

# SECTION 2

## LIMITATIONS

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## 2.1 INTRODUCTION

Section 2 details the limits applicable to the engine, airframe, propeller and associated equipment and the associated instrument markings and placards applicable to operation of the airplane. The limitations included in this section are approved by the Civil Aviation Authority of New Zealand, the United States of America Federal Aviation Administration and the European Aviation Safety Agency.

## 2.2 KINDS OF OPERATIONS LIMITS

The use of this airplane is restricted to the types of operation covered by the airworthiness certificate. The operating limitations placard reflects the limits applicable at the time of airworthiness certificate issuance.

Day and Night VFR operations only are approved. Refer to Section 9 for additional operations permitted and the required equipment.

The airplane has not been tested for flight into icing conditions and falling and blowing snow. The airplane is not approved for flight into icing conditions and or falling and blowing snow conditions. The pilot is to fly the airplane clear of icing and falling and blowing snow conditions if inadvertently encountered.

The following list identifies the systems and equipment upon which type certification for each kind of operation was predicated. These systems and equipment items must be installed and operable for the particular kind of operation indicated. Reference should also be made to the Equipment List in Section 6, Weight and Balance and Section 9 Supplements for additional equipment information. The pilot is responsible for determining the airworthiness of the airplane for each flight and for assuring compliance with all current appropriate operating rules and regulations in the country of operation.

### REQUIRED EQUIPMENT

#### DAY VFR

Airspeed Indicator (1)	Fuel Flow Indicator
Altimeter (1)	Fuel Pressure Low Warning
Magnetic Compass	Low Fuel Level Warning
Airspeed Overspeed Warning System	N <sub>g</sub> RPM Indicator
Outside Air Temperature Indicator	N <sub>p</sub> RPM Indicator
Stall Warning System	Oil Pressure Low Warning
Fuel Quantity Indicators (2)	Fuel Filter Bypass Warning
Oil Pressure and Temperature Indicator	Trim Position Indicators (3)
Generator Warning Light	Emergency Locator Transmitter
Oil Dipstick	Beta Indicator Light
ITT Indicator	Inertial Separator Light
Torque Indicator	Flap Position Indicator
Ammeter/Voltmeter	Starter/Generator
Generator Control Unit	Battery
Circuit Breakers	Navigation Lights (3)
Strobe Lights (2)	Landing Light
Instrument Lights	
Fire Extinguisher	

## NIGHT VFR

All equipment required for Day VFR plus the following:

Post Lights  
Rate of Turn and Slip Indicator

Map Reading Light

## 2.3 AIRSPEED LIMITATIONS

The airspeed limitations are detailed in Figure 2-1.

	SPEED	KCAS	KIAS	REMARKS
V <sub>NE</sub>	Never Exceed Speed	171	170	Do not exceed this speed in any operation.
V <sub>NO</sub>	Maximum Structural Cruise Speed	141	140	Do not exceed this speed except in smooth air and then only with caution.
V <sub>A</sub> / V <sub>O</sub>	Maneuvering Speed 7500 lbs 6500 lbs 5500 lbs 4500 lbs	132 123 113 102	131 122 112 101	Do not make full or abrupt control movements above this speed.
V <sub>FE</sub>	Maximum Flap Extended Speed  0° - 20° Flap 20° - 40° Flap	  128 117	  130 120	Do not exceed this speed with a given flap setting

Figure 2-1, Airspeed Limitations

## 2.4 AIRSPEED INDICATOR MARKINGS

The airspeed indicator markings are detailed in Figure 2-2.

MARKING	KIAS	SIGNIFICANCE
White Arc	58 - 120	Full flap operating range. Lower limit is maximum weight stalling speed in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc	69 - 140	Normal operating range. Lower limit is maximum weight stalling speed with flaps retracted. Upper limit is maximum structural cruising speed
Yellow Arc	140 - 170	Operations must be conducted with caution and only in smooth air.
Red Line	170	Maximum speed for all operations

Figure 2-2, Airspeed Indicator Markings

## 2.5 POWER PLANT LIMITATIONS

<b>NUMBER OF ENGINES:</b>	1
<b>MANUFACTURER:</b>	Pratt & Whitney, Canada, Incorporated (P&WC)
<b>ENGINE MODEL NUMBER:</b>	PT6A-34
<b>ENGINE OPERATING LIMITS:</b>	Refer Figure 2-5
<b>FUEL GRADE:</b>	Approved fuels are detailed in Figure 2-3. Refer to P&WC S.B. No. 1344 for specific details.

APPROVED FUELS	
Jet A /A1 (ASTM D1655)	
Jet B (ASTM D1655)	
JP-4 (MIL-T-5624)	Contains fuel system ice inhibitor
JP-5 (MIL-T-5624)	Contains fuel system ice inhibitor
F-40 (NATO Code)	Contains fuel system ice inhibitor
F-34 (Nato Code)	Contains fuel system ice inhibitor
F-44 (Nato Code)	Contains fuel system ice inhibitor

Figure 2-3, Approved Fuels

**OIL GRADE:**

The approved oil brands and types are detailed in Figure 2-4. Refer to P&WC S.B 1001 for full details.

BRAND	TYPE
AeroShell Turbine Oil 750	Synthetic, CPW202 (7.5 Centistokes)
Royco Turbine Oil 750	Synthetic, CPW202 (7.5 Centistokes)
Castrol 98	Synthetic, CPW202 (7.5 Centistokes)
BP Turbo Oil 274	Synthetic, CPW202 (7.5 Centistokes)
Turbonycoil 35 M	Synthetic, CPW202 (7.5 Centistokes)
AeroShell Turbine Oil 500	Synthetic, PWA 521- Type II (5 Centistokes)
Royco Turbine Oil 500	Synthetic, PWA 521- Type II (5 Centistokes)
Mobil Jet Oil II	Synthetic, PWA 521- Type II (5 Centistokes)
Castrol 5000	Synthetic, PWA 521- Type II (5 Centistokes)
BP Turbo Oil 2380	Synthetic, PWA 521- Type II (5 Centistokes)
Turbonycoil 525-2A	Synthetic, PWA 521- Type II (5 Centistokes)
Turbonycoil 600	Synthetic, PWA 521- Type II (5 Centistokes)
Mobil Jet Oil 254	Synthetic, PWA 521- Type II (5 Centistokes) THIRD GENERATION
AeroShell Turbine Oil 560	Synthetic, PWA 521- Type II (5 Centistokes) THIRD GENERATION
Royco Turbine Oil 560	Synthetic, PWA 521- Type II (5 Centistokes) THIRD GENERATION

Figure 2-4, Oil Specifications

**CAUTION**

*Do not mix different viscosities or specifications of oil as their different chemical structure can make them incompatible. Drain the complete oil system before changing oil viscosities or specifications.*

**CAUTION**

*When changing from an existing lubricant formulation to a "Third Generation" lubricant formulation P & WC strongly recommends that such a change should only be made when an engine is new or freshly overhauled.*

**NOTE**

*Where operation will result in frequent cold soaking at ambient temperatures of -18°C (64°F) or lower, use of a 5 centistoke oil is recommended.*

<b>NUMBER OF PROPELLERS:</b>	1
<b>PROPELLER MANUFACTURER:</b>	Hartzell Propeller Incorporated
<b>PROPELLER MODEL NUMBER:</b>	HC-B3TN-3D/T10282NS+4
<b>NUMBER OF BLADES:</b>	3
<b>PROPELLER DIAMETER:</b>	Maximum 106 inches Minimum 106 inches

**PROPELLER ANGLES:**

Feathered:	86.3 <sup>0</sup>
Low Pitch:	18.5 <sup>0</sup>
Maximum Reverse:	-8.1 <sup>0</sup>

**STARTER DUTY CYCLE:** Using internal and external power the starting cycle is limited to the following intervals and sequence:

30 seconds ON	60 seconds OFF
30 seconds ON	60 seconds OFF
30 seconds ON	30 minutes OFF

## POWER PLANT LIMITATIONS

POWER SETTING	TORQUE psi	MAX. ITT °C	GAS GEN. RPM % Ng	PROP RPM % Np (RPM)	OIL PRESS psi	OIL TEMP. °C	SHAFT HORSE- POWER
Takeoff	64.5 (2)	790	101.6	91.2 (2006)	85-105	10-99	750 (31 °C)
Maximum Continuous	54	740	101.6	91.2 (2006)	85-105	10-99	633
Maximum Climb	54	740	101.6	91.2 (2006)	85-105	0-99	633
Maximum Cruise	64.5 (2)	790	101.6	91.2 (2006)	85-105	0-99	750
	54	740	101.6	91.2 (2006)	85-105	0-99	633
Idle	-	685	52-54	-	40	-40-99	-
Maximum Reverse	64.5 (2)	790	101.6	86 (1892)	85-105	0-99	-
Transient	68.4 (5)	850 (3)	102.6 (3)	100 (2200)	85-105	0-99	-
Starting	-	1090 (3) (4)	-	-	-	-40	-
(1) All limits are based on sea level (2) 5 minute time limit (3) These values are limited to two (2) seconds (4) Starting temperatures above 850 <sup>0</sup> C should be investigated for cause (5) Time limited to 20 seconds							

Figure 2-5, Power Plant Limitations

## ENGINE CONTROL OPERATING LIMITS

Flight operation with the power lever retarded below the FLIGHT IDLE position is prohibited. Positioning of the power lever below the FLIGHT IDLE position may lead to the loss of airplane.

## 2.6 POWER PLANT INSTRUMENT MARKINGS

The power plant instrument markings and the colour significance are detailed in Figure 2-6.

INSTRUMENT	RED LIGHT	GREEN LIGHTS	YELLOW LIGHTS	RED LIGHTS
	MINIMUM LIMIT	NORMAL OPERATING	CAUTION RANGE	MAXIMUM LIMIT
Torque Indicator		10-53 psi	54-64.5 psi	>64.5 psi
Inter Temperature Indicator		1-789 °C		790 °C
Gas Generator % RPM Indicator		1-101.6%		>101.6%
Propeller RPM Indicator		1-91.2% (22-2006 RPM)		>91.2% (>2006 RPM)
Oil Temperature Indicator		15-99 °C	0-14 °C	>99 °C
Oil Pressure Indicator	25 psi	85-105 psi	26-84	>105 psi

### NOTE

*Refer to the digital display for accurate instrument readings. Analogue lights will display within 1% of digital reading.*

Figure 2-6, Power Plant Instrument Markings

## 2.7 MISCELLANEOUS INSTRUMENT MARKINGS

The markings for the miscellaneous instruments and their colour significance are shown in Figure 2-7.

INSTRUMENT	RED LIGHT	GREEN LIGHTS	YELLOW LIGHT	RED LIGHT
	MINIMUM LIMIT	NORMAL OPERATING	CAUTION RANGE	MAXIMUM LIMIT
Fuel Quantity Indicators	<1/8	>1/4 - FULL	1/8 – 1/4	-

Figure 2-7 Miscellaneous Instrument Markings



## 2.8 WEIGHT LIMITS

**MAXIMUM TAKEOFF:** 7500 lbs

**MAXIMUM LANDING:** 7125 lbs

## 2.9 CENTRE OF GRAVITY LIMITS

**FORWARD:** 100.46 inches (0.3% Mean Aerodynamic Chord (MAC) aft of datum at 4209 lbs or less with straight line variation to 103.18 inches (3.47% MAC) aft of datum at 5639 lbs, and straight line variation to 111.55 inches (13.25% MAC) aft of datum at 7500 lbs.

**AFT:** 125.60 inches (29.67%) aft of datum.

**REFERENCE DATUM:** The airplane datum is at station 0.00 which lies 100.21 inches forward of the wing leading edge.

**MEAN AERODYNAMIC CHORD:** The leading edge of the MAC is 100.21 inches aft of the datum. The MAC length is 85.584 inches.

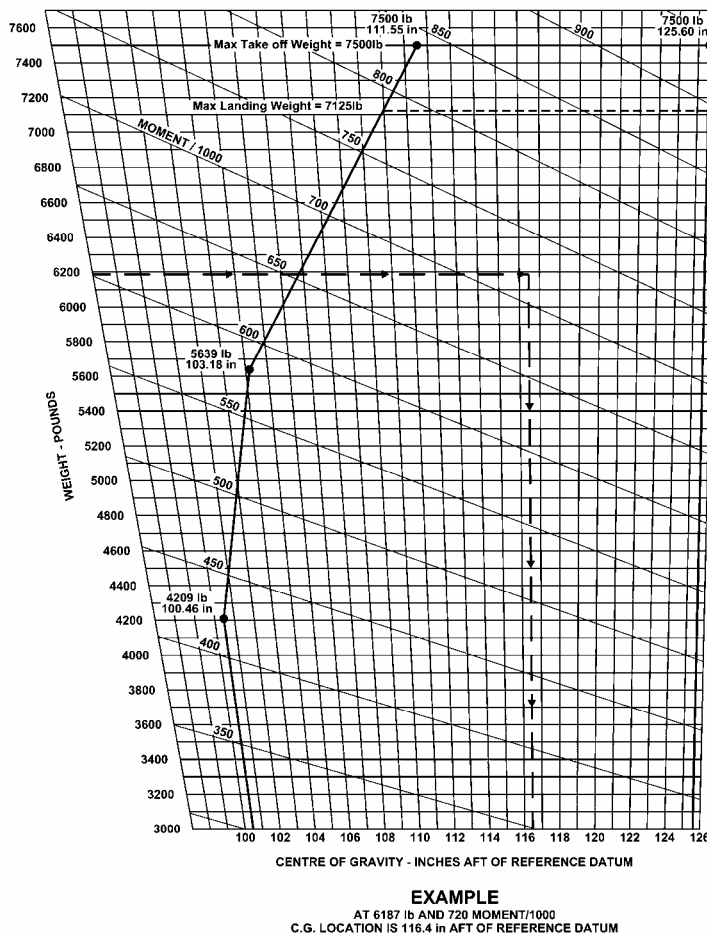


Figure 2-8, Centre of Gravity Envelope

## 2.10 MANOEUVRE LIMITS

The airplane is certified in the Normal Category. Manoeuvres shall be limited to normal flying manoeuvres, but may include straight and steady stalls and turns in which the angle of bank does not exceed 60°. All aerobatic manoeuvres, including spins are prohibited.

## 2.11 FLIGHT LOAD FACTOR LIMITS

	g	g
<b>FLAPS UP:</b>	+3.47	-1.39
<b>FLAPS TAKEOFF:</b>	+3.0	0
<b>FLAPS LANDING:</b>	+3.0	0

## 2.12 FLIGHT CREW LIMITS

The minimum crew is one pilot, seated in the left seat.

## 2.13 FUEL LIMITATIONS

The fuel limitations are detailed in Figure 2-9.

Total Capacity: 861 litres (227.4 U.S. gallons, 1512 lbs)  
Total Useable: 841 litres (221 U.S. gallons, 1476 lbs)

TANK	TOTAL CAPACITY	UNUSABLE FUEL	USABLE
FRONT LEFT TANK *	284* litres, 499 lbs 75* U.S. gallons	10 litres, 18 lbs 3 U.S. gallons	274 litres, 481 lbs 72 U.S. gallons
FRONT RIGHT TANK	293 litres, 515 lbs 77 U.S. gallons	10 litres, 18 lbs 3 U.S. gallons	283 litres, 497 lbs 74 U.S. gallons
REAR LEFT TANK	142 litres, 249 lbs 37.5 U.S. gallons	0	142 litres, 249 lbs 37.5 U.S. gallons
REAR RIGHT TANK	142 litres, 249 lbs 37.5 U.S. gallons	0	142 litres, 249 lbs 37.5 U.S. gallons
TOTAL	861 litres, 1512 lbs 227 U.S. gallons	20 litres, 36 lbs 6 U.S. gallons	841 litres, 1476 lbs 221 U.S. gallons

Figure 2-9 Fuel Limitations

- (1) \* The total includes 26 litres (6.8 U.S. gallons, 45 lbs) of fuel in the sump tank.
- (2) The fuel tank capacity is based on the tanks being filled to the top of the filler neck in each tank.

- (3) Maximum fuel imbalance between the left and right fuel tanks in flight is 100 litres (26.4 U.S. gallons, 176 lbs)
- (4) Due to possible fuel starvation, the duration of maximum full rudder sideslips is 5 minutes.

## 2.14 CLIMB CONDITION LIMITS

Maintain power plant within the operating limitations detailed in Figure 2-5.

## 2.15 MAXIMUM OPERATING ALTITUDE LIMITS

**MAXIMUM OPERATING ALTITUDE:** 20000 ft.

### NOTE

*For operations above 13,000 ft or between 10,000 ft and 13,000 ft for more than 30 minutes, the following oxygen equipment must be carried:*

- (a) *A fixed oxygen supply system supplying each crew member and passenger installed in accordance with acceptable technical data which meets the requirements of the applicable operating rules: or*
- (b) *A portable oxygen supply system for each crew member and passenger which meets the requirements of the applicable operating rules.*

## 2.16 OUTSIDE AIR TEMPERATURE LIMITS

**COLD DAY:** -54°C (-65°F) from sea level to 25,000 ft.

**HOT DAY:**

Ground operations:	+45°C (113°F) at sea level.
Flight operations:	ISA + 30°C (54°F) from sea level to 20,000 ft.

### NOTE

*Engine cooling has been demonstrated to above ambient temperatures.*

## 2.17 MAXIMUM PASSENGER SEATING LIMITS

The right front seat may be occupied by a passenger.

## 2.18 BAGGAGE AND CARGO LOADING

**MAXIMUM INTENSITY OF LOADING:** 136 lbs/ft<sup>2</sup> (664 kgs/m<sup>2</sup>)

**MAXIMUM LOAD PER TIE DOWN POINT:** 166 lbs (75.34 kgs)

### MAXIMUM FLOOR LOADINGS:

Compartment station 82 inches aft of datum to 115 inches aft of datum - 1200 lbs

Compartment station 115 inches aft of datum to 166 inches aft of datum - 1200 lbs

Compartment station 166 inches aft of datum to 240 inches aft of datum - 800 lbs

## 2.19 APPROVED OPERATING SURFACES

Operations are approved on paved and grass surfaces.

## 2.20 FLAP LIMITATIONS

Approved flap ranges.

**TAKEOFF FLAP:** 20°

**LANDING FLAP:** 40 °

Refer to Section 4 Normal Procedures for recommended flap operating speeds.

## 2.21 SMOKING

Smoking is not permitted in the airplane.

## 2.22 OXYGEN BOTTLE PRESSURE LIMITATIONS

**MAXIMUM PRESSURE:** 1800 psi

**MINIMUM PRESSURE:** 300 PSI

**MAXIMUM RECHARGE RATE:** 300 lbs/minute

## 2.23 PLACARDS

The following operating placards shall be fitted to the airplane in the designated position:

In view of the pilot:

THIS AIRPLANE MUST BE OPERATED IN ACCORDANCE  
WITH THE AIRPLANE FLIGHT MANUAL.

THIS AIRPLANE IS CERTIFIED IN THE NORMAL CATEGORY.

FLIGHT INTO ICING CONDITIONS PROHIBITED.

FLIGHT INTO FALLING AND BLOWING SNOW PROHIBITED.

MAXIMUM OPERATING ALTITUDE 20,000 FT.

NO ACROBATIC MANOEUVRES, INCLUDING SPINS,  
APPROVED.

SPINS PROHIBITED.

In view of the pilot when the airplane is approved for only day and night VFR.

**DAY AND NIGHT VFR OPERATIONS ONLY**

In view of the pilot when the airplane is approved for only day VFR.

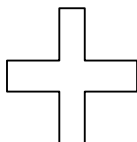
**DAY VFR OPERATIONS ONLY**

On the cover of the lid between the pilot seat and front passenger seat covering the flight manual, axe and first aid kit:

**LIFT HANDLE TO  
OPEN**

**FLIGHT MANUAL**

FIRST AID



INSIDE



Adjacent to the elevator manual trim:

ELEVATOR MANUAL TRIM  
PULL HANDLE DOWN  
ROTATE TO OPERATE  
STOW WHEN NOT IN USE



Adjacent to the rudder trim:



Adjacent to the airspeed indicator:

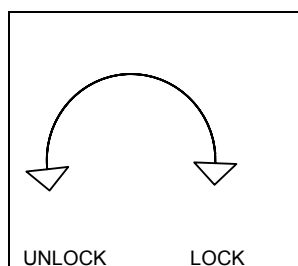
MAXIMUM MANEUVERING SPEEDS

7500 LBS – 131 KIAS  
6500 LBS - 122 KIAS  
5500 LBS – 112 KIAS  
4500 LBS – 101 KIAS

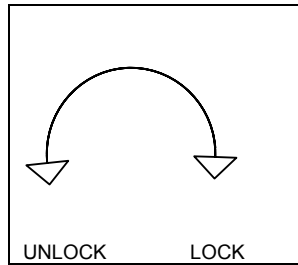
MAXIMUM FLAP EXTENDED SPEED

20° – 130 KIAS  
40° – 120 KIAS

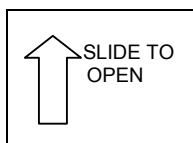
Adjacent to the cargo door handle on the exterior:



Adjacent to the cargo door handle on the interior:



On the interior and exterior side of the cargo door:



**EXIT**

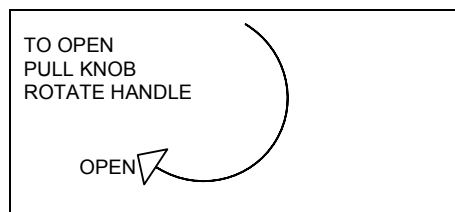
On the instrument panel:

**NO SMOKING**

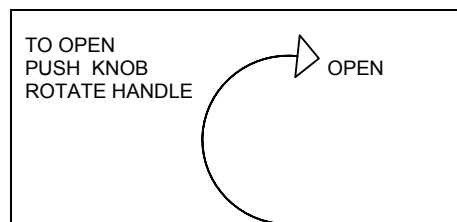
Adjacent to the left and right cabin ventilation levers:

**CABIN AIR  
PULL COLD**

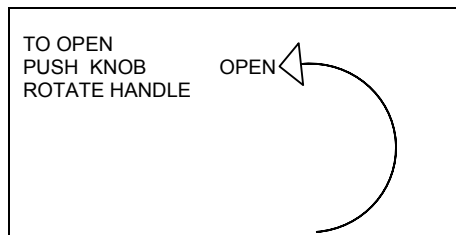
On the exterior left side of the fuselage adjacent to the crew entry door handle:



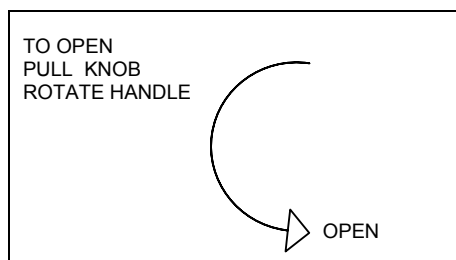
On the interior right side of the cockpit adjacent to the crew entry door handle:



On the interior left side of the cockpit adjacent to the crew entry door handle:



On the exterior right side of the fuselage adjacent to the crew entry door handle:



Adjacent to the elevator trim interrupt switch



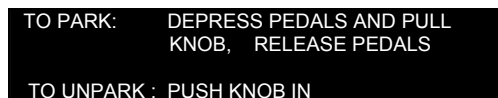
Below elevator trim interrupt switch

**ISOLATE**

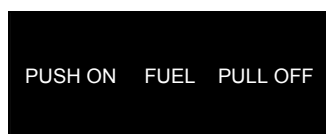
Above elevator trim interrupt switch

**NORMAL**

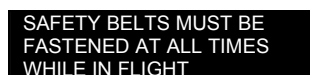
Adjacent to the park brake lever



On the fuel shut off valve lever:



On the instrument panel in view of the pilot





Adjacent to the fuel quantity indicators (placarded quantities may be in litres, pounds or gallons):

MAXIMUM USABLE FUEL	TOTAL USABLE:	841 L
FRONT TANKS: 557 L	REAR TANKS :	284 L

MAXIMUM FUEL IMBALANCE 100 LITRES

In the cargo compartment:

ALL CARGO MUST BE ADEQUATELY TIED DOWN  
MAXIMUM FLOOR LOADING/FT<sup>2</sup>: 136 LB/ FT<sup>2</sup>  
MAXIMUM AIRCRAFT TAKEOFF WEIGHT: 7500 LB  
MAXIMUM LANDING WEIGHT: 7125 LBS

On the ITT indicator:

TRANST: 850°C 2 SECS  
START: 1090°C MAX

On the torque indicator:

TRANSIENT TORQUE  
PRESSURE LIMIT: 68.4 psi

Adjacent to the leading edge fuel tank filler cap:

LEADING EDGE TANKS  
MUST BE FULL, BEFORE  
FUELING REAR TANKS

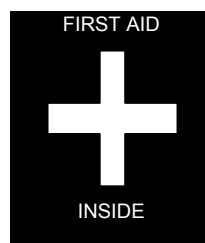
On the inside cover of the oil filler access panel (the particular brand of oil will depend on the operator):

USE ONLY  
MOBIL JET  
OIL II

Adjacent to each fuel tank filler cap:

JET FUEL  
REFER TO A.F.M.  
FOR APPROVED  
FUELS

Adjacent to the first aid kit on the exterior of the aircraft, right hand side:



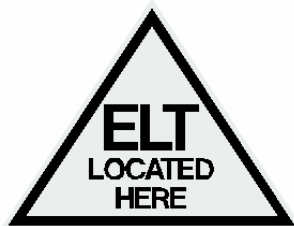
Adjacent to the fire extinguisher on the interior of the aircraft left of the pilot's seat:



Adjacent to the fire extinguisher on the exterior of the fuselage, left hand side:



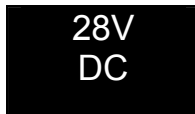
On the exterior of the fuselage adjacent to the ELT, right hand side:



Adjacent to the axe on the exterior of the fuselage, right hand side:



Adjacent to the external power receptacle:



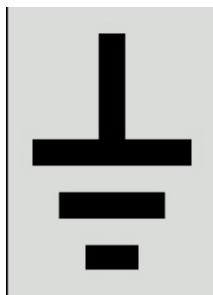
Adjacent to each crew exit on the interior:



Adjacent to each crew exit on the exterior:



Adjacent to earthing points:



On the noseleg:

**TIRE PRESSURE 30 PSI**

**OLEO INFLATION 160 PSI**

On each main landing gear:

**TIRE PRESSURE 40 PSI**

**OLEO INFLATION 450 - 350 PSI**

On the inside cabin wall between station 82 -115:



On the inside cabin wall between station 115 -166:

**COMPARTMENT  
STA 115 - 166  
MAX LOAD 1200 LB**

On the inside cabin wall between station 166 -240:

**COMPARTMENT  
STA 166 - 240  
MAX LOAD 800 LB**

On the compass:

FOR	N	30	60	E	120	150
STEER						
FOR	S	210	240	W	300	330
STEER						
DATE:				AIRPATH		