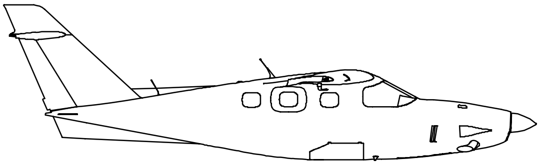
INFORMATION MANUAL



EA 400-500 (EXTRA 500)

MANUFACTURER

EXTRA Flugzeugproduktions- und Vertriebs- GmbH
Flugplatz Dinslaken
46569 Hünxe, Federal Republic of Germany

W A R N I N G

**This is an Information Manual and may be used for general purposes only.
This Information Manual is not kept current.
It must not be used as a substitute for the official EASA approved
Pilot's Operating Handbook required for operation of the airplane.**

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Log of Revisions

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Coverage

The Pilot’s Operating Handbook in the airplane at the time of delivery from EXTRA Flugzeugproduktions- und Vertriebs-GmbH contains information applicable to the EXTRA 500 airplane designated by the serial number and registration number shown on the title page of this handbook. This information is based on data available at the time of publication.

Note **It is the responsibility of the owner to maintain this handbook in a current status when it is being used for operational purposes.**
This handbook is valid only in a current status.

TABLE OF CONTENTS

Section 1
General
Table of Contents

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1 General

Section 1 of this manual contains all technical data and information of general interests. Further, definitions and explanations of commonly used abbreviations, symbols and terms.

1.1 Pilot's Operating Handbook (POH)

This Pilot's Operating Handbook (POH) contains 9 sections including the material required to be furnished to the pilot by the Joint Aviation Requirements (JAR 23) and constitutes the EASA Approved Airplane Flight Manual.

It also contains supplemental data supplied by the manufacturer firm:

EXTRA Flugzeugproduktions- und Vertriebs- GmbH

Flugplatz Dinslaken

Schwarze Heide 21

D-46569 Hünxe

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and all necessary information for safe and efficient operation of the aircraft. These instructions provide you with a general knowledge of the aircraft and its characteristics and specific normal and emergency operating procedures. This manual provides the best possible operating instructions.

In addition, the manual takes a "positive approach" and normally states only what you can do. Unusual operations or configurations are prohibited unless specifically covered herein. Clearance must be obtained before any questionable operation is attempted, which is not specifically permitted in this manual.

1.1.a Basic POH

The basic POH consists of the description of the standard aircraft without optional equipment. The pages are identified by:

Section N°-Page of Section (for example: 1-4) and the date of issuance of the original page.

1.1.b Revisions

Changes and/or additions to this handbook will be covered by revisions, published by EXTRA- Flugzeugproduktions- und Vertriebs- GmbH. They are identified by:

Section N°-Page of Section (for example: 1-4) and the date of issuance of the revised page.

A revision bar will extend the full length of new or revised text and/or illustrations added on new or presently existing pages. This bar will be located adjacent to the applicable revised area on the inner margin of the page.

These revisions are distributed to EXTRA 500 aircraft owners registered by EXTRA- Flugzeugproduktions- und Vertriebs- GmbH at the time of revision issuance.

In addition, owners should contact their EXTRA dealer when ever the revision status of their handbook is in question, for example in case of the owner has changed. A revision bar will extend the full length of new or revised text and/or illustrations added on new or presently existing pages. This bar will be located adjacent to the applicable revised area on the inner margin of the page. All revised pages will carry the revision date.

1.1.c Temporary Revisions

A Temporary Revision will be issued on urgent matters concerning the owners/operators aircraft. They are identified by "yellow pages" and:

Temporary revision No.

They will be replaced in time by an amendment.

1.1.d Supplements

Supplements are provided to insert optional equipment of the aircraft into the standard POH. Standard POH pages plus supplemental pages result in a POH valid for a specific aircraft (e.g. Serial No.).

These pages are identified by:

Section 9 Subsection N°-Page of Section (for example: 901-4) and the date of issuance of the original page.

1.1.e Supplemental Revisions

The information compiled in the Supplemental Pages will be brought up to date by supplemental revisions. They are identified by:

Section 9 Subsection N°-Page of Section (for example: 901-4) and the date of issuance of the revised page.

1.2 Definitions

1.2.a Warning, Cautions, Important, Notes

The following definitions apply:

Warning **Operating procedures, techniques, etc., which, if not correctly followed may result in personal injury or loss of life.**

Caution **Operating procedures, techniques, etc., which, if not strictly observed may result in damage to equipment. This safety note does not exclude a possible danger for the personnel.**

Important **Represents an important hint.**

Note **An operating procedure, technique, etc., which is considered essential to emphasize.**

1.2.b "Shall", "Will", "Should" and "May"

The word **"shall"** or **"will"** shall be used to express a mandatory requirement.

The word **"should"** shall be used to express non-mandatory provisions.

The word **"may"** shall be used to express permissiveness.

1.2.c Fonts

Different fonts are used to mark various parts of equipment and can be found in a similar style on the aircraft.

Sans serif, semi-bold characters correspond to panel areas, switches, circuit breakers, rheostats, handles or levers and to the related positions (e.g. **FUEL PUMP 1** or **IGN OFF**). Circuit breakers and rheostats are additionally marked as such (e.g. **FUEL-P-1** circuit breaker, **-TEMP CTRL-** rheostat).

Sans serif, semi-bold inverted characters on grey background correspond to annunciator lights on the annunciator panel (e.g. **FLAPS** or **FUEL TRANS LEFT**). The color of the respective annunciator light is indicated (where applicable) by the following abbreviations:
r = red (warning)
y = yellow (caution)
g = green (safe operation)

Special inverted characters on grey background correspond to indications on digital displays (e.g. Good or 40.2).

1.3 Dimension Diagram

1.3.a Tree View Drawing

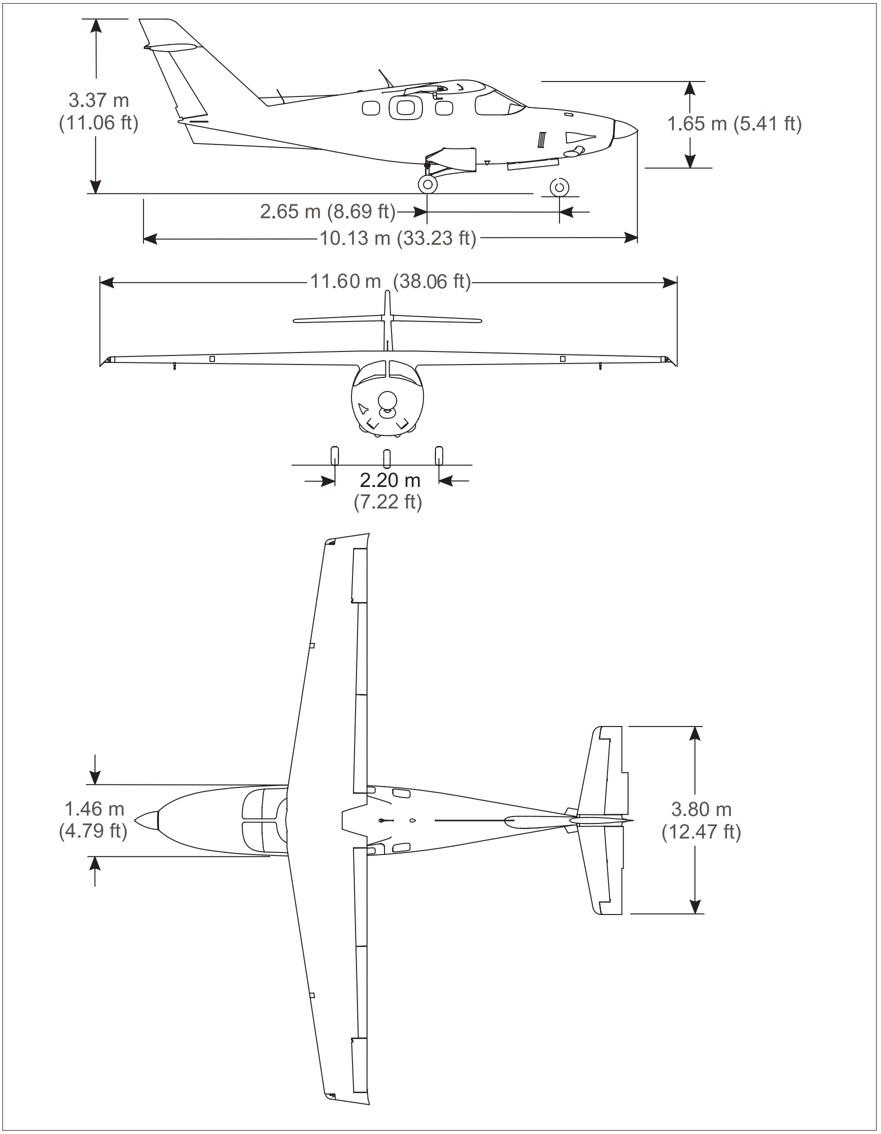


Figure 1-1

1.4 General Description

1.4.a Aircraft

The EXTRA 500 is a single engine, turbopropeller, six seat business aircraft with the following main advantages:

- Fully configured for single pilot IFR-day and night operation.
- Sealed cabin area structurally reinforced for pressurization.
- Lightning strike protected by combination of conducting carbon structure and metal bondings.
- High wing and T-tail designed empennage with extended vertical fin, realizing clear aerodynamic and aircraft control advantages.
- Tricycle, retractable landing gear, equipped with nose wheel steering capability.

1.4.b deleted

1.4.c Engine

Number of Engines:	1
Engine Manufacturer:	Rolls Royce
Engine Model Number is:	250-B17F/2

Main components are:

- propeller reduction gearbox
- compressor
- power and accessory gearbox
- turbine
- combustion section

The power control system is divided into:

- gas producer fuel control
- propeller power turbine governor assembly
- fuel pump and filter assembly
- fuel nozzle
- propeller overspeed governor
- propeller overspeed governor reset solenoid energized by the overspeed test switch
- coordinator

Takeoff Power (limited to 5 minutes):	450 SHP[1]
Maximum Continuous Power:	380 SHP[1]

[1]) ISA conditions at sea level

1.4.d Propeller

Number of Propellers:	1
Propeller Manufacturer:	MT-Propeller
Propeller Model Number:	MTV-5-1-D-C-F-R(A)/CFR210-56
Number of Blades:	5
Propeller Diameter:	2.10 m (82.68 in.)
Propeller Type:	Constant speed, feather, reverse, governor controlled, and equipped with electrothermal de-icing system and a pitch range of 94°.

1.4.e Fuel

Fuel confirming the following military and commercial specifications are approved for unrestricted use:

ASTM D 1655-03 or later, JET A or A-1

Fuel System Icing Inhibitor:
MIL-DTL-85470B or equivalent in the amount of 0.10 % up to 0.15 % by volume.

1.4.f Capacities

Total Fuel Capacity:	680 l (179.6 U.S. Gallons)
Total Usable fuel:	652 l (172.2 U.S. Gallons)
Unusable fuel:	28 l (7.4 U.S. Gallons)

1.4.g Oil

Engine Oil to be used:

	Starting min. temperature:
MIL-PRF-7808L or later	-54 °C (-65 °F)
MIL-PRF-23699F or later	-40 °C (-40 °F)
Total Oil Capacity:	5.18 l (5.47 US Quarts)

1.4.h Maximum Certificated Weights

Maximum allowable Takeoff Weight:	2130 kg (4696 lbs.)
Maximum allowable Landing Weight:	2000 kg (4409 lbs.)
Maximum operational Empty Weight (including 1 Crew members):	1599 kg (3525 lbs.)

1.4.i Cabin and Entry Dimensions

Cabin Width (maximum):	1.39 m (4.56 ft.)
Cabin Length (front to rear bulkhead):	4.13 m (13.55 ft.)
Cabin Height (maximum):	1.24 m (4.07.ft.)
Entry Door Width:	0.68 m (2.23 ft.)
Entry Door Height:	1.15 m (3.77 ft.)
Emergency Exit Window Width:	0.68 m (2.23 ft.)
Emergency Exit Window Height:	0.50 m (1.64 ft.)

1.4.j Baggage Compartment

A baggage compartment is available in the aft pressure cabin area behind the passenger seats in the 3rd row. It is primarily intended for luggage and briefcases up to a total mass of 90 kg.

1.4.k Specific Loadings

Wing Loading (maximum):	149.3 kg/m2 (30.6 lbs./sq.ft.)
Power Loading (maximum):	4.7 kg/BHP (10.4 lbs./BHP)

Note **For further information concerning the above mentioned, refer to Chapter 2, Limitations.**

1.5 Symbols, Abbreviations and Terminology

1.5.a General Airspeed Terminology and Symbols

CAS	Calibrated Airspeed means the indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in "knots".
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed is the speed of an aircraft as shown in the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
KIAS	Indicated Airspeed expressed in "knots".
TAS	True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility.
V_O	Operating maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.
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 aircraft 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_{NE}	Never Exceed Speed is the speed limit that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
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.
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 in altitude in the shortest possible time.

1.5.b Meteorological Terminology

ISA	International Standard Atmosphere in which a The air is a dry perfect gas; b The temperature at sea level is 15° Celsius (59° Fahrenheit); c The pressure at sea level is 1013.2 mbar (29.92 inches hg.); d The temperature gradient from sea level to the altitude at which the temperature is -56.5°C (-69.7°F) is -1.98°C (-3.564°F) per 1,000 foot and zero above that altitude.
OAT	Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.
Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 1013.2 mbar (29.92 in. hg.).
Pressure Altitude	Altitude measured from standard sea level pressure (1013.2 mbar/29.92 in. hg.) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this Handbook, 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 Handbook are to be understood as the headwind or tailwind components of the reported winds.

1.5.c Power Terminology

Takeoff Power	The maximum power permissible for takeoff (is time limited to 5 min. max).
Maximum Continuous Power (MCP)	The maximum power for unrestricted periods of use.
Flight Idle	The minimum power setting required to run an engine that will assure satisfactory engine operation in flight.
Ground Idle	The minimum power setting required to run an engine that will assure satisfactory engine operation on ground.
Reverse	Power setting used for negative thrust (must not be used in flight)

1.5.d Engine Controls and Instruments

Power Control Lever	The power control lever allows thrust modulation from Takeoff (full forward position) to Maximum Reverse (aft position). Specific positions on the lever are: Max Power, Flight Idle, Ground Idle and Max Reverse. A "pull to retard" feature will prevent inadvertent lever movement below the flight idle setting when in flight.
Condition lever	The condition lever allows engine starting and shutdown, propeller feathering and fuel shutoff, and the capability to vary the propeller speed between 93.6 and 100 %. Specific positions are: 100 % Propeller Speed (full forward position), Minimum Propeller Speed setting, and Fuel Shutoff and Propeller Feathering (aft position). A "pull to retard" feature will prevent inadvertent lever movement below the minimum propeller speed setting when in flight.
Turbine Outlet Temperature (TOT) Gauge	The turbine outlet temperature indicator is the instrument used to show the temperature of the gases leaving the 2nd wheel of the gas producer turbine rotor (°C).
Torque Gauge	The torque indicator is the instrument used to identify the propeller shaft torque. The sensed engine torquemeter oil pressure is converted into an indication of torque output, expressed in terms of percent (%).
Oil Pressure Gauge	The oil pressure indicator is the instrument used to show the pressure (PSI) of the engine oil delivered to the gearbox housing "header" passage (downstream the pressure pump, internal oil filter and oil pressure regulating valve)
Oil Temperature Gauge	The oil temperature indicator is the instrument used to show the temperature (°C) of the engine oil delivered to the engine oil inlet port at the accessory gearbox.
Gas Producer Speed (N1) Gauge	The gas producer speed indicator is the instrument used to identify the rotational speed of the engine gas producer turbine rotor. The gas producer speed is sensed via the gas producer gear train by a tach-generator and converted into an indication of RPM output, expressed in terms of percent (%).

Propeller Speed (N2) Gauge	The propeller speed indicator is the instrument used to identify the rotational speed of the propeller. The propeller speed is sensed via the power turbine gear train by a tach-generator and converted into an indication of RPM output.

1.5.e 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 cross wind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests.

1.5.f Weight and Balance

Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Moment	The product of the weight of an item multiplied by its arm.
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.
Usable Fuel	Fuel available for flight planning.

Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with certification basis.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full opera ting fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between takeoff weight, or ramp weight if applicable, and basic empty weight.
Zero Fuel Weight	Basic empty weight plus payload but no usable fuel.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes weight of start, taxi and run up fuel.)
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Minimum Weight	Standard empty weight plus minimum crew (1 pilot) and fuel for half an hour operating the airplane at maximum continuous power.
Maximum Empty Weight	Maximum approved empty weight of airplane including unusable fuel, full operating fluids and full oil.

1.6 Conversion to U.S. Units

Multiply kg by 2.2 to obtain lbs.
Multiply m by 39.37 to obtain in.
Multiply kgm by 0.866 to obtain in.lbs./100

Section 2
Limitations
Table of Contents

Paragraph *Page*

2 Limitations

2.1 Introduction

General

This section includes operating limitations, instrument markings and basic placards, necessary for the safe and efficient operation of the aircraft, its engine, standard systems and standard equipment.

Note **In case an aircraft is equipped with specific options, the necessary additional information for safe operation like limitations, procedures, performance data and other is shown in section 9 of this POH.**

Instrument markings are provided for the corresponding limitations of the aircraft.

Any exceeding of given limitations has to be reported and considered by corresponding maintenance and/or inspection procedures according Maintenance Documentation for EXTRA 500 aircrafts.

The limitations included in this section and in section 9 are approved by the EASA. Observance of these operating limitations is required by national regulations.

2.2 Airspeed Limitations

Airspeed Limitations are indicated in KCAS. The operational significance is shown in Figure 2-1 below.

Speed	KCAS	KIAS	Remarks
Maneuvering Speeds V_A/V_o 1545 kg (3406 lbs.) 2130 kg (4696 lbs.)	 132 158	 131 156	Avoid full or abrupt control movements above this speeds. For masses between the given ones the values are assumed to be linear.
Maximum Flaps Extended Speed V_{FE} 15° 30°	120 111	120 109	Do not exceed this speeds with given flap settings.
Maximum Landing Gear Operating Speed V_{LO}/V_{LE}	142	140	Do not exceed this speed while operating the landing gear or with landing gear extended.
Never Exceed Speed V_{NE}	209	207	Do not exceed this speed in any operation.
Maximum Structural Cruising Speed V_{NO}	190	188	Do not exceed this speed except in smooth air and with caution.
Stall Speed in Landing Configuration V_{SO}	61	58	Refer to section 5 for stall speeds at reduced weights.

Figure 2-1

2.2.a Takeoff and Landing Speeds (KCAS)

Refer to Section 4, Normal Procedures.

2.3 Airspeed Indicator Markings

Airspeed indicator markings and their color code are marked on the relevant instrument. See Figure 2-2 below.

Markings	KIAS Value or Range	Significance
White Arc	58 thru 109 (61 thru 111 KCAS)	Full flaps operating range. Lower limit is maximum mass stalling speed in landing configuration. Upper limit is maximum speed permissible with flaps (30°) extended.
Green Arc	80 thru 188 (79 thru 190 KCAS)	Normal operating range. Lower limit is maximum mass stalling speed with flaps and landing gear retracted. Upper limit is maximum structural Cruising speed.
Yellow Arc	188 thru 207 (190 thru 209 KCAS)	Operations must be conducted with caution and only in smooth air.
Red Line	207 (209 KCAS)	Maximum speed for all operations.

Figure 2-2

2.4 Reserved

2.5 Engine/Propeller Operating Limitations

Engine and propeller operating limitations are listed below:

Note **If any limitations are exceeded, a maintenance check and/or repair as well as an overhaul is required in accordance with adequate maintenance, inspection documentation.**

2.5.a Engine

1 Engine Operating Limits

- Takeoff Power (5 minutes):	450 SHP (336 kW)
- Maximum. Continuous Power:	380 SHP (283 kW)

2 N1 (Gas Producer) Limits:

- Normal operating range	60 % to 105 %
- Maximum 15 seconds	105 % to 106 %
- Above 15 seconds	105 % to 106 %
- Not permitted:	above 106 %

3 Propeller Limits

- Minimum normal operating:	1900 RPM (93.6 %)
- Maximum continuous:	2030 RPM (100 %)
- Maximum during transient:	2030 RPM to 2233 RPM (100 % to 110 %) (15 sec. max above 2132 RPM [105 %])
- Not permitted:	above 2233 RPM (110 %)

4 TOT (Turbine Outlet Temperature) Limits

- Maximum normal operating/Cruise:	752 °C (1385 °F)
- Maximum takeoff power (5 min.):	810 °C (1490 °F)
- Maximum during power transient (6 sec.):	843 °C (1550 °F)
- Maximum during starts (10 sec.): with momentary peak (1 sec.):	above 810 °C (1490 °F) up to 927 °C (1700 °F)
- Not permitted:	above 927 °C (1700 °F)

5 Engine Torque Limits

- Maximum normal operating/Cruise:	92 % (983 lb ft; 1333 Nm)
- Maximum takeoff power (5 min.):	111 % (1185 lb ft; 1607 Nm)
- Maximum momentary peak (10 sec.):	115 % (1218 lb ft; 1651 Nm)
- Not permitted:	115 % (1218 lb ft; 1651 Nm)

6 Oil Temperature Limits

- Maximum normal continuous operating: - above 40 % TRQ (123 kW; 165 SHP):	 82 °C (180 °F)
- below 40 % TRQ (123 kW; 165 SHP):	107 °C (225 °F)
- Maximum takeoff (5 min.):	107 °C (225 °F)
- Not permitted:	above 107 °C (225 °F)

7 Use of Oil Grades Temperature Dependent

- At oil temperature –54 °C (-65 °F) or above:
  MIL-PRF-7808L or later
- At oil temperature –40 °C (-40 °F) or above:
  MIL-PRF-23699F or later

Minimum starting:

- MIL-PRF-7808L or later	-54 °C (-65 °F)
- MIL-PRF-23699F or later	-40 °C (-40 °F)

Caution **Only discretionary mixing of oil series is permitted without time penalty. If brands of oils are changed, it is recommended this change be accomplished gradually using a "TOP-OFF" method or by draining and refilling.**

Note **Oil series and brand used shall be recorded in engine module logbook.**

8 Oil Pressure Limits

- Maximum normal continuous Operation:	130 psig (896 kPa)
- Minimum normal continuous Operation:	
at 94 % N1 and above	120 psig (872 kPa)
at 85 % N1 up to 94 % N1	90 psig (621 kPa)
below 85 % N1	50 psig (345 kPa)
- Minimum in beta range Operation:	
at 94 % N1 and above	105 psig (769 kPa)
at 85 % N1 up to 94 % N1	75 psig (518 kPa)
below 85 %.- N1	35 psig (242 kPa)
- Minimum during start when 59 % N_1 is reached:	Positive indication
- Not permitted:	above 130 psig (896 kPa)

Note **During cold weather operation, 150 psig (1034 kPa) oil pressure is allowable at minimum power, following an engine start. Stay in ground idle power setting as long as oil pressure exceeds max continuous pressure limit (130 psig) during engine warm up.**

9 Fuel Grades

Primary Fuel:

ASTM D 1655-03 or later, grade JET A or A-1

Cold weather fuel:

ASTM D 1655-03 or later, grade JET A or A-1 with anti ice additive MIL-DTL-85470B or later

Caution **Adding anti-icing additive into the fuel during refueling.**
Proper mixing of anti icing additive with fuel is extremely important, because concentration in excess of the recommended (0.10 % up to 0.15 % by volume) will result in detrimental effects to the fuel tanks.

Note **JET A and JET A-1 fuels are not restricted from use at ambient temperatures below –18 °C (0 °F); however, special provisions for starting (preheat to the engine fuel control area) must be made. Once started, engine operation will be satisfactory in outside temperatures down to –32 °C (-25 °F) for JET A and JET A-1.**

10 Use of Fuel Grades Temperature Dependent

Starting and operating temperature ranges:

Ambient temperature	**Fuel grade for**	
	Starting	**Operating**
at +38 °C(+100 °F) down to +4 °C (+40 °F)	Primary	
below +4 °C (+40 °F) down to-18 °C (+0 °F)	Cold weather	
below -18 °C(+0 °F) down to -32 °C (-25 °F)	Cold weather preheated	Cold weather

Figure 2-3

2.5.b Propeller

Propeller manufacturer:	MT-Propeller
Propeller model number:	MTV-5-1-D-C-F-R(A)/CFR210-56
Propeller diameter:	210 cm ±0.5 cm (82.68 in. ±0.2 in.)
Blade angle settings at radius 790 mm (31.1 in.):	Low pitch 8° ±0.2° Feather/course pitch 79° ±1° Reserve –15° ±1°
Max. takeoff and continuous speed:	2030 RPM

2.6 Engine Instrument Markings

Engine instrument markings and their colour significance are shown in Figure 2-4 below.

Instrument	**Red Line**	**Yellow Arc**	**Green Arc**	**Yellow Arc**	**Red Line**
	Min. Limit	Caution Range	Normal Operating	Caution or Takeoff	Max. Limit
TOT °C (°F)	-	-	0 - 752 (32 - 1385)	752 - 810 (1385 - 1490)	810 (1490) 843 (1550) ∇[1] 927 (1700) ◊[2]
Torque %	-	-	0 - 92	92 - 111	111
Prop. "N2" RPM	-	1218 - 1900	1900 - 2030	-	2030 2233 ∇[1]
Gas P. "N1" %	-	-	60 - 105	-	105 106 ∇[1]
Oil Temp. °C (°F)	-	-	0 - 82 (32 - 180)	82 - 107 (180 - 225)	107 (225)
Oil Pressure PSI	35	35 - 90	90 - 130	-	130

[1]) Red Arrowhead: Maximum Transient Limit
[2]) Red Diamond: Maximum Temperature Starting

Figure 2-4

2.7 Miscellaneous Instrument Markings

Miscellaneous instrument markings are shown in Figure 2-5 below.

Instrument	Red Line	Yellow Arc	Green Arc	Yellow Arc	Red Line
	Min. Limit	Caution Range	Normal Operating	Caution or	Max. Limit
Cabin Altitude, ft					10.000
Cabin Differential Pressure, (PSI)			0 – 5.5		5.5
Fuel Quantity collector compartment (LH/RH)	0 1				
Fuel Quantity main compartment (LH/RH)	0 1				
Fuel Quantity auxiliary compartment (LH/RH)	0 1				

Figure 2-5

2.8 Aircraft Weight Limitations

Maximum Ramp Weight (Taxi Weight):	2130 kg (4696 lbs.)
Maximum Takeoff Weight:	2130 kg (4696 lbs.)
Maximum Landing Weight:	2000 kg (4409 lbs.)
Maximum Zero Wing Fuel Weight:	1945 kg (4289 lbs.)
Maximum Empty Weight: (incl. unusable fuel)	1445 kg (3186 lbs.)
Maximum Weight in Baggage Compartment:	90 kg (198 lbs.)

2.9 Center of Gravity Limits

Center of gravity ranges (M.A.C.) are as follows:

Note **Values are for landing gear extended configuration.**

Forward C.G.:	18 % M.A.C. up to TOW 1600 kg (3527 lbs.)
	25 % M.A.C. up to MTOW 2130 kg (4696 lbs.)
Aft C.G.:	34.5 % M.A.C.

Note **C.G. range varies lineary between mass limits. M.A.C. is 1322 mm (52.05 in.).**

0 % M.A.C. is at 3200 mm.

2.10 Maneuver Limits

The EXTRA 500 is a normal category aircraft. 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 angle of bank is not more than 60°.

Aerobatic maneuvers, including spins are prohibited.

2.11 Flight Load Factor Limits

Wing flaps UP:	$-1.5 \leq n \leq +3.8$
Wing flaps 15° and 30°:	$-0 \leq n \leq +2.0$

Intentional negative load factors prohibited.

2.12 Flight Crew Limits

Minimum certificated flight crew is one (1) pilot on the left seat.

Note **For further crew requirements, national regulations must be observed.**

2.13 Kinds of Operation

The aircraft is cleared for day and night VFR and IFR flights if appropriate equipment is installed.

Flights into icing conditions are prohibited.

Ground and flight operation in both falling and blowing snow is prohibited.

Note **For special crew requirements, national regulations must be observed. Presently no NDB-approaches are possible. IFR-equipment does not include an ADF receiver.**

The aircraft is certified for B-RNAV operation. P-RNAV operation and GNSS approach are prohibited.

For kinds of operation equipment lists refer to section 2.14 VFR/IFR Operation Equipment Lists.

2.14 Kinds of Operation Equipment List

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Air Conditioning					
Environmental bleed shut off valve	1	1	1	1	
Windshield defrost system	1	1	1	1	
Warning light: **BLEED OVERTEMP**	1	1	1	1	
Pressure Cabin (above FL 120)					
Automatic bleed temperature control system	1	1	1	1	
Automatic bleed mass flow control system	1	1	1	1	
Cabin pressure controller	1	1	1	1	
Outflow control valve	1	1	1	1	
Outflow safety valve	1	1	1	1	
Cabin altitude indicator	1	1	1	1	
Cabin diff. press. indicator	1	1	1	1	
Warning light: **CABIN PRESSURE**	1	1	1	1	
Auto Flight					
Autopilot			1	1	
Turn & bank indicator (electric)			1	1	
Communications					
Audio panel			1	1	
ELT 406 MHz	1	1	1	1	
Electrical Power					
Battery	1	1	1	1	
(Starter-) generator	1	1	1	1	

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Standby alternator			1	1	
Voltage indicator	1	1	1	1	
Ammeter (generator & standby alternator)	1	1	1	1	
Warning light: GENERATOR FAIL	1	1	1	1	
Caution light: LO VOLTAGE	1	1	1	1	
Caution light: STANDBY ALTERN ON			1	1	
Safe operation light: EXTERNAL POWER	1	1	1	1	
Equipment / Furnishings					
Safety belt and shoulder harness	*	*	*	*	
Fire Protection					
Fire extinguisher	1	1	1	1	
Flight Controls					
Flap system	1	1	1	1	
Flap position indication	1	1	1	1	
Pitch trim system	1	1	1	1	
Pitch trim position indicator	1	1	1	1	
Warning light: FLAPS	1	1	1	1	
Flap position indication (1x amber, 2x green)	1	1	1	1	
Fuel					
Electric fuel pump	2	2	2	2	
Fuel quantity indicators	6	6	6	6	
Fuel transfer system (left & right)	1	1	1	1	
Caution light: FUEL TRANS LEFT	1	1	1	1	
Caution light: FUEL TRANS RIGHT	1	1	1	1	
Caution light: FUEL LOW LEFT	1	1	1	1	

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Caution light: **FUEL LOW RIGHT**	1	1	1	1	
Caution light: **FUEL FILTER BYPASS**	1	1	1	1	
Warning light: **FUEL PRESS**	1	1	1	1	
Hydraulic Power					
Hydraulic power pack	1	1	1	1	
Caution light: **HYDRAULIC PUMP**	1	1	1	1	
Ice and Rain Protection					
Heated engine inlet	1	1	1	1	
Warning light: **WINDSHIELD HEAT FAIL**	1	1	1	1	
Safe operation light: **INTAKE HEAT**	1	1	1	1	
Safe operation light: **WINDSHIELD HEAT ON**	1	1	1	1	
Indicating / Recording Systems					
IFD, incl. COM, NAV, GPS, Altimeter, Airspeed indicator, Attitude indicator, Vertical speed indicator, clock	2	2	2	2	
Aural warning system (over-speed, gear, stall)	1	1	1	1	
Cockpit loudspeaker	1	1	1	1	
Landing Gear					
Landing gear position indication (3x green)	1	1	1	1	
Warning light: **GEAR WARN**	1	1	1	1	
Lights					
Flashlight		1		1	
Anti-collision light system (strobe)	1	1	1	1	
Landing light		1		1	

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Navigation light system (reco)	1	1	1	1	
Instrument light system (incl. test function)		1		1	
Cockpit controls illumination (luminous films)		1		1	
Glare light		1		1	
Safe operation light: **LANDING LIGHT**		1		1	
Safe operation light: **RECOGN LIGHT**	1	1	1	1	
Navigation					
Standby airspeed indicator			1	1	
Pitot tube	1	1			
Pitot tube, heated			2	2	
Standby altimeter			1	1	
Static source	2	2			
Static source, heated			2	2	
IAT indicator	1	1	1	1	
Magnetic compass	1	1	1	1	
Standby attitude gyro (electric)			1	1	
Transponder	1	1	1	1	
Stall warning system	1	1			
Stall warning system (heated)			1	1	
Warning light: **STALL WARN**	1	1	1	1	
Warning light: **STALL HEAT**			1	1	
Caution light: **PITOT HEAT LEFT**			1	1	
Caution light: **PITOT HEAT RIGHT**			1	1	
Caution light: **STATIC HEAT LEFT**			1	1	
Caution light: **STATIC HEAT RIGHT**			1	1	

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Pneumatic					
Pneumatic pressure regulator	1	1	1	1	
Caution light: **PNEUMATIC LOW**	1	1	1	1	
Doors					
Warning light: **AFT DOOR**	1	1	1	1	
Propellers					
Caution light: **LOW PITCH**	1	1	1	1	
Ignition					
Safe operation light: **IGNITION ACTIVE**	1	1	1	1	
Engine Indicating					
Fuel flow indicator			1	1	
Fuel pressure indicator	1	1	1	1	
N_2 (Prop) RPM indicator	1	1	1	1	
N_1 (Gas-generator) RPM indicator	1	1	1	1	
Torque indicator	1	1	1	1	
TOT indicator	1	1	1	1	
Oil pressure indicator	1	1	1	1	
Oil temperature indicator	1	1	1	1	
Warning light: **OIL PRESS**	1	1	1	1	
Caution light: **CHIP DETECTION**	1	1	1	1	

*) one for each seat occupied

Figure 2-6

2.15 Fuel Limitations

2.15.a Fuel Quantity

Fuel quantity is based on fuel grade JET A-1 at 15 °C (59 °F) with specific gravity 0.814 kg/l and shown in table (Figure 2-7) below:

Note **The maximum allowable fuel unbalance is 106 liter (28 U.S. Gallons).**

Note **The left and right wing are subdivided in three compartments each; the collector, main and auxiliary compartment.**

Wing Tank	Liter	lbs	Kg	US Gal.	Remark
Collector Compartment	2 x 37.4	2 x 67.1	2 x 30.4	2 x 9.9	One indicator each side
Main Compartment	2 x 196.6	2 x 352.9	2 x 160.0	2 x 51.9	One indicator each side
Auxiliary Compartment	2 x 106.0	2 x 190.3	2 x 86.3	2 x 28.0	One indicator each side
Total Capacity	**680.0**	**1220.5**	**553.5**	**179.7**	
Unusable Fuel	2 x 14.0	2 x 25.1	2 x 11.4	2 x 3.7	
Usable Fuel	**652.0**	**1170.3**	**530.7**	**172.3**	

Figure 2-7

2.15.b Fuel Pressure

Note **The fuel pressure shall not exceed 25 psig.**

If fuel pressure at engine fuel pressure sensing port drops below 1.5 psig (3 in Hg), the red FUEL PRESS warning light on the annunciator panel illuminates.

2.15.c Fuel Transfer

If fuel pressure in the left and/or right fuel transfer wing system drops below 10 psi (700 hPa), the amber FUEL TRANS LEFT and/or FUEL TRANS RIGHT caution light on the annunciator panel illuminate.

2.15.d Fuel Flow

The maximum fuel flow at takeoff power setting at ISA conditions is 156 ltr/h (280 lbs/h).

2.15.e Low Fuel

The illumination of the amber FUEL LOW LEFT and/or FUEL LOW RIGHT caution lights on the annunciator panel indicates that the remaining fuel quantity from the relevant fuel tank is low and that the fuel selector valve should be switched within next five minutes to the opposite wing tank only. This low fuel condition may be verified by the individual fuel quantity indicators.

2.16 System and Equipment Limitations

2.16.a Electrical Power Supply

1 Starter Generator

The maximum continuous Starter generator current Output is limited to 200 Amps (28 V DC).

2 Starter Operation Limits

Caution **The Starter Operation cycle is limited to 30 seconds.**

If several Starter cycles are necessary, the following Starter generator and engine cooling periods must be observed:

1st cycle: 30 seconds ON	-	1 minute OFF
2nd cycle: 30 seconds ON	-	1 minute OFF
3rd cycle: 30 seconds ON	-	30 minutes OFF

3 Standby Alternator

If bus voltage drops below 26 ±0.2 V DC, the standby operates automatically. The standby alternator System is limited to 20 Amps continuous electrical current output.

However, transient operations of greater than 20 Amps for no more than 5 consecutive minutes may be conducted.

Flashing of the STDBY ALT ON light on the annunciator panel indicates, that the standby alternator is:

- delivering power to the bus

- producing more than rated 20 Amps electrical current.

A load of 20 Amps or less is indicated by steady illuminating of the STBY ALT ON annunciator light.

For full rated power output a minimum N l of 93 % is necessary.

4 Bus Voltage

Normal generator operation: 28.5 ±0.5 VDC (Standard setting)

Standby alternator operation:
26.0 ±0.2 down to 25.0 VDC at rated 20 Amps.

2.16.b Hydraulic System Limits

1 Hydraulic powerpack (Landing Gear Retraction)

Oil Grade:	MIL-H-5606G and MIL-PRF-5606H or later (*)
Reservoir content:	1.1 L (1.16 U.S. Quarts)
Max. operating pressure:	12.0 MPa (1740 psi)

2 Wheel Brakes

Oil Grade:	MIL-H-5606G and MIL-PRF-5606H or later (*)
Reservoir content:	0.148 L (5.0 Oz)
Max. operating pressure :	5.5 MPa (800 psi)

3 Oleo Shock Absorber

Oil Grade:	MIL-H-5606G and MIL- PRF-5606H or later (*)
Normal operating pressure:	Main gear: 5.7 MPa (827 psi)
Nose gear:	1.5 MPa (218 psi)

(*) Recommended hydraulic fluid type is: AeroShell Fluid 4 or AeroShell Fluid 41.

2.16.c Cabin Pressurization Limits

The pressurized cabin operation altitude is up to flight altitudes of 25.000 feet.

Max. cabin pressure differential is 5.5.psi (380 hPa) for normal operation.

Max. structural pressure differential is 5.8 psi (400 hPa)

Max. cabin pressure altitude: 7.950 ft.

Note **A red CABIN PRESSURE warning light on the annunciator panel illuminates when cabin altitude exceeds 10.000 feet ±500 feet or when maximal cabin pressure differential is exceeded.**

Reaching a cabin altitude of 8.500 feet ±500 feet the warning light extinguishes.

Landings with cabin pressurized are prohibited.

2.16.d Tires

Maximum tire limit speed:	140 KCAS
Nose wheel tire size:	5.0-5 6 ply
Nose wheel tire pressure:	0.35 MPa (51 psi)
Main wheel tire size:	15 x 6.0-6 10 ply
Main wheel tire pressure:	0.51 MPa (74 psi)

2.17 Other Limitations

2.17.a Maximum Operating Altitude Limit

The maximum certified aircraft operating altitude is 25.000 ft.

2.17.b Outside Air Temperature Limits

Minimum indicated outside air temperature (IAT) for engine starting:

- primary fuel:	+4 °C (+40 °F)
- alternate cold weather fuel:	-18 °C (0 °F)
- alternate cold weather fuel (preheated):	-32 °C (-25 °F)

Note **It is recommended to use auxiliary power source or preheat to the battery for starting engine below –18 °C (0 °F)**

Minimum indicated outside air temperature (IAT) for normal operation:

- primary fuel:	+4 °C (+40 °F)
- alternate cold weather fuel:	-32 °C (-25 °F)

Maximum indicated outside air temperature (IAT):

Aircraft shall not be operated when takeoff ambient temperature exceeds ISA+23 °C (ISA+41 °F) i.e. +38 °C (+100 °F) on SL.

2.17.c Ground Power Supply Limits

The maximum setting for ground power supply are:

- Voltage:	28 V DC
- Current:	1200 Amps

2.17.d Airstart Envelope Limits

At altitude 25.000 feet or below:

- Begin inflight starting procedure within 1 minute after engine shutdown
  (Power lever: "flight idle")
- Airspeed range for restart: 100 up to 140 KIAS

2.17.e Structural Temperature/Color Limitation

- Minimum Structural component temperature: -54 °C (-65 °F)
- Maximum Structural component temperature: +72 °C (+161.6 °F)

Note **Not to exceed the maximum temperature limit, color specification for composite structure (manufacturer document EA-05205.19) has to be complied with.**

2.17.f Maximum Passenger Seating Limits

Refer to regulations of national authority.

The number of passengers on board is limited by the approved seating configuration installed but must not exceed five (5) persons. Airplane weight and balance limits have to be considered.

2.17.g Limitations for Electrothermal Anti-ice Devices

Maximum operating time of propeller heat without running engine is: 10 seconds.

Maximum operating time of pitot-, static- and stall heat on ground (test function) is: 10 seconds.

Caution **Do not operate pitot-, static- and stall heat during flight at OAT above +20 °C (68 °F).**

2.17.h Flap Limitations

Approved landing position: 30°
Approved takeoff position: 15°

2.17.i Taxiing

Minimum turning radius of aircraft is 20.8 m (68.2 ft).

2.17.j Reverse Utilization Restriction

Positioning of power lever below the flight idle stop in flight is prohibited.

2.18 Reserved

2.19 Reserved

2.20 Placards

The following information must be displayed in the form of composite or individual placards.

The placards marked with (*) have to be used, when the aircraft is requested to be on the German register only.

2.20.a Internal Placards

On instrument panel in full view of the pilot:

> 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.

> WARNING:
> This aircraft is not approved
> for flight in icing conditions

> The airplane is approved for Day and Night, VFR/IFR operation.
> Landing with cabin pressurized prohibited.
> No acrobatic maneuvers, including spins, approved.

> PITOT HEAT
> must be ON below 20°C (68°F)

Near to the pilot's airspeed indicator:

Operating Maneuvering Speed at 1545kg (3406 lbs):	131 KIAS
at MTOW of 2130kg (4696 lbs):	156 KIAS
Maximum Landing Gear Operation Speed:	140 KIAS
Maximum Landing Gear Extended Speed:	140 KIAS

On windshield center strut:

> Compass readings
> only reliable when
> WINDSHIELD HEAT OFF

Near vent fan control switch (2x):

VENT

Next to magnetic compass:

For	N	30	60	E	120	150
Steer						
For	S	210	240	W	300	330
Steer						

DATE: RADIO ON

Near RPM Indicator:

N2 SPEED
AVOID RANGE:
60 sec. max
for engine
operating
above
20% torque
between
1500RPM and
1800RPM

Next to wing flap control:

Wing Flaps UP
before opening the door

Baggage compartment (RH, behind RH seat of 3rd row):

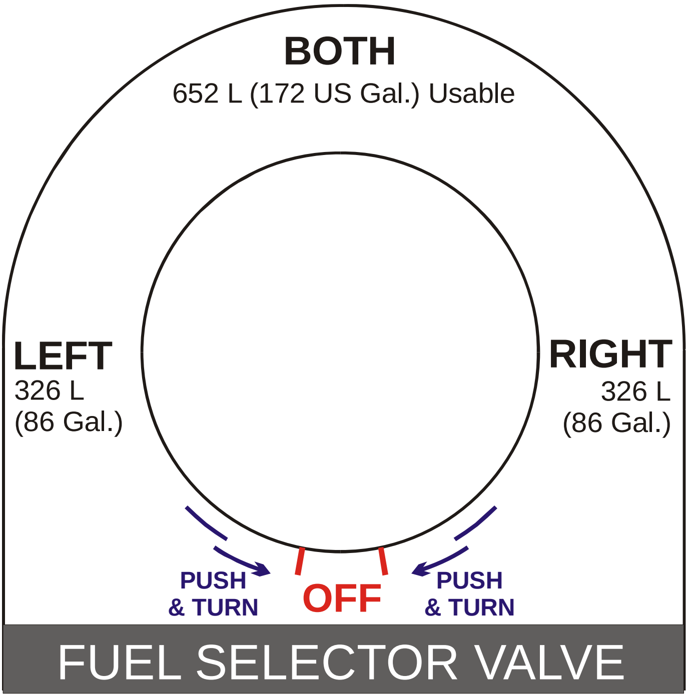
Maximum weight
in baggage compartment
90 kg (198 lbs.)

or

Höchstzulässiges Gewicht
im Gepäckabteil
90 kg (198 lbs.)

(*)

At fuel selector valve (on floor between pilot's and copilot's seat):



Below emergency exit (inside cabin):

EMERGENCY EXIT
swivel up and turn handle
and pull window inside

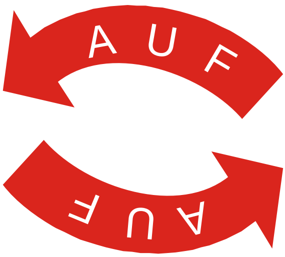
or

NOTAUSSTIEG
Griff drehen und
Fenster hereinziehen

(*)

Next to emergency handle (inside cabin)

or



(*)

Next to cabin door (inside cabin):

To open door

Wing Flaps UP?
Upper part:
depress safety button
and keep depressed,
rotate handle to the left,
deploy upper door
Lower part:
rotate sill lever up
and deploy lower door

To close door

Lower part:
pull up by means of cables,
rotate sill lever down to lock
check 4 inspection glasses
green
Upper part:
pull down,
rotate handle to the right
until it is locked
check 4 inspection glasses
green

In emergency case push upper door strongly against
extended wing flaps. Flap edge is deformable.

or

Öffnen der Tür

Klappen eingefahren?
Oberer Teil:
Sicherungsknopf drücken
und gedrückt halten
Griff nach links drehen
obere Tür hochklappen
Unterer Teil:
Hebel hochklappen
untere Tür herunterklappen

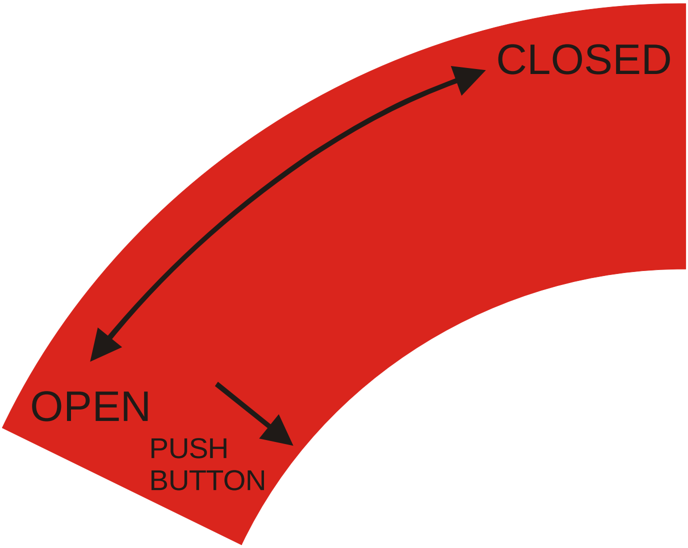
Schließen der Tür

Unterer Teil:
Tür an Kabeln
heraufziehen
Hebel herunterklappen
prüfe 4 Sichtfenster grün
Oberer Teil:
Tür herunterziehen
Griff nach rechts drehen
bis er einrastet
prüfe 4 Sichtfenster grün

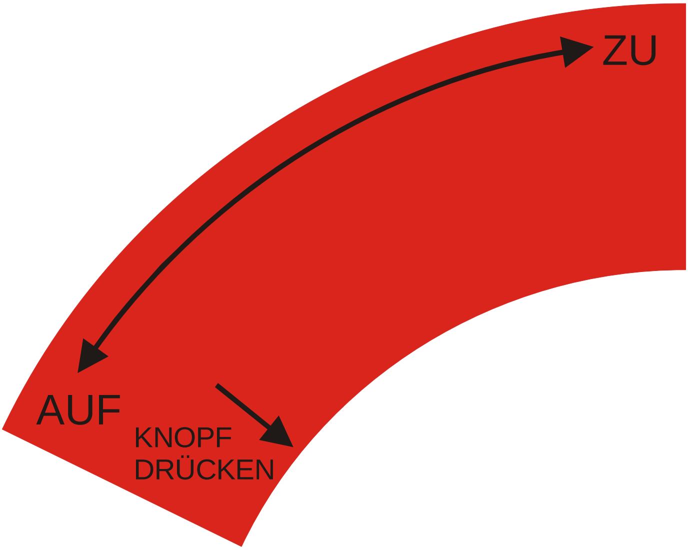
Im Notfall obere Tür kräftig gegen ausgefahrene
Klappe drücken. Klappe läßt sich deformieren

(*)

On upper cabin door nest to operating handle:

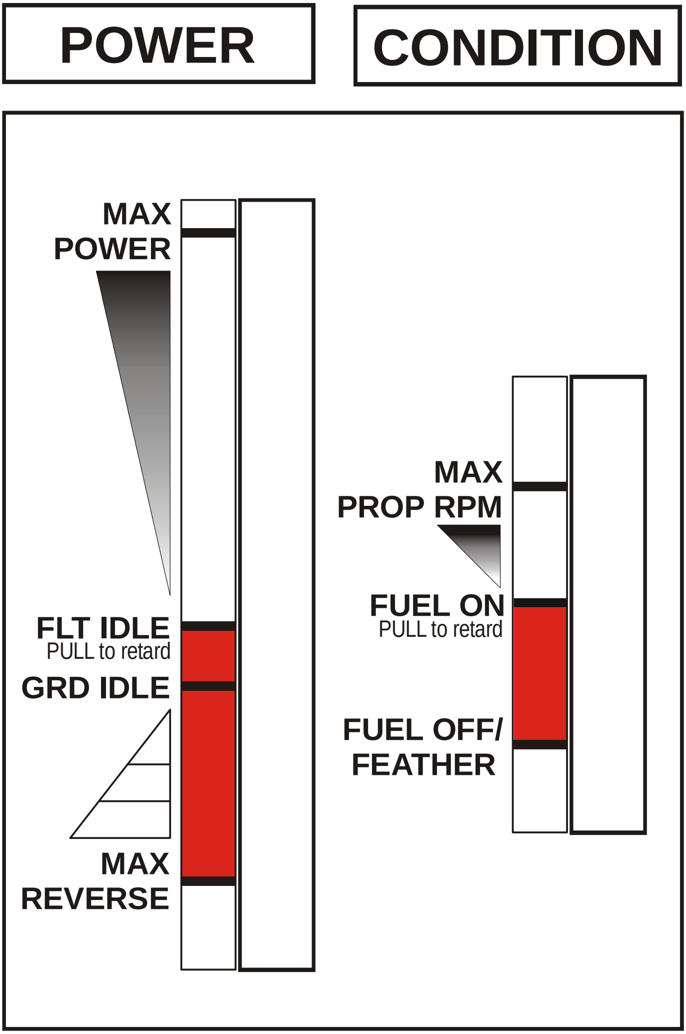


or



(*)

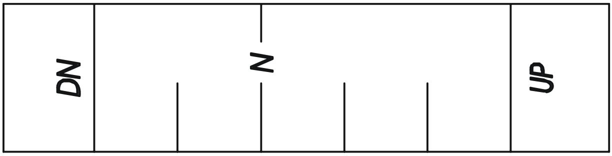
At power column (center pedestal):



At middle console panel (near respective control):

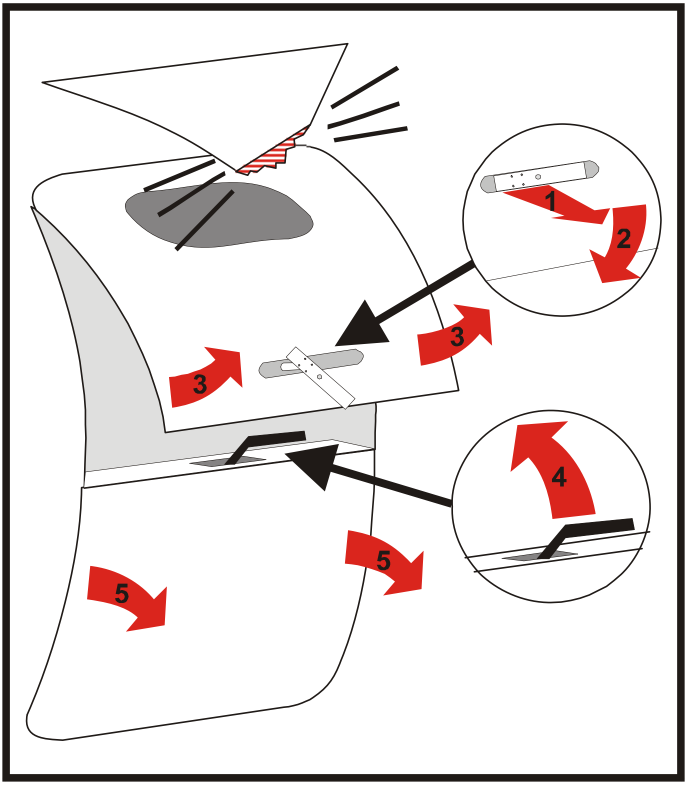
PULL TO DEFROST WINDSHIELD	DEPRESS PEDALS PULL KNOB PARKING BRAKE	PULL FOR INLET ANTI-ICE

At trim position indicator (middle console; right side of trim wheel):



2.20.b External Placards

On the fuselage surface just in front of the door:



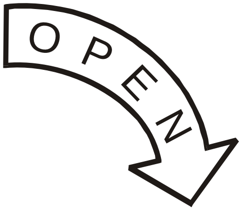
To open door	To close door
Wing Flaps UP? Upper part: Pull out handle completely and rotate handle to the right, deploy upper door Lower part: rotate sill lever up and deploy lower door	Lower part: pull up by means of cables, rotate sill lever down to lock Upper part: pull down, rotate handle to the left and sink
In emergency case pull upper door strongly against extended wing flaps. Flap edge is deformable.	

or

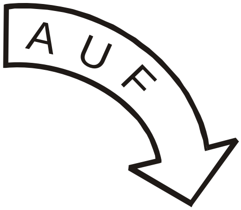
Öffnen der Tür	Schließen der Tür
Klappen eingefahren? Oberer Teil: Griff ganz herausziehen und nach rechts drehen obere Tür hochklappen Unterer Teil: Hebel hochklappen untere Tür herunterklappen	Unterer Teil: Tür an Kabeln heraufziehen Hebel herunterklappen Oberer Teil: Tür herunterziehen Griff nach links drehen und versenken
Im Notfall obere Tür kräftig gegen ausgefahrene Klappe ziehen. Klappe läßt sich deformieren	

(*)

On door handle (outside):



or



(*)

On emergency exit (outside):

or

(*)

Next to the emergency exit operating handle:

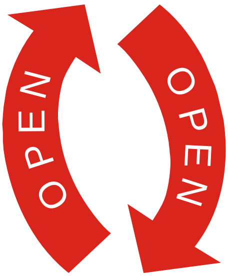
**Remove cover,
rotate handle
and push window inside**

or

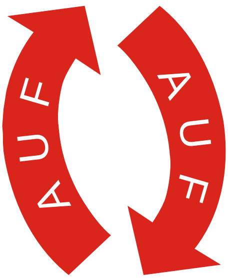
**Schauglas abnehmen,
Griff drehen und
Notausstieg hineindrücken**

(*)

On the cover of the emergency exit operating handle:



or



(*)

At tail cone above air outlet air condition module (left side of rear fuselage):

(yellow colored)

On top of the wing next to each fuel filler (4x):

Next to each fuel tank vent opening on the lower side of the wing (4x):

Next to each fuel tank drain (8x), sump drain on the lower side of the wing (2x) and near the lower fuel overboard drain line (1x; bottom side of the fuselage, aft of the nose gear bay):

FUEL DRAIN

Next to the fuel filter drain (aft of cowling bottom part):

FUEL FILTER DRAIN

Outside/inside the oil access panel (right top of the engine cowling):

OIL

Permissible oil grades:
MIL-PRF-7808L or later
MIL-PRF-23699F or later

On the right keel beam next to the refill opening of the reservoir:

HYDRAULIC FLUID
MIL-H-5606G and
MIL-PRF-5606H or later

On the brake fluid reservoir positioned at the firewall:

BRAKE FLUID
MIL-H-5606G and
MIL-PRF-5606H or later

External power access panel (above the oil cooler air outlet, right fuselage side):

EXTERNAL POWER 28VDC
Max. Starting Current 1200 Amps

Near the external oil filter indicator (opening in the RH lower part of the cowling):

OIL FILTER
BYPASS INDICATOR BUTTON

On the main landing gear oleo shock absorber (LH & RH):

HYDRAULIC FLUID
MIL-H-5606G and
MIL-PRF-5606H or later
57 bar (827 PSI)

On the nose landing gear strut (oleo shock absorber):

HYDRAULIC FLUID
MIL-H-5606G and
MIL-PRF-5606H or later
15 bar (218 PSI)

On the nose landing gear strut (above swivel stops):

DO NOT EXCEED
MAX NOSE GEAR
TURNING ANGLE
WHILE TOWING

On the nose landing gear fork:

INFL. PRESS
3.5 bar (51 PSI)

On the main landing gear leg (2x; LH & RH):

INFL. PRESS
5.1 bar (74 PSI)

Section 3
Emergency Procedures
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3 Emergency Procedures

3.1 Introductions

General

This Section describes in abbreviated form (checklist) the procedures for emergency and abnormal situations. Amplifications to the abbreviated checklist are presented in addition by subparagraphs to each checklist paragraph e.g. subparagraph c corresponds to paragraph c etc.

Important **The procedures are arranged in the most desirable sequence for the majority of cases; therefore the steps must be performed as listed, unless good reasons for deviations can be determined.**

Multiple emergencies, adverse weather and other peculiar conditions may require modification of these procedures. A thorough knowledge of the correct procedures and aircraft systems is essential to analyze the situation correctly and determine the best course of action.

Special emphasis should be placed and knowing those procedures or steps for emergency conditions that require immediate actions.

These procedures are printed in **"bold face".**

Important **Procedures must be periodically reviewed to maintain familiarity with procedures.**

3.2 Basic Rules

Three basic rules apply to most emergencies and should therefore be observed in addition:

1. **Maintain aircraft control**
2. **Analyze the situation and take proper action**
3. **Land as soon as possible/Land as soon as practical**

3.3 Used Terms

The terms "Land as soon as possible" and "Land as soon as practical" are used in this section. The terms are defined as follows:

"Land as soon as possible" (Land ASAP)

Landing should be accomplished at the nearest suitable field considering the severity of the emergency.

Further on, weather conditions, if landing on airport is possible, airport facilities and command guidance and the aircraft gross weight are to be considered.

"Land as soon as practical"

Emergency conditions are less urgent and in pilot's/crew judgment, the flight may be safely continued to an airfield where more adequate facilities are available and a safe landing can be accomplished.

Note **Refer to section 9 of this handbook for amended operating limitations, operating procedures, performance data and other necessary information for aircraft equipped with specific options.**

3.4 Emergency Procedures Checklist

3.4.a Airspeed for safe Operation

Aircraft weight: 2130 kg (4696 lbs)

Speed	KIAS
Maneuvering Speed	156
Stall Speed Flaps Up	80
Stall Speed in Landing Configuration	58
Speed for Maximum Gliding Distance	110
Emergency Descent (gear down)	140
Approach Speed for Precautionary Landing with Power (Landing Configuration)	80
Approach Speed without Power Wing Flaps UP Wing Flaps DOWN 30°	 120 100

3.4.b Airspeed Emergencies

1 STALL WARN r

Item	Condition
Control Wheel	Push
Power Lever	**MAX POWER**

2 OVERSPEED (aural)

Item	Condition
Control Wheel	Pull
Power Lever	Reduce power

3.4.c Engine Malfunctions

1 Aborted Takeoff

Item	Condition
Power Lever	**FLT IDLE**
Condition Lever	**FUEL OFF**
LANDING GEAR	Re-check **DN**
FLAPS	**30°**

If all wheels on ground:

Item	Condition
Brakes	Apply as required

2 Engine Malfunction during Flight

Item	Condition
Aircraft	Trim for 110 KIAS
Power Lever	Minimum required
Condition Lever	As required
Engine/Fuel Indications	Monitor to analyze cause of malfunction

If malfunction cannot be detected and engine power is still available:

Item	Condition
Land as soon as practical	

If total mechanical failure has occurred/was detected:

Item	Condition
Engine	Shut down
Mayday Call	Transmit
Transponder	**EMERGENCY**
Power Off Landing	Perform

3 Compressor Stall

Item	Condition
Power Lever	**FLT IDLE**
Condition Lever	As required
Angle of Attack	Decrease
Airspeed	Increase if possible
ENV AIR	**OFF**

If engine stall is recovered:

Item	Condition
Power Lever	Slowly to desired power
Condition Lever	Set as required
Flight	Continue
Engine Instruments	Monitor

If engine stall cannot be recovered:

Item	Condition
Engine	Shut down
Engine Air Start	Attempt

4 Engine Air Start

Caution **Except during an emergency, do not attempt an in-flight engine restart between 1 and 10 minutes after engine failure**

Important **Safe engine air start is possible up to 24.000 ft pressure altitude and at airspeed up to 140 kt TAS.**

Item	Condition
Airspeed	110 KIAS
FUEL SELECTOR VALVE	Check **BOTH**
FUEL PUMP 1 and **2**	Both **ON**
Condition Lever	**FUEL OFF**
BATT	Check **ON**
Voltmeter Reading	Check reading > 24 V
Power Lever	**FLT IDLE**
TOT	Check reading < 150 °C
ENGINE START	Momentary **START**

At 12 % N_1:

Item	Condition
Condition Lever	Fully forward
TOT	Monitor < 850 °C

At 58 % N1:

Item	Condition
Engine Power	Apply Slowly
Engine Instruments	Monitor, in the green

If engine air start was successful:

Item	Condition
Land as soon as practical	

If air start was unsuccessful:

Item	Condition
Engine	Shut down
Power Off Landing	Perform

3.4.d Engine Oil System Malfunctions

1 OIL PRESS r

Item	Condition
Oil Pressure	Check in limits

If reading exceeds limits:

Item	Condition
Power lever	Reduce to minimum power required to sustain flight
Land as soon as practicable	
Important	
Be prepared for a possible engine shut down and for a power off landing.	

2 CHIP DETECTION y

Item	Condition
Power lever	Reduce to minimum power required to sustain flight
Land as soon as practicable	
Note	
Inspect magnetic plugs as soon as possible after landing. If splinters and/or chips are detected and out of limits, engine inspection is recommended.	

3 Abnormal Engine Oil Pressure Indication

Item	Condition
Engine Oil Pressure	Monitor
Engine Instruments	Monitor
Land as soon as practical	

4 Abnormal High Engine Oil Temperature Indication

Item	Condition
Airspeed	Increase
Land ASAP	

3.4.e Smoke, Fumes and Fire

1 Environmental Smoke Procedure

Note **To provide maximum fresh air turn bleed air off.**

Item	Condition
Engine Cowling Joints	Check for smoke
Cabin Air	Smell
Instrument Panels	Check for smoke
Dispensers and Vents	Check for smoke
Cabin Pressurization System	Check and set as required
Cabin Air	Adjust as required

If situation requires:

Item	Condition
PRESS	**DUMP**
Emergency Descent	Perform to safe altitude

If smoke is out of control:

Item	Condition
Transponder	**EMERGENCY**
Mayday Call	Transmit
Note	
Decision to "land as soon as practical" or to "land ASAP" depends on pilot's decision after analyzing impairment of smoke/fumes.	
Land as soon as possible/practical	

2 Engine Fire During Engine Start

Item	Condition
FUEL SELECTOR VALVE	**OFF**

Engine will shut down within 30 seconds.

Item	Condition
GEN	**OFF**
STDBY ALT	**OFF**
BATT	**OFF**

If engine fire still persists:

Item	Condition
Aircraft	Abandon
Fire	Try to extinguish by external means

3 Engine Fire During Takeoff

Warning **It may be necessary to use engine power as long as possible for safe approach to selected landing site. Sideslip aircraft if necessary for keeping sight. Nevertheless, in any case try to shut down engine as soon as possible.**

After landing area is selected and safe approach established:

Item	Condition
Power Off Landing	Perform ASAP

4 Engine Fire in Flight

Warning **It may be necessary to use engine power as long as possible for safe approach to selected landing site. Sideslip aircraft if necessary for keeping sight. Nevertheless, in any case try to shut down engine as soon as possible.**

After approaching selected landing site:

Item	Condition
Power Off Landing	Perform ASAP

5 Electrical Fire, Smoke or Fumes in Flight

Note **The severity of the electrical fire and the flight conditions will determine how much of the aircraft electrical systems will be cut off.**

Item	Condition
STDBY ALT	Check **ON**
GEN	**OFF**
EMERGENCY	**ON**
BATT	**OFF**

If source is known:

Item	Condition
Faulty Equipment Circuit Breaker	Pull
BATT	**ON**
EMERGENCY	**OFF**
GEN	**ON**
Cabin Ventilation	As required
Land as soon as practical	
Aircraft	After landing Abandon

If source is unknown:

Item	Condition
Land ASAP	

If required:

Item	Condition
PRESS	**DUMP**
Transponder	**EMERGENCY**
Mayday Call	Transmit
Emergency Descent	Perform to safe altitude
Land ASAP	

3.4.f Emergency Descent

Item	Condition
Power Lever	**FLT IDLE**
Condition Lever	Fully forward
Airspeed	140 KIAS
LANDING GEAR	**DN**
Mayday Call	Transmit
Transponder	**EMERGENCY**

At safe altitude:

Item	Condition
Aircraft	Level off
Flight	Continue

3.4.g Maximum Glide

Item	Condition
LANDING GEAR	Re-check **UP**
FLAPS	**UP**
Condition Lever	**FUEL OFF/FEATHER**
Airspeed	110 KIAS
Glide Rate	1.6 NM per 1000 ft

3.4.h Landing Emergencies

Note **If engine power is not available, do not attempt to fly a procedure turn below 1000 ft AGL!**

Procedure turn above 1000 ft AGL under consideration of the following conditions: Landing Gear UP or DOWN, flaps 15°, on final 30°, airspeed 100 KIAS, maximum bank angle 45° to 50°.

1 Precautionary Landing

Note **Try to reduce the aircraft weight and thus the stall speed by reducing fuel quantity as much as possible. If conditions permit, check selected landing site by overflying and analyze surface and obstacles for further landing decision.**

If runway length is insufficient, and landing into unprepared area is unavoidable and if above 1000 ft AGL:

Item	Condition
Passengers/Crew	Alert, instruct to cushion faces
Transponder	**EMERGENCY**
Mayday Call	Transmit
Note	
If possible and time permits, secure loose object in cabin.	

If selected landing area requires gear up landing:

Item	Condition
Wheels Up Landing	Perform

If selected landing area allows gear down landing (e.g. plain grass area):

Item	Condition
LANDING GEAR	**DN**

During landing approach:

Item	Condition
FLAPS	**30°**
Approach Speed	Maintain 80 KIAS

On final:

Item	Condition
Seats, Seat Belts and Shoulder Harnesses	Adjust
Power Lever	Set as required
Condition Lever	Fully forward
Gear UP/DN Landing	Perform Keep nose up attitude as long as possible
Brakes	Apply smoothly as necessary

After standstill of aircraft:

Item	Condition
Power Lever	**GRD IDLE**
Condition Lever	**FUEL OFF**
FUEL PUMP 1 and **2**	**OFF**
GEN	**OFF**
STDBY ALT	**OFF**
Note	
If danger of fire is not obvious raise flaps after landing.	
FLAPS	**UP**
BATT	**OFF**
Aircraft	Abandon

2 Power Off Landing

Item	Condition
Power Lever	**FLT IDLE**
Condition Lever	**FUEL OFF**
FUEL SELECTOR VALVE	**OFF**
Approach Speed	Maintain 100 KIAS

During landing approach:

Item	Condition
FLAPS	**15°**

On final:

Item	Condition
Seats, Seat Belts and Shoulder Harnesses	Adjust
FLAPS	**30°**
30° flap position light	Check illuminated
GEAR IND	Check three greens

Before touch down:

Item	Condition
GEN	**OFF**
STDBY ALT	**OFF**
BATT	**OFF**
Warning	
Stall warning is not available when electrical system is switched off.	
Landing	Perform Keep nose up attitude as long as possible
Brakes	Apply smoothly as necessary

After stand still of aircraft:

Item	Condition
Note	
If danger of fire is not obvious raise flaps after landing.	
BATT	**ON**
FLAPS	**UP**
BATT	**OFF**
Aircraft	Abandon

3 Wheels Up Landing

If runway length is insufficient, and landing into unprepared area is unavoidable and if above 1000 ft AGL:

Item	Condition
Passengers/Crew	Alert, instruct to cushion faces
Transponder	**EMERGENCY**
Mayday Call	Transmit
Note	
If possible and time permits, secure loose object in cabin.	
LANDING GEAR	**UP**

During landing approach:

Item	Condition
FLAPS	**30°**
Approach Speed	Maintain 80 KIAS

On final:

Item	Condition
Seats, Seat Belts and Shoulder Harnesses	Adjust
Power Lever	Set as required
Condition Lever	Fully forward
Gear Up Landing	Perform Keep nose up attitude as long as possible

After standstill of aircraft:

Item	Condition
Power Lever	**GRD IDLE**
Condition Lever	**FUEL OFF**
FUEL PUMP 1 and **2**	**OFF**
ENGINE START	**IGN OFF**
GEN	**OFF**
STDBY ALT	**OFF**
Note	
If danger of fire is not obvious raise flaps after landing.	
FLAPS	**UP**
BATT	**OFF**
Aircraft	Abandon

4 Landing with Flat Main Gear Tire

Caution **Do not retract landing gear with blown main gear tire(s) because blown tire may distort and bind main gear strut(s) within wheel well and may prevent further gear extension.**

Item	Condition
LANDING GEAR	Keep **DN**
FUEL SELECTOR VALVE	Select tank on side of blown tire to consume as much as possible fuel

Short before landing:

Item	Condition
FUEL SELECTOR VALVE	**BOTH**
Caution	
It is recommended to land aircraft into wind ahead or crosswind opposite to side of deflated tire.	
FLAPS	**30°**
Landing Approach	Perform
Caution	
Align aircraft with edge of runway opposite the blown tire, to have room for a mild turn during landing roll. Land slightly with wing low on side of inflated tire and hold aircraft off flat tire as long as possible with aileron control. Lower nose wheel to ground as soon as possible for positive steering.	

After touch down:

Item	Condition
Brakes	Apply brake of inflated tire smoothly and maintain directional control

After aircraft has stopped:

Item	Condition
Power Lever	**GRD IDLE**
Condition Lever	**FUEL OFF**
FUEL PUMP 1 and **2**	**OFF**
ENGINE START	**IGN OFF**
GEN	**OFF**
STDBY ALT	**OFF**
Note	
If danger of fire is not obvious raise flaps after landing.	
FLAPS	**UP**
BATT	**OFF**
Aircraft	Abandon

5 Landing with Flat Nose Gear Tire

Caution **Do not retract landing gear with blown main gear tire(s) because blown tire may distort and bind main gear strut(s) within wheel well and may prevent further gear extension.**

Item	Condition
LANDING GEAR	Keep **DN**
Aircraft Fuel	Consume as much as possible
Approach	Normal
Landing	Perform

After touchdown of main wheel:

Item	Condition
Aircraft Nose	Hold off ground as long as possible
Brakes	Apply smoothly and steadily and keep directional control with differential braking
Control Wheel	Full AFT until aircraft stops

After aircraft has stopped:

Item	Condition
Power Lever	**GRD IDLE**
Condition Lever	**FUEL OFF**
FUEL PUMP 1 and **2**	**OFF**
ENGINE START	**IGN OFF**
GEN	**OFF**
STDBY ALT	**OFF**
Note	
If danger of fire is not obvious raise flaps after landing.	
FLAPS	**UP**
BATT	**OFF**
Aircraft	Abandon

6 Landing with Defective Main Gear

Item	Condition
FUEL SELECTOR VALVE	Select tank on side of defective gear to consume as much as possible fuel

Short before landing:

Item	Condition
FUEL SELECTOR VALVE	**BOTH**
Note	
It is recommended to land aircraft into wind ahead or crosswind opposite to side of defective main gear.	
LANDING GEAR	**DN**
FLAPS	**30°**
Landing Approach	Perform
GEN	**OFF**
STDBY ALT	**OFF**
BATT	**OFF**
Important	
Stall warning is not available without electrical power.	
Caution	
Align aircraft with edge of runway opposite the defective main gear side, to have room for a mild turn during landing roll. Land with wing low on side of defective main gear side and hold aircraft off defective main gear as long as possible with aileron control. Lower nose wheel to ground as soon as possible for positive steering.	

After touchdown:

Item	Condition
Brakes	Apply brake of operative gear smoothly and maintain directional control

After aircraft has stopped:

Item	Condition
Power Lever	**GRD IDLE**
Condition Lever	**FUEL OFF**
FUEL PUMP 1 and **2**	**OFF**
ENGINE START	**IGN OFF**
GEN	**OFF**
STDBY ALT	**OFF**
Note	
If danger of fire is not obvious raise flaps after landing.	
FLAPS	**UP**
BATT	**OFF**
Aircraft	Abandon

7 Landing with Flaps Retracted

Important **Landing with flaps up differs from normal landing in respect of the approach speed, stall speed and landing distance required.**

Item	Condition
Approach Speed	120 KIAS
LANDING GEAR	**DN**
Caution	
Do not overrotate on touchdown. Tailcone may hit the runway	
Note	
Stall speed flaps UP is raised to 80 KIAS. Ensure that runway length is sufficient for landing roll.	
Landing	Perform

3.4.i Ditching, Power Off/Power On

Important **The aircraft has not been flight tested in actual ditching. Therefore the following recommended procedure is based entirely on the best judgment available and following calculations and consideration being made concerning ditching with respect to the vaulted underside of aircraft fuselage.**

Item	Condition
Transponder	**EMERGENCY**
Mayday Call	Transmit

During approach:

Item	Condition
PRESS	**DUMP**
Loose and heavy objects in cabin	Stow and secure
Seat, Seat Belts, Shoulder Harnesses	Fasten and secure
Passengers/Crew	Alert, instruct to cushion faces
LANDING GEAR	**UP**
Important	
In high wind speeds, aircraft approach should be headed into wind. In light winds and heavy swells, aircraft approach should be executed parallel to swells.	

If approach is established:

Item	Condition
FLAPS	**30°** (if possible)
Approach Speed	70 KIAS
Caution	
If flap setting 30° is not possible, the following approach speed are relevant to flap setting: Flaps 15° = 77 KIAS, Flaps 0° = 91 KIAS.	

If power on:

Item	Condition
Power Lever	Set for sink rate of 300 ft/min
Engine	Prior ditching: Shut down

Short before ditching:

Item	Condition
Airspeed	Maintain approach speed
Important	
Stall warning is not available without electrical power.	
GEN	**OFF**
STDBY ALT	**OFF**
BATT	**OFF**
Ditching	Execute without flare (in descent attitude)
Important	
Immediately after aircraft has alighted on water, try to retract flaps by using momentarily battery power. This to make evacuation via main door or emergency window easier. Nevertheless, if flap retraction is not possible, push upper door strongly against extended flaps. Flaps edges are deformable. Be aware, that you have to counteract outside water pressure by opening the lower door.	
BATT	**ON**
FLAPS	**UP**
BATT	**OFF**
Important	
Pilot/Crew have to organize aircraft evacuation and availability of life vests and raft.	
Aircraft	Abandon
Life Vests and Raft	Inflate when outside cabin and clear of aircraft

If circumstances permit:

Note **Try to close door and/or emergency exit window after evacuation to keep aircraft afloat as long as possible.**

3.4.j Fuel System Malfunctions

1 FUEL PRESS r

Item	Condition
Fuel Quantity	Check
FUEL SELECTOR VALVE	Check **BOTH**
FUEL PUMP 1 and **2**	Both **ON**

*If **FUEL PRESS** extinguishes:*

Item	Condition
Land as soon as practical	

*If **FUEL PRESS** still illuminates:*

Item	Condition
Power Lever	Reduce to minimum power required
Warning	
Be prepared for a possible engine failure and power off landing.	
Land ASAP	

2 FUEL LOW LEFT – FUEL LOW RIGHT y

Item	Condition
Fuel Quantity Relevant Tank(s)	Re-check
FUEL SELECTOR VALVE	Switch to not-empty tank within 5 minutes

3 FUEL TRANS LEFT – FUEL TRANS RIGHT y

Item	Condition
Fuel Quantity	Check
FUEL TRANSFER **LEFT** or **RIGHT**	Re-check **ON**
FUEL-TR-L Circuit Breaker or **FUEL-TR-R** Circuit Breaker	Re-check **IN**

If light persists:

Item	Condition
FUEL TRANSFER **LEFT** or **RIGHT**	**OFF**
Note	
On the affected tank side: **Unusable fuel increases from 14 L to 32 L.** **Auxiliary tank fuel is not available.** **FUEL LOW will illuminate on a much earlier stage.**	
Range	Re-calculate and change flight plan as required

4 FUEL FILTER BYPASS y

Item	Condition
Fuel Pressure	Check
Aircraft Fuel Filter Element	Replace within 2 hours of flight

3.4.k Propeller Malfunctions

1 LOW PITCH y

Item	Condition
Power Lever	Move forward

Note **In case of propeller problems e.g. oil pressure loss etc., propeller feathering is accomplished by the condition lever set to "FEATHER" position.**

3.4.l Electrical System Malfunctions

Note **In case of a generator failure, the load bus will be automatically shed.**

1 **GENERATOR FAIL** r

Item	Condition
GEN	**RESET** (hold for approx. 2 seconds and back to **ON**)

If ***GENERATOR FAIL*** *extinguishes:*

Item	Condition
VDC	Check 28
GEN AMPS	Check indication
Flight	Continue

If ***GENERATOR FAIL*** *still illuminates:*

Item	Condition
AVIONICS	**OFF**
Flight	Leave icing conditions
ICE	**OFF**
PROP	**OFF**
BOOTS	**OFF**
WINDSH	**OFF**
ENGINE START	**IGN OFF**
STANDBY ALTERN ON	Check illuminated no specific procedure required
Note	
Battery and standby alternator supply is limited to at least 30 minutes.	

In case a load from the load bus is necessary:

Item	Condition
All load bus Circuit Breakers	Pull
Needed Circuit Breakers	Push in
BUS TIE Circuit Breaker	Push in

If a landing is possible within 30 minutes:

Item	Condition
Land ASAP	

If a landing is not possible within 30 minutes

Item	Condition
FUEL PUMP 1	**ON**
Flight	Descent to 10,000ft
EMERGENCY	**ON**
Notes	
Aircraft functionality will be limited to a minimum (only loads of emergency bus).	
Landing gear will slowly extend. Flaps cannot be moved.	
Unusable fuel increases from 14 L to 32 L per side. **Auxiliary compartment fuel is not available.** **FUEL LOW will illuminate on a much earlier stage.**	
Range	Re-calculate and change flight plan as required

If within 30 minutes of airfield

Item	Condition
EMERGENCY	**OFF**
Land ASAP	

2 STANDBY ALTERN ON y

Item	Condition
GENERATOR FAIL	Check illuminated

If ***GENERATOR FAIL*** *illuminates:*

Item	Condition
GENERATOR FAIL Procedure	Perform

If ***GENERATOR FAIL*** *not illuminates:*

Item	Condition
VDC	Check > 26.5

If voltage is above 26.5VDC

Item	Condition
STDBY ALT	**OFF**

3 LO VOLTAGE y

Item	Condition
VDC	Check > 25.5

In case voltage is below 25.5VDC:

Item	Condition
GEN AMPS	Check approx. 20

In case indication is significantly below:

Item	Condition
Caution	
Do not exceed engine and airspeed limits	
Power Lever	Slightly forward

4 Circuit Breaker Tripped

For essential systems required in current operational conditions:

Item	Condition
Circuit Breaker	Only one attempt: Push in

All other circuit breakers or circuit breaker trips again:

Item	Condition
Circuit Breaker	Leave tripped
Flight	Continue

3.4.m Flight Control Malfunctions

1 FLAPS r

Item	Condition
Balance Aircraft	Slightly by using rudder and/or aileron
Land ASAP	

During landing approach:

Item	Condition
Flaps position	Estimate position
Landing Approach Speed	Due to estimated flap position between Flaps 30° = 80 KIAS Flaps UP = 120 KIAS
LANDING GEAR	**DN**
Power Lever	Set as required
Landing	Perform

2 Elevator Control Failure

Item	Condition
Pitch Control	Use aircraft trim
Mayday Call	Transmit
Note	
For landing, select long runway with possibly low crosswinds.	
Landing Approach	Long Final
Note	
Landing gear and flaps should be set down as early as possible to stabilize drag during approach.	
LANDING GEAR	**DN**
FLAPS	**30°**
Aircraft	Trim full aft
Power Lever	Set as required

Approximately 20 feet AGL:

Item	Condition
Power Lever	Set as required to obtain nose up attitude
Landing	Perform

3 Spins

Note **Spins are not permitted with this aircraft.**

If the aircraft unintentionally comes into a spin, the recovery procedure is as follows:

Item	Condition
Power Lever	**FLT IDLE**
Rudder	Full opposite to rotation direction
Ailerons	Neutral
Elevator	Forward

If flaps were set:

Item	Condition
FLAPS	**UP**

When rotation has stopped:

Item	Condition
Rudder	Neutral
Elevator	Pull
Aircraft	Level off
Flight	Continue

3.4.n Landing Gear Malfunctions

Note **If there is any doubt about condition of landing gear, it is preferable to perform a fly by in conjunction with ground station e.g. tower etc.**

Note **If prolonged flight with extended landing gear is necessary, consider reduced cruise speed.**

1 GEAR WARN r (with aural)

When in approach:

Item	Condition
Airspeed	Reduce below 140KIAS
LANDING GEAR	**DN**

Else:

Item	Condition
Power Lever	move forward until torque above 35%
LANDING GEAR	**DN**

2 GEAR WARN r (without aural and gear retracted)

Item	Condition
Airspeed	Reduce below 140KIAS
LANDING GEAR	Check **UP**
HYDR Circuit Breaker	Check in
GEAR-CTRL Circuit Breaker	Check in
Hydraulic Pump	Runs periodically

If **GEAR WARN** *still illuminated:*

Caution **Do not attempt to retract landing gear further if it fails to retract during first attempt.**

Item	Condition
LANDING GEAR	**DN**
Land as soon as practical	

3 GEAR WARN r (without aural and gear extended)

Item	Condition
Gear Operation Lights	Check illumination (three greens)

If no three greens:

Item	Condition
No Three Greens Procedure	Perform

4 HYDRAULIC PUMP y

Item	Condition
Runs continuously	Check
HYDR Circuit Breaker	Pull
Airspeed	Reduce to max. 140 KIAS
Note	
Landing gear will now slowly extent, which is indicated by the red GEAR WARN light on the annunciator panel.	
Land as soon as practical	
Emergency Extension	Perform

5 No Three Greens

Item	Condition
LANDING GEAR	Check **DN**

If still no three greens:

Item	Condition
Emergency Extension	Perform

6 Emergency Extension

Item	Condition
Airspeed	110 KIAS
LANDING GEAR	**DN**
GEAR CTRL Circuit Breaker	Pull
Gear Operation Lights	Check illumination (three greens)
Land as soon as practical	

If still no three greens:

Item	Condition
Hydraulic System Reactivation	Perform

7 Hydraulic System Reactivation

Item	Condition
HYDR Circuit Breaker	Check in
GEAR-CTRL Circuit Breaker	Push in
Important	
Landing should be performed by using one of the landing emergency procedures.	
Land as soon as practical	
Warning	
If no three green lights and thus landing gear is not locked collapsing of landing gear is possible any times! Support aircraft before working on the landing gear.	
Landing Gear Hydraulic Actuator	(Prior **BATT OFF**) Lock with locking device

3.4.o Pressurization System Malfunctions

1 **CABIN PRESSURE** r

Item	Condition
Cabin Altitude	Check indication
Cabin Differential Pressure	Check indication

If cabin overpressure has been determined:

Item	Condition
ENV AIR	**OFF**
Emergency Descent	Perform to safe altitude (< 10,000 ft)

If cabin altitude above 10,000 ft has been determined:

Item	Condition
ENV AIR	Check **ON**
PRESS	Check **ON**
Cabin Pressure Controller	Check
Rate Control Knob	Turn clockwise to regain pressurization

If cabin altitude drops below 10,000 ft:

Item	Condition
Flight	Continue
Cabin Pressurization Instruments	Monitor

If cabin altitude remains still above 10,000 ft:

Item	Condition
Emergency Descent	Perform to safe altitude (< 10,000 ft)

2 **AFT DOOR** r

Item	Condition
CABIN PRESSURE	Check illuminated

If **CABIN PRESSURE** *illuminated*

Item	Condition
Emergency Descent	Perform to safe altitude (< 10,000 ft)

If in safe altitude:

Item	Condition
Occupants seated and seat belts on	Check
Cabin pressurization	Reduce if possible
Note	
As pilot in command do not leave your seat. Let a passenger check the door inspection glasses if possible.	
Door inspection glasses (8)	Check green
Land as soon as practical	

3 **BLEED OVERTEMP** r

Item	Condition
WINDSHIELD	Push
TEMP CTRL	Check **AUTO**
TEMP CTRL Rheostat	**13°**

If no effect:

Item	Condition
TEMP CTRL	**MANUAL**
WARM/COOL	**COOL** Hold for 10 seconds

If no effect and warning light still illuminates:

Item	Condition
Warning	
When ENV AIR is OFF cabin will lose pressurization.	
ENV AIR	**OFF**
Emergency Descent	Perform to safe altitude (< 10,000 feet)
PRESS	**DUMP**

4 Impending Skin Panel or Window Malfunction

Item	Condition
PRESS	**DUMP**
Emergency Descent	Perform to safe altitude (< 10,000 feet)

3.4.p Flight into Icing Conditions

Note **Flights into known or forecasted icing conditions are prohibited.**

1 WINDSHIELD HEAT FAIL r

Item	Condition
WINDSH	**OFF**

2 STALL HEAT r

Item	Condition
Airspeed indicator	Monitor

3 PILOT HEAT LEFT or RIGHT y

Item	Condition
Airspeed indicators	Cross-check on a regular basis

4 STATIC HEAT LEFT or RIGHT y

Item	Condition
Altimeters	Cross-check on a regular basis

5 PNEUMATIC LOW y

Item	Condition
Caution	
Do not exceed engine and airspeed limits	
Power lever	Move Forward

6 Unintentional Flight into Icing Conditions

Item	Condition
INTAKE ANTI-ICE	Pull
L – PITOT – R	Check **ON**
FUEL PUMP 1 and **2**	**ON**
ENGINE START	**IGN**
BOOTS	**ON**

If necessary:

Item	Condition
WINDSH	**ON**
WINDSHIELD HEAT ON	Check illuminating (intermittent)
Altitude and/or Heading	Change immediately to leave icing zone

7 Windshield Icing

Item	Condition
WINDSH	**ON**
Icing Conditions	Monitor

If icing conditions require:

Item	Condition
Altitude and/or Heading	Change for better conditions

8 Windshield Fogging

Item	Condition
WINDSHIELD	Pull
Flight	Continue
Fogging Conditions	Monitor

3.4.q Lightning Strike

Item	Condition
NIGHT/DAY	**TEST**
Exterior Lights	Check function
Navigation System	Check indications, function

If navigation system no longer available:

Item	Condition
Conventional Instruments	Monitor
IMC	Leave
Land ASAP	

If severe engine vibrations are noticeable caused by propeller damage:

Item	Condition
Power Lever	Reduce as far as possible

If vibrations disappear:

Item	Condition
Flight	Continue
Land as soon as practical	

If vibrations are still severe:

Item	Condition
Land ASAP	
Caution	
Severity of engine vibration can require an immediate landing on the nearest possible and adequate landing area, using power on/power off landing emergency procedures.	

3.4.r Emergency Exit Window Removal

Item	Condition
PRESS	**DUMP**
Cabin Differential Pressure Indicator	Check zero Indication
Emergency Exit Window Handle	Turn counterclockwise
Emergency Exit Window	Pull in and down

3.5 Emergency Procedures (Amplified)

3.5.a Airspeed for Safe Operation

Refer to Item 3.4a this handbook.

3.5.b Airspeed Emergencies

1 STALL WARN r

This warning means the stall warning vane on the LH wing is lifted by airflow and a stall of the aircraft is impending. This warning is accompanied by an aural warning.

Control Wheel; Push
Power Lever; ***MAX POWER***

2 OVERSPEED (aural)

Control Wheel; Pull
Power Lever; Reduce power

3.5.c Engine Malfunctions

1 Aborted Takeoff

Takeoff abort could be required for engine failure, fires, general failures etc.

The decision to abort is based upon the severity of the failure, abort speed, field length and flight conditions (weather).

The required takeoff performance should be calculated prior to each takeoff.

The minimum distance abort is performed by immediate braking at the abort with all wheels on the ground.

If runway length is sufficient the abort procedure is as follows:
Power Lever; ***FLT IDLE***
Condition Lever; ***FUEL OFF***
LANDING GEAR*; Re-check* ***DN***
FLAPS*;* ***30°***

If all wheels on ground:
Brakes; Apply as required

If runway length is insufficient, and landing into unprepared area is unavoidable, perform an applicable Landing Emergency procedure as described in the respective paragraph.

2 Engine Malfunction during Flight

Engine malfunction during flight could result in reduction of power, a rough running engine, compressor stall, engine flameout out or total mechanical failure.

A mechanical engine failure normally is indicated by rough engine operation and/or abnormal noises, possibly accomplished by power loss.

In this case proceed as follows:
Aircraft; Trim for 110 KIAS
Power Lever; Minimum required
Condition Lever; As required
Engine/Fuel Indications; Monitor to analyze cause of malfunction

If malfunction cannot be detected and engine power is still available:
Land as soon as practical

If total mechanical failure has occurred/was detected:
Engine; Shut down
Mayday Call ; Transmit
Transponder; ***EMERGENCY***
Power Off Landing; Perform

3 Compressor Stall

A compressor stall is normally indicated by a rumbling noise, a loud bang or a series of loud bangs. It can be expected at high altitudes, high angle of attack, low airspeed and during engine acceleration. Normally compressor stall is self clearing and no action is necessary.

If stall is not self cleared, proceed as follows:
Power Lever; ***FLT IDLE***
Condition Lever; As required
Angle of Attack; Decrease
Airspeed; Increase if possible

ENV AIR; OFF

If engine stall is recovered:
Power Lever; Slowly to desired power
Condition Lever; Set as required
Flight; Continue
Engine Instruments; Monitor

If engine stall cannot be recovered:
Engine; Shut down
Engine Air Start; Attempt

4 Engine Air Start

Generally the symptoms of an engine flameout are an uncommanded drop in engine speed and abnormal engine instrument readings. The flameout may result from a momentary running out of fuel or may possibly be caused by an unstable engine operation e.g. due to adverse engine intake entry conditions. Once fuel supply has been restored or engine operation has been recovered to stable conditions and after an engine emergency shut down, the engine may be restarted.

Note **A hot restart may be initiated immediately after a flameout or engine emergency shut down occurred, irrespective of altitude or speed conditions, provided that the flameout was not the result of a malfunction (e.g. mechanical failure) that might make it dangerous to attempt an engine restart.**

Caution **Except during an emergency, do not attempt an in-flight engine restart between 1 and 10 minutes after engine failure**

Important **Safe engine air start is possible up to 24.000 ft pressure altitude and at airspeed up to 140 kt TAS.**

Airspeed; 110 KIAS
FUEL SELECTOR VALVE*; Check* ***BOTH***
FUEL PUMP 1 *and* ***2****; Both* ***ON***
Condition Lever; ***FUEL OFF***
BATT; *Check* ***ON***
Voltmeter Reading; Check reading > 24 V
Power Lever; ***FLT IDLE***
TOT; Check reading < 150 °C
ENGINE START*; Momentary* ***START***

At 12 % N_1:
Condition Lever; Fully forward
TOT; Monitor < 850 °C

At 58 % N1:
Engine Power; Apply Slowly
Engine Instruments; Monitor, in the green

If engine air start was successful:
Land as soon as practical

If air start was unsuccessful:
Engine; Shut down
Power Off Landing; Perform

3.5.d Engine Oil System Malfunctions

1 OIL PRESS r

This warning means that the engine oil pressure is too low.

Oil Pressure; Check in limits

If reading exceeds limits:
Power lever; Reduce to minimum power required to sustain flight
Land as soon as practicable
Important: Be prepared for a possible engine shut down and for a power off landing.

2 CHIP DETECTION y

This caution means at least one metal chip has been detected in the engine oil system at one or more of the three chip detectors.

Power lever; Reduce to minimum power required to sustain flight
Land as soon as practicable
Note: Inspect magnetic plugs as soon as possible after landing. If splinters and/or chips are detected and out of limits, engine inspection is recommended.

3 Abnormal Engine Oil Pressure Indication

Engine Oil Pressure; Monitor
Engine Instruments; Monitor
Land as soon as practical

4 Abnormal High Engine Oil Temperature Indication

Airspeed; Increase
Land ASAP

3.5.e Smoke, Fumes and Fire

If an aircraft fire is discovered on ground or during takeoff but prior to committed flight, the aircraft is to be landed and or stopped as soon as possible.

Fires originated in flight must be controlled as quickly as possible in an attempt to prevent major structural damage. Fire or smoke should be controlled by identifying and shutting down the affected system.

An appropriate course of action is:

⇒ Identify the source of fire and smoke

⇒ Isolate the source

⇒ Extinguish the fire

Basically two types of in flight fires exist:

- Engine fire and
- Cabin fires and/or electrical fires

Each type has its peculiarities regarding isolation and smoke control.

In case of fire, it is important to determine the source of fire and to get fresh air into the cabin. Therefore generally proceed as follows:

1 Environmental Smoke Procedure

Note **To provide maximum fresh air turn bleed air off.**

Engine Cowling Joints; Check for smoke
Cabin Air; Smell
Instrument Panels; Check for smoke
Dispensers and Vents; Check for smoke
Cabin Pressurization System; Check and set as required
If aircraft is operated in pressurized mode, a pressure drop may indicate a leak in the system.

Cabin Air; Adjust as required
The **BLEED OVERTEMP** warning light will illuminate when bleed air temperature exceeds 72°C. The cabin pressurization and heating is accomplished by the engine bleed air system, therefore a leak in the bleed air lines can cause smoke from engine department to enter into the cabin. Normally, a leak in the bleed air lines is indicated by illuminating of the amber **PNEUMATIC LOW** caution light on the annunciator panel.

If situation requires:
PRESS; DUMP
Emergency Descent; Perform to safe altitude

If smoke is out of control:
Transponder; ***EMERGENCY***
Mayday Call; Transmit
Note: Decision to "land as soon as practical" or to "land ASAP" depends on pilot's decision after analyzing impairment of smoke/fumes.
Land as soon as possible/practical

2 Engine Fire During Engine Start

If there is evidence of a fire within the engine during start as indicated by high and sustained engine temperature or detected by ground crew, proceed as follows:
FUEL SELECTOR VALVE; OFF
Keep the engine running to burn fuel. Engine will shut down within 30 seconds.

GEN; OFF
STDBY ALT; OFF
BATT; OFF

If engine fire still persists:
Aircraft; Abandon
Fire; Try to extinguish by external means

3 Engine Fire During Takeoff

If engine fire is detected during takeoff an immediate landing is recommended. If not possible on runway due to left runway length, landing on an appropriate landing area is unavoidable.

Warning **It may be necessary to use engine power as long as possible for safe approach to selected landing site. Sideslip aircraft if**

necessary for keeping sight. Nevertheless, in any case try to shut down engine as soon as possible.

After landing area is selected and safe approach established:
Power Off Landing; Perform ASAP

4 Engine Fire in Flight

If engine fire occurs during normal flight and can not be extinguished, immediate landing on a suitable landing area is recommended.

Warning **It may be necessary to use engine power as long as possible for safe approach to selected landing site. Sideslip aircraft if necessary for keeping sight. Nevertheless, in any case try to shut down engine as soon as possible.**

After approaching selected landing size:
Power Off Landing; Perform ASAP

5 Electrical Fire, Smoke or Fumes in Flight

If cabin fire, smoke and/or fumes are detected, try to identify and isolate source. Generally, the following procedure applies:

Note **The severity of the electrical fire and the flight conditions will determine how much of the aircraft electrical systems will be cut off.**

STDBY ALT; C*heck* ***ON***
GEN; OFF
EMERGENCY; ON
BATT; OFF

If source is known:
Faulty Equipment Circuit Breaker; Pull
BATT; ON
EMERGENCY; OFF
GEN; ON
Cabin Ventilation; As required
Land as soon as practical
Aircraft; After landing Abandon

If source is unknown:
Land ASAP

If required:
PRESS; DUMP
Transponder; ***EMERGENCY***
Mayday Call; Transmit
Emergency Descent; Perform to safe altitude
Land ASAP

3.5.f Emergency Descent

If an emergency descent is necessary, proceed as follows:
Power Lever; ***FLT IDLE***
Condition Lever; Fully forward
Airspeed; 140 KIAS
LANDING GEAR; DN
Mayday Call; Transmit
Transponder; ***EMERGENCY***

At safe altitude:
Aircraft; Level off
Flight; Continue

3.5.g Maximum Glide

If an engine failure occurs, an immediate airstart is not possible and engine must be shut down proceed as follows:
LANDING GEAR*; Re-check* ***UP***
FLAPS; UP
Condition Lever; ***FUEL OFF/FEATHER***
Airspeed; 110 KIAS
Glide Rate; 1.6 NM per 1000 ft

3.5.h Landing Emergencies

Note **If engine power is not available, do not attempt to fly a procedure turn below 1000 ft AGL!**

Procedure turn above 1000 ft AGL under consideration of the following conditions: Landing Gear UP or DOWN, flaps 15°, on final 30°, airspeed 100 KIAS, maximum bank angle 45° to 50°.

1 Precautionary Landing

Note **Try to reduce the aircraft weight and thus the stall speed by reducing fuel quantity as much as possible. If conditions permit, check selected landing site by overflying and analyze surface and obstacles for further landing decision.**

If runway length is insufficient, and landing into unprepared area is unavoidable and if above 1000 ft AGL:
Passengers/Crew; Alert, instruct to cushion faces
Transponder; ***EMERGENCY***
Mayday Call; Transmit
Note: If possible and time permits, secure loose object in cabin.

If selected landing area requires gear up landing:
Wheels Up Landing; Perform

If selected landing area allows gear down landing (e.g. plain grass area):
LANDING GEAR; DN

During landing approach:
FLAPS; 30°
Approach Speed; Maintain 80 KIAS

On final:
Seats, Seat Belts and Shoulder Harnesses; Adjust
Power Lever; Set as required
Condition Lever; Fully forward
Gear UP/DN Landing; Perform, Keep nose up attitude as long as possible
Brakes; Apply smoothly as necessary

After standstill of aircraft:
Power Lever; ***GRD IDLE***
Condition Lever; ***FUEL OFF***

FUEL PUMP 1** and **2**; **OFF
GEN; OFF
STDBY ALT; OFF
Note: If danger of fire is not obvious raise flaps after landing.
FLAPS; UP
BATT; OFF
Aircraft; Abandon

2 Power Off Landing

Power Lever; ***FLT IDLE***
Condition Lever; ***FUEL OFF***
FUEL SELECTOR VALVE**; **OFF
Approach Speed; Maintain 100 KIAS

During landing approach:
FLAPS; 15°

On final:
Seats, Seat Belts and Shoulder Harnesses; Adjust
FLAPS; 30°
***30°** flap position light; Check illuminated*
***GEAR IND;** Check three greens*

Before touch down:
GEN; OFF
STDBY ALT ; OFF
BATT; OFF
Warning
Stall warning is not available when electrical system is switched off.
Landing; Perform, Keep nose up attitude as long as possible
Brakes; Apply smoothly as necessary

After stand still of aircraft:
Note: If danger of fire is not obvious raise flaps after landing.
BATT; ON
FLAPS; UP
BATT; OFF
Aircraft; Abandon

3 Wheels Up Landing

If landing on rough or soft area is unavoidable, a wheels up landing is recommended, to avoid a nose over situation.

If the situation allows, shut down the engine prior touchdown to reduce damage to engine and propeller.

If runway length is insufficient, and landing into unprepared area is unavoidable and if above 1000 ft AGL:
Passengers/Crew; Alert, instruct to cushion faces
Transponder; ***EMERGENCY***
Mayday Call; Transmit
Note: If possible and time permits, secure loose object in cabin.
LANDING GEAR; UP

During landing approach:
FLAPS; 30°
Approach Speed; Maintain 80 KIAS

On final:
Seats, Seat Belts and Shoulder Harnesses; Adjust
Power Lever; Set as required
Condition Lever; Fully forward

Note **If power and flaps setting during landing approach is beyond the settings normally used for landing approach and landing gear is not fully down and locked and/or retracted, a warning horn is audible in conjunction with illumination of the red GEAR WARN warning light on annunciator panel. This warnings can be muted by pressing the GEAR WARN MUTE button, located at the left side of power lever, unless flaps are set to 30°.**

Gear Up Landing; Perform, Keep nose up attitude as long as possible

After standstill of aircraft:
Power Lever; ***GRD IDLE***
Condition Lever; ***FUEL OFF***
FUEL PUMP 1 *and* ***2; OFF***
ENGINE START; IGN OFF
GEN; OFF
STDBY ALT; OFF
Note: If danger of fire is not obvious raise flaps after landing.
FLAPS; UP
BATT; OFF
Aircraft; Abandon

4 Landing with Flat Main Gear Tire

Caution **Do not retract landing gear with blown main gear tire(s) because blown tire may distort and bind main gear strut(s) within wheel well and may prevent further gear extension.**

LANDING GEAR*; Keep* ***DN***
FUEL SELECTOR VALVE*; Select tank on side of blown tire to consume as much as possible fuel*

Short before landing:
FUEL SELECTOR VALVE; BOTH
Caution: It is recommended to land aircraft into wind ahead or crosswind opposite to side of deflated tire.
FLAPS; 30°
Landing Approach; Perform
Caution: Align aircraft with edge of runway opposite the blown tire, to have room for a mild turn during landing roll. Land slightly with wing low on side of inflated tire and hold aircraft off flat tire as long as possible with aileron control. Lower nose wheel to ground as soon as possible for positive steering.

After touch down:
Brakes; Apply brake of inflated tire smoothly and maintain directional control

After aircraft has stopped:
Power Lever; ***GRD IDLE***
Condition Lever; ***FUEL OFF***
FUEL PUMP 1 *and* ***2; OFF***
ENGINE START; IGN OFF
GEN; OFF
STDBY ALT; OFF
Note: If danger of fire is not obvious raise flaps after landing.
FLAPS; UP
BATT; OFF
Aircraft; Abandon

5 Landing with Flat Nose Gear Tire

For landing with defective nose gear or blown nose gear tire proceed as follow:

Caution **Do not retract landing gear with blown main gear tire(s) because blown tire may distort and bind main gear strut(s) within wheel well and may prevent further gear extension.**

LANDING GEAR*; Keep* **DN**
Aircraft Fuel; Consume as much as possible
Approach; Normal
Landing; Perform

After touchdown of main wheel:
Aircraft Nose; Hold off ground as long as possible
Brakes; Apply smoothly and steadily and keep directional control with differential braking
Control Wheel; Full AFT until aircraft stops

After aircraft has stopped:
Power Lever; ***GRD IDLE***
Condition Lever; ***FUEL OFF***
FUEL PUMP 1 *and* ***2****;* ***OFF***
ENGINE START; IGN OFF
GEN; OFF
STDBY ALT; OFF
Note: If danger of fire is not obvious raise flaps after landing.
FLAPS; UP
BATT; OFF
Aircraft; Abandon

6 Landing with Defective Main Gear

If a main landing gear defect was detected, proceed as follows:

FUEL SELECTOR VALVE*; Select tank on side of defective gear to consume as much as possible fuel*

Short before landing:
FUEL SELECTOR VALVE*;* ***BOTH***
Note: It is recommended to land aircraft into wind ahead or crosswind opposite to side of defective main gear.
LANDING GEAR*;* ***DN***
FLAPS*;* ***30°***
Landing Approach; Perform
GEN; OFF
STDBY ALT; OFF
BATT; OFF
Important: Stall warning is not available without electrical power.

Caution: Align aircraft with edge of runway opposite the defective main gear side, to have room for a mild turn during landing roll. Land with wing low on side of defective main gear side and hold aircraft off flat tire as long as possible with aileron control. Lower nose wheel to ground as soon as possible for positive steering.

Note **The centrifugal forces in a mild ground loop shall relieve the inner, defective main gear additionally.**

After touchdown:
Brakes; Apply brake of operative gear smoothly and maintain directional control

After aircraft has stopped:
Power Lever; ***GRD IDLE***
Condition Lever; ***FUEL OFF***
FUEL PUMP 1 *and* ***2****;* ***OFF***
ENGINE START; IGN OFF
GEN; OFF
STDBY ALT; OFF
Note: If danger of fire is not obvious raise flaps after landing.
FLAPS; UP
BATT; OFF
Aircraft; Abandon

7 Landing with Flaps Retracted

In case a flaps up landing is required, proceed as follows:

Important **Landing with flaps up differs from normal landing in respect of the approach speed, stall speed and landing distance required.**

Approach Speed; 120 KIAS
LANDING GEAR*;* ***DN***
Caution: Do not overrotate on touchdown. Tailcone may hit the runway
Note: Stall speed flaps UP is raised to 80 KIAS. Ensure that runway length is sufficient for landing roll.
Landing; Perform

3.5.i Ditching, Power Off/Power On

Important **The aircraft has not been flight tested in actual ditching. Therefore the following recommended procedure is based entirely on the best judgment available and following calculations and consideration being made concerning ditching with respect to the vaulted underside of aircraft fuselage.**

Transponder; ***EMERGENCY***
Mayday Call; Transmit

During approach:
PRESS; DUMP
Loose and heavy objects in cabin; Stow and secure
Seat, Seat Belts, Shoulder Harnesses; Fasten and secure
Passengers/Crew; Alert, instruct to cushion faces
LANDING GEAR*;* ***UP***
Important: In high wind speeds, aircraft approach should be headed into wind. In light winds and heavy swells, aircraft approach should be executed parallel to swells.

If approach is established:
FLAPS*;* ***30°*** *(if possible)*
Approach Speed; 70 KIAS
Caution: If flap setting 30° is not possible, the following approach speed are relevant to flap setting:
Flaps 15° = 77 KIAS,
Flaps 0° = 91 KIAS.

If power on:
Power Lever; Set for sink rate of 300 ft/min
Engine; Prior ditching: Shut down

Short before ditching:
Airspeed; Maintain approach speed
Important: Stall warning is not available without electrical power.
GEN; OFF
STDBY ALT; OFF
BATT; OFF
Ditching; Execute without flare (in descent attitude)
Important: Immediately after aircraft has alighted on water, try to retract flaps by using momentarily battery power. This to make evacuation via main door or emergency window easier. Nevertheless, if flap retraction is not possible, push upper door

strongly against extended flaps. Flaps edges are deformable. Be aware, that you have to counteract outside water pressure by opening the lower door.
BATT; ON
FLAPS; UP
BATT; OFF
Important: Pilot/Crew have to organize aircraft evacuation and availability of life vests and raft.
Aircraft; Abandon
Life Vests and Raft; Inflate when outside cabin and clear of aircraft

If circumstances permit:

Note **Try to close door and/or emergency exit window after evacuation to keep aircraft afloat as long as possible.**

3.5.j Fuel System Malfunctions

1 FUEL PRESS r

This warning means the fuel pressure at the engine inlet is too low. The cause of illumination can be a malfunction of the engine driven fuel pump and/or fuel pump assembly. Normally, engine fuel supply is sufficient due to high wing tank position and therefore hydrostatic fuel pressure.

Note **There are two electrical fuel pumps arranged in parallel set-up for redundancy reasons located in the engine compartment. Normally one pump is operative to provide sufficient pressure at the inlet of the engine driven fuel pump.**

Nevertheless, if the **FUEL PRESS** illuminates, proceed as follows:
Fuel Quantity; Check
FUEL SELECTOR VALVE*; Check* **BOTH**
FUEL PUMP 1 *and* ***2****; Both* **ON**

If **FUEL PRESS** extinguishes:
Land as soon as practical

If **FUEL PRESS** still illuminates:
Power Lever; Reduce to minimum power required

Warning: Be prepared for a possible engine failure and power off landing.
Land ASAP

2 **FUEL LOW LEFT – FUEL LOW RIGHT y**

This caution means that the fuel level in the respective collector tank is at low level. Fuel contained in this collector tank is sufficient to supply the engine for 5 minutes of flight. Note that fuel from the respective main tank can freely flow into this collector tank.

Fuel Quantity Relevant Tank(s); Re-check
***FUEL SELECTOR VALVE**; Switch to not-empty tank within 5 minutes*

3 **FUEL TRANS LEFT – FUEL TRANS RIGHT y**

This caution means the respective fuel transfer system is not working correctly. The pressure downstream of the respective transfer pump is too low. So fuel will no more be transferred from the auxiliary to the main compartment nor from the main to the collector compartment. Gravity fuel transfer from the main to the collector compartment still persists but with unusable fuel increased from 14 L to 32 L.

A possible cause for that failure can be that the respective **FUEL TRANSFER** switch is off or the load bus is without electrical power.

Fuel Quantity; Check
FUEL TRANSFER LEFT** or **RIGHT**; Re-check **ON
FUEL-TR-L** Circuit Breaker or **FUEL-TR-R** Circuit Breaker; Re-check **IN

If light persists:
FUEL TRANSFER LEFT** or **RIGHT**; **OFF
Note
On the affected tank side:
Unusable fuel increases from 14 L to 32 L.
Auxiliary tank fuel is not available.
FUEL LOW will illuminate on a much earlier stage.
Range; Re-calculate and change flight plan as required

4 **FUEL FILTER BYPASS y**

This caution means the aircraft fuel filter bypass is about to open (or is open) because its filter element is clogged.

Fuel Pressure ; Check
Aircraft Fuel Filter Element; Replace
within 2 hours of flight

3.5.k Propeller Malfunctions

1 **LOW PITCH y**

This caution means the propeller is commanded to be in 'beta' range and thus the propeller RPM is no longer controlled by the governor.

Power Lever ; Move forward

Note **In case of propeller problems e.g. oil pressure loss etc., propeller feathering is accomplished by the condition lever set to "FEATHER" position.**

3.5.l Electrical System Malfunctions

Note **In case of a generator failure, the load bus will be automatically shed.**

1 **GENERATOR FAIL r**

This warning means the generator relay is open and thus only battery and standby alternator power is available (and external power if connected and on). The Load bus will be without power. The cause can be the **GEN** switch being off or the generator control unit (GCU) has sensed a fault or is faulty itself.

GEN; RESET
(hold for approx. 2 seconds and back to ***ON****)*

If **GENERATOR FAIL** extinguishes:
VDC; *Check 28*
GEN AMPS; *Check indication*
Flight; Continue

If **GENERATOR FAIL** still illuminates:

AVIONICS; OFF
Flight; Leave icing conditions
ICE ; OFF
PROP ; OFF
BOOTS; OFF
WINDSH; OFF
ENGINE START; IGN OFF
STANDBY ALTERN ON; *Check illuminated*
no specific procedure required
Note
Battery and standby alternator supply is limited to at least 30 minutes.

In case a load from the load bus is necessary:
All *load bus Circuit Breakers; Pull*
Needed Circuit Breakers; Push in
BUS TIE *Circuit Breaker**;** Push in*

If a landing is possible within 30 minutes:
Land ASAP

If a landing is not possible within 30 minutes
FUEL PUMP 1; ON
Flight; Descent to 10,000ft
EMERGENCY; ON
Notes
Aircraft functionality will be limited to a minimum (only loads of emergency bus).
Landing gear will slowly extend. Flaps cannot be moved.
Unusable fuel increases from 14 L to 32 L per side. Auxiliary tank fuel is not available.
FUEL LOW will illuminate on a much earlier stage.
Range; Re-calculate and change flight plan as required

If within 30 minutes of airfield
EMERGENCY; OFF
Land ASAP

2 STANDBY ALTERN ON y

This caution means the standby alternator is working because the bus voltage has dropped below 26.5VDC. A blinking light indicates a overload of the standby alternator.

GENERATOR FAIL; *Check illuminated*

If **GENERATOR FAIL** illuminates:
GENERATOR FAIL Procedure; Perform

If **GENERATOR FAIL** not illuminates:
VDC; *Check >* 26.5

If voltage is above 26.5VDC
STDBY ALT; OFF

3 LO VOLTAGE y

This caution means the bus voltage has dropped below 25.5 VDC.

VDC; *Check >* 25.5

If voltage is below 25.5 VDC, it can be assumed that the generator has failed (also refer to the GENERATOR FAIL paragraph).

In case voltage is below 25.5VDC:
GEN AMPS ; *Check approx.* 20

In case indication is significantly below:
Caution
Do not exceed engine and airspeed limits
Power Lever; Slightly forward

4 Circuit Breaker Tripped

Note **Make only one attempt to restore an automatically disconnected power source or reset or replace an automatically disconnected CPD (circuit protection device) that affects flight operations or safety. Each successive attempt to restore an automatically disconnected power source, or the resetting of an automatically disconnected CPD can result in progressively worse effects.**

For essential systems required in current operational conditions:
Circuit Breaker; Only one attempt:
Push in

All other circuit breakers or circuit breaker trips again:
Circuit Breaker; Leave tripped
Flight; Continue

3.5.m Flight Control Malfunctions

1 FLAPS r

This warning means a flap unbalance has been detected by the flap watchdog and the flap motor has been stopped. That means that the left and right wing flap positions differ approx. 7°. The **FLAP-UNB** circuit breaker is out.

Balance Aircraft; Slightly by using rudder and/or aileron
Land ASAP

During landing approach:
Flaps position; Estimate position
Landing Approach Speed; Due to estimated flap position between
Flaps 30° = 80 KIAS
Flaps UP = 120 KIAS
LANDING GEAR**; **DN
Power Lever; Set as required
Landing; Perform

2 Elevator Control Failure

In case elevator control fails, speed shall be controlled by elevator trim while approach angle is controlled by power setting. For CG of 21 % MAC and behind, trim authority will be sufficient to achieve zero sink rate.

For CG of 21 % and behind, the following procedure is recommended:
Pitch Control; Use aircraft trim
Mayday Call; Transmit
Note
For landing, select long runway with possibly low crosswinds.
Landing Approach; Long Final
Note
Landing gear and flaps should be set down as early as possible to stabilize drag during approach.
LANDING GEAR**; **DN
FLAPS**; **30°
Aircraft; Trim full aft
Power Lever; Set as required

Approximately 20 feet AGL:

Power Lever; Set as required to obtain nose up attitude
Landing; Perform

3 Spins

Note **Spins are not permitted with this aircraft.**

If the aircraft unintentionally comes into a spin, the recovery procedure is as follows:
Power Lever; ***FLT IDLE***
Rudder; Full opposite to rotation direction
Ailerons; Neutral
Elevator; Forward

If flaps were set:
FLAPS; UP

When rotation has stopped:
Rudder; Neutral
Elevator; Pull
Aircraft; Level off
Flight; Continue

3.5.n Landing Gear Malfunctions

Note **If there is any doubt about condition of landing gear, it is preferable to perform a fly by in conjunction with ground station e.g. tower etc.**

Note **If prolonged flight with extended landing gear is necessary, consider reduced cruise speed.**

1 GEAR WARN r (with aural)

This warning (with aural) means the gear is not down and locked and the power setting is below 35%TRQ.

When in approach:
Airspeed; Reduce below 140KIAS
LANDING GEAR; DN

Else:
Power Lever; move forward until torque above 35%

LANDING GEAR; DN

2 GEAR WARN r (without aural and gear retracted)

This warning (without aural) means the gear is not fully retracted.

Airspeed; Reduce below 140KIAS
To prevent damage of landing gear and gear doors.

LANDING GEAR; *Check* ***UP***
HYDR *Circuit Breaker; Check in*
GEAR-CTRL *Circuit Breaker; Check in*
Hydraulic Pump; Runs periodically

If ***GEAR WARN*** still illuminated:

Caution **Do not attempt to retract landing gear further if it fails to retract during first attempt.**

LANDING GEAR; DN
Land as soon as practical

3 GEAR WARN r (without aural and gear extended)

This warning (without aural) means the gear is not extended. For full extension the ‘three greens’ can be checked.

Gear Operation Lights; Check illumination
(three greens)

If no three greens:
No Three Greens Procedure; Perform

4 HYDRAULIC PUMP y

This caution means the hydraulic pump (landing gear system) is energized.

Runs continuously ; Check
HYDR *Circuit Breaker; Pull*
Airspeed; Reduce to max. 140 KIAS
Note
Landing gear will now slowly extent, which is indicated by the red GEAR WARN light on the annunciator panel.
Land as soon as practical
Emergency Extension; Perform

5 No Three Greens

LANDING GEAR; *Check* ***DN***

If still no three greens:
Emergency Extension; Perform

6 Emergency Extension

Airspeed; 110 KIAS
LANDING GEAR; DN
GEAR CTRL *Circuit Breaker; Pull*
Gear Operation Lights; Check illumination
(three greens)
Land as soon as practical

If still no three greens:
Hydraulic System Reactivation; Perform

7 Hydraulic System Reactivation

In case landing gear emergency extension has failed (no indication of green status lights), the reactivation of the hydraulic system is advisable to stabilize landing gear, e.g. in case of locking mechanism failure.

HYDR *Circuit Breaker; Check in*
GEAR-CTRL *Circuit Breaker; Push in*
Important
Landing should be performed by using one of the landing emergency procedures.
Land as soon as practical
Warning
If no three green lights and thus landing gear is not locked collapsing of landing gear is possible any times!
Support aircraft before working on the landing gear.

Caution **Do not switch BATT OFF and thus deactivating the hydraulic system before locking the landing gear hydraulic actuator.**

Landing Gear Hydraulic Actuator; (Prior ***BATT OFF****)*
Lock with locking device

3.5.o Pressurization System Malfunctions

1 **CABIN PRESSURE** **r**

This warning means that the cabin altitude is above 10,000ft or the cabin pressure relative to the outside atmosphere is above the normal operating limit (5.5psid).

Cabin Altitude; Check indication
Cabin Differential Pressure; Check indication

If cabin overpressure has been determined:
ENV AIR; OFF
Emergency Descent; Perform to safe altitude
(< 10,000 ft)

If cabin altitude above 10,000 ft has been determined:
ENV AIR*; Check* ***ON***
PRESS*; Check* ***ON***
Cabin Pressure Controller; Check
Rate Control Knob; Turn clockwise to regain pressurization

If cabin altitude drops below 10,000 ft:
Flight; Continue
Cabin Pressurization Instruments; Monitor

If cabin altitude remains still above 10,000 ft:
Emergency Descent; Perform to safe altitude
(< 10,000 ft)

2 **AFT DOOR** **r**

This warning means the cabin door is not correctly closed.

CABIN PRESSURE*; Check illuminated*

If **CABIN PRESSURE** illuminated
Emergency Descent; Perform to safe altitude
(< 10,000 ft)

If in safe altitude:
Occupants seated and
seat belts on ; Check
Cabin pressurization; Reduce if possible
Note
As pilot in command do not leave your seat. Let a passenger check the door inspection glasses if possible.
Door inspection glasses; Check green

Land as soon as practical

3 BLEED OVERTEMP r

This warning means the temperature switch in the duct supplying the pressure cabin with bleed air has detected a temperature exceeding limits for the composite structure and windshield.

WINDSHIELD; *Push*
TEMP CTRL; *Check* **AUTO**
TEMP CTRL *Rheostat;* ***13°***

If no effect:
TEMP CTRL; MANUAL
WARM/COOL; COOL
Hold for 10 seconds

If no effect and warning light still illuminates:
Warning
When ***ENV AIR*** *is* ***OFF*** *cabin will lose pressurization.*
ENV AIR; OFF
Emergency Descent; Perform to safe altitude (< 10,000 feet)
PRESS; DUMP

4 Impending Skin Panel or Window Malfunction

PRESS; DUMP
Emergency Descent; Perform to safe altitude (< 10,000 feet)

3.5.p Flight into Icing Conditions

Note **Flights into known or forecasted icing conditions are prohibited.**

1 **WINDSHIELD HEAT FAIL r**

This warning means that the windshield controller has detected a fault when **WINDSH** switch is switched **ON**. Proper heating current draw is (intermittently) annunciated by the **WINDSHIELD ON** g safe operation light.

WINDSH; OFF

2 **STALL HEAT r**

This warning means that the stall vane heating is not drawing enough current to work properly. The cause can be **PITOT–R** switch is off, load bus is without electrical power or the aircraft is on the ground.
Airspeed indicator ; Monitor

3 **PILOT HEAT LEFT or RIGHT y**

This caution means that the respective pitot heating device is not drawing enough electrical current to function properly. The cause can be the respective **L–PITOT–R** switch is off, aircraft is on the ground or the emergency bus or load bus respectively is without electrical power.

Airspeed indicators; Cross-check
on a regular basis

4 **STATIC HEAT LEFT or RIGHT y**

This caution means that the respective static heating device is not drawing enough electrical current to function properly. The cause can be the respective **L–PITOT–R** switch is off, aircraft is on the ground or the emergency bus or load bus respectively is without electrical power.

Altimeters; Cross-check
on a regular basis

5 PNEUMATIC LOW y

This caution means the bleed air pressure for the de-icing boots is not enough for proper function.

Caution
Do not exceed engine and airspeed limits
Power lever; Move Forward

6 Unintentional Flight into Icing Conditions

INTAKE ANTI-ICE; *Pull*
L – PITOT – R*; Check* **ON**
FUEL PUMP 1 *and* ***2****;* ***ON***
ENGINE START; IGN
BOOTS*;* ***ON***

If necessary:
WINDSH; ON
WINDSHIELD HEAT ON*; Check illuminating (intermittent)*
Altitude and/or Heading; Change immediately to leave icing zone

7 Windshield Icing

WINDSH*;* ***ON***
Icing Conditions; Monitor

If icing conditions require:
Altitude and/or Heading; Change for better conditions

8 Windshield Fogging

WINDSHIELD*; Pull*
Flight; Continue
Fogging Conditions; Monitor

3.5.q Lightning Strike

The aircraft generally is protected against lightning strike. Nevertheless, if a lightning strikes the aircraft, proceed as follows:

NIGHT/DAY; TEST
Exterior Lights*; Check function*
Navigation System; Check indications, function

If navigation system no longer available:
Conventional Instruments; Monitor
IMC; Leave
Land ASAP

If severe engine vibrations are noticeable caused by propeller damage:
Power Lever; Reduce as far as possible

If vibrations disappear:
Flight; Continue
Land as soon as practical

If vibrations are still severe:
Land ASAP
Caution
Severity of engine vibration can require an immediate landing on the nearest possible and adequate landing area, using power on/power off landing emergency procedures.

3.5.r Emergency Exit Window Removal

PRESS; DUMP
To reduce cabin pressure.

Cabin Differential Pressure Indicator; Check zero Indication
Emergency Exit Window Handle; Turn counterclockwise
Emergency Exit Window; Pull in and down

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Section 4
Normal Procedures
Table of Contents

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4 Normal Procedures

4.1 Introduction

General

Section 4 of this handbook describes in abbreviated form (checklists) the procedures for normal operations. Amplifications to the abbreviated checklist are presented in addition by subparagraphs to each checklist paragraph e.g. subparagraph c. corresponds to paragraph c etc..

Note **The Amplified Normal Procedures Checklist should be used until the pilots have become familiar with the aircraft and systems. Thereafter the Abbreviated Normal Procedure checklist can be used for aircraft operations. Nevertheless, all amplified normal procedure items must be accomplished, regardless, which checklist is used. Latest status of these Checklists can be checked against the list of Effective Pages in this manual.**

4.2 Airspeed for Safe Operation

Note **The following data is to be used for normal operations.**

Conditions:

Takeoff Weight: 2130 kg (4696 lbs)
Landing Weight: 2000 kg (4409 lbs)

Speed	KIAS
Best Rate of Climb Speed	110
Best Angle of Climb Speed	90
Transition Speed for Balked Landing	80
Speed	**kts**
Max. Demonstrated Crosswind Velocity	20

4.3 Enroute Climb

Speed	KIAS
Enroute Climb Speed	110

4.4 Landing

Speed	KIAS
Airspeed for Approach, Flaps 30°	80
Airspeed for Approach, Flaps 0°	120
Recommended Airspeed for Flights in Rough Air	156

4.5 Stalling Speeds

Speed	KIAS
Flaps UP	80
Flaps 15°	67
Flaps 30°	58

4.6 Normal Procedures Checklist

4.6.a Preflight Inspection

1 General

The preflight inspection is mandatory for the first flight of the day.

Inspection procedures for subsequent flights are normally limited to brief checks of the fuel, oil, air, security of fuel and oil filler caps, overall appearance of the aircraft and a check of the engine fan blades and the propeller.

It is to ensure, that the aircraft fuel system is drained and checked for contaminations. Samples from fuel drain location should be taken during each preflight inspection and after every refueling.

For the purpose of this section, it is assumed that before entering the aircraft, the takeoff, enroute and anticipated landing weight and center of gravity have been determined and that the cargo is secured and loading is within the weight and balance limitations specified in Section 6 of this handbook.

It is further assumed, that the takeoff, enroute and landing performance, as specified in Section 5 of this handbook, have been reached.

2 Cabin

Before executing the exterior check:

Item	Condition
Aircraft Flight Manual and Documents	Check available and status
Weight and Balance Data	Check
Control Lock Device	Remove
PARKING BRAKE	Check set
LANDING GEAR	Check **DN**
FLAPS	Check **UP**
Circuit Breakers	Check in
BATT	**ON**
Note	
The upper landing gear doors will close with noise. Landing gear doors open slowly, when hydraulic system is deactivated.	
GEAR IND	Check three greens
GENERATOR FAIL	Check illumination
STALL HEAT	Check illumination
OIL PRESS	Check illumination
PITOT HEAT LEFT	Check illumination
PITOT HEAT RIGHT	Check illumination
STATIC HEAT LEFT	Check illumination
STATIC HEAT RIGHT	Check illumination
FUEL TRANS LEFT	Check illumination
FUEL TRANS RIGHT	Check illumination
PNEUMATIC LOW	Check illumination
NIGHT/DAY	**TEST**
Fuel Quantity	Check
FUEL SELECTOR VALVE	**BOTH**
Pitch Trim	Set to **N**
BATT	**OFF**

3 Exterior Check

Note **In cold weather, remove even small accumulations of frost, ice or snow from the wings, fuselage, tail and control surfaces. Also make sure that control surfaces contain no internal accumulations of ice or debris. If night flight is planned, check operation of all lights and flash light available.**

Exterior Inspection Illustration

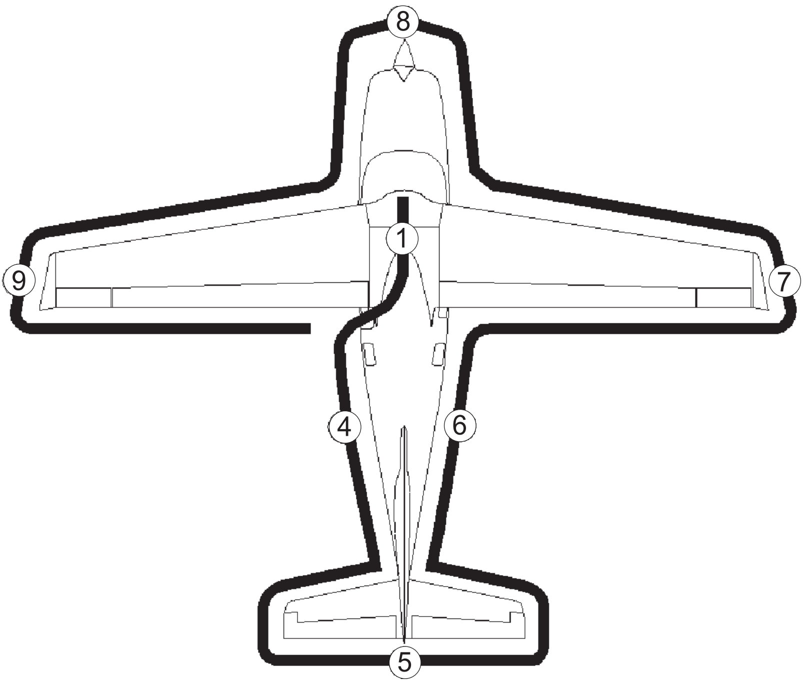

Figure 4-1

4 Left Side of the Fuselage

Item	Condition
Cabin Entrance Door	Check condition
Aircraft	Check in level
Main Gear, Hydraulic Lines, Gear Doors, Wheel Brake, Wheel, Tire and Landing Light	Check condition
Windows	Check for cracks and contamination
Fuselage Sidewall	Check condition
Air Opening	Check condition, free
Antennas	Check condition
Static Port	Check uncovered and condition
Access Panels	Check closed and secured

5 Empennage

Item	Condition
Horizontal and Vertical Fins	Check condition
Elevator	Check condition
Elevator Trim Tab	Check condition and in neutral position
Note	
Consider spring forces of rudder centering, coupling with nose wheel steering and control interconnection with ailerons.	
Rudder	Check condition, free movement
Strobe Light	Check condition
Antennas	Check condition

6 Right Side of Fuselage

Item	Condition
Fuselage Side Wall	Check condition
Static Port	Check uncovered and condition
Windows, Emergency Exit	Check for cracks and contamination
Emergency Exit Release Handle	Check stowed
Main Gear, Hydraulic Lines, Gear Door, Wheel Brake, Wheel, Tire and Landing Light	Check condition
Important	
Hydraulic fluid must be visible in the inspection glass.	
Landing Gear Hydraulic Reservoir	Check fluid level (inspection glass)

7 Right Wing

Item	Condition
Wing Tie Down	Release, remove eye bolt
Fuel Quantity	Check
Fuel Filler Caps (2)	Closed, secured
Flap	Check condition
Note	
Checking movement of aileron, consider spring forces of control interconnection with rudder	
Aileron	Check condition, free movement
Navigation-, Strobe- and Recognition Lights	Check condition
Wing Leading Edge	Check condition and presence of stall strip
Pitot Tube	Check uncovered and for clogging
Caution	
Avoid fuselage contamination with fuel.	
Fuel Tank Sump and Outer Wing Tank Drains	Drain fuel samples with cup, check for water and contamination
Drain Valves	Check locked and secured
Fuel Tank Vent	Check free of clogging

8 Engine and Propeller

Item	Condition
Engine Cowlings	Check condition
Engine Air Intake	Check uncovered, clear and condition
Engine Exhausts	Check uncovered and condition
Engine Oil Level	Check in limits
Oil Access Panel	Check closed, secured
Towing Bar	Removed
Nose Gear, Gear Door, Wheel and Tire	Check condition
Antennas	Check condition
Caution	
Blade shake is allowed up to 3 mm (1/8 inch) and a blade angle play of 2° is acceptable. No critical cracks in the blades. Metal corrosion sheet may not be loose. If not, replace within the next 10 hours after last inspection.	
Propeller and Spinner	Check for condition, oil leaks, blade movements
Propeller De-Ice Pads	Check condition
Front Window	Check for cracks and contamination

9 Left Wing

Item	Condition
Caution	
Avoid fuselage contamination with fuel.	
Fuel Tank Sump	Drain fuel samples with cup, check for water and contamination
Drain Valves	Check locked and secured
Wing Tie Down	Release, remove eye bolt
Fuel Quantity	Check
Fuel Filler Caps (2)	Check closed, secured
Wing Leading Edge	Check condition and presence of stall strip
Stall Warning Sensor	Check free movement
Pitot Tube	Check uncovered and for clogging
Navigation-, Strobe- and Recognition Lights	Check
Note	
Checking movement of aileron, consider spring forces of control interconnection with rudder.	
Aileron	Check condition, free movement
Flap	Check condition

4.6.b Interior Check

Item	Condition
Entrance Door	Re-check closed and secured

After entering and taking seat position, the following cabin procedures are to be carried out:

Item	Condition
Seat Belts and Shoulder Harness	Adjust and locked
Passengers	Seated and strapped
Flight Controls	Check free movement
Note	
BUS TIE circuit breaker must be out!	
Circuit Breakers (others)	Re-check in
BATT	**ON**
Stall Warning System	Check function
L – PITOT – R	(Max. 10 seconds) **– TEST –**

4.6.c Before Starting Engine (with External Power)

Item	Condition
GEN	Check **OFF**
AVIONICS	Check **OFF**
ENV AIR	Check **OFF**
PRESS	**ON**
Pressure Controller	Set to field elevation
Cabin Rate of Climb	Set
AIR CON	**OFF**
STROBE	Check **ON**
PARKING BRAKE	Re-check set
Condition Lever	**FUEL OFF**
Power Lever	**GRD IDLE**
External Power Device (28 V DC)	Check connected
External Power Device	Request on
EXTERNAL POWER	Check illumination
EXT PWR	**ON**
BATT	**ON**
Voltmeter	Check reading
Instrument Lights	As required
Start up Clearance	Obtain

After engine start is completed:

Item	Condition
EXT PWR	**OFF**
External Power Supply Plug	Disconnect
EXTERNAL POWER	Check extinguished
External Power Access Panel	Check close and secured

4.6.d Before Starting engine (without External Power)

Item	Condition
GEN	Check **OFF**
AVIONICS	Check **OFF**
ENV AIR	Check **OFF**
PRESS	**ON**
Pressure Controller	Set to field elevation
Cabin Rate of Climb	Set
AIR CON	**OFF**
STROBE	Check **ON**
PARKING BRAKE	Re-check set
Condition Lever	**FUEL OFF**
Power Lever	**GRD IDLE**
BATT	**ON**
Caution	
Prior to engine start up with battery power, check the voltmeter reading for sufficient battery power. It is recommended to use external power for engine start when battery voltage is below 24 V.	
Voltmeter	Check reading > 24VDC
Instrument Lights	As required
Start Up Clearance	Obtain

4.6.e Engine Start

Note **If TOT is above 100°C prior to engine start, use the ENGINE MOTORING switch to lower it. Observe starter limits, see 2.16.a -2.**

Item	Condition
NIGHT/DAY	**TEST**
FUEL TRANSFER LEFT and **RIGHT**	Check both **ON**
FUEL PUMP 1 or **2**	**ON**
Fuel Pressure	Check reading > 10 psi
TOT	Check reading < 100 °C
ENGINE MOTORING	Check **NORMAL**
ENGINE START	Momentary **START**

At 12 to 15 % N1 is reached:

Item	Condition
Condition Lever	Fully forward
TOT	Monitor < 850 °C

Note **After passing through 58 % N_1 starter will deactivate automatically.**

Item	Condition
Oil Pressure	Check indication
OIL PRESS	Check extinguished
Propeller RPM	Check positive indication at 25% N1
PNEUMATIC LOW	Check extinguished

4.6.f After Starting Engine

Item	Condition
ENGINE START	**IGN OFF**
FUEL PUMP (other)	**ON**
FUEL PUMP (original)	**OFF**
Fuel Pressure	Check reading > 10 psi
STDBY ALT	**ON**
STANDBY ALTERN ON	Check illumination
Note	
Before switching on the generator, make sure the engine RPM-s have stabilized.	
GEN	**ON**
STANDBY ALTERN ON	Check extinguished
GENERATOR FAIL	Check extinguished
FUEL TRANS LEFT	Check extinguished
FUEL TRANS RIGHT	Check extinguished
Ice Protection	**ON**, if required
L – PITOT – R	**ON**
AVIONICS	**ON**
Altimeter	Set
Radios	Set as required
Navigation Equipment	Set as required
ENV AIR	**ON**
Cabin Pressure	Set as required
Air Conditioning	Set as required

4.6.g Taxiing

Item	Condition
PARKING BRAKE	Release
Brakes	Check functioning
Nose Wheel Steering	Check functioning
Flight Instruments	Check function
FLAPS	**15°**

4.6.h Engine Run Up

Item	Condition
PARKING BRAKE	Set
Engine Oil Temperature	Check indication
Power Lever	Set 1800 engine RPM
Caution	
Do not press ENGINE OVSPD TEST for more than 20 sec..	
ENGINE OVSPD TEST	Press and hold
Propeller rpm	Check decrease
ENGINE OVSPD TEST	Release
Propeller rpm	Check return to original value
Ammeter	Check reading
Fuel Flow	Check indication
Engine Oil Pressure	Check indication

After completion:

Item	Condition
Power Lever	**GRD IDLE**

In prolonged idle operation in freezing fog conditions:

Item	Condition
Power Lever	Increase power periodically

4.6.i Before Takeoff

Item	Condition
Note	
Before takeoff, takeoff and emergency briefing shall be given to crew members and passengers.	
AIR CON	**OFF**
Pitch Trim	Check set to **N**
Transponder	Set as required
ADAHRS (2) / gyro	Check aligned
Condition Lever	Fully forward
FUEL PUMP 1 and **2**	Both **ON**
ENGINE START	**IGN**
RECO	**ON**
Engine Instruments	Check normal
Note	
PITOT HEAT, STATIC HEAT and STALL HEAT will extinguish on annunciator panel, when pitot heat is activated and as soon as aircraft is airborne.	
Annunciator Panel Lights (others)	Off

4.6.j Takeoff

Item	Condition
Power Lever	MAX POWER (111 % Torque)
TOT	Monitor < 810°
Brakes	Release
Note	
Rotation speed should be reduced linearly to 69 KIAS at 1900 kg (4190 lbs) and 66 KIAS at 1600 kg (3530 lbs) takeoff weight.	
Aircraft	Under MTOW conditions rotate at 71 KIAS

4.6.k After Takeoff Climb

Item	Condition
LANDING GEAR	**UP**
FLAPS	Before reaching 120 KIAS **UP**
Power Lever	Max Continuous Power (92 % Torque)
All Annunciator Panel Lights	Check extinguished
Note	
Recommended cruise climb speed is 120 KIAS while maximum climb speed is 110 KIAS.	
Engine Instruments	Check continuously
Pressure Controller	Set to cruise level
Cabin Rate of Climb	Adjust, check indication
FUEL PUMP 1 or **2**	**OFF** (Leave one **ON**)
ENGINE START	Set as required
RECO	**OFF**
Air Conditioning	As required

4.6.l Cruise

Item	Condition
Cruising Speed	Set as required
Engine Instruments	Monitor
Flight Instruments	Monitor
Warning	
Maximum allowed fuel unbalance is 106 l (28 U.S. Gallons).	
Fuel Tank Feedings	Monitor, set as required

4.6.m Descent/Approach

Item	Condition
Approach Briefing	Perform
Landing Information	Obtain with ATIS
Navigation Equipment	Set as required
Fuel Quantity	Check
FUEL SELECTOR VALVE	Check **BOTH**
Altimeter	Set and check QNH
Pressure Controller	Set airport elevation
Rate of Descent	Adjust

4.6.n Final

Item	Condition
LANDING GEAR	Below 140 KIAS **DN**
Caution	
Flap selection airspeed must be below 120 KIAS for flaps setting to15° and below 109 KIAS for flap setting to 30°.	
FLAPS	Set as required
Condition Lever	**MAX PROP RPM**
RECO	**ON**
LDG	**ON**
FUEL PUMP 1 and **2**	Both **ON**
ENGINE START	Check **IGN**
AIR CON	**OFF**
Pitch Trim	Set as required

4.6.o Before Landing/Landing

Item	Condition
Seat, Seat Belts and Harnesses	Adjust and locked
GEAR IND.	Re-check three greens
FLAPS	Below 109 KIAS **30°**
Cabin Differential Pressure Indicator	Check zero indication

If differential pressure still is indicated:

Item	Condition
PRESS	**DUMP**
Final Approach Speed	Adjust 80 KIAS
Landing	Perform

After touchdown, wheels on ground:

Item	Condition
Brakes, Propeller Reverse Thrust	Apply as required

When clear of runway:

Item	Condition
FLAPS	**UP**
Transponder	Check Standby
FUEL PUMP 1 and **2**	Both **OFF**
ENGINE START	**IGN OFF**
RECO	**OFF**
LDG	If not required **OFF**
Ice Protection	**OFF** (if applicable)
L – PITOT – R	**OFF**
Pitch Trim	**N**

4.6.p Cross Wind Operation

Approach:

Item	Condition
Approach Speed	Adjust 80 KIAS
Note	
Crosswind should be compensated by a combination of heading the nose into the wind and banking the aircraft slightly into the wind.	
Crosswind Component	Compensate

Prior to touchdown:

Item	Condition
Aircraft	Adjust to center line of runway
Bank Angle	Maintain small angle into wind

After touchdown:

Item	Condition
Nose Wheel	Lower immediately
Straight Path	Control with rudder
Aileron	Keep deflected into wind

4.6.q Balked Landing

Item	Condition
Power Lever	MAX POWER (111 % Torque)
TOT	Monitor < 810°
Condition Lever	**MAX PROP RPM**
Aircraft	Check positive climb
LANDING GEAR	**UP**
FLAPS	Above 74 KIAS **15°**
FLAPS	Above 90 KIAS **UP**

4.6.r Engine Shutdown

Item	Condition
Power Lever	**GRD IDLE** (at least 2 minutes)
ENV AIR	**OFF**
AVIONICS	**OFF**
Lights	**OFF**
STDBY ALT	**OFF**
GEN	**OFF**
Condition Lever	**FUEL OFF**
BATT	**OFF**
PARKING BRAKE	Set as required

4.6.s Rain

Note **Aircraft flight characteristics do not change when flying in rain. However, the stall speeds will be 3 to 5 knots higher than the given ones.**

4.7 Normal Procedures (Amplified)

4.7.a Preflight Inspection

1 General

If the aircraft has been in extended storage or had recent major maintenance, or has been operated from marginal airfields, a more extensive exterior inspection is recommended.

After major maintenance, the flight and trim tab controls should be double-checked for free and correct movement and security.

The security of all inspection plates should be checked following periodic inspections. If the aircraft has been waxed or polished, check that the external static ports are free.

If the aircraft has been exposed in a crowded hangar, it should especially be checked for scratches on wing, empennage and tail surfaces, damage to navigation and anti-collision lights and avionics antennae.

Generally the aircraft should be parked headed into the wind and with air intake, exhaust covers fixed and propeller protected against windmilling.

Outside storage for long periods may result in dust and dirt accumulation, obstructions in airspeed system lines and condensation in fuel tanks. If any water is detected in the fuel system or fuel reservoir drain valves, they should all be thoroughly drained until there is no evidence of water or sediment contamination.

After outside storage in winds or gusty areas or if tied down adjacent to taxiing aircraft, special attention to control surfaces, hinges and brackets is required to detect the presence of wind damage.

If the aircraft has been operated from muddy fields or in snow or slush, check the main and nose wheel wells for obstructions and cleanness. Operation from a gravel or cinder airfield will require extra attention to surfaces.

Aircraft that are operated from rough fields, especially at high altitudes, are subject to abnormal landing gear abuse. Frequently check all components of the landing gear, struts, tires and brakes.

To prevent loss of fuel in flight, make sure, that all filler caps are tightly sealed after any system check or servicing. Fuel system vents should be inspected for obstructions, ice or water, especially after exposure to cold, wet weather.

2 Cabin

Before executing the exterior check, a cabin check should be applied as follows:
Aircraft Flight Manual and Documents; Check available and status
Weight and Balance Data; Check
Control Lock Device; Remove
PARKING BRAKE; *Check set*
LANDING GEAR; *Check* ***DN***
FLAPS; *Check* ***UP***
Circuit Breakers; Check in
BATT; ON

Note **The upper landing gear doors will close with noise. Landing gear doors open slowly, when hydraulic system is deactivated.**

GEAR IND; *Check three greens*
GENERATOR FAIL; *Check illumination*
STALL HEAT; *Check illumination*
OIL PRESS; *Check illumination*
PITOT HEAT LEFT; *Check illumination*
PITOT HEAT RIGHT; *Check illumination*
STATIC HEAT LEFT; *Check illumination*
STATIC HEAT RIGHT; *Check illumination*
FUEL TRANS LEFT; *Check illumination*
FUEL TRANS RIGHT; *Check illumination*
PNEUMATIC LOW; *Check illumination*
NIGHT/DAY; TEST
Fuel Quantity; Check
FUEL SELECTOR VALVE; BOTH
Pitch Trim; Set to ***N***
BATT; OFF

3 Exterior Check

The exterior check is performed to check the aircraft for general condition and should follow the path as shown in Figure 4-1. Check particularly for damage, fuel, oil and fluid leakage and security of access panels and removal of ground safety guards, pins and covers.
Normally no additional aid is required to perform the external preflight.

Note **In cold weather, remove even small accumulations of frost, ice or snow from the wings, fuselage, tail and control surfaces. Also make sure that control surfaces contain no internal accumulations of ice or debris.**

If night flight is planned, check operation of all lights and flash light available.

4 Left Side of the Fuselage

Cabin Entrance Door; Check condition
Aircraft; Check in level
When the aircraft is in level e.g. standing on an even floor, condition of landing gear shock absorbers and/or fuel asymmetry can be checked. In addition, the aircraft must be in lateral level to ensure possible water and/or sediment is in fuel tank sump when taking fuel samples from the wing tank drains.
Main Gear, Hydraulic Lines, Gear Doors, Wheel Brake, Wheel, Tire and Landing Light; Check condition
Windows; Check for cracks and contamination
Fuselage Sidewall; Check condition
Air Opening; Check condition, free
Antennas; Check condition
Static Port; Check uncovered and condition
Access Panels; Check closed and secured

5 Empennage

Horizontal and Vertical Fins; Check condition
Elevator; Check condition
Elevator Trim Tab; Check condition and in neutral position

Note **Consider spring forces of rudder centering, coupling with nose wheel steering and control interconnection with ailerons.**

Rudder; Check condition, free movement
Strobe Light; Check condition
Antennas; Check condition

6 Right Side of Fuselage

Fuselage Side Wall; Check condition
Static Port; Check uncovered and condition
Windows, Emergency Exit; Check for cracks and contamination
Emergency Exit Release Handle; Check stowed
Main Gear, Hydraulic Lines, Gear Door, Wheel Brake, Wheel, Tire and Landing Light; Check condition

Important **Hydraulic fluid must be visible in the inspection glass.**

Landing Gear Hydraulic Reservoir; Check fluid level (inspection glass)

7 Right Wing

Wing Tie Down; Release, remove eye bolt
Fuel Quantity; Check
Fuel Filler Caps (2); Closed, secured
Flap; Check condition

Note **Checking movement of aileron, consider spring forces of control interconnection with rudder.**

Aileron; Check condition, free movement
Navigation-, Strobe- and Recognition Lights; Check condition
Wing Leading Edge; Check condition and presence of stall strip
Pitot Tube; Check uncovered and for clogging

Caution **Avoid fuselage contamination with fuel.**

Fuel Tank Sump and Outer Wing Tank Drains; Drain fuel samples with cup, check for water and contamination
Drain Valves; Check locked and secured
Fuel Tank Vent; Check free of clogging

8 Engine and Propeller

Engine Cowlings; Check condition
Engine Air Intake; Check uncovered, clear and condition
Engine Exhausts; Check uncovered and condition
Engine Oil Level; Check in limits
Oil Access Door; Check closed, secured
Towing Bar; Removed
Nose Gear, Gear Door, Wheel and Tire; Check condition
Antennas; Check condition

Caution **Blade shake is allowed up to 3 mm (1/8 inch) and a blade angle play of 2° is acceptable. No critical cracks in the blades. Metal corrosion sheet may not be loose. If not, replace within the next 10 hours after last inspection.**

Propeller and Spinner; Check for condition, oil leaks, blade movements
Propeller De-Ice Pads; Check condition
Front Window; Check for cracks and contamination

9 Left Wing

Caution **Avoid fuselage contamination with fuel.**

Fuel Tank Sump; Drain fuel samples with cup, check for water and contamination
Drain Valves; Check locked and secured
Wing Tie Down; Release, remove eye bolt
Fuel Quantity; Check
Fuel Filler Caps (2); Check closed, secured
Wing Leading Edge; Check condition and presence of stall strip
Stall Warning Sensor; Check free movement
Pitot Tube; Check uncovered and for clogging
Navigation-, Strobe- and Recognition Lights; Check

Note **Checking movement of aileron, consider spring forces of control interconnection with rudder.**

Aileron; Check condition, free movement
Flap; Check condition

4.7.b Interior Check

Entrance Door; Re-check closed and secured

After entering and taking seat position, the following cabin procedures are to be carried out:

Seat Belts and Shoulder Harness; Adjust and locked
Passengers; Seated and strapped
Flight Controls; Check free movement

Note **BUS TIE circuit breaker must be out!**

Push in the **BUS TIE** circuit breaker only in case of a generator failure and if access to the load bus is necessary.

Circuit Breakers (others); Re-check in
BATT; ON
Stall Warning System; Check function
To avoid leaving the powered aircraft, the following items should be performed with an assisting person outside the aircraft.
The assisting person shall actuate the stall warning (lift detector) switch carefully by hand. Thus to check function of the system as red **STALL WARN** light on annunciator panel and stall warning horn.
L – PITOT – R; *(max. 10 seconds)* ***– TEST –***
The assisting person shall carefully touch the left and right wing pitot head and left wing lift detector. This units should become warm. Warning and advisory lights should not illuminate when systems are tested.

4.7.c Before Starting Engine (with External Power)

If starting engine with external power, an assisting person outside the aircraft should connect the external power supply plug by opening the external power supply access panel at right side of the engine cowling. After the external power supply plug is connected and the external power unit is switched on, the green **EXTERNAL POWER** light on the annunciator panel illuminates.
If using external power for engine start up, proceed as follows:

GEN; *Check* ***OFF***
AVIONICS; *Check* ***OFF***
ENV AIR; *Check* ***OFF***
PRESS; ON
Pressure Controller; Set to field elevation
Cabin Rate of Climb; Set
AIR CON; OFF
STROBE; *Check* ***ON***
PARKING BRAKE; *Re-check set*
Condition Lever; ***FUEL OFF***
Power Lever; ***GRD IDLE***
External Power Device (28 V DC); Check connected
External Power Device; Request on
EXTERNAL POWER; *Check illumination*
EXT PWR; ON
BATT; ON
Voltmeter; Check reading
Instrument Lights; As required
Start up Clearance; Obtain
After engine start is completed:
EXT PWR*;* ***OFF***
External Power Supply Plug; Disconnect
EXTERNAL POWER*; Check extinguished*
External Power Access Panel; Check close and secured

4.7.d Before Starting engine (without External Power)

If using battery only engine start procedure, proceed as follows:

GEN; *Check* ***OFF***
AVIONICS; *Check* ***OFF***
ENV AIR; *Check* ***OFF***
PRESS; ON
Pressure Controller; Set to field elevation
Cabin Rate of Climb; Set
AIR CON; OFF
STROBE; *Check* ***ON***
PARKING BRAKE; *Re-check set*
Condition Lever; ***FUEL OFF***
Power Lever; ***GRD IDLE***
BATT; ON

Caution **Prior to engine start up with battery power, check the voltmeter reading for sufficient battery power. It is recommended to use external power for engine start when battery voltage is below 24 V.**

Voltmeter; Check reading > 24VDC
Instrument Lights; As required
Start Up Clearance; Obtain

4.7.e Engine Start

Usually, "hot" starts will not occure if the normal starting procedures are followed. A "hot" start is caused by excessive fuel flow at normal engine RPM or normal fuel flow with insufficient engine RPM. The latter is usually the problem by attempting a start with low battery voltage.

Note **If TOT is above 100°C prior to engine start, use the ENGINE MOTORING switch to lower it. Observe starter limits, see 2.16.a -2.**

NIGHT/DAY; TEST
FUEL TRANSFER LEFT *and* ***RIGHT;*** *Check both* ***ON***
FUEL PUMP 1 *or* ***2; ON***
Fuel Pressure; Check reading > 10 psi
TOT; Check reading < 100 °C
ENGINE MOTORING; *Check* ***NORMAL***
ENGINE START; *Momentary* ***START***

At 12 to 15 % N1 is reached:

Condition Lever; Fully forward
TOT; Monitor < 850 °C

Note **After passing through 58 % N_1 starter will deactivate automatically.**

Oil Pressure; Check indication
OIL PRESS*; Check extinguished*
Propeller RPM; Check positive indication at 25% N1
PNEUMATIC LOW*; Check extinguished*

4.7.f After Starting Engine

ENGINE START; IGN OFF
FUEL PUMP** (other)**; ON
FUEL PUMP** (original)**; OFF
Fuel Pressure; Check reading > 10 psi
STDBY ALT; ON
***STANDBY ALTERN ON**; Check illumination*

Note **Before switching on the generator, make sure the engine RPM-s have stabilized.**

GEN; ON
***STANDBY ALTERN ON**; Check extinguished*
***GENERATOR FAIL**; Check extinguished*
***FUEL TRANS LEFT**; Check extinguished*
***FUEL TRANS RIGHT**; Check extinguished*
*Ice Protection; **ON**, if required*
L – PITOT – R; ON
AVIONICS; ON
Altimeter; Set
Radios; Set as required
Navigation Equipment; Set as required
ENV AIR; ON
Cabin Pressure; Set as required
Air Conditioning; Set as required

4.7.g Taxiing

Taxiing over loose gravel or cinders should be done with caution to avoid abrasion and stone damage. Strong quatering tail winds require caution. Use rudder and/or wheel brakes/nose wheel steering to maintain directional control of aircraft.

***PARKING BRAKE;** Release*
Brakes; Check functioning
Nose Wheel Steering; Check functioning
Flight Instruments; Check function
FLAPS; 15°

4.7.h Engine Run Up

***PARKING BRAKE**; Set*
Engine Oil Temperature; Check indication

Power Lever; Set 1800 engine RPM

Caution **Do not press ENGINE OVSPD TEST for more than 20 sec.**

ENGINE OVSPD TEST*; Press*
Propeller rpm; Check decrease
ENGINE OVSPD TEST*; Release*
Propeller rpm; Check return to original value
Ammeter; Check reading
Fuel Flow; Check indication
Engine Oil Pressure; Check indication

After completion:

Power Lever; ***GRD IDLE***

In prolonged idle operation in freezing fog conditions:

Power Lever; Increase power periodically, to prevent ice formation on engine air intake.

4.7.i Before Takeoff

Note **Before takeoff, takeoff and emergency briefing shall be given to crew members and passengers.**

AIR CON; OFF
Pitch Trim; Check set to ***N***
Transponder; Set as required
ADAHRS (2) / gyro; Check aligned
Condition Lever; Fully forward
FUEL PUMP 1 *and* ***2****; Both* ***ON***
ENGINE START; IGN
RECO; ON

Engine Instruments; Check normal

Note **PITOT HEAT, STATIC HEAT and STALL HEAT will extinguish on annunciator panel, when pitot heat is activated and as soon as aircraft is airborne.**

Annunciator Panel Lights (others); Off

4.7.j Takeoff

Power Lever; MAX POWER
(111 % Torque)
TOT; Monitor < 810°
Brakes; Release

Note **Rotation speed should be reduced linearly to 69 KIAS at 1900 kg (4190 lbs) and 66 KIAS at 1600 kg (3530 lbs) takeoff weight.**

Aircraft; Under MTOW conditions rotate at 71 KIAS

4.7.k After Takeoff Climb

LANDING GEAR; UP
FLAPS; *Before reaching 120 KIAS* ***UP***
Power Lever; Max Continuous Power (92 % Torque)
All Annunciator Panel Lights; Check extinguished

Note **Recommended cruise climb speed is 120 KIAS while maximum climb speed is 110 KIAS.**

Engine Instruments; Check continuously
Pressure Controller; Set to cruise level
Cabin Rate of Climb; Adjust, check indication
FUEL PUMP 1 *or* ***2; OFF*** *(Leave one* ***ON****)*
ENGINE START; *Set as required*
RECO; OFF
Air Conditioning; As required

4.7.l Cruise

Cruising Speed; Set as required
Engine Instruments; Monitor
Flight Instruments; Monitor

Warning **Maximum allowed fuel unbalance is 106 l (28 U.S. Gallons).**

Fuel Tank Feedings; Monitor, set as required

4.7.m Descent/Approach

Approach Briefing; Perform
Landing Information; Obtain with ATIS

Navigation Equipment; Set as required
Fuel Quantity; Check
FUEL SELECTOR VALVE; *Check* ***BOTH***
Altimeter; Set and check QNH
Pressure Controller; Set airport elevation
Rate of Descent; Adjust

4.7.n Final

LANDING GEAR; *Below 140 KIAS* ***DN***

Caution **Flap selection airspeed must be below 120 KIAS for flaps setting to15° and below 109 KIAS for flap setting to 30°.**

FLAPS; *Set as required*
Condition Lever; ***MAX PROP RPM***
RECO; ON
LDG; ON
FUEL PUMP 1 *and* ***2****; Both* ***ON***
ENGINE START*; Check* ***IGN***
AIR CON; OFF
Pitch Trim; Set as required

4.7.o Before Landing/Landing

Seat, Seat Belts and Harnesses; Adjust and locked
GEAR IND.; *Re-check three greens*
FLAPS*; Below 109 KIAS* ***30°***
Cabin Differential Pressure Indicator; Check zero indication

If differential pressure still is indicated:

PRESS; DUMP
Final Approach Speed; Adjust 80 KIAS
Landing; Perform
After touchdown, wheels on ground:
Brakes, Propeller Reverse Thrust; Apply as required

When clear of runway:

FLAPS; UP
Transponder; Check Standby
FUEL PUMP 1 *and* ***2****; Both* ***OFF***
ENGINE START*;* ***IGN OFF***

RECO; OFF
LDG; *If not required* ***OFF***
Ice Protection; ***OFF*** *(if applicable)*
L – PITOT – R; OFF
Pitch Trim; ***N***

4.7.p Cross Wind Operation

Even in gusty wind conditions, the aircraft can be handled easily. Asymmetric fuel balance of 106 l (28 U.S. Gallons) has no adverse effect to aircraft handling during takeoff in crosswind conditions, however, the heavier side should point into the wind if possible.
For crosswind landings the following procedure is recommended:

Approach*:*

Approach Speed; Adjust 80 KIAS

Note **Crosswind should be compensated by a combination of heading the nose into the wind and banking the aircraft slightly into the wind.**

Crosswind Component; Compensate

Prior to touchdown:

Aircraft; Adjust to center line of runway
Bank Angle; Maintain small angle into wind

After touchdown:

Nose Wheel; Lower immediately
Straight Path; Control with rudder
Aileron; Keep deflected into wind

4.7.q Balked Landing

When a balked landing is necessary, set power lever to Max Power (111 % Torque). The aircraft will climb even in landing configuration and pitch is only slightly affected by change of power setting. After setting flaps to 15° normal climb can be continued.
The following procedure apply:

Power Lever; MAX POWER (111 % Torque)
TOT; Monitor < 810°
Condition Lever; ***MAX PROP RPM***
Aircraft; Check positive climb
LANDING GEAR; UP
FLAPS; *Above 74 KIAS* ***15°***
FLAPS; *Above 90 KIAS* ***UP***

4.7.r Engine Shutdown

Power Lever; ***GRD IDLE*** *(at least 2 minutes)*
ENV AIR; OFF
AVIONICS; OFF
Lights; ***OFF***
STDBY ALT; OFF
GEN; OFF
Condition Lever; ***FUEL OFF***
BATT; OFF
PARKING BRAKE; *Set as required*

4.7.s Rain

Note **Aircraft flight characteristics do not change when flying in rain. However, the stall speeds will be 3 to 5 knots higher than the given ones.**

4.8 Noise Characteristics

The noise level has been established in accordance with

- ICAO Annex 16 to Volume 1, Chapter 10, as 76.7 dB(A) and
- FAR 36 Appendix G, Amendment 28, as 75.6 dB(A).

No determination has been made by the Federal Aviation Administration that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

The above noise levels were established at 2130 kg [4696 lbs] takeoff weight and 2030 RPM.

This aircraft model is in compliance with all ICAO and FAR 36 noise standards applicable to this type.

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Section 5
Performance
Table of Contents

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5 Performance

5.1 Introduction

1 General

Performance Data charts on the following pages are presented to facilitate the planning of flights in detail and with reasonable accuracy under various conditions. The data in the charts have been computed from actual flight tests with the aircraft and engine in good condition and using average piloting techniques.

2 Use of Performance Charts

Performance Date is presented in tabular or graphical from to illustrate the effect of different variables. Sufficiently detailed information is provided in the tables so that conservative values can be selected and used to determine the particular performance figure with reasonable accuracy.

3 Definition of Terms

For definition of terms and symbols, refer to Section 1, General.

5.2 Rain

Due to flight test results, flights in rain conditions do not result in abnormal loss of aircraft performance.

5.3 Stall

Altitude loss during a stall is 500 ft.

5.4 Sample Problems

The following sample problem utilizes information from the various charts to determine the performance data for a typical flight.

The sample bases in the method to fill the fuel tank up to MTOW (Maximum Take Off Weight) level after having determined the weight and moment of the occupants (refer to Section 6).

The following data are assumed in this sample:

1 Aircraft Configuration

Ramp Weight:	2130 kg (4696 lbs)
Usable Fuel:	530.7 kg 652 l (1170.1 lbs)
Takeoff Weight:	2130 kg (4696 lbs)

2 Takeoff Conditions

Temperature (OAT):	19 °C (8° above std)
Field Pressure Altitude:	2000 ft
Wind Component along Runway:	10 kt (headwind)
Field Length:	1000 m (3281 ft)

3 Climb Conditions

Climb speed:	110 KIAS

4 Cruise Conditions

Total Distance:	939 NM
Pressure Altitude:	20000 ft
Temperature at Cruising Level:	-27 °C (2° below std)
Expected Headwind Component:	10 kt
Power Setting:	60 % Torque

5 Landing Conditions

Field Pressure Altitude:	3000 ft
Temperature (OAT):	15 °C (6° above standard)
Field Length:	1200 m (3937 ft)
Wind Component along Runway:	10 kt (headwind)

5.4.a Takeoff

For conservative (ISA +10) the takeoff distance sheet will give the following results:

Ground Roll:
1345 ft – 10 % of 1345 = 1211 ft (369 m)

Total Distance to Clear 50 Feet Obstacle:
2205 ft – 10 % of 2205 = 1985 ft (605 m)

These distances are well within the available field length.

In addition the rate of climb in take-off configuration will be (at MTOW, 2000 ft, climb speed of 87 KIAS and ISA +10 °C) 1110 ft/min.

Caution **If a positive takeoff climb gradient cannot be maintained for a certain weight and temperature, it is prohibited to start from that airfield.**

5.4.b Cruise

The cruising altitude should be selected based on a consideration of trip length, wind aloft and aircraft's performance. Power setting for cruise should be determined for most economical fuel consumption and several other considerations. For this sample a cruise power setting of 60 % torque has been chosen.

5.4.c Fuel Required

The total fuel required for the flight can be estimated using the performance information in Figure 5-7 Sheet 2 and Figure 5-8 Sheet 11 in conjunction with Figure 5-11.

1 Climb

The climb, distance, fuel to climb chart will give the following result without respect to head wind. The different values for different ISA conditions may linearly interpolated.

Using the conservative ISA condition (ISA +8°C) we get:

ISA (figure 5-7, sheet 2):

Time to climb:	17:30 – 01:30	=	16:00 min:sec
Fuel to climb:	35 – 3	=	32 l (57.4 lbs)
Distance to climb:	38 – 3	=	35 NM

ISA +30°C (figure 5-7, sheet 2):

Time to climb:	25:00 – 01:36	=	23:24 min:sec
Fuel to climb:	44 – 4	=	40 l (71.8 lbs)
Distance to climb:	55 – 3	=	52 NM

For ISA +8°C add 8 / 30 times the difference between ISA +30°C and ISA to the ISA value:

Time to Climb:	16:00 + 8 / 30 x (23:24 – 16:00)		
	= 16:00 + 118 sec	=	17:58 min:sec
Fuel to Climb:	32 + 8 / 30 x (40 – 32)		
	= 32 + 2.1	=	34.1 l (61.2 lbs)
Distance to Climb:	35 + 8 / 30 x (52 – 35)		
	= 35 + 4.5	=	39.5 NM

This distance is for zero wind. The decease in distance due to the 10 kt (NM/ hour) head wind will be:
18 min / 60min x 10 kt ≈ 3 NM.

The corrected distance to climb:

= 39.5 – 3 = 36.5 NM.

2 Descent

Using the time-, fuel- and distance to descent charts, the following results are obtained.

Time to Descent:	10:00 – 01:30	=	08:30 min:sec
Fuel to Descent:	14 – 3	=	11 l (19.7 lbs)
Distance to Descent:	43 – 10	=	33 NM

The distances shown on the descent chart are for zero wind. So the decrease in distance due to wind shall be calculated as follows:

9 min divided by 60 min = 0.15 multiplied by 10 kt = 1.5 NM.

Therefore the corrected distance to descent is: 33 NM minus 1.5 NM = **31.5 NM**.

3 Cruise

The cruise charts will give the following result without respect to head wind. The different values for different ISA conditions may linearly interpolated. Using the ISA –2 °C we get:

ISA-20°C (figure 5-8, sheet 11):
Cruise speed: 191 kt

ISA (figure 5-8, sheet 11):
Cruise speed: 195 kt

For ISA -2°C subtract 2 / 20 times the difference between ISA and ISA –20°C of the ISA value:

Cruise speed: 195 - 2 / 20 x (195 - 191)
= 195 – 0.4 = 194.6 kt

The cruise fuel flow is constant with the temperature: 85 l/hr

With a head wind of 10 kt, the ground speed becomes:
= 194.6 – 10 = 184.6 kt

The total cruise distance can be calculated using the above results:

Total trip distance:	939 NM
Climb distance:	-36.5 NM
Descent distance:	-31.5 NM
Total cruise distance:	871 NM

With a ground speed of 184.6 kt, the cruise time is:

871 / 184.6 = 4.72 hours

The cruise fuel flow is 85 l/hr, making the cruise fuel:

85 x 4.72 = 401.1 l (719.8 lbs)

4 Reserve

A 45 min. reserve at 45% torque in FL0 (conservative) and ISA +6 °C:

0.75 h x 86 l/hr = 64.5 l (115.7 lbs)

5 Total Fuel Required

The total estimated fuel amount required for taxi, takeoff, climb, cruise, descent and reserve therefore is as follows:

Engine Start, Taxi and Takeoff:	10 l (17.9 lbs)
Climb:	34.1 l (61.2 lbs)
Cruise:	401.1 l (719.8 lbs)
Descent:	11 l (19.7 lbs)
Reserve:	64.5 l (115.7 lbs)

The total required usable fuel is: **520.7 l (934.4 lbs)**

Note **The total fuel required is well within the fuel available.**

5.4.d Landing

Note **Average fuel density is 0.814 kg/l.**
Jet Fuel density will vary with its temperature.

To obtain the landing weight, the weight of required fuel (520.7 l = 424 kg) must be subtracted from the aircraft ramp weight!

The calculation therefore is:

In kilogram: 2130 kg minus 424 kg	=	1706 kg.
In pounds: 4696 lbs minus 935 lbs	=	3761 lbs.

For the above calculated landing weight and the assumed atmospheric conditions, the landing distance chart will give the following result:

Ground roll:	295 m (967 ft)
Total distance to clear 50 Feet obstacle:	680 m (2230 ft)

Therefore the distances are well within the runway length.

For a possible balked landing the climb speed can be found in figure 5-12, sheet 1. For 1769 kg, 3000 ft, climb speed of 80 KIAS and ISA +10 °C, the climb rate is 1455 ft/min.

Caution **If a positive balked landing climb gradient cannot be maintained for a certain weight and temperature, it is prohibited to attempt to land at that airfield.**

Wind Components

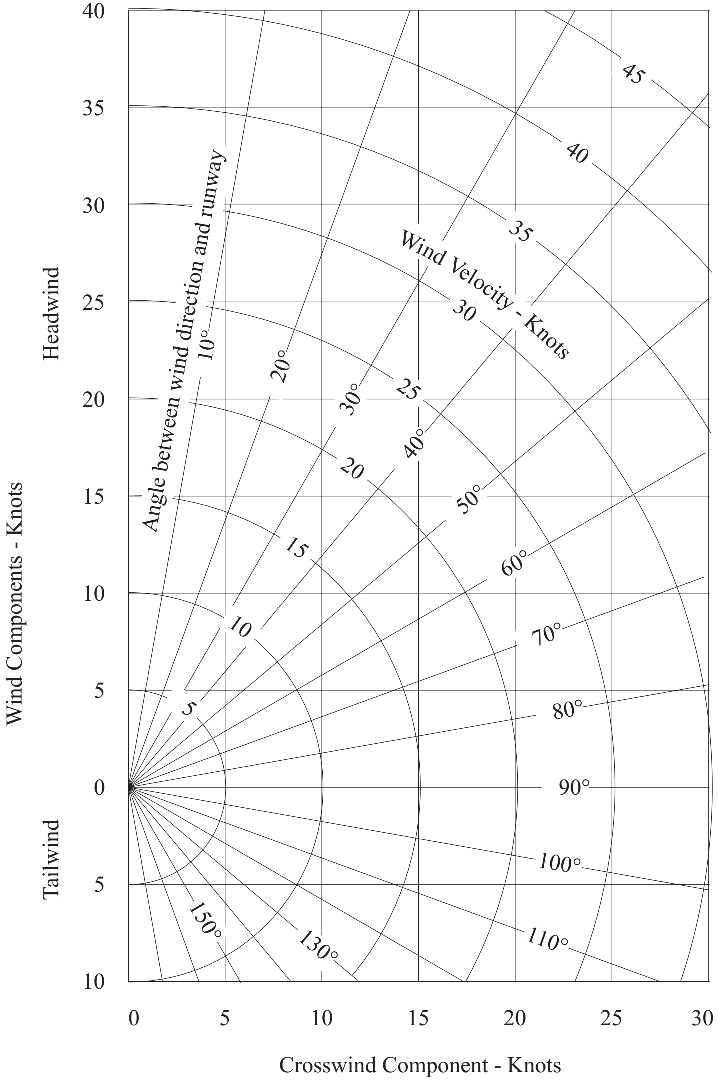

Figure 5-1
Wind Components

ISA Conversion

of pressure altitude and outside air temperature

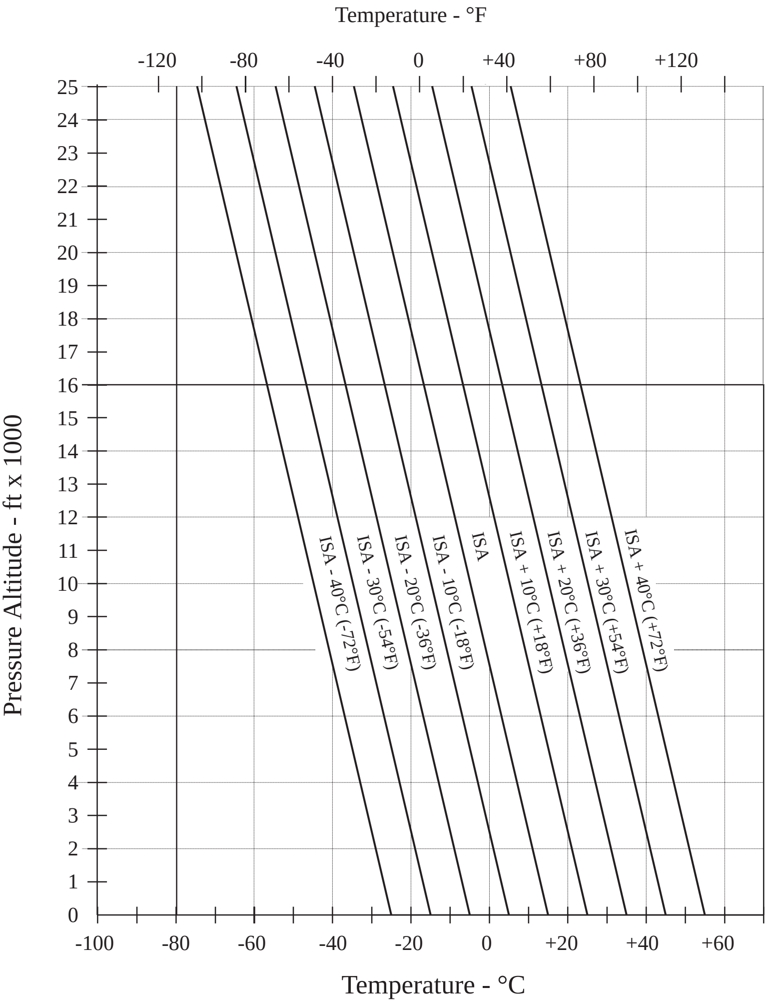

Figure 5-2 a
ISA Conversion

Dynamic pressure dependant temperature rise

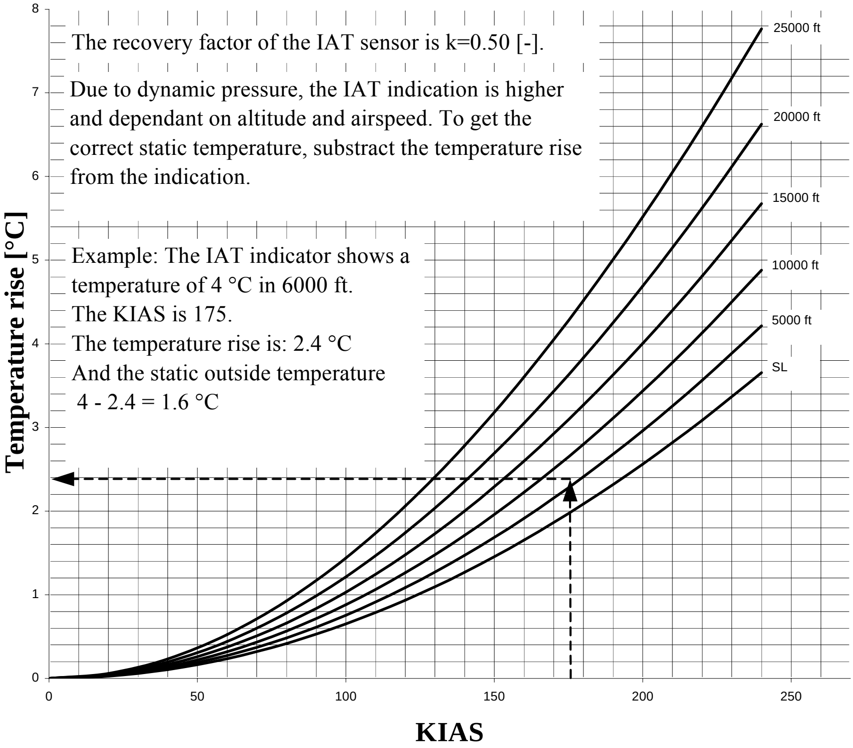

Figure 5-2 b
IAT-OAT Conversion

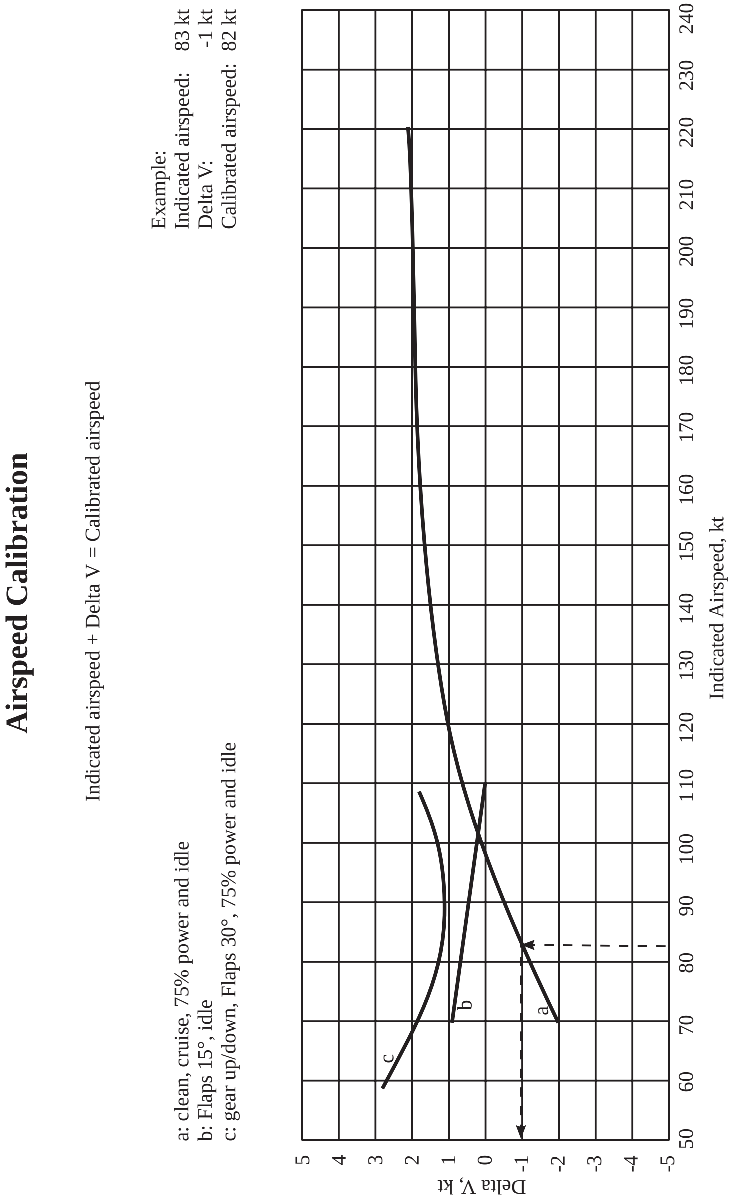

Figure 5-3
Airspeed Calibration

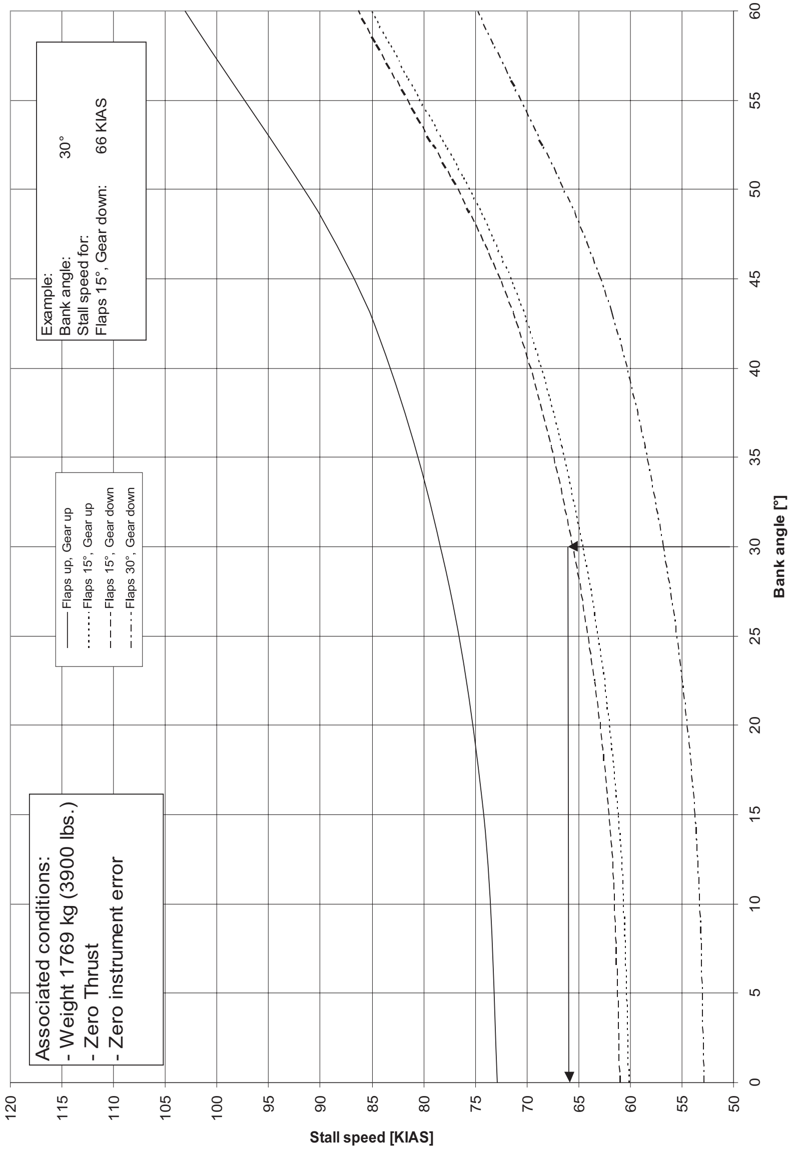

Figure 5-4
Angle of Bank versus Stall Speed (Sheet 1 of 2)

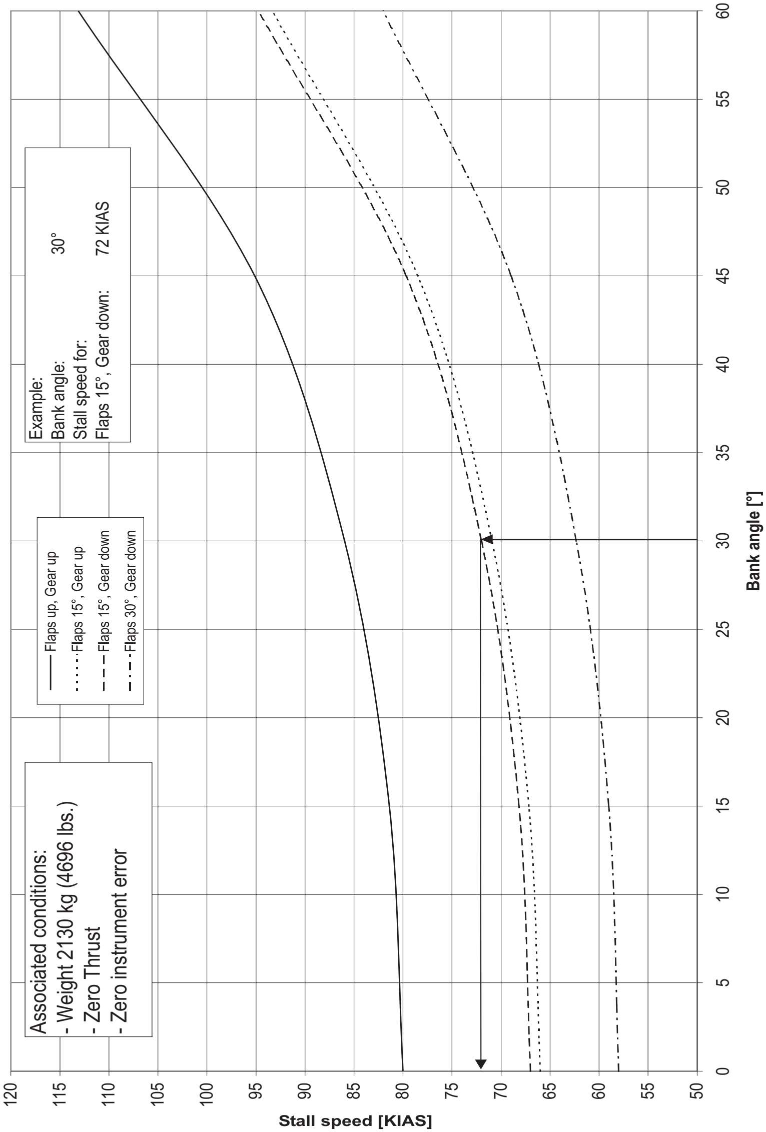

Figure 5-4
Angle of Bank versus Stall Speed (Sheet 2 of 2)

TAKEOFF DISTANCE

CONDITIONS:
Landing gear down and flaps 15
2030 RPM - BLEED 2
111 % Torque or 810 Deg. C TOT

Paved, Level, Dry Runway
Zero Wind

NOTES: Decrease distances 10% for each 10 knots headwind.
For operation with tailwind up to 10 knots, increase distances by 10% for each 2.5 knots.
For operation on a dry, grass runway, increase distances by 40% of the "ground roll" figure.

Takeoff Weight LBS	Rotation Speed KIAS	Takeoff Weight KG	Rotation Speed KIAS
4696	71,0	2130	71,0
4600	70,6	2100	70,7
4400	69,6	2000	69,7
4200	68,7	1905	68,7
4000	67,7	1900	68,6
		1800	67,6
3900	67,3	1769	67,3
3800	66,8	1700	66,6
3600	65,9	1600	65,5
3417	65,0	1550	65,0

WEIGHT LBS (KG)	SPEED AT 50 FT KIAS	PRESS ALT FT	ISA -20 C		ISA -10 C		ISA		ISA +10 C		ISA +20 C		ISA +30 C	
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
4696 (2130)	81	S.L.	1195	1965	1225	2005	1250	2050	1275	2090	1305	2140	1455	2390
		1000	1240	2030	1265	2075	1290	2110	1305	2135	1380	2265	1540	2525
		2000	1280	2100	1305	2145	1330	2175	1345	2205	1465	2400	1630	2675
		3000	1320	2165	1350	2215	1370	2245	1405	2310	1550	2545	1725	2830
		4000	1365	2235	1395	2285	1420	2325	1495	2450	1645	2700	1830	3000
		5000	1405	2305	1440	2360	1470	2410	1580	2590	1745	2860	1940	3180
		6000	1450	2375	1485	2435	1525	2505	1670	2740	1850	3035	2055	3365
		7000	1490	2445	1530	2510	1595	2625	1775	2910	1965	3220	2175	3565
		8000	1535	2515	1575	2585	1690	2780	1885	3095	2080	3410	*	*
		9000	1575	2585	1670	2735	1810	2975	2005	3385	2205	3615	*	*
		10000	1645	2695	1785	2930	1945	3190	2130	3490	2335	3830	*	*

Example refer to 5.4.a

* Denotes conditions where the takeoff climb gradient can not be maintained

Figure 5-5
Takeoff (Sheet 1 of 4)

TAKEOFF DISTANCE

CONDITIONS:
Landing gear down and flaps 15
2030 RPM - BLEED 2
111 % Torque or 810 Deg. C TOT

Paved, Level, Dry Runway
Zero Wind

NOTES: Decrease distances 10% for each 10 knots headwind.
For operation with tailwind up to 10 knots, increase distances by 10% for each 2.5 knots.
For operation on a dry, grass runway, increase distances by 40% of the "ground roll" figure.

Takeoff Weight LBS	Rotation Speed KIAS	Takeoff Weight KG	Rotation Speed KIAS
4696	71,0	2130	71,0
4600	70,6	2100	70,7
4400	69,6	2000	69,7
4200	68,7	1905	68,7
4000	67,7	1900	68,6
		1800	67,6
3900	67,3	1769	67,3
3800	66,8	1700	66,6
3600	65,9	1600	65,5
3417	65,0	1550	65,0

WEIGHT LBS (KG)	SPEED AT 50 FT KIAS	PRESS ALT FT	ISA -20 C		ISA -10 C		ISA		ISA +10 C		ISA +20 C		ISA +30 C	
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
4200 (1905)	77	S.L.	925	1520	945	1550	965	1585	985	1620	1010	1655	1125	1850
		1000	955	1570	980	1605	1000	1635	1010	1655	1070	1750	1190	1955
		2000	990	1620	1010	1655	1030	1685	1040	1705	1130	1855	1260	2070
		3000	1020	1675	1045	1710	1065	1740	1090	1790	1200	1970	1335	2190
		4000	1055	1730	1075	1765	1100	1800	1155	1895	1275	2085	1415	2320
		5000	1085	1785	1110	1825	1135	1865	1220	2005	1350	2215	1500	2460
		6000	1120	1840	1150	1885	1175	1930	1295	2120	1430	2350	1590	2605
		7000	1155	1895	1185	1940	1230	2020	1370	2250	1519	2490	1680	2760
		8000	1190	1950	1220	2000	1305	2145	1460	2390	1610	2640	1780	2920
		9000	1225	2005	1290	2115	1395	2295	1550	2540	1705	2800	1880	3085
		10000	1270	2085	1380	2265	1505	2470	1645	2700	1805	2960	1990	3265

Fig 5-5
Takeoff (Sheet 2 of 4)

TAKEOFF DISTANCE

CONDITIONS:
Landing gear down and flaps 15
2030 RPM - BLEED 2
111 % Torque or 810 Deg. C TOT

Paved, Level, Dry Runway
Zero Wind

NOTES: Decrease distances 10% for each 10 knots headwind.
For operation with tailwind up to 10 knots, increase distances by 10% for each 2.5 knots.
For operation on a dry, grass runway, increase distances by 40% of the "ground roll" figure.

Takeoff Weight LBS	Rotation Speed KIAS	Takeoff Weight KG	Rotation Speed KIAS
4696	71,0	2130	71,0
4600	70,6	2100	70,7
4400	69,6	2000	69,7
4200	68,7	1905	68,7
4000	67,7	1900	68,6
		1800	67,6
3900	67,3	1769	67,3
3800	66,8	1700	66,6
3600	65,9	1600	65,5
3417	65,0	1550	65,0

WEIGHT LBS (KG)	SPEED AT 50 FT KIAS	PRESS ALT FT	ISA -20 C		ISA -10 C		ISA		ISA +10 C		ISA +20 C		ISA +30 C	
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
3900 (1769)	74	S.L.	780	1280	800	1310	815	1335	830	1365	850	1395	950	1560
		1000	810	1325	825	1350	845	1385	850	1400	905	1480	1005	1650
		2000	835	1370	850	1400	860	1420	875	1445	955	1565	1065	1745
		3000	860	1415	880	1445	905	1475	915	1505	1010	1660	1125	1850
		4000	890	1460	910	1490	930	1525	975	1595	1075	1760	1195	1955
		5000	915	1505	940	1540	960	1575	1030	1690	1140	1865	1265	2075
		6000	945	1550	970	1585	985	1620	1090	1800	1205	1980	1340	2195
		7000	975	1595	1000	1635	1030	1695	1160	1910	1280	2100	1420	2325
		8000	1000	1640	1030	1680	1095	1800	1230	2030	1355	2225	1500	2460
		9000	1030	1685	1090	1780	1175	1930	1310	2150	1440	2360	1585	2605
		10000	1070	1755	1165	1910	1270	2085	1390	2275	1525	2500	1680	2750

Fig 5-5
Takeoff (Sheet 3 of 4)

TAKEOFF CLIMB PERFORMANCE

Conditions: Landing gear down and flaps 15
2030 RPM - BLEED 2
111 % Torque or 810 Deg. C TOT

CLIMB SPEED 87 KIAS

Pressure Altitude (Feet)	RATE OF CLIMB (FT/MIN) 3900 LB (1769 KG)				
	ISA -20 C	ISA	ISA +10 C	ISA +20 C	ISA +30 C
SL	1650	1575	1545	1490	1265
1000	1635	1565	1530	1435	1190
2000	1625	1550	1515	1355	1120
3000	1610	1540	1500	1275	1045
4000	1595	1530	1425	1200	975
5000	1585	1520	1340	1120	900
6000	1570	1485	1255	1040	830
7000	1555	1390	1170	960	755
8000	1540	1295	1085	885	685
9000	1530	1195	995	805	610
10000	1500	1100	910	725	540

Pressure Altitude (Feet)	RATE OF CLIMB (FT/MIN) 4696 LB (2130 KG)				
	ISA -20 C	ISA	ISA +10 C	ISA +20 C	ISA +30 C
SL	1245	1175	1135	1100	890
1000	1230	1165	1125	1050	830
2000	1220	1150	1110	980	770
3000	1205	1140	1100	910	705
4000	1190	1130	1035	845	645
5000	1180	1115	960	775	585
6000	1165	1085	885	705	520
7000	1150	1005	810	640	460
8000	1140	920	740	570	*
9000	1125	840	665	500	*
10000	1100	755	590	435	*

Pressure Altitude (Feet)	RATE OF CLIMB (FT/MIN) 4200 LB (1905 KG)				
	ISA -20 C	ISA	ISA +10 C	ISA +20 C	ISA +30 C
SL	1485	1410	1375	1335	1110
1000	1470	1400	1360	1280	1045
2000	1455	1385	1350	1205	975
3000	1445	1375	1335	1130	910
4000	1430	1360	1265	1055	840
5000	1415	1350	1185	985	770
6000	1400	1320	1105	910	705
7000	1390	1235	1025	835	635
8000	1375	1145	945	760	570
9000	1360	1060	865	685	500
10000	1335	975	785	610	435

* Denotes conditions where the takeoff climb gradient can not be maintained

Example refer to 5.4.a

Fig 5-5
Takeoff (Sheet 4 of 4)

CLIMB PERFORMANCE

CLIMB SPEED 110 KIAS

Conditions: Landing gear and flaps UP
2030 RPM - BLEED 2
92 % Torque or 752 Deg. C TOT

Pressure Altitude (Feet)	RATE OF CLIMB (FT/MIN) 3900 LB (1769 KG)		
	ISA -20 C	ISA	ISA +30 C
SL	1830	1785	1715
1000	1830	1785	1720
2000	1830	1790	1725
3000	1835	1790	1725
4000	1835	1795	1720
5000	1835	1800	1690
6000	1835	1800	1620
7000	1835	1795	1550
8000	1840	1795	1480
9000	1840	1795	1405
10000	1840	1790	1335
11000	1840	1790	1265
12000	1840	1785	1195
13000	1835	1675	1125
14000	1830	1570	1050
15000	1800	1460	980
16000	1675	1355	910
17000	1550	1250	840
18000	1420	1145	770
19000	1295	1040	700
20000	1165	930	625
21000	1040	825	555
22000	915	720	485
23000	785	615	415
24000	660	510	340
25000	535	400	270

Figure 5-6
Rate of Climb (Sheet 1 of 2)

CLIMB PERFORMANCE

CLIMB SPEED 110 KIAS

Conditions: Landing gear and flaps UP
2030 RPM - BLEED 2
92 % Torque or 752 Deg. C TOT

Pressure Altitude (Feet)	RATE OF CLIMB (FT/MIN) 4696 LB (2130 KG)		
	ISA -20 C	ISA	ISA +30 C
SL	1385	1335	1265
1000	1385	1335	1270
2000	1385	1335	1275
3000	1390	1340	1275
4000	1390	1345	1270
5000	1390	1350	1255
6000	1390	1350	1195
7000	1390	1345	1135
8000	1395	1345	1075
9000	1395	1345	1015
10000	1395	1340	955
11000	1395	1340	895
12000	1395	1335	835
13000	1390	1255	775
14000	1390	1165	715
15000	1375	1075	655
16000	1260	985	595
17000	1155	895	535
18000	1045	805	475
19000	935	715	415
20000	825	625	355
21000	715	535	295
22000	605	445	235
23000	500	355	175
24000	390	265	115
25000	280	175	55

Figure 5-6
Rate of Climb (Sheet 2 of 2)

TIME, FUEL, AND CLIMB DISTANCE
CLIMB SPEED 110 KIAS

CONDITIONS: Landing gear and flaps UP
2030 RPM – BLEED 2
92 % Torque or 752 Deg. C TOT

Pressure Altitude (Feet)	ISA -20 C 3900 LB (1769 KG)					ISA 3900 LB (1769 KG)					ISA +30 C 3900 LB (1769 KG)				
	Time (min:sec)	Fuel Consump. LB	L	GAL	Dist. (NM)	Time (min:sec)	Fuel Consump. LB	L	GAL	Dist. (NM)	Time (min:sec)	Fuel Consump. LB	L	GAL	Dist. (NM)
SL	0	0	0	0,0	0	0	0	0	0,0	0	0	0	0	0,0	0
1000	:30	2	1	0,3	1	:36	2	1	0,3	1	:36	2	1	0,3	1
2000	1:06	4	2	0,6	2	1:06	4	3	0,7	2	1:12	5	3	0,7	2
3000	1:36	7	4	1,0	3	1:42	7	4	1,0	3	1:42	7	4	1,0	3
4000	2:12	9	5	1,3	4	2:12	9	5	1,3	4	2:18	9	5	1,4	4
5000	2:42	11	6	1,6	5	2:48	11	6	1,6	5	2:54	11	6	1,7	5
6000	3:18	13	7	1,9	6	3:18	13	7	1,9	6	3:30	14	8	2,0	7
7000	3:48	15	8	2,2	7	3:54	15	9	2,3	7	4:06	16	9	2,4	8
8000	4:24	17	10	2,5	8	4:30	17	10	2,6	9	4:48	19	10	2,7	9
9000	4:54	19	11	2,8	10	5:00	20	11	2,9	10	5:30	21	12	3,1	11
10000	5:24	21	12	3,1	11	5:36	22	12	3,2	11	6:12	24	13	3,5	12
11000	6:00	23	13	3,4	12	6:06	24	13	3,5	12	7:00	26	15	3,9	14
12000	6:30	25	14	3,7	13	6:42	26	15	3,8	13	7:48	29	16	4,3	16
13000	7:06	27	15	4,1	14	7:18	28	16	4,2	15	8:42	32	18	4,7	18
14000	7:36	29	16	4,4	15	7:54	30	17	4,5	16	9:36	34	19	5,1	20
15000	8:12	32	18	4,7	17	8:30	33	18	4,8	17	10:36	37	21	5,5	22
16000	8:48	34	19	5,0	18	9:18	35	20	5,2	19	11:36	40	23	6,0	24
17000	9:24	36	20	5,3	19	10:00	38	21	5,6	21	12:48	44	24	6,4	27
18000	10:00	38	21	5,6	21	10:54	40	23	5,9	23	14:00	47	26	6,9	30
19000	10:48	41	23	6,0	23	11:48	43	24	6,4	25	15:24	51	28	7,5	33
20000	11:36	43	24	6,4	25	12:48	46	26	6,8	28	16:54	54	30	8,0	37
21000	12:30	46	26	6,8	27	13:54	49	28	7,3	31	18:36	59	33	8,7	41
22000	13:30	49	27	7,2	30	15:12	53	29	7,8	34	20:30	63	35	9,3	46
23000	14:42	52	29	7,7	33	16:42	57	32	8,4	38	22:42	68	38	10,1	52
24000	16:06	56	31	8,2	37	18:30	61	34	9,0	43	25:24	74	42	11,0	59
25000	17:48	60	33	8,8	41	20:42	66	37	9,7	49	28:42	81	45	12,0	68

Figure 5-7
Time, Distance, Fuel to Climb (Sheet 1 of 2)

TIME, FUEL, AND CLIMB DISTANCE
CLIMB SPEED 110 KIAS

CONDITIONS: Landing gear and flaps UP
2030 RPM – BLEED 2
92 % Torque or 752 Deg. C TOT

Pressure Altitude (Feet)	ISA -20 C 4696 LB (2130 KG) Time (min:sec)	ISA -20 C Fuel Consump. LB	ISA -20 C Fuel Consump. L	ISA -20 C Fuel Consump. GAL	ISA -20 C Dist. (NM)	ISA 4696 LB (2130 KG) Time (min:sec)	ISA Fuel Consump. LB	ISA Fuel Consump. L	ISA Fuel Consump. GAL	ISA Dist. (NM)	ISA +30 C 4696 LB (2130 KG) Time (min:sec)	ISA +30 C Fuel Consump. LB	ISA +30 C Fuel Consump. L	ISA +30 C Fuel Consump. GAL	ISA +30 C Dist. (NM)
SL	0	0	0	0,0	0	0	0	0	0,0	0	0	0	0	0,0	0
1000	:42	3	2	0,4	1	:42	3	2	0,4	1	:48	3	2	0,5	1
2000	**1:24**	**6**	**3**	**0,9**	**3**	**1:30**	**6**	**3**	**0,9**	**3**	**1:36**	**6**	**4**	**0,9**	**3**
3000	2:12	9	5	1,3	4	2:12	9	5	1,3	4	2:24	9	5	1,4	4
4000	2:54	11	6	1,7	5	3:00	12	7	1,8	6	3:06	12	7	1,8	6
5000	3:36	14	8	2,1	7	3:42	15	8	2,2	7	3:54	16	9	2,3	7
6000	4:18	17	10	2,5	8	4:30	18	10	2,6	9	4:48	19	10	2,8	9
7000	5:00	20	11	2,9	10	5:12	20	11	3,0	10	5:36	22	12	3,2	11
8000	5:48	23	13	3,3	11	6:00	23	13	3,4	12	6:30	25	14	3,7	13
9000	6:30	25	14	3,7	13	6:42	26	15	3,9	13	7:30	29	16	4,2	15
10000	7:12	28	16	4,1	14	7:24	29	16	4,3	15	8:30	32	18	4,7	17
11000	7:54	31	17	4,5	16	8:12	32	18	4,7	16	9:36	36	20	5,3	19
12000	8:36	33	19	4,9	17	8:54	35	19	5,1	18	10:42	39	22	5,8	22
13000	9:18	36	20	5,3	19	9:42	38	21	5,6	20	12:00	43	24	6,4	24
14000	10:06	39	22	5,7	20	10:30	41	23	6,0	21	13:18	48	27	7,0	27
15000	10:48	42	23	6,1	22	11:24	44	24	6,5	23	14:48	52	29	7,7	31
16000	11:30	44	25	6,6	24	12:24	47	26	6,9	26	16:24	57	32	8,4	34
17000	12:24	47	26	7,0	26	13:30	50	28	7,5	28	18:06	62	34	9,1	39
18000	13:18	50	28	7,5	28	14:36	54	30	8,0	31	20:06	67	37	9,9	43
19000	14:18	54	30	8,0	30	16:00	58	33	8,6	34	22:24	73	41	10,8	49
20000	**15:24**	**57**	**32**	**8,5**	**33**	**17:30**	**63**	**35**	**9,2**	**38**	**25:00**	**80**	**44**	**11,8**	**55**
21000	16:42	61	34	9,1	37	19:12	67	38	10,0	42	28:06	87	49	12,9	63
22000	18:18	66	37	9,7	40	21:12	73	41	10,8	48	31:54	96	54	14,2	73
23000	20:06	71	40	10,5	45	23:42	79	44	11,7	54	36:48	108	60	15,9	86
24000	22:18	77	43	11,3	51	27:00	87	49	12,9	63	43:48	123	69	18,2	105
25000	25:18	84	47	12,4	59	31:36	98	55	14,4	75	56:06	149	83	22,0	138

Example refer to 5.4.c

Figure 5-7
Time, Distance, Fuel to Climb (Sheet 2 of 2)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 0 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

TRQ %	20C BELOW STANDARD TEMP -5 KTAS		FUEL FLOW LB/HR	FUEL FLOW L/HR	FUEL FLOW GAL/HR	STANDARD TEMPERATURE 15 KTAS		FUEL FLOW LB/HR	FUEL FLOW L/HR	FUEL FLOW GAL/HR	30C ABOVE STANDARD TEMP 45 KTAS		FUEL FLOW LB/HR	FUEL FLOW L/HR	FUEL FLOW GAL/HR
WEIGHT	3900 LBS / 1769 KG	4696 LBS / 2130 KG				3900 LBS / 1769 KG	4696 LBS / 2130 KG				3900 LBS / 1769 KG	4696 LBS / 2130 KG			
92	201	194	242	135	36	205	199	242	135	36	210	205	242	135	36
90	199	193	238	133	35	203	197	238	133	35	208	203	238	133	35
85	193	188	228	128	34	197	192	228	128	34	203	198	228	128	34
80	188	184	218	122	32	192	188	218	122	32	197	193	218	122	32
75	183	179	208	116	31	187	183	208	116	31	192	188	208	116	31
70	178	174	198	111	29	181	177	198	111	29	187	183	198	111	29
65	172	168	188	105	28	176	172	188	105	28	181	177	188	105	28
60	167	163	179	100	27	170	166	179	100	27	175	170	179	100	27
55	161	156	171	96	25	164	159	171	96	25	169	163	171	96	25
50	155	149	163	91	24	158	152	163	91	24	162	156	163	91	24
45	148	142	155	86	23	150	145	155	86	23	155	148	155	86	23

Example refer to 5.7.4

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Figure 5-8
Cruise Performance (Sheet 1 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 2000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -9					STANDARD TEMPERATURE 11					30 C ABOVE STANDARD TEMP 41				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
92	204	198	238	133	35	208	202	238	133	35	213	208	238	133	35
90	202	196	234	131	35	206	200	234	131	35	211	206	234	131	35
85	196	192	224	125	33	200	196	224	125	33	206	202	224	125	33
80	191	187	214	120	32	195	191	214	120	32	201	197	214	120	32
75	186	182	204	114	30	190	186	204	114	30	196	191	204	114	30
70	181	177	194	108	29	185	180	194	108	29	190	186	194	108	29
65	175	171	184	103	27	179	175	184	103	27	185	180	184	103	27
60	170	165	175	98	26	173	168	175	98	26	179	173	175	98	26
55	164	159	167	93	25	167	162	167	93	25	172	166	167	93	25
50	157	152	158	88	23	160	155	158	88	23	165	159	158	88	23
45	150	144	150	84	22	153	147	150	84	22	157	150	150	84	22

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Figure 5-8
Cruise Performance (Sheet 2 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 4000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -13					STANDARD TEMPERATURE 7					30 C ABOVE STANDARD TEMP 37				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
92	207	201	234	131	35	211	206	234	131	35	217	212	234	131	35
90	205	200	230	129	34	209	204	230	129	34	215	210	230	129	34
85	199	195	220	123	33	204	199	220	123	33	210	205	220	123	33
80	194	190	210	117	31	198	194	210	117	31	204	200	210	117	31
75	189	185	200	112	30	193	189	200	112	30	199	195	200	112	30
70	184	180	190	106	28	188	184	190	106	28	194	189	190	106	28
65	178	174	180	101	27	182	178	180	101	27	188	183	180	101	27
60	173	168	171	96	25	176	171	171	96	25	182	176	171	96	25
55	166	161	162	91	24	170	164	162	91	24	175	169	162	91	24
50	160	154	154	86	23	163	157	154	86	23	168	161	154	86	23
45	152	146	145	81	21	155	149	145	81	21	160	153	145	81	21

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Figure 5-8
Cruise Performance (Sheet 3 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 6000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -17					STANDARD TEMPERATURE 3					30 C ABOVE STANDARD TEMP 33				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
92	210	205	232	130	34	214	210	232	130	34	221	216	232	130	34
90	208	203	228	127	34	212	208	228	127	34	219	214	228	127	34
85	203	198	217	121	32	207	203	217	121	32	213	209	217	121	32
80	198	193	207	116	31	202	198	207	116	31	208	204	207	116	31
75	192	188	196	110	29	197	192	196	110	29	203	198	196	110	29
70	187	183	186	104	28	191	187	186	104	28	197	192	186	104	28
65	182	177	176	99	26	186	181	176	99	26	191	186	176	99	26
60	176	171	167	93	25	180	174	167	93	25	185	179	167	93	25
55	169	164	158	88	23	173	167	158	88	23	178	171	158	88	23
50	162	156	149	84	22	166	159	149	84	22	170	163	149	84	22
45	155	148	141	79	21	158	151	141	79	21	162	155	141	79	21

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 4 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 8000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -21					STANDARD TEMPERATURE -1					30 C ABOVE STANDARD TEMP 29				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
92	214	209	230	129	34	218	213	230	129	34					
90	212	207	226	126	33	216	211	226	126	33	223	218	226	126	33
85	206	202	215	120	32	211	207	215	120	32	217	213	215	120	32
80	201	197	204	114	30	206	201	204	114	30	212	207	204	114	30
75	196	192	194	108	29	200	196	194	108	29	207	202	194	108	29
70	191	186	183	102	27	195	190	183	102	27	201	195	183	102	27
65	185	180	173	97	26	189	184	173	97	26	195	189	173	97	26
60	179	173	163	91	24	183	177	163	91	24	188	182	163	91	24
55	172	166	154	86	23	176	170	154	86	23	181	174	154	86	23
50	165	159	145	81	21	169	162	145	81	21	173	166	145	81	21
45	157	151	136	76	20	160	153	136	76	20	165	157	136	76	20

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 5 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 10000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -25					STANDARD TEMPERATURE -5					30 C ABOVE STANDARD TEMP 25				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
92	217	212	229	128	34	222	217	229	128	34					
90	215	211	225	126	33	220	215	225	126	33					
85	210	206	214	120	32	215	210	214	120	32	222	217	214	120	32
80	205	200	203	113	30	210	205	203	113	30	216	211	203	113	30
75	200	195	192	107	28	204	199	192	107	28	211	205	192	107	28
70	194	189	181	101	27	198	193	181	101	27	205	199	181	101	27
65	188	183	170	95	25	192	187	170	95	25	198	192	170	95	25
60	182	176	160	89	24	186	180	160	89	24	192	185	160	89	24
55	175	169	150	84	22	179	172	150	84	22	184	177	150	84	22
50	168	161	141	79	21	171	164	141	79	21	176	169	141	79	21
45	160	153	132	74	20	163	156	132	74	20	168	160	132	74	20

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 6 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 12000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -29					STANDARD TEMPERATURE -9					30 C ABOVE STANDARD TEMP 21				
			FUEL FLOW					FUEL FLOW					FUEL FLOW		
TRQ %	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
92	221	216	227	127	34	226	221	227	127	34					
90	219	214	223	125	33	224	219	223	125	33					
85	214	209	213	119	31	219	214	213	119	31					
80	209	204	201	113	30	214	209	201	113	30	220	215	201	113	30
75	203	198	190	106	28	208	203	190	106	28	215	209	190	106	28
70	198	192	179	100	26	202	197	179	100	26	209	202	179	100	26
65	192	186	168	94	25	196	190	168	94	25	202	195	168	94	25
60	185	179	157	88	23	189	183	157	88	23	195	188	157	88	23
55	178	172	147	82	22	182	175	147	82	22	188	180	147	82	22
50	171	164	138	77	20	174	167	138	77	20	179	171	138	77	20
45	162	155	129	72	19	166	158	129	72	19	170	162	129	72	19

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 7 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 14000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -33					STANDARD TEMPERATURE -13					30 C ABOVE STANDARD TEMP 17				
TRQ %	KTAS	KTAS	FUEL FLOW LB/HR	FUEL FLOW L/HR	FUEL FLOW GAL/HR	KTAS	KTAS	FUEL FLOW LB/HR	FUEL FLOW L/HR	FUEL FLOW GAL/HR	KTAS	KTAS	FUEL FLOW LB/HR	FUEL FLOW L/HR	FUEL FLOW GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
92	225	220	225	126	33										
90	223	218	221	124	33	228	224	221	124	33					
85	218	213	211	118	31	223	218	211	118	31					
80	213	208	200	112	30	218	212	200	112	30					
75	207	202	189	105	28	212	206	189	105	28	219	213	189	105	28
70	201	196	177	99	26	206	200	177	99	26	213	206	177	99	26
65	195	189	166	93	24	200	193	166	93	24	206	199	166	93	24
60	189	182	155	87	23	193	186	155	87	23	199	191	155	87	23
55	181	174	145	81	21	185	178	145	81	21	191	183	145	81	21
50	174	166	135	75	20	177	170	135	75	20	182	174	135	75	20
45	165	158	125	70	19	169	161	125	70	19	173	165	125	70	19

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 8 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 16000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -37					STANDARD TEMPERATURE -17					30 C ABOVE STANDARD TEMP 13				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
90	227	222	221	123	33										
85	222	217	211	118	31	227	222	211	118	31					
80	217	211	200	112	30	222	216	200	112	30					
75	211	205	188	105	28	216	210	188	105	28					
70	205	199	176	99	26	210	203	176	99	26	217	209	176	99	26
65	199	192	165	92	24	203	196	165	92	24	210	202	165	92	24
60	192	185	153	86	23	196	189	153	86	23	202	194	153	86	23
55	185	177	142	80	21	189	181	142	80	21	194	186	142	80	21
50	177	169	132	74	20	180	172	132	74	20	186	177	132	74	20
45	168	160	123	69	18	171	163	123	69	18	176	168	123	69	18

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 9 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 18000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -41					STANDARD TEMPERATURE -21					30 C ABOVE STANDARD TEMP 9				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
85	226	221	214	120	32										
80	221	215	203	113	30	226	220	203	113	30					
75	215	209	190	106	28	220	214	190	106	28					
70	209	203	177	99	26	214	207	177	99	26	221	213	177	99	26
65	202	196	165	92	24	207	200	165	92	24	214	206	165	92	24
60	195	188	153	85	23	200	192	153	85	23	206	198	153	85	23
55	188	180	141	79	21	192	184	141	79	21	198	189	141	79	21
50	180	172	130	73	19	184	175	130	73	19	189	180	130	73	19
45	171	163	120	67	18	174	166	120	67	18	179	170	120	67	18

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 10 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 20000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 °C BELOW STANDARD TEMP -45					STANDARD TEMPERATURE -25					30 °C ABOVE STANDARD TEMP 5				
			FUEL FLOW					FUEL FLOW					FUEL FLOW		
TRQ %	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
75	219	213	194	108	29										
70	213	206	180	101	27	218	211	180	101	27					
65	206	199	166	93	25	211	203	166	93	25	218	209	166	93	25
60	199	**191**	153	85	23	204	**195**	153	85	23	210	201	153	85	23
55	191	183	140	78	21	196	187	140	78	21	201	192	140	78	21
50	183	174	129	72	19	187	178	129	72	19	192	183	129	72	19
45	174	165	118	66	17	177	169	118	66	17	182	173	118	66	17
40	164	155	108	61	16	167	158	108	61	16	172	163	108	61	16

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Example refer to 5.4.c

Figure 5-8
Cruise Performance (Sheet 11 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 22000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -49					STANDARD TEMPERATURE -29					30 C ABOVE STANDARD TEMP 1				
			FUEL FLOW					FUEL FLOW					FUEL FLOW		
TRQ %	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
70	217	210	176	98	26										
65	210	202	165	92	24	215	207	165	92	24					
60	203	195	152	85	23	207	199	152	85	23	214	204	152	85	23
55	195	186	140	78	21	199	190	140	78	21	205	195	140	78	21
50	186	177	128	72	19	190	181	128	72	19	196	186	128	72	19
45	176	168	117	65	17	180	171	117	65	17	185	176	117	65	17
40	166	158	107	60	16	170	161	107	60	16	175	166	107	60	16

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 12 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 24000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -53					STANDARD TEMPERATURE -33					30 C ABOVE STANDARD TEMP -3				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
65	214	206	158	88	23										
60	206	198	150	84	22	211	202	150	84	22					
55	198	189	140	78	21	203	193	140	78	21	209	199	140	78	21
50	189	180	128	72	19	193	184	128	72	19	199	189	128	72	19
45	179	171	116	65	17	183	174	116	65	17	189	179	116	65	17
40	169	160	105	59	16	173	164	105	59	16	178	168	105	59	16

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 13 of 14)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 25000 FEET

Conditions: Landing gear and flaps UP
2030 RPM(*) - BLEED 2

	20 C BELOW STANDARD TEMP -55					STANDARD TEMPERATURE -35					30 C ABOVE STANDARD TEMP -5				
TRQ			FUEL FLOW					FUEL FLOW					FUEL FLOW		
%	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR	KTAS	KTAS	LB/HR	L/HR	GAL/HR
WEIGHT	3900	4696	LBS			3900	4696	LBS			3900	4696	LBS		
	1769	2130	KG			1769	2130	KG			1769	2130	KG		
60	208	200	150	84	22										
55	200	191	140	78	21	204	195	140	78	21	211	201	140	78	21
50	191	182	128	72	19	195	186	128	72	19	201	191	128	72	19
45	181	172	116	65	17	185	176	116	65	17	190	181	116	65	17
40	170	162	105	59	16	174	165	105	59	16	179	170	105	59	16

(*) Propeller RPM utilzation between 1900 and 2030 RPM is possible without changing performance. Display the TRQ indicated in table with N2 = 2030 RPM, then reduce N2 without resetting power lever (within limits permitted by torque).

Indicates performance outside the engine limitations. Data is provided for extrapolation purposes.

Figure 5-8
Cruise Performance (Sheet 14 of 14)

ENDURANCE PROFILE

45 MINUTES RESERVE
172 GAL, (652 L), (1166 LB) USABLE FUEL

CONDITIONS: 4696 LBS (2130 KG)
Standard Temperature
Zero Wind

NOTE: Endurance includes warmup, taxi, takeoff, max. power climb, descent plus 45 minutes reserve at cruise power.

Pressure Altitude (FT)	ENDURANCE (HRS)							
	92%	90%	85%	80%	70%	60%	50%	40%
0	4,0	4,0	4,2	4,5	5,0	5,6	6,2	7,0
2000	4,0	4,1	4,3	4,6	5,1	5,7	6,4	7,3
4000	4,1	4,2	4,4	4,7	5,2	5,9	6,6	7,6
6000	4,2	4,3	4,5	4,8	5,4	6,0	6,8	7,8
8000	4,2	4,3	4,6	4,8	5,5	6,2	7,0	8,1
10000	4,3	4,3	4,6	4,9	5,5	6,3	7,2	8,4
12000	4,3	4,4	4,6	4,9	5,6	6,4	7,4	8,6
14000		4,4	4,7	5,0	5,7	6,5	7,6	8,8
16000			4,7	5,0	5,7	6,6	7,7	9,1
18000				4,9	5,6	6,6	7,8	9,3
20000					5,6	6,6	7,9	9,4
22000						6,6	7,9	9,6
24000						6,7	7,9	9,6
25000							7,9	9,6

Indicates performance outside the engine limitations.
Data is provided for extrapolation purposes.

Figure 5-9
Endurance

RANGE PROFILE

45 MINUTES RESERVE
172 GAL, (652 L), (1166 LB) USABLE FUEL

CONDITIONS: 4696 LBS (2130 KG)
Standard Temperature
Zero Wind

NOTE: **Range includes warmup, taxi, takeoff, max. power climb, descent plus 45 minutes reserve at cruise power.**

Pressure Altitude (FT)	RANGE (NM)							
	92%	90%	85%	80%	70%	60%	50%	40%
0	786	794	816	841	889	928	950	958
2000	817	825	848	873	925	968	995	1008
4000	846	855	880	907	961	1008	1042	1062
6000	871	882	909	939	998	1051	1090	1117
8000	894	905	934	967	1033	1093	1140	1172
10000	914	925	956	991	1065	1135	1191	1230
12000	940	950	981	1016	1095	1173	1238	1285
14000		977	1005	1040	1122	1209	1284	1341
16000			1021	1056	1143	1239	1327	1396
18000				1058	1154	1262	1365	1448
20000					1153	1281	1398	1498
22000						1297	1421	1542
24000						1336	1442	1580
25000							1450	1588

Indicates performance outside the engine limitations.
Data is provided for extrapolation purposes.

Figure 5-10
Range

TIME, FUEL, AND DESCENT DISTANCE

Conditions: Landing gear and flaps UP
2030 RPM - BLEED 2
50 % Torque
Speed as shown to maintain constant Vz

Rate of Descent = 2000 FT/MIN						
Pressure Altitude (Feet)	DESCENT SPEED KIAS	Time (min:sec)	Fuel Consump.			Dist. (NM)
			LB	L	GAL	
25000	172	12:30	0	0	0,0	0
24000	174	12:00	1	1	0,2	2
23000	175	11:30	2	1	0,3	4
22000	176	11:00	3	2	0,5	6
21000	178	10:30	4	2	0,6	8
20000	**179**	**10:00**	**5**	**3**	**0,8**	**10**
19000	181	9:30	6	4	1,0	12
18000	182	9:00	8	4	1,1	14
17000	184	8:30	9	5	1,3	16
16000	185	8:00	10	6	1,5	18
15000	186	7:30	11	6	1,6	20
14000	188	7:00	12	7	1,8	22
13000	189	6:30	13	7	2,0	24
12000	191	6:00	14	8	2,1	26
11000	192	5:30	16	9	2,3	28
10000	194	5:00	17	9	2,5	30
9000	195	4:30	18	10	2,7	32
8000	197	4:00	19	11	2,8	34
7000	198	3:30	20	11	3,0	36
6000	199	3:00	22	12	3,2	37
5000	201	2:50	23	13	3,4	39
4000	202	2:00	24	14	3,6	41
3000	**204**	**1:30**	**25**	**14**	**3,8**	**43**
2000	205	1:00	27	15	3,9	44
1000	207	0:30	28	16	4,1	46
SL	207	0	29	16	4,3	48

Example refer to 5.4.c

Figure 5-11
Time, Distance, Fuel to Descent

Landing Distances

Associated conditions:
Gear extended, Flaps 30°,
Power setting:
flight idle, condition lever fully forward, full stall touchdown, maximum braking, paved level dry runway

Remarks:
Add 15% to distances, for landing on a dry level grass runway. Reasonable additions have to be used for soft, wet ground, for snow and melting snow.

Landing Weight	Airspeed KCAS/KIAS
kg (lbs.)	at 15 m (50 ft)
1600 (3527)	78/77
1800 (3968)	80/79
2000 (4409)	82/81

Example:

Outside air temperature:	25°C
Pressure altitude:	3000 ft
Landing weight:	1706 kg (3761 lbs.)
Wind:	10 kts Head wind
Landing distance:	680 m (2230 ft)
Landing roll:	295 m (967 ft)

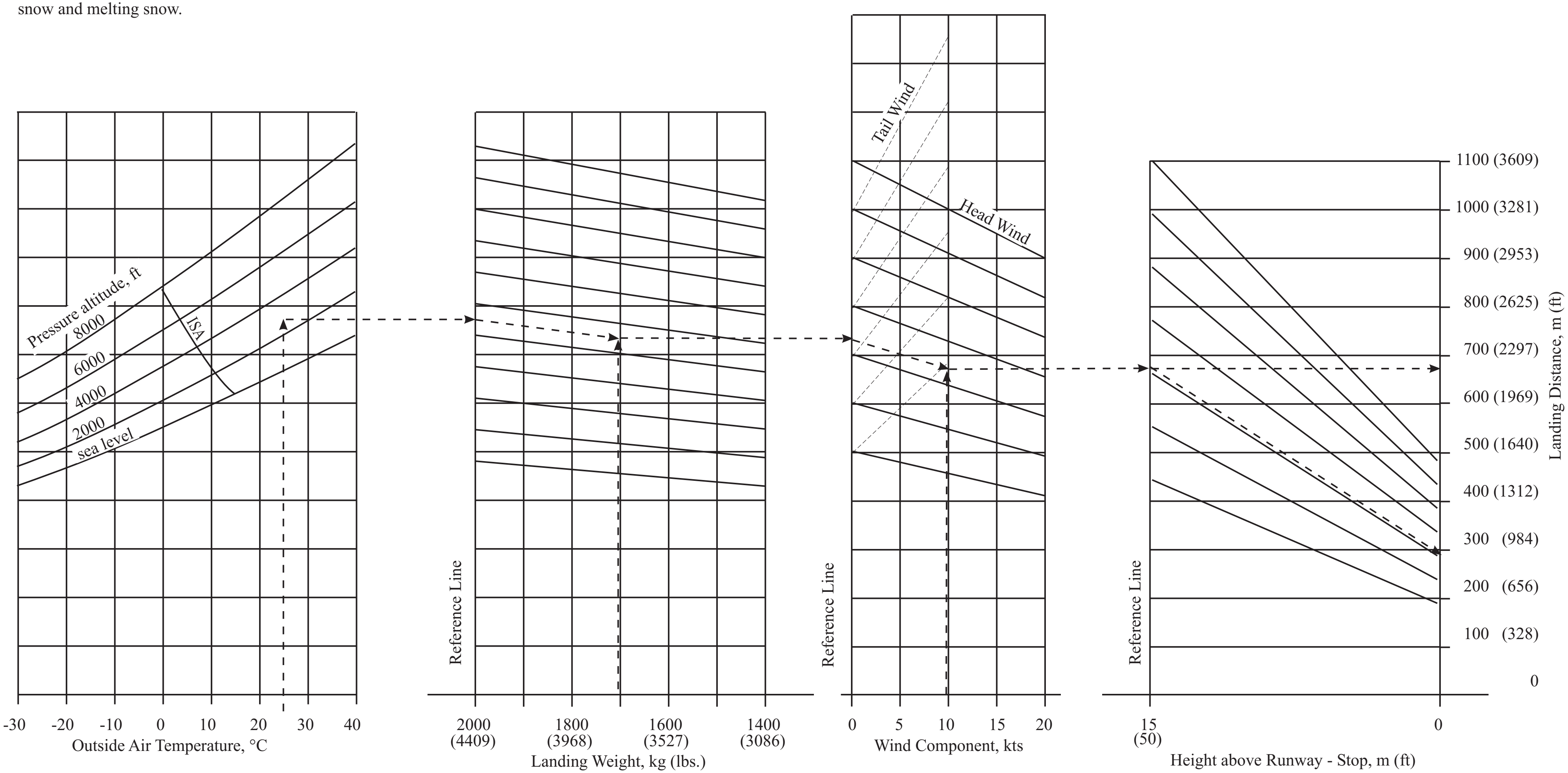

Figure 5-12
Landing (Sheet 1 of 2)

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BALKED LANDING CLIMB PERFORMANCE

Conditions: Landing gear down and flaps 30
2030 RPM - BLEED 2
111 % Torque or 810 Deg. C TOT

CLIMB SPEED 80 KIAS

Pressure Altitude (Feet)	RATE OF CLIMB (FT/MIN) 3900 LB (1769 KG)				
	ISA -20 C	ISA	ISA +10 C	ISA +20 C	ISA +30 C
SL	1610	1545	1510	1475	1255
1000	1590	1530	1495	1405	1165
2000	1575	1510	1475	1305	1070
3000	1560	1495	1455	1210	980
4000	1540	1475	1360	1110	890
5000	1525	1460	1245	1015	800
6000	1505	1410	1135	915	705
7000	1490	1270	1025	820	615
8000	1470	1130	915	720	525
9000	1315	990	800	625	435
10000	1100	845	690	525	340

Pressure Altitude (Feet)	RATE OF CLIMB (FT/MIN) 4696 LB (2130 KG)				
	ISA -20 C	ISA	ISA +10 C	ISA +20 C	ISA +30 C
SL	1190	1135	1100	1065	875
1000	1175	1115	1080	1000	800
2000	1160	1100	1065	915	720
3000	1140	1080	1045	835	645
4000	1125	1065	960	750	565
5000	1105	1045	865	670	490
6000	1090	1005	770	585	410
7000	1070	885	675	505	335
8000	1055	765	580	420	255
9000	925	650	485	335	*
10000	750	530	390	255	*

Pressure Altitude (Feet)	RATE OF CLIMB (FT/MIN) 4200 LB (1905 KG)				
	ISA -20 C	ISA	ISA +10 C	ISA +20 C	ISA +30 C
SL	1435	1375	1340	1305	1100
1000	1420	1355	1325	1235	1015
2000	1400	1340	1305	1145	930
3000	1385	1320	1285	1055	845
4000	1365	1305	1195	965	760
5000	1350	1280	1090	875	675
6000	1330	1245	985	780	585
7000	1315	1115	885	690	500
8000	1300	985	780	600	415
9000	1160	855	675	510	330
10000	965	725	570	420	245

* Denotes conditions where the balked landing climb gradient can not be maintained

Example refer to 5.4.d

Figure 5-12
Landing (Sheet 2 of 2)

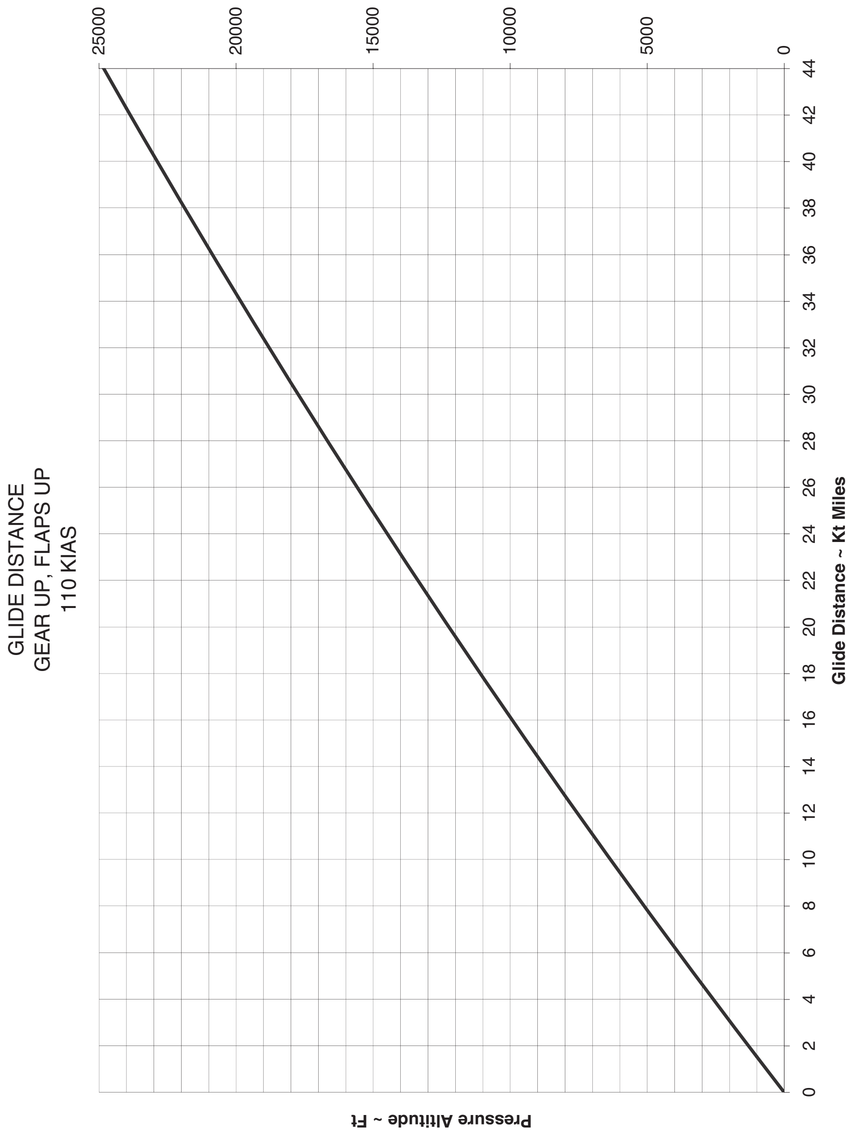

Figure 5-13
Glide Distance

Section 6
Weight and Balance and Equipment List
Table of Contents

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6 Weight and Balance and Equipment List

6.1 Introduction

Section 6 of this handbook provides procedures for establishing the aircraft's basic empty weight and moment and procedures for determining the weight and balance for operations. An equipment list, provided at the end of this section, provides arms and weights of all equipment available for installation on the aircraft.

6.2 Aircraft Weighing Procedures

Weigh the aircraft and determine the Center of Gravity each 5 years, after installation or removal of equipment or after repairs

The procedure as described below shall be followed whenever possible. Its result will be the Basic Empty Weight of the aircraft, so that additions or subtractions in the Basic Empty Weight and Center of gravity Table of Figure 6-1 are not necessary.

Normally the aircraft shall be weighed with full oil and operating fluids but no usable fuel. If changes of the procedure are unavoidable (e.g. if defueling of the aircraft is not possible) the respective calculations of the Basic Empty Weight and Center of gravity Table will give the correct results.

Important **Weigh, read the scales and calculate with care. Incorrect weighing or determination of Center of Gravity endanger the pilot, the passengers and the aircraft.**

Note **Weigh the aircraft only on even floors and if possible in closed hangars due to wind protection. In addition: Use three (3) identical scales.**

6.2a Basic Rules

1 Ensure the aircraft is fully equipped with standard and optional equipment in locations according to the Equipment List, enclosed in this section.

2 Defuel the aircraft to the undrainable fuel level using the drains. Add 14 liters (3.7 U.S. Gallons) to each tank to receive the unusable fuel level or enter 28 liters (7.4 U.S. Gallons) drainable unusable fuel to the "Fuel"-line of the Basic Empty Weight and Center of Gravity table.

3 Add engine oil and landing gear hydraulic fluid as required to obtain a normal full indication.

4 Remove foreign objects (e.g. tools, luggage etc.).

5 Clean and dry the aircraft.

6 Put the aircraft seats to middle position.

7 Retract aircraft flaps and bring control surfaces in neutral position.

8 Close the lower part of the main door.

Note **Ensure the scales are in calibration and used per the applicable manufacturer's recommendations.**

9 Determine the reference datum (3.115 m/122.64 inch in front of the front edge of main wheel bay) and check the values of the landing gear stations (tolerance is 5 mm (o.2 inch) and the wheel base.

10 Roll the aircraft onto the scales. Keep brakes released and secure wheels with wheel chocks.

11 Level the aircraft by inflating or deflating the tires. Use a spirit level on the upper edge of the lower cabin door for longitudinal leveling. Use a spirit level on the inner front seat rails for lateral leveling.

12 Close upper part of the cabin door.

13 Determine scale reading, scale error and tare from all three scales.

14 Enter the scale reading, scale error and tare from all three scales in the columns in the Aircraft As Weighed Table of Figure 6-1. Compute and enter values for the Net Weight and Aircraft Total As Weighed columns.

15 Determine the CG arm of the aircraft after entering the correct values to the formula in Figure 6-1.

16 Enter the net weight and CG arm in the Basic Weight and Center of Gravity table columns. Subtract the values for usable fuel, if aircraft could not be defueled prior weighing, add the value of drainable unusable fuel (28 liters (7.4 U.S. Gallons)), if fuel system has been completely drained and for additional equipment, if applicable. Multiply the weight entries times the CG arm entries to determine moment entries. Total the weight and the moment columns to determine the basic empty weight and moment. For determining the CG arm divide the resulting moment value by the basic empty weight.

Note **Make an attempt to verify the results of each weighing, when data for comparison are available.**

17 Enter basic empty weight, CG arm and moment in the Weight and Balance Record (see Figure 6 2).

6.3 Weight and Balance Record

The Weight and Balance Record, see Figure 6-2, provides a record to reflect the continuous history of changes in aircraft structure and/or equipment which will affect the weight and balance of the aircraft. Changes to the structure and equipment shall be entered on the Weight and Balance Record when any modifications are made to the aircraft.

Important **It is the responsibility of the aircrafts owner to assure this record is up to date, as all loadings will be based on the latest entry.**

6.4 Weight and Balance Determination for Flight

In the following, the procedure of determining of weight and balance for flight operation is described. Values are for sample only and refer to the Sample Weight and Balance Loading Form, see Figure 6-3.

A blank sheet of Weight and Balance Loading Form is provided for the operator's convenience as Figure 6-4.

Note **The following Figures 6-5 and 6-7 are prepared in either SI or U.S. units.**

Important **It is the responsibility of the pilot to assure, that the aircraft is loaded properly. The Basic Empty Weight CG is noted on the aircraft Weighing Form. If the aircraft has been altered, refer to the Weight and Balance Record for this information.**

6.4.a Sample

1. Take the Basic Empty Weight and Moment as noted on the aircraft Weighing Form (Figure 6-1) resp. on the latest entry of the Weight and Balance Record (Figure 6-2) (convert them into U.S. units if necessary using the conversion factors given in Section 1) and enter them in item 1 (Basic Empty Weight) of Figure 6-4 (1425 kg/5095 kgm).
2. Determine arm, weight and moment of the pilot and enter the values in item 3 (2.84 m/86 kg/244.24 kgm).
3. Determine arm, weight and moment of the co-pilot and enter the values in item 3 (2.95 m/80 kg/236 kgm).

Note **The values for the pilot or co-pilot are applicable only when the CG of the occupant is at location specified.**

4 Determine weight(s) and moment(s) of passenger(s) and baggage from the applicable columns of Figure 6-5 (130 kg/510.9 kgm; 50 kg/252.5 kgm; 12 kg/69 kgm).

5 Total items 1 and 2 thru 6 to determine appropriate entries for item 7 (zero fuel weight) (1783 kg/6407.64 kgm).

6 Determine the values for item 8a (fuel loading main compartment) from the applicable columns of Figure 6-6a (293 kg/1104 kgm).

7 Determine the values for item 8b (fuel loading auxiliary compartment) if applicable from columns of Figure 6-6b (0 kg/0 kgm).

8 Total items 7 and 8 to determine item 9 (ramp weight) (2076 kg/7511.64 kgm). Refer to the weight and moment limits form (Figure 6-7) to ensure values are not out of limits.

9 Determine the values for item 10 (less fuel for taxiing) from the applicable columns of Figure 6-6 (7 kg/26.4 kgm).

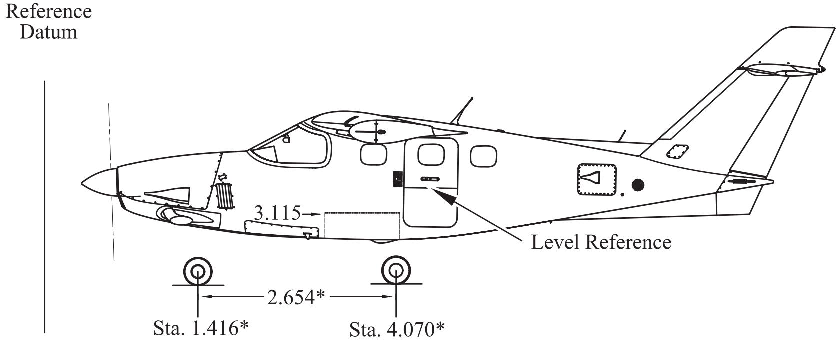
10 Subtract item 10 from item 9 to determine item 11 (takeoff weight) (2069 kg/7485.24 kgm). Enter item 11 in the weight and moment limits from (Figure 6-7) to determine if the loading is within allowable limits. If the determined point falls outside of the envelope, it will be necessary to reduce the load or change location of load.

11 Refer to Section 5 to determine the fuel quantity required for the flight. After determining the fuel used, obtain the appropriate weight and moment from Figure 6-6. Enter this weight and moment in item 12a and b (less fuel to destination) (195.4 kg/736 kgm).

12 Subtract item 12 from item 11 to determine item 13 (landing weight) (1873.6 kg/6749.24 kgm). Refer to landing weight and moment limits form (Figure 6-7) to ensure values are not out of limits.

Aircraft Weighting Form (SI units)

Serial No: Registration No: Date:



Sta. = Station, a position along the fuselage measured in m from the reference datum.
* values have to be checked prior to weighting. Tolerance of station values is ±5 mm.

Aircraft as weighted
(including full oil and operating fluids but no usable fuel)

Position	Scale reading	Scale error	Tare (kg)	Net Weight (kg)
Left wing			-	
Right wing			-	
Nose			-	
			Aircraft total as weighted	

Fuselage station of aft weighting point (4.070 m*)

Difference between forward and aft weighting point (2.654 m*)

Nose net weight

CG arm of aircraft as weighted = ( ) - $\dfrac{(\quad)\times(\quad)}{(\quad)}$ = ( ) m aft of reference datum

Total as weighted

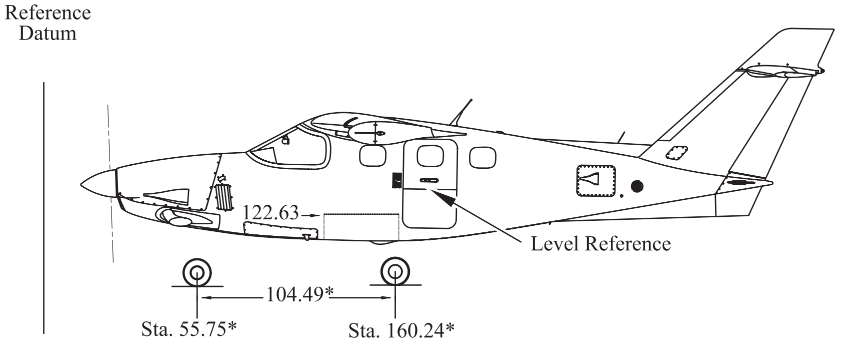
Basic Empty Weight and Center of Garavity

Item	Weight (kg)	CG Arm (m)	Moment (kg x m)
Aircraft as weighted			
Fuel, main tank (if applicable)		3.768	
Fuel, aux tank (if applicable)		3.900	
Optional Equipment (if applicable)			
Basic Empty Weight			

Figure 6-1
Aircraft Weighing Form (SI Units) (Sheet 1 of 2)

Aircraft Weighting Form (U.S. units)

Serial No: Registration No: Date:



Sta. = Station, a position along the fuselage measured in m from the reference datum.
* values have to be checked prior to weighting. Tolerance of station values is ±0.2 in..

Aircraft as weighted (including full oil and operating fluids but no usable fuel)				
Position	Scale reading	Scale error	Tare (lbs)	Net Weight (lbs)
Left wing			-	
Right wing			-	
Nose			-	
			Aircraft total as weighted	

Fuselage station of aft weighting point (160.24 in.*)

Difference between forward and aft weighting point (104.49 in.*)

Nose net weight

CG arm of aircraft as weighted = (   ) - (   ) x (   ) / (   ) = (   ) In. aft of reference datum

Total as weighted

Basic Empty Weight and Center of Garavity			
Item	Weight (lbs)	CG Arm (in.)	Moment (In. lbs./100)
Aircraft as weighted			
Fuel, main tank (if applicable)		148.34	
Fuel, aux tank (if applicable)		153.54	
Optional Equipment (if applicable)			
Basic Empty Weight			

Figure 6-1
Aircraft Weighing Form (U.S. Units) (Sheet 2 of 2)

Sample Weight And Balance Record (SI units)

(Continuous History of Changes in Structure or Equipment Affecting Weight and Balance)

Airplane Model | Serial Number | Page Number

Date	Item No.		Description of Article or Modification	Weight Change						Running Basic Empty Weight	
				Added (+)			Removed (-)				
	In	Out		Weight (kg)	Arm (m)	Moment (kgm)	Weight (kg)	Arm (m)	Moment (kgm)	Weight (kg)	Moment (kgm)
			As Delivered								

Figure 6-2
Sample Weight and Balance Record (Sheet 1 of 2)

Sample Weight And Balance Record (U.S. units)

(Continuous History of Changes in Structure or Equipment Affecting Weight and Balance)

Airplane Model	Serial Number	Page Number

Date	Item No.		Description of Article or Modification	Weight Change						Running Basic Empty Weight	
				Added (+)			Removed (-)				
	In	Out		Weight (lbs.)	Arm (In.)	Moment (In.lbs./100)	Weight (lbs.)	Arm (In.)	Moment (In.lbs./100)	Weight (lbs.)	Moment (In.lbs./100)
			As Deliver ed								

Figure 6-2
Sample Weight and Balance Record (Sheet 2 of 2)

Sample Weight and Balance Loading Form				
Ref	**Item**	**Arm (m)**	**Weight (kg)**	**Moment (kgm)**
1	**Basic Empty Weight** (Sample)		*1425*	*5095*
2	Pilot (Station 2.825 - 2.981)	*2.84*	*86*	*244.24*
3	Copilot (Station 2.825 - 2.981)	*2.95*	*80*	*236*
4	Passenger(s) on Seats 3 + 4 (Station 3.930) (refer to figure 6-5)		*130*	*510.9*
5	Passenger(s) on Seats 5 + 6 (Station 5.050) (refer to figure 6-5)		*50*	*252.5*
6	Baggage (Station 5.750) (Do not exceed max. weight in baggage compartment of 90 kg). (refer to figure 6-5)		*12*	*69*
7	**Zero Fuel Weight** (sub-total) (Do not exceed max. zero fuel weight of 1945 kg)		*1783*	*6407.64*
8a	Fuel Loading main compartment (refer to figure 6-6a)		*293*	*1104*
8b	Fuel Loading auxiliary compartment (if applicable, refer to figure 6-6b)		*0*	*0*
9	**Ramp Weight** (sub-total) (Do not exceed max. ramp weight of 2130 kg)		*2076*	*7511.64*
10	Less Fuel For Taxiing (refer to figure 6-6)		*7*	*26.4*
11	**Takeoff Weight** (Do not exceed max. takeoff weight of 2130 kg)		*2069*	*7485.24*
12a	Less Fuel To Destination main compartment (refer to figure 6-6a)		*195.4*	*736*
12b	Less Fuel To Destination auxiliary compartment (if applicable, refer to figure 6-6b)		*0*	*0*
13	**Landing Weight**		*1873.6*	*6749.24*

Figure 6-3
Sample Weight and Balance Loading Form

Weight and Balance Loading Form (SI units)					
Ref	**Item**	**Arm (m)**	**Weight (kg)**	**Moment (kgm)**
1	**Basic Empty Weight** (refer to figure 6-2)			
2	Pilot (Station 2.825 - 2.977)			
3	Copilot (Station 2.825 - 2.977)			
4	Passenger(s) on Seats 3 + 4 (Station 3.930) (refer to figure 6-5)			
5	Passenger(s) on Seats 5 + 6 (Station 5.050) (refer to figure 6-5)			
6	Baggage (Station 5.750) (Do not exceed max. weight in baggage compartment of 90 kg). (refer to figure 6-5)			
7	**Zero Fuel Weight** (sub-total) (Do not exceed max. zero fuel weight of 1945 kg)			
8a	Fuel Loading main compartment (refer to figure 6-6a)			
8b	Fuel Loading auxiliary compartment (if applicable, refer to figure 6-6b)			
9	**Ramp Weight** (sub-total) (Do not exceed max. ramp weight of 2130 kg)			
10	Less Fuel For Taxiing (refer to figure 6-6)			
11	**Takeoff Weight** (Do not exceed max. takeoff weight of 2130 kg)			
12a	Less Fuel To Destination main compartment (refer to figure 6-6a)			
12b	Less Fuel To Destination auxiliary compartment (if applicable, refer to figure 6-6b)			
13	**Landing Weight**			

Figure 6-4
Weight and Balance Loading Form (Sheet 1 of 2)

Weight and Balance Loading Form (U.S. units)				
Ref	**Item**	**Arm (in.)**	**Weight (lbs.)**	**Moment (in.lbs./ 100)**
1	**Basic Empty Weight** (refer to figure 6-2)			
2	Pilot (Station 111.22 in. - 117.20 in.)			
3	Copilot (Station 111.22 in. - 117.20 in.)			
4	Passenger(s) on Seats 3 + 4 (Station 155 in.) (refer to figure 6-5)			
5	Passenger(s) on Seats 5 + 6 (Station 199 in.) (refer to figure 6-5)			
6	Baggage (Station 226 in.) (Do not exceed max. weight in baggage compartment of 198 lbs.). (refer to figure 6-5)			
7	**Zero Fuel Weight** (sub-total) (Do not exceed max. zero fuel weight of 4289 lbs)			
8a	Fuel Loading main compartment (refer to figure 6-6a)			
8b	Fuel Loading auxiliary compartment (if applicable, refer to figure 6-6b)			
9	**Ramp Weight** (sub-total) (Do not exceed maximum ramp weight of 4696 lbs.)			
10	Less Fuel For Taxiing (refer to figure 6-6)			
11	**Takeoff Weight** (Do not exceed maximum takeoff weight of 4696 lbs.)			
12a	Less Fuel To Destination main compartment (refer to figure 6-6a)			
12b	Less Fuel To Destination auxiliary compartment (if applicable, refer to figure 6-6b)			
13	**Landing Weight**			

Figure 6-4
Weight and Balance Loading Form (Sheet 2 of 2)

Weight and Moment Table (SI units)			
Passengers and Baggage			
Weight (kg)	Moment (kgm)		
	Seats 3 + 4 Arm: 3.930 m	Seats 5 + 6 Arm: 5.050 m	Baggage Arm: 5.750 m
10	39.3	50.5	57.5
20	78.6	101.0	115.0
30	117.9	151.5	172.5
40	157.2	202.0	230.0
50	196.5	252.5	287.5
60	235.8	303.0	345.0
70	275.1	353.5	402.5
80	314.4	404.0	460.0
90	353.7	454.5	517.5
100	393.0	505.0	-
110	432.3	555.5	-
120	471.6	606.0	-
130	510.9	656.5	-
140	550.2	707.0	-
150	589.5	757.5	-
160	628.8	808.0	-
170	668.1	858.5	-
180	707.4	909.0	-
190	746.7	959.5	-
200	786.0	1010.0	-
210	825.3	1060.5	-
220	864.6	1111.0	-
230	903.9	1161.5	-
240	943.2	1212.0	-
250	982.5	1262.5	-
260	1021.8	1313.0	-
270	1061.1	1363.5	-
280	1100.4	1414.0	-
290	1139.7	1464.5	-
300	1179.0	1515.0	-

Figure 6-5
Weight and Moment Table, Passenger & Baggage (Sheet 1 of 2)

Weight and Moment Table (U.S. units)			
Passengers and Baggage			
Weight (lbs.)	Moment (in.lbs./100)		
	Seats 3 + 4 Arm: 155 in.	Seats 5 + 6 Arm: 199 in.	Baggage Arm: 226 in.
20	31	40	45
40	62	80	90
60	93	119	136
80	124	159	181
100	155	199	226
120	186	239	271
140	217	279	316
160	248	318	362
180	279	358	407
200	310	398	(452)
220	341	438	-
240	372	478	-
260	403	517	-
280	434	557	-
300	465	597	-
320	496	637	-
340	527	677	-
360	558	716	-
380	589	756	-
400	620	796	-
420	651	836	-
440	682	876	-
460	713	915	-
480	744	955	-
500	775	995	-
520	806	1035	-
540	837	1075	-
560	868	1114	-
580	899	1154	-
600	930	1194	-

Figure 6-5
Weight and Moment Table, Passenger & Baggage (Sheet 2 of 2)

Weight and Moment Table (SI units)			
Fuel main & collector compartment (max. 440 liters usable)			
Quantity (1)	**Weight (kg)**	**Arm (m)**	**Moment (kgm)**
20	16,3	3,768	61
40	32,6	3,768	123
60	48,8	3,768	184
80	65,1	3,768	245
100	81,4	3,768	307
120	97,7	3,768	368
140	114,0	3,768	429
160	130,2	3,768	491
180	146,5	3,768	552
200	162,8	3,768	613
220	179,1	3,768	675
240	195,4	3,768	736
260	211,6	3,768	797
280	227,9	3,768	859
300	244,2	3,768	920
320	260,5	3,768	981
340	276,8	3,768	1043
360	293,0	3,768	1104
380	309,3	3,768	1166
400	325,6	3,768	1227
420	341,9	3,768	1288
440	358,2	3,768	1350

Figure 6-6 a
Weight and Moment Table / Fuel (Sheet 1 of 2)

Weight and Moment Table (U.S. units)			
Fuel main & collector compartment (max. 114 gal usable)			
Quantity (U.S. Gallons)	**Weight (lbs.)**	**Arm (in.)**	**Moment (in.lbs./100)**
5	35	148	51
10	70	148	103
15	104	148	154
20	139	148	206
25	174	148	257
30	209	148	309
35	243	148	360
40	278	148	411
45	313	148	463
50	348	148	514
55	382	148	566
60	417	148	617
65	452	148	669
70	487	148	720
75	521	148	771
80	556	148	823
85	591	148	874
90	626	148	926
95	660	148	977
100	695	148	1029
105	730	148	1080
110	765	148	1131
114	790	148	1169

Figure 6-6 a
Weight and Moment Table / Fuel (Sheet 2 of 2)

Weight and Moment Table (SI units)			
Fuel auxiliary compartment (max. 212 liters usable)			
Quantity (1)	**Weight (kg)**	**Arm (m)**	**Moment (kgm)**
20	16,3	3,9	63
40	32,6	3,9	127
60	48,8	3,9	190
80	65,1	3,9	254
100	81,4	3,9	317
120	97,7	3,9	381
140	114,0	3,9	444
160	130,2	3,9	508
180	146,5	3,9	571
200	162,8	3,9	635
212	172,6	3,9	673

Figure 6-6 b
Weight and Moment Table / Fuel (Sheet 1 of 2)

Weight and Moment Table (U.S. units)			
Fuel auxiliary compartment (max. 55 gal usable)			
Quantity (U.S. Gallons)	**Weight (lbs.)**	**Arm (in.)**	**Moment (in.lbs./100)**
5	35	154	54
10	70	154	107
15	104	154	161
20	139	154	214
25	174	154	268
30	209	154	321
35	243	154	375
40	278	154	428
45	313	154	482
50	348	154	535
55	382	154	589

Figure 6-6 b
Weight and Moment Table / Fuel (Sheet 2 of 2)

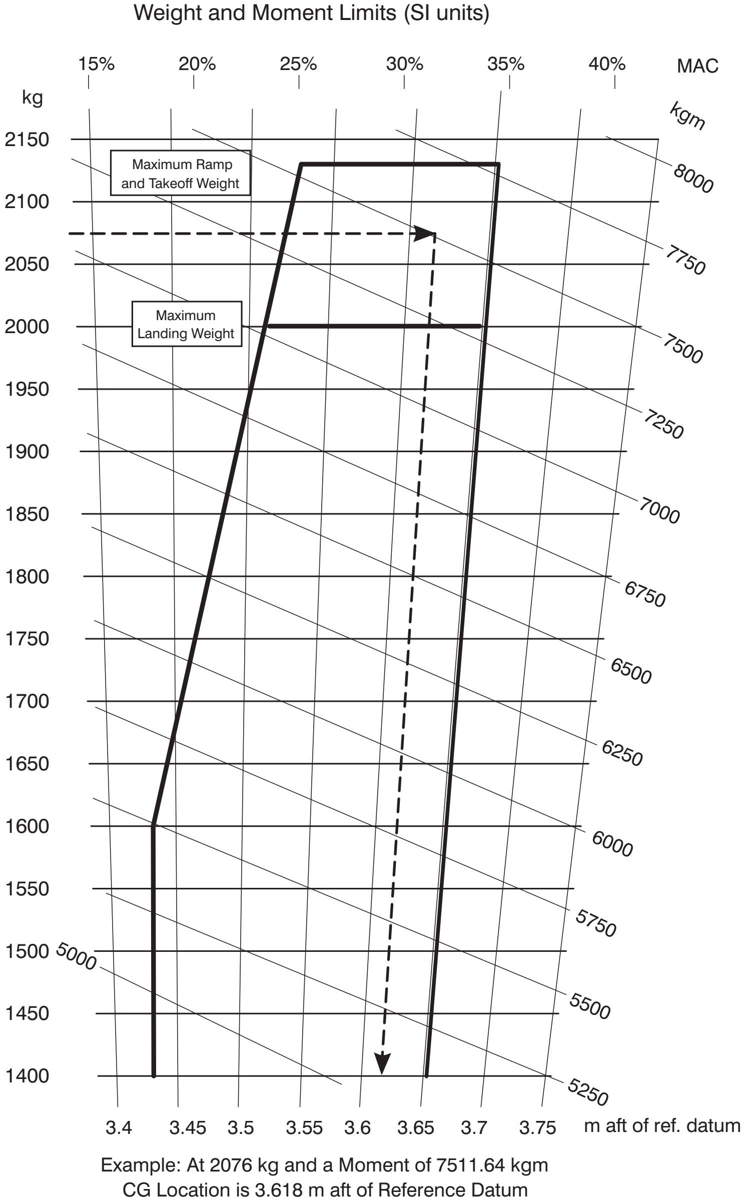


Figure 6-7
Weight and Moment Limits (Sheet 1 of 2)

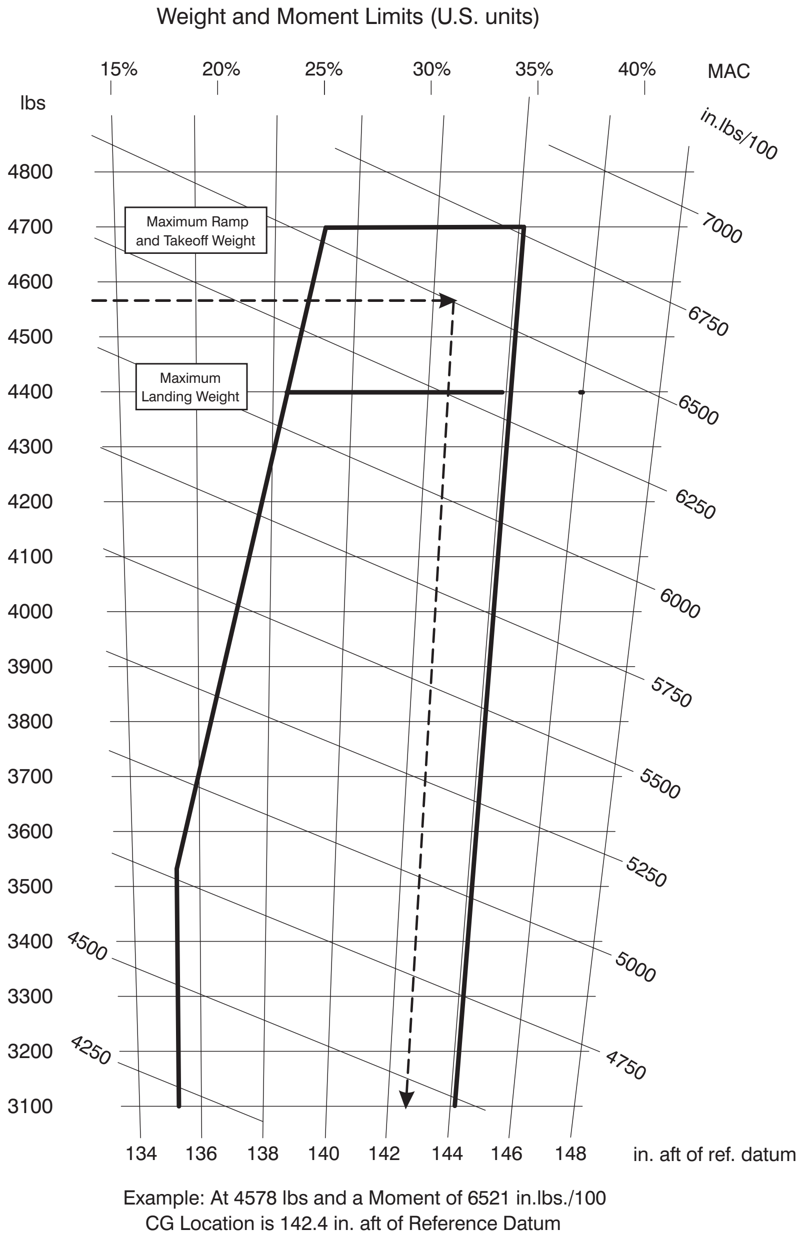


Figure 6-7
Weight and Moment Limits (Sheet 2 of 2)

6.5 Equipment List

The equipment list gives a surview of equipment available for the aircraft, the weight and arm of each item for weight and balance and by a check, the information if an item is installed in the aircraft to which this handbook is related. The letter "A" means, that an item can be used as an alternative to the respective required and/or standard item, the letter "R" means, that an item is required for type certification, a "S" means, that this item is part of the standard equipment, and an "O" means, that this item is defined as optional equipment of the airplane.

No	Item	Manufacturer	Part No	Weight kg [lbs]	Arm m [in]	Re-marks /inst.
1	Pilot's operating handbook	Extra	0B701	0.700 [1.543]	3.400 [133.9]	RS
	11 Placards and Markings					
1	MTOW 1999 kg Kit	Extra	33778	n.a	n.a	O
	21 Air Conditioning					
1	Shut off & Mass flow control valve	Enviro Systems	1300495-1	3.300 [7.275]	0.900 [35.4]	RS
1	Temparature modulating valve	Enviro Systems	1300330	1.043 [2.299]	1.370 [53.9]	RS
1	Primary air to air heat exchanger	Behr	D8026; DWG 37.00578	2.500 [5.512]	1.600 [63.0]	RS
1	Primary air to air heat exchanger	Aero Classics	8001286	2.500 [5.512]	1.600 [63.0]	RA
1	Cabin Air Mass Flow Controller	Enviro Systems	1300360-17	0.322 [0.710]	3.700 [145.7]	RS
1	Cabin Air Temperature Controller	Enviro Systems	1300350-27	0.327 [0.721]	3.700 [145.7]	RS
1	Compressor condensor module	Enviro Systems	1134410-5	11.800 [26.014]	7.400 [291.3]	S
1	Evaporator FWD	Enviro Systems	1134200-81	2.950 [6.504]	3.400 [133.9]	S
1	Evaporator AFT	Enviro Systems	1134200-80	2.950 [6.504]	6.250 [246.1]	S
2	Panel Vent Fan	Sanyo Denki	9G0624G1021	0.195 [0.430]	2.240 [88.2]	S
1	Cabin Press Indicator	U.M.A INC.	11-210-22W	0.142 [0.313]	2.350 [92.5]	RS
1	Cabin Climb Indicator	U.M.A INC.	8-210-64W	0.225 [0.496]	2.350 [92.5]	RS
1	Cabin Pressure Controller	Dukes Inc.	5111-00-3	0.454 [1.001]	2.380 [93.7]	RS

No	Item	Manufacturer	Part No	Weight kg [lbs]	Arm m [in]	Re-marks /inst.
1	Outflow Control Valve	Dukes Inc.	5112-00-3	1.450 [3.197]	6.300 [248.0]	RS
1	Outflow Safety Valve	Dukes Inc.	5113-00-3	1.270 [2.800]	6.300 [248.0]	RS
	22 Auto Flight					
1	System 55X Programmer / Computer	S-Tec	01192-0-37T	1.362 [3.003]	2.400 [94.5]	RS
1	Yaw Amplifier	S-Tec	0121-6-2	1.000 [2.205]	6.863 [270.2]	RS
1	Trim Servo	S-Tec	0106-2-T3	1.310 [2.888]	6.683 [263.1]	RS
1	Roll Servo	S-Tec	0106-R2	1.310 [2.888]	3.200 [126.0]	RS
1	Pitch Servo	S-Tec	0108-P4	1.310 [2.888]	6.683 [263.1]	RS
1	Yaw-Servo	S-Tec	0106-6-Y9	1.310 [2.888]	6.683 [263.1]	RS
1	Pressure Transducer	S-Tec	0111	0.030 [0.066]	6.800 [267.7]	RS
	23 Communications					
1	Audio panel	PS Engineering	PMA8000B; 050-890-0402	0.850 [1.874]	2.200 [86.6]	RS
1	Audio panel	PS Engineering	PMA8000BT; 050-890-0404	0.850 [1.874]	2.200 [86.6]	RA
1	Transponder	Becker	BXP-6402-1R-(01)	0.680 [1.499]	6.971 [274.4]	RS
1	ELT	Artex	ME406; 453-6603	1.036 [2.284]	7.650 [301.2]	RS
2	Headset	Bose	Series X; AHX-04	0.450 [0.992]	2.900 [114.2]	RS
2	Headset	Bose	Series X; AHX-04	0.450 [0.992]	3.930 [154.7]	O
2	Headset	Bose	Series X; AHX-04	0.450 [0.992]	5.050 [198.8]	O
1	Microphone	Holmco	85-03-04963-04	0.200 [0.441]	2.400 [94.5]	RS
1	Twin Cone Speaker	RS	845-308	0.200 [0.441]	3.000 [118.1]	RS
	24 Electrical Power					
1	Lead Acid Battery	Concorde	RG-390E/L	28.100 [61.949]	1.750 [68.9]	RS
1	Disconnect PLUG Battery	Rebling Plastics	MS3349-2; 7016-2	0.300 [0.661]	1.800 [70.9]	RS
1	Starter Generator	Aircraft Parts Corp.	200SGL129Q(5)-1	10.000 [22.046]	1.076 [42.4]	RS

No	Item	Manufacturer	Part No	Weight kg [lbs]	Arm m [in]	Re-marks /inst.
1	Generator Control Unit	Aircraft Parts Corp.	GCSG505-21	1.150 [2.535]	1.860 [73.2]	RS
1	Standby alternator	B+C	BC410-1	2.600 [5.732]	1.000 [39.4]	RS
1	Alternator regulator	B+C	BC203-2D	0.200 [0.441]	1.700 [66.9]	RS
1	External Power Connector	Anderson	AN2552-3A	0.350 [0.772]	1.750 [68.9]	RS
1	Inverter for electroluminescent panels	KGS	SD3	0.454 [1.001]	5.000 [196.9]	RS
(1)	DC-DC Converter (24VDC =>12VDC)	Switched Mode	SM 2430	0.650 [1.433]	3.400 [133.9]	S
	25 Equipment / Furnishings					
1	pilotseat assy (1)	Extra	EA-75430	11.400 [25.132]	2.900 [114.2]	RS
1	pilot seat belt assy	Schroth	P/N 1-08-115201	1.800 [3.968]	2.970 [116.9]	RS
1	co-pilotseat assy (2)	Extra	EA-75440	11.400 [25.132]	2.900 [114.2]	RS
1	co-pilot seat belt assy	Schroth	P/N 1-08-110201	1.800 [3.968]	2.970 [116.9]	RS
1	mid-pax-seat LH (3)	Extra	EA-75450	6.700 [14.771]	3.930 [154.7]	RS
1	seat belt assy (3)	Schroth	P/N 5-02-145701	1.400 [3.086]	3.860 [152.0]	RS
1	mid-pax-seat RH (4)	Extra	EA-75460	6.700 [14.771]	3.930 [154.7]	RS
1	seat belt assy (4)	Schroth	P/N 5-02-140701	1.400 [3.086]	3.860 [152.0]	RS
1	rear-pax seat LH (5)	Extra	EA-75470	6.600 [14.550]	5.050 [198.8]	RS
1	seat belt assy (5)	Schroth	P/N 5-02-140701	1.400 [3.086]	5.120 [201.6]	RS
1	rear-pax-seat RH (6)	Extra	EA-75480	7.700 [16.975]	5.050 [198.8]	RS
1	seat belt assy (6)	Schroth	P/N 5-02-145701	1.400 [3.086]	5.120 [201.6]	RS
	26 Fire Protection					
1	Fire Extinguisher	Air Total	HAL 1.2; P/N 74-20	2.400 [5.291]	3.400 [133.9]	RS
	27 Flight Controls					
1	Flap Control Box	Kissling	7010707-000100.00; EA-85411	0.345 [0.761]	3.800 [149.6]	RS
1	Flap Motor	Engel	GNM 4175A	2.650 [5.842]	3.930 [154.7]	RS

No	Item	Manufacturer	Part No	Weight kg [lbs]	Arm m [in]	Re-marks /inst.
	28 Fuel					
4	Filler cap	Extra	EA-6B215.02	0.105 [0.231]	3.650 [143.7]	RS
2	Fuel quantity indicator collector compartment	UMA	T18 112F 1000 AAW	0.120 [0.265]	2.240 [88.2]	RS
2	Fuel quantity indicator main tank	UMA	T18 112F 1010 ABW	0.120 [0.265]	2.240 [88.2]	RS
2	Fuel quantity indicator long range tank	UMA	T18 112F 1020 ACW	0.120 [0.265]	2.240 [88.2]	RS
1	Fuel selector valve (incl. Shut-off)	Allen Airctaft	8BS1001	0.200 [0.441]	2.950 [116.1]	RS
1	Fuel filter Assembly	Purolator	1743640-06	0.800 [1.764]	1.343 [52.9]	RS
2	El. fuel pump	Parker / Airborne	2B7-40	1.400 [3.086]	1.880 [74.0]	RS
1	Pressure accumulator	Extra	EA-6B236.00	0.840 [1.852]	1.600 [63.0]	RS
2	Motive Flow Filter	Sobek	Z-C 1000 0004	0.150 [0.331]	3.000 [118.1]	RS
2	Motive Flow Filter	Sobek	Z-C 1000 0048	0.150 [0.331]	3.000 [118.1]	RA
2	Motive flow pump	Pierburg	7.21440.68.0	0.300 [0.661]	3.050 [120.1]	RS
	29 Hydraulic Power					
1	Hydraulic Power Pack	Extra	EA-5B530	4.250 [9.370]	3.500 [137.8]	RS
	30 Ice and Rain protection					
1	Deice boot timer	BF-Goodrich	3D2991-14	0.200 [0.441]	2.690 [105.9]	RS
2	Ejector flow control valve (incl. press. switch)	BF-Goodrich	3D3556-03	0.340 [0.750]	1.900 [74.8]	RS
1	Windshield Heat Controller	Kissling	AT15.2121	0.100 [0.220]	2.950 [116.1]	RS
1	Prop Deice Indicator (Amperemeter)	UMA	N15 1120 030P 01W rev.B	0.050 [0.110]	2.240 [88.2]	RS
	31 Indicating/Recording Systems					
1	Annunciator Panel upper	West Coast Specialities	90-42192-1	0.240 [0.529]	2.240 [88.2]	RS
1	Annunciator Panel lower	West Coast Specialities	90-42192-2	0.240 [0.529]	2.240 [88.2]	RS
1	Annunciator Panel	Extra	EA-8B521.00	0.332 [0.732]	2.240 [88.2]	RA

No	Item	Manufacturer	Part No	Weight kg [lbs]	Arm m [in]	Re-marks /inst.
	32 Landing Gear					
1	Nose wheel tire	Goodyear/McCreary/Michelin	5.00-5 6ply 1260lbs	2.153 [4.747]	1.414 [55.7]	RS
1	Nose wheel	Cleveland	40-78B	1.191 [2.626]	1.414 [55.7]	RS
2	Main wheel tire (L/H - R/H)	Goodyear	15x6.00-6 10-ply Tubeless	3.527 [7.776]	4.070 [160.2]	RS
2	Main wheel (L/H - R/H)	Cleveland	40-96E	3.206 [7.068]	4.070 [160.2]	RS
2	Main wheel brake (L/H - R/H)	Cleveland / Extra	30-61B (mod)	1.282 [2.826]	4.170 [164.2]	RS
	33 Lights					
2	Recognition Light L. & R.	Whelen	010771125-XX	0.140 [0.309]	3.300 [129.9]	S
1	ACL / NAV Light Left	Whelen	A 650-PR-28V; 01-0770054-03	0.200 [0.441]	3.800 [149.6]	RS
1	ACL / NAV Light Right	Whelen	A 650-PG-28V; 01-0770054-01	0.200 [0.441]	3.800 [149.6]	RS
1	ACL / NAV Light Tail	Whelen	A 500AV28; 01-0770024-01	0.100 [0.220]	9.750 [383.9]	RS
1	ACL L. Power Supply Wing	Whelen	A 413A; HDA-CF 14/28V; 01-0770028-05	1.000 [2.205]	3.110 [122.4]	RS
1	ACL L. Power Supply Tail	Whelen	A 490; TCF-14/28V; 01-0267771-00	0.550 [1.213]	7.350 [289.4]	RS
1	Ice Light	Whelen	01-0790093-00	0.100 [0.220]	1.730 [68.1]	S
1	Flash Light	Mag Lite	ML2	0.700 [1.543]	3.400 [133.9]	RS
6	Reading Light	Rocamarine	467810	0.100 [0.220]	4.000 [157.5]	RS
2	Map Light	Spruce	11-07800	0.050 [0.110]	3.000 [118.1]	RS
1	Landing light	Xe Vision	XV-19	0.590 [1.301]	0.730 [28.7]	RS
	34 Navigation					
2	IFD (L+R)	Avidyne	IFD5000i; HW: 700-00083-000; SW: 530-00218-000	8.100 [17.857]	2.200 [86.6]	RS
1	Keypad/Display	Avidyne	ACD215; HW: 700-00150-002; SW 530-00205-000	1.040 [2.293]	2.600 [102.4]	S
1	Aircraft Configuration Module	Avidyne	AMC100; HW: 700-00156-xxx	0.090 [0.198]	2.200 [86.6]	RS
2	Magnetometer	Avidyne	MAG300; 700-00011-000; SW 530-00124-000	0.250 [0.551]	3.500 [137.8]	RS

No	Item	Manufacturer	Part No	Weight kg [lbs]	Arm m [in]	Re-marks /inst.
1	DME	Bendix / King	KDM 706A; 066-1066-25	2.500 [5.512]	6.866 [270.3]	O
1	DME-Indicator	Bendix / King	KDI-574; 066-1069-04	0.320 [0.705]	2.300 [90.6]	O
1	Turn Coordinator	S-Tec	6405-28L	0.820 [1.808]	2.250 [88.6]	RS
1	Magnetic direction indicator	Airpath	C 2400-L4VT	0.300 [0.661]	2.450 [96.5]	RS
2	Pitot tube (heated)	Aeroinstruments	AN5812-1	0.400 [0.882]	3.790 [149.2]	RS
2	Dual static port (heated)	Extra	EA-75123.10	0.120 [0.265]	7.000 [275.6]	RS
1	Lift Detector	Safe Flight	C-88807-3	0.135 [0.298]	3.400 [133.9]	RS
1	Standby Gyro	Mid-Continent	4200-11	0.730 [1.609]	2.240 [88.2]	RS
1	Standby Airspeed Indicator	Aerosonic	25025-0177	0.340 [0.750]	2.240 [88.2]	RS
1	Standby Airspeed Indicator	Mid-Continent	MD25-260	0.270 [0.595]	2.240 [88.2]	RA
1	Standby Altitude indicator	Aerosonic	15035-01107	0.370 [0.816]	2.240 [88.2]	RS
1	Standby Altitude indicator	United Instruments	UI5237AMR-A.918	0.410 [0.904]	2.240 [88.2]	RA
1	Standby Altitude indicator	United Instruments	UI5237AR-A.916	0.410 [0.904]	2.240 [88.2]	RA
1	Traffic Advisory System	Avidyne	TAS 610 ; 70-2420-[]	2.550 [5.622]	6.150 [242.1]	O
1	Thunderstorm Detection Processor	Avidyne	TWX 670; 700-00033-000-[00]	0.640 [1.411]	4.100 [161.4]	O
	36 Pneumatic					
1	Pressure regulator	BF-Goodrich	4D2095-183	0.620 [1.367]	1.340 [52.8]	RS
1	Automatic water separator	BF-Goodrich	3D3553-01	0.454 [1.001]	1.850 [72.8]	RS
	61 Propellers					
1	Propeller	MT-propeller	MTV-5-1-D-C-F-R(A)/CFR210-56	46.200 [101.853]	0.234 [9.2]	RS
1	Propeller spinner	MT-propeller	P-629-A	0.300 [0.661]	0.234 [9.2]	RS
	71 Powerplant					
1	Engine air intake	Extra	EA-6B138.00	1.800 [3.968]	0.460 [18.1]	RS

No	Item	Manufacturer	Part No	Weight kg [lbs]	Arm m [in]	Re-marks /inst.
	72 Engine					
1	Engine	Rolls Royce	RR 250-B17F/2	96.200 [212.083]	0.913 [35.9]	RS
3	Shock mounts	Barry Controls	96152-01	0.700 [1.543]	0.850 [33.5]	RS
	77 Engine Indicating					
1	Fuel Flow indicator / totalizer	Shadin	MINIFLO-L; 912047T-D	0.350 [0.772]	2.240 [88.2]	RS
1	Engine analog/digital indicator (6 parameters)	Moritz	A1270	2.050 [4.519]	2.160 [85.0]	RS
1	Engine & Electric digital indicator (6 parameters)	Moritz	A1240	0.800 [1.764]	2.240 [88.2]	RS
	78 Exhaust					
1	Exhaust pipe RH	Extra	EA-6B142.00	1.050 [2.315]	1.086 [42.8]	RS
1	Exhaust pipe LH	Extra	EA-6B141.00	1.600 [3.527]	1.086 [42.8]	RS
	79 Oil					
1	Oil Cooler	Extra	EA-6B411.00	3.200 [7.055]	1.600 [63.0]	RS
1	Oil Cooler	Extra	EA-6B412.00	3.200 [7.055]	1.600 [63.0]	RA
1	Thermostat	Rostra (Behr)	172F	0.300 [0.661]	1.600 [63.0]	RS
1	Scavenge Lube Oil Filter	Extra	EA-6B417.00	1.100 [2.426]	0.850 [33.5]	RS
1	External Oil Tank	Soloy	700-2825-3	4.000 [8.818]	0.950 [37.4]	RS

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Section 7
Description of the Airplane and its Systems
Table of Contents

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7 Description of Airplane and Systems

7.1 General

Section 7 of this handbook provides a description and operation of the airplane and its systems.

Note **Operational procedures for optional systems and equipment are presented in Section 9.**

7.2 Airframe

The aircraft is a 6-place, high-wing, full composite airplane. The fuselage consists of a skin with integrated longerons and frames.
The wing uses a double front spar and a rear spar interconnected by ribs.
The stabilizers use a front and a rear spar.
In general the skins of fuselage, wing, stabilizers and control surfaces consist of carbon fiber facings and honeycomb. The supporting structures such as longerons, frames, spars and ribs consist of carbon fiber with foam core. Only the nose region of the wing consists of glass fiber with honeycomb and glass fiber ribs. The retractable landing gear is a tricycle design with nose gear steering.

7.3 Flight Controls

The flight controls consist of the ailerons, rudder and elevators. The right elevator is equipped with a trim tab system. All these control surfaces are constructed of composite material. The primary control system is a conventional cable-system consisting of a double control wheel (pitch and roll) with respective coupling systems, hanging control pedals (yaw), tubes, levers, pulleys and push-pull rods.
Between ailerons and rudder controls an interconnection, made via springs, is installed.

7.3.a Ailerons

The coupling between the two control wheels is realized by a direct cable-chain coupling. The cables are connected to the control wheels by means of a longitudinal toothed wheel and run through the windshield center strut to the wing nose and move outboard. Then they are connected to a cable segment, which actuates the aileron over a lever and push-rod. Each aileron is attached to the rear spar of the wing by two hinges.

7.3.b Rudder

The pedals are placed hanging on two tubes which have a lever arm at the right side of the cabin from where the cables run along the cabin right side armrest panel to the empennage over in groups positioned pulleys. Here a direct connection to the lever arms of the rudder follows. The connection points lay inside the tail cone adjacent to the lower rudder bearing. The rudder is connected to the rear fin spar at three points.

7.3.c Elevator and Tab

The coupling between the control wheels is realized by a lever system, which is connected to a cable segment. From this cable segment the elevator cables run horizontally to the right cabin side to a 90° pulley and parallel with the rudder cables to the empennage. They are lead to the elevator in front of the front fin spar and are attached to a lever positioned in front of the horizontal stabilizer front spar, which actuates the two elevator sides separately by means of push rods. Each elevator is attached to the respective horizontal stabilizer by three bearings. The mechanical pitch trim is actuated through a trim wheel in the center console. The pitch trim tab is located in the right elevator and is linked over a cable-lever system to the trim wheel. The trim Bowden cable runs from the center console down crossing the cabin floor and is then directed rearwards to the empennage following the nose section of the fin to the right side elevator.

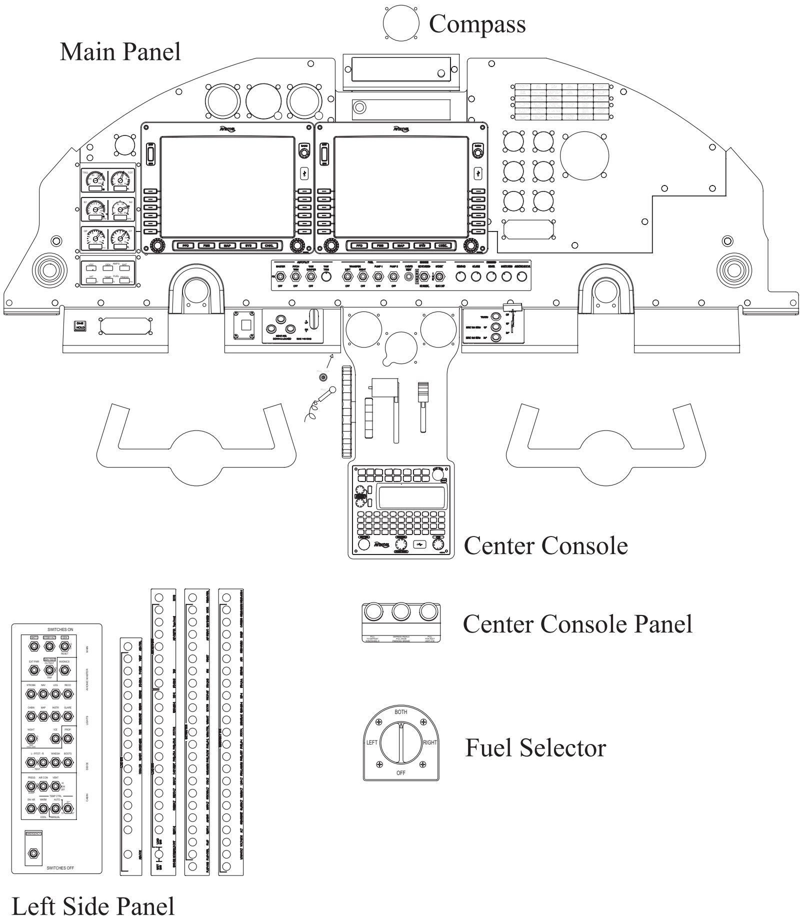


Figure 7-1
Instrument Panel

7.4 Instrument Panel

Figure 7-1 gives a survey of the instrument, circuit breaker and switch panels of the aircraft. For details and for identification of controls, switches, circuit breakers and instruments refer to the following figures and to the description of the systems to which these items are related.

GENERATOR FAIL r	AFT DOOR r	STALL HEAT r	OIL PRESS r	CHIP DETECTION y	HYDRAULIC PUMP y
GEAR WARN r	STALL WARN r	WINDSHIELD HEAT FAIL r	FUEL PRESS r	PITOT HEAT LEFT y	PITOT HEAT RIGHT y
FLAPS r	CABIN PRESSURE r	BLEED OVERTEMP r		STATIC HEAT LEFT y	STATIC HEAT RIGHT y
FUEL TRANS LEFT y	FUEL TRANS RIGHT y	STANDBY ALTERN ON y	IGNITION ACTIVE g	INTAKE HEAT g	RECOGN LIGHT g
FUEL FILTER BYPASS y	PNEUMATIC LOW y	LO VOLTAGE y		DEICE BOOTS g	LANDING LIGHT g
FUEL LOW LEFT y	FUEL LOW RIGHT y	LOW PITCH y	EXTERNAL POWER g	WINDSHIELD HEAT ON g	

r = red, y = yellow, g = green

Figure 7-2
Annunciator Panel

7.5 Flight Instruments

The aircraft is equipped with an integrated 'glass cockpit' consisting of two Integrated Flight Displays (IFD) on the main panel and a keyboard on the center console. These units present the normal flight information and also feature COM/NAV/GPS functions and a flight management system. In addition, conventional back-up flight instruments are placed on the LH main panel.

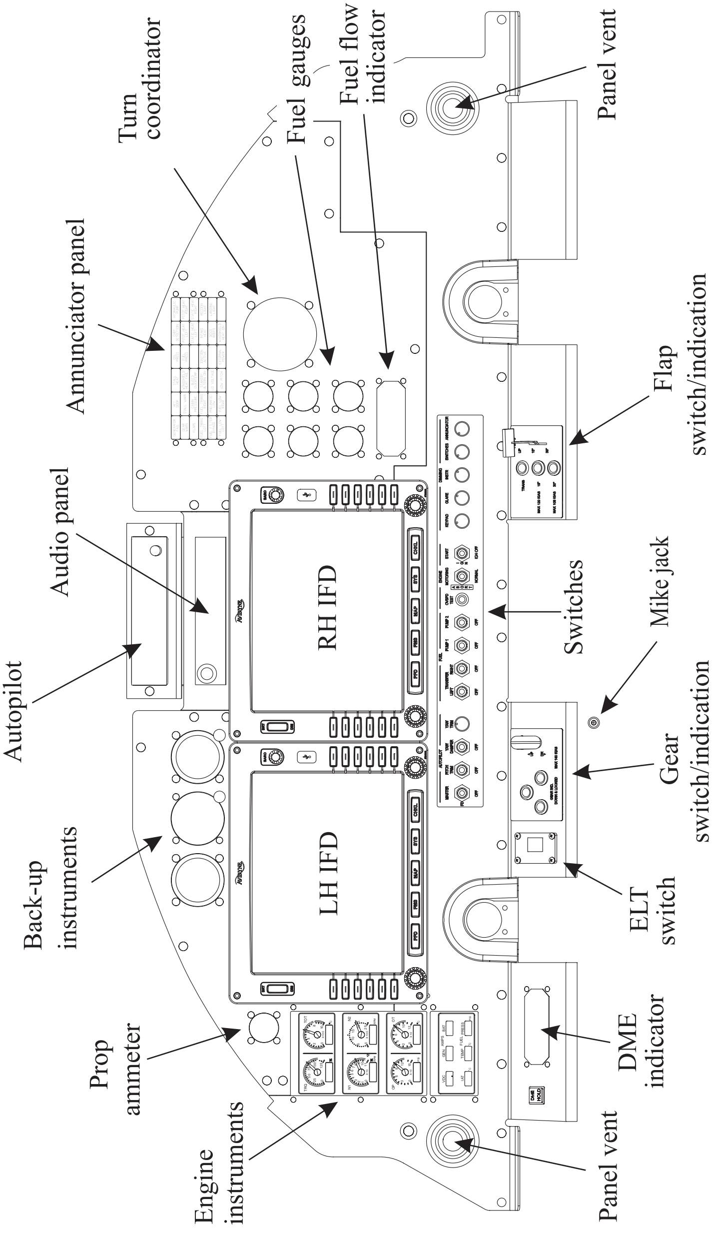


Figure 7-3
Main Panel

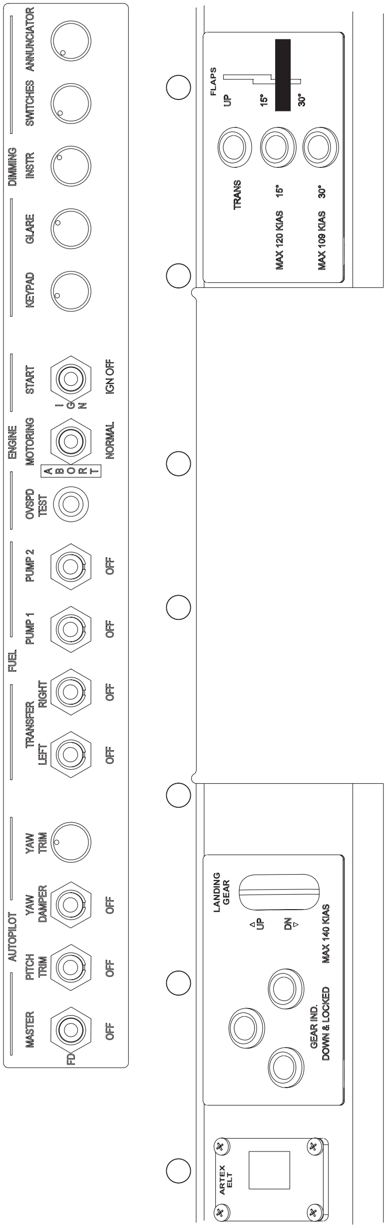


Figure 7-4
Main Panel Switches

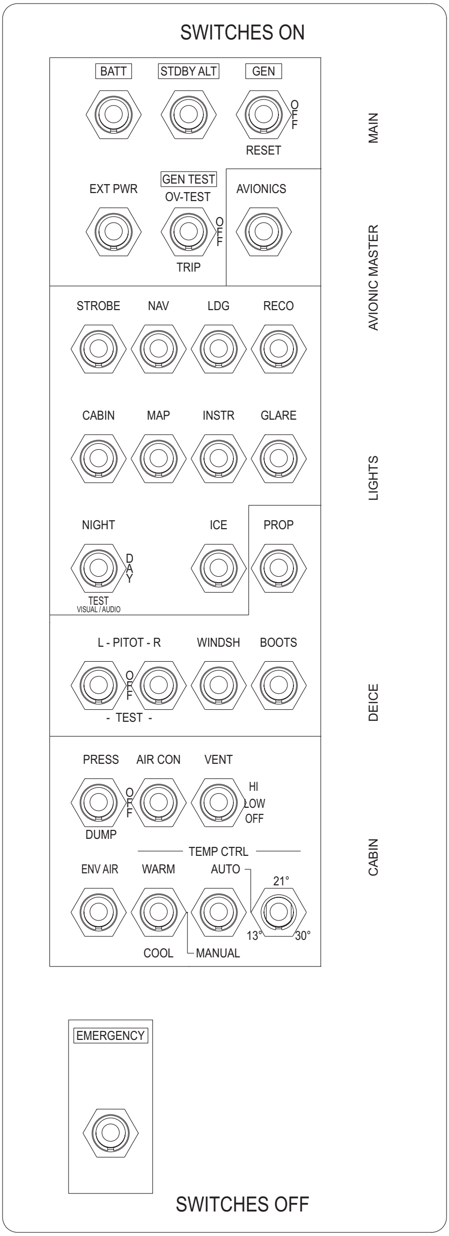


Figure 7-5
Left Side Panel Switches

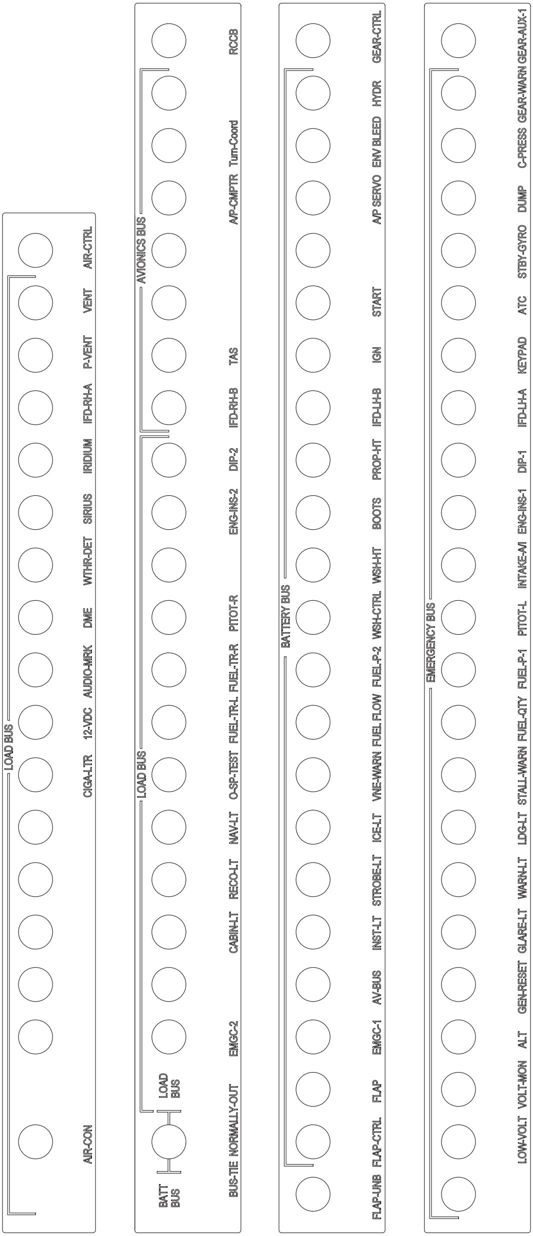


Figure 7-6
Left Side Panel Circuit Breakers

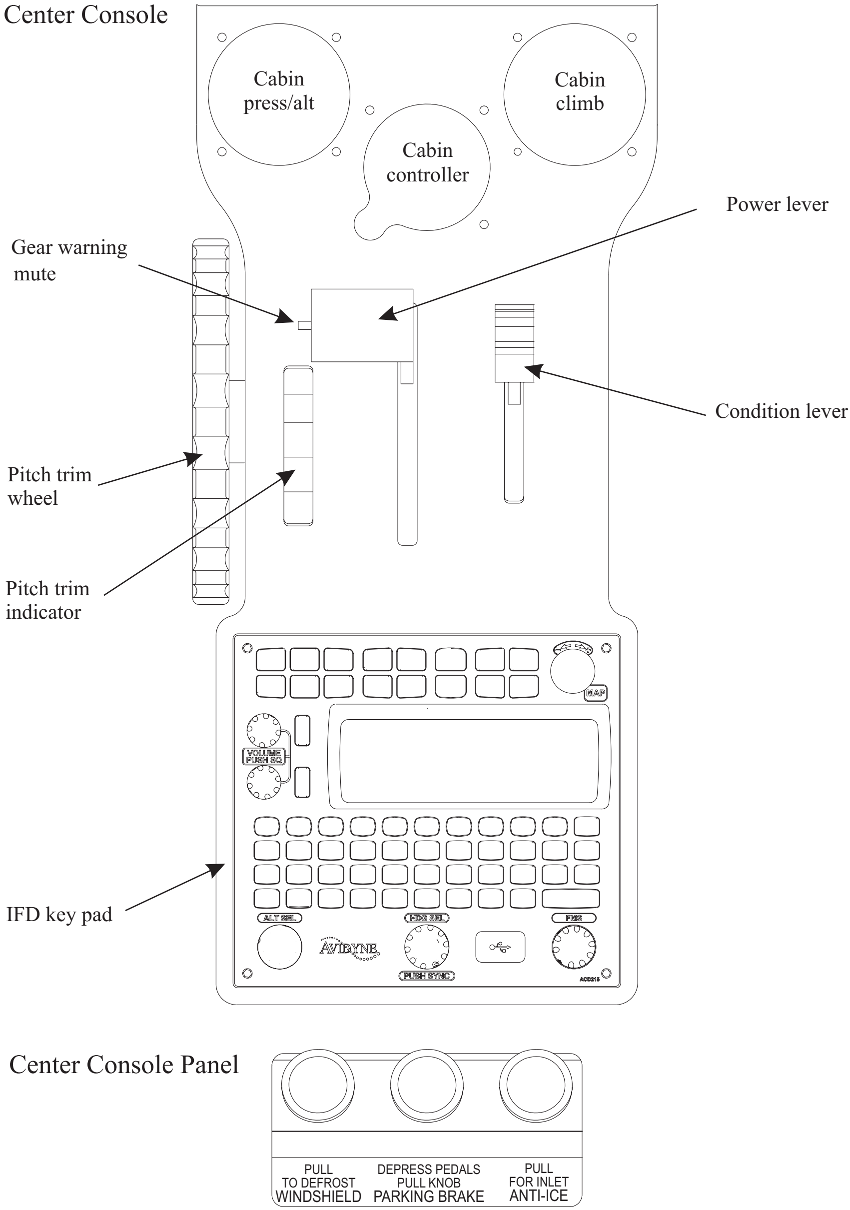


Figure 7-7
Center Console and Center Console Panel

7.6 Nose Wheel Steering System

The nose wheel steering system consists of tappets on the nose gear leg linked to the rudder pedals by a cable system and springs. Landing gear retraction automatically disengages the steering mechanism from the nose wheel and centers the nose wheel for entry into the wheel well. The deflection angle of the extended nose gear is limited to 30° to either side by mechanical stops.

7.7 Ground Control

Ground control while taxiing is accomplished through the nose wheel steering by using the rudder pedals; left rudder pedal to steer left and right rudder pedal to steer right.

7.8 Taxiing And Ground Handling

Minimum turning radius is 20.8 m (68.2 ft) either with or without brakes. A manual tow bar can be used to ground handle the aircraft. While using a tow bar the minimum turning angle applies also. See also section 2.

7.9 Flaps

The flaps are of the Fowler type. Each flap (two per side) is attached to the rear wing spar and guided during its movement by three wing tracks. Actuation is by means of two spindles, which are connected to the central electrical flap motor by flexible shafts. The flap motor is located in front of the rear spar in the fuselage area of the wing and is controlled by the flap position switch (refer to Figure 7-4) in the cockpit. This switch incorporates a preselect feature which allows the pilot to select the amount of flap extension desired. When the **UP**, **15°** or **30°** position is selected, the flap motor is electrically actuated and

drives the flaps toward the selected position. When the actual flap position equals the selected position, limit switches located at the wing tracks respective the outer spindles deenergize the flap motor. The actual flap position will be indicated by illuminating of relevant **15°** or **30°** green light at the left side of the flaps switch. When the flaps are moving, the yellow **TRANS** light illuminates. If the flaps are in UP-position, all lights are off.
As the flaps move, an electrical circuit compares the movement of the left and right flaps. If the flaps positions differ by 7° +/- 3°, the flap motor will be automatically switched off to prevent excessive asymmetric conditions. This will be indicated by the red **FLAPS** warning light located on the annunciator panel. This light indicates also a failure of the complete flap control.

Note **In case of the flaps are unbalanced, they rest in the position they have reached when failing and cannot be actuated until airplane has been in maintenance. However in this case the aircraft can be balanced by slight aileron and/or rudder input. Refer to Section 3, Emergency Procedures.**

Setting the flaps will cause a decrease of airspeed and a moderate nose down moment. The stall speeds for 2130 kg (4696 lbs), corresponding to the different flap positions, are shown in the following table.

Wing Flap Position	Stall Speed (KIAS)
Wing Flaps UP	80
Wing Flaps 15°	67
Wing Flaps 30°	58

Important **Before opening cabin door, the flaps should be moved in to prevent damage.**

7.10 Landing Gear

The aircraft is equipped with a hydraulically operated, retractable landing gear.
The main gear is equipped with an oil shock absorber in a parallel guide rod. It retracts against flight direction after rotating the wheel 90° forward. The nose gear is equipped with an internal shock absorber and retracts aft in the nose gear compartment.
Nose gear doors are positively guided. During ground operation, a weight-on-wheels safety (squat) switch located at the nose gear shock absorber prevents accidental gear retraction regardless of landing gear switch position.
The hydraulic power system includes equipment that provides a flow of pressurized hydraulic fluid to the landing gear system as well as to the respective landing gear doors.
The operation of the hydraulic system is divided in three circuits actuating the following devices:
Firstly the lower main gear doors, secondly the upper main gear doors, thirdly the main landing gear struts and the nose gear strut and doors.

<u>The basic gear down cycle is:</u>

1. Opening of the lower main doors,
   opening of the upper main gear doors,
   and extracting the three gear units simultaneously.
2. Closing the upper main gear doors.

<u>The gear up cycle is:</u>

1. Opening the upper main gear doors.
2. Retracting the three gear units.
3. Closing the upper doors.
4. Closing the lower doors.

Changing from gear up to gear down and vice versa is possible at any time of during operation.

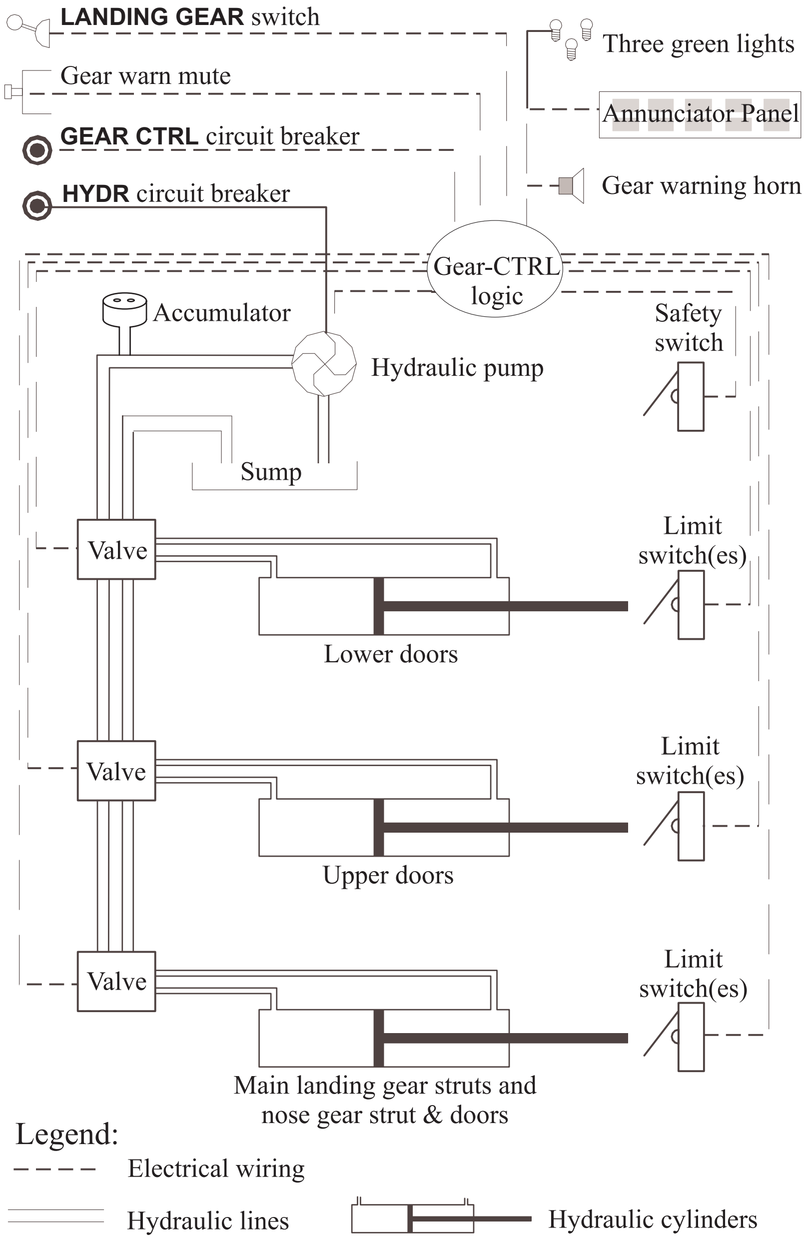


Figure 7-8
Landing Gear Schematic

7.10.a Components and System Features

The hydraulic pump and sump are located in front of the main landing gear attachment frame between the keel beams. The hydraulic valves needed for the sequence operation are located in the same compartment in front of the hydraulic pump. Hydraulic fluid level can be checked on ground by means of an inspection glass with access from the R/H main wheel bay.

The landing gear switch is located on the left main panel (see figure 7-4) well in reach of both pilot seats and has the positions **UP** and **DN** for retracting and extending the landing gear. It is necessary to first pull out the landing gear switch handle prior to moving it up or down. The switch is fitted with a small wheel for easy identification and assisting in moving the switch in rough air.

The downlock information is given by three green **GEAR IND** lights located near the landing gear switch for each wheel separately. The red **GEAR WARN** light on the annunciator panel (see figure 7-2) indicates that the landing gear is not completely retracted or extended.

The entire electric control processes signals from limit switches indicating the completion of actions of the respective hydraulic circuits and from the landing gear switches. In emergency case pulling the **GEAR CTRL** circuit breaker can deactivate it.

The directional valves are spring-loaded and will automatically switch in the gear down position once electric power for the gear control logic is lost.

As long as the landing gear switch is in **DN** position the gear downlock indication will still be operative, however the prescribed re-closing of the upper main doors will not happen and the landing gear extension airspeed limitation needs to be applied accordingly.

To prevent extending of the landing gear during an intended wheels-up landing without battery and generator power, the directional valves are supplied with electrical power by an additional circuit, which is fed by the hot bus when airborne. So the landing gear is kept in the UP-position. On ground this circuit is cut off by the landing gear safety (squat) switch. The additional circuit is protected by the **GEAR-AUX-1** circuit breaker located on the left side panel and the **GEAR-AUX-2** circuit breaker located on the DC power distribution box in the engine compartment. The latter is not accessible for the pilot in flight.

Hydraulic pressure is maintained throughout the flight while the battery bus is powered. The system is equipped with a pressure sensor, which will switch the pump on once the pressure drops. In this case the hydraulic pump will automatically be switched on. A nitrogen pressure accumulator reduces the frequency of hydraulic pump action. The constant system pressure is needed to safely hold the landing gear and doors in place. Consider that landing gear will slowly extend when electrical and/or hydraulic power is not available. This case will be indicated by the red GEAR WARN warning light on the annunciator panel.

Illumination of the yellow HYDRAULIC PUMP caution light on the annunciator panel indicates the activity of the hydraulic pump. This light shall be used to monitor the pump cycles and shall normally illuminate during landing gear operation and for 2 or 3 seconds after periods of several minutes of rest.

If the cycle deviates from this (longer pump action or shorter periods of rest) the aircraft has to be brought to service as soon as practical, because a leak in the hydraulic system must be assumed. In the case the HYDRAULIC PUMP caution light illuminates more than 1 minute permanently, or periods of rest last only several seconds, the **HYDR** circuit breaker has to be pulled to prevent overheating of the pump motor.

In this case the landing gear will slowly extend which is indicated by illuminating of the red GEAR WARN light on the annunciator panel.

Airspeed has than to be reduced immediately to maximum 140 KIAS. Flight can be continued.

However, a significant higher fuel consumption due to landing gear drag and reduced cruise speed has to be considered.

Note **Refer to Section 3, Landing Gear Emergencies.**

A warning horn combined with the red **GEAR WARN** light on the annunciator panel is furnished to caution the pilot against a landing with landing gear retracted:
Firstly, the warning light and horn will be activated in case of the throttle is set below the power setting normally used for landing approach, flaps 0° or 15° and the landing gear is not fully extended and locked. If landing is not intended pressing the **GEAR WARN MUTE** button located at the left side of the power lever will switch off the horn and the warning light. Opening the throttle again will reset this warning system.
Secondly, when the power lever is set below the power setting normally used for landing approach and wing flaps are in landing position (30°) the warning light will illuminate and the warning horn will sound independently from the **GEAR WARN MUTE** button until landing gear has been completely extended and locked.
In flight the extension of the landing gear will cause a slight nose down moment and a decrease of airspeed. The stall speeds are not affected by landing gear operation.

7.11 Baggage Compartment

There is a baggage compartment in the aft cabin area behind the passenger seats in the 3rd row.
It is accessible by folding forward the backrest of one or both of the aft passenger seats. The respective release handle is located on the left side of the backrest.
The baggage compartment is primarily intended for low-density items such as luggage and briefcases up to a total weight of 90 kg (198 lbs).
When loading high-density objects, ensure that adequate protection is available to prevent damage to any of the aircraft's structure.
Luggage loaded to the baggage compartment has to be secured by the tie down belts, which are fastened to the structure of the compartment.

Important **Animals and/or people must not be put in the baggage compartment.**

Hazardous material should not be carried anywhere in the aircraft.

For loading instructions with respect to overall aircraft weight and balance, refer to section 6, weight and balance equipment list.

7.12 Seats, Seat Belts, and Shoulder Harnesses

The pilot's and copilot's seats are one piece, four-way adjustable seats incorporating energy absorber which reduce forces working on the occupants in case of crash. The seats may be moved forward, aft, up, and down. The adjustment is made by pulling a handle located at the right respective left forward underside of the seat to release the fixing mechanism. The horizontal adjustment range is 152 mm; 5 fixed positions are provided. The vertical adjustment range is 80 mm, 5 fixed positions are provided. Telescopic cylinders support the pilot during the vertical adjustment. The seat belts and the shoulder harnesses with inertia reels used for the pilot and copilot are attached to the seats. The seat belts provide a conventional adjustment. Shoulder harness adjustment is not necessary due to the inertia reels, which allow straps to extend and retract as required under normal movement. However the reels will lock in place in the event of a sudden deceleration. Except the right aft seat the passenger seats are one-piece seats as well but are placed on a fix position. The backrest of the aft right seat can be swiveled forward.

Important **Ensure backrest is locked by checking the down position of the release handle before using the seat.**

The seat belts provide a conventional adjustment however the locking mechanism is placed on the inner side of the seat providing a lock for the shoulder strap, which is equipped with inertia reels. The attachments of the seat belts and shoulder harness are integrated in the seat.

7.13 Doors, Windows and Exits

The entry door at the left side of the fuselage is a two-section, outward opening door. The upper part folds up, held in upper position by a gas spring, and the lower part folds down, limited by two cables and provides a step for easy in boarding and deplaning passengers.

Important **Ensure wing flaps are retracted before opening the door to avoid damage.**

In an emergency case the upper door can be opened even with wing flaps down. The upper door shall then be strongly pressed against the wing flap edge, which will bend and thus increasing the upper door opening angle. This allows deploying the lower part.
For opening the door from outside, pull handle out completely, turn handle clockwise and deploy upper door. Then rotate up the sill lever which is now assessable on the lower door, stand clear and deploy the lower door.
For opening the door from inside, press safety button, turn handle counterclockwise and deploy upper door. Then rotate up the sill lever which is now accessible on the lower door, stand clear and deploy the lower door.
For closing the doors reverse above given procedure.
When closing the door ensure outer handle is flush with outer fuselage surface, the inner handle is locked and all 8 inside inspection glasses show green color.

The aircraft has a two-piece windshield and 3 windows on each side. The middle window of the left side is incorporated in the upper part of the entry door.
The opposite window is foreseen as an emergency exit window.
For opening the emergency exit window from outside remove the clear plastic cover, turn the handle clockwise as marked and then push window inside and down. For opening the emergency exit window from inside swivel up the handle, turn the handle counterclockwise as marked and then pull window inside and down.

7.14 Engine

Note **If necessary and if more detailed information concerning engine operation, engine performance and engine maintenance are needed, refer to Engine Specification, Rolls-Royce 250-B17F Series Operation and Maintenance Manual.**

7.14.a General

The aircraft is equipped with a ROLLS-ROYCE turbo-propeller model 250-B17F/2 engine with a rated takeoff power (limited to 5 minutes) of 450 Shaft Horse Power (SHP) and a maximum continuous power of 380 SHP (ISA conditions at sea level).

The engine main components, see Figure 7-10, are divided into:

1. Compressor
2. Combustion Section
3. Turbine
4. Power and Accessory Gearbox
5. Propeller Reduction Gearbox

The engine is provided with the following major systems:

1. Starter-Generator
2. Power Control System
3. External Lubrication System
4. Auxiliary Alternator
5. Compressor Bleed Air System
6. Propeller Reversing System
7. Anti-Icing System

7.14.b Engine Operation

Intake air enters the engine through an annular casing and is then ducted toward compressor. The latter consists of four axial compressor stages and one single centrifugal stage assembly to form a whole assembly.
Compressed air is routed around the turbine section by means of two ducts on both sides of the engine into the combustion chamber on the rear end of the engine. There fuel is sprayed into the air by a single fuel nozzle.
The air-fuel mixture is first ignited by a spark igniter plug, then combustion continues as a result of air-fuel mixture flow. Gases resulting from combustion expand through a series of turbine stages.
The two-stage gas producer turbine drives the compressor and accessory gear train. The following two-stage power turbine furnishes the output power of the engine. The power turbine spool is independent from the gas generator spool ("free power turbine") and drives the propeller shaft through a reduction gearbox.
The expanded gas discharges in a downward direction through the twin ducts of the turbine. The subsequent exhaust ducts are directing the flow backward and discharge into the free stream on the lower sides of the cowling.
All engine driven accessories, except power turbine tachometer and propeller governor, are installed on accessory gearbox.

Note **The life of the engine is determined by care it receives. Efficient engine operation and maximum service life demands careful attention to cleanliness of air and used fuels and oil. In addition good maintenance and service executed by qualified maintenance personnel is demanded.**

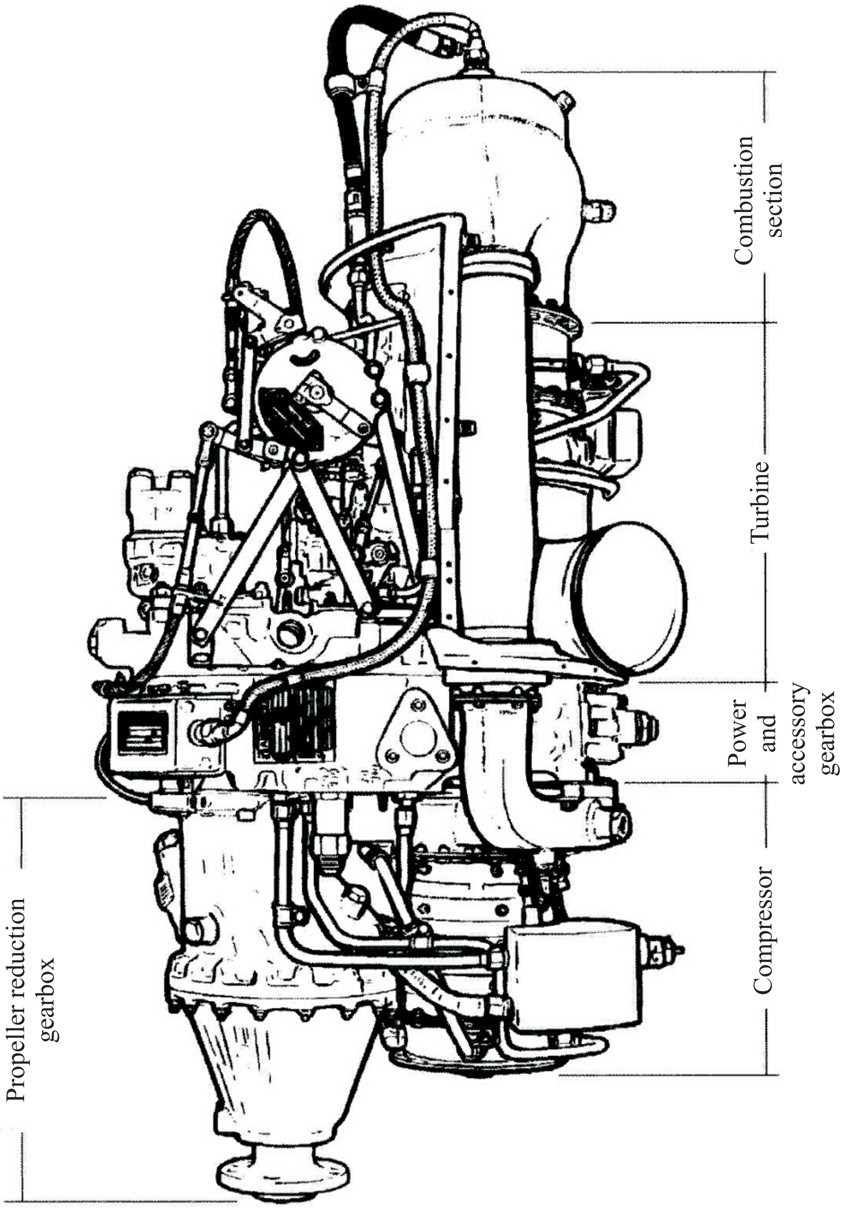


Figure 7-9
Engine Main Components

7.14.c Engine Controls

Engine controls are centrally located between the pilot's and copilot's seat on the center console (see Figure 7-10).

1 Power Lever

The Power Lever allows thrust modulation from takeoff to maximum reverse. The condition lever is mechanically connected via the coordinator to the propeller turbine governor assembly, the gas producer fuel control unit and the beta control valve. It influences therefore the fuel control as well as the propeller pitch control system of the engine.
In the range from **FLT IDLE** to **MAX POWER** propeller pitch is adjusted by the propeller governor to absorb the mechanical power produced by the engine. Advancing the power lever towards **MAX POWER** increases engine output by
increasing the fuel flow to the engine. As no automatic devices exist to avoid violations of the torque or TOT limits of the engine these have to be monitored when increasing engine power.
In the range from **GRD IDLE** to **MAX REVERSE** the propeller pitch angle is directly controlled by the power lever (hydraulically augmented by the Beta Control valve). The fuel control unit automatically adjusts fuel flow according to the power demand, which results from selected propeller pitch and taxi speed.
A mechanic lock avoids inadvertent positioning of the power lever below the **FLT IDLE** position. The lever has to be lifted before it can be retarded to **GRD IDLE**.

2 Condition Lever

The condition lever allows engine starting and shutdown, propeller feathering and fuel shutoff, and the capability to vary propeller governor setting to select propeller speed between 1900 and 2030 rpm in flight regimes.
The condition lever is mechanically connected via the coordinator to the propeller turbine governor assembly and the gas producer fuel control unit.
In the **FUEL OFF/FEATHER** position the fuel flow to the engine is shut off (engine shut down) and the propeller is feathered. Propeller feathering is accomplished by opening a pilot valve allowing oil to be dumped from the propeller operating piston

(zero servo pressure). This allows counterweight and spring forces to increase blade pitch until the feathering stop is reached and propeller rotation is stopped.
In the **FUEL ON** position the fuel flow to the engine is opened. In addition the pilot valve is closed giving propeller pitch control to the Propeller governor assembly for flight regimes respective to the beta valve for ground idle and reverse thrust range.
Advancing the condition lever further forward up to the **MAX PROP RPM** position continuously increases the prop-rpm from 1900 to 2030 rpm.
A mechanic lock avoids inadvertent engine shutdown in flight. The lever has to be lifted before it can be retarded below the **FUEL ON** position.

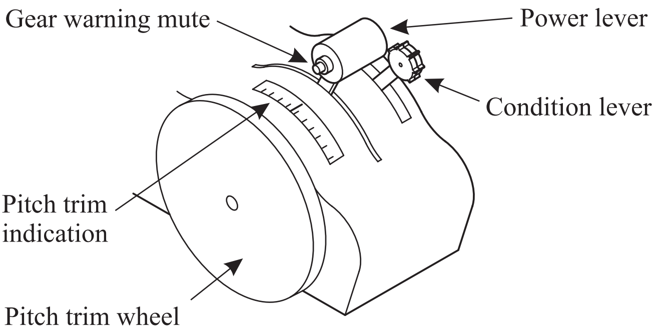
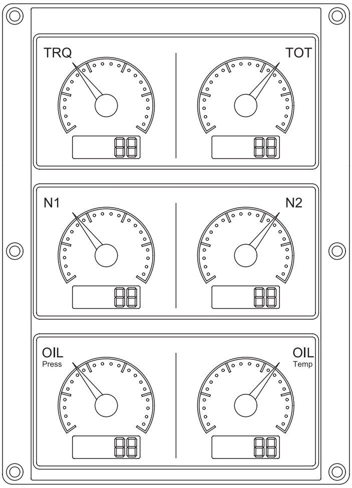


Figure 7-10
Engine Control Unit

7.14.d Engine Instruments

The following engine instruments, providing pilots with engine operating indications, are installed on the left side of instrument main panel in pilot's field of view (see Figure 7-11).

1 Torque indicator, which indicates engine torque in percent (%).
2 Propeller speed (power turbine N_2) indicator, which indicates propeller speed in revolutions per minute (rpm).
3 TOT indicator, which indicates turbine outlet temperature measured in degrees centigrade (°C).
4 Gas generator (gas producer N_1) indicator, indicates gas generator rotation speed expressed in percent (%).
5 Oil temperature indicator, which indicates engine oil temperature in degrees centigrade (°C).
6 Oil pressure indicator indicates engine oil pressure in pounds per square inch (psi).



Nomenclature from
upper left to lower right position:

1 Torque Indicator

2 TOT Indicator

3 N_1 Indicator

4 N_2 Indicator

5 Oil Pressure Indicator

6 Oil Temperature Indicator

Figure 7-11
Engine Instruments

7.14.e Gas Producer Turbine – Generator (N_1)

A gas producer turbine "tacho-generator" is attached on accessory gearbox. It supplies a variable frequency voltage which feeds gas producer speed indicator located on engine instrument panel.

7.14.f Power Turbine – Generator (N_2)

A power turbine "tacho-generator" is attached to the reduction gearbox. It supplies a variable frequency voltage, which feeds propeller speed indicator located on engine instrument panel.

7.14.g Torque Sensor

Prop shaft torque is measured by hydraulically balancing the Propeller reaction torque in the propeller reduction gear. The resulting "torque meter pressure" is proportional to the developed prop shaft torque and is converted into a voltage by means of a pressure transducer. The output voltage of this transducer is applied as an input to the torque indicator.

7.14.h Propeller Overspeed Governor

The propeller overspeed governor is installed in the reduction gearbox. It prevents a propeller overspeed in case of main propeller governor failure. Propeller overspeed governor is equipped with a test solenoid, which allows performing ground tests by momentary pushing the overspeed test button in the instrument panel activates this solenoid, which is temporarily lowering the overspeed warning threshold of the overspeed governor by influencing its internal force balance. This allows testing its function at Propeller-speeds above about 1600 rpm.

7.14.i Engine Lubrication

1 General
Engine lubrication system is a dry sump type with an external oil reservoir, a scavenge filter, heat exchanger and oil pump.

2 Heat Exchanger
The heat exchanger (oil-cooler) is airframe mounted and fixed via its duct outlet to the right side of the non-removable part of cowling. The air inlet of the oil cooler is a NACA submerged

duct type, which is an integrated part of the removable upper right band cowling.
The oil cooler has an internal by-pass, which is controlled by a thermostat, which is fitted direct to the oil cooler which features a separate port integral with its oil outlet connection for that purpose.
For a quicker warm up of engine and to prevent oil temperatures below recommended operation range at low ambient temperatures, the thermostat starts to close the internal by-pass of the cooler on rise at an oil temperature of 55 °C (131 °F). The internal by-pass is totally closed when oil temperature is above 78 °C (172 °F) so that all oil is leaded through the oil cooler core. In addition, the thermostat features a pressure control, which opens the by-pass in case differential pressure (core to by-pass) will rise above 25-40 psi at 78 °C (186 °F) oil temperature.

3 Oil Reservoir

The external oil reservoir (oil tank) is attached to the engine mount tubes, right hand of the engine close to the oil cooler. An oil access panel is incorporated to the removable part of the upper right hand cowling to give unrestricted access to the bayonet type oil tank filler cap, connected with a dip stick, which is marked with the word "OIL" and the permissible oil designation.
The full oil volume for the tank is 5.47 quarts (5.18 liter) and an add mark on the dipstick at 4.31 quarts (4.08 liter).
To reduce foaming on the oil at high altitudes that could result in slight oil pressure fluctuation and to fulfill requirement for minimum oil pressure above 93 % N 1 speeds, the external oil tank is slightly pressurized by means of check valves in the vent line. In addition, this check valve features an internal depressurization bleed hole in the internal poppet head for relieving the pressure after engine shutdown and is plumbed to an overboard line leading to the right hand exhaust stack in the event of a malfunction of the valve.

4 Scavenge Filter System

An external scavenge lube oil filter is installed between the engine scavenge oil outlet and the oil inlet of the oil cooler. It is attached to the bottom engine mount by a steel bracket.
The external oil filter is housed in a ventilated steel box. Ram air is guided from the oil cooler inlet to the oil filter housing and then downwards overboard.

An extended red by-pass indicator pin at the bottom of the filter unit shows flow through its internal by-pass. The indicator can be visually checked through a hole in the right hand removable lower part of the cowling.
The filter features an internal by-pass with a valve cracking pressure of 15 ± 1.5 psi.
The by-pass pressure drop is 20 psi. maximum at rated flow and 38 °C (100 °F). On rise to a differential pressure of 11.6 +/- 1.8 psi, the red by-pass indicator pin is inoperative at oil temperatures below 38 ° ± 4 °C (100 +/-15 °F).
The indicator pin can be put back manually on the ground by depressing while rotating it 360°.

5 Engine Oil Pump

A gas generator driven gear type pressure and scavenge pump assembly is mounted inside the power and accessory gearbox.

Note

The engine may be operated within the oil temperature range of –54 °C to +82 °C (-65 °F to +180 °F) using specified oils as listed in Section 2, Limitations of this POH.

Oil pressure is indicated at the oil pressure indicator and if pressure drops below 35 psi by illumination of a red OIL PRESS warning light on the annunciator panel.

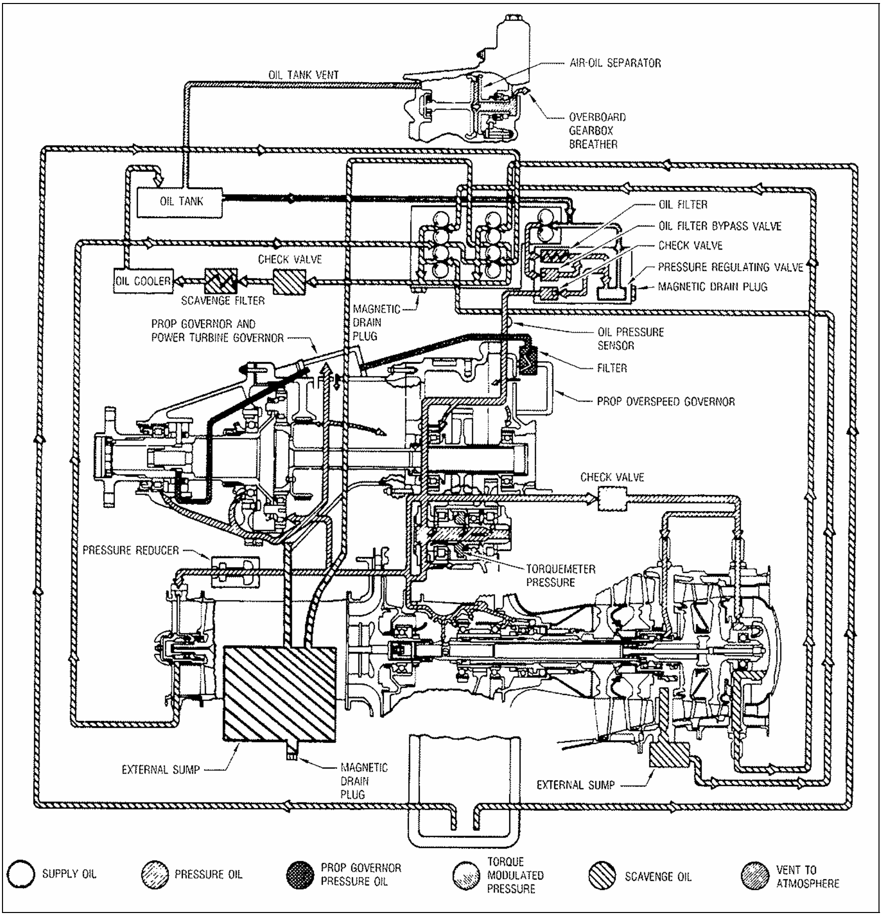


Figure 7-12
Engine Lubrication Schematic

7.14.j Chip Detection

Indicating magnetic chip detector plugs are installed in the engine oil filter housing assembly, the left front of the power and accessory gearbox and the bottom of the propeller reduction gearbox external oil sump. If chips and/or splinter are detected by the system, a yellow CHIP DETECTION advisory light illuminates on the annunciator panel, indicating, that special inspections are required as soon as practical.

7.14.k Engine Starting

1 General

The engine starting system consists of the engine starting panel (see Figure 7-13) with the **ENGINE START** switch with three positions, **START**, **IGN** and **IGN OFF** and on the left side the **ENGINE MOTORING** (cranking) switch with the positions **MOTORING**, **ABORT** and **NORMAL**.

Engine starting will be performed automatically by the generator control unit (GCU).

2 Engine Starting

The engine start up sequence will be initiated by momentarily switching the **ENGINE START** switch to **START** position and then back to **IGN**. The **ENGINE MOTORING** switch has to be in the **NORMAL** position. The GCU automatically activates the starter-generator, which drives the N1, gas producer generator. After reaching necessary N1 rpm, the condition lever must be set manually to **FUEL ON** position to continue the start up sequence. N1 rpm, TOT indication and oil pressure must be monitored continuously by the pilot during engine start up phase.

After reaching safe engine rpm, the GCU automatically switches off the starter-generator.

3 Description of Switches

ENGINE MOTORING

Set to **NORMAL** position allows the automatically GCU start sequence and remains in **NORMAL** position in aircraft normal operation.

Switching to **ABORT** position will interrupt the engine electric start sequence as well as engine ignition. Fuel has to be cut off using the condition lever.

In the **MOTORING** position, the starter-generator motors the N1 gas producer generator with de-activated ignition sequence. The **MOTORING** switch function can be used to clean the engine after unsuccessful start up (aborted start up) and/or to cool engine down before initiating a start up sequence. Also for compressor wash (maintenance) activities the **MOTORING** function can be used.

ENGINE START

The **ENGINE START** (ignition) switch is normally set to **IGN OFF** position if aircraft is on ground and engine shut down. During normal flight and under normal flight conditions, the ignition switch can also be set to **IGN OFF** position.

During start and landing and during critical flight conditions such as severe weather (e.g. heavy rain and others) the ignition switch should be set to **IGN**, which guarantees "continuous" ignition and minimizes possible engine flame out.

Generally during flight and under consideration of the above mentioned, the ignition switch should be set to **IGN OFF** position to minimize wear and tear of spark plug.

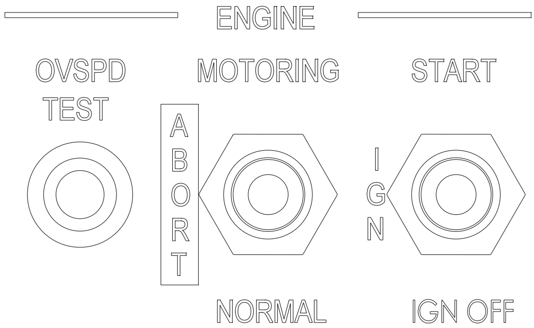


Figure 7-13
Engine Switches

Note **Engine starting can also be performed using external power from a ground power unit (GPU), described in Section 4 of this POH.**

7.14.l Engine Air Intake

Engine air intake is located at front lower section of the engine cowling. Two separate engine inlet heating devices, one for engine external and one for internal heating are installed. The external air inlet heating is heated with exhaust gas while the internal, which is the first stator ring of the engine compressor, is heated with bleed air. Both devices are activated simultaneously via a Bowden cable, located in the center console. The engine part is activated with a micro switch located in the right exhaust stack (activated by Bowden cable position). The micro switch also activates the green INTAKE HEAT advisory light on the annunciator panel.

7.14.m Engine Exhaust System

Exhaust gases are discharged by means of two downward-backward facing exhaust ducts on both sides of the engine cowling.

7.14.n Engine Fuel Pump

The engine driven fuel pump and filter assembly incorporates a single gear-type pumping element, a low-pressure barrier filter, a filter bypass valve and a bypass pressure regulating valve. Fuel enters the engine fuel system at the inlet port of the pump and passes through the low-pressure filter before entering the gear element. The filter bypass valve allows fuel to bypass the filter element if it becomes clogged.

7.14.o Engine Bleed Air System

Two compressor discharge bleed air connections are located after the centrifugal compressor stage of the engine from which air is taken for the bleed air system. The extraction of equal amount of bleed air from both ports is achieved by connecting both discharge lines by means of a common manifold. The bleed air system provides airflow to the cabin pressurization/heating system (primary system) and the pneumatic de-ice system (secondary system).

Important **To prevent a hot start, no bleed air is extracted from the engine during engine starting.**

Note **For further information concerning bleed air systems, refer to paragraph Heating, Ventilation, Defrosting & Air Conditioning and Cabin Pressurization in this section.**

7.15 Propeller

The aircraft is equipped with a 5-blade, constant speed, reversible, full feathering and governor-controlled propeller with a diameter of 2.10 m. The blades are of laminated wood composite construction with epoxy-fiber glass cover and metal tipping.

Regulation
For propeller pitch regulation various mechanisms are responsible depending on operation condition.

Normal Flight Operation (Power lever between **FLT IDLE** and **MAX POWER**):
In normal flight operation propeller pitch is controlled by the propeller governor. The propeller governor regulates the propeller speed to the speed the pilot has selected with the condition lever. The governor adjusts blade pitch angle so that the propeller absorbs the mechanic power provided by the engine at the selected rotational speed. A heavy spring in the propeller hub and the counterweights at the blade roots tend to rotate the blades towards coarse pitch up to the mechanic stop, which defines the feather blade angle. This force towards coarse pitch (and therefore lower rpm) is opposed by pressurized propeller servo oil provided by the propeller governor, which tends to adjust a lower blade pitch angle (and therefore higher rpm). The governor adjusts servo oil pressure to achieve the suitable pitch angle and therefore to maintain selected rotational speed. The lowest possible pitch setting is determined by the low pitch stop, which is held in the "lowest pitch for flight position" by the beta valve as long as the power lever is not in **GRD IDLE** position or below.

Normal Ground Operation (Power lever between **MAX REVERSE** and **GRD IDLE**):
In ground operation the propeller pitch is controlled manually (power lever) and the beta valve provides augmentation to achieve the necessary control forces. In this operation mode the propeller is held by servo oil pressure against its low pitch stop. The low pitch stop is adjusted by the beta valve according to the input the pilot gives with the position of the power lever. As a result the propeller pitch is adjusted according to the pilots command input with the power lever position.

Special operation conditions:
All blade pitch angles except for the feather position require servo oil pressure mainly to overcome the force provided by the spring in the propeller hub. Therefore all operation conditions leading to a loss of servo oil pressure will result in the propeller to into the feather pitch angle position. This occurs in normal operation in case of engine shutdown. Engine or system failures leading to a loss of servo oil pressures also result in the prop to go into the feather position resulting in minimized drag and improved glide performance of the airplane in these emergency conditions.
In case the prop governor should fail to maintain propeller speed below operational limits (system failures) the additional overspeed governor dumps servo oil pressure at 2210 rpm (109%) and in addition reduces fuel supply to minimum flow at 2290 rpm (113%) to avoid an excessive overspeed condition.

For operation in icing conditions, the propeller incorporates an electrothermal de-icing device.
The system is controlled by the **PROP** switch, located on the **DEICE** panel. Continuous heat provided by the de-ice pads reduces the adhesion between the ice and the propeller so that centrifugal force and the blast of the airstream cause the ice to be thrown off the propeller blades in small pieces.

Important **Do not operate the propeller heat longer than ten (10) seconds when engine is not running. The elements can overheat and damage to the structure can occur.**

7.16 Fuel

(Refer to Figure 7-14) The aircraft fuel system is a gravity assisted pump fed system where two equal fuel boost pumps deliver fuel from the collector compartment of the wing tanks to the engine with proper flow and pressure.
If one of the boost pumps is operational, the other serves as an inactive backup.

Note **For fuel capacities and fuel grades refer to relevant Sections 1 and 2 of this POH.**

7.16.a Wing Tanks

The fuel tank consists of a left hand and right hand integral wing tank between front and rear spar, which extends from the root rib at station 550 to the rib at station 4300. The wing tanks are subdivided in three compartments each: the collector, main and auxiliary compartment. Both main compartments incorporate a slosh rib at station 1550.
Fuel is supplied to the engine from the collector compartments located near the root ribs of each wing between stations 550 and 800.
Each wing tank has two – one for the main and one for the auxiliary compartment – flush lightning protected filler caps for gravity refueling. The fuel pick up ports for engine supply are located in the collector compartments. Below the pick up points drainable sumps are located inside the wing-fuselage fairing as a trap for water to prevent it to contaminate fuel supply to the engine.

7.16.b Fuel Transfer System

The wing tanks are equipped with a fuel transfer system each. This system continuously pumps fuel from the auxiliary compartment to the main compartment and from there to the collector compartment. This ensures that the collector compartments (fuel supply to the engine) are permanently filled with fuel as long as fuel is available in the respective wing tank. Each fuel transfer system runs by means of an "motive flow" electric fuel pump feeding three jet pumps, two of them located inboard and outboard in the main compartment, and one in the auxiliary compartment of the respective wing side. The motive flow pump takes fuel from the collector compartment to generate a high pressure/low mass flow to the jet pumps, which suck fuel from their compartment and discharge a low pressure/high mass flow into the main respective collector compartment.

Motive pressure being below the minimum operation pressure is detected by pressure switches (one for each transfer system) and indicated by illumination of a yellow **FUEL TRANS LEFT** or **FUEL TRANS RIGHT** caution light on the annunciator panel. This indicates the system is inoperative or operating below its design performance.

The following may cause this:

- System has not been activated.
- Fuel supply to the motive flow pump failed or interrupted (fuel level in collector compartment below approx. ¼).
- System failure (clogged filter or line, component or line failure, electrical failure)

The **FUEL TRANSFER** switches activate the fuel transfer system. After activation the corresponding caution lights have to be monitored. The lights have to extinguish within 10 sec. In case the caution light does not extinguish or the **FUEL TRANS** light comes on during operation of the system the system has to be switched off. It may be attempted to reactivate the system after checking fuel quantity in the corresponding collector compartment and the corresponding **FUEL-TR** circuit breaker. In case reactivation fails the system has to be switched off. Continuous dry run of the motive flow pump has to be avoided

as this may cause excessive wear and overheat of the motive flow pump.
In case the transfer system of one wing is inactive the fuel flow from the wing tank towards its collector compartment is maintained by means of gravity (flapper valves), but the fuel level in the collector compartment will not be higher than in the wing tank itself. The unusable fuel quantity of the wing tanks (incl. their collector compartment) will increase from 14 to 32l with inoperative transfer system. For the fuel in the auxiliary compartment no gravity feed to the main compartment exits. Therefore fuel in the auxiliary compartment cannot be used for engine supply with the corresponding transfer system being inoperative.

7.16.c Fuel Selector Valve

Fuel runs from the wing tanks through fuel lines passing check valves and meeting in the fuel selector valve, which is located under the cockpit floor. It is direct mechanically linked to the **FUEL SELECTOR VALVE** handle between the pilot's and copilot's seats. The following handle positions are possible:
LEFT, **BOTH**, **RIGHT** and **OFF**.
During normal cruise flight changes between **LEFT**, **BOTH** and **RIGHT** position of selector valve in intervals can be made.

Important **A fuel unbalance of more than 106 liters (28 U.S. Gallons) must be avoided.**

The **OFF** position is selected, when the aircraft is parked or in several emergency situations as described in Section 3.

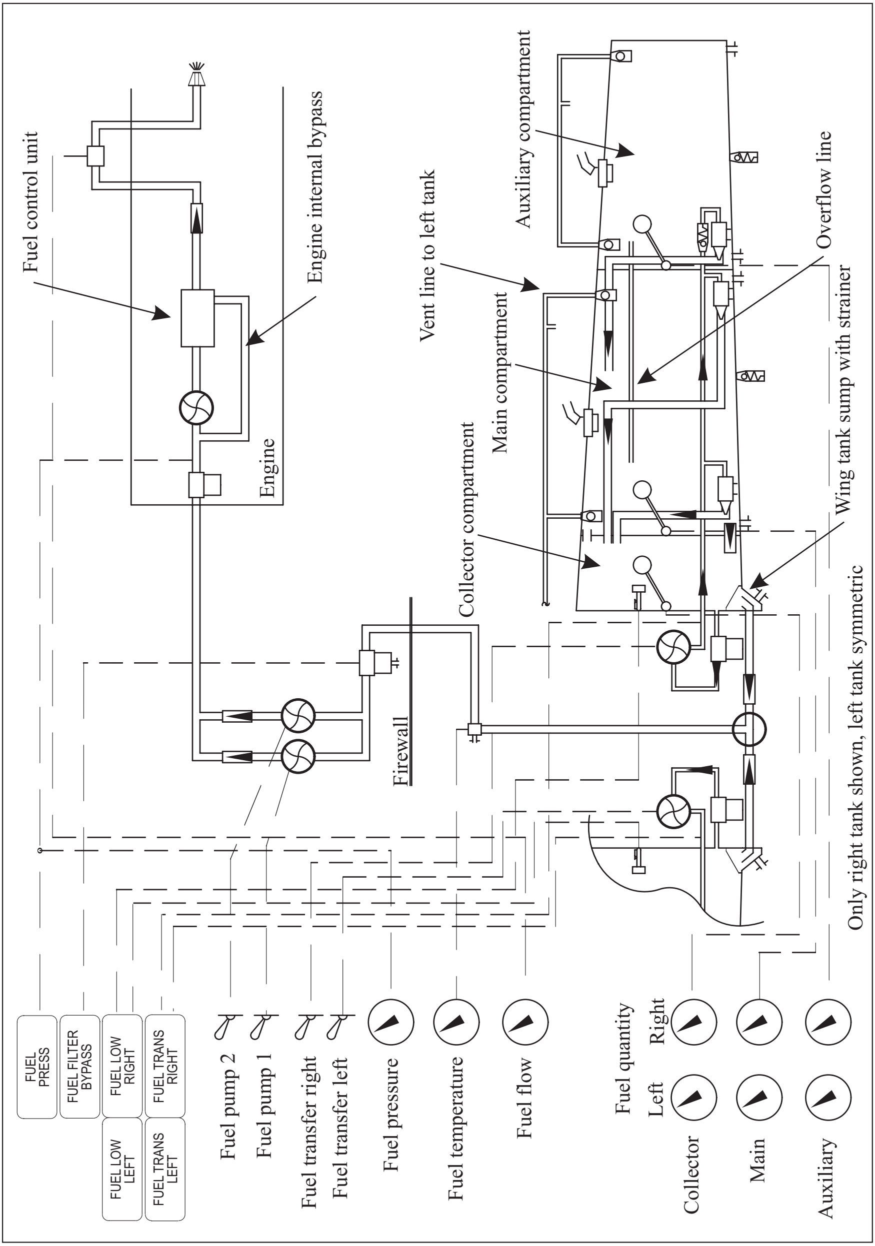


Figure 7-14
Fuel System Schematic (Sheet 1 of 2)

Legend:

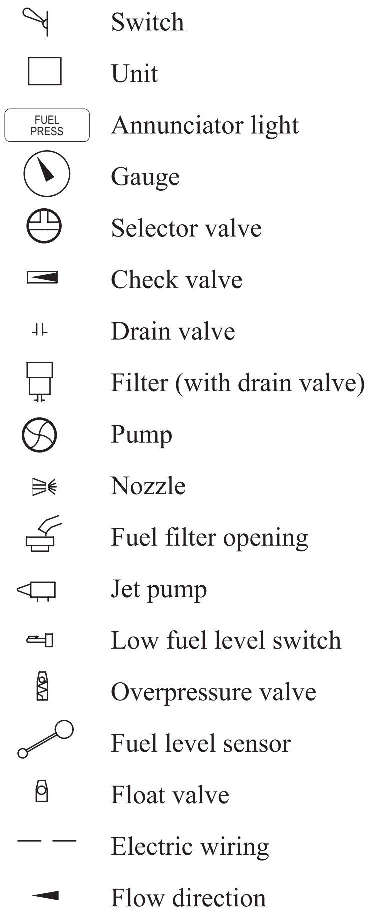


Figure 7-14
Fuel System Schematic (Sheet 2 of 2)

7.16.d Fuel Vent System

The vent system incorporates two float type check valves for each main and auxiliary compartment, which close the vent line when the float is pushed upward by the fuel level. A vent line interconnects the left and right main compartments. To prevent overpressure due to thermal expansion, pressure relief valves are installed in the left and right main and auxiliary compartments.

7.16.e Fuel Drain Valves

The fuel system has in total twelve (12) fuel drains. Five drains per wing side, one (1) at the selector valve (gascolator position) and one (1) at the fuel filter just in front of the nose gear bottom of the aircraft.
The drains provide a device for removing moisture and sediment from the fuel system.

Important **For further drain procedures refer to Section 4 and Section 8 of this POH.**

7.16.f Electrical Fuel Pumps

Two electrical fuel boost pumps are present to ensure correct fuel pressure levels at the engine fuel connection and for vapor suppression. The pumps are installed in the engine compartment, between the fuel filter and the engine. They are in a parallel set up for redundancy reasons. Behind each pump a check valve assures no fuel will return through an eventual inoperative pump. The **FUEL PUMP 1** and **2** switches activate the related fuel pumps.
Normally, one pump is operating to provide sufficient pressure at the inlet of the engine driven fuel pump. The second electrical fuel pump is considered as a back up system. It is advisable to change the mainly active pump from flight to flight to avoid excessive wear of one fuel pump. During takeoff, approach and landing, both electrical fuel pumps must be switched on.

7.16.g Fuel Quantity Indicating System

The fuel quantity is measured by means of a float sensor system. Six sensors, three on each side of the wing are installed at the wing root rib (collector compartment) and on the access covers of the main and auxiliary compartments. Behind every sensor stands an analog indicator, directly connected. In addition, there are two yellow FUEL LOW LEFT and FUEL LOW RIGHT caution lights located on the annunciator panel, which will illuminate when the pilot has at least 5 minutes of fuel on the appropriate tank. In case only one FUEL LOW light illuminates the pilot has to switch to the other tank.

Note **When the collector compartment indication shows zero in level flight, the remaining 14 l (3.7 U.S. Gallons) unusable fuel in this compartment cannot be used safely in flight.**

7.16.h Fuel Flow Transducer

In addition, a fuel flow transducer is installed upstream of the fuel inlet of the engine. The relevant indicator is installed on the instrument panel. It is fully independent of the fuel tank quantity display.

Note **For fuel calculations concerning fuel flow, fuel quantity and flight endurance, the SHADIN MINIFLO-L computer system can be applied. For further information refer to Supplement 905 of this POH.**

7.16.i Fuel Pressure/Temperature

Fuel pressure and temperature are displayed by two indicators located at the instrument panel. The fuel pressure is measured directly before the engine driven fuel pump and downstream of the engine fuel filter.
The fuel temperature is measured in the fuel feed line, before entering the engine compartment. Thus to make sure, that the temperature measured is always on the low side.

7.16.j Fuel Pressure Accumulator

To prevent a fuel overpressure after engine shut-down in warm ambient conditions, a fuel pressure accumulator has been installed.

7.17 Brake System

The aircraft is provided with an independent hydraulically actuated brake system for each main wheel. A toe actuated hydraulic master cylinder is attached to each rudder pedal. Hydraulic lines and hoses are routed from each master cylinder to the wheel cylinder on each brake assembly. The brakes can be actuated from either pilot's or copilot's seat. The parking valve system consists of a manually operated control assembly located on the center console and connected to the parking brake valve. Applying pressure to the brake system by pressing the toe pedals and pulling the **PARKING BRAKE** control sets the parking brake. Pushing the **PARKING BRAKE** control forward releases the brakes. For long term parking wheel chocks and tie downs should be used.

Important **It is not advisable to set the parking brake when brakes are overheated, after heavy braking or when outside temperatures are unusually high. Trapped hydraulic fluid may expand with heat and damage the system.**

7.18 Electrical System

The electrical system is a 28 VDC system with negative ground. The primary DC power source is an engine driven 28 V / 200 A starter-generator. It is backed up by an engine driven 26 V/20 A standby alternator. In addition a lead acid battery (24 V/28 Ah) is installed in the engine compartment. Normal battery power is sufficient to start engine or for ground check operation.
An external 28 V DC power receptacle and its circuit breaker are installed in a hatch right hand at fixed portion of the cowling.
A battery charge adapter is installed at the external power receptacle. The battery may be charged with 29.0 V and 5 A.
The main control switches of the electrical power system are located on the **MAIN** section of the left side panel and are marked **EXT PWR**, **BATT**, **STBY ALT**, **GEN** and **GEN TEST**.
Electrical power from the various power sources is supplied to the "Electrical Heart" installed on the engine side of the firewall. From there power is distributed partly through individual fuses to the following buses:

- Hot Bus,
- Emergency Bus,
- Battery Bus,
- Load Bus,
- Avionics Bus.

For further information refer to Figure 7-15, Electrical System Schematic.

7.18.a Starter-Generator

A starter-generator is mounted on the accessory gearbox of the engine. It is a direct driven starter during engine start and a DC generator driven by the engine during engine operation. Its rated capacity is 200 A maximum for continuous operation. The starter-generator is regulated by the GCU (Generator Control Unit) to provide an output voltage of 28.5 V DC. The GCU is controlled by the **GEN** and **GEN TEST** switches located on the **MAIN** section of the left side panel. Following engine start, the generator delivers electrical power when the **GEN** switch is switched to **ON** position.
In case the generator is not switched on or has failed the red **GENERATOR FAIL** warning light on the annunciator panel illuminates. The generator test switch (**GEN TEST**, left side panel) enables the pilot to test the overvoltage protection function of the GCU (switch position: **OV-TEST**). The **TRIP** position of this switch gives the possibility to "trip" the generator by momentarily interrupting its excitation. Both test functions lead to disengagement of the generator from the aircraft bus system. The momentary **RESET** position of the **GEN** switch enables the pilot to energize the generator field in case problems have occurred trying to connect the generator to the aircraft bus system (switching the generator **ON**). Resetting the generator is recommended in that case before trying to switch the generator on again.

7.18.b Standby Alternator

In case of a starter-generator failure a gear driven standby alternator provides an additional power source in excess to the aircraft battery. The standby alternator is controlled by the **STDBY ALT** switch in the **MAIN** section of the left side panel. Switching it to the **ON** position will command the alternator regulating unit to regulate an alternator output voltage of 26 VDC. Therefore as long as bus voltage is higher caused by an active generator the alternator load will be zero. As soon as bus voltage tends to drop below the regulation voltage of the standby alternator the alternator feeds to the bus system. Max. rated current is 20 A which is available with N1 being at approx

92 %. At 78 % N1 about 10 A are available. Below 70 % N1 the standby alternator isn't able to provide a relevant current.

Note **During flight the standby alternator switch must be ON to be on standby.**

Operation of the standby alternator is indicated by a yellow STANDBY ALTERN ON caution light on the annunciator panel. Continuous illumination of this light signals operation below the 20 A output limitation.

Important **If the yellow STANDBY ALTERN ON light on annunciator panel starts blinking, the load on the alternator exceeds its rated capacity and the pilot must reduce consumption of electrical consumers within 5 minutes to 20 A or less.**

7.18.c Battery

The 24 V DC/28 Ah valve regulated lead acid battery is located in the engine compartment, mounted to the pressure bulkhead and protected by a vented aluminum case. Normally the battery is connected to the battery bus.
The battery supplies power to the electrical system when **BATT** switch is switched to **ON** position.
In case of combined generator and alternator failure the battery is able to supply the essential loads for at least 30 min when following the emergency procedures given in section 3 of the POH.

7.18.d External Power

An external power receptacle is installed under an access door on the right side of the engine compartment. The use of external power is recommended for engine starting in case aircraft battery is weak, for ground operation of the vapor cycle air condition system or for any prolonged ground operation of aircraft systems. An external power source being connected with the external power receptacle and switched on will be indicated by a green EXTERNAL POWER annunciation light in the annunciator panel. To enable the external power source to supply power to the aircraft the **EXT PWR** switch on the **MAIN** section of the left side panel has to be switched on.

Important **Do not connect ground power units with a capacity greater than 1200 A for engine start.**

Note **It is not possible to connect the starter-generator and an external (ground-) power source simultaneously to the aircraft bus system. This is to avoid any uncontrolled currents between these units.**

7.18.e Indication

The digital indicator cluster installed in the left side of the main panel indicates three electric system parameters:

1. **VDC** (bus voltage):
During normal operation (generator active) a voltage of approx 28 V should be indicated. With standby alternator the indication should be about 26 V. Battery nominal voltage is 24 V.

2. **GEN AMPS** (Generator Load):
Generator load is indicated on this indicator as long as the generator is active (GENERATOR FAIL warning light off). Generator Load should be kept below 200 A. In case the generator is offline this indicator automatically displays the standby alternator load. The standby alternator load has to stay below 20 A (see also 7.18.b).

3. **BAT AMPS**:
The battery amp indicator shows load or charging current on the battery. A positive indication means battery is being charged, a negative indication means battery is discharged (load on battery).

4. Low Voltage Warning:
A yellow LO VOLTAGE caution light in the annunciator panel illuminates as soon as bus voltage drops below 25.5 V.

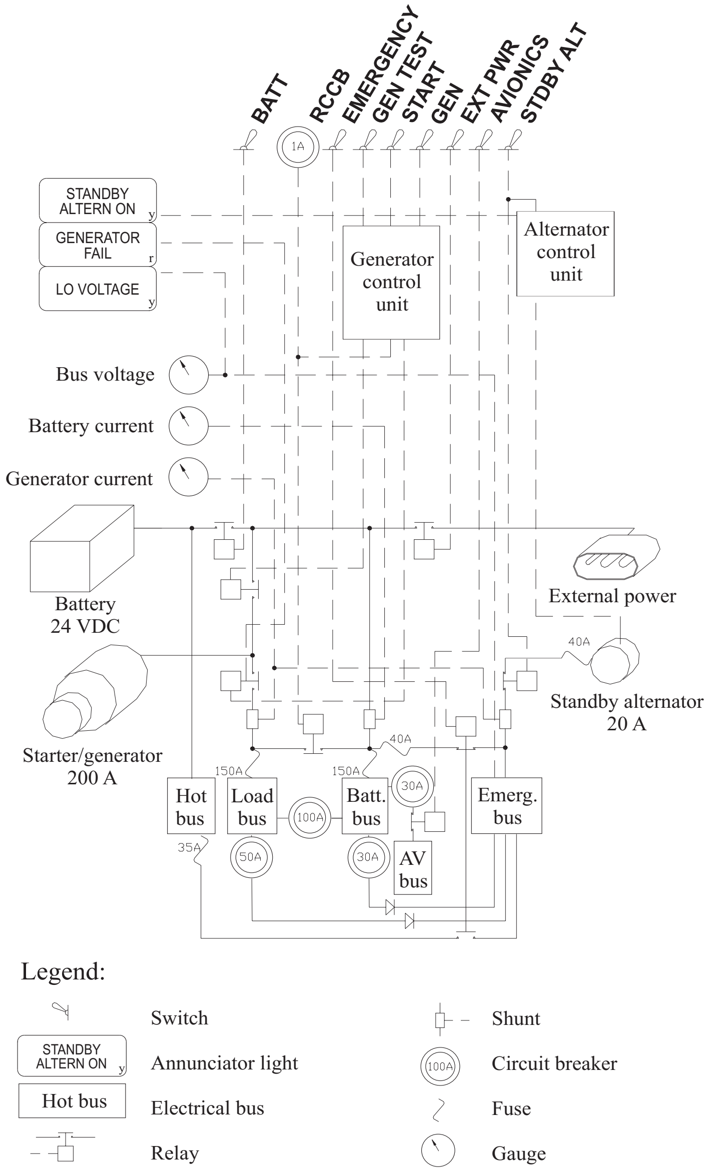


Figure 7-15
Electrical System Schematic

7.19 Lighting System

The aircraft lighting system comprises several internal and external lights. They are controlled by switches located in the **LIGHTS** group of the left side panel (see Figure 7-5). The instrument lighting may be dimmed for several functional groups individually by means of the **DIMMING** panel (see Figure 7-4) with the **NIGHT/DAY** switch in **NIGHT** position. All instrument, warning and annunciator lights may be tested using the **TEST** position of the **NIGHT/DAY** switch.

7.19.a External Lights

The aircraft is equipped with the following exterior lights, all controlled by switches on the **LIGHTS** section of the left side panel:

Navigation Lights are installed on left and right wing tip and tip of the vertical fin. The Navigation Lights are controlled by the **NAV** switch.

White **Strobe Lights** are located on the left and right wing tips and tip of the vertical stabilizer. They are controlled by the **STROBE** switch.

One **Landing Light** is installed in the lower right hand cowling illuminating the area in front of the aircraft for taxiing, takeoff and landing. The landing light is controlled by the **LDG** switch. Operation of landing lights is indicated in the R/H annunciator panel by the green **LANDING LIGHT** annunciation light

Two **Recognition Lights** are installed half of wingspan in the leading edge section of each wing. They are controlled by the **RECO** switch. Operation of recognition lights is indicated in the R/H annunciator panel by the green **RECOGN LIGHT** annunciation light

An **Ice Inspection Light** is installed in the left side of the cowling illuminating a black ice detection area on the wings leading edge deicer boots. The ice light is controlled by the **ICE** switch.

7.19.b Internal Lighting

For internal lightning, the aircraft is equipped with the following lights:

Dome & Map lights:
Cockpit illumination is provided by the dome and map lights installed in the cockpit ceiling. The map lights are controlled by the **MAP** switch in the left side panel. The map lights are providing a spot light for reading. In addition to the map lights, two dome lights may be switched on additionally, by two individual switches in the ceiling besides the respective light.

Glare lights
The Glare lights are installed in the lower side of the glare shield. They provide an indirect illumination for the panel and controls. They are controlled by the **GLARE** switch in the left side panel, and may be dimmed in night mode by means of the GLARE rheostat.

Cabin Lights
Four overhead lights in cabin ceiling above the passenger seats provide light for reading in the passenger compartment. In addition, indirect cabin lighting is provided. The cabin lights are being activated by the **CABIN** switch on the left side panel. With the cabin lights activated each light can be switched on or off with switch situated at each light. No dimming is provided for the cabin lights.

Instrument /Switch Lights
All instrument and control switch markings are individually lighted for night operation. The instrument/switch lights are controlled by means of the **INSTR** switch in the left side panel. The instrument lights may be dimmed in night operation mode by means of the INSTR and SWITCH rheostat respectively.

DAY/NIGHT operation mode selection
Day or night operation mode may be selected by the switch **NIGHT/DAY** in the left side panel. In **DAY** mode all dimming is deactivated and therefore all cockpit lights are operating with full brightness for sunlight readability. In **NIGHT** mode the brightness of cockpit lights may be adjusted to a suitable level with the **DIMMING** rheostats located on the instrument panel.

Note **Except the cabin, map and dome lighting all other lights can be dimmed, separated into independent circuits as labeled.**

Light Test

All above-mentioned lights are activated by corresponding switches (see Figure 7-5). However, for test purposes, all warning, caution and annunciation lights can be tested (illumination) by switching the **NIGHT/DAY** switch momentarily to the **TEST** position. That test function also activates all aural warnings.

7.20 Environmental (Bleed Air) Control System

Note **For system overview refer to Figure 7-17**

7.20.a General

Engine bleed air is used for cabin pressurization. A small portion of the compressed air exiting the engine compressor is extracted from the engine by means of two bleed ports. These ports incorporate orifices to limit bleed air (and therefore power) loss in case of rupture or severe leakage of the airplane's bleed air ducting. The main portion of the extracted bleed air is used for cabin pressurization.
A shut off valve enables the pilot to shut off cabin bleed air. This valve is operated by the switch **ENV AIR** located on the left side panel (see Figure 7-16).
Environmental (cabin) bleed air should be switched off before engine shut down to configure the aircraft for the next engine start with bleed air shut off.
Environmental bleed air should also be shut off in some emergency conditions as:

- contaminated air entering cabin,
- imminent cabin overpressure, or
- in case other measures failed to terminate a **BLEED OVERTEMP** warning, indicated on the annunciator panel.

In case **ENV AIR** is switched off, ram air, taken from the oil cooler air inlet is directed to the cabin. Max. ram air flow will be achieved with the **PRESS** switch on the **CABIN** section (see Figure 7-16) set to the **DUMP** position.

Note **Pressurized flight is not possible with the ENV AIR switch in OFF position.**

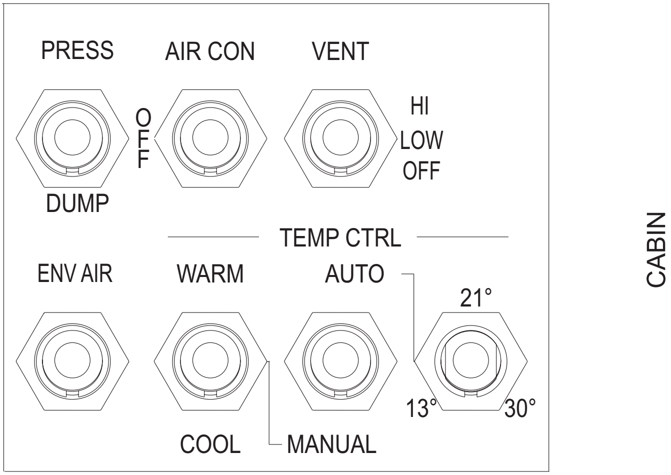


Figure 7-16
Environmental Control Switches, Part of Left Side Panel

7.20.b Temperature control

Environmental bleed air is used for cabin heating purposes. The bleed air, exiting the engine is too hot to be used for cabin heating without prior cooling. The amount of cooling required is dependent on ambient temperature, airspeed, engine power setting, desired cabin temperature and adequate changes if these parameters change.

Cooling effectiveness is controlled by routing the environmental bleed air through the cabin cooler or directly (bypass) to the cabin by means of the temperature modulating valve. Operating mode of this valve is selected by the controls grouped in the **CABIN** section of the left side panel. With the **TEMP CTRL** switch being set to the **AUTO** position a computerized cabin temperature controller compares the actual cabin temperature (measured by a sensor in the cockpit ceiling) to the selected temperature. Selection is being done by means of the cabin temperature rheostat also located in the left side panel **CABIN** section (see Figure 7-16). Adjustment range is between 13 °C and 30 °C (55 °F to 86 °F). Depending on the difference between actual cabin temperature and selected cabin temperature the controller determines a desirable cabin inflow temperature for the environmental bleed air. The actual inflow temperature is measured by a sensor located within the bleed ducting prior to cabin entry through the front pressure bulkhead. The temperature controller compares this actual inflow temperature to the desired inflow temperature and adjusts the temperature modulating valve to match this desired inflow temperature.

It is within the nature of this design (bleed air cooling by means of an air to air heat exchanger) that cabin bleed air may not be cooled below ambient temperature before entering the cabin. Therefore a vapor cycle air conditioning system (refer to paragraph 7.22) provides additional cooling capacity for hot ambient conditions.

The automatic temperature control limits cabin inflow temperatures to values below 72 °C. An additional independent thermal switch installed in the cabin bleed duct activates the red **BLEED OVERTEMP** warning light located on the annunciator panel in case the cabin inflow temperature exceeds 85 °C. In case, the **BLEED OVERTEMP** warning light on the annunciator panel illuminates, indicating a temperature controller failure, the temperature can be manually controlled by switching the **TEMP CTRL** switch, to the **MANUAL** position (see Figure 7-16).

Selected and held in **COOL** or **WARM** position activates the temperature modulating valve manually (overrides the controller) causing warm up or cool down of incoming bleed air.

Important **Avoid unnecessary operation of the environmental bleed control in manual mode to avoid risk of bleed air overtemperature condition. A sustained bleed air over-temperature condition may cause structural overheat including structural damage or even risk of fire.**

7.20.c Mass Flow Control

Environmental bleed air to the cabin is mass flow controlled. A computerized mass flow controller governs the mass flow valve in the engine compartment. Mass flow control input data comes from the mass flow sensor installed in the environmental bleed duct (actual mass flow) and controlled to 4lbs/min.

Note **A combination of high altitude and low engine power setting may produce a PNEUMATIC LOW annunciation. In that case, the engine power setting must be increased.**

7.20.d Cabin Air Distribution

Air, entering the cabin through the cabin inflow check valve in the front pressure bulkhead can be directed to the windshield dispensers for defogging, to the cockpit legroom dispenser or both in any portion. The respective push-pull control is located in the centre console (see Figure 7-7). Pulling the control knob directs the air to the windshield.

7.21 Cabin Pressurization Control System

The aircraft is standard equipped with a pressure cabin, allowing operation up to altitudes of 25,000 feet. The max. operational pressure difference of the cabin is 5.5 psid (380 hPa). This pressure differential results in a cabin altitude of 7,950feet at the max. operating altitude (FL 250).

The cabin pressurization system consists of two independent systems:

- The environmental bleed air system (inflow)
- The cabin pressurization control system (outflow)

7.21.a Pressurization System Description

Cabin pressure is regulated by controlling the airflow leaving the cabin through the cabin control outflow valve installed in the rear pressure dome.

The pressure regulation system consists of a cabin control outflow valve, an unregulated safety valve, the cabin pressurization and dump (**PRESS**) switch (see Figure 7-5), the cabin pressure controller (see Figure 7-19), the landing gear squat switch, two indicators, one for cabin altitude and differential pressure and one for cabin rate-of-climb, and pressure switches which activate the red CABIN PRESSURE warning light on annunciator panel if differential pressure is above 5.65 psi or cabin altitude above 10,000 ft.

The cabin pressure control system is energized when the cabin **PRESS** switch is in the **ON** position. In normal operation the pressure controller (installed in the centre console) will govern the cabin outflow so as to achieve a cabin altitude 700 ft above the selected (on pressure controller dial) airport altitude. In case changes in the selected cabin altitude are made by turning the dial, the controller will not immediately change the cabin outflow valve setting for the new cabin altitude selected but will change this continuously until the new setting is reached to avoid sudden cabin pressure changes. The rate of change towards the new setting is adjusted with the rate control knob of the cabin pressure controller. In the 12 o'clock position approximately 500 ft/min cabin change rate are achieved. Turning the knob clockwise results in higher rates of changes, turning it counter clockwise results in lower rates of change.
In case the system is not energized (**PRESS** switch **OFF**) the outflow valve remains in the setting (selected cabin altitude) it actually has.

The cabin outflow valve as well as the safety valve have an additional mechanical setting for cabin pressure relief not dependent on electric energy or function of the cabin pressure controller. The pressure relief setting of the cabin outflow valve is 5.6 psi, the safety valve opens at 5.7 psi.

The safety valve also provides the dump function. When actuating the **DUMP** switch the safety valve is electrically actuated to open and allows rapid decompression of the cabin e.g. in an emergency. The dump function is also activated by the landing gear squat switch. This avoids inadvertent pressurization of the plane in ground operation.

Note **Landing with cabin differential pressure is prohibited**

7.21.b Pressurization System Operation

Use the cabin pressure controller (Figure 7-19) as follows and refer to Figure 7-18 sample chart:

1 Activate the pressurization controller by switching the **PRESS** switch **ON**.

2 Set the published official airport altitude (such as shown on flight charts) under the index arrow by turning the center control knob.

3 Turn the index arrow of the rate control knob (lower left corner of the control) to the 12 o'clock position (approx. 500 fpm).
These steps set the system to pressurize at approximately 700 feet above the runway after takeoff. The system will hold this cabin altitude until the maximum differential altitude is reached (see "Cabin Altitude with minimum Flight Level Setting" line of Figure 7-18) or a different cabin pressure is selected.

4 After having cleared the airport area and established the climb and being on course to the destination (see "a" on Figure 7-18), select the flight level corresponding to the intended cruise altitude in the center dial and align that with the index arrow. This alignment also indicates the approximate cabin altitude (within approx. 700 feet) at the index on the larger numbers marked "Airport Alt.".

5 Increase or decrease the rate at which the cabin changes altitude for the best comfort level from normal 500 fpm by turning the rate knob counter clockwise for decrease or clockwise for increase the rate.
It is usually the best to set the rate to reach the changed cabin pressure (referenced from the Airport Alt.) slightly ahead of reaching the cruising altitude (550 fpm in the sample of Figure 7-18). This selected altitude will be maintained until the aircraft changes altitude sufficiently to reach the max. differential pressure or descends sufficiently to go below the selected airport altitude / cabin pressure.

6 When the aircraft reaches the proximity of the destination and starts to descend (see "b" on Figure 7-18), set the selector knob to the published airport altitude.

7 Set the rate such that the selected airport altitude is reached in the cabin prior to descending to that altitude (650 fpm in the sample of Figure 7-18).
When approaching the runway, the pressurization will cease approximately 700 feet above the landing field prior to landing. Should any slight pressure remain, the remainder will dump when the squat switch makes contact. However, this is an additionally safety device, because landing with cabin pressurized is not allowed.

If pressurization mode shall be finished during flight, follow the procedure above, setting the airport altitude equal to the momentary flight altitude. Do not switch the **PRESS** switch to **OFF** before cabin altitude reaches the selected airport altitude.

7.22 Cabin Air Recirculation System (incl. Air-conditioning)

For the cabin air a recirculation system exists to provide air movement for improved cabin ventilation.

The recirculation flow is achieved by several electrical blowers:

One panel ventilation fan is installed on each panel side (pilot and copilot) for cockpit ventilation. They may be activated individually by switches located besides their air outlets in the instrument panel.

The main recirculation flow is provided by the two (cabin-) evaporator blowers. They both blow air into the forward part of the cabin. They may be operated without activation of the vapor cycle air-condition system for ventilation purposes and may be activated in two selectable stages (**LOW, HI**) by means of the **VENT** switch.

7.22.a Air Condition System

The aircraft is standard equipped with an electrically driven vapor cycle air conditioning system as part of the cabin air recirculation system. The electrically driven compressor condenser module is installed in the unpressurized part of the tail cone aft of the rear pressure dome. Cooling air for the condenser (circulated by the condenser fan) is taken from an inlet in the left fuselage side aft of the cabin door and dumped overboard through an outlet on the same side.
The electric air-condition provides the ability to operate the system on ground using ground power without the necessity to run the aircraft engine.

Note **It is not possible to operate the air condition on battery power as the high current draw would shortly lead to a depleted battery. Therefore for operation either the**

aircrafts generator (engine running) or a sufficient external power source (capacity min. 100Amps) has to be connected to the aircraft bus system. When using external power the battery must be off.

The cabin recirculation air is cooled by means of two evaporators installed in the cabin. Condensation at the evaporators is drained by means of a float type check valve for each evaporator.
The air condition system is activated by the **AIR CON** switch located in the left side panel.
The air-condition will only operate effectively with the cabin blower **VENT** switch at least in **LOW** position.

7.23 Pitot/Static Pressure Systems

Providing pitot and static pressure for the pilot's and copilot's instruments two independent systems are installed. Each system consists of a heated pitot head located at about 3/4 of the wing span, the tubing, and a drain located on the pitot head. The heated dual static ports with 2 static lines each are located on both sides of the rear fuselage. The two drains are located at the bottom of the fuselage between the gear doors behind the nose gear.

7.23.a Pitot Head and Static Port Heat

The pitot head and static port heating is divided into a left and right hand system. The systems are controlled by the **L-PITOT-R** switches located on the **DEICE** section of the left side panel. Circuit protection is provided by **PITOT-L** and **PITOT-R** circuit breakers. The pitot/static l/h heating circuit is the main system and located on the **EMERGENCY BUS** section of the pilot's left side breaker panel. The r/h pitot/static heating circuit is located on the **LOAD BUS** section of left side circuit breaker panel. Integrated in the r/h pitot/static heat circuit and on the same circuit breaker is the stall warning heating, thus also located on the **LOAD BUS** section. Both pitot/static heat systems are deactivated by the landing gear squat switch to avoid overheating on the ground. If the **PITOT** switch is placed in the **ON** position while the aircraft is sitting on the ground the two yellow **PITOT HEAT, STATIC HEAT** and the red **STALL HEAT** lights will illuminate on the annunciator panel indicating that heating is not active. The yellow **PITOT HEAT and STATIC HEAT** annunciations will only extinguish if the respective system is actually working. The pitot/static heat system can be ground checked prior to flight by holding the **PITOT** switches in the **TEST** positions for no longer than 10 seconds. While the **PITOT** switches are in the **TEST** position the two **PITOT HEAT, STATIC HEAT** and the **STALL HEAT** annunciations will not illuminate if the systems are operational, indicating the systems are working.

Important **Do not operate the heating elements longer than 10 seconds when on ground or at outside air temperatures above 20°C when airborne. The elements can overheat and damage to the structure can occur.**

Note **The yellow PITOT HEAT LEFT or PITOT HEAT RIGHT annunciations are always illuminated when the airplane is airborne, unless the PITOT switch is ON and the systems operating.**

7.24 Pneumatic System

Engine bleed air is used as a power source for the pneumatic system of the aircraft. The air is pressure regulated to a constant 19 psig by the pressure regulator and condensed water is removed by the downstream water separator.
A pressure switch monitors pneumatic pressure. When pneumatic pressure drops below 15 psig it activates the yellow PNEUMATIC LOW annunciation light.
The pneumatic system provides air pressure for the pneumatic de-ice boots operation and evacuation. Normally a minimal amount of air is bled though the two ejector valves to provide suction for boots evacuation. When the pneumatic deicer boots are activated by the **BOOTS** switch, a timer controls the ejector valves periodically to inflate each of the two boot-circuits for 6 seconds. Thereafter they are evacuated again for 48 seconds.

7.25 Stall Warning System

The aircraft is equipped with a heated vane type stall warning switch (lift detector) located on the middle of the left wing leading edge activating the stall warning horn and the red stall warning light in the cockpit before angle of attack reaches a critical value. The system operates at all wing flap positions and will warn the pilot at 5-10 knots above the respective stall speeds.

7.25.a Lift Detector Heat

The lift detector heat is controlled by **PITOT-R** switch located on the **DEICE** section of left side panel. Circuit protection is integrated in the **PITOT-R** circuit breaker on the **LOAD BUS** section of the pilot's left side circuit breaker panel. The lift detector heat (vane, base plate, and case heat) is deactivated by the landing gear squat switch to avoid overheating on the ground. If the **PITOT-R** switch is placed in the **ON** position while the aircraft is sitting on the ground the **STALL HEAT** light will illuminate on the annunciator panel indicating that heating is not active (compare to 7.23.a). The lift detector can be ground checked prior to flight by holding the **PITOT-R** switch in the **TEST** position for no longer than 10 seconds. While the **PITOT-R** switch is in the **TEST** position the **STALL HEAT** annunciation will not illuminate if the system is operational, indicating the system is working.

Important **Do not operate the stall warn heat longer than ten seconds when on ground or at outside air temperatures above 20°C when airborne. The elements can overheat and damage to the structure can occur.**

7.26 Icing Equipment

Note **Flight into known or forecasted icing conditions is prohibited.**

The aircraft is equipped with the following ice protection devices:

1. Pneumatic wing and empennage de-ice boots,
2. electrothermal propeller de-ice pads,
3. electrothermal windshield panel de-icing,
4. heated lift detector (stall warning),
5. heated pitot head and static sources,
6. heated engine air inlet.

7.26.a Pneumatic Wing and Empennage De-Icing

Important **A margin of 10 KIAS has to be added to normal stall speed when flying with activated de-ice system.**

Aircraft wing and empennage ice protection consists of the pneumatic de-ice boots for the wing, the horizontal stabilizer and the vertical fin. The system is activated by the **BOOTS** switch, located on the left cockpit side panel and has the positions **ON** and **OFF**.
Two bleed air operated ejector flow valves provide pressure or vacuum for the operation of the de-ice system. One ejector flow valve supplies the inboard wing de-ice boots, a second the outboard wing and the empennage de-ice boots.
Sufficient operation pressure of the system is indicated by illumination a green **DEICE BOOTS** advisory light on the annunciator panel, if the **BOOTS** switch is **ON** and the boots timer is supplying pressure to the boots.
If the **BOOTS** switch is set to **OFF** position, vacuum is applied to the boots to maintain the de-ice boots in a flat, non-inflated position.
Activation of the de-icing system causes a timer switch, which controls the ejector flow valves, to cycle the system in two separate sequences.
First, the inboard wing de-icing boots are inflated for approximately six (6) seconds; thereafter the outboard wing and

empennage de-icing boots are inflated for approximately six (6) seconds.
After completion of one inflation cycle, vacuum is applied to deflate the boots and to maintain the boots in a non-inflated configuration for approximately 48 seconds.
Thereafter to cycle starts again as described above. Thus a complete cycle takes about 1 minute.

Note **The green DEICE BOOTS advisory light only illuminates in the few seconds, when the boots are actually inflated. Thus the correct operation of the boots can only be checked during this short illumination of the light.**

7.26.b Heated Engine Air Inlet

The engine inlet can be heated for ice protection by means of exhaust gases. The hot exhaust gases are directed from a ram inlet within the LH exhaust stack into a shroud around the intake duct and then back to into the RH exhaust stack. The ram inlet in the LH stack can be opened and closed using the **INTAKE ANTI ICE** push pull control located in the centre console (**PULL TO HEAT**). A switch located on the ram inlet activates the green INTAKE HEAT operation indication light in the annunciator panel. In addition to that a solenoid valve is actuated to direct hot bleed air to the stator vanes in front of the first compressor stage for heating.

Note **Intake heat should be activated in all operation conditions with visible moisture in the air and outside air temperatures below 20 °C.**

Note **Activation of the engine air inlet will cause the TOT to increase significantly with constant engine power output. Therefore unnecessary activation of the intake heat should be avoided in performance critical phases of flight.**

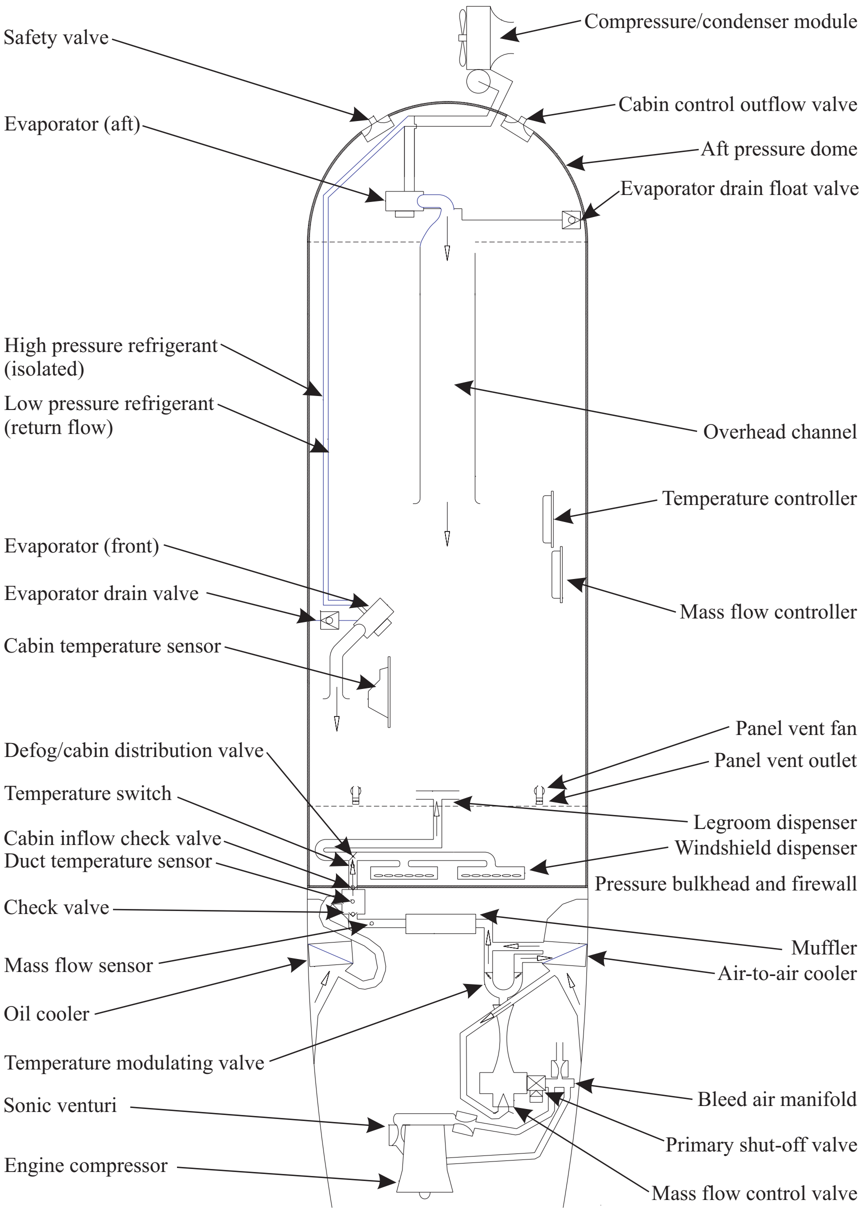


Figure 7-17
Cabin Climatisation and Pressurization Schematic

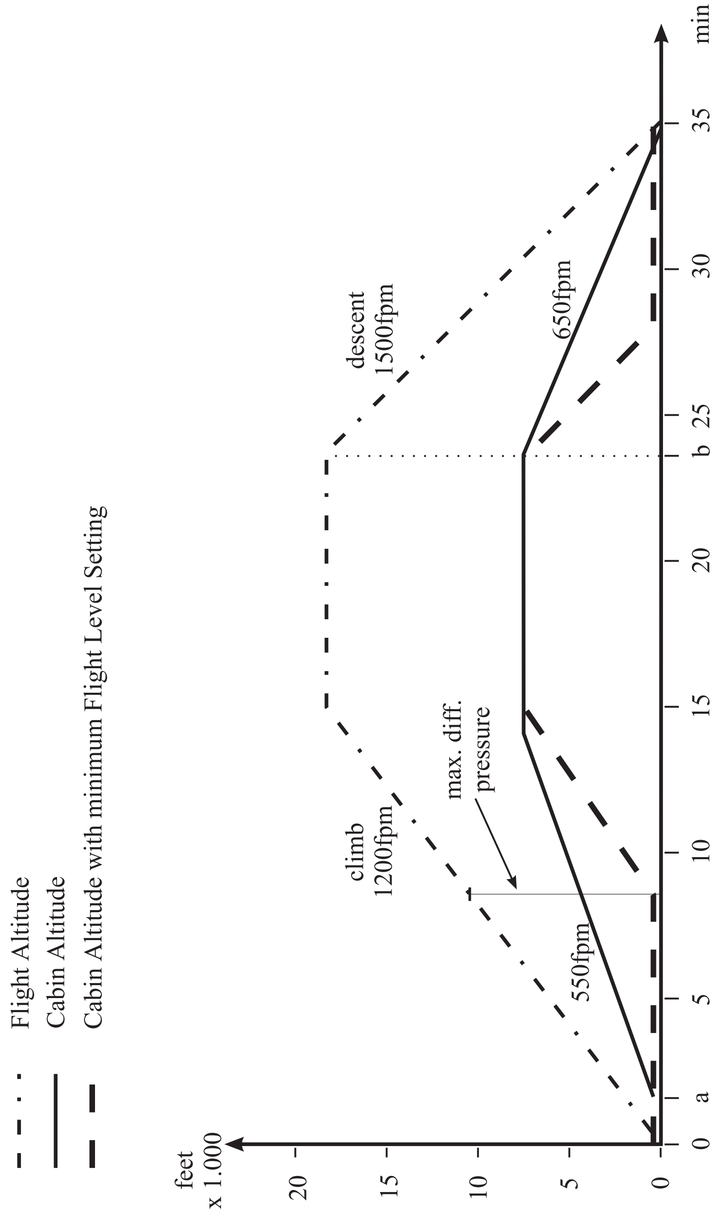


Figure 7-18
Cabin Pressure Sample Chart

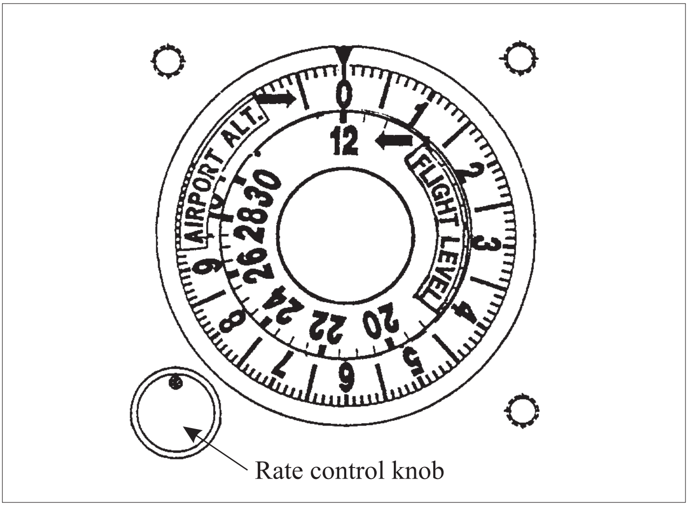


Figure 7-19
Pressure Controller Dial

7.27 Ice Inspection Light

Refer to paragraph "Lighting System" in this Section.

7.28 Electric Propeller De-Icing

Refer to paragraph "Propeller" in this Section.

7.29 Electrically Heated Windshield

An electrically heated rectangular area including temperature sensors is embedded in the pilot's windshield.
The windshield heat can be activated by switching the **WINDSH** select switch on the left side de-ice panel to **ON** position.
Once activated, a temperature regulator monitors via two temperature sensors the temperature and closes a relay to supply the heater with electrical current, when one of the sensors reaches the activation temperature. The regulator opens again

the relays when the deactivation temperature is reached. Both sensors are monitored independently. The windshield heating temperature is between 20 °C and 40 °C.
When the windshield is actively heated the green advisory WINDSHIELD HEAT ON is illuminated.
Failures in the system like broken wires, short circuits or an overheat is indicated by illumination of a red WINDSHIELD HEAT FAIL warning light on the annunciator panel.

Important **In case the red WINDSHIELD HEAT FAIL warning light illuminates on the annunciator panel, the system should be switched OFF immediately.**

7.30 Avionics

Note **For standard avionic equipment refer to the equipment list presented in Section 6 of this POH, while for description of avionics, refer to Section 9 of this POH.**

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Section 8
Handling, Servicing and Maintenance
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8 Handling, Servicing and Maintenance

8.1 Introduction

Note **The owner of the aircraft is responsible for incorporating Service Bulletins to the Service Bulletins List in the Maintenance Manual.**

The purpose of Section 8 is to outline the requirements for maintaining the aircraft in a condition equal to that of its original manufacturer.
The owner and operator of the aircraft is responsible for the maintenance and must ensure that all maintenance is done by qualified mechanics in conformity with all airworthiness requirements for this aircraft.
Al limits, procedures, safety practices, time limits, servicing and maintenance requirements contained in this handbook are to be considered mandatory.
If a question arises concerning the care of the aircraft, it is important to include the aircraft serial number in any correspondence. The serial number appears on the model designation placard, located on the left hand side of the ventral fin.

Important **All maintenance other than preventive maintenance must be accomplished by appropriate licensed personnel.**

Prior to performance of preventive maintenance, review the applicable procedures in the aircraft Maintenance Manual to ensure the procedure is properly completed.

8.2 Aircraft Inspection Periods

As required by national operating rules, all aircrafts must pass a complete annual inspection every twelve (12) calendar months. In addition to the annual inspection, aircrafts must pass a complete inspection as specified in the EXTRA 500 Maintenance Manual.
The Airworthiness Authority may require other inspections by the issuance of airworthiness directives applicable to the aircraft, engine, propeller and components.
The owner is responsible for compliance with all applicable airworthiness directives and periodical inspections.

8.3 Alterations or Repairs to the Aircraft

It is essential that the Airworthiness Authority be contacted prior to any alterations on the aircraft to ensure that airworthiness of the aircraft it not violated.
Alterations or repairs to the aircraft must be accomplished by licensed personnel.

8.4 Ground Handling

Note **Tie-down eye bolts, a fuel sample cup and pitot head covers are located in the map compartment of the aircraft.**

In addition, engine and cooler inlets, exhaust covers and propeller tie downs, to protect the engine gearbox against windmilling, are available.

8.4.a Towing

Movement of the aircraft on the ground can be achieved either with a towing vehicle or by hand.
Normal towing is carried out by using a towing bar, connected to the nose landing gear wheel. Moving the aircraft without a tractor should be carried out with a appropriate number of persons.

Caution **When towing with a tractor, do not exceed the nose gear turning angle of 30° either side of center to avoid damage of the nose gear.**

Do no tow or push the aircraft using the propeller, because serious damage on propeller and/or engine are possible.

8.4.b Parking

If the aircraft is parked in the open, it must be protected against the effects of weather, the degree of protection depending on severity of the weather conditions and the expected duration – long or short parking period! Whenever possible, park the aircraft headed into the wind, set the parking brake, ground it electrically and install control wheel lock and chock the wheels.
In extreme weather conditions, the aircraft should preferably be hangared.

Caution **Do not set the parking brakes during cold weather when accumulated moisture may freeze brakes or when brakes have been overheated.**

Allow the engine to cool down before fitting engine covers.

8.4.c Tie Down

Proper tie-down procedure is the best precaution against damage to the parked airplane by gusty or strong winds. To tie down the aircraft securely, proceed as follows:

1. Install the tie-down eye bolts to the wing jack points.
2. Tie sufficiently strong ropes or chains to the wing tie-down eyes and secure each rope or chain to a ramp tie down.
3. Install pitot tube covers.

8.4.d Jacking

For jacking procedures refer to the applicable chapter in the Maintenance Manual.

8.4.e Leveling

Leveling of the airplane is accomplished by inflating or deflating the tires. A spirit level on the upper edge of the lower cabin door for longitudinal leveling is installed. Place an additional spirit level on the inner front seat rails for lateral leveling.

8.4.f Aircraft inactive

Important **Disconnect battery and check charge level at regular intervals.**

If aircraft was not operated for more then 5 days:
Refer to engine operation and maintenance manual, 72-00-00, table 603, for necessary actions.

If aircraft was not operated for more then 45 days:
Refer to engine operation and maintenance manual, 72-00-00, table 603, for necessary actions.

8.5 Servicing

8.5.a Fuel System Servicing

Warning: **If the fuel system has been completely drained, the fuel system bleeding procedure must be performed, see maintenance manual. If the fuel system is not free of air, an engine flame out may be the result.**

Important: **To prevent lateral fuel unbalance, make sure the left and right collector and main compartments are full before filling any auxiliary compartment. Maximum permissible fuel unbalance in flight is 106 liter (one auxiliary tank).**

Important **Before filling the tanks, connect grounding wire with aircraft structure. Ensure the aircraft is in level before refueling.**

Note **For fuel capacities, fuel grades and types, refer to Section 2 of this handbook.**

The tanks of the aircraft should be gravity refueled when aircraft is in ground level.
The tanks are considered full, when fuel completely covers the bottom of the standpipe.
After refueling check that fuel filler caps are tight and secured.

Warning **Be sure that a fire extinguishing equipment is available. Do not operate radios or other electric equipment during refueling.**

When refueling is completed, fit the fuel filer caps and disconnect the grounding wire from aircraft.
Check the fuel tank vent for clogging before the first flight of the day. The vents are located at the rear underside of each wing in the near of the wing flap gap.
Comment on fuel sampling: there are twelve drains to be checked for water. Five per wing side and two under the plane, one just behind the nose L/G doors and the fuel filter drain, just in front of the nose L/G doors.
Fuel samples from the two drains of each tank and from the gascolator drain should be taken before the first flight of the day to check for water, sediment or other contamination. The fuel

drains are located near each wing root and at the outer end of each fuel tank, the gascolator drain is located on the right underside of the fuselage between the nose gear and the main gear wheel bay. A small plastic cup is supplied in the map compartment for obtaining fuel samples.

Warning: **Take fuel samples with care. Water remaining in the fuel system could ice and clog lines or filters or cause an engine flameout.**

Note **Take fuel samples only with aircraft on level surface.**

To collect a fuel sample, push upward the drain valve by means of the plastic cup to open the valve momentarily and drain fuel into the cup. If water and fuel are in the cup a distinct line separating the water from the fuel will be seen through the transparent cup wall. Water, being heavier, will settle in the bottom of the cup, while the (normally oily yellowish) fuel will remain on the top. If water was detected continue to take fuel samples until all water is purged from the tank.

Fuel samples taken immediately after refueling may not show water or sediment due to mixing action of refueling process. Allow fuel approximately five (5) minutes to settle down after refueling so that possible water and/or sediments can settle down in tank sump before taking fuel samples.

Warning **Take fuel samples with care. Water remaining in the sump could ice and clog the fuel lines.**

Draining
To collect a fuel sample, push upward the drain valve by means of the plastic cup to open the valve momentarily and drain fuel into the cup. If water and fuel in the cup, a distinct line separating the water from the fuel will be seen through the transparent cup wall.
Water, being heavier, will settle to the bottom of the cup, while the colored fuel will remain on the top.
If water was detected, continue taking fuel samples until all water is purged from the tank

When during draining of the outer wing tank drains, wing sump drains or gascolator drains water has been detected, perform the following draining procedure:

1 Verify the aircraft static pitch angle, using the spirit level installed on the upper edge of the lower door.
2 If the reference line is horizontal, all water present in the tank has been drained from the outer wing sump drains.
3 If the reference line was larger than 1° nose down or 2° nose up, bring the aircraft in a horizontal pitch position using the spirit level. After approximately 30 minutes, start draining at wing and sump drains.

When during draining of the drains in the lower wing skin, the wing sump drains, the lower fuel line drain or the fuel filter drain, water has been detected, perform the following draining procedure:

1 Adjust airplane attitude to:
- longitudinal (pitch angle) has to be horizontal (check with spirit level installed on the upper edge of the lower door)
- lateral (bank angle): bank airplane to one side so as the lower wing tip is at least 0,3m (1') lower than the other tip.

2 Maintain this attitude for at least 30min, after that drain from all drain valves until no more water is found.

3 Bank airplane to the other side, wait for 30min and drain all water from drain valves.

8.5.b Oil

1 Engine Oil

Note **For oil capacities, oil grades and specifications, refer to Section 2 of this handbook.**

Oil quantity should be checked prior to each flight. However, if a long distance flight is intended, the oil system shall be filled to the maximum sump capacity.
The oil filler cap access panel is located on the left top of the upper cowling. A complete oil change should be made by certified personnel.

2 Oil Specification and Temperature Ranges

If additional information concerning oil specifications are need and not stated in this handbook, refer to Rolls-Royce engine 250-B17F Operation and Maintenance Manual – Description and Operation, 72-00-00.
Oil temperature ranges are listed in this handbook. However, if additional information are needed, refer to above mentioned Operating and Maintenance Manual.

8.5.c Reserved

8.5.d Landing Gear Hydraulic Oil

Check hydraulic oil level prior to each flight. The respective inspection glass is located in the forward half of the right main wheel bay. Hydraulic oil level is sufficient, if fluid is visible in the inspection glass. The system is a sealed system, so that a loss of fluid indicates a damage of system.
In this case the aircraft must be brought to maintenance/service prior to next flight.

8.5.e Air

Note **For tire pressures and wheel dimensions, refer to Section 2 of this handbook.**

Check wheel tire pressure as well as condition of tires, prior to each flight.

8.6 Cleaning and Care

8.6.a Windshield-Windows

The acrylic windshield and windows should be cleaned with an aircraft windshield cleaner. Apply the cleaner sparingly with soft cloths, and rub with moderate pressure until all dirt, oil scum and bug stains are removed. Allow the cleaner to dry, then wipe it off with soft flannel cloths.

Caution **Never use gasoline, benzene, alcohol, acetone, fire extinguisher or anti-ice fluid, lacquer thinner or glass cleaner to clean plastic. These materials will attack the plastic and may cause it to craze.**

Follow by carefully washing with a mild detergent and plenty of water. Rinse thoroughly, then dry with a clean moist chamois. Do not rub the plastic with a dry cloth since this builds up an electrostatic charge which attracts dust. Waxing with a good commercial wax will finish the cleaning job. A thin, even coat of wax, polished out by hand with clean soft flannel cloths, will fill in minor scratches and help prevent further scratching. Do not use a canvas cover on the windshield unless freezing rain or sleet is anticipated since the cover may scratch the plastic surface.

8.6.b Painted Surfaces

Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with a mild detergent.

To seal any minor surface chips or scratches and protect against corrosion, the airplane should be waxed regularly with a good automotive wax applied in accordance with the manufacturer's instructions. If the airplane is operated in a seacoast or other salt water environment, it must be washed and waxed more frequently to assure adequate protection. A heavier coating of wax on the leading edges of the wings and tail and on the cowl nose cap and propeller spinner will help reduce the abrasion encountered in these areas. Reapplication of wax will generally be necessary after cleaning with soap solutions or after chemical de-icing operations.

When the airplane is parked outside in cold climates and it is necessary to remove ice before flight, care should be taken to protect the painted surfaces during ice removal with chemical liquids. Isopropyl alcohol will satisfactorily remove ice accumulations without damaging the paint. However, keep the isopropyl alcohol away from the windshield and cabin windows since it will attack the plastic and may cause it to craze.

8.6.c Propeller Care

Preflight inspection of propeller blades for nicks, and wiping them occasionally with an oily cloth to clean off grass and bug stains will assure long blade life. Small nicks on the propeller, particularly near the tips and on the leading edges, should be dressed out as soon as possible since these nicks produce stress concentrations, and if ignored, may result in cracks. Never use an alkaline cleaner on the blades; remove grease and dirt with a mild detergent.

A clean propeller blade will assure good performance of the aircraft.

Section 9
Supplements

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9 Supplements

9.1 Introduction

Section 9 "supplements" of the Pilot's Operating Handbook contains all information necessary for a safe and efficient operation of the airplane when equipped with one or more of the various optional systems and equipment not provided with the standard airplane.

9.2 Notes

The described systems and equipment are certified by the EASA for the EXTRA 500. Pages and contents of this section must not be exchanged and alterations of or additions to the approved contents must not be made without the EXTRA Flugzeugproduktions- und Vertriebs-GmbH/EASA approval. The editor has the copyright of these Supplements and is responsible for additions of revisions. The log of effective pages is found on the preceding pages of this Pilot's Operating Handbook.

Each Supplement section (e.g. Bose Headset) covers a single section, device or a piece of equipment only and is a self-contained, miniature Pilot's Operating Handbook. The owner is responsible for incorporating prescribed amendments and should make notes about these on the records of amendments. It is the responsibility of the pilot to be familiar with the contents of relevant supplements.

POH Supplements must be in the airplane for flight operations when the subject equipment is installed or special operations are to be performed.

The Table of Contents shows all EXTRA Supplements available for the EXTRA 500. A check mark in the *Section* column indicates that the corresponding supplement must be included in this POH.

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Avidyne Integrated Flight Displays and Control Display Unit

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901 Avidyne IFDs and CDU

901.1 Section 1 – General

This airplane is equipped with an Avidyne 700-00083-000 Integrated Flight Displays (IFD) in the left (PFD) position and either another 700-00083-000 IFD in the right (MFD) position. A Control Display Unit (CDU) p/n 700-00150-002 is also installed as part of the Entegra Release 9 IFD System. The entire system will herein be referred to as the "Entegra Release 9" or simply Release 9.

The IFDs are 10.4" landscape-oriented displays intended to be the primary display of primary flight parameter information to the pilot. The terms PFD and MFD are still used when referring P/N 600-00145-000 (32-2352) (WAAS) receiver, VHF Nav/Com transceiver and processing to accomplish control, display, navigation and input/output to other avionic systems. The system is integrated to:

- S-TEC System 55X Autopilot (refer to applicable Supplement)
- Audio panel (refer to applicable Supplement)
- Remote transponder (refer to Avidyne Pilot Guide (see below))
- DME (optional, refer to applicable Supplement)
- Weather detection (optional, refer to Avidyne TWX670 Pilot's Operating Handbook P/N 600-00164-000 Rev 008)
- Traffic advisory (optional, refer to Avidyne TAS600 Series Pilot's Guide, P/N 600-00145-000 (32-2352) Rev 007)

Figure 901-1 depicts the Avidyne 700-00083-000 IFDs and CDU p/n 700-00150-002.

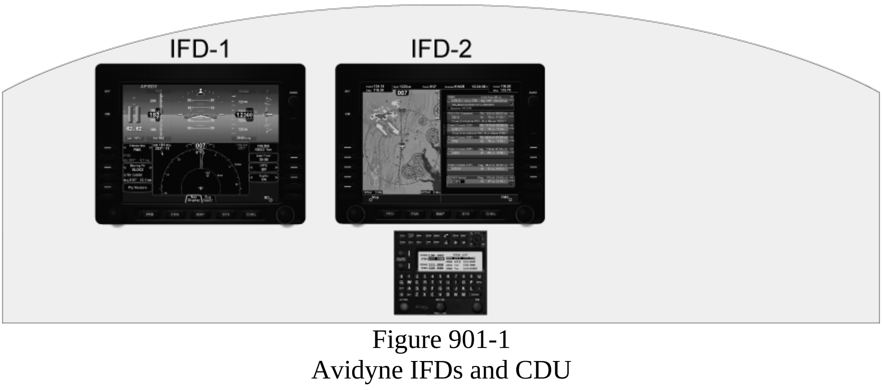

Figure 901-1
Avidyne IFDs and CDU

901.2 Section 2 – Limitations

The IFDs integrate with separately approved system installations. Adherence to limitations in appropriate installation AFM supplements is mandatory.

With respect to the Kinds of Operation (refer to Section 2) an IFD is considered as completely inoperative if only one function is not available.

The Avidyne moving map display provides visual depiction of the airplane's GPS position against a moving map. This information supplements course deviation information (CDI) presented on the left IFD (PFD). The moving map display may not be used as the sole means of primary navigation.

The Avidyne electronic checklists display supplements the Pilot Operating Handbook checklists and are advisory only. The electronic checklists must not be used as the primary set of on-board airplane checklists. EASA Approved Flight Manual paper checklist must be on-board the aircraft.

The IFDs must have software with P/N 510-00275-000 Rev. 02 or Rev. 05 installed.

The Avidyne Entegra Integrated Flight Display System Release 9.0 Pilot Guide, P/N 600-00190-000, Revision 04, or later appropriate revision, must be available to the pilot during all flight operations.

Important **Terrain information shown on the MAP page display is provided to the pilot as an aid to situational awareness. The MAP page terrain color representations should not be used as a basis for terrain avoidance.**

Important **Traffic information shown on the Map page display is provided to the pilot as an aid to visually acquiring traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic. Avoidance maneuvers should not be made based only on a Traffic Advisory.**

Note **When utilizing FMS Routes, Note that routes with the same origin and destination will have the same name in the routes list. The pilot should name one or both routes specifically to avoid confusion.**

901.3 Section 3 – Emergency Procedures

901.3.a Loss of ADAHRS

Both IFDs will automatically revert to remaining ADAHRS.

Refer to mechanical stand-by instrument(s).

If right IFD does not switch to PFD mode automatically, press **PFD** button on right IFD for attitude information.

If neither IFD displays attitude attempt system recovery by cycling both **IFD** circuit breakers for 2 – 3 seconds (ensure not longer than 20 seconds).

Note **Following a lightning strike check indication of IFDs against standby instruments to exclude potential misleading information.**

Note **Consider using the autopilot to reduce workload.**

Without ADAHRS input the S-TEC 55X autopilot still provides the following capabilities:

- NAV GPSS mode to fly the GPS flight plan
- Vectors mode will function in NAV GPSS.
- HDG mode will engage but will not be functional – annunciated yellow on PFD.
- NAV mode will not be functional
- VS and ALT modes will function but target altitude capture is not possible.

901.3.b Loss of GPS

Both IFDs will automatically revert to remaining GPS receiver.

901.3.c Loss of VHF Nav/Com

Pilot to utilize remaining nav/com.

901.3.d Loss of Control Display Unit:

Pilot to utilize the Right IFD for Flight Planning and Com/Nav/XPDR tuning.

901.3.e Caution Messages

Avidyne IFD provide the following Cautions:
ADAHRS (1/2) In Fast Erect – *prepare to use stand-by instruments*
ADAHRS (1/2) Aligning – *prepare to use stand-by instruments*
ADAHRS (1/2) Fault – *prepare to use stand-by instruments*
Perform Mag (1/2) Cal – *received on ground, cal magnetometers*
GPS Miscompare – *crosscheck using VHF navaids*
GPS Integrity Lost – *crosscheck using VHF navaids*
GPS (1/2) Fault Dead Reckoning – *5 minutes of DR, use VHF nav*
GPS (1/2) Fault No Position – *use VHF nav*
Dual GPS Fault Dead Reckoning – *5 minutes of DR, use VHF nav*
Dual GPS Fault No Position – *use VHF nav*
Check Altitude Too Low – *Regain altitude to intercept with glide slope.*
Traffic (if installed) – *Make visual contact and take appropriate action.*
Traffic Sensor Fault (if installed) – *Perform visual air surveillance.*
No Comm with Xpdr – *Transponder may be functioning but with limited or no command*
No Comm with VHF [1/2] – *VHF may be functioning but with limited or no command*
No Comm with KBD – *Use alternate means for keyboard functions provided on IFDs*
COM [1/2] TX Fault – *use other COM to transmit.*
COM [1/2] Stuck TX – *release PTT switch.*

The following Caution messages are associated with WAAS GPS:

LPV Unavailable Use L/VNAV DA
LPV Unavailable Use LNAV MDA
LP Unavailable Use LNAV MDA
L/VNAV Unavail. Use LNAV MDA
VNAV Lost Use LNAV MDA

Pilot to utilize available instruments/data displays to verify message and take appropriate action by selection of alternate systems or settings. Invalid xxx messages generally indicate a failed sensor and that other messages associated with that system will be unavailable. Caution messages indicate the possibility of a pilot action.

901.4 Section 4 – Normal Procedures

901.4.a Switching ON/OFF

Both IFDs are automatically switched on when battery power is available. For the RH IFD the AVIONICS switch must be ON and/or the load bus powered. The Load bus is powered with external power or starter-generator online.

IFDs may be switched off by pulling the following circuit breakers:

LH IFD: **IFD-LH-A** (**EMERGENCY BUS**) and
IFD-LH-B (**BATTERY BUS**)

RH IFD: **IFD-RH-A** (**AVIONICS BUS**) and
IFD-RH-B (**LOAD BUS**)

901.4.b B-RNAV Operation

For B-RNAV operation the following shall be performed:

A pre-flight GPS RAIM prediction for the flight plan. Dispatch should not be made in the event of predicted continuous loss of RAIM of more than 5 minutes for any part of the intended flight.

A NAV database validity check (SYS → setup)

Select NAV frequencies for cross-check purposes along the flight plan.

901.5 Section 5 – Performance

No change from basic Handbook.

901.6 Section 6 – Weight and Balance

No change from basic Handbook. See POH for current weight and balance for this aircraft.

901.7 Section 7 – Systems Description

Note **This supplement provides a general description of the Avidyne Integrated Flight Displays p/n 700-00083-000 and control Display Unit p/n 700-00150-002, system operation, and EXTRA 500 interface. For a detailed description of the IFDs and CDU, refer to the Avidyne Pilot's Guide P/N 600-00190-000, Revision 04, or later.**

The Entegra Release 9 IFD start-up is automatic once power is applied. The display presents the Initialization Display immediately after power is applied. Typical alignment times are 3 minutes from battery turn on.

901.7.a IFD Functions

The IFD provides the following functions (see Figure 901-2):

- Primary Flight Display
- Flight Management System
- WAAS GPS Navigation
- VHF Radio Nav/Com
- Attitude and Air Data Sensors
- Moving Map
- Traffic (optionally)
- Lightning (optionally)
- Electronic Approach Plates
- Electronic Checklist
- Data Logging
- Caution System

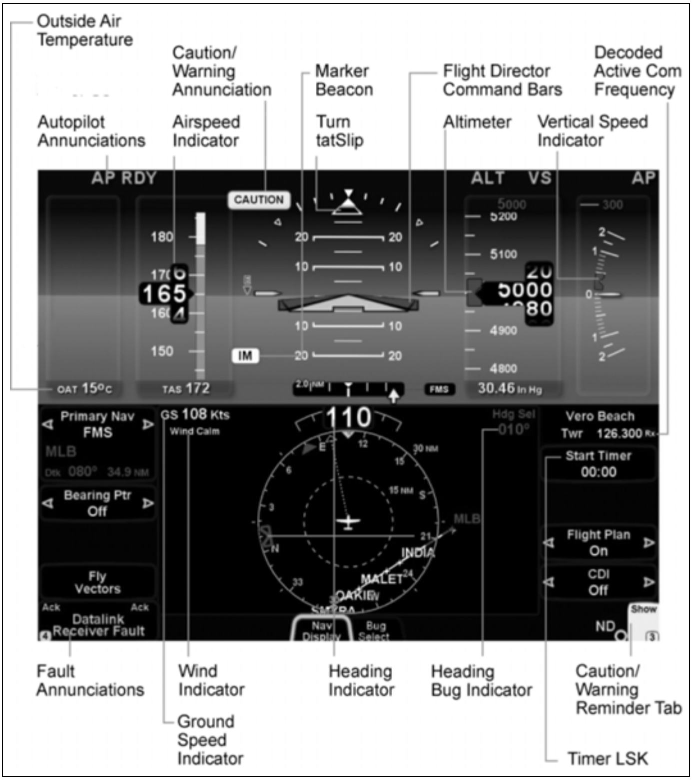

Figure 901-2
IFD Functions

901.7.b Page Function Keys and Tabs

The 5 buttons along the bottom of the IFD bezel are called "Page Function Keys".

PFD (Primary Flight Display)
FMS (Flight Management System)
MAP (Moving Map)
SYS (System Pages)
CHKL (Electronic Checklist)

Detailed descriptions of the functions and information provided on tabs available on each Page is provided in Avidyne Pilot's Guide P/N 600-00190-000, Revision 04, or later

Each key is labeled by function and represents a "page". Each has a number of associated "tabs". Navigate the tabs by rocking left or right on each key. Press and hold one side of the function key to quickly step through the tabs.

Figure 901-3
Page Function Keys and Tabs

901.7.c Line Select Keys

"Line Select Keys", typically abbreviated to "LSK" in this manual are the buttons found along the left and right edges of the bezel. A label, just inside the bezel – adjacent to the physical LSK, indicates the function of the LSK. Each functional LSK is backlit. These LSKs function by rocking left or right on the key. For cases where there is a list of selectable options, browse the list in either direction by pressing the left or right side of the LSK.

901.7.d Page Formats

There are four display formats used throughout the system. The four display formats are:

Half format – the PFD attitude indicator, airspeed, altimeter and vertical speed indicators are always on the top half of the page. The bottom half of the page is dependent on what Page Function Key and tab are selected. Whenever the bottom half of the page is not a traditional HSI, the lower edge of the ADI has a perspective compass and Horizontal Deviation Indicator (HDI).

Figure 901-4
Half Format

The airspeed tape to the left of the ADI, begins indicating at 20 Knots Indicated Airspeed (KIAS) and is color coded in accordance with the model POH airspeeds for V_{SO}, V_{FE}, V_S, V_{NO}, and V_{NE}. An altitude tape is provided to the right of the ADI and also displays a symbol for the Altitude preselect (Altitude bug). The Vertical Speed Indicator (VSI) is displayed to the right of the altitude tape. The displayed scale of the VSI is ± 2000 FPM and for rates above 2000 FPM, the needle will peg just outside the scale and a digital readout of actual VSI up to 4000 FPM is then displayed. An additional data block is provided for display of outside air temperature (OAT) (optional), true airspeed (TAS), and ground speed (GS). Controls for selecting bug and barometric correction values are along the right side of the PFD. A wind indicator is also provided beneath the altitude tape. The CDU can be used to set altitude and heading bugs and the S-TEC autopilot **VS** knob can be used to set the VS bug.

Attitude is depicted on the main ADI using a combination of an aircraft reference symbol against a background of labeled pitch ladders for pitch and a bank angle pointer in the form of an arced scale along the top of the main ADI for bank. A skid/slip indicator is attached to the bottom edge of the bank angle pointer.

Horizontal Situation Indicator (HSI)

Magnetic heading is represented in boxed digital form at the top of the compass rose. Heading rate (Rate of Turn Indicator) takes the form of a blue arcing arrow that begins behind the magnetic heading indicator and moves left or right accordingly. Graduations are provided on the rate of turn indicator scale to indicate ½ and full standard rate turns. A heading bug is also provided on the compass rose.

The "**ND box**" refers to the rectangular section on the lower half of the PFD pages. Most noticeable on the left IFD where the upper half is always a PFD view, the ND box is filled based on what Page Function Key is pressed along the bottom edge of the IFD bezel.

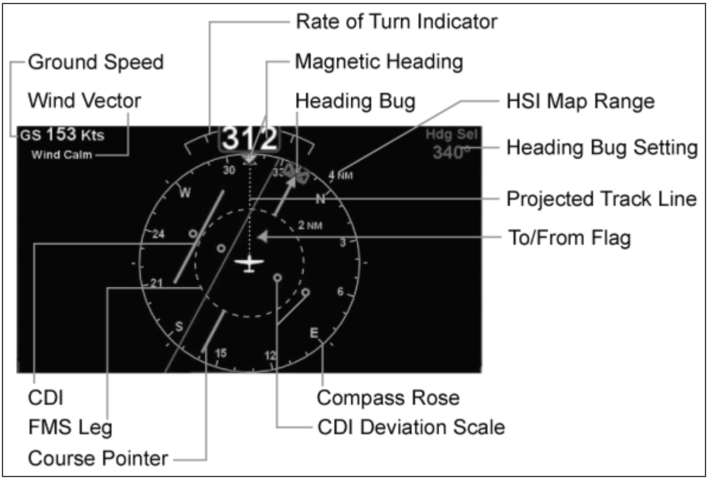

Figure 901-5
ND Box

Perspective Compass Rose

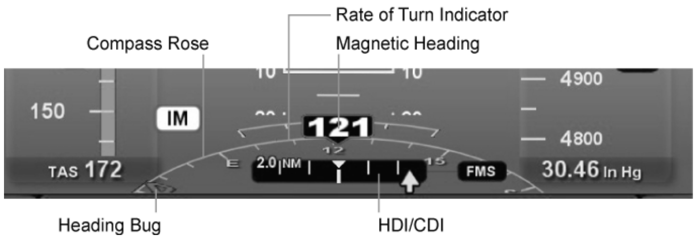

Figure 901-6
Perspective Compass Rose

Full format – the function selected (eg Map, Chart) takes up the entire screen real estate. Associated line select keys can be pilot selected to time out at preset times or never.

Datablock format – the left and right edges of the IFD are populated with various pilot-selectable datablocks.

Figure 901-7
Datablock Format

Split format – The IFD is split vertically in the center allowing two distinct functions to be displayed at the same time. Examples include Map-Chart and Map-FMS.

FMS Map FPL Tab

LSKS CHOICES	LSKS CHOICES
L1 Blank	R1 Blank
L2 Blank	R2 Blank
L3 Blank	R3 Blank
L4 Blank	R4 Blank
L5 Blank	R5 Blank
L6 Blank	R6 Blank
LEFT KNOB	RIGHT KNOB
Range/Range/View	Scroll coarse/Scroll fine/Select

Figure 901-8
Split Format

901.7.e Redundancy

Since both IFDs are identical pieces of hardware, running identical software, they are 100% interchangeable. These IFDs and keyboards are all interconnected via a dual, digital Databus. This means that all sensor data is available to all IFDs, all the time.

901.7.f Primary Navigation Source

The means of selecting which nav source is driving the deviation indicators on the PFD Horizontal Deviation Indicator (HDI), Vertical Deviation Indicator (VDI) and/or HSI. The Primary Nav selection LSK selects the source driving the autopilot when the autopilot is in NAV mode. Choices are **FMS**, **Nav1** and **Nav2**.

The FMS automates much of the mode changing between **FMS** and **Nav1/2** as soon as there is an active flight plan and the autopilot has been engaged in NAV or NAV/GPSS modes. In these cases, as the FMS automatically changes the primary nav source, it commands the autopilot to do the same. Conversely, if the mode was changed on the autopilot control head between NAV and GPSS, the **Primary Nav** LSK state on the PFD will change to follow the autopilot mode.

901.7.g Sensors

External sensors (e.g. traffic, lightning, etc) can be connected to the basic system via one of the I/O "blades" and again, all IFDs have complete access to that information. For example, a traffic system may be connected to one display via the I/O blade, but all IFDs are able to use and display that traffic information.

901.7.h Caution and Advisory Messages

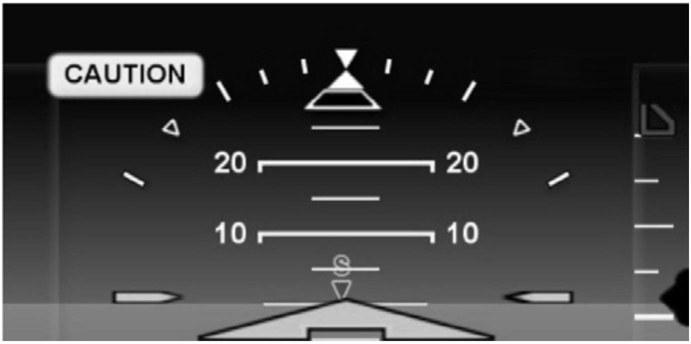

Figure 901-9
Caution Messages

Caution messages are presented in two ways: as a master caution alert near the top of the ADI, and as a message box on the lower right corner of each IFD.

The top edge of each message box will either display **Ack** or **Show** which is intended to describe the behavior of each side of the LSK rocker key. Pressing the side of the LSK that is labeled **Ack** will acknowledge the message but will not do anything else. Pressing the side of the LSK that is labeled **Show** will change right IFD to display the most appropriate page available to provide more details about the given message.

As active messages are acknowledged, a "Reminder tab" is left displayed along with an indication of the number of active caution or warning messages. In cases where no specific page is appropriate, active Caution and Advisory messages can also be seen on the System page, Alerts tab as seen in the figure below.

Due to interferences between the EXTRA 500 air conditioning system, while operating, and the optional TWX670 weather detection system, the accuracy of weather data indication can be restricted in terms of direction, distance and range. In this case the following advisory message is displayed on a cyan background on the lower left corner of each IFD:
Lightning Sensor Error.
The related long text is:
Lightning sensor non-fatal error: Noise.
Temporarily deactivate the air conditioning system in case accurate weather data shall be obtained.

901.7.i Miscompares

The IFDs share and compare much of their data for fault detection purposes. If a miscompare occurs, both IFDs will display the appropriate warning message adjacent to the affected instrument. The following parameters are constantly being compared:

- Pitch
- Roll
- Airspeed
- Altitude
- Heading
- Glideslope
- Localizer
- VOR deviation

If the Primary Nav source is either Nav1 or Nav2 and both Nav1 and Nav2 are tuned to the same navaid, a background cross-check is performed. If the indications are outside the IFR limits, an alert message is annunciated on both IFDs.

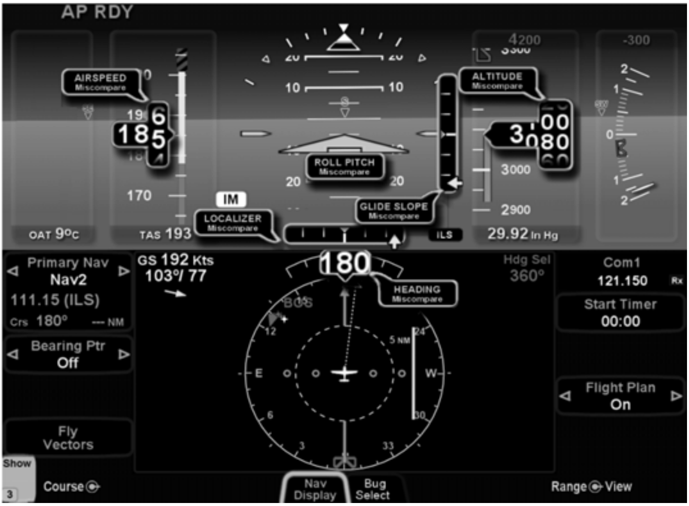

Figure 901-10
Miscompare Annunciations

In the event a miscompare is annunciated, crosschecking secondary or stand-by data sources should be accomplished immediately by the pilot.

901.7.j Checklist

The Normal and Emergency procedures checklists in the MFD are interactive in nature such that the pilot is able to check off each step as it is accomplished and thereby keep a visual record of what steps have been accomplished. Other features in the interactive checklists are the ability to un-check a specific checklist step, reset the entire checklist, and get confirmation of a completed checklist.

The following Normal Procedures checklists are provided in electronic format via the Checklist page of the MFD:

1 Before Takeoff;
2 In Flight and Landing

The checklists steps and content are the same as those found in the POH.

The following Emergency Procedures checklists are provided in electronic format via the Checklist page of the MFD:

1 POH Ground Emergencies;
2 POH In-flight Emergencies;
3 POH Landing Emergencies;
4 POH System Malfunctions.

The checklists steps and content are the same as those found in the POH.

The following POH Performance Data and Charts are provided in electronic format via the Checklist page of either IFD:

1 Take-off distance;
2 Range profile;
3 Landing distance.

901.7.k Control Display Unit (CDU)

The CDU is not required for any function. All functions can be accomplished through the IFDs but the CDU is designed to reduce workload in key areas:

- Nav/Com Control
- Transponder Control
- Flightplan Entry and modification

Figure 901-11
Control Display Unit

The CDU also incorporates a joystick pointing device that can be used with any map page displayed on the right IFD.

901.7.l Autopilot Integration

The Entegra PFD is fully integrated with the S-Tec System 55X autopilot. Reference bugs (HDG Bug, Alt Bug, VSI Bug) are provided to aid in autopilot control and pilot situational awareness. When in an active autopilot mode, full guidance is provided, including smooth transitions to altitude and heading captures.

The reference bugs status will indicate the coupling with the autopilot. A hollow magenta bug indicates that function is not currently coupled to the autopilot in an active mode. In other words, a hollow bug indicates manual or "hand-flying" status. A solid magenta bug indicates that function is currently coupled to the active mode of the autopilot.

The following six modes of the System 55X autopilot are supported by the Entegra system:

- ALT (Altitude Hold) Mode;
- VS (Vertical Speed) Mode;

- Altitude Capture Mode;
- HDG (Heading Capture/Hold Mode);
- NAV Mode;
- GPSS (GPS Steering) Mode.

Note **One of the horizontal modes (HDG, NAV, GPSS) must be engaged on the S-Tec System 55X control head before a vertical mode can be used.**

Note **When HDG mode is engaged, rotation of the heading bug greater than 180 degrees may result in a reversal of turn direction.**

901.8 Section 8 – Handling, Servicing and Maintenance

901.8.a Cleaning the Display

If the IFD screen should become dirty due to fingerprints or dust, clean the screen using the following materials and methods:

1. A clean, soft lint-free cloth such as 3M Ultra-Brite Cloth #2011 or similar
2. A cleaning solution composed of de-ionized water. Do not use any alcohol-based product. Always apply the cleaning solution directly on the cloth. Never spray cleaner directly on the screen.

The use of any 3rd party screen protector, especially those that adhere directly to the IFD display glass, is not endorsed by Avidyne and may void the warranty for any display related issue.

PS Engineering
PMA8000B and PMA8000BT
Audio Panel

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902 PS Engineering PMA8000B(-T)

902.1 Section 1 – General

This supplement provides operating instructions for the PS Engineering PMA8000B and PMA8000BT, Audio Selector Panel/Intercom Systems.
These units were developed exclusively for Avidyne for use with **Entegra Integrated Avionics System Release 9** (Refer to applicable supplement in this manual).
The PMA8000B and PMA8000BT are state-of-the-art audio isolation amplifier and audio selector that contain an automatic voice activated (VOX) intercom system and integral marker beacon receiver. They can switch two transceivers (Com 1, Com 2) and six receivers (Com 1, Com 2, Nav 1, Nav 2, DME, and MKR).
The PMA8000BT is identical to the PMA8000B but features an additional bluetooth function.

Figure 902-1
PMA8000B Panel

The PMA8000B(-T) supports the following aural annunciations in the EXTRA 500 configuration:

- Airspeed warning
- Stall warning
- Gear warning
- Autopilot warnings
- TWX annunciations (if system installed)
- TAS annunciations (if system installed)

902.2 Section 2 – Limitations

National regulations for use of portable electronic devices incl. cellular phones must be observed.

902.3 Section 3 – Emergency Procedures

902.3.a Fail Safe Operation

In the **OFF/EMG** position of the power switch, the pilot headset is connected directly to Com 1 as well as all aural warnings provided by the aircraft or its systems (refer to Section 1). This allows communication capability regardless of unit condition. Any time power is removed or turned off, the audio selector will revert to fail-safe mode.

902.4 Section 4 – Normal Procedures

Not affected.

902.5 Section 5 – Performance

Not affected.

902.6 Section 6 – Weight and Balance

Not affected.

902.7 Section 7 – Description

In this supplement only the basic functions are outlined. For detailed description of the PMA8000B(-T) refer to the Pilot's Guide and Operation Manual 202-890-0402 and 202-890-0404 respectively.

1 Power Switch

Unit power is turned on and off by pushing the volume knob.

The power switch controls all audio selector panel functions, intercom and marker beacon receiver. All pushbutton selections will be remembered and return to the last state when turned on.

2 Communications Transmit (XMT) Selection

There are two pushbuttons associated with the transmitter selection. The two lower buttons (**Com 1, Com 2**) control which transceiver is selected for transmit. The top row of pushbuttons (**Com 1, Com 2**) allows selection of the receiver audio. Active selections are indicated by the green switch LEDs.

3 Split Mode

The split mode can be activated at any time by pressing the **COM 1** and **COM 2 XMT** buttons at the same time. This places the pilot on COM 1 and the copilot on COM 2. Both green switch LEDs are lit.

4 Audio Selector

Navigation receiver audio is selected through three momentary, pushbutton, backlit switches. You will always hear the audio from the selected transceiver.

The users can identify which receivers are selected by noting which green switch LEDs are lit. Navigation aid audio push buttons are labeled **Nav 1**, **Nav 2**, and **MKR** (Marker). If DME is present, it will be controlled by the **Mon 2** button. When one of these buttons is pressed, the mode is active, and the LED will illuminate. Press the switch again and it will be "off" and remove that receiver from the audio output.

In SPLIT mode, only the pilot will hear selected navigation audio.

5 Monitor Function

The **Mon 1** button allows the pilot to listen to the standby frequency of COM 1 selected by the Avidyne Entegra Control/Display Unit.

6 Telephone

The TEL mode serves as a full duplex interface and distribution for portable cellular phones with earpiece jacks. Pressing the **TEL** button activates the telephone mode.

7 Speaker Amplifier

The **SPR** in the lower right section stands for speaker. This switch will place all selected audio on the cockpit speaker when this switch is selected.

All important audio annunciations (refer to Section 1) will come over the speaker even if it is not selected.

8 Public Address Function

To access PA function, press the **Mute** and **SPR** buttons simultaneously.

The **Mute** and **SPR** LEDs will blink to indicate the audio panel is in PA mode. The copilot can continue to use the selected COM radio while the pilot will now be heard over the speaker if he presses his PTT switch. To exit PA mode, push **Mute** and **SPR** again.

9 Intercom Volume Control

The small volume control knob adjusts the loudness of the intercom for the pilot and copilot. It has no effect on selected radio levels, music input levels or passengers' volume level.

The larger, outer volume control knob controls intercom volume for the passengers. It has no effect on radio or music levels.

10 Intercom Modes

The **ICS** pushbutton switch on the left side of the panel provides the selection of the three intercom modes. (The description of the intercom mode function is valid only when the unit is not in the Split mode. Then, the pilot and copilot intercom is controlled with the **Mute** button.)

This button cycles through the intercom modes, from top to bottom and then back up, **ISO**, **ALL**, **Crew**, **ALL**, and **ISO**. An LED shows the active mode.

ISO: The pilot is isolated from the intercom and is connected only to the aircraft radio system. He will hear the aircraft radio reception (and sidetone during radio transmissions). The copilot and passengers will hear the music sources as configured by the audio panel configuration Function keys (Refer to applicable Pilot's Guide).

ALL: All parties will hear the aircraft radio and intercom. Crew will hear Entertainment 1, passengers can hear Entertainment 1 or 2. During any radio or intercom communications, the music volume automatically decreases. The music volume increases gradually back to the original level after communications have been completed.

CREW: Pilot and copilot are connected on one intercom channel and have exclusive access to the aircraft radios. Again, the music that the crew and passengers will hear is determined by the Smart Function Keys (Refer to applicable Pilot's Guide).

11 Marker Beacon Operation

The Marker Beacon Receiver uses visual and audio indicators to alert you when the aircraft passes over a 75 MHz transmitter.

The Blue lamp, labeled **O**, is the Outer Marker lamp and has an associated 400-Hertz 'dash' tone. The lamp and tone will be keyed at a rate of two tones/flashes per second when the aircraft is in the range of the Outer Marker Beacon.

The Amber lamp, labeled **M**, is the Middle Marker lamp and is coupled with a 1300 Hertz tone. It is keyed alternately with short 'dot' and long 'dash' bursts at 95 combinations per minute.

The White lamp, labeled **I**, is the Inner marker and has a 3000 Hertz 'dot' tone. The lamp and tone will be keyed at a rate of six times per second.

The audio from the Marker Beacon Receiver can be heard by selecting the **MKR** push-button switch.

A pushbutton is used to set the receiver sensitivity and to test the indicator lamps mute the marker audio.

Use HIGH sensitivity initially. This allows you to hear the outer marker beacon about a mile out. Then touch the smaller **MKR** button to switch into Low Sensitivity mode. LOW sensitivity gives you a more accurate location of the Outer Marker. Holding the **MKR** button for one second activates marker test lamp, labeled **T/M** and illuminates all three lamps simultaneously to assure the lamps (internal and external) are in working order.

12 Internal Recorder System

The Intercom Recording System is a digital recording system allowing automatic storage and playback of aircraft radio traffic.

Operating as a continuous loop recorder, (first message received will be the last heard), the recorder has 60 seconds of recording time, or up to 8 messages. With its own built in VOX circuit, there are no buttons to press to start recording. The system automatically begins to record the instant the radio becomes active. Only the COM radio selected for transmit is recorded, and only the pilot and copilot will hear the playback audio.

Recording is automatic. To play back the last recorded message, press and hold the COM Receive pushbutton associated with the selected radio transmitter for about one (1) second. You can either wait for the message to finish playing before accessing the prior message or cancel the playback. To cancel the playback, press and hold the COM Receive playback button for two seconds (2). The next time the button is pressed for one (1) second, the next earlier message will be heard.

The playback will stop whenever there is more incoming selected com audio, and the message can be replayed from the beginning by pressing the COM playback button.

13 Utility Jack

The 2.5 millimeter (3/32") jack on the front panel has three distinct functions:

- Cell phone input
- Advisory audio input
- Music input

The use of this jack is controlled by three Smart Function Keys (SFK) controlled from the front panel (Refer to applicable Pilot's Guide).

14 Bluethooth Connection (PMA8000BT only)

Follow the procedure outlined in the Quick References of the PMA8000BT Pilot's Guide.

15 Music Muting

There are two muting circuits.

The front panel **Mute** button will always control the Mute function for music 1. It will also control the muting of the front panel utility jack, when Music 1 is NOT active.

Hold the **Mon 2** button, and repeatedly push the **Mute** (volume up) or **SPR** (volume down) to step the volume level.

Bose Headset

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903 Bose Headset

903.1 Section 1 - General

The "Bose Aviation Headset Series II" uses an advanced combination of electro-acoustical noise reduction circuitry and a patented cushioning system to significantly reduce aircraft noise. It actively reduces noise elements in addition to muffling noise. The "Clear Comfort" cushions require only slight pressure to provide high passive noise attenuation. As a result, this headset can be worn comfortably for extended periods.

Caution **With the headset's combination of both active and passive attenuation, typical aircraft sounds (for example, those from engine, propeller, warning alarms, and other sound sources) may sound different. It is strongly recommended that you ensure you can hear and recognize these sounds while you are using the BOSE aviation headset while operating the aircraft.**

In addition, should you choose to listen to in-flight entertainment through a Bose headset while piloting, we remind you to limit the volume to safe levels so that it does not interfere with your ability to hear informational sounds, such as those emitted by warning alarms.

The headset must be worn with the Bose logo on the earcups facing forward. To achieve comfort and good performance, adjust both sides of the headband equally to provide a comfortable fit. To achieve a good seal, lightly grasp both earcups and position them so that your ears are completely inside the Clear Comfort cushions. Final adjustment is best accomplished in a noisy environment with the headset system turned on. Then, reposition both earcups until the headset seems quietest.

903.1.a Interconnect Plug

The headset interconnect plug connects the headset cable to a power source, located in the aircraft control panel. The interconnect plug is designed for quick connection and removal. To ensure correct pin alignment, the plug has a keyway. To insert: rotate the plug until the keyway is aligned; then insert until it locks in place.

To remove: gently pull back on the sleeve of the connector. This automatically unlocks the plug from the socket.

903.1.b Microphone Placement

For good communication clarity and noise rejection, locate the microphone housing so that it just brushes your lips.

903.1.c Adjusting the Volume

For the active noise reduction and volume control circuitry to be active, the headset must be turned on using the on/off switch located on the headband arm.

The volume for your headset is controlled by the grooved knobs located on the front side of the headband arms.

Avoid setting your volume controls at high levels that may affect your hearing during extended periods of headset use.

Note **The volume controls and active noise reducing circuitry work only when the headset is turned on. The volume cannot be turned off completely.**

903.1.d Fail-resistant Operation

The headset provides communication and the ear cups blocks some noise even with the power switch on your headset turned off, bypassing all active noise reducing electronics. Turn the headset off if you suspect there may be a problem.

903.2 Section 2 - Limitations

No change.

903.3 Section 3 - Emergency Procedure

No change.

903.4 Section 4 - Normal Procedure

No change.

903.5 Section 5 - Performance

No change.

BENDIX KDM 706A
DME System

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904 BENDIX/KING KDM 706A

904.1 Section 1 - General

The KDM 706A is a remote mounted 200 channel DME. Range, speed and time to station are displayed on the KDI 574 indicator on the left lower side of the main panel. Frequency selection is performed on the center console keyboard by pressing the **AUX** button. **NAV1**, **NAV2**, **NAV1 HOLD** and **NAV2 HOLD** can be selected from the display using the **FMS** knob on the right lower side of the keyboard.

An additional hold function is provided by the **DME HOLD** switch located next to the KDI 574 indicator. Always the active frequency is held independent from the selection made on the keyboard. If this hold function is active, the switch will light **HOLD** (blue).

904.2 Section 2 - Limitations

No change.

904.3 Section 3 - Emergency Procedure

No change.

904.4 Section 4 - Normal Procedure

No change.

904.5 Section 5 - Performance

No change.

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SHADIN MINIFLO-L

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905 SHADIN MINIFLO-L

905.1 Section 1 - General

Important **The fuel computer MINIFLO-L does not replace the fuel quantity gauges.**

Note **The fuel computer can measure fuel flow but not fuel amount. It is thus unable to determine the amount of usable fuel available in the tanks. It is, therefore, essential to program the computer with the actual amount of usable fuel in the tanks before each flight in order to ensure exact information.**

905.1.a In-Flight Modes

FUEL FLOW - current consumption
Fuel flow is shown continually in the left display.

ENDURANCE - remaining flight time
If the right knob is turned to "ENDURANCE" the remaining flight time in hours and minutes appears in the right display.

FUEL USED - fuel used
If the right switch is moved to "FUEL USED" and held, the amount of fuel consumed since the last setting will appear in the right display.

FUEL REMAINING - remaining amount of fuel
If the left switch is moved to "FUEL REM" and held, the amount of fuel currently available will appear in the right display.

905.1.b Warnings

ENDURANCE
If the right display flashes while the knob is turned to "ENDURANCE", maximum possible endurance at the selected performance settings is less than 30 minutes.

905.2 Section 2 - Limitations

No change.

905.3 Section 3 - Emergency Procedures

The fuel computer is inoperative during a loss of power or once the master switch has been switched off. Once power returns, the instrument will display the correct fuel flow value, all other values are, however, misleading.

905.4 Section 4 - Normal Procedures

905.4.a Preflight Check

Item	Condition
ENTER/TEST	Press
Note	
Activating the test sequence with running engine will result in a loss of fuel measurements for 18 seconds.	

To add fuel:

Item	Condition
REM/USED	**LIT. REM** and hold
ENTER/TEST	Press and hold until figure to be entered is reached
REM/USED	Release
REM/USED	**LIT. REM** to verify value

To subtract fuel:

Item	Condition
REM/USED	**LIT. USED** and hold
ENTER/TEST	Press and hold until figure to be entered is reached
REM/USED	Release
REM/USED	**LIT. REM** to verify value

905.4.b Preflight Check (amplified)

ENTER/TEST*; Press*

Note **Pressing and holding the ENTER/TEST button activates an internal test sequence. An 8 appears in all parts of display for about 10 seconds. If the test is completed, Good appears on the display. If bAd appears, a defect in the system occurs. Corrective measures must be carried out.**

Activating the test sequence with running engine will result in a loss of fuel measurements for 18 seconds.

If aircraft is refueled e.g. after intermediate landing, the following correction of fuel quantity value is envisaged:

Note **If no refueling during intermediate stop, no action concerning programming the computer is required.**

To add fuel:

Item; Condition
REM/USED*;* ***LIT. REM*** *and hold*
ENTER/TEST*; Press and hold until*
figure to be entered is reached
REM/USED*; Release*
REM/USED*;* ***LIT. REM*** *to verify value*

To subtract fuel:

Item; Condition
REM/USED*;* ***LIT. USED*** *and hold*
ENTER/TEST*; Press and hold until*
figure to be entered is reached
REM/USED*; Release*
REM/USED*;* ***LIT. REM*** *to verify value*

905.4.c Correction of input errors:

If a mistake is made when programming the maximum amount of usable fuel so that it exceeds the correct value, switch and hold the **REM/USED** switch in the **LIT. USED** position and press the **ENTER/TEST** button at the same time. The LIT. USED value will disappear and remaining fuel value (LIT. REM) will appear for four seconds in the right display. This value can be reduced while the button and switch are held. The longer they are held, the faster the reduction. On reaching the correct value, release button and switch.

In order to prevent repetition of the four second long display during resetting, the **REM/USED** switch should be held in the **LIT. USED** position and the **ENTER/TEST** button used to control counting.

905.5 Section 5 - Performance

No change.

S-TEC System 55X Autopilot

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906 S-TEC System 55X Autopilot

906.1 Section 1 - General

This manual is to acquaint the pilot with the features and functions of the System 55X Three Axis Autopilot and to provide operating instructions for the system when installed in the EXTRA 500.

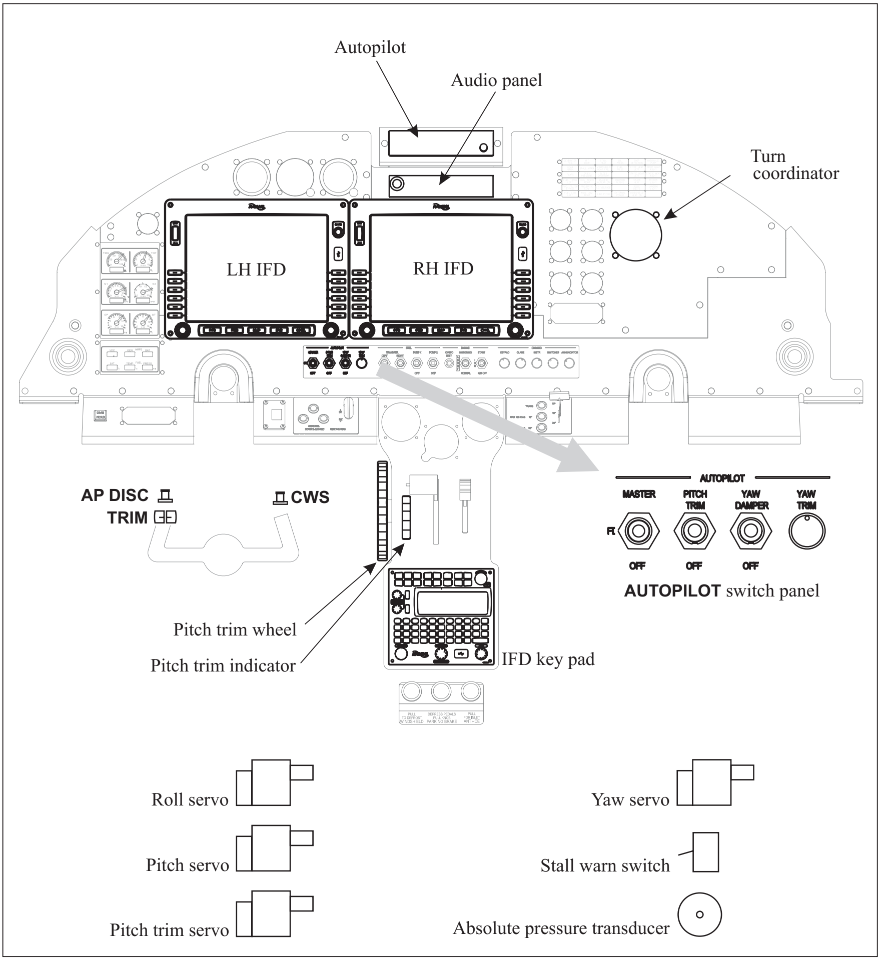

Figure 1
Autopilot and Related Components

Figure 1 shows the autopilot system configuration of the EXTRA 500 including all components interacting with the autopilot. Refer to respective Supplement of this Handbook for information about yaw damper.

906.2 Section 2 - Operating Limitations

The aircraft must be operated within the limitations herein provided when the autopilot is in use.

S-TEC System 55X Pilot's Operating Handbook, P/N 87109, dated 05-01-08 or later, must be carried in the aircraft and be available to the pilot while in flight.

906.2.a Airspeed limitation

Autopilot operation is limited to 90 thru 190 KIAS

906.2.b Flap limitations with autopilot engaged

With autotrim operative: flap extension limited to 15°

With autotrim not operative: flaps limited to 0° position (no extension or retraction)

906.2.c Flight Phase limitations

Autopilot operation prohibited during take-off and landing

Autopilot coupled missed approach or go around maneuvers not authorized

Category I operations only

906.2.d Altitude limitations

Autopilot use prohibited below 200’ AGL during approach operations

Autopilot use prohibited below 800’ AGL during enroute operations

906.3 Section 3 - Emergency Operating Procedures

In the event of an autopilot malfunction, or anytime the autopilot is not performing as expected or commanded, do not attempt to identify the system problem. Immediately regain control of the aircraft by overpowering the autopilot as necessary and then immediately disconnect the autopilot. Do not re-engage the autopilot until the problem has been identified and corrected.

1 The following disconnects the autopilot:

a Depressing the red **AP DISC** switch on the left grip of the pilot's control wheel.

b Operating the pitch **TRIM** switch on the left grip of the pilot's control wheel.

c Placing the **AUTOPILOT MASTER** switch in the **OFF** position.

d Pulling the **A/P-CMPTR** circuit breaker.

e Stall warn switch activation when the critical angle of attack is reached.

2 Trim:

a In the event of a trim failure, manually control aircraft and DEPRESS AND HOLD the red **AP DISC** (trim interrupt) switch on the control wheel.

b Place the **AUTOPILOT PITCH TRIM** switch in **OFF** position, release interrupt switch.

c Trim aircraft manually. Leave trim system OFF until corrected.

3 Altitude loss during a malfunction and recovery:

a The following altitude losses and bank angles were recorded after a malfunction with a 3 second recovery delay:

Configuration	**Bank Angle/Altitude Loss**
Climb	35°/-150'
Cruise	58°/-400'
Descent	50°/-500'

b The following altitude losses and bank angles were recorded after a malfunction with a 1 second recovery delay:

Configuration	Bank Angle/Altitude Loss
Maneuvering	10°/-40'
Approach (Coupled or Uncoupled)	15°/-60'

The above values are the worst case for the EXTRA 500.

906.4 Section 4 - Normal Operating Procedures

For detailed pre-flight and inflight procedures refer to S-TEC System 55X Pilot’s Operating Handbook (see above).

Important **When S-TEC Flight Director is operating, the Flight Director Autopilot should be disconnected using the control wheel disconnect switch only. Any other means of disconnect (breaker, ON-OFF switch, etc.) may leave steering bars in view, but inoperable.**

906.4.a Electric Trim Check

The S-TEC Electric Trim System is designed to accept any single failure, either mechanical or electrical, without uncontrolled operation resulting during operations in the Manual Electric Trim Mode. During autotrim mode the system is designed to limit the effect of any failure causing trim operation. In order to assure proper operation of these safeguards, it is necessary to conduct a simple pre-flight test of the system prior to each flight.

Following is the trim pre-flight test procedure:

1 Manual Electric Elevator Trim

a **AUTOPILOT PITCH TRIM** and **MASTER** switch - **ON**

b Operate **TRIM** switch (both knob sections) - Nose DN - Check trim moves nose down and trim in motion indicator TRIM in A/P Programmer flashes. Operate **TRIM** switch - Nose UP - Check trim moves nose up and for in motion indicator TRIM.

c With trim operating Nose UP and DN - grasp manual trim control and overpower electric trim to stop trim action.

d Operate each half of the trim switch separately - trim should not operate unless both switch knob segments are moved together.

e With Trim Operating - Depress **AP DISC** (trim interrupt) switch - Trim motion should stop while **AP DISC** switch is depressed - when released trim should operate normally.

2 Autotrim (Elevator)

a Engage HDG and VS modes of the autopilot.

b Grasp control and slowly apply forward pressure (NOSE DOWN) - After approximately three (3) seconds trim should run NOSE UP.

c Slowly apply aft pressure (NOSE UP) to control wheel - after approximately three (3) seconds trim should run NOSE DOWN.

d Move manual **TRIM** switch UP or DN - Autopilot should disconnect and trim operates in the commanded direction. (**TRIM** switch will disconnect autopilot only when a pitch mode is engaged.)

e Reengage autopilot HDG and VS Modes and depress **AP DISC** (trim interrupt) switch - Autopilot should disconnect.

f Retrim aircraft for take-off - Check all controls for freedom of motion and to determine that the autopilot and trim have disconnected.

If either the Manual Electric or Autotrim fails any portion of the above check procedure, move the **AUTOPILOT PITCH TRIM** switch **OFF** and do not attempt to use the trim system until the fault is corrected. With the **AUTOPILOT PITCH TRIM** in **OFF** position the autopilot trim indicators and audio system will return to operation.

If the electric trim system suffers a power failure in flight the system will automatically revert to the in motion indicator **TRIM** and to the audio horn (via audio panel). If this occurs turn the **AUTOPILOT PITCH TRIM** switch in **OFF** position and trim manually, using the indicators until the fault can be located and corrected.

906.4.b Glide Slope Flight Procedure

Approach the glide slope intercept point (usually the OM) with the flaps set to approach deflection of 15° at 100-110 KIAS (see Limitations Section) and with the aircraft stabilized in altitude hold mode. At the glide slope intercept, lower the landing gear and adjust power for the desired descent speed. For best tracking results make power adjustments in small, smooth increments to maintain desired airspeed. At the missed approach point or the decision height, disconnect the autopilot for landing or for the go-around maneuver (see Limitations Section). If a missed approach is required, the autopilot may be reengaged after the aircraft has been reconfigured for and established in stabilized climb.

906.5 Section 5 - Performance

No change.

906.6 Section 6 - Weight and Balance

No change.

906.7 Section 7 - Description and Operation of the Airplane and its Systems

For detailed system description refer to S-TEC System 55X Pilot's Operating Handbook (see above).

906.8 Section 8 - Handling, Servicing and Maintenance

No change.

S-TEC Yaw Trim System

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907 S-TEC Yaw Trim System

907.1 Section 1 - General

The aircraft incorporates a yaw trim system that helps to maintain zero side-slip angle, in case the autopilot is engaged and a roll mode selected.

907.2 Section 2 - Operating Limitations

Due to the direct technical dependency on the autopilot installed the yaw trim system limitations are already covered by the autopilot limitations (refer to applicable Autopilot Supplement of this Handbook).

907.3 Section 3 - Emergency Operating Procedures

In the event of abnormal operation of the yaw trim system conduct the following procedure:

1. Manually stabilize the aircraft by application of rudder controls.
2. Press the red **AP DISC** (trim interrupt) switch on the left grip of the pilot's control wheel.
3. Place the **AUTOPILOT YAW DAMPER** switch in **OFF** position

907.4 Section 4 - Normal Operating Procedures

907.4.a Pre-Flight

Note **During system functional checks, adequate aircraft voltage must be provided.**

1. Select HDG mode on the autopilot.
2. Engage the yaw trim system by selecting **AUTOPILOT YAW DAMPER**.
3. With autopilot HDG bug centered, rotate yaw trim potentiometer full left - left rudder pedal should slowly move forward - repeat this step to the right.
4. Disconnect autopilot - verify controls are free.

907.4.b In Flight

1. Center yaw trim control knob and engage roll axis of autopilot.
2. To engage Yaw Trim System, select **AUTOPILOT YAW DAMPER**.
3. Make small trim adjustments using yaw trim control knob, as required, during airspeed and power changes.

Note **The autopilot may be used without the yaw trim system, if desired, but the pilot will be required use manual rudder inputs to maintain yaw trim during power, airspeed and configuration changes.**

907.5 Section 5 - Performance

Not affected.

907.6 Section 6 - Weight and Balance

Not affected.

907.7 Section 7 - Description and Operation of the Airplane and its Systems

The yaw trim system consists of a yaw trim amplifier, a rudder servo and an instrument panel mounted **AUTOPILOT YAW DAMPER** control switch and a **YAW TRIM** adjustment potentiometer. The yaw trim amplifier also contains an accelerometer which senses a long term out of trim condition and produces a rudder trim signal that aids in keeping the slip/skid ball centered. Further yaw trim changes can also be achieved by using the pilot controlled **YAW TRIM** knob.

For more detailed system description refer to S-TEC System 55X Pilot's Operating Handbook, P/N 87109, dated 05-01-08 or later.

The **AUTOPILOT YAW DAMPER** switch provides the following two functions:

OFF - This position disengages the rudder servo by inhibiting power to the servo engagement solenoid.

YAW DAMPER - This position arms the yaw trim system for engagement when a basic autopilot lateral mode is engaged. In the EXTRA 500 configuration the yaw trim cannot be engaged separately from the autopilot system. The yaw trim will disengage simultaneously with the autopilot when the **AP DISC** (trim interrupt) switch is used. The yaw trim system can be disengaged anytime its use is not desired by selecting the **OFF** position of the **AUTOPILOT YAW DAMPER** switch.

YAW TRIM - This knob may be used by the pilot to effect small yaw trim changes to center the "ball" in the turn-slip instrument. Clockwise rotation will provide a right rudder input and counterclockwise will provide a left rudder input.

When making an adjustment, rotate knob in small increments and allow 3-5 seconds for the adjustments to take effect. Normal changes in trim required during airspeed changes will be accomplished automatically for 1/8 to 1/4 ball deflections.

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Flashlight

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908 Flashlight

908.1 Section 1 - General

An emergency flashlight is provided for the case of total loss of electrical power. The flashlight is located on the top of the stowage rack behind the copilot seat.

908.2 Section 2 - Limitations

Use only in emergency case.

The batteries have to be replaced once a year and after each use.

908.3 Section 3 - Emergency Procedure

No change.

908.4 Section 4 - Normal Procedure

No change.

908.5 Section 5 - Performance

No change.

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Airplanes Registered in the EU with a reduced MTOW 1999kg

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909 MTOW 1999 kg

909.1 Section 1 – General

909.1.a Purpose

This supplement is required for operation of the EXTRA 500 with a reduced MTOW of 1999 kg when registered in the European Union.
No physical changes to the aircraft other than additional limitation placards are necessary for this MTOW reduction. Filling the auxiliary fuel compartments is prohibited, however.
Extra Kit N° 33778 (includes placards and this supplement) has to be installed.

909.1.b Capacities

Total Fuel Capacity:	468 l (123.6 U.S. Gallons)
Total Usable Fuel:	440 l (116.2 U.S. Gallons)
Unusable Fuel:	28 l (7.4 U.S. Gallons)

909.1.c Maximum Certificated Weights

Maximum allowable Takeoff Weight:	1999 kg (4407 lbs.)
Maximum allowable Landing Weight:	1999 kg (4407 lbs.)
Maximum operational Empty Weight (including 1 crew member):	1558 kg (3435 lbs.)

909.1.d Specific Loadings

Wing Loading (maximum):	140.1 kg/m2 (28.7 lbs./sq.ft.)
Power Loading (maximum):	4.4 kg/BHP (9.8 lbs./BHP)

909.2 Section 2 – Limitations

909.2.a Airspeed Limitations

Airspeed Limitations are indicated in KCAS. The operational significance is shown in Figure 909-1 below.

Speed	KCAS	KIAS	Remarks
Maneuvering Speeds V_A/V_o 1545 kg (3406 lbs.) 1999 kg (4407 lbs.)	 132 158	 131 156	Avoid full or abrupt control movements above these speeds. For masses between the given ones the values are assumed to be linear.

Figure 909-1

909.2.b Aircraft Weight Limitations

Maximum Ramp Weight (Taxi Weight):	1999 kg (4407 lbs.)
Maximum Takeoff Weight:	1999 kg (4407 lbs.)
Maximum Landing Weight:	1999 kg (4407 lbs.)
Maximum Empty Weight: (incl. unusable fuel)	1481 kg (3265 lbs.)

909.2.c Center of Gravity Limits

Center of gravity ranges (M.A.C.) are as follows:

Note **Values are for landing gear extended configuration.**

Forward C.G.: 18 % M.A.C. up to TOW 1600 kg (3527 lbs.)
23.3 % M.A.C. up to MTOW 1999 kg (4407 lbs.)

Note **C.G. range varies linearly between mass limits. M.A.C. is 1322 mm (52.05 in.).**

0 % M.A.C. is at 3200 mm.

909.2.d Fuel Limitations

1 Fuel Quantity

Fuel quantity is based on fuel grade JET A-1 at 15 °C (59 °F) with specific gravity 0.814 kg/l and shown in table (Figure 910-2) below:

Note **The left and right wing are subdivided in three compartments each; the collector, main and auxiliary compartment.**

Important **The auxiliary fuel compartments (left and right) may not be filled and shall be empty at all times.**

Wing Tank	Liter	lbs	Kg	US Gal.	Remark
Collector Compartment	2 x 37.4	2 x 67.1	2 x 30.4	2 x 9.9	One indicator each side
Main Compartment	2 x 196.6	2 x 352.9	2 x 160.0	2 x 51.9	One indicator each side
Total Capacity	**468.0**	**839**	**381**	**123.6**	
Unusable Fuel	2 x 14.0	2 x 25.1	2 x 11.4	2 x 3.7	
Usable Fuel	**440.0**	**789**	**358**	**116.2**	

Figure 909-2

909.2.e Placards

1 Internal Placards

On instrument panel in full view of the pilot:

Near to the pilot’s airspeed indicator:

Operating Maneuvering Speed at 1545kg (3406 lbs):	131 KIAS
at MTOW of 1999kg (4407 lbs):	156 KIAS
Maximum Landing Gear Operation Speed:	140 KIAS
Maximum Landing Gear Extended Speed:	140 KIAS

2 External Placards

On the filler caps of the auxiliary fuel tanks:

909.3 Section 3 – Emergency Procedures

909.3.a Airspeed for Safe Operation

Aircraft weight: 1999 kg (4407 lbs)

Speed	KIAS
Maneuvering Speed	156

Figure 909-3

909.4 Section 4 – Normal Procedures

909.4.a Before Starting Engine

Item	Condition
Auxiliary tanks fuel gauges	Check 0L

909.5 Section 5 – Performance

All performance data is equal or better than original aircraft data. Due to reduced fuel capacity the Endurance and Range are reduced however.

Note **The Range Profile chart as depicted on the Avidyne release 9 IFD is to be neglected.**

ENDURANCE PROFILE

30 MINUTES RESERVE
116.2 GAL, (440 L), (789 LB) USABLE FUEL

CONDITIONS: 4407 LBS (1999 KG)
Standard Temperature
Zero Wind

NOTE: **Endurance includes warmup, taxi, takeoff, max. power climb, descent plus 30 minutes reserve at cruise power.**

Pressure Altitude (FT)	ENDURANCE (HRS)							
	92%	90%	85%	80%	70%	60%	50%	40%
0	2,6	2,7	2,8	3,0	3,3	3,7	4,2	4,7
2000	2,7	2,7	2,9	3,0	3,4	3,8	4,3	4,8
4000	2,8	2,8	3,0	3,1	3,5	3,9	4,4	5,0
6000	2,8	2,8	3,0	3,2	3,6	4,0	4,5	5,2
8000	2,8	2,9	3,0	3,2	3,6	4,1	4,7	5,4
10000	2,8	2,9	3,1	3,2	3,7	4,2	4,8	5,5
12000	2,9	2,9	3,1	3,3	3,7	4,3	4,9	5,7
14000		3,0	3,1	3,3	3,8	4,3	5,0	5,8
16000			3,1	3,3	3,8	4,4	5,1	6,0
18000				3,3	3,7	4,4	5,1	6,1
20000					3,7	4,4	5,2	6,2
22000						4,4	5,2	6,2
24000						4,4	5,2	6,3
25000							5,2	6,2

Indicates performance outside the engine limitations.
Data is provided for interpolation purposes.

RANGE PROFILE

30 MINUTES RESERVE
116.2 GAL, (440 L), (789 LB) USABLE FUEL

CONDITIONS: 4407 LBS (1999 KG)
Standard Temperature
Zero Wind

NOTE: **Range includes warmup, taxi, takeoff, max. power climb, descent plus 30 minutes reserve at cruise power.**

Pressure Altitude (FT)	RANGE (NM)							
	92%	90%	85%	80%	70%	60%	50%	40%
0	523	529	543	560	592	618	633	638
2000	544	549	565	581	615	644	662	671
4000	563	569	586	603	639	671	693	706
6000	580	587	605	624	664	698	724	742
8000	595	602	621	642	686	726	756	778
10000	607	615	635	658	707	753	789	815
12000	624	631	651	674	725	776	819	850
14000		648	666	689	743	799	848	885
16000			676	699	755	817	875	919
18000				700	761	831	897	951
20000					760	840	917	982
22000						851	930	1007
24000						874	941	1028
25000							945	1032

Indicates performance outside the engine limitations.
Data is provided for interpolation purposes.

909.6 Section 6 – Weight and Balance

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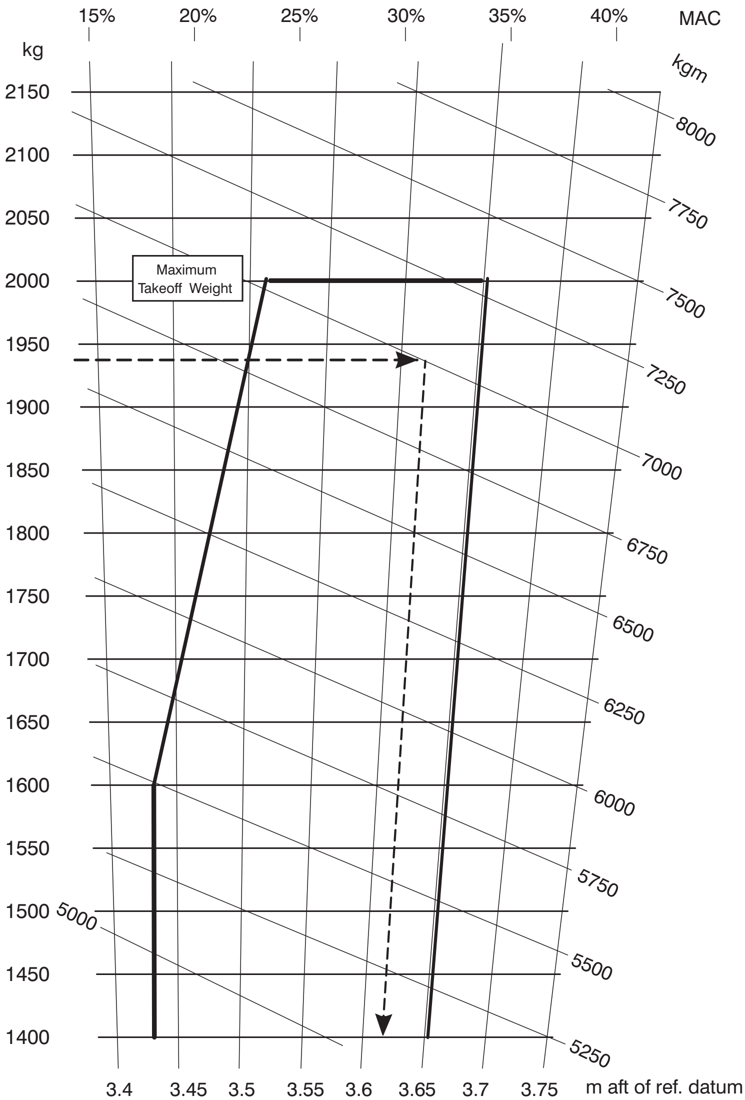
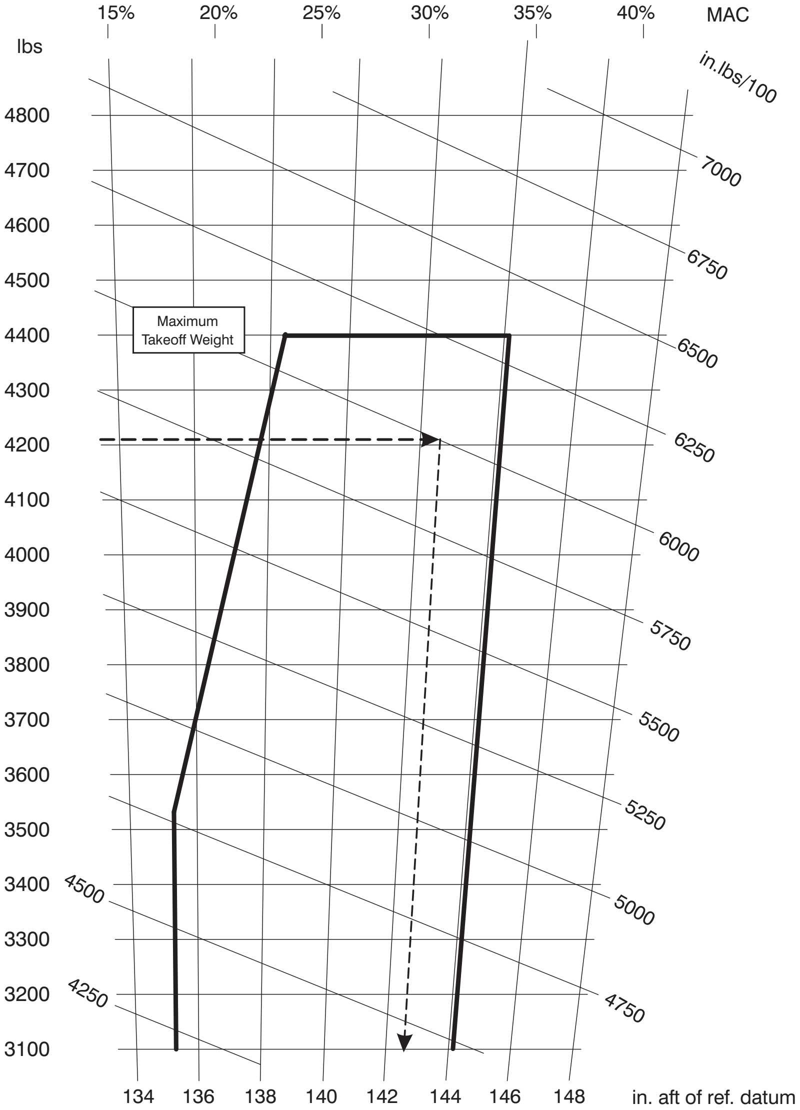
Weight and Moment Limits (SI units)



Example: At 1940 kg and a Moment of 7000 kgm
CG Location is 3.618 m aft of Reference Datum

Figure 909-4

Weight and Moment Limits (U.S. units)



Example: At 4205 lbs and a Moment of 6000 in.lbs./100
CG Location is 142.4 in. aft of Reference Datum

Figure 909-5

909.7 Section 7 – Systems Description

No change from basic Handbook.

909.8 Section 8 – Handling, Servicing and Maintenance

No change from basic Handbook.

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Alternative Annunciator Panel (Extra)

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911 Alternative Annunciator Panel (Extra)

911.1 Section 1 – General

911.1.a Purpose

This supplement describes the alternative annunciator panel of the EXTRA 500. The annunciator panel contains Warnings, Cautions and Safe Operation Lights which inform the pilot of an unusual aircraft situation.

911.2 Section 2 – Limitations

No change from basic Handbook

911.3 Section 3 – Emergency Procedures

No change from basic Handbook

911.4 Section 4 – Normal Procedures

No change from basic Handbook

911.5 Section 5 – Performance

No change from basic Handbook

911.6 Section 6 – Weight and Balance

See Chapter 6.5 Equipment List

911.7 Section 7 – Systems Description

911.7.a Instrument Panel

The annunciator panel is located in the RH, upper part of the instrument panel. Figure 911-1 shows the panel and the positions of all lights:

- Warnings; red, marked with W

- Cautions; yellow, marked with C and
- Safe Operation; green marked with S

Each annunciator is backlit with 2 LED-s. The text is lit and the background is black.

The lights may be dimmed using the **DIMMING ANNUNCIATOR** rheostat and tested using the **TEST** position of the **NIGHT/DAY** switch.

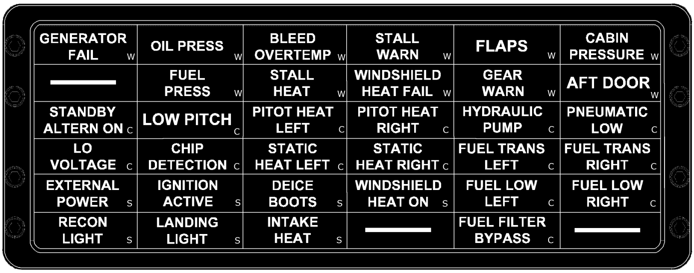

Figure 911-1

911.8 Section 8 – Handling, Servicing and Maintenance

No change from basic Handbook.

Airplanes Registered in the United States

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999 U. S. Registered Airplanes

999.1 Section 1 – General

999.1.a Purpose

1. This supplement is required for operation of EXTRA 500 airplanes when registered in the United States. This supplement must be attached to the applicable EXTRA 500 EASA/FAA approved Airplane Flight Manual.
2. The information contained within this supplement is to be used in conjunction with the basic AFM and supplements. The information contained herein supplements or supersedes that in the basic manual and approved supplements only in those areas indicated.
3. Compliance with the limitations contained in the basic manual and approved supplements is mandatory.
4. Foreign operating rules and any references to such rules in the basic manual and approved supplements are not applicable in the United States. The aircraft must be equipped and operated in accordance with applicable operating requirements.

999.2 Section 2 – Limitations

999.2.a Kinds of Operation

The airplane is approved for day and night VFR operations when the appropriate equipment is installed.

Flights into icing conditions are prohibited.
Flight is prohibited under presence of visible moisture in any form at an indicated outside air temperature (OAT) of +4°C [40°F] or below.

Ground and flight operation in both falling and blowing snow is prohibited.

Note **For special crew requirements, national regulations must be observed.**

The aircraft is certified for B-RNAV operation. P-RNAV operation and GNSS approach are prohibited.

For kinds of operation equipment lists refer to section 999.2.b.

999.2.b Kinds of Operation Equipment List

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Air Conditioning					
Environmental bleed shut off valve	1	1			
Windshield defrost system	1	1			
Warning light: **BLEED OVERTEMP**	1	1			
Pressure Cabin (above FL 120)					
Automatic bleed temperature control system	1	1			
Automatic bleed mass flow control system	1	1			
Cabin pressure controller	1	1			
Outflow control valve	1	1			
Outflow safety valve	1	1			
Cabin altitude indicator	1	1			
Cabin diff. press. indicator	1	1			
Warning light: **CABIN PRESSURE**	1	1			
Auto Flight					
Autopilot					
Turn & bank indicator (electric)					
Communications					
Audio panel					
ELT 406 MHz	1	1			
Electrical Power					
Battery	1	1			

System and/or Equipment	**VFR-Day**	**VFR-Night**	**IFR-Day**	**IFR-Night**	**ICE**
(Starter-) generator	1	1			
Standby alternator					
Voltage indicator	1	1			
Ammeter (generator & standby alternator)	1	1			
Warning light: **GENERATOR FAIL**	1	1			
Caution light: **LO VOLTAGE**	1	1			
Caution light: **STANDBY ALTERN ON**					
Safe operation light: **EXTERNAL POWER**	1	1			
Equipment / Furnishings					
Safety belt and shoulder harness	*	*			
Fire Protection					
Fire extinguisher	1	1			
Flight Controls					
Flap system	1	1			
Flap position indication	1	1			
Pitch trim system	1	1			
Pitch trim position indicator	1	1			
Warning light: **FLAPS**	1	1			
Flap position indication (1x amber, 2x green)	1	1			
Fuel					
Electric fuel pump	2	2			
Fuel quantity indicators	6	6			
Fuel transfer system (left & right)	1	1			
Caution light: **FUEL TRANS LEFT**	1	1			
Caution light: **FUEL TRANS RIGHT**	1	1			

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Caution light: FUEL LOW LEFT	1	1			
Caution light: FUEL LOW RIGHT	1	1			
Caution light: FUEL FILTER BYPASS	1	1			
Warning light: FUEL PRESS	1	1			
Hydraulic Power					
Hydraulic power pack	1	1			
Caution light: HYDRAULIC PUMP	1	1			
Ice and Rain Protection					
Heated engine inlet	1	1			
Warning light: WINDSHIELD HEAT FAIL	1	1			
Safe operation light: INTAKE HEAT	1	1			
Safe operation light: WINDSHIELD HEAT ON	1	1			
Indicating / Recording Systems					
IFD, incl. COM, NAV, GPS, Altimeter, Airspeed indicator, Attitude indicator, Vertical speed indicator, clock	2	2			
Aural warning system (over-speed, gear, stall)	1	1			
Cockpit loudspeaker	1	1			
Landing Gear					
Landing gear position indication (3x green)	1	1			
Warning light: GEAR WARN	1	1			
Lights					
Flashlight		1			
Anti-collision light system (strobe)	1	1			

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Landing light		1			
Navigation light system (reco)	1	1			
Instrument light system (incl. test function)		1			
Cockpit controls illumination (luminous films)		1			
Glare light		1			
Safe operation light: **LANDING LIGHT**		1			
Safe operation light: **RECOGN LIGHT**	1	1			
Navigation					
Standby airspeed indicator					
Pitot tube	1	1			
Pitot tube, heated					
Standby altimeter					
Static source	2	2			
Static source, heated					
IAT indicator	1	1			
Magnetic compass	1	1			
Standby attitude gyro (electric)					
Transponder	1	1			
Stall warning system	1	1			
Stall warning system (heated)					
Warning light: **STALL WARN**	1	1			
Warning light: **STALL HEAT**					
Caution light: **PITOT HEAT LEFT**					
Caution light: **PITOT HEAT RIGHT**					
Caution light: **STATIC HEAT LEFT**					
Caution light: **STATIC HEAT RIGHT**					

System and/or Equipment	VFR-Day	VFR-Night	IFR-Day	IFR-Night	ICE
Pneumatic					
Pneumatic pressure regulator	1	1			
Caution light: **PNEUMATIC LOW**	1	1			
Doors					
Warning light: **AFT DOOR**	1	1			
Propellers					
Caution light: **LOW PITCH**	1	1			
Ignition					
Safe operation light: **IGNITION ACTIVE**	1	1			
Engine Indicating					
Fuel flow indicator					
Fuel pressure indicator	1	1			
N_2 (Prop) RPM indicator	1	1			
N_1 (Gas-generator) RPM indicator	1	1			
Torque indicator	1	1			
TOT indicator	1	1			
Oil pressure indicator	1	1			
Oil temperature indicator	1	1			
Warning light: **OIL PRESS**	1	1			
Caution light: **CHIP DETECTION**	1	1			

*) one for each seat occupied

999.3 Section 3 – Emergency Procedures

No change from basic Handbook.

999.4 Section 4 – Normal Procedures

No change from basic Handbook.

999.5 Section 5 – Performance

No change from basic Handbook.

999.6 Section 6 – Weight and Balance

No change from basic Handbook.

999.7 Section 7 – Systems Description

No change from basic Handbook.

999.8 Section 8 – Handling, Servicing and Maintenance

No change from basic Handbook.

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