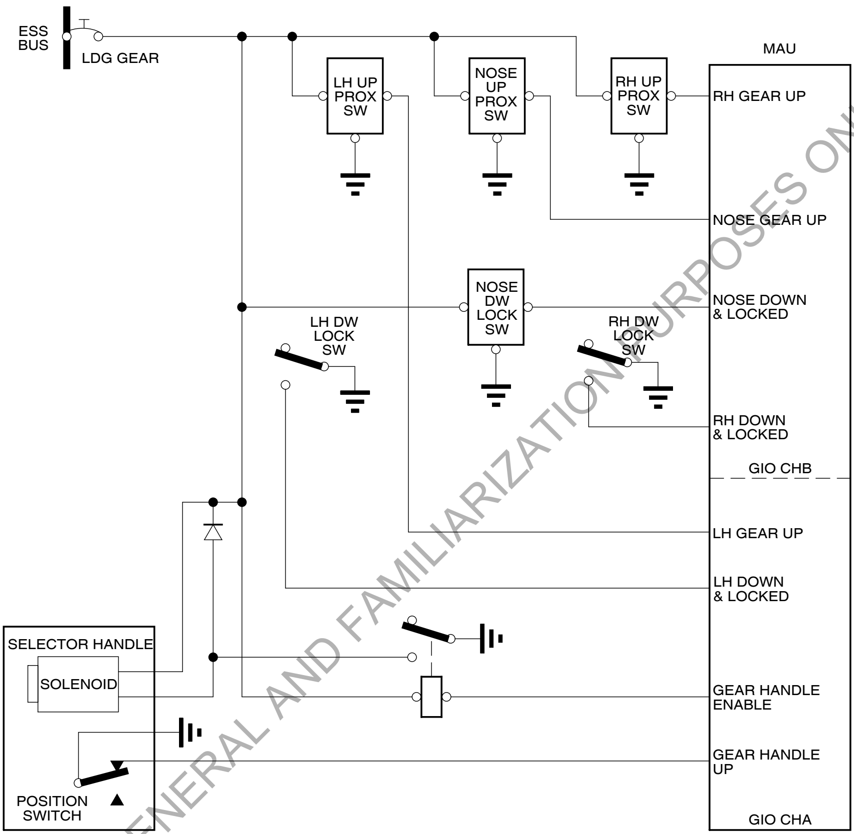

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Figure 7-4-2: Landing Gear System (Sheet 3 of 3)

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7-4-6 Air / Ground System

The aircraft "in air" or "on ground" (AIR/GND) status is determined from a combination of aircraft systems interfaced to the MAU:

- LH main gear proximity switch
- RH main gear proximity switch
- Radar Altimeter - altitude
- Calibrated airspeed (ADAHRS computed).

By comparison monitoring of the above systems the MAU determines the AIR/GND status of the aircraft. MAU Channel A outputs a discrete signal to control the LH AIR/GND relays. MAU Channel B outputs a discrete signal to control the RH AIR/GND relays.

The LH AIR/GND signal is sent to the following systems:

- Propeller de-ice
- Flaps
- ECS
- LH Stick Pusher Computer
- Flight Time Counter.

The RH AIR/GND signal is sent to the following systems:

- RH Stick Pusher Computer
- Logo Lights (optional system).

If the MAU determines a disparity between the monitors by comparison monitoring, a correct determination of the AIR/GND status is still possible as the suspect (invalid) monitor is disregarded in the determination. When the MAU determines that all monitors disagree it results in an invalid AIR/GND state. If the AIR/GND state is invalid a **Air/Ground Fail** will be shown on the CAS.

When **Air/Ground Fail** shows the AIR/GND state defaults to AIR.

A dormant fault in the LH and RH main gear proximity switches is possible as a result of the AIR/GND monitor function of the MAU. To avoid this CAS status alerts will be given for **LH WOW Fault**, **RH WOW Fault** or **LH + RH WOW Fault** when the MAU determines either or both proximity switch inputs are invalid.

7-4-7 Brakes

Refer to Fig. 7-4-3, Brake System, for system operation.

Aircraft braking is provided by two brake assemblies, one bolted to each main landing gear axle. The brakes are controlled by toe pedals attached to each rudder pedal assembly. The pilot and copilot left toe brakes operate the left brake while the pilot and copilot right toe brakes operate the right brake.

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The brake system consists of a brake fluid reservoir, four brake master cylinders, a left and right shuttle valve, a parking brake valve, and two brake assemblies. If the pilot and copilot simultaneously apply pressure to the same side brake pedal, the one applying the greatest pressure will control the braking.

The brake fluid reservoir is located on the right hand side of the cabin sidewall and incorporates a fluid level indicator.

A separate brake master cylinder, located in the cockpit footwell, is mechanically connected to each toe pedal. There is no mechanical connection between the pilot and copilot brake pedals. Two shuttle valves, a left and a right, are used to select inputs from their respective pilot and copilot brake pedals. Pressing a brake pedal causes the applicable brake master cylinder to force brake fluid through the respective shuttle valve and parking brake valve to the brake assembly.

The six piston brake assemblies have steel friction surfaces and three retractors. The retractors pull the pressure plate back when no hydraulic pressure is applied to the brake assembly. When the system is pressurized and the retractors are flush with the piston housing, the brake linings must be overhauled.

The parking brake valve has two off-center cams that hold open poppet valves whenever the parking brake is released. This allows hydraulic fluid flow through the brake system. When the parking brake is set, the off-center cams are rotated to allow the poppet valves to close. This traps brake fluid under pressure between the parking brake valve and the brake assemblies.

To set the parking brake, pull the PARKING BRK T-handle fully out and rotate to lock, then evenly press both brake pedals. Release pedal pressure and the brakes will remain set. To release the brakes, rotate and push the PARKING BRK T-handle fully in.

7-4-8 Wheels and Tires

The wheels are split-hub type, the main wheels have three fusible plugs which melt when there is too much heat from the brakes. Tubeless tires are installed on the wheels and each wheel has a tire inflation valve and an overinflation safety plug. The main wheels have fairings on the outer hubs which make the wheels aerodynamically smooth when the landing gear is retracted.

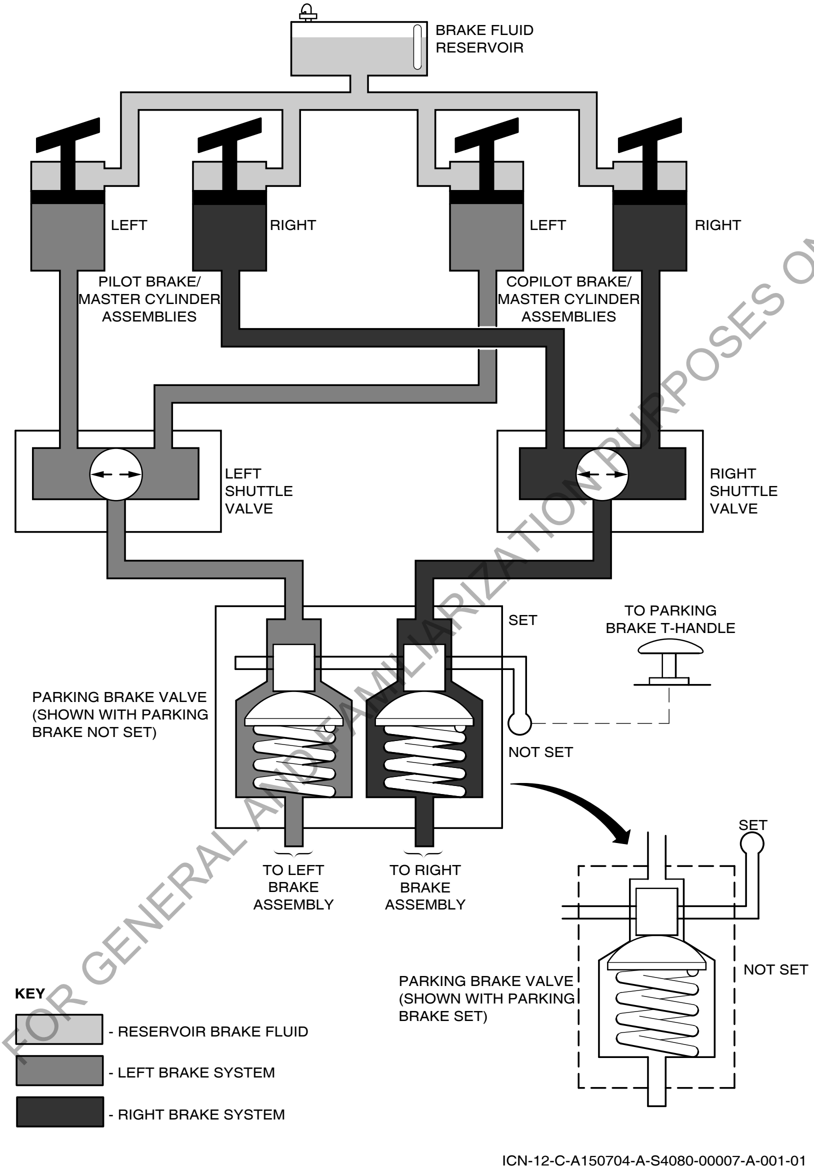

Figure 7-4-3: Brake System

7-5 Baggage Compartment

7-5-1 General

A baggage compartment is provided at the rear of the cabin and is accessible during flight. A standard luggage net is secured at twelve attachment points to secure the baggage. An extendible baggage net can be installed instead of the standard net, to secure baggage in front of and in the baggage compartment. The floor attachments at the front of the net can be moved between Frames 32 and 34.

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7-6 Cargo Tie-Downs

7-6-1 General

Tie-down anchor points fit into the seat rails and lock into place by an over-center lever. Tie-down straps can be secured to these anchor points.

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7-7 Seats / Restraint Systems

7-7-1 Seats

7-7-1.1 Crew Seats

Refer to Fig. 7-7-1, Crew Seat - Controls

The crew seats are adjustable fore and aft and vertically. They also have controls for recline, thigh support, back cushion lumbar support, armrests and headrest. The fore and aft and recline control levers are on the rear inboard side of the seats. The vertical adjustment lever and the thigh support control wheel are at the front of the seat cushion. When the thigh support control wheel is turned it raises or lowers the thigh pads. There is a push button at the bottom of each side of the seat back board. When the inboard button is pushed the lumbar support pad can be moved up or down with the aid of a handle. When the outboard button is pushed the lumbar support pad can be moved inwards or outwards by easing or applying body weight to the back cushion. The padded armrests can be moved upwards and inwards to provide free access to get in and out of the seat. They also have a control wheel on the underside which can be used to adjust the height of the armrest. The seat headrest can be adjusted by moving the headrest to the side and rotating it to one of the six lock positions. There is a life vest stowage box installed under the seat.

7-7-1.2 Passenger Seats

Refer to Fig. 7-7-2, Commuter Seat - Typical

Refer to Fig. 7-7-3, Executive Seat - Typical

CAUTION

Do not lift the commuter seat by the seat pan or the cushion when you remove or install the commuter seat. The commuter seat must be lifted by the rigid metallic structure only. If you do not, you can cause permanent damage to the commuter seat.

The standard passenger seats have a reclining backrest, sliding headrest, a folding inner armrest, and a restraint system.

The executive seats are leather upholstered, with swivel and forward/rear/inboard travel. Seat travel is as follows:

- 4” (101.6 mm) forward/aft for forward facing executive seats
- 2” (50.8 mm) forward/aft for rearward facing executive seats
- 3.6” (91.4 mm) inboard for all executive seats.

A reclining backrest, sliding headrest, sliding armrest, magazine pocket and a restraint system are fitted. The seat position control is located on the forward edge of the arm. Pulling up on the control handle will allow the seat to be moved to the desired position. Releasing the control handle will lock the seat in position. The control for the back recline is a round push button located in the inner surface of the arm. Depressing the button will allow the seat back angle to be adjusted. Depending on the seat location in the cabin, the seat can be reclined to a lay flat position.

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7-7-2 Seat Belts And Shoulder Harnesses

Each crew seat is equipped with a four-point restraint system consisting of an adjustable lap belt and a dual-strap inertia reel-type shoulder harness. Each passenger seat is equipped with a three-point restraint system consisting of an adjustable reel-type lap belt and an inertia reel-type shoulder harness.

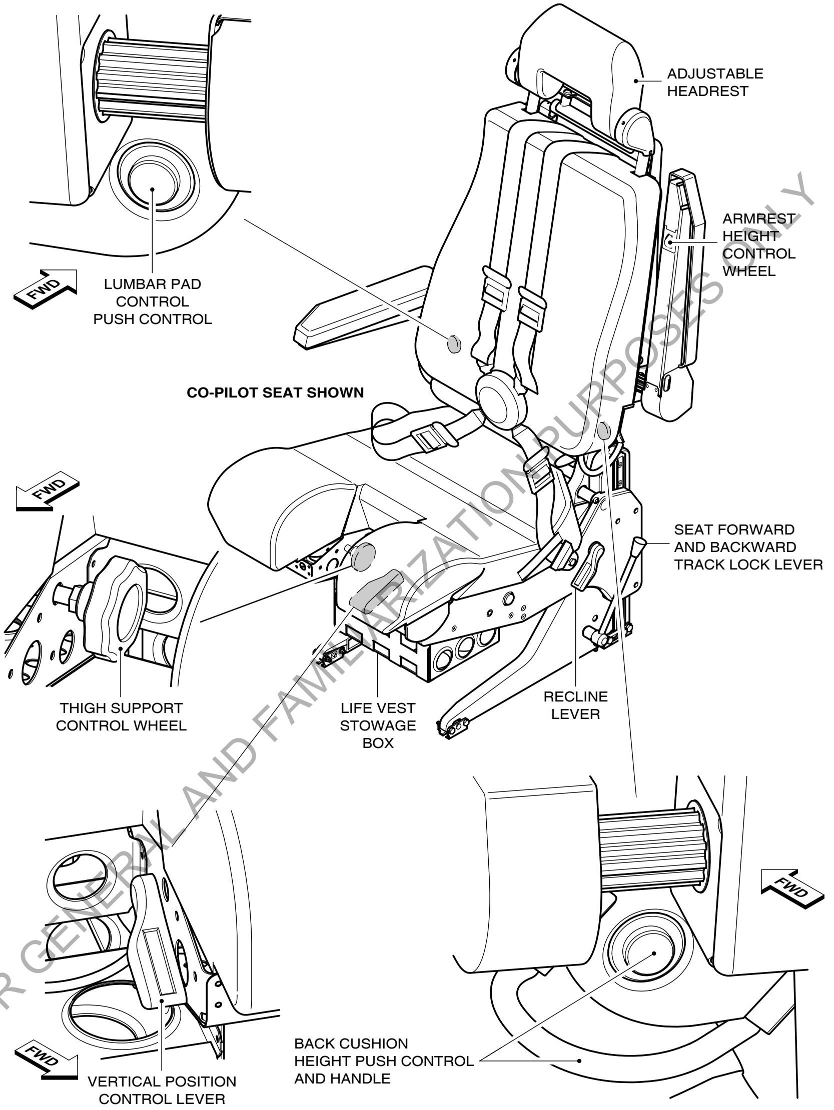

Figure 7-7-1: Crew Seat - Controls

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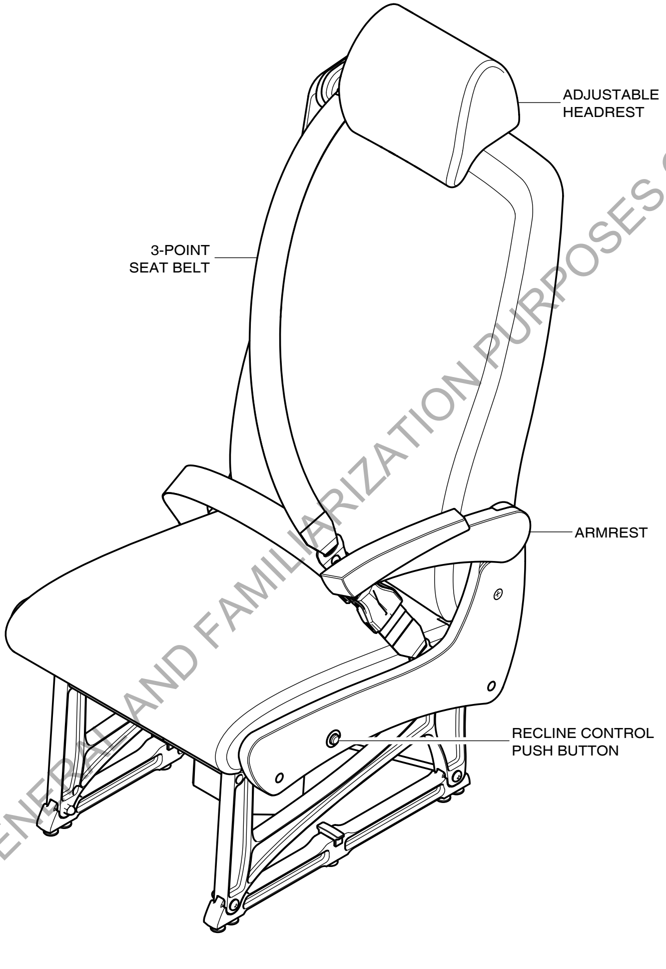

Figure 7-7-2: Commuter Seat - Typical

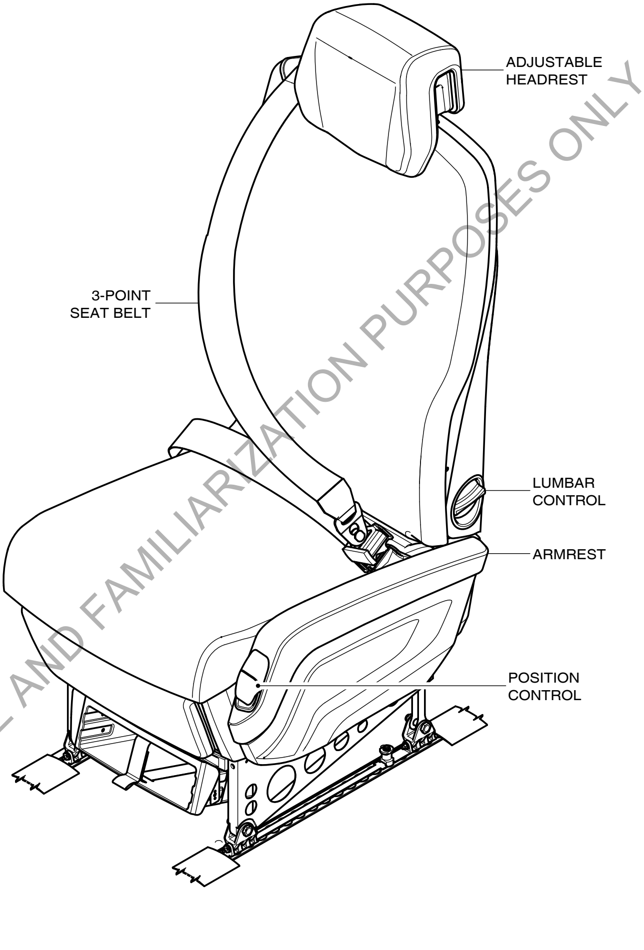

Figure 7-7-3: Executive Seat - Typical

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7-7-3 Restraint Systems for Children

Pilatus supplies the optional CARES™ Restraint System for children who are older than 24 months and weigh 22 – 40 lb (10 - 20 kg).

7-7-3.1 Description

WARNING

DO NOT INSTALL THE CARES™ RESTRAINT SYSTEM IN ANY OTHER WAY THAN THE ONE DESCRIBED BELOW. DEATH OR INJURY MAY OCCUR IF THE RESTRAINT SYSTEM IS NOT INSTALLED PROPERLY.

WARNING

MAKE SURE AN ADULT WILL SIT IN THE SEAT NEXT TO THE SEAT WHERE THE CARES™ RESTRAINT SYSTEM IS INSTALLED. THE ADULT MUST BE ABLE TO REACH THE OXYGEN MASK FOR THE CHILD.

When you use the CARES™ Restraint System, make sure you follow these requirements:

- Only use the CARES™ Restraint System for children who are older than 24 months and weigh 22 - 40 lb (10 - 20 kg)
- Only install the CARES™ Restraint System on a forward facing seat in the following interior configurations:
  - Nine standard seats configuration (STD-9S)
  - Six executive seats configuration (EX-6S-2)
  - Eight executive seats configuration (EX-8S)
  - Six executive seats and two standard seats configuration (EX-6S-STD-2S)
  - Four executive seats and four standard seats configuration (EX-4S-STD–4S)

  Refer to Section 6, Interior Configurations, for more information on the various interior configurations.

7-7-3.2 Installation

Note

Refer to Section 6, Interior Configurations, for more information onto which seat the CARES™ Restraint System is allowed for installation.

Install the CARES™ Restraint System on the seat as follows:

1. Disconnect the shoulder belt from the lap belt connector and retract it into the seat backrest.
2. Install the CARES™ Restraint System on the seat and the lap belt connector as shown in Fig. 7-7-4.

Note

It remains the operator’s responsibility to get the required approval for operation from the local authority.

7-7-3.3 Removal

Remove the CARES™ Restraint System from the seat as follows:

1 Remove the CARES™ Restraint System from the seat and the lap belt connector as shown in Fig. 7-7-5.

2 Pull the shoulder belt out of the seat back rest and connect it to the lap belt connector.

7-7-3.4 Emergency Release

In case of an emergency the CARES™ Restraint System can be quickly released as follows (refer to Fig. 7-7-6):

1 Release the lap belt buckle.

2 Pull the shoulder straps over the child's head.

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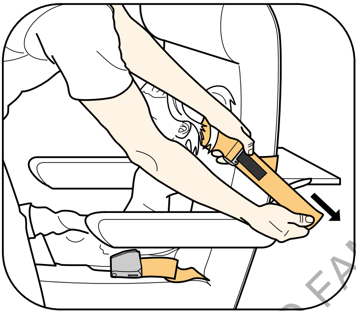
1

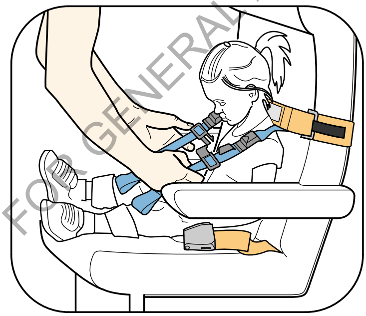
Put the child in the seat.
Install the belt on the back rest.

2



Pull the end of the belt until it is tight.

3



Put the shoulder straps over the child's shoulders.

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Figure 7-7-4: CARES™ Restraint System - Installation (Sheet 1 of 2)

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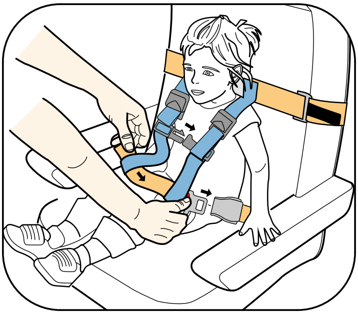
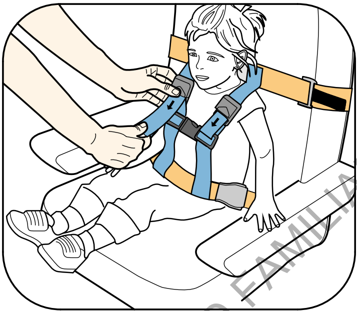


Put the lap belt through the two loops in the shoulder straps. Connect the lap belt to the buckle. Fasten the chest clip.

5



Pull the ends of the shoulder straps until they are tight.

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Figure 7-7-4: CARES™ Restraint System - Installation (Sheet 2 of 2)

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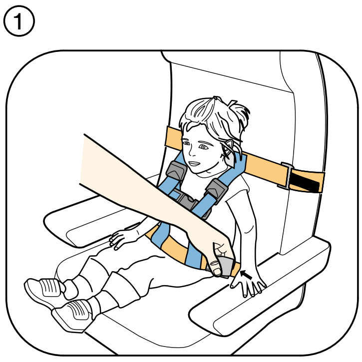
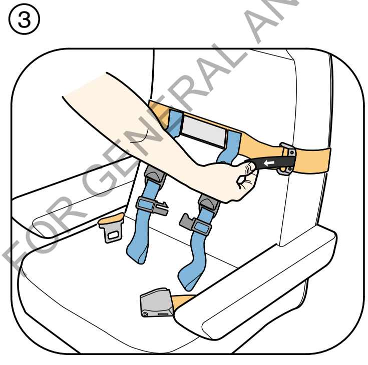


Release the lap belt from the buckle.
Remove the lap belt from the shoulder straps.

Disconnect the chest clip.
Remove the child from the seat.



Remove the belt from the back rest.

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Figure 7-7-5: CARES™ Restraint System - Removal

Release the lap belt buckle.
Pull the shoulder straps
over the child's head.

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Figure 7-7-6: CARES™ Restraint System - Emergency Release

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7-8 Doors, Windows and Exits

7-8-1 Passenger Door

The passenger door is located in the front left fuselage, immediately aft of the cockpit, and is 4 ft 5 in (1,35 m) high by 2 ft 0 in (0,61 m) wide. The door can be opened or closed from either side and is secured by six locking pins. These can be checked visually from inside the cabin to verify engagement. The door is hinged at the bottom and has an integral steps/ handrail assembly which automatically extends and retracts as the door is opened or closed. A non-inflatable seal attached to the door seals the gap to allow the cabin to pressurize when the door is closed.

To open the door from the outside, push the button on the handle, and pull out the free end of the handle at the right hand side. Then pull outward on the door. As the door opens, the steps and the handrail will be pulled from the stowed position. Close the door by lifting the door into position, allowing the steps and handrail to fall into the stowed position. Then push in the free end of the handle.

To open the door from the inside, lift the latch and rotate the handle clockwise to the open position and push the door open. To close, pull the door closed and allow the steps and handrail to fall into the stowed position before rotating the handle counterclockwise.

The cabin door is an emergency exit and it must be accessible at all times.

The Crew Alerting System (CAS) will show **Passenger Door** when the door is not properly closed and locked. In the event that the cargo door is also not properly closed and locked, the CAS will show **Pax + Cargo Door**.

7-8-2 Cargo Door

The cargo door is located in the aft left fuselage and is 4 ft 4 in (1,32 m) high by 4 ft 5 in (1,35 m) wide. It is secured by locking pins which can be checked visually from outside the airplane to verify engagement. The door is hinged at the top and swings up out of the way to facilitate loading and unloading. A gas cylinder assists in door operation and holds the door in the open position. A non-inflatable seal attached to the door seals the gap to allow the cabin to pressurize when the door is closed.

To open the door from the outside, push the button and pull the handle outward and upward. The gas cylinder will assist in raising the door to the open position. An electrical motor and cable is installed to assist the closure of the cargo door. To operate, press and hold the switch located aft of the cargo door until the door has lowered to the near closed position. Push the door closed and push handle in until flush and the button pops back to the lock position. To open the door from the inside, remove the cover, lift the lever and pull handle to unlock and then push open the door. To close, pull down on the strap to bring the door almost closed and stow the strap. Pull the door closed and push handle down to the lock position.

The power supply to the electrical motor is from the HOT BAT BUS and is disconnected by a microswitch which is operated by the drive mechanism when the door is nearly closed. The door must be manually pushed and locked to the closed position.

The CAS will show **Cargo Door** when the door is not properly closed and locked. In the event that the passenger door is also not properly closed and locked the CAS will show **Pax + Cargo Door**.

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7-8-3 Windows

A two-piece windshield and two side windows provide cockpit visibility. Both pilot and copilot windshields are laminated twin-layer mineral glass with an embedded polyvinyl butyral (PVB) layer. The windshield incorporates three electric heating elements for defogging and anti-icing capability. Both side windows are stretched acrylic with inner 2 mm thick double-glazed acrylic windows. A separate direct vision (DV) window, also stretched acrylic, is installed between the left windshield and the left side window. This can be opened to provide pilot visibility/smoke evacuation during emergencies and can be used to provide additional airflow during ground operations.

Windshield heat is controlled by two switches, LH WSHLD and RH WSHLD, both switches are marked HEAVY, LIGHT and OFF. The switches are located on the ICE PROTECTION section of the pilot's lower right switch panel. The HEAVY and LIGHT positions offer two heat levels and areas to be used as required for defog and anti-ice. The windshield is protected from an overheat condition by a temperature sensor. This sensor will remove current from the windshield heat circuit when the windshield surface temperature is above 60 °C.

The cabin has four windows on the left side and five on the right side. All of the windows are stretched acrylic with integral sliding shades.

7-8-4 Indication/Warning

In the event of a failure of a windshield heat system, the CAS will show **LH Windshield**, **RH Windshield** or **LH + RH Windshield**.

7-8-5 Emergency Exit

Refer to Fig. 7-8-1. Emergency Exit

The overwing emergency exit is located over the right wing and is 2 ft 2 in (0,68 m) high by 1 ft 6 in (0,49 m) wide. This exit contains a window and can be quickly opened from either inside or outside when required. A non-inflatable seal attached to the exit seals the gap to allow the cabin to pressurize when the exit is in place. To open the exit from inside, remove cover and pull handle to release exit locking mechanism and pull inward. To open from the outside, push on the release lever and push exit inward.

7-8-6 Aircraft Security

Refer to Fig. 7-8-1. Emergency Exit

To secure the aircraft when parked, install the lock pin in the emergency exit and lock the cargo and passenger door locks. Lock the service door under the rear fuselage, if a lock is installed.

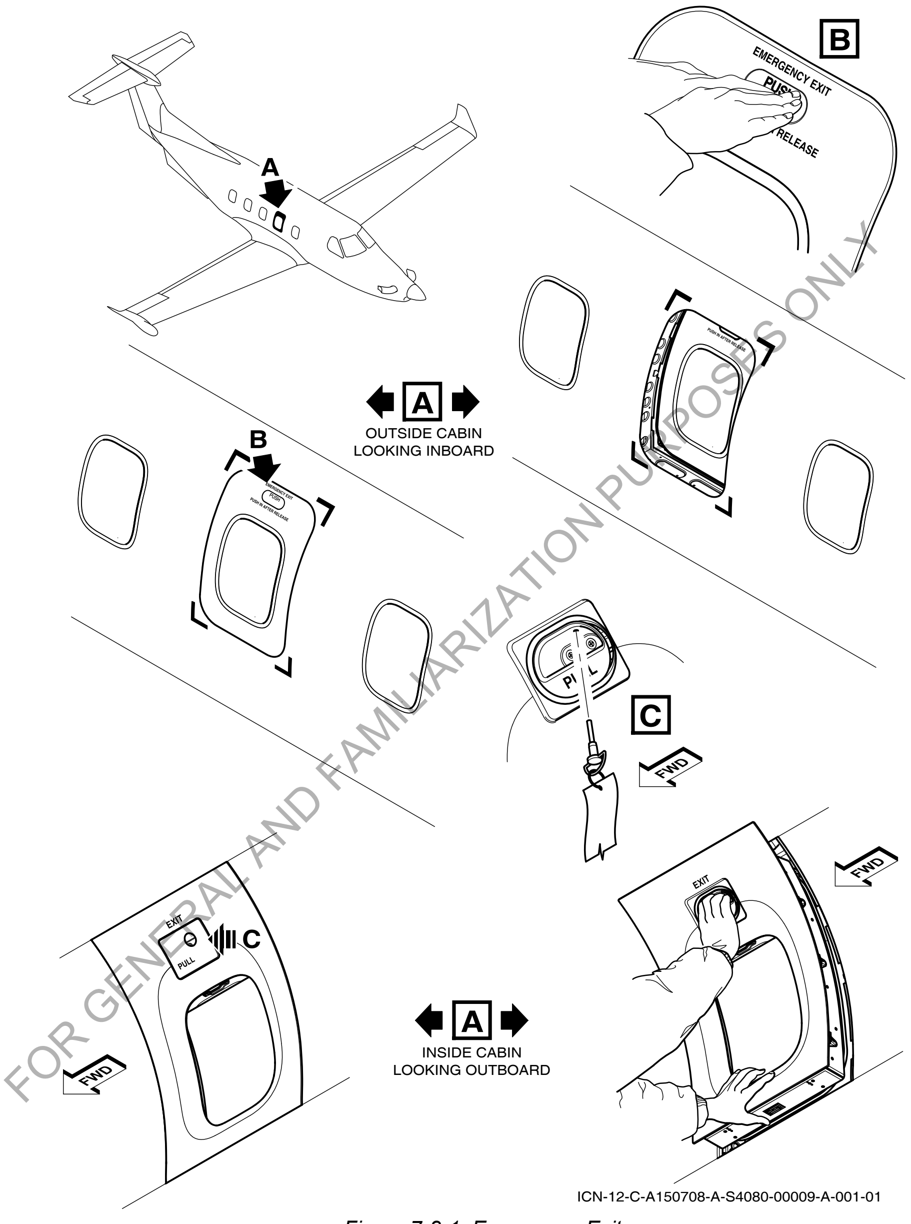

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Figure 7-8-1: Emergency Exit

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7-9 Control Locks

7-9-1 Control Locks

The elevator and ailerons can be secured by placing a control lock through the hole in the collar and control column when the elevator is full down and the ailerons are neutral. For flight, the control lock is stowed in a stowage point located on the cockpit left sidewall to the rear of the pilots seat. The rudder is held in position by the mechanical connection with the nose wheel steering.

WARNING

THE CONTROL LOCK MUST BE REMOVED BEFORE TAKEOFF.

CAUTION

Make sure that the rudder/nose wheel is centered.

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7-10 Engine

7-10-1 Description and Operation

For the engine configuration, refer to Fig. 7-10-1, PT6E-67XP Engine

This airplane is powered by the Pratt & Whitney PT6E-67XP, which is a lightweight, reverse flow, free turbine engine and features an Engine and Propeller Electronic Control System (EPECS).

In addition to the gas generator section, the engine incorporates a power section with the power turbine and propeller reduction gearbox, an integral oil system, and an accessory gearbox for mountings for various accessories.

Air enters the compressor through an annular plenum chamber. The compressor consists of four axial stages and a single centrifugal stage. Stator vanes between each stage of compression diffuse the air, raise its static pressure, and direct it to the next stage of compression. From the centrifugal compressor, air flows through a diffuser tube, then changes direction 180 degrees as it flows into the combustion chamber. A compressor bleed valve is installed on the gas generator case at the 3 o'clock position. It automatically opens to spill interstage compressor air to prevent compressor stall.

The combustion chamber consists of two perforated annular sections bolted together with a large exit duct. Compressed air enters the combustion chamber through the perforations, where it is mixed with fuel and ignited. The rapidly expanding gas is directed through another 180 degree direction change into the turbine.

The turbine consists of a single stage compressor turbine and a two-stage power turbine. As the gas exits the combustion chamber, it is directed onto the compressor turbine, which powers the compressor. From the compressor turbine, the gas is directed to the two-stage power turbine which drives the propeller via the propeller reduction gearbox. engine Inter Turbine Temperature (ITT) is measured between the compressor and power turbines.

Gas flow is directed into the exhaust duct from the turbine. The exhaust duct has an annular inlet which leads exhaust gas to a bifurcated duct connected to two opposed exhaust ports. The exhaust duct is made from heat resistant nickel alloy metal and incorporates mounting flanges for the exhaust nozzles.

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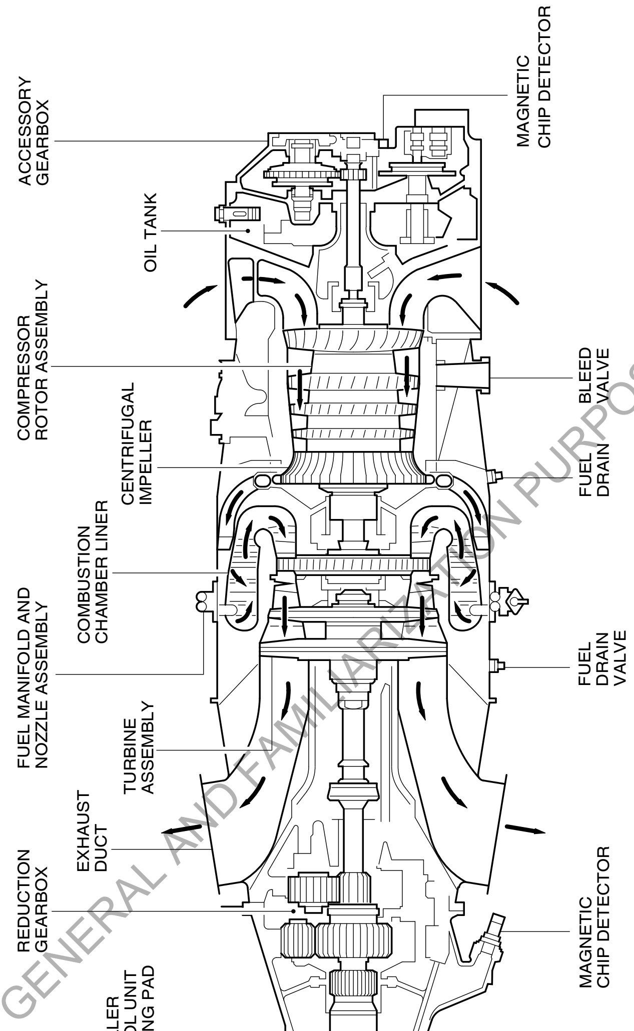

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Figure 7-10-1: PT6E-67XP Engine

7-10-2 Air Induction

The air induction system is integrated into the front and rear lower cowlings and comprises of an air inlet and inlet duct, a plenum, and an inertial separator.

The air inlet consists of a crescent shaped metal leading edge through which hot exhaust is passed to prevent ice accumulation. The exhaust gas is extracted from the left hand side exhaust stub by the means of a 1.5 inch diameter pitot probe inserted into the stub itself. It then passes through the lip, consisting of a sealed chamber, before exiting into the right hand stub through a 1.5 inch discharge tube. The probes are connected to the exhaust lip by 1.5 inch diameter metal ducts complete with integral connectors. The inlet duct, which connects the inlet lip to the plenum, consists of a diverging nozzle following the same general shape as the inlet lip.

The plenum consists of a sealed circular metal canister surrounding the engine compressor inlet screen. It is here that the engine draws air to be compressed for combustion and services supply.

7-10-3 Inertial Separator

Refer to Fig. 7-10-2, Inertial Separator and Fig. 7-10-3, Engine Controls and Indications for the control switch and indicator.

The inertial separator is of the `fixed geometry´ design and provides engine induction system protection when operating in icing or Foreign Object Damage (FOD) conditions. It can be used for takeoff when operating in a FOD environment. It comprises of a fixed No. 2 mesh screen attached to the rear wall of the plenum covering a percentage of the inlet area, a moveable outlet door and electrical actuator situated directly above the oil cooler outlet exit, and a converging bypass duct.

In normal operations (non-icing, non-FOD) the outlet door is closed which seals the bypass and provides the induction air with a single flow path to the plenum and engine through the porous No. 2 screen.

In icing or FOD conditions the actuator is retracted to open the outlet door. This allows a flow path past the plenum to ambient and increases the pressure ratio across the inlet system. The increased pressure ratio has the effect of accelerating heavy particles present in the inlet air, which then go straight past the plenum and into the bypass duct before exiting through the outlet door. In icing conditions, the porous No. 2 screen ices to restrict the flow path of solid particles which cannot turn into the plenum and thus further assist in engine protection. However, the pressure of the air to the engine, with the inertial separator open, is also reduced with consequent reduction in available engine power at climb and cruise. Takeoff power is not affected by the inertial separator position.

The inertial separator outlet door operation is controlled by the ICE PROTECTION INERT SEP switch on the switch panel on the pilot's lower right panel. The switch has two positions OPEN and CLOSED, when the switch is set to the OPEN position the inertial separator door opens and when fully open **INERT SEP** will come on in the ICE PROTECTION window of the systems Multi Function Display (MFD). When the door is selected to OPEN but does not reach its selected position, after 45 seconds the Crew Alerting System (CAS) will show **Inertial Separator** in the CAS window of the systems MFD. If EPECS detects a mismatch between the inertial separator command and the door position, it will select the higher power rating (for inertial separator closed) and the CAS will show **EPECS Fault** in flight and **EPECS Degraded** on ground. When the switch is set to CLOSED the door closes and the **INERT SEP** message will go off.

After failure of the inertial separator, the aircrew should prepare for departure of icing conditions as soon as possible.

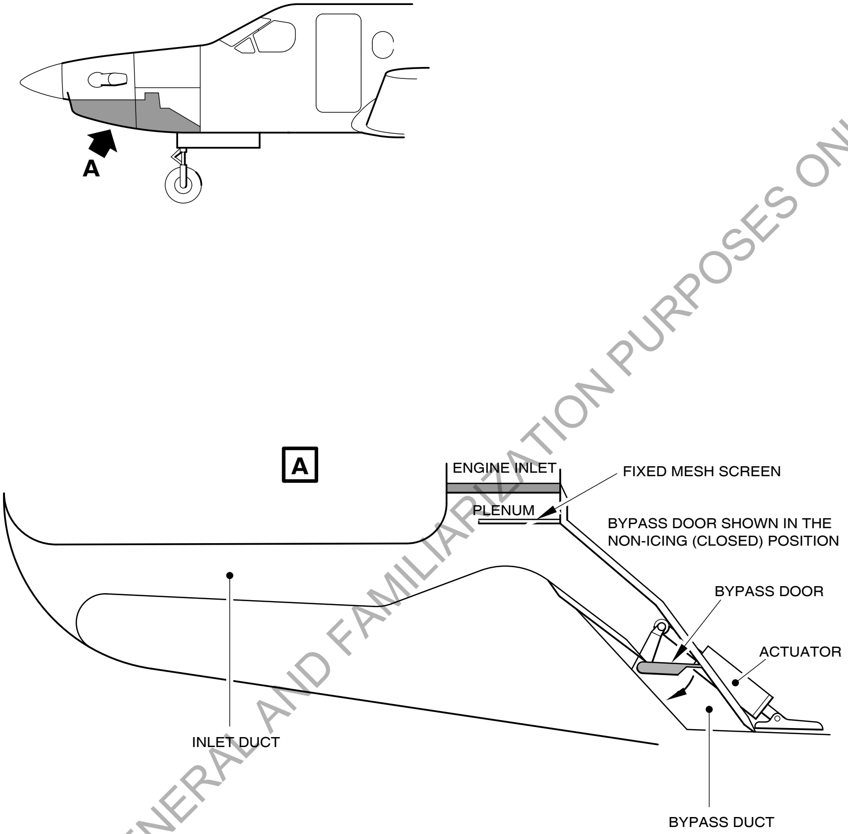

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Figure 7-10-2: Inertial Separator

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7-10-4 Controls

Refer to Fig. 7-10-3, Engine Controls and Indications

The Power Control Lever (PCL) and aircraft sensors provide inputs to the EPECS to control engine power.

7-10-4.1 Power Control Lever

The PCL selects the required engine power and propeller pitch. The flight operating range is forward of the idle detent. As the PCL is moved forward of the idle detent, the engine power and propeller pitch increases from idle and minimum propeller pitch. Propeller speed is held constant at 1700 rpm at higher engine power and/or aircraft airspeeds. The PCL can be set to the Maximum Climb Power (MCP) soft stop or Take Off (T/O) stop depending on the phase of flight. Cruise power is set manually by pilot command in order to operate the engine within limits.

When the PCL is at the idle detent, the gas generator is at idle and the propeller is at or above minimum pitch. A lifting action to raise the PCL over the detent is required to move the PCL into the ground operating/reverse range.

Control between ground and flight idle is automatic. The EPECS receives the aircraft air/ground status in order to schedule either ground or flight power settings. The scheduling is based on the signal received by the EEC channel in control. The air/ground signal does not affect the maximum achievable power but may affect the power setting for a specific PCL position.

WARNING

PCL OPERATION AFT OF THE IDLE DETENT IS NOT PERMITTED IN FLIGHT.

CAUTION

Do not leave the PCL stationary for more than 30 seconds in the beta range (aft of idle detent) to avoid an EPECS Degraded message on the CAS window.

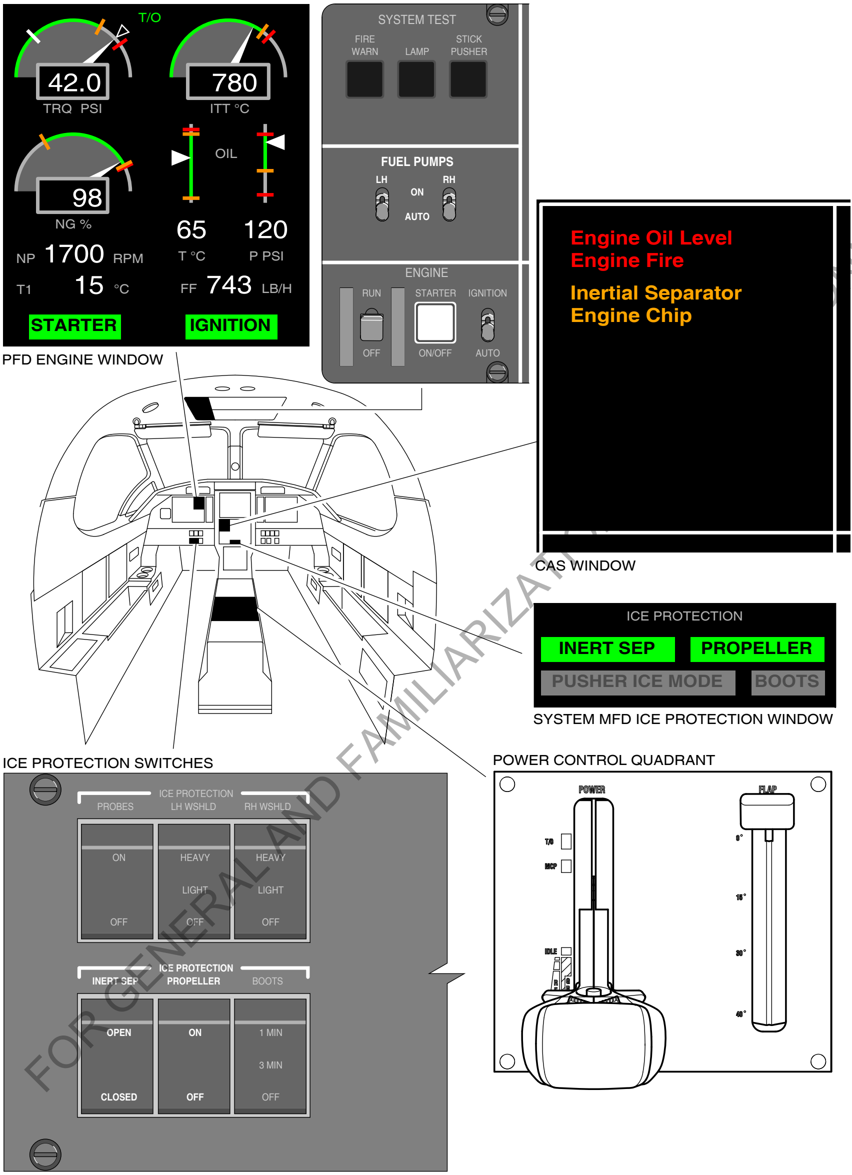

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Figure 7-10-3: Engine Controls and Indications

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7-10-4.2 Engine and Propeller Electronic Control System

7-10-4.2.1 Introduction

The EPECS is a dual channel, dual processor full authority integrated engine and propeller control system.

The EPECS main function is to control the engine output power at a reference propeller speed in response to PCL command, air data (OAT, pressure altitude and air speed) and aircraft discrete inputs (air/ground, de-ice, Environmental Control System (ECS) and inertial separator status). The system controls the propeller speed by changing the blade angle in response to changes in engine power and aircraft conditions. When the engine is operating within predefined criteria, the EPECS controls the minimum blade angle and reverse blade angle of the propeller system. During flight operations the EPECS makes sure that the propeller blades do not go below the minimum allowable blade angle position uncommanded.

CAUTION

The EPECS does not prevent the engine to transition into the reverse range in flight if the PCL is intentionally lifted and moved into the reverse range.

CAUTION

The EPECS does not limit power in order to prevent ITT exceedance in flight.

On ground only, the EPECS will abort an engine start to prevent ITT exceedance, if a hung start is detected or if no light-off is detected. For automation purposes the EPECS initiates a dry motoring cycle when an engine start is aborted.

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7-10-4.2.2 EPECS Components/Interfaces

The EPECS uses/interfaces with:

- The Electronic Engine Control (EEC) unit
- The Data Collection and Transmission Unit (DCTU)
- The Modular Avionics Unit (MAU)
- The engine ignition system
- The Throttle Quadrant Assembly (TQA)
- The Fuel Control Unit (FCU)
- The Propeller Control Unit (PCU)
- The Permanent Magnet Alternator (PMA)
- The engine torque pressure sensor
- The engine oil pressure sensors
- The engine oil temperature sensors
- The fuel pressure sensors
- The P3 pressure sensor
- The T1 temperature sensor
- The engine exhaust gas temperature (T5) sensors
- The Accessory Gearbox (AGB) and the Reduction Gearbox (RGB) chip detectors
- The Np/Beta position sensor
- The Ambient pressure sensor
- The engine oil level switch.

7-10-4.2.2.1 Electronic Engine Control (EEC) Unit

The EEC unit provides an electronic interface between the engine sensors, engine actuators, TQA, airframe discretes and avionics interface. The EEC, in conjunction with the FCU, the PCU and a network of sensors and actuators, controls the engine and propeller in response to the power demanded by the operator. The EEC also gives signal conditioning, control, protection and fault management functions.

The EEC unit will perform a built-in-test at power on to identify any condition that may result in a no-dispatch condition. After power-on, the EEC performs a continuous built-in test and the EEC will continuously monitor the health of the inputs it receives, the internal hardware functions and the external driver circuits.

7-10-4.2.2.2 Data Collection and Transmission Unit (DCTU)

The DCTU is a separate hardware component which interfaces with the EPECS and is part of the standard EPECS installation. The DCTU collects and stores EPECS data for a minimum of 50 flight hours. The stored data consists of approximately 100 parameters during the full flight based on commands from the EPECS.

The DCTU provides a wireless transmission/receiver capability in order to exchange data between the EEC and a ground station. It also provides a hard wired maintenance interface via an USB port. The DCTU communicates with ground based stations over public internet using cellular and/or wireless LAN access technologies. Transmission only occurs when the aircraft is on ground.

The stored EPECS data on the DCTU is used for engine diagnostics and maintenance.

The DCTU is also used by maintenance personnel to enable EEC software reprogramming and to display live engine data through a wireless connection. Reprogramming of the EEC software is only possible through a browser enabled device connected to the USB port on the DCTU.

7-10-4.2.3 EPECS Functions

Next to the engine power control functions, the EPECS performs the following monitoring and diagnostics functions:

- Engine start and shutdown
- Wet and dry motoring
- Engine parameter exceedance limiting (Np, Ng and Tq)
- Inter Turbine Temperature (ITT) limiting (during engine ground start only)
- Flameout detection
- Surge recovery
- Automated power (Tq) setting at takeoff and climb ratings
- Engine rating display for takeoff and climb
- Linear engine power (Tq) governing
- Gas generator speed (Ng) control at low power and idle operation
- Acceleration and deceleration control
- Variable propeller speed (Np) control
- Propeller pitch angle control
- Independent propeller flight fine pitch protection
- Independent propeller overspeed protection
- Fault detection, accommodation and annunciation
- Fault and event recording
- Time limited dispatch capabilities
- Maintenance indication
- Dual channel avionics communication (ARINC 429)
- Communication with ground support equipment
- Data collection and diagnostics
- Main oil pressure and temperature, fuel and oil filter differential pressure indication
- Accessory and reduction gear box chip detector monitoring
- Oil level status.

For the automatic limiting and recovery functions description, refer to Automatic Limiting and Recovery.

7-10-5 Engine Fuel

Low pressure fuel from the airframe is delivered to the engine low pressure pump, which increases the fuel pressure before the fuel enters the fuel/oil heat exchanger. The oil-to-fuel heat exchanger preheats the fuel, removing ice before it enters the fuel filter. The high pressure engine driven fuel pump delivers fuel to the remainder of the FCU components, to the fuel flow meter, to the flow divider and the fuel nozzles. The FCU provides heated, high pressure, regulated motive flow to the airframe fuel system.

The fuel control unit is controlled by the EPECS during normal and emergency operation. Fuel flows through the fuel flow meter on its way to the fuel flow divider and dump valve. The fuel flow meter converts fuel flow rate into an electrical signal which is then displayed in the engine window of the Primary Flight Display (PFD) and in the Fuel window of the systems Multi Function Display (MFD).

The fuel flow divider and dump valve serves two functions. First, it divides the fuel between the primary and secondary system. Secondly, during engine shut down it will shift position, allowing the FCU to extract the residual fuel from the manifolds, which is then directed to the airframe motive flow line. A total of 14 fuel nozzles are used in the primary and secondary manifolds.

7-10-6 Oil

For system configuration, refer to Fig. 7-10-4, Engine Oil System.

The engine oil system consists of pressure, scavenge and breather systems with the oil tank being an integral part of the engine compressor inlet case. Oil is supplied to the engine bearings, bushings, reduction gears, accessory drives, torquemeter and PCU. Oil is also used to cool the bearings. A filler neck with quantity dipstick and cap are located on top of the accessory gearbox. The quantity dipstick is marked in one US quart increments. A visual sight gauge is provided to determine oil quantity without removing the dipstick. If the oil level is in the green range of the sight gauge there is sufficient oil quantity for flight. If the oil level is below the green range, the oil system needs refilling according to the dipstick markings. If **Engine Oil Level** comes on, the oil level is not adequate for safe engine operation. It is not recommended to start a flight with the oil level below the green range on the sight glass. Total oil capacity is 3.6 US gal (13.6 liters) while usable oil quantity is 1.5 US gal (5.7 liters). The oil tank incorporates a drain plug.

An engine driven gear type pressure pump provides oil to the engine bearings, propeller bearings and reduction gears, torquemeter and PCU. Oil flows from the integral oil tank, through the pick-up screen, to the oil pump. Oil then goes through a pressure regulating valve which regulates oil pressure to between 90 and 135 psi (6.2 to 9.3 bar). A pressure relief valve opens when pressure exceeds 160 psi (11.0 bar), possibly during cold weather operations. Oil then goes through a cartridge type oil filter assembly, which incorporates a bypass valve and a spring loaded check valve. The bypass valve allows oil to bypass the filter in case the filter becomes clogged, however oil pressure drops to below 90 psi (6.2 bar) when the filter bypass valve is open. The check valve prevents gravity oil flow into the engine after shutdown and permits the oil filter to be changed without draining the oil tank. Oil is then directed throughout the engine and applicable accessories.

The oil scavenge system incorporates two double element pumps. The oil from the reduction gearbox is pumped directly through the airframe mounted oil cooler. All remaining oil passes through the oil to fuel heat exchanger and, depending on oil temperature, is directed back to the oil tank or through the oil cooler.

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When the fuel temperature is low, warm oil flows through the oil to fuel heater. The scavenge system in the propeller reduction gearbox incorporates a magnetic chip detector that detects foreign matter in the system and causes the **Engine Chip** message in the CAS window to come on. The chip detector also acts as the propeller reduction gearbox oil drain. A second magnetic chip detector is installed in the accessory gearbox. It is also connected to the **Engine Chip** message and operates in parallel to the reduction gearbox chip detector.

The breather system allows air from the engine bearing compartments and the propeller reduction and accessory gearboxes to be vented overboard into the right exhaust stub, through the centrifugal breather in the accessory gearbox.

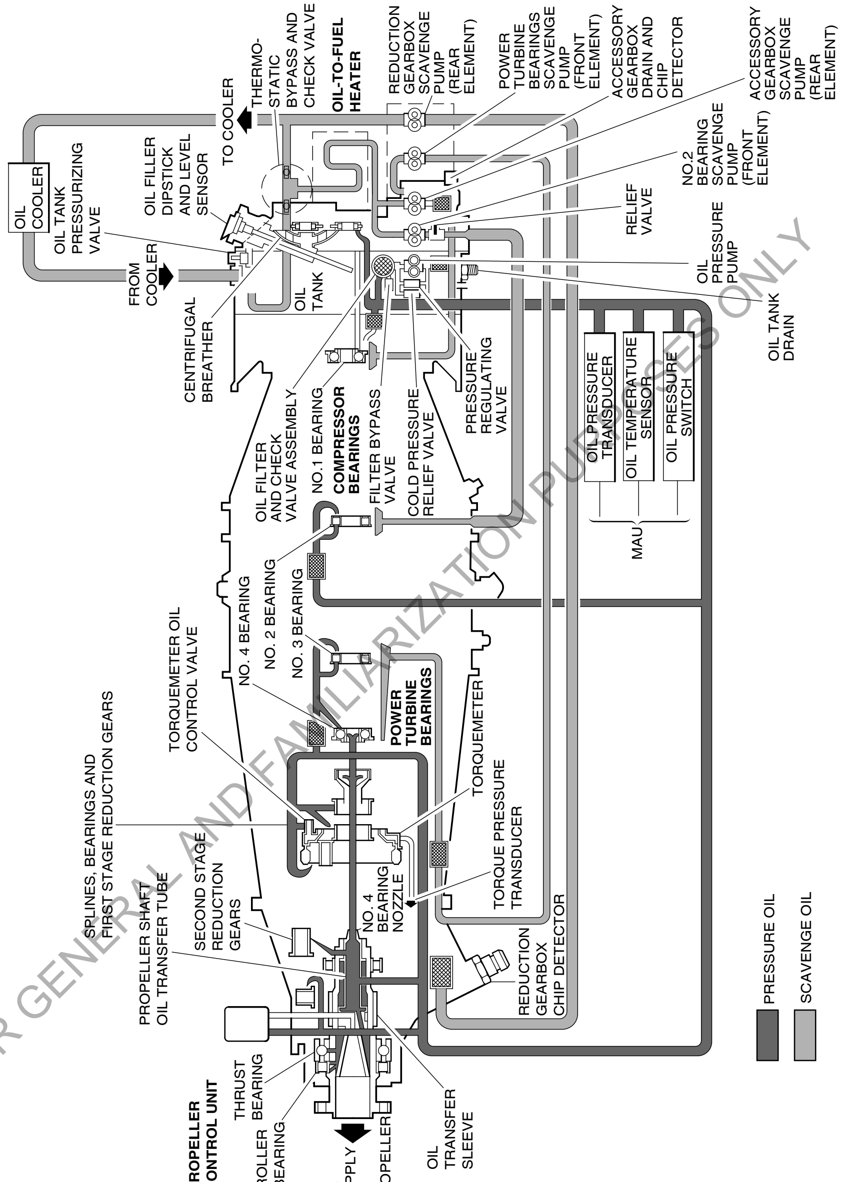

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Figure 7-10-4: Engine Oil System

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7-10-7 Starting

Starting is provided by a starter/generator unit. Starter function is controlled by the STARTER switch in the ENGINE section of the overhead panel (Ref. Fig. 7-10-3, Engine Controls and Indications). After setting the Engine switch to RUN and pressing the STARTER switch momentarily, the STARTER annunciator in the PFD engine window comes on, and the EPECS energizes the starter. The starter will automatically disengage and the STARTER annunciator in the PFD goes off, when the engine Ng reaches ground idle or 80 seconds after the start sequence. Starter Engaged will show on the CAS window in the event a starter engage signal becomes active without the Modular Avionics Unit (MAU) generating the signal.

7-10-7.1 Start Abort

The start sequence can be interrupted at any time by the EPECS (automatic start abort) or by the pilot (pilot initiated start abort).

7-10-7.1.1 Automatic Start Abort

The automatic start abort functionality is only available on ground. The EPECS will automatically abort a ground start if the ITT starting limit is expected to be exceeded (abort will be commanded at 945 °C), or if a hung start is detected, or no light-off has occurred within 13 seconds after the fuel flow is commanded to ON.

During an automatic start abort the EPECS will command the ignitor(s) and fuel boost pumps to OFF, start a dry motoring cycle and DRY MOTORING will be shown on the CAS window.

Note
The automatic dry-motoring cycle which is part of the automatic start abort can be deactivated by the pilot by setting the Engine switch to OFF.

7-10-7.1.2 Manual Start Abort

The pilot can initiate a start abort by two different methods:

- Pressing the STARTER button again, or
- Setting the Engine switch to OFF.

Pressing the STARTER button during an on-ground engine start cycle will signal the EPECS to abort the start sequence. The EPECS will then command the ignitor(s) and fuel boost pumps to OFF and perform a dry motoring cycle for 30 seconds, indicated by STARTER on the PFD engine window and DRY MOTORING on the CAS window.

Setting the Engine switch to OFF will signal the EPECS to abort the start sequence. The EPECS will command the ignitor(s) and fuel boost pumps to OFF.

7-10-7.2 Electrical Power

Battery 2 provides the electrical power to the starter for starting the engine. Battery 1 provides electrical power to maintain the essential systems during engine start. On ground at either 10% Ng or 10 secs after starter activation, EPECS provides a discrete output to connect battery 1 to the starter circuit to further enhance the starter capability. If external power is connected and selected, engine starting will be done with external power.

7-10-8 Ignition

Ignition is provided by an ignition exciter and two spark igniter plugs. The ignition exciter is a sealed electronic unit mounted at the engine cowling and is operated by the aircraft 28 VDC system. Two spark igniter plugs, located at the 4 and 9 o'clock positions in the gas generator section, provide the spark to ignite the fuel/air mixture.

Ignition is controlled from the cockpit by the IGNITION switch, located in the ENGINE section of the overhead panel (Ref. Fig. 7-10-3, Engine Controls and Indications). The switch has two positions, IGNITION and AUTO. When set to IGNITION, ignition will occur continuously and an IGNITION annunciator in the engine section of the PFD will come on.

When set to AUTO, ignition will automatically activate during engine start and the IGNITION annunciator in the engine section of the PFD will come on. Ignition stops following successful engine start.

CAUTION

Ignition should be manually switched to IGNITION when operating in heavy precipitation.

7-10-9 Accessories

Engine accessories comprising the propeller, PCU and torque transducer are mounted on the front of the engine. The generator 1, starter/generator 2, fuel control unit and fuel/oil heat exchanger are mounted on the accessory gearbox.

7-10-10 Fire Detection

The system is composed of a sensor element and a responder. The sensor is a stainless steel capillary tube filled with helium and containing a central hydrogen-charged core which readily releases hydrogen gas when heated above a temperature threshold. The responder houses both the fire pressure switch and the integrity switch consisting of preformed metal diaphragms which snap over center to contact stationary pins under the effect of gas pressure.

Due to generalized temperature increase over the entire length of the sensor, the helium pressure increases and actuates the fire pressure switch triggering the alarm. Alternatively, when the sensor is heated up intensely over a short length, the core material releases hydrogen gas causing a pressure rise and actuates the fire pressure switch. The Engine Fire message will illuminate. Both the averaging and discrete functions are reversible.

When the sensor tube is cooled, the average gas pressure is lowered and the discrete hydrogen gas returns to the core material. The reduction of internal pressure allows the alarm switch to return to its normal position, opening the electrical alarm switch.

In addition to the pressure activated alarm switch, the integrity switch is held closed by the averaging gas pressure at all temperatures down to -55 °C. If a detector should develop a leak, the loss of gas pressure would allow the integrity switch to open activating the system fault caution. The Fire Detector message will illuminate when the Fire Detection system is inoperative.

System integrity is checked by pressing the FIRE WARN switch in the SYSTEM TEST section of the overhead panel. When pressed, the availability of electrical power and circuit continuity is checked. Proper system function is indicated when both the **Engine Fire** and **Fire Detector** illuminate. If **Fire Detector** fails to illuminate during the test, the warning circuit is already closed and will not provide proper warning. In addition a backup power supply to the overhead panel is tested when the switch is pressed.

CAUTION

Due to the composite construction of the Engine Cowling and the possibility of toxic gasses, the airplane ACS must be shutoff when a fire condition is suspected.

7-10-11 Automatic Limiting and Recovery

7-10-11.1 Flameout Detection

The EPECS will detect an uncommanded engine flameout and give annunciation through the APEX system. **Flameout** will be displayed on the CAS window when the function is active.

7-10-11.2 Surge Recovery

The EPECS can detect engine surge (from the P3 pressure input) and automatically activate a surge recovery logic (no pilot action required) which will modulate the fuel flow appropriately.

7-10-11.3 Engine and Propeller Limiters

The EPECS provides engine and propeller exceedance protection by measuring, and if required, limiting the engine and/or propeller parameters and thus give a physical protection to both the engine and the propeller. This capability is intended to make sure that the maximum engine torque, gas generator speed, propeller speed and the ground start ITT limits are not exceeded during normal engine operation. The EPECS protection system mitigates certain failure conditions which could result in a propeller overspeed or uncommanded reverse by commanding the propeller to feather.

Note

These limiting functions have priority over any other form of engine and propeller control.

7-10-11.4 Autothrottle (option)

The optional Autothrottle System (part of the APEX system), when active, will send a Power Lever Angle (PLA) trim value to the EPECS. The EPECS will then use the PLA trim value to set the engine torque by moving the PCL to the required position.

7-10-12 Engine Indications, Cautions and Warnings

For the Engine Operating Limits, refer to Section 2, Power Plant Limitations.

Fig. 7-10-4, Engine Oil System

Fig. 7-10-5, Engine Indicating

Primary engine indications are shown on the upper right corner of the pilot's PFD and on the upper left corner of the copilots PFD when installed. The torque, ITT and Ng analog gauges have a 180° dial with a segmented perimeter, a moving pointer and a digital window. The oil gauges have a segmented vertical scale, a moving pointer and a digital window. The propeller speed, T1 and engine fuel flow are shown as a digital readout. The PCL position (T/O, MCP or IDL) is shown between the torque and ITT gauges.

Under normal operating conditions the analog gauges have semitransparent fan that is attached to a moving white pointer and the digital readouts are shown in white on a grey box.

On the analog torque gauge, a white mark at 15 is placed for better reference during power changes. A torque bug (white triangle) shows the maximum power rating when the PCL is set to T/O or MCP. The maximum power rating is calculated by EPECS from ambient pressure, OAT, airspeed, bleed extraction and inlet bypass door position. When applying takeoff power or maximum climb power, the pilot verifies that the torque needle matches with the torque bug. A significant discrepancy between the actual takeoff power and the torque bug indicates deficient engine performance.

If there is missing data or the MAU senses that the data is invalid, the pointer and marks will be removed and an amber X will be shown on the gauge. The digital data will be replaced with amber dashes.

In a parameter caution condition, the analog gauge pointer and the fan segment in the caution range changes to amber and the digital window changes to amber with black text.

In a parameter warning condition, the analog gauge pointer and the fan segment in the warning range changes to red and the digital window changes to red with white text.

The engine indications for caution and warning conditions shown on the PFD have the same time delays as those shown on the CAS. Refer to the engine CAS Warnings and Cautions for details of the time limits.

The Monitor Warning System (MWS) monitors the EPECS discrete inputs and if caution and warning conditions are reached they will be shown on the CAS and the engine indications will be shown as given in Table 7-10-1.

Table 7-10-1: Engine Indications

Parameter/Range	Caution Indication	Warning Indication
Torque Digital range 0 to 70 psi Analog range 0 to 55 psi White mark at 15 psi Green arc from 0 to 40.63 psi Grey arc from 40.63 psi to max range Amber mark at 40.63 psi Red mark at 44.84 psi	Analog range changes to amber from red mark to max range and fan segment from red mark to pointer changes to amber	Analog range changes to red from red mark to max range and fan segment from red mark to pointer changes to red

Table 7-10-1: Engine Indications (continued from previous page)

Parameter/Range	Caution Indication	Warning Indication
ITT Digital range 0 to 1200 °C Analog range 400 to 1000 °C Green arc from 400 to 820 °C Grey arc from 820 °C to max range Amber mark at 820 °C		
Red mark at 850 °C, 1000 °C during engine start	Analog range changes to amber from red mark to max range and fan segment from red mark to pointer changes to amber	Analog range changes to red from red mark to max range and fan segment from red mark to pointer changes to red
Np Digital range 0 to 1870 rpm	Black readout in amber box	White readout in red box
Ng Digital range 0 to 120% Analog range 0 to 120% White mark at 13% when starter engaged Grey arc from 0 to 64.5% Green arc from 64.5% to 104.3% Grey arc from 104.3% to max range		
Amber mark at 64.5%	Analog range changes to amber from 64.5% to minimum Ng and fan segment from amber mark to pointer changes to amber	
Amber mark at 104%	Analog range between 104 and 104.3% changes to amber	
Red mark at 104.3 %		Analog range changes to red from red mark to max range
Oil Pressure Digital range 0 to 175 psi Analog range 50 to 150 psi Green segment from 90 to 135 psi Grey segment from 50 to 90 psi Grey segment from 135 to 150 psi		

Table 7-10-1: Engine Indications (continued from previous page)

Parameter/Range	Caution Indication	Warning Indication
Amber mark at 90 psi	Analog range pointer changes to amber from 135 psi to max range when oil px above 135 psi Analog range pointer changes to amber from 60 to 90 psi when oil px below 90 psi (after 5 second delay)	
Red mark at 60 and 135 psi		Analog range pointer changes to red from 135 psi to max range when oil px above 135 psi Analog range pointer changes to red from 60 to min range when oil px below 60 psi and Ng is above 72%
Oil Temperature Digital range -45 to 120 °C Analog range 0 to 120 °C Green segment from 15 to 105 °C Grey segment from 0 to 15 °C Grey segment from 105 to 120 °C		
Amber mark at 15 and 105 °C	Analog range pointer changes to amber from 105 °C to110 °C when oil temp between 105 to 110 °C Analog range pointer changes to amber from 15 to min scale when oil temp below 15 °C	
Red mark at 110 °C		Analog range pointer changes to red from 110 °C to max range when oil temp greater than 110 °C Analog range pointer changes to red if oil temp remains between 105 °C and 110 °C for more than 10 minutes Analog range pointer changes to red from 15 to min scale when digital value below -40 °C
Fuel Flow Digital range - 0 to 800 lb/hr		

The CAS window of the systems MFD displays the following engine warnings and cautions for the engine parameters (refer to Table 7-10-2):

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Table 7-10-2: Engine - CAS Messages

CAS Message	Description
Engine Fire	Fire in the engine compartment
Engine ITT	850 to 900 °C (after 20 seconds), above 900 °C During engine start 900 to 1000 °C (after 5 seconds), above 1000 °C
Engine Torque	44.84 to 61 psi (after 20 seconds), above 61 psi
Engine Ng	Above 104% (after 20 seconds) Above 104.3%
Engine Np	1760 to 1870 rpm (after 20 seconds), above 1870 rpm Between 350 and 900 on ground and propeller not feathered (after 15 seconds)
Engine Oil Press	60 to 90 psi (after 90 seconds) and Ng above 72% and engine running 40 to 60 psi (after 20.5 seconds) and engine running 135 to 175 psi (after 20.5 seconds) Below 40 psi (after 0.5 seconds) and engine running
Engine Oil Temp	105 to 110 °C (after 10 minutes), above 110°C, below -40 °C (after 0.5 seconds)
Starter Engaged	Starter is engaged but not commanded by EPECS
Engine Oil Level	On ground after engine shut down only. Indicates engine oil level must be checked.
EPECS Fail	EPECS failed
EPECS Degraded	EPECS performance is degraded
Engine ITT	850 to 900 °C During engine start 900 to 1000 °C
Engine Torque	44.84 to 61 psi (after 5 seconds)
Engine Ng	Below 60% (engine running), 104 to 104.3% (engine running)
Engine Np	1760 to 1870 rpm Below 350 to 900 on ground and propeller not feathered (after 15 seconds)
Engine Oil Press	40 to 60 psi (after 0.5 seconds) or 60 to 90 psi and Ng above 72% (after 5.5 seconds) 135 to 175 psi (after 0.5 seconds)
Engine Oil Temp	105 to 110 °C, -40 to 15 °C (Ng above 72%)
Engine Chip	Oil chip detected in the engine oil system
Fire Detector Fail	A fault in the fire detection system is detected
EPECS Fault	Engine data from one EEC channel is not available for display or a fault has been determined which will not allow dispatch in the subsequent flight
Flameout	EPECS detected an uncommanded engine flameout
EPECS TLD	Engine is cleared for Time Limited Dispatch (TLD)
EPECS MAINT Mode	EPECS is in maintenance mode
Dry Motoring	Engine is dry motoring
Wet Motoring	Engine is wet motoring

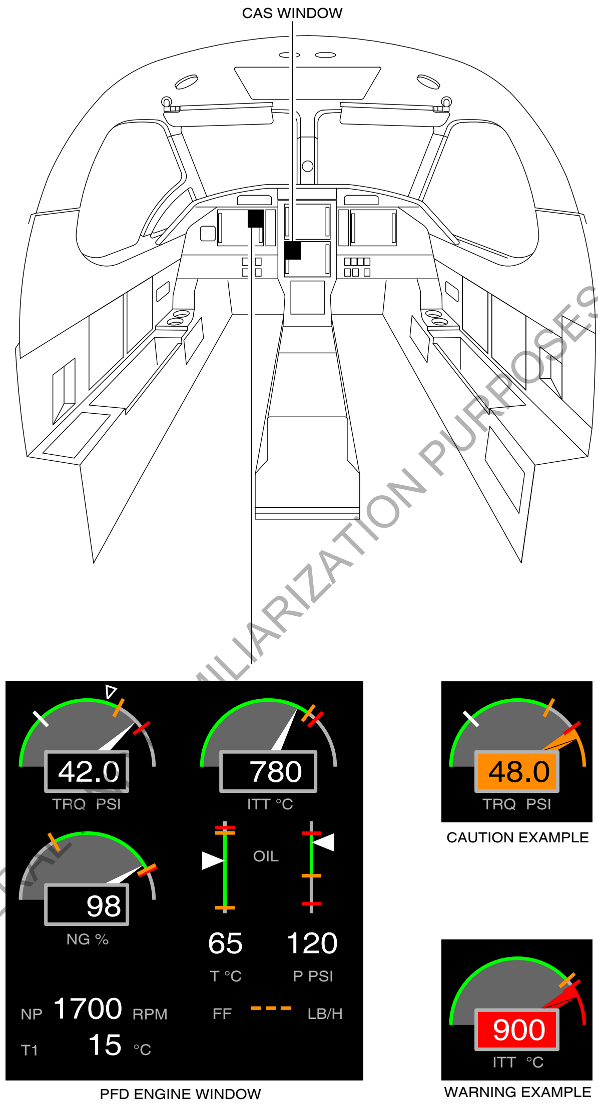

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Figure 7-10-5: Engine Indicating

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7-11 Propeller

7-11-1 General

Refer to Fig. 7-10-3, Engine Controls and Indications and Fig. 7-11-1, Propeller Pitch Mechanism.

The airplane is equipped with a Hartzell 105 in. (2,67 m), five blade, variable pitch, full feathering propeller which is driven by the engine power turbine through a reduction gearing. The propeller hub is made of aluminum. The five blades are of composite construction. An erosion strip protects the leading edge surface of the blades. Each blade incorporates an electric de-ice boot. The propeller includes a beta feedback ring which interfaces with the EPECS Np/beta sensors.

7-11-2 Description

The propeller is powered by the engine through the reduction gearbox. Propeller pitch is adjusted by engine oil pressure regulated through the Power Control Unit (PCU). Nominal propeller rpm during all phases of operation is 1700 rpm, except at low power settings at low speeds where there is insufficient energy available to rotate the prop at 1700 rpm.

The pitch change mechanism is mounted on the propeller front hub and consists of a fixed cylinder, a sliding piston, and a feathering spring. The piston is connected to each propeller blade by a fork assembly which engages a cam follower on the blade root. A counterweight is attached to each blade near its root in such a position that when the propeller is rotating the counterweight is transferred to the blade as a force tending to turn the blade to coarse pitch. The feathering spring within the cylinder also tends to move the blades towards coarse pitch and the feather position.

Oil pressure from the engine oil system is boosted to a higher pressure by a pump in the PCU. Oil pressure is then applied to the rear of the sliding piston, overcoming the force of the feathering spring and counterweights, to move the blades towards fine pitch. Thus, the blade angle is set by controlling the pressure of the oil supplied to the propeller.

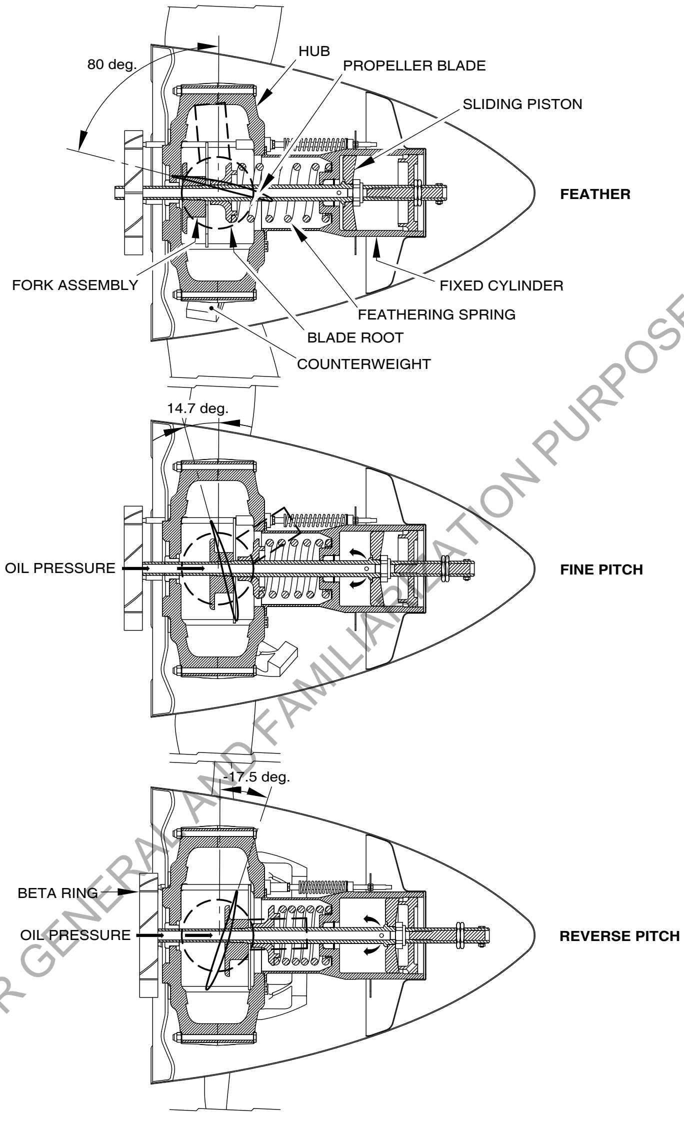

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Figure 7-11-1: Propeller Pitch Mechanism

7-11-3 Operation

Refer to Fig. 7-11-1, Propeller Pitch Mechanism.

In normal operation the propeller unfeathers during engine start when oil pressure rises. On the ground at idle power the propeller rotates at approximately 1025 rpm. When power is increased the PCU will control propeller speed at 1700 rpm. In the air, at low speeds and idle power (F.I.) the propeller rpm may drop below 1700 rpm. When the Engine switch is set to OFF for engine shutdown, EPECS conducts a momentary propeller feather solenoid check. After the check is conducted, the propeller is completely feathered by the PCU. If the feather inhibit (optional) is selected, the propeller is driven to feather by the PCU at a slower rate.

Note
After 9 consecutive engine shutdowns using the propeller feather inhibit function, a normal engine shutdown must be performed (refer to Section 2, Limitations, Power Plant Limitations, Feather Inhibit (optional)).

The propeller is reversible for operation in the Ground Operating range during ground operations only. To achieve propeller pitch below the low pitch stop, lift up the triggers on either side of the PCL to clear the idle detent and pull aft. As the PCL moves aft, the propeller blade angle decreases to the maximum reverse blade angle.

WARNING
STABILIZED GROUND OPERATION WITH PROPELLER BELOW 900 RPM IS NOT PERMITTED.

7-11-4 Propeller De-ice

7-11-4.1 General

Each propeller blade has an electrically heated boot on the inboard upper and lower leading edge. 28 VDC power supply for the boots is taken directly from the Power Line. It is supplied to the propeller de-ice boots via a slip ring mounted on the rear of the spinner bulkhead and brush block mounted on a bracket on the engine. Protection against the effects of lightning strike is provided by a set of Metal Oxide Varistors (MOVs) mounted on the brush block assembly. The system is selected by the ICE PROTECTION PROPELLER switch on the pilot's lower right panel and the green PROPELLER advisory will come on in the ICE PROTECTION window of the systems Multi Function Display (MFD). The switch has the positions ON and OFF. When the PROPELLER switch is set to ON, the blades are heated in cycles. A de-ice timer unit selects automatically the appropriate cycle depending on the Indicated Outside Air Temperature (IOAT).

7-11-4.2 Timer Cycles

Each boot has an inner zone and outer zone.

The de-ice time unit selects power alternately to all blade inner zones followed by all blade outer zones to minimize asymmetric ice shedding

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Table 7-11-1: Propeller De-ice - Timer Cycles

Mode	Propeller
Mode 1 (Warmer than 0 °C)	Timer in stand by
Mode 2 (0°C or colder, but not colder than -16 °C) • 45 sec • 45 sec • 90 sec	 All inner zones are heated All outer zones are heated Blade heating OFF
Mode 3 (Colder than -16 °C • 90 sec • 90 sec	 All inner zones are heated All outer zones are heated

The above cycles are repeated until the PROPELLER switch is set to OFF.

7-11-4.3 IOAT Sensing

IOAT sensing is by a sensor mounted under the left hand wing. This sensor is termed the controller and presents the principal control signal. A second sensor is mounted in an identical position under the right hand wing. This sensor is termed the comparator and allows the control sensor to be checked.

The Propeller De-ice Controller monitors the various system control functions and outputs a fault signal to the Modular Avionics Unit (MAU) if a failure is detected. The Crew Alerting System (CAS) shows a caution in the event of detected failures. The following functions are monitored:

- Inhibit input open
- Failure of IOAT sensor (Open or short sensor or unacceptable difference between IOAT control sensor and IOAT comparator sensor)
- Heater supply voltage out of tolerance
- Heater current out of tolerance
- Built in test for internal failure (power supply, oscillator, watchdog etc.).

7-11-5 Indication / Warning

The propeller speed is displayed digitally in the engine window on the Primary Flight Display (PFD).

Propeller Low Pitch will be shown on the CAS when the propeller pitch is less than 1° (minimum pitch in flight) and the aircraft is not on the ground.

The **Propeller De-ice** caption will be shown if a failure is detected while the de-ice system is operating. Whenever the de-ice system is powered-on, the de-ice timer first performs a built-in functional test, which lasts approximately 20 seconds during which the **Propeller De-ice** caption does not come on.

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7-12 Fuel

7-12-1 General

For system schematics and equipment layout, refer to Fig. 7-12-1, Fuel System.

Fuel is contained in two integral wing tanks and is supplied to the engine in excess pressure of that required for all ground and flight operations. Each wing tank contains drain valves. The transfer of fuel from the main tanks to the collector tanks is achieved using transfer ejectors. The delivery of fuel to the engine is achieved using delivery ejectors. Fuel is supplied to the engine Fuel Control Unit (FCU) which contains two pump stages (low pressure and high pressure). All aircraft ejectors are energized by heated, high pressure, regulated motive flow from the engine fuel system. Electric booster pumps provide pressure during the engine start sequence, as a standby function when the normal system cannot maintain adequate pressure and are used to balance the fuel level in each wing. Fuel symmetry is maintained automatically by the Fuel Control and Monitoring Unit (FCMU).

Refueling is accomplished using over-wing filler caps. Fuel quantity, fuel flow rate, fuel temperature at the engine, fuel endurance, fuel quantity burnt and booster pump operation are shown in the FUEL window of the systems Multi Function Display (MFD). Fuel flow rate is also shown in the engine window of the Primary Flight Display (PFD). Low fuel pressure, fuel temperature, fuel filter contamination stages, fuel pump fault status, low fuel quantity and fault conditions will be shown in the Crew Alerting System (CAS) window. In an emergency, fuel flow to the engine can be stopped by pulling the FUEL EMERG SHUT OFF handle, located at the aft end of the center console, left of the aircraft centerline.

7-12-2 Description

The fuel storage system includes integral wing tanks, fuel drains, refueling ports, and vents. The main fuel tank is between ribs 6 and 16, forward of the rear and main spars. A collector tank is forward of the main spar between ribs 3 and 6. Fuel drains are located in the lower wing-skins. These fuel drains allow the removal of water and other contaminants during preflight.

Refueling is accomplished through an overwing filler cap located at the outer, upper section of each wing. Each wing has a usable fuel capacity of 201 US gal (761 liters).

Each fuel tank is vented to atmosphere through a main vent line to the lower surface of the wing. The main vent consists of a flapper valve and a flame arrestor located at the outmost rib of the fuel tank. It is normally open to allow bidirectional air flow and will be closed by the flapper valve when in contact with fuel. In case of blockage of the main vent there are individual inward and outward vents. The outward vent outlet is located at the lower surface of the wing. The inward vent inlet is located at the trailing edge of the wing tank, in front of the aileron.

A check valve with strainer is installed in the motive flow line at each collector tank. The check valves stop fuel flow between the left and right wing tanks and prevent contamination of ejector nozzles.

The distribution system transfers fuel from left and right main tanks to the collector tank in each wing and delivers fuel from the collector tanks to the engine fuel control unit. Within the tanks are electric booster pumps, transfer ejectors, and delivery ejectors. From the collector tanks the fuel flows through a firewall shutoff valve to the engine fuel system. The engine fuel system includes a low pressure pump, Fuel Oil Heat Exchanger (FOHE), fuel filter with bypass, high pressure pump, etc. Excessive flow not required for combustion is routed to the motive flow regulator, which regulates motive flow pressure (pressure above engine inlet pressure) to the ejectors in the aircraft fuel tanks. The tanks in each wing contain four capacitance type fuel quantity probes that are connected to the fuel computer part of the FCMU. The resistance temperature detector type fuel low level sensors in the collector and main tanks are connected to the low level sensing part of the FCMU.

7-12-3 Operation

During normal operation with the engine running, fuel is delivered from the wings to the engine by a motive flow system. Fuel downstream of the engine high pressure pump is limited by the motive flow regulator and returned to the wings to provide motive flow, which energizes the transfer and delivery ejectors. Motive flow pipes are insulated to prevent large temperature drops and ensure operation without anti-icing additive. The transfer ejector transfers fuel from the main tank to the collector tank. The left hand and right hand delivery ejectors deliver fuel to a common manifold on the lower-left side of the fuselage. Fuel pressure is measured upstream of the firewall shutoff valve which communicates only with the Engine and Propeller Electronic Control System (EPECS).

The fuel then passes through the firewall shutoff valve to the low pressure engine driven fuel pump. The firewall shutoff valve is mechanically connected to the FUEL EMERG SHUT-OFF handle in the cockpit.

An electric booster pump, located within each collector tank, provides fuel pressure during engine start and is used to maintain system pressure and fuel balancing when required. Each booster pump LH and RH is controlled by a two position (ON or AUTO) switch located on the FUEL PUMPS section of the overhead panel. When set to ON, the booster pump will operate continuously. With the switch set to AUTO (the normal operating setting), the booster pump can be commanded by either the FCMU for fuel balancing or by the EPECS when required by the engine. This includes engine start and relight, engine wet motoring or if the fuel system pressure is not sufficient for engine operation. After correcting the low pressure situation the EPECS will command the booster pump to NOT ON after 10 seconds. The FCMU and EPECS cannot prevent the booster pump to be commanded ON by the overhead panel switch.

Refer to Engine Fuel System, for engine fuel supply.

Fuel symmetry is automatically maintained by the FCMU when the FUEL PUMPS switches are set to AUTO. Left and right fuel quantities are monitored to detect fuel asymmetry exceeding 68 lbs and will activate the fuel booster pump in the tank with the higher quantity. Fuel booster pump activation is delayed one minute (confirmation time) to avoid pump cycling during flight in turbulence. The fuel booster pump will continue to operate until the left and right fuel levels are sensed to be equal. Automatic activation of the fuel booster pumps will only occur when the engine switch is out of the OFF position.

A fuel imbalance (refueling errors) of up to 267 lbs can be automatically handled by the automatic fuel balance system. In the event of a system failure, the fuel load symmetry can be maintained by manually selecting the FUEL PUMPS switch to ON for the fuel tank with the higher quantity until a balanced fuel condition is restored and then setting the switch to AUTO. Monitor the fuel quantity gauges for fuel symmetry for the remainder of the flight.

Power for the FCMU fuel computer is taken from the ESSENTIAL BUS through the FUEL QTY circuit breaker. Power for the low level sensing part of the FCMU is from the MAIN BUS through the FUEL LOW LEVEL circuit breaker.

7-12-4 Indication / Warning

Fuel quantity and low level sensing data is sent to the Modular Avionics Unit (MAU) from the FCMU. A fuel flow sensor located forward of the engine FCU sends a signal to the MAU to indicate fuel flow. The MAU calculates and displays analog and digital readouts in the FUEL window of the systems MFD. The left and right fuel tank quantities are shown as analog gauges on the MFD and as digital values on the composite PFD display. The total fuel quantity, fuel flow, endurance and fuel used values are shown digitally.

The analog fuel quantity and the digital fuel flow (FF) are real time data displays. The digital fuel quantity (QTY), endurance (END), and fuel used (USED) are calculated value displays. The values are derived from the stored fuel quantity at the time of FUEL RESET (see below) and the integrated fuel flow over time since reset.

The fuel quantity of the left and right wing fuel tanks is shown by white segments on a left and right analog scale in the FUEL window. The scales are marked from 0 to 4 (full) in units of quarters. The zero fuel quantity value is calibrated and the measuring tolerance on the fuel quantity is about 1 white square on the analog gauge (roughly 50 lb). This can lead to the analog fuel gauge not indicating being full despite the tank being physically full. Left and right booster pump selection is shown by a green PUMP indicator below the respective quantity scale.

The digital total computed left and right fuel tank quantity (QTY) is shown in the FUEL window in lbs (LB). The digital fuel quantity is calculated from the last RESET value, fuel as it is used will then be subtracted from this value. The fuel flow (FF) digital value is shown as pounds fuel used per hour (LB/H). The endurance display (END) range is the time in hours and minutes the aircraft can fly with the quantity of fuel that is calculated to be in the tanks at the current fuel flow. The digital fuel used (USED) value indicates fuel consumed in lbs (LB) based on fuel flow vs time (FF) of engine operation.

Tolerances of the fuel flow measurement system can lead to a conservative digital value of the measured fuel burn and the remaining fuel quantity. The pilot can, on longer flights, update the digital fuel quantity indication with the actual fuel value on board, by pressing the FUEL RESET soft key. Fuel reset in flight should only be used when the wings are level, pitch within ±3°, with unaccelerated flight and no turbulence present. Fuel reset will also reset the fuel used to zero.

A FUEL RESET softkey in the FUEL window is used to re-datum the total fuel quantity and fuel used value after each time fuel is added to the wing tanks. These values are stored in nonvolatile memory when power is removed. To reset the totalizer, either press the bezel key FUEL RESET or bring focus and use the Touch Screen Controller (TSC). After engine start, verify that the fuel quantity indication increases to the new fuel quantity and the fuel used indication is reset to zero. The FUEL RESET command is disabled if the FCMU computer detects a fault condition.

If a fuel low level indication condition becomes active all segments shown on the analog scale and the fuel scale outline will change to amber and a **LH Fuel Low**, or **RH Fuel Low** or **LH + RH Fuel Low** message will be shown in the CAS window of the systems MFD.

The green PUMP captions indicate that the electric booster pumps have been selected to ON, by the overhead panel switches or by the automatic fuel balancing or by the EPECS, and that the pumps are operating. If an electric booster pump does not operate when selected to ON, an amber PUMP caption is displayed. This is always associated with the **LH Fuel Pump Fail**, **RH Fuel Pump Fail**, or **LH + RH Fuel Pump Fail** message in the CAS window. The green PUMP captions do not confirm fuel transfer.

The correction for a fuel imbalance begins at 68 lbs. If the fuel imbalance cannot be corrected, meaning, the fuel imbalance:

- Continues to increase above 68 lbs from the time the balancing started, or
- Correction rate is lower than 0.08 lb/sec, or
- Does not improve within 4 minutes,

Fuel Balance Fault will be shown on the CAS window.

If there is a fuel imbalance of more than 178 lbs, **Fuel Imbalance** will be shown in the CAS window. The segments of the fuel quantity bar representing the excess fuel on the fuller tank side will change to amber. When on the ground takeoff is prohibited until the fuel is balanced.

If there is missing data or the MAU senses that the analog fuel sensing data is invalid, the analog fuel scales will be removed and an amber X will be shown on the scale. If the fuel flow status data becomes invalid or missing the digital data values will be replaced with amber dashes.

A low fuel pressure condition will be shown by a **Fuel Low Pressure** message in the CAS window.

An increase in the engine fuel filter delta pressure, indicating an impending fuel filter and/or FOHE blockage will be shown by a **Fuel IMP Bypass** message in the CAS window. Continued fuel filter blockage will lead to opening of the bypass valve.

When the engine fuel filter is blocked the bypass valve opens. This will be shown by a **Fuel Filter Blocked** message in the CAS window.

Fuel temperature is measured downstream of the FOHE and fuel filter. The fuel temperature signal is provided by the EPECS to the APEX fuel page. A low or high fuel temperature will be shown by a **Fuel TEMP** message in the CAS window.

If the fuel pressure sensor fails, the EPECS will automatically command the Electric Booster Pumps to ON. A failure of the fuel pressure sensor will be shown by a **Fuel PRESS SENS Fail** message in the CAS window.

If the command to and the feedback from the electric booster pump disagree, the **LH Fuel Pump Fail**, **RH Fuel Pump Fail** or **LH + RH Fuel Pump Fail** message will be shown in the CAS window.

The CAS window of the systems MFD displays the following caution and status (on ground only) messages for the fuel system (refer to Table 7-12-1):

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Table 7-12-1: Fuel System - CAS Messages

CAS Message	Description
Fuel Quantity Fault	The FCMU is unable to determine fuel quantity
LH Fuel Low RH Fuel Low LH + RH Fuel Low	The fuel quantity in left, right or both tank(s) RH Fuel Low has reached less than 20 US gal (75 liters) (approximately 134 lb (60 kg) at 59 °F (15 °C))
Fuel Pressure Low	The fuel system pressure is lower than required for continuous engine operation
Fuel Balance Fault	FCMU automatic fuel balancing is not successful
Fuel Imbalance	A fuel imbalance of more than 178 lbs between LH and RH fuel quantity. Takeoff is prohibited until balanced. In flight this indicates a potential failure of the engine motive flow PRV.
Fuel IMP Bypass	Increased blockage of the fuel filter and/or fuel-oil heat exchanger resulting in an increased engine fuel filter delta pressure. Continued fuel filter blockage will lead to opening of the bypass valve. Flight can be completed provided that contamination levels in the tank are not excessive.
Fuel Filter Blocked	The engine fuel filter bypass valve is open
Fuel TEMP	The fuel temperature is below 12 °C or higher than 105 °C after the fuel filter
Fuel PRESS SENS Fail	The fuel pressure sensor has failed on both channels Booster pumps are automatically commanded to ON
LH Fuel Pump Fail RH Fuel Pump Fail LH+RH Fuel Pump Fail	One or both of the electric booster pumps has failed Automatic fuel balancing is not possible
FCMU Fault	The FCMU has detected an internal fault
Low Lvl Sense Fault	The FCMU has detected a fault with fuel low level sensing
Fuel Filter Replace	The EPECS has detected the first level of fuel filter contamination

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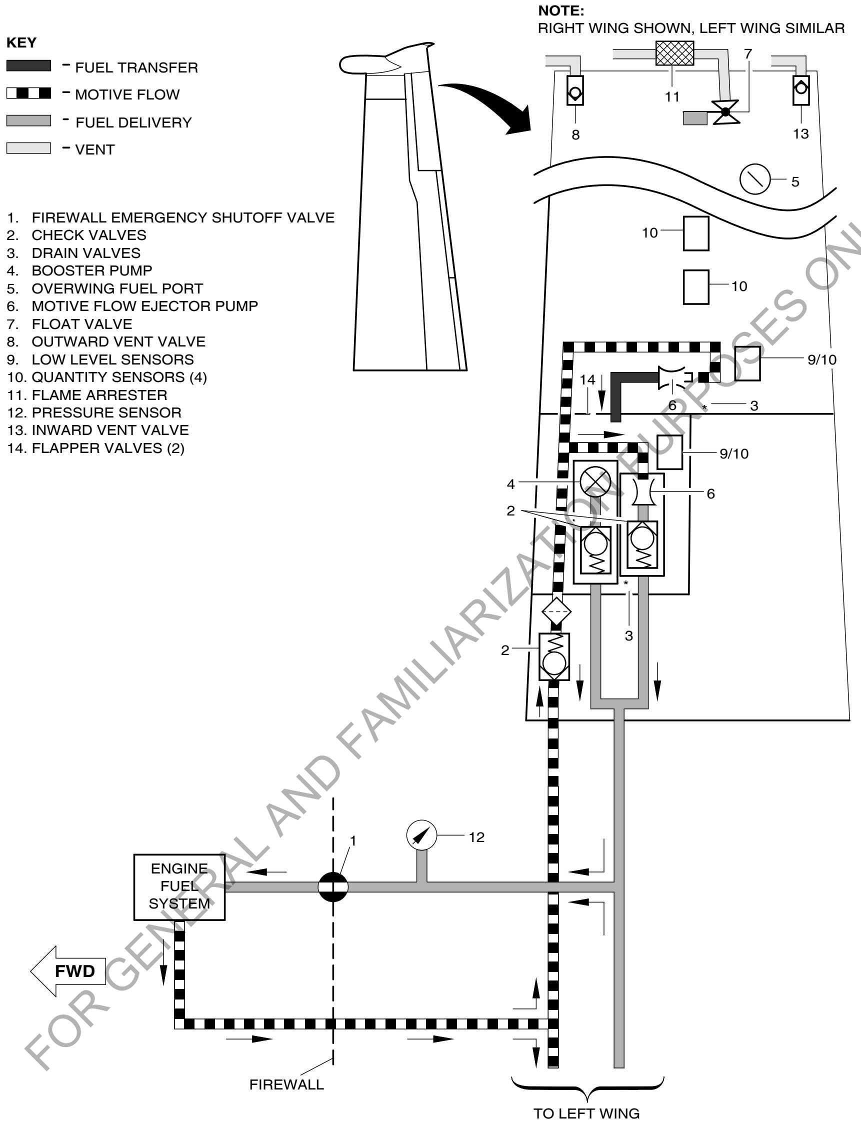

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Figure 7-12-1: Fuel System (Sheet 1 of 4)

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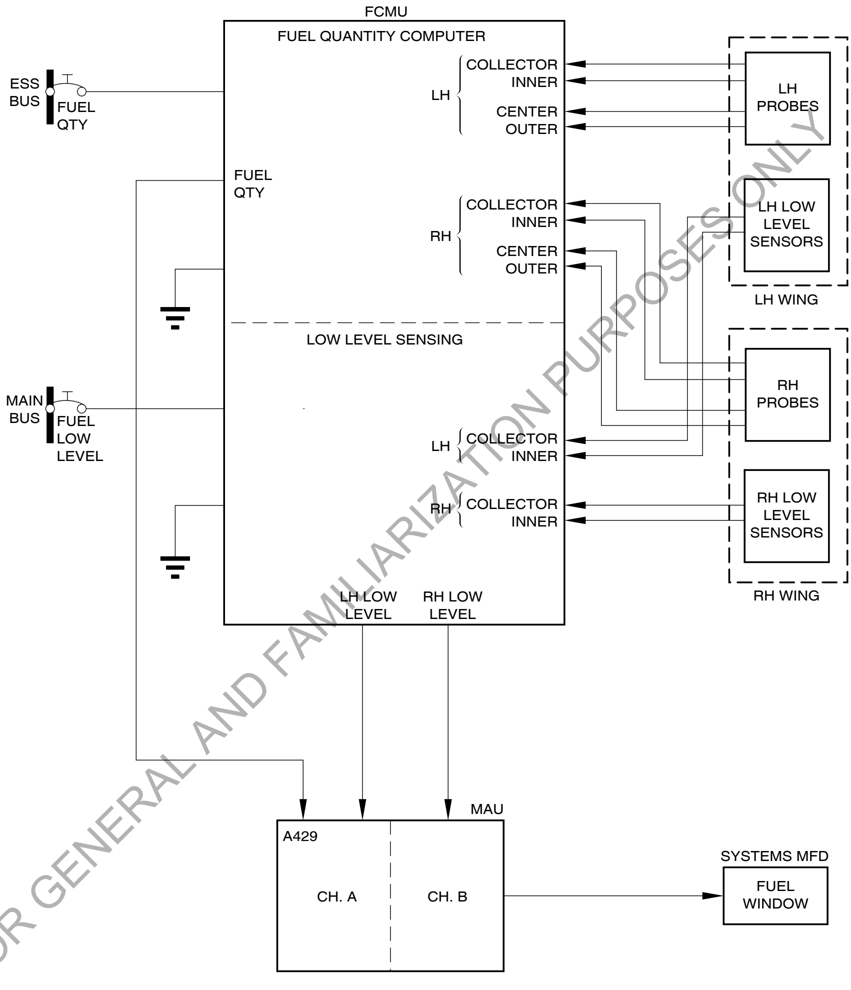

Figure 7-12-1: Fuel System (Sheet 2 of 4)

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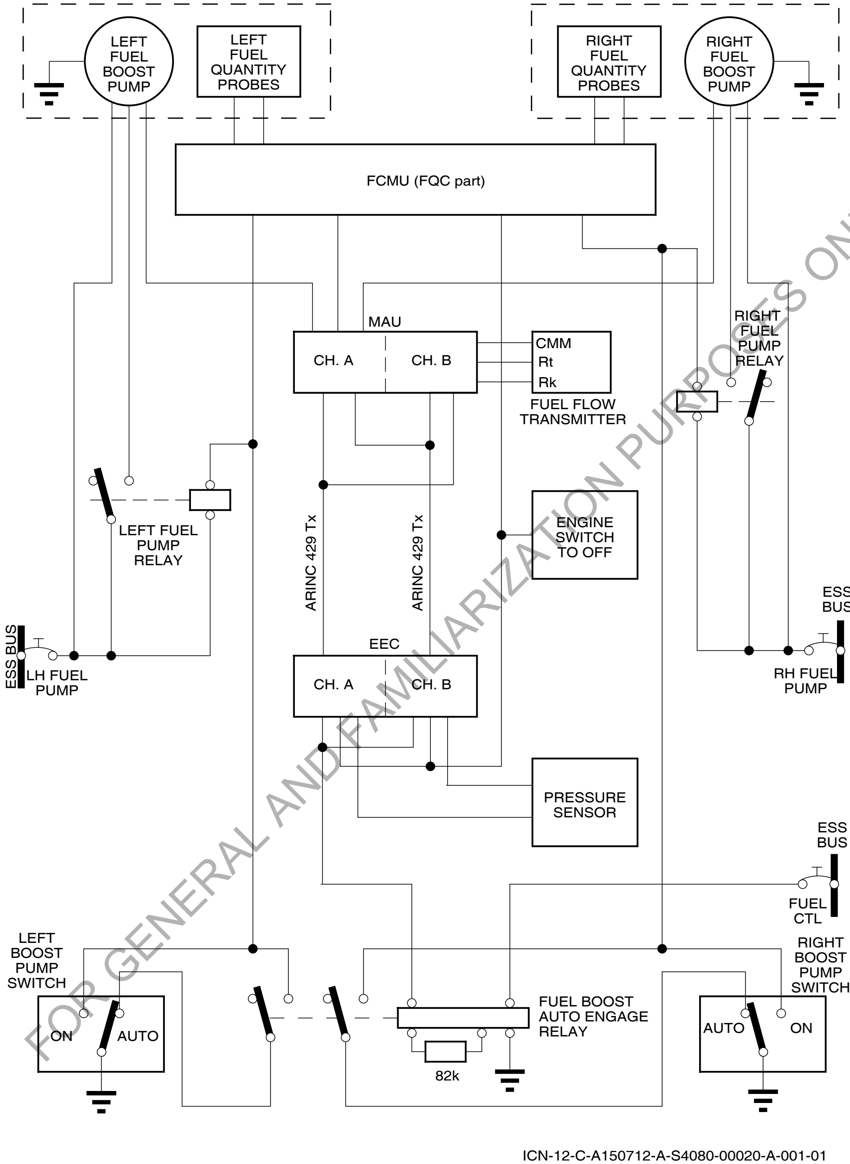

Figure 7-12-1: Fuel System (Sheet 3 of 4)

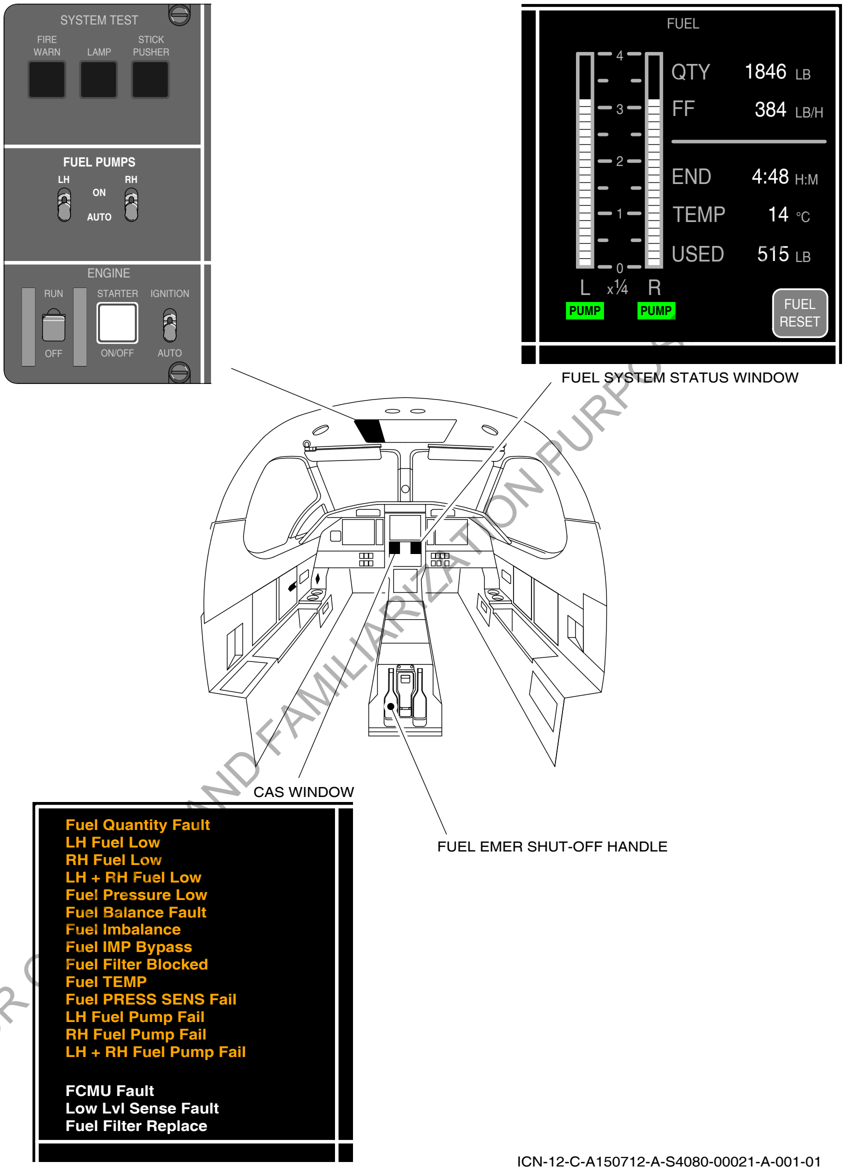

Figure 7-12-1: Fuel System (Sheet 4 of 4)

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7-13 Electrical

7-13-1 General

For system schematics and equipment layout. refer to Fig. 7-13-4, PGDS - Layout

For system schematics, refer to Fig. 7-13-5, PGDS Normal Operation Condition - Both Generators On-Line

The PGDS is a dual channel 28 VDC power generation and distribution system, it has the following power sources:

- Generator 1, a 28 V, 300 A generator
- Generator 2, a 28 V, 300 A generator
- Two lead-acid batteries 24 V 42 Ah or two optional nickel-cadmium batteries 24 V 40Ah or two optional heated nickel-cadmium batteries 24 V 44 Ah
- Emergency Power Supply (EPS) a 24 V 5 Ah lead-acid battery unit.

Under PGDS normal operating condition (Fig. 7-13-5, PGDS Normal Operation Condition - Both Generators On-Line) the systems and circuits powered from Generator 1 are designated channel 1 and systems and circuits powered from Generator 2 are designated channel 2. The channels operate independently and the only connection is through a bus tie in the event of component failures. In the event of component failures, automatic switching and load shedding takes place for continued safe flight and landing under abnormal and emergency conditions.

The PGDS abnormal operating condition is when one generator has failed. High current consumption busses and systems are load shed if a Generator 1 or 2 fails. Refer to Fig. 7-13-6, PGDS Abnormal Operation Condition - Generator 1 Off-Line and Fig. 7-13-7, PGDS Abnormal Operation Condition - Generator 2 Off-Line which show a Generator 1 and 2 failure.

The PGDS emergency operating condition is when both generators have failed (i.e. engine flame out). Refer to Fig. 7-13-8, PGDS Emergency Operation Condition – Both Generators Off-Line for the busses and high current consumption systems that are load shed.

An external power socket permits DC power to be provided from a ground power unit.

7-13-2 Description

7-13-2.1 Power Supplies

When the engine is running, Generator 1 is the primary power source for the Channel 1 Power Line, and the Essential and Avionic 1 Buses. The Standby Bus is powered from the Avionic 1 Bus. If the Avionic 1 Bus is switched OFF, the Standby Bus is powered from the Hot Bat Bus provided the STBY BUS switch is set to on.

Generator 2 is the primary power source for the Channel 2 Secondary Power Line and the Main, Avionic 2, Non-Essential and Cabin Buses. Generator 2 is also the engine starter motor. If the engine STARTER switch is pushed and the engine Ng is less than 50%; the generators are automatically switched OFF.

Should either the Generator 1 or Generator 2 fail, the control relays in the PGDS automatically change and connect the remaining generator and both batteries to the Power and Secondary Power Lines. A caution will be displayed in the Crew Alert System (CAS) window. This is the PGDS abnormal operating condition.

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Battery 1 and Battery 2 are installed in the rear fuselage. Each battery has an on/off switch on the Electrical Power Management (EPM) section of the overhead control panel. Battery 2 provides the power for starting the engine. Battery 1 provides power to maintain the essential systems during engine start and on ground supplements Battery 2 for engine starting at either above 10% Ng or after 10 sec after the starter is activated. In case of an engine or double generator failure, the batteries will supply the essential electrical systems after automatic load shedding for a maximum range glide and one attempted engine start. This is the PGDS emergency operating condition.

The optional in-flight heated Ni-Cad batteries support an extended range of aircraft operating temperatures, specifically cold weather. Heaters inside the battery case are supplied with 28 VDC when the aircraft electrical system is energized. Battery heater 1 is powered by the GENERATOR 1 BUS, and battery heater 2 is powered by the GENERATOR 2 BUS. The battery heater is capable of maintaining the battery temperature above 4°C at ambient temperatures down to −40°C.

Each generator and battery has a current and a voltage sensor. The Modular Avionics Unit (MAU) monitors the condition of the generators for under and over voltage and the batteries for under and over voltage and over current (discharge), and provides the appropriate cautions. The GDS status is displayed in the ELECTRICAL window and the cautions are displayed in the CAS window. Both windows are on the systems Multi Function Display (MFD) unit. Each generator has a three position control switch on the EPM section of the overhead control panel.

On ground the DC system can be powered by an external power unit which is connected under the rear fuselage left side. When the external power supply is connected to the aircraft, an AVAIL caption to the right of the EXT PWR switch on the overhead panel is illuminated to show that external power is available. To apply external power to the aircraft electrical system, the EXT PWR switch must be selected to EXT PWR. When the EXT PWR switch is set to EXT PWR, an ON caption to the right of the EXT PWR switch is illuminated. With both generators off-line the Bus Tie is closed and ground power is fed to all aircraft busses and both batteries. An External Power Controller (EPC) monitors external power supply and automatically isolates the aircraft systems if the voltage is outside the range 22 to 29.5 VDC. The EPC will disconnect external power if either generator is online.

In the event of a total power loss (both generators and batteries) the EPS battery will provide sufficient power through the EPS bus to the backup systems for 30 minutes. Under normal, abnormal and emergency conditions the EPS battery is connected to the Essential Bus to maintain a maximum charge. Following the loss of the Essential Bus the EPS Bus automatically switches to be supplied from the EPS battery. When the aircraft is powered down normally, the EPS switch on the overhead panel must be set to OFF to prevent discharge of the EPS battery.

7-13-2.2 Junction Boxes

There are two Power Junction Boxes (PJB), one for each generator. Generator 1 PJB is installed on the cockpit lower left wall and Generator 2 PJB is installed on the cockpit lower right wall. They contain the principal contactors, relays and other circuit protection devices. There is a Battery and External Power Junction Box (BEPJB) which contains the components for the batteries, external power functions, hot battery bus and associated circuit breakers. It also contains the necessary components to permit optional nickel cadmium batteries to be installed. The BEPJB is installed in the rear fuselage. There is also a Relay Module Panel (RMP) for power Channel 1 and 2, which contain terminal blocks and relays and are installed under the cabin floor on the left and right sides.

7-13-2.3 Bus Bars

The Generator 1 and 2 DC power supplies are distributed via a system of BUS BARS on each channel. A bus tie installed in the left PJB is monitored by the MAU and will close when either generator is off-line to allow the remaining generator to provide power to the other channel.

If both generators are off-line (PGDS emergency condition), both batteries are connected in parallel via the bus tie to power the left channel essential busses. The bus tie will open, if an excessive current condition on one channel is sensed, to isolate the left and right channels. A caution is displayed in the CAS window if the bus tie is in the wrong state for the PGDS configuration.

The Hot Battery Bus is powered directly from Battery 1. It supplies power to systems that must remain powered or available when the aircraft is powered down.

The Power Line is the primary source of electrical power with the highest level of integrity. It supplies the Essential and Avionic 1 Buses and power for the flaps, LH windshield de-ice, propeller de-ice and cabin heating.

The Essential Bus has the highest level of integrity and under normal conditions it is powered from Generator 1. It can be supplied with power from either generator or both batteries. This bus will always be powered under normal, abnormal and emergency conditions. There are no relays or contactors controlling the Essential Bus. The Essential Bus voltage is monitored by the MAU and a warning will be displayed in the CAS window if the voltage is outside the limits.

The Avionic 1 Bus has the highest level of integrity and under normal conditions it is powered from Generator 1. It can be supplied with power from either generator or both batteries. This bus will always be powered under normal, abnormal and emergency conditions. A contactor in the left PJB is controlled by the AV 1 BUS switch on the overhead panel. The Avionic 1 Bus voltage is monitored by the MAU and a caution will be displayed in the CAS window if the voltage is outside the limits.

The Secondary Power Line is the source of electrical power with the second highest level of integrity. It supplies the Main, Avionic 2, Non-Essential and Cabin Busbars and power for the landing gear system, RH windshield de-ice, Vapor Cycle Cooling System (VCCS) and under floor heating.

The Main Bus has the second highest level of integrity and under normal conditions it is powered from Generator 2. It can be supplied with power from either generator. This bus will always be powered under normal and abnormal conditions. The Main Bus contactor is normally closed and will automatically open under emergency conditions and load shed the Main Bus. The Main Bus voltage is monitored by the MAU and a caution will be displayed in the CAS window if the voltage is outside the limits. The caution is suppressed if both generators are offline.

The Avionic 2 Bus has the second highest level of integrity and under normal conditions it is powered from Generator 2. It can be supplied with power from either generator. This bus will always be powered under normal and abnormal conditions. A contactor in the right PJB is controlled by the AV 2 BUS switch on the overhead panel. The Avionic 2 Bus voltage is monitored by the MAU and a caution will be displayed in the CAS window if the voltage is outside the limits. The caution is suppressed if both generators are off-line or the AV 2 BUS switch on the overhead control panel is OFF.

The Generator 1 Bus has the third highest level of integrity and under normal and abnormal (Generator 2 off-line) conditions it is powered from Generator 1. When the Generator 1 is off-line the Generator 1 Bus is unpowered. The Generator 1 Bus provides power to non-essential equipment that can be retained in the event of a Generator 2 failure. The Generator 1 Bus voltage is monitored by the MAU and a caution will be displayed in the CAS window if the voltage is outside the limits. The caution is suppressed if Generator 1 is off-line.

The Generator 2 Bus has the third highest level of integrity and under normal and abnormal (Generator 1 off-line) conditions it is powered from Generator 2. When the Generator 2 is off-line the Generator 2 Bus is unpowered. The Generator 2 Bus provides power to non-essential equipment that can be retained in the event of a Generator 1 failure. The Generator 2 Bus voltage is monitored by the MAU and a caution will be displayed in the CAS window if the voltage is outside the limits. The caution is suppressed if Generator 2 is off-line.

The Non Essential Bus has the fourth highest level of integrity and under normal conditions it is powered from Generator 2. When either generator is off-line the Non Essential Bus is unpowered. The Non Essential Bus provides power to equipment that may be shed in the event of a single generator failure. The Non Essential Bus voltage is monitored by the MAU and a caution will be displayed in the CAS window if the voltage is outside the limits. The caution is suppressed if either generator is off-line.

The Cabin Bus has the fourth highest level of integrity and under normal conditions it is powered from Generator 2. When either generator is off-line the Cabin Bus is unpowered. The Cabin Bus provides power for ancillary non-flight related services within the cabin. All these services are shed in the event of a single generator failure. A contactor in the right PJB is controlled by the CABIN BUS switch on the overhead control panel.

The Standby Power Bus provides power to specific avionic equipment to allow the pilot to perform preflight planning and ATC communication tasks without the need to power up the aircraft primary busses prematurely. The Standby Power Bus is controlled by the STBY BUS switch on the overhead control panel. When the switch is selected on before engine start, an ON indicator illuminates adjacent to the switch. When the Avionic 1 Bus becomes powered the Standby Power Bus ON indicator goes off. During emergency operation if additional load shedding is required the pilot can switch off the AV 1 BUS and retain the Standby Power Bus. The Standby Power Bus voltage is monitored by the MAU and a caution will be displayed in the CAS window if the voltage is outside the limits.

The Emergency Power Supply bus provides power to specific backup equipment following the loss of all electrical power (both generators and the aircraft batteries).

7-13-2.4 Circuit Breakers

Circuits supplied from the Bus Bars have circuit breakers on color coded panels on the left and right cockpit walls. The bus locations and color coding are as follows:

Panel	Bus	Color
LH Front	ESSENTIAL BUS	Cyan
LH Rear	AVIONIC 1 BUS EPS BUS STANDBY BUS GENERATOR 1	Ice blue Yellow Dove blue White
RH Front	MAIN BUS NON ESSENTIAL BUS	Green Pink
RH Rear	AVIONIC 2 BUS CABIN BUS GENERATOR 2	Light green Brown Gray

The circuit breakers for the high current consuming systems FLAP PWR, LH W/SHLD, PROP DE-ICE and CABIN HTG are all installed on the LH PJB. The circuit breakers for the high current consuming systems LDG GEAR PWR, RH W/SHLD, U/FLOOR HTR and optional FOOTWARMER are all installed on the RH PJB. The circuit breakers for the VCCS and optional LOGO LT are installed on the BEPJB.

The BUS TIE circuit breaker on the overhead control panel will open automatically if the current through the bus tie in the left PJB exceeds 200 amps. The bus tie in the left PJB can be opened manually and reset, if required, by pulling or pushing the control BUS TIE circuit breaker on the overhead control panel.

7-13-2.5 Controls and Indicators

Refer to Fig. 7-13-1, Power Generation and Distribution System (PGDS) - Controls

7-13-2.6 Overhead Panel

The electrical system is controlled from the ELECTRICAL POWER MANAGEMENT section of the overhead control panel. The panel has controls for the:

- Avionics busses (AV 1 and AV 2)
- Generators (GEN 1 and GEN 2)
- Batteries (BAT 1 and BAT 2)
- External power (EXT PWR)
- Standby bus (STBY BUS)
- Cabin bus (CABIN BUS)
- Master power (MASTER POWER)
- Emergency Power System (EPS)
- Bus Tie (BUS TIE).

The Power management system is designed to leave the GEN 1, GEN 2, AV 1 BUS, AV 2 BUS and CABIN BUS switches in the on position in normal operations (through power cycles).

The MASTER POWER EMERGENCY OFF switch is guarded to the on position. When the switch is selected off the Generator 1 and 2, Battery 1 and 2 and external power are disconnected from the distribution system. The Standby Power Bus is de-energized. The Hot Battery and Emergency Power busses remain energized.

The GEN 1, GEN 2, BAT 1, BAT 2, AV 1 and AV 2 switches are locking type switches. These switches must be pulled out before they can be moved from the on position. The GEN 1 and GEN 2 switches have three positions: ON, OFF and RESET. The reset position is used to allow the generator back on line following a voltage regulator trip.

The EPS switch has three positions: ARM, OFF and TEST. In the ARM position the EPS bus is powered and the red EPS ON indicator illuminates. In the TEST position an EPS battery capacity test is performed and if successful the green TEST indicator illuminates.

The GEN 1, GEN 2, BAT 1 and BAT 2 voltages and amperes indications are shown are in the ELECTRICAL status window of the systems MFD. A positive BAT current indicates battery charging rate. The indications are shown as amber dashes if a sensor reading is out of range.

The MAU provides monitoring of the battery voltage and current. The conditions that will result in a caution output to the CAS are:

- A decrease of battery voltage below 22.0 VDC will give a Battery caution
- An increase of battery current above 60 Amps discharge will give a Battery caution
- An increase of battery voltage above 30.3 VDC will give a Battery caution.

Continuous monitoring of the GEN 1 and GEN 2 voltages for close to limit cautions is provided by the MAU. The conditions that will result in a caution output to the CAS are:

- A decrease of generator voltage below 22.0 VDC will give a Generator caution
- A increase of generator voltage above 30.3 VDC will give a Generator caution.

7-13-3 Operation

CAUTION

Failure to follow the correct power up and power down sequence will trigger nuisance warnings and cautions, due to equipment not being correctly powered up and therefore resulting in a faulty status. Only performing a correct power up cycle will initialise equipment and systems to a correct state.

The correct power up sequence is STBY BUS switch ON, EPS switch test for 5 seconds then ON, BAT 1 and 2 switches ON and EXT PWR switch ON (if available). The correct power down sequence is EXT PWR switch OFF (if ON), STBY BUS switch OFF, EPS switch OFF and BAT 1 and BAT 2 switches OFF. To power up the aircraft expeditiously, the standby bus and the EPS can be switched ON prior to performing the outside check. Before sitting down, the pilot can switch BAT 1 and 2 switches ON, then, once seated and once the relevant checklist items have been performed, the system is ready for engine start.

When the STBY BUS switch on the overhead control panel is set to on, the blue ON indicator illuminates to show power is available from the Hot Battery bus. This allows the pilot to perform preflight planning and ATC communication tasks without powering up the whole aircraft. After engine start and the Avionic 1 bus becomes powered the blue ON indicator will go off.

The EPS should be checked prior to flight by moving the EPS switch on the overhead control panel to the TEST position. The green TEST indicator comes on to indicate a serviceable battery. The EPS switch is then set to the ARMED position and the red EPS ON comes on. Once either external power or the batteries are switched on the EPS ON indicator goes off.

Before applying external power make sure the BAT 1 and BAT 2 switches are in the ON position. Applying external power to the socket under the rear fuselage left side causes the green AVAIL indicator on the overhead control panel to illuminate. When the EXT PWR switch is set to EXT PWR the blue ON caption is illuminated and the external power is supplied to all busses and both batteries (Bus Tie closed). The external power voltage can be seen on the BAT 1 and BAT 2 indicators. The external power voltage is monitored and the external power supply will be automatically disconnected by the external power controller, if the voltage goes outside the limits. **External Power** is displayed in the CAS window if ground power is still connected and the aircraft is ready to taxi (i.e. engine running, both generators and both avionic busses are on).

Battery voltages and amperes can be seen on the BAT 1 and BAT 2 status indicators. After engine start and when the generators come online the Bus Tie will open (dual channel system) with the Generator 1 powering one channel and Generator 2 powering the other channel. This is the PGDS normal operating condition with all busses available. Disconnecting the external power from the aircraft will cause the overhead control panel green AVAIL indicator to go off.

The output voltages and load of the GEN 1 and GEN 2 and the voltages and load or charging current of BAT 1 and BAT 2 can be observed in the ELECTRICAL status window on the systems MFD.

The generator voltages are monitored by the MAU for under and over voltage conditions. The Generator Control Units (GCU) monitor the generators for over current conditions. The batteries are monitored for under, over voltage and over current conditions by the MAU. If an outside of acceptable limits condition arises the appropriate warnings or cautions are shown in the CAS window.

Failures within the PGDS follow a structured degradation of systems functionality. Should either the Generator 1 or Generator 2 fail, the appropriate control relays within the PGDS automatically reconfigure so that the remaining generator and both batteries are connected in parallel to the Power Line and the Secondary Power Line through the bus tie. A caution will be displayed in the CAS window. This is the PGDS abnormal operating condition and automatic load shedding takes place.

In the event of a dual generator failure the Bus Tie closes and both the batteries supply the Power Line. The Secondary Power Line will also be powered but apart from LDG GEAR PWR all the distribution busbars will be automatically load shed. A warning will be displayed in the CAS window. This is the PGDS emergency condition and automatic load shedding takes place. With the STBY BUS switch on, the Avionic 1 bus can be manually switched off with the AV 1 BUS switch to further reduce the electrical load.

If a battery failure condition is detected and shown in the CAS window the appropriate battery switch must be selected off by the crew to open the battery relay to isolate the failed battery. The position of all other relays and bus ties remain unchanged and there is no degradation of system performance.

Following the loss of generator and battery power to the Essential Bus the EPS battery will provide power to the standby instruments. The red EPS ON indicator on the overhead control panel will come on.

Refer to Section 3, Emergency Procedures, Electrical System Failures, for further information on emergency procedures.

7-13-4 Indication / Warning

PGDS status indication is displayed in the ELECTRICAL window of the systems MFD. Under normal operating conditions the PGDS readouts are given in white. If an out of limit condition arises the PGDS readout background will change to yellow for a caution or red for a warning together with the relevant CAS caution or warning.

The CAS window on the systems MFD displays the following WARNINGS and CAUTIONS for the PGDS (refer to Table 7-13-1):

Table 7-13-1: Electrical - CAS Messages

CAS Message	Description
Essential Bus	Indicates busbar voltage less than 22 VDC
Generators	Indicates both generators are off-line and engine is running
Battery 1 Hot Battery 2 Hot Battery 1 and 2 Hot	Indicates battery 1 or 2 or both batteries over temperature Battery 2 Hot (only operative with Ni-cad batteries installed) Accompanied by voice callout “Battery Hot”
External Power	External power connected with both generators online and both Avionic busses energized
Generator 1 Off	Generator 1 is off-line and engine is running
Generator 2 Off	Generator 2 is off-line and engine is running
Bus Tie	Indicates Bus Tie is in the incorrect position for the PGDS configuration
Avionics 1 Bus Avionics 2 Bus Avionics 1+2 Bus	Indicates Avionics 1 or 2 or both bus voltage is less than 22 VDC
Generator 1 Volts Generator 2 Volts Generator 1+2 Volts	Indicates Generator 1 or 2 or both voltage is less than 22 VDC or more than 30.3 VDC
Battery 1 Battery 2 Battery 1+2	Indicates battery 1 or 2 or both under and over voltage or current discharge condition
Battery 1 Off Battery 2 Off Battery 1+2 Off	Indicates battery 1 or 2 or both are off-line
Main Bus Generator 1 Bus Generator 2 Bus Generator 1+2 Bus Standby Bus Non Essential Bus	Indicates Generator 1+2 Bus a busbar voltage is less than 22 VDC

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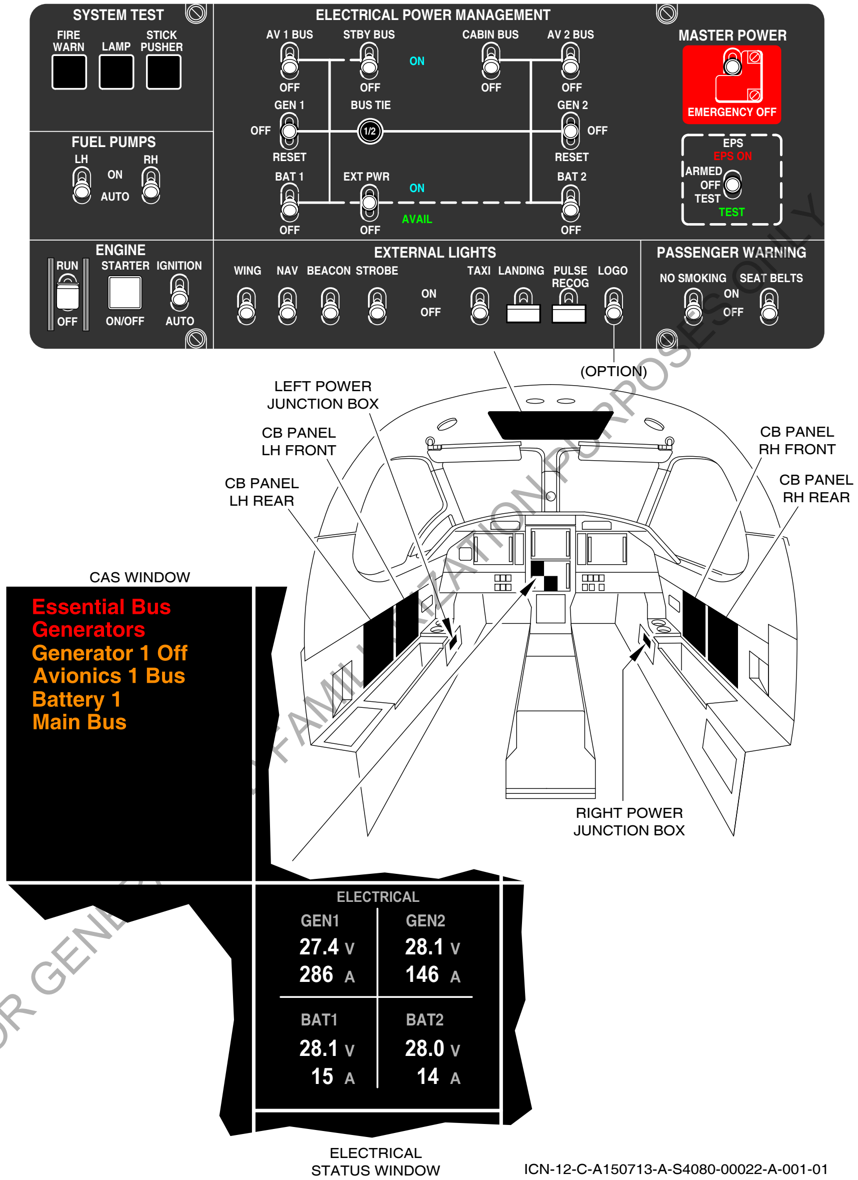

Figure 7-13-1: Power Generation and Distribution System (PGDS) - Controls

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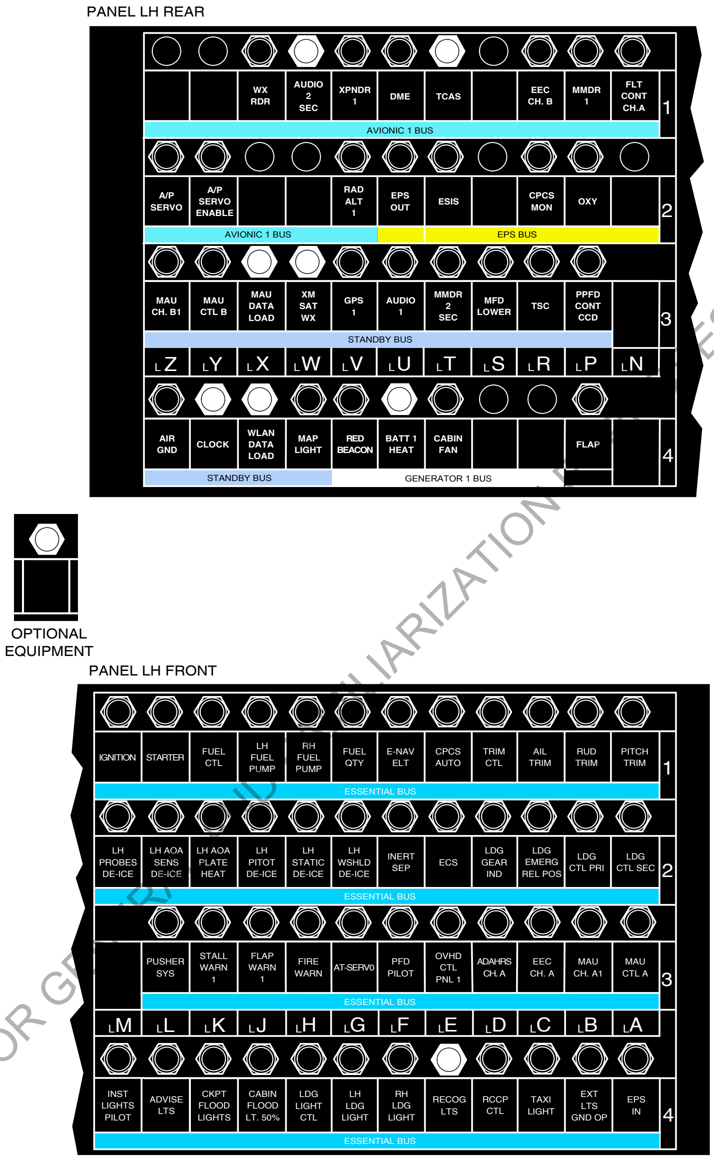

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Figure 7-13-2: PGDS LH Circuit Breaker Panels

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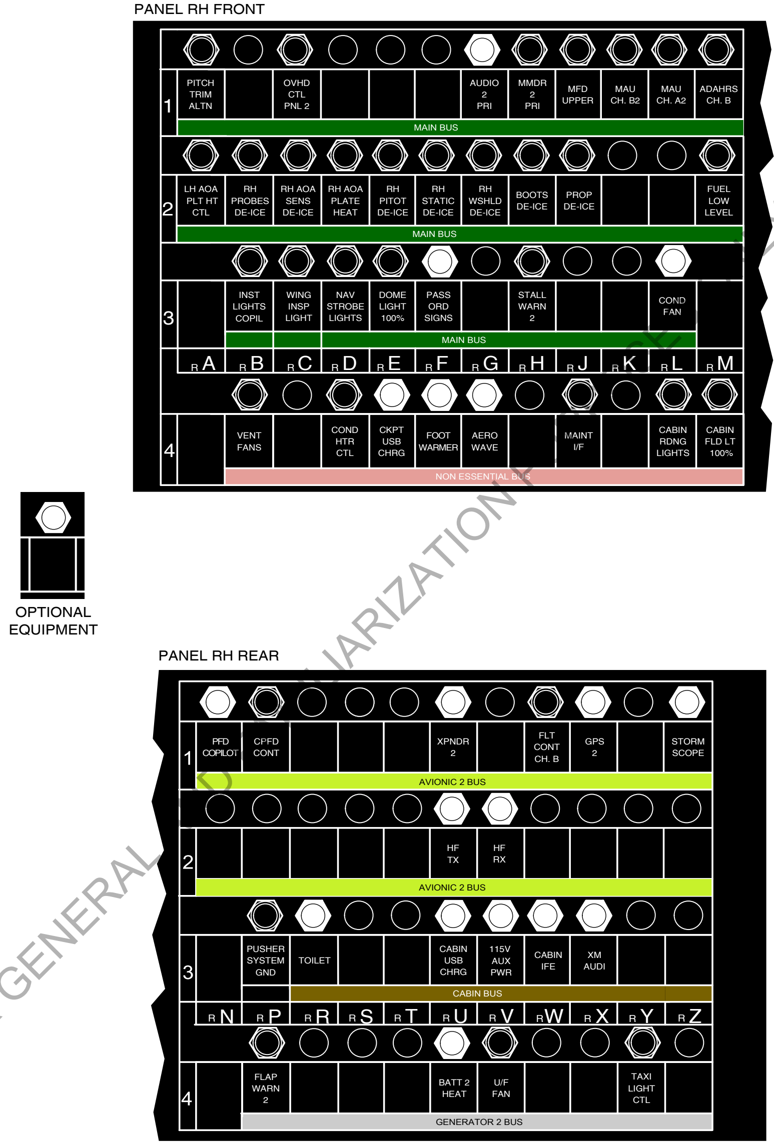

ICN-12-C-A150713-A-S4080-00024-A-001-01

Figure 7-13-3: PGDS - RH Circuit Breaker Panels

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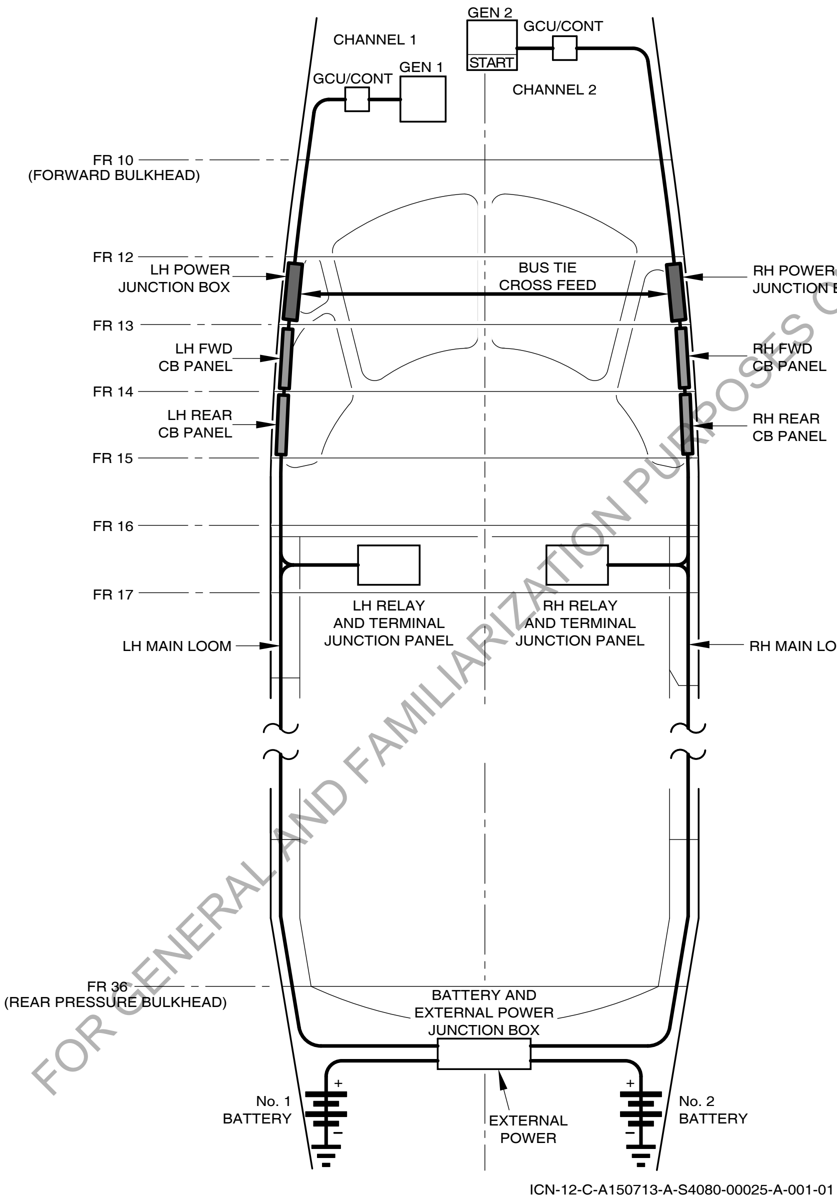
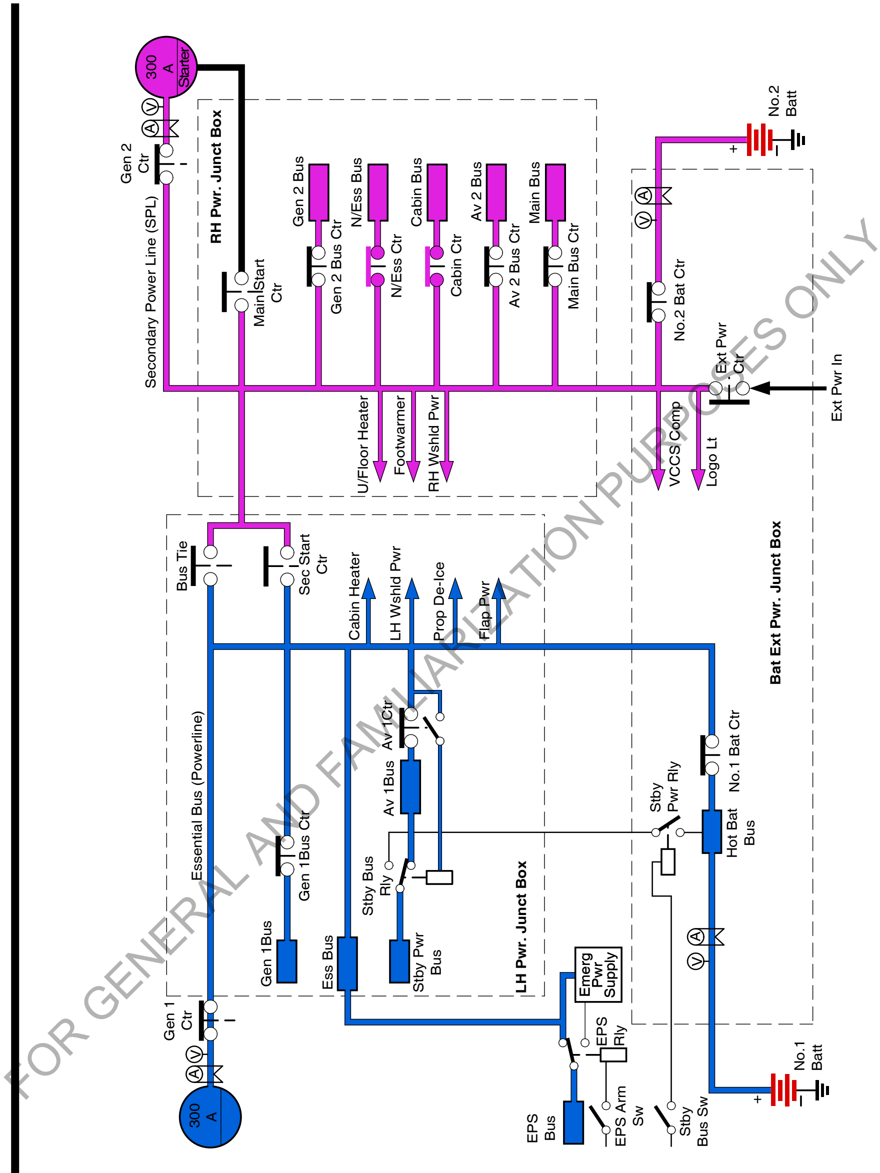


Figure 7-13-4: PGDS - Layout



ICN-12-C-A150713-A-S4080-00026-A-002-01

Figure 7-13-5: PGDS Normal Operation Condition - Both Generators On-Line

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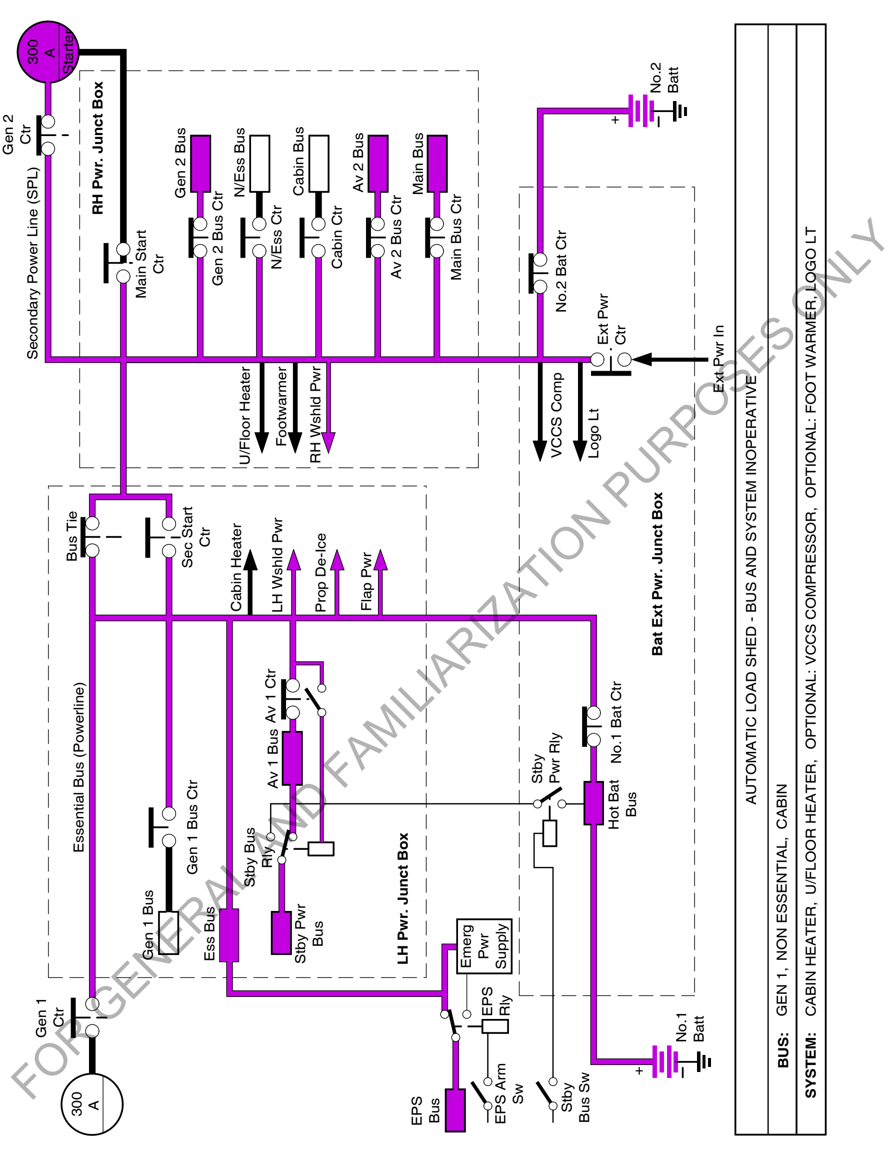
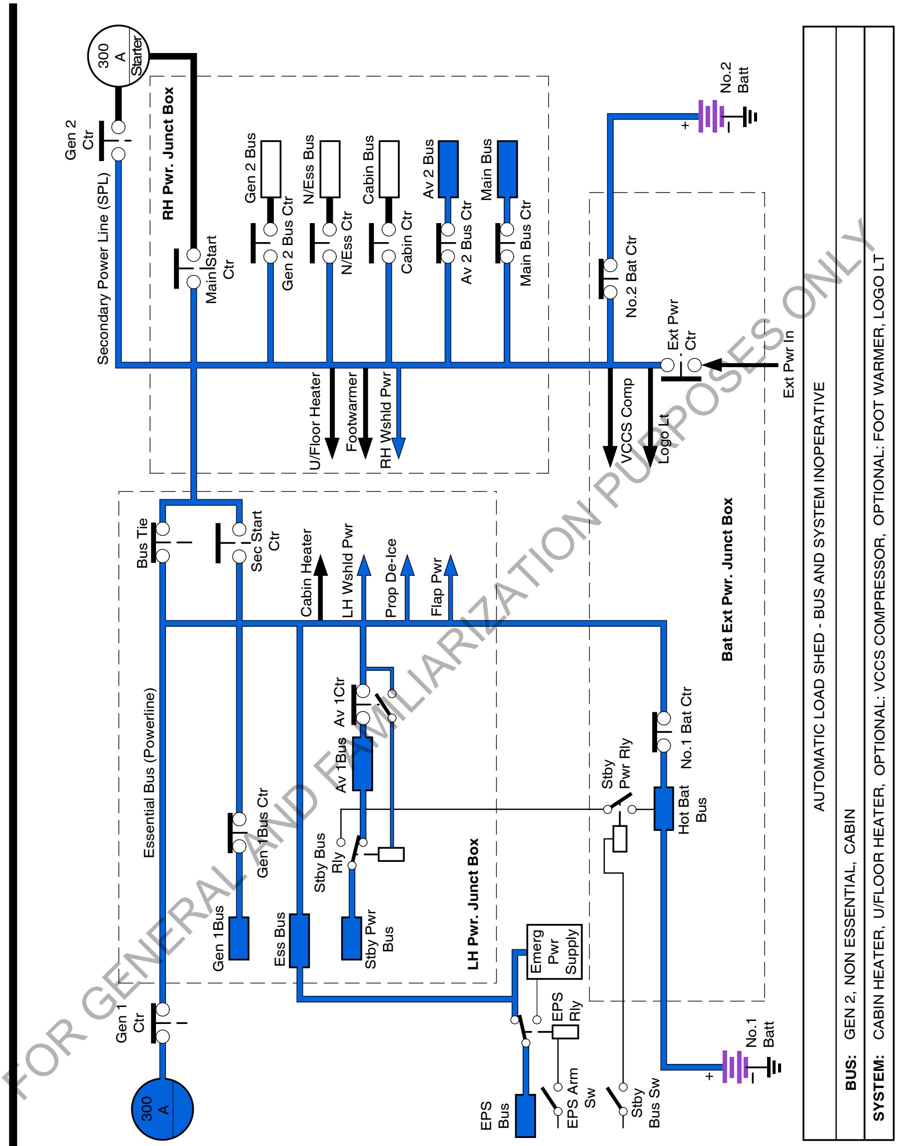


ICN-12-C-A150713-A-S4080-00027-A-002-01

Figure 7-13-6: PGDS Abnormal Operation Condition - Generator 1 Off-Line

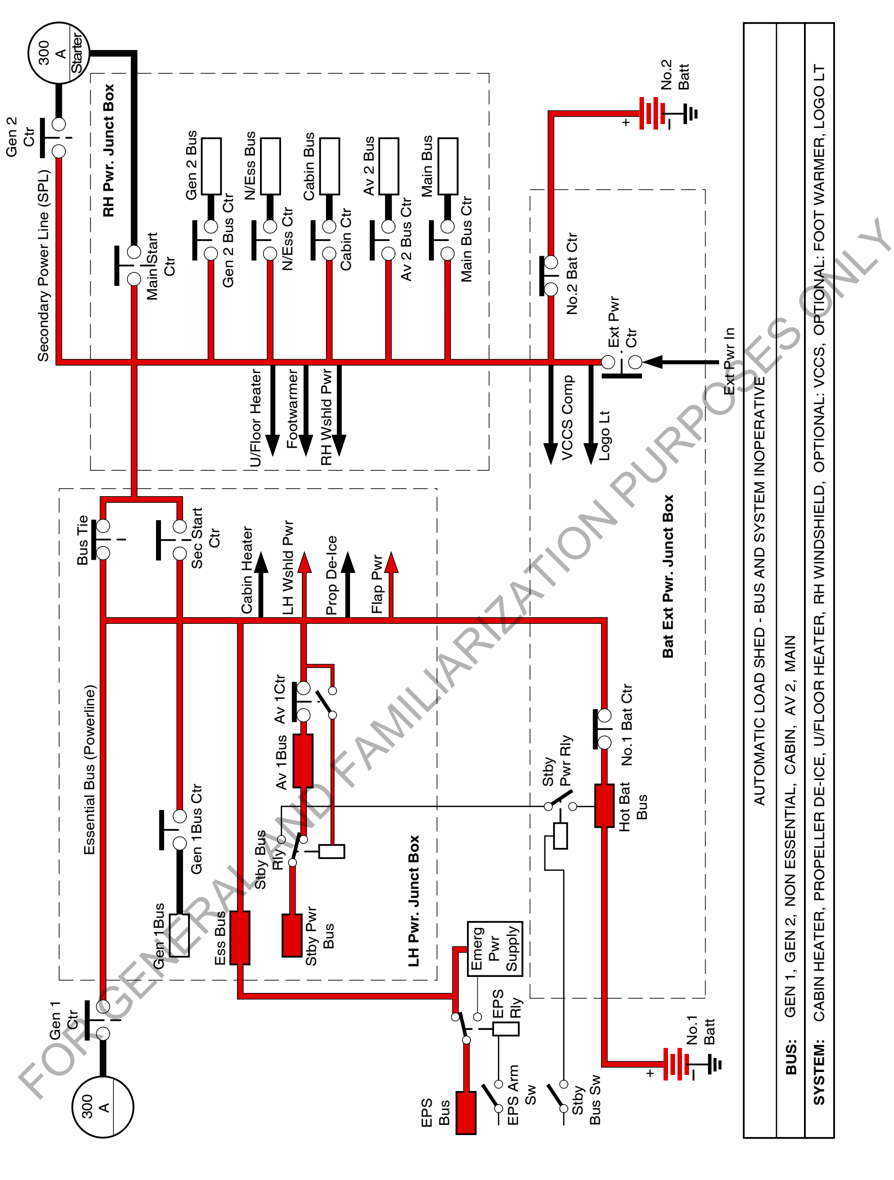
12-C-A15-00-0713-00A-043A-A



ICN-12-C-A150713-A-S4080-00028-A-002-01

Figure 7-13-7: PGDS Abnormal Operation Condition - Generator 2 Off-Line

12-C-A15-00-0713-00A-043A-A



ICN-12-C-A150713-A-S4080-00029-A-002-01

Figure 7-13-8: PGDS Emergency Operation Condition - Both Generators Off-Line

7-14 Lighting

7-14-1 Interior

Cockpit lighting consists of internally lit cockpit displays, controllers, switch panels, instrument panel, circuit breaker panel mounted floodlights, map lights, and a cockpit dome light.

7-14-1.1 Cockpit lights

Light selection and brightness is controlled by rotary switches located near the aft end of the center console. The rotary switches control and adjust the brightness of the pilots and copilots cockpit flood lights and lighted panels and also to select night or day brightness of the advisory lights. The cabin flood lights are controlled by a stacked rotary switch.

Separate intensity control of the Primary Flight Display(s) (PFDs), Multi Function Display(s) (MFDs) and Touch Screen Controller (TSC) is controlled by rheostats located on the Display Reversionary Control Panel. The cockpit dome light can be set to two preset intensities of 50% or 100% brightness. The Master Caution/Master Warning lights are on a fixed dim circuit. The map light switches are on each control wheel and the brightness is controlled by a separate rheostat.

7-14-1.2 Cabin lights

A switch located on the forward edge of the passenger door (accessible when open) will activate a timer for the cockpit overhead panel, cockpit dome light and the passenger door light. When this switch is pressed, the overhead panel, passenger door light and 50% cockpit dome light will be on for 45 seconds to facilitate night preflight boarding. The 50% cabin flood lights and the stair lights are also activated by this switch.

MSN 1720, 2001 - 2190:

- The 50% cabin flood lights operate for 45 seconds
- The stair lights operate for 290 seconds (approximately 4 minutes longer than the other lights).

MSN 2191 and up: The 50% cabin flood lights and the stair lights operate for 290 seconds (approximately 4 minutes longer than the other lights).

The passenger door light illuminates the cabin airstairs and the baggage area has an overhead light. The main cabin is equipped with an overhead flood light system that can be set to 50% or 100% brightness as selected by the cockpit switch. Individual reading lights are provided for each passenger seat and are controlled by a switch near each seat.

A baggage compartment light is operated by a push switch installed on the bulkhead trim adjacent to the cargo door. The light stays on for five minutes when the switch is pushed. For continued lighting the switch must be pushed again.

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7-14-2 Exterior

Exterior lighting consists of a combined ACL, navigation and tail light on each wing, a Light Emitting Diode (LED) landing light on each main landing gear, an LED taxi light on the nose landing gear and a wing inspection light mounted in the left fuselage forward of the passenger door. These lights are controlled by switches located on the EXTERNAL LIGHTS section of the overhead panel.

Red flashing LED beacon lights are installed on the top of the horizontal stabilizer fairing and on the lower center fuselage. They give recognition during ground operation and additional anti-collision protection in flight. The lights are controlled by a BEACON switch located on the EXTERNAL LIGHTS section of the overhead panel.

7-14-2.1 Recognition Lights

Pulse recognition lights are installed in the left and right forward outer flap fairings. They provide forward illumination during taxiing and enhance the conspicuity of the aircraft in the traffic pattern or enroute. The lights can be on continuously or when set to pulse the lights illuminate alternately left and right approximately 45 times per minute. Power for the light control unit is supplied from the Essential bus through the RECOG LTS circuit breaker. If the aircraft has an optional Collision Avoidance System installed, the pulse recognition lights are activated automatically when:

- The strobe lights are ON
- A Traffic Alert signal is received by the Collision Avoidance System.

The recognition lights will operate in Pulse Mode while the Traffic Alert is present. Once the alert is no longer active, the pulse recognition lights will revert to the previously selected mode.

7-14-2.2 Logo Lights

Optional logo lights can be installed under each side of the horizontal stabilizer. They provide illumination of the vertical stabilizer to show the owner’s logo. The lights are controlled by a LOGO switch located on the EXTERNAL LIGHTS section of the overhead panel. Power for the lights is supplied from the Battery and External Power Junction Box (BEPJB) through the LOGO LIGHTS circuit breaker. The BEPJB is installed in the rear fuselage. Each logo light has two filaments. On the ground with battery power, external power or one generator on line, only one filament in each light is illuminated. When both generators are online all four filaments will illuminate. If either generator fails in flight, all filaments are automatically switched off.

7-15 Environmental Control System

7-15-1 General

For the system controls and layout, refer to Fig. 7-15-1, ECS - Controls and Indications

The Environmental Control System (ECS) comprises:

- Air Cycle System (ACS)
- Auxiliary heaters
- Vapor Cycle Cooling System (VCCS), including Vent Fans (optional)
- Vent Fans (if VCCS not installed).

The ACS takes engine bleed air, reduces its temperature to that desired, and delivers it to the cabin air distribution system for pressurization and ventilation. The air cycle system cools a portion of the bleed air and then mixes it with hot bleed air to provide the correct temperature. A firewall shutoff valve can be closed to prevent contaminated air from entering the cabin in the event of an engine compartment fire.

One of the two auxiliary electrical heaters (cabin heater) is used to supplement the air cycle system during prolonged low temperature operations such as cruise at high altitude. The other heater (underfloor heater) heats the under-floor avionic and electrical equipment. Both heaters can also be used for pre-heating the cabin and under floor equipment on the ground when external power is connected.

The VCCS (when installed) is designed to operate on the ground from a 28 VDC ground power unit or aircraft electrical power when both generators are on. The electric motor driven system provides a means of precooling the cockpit and cabin areas prior to and during passenger boarding, providing comfort prior to engine start. The system will automatically be controlled during ground operations and in flight, based on temperature demand setting. It removes a large percentage of the moisture as well as dust and pollen particles from the cabin air. If the VCCS is not installed the two vent fans remain installed. The vent fans provide additional air circulation to the cockpit and cabin.

All environment control systems are controlled by an integrated ECS controller and temperature selections can be made and seen by the pilot on the systems Multi Function Display (MFD) ENVIRONMENT status window.

7-15-2 Air Cycle System

7-15-2.1 Description

The ACS consists of a flow control venturi, a heat exchanger, a cooling turbine, a temperature control valve, a water separator, high pressure shutoff valve, a primary shutoff valve, an air flow control valve and associated non return valves and control sensors.

The flow control venturi is sized to regulate flow and pressure.

The heat exchanger is an aluminum single pass, crossflow, plate and fin unit. The unit includes one charge air tap to assist the injection of water into the heat exchanger coolant intake. The evaporation of the water on contact with the heat exchanger surface increases the efficiency of the unit.

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The cooling turbine is a ball bearing turbo fan and consists of a radial turbine in a stainless steel assembly coupled to an axial flow fan. The turbine casing incorporates a containment ring.

The Temperature Control Valve (TCV) is three ported consisting of one inlet and two outlets and driven by a 28 VDC actuator. The valve body and rotating drum are aluminum. The actuator has gearing, limit switches, and magnetic brake to control the motor.

The water separator consists of an aluminum shell containing a coalescor and its support. The coalescor collects moisture from the passing air and forms large droplets which then enter a swirl section, where they are removed by centrifugal force. The separator has a spring loaded poppet valve which allows air to bypass the unit in the event of the coalescor becoming blocked.

The high pressure shutoff valve is solenoid operated and allows automatic selection between P3 and P2.5 compressor stages depending on flight condition to maintain the pressure schedule required for cabin pressurization.

A Firewall Shutoff Valve enables isolation of the system in emergency conditions such as an engine fire. Operation of the Firewall Shutoff Valve also opens a ram air scoop on the right fuselage underside which introduces ambient ventilation air through the distribution system. This is used in the event of smoke in the cockpit or cabin.

CAUTION
Due to the composite construction of the engine cowling and the possibility of toxic gases, the airplane ACS must be shutoff when a fire condition is suspected.

The air Flow Control Valve (FCV) at the cockpit outlet of the plenum chamber directs the ACS air to the cockpit and/or to the cabin, depending on the cockpit and cabin temperature settings.

Temperature data from the sensors in the cockpit and cabin is sent to the integrated ECS Controller. The integrated ECS Controller also receives signals from the control valves and duct temperature sensors.

The ACS has an ACS BLEED AIR switch on the switch panel located on the copilots lower left panel. The switch has the positions AUTO and INHIBIT.

7-15-2.2 Operation

During engine start (ECS switches in AUTO position) the Primary Shutoff Valve (PSOV) is automatically kept closed (no bleed air) and the auxiliary heaters and VCCS are inhibited. When the engine Ng reaches 62% the PSOV opens and bleed air becomes available.

Air is drawn from the P2.5 and P3 compressor bleed ports on the engine casing. This consists of a single port in the case of the P2.5 connection and two diametrically opposed ports for the P3 connections. The bleed air will be taken exclusively from the P2.5 port during normal operation. However, when the engine is at idle there is insufficient pressure to maintain cabin pressurization. When the P2.5 bleed air pressure falls below a specific value, a pressure sensor in the bleed air ducting opens the high pressure shutoff valve. This creates a back pressure on the non-return valve at the P2.5 port and closes the valve to shut off the P2.5 bleed. The bleed air then passes through the Primary Shutoff Valve and the Flow control venturi, which is sized to regulate the bleed air flow rate and pressure.

The air then passes on to the TCV. At the TCV the bleed air splits where variable amounts are either supplied to the Heat Exchanger or to a mix point downstream of the Cooling Turbine.

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The heat exchanger is cooled by ambient air drawn from a NACA intake in the airplane skin. Cooling airflow is provided by the Heat Exchanger Cooling Fan located downstream of the heat exchanger.

From the heat exchanger, the bleed air is passed to the Cooling Turbine. As the bleed air passes through the Cooling Turbine, its pressure is reduced to delivery pressure and its temperature is, in many cases, close to 0°C. The energy extracted from the bleed air is used to power the Heat Exchanger Coolant Fan which is mechanically linked to the turbine by a shaft.

The duct downstream of the turbine is the mixing duct where the now-cooled turbine exhaust air is mixed with uncooled bleed air directed from the other port of the TCV. The mixing proportions are controlled by the TCV. The TCV is an electrically operated three port valve with one inlet and two outlet ports. Depending on the selected temperature the TCV modulates to either pass air through or bypass the Heat Exchanger and Cooling Turbine. The TCV operation is controlled by the ECS Controller. The TCV will move to allow more bleed air to bypass the Cooling Turbine if the cabin temperature is less than desired. Conversely it will move to pass more air through the Heat Exchanger and Cooling Turbine if the temperature is greater than desired.

The temperature of the duct downstream is monitored by a temperature sensor and will limit the movement of the TCV as required to keep the duct temperature within the maximum and minimum temperature limits.

From the mixing duct the conditioned air passes through a water separator. Moisture is removed from the conditioned air and drawn to the heat exchanger and sprayed into the heat exchanger intake. The conditioned air passes through the Firewall Shutoff Valve and the non-return valves to the cabin for distribution. The non-return valves prevent sudden depressurization in the event of a loss of cabin air supply.

The air enters a small plenum where it is distributed to the cabin and through the FCV controlled by the ECS Controller to the cockpit. Cockpit air is directed to outlets at the crews feet and adjustable outlets adjacent to the instrument panel. Air to the cabin is introduced through fixed outlets placed at floor level along both sides of the cabin.

The integrated ECS Controller adjusts the position of the TCV and FCV to give the warm/cold air mix for the system default temperature of 21 °C, or that set by the pilot, for the cockpit and cabin.

For a takeoff at limited power (hot and high) the ACS BLEED AIR switch can be set to INHIBIT and after takeoff the ACS BLEED AIR switch can then be set to AUTO.

The ACS will automatically shut down when the engine Ng is less than 58%.

Refer to ECS Operation for further information on the operation and for the control of the ACS.

7-15-3 Auxiliary Heating

7-15-3.1 Description

The system comprises two 28 VDC heating units each equipped with a 75 mm mixed flow fan. Each unit is cylindrical in form and contains two heating elements producing 1,625 kW/unit. The system therefore produces 3,25 kW in addition to that of the air cycle system. The units are situated under the cabin floor, one is dedicated to heating the cabin and the other to heating the under floor avionics bay. The cabin heater is supplied 28 VDC power from the powerline (left Power Junction Box) and the under floor heater is supplied from the secondary powerline (right Power Junction Box).

The under floor heater is located between frames 21 and 22. The fan scavenges its air supply from the general under floor zone, through a wire mesh inlet grill, and passes it over the heating element where its temperature is raised. The air is then distributed along the length of the under floor avionics bay by way of a longitudinal distribution duct.

The cabin heater is located between frames 29 and 30. The fan draws its air supply from the cabin, through a grill in the rear floor step. The heated air is then ducted directly to the ECS distribution duct in the right cabin sidewall and augments the ACS airflow. The airflow created by the cabin heater is effective in equalizing the temperature throughout the cabin.

Both heater units are equipped with an internal thermal protection system, which isolates the heater when the element temperature overheats. In the event of an over heat, the fans continue to run and the relevant CABIN HTR circuit breaker (located on the left PJB) or U/F HEATER HTR circuit breaker (located on the right PJB) will trip. The heater will remain isolated until the temperature falls within the heater allowing the circuit breaker to be reset by the pilot.

The power for the heater element circuits is interrupted when the landing gear moves or the cooling system (VCCS) is operating.

The heating capacity of the system is reduced while the engine is operating at P3 bleed in flight. The cabin heater and fan are inhibited while airborne and P3 bleed is extracted, the under floor heater and fan remain operating. While on the ground (WOW valid) the cabin heater and fan continue to operate when P3 is extracted. During engine start and for 10 seconds following engine start both heaters and fans are inhibited.

The function of the power inhibits are fully automatic and require no pilot input. Thermal protection, once tripped, will require pilot action to reset.

There is an ELECTRICAL HEAT/COOL switch on the switch panel located on the copilots lower left panel. The switch has the positions AUTO and INHIBIT.

7-15-3.2 Auxiliary Heating Operation

When the system is in operation the under floor fan runs continuously and the heater element is switched on when the under floor sensor reads below +5 °C and is switched off above +11 °C. The cabin fan runs continuously when the cabin heater is in operation as demanded by the ECS Controller. The cabin heater function is to automatically supplement the ACS cabin heating supply during prolonged low temperature operations such as cruise at high altitude.

Refer to ECS Operation, for the control and operation of the auxiliary heating system.

7-15-4 Vapor Cycle Cooling System

7-15-4.1 Description

A refrigerant gas is the media which absorbs heat and rejects heat from the cabin air. By continuous recirculation of cabin air, heat is absorbed in the evaporator modules and transferred to the outside through the system condenser.

The system is provided with safety interlock devices to prevent component damage and/or excessive power drain from the aircraft electrical system. The evaporator modules are equipped to prevent coil icing at all ambient conditions.

Cabin temperature control is by varying the airflow through each evaporator module rather than cycling the refrigerant compressor. If required the airflow can be reduced by the flight crew. The cabin is cooled by air ducted from the two evaporators (vent fans) located just forward of the aft pressure bulkhead and exhausted through adjustable individual outlets and a series of permanent spray outlets (30 on each side) down the left and right sides of the cabin overhead panel.

The cockpit is cooled by individual outlets located in the overhead panel. These outlets receive air ducted from the two evaporators (vent fans) in the cabin.

There are ELECTRICAL HEAT/COOL, FANS VENT and MAX switches on the switch panel located on the copilots lower left panel. The ELECTRICAL HEAT/COOL and MAX switches have the positions AUTO and INHIBIT. The FANS VENT switch has the positions AUTO and LOW.

7-15-4.2 Operation

When the system is activated, an electric motor drives the compressor at constant capacity which compresses the refrigerant gas to high pressure. The hot, high pressure gas then passes through the condenser coil where it is cooled and condensed into a warm liquid at constant pressure. The heat removed from the fluid is exhausted overboard through a vent in the right rear tail section aft of the pressure bulkhead. The warm liquid from the condenser is then routed into a receiver-dryer container where the liquid and any remaining gas are separated and any moisture in the liquid is absorbed. The warm dry, high quality liquid is then routed to the evaporator module expansion valve where the high pressure liquid is expanded to a low pressure. The large expansion process creates a super cool liquid which passes through the evaporator coil and absorbs heat from the warm cabin air. The cooled air is returned to the cabin. The gas, now warm, is returned to the compressor to repeat the cycle.

Moisture removed from the cabin air by each evaporator drains into a small holding tank below the rear baggage floor panel. The water is held in the tank until the cabin differential pressure is low enough for the tank outlet valve to open allowing the water to drain overboard.

The VCCS is controlled by the integrated ECS Controller and the operation is based on defined hysteresis band between the sensed cockpit/cabin temperatures and those set by the pilot. When the selected cabin temperature demands the cabin to be cooled the ECS Controller will select the appropriate fan speed and the VCCS on. For a small difference between the sensed and selected temperatures the vent fans will be set to low. For a larger difference the vent fans will be set to high and for a large temperature difference the vent fans will be set to MAX. If desired the pilot can set the FANS - VENT switch to LOW or the MAX switch to INHIBIT at any time to reduce noise and airflow.

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The vent fans blow cool air into the left and right overhead ducts. The overhead ducts are equipped with permanent spray outlets providing a continuous flow of cool air to the cabin. Individual outlets in the overhead panel are adjustable for local temperature control at each seat location.

When the VCCS is operating, the GEN 2 DC Indication will increase by approximately 80 amps for compressor and evaporator fans operation.

A temperature switch located in the rear fuselage prevents VCCS operation at ambient temperatures below -15 °C.

Refer to ECS Operation for the control and operation of the VCCS.

7-15-5 ECS Operation

The normal operation of the ECS is with all the switches in the AUTO position and with the adjustable air outlets open at the overhead and side positions. The ECS Controller then automatically controls the cockpit and cabin air temperatures as set by the pilot on the systems MFD ENVIRONMENT status window. The cockpit and cabin temperatures can be set by the bezel buttons, with the Cursor Control Device (CCD) or the Touch Screen Controller (TSC). The primary method of temperature adjustment is by pressing the bezel button adjacent to the CKPT TEMP or CAB TEMP soft key which then displays the up/down arrow legends. Press the adjacent up or down bezel button to move the slider bar left to a colder or right to a warmer position. Due to the system design only a temperature difference of up to a maximum of 5 °C between the cabin and cockpit can be set. After more than 5 °C movement of one slider bar the other slider bar will also move in the same direction. Temperature selection can be from full heating (both slider bars fully right) (ACS air to maximum allowable temperature and auxiliary heater on, VCCS and fans off) to full cooling (both slider bars fully left) (ACS air to minimum allowable temperature and auxiliary heater off, VCCS and fans on). The actual cockpit, cabin and underfloor (optional) temperature readings are displayed at the bottom left of the ENVIRONMENT status window.

After temperature adjustments have been made with the temperature slider bar, allow the system to stabilize for a few minutes and adopt the new setting. During descent, the system has a tendency to overheat the cockpit slowly, therefore the recirculation fans should be allowed to blow fresh air out of the overhead outlets into the cockpit. If the system is unable to reach the preselected temperature values, the aircraft could be operating in high ISA deviation temperatures outside the system performance capabilities or one of the system components may have failed.

The ECS Controller receives data signals from the:

- ACS TCV and FCV position, duct temperature conditions
- Auxiliary heater power supplies and thermal safety switch position
- VCCS compressor motor and the vent fan positions
- Temperature sensors in the cockpit, cabin and underfloor.

The ECS Controller sends and receives status signals to and from the Modular Avionics Unit (MAU) for the control switches and systems MFD ENVIRONMENT status and Crew Alert System (CAS) windows. It will also send a caution signal to the CAS window in the event of an ACS fault.

In the auto mode the ECS Controller adjusts the position of the ACS TCV and FCV to give the warm/cold air mix for the cockpit/cabin temperatures set on the ENVIRONMENT status window. If additional heating is required the cabin auxiliary heater and fan will be automatically selected on. If additional cooling is required the VCCS and fans will be automatically selected on.

The ECS Controller monitors the cabin underfloor temperature and will automatically select the underfloor heater on and off as necessary.

The VENT FANS can be selected from AUTO to LOW at any time with the ELECTRICAL HEAT/COOL switch in the AUTO mode. THE ACS BLEED AIR, ELECTRICAL HEAT/COOL and MAX can be selected off by setting the switches to INHIBIT.

The auxiliary heaters and VCCS can be operated in an ECS Ground Mode for preheating or cooling the aircraft before engine start. With the aircraft on ground and the engine not running, and with a 28 VDC external power supply connected and powered on the ECS Ground Mode can be entered by changing the CKPT or CAB TEMP selection with the TSC or by pressing the bezel buttons adjacent to the soft keys on the ENVIRONMENT status window.

7-15-6 Indication / Warning

Cockpit, cabin and underfloor (with optional cold weather kit) air temperatures are displayed in the ENVIRONMENT window of the systems MFD.

The CAS window on the systems MFD displays the following CAS messages for the ECS (refer to Table 7-15-1):

Table 7-15-1: ECS - CAS Messages

CAS Message	Description
ACS Low Inflow	Caution will illuminate when: – The ACS is automatically shutdown. Overpressure and overtemperature switches are installed to monitor the ACS system. If pressures greater than 40 psi are sensed in the bleed air line downstream of the flow control venturi, temperatures greater than 290°C in the bleed line upstream of the Primary Shutoff Valve, temperatures greater than 105°C are sensed in the air line downstream of the water separator, or if the Firewall Shutoff Valve is closed, the ACS will automatically shutdown. – The CPCS is not able to achieve the required cabin pressure (due to ACS switched to INHIBIT, or insufficient ACS airflow, or excessive cabin air leakage) the Cabin Pressure Control Unit will detect a “ACS Low Inflow”.
ECS Fault	Caution will illuminate when the ECS Controller has detected a critical fault or if the ECS Controller has lost data communication with the MAU.

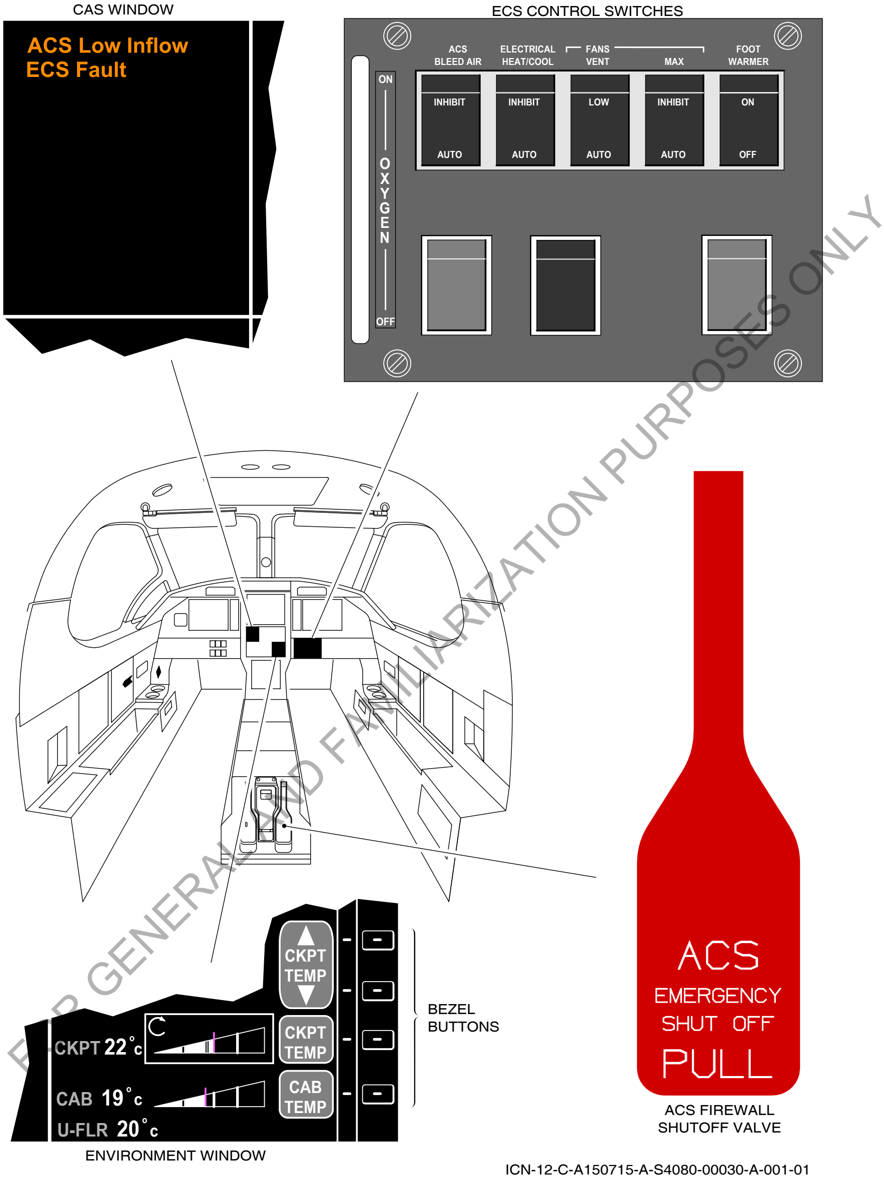

Figure 7-15-1: ECS - Controls and Indications

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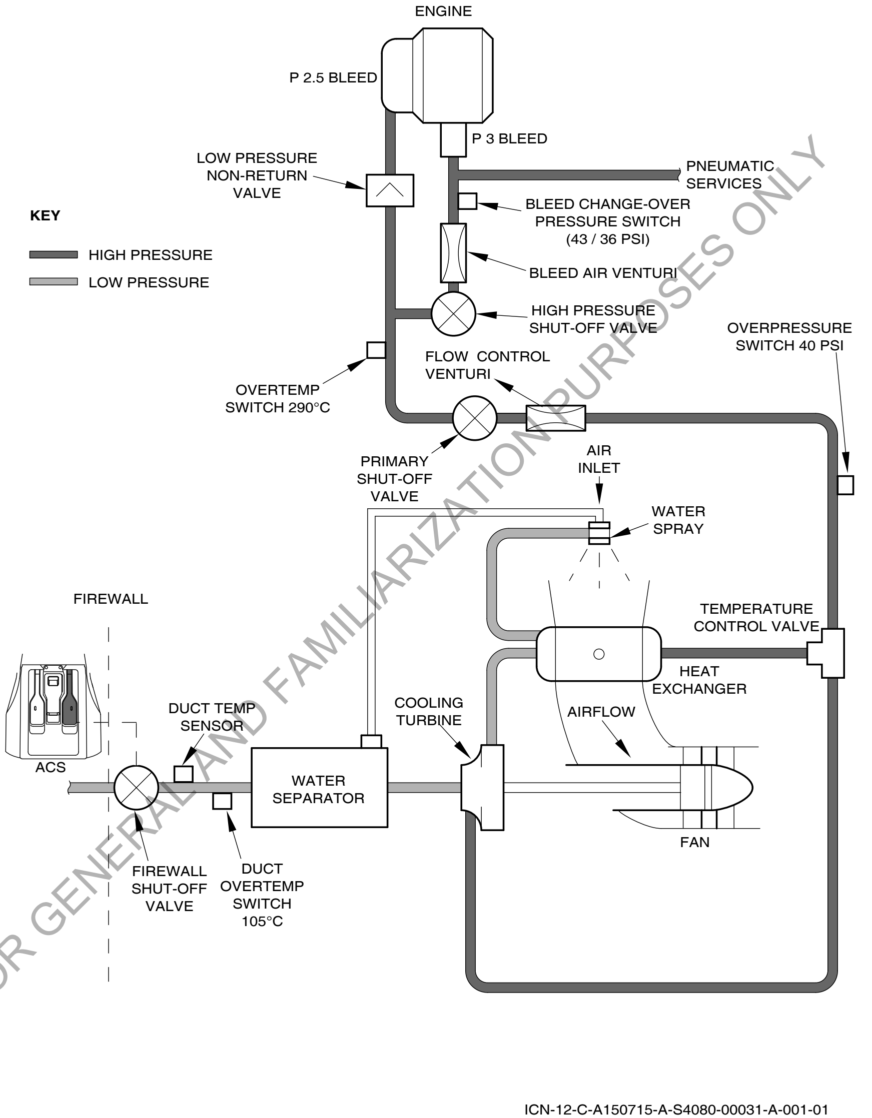

Figure 7-15-2: ECS - Air Cycle System (ACS)

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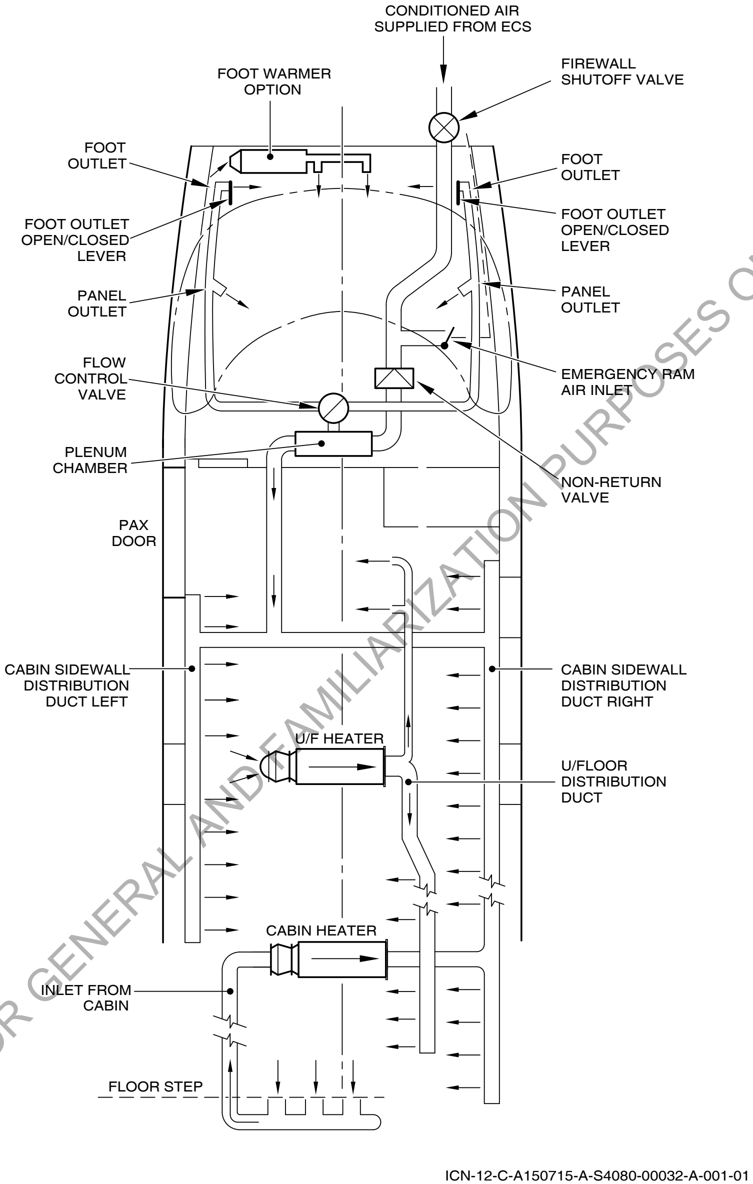

Figure 7-15-3: ECS - Auxiliary Heaters and Distribution Ducting

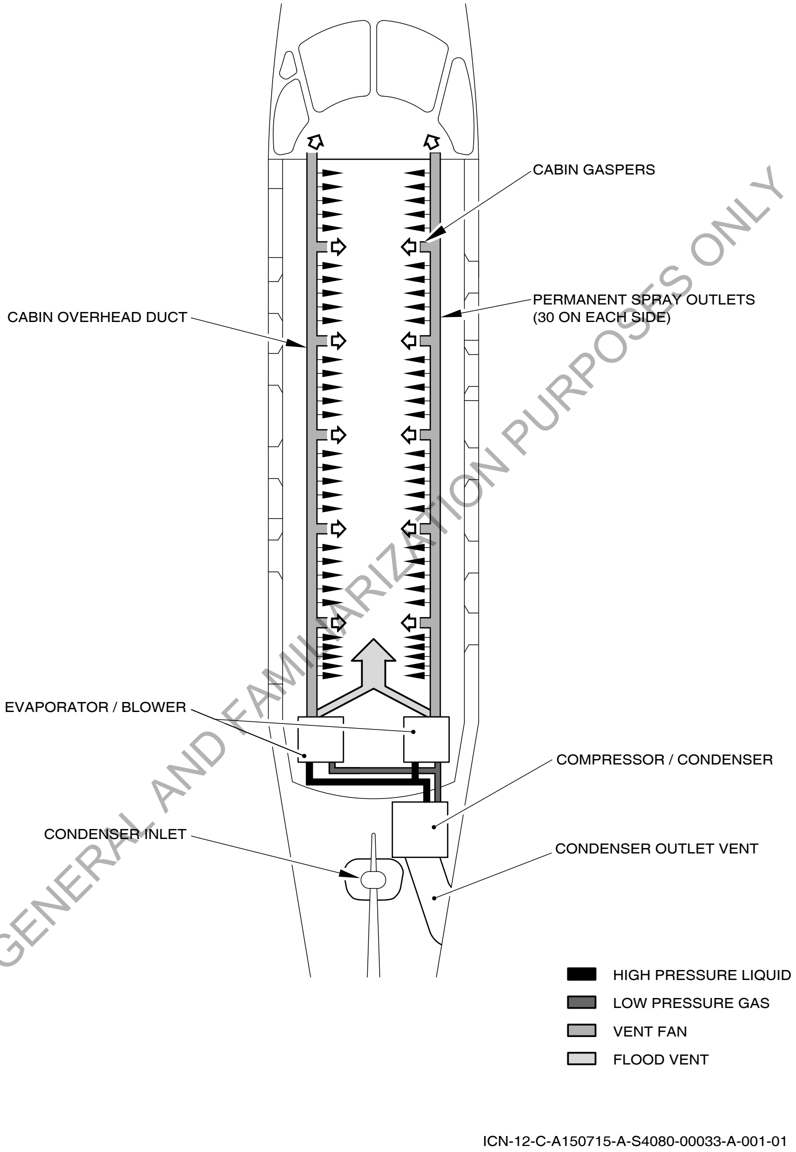

Figure 7-15-4: ECS - Vapor Cycle Cooling System (VCCS)

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7-16 Foot Warmer System (Optional)

7-16-1 Description

The foot warmer system (when installed) comprises a 28 VDC 1kW heater installed forward above the cockpit floor. Ducting connects the heater to foot outlets at the pilot and copilot position. A FOOT WARMER switch is installed on the switch panel located on the copilot's lower left panel. It has the positions ON and OFF. Power is supplied from the secondary powerline to the heater relay and from the non-essential bus through the FOOT WARMER circuit breaker to the switch.

7-16-2 Operation

The foot warmer system operates from the aircraft electrical power or from external power. When the FOOT WARMER switch is set to ON, 28 VDC is supplied to the heater relay. The relay is energized and the heater and fan operates. The heated air is sent by the fan to the pilot and copilot foot outlets. If the temperature of the heater becomes too high the thermal protection switch operates and de-energizes the heater relay.

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7-17 Cabin Pressure Control System

7-17-1 General

For the system controls and functional diagram, refer to Fig. 7-17-1, CPCS - Controls and Indications and Fig. 7-17-2, CPCS - Functional Diagram.

The Cabin Pressure Control system (CPCS) comprises:

- A dual channel Cabin Pressure Electronic Control and Monitoring Unit (ECMU)
- An electrically driven Outflow Valve (OFV)
- A pneumatic safety Pressure Relief Valve (PRV)
- Two Negative Pressure Relief Valves (NPRV).

The systems Multi Function Display (MFD) has an ENVIRONMENT status window that allows the pilot to monitor and control the CPCS. Manual control of the CPCS functions for emergency operation are provided on the CPCS switch panel located on the copilots lower left panel.

The ECMU controls the rate of exhaust of the air that the Air Cycle System (ACS) supplies as conditioned air to the cockpit and cabin. It keeps cabin air pressure between safe and comfortable limits for the passengers and crew, and the aircraft structure.

Operation of the CPCS is fully automatic during normal operation. A semiautomatic mode called ‘Low Cabin’ is available, whereby the pilot can use Landing Field Elevation (LFE) as the target cabin altitude. The CPCS will then maintain the selected cabin altitude (as LFE) up to a maximum pressure differential of 5.75 psi.

7-17-2 Description

The ECMU is a dual channel controller and is installed in the under floor pressurized area. The ECMU channels sense cabin pressure and receive aircraft pressure altitude and rate of climb data from the Modular Avionics Unit (MAU). The cabin altitude, cabin rate of climb and cabin rate of descent and differential pressure are all automatically controlled by the ECMU controlling the exhaust airflow from the outflow valve. The cabin internal pressures and airflow rates are controlled within limitations for safe and comfortable flight. A “Low Cabin” mode can be used for more comfort (cabin at lower pressure altitude) for flight up to intermediate cruise levels. Also, panoramic flights (frequent altitude changes) will be more comfortable using the “Low Cab” mode, due to a constant rather than continuously adjusting cabin pressure.

In the event of a detected fault in the AUTO channel, **CPCS FAULT** will be annunciated and the pilot must switch the ECMU to the MANUAL channel. The AUTO channel of the ECMU is supplied with 28 VDC from the ESS Bus and the MANUAL channel is supplied from the EPS Bus.

The OFV has a circular butterfly plate that rotates in the valve body. The butterfly valve is operated by an actuator assembly which has two electrical motors and a gearbox. Each electrical motor is connected to and controlled by one of the two channels in the ECMU. The OFV is installed on the cabin forward pressure bulkhead and exhausts air out through louvers in the equipment bay doors.

The PRV is a pneumatic poppet type control valve. The PRV contains a positive pressure relief metering section that senses differential pressure between the cabin and atmosphere. If the differential pressure exceeds the relief set point the valve will open to regulate the cabin to atmosphere differential pressure to below the maximum value. The PRV also has a negative pressure relief function and will open to allow atmosphere air to enter the cabin to prevent the atmosphere to cabin differential pressure from exceeding a given limit. The PRV is pneumatically actuated and is completely independent of the OFV and ECMU.

The two NPRV are nonreturn valves and are located in the rear pressure bulkhead. In case of negative pressure conditions they provide a second means to relieve cabin pressure.

The CPCS switch panel is located on the copilots lower left panel for control of the system. There is a guarded SYSTEM MODE switch with the positions AUTO and MANUAL, and a MANUAL CONTROL switch with the positions DESCENT and CLIMB.

There is also a guarded CABIN PRESSURE switch with the positions AUTO and DUMP. In case of emergency the switch can be selected to DUMP.

When the CPCS SYSTEM MODE switch is in the AUTO position, the ENVIRONMENT window on the systems MFD will show a digital display for cabin altitude, differential cabin pressure, cabin altitude rate of change and LFE. The LFE can be automatically provided when the destination airport had been entered in the Flight Management System and the field elevation for the destination airport is in the data base. The pilot can manually enter the LFE and/or switch to a “low cabin” fixed cabin pressure submode (Refer to Section 4, CPCS Low Cabin Mode Operation). When the CPCS SYSTEM MODE switch is selected to MANUAL no information associated with LFE will be displayed.

If the LFE data to the CPCS becomes unavailable or invalid (e.g. due to an FMS failure or a MAU interface error), the CPCS uses the default LFE of 10000 ft to determine the target cabin altitude. Therefore, the flight crew must manually reselect the LFE early enough to prevent over or under pressurization. Alternatively, the CPCS SYSTEM MODE switch may be selected to MANUAL for manual control of the cabin altitude.

In the event of a CPCS malfunction, warning and caution messages will be shown in the Crew Alerting System (CAS) window of the system Multi Function Display.

7-17-3 Operation

The CPCS automatically controls the cabin pressure to:

- Depressurize the cabin on the ground to allow for door opening and crew/passenger entry and exit
- Pre-pressurize the cabin during takeoff and landing to prevent pressure bump excursions
- Control the cabin altitude and rate of change during flight for passenger comfort
- Prevent the cabin to atmosphere differential pressure limit being exceeded and the cabin altitude from exceeding 10,000 feet for normal operation
- Close the OFV to provide an automatic altitude limiting function if the cabin exceeds 14,800 ft, automatic altitude limiting function.

The normal mode of operation is with the switches in the AUTO position. The CPCS Controller then, using data from the MAU, automatically controls the cabin air exhaust to optimize the cabin pressure comfort.

During climb the cabin pressure is controlled depending on aircraft altitude. During descent, the cabin pressure is controlled depending on aircraft altitude, rate and LFE.

The following table helps to understand the targeted cabin pressure altitudes for the automatic controlled scheduling in climb and descent mode. Refer to Table 7-17-1 below.

Table 7-17-1: CPCS - Altitude Target Values

A/C Altitude (ft)	Climb, Target Cabin Alt (in Flight)	Descent, Target Cabin Alt (in Flight)
30000	10000	10000
29000	9770	9770
28000	9074	9074
27000	8452	8452
26000	7890	7890
25000	7379	7379
24000	6908	6908
23000	6470	6470
22000	6060	6060
21000	5676	5676
20000	5315	5070
19000	4969	4447
18000	4633	3813
17000	4306	3170
16000	3989	2518
15000	3680	1857
14000	3379	1190
13000	3087	512
12000	2802	-175
11000	2523	-868
10000	2252	-1300
9000	1988	-1300
8000	1729	-1300
7000	1477	-1300
6000	1230	-1300
5000	989	-1300
4000	752	-1300
3000	520	-1300
2000	293	-1300
1000	69	-1300
0	-150	-1300
-2000	-2000	-2000

Note

The table shows the target values throughout the full operating range. For takeoff and landings, different control routines are followed to match the appropriate field elevation.

If the aircraft descends more than 1,300 ft (from previous stable altitude), the CPCS goes into so-called descent mode, for which the cabin is controlled towards the ELEV pressure altitude. If the aircraft climbs more than 1,300 ft, (from previous stable altitude), the CPCS goes into so called climb mode, for which the cabin is controlled depending on aircraft altitude.

Before flight the pilot enters the Landing Field in the Flight Management System (FMS) and barometric correction on the Primary Flight Display (PFD), this information is then sent via the MAU to the CPCS. The Airport Identifier and Landing Field Elevation will be shown with an FMS ELEV legend in the ENVIRONMENT window. The CPCS also receives data from the MAU ref aircraft altitude, weight on wheels, takeoff power and doors closed. Ground mode Built-in Test (BIT) is continuously running on ground to make sure the system is ready to perform control for the next flight. On ground the OFV is controlled to full open.

If Landing Field information is not available from the FMS, the LFE can be set manually via the Touch Screen Controller or by the bezel button adjacent to the ELEV soft key on the systems MFD ENVIRONMENT status window. The LFE will be shown with an ELEV legend in the ENVIRONMENT window. If incorrect data is entered a DATA MISMATCH legend will be shown.

The Touch Screen Controller or the bezel button adjacent to the CAB MODE soft key can be used to select Low Cab mode. The green LOW CAB annunciator will be shown in the ENVIRONMENT window. The CPCS will control the cabin pressure to the selected pressure altitude (LFE) as long as the max Δ px (5.75 psid) is not exceeded.

During takeoff with ACS inflow air present, the OFV is moved to a more closed position and then changes its position to control the cabin pressure rate of change.

In case of an aborted takeoff the cabin will be automatically depressurized.

During climb the cabin altitude is scheduled to achieve 10,000 feet when the aircraft reaches 30,000 feet.

If a takeoff occurs at an airfield greater than 10,000 feet, the cabin is commanded to 10,000 feet or below just after takeoff at a fast rate so that the cabin altitude reaches 10,000 feet prior to the aircraft exceeding 25,000 feet. This is High Airfield Operation and the green HI FIELD annunciator will be shown in the ENVIRONMENT window until the aircraft climbs to above 25,000 feet.

When the aircraft reaches its cruising altitude and levels off, after a short period of time the commanded cabin pressure is held to a constant value for maximum stability. The CPCS has an automatic altitude limiting function that closes the OFV if the cabin pressure exceeds 14,800 feet.

During descent the cabin altitude is commanded towards the landing field elevation, limited by the differential pressure. If the landing field elevation exceeds 10,000 feet the cabin altitude is limited to 10,000 feet until the aircraft descends through 25,000 feet. The green HI FIELD annunciator will come on when descending through 25,000 feet and will remain on. On the ground, above 10,000 feet, the green HI FIELD annunciator will also come on.

A landing is made with slight differential pressure to reduce cabin pressure transients just before and during touchdown. Once landed the OFV is slowly moved to the open position to fully depressurize the cabin as the aircraft is taxiing.

The actual cabin altitude, cabin altitude rate of change and cabin to atmosphere differential pressure is displayed in the ENVIRONMENT window of the systems MFD. In the event of system malfunctions the ECMU will send warnings and caution alerts to the CAS. Procedures to clear CPCS CAS messages are given in Section 3, Cabin Environment Failures.

The cabin pressurized warning monitor in the Monitor Warning System continually monitors the cabin pressure when the aircraft is on the ground. If the cabin does become pressurized on the ground or does not depressurize on landing with the SYSTEM MODE switch selected to MANUAL, the monitor warning function will give a CAB PRESS alert on the PFD and an aural “Cabin” message. Pilot actions required in this event are given in Section 3, Cabin Pressure - 3-17-01.

In an emergency manual control can be selected by setting the SYSTEM MODE switch to the MANUAL position. This disables the automatic mode completely and an amber CPCS MANUAL CTRL status message will be shown at the top of the ENVIRONMENT window of the systems MFD. The MANUAL CONTROL CLIMB DESCENT switch becomes active. This switch is spring loaded to the center position, and can be held to the CLIMB or DESCENT position which then sends a signal to both ECMU channels and OFV drive motors to close or open the OFV. There will be a time delay between the switch operation and the change to the cabin altitude. Therefore, when setting a certain cabin altitude by use of the CLIMB/DESCENT switch, the switch should be pushed intermittently and cabin altitude monitored in order to avoid over or under shoots. If one of the ECMU channels fails the other channel will still operate the OFV. Once the CLIMB/DESCENT switch is released, no open or close command is given to the OFV. The ECMU altitude limit function will override the manual control by closing the outflow valve once the cabin altitude exceeds 14,800 ft.

Selection of the CABIN PRESSURE switch to the DUMP position will command the OFV to the fully open position with the effect of fully depressurizing the aircraft. DUMP will override the ECMU altitude limit function and will open the outflow valve at any cabin altitude.

If the Passenger oxygen control valve selector is set to AUTO, the CPCS will automatically select the passenger oxygen system on at a cabin altitude of 13,500 feet (or at a higher set point for high airfield operations). With the passenger oxygen system pressurized the green PAX OXY annunciator will be shown in the ENVIRONMENT window of the systems MFD.

7-17-4 Indication / Warning

Indications of the actual cabin altitude, cabin altitude rate of change and cabin to atmosphere differential pressure are displayed in the ENVIRONMENT window of the systems MFD. Under normal operating conditions the CPCS indications are given in white. If a cabin altitude or cabin pressure out of limits condition arises the CPCS indication will change to yellow for a caution or red for a warning condition with the relevant CAS caution or warning. All sensing, indications and warning outputs are created by the ECMU.

The CAS window of the systems MFD displays the following warnings (red) and cautions (amber) for the CPCS (refer to Table 7-17-2):

Table 7-17-2: CPCS - CAS Messages

CAS Message	Description
Cabin Pressure	Cabin pressure differential exceeds 6.35 psi or drops below -0.25 psi
Cabin Altitude	Cabin altitude is above 10,500 feet or above 14,200 feet in High Airfield Operation Secondary backup warning provided by the avionics based on ECMU input detects a cabin altitude above 14,800 feet
Cabin Pressure	Cabin pressure differential is greater than 6.0 psi
ACS Low Inflow	Low airflow into cabin, or excessive cabin air leakage (OFV closed in the air, cabin altitude rate error more than 250 ft/min) (generated by the MAU)
CPCS Fault	ECMU AUTO channel has failed. Automatic control no longer available

The ENVIRONMENT window of the systems MFD displays the following annunciations (refer to Table 7-17-3) when:

Table 7-17-3: CPCS - Annunciations on Environment Window

Annunciation	Flight phase	Description
HI FIELD	Ground or Landing	The CPCS detects the aircraft is on the ground above 10,000 feet and the CPCS is in Ground or Landing mode
	Climb	Takeoff from airfield greater than 10,000 ft and aircraft altitude less than 25,000 ft and the CPCS is in Climb mode
	Descent	Selected landing field elevation is more than 10,000 ft and aircraft altitude less than 25,000 ft and the CPCS is in Descent mode
PAX OXY		Passenger oxygen system is pressurized
LOW CAB		Low cabin mode has been selected

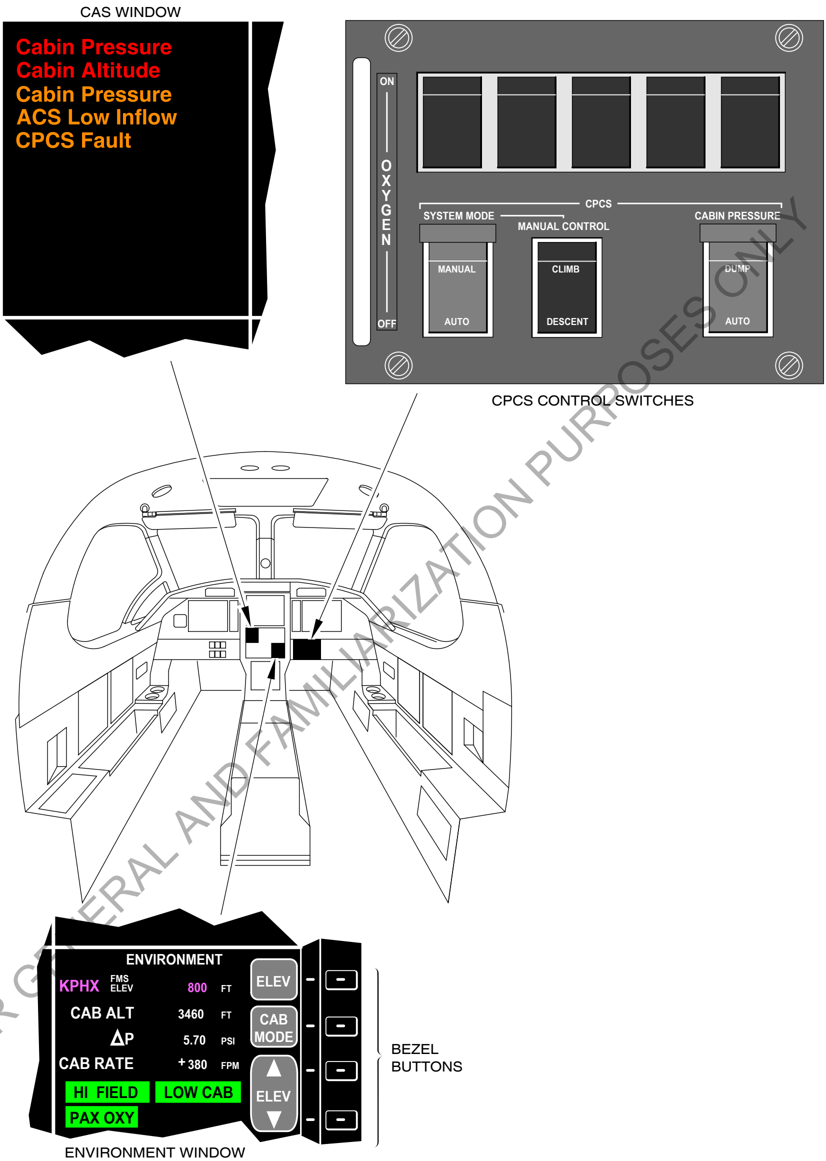

Figure 7-17-1: CPCS - Controls and Indications

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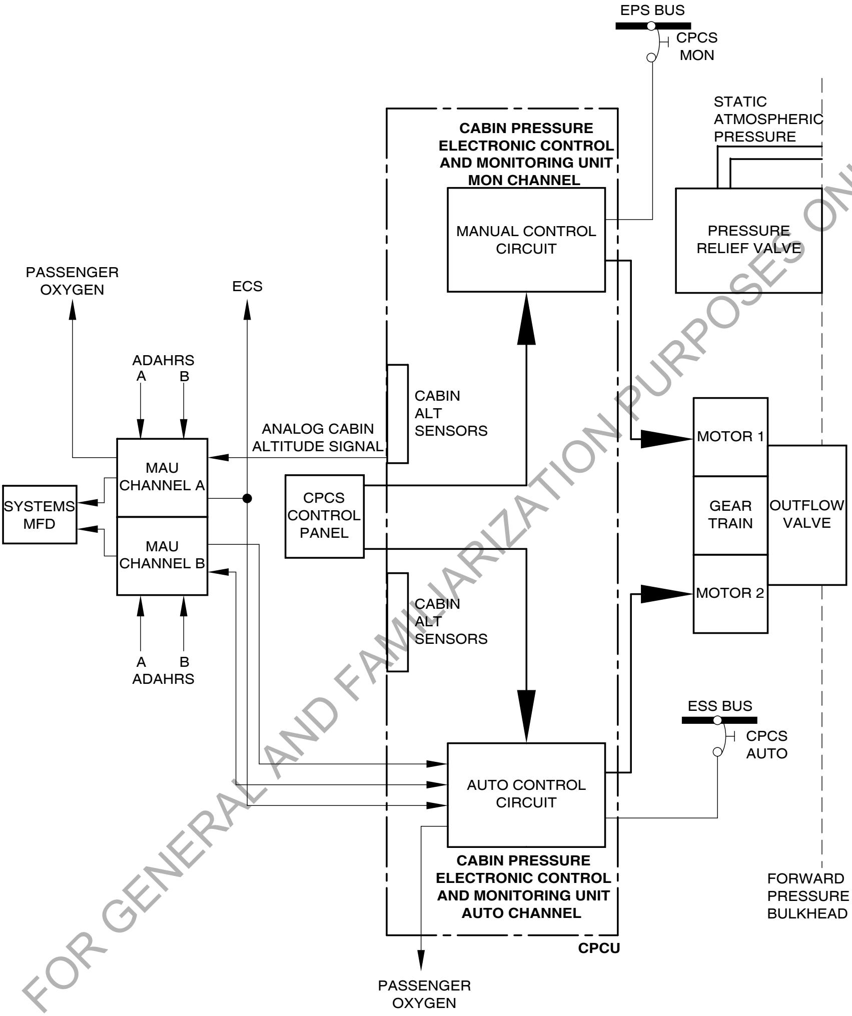

Figure 7-17-2: CPCS - Functional Diagram

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7-18 Oxygen System

7-18-1 General

The aircraft is equipped with an emergency oxygen system for use by the crew and passengers in the event of contaminated air being introduced into the cabin or a loss of pressurization with a rapid descent to lower altitudes.

The pilot and copilot masks are supplied with quick-donning diluter-demand masks which are permanently connected to outlets in the cockpit sidewalls.

A constant flow mask is provided at each passenger seat location in the cabin. In the Corporate Commuter interior configuration the nine masks must be connected to the bayonet outlets in the cabin sidewall before flight by the flight crew for flights above 10,000 ft. In the executive interior configuration the masks (the number is dependent on the interior variation) are located in boxes in the arm rests and are permanently connected for all flights. No connection action is required by the flight crew or passengers.

7-18-2 Description

An oxygen cylinder, made of composite material, is located in an external compartment in the right side of the fuselage forward of the main wing (outside the pressure area) from which the oxygen system is serviced and replenished (Refer to Section 8, Servicing, for servicing instructions).

Attached to the cylinder head is an isolation valve to permit cylinder removal and installation. The valve is connected by a push pull cable to a handle in the cockpit allowing the system to be isolated while the aircraft is on the ground. The valve is connected to the aircraft supply, ground charging valve, the contents pressure gauges and the overpressure relief valve.

Two gauges are provided, one in the service bay and one on the left cockpit side panel forward of the Test Panel. Overpressure protection is provided by a relief valve in the form of a green rupture disc located in the fuselage skin above the service bay door. This disc is designed to rupture at 2775 +50/-0 psi, discharging the cylinder contents overboard. Disc integrity is checked during the preflight inspection. If found ruptured and the contents pressure gauge indicates zero, proper maintenance must be performed on the system before flights above 10,000 ft altitude.

When filled, the storage cylinder should be charged to 1841 psi (126.9 bar) at 20 °C, with a minimum pressure of 265 psi (18.3 bar) for proper flow to the masks. A pressure reducing valve, adjacent to the oxygen cylinder reduces the oxygen pressure to a nominal 70 psi (4.8 bar), prior to entering the cabin. This is for safety reasons and to avoid excessive flow through the masks.

Two crew full-face masks of the diluter demand type are located in boxes on the front of the cockpit bulkhead behind each crew member. They are permanently connected to outlets in the cockpit sidewalls. Each mask which is of the diluterdemand type, is equipped with a microphone and an ON/OFF - AIRMIX/100% selector valve. Oxygen is provided to the crew masks at all times regardless of the PASSENGER OXYGEN selector position. Each mask has a PRESS TO TEST button and a flow indicator that shows when proper pressure is supplied to the mask. Turning the PRESS TO TEST button counterclockwise to the emergency position will supply 100% oxygen at a slight overpressure.

The main OXYGEN lever is mounted to the copilots lower left panel. It is connected by a push pull cable to the isolation valve on the cylinder head. While the aircraft is on ground the lever is normally in the OFF position isolating the cylinder from the system and preventing prolonged leakage from the crew masks. Before engine start and as the first action associated with the oxygen system, the lever should be moved to the ON position.

The PASSENGER OXYGEN selector, located in the left cockpit sidewall, has three positions to control the operation of the passenger distribution system. The OFF position stops the flow to the passenger outlets. The ON position permits flow to the passenger masks. The AUTO position will permit automatic pressurization of the passenger oxygen system when the Cabin Pressure Control System (CPCS) senses a cabin altitude above 13,500 feet +/- 500 feet or when in HI FIELD mode the cabin altitude is sensed above takeoff/landing field elevation +2000 ft or 14,500 +/- 500 ft.

In the Corporate Commuter configuration the passenger constant flow oxygen masks are stored under or near each seat position. For flights below 10,000 ft altitude the masks need not be connected to the outlets in the lower cabin sidewalls. In the event of an emergency requiring oxygen use, the passengers are instructed to connect the mask bayonet type connector to the outlets themselves. For flights above 10,000 ft altitude the mask must be connected to the outlets by the flight crew before flight. When disconnected, the outlets are spring loaded closed to prevent oxygen leakage.

In the executive interior configuration the passenger constant flow oxygen masks are stowed under covers placarded OXYGEN MASK INSIDE in the cabin sidewall armrests. The masks are permanently connected to the outlets irrespective of the type of operation and flight altitude. The mask stowage compartments are located near to the seats. The masks have a red tape band which must be positioned to show from the cover in the direction accessible to the seat occupant. A placard PULL TAPE FOR OXYGEN MASK is attached to the armrest near each oxygen mask cover. An oxygen mask is installed in the lavatory. The mask is connected to the passenger oxygen system and is stowed in a box attached to the top of the lavatory sidewall. A visible red tape band is pulled to release the oxygen mask.

7-18-3 Operation

WARNING

TO PREVENT POSSIBLE FREEZING AND MALFUNCTIONING OF SYSTEM, MAKE SURE THAT SYSTEM IS ONLY SERVICED WITH APPROVED, AVIATION GRADE OXYGEN.

TO PREVENT POSSIBLE EXPLOSION AND/OR FIRE, MAKE SURE ALL OIL AND GREASE IS KEPT AWAY FROM OXYGEN SYSTEM COMPONENTS.

SMOKING IS STRICTLY PROHIBITED ANY TIME OXYGEN IS IN USE.

OILY, FATTY OR GREASY SUBSTANCES, INCLUDING SOAPS, LIPSTICK, AFTER SHAVE LOTION, MAKEUP ARE CAPABLE OF SPONTANEOUS COMBUSTION ON CONTACT WITH OXYGEN.

CAUTION

Pilots who fly at high altitude must be aware of the physiological problems associated with prolonged flights at such high altitudes. Dehydration and the slow onset of Hypoxia may be noticed in the passengers.

Passenger comfort may be increased by an occasional intake of fluids. Prolonged high altitude flights require warm clothing and monitoring of the cabin temperature and the physical state of the crew and passengers.

Normal system operation is with the three-position PASSENGER OXYGEN selector in the AUTO position, to provide oxygen immediately in the event of a depressurization. The crew will then don their own masks and order the passengers to don their masks. The masks in an executive interior aircraft can easily be removed from their stowage by pulling the red tape band showing from the cover marked OXYGEN MASK INSIDE. Oxygen availability to the cabin is verified by the oxygen pressure switch activating the PAX OXY annunciator in the ENVIRONMENT window of the systems Multi Function Display (MFD).

The ON position will be selected by the pilot, in the event of smoke or fumes being present in the cabin. The OFF position will be selected if the aircraft is being flown without passengers or is taken out of service for an extended time in order to conserve oxygen.

Note

When a full oxygen supply is stored, it will supply two crew and nine passengers for a minimum of ten minutes, in which time a descent from 30,000 ft to 10,000 ft is performed. Refer to the Oxygen Duration Chart (Table 4-20-1) in Section 4 to determine the minimum oxygen supply required for the number of occupants when operating at less than full oxygen pressure.

As the oxygen system is an emergency system, normal usage will consist only of periodic mask testing (both crew and passengers masks require testing) and of checking, and topping up, if necessary, the storage cylinder.

7-18-4 Indication / Warning

Oxygen system pressure is indicated on a gauge on the left cockpit sidewall. PAX OXY will show in the ENVIRONMENT window of the systems MFD when oxygen pressure is supplied to the passenger masks (Refer to the Cabin Pressure Control System section Operation for more information).

7-18-5 Larger capacity oxygen system (optional)

7-18-5.1 Rear Left Side

The system has a 1965 liter gaseous oxygen cylinder installed in the top left side of the rear fuselage compartment, behind the rear pressure bulkhead. The large cylinder replaces the standard smaller oxygen cylinder. The cylinder head isolation valve is secured in the open position. System shut off, when the aircraft is on the ground, is by a rotary valve connected to the cable from the oxygen shutoff handle on the copilots lower left panel. The rotary valve is installed between frames 16 and 17 on the right side of the fuselage. A pressure transducer installed near the oxygen cylinder sends a pressure signal to the pressure gauge on the left side of the cockpit. The oxygen replenishment point comprising a charging valve and a system pressure gauge is installed at the bottom of the rear fuselage compartment. The system overpressure protection burst disc indicator is installed on the left side of the rear fuselage.

System controls and operation are the same as for the standard system. The system with full oxygen pressure will meet the Canadian Operational CAR 605.31 and CAR 605.32 requirements. Refer to the Oxygen Duration Chart (Table 4-20-1) in Section 4 to determine the minimum oxygen supply required for the number of occupants when operating at less than full oxygen pressure.

7-18-5.2 Rear Right Side

The right side larger capacity oxygen system has the same operation and components as the left side. The following components have a different location. The oxygen cylinder is installed in the top right side of the rear fuselage compartment. The oxygen replenishment point comprising a charging valve and a system pressure gauge is installed at the bottom right of the rear fuselage compartment. The system overpressure protection burst disc indicator is installed on the right side of the rear fuselage.

7-19 Cockpit Arrangement

7-19-1 General

For the Cockpit Layout, refer to Fig. 7-19-1, Cockpit - Layout

The cockpit avionics suite is based on a four Display Unit layout (the fourth DU is optional), arranged in a T configuration. All of the cockpit controls, switches, and displays are readily accessible to the pilot for single pilot operation. There is an overhead control panel which contains the switches for electrical power management and various systems. The sidewalls contain the circuit breaker panels. The center console contains the controls and switches.

7-19-2 Description

The overhead panel has ELECTRICAL POWER MANAGEMENT, SYSTEM TEST, FUEL PUMPS, ENGINE START, EXTERNAL LIGHTS and PASSENGER WARNING sections. These sections are fully described in their associated systems descriptions within this section.

The left Display Unit (DU) is the pilots Primary Flight Display (PFD) and the right optional DU is the copilot PFD. The center upper DU and center lower DU are the Multi Function Displays (MFD). The MFDs can be configured to situational awareness or systems MFD as required. To the left of the pilots PFD is the clock (if installed), the Emergency Locator Transmitter (ELT) Light Emitting Diode (LED) and the Electronic Standby Instrument System (ESIS), the main function of which is to display altitude, attitude and airspeed in the event of a total failure of the primary avionic system. The clock (if installed) is powered directly from the Standby Bus. The ELT LED indicates if the ELT is activated. To the right side of the pilots PFD (and to the left of the copilots PFD if installed) are the PFD and Radio control panels. Above the pilots PFD is the No. 1 Audio/Marker panel. Above the copilots PFD (if installed) is the No. 2 Audio/Marker panel (if installed). Above the center upper MFD is the Flight Guidance Control Panel and below the lower MFD is the Touch Screen Controller (TSC). A parking brake handle is located forward of the left bottom side panel below the instrument panel. An optional Feather Inhibit switch can be installed on the LH outer crossbar panel on the pilot's side.

The lower right panel on the pilot's side contains switches for the ice protection systems and the landing gear selector. An optional Air Data Attitude Heading Reference System (ADAHRS) Heading Override push switch can be installed on the right side of the pilot's lower left panel. The lower left panel on the copilot's side contains the Air Cycle System (ACS) and pressurization control switches and the main oxygen lever.

The center console contains the prop low speed (optional), the trim interrupt, the flap interrupt and the alternate stab trim switches, and the engine power control and flap lever. Further aft are the display reversionary control switches, the cockpit and cabin lighting controls and the Cursor Control Device (CCD) installed. The ACS and fuel firewall shutoff valve controls and the emergency gear extension lever can be found on the aft vertical surface of the console.

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On the rear left sidewall there is a panel which contains the flight time counter, oxygen pressure gauge, ELT remote control switch, MIC SELECT, AURAL WARN inhibit and EMERG COM 1 switches. When the optional 115 VAC power outlet system is installed a 115 VAC power outlet is also installed on the panel. At the rear of the panel are the pilot MIC, PHONE and the active noise reduction headset connections. Located in a recess at the rear of the left sidewall is the PASSENGER OXYGEN selector, and oxygen and mic connections for the crew oxygen mask. Above this area there is a storage point for the control wheel lock. On the lower left sidewall a removal panel gives access to the document stowage area and also provides storage for the Primus Apex software CD's. Further forward a map light is installed above the two circuit breaker panels in the sidewall. There is provision for document stowage and a cup holder built into the sidewall panel. At the top of the forward left sidewall there is a hand/mic in a stowage area. Below the hand/mic stowage area is the optional dual USB charging port. Lower down there is a recess in the sidewall to give access to the circuit breakers on the left Power Junction Box (PJB).

The right sidewall is similarly equipped but without the ELT remote control switch, control wheel lock, oxygen pressure gauge and control valve. The similar panel at the rear only has the MIC SELECT switch and the copilot MIC, PHONE and the active noise reduction headset connections. When the optional 115 VAC power outlet system is installed a 115 VAC power outlet is installed on the panel. There are two small removal panels on the right sidewall, they are used by maintenance for access to the brakes reservoir and the ground maintenance panel.

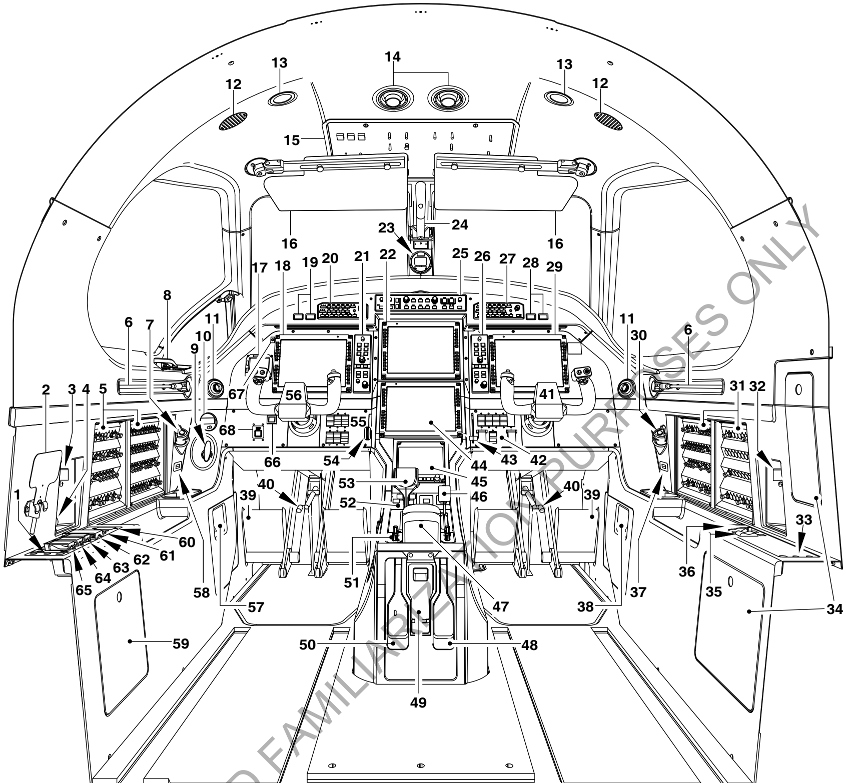
Adjustable air conditioning outlets are positioned on the head liner and the sidewalls. These outlets should be kept open to allow the environmental control system to regulate the temperature in the cockpit.

Divider walls are installed behind the pilot and copilot seats and a curtain or door fits between the walls to form a division between the cockpit and cabin.

On the forward side of each divider there are stowage cups for the pilot and copilot oxygen masks.

Smoke goggles (if equipped) enclosed in a stowage are provided for the pilot and copilot. They are located on the forward side of the cabin divider, behind the pilot seat. Instructions for donning the smoke goggles are shown on Fig. 7-19-2, Cockpit - Donning of Smoke Goggles.

A fire extinguisher is located on the forward side of the cabin divider behind the copilot seat.



1. HEADSET MIC/PHONE JACKS
2. CONTROL LOCK
3. MASK OXYGEN/MIC JACKS
4. PASSENGER OXYGEN SELECTOR
5. LEFT SIDEWALL CB PANELS
6. UTILITY LIGHT
7. HAND MICROPHONE
8. DIRECT VISION (DV) WINDOW
9. PARKING BRAKE HANDLE
10. CLOCK (OPTIONAL)
11. ECS SIDE AIR OUTLET
12. LOUDSPEAKER
13. DOME LIGHT
14. AIR VENTS
15. OVERHEAD ELECTRICAL CTRL PANEL
16. SUNVISOR
17. EMERG. STANDBY INSTR. SYS (ESIS)
18. PRIMARY FLIGHT DISPLAY (PFD)
19. MASTER CAUTION & WARNING LIGHTS
20. AUDIO/MARKER PANEL
21. PFD & RADIO CONTROL PANEL
22. UPPER MFD
23. MAGNETIC COMPASS (OPTIONAL)
24. GRAB HANDLE
25. AFCS CONTROL PANEL
26. CO PILOT PFD & RADIO CTRL PANEL
27. CO PILOT AUDIO/MARKER PANEL
28. MASTER CAUTION & WARNING LIGHTS
29. CO PILOT PFD
30. CO PILOT HAND MICROPHONE
31. RIGHT SIDEWALL CB PANELS
32. CO PILOT MASK OXYGEN/MIC JACKS
33. CO PILOT HEADSET MIC/PHONE JACKS
34. MAINTENANCE PANELS
35. CV ERASE / CVFDR TEST SWITCH & CVFDR TEST LED
36. CO PILOT MASK MIC/COMMS SWITCH
37. DUAL USB PORT (OPTIONAL)
38. RH POWER JUNCTION BOX
39. RUDDER PEDALS
40. RUDDER PEDAL ADJUSTMENT HANDLE
41. CONTOL WHEEL
42. ACS & CPCS CONTROL SWITCHES
43. MAIN OXYGEN LEVER
44. LOWER MFD
45. TOUCH SCREEN CONTROLLER
46. FLAP SELECTOR
47. CURSOR CONTROL DEVICE
48. ACS FIREWALL SHUTOFF CONTROL
49. EMERGENCY LANDING GEAR RELEASE
50. FUEL FIREWALL SHUTOFF CONTROL
51. DISPLAY REVERSIONARY/COCKPIT/CABIN LIGHTING CONTROL PANEL
52. TRIM INTERRUPT, ALT STAB TRIM, FLAP INTERRUPT, PROP LOW SPEED (OPTIONAL) SWITCHES
53. POWER CONTROL LEVER
54. LANDING GEAR HANDLE
55. ICE PROTECTION SWITCHES
56. CONTROL WHEEL
57. LH POWER JUNCTION BOX
58. DUAL USB PORT (OPTIONAL)
59. CD STOWAGE BOX
60. FLIGHT TIME COUNTER
61. OXYGEN PRESSURE INDICATOR
62. ELT REMOTE CONTROL SWITCH
63. MASK MIC/COMMS SWITCH
64. AURAL INHIBIT SWITCH
65. EMERG FREQ/NORM SWITCH
66. HDG/TRK OVERRIDE SWITCH (OPTIONAL)
67. ELT LED
68. FEATHER INHIBIT SWITCH (OPTIONAL)

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Figure 7-19-1: Cockpit - Layout

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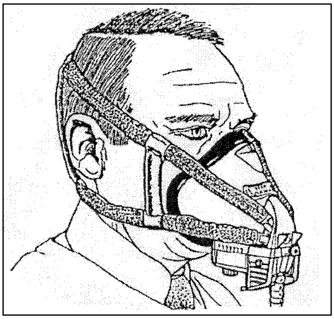
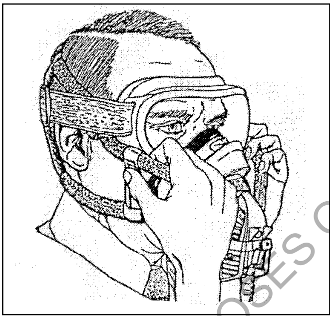
1



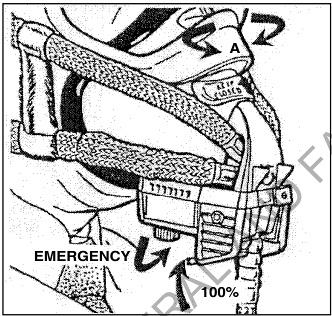
PUT MASK-REGULATOR ON HEAD.
Readjust eye-glasses, if necessary.

2



PLACE SMOKE GOGGLES ON HEAD
Readjust headband tension if necessary.
Pull upper tube of harness and reposition it over the lower side of goggles frame.
Push goggles downwards.

3

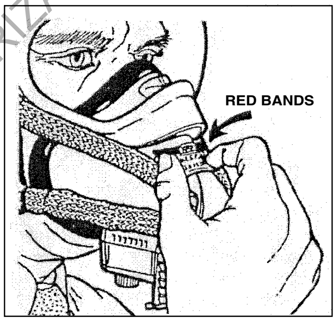


SET REGULATOR CONTROLS ON "100%" AND "EMERGENCY".

Depress "100%" rocker. Turn "EMERGENCY" knob counter-clockwise

Adjust goggles nose bridge shape to fit tightly against mask shell by pressing each side of the bridge inward (see Detail A)

4



OPEN VENT VALVE,
so that red bands are visible.

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Figure 7-19-2: Cockpit - Donning of Smoke Goggles

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7-20 Pitot Static Systems

7-20-1 General

Dual pitot and static systems provide dynamic and static pressure to the Air Data Attitude Heading Reference System (ADAHRS) and the Emergency Standby Instrument System (ESIS).

Refer to Fig. 7-20-1, the Pitot and Static Systems Schematic.

7-20-2 Description

A heated pitot head is installed on the bottom of the left and right wings.

The pitot pressure sensed by the left (No. 1) pitot system is carried through lines within the wing and fuselage to the ADAHRS Channel A.

The pitot pressure sensed by the right (No. 2) pitot system is carried through lines within the wing and fuselage to the ADAHRS Channel B. The No. 2 pitot system also supplies pitot pressure to the ESIS.

Two dual heated static ports are installed, one on each side of the rear fuselage aft of the rear pressure bulkhead. Two pickups are used, one on each side, for each static system. The two pickups balance out the differences in static pressure caused by slight sideslips or skids.

The static pressure sensed by the forward left and rear right static ports is carried through lines within the fuselage to the ADAHRS Channel A. The static pressure sensed by the forward right and rear left static ports is carried through lines within the fuselage to the ADAHRS Channel B and to the ESIS.

If one or more of the pitot static systems malfunction, they should be checked for dirt, leaks or moisture. The holes in the sensors for pitot and static pressures must be fully open and free from blockage. Blocked sensor holes will give erratic or zero readings to the ADAHRS.

The heaters for the pitot heads and static ports are controlled by the PROBES switch on the ICE PROTECTION panel, installed on the pilot's lower right panel. Electrical power for left pitot and static port heating is supplied through the LH PITOT DE-ICE and LH STATIC DE-ICE circuit breakers on the Essential Bus. Electrical power for right pitot and static port heating is supplied through the RH PITOT DE-ICE and RH STATIC DE-ICE circuit breakers on the Main Bus.

7-20-3 Indication / Warning

The Crew Alerting System (CAS) window of the systems Multi Function Display (MFD) displays the following Cautions for the pitot and static systems (refer to Table 7-20-1):

Table 7-20-1: Pitot Static Systems - CAS Messages

CAS Message	Description
Probes Off	Indicates the ice protection probes switch is set to off and OAT < 10 °C
Pitot 1 Heat Pitot 2 Heat Pitot 1 + 2 Heat	Indicates No. 1 system, No. 2 system or both systems pitot head heater failure
Static Heat	Indicates one or both static port heater failure

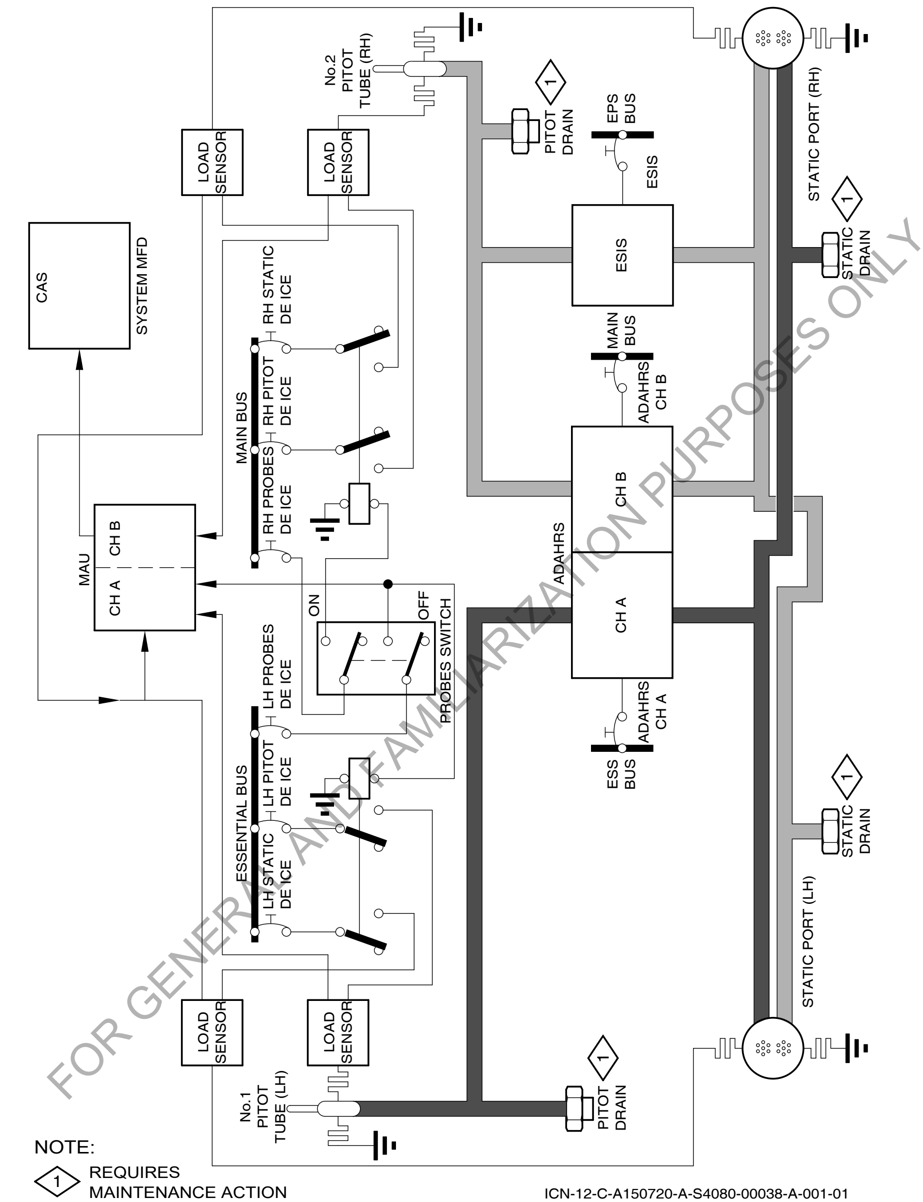

Figure 7-20-1: Pitot and Static Systems

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7-21 Stall Warning / Stick Pusher System

7-21-1 General

The airplane is equipped with a stick shaker-pusher system to improve aircraft handling in the low speed flight regime by preventing the airplane from inadvertently entering a stall condition. The stick shaker-pusher system contains two Angle-of-Attack (AOA) sensors, two computers, a single stick shaker and a single stick pusher. The two computers are connected in such a way that either computer can, independently, provide stall warning (stick shaker and stall warning) but both computers are required to actuate the stick pusher.

7-21-2 Description

For system operation, refer to Fig. 7-21-1, Stall Warning/Stick Pusher System.

The left and right hand Stick Pusher Computers are each provided power from the Essential and Main bus. Each computer receives inputs from its respective AOA vane and AIR/GND relay. Both computers receive inputs from the engine torque, flap position, and self-test. From these various inputs, each computer independently determines the "Defined Angle of Attack" for stall warning (stall warning and stick shaker activation), stick pusher activation, and stick pusher disengagement following an actual push. A digital serial output, from the left and right computers, provide data to the Modular Avionics Unit (MAU) for the Dynamic Speed Bug (DSB) on the airspeed tape of the Primary Flight Display(s) (PFDs). It is also used for the display of the Low Speed Awareness Indication adjacent to the Air Speed Tape.

The stick pusher, shaker, the Flight Alerting System (FAS) visual “Stall” and aural “Stall” warnings are disabled on the ground through the AIR/GND inputs, except for the self-test function. The stick pusher is inhibited for 5 seconds after liftoff. The shaker and the stall warning are operative immediately after liftoff.

The stick pusher actuator has a built-in g-switch which inhibits the stick-pusher when the airplane's normal acceleration becomes less than 0.5 g. The output torque of the stick-pusher actuator is electronically-limited to have a force of 60 to 65 lbf on the control wheel. A slip-clutch on the stick-pusher capstan allows control on the elevator with a force of 85 to 90 lbf on the control wheel, in the event of stick-pusher jam. The force on the control wheel is defined when the longitudinal control is pulled to 3/4 of its travel. This allows the pilot or copilot to override the stick-pusher in the instance of an inadvertent operation.

Each outboard control wheel horn is equipped with a PUSHER INTR push switch providing a means to quickly disable the stick pusher actuator, as long as the switch is pressed, in the event of an inadvertent operation. The pilot’s PUSHER INTR switch stops the motor of the servo actuator and also disengages the clutch of the servo actuator. This provides for free column control movement of the elevators from the cockpit. The co-pilot’s PUSHER INTR switch only stops the motor of the servo actuator. To move the elevators enough force must be applied to the control column to back drive the servo or to slip the capstan assembly clutch.

When operated in pusher Ice Mode (to provide protection in icing conditions), all the shaker and pusher actuating points measured by the angle of attack vanes are reduced by 8°. The pusher Ice Mode is set when the propeller de-icing system is switched ON and the inertial separator is set to OPEN. When both pusher computers are set in Ice Mode, **PUSHER ICE MODE** is shown in the ICE PROTECTION window of the systems Multi Function Display (MFD). If only one computer is set in Ice Mode, or if no computer is set in Ice Mode while conditions for ice mode are present, the **Pusher** message on the Crew Alerting System (CAS) is activated.

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The system is provided with a self-test function that can be activated at any time by pressing and holding the STICK PUSHER switch located on the SYSTEM TEST section of the overhead panel. PUSHER ICE MODE is illuminated during the self-test after the pusher is first activated. The Pusher message on the CAS will remain illuminated until the self-test is passed.

After engine start on the ground, the Pusher message will illuminate until the system test has been successfully tested. The test must be done before takeoff. The engine must be operating with the PCL out of idle, the flaps set to 15°, then press and hold the STICK PUSHER switch to initiate the test. If the test switch is pressed and the test sequence does not occur and/or the Pusher message remains illuminated, the system has failed the self-test and further flight before maintenance is not approved. If the test switch is pressed without the engine operating with the PCL out of idle and the flaps are not set to 15°, the Pusher message will remain illuminated, the “Stall” warning and the test sequence will not occur.

The system function may be tested in the air anytime the engine is operating with the flaps at any setting. Press and hold the test switch and observe the following sequence; PUSHER ICE MODE, “Stall” warning with stick shaker for 2 seconds followed by a 1 second pause, and “Stall” warning with stick shaker for 2 seconds. The pusher will not activate when the system is tested in flight. If the test switch is pushed and the test sequence does not occur and/or the Pusher message remains illuminated, the system has failed the self-test.

WARNING

STALLS MUST BE AVOIDED WHEN THE STICK PUSHER IS INOPERATIVE. EXCESSIVE WING DROP AND ALTITUDE LOSS MAY RESULT DURING STALL WITH FLAPS DOWN AND/OR WHEN POWER IS APPLIED.

The AOA vanes and mounting plates are electrically heated by internal heating elements. AOA vane and mounting plate heat is controlled by the PROBES switch located on the ICE PROTECTION switch panel. Refer to Fig. 7-21-1, Stall Warning/Stick Pusher System for system schematic.

7-21-3 Operation

The vane attached to the AOA probe aligns itself with the relative airflow. As it moves, it positions a wiper unit in the probe. This wiper unit adjusts the electrical output to its respective pusher computer. As the airplane approaches the artificial stall (5 to 10 knots before pusher actuator), the stick shaker and the “Stall” warning will activate when one of the AOA pusher computers senses the defined angle of attack for stall warning/stick shaker activation. If the “Stall” warnings are ignored and the approach to stall is continued, the stick pusher will activate when both AOA pusher computers sense the defined angle of attack for stick pusher activation. The stick shaker and “Stall” warning remain active during pusher operation.

Pusher operation will be stopped when either AOA computer senses an angle of attack lower than the angle of attack required to activate the pusher or when the airplane acceleration is less than 0.5 g.

If an inadvertent operation of the stick pusher occurs, push the PUSHER INTR switch on the control wheel outer horn to quickly disable the stick pusher actuator. The pilot PUSHER INTR also disengages the clutch of the servo actuator.

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Activation of the stick shaker disengages the autopilot if engaged, in order to give full authority to a possible stick pusher activation. The autopilot can be manually reconnected after the angle of attack is reduced and the stick shaker has ceased operation.

WARNING

IF ACCELERATED STALLS ARE PERFORMED IN THE LANDING CONFIGURATION WITH HIGH POWER AND SIDESLIP, A RAPID PITCH-DOWN MAY RESULT WITH AN ALTITUDE LOSS OF UP TO 500 FEET.

7-21-4 Indication / Warning

A digital serial output, from the left and right hand computers, provide data to the MAU for the Monitor Warning System (MWS), the Dynamic Speed Bug on the PFD Attitude Direction Indictor (ADI) and Low Speed Awareness indication on the PFD Air Speed Indicator (ASI).

The stick pusher system has an internal-fault monitoring system which will signal the MAU to illuminate the CAS **Pusher** message when one of the following events occur:

- A Built in Test (BIT) failure
- A push signal from only one computer that is longer than 3 seconds
- No output torque during a push
- If either of the pilot or copilot DISC switches is pressed
- If the aircraft normal acceleration is below 0.5 g for longer than 3 seconds
- Disparity between WOW inputs.

A malfunction in either pusher computer initiates a **Pusher** message to be shown on the CAS. This warns the pilot about a system malfunction and the pusher becoming inoperative.

The stick shaker and “Stall” warning devices may still be operational if the stick pusher is inoperative.

The CAS will show **AOA De Ice** when a malfunction is sensed in the AOA vane or mounting plate heater circuits (current sensing).

PUSHER ICE MODE will show in the ICE PROTECTION window of the systems MFD when the propeller de-ice system is set ON and the inertial separator is set OPEN. In the Ice Mode, the shaker and pusher activation points are reached 8° earlier than in the normal mode and the Dynamic Speed Bug and Low Speed Awareness indication are adapted accordingly.

If the Flap Control and Warning Unit (FCWU) detects a flap asymmetry, it:

- Sends a Flap caution to the MAU for display on the CAS
- Sends a signal to the stick pusher computer
- Sends the flap position to the stick pusher computer.

The stick pusher computer checks the flap position and flap asymmetry and if greater than 2° for 10 seconds or more, sends a **Pusher** message to the MAU for display on the CAS and goes into pusher safe mode. The MAU also signals the CAS to display the **Pusher Safe Mode** advisory. When in safe mode, the stall warning trigger thresholds operate at the 0° flap position settings irrespective of the flap position.

The Dynamic Speed Bug and the Low Speed Awareness indication are based on the left flap position. As a result of setting 0° flap position when there is suspected asymmetry, the stick shaker and stick pusher will operate at higher airspeeds than would be normal for the actual flap position, but these higher airspeeds will not be reflected in the PFD indications. The difference between the PFD indications to the actual activation speeds varies with power and flap angle and can be as much as 5 KIAS faster. To allow for this, on approach the pilot must apply a 10 KIAS margin above the Dynamic Speed Bug.

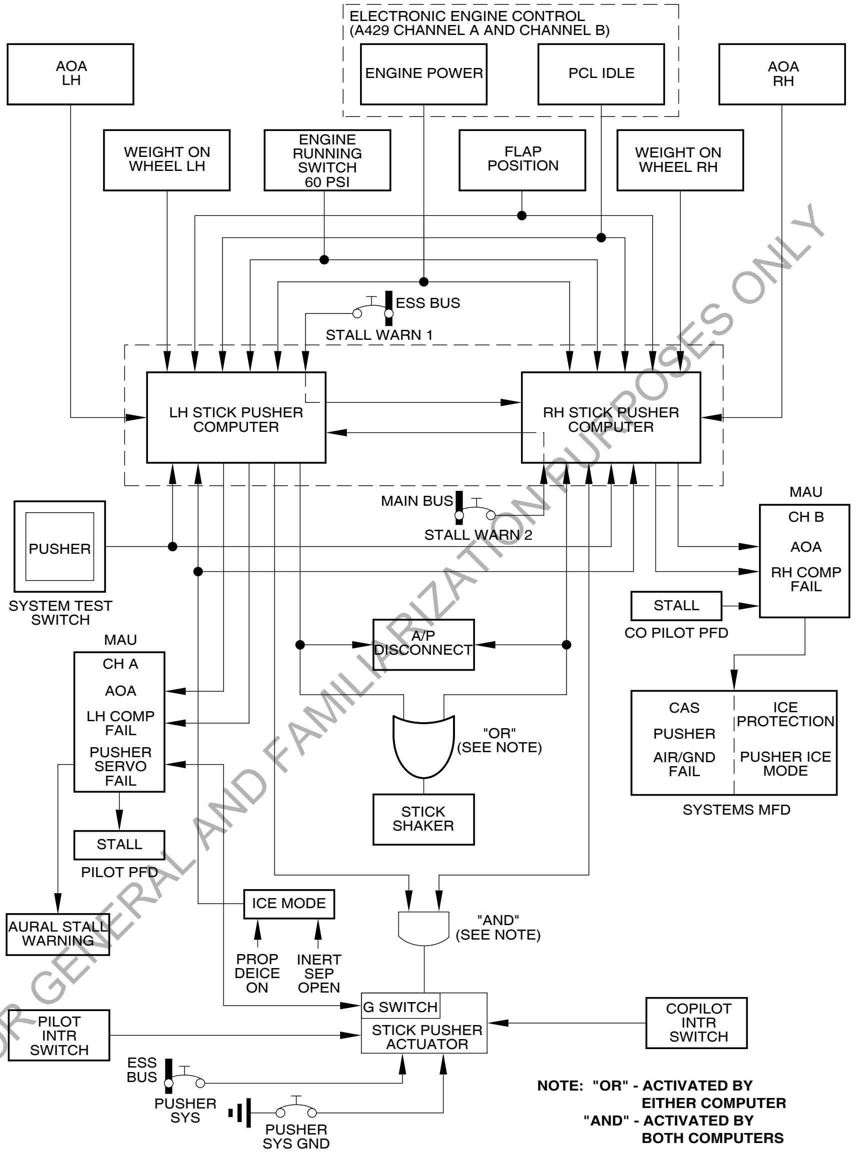

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Figure 7-21-1: Stall Warning/Stick Pusher System (Sheet 1 of 3)

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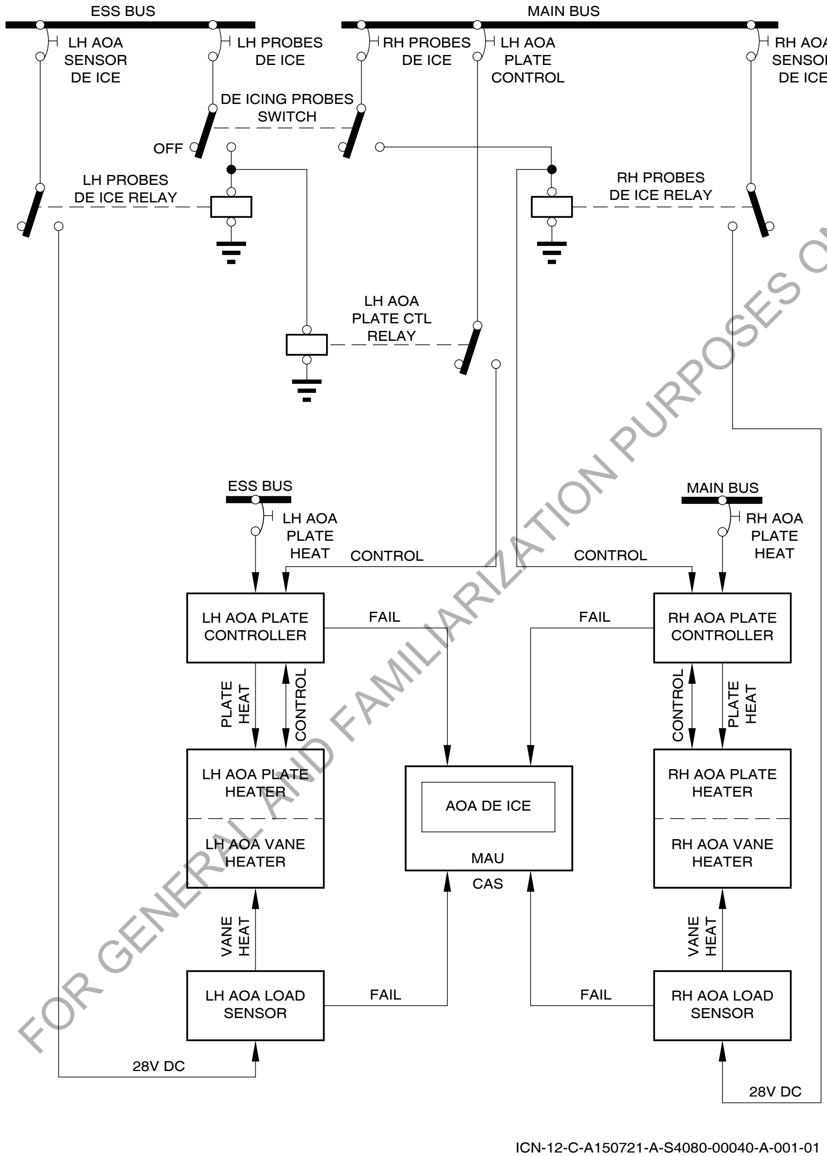

Figure 7-21-1: Stall Warning/Stick Pusher System (Sheet 2 of 3)

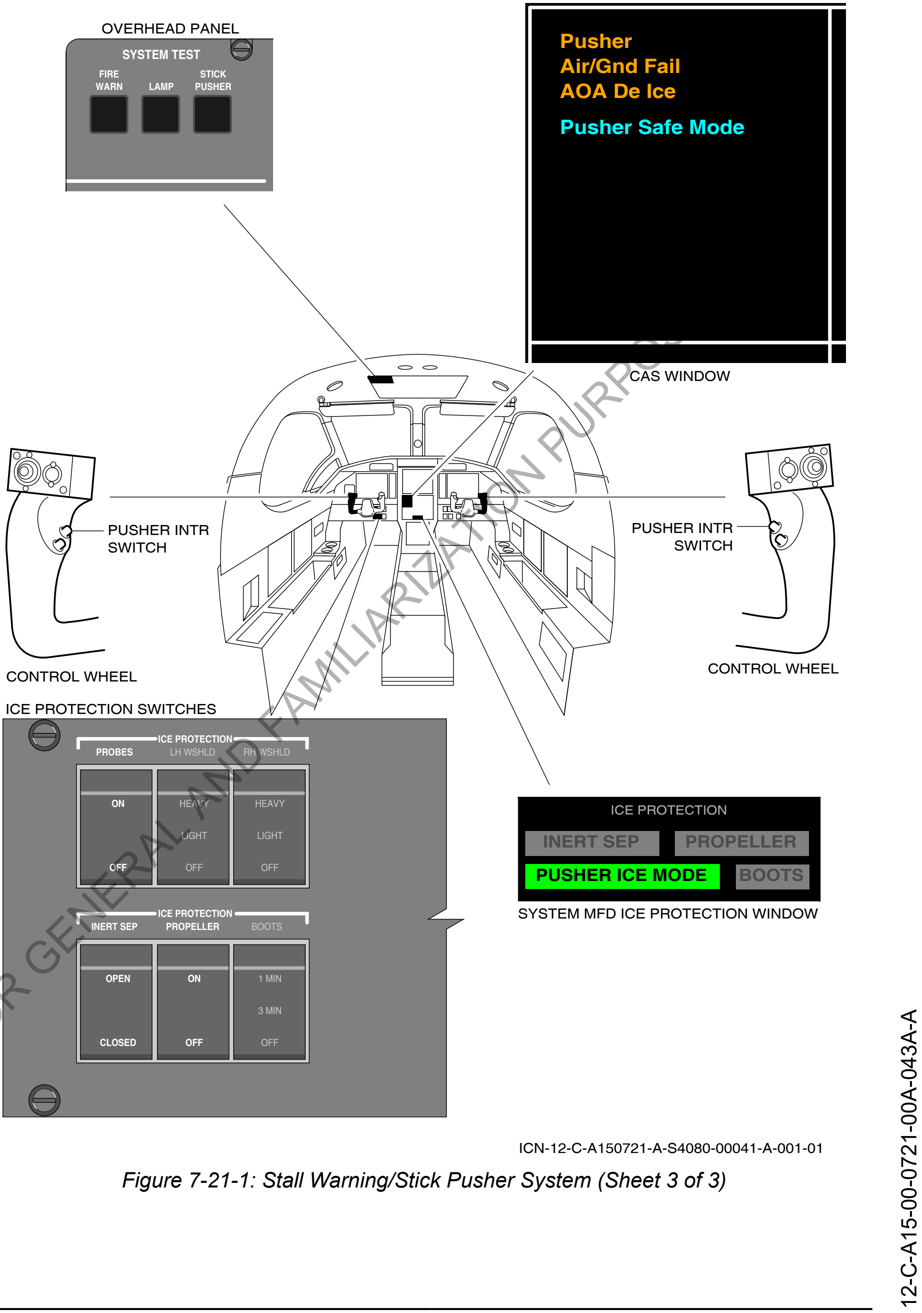

Figure 7-21-1: Stall Warning/Stick Pusher System (Sheet 3 of 3)

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7-22 Airfoil De-ice System

7-22-1 General

Inflatable neoprene boots are installed on the leading edges of the wings and horizontal tail surfaces. Their purpose is to inflate and dispense any ice which may accrete on their surface during flight in atmospheric icing conditions. When not in use, the boots have a vacuum applied to prevent partial inflation while in flight.

7-22-2 Description

The airplane is equipped with inflatable pneumatic de-icing boots fixed to the leading edges of the wings (two boots per wing - inboard and outboard) and the horizontal stabilizer. Air bled from the 3rd stage of the engine compressor section, is routed to the regulator-reliever valve of nominal 14 psi regulating pressure, then through a water separator to the ejector flow control valves. These valves, which are solenoid-operated, port air pressure to the de-icing boots in a prescribed sequence: first to the horizontal stabilizer de-icer, then to the lower portion of the inboard wing de-icers, the upper portion, the lower portion of the outboard wing de-icers, and finally the upper portion. Progression through this sequence is controlled by an electronic Timer/controller and monitored by low pressure sensing switches in each line, which are linked to the Modular Avionics Unit (MAU).

When pressure is not being applied to the de-icer boots a small airflow is allowed to pass through the ejector valves to impose a vacuum in the lines to the de-icing boots. This provides a negative air pressure at the boots ensuring the airfoil contour is maintained.

The pneumatic de-ice boot consists of a smooth neoprene and fabric blanket containing small spanwise de-icer tubes. Each wing de-icer has two air connections: one for the tubes on the lower surface and one for the tubes on the upper surface. The smaller boots on the horizontal stabilizer have one connection only.

The water separator is located upstream of the ejector control valves. Its function is to remove any condensation from the system and consists simply of a set of vanes which introduce a rotational swirl to the air that removes entrained water through centrifugal forces. A drain connection is fitted to the bottom of the housing to vent the moisture overboard.

The pressure-reliever valve consists of a spring and poppet valve which, at the required pressure, will open to allow air to pass from the inlet to the outlet port. The nominal regulating pressure is 14 psi. It also has an integral relief valve relieving at 18 psi.

7-22-3 Operation

Refer to Fig. 7-22-1, De-icing System.

In the off mode the system applies a continuous vacuum to the de-ice boots while the engine is running. The system is initiated by setting the switch labeled BOOTS on the ICE PROTECTION switch panel. The switch can be set to 3 MIN or 1 MIN and **BOOTS** is shown in the ICE PROTECTION window of the systems Multi Function Display (MFD).

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When activated the timer will start the de-icing cycle with a dwell period of 20 seconds (independent of which cycle has been selected), in order to allow the pilot to de-activate the system in case of inadvertent activation outside the operating limits of the pneumatic de-ice boots. The timer then actuates each ejector flow control valve (EFCV) in the prescribed sequence, for eight seconds. The time to inflate and deflate all of the de-icer units is thus 40 seconds. If the 'one minute cycle' has been selected the de-icing cycle is repeated immediately, if the 'three minute cycle' has been selected there is another 120 seconds dwell period before the de-icing cylce is repeated. If the control system is deactivated during the initial 20 seconds dwell period, the system will immediately be shutdown without inflating the boots.

Pressurization of each de-icer will cause the pressure switch to close, indicating proper operation. If there is a failure, the MAU will make the ICE PROTECTION **BOOTS** advisory go off and a **De Ice Boots** message will be shown on the Crew Alerting System (CAS). Operation of the wing boots can also be observed directly during ground checkout or from the airplane cabin. At night the left wing and boot operation can be observed using the wing inspection light. If the control system is deactivated during a de-icing cycle, the cycle will be completed prior to system shutdown.

CAUTION
Operation of the Pneumatic Wing De-ice System in ambient temperatures below -40°C or above 40°C may cause permanent damage to the de-icer boots.

7-22-4 Indicating / Warning

If the Outside Air Temperature (OAT) is outside the allowed limits of the wing de-ice system, the **Boots TEMP Limit** message is shown on the CAS and an aural gong will sound to indicate that the de-icer boots must be switched OFF to prevent damage to the pneumatic de-icer boots.

In icing conditions, the flaps are not allowed to be extended more than 15 degrees, or if the de-icer boots have failed, the flaps are not allowed to be extended. If the flap limits are exceeded, the **Flaps EXT Limit** message is shown on the CAS and an aural gong will sound.

With the BOOTS switch in the 3 MIN or 1 MIN position **BOOTS** is shown in the ICE PROTECTION window to show the system is set to on and working correctly. Should the inflation pressure at the individual pressure switches not reach the nominal filling pressure of 11 psi during the inflation sequence or an incorrect timing sequence, the MAU will make the **De Ice Boots** message show on the CAS and the green advisory goes off in the MFD ICE PROTECTION window.

After failure of the de-icing boots, the aircrew should prepare for departure of icing conditions as soon as possible.

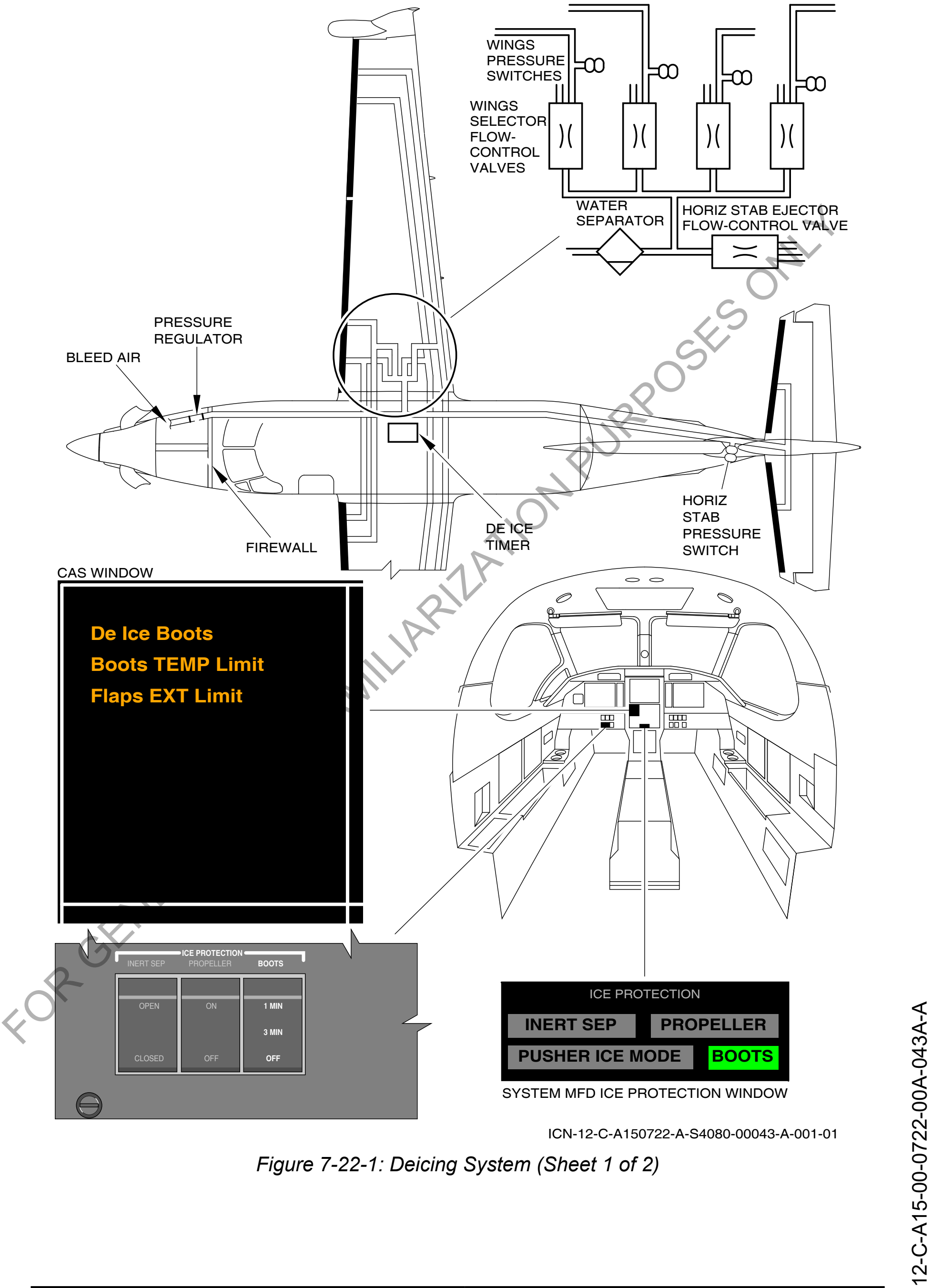

Figure 7-22-1: Deicing System (Sheet 1 of 2)

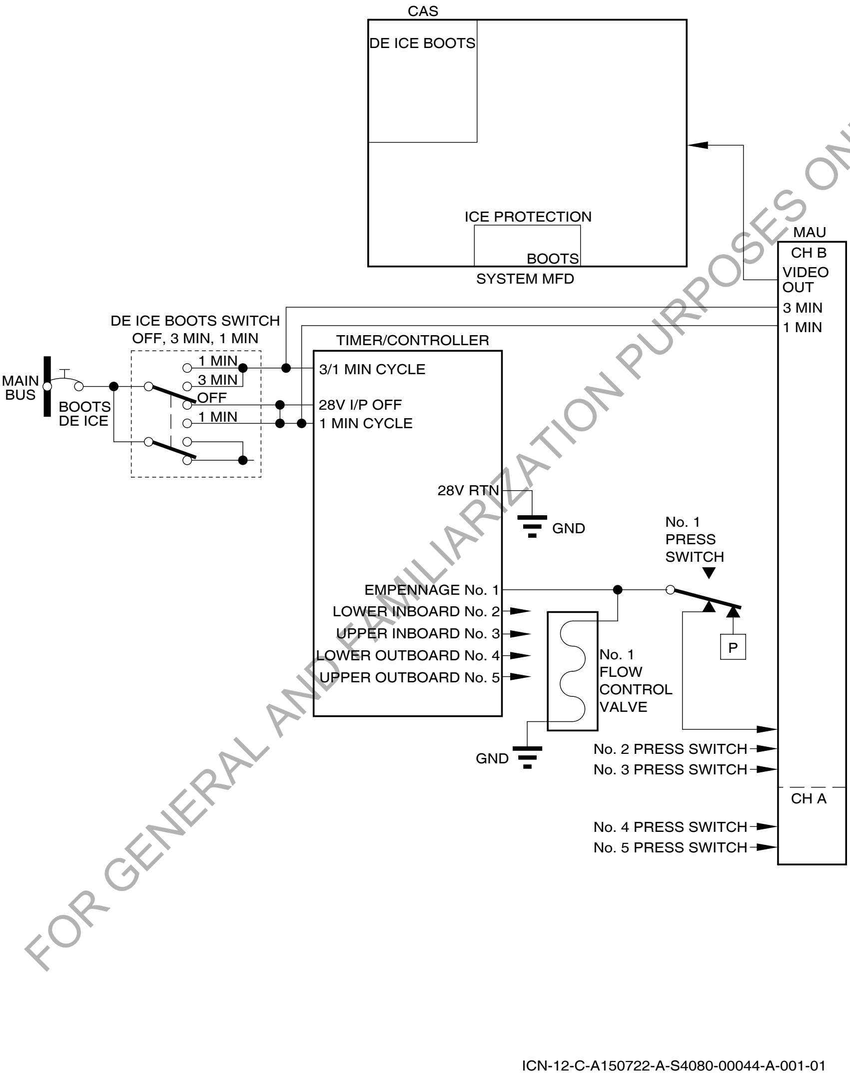

Figure 7-22-1: Deicing System (Sheet 2 of 2)

7-23 Comfort Features

7-23-1 General

Extra comfort for the pilot and copilot can be provided by optional equipment installed at build. For colder climates a Foot Warmer System (Optional) can be installed. Active Noise Reducing (ANR) headsets are installed in the place of normal headsets. Power for the ANR function is provided from the aircraft communications power supplies.

Passenger comfort is provided for by an Air Cycle System (ACS) and a Cabin Pressure Control System system. Additional comfort can be provided with the Vapor Cycle Cooling System (when installed). The fans installed at the rear of the cabin can be used to increase the general air circulation around the cabin. The switches for the fans are on the copilots lower left panel.

An optional 115 VAC power outlet system can be installed to give the facility to operate portable electronic equipment in the cockpit and cabin. Four power outlets are provided, one on the cockpit rear right switch panel, one on the left cabin sidewall and two on the right cabin sidewall. Electrical power to the 115 VAC static inverter is supplied through the 115V AUX PWR circuit breaker on the CABIN BUS. The maximum power output for the system is 500 Watt.

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7-24 Cabin Features

7-24-1 General

The PC-12 has a large cabin that offers a flexible interior configuration for passenger and cargo loading. There are two basic cabin configurations, a Corporate Commuter and an Executive interior. Variations to the two basic configurations are continually being developed, refer to Section 2, Maximum Passenger Seating Limits, for the variations that have been approved. See Section 6, Interior Configurations, for passenger seat locations, and see Section 6, General Loading Recommendations, for combi conversions and cargo loading information

Divider walls are installed behind the pilot and copilot seats and a curtain or door fits between the walls to form a division between the cockpit and cabin.

A fire extinguisher is located on the forward side of the cabin divider behind the copilot seat. Full operating instructions are given on the side of the extinguisher.

A second, optional, fire extinguisher can be installed in the cabin. When the optional fire extinguisher is installed, it is located at the rear of the cabin, aft of the last seat in the right row and, if installed, in front of the cargo net. Full operating instructions are given on the side of the extinguisher.

7-24-2 Corporate Commuter Interior

The standard Corporate Commuter Interior consists of two crew seats plus seating for up to nine passengers. The baggage compartment is situated at the rear of the cabin and a baggage net must be installed at frame 34 when baggage is stowed. An optional coat hanger can be installed in the baggage compartment.

7-24-3 Executive Interior

The standard executive interior aircraft consists of two crew seats plus executive seating for six passengers. The two forward passenger seats 1 and 2 face rearwards and the remainder face forwards. Extra passenger seating can be provided by using a combination of executive and standard passenger seats. Refer to Section 2, Maximum Passenger Seating Limits, for the various executive interiors that are approved and Section 6, Interior Configurations, for more information. An optional bulkhead and curtain assembly can be installed at frame 32 in front of the larger baggage net.

The baggage compartment is situated at the rear of the cabin and a baggage net must be installed at frame 34 when baggage is stowed. A coat hanger is installed in the baggage compartment.

Folding tables installed in the cabin sidewalls extend between the seats. Ashtrays, cupholders, table and overhead lighting switches are provided in the sidewall armrests adjacent to each seat. Individual reading lights and air outlets are installed in the headliner panel above each seat position.

A toilet compartment is installed in the front right hand side of the aircraft. The forward wall of the toilet compartment forms the cabin divider. Left and right storage cabinets are installed, the left cabinet fits against a small divider behind the passenger door and the right cabinet fits against the toilet compartment rear wall.

Passenger information no smoking/fasten seat belt illuminated signs are installed on the rear of the toilet compartment and above the baggage compartment. The signs are turned on and off by the pilot using the switches installed on the electrical overhead panel.

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Various optional interior upgrade packages are available, contact Pilatus for further information and the determination any modification work required.

7-24-4 Combi/Cargo Interior

A Combi or a full cargo interior can be made by the removal of passenger seats from both the Corporate Commuter and Executive Interior aircraft. Cargo net attachment points are installed in the cabin walls at frame positions 24 and 27. Baggage net attachment points are installed at frame 34. Cargo restraining nets can be installed at the attachment points and allow lightweight cargo to be loaded without being secured with tie-down straps. A cargo securing kit contains the necessary items for the securing of heavyweight cargo.

7-25 Emergency Locator Transmitter

7-25-1 Kannad Integra ELT and ENAV Unit

7-25-1.1 Description

An Emergency Locator Transmitter (ELT) 406.037 is installed in the rear fuselage. It is connected to an antenna, which is installed on the top of the fuselage below the dorsal fairing, and has a battery pack that must be replaced after a specified time. The ELT will transmit on the international distress frequencies of 121.5 and 406.037 MHz. The ELT unit has a switch with the positions ARM, OFF and ON.

The ELT is also equipped with an internal 406/121.5 MHz antenna, this antenna is automatically activated if connection to the aircraft external antenna is lost.

The ELT is loaded with unique aircraft identity data to aid the search and rescue services. The unique aircraft identity data is loaded during installation by using a programming Dongle. If there is a change to the aircraft identity, the programming Dongle and ELT must be re-loaded with the unique aircraft identity data by an approved service center.

The ELT connects to the eNAV unit which is located on the same universal mounting bracket within the rear fuselage. The eNAV unit receives aircraft position information from the Global Positioning System (GPS) through the Modular Avionics Unit and provides it to the ELT for use within the 406.037 MHz data transmission. The eNAV is powered by a 28 VDC power supply sourced from the Hot Battery Bus. The ELT has a built in GPS to provide greater accuracy and an integral antenna in case of disconnection or damage to the external antenna.

There is an ELT remote control panel installed on the left hand sidewall panel. The panel has a guarded switch with the positions ON, ARMED and RESET/TEST and an indicator light.

There is a red ELT Light Emitting Diode indicator installed to the left of the pilot’s Primary Flight Display (PFD).

7-25-1.2 Operation

The ELT is installed in the aircraft with the switch at the ARM position, this also makes the remote control panel active. For flight the remote control switch must be in the ARMED guarded position. In the ARMED mode the ELT is automatically operated at a specified g force by an internal g switch. The ELT will continuously transmit on the 121.5 MHz homing frequency for over 100 hours and will also transmit a digital message on the 406.037 MHz frequency every 50 seconds for the first 24 hours. The aircraft position is transmitted as part of the 406.037 MHz digital message.

Once the ELT is activated the internal GPS will attempt to acquire a valid position. If the built-in GPS acquires a valid position, the 406.037 MHz message will contain the true position of the built-in GPS in the next transmission. If the built-in GPS does not acquire a valid position, the message will contain the true position of the external GPS sourced from the eNAV unit. If neither the built-in GPS or the external GPS acquire a valid position the message will contain the default value (GPS position not valid). To avoid consumption the built-in GPS is not powered when the ELT switch is in the ARM position.

In an emergency, the remote switch can be selected to ON. The ELT will then immediately start the distress signal transmission. The red indicators will come on.

In the case of accidental transmission, the ELT can be reset by either selecting the guarded remote switch to RESET or the switch on the ELT unit to OFF.

The remote switch TEST position is used to check the battery voltage and transmission power of the ELT for maintenance purposes.

7-25-2 Low Frequency Underwater Locator Beacon (ULB) (if installed)

7-25-2.1 Description

A low frequency ULB (DK180) is installed in the rear fuselage near the ELT.

The ULB is a battery operated underwater acoustic pulse generator that is activated when the water switch end is immersed in either fresh or salt water.

The ULB is capable of functioning up to depths of 20,000 feet (6096 meters) and can be detected at a range of 7 to 12 NM (13 to 22 km) (depending on ambient noise levels).

7-25-2.2 Operation

When activated, the ULB will transmit at 8.80 kHz every 10 seconds for at least 90 days.

7-26 Primus APEX - Avionics Installation General

7-26-1 General

The aircraft is equipped with a Primus APEX 'glass cockpit' modular avionics system interconnected via various data buses. The APEX architecture design is configured to allow system options, system enhancements and feature upgrades via software. The integrated design approach facilitates a consistent display format across the cockpit display units, display controllers and provides a seamless operation for the pilot(s).

The Primus APEX Software and all parts thereof installed in the aircraft are the subject matter of various Honeywell proprietary rights. The Software License Agreement covers the aircraft owner/operator for the usage of the software installed in the aircraft and any updates, but only the functionality the customer has paid for. In accepting this License, Honeywell hereby grants the aircraft owner/operator a nonexclusive license to use one electronic copy of the Software, solely in conjunction with the installed avionics equipment, to operate the specific aircraft identified at the time this License was granted to the owner/operator. Any other uses, copying or distribution of the Software without prior written approval are strictly prohibited. Honeywell retains all title and interest in and to the Software.

The APEX system performs the following aircraft functions:

- Electronic Display System and Graphics Generation Function
- Configuration Management System (CMS)
- Automatic Flight Control System (AFCS)
- Flight Management System (FMS)
- Audio Control
- Monitor Warning Function (MWF) including Crew Alerting System (CAS)
- Data acquisition function
- Maintenance function
- Enhanced Ground Proximity Warning System (EGPWS)
- Interactive Navigation (INAV)
- Datalink
- Communication Management Function (CMF)
- Electronic Checklist and Charts (optional).

The APEX system interfaces with the following stand-alone equipment:

- Air Data Attitude Heading Reference System (ADAHRS)
- Multi Mode Digital Radios (MMDR)
- Weather Radar System (Wx)
- Radar Altimeter System
- Global Positioning System (GPS)
- Mode S Transponder
- Stormscope (optional)
- Traffic Collision Avoidance System (TCAS) (optional)
- Distance Measuring Equipment (DME)
- Other aircraft systems.

An Electronic Standby Instrument System (ESIS) is installed and displays altitude, attitude, airspeed and magnetic heading. The ESIS is independent of the Primus Apex system.

Fig. 7-26-1, APEX Equipment - Bus Bar Distribution, shows a schematic of the APEX Equipment Bus Bar Distribution. The bus bar colors are shown similar to the colors on the cockpit circuit breaker panels.

Fig. 7-26-2, APEX Equipment - Antenna Locations, shows the APEX Equipment Antenna Locations.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for complete information on the description and operation of the APEX System.

7-26-2 APEX Builds

An overview of the various APEX builds and their corresponding Honeywell part number is given in the Front Matter, List of APEX Builds.

7-26-3 Acronyms and Abbreviations

The acronyms and abbreviations used in the Avionics Installation description are given in Table 7-26-1.

Table 7-26-1: APEX - Acronyms and Abbreviations

Abbreviation / Acronym	Description
ACMS	Aircraft Condition Monitoring System
ACS	Air Cycle System
ADAHRS	Air Data and Attitude Heading Reference System
ADC	Air Data Computer
ADF	Automatic Direction Finder
ADI	Attitude Direction Indictor
ADMS	Aircraft Diagnostic and Maintenance System
AFCS	Automatic Flight Control System
AGM	Advanced Graphics Module
AHRS	Attitude Heading Reference System

Table 7-26-1: APEX - Acronyms and Abbreviations (continued from previous page)

Abbreviation / Acronym	Description
AIRMET	Airman’s Meteorological Advisories
AP	Autopilot
APM	Aircraft Personality Module
ASCB	Avionics Standard Communications Bus
AT	Autothrottle
BIT	Built-in Test
BARO	Barometric
CAN	Controller Area Network
CAS	Crew Alerting System
CAT	Clear Air Turbulence
CCD	Cursor Control Device
CKLST	Checklist (electronic)
CMC	Central Maintenance Computer
CMS	Configuration Management System
CONUS	Continental United States
CPCS	Cabin Pressure Control System
DB	Database
DEOS	Digital Engine Operating System
DME	Distance Measuring Equipment
DRCP	Display Reversion Control Panel
DU	Display Unit
ECS	Environmental Control System
EDM	Emergency Descent Mode
EGNOS	European Geostationary Navigation Overlay Service
EGPWF	Enhanced Ground Proximity Warning Function
EGPWS	Enhanced Ground Proximity Warning System
ESIS	Electronic Standby Instrument System
FAF	Final Approach Fix
FAS	Flight Alerting System
FC	Flight Controller
FD	Flight Director
FLC	Flight Level Change
FMS	Flight Management System
FMW	Flight Management Window
FPLN	Flight Plan
GA	Go Around
GFP	Graphical Flight Planning
GGF	Graphics Generation Function
GNSSU	Global Navigation Sensor System Unit
GPS	Global Positioning System
GS	Glideslope
HDG	Heading
HSI	Horizontal Situation Indicator

Table 7-26-1: APEX - Acronyms and Abbreviations (continued from previous page)

Abbreviation / Acronym	Description
INAV	Interactive Navigation
LAN	Local Area Network
LCD	Liquid Crystal Display
LPV	Localizer Performance with Vertical guidance
LSS	Lightning Sensor System
MAU	Modular Avionics Unit
METAR	Aviation Routine Weather Report
MFD	Multi Function Display
MW	Monitor Warning (miscompare condition)
MWF	Monitor Warning Function
NEXRAD	Next Generation Radar
NIC	Network Interface Controller
PDC	Pre Departure Clearance
PFD	Primary Flight Display
POF	Phase of Flight
PSA	Pre Selected Altitude
RA	Resolution Advisory
RAAS	Runway Awareness and Advisory System
RVSM	Reduced Vertical Separation Minimum
SBAS	Satellite Based Augmentation System
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Information
STAR	Standard Terminal Arrival Route
SSEC	Static Source Error Correction
SVS	Smartview System
TA	Traffic Advisory
TAF	Aviation Terminal Area Forecast
TAS	Traffic Advisory System
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Collision Avoidance System
TCS	Touch Control Steering
TF	Tactile Feedback
TFR	Temporary Flight Restriction
TRK	Track
TSC	Touch Screen Controller
VGP	Vertical Glidepath
VNAV	Vertical Navigation
VSD	Vertical Situation Display
WAAS	Wide Area Augmentation System
WPT	Waypoint
Wx	Weather Radar
XPDR	Transponder
XM	Weather Satellite Receiver

Table 7-26-1: APEX - Acronyms and Abbreviations (continued from previous page)

Abbreviation / Acronym	Description
YD	Yaw Damper

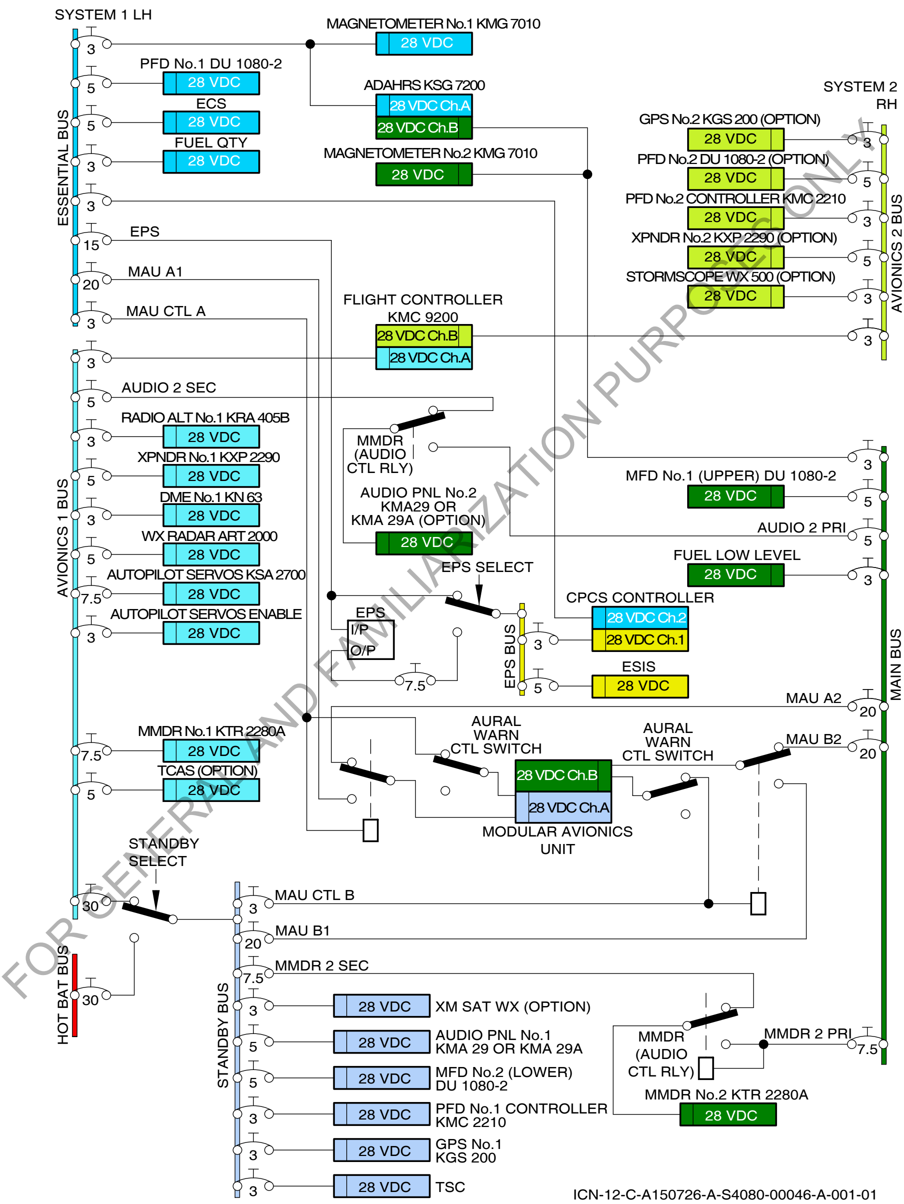

Figure 7-26-1: APEX Equipment - Bus Bar Distribution

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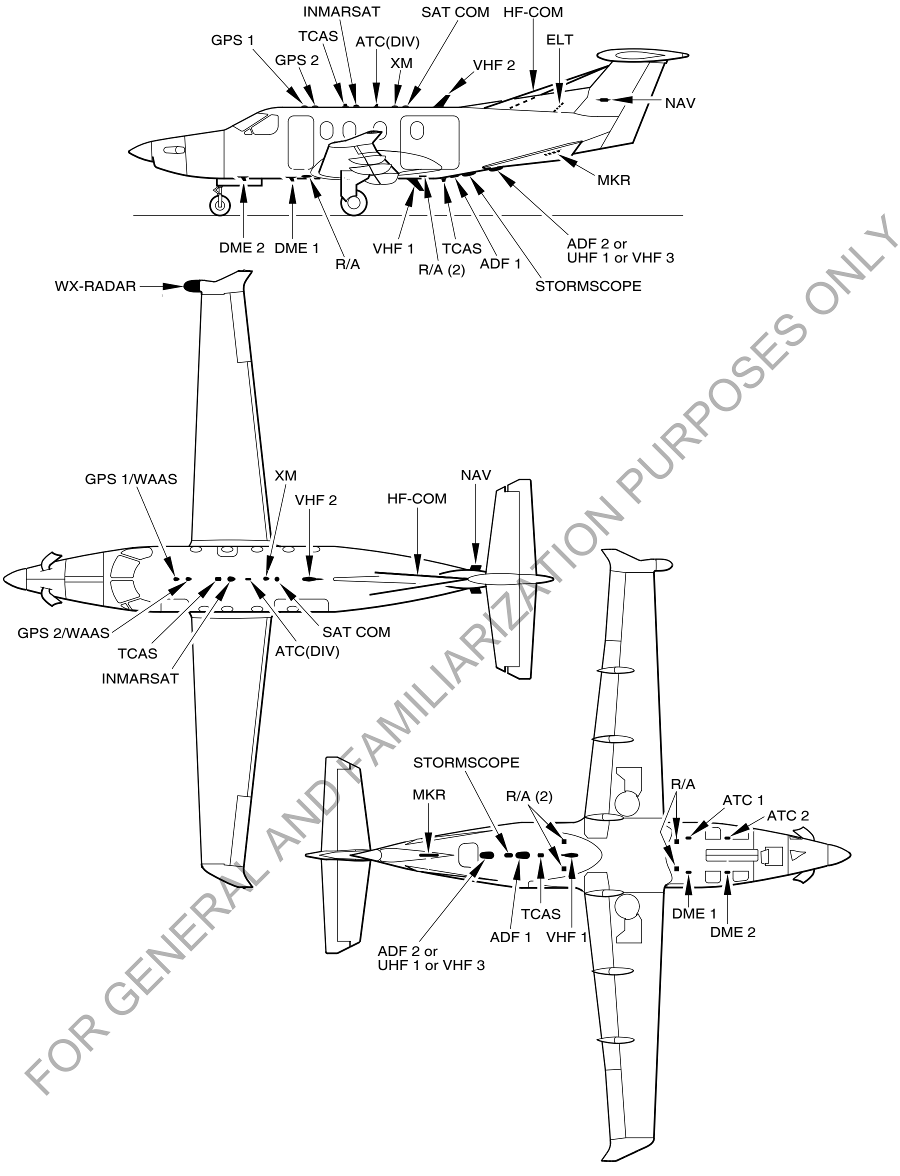

Figure 7-26-2: APEX Equipment - Antenna Locations

7-27 Primus APEX

7-27-1 General

Refer to Fig. 7-27-1, APEX - MAU Configuration for APEX, MAU, displays and controls.

The Primus APEX system is implemented using standard concepts and modular components installed in a Modular Avionics Unit (MAU). Communication via the system components hosted in the MAU comprises a high integrity bus network called Avionics Standard Communication Bus (ASCB). Single channel APEX equipment is powered by a single circuit breaker and dual channel APEX equipment is powered by two circuit breakers connected independently to each channel of the equipment and powered from different aircraft electrical bus bars.

7-27-2 Description

The MAU installed under the cabin floor consists of a cabinet/chassis containing a backplane circuit card assembly, cooling fans and 14 user module slots that host a variety of line replaceable modules. The MAU cabinet is divided into two channels (A and B), each channel is electrically isolated from the other with its own power supply module, Network Interface Controller (NIC) module and data communications backplane. The dual channel architecture of the MAU allows system functions to be distributed between channels. The modules are field replaceable and field loadable with software. The user modules communicate to the ASCB via the NIC modules.

The ASCB consists of two independent busses, the left and right busses correspond to pilot and copilot side primary data. Each NIC in the system reads and writes to the on-side primary bus and reads from the cross-side primary bus.

The aircraft wiring interface to the MAU is segregated into systems, MAU Channel A to system 1 (left side aircraft wiring) and MAU Channel B to system 2 (right side aircraft wiring).

The communication mechanism that Line Replaceable Unit(s) (LRU's) in the APEX system use to communicate is called the Virtual Backplane. The Virtual Backplane comprises an ASCB and the software and hardware mechanisms within the LRU's that communicate on ASCB. LRU's connected to ASCB use a common interface bus control module called a NIC. The NIC provides a high integrity method for an LRU to interface with the ASCB.

A Local Area Network (LAN) provides a general purpose method of transferring data to any LRU in the APEX system. Typical use of the LAN is on-ground data transfer (software installation) and maintenance data transfer. The LAN is connected to each channel of the MAU and the maintenance panel.

Refer to Table 7-27-1 for a list of the line replaceable modules that are installed in the MAU cabinet.

Table 7-27-1: MAU Cabinet - Line Replaceable Modules

Line Replaceable Module	Description
Power Supply (PS) module	A PS module is dedicated to each channel of the MAU. Either power supply can operate both of the MAU cabinet cooling fans. MAU channel A power supply module will normally be powered from the Essential Bus, following the loss of the essential bus power input, channel A would revert to being powered from the Main Bus. MAU channel B power supply module will normally be powered from the Standby Bus, following the loss of the Standby Bus power input, channel B would revert to being powered from the Main Bus. The module contains no processing or backplane communication capability
NIC module	The NIC module provides a gateway for the MAU modules to access ASCB and the LAN. Two NIC modules are installed, one for each channel of the MAU
Aircraft Personality Module (APM)	The APM is a memory storage device connected directly to the MAU NIC module. Two APM's are installed, one for each channel of the MAU. They contain APEX configuration data typically, System Identifier, Aircraft Type, Aircraft Serial Number, Installed Configuration Options and System settings
Advanced Graphics Module (AGM)	The AGM is a single channel module and one is installed for each channel of the MAU. The AGM performs general purpose processing as well as display processing and graphics generation. The Configuration Management System (CMS), charts function and maintenance functions (CMC, ACMS) are also hosted on the AGM module. AGM1 (MAU channel A) drives the Pilot PFD and Upper MFD and AGM2 (MAU channel B) drives the Copilot PFD and Lower MFD. A repeater capability will allow the Pilot PFD to be displayed on the Copilot PFD (and vice-versa) in the event of a single AGM failure. The display controllers, TSC and Display Reversion Control Panel (DRCP) are interfaced with the AGM's. AGM integrity is monitored by the Monitor Warning Function (MWF) which verifies that the data selected by the AGM for display generation has integrity
Generic I/O (GIO) Module	The GIO Module is a dual channel module, each module channel is connected to a different MAU backplane (channel A and B). The GIO module translates aircraft I/O data onto and off ASCB via the MAU's backplane
Custom I/O (CSIO) Module	The CSIO Module is a dual channel module, each module channel is connected to a different MAU backplane (channel A and B). The CSIO module also translates aircraft I/O data onto and off ASCB similar to the GIO module, but is more specialized to meet specific aircraft interface requirements

Table 7-27-1: MAU Cabinet - Line Replaceable Modules (continued from previous page)

Line Replaceable Module	Description
Actuator I/O Processor (AIOP) Module	The AIOP Module is a single channel module and one is installed for each channel of the MAU. The AIOP module is principally associated with the Automatic Flight Control System (AFCS). The Flight Management System (FMS) is hosted on AIOP B and the optional second FMS is hosted on AIOP A.
Processor (PROC) Module	The PROC Module is a single channel module. The PROC Module hosts the Communication Management Function (CMF), Aeronautical Telecommunication Network (ATN) and Enhanced Ground Proximity Warning Function (EGPWF).
Control I/O (CIO) Module	The CIO Module is a single channel input/output module that provides the primary input/output interface to support datalink functionality.

7-27-3 Operation

All the MAU modules use an operating system called Digital Engine Operating System (DEOS). The system provides time and space partitioning that allows functions of mixed criticality levels to coexist on the same processing platform and isolates application software from the underlying hardware used in many of the modules and units. Software objects that reside in DEOS are:

- Threads - that perform a sequence of executions that are time partitioned
- Process - a collection of threads and data that are space partitioned
- Application - a collection of one or more related processes
- Core Software - software that provides all the support functions for the hardware and application
- Boot Software - factory loaded software used to initialize the module and allow software loading.

The APEX operational software for the MAU will be installed for each specific aircraft during production and subsequently in the field for requisite software updates. APEX operational software will be distributed typically on a CD-ROM. Data loading from the CD-ROM is accomplished by using a PC laptop connected to the APEX system installed on the aircraft via a LAN connector on the aircraft Maintenance Panel.

The System Configuration and Data Loading window is a page selection on the systems MFD multi-function window. The Data Loading window is only available when on the ground.

The SYS CONFIG window displays configuration information for all installed software/data bases, including the Top Level System Part Number for the APEX System.

When the Data Loading window is displayed the Touch Screen Controller (TSC) is used to select one of the four selections to start the Data Load process.

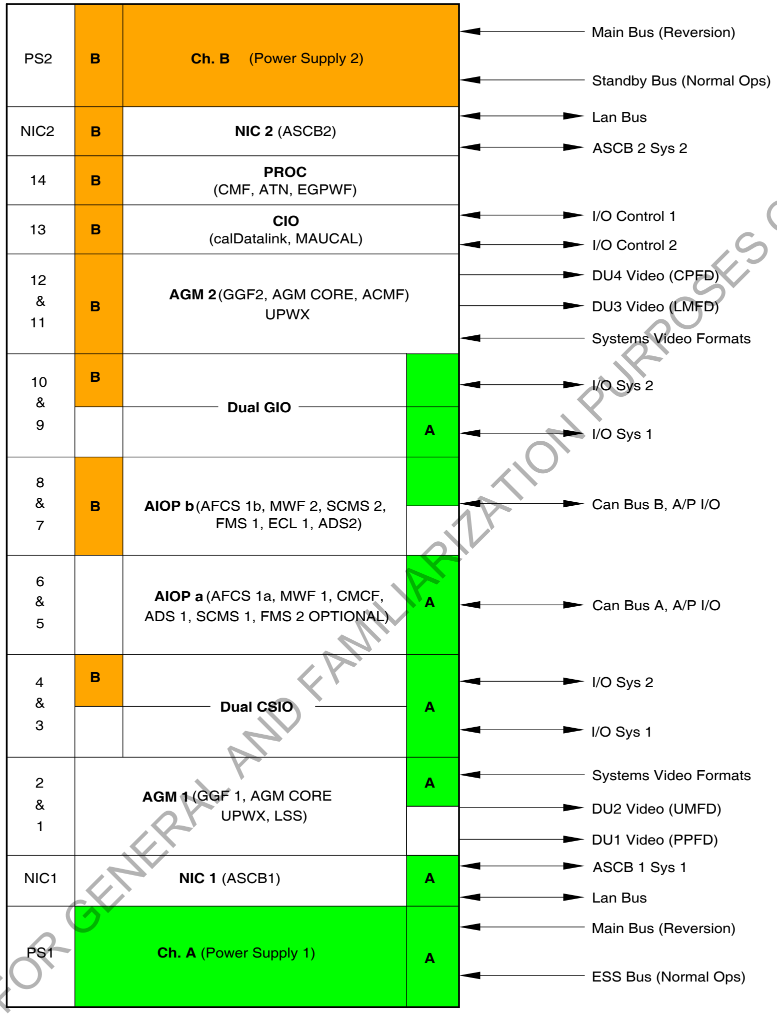

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Figure 7-27-1: APEX - MAU Configuration

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7-27-4 Display and Window Configuration

The APEX Avionics suite is based on a four Display Unit (DU) layout arranged in a T configuration to provide the pilot with quick easy access to avionic operations. The DUs are numbered:

- DU 1 is the pilot's PFD
- DU 2 is the upper MFD (default format is Situation Awareness Display MFD)
- DU 3 is the lower MFD (default format is Systems Display MFD)
- DU 4 is the copilot's PFD (when installed).

The DUs do not contain any flight operational software and are driven by the AGMs installed in the MAU. DUs 1 and 2 are driven by AGM1 and DUs 3 and 4 are driven by AGM2. The DU area of display is divided into 1/6th sections. These sections can be combined into larger sections to generate the required display functionality. These sections of the displays are referred to as windows.

Each DU has a default display/functionality configuration. The functionality is displayed using a 1/6th or 2/3rd window. The default window configurations are shown in Fig. 7-27-2, APEX - Displays. By utilizing the full area of display in the various configuration windows, multiple system operations/functionalities can be shown on a DU at the same time. Each window operates independently of the other windows. The only window size that can be changed is the waypoint list window in the Situation MFD. With the waypoint list window in focus pressing the Cursor Control Device (CCD) or TSC PAGE button changes the display to a 1/3rd window. Selecting FMW returns the 1/3rd window to a 1/6th window.

Window navigation comes under four areas:

- Window entry
- Window focus
- Page operation
- DU focus.

Entry and operation on the interactive windows, which are the Radio and HSI windows on the PFDs and windows colocated to bezel buttons on the MFD's, is by controllers and the DU bezel buttons.

There is a PFD controller which only operates on the PFD and a TSC which operates on the PFDs and the MFDs. The PFD controllers are installed on the inboard side of the PFDs and the TSC is installed in the center console.

The PFD controller push button controls for normal window navigation are:

DME	Shortcut key to the DME detail window on the radio window
DETAIL	Calls up a secondary window related to the current active window providing additional details related to the selected item
PFD	Allows PFD control to be transferred to the other PFD in the event of a controller failure, when in operation PFD Cross Control annunciations are displayed in amber along the bottom right side of the ADI

Refer to the Primary Flight Display paragraph for a description of the controller controls for the PFD ADI/HSI displays and the Communication and Navigation - Controls section for the RADIO controls.

The TSC displays Quick Access (QA) buttons along the left side of the TSC display. The bezel of the TSC is equipped with inner and outer rotating knobs and soft buttons. Basic functionality of the buttons and knobs is given in Table 7-27-2.

Table 7-27-2: TSC knobs and buttons - Functionality

QA buttons	
Home	When the Home QA button is selected, the the TSC screen will show the home page. The home page shows these options: − Direct-To − Inhibits − MFD Format − Show Info − Timers − Settings − WX/LX/TAWS − Datalink (if installed) − Checklist (if installed).
DU & CCD	When the DU & CCD QA button is selected, the TSC screen will show buttons that allow the pilot to select a DU for cursor focus. The TSC screen also provides cursor control in the form of a cursor touchpad. To put cursor focus on a DU, select the desired DU from the buttons at the top of the display (Pilot PFD, Upper MFD, Lower MFD or Copilot PFD). The selected DU will also be highlighted on the DU & CCD QA button. The top right corner of the display shows a PAGE button. Pushing the PAGE button will bring up the dropdown menu for the window that has focus.
COM	When the COM QA button is selected, the TSC screen shows the COM dialog that is used to tune the COM frequencies. The current radio and frequency are shown on the top line of the screen. COM1 and COM2 selection buttons as well as a numpad and various execution buttons are also available.
NAV	When the NAV QA button is selected, the TSC screen shows the NAV dialog that is used to tune the NAV1, NAV2 and ADF radio frequencies. The current navigation source and frequency are shown on the top line of the screen.
XPDR	When the XPDR QA button is selected, the TSC screen shows the XPDR dialog that is used to set the transponder code. The current transponder code is shown on the top line of the screen.
Knobs and soft keys	
Rotating knobs	The TSC has two dual concentric knobs in the lower left and lower right corner of the bezel. The knobs can perform various functions depending on the associated annunciation/label on the TSC screen which is shown above the knob. Example: When **DU Scroll** is shown above a knob, rotating the inner or outer knob controls DU scrolling. When **COM1 Freq** is shown, rotating the inner or outer knob controls the COM frequency.

Table 7-27-2: TSC knobs and buttons - Functionality (continued from previous page)

Soft keys	The TSC has three soft keys installed on the lower bezel. The soft key performs the function as indicated by the label shown above it. The labels available are: **Datalink** (if installed), **MFD Swap** and **Event** For example, when the **MFD Swap** soft key is pushed, the upper and lower MFDs swap position. The label will be greyed out and not selectable when both MFDs are powered off or have failed.

For more information and a description of the remainder of the TSC functions, refer to the relevant system and the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E.

For each interactive window there are adjacent bezel buttons on the outer edge of the DU. The operational bezel buttons have an adjacent soft key, pressing a bezel button without a soft key will have no effect. The bezel buttons are used for toggle operations and selections within a window without having to bring window focus (via the CCD or the TSC) to the area.

Window focus is only obtainable using the CCD or TSC, pressing a bezel button does not bring window focus to a window. The Map window is the default window focus except in composite mode. Only one window can be in focus across the displays. When focus is obtained a cyan border will be shown around the window. After an inactive period of 60 seconds the window focus will return to the Map window. When focus is brought to a new display the cursor will bloom for approximately 10 seconds.

When window focus is brought to a window that has data entry fields a cursor colored cyan will be placed on the first data entry field. The CCD or the TSC can then be used to position the cursor onto a required data entry field. At power up the cursor is placed in the upper left corner of the default Map window.

Page operation is accomplished by pressing the PAGE button on the CCD or the TSC when in an active window. A menu listing the available pages for the window will be displayed. To make a selection and display a new window, use the ENTER button on the CCD or the TSC touchpad tap (ENTER function). Pressing the PAGE button again or after 30 seconds of display the page menu is removed. There are two types of menus:

Page menus	To access pages of functions contained in the same window
Functionality menus	To show selection headings that remain the same regardless of the current mode of operation.

All menus once selected have cursor snapping, whereby the cursor snaps to the first item in the menu and to the subsequent items with trackball or touchpad operation. When an entry is made the cursor is caged inside the data field until the entry is completed by pressing the ENTER key or clearing the entry with the CLEAR or DELETE keys. If a TSC short cut key is pressed or the cursor time out period is reached the entry is considered not finished and reverts to the previous value.

The TSC has Quick Access (QA) buttons which can be used to quickly access functionality also available on the windows. Pressing a QA button will bring up the applicable dialog field on the TSC screen (refer to Table 7-27-2).

Pressing the Show Info button activates the WPT window (if not displayed) and transfers cursor focus to the waypoint information display box.

Pressing the Direct-To button opens the FMW (if not opened), activates the direct-to-page, and sets the cursor focus to the DIR field for subsequent entry of a direct-to-waypoint into the flight plan.

A CCD is installed on the top rear of the center console. It provides the crew with a more ergonomic means for controlling the cursor movement on the DUs. The CCD is connected to a Control Unit which provides the interface between the CCD and the Primus APEX Modular Avionics Unit (MAU). The Control Unit is powered through the Pilot PFD CONT/CCD circuit breaker from the Standby Bus and therefore the CCD can be used for preflight functions (engine not running). The CCD will continue to provide the same functionality as the TSC related controls, in the event of a TSC failure. The CCD has a trackball to select focus and drop down menus, and a scroll wheel. The scroll wheel can be pressed sideways (left) to operate the page function. On the left side of the CCD is an Enter pushbutton, on the right side a Focus pushbutton. The Focus pushbutton swaps display focus between the installed displays in a counterclockwise direction.

The Display Units each have a power supply from a different power bus. The pilots DU is powered from the Essential Bus, The upper MFD is powered by the Main Bus, the lower MFD is powered by the Standby Bus and the copilots DU (when installed) is powered by the Avionic 2 bus.

7-27-5 Display Reversion

The display system is capable of reverting the Display Units (DU) and Advance Graphics Module 1 and 2 (AGM) by pilot operation in the event of a display or AGM failure condition. A Display Reversion Control panel is installed on the center console between the throttle quadrant and the CCD.

The control panel has potentiometers for the PILOTS PFD, UPPER MFD, TSC, LOWER MFD and CO-PILOTS PFD (when installed). The potentiometers are used to adjust the individual DU brightness and to switch the displays to OFF/REV. At the OFF/REV position the DU goes blank and the display is moved to another display. In a reversion scenario (e.g. Pilot PFD displayed on Upper MFD) the navigation information displayed will be based on the Nav sensor selected on the source display. In some cases the PFD will go into a composite mode. The PFD composite format shows the ADI/HSI, up to twelve CAS messages, Systems Summary and Radio windows.

The PILOTS PFD and CO-PILOTS PFD (when installed) controls also have a rotating switch that can be used to select from the NORM position to the other AGM in the event of a primary AGM drive failure indicated by a red X displayed across the DU.

In the event of a Multi Function Display (MFD) failure, the Situation Awareness or the Systems data can be switched to the remaining MFD by pressing the MFD swap soft key on the TSC.

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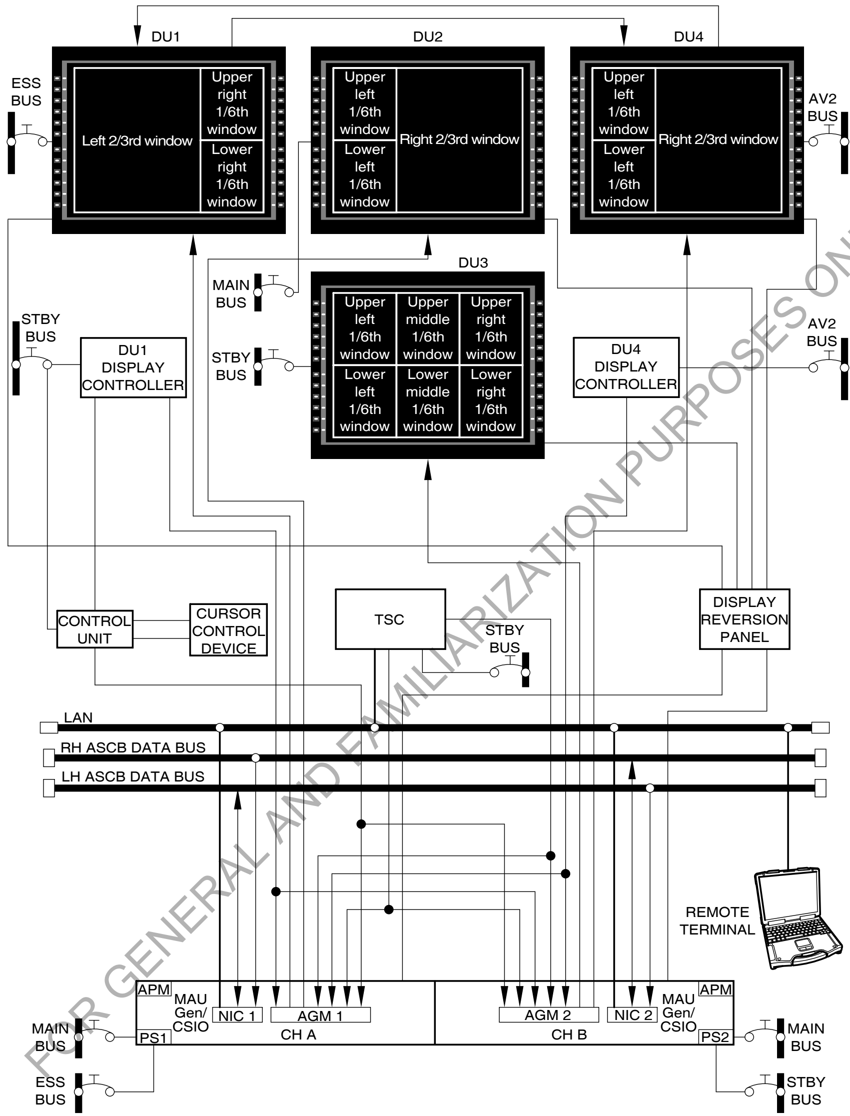

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Figure 7-27-2: APEX - Displays

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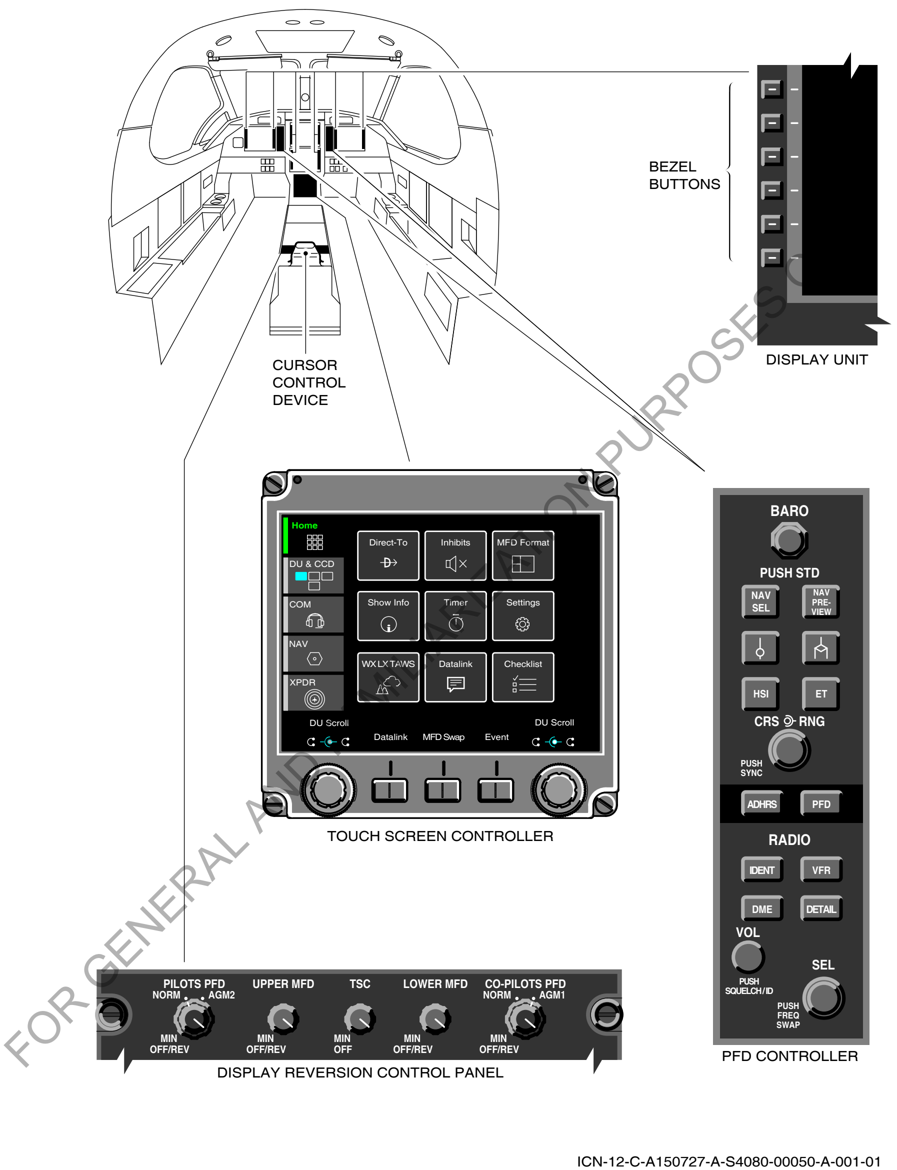

Figure 7-27-3: APEX - Controls

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7-27-6 Primary Flight Display

Refer to Fig. 7-27-4, Typical APEX ADI HSI Display - HSI Rose.

The Primary Flight Display (PFD) provides all the essential flight data to the pilot. The PFD displays attitude, heading, airspeed and altitude in the left 2/3rd window. The right upper 1/6th window displays the engine indicators and the right lower 1/6th window displays the radio controls, refer to the Engine and Primus APEX - Communication and Navigation sections for a description of these windows. A second optional PFD can be installed for the copilot, the window layout on this PFD is shown in a mirror image.

In normal operation the PFD receives air data, heading inputs for flight guidance, radio navigation or FMS data and engine instrument data. The PFD is divided into the following display areas:

- Flight Mode Annunciators (FMA)
- Attitude Director Indicator (ADI)
- Airspeed
- Altitude
- Vertical Speed
- Horizontal Situation Indicator (HSI) Displays and Annunciators
- Radio Management
- Engine Instruments.

Attitude information is displayed on an electronic ADI and heading and course information on an electronic HSI.

The T/O and LDG V-speeds are entered from the FMW. All V-speed entries are limited from 30 to 200 knots with the exception of VT that is limited from 30 to V_{MO} knots. Only entered V-speeds will be displayed. The ADI T/O V-speeds are displayed in the lower portion of the airspeed tape, if the aircraft is “on ground” and below 45 knots. The ADI T/O V-speed bugs are displayed on the airspeed tape while the Indicated Airspeed is less than the highest V-speed (VX, VR and VY) plus 10 knots. The ADI Landing/Approach bugs are displayed while airborne and the indicated Airspeed transitions to less than the highest V-speed (VT, VREF and VGA) plus 40 knots. 5 seconds after landing the T/O V-speeds are displayed on the airspeed tape or in the preview window if speed is below 45 knots. After an electrical power cycle the V-speeds have to be reprogrammed for the next flight.

The Dynamic Speed Bug (DSB) is shown as a green chevron on the right side of the airspeed tape when the calibrated airspeed is 45 knots or more and the aircraft status is in-air. The DSB is removed when the aircraft is on the ground and below 45 knots for more than 5 seconds. Based on angle of attack information, the DSB indicates 1.3 V_S referenced to the airspeed tape.

The Avionics window on the systems MFD provides the pilot with the capability to configure some display options on the ADI and HSI, and to utilize the FMS custom database feature.

The displayed data is compared by the comparison monitors and if data is determined to be invalid or miscompare, warning, caution and miscompare annunciations are shown on the PFD. The warning annunciators are shown in white on a red box or a red cross over the symbol or tape. Some miscompare annunciators are shown in white on a red box and some are shown in black on an amber box. The NO TAKEOFF and ATT FAIL annunciators are shown in the same location on the ADI. For annunciator detail refer to:

- Fig. 7-27-4, Typical APEX ADI HSI Display - HSI Rose
- Fig. 7-27-5, Typical APEX ADI HSI Display - HSI Arc
- Fig. 7-27-6, Typical APEX ADI HSI Display - Failed Indications
- Fig. 7-27-7, Typical APEX ADI HSI Display - All Failures
- Fig. 7-27-8, Typical APEX ADI HSI Display - Miscompare Annunciations.

The following displays can be overlaid on the HSI in the partial compass (ARC) mode:

- Traffic
- Weather Radar
- Lightning (optional)
- Terrain from EGPWS (optional).

The PFD controller contains the controls for ADI/HSI:

BARO	Rotary click knob for the setting of the current barometric pressure value for display on the PFD altitude window for the selected ADAHRS channel. Clockwise rotation increments and counter clockwise decrements the barometric correction value
PUSH STD	Push button to set the current barometric pressure value to standard pressure
NAV SEL	Push button to cycle through the navigation sources shown on the HSI display
NAV PRE-VIEW	Push button to activate and cycle through available navigation sensors when FMS is the active sensor
O (circle)	Push button to cycle through the No. 1 sources of navigation bearing to be displayed on HSI as a circle pointer (single pointer)
◊ (diamond)	Push button to cycle through the No. 2 sources of navigation bearing to be displayed on HSI as a diamond pointer (double pointer)
HSI	Push button to alternate HSI display between compass and arc formats
ET	Push button to activate and control an elapsed timer displayed on PFD
CRS/RNG	Dual rotary click knob, inner for control of the desired VOR/LOC course to be flown and the selected navigation sensor shown on the HSI. Outer for control of the range display on the HSI
PUSH SYNC	Push button to cause a synchronization of the selected course to the current VOR bearing, if a VOR is the selected navigation sensor

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Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for complete information on the description and operation of the PFD.

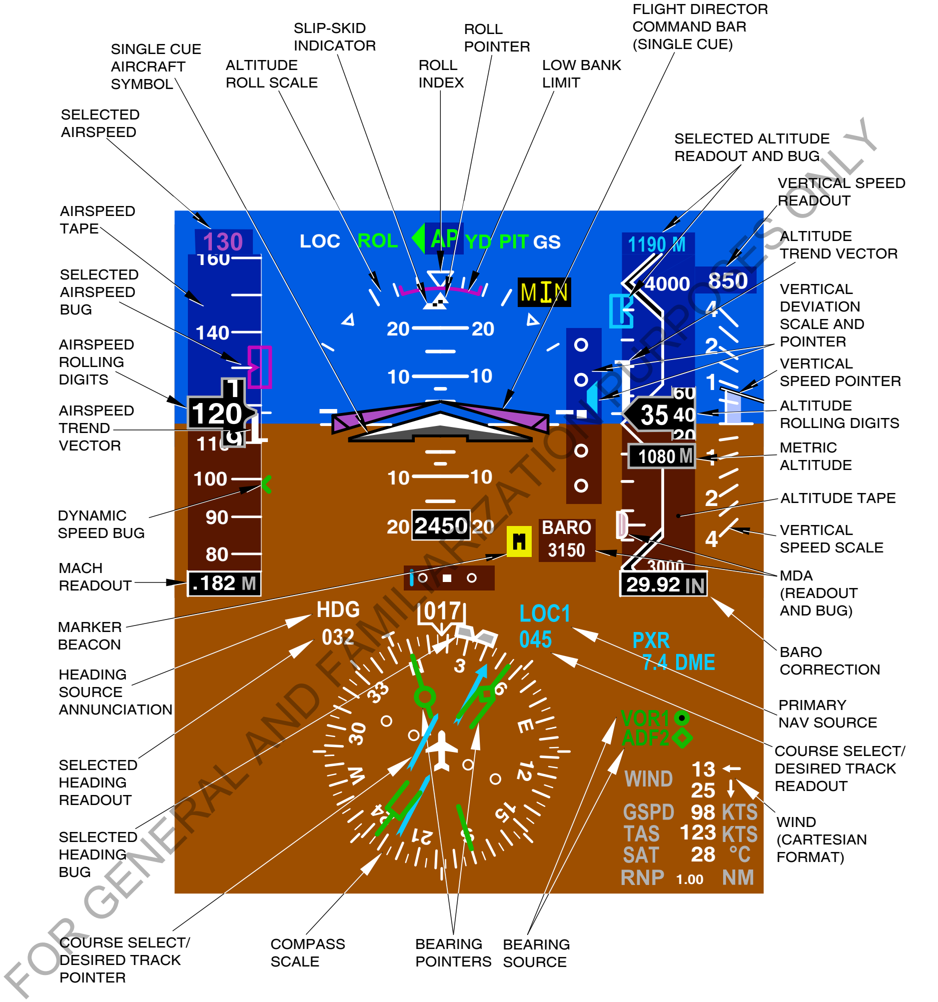

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Figure 7-27-4: Typical APEX ADI HSI Display - HSI Rose

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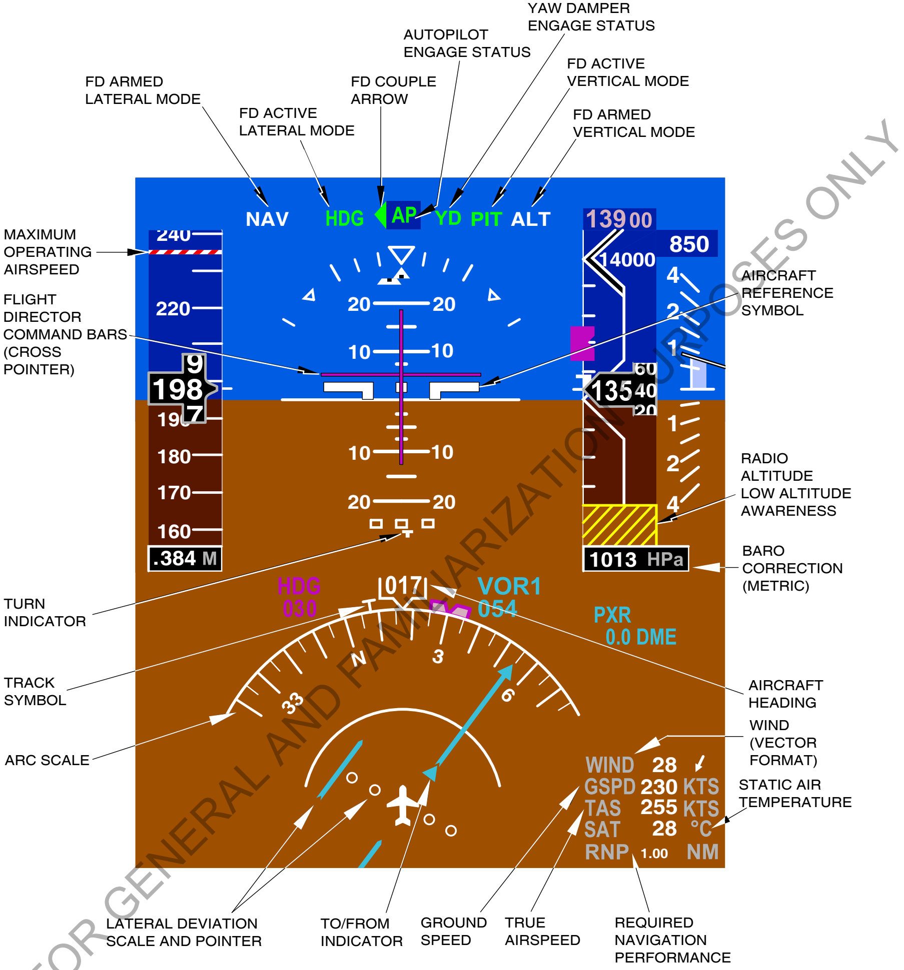

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Figure 7-27-5: Typical APEX ADI HSI Display - HSI Arc

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Figure 7-27-6: Typical APEX ADI HSI Display - Failed Indications

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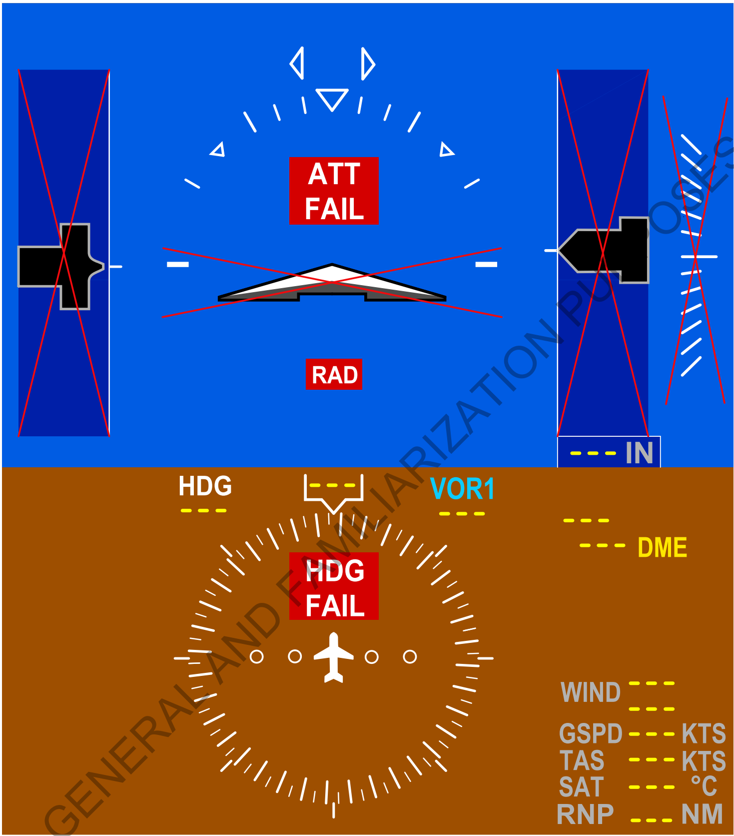

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Figure 7-27-7: Typical APEX ADI HSI Display - All Failures

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Figure 7-27-8: Typical APEX ADI HSI Display - Miscompare Annunciations

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7-27-7 Situation Awareness Multifunction Display

The upper MFD default display is used for situation awareness formats with various other system displays in dedicated windows. The bezel buttons on the sides of the MFD are used to select formats and control various systems. Refer to the Flight Management System section and the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for complete information on the description and operation of the MFD.

7-27-8 Systems Multifunction Display

Refer to Fig. 7-27-9, Systems Multi Function Display.

The lower MFD default display is used for the aircraft systems displays and control for the display of CAS messages. The MFD display is divided into six windows with the two center windows further sub divided. Refer to the relevant aircraft system section for further information on the content of systems MFD windows, apart from the lower left window which displays the following menus:

CKLST	If no valid database is installed, the window will display (optional) Checklist Unavailable. If installed, displays an electronic Normal Procedures Checklist as a menu line item
SENSORS	Sensor Type selections provide a hierarchical view of the navigation status to the pilot. The highest levels contain summary information and the lower levels contain more sensor specific details. The pull down menu contains selection of the Performance, FMS and GPS pages
WX/LX/TAWS	The Weather, Lightning and Terrain set up pages can be accessed from their individual tabs
AVIONICS	The avionics window gives the capability to configure the following display options on the ADI and HSI from the PFD tab: – Barometric correction imperial or metric – Metric altitude enable or disenable – Wind format X-Y or vector – Heading display magnetic or true – Baro synchronization enable or disable.

DATALINK	The datalink window gives the flight crew access to text based communications using a datalink network:
	– Datalink
	  ● Airline Operational Control (AOC)
	  ● Air Traffic Services (ATS)
	– Protected Mode Controller Pilot Datalink Communications (PM-CPDLC) (optional).

The following display option is controlled from the FCS tab:

Flight Director command cue s-cue or cross pointer

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The Custom DB tab is used for managing the FMS custom database:

SCMS/DL	Only available on the ground. The Configuration Management Systems page displays configuration information for all installed software/databases and is used for return to service type operations.

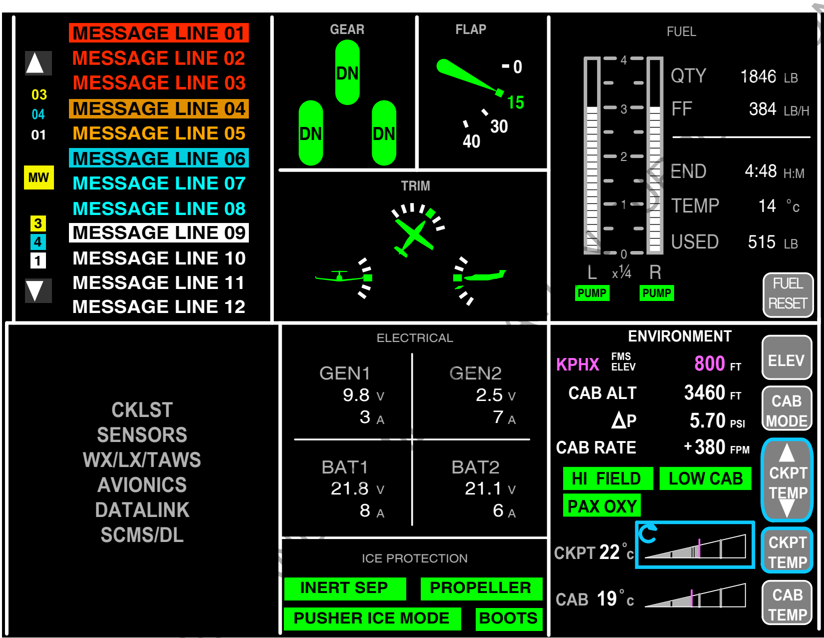

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Figure 7-27-9: Systems Multi Function Display

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7-27-9 Indication / Warning

The Crew Alerting System (CAS) window on the systems MFD will show the following Caution and Advisory messages for the APEX core system status (refer to Table 7-27-3):

Table 7-27-3: Primus APEX - CAS Messages

CAS Message	Description
MAU A Fail MAU B Fail	Indicates Channel A or B of Modular Avionics Unit is failed
Check DU 1 Check DU 2 Check DU 3 Check DU 4 Check DU 1+2 Check DU 1+3 Check DU 1+4 Check DU 2+3 Check DU 2+4 Check DU 3+4 Check DU 1+2+3 Check DU 1+2+4 Check DU 1+3+4 Check DU 2+3+4 Check DU 1+2+3+4	Indicates that there is a problem with either a Display Unit, the fiber channel between the AGM and Display Unit or a Display Unit connector
DU 1 Overheat DU 2 Overheat DU 3 Overheat DU 4 Overheat DU 1+2 Overheat DU 1+3 Overheat DU 1+4 Overheat DU 2+3 Overheat DU 2+4 Overheat DU 3+4 Overheat DU 1+2+3 Overheat DU 1+2+4 Overheat DU 1+3+4 Overheat DU 2+3+4 Overheat DU 1+2+3+4 Overheat	Indicates one or two or three or four (if installed) Display Units have overheated
Check Pilot PFD Check Copilot PFD Check Engine Display	Indicates pilots PFD wrap monitor failed Indicates copilots PFD wrap monitor failed Indicates pilot and copilot engine displays wrap monitor failed
LH PFD CTLR Fail RH PFD CTLR Fail LH+RH PFD CTLR Fail	Indicates Pilot's PFD Controller has failed (on ground only) Indicates Copilot's PFD Controller has failed (on ground only) Indicates Pilot's and Copilot's PFD Controllers have failed (on ground only)
ASCB Fail	Indicates Avionics Standard Data Bus has failed
APM 1 Fail APM 2 Fail APM 1+2 Fail	Indicates No.1, No. 2 or both Aircraft Personality Modules have failed (on ground only)

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Table 7-27-3: Primus APEX - CAS Messages (continued from previous page)

CAS Message	Description
CMS 1+2 Fail	Indicates No.1 and No. 2 Configuration Management System has failed (on ground only)
System Config Fail	Indicates System Configuration Monitor detects a HW or SW configuration error (on ground only)
Validate Config	Indicates System Configuration Monitor detects a system part number change (on ground only)
APM Miscompare	Indicates Aircraft Personality Modules disagree over installed systems configuration (on ground only)
AIOP A Module Fail AIOP B Module Fail	Indicates Actuator I/O Module Ch A or B has failed in the Modular Avionics Unit
CSIO A Fail CSIO B Fail CSIO A+B Fail	Indicates Custom I/O Module Ch A or B has failed in the Modular Avionics Unit
MAU A Overheat MAU B Overheat MAU A+B Overheat	Indicates Modular Avionics Unit Channel A or B or both channels have overheated
MAU Fan Fail	Indicates a Modular Avionics Unit cooling fan has failed
GIO A Fail GIO B Fail GIO A+B Fail	Indicates Generic I/O Module Ch A or B or both have failed in the Modular Avionics Unit
AGM 1 fail AGM 2 fail	Indicates Advanced Graphics Module Ch A or B has failed in the Modular Avionics Unit
TSC Fail	Indicates Touch Screen Controller has failed
TSC Fan Fail	Indicates Touch Screen Controller fan has failed
LH PFD CTLR Fail RH PFD CTLR Fail LH+RH PFD CTLR Fail	Indicates Pilot's PFD Controller has failed Indicates Copilot's PFD Controller has failed Indicates Pilot's and Copilot's PFD Controllers have failed
CMS 1 Fail CMS 2 Fail	Indicates Configuration Management System 1 or 2 has failed Indicates Configuration Management System 2 has failed

7-28 Primus APEX - Attitude and Heading

7-28-1 General

Refer to Fig. 7-28-2, Attitude and Heading - Polar Regions.

The Attitude and Heading system comprises:

- Air Data and Attitude Heading Reference System (ADAHRS)
- Electronic Standby Instrument system (ESIS).

7-28-2 Air Data and Attitude Heading Reference System (ADAHRS)

7-28-2.1 General

The aircraft is equipped with one dual channel ADAHRS. Each channel has a separate power supply, Channel A from the Essential Bus and Channel B from the Main Bus. The system provides primary attitude, heading and air data parameters from each channel to the Modular Avionics Unit (MAU). This ensures that a single component failure will not affect both channels.

7-28-2.2 Description

Each channel of the ADAHRS contains a solid-state Microelectromechanical Systems (MEMS) technology sensor block, which contains three rate sensors and three accelerometers in an orthogonal triad configuration. The triad in Channel B is skewed relative to Channel A. Each channel has an interface for an Outside Air Temperature (OAT) probe, a magnetometer and two isolated absolute pressure sensors (one for pitot and one for static pressure). Channel A receives inputs from the No. 1 pitot/static, magnetometer and temperature probe. Channel B receives inputs from the No. 2 pitot/static, magnetometer and temperature probe. Each channel also has a Central Processing Unit (CPU). The ADAHRS is installed under the cabin floor between frames 25 and 26.

During normal operation the pilots Primary Flight Display (PFD) receives ADAHRS source data from the No. 1 pitot/static system (left side sensors) and ADAHRS Channel A. The copilot PFD (when installed) receives ADAHRS source data from the No. 2 pitot/static system (right side sensors) and ADAHRS Channel B. The controllers for the pilot and copilot PFD have an ADHRS button, which can be used to change the PFD ADAHRS source channel. ADAHRS source annunciations will be shown in amber in the lower left region of PFD Attitude Director Indicator (ADI) window when the same source has been selected on both pilot and copilot PFDs.

The ADAHRS also receives data from the Global Positioning Systems (GPS) sensor, in the single GPS installation the data signal is connected to both ADAHRS channels. In an optional dual GPS installation, the GPS 1 data signal is connected to the ADAHRS channel A and the GPS 2 data signal is connected to the ADAHRS channel B.

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7-28-2.3 Operation

Each ADAHRS channel CPU receives air data, temperature and heading information from that channel's sensor block and passes it to the other channel. Both CPU's compare the data to verify sensor integrity. Verified AHRS and air data information is sent to each channel of the MAU for the APEX system.

If the data from a sensor does not pass the verification check the data is discarded and not used. A fault signal will be sent to the MAU and a caution will be shown on the Crew Alerting system (CAS). In this case the ADHRS button on the PFD Controller for the failed side can be pressed to change the ADAHRS source channel to the opposite side.

7-28-2.4 High And Low Latitude Operations

The ADAHRS automatically provides calculated magnetic track, when the measured horizontal magnetic field strength is less than 60 mGauss but still within the coverage of the Magnetic Variation look up table of the Flight Management System (FMS), and true track when operating outside this coverage. When true track is displayed, the airplane symbol on the INAV and Charts display is removed. When flying from true track zone into magnetic track zone, magnetic mode needs to be manually selected on the Avionics window. The Weather Radar, Stormscope and TCAS data is always shown relative to the aircraft's nose and is therefore not corrected for Drift Angle in Track Mode.

The coverage of the Magnetic Variation look up table can be seen in the Fig. 7-28-2, Attitude and Heading - Polar Regions. If desired, the crew can also manually select a true North reference before the automatic switch from mag to track occurs. As soon as the measured horizontal magnetic field strength is more than 75 mGauss, the system automatically switches back to the MAG HDG. This hysteresis can be seen in Fig. 7-28-1, Hysteresis Figure of the Magnetic Variation below.

Note
Magnetic Heading is not reliable in regions where the magnetic inclination (dip angle) exceeds 80° due to environmental variations.

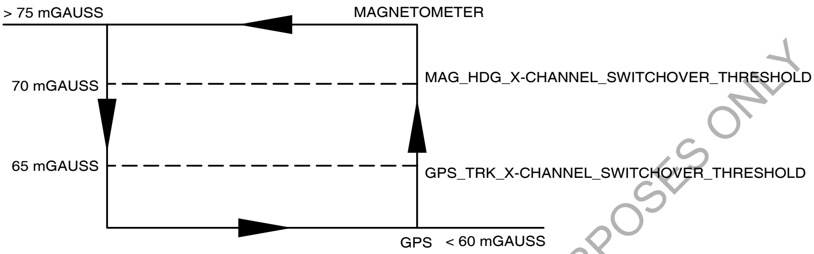

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Figure 7-28-1: Hysteresis Figure of the Magnetic Variation

7-28-2.5 Horizontal Magnetic Field Strength

On the ground in geographical latitudes where the measured horizontal magnetic field strength is less than 60 mGauss and the aircraft ground speed is less than 9 kts neither heading from the ADAHRS, nor track from the GPS is provided. Therefore heading flags (HDG FAIL) are shown on the Horizontal Situation Indicator (HSI) and (HDG) on the Interactive Navigation (INAV). During the initial takeoff roll track output is provided and the heading flags are removed.

With the optional HDG/TRK Override switch installed (Refer to Fig. 7-19-1), the pilot can manually force the system into a magnetic HDG or GPS-TRK mode, independent from the implemented automatic switching.

7-28-2.6 Optional HDG/TRK Override Switch

An optional HDG/TRK Override switch can be installed on the right side of the pilot's lower left panel. It is a three position rocker type switch with the positions GPS TRK / AUTO / MAG HDG. The switch gives the pilot the ability to select either GPS Track or Magnetic Heading as directional indication on the HSI, independent of the implemented automatic switching.

With the switch in AUTO (normal position) the measured magnetic HDG is shown on the HSI as long as the measured horizontal magnetic field strength is at least 60 mGauss. If the measured horizontal magnetic field strength becomes less than 60 mGauss the system automatically switches to track reversion mode and GPS-TRK will be indicated on the HSI. In this case the pilot should manually switch to TRK on the Automatic Flight Control System (AFCS) panel. The system automatically switches back to the MAG HDG as soon as the measured horizontal magnetic field strength is more than 75 mGauss (hysteresis).

If the HDG/TRK Override switch is in the GPS TRK position, the system is forced to indicate GPS-Track on the HSI. In this case two different readings are possible on the HSI either magnetic track or true track. If the magnetic variation look up table of the FMS is valid the HSI reading will be magnetic track (MAG TRK) and a CAS **HSI is MAG TRK** message will be shown. If the magnetic variation look up table is not valid the HSI reading will be true track (TRU TRK) and a CAS **HSI is TRU TRK** message will be shown.

If the HDG/TRK Override switch is in the MAG HDG position, the system is forced to indicate magnetic heading on the HSI. With a measured horizontal magnetic field strength of less than 60 mGauss this may lead to HDG comparator flags and the magnetic heading on the HSI may show inaccurate or unstable readings.

Refer to Pilatus Pilot Guide Document No. 02336 for more information on the operation of the HDG/TRK override switch. The guide can be found at: www.pilatus-aircraft.com -> Menu -> Customer Support -> MyPilatus Customer Portal.

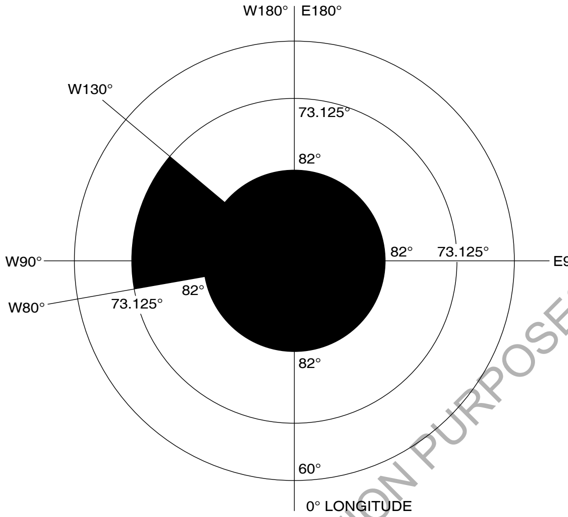
7-28-2.7 Indication/Warning

The CAS window of the systems Multi Function Display (MFD) displays the following Cautions and Advisory messages for the ADAHRS status (refer to Table 7-28-1):

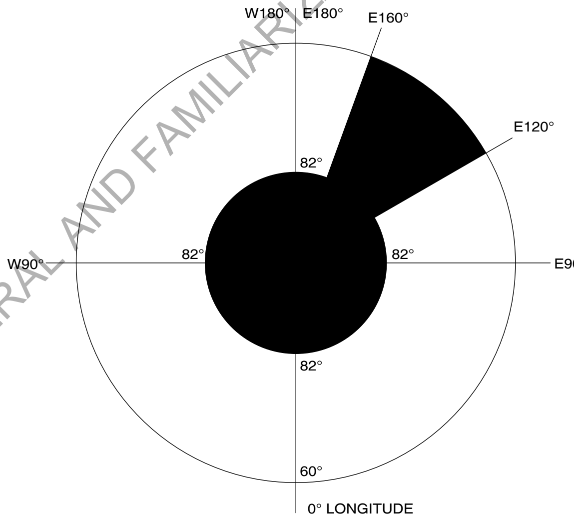
Table 7-28-1: ADAHRS - CAS Messages

CAS Message	Description
ADC A fail **ADC B Fail** **ADC A+B Fail**	Loss of altitude and airspeed data from ADAHRS Channel A Loss of altitude and airspeed data from ADAHRS Channel B Loss of altitude and airspeed data from ADAHRS Channel A and B
AHRS A Fail **AHRS B Fail** **AHRS A+B Fail**	Loss of attitude and heading data from ADAHRS Channel A Loss of attitude and heading data from ADAHRS Channel B Loss of attitude and heading data from ADAHRS Channel A and B
HSI 1 is MAG TRK **HSI 1 is TRU TRK** **HSI 2 is MAG TRK** **HSI 2 is TRU TRK** **HSI 1 + 2 is MAG TRK** **HSI 1 + 2 is TRU TRK**	HSI 1 is referenced to a magnetic track HSI 1 is referenced to a true track HSI 2 is referenced to a magnetic track HSI 2 is referenced to a true track HSI 1 and 2 is referenced to a magnetic track HSI 1 and 2 is referenced to a true track
LH OAT Fail	Loss of total and static air temperature from ADAHRS Channel A
RH OAT Fail	Loss of total and static air temperature from ADAHRS Channel B
LH+RH OAT Fail	Loss of total and static air temperature from ADAHRS Channel A and B

Refer to the Pitot Static Systems, Section 7-20, Pitot Static Systems, for the pitot and static systems cautions.



Polar Cut Out Region North



Polar Cut Out Region South

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Figure 7-28-2: Attitude and Heading - Polar Regions

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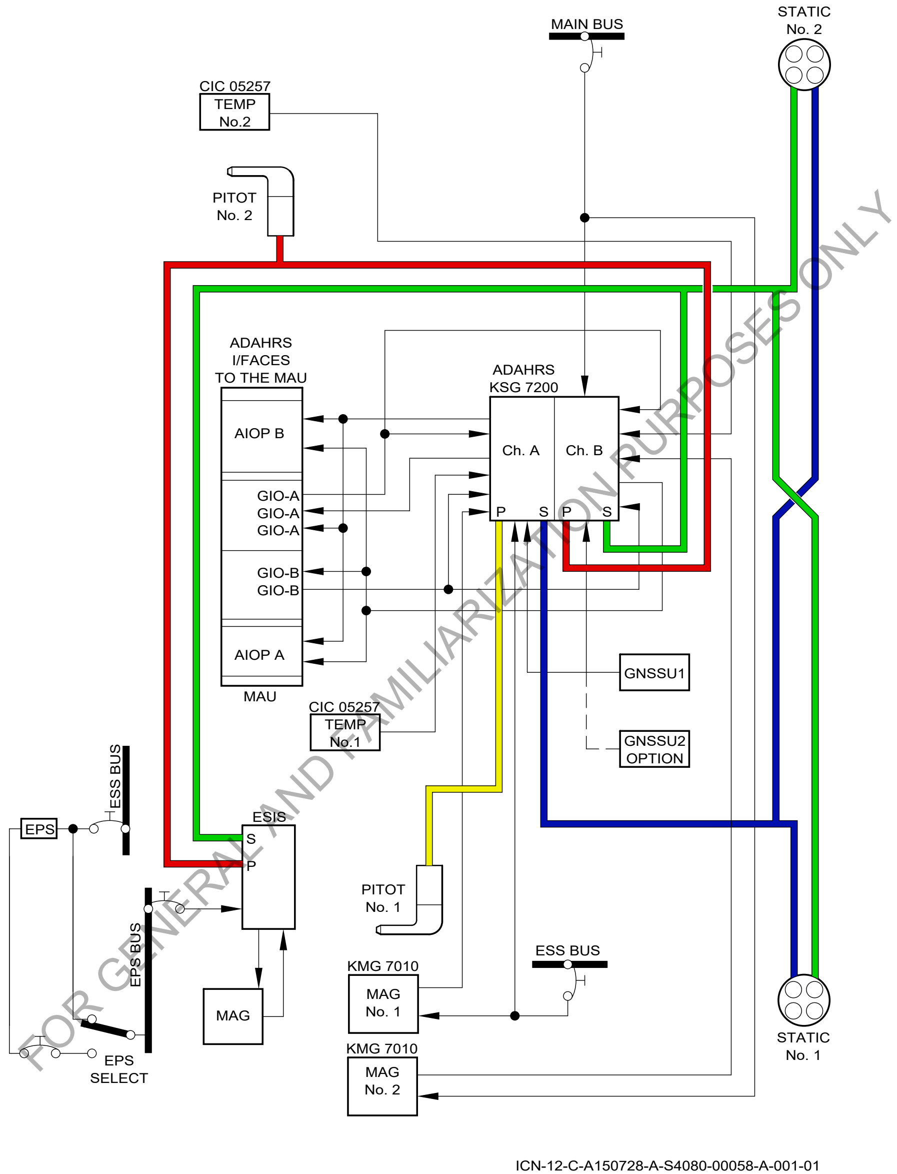

Figure 7-28-3: Attitude and Heading – Schematic

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7-28-3 Electronic Standby Instrument System (ESIS)

Refer to Fig. 7-28-3, Attitude and Heading, for system schematic

Refer to Fig. 7-28-4, ESIS - Typical Operational Display

Fig. 7-28-5, ESIS - Typical Splash Screen Display

Fig. 7-28-6, ESIS - Typical ATT Aligning Display

Fig. 7-28-7, ESIS - Typical Failure Flags

7-28-3.1 General

The ESIS provides displays for attitude, altitude and airspeed in case of primary display failure. It is also a Standby Magnetic Direction Indicator that gives an alternate source for magnetic heading. The ESIS is independent of the Primus APEX system and is installed on the left instrument panel.

The ESIS contains electronic inertial and pressure sensors and electronic processors which calculate and display attitude, skid/slip, altitude, airspeed, and VMO.

Electrical power is supplied from the Emergency Power Supply (EPS) busbar. Static and pitot pressure inputs to the ESIS come from the right hand No. 2 pitot/static system. The heading display is from a separate magnetometer installed in the right wing.

7-28-3.2 Description

The ESIS internal inertial sensors compute and display the attitude (pitch and roll), skid/slip and altitude on an active LCD matrix color display screen.

Internal pressure sensors measure the total and static pressure to compute and display altitude, indicated airspeed corrected for Static Source Error Correction (SSEC) and VMO. The ESIS also displays magnetic heading from a separate magnetometer.

If a failure is detected by the ESIS in its system, the display of the corresponding data is removed from the screen and it is replaced by either a failure message (“Attitude Fail”) or by a red cross.

The ESIS has a rotating push-button knob and a single bezel key marked MENU which is used to access the in-flight menu. When the in-flight menu is active, the menu items are selected and adjusted by rotating and pressing the knob.

An ambient light sensor is provided on the ESIS bezel. The ambient light sensor is used by the ESIS to automatically control the display brightness based on the intensity of the ambient light and the brightness offset value selected by the pilot within the in-flight menu.

The ESIS in-flight menu has the following selectable items:

- Set BRT Trim
- BARO Units
- Metric Altitude
- Attitude Alignment
- System Status.

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Display brightness

The display brightness is controlled by selecting the Set BRT Trim item within the in-flight menu. Use the rotating knob to increase or decrease the brightness offset value.

Barometric pressure units

The units for barometric pressure can be changed using the BARO Units item within the in-flight menu. Barometric pressure can be displayed in Millibars, Hectopascals or Inches of Mercury based on the unit selected.

When the in-flight menu is not active, the rotating knob is used to increase or decrease the barometric pressure. Pressing the rotating knob sets the barometric pressure to STD.

Metric altitude

The metric altitude display can be set to ON or OFF by selecting the Metric Altitude item within the in-flight menu.

Attitude alignment

Attitude alignment can be manually activated by selecting the Attitude Alignment item within the in-flight menu and then pressing the rotating knob to confirm.

Note
Manual attitude alignment is performed when an attitude discrepancy (more than 4°) between the ESIS and PFD is detected by the pilot. The attitude alignment function can only be used in straight and level flight.

The alignment of attitude may take up to 3 minutes to complete depending on the motion of the aircraft. The attitude message and progress bar remain showing on the screen until the unit is properly aligned. During alignment, the magnetic heading indication is removed from the screen.

System status

The system status item within the in-flight menu displays the aircraft effectivity applicable to the currently installed aircraft configuration file.

Ground/flight switching

The ESIS uses airspeed data to switch between ground/flight conditions automatically.

Magnetic heading

Magnetic heading information must not be used in the following regions due to unsuitable magnetic fields (a red HDG failure flag will be displayed):

- North of 70° N latitude
- South of 70° S latitude
- North of 65° N latitude between 75° W and 115° W longitude (northern Canada)
- North of 62° N latitude between 87.5° W and 100° W longitude (northern Canada)
- North of 65° N latitude between 75° E and 120° E longitude (northern Russia)
- South of 55° S latitude between 120° and 165° E longitude (south of Australia and New Zealand).

The magnetic heading will fail (a red HDG failure flag will be displayed) if the calculated magnetic dip angle exceeds 82° and may fail in regions where the magnetic dip angle exceeds 80° due to environmental variations.

7-28-3.3 Operation

Power off

The ESIS is not operational and the display is blank.

Power on

The ESIS checks for software, hardware and DCM-750 compatibility during start-up. If no errors are detected, the unit starts initialization and obtains the aircraft configuration and installation settings from the configuration module. Errors detected at this time are shown as an error message on the splash screen (refer to Fig. 7-28-5).

After the self-check and initialization are completed, the ESIS splash screen is displayed and shows the system identification information for approximately 5 seconds including: company name, system name and software and firmware version. After the spash screen is removed, the ESIS enters normal mode and begins automatic alignment.

During alignment an ATT ALIGNING message is displayed above the aircraft reference symbol. A progress bar is located below the aircraft reference symbol until the unit is properly aligned. During alignment the magnetic heading is invalid (refer to Fig. 7-28-6). The alignment of attitude may require up to 3 minutes to complete depending on motion of the aircraft. When under extreme cold temperatures, the alignment procedure may take longer, up to 8 minutes. The alignment procedure must be performed when the aircraft is either stationary on ground, or while maintaining a straight and level flight. To maintain control of the aircraft during alignment, the ESIS provides basic attitude performance similar to attitude degraded mode until alignment is complete

When alignment is complete, the ESIS display shows pitch, roll, heading and slip-skid information. If alignment is not satisfactory, the display will show a red ATT FAIL flag.

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7-28-3.4 Indication / Warning

The ESIS monitors the system status and will display a red failure flag if an invalidity is identified. The failure flags that can be displayed are (refer to Fig. 7-28-7):

- ALT
- ATT FAIL
- IAS
- HDG
- ADEC.

When displayed, a failure flag will first flash on/off for 5 seconds and then remain on. The failure flag is removed when the invalidity condition is resolved.

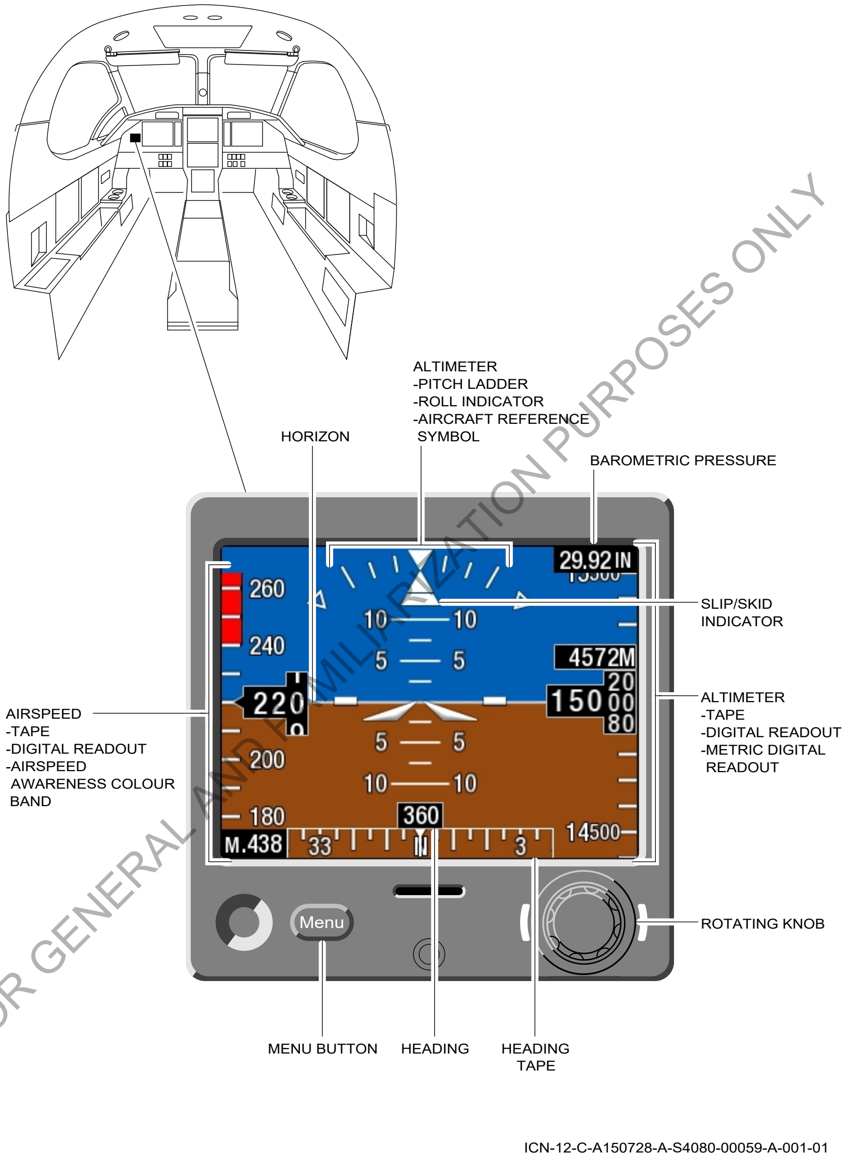

Figure 7-28-4: ESIS - Typical Operational Display

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Figure 7-28-5: ESIS - Typical Splash Screen Display

ICN-12-C-A150728-A-S4080-00061-A-001-01

Figure 7-28-6: ESIS - Typical ATT Aligning Display

ICN-12-C-A150728-A-S4080-00062-A-001-01

Figure 7-28-7: ESIS - Typical Failure Flags

7-28-4 Standby Magnetic Compass (If Installed)

A standby magnetic compass (E2B) is installed on the center post between the windshields. The compass is a self-contained unit that shows aircraft magnetic heading.

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7-29 Primus APEX - Communication and Navigation

7-29-1 General

Refer to Fig. 7-29-1, APEX Communication and Navigation - Schematic.

The communication and navigation part of the Primus APEX comprises:

- Two Honeywell KTR 2280A Multi Mode Digital Radio (MMDR) integrated transceivers
- KMA 29 or KMA 29A Audio Control Panel
- KN-63 Distance Measuring Equipment
- KXP 2290 Transponder
- Global Positioning System.

7-29-2 Multimode Digital Radio Transceiver (MMDR)

Multi Mode Digital Radio (MMDR) integrated transceivers are installed behind the pilots Primary Flight Display (PFD) and upper Multi Function Display (MFD). Power supplies to the MMDR's are from the Avionic 1 bus for MMDR No. 1 and from the Main bus for MMDR No. 2. The No. 2 MMDR also has a power supply from the Standby bus to permit radio communication without the avionic systems being powered up. The COM 2 system utilizes the upper antenna primarily for ground communications and the COM 1 system utilizes the lower antenna for airborne communications.

The MMDR is a combined VHF communications and navigation transceiver and forms part of the APEX system. The MMDR receives inputs in ARINC 429 format and outputs in ARINC 429 and analogue formats. The navigation section of the MMDR contains VOR, LOC and GS functions. The VHF communications section contains four receivers available for COM and ADF functions and one transmitter. Primary controls for the MMDR are on the Touch Screen Controller (TSC) and the PFD Control Panel, with display of the selected information on the PFD. An EMERG COM 1 transfer to 121.5 MHz switch is installed on the cockpit rear left switch panel. A transfer switch is installed on the PCL and is used to interchange the active and standby frequencies that are set on the COM 1 display.

The optional ADF function will tune frequencies from 200 to 1799 kHz and 2180 to 2189 kHz. If no ADF equipment is installed it is still possible to select the ADF bearing pointers. The ADF pointer label will be displayed but no bearing pointers will be shown.

The KTR 2280A MMDR provides a morse code decoding capability which automatically decodes the morse code identifier of a (VOR, LOC) station. If available, the morse code identifier is shown to the left of the morse code annunciatior (ID).

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7-29-3 Radio Tuning Windows

The radio tuning window is on the bottom right of the pilots PFD and bottom left of the copilots PFD (when installed). Each radio tuning window is divided into subwindows which show the installed receivers in the following format COM1, COM2, NAV1, NAV2, optional ADF and XPDR. To make selections the radio sub-window must be activated by pressing the adjacent bezel button. If the DETAIL button on the PFD Controller is pressed a detail window will be shown and the different equipment modes can be selected by pressing the associated soft key for more than one second.

STUCK MIC is displayed in amber between the squelch inhibit and Transmit/Receive annunciator if a transmit button is pushed for 32 seconds or more. When the STUCK MIC annunciator shows, the selected radio stops transmitting immediately.

When it is necessary to make a radio transmission for more than 32 seconds, momentarily release the transmit button. This resets the stuck microphone protection timer, after which another 32 seconds of transmission are available.

7-29-4 Controls And Displays

Refer to Fig. 7-29-1, APEX Communication and Navigation - Schematic

Table 7-29-1: Primus APEX - Communication and Navigation - Controls

Button / Switch	Description
PFD bezel:	
PFD bezel buttons	See Section 7-27, Primus APEX
Control Panel PFD, Radio Segment:	
IDENT pushbutton	Activates XPDR identification response mode, independent of cursor position
VFR pushbutton	Alternates between active transponder code and configured VFR code, independent of cursor position
DETAIL pushbutton	Activates a secondary radio window/page to allow option or mode selections for the related radio system. Push the button again to revert to the selected radio tuning page
VOL rotary control	Adjusts the radio volume level (COM, NAV, ADF if installed)
SEL rotary control	Dual rotary controls to tune radio frequency and transponder codes
PUSH FREQ SWAP	Toggles the active frequency to the standby (preset) frequency and vice versa
PUSH SQUELCH / ID	Squelch inhibit when the cursor is focused on a COM radio, Morse code filter when the cursor is focused on a NAV radio
Touch Screen Controller, radio controls:	
COM QA button	Shows the COM quick access dialog on the TSC screen which is used to tune the COM radio frequencies. The selected radio and frequency are shown on the top line. COM1 is selected by default.
NAV QA button	Shows the NAV quick access dialog on the TSC screen which is used to tune the NAV and ADF radio frequencies. The selected navigation source and frequency are shown on the top line. NAV1 is selected by default.

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Table 7-29-1: Primus APEX - Communication and Navigation - Controls (continued from previous page)

Button / Switch	Description
XPDR QA button	Shows the XPDR quick access dialog on the TSC screen which is used to set the transponder code. The current transponder code is shown on the top line.
SWAP/CLOSE (COM and NAV dialog)	Swaps the active and standby (preset) VHF NAV or VHF COM frequencies for the radio
Additional radio controls:	
COM 1 NORM/EMERG Switch	A COM 1 NORM/EMERG switch on the left hand side panel allows the pilot to set COM1 to either: NORM — Normal radio tuning controls are enabled EMERG — VHF COM 1 active frequency is set to 121.50 MHz. The previous active frequency is moved to the standby frequency window
Frequency Transfer Switch (FTS)	A Frequency Transfer switch on the Power Control Lever allows the pilot to transfer COM 1 between the active frequency and the standby frequency

7-29-4.1 VHF Communication Control and Display

Refer to Fig. 7-29-3, VHF Com Display and Detail Page

Table 7-29-2: Primus APEX - VHF Communication - Control and Display

Field	Description
Active Frequency	Shows the frequency currently in use
Standby Frequency	Shows the frequency currently on standby
Transmit Receive annunciator	Shows transmit or receive mode
Squelch Inhibit annunciator	Shows that squelch has been deselected
Volume Control Scale	Shows the range of available volume adjustment
Volume Control Indication	Shows the current volume setting against the volume scale

7-29-4.2 VHF Navigation Control and Display

Refer to Fig. 7-29-4, VHF Nav Display and Detail Page

Table 7-29-3: Primus APEX - VHF Navigation - Control and Display

Field	Description
Active Frequency	Shows the frequency currently in use
Preset Frequency	Shows the frequency currently on standby
VOR Bearing	Shows the bearing of the selected beacon
Morse ID Annunciator	Shows the navigation identification filter is OFF
DME association	Shows DME Hold is selected
Volume Control scale	Shows the range of available volume adjustment

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7-29-4.3 ADF Control and Display (if installed)

Refer to Fig. 7-29-5, ADF (if installed) Display and Detail Page

Table 7-29-4: Primus APEX - ADF Control and Display

Field	Description
ADF Frequency	Shows the frequency of the selected station (shows amber dashes when the frequency is missing)
ADF Mode	Shows the selected mode (will not be shown if the mode data is missing or invalid)

7-29-4.4 Transponder (XPDR) Control and Display

Refer to Fig. 7-29-2, Transponder Display and Detail Page

Table 7-29-5: Primus APEX - XPDR Control and Display

Field	Description
ATC Code	Shows the transponder code that is set (shows amber dashes if the code is missing or invalid)
Aircraft flight level	Shows the aircraft flight level rounded to the nearest 100 feet (replaced by amber dashes when the ATC code is missing)
Air/Ground Mode	Shows GND when the aircraft status is on the ground
ATC selectable mode	Shows the selected XPDR mode (STBY, ON or ALT)
ATC active mode	Shows the XPDR mode that is in use (not displayed when the ATC code data is missing or invalid)
Ident annunciator	Shows IDT when identification is activated
Reply annunciator	Shows a reply from the XPDR to interrogation

7-29-5 Audio Control Panel

The KMA 29 or KMA 29A (optional) audio control panel provides audio system control for the crew and passengers. The panel also provides an interface to the Passenger Address (PA) system and aural warning system as well as a marker beacon receiver. The optional KMA 29A also includes a Bluetooth® transceiver.

The audio control panel is used to make audio selections for all audio communications to and from the crew. The audio control panel receives inputs from all audio communication channels and aural warnings. Audio outputs from the panel are to the flight compartment speaker and crew headsets. The audio outputs to the crew headsets are in stereo. There is a PTT switch on each control wheel left yoke and on the hand microphones.

The audio control panel is installed above the pilots PFD and an optional second audio control panel can be installed above the copilots PFD. Momentary pushbuttons are used to select one of the COM transceivers for the pilot and copilot position, which allows radio transmission. Pressing a button turns on the associated receiver and the green LED. The pilot can identify which receivers are selected by noting which LEDs are on. In the Split Mode, the pilot has the ability to transmit on one COM, while the copilot can transmit on another COM. In the Split Mode, the pilot has the ability to transmit on one COM, while the copilot can transmit on another COM. A fail-safe mode connects the pilot headphone and microphone to COM 1 if there is a power failure or the power switch is set to the EMG/OFF position (for the correct operation of headsets capable of stereo operation, the headset must be set to stereo mode). For the intercom system there is a push button mode switch and a small volume control knob for crew intercom volume and a large knob for the passenger intercom volume. The AUX button selects the entertainment audio.

Marker beacon receiver

A marker beacon receiver provides the necessary marker beacon signals to the PFD and audio indications for an Instrument Landing System (ILS). The MKR push button, when selected, allows the pilot to cycle the marker beacon audio between ON (high sensitivity), ON (low sensitivity), OFF, ON (high sensitivity), and so on. The marker beacon audio can be muted by pressing the MKR MUTE/TEST button. The pilots audio panel is connected to the marker beacon receiver and the copilots audio panel (if installed) receives marker beacon information via the pilots audio panel. The marker beacon can be tested by pressing and holding the MKR MUTE/TEST button. For the KMA 29, press and hold on either panel for 1 second. For the KMA 29A, press and hold on the pilots panel for five seconds.

Radio playback (KMA 29A)

The audio control panel automatically records and stores the last incoming audio from the radio that is selected for transmission (max 8 recordings). The PLY button when selected plays the latest recorded radio audio. The BCK button when selected allows the pilot to cycle through the recorded radio audio in reverse order (latest recording first).

Bluetooth® transceiver (KMA 29A)

A Bluetooth® transceiver provides the necessary Bluetooth® connectivity. Each audio control panel is capable of pairing one other Bluetooth® capable device (for example: cellphone or tablet). The Bluetooth® transceiver is capable of providing cellular phone operation and music streaming. When the Bluetooth® function is activated (press and hold the BT/Mute button for 5 seconds), the audio control panels are always discoverable, except for when a device is already paired to it. Once Bluetooth® is activated, the audio control panels will appear as “Pilot KMA29A” and “Copilot KMA29A” on the user’s personal device. Pairing requires an access code at the first attempt to pair the personal device to the ACP. Subsequent pairings are accomplished without the use of an access code.

Note
A security code option is available and can be installed with the Maintenance Mode if required.

The TEL button when selected activates the telephone mode and allows the user to answer a phone call received on the paired cellphone.

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The BT/MUTE button when selected allows the user to cycle through various audio source muting options. The BT/MUTE button cycles through four mute modes (Bluetooth® suppressed, No Mute, Radio and Mute All):

- Bluetooth® suppressed

  In Bluetooth® suppressed mode all audio received via the Bluetooth® connection is set to OFF.

- NO MUTE

  In No Mute mode all audio received via the Bluetooth® connection will be played and will intermix audibly with other audio sources (for example: COM radio and Intercom audio).

- RADIO MUTE

  In Radio Mute mode the audio received via the Bluetooth® connection will be muted/ suppressed when any COM audio is received. Bluetooth® audio will be resumed after the COM audio stops.

- MUTE ALL

  In Mute All mode the Bluetooth® audio is muted/suppressed if any other kind of audio is received (for example COM, NAV, MKR, etc). Bluetooth® audio will be resumed after the other audio source stops.

At power up, the default is MUTE ALL.

SPLIT mode (KMA 29)

To enter SPLIT mode on a single KMA 29 installation, the SPLIT button is used. Press the left side of the SPLIT button followed by pressing the required COM audio button to select the pilot’s COM source. Press the right side of the SPLIT button followed by pressing the required COM audio button to select the copilot’s COM source.

SPLIT mode (KMA 29A)

To enter SPLIT mode on a single KMA 29A installation, both required COM audio buttons (MIC) must be pushed simultaneously.

Head Related Transfer Function (HRTF) (KMA 29A)

The audio control panel provides the ability to place each of the available COM audio sources in one of eight spatial positions: 9 o’clock near and far, 10, 11, 1 and 2 o’clock and 3 o’clock near and far. The HRTF button, when selected, turns the HRTF function ON or OFF.

7-29-6 Dual Audio Panel Operation

KMA 29

When two KMA 29 audio panels are installed, both have access to the communications transceivers. When both panels have selected the same transmitter, the KMA 29 designated as the pilot position has priority.

Indication arrows above the microphone selectors indicate which side has selected the radio for transmit. Offside radio indication is user selectable. When the offside indication is off, only the mic select arrow for the KMA 29 position is active. When on, the pilot can see which radio the copilot has selected for transmit, and vice versa, by noting which of the arrows is illuminated.

To toggle the offside transmit selection indication, press the right side of the SPLIT button three times within one and a half seconds. When the mode is activated, the NAV 1 indicator blinks once. When the mode is toggled off, the NAV 1 indicator blinks twice. This mode remains in effect until changed by the user, including power cycles.

KMA 29A

When two KMA 29A audio panels are installed, both have access to the communications transceivers. When both panels have selected the same transmitter, the KMA 29A designated as the pilot position has priority.

7-29-7 Audio Panel Controls

Refer to Fig. 7-29-2, APEX Communication and Navigation - Controls and Displays.

Table 7-29-6: Primus APEX - Audio panel controls

Control	Description
SPKR/PA	Speaker /Passenger Address rocker switch. Toggles between the following selections: − ON LED illuminated: All selected audio will come over cockpit speaker (headset audio is always on) − OFF LED illuminated: No audio over cockpit speaker − PA LED illuminated: Pilot can transmit through microphone to cabin speaker
COM MIC	Microphone input selector buttons
TEL (KMA 29A)	Telephone call accept button
BCK / PLY (KMA 29A)	Radio playback button. PLY plays back the latest recorded incoming audio. BCK cycles through the recorded audio (8 max) in reverse order, (latest recording first)
CREW/PAX ICS VOL	Crew/Passenger Intercom system volume knob. Inner knob for crew intercom
PUSH EMG/OFF	Power on and emergency/off switch. Pilot and copilot microphones connected to COM 1
ICS	Intercom System toggle switch. Toggles between ISO (isolated), ALL and CREW
COM AUDIO	Com Audio selector buttons
HRTF (KMA 29A)	Head Related Transfer Function (HRTF) button. When pressed turns the HRTF function ON or OFF
NAV, ADF (if installed), DME	Navigation Radio Audio selector buttons
AUX	Entertainment audio select button
BT/MUTE (KMA 29A)	The BT/MUTE button cycles through four mute modes: Bluetooth® suppressed, No Mute, Radio Mute and Mute All

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Table 7-29-6: Primus APEX - Audio panel controls (continued from previous page)

Control	Description
MKR	KMA 29: Marker button. When pressed (LED illuminated) audio indicator enabled KMA 29A: Marker Beacon. When pressed (LED illuminated) audio indicator enabled. Sensitivity is set to HI. Subsequent pressing of the button alternates between OFF, HI and LOW
MKR SENS (KMA 29)	Marker Beacon sensitivity button. Alternates between HI and LOW
MKR MUTE/TEST	Marker Beacon Mute/Test button. When pressed and released, marker beacon audio is muted for that beacon. When pressed for one second (KMA 29) or five seconds (KMA 29A) marker beacon discretes go high for one second in order to test the marker beacon. The marker annunciations are shown on the PFD. **Note** The TEST function on the optional second copilot audio control panel is inoperative on the KMA 29A.

7-29-8 Distance Measuring Equipment (DME)

A KN-63 DME transceiver is installed under the cabin floor. Power supply to the DME is from the Avionic 1 bus. The transceiver transmits a signal to a ground station and calculates the time between the transmitted signal and the reply signal from the ground station. It uses the data to give the distance from a ground station, the groundspeed and the time-to-station. The maximum range of the DME transceiver is 389 nautical miles. The transceiver has 200 different channels. The transmitter processes signals between 1025 MHz and 1150 MHz and the receiver processes signals between 962 MHz and 1213 MHz.

The DME detail window can be shown in the radio tuning window by pressing the DME button on the PFD Controller. An alternative means of accessing the DME window is through the Go To DME Detail soft key in the NAV detail window. The DME detail window contains soft keys DME PAIR to select the association of the DME to NAV 1 or NAV 2 and DME HOLD to select DME hold ON or OFF. When the DME hold is selected to ON, an H adjacent to the DME distance is displayed on the PFD HSI display.

7-29-9 Transponder (XPDR)

The Transponder KXP 2290A is installed behind the pilot PFD and is controlled by the PFD controller. The KXP 2290A transponder supports ADS-B Out functionality. The KXP 2290A transponder can be installed in diversity and non-diversity versions. With the diversity version, an upper and a lower ATC antenna are installed. An optional second transponder can be installed. The KXP 2290A transponder transmits elementary, enhanced and extended squitter data. Each system receives data on ARINC 429 databuses.

The transponder ADS-B Out status annunciator is located below the transponder code (see Fig. 7-29-6, XPDR Function and Display Location). ADS-B Out status is displayed in white when the transponder indicates ADS-B Out is ON and the Aircraft Personality Module (APM) indicates that ADS-B Out is enabled.

CAUTION

The ADS-B out annunciator must be displayed in white to meet the requirements specified in Section 2, Systems and Equipment Limits, otherwise Flight in ADS-B equipped airspace is not allowed. the ADS-B system must be enabled (set to ON) during all flight phases including airport surface movement operations.

The ADS-B Out status is displayed in amber when the transponder indicates ADS-B Out is failed and the APM indicates that ADS-B Out is enabled. The ADS-B Out annunciator is removed if the APM indicates that ADS-B Out is not enabled, or the transponder indicates ADS-B Out is off, or a failure has occurred.

ADS-B Out capability can be set ON/OFF on the transponder detail window (see Fig. 7-29-6, Transponder Display and Detail Page). ADS-B Out is set to ON by default at power on and independent of the STBY, ON or ALT (or TA or TA/RA if TCAS I or TCAS II is installed) mode.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for further information about the ADS-B Out control and function.

7-29-10 Global Navigation Satellite Sensor Unit (GNSSU)

7-29-10.1 General

Either one or two GNSSUs (2nd GNSSU is a Factory Option) can be installed in the aircraft, behind the systems MFD. Power supply to GNSSU 1 is from the Standby Bus, to GNSSU 2 from the Avionic 2 Bus. Both GNSSUs process satellite data to determine aircraft position, velocity and time. Both GNSSUs are certified of tracking the U.S. Global Position System (GPS). Tracking of any other Global Navigation Satellite Systems (GNSS), e.g. Galileo, is not certified yet. Both GNSSUs calculate and output navigation data, satellite measure data, Receiver Autonomous Integrity Monitoring (RAIM) and Predictive RAIM (PRAIM). Both GNSSUs also manage Sign Status Matrix (SSM), satellite status and perform BITE. The processed output data of both GNSSUs is sent to the CSIO module within the MAU for further use by the rest of the avionics system. An Apex maintenance function interfaces with both GNSSUs.

The GPS data page can be accessed from the SENSOR page. The SENSOR page can be accessed with the systems MFD lower left window in focus and selecting the SENSORS page menu.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for complete information on the description and operation of the communication and navigation equipment.

7-29-10.2 Satellite Based Augmentation System (SBAS)

The aircraft is equipped with a KSG200 SBAS capable GNSSU.

The SBAS capable GNSSU provides GNSS position corrected by the SBAS providing improved accuracy and integrity. The SBAS capable GNSSUs are certified for interoperability with the signals-in-space provided by the U.S. Wide Area Augmentation System (WAAS) and other SBAS providers, e.g. operate both within SBAS and outside SBAS coverage area. Within the SBAS coverage area, the SBAS capable GNSSUs are able to determine the vertical and horizontal guidance information sufficient for Localizer Performance with Vertical Guidance (LPV) approaches.

7-29-10.3 SBAS/LPV

The basic concept of the LPV functionality is Area Navigation (RNAV) using ILS control laws. In order to enable the SBAS/LPV an SBAS capable GNSSU must be installed. Operational information of LPV is given in Section 4.28, LPV/LP Detailed Operating Procedures.

7-29-10.4 Indication / Warning

The Crew Alerting system (CAS) window of the systems MFD displays the following Cautions and Advisory messages for the communication and navigation equipment status:

Table 7-29-7: Primus APEX - Communication and Navigation - CAS Messages

CAS Message	Description
MMDR 1 Fail MMDR 2 Fail MMDR 1+2 Fail	Multi Mode Digital Radio No. 1 has failed Multi Mode Digital Radio No. 2 has failed Multi Mode Digital Radios No. 1 and 2 have failed
MMDR 1 Overheat MMDR 2 Overheat MMDR 1+2 Overheat	Multi Mode Digital Radio No. 1 has overheated Multi Mode Digital Radio No. 2 has overheated Multi Mode Digital Radios No. 1 and 2 have overheated
DME 1 Fail	Distance Measuring Equipment No. 1 has failed
XPDR 1 Fail XPDR 2 Fail XPDR 1+2 Fail	Transponder No. 1 failed Transponder No. 2 failed (only if optional second XPDR installed) Transponder No. 1 and 2 failed (only if two XPDR's installed)
GPS 1 Fail GPS 2 Fail GPS 1+2 Fail No Alt Reporting	Global Positioning system No. 1 failed GPS No. 2 failed (only if optional second GPS installed) GPS 1 and 2 failed (only if two GPS's installed) In flight and XPDR is not selected to ALT, TA or TA/RA mode

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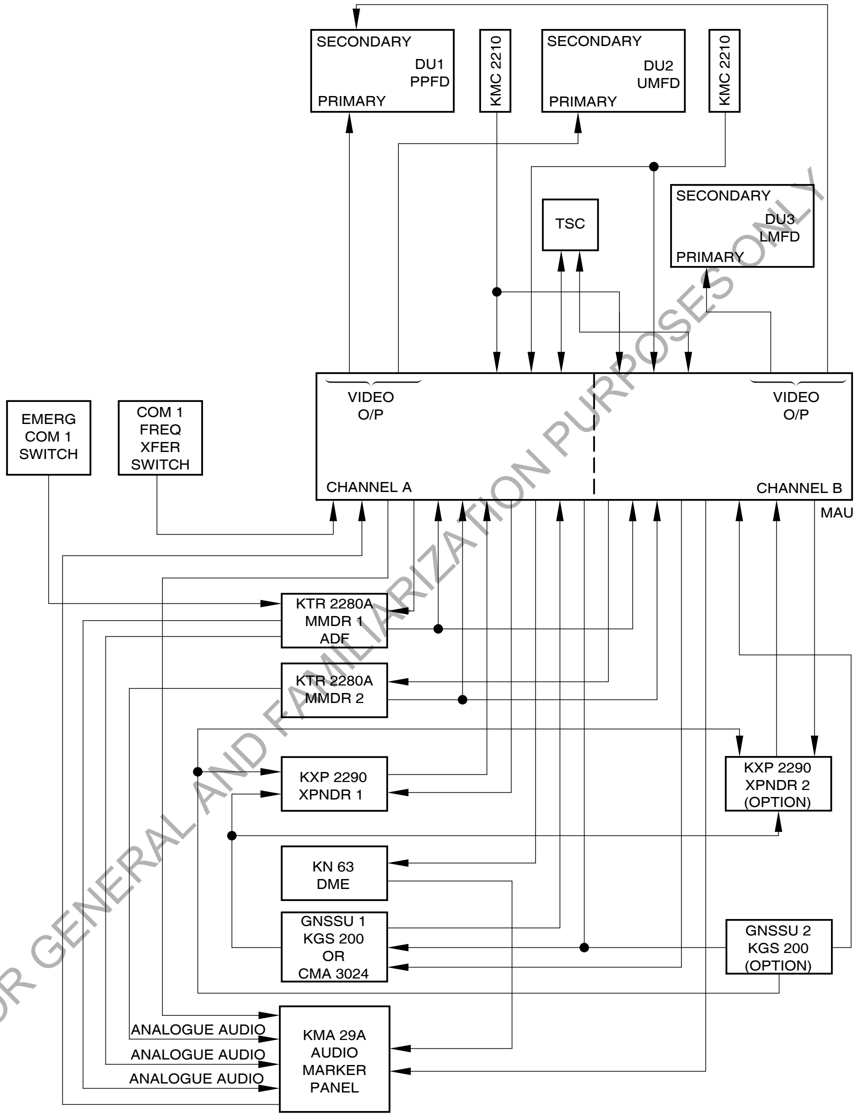

Figure 7-29-1: APEX Communication and Navigation - Schematic

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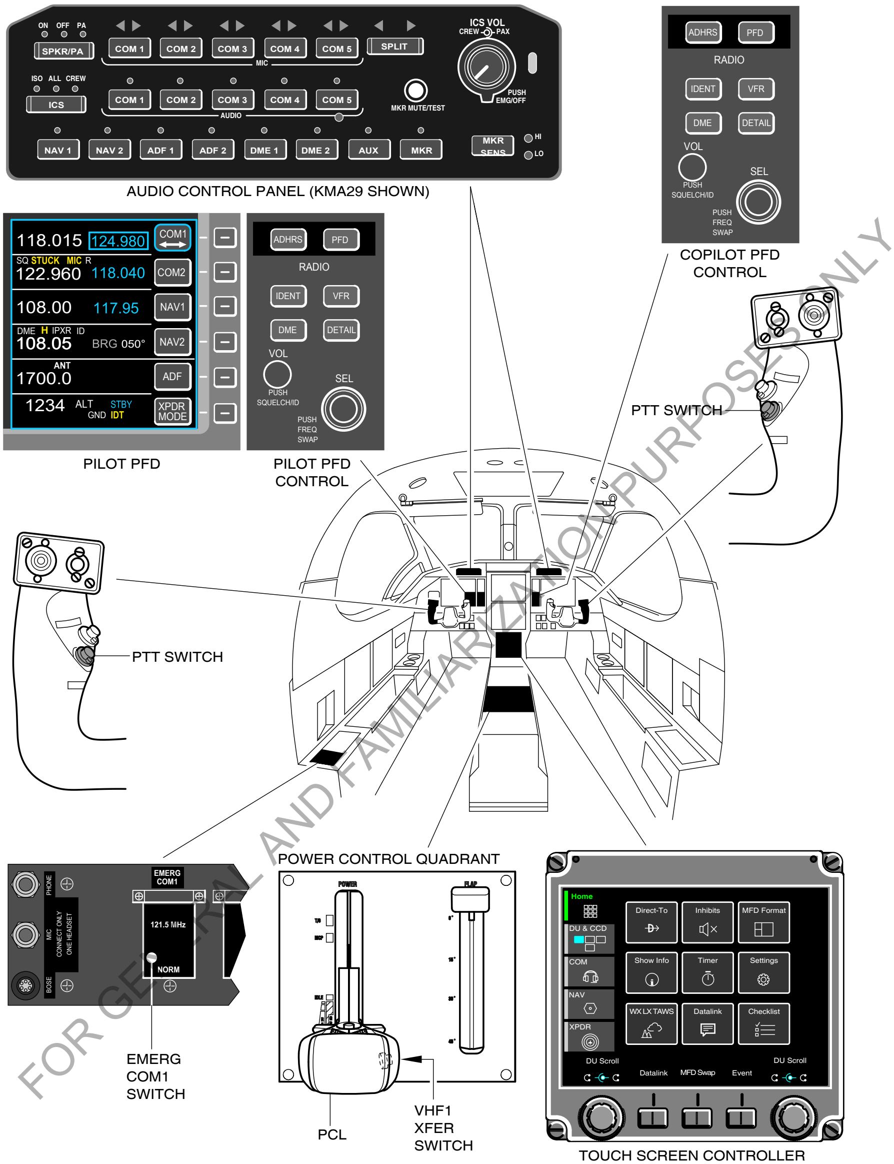

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Figure 7-29-2: APEX Communication and Navigation - Controls and Displays

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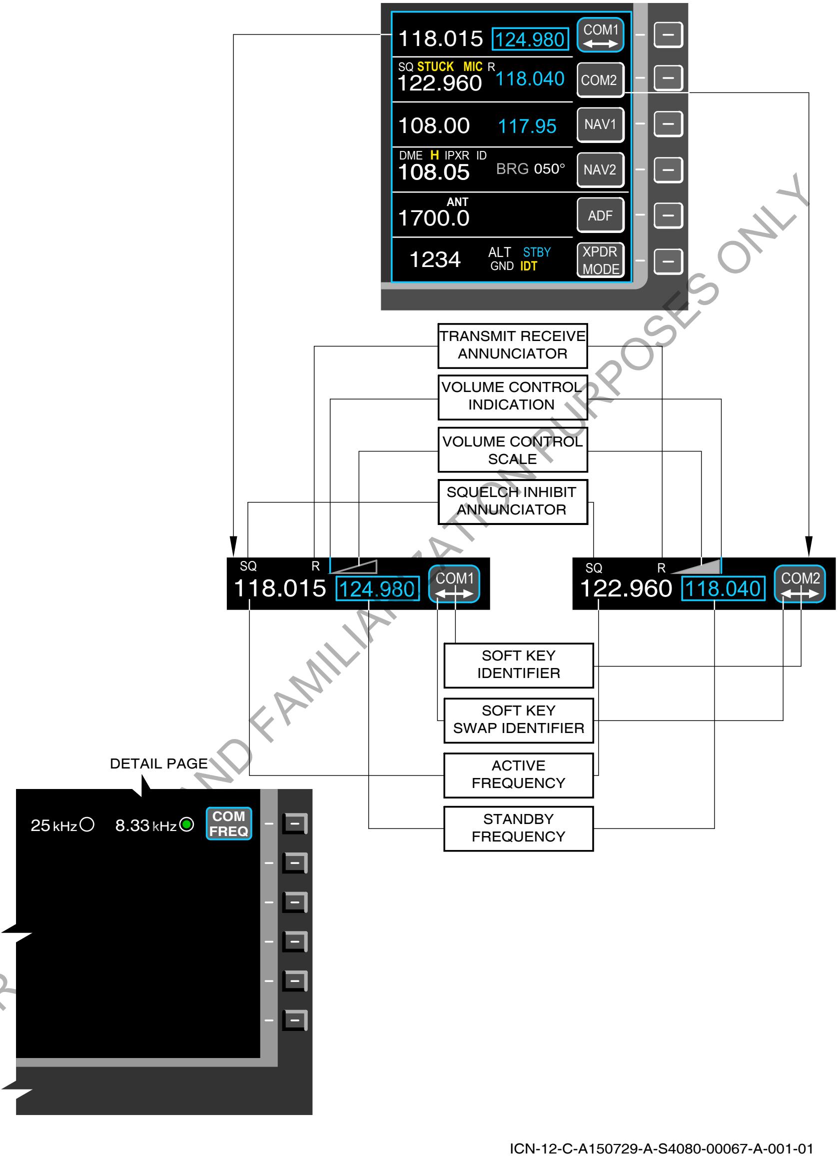

Figure 7-29-3: VHF Com Display and Detail Page

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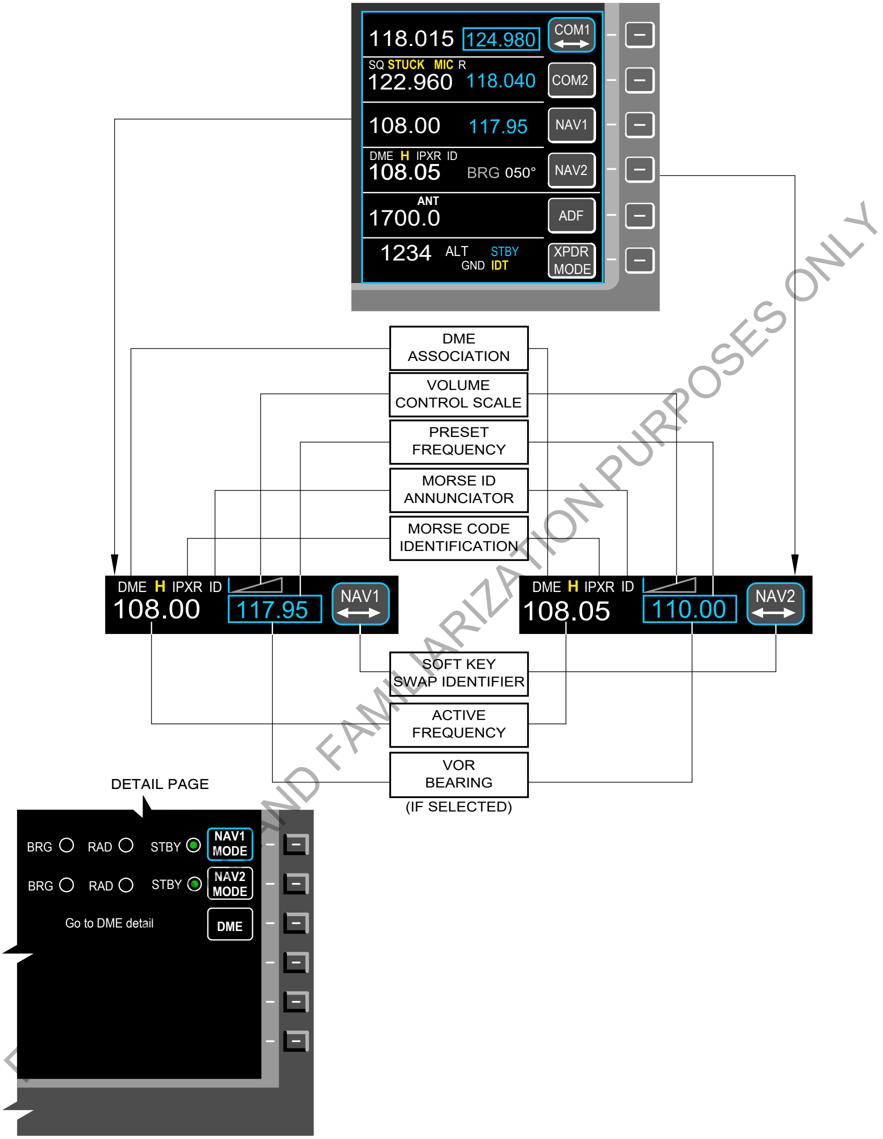

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Figure 7-29-4: VHF Nav Display and Detail Page

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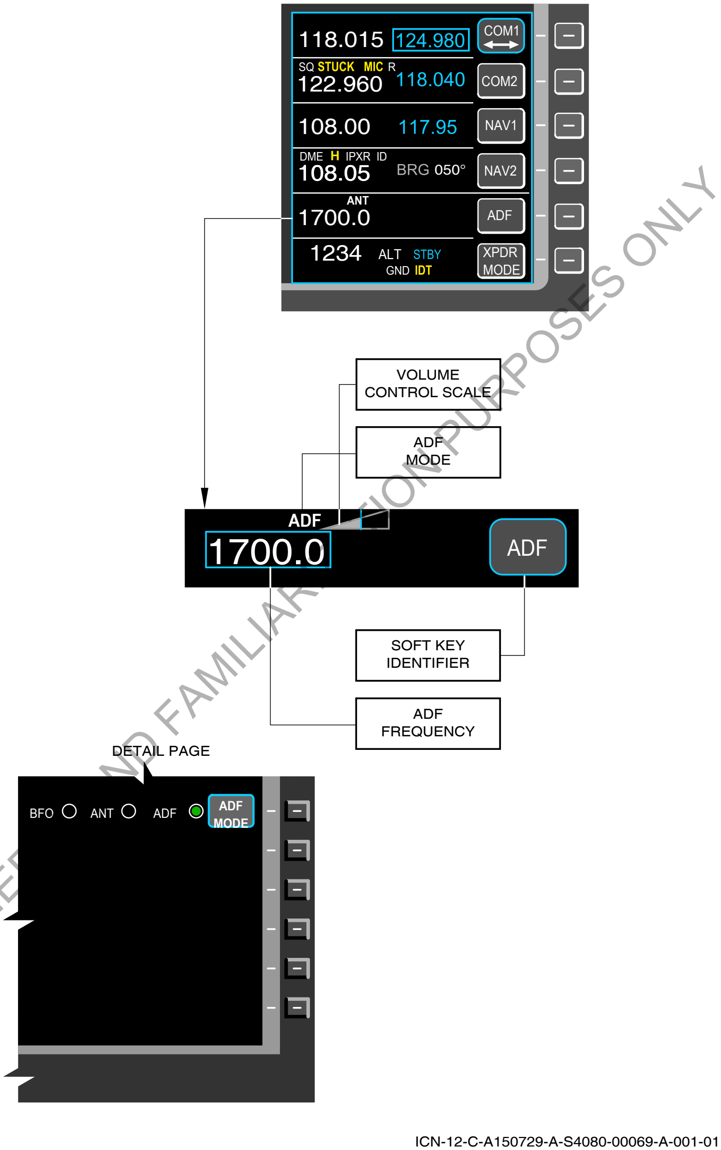

Figure 7-29-5: ADF (if installed) Display and Detail Page

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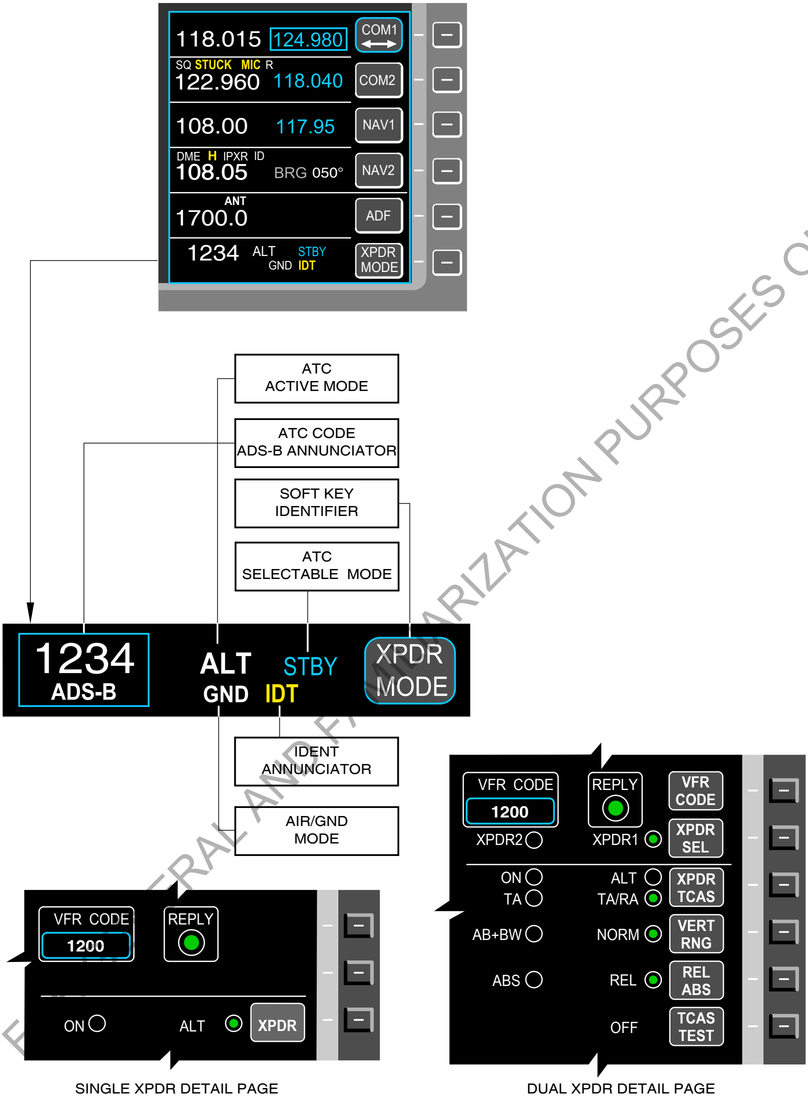

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Figure 7-29-6: Transponder Display and Detail Page

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7-29-11 HF Communications System

7-29-11.1 General

The KHF 1050 High Frequency (HF) communication system gives long range voice communication in remote areas. Additionally the system enables the operator to communicate using the Maritime Radiotelephone Network to contact marine operators.

The HF system operates in the High Frequency Short Wave Band from 2.000 Mhz up to 29.999 Mhz in tuning steps of 1.0 Mhz.

The HF system comprises:

- a PS440 Control Unit
- a KRX1053 Receiver/Exciter
- a KPA1052 Power Amplifier
- a KAC1052 Antenna Coupler
- an RF antenna.

The power supply to the HF system is 28 VDC through the HF TX and HF RX circuit breakers on the AVIONIC 2 BUS circuit breaker panel.

7-29-11.2 Description

The Control Unit is installed on the pilots lower left panel. It provides the controls for operation of the HF system. For a description of the controls on the Control Unit, refer to the KHF 1050 Pilot’s Guide. Voice and audio signals are interfaced to the pilot’s Audio Control Panel COM 3 push buttons.

The Receiver/Exciter is installed under the cabin floor between frames 33 and 34. The Receiver/Exciter provides the circuitry for RF receive and transmit functions. It generates a low power RF signal to excite the Power Amplifier when in transmit mode and demodulates the received RF signal to generate the required audio output in the receive mode. It also controls the audio interface and control switching for the Power Amplifier and Antenna Coupler.

The Power Amplifier is installed under the cabin floor between frames 31 and 32. Its main functions are to excite the low power RF signal from the Receiver/Exciter to a high energy signal which is then fed to Antenna Coupler and in the receive mode it passes the RF signal from the Antenna Coupler to the Receiver/Exciter. Excessive RF signal amplification protection is provided.

The Antenna Coupler is installed in the upper rear fuselage between frames 37 and 38. It contains the main matching circuitry to match the 50 Ohm exciter signal to the various impedances of the antenna. The Antenna Coupler contains a Non Volatile Memory (NVM) to store the best impedance value for each previously tuned frequency to reduce tuning time. The Antenna Coupler is pressurized with nitrogen to reduce the possibility of arcing. Low pressure warnings are given on the Control Unit and if the Nitrogen pressure becomes too low the Antenna Coupler output power will be limited.

The RF Antenna is installed on the top of the rear fuselage. It is routed in a V shape from the Antenna Coupler up to an attachment point on the horizontal stabilizer and back down to an earth point on the top of the rear fuselage.

7-29-11.3 Operation

Under normal operation conditions, the KHF1050 HF system is connected to the Pilots Audio Control Panel on COM 3 input selection.

The operator is able to either directly set a frequency on the Control Unit, or in channel mode, select the appropriate frequency channel for the intended use.

Once a frequency or a channel has been selected and output power level set, pressing the PTT button will initiate tuning of the chosen frequency which should be completed after approx. 8 seconds. Unsuccessful tuning will result in an error message displayed on the Control Unit.

If the HF control unit indicates “PRS W”, the couple is losing Nitrogen pressure and may be approaching a pressure fault condition. The HF radio will continue to function normally but the indication should be reported to maintenance.

If the HF control unit indicates “PRS F”, the coupler has lost Nitrogen pressure and will therefore operate in the pressure fault condition. In this condition, the HF radio will reduce transmit power to 50W regardless of the transmit power selected by the crew. Report to maintenance.

The operator may choose to use and pre-program up to 99 channels with often used frequencies for direct access in operation. In addition, the system provides preprogrammed channels of the Maritime Radiotelephony Network (ITU) for aircraft/ship communication using HF equipment.

Under operational emergency conditions in areas with bad VHF coverage, the KHF1050 provides six pre-programmed emergency channels (EMR1 - EMR6) for international distress and calling.

EMR 1 is factory programmed to 2.182 MHz international calling frequency.

EMR 2 to EMR 6 is factory programmed but can be overwritten by the operator if he wishes to use different emergency frequencies.

Refer to the KHF 1050 Pilot’s Guide for complete information on the operation of the HF system.

CAUTION
Do not operate the HF communications system when ground power is connected

7-29-12 Aerowave 100 Satcom System

7-29-12.1 General

The Aerowave 100 satellite communication (SATCOM) system, if installed, gives long range voice and data communication via the Inmarsat satellite constellation.

The Aerowave 100 system comprises:

- A High-speed Data Unit (HDU)
- An External Satcom Configuration Module (ESCM)
- A bias-T
- An active Low Gain Antenna (LGA)
- A Wi-Fi router
- An ON-OFF switch in the cockpit

The power supply to the Aerowave 100 system is 28 VDC through the AEROWAVE circuit breaker on the NON ESS BUS circuit breaker panel.

The Aerowave 100 system is stand-alone and has no connection to on-board aircraft systems.

7-29-12.2 Description

The HDU is installed under the cabin floor on the aft side of frame 31. It provides the power, control and distribution of telephony and high-speed data services to the components in the system.

The ESCM is installed under the cabin floor on the forward side of frame 32. The ESCM is connected to the HDU and contains the Subscriber Identity Module (SIM). The SIM identifies the sitcom terminal of the HDU to the Inmarsat Services Provider.

The bias-T is installed under the cabin floor on the aft side of frame 32. It provides the power necessary for the active LGA to function. The bias-T also has an active GPS receiver element that works with the LGA to supply navigation data to the HDU. The navigation data is used to calculate the aircraft to satellite elevation (look angle) and Doppler effect while the aircraft moves.

The active LGA is installed on the top of the fuselage between frames 22 and 23. The active LGA lets the HDU communicate with the Inmarsat Swift Broadband Class 15 Services (SBB-200). These services supply voice and high-speed data to a maximum of 200 kbps when the look angle is above 20 degrees.

The Wi-Fi router is installed in the aft baggage compartment on the right side of the fuselage between frames 34 and 35. It is an IEEE 802.11 g and n wireless router that operates in the 2.4 GHz bandwidth spectrum and gives connection to any consumer data device with Wi-Fi connectivity. The Wi-Fi router supports WEP, WPA or WPA2 wireless security and has a single cast antenna.

The ON-OFF switch is installed in the cockpit on the RH side wall panel. The switch is used to turn the Aerowave 100 system ON or OFF as required.

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7-29-12.3 Operation

The Aerowave 100 SATCOM system is in operation as soon as the non-essential bus is powered. When in operation, the system automatically connects to the Inmarsat satellite network with the subscriber information contained in the ESCM.

The ON-OFF switch in the cockpit can be used to disable the system when it is not needed.

Wi-Fi enabled devices that are connected to the Wi-Fi router can be used to access the internet.

An alternative Wi-Fi router gives the added function of Voice over Internet Protocol (VOIP). Customers can use VOIP to make voice calls with a Personal Electronic Device (PED). A maximum of three PEDs can be connected at the same time. Only one user (PED) can make a voice call at a time.

7-30 Primus APEX - Situation Awareness

7-30-1 General

Refer to Fig. 7-30-1, APEX Situation Awareness - Schematic

The situation awareness part of the Primus APEX comprises:

- RDR 2000 or RDR 2060 (optional) Weather Radar - refer to the Weather Radar (WX) paragraph
- KRA 405B Radar Altimeter - refer to the Radar Altimeter paragraph
- Navigation Map - refer to Section 7-33, Primus APEX - Flight Management System
- Optional Equipment (TCAS, EGPWS, TCAS, LSS, XM and SmartView) - refer to the Optional Equipment paragraph.

7-30-2 Weather Radar (WX)

Refer to Fig. 7-30-2, APEX Weather Radar - Overlay Menu and Display

The weather radar system gives the pilot a selectable horizontal or vertical display of thunderstorms or high density precipitation in front of the aircraft. The weather radar system can be used with an optional Lightning Sensor System, which shows areas of lightning activity 360 degrees around the aircraft.

The RDR 2000 or RDR 2060 (optional) Weather Radar installation consists of a radar receiver and radar transmitter in a radome installed in the right wing tip. The power supply to the weather radar is 28 VDC through the WX RDR circuit breaker on the AVIONIC 1 BUS circuit breaker panel.

7-30-2.1 Description

The RDR 2000 sensor unit receives pitch and roll signals from the ADAHRS to stabilize the radar antenna.

The RDR 2060 sensor unit receives pitch, roll and altitude signals from the ADAHRS to stabilize the radar antenna. The altitude signal is used to support additional functionality (e.g. Auto Tilt).

The sensor unit transmits a beam of pulsed microwave energy. When a pulse intercepts a bank of cloud, the energy is reflected back to the antenna. The return signals are processed by the sensor unit and sent to the Modular Avionics Unit (MAU) for display. The sensor unit is connected to a configuration module and receives an air/ground status from the MAU.

Weather radar can be displayed as overlays on the PFD's and INAV Map. The PFD weather radar overlay can be assessed by pressing the soft key on the side of the Horizontal Situation Indicator (HSI) display. The soft key identifier OVRLY appears in white. Pressing the OVRLY soft key displays the overlay selection menu. Selecting WX RDR will enable the weather radar overlay to be displayed on the HSI. There is also an OFF selection to remove the overlay. The WX overlay can be displayed on the Situation Awareness MFD INAV Map. First select the WX overlay on the pilot's HSI and then select the WX button on the Active Layers Control Bar.

The WX overlay can be independently selected for either the PFD or Situational Awareness MFD within the same Advanced Graphics Module (AGM). It should however be noted that the Situational Awareness MFD WX overlay is limited to the maximum resolution of the PFD HSI range and will be inhibited when the TAWS overlay is selected on the HSI.

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When the Tilt/Gain knob button on the TSC is activated on the WX page on the TSC, the current weather radar mode is shown above the right hand rotary knob of the TSC and the Tilt/Gain control remains active, even when the WX page is not displayed on the TSC.

The RDR 2060 weather radar can be optionally installed. When the RDR 2060 is installed, additional features and functionalities are available. The main features and functionalites are described below:

− Magnetron power increased by 50% to 6 kW

  This extends the theoretical weather detection capability from 240 NM to 320 NM and allows the pilot to have a greater awareness of the airspace ahead

− Auto Range Limiting (ARL)

  When the Auto Range Limit checkbox is selected, a blue area is displayed behind the weather systems where weather detection is no longer possible because of attenuation. This allows the pilot to have increased awareness about sensor performance

− Auto Step Scan

  When the automatic step scan radio button is selected, the antenna does a complete scan, followed by sequential tilts (up or down) in 4 degree increments. This allows the pilot to vertically profile the entire azimuth scan angle by monitoring successive antenna scans

− Auto Tilt

  When the automatic radio button is selected, the antenna position is automatically adjusted to maintain a common beam intercept point with the earth. For example, when the tilt is such that the last 10 percent of the display show ground returns, the system will automatically adjust the tilt based on barometric altitude during ascent or descent to maintain ground returns on 10 percent of the display.

− Lateral Scan

  When set to full, the weather radar performs a full 100° scan as normal. When set to sector, the weather radar performs a 60° scan which leads to a quicker update of the weather radar picture. However, when set to sector, the weather radar returns are no longer synchronized between the pilot's PFD and the copilot's PFD: The left to right scan is shown on the pilot's PFD and the right to left scan on the copilot's PFD. The sector can be adjusted 20° to the left or to the right with the azimuth selection.

− Vertical weather

  When the vertical profile checkbox is selected, the weather radar performs a vertical scan after each lateral scan. The vertical profile is shown on the vertical weather page on the MFD. When the vertical profile is selected, the lateral scan can be set to off and the weather radar will only perform vertical scans and there will be no weather overlay on the PFDs. The azimuth selection determines where the vertical scan is performed. There is no roll stabilization when the vertical profile is active.

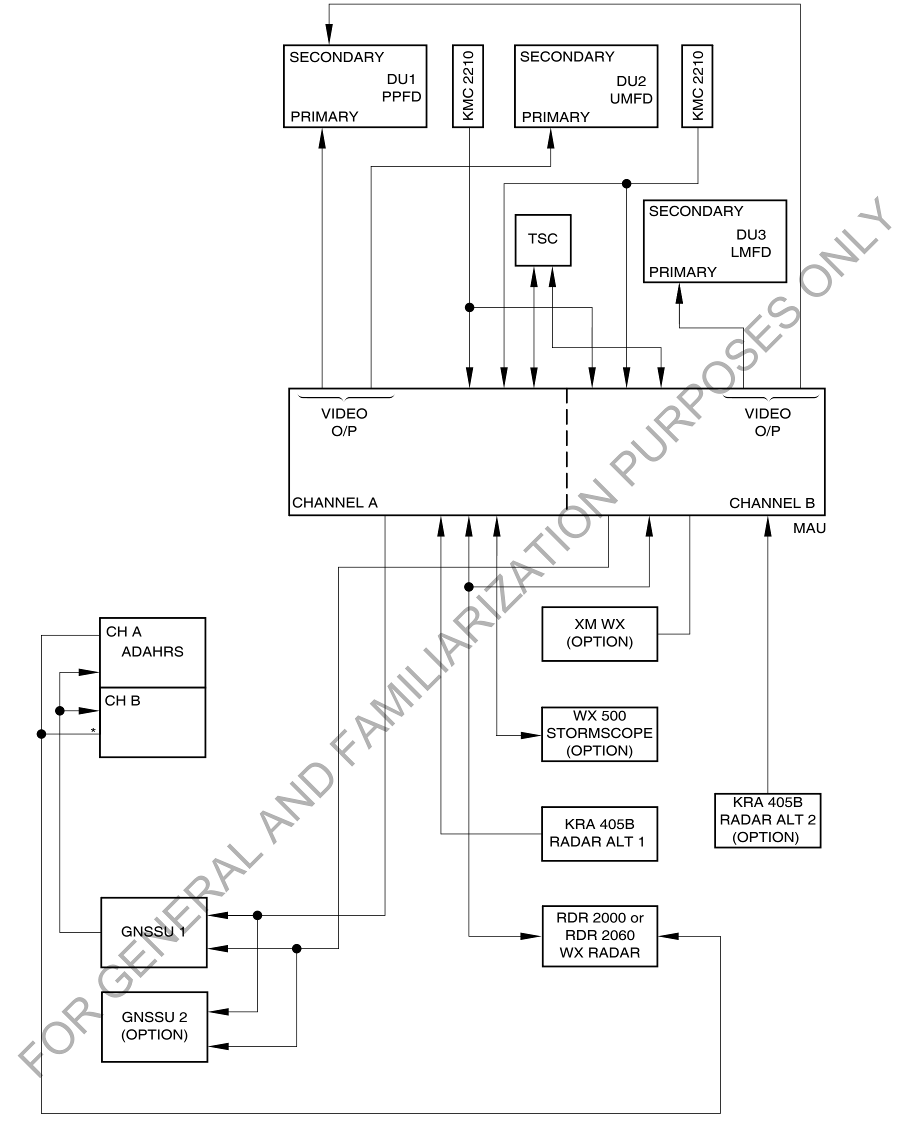
7-30-2.2 Operation

The controls for the weather radar are on the Touch Screen Controller (TSC). The WX LX TAWS button on the home page gives access to the weather radar controls. The WX Radar mode button allows to select the modes OFF/STBY/TEST/WX ON/GND MAP. The current active mode is shown in green or white within the button. Soft buttons and the TSC rotary knobs allow to modify the tilt or gain setting. Additional buttons are shown to control further WX settings. The Tilt/Gain knob button allows to permanently allocate the right hand rotary knobs to modify the Tilt/Gain setting independent of the shown TSC format. Weather radar annunciations for ALERT, MODE and TILT are located on the left side of the HSI. The ALERT annunciations are TX ON GND in amber when WX and transmit on ground are selected on the TSC and the aircraft is on the ground. TGT ALRT is given in amber when there are potentially hazardous targets directly in front of the aircraft that are outside of the selected range. Longer ranges should be selected to view the questionable target. The MODE annunciation is that set by the TSC. The TILT annunciation value is a three digit number preceded by an arrow, up for positive value and down for negative value. Faults are annunciated WX FAULT in white on the right lower part of the weather radar overlay and failures are annunciated WX FAIL in amber.

For further information on operational techniques and weather interpretation consult the RDR 2000 or RDR 2060 Pilot Guide.

The Avionics window of the systems MFD also contains WX/LX/TAWS setup pages. The WX setup tab is selected via the page menu of the multifunctional window and has similar controls as the TSC WX format page.

Refer to the Pilot’s Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for complete information on the description and operation of the weather radar.



*RDR 2060 INSTALLATION ONLY

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Figure 7-30-1: APEX Situation Awareness – Schematic

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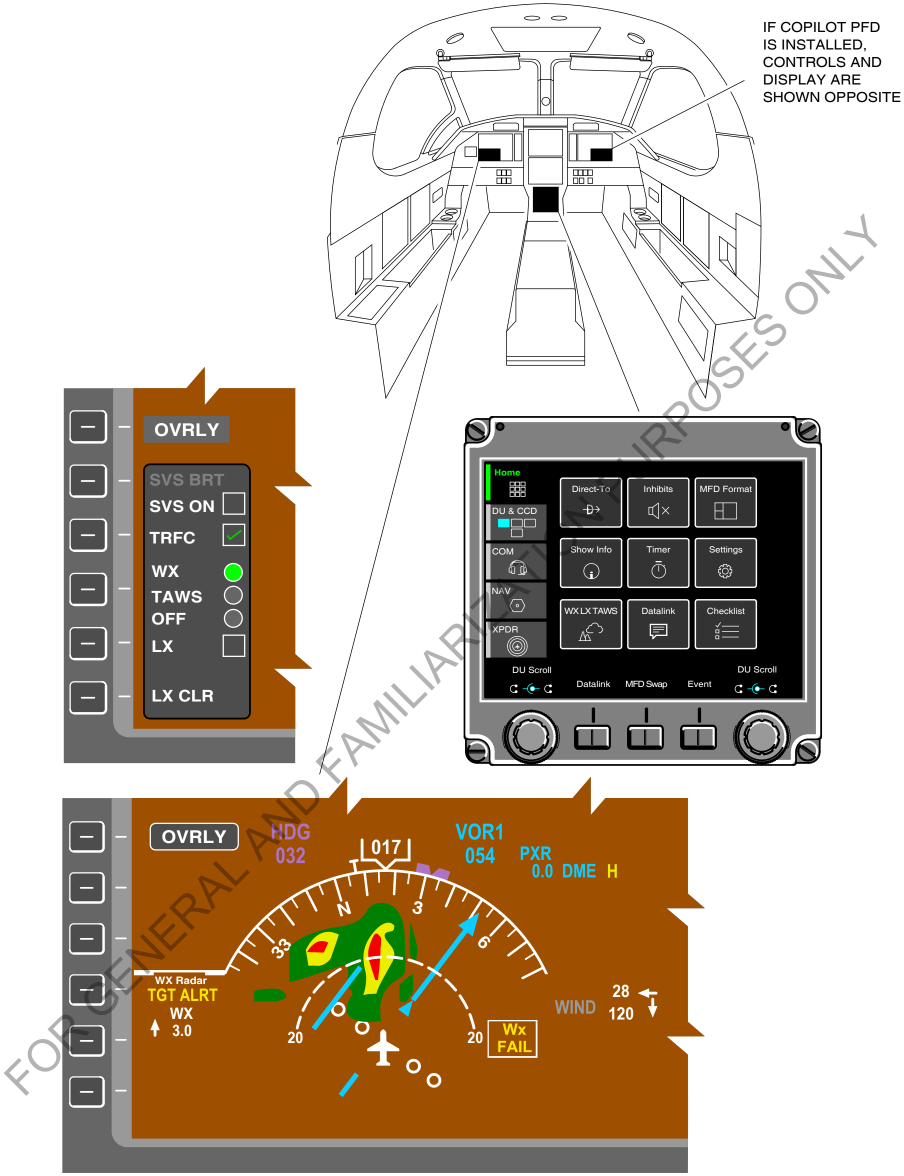

Figure 7-30-2: APEX Weather Radar – Overlay Menu and Display

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7-30-3 Radar Altimeter

7-30-3.1 Description

The KRA 405B transceiver is installed under the cabin floor between frames 26 and 27. The power supply to the transceiver is 28 VDC through the RAD ALT 1 circuit breaker on the AVIONIC 1 BUS circuit breaker panel. An optional second radar altimeter can be installed.

The transceiver sends a signal to the transmit antenna and gets the return signal from the receive antenna. The transceiver measures the time between the transmitted signal and the reply signal then processes the data to give height from the ground. The maximum operating height AGL used by the system is 2500 ft.

The radar altimeter system measures the aircraft height Above Ground Level (AGL) electronically and sends the height AGL data to the MAU for display in the ADI window of the pilot PFD and copilot PFD (when installed). The digital readout for radio altitude is displayed in green text to the lower right of the aircraft symbol on the PFD. The radar altitude display is removed at altitudes greater than 2500 ft. When altitude is less than 550 feet, the lower portion of the PFD altitude tape will show a yellow cross hatched box to indicate the ground proximity.

If the radar altitude data becomes invalid the digital readout will be replaced with RAD in white. The radar altimeter data is also used by the optional situation awareness systems.

7-30-3.2 Indication / Warning

The Crew Alerting system (CAS) window of the systems Multi Function Display (MFD) displays the following CAS messages for the radar altimeter status (refer to Table 7-30-1):

Table 7-30-1: Primus APEX - Weather Radar - CAS Messages

CAS Message	Description
RA 1 Fail	Indicates RA failed in both CSIO module channels

7-30-4 Optional Equipment

7-30-4.1 Enhanced Ground Proximity Warning System (EGPWS)

7-30-4.1.1 General

The Enhanced Ground Proximity Warning System (EGPWS) consists of an Enhanced Ground Proximity Warning Function (EGPWF) hosted on a processor card housed in the Modular Avionics Unit (MAU).

The EGPWS provides an enhanced capability of reducing accidents caused by controlled flight into terrain. The system achieves this by receiving a variety of aircraft parameters as inputs, then applying alerting algorithms to provide the flight crew with aural messages and visual annunciation and display. The EGPWS provides the flight crew with enhanced Class A terrain awareness while following an ATC flight plan clearance. The EGPWS can optionally be set to TAWS Class A or Class B.

The EGPWS uses GPS position data for accurate position determination in conjunction with a global database. The database also contains the locations of all runways longer than 2000 feet that have a published instrument approach. The TAWS terrain overlay when selected is displayed on the PFD HSI.

Optionally, these features can be included in the EGPWS: SmartLanding® and SmartRunway®.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E, for information regarding the specific operating details of the system. For further information, refer to the latest edition of the Honeywell EGPWS Pilot's Guide.

7-30-4.1.2 Description

The EGPWS uses the database and inputs from the GPS, FMS, ADAHRS, APEX and radio altimeter to perform its proximity computations.

Terrain is displayed as a variable density dot pattern in green, yellow or red. The pattern density and color being a function of how close the terrain or obstacle is, relative to the altitude of the aircraft. Solid red for a warning terrain threat area and solid yellow for a caution terrain threat area.

The terrain alerting algorithms continuously compute the terrain clearance envelopes ahead of the aircraft. If the boundaries of these envelopes conflict with terrain elevation data in the terrain database, then alerts are issued. Two envelopes are computed, one corresponding to a terrain caution alert and the other to a terrain warning alert.

When the required conditions have been met to generate a terrain or obstacle caution alert, the terrain image on the PFD TAWS Overlay is enhanced to highlight the threatening terrain as solid yellow for caution threats and the appropriate aural alert is given. When the required conditions have been met to generate a terrain or obstacle warning alert, the display image on the PFD TAWS Overlay is enhanced to highlight the terrain as solid red and the appropriate aural alert is given.

7-30-4.1.3 Operation

Refer to Fig. 7-30-3, APEX Terrain - Overlay Menu and Display

The (EGPWS) terrain overlay on the PFD HSI can be selected by pressing the bezel button adjacent to the OVERLAY annunciator, which then displays the overlay selection menu. Select TAWS with the bezel button and repress the OVERLAY bezel button. Terrain map data from the EGPWS is displayed on the lateral map display on the HSI.

EGPWS mode white annunciators for STEEP APR, TERR INHIB and TERR are displayed in the lower left portion of the HSI. When the optional TAWS Class A is installed, G/S INHIB and FLAP OVRD will be displayed as well. The steep approach (STEEP APR) mode which allows the pilot to fly a steeper approach angle without terrain callouts being generated, can be selected from the TAWS set up page. The TERR annunciation indicates normal operation of the TAWS. The terrain inhibit (TERR INHIB), glideslope inhibit (G/S INHIB) and flap override (FLAP OVRD) options are available on the TSC.

Mode 5 Glideslope alerts can be manually cancelled when below 2000 feet Radio Altitude by pressing the G/S INHIBIT button. This button is typically pressed when an unreliable glideslope is expected or when maneuvering is required during an Instrument Landing System (ILS) final approach. The G/S INHIBIT function is automatically reset below 30 feet radar altitude or if the aircraft climbs above 2000 feet or by selecting a non-ILS frequency as the primary navigation source. Unsafe Terrain Clearance alerts can be manually inhibited by pressing the FLAP OVRD button.

All six modes can be manually inhibited by pressing the TERR INHIB button at the Inhibits view (under the Home QA button) on the TSC. All the terrain and aural alerts are deactivated. This feature is generally used when the position accuracy is inadequate or when operating at airports not in the terrain database.

Three amber annunciators for TEST, RANGE and TERR N/A can be displayed on the HSI. A test of the EGPWS can be performed from the TAWS set up page using the TAWS SELF TEST soft key on the MFD or by selecting the TAWS tab on the TSC home page and selecting the TAWS Self Test button. The range update failure shows that the actual range of the TAWS does not match the currently displayed HSI range. The terrain unavailable status shows that the TAWS is not available.

The EGPWS sends aural alert messages, when necessary, to the audio control panel and to the headphones and cockpit speaker. At the same time annunciations are displayed on the PFD ADI in an amber box for GND PROX or red box for PULL UP. The annunciations flash in reverse video for 5 seconds and then remain on until the condition is no longer detected. If the TAWS terrain overlay is not displayed and a EGPWS alert is set, the terrain overlay will be displayed (automatic pop-up) on the HSI in the partial compass mode.

The EGPWS voice messages are annunciated as per the priorities set within the Primus APEX - Monitor Warning System (MWS).

The enhanced feature of the EGPWS is the ability to alert the crew to and provide a display of potential conflict with terrain. Terrain conflict alerts will initiate a specific aural message and annunciator illumination. The EGPWS keeps a synthetic image of local terrain in front of the aircraft for display on the PFD Terrain Overlay.

Other enhanced features of the EGPWS are:

- Terrain Alerting and Display (TAD)
- Peaks
- Obstacles
- Envelope Modulation
- Terrain Clearance Floor (TCF)
- Runway Field Clearance Floor (RFCF)
- Geometric Altitude.

The EGPWS issues voice messages and tones for the following types of warning:

- Sink rate pull up warning (Mode 1)
- Terrain closure pull up warning (with preface - Mode 2)
- Terrain awareness pull up warning (with preface - TAD)
- Terrain (Mode 2B/Mode 2A Altitude Gain)
- Minimums type (Mode 6)
- Terrain awareness caution (TAD)
- Too low terrain (Mode 4)
- Too low terrain (TCF)
- Altitude callouts (Mode 6)
- Too low gear (Mode 4)
- Too low flaps (Mode 4)
- Sink rate (Mode 1)
- Don't sink (Mode 3)
- Glideslope (Mode 5)
- Approaching minimums type (Mode 6)
- Bank angle (mode 6)
- SR/SL Cautions
- SR/SL Advisories

7-30-4.1.4 Indication / Warning

The CAS window on the Systems MFD will show the following advisory messages for the Terrain Avoidance system status (refer to Table 7-30-2):

Table 7-30-2: Primus APEX - EGPWS - CAS Messages

CAS Message	Description
FLAP OVRD Active	Flap Override selected for EGPWF
G/S INHB Active	Glide slope inhibited for EGPWF while flying backcourse approach
RAAS Fail	Internal hardware / software or input failures leading to loss of Runway Awareness and Advisory System (RAAS) function
RAAS Inhibit	RAAS inhibit selected by pilot
RAAS Not Available	Missing RAAS Parameter (e.g. Airport not in Database) leading to loss of RAAS function
TAWS Fail	Indicates terrain avoidance system data has become invalid
Terrain Fail	Terrain Awareness inoperative leading to loss of display
Terr Inhib Active	Indicates terrain visual and aural alerting is inhibited

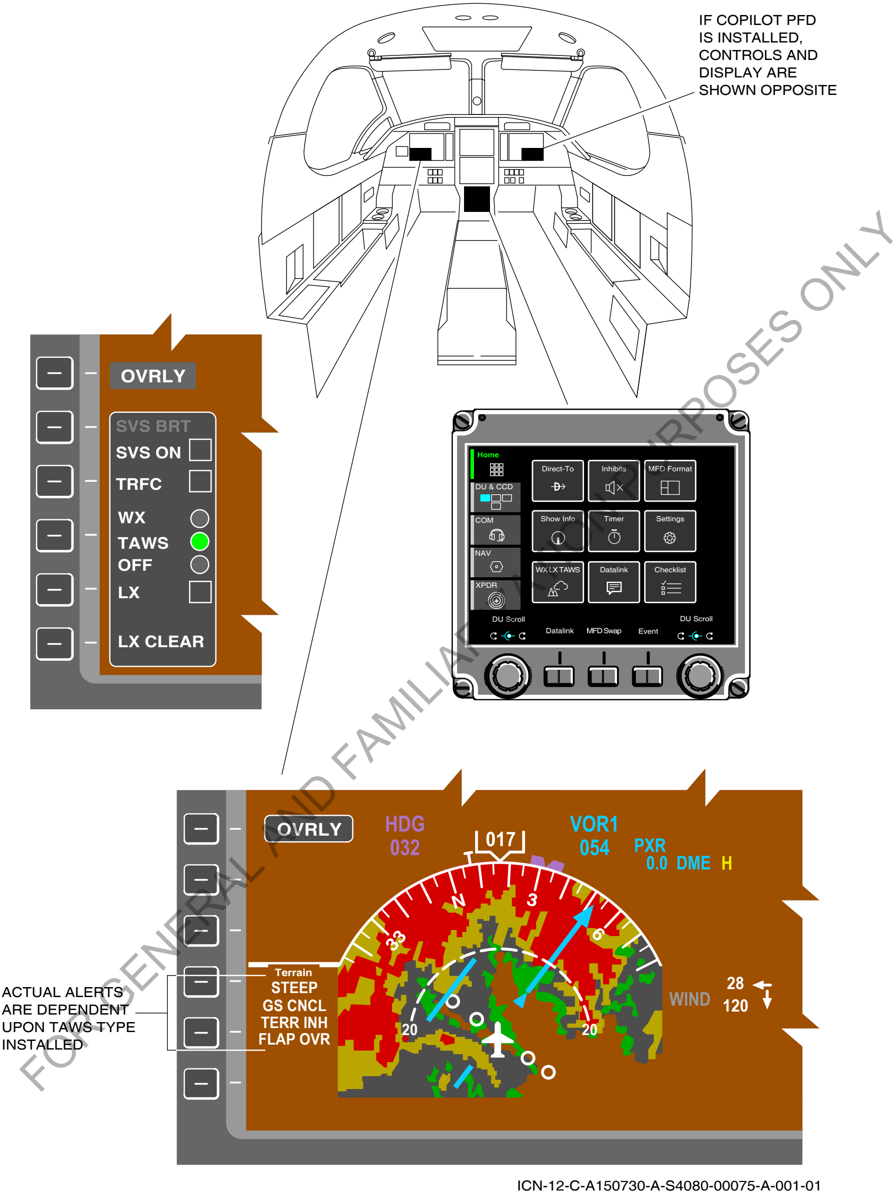

Figure 7-30-3: APEX Terrain - Overlay Menu and Display

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7-30-4.2 Traffic Collision And Avoidance System (TCAS)

7-30-4.2.1 General

The TPA-100C Traffic Collision and Avoidance System (TCAS I or II) comprises a processor, one Upper antenna (directional), one Lower antenna (omnidirectional) and a configuration module. Power supply to the processor is 28 VDC through the TCAS circuit breaker on the Avionic 1 BUS circuit breaker panel. Aural alerts are available through the headphones and cockpit speaker.

TCAS is intended as an aid to the see and avoid concept. Once an Intruder is visually acquired, it is the pilot's responsibility to maneuver as necessary to maintain safe separation.

TCAS I does not incorporate the sophisticated sensors, bearing accuracy or track rate computations incorporated in TCAS II that are necessary for evasive maneuvering (rapid change in pitch, roll, normal acceleration, thrust or speed). In general, TCAS I does not provide adequate information for pilots to determine reliably which horizontal or, in some cases, vertical direction to move to increase separation, and there is some likelihood that such maneuvers will actually result in reduced separation.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for information regarding the specific operating details of the system. For further information refer to the TPA-100C Pilots Guide.

7-30-4.2.2 Description

The TCAS detects and tracks other (Intruder) aircraft by interrogating their transponders. From the transponder replies, TCAS determines range, bearing and (if the Intruder is equipped with a Mode C or S transponder) relative altitude. Intruders equipped with a Mode A transponder do not provide altitude information. With this data, the TCAS uses standard algorithms to determine the threat of collision. When a possible collision hazard exists, the TCAS issues a visual and aural Traffic Advisory (TA) (TCAS I and II) or Resolution Advisory (RA) (TCAS II) to the flight crew. The TCAS will not detect aircraft which have no operating transponder.

The TCAS traffic overlay when selected is displayed on the PFD or the Map window of the INAV. It displays the horizontal picture of the traffic around the aircraft. The horizontal picture represents aircraft (intruders) within the surveillance volume, including the range, azimuth, altitude and vertical direction arrows, when the information is available from the TCAS processor operation.

7-30-4.2.3 Operation

Refer to Fig. 7-30-4, APEX Traffic - Overlay Menu and Display

The TCAS traffic overlay on the PFD HSI can be selected by pressing the bezel button adjacent to the OVERLAY annunciator, which then displays the overlay selection menu. Select TRFC with the bezel button and repress the OVERLAY bezel button.

The TCAS overlay can be displayed on the Situation Awareness MFD INAV Map by selecting the TCAS button on the Active Layers Control Bar.

For TCAS I, the aircraft intruder symbology consists of three different shapes:

- Traffic Advisory (TA) displayed as a solid amber circle
- Proximate Traffic (PA) displayed as solid cyan diamond
- Other Traffic, no threat, displayed as hollow cyan diamond.

For TCAS II, the aircraft intruder symbology consists of eight different shapes:

- Non-directional RA displayed as a solid red square
- Directional RA displayed as a solid red square with arrowhead inside
- Non-directional TA displayed as a solid amber circle
- Directional TA displayed as a solid amber circle with arrowhead inside
- Non-directional Proximate Traffic (PA) displayed as solid cyan diamond
- Directional Proximate Traffic (PA) displayed as solid cyan diamond with arrowhead inside
- Non-directional other traffic, no threat, displayed as hollow cyan diamond
- Directional other traffic, no threat, displayed as hollow cyan arrowhead.

A data tag representing intruder altitude is displayed above or below and a vertical speed arrow pointing up or down to the right of the intruder symbol. TCAS can track up to 60 aircraft and display up to 30 intruders.

TA (TCAS I and II) or RA (TCAS II) intruders that are outside the set display range on the selected PFD or MFD are shown in such a way that half of the non-direction symbol is visible at the approximate azimuth. Increasing the HSI range can make the intruder visible on the PFD or MFD.

If an Intruder gets to within 20 to 48 seconds of a projected closest point of approach and/or meets other range and closure criteria, it is then considered a potential threat and a visual TA is issued with a voice message.

The TCAS system will issue an aural “Traffic, Traffic” alert message at the same time a TA is detected and displayed on the Traffic overlay. This assists the pilot in achieving visual acquisition of the threat traffic. If the TCAS traffic overlay is not displayed and a TCAS alert is set, an amber TRFC soft key is displayed. Pressing the bezel button adjacent to the TRFC soft key will enable the traffic overlay to be displayed on the HSI in the partial compass mode.

The TCAS aural alert is sent directly to the audio control panel and is available through the headphones and cockpit speaker. TCAS aural alerts cannot be muted by the pilot. TCAS aural alerts are part of the third priority group of aural warnings. Only the stall warning aural alert and the EGPWF aural alerts have greater priority than TCAS aural alerts.

TCAS II: If an Intruder gets to within 15 to 35 seconds of a projected closest point of approach (10 to 15 seconds after the TA was issued), it is then considered a collision threat and a visual RA is issued. When an RA occurs, the pilot flying shall respond immediately to RA displays and aural alerts, manoeuvring as indicated, unless doing so would jeopardize the safe operation of the aircraft.

Note

Visually acquired traffic may not be the same traffic causing an RA. The visual perception of an encounter may be misleading, particularly at night.

TCAS is intended as an aid to the see and avoid concept. Once an intruder is visually acquired, it is the pilots responsibility to maneuver as necessary to maintain safe separation.

7-30-4.2.4 Indication / Warning

The CAS window on the systems MFD will show the following advisory message for the Terrain and Traffic Alerting systems status (refer to Table 7-30-3):

Table 7-30-3: Primus APEX - TCAS - CAS Messages

CAS Message	Description
TCAS Fail	TCAS hardware/software fault leading to loss of Traffic Collision Avoidance System (TCAS) and Cockpit Display of Traffic Information (CDTI)

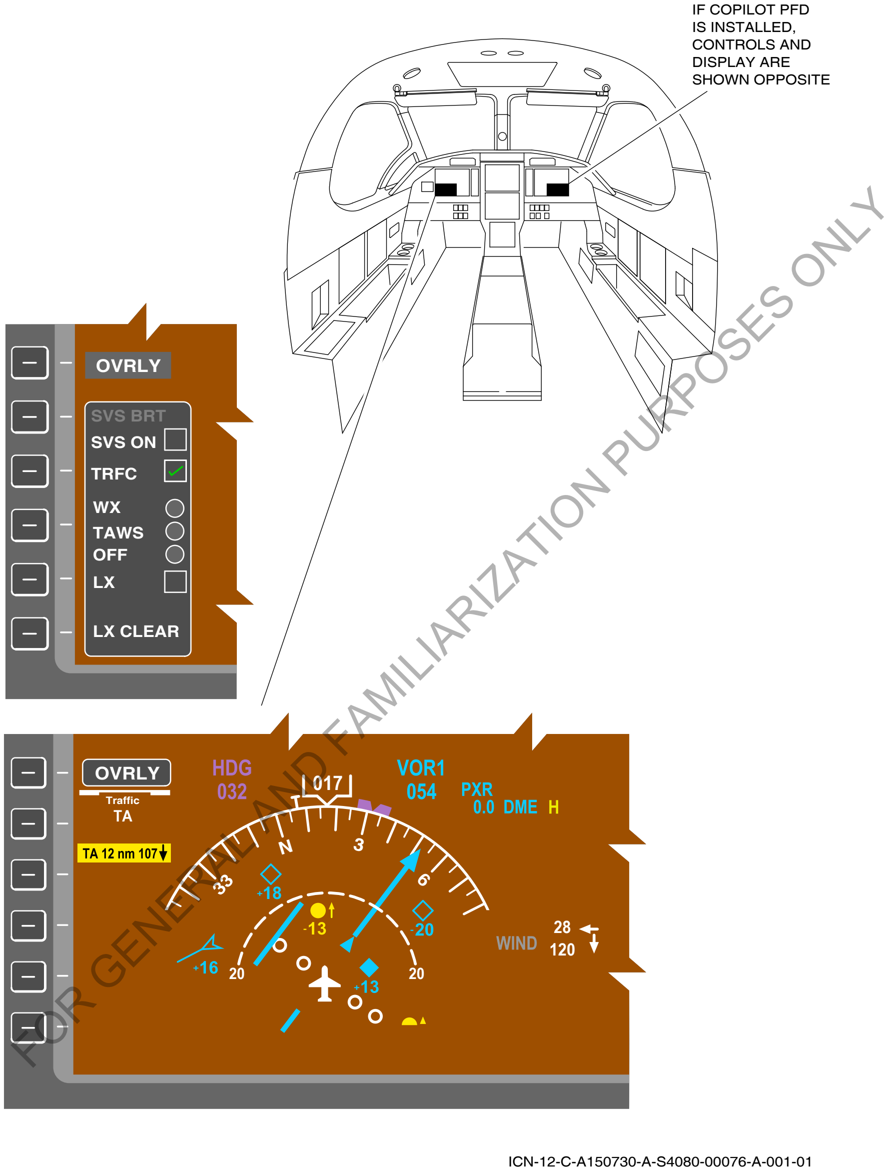

Figure 7-30-4: APEX Traffic - Overlay Menu and Display

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7-30-4.3 Automatic Dependent Surveillance - Broadcast (ADS-B) In

7-30-4.3.1 General

ADS-B In is a feature of the transponder that can provide the following additional features:

- Basic Airborne situational awareness (AIRB)
- Visual Separation on Approach (VSA)
- SURFace situational awareness (SURF)
- Oceanic In-Trail Procedure (ITP)
- Enhance Visual Acquisition (EVAcq)

The ADS-B In receiver gets broadcast data from other transponder equipped aircraft.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for information regarding the specific operating details of ADS-B In.

7-30-4.3.2 Indication / Warning

The CAS window on the systems MFD will show the following advisory message for the ADS-B In systems status (refer to Table 7-30-4):

Table 7-30-4: Primus APEX - TCAS - CAS Messages

CAS Message	Description
ADS-B In Fail	TCAS hardware/software fault leading to loss of Cockpit Display of Traffic Information (CDTI)

7-30-4.4 Lightning Sensor System

7-30-4.4.1 General

The Lightning Sensor System (LSS) Stormscope WX 500 processor is installed under the cabin floor between frames 34 and 35. The power supply to the system is 28 VDC through the STORMSCOPE circuit breaker on the AVIONIC 2 BUS circuit breaker panel.

7-30-4.4.2 Description

The LSS detects lightning activity 360 degrees around the aircraft up to a distance of 200 nautical miles. The antenna is installed on the bottom of the fuselage, it detects intra-cloud, inter-cloud or cloud-to-ground electrical discharges and sends the resulting discharge signals to the processor. The processor converts the signals into range and bearing data then stores the data in memory. The processor then communicates the data to the MAU as strikes and cells with updates every two seconds.

To maintain correct storm orientation the system receives heading source data from the ADAHRS. If the heading source data becomes invalid the LSS may fail and remain failed until a complete power cycle is performed.

The LSS is inhibited automatically when the pilot or copilot presses his PTT switch. This prevents false lightning activity detections which could be caused by the communications transmission signals.

For further information on the use of the system, operational techniques and weather display interpretation consult the Stormscope Model WX-500 User's Guide.

7-30-4.4.3 Operation

Refer to Fig. 7-30-5, APEX Lightning - Overlay Menu and Display

The LSS is a passive system and is commanded into the normal working mode by the MAU at power up. The system has three levels of self test; at power on, continuous and pilot initiated. The pilot initiated LX self test which takes approximately 30 seconds can be done from the LX set up page accessed from the WX/LX/TAWS menu on the TSC or the MFD lower 1/6th window tab. The LX MODE can be toggled between Cell and Strike on the LX set up page. The power default state of LX MODE is Strike.

During the system operation the partial compass of the HSI display and the Situation Awareness MFD Map display can be overlaid with lightning information. There are two components of the lightning display, mode/fault annunciations; strike rate and lightning cell/strike data. Mode/fault and strike rate annunciations are placed outside the display area and the lightning cell/strike is placed inside the display using a lightning symbol as described in the cell and strike modes given below.

The Lightning (LX) overlay on the PFD HSI can be selected by pressing the bezel button adjacent to the OVERLAY annunciator, which then shows the overlay selection menu. Select LX with the bezel button and then press the OVERLAY bezel button again.

The Situation Awareness MFD INAV Map Lightning Sensor System overlay can be displayed by selecting the WX button on the Active Layers Control Bar and then selecting the LSS check box.

When the LSS overlay is selected the normal mode annunciations for CELL or STRIKE and the RATE are shown in white on the bottom left of the overlay. In either the cell or strike mode, if a lightning strike is detected within 25 nm of the aircraft position within the last three minutes the mode annunciator will change to amber.

Indicated distance of lightning activity may differ slightly from distance provided by the XM SAT Weather. This is due to the measuring technique used by the WX-500 Stormscope.

Annunciations in white are also given: CLEAR, TEST and FAULT. If the lightning sensor fails an amber LX FAIL annunciation will be shown and the RATE and overlay display data will be removed.

7-30-4.4.3.1 Strike Display Mode (default mode)

In the strike display mode a discharge symbol is shown on the lightning detection overlay when the LSS detects a discharge within the selected range and view. The strike display mode shows the discharge points on the overlay in relation to where the discharges are actually detected instead of close to an associated group as is done in the cell display mode. The strike display mode is most useful during periods of light electrical discharge activity because it may show discharges associated with a building thunderstorm.

7-30-4.4.3 .2 Cell Display Mode

In the cell display mode a discharge symbol is shown on the lightning detection overlay when the LSS detects discharges within the selected range and view. The system will show another discharge symbol close to the first for each additional discharge determined to be associated with the group. Discharges not associated with a group are not shown unless its detected within 25 nm radius of the aircraft. The effect of this clustering algorithm is to display the location of storm cells instead of individual discharges. The cell display mode is most useful during periods of heavy electrical discharge activity.

Clearing the discharge points periodically while monitoring thunderstorms is a good way to determine if the storm is building or dissipating. Discharge points in a building storm will reappear faster and in larger numbers. Discharge points in a dissipating storm will appear slower and in smaller numbers. The LX CLR soft key is accessed from the OVRLY window and when the adjacent bezel button is pressed an LX CLR “ON” indicator will show for three seconds and all the lightning cells or strikes will be removed from the PFD and any other displays.

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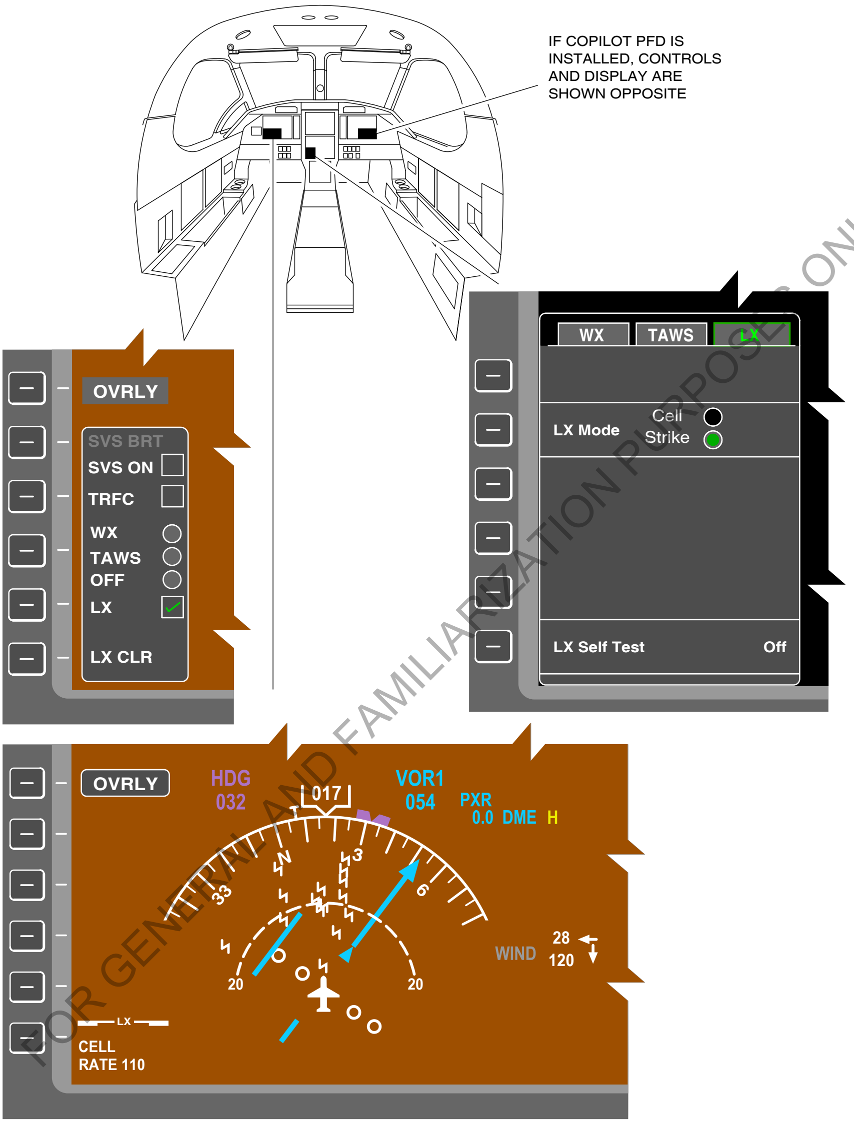

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Figure 7-30-5: APEX Lightning – Overlay Menu and Display

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7-30-4.5 XM Sat Weather

7-30-4.5.1 Description

The XM Sat Weather is a streaming weather data source which provides data to the Primus Apex system for display on the Situation Awareness MFD Map display. The XM Sat Weather processor is installed under the cabin floor between frames 27 and 28. The power supply to the XM Sat Weather system is 28 VDC through the XM SAT WX circuit breaker on the STANDBY BUS. An XM antenna is installed on the forward top of the fuselage.

The XM Weather Receiver sends validated data to the MAU.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE) (powered by Honeywell) for the Pilatus PC-12/47E for more information regarding the specific operating details of the XM Sat Weather system.

7-30-4.5.2 Operation

The XM Sat Weather INAV overlays are selected from the WX button menu on the Situation Awareness MFD.

The following Table 7-30-5 gives the XM Sat Weather system declutter ranges (nm).

Table 7-30-5: XM Sat Weather system declutter ranges (nm)

Layer	Min. Range (North Up)	Min. Range (Heading Up)	Max. Range (North Up)	Max. Range (Heading Up)
NEXRAD	10	5	500	250
Composite Radar	10	5	500	250
Sat	50	25	500	250
Winds	50	25	500	250
Tops	10	5	500	250
Lghtng	10	5	200	100
Turb	50	25	500	250
E-Tops	10	5	500	250
Freezing	50	25	500	250
TFR	5	2.5	500	250
AIRMET	50	25	500	250
SIGMET	5	2.5	500	250
PIREP	50	25	500	250
AIREP	50	25	500	250
Icing	10	5	750	375
NXRDcv	Min INAV range	Min INAV range	Max INAV range	Max INAV range
METAR	Min INAV range	Min INAV range	* 75	* 37.5
TAF	Min INAV range	Min INAV range	* 75	* 37.5

* Airport symbols are decluttered at this range.

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7-30-4.6 SmartView

7-30-4.6.1 General

The purpose of SmartView (SV) is to enhance the pilot's awareness of the aircraft position in relation to terrain, obstacles and airports within the limits of the navigation source capabilities of the system.

SV does not provide the accuracy or reliability upon which the flight crew can solely base decisions and/or plan maneuvers to avoid terrain or obstacles.

Note
To avoid intentional misuse of SmartView (SV) refer to Section 2 (Limitations), Systems and Equipment Limits.

The integrity of SV depends on the validity of the installed Obstacle and Terrain database. If using SV, it is the Pilot's responsibility to verify that a valid database is installed.

Along with the SV option, the PFD also provides PFD symbology to reduce pilot's workload, which is available whether SV is turned ON or OFF.

7-30-4.6.2 Primary Flight Display and SmartView Elements

7-30-4.6.2.1 SmartView Display

Refer to Fig. 7-30-6, SmartView Display Elements and Fig. 7-30-7, Parked Heading Reference Symbol.

Advanced PFD symbology consists of:

1 Flight Path Symbol

The Flight Path Symbol (FPS) is a representation of the current aircraft flight path over ground, i.e. Flight Path Angle (FPA) and track.

2 Flight Path Director

The Flight Path Director (FPD) provides guidance cues with respect to the FPS.

3 Acceleration Chevron

The relative position of the Acceleration Chevron with respect to the FPS indicates the instantaneous acceleration/deceleration of the aircraft with respect to the current Indicated Air Speed (IAS).

4 Zero Pitch/Path Reference Line

The PFD includes a white horizon line that represents the true horizon. If the Aircraft Reference Symbol (ARS) is in line with that white horizon line it indicates a zero pitch. If the FPS is in line with that white horizon line it indicates zero FPA. Therefore the white horizon line is called Zero Pitch/Path Reference Line (ZPRL).

5 Track Reference Symbol

The Track Reference Symbol (TRS) on the ZPRL represents the aircraft track.

6 Heading Reference Symbol

The Heading Reference Symbol (HRS) on the ZPRL indicates the current aircraft heading.

Note
The angle between the TRS and HRS represents the current Drift Angle (DA). If the DA is greater than 9 degrees the HRS will be parked on either side of the display (on the right side if the wind comes from the right and on the left side if the wind comes from the left) and will be ghosted (dashed). In this scenario, the HRS is nonconformal to the synthetic scenery and the angle between the HRS and the TRS does not represent the DA anymore.

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SmartView consists of:

1 Synthetic Scenery

The synthetic scenery provides the display of sky, water and terrain relative to the current aircraft position and track, and is depicted from the perspective of the flight crew. The synthetic scenery is created based on the terrain database.

Note
The terrain database has an area of coverage from latitude 80 degrees North to latitude 80 degrees South in all longitudes.

2 Grid Lines

Grid lines are regularly spaced black lines on terrain that help to provide an optical flow for general sense of motion and altitude above ground and aid depth perception and terrain closure rate to the flight crew.

3 Range Rings

The terrain tracing range rings indicate points on the terrain that are the same indicated ground distance from the aircraft. The white range rings mark distances of 3 nm, 5 nm, 10 nm and 20 nm.

4 Obstacles

All obstacles in the database that are 200 ft AGL or higher are shown on the synthetic scenery by a purple rectangle that represents the true height of the obstacle, but not the true width. Obstacles are always assumed to be 80 ft wide. Obstacles appear when the obstacle position is 13 nm (ground range) from the aircraft. The obstacles are created based on the obstacle database.

Note
Terrain and obstacles shown above the ZPRL are above the current aircraft altitude. Similarly, terrain and obstacles shown below the ZPRL are below the current aircraft altitude. SV is intended to assist as an awareness tool only. It may not provide either the accuracy or fidelity (or both) on which to solely base decisions and plan maneuvers to avoid terrain or obstacles.

5 Runways and Runway Markings

All runways from the database are displayed on the synthetic scenery. Runways appear on the display at a range of 33 nm (ground distance). Runways are shown with a realistic looking surface texture, runway identification number and center line.

Note
All runways are shown without clear ways.

6 Destination Runway Outline

A cyan box is placed around the FMS selected runway to help the pilot to easily identify the destination runway.

7 Destination Runway Extended Centre Line

The destination runway extended centre line is a line originating from the FMS selected destination runway end along the runway direction. The length of the extended centre line is 10 nm.

Note

The extended destination runway center line does not represent a localizer.

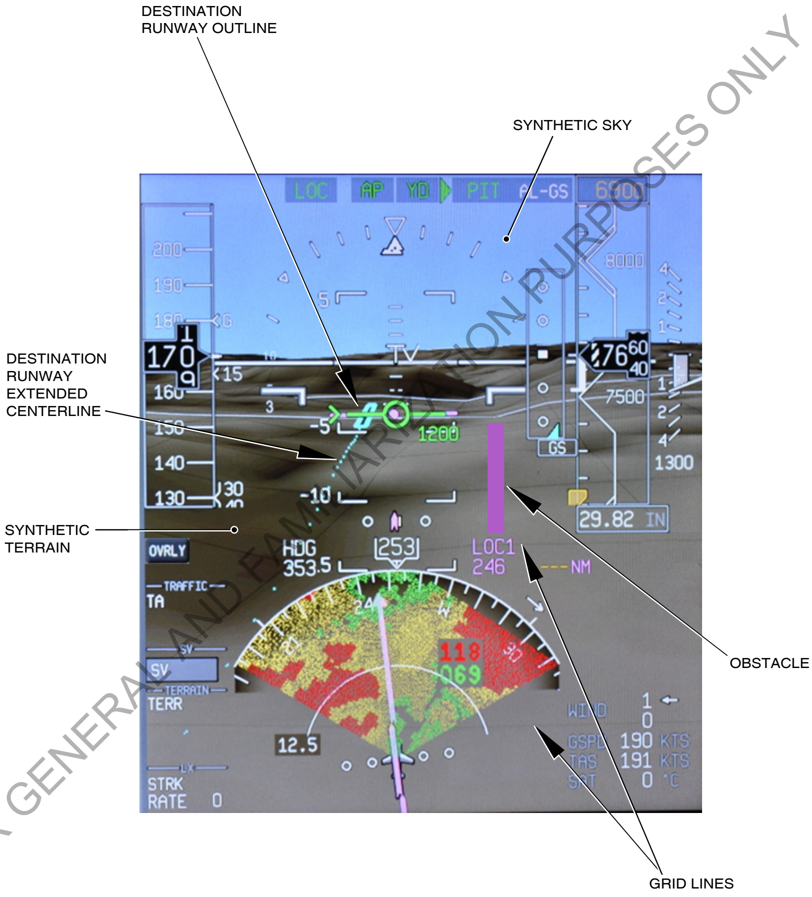

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Figure 7-30-6: SmartView Display Elements (Sheet 1 of 3)

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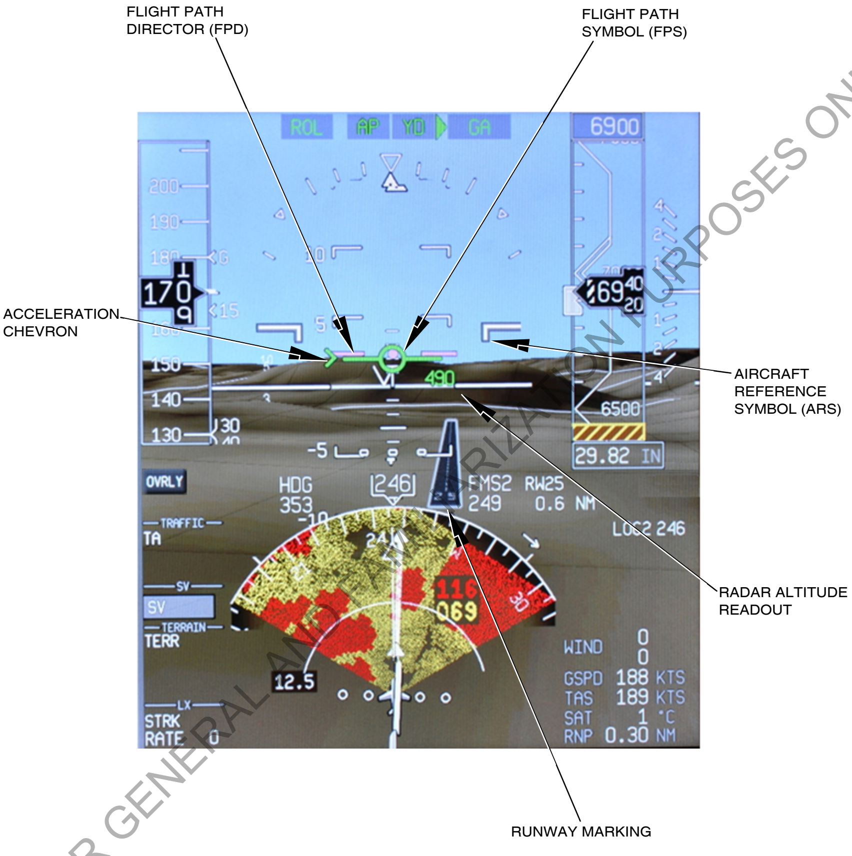

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Figure 7-30-6: SmartView Display Elements (Sheet 2 of 3)

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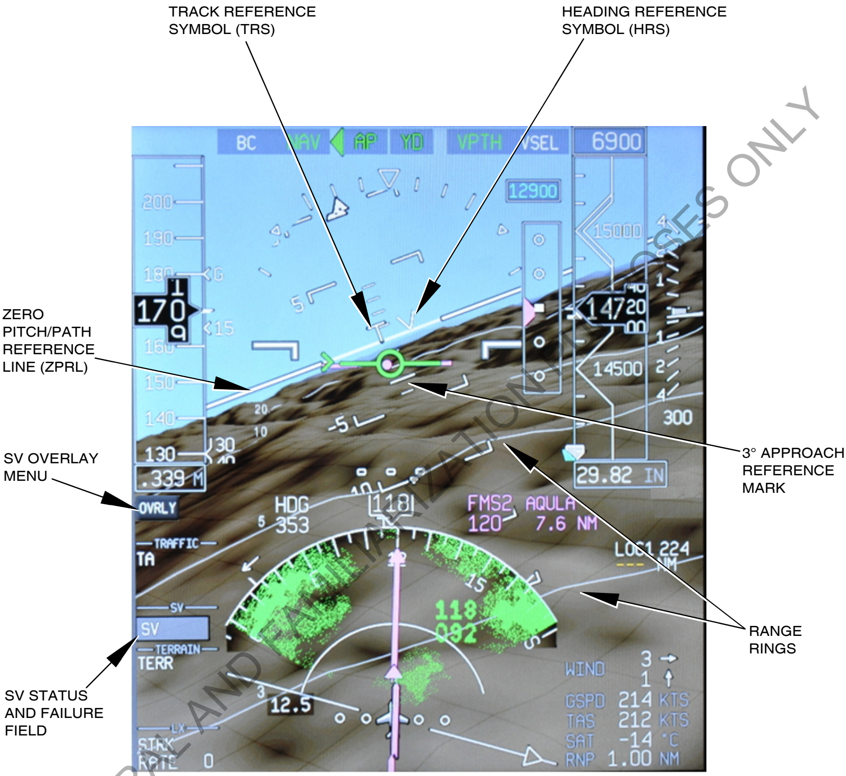

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Figure 7-30-6: SmartView Display Elements (Sheet 3 of 3)

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Figure 7-30-7: Parked Heading Reference Symbol

7-30-4.6.2 .2 SV Vertical Centering Mode

The vertical centering mode is pitch-based. This means the synthetic terrain is vertically centered with the ARS, which does not move vertically. The vertical scale is positioned so that the ARS represents the correct aircraft pitch attitude.

Note

The synthetic scenery is vertically centered to where the aircraft is pointing at (pitch angle) and not where it is going to (Flight Path Angle).

Note

The FPS can move vertically to indicate the current aircraft FPA in respect to the vertical scale.

7-30-4.6.2 .3 SV Lateral Centering Mode

The SV lateral centering mode is track-based. This means the synthetic terrain is laterally centered with the FPS, which does not move laterally.

Note

The FPS is always conformal to the synthetic scenery, obstacles and runways. The synthetic scenery is laterally centered to where the aircraft is going to (tracking) and not where it is pointing at (heading).

Note

The ARS does not move laterally. Therefore it does not indicate the aircraft heading. For indication of the aircraft heading the pilot must use the (Horizontal Situation Indicator) HSI. The HRS on the ZPRL also gives a reference for the aircraft heading with respect to the background synthetic scenery.

7-30-4.6.2 .4 SV Field of Regard Lines

Refer to Fig. 7-30-8, iNAV lateral Field of Regard line.

The lateral Field of Regard (FOR) lines are displayed on the 2D map (iNAV). The FOR lines represent the lateral limits of the displayed synthetic scenery.

Note

As a consequence of the track-based lateral centering mode the FOR lines are also centered according to the aircraft track. Therefore during high DA the FOR lines will not symmetrically line up with the aircraft longitudinal axis (heading).

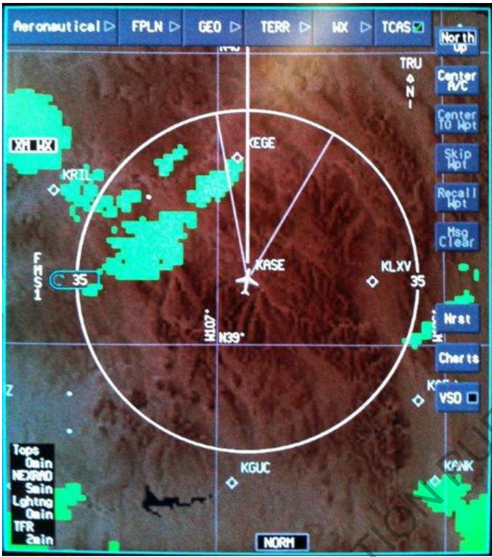

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Figure 7-30-8: iNAV lateral Field of Regard line

7-30-4.6.2 Flight Director Selection
.5

Refer to Fig. 7-30-9, FCS Tab and Fig. 7-30-10, Flight Director Modes.

Three Flight Director (FD) modes are available. They can be selected from the FCS tab in the Avionics window:

- Single-Cue (S-Cue) Flight Director with a flying wedge as primary reference symbol
- Cross-Pointer (X-Ptr) Flight Director with gull wings as primary reference symbol
- Flight Path (Flt-Path) Flight Director with a FPS as primary reference symbol.

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Figure 7-30-9: FCS Tab

If Flt-Path is selected as Flight Director mode the FPS is the primary reference symbol and gull wings are shown as a secondary reference symbol (Aircraft Reference Symbol). In this case the FPS cannot be selected OFF (FPS selection is greyed out).

If S-Cue or X-Ptr is selected as Flight Director mode the flying wedge or gull wings are shown as the primary reference symbol. The FPS in this case is a secondary symbol and can be selected ON or OFF in the FPS selection line in the FCS tab in the Avionics window.

The FD selection menu can be controlled via DU bezel buttons or via CCD or TSC on the FCS tab in the Avionics window. The FD selection will cycle with each press between S-Cue, X-Ptr and Flt-Path.

At power-up the default is the last pilot selection. In the case that the FPS is invalid initially at power-up, the system defaults to X-Ptr.

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	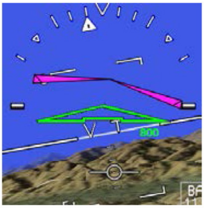	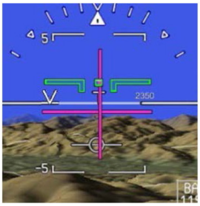	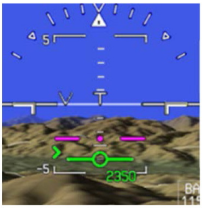
PITCH-BASED MODE			PATH-BASED MODE
GUIDANCE CUE	SINGLE CUE (S-CUE) FLIGHT DIRECTOR	CROSS POINTER (X-PTR) FLIGHT DIRECTOR	FLIGHT PATH (FLT-PATH) DIRECTOR
PRIMARY CONTROL REFERENCE	FLYING WEDGE AIRCRAFT REFERENCE SYMBOL	GULL WINGS AIRCRAFT REFERENCE SYMBOL	FLIGHT PATH SYMBOL
SECONDARY REFERENCE	DE-EMPHASIZED FLIGHT PATH SYMBOL	DE-EMPHASIZED FLIGHT PATH SYMBOL	DE-EMPHASIZED GULL WINGS AIRCRAFT REFERENCE SYMBOL

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Figure 7-30-10: Flight Director Modes

1 Pitch-Based Mode

In pitch-based mode (S-Cue or X-Ptr Flight Director) the primary control reference is the ARS displayed as a green flying wedge or gull wings. The FPS, if selected, is deemphasized (smaller and grey in colour) as it is a secondary reference. In this mode the magenta Flight Director (S-Cue or X-Ptr) provides guidance cues with respect to the green ARS.

2 Path-Based Mode

In path-based mode (Flt-Path Flight Director) the primary control reference is the FPS, displayed as a green circle with wings. The ARS is shown as gull wings. As the ARS in this case is a secondary reference, it is shown deemphasized (thinner, expanded and white/grey in colour). In this mode the magenta FPD provides guidance cues with respect to the green FPS.

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7-30-4.6.2 .6 Unusual Attitudes

Refer to Fig. 7-30-11, Unusual Attitude Overlays and Fig. 7-30-12, Synthetic Blue Display.

1 Semi-Transparent Blue over Brown in unusual attitudes.

In unusual attitudes, there may not be enough sky or terrain shown to provide an adequate interpretation of the aircraft attitude. To aid this information a semitransparent blue or brown is overlaid in certain attitudes. The sky/terrain colour is semi-transparent so the pilot can continue to see the terrain behind the sky/terrain colour for terrain awareness. In this case the ZPRL is non-conformal, i.e. the angle between the ZPRL and the ARS does not represent the current aircraft pitch angle anymore and the angle between the FPS and the ZPRL does not represent the current FPA. However, the ARS and the FPS are still presented correct with respect to the background vertical scale of the display.

Note
In normal operation, with enough blue (sky) on the top of the display, the semi-transparent synthetic blue will not be visible. When terrain is displayed on the upper part of the display (e.g. when tracking to a mountain), the semitransparent synthetic blue becomes visible.

2 Reversion to PFD due to excessive bank angle:

Refer to Fig. 7-30-13, Excessive Bank Angle.

At excessive angles of bank the PFD symbology is decluttered. SV is removed if the bank angle increases at 65 degrees left or right. The FPS will be removed at 70 degrees left or right bank.

3 Reversion to PFD due to excessive pitch angle:

Refer to Fig. 7-30-14, Excessive Pitch Angle.

The PFD will declutter at 30 degrees pitch up or 20 degrees pitch down. The FPS will be removed at 40 degrees pitch up or 30 degrees pitch down.

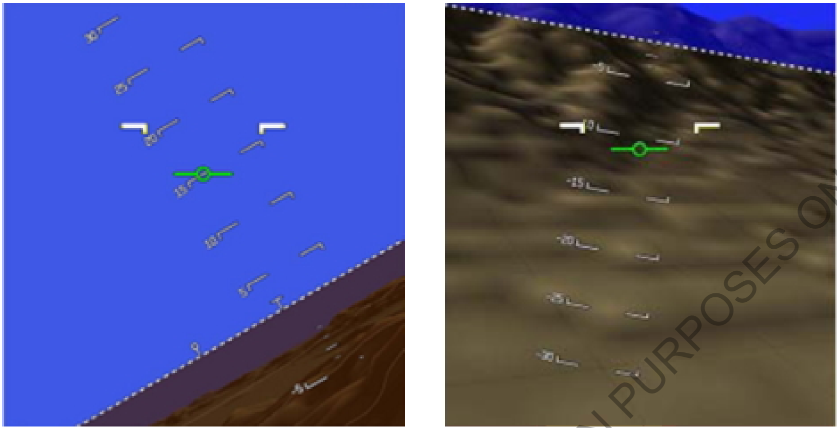

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Figure 7-30-11: Unusual Attitude Overlays

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Figure 7-30-12: Synthetic Blue Display

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Figure 7-30-13: Excessive Bank Angle

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Figure 7-30-14: Excessive Pitch Angle

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7-31 Primus APEX - Monitor Warning System (MWS)

7-31-1 General

The MWS performs the following functions:

- Monitor Warning Function (MWF)
  - System monitors
  - Aural Warning.
- Crew Alerting System (CAS)
- Flight Alerting System (FAS).

7-31-2 Monitor Warning Function (MWF)

The MWF continuously monitors the interfaced aircraft systems and initiates the appropriate warning, caution and aural alerts to the crew when necessary.

The MWF runs in both channels of the Modular Avionics Unit (MAU), each MWF is comparison monitored with its opposing channel for integrity of the resultant alert.

Each MWF instance will produce a priority status parameter, and dependent on its origin will be sent to the FAS (Refer to Section 3, FAS Messages and Actions for these messages), CAS or to the Aural Warning system.

7-31-3 System Monitors

The MWF provides two levels of system monitoring, Level A and C. The level A monitor consists of the following:

- On ground
  - WOW air-ground monitor
  - Radio altitude air-ground monitor
  - Calibrated airspeed air-ground monitor
  - Aircraft on ground monitor.
- PBIT on ground
- Engine running
- Inhibit monitors
  - Takeoff global inhibit monitor
  - Approach global inhibit monitor
  - Standby Bus On global inhibit monitor
  - Electrical power on functional inhibit monitor
  - Engine start functional inhibit monitor
  - Taxi functional inhibit monitor.
- Cruise functional inhibit monitor
- Takeoff configuration
- Check DU graphics generation and display monitor
- Gear warning monitor
- Stall warning monitor
- Cabin pressurized warning monitor
- Overspeed warning monitor
- CPCS doors monitor
- CPCS takeoff roll monitor
- Landing gear status.

The level C monitor consists of the following:

- Sensor miscompare
  - Selected ADAHRS data determination
  - Pitch miscompare monitor
  - Roll miscompare monitor
  - Heading miscompare monitor
  - Barometric corrected altitude miscompare monitor
  - Barometric correction miscompare monitor
  - Calibrated airspeed miscompare monitor.
- Altitude alert
- Autopilot engage
- Minimums alert
- Gear enable energized
- De-ice boots
- Hydraulic pressure
- Engine automatic start
- Oil debris
- ACS control
- ASCB Bus.

7-31-4 Aural Warning

The MWF consists of two monitor warning functions that provide requests for the aural warning drivers to output tones and/or voice callouts to the audio system.

Table 7-31-1 lists the aural alerts generated from the MWF in priority order.

Table 7-31-1: Aural Alerts

CONDITION	AURAL MESSAGE / TONE	TYPE	MUTABLE
Stall	“Stall”	Continuous	No
Terrain alerts	Numerous	N/A	Note 1
Traffic alerts	Numerous	External	Note 2
Gear	“Gear”	Continuous	No
Overspeed	“Speed”	Continuous	No
Takeoff Configuration	“No Takeoff”	Continuous	No
Cabin Pressurized	“Cabin”	Continuous	No
Warning Chime	Triple Chime	Continuous	Yes
Pitch Trim Runaway	“Trim Runaway”	Continuous	Yes
Yaw Trim Runaway	“Trim Runaway”	Continuous	Yes
Engine Fire	“Fire”	Continuous	Yes
Cabin Altitude	“Cabin Altitude”	Continuous	Yes
Battery Hot Warning	“Battery Hot”	Continuous	Yes *
Propeller Low Pitch Warning	“Propeller Low Pitch”	Continuous	Yes
RAAS Cautions	Numerous	N/A	Note 1
Smart Runway / Smart Landing Cautions (optional)	Numerous	N/A	Note 1
Caution Chime	Single Chime	Continuous	Yes
AP Uncommanded Disconnect	Cavalry Charge	Continuous	Yes
Minimums	“Minimums”	Single	No
AP Commanded Disconnect	Cavalry Charge	Single	No
Altitude	C Chord	Single	No
Vertical Track Alert	C Chord (0.2 sec on, 0.15 sec off, 0.2 sec on)	Single	No
AT (optional) Uncommanded Disconnect	“Autothrottle”	Continuous	Yes
AT (optional) Commanded Disconnect	“Autothrottle”	Single	No
RAAS Advisories	Numerous	N/A	Note 1
ATC Uplink Aural	Ding-Dong	Single	Yes
ATC center notified failed	Ding-Dong	Single	Yes
ATC MSG buffer full	Ding-Dong	Single	Yes
ATS uplink aural	Ding-Dong	Single	Yes
Smart Runway / Smart Landing Advisories (optional)	Numerous	N/A	Note 1

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Note	
1	EGPWF tones are commanded by the EGPW function on the MAU and played based on MWS priorities.
2	TCAS alerts are part of the third priority group of aural warnings. Only the stall and EGPWF aural alerts have a higher priority than TCAS aural alerts.
3	* Only when NiCad batteries are installed.

If the MWF detects a fault in the aural warning system a CAS caution message will be shown to annunciate the Aural Warning Failure. If one channel of the aural warning system becomes inhibited or defective a CAS advisory message will be shown to indicate an aural warning fault. If one channel of the MWF becomes defective a CAS advisory message will be shown to indicate an MWF A or B channel failure. The aural warning system can be disabled by operation of the AURAL WARN INHIBIT switch on the cockpit rear left switch panel, in the event of a failed repetitive aural.

For normal operation the AURAL WARN INHIBIT switch should not be selected to INHIBIT. To reduce nuisance alerting in the cockpit, both channels of the aural warning are disabled while the aircraft is on the ground and not fully powered.

7-31-5 Crew Alerting System (CAS)

Refer to Fig. 7-31-1, Crew Alerting System (CAS).

When the MWF detects an out of limits condition it will illuminate either the master WARNING or master CAUTION attention lights and generate the appropriate message and aural alert. The CAS messages are displayed in the CAS window of the systems Multi Function Display (MFD). When no messages are active the window is blank except for the window title CAS and the scroll arrows. The window can display 12 lines of messages of 20 characters each.

The CAS messages have four levels:

- **Warning (red)**

  Indicates a condition that requires an immediate corrective action by the pilot. A red warning CAS message will be displayed in reverse (red background) until acknowledged by pressing the WARNING attention light. After which the CAS warning message text will be shown in the red warning color

- **Caution (amber)**

  Indicates a condition that requires a pilots attention but not an immediate reaction. An amber caution CAS message will be displayed in reverse (amber background) until acknowledged by pressing the CAUTION attention light. After which the CAS caution message text will be shown in the amber caution color. Unacknowledged reversed caution messages cannot be scrolled off the CAS window

- **Advisory (cyan)**

  Indicates a system condition, which requires pilot awareness and may require crew action. A cyan advisory CAS message will be displayed in reverse (cyan background) for 5 seconds. After 5 seconds they will be shown in the cyan advisory color

- **Status (white)**

  Are only displayed on the ground in white text and indicate a maintenance action is required. The **Event** message will be displayed in flight to indicate that the crew initiated event recording is captured.

The CAS messages have been given a hierarchical priority status. Red warning has priority over an amber caution, which has priority over cyan advisory. The purpose of the priority status is that new incoming messages will be held in a queuing system based on priorities. Whenever a new CAS message becomes active it will appear in the appropriate color in reverse video.

Red master WARNING and amber master CAUTION attention lights are positioned on the instrument panel directly in front of the pilot and copilot. They alert the crew to changes in the CAS monitoring status. Any condition that causes a red or amber CAS message also causes the applicable master WARNING or CAUTION attention light to come on. Some warnings are accompanied with a voice callout which will sound through the overhead speaker and/or headset(s). Pushing the applicable master WARNING or CAUTION attention light acknowledges the message and extinguishes the light. This action also changes the warning or caution message from reverse video to normal text in the CAS window. All advisory and status messages will be automatically acknowledged and revert to normal text after being in view for 5 seconds.

The master WARNING and CAUTION attention lights are checked before flight by pressing the LAMP switch on the overhead panel which will make the pilot and copilot attention lights illuminate.

In the event that more than 12 messages are active simultaneously, scrolling is provided for the pilot to view all active messages. Warning messages cannot be scrolled off the display. Caution messages can only be scrolled off the display when they have been acknowledged. Scrolling is not active until the message window is full. On the left side of the CAS window a digital display will show the number of CAS messages scrolled off the CAS window for each color. Acknowledged messages scrolled off the CAS window will appear in normal text and unacknowledged messages will be shown in reverse video.

To initiate CAS scrolling, press the bezel button adjacent to the up or down arrow softkey. Scrolling of the CAS messages can also be done with the Cursor Control Device (CCD) by bringing the CAS window into focus, and then use the scrollwheel function to scroll up or down.

In the event of a MWF miscompare condition, an amber MW annunciator is displayed on the left of the CAS window (Ref. Fig. 7-31-1, Crew Alerting System (CAS)). When this MW annunciator is displayed, the pilot can toggle between the MWF Sources by pressing the bezel button adjacent to the MW softkey. The pilot decides which MWF Source to select in a miscompare condition.

All the warnings (including their respective audio), cautions, advisory and status messages that can be displayed on the CAS are listed in Table 7-31-2 (warnings), Table 7-31-3 (cautions), Table 7-31-4 (advisories) and Table 7-31-5 (status). An X in the flight phase columns indicates a message is inhibited during that flight phase.

Refer to the relevant aircraft System Indication/Warning section for a description of the conditions when a CAS message will be generated. Refer to Section 3, General for the relevant emergency procedures given for the CAS Warning and Caution messages.

7-31-6 CAS Warning Messages (RED)

Table 7-31-2: CAS Warning Messages (Red)

Message Text	Voice	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
Engine Fire	Fire	X						
Engine ITT		X						
Engine Torque		X						
Engine NG		X						
Engine NP		X						
Engine Oil Press		X						
Engine Oil Temp		X						
Essential Bus		X		X				
Generators		X	X	X				
Cabin Pressure		X		X				
Starter Engaged		X		X				
Battery 1 Hot	Battery Hot	X		X		X		X
Battery 2 Hot		X		X		X		X
Battery 1 + 2 Hot		X		X		X		X
Pitch Trim Runaway	Trim Runaway	X		X				
Engine Oil Level (only valid with engine oil pressure below 50 psig)		X		X				
Cabin Altitude	Cabin Altitude	X		X				
Passenger Door		X		X				X
Cargo Door		X		X				X
Pax + Cargo Door		X		X				X

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Table 7-31-2: CAS Warning Messages (Red) (continued from previous page)

Message Text	Voice	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
Propeller Low Pitch	Propeller Low Pitch	X		X				
EPECS Fail		X						
Yaw Trim Runaway	Trim Runaway	X		X				

7-31-7 CAS Caution Messages (AMBER)

Table 7-31-3: CAS Caution Messages (Amber)

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
MAU A Fail			X				
MAU B Fail			X				
Engine ITT	X						
Engine Torque	X						
Engine NG	X						
Engine NP	X						
Engine Oil Press	X						
Engine Oil Temp	X						
EPECS Degraded	X				X		X
Probes Off	X		X		X		X
Fuel Quantity Fault	X		X		X		X
Fuel Balance Fault	X		X		X		X
LH Fuel Low	X		X				
RH Fuel Low	X		X				
LH & RH Fuel Low	X		X				
Fuel Pressure Low	X						
Fuel PRESS SENS Fail	X				X		X
Fuel IMP Bypass	X		X		X		X
Fuel Filter Blocked	X						
Fuel TEMP	X				X		X
LH Fuel Pump	X				X		X
RH Fuel Pump	X				X		X
LH & RH Fuel Pump	X				X		X
Gear Actuator Cntl	X		X				
Invalid Gear Config			X		X	X	X
External Power	X		X		X	X	X
ACS Low Inflow	X		X		X		X
ECS Fault	X		X		X		X
CPCS Fault	X		X		X		X
Generator 1 Off	X		X		X		X

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Table 7-31-3: CAS Caution Messages (Amber) (continued from previous page)

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
Generator 2 Off	X		X		X		X
Fuel Imbalance	X		X		X		X
Bus Tie	X				X		X
Pusher	X		X				
Avionics 1 Bus	X		X		X		X
Avionics 2 Bus	X		X		X		X
Avionics 1 + 2 Bus	X		X		X		X
Fire Detector	X		X		X		X
Generator 1 Volts	X		X		X		X
Generator 2 Volts	X		X		X		X
Generator 1 + 2 Volts	X		X		X		X
Battery 1	X		X		X		X
Battery 2	X		X		X		X
Battery 1 + 2	X		X		X		X
Battery 1 Off	X		X		X		X
Battery 2 Off	X		X		X		X
Battery 1 + 2 Off	X		X		X		X
Flaps	X		X				
Engine Chip	X		X		X		X
Main Bus	X		X		X		X
Generator 1 Bus	X		X		X		X
Generator 2 Bus	X		X		X		X
Generator 1 + Bus	X		X		X		X
AOA De Ice	X		X				X
Pitot 1 Heat	X		X		X		X
Pitot 2 Heat	X		X		X		X
Pitot 1 + 2 Heat	X		X		X		X
Static Heat	X		X				X
Inertial Separator	X		X				X
De Ice Boots	X		X				X
LH Windshield Heat	X		X		X		X
RH Windshield Heat	X		X		X		X
LH + RH Windshield Heat	X		X		X		X
Propeller De Ice	X		X				X
Check DU 1			X				
Check DU 2			X				
Check DU 1+2			X				
Check DU 3			X				
Check DU 1+3			X				
Check DU 2+3			X				
Check DU 1+2+3			X				
Check DU 4			X				
Check DU 1+4			X				

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Table 7-31-3: CAS Caution Messages (Amber) (continued from previous page)

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
Check DU 2+4			X				
Check DU 1+2+4			X				
Check DU 3+4			X				
Check DU 1+3+4			X				
Check DU 2+3+4			X				
Check DU 1+2+3+4							
Non Essential Bus	X		X		X		X
Standby Bus			X		X		X
RA 1 Fail	X		X		X		
RA 2 Fail	X		X		X		
RA 1+2 Fail	X		X		X		
MMDR 1 Fail			X		X		X
MMDR 2 Fail			X		X		X
MMDR 1+2 Fail			X		X		X
XPDR 1 Fail	X		X		X		X
XPDR 2 Fail	X		X		X		X
XPDR 1+2 fail	X		X		X		X
AHRS A Fail	X		X		X		X
AHRS B Fail	X		X		X		X
AHRS A+B Fail	X		X		X		X
ADC A Fail	X		X		X		X
ADC B Fail	X		X		X		X
ADC A+B Fail	X		X		X		X
Air/Ground Fail	X		X		X		X
Aural Warning Fail	X	X	X		X		X
DME 1 Fail	X		X		X		X
DME 2 Fail	X		X		X		X
DME 1+2 Fail	X		X		X		X
MMDR 1 Overheat			X		X		X
MMDR 2 Overheat			X		X		X
MMDR 1+2 Overheat			X		X		X
HSI1 is MAG TRK	X	X	X				
HSI1 is TRU TRK	X	X	X				
HSI2 is MAG TRK	X	X	X				
HSI2 is TRU TRK	X	X	X				
HSI1+2 is MAG TRK	X	X	X				
HSI1+2 is TRU TRK	X	X	X				
AP Hold LH Wing Dn		X	X	X	X		
AP Hold RH Wing Dn		X	X	X	X		
AP Hold Nose Up		X	X	X	X		
AP Hold Nose Dn		X	X	X	X		
YD Hold Nose Left		X	X	X	X		
YD Hold Nose Right		X	X	X	X		

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Table 7-31-3: CAS Caution Messages (Amber) (continued from previous page)

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
LH PFD CTLR Fail			X		X	X	X
RH PFD CTLR Fail			X		X	X	X
LH+RH PFD CTLR Fail			X		X	X	X
FLT CTLR Ch A Fail	X		X		X	X	X
FLT CTLR Ch B Fail	X		X		X	X	X
FLT CTLR Ch A+B	X		X		X	X	X
DU 1 Overheat	X		X		X		X
DU 2 Overheat	X		X		X		X
DU 1+2 Overheat	X		X		X		X
DU 3 Overheat	X		X		X		X
DU 1+3 Overheat	X		X		X		X
DU 1+2+3 Overheat	X		X		X		X
DU 1+4 Overheat	X		X		X		X
DU 4 Overheat	X		X		X		X
DU 1+4 Overheat	X		X		X		X
DU 1+2+4 Overheat	X		X		X		X
DU 2+4 Overheat	X		X		X		X
DU 3+4 Overheat	X		X		X		X
DU 1+3+4 Overheat	X		X		X		X
DU 2+3+4 Overheat	X		X		X		X
DU 1+2+3+4 Overheat	X		X		X		X
APM 1 Fail			X		X	X	X
APM 2 Fail			X		X	X	X
APM 1+2 Fail			X		X	X	X
CMS 1+2 Fail	X		X		X	X	X
System Config Fail			X		X	X	X
Validate Config	X		X		X	X	X
APM Miscompare	X		X		X	X	X
Cabin Pressure	X		X				
FMS1-GPS1 Pos Misc			X		X		X
FMS1-GPS2 Pos Misc			X		X		X
FMS1-GPS1+2 Pos Misc			X		X		X
FMS2-GPS1 Pos Misc			X		X		X
FMS2-GPS2 Pos Misc			X		X		X
FMS2-GPS1+2 Pos Misc			X		X		X
Unable FMS-GPS Mon	X	X	X		X		
Check Pilot PFD	X		X				
Check Copilot PFD	X	X	X				
Check Engine Display	X		X				
ASCB Fail	X		X		X		X
Boots TEMP Limit							
Flaps EXT Limit							
Emergency Descent							

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Table 7-31-3: CAS Caution Messages (Amber) (continued from previous page)

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
Gear Power Fail	X						
ATC Datalink Fail			X		X		X
YD Fail	X		X		X		X
YD Off							

7-31-8 CAS Advisory Messages (CYAN)

Table 7-31-4: CAS Advisory Messages (Cyan)

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
Terr Inhib Active							
MWF A Fail			X		X		X
MWF B Fail			X		X		X
Aural Warning Fault	X	X	X		X	X	X
No Alt Reporting							
YD Fail	X		X		X		X
AP Fail	X		X		X		X
AIOP A Module Fail			X		X		X
AIOP B Module Fail			X		X		X
CSIO A Fail			X		X		X
CSIO B Fail			X		X		X
CSIO A + B Fail			X		X		X
MAU A Overheat			X		X		X
MAU B Overheat			X		X		X
MAU A + B Overheat			X		X		X
FMS1 Fail			X		X		X
FMS2 Fail			X		X		X
FMS1+2 Fail			X		X		X
Maintenance Fail	X		X	X	X	X	X
MAU Fan Fail			X		X		X
MF CTLR Fail			X		X		X
FMS Synch Error	X		X		X		X
LH OAT Fail	X		X		X		X
RH OAT Fail	X		X		X		X
LH+RH OAT Fail	X		X		X		X
LH PFD CTLR Fail			X		X		X
RH PFD CTLR Fail			X		X		X
LH+RH PFD CTLR Fail			X		X		X
FD Fail	X		X		X		X
CMS 1 Fail			X		X		X
CMS 2 Fail			X		X		X
GIO A Fail			X		X		X

Table 7-31-4: CAS Advisory Messages (Cyan) (continued from previous page)

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
GIO B Fail			X		X		X
GIO A+B Fail			X		X		X
AGM 1 Fail			X		X		X
AGM 2 Fail			X		X		X
Takeoff Config	X		X		X	X	X
ACMF Logs Full	X		X		X	X	X
ACMF Logs >80% Full	X		X		X	X	X
Engine Log Full	X		X		X	X	X
Engine Log >80% Full	X		X		X	X	X
Pusher Safe Mode	X		X				
FLT CTLR Ch A Fail	X		X		X		X
FLT CTLR Ch B Fail	X		X		X		X
FLT CTLR Ch A+B Fail	X		X		X		X
TCAS Fail	X	X	X		X		X
TAWS Fail	X				X		X
GPS 1 Fail			X		X		X
GPS 2 Fail			X		X		X
GPS 1+2 Fail			X		X		X
AFCS Fault	X	X	X		X		X
CVR Fail	X		X		X		X
FDR Fail	X		X		X		X
Gear Control Fault	X		X		X	X	X
Flameout	X						
AUTO Relight	X						
EPECS Fault	X				X		X
Prop Reverse Fail	X						
TF Fail	X	X	X		X		X
AT Fail		X	X		X		X
CIO 1 Fail							
PROC 1 Fail							
Aural Warning Fault	X	X	X		X	X	X
ADS-B In Fail	X	X	X		X		X
VSA Unavailable	X	X	X		X		
SURF Traffic UNAVAIL	X	X	X		X		X
Windshear Fail					X		X
G/S Inhib Active							
FLAP OVRD Active							
STEEP APR Active							
Terrain Fail	X						
RAAS Fail	X		X		X	X	
RAAS Inhibit							
RAAS Not Available	X		X		X	X	

Table 7-31-4: CAS Advisory Messages (Cyan) *(continued from previous page)*

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
AOC Uplink			X		X		X
ATS Uplink			X		X		X
ATC Uplink			X		X		X
TSC Fail					X		
TSC Fan Fail					X		

7-31-9 CAS Status Messages (WHITE)

Table 7-31-5: CAS Status Messages (White)

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
FCMU Fault	X		X		X	X	X
Low Lvl Sense Fault	X		X		X	X	X
Maint Memory Full	X		X		X	X	X
No Eng Trend Store	X		X		X	X	X
EPECS TLD	X				X	X	X
EPECS MAINT Mode	X				X		X
Wet Motoring	X				X		X
Dry Motoring	X				X		X
Maintenance Feather	X				X		X
Fuel Filter Replace	X				X		X
Engine Exceedence	X		X		X	X	X
Aircraft Exceedence	X		X		X	X	X
Event	X						
LH WOW Fault	X		X		X	X	X
RH WOW Fault	X		X		X	X	X
LH+RH WOW Fault	X		X		X	X	X
LH Fan Fault	X		X		X	X	X
RH Fan Fault	X		X		X	X	X
LH+RH Fan Fault	X		X		X	X	X
Crew Event Store	X		X		X	X	X
AGM1/FMS1 GFP Inop	X		X		X	X	X
AGM1/FMS2 GFP Inop	X		X		X	X	X
AGM1/FMS1+2 GFP Inop	X		X		X	X	X
AGM2/FMS1 GFP Inop	X		X		X	X	X
AGM2/FMS2 GFP Inop	X		X		X	X	X
AGM2/FMS1+2 GFP Inop	X		X		X	X	X
AGM 1 DB Error	X		X		X	X	X
AGM 2 DB Error	X		X		X	X	X
AGM 1+2 DB Error	X		X		X	X	X
AGM 1 DB Old	X		X		X	X	X

Table 7-31-5: CAS Status Messages (White) *(continued from previous page)*

Message Text	Stby Bus	Elec Pwr on	Eng Start	Taxi	Takeoff	Cruise	Approach
AGM 2 DB Old **AGM 1+2 DB Old**	X X		X X		X X	X X	X X
Function Unavailable							
Prop Feather Inhibit					X		X
CVFDR Fail (APEX Build 12.7.1 and higher)	X		X		X	X	X

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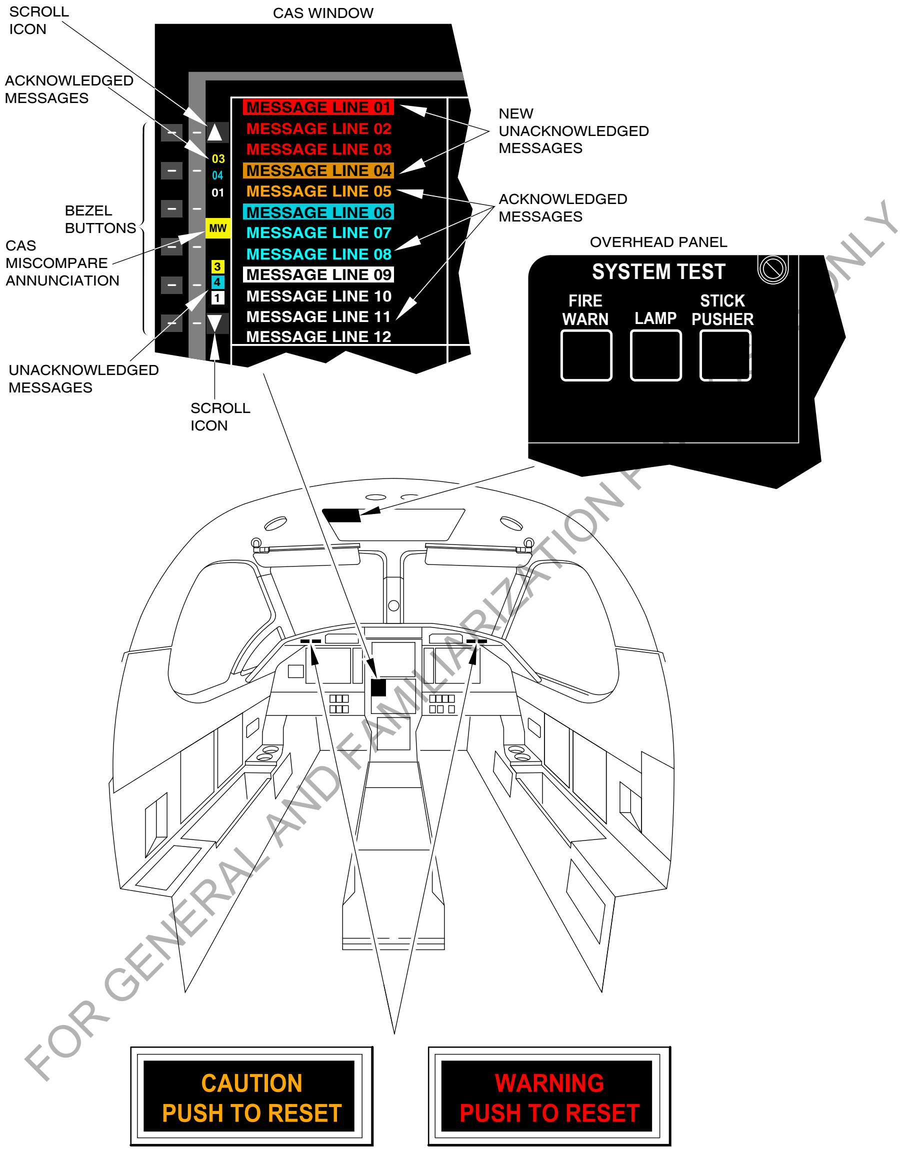

Figure 7-31-1: Crew Alerting System (CAS)

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7-32 Primus APEX - Automatic Flight Control System

7-32-1 General

Refer to Fig. 7-32-1, AFCS Schematic.

The Automatic Flight Control System (AFCS) provides the following functions:

- Autopilot (including automatic pitch trim)
- Yaw Damper (including automatic yaw trim)
- Flight Director (FD) guidance
- Thrust Management System (optional)
- Emergency Descent Mode
- Tactile Feedback.

The AFCS function is hosted in the Modular Avionics Unit (MAU). The autopilot software runs in channels A and B of the MAU and both channels are required to be functional for normal autopilot operation. Pilot control is via a control panel installed above the upper Multi Function Display (MFD).

Auto flight control is accomplished with aileron, elevator and rudder servo actuator motors.

The AFCS consists of the following components:

- AFCS processing within the MAU
- Flight Controller (FC)
- Pitch and yaw trim adaptor and actuators
- Aileron, elevator and rudder servos.

7-32-2 Description

The aileron, elevator and rudder servo motors communicate with the MAU via dual Controller Area Network (CAN) data buses. The AFCS function in the MAU generates servo commands that are identically output onto both of the CAN data buses. Commands received by the servo from each of the CAN data buses are dual processed within the servo and the resultant processed data must agree to effect a servo action. Additionally both servo channels must agree in their monitoring of motor current, clutch solenoid engagement and motor position.

The servo motors have an electrical clutch that is used to engage and disengage the output shaft from the drive train. The servo motors are mounted on capstans which are connected by autopilot cables to the flight control cables. The capstans incorporate a mechanical clutch, which can be physically overridden by the pilot if the electrical clutch will not disengage. Power to actuate the electrical clutch is supplied from the Avionic 1 bus A/P SERVO ENABLE circuit breaker through the MAU. When the autopilot is engaged the electrical clutches engage and connect the servo motors to the capstans in order to move the flight control surfaces. Electrical power to move the servos is supplied from the Avionic 1 bus through the A/P SERVO circuit breaker. The pilot can disconnect the electrical clutches (autopilot) by pressing the AP DISC push-button switch mounted on each control wheel yoke. This is the primary means of disconnecting the autopilot but operation of any of the following controls will also disconnect the autopilot:

- Trim engage switch on the pilot or copilot control wheel
- Rudder trim switch on the PCL
- Alternate Stab Trim switch on the center console
- Trim Interrupt switch on the center console
- AP switch on the FC panel.

When the autopilot is engaged the horizontal stabilizer trim actuator alternate motor and the rudder trim actuator motor are interfaced through the trim adapter to the AFCS autotrim function in the MAU. This autotrim function is to minimize the steadystate torque on the elevator and rudder servos. Manual trim commands are monitored by the MAU and disconnect the autopilot whenever sensed.

The pilot can momentarily disconnect the aileron and elevator electrical clutches by pressing the Touch Control Steering (TCS) push-button switch mounted on each control wheel. Release of the TCS push button will re-engage the aileron and elevator electrical clutches.

The Takeoff / Go Around (TO/GA) switch on the left side of the Power Control Lever (PCL) is used to initiate a go around mode in the flight director.

Flap position and flap fail indications are provided to the AFCS function in the MAU as part of the auto pitch trim control laws. The AFCS monitors the positions of the control wheel AP DISC and TCS switches, the TO/GA switch on the PCL, the manual pitch/roll trim switches on the control wheel, the rudder trim switch on the PCL and the TRIM INTERRUPT and ALTERNATE STAB TRIM switches on the center console.

The FC panel provides the means for selection of all AFCS functions except Go Around mode, TCS and AP/AT quick disconnect. Electrical power is supplied to the FC for Ch A from the Avionic 1 bus through the FLT CONT CH A circuit breaker. The FC Ch B is supplied from the Avionic 2 bus through the FLT CONT CH B circuit breaker.

Refer to Fig. 7-32-2, AFCS - Controls and Indications.

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AFCS mode selection provides the following functions (refer to Table 7-32-1):

Table 7-32-1: AFCS - Controls

AFCS Control	Description
L/R	Selects which PFD pilot or copilot (if installed) is used for coupling with the FD. At power up, the default setting for the control is L (left for pilot side)
HDG/T	Momentary push-button to engage or disengage the HDG or TRK mode. When pressed the green annunciator bar above the button comes on
HDG TRK	The control is a dual concentric knob that allows selection between HDG and TRK mode and is used in conjunction with the HDG TRK switch. The outer control is a two-position rotary switch with a pointer. Selects either heading or track on the HSI compass card. The inner knob provides a continuous selection for the Heading or Track Select Bug on the HSI compass and digital readout. Clockwise increments and counter-clockwise decrements the heading or track value by 1 degree per detent. The dual concentric knob is also a momentary push-button PUSH SYNC for synchronization of the selected Heading or Track to the current aircraft heading or track
AP, FD, YD	Momentary push-buttons to engage or disengage the autopilot, flight director and yaw damper. When pressed the green annunciator bar above the button comes on. The AP and YD annunciators and FD command bars will be illuminated on the PFD displays, when the respective button is pressed and engagement occurs
ALT	Controls the altitude preselect and alerting bug on the altitude tape of the PFD displays. The control is a dual concentric knob. Clockwise rotation of the outer control increments and counterclockwise decrements the altitude preselect value by 1000 feet per detent. Clockwise rotation of the inner knob increments and counter-clockwise decrements the altitude preselect value by 100 feet per detent
PITCHWHEEL	Rotating pitchwheel to adjust the vertical mode target values (pitch attitude or vertical speed). The pitchwheel control is only active if the FD is engaged
BNK	Momentary push-button to engage or disengage the high and low bank limits. A magenta arc is displayed on PFD ADI roll scale when low bank selected. The BNK mode is only available in HDG or TRK mode. BNK is automatically activated in HDG mode above FL 250
NAV	Momentary push-button to engage NAV mode. When pressed the green annunciator bar above the button comes on. NAV mode provides tracking of the primary navigation source

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Table 7-32-1: AFCS - Controls (continued from previous page)

AFCS Control	Description
APR	Momentary push-button to engage APR mode. When pressed the green annunciator bar above the button comes on. APR mode gives capture and tracking of approaches
VS	Momentary push-button to engage VS mode. When pressed the green annunciator bar above the button comes on. VS mode is used to climb or descend at the target vertical speed.
VNAV	Momentary push-button to engage VNAV mode (if installed). When pressed the green annunciator bar above the button comes on. Pressing VNAV arms the VNAV modes of the flight director.
FLC	Momentary push-button to engage Flight Level Change (FLC) mode. FLC mode can only be engaged if the altitude preselect is set and is not at current aircraft altitude. The PCL needs to be used in the correct sense to allow proper operation of FLC mode. **Note** The PCL needs to be operated by the pilot if the optional autothrottle is not installed. When pressed the green annunciator bar above the button comes on. The speed target defaults to the current aircraft speed, and the FMS provides guidance for the flight director to climb or descend at the speed target while complying with the altitude preselector. This mode is mainly used for climb and descent. During climb, if insufficient thrust is available to maintain the speed reference, the system will attempt to climb at the maximum speed achievable below the speed reference. During descent, if there is excessive thrust available to maintain the speed reference, the system will attempt to descent at the minimum speed achievable above the speed reference.
ALT	Momentary push-button to engage ALT mode. When pressed the green annunciator bar above the button comes on. Alt mode is used to hold an altitude. The aircraft levels off at the present altitude when the ALT button is pressed
MINIMUMS	Octagonal rotary knob to adjust the minimum height/altitude, referenced to either a target Radar Altitude or Barometric altitude respectively. Clockwise or counter-clockwise rotation when RA is active increases or decreases the minimums value over a range of 0 to 2500 feet. Clockwise or counter-clockwise rotation when BARO is active increases or decreases the minimums value over a range of 20 to 16,000 feet. The knob adjusts the minimums value 10 feet per detent. The rotary knob is also a momentary push-button PUSH RA/BARO to switch between a minimums referenced to radar altitude or to barometric altitude

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Table 7-32-1: AFCS - Controls (continued from previous page)

AFCS Control	Description
AT	Momentary push-button to engage the optional autothrottle function
FMS MAN	The control is a dual concentric knob with a push select (see IAS/MACH) that allows selection between FMS computed speed target or Manually selected speed target for display on the ADI speed tape. The outer control is a two-position rotary switch with a pointer and selects either FMS or Manually selected speed target. The inner knob provides a continuous selection for the Manual speed bug on the ADI speed tape
IAS/MACH	Momentary push select button on the FMS MAN knob to toggle the speed bug reference between IAS and MACH airspeed

7-32-3 Operation

Note
The AP should be engaged when flying in a steady state condition.

Pressing the AP push-button on the FC panel will engage the Autopilot (AP), Yaw Damper (YD) and FD. The associated annunciation bars will illuminate on the FC panel and the AP and YD green annunciators and FD bars will be shown on the PFD. Whenever the autopilot is engaged, the pressing of the YD button will disengage the yaw damper and autopilot, the pressing of the AP button will not disengage the yaw damper.

Autopilot disengagement is defined as either normal or abnormal. A normal disengagement is initiated manually by pressing the AP DISC push-button on the control wheel or by the AP push button on the FC or by activating the manual trim system. A normal disconnect will cause the AP indication on the PFD to flash red/white and the aural “Cavalry Charge” warning tone to be activated. After 2.5 seconds the AP indicator and audio are removed. Any disengagement due to a monitor trip or failure is considered abnormal. An abnormal disconnect will cause the AP indication on the PFD to flash red/white and the aural warning tone to be activated until acknowledged via the AP DISC push-button. For some failures an autopilot disengagement will be accompanied by a CAS advisory indicating the reason for the disengagement.

The AFCS also controls the pitch and yaw manual trim actuators through the trim interface unit. Whenever the AP is engaged the pitch auto trim function is active, whenever the YD is engaged the yaw auto trim function is active. Pitch and roll commands are limited to +/- 20° and +/- 35° respectively. If the autopilot is engaged or the TCS is used to position the aircraft outside of these limits the autopilot will initially reduce the angles to the above limits.

When the autopilot is engaged the horizontal stabilizer trim actuator will be driven in order to minimize steady-state torque on the elevator servo motor. Operation of the trim switches on the control wheels or the ALTERNATE STAB TRIM switch on the center console will automatically disengage the autopilot and yaw damper. Similarly when the Yaw Damper is engaged the rudder trim actuator will be driven in order to minimize steady-state torque on the rudder servo motor. Operation of the Rudder Trim switch on the Power Control Lever will automatically disengage the autopilot and yaw damper.

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The use of the yaw damper is highly recommended when flying above FL155 (15,500 ft) and its use is mandatory when flying above FL155 with airspeeds below 140 KIAS. When flying at high altitude with the yaw damper off, high power selected and at low speed, large right rudder pedal deflection may cause large aircraft yaw angles and require the pilot to apply positive left rudder pedal force to re-establish balanced flight. **YD Off** is displayed on the CAS when flying above FL155 with the yaw damper off.

During autopilot operation, the voltages on each side of the horizontal stabilizer and rudder trim actuators are monitored by the MAU for trim runaway and trim inactive conditions. If either condition is detected, the trim engage relay is released and a CAS **Pitch Trim Runaway** or **Yaw Trim Runaway** and an aural “Trim Runaway” warning is given. A yaw damper failure will be shown as a CAS **YD Fail** advisory when flying below FL155 or a CAS **YD Fail** caution when flying at FL155 or above.

The autopilot can be engaged with or without the FD guidance modes active. When no flight director mode is active, engagement of the autopilot will automatically bring up the FD in the pitch hold vertical mode and the roll hold lateral mode with FD guidance on the PFD’s. When FD guidance modes have been selected, the autopilot will couple itself to the pitch and roll commands generated by the FD guidance function.

HDG mode is not available if the heading flag is displayed on both HSI. All other modes may be operational.

FLC mode climb should only be performed with the speed target at or above the Dynamic Speed Bug (DSB) and V_{REF}.

The flight director source indicator arrow has a left side default at power up. If the pilot selects DU1 and DU 2 off the AGM 1 display capability is disabled and then flight director switches automatically to the right side PFD format (AGM 2). Selecting DU 1 and or DU 2 on again does not automatically revert the indicator arrow back to the left side. This can be done by pressing the L/R button on the FC panel.

When encountering turbulence with autopilot and the optional autothrottle engaged while in a steady cruise condition, consider turning off the autothrottle to avoid frequent autothrottle induced longitudinal accelerations. This will increase comfort and engine longevity.

When disengaging the autopilot, yaw damper or the optional autothrottle, always use the appropriate button on the FGP. Only use the quick-disconnect button on the yoke before landing.

7-32-4 Indication / Warning

Depending on mode selection, the PFD displays the following AFCS related information:

- AP engage status
- YD engage status
- YD fail indication
- TF engage status
- EDM engage status
- AT engage status (optional)
- TCS status
- FD commands and status
- FD data source (PFD couple)
- Vertical speed bug
- Overspeed mode management
- Heading bug
- IAS bug
- Armed lateral mode
- Active lateral mode
- Armed vertical mode
- Active vertical mode
- Altitude preselect.

The Crew Alerting System (CAS) window of the systems MFD, displays the following Warning, Caution and Advisory messages for the AFCS status (refer to Table 7-32-2):

Table 7-32-2: AFCS - CAS Massages

CAS Message	Description
Pitch Trim Runaway	Manual or auto pitch trim runaway or trim failure, monitor detects failure of trim to properly respond, accompanied with voice callout "Trim Runaway"
Yaw Trim Runaway	Manual or auto yaw trim runaway or trim failure, monitor detects failure of trim to properly respond, accompanied with voice callout "Trim Runaway"
AP Hold LH Wing DN AP Hold RH Wing DN	Roll mistrim, monitor detects excessive forces over an excessive time period
AP Hold Nose UP AP Hold Nose DN	Pitch mistrim, monitor detects excessive forces over an excessive time period
YD Hold Nose Left YD Hold Nose Right	Yaw mistrim, monitor detects excessive forces over an excessive time period
YD Fail	Yaw damper not available (at or above FL155)
YD Off	Yaw damper off (at or above FL155)

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Table 7-32-2: AFCS - CAS Massages (continued from previous page)

CAS Message	Description
Emergency Descent	Emergency Descent Mode engaged
YD Fail	Yaw damper not available (below FL155)
AP Fail	Autopilot not available
FD Fail	Flight director not available
AFCS Fault	Fault detected in the AFCS system
TF Fail	Tactile Feedback not available
AT Fail	Optional Autothrottle not available

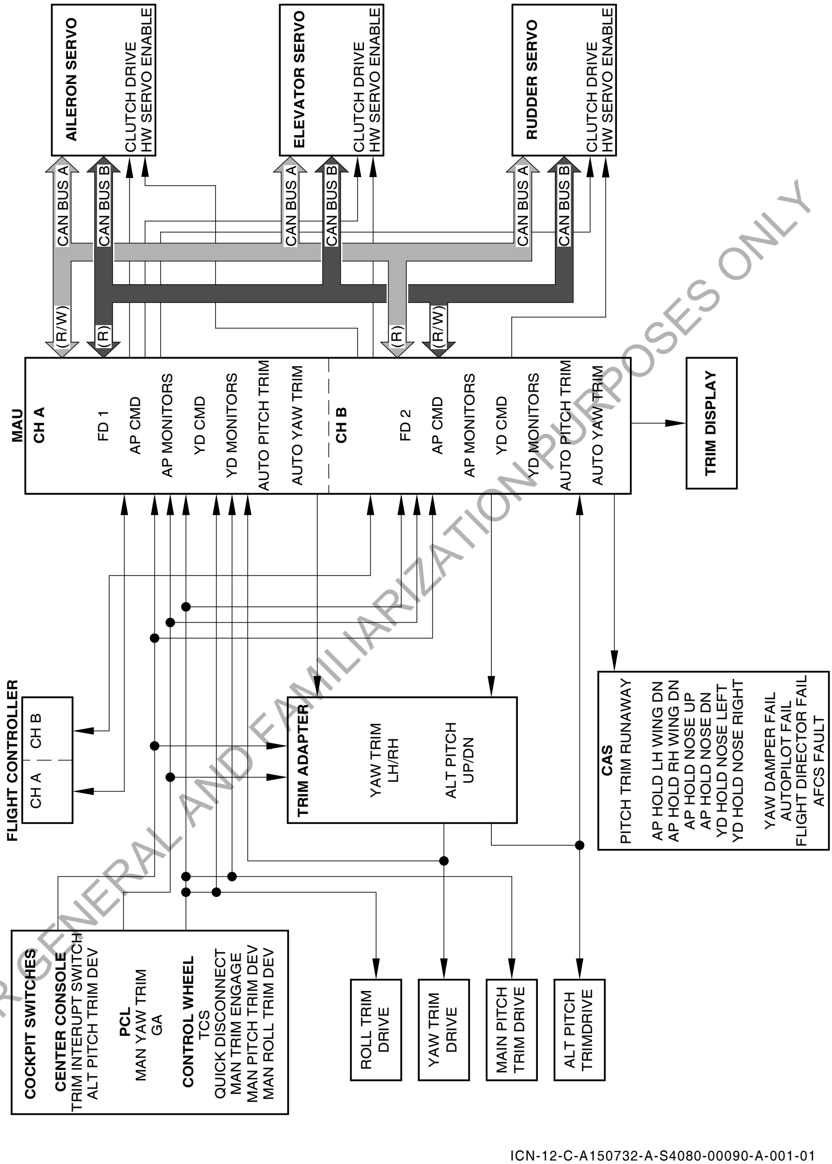

Figure 7-32-1: AFCS - Schematic

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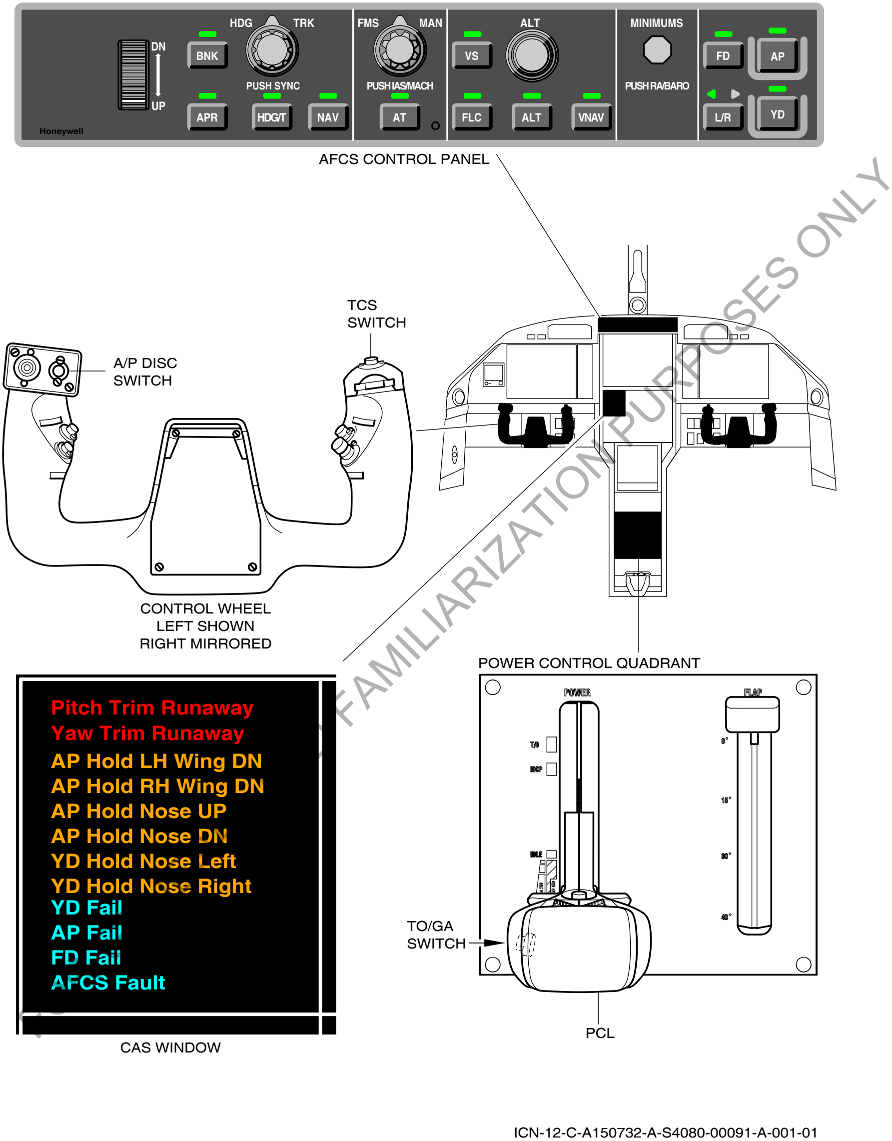

Figure 7-32-2: AFCS - Controls and Indications

7-32-5 Thrust Management System (optional)

The TMS provides the following functions:

- Thrust Director
- Thrust/Speed Control System (Autothrottle) (optional)

7-32-5.1 Thrust Director

The Thrust Director function provides a Flight Director type capability for manual control of the Power Control Lever (PCL). PCL guidance commands are presented on the PFD for use by the pilot to manually control the position of the PCL.

The Thrust Director is turned on/off with the Flight Director via the FD push button on the FC panel. The Thrust Director function can be independently turned on/off via a soft key on the FCS page on the MFD. Once on, the Thrust Director will drive a PCL guidance cue on the PFD.

7-32-5.2 Autothrottle

The optional autothrottle function provides an automatic, full flight regime energy management with a minimum of pilot inputs. Flight economy is improved by accurate speed control and thrust management. Safety is enhanced by maintaining aircraft speed and engine torque within the minimum/maximum operating limits which helps to reduce pilot workload.

The autothrottle function software is installed on the MAU (AIOP a and AIOP b modules) and interfaces with:

- The Throttle Quadrant Assembly (TQA) (autothrottle servo and quick disconnect switch on the PCL)
- The Engine Electronic Control unit (EEC)
- The FC panel (AT button and speed target bezel button/rotary knob).

The autothrottle is programmed to protect speed and thrust limits during the various phases of flight (takeoff, climb, cruise, descent and approach). The autothrottle (and thrust director) control laws are designed to maximize passenger comfort and minimze unnecessary response to temporary environmental variations (e.g. a gust of wind) with gradual throttle response to smoothly capture a new selected airspeed.

The autothrottle reduces the pilot workload by managing PCL control from takeoff through the entire flight until final approach. Autothrottle modes are automatically tied to autopilot/flight director modes and speed control is fully coordinated with the AFCS, thus requiring minimum pilot interaction.

WARNING

DO NOT ATTEMPT TO LAND WITH THE AUTOTHROTTLE ENGAGED. THE AUTOTHROTTLE MUST BE DISENGAGED PRIOR TO LANDING (REFER TO SECTION 2, SYSTEMS AND EQUIPMENT LIMITS, PRIMUS APEX - AUTOMATIC FLIGHT CONTROL SYSTEM).

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When engaged, the autothrottle can be disengaged by:

- Pressing the AT button on the FGP
- Pressing the AT Quick-Disconnect (QD) button on the PCL
- Pressing the AP QD button on the yoke
- Manual override of the PCL.

The autothrottle features a pilot override monitor which, when autothrottle is engaged, monitors for a significant override input of the PCL by the pilot. When the pilot moves the PCL, thus overriding the autothrottle, the override monitor function will disengage the autothrottle resulting in an abnormal disconnect.

Autothrottle can be armed on ground by selecting the Go-Around (GA) mode followed by pressing the AT button on the FGP. A cyan AT THR annunciation will be displayed on the PFD.

When active, the autothrottle determines a requested thrust and corresponding PCL setting based on current airspeed, speed target and the selected speed or thrust mode. The autothrottle will then command a PCL rate to the TQA to achieve the required PCL position (as provided by the EEC). The autothrottle output is limited to the engine torque based on EEC provided bug ratings for takeoff, climb, cruise and idle. Once a speed/thrust limit is reached, the autothrottle mode changes to indicate “LIM” informing the pilot that a limit is reached.

CAUTION

The autothrottle observes the high airspeed limits (V_{MO}, M_{MO}) and low airspeed limits only while in the speed hold mode.

The autothrottle modes are:

- Thrust

  Thrust mode is active when:

  - Takeoff and Go around (PCL set to takeoff thrust)
  - FLC Climb (PCL set to Climb thrust and below)
  - FLC Descent (PCL set to Idle thrust or above)
  - EDM

- Speed Hold

  Speed hold mode is active when:

  - All other modes including VS, ALT, ASEL, GS, etc
  - PCL set to maintain manual or FMS speed reference

- Takeoff Hold

  Takeoff Hold is active during takeoff when speed is more than 60 knot until the aircraft is more than 400 feet above the runway. Takeoff Hold mode makes sure that no undesirable PCL movement occurs during this critical phase of flight.

For more information on the autothrottle refer to the Pilot’s Guide for the Advanced Cockpit Environment (ACE^{TM}) (powered by Honeywell) for the Pilatus PC-12/47E.

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7-32-6 Emergency Descent Mode

The Emergency Descent Mode is a function that will automatically descend the aircraft to a safe altitude in the event of detecting a cabin decompression.

The EDM is armed whenever the aircraft is above 20,000 ft and the autopilot is engaged and will become active five seconds after a CABIN ALTITUDE CAS message and associated callout is triggered. Once active, the EDM performs a 90 degree left turn, will make the thrust director display an idle PCL command on the PFD and descends at V_{MO}/M_{MO} to 15,000 feet. At 15,000 feet the aircraft performs an altitude capture followed by the autopilot transitioning to heading mode and 160 knots speed hold mode (if autothrottle installed). The PFD will show EDM on both lateral and vertical FD mode annunciators, Emergency Descent will be displayed on the CAS window and the autothrottle mode is displayed as AT EDM informing the pilot that EDM is active.

If autothrottle is installed, the EDM will perform the above steps and also engage the autothrottle (if not engaged already) and command the thrust to idle.

EDM can be cancelled by the pilot by disengaging the autopilot through the quick disconnect, activation of manual trim or the AP push button on the FC panel. All other push buttons on the FC panel will be ignored and have no effect when EDM is active. Pushing the TCS button temporarily deactivates EDM and release of the TCS button will reactivate EDM as long as the aircraft altitude is still above 20,000 feet, the autopilot is on and the CABIN ALTITUDE CAS message is still on.

Note
When using the quick disconnect button on the PCL to disengage the EDM, the autothrottle will stay engaged. The autothrottle can be disengaged by pressing the AT button on the FGP.

7-32-7 Tactile Feedback

The TF system uses the autopilot's aileron servo to provide a force on the ailerons to bring the aircraft back to within a safe bank angle when detecting that the aircraft is approaching or banking beyond 51 degrees left or right. The TF system will activate at 51 degrees for lower roll rates or at 49 degrees at higher roll rates (approaching 51 degrees). TF activation at 51 degrees bank angle makes sure that the TF system does not generate nuisance activations in normal operation. The TF system will automatically deactivate once the aircraft returns to within 31 degrees bank angle.

The TF system is only available when the autopilot is not engaged.

Note
The TCS function is available when TF is engaged.

When activated at a bank rate of less than 10 degrees per second, the TF system will steadily increase the force from a minimum of 10 lb at the yoke at 51 degrees bank angle, up to a maximum force of 25 lb at the yoke at 60 degrees bank angle. If the pilot has hands on the yoke, the TF System provides an opposing force when aircraft roll attitude exceeds 51 degrees Angle of Bank, returning the aircraft within 31 degrees angle of bank and deactivates.

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When TF is active, **TF** is displayed on the PFDs Flight Mode Annunciator. The pilot can manually override/deactivate the TF by using the TCS or by pressing the quick disconnect switch on the yoke. When manually deactivated, the TF system remains deactivated until the TF system detects the standard deactivation threshold (31 degrees bank angle or less) after which the TF system is available again.

The PFD Statuses tab on the Avionics Window can be used to check if the TF system is installed on the aircraft. If the TF system is installed, the PFD Statuses tab will show “Tactile Feedback Enabled”.

Loss of TF is indicated by a **TF Fail** message on the CAS.

7-33 Primus APEX - Flight Management System

7-33-1 Description

(Refer to Fig. 7-33-1)

The flight planning function of the Flight Management System (FMS) enables the pilot to build, review and modify flight plans on the Situation Awareness Multi Function Display (MFD) via the Cursor Control Device (CCD) or the Touch Screen Controller (TSC). Flight plans are stored for retrieval and activation at a later time. They are a series of legs and are bounded by waypoints. Waypoints are named and precisely located by latitude and longitude. Database waypoints include airports, Navaids, runways, published named fixes, unnamed fixes and intersections. The FMS provides the pilot with the facility to create pilot defined waypoints as Lat/Long, Place/Bearing/Distance or Place/Bearing/Place/Bearing in an active or secondary flight plan. If the pilot does not name a pilot defined waypoint, the FMS creates a temporary waypoint.

The pilot has the option to load an off-aircraft created flight plan instead of creating a new flight plan on the aircraft. The flight plan is installed on the flash memory of FMS 1 in the same way as when updateing the FMS database (refer to Database Loading).

APEX Build 12.7.1 and higher: The pilot also has the option to load an off-aircraft created flight plan via datalink.

With a dual FMS installation, saving the flight plan after uploading will synchronize the flight plan between the FMS 1 and FMS 2 custom databases.

The active flight plan is the flight plan that the FMS is actively flying. An active flight plan contains a From waypoint, a To waypoint and a destination (optional). Waypoints are either database, pilot defined or temporary waypoints. Changes made to an active flight plan are inserted into a pending flight plan, which can be reviewed before the changes are incorporated into the active flight plan.

The FMS provides the ability to add altitude and speed constraints to waypoints of the active flight plan. It will also calculate a Top-Of-Climb (TOC) waypoint that laterally indicates where the cruise altitude level off will occur and will similarly create a Top-Of-Descent (TOD) waypoint that laterally indicates where the descent from cruise altitude should occur. These waypoints are displayed on the Situation Awareness Multi Function Display (MFD) map. A waypoint altitude constraint can be entered on any waypoint of the flight plan. The FMS will indicate a predicted or pilot entered descent angle for each waypoint.

When an “At” Altitude Constraint is defined for a waypoint in the descent portion of the flight plan, the FMS calculates the vertical profile with a default 3° descent angle. The pilot can enter up to 8°, perform a vertical direct-to limited to 8° or load a procedure.

Before reaching the TOD, the FMS generates a Vertical Track Alert (VTA) and a Vertical Navigation Deviation Scale, similar to a Glideslope, is displayed on the Primary Flight Display (PFD).

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The VNAV information is for advisory only and can be coupled to the AP/FD. VNAV is based on the Barometric Altitude, therefore a correct Baro Correction Selection is essential for safe operation.

Note

- VNAV must not be used when the CAS message **ADC A Fail**, **ADC B Fail** or **ADC A+B Fail** are shown
- A secondary flight plan can be created and stored at any time and is not related to the active flight plan. Only one stored flight plan can be activated into the secondary state at a time to review
- Each stored and active flight plan can contain a maximum of 100 waypoints. The FMS can store up to 255 flight plans and 300 custom waypoints
- When saving a flight plan into the stored database there is an unannunciated time delay of up to 45 seconds
- Stored flight plans do not contain procedures associated with the Origin or Destination and the Weather Alternate destinations not stored. The FMS provides only one active flight plan. Stored flight plans can be deleted
- After the Performance Compute button is pressed there will be unannunciated time delay before the Computing Data … status is displayed
- After an electrical power cycle, the active flight plan is lost and must be reentered
- When a circling approach is chosen, the FMS will create a Discontinuity after the last waypoint of the overlay approach. Vertical guidance after this point cannot be relied on. The autopilot will revert to basic modes (Pitch and Roll)
- Visual Reporting Points (VRP) can be selected for display on INAV. A pilot defined waypoint can be created on top of the VRP to be used as part of the flight plan. Alternative, autopilot track line shown on INAV can be used to maneuver the aircraft over the VRP.

The FMS also has the ability to compute:

- Waypoints for specific legs, which includes Direct-To, holding patterns, procedure turns, leg intercepts, TOCs and TODs
- Distance and Course computations
- ETE and ETA calculations
- Curved path distance calculations
- Altitude constraint type determination.

The active leg defined as the From To waypoint in an active flight plan, can be modified:

- Direct-To, any waypoint
- Present position hold, create a fix at the current latitude/longitude aircraft position from which the aircraft may hold (not always available-see Pilot's Guide for the Advanced Cockpit Environment (ACE™) (powered by Honeywell) for the Pilatus PC-12/47E)
- Pilot confirmation of an active leg modification change initiated by the pilot
- Automatic active leg sequencing, when satisfied the FMS makes the To waypoint the From waypoint and the next waypoint the To waypoint
- Procedure turns, creation and deletion of a procedure turn on the active flight plan that is part of a database procedure.

A discontinuity leg may exist in the active flight plan when there is insufficient lateral flight plan definition. The FMS will allow the programming of a discontinuity leg when it is part of a database procedure.

FMS controls are provided via the CCD and on the Home page of the TSC (refer to Table 7-33-1):

Table 7-33-1: FMS - Controls

FMS Control	Description
D→(Direct-To)	The Direct to Dialog box opens in the Waypoint List Window
Show Info	The INFO Dialog Box opens on the INAV
Auto pop-up keypad/keyboard	Inputs data at the cursor position

7-33-2 Operation

7-33-2.1 Graphical Flight Planning

The Graphical Flight Planning (GFP) mode allows the pilot to make and change flight plans. GFP can be performed on the Waypoint List and on the Interactive Navigation map display. GFP mode starts automatically and shows the options for the selected data or active flight planning task when the pilot moves the cursor over the object he wants to modify. This generates commands to the FMS. The FMS receives and validates the commands, actions them and displays the changed flight plan. Two menus are available when GFP mode is started - Select Object menu and Select Task menu.

- Select Object menu

  At large ranges on the lateral map, many objects may be shown very close to each other. The Select Object menu allows the pilot to tell the system which particular object he wants to change. Also, a waypoint may be listed more than once in the active flight plan, approach, missed approach or alternate flight plan. The pilot must tell the FMS which waypoint listing to change.

- Select Task menu

  See Table 7-33-2 for the functions that can be selected using the Select Task menu.

Table 7-33-2: FMS - Graphical Flight Planning - Select Task menu functions

Task	Action
Center Map	Lateral map centers at the selected location
Direct To	Direct To route modification performed
Intercept …	Starts a dialogue box to define a heading select intercept leg inbound to an object
Change Dest	Assigns the selected airport as the new destination
Show Info …	Starts a dialogue box showing all the information about the selected object
Departure/Arrival	Starts a dialogue box to insert, delete, modify and review the selected departure/arrival procedure
Amend Route	Performs modification of the selected flight plan route
Delete Wpt	Removes the selected waypoint from the flight plan
Cross …	Starts a dialogue box to define lateral and vertical constraints on a waypoint
Hold …	Starts a dialogue box to define, modify and/or delete holding patterns for waypoints
Procedure Turn …	Starts a dialogue box to define, modify and/or delete a procedure turn
Direct To Recovery	Adds to the pending flight plan waypoints that were removed when a direct-to was previously performed
PPOS Hold …	Starts a dialogue box to define, modify and/or delete a holding pattern for PPOS
Offset …	Starts a dialogue box to define, modify and/or delete offset
Airway …	Starts a join airway dialogue box to add an airway to the flight plan
XXXX Departure	Starts the procedure dialogue box for the origin
YYYY Arrival	Starts the procedure dialogue box for the destination
Orbit ... (optional)	Starts a dialogue box to define, modify and/or delete a circular leg around a designated waypoint
SAR ... (optional)	Starts a dialogue box to define, modify and/or delete a search pattern for SAR operations
Visual App ... (optional)	Starts a dialogue box to define, modify and/or delete a Visual Approach to a user-defined approach to a runway or pilot-defined waypoint

7-33-2.2 Actual Flight Planning

The Flight Management Window (FMW) is used to access or create a fight plan. The FMW is displayed in a 1/6th window format on the Situation Awareness MFD. A Flight Plan (FPLN) pull down menu allows selection of either the Active or Secondary flight plan for display and interaction. The Phase of Flight (POF) selections for a flight plan are Init, Preflight, Departure and Arrival. Available POFs are indicated by white outlined icons with gray button borders. Upon selection the button border and icon changes to green and the available tabs are displayed.

The INIT (initialization) POF, when selected, displays a Time/Date tab, a Data Bases tab and an S/W (software) tab.

Position is automatically initialized at power up.

The Preflight POF, when selected, displays a FPLN (Flight Plan), an Alt/Spd tab and a Fuel/Weight tab. When all the mandatory data has been entered on the Preflight tabs the Compute button becomes highlighted. Pressing the Compute button initiates the computation of performance parameters by the FMS. The Computing Data message will be removed when the computed performance data is available for display.

The Departure POF when selected, displays a SID (Standard Instrument Departure)/Takeoff page that includes the Takeoff V Speeds and the Transition Altitude.

The Arrival POF, when selected, displays a STAR (Standard Terminal Arrival Route)/Landing page that includes the Landing V Speeds and the Transition level.

The pilot can also define a Secondary flight plan which is totally independent of the primary active flight plan. The Secondary flight plan may be created, stored and activated at any time, but only one stored flight plan may be activated into the secondary state for review.

Once airborne the aircraft can be flown either indirectly through the Flight Director or automatically through the autopilot. The FMS active flight plan is used to steer the aircraft and the FMS constantly calculates and updates the aircraft position and performance data output data to the displays.

7-33-2.3 Displays

Flight plans are shown pictorially on the Situation Awareness MFD with vector lines between successive connected waypoints, transition onto waypoints, holding patterns and procedure turns.

See Table 7-33-3 for the ARINC 424 leg types that are supported by the FMS.

Table 7-33-3: FMS - ARINC 424 Leg Types

Leg Type	Description
IF	Initial Fix
TF	Track to a Fix
CF	Course to a Fix
DF	Direct to a Fix
FA	Fix to an Altitude
RF	Constant Radius Arc
AF	Arc to a Fix
VA	Heading to an Altitude
VI	Heading to an Intercept
VM	Heading to a Manual Termination
PI	Procedure Turn
HA	Holding with Altitude Termination
HF	Holding with Single Circuit Termination at the Fix
HM	Holding with a Manual termination

Flight planning information is shown in the upper left 1/6th window. This window can be made larger (upper left and lower left windows combined 1/3rd window) to show more information when Waypoint (WPT) information is active. The information displayed is controlled by on-screen pull-down menus which are selected by the CCD or TSC.

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Navigation and steering information is displayed on the PFD ADI/HSI and the upper MFD right window. A bezel button on the PFD HSI will be used to select an Overlay menu which will show flight planning and situational awareness information on the HSI.

7-33-3 Database Loading

7-33-3.1 Database Loading with RT

The Navigation Database updates can be loaded with the Remote Terminal software to the FMS Navigation Database. Refer to the PC-12/47E Data Loading Guide (Document Number 02313). The guide can be found at www.pilatus-aircraft.com -> Menu -> Customer Support -> Technical Publications -> PC-12 -> Flight Manuals -> Data Loading Guide.

Note
If a Connected Flight Deck (CFD) is installed, it must be disabled by opening the CB "WLAN Data Load" before energizing the aircraft electrical system.

7-33-3.2 Database Loading with Connected Flight Deck (CFD)

If the optional CFD is installed, an Apple iPad can be used to load Navigation and Electronic Chart Databases to PRIMUS APEX. To do this, the INDS Data Manager application is used on an iPad with an INDS subscription. Firstly, the iPad must be connected to an internet network to download the databases. Thereafter, the iPad can be connected to the wireless network of the aircraft to upload the databases to PRIMUS APEX. Refer to the PC-12/47E Wireless Data Loading (Connected Flight Deck) guide (Document Number 02373). The guide can be found at www.pilatus-aircraft.com -> Menu -> Customer Support -> Technical Publications -> PC-12 -> Flight Manuals -> Data Loading Guide.

The loading of the Navigation and Electronic Chart Databases can be done with the aircraft only powered by the STBY bus, after pressing the MAU DATA LOAD switch on the copilot side panel. A red cross will be shown on all powered MFDs and PFDs during the data loading process. This is normal and due to the Advanced Graphics Module (AGM) being set to download data mode. The data loading process shall not be interrupted nor shall the aircraft be de-energized.

When the data loading has been completed, the lower MFD (and, if powered, the copilot PFD) will return to their default configuration. The pilot PFD and upper MFD will continue to display red crosses.

A full power cycle of the aircraft is required to return the aircraft to normal operation.

Stuck database upload

When attempting to upload INDS databases (Charts, Navigational, Terrain) using the INDS Data Manager iPad application, in rare cases the status bar in the application remains at 64% for 5 minutes or more, and does not complete the upload. The APEX pilot PFD and upper MFD show red crosses, while the co-pilot PFD and MFD return to normal screens. The following procedure shall be performed to resolve the issue:

CAUTION
Do NOT remove electrical power from the aircraft.

1. On the iPad: Force close the INDS Datamanager app.............. Push the home button (double click) on the iPad and swipe up to close the app
2. WLAN DATA LOAD circuit breaker (Standby Bus $_L$X4)......... Pull

CAUTION

You must wait the full 1 minute for the Connected Flight Deck to completely power down.

3. WLAN DATA LOAD circuit breaker (Standby Bus $_L$X4)......... Reset

Wait 2-3 minutes for the Connected Flight Deck to fully reboot. The iPad should reconnect automatically.

When the iPad has reconnected to the Connected Flight Deck:

4. Re-start the INDS Data Manager application on the iPad................
5. Push the upload button of the database that remained stuck at 64%.. Verify that the progress bar goes up to 100% and the database upload completes successfully
6. Do a full power cycle of the aircraft..

Following database uploads should complete successfully without issues. If not, repeat the above procedure.

----------- END -----------

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7-33-4 Indication / Warning

The Crew Alerting System (CAS) window on the systems MFD will show the following caution, advisory and status messages for the FMS (refer to Table 7-33-4):

Table 7-33-4: FMS - CAS Messages

CAS Message	Description
FMS-GPS1 Pos Misc FMS-GPS2 Pos Misc FMS-GPS1+2 Pos Misc	Indicates FMS to GPS 1 position miscompare Indicates FMS to GPS 2 position miscompare (only if GPS 2 installed) Indicates FMS to GPS 1+2 position miscompare (only if GPS 2 installed)
Unable FMS-GPS Mon	Indicates FMS to GPS position monitor has failed (Typical RAIM not available)
FMS Fail	Indicates FMS has failed
AGM2/FMS 1GFP Inop	Indicates graphical flight planning function failed in AGM 2
AGM 1 DB Error AGM 2 DB Error AGM 1+2 DB Error	Indicates database in AGM 1 has an error Indicates database in AGM 2 has an error Indicates database in AGM 1+2 have an error
AGM 1 DB Old AGM 2 DB Old AGM 1+2 DB Old	Indicates database in AGM 1 is out of date Indicates database in AGM 2 is out of date Indicates database in AGM 1+2 are out of date

The following FMS annunciations can be shown on the PFD (refer to Table 7-33-5):

Table 7-33-5: FMS - Annunciations on PFD

FMS Annunciation on PFD	Description
APP Approach advisory	Indicates FMS is in approach mode
XTK Offset advisory	Displayed when lateral offset has been entered
MSG Message advisory	Displayed when message is shown on INAV map
DR Dead Reckoning alert	Displayed when operating in DR mode for more than 2 minutes
DGRD Degraded alert	Displayed when FMS accuracy cannot guarantee accuracy for present phase of flight due to sensor availability

The following FMS messages (refer to Table 7-33-6) can be shown on the INAV Map or on other INAV windows and dialogue boxes, refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE™) (powered by Honeywell) for the Pilatus PC-12/47E for the explanations:

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Table 7-33-6: FMS - Messages shown on INAV Map, Windows and/or Dialogue Boxes

ACDB Config Mismatch	High PCDR Turn GRD SPD
ACDB Database Mismatch	Intersection Not Found
Active Mode is Mag/True Hdg	Invalid Aircraft DB
Active Mode is Mag/True Trk	Invalid Custom DB
Alt Constraint Deleted	Invalid Direct To Entry
Brg/Crs must be in True	Invalid Entry
Check *PD Placement	Invalid FPLN Operation
Check Alt Constraint	Invalid NAV DB
Check Baro Set	NDB Over Max Size
Check data Load (xx)	No Position Sensors
Check Dest Fuel	No Present Position
Check GPS 1 Position	Offset Cancel
Check GPS 2 Position	Offset Cancel Next WPT
Check Loaded Wind/Temp	Check Orbit Radius / GSPD
Check Spd/Altitude Limit	PERF-VNAV Unavailable
Check Speed Constraint	Predict LPV Unavailable
Compare Fuel Quantity	Radials Do Not Intersect
Data Base out of Date	RAIM Will Exceed Limit
DB Transfer Aborted	Reset ALT SEL?
DB Transfer Complete	SBAS APPR Load Fail
DB Transfer in Progress	Single Operation
Entering Polar Region	Stored FPL PERF Unavailable
Exceeds Cert Ceiling	Unable *PD Placement
Exceeds Max Gross Weight	Unable Approach Mod
Exceeds Max Landing Weight	Unable CDB XLOAD In Prog
Exceeds Max Landing WT	Unable Hold Change
Exiting Polar Region	Unable Next ALT
Flight Plan Full	Unable Offset
FLT Path Angle Too Steep	Unable PCDR Turn Change
FMS Exiting Hold	Unable RNP
FMS-LPV Miscompare	Unable RNP Next WPT
FPL Storage Full	Used by Active FPL
GPS RAIM Above Limit	Vert Dir Over Max Ang
GPS Config Miscompare	Vert Dir Under Min Ang
GPS RAIM Unavailable	Waypoint Not Found
High Holding GRD SPD	WPT Storage Full.

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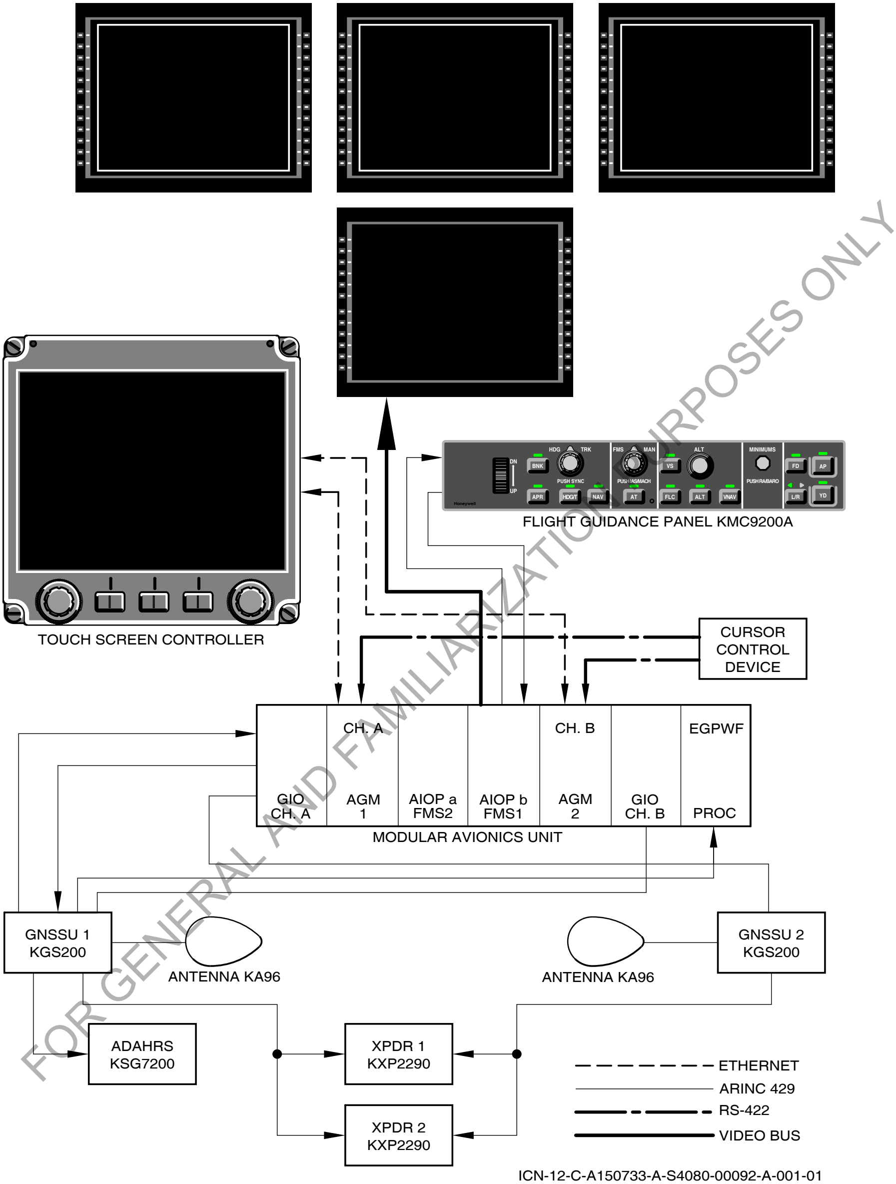

Figure 7-33-1: FMS - Schematic

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7-33-5 Dual FMS (Optional)

7-33-5.1 General

FMS 1 is located on AIOP b card and FMS 2 is located on AIOP a card. Both FMS share the existing APEX resources and interfaces (INAV, TSC, and CCD). The dual FMS system can operate in either Synch mode or Single mode.

Dual FMS provide a “One FMS” view to the crew. In normal operation both FMS are in Synch mode (Primary/Secondary). In this configuration both FMS have the same flight plan and all synchronization between the multiple FMS instances is automatic. Although the FMS operates in a Synch mode, some data is computed independently to enhance safety. For example, the desired track and cross track error on each HSI are driven and computed independently. The positions of each FMS are crosscompared, and a message is shown if the positions disagree.

In Single mode, data is not synchronized between the two FMS and all navigation guidance is calculated independently. The guidance information from FMS 1 or 2 can be selected for display on each HSI by using the NAV SEL button on PFD controller. In FMS Single mode, the crew can only apply changes to the FMS which is selected for display on the INAV. INAV always represents the information from the FMS on the FD coupled side HSI.

Refer to the Pilot’s Guide for the Advanced Cockpit Environment (ACE^{TM}) (powered by Honeywell) for the Pilatus PC-12/47E for additional information.

7-33-5.2 FMS Synchronization

Active and Selected FMS mode fields (Single or Synch) are shown on the FMS Sensor Page (refer to Fig. 7-33-2). The selected mode can be manually changed on this page. If the Active Mode does not match the selected mode for any of the FMS, the FMS Synch Error is shown on the CAS window and the Problems button becomes selectable for access to the FMS Problems dialog box. Once on Battery power, to solve synchronization problems, select the Avionics window tab Custom DB (refer to Fig. 7-33-3) and select the Xload tab. This action synchronizes FMS 1 and FMS 2 Custom databases.

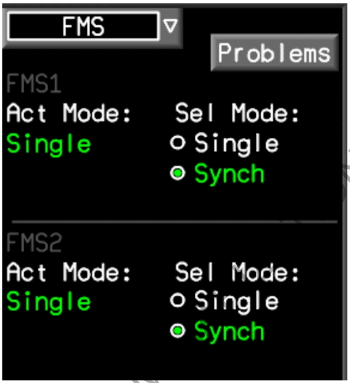

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Figure 7-33-2: FMS - Mode Selection Page (Dual FMS)

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Figure 7-33-3: FMS - Avionics Window Custom DB Tab (Dual FMS)

In Synch mode the following items are synchronized between the two FMS:

- Position Initialization Data, when both FMS are running
- Active Flight Plan Data
- Secondary Flight Plan Data
- Custom Database, when both FMS are running.

Note

Both FMS need to be up and running (Batteries ON) for automatic synchronization of “Custom Database” and “Position Initialization Data”. In PDC mode only FMS 1 is powered, therefore changing the Custom Database in PDC mode (saving flight plan or pilot defined waypoints), causes database miscompare and forces both FMS into Single mode when FMS 2 is powered. Cross-loading of the “Custom Database” on the “Cust DB” tab in the avionics window is required to re-synchronize both FMS.

Note

In PDC mode only FMS 1 is powered. If FMS position initialization is done in PDC mode then FMS 2 position will not be initialized. Consequently, after power up, FMS 2 will not provide guidance information until position initialization is repeated. FMS1 and FMS2 position will be auto-initialized at power up.

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7-33-5.3 Indication / Warning

The CAS window on the systems MFD will show the following caution, advisory and status messages for the Dual FMS (refer to Table 7-33-7):

Table 7-33-7: FMS - CAS Messages (Dual FMS)

CAS Message	Description
FMS1-GPS1 Pos Misc FMS1-GPS2 Pos Misc FMS1-GPS1+2 Pos Misc FMS2-GPS1 Pos Misc FMS2-GPS2 Pos Misc FMS2-GPS1+2 Pos Misc	Indicates FMS1 to GPS 1 position miscompare Indicates FMS1 to GPS 2 position miscompare Indicates FMS1 to GPS 1+2 position miscompare Indicates FMS2 to GPS 1 position miscompare Indicates FMS2 to GPS 2 position miscompare Indicates FMS2 to GPS 1+2 position miscompare
FMS1 Fail FMS2 Fail FMS1+2 Fail FMS Synch Error	Indicates FMS1 has failed Indicates FMS2 has failed Indicates FMS1 and FMS2 have failed Indicates the active mode does not match the selected FMS mode
AGM1/FMS1 GFP Inop AGM1/FMS1+2 GFP Inop AGM1/FMS2 GFP Inop AGM2/FMS 1GFP Inop AGM2/FMS1+2 GFP Inop AGM2/FMS2 GFP Inop	Indicates FMS1 graphical flight planning function failed in AGM 1 Indicates FMS1 and 2 graphical flight planning function failed in AGM 1 Indicates FMS2 graphical flight planning function failed in AGM 1 Indicates FMS1 graphical flight planning function failed in AGM 2 Indicates FMS1 and 2 graphical flight planning function failed in AGM 2 Indicates FMS2 graphical flight planning function failed in AGM 2
AGM 1 DB Error AGM 2 DB Error AGM 1+2 DB Error	Indicates database in AGM 1 has an error Indicates database in AGM 2 has an error Indicates database in AGM 1+2 have an error
AGM 1 DB Old AGM 2 DB Old AGM 1+2 DB Old	Indicates database in AGM 1 is out of date Indicates database in AGM 2 is out of date Indicates database in AGM 1+2 are out of date

7-34 Primus APEX - Aircraft Condition Monitoring System (ACMS)

7-34-1 General

7-34-1.1 Engine Trend Recording

The engine trend recording function of the Aircraft Condition Monitoring System (ACMS) records selected engine trend data into a Stable Cruise log file stored in Non Volatile Memory (NVM). The Stable Cruise file record is created once per flight when the aircraft is in a stable cruise condition. Stable cruise is determined from pre set conditions achieved in two minute window and then records pressure altitude, static air temperature, computed airspeed, torque, Np, Ng, ITT and fuel flow. The Stable Cruise file is capable of storing up to 5000 records, which should be enough for between engine overhauls. If the Stable Cruise file does reach maximum capacity, the oldest record is removed and the newest added to the log file. Crew Alerting System (CAS) advisories are generated when the log file has less than 20% storage capacity remaining and another when the file is full.

7-34-1.2 Trend Data Download

The Primus Apex system supports two methods for transferring the ACMS log data on the ground. One is via the optional Connected Flight Deck (CFD) and the other is via the LAN connector on the aircraft maintenance panel to a laptop computer. Only the CFD method is described here.

Trend Data Download With Connected Flight Deck

If the optional CFD is installed, the Honeywell MyCMC Apple iPad application can be used to download the ACMS files. The MyCMC application can also be used to reset the “ACMF Logs Full” CAS message from APEX. The iPad must be connected to the CFD wireless network of the aircraft to download the files from the PRIMUS APEX. Refer to the PC-12/47E Wireless Data Loading System (Connected Flight Deck) guide (Document Number 02373). The guide can be found at www.pilatus-aircraft.com -> Menu -> Customer Support -> Technical Publications -> PC-12 -> Flight Manuals -> Data Loading Guide.

The download of these files can be done with the aircraft only powered by the STBY bus, after pressing the MAU DATA LOAD switch on the copilot side panel. A red cross will be shown on all powered MFDs and PFDs during the data loading process. This is normal and due to the AGM being set to download data mode. The data loading process shall not be interrupted nor shall the aircraft be de-energized. When the data loading has been completed, the lower MFD (and, if powered, the copilot PFD) will return to their default configuration. The pilot PFD and upper MFD will continue to display red crosses.

A full power cycle of the aircraft is required to return the aircraft to normal operation.

CAUTION
The SYS CONFIG and Data Loading pages should not be active before takeoff. Normally the Data Loading page is grayed out (un-selectable) when the aircraft is in flight. However if the SYS CONFIG and Data Loading window is selected before takeoff it will remain active and Data Loading could be initiated in flight, with the subsequent blanking of displays.

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7-34-1.3 Indication

The CAS window on the systems MFD will show the following advisory and status messages for the ACMS (refer to Table 7-34-1):

Table 7-34-1: ACMS - CAS Messages

CAS Message	Description
ACMF Logs Full	Indicates that one or more Aircraft Data, Navigation & Air data, or Engine Data log files are full. Data will be lost if not transferred
ACMF Logs >80% Full	Indicates that one or more Aircraft Data, Navigation & Air data, or Engine Data log files are more than 80% full. Data may be lost if not transferred
Engine Log Full	Indicates that Engine Stable Cruise data log files are full. Data will be lost if not transferred
Engine Log >80% Full	Indicates that Engine Stable Cruise data log file is more than 80% full. Data may be lost if not transferred
No Engine Trend Store	Indicates that a Stable Cruise flight data store was not successful. During the last flight. Will remain on until next power cycle
Engine Exceedance	Reminds on the ground that during flight a WARNING was displayed for an exceedance of one or more of the following engine parameters: – Oil Pressure, Oil Temperature, ITT, TORQUE, NG, NP or Fuel Temperature High. If no exceedances were noted by the pilot, continue flight and report to maintenance personnel. If an exceedance was noted, maintenance action may be required before continued flight, depending on the extent of the exceeded parameter – The CAS message will be displayed on the ground as a reminder, until the next power cycle
Aircraft Exceedance	Reminds on the ground that during flight an AIRSPEED WARNING was displayed or an acceleration (g limit) was exceeded If no exceedances were noted by the pilot, continue flight and report to maintenance personnel. If an exceedance was noted, maintenance action may be required before continued flight, depending on the extent of the exceeded parameter The CAS message will be displayed on the ground as a reminder, until the next power cycle
Event	5 sec airborne indication, to show that a crew initiated event has been recorded
Crew Event Store	Indicates after landing, that a crew initiated event has been recorded and is available for download

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7-34-1.4 Event Button

The use of the Event button on the TSC may aid maintenance crew with troubleshooting. When pressed, the sampling rate of selected aircraft, navigation, air and engine parameters increases from once per minute to once per second. Maintenance should be informed about the use of the Event button.

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7-35 Primus APEX - Aircraft Diagnostic and Maintenance System (ADMS)

7-35-1 General

The Aircraft Diagnostic and Maintenance System (ADMS) consists of a Central Maintenance Computer (CMC) function and member systems. The CMC function is a software application hosted on the Modular Avionics Unit (MAU) Advanced Graphics Module. It runs under the Digital Engine Operating System (DEOS). The CMC acquires the Fault Reports from the various Member Systems and the Flight Deck Effects from the Monitor Warning Function (MWF) system. Member systems are the aircraft system equipment that comply with the requirements of the CMC Specifications for Member Systems. A list of the member system equipment can be found in the Aircraft Maintenance Manual. A data file called Loadable Diagnostic Information (LDI) contains the Member System information that is used to drive the CMC. The CMC collects information and stores failures in a Fault History Database (FHDB) which can be accessed by a maintenance technician, using the Remote Terminal, to assess the past and present operating condition of the aircraft.

7-35-2 Description

The CMC’s function is to provide the means to identify and isolate faulted hardware, Line Replaceable Unit(s) (LRUs), modules and wiring. The Member Systems implement their own Built-in Test (BIT) capability either by initiated BIT, continuous BIT or power up BIT. The BIT capability identifies faults and provides information to the CMC which is processed against Member system specific data from the LDI data file to produce maintenance messages, which are then stored in the Fault History Database.

The MWF continuously provides the CMC a list of all MWF messages and indication of the status of each message. The CMC correlates MWF messages with maintenance messages and stores this information in the FHDB along with the correlation with MWF messages, indications of which fault report caused the massage and the Date/Time, Flight Leg and Phase. A Flight Leg is a sequential number incremented at each transition of the aircraft from ground to air. Each midnight UTC the CMC software resets the Flight Log to 1. The Flight Phase definitions are contained in the LDI. The FHDB has a capacity to store up to 10 MB of data. Once full capacity is reached the CMC will overwrite the oldest records with the newest records. The CMC is functional but not accessible in flight, full maintenance functionality is only available on the ground. On the ground, the CMC will generate a Crew Alerting System (CAS) advisory message if there is a fault in the system and a status message when the ADMS memory is full.

A PC loaded with Remote Terminal Software allows access to the CMC through the LAN BUS connector on the Aircraft Maintenance Panel. The Remote Terminal Software provides all the user interface capability that is needed to perform diagnostics on the systems. In order to use this software the Advanced Graphics Module (AGM) in the MAU must be operating.

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7-35-3 Maintenance Data Download

The Fault History Database (FHDB) can be downloaded with a laptop and the Honeywell Remote Terminal 8RT) software, or via the optionally installed Connected Flight Deck.

7-35-3.1 Maintenance Data Download with RT

Note
If a Connected Flight Deck is installed, it must be disabled by opening the CB “WLAN Data Load”, prior to powering up the aircraft.

For more information on how to download the maintenance data with RT, refer to the PC-12/47E Data Loading guide (Document Number 02313). The guide can be found at www.pilatus-aircraft.com -> Menu -> Customer Support -> Technical Publications -> PC-12 -> Flight Manuals -> Data Loading Guide.

7-35-3.2 Maintenance Data Download with Connected Flight Deck (CFD)

If the optional Connected Flight Deck (CFD) is installed, the Honeywell MyCMC Apple iPad application can be used to download the Fault History Database. The iPad must be connected to the CFD wireless network of the aircraft to download the files from PRIMUS APEX. Refer to the PC-12/47E Wireless Data Loading (Connected Flight Deck) guide (Document Number 02373). The guide can be found at www.pilatus-aircraft.com -> Menu -> Customer Support -> Technical Publications -> PC-12 -> Flight Manuals -> Data Loading Guide.

The download of the FHDB files can be done with the aircraft only powered by the STBY bus, after pressing the MAU DATA LOAD switch on the copilot side panel. A red cross will be shown on all powered MFDs and PFDs during the data loading process. This is normal and due to the AGM being set to download data mode. The data loading process shall not be interrupted nor shall the aircraft be de-energized.

When the data loading has been completed, the lower Multi Function Display (MFD) (and, if powered, the copilot Primary Flight Display (PFD)) will return to their default configuration. The pilot PFD and upper MFD will continue to display red crosses.

A full power cycle of the aircraft is required to return the aircraft to normal operation.

7-35-4 Indication

The CAS window on the systems MFD will show the following advisory and status messages for the ADMS (refer to Table 7-35-1):

Table 7-35-1: ADMS - CAS Messages

CAS Message	Description
Maintenance Fail	On ground, indicates ADMS failure
Maint Memory Full	On ground, indicates ADMS memory is full

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7-36 Primus APEX - Optional Electronic Charts

7-36-1 General

The Primus APEX system provides the functionality to display optional Jeppesen Sanderson terminal charts. The charts functionality is hosted on the Advanced Graphic Module (AGM 1 and AGM 2) within the MAU and displays information primarily from the charts database. Refer to Section 7-27, Primus APEX, for the APEX system architecture. Updated charts are released every two weeks and are loaded when the aircraft is on the ground with the Remote Terminal software. Refer to the Database Downloading paragraph for the procedure to download data. The charts are stored as vector images that can be scaled, rotated and split. The pilot has the ability to select and manipulate the charts for viewing by using the Cursor Control Device (CCD) or Touch Screen Controller (TSC).

Refer to the limitations given in Section 2, Systems and Equipment Limits, Primus Apex - Electrionic Charts, for the use of electronic charts.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE™) (powered by Honeywell) for the Pilatus PC-12/47E for complete information on the description and usage of Jeppesen charts.

7-36-2 Functionality

Refer to Fig. 7-36-1, Charts Graphical User Interface.

The charts functionality can be activated by pressing the Charts softkey on the Situation Awareness MFD or using the TSC MFD Format page or CCD page selection. The Charts softkey activates the charts on the Situation Awareness Multi Function Display (MFD). The charts then replace the INAV map and the remaining one third window is used to display the Waypoint List and the Flight Management Window. The TSC MFD Format page allows to select the synoptic, chart (option) and video (option) window on the Systems MFD. The Charts functionality can be activated on both MFDs.

The Airport Pull-Down Menu is located at the top left and is activated by placing the cursor over the Airport Selection Box and then selecting ENTER with the CCD or TSC. This provides the ability to display a maximum of four airports (three automatic selections and one search selection). The automatic selections consist of origin, destination and alternate airports derived from an active flight plan. In addition, the pilot can display charts from any airport by using the Search Aprt menu item. In the case when a flight plan is not complete (with origin, destination and alternate), the automatic selections for the charts may not be able to provide the full functionality.

Chart effectivity and coverage information can be viewed using the Revision Info menu item. When the chart data is current the volume label is displayed in white. If the chart is used beyond its intended cycle time, the volume label and a notification “May contain outdated information” are displayed in amber to indicate that the database needs to be updated. In addition, a Crew Alerting System (CAS) message **AGM 1 DB Old** , **AGM 2 DB Old** or **AGM 1+2 DB Old** is displayed.

The seven chart type tabs for each airport are segregated into the following categories (refer to Table 7-36-1):

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Table 7-36-1: Electronic Charts - Chart Types

Chart Type	Description
Aprt	Airport Diagrams
SID	Standard Instrument Departure
STAR	Standard Terminal Arrival Route
App	Approach procedures
Noise	Noise abatement procedures
NOTAM	Airport notice to airmen
Airsp	Terminal airspace

The CCD scroll function or the TSC knob controls the magnification of the chart window, which allows the smallest chart characters to be sized to a readable level.

The scroll frame is enabled whenever the cursor is placed along the chart display edge in any direction. Once the cursor is located within the frame leg of the desired scroll direction, the ENT button on the CCD, or pushing and holding on the DU&CCD touchpad on the TSC, can be used for scrolling. For each press, the chart will scroll in increments in the direction of the arrows.

The aircraft symbol will only be shown on Geo referenced charts. Geo referenced charts are indicated by a small aircraft symbol on the right of the chart title bar.

The airport chart for destination airport will be automatically displayed after landing if the charts window is shown on the MFD.

Night mode is optional and once selected will show all charts in a color palette that is optimized for viewing in dark cockpit environments (refer to Fig. 7-36-2). Night mode will automatically be selected at aircraft power-up if it is nighttime at the aircraft location.

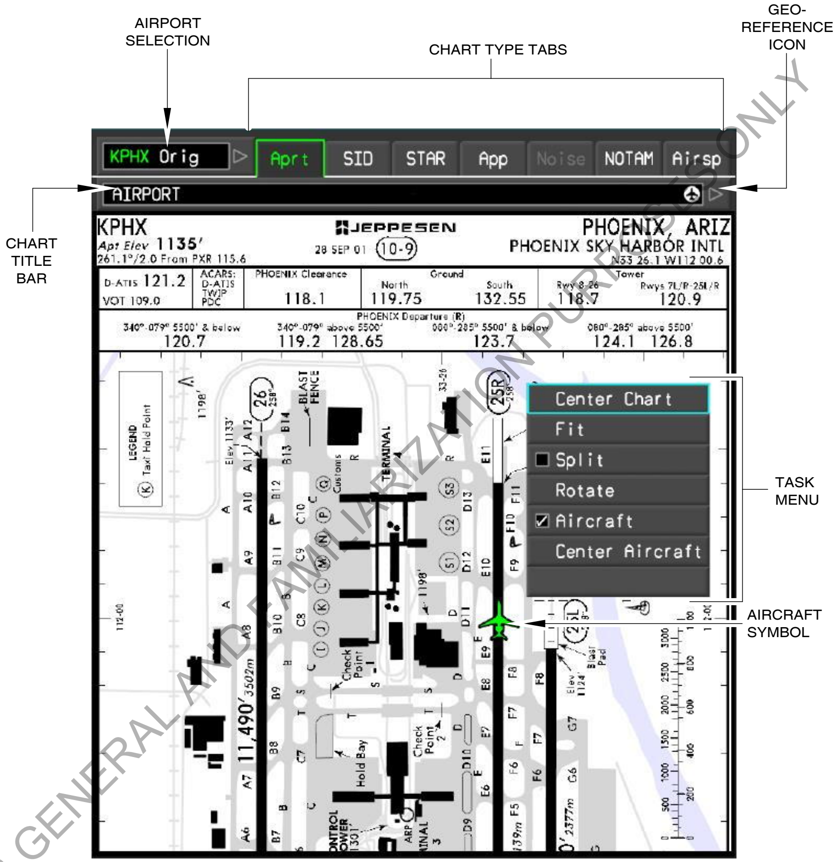

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Figure 7-36-1: Charts - Graphical User Interface

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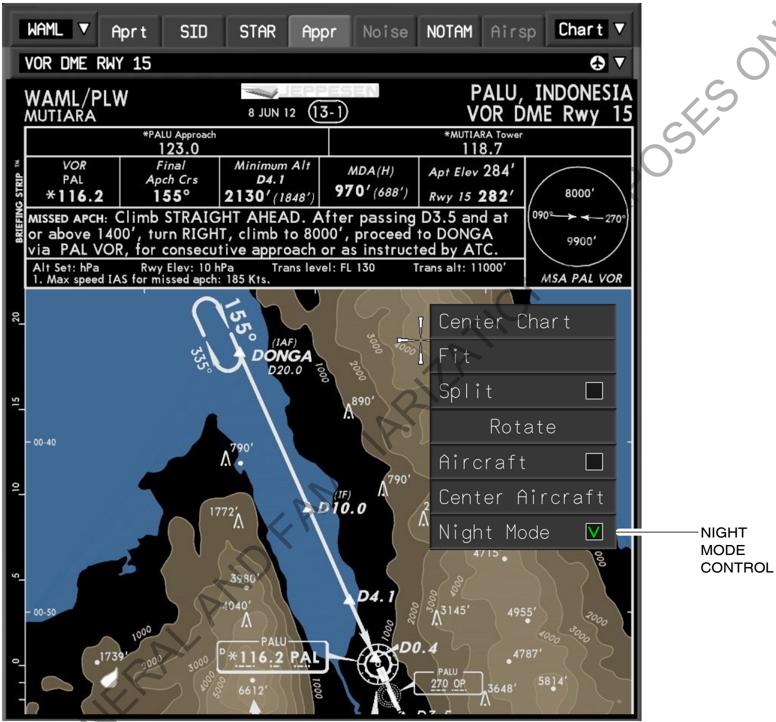

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Figure 7-36-2: Charts - Night Mode (optional)

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7-36-3 Electronic Chart Database Loading

7-36-3.1 Electronic Chart Database Loading with RT

The Charts Database updates can be downloaded with the Remote Terminal software to the FMS Navigation Database. Refer to the PC-12/47E data Loading Guide (Document Number 02313) available on the Pilatus web site.

Note
If a Connected Flight Deck (CFD) is installed, it must be disabled by opening the CB "WLAN Data Load" before energizing the aircraft electrical system.

7-36-3.2 Electronic Chart Database Loading with Connected Flight Deck (CFD)

If the optional CFD is installed, an Apple iPad can be used to load Navigation and Electronic Chart Databases to PRIMUS APEX. To do this, the INDS Data Manager application is used on an iPad with an INDS subscription. Firstly, the iPad must be connected to an internet network to download the databases. Thereafter, the iPad can be connected to the wireless network of the aircraft to upload the databases to PRIMUS APEX. Refer to the PC-12/47E Wireless Data Loading (Connected Flight Deck) guide (Document Number 02373). The guide can be found at www.pilatus-aircraft.com - > Menu -> Customer Support -> Technical Publications -> PC-12 -> Flight Manuals -> Data Loading Guide.

7-36-4 Optional Apex Video Input

7-36-4.1 General

The Primus APEX system provides the functionality to display video on the Systems MFD. An optional video input module converts analogue video input signals to digital format that can be used by the Modular Avionics Unit (MAU) to display the video.

Note
It is the responsibility of the operator to apply for operational approval at the local authority for displaying video on the Systems MFD by using the optional video input module.

7-36-4.2 Functionality

The video functionality can be activated by opening the page selection drop down menu using the CCD or from the TSC MFD Format page.

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7-37 Primus APEX - Optional Electronic Checklist

7-37-1 General

The Primus APEX system provides the functionality to host an optional Electronic Checklist (ECL) database that will be supplied and certified independently. Refer to the limitations given in this POH Section 2, Systems and Equipment Limits, Primus Apex - Electrionic Checklist for the use of the ECL.

The default location of the ECL is on the lower Multi Function Display (MFD) in the bottom left window. If desired, the ECL can also be displayed on the TSC by pushing the Checklist button on the TSC home page. The ECL can thus be shown on either the MFD or the TSC. Or, the ECL can be shown on both the MFD and the TSC at the same time. When the ECL is shown on both the MFD and TSC, both electronic checklist mirror each other when changes are made.

The ECL is designed with a CAS linking functionality that automatically activates the associated checklist for specific CAS messages.

Control of the ECL is via the Touch Screen Controller (TSC), soft keys on the ECL display and flight control wheel yoke buttons.

7-37-2 Description

The ECL layout consists of two types of line items: Menu line items and Checklist line items. The Menu line items are the Normal Procedures Checklist and the Checklist line items are divided into two types. These are Open Loop and Inactive. The Open Loop items are those items that will require pilot feed-back to check-off. An inactive item can be used as a Note to the pilot or to allow blank lines. Inactive items do not require any pilot action.

7-37-3 Operation

When selected on the MFD or TSC, the ECL will be called up to the GENERAL MENU page. The Normal Procedures Checklist can then be selected. If there are no procedures installed for a Checklist or a failure occurs, a “Checklist Unavailable” message will be displayed in the checklist window. The MFD bezel buttons perform the same function as the soft keys shown on the TSC.

The selected checklist menu will appear in the checklist window. Inside the checklist the cursor will be positioned on the first unchecked item in the checklist. To check off items in a checklist push on either the ENT bezel key on the MFD or the TSC soft key or press the CHKLST button on the yoke to complete the checklist action. The item checkbox will then be filled with a checkmark and the cursor will then move to the next item. Once all the checklist items are checked off, the message “Checklist Complete” will be displayed at the end of the checklist.

When using the CKLST button on the pilot or copilot control wheel yoke an item can only be checked or unchecked. The MFD bezel keys or TSC soft keys must be used to move the cursor in all other circumstances.

Refer to the Pilot’s Guide for the Advanced Cockpit Environment (ACE™) (powered by Honeywell) for the Pilatus PC-12/47E for more information on the ECL.

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7-38 Primus APEX - Coupled VNAV Approach

7-38-1 General

The Primus APEX avionics suite provides a coupled VNAV approach functionality.

7-38-2 Description

The FMS is capable of generating a vertical flight profile by using altitude and angle constraints from the flight plan waypoints. The waypoint constraints used by the FMS for both climb and descent, may come from the Navigation Database via terminal procedures or may be entered by the crew. The VNAV function will ensure compliance with the PSA or the FMS altitude constraints whichever target is closer to the actual altitude.

The FMS calculates the path deviation by using barometric altitude signal from the ADAHRS.

The vertical profile calculated by the FMS can be displayed on the Vertical Situational Display (VSD). After changes to the vertical flight profile it can take up to 10 seconds to re-compute the VSD.

Refer to Honeywell APEX Pilots Guide for more information on coupled VNAV.

7-38-3 VNAV Modes

The FMS supports four vertical modes:

− VNAV Flight Level Change (VFLC)

  The FMS provides target altitude guidance for the flight director to climb or descend. This mode is mainly used for climb and descent. VFLC will also engage when VNAV Altitude (VALT) hold is engaged, the target altitude is more than approximately 150 feet from the current altitude of the aircraft, and the FMS initiates a climb or descent.

− VNAV Altitude Select Capture (VSEL)

  VSEL is active whenever the aircraft is capturing FMS or PSA altitude and VNAV is active

− VNAV Altitude Hold (VALT)

  VALT is used for holding an altitude as computed by the FMS or by the preselected altitude (PSA). The autopilot automatically transitions from VALT to VFLC or VPTH mode when an altitude constraint is passed, next altitude constraint is at different altitude and PSA allows a flight level change

− VNAV Path (VPTH)

  VPTH mode is a descent mode used by the FMS to guide the aircraft along a geo-referenced path.

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7-38-4 Pilot’s Display

7-38-4.1 General

With coupled VNAV active, the following information is displayed on the Primary Flight Display (PFD). Refer to Fig. 7-38-1, VNAV - Example Indications:

- Vertical Deviation Pointer

  Represents the FMS VNAV descent profile deviation

- FMS Altitude and Target Bug and digital Readout

  Provides information for the next altitude constraint defined in the flight plan and is displayed as long as the FMS is selected as the primary navigation source

- VNAV Modes

  VNAV autopilot armed and active modes (VFLC, VSEL, VALT and VPTH)

- Vertical Tracks Alert

  Warns the pilot of an impending vertical-mode or vertical-track change by VNAV (e.g. before crossing a climb / descent constraint that does not equal the altitude preselector).

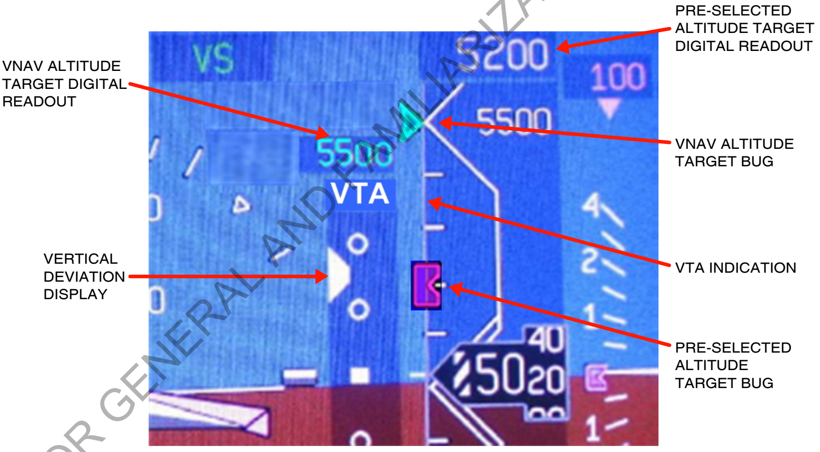

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Figure 7-38-1: VNAV - Example Indications

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7-38-4.2 VNAV Pre-Approach Path Guidance

Refer to Fig. 7-38-2, FMS VNAV Pre-Approach Pointer.

VNAV pre-approach path deviation will be indicated on the left side of the vertical deviation scale as a solid pointer as shown below. The so called VNAV preapproach pointer is not labelled as it always represents the barometric VNAV pointer driven by FMS and it is always on the left of the vertical scale. If an Instrument Flight Rules (IFR) approach procedure is available and loaded into the FMS the pre approach pointer will be removed when the system is transitioning to GS, LPV or VNAV for final approach guidance. The FMS is able to guide the aircraft on the pre-approach vertical path by using the VPTH mode on a continuous descent profile from TOD down to a runway threshold for a visual approach supplementary guidance.

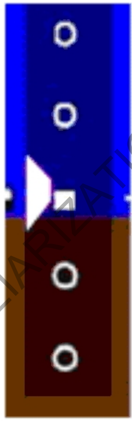

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Figure 7-38-2: FMS VNAV Pre-Approach Pointer

7-38-4.3 Approach Pointer Display

Refer to Fig. 7-38-3, VNAV, LPV and GS Pointers.

Refer to Fig. 7-38-4, VNAV, LPV and GS Ghost Preview Pointers.

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The vertical approach path deviation is displayed on the right side of the vertical deviation scale as a solid pointer and is displayed as soon as the approach capture criteria are met. The approach pointer will be labelled in a white font off to the right and below the vertical scale to identify the pointer as follows:

- VNAV, if the pointer is driven by the FMS using barometric altitude from the ADAHRS. The VNAV pointer is displayed during LNAV or LNAV/VNAV approaches
- LPV, if the pointer is driven by the FMS using the GNSSU proportional path deviation prior transition to the LPV approach or if the pointer is driven directly by the GNSSU during LPV approach
- GS, if the pointer is driven by the Multi Mode Digital Radio during ILS approach.

The approach pointers for the VNAV, LPV and ILS approaches are mutually exclusive and are shown below.

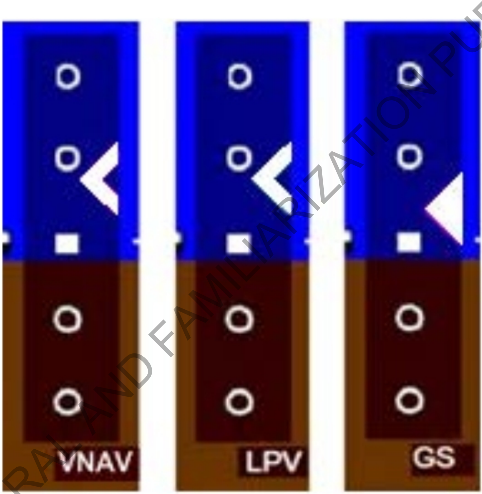

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Figure 7-38-3: VNAV, LPV and GS Pointers

If the selected approach path deviation becomes valid at any time within the terminal area, then it will be displayed as a ghost preview pointer until the approach capture criteria are met. The display of a ghost preview pointer allows the crew to arm the approach mode before the approach becomes captured. The ghost preview pointer will be displayed as a hollow pointer as shown below. The labelling for the ghost preview pointer follows the same philosophy as for the approach pointer.

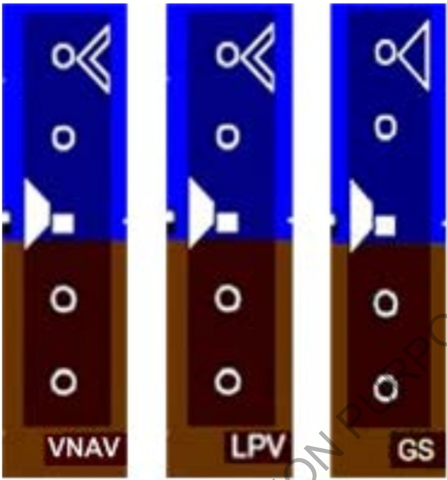

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Figure 7-38-4: VNAV, LPV and GS Ghost Preview Pointers

Note
NAV Preview is not available while executing a VNAV or LPV approach.

7-38-4.4 Vertical Deviation Display

Refer to Fig. 7-38-5, Vertical Deviation Pointer During Standard VNAV Approach.

The vertical deviation pointers displayed during a standard VNAV approach are shown below. The left picture shows the ghost preview pointer displayed along with any vertical AFCS mode except VGP. The next picture shows the armed ghost preview pointer displayed when the next leg is not the FAF and the corresponding AFCS mode is VGP armed mode. The next picture shows the armed approach pointer displayed when the active leg is to the FAF and the corresponding AFCS mode is VGP armed mode. The right picture shows the approach pointer displayed when the approach capture criteria are met and the corresponding AFCS mode is VGP active mode.

The vertical deviation information is displayed on the right side of the Attitude Director Indicator (ADI) sphere next to the altitude tape. The vertical deviation display provides the pre-approach and approach path guidance.

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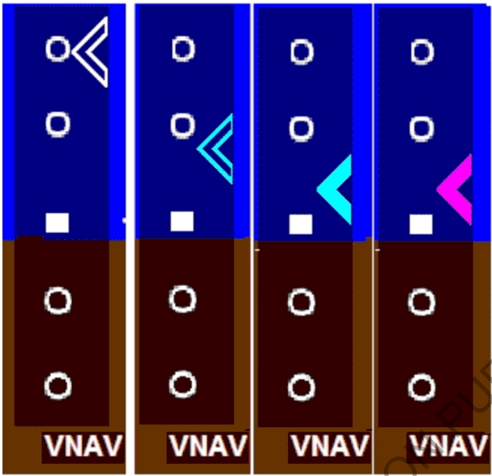

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Figure 7-38-5: Vertical Deviation Pointer During Standard VNAV Approach

7-38-4.5 Altitude Preselector

The altitude preselector is displayed as PSA altitude bug and a PSA digital readout. The pilot selects ATC assigned altitudes using the PSA knob to ensure that the aircraft will not fly through a clearance limit. VNAV uses the altitude preselector to compute altitude targets as well as a variety of other calculations.

In all VNAV modes (except VGP or if engine out condition exists) the FMS will not command the aircraft to move away from the preselected altitude. This gives the pilot a means to control the aircraft movement and to confirm the climb/descent commands of the VNAV functionality Vertical Track Alert.

The FMS will output a Vertical Track Alert (VTA) message to warn the pilot of an impending vertical mode or vertical track change. The VTA annunciation will be displayed in white with a semi-transparent background above the vertical deviation display. Conditions causing a display of VTA include the following:

- Before crossing a climb/descent constraint that does not equal the altitude preselector
- Before TOD while in VALT
- Before resumption of climb after a constraint
- Prior to resuming descent after level off at the speed/altitude limit or descent intermediate level segment
- One minute prior to a TOD in VALT when in a holding pattern and Exit Hold has been selected
- In climb and holding one minute prior to a constrained Hold Fix and Exit Hold has been selected.

7-38-4.6 ILS Approach

Refer to Fig. 7-38-6, Vertical Deviation Pointers During Standard ILS Approach.

Refer to Fig. 7-38-7, Excessive Vertical Deviation during ILS Approach.

The vertical deviation pointers displayed during standard Instrument Landing system (ILS) approach are shown below. The left picture shows the ghost preview pointer displayed along with any vertical AFCS mode except GS. The next picture shows the ILS approach pointer displayed when the ILS localizer is captured and the corresponding AFCS mode is GS armed mode. The right picture shows the approach pointer displayed when the ILS glideslope is captured and the corresponding Flight Director (FD) mode is GS active mode.

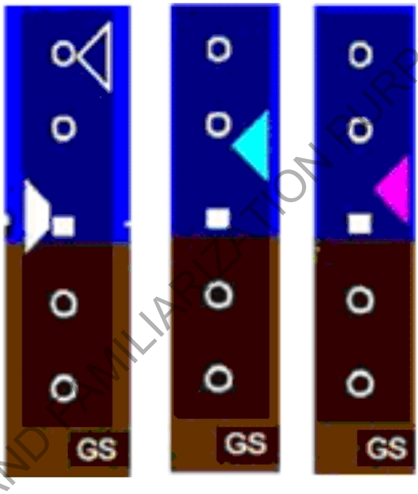

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Figure 7-38-6: Vertical Deviation Pointers During Standard ILS Approach

An excessive vertical deviation indication for ILS approaches triggers when the ILS approach is captured, radar altimeter is less than 500 ft and the vertical deviation exceeds one dot. When these conditions are valid, the deviation scale flashes amber for five seconds and then shows in steady amber for as long as the conditions are true.

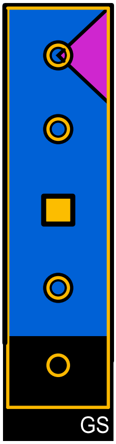

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Figure 7-38-7: Excessive Vertical Deviation during ILS Approach

7-38-4.7 Vertical Situation Display

Refer to Fig. 7-38-8, Vertical Situation Display.

The Vertical Situation Display (VSD) provides a vertical flight view that supplements the lateral map. The VSD can be used to improve the pilot situational awareness during coupled VNAV operation. The VSD is selectable through the VSD softkey on the 2/3rd INAV Window on the MFD. The VSD overlays the bottom of the INAV window. The following are displayed on the VSD:

- Aircraft Symbol
- FMS Vertical Flight Plan
- Actual Flight Path
- FMS Computed Points (Top of Climb, Top of Descent)
- Runway (Origin, Destination, Alternate)
- Altitude preselector Bug and Readout
- Terrain
- ILS Beam
- Flight Plan or Track mode annunciation
- Cursor position on VSD with distance and coordinates indication.

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Figure 7-38-8: Vertical Situation Display

Note
The Vertical Situation Display provides situational awareness and must not be used for navigation purposes.

Items that exist in both INAV and VSD will be displayed using the INAV color code.

The vertical profile is calculated by the FMS and is displayed on the VSD. After changes to the vertical flight profile it can take up to 10 seconds to re-compute the VSD.

Vertical profile is calculated based on the baro-setting from PFD. Therefore when flying with STD baro-setting, the profile for an approach can be shown with an offset.

Refer to the Pilot’s Guide for the Advanced Cockpit Environment (ACE™) (powered by Honeywell) for the Pilatus PC-12/47E for details of the Vertical Situation Display.

7-38-5 VNAV Operation Description

Refer to Fig. 7-38-9, Flight Plan on Vertical Situation Display.

Defining a lateral FMS flight plan entering origin and destination also automatically generates a vertical flight plan, when performance is initialized. Top of climb is calculated according the generic aircraft performance model based on set cruise altitude or PSA whichever is higher. After takeoff when VNAV mode on the FGP is pressed, VFLC mode is automatically engaged which sets the speed bug at the current climb speed. The altitude target can be manually adjusted by the pilot using the altitude selector on the FGP.

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Altitude constraints can be found in terminal procedures or can be defined by the pilot in the waypoints list cross dialogue box. During the VNAV climb in VFLC mode the system will comply with all restricting altitude constraints or the PSA, whichever target is closer to the current altitude. If an FMS altitude constraint waypoint in climb is passed, the system will automatically switch back to VFLC mode to continue the climb, but the pilot has to change the speed target or power setting to initiate the climb.

Keeping the VALT mode engaged in cruise will allow the aircraft to descend in VPTH mode once the Top-Of-Descent (TOD) is reached and the PSA is set to a lower altitude. Typical descents are flown in VPTH mode. However, intercepting a VPTH descent from above or below can also be made in VFLC mode. When VNAV is active, VFLC mode can be initiated for climb or descent by pressing the FLC button.

The default descent profile in VPTH mode is 3°, but can be modified by the pilot to a maximum of 8°. Coupled VPTH continuous descents can be flown from TOD until 400ft AGL on a visual approach. However from maximum 30 NM to the destination airport the approach path guidance is typically transitioned to VGP, or GS using the FGP approach button. The vertical direct to function can be used to define a direct vertical path from the present aircraft altitude to the FAF altitude constraint for a coupled continuous descent approach passing through several waypoints.

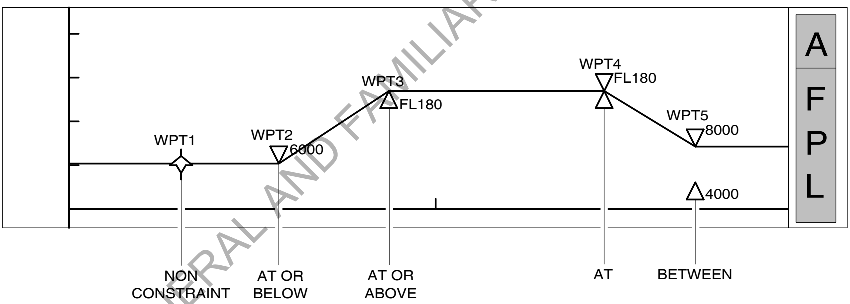

Figure 7-38-9: Flight Plan on Vertical Situation Display

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7-38-6 Visual Approach (optional)

7-38-6.1 General

The Primus APEX avionics suite provides an optional Visual Approach function.

7-38-6.2 Description

The visual approach functionality provides a method to setup a user defined standard VNAV approach to a runway or a pilot defined waypoint.

The visual approach function is activated via the INAV Graphical Flight Planning task menu pattern. The visual approach function can be a left hand or right hand downwind approach or a straight-in approach pattern.

The visual approach function uses VGP mode for vertical guidance during the descent, regardless of the altitude pre-selector setting. The VGP glideslope is drawn to the destination waypoint.

The visual approach function does not automatically take local procedures or terrain into account. It is the pilot's responsibility to make sure sufficient terrain clearance is maintained at all times.

Refer to the Pilot's Guide for the Advanced Cockpit Environment (ACE^{TM}) (powered by Honeywell) for the Pilatus PC-12/47E for more information on the Visual Approach function.

7-38-6.3 Pilot's Display

7-38-6.3.1 General

The pilot's display during visual approach is the same as a standard VNAV approach.

7-38-6.3.2 Vertical Deviation Display

The vertical deviation pointers displayed during a visual approach are identical to a standard VNAV approach.

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7-39 Primus APEX - Optional LPV/LP Approach

7-39-1 General

This section provides the information necessary to operate the PC-12/47E aircraft with Localizer Performance with Vertical (LPV) Guidance or Localizer Performance (LP) Functionality as factory options installed.

The installed SBAS GNSSU and Honeywell PRIMUS APEX avionics suite complies with FAA AC 20-138A (LPV Approach), FAA AC 20-138D (LP Approach), FAA AC 90-107 (aircraft and systems requirements) and EASA AMC 20-28 for navigation using Global Position System (GPS) with Wide Area Augmentation System (WAAS) or EGNOS (within the coverage of a Satellite-Based Augmentation System complying with ICAO Annex 10) for en route, terminal area, non-precision approach operations (including “GPS”, “or GPS”, and “RNAV” approaches), approach procedures with vertical guidance (including “LNAV/VNAV” and “LPV”). The Primus APEX Suite complies with AC20-129 for Baro VNAV.

For all aircraft the relevant Primus Apex option SBAS function has to be activated in the Aircraft Personality Module (APM) options file.

A detailed description of the system operation can be found in the Pilot’s Guide for the Advanced Cockpit Environment (ACE™) (powered by Honeywell) for the Pilatus PC-12/47E.

For aircraft with TAWS Class A (EGPWS) installed with -30 software or higher, mode 5 alert “below glideslope” is provided for LPV approaches.

7-39-2 Description

The SBAS GNSSU provides GPS position corrected by the SBAS providing improved accuracy and integrity. Refer to the Primus Apex Comms and Nav - GPS section for a description of the SBAS GNSSU.

The RNAV approach to LPV/LP minimum may be selected on the Flight Management Window (FMW) STAR/Landing page. If the Final Approach Segment data block is available for any selected RNAV approach then the LPV/LP minimum selection will be displayed by default. The pilot can change the RNAV minimum if required. The selection of LNAV(/VNAV) is only meant to deselect the LPV/LP approach, since landing minima is set manually using the MINIMUMS knob on the Flight Guidance Panel (FGP).

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7-39-3 Pilot's Display

Refer to Fig. 7-39-1, LPV and LP Approach Status Display Armed

The SBAS GNSSU information is displayed on the Primary Flight Display (PFD) and Multi Functional Display (MFD).

The LPV/LP status indicator provides the following information to the pilot.

White (arm)

The LPV/LP approach status is indicated on the LPV/LP status field. The LPV/LP status field is located below the flight director vertical mode display as shown below.

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Figure 7-39-1: LPV and LP Approach Status Display Armed

Green (active)

Refer to Fig. 7-39-2, LPV and LP Approach Status Display Active

LPV or LP is displayed in green on the PFD when LPV/LP status is active and the aircraft is within the approach area.

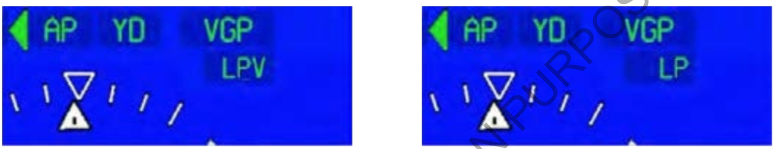

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Figure 7-39-2: LPV and LP Approach Status Display Active

Amber (“LPV UNVL” or “LP UNVL”)

Refer to Fig. 7-39-3, LPV and LP Approach Status Display Unavailable

LPV UNVL or LP UNVL is displayed in amber when the pilot loads an RNAV approach to LPV/LP minimums, but an error has been detected or the pilot selected a NAV preview outside the approach area or Vertical Glidepath (VGP) was not armed nor captured.

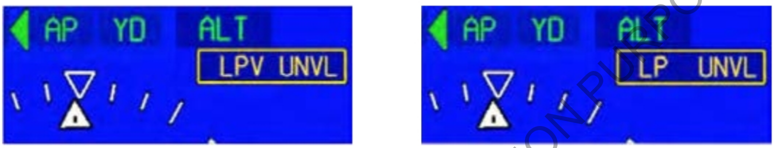

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Figure 7-39-3: LPV and LP Approach Status Display Unavailable

7-39-3.1 Vertical Deviation Display

Vertical deviation information is displayed on the right side of the Attitude Direction Indicator (ADI) sphere next to the altitude tape. The Vertical deviation display provides the pre-approach and approach path deviation.

For LPV the approach path deviation is provided by the SBAS GNSSU.

For LP approach Baro-VNAV is used to provide vertical deviation indication. The LP vertical guidance is advisory only and pilots must use the barometric altimeter as the primary altitude reference. This is to ensure compliance with any and all altitude restrictions during instrument approach operations.

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7-39-3.2 LPV Approach

Refer to Fig. 7-39-4, Vertical Deviation Pointers During Standard LPV Approach

The vertical deviation pointers displayed during a standard LPV approach are shown below. The left picture shows the ghost preview pointer displayed along with any vertical Automatic Flight Control System (AFCS) mode except VGP. The next picture shows the armed ghost preview pointer displayed when the next leg is not the Final Approach Fix (FAF) and the corresponding AFCS mode is VGP armed mode. The next picture shows the armed approach pointer displayed when the active leg is to the FAF and the corresponding FD mode is VGP armed mode. The right picture shows the approach pointer displayed when the approach capture criteria are met and the corresponding Flight Director (FD) mode is VGP active mode.

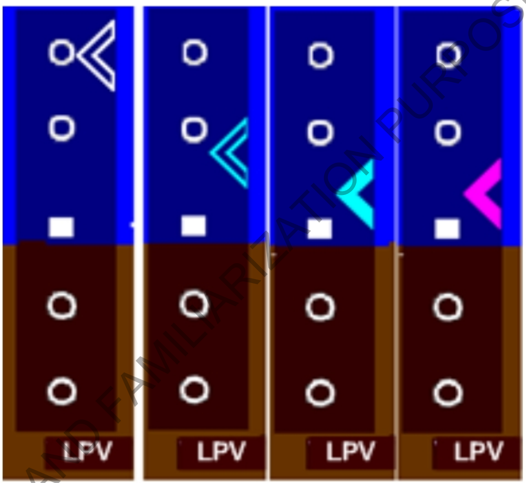

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Figure 7-39-4: Vertical Deviation Pointers During Standard LPV Approach

7-39-3.3 LP Approach

The vertical deviation pointers displayed during a LP approach are identical to a Baro-VNAV approach.

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7-40 Lightweight Data Recorder (If Installed)

7-40-1 Description

Refer to Fig. 7-40-1, Lightweight Data Recorder Schematic (MSN 1720, 2001 - 2190).

Refer to Fig. 7-40-2, Lightweight Data Recorder Schematic (MSN 2191 and up).

The Lightweight Data Recorder (LDR) is an airborne crash-survivable recording system which records both cockpit voice and aircraft flight data.

The LDR simultaneously records:

- One channel of audio from the pilot's audio panel. The latest 120 minutes of recorded audio data is retained
- One channel of audio from the Cockpit Area Microphone (CAM). The latest 120 minutes of recorded audio data is retained
- One channel for flight data information received from the Modular Avionics Unit (MAU) by ARINC 717 databus. The latest 25 hours of ARINC data at a rate of 256 words per second is retained
- One channel for datalink data information received from the Modular Avionics Unit (MAU) by ARINC 429 databus. The latest 25 hours of ARINC data at a rate of 256 words per second is retained.

The LDR correlates the voice and flight data to within ± 1 second.

The LDR system has:

- A LDR installed in the rear fuselage between Frames 36 and 37
- A CAM installed on the right lower sidewall panel in the flight compartment
- **MSN 1720, 2001 - 2190:** A CV ERASE/CVFDR TEST switch and a CVFDR TEST LED installed on the copilot's auxiliary panel.
- **MSN 2191 and up:** A CV ERASE switch installed on the copilot's auxiliary panel.

The power supply to the LDR system is 28 VDC from the Battery and External Power Junction Box (BEPJB) through the CVFDR POWER circuit breaker installed in the rear fuselage.

MSN 1720, 2001 - 2190: The LDR is powered when the STBY BUS switch is ON and the HOT BATT BUS has a minimum of 18 VDC.

MSN 2191 and up: The LDR is powered when the STBY BUS switch is ON, the HOT BATT BUS has a minimum of 18 VDC and the APEX commands the LDR to ON..

MSN 1720, 2001 - 2190: The green CVFDR TEST LED indicator is ON to show the LDR has no faults when the CV ERASE/CVFDR TEST switch has been set to CVFDR TEST. The CV ERASE switch gives the option to delete the recorded voice data. The spring loaded switch must be set to ERASE for at least three seconds to erase the voice data. It does not erase the flight data.

7-40-2 Operation

Power off: The LDR system is not operating, no data is recorded.

Power on: The LDR system operates and records audio and flight data.

7-40-3 Indication / Warning

APEX Build 12.7.1 and higher: If the LDR is off or has failed while the aircraft is on ground with electrical power available, the **CVFDR Fail** message is shown on the CAS.

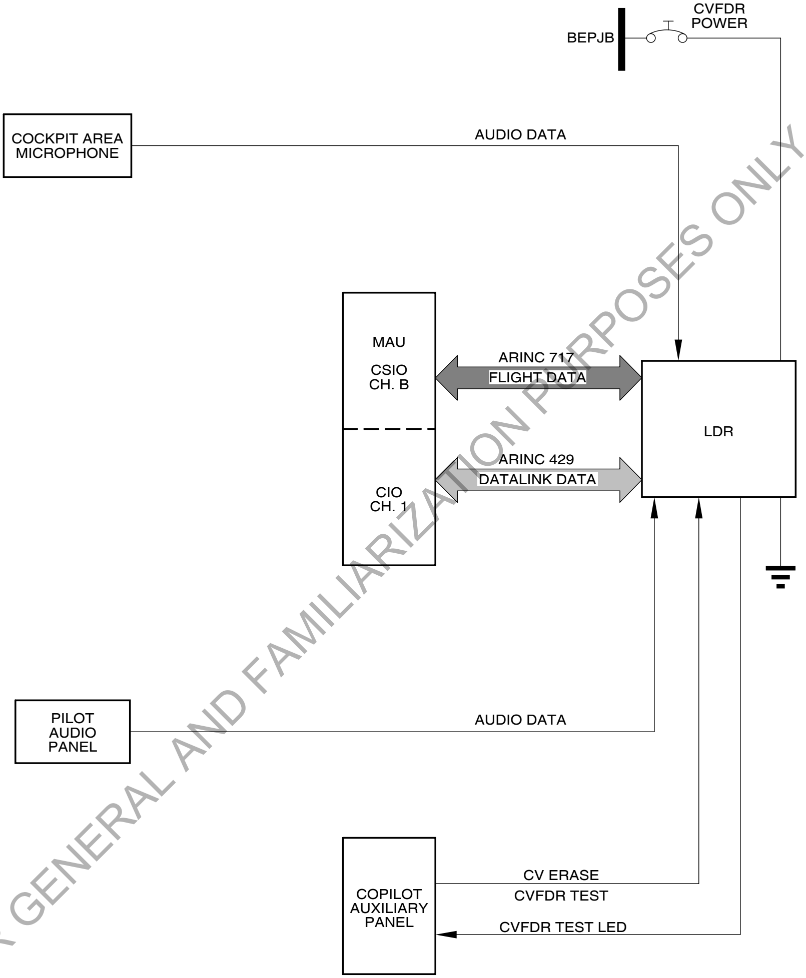

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Figure 7-40-1: Lightweight Data Recorder - Schematic (MSN 1720, 2001 - 2190)

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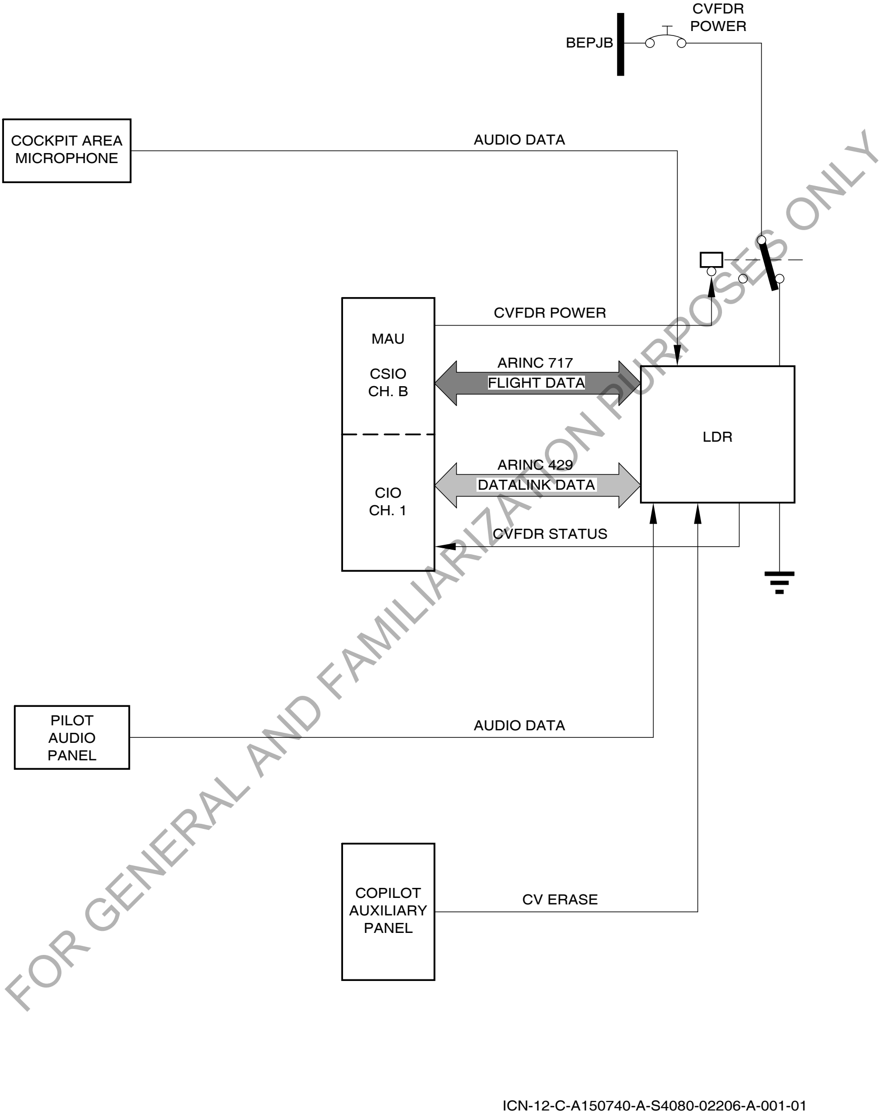

Figure 7-40-2: Lightweight Data Recorder - Schematic (MSN 2191 and up)

SECTION 8

Handling, Servicing and Maintenance

Table of Contents

8-1 General

8-1-1 General

This section contains factory-recommended procedures for proper ground handling and routine care and servicing of the PC-12 airplane. It also identifies certain inspection and maintenance requirements that must be followed if the airplane is to retain its performance and dependability. It is recommended that a planned schedule be followed for lubrication and preventive maintenance based on climatic and flying conditions which may be encountered.

All correspondence regarding the airplane must contain a reference to the manufacturer's serial number (MSN) and be addressed to:

PILATUS AIRCRAFT LTD. CUSTOMER SUPPORT GENERAL AVIATION, CH-6371 STANS, SWITZERLAND

Customer Support	
Website:	http://www.pilatus-aircraft.com → Contact Us
Tel:	+41 848 247 365 (24/7/365 customer support)

Pilatus Aircraft Ltd. cannot accept responsibility for continued airworthiness of any airplane not maintained in accordance with the information contained within this section and the Airplane Maintenance Manual (AMM).

8-1-2 Identification Plate

An identification plate is located on the lower left side of the fuselage aft of the cargo door. This plate displays the manufacturer's name, model designation, serial number (MSN), date of manufacture and the FOCA and FAA type certificate numbers.

Certain regulations may require an identification plate that displays the airplane registration number. This identification plate is located in the empennage.

8-1-3 Airplane Inspections

8-1-3.1 Airplane Inspection Periods

As required by regulations, all civil airplanes must undergo a complete inspection annually (each twelve calendar months). In addition to the required annual inspection, the manufacturer also requires inspections based on flying hours and Time Limited Inspections.

Other inspections may be required by the issuance of airworthiness directives or service bulletins applicable to the airplane, engine, propeller and components. It is the responsibility of the operator to ensure compliance with all applicable airworthiness directives and, when the inspections are repetitive, to take appropriate steps to prevent inadvertent non-compliance.

8-1-3.2 Airplane Scheduled Inspections

As required by national regulations, the airplane must be the subjected to a complete Annual Inspection. In addition, national regulations may require periodic, hourly inspections. The PC-12 AMM Chapter 5 gives the manufacturers recommended time limits for inspections, maintenance checks and the scheduled and unscheduled inspections.

The inspection intervals are based on normal usage of the airplane under average environmental conditions. Airplane operated in extremely humid tropics, or in exceptionally cold, damp climates, salt-laden conditions may need more frequent inspections for wear, corrosion and lubrication. Under these adverse conditions, the hourly inspection should be done at a more frequent interval. The owner or operator can then set his own inspection interval based on field experience.

The hourly inspection interval should never be exceeded by more than 10% but not more than 500 FH (refer to the AMM Chapter 5 for more information on permissible tolerances), which can be used only if additional time is required to reach a maintenance center. The permissible tolerances are not cumulative. For example, the 600 FH inspection can be accomplished at any time between 540 FH and 660 FH (±10% or ±60 FH).

The owner or operator is responsible for complying with any local regulations. The owner or operator is primarily responsible for maintaining the airplane in an airworthy condition, including compliance with Airworthiness Directives. It is further the responsibility of the owner or operator to make sure that the airplane is inspected in conformity with the inspection sheets.

Detailed information of systems and sub-systems on the airplane can be found in the relevant chapters of the AMM. Reference is made to the topics in this manual and Pilatus issued Service Bulletins for inspection, repair, removal and installation procedures. It is the responsibility of the owner or operator to make sure that mechanics inspecting the airplane have access to these documents.

The master maintenance plan and the different inspection packages list the maintenance and structural significant items for inspection and state the level of inspection required.

8-1-3.2.1 Component Life Policy

The AMM Section 4 contains the Airworthiness Limitations which specify Life Limit and Inspection Intervals for major components of the airplane.

The AMM Section 5 contains the time limits for overhaul and replacement of components based on average usage and environmental conditions. The stated time limits do not constitute a guarantee that the component will remain in service until this time as the environmental conditions that the component is operated in cannot be controlled by the manufacturer.

8-1-4 Preventive Maintenance

Pilots operating the airplane should refer to the regulations of the country of registry for information on preventive maintenance that may be performed by pilots.

The holder of a Pilot Certificate may perform certain preventive maintenance described in FAR Part 43. This maintenance may be performed only on an airplane which the pilot owns or operates and which is not used to carry persons or property for hire, except as provided in the applicable FAR's. Although such maintenance is allowed by law, each individual should make an analysis as to whether he/she has the ability to perform the work.

Pilatus Aircraft Ltd should be contacted for further information, or for the required maintenance which must be accomplished by appropriately licensed personnel. All other maintenance required on the airplane should be accomplished by the appropriately licensed personnel.

The aircraft has Computer Aided Testing (CAT) connectors which are installed in the maintenance test panel on the right side of the flight compartment. They are the central access point for ground maintenance to do aircraft system tests using either a portable computer or a maintenance box. Serious flight safety implications could result if equipment is connected to the CAT connectors during flight. The protective CAT connector caps must be installed during flight and all test equipment must be removed from the aircraft.

If maintenance is accomplished, an entry must be made in the appropriate logbook. The entry should contain:

- The date the work was accomplished
- Description of the work
- Number of hours on the airplane
- The certificate number of pilot performing the work
- Signature of the individual doing the work.

8-1-5 Modifications or Repairs

It is essential that the Airworthiness Authorities of the country of registry be contacted prior to any modifications to the airplane to ensure that the airworthiness of the airplane is not violated. Modifications or repairs to the airplane must be accomplished by licensed personnel.

8-1-6 Service Bulletins and Service Letters

Pilatus Aircraft will issue Service Bulletins and Service Letters from time to time which will be sent to owners, service centers and distributors. Service Bulletins should be complied with promptly and depending on their nature material and labor allowances may apply, this aspect will be addressed in the Planning Information section of the bulletin. Service Letters give information on product improvements, or discussion on field problems. Service Bulletin and Service Letter Indexes are issued periodically to provide a complete listing of all issued bulletins and letters.

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8-2 Ground Handling

8-2-1 Towing

Refer to Fig. 8-2-1, Aircraft Towing

The use of a towing arm which attaches to lugs on the nose leg is the recommended method of towing the airplane over prepared, hard, even ground. The towing arm should incorporate shock absorbers to prevent damage to the airplane. The steering arm provided for this airplane is a steering bar extension to the tail stand. When not in use the components of the towing arm are stowed inside the rear fuselage cone accessible through the battery door.

When towing the airplane, a qualified person should sit in the cockpit ready for immediate braking action, in the event that the towing arm becomes uncoupled. The movement of the towing vehicle should always be started and stopped slowly to avoid unnecessary shock loads. When towing in a congested area, two helpers should watch the wing tip and tail clearances.

In any towing operation, especially when towing with a vehicle, do not exceed the nose gear maximum tow limit angle either side of center or damage to the nose gear will result. The maximum tow limit angle is indicated by a placard on the nose strut. If the airplane is towed or pushed over a rough surface during hangaring, watch that the normal cushioning action of the nose gear does not cause excessive vertical movement of the tail and the resulting contact with low hangar doors or structure. A flat nose tire will also increase the tail height.

When towing an aircraft it is recommended to install the propeller towing restraint to avoid damage to the propeller. The towing restraint, which is part of the parking equipment, is attached to the propeller restraint and the tow bar. During this operation, the propeller restraint has to be attached to the spinner dome with the hooks, provided in the parking equipment.

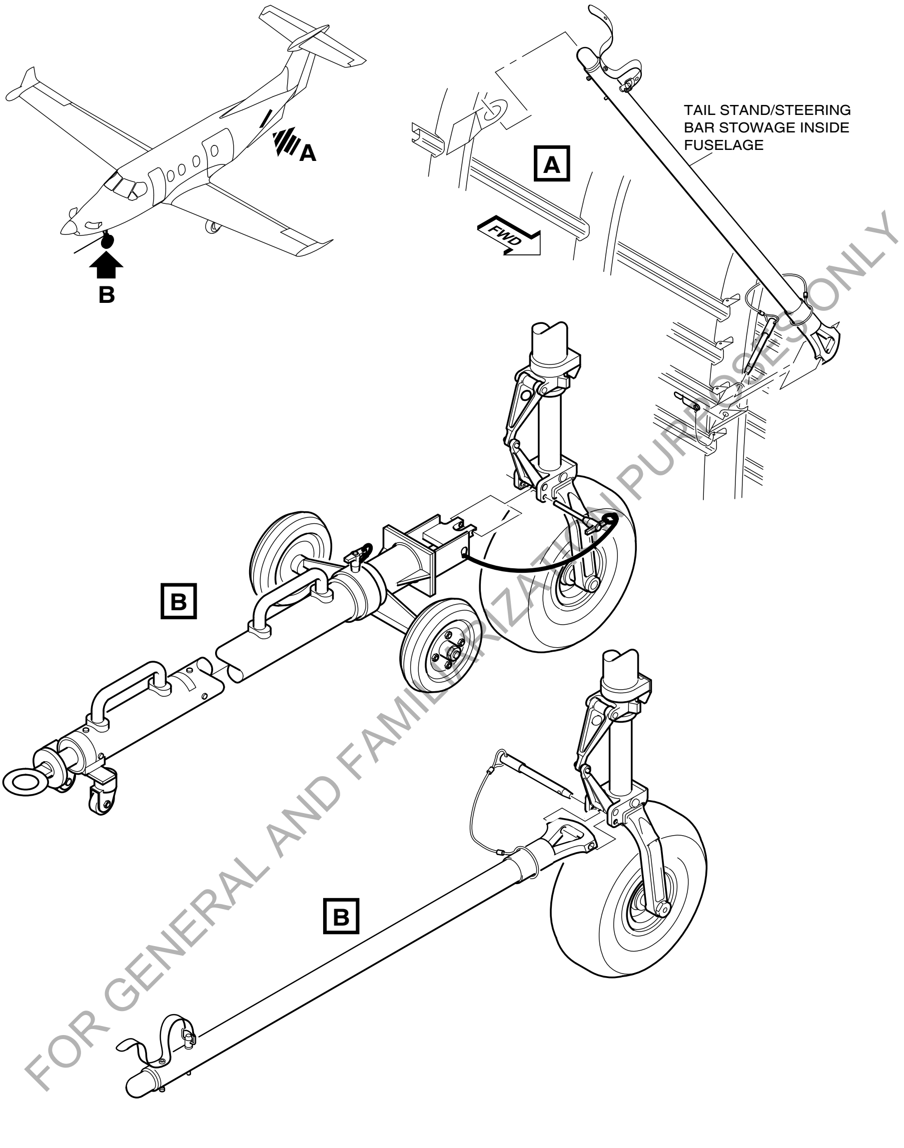

Figure 8-2-1: Aircraft Towing

CAUTION

To avoid any damage, the propeller restraint must not be attached to the exhaust covers or the engine cowling.

In the event that towing lines are necessary, ropes should be attached to the main gear struts as high as possible without contacting brake lines or wire harness. The lines should be long enough to clear the nose and/or tail by not less than 20 feet. A qualified person should occupy the pilot's seat to maintain control of the airplane by the use of the nose wheel steering and brakes.

It is acceptable to tow the aircraft by grasping the nose wheel and lifting it just enough to clear the ground.

8-2-2 Parking

In normal weather conditions, the airplane can be parked on any firm surface, headed into wind (if possible) and the parking brake applied, or wheel chocks in place, or both. Make sure that the rudder/nose wheel is centered.

The tail stand should be installed any time the aircraft is parked outside and wet snow fall is expected.

Parking for long periods should be done with wheel chocks in place and the parking brake released. Install cockpit control locks. Blanks and covers should be fitted at any time the airplane is parked for an extended time or overnight (refer to Fig. 8-2-2). Before the blanks and covers are installed they must be checked for condition and completeness (i.e. in serviceable condition with all warning flags attached). When the aircraft is parked in direct sunlight and Outside Air Temperature (OAT) is above 30°C it is recommended to install the Cockpit Sun Screen.

The airplane should be moored if it is to be parked in the open for long periods and weather conditions are unfavorable. In extreme conditions, the airplane should be parked in a hangar, as structural damage can occur in high winds, even when moored correctly.

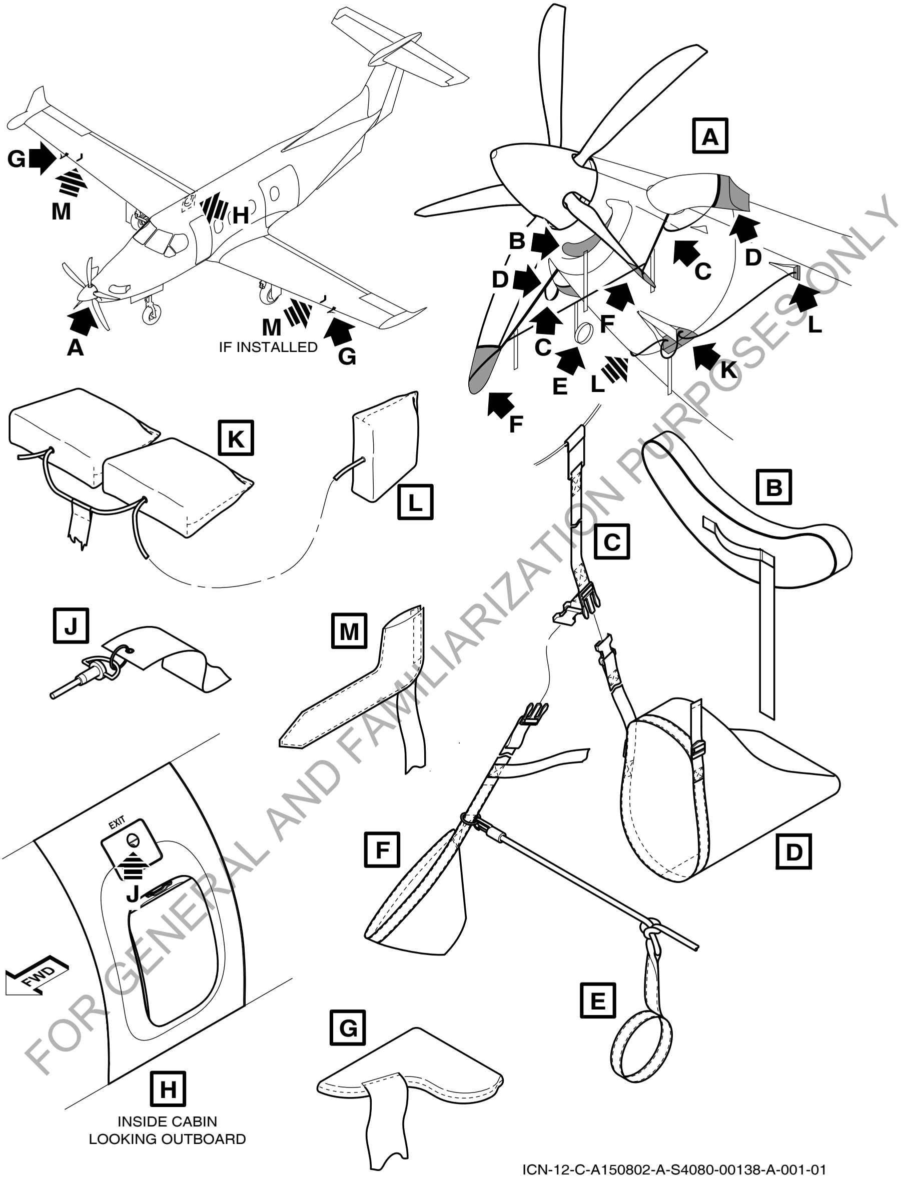

Figure 8-2-2: Blanks and Covers

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8-3 Mooring

The airplane should be moored for immovability, security and protection. The following procedures should be used for the proper mooring of the airplane (refer to Fig. 8-2-2 and Fig. 8-3-1):

- Head the airplane into wind, where possible
- Retract the flaps
- Close the inertial separator
- Install cockpit control locks
- Chock the wheels
- Install the blanks and covers
- Install the propeller anchor
- Secure tiedown ropes to the wings at approximately 45° and tail tiedown points at a maximum of 25° angle to the ground
- Fit the propeller boots, and attach to the cowling under the engine exhausts, to prevent engine wind milling
- If the aircraft is in direct sunlight and Outside Air Temperature (OAT) is above 30°C it is recommended to install the Cockpit Sun Screen.

CAUTION

Use bowline knots, square knots or locked slip knots. Do not use plain slip knots.

CAUTION

Make sure propeller anchor is properly installed to prevent possible engine damage due to wind milling with zero oil pressure.

Note

When using rope of a non-synthetic material, leave sufficient slack to avoid damage to the airplane should the ropes contract. Hemp ropes contract significantly in high moisture conditions.
Additional preparations for high winds include using tiedown ropes from the nose landing gear.

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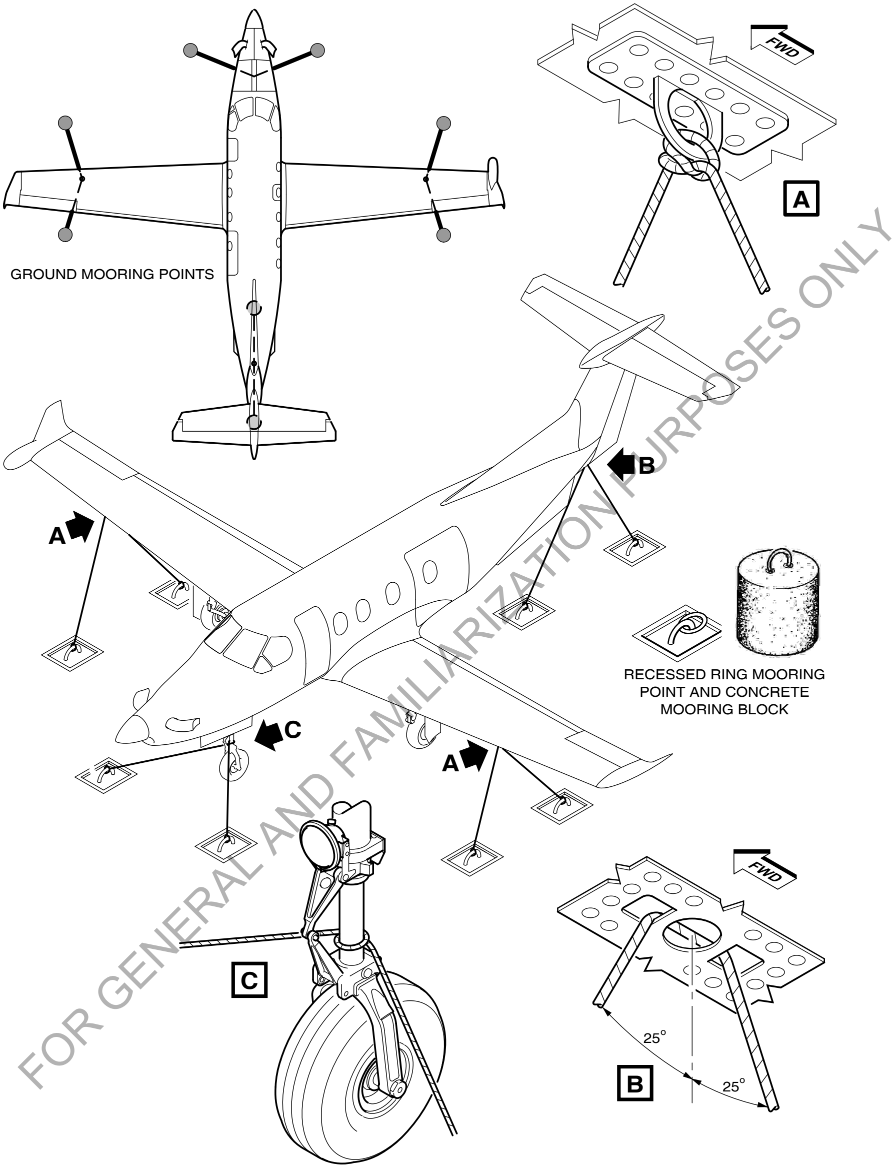

Figure 8-3-1: Airplane Mooring

8-4 Jacking

8-4-1 Single Wheel Jacking

To assist in wheel and brake maintenance, both the two main wheels and the nose wheel can be jacked, independently, using a bottle jack and an adapter (refer to Fig. 8-4-1). The adapters are shaped to accept the piston of a bottle jack. It is advisable that when jacking the nose wheel up, the tail support should be fitted in the rear main jacking pad as a precautionary measure.

Chock the other two tires before single wheel jacking to prevent airplane movement.

8-4-2 Airplane Jacking

The airplane is equipped with two main jacking points and a combined tail jacking pad/mooring point (refer to Fig. 8-4-2). The two main jacking points are located on the wing bottom surface just outboard of the fuselage and the tail jacking pad is located on the fuselage bottom surface just forward of the empennage.

Hydraulic jacks are used at the main jacking points to raise and lower the airplane. The tail jacking point is used to maintain the airplane in a level attitude during lifting. When the airplane is raised or lowered, the airplane tail is also progressively raised or lowered accordingly.

CAUTION
Attach ballast to the Tail Jacking Point to prevent any possible rear fuselage upwards movement, while the airplane is on jacks.

Refer to the Aircraft Maintenance Manual Chapter 7 for procedures on lifting and lowering the complete airplane and information concerning the amount of ballast to be attached to the tail jacking point.

Note
When jacking the airplane outdoors, use the tiedown for provisions for the wing and tail as described in Section 8-3, Mooring.

8-4-3 Levelling

Longitudinal and lateral leveling of the airplane is achieved by positioning a spirit level along or across one of the seat rails in the aft fuselage area. This task is normally done in conjunction with raising the airplane on the three main jacks for weighing, setting of landing lights and fuel system calibration.

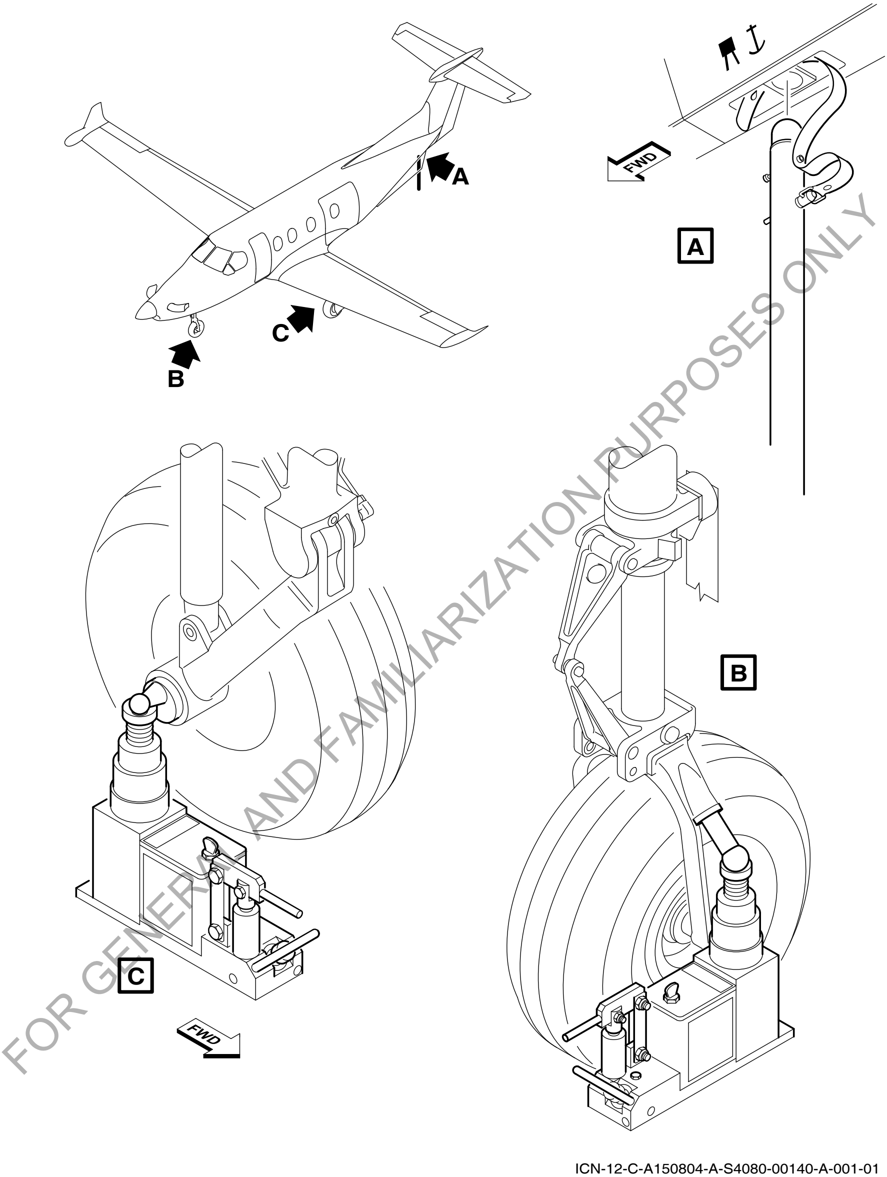

Figure 8-4-1: Single Wheel Jacking

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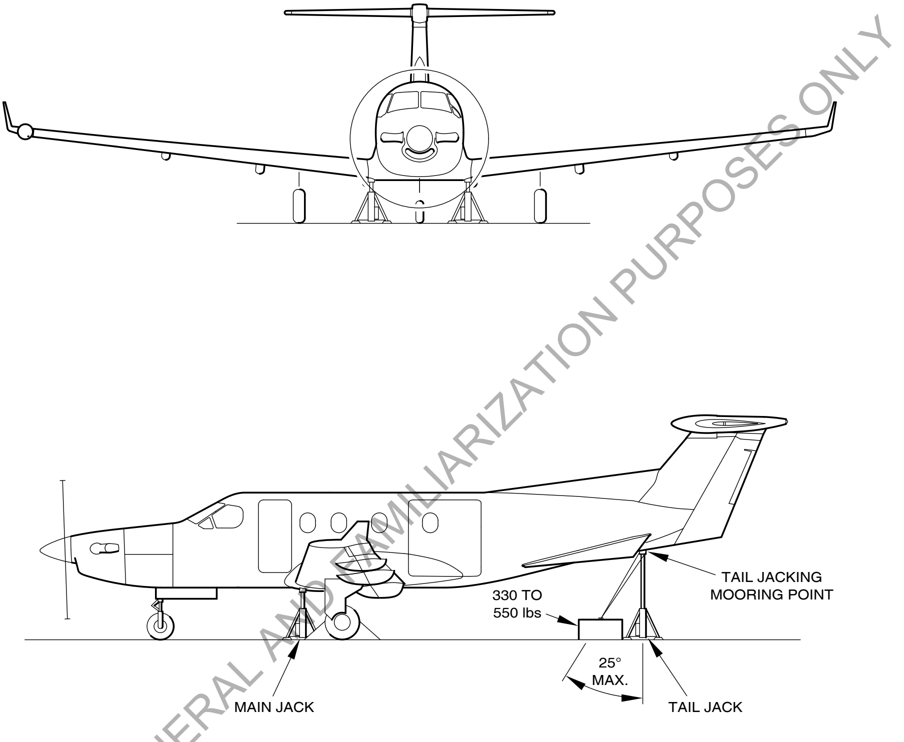

Figure 8-4-2: Main Jacking Points

8-5 Passenger Seat Removal and Installation

Pilots may remove and install passenger seats in accordance with the information given in Section 6-8, Interior Configurations.

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8-6 Servicing

8-6-1 General

In addition to the inspection periods (detailed in Airplane Inspection) and the pre-flight inspections provided in Section 4, Preflight Inspection, of this Handbook, complete servicing instructions are detailed in the AMM Chapter 12-00-00. The following sub-paragraphs give an overview.

8-6-2 Battery

Access to the batteries is gained by opening the hinged panel (31AB) located on the rear fuselage bottom surface. The batteries must be regularly maintained in accordance with the AMM. The operator must also make sure that the battery vents pipes which extrude from the fuselage, just aft of the hinged panel, are free of dirt and any sign of corrosion. In the event that corrosion or a blockage is found, a maintenance shop visit is required, as this situation - if left unchecked - could lead to explosive pressure being reached within the battery which could jeopardize airplane safety.

An external power control unit is installed which will allow the batteries to be charged on the ground. With an external power unit connected and operating set the EXT PWR and BAT 1 or BAT 2 switches to ON to ground charge a battery. The battery must be vented during ground charging operations, refer to the AMM Chap 24 for instructions.

8-6-3 Engine Oil

Oils specified for use in the PT6E-67XP engine oil system are listed in Section 2, Power Plant Limitations, Oil.

If operating conditions are such that the engine will be subjected to frequent cold soaking at an ambient temperature of -18 °C or lower, the use of PWA521, Type II oil (5cs) (viscosity) oil (Type II) is recommended.

The engine oil level filler cap and indicator is marked with 1, 2, 3, MAX COLD and MAX HOT:

- The MAX HOT mark refers to the engine condition in the first ten minutes after shutdown
- The 1, 2, 3 marks give the quantity of oil in US quarts that must be added to the oil tank to fill it when it is hot
- The MAX COLD mark refers to the engine condition when the engine has been shutdown for 12 hours or more. Do not add oil to the engine oil system when cold, as this can cause the engine to have too much oil.

A visual sight gauge is provided to allow the oil level to be checked without removing the oil level filler cap and indicator. If the oil level is below the green band on the sight gauge the oil level has to be checked with the oil level filler cap and indicator.

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CAUTION
The green marks on the filler tube and the filler cap must be aligned when the oil level filler cap and indicator are installed.

Note
Less than 30 minutes after engine shutdown, oil level is optimal when it is between the "MAX COLD" and the "ADD 1" mark on the sight glass. To fill the oil to the maximum level can cause a high consumption rate, with the oil exiting through the AGB breather.

CAUTION
Never replenish the oil in a cold engine, as this can result in overfilling of the system. Start the engine and run at ground idle for 5 minutes, recheck the oil level before adding oil to the system. **Make sure that the oil is of the correct type. Refer to Section 2, Power Plant Limitations, Oil.** **To prevent oil dripping from the dipstick and contaminating equipment, hold a piece of absorbent lint-free material under the dipstick during removal.**

8-6-3.1 Oil Replenishment Procedure

1 Open the left engine access panel and secure open with the struts.

2 Use a ladder for better access to the filler cap/dipstick.

3 Release the locking mechanism and remove the filler cap/dipstick assembly from the filler neck on the filler neck on the accessory gearbox.

4 Find the oil level shown on the dipstick.

Note
If there is no indication of oil on the dipstick, large oil pressure changes have been noted or the rate of use of oil is high, find the cause.

5 Replenish the oil according to HOT/COLD condition of the engine.

6 Make a note of the quantity of oil used.

7 Reinstall the filler cap/dipstick assembly and engage the locking mechanism.

Note
To check if the filler cap is properly installed, open the right hand engine access door. The green line cannot be seen from the LH engine access door without a mirror being used.

8 Close the access panel.

8-6-3.2 Complete Oil System Replenishment

Refer to the AMM for the Complete Oil System Replenishment procedure.

WARNING
MAKE SURE THE FILLER CAP/DIPSTICK IS PROPERLY ENGAGED AND LOCKED AFTER REPLENISHMENT.

8-6-4 Fuel System

The left and right wing fuel tanks are gravity filled through openings on the upper surface. The tanks should always be kept full between flights to reduce explosive vapor space and condensation. Allowance should be made for expansion to minimize venting of fuel if ambient temperature is expected to rise markedly. Approved fuels are to be used. Refer to Section 2, Powerplant Limitations, Fuel.

WARNING
CHECK FUEL SUPPLY VEHICLE FOR CORRECT FUEL GRADE AND TYPE. USE AN APPROVED WATER DETECTION KIT TO CHECK FOR WATER CONTAMINATION.

CAUTION
Anti-icing additives are not required for aircraft operation within the certified outside air temperature limits (refer to Section 2, Outside Air Temperature Limits).   **Nevertheless, it is important to drain free water from the wing tanks before the first flight of the day. There are two fuel tank drain valves on the lower surface of each wing.**

Note
There are two fuel tank drain valves on the lower surface of each wing and one on the front left of the fuselage, aft of the nose wheel well.

8-6-4.1 Refueling Precautions

During refueling/defueling operations, the following arrangements must be complied with:

- Refuel and defuel only in a well-ventilated area
- Do not allow open flame or smoking in the vicinity of the airplane while refueling
- Do not replenish the oxygen system during refueling or defueling
- Do not operate airplane electrical or radio equipment while refueling
- High frequency pulse transmissions in the vicinity of the airplane represent a fire hazard
- During all refueling/defueling operations, fire-fighting equipment must be available.

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8-6-4.2 Fueling Procedure

1 Make sure the fuel supplied is checked for type, grade and freedom from contamination.
2 Make sure that the refueling vehicle is grounded.
3 Ground the vehicle to the airplane (attach the vehicle grounding lead to the nose landing gear).
4 Remove external power, if connected.
5 Make sure all electrical power is OFF.
6 Connect the grounding cable from the nozzle to grounding point next to the fuel cap.

CAUTION
Directing the nozzle outboard may cause damage to the fuel quantity probe.

7 Open the wing fuel cap and insert the nozzle, directing it inboard, after first making sure that the filler nozzle is clean.
8 Add fuel. Allow the fuel to settle when topping-off the fuel tank. Remove the fuel nozzle and disconnect the grounding cable. Secure the filler cap.
9 Repeat the procedure for the other wing tank.
10 Remove the vehicle grounding cable from the airplane.
11 Clean up any fuel spillage (Use a water hose if excessive).
12 On the overhead panel set the STBY BUS switch to ON
Check all system switches are OFF.
13 Set both Battery switches to ON and check the fuel quantity gauges for correct indication.
14 Set both Battery switches to OFF.
15 Set the STBY BUS switch to the OFF position.

8-6-4.3 Fuel Contamination

Fuel contamination is usually the result of foreign material present in the fuel system. This foreign material can take many forms, i.e. water, sand, dirt, microbes or bacterial growth. In addition, additives that are not compatible with the fuel used can cause the fuel to become contaminated.

Jet fuel contains some dissolved, suspended water and is a fuel contamination concern. The quantity of water that can remain in solution will depend upon the temperature of the fuel. Dissolved water cannot be removed by a filter during a fuel service but will be released from suspension as the fuel temperature decreases, as during flight. These supercooled water droplets only need to contact solid contaminates or receive an impact shock to change into ice crystals. In addition, free water may result from condensation, mainly when descending into warm, humid air with cold fuel tanks. The PC-12 fuel system is designed to operate without requiring fuel anti-icing additives, but requires careful maintenance. Excessive ice forming at the bottom of the tanks could block pump inlets and excessive ice forming in the motive flow lines could block ejector nozzles.

For cold weather operations it is recommended to refuel, with warm fuel, before the flight. This improves water drainage and reduces the time to warm up fuel before takeoff. Do not artificially heat the fuel, natural heating within the aircraft environmental envelope is acceptable.

Before the first flight of the day and after each refueling, use a clean container and drain at least one sample of fuel from each tank drain valve to determine if contaminants are present (and that the airplane has been fueled with the proper fuel). If contamination is detected, drain all fuel drains points until all contamination has been removed. If after repeated sampling, evidence of contamination still exists, the fuel tanks should be completely drained and the fuel system flushed. Do not fly the airplane with contaminated or unapproved fuel.

Refer to the AMM for the complete fuel contamination check procedure.

In addition, operators who are not acquainted with a particular airfield should be assured that the fuel supply has been checked for contamination and is properly filtered before allowing the airplane to be serviced. Also, fuel tanks should be kept full between flights, provided weight and balance considerations will permit, to reduce the possibility of water condensing on the walls of partially filled tanks.

8-6-4.4 Fuel Anti-Icing Additive

Anti-icing additive is not required for PC-12 operation within the certified outside air temperature limits (refer to Section 2, Outside Air Temperature Limits), but may still be used if desired.

Refer to Section 2, Power Plant Limitations, Anti-Icing Additive, for additive types and concentration levels.

WARNING

THE FUEL SYSTEM ANTI-ICING ADDITIVES CONTAIN DIETHYLENE GLYCOL MONOMETHYL ETHER (DIEGME) WHICH IS HIGHLY TOXIC. THESE PRODUCTS MUST BE HANDLED WITH EXTREME CARE. AVOID ALL DIRECT CONTACT WITH SKIN AND CLOTHING. ANY CLOTHING ACCIDENTLY CONTAMINATED BY SPLASHING SHOULD BE PROMPTLY REMOVED AND THE SKIN WASHED WITH SOAP AND WATER. PREVENT CONTACT WITH EYES AND AVOID INHALATION OF VAPORS. IF CONTACT IS MADE WITH THE EYES THEY SHOULD BE FLUSHED WITH CLEAN WATER FOR 15 MINUTES. IF SWALLOWED, RINSE THE MOUTH WITH WATER. DO NOT INDUCE VOMITING. CONSULT A PHYSICIAN AS RAPIDLY AS POSSIBLE AFTER ALL CONTACT CASES.

CAUTION

The additive-to-fuel ratio must conform to the requirements of Section 2, Power Plant Limitations, Anti-Icing Additive.

Too low additive-to-fuel ratios will not be sufficient to inhibit ice formation. Too high additive-to-fuel ratios will cause damage to the protective primer and sealants of the fuel tanks and to the seals in the fuel system and engine components.

Make sure that the additive is directed into the fuel stream. Start additive flow after the fuel flow starts and stop the additive flow before the fuel flow stops. Do not allow concentrated additive to contact the interior of the fuel tanks or exterior painted surfaces.

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If operation with anti-icing additive is chosen, blend the anti-icing additive in accordance with the following procedure:

1. Calculate the quantity of anti-icing additive required based on the quantity of fuel to be added. Refer to Section 2, Power Plant Limitations, Anti-Icing Additive for the correct additive-to-fuel ratio.
2. Prepare the additive container in accordance with the manufacturer's instructions.
3. Pull the trigger on the fuel nozzle firmly to ensure full flow, and then lock the trigger in place.
4. Start the additive flow immediately after the fuel flow starts. Make sure that the additive is directed into the fuel stream.

Note
Refueling rates should be between 30 and 60 gallons per minute.

5. If necessary, regulate the additive flow rate to ensure correct and complete mixing of the additive and the fuel.
6. Stop the additive flow before the fuel stops.
7. Make sure that the correct quantity of anti-icing additive has been added.
8. Do a water drain check before the first flight of the day.

8-6-5 Landing Gear - Tires

For maximum service, keep tires inflated to the proper pressures. All wheels and tires are balanced before original installation, and the relationship to tire and wheel should be maintained upon reinstallation. Unbalanced wheels can cause extreme vibration in the landing gear; therefore, in the installation of new components, it may be necessary to re-balance the wheels with tires mounted. When checking the tire pressures, examine the tires for wear, cuts, bruises and slippage.

Nose Wheel Tire:

- Wheel type: BFG PN3-1501
- Tire size: 17.5 x 6.25-6, 8PR, TL (160 mph)
- Tire Pressure: 60 +3 -0 psi (4.1 +0.2 -0 bar)
- Max. castor rotation: +/- 60° free (+/- 12° Nose Wheel Steering).

Main Wheel Tires:

- Wheel type: BFG PN3-1543-1
- Tire size: 8.50-10, 10PR, TL (160 mph)
- Tire pressure: 60 + 3 - 0 psi (4.1 + 0.2 - 0 bar).

Refer to the AMM for the alternative types of tires that can be installed.

8-6-6 Landing Gear - Brakes

The fluid level should be checked periodically or at a scheduled maintenance event and replenished as necessary. Each brake assembly incorporates a brake lining wear indicator. As the brake pads wear, the pin will be pulled into the piston housing. When the system is pressurized and the pin is flush with the piston housing, the brake linings must be overhauled.

Refer to the AMM for complete information on the type of hydraulic fluid, servicing the fluid level and brake inspection and replacement.

8-6-7 Lubrication Points

Proper lubrication is essential for trouble-free operation of mechanical components. Lubricants and dispensing equipment must be kept clean. Use only one lubricant in a grease gun or oil can. After lubrication, clean off all excessive grease or oil to prevent dust and dirt build-up.

The frequency of application may be increased for a particular type of operation or if excessive wear is experienced. For lubricating instructions, locations and lubricants refer to the AMM, Chapter 12.

8-6-8 Vapor Cycle Cooling System (VCCS) (If Installed)

CAUTION

Operation of the system at low ambient temperatures for more than 15 minutes can result in major damage to the compressor.

Note

A temperature switch is installed to keep the system from operating and causing possible damage if operated for extended periods of time if ambient temperature is below -12 °C (10 °F). In this case, it is recommended that the aircraft be heated above this threshold to enable the system to operate.

During cold winter months, the system should be operated for 10-15 minutes every two weeks to maintain a thin oil film on the compressor output shaft dynamic seal to prevent shaft leakage.

Prior to selecting on the air conditioning system (energizing the compressor drive), run the blowers on high speed for a minimum of 5 minutes. This will aid in warming the refrigerant and bringing it up to an acceptable temperature enabling operation of the system.

8-6-9 Oxygen System

The standard oxygen system replenishment is carried out at a hinged service panel (11BR) on the right side of the fuselage, forward of the wing leading edge. The service panel is fitted with an oxygen replenishment valve and a system pressure gage. The gage is marked from 0 to 2000 psi, with a red zone from 1850 to 2000 psi. A charge pressure/temperature chart is installed on the inside of the service panel.

The larger capacity oxygen system replenishment is carried out at a hinged service door (31AB) on the bottom of the fuselage, rear of the wing trailing edge. An oxygen service panel is installed inside of the rear fuselage on the forward frame. The service panel is fitted with an oxygen replenishment valve and a system pressure gage. The gage is marked from 0 to 2000 psi, with a red zone from 1850 to 2000 psi. A charge pressure/temperature chart is also installed on the service panel.

8-6-9.1 Replenishment Procedure

WARNING

MAKE SURE THAT THE AIRPLANE IS FITTED WITH A GROUNDING CABLE AND IS PROPERLY GROUNDED. THE OXYGEN CART MUST BE ELECTRICALLY BONDED TO THE AIRPLANE.

DO NOT OPERATE THE AIRPLANE ELECTRICAL SWITCHES OR CONNECT/ DISCONNECT GROUND POWER DURING OXYGEN SYSTEM REPLENISHMENT.

DO NOT OPERATE THE OXYGEN SYSTEM DURING REFUELING/DEFUELING OR ANY OTHER SERVICING PROCEDURE THAT COULD CAUSE IGNITION.

INTRODUCTION OF PETROLEUM BASED SUBSTANCES SUCH AS GREASE OR OIL TO OXYGEN CREATES A SERIOUS FIRE HAZARD. USE NO OIL OR GREASE WITH THE OXYGEN REPLENISHMENT EQUIPMENT.

ALWAYS OPEN SHUTOFF VALVE SLOWLY TO AVOID GENERATING HEAT AND REPLENISH THE SYSTEM SLOWLY (MINIMUM TIME 6 MINUTES).

CAUTION

Replenishment of the oxygen system should only be carried out by qualified personnel.

Obtain the Outside Air Temperature. (OAT). A fully charged cylinder has a pressure of 1841 psi at a temperature of 20 °C. Filling pressures will vary depending upon the ambient temperature in the service bay and the temperature rise due to the compression of the oxygen. If the airplane is or has been parked outside in the sun, the temperature inside the fuselage will be appreciably higher than ambient. Table 8-6-1 lists the required charging pressures for a range of temperatures.

1 Open

- The oxygen service panel 11BR on aircraft with the standard oxygen system
- The service door 31AB on aircraft with the larger capacity oxygen system.

2 Hold the thermometer close to the oxygen cylinder.

3 Make sure the thermometer indication is constant. Make a note of the indication.

4 Refer to the temperature/pressure graph for the correct oxygen cylinder pressure.

5 If the pressure on the service panel gage is low, fill the oxygen cylinder.

6 Make sure the area around the service panel charging valve is clean. Remove the cap from the charging valve.

7 Make sure the oxygen supply hose is clean and connect it to the charging valve.

8 Slowly pressurize the oxygen cylinder to the correct pressure.

9 Close the oxygen supply and let the cylinder temperature become stable.

10 Monitor the oxygen pressure on the gage and fill to the correct pressure if necessary.

11 Release the pressure in the oxygen supply hose and disconnect from the charging valve.

12 Install the cap on the charging valve. Make sure the work area is clear of tools and other items.

13 Close the service panel 11BR or the service door 31AB.

Table 8-6-1: Oxygen Charging Pressures

Temp (°C)	Press (psig)
85	2419
80	2375
75	2331
70	2287
65	2242
60	2198
55	2153
50	2108
45	2063
40	2018
35	1974
30	1930
25	1885
21	1850
20	1841
15	1798
10	1755
5	1712
0	1669
-5	1628
-10	1586
-15	1545
-20	1505
-25	1466
-30	1426
-35	1388
-40	1351
-45	1313
-50	1275
-55	1239

8-7 Cleaning and Care

8-7-1 Windshield / Side Windows

CAUTION

Remove wrist-watches, rings and other jewelry from hands and wrists before cleaning the side windows.

Windshields and windows are easily damaged by improper handling and cleaning techniques.

Do not use solvents, fuels, detergents, alcohol, acetone or thinners to clean the side windows.

Transparent plastics lack the surface hardness of glass. Exercise caution when cleaning all the side windows to avoid scratching or scoring transparencies.

The following procedures provide information regarding cleaning and servicing of windshields and windows. Improper cleaning, or use of unapproved cleaning agents, can cause damage to these surfaces. As a preventive measure, do not park the airplane where it might be subjected to direct contact with or vapor from: methanol, denatured alcohol, gasoline, benzene, xylene, MEK, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays, paint strippers or other types of solvents. Do not park airplane near a paint-spray shop.

8-7-1.1 Windshield (Glass)

1 Place the airplane inside a hanger or in a shaded area and allow to cool from the heat of the sun's rays.

2 Using clean (preferably running) water, flood the surface. Use bare clean hands, with no jewelry, to feel and dislodge any dirt or abrasive materials.

3 Using a mild soap or detergent (such as dish washing liquid) in water, wash the surface. Again, use only the bare hand to provide rubbing force. (A clean lintfree cloth may be used to transfer the soap solution to the surface, but extreme care must be excised to prevent scratching the surface.)

4 Rinse the surface thoroughly with clean fresh water and dry with a clean cloth or damp chamois leather.

8-7-1.2 Side Windows (Acrylic)

1 Flush with clean water to remove loose dust etc.

2 Wash the side windows using a soft sponge, warm water and soft soap solution.

3 Rinse with clean water and dry with a damp chamois leather.

4 Use an appropriate transparency cleaner to remove any grease, smears, etc., still adhering to the side windows.

Note
Rubbing transparencies with a dry cloth will cause scratches and the build-up of an electrostatic charge which attracts dust. Where an electrostatic charge is present, gently pat the area with a damp chamois leather to remove the charge and any accumulated dust.

8-7-2 Exterior Paint Surfaces

The airplane should be washed with a mild soap and water solution. Harsh abrasives or alkaline soaps or detergents could make scratches on painted or plastic surfaces or cause corrosion of metal. Cover areas where cleaning solutions could cause damage.

Exterior Recommended Cleaning Agents:

- Mild soap or approved detergent

  (AERO-KLENE No. 1002, Ardrox 6484A, or Ardrox 6025A)
- Jet MULSO 2 (TURCO product) or equivalent.

The wash procedure must be done on an “on-condition” basis and depends on the local climatic conditions as given in Table 8-7-1. Local conditions will not be the same for all operators and must be considered when establishing a wash program.

Table 8-7-1: Climatic conditions

CLIMATIC CONDITIONS	WASH
Mild	Each 3 months
Moderate	Each month
Severe	Each week

To wash the airplane, use the following procedure:

Preparation:

1 Set the flaps to the landing position (40 degrees).

2 Close the passenger door, the cargo door and the DV window.

3 Make sure all access panels are closed.

4 Install these covers:

- The engine exhaust-stub covers
- The ICS NACA intake cover
- The AOA transmitter covers
- The pitot head covers
- The static port covers.

5 Make sure that all the other covers are removed from the aircraft.

6 The aircraft can be divided into five sections that can be cleaned at different times to prevent the cleaning agent from drying out on the aircraft surface:

- Section 1 - The front fuselage
- Section 2 - The wings and center fuselage
- Section 3 - The rear fuselage
- Section 4 - The tail and control surfaces
- Section 5 - The landing gear.

7 To maintain a clear appearance, regularly wash the aircraft thoroughly. Give special attention to the exhaust fume exposed areas.

CAUTION

Make sure that the water and soap solution does not go into the:

- **Static ports**
- **Fuel system inward vent valve outlets in the wing rear spar.**

CAUTION

Do not allow the heavy duty cleaner to come into contact with acrylic glasses i.e. the cockpit or cabin windows, as contact may cause a stress crazing effect of the acrylic glass.

Do not apply too much pressure when you clean the heavy dirt or stains, as this may damage the top coat.

Do net let any cleaning agent stay in contact with the aircraft tires for any length of time, as damage to the tires may occur.

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Procedure:

1 Prepare the soap solution.

2 Flush the aircraft skin and landing gear with clean water.

3 Apply the soap solution (for up to three minutes) to a small area (43 to 54 ft2) of the aircraft skin and then clean it with a soft bristle brush.

4 Flush the soap solution from the aircraft skin with clear water.

5 Do step 3 and 4 again (up to a maximum of 3 times) until all the aircraft skin and landing gear is clean.

6 To remove heavy exhaust gas or heavy dirt stains, apply undiluted heavy duty cleaner to the affected area (for up to three minutes) and then clean with a soft bristle brush.

7 Flush the cleaner from the aircraft skin with clean water.

8 Do step 6 and 7 again (up to a maximum of 3 times) to remove heavy dirt or stains.

9 Flush the aircraft tires with clean water and then, if necessary, move the aircraft to a dry area.

8-7-3 De-icing Boot Care

The wings, T-tail, and propeller de-icing boots have a special electrical-conductive coating to bleed off static charges which cause radio interference and may perforate the boots. Fuelling and other servicing practices should be done carefully to avoid damaging the conductive coating or tearing of the boots.

To prolong the life of the deicing boots, they should be washed, with a mild soap and water solution, rinsed with clean water regularly. Keep the boots clean and free from oil, grease and other solvents, which cause neoprene to swell and deteriorate.

The PC-12 scheduled maintenance requires every 6 months treatment of the deice boots with Age Master No 1. If a flight to a Service Center imposes an operational burden, the deice boot treatment with Age Master No 1 may be carried out by the operator as per the procedure given below every 6 months.

The treatment of the deice boots with Age Master No 1 must be recorded in the aircraft flight log book or any other maintenance recording system.

Application of Age Master No 1:

WARNING

AGE MASTER NO 1 CONTAINS PETROLEUM DISTILLATES WHICH ARE POISONOUS IF SWALLOWED AND CAN CAUSE DEATH OR INJURY TO PERSONNEL. IF SWALLOWED, DO NOT INDUCE VOMITING AND SEE A PHYSICIAN IMMEDIATELY.

PREVENT THE CONTACT WITH THE EYES AND THE SKIN AND DO NOT BREATHE THE VAPORS. IF THERE IS CONTACT WITH THE EYES, FLUSH WITH CLEAN WATER FOR 15 MINUTES AND SEE A PHYSICIAN IMMEDIATELY. IF THERE IS CONTACT WITH THE SKIN, WASH THOROUGHLY WITH SOAP AND CLEAN WATER.

KEEP AWAY FROM OPEN FLAMES AND SPARKS. THE VAPORS OF THE FLUID MAY IGNITE AND AN EXPLOSION CAN OCCUR.

DO NOT APPLY BY SPRAYING. ONLY APPLY WITH ADEQUATE VENTILATION AND AVOID PROLONGED BREATHING OF VAPORS. IF DIZZINESS OR NAUSEA OCCURS, OBTAIN FRESH AIR.

EMPTY CONTAINERS MAY CONTAIN FLAMMABLE OR EXPLOSIVE RESIDUAL VAPORS. SEE THE MATERIAL SAFETY DATA SHEET FOR ADDITIONAL SAFETY INFORMATION.

CAUTION

Age Master no 1 stains skin, clothing and other surfaces. Wear plastic or rubber gloves and protect surrounding areas when using it. Use waterless hand cleaner to remove staining. It is not suitable for the use on Estane De-Icers as it will not be absorbed by the De-Icer, causing run back and staining on the aircraft surface.

1 Wash the deice boots with clean water and a mild soap. Rinse with clean water.

2 Dry the deice boots thoroughly.

3 If there are stains that were not removed with step 1: Use isopropyl alcohol to remove substances.

4 Apply one even coat of Age Master No. 1 on the deice boot surface with a lint free cloth. Coat the deice boot surface completely and evenly for the best results and appearance. Let the coat dry for 5-10 minutes. Dry time may vary due to temperature and humidity conditions.

5 Repeat Step 4 two more times so that three even coats have been applied with 5-10 minutes dry time between each coat.

6 Let the deice boot dry for 24 hours before flying or before applying Aerospace Protectant ICEXII or ShineMaster products.

During icing season, apply ICEXII every 50 flying hours as described below.

Application of ICEXII:

Note

If Age Master No 1 is combined with ICEXII, then apply Age Master No 1 first.

1 Wash the deice boots with clean water and a mild soap. Rinse with clean water.

2 Dry the deice boots thoroughly.

3 If there are stains that were not removed with step 1: Use isopropyl alcohol to remove substances.

4 Repeat steps 1 and 2.

5 Apply ICEXII with a clean cloth or pad. Apply lightly and wipe in a single continuous back and forth motion span wise on the deice boot.

8-7-4 Brake Care

8-7-4.1 General

If the brakes are used exclusively for low speeds (below 25 knots), it is recommended to condition (glaze) the brake linings by performing a firm brake after landing (at about 80 knots) every 30 landings to ensure optimum service life is achieved.

8-7-4.2 Brake Lining Procedure (new brakes)

When new brakes are fitted during maintenance, it is recommended to condition them in order to achieve long brake life.

Do the brake lining procedure as follows:

1 Perform two consecutive full stop braking applications:

  1.1 Accelerate the aircraft to a maximum groundspeed of 30 to 35 kts.

  1.2 Brake the aircraft to a stop within 12 seconds.

  1.3 Do not allow the brakes to cool substantially between the 2 stops.

2 Allow the brakes to cool for fifteen minutes.

3 Apply the brakes.

4 Set the PCL to T/O power.

5 If the brakes do not hold the aircraft at take-off power:

  5.1 Allow the brakes to cool to ambient temperature.

  5.2 Repeat step 1 thru step 4 until the brakes hold.

8-7-5 Propeller Care

Propeller care consists of checking the propeller area for leaks and damage; this also includes any damage to the propeller hub and de-icing boots. Inspect the visible hub parts daily for surface damage. Look for evidence of grease and or oil leaks. Inspect the propeller blades, daily, for scratches and gouges in the leading or trailing edge, or on the blade face and camber surfaces.

WARNING

ABNORMAL GREASE LEAKAGE CAN BE AN INDICATION OF A FAILING PROPELLER BLADE OR BLADE RETENTION COMPONENT, WHICH MAY EVENTUALLY RESULT IN AN IN-FLIGHT BLADE SEPARATION.

Check blades for radial play or movement of blade tip (in and out, back and forth). Refer to loose blades in the Inspection Procedures section of the Propeller Owner's Manual.

Inspect de-ice boots for damage. Refer to the de-ice systems chapter of the Propeller Owner's Manual for the inspection information.

Visually inspect the entire blade and the erosion shield (lead, trail, face and camber sides) for nicks, gouges, looseness of material, erosion, cracks and debonds. Visually inspect the blades for lightning strike. Defects or damage discovered during preflight inspection must be evaluated in accordance with the allowable damage given in the Propeller Owner's Manual to determine if repairs are required before further flight.

8-7-6 Landing Gear Care

Before cleaning the landing gear, place a plastic cover or similar material over the wheel and brake assembly.

1 Place a catch-pan under the gear to catch the waste.

2 Spray or brush the gear area with solvent or a mixture of solvent and degreaser, as desired. Where heavy grease and dirt deposits have collected, it may be necessary to brush the areas sprayed, in order to clean them.

3 Allow the solvent to remain on the gear from five to ten minutes. Then rinse the gear with additional solvent and allow to dry. If necessary help the drying process with a gentle blast of compressed air.

4 Remove the plastic cover and the catch-pan from the wheel.

8-7-7 Engine Care

The engine exterior and compartment may be cleaned, using a suitable solvent. Most efficient cleaning is done using a spray-type cleaner. Before spray cleaning, make sure the protection is afforded for components which might be adversely affected by the solvent.

8-7-8 Interior Care

The cockpit area should be frequently vacuum-cleaned. Instrument and side panels may be cleaned with a chamois leather made moist with clean water.

CAUTION

Do not clean fabric surfaces with a soap solution or water. This can inhibit the properties of the fireblock treatment applied to the fabric.

Seat harnesses that have been soiled may be cleaned by gently scrubbing with a soft brush, water and an approved soap. Alternatively, an officially approved detergent emulsion may be used when diluted in the proper proportions. Seats may be cleaned as per manufacturers-recommended instructions.

Dust and loose dirt should be picked up regularly with a vacuum-cleaner. Stained carpets should be cleaned with a non-flammable dry cleaning carpet shampoo which should be kept as dry as possible and again vacuumed.

Blot up any spilled liquid on the seats promptly with cleansing tissue or rags. Do not pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off any sticky materials with a dull knife, then spot-clean the area, following the manufacturer's instructions.

Headliners, side panels and paint work should be cleaned with a lint-free cloth dampened with a mild soap and water mixture. Oil and grease can be removed with a sponge and common household detergent and then wiped dry with a clean rag.

Oxygen masks assemblies should be cleaned with a suitable oil-free disinfectant and then wipe dirt or foreign particles from the unit with a clean dry lint-free cloth.

Care kits are available for the care of leather upholstery and high gloss cabin furniture, refer to the Illustrated Parts Catalog for the kit Part No's.

8-7-9 Primus Apex Display Care

CAUTION

Remove wrist-watches, rings and other jewelry from hands and wrists before cleaning the Primus Apex display screens.

Do not use a cleaner that has acetone, thinner, benzene, ethyl alcohol, toluene, ethyl acid, ammonia, methyl chloride or alkaline based solvents. These chemicals can damage the display screen anti-glare coating.

Do not attach self-adhesive labels or notes on the display screen surfaces. This can damage the anti-glare coating.

The Primus Apex display screens (Primary Flight Display, Multi Function Display and Touch Screen Controller) must only be cleaned with the manufacturer's recommended cleaning material (Isopropyl alcohol) and a clean microfiber cloth. Fold a clean microfiber cloth around a small piece of rigid (credit card sized) plastic, and ensure that the cloth covers the entire plastic. Use the Isopropyl alcohol to moisten the cloth, then wipe the screen carefully to remove dust and marks.

Clean the display bezel with a damp cloth and a minimum quantity of soap solution.

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8-8 Extended Storage

Prolonged out-of-service care applies to all airplanes which will not be flown for less than 60 days but which are to be kept ready-to-fly, with the least possible preparation. If the airplane is to be stored temporarily, or indefinitely, reference must be made to the AMM for the proper storage procedures, which are all time related and classified as follows:

Part 1	Up to 7 days.
Part 2	More than 7 days and up to 28 days.
Part 3	More than 28 days and up to 90 days.
Part 4	More than 90 days.

Parts 1 and 2 are considered as flyable storage status.

- Part 1 storage

  Part 1 storage requires that the airplane is moored and properly grounded, all covers and blanks are fitted, and that the fuel tanks are full. The engine must be preserved. Where possible, cover the windshield with a light cotton dust cover.

- Part 2 storage

  Part 2 storage begins after Part 1 (7 days) has elapsed, and includes placing desiccant bags and humidity indicators in the engine exhaust stubs and behind the exhaust stub covers. A suitable means must be provided to view the humidity indicators with the stub covers installed.

  Open and install a safety clip on these circuit breakers: E-NAV/ELT (Essental Bus) and DCTU/CLOCK (Battery and External Power Junction Box).

  At 7 day intervals:

  Check the tire pressures.

  Drain any water from the fuel system.

  Check the humidity indicator, in the engine exhaust stubs, and replace the desiccant bags, if the humidity is in excess of 40%.

  Move the airplane to prevent flat areas on the tires. Mark the tires with tape to ensure the tires are placed approximately 90 degrees from their previous position.

- Part 3 storage

  Part 3 storage should be a planned situation, when the time difference can be foreseen but following on from the Part 2, the batteries must be removed and their state of charge regularly checked.

  At 7 day intervals:

  Check the tire pressures.

  Drain any water from the fuel system.

  Check for fuel contamination and, if necessary, apply the biocide treatment in accordance with the AMM.

  Check the humidity indicator, in the engine exhaust stubs, and replace the desiccant bags, if the humidity is in excess of 40%.

  Move the airplane to prevent flat areas on the tires. Mark the tires with tape to ensure the tires are placed approximately 90 degrees from their previous position.

- Stage 4 storage

  Stage 4 is a definite planned exercise, when deterioration of the airplane must be considered. An engine inactive for over 90 days in the airframe, or removed for long term storage, must in addition to the Stage 3 procedure, have the engine oil drained and filled with preserving oil in accordance with the P&WC EMM.

  Check for fuel contamination and apply the biocide treatment in accordance with the AMM.

To return the airplane to service, refer to the AMM for specific instructions.

8-9 Corrosion Inspection

8-9-1 General

If a flight to a Service Center imposes an operational burden, the following monthly (severe climatic areas) and every 6 months (moderate climatic area) corrosion inspection may be carried out by the operator. Pilots must be trained by qualified maintenance personnel to identify corrosion and to understand the critical inspection areas. The training must be given to the corrosion inspection procedures as detailed in the AMM.

The inspection must be recorded in the aircraft flight log book.

If corrosion is evident or suspected, you must contact a Pilatus service center for further instructions.

8-9-2 Severe Climatic Areas

Aircraft based/operated in severe or moderate climatic areas, (refer to Section 8, Geographical Location and Environment), must be inspected every month or every 6 months (respectively) as follows:

- Wash the exterior surface of the aircraft
- Examine the aircraft skin, especially around the seams and fasteners
- Make sure all drain holes are clear
- Examine the landing gear compartments, especially the landing gear, wheels, tubing clamps, folding strut, overcenter spring and actuators
- Examine the flight control surfaces, especially the bearings
- Examine all doors, especially the locks, handles and hinges.

Based on inspection results, the inspection interval can be increased to every 6 months. At this interval it is recommended that the aircraft is washed on a weekly basis.

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8-10 Geographical Location and Environment

The geographical location and environmental conditions can cause damage to the aircraft exposed to the conditions that follow:

- Marine atmospheres
- Moisture
- Acid rain
- Tropical temperatures
- Industrial chemicals
- Soil and dust in the atmosphere.

Moisture is in the air as a gas, water vapor or as finely divided droplets of liquid. These forms of moisture contain chemicals such as chlorides, sulfates and nitrates. When the moisture evaporates the chemicals remain on the surfaces. The moisture and the chemicals can be trapped in joints. A capillary action can put moisture in to bond lines and cause corrosion.

Salt particles, when dissolved in water, form strong electrolytes. Sea winds carry the dissolved salt, on to the land and can make the coastal environments very corrosive.

The industrial chemicals that follow can cause corrosion:

- Carbon
- Nitrates
- Ozone
- Sulfur dioxide
- Sulfates.

These industrial chemicals cause damage to non-metallic materials and can cause severe corrosion of many metals.

Warm, moist air, usually in tropical climates can make the formation of corrosion a very quick process. Cold dry air, usually in cold climates makes the formation of corrosion a slower process.

Islands and areas near the sea are in severe corrosion zones.

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SECTION 9

Supplements

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9-1 General

This section provides information in the form of supplements for the operation of the airplane when equipped with optional equipment or systems which are not installed on the standard airplane. All of the supplements are EASA Approved and those that are applicable are part of this Handbook.
The information contained in each supplement applies only when the specific equipment or system is installed in the airplane.

Mark X if installed	Subject	Report No.
	IAC AR Certified Airplanes	02407
	Operations in Cold Conditions	02408
	Aircraft Registered in Canada	02409
	Aircraft Registered in the Republic of Argentina	02410
	Aircraft Registered in the People's Republic of China (PRC)	02411
	Steep Approach Landings	02412
	Aircraft Registered in Ukraine	02413
	Aircraft Registered in Chile	02414
	Passenger Oxygen Drop-Down Mask System	02415
	Propeller Low Speed Operation	02439
	FATA Certified PC-12/47E Airplanes	02464
	German Placards	02474
	Aircraft Registered in Brazil	02486
	Aircraft Registered in Japan	02505

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SECTION 10

Safety and Operational Tips

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Subject		**Page**

10-1 General

This section provides information for the operation of the airplane.

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10-2 Safety Tips

Pilots who fly above 10,000 feet should be aware of the need for physiological training. It is recommended that this training be taken before flying above 10,000 feet and receive refresher training every two or three years.

Information on the location of flammable materials, pressure vessels and equipment locations for crash-fire-rescue purposes is given in Section 10, Flammable Materials, Pressure Vessels and Equipment Locations.

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10-3 Operational Tips

10-3-1 Anti-Collision Lights

Anti-collision strobe lights should not be operating when flying through cloud, fog, or haze. Reflected light can produce spatial disorientation.

10-3-2 Crosswind Operation

10-3-2.1 Takeoff

It is possible, if required, to hold the aircraft stationary with the brakes while the engine is at max takeoff power. When the brakes are released, rapid and aggressive use of the rudder and possibly some small application of brake is necessary to establish and maintain the centerline but, once rolling, directional control is easy with rudder only. Holding the elevator neutral will keep the nosewheel on the ground and assist in maintaining directional control.

In strong crosswinds the aircraft establishes a drift angle of up to 10° while accelerating to rotation speed.

In gusty conditions it is recommended to rotate at V_R +10 Kts. On rotation the aircraft yaws considerably further into wind and automatically establishes the heading necessary to track the runway centerline.

10-3-2.2 Landing

It is recommended to use the wing down technique. At approximately 100 to 200 ft on approach to the runway, apply rudder to align the longitudinal axis of the aircraft to the runway and put on bank in the opposite direction to maintain the runway centerline. The aircraft is then flown in a sideslip to touch down initially on one wheel. As soon as one wheel touches, lower the other two to the runway and immediately select the Power Control Lever (PCL) to beta or reverse. Once the aircraft is established on the runway it can be stopped as normal with brakes or reverse power without difficulty. Do not attempt heavy braking in a strong crosswind as the into wind wheel will tend to lock more easily.

In conditions of strong turbulence it is recommended, if runway length permits, to fly the approach with reduced flap deflection to increase Indicated Air Speed (IAS) and aileron efficiency. It is also recommended to increase the approach speed for the chosen flap setting by 50% of the difference between the wind mean speed and max gust speed, to give a greater speed margin over the stall.

10-3-3 Behavior After High Mass/High Speed Braking

In the case of heavy braking, soft brake pedals and/or fusible plug release may occur during following taxi. Limitation in Section 2, Systems and Equipment Limits, applies.

If any signs of soft brake pedals are observed it is highly recommended to stop immediately, shut down the engine and ask for ground assistance. If a decision is taken to continue taxiing, use caution and taxi slowly. Use Beta and/or reverse thrust to control taxi speed only. Pedal fall through (brake failure) and/or fusible plug release can occur anytime when soft pedals are observed.

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10-4 Flammable Materials, Pressure Vessels and Equipment Locations

Refer to Fig. 10-4-1, Flammable Materials, Pressure Vessels and Equipment Locations.

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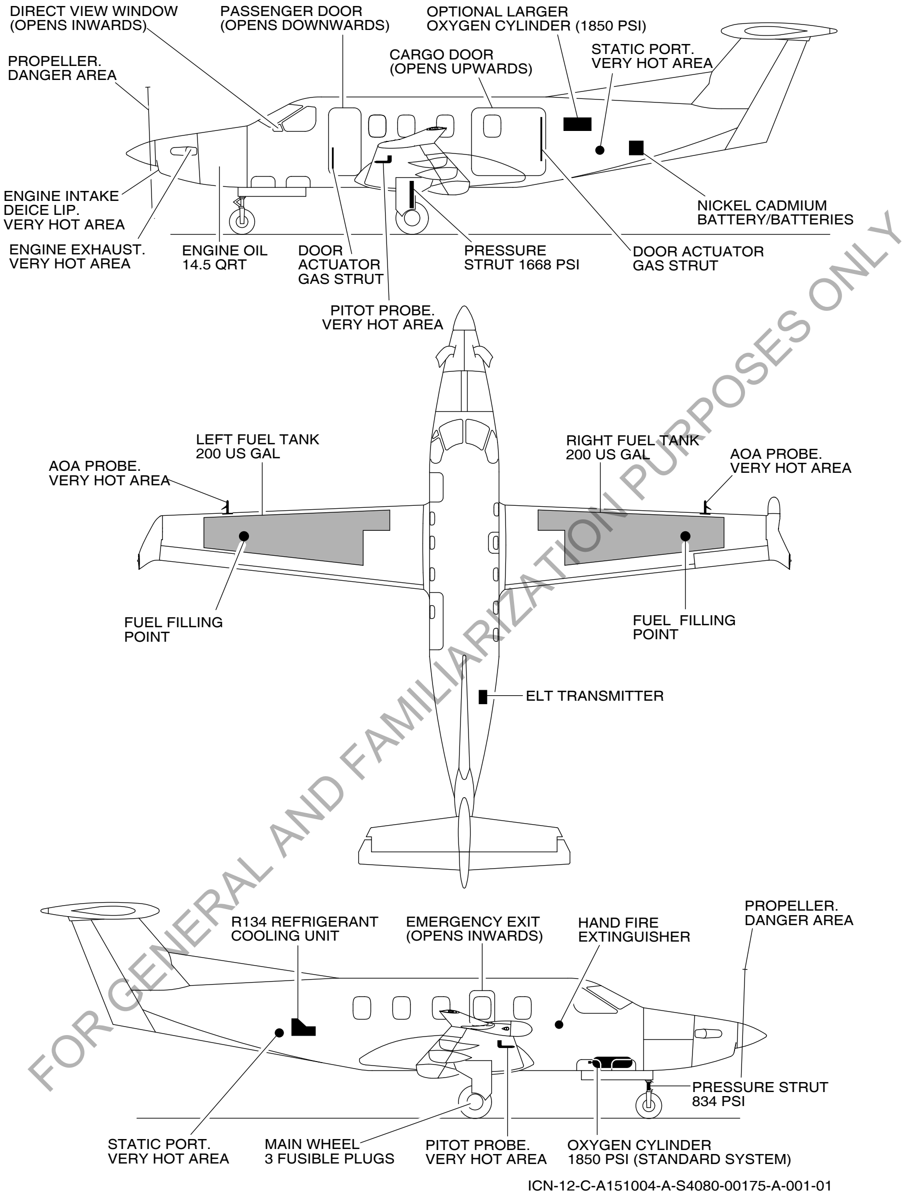

Figure 10-4-1: Flammable Materials, Pressure Vessels and Equipment Locations

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10-5 Removal of Snow, Ice and Frost from the Aircraft

10-5-1 General

Flight crews are responsible for ensuring the aircraft is free of ice, snow or any contaminants. Ground icing may occur whenever there is high humidity with temperatures of +10 °C (+50 °F) or colder.

Approved de-icing/anti-icing fluids must be used during the de-icing/anti-icing procedure.

The aircraft must be clear of all deposits of snow, ice and frost adhering to the lifting and control surfaces immediately prior to takeoff. The clean aircraft concept is essential for safe flight operations. The pilot in command of the aircraft has the ultimate responsibility to determine if the aircraft is clean and in a condition for safe flight.

Manual methods of de-icing provide a capability in clear weather to clean the aircraft to allow a safe takeoff and flight. De-icing/anti-icing fluids can be used to quickly remove frost and to assist in melting and removal of snow. In inclement cold weather conditions, the only alternative may be limited to placing the aircraft in a hangar to perform the cleaning process. Manual methods are described in more detail in the De-icing Only Procedure.

It is recommended that flight crews familiarize themselves seasonally with the following publications for expanded de-ice and anti-ice procedures:

- FAA Advisory Circular AC135-17 (small aircraft)
- AEA Recommendations for De-icing/Anti-icing Aeroplanes on the Ground
- FAA and Transport Canada Holdover Timetables.

Pilatus recommends that ground de-icing/anti-icing is done with the engine shutdown to minimize fluid ingestion into the engine and bleed air ducting.

The ACS BLEED AIR switch must remain set to INHIBIT for approximately five minutes after the de-icing/anti-icing procedure has been completed.

The de-icing/anti-icing crew must be instructed not to direct fluid at the propeller or engine.

De-icing with the engine running may result in a strong and unpleasant smell inside the aircraft, as the engine bleed system carries the odors to the passengers and crew.

Propwash from operating the propeller can cause rapid flow-off of de-icing/anti-icing fluid from the wing and other surfaces within the slip stream.

During the de-icing/anti-icing procedure, the ground crew may have to request the pilot to power down the engine in order to reduce propwash, or to stop the aircraft from sliding forward on a slippery surface.

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10-5-2 De-icing/Anti-icing Fluids

Various de-icing fluids are commercially available.

Clariant fluids were rigorously tested on PC-12 aircraft with no detrimental effect identified. Clariant fluids are therefore recommended by Pilatus for use on PC-12 aircraft.

Note
For de-icing the temperature of all heated fluids should be at least 60 °C (140 °F) at the nozzle. The aircraft skin maximum temperature limit is 70 °C (158 °F). As part of a two-step procedure, cold Type IV fluids shall only be used within 3 minutes after the surface has been de-iced with heated water or heated Type I fluid as cold Type IV fluids significantly reduce the aircraft lift and increase control forces.

The following de-icing/anti-icing fluids are recommended for use on the PC-12 (refer to Table 10-5-1):

Table 10-5-1: Recommended de-icing/anti-icing fluids for use on the PC-12

International Standard	International Standard	Primary Use	Description
SAE Type I	AMS 1424	De-Icing	Type I fluids are water/glycol mixtures with a glycol content of at least 80%, which contain a corrosion inhibitor package. These fluids have been used for many years to remove ice, snow and frost (de-icing). They offer only limited protection against further icing due to freezing precipitation.
ISO Type I	ISO 11075		
SAE Type II	AMS 1428	Anti- Icing	Type II fluids contain at least 50% of glycol and a corrosion inhibition package. Furthermore, they contain a pseudoplastic thickener system which additionally protects against re-freezing (anti-icing) due to its filmforming properties.
SAE Type III	AMS 1428	Anti- Icing	Type III fluids are used for de-icing/anti-icing and offer longer “holdover” performance than Type I fluids.
SAE Type IV	AMS 1428	Anti- Icing	Type IV fluids contain at least 50% of glycol and a corrosion inhibition package. Furthermore, they contain a pseudoplastic thickener system which additionally protects against re-freezing (anti-icing) due to its filmforming properties.

10-5-3 Health Effects

Pilots must be aware of the potential health problems of de-icing/anti-icing fluids to ensure the correct precautions are taken when a de-icing/anti-icing procedure is done, and to better ensure the wellbeing of the passengers and crew.

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10-5-4 Pre-flight Checks for Ice, Slush, Snow or Frost that Adheres to the Aircraft

To establish the need for aircraft de-icing, a pre-flight check is required to identify any contamination that adheres to the aircraft surface and to direct any required deicing/ anti-icing operations.

Note
This check should normally be done by the flight crew when they do a walk around pre-flight check.

Ice can build up on aircraft surfaces during flight through dense clouds or precipitation. When ground Outside Air Temperature (OAT) at the destination is low, it is possible for flaps and other moveable surfaces to be treated but accumulations of ice may remain undetected between stationary and moveable surfaces. It is important that these areas are checked before departure and any frozen deposits removed.

10-5-5 Selecting the De-icing Only or De-icing/Anti-icing Method

Ice, slush and snow must be removed from all aircraft surfaces before dispatch or before anti-icing.

Any contamination found on components of the aircraft that are critical to safe flight must be removed by de-icing.

When freezing precipitation exists, and the precipitation is adhering to the surfaces at the time of dispatch, the aircraft surfaces must be de-iced/anti-iced.

If both de-icing and anti-icing are required, the procedure may be performed in one or two steps.

The selection of one or two-step processes depends on the weather conditions, available equipment, available fluids and the holdover time to be achieved.

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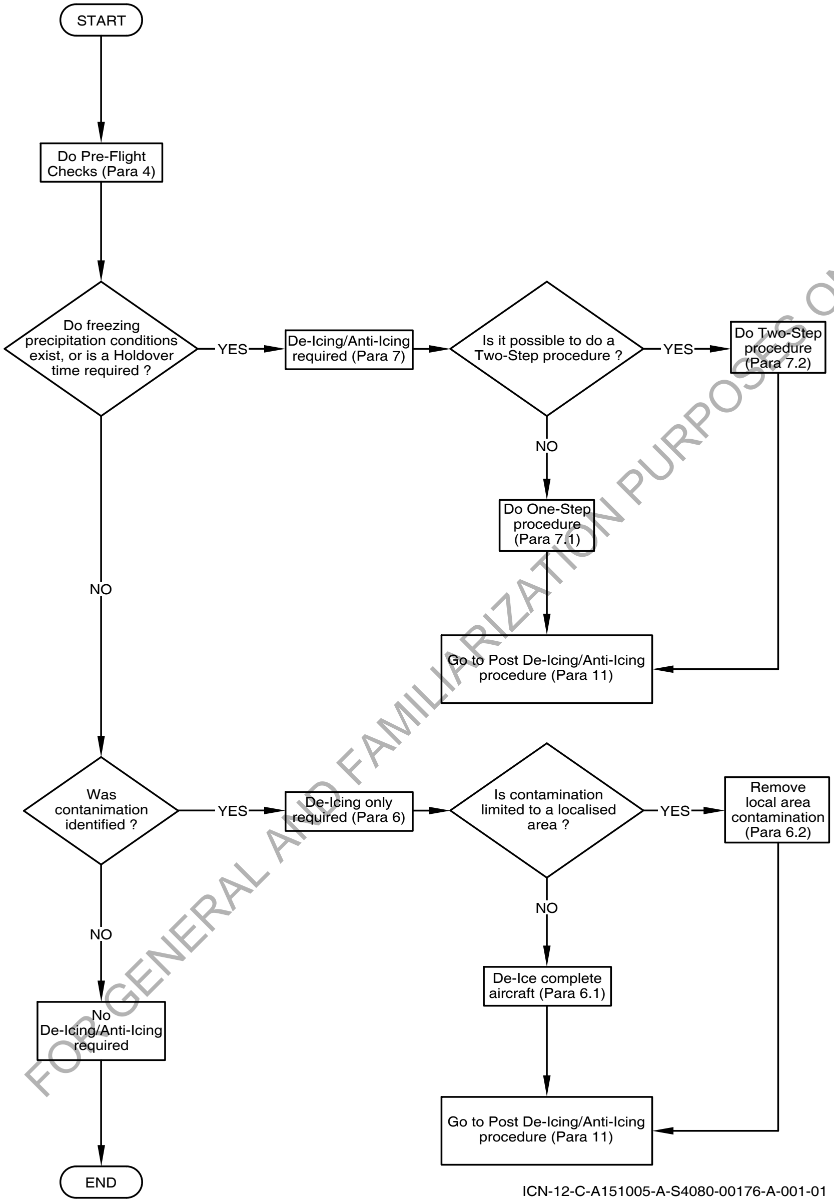

Figure 10-5-1: Selection of de-icing only or de-icing/anti-icing method flowchart

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10-5-6 De-icing Only Procedure

To reduce the quantity of de-icing fluid required, a manual method can be used as a pre-step process, before the de-icing process, in order to remove large amounts of frozen contamination, for example, snow, slush or ice.

Ice, slush, snow or frost may be removed from aircraft surfaces by manual methods or fluids.

Manual methods of de-icing such as brooms, brushes, ropes, squeegees etc. can be used to remove dry snow accumulations and to remove the bulk of wet snow deposits. These manual methods require that caution be exercised to prevent damage to the aircraft skin or components.

10-5-6.1 De-icing of the Complete Aircraft

Ground support equipment is required and must have the capability to heat the water and/or de-icing fluids to 60 ºC (140 ºF) or more at the nozzle. However, the temperature of the de-icing/anti-icing fluids in contact with the aircraft surfaces must be limited to less than 70 ºC (158 ºF).

10-5-6.2 Removal of Local Area Ice Contamination

CAUTION

The aircraft must be treated symmetrically, that is, left hand and right hand sides shall receive the same and complete treatment. Aerodynamic problems could result if this requirement is not met.

When the presence of frost and/or ice is limited to localized areas on the surfaces of the aircraft and no precipitation is falling or expected, it is not necessary to apply de-icing/anti-icing fluids to the complete aircraft.

If no holdover time or only de-icing is required, only the contaminated areas will require treatment, then a “local area” de-icing may be done. The affected area(s) must be sprayed with de-icing fluid.

10-5-7 De-icing/Anti-icing

CAUTION

The application of type II, III or IV fluids, may cause residues to collect in aerodynamically quiet areas, cavities and gaps.

Dried residues may rehydrate and freeze following a period of high humidity and/or rain.

This may impede flight controls. These residues must be removed by hot water washing before the next flight.

Whenever possible, use heated water and/or type I fluid to de-ice the aircraft.

10-5-7.1 One Step De-icing/Anti-icing

Heated SAE Type I, II or III Fluid may be used to remove ice, slush and snow from the aircraft prior to departure, and to provide minimal anti-icing protection as given in the applicable Fluid holdover timetable.

10-5-7.2 Two Step De-icing/Anti-icing

CAUTION

Where re-freezing occurs following the initial treatment, both first and second steps must be repeated.

Steps:

1. De-icing with heated water and/or heated SAE Type I de-icing fluids.
2. Anti-icing: A separate over-spray of cold SAE Type II, III or IV anti-icing fluids may be applied within three minutes (if necessary, area by area) to completely cover the first step fluid in a sufficient amount of second step fluid. The fluid used and it’s concentration must be chosen with respect to the desired holdover time, which is dictated by the OAT wing temperature and the weather conditions.

10-5-8 Application of De-icing/Anti-icing Fluid

10-5-8.1 General

Flight crew should supervise the de-icing and anti-icing of the aircraft to ensure proper application of the fluid.

When ice, snow or slush is removed from aircraft surfaces, care must be taken to prevent entry and accumulation of the ice, snow or slush in intakes or control surface hinge areas.

All doors and windows shall be closed.

De-icing and anti-icing fluids must not be directed towards the static ports, pitot heads, Angle-of-Attack (AOA) transmitters, cockpit windows, air intakes, brakes, wheels, engine inlet or exhaust ports.

Note

De-icing or anti-icing fluid that may splash onto heated surfaces (exhaust ducts, AOA transmitters, etc.) will produce significant smoke/vapor.

Fluid must always be sprayed from the front of the aircraft. Fluid sprayed from the rear can force fluid into aerodynamically quiet areas where it may not be able to drain. Refer to Fig. 10-5-2, Essential Aircraft de-icing areas

Any forward area from which fluid may blow back onto the windscreen during taxi or subsequent takeoff shall be free of fluid residues prior to departure.

Note

- If fluid is sprayed or runs onto the windscreen during application, it must be removed prior to taxi and takeoff
- De-icing and anti-icing fluid can be removed by rinsing with approved cleaner and a soft cloth
- The first area to be de-iced/anti-iced should be easily visible from the cockpit and must be used to provide a conservative estimate for unseen areas of the aircraft before a takeoff roll is initiated
- Anti-icing of the lower side of the wings and/or horizontal stabilizer and elevator is not normally expected. However, if these surfaces must be de-iced, the freezing point of the de-icing fluid must be low enough to prevent refreezing.

10-5-8.2 De-icing/Anti-icing the Wings, Tail and Fuselage

The wings are the main lifting surfaces of the aircraft and must be free of snow and ice to operate efficiently. De-icing/anti-icing of the wings should begin at the leading edge wing tip with the flaps retracted, sweeping in the aft and inboard direction.

Tail surfaces should be de-iced/anti-iced in a similar manner to the wing. Move the horizontal stabilizer to nose down for a better visual check. The area adjacent to the elevator balance horns and the horizontal stabilizer must be thoroughly inspected.

Passenger and cargo doors must be de-iced to ensure correct operation. All door hinges, locks and seals must be inspected to make sure that they are free from contamination.

10-5-8.3 Propeller and Engine Area De-icing

WARNING

ICE DEPOSITS SHED FROM THE PROPELLER MAY CAUSE SERIOUS INJURY TO PERSONNEL

CAUTION

De-icing/anti-icing spray directed into the engine can cause a flameout or other problems, depending on the amount of de-icing/anti-icing fluid ingested.

The propeller must be thoroughly de-iced while static. DO NOT start the engine until it has been ascertained that all ice deposits have been removed from the propeller.

If the engine is required to run while de-icing/anti-icing:

- Set the ACS BLEED AIR switch to INHIBIT
- Set the INERT SEP switch to OPEN
- Apply the brakes

If needed, minimal amounts of de-icing/anti-icing fluid can be used to de-ice the engine external cowling area. The engine inlet area must be avoided. Fluid residue on the engine compressor blades can reduce engine performance or cause a stall or surge. This will also minimize the ingestion of fluid vapors into the engine air bleed system.

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Engine intake areas must be inspected for the presence of ice immediately after shutdown. Any accumulation must be removed while the engine is still warm and before the installation of the intake covers.

10-5-8.4 Landing Gear and Wheel Bays De-icing

The application of de-icing fluid in this area must be kept to a minimum. De-icing fluid must not be directed onto the brakes and wheels.

Landing gear and wheel bays must be kept free from a buildup of slush, ice or accumulation of blown snow. Deposits can be removed by brush etc. Where deposits have bonded to surfaces, these can be removed by spraying with deicing fluids.

10-5-8.5 Clear Ice Precautions

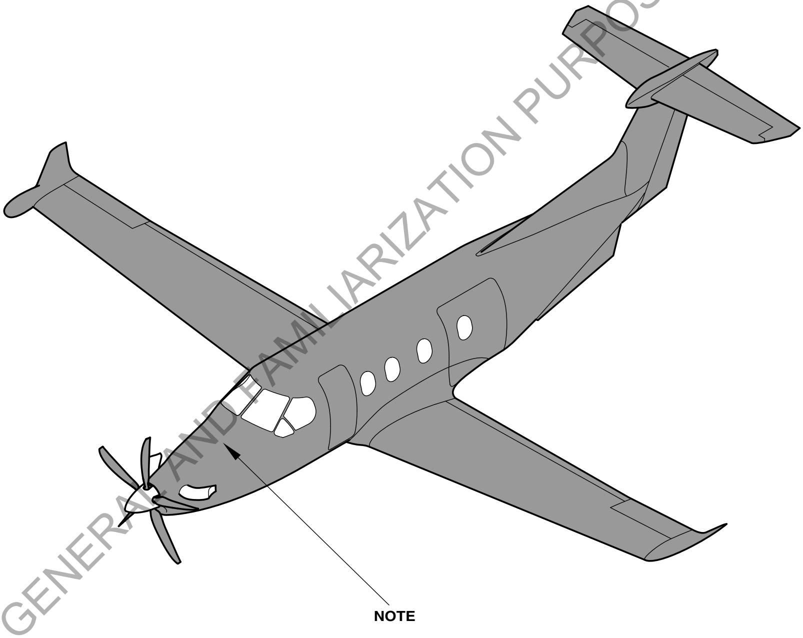
Clear ice can form on aircraft surfaces below a layer of snow or slush. It is important that surfaces are closely examined after each de-icing operation to make sure that all deposits have been removed.

SHADED AREAS INDICATES ESSENTIAL AREAS TO BE DEICED

NOTE

AVOID DIRECT SPRAYING OF DEICING FLUID ON/IN THE FOLLOWING AREAS

ENGINE INLETS	BRAKES	PITOT HEADS
ENGINE EXHAUST	WINDSHIELD	STATIC PORTS
RAM AIR INLETS	CABIN WINDOWS	AOA VANES



NOTE

Any forward area from which fluid may blow back onto the windscreen during taxi or takeoff must be free of fluid residues prior to departure.

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Figure 10-5-2: Essential Aircraft de-icing areas

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SHADED AREAS INDICATES ESSENTIAL AREAS TO BE ANTI-ICED

NOTE

AVOID DIRECT SPRAYING OF ANTI-ICING FLUID ON/IN THE FOLLOWING AREAS

ENGINE INLETS	BRAKES	PITOT HEADS
ENGINE EXHAUST	WINDSHIELD	STATIC PORTS
RAM AIR INLETS	CABIN WINDOWS	AOA VANES

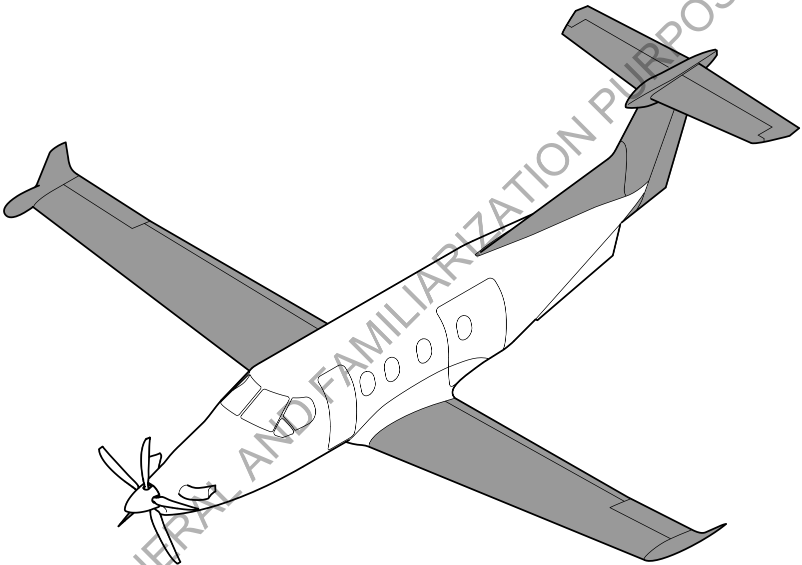

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Figure 10-5-3: Essential Aircraft anti-icing areas

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10-5-9 Spraying Technique

10-5-9.1 One Step De-icing/Anti-icing

Heated water and/or heated fluid must be sprayed on the aircraft in a manner which minimizes heat loss on the aircraft. If spraying is carried out with the engine running, the engine must be at Idle with all engine bleed air turned off.

For de-icing, the temperature of all heated fluids must be at least 60 °C (140 °F) at the nozzle. The aircraft skin maximum temperature limit is 70 °C (158 °F).

If possible, fluid should be sprayed in a solid cone pattern of large, coarse droplets.

The fluid must be sprayed as close as possible to the aircraft surface, but not closer than 3 m (10 feet) if a high pressure nozzle is used.

10-5-9.2 Two Step De-icing/Anti-icing

The application technique for SAE Type II, III and IV fluids are the same as for SAE Type I fluid, except that as the aircraft surface is already de-iced, the application lasts only long enough to coat the aircraft surfaces.

10-5-10 Holdover Timetables

Holdover Timetables are only estimates and vary depending on many factors such as temperature, precipitation type, precipitation rate, wind, and airplane skin temperature. Holdover times are based on the mixture ratio of fluid/water.

For a one step De-icing/Anti-icing procedure, the holdover time begins at the start of the treatment.

For a two step De-icing/Anti-icing procedure, the holdover time begins at the start of the second step (anti-icing).

10-5-11 Post De-icing/Anti-icing Procedure

CAUTION

Aircraft operators are solely responsible for ensuring holdover timetables contain current data.

Tables are for use in departure planning only and must be used in conjunction with pre takeoff contamination procedures.

10-5-11.1 Post De-icing/Anti-icing Check

The areas that follow must be checked for any contamination that may still remain after the de-icing/anti-icing procedure has been done:

- Wing leading edges, upper and lower surfaces and aileron including the wing seals
- Horizontal stabilizer leading edges, upper and lower surfaces and the elevator surfaces, particularly the balance horns
- Vertical stabilizer and rudder surfaces
- Flaps
- Propeller
- Engine oil cooler and Environmental Control System (ECS) air intakes
- Inertial separator and screen
- Fuselage
- Static ports, pitot heads, AOA vanes and temperature probes
- Fuel tank vents
- Landing gear.

A thorough pre-flight inspection is more important in extreme temperatures, as this may affect the aircraft and/or its performance.

10-5-11.2 Pre-Takeoff Contamination Check

CAUTION

Under no circumstances shall an aircraft that has been anti-iced receive a further coating of anti-icing fluid directly on top of the contaminated film.

If an additional treatment is required before flight, a complete de-icing/anti-icing procedure must be performed.

Make sure that all residues from any previous treatments are flushed off.

Anti-icing only is not permitted.

A pre-takeoff check must be done by the flight crew before takeoff and within the holdover time. This check is normally done from within the cockpit. It may be accomplished by the continuous assessment of the conditions that affect holdover times, and should include the assessment and adjustment of holdover times.

When freezing precipitation exists, aerodynamic surfaces must be checked just before the aircraft taxis onto the active runway or initiates the takeoff roll, to make sure that they are free of ice, slush and snow or frost (refer to Fig. 10-5-2 and Fig. 10-5-3). This is most important when severe conditions are experienced. When adhering deposits are in evidence, de-icing of the aircraft must be repeated.

10-5-11.3 Flight Control Check

After the de-icing/anti-icing procedure has been done, and before the takeoff roll has started, the flaps must be fully extended and then retracted to the 15 degree position. During control checks, the controls may feel heavier than normal.

10-5-12 Takeoff Performance - SAE Type II, Type III and Type IV Fluids

CAUTION

Anticipate a heavier than normal elevator force at rotation. Even with the increased pull force, the aircraft may rotate slower then normal. The elevator forces will return to normal shortly after takeoff.

The takeoff correction factor is approximate. Actual conditions may require distances greater than those determined.

For takeoff after a de-icing/anti-icing procedure has been done, PUSHER ICE MODE must be used, with the flaps set to 15 degrees, and the rotational speed increased by 10 KIAS (as specified in Section 5, Performance). As a result, the takeoff ground roll distance can be increased by up to 30% and the total distance by up to 31%.

10-5-13 Periodic Inspection - Type II, III and IV Fluids

Operators who use SAE Type II, III or IV anti-icing fluids are recommended to carry out periodic inspections for anti-icing fluid residues. The visual inspection must include:

- Along the wing rear spar area with flaps extended
- Around the perimeter of the aileron surface
- The gaps around the elevator and elevator trim tab
- The gaps around the rudder and rudder trim tab
- Inside the drain hole located at the base of the rudder.

Any identified residues must be removed by cleaning with warm water or an approved fluid.

If the aircraft is washed, or if SAE Type I fluid is used for de-icing, the frequency of inspection may be reduced.

Initially, the inspections must be carried out after a maximum of three applications of SAE Type II, III or IV anti-icing fluids.

The operator must determine the frequency of inspections based on the results of residue inspections, the frequency of de-icing/anti-icing operations as well as the frequency of aircraft washing.

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10-6 Operations from Prepared Unpaved Surfaces

10-6-1 General

The aircraft is constructed for operations from prepared unpaved surfaces.

Prepared unpaved surfaces are taxi-ways and runways that are prepared and approved for aircraft operations with a surface other than tarmac or concrete.

CAUTION

Prepared unpaved surfaces suitable for aircraft operations vary greatly and some may not be suitable for operations.

It is the responsibility of the pilot in command to make sure that each taxi-way and runway surface is fit for use at the intended aircraft weight before commencing operations on it.

The following factors should be considered when deciding if a surface is fit for operation or when operating from prepared unpaved surfaces:

- Surface hardness
- Surface roughness
- Surface type
- Inertial separator
- Aircraft inspection
- Before starting engine
- Taxiing
- Takeoff
- Landing.

10-6-2 Surface Hardness

A prepared unpaved surface may be hard after a period of dry weather but after rain can become soft. The wheels of a heavy aircraft can sink into soft surfaces causing a large increase in drag. This can make taxiing difficult or impossible and increase the takeoff ground roll distance considerably, sometimes to the point where VR cannot be achieved. How deep the wheels sink in, varies with aircraft weight and surface condition. It may be possible to operate a light weight aircraft when it is not possible to operate it at maximum takeoff weight.

10-6-3 Surface Roughness

The taxi-way and runway surface should be smooth. Undulations, depression or bumps can cause longitudinal pitching of the aircraft which may cause a significant reduction in propeller ground clearance. Particular care should be exercised in long grass which can conceal hard objects and depressions and also at the borders between grass and concrete surfaces.

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10-6-4 Surface Type

Loose stones or gravel can cause propeller or airframe damage. The propeller creates turbulence which lifts stones into the air which then are struck by following blades or are accelerated rearwards to hit the airframe. The risk of damage is reduced if the aircraft is allowed to accelerate forwards before high power is selected and if reverse thrust is not used below 30 kts forward speed.

Wet or fresh grass on a hard surface is slippery and has a lower coefficient of friction than short dry grass. Takeoff and stopping distances may increase. On a soft surface landing ground roll may decrease but takeoff ground roll may increase. On sandy or dusty surfaces, or where loose grass is present, reverse thrust can cause a loss of forward visibility and particles ingested into the air intake can cause increased engine wear.

10-6-5 Inertial Separator

When operating from any surface where there is a risk of dust, sand or other material entering the engine intake, it is recommended to open the inertial separator.

On takeoff from hot and high airfields with the inertial separator open it may not be possible to obtain maximum takeoff power (44 psi) and the takeoff performance will consequently deteriorate.

10-6-6 Aircraft Inspection

When operating from prepared unpaved surfaces where there are loose stones, gravel, grit, sand, dust or cut grass etc. there is always a risk of propeller or airframe damage or blockage of air inlets. After operations from prepared unpaved surfaces, where a risk of damage or contamination exists, the aircraft should be thoroughly inspected.

10-6-7 Before Starting Engine

Make sure the area under and adjacent to the propeller is clear of loose stones or other objects which could damage the propeller or enter the engine or oil cooler air inlets.

10-6-8 Taxiing

1. Use minimum power to prevent stone damage particularly when moving away from rest and when turning.
2. Be alert for surface unevenness or obstructions which could cause propeller damage.
3. To turn the aircraft on soft or slippery surfaces using nosewheel steering assisted by brake will help to keep the power low. (Reducing the risk of damage to the propeller or runway surface). If possible avoid making small radius turns.

10-6-9 Takeoff

When aligned for takeoff set a low power before brake release. After brake release, as the aircraft begins to accelerate, move the power lever steadily forwards to achieve takeoff power. This procedure will reduce the risk of damaging the propeller by loose stones on the ground.

10-6-10 Landing

CAUTION
Before landing on a prepared unpaved runway check that the surface is fit for operation at the intended weight.

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10-7 Passenger Briefings

10-7-1 General

In Sections 3 and 4 there are procedural actions that call for the pilot to brief the passengers. They fall into two categories, those forming part of an emergency procedure and the more regular type ones for taxiing prior to takeoff and before landing. Tips for passenger briefings during an emergency cannot be specified as each situation will place a different demand on the pilot. However, much of the content in the Taxiing briefing tips can be used to brief the passengers, if time permits. Tips for the recommended subjects that should be covered for the regular passenger briefings are given in the following lists:

10-7-2 Taxiing

(Section 4, Normal Procedures, Taxiing)

For aircraft with a standard cabin interior:

- Stow hand baggage under the seats
- Put the seat back in the upright position
- Position the seat headrest to support the head
- Switch off electronic equipment
- Fasten seat lap and shoulder belts, and tighten lap strap
- Mention how to locate and put on the passenger oxygen masks
- Mention the location and usage of the emergency exits
- Mention to remain buckled up during cruise in case of unexpected turbulence, but that the shoulder strap may be released (if releasable type) when airborne and permission has been given
- Mention the safety on board cards for more detailed information about the safety features (if available).

For aircraft with an executive cabin interior:

- Stow hand baggage in the seat or cabinet drawers
- Move the seat to the required position for takeoff (as per the placard adjacent to each seat)
- Position the seat headrest to support the head
- Stow the tables, cabinet drawers, seat drawers and legrests
- Switch off electronic equipment
- Fasten seat lap and shoulder belts, tighten lap strap
- Mention how to locate and put on the passenger oxygen masks
- Mention the location and usage of the emergency exits
- Mention to remain buckled up during cruise in case of unexpected turbulence, but that the shoulder strap may be released once the fasten seat belt sign has been switched off
- Mention the safety on board cards for more detailed information about the safety features (if available).

10-7-3 Before Landing

(Section 4, Normal Procedures, Before Landing)

For aircraft with a standard cabin interior:

- Stow hand baggage under the seats
- Put the seat back in the upright position
- Position the seat headrest to support the head
- Switch off electronic equipment
- Fasten seat lap and shoulder belts, tighten lap strap
- Remain seated and buckled until the aircraft has come to a standstill and the engine is turned off.

For aircraft with an executive cabin interior:

- Stow hand baggage in the seat or cabinet drawers
- Move the seat to the required position for landing (as per the placard adjacent to each seat)
- Position the seat headrest to support the head
- Stow the tables, cabinet drawers, seat drawers and legrests
- Switch off electronic equipment
- Fasten seat lap and shoulder belts, tighten lap strap
- Remain seated and buckled until the aircraft has come to a standstill and the engine is turned off.