

SECTION 2 LIMITATIONS

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INTRODUCTION

The FBA-2C3 (Expedition E350) landplane must be operated in accordance with the limitations contained in this section. These include operating limitations, instrument markings, colour coding and basic placards, power plant, systems and equipment limitations.

AIRSPPEED LIMITATIONS

Airspeed limitations and their operational significance are shown below. The indicated airspeeds presented are based on the normal static source airspeed calibration. When using the optional alternate static source, allow for the airspeed calibration variations between the normal and alternate static sources, as shown in Section 5.

	SPEED	KCAS	KIAS	REMARKS
V_A	Maneuvering Speed 3800 lbs.	117	118	Do not make full or abrupt control movements above this speed.
V_{FE}	Maximum Flap Extended Speed	115	116	Do not exceed this speed with flaps down.
V_{NE}	Never Exceed Speed	188	191	Do not exceed this speed in any operation.
V_{NO}	Maximum Structural Cruising Speed	153	155	Do not exceed this speed except in smooth air, and then only with caution.

Figure 2-1 Airspeed Limitations

AIRSPPEED INDICATOR MARKINGS

Airspeed indicator markings and their colour coding are presented below. The indicated airspeeds presented are based on the normal static source airspeed calibration. When using the optional alternate static source, allow for the airspeed calibration variations between the normal and alternate static sources, as shown in Section 5.

The FBA-2C3 airplane has two airspeed indicators. The primary airspeed indicator is displayed on the Garmin G500 PFD (primary flight display). The standby airspeed indicator is a conventional 3 1/8” diameter analog-type instrument located on the flight panel.

MARKING	KIAS OR RANGE	SIGNIFICANCE
White Arc	50 – 116	Full flap operating range. Lower limit is approximately maximum weight V_{so} in landing configuration. Upper limit is maximum flap extended speed.
Green Arc	56 - 155	Normal operating range. Lower limit is approximately maximum weight V_s at forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow Arc	155 - 191	Operations must be conducted with caution and only in smooth air.
Red Line	191	Maximum speed for all operations.

Figure 2-2 Airspeed Indicator Markings

POWER PLANT LIMITATIONS

Number of Engines:	1
Engine Manufacturer:	Textron Lycoming
Engine Model Number:	IO-580-B1A
Rated Maximum Continuous HP @ RPM:	315 @ 2700
Maximum Oil Temperature:	235°F (112°C)
Oil Pressure:	
Minimum:	25 psi
Maximum:	115 psi
Maximum Cylinder Head Temperature:	465° F (240° C)
Aviation Grade Fuel:	100LL (Blue) or 100 (Green)
Approved Oils*:	MIL-L-6082 Mineral Oil or MIL-L-22851 Ashless Dispersant Oil.

*See Chapter 8 for oil specification for engine break-in and recommended viscosity versus temperature table.

Propeller

Propeller Manufacturer:	Hartzell Propellers Inc.
Propeller Model Number:	HC-C3YR-1RF/F8068
Propeller Diameter:	82 inches (minimum 81 inches)

POWER PLANT INSTRUMENT MARKINGS

Power plant markings and their colour coding are presented below.
The coding is represented by a coloured arc, bar or number.

INSTRUMENT	RED	GREEN	YELLOW	RED
	MINIMUM LIMIT	NORMAL OPERATING	CAUTION RANGE	MAXIMUM LIMIT
Oil Temperature	---	0 °F – 235 °F	---	235 °F
Oil Pressure	25 psi	55 – 95 psi	25 – 55 & 95 – 115 psi	115 psi
Cylinder Head Temperature	---	150 – 435 °F	435 – 465 °F	465 °F
Tachometer	---	500 to 2700 RPM	---	Above 2700 RPM
Manifold Pressure	---	12 to 32 in. in. Hg	---	---
Suction Gage	---	4.5 – 5.5 in. Hg	---	---
Fuel Quantity	0 litres	---	---	---
Fuel Flow	---	0 to 40 GPH	---	---
Voltage	---	25 to 32 V	0 to 25 V	Above 32 V

Figure 2-3 Power Plant Markings

WEIGHT LIMITS

Maximum Takeoff Weight:	3800 pound
Maximum Landing Weight:	3800 pound
Maximum Weight in Baggage Compartment:	250 pound maximum at Station 94 in.

CENTER-OF-GRAVITY LIMITS

Center-of-Gravity Range:

Forward:	15.0 inches aft of datum at 2600 pounds or less. 20.5 inches aft of datum at 3800 pounds maximum gross weight with linear variation with weight in between.
Aft:	24.5 inches aft of datum at all weights.

Reference Datum: ½” aft of the lower hinge pin on front door

MANEUVER LIMITS

This airplane is certificated in the *Normal Category* and no acrobatic maneuvers, including spins, are approved.

FLIGHT LOAD FACTOR LIMITS

Flight Load Factors:

Flaps-Up:	-1.52g to +3.8g
Flaps-Down:	-1.52g to +2.0g

FLAP LIMITATIONS

Approved Takeoff Range:	0° to 20°
Approved Landing Range:	0° to 30°

FUEL LIMITATIONS

2 Standard Tanks:	189.3 litres each (50 U.S. gallons each)
(For all flight conditions)	
Total Fuel:	378.5 litres (100 U.S. gallons)
Usable Fuel:	372.1 litres (98.3 U.S. gallons)
Unusable Fuel:	6.4 litres (1.7 U.S. gallons)

MAXIMUM OPERATING ALTITUDE

Maximum Operating Altitude18, 000 ft. MSL

MINIMUM FLIGHT CREW

The minimum flight crew is one pilot

MAXIMUM PASSENGER SEATING CONFIGURATION

The maximum occupancy of this airplane is four passengers and one pilot.

RUNWAY SURFACE

This airplane may be operated into and off of any paved, gravel and grass runway surface.

KINDS OF OPERATIONAL LIMITS

The airplane is approved for day and night VFR and IFR flights when equipped as required by national requirements (e.g. CAR 605, FAR Part 91 & Part 135).
Flight into known icing conditions is prohibited.

KINDS OF OPERATION EQUIPMENT LIST

This airplane is approved for flight into non-icing conditions during day or night, and under VFR or IFR conditions when equipped in accordance with national regulations and the required equipment is operating properly.

The following list does not include specific radio or navigation equipment, the pilot in command must ensure compliance with national regulations for each intended flight.

NOTE

All references to types of flight operations on the operating limitations placards are based upon equipment installed at the time of Airworthiness Certificate issuance.

System, Instrument, and/or Equipment	Kinds of Operation				Notes
	VFR Day	VFR Night	IFR Day	IFR Night	
Communications					
VHF Comm	---	---	1	1	
Electrical Power					
Battery	1	1	1	1	
Alternator	1	1	1	1	
Voltammeter	1	1	1	1	
Under Voltage Indicator	1	1	1	1	
Over Voltage Indicator	1	1	1	1	
Circuit Breakers	AR	AR	AR	AR	As Required
Flight Controls					
Flap Position Indicator	1	1	1	1	
Flap System	1	1	1	1	
Pitch Trim Indicator	1	1	1	1	
Pitch Trim System	1	1	1	1	
Stall Warning System	1	1	1	1	
Fuel System					
Auxiliary Fuel Pump	1	1	1	1	
Fuel Quantity Indicator	2	2	2	2	
Fuel Selector Valve	1	1	1	1	
Ice & Rain Protection					
Alternate Engine Air Induction System	1	1	1	1	
Alternate Static Air Source	---	---	1	1	
Pitot Heater	---	1	1	1	

System, Instrument, and/or Equipment	Kinds of Operation				Notes
	VFR Day	VFR Night	IFR Day	IFR Night	
Lights					
Anticollision Lights	2	2	2	2	
Instrument Lights	---	*	---	*	* - Must be operative
Navigation Lights	---	4	---	4	1 Red, 1 Green, 2 White Lights
Landing Lights	---	1	---	1	
Navigation & Instruments					
Airspeed Indicator	1	1	1	1	
Altimeter (Sensitive)	1	1	1	1	Sensitive Altemeter
Vertical Speed Indicator	---	1	1	1	
Magnetic Compass	1	1	1	1	
Attitude Indicator	---	1	1	1	
Directional Gyro	---	1	1	1	
HSI	---	---	1	1	
Turn Coordinator (Gyro)	---	1	1	1	
Clock	---	---	1	1	
Pitot System	1	1	1	1	
OAT Gauge	---	1	1	1	
Vacuum Gauge	---	---	1	1	
Engine Instruments					
Oil Pressure Indicator	1	1	1	1	
Oil Temperature Indicator	1	1	1	1	
Oil Quantity Indicator (Dipstick)	1	1	1	1	
CHT Indicator	1	1	1	1	
Fuel Flow Indicator	1	1	1	1	
Manifold Pressure Gauge	1	1	1	1	
Tachometer	1	1	1	1	
Equipment & Furnishings					
ELT	1	1	1	1	
Restraint System	AR	AR	AR	AR	As Required
Fire Protection					
Portable Fire Extinguisher	1	1	1	1	

* For VFR operations under 14 CFR Part 91, the aircraft must have one source of altitude and airspeed information. This may be from either the PFD or the standby instruments. (i.e. all “1a” items or all “1b” items from the table above)

** For NVFR and IFR flight a fully functional G500 system should not generate system alerts, which indicate faults within the system or any interfaced equipment.

ENGINE MONITOR

This airplane is equipped with a digital engine monitor. This unit has a full colour, glass-panelled display that has factory set and pilot customizable screens.

The factory set screens display the engine and system parameters. These screens cannot be changed by the pilot. Figure 2-4 show the factory set Main screen. All factory set screens are approved screens.

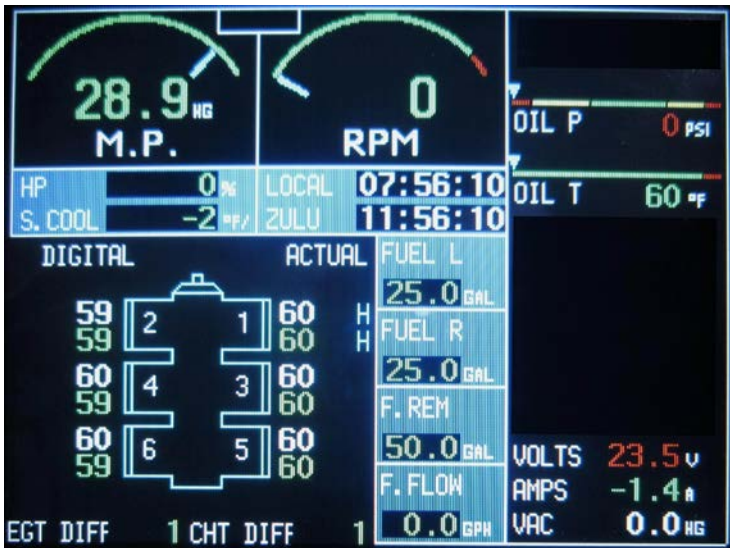


Figure 2-4 Factory Set Main Screen

Figure 2-5 shows a typical pilot customizable screen. Only the “blue” screen on the left can be customized, the “black” screen on the left is set by the factory and cannot be changed.

All pilot customizable screens are NOT approved. Following is a list of non-approved screens.

- System Screen
- Add Fuel
- Fuel Management
- Timers

- Clocks and Hours Meters
- Weight and Balance
- Check List 1
- Check List 2
- Check List 3
- Flight Plans
- Gen. Info. 1
- Gen. Info. 2
- Data Logs: Flight-Log
- Bar Graph Setup
- USB Data Recording
- Voice + Display Control
- Screen Button Setup
- System Configuration



Figure 2-5 Typical Pilot Customizable Screen (left “blue” side)

SYSTEM LIMITATIONS

AUX AUDIO SYSTEM (IF INSTALLED)

Use of the AUX AUDIO IN entertainment input is prohibited during takeoff and landing.

Use of the AUX AUDIO IN entertainment audio input and portable electronic devices (PED), such as cellular telephones, games, cassette, CD or MP3 players, is prohibited under IFR unless the operator of the airplane has determined that the use of the Aux Audio System and the connected portable electronic device(s) will not cause interference with the navigation or communication system of the airplane.

12V POWER SYSTEM

The 12 Volt Power System is not certified for supplying power to flight-critical communications or navigation devices.

Use of the 12 Volt Power System is prohibited during takeoff and landing.

Use of the 12 Volt Power System is prohibited under IFR unless the operator of the airplane has determined that the use of the 12 VDC power supply and connected portable electronic device(s) will not cause interference with the navigation or communication systems of the airplane.

GARMIN G500 LIMITATIONS**COCKPIT REFERENCE & PILOT'S GUIDE**

The Garmin G500 Cockpit Reference Guide P/N 190-01102-03, Revision A or later appropriate revision must be immediately available to the flight crew.

Garmin also provides a detailed G500 Pilot's Guide P/N 190-01102-02. This reference material is not required to be on board the aircraft but does contain a more in depth description of all the functions and capabilities of the G500.

SYSTEM SOFTWARE REQUIREMENTS

The G500 must utilize the following or later FAA approved software versions:

Component	Identification	Software Version
GDU 620	PFD/MFD	5.00

In addition to the main components of the G500, at least one Garmin GPS/WAAS navigator must be interfaced to the G500. Any GPS/WAAS systems connected to the G500 must utilize the following applicable software versions:

Component	Identification	Software Version (or later)
GNS 400W Series	GPS / WASS NAV	3.20
GNS 500W Series	GPS / WASS NAV	3.20
GNS 480/ CNX 80	GPS / WASS NAV	2.2
GTN 6XX/7XX	GPS / WASS NAV	2.00

DATABASE CARDS

The G500 utilizes several databases. Database titles display in yellow if expired or in question (Note: the G500 receives the calendar date from the GPS, but only after acquiring a position fix.). Database cycle information is displayed at power up on the MFD screen, but more detailed information is available on the AUX pages. Internal database validation prevents incorrect data from being displayed.

The upper Secure Digital (SD) data card slot is typically vacant as it is used for software maintenance and navigational database updates. The lower data card slot should contain a data card with the system's terrain / obstacle information and optional data including Safe Taxi, FliteCharts and ChartView electronic charts.

The terrain databases are updated periodically and have no expiration date. Coverage of the terrain database is between North 75° latitude and South 60°

latitude in all longitudes. Coverage of the airport terrain database is worldwide.

The obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. Obstacles 200 feet and higher are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. Coverage of the obstacle database includes the United States and Europe. This database is updated on a 56-day cycle.

The Garmin SafeTaxi database contains detailed airport diagrams for selected airports. These diagrams aid in following ground control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals, and services. This database is updated on a 56-day cycle.

The Garmin FliteCharts database contains procedure charts for the coverage area purchased. This database is updated on a 28-day cycle. If not updated within 180 days of the expiration date, FliteCharts will no longer function.

The Jeppesen ChartView electronic charts database contains procedure charts for the coverage area purchased. An own-ship position icon will be displayed on these charts. This database is updated on a 14-day cycle. If not updated within 70 days of the expiration date, ChartView will no longer function.

AHRS OPERATIONAL AREA

The AHRS used in the G500 is limited in its operational area: IFR Operations are prohibited north of 72°N and south of 70°S latitudes. In addition, IFR operations are prohibited in the following four regions:

- 1) North of 65° North latitude between longitude 75° W and 120° W
- 2) North of 70° North latitude between longitude 70° W and 128° W
- 3) North of 70° North latitude between longitude 85° E and 114° E
- 4) South of 55° South latitude between longitude 120° E and 165° E

Loss of the G500 heading and attitude may occur near the poles, but this will not affect the GPS track or standby attitude indicator.

MAGNETIC VARIATION OPERATIONAL AREA

IFR operations are prohibited in areas where the magnetic variation is greater than 99.9 degrees East or West.

NAVIGATION ANGLE

The GDU 620 Navigation Angle can be set to either True or Magnetic on the AUX page. The Navigation Angle defines whether the GDU 620 headings are referenced to True or Magnetic North. The Navigation Angle set in the GDU 620 must match that which is set on all GNS navigators interfaced to the unit.

AHRS NORMAL OPERATING MODE

The Attitude and Heading Reference System integrity monitoring features require the availability of GPS and Air Data. Although the attitude will remain valid if one of these systems becomes inoperative, IFR flight is not authorized unless both integrity systems are fully operational. The G500 monitors these integrity systems automatically and will alert the pilot when the AHRS is not receiving GPS or Air Data. Note: In dual GPS installations, only one GPS needs to be available for IFR use.

AEROBATIC MANEUVERS

Conducting aerobatic maneuvers may cause the attitude information displayed on the G500 to be incorrect or temporarily removed from the display.

STANDBY ATTITUDE GYRO

A standby attitude indicator is required. The Standby Attitude Gyro may operate via the aircraft vacuum system or the aircraft electrical system with a dedicated emergency battery specific to the electric gyro. The electric attitude gyro battery capacity may vary considerably depending on temperature, charge status, and battery life condition. Low temperatures below 32°F will temporarily degrade battery capacity. Internal chemistry will slowly degrade battery capacity over several years of operation even when correctly maintained. A poorly maintained battery will suffer accelerated degradation. Extended storage in a discharged state and over-charging will permanently damage the battery. Complete charging is required to bring the battery up to full capacity if it has been unused for more than four months or partially discharged.

COURSE POINTER AUTO SLEWING

The G500 HSI will auto slew, i.e. automatically rotate the GPS course pointer to the desired course defined by each GPS leg. The system will also auto slew the VHF NAV course pointer when the CDI transitions to a LOC setting if an ILS, LOC, LOC BC, LDA, or SDF approach is activated in the GPS/WAAS navigator.

The VHF NAV (green) course pointer will only auto slew if the approach is active in the navigator, the LOC frequency is loaded in the active NAV frequency, and *then* the HSI source is changed to the corresponding VHF NAV for the approach.

Back Course approaches will auto slew to the reciprocal course.

The system is not capable of automatically setting the inbound VHF NAV course pointer if an approach is not active in the GNS Navigation System.

The pilot should always double check the inbound course pointer prior to initiating any transition on any VHF NAV approach. Auto slewing the VHF NAV course pointer to the correct selected course is a database dependent function.

SYNTHETIC VISION TECHNOLOGY (IF INSTALLED)

The use of the synthetic vision display elements alone for aircraft control without reference to the G500 primary flight instruments or the aircraft standby instruments is prohibited.

The use of the synthetic vision display alone for navigation, or obstacle, terrain, or traffic avoidance is prohibited.

AUTOPILOT INTERFACE (IF INSTALLED)

The G500 is not capable of controlling autopilot mode selection or displaying the autopilot selected mode, except for GPS Steering mode when emulating Roll Steering via the autopilot heading mode, see Paragraph 4.5. Refer to the autopilot operator's manual or Airplane Flight Manual Supplement for proper operation of the installed autopilot system.

The G500 acts as a navigation source switching hub to an interfaced autopilot when multiple navigation sources are available. The autopilot will follow navigation deviations from the selected course which is displayed on the G500 HSI. Some autopilots may have navigation source selection integral to their system; this feature is overridden by the G500 navigation source selection described herein. Changing the navigation sources displayed on the HSI (by pressing the CDI button or the 1-2 button) may result in some autopilots disconnecting or entering a wings level mode.

The G500 altitude alerter may be used as an altitude pre-selector for some autopilot installations. The autopilot will not couple to the pre-selected altitude if not properly configured or supported by the installation. Refer to the autopilot operators manual or Airplane Flight Manual Supplement for the proper operation of that system.

TERRAIN DISPLAY

The G500 terrain and obstacle information appears on the MFD display as red and yellow tiles or towers, and is depicted for advisory only. Aircraft maneuvers and navigation must not be predicated upon the use of the terrain display. Terrain unit alerts are advisory only and are not equivalent to warnings provided by TAWS.

TAWS ANNUNCIATIONS ON THE PFD [FROM A GARMIN NAVIGATOR]

The G500 can display TAWS (Terrain Awareness and Warning System) annunciations on the PFD if the G500 is interfaced to a Garmin navigator with integrated TAWS. The required TAWS annunciations appear in the upper right of the PFD. These annunciations include PULL UP (red), TERRAIN (yellow), TERR N/A (white), TERR INHB (white). These annunciations are not relative to the terrain displayed on the MFD or the yellow/red terrain shading of the Synthetic Vision displayed on the PFD of the G500 system. Refer to the Garmin navigator Airplane Flight Manual Supplement for proper pilot action and information on these alerts.

TAWS alerts on the PFD of the G500 System are only displayed from GNS system 1 and are displayed regardless of the system 1-2 setting, which drives all other PFD and MFD data used by the G500.

DATALINKED WEATHER DISPLAY (IF INSTALLED)

XM weather data is provided by an optional GDL 69 interface. The weather information display on the MFD of the G500 is limited to supplemental use only and may not be used in lieu of an official weather data source.

TRAFFIC DISPLAY (IF INSTALLED)

Traffic may be displayed on the G500 System when connected to an approved optional TCAS, TAS, or TIS traffic device. These systems are capable of providing traffic monitoring and alerting to the pilot. Traffic shown on the display may or may not have traffic alerting available. The display of traffic is an aid to visual acquisition and may not be utilized for aircraft maneuvering.

ACTIVE WEATHER RADAR (IF INSTALLED)

RADAR is broadcasting energy while in Weather or Ground mapping modes. If the G500 system is configured to control an airborne weather radar unit, observe all safety precautions, including:

- Do not operate in the vicinity of refueling operations.
- Do not operate while personnel are in the vicinity (approximately 20 feet) of the radar sweep area.

WARNING

If a radar system is installed, it generates microwave radiation and improper use, or exposure, may cause serious bodily injury.

DO NOT OPERATE THE RADAR EQUIPMENT UNTIL YOU HAVE READ AND CAREFULLY FOLLOWED THE SAFETY PRECAUTIONS AND INSTRUCTIONS in the USER MANUAL

LIMITATIONS PLACARDS

All limitation placards are as follows. A list of all placards is detailed in chapter 11 of the airplane maintenance manual (FAC2-M200).

INTERIOR PLACARDS

Located on the Fuel Selector:

USABLE 185 L
(49 US GAL)
LEFT

USABLE 185 L
(49 US GAL)
RIGHT

OFF
LIFT KNOB

In the Baggage Compartment:

250 POUNDS MAXIMUM BAGGAGE
AT THIS ARM (94")
↓

Near the Airspeed Indicator:

MANEUVER SPEED = 118 KIAS

In full view of the pilot on the Flight Instrument Panel:

The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Airplane Flight Manual.

Normal Category: No acrobatic maneuvers, including spins, approved.

Flight into known icing conditions is prohibited.

This airplane is certified for the following flight operations:
DAY – NIGHT – VFR – IFR
(WITH REQUIRED EQUIPMENT)

Near the ELT Remote Switch:

FOR AVIATION
EMERGENCY USE ONLY
UNAUTHORIZED OPERATION
PROHIBITED

On the Circuit Breaker Panel or other Instrument Panel:

NO SMOKING
FASTEN SEATBELTS

X955
FIRE EXTINGUISHER LOCATED
ON R/H SIDE OF CONSOLE

In clear view of the pilot:

This aircraft is airworthy with up to 4 VGs missing per wing. The upper wing surface must be inspected prior to each flight to verify that no more than 4 VGs per wing are missing or damaged.

X969

Near each interior door handle:

PULL TO OPEN

EXTERIOR PLACARDS

Near the Fuel Tank Filler Caps:

FUEL
100/100LL MIN. GRADE AVIATION GASOLINE
[185 LITRES (49 U.S. GAL.) USABLE]

Near the Brake Fluid Reservoir:

BRAKE FLUID RESERVOIR
FLUID TYPE: MIL-H-5606

On the External Surface of the Fuselage near the ELT:

EMERGENCY LOCATOR TRANSMITTER
FOR AVIATION EMERGENCY USE ONLY
UNAUTHORIZED OPERATION PROHIBITED

Near the Battery:

CAUTION 24 VOLTS D.C.
THIS AIRCRAFT IS EQUIPPED WITH ALTERNATOR
AND A NEGATIVE GROUND SYSTEM.
OBSERVE PROPER POLARITY
REVERSE POLARITY WILL DAMAGE ELECTRICAL
COMPONENTS.

On the Oil Check Access Panel:

OIL SUMP CAPACITY 10.4 LITRES (11 US QUARTS)
SAFE MINIMUM OIL IN SUMP 3.8 LITRES (4 US QUARTS)
SEE AIRCRAFT FLIGHT MANUAL FOR GRADE