SECTION I
GENERAL

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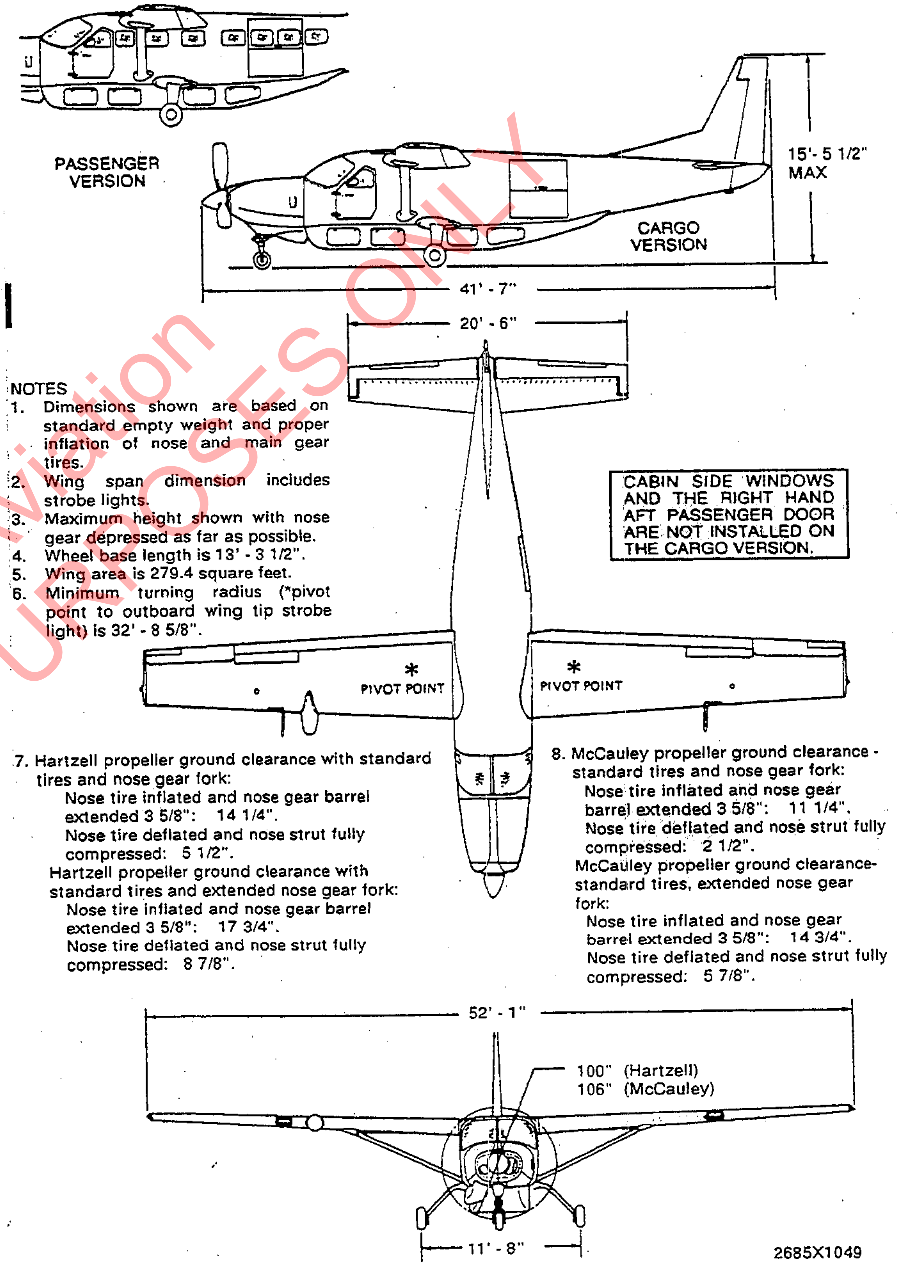


Figure 1-1. Three View

INTRODUCTION

This handbook contains 9 sections, and includes the material required to be furnished to the pilot by Federal Aviation Regulations and additional information provided by Cessna Aircraft Company. This handbook constitutes the FAA Approved Airplane Flight Manual.

WARNING

- **This handbook is not intended to be a guide for basic flight instruction or a training manual and should not be used as one. It is not a substitute for adequate and competent flight instruction, pilot skill, and pilot knowledge of current Airworthiness Directives, applicable Federal Aviation Regulations and/or Advisory Circulars.**
- **Assuring the airworthiness of the airplane is the responsibility of the airplane owner or operator. Determining if the airplane is safe for flight is the responsibility of the pilot in command. The pilot is also responsible for adhering to the operating limitations set forth by instrument markings, placards, and this Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.**

Generally, information in this handbook is applicable to both cargo and passenger versions of the Model 208B. Some equipment differences exist between these versions, and specific versions are identified through use of the terms "Cargo Version" and "Passenger Version". When one of these terms appears in text or on an illustration, the information applies only to that group of airplanes. If no term appears, the information applies to all airplanes.

Section 1 provides basic data and information of general interest. It also contains definitions or explanations of symbols, abbreviations, and terminology commonly used.

DESCRIPTIVE DATA

ENGINE

Number of Engines: 1
Engine Manufacturer: Pratt & Whitney Canada, Inc.
Engine Model Number: PT6A-114A.
Engine Type: Free turbine, two-shaft engine utilizing a compressor section having three axial stages and one centrifugal stage, an annular reverse-flow

combustion chamber, a one-stage compressor turbine, a one-stage power turbine, and a single exhaust. The power turbine drives the propeller through a two-stage planetary gearbox at the front of the engine.
Horsepower: Flat rated at 675 shaft horsepower.

PROPELLER (Hartzell)

Propeller Manufacturer: Hartzell Propeller Products.
Propeller Model Number: HC-B3MN-3/M10083.
Number of Blades: 3.
Propeller Diameter, Maximum: 100 inches.
Minimum: 100 inches (No cutoff approved).
Propeller Type: Constant-speed, full-feathering, reversible, hydraulically-actuated composite-bladed propeller, with a feathered blade angle of 78.4°, a low pitch blade angle of 9°, and a maximum reverse blade angle of -18° (42-inch station).

PROPELLER (McCauley)

Propeller Manufacturer: McCauley Accessory Division.
Propeller Model Number: 3GFR34C703/106GA-0.
Number of Blades: 3.
Propeller Diameter, Maximum: 106 inches.
Minimum: 104 inches.
Propeller Type: Constant-speed, full-feathering, reversible, hydraulically-actuated aluminum-bladed propeller, with a feathered blade angle of 88°, a low pitch blade angle of 15.6°, and a maximum reverse blade angle of -14° (30-inch station).

FUEL

Approved Fuel Grade (Specification):
JET A (ASTM-D1655).
JET A-1 (ASTM-D1655).
JET B (ASTM-D1655).
JP-1 (MIL-L-5616).
JP-4 (MIL-T-5624).
JP-5 (MIL-T-5624).
JP-8 (MIL-T-83133A).
Alternate/Emergency Fuels:
Aviation Fuel(All grades of military and commercial aviation gasoline).

CAUTION

Aviation gasoline is restricted to emergency use and shall not be used for more than 150 hours in one overhaul period; a mixture of one part aviation gasoline and three parts of Jet A, Jet A-1, JP-1, or JP-5 may be used

for emergency purposes for a maximum of 450 hours per overhaul period.

Approved Fuel Additives:
One of the following additives is required for anti-icing protection:

Ethylene Glycol Monomethyl Ether.
Diethylene Glycol Monomethyl Ether.

CAUTION

JP-4 and JP-5 fuel per MIL-T-5624 and JP-8 fuel per MIL-T-83133A contain the correct premixed quantity of an approved type of anti-icing fuel additive and no additional anti-ice compounds should be added.

If additional anti-static protection is desired, the following additive is approved for use:
Dupont Stadis 450

If additional biocidal protection is desired, the following additives are permitted for use in certain conditions.
Sohio Biobor JF
Kathon FP 1.5

Refer to Section 8 for allowable concentrations of the above additives and additional information.

Fuel Capacity (S/N 208B0001 thru 208B0089 Not Modified With SK208-52):
Total Capacity: 335 U.S. gallons.
Total Capacity Each Tank: 167.5 U.S. gallons.
Total Usable: 332 U.S. gallons.

Fuel Capacity (S/N 208B0001 thru 208B0089 Modified With SK208-52 And S/N 208B0090 And On):
Total Capacity: 335.6 U.S. gallons.
Total Capacity Each Tank: 167.8 U.S. gallons.
Total Usable: 332 U.S. gallons.

OIL

Oil Grade (Specification):
Oil conforming to Pratt & Whitney Engine Service Bulletin No. 1001, and all revisions or supplements thereto, **must be used**. Refer to Section 8 for a listing of approved oils.

Total Oil Capacity: 14 U.S. quarts (including oil in filter, cooler and hoses).
Drain and Refill Quantity: Approximately 9.5 U.S. quarts.
Oil Quantity Operating Range:
Fill to within 1 1/2 quarts of MAX HOT or MAX COLD (as appropriate) on dipstick. Quart markings indicate U.S. quarts low if oil is hot. For example, a dipstick reading of 3 indicates the system is within 2 quarts of MAX if the oil is cold and within 3 quarts of MAX if the oil is hot.

WARNING

Ensure oil dipstick cap is securely latched down. Operating the engine with the dipstick cap unlatched will result in excessive oil loss and eventual engine stoppage.

NOTE

To obtain an accurate oil level reading, it is recommended the oil level be checked within 10 minutes after engine shutdown while the oil is hot (MAX HOT marking) or prior to the first flight of the day while the oil is cold (MAX COLD marking). If more than 10 minutes has elapsed since engine shutdown and engine oil is still warm, perform an engine dry motoring run before checking oil level.

MAXIMUM CERTIFICATED WEIGHTS

Ramp: 8785 lbs.
Takeoff: 8750 lbs.
Landing: 8500 lbs.

NOTE

Refer to Section 6 for recommended loading arrangements.

STANDARD AIRPLANE WEIGHTS

Standard Empty Weight (S/N 208B0179, 208B0230 thru 208B0381, and early serials modified by SK208-80):
Cargo Version: 4040 lbs., Passenger Version: 4162 lbs.
Standard Empty Weight (S/N 208B0382 and on):
Cargo Version: 4071 lbs., Passenger Version: 4237 lbs.
Maximum Useful Load (S/N 208B0179, 208B0230 thru 208B0381, and early serials modified by SK208-80):
Cargo Version: 4745 lbs., Passenger Version: 4623 lbs.
Maximum Useful Load (S/N 208B0382 and on):
Cargo Version: 4714 lbs., Passenger Version: 4548 lbs.

CABIN AND ENTRY DOOR DIMENSIONS

Detailed dimensions of the cabin interior and entry door openings are illustrated in Section 6.

BAGGAGE /CARGO COMPARTMENT AND CARGO DOOR ENTRY DIMENSIONS

Dimensions of the baggage/cargo area and cargo door openings are illustrated in detail in Section 6.

SPECIFIC LOADINGS

Wing Loading: 31.3 lbs./sq.ft. Power Loading: 13.0 lbs./shp.

SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

KCAS	**Knots Calibrated Airspeed** is indicated airspeed corrected for position and instrument error and expressed in knots. Knots calibrated airspeed is equal to KTAS in standard atmosphere at sea level.
KIAS	**Knots Indicated Airspeed** is the speed shown on the airspeed indicator and expressed in knots.
KTAS	**Knots True Airspeed** is the airspeed expressed in knots relative to undisturbed air which is KCAS corrected for altitude and temperature.
V_A	**Maneuvering Speed** is the maximum speed at which full or abrupt control movements may be used.
V_{FE}	**Maximum Flap Extended Speed** is the highest speed permissible with wing flaps in a prescribed extended position.
V_{MO}	**Maximum Operating Speed** is the speed that may not be deliberately exceeded at any time.
V_S	**Stalling Speed or the minimum steady flight speed** at which the airplane is controllable.
V_{SO}	**Stalling Speed or the minimum steady flight speed** at which the airplane is controllable in the landing configuration at the most forward center of gravity.
V_X	**Best Angle-of-Climb Speed** is the speed which results in the greatest gain of altitude in a given horizontal distance.
V_Y	**Best Rate-of-Climb Speed** is the speed which results in the greatest gain in altitude in a given time.

METEOROLOGICAL TERMINOLOGY

OAT	**Outside Air Temperature** is the free air static temperature. It is expressed in either degrees Celsius or degrees Fahrenheit.
Pressure Altitude	**Pressure Altitude** is the altitude read from an altimeter when the altimeter's barometric scale has been set to 29.92 inches of mercury (1013.2 mb).

ISA	**International Standard Atmosphere** is an atmosphere in which: 1. The air is a perfect dry gas; 2. The temperature at sea level is 15°C; 3. The pressure at sea level is 29.92 inches Hg. (1013.2 mb); 4. The temperature gradient from sea level to the altitude at which the temperature is -56.5°C is -1.98°C per 1000 feet.

ENGINE POWER TERMINOLOGY

Beta Mode	**Beta Mode** is the engine operational mode in which propeller blade pitch is controlled by the power lever. The beta mode may be used during ground operations only.
Flameout	**Flameout** is the unintentional loss of combustion chamber flame during operation.
Flat Rated	**Flat Rated** denotes constant horsepower over a specific altitude and/or temperature range.
Gas Generator RPM (N_g)	**Gas Generator RPM** indicates the percent of gas generator RPM based on a figure of 100% being 37,500 RPM.
GCU	**GCU** is generator control unit.
Hot Start	**Hot Start** is an engine start, or attempted start, which results in an ITT exceeding 1090°C.
ITT	**ITT** signifies inter-turbine temperature.
Maximum Climb Power	**Maximum Climb Power** is the maximum power approved for normal climb. Use of this power setting is limited to climb operations. This power corresponds to that developed at the maximum torque limit, ITT of 765°C (740°C is recommended) or N_g limit (101.6%), whichever is less.
Maximum Continuous Power	**Maximum Continuous Power** is the maximum power rating not limited by time. Use of this power should be limited to those circumstances which require maximum aircraft performance (i.e., extreme icing conditions or windshear downdrafts). This power corresponds to that developed at the maximum torque limit, ITT of 805°C or N_g limit (101.6%), whichever is less.

Maximum Cruise Power — **Maximum Cruise Power** is the maximum power approved for cruise and is not time limited. This power corresponds to that developed at the maximum specified cruise torque (Section 5), ITT of 740°C or N_g limit (101.6%), whichever is less.

N_g — **N_g** signifies gas generator RPM.

Propeller RPM — **Propeller RPM** indicates propeller speed in RPM.

Reverse Thrust — **Reverse Thrust** is the thrust produced when the propeller blades are rotated past flat pitch into the reverse range.

RPM — **RPM** is revolutions per minute.

SHP — **SHP** is shaft horsepower and is the power delivered at the propeller shaft.

$$SHP = \frac{\text{Propeller RPM} \times \text{Torque (foot-pounds)}}{5252}$$

Takeoff Power — **Takeoff Power** is the maximum power rating and is limited to a maximum of 5 minutes under normal operation. Use of this power should be limited to normal takeoff operations. This power corresponds to that shown in the Engine Torque For Takeoff figure of Section 5.

Torque — **Torque** is a measurement of rotational force exerted by the engine on the propeller.

Windmill — **Windmill** is propeller rotation from airstream inputs.

AIRPLANE PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

Demonstrated Crosswind Velocity — **Demonstrated Crosswind Velocity** is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests. The value shown is not considered to be limiting.

g — **g** is acceleration due to gravity.

NMPP — **Nautical Miles Per Pound** is the distance which can be expected per pound of fuel used.

PPH — **PPH** signifies pounds per hour and is the amount of fuel used per hour.

Unusable Fuel — **Unusable Fuel** is the quantity of fuel that can not be safely used in flight.

Usable Fuel — **Usable Fuel** is the fuel available for flight planning.

WEIGHT AND BALANCE TERMINOLOGY

Arm — **Arm** is the horizontal distance from the reference datum to the center of gravity (C.G.) of an item.

Basic Empty Weight — **Basic Empty Weight** is the standard empty weight plus the weight of optional equipment.

Center of Gravity (C.G.) — **Center of Gravity** is 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 — **Center of Gravity Arm** is the arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.

C.G. Limits — **Center of Gravity Limits** are the extreme center-of-gravity locations within which the airplane must be operated at a given weight.

MAC — **MAC (Mean Aerodynamic Chord)** of a wing is the chord of an imaginary airfoil which throughout the flight range will have the same force vectors as those of the wing.

Maximum Landing Weight — **Maximum Landing Weight** is the maximum weight approved for the landing touchdown.

Maximum Ramp Weight — **Maximum Ramp Weight** is the maximum weight approved for ground maneuver. (It includes the weight of start, taxi and runup fuel.)

Maximum Takeoff Weight — **Maximum Takeoff Weight** is the maximum weight approved for the start of the takeoff roll.

Moment — **Moment** is the product of the weight of an item multiplied by its arm. (Moment divided by the constant 1000 is used in this handbook to simplify balance calculations by reducing the number of digits.)

Reference Datum — **Reference Datum** is an imaginary vertical plane 100 inches forward of the front face of the firewall.

Residual Fuel — **Residual Fuel** is the fuel remaining when the airplane is defueled in a specific attitude by the normal means and procedures specified for draining the tanks.

Scale Drift — **Scale Drift** may occur on some types of electronic scales because of the inability of the scale to return to a true zero reading after weighing. If present, this deviation from zero should be accounted for when calculating the net weight of the airplane.

Standard Empty Weight — **Standard Empty Weight** is the weight of a standard airplane including unusable fuel, full operating fluids and full engine oil.

Station — **Station** is a location along the airplane fuselage given in terms of the distance from the reference datum.

Tare — **Tare** is the weight of chocks, blocks, stands, etc. used when weighing an airplane, and is included in the scale readings. Tare is deducted from the scale reading to obtain the actual (net) airplane weight.

Useful Load — **Useful Load** is the difference between ramp weight and the basic empty weight.

AUTOPILOT/FLIGHT DIRECTOR TERMINOLOGY

WARNING

A thorough understanding of the difference between an autopilot and a flight director is required before operating any of the components of these systems which can be found in the KFC-150 supplement in Section 9 of this handbook.

Autopilot — **Autopilot** is a system which automatically controls attitude and/or flight path of the airplane as directed by the pilot through the system's computer.

Flight Director — **Flight Director** is a system which provides visual recommendations to the pilot to allow him to manually control the airplane attitude and/or flight path in response to his desires as selected through the system's computer.

WARNINGS, CAUTIONS, AND NOTES

WARNING — An operating procedure, technique, or maintenance practice which may result in personal injury or loss of life if not carefully followed.

CAUTION — An operating procedure, technique, or maintenance practice which may result in damage to equipment if not carefully followed.

NOTE — An operating procedure, technique, or maintenance condition which is considered essential to emphasize.

GROUND OPERATIONS STALL WARNING DISABLE SWITCH

The following procedure applies to airplane serials 208B0800 and on, and earlier serials modified with Accessory Kit AK208-22:

To preclude or disable nuisance stall warnings during ground operations, push the control yoke forward to the stop. This will engage the ground stall warning disable switch.

INTRODUCTION

Section 2 includes the operating limitations, instrument markings, and basic placards necessary for the safe operation of the airplane, its engine, standard systems and standard equipment.

⚠ WARNING

The limitations included in this section and in Section 9 have been approved by the Federal Aviation Administration. Observance of these operating limitations is required by Federal Aviation Regulations.

NOTE

- Operation in countries other than the United States may require observance of other limitations, procedures or performance data.
- Refer to Section 9 of this Pilot's Operating Handbook for amended operating limitations, procedures, performance data and other necessary information for supplemental systems.
- The airspeeds listed in the Airspeed Limitations chart (Figure 2-1) and the Airspeed Indicator Markings chart (Figure 2-2) are based on Airspeed Calibration data shown in Section 5 with the normal static source. If the alternate static source is being used, ample margins should be observed to allow for the airspeed calibration variations between the normal and alternate static sources as shown in Section 5.

Your Cessna is certificated under FAA Type Certificate No. A37CE as Cessna Model No. 208B.

AIRSPEED LIMITATIONS

Airspeed limitations and their operational significance are shown in Figure 2-1.

	SPEED	KCAS	KIAS	REMARKS
V_{MO}	Maximum Operating Speed	175	175	Do not exceed this speed in any operation.
V_A	Maneuvering Speed: 8750 Pounds 7500 Pounds 6250 Pounds 5000 Pounds	 148 137 125 112	 148 137 125 112	Do not make full or abrupt control movements above this speed.
V_{FE}	Maximum Flap Extended Speed To 10° Flaps 10° - 20° Flaps 20° - 30° Flaps	 175 150 125	 175 150 125	Do not exceed these speeds with the given flap settings.
	Maximum Window Open Speed	175	175	Do not exceed this speed with window open.

Figure 2-1. Airspeed Limitations

AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their color code significance are shown in Figure 2-2.

MARKING	KIAS VALUE OR RANGE	KIAS VALUE OR RANGE
White Arc	50 - 125	Full Flap Operating Range. Lower limit is maximum weight V_{so} in landing configuration. Upper limit is maximum speed permissible with flaps fully extended.
Green Arc	63 - 175	Normal Operating Range. Lower limit is maximum weight Vs at most forward C.G. with flaps retracted. Upper limit is maximum operating speed.
Red Line	175	Maximum speed for all operations.

Figure 2-2. Airspeed Indicator Markings

POWER PLANT LIMITATIONS

Engine Manufacturer: Pratt & Whitney Canada Inc.

Engine Model Number: PT6A-114A

Engine Operating Limits: Refer to Figure 2-3.

Fuel Grade and Approved Fuel Additives: Refer to Fuel Limitations.

Oil Grade (Specification):

Oil conforming to Pratt & Whitney Engine Service Bulletin No. 1001, and all revisions or supplements thereto, **must be used.** Refer to Section 8 for a listing of approved oils. When adding oil, service the engine with the type and brand which is currently being used in the engine.

CAUTION

DO NOT mix types or brands of oil.

Hartzell Propeller Manufacturer: Hartzell Propeller Products.

Hartzell Propeller Model Number: HC-B3MN-3/M10083.

Hartzell Propeller Diameter,

Maximum: 100 inches.

Minimum: 100 inches (No cutoff approved).

Hartzell Propeller Blade Angle at 42-Inch Station,

Feathered: 78.4°.
Low Pitch: 9°.
Maximum Reverse: -18°.

McCauley Propeller Manufacturer: McCauley Accessory Division.

McCauley Propeller Model Number: 3GFR34C703/106GA-0.

McCauley Propeller Diameter,

Maximum: 106 inches
Minimum: 104 inches.

McCauley Propeller Blade Angle at 30-inch Station,

Feathered: 88°.
Low Pitch: 15.6°.
Maximum Reverse: -14°.

Propeller System Operating Limits:

An overspeed governor check shall be performed before the first flight of the day, after engine control system maintenance, or if adjustment has been made.

Engine Control Operating Limits:

Flight operation with the power lever retarded below the IDLE position is prohibited. Such positioning may lead to loss of airplane control or may result in an engine overspeed condition and consequent loss of engine power.

Operation of the emergency power lever is prohibited with the power lever out of the IDLE position.

Engine Starting Cycle Limits:

Using the airplane battery, the starting cycle shall be limited to the following intervals and sequence:

30 seconds ON - 60 seconds OFF,
30 seconds ON - 60 seconds OFF,
30 seconds ON - 30 **minutes** OFF,

Repeat the above cycle as required.

Engine Starting Cycle Limits (Continued):

Using external power, the starting cycle shall be limited to the following intervals and sequence:

20 seconds ON - 120 seconds OFF,
20 seconds ON - 120 seconds OFF,
20 seconds ON - 60 **minutes** OFF.

Repeat the above cycle as required.

POWER SETTING	TORQUE FT-LBS	MAXIMUM ITT°C	GAS GENERATOR RPM % N_g (2)	PROPELLER RPM	OIL PRESSURE PSIG (3)	OIL TEMP °C (7)	SHAFT HORSE-POWER (9)
Takeoff	1865 (1)	805 (10)	101.6	1900	85 to 105	10 to 99	675
Maximum Climb	1865 1970 (4)	765	101.6	1900	85 to 105	0 to 99	675
Maximum Cruise	1865 1970 (4)	740	101.6	1900	85 to 105	0 to 99	675
Idle	---	685	52 Minimum	---	40 Minimum	-40 to 99	---
Maximum Reverse (5)	1865	805	101.6	1825	85 to 105	0 to 99	675
Transient	2400 (6)	850 (11)	102.6 (11)	2090	---	0 to 99 0 to 104 (12)	---
Starting	---	1090 (11)	---	---	---	-40 Minimum	---
Maximum Continuous (8)	1865	805	101.6	1900	85 to 105	10 to 99	675

(1) Per the Engine Torque For Takeoff figure of Section 5.
(2) For every 10°C (18°F) below -30°C (-22°F) ambient temperature, reduce maximum allowable N_g by 2.2%.
(3) Normal oil pressure is 85 to 105 PSI at gas generator speeds above 72% with oil temperature between 60° and 70°C (140° and 158°F). Oil pressures below 85 PSI are undesirable and should be tolerated only for the completion of the flight, preferably at a reduced power setting. Oil pressures below normal should be reported as an engine discrepancy and should be corrected before the next flight. Oil pressures below 40 PSI are unsafe and require that either the engine be shut down or a landing be made as soon as possible using the minimum power required to sustain flight.
(4) Propeller RPM must be set so as not to exceed 675 SHP with torque above 1865 ft-lbs. Full 675 SHP rating is available only at RPM setting of 1800 or greater.
(5) Reverse power operation is limited to one minute.
(6) These values are time limited to 20 seconds.
(7) For increased oil service life, an oil temperature between 74° and 80°C (165° and 176°F) is recommended. A minimum oil temperature of 55°C (130°F) is recommended for fuel heater operation at takeoff power.
(8) Use of this rating is intended for abnormal situations (i.e., maintain altitude or climb out of extreme icing or windshear conditions).
(9) The maximum allowable SHP is 675. Less than 675 SHP is available under certain temperature and altitude conditions as reflected in the takeoff, climb and cruise performance charts.
(10) When the ITT exceeds 765°C, this power setting is time limited to 5 minutes.
(11) These values are time limited to 2 seconds.
(12) Up to 10 minutes for airplane serial numbers 208B1000 and on, and earlier airplanes equipped with Service Kit SK208-147.

Figure 2-3. Engine Operating Limits

POWER PLANT INSTRUMENT MARKINGS

Power plant instrument markings and their color significance are shown in Figure 2-4.

INSTRUMENT	RED LINE	GREEN ARC	YELLOW ARC	STRIPED GREEN ARC	RED LINE
	MINIMUM LIMIT	NORMAL OPERATING	CAUTION RANGE	ALTERNATE POWER RANGE	MAXIMUM LIMIT
Torque Indicator (1)	---	0 - 1865 ft-lbs	---	1865 - 1970 ft-lbs (2)	1970 ft-lbs
Inter-Turbine Temperature (ITT) Indicator (3)	---	100° -740°C	---	---	805°C
Gas Generator % RPM Indicator (4)	---	52% - 101.6%	---	---	101.6%
Propeller RPM Indicator	---	1600 - 1900 RPM	---	---	1900 RPM
Oil Pressure Gage	40 psi	85 - 105 psi	40 - 85 psi	---	105 psi
Oil Temperature Gage	-40°C	+10° to +99°C	-40°C to +10°C +99°C to +104°C (6)	---	+99°C (5) +104°C (6)

(1) Incorporates red wedge and T.O. at 1865 ft-lbs to indicate the takeoff position.
(2) Propeller RPM must be set so as not to exceed 675 SHP with torque above 1865 ft-lbs. Full 675 SHP rating is available only at RPM settings of 1800 or greater.
(3) Incorporates red triangle at 1090°C and starting temperature limitation box labeled ST. LIM 1090°.
(4) 100% Ng is 37,500 RPM.
(5) Maximum oil temperature indicated by a red wedge.
(6) Airplane serial numbers 208B1000 and on, and earlier airplanes equipped with Service Kit SK208-147.

Figure 2-4. Power Plant Instrument Markings

MISCELLANEOUS INSTRUMENT MARKINGS

Miscellaneous instrument markings and their color code significance are shown in Figure 2-5.

INSTRUMENT	RED LINE (Minimum Limit)	GREEN ARC (Normal Operating)	YELLOW ARC (Caution Range)	RED LINE (Maximum Limit)
Fuel Quantity Indicators (1)	E (2.5 Gal Unusable Each Tank)	---	---	---
Fuel Quantity Indicators (2)	E (2.8 Gal Unusable Each Tank)	---	---	---
Suction Gage (3) To 15,000 Ft To 20,000 Ft To 25,000 Ft	---	4.5 - 5.5 in.Hg 4.0 - 5.5 in.Hg 3.5 - 5.5 in.Hg	---	---
Propeller Anti-ice Ammeter	---	20 - 24 Amps		---
Oxygen Pressure Gage	---	1550 - 1850 PSI	0 - 300 PSI	2000 PSI

(1) S/N 208B0001 thru 208B0089 not modified with Service Kit SK208-52:

Total unusable when operating with both tanks on is 3.0 U.S. gallons.

(2) S/N 208B0001 thru 208B0089 modified with Service Kit SK208-52, and S/N 208B0090 and on:

Total unusable when operating with both tanks on is 3.6 U.S. gallons.

(3) Incorporates stepped green arc with 15K, 20K, 25K and 30K markings at the appropriate step locations to indicate the altitude (In thousands of feet) at which the lower limit of that arc segment is acceptable.

Figure 2-5. Miscellaneous Instrument Markings

WEIGHT LIMITS

Maximum Ramp Weight: 8785 lbs.
Maximum Takeoff Weight: 8750 lbs.
Maximum Landing Weight: 8500 lbs.
Maximum Weight for Flight into Known Icing Conditions:
Cargo Pod Installed: 8550 lbs.
Cargo Pod Removed: 8750 lbs.

NOTE

Refer to Section 6 of this handbook for recommended loading arrangements in the Standard 208 and Cargomaster.

CENTER OF GRAVITY LIMITS

Center of Gravity Range:
Forward: 179.60 inches (3.06% MAC) aft of datum at 5500 lbs. or less, with straight line variation to 193.37 inches (23.80% MAC) aft of datum at 8000 lbs., and straight line variation to 199.15 inches (32.50% MAC) aft of datum at 8750 lbs.
Aft: 204.35 inches (40.33% MAC) aft of datum at all weights up to 8750 lbs.

Reference Datum: 100 inches forward of front face of firewall.
Mean Aerodynamic Chord (MAC):
The leading edge of the MAC is 177.57 inches aft of the datum. The MAC length is 66.40 inches.

MANEUVER LIMITS

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

Aerobatic maneuvers, including spins, are not approved.

FLIGHT LOAD FACTOR LIMITS

Flight Load Factors:
*Flaps Up: +3.8g, -1.52g
*Flaps Down (All Settings): +2.4g

* The design load factors are 150% of the above, and in all cases, the structure meets or exceeds design loads.

FLIGHT CREW LIMITS

One pilot required in left seat.

KINDS OF OPERATION LIMITS

This airplane is equipped for day VFR, and may be equipped for night VFR and/or IFR operations and for flight-into-known icing conditions. The operating limitations placard reflects the limits applicable at the time of Airworthiness Certificate issuance.

The following equipment lists identify the systems and equipment upon which type certification for each kind of operation was predicated. These systems and equipment items must be installed and operable for the particular kind of operation indicated. Reference should also be made to the Equipment List furnished with the airplane for additional equipment information. The pilot is responsible for determining the airworthiness of his airplane for each flight and for assuring compliance with current operating FAR's.

REQUIRED EQUIPMENT

DAY VFR:

Airspeed Indicator (1)
Altimeter (1)*
Auxiliary Boost Pump System
BATTERY HOT And BATTERY
  OVERHEAT Annunciators (NiCad
  Batteries Only)
Elevator Trim System (Manual)
Engine Ignition System
Flap Motor (1)
Flap Position Indicator
FUEL PRESS LOW Annunciator
Fuel Quantity Indicators (2)
Fuel Selectors Off Warning
  System
Generator
Inertial Separator System
ITT Indicator
Magnetic Compass
Ng% RPM Indicator
OIL PRESS LOW Annunciator
Oil Pressure Gage
Oil Temperature Gage
Outside Air Temperature Gage
Overspeed (Airspeed) Warning
  System
Overspeed Governor
Pilots Operating Handbook/AFM
Pitot-Static System (1)
Propeller RPM Indicator
Seat Belts (Each Occupant)
Shoulder Harnesses (Front Seats)
Slip-Skid Indicator (1)
Stall Warning System
Torque Indicator
Trim Position Indicators (3)
Volt/Ammeter

*** NOTE**

When a servoed altimeter is installed, a functioning pneumatic altimeter is also required.

NIGHT VFR:

All Equipment Required For
  Day VFR
Instrument Lights
Navigation Lights (3)
Strobe Lights (2)

IFR:

All Equipment Required For
  Day VFR
All Equipment Required For Night
  VFR (If a night flight)
Attitude Indicator (Gyro
  Stabilized) (1)
Clock
Communications Radio (VHF) (1)
Directional Indicator (Gyro
  Stabilized) (1)
Navigation Radios (As required)
Sensitive Altimeter (1)*
Suction Gage (If gyros are
  vacuum powered)
Turn And Bank Indicator or
  Turn Coordinator (1)

*** NOTE**

When a servoed altimeter is installed, a functioning pneumatic altimeter is also required.

FLIGHT INTO KNOWN ICING:

All Equipment Required For Day VFR
  Night VFR, and/or IFR
  As Applicable
Horizontal Stabilizer Deice Boots
Ice Detector Light (For night flight)
Propeller Anti-Ice Boots
Pitot-Static Tube Heat System
Standby Electrical System
Stall Warning System Heater
Vertical Stabilizer Deice Boot
Windshield Anti-Ice Panel
Wing And Wing Strut Deice Boots

FUEL LIMITATIONS

2 Standard Tanks:

Total Fuel,	Both Tanks:	335.6 U.S. gallons.
	Each Tank:	167.8 U.S. gallons.
Usable Fuel,	Both Tanks On:	332 U.S. gallons total.
	Single Tank On:	165 U.S. gallons per tank.
Unusable Fuel,	Both Tanks On:	3.6 U.S. gallons total.
	Single Tank On:	2.8 U.S. gallons per tank.

NOTE

To achieve full capacity, fill fuel tank to the top of the filler neck. Filling fuel tanks to the bottom of the fuel filler collar (level with flapper valve) allows space for thermal expansion and results in a decrease in fuel capacity of four gallons per side (eight gallons total).

With low fuel reserves (FUEL LOW annunciator(s) ON), continuous uncoordinated flight with the turn and bank "ball" more than one-quarter ball out of center position is prohibited. Unusable fuel quantity increases when more severe sideslip is maintained.

Due to possible fuel starvation, maximum full rudder sideslip duration time is three minutes.

Maximum fuel unbalance in flight is 200 lbs.

Fuel Grade (Specification) and Fuel Additives:

The following fuel grades and fuel additives are approved.

CAUTION

Aviation gasoline is restricted to emergency use and shall not be used for more than 150 hours in one overhaul period; a mixture of one part aviation gasoline and three parts of Jet A, Jet A-1, JP-1, or JP-5 may be used for emergency purposes for a maximum of 450 hours per overhaul period.

FUEL GRADE (SPECIFICATION) (1)		MINIMUM FUEL TEMPERATURE FOR TAKEOFF (2)
JET A	ASTM-D1655	-35°C
JET A-1	ASTM-D1655	-40°C
JET B	ASTM-D1655	-45°C
JP-1	MIL-L-5616	-35°C
JP-4	MIL-T-5624	-54°C
JP-5	MIL-T-5624	-40°C
JP-8	MIL-T-83133A	-40°C
AVIATION GASOLINE (ALL GRADES) (3)		-54°C

(1) Fuel used must contain anti-icing fuel additive in compliance with MIL-I-27686 (EGME), or MIL-I-85470 (DIEGME).

CAUTION

JP-4 and JP-5 fuels per MIL-T-5624 and JP-8 fuel per MIL-T-83133A contain the correct premixed quantity of an approved type of anti-icing fuel additive and no additional anti-ice compounds should be added.

(2) Minimum starting temperature is that given or the minimum allowable oil temperature (-40°C), whichever is warmer.

NOTE

Starts may be attempted with fuel at lower temperatures providing other specified engine limitations are not exceeded.

(3) When using aviation gasoline, the maximum fuel and ambient temperature for takeoff is +29°C (85°F) and the maximum operating altitude is 9000 feet. The boost pump must be ON for all flight operations.

Refer to Section 8 for additional approved additives and allowable concentrations of the above additives.

MAXIMUM OPERATING ALTITUDE LIMITS

Certificated Maximum Operating Altitudes:
Non-Icing Conditions: 25,000 Feet.
Icing Conditions (if so equipped): 20,000 Feet.
Any conditions with any ice on the airplane: 20,000 Feet.

OUTSIDE AIR TEMPERATURE LIMITS

Cold Day:

-54°C from sea level to 25,000 feet.

Hot Day:

Ground Operations: +53°C from sea level to 5000 feet; ISA +37°C above 5000 feet.
Flight Operations: ISA +35°C from sea level to 25,000 feet.

Refer to Figure 5-5, ISA Conversion And Operating Temperature Limits chart, for a graphical presentation of the operating air temperature limits.

MAXIMUM PASSENGER SEATING LIMITS

In the Cargo Version, a maximum of one seat may be installed to the right of the pilot's seat for use by a second crew member or a passenger. In the Passenger Version, up to eleven seats may be installed. The right front seat may be occupied by either a second crew member or passenger. When the right front seat is occupied by a passenger, only eight seats in the aft cabin can be occupied. Refer to Section 6 for seat locations.

OTHER LIMITATIONS

FLAP LIMITATIONS

Approved Takeoff Range:	0° to 20°.
Approved Landing Range:	0° to 30°.
Approved Landing Range in Icing Conditions:	0° to 20°.

TYPE II OR TYPE IV ANTI-ICE FLUID TAKEOFF LIMITATIONS

FLAP LIMITATIONS

Takeoff Flaps Setting: 0°.

AIRSPEED LIMITATIONS

Takeoff Rotation Speed: 83 KIAS.

FLIGHT IN KNOWN ICING VISUAL CUES

As Required by AD 96-09-15, Paragraph (a) (1)

WARNING

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

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

1. Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.
2. Accumulation of ice on the lower surface of the wing aft of the protected area.
3. Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.
4. All icing detection lights must be operative prior to flight into icing conditions at night.

NOTE

This supersedes any relief provided by the Master Minimum Equipment List (MMEL).

The airplane must be equipped with the following equipment when operating at an airport in ground icing conditions defined under "Visual/ Tactile Check" in LIMITATIONS section.

1. Pilot assist handle, Cessna P/N SK208-146-2 (or equivalent part number)

PLACARDS

⚠ WARNING

The following information must be displayed in the form of composite or individual placards. As a minimum, the exact wording of these placards is required as specified in this section. Placard wording can be from part numbered placards obtained from Cessna Aircraft Company or equivalent placards installed by an approved repair station in accordance with normal maintenance practices/procedures.

1. In full view of the pilot on the sunvisor or windshield trim strip on airplanes equipped for flight into known icing:

> 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 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
>
> No acrobatic maneuvers, including spins, approved.
>
> This airplane is approved for flight into icing conditions if the proper optional equipment is installed and operational. See POH for weight and altitude restrictions relating to ice.
>
> This airplane is certified for the following flight operations as of date of original airworthiness certificate:
>
> DAY - NIGHT - VFR - IFR

2. In full view of the pilot on the sunvisor or windshield trim strip on airplanes not equipped for flight into known icing:

> 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 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
>
> No acrobatic maneuvers, including spins, approved.
>
> Flight into known icing conditions prohibited.
>
> This airplane is certified for the following flight operations as of date of original airworthiness certificate:
>
> DAY - NIGHT - VFR - IFR

3. On control lock:

CAUTION!
CONTROL LOCK
REMOVE BEFORE STARTING ENGINE

4. On left sidewall below and forward of instrument panel and on right sidewall and forward of instrument panel:

STATIC SOURCE DRAIN

OPEN **CLOSED**

MUST BE CLOSED FOR FLIGHT

5. On sunvisor or windshield trim-strip:

> ALTERNATE STATIC SOURCE CORRECTION
>
> CLIMBS & APPROACHES: NO CORRECTION REQUIRED.
>
> CRUISE: CORRECTIONS VARY WITH VENTS OPEN OR CLOSED. REFER TO SECTION 5 OF PILOT'S OPERATING HANDBOOK.

6. Near airspeed indicator:

MAX WT. MANEUVER SPEED 148 KIAS
SEE POH FOR OTHER WEIGHTS

7. Near torque indicator:

RPM	MAX TORQUE
1900	1865
1800	1970
1700	1970
1600	1970

8. A calibration card must be provided to indicate the accuracy of the magnetic compass in 30° increments.

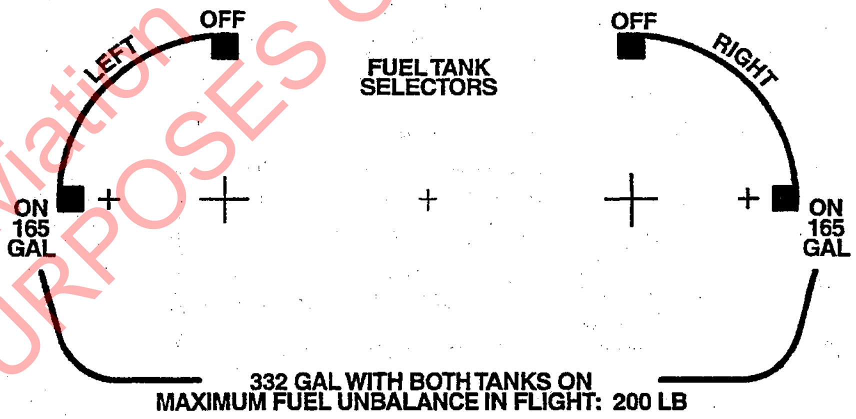
9. Near wing flap position indicator:

UP to 10°	175 KIAS	(partial flap range with dark blue color code; also mechanical detent at 10°)
10° to 20°	150 KIAS	(light blue code; also, mechanical detent at 20°)
20° to FULL	125 KIAS	(white color code)

10. Below power lever:

CAUTION
USE BETA AND REVERSE ONLY
WITH ENGINE RUNNING AND
PROPELLER OUT OF FEATHER

11. On fuel tank selector:



12. Adjacent to each outboard fuel tank filler cap:

> **JET-A-FUEL**
> **TOTAL CAPACITY 167.8 U.S. GALLONS**
> **ANTI-ICE ADDITIVE REQUIRED. SEE PILOT'S OPERATING HANDBOOK FOR OTHER APPROVED FUELS, QUANTITY AND TYPE OF ADDITIVE.**
> **- GROUND TO WING TIE-DOWN FITTING.-**
> 2605007-9

13. Adjacent to each inboard fuel tank filler cap (when installed):

JET-A-FUEL

TOTAL INBD CAPACITY 120.3 U.S. GALLONS

ANTI-ICE ADDITIVE REQUIRED. SEE PILOT'S OPERATING HANDBOOK FOR OTHER APPROVED FUELS, QUANTITY AND TYPE OF ADDITIVE.
—GROUND TO WING TIE-DOWN FITTING.—

CAUTION

DO NOT OPEN WHEN FUEL QUANTITY IS IN EXCESS OF 120.3 U.S. GALLONS.

2605007-11

14. Adjacent to fuel filter:

FUEL FILTER
DRAIN DAILY

15. Adjacent to fuel drain can:

EPA CAN - DRAIN
PROPERLY DISPOSE

16. On the brake fluid reservoir:

—— MAX ——

BRAKE FLUID RESERVOIR

REFILL WITH MIL-H-5606 FLUID

—— MIN ——

17. Adjacent to oil dipstick/filler cap (on inertial separator duct):

ENGINE OIL

TOTAL CAPACITY 14 U.S. QUARTS
DRAIN & FILL 9.5 U.S. QUARTS

TYPE: SEE PILOT'S OPERATING HANDBOOK
FOR APPROVED OILS. DO NOT MIX BRANDS

SERVICED WITH:____________________

17A. On side of inertial separator duct:

WARNING

PRESSURIZED OIL TANK

ENSURE
OIL DIPSTICK
IS SECURE

18. On firewall, above battery tray:

CAUTION 24 VOLTS D.C.
THIS AIRCRAFT IS EQUIPPED WITH GENERATOR AND A NEGATIVE GROUND SYSTEM
OBSERVE PROPER POLARITY
REVERSE POLARITY WILL DAMAGE ELECTRICAL COMPONENTS
2605010-2

19. Near ground service plug receptacle:

EXTERNAL POWER
28 VOLTS D.C. NOMINAL
800 AMP
STARTING CAPACITY MIN.
DO NOT EXCEED 1700 AMPS

20. On bottom of right hand wing just forward of aileron:

FLUX VALVE
USE NON-MAGNETIC
TOOLS AND SCREWS

21. On each side of nose strut fairing near tow limit marking (rudder lock placard required when rudder lock installed):

WARNING
MAXIMUM
TOW
LIMIT
2505045-2

CAUTION
DO NOT TOW AIRCRAFT
WITH RUDDER LOCK
ENGAGED
2605023-3

22. Adjacent to left crew door inside door handle:

LOCK OVERRIDE:
TO UNLOCK
PULL & ROTATE
KNOB
TO LOCK
PULL & ROTATE
KNOB

23. Adjacent to upper passenger door outside door handle (Passenger Version Only):

DOOR OPERATION:
TO OPEN
PUSH BUTTON &
ROTATE
HANDLE
TO CLOSE
ROTATE
HANDLE

24. Adjacent to upper passenger door inside door handle (Passenger Version Only):

DOOR OPERATION:
TO OPEN
PULL HANDLE
INBD & ROTATE
TO CLOSE
ROTATE HANDLE
& STOW

25. At center of lower passenger door on inside and outside (Passenger Version Only):

WARNING
OUTSIDE PROXIMITY OF
LOWER DOOR MUST BE
CLEAR BEFORE OPENING

26. Adjacent to upper cargo door outside pushbutton and door handle (Passenger Version Only):

DOOR OPERATION:
TO OPEN
PUSH BUTTON &
ROTATE
HANDLE
TO CLOSE
ROTATE
HANDLE

27. Adjacent to upper cargo door inside door handle (Passenger Version Only):

DOOR OPERATION:
TO OPEN
PULL HANDLE
INBD & ROTATE
TO CLOSE
ROTATE HANDLE
& STOW

28. Adjacent to upper cargo door outside door handle (Cargo Version Only):

DOOR OPERATION:
TO OPEN
ROTATE
HANDLE
TO CLOSE
ROTATE
HANDLE

29. On right sidewall aft of lower passenger door (Passenger Version Only):

MAX BAGGAGE 325 LBS. REFER TO
WEIGHT AND BALANCE DATA FOR
BAGGAGE/CARGO LOADING

30. On aft side of cargo barrier (each side) (Cargo Version Only):

MAX LOAD BEHIND BARRIER
3400 LBS TOTAL
ZONES FWD OF LAST LOADED
ZONE MUST BE AT LEAST
75% FULL BY VOLUME. SEE
POH FOR EXCEPTIONS.
-CHECK WEIGHT AND BALANCE-

31. On inside of lower cargo door (Cargo Version Only):

MAX LOAD BEHIND BARRIER
3400 LBS TOTAL
ZONES FWD OF LAST LOADED ZONE
MUST BE AT LEAST 75% FULL BY
VOLUME. SEE POH FOR EXCEPTIONS

-CHECK WEIGHT AND BALANCE-

LOAD MUST BE PROTECTED FROM
SHIFTING-SEE POH.-

32. On right sidewall adjacent to Zone 5 (Cargo Version Only):

IF LOAD IN ZONE 5 EXCEEDS
400 LBS A PARTITION NET IS REQD
AFT OR LOAD MUST BE
SECURED TO FLOOR

33. On left and right sides of cabin in appropriate zones (Cargo Version Only):

ZONE 1
MAX LOAD 1780 LBS

ZONE 2
MAX LOAD 3100 LBS

ZONE 3
MAX LOAD 1900 LBS

ZONE 4
MAX LOAD 1380 LBS

ZONE 5
MAX LOAD 1270 LBS

ZONE 6
MAX LOAD 320 LBS

34. On inside of cargo pod doors:

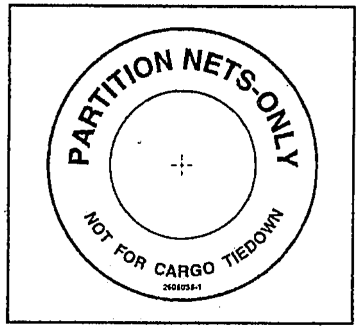
FWD. COMPARTMENT
MAX. WEIGHT 230 LBS.
MAX. FLOOR LOADING
30 LBS. PER SQ. FT.
NO SHARP EDGES

CTR. COMPARTMENT - FWD
MAX. WEIGHT 310 LBS.
MAX. FLOOR LOADING
30 LBS. PER SQ. FT.
NO SHARP EDGES

CTR. COMPARTMENT - AFT
MAX. WEIGHT 270 LBS.
MAX. FLOOR LOADING
30 LBS. PER SQ. FT.
NO SHARP EDGES

AFT COMPARTMENT
MAX. WEIGHT 280 LBS.
MAX. FLOOR LOADING
30 LBS. PER SQ. FT.
NO SHARP EDGES

35. At each sidewall and ceiling anchor plate (except heavy duty anchor plates with additional structural support), and at anchor plate at center of lower cargo door (Cargo version only):



SECTION 3 EMERGENCY PROCEDURES

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INTRODUCTION

Section 3 provides checklist and amplified procedures for coping with emergencies that may occur. Emergencies caused by airplane or engine malfunctions are extremely rare if proper preflight inspections and maintenance are practiced. Enroute weather emergencies can be minimized or eliminated by careful flight planning and good judgment when unexpected weather is encountered. However, should an emergency arise, the basic procedures described in this section should be considered and applied as necessary to correct the problem. Emergency procedures associated with ELT and other supplemental systems can be found in Section 9.

⚠ WARNING

There is no substitute for proper and complete preflight planning habits and their continual review in minimizing emergencies. Be thoroughly knowledgeable of hazards and conditions which represent potential dangers, and be aware of the capabilities and limitations of the airplane.

AIRSPEEDS FOR EMERGENCY OPERATION

Engine Failure After Takeoff:		
Wing Flaps Up		100 KIAS
Wing Flaps Down		80 KIAS
Maneuvering Speed:		
8750 Pounds		148 KIAS
7500 Pounds		137 KIAS
6250 Pounds		125 KIAS
5000 Pounds		112 KIAS
Maximum Glide:	With Cargo Pod	Without Cargo Pod
8750 Pounds	95 KIAS	97 KIAS
7500 Pounds	87 KIAS	90 KIAS
6250 Pounds	79 KIAS	82 KIAS
5000 Pounds	71 KIAS	74 KIAS
Precautionary Landing with Engine Power, Flaps Down		80 KIAS
Landing Without Engine Power:		
Wing Flaps Up		100 KIAS
Wing Flaps Down		80 KIAS

OPERATIONAL CHECKLISTS

Procedures in the Operational Checklists portion of this section shown in **bold-faced** type are immediate-action items which should be committed to memory

ENGINE FAILURES

ENGINE FAILURE DURING TAKEOFF ROLL

1. **Power Lever -- BETA range.**
2. **Brakes -- APPLY.**
3. Wing Flaps -- RETRACT.

If airplane cannot be stopped on remaining runway:

4. Fuel Condition Lever -- CUTOFF.
5. Fuel Shutoff -- OFF (pull out).
6. Fuel Tank Selectors -- OFF (warning horn will sound).
7. Battery Switch -- OFF.

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. **Airspeed -- 85 KIAS with 20° flaps.**
2. Propeller -- FEATHER.
3. Wing Flaps -- FULL DOWN.
4. Fuel Condition Lever -- CUTOFF.
5. Fuel Shutoff -- OFF (pull out).
6. Fuel Tank Selectors -- OFF (warning horn will sound).
7. Battery -- OFF.

ENGINE FAILURE DURING FLIGHT

1. **Airspeed -- 95 KIAS.**
2. **Power Lever -- IDLE.**
3. **Propeller Control Lever -- FEATHER.**
4. **Fuel Condition Lever -- CUTOFF.**
5. Wing Flaps -- UP.
6. Fuel Boost Switch -- OFF.
7. Fuel Shutoff -- OFF (pull out).
8. Ignition Switch -- NORM.
9. Standby Power Switch (if installed) -- OFF.
10. Electrical Load -- REDUCE.
11. Landing -- Refer to Emergency Landing Without Engine Power checklist.

ENGINE FLAMEOUT DURING FLIGHT

1. **If Gas Generator Speed (Ng) Is Above 50%:**
   a. **Power Lever -- IDLE.**

b. Ignition Switch -- ON.
c. Power Lever -- AS DESIRED after satisfactory relight as evidenced by normal ITT and Ng.
d. Ignition Switch -- OFF if cause of flameout has been corrected.

2. If Gas Generator Speed (N_g) Is Below 50%:
a. Fuel Condition Lever -- CUTOFF.
b. Refer to Airstart checklists for engine restart.

AIRSTART

STARTER ASSIST (Preferred Procedure)

1. Electrical Load -- REDUCE.
2. Standby Power Switch (if installed) -- OFF.
3. Avionics Power Switches -- OFF.
4. Ignition Switch -- NORM.
5. Air Conditioner (if installed) -- OFF.
6. Bleed Air Heat Switch -- OFF.
7. Emergency Power Lever -- NORMAL.
8. Power Lever -- IDLE.
9. Propeller Control Lever -- MIN RPM.
10. Fuel Condition Lever -- CUTOFF.
11. Fuel Shutoff -- ON (push in).
12. Fuel Tank Selectors -- LEFT ON, RIGHT ON.
13. Battery Switch -- ON.
14. Fuel Boost Switch -- ON (check AUX FUEL PUMP ON annunciator ON, FUEL PRESS LOW annunciator OFF).
15. Altitude -- 20,000 feet maximum.
16. Starter Switch -- START and OBSERVE.
    a. IGNITION ON Annunciator -- CHECK ON.
    b. Engine Oil Pressure -- CHECK for indication.
    c. N_g -- 12% MINIMUM.
17. Fuel Condition Lever -- LOW IDLE and OBSERVE.
    a. ITT -- MONITOR (1090°C maximum).
    b. N_g -- 52% MINIMUM.
18. Starter Switch -- OFF.

WARNING

If conditions exist, such as heavy precipitation or nearly empty fuel tanks, turn the ignition switch ON.

19. Fuel Boost Switch -- NORM (unless it cycles on and off; then leave ON).

20. Fuel Condition Lever -- HIGH IDLE.
21. Propeller Control Lever -- AS DESIRED.
22. Power Lever -- AS DESIRED.
23. Electrical Equipment -- AS REQUIRED.

NO STARTER ASSIST

1. Generator Switch -- TRIP and release.
2. Standby Power Switch (if installed) -- OFF.
3. Avionics Power Switches -- OFF.
4. Air Conditioner (if installed) -- OFF.
5. Bleed Air Heat Switch -- OFF.
6. Emergency Power Lever -- NORMAL.
7. Power Lever -- IDLE.
8. Propeller Control Lever -- MIN RPM.
9. Fuel Condition Lever -- CUTOFF.
10. Fuel Shutoff -- ON (push in).
11. Fuel Tank Selectors -- LEFT ON, RIGHT ON.
12. Battery Switch -- ON.
13. Fuel Boost Switch -- ON (check AUX FUEL PUMP ON annunciator ON, FUEL PRESS LOW annunciator OFF).
14. Ignition Switch -- ON, check IGNITION ON annunciator ON.
15. Airspeed -- 100 KIAS minimum (140 KIAS if propeller is feathered).
16. Altitude -- 20,000 feet maximum (15,000 feet if propeller is feathered).

CAUTION

Do not attempt a restart without starter assist if N_g tachometer indicates zero RPM.

17. N_g Indicator -- CHECK STABLE.
18. Fuel Condition Lever -- LOW IDLE and OBSERVE.
    a. ITT -- MONITOR (1090°C maximum).
    b. N_g -- 52% MINIMUM.
19. Ignition Switch -- NORM (N_g 52% or above) unless conditions warrant leaving ON.

WARNING

If conditions exist, such as heavy precipitation or nearly empty fuel tanks, turn the ignition switch ON.

20. Fuel Boost Switch -- NORM (unless it cycles on and off); then leave ON.
21. Fuel Condition Lever -- HIGH IDLE.
22. Propeller Control Lever -- AS DESIRED.
23. Power Lever -- AS DESIRED.
24. Generator Switch -- RESET and release.
25. Electrical and Avionics Equipment -- AS REQUIRED.

FORCED LANDINGS

EMERGENCY LANDING WITHOUT ENGINE POWER

1. Seats, Seat Belts, Shoulder Harnesses -- SECURE.
2. Airspeed -- 100 KIAS (flaps UP).
   80 KIAS (flaps DOWN).
3. Power Lever -- IDLE.
4. Propeller Control Lever -- FEATHER.
5. Fuel Condition Lever -- CUTOFF.
6. Fuel Boost Switch -- OFF.
7. Ignition Switch -- NORM.
8. Standby Power Switch (if installed) -- OFF.
9. Nonessential Equipment (if installed) -- OFF.
10. Fuel Shutoff -- OFF (pull out).
11. Fuel Tank Selectors -- OFF (warning horn will sound).
12. Wing Flaps -- AS REQUIRED (FULL recommended).
13. Crew Doors -- UNLATCH PRIOR TO TOUCHDOWN.
14. Battery Switch -- OFF when landing is assured.
15. Touchdown -- SLIGHTLY TAIL LOW.
16. Brakes -- APPLY HEAVILY.

PRECAUTIONARY LANDING WITH ENGINE POWER

1. Seats, Seat Belts, Shoulder Harnesses -- SECURE.
2. Wing Flaps -- 10°.
3. Airspeed -- 90 KIAS.
4. Selected Field -- FLY OVER, noting terrain and obstructions.
5. All Electrical Switches (except Battery and Generator) -- OFF.
6. Wing Flaps -- FULL DOWN (on final approach).
7. Airspeed -- 80 KIAS.
8. Crew Doors -- UNLATCH PRIOR TO TOUCHDOWN.
9. Generator Switch -- TRIP and release.
10. Battery Switch -- OFF.
11. Touchdown -- SLIGHTLY TAIL LOW.
12. Fuel Condition Lever -- CUTOFF.
13. Brakes -- APPLY HEAVILY.

DITCHING

1. Radio -- TRANSMIT MAYDAY on 121.5 MHz, giving location and intentions and SQUAWK 7700 if transponder is installed.
2. Heavy Objects in Cabin -- SECURE if passenger is available to assist.
3. Seats, Seat Belts, Shoulder Harnesses -- SECURE.
4. Wing Flaps -- FULL DOWN.
5. Power -- ESTABLISH 300 FT/MIN DESCENT AT 80 KIAS.
6. Approach -- High Winds -- INTO THE WIND.
   Light Winds, Heavy Swells -- PARALLEL TO SWELLS.
7. Face -- CUSHION at touchdown with folded coat or similar object.
8. Touchdown -- NO FLARE, maintain descent attitude.
9. Airplane -- EVACUATE.
10. Life Vests and Raft -- INFLATE when outside cabin.

WARNING

The airplane has not been flight tested in actual ditchings, thus the above recommended procedure is based entirely on the best judgment of Cessna Aircraft Company.

SMOKE AND FIRE

ENGINE FIRE IN FLIGHT (Red ENGINE FIRE Annunciator On Or Off)

1. **Power Lever -- IDLE.**
2. **Propeller Control Lever -- FEATHER.**
3. **Fuel Condition Lever -- CUTOFF.**
4. **Fuel Shutoff -- OFF.**
5. **Cabin Heat Firewall Shutoff Control -- PULL OFF.**
6. Forward Side Vents -- CLOSE.
7. Overhead Vents -- OPEN.
8. Ventilation Fans (if installed) -- ON.
9. Wing Flaps -- 20°-30°.
10. Airspeed -- 80-85 KIAS.
11. Forced Landing -- EXECUTE (as described in Emergency Landing Without Engine Power).

ELECTRICAL FIRE IN FLIGHT

1. **Battery Switch -- OFF.**
2. **Generator Switch -- TRIP and release.**
3. **Standby Power Switch (if installed) -- OFF.**

⚠ WARNING

Without electrical power, all electrically-operated gyros and engine instruments, fuel boost pump, annunciator lights, wing flaps and all avionics will be inoperative. Vacuum-driven gyros will still be operative. (For airplanes with a KFC-150 autopilot, vacuum-driven gyros are the pilot's horizon gyro and right-hand directional gyro. For airplanes with a KFC-250 autopilot, vacuum-driven gyros are the right-hand horizon and directional gyros.)

4. **Vents -- CLOSED (to avoid drafts.)**
5. **Bleed Air Heat Switch -- OFF.**
6. **Fire Extinguisher -- ACTIVATE.**

⚠ WARNING

Occupants should use oxygen masks until smoke clears. After discharging an extinguisher within a closed cabin, ventilate the cabin.

7. Avionics Power Switches -- OFF.
8. All Other Electrical Switches -- OFF.

If fire appears out and electrical power is necessary for continuance of flight:

9. Battery Switch and Standby Power Switch (if installed) -- ON.
10. Generator Switch -- RESET and release.
11. Circuit Breakers -- CHECK for faulty circuit; do not reset.
12. Inverter Switch (if installed) -- 1 or 2.
13. Radio Switches -- OFF.
14. Avionics Power Switches -- ON.
15. Radio and Electrical Switches -- ON one at a time, with delay after each until short circuit is localized.
16. Vents -- OPEN when it is ascertained that fire is completely extinguished.
17. Bleed Air Heat -- ON as desired.

CABIN FIRE

1. **Battery Switch -- OFF.**
2. **Generator Switch -- TRIP and release.**
3. **Standby Power Switch (if installed) -- OFF.**

⚠ WARNING

Without electrical power, all electrically-operated gyros and engine instruments, fuel boost pump, annunciator lights, wing flaps and all avionics will be inoperative. Vacuum-driven gyros will still be operative. (For airplanes with a KFC-150 autopilot vacuum-driven gyros are the pilot's horizon gyro and right-hand directional gyro. For airplanes with a KFC-250 autopilot, vacuum-driven gyros are the right-hand horizon and directional gyros.)

4. **Vents -- CLOSED (to avoid drafts.)**
5. **Bleed Air Heat Switch -- OFF.**
6. **Fire Extinguisher -- ACTIVATE.**

⚠ WARNING

Occupants should use oxygen masks until smoke clears. After discharging an extinguisher within a closed cabin, ventilate the cabin.

7. Land the airplane as soon as possible.

WING FIRE

1. **Pitot/Static Heat Switch -- OFF.**
2. **Stall Heat Switch -- OFF.**
3. **Strobe Lights Switch -- OFF.**
4. **Navigation Lights Switch -- OFF.**
5. **Landing and Taxi Light Switches -- OFF.**
6. **Radar -- OFF.**
7. **Ventilation Fans (if installed) -- OFF.**

⚠ WARNING

Perform a sideslip as required to keep flames away from the fuel tank and cabin. Land the airplane.

CABIN FIRE DURING GROUND OPERATIONS

1. **Power Lever -- IDLE.**
2. **Brakes -- AS REQUIRED.**
3. **Propeller Control Lever -- FEATHER.**
4. **Fuel Condition Lever -- CUTOFF.**
5. **Battery Switch -- OFF.**
6. **Airplane -- EVACUATE.**
7. Fire -- EXTINGUISH.

ENGINE FIRE DURING START ON GROUND (Red ENGINE FIRE Annunciator On or Off)

1. **Fuel Condition Lever -- CUTOFF.**
2. **Fuel Boost Switch -- OFF.**
3. **Starter Switch -- MOTOR.**

CAUTION

- **Do not exceed the starting cycle limitations; refer to Section 2.**
- **Should the fire persist, as indicated by sustained interturbine temperature, immediately close the fuel shutoff and continue motoring.**

4. Starter Switch -- OFF.
5. Fuel Shutoff -- OFF (pull out).
6. Battery Switch -- OFF.
7. Airplane -- EVACUATE.
8. Fire -- EXTINGUISH.

ICING

THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING - As Required by AD 96-09-15, Paragraph (a) (2):

1. Visible rain at temperatures below 0 degrees Celsius ambient air temperature.
2. Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT - As Required by AD 96-09-15, Paragraph (a) (2):

These procedures are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature. While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues specified in Section 2 Limitations for identifying severe icing conditions are observed, accomplish the following:

1. Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.
2. Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.

(Continued)

3. Do not engage the autopilot.
4. If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.
5. If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.
6. Do not extend flaps during extended operation in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.
7. If the flaps are extended, do not retract them until the airframe is clear of ice.
8. Report these weather conditions to Air Traffic Control.

INADVERTENT ICING ENCOUNTER

1. **Ignition Switch -- ON.**
2. **Inertial Separator -- BYPASS.**
3. **Pitot/Static Heat Switch -- ON.**
4. **Stall Warning Heat Switch -- ON.**
5. **Windshield Anti-ice Switch(es) (if installed) -- AUTO.**
6. **Prop Anti-ice Switch (if installed) -- AUTO.**
7. **If above 20,000 feet:**
   a. **Airspeed -- 160 KIAS or below.**
   b. **Altitude -- DESCEND to 20,000 feet or below as soon as practical.**
8. **Turn back or change altitude** to obtain an outside air temperature that is less conducive to icing.
9. Ignition Switch -- OFF after 5 minutes operations.
10. Bleed Air Heat Switch and Temp Control -- ON and ADJUST.
11. Push Fwd Cabin Heat control full in and pull Defrost control full out to obtain maximum windshield defroster effectiveness.
12. Propeller RPM -- INCREASE to 1900 RPM to minimize ice build-up.

CAUTION

If excessive vibration is noted, momentarily reduce propeller RPM to 1600 with the propeller control, then rapidly move the control full forward. Cycling the RPM flexes the propeller blades and high RPM increases centrifugal force, causing ice to shed more readily.

13. If icing conditions are unavoidable, plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site.

(Continued next page)

14. With an ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for a significantly higher power requirement, approach speed and stall speed and longer landing roll.
15. If necessary, set up a forward slip for visibility through the left portion of the windshield during the landing approach.
16. Use a minimum approach speed of 105 KIAS, select the minimum flap setting required, and maintain extra airspeed consistent with available field length. With ice suspected on the airframe, or operating at 4°C or less in visible moisture, **Do Not Extend Flaps Beyond 20° for Landing.**

WARNING

With heavy ice accumulations on the horizontal stabilizer leading edge, do not extend flaps while enroute or holding. When landing is assured, select the minimum flap setting required, not to exceed 20°, and maintain extra airspeed consistent with available field length. Do not retract the flaps once they have been extended, unless required for go-around. Then retract flaps in increments while maintaining 5 to 10 knots extra airspeed.

17. Land on the main wheels first, avoiding a slow and high flare-out.
18. Missed approaches should be avoided whenever possible because of severely reduced climb capability. However, if a go-around is mandatory, make the decision much earlier in the approach than normal. Apply takeoff power and maintain 90 to 105 KIAS while retracting the flaps slowly in small increments.

STATIC SOURCE BLOCKAGE (Erroneous Instrument Reading Suspected)

1. **Static Pressure Alternate Source Valve -- PULL FULL ON.**

NOTE

The alternate static source is connected to the left-hand flight panel instruments only.

2. Refer to Section 5 for airspeed and altimeter corrections.
3. Autopilot -- DISENGAGE altitude hold mode.

ENGINE MALFUNCTIONS

LOSS OF OIL PRESSURE (Red OIL PRESS LOW Annunciator On)

1. Oil Pressure Gage -- CHECK oil pressure indication. If oil pressure gage confirms annunciator warning, proceed in accordance with Engine Failures checklists or at the discretion of the pilot and consistent with safety, continue engine operation in preparation for an emergency landing as soon as possible.

FUEL CONTROL UNIT MALFUNCTION IN THE PNEUMATIC OR GOVERNOR SECTIONS (Engine Power Falls Back To Idle)

1. **Power Lever -- IDLE.**
2. **Emergency Power Lever -- AS REQUIRED (maintain 65 Ng minimum during flight).**

CAUTION

The emergency power lever overrides normal fuel control functions and results in the direct operation of the fuel metering valve. Utilize slow and smooth movement of the emergency power lever to avoid engine surges, and/or exceeding ITT, N_g, and torque limits.

GEAR BOX CONTAMINATION (Amber CHIP DETECTOR Annunciator On)

1. Engine Gages -- CAREFULLY MONITOR engine gages for abnormal oil pressure, oil temperature or power indications.
2. If engine gages are normal, proceed to destination and determine cause of chip detector annunciator warning prior to next flight.
3. If engine gages confirm chip detector annunciator warning, proceed in accordance with Engine Failures checklists or at the discretion of the pilot and consistent with safety, continue engine operation in preparation for an emergency landing as soon as possible.

FUEL SYSTEM MALFUNCTION/INADVERTENT FUEL FLOW INTERRUPTION PROCEDURES

LOSS OF FUEL PRESSURE (Amber FUEL PRESS LOW Annunciator On)

1. **Fuel Boost Switch -- ON.**
2. If FUEL PRESS LOW annunciator extinguishes:
   a. Carefully monitor fuel quantity and cabin odor for evidence of a fuel leak.
   b. Land as soon as practical and determine cause for motive flow failure before next flight.
3. If FUEL PRESS LOW annunciator and AUX FUEL PUMP ON annunciator are illuminated:
   a. Carefully monitor engine gages for sign of fuel starvation.
   b. Land as soon as possible.

FUEL FLOW INTERRUPTION TO FUEL RESERVOIR (Red RESERVOIR FUEL LOW Annunciator On)

1. **Fuel Tank Selectors -- LEFT ON, RIGHT ON.**
2. **Ignition Switch -- ON.**
3. **Fuel Boost Switch -- ON.**

(Continued Next Page)

4. If RESERVOIR FUEL LOW annunciator remains illuminated and there is usable fuel in the wing tanks:
   a. Carefully monitor engine gages and FUEL PRESS LOW annunciator for signs of fuel starvation.
   b. Land as soon as possible and determine cause of RESERVOIR FUEL LOW warning.

WARNING

If there are signs of fuel starvation, prepare for a forced landing (as described in Emergency Landing Without Engine Power).

FUEL TANK SELECTOR OFF DURING ENGINE START (Red FUEL SELECT OFF Annunciator On And Both Fuel Selector Warning Horns Activated)

1. **Left and Right Fuel Tank Selectors -- ON.**

FUEL LEVEL LOW WITH SINGLE TANK SELECTED (Red FUEL SELECT OFF And Amber LEFT Or RIGHT FUEL LOW Annunciators On And Fuel Selector Warning Horn Activated)

1. **Left and Right Fuel Tank Selectors -- ON** (turning both fuel tank selectors ON will extingush the red FUEL SELECT OFF annunciator and silence the warning horn).

FLAP SYSTEM MALFUNCTION PROCEDURES

ASYMMETRIC FLAP EXTENSION OR SUDDEN FLAP RETRACTION ON ONE SIDE

1. **Apply aileron and rudder to stop the roll.**
2. **Flap Selector -- UP.**
3. **Airspeed -- SLOW to 100 KIAS or less.**
4. If both flaps retract to a symmetrical setting:
   a. Plan a flaps up landing.
   b. Refer to Section 5 (notes above landing performance tables) for increase in approach speed and landing distance.
5. If both flaps cannot be retracted to a symmetrical setting:
   a. Land as soon as practical.
   b. Maintain a minimum airspeed of 90 KIAS on the approach and avoid a nose high flare on landing.

FLAPS FAIL TO EXTEND OR RETRACT

1. Flap Motor and STBY Flap Motor Circuit Breakers -- CHECK IN.
2. If flaps still fail to extend or retract:

   Earlier Airplanes:

   a. Guarded Standby Flap Motor Switch (Overhead) -- MOVE GUARD, and POSITION SWITCH TO STBY.
   b. Standby Flap Motor Up/Down Switch (Overhead) -- UP or DOWN (hold switch until flaps reach desired position, except release switch before flaps reach full up or full down travel).

   Later Airplanes:

   a. Guarded and Safetied Standby Flap Motor Switch (Overhead) -- MOVE GUARD, breaking safety wire, and POSITION SWITCH TO STBY.
   b. Guarded and Safetied Standby Flap Motor Up/Down Switch (Overhead) -- MOVE GUARD, breaking safety wire, and position switch UP or DOWN (hold switch until flaps reach desired position, except release switch before flaps reach full up or full down travel).

CAUTION

With the standby flap system in use, limit switches, which normally shut off the primary flap motor when reaching the flap travel limits, are electrically inactivated. Therefore, the pilot must release the standby flap motor up/down switch before the flaps reach their travel limit to prevent overloading and damage to the flap system.

3. Guarded Standby Flap Motor Switch -- Leave in STBY position until after landing when maintenance action can be accomplished.

LANDING GEAR MALFUNCTION PROCEDURES

LANDING WITH FLAT MAIN TIRE

1. Airplane -- FLY as desired to lighten fuel load.
2. Fuel Selectors -- POSITION ONE SIDE OFF TO LIGHTEN LOAD ON SIDE OF FLAT TIRE (maximum fuel unbalance of 200 pounds).
3. Approach -- NORMAL (full flaps).
4. Touchdown -- INFLATED TIRE FIRST. Hold airplane off flat tire as long as possible with aileron control.
5. Directional Control -- MAINTAIN using brake on wheel with inflated tire as required.

LANDING WITH FLAT NOSE TIRE

1. Passengers and Baggage -- MOVE AFT if practical (remain within approved C.G. envelope).
2. Approach -- NORMAL with full flaps.
3. Touchdown -- NOSE HIGH. Hold nose wheel off as long as possible during roll.
4. Brakes -- MINIMUM necessary.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

BATTERY TEMPERATURE HIGH (Amber BATTERY HOT Annunciator On) (Ni-Cad Battery Equipped Airplanes Only)

1. **Battery Switch -- OFF.**
2. Ammeter -- CHECK with selector switch in BATT position.
   a. If ammeter shows zero indication:
      (1) Annunciator light should extinguish.
   b. If ammeter shows charge indication:
      (1) Generator Switch -- TRIP and release.
      (2) Standby Power Switch (if installed) -- OFF.
      (3) All Electrical System Switches -- OFF.
      (4) Bus 1 Pwr and Bus 2 Pwr Circuit Breakers -- PULL OFF (total of 6 circuit breakers).
      (5) Avionics Switches -- OFF.
      (6) Standby Power Switch (if installed) -- ON.
      (7) Avionics Standby Power Switch -- LIFT GUARD, TURN ON.
      (8) Avionics Bus Tie Switch -- LIFT GUARD, TURN ON.
      (9) Reinstate essential electrical systems, exercising caution not to exceed capacity of standby electrical system (if installed).
3. As Soon as Practical -- LAND.

BATTERY OVERHEATED (Red BATTERY OVERHEAT Annunciator On) (Ni-Cad Battery Equipped Airplanes Only)

1. **Battery Switch -- CHECK OFF.**
2. Generator Switch -- TRIP and release.
3. Standby Power Switch (if installed) -- OFF.
4. All Electrical System Switches -- OFF.
5. Bus 1 Pwr and Bus 2 Pwr Circuit Breakers -- PULL OFF (total of 6 circuit breakers.
6. Avionics Switches -- OFF.
7. Standby Power Switch (if installed) -- ON.
8 Avionics Standby Power Switch -- LIFT GUARD, TURN ON.
9. Avionics Bus tie Switch -- LIFT GUARD, TURN ON.

10. Reinstate essential electrical systems, exercising caution not to exceed capacity of standby electrical system (if installed).
11. As Soon as Practical -- LAND.

GENERATOR FAILURE (Red VOLTAGE LOW and/or Red GENERATOR OFF Annunciators On)

1. Volt/Ammeter Selector Switch -- VOLTS. If voltage is near normal of 28.5 volts, assume fault in VOLTAGE LOW annunciator circuit and continue flight to destination monitoring voltage and generator output.

CAUTION

A red VOLTAGE LOW warning followed by a BUS 1 or BUS 2 circuit breaker opening may be a feeder fault that has isolated itself. DO NOT reset the breaker. The VOLTAGE LOW warning should extinguish.

If voltage is less than 24.5 volts:

2. Volt/Ammeter Selector Switch -- GEN and monitor ammeter.
3. If generator output is zero:
   a. GEN CONT and GEN FIELD Circuit Breakers -- PUSH IN.
   b. Generator Switch -- RESET and release.
4. If generator output is still zero:
   a. Generator Switch -- TRIP.
   b. Electrical Load -- REDUCE as follows:
      (1) Avionics Bus 2 Switch -- OFF.
      (2) Flashing Beacon -- OFF.
      (3) Strobe Lights -- OFF.
      (4) All De-Icing Equipment -- OFF (if pitot heat is required, pull RIGHT PITOT HEAT circuit breaker and turn pitot heat switch on).
      (5) Vent Fans -- OFF.
      (6) Air Conditioner (if installed) -- OFF.
      (7) GEN CONT and GEN FIELD Circuit Breakers -- PULL (top row, last two breakers on forward end).

      With KFC-150 Autopilot System Installed:

      (8) A/P CONT Circuit Breaker -- PULL (third row from bottom, first breaker from forward end).

      With KFC-250 Autopilot System installed:

      (8) A/P FD Circuit Breaker -- PULL. (third row from bottom, second breaker from forward end).

   To reactivate the avionics fan and the disabled section of the audio amplifier if desired:

      (1) Pull all AVIONICS BUS 2 circuit breakers except AVIONICS FAN and AUDIO AMP breakers (second row from bottom, last two breakers on forward end).
      (2) Avionics Bus 2 Switch -- ON.
   c. Flight -- TERMINATE as soon as practical.

NOTE

If the optional Standby Electrical System is installed, the flight may be continued to destination with the GENERATOR OFF annunciator illuminated. Refer to emergency procedures of Standby Electrical System supplement in Section 9.

5. If generator output resumes:
   a. Volt/Ammeter Selector Switch -- VOLTS and monitor voltmeter. If voltage increases past 29 volts, expect the generator to trip off again. If this occurs, turn off the nonessential radio and electrical equipment and land as soon as practical.

INVERTER FAILURE (Amber INVERTER INOP Annunciator On) (Airplanes Equipped with KFC-250 Autopilot Only)

1. Inverter Switch -- SELECT other inverter.
2. Failed Inverter -- REPAIR before next flight.

If INVERTER INOP annunciator remains on:

3. Inverter 1 and 2 Circuit Breakers -- CHECK IN.
4. If the left-hand gyros are flagged, the INVERTER INOP annunciator is correct.
5. Disregard left-hand gyros, land as soon as practical, and repair inverters.

STARTER CONTACTOR DOES NOT DISENGAGE AFTER ENGINE START (Amber STARTER ENERGIZED Annunciator On)

1. **Battery Switch --OFF.**
2. **Auxiliary Power Unit -- OFF, then DISENGAGE.**
3. **Fuel Condition Lever -- CUTOFF.**
4. Engine Shutdown -- COMPLETE.

EMERGENCY DESCENT PROCEDURES

ROUGH AIR

1. Seats, Seat Belts, Shoulder Harnesses -- SECURE.
2. Power Lever -- IDLE.
3. Propeller Control Lever -- MAX (full forward)
4. Wing Flaps -- UP.
5. Weights and Airspeed:
   8750 Pounds -- 148 KIAS
   7500 Pounds -- 137 KIAS
   6250 Pounds -- 125 KIAS
   5000 Pounds -- 112 KIAS

SMOOTH AIR

1. Seats, Seat Belts, Shoulder Harnesses -- SECURE.
2. Power Lever -- IDLE.
3. Propeller Control Lever -- MAX (full forward)
4. Wing Flaps -- 10°.
5. Airspeed -- 175 KIAS.

INADVERTENT OPENING OF AIRPLANE DOORS IN FLIGHT

UPPER HALF OF CARGO DOOR OR UPPER HALF OF PASSENGER AIRSTAIR DOOR OPEN (Red DOOR WARNING Annunciator On)

1. Airspeed -- MAINTAIN LESS THAN 100 KIAS.
2. Wing Flaps -- FULL (wing downwash with flaps extended will move the doors near their normally closed position).

3. If available or practical, have e second crew member go aft to close and latch door.
4. If landing is required with door open:
   a. Approach and Landing -- NORMAL.

LOWER HALF OF PASSENGER AIRSTAIR DOOR OPEN

1. Airspeed -- MAINTAIN LESS THAN 100 KIAS.
2. Flight Controls -- MANEUVER for return for landing.
3. Wing Flaps -- FULL.
4. Approach -- NORMAL.
5. Landing -- SLIGHTLY TAIL LOW; avoid nose high flare.

RIGHT OR LEFT CREW DOORS OPEN

1. Airspeed -- MAINTAIN LESS THAN 125 KIAS.
2. Door -- PULL CLOSED and LATCH.

CARGO POD DOOR(S) OPEN

1. Airspeed -- MAINTAIN LESS THAN 125 KIAS.
2. Land -- AS SOON AS PRACTICAL.
   a. Approach -- NORMAL.
   b. Landing -- AVOID A NOSE HIGH FLARE.

AMPLIFIED PROCEDURES

The following Amplified Procedures elaborate upon information contained in the Operational Checklists portion of this section. These procedures also include information not readily adaptable to a checklist format, and material to which a pilot could not be expected to refer in resolution of a specific emergency.

NOTE

If a red or non-dimmable amber annunciator illuminates at night and becomes an unacceptable distraction to the pilot because of its brightness level, it may be extinguished for the remainder of the flight by pushing in on the face of the light assembly and allowing it to pop out. To reactivate the annunciator, pull the light assembly out slightly and push back in. For further details, refer to Section 7, Annunciator Panel.

ENGINE FAILURE

If an engine failure occurs during the takeoff roll, the most important thing to do is stop the airplane on the remaining runway. Those extra items on the checklist will provide added safety after a failure of this type.

Prompt lowering of the nose to maintain airspeed and establish a glide attitude is the first response to an engine failure after takeoff. Feathering the propeller substantially reduces drag, thereby providing increased glide distance. In most cases, the landing should be planned straight ahead with only small changes in direction to avoid obstructions. Altitude and airspeed are seldom sufficient to execute a 180° gliding turn necessary to return to the runway. The checklist procedures assume that adequate time exists to secure the fuel and electrical systems prior to touchdown.

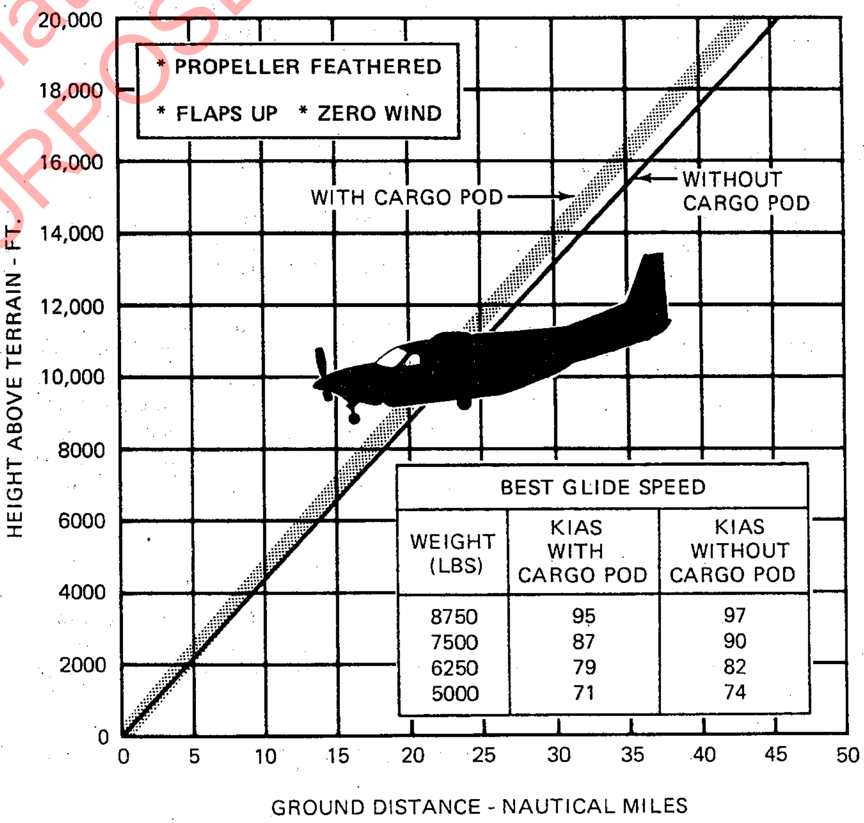
After an engine failure in flight, the best glide speed as shown in Figure 3-1 should be established as quickly as possible. Propeller feathering is dependent on existing circumstances and is at the discretion of the pilot. Maximum RPM selection will provide increased gas generator windmilling speed for emergency restarts in the event of a starter failure. On the other hand, to obtain the maximum glide, the propeller must be feathered.

While gliding toward a suitable landing area, an effort should be made to identify the cause of the power loss. An engine **failure** might be identified by abnormal temperatures, mechanical noises or high vibration levels in conjunction with the power loss. A **flameout** will be noticed by a drop in ITT, torque and % N_g.

CAUTION

Do not attempt to restart an engine that is definitely known to have failed.

A flameout may result from the engine running out of fuel, or possibly may be caused by unstable engine operation. Unstable engine operation such as a compressor surge (possibly due to a bleed valve malfunction) may be identifiable by an audible popping noise just before flameout. Once the fuel supply has been restored to the engine or cause of unstable engine operation eliminated, the engine may be restarted.



BEST GLIDE SPEED

WEIGHT (LBS)	KIAS WITH CARGO POD	KIAS WITHOUT CARGO POD
8750	95	97
7500	87	90
6250	79	82
5000	71	74

Figure 3-1. Maximum Glide

The best airstart technique is to initiate the relight procedure immediately after a flameout occurs, provided the pilot is certain that the flameout was not the result of some malfunction that might make it hazardous to attempt a relight. Regardless of airspeed or altitude, there is always the possibility that the engine may light up successfully just as soon as the ignition is turned on. In an emergency, turn on the ignition just as soon as possible after flameout, provided the gas generator speed has not dropped below 50%. Under these circumstances, it is not necessary to shut off the fuel or feather the propeller. The power lever, however, should be retarded to IDLE position.

If a flameout has occurred and the gas generator speed has dropped below 50%, the fuel condition lever should be moved to the CUTOFF position before an airstart is attempted.

CAUTION

The pilot should determine the reason for power loss before attempting an airstart.

Propeller feathering is dependent on circumstances and is at the discretion of the pilot. However, if engine oil pressure drops below 15 psi, the propeller should be feathered.

If an airstart is to be attempted, follow the checklist procedures. The Starter Assist procedure is preferred since it results in cooler engine starts. Successful airstarts (with starter assist) may be achieved at all airspeeds normally flown and up to an altitude of 14,000 feet. However, above 14,000 feet, or with the gas generator RPM below 10%, starting temperatures tend to be higher and caution is required.

CAUTION

The fuel condition lever may be moved momentarily to CUTOFF and then back to LOW IDLE if overtemperature tendencies are encountered. This reduces the flow of fuel to the combustion chamber.

If the engine starter is inoperative, follow the No Starter Assist checklist procedures for an airstart.

CAUTION

If a rise in N_g and ITT are not indicated within 10 seconds, place fuel condition lever to CUTOFF and abort start. Refer to Engine Failure During Flight and Emergency Landing Without Power checklists.

CAUTION

- **Emergency airstarts may be attempted below 10% N_g and outside the normal airspeed envelope, but ITT should be closely monitored. The fuel condition lever may be moved alternately to CUTOFF and then back to LOW IDLE if overtemperature tendencies are encountered.**
- **Do not attempt an airstart without starter assist with 0% N_g.**

FORCED LANDINGS

If all attempts to restart the engine fail and a forced landing is imminent, select a suitable field and prepare for the landing as discussed under the Emergency Landing Without Engine Power checklist.

Before attempting an "off airport" landing with engine power available, one should fly over the landing area at a safe but low altitude to inspect the terrain for obstructions and surface conditions, proceeding as discussed under the Precautionary Landing With Engine Power checklist.

NOTE

The overhead fuel tank selectors control shutoff valves at the wing fuel tank outlets. To minimize the possibility of a fire, these selectors may be turned OFF during the final stage of an approach to an "off-airport" landing. With the selectors turned OFF, there is adequate fuel in the fuel reservoir tank for 3 minutes of maximum continuous power operation or approximately 9 minutes idle power operation. A warning horn will sound with both fuel selectors turned OFF. If it is objectionable, it may be silenced by pulling the START CONT circuit breaker.

WARNING

If the precautionary landing is aborted, turn the fuel tank selectors back ON after initiating the balked landing.

Prepare for ditching by securing or jettisoning heavy objects located in the baggage area and collect folded coats for protection of occupants' face at touchdown. Transmit Mayday message on 121.5 MHz giving location and intentions and squawk 7700 if a transponder is installed. Avoid a landing flare because of difficulty in judging height over a water surface.

LANDING WITHOUT ELEVATOR CONTROL

Using power lever and elevator trim control, trim for approximately 500 fpm descent with 20° flaps at 85 KIAS. Then control the glide angle by adjusting power. If required, make small trim changes to maintain approximately 85 KIAS as power is adjusted during the approach.

The landing flare can be accomplished by a gentle power reduction accompanied by nose up trim. At forward C.G. loadings, it may be necessary to make a small power increase in the final flare stage to bring the nose up and prevent touchdown on the nose first. After touchdown, move the power lever to idle.

SMOKE AND FIRE

In the event a fire is encountered, the following information will be helpful in dealing with the emergency as quickly and safely as possible.

The preflight checklist in Section 4 is provided to aid the pilot in detecting conditions which could contribute to an airplane fire. As a fire requires a combustible material, oxygen and a source of ignition, close preflight inspection should be given to the engine compartment and the underside of the wing and fuselage. Leaks in the fuel or oil systems can lead to a ground or inflight fire.

⚠ WARNING

Flight should not be attempted with known fuel or oil leaks. The presence of fuel or unusual oil stains may be an indication of system leaks and should be corrected prior to flight.

Probable causes of an engine fire are a malfunction of the fuel control unit and improper starting procedures. Improper procedures such as starting with the emergency power lever out of NORMAL position or introducing fuel into the engine when gas generator speed is below 10% RPM will cause a hot start which may result in an engine fire. In the event that this occurs, proceed in accordance with the Engine Fire During Start On Ground checklist.

If an airplane fire is discovered on the ground or during takeoff, but prior to committed flight, the airplane should be stopped and evacuated as soon as practical.

Engine fires originating in flight must be controlled as quickly as possible in an attempt to prevent major structural damage. Immediately shut off all fuel to the engine and shut down the engine. Close the cabin heat firewall shutoff control and forward side vents. To avoid drawing fire into the cabin, open the overhead vents, extend 20° to 30° flaps and slow down to 80-85 KIAS. This provides a positive cabin pressure in relation to the engine compartment. An engine restart should not be attempted.

An open foul weather window produces a low pressure in the cabin. To avoid drawing the fire into the cabin, the foul weather window should be kept closed.

A fire or smoke in the cabin should be controlled by identifying and shutting down the faulty system. Smoke may be removed by opening the cabin ventilation controls. When the smoke is intense, the pilot may choose to expel the smoke through the foul weather window. The foul weather window should be closed immediately if the fire becomes more intense when the window is opened.

The initial indication of an electrical fire is usually the odor of burning insulation. The checklist for this problem should result in elimination of the fire.

EMERGENCY OPERATION IN CLOUDS (Airplanes Equipped With KFC-150 Autopilot)

In the event of a complete electrical system failure (gyro warning flags extend in pilot's directional gyro and right-hand horizon gyro and VOLTAGE LOW annunciator illuminates) the electrically-operated pilot's directional gyro, right-hand horizon gyro and both turn and bank indicators will become inoperative. In the event of a vacuum system failure (VACUUM LOW annunciator illuminates), the vacuum-operated pilot's horizon gyro and right-hand directional gyro will become inoperative. In either case, the unaffected gyros on the opposite flight panels should be used for the remainder of the flight.

EMERGENCY OPERATION IN CLOUDS (Airplanes Equipped With KFC-250 Autopilot)

In the event of an electrical system failure (gyro warning flags extend and VOLTAGE LOW annunciator and/or INVERTER INOP annunciators illuminate), the left-hand gyros will become inoperative. In the event of a vacuum system failure (VACUUM LOW annunciator illuminates), the right flight panel gyros will become inoperative. In either case, the unaffected gyros on the opposite flight panel should be used for the remainder of the flight. If failure of the left-hand gyros is caused by an inverter failure, selecting the Number 2 inverter may restore the necessary gyro power. If DC electrical power is still available, the turn-and-bank indicator may also be used.

INADVERTENT FLIGHT INTO ICING CONDITIONS

Intentional flight into known icing conditions is prohibited unless the complete flight into known icing equipment package is operative and the airplane weight is 8550 pounds or less. During instrument flights, however, icing conditions may be encountered inadvertently and, if the known icing equipment package is not completely functional, some corrective action will be required as shown in the checklist. Initiation of a climb is usually the best ice avoidance action to take; however, alternatives are descent to warmer air or course reversal.

STATIC SOURCE BLOCKED

If erroneous instrument readings are suspected due to water, ice or other foreign matter in the pressure lines going to the left flight panel's external static pressure source, the alternate static source valve should be pulled full on. A chart in Section 5 provides a correction which may be applied to the indicated airspeeds and altitudes resulting from inaccuracies in the alternate static source pressures.

NOTE

The altitude hold mode of the autopilot should be disengaged before actuating the alternate static source valve.

SPINS

Intentional spins are prohibited in this airplane. Should an inadvertent spin occur, the following recovery technique may be used.

1. RETARD POWER LEVER TO IDLE POSITION.
2. PLACE AILERONS IN NEUTRAL POSITION.
3. APPLY AND HOLD FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION.
4. IMMEDIATELY AFTER THE RUDDER REACHES THE STOP, MOVE THE CONTROL WHEEL **BRISKLY** FORWARD FAR ENOUGH TO BREAK THE STALL. Full down elevator may be required at aft center of gravity loadings to assure optimum recoveries.
5. **HOLD** THESE CONTROL INPUTS UNTIL ROTATION STOPS. Premature relaxation of the control inputs may extend the recovery.
6. AS ROTATION STOPS, NEUTRALIZE RUDDER AND MAKE A SMOOTH RECOVERY FROM THE RESULTING DIVE.

NOTE

If disorientation precludes a visual determination of the direction of rotation, the needle of the turn and bank indicator may be referred to for this information.

ENGINE MALFUNCTIONS

LOSS OF OIL PRESSURE

The complete loss of oil pressure, as evidenced by the low oil pressure annunciator being illuminated and confirmed by the oil pressure gage reading, implies that the pilot will eventually lose control of the propeller as the propeller springs and counterweights drive the propeller blades into feather. Also, the engine will eventually seize. Therefore, if the pilot elects to continue to operate the engine after loss of oil pressure, engine and propeller operation should be closely monitored for indication of the onset of propeller feathering or engine seizure and the engine failure checklist should be completed at that time. Operation of the engine at a reduced power setting (preferably at the minimum

power required for the desired flight regime) will generally prolong the time to loss of engine/propeller thrust.

Operation of the engine with the oil pressure in the yellow arc is not considered critical, but is a cause for concern and should be tolerated only for the completion of the flight. Continued monitoring of the oil pressure gage will provide an early indication of dropping oil pressure due to insufficient oil supply or a malfunctioning oil pump, and will give the pilot additional time to divert to a suitable emergency landing area with the engine operating.

FUEL CONTROL UNIT MALFUNCTION IN THE PNEUMATIC OR GOVERNOR SECTIONS

A malfunction in the pneumatic or governor sections of the fuel control unit may cause engine power to decrease to minimum flow idle. Symptoms of this type of failure would be an ITT indication in the typical idle range of 500 to 600°C, Ng of 48 or above (increases with altitude), and no engine response to power lever movement. If this type of malfunction has occurred, the emergency power lever (fuel control manual override) may be used to restore engine power. To use the manual override system, place the power lever at its IDLE position and move the emergency power lever forward of its IDLE gate and advance as required.

CAUTION

When using the fuel control manual override system, engine response may be more rapid than when using the power lever. Utilize slow and smooth movement of the emergency power lever to avoid engine surges, and/or exceeding ITT, N_g, and torque limits.

NOTE

- When using the emergency power lever, monitor gas generator RPM when reducing power near idle, to keep it from decreasing below 65% in flight.
- The emergency power lever may have a dead band, such that no engine response is observed during the initial forward travel from the IDLE position.

GEAR BOX CONTAMINATION

Contamination of the reduction gear box as evidenced by the chip detector annunciator being illuminated does not by itself demand any immediate action by the pilot. If this annunciation is accompanied by signs of engine distress (fluctuation in engine power gage indications or erratic engine operation), engine operation may be continued at the discretion of the pilot consistent with crew safety. However, the power gages should be closely monitored for further degradation in the torque or RPM indications or engine operation which implies that seizure is imminent. The engine failure checklist should be completed at that time.

FUEL SYSTEM MALFUNCTION/INADVERTENT FUEL FLOW INTERRUPTION PROCEDURES

Fuel flows by gravity from the wing tanks, through fuel tank shutoff valves at the inboard end of each wing tank, and on to the reservoir located under the center cabin floorboard. After engine start, the main ejector pump (located in the reservoir) provides fuel to the engine-driven fuel pump at approximately 10 psi.

If the main ejector pump should malfunction, a pressure switch will activate the amber FUEL PRESS LOW annunciator as well as turn on the auxiliary boost pump (when the fuel boost switch is in the NORM position) anytime the fuel pressure drops below approximately 4.75 psi.

Anytime the level of fuel in the reservoir drops to approximately one-half full, the red RESERVOIR FUEL LOW annunciator will illuminate. If this occurs, the pilot should immediately verify that both fuel tank selectors (located in the overhead panel) are ON and turn on the ignition and fuel boost switches.

⚠ WARNING

There is only enough fuel in the reservoir for approximately 1-1/2 minutes of engine operation at maximum continuous power after illumination of the RESERVOIR FUEL LOW annunciator.

If the fuel tank selectors have been left off, turning them on will quickly fill the reservoir and extinguish the RESERVOIR FUEL LOW annunciator. Once the cause of the RESERVOIR FUEL LOW condition has been determined and corrected (annunciator extinguished), the ignition and fuel boost switches can be returned to their NORM positions.

A fuel selector off warning system advises the pilot if both fuel tank selectors are in the OFF position before engine start, if either fuel tank selector is OFF during engine start, or if one fuel tank selector is OFF and the fuel level in the tank being used drops below approximately 25 gallons. The warning system includes a red annunciator labeled FUEL SELECT OFF and two warning horns. If the FUEL SEL WARN circuit breaker has popped or the START CONT circuit breaker has been pulled (possibly for ground maintenance), the FUEL SELECT OFF annunciator will be illuminated even with both fuel tank selectors in the ON position. This is a warning to the pilot that the fuel selector off warning system has been deactivated. See Section 7 for further details on the fuel selector off warning system.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

BATTERY MALFUNCTIONS (Ni-Cad Battery Only)

If a Ni-Cad battery is installed, a battery temperature monitoring system is provided to detect an incipient thermal problem. The BATTERY HOT annunciator indicates internal battery temperature is 140°F or higher. The BATTERY OVERHEAT annunciator indicates battery temperature has reached 160°F. In either case, it is necessary to stop providing charging current to the battery from the airplane power system. This is accomplished by turning the battery switch off using the checklist procedures. During these procedures, the volt/ammeter (in BATT position) should be used to verify that charging current is reduced to zero. A battery temperature of 160°F may be critical and the flight should be terminated as soon as practical. A battery temperature of 140°F is critical if the temperature and charging current continue to rise. Under high ambient temperature (above 100°F) conditions, a battery temperature of 140°F is not critical if a decreasing charging current trend is verified and maintained by monitoring the volt/ammeter selected to the BATT position.

GENERATOR OR MAIN BUS MALFUNCTIONS

Illumination of the VOLTAGE LOW annunciator is a warning that the power distribution bus voltage is low enough to start discharging the battery. The volt/ammeter (in VOLTS position) is used to verify the low bus voltage. A low or zero reading of the volt/ammeter (in GEN position) confirms that the charge is insufficient or generator output current is zero. If the GENERATOR OFF annunciator is illuminated, it indicates that the generator contactor has disconnected the generator from the power distribution bus. The most likely causes of a generator trip (disconnection) are line surges, tripped circuit breakers or accidental switch operation. In these cases, follow the checklist procedures to restore generator operation.

The airplane is equipped with two starter contactors. One is used for starts on external power and the other for battery starts. If either contactor does not open after reaching approximately 46% N_g, the amber STARTER ENERGIZED annunciator will remain illuminated. In most cases when this occurs, the generator will not transfer to the generate mode, and the GENERATOR OFF annunciator will remain illuminated. Under these conditions, it will be necessary to shut down the engine using checklist procedures and correct the malfunction prior to flight.

The electrical power distribution system consists of a primary power distribution bus in the engine compartment which receives power from the battery and the generator, and two (No. 1 & No. 2) main power buses located in the circuit breaker panel. The main buses are each connected to the power distribution bus by three feeder cables. Each feeder cable is protected by a fuse link and a circuit breaker. This multiple feeder system provides automatic isolation of a feeder cable ground fault. If one of the three 30-amp feeder circuit breakers on either bus opens, it should be assumed that a feeder cable ground fault has been isolated, and attempted resetting of these breakers prior to troubleshooting is not recommended. The electrical load on the affected bus should be maintained below the remaining 60-ampere capacity.

LOSS OF ELECTRICAL POWER

The design of the electrical power system, due to the self-exciting feature of the generator and the multiple protected busing system, minimizes the possibility of a complete electrical power loss. However, a fault to ground (airframe) on the generator or battery cables can be identified by one or more of the following: illumination of the GENERATOR OFF annunciator, sudden dimming of lights, contactor chattering, circuit breaker tripping, or arcing noises. The volt/ammeter provides further information concerning the location of the fault, or the system affected by the fault. In the event of the above indications, the portion of the system containing the fault should be isolated. The battery should be disconnected first by turning the battery switch to OFF. Then, following the checklist procedures for Generator Failure should result in restoration of electrical power to the distribution buses. The volt/ammeter should be monitored to assure that ground fault currents have been shut off and the capacity of the remaining power source(s) is not exceeded.

PARTIAL AVIONICS POWER FAILURE

Avionics power is supplied to the No. 1 and No. 2 avionics buses from the power distribution bus in the engine compartment through separate protected feeder cables. In the event of a feeder cable failure, both avionics buses can be connected to the remaining feeder by closing the guarded avionics bus tie switch. If a ground fault has occurred on one feeder, it will be necessary to verify the avionics power switch/breaker associated with the affected feeder is off before the avionics bus tie switch will restore power to both avionics buses. The maximum avionics load with one feeder should be limited to 30 amperes. Nonessential avionics equipment should be turned off.

STANDBY ELECTRICAL SYSTEM MALFUNCTIONS

An operational check of the standby electrical system is performed by following the Normal Procedures, Before Takeoff checklist. With the generator supplying the electrical load and the standby power switch ON, both the amber annunciators, STBY ELECT PWR ON and STBY ELECT PWR INOP, should be extinguished. The volt/ammeter should indicate zero amps in the ALT position. If the STBY ELECT PWR INOP annunciator is illuminated, it indicates that the alternator has no output. If a line voltage surge or temporary condition has tripped the ACU (alternator control unit), then cycling the standby power

switch to OFF, then back ON, may reset the ACU and restore standby power.

If, due to a power system malfunction, the standby electrical system is carrying part of the electrical load (more than 10 amps), the STBY ELECT PWR ON annunciator will be illuminated and the volt/ammeter (in ALT position) will indicate the amount of current being supplied by the standby electrical system.

To attempt to restore main power, refer to the Section 3 emergency procedures for Loss Of Electrical Power. If this attempt is successful, the standby electrical system will revert to its normal no-load condition and the STBY ELECT PWR ON annunciator will extinguish. If main electrical power cannot be restored, reduce nonessential loads as necessary to remain within the 75-amp capability of the standby electrical system. Loads in excess of this capability will be indicated by illumination of the VOLTAGE LOW annunciator and the volt/ammeter showing discharge current (in the BATT position).

INADVERTENT OPENING OF AIRPLANE DOORS IN FLIGHT

If any of the airplane doors should inadvertently open in flight, the airplane should be slowed to 125 KIAS or less to reduce buffeting of the doors. If the upper cargo door is open, slow to 100 KIAS or less and lower flaps to full down so that wing downwash will move the door towards its normally closed position. On the Passenger Version, closing the upper cargo door or upper half of the passenger airstair door can be accomplished after airspeed has been reduced by pulling the door forcefully closed and latching the door. If the door cannot be closed in flight, a landing should be made as soon as practical in accordance with the checklist procedures. On Cargo Versions, an open cargo door cannot be closed in flight since the inside of the upper door has no handle.

If any cargo pod doors inadvertently open in flight, the airplane should be slowed to 125 KIAS or less and landed as soon as practical. During the landing, avoid a nose-high flare to prevent dragging an open rear cargo pod door on the runway.

EMERGENCY EXITS

Use of the crew entry doors, the passenger entry doors, and the cargo doors for emergency ground egress from the Passenger Version is illustrated in Figure 3-2. Emergency ground egress from the Cargo Version is accomplished by exiting the airplane through the left and right crew entry doors as shown in Figure 3-2.

⚠ WARNING

- **Do not attempt to exit the Cargo Version through the cargo doors. Since the inside of the upper door has no handle, exit from the airplane through these doors is not possible without outside assistance.**
- **When exiting the airplane, avoid the propeller area.**

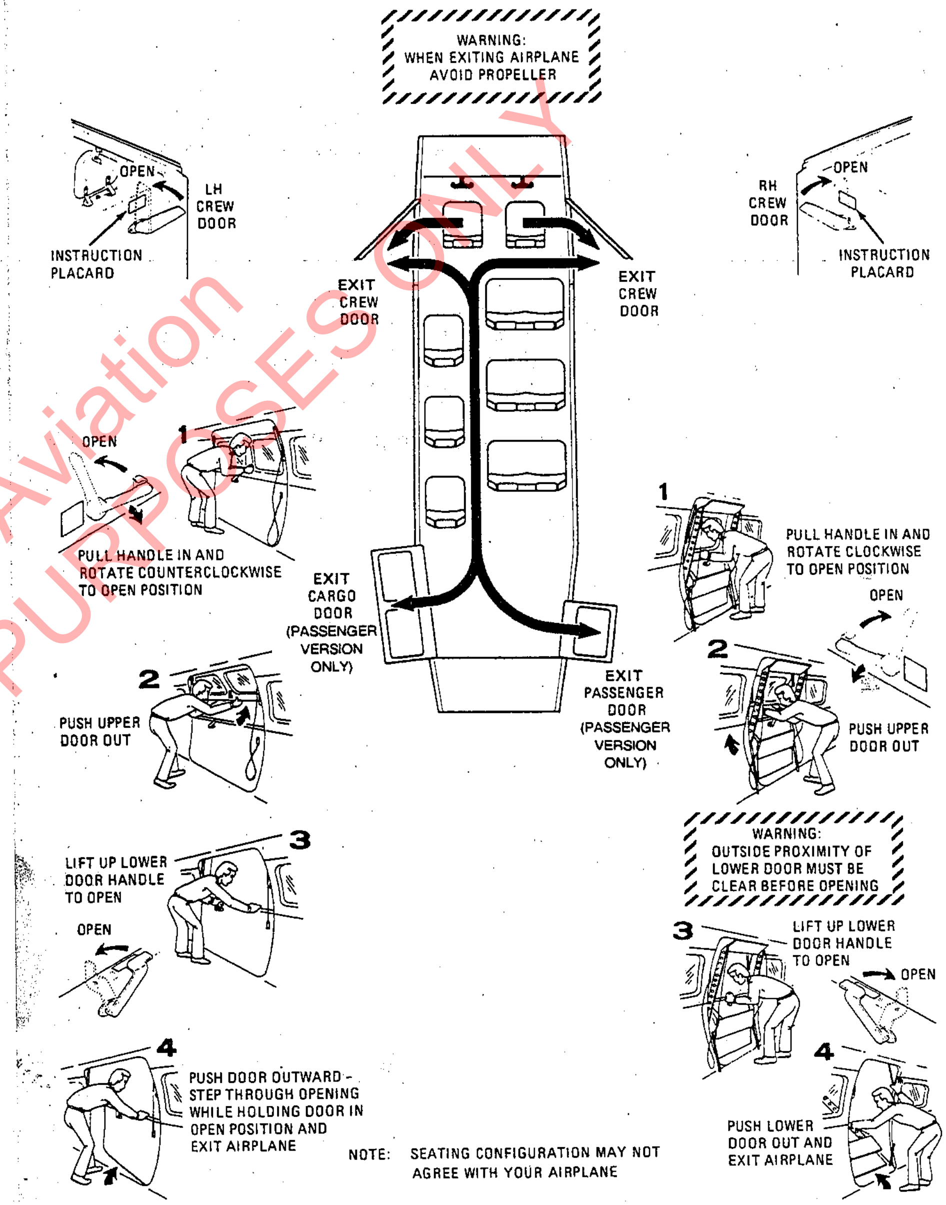


Figure 3-2. Emergency Exit

SECTION 4 NORMAL PROCEDURES

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INTRODUCTION

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 9.

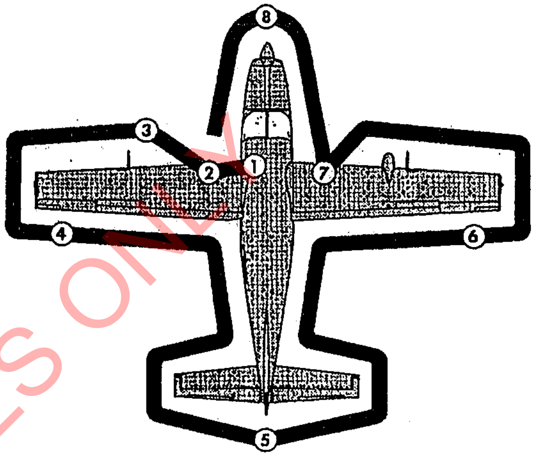
⚠ WARNING

There is no substitute for proper and complete preflight planning habits and their continual review in minimizing emergencies. Be thoroughly knowledgeable of hazards and conditions which represent potential dangers, and be aware of the capabilities and limitations of the airplane.

SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 8750 pounds for takeoff and 8500 pounds for landing and may be used for any lesser weight. However, to achieve the performance specified in Section 5 for takeoff distance, climb performance, and landing distance, the speed appropriate to the particular weight must be used.

Takeoff:	
Normal Climb Out	85-95 KIAS
Short Field Takeoff, Flaps 20°, Speed at 50 Feet	83 KIAS
Type II or Type IV Anti-ice Fluid Takeoff, Flaps 0°:	
8750 Lbs Without Cargo Pod	83 KIAS
8550 Lbs With Cargo Pod	83 KIAS
Enroute Climb, Flaps Up:	
Cruise Climb	110-120 KIAS
Best Rate of Climb, Sea Level to 10,000 Feet	104 KIAS
Best Rate of Climb, 20,000 Feet	87 KIAS
Best Angle of Climb, Sea Level to 20,000 Feet	72 KIAS
Landing Approach:	
Normal Approach, Flaps Up	100-115 KIAS
Normal Approach, Flaps 30°	75-85 KIAS
Short Field Approach, Flaps 30°	78 KIAS
Balked Landing:	
Takeoff Power, Flaps 20°	80 KIAS
Maximum Recommended Turbulent Air Penetration Speed:	
8750 Lbs	148 KIAS
7500 Lbs	137 KIAS
6250 Lbs	125 KIAS
5000 Lbs	112 KIAS
Maximum Demonstrated Crosswind Velocity:	
Takeoff or Landing	20 KNOTS



⚠ WARNING

- **Visually check airplane for general condition during walk-around inspection and remove any inlet, exit or exhaust covers. If cargo pod is installed, check its installation for security during the walk-around inspection. Use of a ladder will be necessary to gain access to the wing for visual checks, refueling operations, checks of the stall warning and pitot heat, and to reach outboard fuel tank sump drains.**
- **It is the pilot's responsibility to ensure that the airplane's fuel supply is clean before flight. Any traces of solid contaminants such as rust, sand, pebbles, dirt, microbes, and bacterial growth or liquid contamination resulting from water, improper fuel type, or additives that are not compatible with the fuel or fuel system components must be considered hazardous. Carefully sample fuel from all fuel drain locations during each preflight inspection and after every refueling.**
- **It is essential in cold weather to remove even small accumulations of frost, ice, or snow from wing, tail, and control surfaces (exercise caution to avoid distorting vortex generators on horizontal stabilizer while deicing). Also, make sure that control surfaces contain no internal accumulations of ice or debris. Prior to any flight in icing conditions, check that pitot/static source and stall warning heaters are warm to touch within 30 seconds with appropriate switches on. If these requirements are not performed, aircraft performance will be degraded to a point where a safe takeoff and climbout may not be possible.**
- **If a night flight is planned, check operation of all lights, and make sure a flashlight is available and properly stowed.**

Figure 4-1. Preflight Inspection

CHECKLIST PROCEDURES

PREFLIGHT INSPECTION

1 CABIN

1. Pilot's Operating Handbook and Other Required Documents -- AVAILABLE IN THE AIRPLANE.
2. Control Locks -- REMOVE (DISENGAGE rudder lock, if installed).
3. Parking Brake -- SET.
4. All Switches -- OFF.
5. All Circuit Breakers -- IN.
6. Static Pressure Alternate Source Valve -- OFF (full in).
7. Inertial Separator T-Handle -- NORMAL.
8. Standby Flap Motor Switch (Overhead) -- GUARDED NORM.
9. Oxygen Supply Pressure -- CHECK.
10. Oxygen Masks -- CHECK AVAILABLE.
11. Fuel Selector Valves -- CHECK ON and FEEL AGAINST STOPS.
12. Radar -- OFF.
13. Air Conditioner (if installed) -- OFF.
14. Inverter Switch (if installed) -- OFF.
15. Bleed Air Heat Switch -- OFF.
16. Emergency Power Lever -- NORMAL, and if applicable, copper witness wire present and intact.
17. Trim Controls -- SET.
18. Fuel Shutoff -- ON.
19. Cabin Heat Firewall Shutoff Control -- CHECK IN.
20. Battery Switch -- ON.
21. Avionics Power Switch No. 2 -- ON. Check audibly that avionics cooling fan is operating.
22. Avionics Power Switch No. 2 -- OFF.
23. Fuel Quantity Indicators -- CHECK QUANTITY.
24. Wing Flaps -- FULL DOWN.
25. Pitot/Static and Stall Heat Switches -- ON for 30 seconds, then OFF. (Ensure pitot/static tube covers are removed.)
26. Battery Switch -- OFF.

2 LEFT SIDE

1. Fuel Reservoir Drain (bottom of fuselage or left side of cargo pod) -- DRAIN (using fuel sampler) to check for water, sediment, and proper fuel before each flight and after each refueling. If water is observed, take further samples until clear. Take repeated samples from **all** fuel drain points (see Section 7 Fuel System Schematic for all **nine** drain locations) until all contamination has been removed.

NOTE

Properly dispose of samples from all fuel drains, since aviation turbine fuel will deteriorate asphalt surfaces.

2. Main Landing Gear -- CHECK proper tire inflation and condition of gear.
3. Inboard Fuel Tank Sump and External Sump Quick-Drain Valves -- DRAIN (using fuel sampler) to check for water, sediment, and proper fuel before each flight and after each refueling. If water is observed, take further samples until clear. Take repeated samples from all fuel drain points until all contamination has been removed.

3 LEFT WING Leading Edge

WARNING

It is essential in cold weather to remove even small accumulations of frost, ice, or snow from the wing and control surfaces. Also, make sure the control surfaces contain no internal accumulations of ice or debris. Prior to any flight in icing conditions, check that pitot/static source and stall warning heaters are warm to touch after turning pitot/static and stall heat switches on for 30 seconds, then off. Make sure the pitot covers are removed.

1. Wing Strut Deice Boots -- CHECK for tears, abrasion and cleanliness.
2. Wing Tie-Down -- DISCONNECT.
3. Wing Deice Boots -- CHECK for tears, abrasions and cleanliness.
4. Stall Warning Vane -- CHECK freedom of movement, audible warning and warmth. (For aircraft equipped with a stall warning ground disconnect switch, check audible warning with elevator off forward stop).
5. Pitot/Static Tube -- CHECK security, openings for stoppage and warmth.
6. Landing and Taxi Lights -- CHECK condition and cleanliness.
7. Fuel Quantity -- Visually check for desired level.
8. Fuel Filler Cap -- SECURE.
9. Outboard Fuel Tank Sump Quick-Drain Valve (if installed and airplane parked with one wing low on a sloping ramp) -- DRAIN (using fuel sampler) to check for water, sediment, and proper fuel before each flight and after each refueling. If water is observed, take further samples until clear. Take repeated samples from **all** fuel drain points until all contamination has been removed.
10. Navigation and Strobe Lights -- CHECK for condition and cleanliness.

(4) LEFT WING Trailing Edge

1. Fuel Tank Vent -- CHECK for obstructions.
2. Aileron and Servo Tab -- CHECK condition and security.
3. Static Wicks -- CHECK condition.
4. Spoiler -- CHECK condition and security.
5. Flap Leading Edge Vortex Generators -- CHECK for security.
6. Flap -- CHECK condition and security.

(5) EMPENNAGE

WARNING

It is essential in cold weather to remove even small accumulations of frost, ice, or snow from the tail and control surfaces. Exercise caution to avoid distorting vortex generators on the horizontal stabilizer while deicing. Also make sure the control surfaces contain no internal accumulations of ice or debris.

1. Baggage/Cargo -- CHECK SECURE through cargo door.
2. Cargo Door -- CLOSED and LATCHED.
3. Tail Tie-Down -- DISCONNECT.
4. Deice Boots -- CHECK for tears, abrasion and cleanliness.
5. Rudder Gust Lock (if installed) -- DISENGAGE.
6. Control Surfaces and Elevator Trim Tabs -- CHECK condition, security, freedom of movement and tab position.
7. Static Wicks -- CHECK condition.
8. Passenger Entry Door (if installed) -- CLOSED and LATCHED.

(6) RIGHT WING Trailing Edge

1. Flap -- CHECK condition and security.
2. Flap Leading Edge Vortex Generators -- CHECK for security.
3. Spoiler -- CHECK condition and security.
4. Aileron and Trim Tab -- CHECK condition and security.
5. Static Wicks -- CHECK condition.
6. Fuel Tank Vent -- CHECK for obstructions.

(7) RIGHT WING Leading Edge

WARNING

It is essential in cold weather to remove even small accumulations of frost, ice, or snow from the wing and control surfaces. Also, make sure the control surfaces contain no internal accumulations of ice or debris.

1. Navigation and Strobe Lights -- CHECK condition and cleanliness.
2. Fuel Quantity -- VISUALLY CHECK for desired level.
3. Fuel Filler Cap -- SECURE.
4. Outboard Fuel Tank Sump Quick-Drain Valve (if installed and airplane parked with one wing low on a sloping ramp) -- DRAIN (using fuel sampler) to check for water, sediment, and proper fuel before each flight and after each refueling. If water is observed, take further samples until clear. Take repeated samples from **all** fuel drain points until all contamination has been removed.
5. Pitot/Static Tube -- CHECK security, openings for stoppage and warmth.
6. Landing and Taxi Lights -- CHECK condition and cleanliness.
7. Wing Deice Boots -- CHECK for tears, abrasion and cleanliness.
8. Radome -- CHECK condition and security.
9. Wing Tie-Down -- DISCONNECT.
10. Wing Strut Deice Boots -- CHECK for tears, abrasion, and cleanliness.
11. Inboard Fuel Tank Sump and External Sump Quick-Drain Valves -- DRAIN (using fuel sampler) to check for water, sediment, and proper fuel before each flight and after each refueling. If water is observed, take further samples until clear. Take repeated samples from all fuel drain points until all contamination has been removed.
12. Main Landing Gear -- CHECK proper tire inflation and gear condition.

(8) NOSE

⚠ WARNING

It is essential in cold weather to remove even small accumulations of frost, ice, or snow from the propeller blades and spinner, and the air inlets (starter/generator, oil cooler and engine inlets).

1. Exhaust Cover (if installed) -- REMOVE.
2. Cowling -- OPEN right side of upper cowling for access and CHECK condition and security.
3. Engine (right side) -- CHECK for general condition, security, fuel and oil leakage and damage to any components.

⚠ WARNING

Avoid touching the output connectors or coupling nuts of ignition excitor with bare hands.

4. Battery -- CHECK condition and security, and power cables secure.
5. Exhaust System -- CHECK condition, security, and for cracks, distortion and damage.
6. Cowling -- CLOSE and LATCH right side.
7. Air Inlet Covers -- REMOVE.
8. Air Inlets -- CHECK starter/generator blast tube opening and oil cooler inlet (right) and engine induction air inlet (left) for condition, restrictions, and debris.
9. Propeller Anchor -- REMOVE.
10. Propeller -- CHECK blades for nicks, gouges, erosion, cracks (and looseness of material and debonds if Hartzell propeller installed). Also, inspect blades for lightning strike (darkened area near tips), anti-ice boots for security, and evidence of grease and oil leaks.
11. Propeller Spinner -- CHECK condition and security.
12. Nose Wheel Strut and Tire -- CHECK for condition, red over-travel indicator block and cable intact (not fallen into view) and proper inflation of tire.
13. Cowling -- OPEN left side of upper cowling for access and CHECK condition and security.
14. Engine (left side) -- CHECK for general condition, security, fuel and oil leakage and damage to any components.
15. Inertial Separator Bypass Outlet -- CHECK CLOSED and duct free of debris.
16. Oil Dipstick/Filler Cap -- CHECK oil level, then check dipstick/filler cap SECURE. Fill to within 1 1/2 quarts of MAX HOT or MAX COLD (as appropriate) on dipstick. Markings indicate U.S. quarts low if oil is hot.

⚠ WARNING

Ensure oil dipstick cap is securely latched down. Operating the engine with less than the recommended oil level and with the dipstick cap unlatched will result in excessive oil loss and eventual engine stoppage.

17. Fuel Filter -- CHECK FUEL FILTER BYPASS FLAG for proper location (flush).
18. Brake Fluid Reservoir -- CHECK LEVEL.
19. Cowling -- CLOSE and LATCH left side.
20. Fuel Filter Quick-Drain Valve -- DRAIN (using fuel sampler) to check for water, sediment, and proper fuel before each flight and after each refueling. If water is observed, take further samples until clear. Take repeated samples from all fuel drain points until **all** contamination has been removed.
21. Fuel Drain Can -- DRAIN until empty.
22. Fuel Pump Drain Reservoir (if installed) -- DRAIN until empty.

BEFORE STARTING ENGINE

1. Preflight Inspection and Weight and Balance Check -- COMPLETE.
2. All Key Locking Cabin Doors -- UNLOCKED (except cargo configured aircraft. Cargo door may be locked if no passengers occupy cargo section of aircraft).
3. Passenger Briefing -- COMPLETE.
4. Cabin Doors -- LATCHED (check aft doors).
5. Left Crew Door Lock Override Knob and Right Crew Door Inside Lock -- UNLOCKED.
6. Parking Brake -- SET (pull control out and depress brake pedals).
7. Control Locks -- REMOVED and DISENGAGED.
8. Seats, Seat Belts, Shoulder Harnesses -- ADJUST and SECURE (seat lock indicator pin extended).

WARNING

Failure to properly utilize seat belts and shoulder harnesses could result in SERIOUS or FATAL injury in the event of an accident.

9. Switches -- OFF.
10. Ignition Switch -- NORM.
11. Circuit Breakers -- CHECK IN.
12. Fuel Tank Selectors -- LEFT ON, RIGHT ON.
13. Radar -- OFF.
14. Air Conditioner (if installed) -- OFF.
15. Inverter Switch (if installed) -- OFF.
16. Bleed Air Heat Switch -- OFF.

CAUTION

Leaving the bleed air heat switch ON may result in a hot start or abnormal acceleration to idle.

17. Cabin Heat Mixing Air Control -- FLT-PUSH.
18. Emergency Power Lever -- NORMAL.
19. Power Lever -- IDLE.
20. Propeller Control Lever -- MAX (full forward).
21. Fuel Condition Lever -- CUTOFF.
22. Rudder Lock (if installed) -- TURN and PUSH to unlock.
23. Fuel Shutoff -- ON (push in).
24. Battery Switch -- ON.
25. Wing Flaps -- UP.
26. No Smoking/Seat Belt Sign Switches (if installed) -- ON as required/desired.
27. Fire Detector Test Switch -- PRESS-TO-TEST.

28. Annunciator Panel Lamp Test Switch -- PRESS-TO-TEST (all annunciator lamps illuminate and both fuel selectors off warning horns are activated).
29. Annunciator Panel Day/Night Switch -- SET.

STARTING ENGINE (Battery Start)

1. Battery Switch -- ON.
2. Volt/Ammeter -- CHECK (24 volts minimum).
3. Emergency Power Lever -- NORMAL (full aft) position (check EMERGENCY POWER LEVER annunciator OFF).

CAUTION

Ensure that the emergency power lever is in the NORMAL (full aft) position or an over-temperature condition will result during engine start.

4. Propeller Area -- CLEAR.
5. Fuel Boost Switch -- ON and OBSERVE.
   a. AUX FUEL PUMP ON Annunciator -- ON.
   b. FUEL PRESS LOW Annunciator -- OFF.
   c. No fuel flow.
6. Starter Switch -- START and OBSERVE.
   a. IGNITION ON Annunciator -- CHECK ON.
   b. Engine Oil Pressure -- CHECK for indication.
   c. N_g -- STABLE (12% minimum).
7. Fuel Condition Lever -- LOW IDLE and OBSERVE.
   a. Fuel Flow -- CHECK for 80 to 110 pph.
   b. ITT -- MONITOR (1090°C maximum, limited to 2 seconds).

CAUTION

- **If ITT climbs rapidly towards 1090°C, be prepared to return the fuel condition lever to CUTOFF.**
- **Under hot OAT and/or high ground elevation conditions, idle ITT may exceed maximum idle ITT limitation of 685°C. Increase N_g and/or reduce accessory load to maintain ITT within limits.**

   c. N_g -- 52% MINIMUM.
8. Starter Switch -- OFF (check STARTER ENERGIZED annunciator OFF).
9. Inverter Switch (if installed) -- 1 or 2.
10. Engine Instruments -- CHECK.

11. Generator -- CHECK GENERATOR OFF annunciator OFF and battery charging.
12. Fuel Boost Switch -- NORM (check AUX FUEL PUMP ON annunciator OFF).
13. Avionics No. 1 and No. 2 Power Switches -- ON.
14. Navigation Lights and Flashing Beacon -- ON as required.
15. Suction Gage -- CHECK.
16. Cabin Heating, Ventilating and Defrosting Controls -- AS DESIRED.
17. Radios -- AS REQUIRED.

STARTING ENGINE (Auxiliary Power Start) (24-28 Volt, Minimum 800 Amp and Maximum 1700 Amp Capacity)

1. Battery Switch -- ON.
2. External Power Switch -- OFF.
3. Volt/Ammeter -- CHECK (20 volts minimum).
4. Battery Switch -- OFF.
5. Auxiliary Power Unit -- ENGAGE; then ON.
6. External Power Switch -- BUS.
7. Volt/Ammeter -- CHECK (24-28.5 Volts).
8. Battery Switch -- ON.
9. External Power Switch -- STARTER.
10. Emergency Power Lever -- NORMAL (check EMERGENCY POWER LEVER annunciator OFF).

CAUTION

Ensure that the emergency power lever is in the NORMAL position or an over-temperature condition will result during engine start.

11. Propeller Area -- CLEAR.
12. Fuel Boost Switch -- ON and OBSERVE.
    a. AUX FUEL PUMP ON Annunciator -- ON.
    b. FUEL PRESS LOW Annunciator -- OFF.
    c. No fuel flow.

CAUTION

If the auxiliary power unit drops off the line, initiate engine shutdown.

13. Starter Switch -- START and OBSERVE.
    a. IGNITION ON Annunciator -- CHECK ON.
    b. Engine Oil Pressure -- CHECK for indication.
    c. N_g -- STABLE (12% minimum).
14. Fuel Condition Lever -- LOW IDLE and OBSERVE.
    a. Fuel Flow -- CHECK for 80 to 110 pph.
    b. ITT -- MONITOR (1090°C maximum, limited to 2 seconds).

CAUTION

- **If ITT climbs rapidly towards 1090°C, be prepared to return the fuel condition lever to CUTOFF.**
- **Under hot OAT and/or high ground elevation conditions, idle ITT may exceed maximum idle ITT limitation of 685°C. Increase N_g and/or reduce accessory load to maintain ITT within limits.**

    c. N_g - 52% MINIMUM.

15. Starter Switch -- OFF (check STARTER ENERGIZED annunciator OFF).
16. Inverter Switch (if installed) -- 1 or 2.
13. Engine Instruments -- CHECK.
17. External Power Switch -- OFF.
18. Auxiliary Power Unit -- OFF, then DISENGAGE.
19. Generator -- CHECK GENERATOR OFF annunciator OFF and battery charging.
20. Fuel Boost Switch -- NORM (check AUX FUEL PUMP ON annunciator OFF).
21. Avionics No. 1 and No. 2 Power Switches -- ON.
22. Navigation Lights and Flashing Beacon -- ON as required.
23. Suction Gage -- CHECK.
24. Cabin Heating, Ventilating and Defrosting Controls -- AS DESIRED.
25. Radios -- AS REQUIRED.

TAXIING

1. Brakes -- CHECK.

NOTE

For improved brake life, propeller BETA range may be used during taxi with minimum blade erosion up to the point where N_g increases (against beta range spring).

2. Flight Instruments -- CHECK.

BEFORE TAKEOFF

1. Parking Brake -- SET.
2. Seats, Seat Belts, Shoulder Harnesses -- CHECK SECURE.

WARNING

Failure to properly utilize seat belts and shoulder harnesses could result in SERIOUS or FATAL injury in the event of an accident.

3. Flight Controls -- FREE and CORRECT.
4. Flight Instruments -- CHECK and SET.
5. Fuel Boost Switch -- RECHECK NORM.
6. Fuel Tank Selectors -- RECHECK BOTH ON.
7. Fuel Quantity -- RECHECK.
8. Fuel Shutoff -- RECHECK FULLY ON.
9. Elevator, Aileron, and Rudder Trim Controls -- SET for takeoff.
10. Power Lever -- 400 FT-LBS.
    a. Suction Gage -- CHECK.
    b. Volt/Ammeter -- CHECK and return selector to BATT position.
    c. Inertial Separator -- CHECK. Turn control counterclockwise, pull to BYPASS position and check torque drop; move control back to NORMAL position and check that original torque is regained.
    d. Engine Instruments -- CHECK (See Section 2, Limitations for minimum oil temperature required for flight).
11. Overspeed Governor -- CHECK (stabilized at 1750 ±60 RPM) (See Systems Checks).
12. Power Lever -- IDLE.
13. Quadrant Friction Lock -- ADJUST.
14. Standby Power (if installed) -- CHECK (See Systems Checks).
15. Autopilot -- PREFLIGHT TEST (See Systems Checks).
16. Known Icing System -- PREFLIGHT COMPLETE (See Systems Checks) prior to any flight in icing conditions.
17. Pitot/Static Heat -- On when OAT is below 4°C (40°F).
18. Ice Protection -- AS REQUIRED.
19. Avionics and Radar -- CHECK and SET.
20. GPS/NAV Switch -- SET.
21. Strobe Lights -- AS REQUIRED.
22. Annunciators -- EXTINGUISHED or considered.
23. Wing Flaps -- SET at 20°.
24. Cabin Heat Mixing Air Control -- FLT-PUSH.
25. Window -- CLOSE.
26. Brakes -- RELEASE.
27. Fuel Condition Lever -- HIGH IDLE.
28. Standby Power Switch (if installed) -- ON (Standby Power INOP Annunciator -- OFF).

WARNING

When ground icing conditions are present, a pretakeoff contamination check should be conducted by the pilot in command within 5 minutes of takeoff, preferably just prior to taxiing onto the active runway. Critical areas of the airplane, such as empennage, wings, windshield, control surfaces, and engine inlets should be checked to ensure they are free of ice, slush, and snow and that the deice or anti-ice fluid is still protecting the airplane.

TAKEOFF

NORMAL TAKEOFF

1. Wing Flaps -- 20°.
2. Power -- SET FOR TAKEOFF (observe Takeoff ITT and N_g limits). Refer to Section 5 for takeoff power.
3. Annunciators -- CHECK.
4. Rotate -- 70-75 KIAS.
5. Climb Speed -- 85-95 KIAS.
6. Wing Flaps -- RETRACT to 10° after reaching 85 KIAS and to 0° after reaching 95 KIAS.

SHORT FIELD TAKEOFF

1. Wing Flaps -- 20°.
2. Brakes -- APPLY.
3. Power -- SET FOR TAKEOFF (observe Takeoff ITT and N_g limits). Refer to Section 5 for takeoff power.
4. Annunciators -- CHECK.
5. Brakes -- RELEASE.
6. Rotate -- 70 KIAS.
7. Climb Speed -- 83 KIAS until all obstacles are cleared. Refer to Section 5 for speeds at reduced weights.
8. Wing Flaps -- RETRACT to 10° after reaching 85 KIAS and to 0° after reaching 95 KIAS.

TYPE II OR TYPE IV ANTI-ICE FLUID TAKEOFF

1. Wing Flaps -- 0°.
2. Power -- SET FOR TAKEOFF (observe Takeoff ITT and N_g limits). Refer to Section 5 for takeoff power.
3. Annunciators -- CHECK.
4. Rotate -- 83 KIAS.
5. Climb Speed -- 104 KIAS.

ENROUTE CLIMB

CRUISE CLIMB

1. Ice Protection -- AS REQUIRED.
2. Pitot/Static Heat -- ON when OAT is below 4°C (40°F).
3. Airspeed -- 110-120 KIAS.
4. Propeller -- 1600-1900 RPM.

NOTE

To achieve maximum flat rated horsepower, use a minimum of 1800 RPM.

5. Torque -- SET (refer to RPM/MAX TORQUE placard for corresponding RPM; observe Maximum Climb ITT and N_g limits).

NOTE

Engine operations which exceed 740°C ITT may reduce engine life.

CAUTION

For every 10° below -30°C ambient temperature, reduce maximum allowable N_g by 2.2%.

MAXIMUM PERFORMANCE CLIMB

1. Ice Protection -- AS REQUIRED.
2. Pitot/Static Heat -- ON when OAT is below 4°C (40°F).
3. Airspeed -- 104 KIAS from sea level to 10,000 feet decreasing to 87 KIAS at 20,000 feet.
4. Propeller -- 1900 RPM.
5. Torque -- 1865 FT-LBS MAXIMUM (observe Maximum Climb ITT and N_g limits).

NOTE

Engine operations which exceed 740°C ITT may reduce engine life.

CAUTION

For every 10° below -30°C ambient temperature, reduce maximum allowable N_g by 2.2%.

CRUISE

1. Ice Protection -- AS REQUIRED.
2. Pitot/Static Heat -- ON when OAT is below 4°C (40°F).
3. Propeller -- 1600 to 1900 RPM.
4. Power -- SET per Cruise Power Tables (observe Maximum Cruise ITT and N_g limits).

NOTE

Engine operations which exceed 740°C ITT may reduce engine life.

CAUTION

For every 10° below -30°C ambient temperature, reduce maximum allowable N_g by 2.2%.

DESCENT

1. Ice Protection -- AS REQUIRED.
2. Pitot/Static Heat -- ON when OAT is below 4°C (40°F).
3. No Smoking/Seat Belt Sign Switches (if installed) -- AS REQUIRED.
4. Altimeter -- SET.
5. GPS/NAV Switch -- SET.
6. Power -- AS REQUIRED to give desired rate of descent.

BEFORE LANDING

NOTE

Refer to Landing Distance table in Section 5 for anticipated ground roll and total distance requirements.

1. Seats, Seat Belts, Shoulder Harnesses -- SECURE.

WARNING

Failure to properly utilize seat belts and shoulder harnesses could result in SERIOUS or FATAL injury in the event of an accident.

2. Fuel Tank Selectors -- LEFT ON, RIGHT ON.
3. Fuel Condition Lever -- HIGH IDLE.

4. Propeller Control Lever -- MAX (full forward).
5. Radar -- STANDBY or OFF.
6. Autopilot -- OFF.
7. Wing Flaps -- AS DESIRED (0° to 10° below 175 KIAS, 10° to 20° below 150 KIAS, 20° to 30° below 125 KIAS).

LANDING

NORMAL LANDING

1. Wing Flaps -- FULL DOWN.
2. Airspeed -- 75-85 KIAS.
3. Touchdown -- MAIN WHEELS FIRST.
4. Power Lever -- BETA range after TOUCHDOWN.
5. Brakes -- AS REQUIRED.

SHORT FIELD LANDING

1. Wing Flaps -- FULL DOWN.
2. Airspeed -- 78 KIAS (Refer to Section 5 for speeds at reduced weights).
3. Power Lever -- REDUCE to IDLE after clearing obstacles.
4. Touchdown -- MAIN WHEELS FIRST.
5. Power Lever -- BETA range (lever against spring) after TOUCHDOWN.

NOTE

Further reduction of landing roll will result from use of reverse thrust (see Section 5).

6. Brakes -- APPLY HEAVILY while holding elevator control full aft.
7. Wing Flaps -- RETRACT for maximum brake effectiveness at light weights.

BALKED LANDING

1. Power Lever -- ADVANCE for takeoff power.
2. Wing Flaps -- RETRACT to 20°.
3. Climb Speed -- 80 KIAS MINIMUM until obstacles are cleared.
4. Wing Flaps -- RETRACT after reaching safe altitude and airspeed.

AFTER LANDING

1. Wing Flaps -- UP.
2. Ice Protection Equipment -- OFF.
3. Standby Power Switch (if installed) -- OFF.

(Continued next page)

4. Strobe Lights -- OFF.
5. Landing and Taxi Lights -- AS REQUIRED.
6. Fuel Condition Lever -- LOW IDLE when clear of the runway.

CAUTION

If the fuel condition lever is moved past the LOW IDLE position and the engine N_g falls below 53%, moving the lever back to the LOW IDLE position can cause an ITT overtemperature condition. If the engine has started to shutdown in this situation, allow the engine to complete its shutdown sequence, and proceed to do a normal engine start using the "Starting Engine" checklist.

SHUTDOWN AND SECURING AIRPLANE

1. Parking Brake -- SET.
2. Avionics Switches -- OFF.
3. Standby Power Switch (if installed) -- OFF.
4. Fuel Boost Switch -- OFF.
5. Bleed Air Heat, Ventilation Fans and Air Conditioner -- OFF.
6. Inverter Switch (if installed) -- OFF.
7. Power Lever -- IDLE.
8. ITT -- STABILIZED at minimum temperature for one minute.
9. Propeller Control Lever -- FEATHER.
10. Fuel Condition Lever -- CUTOFF.
11. Oxygen Supply Control Lever -- OFF.
12. Lighting Switches -- OFF.
13. Battery Switch -- OFF.
14. Controls -- LOCK.
15. Fuel Tank Selectors -- LEFT OFF or RIGHT OFF (turn high wing tank off if parked on a sloping surface to prevent crossfeeding).
16. Tie-Downs And Chocks -- AS REQUIRED.
17. External Covers -- INSTALL.
18. Fuel Filter -- CHECK FUEL FILTER BYPASS FLAG for proper location (flush).
19. Oil Breather Drain Can (if installed) -- DRAIN until empty.

NOTE

Possible delays of subsequent flights, or even missed flights, are often eliminated by routinely conducting a brief postflight inspection. Usually, a visual check of the airplane for condition, security, leakage, and tire inflation will alert the operator to potential problems, and is therefore recommended.

SYSTEMS CHECKS

OVERSPEED GOVERNOR CHECK

1. Overspeed Governor -- CHECK (first flight of the day and after maintenance).
   a. Propeller Control Lever -- MAX (full forward).
   b. Overspeed Governor Test Switch -- PRESS and HOLD.
   c. Power Lever -- ADVANCE (propeller should stabilize at 1750 ±60 RPM).
   d. Power Lever -- IDLE.
   e. Overspeed Governor Test Switch -- RELEASE.

AUTOPILOT CHECK (KING KFC-150)

Refer to Section 9, STC Supplement K3E, for complete information.

NOTE

When autopilot is turned on while airplane is on the ground, the control wheel should be held to prevent ailerons from banging stops.

BEFORE TAKEOFF RELIABILITY TESTS

NOTE

Steps 1 thru 10 are to be performed prior to each flight.

1. Gyros -- Allow 3-4 minutes for gyros to come up to speed.
2. AVIONICS POWER 1 Switch -- ON.
3. PREFLIGHT TEST Button -- PRESS momentarily and NOTE:
   a. All annunciator lights on (TRIM annunciator flashing).
   b. All legends and digits are displayed on the KAS-297B Vertical Speed and Altitude Selector (Optional).
   c. After approximately 5 seconds, all annunciator lights off except AP, which will flash approximately 12 times and then remain off.

NOTE

IF TRIM WARNING LIGHT STAYS ON, THE AUTOTRIM DID NOT PASS THE PREFLIGHT TEST. THE AUTOPILOT CIRCUIT BREAKER SHOULD BE PULLED. (THE AUTOPILOT AND MANUAL ELECTRIC TRIM WILL BE INOPERATIVE.)

4. Manual Electric Trim -- TEST as follows:
   a. Actuate left side of split switch unit to the fore and aft positions. The trim wheel should not move on its own. Rotate the trim wheel manually against the engaged clutch to check the pilot's trim overpower capability.
   b. Actuate right side of split switch unit to the fore and aft positions. The trim wheel should not move on its own and normal trim wheel force is required to move it manually.
   c. Press the A/P DISC/TRIM INTER switch down and hold. Manual electric trim should not operate either nose up or nose down.
5. Flight Director -- ENGAGE by pressing FD or CWS button.
6. Autopilot -- ENGAGE by pressing AP ENG button.
7. Yaw Damper (Optional) -- ENGAGE by pressing YAW DAMP switch button.
8. Flight Controls -- MOVE fore, aft, left, and right to verify that the autopilot/yaw damper can be overpowered.
9. A/P DISC/TRIM INTER Switch -- PRESS. Verify that the autopilot and yaw damper (optional) disconnects and all flight director modes are canceled.
10. TRIM -- SET to takeoff position.

AUTOPILOT CHECK (KING KAP-150)

Refer to Section 9, STC Supplement K3G, for complete information.

NOTE

When autopilot is turned on while airplane is on the ground, the control wheel should be held to prevent ailerons from banging stops.

BEFORE TAKEOFF RELIABILITY TESTS

NOTE

Steps 1 thru 9 are to be performed prior to each flight.

1. Gyros -- Allow 3-4 minutes for gyros to come up to speed.
2. AVIONICS POWER 1 Switch -- ON.
3. PREFLIGHT TEST Button -- PRESS momentarily and NOTE:
   a. All annunciator lights on (TRIM annunciator flashing).
   b. All legends and digits are displayed on the KAS-297B Vertical Speed and Altitude Selector (Optional).
   c. After approximately 5 seconds, all annunciator lights off except AP, which will flash approximately 12 times and then remain off.

NOTE

If trim warning light stays on, the autotrim did not pass the preflight test. The autopilot circuit breaker should be pulled. (the autopilot and manual electric trim will be inoperative.)

4. Manual Electric Trim -- TEST as follows:
   a. Actuate left side of split switch unit to the fore and aft positions. The trim wheel should not move on its own. Rotate the trim wheel manually against the engaged clutch to check the pilot's trim overpower capability.
   b. Actuate right side of split switch unit to the fore and aft positions. The trim wheel should not move on its own and normal trim wheel force is required to move it manually.
   c. Press the A/P DISC/TRIM INTER switch down and hold. Manual electric trim should not operate either nose up or nose down.
5. Autopilot -- ENGAGE by pressing AP ENG button.
6. Yaw Damper (Optional) -- ENGAGE by pressing YAW DAMP switch button.
7. Flight Controls -- MOVE fore, aft, left, and right to verify that the autopilot/yaw damper can be overpowered.
8. A/P DISC/TRIM INTER Switch -- PRESS. Verify that the autopilot and yaw damper (optional) disconnects and all flight director modes are canceled.
9. TRIM -- SET to takeoff position.

AUTOPILOT CHECK (BENDIX/KING KFC-225)

Refer to Supplement S27 of Pilot's Operating Handbook for complete information.

NOTE

When autopilot is turned on while airplane is on the ground, the control wheel should be held to prevent ailerons from banging stops.

BEFORE TAKEOFF RELIABILITY TESTS

NOTE

Steps 1 thru 8 are to be performed prior to each flight.

1. Gyros -- Allow 3-4 minutes for gyros to come up to speed.
2. AVIONICS POWER 1 Switch -- ON.
3. PREFLIGHT TEST -- Performed automatically on power up.

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NOTE

If TRIM warning light stays on, the autotrim did not pass the preflight test. The autopilot circuit breaker should be pulled (the autopilot and manual electric trim will be inoperative).

4. Manual Electric Trim -- TEST as follows:
   a. Actuate left side of split switch unit to the fore and aft positions. The trim wheel should not move on its own. Rotate the trim wheel manually against the engaged clutch to check the pilot's trim overpower capability.
   b. Actuate right side of split switch unit to the fore and aft positions. The trim wheel should not move on its own and normal trim wheel force is required to move it manually.
   c. Press the A/P DISC/TRIM INTER switch down and hold. Manual electric trim should not operate either nose up or nose down.
5. Autopilot -- ENGAGE by pressing the AP button. The optional yaw damper will also engage.
6. Flight Controls -- MOVE fore, aft, left, and right to verify that the autopilot/yaw damper can be overpowered.
7. A/P DISC/TRIM INTER Switch -- PRESS. Verify that the autopilot and yaw damper (optional) disconnects and all flight director modes are canceled.
8. TRIM -- SET to takeoff position.

AUTOPILOT CHECK (KING KFC-250 - CATEGORY I)

Refer to Section 9, STC Supplement K3H, for complete information.

NOTE

When autopilot is turned on while airplane is on the ground, the control wheel should be held to prevent ailerons from banging stops.

PREFLIGHT: (Perform steps 1 thru 12 prior to each flight)

1. INVERTER Switch -- SELECT 1 or 2. Required for primary flight instruments as well as for autopilot operation. Turn OFF prior to engine shut down.
2. AVIONICS POWER 1 Switch -- ON.
3. Gyros -- Allow 3-4 minutes for gyros to come up to speed.

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4. All Autopilot/Flight Director Modes -- DISENGAGE or check disengaged.
5. PRFLT TEST Button -- PRESS and HOLD. All KFC-250 System mode annunciators should illuminate, including the marker lights on the KA-285 Mode Annunciator. In addition, the red TRIM failure light in the annunciator panel should flash at least four but not more than six times and be accompanied by an aural alert to indicate correct trim monitoring.
6. MANUAL ELECTRIC TRIM -- TEST as follows:
   a. Actuate left side of split switch unit to the fore and aft position. The trim wheel should not move on its own. Rotate the trim wheel manually against the engaged clutch to check the pilot's trim overpower capability.
   b. Actuate right side of split switch unit to the fore and aft positions. Trim wheel should not move on its own and normal trim wheel force is required to move it manually.
   c. Run the manual electric trim in both the up and down directions checking the trim wheel for proper direction.
   d. Depress and hold the TRIM TEST switch and run the manual electric trim both up and down. The trim warning light will illuminate and the warning horn sound.
   e. Press the AP DISC/TRIM INTER switch down and hold. The manual electric pitch trim will not operate either up or down.
7. FD Mode Selector Button -- PRESS to engage flight director. FD mode must be engaged prior to AP engagement.
8. AP ON/OFF Switch -- ON to engage autopilot.
9. Flight Controls -- MOVE fore, aft, left and right to verify that the autopilot can be overpowered.
10. AP MON TEST Switch -- ACTUATE and HOLD in the number 1 position for approximately 2 seconds. The autopilot will disconnect and the aural alert will sound. Re-engage the autopilot. ACTUATE and HOLD the switch in the number 2 position. Again the autopilot will disconnect and the aural alert will sound. Re-engage the autopilot.
11. AP DISC/TRIM INTER Switch -- PRESS. Verify that the autopilot disconnects and all flight director modes cancel.
12. TRIM -- SET to takeoff position.

(Steps 13 thru 18 are to be performed prior to the first flight each day.)

13. FLIGHT DIRECTOR and AUTOPILOT -- ENGAGE.
14. AUTOTRIM -- CHECK by first pressing and releasing the CWS button, and then inserting a pitch UP command using the vertical trim control (noting the upward command bar movement) and simultaneously restraining the control column against movement. After approximately a 3-second delay, observe autotrim movement in the nose up direction. Press the CWS button momentarily and repeat the autotrim test in the nose down direction.

15. HDG Mode -- CHECK by pressing the HDG mode button and commanding left and right turns using the heading selector knob. Observe corresponding command bar and control wheel movement in the directions commanded.
16. FLIGHT DIRECTOR and AUTOPILOT -- DISENGAGE.
17. MANUAL ELECTRIC TRIM -- RUN from full nose up to full nose down. Time required should be 32 plus or minus 6 seconds.
18. TRIM -- SET to takeoff position.

NOTE

If the autopilot fails preflight test, the a/p fd circuit breaker should be pulled. Manual electric trim may still be used. If electric trim fails preflight test, the elev trim circuit breaker should be pulled, and neither electric trim nor the autopilot should be used.

CAUTION

- IF THE A/P FD CIRCUIT BREAKER IS PULLED, THE RED TRIM FAILURE LIGHT ON THE MODE ANNUNCIATOR PANEL WILL BE DISABLED AND ONLY THE AUDIBLE WARNING WILL SOUND IF AN ELECTRIC TRIM MALFUNCTION SHOULD OCCUR. IN THIS EVENT, THE ELEV TRIM CIRCUIT BREAKER SHOULD BE PULLED AND INFLIGHT TRIM ACCOMPLISHED BY USING THE MANUAL PITCH TRIM WHEEL.
- OPERATION OF THE AUTOPILOT ON THE GROUND MAY CAUSE THE AUTOTRIM TO RUN BECAUSE OF BACK FORCE GENERATED BY STATIC ELEVATOR LOADS OR PILOT INDUCED FORCES. THEREFORE, DISENGAGE THE AUTOPILOT AND CHECK THAT THE AIRPLANE PITCH TRIM IS IN THE TAKEOFF POSITION PRIOR TO TAKEOFF.

AUTOPILOT CHECK (KING KFC-250 - CATEGORY II)

Refer to Section 9, STC Supplement K3J, for complete information.

NOTE

When autopilot is turned on while airplane is on the ground, the control wheel should be held to prevent ailerons from banging stops.

PREFLIGHT: (Perform steps 1 thru 12 prior to each flight)

1. INVERTER Switch -- SELECT 1 or 2. Required for primary flight instruments as well as for autopilot operation. Turn OFF prior to engine shut down.
2. AVIONICS POWER 1 Switch -- ON.
3. Gyros -- Allow 3-4 minutes for gyros to come up to speed.
4. All Autopilot/Flight Director Modes -- DISENGAGE or check disengaged.
5. PRFLT TEST Button -- PRESS and HOLD. All KFC-250 System mode annunciators should illuminate, including the marker lights on the KA-285 Mode Annunciator. In addition, the red TRIM failure light in the annunciator panel should flash at least four but not more than six times and be accompanied by an aural alert to indicate correct trim monitoring.
6. MANUAL ELECTRIC TRIM -- TEST as follows:
   a. Actuate left side of split switch unit to the fore and aft position. The trim wheel should not move on its own. Rotate the trim wheel manually against the engaged clutch to check the pilot's trim overpower capability.
   b. Actuate right side of split switch unit to the fore and aft positions. Trim wheel should not move on its own and normal trim wheel force is required to move it manually.
   c. Run the manual electric trim in both the up and down directions checking the trim wheel for proper direction.
   d. Depress and hold the TRIM TEST switch and run the manual electric trim both up and down. The trim warning light will illuminate and the warning horn sound.
   e. Press the AP DISC/TRIM INTER switch down and hold. The manual electric pitch trim will not operate either up or down.
7. FD Mode Selector Button -- PRESS to engage flight director. FD mode must be engaged prior to AP engagement.
8. AP ON/OFF Switch -- ON to engage autopilot.
9. Flight Controls -- MOVE fore, aft, left and right to verify that the autopilot can be overpowered.

10. AP MON TEST Switch -- ACTUATE and HOLD in the number 1 position for approximately 2 seconds. The autopilot will disconnect and the aural alert will sound. Re-engage the autopilot. ACTUATE and HOLD the switch in the number 2 position. Again the autopilot will disconnect and the aural alert will sound. Re-engage the autopilot.
11. AP DISC/TRIM INTER Switch -- PRESS. Verify that the autopilot disconnects and all flight director modes cancel.
12. TRIM -- SET to takeoff position.

(Steps 13 thru 19 are to be performed prior to the first flight each day.)

13. FLIGHT DIRECTOR and AUTOPILOT -- ENGAGE.
14. AUTOTRIM -- CHECK by first pressing and releasing the CWS button, and then inserting a pitch UP command using the vertical trim control (noting the upward command bar movement) and simultaneously restraining the control column against movement. After approximately a 3-second delay, observe autotrim movement in the nose up direction. Press the CWS button momentarily and repeat the autotrim test in the nose down direction.
15. HDG Mode -- CHECK by pressing the HDG mode button and commanding left and right turns using the heading selector knob. Observe corresponding command bar and control wheel movement in the directions commanded.
16. FLIGHT DIRECTOR and AUTOPILOT -- DISENGAGE.
17. MANUAL ELECTRIC TRIM -- RUN from full nose up to full nose down. Time required should be 32 plus or minus 6 seconds.
18. TRIM -- SET to takeoff position.

NOTE

IF THE AUTOPILOT FAILS PREFLIGHT TEST, THE A/P FD CIRCUIT BREAKER SHOULD BE PULLED. MANUAL ELECTRIC TRIM MAY STILL BE USED. IF ELECTRIC TRIM FAILS PREFLIGHT TEST, THE ELEV TRIM CIRCUIT BREAKER SHOULD BE PULLED AND NEITHER ELECTRIC TRIM NOR THE AUTOPILOT SHOULD BE USED.

⚠ CAUTION

IF THE A/P FD CIRCUIT BREAKER IS PULLED, THE RED TRIM FAILURE LIGHT ON THE MODE ANNUNCIATOR PANEL WILL BE DISABLED AND ONLY THE AUDIBLE WARNING WILL SOUND IF AN ELECTRIC TRIM MALFUNCTION SHOULD OCCUR. IN THIS EVENT, THE ELEV TRIM CIRCUIT BREAKER SHOULD BE PULLED AND INFLIGHT TRIM ACCOMPLISHED BY USING THE MANUAL PITCH TRIM WHEEL.

⚠ CAUTION

OPERATION OF THE AUTOPILOT ON THE GROUND MAY CAUSE THE AUTOTRIM TO RUN BECAUSE OF BACK FORCE GENERATED BY STATIC ELEVATOR LOADS OR PILOT INDUCED FORCES. THEREFORE, DISENGAGE THE AUTOPILOT AND CHECK THAT THE AIRPLANE PITCH TRIM IS IN THE TAKEOFF POSITION PRIOR TO TAKEOFF.

19. The KRA-405 Radar Altimeter should be tested by pressing the test button on the KNI-415 Radar Altimeter Indicator. The indicator needle on the KNI-415 should indicate 50<pm>5 feet. The flag on the KNI-415 should come into view. The DH lamps on the KNI-415 and KCI-310 should illuminate if the DH setting is above 50 feet. (Retest prior to APPR CPLD on an ILS approach).

STANDBY POWER CHECK (If Standby Electrical System is Installed)

1. Standby Power -- CHECK (first flight of the day and before all flights into known icing conditions).
   a. Standby Power Switch -- ON.
   b. Generator -- LOAD to approximately 30 amps (use taxi lights if required), but not more than 60 amps.
   c. Volt/Ammeter -- SELECT ALT position and verify alternator output near zero.
   d. Generator Switch -- TRIP.
   e. Volt/Ammeter -- CHECK for alternator output and voltage approximately one volt less than with generator ON.

NOTE

A fully charged battery will carry part of the electrical load when initially switching from generator to standby alternator power because of the generator's higher voltage regulation.

   f. STBY ELECT PWR ON Annunciator -- CHECK ON.
   g. Generator Switch -- RESET.
   h. STBY ELECT PWR ON Annunciator -- CHECK OFF.
   i. Volt/Ammeter Selector Switch -- RETURN to BATT position.
   j. Standby Power Switch -- OFF (STBY ELECT PWR INOP Annunciator -- ON).

KNOWN ICING CHECK (If Flight Into Known Icing Equipment Package is Installed)

PREFLIGHT INSPECTION

1. Windshield Anti-ice Panel -- INSTALL. Check security and electrical connection.
2. Battery Switch -- ON.
3. Wing Ice Detector Light Switch -- ON and CHECK for illumination.
4. DAY/NIGHT Switch to NIGHT -- Windshield Ice Detector Light (if installed) CHECK for illumination.
5. PITOT/STATIC and Stall Heat Switches -- ON (for 30 seconds maximum, ensure pitot covers are removed).
6. LOW AIRSPEED ADVISORY SYSTEM (if installed) -- CHECK for illumination when pitot heat is ON.
7. PITOT/STATIC and Stall Heat Switches -- OFF.
8. Battery Switch -- OFF.
9. Stall Warning Transducer -- PERCEPTIBLY WARM.
10. Pitot/Static Tubes -- CLEAR and VERY WARM.
11. Wing, Wing Strut, Main Landing Gear Leg, Cargo Pod Nosecap and Stabilizer Deice Boots -- CHECK for tears, abrasions and cleanliness.
12. Propeller Anti-ice Boots -- CHECK condition of boots and heating elements.
13. Control Surface Static Dischargers -- CHECK condition.

BEFORE TAKEOFF

CAUTION

To prevent blistering the cargo pod deice boot (if installed), ground operation in a right hand crosswind or operating the propeller in beta or feather should be kept to a minimum.

1. (Small Windshield Anti-ice Panel):

   Windshield Anti-ice Switch -- AUTO and MANUAL. Observe increase in generator output and illumination of WINDSHIELD ANTI-ICE annunciator in both switch positions.

   (Large Windshield Anti-ice Panel):

   PRIMARY Windshield Anti-ice Switch -- AUTO.
   SECONDARY Windshield Anti-ice Switch -- AUTO and MANUAL.
   PRIMARY Windshield Anti-ice Switch -- MANUAL.

   For each switch movement, observe change in generator output and illumination of WINDSHIELD ANTI-ICE annunciator.

2. Prop Anti-ice Switch -- AUTO.
3. Prop Anti-ice Ammeter -- CHECK in green arc range and for periodic cycling. The ammeter should indicate 20 to 24 amps for 90 seconds, and 0 amps for 90 seconds.
4. Prop Anti-ice Switch -- MANUAL.
5. Prop Anti-ice Ammeter -- CHECK in green arc range.
6. Power Lever -- ADJUST for 400 FT-LBS TORQUE.
7. Boot Press Switch -- AUTO and release. Visually check inflation and deflation cycle of stabilizer, wing inboard, main landing gear leg, wing outboard and wing strut deicing boots.
8. DEICE PRESSURE Annunciator -- CHECK ON within three seconds and OFF after 18 seconds with approximate two-second OFF periods after 6 and 12 seconds.
9. Boots -- CHECK VISUALLY FOR COMPLETE DEFLATION to the vacuum hold-down condition.
10. Boot Press Switch -- MANUAL and hold. Visually check inflation of all visible boots and illumination of DEICE PRESSURE annunciator within 6 seconds.
11. Inertial Separator -- CHECK for torque drop between NORMAL and BYPASS modes. Return control to BYPASS if moisture is present below approximately 4°C (40°F).
12. Power Lever -- IDLE.
13. Standby Power -- CHECK.
14. Pitot/Static Heat -- ON when OAT is below 4°C (40°F).
15. Stall Heat, Windshield Anti-ice and Propeller Anti-ice Switches, and Inertial Separator Control -- AS REQUIRED for takeoff and climb out conditions.

CAUTION

Do not operate pitot/static, stall warning, and propeller anti-ice heaters for prolonged periods on ground.

AMPLIFIED PROCEDURES

PREFLIGHT INSPECTION

The Preflight Inspection, described in Figure 4-1 and adjacent checklist, is recommended. If the airplane has been in extended storage, has had recent major maintenance, or has been operated from rough or unprepared surfaces, an extensive exterior inspection is recommended.

CAUTION

Flights at night and in cold weather involve a careful check of other specific areas which are discussed in this section.

After major maintenance has been performed, the flight and trim tab controls should be double-checked for free and correct movement and security. The security of all inspection plates on the airplane should be checked following periodic inspections.

If the airplane has been exposed to much ground handling in a crowded hangar, it should be checked for dents and scratches on wings, fuselage, and tail surfaces, as well as damage to navigation and anti-collision lights, and avionics antennas. Outside storage in windy or gusty areas, or tie-down adjacent to taxiing airplanes, calls for special attention to control surface stops, hinges, and brackets to detect the presence of wind damage.

If the airplanes has been operated from an unimproved runway, check the propeller tips for stone damage and the leading edges of the horizontal tail for abrasion. Airplanes that are operated from rough fields, especially at high altitude, are subjected to abnormal landing gear abuse. Frequently check all components of the landing gear, tires and brakes.

Outside storage may result in water and obstructions in airspeed system lines, condensation in fuel tanks, and dust and dirt in the engine air inlet and exhaust areas. If any water is suspected in the static source system, open both static source drain valves and thoroughly drain all water from the system.

WARNING

If the static source drain valves are opened, assure both valves are completely closed before flight.

If any water is detected in the fuel system, the inboard fuel tank sump and external sump quick-drain valves, fuel reservoir quick-drain valve, and fuel filter quick-drain valve should all be thoroughly drained until there is no evidence of water or sediment contamination. If the airplane is parked with one wing low on a sloping ramp (as evidenced by the ball of the turn and bank indicator displaced from center), draining of the outboard fuel tank sump quick-drain valves (if installed) is also recommended.

Prolonged storage of the airplane will result in a water buildup in the fuel which "leaches out" the fuel additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. Refer to Section 8 for fuel additive servicing.

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

The interior inspection will vary according to the planned flight and the optional equipment installed. Prior to high-altitude flights, it is important to check the condition and quantity of oxygen face masks and hose assemblies. The oxygen supply system should be functionally checked to ensure that it is in working order and that an adequate supply of oxygen is available.

BEFORE STARTING ENGINE

WARNING

- **It is the responsibility of the pilot in command to ensure that the airplane is properly loaded within the weight and center of gravity limits prior to takeoff.**
- **Failure to properly utilize seat belts and shoulder harnesses could result in SERIOUS or FATAL injury in the event of an accident.**

The Before Starting Engine checklist procedures should be followed closely to assure a satisfactory engine start. Most of the checklist items are self-explanatory. Those items that may require further explanation are noted in the following discussion.

When setting electrical switches prior to engine start, only those lighting switches that are necessary for a nighttime engine start should be turned on. All other switches, including exterior lights, anti-ice, and de-ice, ventilation blower and air conditioning switches should be turned off. The bleed air heat switch should be off to prevent excessive compressor bleed during the engine start. Also, the standby power switch, inverter switch (if installed) and avionics 1 and 2 switches should be off during engine starts.

CAUTION

Leaving the bleed air heat switch ON may result in a hot start or abnormal acceleration to idle.

The generator switch is spring-loaded to the ON position. When the starter switch is placed in the START or MOTOR position, the generator control unit

(GCU) opens the generator contactor. When the starter switch is returned to the OFF position after an engine start, the GCU closes the generator contactor, thereby placing the generator on the line.

The ignition switch is left in the NORM position for engine starting with the starter motor (non-windmilling start). In this position, the igniters are energized when the starter switch is placed in the START position. Ignition is automatically terminated when the starter switch is turned OFF.

CAUTION

It is especially important to verify that the emergency power lever is in the NORMAL position (aft of the IDLE gate) during engine starts. With the lever forward of this gate, excessive quantities of fuel will be discharged through the fuel nozzles when the fuel condition lever is moved to the LOW IDLE position and a hot start will result.

Before starting the engine, the power lever is placed at the IDLE position (against the BETA gate), the propeller control lever is moved to the MAX RPM position (full forward), and the fuel condition lever is stowed in the CUTOFF position.

CAUTION

The propeller reversing linkage can be damaged if the power lever is moved aft of the IDLE position when the engine is not running and the propeller is feathered.

STARTING ENGINE

The Starting Engine checklist procedures should be followed closely to assure a satisfactory engine start. With the fuel condition lever in the CUTOFF position, move the starter switch to the START position; verify that the STARTER ENERGIZED and IGNITION ON annunciators illuminate. Next, check for a positive indication of engine oil pressure. After N_g stabilizes (minimum of 12%), move the fuel condition lever to the LOW IDLE position and verify a fuel flow in the general range of 80 to 110 pph. After the engine "lights" and during acceleration to idle (approximately 52% N_g), monitor ITT and N_g. Maximum ITT during engine start is 1090°C, limited to 2 seconds. Typically, the ITT during start is well below this maximum value. After the engine has stabilized at idle, the STARTER ENERGIZED annunciator should be OFF. If this annunciator remains ON, it indicates the starter has not been automatically disengaged during the engine starting sequence due to a failed speed sensor.

CAUTION

If no ITT rise is observed within 10 seconds after moving the fuel condition lever to the LOW IDLE position, or ITT rapidly approaches 1090°C, move the fuel condition lever to CUTOFF and perform the Engine Clearing Procedure in this section.

After the engine reaches idle (52% N_g or above), return the starter switch to the OFF position. With a cold engine or after making a battery start (high initial generator load into battery), it may be necessary to advance the power lever slightly ahead of the idle detent to maintain a minimum idle of 52% N_g. To assure maintaining the minimum N_g and ITT within limits, advance the power lever to obtain approximately 55% N_g before turning the starter switch OFF (the generator contactor closes when the starter switch is turned OFF).

CAUTION

Under hot OAT and/or high ground elevation conditions, idle ITT may exceed maximum idle ITT limitation of 685°C. Increase N_g and/or reduce accessory load to maintain ITT within limits.

NOTE

If the STARTER ENERGIZED annunciator fails to go out after the starter switch has been moved to the OFF position, the start contactor may be closed and the generator will not function. Perform an engine shutdown.

Engine starts may be made with airplane battery power or with an auxiliary power unit (APU). However, it is recommended that an APU be used when the ambient air temperature is less than 0°F (-18°C). Refer to Cold Weather Operation in this section when ambient temperature is below 0°F (-18°C).

CAUTION

- **In the event the auxiliary power unit drops off the line during engine start, a loss of electrical power to the starter will result which could cause a hot start. Should a loss of auxiliary power occur, immediately place the fuel condition lever to CUTOFF, monitor ITT, and ensure the engine is shutting down. Turn the external power switch off and place the starter switch to the MOTOR position to aid in reducing ITT if necessary.**
- **When an auxiliary power unit is used, ensure the unit is negatively grounded and regulated to 28 volts DC with a capability of providing a minimum of 800 amperes during the starting cycle. Auxiliary power units with output exceeding 1700 amperes shall not be used.**

Before starting engine with the airplane battery, check the voltmeter for a minimum of 24 volts. With turbine engines, the operator must monitor ITT during each engine start to guard against a "hot" start. The operator must be ready to immediately stop the start if ITT exceeds 1090°C or is rapidly approaching this limit. Usually, "hot" starts are not a problem if the normal starting procedures are followed. A "hot" start is caused by excessive fuel flow at normal revolutions per minute or normal fuel flow with insufficient revolutions per minute. The latter is usually the problem which is caused by attempting a start with a partially discharged or weak battery.

CAUTION

A minimum battery voltage of 24 volts is not always an indication that the battery is near full charge or in good condition. This is especially true with the optional Ni-Cad battery which maintains a minimum no-load voltage of 24 volts even at a 50% (or less) charge condition. Therefore, if gas generator acceleration in the initial part of the start is less than normally observed, return the fuel condition lever to CUTOFF and discontinue the start. Recharge the battery or use an auxiliary power unit before attempting another start.

If a cold engine does not quite idle at 52%, it is acceptable to advance the power lever or fuel condition lever slightly. If the starter accelerates the gas generator rapidly above 20%, suspect gear train decouple. Do not continue start. Rapid acceleration through 35% Ng suggests a start on the secondary nozzles. Anticipate a hot start.

After an aborted start for whatever reason, it is essential before the next start attempt to allow adequate time to drain off unburned fuel. Failure to drain all residual fuel from the engine could lead to a hot start, a hot streak leading to hot section damage, or the torching of burning fuel from engine exhaust on the next successful ignition.

A dry motoring, within starter limitations after confirming that all fuel drainage has stopped, will ensure that no fuel is trapped before the next start.

ENGINE CLEARING PROCEDURES (DRY MOTORING RUN)

The following procedure is used to clear an engine at any time when it is deemed necessary to remove internally trapped fuel and vapor, or if there is evidence of a fire within the engine. Air passing through the engine serves to

ENGINE CLEARING PROCEDURES (DRY MOTORING RUN) (Continued)

purge fuel, vapor, or fire from the combustion section, gas generator turbine, power turbine, and exhaust system.

1. Fuel Condition Lever -- CUTOFF.
2. Ignition Switch -- NORM.
3. Battery Switch -- ON (to supply current for the starter motor).
4. Fuel Shutoff -- OPEN (push in)
5. Fuel Boost Switch -- ON (to provide lubrication for the engine-driven fuel pump elements) or OFF (if a fire is suspected).
6. Starter Switch -- MOTOR.

CAUTION

- **Do not exceed the starting cycle limitations; refer to Section 2.**
- **Should a fire persist, as indicated by sustained ITT, close the fuel shutoff valve and continue motoring the engine.**

7. Starter Switch -- OFF.
8. Fuel Boost Switch -- OFF.
9. Fuel Shutoff -- CLOSED (pull out).
10. Battery Switch -- OFF.

Allow the required cooling period for the starter before any further starting operation is attempted.

ENGINE IGNITION PROCEDURES

For most operations, the ignition switch is left in the NORM position (aft). With the switch in this position, ignition is on only when the starter switch is in the START position.

NOTE

The use of ignition for extended periods of time will reduce ignition system component life.

However, the ignition switch should be turned ON to provide continuous ignition under the following conditions:

1. Emergency engine starts without starter assist (refer to Section 3, Airstarts).
2. Operation on water or slush covered runways.
3. Flight in heavy precipitation.
4. During inadvertent icing encounters until the inertial separator has been in BYPASS for 5 minutes (refer to Section 3, Icing).
5. When near fuel exhaustion as indicated by RESERVOIR FUEL LOW annunciator ON.

Refer to Section 7, Ignition System for further details regarding the ignition system.

ENGINE INERTIAL SEPARATOR PROCEDURES

An inertial separator system is built into the engine air inlet duct to prevent ice buildups on the compressor inlet screen. The inertial separator control should be moved to the BYPASS position prior to running the engine during ground or flight operation in visible moisture (clouds, rain, snow or ice crystals) with an OAT of 4°C or less.

The BYPASS mode may also be used for ground operations or takeoffs with dusty, sandy field conditions to minimize ingestion of foreign particles into the compressor. Refer to the charts in Section 5 for performance changes associated with the inertial separator in the BYPASS mode.

The NORMAL mode is used for all other operating conditions, since it provides a substantial inlet ram recovery. This results in more efficient engine operation and higher critical altitude for a particular power setting.

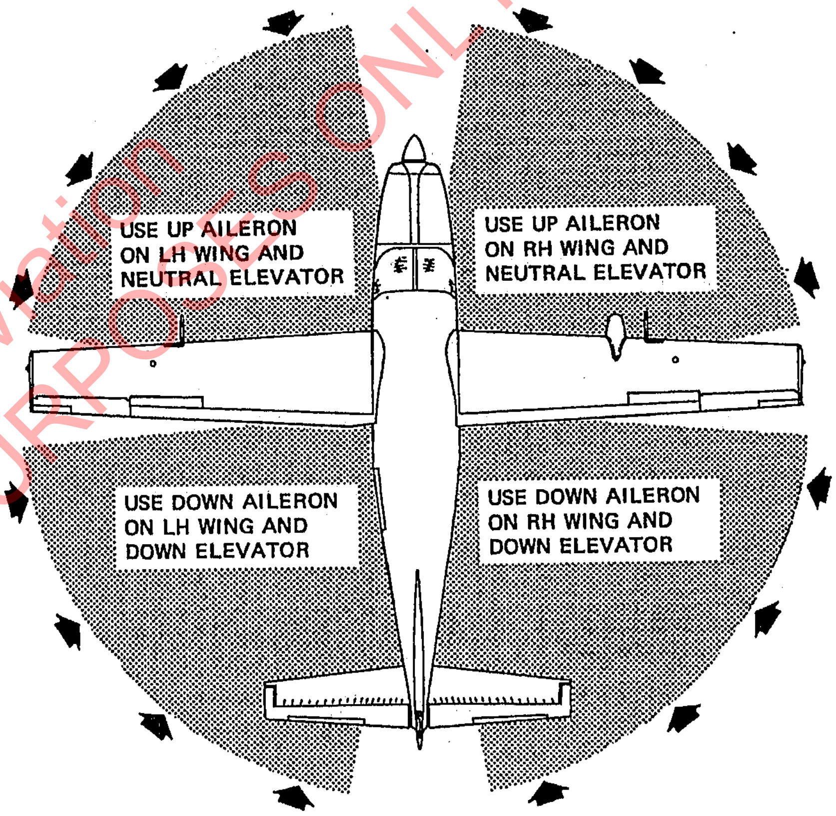
Refer to Section 7, Air Induction System for further details regarding the inertial separator.

TAXIING

Power lever BETA range may be used during taxi to improve brake life. A leaf spring is installed in the control quadrant which the power lever contacts and provides the pilot with a noticeable "feel". With the power lever moved to this position in the BETA range, the propeller is near zero thrust in a static, 52% idle condition. Besides acting as a zero thrust reference during taxi, this power lever position (lever against spring) is used after landing to minimize brake wear. Further aft movement of the power lever will result in increased engine power and reverse thrust from the propeller blades.

CAUTION

- **The use of reverse thrust should be minimized, especially on unprepared surfaces, to protect the propeller.**
- **To minimize cargo pod temperatures and avoid damage to the pod surfaces, do not leave the power lever in the BETA range for extended periods (greater than 30 seconds) when parked with a right crosswind.**



CODE

WIND DIRECTION ➔

NOTE

Strong quartering tail winds require caution. Avoid excessive use of power and sharp braking when the airplane is in this attitude. Use the steerable nose wheel and rudder to maintain direction.

Figure 4-2. Taxiing Diagram

NOTE

During low-speed taxi with a strong tailwind, or when stopped with a strong tailwind, a moderate vibration may occur as a result of reverse airflow through the propeller disk with the blades at a positive pitch angle. This vibration can be significantly reduced by placing the power lever in the BETA range, or it can be eliminated by turning the airplane into the wind.

Refer to Figure 4-2 for additional taxiing instructions.

BEFORE TAKEOFF

The fuel tank selectors are normally both ON for takeoff and all flight operations. However, one side may be turned OFF as required to balance the fuel load.

WARNING

- **Do not exceed 200 pounds fuel imbalance in flight.**
- **To obtain accurate fuel quantity indicator readings, verify the airplane is parked in a laterally level condition, or, if in flight, make sure the airplane is in a coordinated and stabilized condition (ball of turn-and-bank indicator centered).**

When checking the inertial separator with engine power set at 400 foot-pounds, it is typical to see an approximate 25 foot-pound drop in torque when the T-handle is pulled to the BYPASS position. This torque drop will vary some with wind conditions during static check.

A neutral index mark and a takeoff range for elevator trim tab position are provided on the pedestal cover. The neutral index mark corresponds to the zero degree trim tab position. As loadings vary towards the forward C.G. limit or the aft C.G. limit, elevator trim settings towards the nose up and nose down ends of this takeoff range, respectively, will provide comfortable control wheel forces during takeoff and initial climbout.

Refer to Systems Checks (at end of Checklist Procedures in this section) for procedures to use when checking the Overspeed Governor, Autopilot, Standby Power, and Known Icing Systems.

Prior to takeoff, the fuel condition lever is moved forward to the HIGH IDLE position (approximately 65% N_g) and left in this position until after landing. The higher gas generator idle speed for flight provides faster en-

gine acceleration when adding power (from an idle condition) on approach or for a balked landing go-around.

TAKEOFF

POWER SETTING

Refer to the Takeoff Torque figure in Section 5 to determine the torque corresponding to the surface altitude and OAT conditions. This torque should be obtainable without exceeding 805°C ITT or 101.6% N_g.

Takeoff roll is most smoothly initiated by gradually advancing the power lever until propeller RPM nears 1900. Smoothly release the brakes and continue advancing the power lever until the takeoff torque (from Section 5) is reached.

NOTE

As airspeed increases during takeoff, an increase in torque at a fixed power lever position is normal and need not be reduced provided torque limit (1865 foot-pounds) is not exceeded.

WING FLAP SETTINGS

A flap setting of 20°is recommended for all takeoffs unless a strong crosswind exists at which time 10°flaps may be preferred. Use of 20°flaps provides for a lower liftoff speed, as well as a reduction in ground roll and total distance over an obstacle compared to takeoff with flaps up.

Flap settings greater than 20°are not approved for takeoff.

SHORT FIELD TAKEOFF

If an obstruction dictates the use of a steep climb angle after liftoff, accelerate to and climb out at an obstacle clearance speed of 83 KIAS with 20°flaps. Takeoff performance data is shown in Section 5 based on this speed and configuration.

NOTE

The 83 KIAS obstacle clearance speed is a recommended safe speed under all conditions, including turbulence and complete engine failure. The actual Vx speed with flaps 20°is 70 KIAS at maximum takeoff weight as noted in the Flaps 20°Climb Gradient chart in Section 5.

After clearing the obstacle, and reaching a safe altitude, the flaps may be retracted slowly as the airplane accelerates to the normal climb-out speed.

Minimum ground roll takeoffs are accomplished using 20° flaps by lifting the nose wheel off the ground as soon as practical and leaving the ground in a slightly tail-low attitude. However, the airplane should be leveled off immediately to accelerate to a safe climb speed.

TYPE II OR TYPE IV ANTI-ICE FLUID TAKEOFF

When Type II or Type IV fluid is applied to the airplane, a rotation speed of 83 KIAS with 0° flaps is required. Use of 0° flaps allows the airplane to accelerate to a higher rotation speed without any liftoff tendencies, which is required for the Type II or Type IV fluid to be effective. Takeoff performance data shown in Section 5 is based on this speed and configuration.

CROSSWIND TAKEOFF

Takeoffs into strong crosswinds normally are performed with 10° or 20° flaps. With the ailerons partially deflected into the wind, the airplane is accelerated to a speed higher than normal, and then pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift. The use of 10° flaps will improve directional control power but will also increase the takeoff distance. If 10° flaps are used, add 7 knots to the liftoff and 50-foot obstacle speeds published in this handbook for 20° flaps.

ENROUTE CLIMB

Normally, maximum climb power is maintained during the climb to cruise altitude. Adjust the power lever as required to prevent exceeding 1865 foot-pounds torque, maximum climb ITT of 765°C, or maximum climb N_g of 101.6%, whichever occurs first.

NOTE

Engine operations which exceed 740°C ITT may reduce engine life.

At lower altitudes and cool outside air temperatures (below approximately 7,500 feet), the engine will reach the torque limit before reaching the ITT or Ng limit. As the climb progresses and the torque is maintained by power lever advancement, the ITT and N_g will increase until an altitude is reached where ITT or N_g will dictate power lever positioning. When operating near the ITT limit, advance power lever slowly to allow the current ITT to be indicated. The rate of power (and temperature) increase of the engine is greater than the response rate of the ITT indicating system; therefore, a rapid power lever advance could allow an over-temperature condition to exist momentarily in the engine before the over-temperature would be indicated.

For maximum performance climb, the best rate-of-climb speed should be used with 1900 RPM and maximum climb power. This speed is 104 KIAS from sea level to 10,000 feet, decreasing to 87 KIAS at 20,000 feet.

For improved visibility over the nose, a cruise climb speed of 110-120 KIAS may be desirable at altitudes up to approximately 12,000 feet. Also, for improved comfort, propeller RPM may be reduced to 1600, if desired. Adjust the power lever (in accordance with the following table) to prevent exceeding maximum torque for the corresponding RPM, maximum climb ITT of 765°C, or maximum N_g of 101.6%, whichever occurs first.

NOTE

- Engine operations which exceed 740°C ITT may reduce engine life.
- To achieve maximum flat rated horsepower, use a minimum of 1800 RPM.

RPM	MAX TORQUE
1900	1865
1800	1970
1700	1970
1600	1970

If an obstruction dictates the use of a steep climb angle, climb with flaps retracted and maximum continuous power at 72 KIAS.

CRUISE

Normal cruising is performed using any desired power setting up to the maximum cruise power (observe ITT, torque, and N_g cruise limits). Do not exceed the maximum cruise torque shown in Section 5 for the particular altitude and temperature. Normally, a new engine will exhibit an ITT below 740°C when set to the maximum cruise torque.

The Cruise Performance Table, Figure 4-3, illustrates the advantage of higher altitude on both true airspeed and nautical miles per pound of fuel. In addition, the beneficial effect of lower cruise power on nautical miles per pound at a given altitude can be observed. Charts are provided in Section 5 to assist in selecting an efficient altitude based on available winds aloft information for a given trip. The selection of cruise altitude on the basis of the most favorable wind conditions and the use of low power settings are significant factors that should be considered on every trip to reduce fuel consumption.

Pitot/static heat should be ON anytime the OAT is below 4°C (40°F). If icing conditions are encountered, ensure that the additional anti-icing systems (stall vane and inertial separator) are ON and in the BYPASS mode before encountering visible moisture below approximately 4°C (40°F). Windshield and propeller anti-ice systems should be turned on also.

These systems are designed to prevent ice formation, rather than remove it after it has formed. Even though the airplane is equipped with "Flight Into Known Icing" package, accumulation of some airframe ice is unavoidable; this will increase airplane weight and drag and decrease airspeed and general airplane performance. It is always wise to avoid icing conditions, if practical.

Fuel unbalance should be monitored to assure it does not exceed 200 pounds. Normally, both fuel tank selectors are left ON and fuel feeds approximately equal from each tank. If fuel unbalance approaching 200 pounds does occur, the fuel tank selector for the tank with less fuel should be turned OFF until the tanks become balanced. With one fuel tank selector OFF and fuel remaining in the tank being used less than approximately 25 gallons, the FUEL SELECT OFF annunciator will illuminate and a warning horn will be activated.

⚠ WARNING

Ignition should be turned ON when flying in heavy precipitation. Refer to Engine Ignition Procedures in this section for further information on use of ignition.

⚠ CAUTION

Prolonged zero or negative "G" maneuvers will starve the engine oil pump and result in engine damage.

ALTITUDE	MAXIMUM CRUISE POWER				MAXIMUM RANGE POWER			
	KTAS		NMPP		KTAS		NMPP	
	WITH CARGO POD	WITHOUT CARGO POD	WITH CARGO POD	WITHOUT CARGO POD	WITH CARGO POD	WITHOUT CARGO POD	WITH CARGO POD	WITHOUT CARGO POD
5000 Feet	173	182	0.41	0.43	149	155	0.45	0.47
10,000 Feet	172	182	0.46	0.48	151	157	0.50	0.53
15,000 Feet	167	177	0.51	0.54	152	159	0.54	0.58
20,000 Feet	157	167	0.57	0.61	156	161	0.57	0.61
Standard Conditions				1900 RPM				Zero Wind

Figure 4-3. Cruise Performance Table

Supplemental oxygen should be used by all occupants when cruising above 12,500 feet. It is often advisable to use oxygen at altitudes lower than 12,500 feet under conditions of night flying, fatigue, or periods of physiological or emotional disturbances. Also, the habitual and excessive use of tobacco or alcohol will usually necessitate the use of oxygen at less than 10,000 feet.

⚠ WARNING

- **Operation up to the maximum allowable operating altitude is predicated on the availability and use of supplemental oxygen above 12,500 feet as specified by FAR Part 91.211.**
- **Permit no smoking when using oxygen. Oil, grease, soap, lipstick, lip balm and other fatty materials constitute a serious fire hazard when in contact with oxygen. Be sure hands and clothing are oil-free before handling oxygen equipment.**

STALLS

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 knots above the stall in all configurations.

Idle-power stall speeds at maximum weight for both forward and aft C.G. are presented in Section 5.

NOTE

Practice of stalls should be done conservatively and with sufficient altitude for a safe recovery.

LANDING

NORMAL LANDING

Normal landing approaches can be made with power-on or idle power with any flap setting desired. Use of flaps down is normally preferred to minimize touchdown speed and subsequent need for braking. For a given flap setting, surface winds and turbulence are usually the primary factors in determining the most comfortable approach speed.

NOTE

During night approaches under some low visibility conditions, landing and taxi lights may be left off to reduce light reflections.

Actual touchdown should be made with idle power and on the main wheels first, just slightly above stall speed. The nose wheel is then gently lowered to the runway, the power lever repositioned to the BETA range, and brakes applied as required. When clear of the runway, reposition the fuel condition lever from HIGH IDLE to LOW IDLE. This will reduce cabin and exterior noise levels as well as reduce braking requirements when the power lever is positioned ahead of the REVERSE range. Landings on rough or soft fields are accomplished in a similar manner except that the nose wheel is lowered to the runway at a lower speed to prevent excessive nose gear loads.

NOTE

The use of BETA range after touchdown is recommended to reduce brake wear. Generally, the power lever can be moved aft of the IDLE gate until it contacts a spring in the control quadrant without substantial propeller erosion from loose debris on the runway or taxiway.

SHORT FIELD LANDING

For short field landings, make a power approach at 78 KIAS with the propeller control lever at MAX (full forward) and with full flaps. After all approach obstacles are cleared, reduce power to idle. Maintain 78 KIAS approach speed by lowering the nose of the airplane. Touchdown should be made with the power lever at IDLE, and on the main wheels first. Immediately after touchdown, lower the nose gear, reposition the power lever against the spring in the BETA range, and apply heavy braking as required.

For maximum brake effectiveness after all three wheels are on the ground, hold full nose up elevator and apply maximum possible brake pressure without sliding the tires.

The landing performance in Section 5 is based on the above procedure. A reduction in ground roll of approximately 10% will result from the use of reverse thrust (power lever full aft to provide increased power from the gas generator and a reverse thrust propeller blade angle).

CAUTION

To minimize propeller blade erosion or possible propeller blade damage, reverse thrust should be used only when necessary to shorten the ground roll. Bringing the propeller out of reverse before decelerating through approximately 25 knots will minimize propeller erosion.

CROSSWIND LANDING

For crosswind approaches, either the wing-low, crab or combination method may be used. A flap setting between 10° and 30° is recommended. Use a minimum flap setting for the field length. After touchdown, lower the nose wheel and maintain control. A straight course is maintained with the steerable nose wheel, ailerons, and occasional braking if necessary.

BALKED LANDING

In a balked landing (go-around) climb, the wing flap setting should be reduced to 20° after takeoff power is applied. After all obstacles are cleared and a safe altitude and airspeed are obtained, the wing flaps should be retracted.

AFTER SHUTDOWN

If dusty conditions exist or if the last flight of the day has been completed, install engine inlet covers to protect the engine from debris. The covers may be installed after the engine has cooled down (ITT indicator showing "off scale" temperature). Secure the propeller to prevent windmilling since no oil pressure is available for engine lubrication when the engine is not running.

COLD WEATHER OPERATION

Special consideration should be given to the operation of the airplane fuel system during the winter season or prior to any flight in cold temperatures. Proper preflight draining of the fuel system is especially important and will eliminate any free water accumulation. The use of an additive is required for anti-ice protection. Refer to Section 8 for information on the proper use of additives.

Cold weather often causes conditions which require special care prior to flight. Operating the elevator and aileron trim tabs through their full travel in both directions will assure smooth operation by reducing any stiffness in these systems caused by the cold weather effects on system lubrication. Even small accumulations of frost, ice, or snow must be removed, particularly from wing, tail and all control surfaces to assure satisfactory flight performance and handling. Also, control surfaces must be free of any internal accumulations of ice or snow.

The use of an external pre-heater reduces wear and abuse to the engine and the electrical system. Pre-heat will lower the viscosity of the oil trapped in the oil cooler, prior to starting in extremely cold temperatures.

Use of an APU is recommended when ambient temperatures are below 0°F (-18°C). Assure that oil temperature is in the green arc (10°C to 99°C) prior to takeoff.

If snow or slush covers the takeoff surface, allowance must be made for takeoff distances which will be increasingly extended as the snow or slush depth increases. The depth and consistency of this cover can, in fact, prevent takeoff in many instances.

HIGH ALTITUDE OPERATION

At altitudes above 20,000 feet, a compressor surge may be experienced if engine power is very rapidly re-applied immediately after a power reduction. This characteristic is not detrimental to the engine and can be eliminated completely by turning on cabin bleed heat to at least the one-half setting.

ENGINE COMPRESSOR STALLS

An engine compressor stall may be noted by a single or multiple loud "popping" noise from the engine compartment. This situation may be resolved by reducing the engine power to a point where the "popping" discontinues, and slowly advancing the throttle to the necessary setting for continued flight. The use of cabin bleed heat may also help eliminate engine compressor stalls if this situation is encountered.

NOISE CHARACTERISTICS

Increased emphasis on improving the quality of our environment requires renewed effort on the part of all pilots to minimize the effect of airplane noise on the public.

We, as pilots, can demonstrate our concern for environmental improvement, by application of the following suggested procedures, and thereby tend to build public support for aviation:

1. Pilots operating aircraft under VFR over outdoor assemblies of persons, recreational and park areas, and other noise-sensitive areas should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.
2. During departure from or approach to an airport, climb after takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas.

(Continued Next Page)

NOTE

The above recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgment, an altitude of less than 2000 feet is necessary for him to adequately exercise his duty to see and avoid other aircraft.

The certificated noise level for the Model 208B at 8750 pounds maximum weight is 80.1 dB(A) when a Hartzell propeller is installed and 82.7 dB(A) when a McCauley propeller is installed. The noise level measurements were made based on a takeoff profile for both propellers. No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

SECTION 5
PERFORMANCE

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INTRODUCTION

Performance data charts on the following pages are presented so that you may know what to expect from the airplane under various conditions, and also, to facilitate the planning of flights in detail and with reasonable accuracy. The data in the charts has been computed from actual flight tests using average piloting techniques and an airplane and engine in good condition and equipped with a Hartzell propeller. Airplanes equipped with a McCauley propeller will have comparable performance and should also use the data shown.

WARNING

To ensure that performance in this section can be duplicated, the airplane and engine must be maintained in good condition. Pilot proficiency and proper preflight planning using data necessary for all flight phases is also required to assure expected performance with ample margins of safety.

It should be noted that the performance information presented in the range and endurance profile charts allows for 45 minutes reserve fuel at the specified cruise power and altitude. Some indeterminate variables such as engine and propeller condition, and air turbulence may account for variations of 10% or more in range and endurance. Therefore, it is important to utilize all available information to estimate the fuel required for the particular flight.

Notes have been provided on various graphs and tables to approximate performance with the inertial separator in BYPASS and/or cabin heat on. The effect will vary, depending upon airspeed, temperature, and altitude. At lower altitudes, where operation on the torque limit is possible, the effect of the inertial separator will be less, depending upon how much power can be recovered after the separator vanes have been extended.

In some cases, performance charts in this section include data for temperatures which are outside of the operating limits (Figure 5-5). This data has been included to aid in interpolation.

USE OF PERFORMANCE CHARTS

Performance data is presented in tabular or graphical form 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.

SAMPLE PROBLEM

The following sample flight problem utilizes information from the various charts to determine the predicted performance data for a typical flight of an airplane equipped with a cargo pod. A similar calculation can be made for an airplane without a cargo pod using charts identified as appropriate for this configuration. The following information is known:

AIRPLANE CONFIGURATION (CARGO POD INSTALLED)	
Takeoff weight	8600 Pounds
Usable fuel	2224 Pounds
TAKEOFF CONDITIONS	
Field pressure altitude	3500 Feet
Temperature	16°C (8°C above standard)
Wind component along runway	12 Knot Headwind
Field length	4000 Feet
CRUISE CONDITIONS	
Total distance	650 Nautical Miles
Pressure altitude	11,500 Feet
Temperature	8°C
Expected wind enroute	10 Knot Headwind
LANDING CONDITIONS	
Field pressure altitude	1500 Feet
Temperature	25°C
Field length	3000 Feet

TAKEOFF

The Takeoff Distance chart, Figure 5-9, should be consulted, keeping in mind that the distances shown are based on the short field technique. Conservative distances can be established by reading the chart at the next higher value of weight, altitude and temperature. For example, in this particular sample problem, the takeoff distance information presented for a weight of 8750 pounds, pressure altitude of 4000 feet and a temperature of 20°C should be used and results in the following:

Ground roll	1875 Feet
Total distance to clear a 50-foot obstacle	3295 Feet

These distances are well within the available takeoff field length. However, a correction for the effect of wind may be made based on Note 2 of the takeoff chart. The correction for a 12 knot headwind is:

$\frac{12 \text{ Knots}}{11 \text{ Knots}} \times 10\% = 11\%$ Decrease

This results in the following distances, corrected for wind:

Ground roll, zero wind	1875
Decrease in ground roll (1875 feet X 11%)	206
Corrected ground roll	1669 Feet
Total distance to clear a 50-foot obstacle, zero wind	3295
Decrease in total distance (3295 feet X 11%)	362
Corrected total distance to clear a 50-foot obstacle	2933 Feet

The Engine Torque For Takeoff chart, Figure 5-8, should be consulted for takeoff power setting. For the above ambient conditions, the power setting is:

Takeoff torque	1865 Ft-Lbs

CRUISE

The cruising altitude should be selected based on a consideration of trip length, winds aloft, and the airplane's performance. A cruising altitude and the expected wind enroute have been given for this sample problem. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics presented in Figure 5-17, the Fuel and Time Required charts presented in Figure 5-18 and 5-19, the Range Profile chart presented in Figure 5-20, and the Endurance Profile chart presented in Figure 5-21.

The Range Profile chart, Figure 5-20, shows range at maximum cruise power and also at maximum range power. For this sample problem, maximum cruise power and 1900 RPM will be used.

The Cruise Performance chart for 12,000 feet pressure altitude is entered using 10°C temperature. These values most nearly correspond to the planned altitude and expected temperature conditions. The torque setting for maximum cruise power is 1280 Ft-Lbs torque at 1900 RPM which results in the following:

True airspeed	158 Knots
Cruise fuel flow	306 PPH

FUEL REQUIRED

The total fuel requirement for the flight may be estimated using the performance information in Figures 5-16, 5-17 and 5-22 or in Figures 5-18 and 5-19. The longer detailed method will be used for this sample problem, but the use of Figures 5-18 and 5-19 will provide the desired information for most flight planning purposes.

Assuming a maximum climb, Figure 5-16 may be used to determine the time, fuel and distance to climb by reading values for a weight of 8750 pounds and a temperature 20°C above standard. The difference between the values shown in the table for 4000 feet and 12,000 feet results in the following:

Time	16 Minutes
Fuel	94 Pounds
Distance	33 Nautical Miles

Similarly, Figure 5-22 shows that a descent from 12,000 feet to sea level results in the following:

Time	15 Minutes
Fuel	72 Pounds
Distance	43 Nautical Miles

The distances shown on the climb and descent charts are for zero wind. A correction for the effect of wind may be made as follows:

Distance during climb with no wind	33
Decrease in distance due to wind (16/60 X 10 knot headwind)	3
Corrected distance to climb	30 Nautical Miles

Similarly, the distance for descent may be corrected for the effect of wind and results in 40 nautical miles.

The cruise distance is then determined by subtracting the distance during climb and distance during descent.

Total distance	650
Distance during climb and descent	-70
Cruise distance	580 Nautical Miles

With an expected 10 knot headwind, the ground speed for cruise is predicted to be:

158
-10
148 Knots

Therefore, the time required for the cruise portion of the trip is:

$$\frac{580 \text{ Nautical Miles}}{148 \text{ Knots}} = 3.9 \text{ Hours}$$

The fuel required for cruise is:

3.9 hours × 306 pounds/hour = 1194 Pounds

A 45-minute reserve requires:

$$\frac{45}{60} \times 306 \text{ pounds/hour} = 230 \text{ Pounds}$$

The total estimated fuel required is as follows:

Engine start, taxi, and takeoff	35
Climb	94
Cruise	1194
Descent	72
Reserve	230
Total fuel required	1625 Pounds

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel required to complete the trip with ample reserve.

LANDING

A procedure similar to takeoff should be used for estimating the landing distance at the destination airport. The estimated landing weight is as follows:

Takeoff weight	8600
Fuel required for climb, cruise, and descent	1625
Landing weight	6975 Pounds

Figure 5-23 presents landing distance information for the short field technique. The landing distances for a weight of 7000 pounds and corresponding to 2000 feet pressure altitude and a temperature of 30°C should be used and are as follows:

Ground roll	850 Feet
Total distance to clear a 50-foot obstacle	1650 Feet

A correction for the effect of wind may be made based on Note 2 of the landing chart using the same procedure as outlined for takeoff.

AIRSPEED CALIBRATION

NORMAL STATIC SOURCE

CONDITIONS:
8750 Pounds.
Power required for level flight or maximum power for descent.

NOTE:

Where airspeed values have been replaced by dashes, the airspeed would be either below stall speed at maximum weight or above the maximum approved operating limit speed for the condition.

FLAPS UP								
KIAS	---	80	100	120	140	160	175	---
KCAS	---	85	100	120	140	160	175	---
FLAPS 10°								
KIAS	75	80	100	120	140	160	175	---
KCAS	79	83	100	120	140	160	175	---
FLAPS 20°								
KIAS	65	70	80	90	100	110	130	150
KCAS	71	74	81	91	100	110	130	150
FLAPS 30°								
KIAS	65	70	80	90	100	110	125	---
KCAS	69	72	80	90	101	111	126	---

Figure 5-1. Airspeed Calibration (Sheet 1 of 2)

AIRSPEED CALIBRATION

ALTERNATE STATIC SOURCE

VENTS CLOSED

FLAPS UP							
NORMAL KIAS	80	100	120	140	160	175	---
ALTERNATE KIAS	86	103	123	144	165	180	---
FLAPS 10°							
NORMAL KIAS	70	80	100	120	140	160	175
ALTERNATE KIAS	76	84	103	124	145	166	182
FLAPS 20°							
NORMAL KIAS	60	70	80	100	120	140	150
ALTERNATE KIAS	66	74	83	104	125	147	157
FLAPS 30°							
NORMAL KIAS	60	70	80	90	100	110	125
ALTERNATE KIAS	65	73	83	94	105	116	132

VENTS OPEN

FLAPS UP							
NORMAL KIAS	80	100	120	140	160	175	---
ALTERNATE KIAS	82	99	119	140	160	176	---
FLAPS 10°							
NORMAL KIAS	70	80	100	120	140	160	175
ALTERNATE KIAS	72	80	100	120	141	162	178
FLAPS 20°							
NORMAL KIAS	60	70	80	100	120	140	150
ALTERNATE KIAS	62	70	79	100	121	143	153
FLAPS 30°							
NORMAL KIAS	60	70	80	90	100	110	125
ALTERNATE KIAS	61	70	79	90	101	112	128

Figure 5-1. Airspeed Calibration (Sheet 2 of 2)

ALTIMETER CORRECTION

ALTERNATE STATIC SOURCE

NOTES:

1. Add correction to desired altitude to obtain indicated altitude to fly.
2. Where altimeter correction values have been replaced by dashes, the correction is unnecessary because of conditions in which airspeed is not attainable in level flight.

VENTS CLOSED

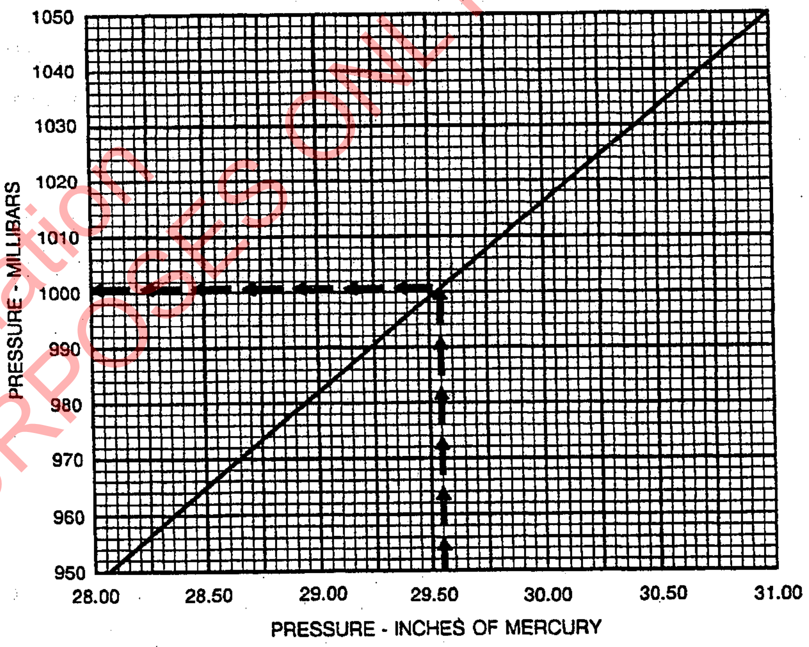
CONDITION	CORRECTION TO BE ADDED - FEET					
	KIAS					
	80	90	100	120	140	160
FLAPS UP						
Sea Level	- - -	15	20	40	55	80
10,000 Ft.	- - -	20	30	50	75	- - -
20,000 Ft.	- - -	25	40	70	- - -	- - -
FLAPS 20°						
Sea Level	20	25	35	55	75	- - -
10,000 Ft.	25	35	50	75	- - -	- - -
FLAPS 30°						
Sea Level	15	25	35	60	- - -	- - -
10,000 Ft.	20	35	50	85	- - -	- - -

VENTS OPEN

CONDITION	CORRECTION TO BE ADDED - FEET					
	KIAS					
	80	90	100	120	140	160
FLAPS UP						
Sea Level	- - -	-15	-10	-10	5	10
10,000 Ft.	- - -	-20	-20	-15	10	- - -
20,000 Ft.	- - -	-30	-25	-15	- - -	- - -
FLAPS 20°						
Sea Level	-20	-10	- 5	10	25	- - -
10,000 Ft.	-25	-15	- 5	15	- - -	- - -
FLAPS 30°						
Sea Level	-15	-10	0	20	- - -	- - -
10,000 Ft.	-20	-10	0	25	- - -	- - -

Figure 5-2. Altimeter Correction

PRESSURE CONVERSION



EXAMPLE:

Pressure - 29.55 Inches of Mercury.

Pressure - 1000.6 Millibars.

5984C7002

Figure 5-3. Pressure Conversion - Inches Of Mercury To Millibars

TEMPERATURE CONVERSION CHART

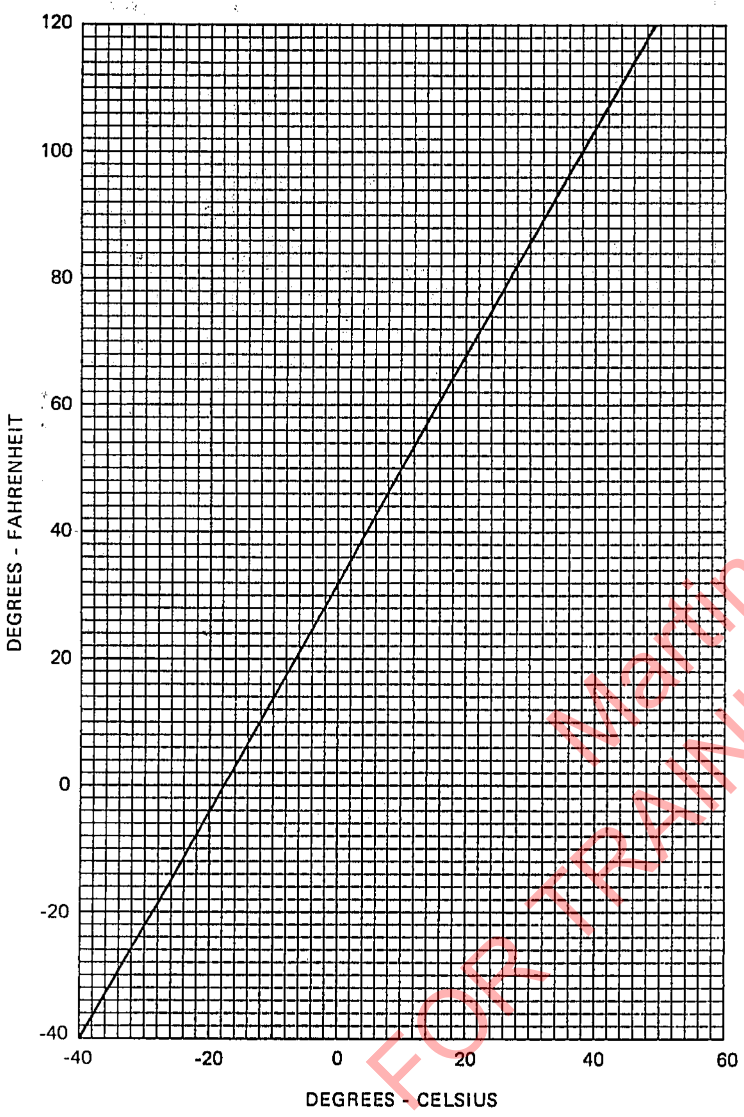


Figure 5-4. Temperature Conversion Chart

ISA CONVERSION AND OPERATING TEMPERATURE LIMITS

CAUTION

Do not operate in shaded area of chart.

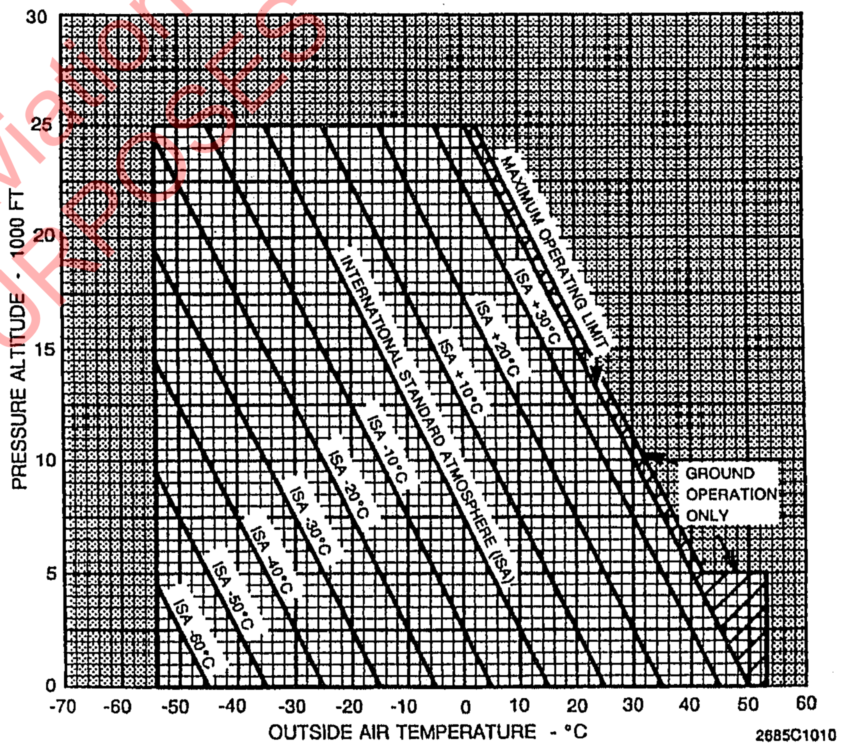


Figure 5-5. ISA Conversion And Operating Temperature Limits

STALL SPEEDS

CONDITIONS:
Power Lever - Idle
Fuel Condition Lever - High Idle

NOTES:
1. Altitude loss during a stall recovery may be as much as 300 feet from a wings-level stall and even greater from a turning stall.
2. KIAS values are approximate.

MOST REARWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
8750	UP	63	78	68	84	75	93	89	110
	10°	58	69	62	74	69	82	82	98
	20°	53	63	57	68	63	75	75	89
	30°	48	60	52	64	57	71	68	85

MOST FORWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
8750	UP	63	78	68	84	75	93	89	110
	10°	60	70	64	75	71	83	85	99
	20°	54	64	58	69	64	76	76	91
	30°	50	61	54	66	59	73	71	86

Figure 5-6. Stall Speeds

WIND COMPONENTS

NOTE:
Maximum demonstrated crosswind velocity is 20 knots (not a limitation).

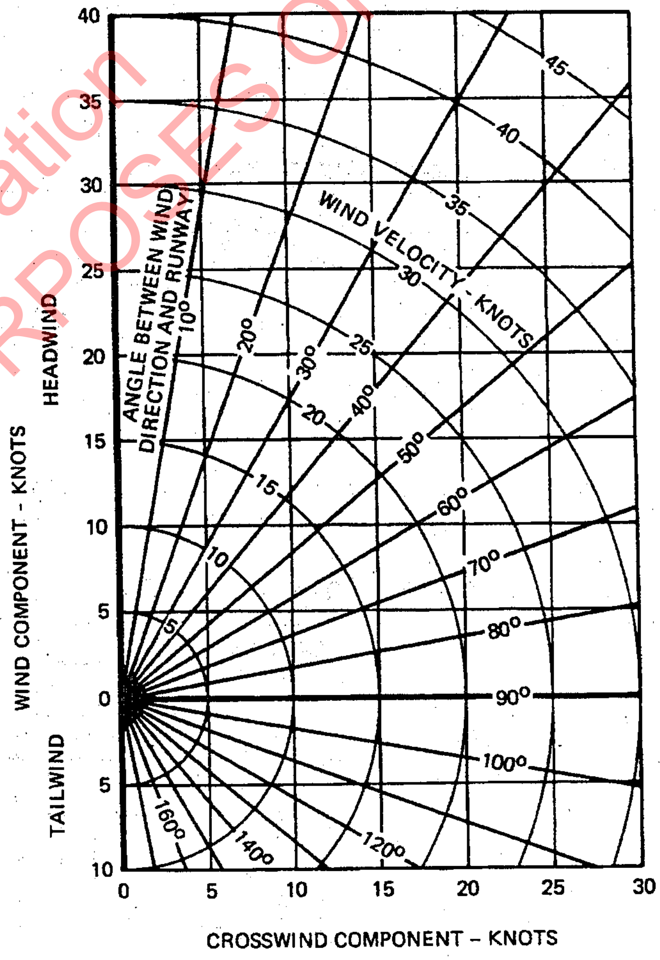


Figure 5-7. Wind Components

ENGINE TORQUE FOR TAKEOFF

CONDITIONS:
1900 RPM
60 KIAS
Inertial Separator - Normal

NOTES:
1. Torque increases approximately 10 Ft-Lbs from 0 to 60 KIAS.
2. Torque on this chart shall be achieved without exceeding 805°C ITT or 101.6 percent N_g. When the ITT exceeds 765°C, this power setting is time-limited to 5 minutes.
3. With the inertial separator in BYPASS and takeoff power set below the torque limit (1865 Ft-Lbs), decrease torque setting by 15 Ft-Lbs.
4. With the cabin heater on and takeoff power set below the torque limit (1865 Ft-Lbs), decrease torque setting by 65 Ft-Lbs.

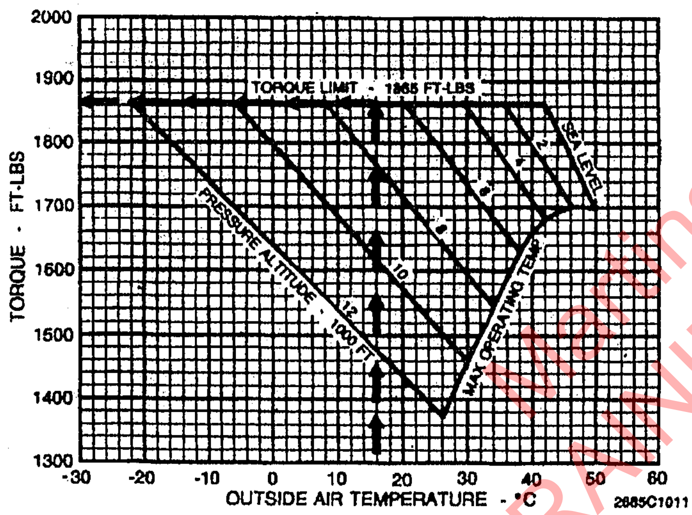


Figure 5-8. Engine Torque for Takeoff

(CARGO POD INSTALLED)

TAKEOFF DISTANCE

MAXIMUM WEIGHT 8750 LBS
SHORT FIELD

CONDITIONS
Flaps 20°
1900 RPM
Inertial Separator - Normal
Cabin Heat - Off
Torque Set per Figure 5-8
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field takeoff technique as specified in Section 4.
2. Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. With takeoff power set below the torque limit (1865 ft-lbs), increase distance (both ground roll and total distance) by 3% for inertial separator in BYPASS and increase ground roll 5% and total distances 10% for cabin heat on.
5. Where distance values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those distances which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.
6. For operations above 40°C and below the temperature operating limitations, multiply takeoff distances at 40°C by 1.2.

WT. LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	-10°C		0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS
8750	70	83	SL	1205	2160	1280	2295	1365	2430	1445	2570	1535	2720	1625	2870
			2000	1360	2430	1455	2580	1545	2740	1645	2905	1745	3075	1910	3400
			4000	1550	2745	1655	2920	1760	3105	1875	3295	1995	3510	2290	4135
			6000	1765	3115	1890	3325	2015	3540	2145	3765	2435	4370	2805	5195
			8000	2025	3560	2165	3805	2345	4125	2670	4815	3065	5715	3565	7005
			10000	2335	4090	2585	4580	2930	5325	3370	6350	3915	7790	---	---
			12000	2875	5155	3270	6030	3745	7175	4350	8865	---	---	---	---

Figure 5-9. Takeoff Distance (Sheet 1 of 2)

(CARGO POD INSTALLED)

TAKEOFF DISTANCE
8300, 7800 AND 7300 LBS
SHORT FIELD

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES

WT. LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	-10°C		0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS
8300	67	80	SL	1050	1870	1120	1980	1190	2095	1260	2215	1335	2340	1415	2470
			2000	1190	2095	1265	2225	1345	2360	1430	2495	1515	2640	1660	2910
			4000	1350	2360	1440	2510	1530	2665	1630	2825	1735	3005	1980	3510
			6000	1535	2675	1640	2850	1750	3030	1860	3220	2105	3710	2415	4360
			8000	1760	3045	1880	3250	2030	3515	2305	4070	2635	4775	3050	5745
			10000	2025	3490	2235	3890	2530	4485	2890	5275	3340	6345	----	----
			12000	2480	4350	2810	5040	3205	5915	3700	7135	4330	8965	----	----
7800	64	76	SL	895	1585	955	1680	1015	1775	1075	1875	1140	1975	1205	2080
			2000	1015	1775	1080	1880	1145	1990	1215	2105	1290	2225	1410	2440
			4000	1150	1995	1225	2115	1300	2245	1385	2375	1470	2525	1675	2925
			6000	1305	2250	1395	2395	1485	2545	1580	2700	1780	3085	2030	3595
			8000	1495	2555	1595	2725	1720	2940	1945	3375	2215	3920	2550	4645
			10000	1715	2920	1890	3240	2130	3705	2425	4310	2785	5100	----	----
			12000	2090	3605	2360	4135	2680	4800	3075	5685	3575	6920	----	----
7300	61	73	SL	760	1345	805	1420	855	1500	910	1580	960	1665	1015	1755
			2000	855	1500	910	1585	970	1680	1025	1775	1085	1870	1185	2045
			4000	970	1680	1035	1780	1100	1885	1165	1995	1240	2115	1405	2435
			6000	1100	1895	1175	2010	1250	2130	1330	2260	1495	2570	1695	2965
			8000	1255	2145	1340	2280	1445	2455	1630	2800	1845	3225	2115	3780
			10000	1440	2440	1585	2695	1780	3065	2020	3530	2305	4130	----	----
			12000	1750	2985	1970	3405	2225	3910	2540	4575	2930	5460	----	----

Figure 5-9. Takeoff Distance (Sheet 2 of 2)

(CARGO POD INSTALLED)

TAKEOFF DISTANCE

MAXIMUM WEIGHT 8750 LBS
FLAPS 0°

CONDITIONS
Flaps 0°
1900 RPM
Inertial Separator - Normal
Cabin Heat - Off
Torque Set per Figure 5-8
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Use Type II or Type IV anti-ice fluid takeoff technique as specified in Section 4.
2. Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. With takeoff power set below the torque limit (1865 ft-lbs), increase distance (both ground roll and total distance) by 3% for inertial separator in BYPASS and increase ground roll 5% and total distances 10% for cabin heat on.
5. Where distance values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those distances which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WT. LBS	TAKEOFF SPEED KIAS		PRES ALT FT	-20°C		-10°C		0°C		10°C	
	LIFT OFF	AT 50 FT		GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS
8750	83	104	SL	1720	3205	1840	3420	1960	3645	2085	3880
			2000	1950	3625	2085	3875	2225	4140	2370	4410
			4000	2215	4125	2370	4415	2535	4725	2700	5045
			6000	2530	4715	2710	5060	2900	5425	3095	5805
			8000	2900	5425	3110	5835	3335	6270	3605	6825
			10000	3340	6280	3590	6775	3995	7660	4575	9045
			12000	3930	7485	4475	8740	5135	10385	5955	12585

Figure 5-9A Takeoff Distance (Sheet 1 of 2)

(CARGO POD INSTALLED)

TAKEOFF DISTANCE
8300, 7800 and 7300 LBS
FLAPS 0°

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES

WT. LBS	TAKEOFF SPEED KIAS LIFT OFF	TAKEOFF SPEED KIAS AT 50 FT	PRES ALT FT	-20°C GRD ROLL FT	-20°C TOTAL FEET TO CLEAR 50 FT OBS	-10°C GRD ROLL FT	-10°C TOTAL FEET TO CLEAR 50 FT OBS	0°C GRD ROLL FT	0°C TOTAL FEET TO CLEAR 50 FT OBS	10°C GRD ROLL FT	10°C TOTAL FEET TO CLEAR 50 FT OBS
8300	83	104	SL	1620	3015	1730	3220	1845	3430	1965	3650
			2000	1835	3410	1960	3645	2095	3890	2230	4145
			4000	2085	3875	2230	4150	2385	4435	2540	4735
			6000	2380	4430	2550	4750	2725	5090	2910	5445
			8000	2725	5090	2925	5475	3130	5880	3385	6395
			10000	3140	5890	3375	6350	3750	7170	4285	8450
			12000	3690	7010	4195	8170	4810	9685	5570	11705
7800	83	104	SL	1510	2810	1615	2995	1720	3190	1830	3395
			2000	1710	3175	1825	3390	1950	3620	2075	3855
			4000	1940	3605	2080	3860	2220	4125	2365	4400
			6000	2215	4115	2370	4415	2535	4730	2705	5055
			8000	2535	4730	2720	5085	2910	5455	3145	5930
			10000	2920	5465	3135	5890	3480	6640	3975	7810
			12000	3430	6495	3890	7555	4460	8935	5155	10765
7300	83	104	SL	1405	2605	1500	2780	1595	2960	1695	3145
			2000	1585	2945	1695	3145	1810	3355	1925	3570
			4000	1800	3340	1925	3575	2055	3820	2190	4075
			6000	2055	3810	2200	4085	2350	4375	2505	4675
			8000	2350	4375	2520	4700	2695	5040	2910	5475
			10000	2705	5050	2905	5440	3220	6125	3675	7190
			12000	3170	5995	3595	6960	4115	8215	4750	9865

Figure 5-9A. Takeoff Distance (Sheet 2 of 2)

(CARGO POD INSTALLED)

RATE OF CLIMB - TAKEOFF FLAP SETTING

FLAPS 20°

CONDITIONS:
Takeoff Power
1900 RPM
Inertial Separator - Normal

NOTES:
1. **Do not exceed torque limit for takeoff per ENGINE TORQUE FOR TAKEOFF chart. When ITT exceeds 765°C, this power setting is time limited to 5 minutes.**
2. With climb power set below the torque limit, decrease rate of climb by 20 fpm for inertial separator set in BYPASS and 45 fpm for cabin heat on.
3. Where rate of climb values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those rates of climb which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM -20°C	0°C	20°C	40°C
8750	SL	91	855	835	815	795
	2000	90	835	815	795	730
	4000	89	815	790	765	645
	6000	88	790	765	740	555
	8000	87	760	735	620	435
	10000	85	730	665	500	---
	12000	84	680	540	380	---
8300	SL	90	940	920	900	880
	2000	89	920	895	875	810
	4000	88	895	870	850	725
	6000	86	870	845	820	630
	8000	85	840	815	700	505
	10000	84	810	745	575	---
	12000	82	760	615	450	---
7800	SL	89	1035	1020	1000	980
	2000	87	1015	995	975	910
	4000	86	995	970	950	820
	6000	85	965	945	920	720
	8000	83	940	915	795	595
	10000	82	905	840	665	---
	12000	80	855	710	540	---
7300	SL	88	1145	1130	1110	1090
	2000	86	1125	1105	1085	1020
	4000	85	1105	1080	1060	925
	6000	84	1075	1055	1030	825
	8000	82	1050	1025	900	690
	10000	81	1015	950	765	---
	12000	79	965	810	635	---

Figure 5-10. Rate Of Climb - Takeoff Flap Setting

(CARGO POD INSTALLED)

CLIMB GRADIENT - TAKEOFF FLAP SETTING

FLAPS 20°

CONDITIONS:
Takeoff Power
1900 RPM
Inertial Separator - Normal
Zero Wind

NOTES:

1. **Do not exceed torque limit for takeoff per ENGINE TORQUE FOR TAKEOFF chart. When ITT exceeds 765°C, this power setting is time limited to 5 minutes.**
2. With climb power set below the torque limit, decrease climb gradient by 10 FT/NM for inertial separator set in BYPASS and 30 FT/NM for cabin heat on.
3. Where climb gradient values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those climb gradients which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	CLIMB GRADIENT - FT/NM			
			-20°C	0°C	20°C	40°C
8750	SL	70	670	630	595	560
	2000	71	630	590	555	500
	4000	71	590	555	520	430
	6000	71	555	515	480	355
	8000	72	515	475	390	270
	10000	72	475	420	310	---
	12000	72	430	330	225	---
8300	SL	68	745	705	665	630
	2000	69	705	660	625	565
	4000	69	665	620	585	490
	6000	69	620	580	545	410
	8000	69	580	540	450	325
	10000	69	540	475	360	---
	12000	69	490	385	275	---
7800	SL	65	840	795	755	715
	2000	65	795	750	710	645
	4000	66	750	705	665	565
	6000	66	705	665	625	480
	8000	66	660	620	525	390
	10000	67	620	550	430	---
	12000	67	565	450	335	---
7300	SL	62	950	900	855	810
	2000	62	900	855	805	735
	4000	63	855	805	760	650
	6000	63	805	755	715	560
	8000	63	755	710	605	460
	10000	64	710	635	505	---
	12000	64	650	530	405	---

Figure 5-11. Climb Gradient - Takeoff Flap Setting

(CARGO POD INSTALLED)

MAXIMUM RATE OF CLIMB

FLAPS UP

CONDITIONS:
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
2. With climb power set below the torque limit, decrease rate of climb by 30 fpm for inertial separator set in BYPASS and 65 fpm for cabin heat on.
3. Where rate of climb values have been replaced by dashes, an appreciable rate of climb for the weight shown cannot be expected or operating temperature limits of the airplane would be greatly exceeded. Those rates of climb which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM				
			-40°C	-20°C	0°C	20°C	40°C
8750	SL	104	975	960	940	920	705
	4000	104	940	915	890	785	450
	8000	104	890	865	780	515	215
	12000	101	840	710	510	275	15
	16000	95	610	445	260	50	---
	20000	87	345	195	20	---	---
	24000	78	95	---	---	---	---
8300	SL	103	1065	1045	1025	1005	780
	4000	103	1025	1000	980	865	520
	8000	103	980	950	865	590	275
	12000	100	930	795	585	340	70
	16000	94	690	520	330	110	---
	20000	86	420	260	80	---	---
	24000	77	165	15	---	---	---
7800	SL	101	1170	1150	1135	1115	880
	4000	101	1130	1110	1090	975	610
	8000	101	1085	1060	975	685	355
	12000	98	1035	900	680	425	145
	16000	91	790	615	415	185	---
	20000	83	510	345	160	---	---
	24000	73	245	95	---	---	---
7300	SL	99	1285	1270	1250	1235	990
	4000	99	1250	1230	1210	1090	710
	8000	99	1205	1180	1090	790	445
	12000	96	1155	1015	790	520	225
	16000	88	900	720	510	275	---
	20000	80	605	440	245	25	---
	24000	69	330	175	---	---	---

Figure 5-12. Maximum Rate of Climb - Flaps Up

(CARGO POD INSTALLED)

TAKEOFF CLIMB GRADIENT

FLAPS UP

CONDITIONS:
Takeoff Power
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Do not exceed torque limit for takeoff per ENGINE TORQUE FOR TAKEOFF chart. When ITT exceeds 765°C, this power setting is time limited to 5 minutes.**
2. With climb power set below the torque limit, decrease rate of climb by 10 FT/NM for inertial separator set in BYPASS and 40 FT/NM for cabin heat on.
3. Where climb gradient values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those climb gradients which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	CLIMB GRADIENT - FT/NM			
			-20°C	0°C	20°C	40°C
8750	SL	68	695	655	620	475
	2000	69	655	615	580	390
	4000	69	615	580	500	305
	6000	70	580	545	410	230
	8000	70	540	475	330	165
	10000	71	505	390	250	---
	12000	72	420	305	180	---
8300	SL	66	770	725	690	535
	2000	66	730	685	650	445
	4000	67	690	650	565	360
	6000	68	645	610	470	280
	8000	68	605	540	380	210
	10000	69	570	445	300	---
	12000	69	475	355	225	---
7800	SL	61	860	815	775	615
	2000	62	820	775	735	515
	4000	62	775	730	640	425
	6000	62	730	690	540	340
	8000	63	690	615	445	265
	10000	63	645	515	360	---
	12000	63	550	420	280	---
7300	SL	59	970	920	875	700
	2000	59	920	875	830	595
	4000	59	875	830	730	500
	6000	59	830	780	620	405
	8000	59	780	700	520	330
	10000	59	735	595	430	---
	12000	59	630	490	340	---

Figure 5-13. Takeoff Climb Gradient - Flaps Up

(CARGO POD INSTALLED)

CRUISE CLIMB

FLAPS UP - 115 KIAS

CONDITIONS:
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
2. With climb power set below the torque limit, decrease rate of climb by 50 fpm for inertial separator set in BYPASS and 70 fpm for cabin heat on.
3. Where rate of climb values have been replaced by dashes, an appreciable rate of climb for the weight shown cannot be expected or operating temperature limits of the airplane would be greatly exceeded. Those rates of climb which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	RATE OF CLIMB - FPM				
		-40°C	-20°C	0°C	20°C	40°C
8750	SL	940	915	890	865	635
	2000	915	890	865	840	495
	4000	890	865	835	715	355
	6000	865	835	805	570	225
	8000	835	800	710	425	105
	10000	800	765	555	285	---
	12000	765	625	400	145	---
8300	SL	1015	990	970	945	700
	2000	995	970	945	915	555
	4000	970	940	915	790	410
	6000	945	910	880	635	275
	8000	915	880	785	485	150
	10000	880	845	625	340	30
	12000	845	695	460	195	---
7800	SL	1115	1090	1065	1040	780
	2000	1090	1065	1040	1010	630
	4000	1065	1040	1010	880	475
	6000	1040	1005	975	715	330
	8000	1010	975	875	555	200
	10000	975	935	705	405	75
	12000	935	780	535	250	---
7300	SL	1220	1195	1175	1150	870
	2000	1195	1170	1145	1120	710
	4000	1170	1145	1115	975	550
	6000	1145	1115	1080	805	395
	8000	1115	1080	975	635	255
	10000	1080	1040	795	475	125
	12000	1040	875	615	310	---

Figure 5-14. Cruise Climb - Flaps Up - 115 KIAS

(CARGO POD INSTALLED)

RATE OF CLIMB - BALKED LANDING

FLAPS 30°

CONDITIONS:
Takeoff Power
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Do not exceed torque limit for takeoff per ENGINE TORQUE FOR TAKEOFF chart. When ITT exceeds 765°C, this power setting is time limited to 5 minutes.**
2. With climb power set below the torque limit, decrease rate of climb by 15 fpm for inertial separator set in BYPASS and 45 fpm for cabin heat on.
3. Where rate of climb values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those rates of climb which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
8500	SL	83	805	780	760	735
	2000	82	780	755	735	670
	4000	81	755	730	705	590
	6000	80	730	700	675	495
	8000	79	700	670	560	380
	10000	78	665	600	440	---
	12000	77	620	480	325	---
8000	SL	82	895	870	850	830
	2000	81	870	850	825	760
	4000	80	845	820	795	675
	6000	79	820	795	765	580
	8000	78	790	760	645	460
	10000	77	760	690	525	---
	12000	76	710	565	405	---
7500	SL	81	995	975	950	930
	2000	80	975	950	925	860
	4000	79	950	925	900	775
	6000	78	920	895	870	675
	8000	77	890	865	745	550
	10000	75	860	790	620	---
	12000	74	810	660	490	---
7000	SL	80	1105	1085	1065	1045
	2000	79	1085	1065	1040	970
	4000	78	1060	1035	1010	880
	6000	77	1035	1010	980	780
	8000	75	1005	975	850	645
	10000	74	970	900	720	---
	12000	73	920	765	590	---

Figure 5-15. Rate of Climb - Balked Landing

(CARGO POD INSTALLED)

TIME, FUEL, AND DISTANCE TO CLIMB

MAXIMUM RATE OF CLIMB

CONDITIONS:
Flaps Up
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
2. Add 35 pounds of fuel for engine start, taxi, and takeoff allowance.
3. Distances shown are based on zero wind.
4. With inertial separator set in BYPASS, increase time, fuel, and distance numbers by 1% for each 2000 feet of climb and for cabin heat on, increase time, fuel, and distance numbers by 1% for each 1000 feet of climb.
5. Where time, fuel, and distance values have been replaced by dashes, an appreciable rate of climb for the weight shown cannot be expected.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
			CLIMB FROM SEA LEVEL								
			TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM
8750	SL	104	0	0	0	0	0	0	0	0	0
	4000	104	4	32	8	5	33	8	6	38	10
	8000	104	9	64	16	9	66	17	12	80	24
	12000	101	14	98	25	15	105	29	22	132	43
	16000	95	20	136	37	23	152	45	35	202	71
	20000	87	28	186	54	36	219	72	69	349	142
	24000	78	0	0	0	---	---	---	---	---	---
8300	SL	103	0	0	0	0	0	0	0	0	0
	4000	103	4	29	7	4	30	7	5	34	9
	8000	103	8	58	14	8	60	15	11	72	21
	12000	100	13	89	23	14	95	26	19	116	37
	16000	94	18	123	33	21	135	40	30	172	60
	20000	86	25	165	47	31	189	61	51	265	104
	24000	77	40	233	76	54	287	106	---	---	---
7800	SL	101	0	0	0	0	0	0	0	0	0
	4000	101	4	26	6	4	27	6	4	30	8
	8000	101	7	52	13	8	54	14	10	63	18
	12000	98	11	80	20	12	84	22	16	100	31
	16000	91	16	110	29	18	119	34	25	145	49
	20000	83	22	146	41	27	163	51	40	210	79
	24000	73	33	198	62	42	229	81	---	---	---
7300	SL	99	0	0	0	0	0	0	0	0	0
	4000	99	3	24	5	3	24	6	4	27	7
	8000	99	7	47	11	7	49	12	9	55	16
	12000	96	10	72	18	11	75	20	14	87	27
	16000	88	14	99	25	16	105	30	21	124	41
	20000	80	20	129	35	23	141	43	32	173	63
	24000	69	29	171	52	34	191	65	---	---	---

Figure 5-16. Time, Fuel, and Distance to Climb (Sheet 1 of 2)

(CARGO POD INSTALLED)

TIME, FUEL, AND DISTANCE TO CLIMB

CRUISE CLIMB - 115 KIAS

CONDITIONS:
Flaps Up
1900 RPM
Inertial Separator - Normal

NOTES:
1. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
2. Add 35 pounds of fuel for engine start, taxi, and takeoff allowance.
3. Distances shown are based on zero wind.
4. With inertial separator set in BYPASS or cabin heat on, increase time, fuel, and distance numbers by 1% for each 1000 feet of climb.

WEIGHT LBS	PRESS ALT FT	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
		CLIMB FROM SEA LEVEL								
		TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM
8750	SL	0	0	0	0	0	0	0	0	0
	2000	2	17	4	2	17	5	3	20	6
	4000	5	33	9	5	35	9	6	42	13
	6000	7	50	14	7	53	15	10	65	20
	8000	10	68	19	10	71	20	14	91	30
	10000	12	86	24	13	92	27	19	122	42
	12000	15	105	30	17	115	35	26	159	58
8300	SL	0	0	0	0	0	0	0	0	0
	2000	2	15	4	2	16	4	3	18	5
	4000	4	31	8	4	32	9	6	38	11
	6000	6	46	12	7	48	13	9	59	18
	8000	9	62	17	9	65	18	13	82	27
	10000	11	79	22	12	84	24	17	108	37
	12000	13	96	27	15	104	32	23	140	50
7800	SL	0	0	0	0	0	0	0	0	0
	2000	2	14	4	2	14	4	2	17	5
	4000	4	28	7	4	29	8	5	34	10
	6000	6	42	11	6	44	12	8	52	16
	8000	8	56	16	8	59	17	11	73	24
	10000	10	71	20	11	75	22	15	95	33
	12000	12	87	25	14	94	29	20	122	44
7300	SL	0	0	0	0	0	0	0	0	0
	2000	2	13	3	2	13	4	2	15	4
	4000	4	25	7	4	26	7	5	30	9
	6000	5	38	10	5	39	11	7	47	15
	8000	7	51	14	7	53	15	10	65	21
	10000	9	64	18	10	68	20	13	85	29
	12000	11	78	22	12	84	26	17	107	38

Figure 5-16. Time, Fuel, and Distance to Climb (Sheet 2 of 2)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE

NOTES

The following general information is applicable to all Cruise Performance Charts contained in Figure 5-17, Sheet 2 through Sheet 13, in this section.

1. The highest torque shown for each temperature and RPM corresponds to maximum allowable cruise power. Do not exceed this torque, 740°C ITT, or 101.6% Ng, whichever occurs first.
2. The lowest torque shown for each temperature and RPM corresponds to the recommended torque setting for best range in zero wind conditions.
3. With the inertial separator in BYPASS and power set below the torque limit (1865 foot-pounds), decrease the maximum cruise torque by 100 foot-pounds. Do not exceed 740°C ITT. Fuel flow for a given torque setting will be 15 pph higher.
4. With the cabin heat on and power set below the torque limit (1865 foot-pounds), decrease maximum cruise torque by 80 foot-pounds. Do not exceed 740°C ITT. Fuel flow for a given torque setting will be 7 pph higher.

Figure 5-17. Cruise Performance (Sheet 1 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 2000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM TORQUE FT-LBS	1900 RPM FUEL FLOW PPH	1900 RPM KTAS	1750 RPM TORQUE FT-LBS	1750 RPM FUEL FLOW PPH	1750 RPM KTAS	1600 RPM TORQUE FT-LBS	1600 RPM FUEL FLOW PPH	1600 RPM KTAS
45	1247	346	146	1336	346	145	1427	346	144
40	1363	362	152	1457	362	151	1555	362	149
							1550	361	149
30	1584	393	161	1689	393	160	1797	393	157
	1420	367	153	1500	365	151	1600	365	150
				1465	360	150	1545	357	147
20	1794	424	168	1910	424	166	1970	416	162
	1600	393	160	1800	407	162	1800	390	156
	1395	361	150	1600	376	154	1600	361	148
				1465	356	148	1535	352	146
10	1865	433	168	1970	430	167	1970	411	160
	1700	406	162	1800	404	161	1800	386	155
	1500	375	154	1600	373	153	1600	358	147
	1395	358	149	1450	351	146	1500	344	143
0	1865	430	167	1970	427	165	1970	407	159
	1700	403	160	1800	400	159	1800	382	153
	1500	372	152	1600	370	151	1600	354	146
	1390	355	147	1435	345	144	1500	341	141
-10	1865	427	165	1970	423	163	1970	403	157
	1700	400	159	1800	397	157	1800	379	151
	1500	369	150	1600	367	150	1600	351	144
	1380	351	145	1425	341	142	1485	335	139
-20	1865	424	163	1970	419	161	1970	400	155
	1700	397	157	1800	393	155	1800	375	150
	1500	366	148	1600	364	148	1600	347	142
	1375	347	143	1405	335	140	1465	329	137
-30	1865	422	161	1970	415	159	1970	396	153
	1700	395	155	1800	390	154	1800	372	148
	1500	364	147	1600	360	146	1600	343	141
	1370	344	141	1400	332	138	1460	325	135
-40	1865	420	159	1970	413	157	1970	392	152
	1700	392	153	1800	387	152	1800	368	146
	1500	361	144	1600	357	144	1600	340	139
	1355	340	138	1395	328	136	1455	320	134
-50	1865	419	156	1970	411	155	1970	388	150
	1700	390	150	1800	383	150	1800	364	144
	1500	359	142	1600	354	142	1600	336	137
	1360	338	136	1400	326	134	1435	314	131
				1385	324	134			
-54	1865	418	155	1970	410	154	1970	386	149
	1700	389	150	1800	382	149	1800	362	144
	1500	359	142	1600	353	141	1600	335	137
	1365	338	136	1400	325	133	1435	313	130
				1380	322	133			

Figure 5-17. Cruise Performance (Sheet 2 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 4000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM TORQUE FT-LBS	1900 RPM FUEL FLOW PPH	1900 RPM KTAS	1750 RPM TORQUE FT-LBS	1750 RPM FUEL FLOW PPH	1750 RPM KTAS	1600 RPM TORQUE FT-LBS	1600 RPM FUEL FLOW PPH	1600 RPM KTAS
40	1248	335	148	1335	335	147	1426	335	145
30	1460	365	158	1558	365	157	1658	365	155
	1375	352	154	1420	345	151	1505	343	148
20	1661	395	166	1769	395	164	1876	395	162
	1500	369	159	1600	369	158	1700	368	155
	1355	346	152	1415	340	149	1500	339	147
							1485	337	146
10	1859	426	172	1970	425	170	1970	406	164
	1700	399	166	1800	397	164	1800	379	158
	1500	366	157	1600	366	156	1600	350	150
	1335	341	149	1405	336	147	1480	333	145
0	1865	425	170	1970	422	168	1970	402	162
	1700	396	164	1800	394	162	1800	376	156
	1500	364	155	1600	362	154	1600	347	148
	1330	337	147	1400	332	145	1450	325	142
				1390	331	145			
-10	1865	423	168	1970	419	167	1970	397	160
	1700	394	162	1800	390	161	1800	372	154
	1500	361	154	1600	359	153	1600	343	147
	1330	334	145	1400	329	144	1435	320	140
				1380	326	143			
-20	1865	421	166	1970	417	165	1970	393	158
	1700	391	160	1800	387	159	1800	369	153
	1500	359	152	1600	356	151	1600	340	145
	1315	330	143	1400	327	142	1415	314	138
				1370	322	141			
-30	1865	419	164	1970	414	163	1970	390	157
	1700	388	158	1800	383	157	1800	365	151
	1500	356	150	1600	353	149	1600	337	144
	1310	327	141	1400	324	141	1420	311	136
				1345	316	138			
-40	1865	417	162	1970	411	161	1970	387	155
	1700	386	156	1800	380	155	1800	362	149
	1500	354	148	1600	351	147	1600	333	142
	1305	324	139	1400	321	139	1415	307	135
				1335	312	136			
-50	1865	416	160	1970	409	159	1970	384	153
	1700	385	154	1800	378	153	1800	358	148
	1500	352	146	1600	348	146	1600	329	140
	1315	323	137	1400	318	137	1395	301	132
				1330	308	134			
-54	1865	415	159	1970	408	158	1970	383	152
	1700	384	153	1800	377	152	1800	357	147
	1500	351	145	1600	347	145	1600	328	140
	1320	323	137	1400	317	137	1400	301	131
				1325	306	133	1375	297	130

Figure 5-17. Cruise Performance (Sheet 3 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 6000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
35	1241	324	150	1326	324	149	1413	324	147
30	1340	338	155	1430	338	154	1522	338	152
	1330	337	155	1380	330	151	1455	329	148
20	1533	367	164	1632	367	162	1731	367	159
	1400	345	157	1500	346	156	1600	347	154
	1320	332	153	1360	325	149	1455	325	147
10	1720	396	170	1828	396	169	1934	396	166
	1600	375	165	1700	375	164	1800	374	161
	1400	343	156	1500	343	155	1600	343	153
	1305	328	150	1360	322	148	1440	320	146
0	1865	423	174	1970	421	172	1970	399	165
	1700	390	168	1800	388	166	1800	370	159
	1500	357	159	1600	356	158	1600	340	151
	1300	325	148	1400	325	149	1415	313	143
	1285	323	148	1360	319	146			
-10	1865	421	172	1970	418	170	1970	396	164
	1700	388	166	1800	386	164	1800	366	158
	1500	354	157	1600	353	156	1600	337	150
	1300	322	147	1400	322	147	1400	308	141
	1265	320	146	1330	312	143			
-20	1865	419	170	1970	415	168	1970	392	162
	1700	387	164	1800	383	162	1800	363	156
	1500	352	155	1600	350	154	1600	334	148
	1300	320	145	1400	319	145	1400	305	139
	1270	315	144	1320	308	142	1380	302	138
-30	1865	417	168	1970	413	166	1970	389	160
	1700	385	162	1800	380	160	1800	360	154
	1500	349	153	1600	347	153	1600	331	147
	1300	318	144	1400	317	144	1400	302	138
	1265	313	142	1315	304	139	1370	297	137
-40	1865	415	166	1970	410	164	1970	386	158
	1700	383	160	1800	378	158	1800	357	153
	1500	347	151	1600	344	151	1600	327	145
	1300	316	142	1400	314	142	1400	299	136
	1265	310	140	1290	298	137	1350	292	134
-50	1865	413	164	1970	407	162	1970	383	156
	1700	381	158	1800	376	156	1800	354	151
	1500	345	149	1600	341	149	1600	324	143
	1300	314	140	1400	311	140	1400	296	135
	1270	309	138	1280	294	134	1350	289	133
-54	1865	412	163	1970	406	161	1970	382	156
	1700	381	157	1800	375	156	1800	352	150
	1500	344	149	1600	340	148	1600	322	143
	1300	313	139	1400	310	140	1400	295	134
	1265	308	137	1275	292	133	1335	285	131

Figure 5-17. Cruise Performance (Sheet 4 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 8000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
30	1209	311	150	1291	311	149	1375	311	146
20	1390	338	160	1481	338	158	1572	338	155
	1325	327	156	1325	314	150	1410	313	147
10	1564	364	167	1663	364	165	1760	364	162
	1400	337	159	1500	338	158	1600	338	155
	1290	319	153	1325	310	149	1405	309	146
0	1736	396	173	1844	396	171	1949	396	168
	1600	369	167	1700	368	165	1800	368	162
	1400	335	157	1500	335	156	1600	335	154
	1260	312	150	1330	308	148	1400	306	144
							1380	302	143
-10	1865	420	176	1970	418	174	1970	396	167
	1700	387	170	1800	385	168	1800	364	161
	1500	349	161	1600	348	159	1600	332	153
	1300	316	150	1400	316	150	1400	303	143
	1250	308	147	1315	304	146	1365	297	141
-20	1865	418	174	1970	415	172	1970	393	165
	1700	385	168	1800	383	166	1800	361	159
	1500	346	159	1600	345	158	1600	329	151
	1300	314	148	1400	314	148	1400	300	142
	1240	304	145	1325	302	144	1340	291	139
-30	1865	415	172	1970	412	170	1970	389	163
	1700	383	166	1800	380	164	1800	358	157
	1500	344	157	1600	.342	156	1600	326	150
	1300	312	147	1400	311	147	1400	297	141
	1235	302	143	1285	294	141	1325	286	137
-40	1865	413	170	1970	409	168	1970	386	161
	1700	381	164	1800	377	162	1800	356	156
	1500	343	155	1600	340	154	1600	323	148
	1300	310	145	1400	308	145	1400	294	139
	1240	300	142	1260	288	138	1320	282	135
-50	1865	411	168	1970	406	166	1970	383	159
	1700	380	161	1800	375	160	1800	353	154
	1500	342	153	1600	338	152	1600	320	146
	1300	308	143	1400	306	143	1400	291	137
	1240	298	140	1255	284	136	1320	279	134
-54	1865	410	167	1970	405	165	1970	382	159
	1700	379	161	1800	374	159	1800	352	153
	1500	341	152	1600	338	151	1600	318	146
	1300	307	142	1400	305	143	1400	289	137
	1225	295	138	1240	281	134	1305	276	132

Figure 5-17. Cruise Performance (Sheet 5 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 10000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM TORQUE FT-LBS	1900 RPM FUEL FLOW PPH	1900 RPM KTAS	1750 RPM TORQUE FT-LBS	1750 RPM FUEL FLOW PPH	1750 RPM KTAS	1600 RPM TORQUE FT-LBS	1600 RPM FUEL FLOW PPH	1600 RPM KTAS
25	1176	298	150	1254	298	148	1335	298	145
20	1259	310	155	1342	310	154	1426	310	150
				1320	307	152	1395	306	149
10	1420	334	163	1510	334	161	1600	334	158
	1295	314	156	1400	317	156	1395	302	148
				1305	302	150			
0	1580	364	170	1678	364	168	1775	363	165
	1400	329	161	1500	330	159	1600	331	157
	1265	307	153	1295	298	148	1400	300	147
							1385	298	146
-10	1738	394	175	1847	394	173	1949	394	170
	1600	366	169	1700	366	167	1800	365	164
	1400	327	159	1500	328	158	1600	328	155
	1235	300	149	1295	295	147	1400	298	146
							1365	292	144
-20	1865	417	178	1970	414	176	1970	394	169
	1700	384	171	1800	382	169	1800	362	162
	1500	344	162	1600	344	161	1600	325	154
	1300	308	152	1400	308	151	1400	295	144
	1235	297	148	1285	291	145	1345	287	142
-30	1865	414	176	1970	412	174	1970	390	167
	1700	382	169	1800	380	167	1800	358	161
	1500	343	160	1600	342	159	1600	322	152
	1300	306	150	1400	306	150	1400	292	143
	1215	292	145	1290	289	144	1320	280	139
-40	1865	412	174	1970	409	172	1970	386	165
	1700	380	167	1800	377	166	1800	355	159
	1500	341	158	1600	339	157	1600	320	151
	1300	304	148	1400	303	148	1400	289	142
	1210	289	143	1270	283	141	1305	275	137
-50	1865	411	172	1970	407	170	1970	382	163
	1700	378	165	1800	374	164	1800	353	157
	1500	340	156	1600	337	156	1600	317	149
	1300	302	146	1400	301	147	1400	286	140
	1200	286	141	1245	277	138	1300	271	135
-54	1865	411	171	1970	406	169	1970	381	162
	1700	378	164	1800	373	163	1800	352	156
	1500	339	156	1600	336	155	1600	316	149
	1300	301	146	1400	300	146	1400	285	140
	1205	286	140	1250	277	138	1285	268	134

Figure 5-17. Cruise Performance (Sheet 6 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 12000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM TORQUE FT-LBS	1900 RPM FUEL FLOW PPH	1900 RPM KTAS	1750 RPM TORQUE FT-LBS	1750 RPM FUEL FLOW PPH	1750 RPM KTAS	1600 RPM TORQUE FT-LBS	1600 RPM FUEL FLOW PPH	1600 RPM KTAS
20	1131	284	148	1207	284	147	1283	284	143
10	1280	306	158	1362	306	156	1445	306	153
	1275	306	158	1310	298	153	1390	297	149
0	1431	333	166	1520	333	164	1609	332	160
	1300	307	158	1400	310	157	1500	312	155
	1265	302	156	1295	293	151	1380	293	148
-10	1578	361	172	1676	361	169	1771	361	166
	1400	325	162	1500	327	161	1600	328	158
	1245	296	153	1300	291	150	1400	293	148
				1280	288	149	1375	289	146
-20	1702	383	175	1808	383	173	1908	383	170
	1500	343	166	1700	363	169	1800	363	166
	1300	304	155	1500	324	159	1600	325	157
	1165	285	147	1300	288	149	1400	291	147
				1285	286	148	1350	283	144
-30	1823	408	178	1936	408	176	1970	392	170
	1700	381	173	1800	380	171	1800	360	164
	1500	342	164	1600	342	162	1600	322	155
	1300	302	153	1400	303	153	1400	288	146
	1215	287	148	1265	281	145	1325	276	141
-40	1865	415	178	1970	413	175	1970	389	169
	1700	379	171	1800	377	169	1800	356	162
	1500	340	162	1600	339	161	1600	320	154
	1300	301	151	1400	301	151	1400	285	144
	1205	283	146	1255	277	143	1300	270	139
-50	1865	414	176	1970	410	173	1970	385	167
	1700	377	169	1800	374	167	1800	353	160
	1500	339	160	1600	337	159	1600	317	152
	1300	300	150	1400	299	150	1400	282	143
	1185	278	143	1245	272	141	1280	264	136
-54	1865	413	175	1970	410	172	1970	384	166
	1700	377	168	1800	374	166	1800	352	159
	1500	338	159	1600	336	158	1600	316	152
	1300	299	149	1400	299	149	1400	281	142
	1175	276	141	1240	271	140	1275	262	136

Figure 5-17. Cruise Performance (Sheet 7 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 14000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
15	1081	269	145	1152	269	143	1225	269	139
10	1151	280	151	1225	280	149	1300	280	145
0	1291	304	160	1372	304	158	1454	303	155
	1240	293	157	1295	289	153	1380	290	150
-10	1428	330	167	1516	329	165	1603	329	161
	1300	304	160	1400	307	159	1400	291	150
	1225	289	155	1280	284	151	1365	284	148
-20	1546	352	172	1642	352	169	1734	352	166
	1400	322	164	1500	324	163	1600	326	160
	1210	285	152	1300	286	151	1400	288	149
				1260	278	149	1355	279	146
-30	1658	374	175	1761	373	173	1859	373	170
	1500	341	168	1600	341	166	1700	342	163
	1300	301	157	1400	303	156	1500	304	153
	1190	279	149	1255	275	147	1335	274	144
-40	1774	398	178	1885	398	176	1970	394	172
	1600	359	171	1700	358	169	1800	358	166
	1400	319	160	1500	320	159	1600	320	157
	1200	280	148	1300	282	148	1400	284	147
	1155	271	145	1235	269	144	1305	267	141
-50	1865	414	180	1970	412	177	1970	390	170
	1700	379	173	1800	378	171	1800	354	164
	1500	337	164	1600	336	162	1600	317	155
	1300	298	153	1400	298	153	1400	282	145
	1135	267	142	1225	266	142	1285	261	139
-54	1865	413	179	1970	411	176	1970	389	169
	1700	379	172	1800	377	170	1800	353	163
	1500	336	163	1600	336	161	1600	316	154
	1300	298	152	1400	298	152	1400	281	145
	1130	265	141	1225	266	142	1275	258	138

Figure 5-17. Cruise Performance (Sheet 8 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 16,000 FEET

CONDITIONS:
8750 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
10	1033	256	141	1101	256	138	1168	256	132
0	1163	277	153	1237	277	151	1311	277	147
-10	1287	300	162	1367	300	159	1447	300	155
	1165	276	153	1235	275	150	1330	278	147
-20	1401	322	167	1488	322	165	1572	322	161
	1200	282	154	1300	285	153	1400	289	151
	1150	272	150	1215	268	147	1305	270	145
-30	1504	341	171	1597	341	169	1687	341	166
	1300	300	159	1400	303	158	1500	305	156
	1130	267	147	1195	263	145	1300	267	144
							1290	265	143
-40	1610	364	175	1710	364	172	1805	363	169
	1500	339	169	1600	340	167	1600	321	160
	1300	299	158	1400	301	157	1400	284	149
	1115	262	145	1200	262	144	1265	259	140
				1185	259	143			
-50	1720	385	178	1824	384	175	1923	384	172
	1600	360	172	1700	359	170	1800	359	167
	1400	317	162	1500	317	161	1600	317	158
	1200	278	150	1300	279	149	1400	281	148
	1095	257	142	1160	253	140	1245	253	138

Figure 5-17. Cruise Performance (Sheet 9 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 18,000 FEET

CONDITIONS:
8750 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
-5	1103	263	149	1173	263	146	1242	263	141
-15	1218	285	159	1293	285	156	1368	284	151
	1155	273	154	1225	272	151	1325	276	148
-25	1314	303	164	1396	302	162	1475	302	158
	1200	280	156	1205	266	148	1310	270	146
	1140	268	151						
-35	1408	321	169	1495	321	166	1579	321	162
	1300	298	162	1300	282	154	1400	285	152
	1135	265	150	1185	260	145	1295	265	144
-45	1505	342	172	1598	341	170	1688	341	166
	1400	318	166	1400	299	159	1500	302	157
	1200	277	153	1200	261	145	1300	264	144
	1110	259	146	1175	256	144	1265	258	141
-54	1547	348	173	1642	348	170	1735	348	167
	1400	317	165	1500	319	163	1600	320	160
	1200	276	152	1300	278	151	1400	281	149
	1100	256	144	1155	251	141	1230	249	138

Figure 5-17. Cruise Performance (Sheet 10 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 20,000 FEET

CONDITIONS:
8750 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
-20	1142	268	153	1212	268	150	1282	267	144
-30	1229	284	160	1305	284	157	1379	284	152
	1170	272	155	1235	270	152	1340	275	149
-40	1315	302	165	1397	301	162	1475	301	158
	1200	277	156	1210	263	149	1315	268	147
	1150	267	153						
-50	1402	319	169	1487	319	166	1570	318	162
	1200	275	155	1300	279	154	1400	282	152
	1130	262	150	1195	258	147	1310	264	146
-54	1395	317	168	1481	317	165	1566	316	162
	1200	275	154	1300	279	154	1400	281	152
	1135	262	149	1180	255	145	1295	261	144

Figure 5-17. Cruise Performance (Sheet 11 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 22,000 FEET

CONDITIONS:
8300 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
-25	1065	250	152	1131	250	148	1197	250	142
-35	1146	265	159	1217	265	156	1288	265	151
	1110	258	155	1175	257	152	1270	262	149
-45	1228	283	164	1304	283	161	1379	282	157
	1095	253	153	1150	250	149	1250	255	147
-54	1257	288	165	1336	288	162	1414	287	158
	1100	253	152	1200	259	152	1300	263	150
	1090	251	151	1130	244	146	1245	252	146

Figure 5-17. Cruise Performance (Sheet 12 of 13)

(CARGO POD INSTALLED)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 24,000 FEET

CONDITIONS:
7800 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
-30	994	234	151	1057	234	147	1119	234	141
-40	1069	249	158	1136	249	155	1202	248	150
	1040	242	155	1100	241	151	1190	245	149
-50	1140	263	163	1210	263	160	1279	262	156
	1025	238	152	1100	239	151	1165	238	146
				1080	236	149			
-54	1133	262	162	1204	261	159	1275	261	155
	1020	236	151	1070	233	148	1165	238	146

Figure 5-17. Cruise Performance (Sheet 13 of 13)

(CARGO POD INSTALLED)

FUEL AND TIME REQUIRED

MAXIMUM CRUISE POWER 40-200 NM

CONDITIONS:
8750 Pounds
1900 RPM
Inertial Separator - Normal
Standard Temperature

NOTES:

1. Fuel required includes the fuel used for engine start, taxi, takeoff, maximum climb from sea level, descent to sea level and 45 minutes reserve. Time required includes the time during a maximum climb and descent.
2. With inertial separator in BYPASS, increase time by 4% and fuel by 2%, or with cabin heat on, increase time by 3% and fuel by 2%.

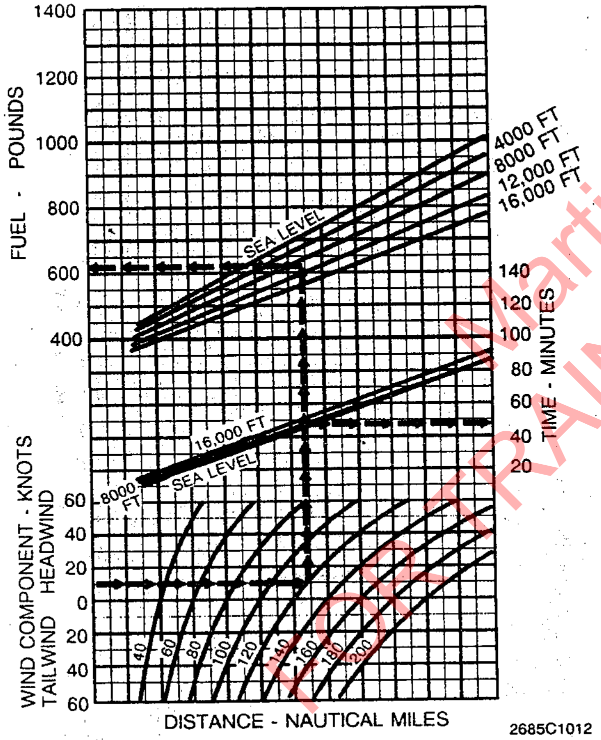


Figure 5-18. Fuel And Time Required - Maximum Cruise Power (Sheet 1 of 2)

(CARGO POD INSTALLED)

FUEL AND TIME REQUIRED

MAXIMUM CRUISE POWER 200-1000 NM

CONDITIONS:
8750 Pounds
1900 RPM
Inertial Separator - Normal
Standard Temperature

NOTES:

1. Fuel required includes the fuel used for engine start, taxi, takeoff, maximum climb from sea level, descent to sea level and 45 minutes reserve. Time required includes the time during a maximum climb and descent.
2. With inertial separator in BYPASS, increase time by 5% and fuel by 2%, or with cabin heat on, increase time by 5% and fuel by 4%.

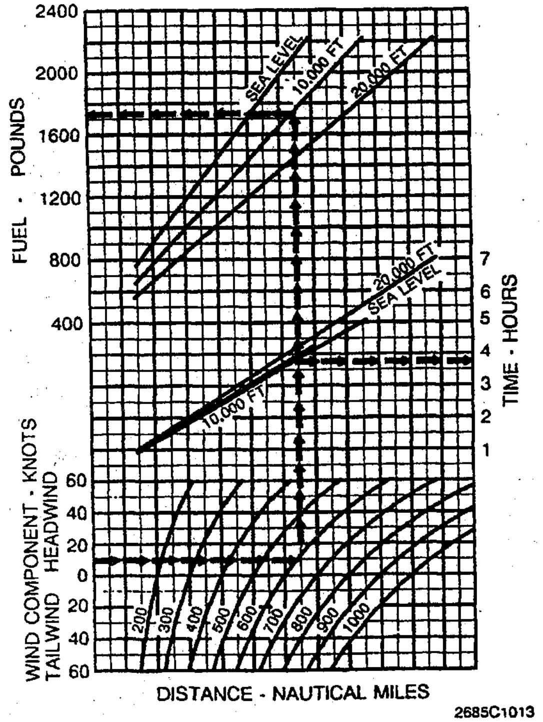


Figure 5-18. Fuel And Time Required - Maximum Cruise Power (Sheet 2 of 2)

(CARGO POD INSTALLED)

FUEL AND TIME REQUIRED

MAXIMUM RANGE POWER
40-200 NM

CONDITIONS:
8750 Pounds
1900 RPM
Inertial Separator - Normal
Standard Temperature

NOTES:
1. Fuel required includes the fuel used for engine start, taxi, takeoff, maximum climb from sea level, descent to sea level and 45 minutes reserve. Time required includes the time during a maximum climb and descent.
2. With inertial separator in BYPASS, increase time by 1% and fuel by 2%, or with cabin heat on, increase time by 1% and fuel by 3%.

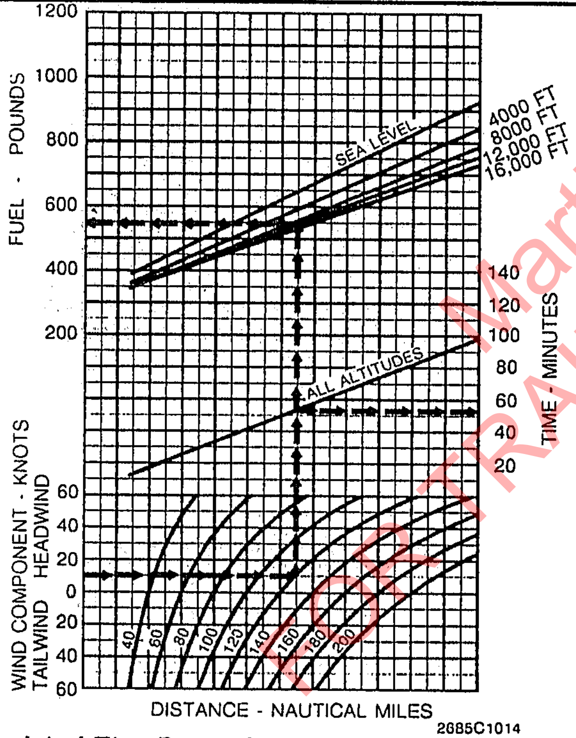


Figure 5-19. Fuel And Time Required - Maximum Range Power (Sheet 1 of 2)

(CARGO POD INSTALLED)

FUEL AND TIME REQUIRED

MAXIMUM RANGE POWER
200-1000 NM

CONDITIONS:
8750 Pounds
1900 RPM
Inertial Separator - Normal
Standard Temperature

NOTES:
1. Fuel required includes the fuel used for engine start, taxi, takeoff, maximum climb from sea level, descent to sea level and 45 minutes reserve. Time required includes the time during a maximum climb and descent.
2. With inertial separator in BYPASS, increase time by 1% and fuel by 2%, or with cabin heat on, increase time by 1% and fuel by 3%.

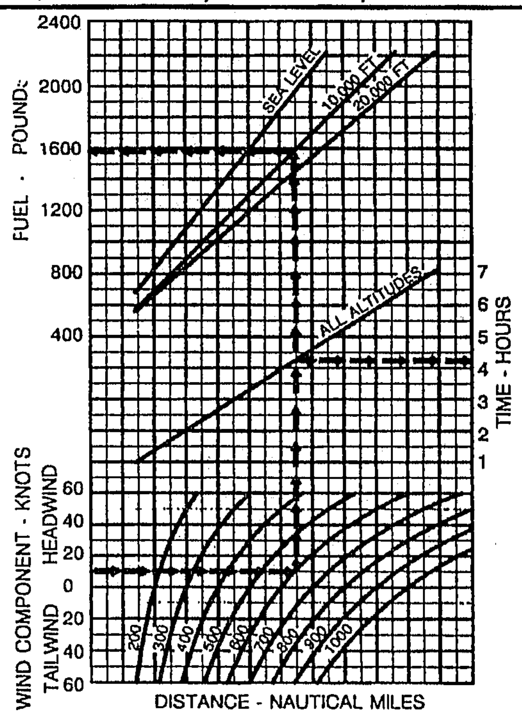


Figure 5-19. Fuel And Time Required - Maximum Range Power (Sheet 2 of 2)

(CARGO POD INSTALLED)

RANGE PROFILE

45 MINUTES RESERVE

2224 POUNDS USABLE FUEL

CONDITIONS:
8750 Pounds
1900 RPM
Standard Temperature
Zero Wind
Inertial Separator - Normal

NOTES:
1. This chart allows for the fuel used for engine start, taxi, takeoff, climb and descent. The distance during a maximum climb and the distance during descent are included.
2. With the inertial separator in BYPASS, decrease range by 2%, or with cabin heat on, decrease range by 3%.

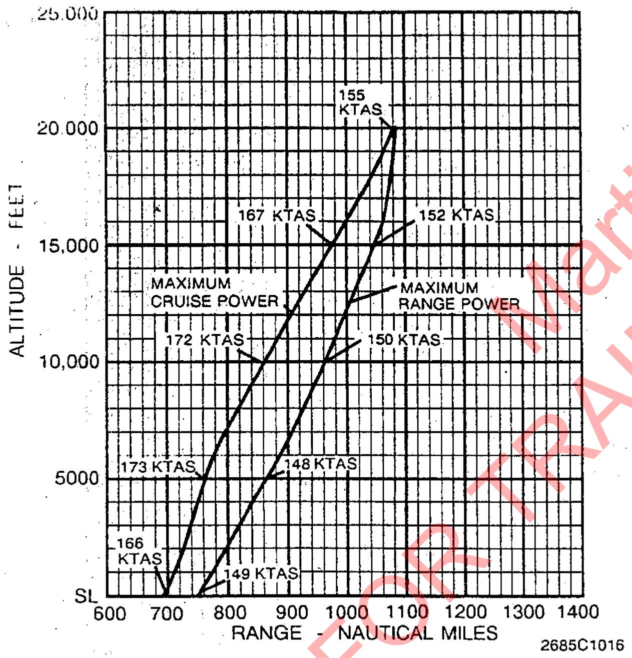


Figure 5-20. Range Profile

(CARGO POD INSTALLED)

ENDURANCE PROFILE

45 MINUTES RESERVE

2224 POUNDS USABLE FUEL

CONDITIONS:
8750 Pounds
1900 RPM
Standard Temperature
Inertial Separator - Normal

NOTES:
1. This chart allows for the fuel used for engine start, taxi, takeoff, climb and descent. The time during a maximum climb and the time during descent are included.
2. With the inertial separator in BYPASS, decrease endurance by 2%, or with cabin heat on, decrease endurance by 3%.

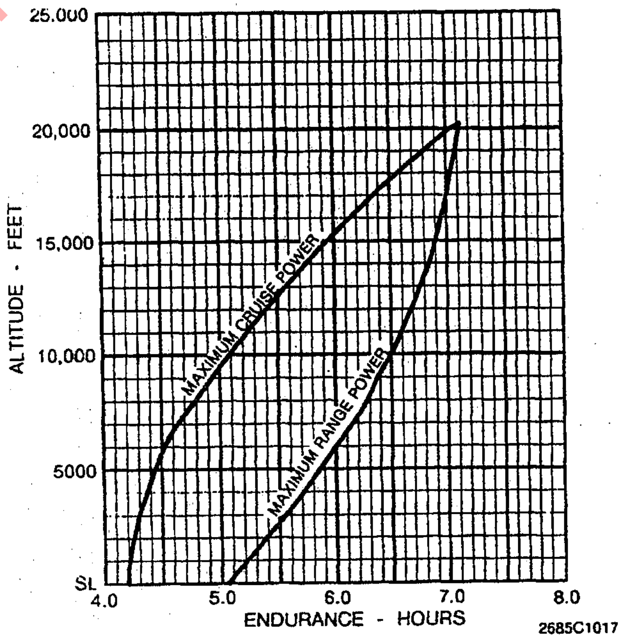


Figure 5-21. Endurance Profile

(CARGO POD INSTALLED)

TIME, FUEL, AND DISTANCE TO DESCEND

CONDITIONS:
8750 Pounds
Flaps Up
140 KIAS Above 16,000 Feet, 160 KIAS Below 16,000 Feet
Power Set for 800 FPM Rate of Descent
1900 RPM

NOTE:
Distances shown are based on zero wind.

PRESS ALT FT	DESCENT TO SEA LEVEL		
	TIME MIN	FUEL LBS	DIST NM
24,000	30	132	91
20,000	25	113	75
16,000	20	95	59
12,000	15	72	43
8,000	10	48	28
4,000	5	25	14
SL	0	0	0

Figure 5-22. Time, Fuel And Distance to Descend

(CARGO POD INSTALLED)

LANDING DISTANCE

MAXIMUM WEIGHT 8500 LBS
SHORT FIELD

CONDITIONS:
Flaps 30°
Power Lever - Idle after clearing obstacles, BETA range (lever against spring) after touchdown.
Propeller Control Lever - MAX
Maximum Braking
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 40% of the "ground roll" figure.
4. If a landing with flaps up is necessary, increase the approach speed by 15 KIAS and allow for 40% longer distances.
5. Use of maximum reverse thrust after touchdown reduces ground roll by approximately 10%.
6. Where distance values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those distances which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WT. LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	-10°C		0°C		10°C		20°C		30°C		40°C	
			GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS
8500	78	SL	835	1625	865	1670	900	1715	930	1765	965	1810	995	1855
		2000	900	1715	935	1765	965	1815	1000	1865	1035	1910	1070	1960
		4000	970	1815	1005	1865	1040	1920	1080	1970	1115	2020	1150	2075
		6000	1045	1920	1080	1975	1120	2030	1160	2085	1200	2140	1240	2195
		8000	1125	2035	1170	2095	1210	2155	1255	2215	1295	2270	1340	2330
		10000	1215	2160	1260	2225	1310	2290	1355	2350	1400	2415	---	---
		12000	1315	2295	1365	2365	1415	2430	1465	2500	1515	2565	---	---

Figure 5-23. Landing Distance (Sheet 1 of 2)

(CARGO POD INSTALLED)

LANDING DISTANCE

8000, 7500, and 7000 LBS
SHORT FIELD

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES

WT. LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	-10°C		0°C		10°C		20°C		30°C		40°C	
			GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS
8000	75	S.L.	785	1555	815	1600	845	1640	875	1685	905	1730	935	1770
		2000	845	1640	880	1690	910	1735	940	1780	975	1825	1005	1870
		4000	910	1735	945	1785	980	1835	1015	1885	1050	1930	1085	1980
		6000	980	1835	1020	1890	1055	1940	1095	1995	1130	2045	1170	2100
		8000	1060	1945	1100	2000	1140	2060	1180	2115	1220	2170	1260	2225
		10,000	1145	2065	1185	2125	1230	2185	1275	2245	1315	2305	---	---
		12,000	1235	2195	1285	2255	1330	2320	1380	2385	1425	2450	---	---
7500	73	S.L.	740	1480	765	1520	795	1565	820	1605	850	1645	880	1685
		2000	795	1565	825	1605	855	1650	885	1695	915	1740	945	1780
		4000	855	1650	885	1700	920	1745	950	1790	985	1840	1015	1885
		6000	920	1750	955	1800	990	1845	1025	1895	1060	1945	1095	1995
		8000	995	1850	1030	1905	1070	1960	1105	2010	1145	2065	1185	2115
		10,000	1075	1965	1115	2020	1155	2075	1195	2135	1235	2190	---	---
		12,000	1160	2085	1205	2145	1250	2205	1295	2265	1340	2325	---	---
7000	71	S.L.	690	1410	715	1450	740	1485	765	1525	790	1565	820	1600
		2000	740	1485	770	1530	795	1570	825	1610	850	1650	880	1690
		4000	795	1570	825	1615	855	1660	885	1700	915	1745	950	1790
		6000	860	1660	890	1705	925	1755	955	1800	990	1845	1020	1895
		8000	925	1760	960	1810	995	1860	1030	1910	1065	1955	1100	2005
		10,000	1000	1865	1040	1915	1075	1970	1115	2025	1150	2075	---	---
		12,000	1080	1980	1125	2035	1165	2090	1205	2150	1245	2205	---	---

Figure 5-23. Landing Distance (Sheet 2 of 2)

(WITHOUT CARGO POD)

TAKEOFF DISTANCE

MAXIMUM WEIGHT 8750 LBS
SHORT FIELD

CONDITIONS
Flaps 20°
1900 RPM
Inertial Separator - Normal
Cabin Heat - Off
Torque Set per Figure 5-8
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field takeoff technique as specified in Section 4.
2. Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. With takeoff power set below the torque limit (1865 ft-lbs), increase distance (both ground roll and total distance) by 3% for inertial separator in BYPASS and increase ground roll 5% and total distances 9% for cabin heat on.
5. Where distance values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those distances which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.
6. For operations above 40°C and below the temperature operating limitations, multiply takeoff distances at 40°C by 1.2.

WT. LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	-10°C		0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS
8750	70	83	SL	1170	2095	1245	2220	1325	2350	1405	2490	1490	2630	1575	2775
			2000	1325	2350	1410	2500	1500	2650	1595	2810	1690	2970	1855	3285
			4000	1505	2655	1605	2825	1710	3000	1820	3185	1935	3390	2220	3985
			6000	1715	3010	1835	3210	1955	3420	2080	3635	2380	4205	2715	4985
			8000	1965	3435	2105	3670	2270	3975	2585	4630	2965	5470	3445	6860
			10000	2265	3945	2505	4410	2840	5115	3260	6065	3780	7385	---	---
			12000	2785	4955	3185	5770	3620	6835	4200	8360	---	---	---	---

Figure 5-24. Takeoff Distance (Sheet 1 of 2)

(WITHOUT CARGO POD)

TAKEOFF DISTANCE
8300, 7800 AND 7300 LBS
SHORT FIELD

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES

WT. LBS	TAKEOFF SPEED KIAS LIFT OFF	TAKEOFF SPEED KIAS AT 50 FT	PRESS ALT FT	-10°C GRD ROLL FT	-10°C TOTAL FEET TO CLEAR 50 FT OBS	0°C GRD ROLL FT	0°C TOTAL FEET TO CLEAR 50 FT OBS	10°C GRD ROLL FT	10°C TOTAL FEET TO CLEAR 50 FT OBS	20°C GRD ROLL FT	20°C TOTAL FEET TO CLEAR 50 FT OBS	30°C GRD ROLL FT	30°C TOTAL FEET TO CLEAR 50 FT OBS	40°C GRD ROLL FT	40°C TOTAL FEET TO CLEAR 50 FT OBS
8300	67	80	SL	1020	1815	1090	1920	1155	2035	1225	2150	1300	2270	1375	2390
			2000	1155	2030	1230	2155	1310	2285	1390	2420	1475	2555	1610	2815
			4000	1310	2290	1395	2430	1485	2580	1580	2735	1685	2910	1925	3390
			6000	1495	2590	1595	2755	1700	2930	1810	3110	2045	3580	2340	4195
			8000	1705	2945	1825	3145	1970	3395	2235	3925	2550	4585	2950	5495
			10000	1965	3370	2170	3755	2450	4315	2800	5060	3230	6055	----	----
			12000	2405	4195	2725	4840	3100	5660	3575	6790	4180	8430	----	----
7800	64	76	SL	875	1540	930	1630	985	1725	1045	1820	1105	1920	1170	2020
			2000	985	1725	1050	1825	1115	1930	1185	2045	1255	2155	1370	2365
			4000	1115	1935	1190	2055	1265	2175	1345	2305	1430	2445	1630	2830
			6000	1270	2185	1355	2320	1445	2465	1535	2615	1730	2985	1970	3470
			8000	1450	2475	1550	2640	1670	2845	1890	3260	2145	3775	2470	4465
			10000	1665	2825	1835	3130	2065	3575	2350	4150	2695	4895	----	----
			12000	2030	3480	2290	3990	2600	4615	2980	5445	3455	6585	----	----
7300	61	73	SL	740	1305	785	1380	835	1460	885	1535	935	1620	985	1705
			2000	835	1455	885	1540	940	1630	1000	1720	1060	1815	1155	1985
			4000	945	1635	1005	1730	1070	1830	1135	1935	1205	2055	1365	2360
			6000	1070	1840	1145	1950	1215	2070	1295	2190	1450	2490	1650	2870
			8000	1220	2080	1305	2210	1405	2380	1585	2710	1790	3115	2050	3645
			10000	1400	2365	1540	2610	1730	2965	1960	3410	2235	3975	----	----
			12000	1700	2890	1910	3290	2160	3775	2465	4400	2835	5230	----	----

Figure 5-24. Takeoff Distance (Sheet 2 of 2)

(WITHOUT CARGO POD)

TAKEOFF DISTANCE
MAXIMUM WEIGHT 8750 LBS
FLAPS 0°

CONDITIONS
Flaps 0°
1900 RPM
Inertial Separator - Normal
Cabin Heat - Off
Torque Set per Figure 5-8
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Use Type II or Type IV anti-ice fluid takeoff technique as specified in Section 4.
2. Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. With takeoff power set below the torque limit (1865 ft-lbs), increase distance (both ground roll and total distance) by 3% for inertial separator in BYPASS and increase ground roll 5% and total distances 9% for cabin heat on.
5. Where distance values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those distances which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WT. LBS	TAKEOFF SPEED KIAS LIFT OFF	TAKEOFF SPEED KIAS AT 50 FT	PRES ALT FT	-20°C GRD ROLL FT	-20°C TOTAL FEET TO CLEAR 50 FT OBS	-10°C GRD ROLL FT	-10°C TOTAL FEET TO CLEAR 50 FT OBS	0°C GRD ROLL FT	0°C TOTAL FEET TO CLEAR 50 FT OBS	10°C GRD ROLL FT	10°C TOTAL FEET TO CLEAR 50 FT OBS
8750	83	104	SL	1685	3135	1800	3345	1920	3560	2040	3790
			2000	1910	3545	2040	3785	2175	4040	2315	4305
			4000	2170	4025	2320	4310	2475	4605	2640	4915
			6000	2475	4595	2650	4930	2835	5280	3025	5645
			8000	2835	5280	3040	5675	3255	6095	3515	6625
			10000	3260	6105	3505	6580	3895	7420	4450	8730
			12000	3835	7260	4355	8445	4995	9995	5775	12050

Figure 5-24A. Takeoff Distance (Sheet 1 of 2)

(WITHOUT CARGO POD)

TAKEOFF DISTANCE
8300, 7800 and 7300 LBS
FLAPS 0°

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES

WT. LBS	TAKEOFF SPEED KIAS LIFT OFF	TAKEOFF SPEED KIAS AT 50 FT	PRES ALT FT	-20°C GRD ROLL FT	-20°C TOTAL FEET TO CLEAR 50 FT OBS	-10°C GRD ROLL FT	-10°C TOTAL FEET TO CLEAR 50 FT OBS	0°C GRD ROLL FT	0°C TOTAL FEET TO CLEAR 50 FT OBS	10°C GRD ROLL FT	10°C TOTAL FEET TO CLEAR 50 FT OBS
8300	83	104	SL	1590	2950	1695	3145	1805	3350	1920	3560
			2000	1795	3330	1920	3560	2050	3795	2180	4045
			4000	2040	3785	2185	4050	2330	4325	2485	4615
			6000	2325	4320	2490	4630	2665	4955	2840	5300
			8000	2665	4955	2855	5325	3060	5715	3305	6210
			10000	3065	5725	3290	6170	3655	6950	4175	8160
			12000	3600	6800	4085	7900	4680	9330	5405	11215
7800	83	104	SL	1480	2750	1580	2930	1685	3120	1790	3315
			2000	1675	3100	1790	3315	1910	3535	2030	3760
			4000	1900	3520	2035	3765	2170	4020	2310	4290
			6000	2165	4015	2320	4305	2480	4605	2645	4920
			8000	2480	4605	2660	4945	2845	5305	3070	5760
			10000	2850	5315	3060	5720	3395	6440	3875	7545
			12000	3345	6300	3790	7310	4335	8610	5000	10320
7300	83	104	SL	1375	2550	1465	2720	1565	2890	1660	3075
			2000	1555	2875	1660	3070	1770	3275	1885	3485
			4000	1765	3260	1885	3490	2010	3725	2145	3970
			6000	2010	3720	2150	3985	2295	4260	2450	4550
			8000	2295	4260	2460	4575	2635	4905	2845	5320
			10000	2640	4915	2835	5285	3140	5945	3580	6950
			12000	3095	5815	3505	6735	4005	7920	4616	9465

Figure 5-24A. Takeoff Distance (Sheet 2 of 2)

(WITHOUT CARGO POD)

RATE OF CLIMB - TAKEOFF FLAP SETTING

FLAPS 20°

CONDITIONS:
Takeoff Power
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Do not exceed torque limit for takeoff per ENGINE TORQUE FOR TAKEOFF chart. When ITT exceeds 765°C, this power setting is time limited to 5 minutes.**
2. With climb power set below the torque limit, decrease rate of climb by 20 fpm for inertial separator set in BYPASS and 45 fpm for cabin heat on.
3. Where rate of climb values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those rates of climb which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM -20°C	RATE OF CLIMB - FPM 0°C	RATE OF CLIMB - FPM 20°C	RATE OF CLIMB - FPM 40°C
8750	SL	91	890	875	855	835
	2000	90	870	850	830	770
	4000	89	850	825	805	685
	6000	88	820	800	775	590
	8000	87	795	770	655	470
	10000	85	760	700	535	---
	12000	84	715	575	415	---
8300	SL	90	975	955	935	915
	2000	89	955	935	910	850
	4000	88	930	905	885	765
	6000	86	905	880	855	670
	8000	85	875	850	735	545
	10000	84	840	780	610	---
	12000	82	790	650	485	---
7800	SL	89	1070	1055	1035	1015
	2000	87	1050	1030	1010	950
	4000	86	1025	1005	985	860
	6000	85	1000	980	955	760
	8000	83	970	950	830	630
	10000	82	940	875	705	---
	12000	80	890	740	575	---
7300	SL	88	1185	1165	1150	1130
	2000	86	1160	1145	1125	1060
	4000	85	1140	1120	1095	965
	6000	84	1110	1090	1065	865
	8000	82	1085	1060	935	730
	10000	81	1050	985	805	---
	12000	79	1000	845	670	---

Figure 5-25. Rate of Climb - Takeoff Flap Setting

(WITHOUT CARGO POD)

CLIMB GRADIENT - TAKEOFF FLAP SETTING

FLAPS 20°

CONDITIONS:
Takeoff Power
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Do not exceed torque limit for takeoff per ENGINE TORQUE FOR TAKEOFF chart. When ITT exceeds 765°C, this power setting is time limited to 5 minutes.**
2. With climb power set below the torque limit, decrease climb gradient by 10 FT/NM for inertial separator set in BYPASS and 30 FT/NM for cabin heat on.
3. Where climb gradient values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those climb gradients which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	CLIMB GRADIENT - FT/NM			
			-20°C	0°C	20°C	40°C
8750	SL	70	685	645	610	575
	2000	71	645	605	570	515
	4000	71	610	570	535	445
	6000	71	570	530	495	370
	8000	72	530	495	410	290
	10000	72	490	435	325	---
	12000	72	445	345	245	---
8300	SL	68	760	720	680	645
	2000	69	720	680	640	580
	4000	69	680	640	600	505
	6000	69	635	595	560	430
	8000	69	595	555	465	340
	10000	69	555	495	375	---
	12000	69	505	400	290	---
7800	SL	65	860	810	770	730
	2000	65	815	765	725	660
	4000	66	770	725	680	580
	6000	66	725	680	640	500
	8000	66	680	635	540	405
	10000	67	635	570	445	---
	12000	67	580	470	350	---
7300	SL	62	965	915	870	830
	2000	62	920	870	825	755
	4000	63	870	820	775	670
	6000	63	820	775	730	580
	8000	63	770	725	620	475
	10000	64	725	655	520	---
	12000	64	665	545	420	---

Figure 5-26. Climb Gradient - Takeoff Flap Setting

(WITHOUT CARGO POD)

MAXIMUM RATE OF CLIMB

FLAPS UP

CONDITIONS:
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
2. With climb power set below the torque limit, decrease rate of climb by 30 fpm for inertial separator set in BYPASS and 65 fpm for cabin heat on.
3. Where rate of climb values have been replaced by dashes, an appreciable rate of climb for the weight shown cannot be expected or operating temperature limits of the airplane would be greatly exceeded. Those rates of climb which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM				
			-40°C	-20°C	0°C	20°C	40°C
8750	SL	104	1025	1005	990	970	755
	4000	104	990	970	945	840	505
	8000	104	945	920	840	575	275
	12000	101	895	765	565	335	75
	16000	95	660	495	315	105	---
	20000	87	390	240	65	---	---
	24000	78	135	---	---	---	---
8300	SL	103	1110	1095	1075	1060	835
	4000	103	1075	1055	1035	925	580
	8000	103	1035	1010	925	650	340
	12000	100	985	850	645	400	135
	16000	94	740	570	385	165	---
	20000	86	465	310	130	---	---
	24000	77	205	60	---	---	---
7800	SL	101	1215	1200	1185	1170	935
	4000	101	1185	1165	1145	1030	670
	8000	101	1145	1120	1035	745	420
	12000	98	1090	955	740	490	210
	16000	91	840	665	470	245	---
	20000	83	555	395	210	---	---
	24000	73	285	135	---	---	---
7300	SL	99	1335	1320	1305	1290	1045
	4000	99	1305	1285	1265	1150	770
	8000	99	1265	1240	1155	855	510
	12000	96	1210	1070	850	585	290
	16000	88	950	770	565	330	65
	20000	80	650	485	295	75	---
	24000	69	370	220	40	---	---

Figure 5-27. Maximum Rate of Climb - Flaps Up

(WITHOUT CARGO POD)

TAKEOFF CLIMB GRADIENT

FLAPS UP

CONDITIONS:
Takeoff Power
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Do not exceed torque limit for takeoff per ENGINE TORQUE FOR TAKEOFF chart. When ITT exceeds 765°C, this power setting is time limited to 5 minutes.**
2. With climb power set below the torque limit, decrease rate of climb by 10 FT/NM for inertial separator set in BYPASS and 40 FT/NM for cabin heat on.
3. Where climb gradient values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those climb gradients which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	CLIMB GRADIENT - FT/NM			
			-20°C	0°C	20°C	40°C
8750	SL	68	710	670	635	490
	2000	69	675	635	600	405
	4000	69	635	600	515	325
	6000	70	600	560	430	250
	8000	70	560	495	345	185
	10000	71	525	405	270	---
	12000	72	440	320	195	---
8300	SL	66	785	745	705	555
	2000	66	745	705	670	465
	4000	67	705	665	580	375
	6000	68	665	625	485	300
	8000	68	625	555	400	230
	10000	69	585	460	320	---
	12000	69	495	375	240	---
7800	SL	61	880	835	795	635
	2000	62	835	795	755	535
	4000	62	795	750	660	440
	6000	62	750	710	560	355
	8000	63	705	635	465	285
	10000	63	665	530	380	---
	12000	63	565	435	295	---
7300	SL	59	990	940	895	720
	2000	59	940	895	850	615
	4000	59	895	850	750	515
	6000	59	845	800	640	425
	8000	59	800	720	540	345
	10000	59	755	610	450	---
	12000	59	650	510	360	---

Figure 5-28. Takeoff Climb Gradient - Flaps Up

(WITHOUT CARGO POD)

CRUISE CLIMB

FLAPS UP - 115 KIAS

CONDITIONS:
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
2. With climb power set below the torque limit, decrease rate of climb by 50 fpm for inertial separator set in BYPASS and 70 fpm for cabin heat on.
3. Where rate of climb values have been replaced by dashes, an appreciable rate of climb for the weight shown cannot be expected or operating temperature limits of the airplane would be greatly exceeded. Those rates of climb which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	RATE OF CLIMB - FPM				
		-40°C	-20°C	0°C	20°C	40°C
8750	SL	1000	980	960	940	705
	2000	980	960	935	910	570
	4000	960	935	910	795	435
	6000	935	905	880	650	305
	8000	910	880	790	505	190
	10000	880	845	640	370	---
	12000	845	705	485	235	---
8300	SL	1085	1060	1040	1020	780
	2000	1065	1040	1020	995	635
	4000	1040	1015	990	870	495
	6000	1015	990	960	720	360
	8000	990	960	870	570	235
	10000	960	925	710	430	120
	12000	925	780	550	285	---
7800	SL	1185	1165	1145	1120	865
	2000	1165	1140	1120	1095	715
	4000	1140	1115	1090	965	565
	6000	1115	1090	1060	805	420
	8000	1090	1060	965	645	295
	10000	1060	1025	795	500	175
	12000	1025	870	630	350	---
7300	SL	1300	1275	1255	1235	960
	2000	1275	1255	1230	1205	800
	4000	1255	1230	1205	1065	645
	6000	1230	1200	1170	900	490
	8000	1200	1170	1070	730	355
	10000	1170	1135	890	575	230
	12000	1135	970	715	415	---

Figure 5-29. Cruise Climb - Flaps Up - 115 KIAS

(WITHOUT CARGO POD)

RATE OF CLIMB - BALKED LANDING

FLAPS 30°

CONDITIONS:
Takeoff Power
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Do not exceed torque limit for takeoff per ENGINE TORQUE FOR TAKEOFF chart. When ITT exceeds 765°C, this power setting is time limited to 5 minutes.**
2. With climb power set below the torque limit, decrease rate of climb by 15 fpm for inertial separator set in BYPASS and 45 fpm for cabin heat on.
3. Where rate of climb values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those rates of climb which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
8500	SL	83	830	810	785	765
	2000	82	805	785	760	700
	4000	81	780	755	735	620
	6000	80	755	730	700	525
	8000	79	725	695	590	410
	10000	78	695	630	470	---
	12000	77	645	505	350	---
8000	SL	82	920	900	880	860
	2000	81	900	875	855	790
	4000	80	875	850	825	705
	6000	79	845	820	795	610
	8000	78	820	790	675	490
	10000	77	785	720	555	---
	12000	76	735	595	435	---
7500	SL	81	1020	1000	980	960
	2000	80	1000	980	955	890
	4000	79	975	950	930	805
	6000	78	950	925	900	705
	8000	77	920	890	775	580
	10000	75	890	820	650	---
	12000	74	840	690	520	---
7000	SL	80	1135	1115	1095	1075
	2000	79	1115	1095	1070	1005
	4000	78	1090	1065	1045	915
	6000	77	1065	1040	1010	810
	8000	75	1035	1005	885	680
	10000	74	1000	930	750	---
	12000	73	950	795	620	---

Figure 5-30. Rate of Climb - Balked Landing

(WITHOUT CARGO POD)

TIME, FUEL, AND DISTANCE TO CLIMB

MAXIMUM RATE OF CLIMB

CONDITIONS:
Flaps Up
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
2. Add 35 pounds of fuel for engine start, taxi and takeoff allowance.
3. Distances shown are based on zero wind.
4. With inertial separator set in BYPASS, increase time, fuel, and distance numbers by 1% for each 2000 feet of climb and for cabin heat on, increase time, fuel, and distance numbers by 1% for each 1000 feet of climb.
5. Where time, fuel, and distance values have been replaced by dashes, an appreciable rate of climb for the weight shown cannot be expected.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
			CLIMB FROM SEA LEVEL								
			TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM
8750	SL	104	0	0	0	0	0	0	0	0	0
	4000	104	4	30	7	4	31	8	5	35	10
	8000	104	8	60	15	9	62	16	11	74	22
	12000	101	13	92	24	14	98	27	19	119	38
	16000	95	19	128	34	21	140	42	31	177	62
	20000	87	26	173	50	33	198	65	54	280	111
	24000	78	0	0	0	---	---	---	---	---	---
8300	SL	103	0	0	0	0	0	0	0	0	0
	4000	103	4	27	7	4	28	7	5	32	9
	8000	103	8	55	14	8	57	14	10	66	19
	12000	100	12	84	21	13	89	24	17	106	34
	16000	94	17	116	31	19	126	37	27	154	53
	20000	86	24	155	44	29	173	56	43	227	88
	24000	77	36	213	69	46	252	92	---	---	---
7800	SL	101	0	0	0	0	0	0	0	0	0
	4000	101	4	25	6	4	26	6	4	28	8
	8000	101	7	50	12	7	52	13	9	59	17
	12000	98	11	76	19	12	80	21	15	93	29
	16000	91	15	104	27	17	112	32	23	133	45
	20000	83	21	138	38	25	151	47	35	187	70
	24000	73	31	184	57	38	208	73	---	---	---
7300	SL	99	0	0	0	0	0	0	0	0	0
	4000	99	3	23	5	3	23	5	4	25	7
	8000	99	6	45	11	7	47	11	8	52	15
	12000	96	10	69	17	10	72	19	13	81	25
	16000	88	14	94	24	15	100	28	20	115	38
	20000	80	19	123	34	22	133	40	29	158	57
	24000	69	27	161	49	32	177	60	47	227	93

Figure 5-31. Time, Fuel, and Distance to Climb - (Sheet 1 of 2)

(WITHOUT CARGO POD)

TIME, FUEL, AND DISTANCE TO CLIMB

CRUISE CLIMB - 115 KIAS

CONDITIONS:
Flaps Up
1900 RPM
Inertial Separator - Normal

NOTES:

1. **Torque set at 1865 foot-pounds or lesser value must not exceed maximum climb ITT of 765°C or N_g of 101.6%.**
2. Add 35 pounds of fuel for engine start, taxi, and takeoff allowance.
3. Distances shown are based on zero wind.
4. With inertial separator set in BYPASS or cabin heat on, increase time, fuel, and distance numbers by 1% for each 1000 feet of climb.

WEIGHT LBS	PRESS ALT FT	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
		CLIMB FROM SEA LEVEL								
		TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM
8750	SL	0	0	0	0	0	0	0	0	0
	2000	2	15	4	2	16	4	3	18	5
	4000	4	31	8	4	32	9	6	38	11
	6000	7	47	13	7	48	13	9	58	18
	8000	9	63	17	9	65	18	12	80	26
	10000	11	79	22	12	84	24	17	105	36
	12000	14	96	27	15	104	32	22	134	48
8300	SL	0	0	0	0	0	0	0	0	0
	2000	2	14	4	2	15	4	2	17	5
	4000	4	28	8	4	29	8	5	34	10
	6000	6	43	12	6	44	12	8	53	16
	8000	8	57	16	8	60	17	11	72	24
	10000	10	72	20	11	76	22	15	94	32
	12000	12	88	25	14	94	29	19	119	43
7800	SL	0	0	0	0	0	0	0	0	0
	2000	2	13	3	2	13	4	2	15	4
	4000	4	26	7	4	27	7	5	31	9
	6000	5	39	11	6	40	11	7	47	15
	8000	7	52	14	8	54	15	10	65	21
	10000	9	66	18	10	69	20	13	84	29
	12000	11	80	23	12	85	26	17	106	38
7300	SL	0	0	0	0	0	0	0	0	0
	2000	2	12	3	2	12	3	2	14	4
	4000	3	24	6	3	24	7	4	28	8
	6000	5	35	10	5	37	10	6	42	13
	8000	7	47	13	7	49	14	9	58	19
	10000	8	60	17	9	62	18	12	75	26
	12000	10	72	21	11	77	23	15	94	33

Figure 5-31. Time, Fuel, and Distance to Climb - (Sheet 2 of 2)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE

NOTES

The following general information is applicable to all Cruise Performance Charts contained in Figure 5-32, Sheet 2 through Sheet 13, in this section.

1. The highest torque shown for each temperature and RPM corresponds to maximum allowable cruise power. Do not exceed this torque, 740°C ITT, or 101.6% Ng, whichever occurs first.
2. The lowest torque shown for each temperature and RPM corresponds to the recommended torque setting for best range in zero wind conditions.
3. With the inertial separator in BYPASS and power set below the torque limit (1865 foot-pounds), decrease the maximum cruise torque by 115 foot-pounds. Do not exceed 740°C ITT. Fuel flow for a given torque setting will be 15 pph higher.
4. With the cabin heat on and power set below the torque limit (1865 foot-pounds), decrease maximum cruise torque by 80 foot-pounds. Do not exceed 740°C ITT. Fuel flow for a given torque setting will be 7 pph higher.

Figure 5-32. Cruise Performance (Sheet 1 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 2000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
45	1254	346	154	1343	346	154	1435	346	152
40	1369	362	160	1464	362	159	1563	362	157
				1460	361	159	1540	359	156
30	1590	393	169	1696.	393	168	1804	393	166
	1400	363	160	1500	364	159	1600	363	157
	1390	362	159	1450	357	157	1530	354	155
20	1800	424	176	1916	424	175	1970	414	170
	1600	392	168	1800	406	171	1800	389	164
	1400	361	158	1600	375	162	1600	360	156
	1375	357	157	1440	351	155	1510	348	152
10	1865	432	177	1970	429	175	1970	410	168
	1700	405	170	1800	402	169	1800	385	162
	1500	374	161	1600	372	161	1600	357	155
	1380	355	156	1430	347	153	1495	343	150
0	1865	429	175	1970	425	173	1970	406	167
	1700	402	168	1800	399	167	1800	381	161
	1500	371	160	1600	369	159	1600	353	153
	1380	352	154	1415	342	151	1480	337	148
-10	1866	426	173	1970	422	171	1970	402	165
	1700	399	166	1800	395	165	1800	378	159
	1500	368	158	1600	366	157	1600	350	151
	1370	348	152	1405	337	148	1460	331	146
-20	1865	423	171	1970	418	169	1970	398	163
	1700	396	164	1800	392	163	1800	374	157
	1500	365	156	1600	362	155	1600	346	150
	1375	347	150	1400	334	147	1455	326	144
				1390	332	146			
-30	1865	421	168	1970	414	167	1970	395	161
	1700	394	162	1800	389	161	1800	370	156
	1500	363	154	1600	359	153	1600	342	148
	1360	342	147	1400	331	145	1450	322	142
				1380	328	144			
-40	1865	419	166	1970	412	165	1970	391	159
	1700	391	160	1800	386	159	1800	367	154
	1500	361	152	1600	356	151	1600	339	146
	1355	339	145	1400	328	143	1435	316	139
				1380	325	142			
-50	1865	417	164	1970	410	163	1970	387	157
	1700	389	158	1800	382	157	1800	363	152
	1500	358	150	1600	353	149	1600	335	144
	1360	337	143	1400	325	141	1415	311	137
				1375	321	140			
-54	1865	417	163	1970	409	162	1970	385	156
	1700	388	157	1800	381	156	1800	361	151
	1500	358	149	1600	362	148	1600	334	143
	1360	336	142	1400	324	140	1410	309	136
				1375	320	139			

Figure 5-32. Cruise Performance (Sheet 2 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 4000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
40	1255	335	156	1342	335	156	1433	335	154
30	1466	365	167	1564	365	166	1664	365	163
	1350	347	161	1395	340	157	1500	341	156
							1480	338	155
20	1667	395	175	1775	395	173	1883	395	170
	1500	368	167	1600	368	166	1700	367	163
	1330	342	158	1395	336	156	1500	338	155
							1465	333	153
10	1864	426	181	1970	424	179	1970	405	172
	1700	398	174	1800	396	172	1800	378	166
	1500	365	165	1600	365	164	1600	349	158
	1320	337	156	1400	334	155	1445	327	151
				1380	331	154			
0	1865	424	179	1970	421	177	1970	400	170
	1700	395	172	1800	393	171	1800	375	164
	1500	363	163	1600	361	162	1600	346	156
	1325	335	154	1400	331	153	1430	322	148
				1365	326	151			
-10	1865	422	177	1970	418	175	1970	396	168
	1700	392	170	1800	389	169	1800	371	162
	1500	360	161	1600	358	161	1600	342	155
	1320	332	153	1400	329	151	1415	316	146
				1355	322	149			
-20	1865	420	175	1970	416	173	1970	392	167
	1700	390	168	1800	386	167	1800	368	161
	1500	358	159	1600	355	159	1600	339	153
	1310	329	150	1400	326	150	1395	311	144
				1340	317	147			
-30	1865	418	172	1970	413	171	1970	389	165
	1700	387	166	1800	382	165	1800	364	159
	1500	355	157	1600	352	157	1600	336	151
	1300	324	147	1400	323	148	1395	307	142
				1325	312	144			
-40	1865	416	170	1970	410	169	1970	386	163
	1700	385	164	1800	379	163	1800	361	157
	1500	353	155	1600	350	155	1600	332	149
	1295	322	145	1400	320	146	1400	305	141
				1330	310	143	1380	302	140
-50	1865	415	168	1970	408	166	1970	383	161
	1700	384	162	1800	377	161	1800	357	155
	1500	351	153	1600	347	153	1600	328	147
	1300	320	144	1400	317	144	1400	301	139
				1320	306	140	1355	296	137
-54	1866	414	167	1970	407	165	1970	382	160
	1700	383	161	1800	376	160	1800	356	154
	1500	350	152	1600	346	152	1600	327	147
	1305	320	143	1400	316	143	1400	300	138
				1320	305	140	1360	295	137

Figure 5-32. Cruise Performance (Sheet 3 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 6000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM TORQUE FT-LBS	1900 RPM FUEL FLOW PPH	1900 RPM KTAS	1750 RPM TORQUE FT-LBS	1750 RPM FUEL FLOW PPH	1750 RPM KTAS	1600 RPM TORQUE FT-LBS	1600 RPM FUEL FLOW PPH	1600 RPM KTAS
35	1248	324	159	1333	324	158	1421	324	155
30	1346	338	164	1436	338	163	1529	338	160
	1305	332	161	1355	326	158	1440	325	156
20	1538	367	172	1638	367	171	1737	367	168
	1400	344	165	1500	345	165	1600	346	162
	1295	328	159	1345	322	156	1425	320	154
10	1725	396	179	1833	396	177	1940	396	174
	1600	375	174	1700	374	172	1800	373	169
	1400	342	164	1500	342	163	1600	342	161
	1275	322	157	1340	318	155	1405	314	152
0	1865	422	183	1970	420	181	1970	398	174
	1700	389	176	1800	387	174	1800	369	167
	1500	356	167	1600	355	166	1600	339	159
	1300	324	156	1400	324	156	1400	311	150
	1265	318	154	1330	314	153	1390	309	150
-10	1865	420	181	1970	417	179	1970	395	172
	1700	387	174	1800	385	172	1800	365	166
	1500	353	165	1600	352	164	1600	336	158
	1300	322	155	1400	321	155	1400	308	148
	1270	317	153	1310	308	150	1375	303	147
-20	1865	418	179	1970	414	177	1970	391	170
	1700	386	172	1800	382	171	1800	362	164
	1500	351	163	1600	349	162	1600	333	156
	1300	319	153	1400	318	153	1400	304	147
	1255	312	150	1300	304	148	1355	298	145
-30	1865	416	177	1970	412	175	1970	388	168
	1700	384	170	1800	379	169	1800	359	162
	1500	348	161	1600	346	160	1600	330	154
	1300	317	151	1400	316	151	1400	301	145
	1260	311	149	1290	299	145	1350	294	143
-40	1865	414	174	1970	409	172	1970	385	166
	1700	382	168	1800	377	166	1800	356	160
	1500	346	159	1600	343	158	1600	326	153
	1300	315	149	1400	313	149	1400	298	144
	1245	307	146	1275	295	143	1340	289	141
-50	1865	412	172	1970	406	170	1970	382	164
	1700	381	165	1800	375	164	1800	353	158
	1500	344	157	1600	340	156	1600	323	151
	1300	313	147	1400	310	148	1400	295	142
	1255	306	145	1275	292	141	1325	284	138
-54	1865	411	171	1970	405	169	1970	381	163
	1700	380	165	1800	374	163	1800	352	157
	1500	343	156	1600	339	155	1600	322	150
	1300	312	146	1400	309	147	1400	294	141
	1255	305	144	1265	290	140	1315	282	137

Figure 5-32 Cruise Performance (Sheet 4 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 8000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM TORQUE FT-LBS	1900 RPM FUEL FLOW PPH	1900 RPM KTAS	1750 RPM TORQUE FT-LBS	1750 RPM FUEL FLOW PPH	1750 RPM KTAS	1600 RPM TORQUE FT-LBS	1600 RPM FUEL FLOW PPH	1600 RPM KTAS
30	1215	311	159	1297	311	158	1382	311	155
20	1397	338	169	1488	338	167	1579	338	164
	1260	316	161	1305	309	157	1400	310	155
							1385	308	154
10	1571	364	176	1670	364	174	1767	364	171
	1400	336	167	1500	337	166	1600	337	164
	1245	311	158	1295	305	155	1400	308	154
							1375	303	152
0	1743	397	182	1852	396	180	1957	396	177
	1600	368	176	1700	367	174	1800	367	171
	1400	334	165	1500	334	165	1600	334	162
	1235	307	156	1300	303	154	1400	304	153
				1290	301	153	1355	298	150
-10	1865	419	185	1970	416	183	1970	395	176
	1700	386	178	1800	384	176	1800	363	169
	1500	348	169	1600	347	168	1600	331	161
	1300	315	158	1400	315	158	1400	302	151
	1225	303	153	1275	297	151	1335	293	148
-20	1865	416	183	1970	414	181	1970	392	174
	1700	384	176	1800	382	174	1800	360	167
	1500	345	167	1600	344	166	1600	328	159
	1300	313	156	1400	313	156	1400	299	150
	1225	301	152	1265	293	149	1320	287	145
-30	1865	414	181	1970	411	179	1970	388	172
	1700	382	174	1800	379	172	1800	357	166
	1500	343	165	1600	341	164	1600	325	157
	1300	311	154	1400	310	155	1400	296	148
	1220	298	150	1250	288	146	1305	282	143
-40	1865	412	178	1970	408	176	1970	385	170
	1700	380	172	1800	376	170	1800	355	164
	1500	342	163	1600	339	162	1600	322	156
	1300	309	152	1400	307	153	1400	293	147
	1225	297	149	1230	282	143	1300	278	141
-50	1865	410	176	1970	405	174	1970	382	168
	1700	379	169	1800	374	168	1800	352	162
	1500	341	161	1600	337	160	1600	319	154
	1300	307	151	1400	305	151	1400	290	145
	1205	292	145	1230	280	142	1275	272	139
-54	1865	409	175	1970	404	173	1970	381	167
	1700	378	168	1800	373	167	1800	351	161
	1500	340	160	1600	337	159	1600	317	153
	1300	306	150	1400	304	150	1400	289	144
	1210	292	144	1230	279	141	1270	271	138

Figure 5-32. Cruise Performance (Sheet 5 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 10000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
25	1182	298	159	1261	298	158	1341	298	155
20	1266	310	164	1349	310	163	1433	310	159
	1235	306	162	1290	301	159	1355	299	155
10	1426	334	172	1516	334	170	1606	334	167
	1300	314	165	1400	316	164	1500	318	162
	1235	303	160	1280	297	157	1355	295	154
0	1586	364	179	1685	364	177	1782	364	174
	1400	328	169	1500	330	168	1600	330	165
	1220	298	158	1300	298	167	1400	299	155
				1265	292	155	1340	290	152
-10	1745	394	184	1854	394	182	1957	394	179
	1600	365	178	1700	365	176	1800	364	173
	1400	326	167	1500	326	166	1600	326	164
	1205	294	155	1300	295	155	1400	296	154
				1260	289	153	1330	286	150
-20	1865	416	187	1970	413	184	1970	393	177
	1700	383	180	1800	381	178	1800	361	171
	1500	343	171	1600	343	169	1600	324	162
	1300	308	160	1400	307	160	1400	294	152
	1195	290	153	1245	284	151	1310	280	148
-30	1865	413	185	1970	410	182	1970	389	175
	1700	381	178	1800	379	176	1800	357	169
	1500	342	169	1600	341	168	1600	321	161
	1300	305	158	1400	305	158	1400	291	151
	1195	288	152	1230	279	148	1280	274	145
-40	1865	411	183	1970	408	180	1970	385	173
	1700	379	176	1800	376	174	1800	354	167
	1500	340	167	1600	338	166	1600	319	159
	1300	303	156	1400	302	156	1400	288	149
	1190	286	150	1220	275	146	1275	270	143
-50	1865	410	180	1970	406	178	1970	381	171
	1700	377	173	1800	373	172	1800	352	165
	1500	339	164	1600	336	164	1600	316	157
	1300	301	154	1400	300	154	1400	285	148
	1200	285	148	1215	272	144	1265	265	141
-54	1865	409	179	1970	405	177	1970	380	170
	1700	377	173	1800	372	171	1800	351	164
	1500	338	163	1600	335	163	1600	316	156
	1300	300	153	1400	299	153	1400	284	147
	1190	283	147	1205	270	142	1255	263	140

Figure 5-32. Cruise Performance (Sheet 6 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 12000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
20	1138	284	158	1213	284	156	1290	284	153
10	1287	306	167	1369	306	165	1452	306	162
	1220	295	163	1275	291	160	1340	289	155
0	1437	333	175	1527	333	173	1615	333	169
	1300	306	167	1400	309	166	1500	311	163
	1215	293	161	1260	286	157	1340	286	154
-10	1586	361	181	1684	361	179	1778	361	175
	1400	324	171	1500	326	170	1600	327	167
	1205	288	159	1300	290	158	1400	292	156
				1255	283	156	1330	281	152
-20	1708	384	185	1815	384	182	1915	384	179
	1600	362	180	1700	362	178	1800	362	175
	1400	323	169	1500	324	168	1600	324	165
	1200	286	157	1300	288	157	1400	290	155
	1190	285	156	1240	278	153	1305	275	150
-30	1835	409	188	1947	409	186	1970	391	179
	1700	380	182	1800	378	180	1800	359	173
	1500	341	172	1600	341	171	1600	321	164
	1300	302	161	1400	302	161	1400	287	154
	1185	281	154	1230	274	151	1280	269	147
-40	1865	414	187	1970	411	184	1970	388	177
	1700	378	180	1800	376	178	1800	355	171
	1500	339	170	1600	338	169	1600	319	162
	1300	300	159	1400	300	159	1400	284	152
	1180	278	152	1210	269	148	1260	263	144
-50	1865	412	184	1970	409	182	1970	384	175
	1700	376	178	1800	373	176	1800	352	169
	1500	338	168	1600	336	167	1600	316	160
	1300	299	158	1400	299	157	1400	281	151
	1170	275	149	1200	265	146	1250	259	142
-54	1865	411	183	1970	408	181	1970	383	174
	1700	376	177	1800	372	175	1800	351	168
	1500	337	167	1600	335	166	1600	315	160
	1300	299	157	1400	298	157	1400	280	150
	1165	274	148	1200	265	145	1240	256	141
				1190	262	144			

Figure 5-32. Cruise Performance (Sheet 7 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 14000 FEET

CONDITIONS:
8750 POUNDS
INERTIAL SEPARATOR - NORMAL

NOTE
DO NOT EXCEED MAXIMUM CRUISE TORQUE OR 740 DEG C ITT

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP DEG C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
15	1087	270	155	1159	270	153	1232	270	149
10	1157	280	161	1232	280	159	1307	280	155
0	1297	304	170	1379	304	168	1460	304	164
	1210	287	164	1265	283	160	1335	282	156
-10	1434	330	177	1523	330	174	1610	330	171
	1300	303	168	1400	306	167	1500	309	165
	1190	281	161	1235	276	157	1325	277	154
-20	1553	352	181	1649	352	179	1741	352	175
	1400	322	173	1500	323	172	1600	325	169
	1200	282	160	1300	285	160	1400	287	158
	1175	277	158	1235	273	156	1315	272	153
-30	1666	374	185	1768	374	182	1865	374	179
	1500	340	176	1600	340	175	1700	341	172
	1300	300	165	1400	302	164	1500	303	162
	1160	273	156	1225	269	153	1300	269	150
							1285	266	150
-40	1790	400	188	1899	399	186	1970	393	181
	1600	358	179	1700	357	177	1800	357	174
	1400	319	169	1500	319	168	1600	319	165
	1200	280	156	1300	281	157	1400	283	155
	1150	269	153	1210	264	151	1270	261	147
-50	1865	413	189	1970	411	186	1970	389	179
	1700	378	182	1800	376	180	1800	353	172
	1500	336	172	1600	335	171	1600	316	163
	1300	298	161	1400	298	161	1400	281	153
	1125	264	150	1200	261	149	1245	254	144
-54	1865	412	188	1970	409	185	1970	387	178
	1700	378	181	1800	376	179	1800	352	171
	1500	336	171	1600	335	170	1600	316	163
	1300	297	160	1400	297	160	1400	280	153
	1120	262	148	1200	260	148	1240	253	144
				1185	257	147			

Figure 5-32. Cruise Performance (Sheet 8 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 16,000 FEET

CONDITIONS:
8750 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
10	1039	256	152	1107	256	149	1176	256	144
0	1169	277	163	1243	277	161	1317	277	157
	1160	275	162	1235	275	160	1315	276	157
-10	1293	301	171	1374	301	169	1453	301	165
	1145	271	160	1215	269	157	1300	271	155
-20	1407	322	177	1494	322	174	1579	322	171
	1300	301	170	1300	284	163	1400	288	160
	1130	266	157	1200	265	155	1285	266	153
-30	1510	342	181	1604	342	178	1693	341	175
	1400	319	175	1400	302	167	1500	304	165
	1200	279	161	1200	263	154	1300	266	153
	1115	262	155	1185	260	153	1265	260	150
-40	1622	365	185	1721	365	182	1813	364	179
	1500	338	178	1600	339	176	1700	340	174
	1300	298	167	1400	300	166	1500	301	163
	1095	257	152	1200	262	153	1300	265	151
				1170	255	150	1245	254	148
-50	1737	387	188	1842	386	185	1941	386	182
	1600	359	181	1700	358	179	1800	358	176
	1400	316	171	1500	316	169	1600	316	167
	1200	277	158	1300	279	158	1400	281	156
	1075	252	149	1145	250	147	1225	249	145

Figure 5-32. Cruise Performance (Sheet 9 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 18,000 FEET

CONDITIONS:
8750 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
-5	1109	263	160	1179	263	157	1249	263	152
-15	1224	285	168	1300	285	166	1375	285	162
	1110	262	159	1170	260	155	1275	266	154
-25	1320	303	174	1402	303	171	1482	303	167
	1200	279	165	1200	264	157	1300	268	155
	1095	258	156	1155	255	153	1260	261	152
-35	1414	322	178	1501	321	176	1586	321	172
	1300	298	171	1300	281	163	1400	284	161
	1100	258	155	1130	249	150	1225	252	148
	1085	255	154						
-45	1516	343	182	1608	342	179	1696	342	176
	1400	317	175	1500	319	174	1500	300	166
	1200	276	162	1300	279	162	1300	264	153
	1070	251	151	1130	247	149	1210	247	146
-54	1567	351	183	1660	350	180	1752	350	177
	1400	316	174	1500	318	172	1600	319	169
	1200	275	160	1300	278	160	1400	279	158
	1065	249	150	1110	241	146	1200	244	145
							1185	241	143

Figure 5-32. Cruise Performance (Sheet 10 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 20,000 FEET

CONDITIONS:
8750 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
-10	1043	249	154	1109	248	150	1173	248	143
-20	1148	268	164	1219	268	161	1289	268	156
	1130	264	162	1200	264	159			
-30	1235	284	170	1311	284	167	1386	284	163
	1115	260	160	1200	263	158	1285	265	155
				1180	259	157			
-40	1321	302	175	1403	302	172	1482	302	168
	1200	276	166	1200	261	157	1300	265	155
	1095	255	157	1145	250	153	1265	258	153
-50	1415	321	179	1500	320	176	1582	320	172
	1300	296	172	1300	278	164	1400	281	161
	1100	255	156	1140	248	151	1235	250	149
	1080	251	154						
-54	1409	319	178	1494	318	175	1578	318	172
	1300	296	171	1300	277	163	1400	280	161
	1100	255	155	1135	245	150	1230	249	149
	1075	250	153						

Figure 5-32. Cruise Performance (Sheet 11 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 22,000 FEET

CONDITIONS:
8300 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
-25	1071	251	162	1138	251	159	1204	250	154
-35	1151 1060	266 247	169 160	1223 1125	266 246	166 157	1294 1220	266 251	161 155
-45	1234 1100 1045	283 254 243	174 163 157	1310 1200 1095	283 259 239	171 163 154	1385 1205	283 246	167 153
-54	1268 1100 1035	290 253 240	175 161 156	1346 1200 1085	289 258 235	172 162 152	1425 1300 1175	289 263 238	168 160 150

Figure 5-32. Cruise Performance (Sheet 12 of 13)

(WITHOUT CARGO POD)

CRUISE PERFORMANCE

PRESSURE ALTITUDE 24,000 FEET

CONDITIONS:
7800 Pounds
Inertial Separator - Normal

NOTE
Do not exceed maximum cruise torque or 740°C ITT.

REFER TO SHEET 1 FOR APPROPRIATE NOTES APPLICABLE TO THIS CHART

TEMP °C	1900 RPM			1750 RPM			1600 RPM		
	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS	TORQUE FT-LBS	FUEL FLOW PPH	KTAS
-30	999	234	162	1062	234	158	1125	234	153
-40	1074 990	249 232	168 160	1141 1050	249 230	165 157	1208 1145	249 236	161 155
-50	1149 1000 990	265 232 230	173 159 159	1219 1100 1040	264 238 227	170 160 155	1289 1135	264 232	166 154
-54	1142 1000 985	263 232 228	172 159 157	1214 1100 1025	263 238 223	169 160 153	1285 1130	262 230	165 153

Figure 5-32. Cruise Performance (Sheet 13 of 13)

(WITHOUT CARGO POD)

FUEL AND TIME REQUIRED

MAXIMUM CRUISE POWER
40-200 NM

CONDITIONS:
8750 Pounds
1900 RPM
Inertial Separator - Normal
Standard Temperature

NOTES:

1. Fuel required includes the fuel used for engine start, taxi, takeoff, maximum climb from sea level, descent to sea level and 45 minutes reserve. Time required includes the time during a maximum climb and descent.
2. With inertial separator in BYPASS increase time by 4% and fuel by 2%, or with cabin heat on, increase time by 3% and fuel by 2%.

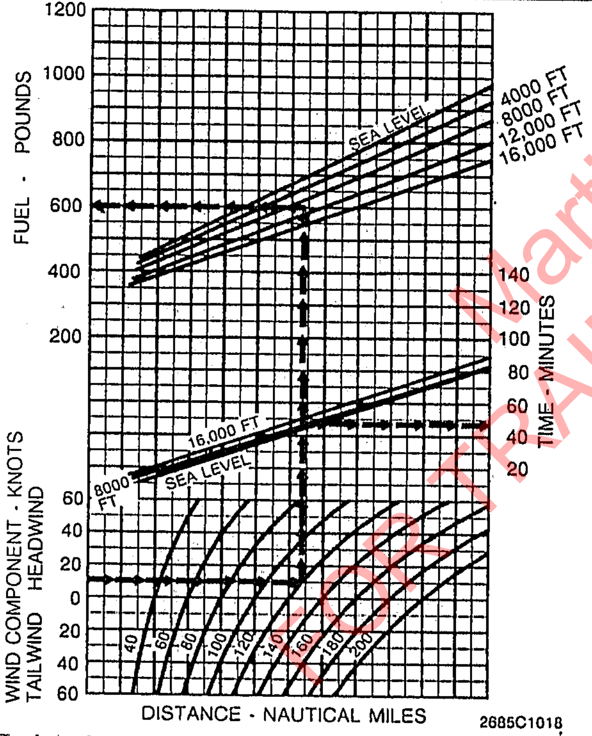


Figure 5-33. Fuel And Time Required - Maximum Cruise Power (Sheet 1 of 2)

(WITHOUT CARGO POD)

FUEL AND TIME REQUIRED

MAXIMUM CRUISE POWER
200-1000 NM

CONDITIONS:
8750 Pounds
1900 RPM
Inertial Separator - Normal
Standard Temperature

NOTES:

1. Fuel required includes the fuel used for engine start, taxi, takeoff, maximum climb from sea level, descent to sea level and 45 minutes reserve. Time required includes the time during a maximum climb and descent.
2. With inertial separator in BYPASS, increase time by 5% and fuel by 2%, or with cabin heat on, increase time by 4% and fuel by 3%.

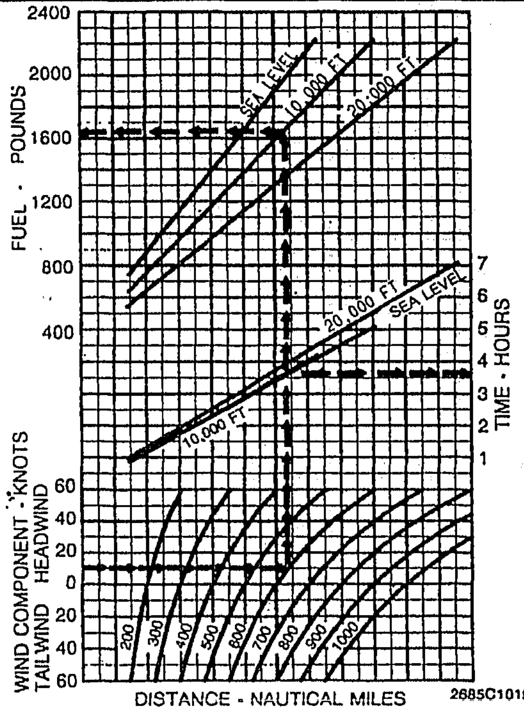


Figure 5-33. Fuel And Time Required - Maximum Cruise Power (Sheet 2 of 2)

(WITHOUT CARGO POD)

FUEL AND TIME REQUIRED

MAXIMUM RANGE POWER
40-200 NM

CONDITIONS:
8750 Pounds
1900 RPM
Inertial Separator - Normal
Standard Temperature

NOTES:
1. Fuel required includes the fuel used for engine start, taxi, takeoff, maximum climb from sea level, descent to sea level and 45 minutes reserve. Time required includes the time during a maximum climb and descent.
2. With inertial separator in BYPASS, increase time by 1% and fuel by 2%, or with cabin heat on, increase time by 1% and fuel by 3%.

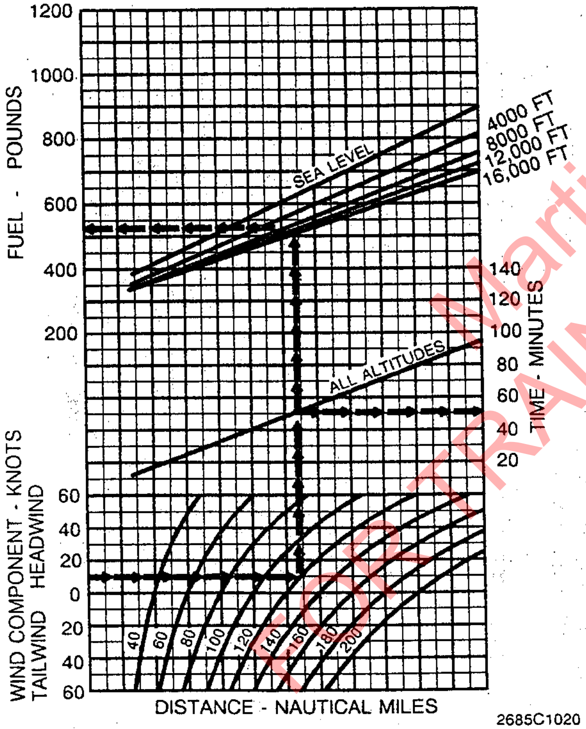


Figure 5-34. Fuel And Time Required - Maximum Range Power (Sheet 1 of 2)

(WITHOUT CARGO POD)

FUEL AND TIME REQUIRED

MAXIMUM RANGE POWER
200-1000 NM

CONDITIONS:
8750 Pounds
1900 RPM
Inertial Separator - Normal
Standard Temperature

NOTES:
1. Fuel required includes the fuel used for engine start, taxi, takeoff, maximum climb from sea level, descent to sea level and 45 minutes reserve. Time required includes the time during a maximum climb and descent.
2. With inertial separator in BYPASS, increase time by 1% and fuel by 2%, or with cabin heat on, increase time by 1% and fuel by 3%.

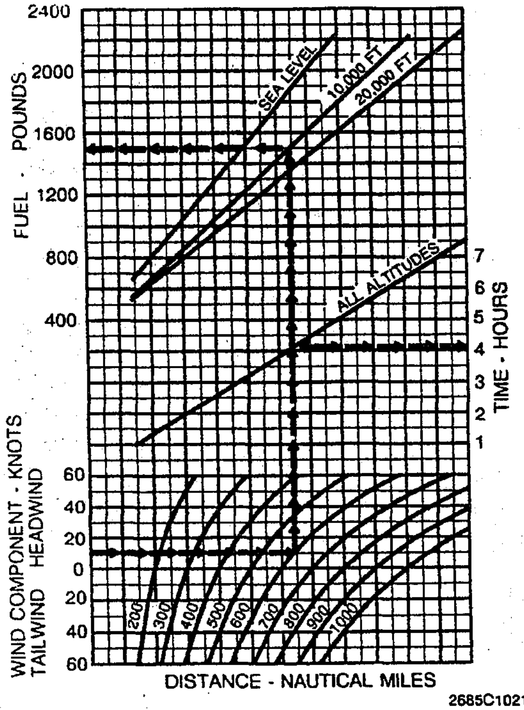


Figure 5-34. Fuel And Time Required - Maximum Range Power (Sheet 2 of 2)

(WITHOUT CARGO POD)

RANGE PROFILE

45 MINUTES RESERVE

2224 POUNDS USABLE FUEL

CONDITIONS:
8750 Pounds
1900 RPM
Standard Temperature
Zero Wind
Inertial Separator - Normal

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff, climb and descent. The distance during a maximum climb and the distance during descent are included.
2. With the inertial separator in BYPASS, decrease range by 2%, or with cabin heat on, decrease range by 3%.

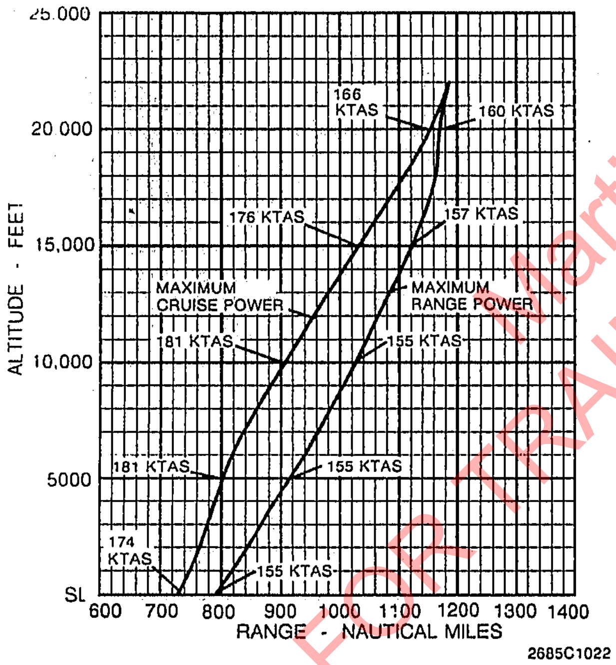


Figure 5-35. Range Profile

(WITHOUT CARGO POD)

ENDURANCE PROFILE

45 MINUTES RESERVE

2224 POUNDS USABLE FUEL

CONDITIONS:
8750 Pounds
1900 RPM
Standard Temperature
Inertial Separator - Normal

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff, climb and descent. The time during a maximum climb and the time during descent are included.
2. With the inertial separator in BYPASS, decrease endurance by 2%, or with cabin heat on, decrease endurance by 3%.

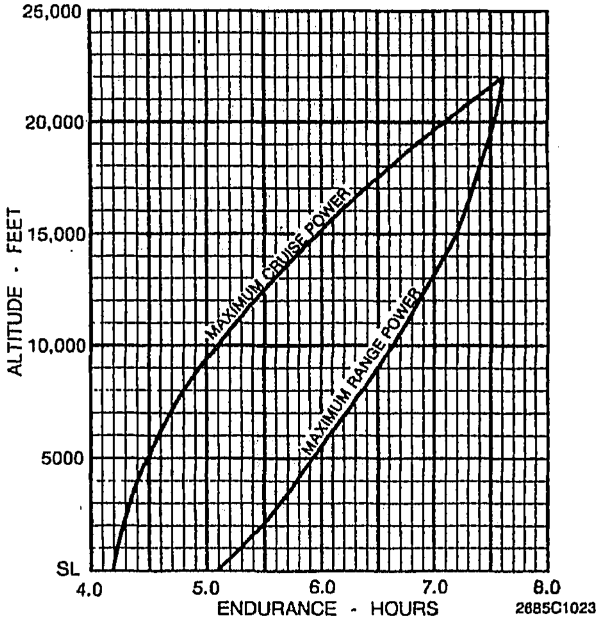


Figure 5-36. Endurance Profile

(WITHOUT CARGO POD)
TIME, FUEL, AND DISTANCE TO DESCEND

CONDITIONS:
8750 Pounds
Flaps Up
140 KIAS Above 16,000 Feet, 160 KIAS Below 16,000 Feet
Power Set for 800 FPM Rate of Descent
1900 RPM

NOTE:
Distances shown are based on zero wind.

PRESS ALT FT	DESCENT TO SEA LEVEL		
	TIME MIN	FUEL LBS	DIST NM
24,000	30	118	91
20,000	25	102	75
16,000	20	86	59
12,000	15	65	43
8,000	10	45	28
4,000	5	23	14
SL	0	0	0

Figure 5-37. Time, Fuel and Distance to Descend

(WITHOUT CARGO POD)

LANDING DISTANCE
MAXIMUM WEIGHT 8500 LBS
SHORT FIELD

CONDITIONS
Flaps 30°
Power Lever - Idle after clearing obstacles, BETA range (lever against spring) after touchdown.
Propeller Control Lever - MAX
Maximum Braking
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 40% of the "ground roll" figure.
4. If a landing with flaps up is necessary, increase the approach speed by 15 KIAS and allow for 40% longer distances.
5. Use of maximum reverse thrust after touchdown reduces ground roll by approximately 10%.
6. Where distance values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those distances which are included but the operation slightly exceeds the temperature limit are provided for interpolation purposes only.

WT LBS	SPEED AT 50 FT KIAS	PRES ALT FT	-10°C		0°C		10°C		20°C		30°C		40°C	
			GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS
8500	78	SL	870	1675	900	1725	935	1770	965	1820	1000	1865	1030	1910
		2000	935	1770	970	1820	1005	1870	1040	1920	1075	1970	1110	2020
		4000	1005	1870	1040	1925	1080	1980	1120	2035	1155	2085	1195	2140
		6000	1080	1980	1125	2040	1165	2095	1205	2150	1245	2210	1290	2265
		8000	1165	2100	1210	2160	1255	2220	1300	2280	1345	2345	1390	2405
		10000	1260	2230	1310	2295	1355	2360	1405	2425	1450	2490	---	---
		12000	1360	2365	1415	2435	1465	2505	1515	2575	1570	2645	---	--

Figure 5-38. Landing Distance (Sheet 1 of 2)

(WITHOUT CARGO POD)

LANDING DISTANCE
8000, 7500 and 7000 LBS
SHORT FIELD
REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES

WT LBS	SPEED AT 50 FT KIAS	PRES ALT FT	-10°C		0°C		10°C		20°C		30°C		40°C	
			GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS	GRD ROLL FT	TOTAL FEET TO CLEAR 50 FT OBS
8000	75	SL	815	1605	845	1650	880	1695	910	1740	940	1785	970	1830
		2000	880	1695	910	1740	945	1790	980	1835	1010	1885	1045	1930
		4000	945	1790	980	1840	1015	1890	1050	1945	1090	1995	1125	2045
		6000	1020	1895	1055	1950	1095	2000	1135	2055	1175	2110	1210	2165
		8000	1100	2005	1140	2065	1180	2120	1225	2180	1265	2235	1305	2295
		10000	1185	2130	1230	2190	1275	2250	1320	2315	1365	2375	---	---
		12000	1280	2260	1330	2325	1380	2395	1430	2460	1475	2525	---	---
7500	73	SL	765	1525	795	1570	825	1610	855	1655	885	1695	910	1740
		2000	825	1610	855	1655	885	1700	920	1745	950	1790	980	1835
		4000	885	1705	920	1750	955	1800	990	1850	1020	1895	1055	1945
		6000	955	1800	990	1855	1030	1905	1065	1955	1100	2005	1135	2055
		8000	1030	1905	1070	1960	1110	2015	1150	2070	1190	2125	1225	2180
		10000	1115	2025	1155	2080	1200	2140	1240	2200	1285	2255	---	---
		12000	1205	2150	1250	2210	1295	2275	1340	2335	1385	2395	---	---
7000	71	SL	715	1455	740	1495	770	1535	795	1575	820	1610	850	1650
		2000	770	1530	795	1575	825	1620	855	1660	885	1705	915	1745
		4000	825	1620	860	1665	890	1710	920	1755	950	1800	985	1845
		6000	890	1710	925	1760	960	1810	990	1855	1025	1905	1060	1950
		8000	960	1810	995	1865	1035	1915	1070	1965	1105	2015	1145	2070
		10000	1035	1920	1075	1975	1115	2030	1155	2085	1195	2140	---	---
		12000	1120	2040	1165	2095	1205	2155	1250	2215	1290	2275	---	---

Figure 5-38. Landing Distance (Sheet 2 of 2)

SECTION 6
WEIGHT & BALANCE/ EQUIPMENT LIST

TABLE OF CONTENTS

INTRODUCTION

This section describes the procedure for establishing the basic empty weight and moment of the airplane. Sample forms are provided for reference. Procedures for calculating the weight and moment for various operations are also provided.

In order to achieve the performance and flight characteristics which are designed into the airplane, it must be flown within approved weight and center of gravity limits. Although the airplane offers flexibility of loading, it cannot be flown with full fuel tanks and a full complement of passengers or a normal crew and both cabin and cargo pod (if installed) loading zones filled to maximum capacity. The pilot must utilize the loading flexibility to ensure the airplane does not exceed its maximum weight limits and is loaded within the center of gravity range before takeoff.

Weight is important because it is a basis for many flight and structural characteristics. As weight increases, takeoff speed must be greater since stall speeds are increased, the rate of acceleration decreases, and the required takeoff distance increases. Weight in excess of the maximum takeoff weight may be a contributing factor to an accident, especially when coupled with other factors such as temperature, field elevation, and runway conditions, all of which may adversely affect the airplane's performance. Climb, cruise, and landing performance will also be affected. Flights at excess weight are possible, and may be within the performance capability of the airplane, but loads for which the airplane was not designed may be imposed on the structure, especially during landing.

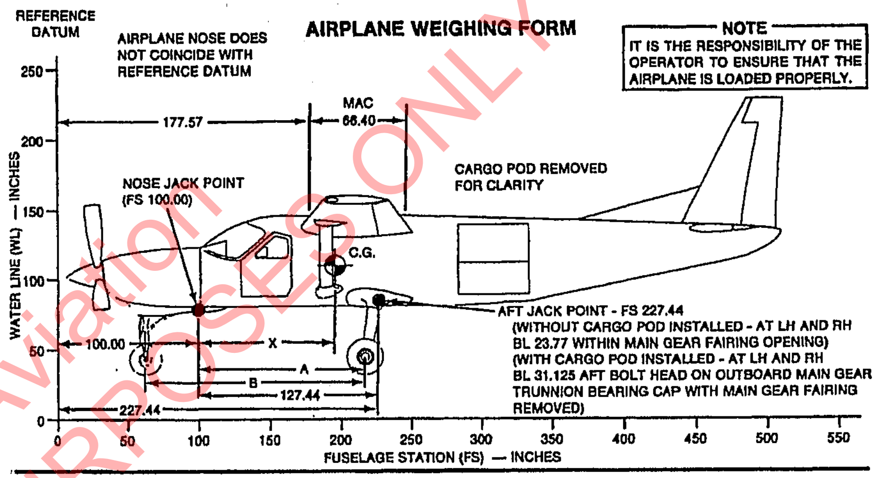
The pilot should routinely determine the balance of the airplane since it is possible to be within the maximum weight limit and still exceed the center of gravity limits. An airplane loading which exceeds the forward center of gravity limit may place heavy loads on the nose wheel, and the airplane will be slightly more difficult to rotate for takeoff or flare for landing. If the center of gravity is too far aft, the airplane may rotate prematurely on takeoff, depending on trim settings.

A properly loaded airplane, however, will perform as intended. Before the airplane is licensed, a basic empty weight, center of gravity (C.G.) and moment are computed. Specific information regarding the weight, arm, moment, and installed equipment for this airplane as delivered from the factory can be found in the plastic envelope in the back of this handbook. Using the basic empty weight and moment, the pilot can determine the weight and moment for the loaded airplane by computing the total weight and moment and then determining whether they are within the approved Center of Gravity Moment Envelope.

⚠ WARNING

It is the responsibility of the pilot to ensure that the

AIRPLANE WEIGHING FORM



LOCATING CG WITH AIRPLANE ON LANDING GEAR

FORMULA for Longitudinal CG

$$(X) = (A) - \frac{\text{(Nose Gear Net Weight)(\quad) X (B)}}{\text{Nose and Main Landing Gear Weight Totaled(\quad)}} = (\quad) \text{ Inches}$$

CG Arm of Airplane = 100 + (X) = (   ) Inches Aft of Datum

MEASURING A AND B

MEASURE A AND B PER PILOT'S OPERATING HANDBOOK INSTRUCTIONS TO ASSIST IN LOCATING CG WITH AIRPLANE WEIGHED ON LANDING GEAR

LOCATING CG WITH AIRPLANE ON JACK PADS

FORMULA for Longitudinal CG

$$\text{CG Arm of Airplane} = 227.44 - \frac{127.44 \text{ X (Nose Jack Point Net Weight)(\quad)}}{\text{Nose and Aft Jack Point Weight Totaled(\quad)}} = (\quad) \text{ Inches Aft of Datum}$$

LEVELING PROVISIONS

LONGITUDINAL — LEFT SIDE OF FUSELAGE AT FS 239.00 & 272.00
LATERAL — SEAT RAILS AFT OF PILOT AND FRONT PASSENGER SEATS

LOCATING PERCENT MAC

FORMULA for Percent MAC

$$\text{CG Percent MAC} = \frac{\text{(CG Arm of Airplane)} - 177.57}{0.6640}$$

AIRPLANE AS WEIGHED TABLE

POSITION	SCALE READING	SCALE DRIFT	TARE	NET WEIGHT
LEFT SIDE				
RIGHT SIDE				
NOSE				
AIRPLANE TOTAL AS WEIGHED				

BASIC EMPTY WEIGHT AND CENTER-OF-GRAVITY TABLE

ITEM	WEIGHT (POUNDS)	CG ARM (INCHES)	MOMENT/1000 (INCH-POUNDS)
AIRPLANE (CALCULATED OR AS WEIGHED) (INCLUDES ALL UNDRAINABLE FLUIDS AND FULL OIL)			
DRAINABLE UNUSABLE FUEL AT 6.7 POUNDS PER GALLON: S/N 208B0001 Thru 208B0089 Not Modified With SK208-52	20.1	205.7	4.1
S/N 208B0001 Thru 208B0089 Modified With SK208-52 And S/N 208B0090 And On	24.1	206.4	5.0
BASIC EMPTY WEIGHT			

Figure 6-1. Airplane Weighing Form

SAMPLE WEIGHT AND BALANCE RECORD

(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		Wt. (lb.)	Arm (In.)	Moment /1000	Wt. (lb.)	Arm (In.)	Moment /1000	Wt. (lb.)	Moment /1000
			As Delivered								

Figure 6-2. Sample Weight And Balance Record

airplane is loaded properly. Operation outside of prescribed weight and balance limitations could result in an accident and serious or fatal injury.

AIRPLANE WEIGHING PROCEDURES

1. Preparation:
   a. Remove all snow, ice or water which may be on the airplane.
   b. Inflate tires to recommended operating pressure.
   c. Lock open fuel tank sump quick-drains and fuel reservoir quick-drain to drain all fuel. Drain fuel can.
   d. Service engine oil as required to obtain a normal full indication (MAX HOT or MAX COLD, as appropriate, on dipstick).
   e. Move sliding pilot and front passenger seats to position the seat locking pins on the back legs of each seat at station 145. Aft passenger seats (if installed) have recommended fixed positions and should be located, using a station location code on the seat rails, as described in Figure 6-11. In the event the aft seats were moved to acommodate a custom loading, they should be returned to the standard locations prior to weighing.
   f. Raise flaps to fully retracted position.
   g. Place all control surfaces in neutral position.
2. Leveling:
   a. Place scales under each wheel (minimum scale capacity, 2000 pounds nose, 4000 pounds each main). The main landing gear must be supported by stands, blocks, etc., on the main gear scales to a position at least four (4) inches higher than the nose gear as it rests on an appropriate scale. This initial elevated position will compensate for the difference in waterline station between the main and nose gear so that final leveling can be accomplished solely by deflating the nose gear tire.
   b. Deflate the nose tire to properly center the bubble in the level (see Figure 6-1). Since the nose gear strut contains an oil snubber for shock absorption rather than an air/oil strut, it can not be deflated to aid in airplane leveling.
3. Weighing.:
   a. Weigh airplane in a closed hangar to avoid errors caused by air currents.
   b. With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare from each reading.
4. Measuring:
   a. Obtain measurement A by measuring horizontally (along airplane centerline) from a line stretched between the main wheel centers to a plumb bob dropped from the center of the nose jack point located below the firewall and housed within the nose strut fairing.

b. Obtain measurement B by measuring horizontally and parallel to the airplane centerline, from center of nose wheel axle, left side, to a plumb bob dropped from the line between the main wheel centers. Repeat on right side and average the measurements.

5. Using weights from item 3 and measurements from item 4, the airplane weight and C.G. can be determined.
6. Basic Empty Weight may be determined by completing Figure 6-1.

WEIGHT AND BALANCE

The following information will enable you to operate your Cessna within the prescribed weight and center of gravity limitations. To figure weight and balance, use the Sample Loading Problem, Weight and Moment Tables, and Center of Gravity Moment Envelope as follows:

Take the basic empty weight and moment from appropriate weight and balance records carried in your airplane, and enter them in the column titled YOUR AIRPLANE on the Sample Loading Problem.

NOTE

In addition to the basic empty weight and moment noted on these records, the C.G. arm (fuselage station) is also shown, but need not be used on the Sample Loading Problem. The moment which is shown must be divided by 1000 and this value used as the moment/1000 on the loading problem.

Use the Weight and Moment Tables to determine the moment/1000 for each additional item to be carried; then list these on the loading problem.

NOTE

Information on the Fuel Weight And Moment Tables is based on average fuel density at fuel temperatures of 60°F. However, fuel weight increases approximately 0.1 lb./gal. for each 25°F decrease in fuel temperature. Therefore, when environmental conditions are such that the fuel temperature is different than shown in the chart heading, a new fuel weight calculation should be made using the 0.1 lb./gal increase in fuel weight for each 25°F decrease in fuel temperature. As an example, the fuel chart for Jet A fuel indicates an average density of 6.7 lbs./gal.

Assume the tanks are completely filled and the fuel temperature is at 35°F (25°F below the 60°F noted on the chart).

Calculate the revised fuel weight by multiplying the total usable fuel by the sum of the average density (stated on chart) plus the increase in density estimated for the lower fuel temperature. In this particular sample, as shown by the calculation below, the resulting fuel weight increase due to lower fuel temperature will be 33.6 lbs. over the 2224 lbs. (for 332 gallons) shown on the chart, which might be significant in an actual loading situation:

332 gal. × (6.7 + 0.1 lbs./gal.) = 2257.6 lbs. revised fuel weight.

Then calculate the revised fuel moment. The revised moment is in direct proportion to the revised fuel weight:

$$\frac{X \text{ (revised moment)}}{453.2 \text{ (average moment)}} = \frac{2257.6 \text{ (revised weight)}}{2224 \text{ (average weight)}}$$

$$X = (453.2 \times 2257.6) \div 2224$$

The revised moment of X = 460.0. This value would be used on the Sample Loading Problem as the moment/1000 in conditions represented by this sample.

NOTE

Information on the Crew And Passenger and Cargo Weight And Moment Tables is based on the pilot and front passenger sliding seats positioned for average occupants (e.g., station 135.5), the aft passenger fixed seats (if installed) in the recommended position, and the baggage or cargo uniformly loaded around the center (e.g., station 172.0 in zone 1) of the zone fore and aft boundaries (e.g., stations 155.4 and 188.7 in zone 1) shown on the Loading Arrangements diagrams. For loadings which may differ from these, the Loading Arrangements diagrams and Sample Loading Problem lists fuselage stations for these items to indicate their forward and aft C.G. range limitations. Additional moment calculations, based on the actual weight and C.G. arm (fuselage station) of the item being loaded, must be made if the position of the load is different from that shown on the Weight And Moment Tables. For example, if seats are in any position other than stated on the Loading Arrangements diagram, the moment must be calculated by multiplying the occupant weight times the arm in inches. A point 9 inches forward of the intersection of the seat bottom and seat back (with cushions compressed) can be assumed to be the occupant C.G. For a reference in determining the arm, the forward face of the raised aft cargo floor is fuselage station 332.0.

Total the weights and moments/1000 and plot these values on the Center of Gravity Moment Envelope to determine whether the point falls within the envelope, and if the loading is acceptable.

WARNING

It is the responsibility of the pilot to ensure that the airplane is loaded properly. Operation outside of prescribed weight and balance limitations could result in an accident and serious or fatal injury.

WEIGHT AND BALANCE PLOTTER

A Weight And Balance Plotter is available to quickly determine the weight and balance of the airplane when loading cargo. If the plotter shows a marginal condition developing, or if there is a question concerning the results in any way, then a more precise weight and balance should be determined using the weight and balance procedure in this section. Instructions for use of the plotter are included on the plotter.

WEIGHT AND BALANCE RECORD (LOADING MANIFEST)

A Weight And Balance Record (Loading Manifest) is available for recording the cargo loading configuration of each flight and verifing that the airplane weight and takeoff center of gravity in terms of % MAC (Mean Aerodynamic Chord) is acceptable. A sample of this record is shown in Figure 6-3. The procedure for using this record is summarized below.

1. Enter flight date and number, point of departure and destination, and airplane indentification in spaces provided.
2. Enter weight of cargo in each cabin cargo zone in appropriate ITEM WEIGHT spaces. Total cabin cargo weights in space provided as a check that maximum allowable cabin cargo weight of 3400 pounds is not exceeded. Refer to other portions of the Pilot's Operating Handbook for additional limitations which must be observed.
3. Enter weight of cargo in cargo pod and weight of pilot and front passenger (observer).

4. Complete ITEM INDEX column for all cargo and the pilot and passenger by referring to adjacent WEIGHT INDICES listing. For each cargo or personnel weight recorded previously, read across horizontally to the vertical column having an identical weight at the top. The number shown at this intersection is the weight index for the recorded weight. As an example, 300 pounds of cargo loaded in cabin zone 1 has a weight index of 988, and this number should be entered under ITEM INDEX for cabin zone 1.

NOTE

If weight to be loaded does not match one of the weight increments provided, and a more precise weight index is needed, use the LOAD ITEM INDEX formula on the backside of the Weight And Balance Record to calculate the index. However, as shown in the sample calculation below for a 315-pound load (instead of 300 pounds) in cabin zone 1, minor weight variables do not affect the weight index significantly. The ARM used in the following calculation is the centroid of cabin zone 1 as shown on the diagram on the backside of the record.

$$\frac{315 \times (172 - 192)}{500} = -12.6$$

$$1000 - 12.6 = 987.4$$

The weight index of 987.4, when rounded to the next highest number, would still result in the 988 given in the example above for a 300-pound load.

5. Add weight of pod cargo, pilot and passenger to sub-total weight for cabin cargo and enter this value as the weight of the total payload; the sum of all item indices recorded is the item index for the total payload. For calculation purposes, enter only the last three digits of the total in the item index columns.
6. Enter basic empty weight (from airplane weight and balance information) in ITEM WEIGHT column for aircraft empty weight. Calculate weight index using the BASIC AIRPLANE INDEX formula on the backside of the Weight And Balance Record. The sample calculation below is for an airplane with a basic empty weight of 4575 pounds and a C.G. arm of 185.03.

$$\frac{4575 \times (185.03 - 192)}{500} + 500$$

$$\frac{4575 \times (-6.97)}{500} + 500 = 436.22$$

In the aircraft empty weight spaces for the airplane in this sample, a weight of 4575 and an index of 436 would be entered.

7. Add aircraft empty weight and index to payload weight and index to acquire a zero fuel weight and index. A plot of this weight and index on the adjacent chart indicates the location of the zero fuel weight center of gravity in terms of % MAC. A C.G. % MAC space is provided to enter this value. If the zero fuel weight C.G. falls well within clear area of chart envelope, the loading will likely be acceptable. However, if the C.G. at this weight falls near or within shaded area, a careful recheck of the loading and C.G. is important.
8. The weight available for takeoff fuel is the difference between zero fuel weight and takeoff weight. A FUEL INDICES table at bottom of Weight And Balance Record provides an index for the weight of fuel to be carried. The fuel weight and this index should be entered for takeoff fuel. When calculating takeoff fuel, 35 pounds of additional fuel can be allowed as taxi fuel under average conditions. A space for taxi fuel weight is provided.
9. Add takeoff fuel weight and index to zero fuel weight and index to acquire a takeoff weight and index which can be plotted to determine the takeoff C.G. location in terms of % MAC. A C.G. % MAC space is provided for this value.
10. Enter 8750 pounds as the maximum allowable takeoff weight for this airplane. The additional 35 pounds of taxi fuel provides a maximum ramp weight of 8785 pounds.

MAXIMUM STRUCTURAL WEIGHTS

MAX RAMP	8785 LBS
MAX TAKEOFF	8750 LBS
MAX LANDING	8500 LBS

INDEX FORMULAE

$$\text{BASIC AIRPLANE INDEX} = \frac{\text{WT (ARM - 192)}}{500} + 500$$

$$\text{LOAD ITEM INDEX} = \frac{\text{WT (ARM - 192)}}{500} =$$ (IF NEG SUBSTRACT FROM 1000)

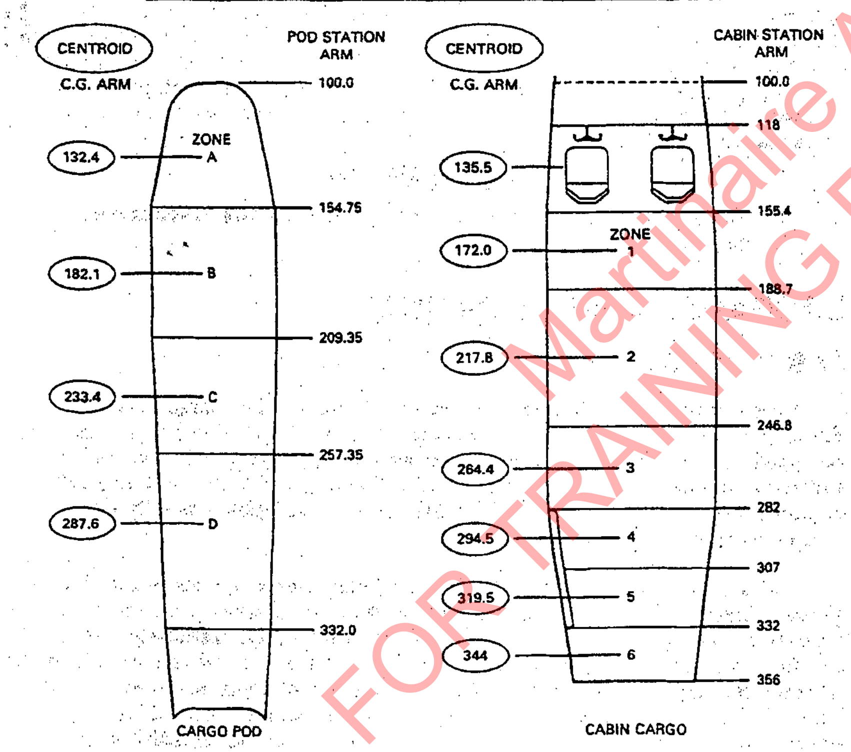


Figure 6-3. Weight And Balance Record (Loading Manifest) (Sheet 2 of 2)

CREW/PASSENGER LOADING

Six-way adjustable seats are provided for the pilot and front passenger, and these seats slide fore and aft on tracks having adjustment holes for seat position. On the Passenger Version, additional aft passenger seating is available in three types of Commuter seating and one type of Utility seating. Two types of Commuter seating is a staggered seating arrangement consisting of, two (or three) individual, fixed-position passenger seats located on the left side of the cabin, and three two-place, fixed-position, bench-type seats located on the right side. A second type of Commuter seating configuration is the same as the first, except the seats are placed in a side-by-side arrangement. A third Commuter configuration includes four individual, fixed-position passenger seats on the left side of the cabin and four individual, fixed-position passenger seats on the right side. In Utility seating, all aft passenger seats are individual, fixed-position, collapsible seats which, if removed, can be folded for storage in the aft baggage area. Four of the utility seats are located on the left side of the cabin, and four are located on the right side. Single-digit numbers (e.g., 6, 8, 0, etc.) are added to the aft seat tracks to facilitate the location of seats (or placement of cargo). The numbers 6, 8, 0, etc. represent stations 160, 180, 200, etc. A count of the one-inch spacing of the track attachment positions either forward or aft from one of these numbers will readily locate any fuselage station in the aft cabin area. Placement of the front leg plunger on Commuter and Utility seating on the station described on the Internal Cabin Loading Arrangements diagram will locate the seats at the proper station (C.G. arm).

WARNING

None of the airplane seats are approved for installation facing aft.

BAGGAGE/CARGO LOADING

CABIN CARGO AREA

Cargo may be carried in the cabin of either the Cargo Version or the Passenger Version. The cabin interior of the Cargo Version is specifically equipped for the carriage of cargo. However, after seat removal and the installation of miscellaneous equipment, the Passenger Version will also fulfill the requirements of cargo missions. The following paragraphs generally describe the cargo area of both versions.

To facilitate the carrying of large or bulky items, all aft seats (Passenger Version Only) and the front passenger seat may be removed from the airplane. If a cargo barrier and its three barrier nets are available for installation, removal of the front passenger seat may not be desired. Mission requirements will dictate whether the barrier is to be used and the number of seats removed. If seats are removed for hauling cargo and the cargo barrier and its nets added, the basic empty weight and C.G. moment of the airplane should be adjusted so that these values accurately represent the weight and moment of the airplane before loading.

To calculate the new weight and moment, refer to the airplane equipment list and acquire the weight and C.G. arm of each item of equipment to be removed or added, then record these values on Figure 6-2, Sample Weight And Balance Record, to assist in the calculation. For each item of equipment, multiply its weight by its C.G. arm to provide the moment for that item. Subtract weights of removed items (seats) and add weights of installed items (cargo barrier and its nets) to the original basic empty weight to provide a new basic empty weight. Likewise, subtract the moments of removed items and add the moments of installed items to the original moment to provide a new airplane moment. (Remember that the moment value is to be divided by 1000 to reduce the number of digits.) The new basic empty weight and moment/1000 can be used as illustrated in the Sample Loading Problem when figuring airplane loading with the selected items of equipment removed/installed.

With all seats except the pilot's seat removed, a large cabin volume is available for baggage/cargo; if a cargo barrier is installed, the total volume available for cargo behind the barrier is 340 cubic feet. Cargo can be loaded through the large, almost square, two-piece cargo door. The floor is flat from the firewall at station 100, except in the rudder pedal area, to the aft side of the cargo door (station 332), and has a 200 pound per square foot allowable loading. Strategically located nutplates are provided which will allow the installation of plywood flooring (standard equipment on Cargo Versions) for ease of loading and distribution of concentrated loads. Between stations 332 and 356, additional cargo space with a capacity of 320 pounds is provided on a raised floorboard approximately five (5) inches above the main floorboard.

In the area of the removed front passenger seat, "I" section seat tracks are installed from station 125 to 159.98, and tie-down block assemblies which clamp to the tracks can be installed to serve as tie-down attach points. From station 158 aft to the raised baggage/cargo floor, seat tracks are provided and are designed to receive quick-release tie-down fittings which can be snapped into the tracks at intervals of 1 inch. The raised baggage/cargo floor contains eight (8) anchor plates to which quick-release tie-down fittings can be attached. If rope, cable or other fittings are used for tie-downs, they should be rated at a minimum of 2100 pounds when used with all fittings noted in the table on Figure 6-10, except the double-stud quick-release tie-downs which require a 3150 pound rating. Maximum allowable cargo loads will be determined by the individual zone weight limitations and by the airplane weight and C.G. limitations. The number of tie-downs required is dependent on the load(s) to be secured. Figure 6-10 shows the maximum allowable cargo weight for each type of cargo tie-down attachment.

On Cargo Versions, the sidewalls in the cargo area are marked with vertical lines to facilitate the identification of six (6) loading zones. Markings located on the sidewalls between the lines identify each zone by number and display the maximum load which can be carried within the zones. Refer to Maximum Zone/Compartment Loadings for maximum zone weight limits.

CAUTION

The maximum load values marked in each zone are predicated on all cargo being tied down within the zones.

On Cargo Versions, a horizontal line, labeled 75%, is prominently marked along each sidewall as a loading reference. As indicated on a placard on the lower cargo door, zones forward of the last loaded zone must be at least 75% full by volume. Whenever possible, each zone should be loaded to its maximum available volume prior to loading the next zone. An additional placard located on the right sidewall between zones 5 and 6 cautions that if the load in zone 5 exceeds 400 pounds, a cargo partition net (if available) is required aft of the load or the load must be secured to the floor.

A cargo barrier and three barrier nets may be installed directly behind the pilot's and front passenger's seats. The barrier and nets preclude loose cargo from moving forward into the pilot's and front passenger's stations during an abrupt deceleration. The barrier consists of a U-shaped assembly of honeycomb composite construction. The assembly attaches to the four pilot and front passenger seat rails at the bottom at station 153 and to cabin top structure at approximately station 166. The cargo barrier nets consist of three nets: one for the left sidewall, one for the right sidewall, and one for the center. The left and right nets fill in the space between the barrier assembly and the airplane sidewalls. The side nets are fastened to the airplane sidewalls and the edge of the barrier with six (6) quick-release fasteners each, three on each side. The center net fills in the opening in the top center of the barrier. The center net is fastened with four (4) fasteners, two on each side. Horizontal lines, labeled 75%, are marked on the aft side of the cargo barrier. Placards above the horizontal lines caution that the maximum allowable load behind the barrier is 3400 pounds total, and that zones forward of the last loaded zone must be at least 75% full by volume. Refer to Figure 6-7 for additional details.

WARNING

When utilized, the cargo barrier and its attached nets provide cargo forward crash load restraint and protection of the pilot and front passenger; however, the cargo must still be secured to prevent it from shifting due to takeoff, flight, landing, and taxi accelerations and decelerations. On the Passenger Version, if passengers as well as cargo are located aft of the barrier, cargo placement must allow movement and exit of the passengers and the cargo must be secured for crash load restraint conditions. Refer to Cargo Load Restraint in this section for additional information concerning cargo restraint with and without a cargo barrier.

⚠ WARNING

Ensure the barrier net fasteners are secured for takeoff, landing, and inflight operations, and are momentarily detached only for movement of the nets for loading/unloading of items through the crew area.

Cargo partition nets are available and can be installed to divide the cargo area into convenient compartments. Partitions may be installed in all of the five locations at stations 188.7, 246.8, 282.0, 307.0, and 332.0. The cargo partitions are constructed of canvas with nylon webbing reinforcement straps crisscrossing the partition for added strength. The ends of the straps have quick-release fasteners which attach to the floor tracks and two floor-mounted anchor plates located just forward of the raised cargo floor and other anchor plates on the sidewalls and ceiling. Four straps have adjustable buckles for tightening the straps during installation of the partition. Refer to Figure 6-8 for additional details.

Zones divided by cargo partitions can be loaded without additional tie-downs provided a total loaded density for each partitioned zone does not exceed 7.9 pounds per cubic foot and the zone is more than 75% full. Cargo loading that does not meet these requirements must be secured to the cabin floor.

⚠ CAUTION

The maximum cargo partition load is the sum of any two zones. No more than two adjacent zones can be divided by one partition. The partitions are designed to prevent the cargo from shifting forward and aft in flight; they should not be considered adequate to withstand crash loads and do not replace the need for a cargo barrier.

A restraining net is installed on the inside of the airplane over the cargo door opening. The restraining net precludes loose articles from falling out the cargo door when the doors are opened. The restraining net consists of two halves which part in the center of the door opening. The front and rear halves slide fore and aft, respectively, on a rod to open the net. The net is attached to the sidewall by screws and nutplates along the front and rear edges of the net. When the net is closed, the two halves are held together by snap-type fasteners. Refer to Figure 6-9 for additional details.

Various tie-down belt assemblies and tie-down ring anchors are available for securing cargo within the airplane; the belts may also be used for tying down the airplane. A standard configuration is offered and contains three 3000-pound rated belt assemblies with ratchet-type adjusters and six single-stud, quick-release tie-down ring anchors. A heavy-duty configuration consists of three 5000-pound rated belts with ratchet-type adjusters and six double-stud, quick-release anchors. Three 5000-pound rated belts with overcenter-type locking devices are also available for

heavy duty use. The six single-stud and double-stud tie-down ring anchors are also available separately. The single-stud anchors can be attached to any tie-down point in the airplane which isn't placarded for attachment of partition nets only, whereas the double-stud anchors can be attached to the aft seat tracks only. See Figure 6-10 for maximum load ratings and tie-down ring anchor spacing restrictions.

CARGO POD

The airplane may be equipped with a 111.5 cubic foot capacity cargo pod attached to the bottom of the fuselage. The pod is divided into four compartments (identified as zones A, B, C, and D) by bulkheads and has a maximum floor loading of 30 pounds per square foot and maximum load weight limit of 1090 pounds. Each compartment has a loading door located on the left side of the pod. The doors are hinged at the bottom, and each has two latches. When the latch handles are rotated to the horizontal position with the doors closed, the doors are secured. Refer to Figure 6-5 and 6-12 for additional details.

MAXIMUM ZONE/COMPARTMENT LOADINGS

Maximum zone loadings are as follows:

	ZONE/ COMPART- MENT	VOLUME (CUBIC FEET)	WEIGHT LIMITS (LBS) *SECURED BY TIE-DOWNS	WEIGHT LIMITS (LBS) **UNSECURED USING PARTITIONS OR IN CARGO POD	C.G. (STATION LOCATION)
FUSELAGE	1	52.9	1780	415	172.0
	2	109.0	3100	860	217.8
	3	63.0	1900	495	264.4
	4	43.5	1380	340	294.5
	5	40.1	1270	315	319.5
	6	31.5	320	245	344.0
CARGO/POD	A	23.4	--	230	132.4
	B	31.5	--	310	182.1
	C	27.8	--	270	233.4
	D	28.8	--	280	287.6

* THIS IS THE MAXIMUM CARGO ALLOWED IN THE BAY INDICATED.
** DENSITY MUST BE 7.9 LBS/FT³ OR LESS AND BAY 75% OR MORE FULL.

CENTER OF GRAVITY PRECAUTIONS

Since the airplane can be used for cargo missions, carrying various types of cargo in a variety of loading configurations, precautions must be taken to protect the forward and aft C.G. limits. Load planning should include a careful comparison of the mission requirements with the volume and weight limitation in each loading zone and the final airplane C.G. Cargo loaded in the forward zones may need to be balanced by loading cargo in one or more aft zones. Conversely, loadings can not be concentrated in the rear of the airplane, but must be compensated by forward cargo to maintain balance. Under ideal conditions, loadings should be accomplished with heavy items on the bottom and the load distributed uniformly around the C.G. of the cabin cargo area zone and/or cargo pod compartment. Loading personnel must maintain strict accountability for loading correctly and accurately, but may not always be able to achieve and ideal loading. A means of protecting the C.G. aft limit is provided by supplying an aft C.G. location warning area between 38.33% MAC and the maximum allowable aft C.G. of 40.33% MAC. The warning area is indicated by shading on the C.G. Moment Envelope (Figure 6-17) and C.G. Limits (Figure 6-18). **This shaded area should be used only if accurate C.G. determination can be obtained.**

CAUTION

Exercise caution while loading or unloading heavy cargo through the cargo doors. An ideal loading in every other respect can still cause tail tipping and structural damage if proper weight distribution is ignored. For example, heavy cargo loaded through the doors and placed momentarily in zones 4 and 5, plus the weight of personnel required to move it to a forward zone, could cause an out-of-balance condition during loading.

CARGO LOAD RESTRAINT

PREVENTION OF MOVEMENT

Cargo restraint requires the prevention of movement in five principal directions: forward, aft, upward (vertical), left (side), and right (side) These movements are the result of forces exerted upon the cargo due to acceleration or deceleration of the airplane in takeoffs and landings as well as forces due to air turbulence in flight. Correct restraint provides the proper relationship between airplane configuration (with or without barrier), weight of the cargo, and the restraint required. Restraint is required for flight, landing, and taxi loads and for crash loads.

Cargo must be tied down for flight, landing and taxi load restraint and/or crash load restraint. **When a cargo barrier is not installed,** all cargo must be prevented from movement in the five principal directions and secured to provide crash load restraint. The maximum rated loads specified for loadings without a barrier in the table on Figure 6-10 should be used for each tie-down. Consistent use of these loading criteria is important, and it is the responsibility of the pilot to assure the cargo is restrained properly. **When a cargo barrier is installed,** cargo aft of the barrier must also be secured to prevent movement in the five principal directions, but only to the extent that shifting due to flight, landing, and taxi loads is provided. The maximum rated loads specified for loadings with a barrier installed shown in the table of Figure 6-10 should be used for each tie-down. With a barrier installed, all cargo must be loaded such that loading zones forward of the last loaded zone must be 75% full by volume.

WARNING

In special loading arrangements which allow the carriage of passengers as well as cargo behind the barrier in the Passenger Version, all cargo must be secured to prevent movement in the five principal directions and provide the same crash load restraint as though a barrier was not installed using the maximum rated loads specified for loading without a barrier. In this arrangement, cargo placement must allow for movement and exit of the passengers. The pilot must be responsible to ensure proper load restraint in all loadings.

Refer to Figure 6-14 for diagrams of typical cargo tie-down methods for prevention of movement. Also, the cargo partition nets available for the airplane can be installed at stations 188.7, 246.8, 282.0, 307.0 and 332.0 to divide the cabin cargo area into compartments. If the partitions are used, they must be used in conjunction with the cargo barrier. Since partitions are not designed to withstand crash loads, they cannot be considered as a replacement for the barrier. Each partition will withstand the forward and aft operational loads applied during takeoff, flight and landing by any two (2) zones forward or aft of the partition. Use of the partitions will allow loading of the zones without tying down cargo if the load density is no more than 7.9 pounds per cubic foot and the zone is more than 75% full. Cargo loading that does not meet these requirements must be secured to the cabin floor.

LOADING OF PIERCING OR PENETRATING ITEMS

Regardless of cargo location, items of a piercing or penetrating nature shall be located so that other cargo is loaded between the barrier/nets, cargo partitions, and rear wall and the piercing or penetrating items to provide a buffer. The density of this cargo shall be sufficient to restrain the piercing or penetrating items from passing through the barrier/nets, partitions, and rear wall under critical emergency landing conditions. If the condition cannot be complied with, the piercing or penetrating items shall be tied down.

TRANSPORTATION OF HAZARDOUS MATERIALS

Special protection of the airplane and training of personnel are key considerations in conducting approved transportation of hazardous materials.

Protection against hazardous materials has been provided in the fuselage bilge area under the cargo compartment from station 168 to 356, and these materials may be carried in any location within this area.

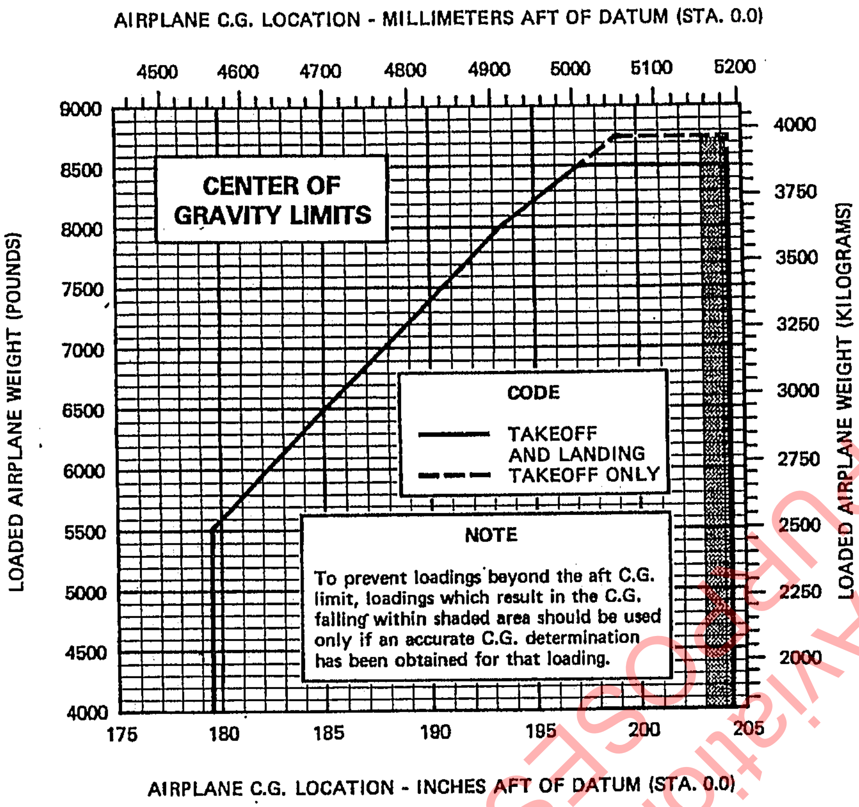
In addition to the pilot-in-command and flight crew member (if used), other personnel such as cargo receiving and loading personnel should be properly trained concerning the acceptance, handling, storage, loading and unloading of hazardous materials if these materials are to be carried. Information and regulations pertaining to the air transportation of hazardous materials is outlined in the Code of Federal Regulations (CFR) Title 49 and in the International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air. Additional details on training subject matter and location references for this information are included in the Cargo Loading Manual for this airplane. Some general guidelines important to safe carriage of hazardous materials are also described in the Cargo Loading Manual.

EQUIPMENT LIST

For a complete list of equipment installed in the airplane as delivered from the manufacturer, refer to the equipment list furnished with the airplane.

FUEL (JET A, JET A-1, JET B, JP-1 AND JP-8 WITH DENSITY OF 6.7 LBS./GAL AT 60°F)					
GALLONS	WEIGHT (POUNDS)	MOMENT/1000 ARM VARIES	GALLONS	WEIGHT (POUNDS)	MOMENT/1000 ARM VARIES
5	33	6.8	175	1172	239.9
10	67	13.7	180	1206	246.7
15	100	20.6	185	1239	253.5
20	134	27.5	190	1273	260.4
25	167	34.3	195	1306	267.2
30	201	41.2	200	1340	274.0
35	234	48.1	205	1373	280.8
40	268	55.0	210	1407	287.6
45	301	61.8	215	1440	294.4
50	335	68.7	220	1474	301.2
55	368	75.6	225	1507	308.0
60	402	82.5	230	1541	314.8
65	435	89.3	235	1574	321.6
70	469	96.2	240	1608	328.4
75	502	103.1	245	1641	335.2
80	536	109.9	250	1675	342.0
85	569	116.8	255	1708	348.8
90	603	123.6	260	1742	355.6
95	636	130.5	265	1775	362.4
100	670	137.3	270	1809	369.2
105	703	144.2	275	1842	376.0
110	737	151.0	280	1876	382.8
115	770	157.9	285	1909	389.5
120	804	164.7	290	1943	396.3
125	837	171.6	295	1976	403.1
130	871	178.4	300	2010	409.9
135	904	185.3	305	2043	416.7
140	938	192.1	310	2077	423.4
145	971	198.9	315	2110	430.2
150	1005	205.8	320	2144	437.0
155	1038	212.6	325	2177	443.7
160	1072	219.4	327	2189	446.1
165	1105	226.3	330	2211	450.5
170	1139	233.1	332	2224	453.2

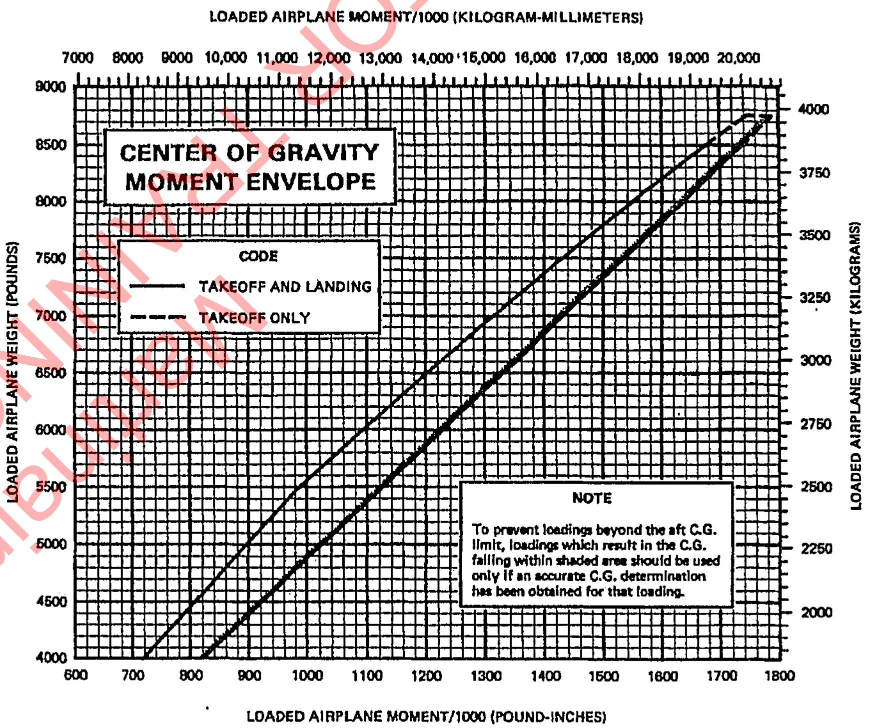
Figure 6-15. Weight and Moment Tables (Sheet 5 of 10)



WARNING

It is the responsibility of the pilot to ensure that the airplane is loaded properly. Operation outside of prescribed weight and balance limitations could result in an accident and serious or fatal injury.

Figure 6-18. Center of Gravity Limits



WARNING

Since loading personnel may not always be able to achieve an ideal loading, a means of protecting the C.G. envelope is provided by supplying an aft C.G. location warning (shaded area) between 38.33% MAC and the maximum aft C.G. of 40.33% MAC on the Center of Gravity Moment Envelope. POINTS FALLING WITHIN THIS SHADED AREA SHOULD BE USED ONLY IF ACCURATE C.G. DETERMINATION FOR CARGO LOADINGS CAN BE OBTAINED.

WARNING

It is the responsibility of the pilot to ensure that the airplane is loaded properly. Operation outside of prescribed weight and balance limitations could result in an accident and serious or fatal injury.

Figure 6-17. Center of Gravity Moment Envelope

SECTION 7
AIRPLANE & SYSTEMS DESCRIPTIONS

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INTRODUCTION

This section provides description and operation of the airplane and its systems. Refer to Section 9, Supplements, for details of other supplemental systems and equipment.

⚠ WARNING

Complete familiarity with the airplane and its systems will not only increase the pilot's proficiency and ensure optimum operation, but could provide a basis for analyzing system malfunctions in case an emergency is encountered. Information in this section will assist in that familiarization. The responsible pilot will want to be prepared to make proper and precise responses in every situation.

AIRFRAME

The airplane is an all-metal, high-wing, single-engine airplane equipped with tricycle landing gear and designed for general utility purposes.

The construction of the fuselage is a conventional formed sheet metal bulkhead, stringer, and skin design referred to as semimonocoque. Major items of structure are the front and rear carry-through spars to which the wings are attached, a bulkhead and forgings for main landing gear attachment and a bulkhead with attaching plates at its base for the strut-to-fuselage attachment of the wing struts.

The externally braced wings, having integral fuel tanks, are constructed of a front and rear spar with formed sheet metal ribs, doublers, and stringers. The entire structure is covered with aluminum skin. The front spars are equipped with wing-to-fuselage and wing-to-strut attach fittings. The aft spars are equipped with wing-to-fuselage attach fittings. The integral fuel tanks are formed by the front and rear spars, upper and lower skins, and inboard and outboard closeout ribs. Extensive use of bonding is employed in the fuel tank area to reduce fuel tank sealing. Round-nose ailerons and single-slot type flaps are of conventional formed sheet metal ribs and smooth aluminum skin construction. A slot lip spoiler, mounted above the outboard end of each flap, is of conventional construction. The left aileron incorporates a servo tab while the right aileron incorporates a trimmable servo tab, both mounted on the outboard end of the aileron trailing edge.

The empennage (tail assembly) consists of a conventional vertical stabilizer, rudder, horizontal stabilizer, and elevator. The vertical stabilizer consists of a forward and aft spar, sheet metal ribs and reinforcements, four skin panels, formed leading edge skins, and a dorsal fin. The rudder is constructed of a forward and aft spar, formed sheet metal ribs and reinforcements, and a wrap-around skin panel. The top of the rudder incorporates a leading edge extension which contains a balance weight. The horizontal stabilizer is constructed of a forward and aft spar, ribs and stiffeners, four upper and four lower skin panels, and two left and two right wrap-around skin panels which also form the leading edges. The horizontal stabilizer also contains dual jack screw type actuators for the elevator trim tabs. Construction of the elevator consists of a forward and aft spar, sheet metal ribs, upper and lower skin panels, and wrap-around skin panels for the leading and trailing edges. An elevator trim tab is attached to the trailing edge of each elevator by full length piano-type hinges. Dual pushrods from each actuator located in the horizontal stabilizer transmit actuator movement to dual horns on each elevator trim tab to provide tab movement. Both elevator tip leading edge extensions provide aerodynamic balance and incorporate balance weights. A row of vortex generators on the top of the horizontal stabilizer just forward of the elevator enhances nose down elevator and trim authority.

To assure extended service life of the airplane, the entire airframe is corrosion proofed. Internally, all assemblies and sub-assemblies are coated with a chemical film conversion coating and are then epoxy primed. Organic corrosion inhibiter is applied in the fuselage bilge area beneath the cargo floor from fuselage station 168 to 356. Steel parts in contact with aluminum structure are given a chromate dip before assembly. Externally, the complete airframe is painted with an overall coat of polyurethane paint which enhances resistance to corrosive elements in the atmosphere. Also, all control cables for the flight control system are of stainless steel construction.

CARGO POD

The airplane may be equipped with a cargo pod which provides additional cargo space. The pod attaches to the bottom of the fuselage with screws and can be removed, if desired, for increased performance and useful load. The pod is fabricated with a Nomex inner housing, a layer of Kevlar, and an outer layer of fiberglass. Complete instructions for removal and installation of the cargo pod are contained in the Maintenance Manual.

The volume of the cargo pod is 111.5 cubic feet and has a load-carrying capacity of 1090 pounds. The pod is divided into four separate compartments divided by aluminum bulkheads. Each compartment has an individual loading door on the left side of the pod which is hinged at the bottom. Each door is secured in the closed position by two handles which latch the doors when rotated 90 degrees to the horizontal position.

FLIGHT CONTROLS

The airplane's flight control system (see Figure 7-1) consists of conventional aileron, elevator and rudder control surfaces and a pair of spoilers mounted above the outboard ends of the flaps. The control surfaces are manually operated through mechanical linkage using a control wheel for the ailerons, spoilers and elevator and rudder/brake pedals for the rudder. The wing spoilers improve lateral control of the airplane at low speeds by disrupting lift over the appropriate flap. The spoilers are interconnected with the aileron system through a push-rod mounted to an arm on the aileron bellcrank. Spoiler travel is proportional to aileron travel for aileron deflections in excess of 5°up. The spoilers are retracted throughout the remainder of aileron travel. Aileron servo tabs provide reduced maneuvering control wheel forces.

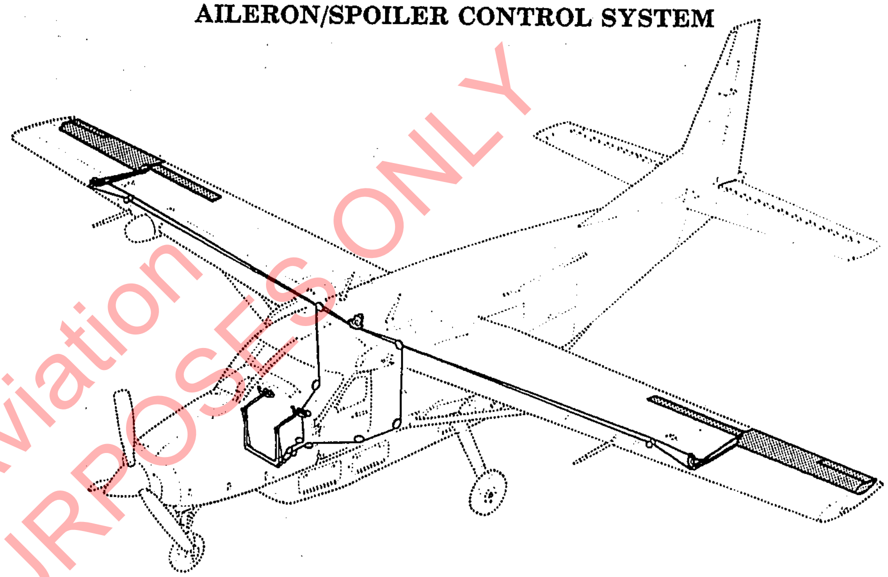
TRIM SYSTEMS

Manually-operated aileron, elevator, and rudder trim systems are provided (see Figure 7-1). Aileron trimming is achieved by a trimmable servo tab attached to the right aileron and connected mechanically to a knob located on the control pedestal. Rotating the trim knob to the right (clockwise) will trim right wing down; conversely, rotating it to the left (counterclockwise) will trim left wing down.

Elevator trimming is accomplished through two elevator trim tabs by utilizing the vertically mounted trim control wheel on the top left side of the control pedestal. Forward rotation of the control wheel will trim nose-down; conversely, aft rotation will trim nose-up. The airplane is also equipped with an electric elevator trim system. Details of this system are presented in Section 9, Supplements, in discussion of the King Flight Control System.

Rudder trimming is accomplished through the nose wheel steering bungee connected to the rudder control system and a trim control wheel mounted on the control pedestal by rotating the horizontally mounted trim control wheel either left or right to the desired trim position. Rotating the trim wheel to the right will trim nose-right; conversely, rotating it to the left will trim nose-left.

AILERON/SPOILER CONTROL SYSTEM



AILERON TRIM CONTROL SYSTEM

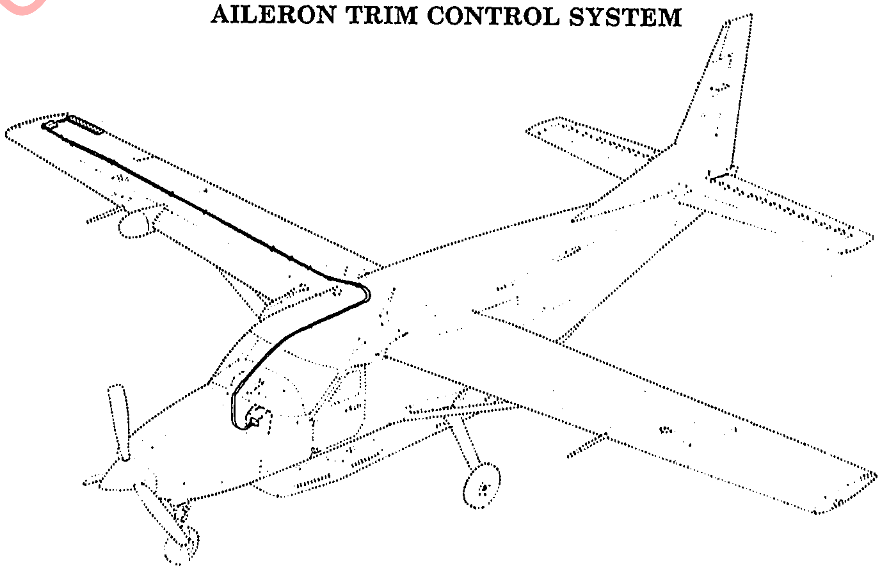
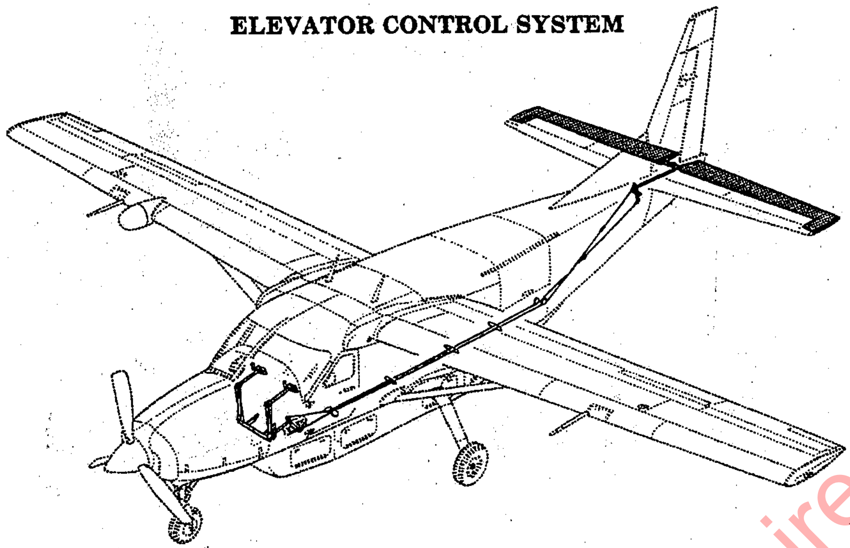


Figure 7-1. Flight Control and Trim Systems (Sheet 1 of 3)

ELEVATOR CONTROL SYSTEM



ELEVATOR TRIM CONTROL SYSTEM

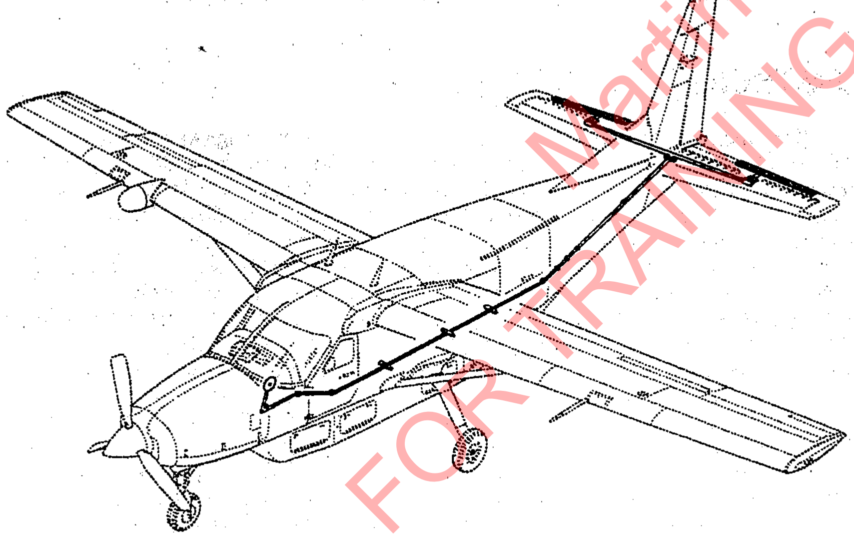


Figure 7-1. Flight Control and Trim Systems (Sheet 2 of 3)

RUDDER AND RUDDER TRIM CONTROL SYSTEMS

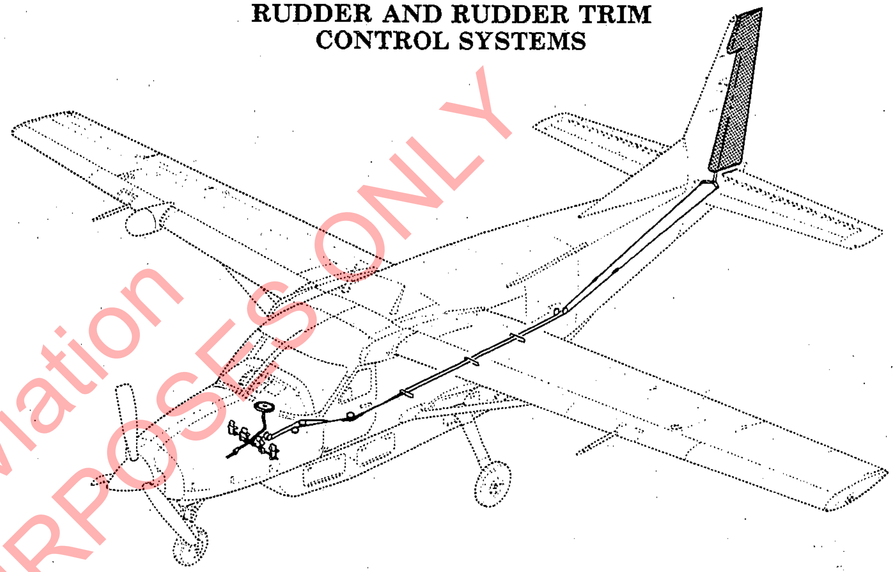


Figure 7-1. Flight Control and Trim Systems (Sheet 3 of 3)

INSTRUMENT PANEL

The instrument panel (see Figures 7-2 and 7-3) is designed around the basic "T" configuration. The gyros are located immediately in front of the pilot, and arranged vertically. The airspeed indicator and altimeter are located to the left and right of the gyros respectively. The remainder of the flight instruments are located around the basic "T". Immediately to the left of the flight instruments are the clock, propeller anti-ice ammeter, slaving accessory, volt/ammeter, volt/ammeter selector switch, propeller overspeed governor test switch, left fresh air vent pull knob, left fresh air vent outlet, and microphone and headset jacks. The lower left side of the instrument panel contains a switch panel which has many of the switches necessary to operate the airplane systems. Located directly above the flight instrument panel are the annunciator panel, annunciator panel day-night switch, annunciator panel test switch, and the fire detector test switch. Below the flight instrument panel are the suction gage, inertial separator control, lighting switch panel, and the parking brake. Avionics equipment is placed vertically in dual stacks approximately in the center and just right of center of the instrument panel. Located directly above the avionics stacks in the top center of the instrument panel are the engine instruments consisting of the torque indicator, propeller RPM indicator, ITT indicator, N_g% RPM indicator, oil pressure/oil temperature gage, fuel flow indicator, and left and right fuel quantity indicators. The cabin heat switch and control panel and provisions for air conditioning controls are located directly below the avionics stacks. The right side of the instrument panel contains additional flight instruments. Directly to the right of these instruments are the hourmeter (if installed), right fresh air vent pull knob, right fresh air vent, right front passenger's microphone and headset jacks, and map compartment. A control pedestal, extending from the center of the instrument panel to the floor, contains the emergency power lever, power lever, propeller control lever, fuel condition lever, wing flap selector and position indicator, elevator, rudder and aileron trim controls with position indicators, the fuel shutoff valve control, cabin heat firewall shutoff valve control, and a microphone.

For details concerning the instruments, switches, and controls on this panel, refer in this section to the description of the systems to which these items are related.

RIGHT FLIGHT INSTRUMENT PANEL

A supplementary flight instrument group may be installed directly in front of the right front passenger. Like the pilot's flight instrument panel, the right flight panel groups the attitude and directional indicators vertically with the airspeed indicator to the left and the altimeter to the right to form a basic "T" arrangement. The remainder of the instruments (turn and bank indicator and vertical speed indicator) are grouped around the basic "T". The right flight instruments utilize a second, independent pitot-static pressure system for operation.

LEFT SIDEWALL SWITCH AND CIRCUIT BREAKER PANEL

Most of the engine control switches and all circuit breakers are located on a separate panel mounted on the left cabin sidewall adjacent to the pilot. Switches and controls on this panel are illustrated in Figures 7-4 and 7-5.

ANNUNCIATOR PANEL

The annunciator panel (see Figure 7-6) is located at the top edge of the instrument panel directly in front of the pilot. The panel contains separate indicator lamps which illuminate green, amber or red when a specific condition occurs in the associated airplane system. A **green** colored lamp is illuminated to indicate a normal or safe condition in the system. An illuminated **amber** lamp indicates that a cautionary condition exists which may

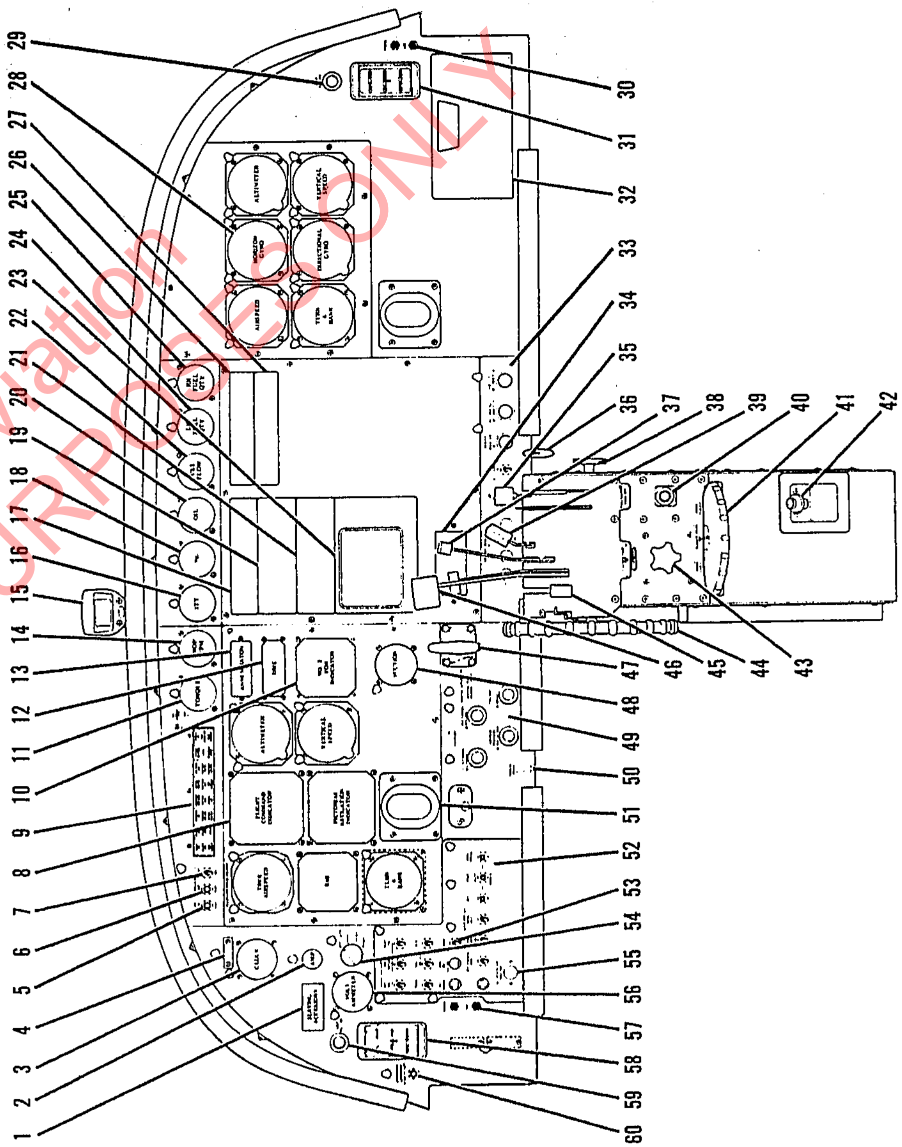


Figure 7-2. Typical Instrument Panel With KFC-150 Autopilot (Sheet 1 of 2)

1. Slaving Accessory
2. Propeller Anti-Ice Ammeter
3. Clock
4. Airplane Registration Number
5. Fire Detection Test Switch
6. Annunciator Panel Lamp Test Function Switch
7. Annunciator Panel Day/Night Function Switch
8. Pilot's Flight Instrument Group
9. Annunciator Panel
10. No. 2 VOR Indicator
11. Torque Indicator
12. Distance Measuring Equipment
13. Autopilot Mode Annunciator
14. Propeller RPM Indicator
15. Magnetic Compass
16. ITT Indicator
17. Audio Control Panel
18. N_g% RPM Indicator
19. NAV/COM Radio 1
20. Oil Pressure Gage/Oil Temperature Gage
21. NAV/COM Radio 2
22. Fuel Flow Indicator
23. Weather Radar
24. Left Fuel Quantity Indicator
25. Right Fuel Quantity Indicator
26. ADF Radios
27. Transponder
28. Right Flight Instrument Group
29. Instrument Panel Ventilating Control
30. Right Auxiliary Mic and Phone Jacks
31. Instrument Panel Ventilating Outlet
32. Map Compartment
33. Cabin Heat Switch and Control Panel
34. Autopilot Mode Controller
35. Wing Flap Selector Lever and Position Indicator
36. Rudder Lock Control Handle
37. Propeller Control Lever
38. Quadrant Friction Lock
39. Fuel Condition Lever
40. Fuel Shutoff Control
41. Rudder Trim Control Wheel and Position Indicator
42. Cabin Heat Firewall Shutoff Control
43. Aileron Trim Control Knob and Position Indicator
44. Elevator Trim Control Wheel and Position Indicator
45. Emergency Power Lever
46. Power Lever
47. Inertial Separator Control
48. Suction Gage
49. Instrument, Radio Dial, and Control Panel Lighting Rheostats
50. Parking Brake Handle
51. Pilot's Control Wheel Location
52. De-Ice/Anti-Ice Switch Panel
53. Lighting Switch Panel
54. Volt/Ammeter Selector Switch
55. Static Pressure Alternate Source Valve
56. Volt/Ammeter
57. Pilot's Auxiliary Mic and Phone Jacks
58. Instrument Panel Ventilating Outlet
59. Instrument Panel Ventilating Control
60. Overspeed Governor Test Switch

Figure 7-2. Typical Instrument Panel With KFC-150 Autopilot (Sheet 2 of 2)

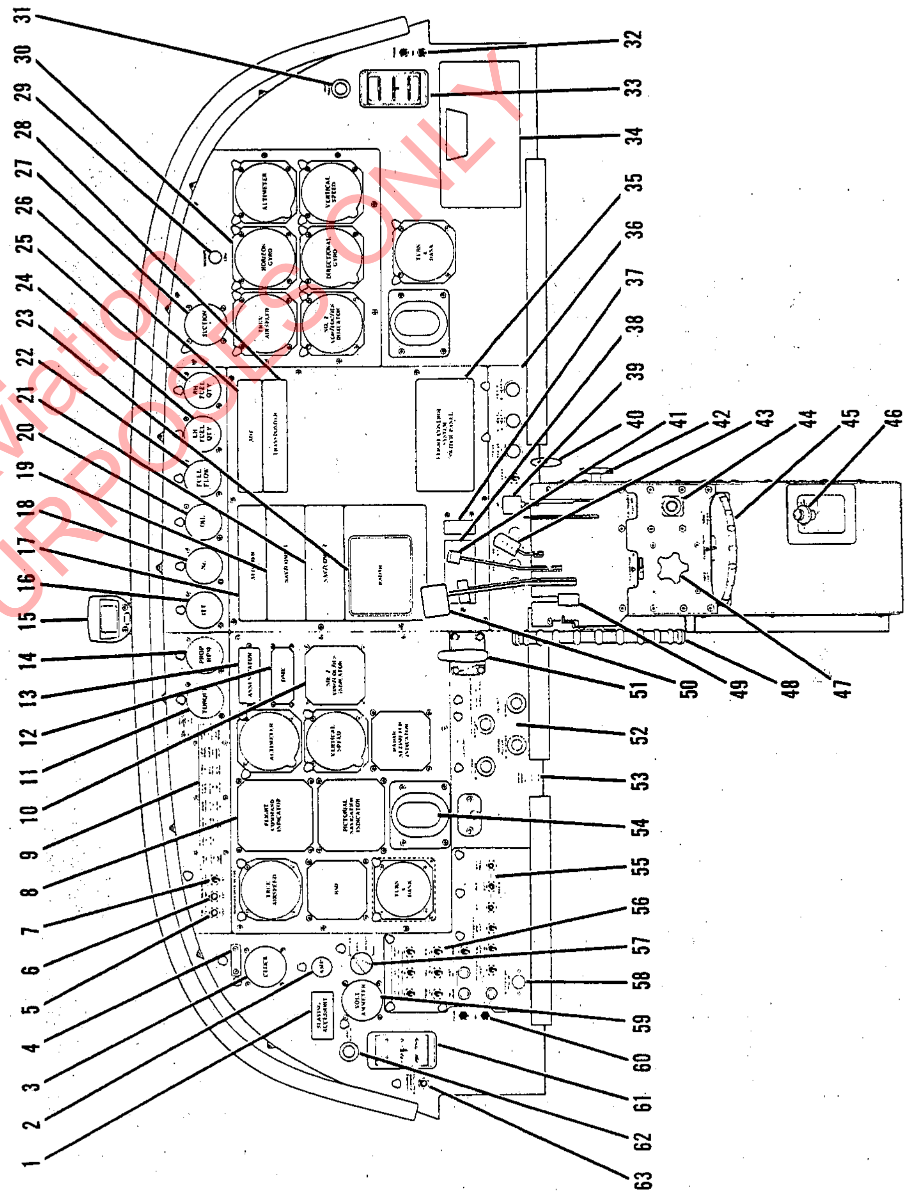


Figure 7-3. Typical Instrument Panel With KFC-250 Autopilot (Sheet 1 of 2)

1. Slaving Accessory
2. Propeller Anti-Ice Ammeter
3. Clock
4. Airplane Registration Number
5. Fire Detection Test Switch
6. Annunciator Panel Lamp Test Function Switch
7. Annunciator Panel Day/Night Function Switch
8. Pilot's Flight Instrument Group
9. Annunciator Panel
10. No. 2 VOR Indicator
11. Torque Indicator
12. Distance Measuring Equipment
13. Autopilot Mode Annunciator
14. Propeller RPM Indicator
15. Magnetic Compass
16. ITT Indicator
17. Audio Control Panel/Marker Beacon Receiver
18. N_g % RPM Indicator
19. NAV/COM Radio 1
20. Oil Pressure Gage/Oil Temperature Gage
21. NAV/COM Radio 2
22. Fuel Flow Indicator
23. Weather Radar
24. Left Fuel Quantity Indicator
25. Right Fuel Quantity Indicator
26. ADF Radios
27. Suction Gage
28. Transponder
29. Vacuum Low Warning Light
30. Right Flight Instrument Group
31. Instrument Panel Ventilating Control
32. Right Auxiliary Mic and Phone Jacks
33. Instrument Panel Ventilating Outlet
34. Map Compartment
35. Flight Control System Switch Panel
36. Cabin Heat Switch and Control Panel
37. Yaw Control
38. Autopilot Mode Controller
39. Wing Flap Selector Lever and Position Indicator
40. Rudder Lock Control Handle
41. Propeller Control Lever
42. Quadrant Friction Lock
43. Fuel Condition Lever
44. Fuel Shutoff Control
45. Rudder Trim Control Wheel and Position Indicator
46. Cabin Heat Firewall Shutoff Control
47. Aileron Trim Control Knob and Position Indicator
48. Elevator Trim Control Wheel and Position Indicator
49. Emergency Power Lever
50. Power Lever
51. Inertial Separator Control
52. Instrument, Radio Dial, and Control Panel Lighting Rheostats
53. Parking Brake Handle
54. Pilot's Control Wheel Location
55. De-Ice/Anti-Ice Switch Panel
56. Lighting Switch Panel
57. Volt/Ammeter Selector Switch
58. Static Pressure Alternate Source Valve
59. Volt/Ammeter
60. Pilot's Auxiliary Mic and Phone Jacks
61. Instrument Panel Ventilating Outlet
62. Instrument Panel Ventilating Control
63. Overspeed Governor Test Switch

Figure 7-3. Typical Instrument Panel With KFC-250 Autopilot (Sheet 2 of 2)

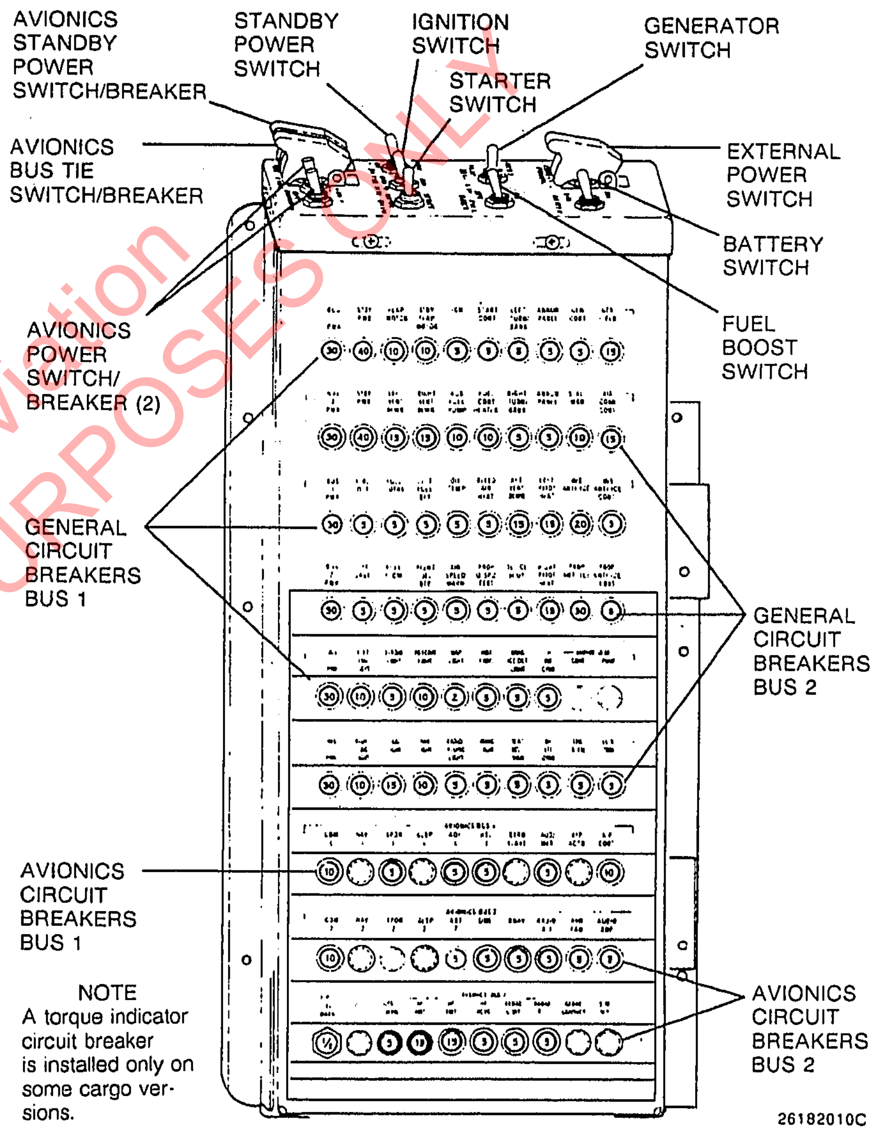


Figure 7-4. Typical Left Sidewall Switch and Circuit Breaker Panel With KFC-150 Autopilot

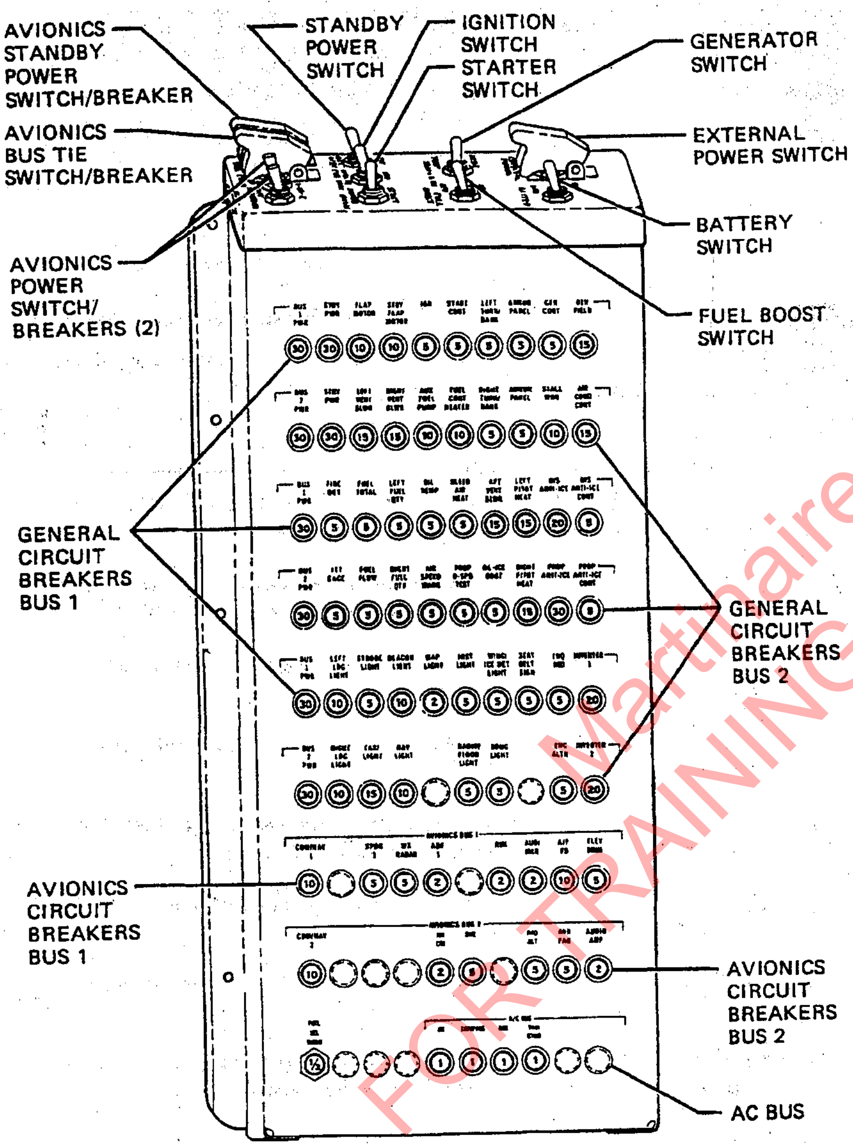
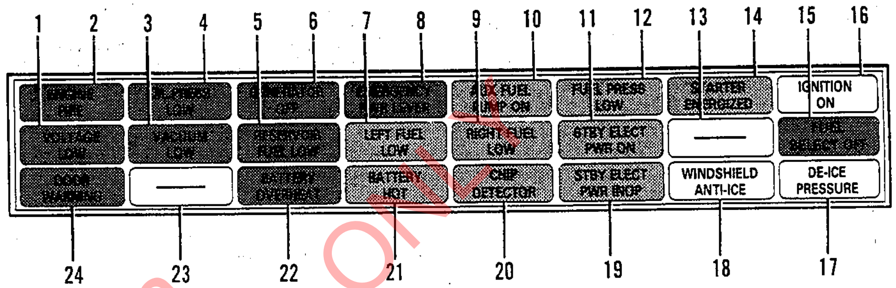


Figure 7-5. Typical Left Sidewall Switch and Circuit Breaker Panel With KFC-250 Autopilot



ILLUMINATION CODE

RED - HAZARDOUS CONDITION (Requires Immediate Corrective Action)

AMBER - CAUTIONARY CONDITION (May Require Immediate Corrective Action)

GREEN - NORMAL OR SAFE CONDITION

UNUSED ANNUNCIATOR SPACE

1. VOLTAGE LOW (RED) - Indicates electrical system bus voltage is low and power is being supplied from the battery.

2. ENGINE FIRE (RED) - Indicates an excessive temperature condition and/or possible fire has occurred in the engine compartment.

3. VACUUM LOW (RED) - Indicates the vacuum system suction is less than approximately 3.0 in. Hg.

4. OIL PRESSURE LOW (RED) - Indicates engine oil pressure is less than 38 psi.

5. RESERVOIR FUEL LOW (RED) - Indicates the fuel level in the reservoir tank is approximately one-half full or less.

6. GENERATOR OFF (RED) - Indicates the generator is not connected to the airplane bus.

7. LEFT FUEL LOW (AMBER) - Indicates fuel quantity in the left fuel tank is 25 gallons or less.

8. EMERGENCY POWER LEVER (RED) - Indicates the emergency power lever is advanced out of the NORMAL position.

Figure 7-6. Typical Annunciator Panel (Sheet 1 of 2)

9. RIGHT FUEL LOW (AMBER) - Indicates fuel quantity in the right fuel tank is 25 gallons or less.

10. AUXILIARY FUEL PUMP ON (AMBER) - Indicates the auxiliary fuel pump is operating.

11. STANDBY ELECTRICAL POWER ON (AMBER) - Indicates the standby alternator is supplying electrical power to the bus.

12. FUEL PRESSURE LOW (AMBER) - Indicates fuel pressure in the fuel manifold assembly is below 4.75 psi.

13. NOT USED (Some Airplanes); INVERTER INOP (AMBER) - Indicates the selected inverter is not operating (Airplanes With KFC-250 Autopilot).

14. STARTER ENERGIZED (AMBER) - Indicates the starter-generator is operating in the starter mode.

15. FUEL SELECT OFF (RED) - Indicates one or both fuel tank selectors are off.

16. IGNITION ON (GREEN) - Indicates electrical power is being supplied to the engine ignition system.

17. DE-ICE PRESSURE (GREEN) - Indicates pressure in the de-ice boot system has reached approximately 15 psig.

18. WINDSHIELD ANTI-ICE (GREEN) - Indicates electrical power is being supplied to the windshield anti-ice power relay.

19. STANDBY ELECTRICAL POWER INOPERATIVE (AMBER) - Indicates electrical power is not available from the standby alternator.

20. CHIP DETECTOR (AMBER) - Indicates that metal chips have been detected in either the reduction gearbox case or accessory gearbox case.

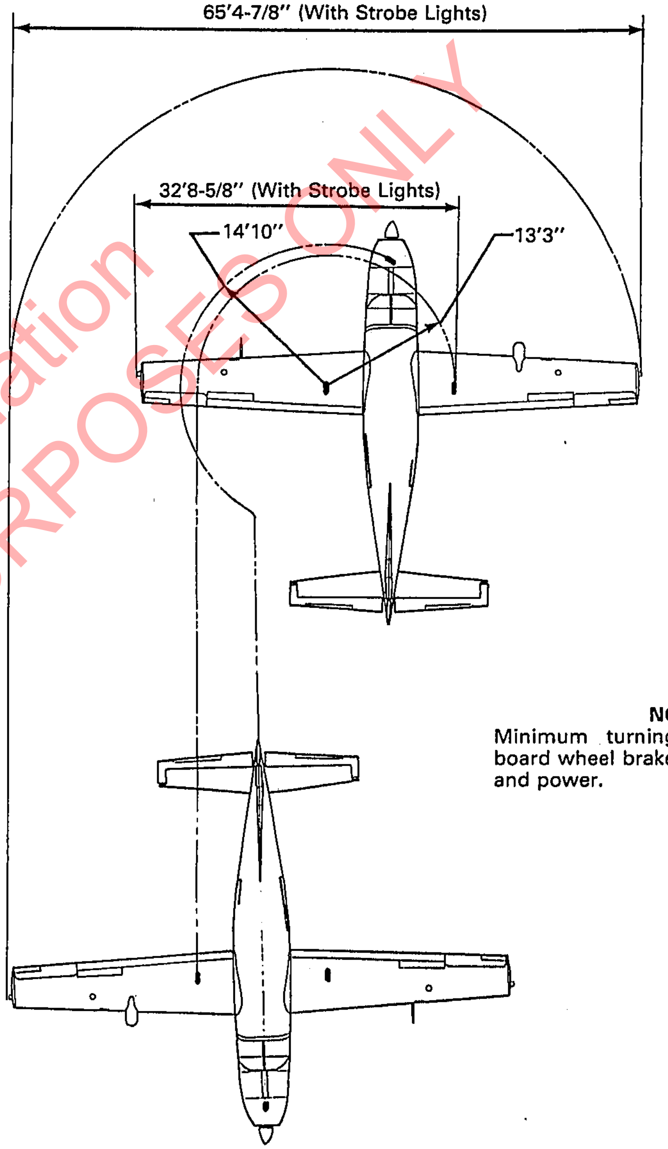
21. BATTERY HOT (AMBER) - Indicates the electrolyte temperature in the Ni-Cad battery is high.

22. BATTERY OVERHEAT (RED) - Indicates the electrolyte temperature in the Ni-Cad battery is critically high.

23. NOT USED.

24. DOOR WARNING (RED) - Indicates the upper cargo door and/or upper aft passenger door (Passenger Version Only) are not latched.

Figure 7-6. Typical Annunciator Panel (Sheet 2 of 2)



NOTE
Minimum turning radius with inboard wheel brake locked, full rudder and power.

Figure 7-7. Minimum Turning Radius

or may not require immediate corrective action. When a hazardous condition exists requiring immediate corrective action, a red lamp illuminates.

Two annunciator panel function switches, labeled LAMP TEST and DAY/NIGHT, are located to the left of the panel. When activated, the LAMP TEST switch illuminates all lamps on the annunciator panel and activates both of the fuel selector off warning horns. The DAY/NIGHT switch provides variable intensity down to a preset minimum dim level for the green lamps and some of the amber lamps (when in the NIGHT position). This variable intensity is controlled by the ENG INST lighting rheostat.

NOTE

> If a red or non-dimmable amber annunciator illuminates at night and becomes an unacceptable distraction to the pilot because of its brightness level, it may be extinguished for the remainder of the flight by pushing in on the face of the light assembly and allowing it to pop out. To reactivate the annunciator, pull the light assembly out slightly and push back in.

GROUND CONTROL

Effective ground control while taxiing is accomplished through nose wheel steering by using the rudder pedals; left rudder pedal to steer left and right rudder pedal to steer right. When a rudder pedal is depressed, a spring-loaded steering bungee (which is connected to the nose gear and to the rudder bars) will turn the nose wheel through an arc of approximately 15° each side of center. By applying either left or right brake, the degree of turn may be increased up to 56° each side of center.

Moving the airplane by hand is most easily accomplished by attaching a tow bar (stowed in aft cargo compartment) to the nose gear fork axle holes. If a tow bar is not available, or pushing is required, use the wing struts as push points. Do not use the propeller blades or spinner to push or pull the airplane. If the airplane is to be towed by vehicle, never turn the nose wheel beyond the steering limit marks either side of center. On airplanes having serial numbers 208B0001 thru 208B0054 which have been modified with SK208-48 and airplanes with serial numbers 208B0055 and On, if excess force is exerted beyond the turning limit, a red over-travel indicator block (frangible stop) will fracture and the block, attached to a cable, will fall into view alongside the nose strut. This should be checked routinely during preflight inspection to prevent operation with a damaged nose gear.

The minimum turning radius of the airplane, using differential braking and nose wheel steering during taxi, is as shown in Figure 7-7.

WING FLAP SYSTEM

The wing flaps are large span, single-slot type (see Figure 7-8) and incorporate a trailing edge angle and leading edge vortex generators to reduce stall speed and provide enhanced lateral stability. The flaps are driven by an electric motor. They are extended or retracted by positioning the wing flap selector lever on the control pedestal to the desired flap deflection position. The selector lever is moved up or down in a slotted panel that provides mechanical stops at the 10° and 20° positions. For flap deflections greater than 10°, move the selector lever to the right to clear the stop and position it as desired. A scale and white-tipped pointer on the left side of the selector lever provides a flap position indication. The wing flap system is protected by a "pull-off" type circuit breaker, labeled FLAP MOTOR, on the left sidewall switch and circuit breaker panel.

A standby system can be used to operate the flaps in the event the primary system should malfunction. On earlier airplanes, the standby system consists of a standby motor, a guarded standby flap motor switch and an unguarded standby flap motor up/down switch located on the overhead panel. On later airplanes, both switches have guards which are safetied in the closed position, with breakable copper wire. The guarded standby flap motor switch has NORM and STBY positions. The guarded NORM position of the switch permits operation of the flaps using the control pedestal mounted selector; the STBY position is used to disable the dynamic braking of the primary flap motor when the standby flap motor system is operated.

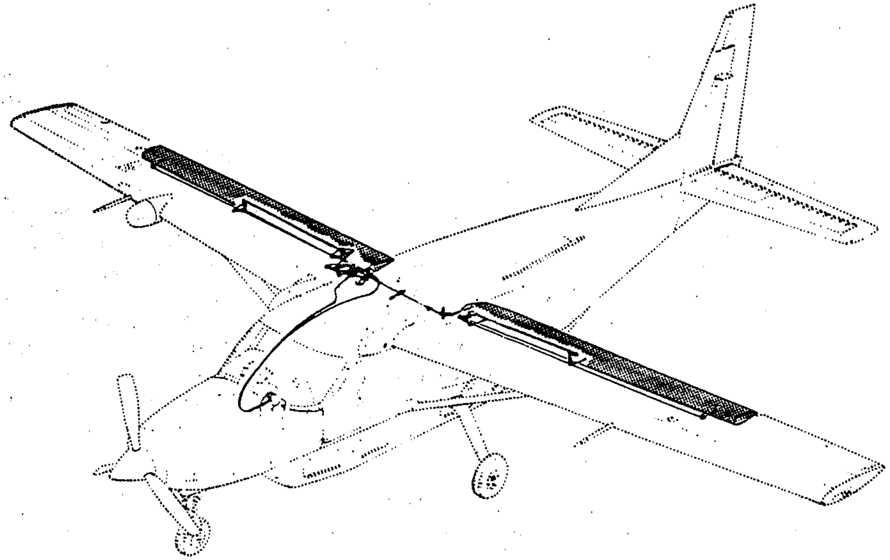


Figure 7-8. Wing Flap System

The standby flap motor up/down switch has UP, center off and DOWN positions. On later airplanes, the switch is guarded in the center off position. To operate the flaps with the standby system, lift the guard breaking safety wire (if installed), and place the standby flap motor switch in STBY position; then, lift the guard (if installed), breaking safety wire and actuate the standby flap motor up/down switch momentarily to UP or DOWN, as desired. Observe the flap position indicator to obtain the desired flap position. Since the standby flap system does not have limit switches, actuation of the standby flap motor up/down switch should be terminated before the flaps reach full up or down travel. After actuation of the standby flap motor system, switch guards should be resafetied to the closed position by maintenance personnel when maintenance action is accomplished. The standby flap system is protected by a "pull-off" type circuit breaker, labeled STBY FLAP MOTOR, located on the left sidewall switch and circuit breaker panel.

LANDING GEAR SYSTEM

The landing gear is of the tricycle type with a steerable nose wheel and two main wheels. Shock absorption is provided by the tubular spring-steel main landing gear struts, an interconnecting spring-steel tube between the two main landing gear struts, and the nose gear oil-filled shock strut and spring-steel drag link. Each main gear wheel is equipped with a hydraulically-actuated single-disc brake on the inboard side of each wheel. To improve operation from unpaved runways, and in other conditions, the standard nose gear fork can be replaced with a three-inch extended nose gear fork.

BAGGAGE/CARGO COMPARTMENT

In the passenger version, the space normally used for baggage consists of the raised area from the back of the cargo doors to the aft cabin bulkhead. Access to the baggage area is gained through the cargo doors, the aft passenger door or from within the cabin. Quick-release tie-down ring/strap assemblies are provided for securing baggage and are attached to baggage floor anchor plates provided in the airplane When utilizing the airplane as a cargo carrier, refer to Section 6 for complete cargo loading details. When loading aft passengers in the passenger version, they should not be placed in the baggage area unless the airplane is equipped with special seating for this area. Also any material that might be hazardous to the airplane or occupants should not be placed anywhere in the airplane. For baggage/cargo area and door dimensions, refer to Section 6.

SEATS

On earlier serial airplanes, standard seating for the airplane consists of a pilot's six-way adjustable seat. A similar six-way adjustable seat is also available for the front passenger. On later serial airplanes, standard seating consists of both a pilot's and front passenger's six-way adjustable seat. Additional cabin seating is available in the passenger version in two different Commuter configurations and one Utility configuration. One Commuter configuration consists of three rows of two-place fixed seats and two (or three) rows of one-place fixed seats. A second Commuter configuration consists of four rows of

uration consists of three rows of two-place fixed seats and two (or three) rows of one-place fixed seats. A second Commuter configuration consists of four rows of one-place fixed seats on each side of the cabin. The Utility configuration consists of four rows of one-place, fixed-position collapsible seats on each side of the cabin.

⚠ WARNING

None of the airplane seats are approved for installation facing aft.

PILOT'S AND FRONT PASSENGER'S SEATS

The six-way adjustable pilot's or front passengers seats may be moved forward or aft, adjusted for height, and the seat back angle changed. Position the seat by pulling on the small T-handle under the center of the seat bottom and slide the seat into position; then release the handle, and check that the seat is locked in place by attempting to move the seat and by noting that the small pin on the end of the T-handle protrudes. The seat is not locked if the pin is retracted or only partially extends. Raise or lower the seat by rotating a large crank under the front right corner of the seat. Seat back angle is adjusted by rotating a small crank under the front left corner of the seat. The seat bottom angle will change as the seat back angle changes, providing proper support. Later serial airplane seats are equipped with armrests which can be moved to the side and raised to a position beside the seat back for stowage.

AFT PASSENGERS' SEATS (COMMUTER) (Passenger Version)

The third, sixth and eleventh seats of one Commuter configuration and all aft seats of the second Commuter configuration are individual fixed-position seats with fixed seat backs. Seats for the fourth and fifth, seventh and eighth, and ninth and tenth positions of the first Commuter configuration are two-place, fixed-position bench type seats with fixed seat backs. All seats are fastened with quick-release fasteners in the fixed position to the seat tracks. The seats are lightweight and quick-removable to facilitate cargo hauling.

AFT PASSENGERS' SEATS (UTILITY) (Passenger Version)

Individual collapsible seats are available for the aft eight passenger positions. The seats, when not in use, are folded into a compact space for stowage in the aft baggage area. When desired, the seats can be unfolded and installed in the passenger area. The seats are readily fastened with quick-release fasteners to the seat tracks in any one of the eight seat positions.

HEADRESTS

Headrests are available for all pilot and passenger seat configurations, except the Utility aft passenger seats. To adjust a pilot seat or front passenger

PILOT'S & PASSENGER'S SEATS (Typical)

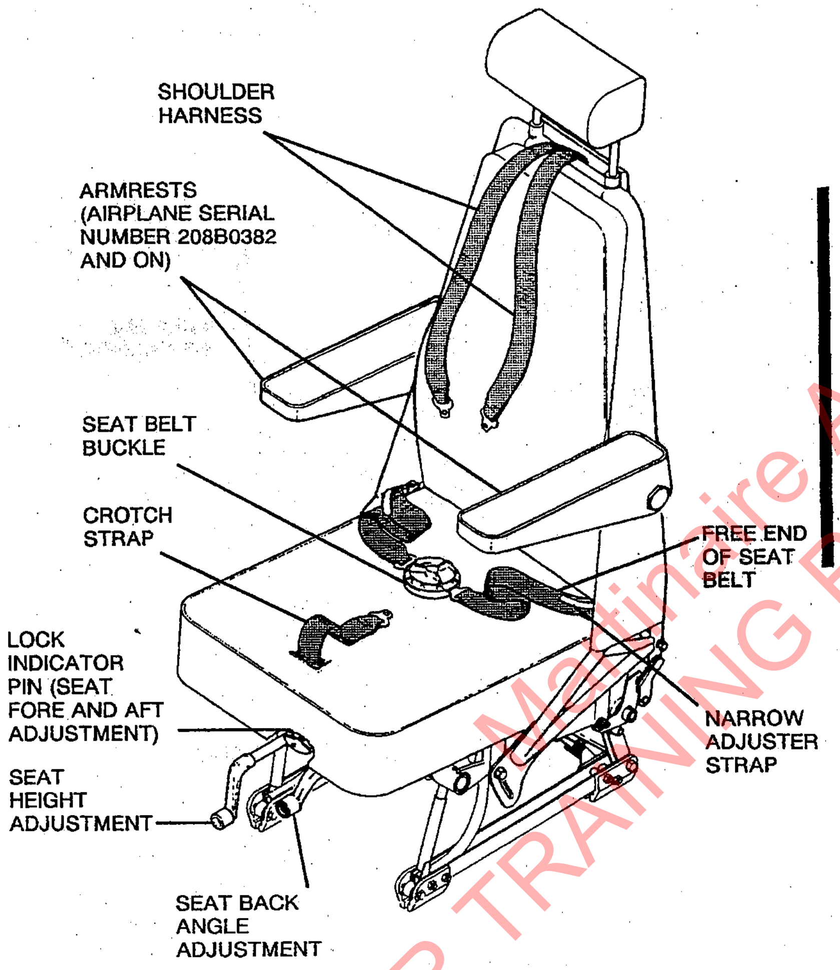


Figure 7-9. Seat Belts And Shoulder Harnesses (Sheet 1 of 2)

AFT PASSENGERS' SEATS (INDIVIDUAL COMMUTER SEATING SHOWN)

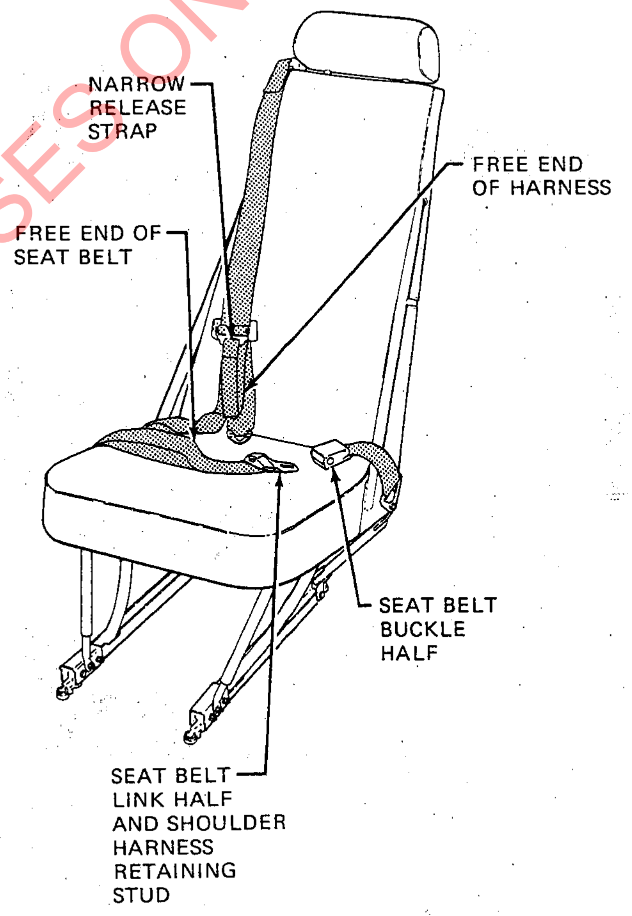


Figure 7-9. Seats, Belts and Shoulder Harnesses (Sheet 2 of 2)

seat headrest, apply enough pressure to it to raise or lower it to the desired level. The aft passenger seat headrests are not adjustable.

SEAT BELTS AND SHOULDER HARNESSES

All seat positions are equipped with seat belts and shoulder harnesses. The pilot's and front passenger's seat positions are equipped with shoulder harnesses with inertia reels.

⚠ WARNING

Failure to properly utilize seat belts and shoulder harnesses could result in SERIOUS or FATAL injury in the event of an accident.

SEAT BELTS, STRAP, AND SHOULDER HARNESSES (Pilot/Front Passenger Seats)

Both the pilot's and front passenger's seat positions are equipped with a five-point restraint system which combines the function of conventional type seat belts, a crotch strap, and an inertia reel equipped double-strap shoulder harness in a single assembly. The seat belts and crotch strap attach to fittings on the lower seat frame and the inertia reel for the shoulder harness attaches to the frame of the seat back.

The right half of the seat belt contains the buckle, which is the connection point for the left belt half, crotch strap, and harnesses. The left belt, crotch strap, and harnesses are fitted with links which insert into the buckle. Both halves of the seat belt have adjusters with narrow straps to enable the belt halves to be lengthened prior to fastening.

To use the restraint system, lengthen each half of the belt as necessary by pulling the buckle (or connecting link) to the lap with one hand while pulling outward on the narrow adjuster strap with the other hand. Insert the left belt link into the left slot of the buckle. Bring the crotch strap upward and insert its link into the bottom slot in the buckle. Finally, position each strap of the shoulder harness over the shoulders and insert their links into the upper slots in the buckle. The seat belts should be tightened for a snug fit by grasping the free end of each belt and pulling up and inward.

During flight operations, the inertia reel allows complete freedom of upper body movement; however, in the event of a sudden deceleration, the reel will lock automatically to protect the occupant.

Release of the belts, strap, and harnesses is accomplished by simply twisting the front section of the buckle in either direction and pulling all connecting links free.

SEAT BELTS (Aft Seats In Passenger Version)

Seat belts for all seats attach to fittings on the seat frame. The belts consist of a link half and a buckle half on each seat. To use the seat belts, lengthen the link half of the belt as needed by grasping the sides of the link and pulling against the belt. Insert and lock the belt link into the buckle. Tighten the belt to a snug fit. To release the seat belts, grasp the top of the buckle opposite the link and pull upward.

SHOULDER HARNESSES (Aft Seats In Passenger Version)

The aft passengers' shoulder harnesses each consist of a single strap which is attached to the back of the seat. The strap is then routed over the back of the seat and down to the occupants lap where it attaches to a retaining stud on the seat belt. To use a shoulder harness, fasten and adjust the seat belt first. Lengthen the harness as required by pulling on the connecting link on the end of the harness and the narrow release strap. Snap the connecting link firmly onto the retaining stud on the seat belt link half. Then adjust to length. A properly adjusted harness will permit the occupant to lean forward enough to sit completely erect, but will prevent excessive forward movement and contact with objects during sudden deceleration.

CABIN ENTRY DOORS

Entry to, and exit from the airplane is accomplished through an entry door on each side of the cabin at the pilot's and front passenger's positions and, on the Passenger Version only, through a two-piece, airstair type door on the right side of the airplane aft of the wing (refer to Section 6 for cabin and cabin entry door dimensions). A cargo door on the left side of the airplane also can be used for cabin entry.

CREW ENTRY DOORS

The left crew entry door incorporates a conventional exterior door handle, a key-operated door lock, a conventional interior door handle, a lock override knob, and an openable window. The right crew entry door incorporates a conventional exterior door handle, a conventional interior door handle, and a manually-operated inside door lock. To open either entry door from outside the airplane (if unlocked), rotate the handle down and forward to the OPEN position. To close the door from inside the airplane, use the conventional door handle and door pull. The inside door handle is a three-position handle with OPEN, CLOSE and LATCHED positions. Place the handle in the CLOSE position and pull the door shut; then rotate the handle forward to the LATCHED position.

When the handle is rotated to the LATCHED position, an over-center action will hold it in that position.

CAUTION

Failure to properly close and latch the crew doors may allow them to open in flight.

A lock override knob on the inside of the left crew door provides a means of overriding the outside door lock from inside the airplane. To operate the override, pull the knob and rotate it in the placarded direction to unlock or lock the door. Both crew doors should be latched prior to flight, and should not be opened intentionally during flight. To lock the crew entry doors when leaving the airplane, lock the right entry door with the manually-operated inside door lock, close the left crew entry door, and using the key, lock the door.

PASSENGER ENTRY DOOR (Passenger Version Only)

The passenger entry door consists of an upper and lower section. When opened, the upper section swings upward and the lower section drops down providing integral steps to aid in boarding or exiting the airplane. The upper door section incorporates a conventional exterior door handle with a separate key-operated lock, a pushbutton exterior door release, and an interior door handle which snaps into a locking receptacle. The lower door section features a flush handle which is accessible from either inside or outside the airplane. This handle is designed so that when the upper door is closed, the handle cannot be rotated to the open position. The lower door also contains integral door support cables and a door lowering device. A cabin door open warning system is provided as a safety feature so that if the upper door is not properly latched, a red light, labeled DOOR WARNING, located on the annunciator panel, illuminates to alert the pilot.

To enter the airplane through the passenger entry door, depress the exterior pushbutton door release, rotate the exterior door handle on the upper door section counterclockwise to the open position, and raise the door section to the over-center position. Following this action, the gas spring telescoping door lift automatically raises the door to the full up position. Once the upper section is open, release the lower section by pulling up on the inside door handle and rotating the handle to the OPEN position. Lower the door section until it is supported by the integral support cables. The door steps deploy automatically from their stowed positions.

WARNING

The outside proximity of the lower door section must be clear before opening the door.

Closing the passenger entry door from inside the airplane is accomplished by grasping the support cables of the lower door section and pulling the door up until the top edge is within reach, then grasping the center of the door and pulling inboard until the door is held snugly against the fuselage door frame. Latch the lower door section by rotating the inside handle forward to the CLOSE position. Check that the lower front and rear latches are properly engaged. After the lower door section is secured, grasp the pull strap on the upper door section and pull down and inboard. As the door nears the closed position, pull inboard firmly to assure engagement of the latching pawls. Once the latching pawls are engaged, the inside handle should be rotated counterclockwise to the horizontal (latched) position, but do not use excessive force. If the handle will not rotate easily, the door is not fully closed. A more firm closing motion should allow the latching pawls to engage and permit the door handle to rotate to the latched position. Then snap the interior handle into its locking receptacle.

CAUTION

Refer to Section 3, Emergency Procedures, for proper operational procedures to be followed if the passenger entry door should inadvertently open in flight.

Exit from the airplane through the passenger entry door is accomplished by pulling the upper door section inside handle from its locked position receptacle, rotating the handle clockwise to the open position, and pushing the door outward. Once the door is partially open, the automatic door lift will raise the upper door section to the fully open position. Next, rotate the lower section door handle up and aft to open position and push the door outward. The telescoping damper will lower the door to its fully open position and the integral steps will deploy.

WARNING

The outside proximity of the lower door section must be clear before opening the door.

Closing the passenger entry door from outside the airplane is accomplished by raising the lower door section until the door is held firmly against the fuselage door frame. Latch the lower door section by rotating the inside handle forward and down to the CLOSE position. After the lower door section is secured, grasp the pull strap on the upper door section and pull down. As the door nears the closed position, grasp the edge of the door and push inward firmly to assure engagement of the latching pawls. Once engaged, the outside door handle can be rotated clockwise to the horizontal (latched) position. After entering the airplane, snap the upper door interior handle into its locking receptacle (unless cargo obstructs access to the door). If desired when leaving the airplane parked, lock the handle in the horizontal position by use of the key in the outside key lock.

⚠ WARNING

Do not use the outside key lock to lock the door prior to flight since the door could not be opened from the inside if it were needed as an emergency exit.

The exterior pushbutton-type lock release, located on the upper door section just forward of the exterior door handle, operates in conjunction with the interior door handle and is used whenever it is desired to open the door from outside the airplane while the interior door handle is in the locked position. Depressing the pushbutton releases the interior door handle lock and allows the exterior door handle to function normally to open the door.

CARGO DOORS

A two-piece cargo door is installed on the left side of the airplane just aft of the wing trailing edge. The cargo door is divided into an upper and a lower section. When opened, the upper section swings upward and the lower section swings forward to create a large opening in the side of the fuselage which facilitates the loading of bulky cargo into the cabin. The upper section of the cargo door incorporates a conventional exterior door handle with a separate key-operated lock, and, on the Passenger Version only, a pushbutton exterior emergency door release and an interior door handle which snaps into a locking receptacle. The upper door also incorporates two telescoping door lifts which raise the door to the fully open position, when opened. A cargo door open warning system is provided as a safety feature so that if the upper door is not properly latched, a red light, labeled DOOR WARNING, located on the annunciator panel, illuminates to alert the pilot. The lower door section features a flush handle which is accessible from either inside or outside the airplane. The handle is designed so that when the upper door is closed, the handle cannot be rotated to the open position.

⚠ WARNING

In an emergency, do not attempt to exit the Cargo Version through the cargo doors without outside assistance. Since the inside of the upper door has no handle, exit from the airplane through these doors without outside assistance is not possible.

⚠ CAUTION

Failure to properly latch the upper cargo door section will result in illumination of the red DOOR WARNING annunciator. Inattention to this safety feature may allow the upper cargo door to open in flight.

To open the cargo door from outside the airplane, depress the upper door section exterior pushbutton door release (Passenger Version only) and rotate the exterior door handle clockwise to the open position. Following this action, the telescoping door lifts will automatically raise the door to the full up position. Once the upper section is open, release the lower section by pulling up on the inside door handle and rotating the handle to the OPEN position. Open the door forward until it swings around next to the fuselage where it can be secured to the fuselage by a holding strap or chain.

To close the cargo door from outside the airplane, disconnect the holding strap or chain from the fuselage, swing the door aft to the closed position, and hold the door firmly against the fuselage door frame to assure engagement of the latching pawls. Latch the lower door section by rotating the inside handle forward and down to the CLOSE position. After the lower door section is secured, grasp the pull strap on the upper door section and pull down. As the door nears the closed position, grasp the edge of the door and push inward firmly to assure engagement of the latching pawls. Once engaged, the exterior door handle can be rotated counterclockwise to the horizontal (latched) position. On the Passenger Version only, after entering the airplane, snap the upper door interior handle into its locking receptacle (unless cargo obstructs access to the door). If desired when leaving the airplane parked, lock the handle in the horizontal position by use of the key in the outside key lock.

To open the cargo door from inside the airplane (Passenger Version only), open the upper door section by pulling the inside door handle from its locked position receptacle, rotating the handle counterclockwise to the vertical position, and pushing the door outward. Once the door is partially open, the automatic door lifts will raise the upper door section to the fully open position. Next, rotate the lower section door handle up and aft to the open position and push the aft end of the door outward. The door may be completely opened and secured to the fuselage with the holding strap or chain from outside.

⚠ WARNING

Do not attempt to exit the Cargo Version through the cargo doors, Since the inside of the upper door has no handle, exit from the airplane through these doors is not possible without outside assistance.

To close the cargo door from inside the airplane (Passenger Version only), disconnect the holding strap or chain from the fuselage and secure it to the door. Pull the door aft to the closed position and hold the aft edge of the door firmly against the fuselage door frame to assure engagement of the latching pawls. Latch the lower door section by rotating the inside handle forward and down to the CLOSE position. After the lower door section is secured, grasp the pull strap on the upper door section and pull down. As the door nears the closed position, grasp the edge of the door and pull inward firmly to assure engagement of the latching pawls. Once engaged, the interior door handle can be rotated clockwise to the horizontal position. Snap the handle into its locking receptacle.

CABIN WINDOWS

The airplane is equipped with a two-piece windshield reinforced with a metal center strip. The passenger version has sixteen cabin side windows of the fixed type including one each in the two crew entry doors, two windows in the cargo door upper section , and one window in the upper section of the passenger entry door. The side window installed adjacent to the pilot's position incorporates a small triangular foul weather window. The foul weather window may be opened for ground ventilation and additional viewing by utilizing the twist latch which is integral to the window. The cargo version has two cabin side windows, one in each crew entry door.

CONTROL LOCKS

A control lock is provided to lock the aileron and elevator control surfaces to prevent damage to these systems by wind buffeting while the airplane is parked. The lock consists of a shaped steel rod and flag. The flag identifies it as a control lock and cautions about its removal before starting the engine. To install the control lock, align the hole in the right side of the pilot's control wheel shaft with the hole in the right side of the shaft collar on the instrument panel and insert the rod into the aligned holes. Installation of the lock will secure the ailerons in a neutral position and the elevators in a slightly trailing edge down position. Proper installation of the lock will place the flag over the left sidewall switch panel.

Earlier serial airplanes are equipped with a rudder lock which is operated by a spring-loaded, pull-type T-handle located on the bottom of the instrument panel to the right of the control pedestal. The handle is labeled RUDDER LOCK - PULL, and when pulled out, locks the rudder in the neutral position. An interlock between the rudder lock and the fuel condition lever prevents locking the rudder when the fuel condition lever is in any position other than CUTOFF. Should the rudder lock T-handle be left in the locked position inadvertently, moving the fuel condition lever out of cutoff, such as during the engine starting sequence, will automatically release the T-handle to the unlocked position. The T-handle is normally released from the locked position by rotating it 90° and allowing it to retract forward to the unlocked position.

Later serial airplanes are equipped with a rudder gust lock which is operated by an external handle on the left side of the tailcone. For information and operating procedures pertaining to this type of lock, refer to Aero Twin Rudder Gust Lock Supplement 2C in Section 9 of this handbook.

The control lock and any other type of locking device should be removed or unlocked prior to starting the engine.

ENGINE

The Pratt & Whitney Canada Inc. PT6A-114A powerplant is a free-turbine engine. It utilizes two independent turbines; one driving a compressor in the gas generator section, and the second driving a reduction gearing for the propeller.

Inlet air enters the engine through an annular plenum chamber formed by the compressor inlet case where it is directed to the compressor. The compressor consists of three axial stages combined with a single centrifugal stage, assembled as an integral unit. It provides a compression ratio of 7.0:1.

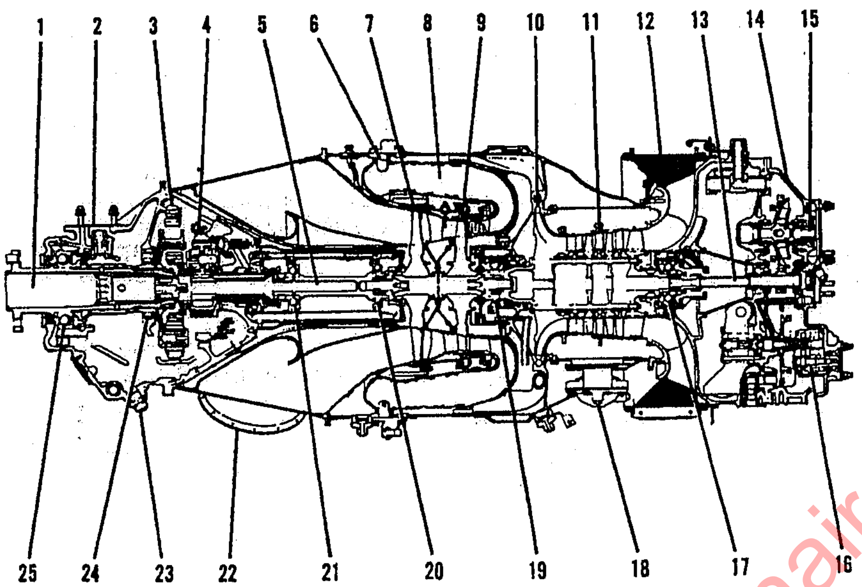
A row of stator vanes located between each stage of compressor rotor blades diffuses the air, raises its static pressure and directs it to the next stage of compressor rotor blades. The compressed air passes through diffuser ducts which turn it 90° in direction. It is then routed through straightening vanes into the combustion chamber.

The combustion chamber liner located in the gas generator case consists of an annular reverse-flow weldment provided with varying sized perforations which allow entry of compressed air. The flow of air changes direction to enter the combustion chamber liner where it reverses direction and mixes with fuel. The location of the combustion chamber liner eliminates the need for a long shaft between the compressor and the compressor turbine, thus reducing the overall length and weight of the engine.

Fuel is injected into the combustion chamber liner by 14 simplex nozzles supplied by a dual manifold. The mixture is initially ignited by two spark igniters which protrude into the combustion chamber liner. The resultant gases expand from the combustion chamber liner, reverse direction and pass through the compressor turbine guide vanes to the compressor turbine. The turbine guide vanes ensure that the expanding gases impinge on the turbine blades at the proper angle, with a minimum loss of energy. The still expanding gases pass forward through a second set of stationary guide vanes to drive the power turbine.

The compressor and power turbines are located in the approximate center of the engine with their shafts extending in opposite directions. The exhaust gas from the power turbine is directed through an exhaust plenum to the atmosphere via a single exhaust port on the right side of the engine.

The engine is flat rated at 675 shaft horsepower (1865 foot-pounds torque at 1900 RPM varying linearly to 1970 foot-pounds torque at 1800 RPM; below 1800 RPM, the maximum torque value remains constant at 1970 foot-pounds).



1. Propeller Shaft
2. Propeller Governor Drive Pad
3. Second Stage Planetary Gear
4. First Stage Planetary Gear
5. Power Turbine Shaft
6. Fuel Nozzle
7. Power Turbine
8. Combustion Chamber
9. Compressor Turbine
10. Centrifugal Compressor Impeller
11. Axial-Flow Compressor Impellers (3)
12. Compressor Air Inlet
13. Accessory Gearbox Drive Shaft
14. Accessory Gearbox Cover
15. Starter-Generator Drive Shaft
16. Oil Scavenge Pump
17. Number 1 Bearing
18. Compressor Bleed Valve
19. Number 2 Bearing
20. Number 3 Bearing
21. Number 4 Bearing
22. Exhaust Outlet
23. Chip Detector
24. Roller Bearing
25. Thrust Bearing

Figure 7-10. Typical Engine Components

Between 1800 and 1600 propeller RPM, the gearbox torque limit of 1970 foot-pounds will not allow the full flat rating of 675 SHP to be achieved. The speed of the gas generator (compressor) turbine (N_g) is 37,500 RPM at 100% N_g. Maximum permissible speed of the gas generator is 38,100 RPM which equals 101.6% N_g. The power turbine speed is 33,000 RPM at a propeller shaft speed of 1900 RPM (a reduction ratio of 0.0576:1).

All engine-driven accessories, with the exception of the propeller tachometer-generator and the propeller governors, are mounted on the accessory gearbox located at the rear of the engine. These are driven by the compressor turbine with a coupling shaft which extends the drive through a conical tube in the oil tank center section.

The engine oil supply is contained in an integral tank which forms part of the compressor inlet case. The tank has a capacity of 9.5 U.S. quarts and is provided with a dipstick and drain plug.

The power turbine drives the propeller through a two-stage planetary reduction gearbox located on the front of the engine. The gearbox embodies an integral torquemeter device which is instrumented to provide an accurate indication of the engine power output.

ENGINE CONTROLS

The engine is operated by four separate controls consisting of a power lever, emergency power lever, propeller control lever, and a fuel condition lever. The power and fuel condition levers are engine controls while the propeller control lever controls propeller speed and feathering.

POWER LEVER

The power lever is connected through linkage to a cam assembly mounted in front of the fuel control unit at the rear of the engine. The power lever controls engine power through the full range from maximum takeoff power back through idle to full reverse. The lever also selects propeller pitch when in the BETA range. The power lever has MAX, IDLE, and BETA and REVERSE range positions. The range from MAX position through IDLE enables the pilot to select the desired power output from the engine. The BETA range enables the pilot to control propeller blade pitch from idle thrust back through a zero or no-thrust condition to maximum reverse thrust.

CAUTION

The propeller reversing linkage can be damaged if the power lever is moved aft of the IDLE position when the propeller is feathered.

EMERGENCY POWER LEVER

The emergency power lever is connected through linkage to the manual override lever on the fuel control unit and governs fuel supply to the engine should a pneumatic malfunction occur in the fuel control unit. When the engine is operating, a failure of any pneumatic signal input to the fuel control unit will result in the fuel flow decreasing to minimum idle (about 48% N_g at sea level and increasing with altitude). The emergency power lever allows the pilot to restore power in the event of such a failure. The emergency power lever has NORMAL, IDLE, and MAX positions. The NORMAL position is used for all normal engine operation when the fuel control unit is operating normally and engine power is selected by the power lever. The range from IDLE position to MAX governs engine power and is used when a pneumatic malfunction has occurred in the fuel control unit and the power lever is ineffective. A mechanical stop in the lever slot requires that the emergency power lever be moved to the left to clear the stop before it can be moved from the NORMAL (full aft) position to the IDLE position.

NOTE

The knob on the emergency power lever has cross-hatching. The cross-hatching is visible when the lever is in MAX position. Also, the emergency power lever is annunciated on the annunciator panel whenever it is unstowed from the NORMAL position. These precautions are intended to preclude starting of the engine with the emergency power lever inadvertently placed in any position other than NORMAL.

CAUTION

- **The emergency power lever and its associated manual override system is considered to be an emergency system and should be used only in the event of a fuel control unit malfunction. When attempting a normal start, the pilot must ensure that the emergency power lever is in the NORMAL (full aft) position; otherwise, an over-temperature condition may result.**
- **When using the fuel control manual override system, engine response may be more rapid than when using the power lever. Additional care is required during engine acceleration to avoid exceeding engine limitations.**

Operation of the emergency power lever is prohibited with the primary power lever out of the IDLE position. The emergency power lever overrides normal fuel control functions and results in the direct operation of the fuel metering valve. The emergency power lever will override the automatic fuel governing and engine acceleration scheduling controlled during normal operation by the primary power lever.

CAUTION

Inappropriate use of the emergency power lever may adversely affect engine operation and durability. Use of the emergency power lever during normal operation of the power lever may result in engine surges, or exceeding the ITT, N_g, and torque limits.

Airplane serials 208B0920 and on, and earlier airplanes incorporating Service Kit SK208-142, have a copper witness wire installed that indicates when the emergency power lever has been moved from the NORMAL position. In the event that the emergency power lever is required due to an engine malfunction, moving the emergency power lever out of the NORMAL position and into the IDLE position easily breaks the copper wire.

After EPL use, the witness wire should be replaced after appropriate maintenance action. An entry shall be made in the airplane logbook indicating the circumstances of the EPL use and the action taken.

PROPELLER CONTROL LEVER

The propeller control lever is connected through linkage to the propeller governor mounted on top of the front section of the engine, and controls propeller governor settings from the maximum RPM position to full feather. The propeller control lever has MAX, MIN, and FEATHER positions. The MAX position is used when high RPM is desired and governs the propeller speed at 1900 RPM. Propeller control lever settings from the MAX position to MIN permit the pilot to select the desired engine RPM for cruise. The FEATHER position is used during normal engine shutdown to stop rotation of the power turbine and front section of the engine. Since lubrication is not available after the gas generator section of the engine has shut down, rotation of the forward section of the engine is not desirable. Also, feathering the propeller when the engine is shut down minimizes propeller windmilling during windy conditions. A mechanical stop in the lever slot requires that the propeller control lever be moved to the left to clear the stop before it can be moved into or out of the FEATHER position.

FUEL CONDITION LEVER

The fuel condition lever is connected through linkage to a combined lever and stop mechanism on the fuel control unit. The lever and stop also function as an idle stop for the fuel control unit rod. The fuel condition lever controls the minimum RPM of the gas generator turbine (N_g) when the power lever is in the IDLE position. The fuel condition lever has CUTOFF, LOW IDLE, and HIGH IDLE positions. The CUTOFF position shuts off all fuel to the engine fuel nozzles. LOW IDLE positions the control rod stop to provide an RPM of 52 N_g. HIGH IDLE positions the control rod stop to provide an RPM of 65 N_g.

QUADRANT FRICTION LOCK

A quadrant friction lock, located on the right side of the pedestal, is provided to minimize creeping of the engine controls once they have been set. The lock is a knurled knob which increases friction on the engine controls when rotated clockwise.

ENGINE INSTRUMENTS

Engine operation is monitored by the following instruments: torque indicator, propeller RPM indicator, ITT indicator, Ng RPM indicator, fuel flow indicator, oil pressure gage, and oil temperature gage.

TORQUE INDICATOR

The torque indicator is located on the upper portion of the instrument panel and indicates the torque being produced by the engine. On some Cargo Versions, the torque indicator is electrically powered and operates in conjunction with a transmitter located on the top of the reduction gearbox front case. The transmitter senses the difference between the engine torque pressure and the pressure in the engine case and transmits this data to the torque indicator. The torque indicator converts this information into an indication of torque in foot-pounds. The torque indicator system is powered by 28-volt DC power through a circuit breaker, labeled TRQ IND, on the left sidewall switch and circuit breaker panel. On other Cargo Versions and the Passenger Version, the torque indicator is pressure actuated. Two independent lines enter the back of the torque indicator. One line measures the engine torque pressure and one line measures the reduction gearbox internal pressure. The torque indicator monitors the engine torque pressure and converts this pressure into an indication of torque in foot-pounds. Instrument markings indicate that the normal operating range (green arc) is from 0 to 1865 foot-pounds, the alternate power range (striped green arc) is from 1865 to 1970 foot-pounds, and maximum torque (red line) is 1970 foot-pounds. Maximum takeoff torque is denoted by "T.O." and a red wedge at 1865 foot-pounds.

(Continued)

PROPELLER RPM INDICATOR

The propeller RPM indicator is located on the upper portion of the instrument panel. The instrument is marked in increments of 50 RPM and indicates propeller speed in revolutions per minute. The instrument is electrically-operated from the propeller tachometer-generator which is mounted on the right side of the front case. Instrument markings indicate a normal operating range (green arc) of from 1600 to 1900 RPM and a maximum (red line) of 1900 RPM.

ITT INDICATOR

The ITT (interturbine temperature) indicator is located on the upper portion of the instrument panel. The instrument displays the gas temperature between the compressor and power turbines. Instrument markings indicate a normal operating range (green arc) of from 100°C to 740°C, and a maximum (red line) of 805°C. Also, instrument markings indicate a maximum starting temperature (red triangle) of 1090°C.

N_g% RPM INDICATOR

The Ng RPM indicator is located on the upper portion of the instrument panel. The instrument indicates the percent of gas generator RPM based on a figure of 100% at 37,500 RPM. The instrument is electrically-operated from the gas generator tachometer-generator mounted on the lower right-hand portion of the accessory case. Instrument markings indicate a normal operating range (green arc) of from 52% to 101.6% and a maximum (red line) of 101.6%.

FUEL FLOW INDICATOR

Details of the fuel flow indicator are included under Fuel System in a later paragraph in this section.

OIL PRESSURE GAGE

The oil pressure gage is the left half of a dual-indicating instrument mounted on the upper portion of the instrument panel. A direct pressure oil line from the engine delivers oil at engine operating pressure to the oil pressure gage. Instrument markings indicate a minimum operating pressure (red line) of 40 psi, a cautionary range (yellow arc) of from 40 to 85 psi, a normal operating range (green arc) of from 85 to 105 psi, and a maximum (red line) of 105 psi.

OIL TEMPERATURE GAGE

The oil temperature gage is the right half of a dual-indicating instrument mounted on the upper portion of the instrument panel. The instrument is operated by an electrical-resistance type temperature sensor which receives power from the airplane electrical system.

Instrument markings:

Airplane serials 208B0001 thru 208B0999 not equipped with Service Kit SK208-147: Minimum operating temperature (red line) -40°C, cautionary range (yellow arc) from -40°C to 10°C, normal operating range (green arc) from 10°C to 99°C, and maximum (red line) 99°C.

Airplane serials 208B1000 and on, and earlier airplanes equipped with Service Kit SK208-147: Minimum operating temperature (red line) -40°C, cautionary range (yellow arc) from -40°C to 10°C, normal operating range (green arc) from 10°C to 99°C, 10-minute transient range (yellow arc) 99°C to 104°C, and maximum (red line) 104°C.

NEW ENGINE BREAK-IN AND OPERATION

There are no specific break-in procedures required for the Pratt & Whitney Canada Inc. PT6A-114A turboprop engine. The engine may be safely operated throughout the normal ranges authorized by the manufacturer at the time of delivery of your airplane.

ENGINE LUBRICATION SYSTEM

The lubrication system consists of a pressure system, a scavenge system and a breather system. The main components of the lubrication system include an integral oil tank at the back of the engine, an oil pressure pump at the bottom of the oil tank, an external double-element scavenge pump located on the back of the accessory case, an internal double-element scavenge pump located inside the accessory gearbox, an oil-to-fuel heater located on the top rear of the accessory case, an oil filter located internally on the right side of the oil tank, and an oil cooler located on the right side of the nose cowl. A large capacity oil cooler is installed in modified early serial airplanes and all later serial airplanes to increase the hot day outside air temperature limits for flight operations. The large oil cooler has 25% more airflow area than a standard cooler.

Oil is drawn from the bottom of the oil tank through a filter screen where it passes through a pressure relief valve for regulation of oil pressure. The pressure oil is then delivered from the main oil pump to the oil filter where extraneous matter is removed from the oil and precluded from further circulation. Pressure oil is then routed through passageways to the engine bearings, reduction gears, accessory drives, torquemeter, and propeller governor. Also, pressure oil is routed to the oil-to-fuel heater where it then returns to the oil tank.

After cooling and lubricating the engine moving parts, oil is scavenged as follows: Oil from the number 1 bearing compartment is returned by gravity into the accessory gearbox. Oil from the number 2 bearing is scavenged by the front element of the internal scavenge pump back into the accessory gearbox. Oil from the number 3 and number 4 bearings is scavenged by the front element of the external scavenge pump into the accessory gearbox. Oil from the propeller governor, front thrust bearing, reduction gear accessory drives, and torquemeter is scavenged by the rear element of the external scavenge pump where it is routed through a thermostatically-controlled oil cooler and then returned to the oil tank. Also, the rear element of the internal scavenge pump scavenges oil from the accessory case and routes it through the oil cooler where it then returns to the oil tank.

Breather air from the engine bearing compartments and from the accessory and reduction gearboxes is vented overboard through a centrifugal breather installed in the accessory gearbox. The bearing compartments are connected to the accessory gearbox by cored passages and existing scavenge oil return lines. A bypass valve, immediately upstream of the front element of the internal scavenge pump, vents the accessory gearbox when the engine is operating at high power.

An oil dipstick/filler cap is located at the rear of the engine on the left side and is accessible when the left side of the upper cowling is raised. Markings which indicate U.S. quarts low if the oil is hot are provided on the dipstick to faciliate oil servicing. The oil tank capacity is 9.5 U.S. quarts and total system capacity is 14 U.S. quarts. For engine oil type and brand, refer to Section 8.

IGNITION SYSTEM

The ignition system consists of two igniters, an ignition exciter, two high-tension leads, an ignition monitor light, an ignition switch, and a starter switch. Engine ignition is provided by two igniters in the engine combustion chamber. The igniters are energized by the ignition exciter mounted on the engine mount on the right side of the engine compartment. Electrical energy from the ignition exciter is transmitted through two high-tension leads to the igniters in the engine. The ignition system is normally energized only during engine start.

Ignition is controlled by an ignition switch and a starter switch located on the left sidewall switch and circuit breaker panel. The ignition switch has two positions, ON and NORMAL. The NORMAL position of the switch arms the ignition system so that ignition will be obtained when the starter switch is placed in the START position. The NORMAL position is used during all ground starts and during air starts with starter assist. The ON position of the switch provides continuous ignition regardless of the position of the starter switch. This position is used for air starts without starter assist, for operation on water-covered runways, during flight in heavy precipitation, during inadvertent icing encounters until the inertial separator has been in bypass for 5 minutes, and when near fuel exhaustion as indicated by illumination of the RESERVOIR FUEL LOW annunciator.

The main function of the starter switch is control of the starter for rotating the gas generator portion of the engine during starting. However, it also provides ignition during starting. For purposes of this discussion, only the ignition functions of the switch are described. For other functions of the starter switch, refer to paragraph titled Starting System, in this section. The starter switch has three positions, OFF, START, and MOTOR. The OFF position shuts off the ignition system and is the normal position at all times except during engine start or engine clearing. The START position energizes the engine ignition system provided the ignition switch is in the NORMAL position. After the engine has started during a ground or air start, the starter switch must be manually positioned to OFF for generator operation.

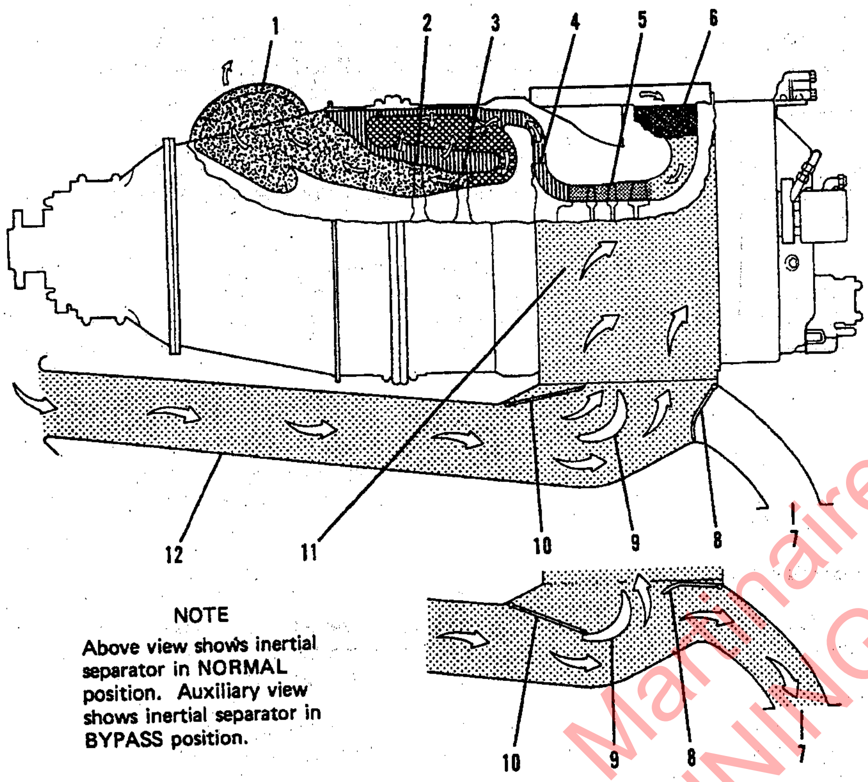
A green annunciator, located on the annunciator panel, is labeled IGNITION ON, and will illuminate when electrical power is being applied to the igniters. The ignition system is protected by a ^"pull-off" type circuit breaker, labeled IGN, on the left sidewall switch and circuit breaker panel.

AIR INDUCTION SYSTEM

The engine air inlet is located at the front of the engine nacelle to the left of the propeller spinner. Ram air entering the inlet flows through ducting and an inertial separator system and then enters the engine through a circular plenum chamber where it is directed to the compressor by guide vanes. The compressor air inlet incorporates a screen which will prevent entry of large articles, but does not filter the inlet air.

INERTIAL SEPARATOR SYSTEM

An inertial separator system in the engine air inlet duct prevents moisture particles from entering the compressor air inlet plenum when in bypass mode. The inertial separator consists of two movable vanes and a fixed airfoil which, during normal operation, route the inlet air through a gentle turn into the compressor air inlet plenum. When separation of moisture particles is desired, the vanes are positioned so that the inlet air is forced to execute a sharp turn in order to enter the inlet plenum. This sharp turn causes any moisture particles to separate from the inlet air and discharge overboard through the inertial separator outlet in the left side of the cowling.



NOTE

Above view shows inertial separator in NORMAL position. Auxiliary view shows inertial separator in BYPASS position.

CODE

- RAM AIR
- RAM AIR COMPRESSED WHILE FLOWING THROUGH THREE STAGES OF AXIAL-FLOW IMPELLERS
- RAM AIR COMPRESSED WHILE FLOWING THROUGH CENTRIFUGAL IMPELLER
- COMPRESSED AIR INJECTED WITH FUEL AND IGNITED
- BURNED FUEL-AIR MIXTURE IS EXPANDED AND DRIVES COMPRESSOR TURBINE AND POWER TURBINE, AND IS THEN EXHAUSTED

1. Primary Exhaust Pipe
2. Power Turbine
3. Compressor Turbine
4. Centrifugal Impeller
5. Axial-Flow Impellers (3)
6. Engine Air Inlet
7. Inertial Separator Outlet
8. Inertial Separator Rear Vane
9. Inertial Separator Airfoil
10. Inertial Separator Front Vane
11. Induction Air Inlet Plenum
12. Induction Air Inlet Duct

Figure 7-11. Engine Air Flow

Inertial separator operation is controlled by a T-handle located on the lower instrument panel. The T-handle is labeled BYPASS-PULL, NORMAL-PUSH. The inertial separator control should be moved to the BYPASS position prior to running the engine during ground or flight operation in visible moisture (clouds, rain, snow, ice crystals) with an OAT of 4°C or less. It may also be used for ground operations or takeoffs from dusty, sandy field conditions to minimize ingestion of foreign particles into the compressor. The normal position is used for all other operations.

The T-handle locks in the NORMAL position by rotating the handle clockwise 1/4 turn to its vertical position. To unlock, push forward slightly and rotate the handle 90° counterclockwise. The handle can then be pulled into the BYPASS position. Once moved to the BYPASS position, air loads on the movable vanes hold them in this position.

NOTE

When moving the inertial separator control from BYPASS to NORMAL position during flight, reduction of engine power will reduce the control forces.

EXHAUST SYSTEM

The exhaust system consists of a primary exhaust pipe attached to the right side of the engine just aft of the propeller reduction gearbox. A secondary exhaust duct, fitted over the end of the primary exhaust pipe carries the exhaust gases away from the cowling and into the slipstream. The juncture of the primary exhaust pipe and secondary exhaust duct is located directly behind the oil cooler. Since the secondary exhaust duct is of larger diameter than the primary exhaust pipe, a venturi effect is produced by the flow of exhaust. This venturi effect creates a suction behind the oil cooler which augments the flow of cooling air through the cooler. This additional airflow improves oil cooling during ground operation of the engine.

ENGINE FUEL SYSTEM

The engine fuel system consists of an oil-to-fuel heater, an engine-driven fuel pump, a fuel control unit, a flow divider and dump valve, a dual fuel manifold with 14 simplex nozzles, and two fuel drain lines. The system provides fuel flow to satisfy the speed and power demands of the engine.

Fuel from the airplane reservoir is delivered to the oil-to-fuel heater which is essentially a heat exchanger which utilizes heat from the engine lubricating oil system to preheat the fuel in the fuel system. A fuel temperature-sensing oil bypass valve regulates the fuel temperature by either allowing oil to flow through the heater circuit or bypass it to the engine oil tank.

Fuel from the oil-to-fuel heater then enters the engine-driven fuel pump chamber through a 74-micron inlet screen. The inlet screen is spring-loaded and should it become blocked, the increase in differential pressure will overcome the spring and allow unfiltered fuel to flow into the pump chamber. The pump increases the fuel pressure and delivers it to the fuel control unit via a 10-micron filter in the pump outlet. A bypass valve and cored passages in the pump body enables unfiltered high pressure fuel to flow to the fuel control unit in the event the outlet filter becomes blocked.

The fuel control unit consists of a fuel metering section, a temperature compensating section, and a gas generator (N_g) pneumatic governor. The fuel control unit determines the proper fuel schedule to provide the power required as established by the power lever input. This is accomplished by controlling the speed of the compressor turbine. The temperature compensating section alters the acceleration fuel schedule to compensate for fuel density differences at different fuel temperatures, especially during engine start. The power turbine governor, located in the propeller governor housing, provides power turbine overspeed protection in the event of propeller governor failure. This is accomplished by limiting fuel to the gas generator. During reverse thrust operation, maximum power turbine speed is controlled by the power turbine governor. The temperature compensator alters the acceleration fuel schedule of the fuel control unit to compensate for variations in compressor inlet air temperature. Engine characteristics vary with changes in inlet air temperature, and the acceleration fuel schedule must, in turn, be altered to prevent compressor stall and/or excessive turbine temperatures.

The flow divider schedules the metered fuel, from the fuel control unit, between the primary and secondary fuel manifolds. The fuel manifold and nozzle assemblies deliver fuel to the combustion chamber through 10 primary and 4 secondary fuel nozzles. During engine start, metered fuel is delivered initially by the primary nozzles, with the secondary nozzles cutting in above a preset value. All nozzles are operative at idle and above.

When the fuel cutoff valve in the fuel control unit closes during engine shutdown, both primary and secondary manifolds are connected to a dump valve port and residual fuel in the manifolds is allowed to drain into the fuel can attached to the firewall where it can be drained daily.

COOLING SYSTEM

No external cooling provisions are provided for the PT6A-114A engine in this installation. However, the engine incorporates an extensive internal air system which provides for bearing compartment sealing and for compressor and power turbine disk cooling. For additional information on internal engine air systems, refer to the engine maintenance manual for the airplane.

STARTING SYSTEM

The starting system consists of a starter/generator, a starter switch, and a starter annunciator light. The starter/generator functions as a motor for engine starting and will motor the gas generator section until a speed of 46% N_g is reached, at which time, the start cycle will automatically be terminated by a speed sensing switch located in the starter/generator. The starter/generator is controlled by a three-position starter switch located on the left sidewall switch and circuit breaker panel. The switch has OFF, START, and MOTOR positions. The OFF position deenergizes the ignition and starter circuits and is the normal position at all times except during engine start. The START position of the switch energizes the starter/generator which rotates the gas generator portion of the engine for starting. Also, the START position energizes the ignition system, provided the ignition switch is in the NORMAL position. When the engine has started, the starter switch must be manually placed in the OFF position to de-energize the ignition system and activate the generator system. The MOTOR position of the switch motors the engine without having the ignition circuit energized and is used for motoring the engine when an engine start is not desired. This can be used for clearing fuel from the engine, washing the engine compressor, etc. The MOTOR position is spring-loaded back to the OFF position. Also, an interlock between the MOTOR position of the starter switch and the ignition switch prevents the starter from motoring unless the ignition switch is in the NORMAL position. This prevents unintentional motoring of the engine with the ignition on. Starter contactor operation is indicated by an amber annunciator, labeled STARTER ENERGIZED, on the annunciator panel.

ENGINE ACCESSORIES

All engine-driven accessories, with the exception of the propeller tachometer-generator and the propeller governors, are mounted on the accessory gearbox located at the rear of the engine. These accessories are driven from the compressor turbine by a coupling shaft which extends the drive through a conical tube in the oil tank center section.

OIL PUMP

Pressure oil is circulated from the integral oil tank through the engine lubrication system by a self-contained, gear-type pressure pump located in the lowest part of the oil tank. The oil pump is contained in a cast housing which is bolted to the front face of the accessory diaphragm, and is driven by the accessory gear shaft. The oil pump body incorporates a circular mounting boss to accommodate a check valve, located in the end of the filter housing. A second mounting boss on the pump accommodates a pressure relief valve.

FUEL PUMP

The engine-driven fuel pump is mounted on the accessory gearbox at the 2 o'clock position. The pump is driven through a gear shaft and splined coupling. The coupling splines are lubricated by oil mist from the auxiliary gearbox through a hole in the gear shaft. Another splined coupling shaft extends the drive to the fuel control unit which is bolted to the rear face of the pump. Fuel from the oil-to-fuel heater enters the fuel pump through a 74-micron inlet screen. Then, fuel enters the pump gear chamber, is boosted to high pressure, and delivered to the fuel control unit through a 10-micron pump outlet filter. A bypass valve and cored passages in the pump casing enable unfiltered high pressure fuel to flow from the pump gears to the fuel control unit should the outlet filter become blocked. An internal passage originating at the mating face with the fuel control unit returns bypass fuel from the fuel control unit to the pump inlet downstream of the inlet screen. A pressure regulating valve in this line serves to pressurize the pump gear bushings.

N_g TACHOMETER-GENERATOR

The N_g tachometer-generator produces an electric current which is used in conjunction with the gas generator % RPM indicator to indicate gas generator RPM. The N_g tachometer-generator drive and mount pad is located at the 5 o'clock position on the accessory gearbox and is driven from the internal scavenge pump. Rotation is counterclockwise with a drive ratio of 0.1121:1.

PROPELLER TACHOMETER-GENERATOR

The propeller tachometer-generator produces an electric current which is used in conjunction with the propeller RPM indicator. The propeller tachometer-generator drive and mount pad is located on the right side of the reduction gearbox case and rotates clockwise with a drive ratio of 0.1273:1.

TORQUEMETER

The torquemeter is a hydro-mechanical torque measuring device located inside the first stage reduction gear housing to provide an accurate indication of engine power output. The difference between the torquemeter pressure and the reduction gearbox internal pressure accurately indicates the torque being produced. On some Cargo Versions, the two pressures are internally routed to bosses located on the top of the reduction gearbox front case and to a pressure transducer which is electrically connected to the torque indicator which indicates the correct torque pressure. On other Cargo Versions and the Passenger Version, the two pressures are internally routed to bosses located on the top of the reduction gearbox front case and are then plumbed to the torque indicator which indicates the correct torque pressure.

STARTER/GENERATOR

The starter/generator is mounted on the top of the accessory case at the rear of the engine. The starter/generator is a 28-volt, 200-amp engine-driven unit that functions as a motor for engine starting and, after engine start, as a generator for the airplane electrical system. When operating as a starter, a speed sensing switch in the starter/generator will automatically shut down the starter, thereby providing overspeed protection and automatic shutoff. The starter/generator is air cooled by an integral fan and by ram air ducted from the front of the engine cowling.

INTERTURBINE TEMPERATURE SENSING SYSTEM

The interturbine temperature sensing system is designed to provide the operator with an accurate indication of engine operating temperatures taken between the compressor and power turbines. The system consists of twin leads, two bus bars, and eight individual chromel-alumel thermocouple probes connected in parallel. Each probe protrudes through a threaded boss on the power turbine stator housing into an area adjacent to the leading edge of the power turbine vanes. The probe is secured to the boss by means of a floating, threaded fitting which is part of the thermocouple probe assembly. Shielded leads connect each bus bar assembly to a terminal block which provides a connecting point for external leads to the ITT indicator in the airplane cabin.

PROPELLER GOVERNOR

The propeller governor is located in the 12 o'clock position on the front case of the reduction gearbox. Under normal conditions, the governor acts as a constant speed unit, maintaining the propeller speed selected by the pilot by varying the propeller blade pitch to match the load to the engine torque. The propeller governor also has a power turbine governor section built into the unit. Its function is to protect the engine against a possible power turbine overspeed in the event of a propeller governor failure. If such an overspeed should occur, a governing orifice in the propeller governor is opened by flyweight action to bleed off compressor discharge pressure through the governor and computing section of the fuel control unit. When this occurs, compressor discharge pressure, acting on the fuel control unit governor bellows, decreases and moves the metering valve in a closing direction, thus reducing fuel flow to the flow divider.

PROPELLER OVERSPEED GOVERNOR

The propeller overspeed governor is located at the 10 o'clock position on the front case of the reduction gearbox. The governor acts as a safeguard against propeller overspeed should the primary propeller governor fail. The propeller overspeed governor regulates the flow of oil to the propeller pitch-change mechanism by means of a flyweight and speeder spring arrangement similar to the primary propeller governor. Since it has no mechanical controls, the overspeed governor is equipped with a test solenoid that resets the governor below its normal overspeed setting for ground test. The overspeed governor test switch is located on the left side of the instrument panel. For a discussion of this switch, refer to the paragraph titled Propellers in this section.

ENGINE MOUNT

The engine mount is a 9-element space frame weldment fabricated from 4130 steel. The space frame attaches to the firewall at five points and has an engine mounting ring that attaches to the front of the frame at four points. The forward mounting ring also facilitates engine removal without disturbing the nose gear attachment.

ENGINE FIRE DETECTION SYSTEM

The engine fire detection system consists of a heat sensor in the engine compartment, a warning light, labeled ENGINE FIRE, on the annunciator panel, and a warning horn above the pilot. The heat sensor consists of three flexible closed loops. When high engine compartment temperatures are experienced, the heat causes a change in resistance in the closed loops. This change in resistance is sensed by a control box, located on the aft side of the firewall, which will illuminate the annunciator light and trigger the audible warning horn. Fire warning is initiated when temperatures in the engine compartment exceed 425°F (218°C) on the first section (firewall), 625°F (329°C) on the second section (around the exhaust), or 450°F (232°C) on the third section (rear engine compartment). A test switch, labeled FIRE DETECT TEST, is located adjacent to the annunciator panel. When depressed, the ENGINE FIRE annunciator will illuminate and the warning horn will sound indicating that the fire warning circuitry is operational. The system is protected by a "pull-off" type circuit breaker, labeled FIRE DET, on the left sidewall switch and circuit breaker panel.

ENGINE GEAR REDUCTION SYSTEM

The reduction gear and propeller shaft, located in the front of the engine, are housed in two magnesium alloy castings which are bolted together at the exhaust outlet. The gearbox contains a two-stage planetary gear train, three accessory drives, and propeller shaft. The first-stage reduction gear is contained in the rear case, while the second-stage reduction gear, accessory drives, and propeller shaft are contained in the front case. Torque from the power turbine is transmitted to the first-stage reduction gear, from there to the second-stage reduction gear, and then to the propeller shaft. The reduction ratio is from a maximum power turbine speed of 33,000 RPM down to a propeller speed of 1900 RPM or a reduction ratio of 0.0576:1.

The accessories, located on the front case of the reduction gearbox, are driven by a bevel gear mounted at the rear of the propeller shaft thrust bearing assembly. Drive shafts from the bevel drive gear transmit rotational power to the three pads which are located at the 12, 3 and 9 o'clock positions.

Propeller thrust loads are absorbed by a flanged ball bearing assembly located on the front face of the reduction gearbox center bore. The bevel drive gear adjusting spacer, thrust bearing, and seal runner are stacked and secured to the propeller shaft by a key-washer and spanner nut. A thrust bearing cover assembly is secured by bolts at the front flange of the reduction gearbox front case.

CHIP DETECTORS (Optional)

Two chip detectors are installed on the engine, one on the underside of the reduction gearbox case and one on the underside of the accessory gearbox case. The chip detectors are electrically connected to an annunciator, labeled CHIP DETECTOR, on the instrument panel. The annunciator will illuminate when metal chips are present in one or both of the chip detectors. Illumination of the CHIP DETECTOR annunciator necessitates the need for inspection of the engine for abnormal wear.

OIL BREATHER DRAIN CAN

Some Model 208B airplanes have an oil breather drain can mounted on the right lower engine mount truss. This can collects any engine oil discharge coming from the accessory pads for the alternator drive pulley, starter/generator, air conditioner compressor (if installed), and the propeller shaft seal. This can should be drained after every flight. A drain valve on the bottom right side of the engine cowling enables the pilot to drain the contents of the oil breather drain can into a suitable container. The allowable quantity of oil discharge per hour of engine operation is 14 cc for airplanes with air conditioning and 11 cc for airplanes without air conditioning. If the quantity of oil drained from the can is greater than specified, the source of the leakage should be identified and corrected prior to further flight.

PROPELLER

The airplane may be equipped with either a Hartzell, composite material, three-bladed propeller or a McCauley aluminum material, three-bladed propeller. Both propellers are constant-speed, full-feathering, reversible, single-acting, governor-regulated propellers. With either propeller, a setting introduced into the governor with the propeller control lever establishes the propeller speed. The propeller utilizes oil pressure which opposes the force of springs and counter-weights to obtain correct pitch for the engine load. Oil pressure from the propeller governor drives the blades toward low pitch(increases RPM) while the springs and counterweights drive the blades toward high pitch (decreasing RPM). The source of oil pressure for propeller operation is furnished by the engine oil system, boosted in pressure by the governor gear pump, and supplied to the propeller hub through the propeller flange.

To feather the propeller blades, the propeller control lever on the control pedestal is placed in the FEATHER position; counterweights and spring tension will continue to twist the propeller blades through high pitch and into the streamlined or feathered position. Unfeathering the propeller is accomplished by positioning the propeller control lever forward of the feather gate. The unfeathering system uses engine oil pressure to force the propeller out of feather.

Reversed propeller pitch is available for decreasing ground roll during landing. To accomplish reverse pitch, the power lever is retarded beyond IDLE and well into the BETA range. Maximum reverse power is accomplished by retarding the power lever to the MAX REVERSE position which increases power output from the gas generator and positions the propeller blades at full reverse pitch. An externally grooved feedback ring is provided with the propeller.

Motion of the feedback ring is proportional to propeller blade angle, and is picked up by a carbon block running in the feedback ring. The relationship between the axial position of the feedback ring and the propeller blade angle is used to maintain control of blade angle from idle to full reverse.

⚠ CAUTION

The propeller reversing linkage can be damaged if the power lever is moved aft of the IDLE position when the propeller is feathered.

OVERSPEED GOVERNOR TEST SWITCH

An overspeed governor test switch is located on the left side of the instrument panel. The switch is the push-to-test type and is used to test the propeller overspeed governor during engine run-up. The switch, when depressed, actuates a solenoid on the propeller overspeed governor which restricts propeller RPM when the power lever is advanced. To check for proper operation of the overspeed governor, during engine run-up, depress the press-to-test switch and advance the power lever until propeller RPM stabilizes; propeller RPM should not exceed 1750 ±60 RPM.

FUEL SYSTEM

The airplane fuel system (see Figure 7-12) consists of two vented, integral fuel tanks with shutoff valves, a fuel selectors off warning system, a fuel reservoir, an ejector fuel pump, an electric auxiliary boost pump, a reservoir manifold assembly, a firewall shutoff valve, a fuel filter, an oil-to-fuel heater, an engine-driven fuel pump, a fuel control unit, a flow divider, dual manifolds, and 14 fuel nozzle assemblies. A fuel can and drain is also provided. Refer to Figure 7-13 for fuel quantity data for the system.

⚠ WARNING

Unusable fuel levels for this airplane were determined in accordance with Federal Aviation Regulations. Failure to operate the airplane in compliance with the Fuel Limitations specified in Section 2 may further reduce the amount of fuel available in flight.

Fuel flows from the tanks through the two fuel tank shutoff valves at each tank. The fuel tank shutoff valves are mechanically controlled by two fuel selectors, labeled LEFT, ON and OFF and RIGHT, ON and OFF, located on the

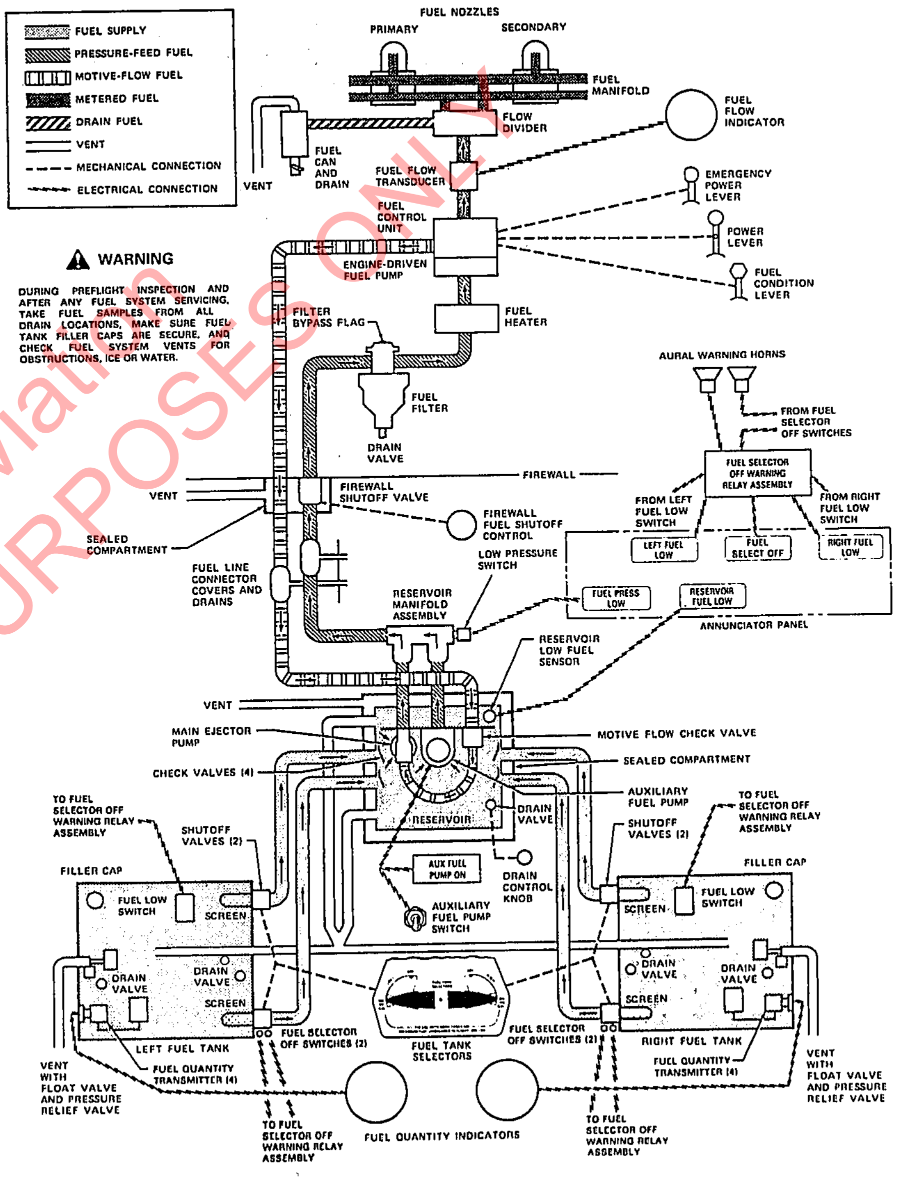


Figure 7-12. Fuel System

FUEL QUANTITY DATA				
UNITS OF MEASURE	FUEL LEVEL (QUANTITY EACH TANK)	TOTAL FUEL	TOTAL UNUSABLE	TOTAL USABLE ALL FLIGHT CONDITIONS
POUNDS	FULL (OUTBOARD FILLERS) 1122.25 **1124.25**	2244.5 **2248.5**	20.1 **24.1**	2224.4 **2224.4**
U.S. GALLONS	FULL (OUTBOARD FILLERS) 167.5 **167.8**	335 **335.6**	3.0 **3.6**	332 **332**

NOTES:

1. Pounds/gallons in light-faced type are capacities for S/N 208B0001 thru 208B0089 not modified with SK208-52 (wing tank external sump).
2. Pounds/gallons in **bold-faced** type are capacities for S/N 208B0001 thru 208B0089 modified with SK208-52 (wing tank external sump) and S/N 208B0090 and On.
3. Pounds are based on a fuel specific weight of 6.7 pounds per U.S. gallon.

⚠ WARNING

To achieve full capacity, fill fuel tank to the top of the fuel filler neck. Filling fuel tanks to the bottom of the fuel filler collar (level with flapper valve) allows space for thermal expansion and results in a decrease in fuel capacity of four gallons per side (eight gallons total).

Figure 7-13. Fuel Quantity Data

overhead panel. By manipulating the fuel selectors, the pilot can select either left or right fuel tanks or both at the same time. Normal operation is with both tanks on. Fuel flows by gravity from the shutoff valves in each tank to the fuel reservoir. The reservoir is located at the low point in the fuel system which maintains a head of fuel around the ejector boost pump and auxiliary boost pump which are contained within the reservoir. This head of fuel prevents pump cavitation in low-fuel quantity situations, especially during inflight maneuvering. Fuel in the reservoir is pumped by the ejector boost pump or by the electric auxiliary boost pump to the reservoir manifold assembly. The ejector boost pump, which is driven by motive fuel flow from the fuel control unit, normally provides fuel flow when the engine is operating. In the event of failure of the ejector boost pump, the electric boost pump will automatically turn on, thereby supplying fuel flow to the engine. The auxiliary boost pump is also used to supply fuel flow during starting. Fuel in the reservoir manifold then flows through a fuel shutoff

valve located on the aft side of the firewall. This shutoff valve enables the pilot to cut off all fuel to the engine.

After passing through the shutoff valve, fuel is routed through a fuel filter located on the front side of the firewall. The fuel filter incorporates a bypass feature which allows fuel to bypass the filter in the event the filter becomes blocked with foreign material. A red filter bypass flag on the top of the filter extends upward when the filter is bypassing fuel. Fuel from the filter is then routed through the oil-to-fuel heater to the engine-driven fuel pump where fuel is delivered under pressure to the fuel control unit. The fuel control unit meters the fuel and directs it to the flow divider which distributes the fuel to dual manifolds and 14 fuel nozzles located in the combustion chamber. For additional details concerning the flow of fuel at the engine, refer to the Engine Fuel System paragraph in this section.

Fuel rejected by the engine on shutdown drains into a fireproof fuel can located on the front left side of the firewall. The can should be drained during preflight inspection. If left unattended, the can fuel will overflow overboard.

Fuel system venting is essential to system operation. Complete blockage of the vent system will result in decreased fuel flow and eventual engine stoppage. Venting is accomplished by check valve equipped vent lines, one from each fuel tank, which protrude from the trailing edge of the wing at the wing tips. Also the fuel reservoir is vented to both wing tanks.

FIREWALL FUEL SHUTOFF VALVE

A manual firewall fuel shutoff valve, located on the aft side of the firewall, enables the pilot to shut off all fuel flow from the fuel reservoir to the engine. The shutoff valve is controlled by a red push-pull knob labeled FUEL SHUTOFF-PULL OFF and located on the right side of the pedestal. The push-pull knob has a press-to-release button in the center which locks the knob in position when the button is released.

FUEL TANK SELECTORS

Two fuel tank selectors, one for each tank, are located on the overhead console. The selectors, labeled LEFT, ON and OFF and RIGHT, ON and OFF, mechanically control the position of the two fuel tank shutoff valves at each wing tank. When a fuel tank selector is in the OFF position, the shutoff valves for that tank are closed. When in the ON position, both shutoff valves in the tank are open, allowing fuel from that tank to flow to the reservoir. Normal fuel management is with both fuel tank selectors in the ON position.

Before refueling, or when the airplane is parked on a slope, turn off one of the fuel tank selectors (if parked on a slope, turn high wing tank off). This action prevents crossfeeding from the fuller or higher tank and reduces any fuel seepage tendency from the wing tank vents.

FUEL SELECTORS OFF WARNING SYSTEM

A fuel selectors off warning system is incorporated to alert the pilot if one or both of the fuel tank selectors are left in the OFF position inadvertently. The system includes redundant warning horns, a red annunciator light labeled FUEL SELECT OFF, actuation switches, and miscellaneous electrical hardware. The dual aural warning system is powered through the START CONT circuit breaker with a non-pullable FUEL SEL WARN circuit breaker installed in series to protect the integrity of the start system. The annunciator is powered from the ANNUN PANEL circuit breaker.

The warning system functions as follows: (1) If both the left and right fuel tank shutoff valves are closed (fuel tank selectors in the OFF position), the red FUEL SELECT OFF annunciator illuminates and one of the fuel selector off warning horns is activated; (2) During an engine start operation (STARTER switch in START or MOTOR position) with either the left or right fuel tank shutoff valves closed, the red FUEL SELECT OFF annunciator illuminates and both of the fuel select off warning horns are activated; (3) With one fuel tank selector OFF and fuel remaining in the tank being used less than approximately 25 gallons, the FUEL SELECT OFF annunciator illuminates and one of the fuel selector off warning horns is activated.

If the FUEL SEL WARN circuit breaker has popped or the START CONT circuit breaker has been pulled (possibly for ground maintenance), the FUEL SELECT OFF annunciator will be illuminated even with both fuel tank selectors ON. This is a warning to the pilot that the fuel selector warning system has been deactivated.

AUXILIARY BOOST PUMP SWITCH

An auxiliary boost pump switch, located on the left sidewall switch and circuit breaker panel, is labeled FUEL BOOST and has OFF, NORM, and ON positions. When the switch is in the OFF position, the auxiliary boost pump is inoperative. When the switch is in the NORM position, the auxiliary boost pump is armed and will operate when fuel pressure in the fuel manifold assembly drops below 4.75 psi. This switch position is used for all normal engine operation where main fuel flow is provided by the ejector boost pump and the auxiliary boost pump is used as a standby. When the auxiliary boost pump switch is placed in the ON position, the auxiliary boost pump will operate continuously. This position is used for engine start, at any other time the auxiliary boost pump cycles on and off with the switch in the NORM position, and for all operations utilizing aviation gasoline.

FUEL FLOW INDICATOR

A fuel flow indicator, located at the top of the instrument panel, indicates the fuel consumption of the engine in pounds per hour based on **Jet A** fuel. The indicator measures the flow of fuel downstream of the fuel control unit just before being routed into the flow divider. When power is removed from the indicator, the needle will stow below zero in the OFF band. The fuel flow indicator receives power from a "pull-off" type circuit breaker labeled FUEL FLOW, on the left sidewall switch and circuit breaker panel.

FUEL QUANTITY INDICATORS

Fuel quantity is measured by eight fuel quantity transmitters (four in each tank) and indicated by two electrically-operated fuel quantity indicators on the upper portion of the instrument panel. The fuel quantity indicators, which measure volume, are calibrated in pounds (based on the weight of Jet A fuel on a standard day) and gallons. An empty tank is indicated by a red line and the letter E. When an indicator shows an empty tank, approximately 2.5 gallons (2.8 gallons in S/N 208B0001 thru 208B0089 modified with SK208-52 and S/N 208B0090 and On) remain in the tank as unusable fuel. The left and right fuel quantity indicators each receive power from a "pull-off" type circuit breaker. The breakers are labeled LEFT FUEL QTY and RIGHT FUEL QTY, respectively, and are located on the left sidewall switch and circuit breaker panel.

⚠ WARNING

Because of the relatively long fuel tanks, fuel quantity indicator accuracy is affected by uncoordinated flight or a sloping ramp if reading the indicators while on the ground. Therefore, to obtain accurate fuel quantity readings, verify that the airplane is parked in a laterally level condition, or if in flight, make sure the airplane is in a coordinated and stabilized condition.

WING TANK FUEL LOW WARNING ANNUNCIATORS

Two amber fuel low warning annunciators, one for each wing tank, are located on the annunciator panel. The annunciators are labeled LEFT FUEL LOW and RIGHT FUEL LOW. Each annunciator will illuminate when the fuel in the respective tank is 25 gallons or less.

RESERVOIR FUEL LOW WARNING ANNUNCIATOR

A red reservoir fuel low warning annunciator is located on the annunciator panel. The annunciator is labeled RESERVOIR FUEL LOW, and will illuminate when the level of fuel in the reservoir drops to approximately one-half full.

FUEL PRESSURE LOW WARNING ANNUNCIATOR

An amber fuel pressure low warning annunciator is located on the annunciator panel. The annunciator is labeled FUEL PRESS LOW, and will illuminate when fuel pressure in the reservoir fuel manifold assembly is below 4.75 psi.

AUXILIARY FUEL PUMP ON ANNUNCIATOR

An amber auxiliary fuel pump on annunciator is located on the annunciator panel. The annunciator is labeled AUX FUEL PUMP ON and will illuminate when the auxiliary boost pump is operating, such as when the auxiliary boost pump switch is placed in the ON position or when the auxiliary boost pump switch is in the NORM position and fuel pressure in the fuel manifold assembly drops below 4.75 psi.

DRAIN VALVES

The fuel system is equipped with drain valves to provide a means for the examination of fuel in the system for contamination and grade. Drain valves are located on the lower surface of each wing at the inboard end of the fuel tank, in fuel tank external sumps on S/N 208B0001 thru 208B0089 modified with SK208-52 and S/N 208B0090 and On, on the left side of the cargo pod for the reservoir tank, and on the underside of the fuel filter. Outboard fuel tank drain valves may be installed, and their use is recommended if the airplane is parked with one wing low on a sloping ramp (as evidenced by the ball of the turn and bank indicator displaced from center). The drain valves for the wing tanks (and their external sumps, if installed) are tool-operated poppet type and are flush-external mounted. The wing tank and external sump drain valves are constructed so that the Phillips screwdriver on the fuel sampler which is provided can be utilized to depress the valve and then twist to lock the drain valve in the open position. The drain valve for the reservoir is controlled by a double-button push-pull drain control knob. When pulled out, fuel from the reservoir drains out the rear fuel drain pipe located adjacent to the drain valve. The drain valve for the fuel filter consists of a drain pipe which can be depressed upward to drain fuel from the filter. The fuel sampler can be used in conjunction with these drain valves for fuel sampling and purging of the fuel system. The fuel tanks should be filled after each flight when practical to minimize condensation.

Before each flight and after each refueling, use a clear sampler and drain fuel from the inboard fuel tank sump (and external sump, if installed) quick-drain valves, fuel reservoir quick-drain valve, and fuel filter quick-drain valve to determine if contaminants are present, and that the airplane has been fueled with the proper fuel. If the airplane is parked with one wing low on a sloping ramp, draining of the outboard fuel tank sump quick-drain valves (if installed) is also recommended. If contamination is detected, drain **all** fuel drain points again. Take repeated samples from **all** fuel drain points until all contamination has been

removed. If after repeated sampling, evidence of contamination still exists, the fuel tanks should be completely drained and the fuel system cleaned. **Do not** fly the airplane with contaminated or unapproved fuel.

WARNING

JP-4 and other naphtha based fuels can cause severe skin and eye irritation.

FUEL CAN/DRAIN

When the engine is shut down, residual fuel in the engine drains into a fuel can mounted on the front left side of the firewall. This can should be drained once a day or at an interval not to exceed six engine shutdowns. A drain valve on the bottom side of the cowling enables the pilot to drain the contents of the fuel can into a suitable container.

FUEL PUMP DRAIN RESERVOIR

To control expended lubricating oil from the engine fuel pump drive coupling area and provide a way to determine if fuel is leaking past the fuel pump seal, early serial airplanes modified with Service Kit SK208-57 and later serial airplanes are equipped with a drainable reservoir to collect this allowable discharge of oil and any fuel seepage. The reservoir is mounted on the front left side of the firewall. It should be drained once a day or at an interval not to exceed six engine shutdowns. A drain valve on the bottom side of the cowling enables the pilot to drain the contents of the reservoir into a suitable container. A quantity of up to 3 cc of oil and 20 cc of fuel discharge per hour of engine operation is allowable. If the quantity of oil or fuel drained from the reservoir is greater than specified, the source of leakage should be identified and corrected prior to further flight.

BRAKE SYSTEM

The airplane has a single-disc, hydraulically-actuated brake on each main landing gear wheel. Each brake is connected, by a hydraulic line, to a master cylinder attached to each of the pilot's rudder pedals. The brakes are operated by applying pressure to the top of either the left (pilot's) or right (front passenger's) set of rudder pedals, which are interconnected. When the airplane is parked, both main wheel brakes may be set by utilizing the parking brake which is operated by a handle on the lower left side of the instrument panel. To apply the parking brake, set the brakes with the rudder pedals and pull the handle aft. To release the parking brake, push the handle fully in.

A brake fluid reservoir, located just forward of the firewall on the left side of the engine compartment, provides additional brake fluid for the brake master cylinders. The fluid in the reservoir should be checked for proper level prior to each flight.

For maximum brake life, keep the brake system properly maintained. Early serial airplanes were equipped with organic type brake linings and brake life is prolonged by conservative brake application during taxi operations and landings. Airplanes with serial numbers 208B0103 and on and early serial airplanes with replaced linings may have metallic type brakes, and these were given a special brake burn-in before delivery (or after brake replacement). Unlike organic brakes, the day-to-day braking technique is different. When conditions permit, hard brake application is beneficial in that the resulting higher brake temperatures tend to maintain proper brake glazing and will prolong the expected brake life. Conversely, the habitual use of light and conservative brake application is detrimental to metallic brakes.

Some of the symptoms of impending brake failure are: gradual decrease in raking action after brake application, noisy or dragging brakes, soft or spongy pedals, and excessive travel and weak braking action. If any of these symptoms appear, the brake system is in need of immediate attention. If, during taxi or landing roll, braking action decreases, let up on the pedals and then re-apply the brakes with heavy pressure. If the brakes become spongy or pedal travel increases, pumping the pedals should build braking pressure. If one brake becomes weak or fails, use the other brake sparingly while using opposite rudder, as required, to offset the good brake.

ELECTRICAL SYSTEM

The airplane is equipped with a 28-volt, direct-current electrical system (see Figure 7-12). The system uses a 24-volt lead-acid battery; or a 24-volt sealed lead acid battery; or a 24-volt Ni-Cad battery, located on the front right side of the firewall, as a source of electrical energy. A 200-amp engine-driven starter-generator is used to maintain the battery's state of charge. Power is supplied to most general electrical and all avionic circuits through two general buses, two avionic buses and a battery bus. The battery bus is energized continuously for memory keep-alive, clock and cabin/courtesy light functions. The two general buses are on anytime the battery switch is turned on. All DC buses are on anytime the battery switch and the two avionic switches are turned on.

An optional standby electrical system, which consists of an engine-driven alternator and separate busing system, may be installed in the airplane. For details of this system, refer to Section 9, Supplements.

GENERATOR CONTROL UNIT

The generator control unit (GCU) is mounted inside the cabin on the left forward fuselage sidewall. The unit provides the electrical control functions necessary for the operation of the starter-generator. The GCU provides for automatic starter cutoff when engine RPM is above 46. Below 46, the starter-generator functions as a starter, and above 46, the starter-generator functions as a generator when the starter switch is OFF. The GCU provides voltage regulation plus high voltage protection and reverse current protection. In the event of a high-voltage or reverse current condition, the generator is automatically disconnected from the buses. The generator contactor (controlled by the GCU) connects the generator output to the airplane bus. If any GCU function causes the generator contactor to de-energize, the red GENERATOR OFF light on the annunciator panel will come on.

GROUND POWER MONITOR

The ground power monitor is located inside the electrical power control assembly mounted on the left hand side of the firewall in the engine compartment. This unit senses the voltage level applied to the external power receptacle and will close the external power contactor when the applied voltage is within the proper limits. In addition, the ground power monitor senses airplane bus voltage and will illuminate the VOLTAGE LOW light on the annunciator panel when bus voltage drops to battery voltage.

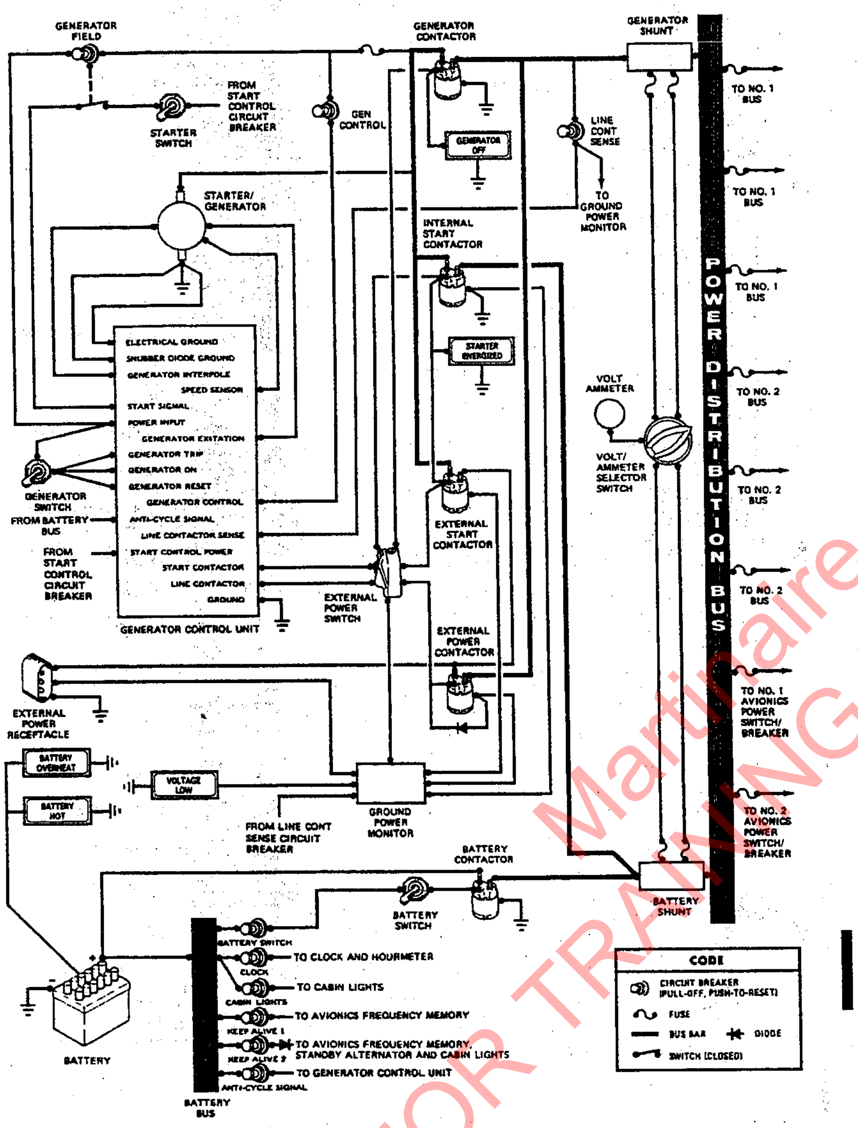


Figure 7-14. Typical Electrical System (Sheet 1 of 3)

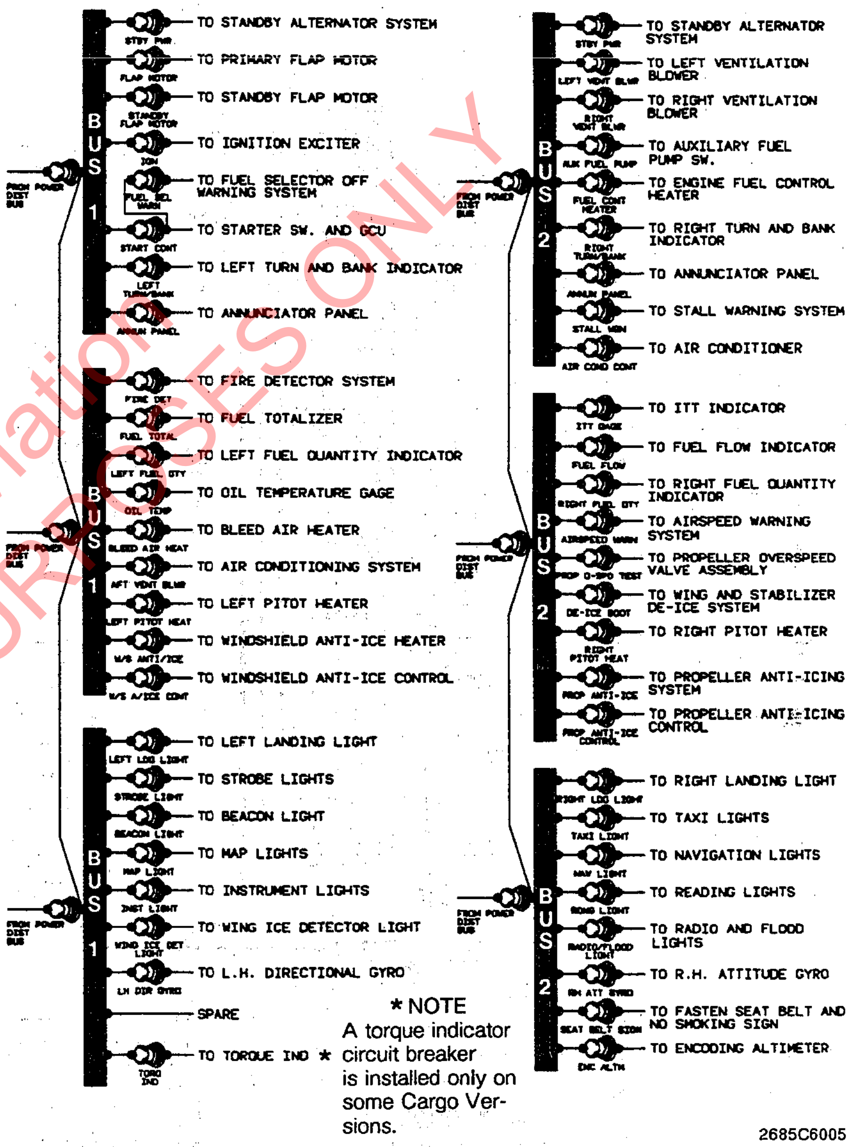
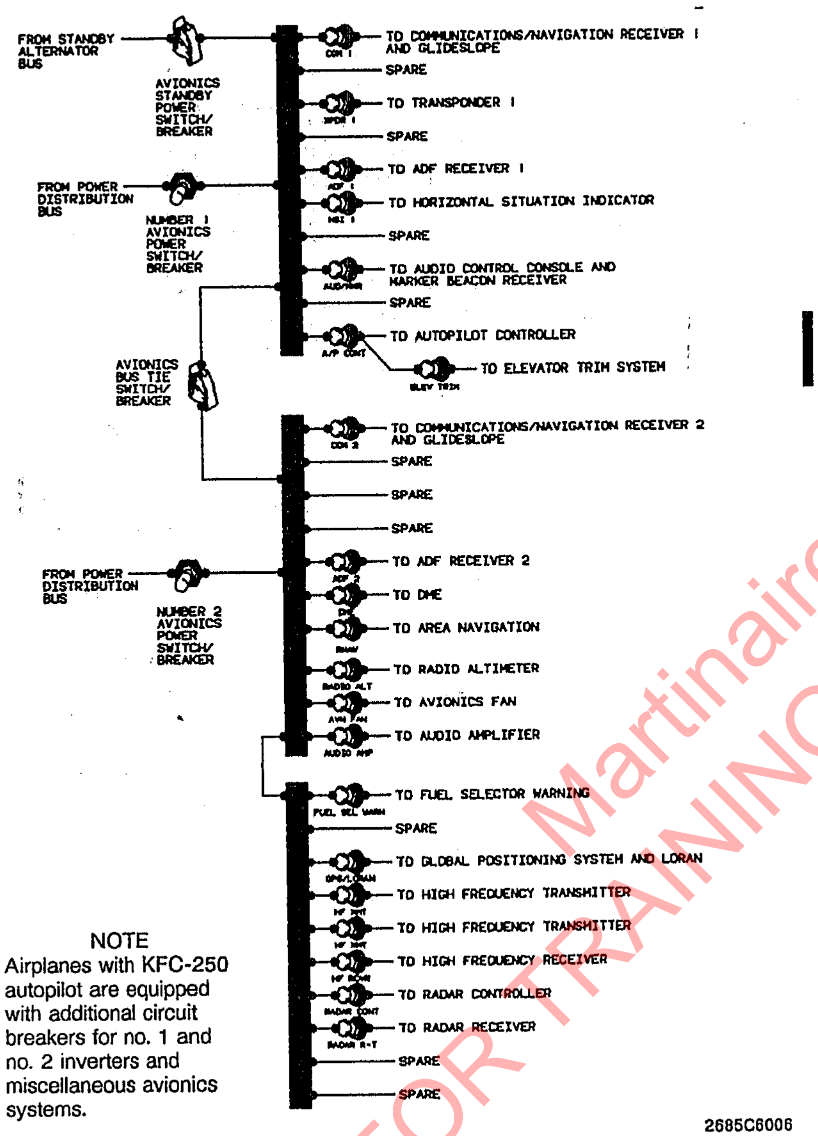


Figure 7-14. Typical Electrical System (Sheet 2 of 3)



NOTE
Airplanes with KFC-250 autopilot are equipped with additional circuit breakers for no. 1 and no. 2 inverters and miscellaneous avionics systems.

Figure 7-14. Typical Electrical System (Sheet 3 of 3)

BATTERY SWITCH

The battery switch is a two-position toggle-type switch, labeled BATTERY, and is located on the left sidewall switch and circuit breaker panel. The battery switch is ON in the forward position and OFF in the aft position. When the battery switch is in the ON position, battery power is supplied to the two general buses. The OFF position cuts off power to all buses except the battery bus.

STARTER SWITCH

The starter switch is a three-position toggle-type switch, labeled STARTER, on the left sidewall switch and circuit breaker panel. The switch has OFF, START, and MOTOR positions. For additional details of the starter switch, refer to the Starting System paragraph in this section.

IGNITION SWITCH

The ignition switch is a two-position toggle-type switch, labeled IGNITION, on the left sidewall switch and circuit breaker panel. The switch has ON and NORMAL positions. For additional details of the ignition switch, refer to the Ignition System paragraph in this section.

GENERATOR SWITCH

The generator switch is a three-position toggle-type switch, labeled GENERATOR, on the left sidewall switch and circuit breaker panel. The switch has ON, RESET, and TRIP positions. With the switch in the ON position, the GCU will automatically control the generator line contactor for normal generator operation. The RESET and TRIP positions are momentary positions and are spring-loaded back to the ON position. If a momentary fault should occur in the generating system (as evidenced by the GENERATOR OFF and/or VOLTAGE LOW lights illuminating), the generator switch can be momentarily placed in the RESET position to restore generator power. If erratic operation of the generating system is observed, the system can be shutoff by momentarily placing the generator switch to the TRIP position. After a suitable waiting period, generator operation may be recycled by placing the generator switch momentarily to RESET.

AVIONICS POWER SWITCHES

Electrical power from the airplane power distribution bus to the avionics buses (see Figure 7-14) is controlled by two toggle-type switch breakers located on the left sidewall switch and circuit breaker panel. One switch controls power to the number 1 avionics bus while the other switch controls power to the number 2 avionics bus. The switches are labeled AVIONICS and are ON in the forward position and OFF in the aft position. The avionics power switches should be placed in the OFF position prior to turning the battery switch ON or OFF, starting the engine, or applying an external power source. The avionics power switches may be used in place of the individual avionics equipment switches.

AVIONICS BUS TIE SWITCH

The avionics bus tie switch is a two-position guarded toggle-type switch located on the left sidewall switch and circuit breaker panel. The switch connects the number 1 and number 2 avionics buses together in the event of failure of either bus feeder circuit. Since each avionics bus is supplied power from a separate current limiter on the power distribution bus, failure of a current limiter can cause failure of the affected bus. Placing the bus tie switch to the ON position will restore power to the failed bus. Operation without both bus feeder circuits may require an avionics load reduction, depending on equipment installed.

INVERTER SELECTOR SWITCH (Airplanes With KFC-250 Autopilot Only)

Two inverters, a main (inverter 1) and a spare (inverter 2), are located beneath the front passenger's floor. The inverters operate from DC power supplied through two circuit breakers on the main bus. Each inverter supplies 26-volt AC and 115-volt AC to the 26-volt AC bus bar and 115-volt AC bus, respectively. The inverters are controlled by an inverter selector switch located on the instrument panel below the avionics stack. The selector switch has INVERTER 1, INVERTER 2 positions with a center unmarked off position. AC power is available when the battery switch is on and the inverter selector switch is placed in either INVERTER 1 or INVERTER 2 position.

EXTERNAL POWER SWITCH

The external power switch is a three-position guarded toggle-type switch located on the left sidewall switch and circuit breaker panel. The switch has OFF, STARTER, and BUS positions and is guarded in the OFF position. When the switch is in the OFF position, battery power is provided to the main bus and to the starter-generator circuit, external power cannot be applied to the main bus, and, with the generator switch in the ON position, power is applied to the generator control circuit. When the external power switch is in the STARTER position, external power is applied to the starter circuit only and battery power is provided to the main bus. No generator power is available in this position. When the external power switch is in the BUS position, external power is applied to the main bus and no power is available to the starter. The battery, if desired, can be connected to the main bus and external power by the battery switch; however, battery charge should be monitored to avoid overcharge.

CIRCUIT BREAKERS

Most of the electrical circuits in the airplane are protected by "pull-off" type circuit breakers mounted on the left sidewall switch and circuit breaker panel. Should an overload occur in any circuit, the controlling circuit breaker will trip, opening the circuit. After allowing the circuit breaker to cool for approximately three minutes, it may be reset (pushed in).

WARNING

Ensure all circuit breakers are engaged before all flights. Never operate with disengaged circuit breakers without a thorough knowledge of the consequences.

VOLT/AMMETER AND SELECTOR SWITCH

A volt/ammeter and four-position rotary-type selector switch are mounted on the left side of the instrument panel so that electrical system operation can be monitored. The selector switch has GEN, ALT, BATT, and VOLT positions and selects either generator current, standby alternator current, battery charge or discharge current, or system voltage, respectively, on the volt/ammeter. The ALT position of the selector switch is used for the standby alternator system which may not be installed on some airplanes. In that case, the position will be inoperative. Refer to Standby Electrical System in Section 9 of this handbook for further details.

ANNUNCIATOR LIGHTS

Six lights on the annunciator panel indicate the condition of the standard electrical system to the pilot. These lights are GENERATOR OFF, VOLTAGE LOW, BATTERY OVERHEAT (if installed), STARTER ENERGIZED, BATTERY HOT (if installed), IGNITION ON and INVERTER INOP (if installed). These lights should be observed at all times during airplane operation and if any light illuminates unexpectedly, a malfunction may have occurred and appropriate action should be undertaken to correct the problem. For details of other lights on the annunciator panel, refer to the Annunciator Panel paragraph in this section.

GROUND SERVICE PLUG RECEPTACLE

A ground service plug receptacle permits the use of an external power source for cold weather starting and during lengthy maintenance work on the electrical and avionics equipment. External power control circuitry is provided to prevent the external power and the battery from being connected together during starting. The external power receptacle is installed on the left side of the engine compartment near the firewall.

The ground service circuit incorporates polarity reversal and over-voltage protection. Power from the external power source will flow only if the ground service plug is correctly connected to the airplane. If the plug is accidentally connected backwards or the ground service voltage is too high, no power will flow to the electrical system, thereby preventing any damage to electrical equipment.

LIGHTING SYSTEMS

EXTERIOR LIGHTING

Exterior lighting consists of three navigation lights, two landing lights, two taxi/recognition lights, two strobe lights, a flashing beacon, and two underwing courtesy lights. All exterior lights are controlled by toggle switches located on the lighting control panel on the left side of the instrument panel. The toggle switches are ON in the up position and OFF in the down position.

NAVIGATION LIGHTS

Conventional navigation lights are installed on the wing tips and tail cone stinger. The lights are protected by a "pull-off" type circuit breaker, labeled NAV LIGHT, on the left sidewall switch and circuit breaker panel.

LANDING LIGHTS

Two landing lights are installed on the airplane, one in each wing leading edge mounted outboard. The lights provide illumination forward and downward during takeoff and landing. The lights are protected by two "pull-off" type circuit breakers, labeled LEFT LDG LT and RIGHT LDG LT, on the left sidewall switch and circuit breaker panel.

NOTE

It is not recommended that the landing lights be used to enhance the conspicuity of the airplane in the traffic pattern or enroute, because of their relatively short service life. The taxi/recognition lights have considerably longer service life and are designed for this purpose, if desired.

TAXI/RECOGNITION LIGHTS

Two taxi/recognition lights are mounted inboard of each landing light in each wing leading edge. The lights are focused to provide illumination of the area forward of the airplane during ground operation and taxiing. The lights are also used to enhance the conspicuity of the airplane in the traffic pattern or enroute. The taxi/recognition lights are protected by a "pull-off" type circuit breaker, labeled TAXI LIGHT, on the left sidewall switch and circuit breaker panel.

STROBE LIGHTS

A high intensity strobe light system is installed on the airplane. The system includes two strobe lights (with remote power supplies) located one on each wing tip. The lights are used to enhance anti-collision protection for the airplane and are required anti-collision lights for night operations. The strobe lights are protected by a "pull-off" type circuit breaker, labeled STROBE LIGHT, on the left sidewall switch and circuit breaker panel.

⚠ WARNING

Strobe lights should be turned off when taxiing. Ground operation of the high intensity anti-collision lights can be of considerable annoyance to ground personnel and other pilots. Do not operate the anti-collision lights in conditions of fog, clouds, or haze as the reflection of the light beam can cause disorientation or vertigo.

FLASHING BEACON LIGHT

A red flashing beacon light is installed on the top of the vertical fin as additional anti-collision protection in flight and for recognition during ground operation. The light is visible through 360°. The flashing beacon light circuit is protected by a "pull-off" type circuit breaker, labeled BEACON LIGHT, on the left sidewall switch and circuit breaker panel.

⚠ WARNING

The flashing beacon should not be used when flying through clouds or overcast; the flashing light reflected from water droplets or particles in the atmosphere, particularly at night, can cause disorientation or vertigo.

COURTESY LIGHTS

Two courtesy lights are installed, one under each wing. The lights illuminate the area outside of the airplane adjacent to the crew entry doors. The lights operate in conjunction with the cabin lights and are controlled by the cabin light switches as described in the Cabin Lights paragraph in this section.

INTERIOR LIGHTING

Instrument and control panel lighting is provided by integral, flood, and post lights. Four concentric-type dual lighting control knobs are grouped together on the lower part of the instrument panel to the left of the control pedestal. These four controls vary the intensity of the instrument panel lighting, the left sidewall switch and circuit breaker panel lighting, the pedestal lighting, and the overhead panel lighting. The following paragraphs describe the function of these controls. Other miscellaneous lighting provided or available includes a control wheel maplight, cabin lights, passenger reading lights, and a no smoking/seat belt sign. Discussion of these lights and their controls is also included in the following paragraphs.

LEFT FLIGHT PANEL/LEFT FLOOD LIGHTING CONTROL KNOBS

The large (outer) knob of this control, labeled L FLT PANEL, varies the intensity of the postlights illuminating the left portion of the instrument panel directly in front of the pilot. The control also varies the intensity of the integral lighting of the HSI, FCI, and radio instruments. The small (inner) knob of the control, labeled L FLOOD, varies the brightness of the left side floodlight located on the right aft side of the overhead panel. This floodlight may also be used to illuminate the left sidewall switch and circuit breaker panel. Clockwise rotation of either of the concentric control knobs increases lamp brightness and counterclockwise rotation decreases brightness.

RIGHT FLIGHT PANEL/RIGHT FLOOD LIGHTING CONTROL KNOBS

The large (outer) knob of this control, labeled R FLT PANEL, varies the intensity of the post lights illuminating the right flight panel directly in front of the right passenger. The small (inner) knob of this control, labeled R FLOOD, varies the brightness of the right side floodlight located on the left aft side of the overhead panel. Clockwise rotation of either of the concentric control knobs increases lamp brightness and counterclockwise rotation decreases brightness.

LOWER PANEL, PEDESTAL, OVERHEAD, SWITCH/CIRCUIT BREAKER LIGHTING CONTROL KNOBS

The large (outer) knob of this control, labeled LWR PANEL/PED/OVHD, varies the intensity of postlights and a floodlight illuminating the lower portion of the instrument panel, a floodlight illuminating the pedestal, and lights illuminating the overhead panel and OAT gage. The small (inner) knob of the control, labeled SW/CKT BKR, varies the intensity of two floodlights illuminating the left sidewall switch and circuit breaker panel. Clockwise rotation of either of the concentric control knobs increases lamp brightness and counterclockwise rotation decreases brightness.

ENGINE INSTRUMENTS/RADIO LIGHTING CONTROL KNOBS

The large (outer) knob of this control, labeled ENG INST, varies the intensity of the post lights which illuminate the engine instruments on the top center of the instrument panel and the intensity of the dimmable lamps on the annunciator panel. The small (inner) knob of this control, labeled RADIO, controls the integral lights of the avionics equipment. Clockwise rotation of either of the concentric control knobs increases lamp brightness and counterclockwise rotation decreases brightness. However, extreme counterclockwise rotation of the RADIO knob turns the digital readouts on bright for daylight viewing.

CONTROL WHEEL MAPLIGHT

A control wheel maplight is mounted on the bottom of the pilot's control wheel. This light illuminates the lower portion of the cabin in front of the pilot, and is used for checking maps and other flight data during night operation. Brightness of the light is adjusted with a rheostat control knob on the bottom of the control wheel.

CABIN LIGHTS

Four cabin lights are installed in the interior of the airplane to facilitate boarding or deplaning the airplane or loading and unloading cargo during night operations. The lights are located one above the center of the forward cabin area, one above the left side of the center cabin area, one above the aft cargo door, and one above the aft right side of the aft cargo area (Cargo Versions) or above the passenger entry door (Passenger Version). These lights (and the courtesy light located under each wing) are controlled by a two-position toggle switch, labeled CABIN, on the lighting control panel, a rocker-type switch located just forward of the cargo door on the inside left sidewall and, on the Passenger Version, a rocker switch located just forward of the passenger entry door on the inside right sidewall. Actuating either of these switches turns on the cabin lights regardless of the corresponding position of the other switches. This light circuit does not require power to be applied to the main electrical system buses (battery switch on) for operation. The courtesy lights circuit incorporates a solid-state timer which allows the courtesy lights to remain illuminated for a period of 30 minutes after the lights have been turned on.

PASSENGER READING LIGHTS (Passenger Version Only)

Passenger reading lights may be installed near each of the aft passengers positions. The lights are located in 11 small convenience panels above the seats. A pushbutton-type ON, OFF switch, mounted in each panel, controls the lights. The lights can be pivoted in their mounting sockets to provide the most comfortable angle of illumination for the passenger.

NO SMOKING/SEAT BELT SIGN (Passenger Version Only)

A lighted warning sign may be installed in the airplane to facilitate warning passengers of impending flight operations necessitating the fastening of seat belts and/or the extinguishing of all smoking materials. This installation consists of a small lighted panel mounted in the cabin headliner above the right side of the forward cabin area and two toggle-type switches, labeled SEAT BELT and NO SMOKE, on the lighting control panel. When these switches are placed in the ON position, the warning signs illuminate, displaying the international graphic symbolism for "fasten seat belts" and "no smoking" to the rear cabin passengers. The circuit for the warning sign lights is protected by a "pull-off" type circuit breaker, labeled SEAT BELT SIGN, on the left sidewall switch and circuit breaker panel.

CABIN HEATING, VENTILATING AND DEFROSTING SYSTEM

The temperature and volume of airflow to the cabin is regulated by the cabin heating, ventilating and defrosting system (see Figure 7-15). In the heating system, hot compressor outlet air is routed from the engine through a flow control valve, then through a mixer/muffler where it is mixed with cabin return air or warm air from the compressor bleed valve (depending on the setting of the mixing air valve) to obtain the correct air temperature before the air is routed to the cabin air distribution system. Controls are provided to direct the heated air to the forward and/or aft portions of the cabin for heating and to the windshield for defrosting. Ventilating air is obtained from an inlet on each side at the forward fuselage and through two ram air inlets, one on each wing at the upper end of the wing struts. The wing inlet ventilating air is routed through the wing into a plenum chamber located in the center of the cabin top. The plenum distributes the ventilating air to individual overhead outlets near each seat position. Two electric blowers are available for the overhead ventilating system. Details of this installation are presented in Section 9, Supplements.

BLEED AIR HEAT SWITCH

A two-position toggle switch, labeled BLEED AIR HEAT, is located on the cabin heat switch and control panel. The switch controls the operation of the bleed air flow control valve. The ON position of the switch opens the flow control valve, allowing hot bleed air to flow to the cabin heating system. The OFF position closes the valve, shutting off flow of hot bleed air to the heating system.

TEMPERATURE SELECTOR KNOB

A rotary temperature selector knob, labeled TEMP, is located on the cabin heat switch and control panel. The selector modulates the opening and closing action of the flow control valve to control the amount and temperature of air flowing into the cabin. Clockwise rotation of the knob increases the mass flow and temperature of the air.

NOTES

- If more cabin heat is needed while on the ground, move the fuel condition lever to HIGH IDLE and/or select the GRD position (pulled out) of the mixing air control.
- Some hysteresis may be encountered when adjusting bleed air temperature. The resulting amount and temperature of bleed air may be different when approaching a particular temperature selector knob position from a clockwise versus a counterclockwise direction. Best results can usually be obtained by turning the temperature selector knob full clockwise and then slowly turning it counterclockwise to decrease bleed airflow to the desired amount.

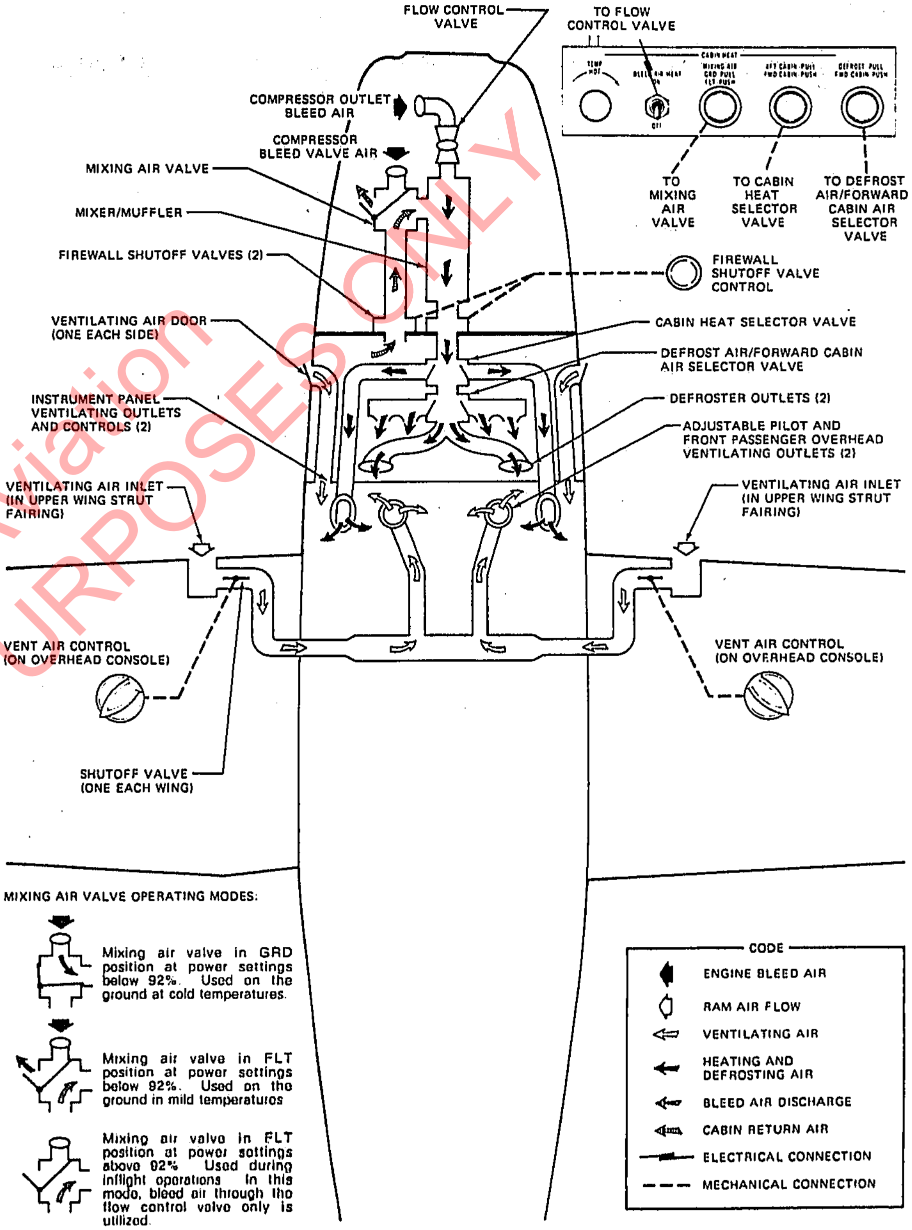


Figure 7-15. Cabin Heating, Ventilating and Defrosting System (Cargo Version) (Sheet 1 of 2)

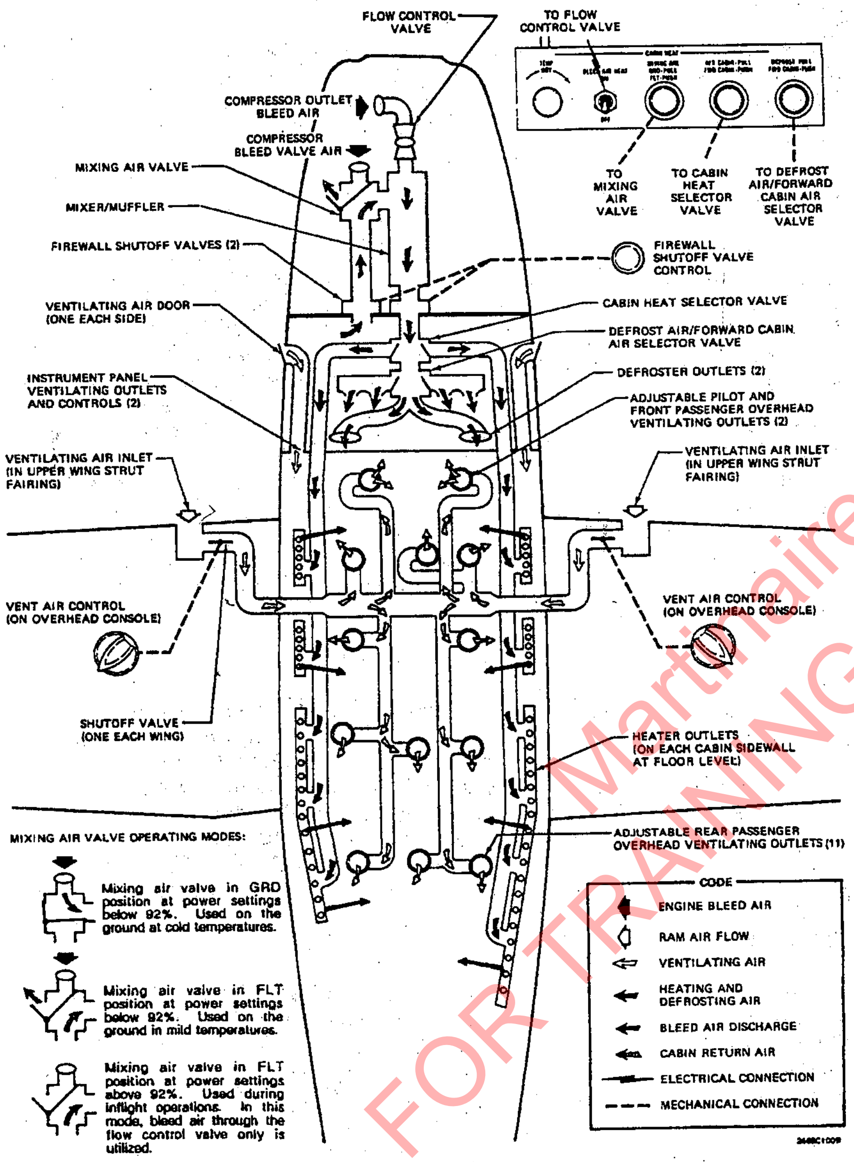


Figure 7-15. Cabin Heating, Ventilating and Defrosting System (Passenger Version) (Sheet 2 of 2)

A temperature sensor, located in the outlet duct from the mixer/muffler operates in conjunction with the temperature selector knob. In the event of a high temperature condition (overheat) in the outlet duct, the temperature sensor will be energized, closing the flow control valve and thus shutting off the source of hot bleed air from the engine.

MIXING AIR PUSH-PULL CONTROL

A push-pull control, labeled MIXING AIR, GRD-PULL, FLT-PUSH, is located on the cabin heat switch and control panel. With the push-pull control in the GRD position (pulled out), warm compressor bleed valve air is mixed with hot compressor outlet air in the mixer/muffler. This mode is used during ground operation when warm compressor bleed valve air is available (at power setting below 92% N_g) and can be used as additional bleed air heat to augment the hot compressor outlet bleed air supply during periods of cold ambient temperature. With the push-pull control in the FLT position (pushed in), cabin return air is mixed with the hot compressor outlet air in the mixer/muffler. This recirculation of cabin return air enables the heating system to maintain the desired temperature for proper cabin heating. If desired, the FLT position of the push-pull control can be used on the ground when ambient temperatures are mild and maximum heating is not required. In this mode, the excess warm compressor bleed valve air available at power settings below 92% N_g is exhausted overboard from the mixing air valve.

CAUTION

The mixing air push-pull control should always be in the FLT position (pushed in) when the airplane is in flight. Cabin return air must be allowed to flow through the mixing valve and blend with hot compressor outlet air during high engine power operation in order to maintain proper temperature in the cabin heat distribution system. If the FLT position is not used during flight, the system may overheat and cause an automatic shutdown.

AFT/FORWARD CABIN PUSH-PULL CONTROL

A push-pull control, labeled AFT CABIN-PULL, FWD CABIN-PUSH, is located on the cabin heat switch and control panel. With the control in the AFT CABIN position (pulled out), heated air is directed to the aft cabin heater outlets located in the floor directly behind the pilot and front passenger in Cargo Versions and on the cabin sidewalls at floor level in the Passenger Version. With the control in the FWD CABIN position (pushed in), heated air is directed to the forward cabin through four heater outlets located behind the instrument panel and/or the two windshield defroster outlets. The push-pull control can be positioned at any intermediate setting desired for proper distribution of heated air to the forward and aft cabin areas.

DEFROST/FORWARD CABIN PUSH-PULL CONTROL

A push-pull control, labeled DEFROST-PULL, FWD CABIN-PUSH, is located on the cabin heat switch and control panel. With the control in the DEFROST position (pulled out), forward cabin air is directed to two defroster outlets located at the base of the windshield (the aft/forward cabin push-pull control also must be pushed in for availability of forward cabin air for defrosting). With the defrost/forward cabin push-pull control in the FWD CABIN position (pushed in), heated air will be directed to the four heater outlets behind the instrument panel.

CABIN HEAT FIREWALL SHUTOFF KNOB

A push-pull shutoff knob, labeled CABIN HEAT FIREWALL SHUTOFF, PULL OFF, is located on the lower right side of the pedestal. When pulled out, the knob actuates two firewall shutoff valves, one in the bleed air supply line to the cabin heating system and one in the cabin return air line, to the off position. This knob should normally be pushed in unless a fire is suspected in the engine compartment.

⚠ CAUTION

Do not place the cabin heat firewall shutoff knob in the OFF position when the mixing air control is in the GRD position because a compressor stall will occur at low power settings when the compressor bleed valve is open. The engine must be shut down to relieve back pressure on the valves prior to opening the valves.

VENT AIR CONTROL KNOBS

Two vent air control knobs, labeled VENT AIR, are located on the overhead console. The knobs control the operation of the shutoff valves in each wing which control the flow of ventilating air to the cabin. The knob on the right side of the console controls the right wing shutoff valve and similarly, the knob on the left side controls the left wing shutoff valve. When the vent air control knobs are rotated to the CLOSE position, the wing shutoff valves are closed; rotating the knobs to the OPEN position progressively opens the wing shutoff valves. When cabin ventilation fans are installed, rotating the knobs to the full OPEN position also turns on the ventilation fans.

INSTRUMENT PANEL VENT KNOBS

Two vent knobs, labeled VENT, PULL ON, are located one on each side of the instrument panel. Each knob controls the flow of ventilating air from an outlet located adjacent to each knob. Pulling each knob opens a small air door on the fuselage exterior which pulls in ram air for distribution through the ventilating outlet.

VENTILATING OUTLETS

Adjustable ventilating outlets (above each seat position) permit individual ventilation to the airplane occupants. The outlets are the swivel type for optimum positioning, and airflow volume is controlled by rotating the outlet nozzle which controls an internal valve. In addition to the pilot and front passenger outlets, the Passenger Version has 11 outlets in the rear cabin area for use by rear seat passengers.

OXYGEN SYSTEM

Some Cargo Versions are equipped with a two-port oxygen system having quick-don type masks for the pilot and passenger; other Cargo Versions can be equipped with a two-port oxygen system utilizing conventional masks. The Passenger Version can be equipped with a 13-port oxygen system utilizing conventional masks. Refer to Section 9, Supplements, for complete details and operating instructions.

PITOT-STATIC SYSTEM AND INSTRUMENTS

The pitot-static system supplies ram air pressure to the airspeed indicator and static pressure to the airspeed indicator, vertical speed indicator, and altimeter. The system is composed of a heated pitot-static tube mounted on the leading edge of the left wing, a static pressure alternate source valve located below the de-ice/anti-ice switch panel, a drain valve located on the left sidewall beneath the instrument panel, an airspeed pressure switch located behind the instrument panel, and the associated plumbing necessary to connect the instruments and sources.

The pitot-static heat system consists of a heating element in the pitot-static tube, a two-position toggle switch, labeled PITOT/STATIC HEAT, on the de-ice/anti-ice switch panel, and a "pull-off" type circuit breaker, labeled LEFT PITOT HEAT, on the left sidewall switch and circuit breaker panel. When the pitot-static heat switch is turned on, the element in the pitot-static tube is heated electrically to maintain proper operation in possible icing conditions.

A static pressure alternate source valve is installed below the de-ice/anti-ice switch panel, and can be used if the static source is malfunctioning. This valve supplies static pressure from inside the cabin instead of from the pitot-static tube. If erroneous instrument readings are suspected due to water or ice in the pressure line going to the static pressure source, the alternate source valve should be pulled on. Pressures within the cabin will vary with vents open or closed. Refer to Sections 3 and 5 for the effect of varying cabin pressures on airspeed and altimeter readings.

A drain valve is incorporated into the system and is located on the left cabin sidewall beneath the instrument panel. The valve is used to drain suspected moisture accumulation in the system by lifting the drain valve lever to the OPEN position as indicated by the placard adjacent to the valve. The valve must be returned to the CLOSED position prior to flight.

An airspeed pressure switch in the pitot-static system is used to actuate an airspeed warning horn in the event excessive airspeed is inadvertently attained. The horn is located behind the headliner in the area above the pilot, and will sound when airspeed exceeds V_{MO} (175 KIAS). A warning signal will also be heard in the pilot's headset.

RIGHT FLIGHT INSTRUMENT PANEL PITOT-STATIC SYSTEM

A second, independent pitot-static system is included for the right flight instrument panel. The system supplies ram air pressure to the airspeed indicator and static pressure to the airspeed indicator, vertical speed indicator, and altimeter utilized in the right flight panel instrument group. The system is composed of a heated pitot-static tube on the leading edge of the right wing, a drain valve on the right cabin sidewall beneath the instrument panel, and the plumbing necessary to connect the instruments to the sources. The right pitot-static system is not connected to the pilot's flight instrument pitot-static (left) system.

The pitot-static heat system for the right flight instrument panel consists of a heating element in the right pitot-static tube, the standard system two-position toggle switch, labeled PITOT/STATIC HEAT, on the de-ice/anti-ice switch panel, a "pull-off" type circuit breaker, labeled RIGHT PITOT HEAT, on the left sidewall switch and circuit breaker panel, and the associated wiring.

The drain valve incorporated into the right flight panel static system functions identically to the standard system drain valve. Use the right valve to drain suspected moisture accumulation in the system lines as indicated by the placard, labeled STATIC SOURCE DRAIN, OPEN, CLOSED, adjacent to the valve. Make sure the valve is returned to the CLOSED position prior to flight.

AIRSPEED INDICATORS

The airspeed indicators are calibrated in knots. Limitation and range markings (in KIAS) include the white arc (full flap operating range of 50 to 125 knots), green arc (normal operating range of 63 to 175 knots), and a red line (maximum speed of 175 knots). The left-hand instrument is a true airspeed indicator and is equipped with a rotatable ring which works in conjunction with the airspeed indicator dial in a manner similar to the operation of a flight computer. To operate the indicator, first rotate the ring until pressure altitude is aligned with outside air temperature in degrees Fahrenheit. Pressure altitude

should not be confused with indicated altitude. To obtain pressure altitude, momentarily set the barometric scale on the altimeter to 29.92 and read pressure altitude on the altimeter. Be sure to return the altimeter barometric scale to the original barometric setting after pressure altitude has been obtained. Having set the ring to correct for altitude and temperature, read the true airspeed shown on the rotatable ring by the indicator pointer. For best accuracy, the indicated airspeed should be corrected to calibrated airspeed by referring to the Airspeed Calibration chart in Section 5. Knowing the calibrated airspeed, read true airspeed on the ring opposite the calibrated airspeed.

VERTICAL SPEED INDICATORS

The vertical speed indicators depict airplane rate of climb or descent in feet per minute. The pointers are actuated by atmospheric pressure changes resulting from changes of altitude as supplied by the two independent static sources.

ALTIMETERS

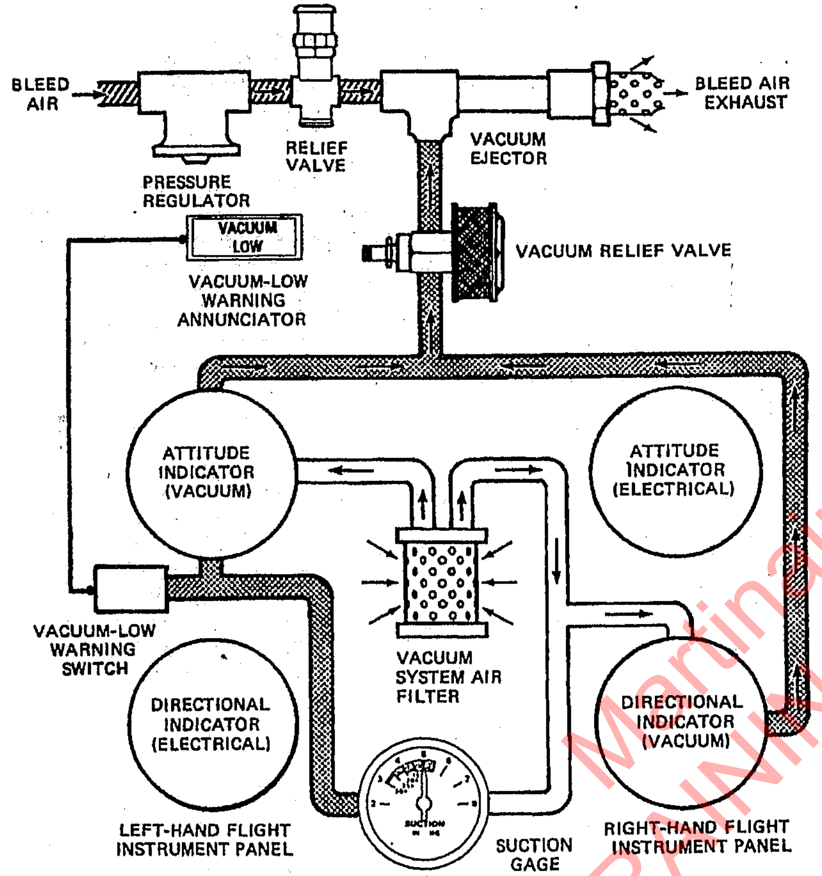
Airplane altitude is depicted by barometric type altimeters. A knob near the lower left portion of each indicator provides adjustment of the instrument's barometric scale to the current altimeter setting.

VACUUM SYSTEM AND INSTRUMENTS

A vacuum system (see Figure 7-16) provides the suction necessary to operate the left-hand attitude indicator and the right-hand directional indicator on some airplanes. On airplanes with the KFC-250 autopilot, the right-hand attitude indicator and right-hand directional indicator are vacuum operated. Vacuum is obtained by passing regulated compressor outlet bleed air through a vacuum ejector. Bleed air flowing through an orifice in the ejector creates the suction necessary to operate the instruments. The vacuum system consists of the bleed air pressure regulator, a vacuum ejector on the forward left side of the firewall, a vacuum relief valve and vacuum system air filter on the aft side of the firewall, vacuum operated instruments and a suction gage on the instrument panel, and a vacuum-low warning annunciator on the annunciator panel.

ATTITUDE INDICATOR (Right Flight Instrument Panel)

The attitude indicator gives a visual indication of flight attitude. Bank attitude is presented by a pointer at the top of the indicator relative to the bank scale which has index marks at 10°, 20°, 30°, 60°, and 90° either side of the center mark. Pitch and roll attitudes are presented by a miniature airplane



CODE

BLEED AIR

INLET AIR

VACUUM

ELECTRIC

NOTE:

Airplanes without a KFC-250 autopilot shown. On airplanes with a KFC-250 autopilot, the right-hand attitude and directional indicators are vacuum-operated, an additional vacuum-low warning light is installed, system plumbing changes, and the suction gage is relocated to the upper right portion of the instrument panel.

Figure 7-16. Typical Vacuum System

superimposed over a symbolic horizon area divided into two sections by a white horizon bar. The upper "blue sky" area and the lower "ground" area have arbitrary pitch reference lines useful for pitch attitude control. A knob at the bottom of the instrument is provided for inflight adjustment of the miniature airplane to the horizon bar for a more accurate flight attitude indication.

DIRECTIONAL INDICATOR (Right Flight Instrument Panel)

The directional indicator displays airplane heading on a compass card in relation to a fixed simulated airplane image and index. The directional indicator will precess slightly over a period of time. Therefore, the compass card should be set in accordance with the magnetic compass just prior to takeoff, and occasionally re-adjusted on extended flights. A knob on the lower left edge of the instrument is used to adjust the compass card to correct for any precession.

SUCTION GAGE

The suction gage is calibrated in inches of mercury and indicates suction available for operation of the attitude and directional indicators. The desired suction range is 4.5 to 5.5 inches of mercury up to 15,000 feet altitude, 4.0 to 5.5 inches of mercury from 15,000 to 20,000 feet, and 3.5 to 5.5 inches of mercury from 20,000 to 25,000 feet. The 15K, 20K, 25K and 30K markings at the appropriate step locations indicate the altitude (in thousands of feet) at which the lower limit of that arc segment is acceptable. A suction reading out of these ranges may indicate a system malfunction or improper adjustment, and in this case, the attitude and directional indicators should not be considered reliable.

VACUUM-LOW WARNING ANNUNCIATOR

A red vacuum-low warning annunciator is installed on the annunciator panel to warn the pilot of a possible low-vacuum condition existing in the vacuum system. Illumination of the annunciator warns the pilot to check the suction gage and to be alert for possible erroneous vacuum-driven gyro instrument indications. The annunciator is illuminated by operation of a warning switch which is activated anytime suction is less than approximately 3.0 in. Hg.

OUTSIDE AIR TEMPERATURE (OAT) GAGE

An outside air temperature (OAT) gage is installed in the upper left side of the windshield. The gage is calibrated in degrees Fahrenheit and Celsius.

STALL WARNING SYSTEM

The airplane is equipped with a vane-type stall warning unit, in the leading edge of the left wing, which is electrically connected to a stall warning horn located overhead of the pilot's position. The vane in the wing senses the change in airflow over the wing, and operates the warning horn at airspeeds between 5 and 10 knots above the stall in all configurations.

The stall warning system should be checked during the preflight inspection by momentarily turning on the battery switch and actuating the vane in the wing. The system is operational if the warning horn sounds as the vane is pushed upward. Aircraft equipped with a stall warning ground disconnect switch will require that the elevator be off the forward stop before the stall warning horn is enabled.

A "pull-off" type circuit breaker, labeled STALL WRN, protects the stall warning system. Also, it is provided to shut off the warning horn in the event it should stick in the on position.

⚠ WARNING

This circuit breaker must be pushed in for landing.

The vane and sensor unit in the wing leading edge is equipped with a heating element. The heated part of the system is operated by the STALL HEAT switch on the deice/anti-ice switch panel, and is protected by the STALL WRN circuit breaker on the left sidewall switch and circuit breaker panel.

AVIONICS SUPPORT EQUIPMENT

Various avionics support equipment is installed in the airplane, and includes an avionics cooling fan, microphone/speaker, mic/phone jacks, and control surface static dischargers. The following paragraphs discuss these items. Description and operation of radio equipment is covered in Section 9 of this handbook.

AVIONICS COOLING FAN

An avionics cooling fan system is provided in the airplane to supply internal cooling air for prolonged avionics equipment life. The fan will operate when the battery switch is on and the number 2 avionics power switch is on. If the fan malfunctions, it can be shut off using the "pull-off" type circuit breaker, labeled AVN FAN, located on the left sidewall switch and circuit breaker panel.

MICROPHONE/SPEAKER AND MIC/PHONE JACKS

Radio communications are accomplished by the use of a hand-held microphone and the airplane speaker. The microphone stows in a hanger on the front of the pedestal and plugs into a mic jack located on the right side of the pedestal. The airplane speakers are located above the pilot's and front passenger's positions in the cabin headliner. Microphone and headset jacks are located on the left side of the instrument panel for the pilot and the right side of the instrument panel for the front passenger. These jacks are used when oxygen masks are in use. Audio is controlled by the individual audio selector switches and adjusted for volume level by using the selected receiver volume controls.

NOTE

To ensure audibility and clarity when transmitting with the hand-held microphone, always hold it as closely as possible to the lips, then key the microphone and speak directly into it. Avoid covering the opening on the back side of microphone for optimum noise cancelling.

STATIC DISCHARGERS

As an aid in IFR flights, wick-type static dischargers are installed to improve radio communications during flight through dust or various forms of precipitation (rain, snow or ice crystals). Under these conditions, the build-up and discharge of static electricity from the trailing edges of the wings, rudder, elevator, propeller tips, and radio antennas can result in loss of usable radio signals on all communications and navigation radio equipment. Usually the ADF is first to be affected and VHF communication equipment is the last to be affected.

Installation of static dischargers reduces interference from precipitation static, but it is possible to encounter severe precipitation static conditions which might cause the loss of radio signals, even with static dischargers installed. Whenever possible, avoid known severe precipitation areas to prevent loss of dependable radio signals. If avoidance is impractical, minimize airspeed and anticipate temporary loss of radio signals while in these areas.

Static dischargers lose their effectiveness with age, and therefore, should be checked periodically (at least at every annual inspection) by qualified avionics technicians, etc. If testing equipment is not available, it is recommended that the wicks be replaced every two years, especially if the airplane is operated frequently in IFR conditions. The discharger wicks are designed to unscrew from their mounting bases to facilitate replacement.

CABIN FEATURES

CABIN FIRE EXTINGUISHER

A portable fire extinguisher is installed on the cargo barrier in some Cargo Versions and on the inside of the pilot's entry door in other Cargo Versions and the Passenger Version. The extinguisher in both airplanes is readily accessible in case of fire. The extinguisher should be checked prior to each flight to ensure that its bottle pressure, as indicated by the gage on the bottle, is within the green arc and the operating lever lock pin is securely in place.

To operate the fire extinguisher:

1. Loosen retaining clamp and remove extinguisher from bracket.
2. Hold extinguisher upright, pull operating lever lock pin, and press lever while directing the discharge at the base of the fire at the near edge. Progress toward the back of the fire by moving the nozzle rapidly with a side-to-side sweeping motion.

CAUTION

Care must be taken not to direct the initial discharge directly at the burning surface at close range (less than five feet) because the high velocity stream may cause splashing and/or scattering of the burning material.

3. Anticipate approximately ten seconds of discharge duration.

WARNING

Ventilate the cabin promptly after successfully extinguishing the fire to reduce the gases produced by thermal decomposition. Occupants should use oxygen masks until the smoke clears.

Fire extinguishers should be recharged by a qualified fire extinguisher agency after each use. Such agencies are listed under "Fire Extinguisher" in the telephone directory. After recharging, secure the extinguisher to its mounting bracket; do not allow it to lie loose on floor or seats.

SUN VISORS

Two sun visors are mounted overhead of the pilot and front passenger. The visors are mounted on adjustable arms which enable them to be swung and telescoped into the desired windshield area.

MAP AND STORAGE COMPARTMENTS

A map compartment is located in the lower right side of the instrument panel. A hinged door covers the compartment and can be opened to gain access into the compartment. Storage pockets are also installed on the back of the pilot's and the front passenger's seats and along the bottom edge of each crew entry door and can be used for stowage of maps and other small objects.

MISCELLANEOUS EQUIPMENT

ENGINE INLET COVERS AND PROPELLER ANCHOR

Various covers and an anchor are available to close engine openings and restrain the propeller during inclement weather conditions and when the airplane is parked for extended periods of time, such as overnight. The covers preclude the entrance of dust, moisture, bugs, etc. into the engine and engine compartment.

Two covers are provided which plug into the two front inlets, thereby closing off these openings. The engine inlet covers may be installed after the engine has cooled down (ITT indicator showing ^"off scale" temperature). To prevent the propeller from windmilling during windy conditions, the propeller anchor can be installed over a blade of the propeller and its anchor strap secured around the nose gear or to the bracket located on the lower right-hand cowl.

CREW ENTRY STEP ASSEMBLY

The airplane may be equipped with a crew entry step for each crew entry door. The step assembly attaches to the floorboard just inside the entry door and extends toward ground level, providing two steps for entering or exiting the airplane. When not in use, the step assembly folds and stows just inside the cabin, inboard of each entry door.

CARGO BARRIER AND NETS

A cargo barrier and three cargo barrier nets may be installed directly behind the pilot's and front passenger's seats. The barrier and nets preclude loose cargo from moving forward into the pilot's and front passenger's stations during an abrupt deceleration. The barrier consists of a U-shaped assembly of honeycomb composite construction. The assembly attaches to the four seat rails at the bottom at station 153 and to structure at the top at approximately station 166. The cargo barrier nets consist of three nets: one for the left sidewall, one for the right sidewall, and one for the center. The left and right nets fill in the space between the barrier assembly and the airplane sidewalls. The side nets are fastened to the airplane sidewalls and the edge of the barrier with six anchor-type fasteners each, three on each side. The center net fills in the opening in the top center of the barrier. The center net is fastened with four anchor-type fasteners, two on each side.

CARGO PARTITIONS

Cargo partitions are available and can be installed to divide the cargo area into convenient compartments. Partitions may be installed in all of the five locations at stations 188.7, 246.8, 282.0, 307.0, and 332.0. The cargo partitions are constructed of canvas with nylon webbing reinforcement straps crisscrossing the partition for added strength. The ends of each strap have fittings which attach to the floor tracks and anchor-type fasteners on the sides and top of the fuselage. Four straps have adjustable buckles for tightening the straps during installation of the partition.

CARGO DOOR RESTRAINING NET

A restraining net may be installed on the inside of the airplane over the cargo door opening. The net precludes loose articles from falling out the cargo door when the doors are opened. The restraining net consists of two halves which

(Continued Next Page)

part in the center of the door opening. The front and rear halves slide fore and aft, respectively, on a rod to open the net. The net is attached to the sidewall by screws and nutplates along the front and rear edges of the net. When the net is closed, the two halves are held together by snap-type fasteners.

CARGO/AIRPLANE TIE-DOWN EQUIPMENT

Various items of tie-down equipment are available for securing cargo within the airplane and/or tying down the airplane. This equipment consists of tie-down belt assemblies having various load ratings and adjustment devices and two types of quick-release tie-down ring anchors for securing the belts to the cabin seat tracks and anchor plates. Refer to Section 6 for the recommended use and restrictions of this equipment.

HOISTING RINGS

Provisions are made for the installation of four hoisting rings which attach to the left and right sides of both front and rear spar wing-to-fuselage attach fittings. Each hoisting ring consists of a hinge which replaces the washer on the attachment bolt of the fitting. The upper half of the hinge contains a ring which is used for attaching the hoist when the airplane is being hoisted. When not in use, the upper hinge half folds down out of the way. To gain access to the hoisting rings, when installed, it is necessary to remove the wing-to-fuselage fairing strips.

RELIEF TUBE

Provisions are made for the installation of a relief tube in the aft cabin area on the Passenger Version. The relief tube is installed on the right sidewall, just aft of the passenger entry door.

OIL QUICK-DRAIN VALVE

An oil quick-drain valve is available to replace the drain plug on the bottom of the engine oil tank, and provides quicker, cleaner draining of the engine oil. To drain the oil with this valve, slip a hose over the end of the valve, cut the safety wire securing the valve on-off lever in the off position, and rotate the lever to the on position. After draining, rotate the valve on-off lever to the off position, remove the hose to check for leakage, and resafety the on-off lever in the off position.

SECTION 8
AIRPLANE HANDLING, SERVICE & MAINTENANCE

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INTRODUCTION

This section contains factory-recommended procedures for proper ground handling and routine care and servicing of your Cessna. It also identifies certain inspection and maintenance requirements which must be followed if your airplane is to retain that new-plane performance and dependability. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered in your locality.

Keep in touch with your Cessna Service Facility and take advantage of his knowledge and experience. He knows your airplane and how to maintain it. He will remind you when lubrications and oil changes are necessary, and about other seasonal and periodic services.

⚠ WARNING

The airplane should be regularly inspected and maintained in accordance with information found in the airplane Maintenance Manual and in company issued Service Bulletins and Service Newsletters All recommendations for product improvements called for by Service Bulletins should be accomplished and the airplane should receive repetitive and required inspections. Cessna does not condone modifications, whether by Supplemental Type Certificate or otherwise, unless these certificates are held and/or approved by Cessna. Other modifications may void warranties on the airplane since Cessna has no way of knowing the full effect on the overall airplane. Operation of an airplane that has been modified may be a risk to the occupants, and operating procedures and performance data set forth in the operating handbook may no longer be considered accurate for the modified airplane.

IDENTIFICATION PLATE

All correspondence regarding your airplane should include the SERIAL NUMBER. The Serial Number, Model Number, Production Certificate Number (PC) and Type Certificate Number (TC) can be found on the Identification Plate, located on the forward doorpost of the left crew door on early serial airplanes or on the left side of the tailcone below the horizontal stabilizer on later serial airplanes. A Finish and Trim Plate is located on the forward doorpost of the left crew door of all airplanes and contains a code describing the interior color scheme and exterior paint combination of the airplane. The code may be used in conjunction with an applicable Parts Catalog if finish and trim information is needed.

CESSNA OWNER ADVISORIES

Cessna Owner Advisories are sent to Cessna Aircraft owners at no charge to inform them about mandatory and/or beneficial aircraft service requirements and product improvements:

United States Aircraft Owners

If your aircraft is registered in the U.S., appropriate Cessna Owner Advisories will be mailed to you automatically according to the latest aircraft registration name and address provided to the FAA.

If you require a duplicate Owner Advisory to be sent to an address different from the FAA aircraft registration address, please complete and return an Owner Advisory Application (otherwise no action is required on your part).

International Aircraft Owners

To receive Cessna Owner Advisories, please complete and return an Owner Advisory Application.

Receipt of a valid Owner Advisory Application will establish your Cessna Owner Advisory service (duplicate Owner Advisory service for U.S. aircraft owners) for one year, after which you will be sent a renewal notice.

PUBLICATIONS

Various publications and flight operation aids are furnished in the airplane when delivered from the factory. These items are listed below.

- CESCOM/CUSTOMER CARE PROGRAM HANDBOOK
- PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL
- PILOT'S CHECKLISTS
- CESSNA SALES AND SERVICE DIRECTORY

The following additional publications, plus many other supplies that are applicable to your airplane, are available from your Cessna Service Facility.

- INFORMATION MANUAL (Contains Pilot's Operating Handbook Information)
- MAINTENANCE MANUALS AND PARTS CATALOGS FOR YOUR:
  - AIRPLANE
  - ENGINE AND ACCESSORIES
  - AVIONICS AND AUTOPILOT

Your Cessna Service Facility has a Customer Care Supplies and Publications Catalog covering all available items, many of which he keeps on hand. He will be happy to place an order for any item which is not in stock.

NOTE

A Pilot's Operating Handbook and FAA Approved Airplane Flight Manual which is lost or destroyed may be replaced by contacting your Cessna Service Facility. An affidavit containing the owner's name, airplane serial number and registration number must be included in replacement requests since the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual is identified for specific airplanes only.

AIRPLANE FILE

There are miscellaneous data, information and licenses that are a part of the airplane file. The following is a checklist for that file. In addition, a periodic check should be made of the latest Federal Aviation Regulations to ensure that all data requirements are met.

A. To be displayed in the airplane at all times:
   1. Aircraft Airworthiness Certificate (FAA Form 8100-2).
   2. Aircraft Registration Certificate (FAA Form 8050-3).
   3. Aircraft Radio Station License, if transmitter installed (FCC Form 556).

B. To be carried in the airplane at all times:
   1. Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
   2. Weight and Balance, and associated papers (latest copy of the Repair and Alteration Form, FAA Form 337, if applicable).
   3. Equipment List.

C. To be made available upon request:
   1. Aircraft Maintenance Record.
   2. Engine Maintenance Record.
   3. Propeller Maintenance Record.
   4. Avionics Maintenance Record.

Most of the items listed are required by the United States Federal Aviation Regulations. Since the Regulations of other nations may require other documents and data, owners/operators of airplanes not registered in the

United States should check with their own aviation officials to determine their individual requirements.

Cessna recommends that these items, plus the Pilot's Checklists, Weight and Balance Plotter, CESCOM/Customer Care Program Handbook and Customer Care Card, be carried in the airplane at all times.

AIRPLANE INSPECTION PERIODS

FAA REQUIRED INSPECTIONS

As required by Federal Aviation Regulations, all civil aircraft of U.S. registry must undergo a complete inspection (annual) each twelve calendar months. In addition to the required ANNUAL inspection, aircraft operated commercially (for hire) must have a complete inspection every 100 hours of operation.

The FAA may require other inspections by the issuance of airworthiness directives applicable to the airplane, engine, propeller and components. It is the responsibility of the owner/operator to ensure compliance with all applicable airworthiness directives and, when the inspections are repetitive, to take appropriate steps to prevent inadvertent noncompliance.

In lieu of the 100 HOUR and ANNUAL inspection requirements, an airplane may be inspected in accordance with a progressive inspection schedule, which allows the work load to be divided into smaller operations that can be accomplished in shorter time periods.

The Cessna Progressive Care Program has been developed to provide a modern progressive inspection schedule that satisfies the complete airplane inspection requirements of both the 100 HOUR and ANNUAL inspections as applicable to Cessna airplanes. The program assists the owner/operator in his responsibility to comply with all FAA inspection requirements, while ensuring timely replacement of life-limited parts and adherence to factory-recommended inspection intervals and maintenance procedures.

CESSNA PROGRESSIVE CARE

The Cessna Progressive Care Program has been designed to help you realize maximum utilization of your airplane at a minimum cost and downtime. Under this program, your airplane is inspected and maintained in four operations. The four operations are recycled each 400 hours and are recorded in a specially provided Aircraft Inspection Log as each operation is conducted.

The Cessna Aircraft Company recommends Progressive Care for airplanes that are being flown 400 hours or more per year, and the 100-hour inspection for all other airplanes. The procedures for the Progressive Care Program and the 100-hour inspection have been carefully worked out by the factory and are followed by the Cessna Service Organization. The complete familiarity of Cessna Authorized Caravan Service Stations with Cessna equipment and factory-approved procedures provides the highest level of service for Cessna owners/operators.

Regardless of the inspection method selected by the owner/operator, he or she should keep in mind that FAR Part 43 and FAR Part 91 establishes the requirement that properly certified agencies or personnel accomplish all required FAA inspections and most of the manufacturer recommended inspections.

CESSNA CUSTOMER CARE PROGRAM

Specific benefits and provisions of the Cessna Warranty plus other important benefits for you are contained in your CESCOM/Customer Care Program Handbook supplied with your airplane. You will want to thoroughly review your CESCOM/Customer Care Program Handbook and keep it in your airplane at all times.

You will also want to contact your Service Station either at 100 hours for your first Progressive Care Operation, or for your first 100-hour inspection depending on which program you choose to establish for your airplane. While these important inspections will be performed for you by any Cessna Caravan Service Station, in most cases you will prefer to have the facility from whom the airplane was purchased accomplish this work.

CESCOM SYSTEM

CESCOM is Cessna's Computerized Maintenance Records System. This comprehensive system provides you with an accurate and simple method of monitoring and scheduling inspections, Service Bulletins, Service Kits, Airworthiness Directives as well as scheduled and unscheduled maintenance activities. For detail information about CESCOM, refer to the CESCOM Instruction Manual supplied with your airplane.

ENGINE CONDITION TREND MONITORING

Pratt & Whitney Canada Inc. Engine Condition Trend Monitoring is a system of recording engine instrument readings, correcting the readings for ambient conditions, and comparing actual engine operation to typical engine operating characteristics.

It has been established that engine operating characteristics, such as output torque (T_q), propeller RPM (N_p), interturbine temperature (ITT), gas generator RPM (N_g), and fuel flow (Wf) are predictable for various engine types under specific ambient conditions.

Because aircraft engines operate at a wide range of altitudes, outside air temperatures, and airspeeds, corrections for varying ambient conditions are also incorporated into the Trend Monitoring process.

Additional information about both of these methods may be obtained from the following sources:

- A Caravan Service Station.
- Cessna Propeller Aircraft Product Support.
- Pratt & Whitney Canada Inc.
  1000 Marie - Victorin, Longueuil, Quebec
  Canada, J4G 1A1

  Attention: Customer Support, Small Turboprops
  Mail Code: 1RC1

  Tel: (514) 677-9411.
- The publication "Engine Condition Trend Monitoring and Power Management for PT6A-114, PT6A-114A Installed in the Cessna Caravan I" supplied in this Pilot's Operating Handbook, or from sources listed above.
- Pratt & Whitney Canada Aircraft Gas Turbine Operation Information Letter, No. 23.

ALTERATIONS OR REPAIRS

It is essential that the FAA be contacted prior to any alterations on the airplane to ensure that airworthiness of the airplane is not violated. Alterations or repairs to the airplane must be accomplished by licensed personnel.

GROUND HANDLING

TOWING

The airplane is most easily and safely maneuvered by hand with the tow-bar attached to the nose wheel. The tow bar may be stowed in Zone 6. Moving the airplane by hand will require that the individual steering with the tow bar be assisted by personnel pushing at the wing struts.

CAUTION

Do not push or pull the airplane using the propeller blades or control surfaces.

In any towing operation, especially when towing with a vehicle, do not exceed the nose gear turning angle of 56° either side of center as shown by the steering limit marks. On airplanes having serial numbers 208B0001 thru 208B0054 which have been modified with SK208-48 and airplanes with serial numbers 208B0055 and On, if excess force is exerted beyond the turning limit, a red over-travel indicator block (frangible stop) will fracture and the block, attached to a cable, will fall into view alongside the nose strut. This should be checked routinely during preflight inspection to prevent operation with a damaged nose gear.

CAUTION

Disengage rudder lock and remove any external rudder locks before towing.

If the airplane is towed or pushed over a rough surface during hangaring, watch that the normal cushioning action of the nose gear does not cause excessive vertical movement of the tail and the resulting contact with low hangar doors or structure. A flat nose tire will also increase tail height.

PARKING

When parking the airplane, head into the wind and set the parking brakes. Do not set the parking brakes during cold weather when accumulated moisture may freeze the brakes, or when the brakes are overheated. Install the control wheel lock, engage the rudder lock, and chock the wheels (if the brakes are not utilized) to prevent airplane movement. In severe weather and high wind conditions, tie the airplane down as outlined in the following paragraph.

CAUTION

Any time the airplane is loaded heavily, the footprint pressure (pressure of the airplane wheels upon the contact surface of the parking area or runway) will be extremely high, and surfaces such as hot asphalt or sod may not adequately support the weight of the airplane. Precautions should be taken to avoid airplane parking or movement on such surfaces.

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 airplane securely, proceed as follows:

1. Head the airplane into the wind, if possible.
2. Set the parking brake.

CAUTION

Do not set the parking brake during cold weather when accumulated moisture may freeze the brakes or when the brakes are overheated. If the brakes are not utilized, chock the nose and main wheels to prevent airplane movement.

3. Install the control wheel lock and engage the rudder lock.
4. Set aileron and elevator trim tabs to neutral position so that tabs fair with control surfaces.
5. Install a pitot tube cover(s), if available.
6. Secure ropes or chains of sufficiently strong tensile strength to the wing tie-down fittings and secure to ground anchors.
7. Attach a rope or chain to the tail tie-down, and secure to a ground anchor.
8. If additional security is desired, attach a rope (no chains or cables) to the nose gear torque link and secure to a ground anchor.
9. If dusty conditions exist, or the last flight of the day has been completed, install the two engine inlet covers to protect the engine from debris. The covers may be installed after the engine has cooled down (ITT indicator showing "off scale" temperature).
10. To prevent the propeller from windmilling, install the propeller anchor over a blade of the propeller and secure its anchor strap around the nose gear or to the bracket located on the lower right hand cowl.

JACKING

Several jack points or jacking locations are available. depending on whether a cargo pod is installed. A fuselage jack point directly below the firewall and housed within the nose gear strut fairing is accessible for nose gear jacking regardless of the installation of a cargo pod. Two additional fuselage jack points are located at the main gear supports, but are not accessible with the cargo pod installed. Their use is generally reserved for maintenance such as main gear removal or raising the entire airplane whenever the cargo pod is not installed. Anytime the cargo pod is installed, if the main gear-to-fuselage fairings are removed, jacks can be positioned adjacent to the sides of the cargo pod and raised to engage the receptacle on the end of the jacks over the head of the outboard bolt which secures the main gear attach trunnion bearing cap (aft) on the left and right gear. These jacking locations serve essentially the same purpose as the fuselage jack points at the main gear supports. An additional jack point on each main gear axle fitting is used primarily when the cargo pod is installed and it is desired to jack a single main gear for tire replacement, etc. If desired, jack stands with wing jack pads may be fabricated so that the front wing spar at stations 141.2 or 155.9 on each wing may be used as jacking locations. A tail jack must be used in conjunction with wing jacking.

CAUTION

- **A tail jack stand must be used when conducting maintenance inside the tail section, and should be installed in most jacking operations. Be sure the stand is suitably heavy to keep the tail stable under all conditions and is strong enough to support the airplane. Placing a jack stand under the nose jack point (if not used for jacking) will provide additional stability.**
- **Do not use cargo pod structure for jacking or as a blocking surface.**
- **Raise the airplane no more than required for the maintenance being performed.**

In some instances, it may be necessary to use a sling or hoisting rings for the initial lift, to be followed with jacking at the jack points. Refer to the Maintenance Manual for procedures on jacking and hoisting, and information concerning jacking equipment.

LEVELING

Longitudinal leveling of the airplane for weighing will require that the main landing gear be supported by stands, blocks, etc., on the main gear scales to a position at least four inches higher than the nose gear as it rests on an appropriate scale. This initial elevated position will compensate for the difference in waterline station between the main and nose gear so that final leveling can be accomplished solely by deflating the nose gear tire.

NOTE

Since the nose gear strut on this airplane contains an oil snubber for shock absorption rather than an air/oil shock strut, it cannot be deflated to aid in airplane leveling.

The airplane can also be leveled longitudinally by raising or lowering the airplane at the jack points. Longitudinal leveling points are provided by backing out the two leveling screws located on the left side of the fuselage just forward of the cargo doors. Place a spirit level on the screws, then deflate the nose gear tire (if placed on scales) or adjust the jacks to center the bubble in the level. The pilot's seat rails can also be used for longitudinal leveling by moving the seat to the most forward position and placing the level on the rail just aft of the seat. To level the airplane laterally, center a spirit level across the seat rails aft of the pilot and right front passenger seats and raise or lower one side of the airplane. Refer to the 208 Series Maintenance Manual for additional information.

SERVICING

In addition to the PREFLIGHT INSPECTION covered in Section 4, COMPLETE servicing, inspection, and test requirements for your airplane are detailed in the 208 Series Maintenance Manual. The Maintenance Manual outlines all items which require attention at 100, 200, and 400-hour intervals, plus those items which require servicing, inspection, and/or testing at special intervals.

Since Cessna Service Stations have the training and equipment necessary to conduct all service, inspection, and test procedures in accordance with applicable maintenance manuals, it is recommended that you contact your Cessna Service Station concerning these requirements and begin scheduling your airplane for service at the recommended intervals.

Cessna Progressive Care ensures that these requirements are accomplished at the required intervals to comply with the 100-hour or ANNUAL inspection as previously covered.

Depending on var[illegible] your local Government Aviation Agency may require additional service, inspections, or tests. For these regulatory requirements, owners/operators should check with local aviation officials where the airplane is being operated.

For quick and ready reference, quantities, materials, and specifications for frequently used service items are as follows:

OIL

OIL GRADE (SPECIFICATION) --

Oil conforming to Pratt & Whitney Engine Service Bulletin No. 1001, and all revisions or supplements thereto, **must be used.** The oils listed below comply with the engine manufacturers specification PWA521 and have a viscosity Type II rating. These oils are fully approved for use in Pratt & Whitney Canada Inc. commercially operated engines. When adding oil, service the engine with the type and brand which is currently being used in the engine. Refer to the airplane and engine maintenance records for this information. Should oils of different viscosities or brands be inadvertently mixed, the oil system servicing instructions in the Maintenance Manual shall be carried out.

BP Turbo Oil 2380
Exxon Turbo Oil ETO 85 (Third generation lubricant)
Aero Shell Turbine Oil 500
Aero Shell Turbine Oil 555
Aero Shell Turbine Oil 560 (Third generation lubricant)
Royco Turbine Oil 500
Royco Turbine Oil 555
Royco Turbine Oil 560 (Third generation lubricant)
Mobil Jet Oil II
Mobil Jet Oil 254 (Third generation lubricant)
Castrol 5000
Turbonycoil 600

CAUTION

- **DO NOT mix brands or types of oils.**
- **When changing from an existing lubricant formulation to a "third generation" lubricant formulation (see list above), the engine manufacturer strongly recommends that such a change should only be made when an engine is new or freshly overhauled. For additional information on use of third generation oils, refer to the engine manufacturer's pertinent oil service bulletins.**

TOTAL OIL CAPACITY -- 14 U.S. Quarts (including oil in filter, cooler and hoses).

DRAIN AND REFILL QUANTITY -- Approximately 9.5 U.S. Quarts.
OIL QUANTITY OPERATING RANGE

Fill to within 1 1/2 quarts of MAX HOT or MAX COLD (as appropriate) on dipstick. Quart markings indicate U.S. quarts low if oil is hot. For example, a dipstick reading of 3 indicates the system is within 2 quarts of MAX if the oil is cold and within 3 quarts of MAX if the oil is hot.

WARNING

Ensure oil dipstick cap is securely latched down. Operating the engine with less than the recommended oil level and with the dipstick cap unlatched will result in excessive oil loss and eventual engine stoppage.

NOTE

To obtain an accurate oil level reading, it is recommended the oil level be checked either within 10 minutes after engine shutdown while the oil is hot (MAX HOT marking) or prior to the first flight of the day while the oil is cold (MAX COLD marking). If more than 10 minutes has elapsed since engine shutdown, and engine oil is still warm, perform an engine dry motoring run before checking oil level.

OIL DRAIN PERIOD --
For engines operated in corporate or utility airplanes with a typical utilization of 50 hours per month or less, it is recommended the oil be changed every 400 hours or 12 months, whichever occurs first. For engines operated in high utilization commuter airline type operation, a basic oil drain period of 1200 hours or 12 months is recommended. Regardless of the degree of utilization, if operating in a sandy or dusty environment, the oil change interval must be at least every 6 months.

FUEL

APPROVED FUEL GRADE (SPECIFICATION) --
Jet A (ASTM-D1655).
Jet A-1 (ASTM-D1655).
Jet B (ASTM-D1655).
JP-1 (MIL-L-5616).
JP-4 (MIL-T-5624).
JP-5 (MIL-T-5624).
JP-8 (MIL-T-83133A).

ALTERNATE/EMERGENCY FUELS --
Aviation Fuel (All grades of military and commercial aviation gasoline).

CAUTION

Aviation gasoline is restricted to emergency use and shall not be used for more than 150 hours in one overhaul period; a mixture of one part aviation gasoline and three parts of Jet A, Jet A-1, JP-1, or JP-5 may be used for emergency purposes for a maximum of 450 hours per overhaul period.

CAPACITY EACH TANK

S/N 208B0001 thru 208B0089 not modified with SK208-52: 167.5 U.S. Gallons.
S/N 208B0001 thru 208B0089 modified with SK208-52 And S/N 208B0090 and On: 167.8 U.S. Gallons.

CAUTION

To obtain accurate fuel quantity indicator readings, verify the airplane is parked in a laterally level condition, or, if in flight, make sure the airplane is in a coordinated and stabilized condition (ball of turn-and-bank indicator centered).

FUEL ADDITIVES

A variety of fuels may be used in the airplane; however, each must have an anti-icing additive, (EGME) or (DIEGME), incorporated or added to the fuel during refueling.

It is recommended that fuel anti-icing additive be used to control bacteria and fungi. The anti-ice additives EGME/DIEGME have shown, through service experience, that they provide acceptable protection from microorganisms such as bacteria and fungi that can rapidly multiply and cause serious corrosion in tanks and may block filters, screens and fuel metering equipment.

CAUTION

JP-4 and JP-5 fuels per MIL-T-5624 and JP-8 fuel per MIL-T-83133A contain the correct premixed quantity of an approved type of anti-icing fuel additive and no additional anti-ice compounds should be added.

NOTE

The oils listed above are recommended when operation will result in frequent cold soaking at ambient temperatures of 0°F (-18°C). Refer to Pratt & Whitney Engine Service Bulletin No. 1001 for additional oils which are approved.

If one or more of the following conditions exist, the accessory gearbox scavenge pump inlet screen and any drained oil should be inspected for the presence of carbon particles, per airplane and engine maintenance manual procedures and the engine manufacturer's pertinent engine and oil service bulletins:

1. Engine oil has been switched to a "third generation" lubricant during mid-life.
2. High oil consumption.
3. Oil leaking from engine intake.

If carbon particles are found, refer to the above referenced maintenance manuals and service bulletins for corrective action.

⚠ CAUTION

- **Assure the additive is directed into the flowing fuel stream with the additive flow started after the fuel flow starts and stopped before fuel flow stops. Do not allow concentrated additive to contact coated interior of fuel tank or airplane painted surface.**
- **Use not less than 20 fluid ounces of additive per 156 gallons of fuel or more than 20 fluid ounces of additive per 104 gallons of fuel.**

PROCEDURE FOR CHECKING FUEL ADDITIVES

1. Prolonged storage of the airplane will result in a water buildup in the fuel which "leaches out" the additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. The concentration of additive can be checked using an anti-icing additive concentration test kit. For additional information about this kit, refer to Chapter 12 of the 208 series maintenance manual. It is imperative that the instructions for the test kit be followed explicitly when checking the additive concentration. The additive concentrations by volume for EGME/DIEGME shall be 0.10 percent minimum and 0.15 percent maximum, either individually or mixed in a common tank. Fuel, when added to the tank, should have a minimum concentration of 0.10 percent by volume.

⚠ CAUTION

If the fuel additive concentration has fallen below 0.035% by volume, the airplane should be defueled and refueled.

If additional anti-static protection is desired, the following additive is approved for use:

Dupont Stadis 450

⚠ CAUTION

These additives shall not exceed a maximum concentration of 1 part per million by weight.

If additional biocidal protection is desired, an additive is permitted for use in certain conditions. Fuel tank maintenance practices are of prime importance in controlling microbial growth. However, other factors such as climate, airplane design, route structure and utilization also affect microbial growth; therefore, occasional use of a biocide may be required. Biocide additive may be used on a limited basis, defined as intermittent or non-continuous use in a single application, to sterilize airplane fuel systems suspected, or found to be contaminated by microbial organisms. For those operators, where the need for biocide use is dictated, Pratt & Whitney Canada Inc. recommends, as a guide, a dosage interval of once a month. This interval can then be adjusted, either greater or lesser, as an operator's own experience dictates. An engine operated in private and corporate airplanes, where utilization rates are relatively low, may use the additive continuously. The following additives are permitted for use:

Sohio Biobor JF
Kathon FP 1.5

⚠ CAUTION

Additive shall not exceed a maximum concentration of 270 parts per million by weight.

FUEL CONTAMINATION --

Fuel contamination is usually the result of foreign material present in the fuel system, and may consist of water, rust, sand, dirt, microbes or bacterial growth. In addition, additives that are not compatible with fuel or fuel system components can cause the fuel to become contaminated.

Before each flight and after each refueling, use a clear sampler and drain at least one sampler full of fuel from the inboard fuel tank sump quick-drain valves, fuel tank external sump quick-drain valves on S/N 208B0001 thru 208B0089 modified with SK208-52 and S/N 208B0090 and On, fuel reservoir quick-drain valve (actuated by a push-pull drain control on cargo pod), and fuel filter quick-drain valve to determine if contaminants are present, and that the airplane has been fueled with the proper fuel. If the airplane is parked with one wing low on a sloping ramp (as evidenced by the ball of the turn and bank indicator displaced from center), draining of the outboard fuel tank sump quick-drain valves (if installed) is also recommended.

If contamination is detected, drain **all** fuel drain points again. Take repeated samples from **all** fuel drain points until all contamination has been removed. If after repeated sampling, evidence of contamination still exists, the fuel tanks should be completely drained and the fuel system cleaned. **Do not** fly the airplane with contaminated or unapproved fuel. Anytime the filter bypass flag (red warning button) is found to be extended, the filter element has become clogged. Disassemble the filter, clean the element, and check the fuel system to determine the cause of contamination before further flight.

In addition, owners/operators who are not acquainted with a particular fixed base operator should verify that the fuel supply has been checked for contamination and is properly filtered before allowing the airplane to be serviced. Also, fuel tanks should be kept full between flights, provided weight and balance considerations will permit, to reduce the possibility of water condensing on the inside walls of partially filled tanks.

To further reduce the possibility of contaminated fuel, routine maintenance of the fuel system should be performed in accordance with the airplane Maintenance Manual. Only the proper fuel, as recommended in this handbook, should be used, and fuel additives should not be used unless approved by Cessna and the Federal Aviation Administration.

⚠ WARNING

It is the pilot's responsibility to ensure that the airplane's fuel supply is clean before flight. Any traces of solid contaminants such as rust, sand, pebbles, dirt, microbes and bacterial growth or liquid contamination resulting from water, improper fuel type, or additives that are not compatible with the fuel or fuel system components must be considered hazardous. Carefully sample fuel from all fuel drain locations during each preflight inspection and after every refueling.

LANDING GEAR

NOSE WHEEL TIRE PRESSURE --
36 ±6 PSI on 22x8.00-8, 6-Ply Rated Tire.

MAIN WHEEL TIRE PRESSURE --
55 ±2 PSI on 8.50-10, 8-Ply Rated Tires.
40 ±5 PSI on 29x11.00-10, 10-Ply Rated Tires.

NOSE GEAR SHOCK STRUT --
Keep filled with MIL-H-5606 hydraulic fluid per filling instructions placard. No air pressure is required in strut.

BRAKES --
Service brake fluid reservoir with MIL-H-5606 hydraulic fluid as placarded on reservoir. Maintain fluid level between MIN and MAX markings.

OXYGEN

AVIATOR'S BREATHING OXYGEN -- Spec. No. MIL-O-27210.

MAXIMUM PRESSURE (cylinder temperature stabilized after filling) --
1850 PSI at 21°C (70°F).
Refer to Oxygen Supplements (Section 9) for filling pressures.

GROUND DEICE/ANTI-ICE OPERATIONS

During cold weather operations, flight crews are responsible for ensuring that the airplane is free of ice contamination. Type I deice, and Type II or Type IV anti-ice fluids may be used sequentially to ensure compliance with FAA regulations, which require that all critical components (wings, control surfaces and engine inlets as an example) be free of snow, ice, or frost before takeoff. The deicing process is intended to restore the airplane to a clean configuration so that neither aerodynamic characteristics nor mechanical interference from contaminants will occur.

⚠ WARNING

Type II and Type IV anti-ice fluid is designed for use on airplanes with a V_R speed of 85 knots or greater. Whenever Type II or Type IV anti-ice fluid is applied to the airplane, the takeoff flap setting is limited to 0° and the V_R is 88 KCAS. Refer to Section 2 for limitations and Section 5 for takeoff distances with 0° flaps setting and liftoff speeds in KIAS. The takeoff distance charts for 0° flaps setting start with the airplane's maximum weight for normal operations. However, when icing conditions exist, the airplane should only be loaded to its maximum weight for flight into known icing conditions.

NOTE

It is recommended that flight crews refamiliarize themselves seasonally with the following publications for expanded deice and anti-ice procedures:

- Cessna 208 Series Maintenance Manual Chapter 12.
- FAA Advisory Circular AC135-17, dated 14 December 1994 or later.
- FAA Advisory Circular AC20-117, dated 17 December 1982 or later.
- FAA Flight Standards Information Bulletin FSAT 01-09, dated 5 October 2001, or later.

Deicing and anti-icing fluids are aqueous solutions which work by lowering the freezing point of water in either the liquid or crystal phase, thus delaying the onset of freezing. For this reason, they are referred to as Freezing Point Depressant (FPD) fluids. Deicing fluid is classified as Type I. Anti-icing fluid is classified as Type II or Type IV. Deicing and anti-icing with fluids may be

(Continued Next Page)

performed as a one-step or two-step process. The one-step deicing procedure involves using Type I deice fluid to remove ice and slush from the airplane prior to departure and to provide minimal anti-icing protection as provided in the Type I holdover timetable (refer to FSAT 01-09, dated 5 October 2001 or later).

Procedure involves applying Type II or Type IV anti-ice fluid to ensure the airplane remains clean after deicing. Type II or Type IV fluid is used to provide longer term anti-icing protection as provided in the Type II holdover timetable (Figure 8-2) or Type IV holdover timetable (Figure 8-3). Type I, Type II, and Type IV fluids have time limitations before refreezing begins, at which time additional deicing is required. This time limitation is referred to as "holdover time". Because holdover time is highly dependent on a number of factors, charts can provide only approximate estimates. Refer to Figure 8-1 for Type I holdover times, Figure 8-2 for Type II holdover times, and Figure 8-3 for Type IV holdover times. It remains the responsibility of the pilot in command to determine the effectiveness of any deicing or anti-icing procedure.

⚠ CAUTION

Type I, Type II and Type IV fluids are not compatible and may not be mixed. Additionally, most manufacturers prohibit the mixing of brands within a type. Line personnel should be supervised by the pilot in command to ensure proper application of Type I deice, and Type II or IV anti-ice fluids (refer to Figures 8-4 thru 8-7).

NOTE

Deicing fluids are not intended for use in removing snow deposits. Snow is best removed by mechanically sweeping or brushing it from the airplane structure. Use caution not to damage any airplane structure or antennas when removing snow.

Deicing may be accomplished using the ambient temperature available from a heated hangar or by mechanical means using a glycol-based Freezing Point Depressant (FPD) Type I fluid. A heated hangar is an excellent option to deice airplanes and should be utilized whenever possible. Care must be exercised however, to ensure that all melted precipitation is removed from the airplane to prevent refreezing once the airplane is moved from the hangar to the flight line. Type I deicing fluids should be sprayed on the airplane (with engine shutdown) in a manner which minimizes heat loss of fluid to the air. The fluid should be applied in a temperature range from 160°F to 180°F (71°C to 82°C) using a solid cone pattern of large coarse droplets. Fluid should be sprayed as close as possible to the airplane surfaces, but not closer than approximately 10 feet if a high pressure nozzle is used. Application techniques for Type II and Type IV fluids are the same as Type I, except that since the airplane is already clean, the application should last only long enough to properly coat the airplane surfaces. Type II or Type IV fluid should be applied undiluted at ambient

(Continued Next Page)

temperature to a "clean" airplane within three minutes after deicing is completed, due to the limited holdover times of Type I deice fluid. Type II or Type IV fluid is however sometimes heated and sprayed as a deicing fluid. For this case, it should be considered a Type I fluid, as the heat may change the characteristics of the thickening agents in the fluid. Type II or Type IV fluid therefore, applied in this manner, will not be as effective as it would be if it were applied at ambient temperature.

Refer to Figure 8-1 for areas to spray Type I deicing fluid, Figure 8-2 for areas to spray Type II and Type IV anti-icing fluid, Figure 8-3 for areas to avoid spraying directly, and Figure 8-4 for sequence of application. Heated solutions of FPD are more effective than unheated solutions because thermal energy is used to melt the ice, snow, or frost formations. Type I deicing fluids are used in the diluted state, with specific ratios of fluid-to-water dependent on ambient temperature. Type I deicing fluids have a very limited holdover time (refer to FSAT 01-09, dated 5 October 2001 or later.

⚠ CAUTION

Type I fluids should never be used full strength (undiluted). Undiluted glycol fluid is quite viscous below 14°F (-10°C) and can actually produce lift reductions of about 20 percent. Additionally, undiluted glycol has a higher freezing point than a glycol/water mixture.

NOTE

- Deicing and anti-icing procedures must be closely coordinated between the pilot in command and ground crews, and carried out in a timely manner. Ultimate responsibility for safety of flight rests with the pilot in command, and any decisions to deice or anti-ice an airplane must be accomplished under his or her direct supervision.
- The first area to be deiced and anti-iced should be visible from the cockpit and should be used to provide a conservative estimate for subsequent ice accumulations on unseen areas of the airplane before initiating takeoff.
- Due to the weight and C.G. changes which occur while deicing the airplane, a tail stand should be placed under the tail to prevent the airplane from tipping on its tail.

HOLDOVER TIMETABLE (TYPE I, TYPE II, AND TYPE IV FLUIDS)

NOTE

Refer to FAA Flight Standards Information Bulletin FSAT 01-09, dated 5 October 2001 or later, for holdover timetables.

The length of time that deicing and anti-icing fluids remain effective is known as "holdover time". The holdover timetables for Type I deicing, and Type II or Type IV anti-icing fluids are only an estimation and vary depending on many factors, such as temperature, precipitation type, wind and aircraft skin temperature. Holdover times are based on the mixture ratio appropriate for the OAT. Holdover times start when the last application has begun.

Guidelines for maximum holdover times anticipated by SAE Type I, Type II, or Type IV, and ISO Type I, Type II or Type IV fluid mixtures are a function of weather conditions and outside air temperature (OAT).

CAUTION

- **Aircraft operators are solely responsible for ensuring that holdover timetables contain current data.**
- **The tables are for use in departure planning only and should be used in conjunction with pretakeoff contamination check procedures.**
- **The time of protection will be shortened in heavy weather conditions. High wind velocity and jet blast may cause a degradation of the protective film. If these conditions occur, the time of protection may be shortened considerably. This is also the case when fuel temperature is significantly lower than OAT.**

NOTE

- Holdover timetables in FSAT 01-09, dated 5 October 2001 or later, do not apply to other than SAE or ISO Type I, Type II or Type IV fluids.
- The responsibility for the application of this data remains with the user.

WARNING

When ground icing conditions are present, a pretakeoff contamination check should be conducted by the pilot in command within 5 minutes of takeoff, preferably just prior to taxiing onto the active runway. Critical areas of the airplane such as empennage, wings, windshield, control surfaces, and engine inlets should be checked to ensure they are free of ice, slush, and snow and that the deice or anti-ice fluid is still protecting the airplane.

TYPE I DEICE FLUID

NOTE

- Freezing point of Type I fluid mixture must be at least 10°C (18°F) below OAT.
- Holdover time starts when last application has begun.
- Type I fluid should be sprayed on the airplane (with engine off) in a manner which minimizes heat loss to the air. If possible, fluid should be sprayed in a solid cone pattern of large coarse droplets at a temperature of 160° to 180°F. The fluid should be sprayed as close as possible to the airplane surfaces, but not closer than 10 feet if a high pressure nozzle is used.

WARNING

When ground icing conditions are present, a pretakeoff contamination check should be conducted by the pilot in command within 5 minutes of takeoff, preferably just prior to taxiing onto the active runway. Critical areas of the airplane such as empennage, wings, windshield, control surfaces, and engine inlets should be checked to ensure they are free of ice, slush, and snow and that the deice or anti-ice fluid is still protecting the airplane.

TYPE II ANTI-ICE FLUID

NOTE

- Freezing point of Type II fluid mixture must be at least 10°C (18°F) below OAT.
- Holdover time starts when last application has begun.
- Application techniques for Type II fluid are the same as for Type I, except that since the airplane is already clean, the application should last only long enough to properly coat the airplane surfaces.
- Type II fluid should be applied undiluted at ambient temperature to a "clean" airplane within three minutes after deicing is completed, due to the limited holdover times of Type I deice fluid. Type II fluid is however, sometimes heated and sprayed as a deicing fluid. For this case, it should be considered a Type I fluid, as the heat may change the characteristics of the thickening agents in the fluid. Type II fluid therefore, applied in this manner, will not be as effective as it would be if it were applied at ambient temperature.

WARNING

When ground icing conditions are present, a pretakeoff contamination check should be conducted by the pilot in command within 5 minutes of takeoff, preferably just prior to taxiing onto the active runway. Critical areas of the airplane such as empennage, wings, windshield, control surfaces, and engine inlets should be checked to ensure they are free of ice, slush, and snow and that the deice or anti-ice fluid is still protecting the airplane.

TYPE IV ANTI-ICE FLUID

CAUTION

The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates, high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than OAT.

NOTE

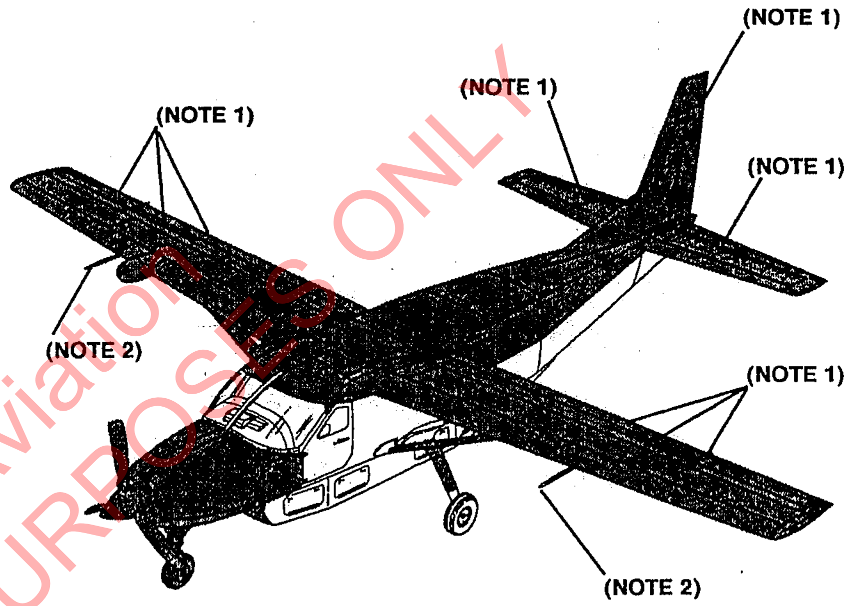
- Freezing point of Type IV fluid mixture must be at least 10°C (18°F) below OAT.
- Holdover time starts when last application has begun.
- Application techniques for Type IV fluid are the same as for Type I, except that since the airplane is already clean, the application should last only long enough to properly coat the airplane surfaces.

NOTE

- Type IV fluid should be applied undiluted at ambient temperature to a "clean" airplane within three minutes after deicing is completed, due to the limited holdover times of Type I deice fluid. Type IV fluid is however, sometimes heated and sprayed as a deicing fluid. For this case, it should be considered a Type I fluid, as the heat may change the characteristics of the thickening agents in the fluid. Type IV fluid therefore, applied in this manner, will not be as effective as it would be if it were applied at ambient temperature.

CAUTION

- Some Type IV fluids could form a thick or high-strength gell during "dry-out" and when rehydrated form a slippery film.
- Some Type IV fluids exhibit poor aerodynamic elimination (flow-off) qualities at colder temperatures.
- Heated areas of aircraft (i.e.; heated leading edge) should be avoided due to the fact that fluid may "dry-out" into hard globular nodules.
- Type IV fluid should not be used undiluted below -24°C (-11°F).



NOTE 1: GIVE SPECIAL ATTENTION TO THE GAPS BETWEEN THE FLIGHT CONTROLS. ALL SNOW, ICE AND SLUSH MUST BE REMOVED FROM THESE GAPS.

NOTE 2: REMOVE SNOW, ICE AND SLUSH FROM PITOT TUBES BY HAND ONLY.

SHADED AREAS INDICATE ESSENTIAL AREAS TO BE DEICED.

DIRECT SPRAY AVOIDANCE AREAS:	ENGINE INLETS AND EXHAUST, BRAKES, PITOT STATIC TUBES, WINDSHIELDS, CABIN WINDOWS, AND STALL WARNING VANE.

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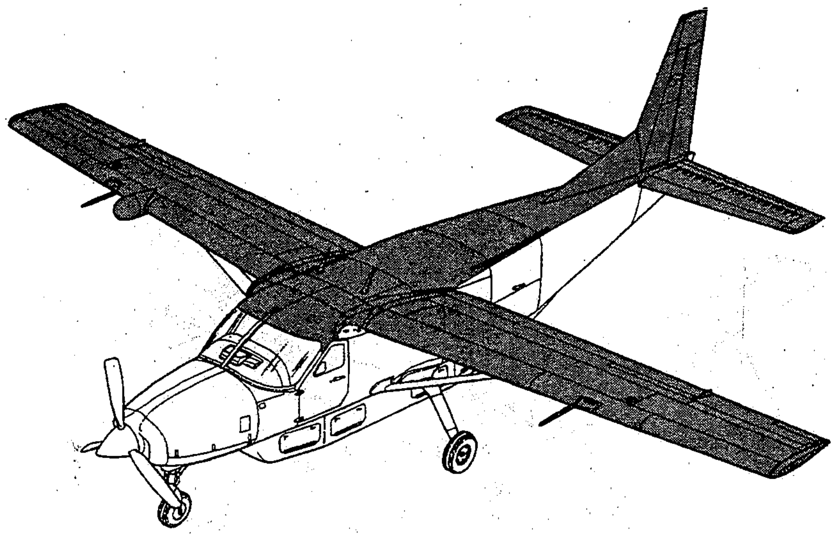
Figure 8-1. Essential Areas to be Deiced



NOTE : ANTI-ICE FLUID SHOULD BE APPLIED AT LOW PRESSURE TO FORM A THIN FILM ON SURFACES. FLUID SHOULD JUST COVER AIRPLANE WITHOUT RUNOFF.

SHADED AREAS INDICATE ESSENTIAL AREAS WHERE ANTI-ICE FLUID IS APPLIED.

DIRECT SPRAY AVOIDANCE AREAS:	PITOT STATIC TUBES, WINDSHIELDS, CABIN WINDOWS, AND STALL WARNING VANE.

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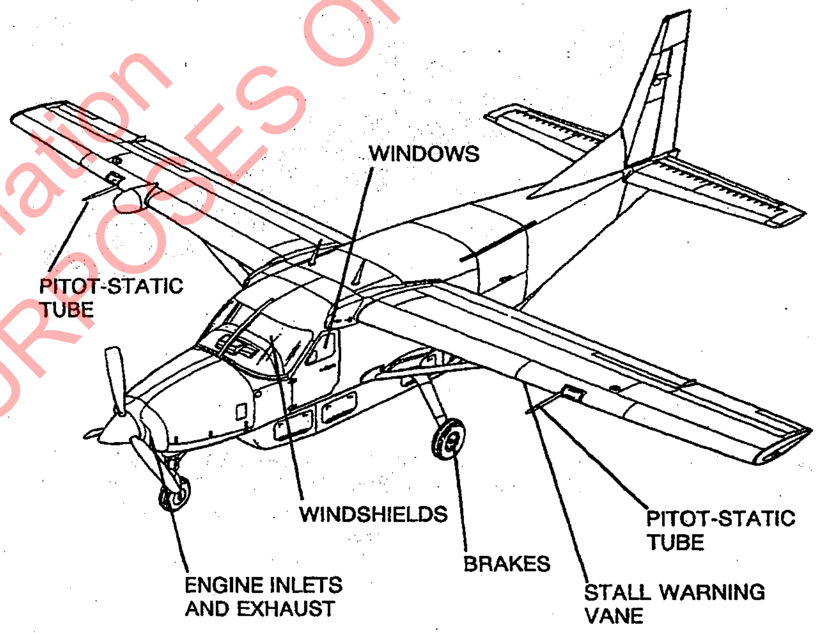
Figure 8-2. Essential Areas to Apply Anti-ice Fluid



DIRECT SPRAY AVOIDANCE AREAS:	ENGINE INLETS AND EXHAUST, BRAKES, PITOT STATIC TUBES, WINDSHIELDS, CABIN WINDOWS, AND STALL WARNING VANE.

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Figure 8-3. Deice and Anti-ice Fluid Direct Spray Avoidance Areas

NOTE: BY STARTING DEICE AND ANTI-ICE APPLICATION AT THE LEFT-FRONT AREA OF THE AIRPLANE, THE PILOT CAN GET A CONSERVATIVE ESTIMATE OF ICE REFORMATION FROM INSIDE THE COCKPIT. SINCE THIS WAS THE FIRST AREA DEICED OR ANTI-ICED, IT WILL BE THE FIRST AREA WHERE ICE WILL REFORM.

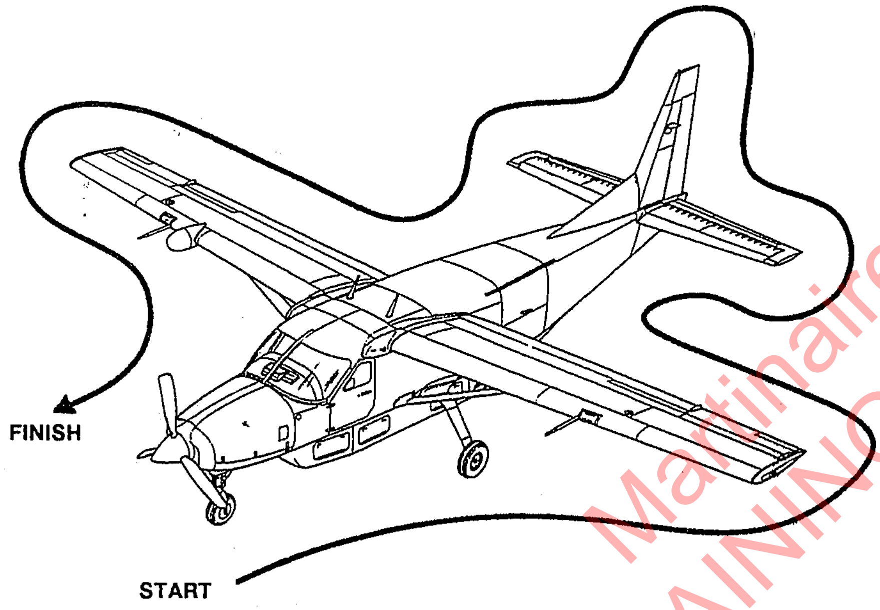

Figure 8-4. Deicing and Anti-icing Application

CLEANING AND CARE

WINDSHIELD-WINDOWS

The windshield and windows are constructed of cast acrylic. The surface hardness of acrylic is approximately equal to that of copper or brass. **Do not use** a canvas cover on the windshield unless freezing rain or sleet is anticipated. Canvas covers may scratch the plastic surface. When cleaning and waxing the windshield and windows, use only the following prescribed methods and materials (refer to Figure 8-5).

WINDSHIELD AND WINDOW MAINTENANCE PROCEDURES

The following procedures provide the most current information regarding cleaning and servicing windshields and windows. Improper cleaning, or use of unapproved cleaning agents, can cause damage to these surfaces.

CLEANING INSTRUCTIONS

CAUTION

Windshields and windows can be damaged by improper handling and cleaning techniques.

1. Place airplane inside hangar or in shaded area and allow to cool from heat of sun's direct rays.
2. Using clean (preferably running) water, flood the surface. Use bare hands with no jewelry to feel and dislodge any dirt or abrasive materials.
3. Using a mild soap or detergent (such as a dishwashing liquid) in water, wash the surface. Again, use only the bare hand to provide rubbing force. (A clean cloth may be used to transfer the soap solution to the surface, but extreme care must be exercised to prevent scratching the surface.)
4. On acrylic windshields and windows, if soils which cannot be removed by a mild detergent remain, Type II aliphatic naphtha, applied with a soft clean cloth, may be used as a cleaning solvent. Be sure to frequently refold the cloth to avoid redepositing soil and/or scratching the windshield and windows with any abrasive particles.
5. Rinse surface thoroughly with clean fresh water and dry with a clean cloth.

CAUTION

Do not use any of the following on, or for cleaning, windshields and windows: methanol, denatured alcohol, gasoline, benzene, xylene, MEK, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays. When in doubt about any product, do not use it.

6. Hard polishing wax should be applied to acrylic surfaces. The wax has an index of refraction nearly the same as transparent acrylic and will tend to mask any shallow scratches.
7. Acrylic surfaces may be polished using a polish meeting Federal Specification P-P-560 applied per the manufacturer's instructions.

CAUTION

On acrylic surfaces, use only rain repellents which conform to specification MIL-W-6882. Refer to Figure 8-5 for specific rain repellent products approved by Cessna.

NOTE

When applying or removing wax or polish, use a clean soft cloth.

8. Windshields may have rain repellent applied per the manufacturer's instructions. Caution should be used **not** to get rain repellent on painted surfaces surrounding the windshield.

WINDSHIELD AND WINDOW PREVENTIVE MAINTENANCE

CAUTION

Utilization of the following techniques will help minimize windshield and window crazing.

1. Keep all surfaces of windshields and windows clean.
2. If desired, wax acrylic surfaces.
3. Carefully cover all surfaces during any painting, powerplant cleaning or other procedure that calls for the use of any type of solvents or chemicals. The following coatings are approved for use in protecting surfaces from solvent attack:
   a. White Spray Lab, MIL-C-6799, Type I, Class II.
   b. WPL-3 Masking Paper - St. Regis, Newton, MA.
   c. 5 X N - Poly-Spotstick - St. Regis, Newton, MA.
   d. Protex 40 - Mask Off Company, Monrovia, CA and Southwest Paper Co., Wichita, KS.

Materials Required for Acrylic Windshields and Windows

MATERIAL	MANUFACTURER	USE
Mild soap or detergent (hand dishwashing type without abrasives)	Commercially available	Cleaning windshields and windows.
Aliphatic naphtha Type II conforming to Federal Specification TT-N-95	Commercially available	Removing deposits which cannot be removed with mild soap solution on acrylic windshields and windows.
Polishing wax: (Refer to Note 1)		Waxing acrylic windshields and windows.
Turtle Wax (paste)	Turtle Wax, Inc. Chicago, IL 60638	
Great Reflections Paste Wax	E.I. duPont de Nemours and Co., (Inc.) Wilmington, DE 19898	
Slip-stream Wax (paste)	Classic Chemical Grand Prairie, TX 75050	
Acrylic polish conforming to Federal Specification P-P-560 such as:		Cleaning and polishing acrylic windshields and windows.
Permatex plastic cleaner Number 403D	Permatex Company, Inc. Kansas City, KS 66115	
Mirror Glaze MGH-17	Mirror Bright Polish Co. Pasadena, CA	
Soft cloth, such as: Cotton flannel or cotton terry cloth material	Commercially available	Applying and removing wax and polish.
Rain repellent conforming to Federal Specification MIL-W-6882, such as:		Rain shedding on acrylic windshields.
REPCON (Refer to Note 2)	UNELKO Corp., 7428 E. Karen Dr. Scottsdale, AZ 85260	

NOTE 1: These are the only polishing waxes tested and approved for use by Cessna Aircraft Company.
NOTE 2: This is the only rain repellent approved by Cessna Aircraft Company for use on Cessna Model 208 series airplanes.

Figure 8-5. Materials Required for Acrylic Windshields and Windows

e. Protex 10VS - Mask Off Company, Monrovia, CA and Southwest Paper Co., Wichita, KS.
f. Scotch 344 Black Tape - 3M Company.

4. Do not park or store the airplane where it might be subjected to direct contact with or vapors from: methanol, denatured alcohol, gasoline, benzene, xylene, MEK, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays, paint strippers, or other types of solvents.
5. Do not leave sunvisors up against windshield when not in use. The reflected heat from these items causes elevated temperatures on the windshield. If solar screens are installed on the inside of the airplane, make sure they are the silver appearing, reflective type.
6. Do not use power drill motor or any powered device to clean, polish or wax windshield surfaces.

PAINTED SURFACES

The painted exterior surfaces of your new Cessna have a durable, long lasting finish. Approximately 10 days are required for the paint to cure completely; in most cases, the curing period will have been completed prior to delivery of the airplane. In the event that polishing or buffing is required within the curing period, it is recommended that the work be done by someone experienced in handling uncured paint. Any Cessna Service Station can accomplish this work.

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 Stoddard solvent.

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. Special care should be taken to seal around rivet heads and skin laps, which are the areas most susceptible to corrosion. 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.

STABILIZER ABRASION BOOT CARE

If the airplane is equipped with stabilizer abrasion boots, keep them clean and free from oil and grease which can swell the rubber. Wash them with mild soap and water, using Form Tech AC cleaner or naphtha to remove stubborn grease. Do not scrub the boots, and be sure to wipe off all solvent before it dries. Boots with loosened edges or small tears should be repaired. Your Cessna Service Station has the proper material and knowledge to do this correctly.

DEICE/ANTI-ICE BOOT CARE

The wing, wing strut and stabilizer de-ice boots are electrically-conductive through all plies and the edge sealer to bleed off static charges which cause radio interference and may perforate the boots. Fueling and other servicing operations should be done carefully to avoid damaging or tearing the boots.

To prolong the life of de-ice/anti-ice boots, they should be washed and serviced on a regular basis. Keep the boots clean and free from oil, grease and other solvents which cause rubber to swell and deteriorate. Outlined below are recommended cleaning and servicing procedures.

CAUTION

Use only the following instructions when cleaning boots. Disregard instructions which recommend petroleum base liquids (MEK, non-leaded gasoline, etc.) which can harm the boot material.

1. Clean boots with mild soap and water, then rinse thoroughly with clean water.

CAUTION

Temperature of water for cleaning de-ice/anti-ice boots shall not exceed 140°F.

NOTE

Isopropyl alcohol or toluene can be used to remove grime which can not be removed using soap. If isopropyl alcohol or toluene is used for cleaning, wash area with mild soap and water, then rinse thoroughly with clean water.

2. Allow the boots to dry, then apply a coating of Age Master No. 1 to the boots in accordance with application instructions on the container.

CAUTION

Do not apply Age Master No. 1 to boots treated with BFG Resurfacing Kit 74-451-L.

NOTE

Age Master No. 1 is beneficial for its ozone and weather resistance features.

3. After the boots have been treated with Age Master No. 1, apply a coating of ICEX II to the boots in accordance with application instructions on the ICEX II container.

NOTE

ICEX II may be beneficial as an ice adhesion depressant. Both Age Master No. 1 and ICEX II are distributed by the BFGoodrich Company.

CAUTION

ICEX II contains silicone, which lessens paint adhesion. Use care when applying ICEX II, and protect adjacent surfaces from overspray, since overspray of ICEX II will make touch-up painting almost impossible.

Age Master No. 1 and ICEX II coatings last approximately 50 hours on the wing and stabilizer de-ice boots and 150 hours on propeller anti-ice boots.

Small tears and abrasions on pneumatic de-ice boots can be repaired temporarily without removing the boots and the conductive edge sealer can be renewed. Your Cessna Service Station has the proper materials and knowledge to do this correctly.

PROPELLER CARE

The difference in blade material on the composite-bladed Hartzell versus the aluminum-bladed McCauley propeller will necessitate different inspection and care techniques, and the pilot should be aware of which propeller is installed on the airplane.

Using the Hartzell propeller, always conduct a preflight inspection and occasionally clean the blades with mild soap and water (no solvent-based cleaners) to clean off grass and bug stains and assure a longer blade life. During the preflight inspection, check the blades for nicks, gouges, looseness of material, erosion, cracks and debonds. The debond check is best accomplished by lightly tapping the entire metal leading edge cap of each blade with a coin and noting any apparent audible change. Also, the blades should be inspected for lightning strike, which would be indicated by the presence of a

darkened area in the proximity of the tips. Check the anti-ice boots for security, the propeller hub for evidence of grease and oil leaks, and the propeller spinner for condition and security. A Composite Blade Inspection, Repair and Overhaul Instruction Manual No. 135-C is available from Hartzell Propeller Products and defines the various types of propeller damage. Examples of minor and major damage are described. Repair to the blades must be accomplished by a Hartzell Propeller Products certified mechanic. Damages which are beyond the limits specified under "Minor Damage" must be repaired prior to flight and may require the blades be returned to the factory or a designated repair facility for evaluation and repair.

With the McCauley propeller, always conduct a preflight inspection and occasionally wipe the blades with a cloth dampened with oil to clean off grass and bug stains, minimize corrosion and assure a longer blade life. Waxing the blades with an automotive type paste wax on a regular basis will further minimize corrosion. Damaged or blistered paint should be repainted. During the preflight inspection, check the blades for nicks, gouges, scratches, corrosion pits, etc., the anti-ice boots for security, the propeller hub for evidence of grease and oil leaks, and the propeller spinner for condition and security. Repair of small nicks and scratches may be performed by qualified mechanics in accordance with procedures specified in FAA Advisory Circular 43.13-1A. However, whenever a significant amount of metal is removed, or in the case of previously reworked blades which may be at or near minimum width and thickness limits, the appropriate McCauley Service Manual should be consulted to determine if minimum allowable blade width and thickness limits have been exceeded. If these limits are exceeded, blade replacement is required. After filing and polishing, the damaged area should be inspected by the dye penetrant method to verify that all damage has been removed and the blade is not cracked. The area should then be reprotected by localized application of chemical film per MIL-C-5541 (e.g. Alodine) and repainted as necessary. Large nicks or scratches or other damage involving such things as bent blades, balance, diameter reduction, etc. should be corrected by an FAA approved propeller repair station.

ENGINE CARE

ENGINE EXTERIOR/COMPARTMENT CLEANING

The engine exterior and compartment may be cleaned, using a suitable solvent. Most efficient cleaning is done using a spray-type cleaner. Before spray cleaning, ensure that protection is afforded for components which might be adversely affected by the solvent. Refer to the Maintenance Manual for proper lubrication of controls and components after engine cleaning.

ENGINE COMPRESSOR WASH

The benefits of performance improvements and increased service life of hot section parts accruing from instituting a regular compressor wash program cannot be overemphasized. A compressor wash ring is installed on the top of the engine adjacent to the induction air inlet screen to facilitate this maintenance program.

Compressor washes can be performed by either motoring the engine with the starter or running the engine. Depending on the nature of the operating environment and the type of deposits in the engine gas path, either of the two wash methods can be used to remove salt or dirt and other baked on deposits which accumulate over a period of time and cause engine performance deterioration. When the wash is performed solely to remove salt deposits, it is known as a "desalination" wash. A wash performed to remove baked on deposits to improve engine performance is known as a "performance recovery" wash. A motoring wash is conducted at a gas generator RPM of 14-25%; the running wash is carried out at an N_g of approximately 60% (23,000 RPM). The water or cleaning mixture and rinsing solution, dependent on ambient temperature, is injected at different pressure, depending on the wash method being conducted.

Operating environment determines the nature of the wash, the frequency, and wash method recommended. If operating in a continuously salt laden environment, a desalination wash is recommended following the last flight of the day by means of the motoring method. Occasionally salt laden environments may necessitate a desalination wash each week using the motoring method. Less severe and more general operating environments are not as conducive to rapid deposit buildup but eventually can contribute to performance deterioration and necessitate a performance recovery wash at intervals of 100-200 hours. In these general environments, a motoring wash is recommended for light soil and multiple motoring or a running wash is suggested for heavy soil.

CAUTION

Always observe engine starting cycle limits when conducting motoring wash procedures.

A number of cleaning agents are recommended for addition to water to form the cleaning solution used for compressor wash. The mixture proportion of all the cleaning agents is not identical, however. Depending on the prevalent ambient temperature, aviation kerosene and methanol must be added to the cleaning solution in various proportions. The quality of the water used is also important; any drinking quality water is permissible for a motoring wash, but demineralized water only is recommended for a running wash. Detailed information concerning the cleaning mixture components, mixture formulation, recommended quantity and application equipment can be found in Pratt & Whitney Aircraft Gas Turbine Operation Information Letter No. 7.

COMPRESSOR TURBINE BLADE WASH

Pratt & Whitney Canada Inc. has developed a procedure for performing a compressor turbine blade motoring wash. This technique will facilitate the removal of contaminants from the compressor turbine blade airfoil surfaces, thereby minimizing sulphidation attack of these surfaces. This serves as an aid for obtaining optimum blade service life. With this method, a water or water/methanol solution is injected directly into the combustion chamber by way of a special spray tube which is installed in one of the igniter plug ports. This method of engine wash does not replace the need for a normal engine compressor wash for performance recovery or desalination purposes.

Compressor turbine blade washing is accomplished using water of drinking quality (potable) only at ambient temperatures of +2°C (36°F) and above. Use a water/methanol solution at ambient temperatures below + 2°C (36 °F). Consult the Engine Maintenance Manual for solution strength according to ambient temperature and review Special Instruction P & WC: 4-84 for washing procedures and limitations.

INTERIOR CARE

The instrument panel, control wheel, and control knobs need only be wiped off with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with Stoddard solvent. Volatile solvents, such as mentioned in paragraphs on care of the windshield, must never be used since they soften and craze the plastic.

The plastic trim, headliner, door panels, and floor covering in the crew area of both versions and the rear cabin headliner and sidewalls of the Passenger Version need only be wiped off with a damp cloth. In Cargo Versions, the sidewalls, cargo doors, and overhead in the cargo area are not easily soiled or stained. Dust and loose dirt should be picked up with a vacuum cleaner. Stubborn dirt can be wiped off with a cloth moistened in clean water. Mild soap suds, used sparingly, will remove grease. The soap should be removed with a clean damp cloth.

The protective plywood floor panels (if installed) and aft bulkhead covering in the cargo area should be vacuum cleaned to remove dust and dirt. A cloth moistened with water will aid in removing heavy soil. Do not use excessive amounts of water which would deteriorate the protective floor panels.

To remove dust and loose dirt from seating upholstery, clean the seats regularly with a vacuum cleaner.

Blot up any spilled liquid on the seats promptly with cleansing tissue or rags. Don't pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, then spot-clean the area.

Oily spots on the seats may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent; it may damage the padding and backing materials.

Soiled seating upholstery may be cleaned with foam type detergent, used according to the manufacturer's instructions. To minimize wetting the fabric, keep the foam as dry as possible and remove it with a vacuum cleaner.

PROLONGED OUT-OF-SERVICE CARE

Prolonged out-of-service care applies to all airplanes which will not be flown for an indefinite period (less than 60 days) but which are to be kept ready to fly with the least possible preparation. If the airplane is to be stored temporarily, or indefinitely, refer to the airplane Maintenance Manual for proper storage procedures. The Maintenance Manual provides amplification for the following procedures:

1. The procedure to be followed for preservation of an engine in service depends on the period of inactivity and whether or not the engine may be rotated during the inactive period. The expected period of inactivity should be established and reference made to the Engine Preservation Schedule. The preservation carried out should be recorded in the engine maintenance record and on tags secured to the engine. The following preservation schedule lists procedures to be followed:

CAUTION

UNDER NO CIRCUMSTANCES should preservative oil be sprayed into the compressor or exhaust ports of the engine. Dirt particles deposited on blades and vanes during engine operation will adhere and alter the airfoil shape, adversely affecting compressor efficiency.

   a. 0 to 7 Days -- The engine may be left in an inactive state, with no preservation protection, provided the engine is sheltered, humidity is not excessively high, and the engine is not subjected to extreme temperature changes that would produce condensation.
   b. 8 to 28 Days -- An engine inactive for up to 28 days requires no preservation provided all engine openings are sealed off and relative humidity in the engine is maintained at less than 40 percent. Humidity control is maintained by placing desiccant bags and a humidity indicator on wooden racks in the engine exhaust duct. Suitable windows must be provided in the exhaust closure to facilitate observation of the humidity indicators.

   c. 29 to 90 Days -- An engine inactive for a period exceeding 28 days, but less than 91 days, need only have the fuel system preserved, engine openings covered, and desiccant bags and humidity indicators installed.
   d. 91 Days and Over -- An engine inactive over 90 days in the airframe or removed for long term storage in a container, must, in addition to the 29 to 90 day procedure, have the engine oil drained and unused accessory drive pads sprayed.

2. Place a cover over the pitot tube, and install the two engine inlet covers. To prevent the propeller from windmilling, install the propeller anchor over a blade of the propeller and secure the strap around the nose gear or to the bracket located on the lower right hand cowl. Cover all other openings to prevent entry of foreign objects.
3. Keep the fuel tanks full to minimize condensation in the tanks.
4. If the airplane will be out of service for 5 days or more, disconnect the battery. If the battery is left in the airplane, it should be removed and serviced regularly to prevent discharge. If the battery is removed from the airplane, check it regularly for state of charge.
5. If the airplane is stored outside, tie-down the airplane in accordance with the procedure in this section. Chock the nose and main wheels; do not set the parking brake if a long period of inactivity is anticipated as brake seizing can result.
6. Every two weeks, move the airplane to prevent flat areas on the tires. Mark the tires with tape to ensure the tires are placed approximately 90° from their previous position.
7. Drain all fuel drain points every 30 days and check for water accumulation. Prolonged storage of the airplane will result in a water buildup in the fuel which "leaches out" the fuel additive. An indication of this is when an excessive amount of water accumulates at the fuel drain points. Refer to Fuel Additive in this section for minimum allowable additive concentrations.

BULB REPLACEMENT DURING FLIGHT

Figure 8-6 provides instructions to aid the pilot in the replacement of defective light bulbs during flight without tools. It is suggested that spare bulbs be stored in the map compartment. However, if a spare bulb is not available, an identical bulb which is found to be available from other lights listed herein can be substituted for the defective bulb. For a listing of other bulb requirements and specific tools needed, refer to the Maintenance Manual for this airplane.

ANNUNCIATOR PANEL LIGHTS

Push in on face of light assembly and allow assembly to pop out. Pull assembly out to limit of its hinged retainer and allow it to rotate 90 degrees down. Retainer will keep light assembly suspended in this position. Lift defective bulb out of assembly and replace with MS25237-327 bulb (MS25237-8918 14-volt bulb in IGNITION ON light assembly only). Rotate light assembly upward into position and press into place.

NOTE

Each light assembly contains two bulbs, and, if necessary, remains sufficiently illuminated with one bulb defective.

POST LIGHTS

Grasp lens cap and pull straight out from socket. Pull bulb from cap and replace with MS25237-327 bulb. Replace cap in socket and rotate cap to direct light in desired direction.

CONTROL WHEEL MAP LIGHT

Grasp rim of bulb, push straight up and turn counterclockwise as far as possible, then pull bulb straight down and out of socket. Replace with 24RB bulb. To install new bulb in socket, align pins on bulb with slots in socket, then push straight up and rotate bulb clockwise as far as possible.

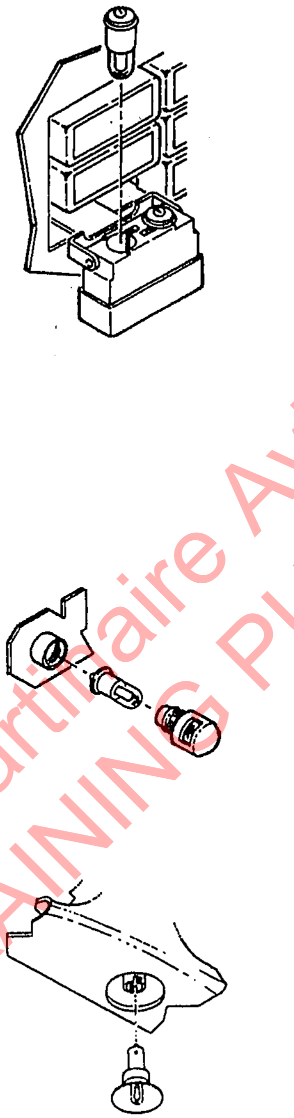

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Figure 8-6. Bulb Replacement