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SUPERVAN 900

FAA- APPROVED
Airplane Flight Manual Supplement
for
Cessna 208B Caravan Landplane
Equipped with Honeywell TPE331-12JR Engine

Doc. No. SSL-FMS-208B-12JR

Reg. No. _____

Ser. No. _____

This supplement must be attached to the Cessna Model 208B Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Honeywell TPE331-12JR engine is installed in accordance with Supervan Systems, Ltd. STC **SA10841SC**. The information contained in this document supplements or supersedes the basic manual only in those areas listed. For limitations, procedures, performance, and loading information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA Approved: _____ for Monica Morritt
Manager
Southwest Flight Test Section, AIR-713
Federal Aviation Administration
Ft. Worth, Texas 76177

Date: November 7, 2019

LOG OF EFFECTIVE PAGES

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Airplane Flight Manual Supplement. Pages affected by the current revision are indicated by an asterisk (*) preceding the page number.

Revision Level	Date of Issue
Initial Release	12 November 2008
Revision 1	15 December 2010
Revision 2	23 February 2012
Revision 3	18 April 2014
Revision 4	5 May 2017
Revision 5	7 November 2019

Page	Date	Revision Number
i thru v	7 November 2019	5
1-1 thru 1-8	7 November 2019	5
2-1 thru 2-11	7 November 2019	5
3-1 thru 3-27	7 November 2019	5
4-1 thru 4-39	7 November 2019	5
5-1 thru 5-14	7 November 2019	5
6-1	7 November 2019	5
7-1 thru 7-26	7 November 2019	5
8-1 thru 8-6	7 November 2019	5
9-1 thru 9-2	7 November 2019	5

NOTE

The following is a Log of Effective Pages for Section 9 supplements. Supplements for optional equipment not installed in the airplane do not have to be retained in the basic manual, and may be discarded, if desired.

Supplement	Page	Date	Revision Number
S1	S1-1 thru S1-38	23 February 2012	1
S2	S2-1 thru S2-6	30 May 2014	2
S3	S3-1 thru S3-9	5 May 2017	0

FAA Approved: _____

Manager
Southwest Flight Test Section, AIR-713
Federal Aviation Administration
Ft. Worth, Texas 76177

Date: November 7, 2019

General Information

	Cargo Version	Passenger Version
SPEED (KTAS)		
Maximum Cruise @ 12,000 ft	175 KNOTS*	184 KNOTS*
Maximum Cruise @20,000 ft	164KNOTS*	174 KNOTS*
RANGE: With 2224 pounds usable fuel and fuel allowance for engine start, taxi, takeoff, climb, descents and 45 minutes reserve.		
Maximum Cruise at 10,000 Ft	862 NM *	907 NM*
	5.1 HRS *	5.1 HRS*
Maximum Cruise at 18,000 Ft	1044 NM *	1109 NM*
	6.6 HRS*	6.6 HRS*
Maximum Range at 10,000 Ft	963 NM*	1026 NM*
	6.4 HRS*	6.6 HRS*
Maximum Range at 18,000 Ft	1076 NM*	1163 NM*
	7.2 HRS*	7.5 HRS*
RATE OF CLIMB AT SEA LEVEL (9062 lbs, Flaps 30)	1435 FPM	1435 FPM
SERVICE CEILING	25,000 FT	25,000 FT
MAXIMUM OPERATING ALTITUDE	25,000 FT	25,000 FT
TAKEOFF PERFORMANCE (9062 lbs):		
Ground Roll	826 FT**	826 FT**
Total Distance Over 50-Foot Obstacle	1552 FT**	1552 FT**
LANDING PERFORMANCE:		
Ground Roll	915 FT*	950 FT*
Total Distance Over 50-Foot Obstacle	1740 FT*	1795 FT*
STALL SPEED (KCAS):		
Flaps Up, Idle Power	78 KNOTS	78 KNOTS
Flaps Down, Idle Power	61 KNOTS	61 KNOTS
MAXIMUM WEIGHT:		
Ramp	8785 LBS**	8785 LBS**
Takeoff	8750 LBS	8750 LBS
Landing	8500 LBS	8500 LBS
STANDARD EMPTY WEIGHT:		
S/N 208B0179, 208B0230 thru 208B0381, and early serials modified by SK208-80	4140 LBS	4262 LBS
S/N 208B0382 and on	4171 LBS	4337 LBS
MAXIMUM USEFUL LOAD		
S/N 208B0179, 208B0230 thru 208B0381, and early serials modified by SK208-80	4645 LBS	4523 LBS
S/N 208B0382 and on	4614 LBS	4448 LBS
WING LOADING	31.3 LBS/SQ FT	
POWER LOADING	9.72 LBS/SHP	
FUEL CAPACITY: Total		
S/N 208B0001 thru 208B0089 not modified by SK208-52	335 GAL	
S/N 208B0001 thru 208B0089 modified by SK208-52 and S/N 208B0382 and on	335.6 GAL	
ENGINE: Honeywell Aerospace, Inc.		
Flat Rated at 900 shaft horsepower to 34ºC	TPE331-12JR	
PROPELLER: Hartzell 4-Bladed, Constant Speed, Full Feathering, Reversible. Diameter	109.5 IN.	

* Performance is based on mid-cruise weight for PT6 engine. This installation assumes no credit for cruise or landing performance. Under some operating conditions, fuel flow for the TPE331-12JR engine exceeds that of the original PT6A-114A engine resulting in reduced range and endurance

** Compatibility with this engine modification and the APE I gross weight increase STC SA00188SE to 8950 lbs and the APE II gross weight increase STC SA00392SE to 9062 lbs has been shown. If the aircraft has one of the gross weight STC kits installed, the aircraft can be operated at the associated gross weight under that STC

NOTE

The above performance figures are based on the indicated weights, standard atmospheric conditions, level hard-surface dry runways and no wind. They are calculated values derived from flight tests conducted by Cessna Aircraft Company or Supervan Systems, Ltd. under carefully documented conditions and will vary with individual airplanes and numerous factors affecting performance. Performance for other operational conditions can be derived by reference to operational data in other sections of this handbook.

CONTENTS

SAFETY

Your safety when operating this airplane is dependent on the airplane and you.

Supervan Systems, Ltd. is committed to flight safety. The goal of the Supervan Systems team has been to design and build a safe, reliable engine modification for the Cessna Caravan that features excellent performance, efficiency, and capability. Although, the aircraft performs better in many areas, you should still respect all WARNINGS, CAUTIONS, and NOTES contained in both the original Cessna Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, and those contained in this Airplane Flight Manual Supplement.

You have the obligation to maintain and operate the airplane in a safe, professional, and conservative manner in accordance with Cessna approved Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, approved Airplane Flight Manual Supplement, Maintenance Manual, Maintenance Manual Supplement, and company issued service information from either Cessna or Supervan Systems, Ltd. This will assure that the high level of safety we are both striving for is attained.

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this supplement.

WARNING **OPERATING PROCEDURES, TECHNIQUES, OR ETC., WHICH MAY RESULT IN PERSONAL INJURY OR LOSS OF LIFE IF NOT CAREFULLY FOLLOWED.**

CAUTION OPERATION PROCEDURES, TECHNIQUES, OR ETC., WHICH MAY RESULT IN DAMAGE TO EQUIPMENT IF NOT CAREFULLY FOLLOWED.

NOTE An operation procedure, technique, etc., which is considered essential to emphasize.

SECTION 1:
GENERAL

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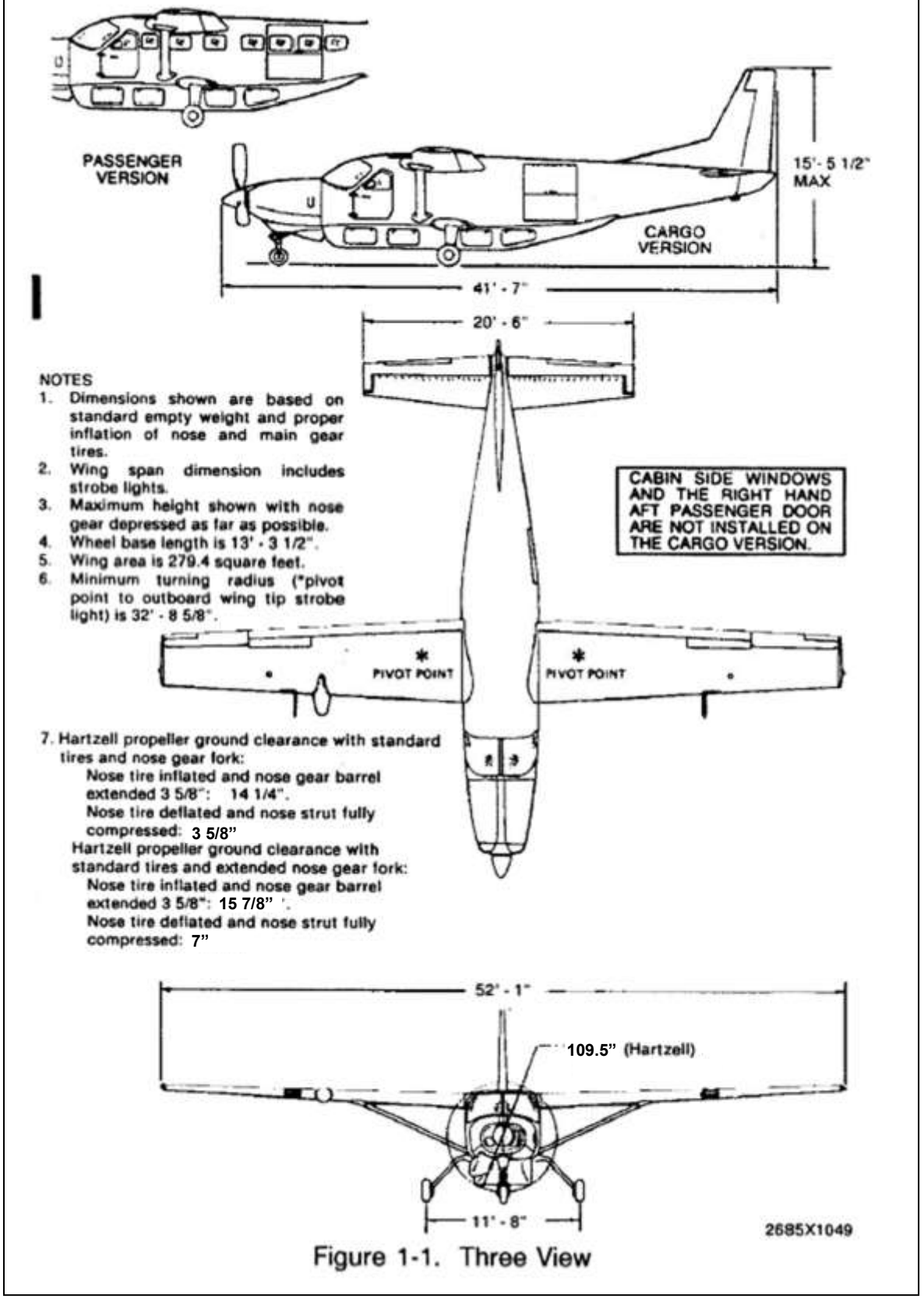

Figure 1-1. Three View

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 Supervan Systems, Ltd. This handbook constitutes the FAA Approved Airplane Flight Manual Supplement to the Cessna Model 208B Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (Cessna POH/AFM) when the aircraft is modified in accordance with STC **SA10841SC**.

WARNING

- **THIS HANDBOOK IS NOT INTENDED TO BE A GUIDE FOR BASIC FLIGHT INSTRUCTION OR A FLIGHT 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 OPERATION LIMITATIONS SET FORTH BY INSTRUMENT MARKINGS, PLACARDS, AND THE CESSNA POH/AFM.**

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: Honeywell International, Inc.
Engine Model Number: TPE331-12JR
Engine Type: Direct drive, single-shaft engine utilizing two centrifugal compressors, an annular reverse-flow combustion chamber, three axial turbines, and a single exhaust. The engine drives the propeller through 26.2:1 reduction gearbox at the front of the engine.
Horsepower: Flat rated at 900 shaft horsepower.

PROPELLER

Propeller Manufacturer: Hartzell Propeller, Inc
Propeller Model Number: HC-B4TN-5QL/LT10890NK (de-ice), or
HC-B4TN-5NL/LT10890N (non de-ice), or
HC-B4TN-5QL/LT10891NK (de-ice), or
HC-B4TN-5NL/LT10891N (non de-ice)
Number of Blades: 4
Propeller Diameter Maximum: 109.5 inches.
Minimum: 107.5 inches.
Propeller Type: Constant-speed, full feathering, reversible, hydraulically-actuated aluminum-bladed propeller, with a feathered blade angle of +81.2º, a flight idle blade angle of +5.0º (±1.0º), and a maximum reverse blade angle of -12º (42-inch station).

FUEL

Fuel Type	Honeywell Specification	Class	Freeze Point, C	Equivalent Specification	Grade/ Type	Freeze Point, C	Additives		NATO Code
							Anti-icing	Anti-static	
Kerosene Aviation Turbine Fuel	EMS53111	A	-40	ASTM D1655	A	-40	Conditional	Conditional	----
	EMS51112	A-1	-46	ASTM D1655	A-1	-46	Conditional	Conditional	----
		JP-8	-50	MIL-T-83133D	JP-8	-50	Mandatory	Mandatory	F-34
Wide-Cut Aviation Turbine Fuel	EMS53113	A	-58	MIL-T-5624K	JP-4	-58	Mandatory	Mandatory	F-40
		B	-49	ASTM D1655	B	-48	Conditional	Conditional	----
High Flash Kerosene, Aviation Turbine Fuel	EMS53116	JP-5	-46	MIL-T-5624K	JP-5	-46	Mandatory	Mandatory	F-44
Gasoline Aviation Type	EMS53122 (Grade 100LL)			ASTM D910	80/87	-60	Without	Without	F-12
				ASTM D910	100/130	-60	Without	Without	F-18

Table 1-1, Approved Fuel Types

Alternate/Emergency Fuels

Aviation Fuel (All grades of military and commercial aviation gasoline).

CAUTION

Aviation gasoline (ASTM D910, Grade 80/87) is restricted to emergency use and shall not be used in excess of 1000 gallons per 100 hours of operation

Aviation gasoline (ASTM D910, Grade 100/130 low lead or grade 100LL PPS EMS53122) is restricted to emergency use and shall not be used in excess of 250 gallons per 100 hours of operation. Total usage must be limited to 7000 gallons during any 3000-hour period.

When mixing the above aviation gasolines, use this formula to set proportions of each grade during any overhaul period:

$$\frac{\text{Amount of Grade 100LL or 100/130 (gal)}}{\text{7000 (gal)}} + \frac{\text{Amount of Grade 80/87 (gal)}}{\text{30,000 (gal)}} < 1$$

If 25 percent or more Avgas is used at any time, one quart of aviation grade mineral oil must be added to the mixture per 100 gallons of Avgas.

Whenever any of the above fuels or combinations of the above fuels is changed, make engine speed and power checks prior to flight. Refer to the Honeywell TPE331-12JR maintenance manual for fuel trim, which may be needed to restore speed settings and/or maximum power.

Approved Fuel Additives:

Fuels without icing inhibitors may have MIL-I-27686E Fuel System Icing Inhibitor, or an equivalent inhibitor, added, but not in excess of 0.15 percent by volume.

CAUTION

JP-4 and JP-5 fuel per MIL-T-5624 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 additives are approved for use:

Shell ASA3 (up to 300 conductivity units, but the additive should not exceed 1ppm)

If additional biocidal protection is desired, the following additive is permitted for use in certain conditions.

Sohio Biobor JF (270ppm maximum {20 ppm of elemental boron} may be used)

Fuel Capacity (S/N 20800001 thru 20800130 Not Modified With SK208-52):

Total Capacity: 335 U.S. gallons.
Total Capacity Each Tank: 167.5 U.S. gallons.
Total Usable: 331 U.S. gallons.

Fuel Capacity (S/N 20800001 thru 20800130 Modified With SK208-52 and S/N 20800131 and higher):

Total Capacity: 335.6 U.S. gallons.
Total Capacity Each Tank: 167.8 U.S. gallons.
Total Usable: 331 U.S. gallons.

OIL

Approved Lubricants

Type Oil	Mil-Specification	Brand Name
Type II Only	MIL-L-23699	Mobil Jet Oil II
		BP (Exxon) 2380 Turbo Oil
		Chevron Jet Engine Oil No. 5
		Stauffer Jet II
		Cal Tech RPM Jet Engine Oil No. 5
		Castrol 205
		Castrol 5000
		Aeroshell/Royco Turbine Oil 500
		Aeroshell/Royco Turbine Oil 560
		Mobil 254

Table 1-2, Approved Engine Lubricants

Oil Grade (Specification):
Oil conforming to table 1-2 must be used.

Total Oil Capacity: 10 U.S. quarts (including oil in filter, cooler and hoses).

Drain and Refill Quantity: Approximately 8 U.S. quarts.

Oil Quantity Operating Range:
Fill to between FULL or ADD on dipstick. It takes approximately 1 U.S. quart from the ADD to FULL marks on the dipstick. To get an accurate reading, it is recommended to check the level with hot oil.

WARNING

ENSURE OIL FILLER CAP IS SECURELY INSTALLED. OPERATING THE ENGINE WITH THE FILLER CAP LOOSE WILL RESULT IN EXCESSIVE OIL LOSS AND EVENTUAL ENGINE STOPPAGE.

MAXIMUM CERTIFICATED WEIGHTS

No changes to type certificated weights.

Compatibility with this engine modification and the APE I gross weight increase STC SA00188SE to 8950 lbs and the APE II gross weight increase STC SA00392SE to 9062 lbs has been shown. If the aircraft has one of these STC kits installed, the aircraft can be operated at the associated gross weight under that STC, except for flight in known icing conditions. Refer to Supplement 1, Known Icing Equipment, SSL-KIS-208B-12JR, for weight limits during flight in known icing conditions.

STANDARD AIRPLANE WEIGHTS

Refer to new weight and balance accomplished during engine modification or later revision. Aircraft empty weights increase by approximately 90 lbs. Maximum useful loads decrease by approximately 90 lbs.

CABIN, ENTRY, CARGO DOOR AND COMPARTMENT DIMENSIONS

No changes

SPECIFIC LOADINGS

Wing Loading: 31.3 lbs/sq. ft. Power Loading: 9.72 lbs/shp

SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

See Cessna POH/AFM

METEOROLOGICAL TERMINOLOGY

See Cessna POH/AFM

ENGINE POWER TERMINOLOGY

This section only references terms that are different from the OEM engine installation. Please reference the Cessna POH/AFM for any terms not included here.

Beta Mode	**Beta Mode** is the engine operational mode in which propeller blade pitch is controlled by the power lever. A beta light can illuminate during landing under some conditions, but is not normally used during flight. Operation below the flight idle gate is prohibited in flight.
GCP	**GCP** is the Generator Control Panel
FCM	**FCM** is the Function Control Module
Hot Start	**Hot Start** is an engine start, or attempted start, which results in an EGT exceeding 770ºC.
EGT	**EGT** signifies Exhaust Gas Temperature
Max Climb Power Max Continuous Power Max Cruise Power	**Max Climb Power, Max Continuous Power, and Max Cruise Power** all utilize the same power setting on the Honeywell TPE331-12JR as installed in the Caravan. These all equate to either 100% torque, or 650ºC EGT (SRL ON), whichever is reached first at 100% engine rpm. For SRL "off" temperatures, see Section 2, page 2-5.
SRL	**SRL** is Single Red Line relating to the maximum exhaust gas temperature for takeoff and continuous operations with the SRL system operating, which is 650ºC.
Takeoff Power	**Takeoff Power** is the same as Maximum Continuous Power in this installation. It equates to either 100% torque, or 650ºC EGT (SRL ON), whichever is reached first at 100% engine rpm and has no time limit. For SRL "off" temperatures, see Section 2, page 2-5.
TTL	**TTL** stands for Torque and Temperature Limiter Computer

AIRPLANE PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

See Cessna POH/AFM

WEIGHT AND BALANCE TERMINOLOGY

See Cessna POH/AFM

AUTOPILOT/FLIGHT DIRECTOR TERMINOLOGY

See Cessna POH/AFM

SECTION 2:
LIMITATIONS

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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. OBSERVATION OF THESE OPERATING LIMITATIONS IS REQUIRED BY FEDERAL AVIATION REGULATIONS.

NOTE

Operation in countries other than the United States may require the observance of other limitations, procedures, or performance data.

Refer to Section 9 of this Airplane Flight Manual Supplement for amended operating limitations, procedures, performance data and other necessary information for supplemental systems.

AIRSPEED LIMITATIONS

No changes

AIRSPEED INDICATOR MARKINGS

No changes

POWER PLANT LIMITATIONS

Engine Manufacturer: Honeywell International, Inc.

Engine Model Number: TPE331-12JR

Engine Operating Limits: Refer to Table 2-1

Fuel Grade and Approved Fuel Additives: Refer to Fuel Limitations

Oil Grade (Specification):

Oil conforming to Honeywell International requirements must be used. Refer to Section 1 or 8 for a listing of approved oils. When adding oil, service the engine with the same type and brand which is currently being used in the engine.

CAUTION

DO NOT MIX TYPES OR BRANDS OF OIL.

Propeller Manufacturer: Hartzell Propeller, Inc.

Propeller Model Numbers: HC-B4TN-5QL/LT10890NK with de-ice
HC-B4TN-5NL/LT10890N without de-ice
HC-B4TN-5QL/LT10891NK with de-ice
HC-B4TN-5NL/LT10891N without de-ice

Propeller Diameter:

Maximum: 109.5”
Minimum: 107.5”

Propeller Blade Angle @ 42” station,

Feathered:	+81.2º
Flight Idle Blade Angle:	5º ± 1.0º
Reverse:	-12º

Propeller System Operating Limits:

An overspeed fuel governor check should be made for the following reasons;

- Normally, every 300 flight hours.
- Prior to each flight when air starts are to be intentionally made.
- Any indication of an overspeed governor malfunction.
- When any maintenance or adjustments involving the engine control system have been performed.

See Section 4 for instructions on conducting the overspeed governor check.

Engine Control Operating Limits:

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

Engine Starting Cycle Limits:

Using airplane batteries only:

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

Using airplane batteries with external power:

45 seconds ON- 120 seconds OFF
45 seconds ON- 120 seconds OFF
45 seconds ON- 60 minutes OFF

CAUTION

DUE TO THE POSSIBILITY OF EXCESSIVELY HIGH CURRENT SURGE DURING ENGINE START, IT IS RECOMMENDED THAT THE MAXIMUM STARTING CURRENT FROM AN EXTERNAL POWER SOURCE BE LIMITED TO 1700 AMPERES.

CAUTION

IT IS RECOMMENDED THAT THE START MODE SWITCH BE IN THE PARALLEL POSITION FOR ALL STARTS USING EXTERNAL POWER DUE TO THE HIGH CURRENT. DAMAGE TO THE AIRCRAFT BATTERIES CAN OCCUR USING THE PARALLEL-SERIES MODE WITH EXTERNAL POWER.

NOTE

The specified starter ON times assumes no ignition of fuel, but does include engine clearing time. Starter ON times may be extended if ignition of fuel occurs, but procedures listed under Battery Start in Section 4 should be observed.

ENGINE OPERATING LIMITS

Operating Condition	SHP	Torque (%)	Max EGT (degrees C)	RPM (%)	Oil Press. (psig)	Oil Temp. (degrees C)	Fuel Pressure (psi)
Starting	---	---	770 (1 sec)	---	---	-40 (min)	8
Ground Idle	---	---	770 (1 sec)	68 (min)	40 (min)	127	8-20
Takeoff	900	100	650 (1)	101.0 (7)	70-120 (3)	55-110 (4)	20-80
Maximum Continuous	900	100	650 (1)	101.0 (7)	70-120 (3)	55-110 (4)	20-80
Climb	900	100	650 (1)	101.0 (7)	70-120 (3)	55-110 (4)	20-80
Cruise	900	100	650 (1)	96 to 101.0 (7)	70-120 (3)	55-110 (4)	20-80
Landing	---	---	---	93.0 (min)	70-120 (3)	55-110 (4)	20-80
Maximum Reverse	---	---	565 (1)	101.0 (7)	70-120 (3)	55-110 (4)	20-80
Transient	---	104 (5 min)	770 (1 sec)	104 (2)	(6)	127 (5)	80-90

Note 1: This temperature is based on the Single Red Line (SRL) control system “ON”. With the SRL system “OFF” the maximum permissible temperatures vary as a function of ambient temperature, altitude, and other operating conditions. Refer to EGT table 2-2, Section 2, page 2-5.

Note 2: Transient operation of propeller output shaft speed above 104 percent, to a maximum of 106 percent, is allowable for fuel control overspeed governor test when propeller is on the start locks. DO NOT allow the engine to windmill between 18% and 28 %.

Note 3: Normal operating range above 23,000 ft.: 50-120 psig.

Note 4: Oil temperature limits are for Type II oil only

Note 5: The TPE331-12JR has an oil temperature limit between 110ºC and 127ºC for a maximum of 10 minutes. The normal continuous limit is 110ºC. If the 10 minute limit is exceeded, a SOAP sample is required within 25 flight hours. When at ground idle, oil temperature limit is 127ºC without a time limitation.

Note 6: Transients above 120 psig can occur during cold weather starting

Note 7: 101% to 101.5% for 5 minutes, 101.5% to 105.5% for 30 seconds. 105.5% to 106% for 5 seconds. If RPM time limits are exceeded, conduct power checks to determine satisfactory engine performance. Record the time in excess of time limits in engine logbook. If 5 second time limit or 106% is exceeded, remove engine.

Table 2-1, Engine Operating Limits

Honeywell TPE331-12JR Manual Mode (SRL "OFF" or INOP) EGT Table

OAT (ºC)	SRL "OFF" EGT @ 100%RPM (ºC)	SRL "OFF" EGT @ 96%RPM (ºC)
-60	556	535
-55	558	537
-50	559	539
-45	561	540
-40	563	542
-35	564	544
-30	566	546
-25	568	547
-20	569	549
-15	574	551
-10	578	552
-5	582	554
0	587	556
5	591	557
10	595	561
15	600	565
20	604	569
25	608	574
30	613	578
35	617	582
40	622	587
45	626	591
50	630	596
55	635	600
60	639	605

Table 2-2, Maximum Exhaust Gas Temperature Limits (Manual Mode)

POWER PLANT INSTRUMENT MARKINGS

Instrument	Red Line	Green Arc	Yellow Arc	Red Line
	Minimum Limit	Normal Operating	Caution Range	Maximum Limit
Torque Indicator	---	0-100%	---	100%
Exhaust Gas Temperature (EGT) Indicator (2)	---	---	---	650ºC (1)
Engine % RPM Indicator	---	68-85% 92-100%	85-92% 100-101%	101%
Oil Pressure Indicator	40 psi	70-120 psi	40-70 psi (4)	120 psi
Oil Temperature Indicator	-40ºC	55-110ºC	-40-55ºC 110-127ºC	127ºC
Fuel Pressure	8 psi	Narrow 8-20 psi (3) Wide 20-80 psi	80-90 psi	90 psi

1) This temperature is based on the Single Red Line (SRL) control system “ON”. With the SRL system “OFF” the maximum permissible temperatures vary as a function of ambient temperature, altitude, and other operating conditions. Refer to EGT table 2-2, Section 2, page 2-5.

2) The EGT indicator incorporates a red triangle at 770ºC and the letters “SL” to indicate the start limit of the engine.

3) The fuel pressure indicator has a narrow green band between 8-20 psi and a white line from 8-20 psi in the outer ring with the letters “GI” to signify that those pressures are only allowed during ground idle operation. The minimum in flight is 20 psi.

4) The oil pressure indicator has a white line from 40-70 psi in the outer ring with the letters “GI” to signify that those pressures are only allowed during ground idle operation.

Figure 2-1, Power Plant Instrument Markings

MISCELLANEOUS INSTRUMENT MARKINGS

Instrument	Red Line	Green Arc	Yellow Arc	Red Line
	Minimum Limit	Normal Operating	Caution Range	Maximum Limit
Propeller Anti-ice Ammeter	---	24-28 amps	---	---

Figure 2-2, Power Plant Instrument Markings

PREFLIGHT

No changes.

VISUAL AND TACTILE CHECK

No changes

IGNITION UNIT DUTY CYCLE

The ignition unit can be used continuously with no limitation.

ELECTRICAL LIMITS

The Unison 300SG119Q starter/generator is limited to a continuous load of **200 amps** on the ground and **225 amps** from sea level to FL180. From FL180 to FL250, the maximum continuous load is limited to **200 amps**.

The Goodrich 23079-000-1 starter/generator is limited to a continuous load of **200 amps** on the ground and **300 amps** from sea level to FL180. From FL180 to FL250, the maximum continuous load is limited to **250 amps**.

WEIGHT LIMITS

Maximum Ramp Weight: 8785 lbs*
Maximum Ramp Weight: 8750 lbs*
Maximum Landing Weight: 8500 lbs

Maximum Weight for Flight into Known Icing Conditions:
Cargo Pod ON: 8550 lbs
Cargo Pod OFF: 8750 lbs

* Compatibility with this engine modification and the APE I gross weight increase STC SA00188SE to 8950 lbs and the APE II gross weight increase STC SA00392SE to 9062 lbs has been shown. If the aircraft has one of the gross weight STC kits installed, the aircraft can be operated at the associated gross weight under that STC.

CENTER OF GRAVITY LIMITS, **MANEUVER LIMITS, FLIGHT LOAD FACTOR LIMITS & FLIGHT CREW LIMITS**

No changes.

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 list identifies the systems and equipment that are required instead/or beyond those required in the Cessna POH/AFM.

REQUIRED EQUIPMENT

The following equipment is required in place of the required OEM equipment. All other equipment listed in the OEM flight manual is still required.

DAY VFR:

- Operational engine inlet anti-ice system in place of the OEM inertial separator system
- EGT indicator in place of the OEM ITT indicator
- Engine % RPM indicator in place of the OEM N_g% RPM and Propeller RPM Indicator

NIGHT VFR:

No changes.

IFR:
No changes.

FLIGHT INTO KNOWN ICING:

Same required equipment as for unmodified Cessna 208B with addition of heated engine inlet anti-ice system.

The aircraft is limited to a maximum of **10 degrees** flaps in icing conditions or when ice remains on the aircraft after encountering icing conditions.

Refer to Supplement S1, Known Icing Equipment, SSL-KIS-208B-12JR, for other limitations and differences for the modified Cessna 208B.

COLD WEATHER OPERATIONS:

No changes.

FUEL LIMITATIONS

Two Standard Tanks:

Total Fuel,	Both Tanks:	335.6 U.S. gallons
	Each Tank:	167.8 U.S. gallons
Usable Fuel,	Both Tanks On:	331 U.S. gallons
	Single Tank On:	164 U.S. gallons per tank
Unusable Fuel	Both Tanks On:	4.7 U.S. gallons
	Single Tank On:	3.9 U.S. gallons per tank

NOTE

To achieve full capacity, fill the fuel tank to the top of the filler neck. Filling fuel tanks to the bottom of the fuel filler collar (level with the 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 two minutes.

Maximum fuel imbalance in flight is 200 lbs.

Approved Fuel Grade (Specification) and Fuel Additives:

FUEL GRADE	SPEC (1)	MIN FUEL TEMP FOR TAKEOFF(2)	MAXIMUM OPERATING ALT. (No boost pump unless specified)
JET A	ASTM-D1655	-35ºC	25,000 FT
JET A-1	ASTM-D1655	-40ºC	25,000 FT
JET B	ASTM-D1655	-45ºC	9,500 FT
JP-4	MIL-T-5624	-54ºC	9,500 FT
JP-5	MIL-T-5624	-40ºC	25,000 FT
JP-8	MIL-T-83133A	-40ºC	25,000 FT
AVIATION GASOLINE	80/87	-54ºC	9,000 FT (see note 3)
-ALL GRADES (3)	100/130	-54ºC	9,000 FT (see note 3)

1) Fuels without icing inhibitors may have MIL-I-27686E Fuel System Icing Inhibitor, or an equivalent inhibitor, added, but not in excess of 0.15 percent by volume.

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.

2) Minimum starting temperature is that given or the minimum allowable oil temperature (-40ºC), 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 29ºC (85ºF) and the maximum operating altitude is 9000 feet. **The boost pump must be ON for all flight operations.**

Table 2-4, Approved Fuel Grade and Fuel Additives

Alternate/Emergency Fuels

Aviation Fuel (All grades of military and commercial aviation gasoline).

CAUTION

AVIATION GASOLINE (ASTM D910, GRADE 80/87) IS RESTRICTED TO EMERGENCY USE AND SHALL NOT BE USED IN EXCESS OF 1000 GALLONS PER 100 HOURS OF OPERATION.

AVIATION GASOLINE (ASTM D910, GRADE 100/130 LOW LEAD OR GRADE 100LL PPS EMS53122) IS RESTRICTED TO EMERGENCY USE AND SHALL NOT BE USED IN EXCESS OF 250 GALLONS PER 100 HOURS OF OPERATION. TOTAL USAGE MUST BE LIMITED TO 7000 GALLONS DURING ANY 3000-HOUR PERIOD.

WHEN MIXING THE ABOVE AVIATION GASOLINES, USE THIS FORMULA TO SET PROPORTIONS OF EACH GRADE DURING ANY OVERHAUL PERIOD:

$$\frac{\text{AMOUNT OF GRADE 100LL OR 100/130 (GAL)}}{\text{7000 (GAL)}} + \frac{\text{AMOUNT OF GRADE 80/87 (GAL)}}{\text{30,000 (GAL)}} < 1$$

IF 25 PERCENT OR MORE AVGAS IS USED AT ANY TIME, ONE QUART OF AVIATION GRADE MINERAL OIL MUST BE ADDED TO THE MIXTURE PER 100 GALLONS OF AVGAS.

WHENEVER ANY OF THE ABOVE FUELS OR COMBINATIONS OF THE ABOVE FUELS IS CHANGED, MAKE ENGINE SPEED AND POWER CHECKS PRIOR TO FLIGHT. REFER TO THE HONEYWELL TPE331-12JR MAINTENANCE MANUAL FOR FUEL TRIM, WHICH MAY BE NEEDED TO RESTORE SPEED SETTINGS AND/OR MAXIMUM POWER.

Other Approved Fuel Additives:

If additional anti-static protection is desired, the following additives are approved for use:
Shell ASA3 (up to 300 conductivity units, but shall the additive should not exceed 1ppm)

If additional biocidal protection is desired, the following additive is permitted for use in certain conditions.
Sohio Biobor JF (270ppm maximum {20 ppm of elemental boron} may be used)

MAXIMUM OPERATING ALTITUDE

No changes.

OUTSIDE AIR TEMPERATURE LIMITS

No changes.

MAXIMUM PASSENGER SEATING LIMITS

No changes.

OTHER LIMITATIONS

FLAP LIMITATIONS
Approved flap range in icing conditions ..... 0^{o} to 10^{o}

TYPE II, TYPE III, OR TYPE IV ANTI-ICE FLUID TAKEOFF LIMITATIONS

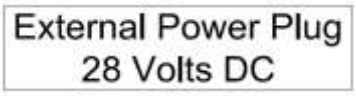
No changes.

FLIGHT IN KNOWN ICING VISUAL CUES (As Required by AD 96-09-15, Paragraph (a) (1))

No changes.

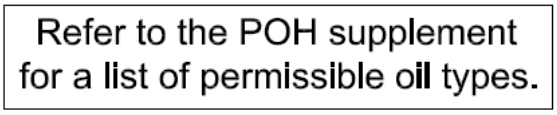
PLACARDS- In addition to OEM placards

1. On the electrical junction box next to the external power plug:



2. On the instrument panel next to the torque gauge:

3. On the oil tank next to the filler cap:



SECTION 3:
EMERGENCY PROCEDURES

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OPERATIONAL CHECKLISTS

AMPLIFIED PROCEDURES

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 of the Cessna POH/AFM. Emergency procedures relating to Known Icing Equipment and the Standby Alternator System can be found in Section 9 of this airplane flight manual supplement.

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
9062 Pounds	96 KIAS	98 KIAS
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

NOTE

This section contains all emergency procedures that are in the basic airplane flight manual. These procedures are revised as necessary or expanded to reflect aircraft changes resulting from this modification.

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 Shutoff/Feather Lever – SHUTOFF/FEATHER.
5. Ignition Switch- OFF.
6. Fuel Valve Switch – OFF.
7. Fuel Shutoff – OFF (pull out).
8. Fuel Tank Selectors – OFF (warning horn will sound).
9. Battery Switch – OFF.

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. **Airspeed – 85 KIAS with 20º flaps.**
2. Fuel Shutoff/Feather Lever – SHUTOFF/FEATHER.
3. Ignition Switch- OFF.
4. Wing Flaps – FULL DOWN.
5. Fuel Valve Switch – OFF.
6. Fuel Shutoff – OFF (pull out).
7. Fuel Tank Selectors – OFF (warning horn will sound).
8. Battery – OFF.

ENGINE FAILURE DURING FLIGHT (No re-start will be attempted)

1. **Airspeed – 95 KIAS**
2. **Fuel Shutoff/Feather Lever – SHUTOFF/FEATHER.**
3. Wing Flaps – UP
4. Fuel Boost Switch – OFF.
5. Fuel Shutoff – OFF (pull out).
6. Ignition Switch – OFF
7. Standby Power Switch (if installed) – OFF
8. Electrical Load – REDUCE as follows:
    A. Avionics Bus 2 Switch – OFF.
    B. Flashing Beacon – OFF.
    C. Strobe Lights – OFF.
    D. Ice Protection (if installed) – CONSIDER (if pitot heat is required, pull the RIGHT PITOT HEAT circuit breaker and turn pitot heat switch ON).
    E. Vent Fans – OFF.
    F. GEN FIELD circuit breaker – PULL (top row, last breaker on forward end).
    G. Autopilot Circuit Breaker – PULL (third row from bottom, second from forward end).
9. Landing – Refer to Emergency Landing Without Engine Power checklist in the Forced Landings section.

ENGINE FLAMEOUT DURING FLIGHT

1. If Engine RPM Is Above **60%**:
   a) Power Lever – ½ inch forward of FLIGHT IDLE
   b) Ignition Switch – CONT
   c) Power Lever – AS DESIRED after satisfactory relight as evidenced by normal EGT and RPM.
   d) Ignition Switch – AUTO if cause of flameout has been corrected.

2. If Engine RPM is Below **60%**:
   a) Fuel Valve Switch – OFF
   b) Refer to Airstart checklists for engine restart.

AIRSTART

WARNING

IF AN ENGINE HAS BEEN SHUT DOWN BECAUSE OF AN OBVIOUS FAILURE, AS INDICATED BY THE ENGINE INSTRUMENTS OR EXCESSIVE VIBRATION, AN AIRSTART SHOULD NOT BE ATTEMPTED.

AN AIRSTART FROM FEATHER SHOULD NOT BE ATTEMPTED BELOW 1000 FEET ABOVE GROUND LEVEL (AGL) DUE TO THE TIME AND ALTITUDE REQUIRED FOR RESTART. PILOT SHOULD PREPARE FOR EMERGENCY LANDING WITHOUT ENGINE POWER.

CAUTION

DO NOT ENGAGE THE STARTER DURING AN AIR START BECAUSE THE HIGH TORQUE REQUIREMENTS OF A FEATHERED PROPELLER MAY DAMAGE THE STARTER.

DO NOT ATTEMPT AN AIRSTART FROM FEATHER WITH THE FUEL SHUTOFF/FEATHER LEVER IN THE SHUTOFF/FEATHER POSITION AS ALL THE OIL FROM THE TANK WILL BE PUMPED INTO THE ENGINE SUMP MAKING AN AIRSTART IMPOSSIBLE.

AIRSTART FROM FEATHER or WIND-MILLING below 60%

1. Ground/Air Switch- AIR.
2. Standby Power Switch (if installed) – OFF.
3. Avionics Power Switches – OFF.
4. SRL Switch – ON (or OFF for manual airstart or if SRL INOP).

NOTE

Engine will not automatically re-light during the airstart if the SRL computer speed switch has failed or the SRL switch is in the “OFF” position.

5. Air Conditioner (if installed) – OFF.
6. Bleed Air Heat Switch – OFF.
7. Engine Inlet Anti-ice Switch – OFF.
8. Power Lever – ½ inch forward of FLIGHT IDLE.
9. Speed Lever – MIN RPM (approx. 96%).
10. Fuel Shutoff/Feather Lever – NORM.

AIRSTART (continued)

AIRSTART FROM FEATHER or WIND-MILLING below 60% (continued)

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. Fuel Valve Switch – RUN.
16. Altitude – 20,000 feet maximum.
17. Airspeed – 90 KIAS minimum.
18. Start Switch- START.
19. RPM Indicator – RISING.

NOTE

The propeller unfeathering pump will begin unfeathering the propeller and engine rpm should begin to rise. At 10% rpm, ignition, fuel flow, and light-off should occur automatically with SRL "ON". If no fuel flow occurs at 10% (or conducting a manual air-start), move the FUEL VALVE switch to the "ON/ENRICH" position momentarily and check for fuel flow, ignition, and light off. Modulate FUEL VALVE to the "ON/ENRICH" position if necessary to help accelerate the engine during manual starts. Monitor EGT.

When rpm reaches 10%:

20. Fuel Valve Switch- ON/ENRICH momentarily (Automatic with SRL-"ON").
    a) EGT – MONITOR (770ºC maximum for one second).
    b) RPM – Increasing at least 1% per second to propeller governor setting.

When rpm reaches 60%

21. Start Switch – OFF.

When rpm reaches approx 96% rpm on propeller governor

22. Speed Lever - AS REQUIRED.
23. Power Lever - AS REQUIRED.
24. Ignition Switch – AUTO unless conditions warrant use of CONT.

WARNING

IF CONDITIONS EXIST, SUCH AS HEAVY PRECIPITATION OR NEARLY EMPTY FUEL TANKS, TURN THE IGNITION SWITCH TO CONT.

25. Fuel Boost Switch – NORM (unless it cycles on and off, then leave ON).
26. Generator Switch – ON.
27. Standby Power Switch (if installed) – ON.
28. Engine Inlet Anti-ice Switch – AS REQUIRED.
29. 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. Fuel Shutoff/Feather Lever – SHUTOFF/FEATHER.
4. Fuel Valve – OFF.
5. Fuel Boost Switch – OFF.
6. Ignition Switch – OFF.
7. Standby Power Switch (if installed) – OFF.
8. Non-essential Equipment (if installed) – OFF.
9. Fuel Shutoff – OFF (pull out).
10. Fuel Tanks Selectors – OFF (warning horn will sound).
11. Crew Doors – UNLATCH PRIOR TO TOUCHDOWN.
12. Battery Switch – OFF when landing is assured.
13. Touchdown – SLIGHTLY TAIL LOW.
14. Brakes – APPLY HEAVILY.

PRECAUTIONARY LANDING WITH ENGINE POWER

1. Seats, Seat Belts, Shoulder Harnesses – SECURE.
2. Wing Flaps - 10º.
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 – OFF.
10. Battery Switch – OFF.
11. Touchdown – SLIGHTLY TAIL LOW.
12. Fuel Shutoff/Feather Lever – SHUTOFF/FEATHER.
13. Brakes – APPLY HEAVILY.

DITCHING

NO CHANGES FROM CESSNA RECOMMENDED PROCEDURES.

WARNING

THE AIRPLANE HAS NOT BEEN FLIGHT TESTED IN ACTUAL DITCHINGS, THUS THE ABOVE RECOMMENDED PROCEDURE IS BASED ENTIRELY ON THE BEST JUDGMENT OF SUPERVAN SYSTEMS LTD.

SMOKE AND FIRE

ENGINE FIRE IN FLIGHT (Red ENGINE FIRE Annunciator ON or OFF)

1. **Power Lever – IDLE.**
2. **Fuel Valve Switch – OFF.**
3. **Fuel Shutoff/Feather Lever – SHUTOFF/FEATHER.**
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 - 20º- 30º.
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 – OFF.**
3. **Standby Power Switch (if installed) – OFF.**

WARNING

WITHOUT ELECTRICAL POWER, ALL ELECTRICALLY-OPERATED GYROS AND ENGINE INSTRUMENTS, SRL COMPUTER, TORQUE/TEMPERATURE LIMITER, 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 OR KFC-225 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. **Hand Fire Extinguisher – ACTIVATE.**

WARNING

OCCUPANTS SHOULD USE OXYGEN MASKS (IF INSTALLED) 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.

WARNING

LAND THE AIRPLANE AS SOON AS POSSIBLE. DO NOT ATTEMPT TO TROUBLE-SHOOT ELECTRICAL PROBLEMS IN FLIGHT.

If fire appears out and electrical power is absolutely necessary for continuance of flight, only restore power to equipment essential for flight:

9. Bus 1 Pwr and Bus 2 Pwr Circuit Breakers – PULL (6 total- first circuit breaker on each row)
10. Battery Switch and Standby Power Switch (if installed) – ON.
11. Generator Switch – ON.
12. Circuit Breakers – CHECK for faulty circuit (open circuit breaker); DO NOT reset.

SMOKE AND FIRE (continued)

ELECTRICAL FIRE IN FLIGHT (continued)

13. Bus 1 Pwr and Bus 2 Pwr Circuit Breakers- PUSH one at time with delay after each until short circuit is localized. Leave that Bus Pwr circuit breaker PULLED if necessary.
14. Inverter Switch (if installed) – 1 or 2.
15. Radio Switches – OFF.
16. Avionics Power Switches – ON.
17. Radio and Electrical Switches – ON one at a time, with delay after each until short circuit is localized.
18. Vents – OPEN when it is ascertained that fire is completely extinguished.
19. Bleed Air Heat – ON if necessary.
20. Land the airplane as soon as possible.

CABIN FIRE

1. **Battery Switch – OFF.**
2. **Generator Switch – OFF.**

WARNING

WITHOUT ELECTRICAL POWER, ALL ELECTRICALLY-OPERATED GYROS AND ENGINE INSTRUMENTS, SRL COMPUTER, TORQUE/TEMPERATURE LIMITER, 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.)

3. **Standby Power Switch (if installed) – OFF.**
4. **Vents – CLOSED (to avoid drafts).**
5. **Bleed Air Heat Switch – OFF.**
6. **Hand Fire Extinguisher – ACTIVATE.**

WARNING

OCCUPANTS SHOULD USE OXYGEN MASKS (IF INSTALLED) 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 (if installed) – OFF.**
7. **Ventilation Fans (if installed) – OFF.**

SMOKE AND FIRE (continued)

WING FIRE (continued)

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. **Fuel Valve Switch – OFF.**
4. **Fuel Shutoff/Feather Lever – SHUTOFF/FEATHER.**
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 Valve Switch –OFF.**
2. **Fuel Shutoff/Feather Lever – SHUTOFF/FEATHER.**
3. **Fuel Boost Switch – OFF.**
4. **Starter Mode Switch – MOTOR.**

CAUTION

- DO NOT EXCEED THE STARTING CYCLE LIMITATIONS; REFER TO SECTION 2
- SHOULD THE FIRE PERSIST, AS INDICATED BY SUSTAINED EXHAUST GAS TEMPERATURE, IMMEDIATELY CLOSE THE FIREWALL FUEL SHUTOFF AND CONTINUE MOTORING.

5. **Fuel Shutoff – OFF (pull out).**
6. Starter Switch – OFF.
7. Battery Switch – OFF.
8. Airplane – EVACUATE.
9. Fire – EXTINGUISH.

ICING

THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING (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 ENVIROMENT (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.
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. If the flaps are extended, do not retract them until the airframe is clear of ice.
7. Report these weather conditions to Air Traffic Control.

INADVERTENT ICING ENCOUNTER

1. **Ignition Switch – CONT.**
2. **Engine Inlet Anti-ice Switch – ON.**
3. **PITOT/STATIC, STALL, WINDSHIELD, PROP ANTI-ICE – ON.**
4. **If above 20,000 feet:**
   a) **Airspeed – 160 KIAS Maximum.**
   b) **Altitude – DESCEND to 20,000 feet or below as soon as practical.**
5. **Turn back or change altitude to obtain an outside air temperature that is less conducive to icing.**
6. Ignition Switch – AUTO after 5 minutes operations.
7. Bleed Air Heat Switch and Temp Control – ON and ADJUST
8. Push Fwd Cabin Heat control full in and pull Defrost control full out to obtain maximum windshield defroster effectiveness.
9. Speed Lever – INCREASE to 100% RPM to minimize ice build-up.

CAUTION

IF EXCESSIVE VIBRATION IS NOTED, MOMENTARILY REDUCE PROPELLER RPM TO 96% WITH THE SPEED LEVER, 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.

10. 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.

ICING (continued)

INADVERTENT ICING ENCOUNTER (continued)

11. With an ice accumulation of ¼ inch or more on the wing leading edges, be prepared for a significantly higher power requirement, approach speed, stall speed, and longer landing roll.
12. If necessary, set up a forward slip for visibility through the left portion of the windshield during the landing approach.
13. Use a minimum approach speed of 110 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 5ºC (41ºF) or less in visible moisture, **Do Not Extend Flaps Beyond 10º 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 10º, 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.

14. Land on the main wheels first, avoiding a slow and high flare-out.
15. 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 a minimum of 110 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 of the Cessna POH/AFM for airspeed and altimeter corrections.
3. Autopilot – DISENGAGE altitude hold mode.

ENGINE MALFUNCTIONS

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

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 MALFUNCTION

If there is an indication of improper operation of the fuel control, when possible, check the handling of the aircraft by a simulated landing flare at a safe altitude before trying to land. If unusual drag is noted that cannot be eliminated by increasing the power, it may be necessary to feather the propeller when the pilot has the runway made.

ENGINE INLET ANTI-ICE AND CONTINUOUS IGNITION

Engine inlet anti-ice (inlet heat) should be used during all flight in potential icing conditions. These conditions exist when flying in precipitation or visible moisture (including clouds or fog), with OAT of 5ºC (41ºF) or less.

Select Ignition Switch to CONT as below:

1. During takeoff or approach, before operation in icing conditions.
2. When ice is observed shedding from the propeller and/or spinner.
3. Before applying inlet heat, when ice has accumulated.
4. Immediately, any time engine flameout occurs as a possible result of ice ingestion.

NON-RESPONSIVE POWER LEVER

If a lack of response to the power lever is observed:

1. Ignition switch – CONT.
2. Engine Inlet Anti-ice Switch - ON.

After the engine has cleared and normal operation is observed, which occurs in approximately three minutes:

3. Engine Inlet Anti-ice – OFF.
4. Ignition Switch - AUTO.

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 pilot and consistent with safety, continue engine operation in preparation for an emergency landing as soon as possible.

FUELS 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 low fuel pressure 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 – AUTO or CONT**
3. **Fuel Boost Switch – ON**
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 extinguish 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 of the Cessna POH/AFM (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:

   a) Guarded and Safetied Standby Flap Motor Switch (Overhead) – MOVE GUARD, breaking safety wire, and POSITON 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 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 imbalance of 200 pounds).
3. Approach – NORMAL (flaps FULL).
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

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 FIELD Circuit Breaker – PUSH IN.
   B. Generator Switch – OFF then GEN.
4. If generator output is still zero:
   A. Generator Switch – OFF.
   B. Electrical Load – REDUCE as follows:
      a) Avionics Bus 2 Switch – OFF
      b) Flashing Beacon – OFF
      c) Strobe Lights – OFF
      d) Ice Protection (if installed)– CONSIDER (if pitot heat is required, pull RIGHT PITOT HEAT circuit breaker and turn pitot heat switch on).
      e) Vent Fans – OFF
      f) Air Conditioner (if installed) – OFF
      g) GEN FIELD Circuit Breaker – PULL (top row, last breaker on forward end).

   With KFC-150 or KFC-225 Autopilot System Installed:

      h) A/P CONT Circuit Breaker – PULL

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS (continued)

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

With KFC-250 Autopilot System Installed:

i) 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:

(i) Pull all AVIONICS BUS 2 circuit breakers except AVIONICS FAN and AUDIO AMP breakers (second row from bottom, last two breakers on forward end).
(ii) 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. SRL Power Switch – OFF.

If amber STARTER ENERGIZED light is no longer illuminated, perform normal engine shutdown and repair SRL box.

If amber STARTER ENERGIZED light is still illuminated, proceed as follows:

2. Fuel Valve Switch – OFF.
3. Battery Switch – OFF
4. Auxiliary Power Unit – OFF, then DISENGAGE
5. 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. Maneuvering speed for various weights:
   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 -- 10º.
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 the flaps extended will move the doors near their normally closed position).
3. If available or practical, have a second crew member go aft to close and latch door.
4. If landing is required with door open perform a normal approach and landing

LOWER HALF OF PASSENGER AIRSTAIR DOOR OPEN

1. Airspeed – MAINTAIN 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 180º 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 engine wind milling speed for emergency restarts. 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 EGT, torque, and RPM.

CAUTION

DO NOT ATTEMPT TO RESTART AN ENGINE THAT IS DEFINITELY KNOWN TO HAVE HAD A MECANICAL FAILURE.

A flameout may result from the engine running out of fuel, or possibly may be caused by unstable engine operation. Once the fuel supply has been restored to the engine or cause of unstable engine operation eliminated, the engine may be restarted.

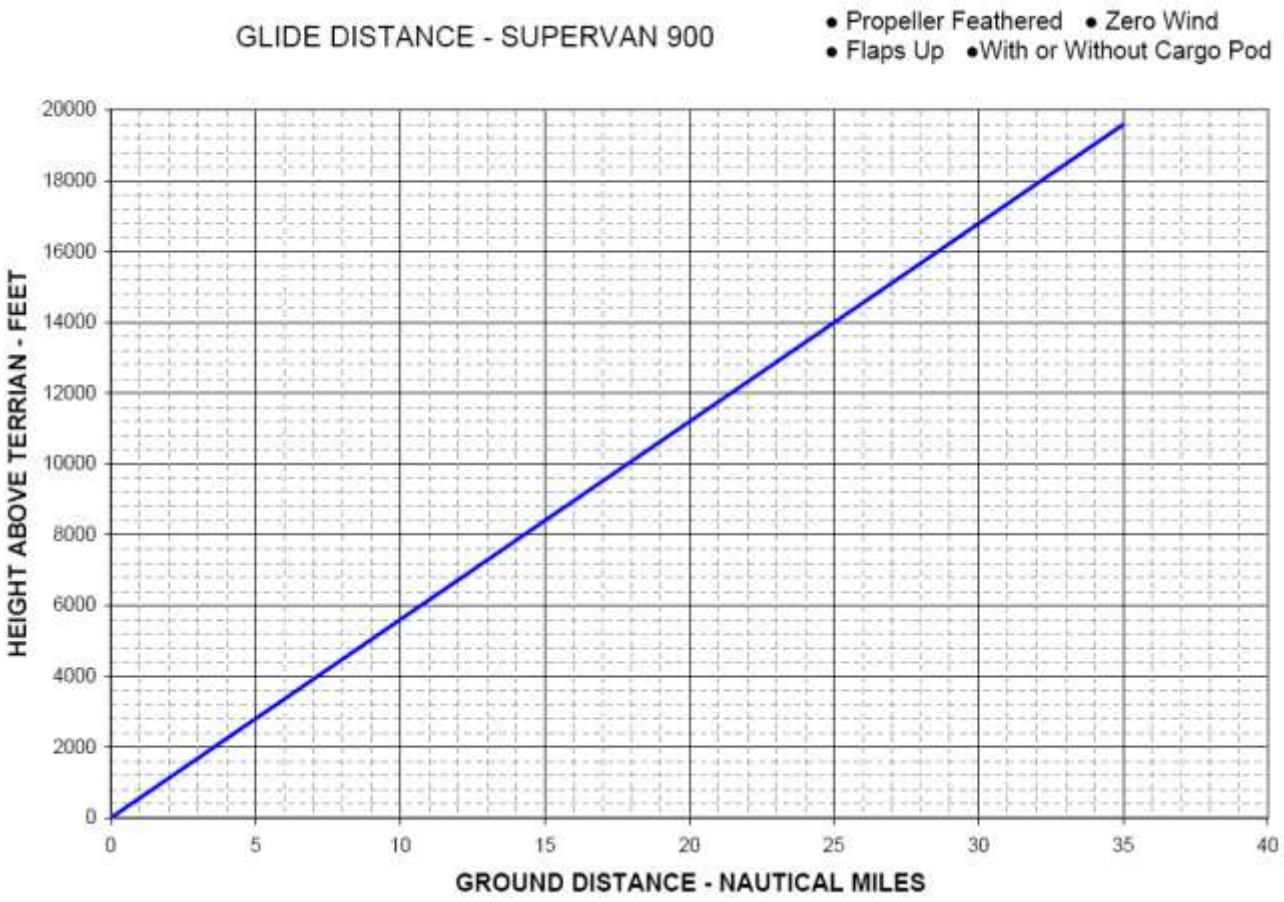

Figure 3-1, Maximum Glide

BEST GLIDE SPEED		
WEIGHT (LBS)	KIAS (WITH CARGO POD)	KIAS (WITHOUT CARGO POD)
9062	96	98
8750	95	97
7500	87	90
6250	79	82
5000	71	74

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 a flameout, provided the engine speed has not dropped below 60%. 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 engine speed has dropped below 60%, the fuel valve switch should be moved to the OFF 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 40 psi, the engine should be shut down and the propeller should be feathered unless a greater emergency exists. Typically, as oil pressure decreases, propeller control may become an issue necessitating engine shutdown.

If an airstart is to be attempted, follow the checklist procedures. Wind-milling air starts utilizing the propeller unfeathering pump are the only type of airstart available. Attempting a starter-assisted airstart can shear the starter shaft due to the high torque loads of a feathered propeller. Successful air starts may be achieved at all airspeeds above 90 kts from sea level up to an altitude of 20,000 feet. However, start temperatures tend to be higher at slower airspeeds.

CAUTION

IF A RISE IN RPM AND EGT ARE NOT INDICATED WITHIN 10 SECONDS, PLACE FUEL VALVE SWITCH TO OFF AND ABORT START. REFER TO ENGINE FAILURE DURING FLIGHT AND EMERGENCY LANDING WITHOUT POWER CHECKLISTS.

CAUTION

EMERGENCY AIRSTARTS MAY BE ATTEMPTED BELOW 10% RPM AND OUTSIDE THE NORMAL AIRSPEED ENVELOPE, BUT EGT SHOULD BE CLOSELY MONITORED. A MANUAL AIRSTART (SRL "OFF") WITHOUT THE USE OF FUEL ENRICHMENT CAN BE PERFORMED IF START TEMPERATURES ARE TOO HIGH WITH THE SRL SYSTEM ON. REFER TO THE AIRSTART CHECKLIST

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 in 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 in 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 can be set to the OFF position 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 2.5 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 TO THE "ON" POSITION 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 20º 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 in-flight 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 introducing fuel into the engine when the engine RPM 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 20º to 30º 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

No changes from the OEM procedures found in the Cessna POH/AFM.

INADVERTENT FLIGHT INTO ICING CONDITIONS

Intentional flight into known icing conditions is prohibited unless the complete flight into known icing equipment package is installed and operative and the airplane weight is 8750 pounds or less (cargo pod off) or 8550 pounds or less (cargo pod on). 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 technique may be used:

1. RETARD THE POWER LEVER TO IDLE POSITION.
2. PLACE AILERONS IN NEUTRAL POSITION.
3. SIMULTANEOUSLY APPLY AND HOLD FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION, AND 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.
4. HOLD THESE CONTROL INPUTS UNTIL ROTATION STOPS. Premature relaxation of the control inputs may extend the recovery.
5. 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.

NOTE

Airspeed during the recovery of the airplane may exceed the respective flap setting V_{FE}. When able, it is recommended that flaps be retracted during recovery to prevent this type of occurrence.

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 attempt to 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

If there is an indication of improper operation of the fuel control, when possible, check the handling of the aircraft by a simulated landing flare at a safe altitude before trying to land. If unusual drag is noted that cannot be eliminated by increasing power, it might be necessary to feather the engine and perform an Emergency Landing Without Engine Power.

NON-RESPONSIVE POWER LEVER

If during flight the power lever becomes unresponsive, it may be due to a frozen P_2T_2 sensor. The power lever response can be restored by utilizing the engine inlet anti-ice heat, which also heats the sensor. It is recommended to turn on the engine ignition during this operation to prevent an engine flameout. It may take several minutes for the power lever response to return after turning on the inlet anti-ice. Refer to the Non-Responsive Power Lever Checklist

PROPELLER CONTROL MALFUNCTION

Indication of a propeller control malfunction may be the inability to govern at the selected speed. If the beta light comes on at low power settings at approach airspeeds, when possible, check the handling of the aircraft by a simulated landing flare at a safe altitude. If power increases, the propeller should be feathered prior to landing, as the pilot may not be able to reduce thrust on the engine during the flare and after touchdown.

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 - INAVERTENT 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, gravity provides fuel to the engine-driven fuel pump.

If the inter-stage fuel pressure drops between the low and high pressure engine driven fuel pumps, 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) and illuminate the AUX FUEL PUMP ON annunciator. This occurs 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 illuminated. If this occurs, the pilot should immediately verify that both fuel tank selectors (located in the overhead panel) are ON and turn the ignition to continuous and fuel boost pump on.

WARNING

THERE IS ONLY ENOUGH FUEL IN THE RESERVOIR FOR APPROXIMATELY 1 MINUTE OF ENGINE OPERATION AT MAXIMUM CONTINUOUS POWER AFTER ILLUMINATION OF THE RESERVOIR FUEL LOW ANNUNCIATOR.

If the 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 switch can be moved to the AUTO position and the fuel boost switch can be returned to the NORM position.

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

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 one starter contactor. If the contactor does not open after reaching approximately 60% RPM, the amber STARTER ENERGIZED annunciator will remain illuminated. DO NOT turn the Start/Gen switch to the GEN position as it could damage the starter/generator. 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 noise. 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 that 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. The check will vary depending on whether or not the aircraft has SSL service bulletin 208-7 incorporated.

PRE SB 208-7:

With the generator supplying the electrical load and the standby power switch ON, the amber annunciator, STBY ELECT PWR INOP, should be extinguished. The volt/ammeter should indicate approximately 10%-20% (amps) in the ALT position of the generator load in the GEN 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 the generator fails, the standby alternator will assume the total load. 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 10%-20% load condition. 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).

POST SB 208-7:

With the generator supplying the electrical load and the standby power switch ON, the amber annunciator, both the amber annunciators, STBY ELEC PWR ON and STBY ELEC PWR INOP, should be extinguished. The volt/ammeter should indicate approximately 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 carrying part of the electrical load (more than 10 amps), the STBY ELEC 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 ELEC PWR ON annunciator will extinguish. If main electrical power cannot be restored, reduce non-essential 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 the illumination of the VOLTAGE LOW annunciator and the volt/ammeter showing discharge current (in the BATT position).

INADVERTENT OPENING OF AIRPLANE DOORS IN FLIGHT

No changes from the OEM procedures found in the Cessna POH/AFM.

EMERGENCY EXITS

No changes from the OEM procedures found in the Cessna POH/AFM.

SECTION 4:
NORMAL PROCEDURES

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AMPLIFIED PROCEDURES

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 of this manual for takeoff distance and climb performance, the speed appropriate to the particular weight must be used. To achieve the performance specified in Section 5 of the Cessna POH/AFM for landing distance, the speed appropriate to the particular weight must be used.

Takeoff:
- Normal Climb Out ..... 85-95 KIAS
- Short Field Takeoff, Flaps 30º, Speed at 50 Feet ..... 76 KIAS
- Short Field Takeoff, Flaps 20º, Speed at 50 Feet ..... 86 KIAS
- Type II, Type III, or Type IV Anti-ice Fluid Takeoff, Flaps 0º
  - With or Without Cargo Pod ..... 83 KIAS

Enroute Climb, Flaps Up:
- Cruise Climb ..... 110-120 KIAS
- Best Rate Climb, Sea Level to 10,000 Feet ..... 105 KIAS
- Best Rate Climb, 20,000 Feet ..... 103 KIAS
- Best Angle of Climb, Sea Level to 20,000 Feet ..... 86 KIAS

Landing Approach:
- Normal Approach, Flaps Up ..... 100-115 KIAS
- Normal Approach, Flaps 30º ..... 75-85 KIAS
- Short Field Approach, Flaps 30º ..... 78 KIAS

Balked Landing:
- Takeoff Power, Flaps 20º ..... 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 ..... 14 KNOTS

PREFLIGHT INSPECTION WARNINGS

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, ANY 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). TO ASSURE COMPLETE REMOVAL OF CONTAMINATION, CONDUCT A VISUAL AND TACTILE INSPECTION OF ALL SURFACES. 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 CLIMB OUT 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.**

CHECKLIST PROCEDURES

PREFLIGHT INSPECTION

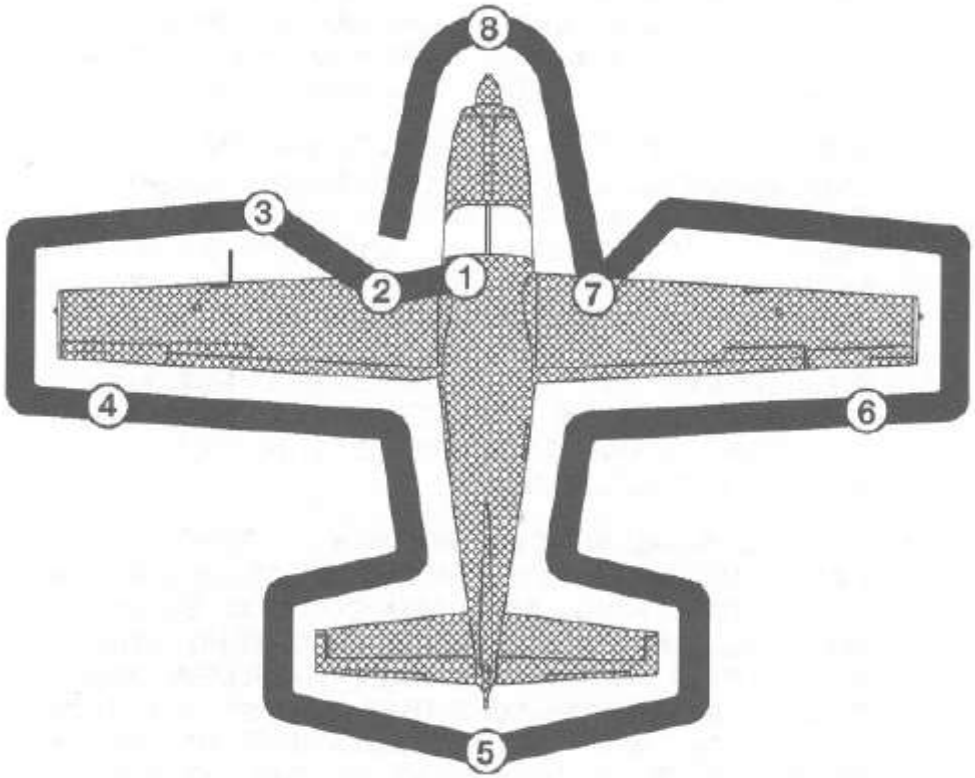


Figure 4-1, Pre-flight Inspection

(1.) CABIN

1. Pilot's Operating Handbook and Other Required Document – 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. Standby Flap Motor Switch (Overhead) – GUARDED NORM.
8. Oxygen Supply Pressure – CHECK.
9. Oxygen Masks – CHECK AVAILABLE.
10. Fuel Selector Valves – CHECK ON and FEEL AGAINST STOPS.
11. Radar – OFF.
12. Air Conditioner (if installed) – OFF.
13. Inverter Switch (if installed) – OFF.
14. Bleed Air Heat Switch – OFF.
15. Trim Controls – SET.
16. Fuel Shutoff – ON.
17. Cabin Heat Firewall Shutoff Control – CHECK IN.

18. Battery Switch – ON.
19. Avionics Power Switch No. 2 – ON. Check audibly that avionics cooling fan is operating.
20. Avionics Power Switch No. 2 – OFF.
21. Fuel Quantity Indicators – CHECK QUANTITY.
22. Wing Flaps – FULL DOWN.
23. Pitot/Static and Stall Heat Switches – ON for 30 seconds, then OFF. (Ensure pitot/static tube covers are removed.)
24. 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, SNOW, OR SLUSH FROM THE WING AND CONTROL SURFACES. TO ASSURE COMPLETE REMOVAL OF CONTAMINATION, CONDUCT A VISUAL AND TACTILE INSPECTION OF ALL 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 De-ice Boots (if installed) – CHECK for tears, abrasion and cleanliness.
2. Wing Tie-Down – DISCONNECT.
3. Wing De-ice Boots (if installed) – CHECK for tears, abrasions and cleanliness.
4. Stall Warning Vane – CHECK freedom of movement, audible warning and warmth. (For airplanes equipped with a stall warning ground disconnect switch, check audible warning with elevator control 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. See Figure 4-2 for fuel quantity versus depth if using Universal XL Fuel Gauge.

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 (if installed).
6. Flap – CHECK condition and security.

Universal XL Fuel Gage	Fuel Quantity	
Gage Scale	Gal	Lbs
0.50	87.4	585
0.75	91.1	610
1.00	94.7	634
1.25	98.2	658
1.50	101.8	682
1.75	105.2	705
2.00	108.6	727
2.25	111.9	750
2.50	115.1	771
2.75	118.3	793
3.00	121.5	814
3.25	124.5	834
3.50	127.5	855
3.75	130.5	874
4.00	133.4	894
4.25	136.2	912
4.50	138.9	931
4.75	141.6	949
5.00	144.3	966
5.25	146.8	984
5.50	149.3	1000
5.75	151.8	1017
6.00	154.1	1033
6.25	156.5	1048
6.50	158.7	1063
6.75	160.9	1078
7.00	163.0	1092
7.25	165.0	1106

Generic Fuel Gage-Inches	Fuel Quantity	
Inches	Gal	Lbs
0.50	88.4	592
0.75	92.6	621
1.00	96.7	648
1.25	100.8	675
1.50	104.7	702
1.75	108.6	727
2.00	112.4	753
2.25	116.1	778
2.50	119.7	802
2.75	123.2	826
3.00	126.7	849
3.25	130.1	871
3.50	133.4	894
3.75	136.6	915
4.00	139.7	936
4.25	142.8	956
4.50	145.7	976
4.75	148.6	996
5.00	151.4	1015
5.25	154.1	1033
5.50	156.8	1050
5.75	159.3	1068
6.00	161.8	1084
6.33	165.0	1105

Figure 4-2, Measured Fuel Depth vs. Fuel Quantity

(5.) EMPENNAGE

WARNING

IT IS ESSENTIAL IN COLD WEATHER TO REMOVE EVEN SMALL ACCUMULATIONS OF FROST, ICE, SNOW, OR SLUSH FROM THE TAIL AND CONTROL SURFACES. TO ASSURE COMPLETE REMOVAL OF CONTAMINATION, CONDUCT A VISUAL AND TACTILE INSPECTION OF ALL SURFACES. EXERCISE CAUTION TO AVOID DISTORTING VORTEX GENERATORS ON THE HORIZONTAL STABILIZER WHILE DE-ICING. 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. De-ice Boots (if installed) – CHECK for tears, abrasions and cleanliness.
5. Rudder Gust Lock – 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 (if installed).
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, SNOW, OR SLUSH FROM WING AND CONTROL SURFACES. TO ASSURE COMPLETE REMOVAL OF CONTAMINATION, CONDUCT A VISUAL AND TACTILE INSPECTION OF ALL 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. See Figure 4-2 for fuel quantity versus depth if using Universal XL Fuel Gauge.
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 De-ice Boots (if installed) – CHECK for tears, abrasion and cleanliness.
8. Radome (if installed) – CHECK condition and security.
9. Wing Tie-Down – DISCONNECT.
10. Wing Strut De-ice Boots (if installed) – 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, SNOW, OR SLUSH FROM THE PROPELLER BLADES AND SPINNER, AND THE AIR INLETS (STARTER/GENERATOR, OIL COOLER AND ENGINE INLETS). TO ASSURE COMPLETE REMOVAL OF CONTAMINATION, CONDUCT A VISUAL AND TACTILE INSPECTION OF ALL SURFACES.

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. Batteries – CHECK condition and security, and power cables secure.
5. Exhaust System – CHECK condition, security, and for cracks, distortion and damage.
6. Oil Dipstick/Filler Cap - CHECK oil level, then check dipstick/filler cap SECURE.

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.

7. Oil Filter Bypass Indicator – CHECK FLUSH (OUT indicates possible bypassing).
8. Cowling – CLOSE and LATCH right side.
9. Air Inlet Cover – REMOVE.
10. Air Inlets – CHECK oil cooler inlet (right side cowling), engine induction air inlet (front), starter/generator NACA duct opening (top left), and fresh air NACA duct (bottom left) for condition, restrictions, and debris.
11. Propeller – CHECK blades for nicks, gouges, erosion, cracks. Also, inspect blades for lightning strike (darkened area near tips), anti-ice boots (if installed) for security, and evidence of grease and security.
12. Propeller Spinner – CHECK condition and security.
13. 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.
14. Cowling – OPEN left side of upper cowling for access and CHECK condition and security.
15. Engine (left side) – CHECK for general condition, security, fuel and oil leakage and damage to any components.

16. Starter/Generator Security – Check.
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. Engine Drain Manifold (behind nose gear)- DRAIN Check for excessive fuel or oil leakage.
21. 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.

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 Lock – 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. All Switches – OFF (General Check).
10. Ground/Air Switch – GND.
11. Start/Gen Switch – OFF.
12. Fuel Valve Switch – OFF.
13. Circuit Breakers – CHECK IN.
14. Fuel Tank Selectors – LEFT ON, RIGHT ON.
15. Radar – OFF.
16. Air Conditioner (if installed) – OFF.
17. Inverter Switch (if installed) – OFF.
18. Bleed Air Heat Switch – OFF.
19. Engine Inlet Anti-ice Switch – OFF.

CAUTION

LEAVING THE BLEED AIR HEAT SWITCH OR THE ENGINE INLET ANTI-ICE SWITCH ON MAY RESULT IN A HOT START OR ABNORMAL ACCELERATION TO IDLE.

20. Cabin Heat Mixing Air Control – FLT-PUSH.
21. Power Lever – IDLE.
22. Speed Lever – MIN (full aft).
23. Fuel Shutoff/Feather Lever – NORM.
24. Rudder Lock (if installed) – TURN and PUSH to unlock.
25. Fuel Shutoff – ON (push in).
26. Battery Switch – ON.
27. Wing Flaps – UP.
28. No Smoking/Seat Belt Sign Switches (if installed) – ON as required/desired.
29. Fire Detector Test Switch – PRESS-TO-TEST.

30. Annunciator Panel Lamp Test Switch – PRESS-TO-TEST (all annunciator lamps illuminate and both fuel selectors off warning horns are activated).
31. Annunciator Panel Day/Night Switch – SET.
32. Flashing Beacon – ON.

STARTING ENGINE (Auto Start)

CAUTION

IF USING AN EXTERNAL POWER SOURCE, USE ONLY NEGATIVELY GROUNDED GROUND POWER SOURCES.

DUE TO THE POSSIBILITY OF EXCESSIVELY HIGH CURRENT SURGE DURING ENGINE START, IT IS RECOMMENDED THAT THE MAXIMUM STARTING CURRENT FROM AN EXTERNAL POWER SOURCE BE LIMITED TO 1700 AMPERES.

IT IS RECOMMENDED THAT THE START MODE SWITCH BE IN THE PARALLEL POSITION FOR ALL STARTS USING EXTERNAL POWER DUE TO THE HIGH CURRENT. DAMAGE TO THE AIRCRAFT BATTERIES CAN OCCUR USING THE PARALLEL-SERIES MODE WITH EXTERNAL POWER.

1. Battery Switch – ON.
2. Volt/Ammeter – CHECK (24-28 volts).
3. Propeller – UNFEATHERED & CLEAR (if feathered, see Systems Checks at the end of this section).
4. SRL Switch – ON.
5. SRL INOP Annunciator – CHECK OFF.
6. TTL Switch – ON.
7. Fuel Boost Switch – ON and OBSERVE.
   a. AUX FUEL PUMP ON Annunciator – ON.
   b. FUEL PRESS LOW Annunciator – OFF.
   c. Fuel pressure gauge reads approx. 12-15 psi.
   d. No fuel flow.
8. Start Mode Switch – PARA-SERIES or PARA (normally PARA-SERIES)

NOTE

It is recommended to use the PARA-SERIES start mode unless one of the batteries is weaker and problems have occurred during the start. In that case, use the PARA mode, which should result in an adequate, but longer start time.

9. Fuel Valve Switch – RUN.
10. Starter Switch – START and OBSERVE.
    a. STARTER ENERGIZED Annunciator – CHECK ON.
    b. Engine Oil Pressure – CHECK for indication.
    c. Engine RPM rising.

WHEN ENGINE RPM REACHES 10% RPM

11. OBSERVE.
    a. IGNITION ON Annunciator – CHECK ON.
    b. Fuel Flow – CHECK for 90 to 140 pph.
    c. EGT – MONITOR RISING (770ºC maximum, limited to 1 second).
    d. RPM rising at least 1% per second.

CAUTION

IF EGT RISE IS NOT OBTAINED WITHIN 10 SECONDS AFTER REACHING 10%, SELECT THE FUEL VALVE SWITCH TO THE OFF POSITION AND PULL THE FUEL SHUTOFF/FEATHER HANDLE TO THE SHUTOFF/FEATHER POSITION. SELECT THE MOTOR POSITION ON THE START MODE SWITCH AND ALLOW THE ENGINE TO MOTOR AN ADDITIONAL 10 SECONDS. THEN, SELECT THE START SWITCH TO THE OFF POSITION. DO NOT ALLOW THE ENGINE TO OPERATE IN THE 18% TO 28% RPM RANGE DURING START OR CLEARING OPERATIONS EXCEPT DURING COMBUSTION-ASSISTED ACCELERATION THROUGH THAT RANGE.

IF RPM STOPS INCREASING AND/OR EGT IS APPROACHING THE START LIMIT OF 770ºC AND RISING RAPIDLY, IMMEDIATELY MOVE THE FUEL VALVE SWITCH THE OFF POSITION AND PULL THE FUEL SHUTOFF/FEATHER HANDLE TO THE SHUTOFF/FEATHER POSITION. CONTINUE TO MOTOR THE ENGINE FOR AN ADDITIONAL TEN SECONDS AS DESCRIBED ABOVE.

DO NOT ALLOW THE ENGINE TO DWELL IN THE 18% TO 28% RPM RANGE AS IT CAN DAMAGE THE ENGINE. TRANSITIONS THRU THIS RPM ARE ALLOWED FOR STARTING, BUT THE ENGINE MUST BE ACCELERATING.

NOTE

If no fuel flow or ignition is observed and combustion is not obtained, it is permissible to attempt an engine start using the MANUAL START procedure on page 4-13.

The engine is equipped with a start fuel enrichment system that is automatically actuated during a normal start when:

1. The SRL switch is in the ON position
2. The EGT is less than 695ºC and not increasing at a rate higher than 1ºC/sec.
3. The RPM is between 10% and 60%.

Moving the fuel valve switch to the ON/ENRICH position will override the automatic function and increase the starting fuel flow provided the engine RPM is between 10% and 60%.

Whenever an engine ground start is required soon after engine shutdown while residual EGT is above 200ºC, pay special attention to EGT during the start as the temperatures tend to be higher.

WHEN ENGINE RPM REACHES 60% RPM

12. Start/Gen Switch – OFF.
13. Power Lever – GROUND IDLE (1/2 inch aft of FLIGHT IDLE detent)
14. OBSERVE.
    a. STARTER ENERGIZED AND IGNITION ON Annunciators – CHECK OFF.
    b. Engine RPM – stabilized at 68% - 70%.
    c. EGT – stabilized.
    d. Oil Pressure – above 40 psi.
15. Ground Power Unit (if used) – OFF, then DISENGAGE.
16. Start/Gen Switch – GEN.
17. Standby Power Switch – ON.
18. Inverter Switch (if installed) – 1 or 2.
19. Engine Instruments – CHECK.
20. Generator – CHECK GENERATOR OFF annunciator OFF and battery charging.
21. Standby Power (if installed) – CHECK (see Systems Checks)
22. Fuel Boost Switch – NORM (check AUX FUEL PUMP ON annunciator OFF).

23. Avionics No. 1 and No. 2 Power Switches – ON.
24. Navigation Lights – ON as required.
25. Suction Gage – CHECK.
26. Cabin Heating, Ventilating and Defrosting Controls – AS DESIRED.
27. Radios – AS REQUIRED.
28. Overspeed Governor (as required) – CHECK (see Systems Checks).
29. Propeller Start Locks – RELEASE
30. Single Red Line Computer (SRL)/Torque & Temp Limiter (TTL) (as required) – CHECK (see Systems Checks).
31. Negative Torque Sensing (NTS) System (first flight of day)- CHECK (see System Checks)

STARTING ENGINE (Manual Start)

CAUTION

IF USING AN EXTERNAL POWER SOURCE, USE ONLY NEGATIVELY GROUNDED GROUND POWER SOURCES.

DUE TO THE POSSIBILITY OF EXCESSIVELY HIGH CURRENT SURGE DURING ENGINE START, IT IS RECOMMENDED THAT THE MAXIMUM STARTING CURRENT FROM AN EXTERNAL POWER SOURCE BE LIMITED TO 1700 AMPERES.

IT IS RECOMMENDED THAT THE START MODE SWITCH BE IN THE PARALLEL POSITION FOR ALL STARTS USING EXTERNAL POWER DUE TO THE HIGH CURRENT. DAMAGE TO THE AIRCRAFT BATTERIES CAN OCCUR USING THE PARALLEL-SERIES MODE WITH EXTERNAL POWER.

1. Battery Switch – ON.
2. Volt/Ammeter – CHECK (24- 28 volts).
3. Propeller – UNFEATHERED & CLEAR (if feathered, see Systems Checks).
4. SRL Switch – OFF.

NOTE

The automatic start functions are disabled when the SRL switch is in the OFF position. Therefore, the fuel and ignition are enabled when the fuel valve switch is moved to the ON/ENRICH position. The automatic enrichment function is also disabled and requires the operator to modulate the fuel valve switch to the ON/ENRICH position to add starting fuel.

5. SRL INOP Annunciator – CHECK ON.
6. TTL Switch – OFF.
7. Fuel Boost Switch – ON and OBSERVE.
    a. AUX FUEL PUMP ON Annunciator – ON.
    b. FUEL PRESS LOW Annunciator – OFF.
    c. Fuel pressure gauge reads approx. 12-15 psi.
    d. No fuel flow.
8. Start Mode Switch – PARA-SERIES or PARA. (normally PARA-SERIES)

NOTE

It is recommended to use the PARA-SERIES start mode unless one of the batteries is weaker and problems have occurred during the start. In that case, use the PARA mode, which should result in an adequate, but longer start time.

9. Fuel Valve Switch – RUN.
10. Starter Switch – START and OBSERVE.
    a. STARTER ENERGIZED Annunciator – CHECK ON.
    b. Engine Oil Pressure – CHECK for indication.
    c. Engine RPM rising.

WHEN ENGINE RPM REACHES 10% RPM

11. Fuel Valve Switch – ON/ENRICH
12. OBSERVE.
    a. IGNITION ON Annunciator – CHECK ON.
    b. Fuel Flow – CHECK for 90 to 140 pph.
    c. EGT – MONITOR RISING (770ºC maximum, limited to 1 second).
    d. RPM rising at least 1% per second.

CAUTION

IF EGT RISE IS NOT OBTAINED WITHIN 10 SECONDS AFTER REACHING 10%, SELECT THE FUEL VALVE SWITCH TO THE OFF POSITION AND PULL THE FUEL SHUTOFF/FEATHER HANDLE TO THE SHUTOFF/FEATHER POSITION. SELECT THE MOTOR POSITION ON THE START MODE SWITCH AND ALLOW THE ENGINE TO MOTOR AN ADDITIONAL 10 SECONDS. THEN, SELECT THE START SWITCH TO THE OFF POSITION. DO NOT ALLOW THE ENGINE TO OPERATE IN THE 18% TO 28% RPM RANGE DURING START OR CLEARING OPERATIONS EXCEPT DURING COMBUSTION-ASSISTED ACCELERATION THROUGH THAT RANGE.

IF RPM STOPS INCREASING AND/OR EGT IS APPROACHING THE START LIMIT AND RISING RAPIDLY, IMMEDIATELY MOVE THE FUEL VALVE SWITCH THE OFF POSITION AND PULL THE FUEL SHUTOFF/FEATHER HANDLE TO THE SHUTOFF/FEATHER POSITION. CONTINUE TO MOTOR THE ENGINE FOR AN ADDITIONAL TEN SECONDS AS DESCRIBED ABOVE.

DO NOT ALLOW THE ENGINE TO DWELL IN THE 18% TO 28% RPM RANGE AS IT CAN DAMAGE THE ENGINE. TRANSITIONS THRU THIS RPM ARE ALLOWED FOR STARTING, BUT THE ENGINE MUST BE ACCELERATING.

NOTE

Whenever an engine ground start is required soon after engine shutdown while residual EGT is above 200ºC, pay special attention to EGT during the start as the temperatures tend to be higher.

13. Fuel Valve Switch – Toggle ON/ENRICH as necessary to maintain 675ºC to 690ºC.

CAUTION

DO NOT HOLD THE FUEL VALVE SWITCH IN THE ON/ENRICH POSITION AS AN ENGINE OVERTEMPERATURE COULD RESULT.

WHEN ENGINE RPM REACHES 60% RPM

14. Start/Gen Switch – OFF.
15. Power Lever – GROUND IDLE.
16. OBSERVE.
    a. STARTER ENERGIZED AND IGNITION ON Annunciators – CHECK OFF.
    b. Engine RPM – stabilized @ 68% - 70%.
    c. EGT – stabilized.
    d. Oil Pressure – above 40 psi.
17. Ground Power Unit (if used) – OFF, then DISENGAGE.
18. Start/Gen Switch – GEN.
19. Standby Power Switch – ON.
20. Inverter Switch (if installed) – 1 or 2.
21. Engine Instruments – CHECK.
22. Generator – CHECK GENERATOR OFF annunciator OFF and battery charging.
23. Standby Power (if installed) – CHECK (see Systems Checks).

24. Fuel Boost Switch – NORM (check AUX FUEL PUMP ON annunciator OFF).
25. Avionics No. 1 and No. 2 Power Switches – ON.
26. Navigation Lights – ON as required.
27. Suction Gage – CHECK.
28. Cabin Heating, Ventilating and Defrosting Controls – AS DESIRED.
29. Radios – AS REQUIRED.
30. Overspeed Governor (as required) – CHECK (see Systems Checks).
31. Propeller Start Locks – RELEASE.
32. Single Red Line Computer (SRL)/Torque & Temp Limiter (TTL) (as required) – CHECK (see Systems Checks).
33. Negative Torque Sensing (NTS) System (first flight of day)- CHECK (see System Checks)

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 RPM increases (under-speed governor reset).

2. Flight Instruments – CHECK.

BEFORE TAKEOFF

1. Power Lever – IDLE.
2. Parking Brake – SET.
3. Seats, Seat Belts, Shoulder Harnesses – CHECK SECURE.

WARNING

FAILURE TO CORRECTLY USE SEAT BELTS AND SHOULDER HARNESSES COULD RESULT IN SERIOUS OR FATAL INJURY IN THE EVENT OF AN ACCIDENT.

4. Flight Controls – FREE and CORRECT.
5. Flight Instruments – CHECK and SET.
6. Fuel Boost Switch – ON.
7. Fuel Tank Selectors – RECHECK BOTH ON.
8. Fuel Quantity – RECHECK.
9. Fuel Shutoff – RECHECK FULLY ON.
10. Elevator, Aileron, and Rudder Trim Controls – SET for takeoff.
11. Suction Gage – CHECK.
12. Volt/Ammeter – CHECK and return selector to BATT position.
13. Engine Instruments – CHECK
14. Quadrant Friction Lock – ADJUST.
15. Autopilot (if installed) – PREFLIGHT TEST (See Cessna POH Systems Checks).
16. Known Icing System (if installed) – PREFLIGHT COMPLETE (Refer to page 4-24, Known Icing Check) prior to any flight in icing conditions.
17. Engine Inlet Anti-ice – CHECK (See Systems Checks) prior to any flight in icing conditions.
18. Pitot/Static Heat – ON when OAT is 5ºC (41ºF) or less.
19. Ice Protection – AS REQUIRED.
20. Avionics and Radar – CHECK and SET.
21. GPS/NAV Switch – SET.
22. Strobe Lights – AS REQUIRED.
23. Annunciators – EXTINGUISHED or considered.
24. Wing Flaps – SET at 20º (30º for short field).
25. Cabin Heat Mixing Air Control – AS DESIRED.
26. Window – CLOSE.

27. Parking Brake – RELEASE.

WARNING

- **WHEN GROUND ICING CONDITIONS ARE PRESENT, A PRETAKEOFF VISUAL AND TACTILE CHECK SHOULD BE CONDUCTED BY THE PILOT IN COMMAND WITHIN 5 MINUTES OF TAKEOFF, PREFERABLY JUST PRIOR TO TAXIING ONTO THE ACTIVE RUNWAY.**
- **TAKEOFF IS PROHIBITED WITH ANY FROST, ICE, SNOW, OR SLUSH ADHERING TO THE WINGS, HORIZONTAL STABAILIZER, VERTICAL STABILIZER, CONTROL SURFACES, PROPELLER BLADES, AND ENGINE INLET.**
- **EVEN SMALL AMOUNTYS OF FROST, ICE, SNOW, OR SLUSH ON THE WING MAY ADVERSELY CHANGE LIFT AND DRAG. FAILURE TO REMOVE THESE CONTAMINANTS WILL DEGRADE AIRPLANE PERFORMANCE AND MAY PREVENT A SAFE TAKEOFF AND CLIMBOUT.**
- **MAKE SURE THAT THE ANTI-ICE FLUID (IF APPLIED) IS STILL PROTECTING THE AIRPLANE.**

TAKEOFF

NORMAL TAKEOFF

1. Ignition Switch – AUTO or CONT
2. Engine Inlet Anti-ice – ON (OAT 5ºC (41ºC) or less and wet or snow/slush on runway)

NOTE

Use continuous ignition and inlet anti-ice for takeoff on a wet or snow/slush covered runway to ensure immediate relight in the event that engine combustion is interrupted by ingested water, slush, or snow during the ground roll and to prevent ice formation on the inlet.

3. Speed Lever – MAX.

WARNING

IF TAKEOFF IS ATTEMPTED WITH THE SPEED LEVER IN LESS THAN THE MAXIMUM POSITION, ENGINE OSCILLATIONS ARE LIKELY TO OCCUR IF THE TEMPERATURE LIMITING RANGE IS REACHED.

4. Engine RPM – CHECK 96% to 97.5% RPM.
5. SRL INOP Annunciator – VERIFY not illuminated.

CAUTION

FOR AN SRL “OFF” or INOP TAKEOFF, THE TORQUE AND TEMPERATURE LIMITING SYSTEM WILL BE INOPERATIVE AS WELL. DO NOT EXCEED THE ENGINE TAKEOFF LIMITS IN SECTION 2.

NOTE

For an SRL “OFF” or INOP takeoff, the SRL INOP light will be illuminated and the takeoff EGT limit must be determined from table 2-2 for the specific outside air temperature (OAT).

6. Power – SET FOR TAKEOFF (Do not exceed 650ºC EGT (SRL) or 100% torque).
7. Engine RPM – CHECK 100% to 101% RPM.

CAUTION

IF THE RPM IS ALLOWED TO DECREASE BELOW 99% WITH THE TEMPERATURE LIMITING SYSTEM OPERATING, ENGINE POWER SURGES MAY OCCUR WHEN THE SRL COMPUTER TRANSITIONS BACK AND FORTH BETWEEN ITS SPEED/TEMPERATURE SCHEDULES.

8. Annunciators – CHECK.
9. Rotate – 70-75 KIAS.
10. Climb Speed – 85-95 KIAS.
11. Wing Flaps – RETRACT to 10º after 85 KIAS; RETRACT to 0º after 95 KIAS.

SHORT FIELD TAKEOFF

1. Ignition Switch – AUTO or CONT

NOTE

Use continuous ignition for takeoff on a wet or snow/slush covered runway to ensure immediate relight in the event that engine combustion is interrupted by ingested water, slush, or snow during the ground roll.

2. Speed Lever – MAX.

WARNING

IF TAKEOFF IS ATTEMPTED WITH THE SPEED LEVER IN LESS THAN THE MAXIMUM POSITION, ENGINE OSCILLATIONS ARE LIKELY TO OCCUR IF THE TEMPERATURE LIMITING RANGE IS REACHED.

3. Engine RPM – CHECK 96% to 97.5% RPM.
4. SRL INOP Annunciator – VERIFY not illuminated.

CAUTION

FOR AN SRL “OFF” or INOP TAKEOFF, THE TORQUE AND TEMPERATURE LIMITING SYSTEM WILL BE INOPERATIVE AS WELL. DO NOT EXCEED THE ENGINE TAKEOFF LIMITS IN SECTION 2.

NOTE

For an SRL “OFF” or INOP takeoff, the SRL INOP light will be illuminated and the max takeoff EGT must be determined from table 2-2 for the specific outside air temperature (OAT).

5. Wing Flaps -- 20º or 30º (20º normally).
6. Brakes – APPLY.
7. Power – SET FOR TAKEOFF (Do not exceed 650ºC EGT (SRL) or 100% torque).
8. Engine RPM – CHECK 100% to 101% RPM.

CAUTION

IF THE RPM IS ALLOWED TO DECREASE BELOW 99% WITH THE TEMPERATURE LIMITING SYSTEM OPERATING, ENGINE POWER SURGES MAY OCCUR WHEN THE SRL COMPUTER TRANSITIONS BACK AND FORTH BETWEEN ITS SPEED/TEMPERATURE SCHEDULES.

9. Annunciators – CHECK.
10. Brakes – RELEASE.
11. Rotate – 67 KIAS for Flaps 20º and 63 KIAS for Flaps 30º.

12. Climb Speed – 83 KIAS (Flaps 20) or 80 KIAS (Flaps 30) until all obstacles are cleared. Refer to Section 5 of this manual for speeds at reduced weights.
13. Wing Flaps – Wing Flaps – RETRACT to 10º after 85 KIAS; RETRACT to 0º after 95 KIAS.

TYPE II, TYPE III, OR TYPE IV ANTI-ICE FLUID TAKEOFF

1. Wing Flaps - 0º.
2. Power – SET FOR TAKEOFF (Do not exceed 650ºC EGT (SRL) or 100% torque).
3. Annunciators – CHECK.
4. Rotate – 83 KIAS.
5. Climb Speed – 104 KIAS.

ENROUTE CLIMB

CRUISE CLIMB

1. Fuel Boost Switch – NORM.
2. Ignition Switch – AUTO or CONT.
3. Ice Protection (if installed) – AS REQUIRED.
4. Engine Inlet Anti-ice Switch – AS REQUIRED.
5. Pitot/Static Heat – ON when OAT is 5ºC (41ºF) or less.
6. Airspeed – 110-120 KIAS.
7. Engine RPM – 96% -100% RPM.

NOTE

To achieve maximum flat-rated horsepower, use 100% RPM.

8. Power Lever – AS REQUIRED (Do not exceed 650ºC EGT (SRL) or 100% torque).

CAUTION

FOR AN SRL INOP CLIMB, THE TORQUE AND TEMPERATURE LIMITING SYSTEM WILL BE INOPERATIVE AS WELL. DO NOT EXCEED THE ENGINE LIMITS IN SECTION 2.

NOTE

For an SRL INOP climb, the SRL INOP light will be illuminated and the max climb EGT must be determined from table 2-2 for the specific outside air temperature (OAT).

MAXIMUM PERFORMANCE CLIMB

1. Fuel Boost Switch – NORM.
2. Ignition Switch – AUTO or CONT.
3. Ice Protection (if installed) – AS REQUIRED.
4. Engine Inlet Anti-ice Switch – AS REQUIRED.
5. Pitot/Static Heat – ON when OAT is 5ºC (41ºF) or less.
6. Airspeed – 105 KIAS from sea level to 104 KIAS at 10,000 feet to 103 KIAS at 24,000 feet.
7. Engine RPM – 100% RPM.
8. Power Lever – AT LIMIT (Do not exceed 650ºC EGT (SRL) or 100% torque).

CAUTION

FOR AN SRL INOP CLIMB, THE TORQUE AND TEMPERATURE LIMITING SYSTEM WILL BE INOPERATIVE AS WELL. DO NOT EXCEED THE ENGINE LIMITS IN SECTION 2.

WHEN PERFOMING A MAX RATE-OF-CLIMB AT HIGH ALTITUDE (ABOVE 18,000 FEET), IT MAY BE NECESSARY TO INCREASE AIRSPEED SLIGHTLY TO PREVENT

EXCEEDING THE 10 MINUTE CAUTION RANGE LIMIT ON THE ENGINE OIL TEMPERATURE.

NOTE

For an SRL INOP climb, the SRL INOP light will be illuminated and the max climb EGT must be determined from table 2-2 for the specific outside air temperature (OAT).

CRUISE

1. Ice Protection (if installed) – AS REQUIRED.
2. Engine Inlet Anti-ice Switch – AS REQUIRED.
3. Pitot/Static Heat – ON when OAT is 5ºC (41ºF) or less.
4. Ignition Switch – AUTO or CONT.
5. Engine RPM – 96% for normal cruise or 100% RPM for max cruise.

NOTE

During SRL operation, reduce EGT to 600ºC or less before reducing engine rpm to prevent SRL temperature shift exceeding 650ºC causing possible engine surging due to the temperature limiter. For SRL INOP operation, reduce max EGT by 75ºC or more before reducing the engine rpm to prevent exceeding max EGT limits.

6. Power Lever– AS REQUIRED (Do not exceed 650ºC EGT (SRL) or 100% torque).

CAUTION

FOR AN SRL INOP CRUISE, THE TORQUE AND TEMPERATURE LIMITING SYSTEM WILL BE INOPERATIVE AS WELL. DO NOT EXCEED THE ENGINE LIMITS IN SECTION 2.

NOTE

For an SRL INOP cruise, the SRL INOP light will be illuminated and the max cruise EGT must be determined from table 2-2 for the specific outside air temperature (OAT).

DESCENT

1. Ice Protection (if installed) – AS REQUIRED.
2. Engine Inlet Anti-ice Switch – AS REQUIRED.
3. Pitot/Static Heat – ON when OAT is 5ºC (41ºF) or less.
4. No Smoking/Seat Belt Sign Switches (if installed) – AS REQUIRED.
5. Altimeter – SET.
6. GPS/NAV Switch (if installed) – SET.
7. Power Lever – AS REQUIRED to give desired rate of descent. (Do not exceed 650ºC EGT (SRL) or 100% torque).

CAUTION

FOR AN SRL INOP DESCENT, THE TORQUE AND TEMPERATURE LIMITING SYSTEM WILL BE INOPERATIVE AS WELL. DO NOT EXCEED THE ENGINE TAKEOFF LIMITS IN SECTION 2.

NOTE

For an SRL INOP descent, the SRL INOP light will be illuminated and the max EGT must be determined from table 2-2 for the specific outside air temperature (OAT).

BEFORE LANDING

NOTE

Refer to Landing Distance table in Section 5 of the Cessna POH/AFM for anticipated ground roll and total distance requirements.

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

WARNING

FAILURE TO CORRECTLY USE SEAT BELTS AND SHOULDER HARNESSES COULD RESULT IN SERIOUS OR FATAL INJURY IN THE EVENT OF AN ACCIDENT.

2. Ice Protection (if installed) – AS REQUIRED.
3. Engine Inlet Anti-ice Switch – AS REQUIRED.
4. Fuel Tank Selectors – LEFT ON, RIGHT ON.
5. Ignition Switch – AUTO or CONT.
6. Fuel Boost Switch – ON.
7. Engine RPM – 100% RPM.
8. Radar (if installed) – STANDBY or OFF.
9. Autopilot (if installed) – OFF.
10. Wing Flaps – AS DESIRED (0º to 10º below 175 KIAS, 10º to 20º below 140 KIAS, 20º to 30º below 125 KIAS).

LANDING

NORMAL LANDING

1. Wing Flaps – FULL DOWN.
2. Airspeed – 75-85 KIAS.
3. Touchdown – MAIN WHEELS FIRST.
4. Power Lever – Ground Idle (1/2” aft of FLIGHT IDLE detent) after TOUCHDOWN.
5. Brakes – AS REQUIRED.

SHORT FIELD LANDING

1. Wing Flaps – FULL DOWN
2. Airspeed – 78 KIAS (Refer to Section 5 of Cessna POH/AFM for speeds at reduced weights).
3. Power Lever – REDUCE to IDLE after clearing obstacles.
4. Touchdown – MAIN WHEELS FIRST.
5. Power Lever – GROUND IDLE (1/2” aft of FLIGHT IDLE detent) or REVERSE after TOUCHDOWN.

CAUTION

ATTEMPTED REVERSE WITH THE SPEED LEVER AFT OF THE HIGH RPM POSITION MAY RESULT IN AN ENGINE OVER TEMPERATURE CONDITION.

FOR HC-B4TN-5NL/LT10890N AND HC-B4TN-5QL/LT10890NK INSTALLED PROPELLERS ONLY: DO NOT USE FULL REVERSE ABOVE 65 KIAS. ONCE BELOW 65 KIAS, SMOOTHLY APPLY REVERSE TO PREVENT ADVERSE PROPELLER VIBRATIONS FROM RAPID MOVEMENT.

NOTE

Further reduction of landing roll will result from use of reverse thrust.

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. Speed Lever – VERIFY max position
3. Wing Flaps – RETRACT to 20º.
4. Climb Speed – 75 KIAS MINIMUM until obstacles are cleared.
5. Wing Flaps – RETRACT after reaching safe altitude and airspeed.

AFTER LANDING

1. Wing Flaps – UP.
2. Speed Lever – MIN (full aft).

CAUTION

DO NOT RETARD SPEED LEVER WHILE THE POWER LEVER IS AFT OF GROUND IDLE. ATTEMPTED REVERSE WITH THE SPEED LEVER AFT OF THE HIGH RPM POSITION MAY RESULT IN AN ENGINE OVER TEMPERATURE CONDITION.

3. Ice Protection Equipment (if installed) – OFF.
4. Engine Inlet Anti-ice – OFF.
5. Ignition Switch – OFF.
6. Fuel Boost Switch – NORM.
7. Standby Power Switch (if installed) – OFF.
8. Strobe Lights – OFF.
9. Landing and Taxi Lights – AS REQUIRED.

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 (if installed) – OFF.
6. Inverter Switch (if installed) – OFF.
7. Power Lever – GROUND IDLE (1/2” aft of FLIGHT IDLE DETENT).
8. Three Minute Engine Cool-Down – PERFORM

NOTE

Allow the engine to cool below 20% torque for at least three minutes. This may include descent, approach, landing, and taxi time if power does not exceed 20% torque. This is to prevent turbine wheel rub during shutdown.

9. Fuel Valve Switch - OFF.
10. Power Lever – REVERSE (at approx. 50% to place propeller on the start locks).
11. Oxygen Supply Control Lever (if installed) – OFF.
12. Lighting Switches – OFF.
13. Battery Switch – OFF.
14. Start/Gen Switch – OFF.
15. Controls – LOCK.
16. Fuel Tank Selectors – LEFT OFF or RIGHT OFF (turn high wing tank off if parked on a sloping surface to prevent cross feeding).

17. Tie-Downs and Chocks – AS REQUIRED.
18. External Covers – INSTALL.
19. Fuel Filter – CHECK FUEL FILTER BYPASS FLAG for proper location (flush).

NOTE

Possible delays of subsequent flights, or even missed flights, are often eliminated by routinely conducting a brief post-flight 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

BEFORE START PROPELLER UNFEATHERING

1. Battery Switch – ON.
2. Power Lever – REVERSE.
3. Unfeather Pump Switch – Lift Guard and turn ON.
4. Unfeather Pump Switch – OFF and close guard when blades reach the reverse stop.
5. Power Lever – FLIGHT IDLE.
6. Battery Switch – OFF.

OVERSPEED GOVERNOR CHECK

This check should be made:

- At intervals not to exceed 300 flight hours.
- Prior to any flight during which intentional air starts are planned.
- When there is any indication of overspeed governor malfunction.
- After any engine control system maintenance or adjustment.

After engine start, but before taking the propeller off the start locks.

1. Parking Brake – SET (pull control out and depress brake pedals).
2. Speed Lever – MAX (full forward).
3. Power Lever – ADVANCE until further motion causes no increase in fuel flow or rpm (rpm should be 104.0% to 105.0%).

CAUTION

DO NOT ALLOW RPM TO EXCEED 106%.

FAILURE OF THE START LOCKS DURING AN OVERSPEED GOVERNOR CHECK CAN RESULT IN A SUDDEN FORWARD “JUMP” OF THE AIRCRAFT. BEFORE PERFORMING OVERSPEED GOVERNOR CHECKS, THE PILOT SHOULD VERIFY THAT THE AREAS BEHIND AND AHEAD OF THE AIRCRAFT ARE CLEAR.

4. Power Lever – GROUND IDLE.

SINGLE RED LINE COMPUTER/TEMP LIMITER CHECKS

The single red line computer is checked during each application of high rpm and power. During takeoff checks observe the following:

1. As engine rpm passes 80%, check that the EGT "jumps" indicating that it is now calculating SRL EGT versus non-SRL EGT.
2. Check that the SRL INOP annunciator is not illuminated.

NOTE

If the SRL INOP light is illuminated or the SRL system is turned OFF, the pilot must determine the maximum allowable EGT under all operating conditions from table 2-2 for the specific outside air temperature (OAT).

SRL/Temp Limiter checks are required for the following:

- At intervals not to exceed 50 flight hours.
- Prior to any flight when a manual engine start has been necessary.
- When there is any indication of SRL/Temp Limiter malfunction.
- After any fuel control or SRL computer maintenance or adjustment.

WARNING

DO NOT TEST TEMP LIMITER IN FLIGHT. AT HIGH ALTITUDES A FLAMEOUT MAY RESULT.

1. Propeller- Off the Propeller Locks
2. Speed Lever – MAX (full forward).
3. Power Lever – ADVANCE to 30% torque (or roughly 300 lbs/hr).
4. Limiter Test Switch – TEMP (note a decrease in EGT, RPM, and Fuel Flow ≈ 70 lbs/hr).
5. Limiter Test Switch – OFF (note EGT, RPM, and Fuel Flow normal).
6. Limiter Test Switch – TORQ (note a slight decrease in EGT, RPM, and Fuel Flow ≈ 70 lbs/hr).
7. Limiter Test Switch – OFF (note EGT, RPM, and Fuel Flow normal).
8. Power Lever – GROUND IDLE (1/2" aft of FLIGHT IDLE stop).
9. Speed Lever – MIN (full aft).

NEGATIVE TORQUE SENSING (NTS) SYSTEM CHECK

1. First Flight of the Day – Check the propeller governor reset function by setting the speed lever low and advancing power lever slowly with the propeller off the start locks until the BETA light goes out. Note maximum stabilized RPM does not exceed 97%. RPM in excess of 97% indicates either improper propeller governor low setting or an NTS system malfunction.
2. Verify that maintenance personnel have performed a NTS System Trip Check per the Honeywell Engine Maintenance Manual at intervals per Honeywell Service Bulletin TPE331-72-0476.

ENGINE INLET ANTI-ICE SYSTEM CHECK

1. Speed Lever – MIN (full aft).
2. Power Lever – GROUND IDLE (1/2" aft of FLIGHT IDLE stop).
3. Engine Inlet Anti-ice Switch – ON. The ENG INLET ANTI-ICE annunciator should illuminate; the ENG INLET A-ICE FAIL annunciator should not illuminate; and an EGT rise should occur.

CAUTION

DO NOT LEAVE THE ENGINE INLET ANTI-ICE ON WITH OUTSIDE AIR TEMPERATURES OF 10ºC OR ABOVE, BECAUSE IT CAN DAMAGE THE INLET AND THE ENGINE.

4. Engine Inlet Anti-ice Switch – OFF. The ENG INLET ANTI-ICE annunciator should extinguish; and an EGT drop should occur.

STANDBY POWER CHECK (If Standby Electrical System is Installed)

Standby Power – CHECK (first flight of the day and before all fights into known icing conditions)

PRE Supervan Systems SB 208-7:

1. Standby Power Switch – ON
2. Generator – LOAD to approximately 30 amps (use taxi lights, if required), but not more than 60 amps.
3. Volt/Ammeter – SELECT ALT position and verify alternator output is approximately 10-20% of the generator load.
4. Start/Gen Switch – OFF.
5. GENERATOR OFF Annunciator- VERIFY ON
6. Volt/Ammeter – CHECK alternator picked up generator load and alternator voltage is approximately 28 volts.
7. STBY ELECT PWR INOP Annunciator – VERIFY OFF.
8. Start/Gen Switch – GEN.
9. GENERATOR OFF Annunciator – VERIFY extinguished.
10. Volt/Ammeter Selector Switch – RETURN to BATT position.

POST Supervan Systems SB 208-7:

1. Standby Power Switch – ON
2. Generator – LOAD to approximately 30 amps (use taxi lights, if required), but not more than 60 amps.
3. Volt/Ammeter – SELECT ALT position and verify alternator output is near zero.
4. Start/Gen Switch – OFF.
5. GENERATOR OFF Annunciator- VERIFY ON
6. Volt/Ammeter – CHECK for alternator output and voltage is approximately one volt less than with the 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.

7. STBY ELECT PWR ON Annunciator – CHECK ON.
8. Start/Gen Switch – GEN.
9. STBY ELECT PWR ON Annunciator – CHECK OFF
10. GENERATOR OFF Annunciator – VERIFY extinguished.
11. Volt/Ammeter Selector Switch – RETURN to BATT position.
12. Standby Power Switch - OFF (STBY ELEC PWR INOP Annunciator – ON)
13. Standby Power Switch - ON (STBY ELEC PWR INOP Annunciator – OFF)

KNOWN ICING CHECK (If Known Icing Equipment Package is installed)

PREFLIGHT INSPECTION

1. Wings – Visual and tactile inspection to make sure clear of ice and frost
2. Horizontal Stabilizer – Visual or tactile inspection to make sure clear of ice and frost.
3. Vertical Stabilizer – Visual inspection to make sure clear of ice and frost.
4. Battery Switch – ON
5. Wing Ice Detector Light Switch – ON and CHECK for illumination.
6. DAY/NIGHT Switch to NIGHT – Windshield Ice Detector Light (if installed) CHECK for illumination.
7. PITOT/STATIC and Stall Heat Switches – ON (for 30 seconds maximum, ensure pitot covers are removed).

8. LOW AIRSPEED ADVISORY SYSTEM (if installed) – CHECK for illumination when pitot heat is ON.
9. PITOT/STATIC and Stall Heat Switches – OFF.
10. Battery Switch – OFF.
11. Stall Warning Transducer – PERCEPTIBLY WARM.
12. Pitot/Static Tubes – CLEAR and VERY WARM.
13. Wing, Wing Strut, Main Landing Gear Leg (if installed), Cargo Pod Nosecap (if installed), and Stabilizer De-ice Boots – CHECK for tears, abrasions and cleanliness.
14. Propeller Anti-Ice Boots – CHECK condition of boots and heating elements.
15. Control Surface Static Dischargers – CHECK condition.

BEFORE TAKEOFF

CAUTION

TO PREVENT BLISTERING THE CARGO POD DE-ICE BOOT (IF INSTALLED), GROUND OPERATION IN A RIGHT HAND CROSSWIND OR OPERATING THE PROPELLER IN BETA SHOULD BE KEPT TO A MINIMUM.

1. Windshield Anti-ice Panels-
   A. Windshield Small Anti-ice Panel:
      1) Windshield Anti-ice Switch – AUTO and MANUAL. Observe increase in generator output and illumination of WINDSHIELD ANTI-ICE annunciator in both switch positions.
   B. Windshield Large Anti-ice Panel:
      1) PRIMARY Windshield Anti-ice Switch – AUTO
      2) SECONDARY Windshield Anti-ice Switch – AUTO and MANUAL
      3) PRIMARY Windshield Anti-ice Switch – MANUAL.

NOTE

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 24 to 28 amps for 34 seconds with a jump on the ammeter and 24 to 28 amps for another 34 seconds, and so on. Total cycle is 68 seconds (34 on inner elements and 34 on outer elements).
4. Prop Anti-ice Switch – MANUAL.
5. Prop Anti-ice Element Select Switch – OUTER.
6. Prop Anti-ice Ammeter – CHECK in green arc range.
7. Prop Anti-ice Element Select Switch – INNER.
8. Prop Anti-ice Ammeter – CHECK in green arc range.
9. 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.
10. DE-ICE PRESSURE Annunciator - CHECK ON within three seconds and OFF after 18 seconds with approximate two-second OFF periods after 6 and 12 seconds.
11. Boots – CHECK VISUALLY FOR COMPLETE DEFLATION to the vacuum hold-down condition.
12. Boot Press Switch – MANUAL and hold. Visually check inflation of all visible boots and illumination of DE-ICE PRESSURE annunciator within 6 seconds.
13. Engine Inlet Anti-ice Switch – ON. The ENG INLET ANTI-ICE annunciator should illuminate; and an EGT rise should occur.

CAUTION

DO NOT LEAVE THE ENGINE INLET ANTI-ICE ON WITH OUTSIDE AIR TEMPERATURES OF 10ºC OR ABOVE, BECAUSE IT CAN DAMAGE THE INLET AND THE ENGINE.

14. Engine Inlet Anti-ice Switch – OFF. The ENG INLET ANTI-ICE annunciator should extinguish; and an EGT drop should occur.
15. Standby Power – CHECK.
16. Pitot/Static Heat – ON when OAT is below 5ºC (40ºF).
17. Stall Heat, Windshield Anti-ice, Propeller Anti-ice, and Engine Inlet Anti-ice Switches – 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.

AUTOPILOT CHECK (ALL OEM MODELS)

No changes from the OEM procedures found in the Cessna POH/AFM.

AMPLIFIED PROCEDURES

PREFLIGHT INSPECTION

No changes from the OEM procedures found in the Cessna POH/AFM.

BEFORE STARTING ENGINE

WARNING

- **IT IS THE RESPONSIBILITY OF THE PILOT IN COMMAND TO MAKE SURE THAT THE AIRPLANE IS LOADED CORRECTLY 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 (if installed), 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 (if installed), 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 start mode switch selects the type electrical power the starter will use for the engine start. In the PARA mode the starter utilizes the batteries in a pure parallel mode (24 VDC) throughout the start. In the PARA-SERIES mode the starter is powered by the two batteries in parallel mode (24 VDC) up to 10% rpm and then, via relays, the starter is powered by the two batteries in series mode (48 VDC) up to 60% rpm. In the MOTOR mode, engine can be cranked without any ignition.

The ignition switch is left in the OFF position for ground engine starting with the starter motor (non-wind milling start). In this position, the igniters are energized when the starter switch is placed in the START position and the engine has reached 10% with the SRL auto-start, or when the fuel is turned ON during a manual start. Ignition is automatically terminated when the engine reaches 60% rpm during an auto-start or when the starter switch is turned OFF during a manual start.

Before starting the engine, the power lever is placed at the flight IDLE position (against the BETA gate), the speed lever is moved to the MIN position (full aft), and the fuel shutoff/feather lever is stowed in the NORM position.

CAUTION

ATTEMPTING AN ENGINE START WITH THE POWER LEVER IN THE REVERSE POSITION WILL LEAD TO A HUNG START AND A POSSIBLE OVER-TEMPERATURE SITUATION.

STARTING ENGINE

The Starting Engine checklist procedures should be followed closely to assure a satisfactory engine start. With Single Red Line Computer (Auto-Start) ON, select the start mode to either PARA-SERIES (normal) or PARA. Move the fuel boost switch to the ON position and the fuel valve switch to the RUN position. Next, move the start/gen switch to the START position; verify that the STARTER ENERGIZED annunciator illuminates. Next, check for a positive indication of engine oil pressure. At 10%, the SRL system should automatically turn on the fuel and ignition (it is done manually when the SRL is OFF by moving the fuel valve to the ON/ENRICH position) and the IGNITION annunciator should illuminate. Verify a fuel flow in the general range of 90 to 140 pph. After the engine "lights" and during acceleration to idle (68% RPM), monitor EGT and RPM. Maximum EGT during engine start is 770ºC, limited to 1 second. Typically, the EGT during start is well below this maximum value because the auto-start system attempts to maintain 690ºC during the acceleration. At 60%, the SRL computer automatically shuts off the starter and the ignition; the start switch should be moved to the OFF position (during a manual start, this occurs when the start switch is moved to the OFF position); and the power lever should be moved to the GROUND IDLE position. After the engine has stabilized at idle, verify the STARTER ENERGIZED and IGNITION annunciators are not illuminated. If these annunciators remain ON, it indicates that the starter has not been automatically disengaged during the engine starting sequence due to a failed SRL computer or relay and the engine should be shut down for maintenance.

CAUTION

IF NO EGT RISE IS OBSERVED WITHIN 10 SECONDS AFTER THE FUEL AND IGNITION IS INTRODUCED, OR THE EGT RAPIDLY APPROACHES 770ºC, MOVE THE FUEL VALVE SWITCH TO THE OFF POSITION AND MOVE THE FUEL SHUTOFF/FEATHER HANDLE TO THE SHUTOFF/FEATHER POSITION. PERFORM THE ENGINE CLEARING PROCEDURE IN THIS SECTION.

After the engine reaches idle (68% MIN), return the fuel boost switch to the NORM position. Move the start/gen switch to the GEN position and verify the VOLTAGE LOW and GENERATOR OFF annunciators are not illuminated.

CAUTION

UNDER HOT OAT AND/OR HIGH GROUND ELEVATION CONDITIONS, IT MAY BE NECESSARY TO MOVE THE POWER LEVER FORWARD OF GROUND IDLE SLIGHTLY TO PROVIDE ADDITIONAL COOLING AIRFLOW THRU THE OIL COOLER FOR EXTENDED IDLE PERIODS.

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 alone, with both airplane battery power and APU, or purely with an auxiliary power unit (APU). However, it is recommended that an APU be used when the ambient air temperature is less that 32ºF (0ºC).

STARTING ENGINE (continued)

CAUTION

- IN THE EVENT THE AUXILIARY POWER UNIT DROPS OFF THE LINE DURING A PURE APU ENGINE START, A LOSS OF ELECTRICAL POWER TO THE STARTER AND AIRCRAFT WILL RESULT WHICH COULD CAUSE A HOT START. SHOULD A LOSS OF AUXILIARY POWER OCCUR, IMMEDIATELY MOVE THE FUEL SHUTOFF/FEATHER HANDLE TO THE SHUTOFF/FEATHER POSITION AND TURN THE BATTERY SWITCH ON, WHICH WILL RESTORE POWER TO THE STARTER FOR MOTORING. MOVE THE START MODE SWITCH TO THE MOTOR POSITION AND MONITOR EGT, AND ENSURE THAT ENGINE IS SHUTTING DOWN.

- WHEN AN AUXILIARY POWER UNIT IS USED, ENSURE THE UNIT IS NEGATIVELY GROUNDED AND REGULATED TO 28 VOLTS DC. DUE TO THE POSSIBILITY OF EXCESSIVELY HIGH CURRENT SURGE DURING ENGINE START, IT IS RECOMMENDED THAT THE MAXIMUM STARTING CURRENT FROM AN EXTERNAL POWER SOURCE BE LIMITED TO 1700 AMPERES.

- IT IS RECOMMENDED THAT THE START MODE SWITCH BE IN THE PARALLEL POSITION FOR ALL STARTS USING EXTERNAL POWER DUE TO THE HIGH CURRENT. DAMAGE TO THE AIRCRAFT BATTERIES CAN OCCUR USING THE PARALLEL-SERIES MODE WITH EXTERNAL POWER.

Before starting engine with the airplane battery, check the voltmeter for a minimum of 24 volts. With turbine engines, the operator must monitor EGT during each engine start to guard against a “hot” start. The operator must be ready to immediately stop the start if EGT exceeds 770ºC 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. THEREFORE, IF ENGINE ACCELERATION IN THE INITIAL PART OF THE START IS LESS THAN NORMALLY OBSERVED, RETURN THE FUEL VALVE SWITCH TO THE OFF POSITION AND DISCONTINUE THE START. RECHARGE THE BATTERY OR USE AN AUXILIARY POWER UNIT BEFORE ATTEMPTING ANOTHER START.

- DO NOT ALLOW THE ENGINE TO DWELL IN THE 18% TO 28% RPM RANGE AS IT CAN DAMAGE THE ENGINE. TRANSITIONS THRU THIS RPM ARE ALLOWED FOR STARTING, BUT THE ENGINE MUST BE ACCELERATING.

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 (no fuel or ignition), 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 purge fuel, vapor, or fire from the combustion section, gas generator turbine, power turbine, and exhaust system.

1. Fuel Valve Switch – OFF.
2. Ignition Switch – OFF.
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. Start Mode Switch – MOTOR.
7. Start/Gen Switch – START.

CAUTION

DO NOT EXCEED THE STARTING CYCLE LIMITATIONS; REFER TO SECTION 2.

DO NOT ALLOW THE ENGINE TO DWELL IN THE 18% TO 28% RPM RANGE AS IT CAN DAMAGE THE ENGINE. TRANSITIONS THRU THIS RPM ARE ALLOWED FOR STARTING, BUT THE ENGINE MUST BE ACCELERATING.

SHOULD A FIRE PERSIST, AS INDICATED BY SUSTAINED EGT, CLOSE THE FIREWALL FUEL SHUTOFF VALVE AND CONTINUE MOTORING THE ENGINE.

8. Starter Switch – OFF.
9. Fuel Boost Switch – OFF.
10. Fuel Shutoff – CLOSED (pull out).
11. 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 AUTO position (forward). With the switch in this position, ignition is on only when the negative torque sensing system senses a negative torque (the propeller is driving the engine instead of the engine driving the propeller).

NOTE

The use of ignition for extended periods of time will reduce ignition system component life. However, the ignition system can be operated continuously without limitation.

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

1. Emergency engine starts (refer to Section 3, Air starts).
2. Operation on water or slush covered runways.
3. Flight in heavy precipitation or heavy turbulence.
4. During inadvertent icing encounters until the engine inlet anti-ice has been ON 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 INLET ANTI-ICE PROCEDURES

A heated engine inlet has been provided to prevent the build-up of ice on the inlet lip. The inlet is heated by P_3 compressor discharge air when the engine inlet anti-ice switch is moved to the ON position. The ENG INLET ANTI-ICE annunciator, when illuminated, indicates that the anti-ice valve is OPEN. The engine inlet anti-ice switch should be moved to the ON position during ground or flight operation in visible moisture (clouds, rain, snow or ice crystals) with an OAT of 5ºC (41ºF) or less. Use of engine inlet anti-ice causes an approximate 2% reduction in torque for the same power setting when it is off.

TAXIING

Power lever BETA range may be used during taxi to improve brake life. With the power lever moved to GROUND IDLE position in the BETA range, the propeller is near zero thrust in a static, 68% idle condition (minimum fuel flow position with the speed lever at the MIN (full aft) position). Besides acting as a zero thrust reference during taxi, this power lever position 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.

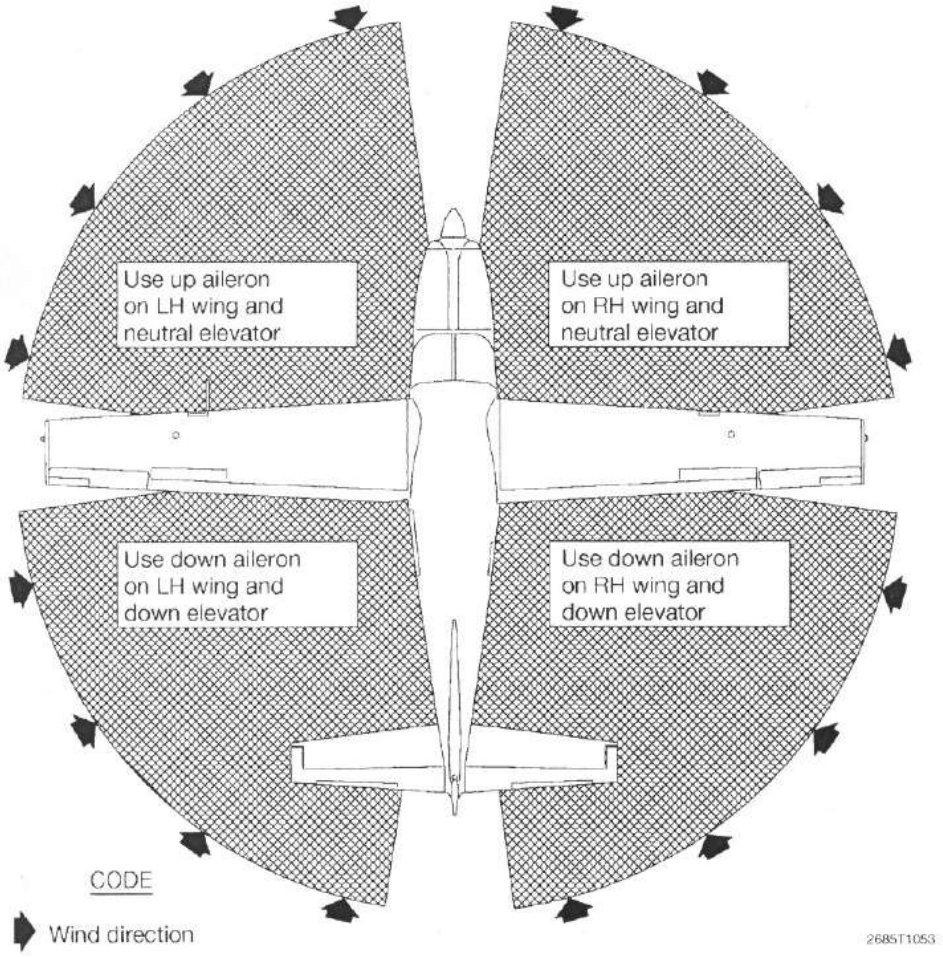
- DO NOT MOVE THE POWER LEVER RAPIDLY TOWARD REVERSE WITH THE SPEED LEVER LESS THAN MAX. AN ENGINE BOG AND OVERTEMPERATURE CAN OCCUR.

- 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.

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 4-3 for additional taxiing instruction.



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 4-3, Taxiing Diagram

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 engine inlet anti-ice, set the speed lever low and power lever at ground idle. Turn the engine inlet anti-ice switch to the ON position. Observe a slight EGT rise and the ENGINE INLET ANTI-ICE annunciator should illuminate. Turn the engine inlet anti-ice switch to the OFF position and observe a slight EGT decrease and the ENG INLET ANTI-ICE annunciator should not be illuminated.

CAUTION

DO NOT LEAVE THE ENGINE INLET ANTI-ICE ON WITH OUTSIDE AIR TEMPERATURES OF 10ºC OR ABOVE, BECAUSE IT CAN DAMAGE THE INLET AND THE ENGINE.

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 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 climb out.

Refer to Systems Checks (refer to page 4-22) for procedures to use when checking the Overspeed Governor, NTS system, SRL system, Autopilot, Standby Power, and Known Icing Systems.

Prior to takeoff, the speed lever is moved forward to the MAX position (engine rpm approximately 97% RPM).

WARNING

IF TAKEOFF IS ATTEMPTED WITH THE SPEED LEVER IN LESS THAN THE MAXIMUM POSITION, ENGINE OSCILLATIONS ARE LIKELY TO OCCUR IF THE TEMPERATURE LIMITING RANGE IS REACHED.

TAKEOFF

POWER SETTING

Takeoff power should be applied until the 100% torque limit or the maximum 650ºC EGT limit is obtained with the SRL system ON or the max EGT from table 2-2 for non-SRL operations.

CAUTION

THE TORQUE AND TEMPERATURE LIMITER IS NOT OPERATIONAL WHEN TURNED OFF OR WHEN THE SRL SYSTEM IS INOP OR TURNED OFF.

Takeoff roll is initiated by gradually advancing the power lever until the BETA light goes out and the propeller RPM nears 100%. Smoothly release the brakes and continue advancing the power lever until the 100% takeoff torque or 650ºC EGT (SRL ON) temperature limit is reached, whichever comes first. If the SRL/TTL system is operational the fuel bypass limiter will automatically limit the fuel to the engine once the torque or temperature limit has been reached. If the TTL system is turned off, or the SRL system is INOP, the pilot must prevent the torque or temperature limits from being exceeded manually.

CAUTION

TO PRECLUDE A REDUCTION IN DIRECTIONAL STABILITY, IT IS RECOMMENDED TO MAINTAIN BALL-CENTERED FLIGHT WITH POWER ON BELOW 100KTS.

NOTE

As speed increases during takeoff, an increase in torque at a fixed power lever position is normal and need not be reduced, provided torque limit (100%) is not exceeded.

WING FLAP SETTINGS

A flap setting of 20º is recommended for all takeoffs unless a strong crosswind exists, at which time 10º flaps may be preferred. Use of 20º 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.

For short field takeoffs, or takeoffs from soft or rough fields, use of 20º or 30º flaps is recommended since it will allow the safe use of slower speeds, resulting in a shorter ground roll and total distance over the obstacle.

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 20º flaps. Takeoff performance data is shown in Section 5 of this manual is based on this speed and configuration. 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.

NOTE

The 83 KIAS obstacle clearance speed is a recommended safe speed under all conditions, including turbulence and complete engine failure. The actual V_X speed with flaps 20º is 71 KIAS at maximum takeoff weight as noted in the Flaps 20º Climb Gradient chart in Section 5 of this manual.

Minimum ground roll takeoffs are accomplished using 20º or 30º 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, TYPE III, OR TYPE IV ANTI-ICE FLUID TAKEOFF

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

CROSSWIND TAKEOFF

Takeoffs into strong crosswinds normally are performed with 10º or 20º 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 10º flaps will improve directional control

power but will also increase the takeoff distance. If 10º flaps are used, add 7 knots to the liftoff and 50-foot obstacle speeds published in this handbook for 20º flaps.

ENROUTE CLIMB

Normally, maximum climb power is maintained during the climb to cruise altitude. Adjust the power lever as required to prevent exceeding 100% torque, or the maximum EGT of 650ºC, whichever occurs first, although the SRL/TTL system should prevent this when operational. If the SRL/TTL is INOP, the pilot must prevent exceeding the torque and EGT limits manually. The maximum operating EGT must be determined for the given outside air temperature (OAT) for each altitude (see table2-2).

NOTE

It is recommended that the SRL and TTL systems be utilized during all phases of flight to prevent exceeding the maximum torque or EGT limits of the engine.

At lower altitudes and cool outside air temperatures (below approximately 7,500 feet), the engine will reach the torque limit before reaching the EGT limit. As the climb progresses and the torque is maintained by power lever advancement, the EGT will increase until an altitude is reached where EGT will dictate power lever positioning. When operating near the EGT limit, advance power lever slowly to allow the current EGT to be indicated. The rate of power (and temperature) increase of the engine is greater than the response rate of the EGT 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. Once at any limit, the SRL/TTL should prevent any further power increases by opening the fuel bypass valve.

CAUTION

DO NOT CONTINUE TO PUSH THE POWER LEVER FORWARD ONCE THE TORQUE OR TEMPERATURE LIMIT HAS BEEN REACHED (SRL/TTL ON), BECAUSE THE LIMITER (FUEL BYPASS VALVE) CAN BECOME SATURATED AND AN OVER-TEMPERATURE OR OVER-TORQUE CAN OCCUR.

For maximum performance climb, the best rate-of-climb speed should be used with 100% RPM and maximum climb power. This speed is 105 KIAS at sea level to 104 KIAS at 10,000 feet to 103 KIAS at 24,000 feet.

For improved visibility over the nose, a cruise climb speed of 115-125 KIAS may be desirable at altitudes up to approximately 12,000 feet. Also, for improved comfort, propeller RPM may be reduced to 96%, if desired, although the EGT should be reduced below 600ºC prior to the rpm reduction for the SRL temperature shift (re-calculation of 650ºC limit) to prevent overshoot of EGT and temp limiter actuation. Once at 96%, adjust the power lever to prevent exceeding maximum torque, or maximum climb EGT of 650ºC, whichever occurs first. If SRL computer is OFF, refer to the EGT limitations in Section 2.

NOTE

To achieve maximum flat-rated horsepower, use 100% RPM.

If an obstruction dictates the use of a steep climb angle, climb with flaps retracted and maximum continuous power at 86 KIAS.

CAUTION

TO PRECLUDE A REDUCTION IN DIRECTIONAL STABILITY, IT IS RECOMMENDED TO MAINTAIN BALL-CENTERED FLIGHT WITH POWER ON BELOW 100KTS.

CRUISE

Normal cruising is performed using 95% - 96% RPM and any desired torque or temperature setting up to the maximum cruise power (observe EGT and torque limits). EGT should be reduced below 600ºC prior to the rpm reduction for the SRL temperature shift (re-calculation of 650ºC limit) to prevent overshoot of EGT and temp limiter actuation. Once at 96%, adjust the power lever to prevent exceeding maximum torque, or maximum climb EGT of 650ºC, whichever occurs first. If SRL computer is OFF, refer to the EGT limitations in Section 2.

Charts are provided in Section 5 of the Cessna POH/AFM 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 5ºC (41ºF) or less. If icing conditions are encountered, ensure that the additional anti-icing systems (stall vane and engine inlet anti-ice) are ON before encountering visible moisture with OAT 5ºC (41ºF) or less. Windshield and propeller anti-ice systems should also be turned ON.

These systems are designed to prevent ice formation, rather than removing 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 imbalance should be monitored to assure it does not exceed 200 pounds. Normally, both fuel tank selectors are left ON and fuel feeds approximately equally from each tank. If fuel imbalance 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 TO CONTINUOUS 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.

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 of the Cessna POH/AFM.

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 at 100% engine rpm 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.

CAUTION

TO PRECLUDE A REDUCTION IN DIRECTIONAL STABILITY, IT IS RECOMMENDED TO MAINTAIN BALL-CENTERED FLIGHT WITH POWER ON BELOW 100KTS.

CAUTION

DO NOT LAND WITH THE SPEED LEVER LESS THAN MAX (FULL FORWARD), BECAUSE, IN A BALKED LANDING GO-AROUND, THE ENGINE WOULD NOT PRODUCE SUFFICIENT PERFORMANCE WITHOUT AN OVERTEMPERATURE.

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 GROUND IDLE (1/2” behind flight idled stop in the BETA range), and brakes applied as required. When clear of the runway, reposition the speed lever to the MIN (full aft) position. 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.

CAUTION

USE OF REVERSE ON LANDING WITH THE SPEED LEVER LESS THAN MAX (FULL FORWARD) CAN RESULT IN BOGGING OF THE ENGINE AND AN OVERTEMPERATURE.

NOTE

The use of BETA range after touchdown is recommended to reduce brake wear. Generally, the power lever can be moved to GROUND IDLE 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 speed 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 to GROUND IDLE (1/2" aft of the flight idle stop 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, retract the flaps, and apply maximum possible brake pressure without sliding the tires.

The landing performance in Section 5 of the Cessna POH/AFM 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 engine and a reverse thrust propeller blade angle).

CAUTION

TO PRECLUDE A REDUCTION IN DIRECTIONAL STABILITY, IT IS RECOMMENDED TO MAINTAIN BALL-CENTERED FLIGHT WITH POWER ON BELOW 100KTS.

USE OF REVERSE ON LANDING WITH THE SPEED LEVER LESS THAN MAX (FULL FORWARD) CAN RESULT IN BOGGING OF THE ENGINE AND AN OVERTEMPERATURE.

TO MINIMIZE PROPELLER BLADE EROSION OR POSSIBLE PROPELLER 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.

FOR HC-B4TN-5NL/LT10890N AND HC-B4TN-5QL/LT10890NK INSTALLED PROPELLERS ONLY: DO NOT USE MAX REVERSE ABOVE 65 KNOTS DUE TO POSSIBLE PROPELLER DAMAGE.

CROSSWIND LANDING

For crosswind approaches, either the wing-low, crab or combination method may be used. A flap setting between 10º and 30º 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 20º 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. Do not install the covers until the engine has cooled down (EGT indicator showing "off scale" temperature).

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 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 cold weather effects on system lubrication. Even small accumulations of frost, ice, snow, or slush 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 accumulation 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 32ºF (0ºC). Assure that oil temperature is in the green arc (55ºC to 110ºC) 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.

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, thus increasing 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.

NOTE

The above recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instruction, 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 corrected noise level of this airplane is **76.01 dB** determined by flight tests when operated at Maximum Continuous Power (100% Torque and 100% RPM) at weights up to 9062 lbs. No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable for operation at, into, or out of any airport.

The above statement notwithstanding, the noise level stated above has been verified by and approved by the Federal Aviation Administration in noise level test flights conducted in accordance with 14 CFR Part 36, Appendix G, Amendment 24, Noise Standards: Airplane Type and Airworthiness Certification, and ICAO Annex 16, Chapter 10. The airplane noise is in compliance with all FAR Part 36 noise standards applicable to this type.

SECTION 5
PERFORMANCE

TABLE OF CONTENTS **Page**

INTRODUCTION

Performance data charts on the following pages are presented so that you may know what to expect from the airplane under the 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. For performance information not contained in this section, refer to the Cessna POH/AFM. The cruise, and landing performance of the modified aircraft "meets or exceeds" the published performance of the unmodified aircraft unless otherwise stated.

NOTE

Takeoff performance and climb performance data is based upon flight testing conducted by Supervan Systems, Ltd. using a Cessna 208B aircraft with a cargo pod installed. This data may also be used for an aircraft without a cargo pod installed for which it will be conservative.

WARNING

TO MAKE SURE THAT PERFORMANCE IN THE 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.

Notes have been provided on various graphs and tables to approximate performance with the engine inlet ANTI-ICE 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 engine inlet anti-ice will be less, depending upon how much power can be recovered after the inlet heat has been turned on.

In some cases, performance charts in this section include data for temperatures which are outside of the operating limits. This data has been included to aid in interpolation. The sample performance problems listed in Section 5 of the Cessna POH/AFM are applicable to this performance section and can be used as reference.

CAUTION

UNDER SOME HIGH POWER CRUISE CONDITIONS EXCEEDING THAT PUBLISHED IN THE CESSNA POH, IT IS POSSIBLE TO HAVE A MAXIMUM RANGE THAT IS LESS THAN DEPICTED IN THE CESSNA POH. PILOTS SHOULD BE VIGILANT AND MONITOR FUEL CONSUMPTION THROUGHOUT THE FLIGHT TO ENSURE ADEQUATE FUEL FOR THE FLIGHT.

MINIMUM ENGINE TORQUE FOR TAKEOFF AND CLIMB (Minimum Engine)

CONDITIONS:
100% RPM
650ºC SRLT (Indicated EGT)
0-60 KIAS

NOTE

1. Torque increases approximately 2-3% from 0 to 60 KIAS.
2. Torque on this chart shall be achieved without exceeding 650ºC EGT (SRL ON) or the maximum EGT determined from Table 2-2 for operation with the SRL OFF and without exceeding 101% engine rpm.
3. With the engine inlet anti-ice ON, where altitude and temperature do not permit 100% torque for takeoff, decrease torque by 2%.
4. With the cabin heater ON, where altitude and temperature do not permit 100% torque for takeoff, decrease torque setting by 3%.

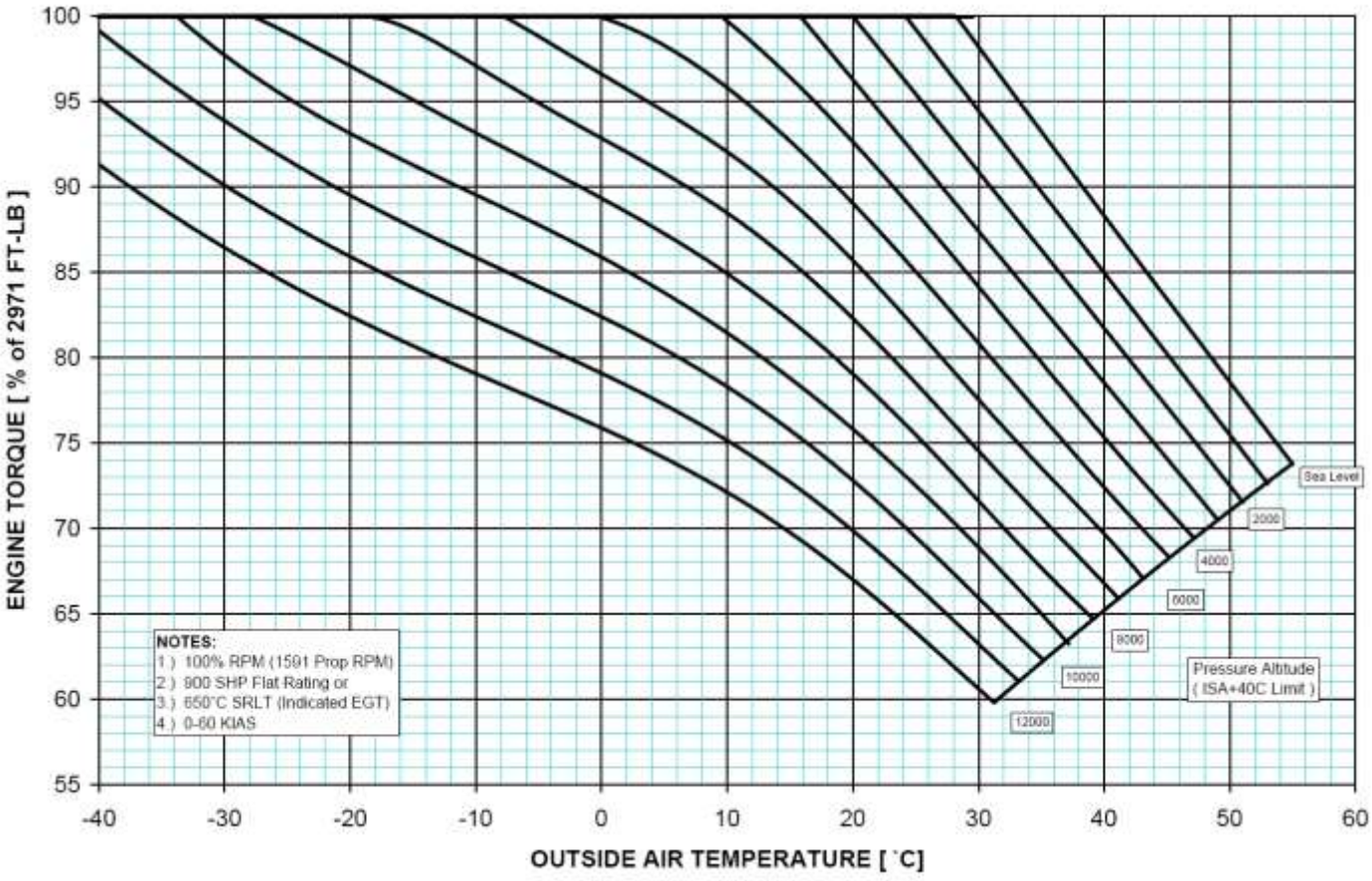


Figure 5-1, MINIMUM Engine Torque for Takeoff

Maximum EGT vs. OAT with the SRL Controller INOP

Honeywell TPE331-12JR Manual Mode
(SRL "OFF" or INOP) EGT Table

The following table should be referenced for the maximum takeoff and continuous compensated EGT for all operations when the engine is operated with the single redline (SRL) controller turned OFF or the SRL system is inoperative. Anytime the SRL INOP light is illuminated, table 5-1 should be referenced to determine the EGT limit corresponding to the indicated outside air temperature (OAT).

NOTE

The 100% engine torque limit is still applicable with the SRL turned off or INOP and must not be exceeded.

OAT (ºC)	SRL "OFF" EGT @ 100%RPM (ºC)	SRL "OFF" EGT @ 96%RPM (ºC)
-60	556	535
-55	558	537
-50	559	539
-45	561	540
-40	563	542
-35	564	544
-30	566	546
-25	568	547
-20	569	549
-15	574	551
-10	578	552
-5	582	554
0	587	556
5	591	557
10	595	561
15	600	565
20	604	569
25	608	574
30	613	578
35	617	582
40	622	587
45	626	591
50	630	596
55	635	600
60	639	605

Table 5-1, Maximum Exhaust Gas Temperature Limits (Manual Mode)

WITH OR WITHOUT CARGO POD
TAKEOFF DISTANCE
SHORT FIELD- FLAPS 30º
(GROUND ROLL DISTANCE AND DISTANCE TO CLEAR 50 FEET)

CONDITIONS:

FLAPS 30 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
PAVED, LEVEL, DRY RUNWAY
ZERO WIND

NOTES:

1. USE SHORT FIELD TECHNIQUES AS SPECIFIED IN SECTION 4.
2. DECREASE DISTANCES 10% FOR EACH 11 KNOTS OF HEADWIND. FOR OPERATION WITH TAILWINDS UP TO 10 KNOTS, INCREASE THE DISTANCES BY 10% FOR EACH 2 KNOTS.
3. FOR OPERATION ON A DRY, GRASS RUNWAY, INCREASE DISTANCES BY 15% OF THE "GRD ROLL" FIGURE.
4. WITH TAKEOFF POWER SET BELOW THE TORQUE LIMIT (100%), INCREASE DISTANCE (BOTH GND ROLL AND 50' DISTANCE) BY 3% FOR ENGINE INLET ANTI-ICE **ON** AND INCREASE GND 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.

Flaps 30

WEIGHT LB	TAKEOFF SPEED		PRESS ALT FT	-20 °C		-10 °C		0 °C		10 °C		20 °C		30 °C		40 °C		50 °C	
	LIFT OFF KIAS	AT 50' KIAS		GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT
9062	67	76	0	648	1247	697	1330	746	1418	799	1507	854	1597	916	1697	1026	1972	1164	2313
			2000	741	1409	797	1504	857	1602	918	1703	982	1807	1092	2048	1224	2388	1393	2813
			4000	852	1593	918	1704	988	1816	1063	1933	1170	2159	1303	2484	1465	2909	---	---
			6000	983	1811	1063	1935	1160	2098	1269	2325	1398	2622	1561	3028	1761	3551	---	---
			8000	1215	1956	1333	2161	1462	2393	1600	2650	1763	3000	1972	3475	2215	4047	---	---
			10000	1459	2386	1601	2636	1756	2923	1922	3249	2119	3677	2379	4274	---	---	---	---
			12000	1757	2921	1928	3231	2114	3584	2317	3979	2560	4525	2882	5280	---	---	---	---
8750	65	74	0	598	1151	643	1228	688	1308	737	1390	788	1474	845	1568	947	1817	1074	2127
			2000	683	1300	735	1388	791	1478	847	1574	906	1670	1007	1890	1129	2198	1285	2582
			4000	786	1470	847	1573	912	1678	981	1786	1079	1993	1202	2289	1352	2674	---	---
			6000	907	1673	981	1789	1070	1939	1171	2146	1290	2417	1440	2784	1625	3260	---	---
			8000	1121	1808	1230	1996	1349	2208	1476	2448	1627	2761	1820	3190	2044	3710	---	---
			10000	1346	2202	1477	2431	1620	2694	1773	2987	1955	3380	2195	3917	---	---	---	---
			12000	1621	2693	1779	2975	1950	3300	2138	3662	2361	4153	2659	4835	---	---	---	---
8300	62	71	0	526	1095	565	1170	606	1246	649	1325	694	1404	745	1494	833	1729	943	2020
			2000	601	1238	647	1322	697	1408	747	1500	799	1592	887	1799	993	2089	1128	2452
			4000	692	1401	747	1500	804	1600	866	1703	952	1900	1059	2178	1187	2540	---	---
			6000	801	1594	866	1705	945	1849	1033	2045	1137	2302	1267	2648	1426	3094	---	---
			8000	963	1614	1056	1782	1158	1970	1266	2181	1395	2458	1557	2837	1744	3294	---	---
			10000	1155	1965	1268	2168	1391	2401	1522	2658	1453	3005	1876	3480	---	---	---	---
			12000	1391	2398	1526	2650	1674	2937	1833	3257	2020	3690	2267	4288	---	---	---	---
7800	59	68	0	455	949	490	1014	525	1080	562	1148	602	1217	646	1296	721	1497	816	1747
			2000	521	1073	561	1146	604	1221	648	1301	693	1382	769	1559	859	1808	975	2117
			4000	600	1214	648	1300	698	1387	752	1477	826	1647	917	1886	1028	2195	---	---
			6000	695	1383	752	1479	820	1605	896	1774	986	1994	1098	2290	1234	2672	---	---
			8000	835	1401	916	1545	1005	1708	1099	1890	1210	2129	1349	2452	1509	2840	---	---
			10000	1002	1704	1100	1879	1206	2080	1319	2308	1259	2599	1624	3003	---	---	---	---
			12000	1206	2077	1324	2294	1451	2541	1589	2811	1752	3186	1963	3697	---	---	---	---
7300	56	65	0	390	814	420	869	450	927	483	986	517	1045	555	1113	618	1283	698	1495
			2000	447	920	482	984	519	1048	557	1117	597	1187	661	1338	736	1549	834	1812
			4000	515	1042	557	1116	601	1192	647	1269	710	1415	787	1617	881	1880	---	---
			6000	597	1187	647	1271	706	1378	771	1523	848	1711	942	1961	1057	2285	---	---
			8000	719	1204	789	1328	865	1466	945	1622	1039	1825	1157	2098	1291	2427	---	---
			10000	863	1462	946	1613	1038	1784	1135	1978	1082	2225	1393	2566	---	---	---	---
			12000	1038	1783	1139	1968	1249	2178	1367	2413	1504	2724	1682	3156	---	---	---	---

WITH OR WITHOUT CARGO POD
TAKEOFF DISTANCE
SHORT FIELD- FLAPS 20º
(GROUND ROLL DISTANCE AND DISTANCE TO CLEAR 50 FEET)

CONDITIONS:

FLAPS 20 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
PAVED, LEVEL, DRY RUNWAY
ZERO WIND

NOTES:

1. USE SHORT FIELD TECHNIQUES AS SPECIFIED IN SECTION 4.
2. DECREASE DISTANCES 10% FOR EACH 11 KNOTS OF HEADWIND. FOR OPERATION WITH TAILWINDS UP TO 10 KNOTS, INCREASE THE DISTANCES BY 10% FOR EACH 2 KNOTS.
3. FOR OPERATION ON A DRY, GRASS RUNWAY, INCREASE DISTANCES BY 15% OF THE "GRD ROLL" FIGURE.
4. WITH TAKEOFF POWER SET BELOW THE TORQUE LIMIT (100%), INCREASE DISTANCE (BOTH GND ROLL AND 50' DISTANCE) BY 3% FOR ENGINE INLET ANTI-ICE **ON** AND INCREASE GND 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.

Flaps 20

WEIGHT	TAKEOFF SPEED		PRESS ALT	-20 °C		-10 °C		0 °C		10 °C		20 °C		30 °C		40 °C		50 °C	
LB	LIFT OFF KIAS	AT 50' KIAS	FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT
9062	71	86	0	715	0	768	1485	822	1582	880	1680	940	1782	1008	1886	1131	2204	1286	2601
			2000	816	1573	878	1680	944	1788	1010	1896	1079	2011	1201	2288	1349	2678	1539	3169
			4000	937	1777	1009	1900	1085	2022	1167	2148	1286	2403	1427	2783	1617	3275	---	---
			6000	1080	1938	1167	2153	1274	2325	1393	2584	1537	2927	1718	3404	1945	4018	---	---
			8000	1389	2183	1524	2437	1671	2703	1829	3002	2018	3411	2264	3972	2549	4650	---	---
			10000	1668	2694	1830	2983	2007	3311	2202	3690	2433	4192	2735	4894	---	---	---	---
			12000	2009	3316	2206	3670	2422	4083	2656	4553	2944	5176	3317	6070	---	---	---	---
8750	70	83	0	659	0	709	1370	759	1460	812	1551	867	1644	930	1742	1044	2032	1187	2392
			2000	753	1451	810	1548	871	1648	931	1748	996	1856	1108	2108	1245	2462	1420	2908
			4000	864	1640	931	1751	1001	1866	1076	1981	1186	2215	1317	2561	1492	3006	---	---
			6000	997	1787	1077	1987	1175	2147	1285	2384	1418	2697	1585	3127	1794	3687	---	---
			8000	1281	2016	1406	2249	1542	2491	1687	2768	1862	3138	2089	3652	2351	4265	---	---
			10000	1539	2484	1688	2749	1852	3048	2031	3392	2245	3850	2524	4493	---	---	---	---
			12000	1854	3055	2035	3377	2235	3752	2451	4179	2716	4746	3060	5557	---	---	---	---
8300	67	80	0	548	1080	589	1151	631	1226	675	1304	721	1381	774	1466	867	1707	985	2004
			2000	626	1219	673	1301	724	1385	549	1472	829	1561	922	1770	1035	2065	1179	2434
			4000	719	1378	775	1473	834	1570	896	1666	987	1862	1101	2147	1240	2517	---	---
			6000	830	1502	897	1672	979	1806	1070	2002	1180	2264	1317	2618	1490	3079	---	---
			8000	1085	1752	1190	1954	1305	2164	1429	2401	1575	2718	1764	3155	1985	3678	---	---
			10000	1303	2156	1429	2386	1567	2644	1718	2939	1897	3330	2130	3884	---	---	---	---
			12000	1569	2650	1721	2926	1889	3248	2071	3612	2293	4099	2581	4796	---	---	---	---
7800	64	76	0	475	935	510	997	547	1063	585	1130	625	1197	671	1273	752	1479	853	1730
			2000	542	1056	584	1128	628	1201	476	1277	719	1355	799	1533	896	1784	1020	2100
			4000	624	1195	672	1278	724	1362	778	1449	857	1615	954	1857	1073	2171	---	---
			6000	720	1302	779	1451	850	1567	929	1738	1024	1960	1142	2262	1290	2654	---	---
			8000	942	1521	1033	1694	1133	1875	1240	2076	1366	2350	1529	2721	1717	3166	---	---
			10000	1131	1869	1240	2066	1361	2289	1490	2543	1643	2875	1844	3342	---	---	---	---
			12000	1362	2292	1494	2531	1639	2807	1795	3121	1984	3536	2234	4127	---	---	---	---
7300	61	73	0	407	803	438	857	469	913	502	970	537	1028	577	1094	644	1269	730	1481
			2000	465	907	501	968	540	1031	410	1097	619	1165	687	1316	768	1529	873	1797
			4000	536	1026	578	1097	623	1170	670	1246	737	1387	819	1593	919	1860	---	---
			6000	620	1119	670	1248	731	1347	799	1493	880	1681	980	1937	1104	2270	---	---
			8000	811	1308	889	1455	975	1610	1066	1781	1174	2014	1311	2328	1469	2706	---	---
			10000	973	1603	1067	1772	1170	1962	1282	2181	1411	2463	1580	2859	---	---	---	---
			12000	1172	1965	1285	2170	1410	2406	1543	2672	1701	3024	1910	3527	---	---	---	---

WITH OR WITHOUT CARGO POD
TAKEOFF DISTANCE
FLAPS UP
(GROUND ROLL DISTANCE AND DISTANCE TO CLEAR 50 FEET)

CONDITIONS:

FLAPS 0 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
PAVED, LEVEL, DRY RUNWAY
ZERO WIND

NOTES:

1. USE TYPE II, TYPE III, OR TYPE IV ANTI-ICE FLUID TAKEOFF TECHNIQUES AS SPECIFIED IN SECTION 4.
2. DECREASE DISTANCES 10% FOR EACH 11 KNOTS OF HEADWIND. FOR OPERATION WITH TAILWINDS UP TO 10 KNOTS, INCREASE THE DISTANCES BY 10% FOR EACH 2 KNOTS.
3. FOR OPERATION ON A DRY, GRASS RUNWAY, INCREASE DISTANCES BY 15% OF THE "GRD ROLL" FIGURE.
4. WITH TAKEOFF POWER SET BELOW THE TORQUE LIMIT (100%), INCREASE DISTANCE (BOTH GND ROLL AND 50' DISTANCE) BY 3% FOR ENGINE INLET ANTI-ICE **ON** AND INCREASE GND 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.

Flaps 0

WEIGHT	TAKEOFF SPEED		PRESS	-20 °C		-10 °C		0 °C		10 °C		20 °C		30 °C		40 °C		50 °C	
LB	LIFT OFF KIAS	AT 50' KIAS	ALT FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT	GRD ROLL FT	50' DIST FT
9062	83	104	0	1281	2190	1375	2334	1470	2486	1570	2640	1673	2795	1793	2953	2026	3466	2318	4115
			2000	1458	2473	1566	2637	1678	2805	1794	2974	1915	3150	2142	3579	2425	4232	2816	5053
			4000	1668	2795	1793	2978	1925	3168	2064	3367	2286	3752	2567	4374	2912	5204	---	---
			6000	1917	3160	2066	3374	2252	3610	2471	4033	2744	4597	3084	5365	3512	6404	---	---
			8000	2242	3365	2462	3731	2703	4157	2965	4641	3296	5295	3718	6204	4209	7349	---	---
			10000	2698	4137	2964	4596	3256	5122	3578	5730	3985	6535	4502	7692	---	---	---	---
			12000	3259	5121	3580	5688	3931	6343	4329	7107	4828	8111	5468	9571	---	---	---	---
8750	83	104	0	1182	2021	1268	2153	1356	2293	1448	2436	1543	2579	1654	2725	1870	3198	2139	3796
			2000	1345	2282	1445	2433	1548	2588	1655	2744	1767	2906	1976	3302	2238	3905	2598	4662
			4000	1538	2579	1654	2747	1776	2922	1904	3106	2109	3462	2368	4035	2687	4801	---	---
			6000	1769	2915	1906	3113	2078	3330	2279	3720	2531	4241	2845	4949	3241	5908	---	---
			8000	2069	3105	2271	3442	2493	3835	2735	4281	3041	4885	3430	5723	3883	6780	---	---
			10000	2489	3816	2734	4240	3004	4726	3301	5286	3677	6029	4153	7097	---	---	---	---
			12000	3006	4724	3303	5247	3627	5852	3993	6557	4454	7483	5045	8830	---	---	---	---
8300	83	104	0	1045	1961	1122	2089	1199	2225	1281	2364	1365	2503	1463	2644	1654	3103	1891	3684
			2000	1190	2214	1278	2361	1370	2511	1464	2663	1563	2820	1748	3204	1979	3789	2298	4524
			4000	1361	2502	1463	2666	1571	2836	1684	3014	1865	3359	2094	3916	2376	4659	---	---
			6000	1564	2829	1686	3021	1838	3232	2016	3610	2239	4116	2516	4803	2866	5734	---	---
			8000	1872	2901	2055	3216	2256	3583	2475	4000	2752	4564	3104	5347	3514	6334	---	---
			10000	2252	3565	2474	3962	2718	4415	2987	4938	3327	5632	3758	6630	---	---	---	---
			12000	2721	4414	2989	4902	3282	5467	3614	6126	4031	6991	4565	8249	---	---	---	---
7800	83	104	0	906	1700	972	1811	1040	1929	1110	2049	1183	2169	1268	2292	1433	2690	1640	3194
			2000	1031	1919	1108	2047	1187	2177	1269	2308	1355	2444	1515	2777	1716	3285	1992	3922
			4000	1180	2169	1268	2311	1362	2458	1460	2613	1617	2912	1816	3394	2060	4039	---	---
			6000	1356	2452	1461	2619	1593	2802	1747	3130	1941	3568	2181	4163	2484	4970	---	---
			8000	1623	2514	1782	2788	1956	3106	2146	3467	2386	3956	2691	4635	3046	5491	---	---
			10000	1952	3091	2145	3434	2356	3827	2590	4281	2884	4882	3258	5747	---	---	---	---
			12000	2358	3826	2591	4249	2845	4739	3132	5310	3494	6060	3957	7151	---	---	---	---
7300	83	104	0	778	1460	835	1555	893	1656	953	1759	1016	1863	1089	1968	1231	2310	1408	2742
			2000	885	1648	951	1757	1019	1869	1089	1982	1163	2099	1301	2385	1473	2820	1710	3367
			4000	1013	1863	1089	1984	1169	2111	1253	2244	1389	2500	1559	2915	1769	3468	---	---
			6000	1164	2106	1255	2249	1368	2406	1501	2687	1666	3063	1873	3575	2133	4268	---	---
			8000	1393	2159	1530	2394	1679	2667	1842	2977	2048	3397	2310	3980	2615	4715	---	---
			10000	1676	2654	1842	2949	2023	3286	2224	3676	2476	4192	2797	4935	---	---	---	---
			12000	2025	3285	2225	3649	2443	4069	2690	4559	3000	5204	3398	6140	---	---	---	---

WITH OR WITHOUT CARGO POD
RATE OF CLIMB – TAKEOFF (FLAPS 30) OR BALKED LANDING

CONDITIONS:

FLAPS 30 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
ZERO WIND

NOTES:
1. WITH CLIMB POWER SET BELOW THE TORQUE LIMIT (100%), DECREASE RATE OF CLIMB BY 60 FPM FOR ENGINE INLET ANTI-ICE **ON** AND 60 FPM WITH CABIN HEAT **ON**.
2. 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.
3. MAX LANDING WEIGHT IS 8500 LBS.

Flaps 30

WEIGHT *LB*	PRESS ALT *FT*	CLIMB SPEED *KIAS*	RATE OF CLIMB - FPM				
			-20 °C	0 °C	20 °C	40 °C	50 °C
9062	0	86	1193	1158	1120	910	719
	2000	86	1159	1117	1069	753	568
	4000	86	1119	1068	935	600	---
	6000	86	1070	996	774	449	---
	8000	86	1003	833	618	305	---
	10000	86	836	672	456	---	---
	12000	85	699	510	303	---	---
8500	0	85	1335	1296	1262	1043	845
	2000	85	1298	1260	1211	879	685
	4000	84	1259	1210	1069	723	---
	6000	84	1210	1133	907	565	---
	8000	84	1209	965	745	422	---
	10000	84	969	801	580	---	---
	12000	84	802	632	415	---	---
8000	0	83	1471	1432	1397	1178	970
	2000	83	1434	1394	1353	1006	805
	4000	83	1396	1351	1203	841	---
	6000	83	1351	1271	1032	679	---
	8000	83	1279	1093	864	532	---
	10000	82	1099	924	704	---	---
	12000	82	928	756	535	---	---
7500	0	82	1626	1585	1549	1320	1105
	2000	81	1586	1542	1502	1149	941
	4000	81	1544	1500	1350	978	---
	6000	81	1504	1421	1172	805	---
	8000	81	1429	1238	1000	656	---
	10000	81	1245	1059	828	---	---
	12000	81	1063	888	657	---	---
7000	0	80	1796	1751	1716	1476	1256
	2000	80	1756	1713	1672	1304	1084
	4000	80	1714	1671	1516	1121	---
	6000	79	1663	1584	1330	948	---
	8000	79	1592	1394	1148	791	---
	10000	79	1402	1210	969	---	---
	12000	79	1214	1030	796	---	---

WITH OR WITHOUT CARGO POD
CLIMB GRADIENT – TAKEOFF (FLAPS 30)

CONDITIONS:

FLAPS 30 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
ZERO WIND

NOTES:
1. WITH CLIMB POWER SET BELOW THE TORQUE LIMIT (100%), DECREASE RATE OF CLIMB BY 40 FT/NM FOR ENGINE INLET ANTI-ICE **ON** AND 40 FT/NM WITH CABIN HEAT **ON**.
2. WHERE CLIMB GRADIENT 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.

Flaps 30

WEIGHT *LB*	PRESS ALT *FT*	CLIMB SPEED KIAS	CLIMB GRADIENT - FT/NM				
			-20 °C	0 °C	20 °C	40 °C	50 °C
9062	0	72	920	892	853	706	574
	2000	73	879	841	803	585	455
	4000	74	843	805	705	479	---
	6000	75	807	749	599	368	---
	8000	76	756	636	483	265	---
	10000	77	639	519	368	---	---
	12000	78	508	393	249	---	---
8500	0	71	1040	1012	975	815	681
	2000	72	1014	976	937	703	565
	4000	73	962	923	819	578	---
	6000	74	921	864	704	465	---
	8000	75	868	746	585	355	---
	10000	76	747	623	464	---	---
	12000	77	621	500	348	---	---
8000	0	70	1159	1131	1097	933	811
	2000	71	1132	1097	1057	810	665
	4000	72	1095	1056	947	692	---
	6000	73	1038	977	812	562	---
	8000	74	983	855	686	445	---
	10000	75	858	724	560	---	---
	12000	76	723	596	437	---	---
7500	0	69	1291	1260	1229	1056	902
	2000	70	1265	1232	1192	930	777
	4000	71	1230	1187	1075	803	---
	6000	71	1190	1121	946	680	---
	8000	72	1127	992	818	559	---
	10000	73	977	846	669	---	---
	12000	74	842	706	539	---	---
7000	0	67	1452	1421	1390	1208	1045
	2000	68	1426	1393	1351	1073	912
	4000	69	1381	1333	1215	927	---
	6000	70	1338	1269	1081	798	---
	8000	71	1274	1129	948	675	---
	10000	72	1130	991	803	---	---
	12000	73	972	828	651	---	---

WITH OR WITHOUT CARGO POD
RATE OF CLIMB – TAKEOFF (FLAPS 20)

CONDITIONS:

FLAPS 20 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
ZERO WIND

NOTES:

1. WITH CLIMB POWER SET BELOW THE TORQUE LIMIT (100%), DECREASE RATE OF CLIMB BY 60 FPM FOR ENGINE INLET ANTI-ICE **ON** AND 60 FPM WITH CABIN HEAT **ON**.
2. 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.

Flaps 20

WEIGHT *LB*	PRESS ALT *FT*	CLIMB SPEED *KIAS*	RATE OF CLIMB - FPM				
			-20 °C	0 °C	20 °C	40 °C	50 °C
9062	0	94	1364	1328	1296	1082	879
	2000	94	1328	1293	1257	916	719
	4000	94	1294	1255	1118	752	---
	6000	93	1252	1187	948	597	---
	8000	93	1195	1013	782	452	---
	10000	92	1018	843	623	---	---
	12000	92	844	676	460	---	---
8750	0	94	1446	1409	1377	1156	947
	2000	93	1410	1372	1332	989	795
	4000	93	1373	1334	1196	821	---
	6000	93	1333	1268	1021	659	---
	8000	92	1276	1086	854	516	---
	10000	92	1095	915	689	---	---
	12000	91	915	745	526	---	---
8300	0	92	1572	1532	1498	1268	1056
	2000	92	1533	1495	1456	1100	891
	4000	91	1493	1452	1315	931	---
	6000	91	1451	1390	1138	760	---
	8000	91	1398	1205	961	612	---
	10000	90	1211	1024	794	---	---
	12000	90	1028	850	625	---	---
7800	0	90	1723	1684	1647	1409	1187
	2000	90	1685	1643	1605	1236	1020
	4000	90	1645	1602	1460	1058	---
	6000	89	1600	1533	1279	887	---
	8000	89	1541	1350	1095	733	---
	10000	89	1355	1162	917	---	---
	12000	88	1167	983	749	---	---
7300	0	88	1887	1856	1819	1569	1337
	2000	88	1857	1816	1774	1386	1162
	4000	88	1817	1771	1618	1207	---
	6000	87	1769	1694	1433	1030	---
	8000	87	1702	1508	1246	867	---
	10000	87	1513	1317	1063	---	---
	12000	86	1318	1127	884	---	---

WITH OR WITHOUT CARGO POD
CLIMB GRADIENT – TAKEOFF (FLAPS 20)

CONDITIONS:

FLAPS 20 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
ZERO WIND

NOTES:

1. WITH CLIMB POWER SET BELOW THE TORQUE LIMIT (100%), DECREASE RATE OF CLIMB BY 40 FT/NM FOR ENGINE INLET ANTI-ICE **ON** AND 40 FT/NM WITH CABIN HEAT **ON**.
2. WHERE CLIMB GRADIENT 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.

Flaps 20

WEIGHT *LB*	PRESS ALT *FT*	CLIMB SPEED *KIAS*	CLIMB GRADIENT - FT/NM			
			-20 °C	0 °C	20 °C	40 °C
9062	0	71	1030	1000	968	814
	2000	72	980	944	909	681
	4000	74	948	915	817	579
	6000	75	908	854	697	461
	8000	77	852	729	576	357
	10000	79	723	607	458	—
	12000	80	603	493	347	—
8750	0	70	1093	1066	1028	871
	2000	72	1055	1018	983	748
	4000	74	1021	987	888	642
	6000	75	980	925	764	520
	8000	77	922	795	638	411
	10000	78	791	672	519	—
	12000	80	664	550	400	—
8300	0	70	1219	1192	1154	989
	2000	71	1180	1143	1108	859
	4000	73	1130	1094	990	734
	6000	74	1085	1031	864	607
	8000	76	1023	896	731	491
	10000	77	891	764	605	—
	12000	79	754	636	481	—
7800	0	68	1362	1336	1300	1126
	2000	70	1324	1286	1247	985
	4000	71	1274	1236	1124	855
	6000	73	1223	1163	990	720
	8000	74	1161	1027	853	600
	10000	76	1016	884	715	—
	12000	77	877	750	588	—
7300	0	67	1526	1498	1466	1281
	2000	69	1484	1450	1410	1129
	4000	70	1435	1396	1277	988
	6000	71	1382	1322	1135	852
	8000	73	1311	1173	988	719
	10000	74	1164	1024	843	—
	12000	76	1010	876	704	—

WITH OR WITHOUT CARGO POD
MAXIMUM RATE OF CLIMB – FLAPS UP

CONDITIONS:

FLAPS 0 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
ZERO WIND

NOTES:

1. WITH CLIMB POWER SET BELOW THE TORQUE LIMIT (100%), DECREASE RATE OF CLIMB BY 70 FPM FOR ENGINE INLET ANTI-ICE **ON** AND 70 FPM WITH CABIN HEAT **ON**.
2. 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.

Flaps 0

WEIGHT *LB*	PRESS ALT *FT*	CLIMB SPEED *KIAS*	RATE OF CLIMB - FPM					
			-40 °C	-20 °C	0 °C	20 °C	40 °C	50 °C
9062	0	105	1527	1496	1464	1426	1203	990
	4000	105	1469	1428	1390	1264	868	---
	8000	105	1393	1353	1156	907	554	---
	12000	104	1186	967	787	559	---	---
	16000	104	827	618	445	235	---	---
	20000	103	460	269	107	---	---	---
	24000	103	119	---	---	---	---	---
8750	0	105	1620	1590	1559	1521	1292	1071
	4000	104	1555	1513	1475	1342	942	---
	8000	104	1479	1434	1236	981	621	---
	12000	103	1276	1049	864	630	---	---
	16000	103	900	688	512	295	---	---
	20000	103	534	338	172	---	---	---
	24000	102	179	---	---	---	---	---
8300	0	103	1750	1717	1689	1653	1417	1188
	4000	102	1685	1647	1606	1467	1053	---
	8000	102	1609	1563	1362	1099	724	---
	12000	102	1415	1176	985	745	---	---
	16000	101	1012	796	617	392	---	---
	20000	101	640	436	268	---	---	---
	24000	101	280	87	---	---	---	---
7800	0	101	1913	1881	1851	1823	1570	1326
	4000	100	1847	1812	1769	1626	1193	---
	8000	100	1772	1722	1514	1245	853	---
	12000	100	1569	1327	1129	876	---	---
	16000	99	1154	930	748	513	---	---
	20000	99	766	555	384	---	---	---
	24000	99	391	191	22	---	---	---
7300	0	98	2097	2063	2033	2009	1743	1488
	4000	98	2035	2007	1962	1809	1354	---
	8000	98	1962	1911	1693	1413	998	---
	12000	97	1739	1490	1284	1019	---	---
	16000	97	1319	1084	894	648	---	---
	20000	97	913	693	514	---	---	---
	24000	96	522	316	141	---	---	---

WITH OR WITHOUT CARGO POD
MAXIMUM CLIMB GRADIENT – FLAPS UP

CONDITIONS:

FLAPS 0 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
ZERO WIND

NOTES:

1. WITH CLIMB POWER SET BELOW THE TORQUE LIMIT (100%), DECREASE RATE OF CLIMB BY 40 FT/NM FOR ENGINE INLET ANTI-ICE **ON** AND 40 FT/NM WITH CABIN HEAT **ON**.
2. WHERE CLIMB GRADIENT 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.

Flaps 0

WEIGHT *LB*	PRESS ALT *FT*	CLIMB SPEED KIAS	GLIMB GRADIENT - FT/NM				
			-20 °C	0 °C	20 °C	40 °C	50 °C
9062	0	73	967	937	911	769	637
	2000	75	941	913	887	670	572
	4000	78	916	889	795	564	---
	6000	80	887	837	688	466	---
	8000	82	847	735	588	373	---
	10000	84	732	621	476	---	---
	12000	86	622	513	376	---	---
8750	0	73	1037	1007	982	836	700
	2000	75	1009	982	956	733	637
	4000	77	983	958	861	622	---
	6000	79	952	903	750	517	---
	8000	82	904	791	640	420	---
	10000	84	791	677	530	---	---
	12000	86	672	562	422	---	---
8300	0	72	1149	1119	1091	937	795
	2000	74	1116	1088	1060	828	732
	4000	76	1088	1060	962	712	---
	6000	78	1058	1004	844	602	---
	8000	81	1007	887	731	501	---
	10000	83	883	764	611	---	---
	12000	85	766	649	501	---	---
7800	0	71	1284	1254	1226	1062	913
	2000	73	1251	1220	1192	947	855
	4000	75	1217	1190	1089	824	---
	6000	77	1187	1132	963	706	---
	8000	79	1131	1003	841	599	---
	10000	81	1003	880	719	---	---
	12000	83	872	750	594	---	---
7300	0	70	1433	1406	1378	1205	1046
	2000	72	1400	1370	1341	1077	994
	4000	74	1363	1336	1232	950	---
	6000	76	1331	1273	1094	824	---
	8000	77	1275	1141	967	713	---
	10000	79	1135	1006	836	---	---
	12000	81	1003	872	708	---	---

WITH OR WITHOUT CARGO POD
CRUISE CLIMB – FLAPS UP – 115 KIAS

CONDITIONS:

FLAPS 0 DEGREES
100% RPM
ENGINE INLET ANTI-ICE OFF
CABIN HEAT OFF
POWER SET AT 100% TQ OR MAX EGT
ZERO WIND

NOTES:

1. WITH CLIMB POWER SET BELOW THE TORQUE LIMIT (100%), DECREASE RATE OF CLIMB BY 70 FT/NM FOR ENGINE INLET ANTI-ICE **ON** AND 70 FT/NM WITH CABIN HEAT **ON**.
2. 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.

Flaps 0	CRUISE CLIMB - 115 KIAS						
		RATE OF CLIMB - FPM					
WEIGHT *LB*	PRESS ALT *FT*	-40 °C	-20 °C	0 °C	20 °C	40 °C	50 °C
9062	0	1526	1488	1452	1415	1187	959
	2000	1491	1453	1412	1374	1003	780
	4000	1456	1413	1370	1241	823	---
	6000	1413	1370	1324	1053	644	---
	8000	1370	1323	1127	862	485	---
	10000	1324	1134	929	679	---	---
	12000	1177	936	739	495	---	---
8750	0	1609	1572	1536	1498	1264	1028
	2000	1575	1536	1496	1457	1074	844
	4000	1539	1496	1454	1321	890	---
	6000	1497	1453	1407	1127	705	---
	8000	1454	1406	1204	931	542	---
	10000	1407	1212	1001	743	---	---
	12000	1256	1008	805	555	---	---
8300	0	1740	1702	1666	1628	1382	1135
	2000	1705	1666	1625	1586	1184	943
	4000	1669	1625	1584	1445	992	---
	6000	1626	1582	1535	1242	799	---
	8000	1582	1534	1324	1037	630	---
	10000	1535	1332	1111	843	---	---
	12000	1377	1119	907	647	---	---
7800	0	1900	1862	1826	1787	1527	1264
	2000	1865	1825	1783	1744	1318	1062
	4000	1828	1784	1740	1596	1116	---
	6000	1785	1739	1692	1382	913	---
	8000	1740	1691	1469	1166	735	---
	10000	1691	1477	1245	959	---	---
	12000	1526	1252	1030	756	---	---
7300	0	2079	2039	2003	1964	1687	1408
	2000	2043	2003	1961	1920	1467	1194
	4000	2005	1960	1917	1764	1252	---
	6000	1962	1914	1866	1537	1037	---
	8000	1915	1867	1630	1309	850	---
	10000	1865	1639	1393	1090	---	---
	12000	1690	1401	1166	875	---	---

SECTION 6
WEIGHT AND BALANCE / EQUIPMENT LIST

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INTRODUCTION

No changes have been made to the basic weight and balance envelope of the aircraft for this modification. For detailed weight and balance information, refer to the Cessna POH/AFM.

SECTION 7
AIRPLANE & SYSTEM DESCRIPTIONS

TABLE OF CONTENTS

INTRODUCTION

This section provides the description and operation of the airplane and its systems as modified with the Honeywell TPE331-12JR engine. For information on systems not contained in this section, refer to the Cessna POH/AFM.

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 MAFUNCTIONS 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.

INSTRUMENT PANEL

Only minor changes have been made to the engine instrument panel to accommodate the Honeywell engine. The inertial separator handle has been removed since it is not used with the Honeywell engine. Single Red Line (SRL), Torque/Temperature Limiting (TTL), propeller de-ice, engine inlet anti-ice, and TTL test switches have been added to accommodate Honeywell engine operation. Several placards have been added as well (refer to Section 2).

LEFT SIDEWALL SWITCH AND CIRCUIT BREAKER PANEL

The start panel has been modified to allow for additional switches needed for engine operation and several circuit breakers have been re-labeled or changed (see Figure 7-13).

ANNUNCIATOR PANEL

The following changes have been made to the annunciator panel as depicted in Table 7-1 and Figure 7-1.

Action	Annunciation	Color	Purpose
Removed	EMERGENCY POWER LEVER	N/A	N/A
Removed	STDBY ELEC PWR ON	N/A	For PRE SB 208-7 only
Added	BETA	Amber	Caution: engine in beta mode
Added	SRL INOP	Amber	Caution: Single Redline Computer is inoperable or turned off
Added	INLET ANTI-ICE	Green	Normal: engine anti-ice valve is open

Table 7-1, Annunciator Panel Changes

Figure 7-1, Modified Annunciator Panel PRE Supervan Systems SB 208-7

Figure 7-1A, Modified Annunciator Panel POST Supervan Systems SB 208-7

ENGINE

The type certified 675 shp Pratt & Whitney PT6A-114/-114A engine on the baseline aircraft has been replaced by the Honeywell TPE331-12JR engine, which is flat-rated to 900 shp at 1591 rpm.

The Honeywell TPE331-12JR engine has a single drive shaft and the engine's direction of rotation is left or counter-clockwise (from the pilot's perspective). A cut-away example of a typical TPE331 engine is shown below in figure 7-2. Engine operational limits as installed in this application are shown in Table 7-2.

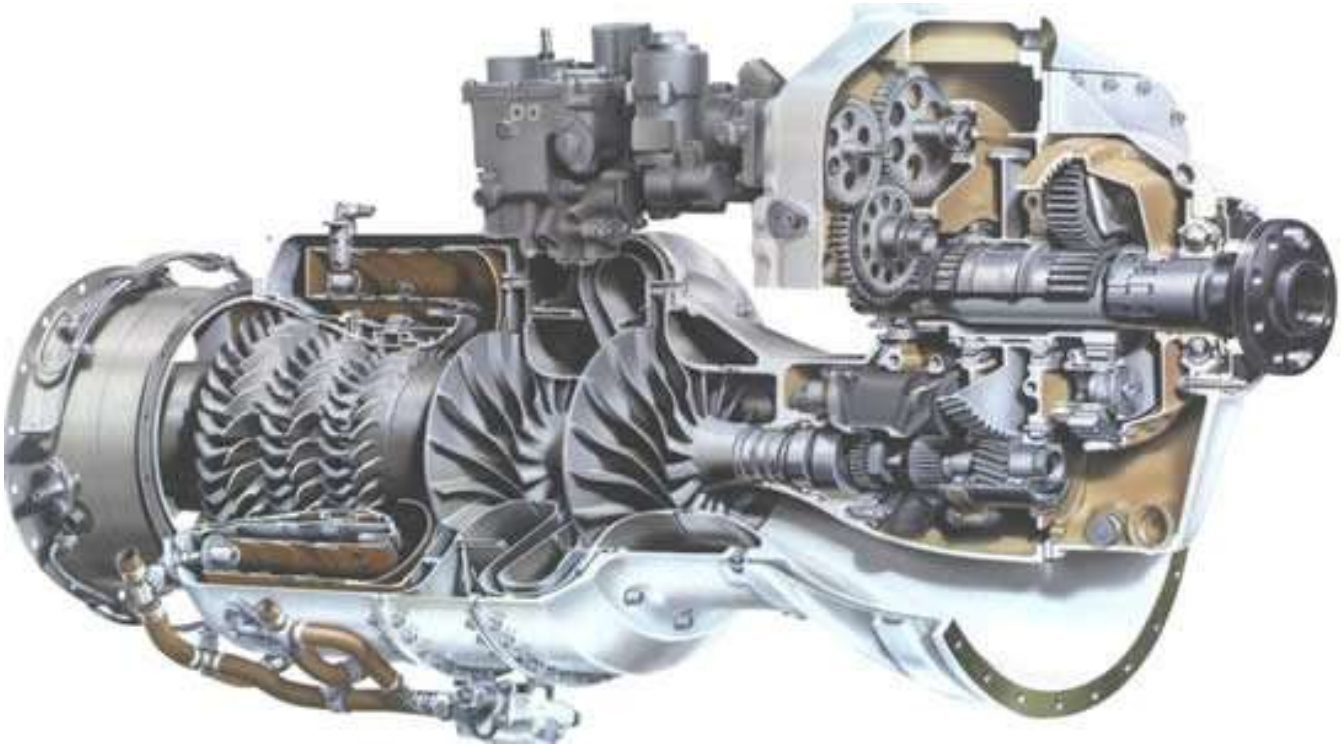

Figure 7-2, Typical Honeywell TPE331 Engine

Rating	Honeywell TPE331-12JR
Takeoff SHP	900
Max. Cont SHP	900
Takeoff RPM	1591
Max. Cont RPM	1591
Takeoff Torque (ft-lbs)	2972
Max. Cont Torque (ft-lbs)	2972
Estimated Dry Weight (lbs)	415

Table 7-2, Engine Power Output

ENGINE CONTROLS

The engine controls quadrant for the Pratt & Whitney configuration has been retained with modifications to the function of the handles. The emergency power lever and slot have been removed from the quadrant because they are not necessary for the TPE331-12JR engine installation.

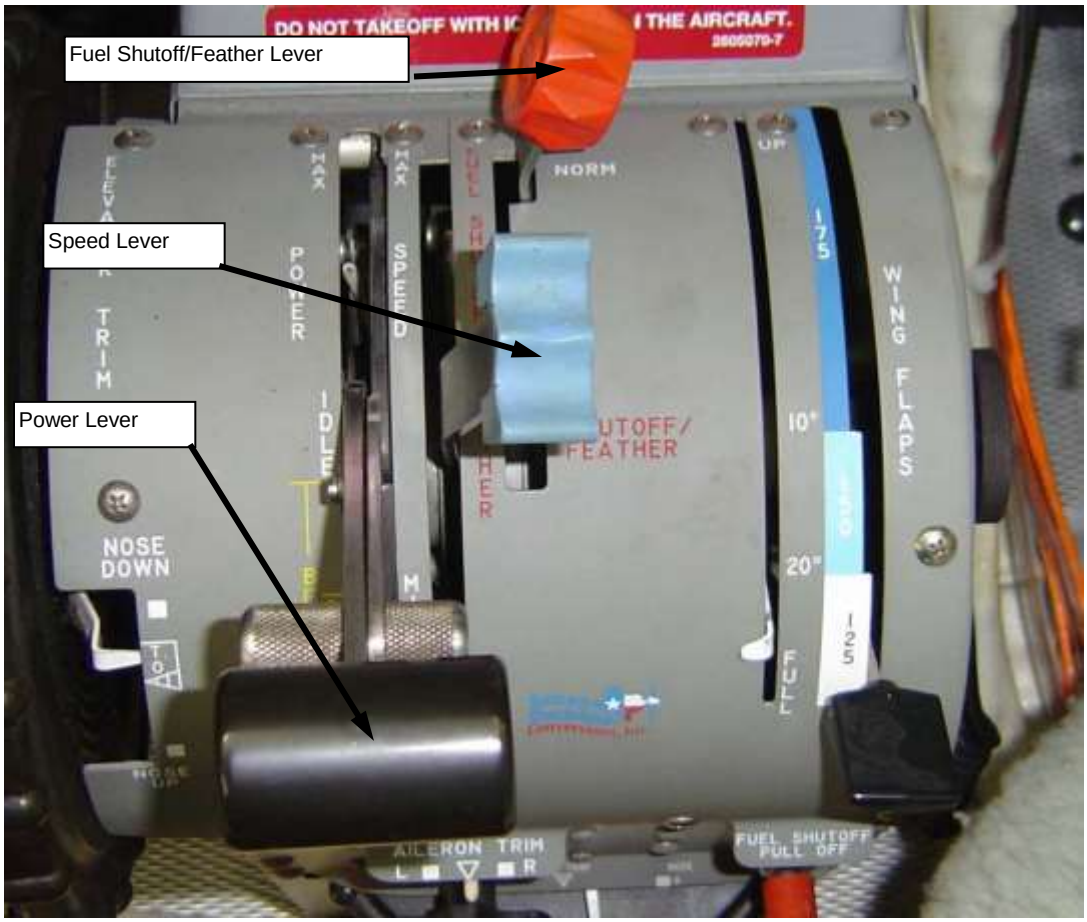

Figure 7-3, Modified Engine Control Quadrant

POWER LEVER

The power lever operates in the same manner as the OEM power lever in the Pratt & Whitney engine configuration. Forward of flight idle (out of beta mode) the power lever controls fuel to the engine, while aft of flight idle (in beta mode) the power lever controls propeller blade angle. The flight idle gate prevents selection of power settings below the flight regime via a spring loaded tee handle.

SPEED LEVER

The baseline propeller lever has been re-designated as SPEED LEVER. The lever operates similar to the baseline lever when the TPE331-12JR engine is in prop governing mode, except that moving the handle all the way aft only selects the minimum prop governor rpm (96%) instead of feather as with the baseline configuration. In beta mode (out of prop governing mode), the speed lever selects the engine operating or idle speed of 68% to 96% from the low to high positions.

FUEL SHUTOFF/FEATHER LEVER

The baseline condition lever has been re-designated as the FUEL SHUT-OFF/FEATHER lever. In the Pratt & Whitney configuration, the baseline condition lever mechanically turned the fuel on and off, determined the engine idle speed and was used to start and stop the engine. Because the TPE331-12JR engine normally uses an electric fuel shutoff valve, the fuel SHUTOFF/FEATHER handle is locked in the forward "NORM" position for all normal operations. If the handle is moved to the aft fuel SHUTOFF/FEATHER position, the fuel valve is mechanically closed and the propeller feathering valve is mechanically actuated. If the propeller is off the start locks, it will go into the feather position. The handle locks in both the NORM and SHUTOFF/FEATHER position to prevent inadvertent operation.

ANALOG ENGINE INSTRUMENTS (early modified aircraft)

The OEM torque, inter-turbine temperature (ITT), gas generator speed (Ng), propeller rpm (PROP) and fuel flow gauges have been replaced with new TSO'd instruments built for the SSL modification. The torque gauge has been replaced with an electronic gauge with an analog dial that interfaces directly with the Honeywell torque signal conditioner. The ITT gauge has been replaced with an electronic exhaust gas temperature (EGT) indicator that utilizes an analog dial. The Ng gauge is no longer needed and has been removed. The PROP gauge has been replaced with an electronic rpm gauge with an analog dial. A fuel pressure gauge that measures inter-stage fuel pressure between the low and high pressure engine fuel pumps is placed in the open hole left by the Ng gauge, although the gauge location has shifted. The oil pressure/temperature gauge has been re-marked and calibrated to the new engine limitations of the TPE331-12JR engine. The fuel flow gauge has been re-marked and calibrated to enable display of flow rates up to 600 lbs/hr.

Figure 7-4, Modified Engine Instruments

Figure 7-5, Modified and Existing Engine Instruments

ANALOG/DIGITAL INSTRUMENTS (later modified aircraft)

General Information

The baseline torque, inter-turbine temperature (ITT), gas generator speed (Ng), propeller rpm (PROP), oil temp/pressure, and fuel flow gauges have been replaced with new TSO'd instruments built for the SSL modification. The wet torque gauge has been replaced with an electronic gauge with an analog/digital dial that interfaces directly with the Honeywell torque signal conditioner. The ITT gauge has been replaced with an electronic exhaust gas temperature (EGT) indicator that utilizes an analog/digital dial. The Ng gauge is no longer needed and has been removed. The PROP gauge has been replaced with an electronic rpm gauge with an analog/digital dial. An electronic fuel pressure gauge that utilizes an analog/digital dial measures inter-stage fuel pressure between the low and high pressure engine fuel pumps is placed in the open hole left by the NG gauge, although the gauge location has shifted. The fuel pressure is feed to the instrument via a pressure transducer mounted on the right side of the engine mount. A new electronic oil pressure/temperature gauge that utilizes an analog dial with dual needles. The gauge reads both engine oil temperature and pressure electrically rather than a wet pressure system as before. The pressure is fed to the oil pressure gauge via pressure transducer mounted on the right side of the engine mount. An electronic fuel flow gauge utilizing an analog/digital dial measures fuel flow rates up to 600 lbs/hr. The fuel flow gauge receives the flow rate from a transmitter mounted on the left side of the engine. There have been no changes to the OEM fuel quantity gauges.

Figure 7-5A, New Analog/Digital Instruments

Figure 7-5B, New Analog/Digital Instruments

Basic Engine Instrument Characteristics

- Each instrument is DC powered and protected by its own 5 amp circuit breaker
- Each instrument is microprocessor controlled and displays an analog needle as well as a digital display except for the oil pressure/temperature gauge that is an analog only display.
- The analog displays are internally backlit and require no external lighting. The back lighting is controlled by the engine instrument rheostat switch.
- The LED digital display will display a value proportional to the sensor data. In the event of a sensor failure, the digital display will show dashes (------) across the display.
- The brightness for the LED digital display is controlled by the annunciator panel DAY/NIGHT switch.
- Each gauge is equipped with a red LED status light that is typically located at the 12 o'clock position on the dial face. If the instrument fails a self-test, the LED will flash red at a rate of 4 times a second for approximately 30 seconds. The instrument will constantly monitor sensor reasonableness, and if the instrument senses a signal less than or greater than the pre-programmed sensor reasonableness values, the instrument will indicate a sensor failure by flashing the red LED at a rate of 8 times per second.
- The pointer operation, during normal operation, will deflect to a value proportional to the sensor data. In the case of an instrument failure, the pointer will go to the park position and remain there until the condition no longer exists.
- Engine Instrument exceedances shall be displayed as follows:
    - The instrument status LED shall flash red at a rate of 4 cycles per second and then become steady after 30 seconds
    - If the instrument has a digital display, the display shall show a checkerboard pattern.

Instrument Self Test

During initial power up the gauge will perform a self-test as follows:

- Digital display shows "OKAY" followed by the display name i.e. "TRQ", followed by "------". Once the test is complete the digital display shows the actual engine indication.
- The status LED flashes red twice and then extinguishes.
- The analog pointer is driven off scale to the full scale position followed by off scale to the low position and then finally displays the actual engine indication.

TORQUE INDICATOR

The TPE331-12JR uses a two-channel strain gauge system that is fed to a remotely mounted signal conditioner.

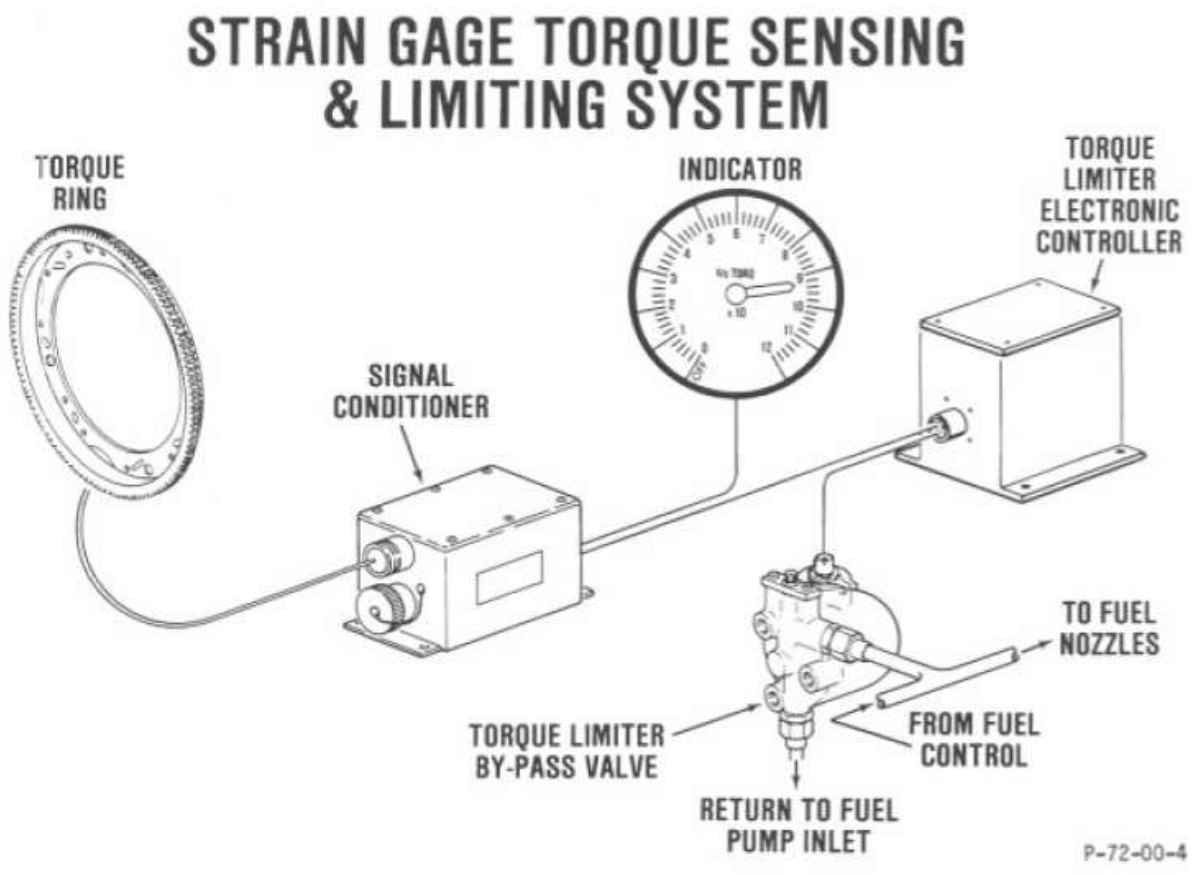

Figure 7-6, TPE331-12JR Torque Indicating System

SINGLE REDLINE CONTROLLER and TORQUE & TEMPERATURE LIMITER

The engine installation utilizes the Honeywell torque and temperature limiter (TTL) system and Honeywell single redline control (SRL) system that are certificated as part of the engine type certificate.

SINGLE RED LINE (SRL) CONTROL SYSTEM

With the TPE331-12JR, the maximum exhaust gas temperature (EGT) for takeoff and continuous operation is OAT (outside air temperature) dependent. The SRL system provides the pilot with a single EGT redline of 650ºC for all operations regardless of OAT, altitude and pressure. This Aircraft Flight Manual Supplement also provides a look-up table for “SRL Inoperable” or “SRL off” maximum EGT for a given condition.

Another function of the SRL system is an auto-start function which reduces pilot workload by utilizing several inputs and speed switches to control the engine start phase.

TORQUE AND TEMPERATURE LIMITING (TTL) SYSTEM

The TTL system provides torque and temperature limiting via a TTL computer and a torque limiter located on the engine to prevent the pilot from exceeding the 650ºC EGT limit or the maximum torque limit of 2972 ft-lbs (or 100%). The TTL computer receives inputs from the SRL computer for temperature limiting and the strain gage signal conditioner to determine torque limiting on the engine. If either parameter is exceeded, the TTL computer will actuate the torque limiter to reduce fuel flow to the engine.

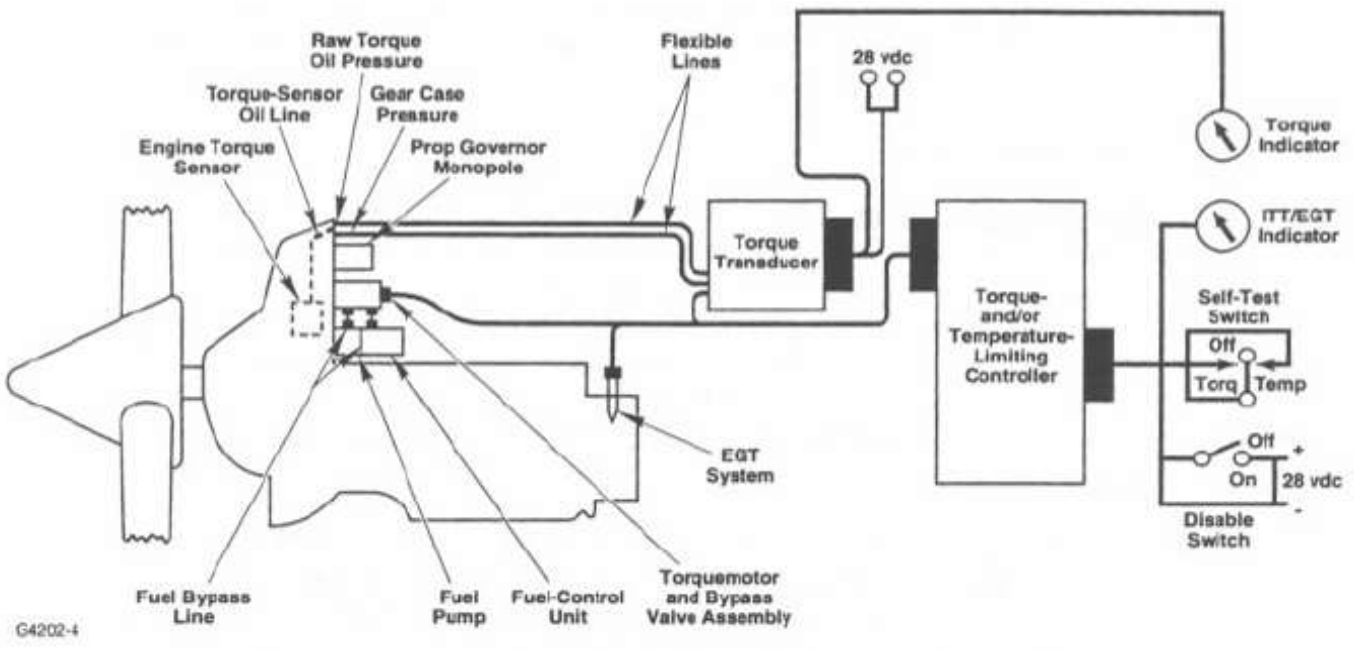

Figure 7-7, TTL System Schematic

ENGINE AND PROP RPM INDICATOR

The engine and propeller rpm indicator is located on the upper portion of the instrument panel. The instrument indicates the percentage of engine rpm based on a figure of 100% at 41,760 rpm. The analog RPM gauge is electrically operated from an engine-driven tach generator located on the back of the gearbox. The analog/digital RPM gauge is DC powered and driven receives is signal from the tach generator just as the pure analog gauge.

EXHAUST GAS TEMPERATURE (EGT) INDICATOR

The exhaust gas temperature (EGT) indicator is located on the upper portion of the instrument panel. The instrument displays the gas temperature after leaving the turbine section in the exhaust. Instrument markings indicate the exhaust temperature from 100ºC to 840ºC (or 900ºC on the analog/digital gauges) with a red triangle indicating the maximum starting temperature of 770ºC. Normal SRL operation uses a 650ºC maximum takeoff and cruise EGT. In the event the SRL is turned off or inoperable, the pilot must reference the following table to determine maximum EGT for takeoff and cruise, because EGT is OAT dependent.

Honeywell TPE331-12JR Manual Mode (SRL "OFF" or INOP) EGT Table

OAT (ºC)	SRL "OFF" EGT @ 100%RPM (ºC)	SRL "OFF" EGT @ 96%RPM (ºC)
-60	556	535
-55	558	537
-50	559	539
-45	561	540
-40	563	542
-35	564	544
-30	566	546
-25	568	547
-20	569	549
-15	574	551
-10	578	552
-5	582	554
0	587	556
5	591	557
10	595	561
15	600	565
20	604	569
25	608	574
30	613	578
35	617	582
40	622	587
45	626	591
50	630	596
55	635	600
60	639	605

Table 7-3, Maximum EGT Limits (SRL OFF)

FUEL FLOW INDICATOR

Early Modified Aircraft: The fuel flow indicator is the same system as that used in the unmodified aircraft, except that the indicator has been recalibrated and the face of the indicator has been re-screened to indicate up to 600 lbs/hr of fuel flow.

Later Modified Aircraft: The fuel flow indicator is a new microprocessor controlled gauge that uses a flow transmitter to indicate fuel flow rates from 0-600 lbs/hr with both an analog and digital readouts.

OIL PRESSURE GAGE and OIL TEMPERTURE GAGE

Early Modified Aircraft: The oil temperature/oil pressure gage is the same as that used in the unmodified aircraft, except the face has been re-screened and calibrated for the Honeywell engine.

Later Modified Aircraft: The oil pressure/temperature gauge is a new microprocessor controlled gauge that uses a pressure transducer and temp bulb to indicate both pressure and temperature in an analog readout.

NEW ENGINE BREAK-IN AND OPERATION

There are no specific break-in procedures required for the Honeywell TPE331 engine. The engine may be safely operated throughout the normal ranges authorized by the manufacturer at the time of delivery.

ENGINE LUBRICATION SYSTEM

The lubrication system includes an internal pressure pump and three internal scavenge pumps. The pressure pump provides jet and mist lubrication of engine bearings and gears. The scavenge pumps, two in the reduction gear section (in a single housing) and one in the turbine section, return the lubricating oil to the oil cooling system, oil tank assembly, and oil-to-fuel heat exchanger for fuel filter anti-icing. An oil vent valve unloads the oil pumps (gearbox scavenge and pressure) during starting. The lubrication system also supplies actuating oil to the propeller control system and to the torque sensing components. The system also includes an oil temperature bulb and magnetic drain plug for indication of oil temperature and the presence of magnetic particles in the oil.

A remote mounted oil cooler is mounted on the right side of the engine mount. Heated oil scavenged from the reduction gearbox is routed to the oil cooler via a hose along the right side of the engine. A thermal bypass valve (vernatherm) opens to circulate oil through the cooler if the oil temperature is above 160ºF. Otherwise, oil is routed past the cooler and returns via a hose to the oil tank.

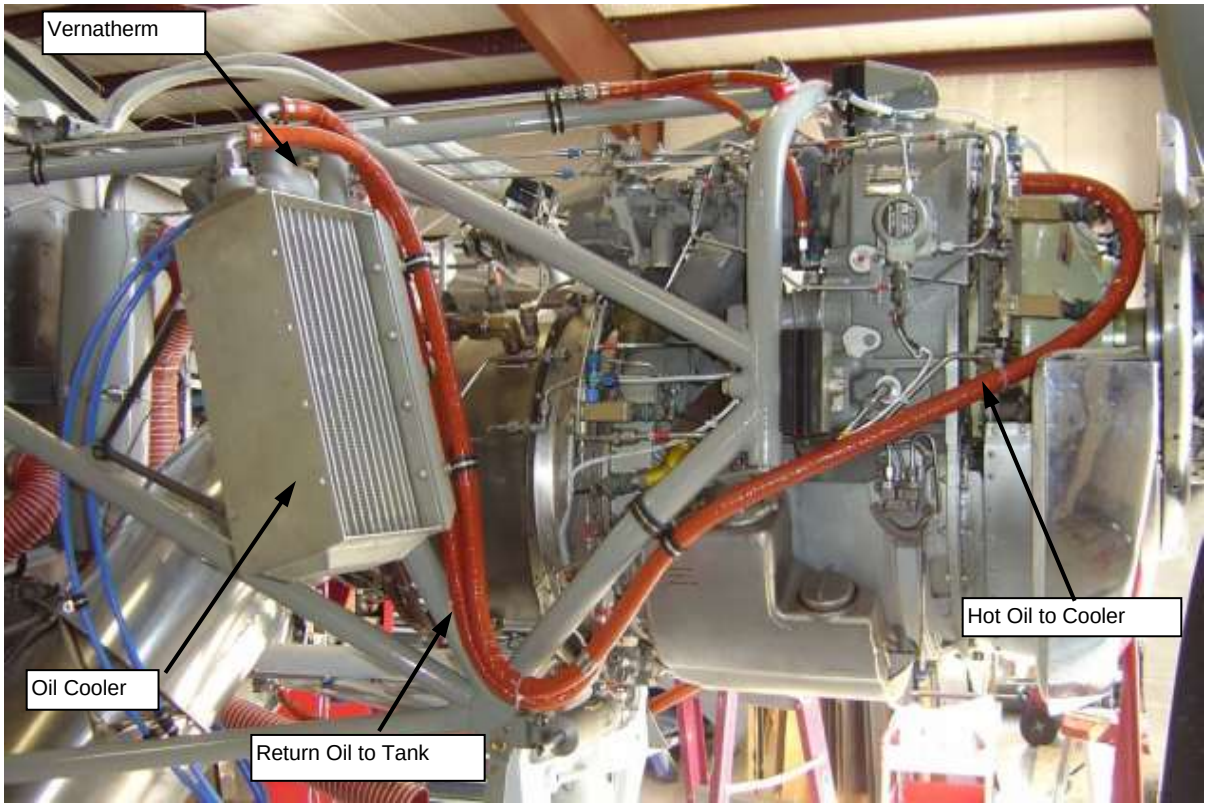

Figure 7-8, Oil Cooler Installation

The engine is certified to operate with four different, interchangeable oil coolers. The coolers are virtually identical in size and relative performance and all four units use the same Standard Thompson 8A680-05 vernatherm.

IGNITION SYSTEM

The ignition system consists of an ignition exciter box, two high tension leads, two spark igniters, an ignition monitor light on the annunciator panel, an auto-ignition pressure switch, an ignition switch, and a starter switch. Electrical energy from the exciter box, mounted on the left side of the engine, is transmitted via two high tension leads to two igniters on the engine plenum next to the fuel manifold. The ignition system is normally energized only during the engine start.

The ignition is controlled by two switches located on the start panel labeled IGNITION and START MODE. The ignition switch has three positions, AUTO, OFF, and CONT. In the AUTO position with the engine running, the ignition is armed in the event of an engine failure. The ignition is activated by the auto-ignition pressure switch thru the negative torque sensing (NTS) system. In the OFF position, the ignition is not active, but can still be powered during the start. In the CONT position, the ignition is on continuously. The ignition is normally operated in the AUTO position, while the CONT position is normally reserved for air starts, or initial application of engine inlet anti-ice, and during encounters with heavy precipitation.

The start mode switch has three positions, PARA/SERIES, PARA, and MOTOR. The switch has no effect other than during the starting or motoring phase. The switch allows ignition during start in all positions except the MOTOR position.

A green annunciator panel light, labeled IGNITION ON, will illuminate when ignition energy is being applied to the igniters. A ten amp push-to-reset type circuit breaker is provided to protect the ignition system primary wiring circuit.

The ignition exciter is a sealed unit containing electronic components encased in an epoxy resin. The unit is energized during the starting sequence to initiate combustion in the combustion chamber and as desired during flight. The exciter transforms 28 VDC input to a high voltage output through solid state circuitry, a transformer, and diodes.

ENGINE INLET and INLET ANTI-ICE SYSTEM

The engine inlet is bolted directly to the engine gearbox and uses P_3 bleed-air to heat the lip when in icing conditions. The inertial separator system has been removed from the aircraft during the Honeywell engine installation. The engine inlet has no screens in front of the compressor, but the centrifugal compressor is resistant to foreign object damage (FOD). To preclude FOD damage, it is recommended, when possible, that minimal reverse be used on un-improved strips during landing and the speed lever be moved to LOW as soon as practical and left there during taxi. Additionally, it is recommended that the speed lever remain low until just prior to commencing the takeoff roll and a rolling takeoff (rather than maximum power- static takeoff) performed when safety permits. Utilizing these procedures will reduce the possibilities of FOD damage to the propeller and engine compressors.

The modified system utilizes engine bleed air to heat the engine inlet and protect it from the accumulation of ice. Bleed air is routed from the engine P_3 port through the inlet anti-ice valve to the inlet. Within the inlet, the hot bleed-air is dispersed over the inlet lip via a piccolo tube with holes that directs the hot air flow to the appropriate locations along the lip. The P_3 air is then exhausted out the back of the inlet and into the nacelle. Refer to figure 7-9.

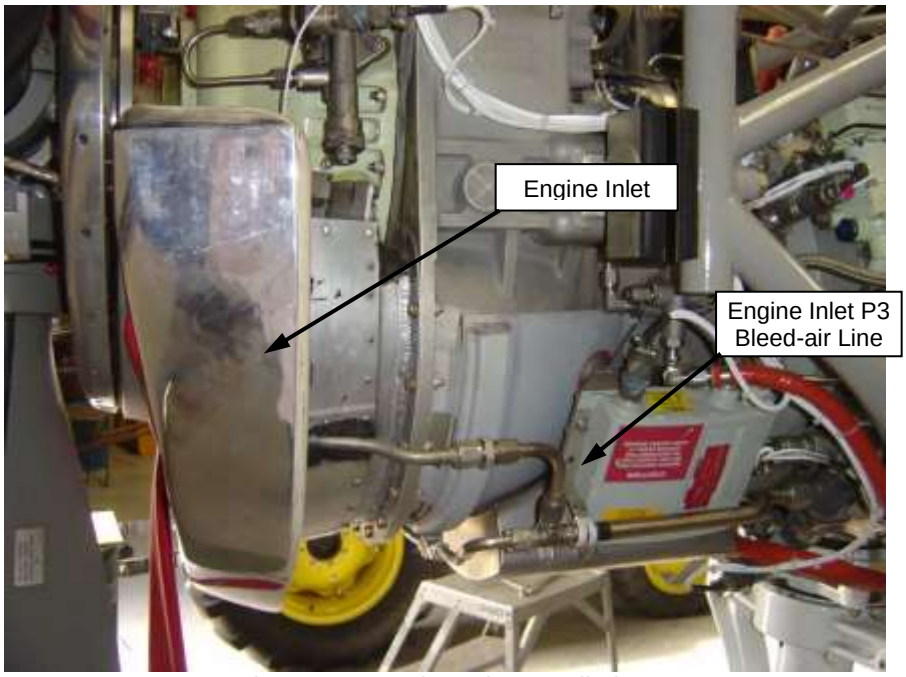

Figure 7-9, Engine Inlet Installation

EXHAUST SYSTEM

The original Caravan exhaust and duct has been replaced by a new stainless steel exhaust nozzle and augmenter/eductor. The high velocity exhaust exits the engine thru the exhaust nozzle into a slightly larger augmenter that overlaps the nozzle by approximately two inches. This overlap creates a vacuum effect to pull warm air out of the engine nacelle and dump it overboard. An additional effect of the augmenter is pre-cooling of the exhaust gases before they exit the cowling. The modified exhaust system is attached to the engine mount and firewall thus providing electrical bonding for transfer of any lightning currents or static build-up.

Figure 7-10, Modified Exhaust System

ENGINE FUEL SYSTEM

The fuel system for the TPE331-12JR engine consists of a fuel pump, fuel metering control, enrichment circuit, electrically operated fuel shutoff valve, flow divider and fuel atomizers. Fuel flows from the aircraft system to the fuel pump assembly, and from the high pressure pump to the fuel control unit, then thru the fuel shutoff valve to the flow divider and finally to the fuel nozzles. Fuel is metered to the engine for all operating conditions. An alternate path from the high pressure pump is used for the fuel enrichment circuit (added fuel for engine acceleration). Fuel can also be routed through a fuel heater to anti-ice the fuel filter.

The fuel shutoff valve is open above 10 percent RPM, and supplies fuel to the flow divider which routes fuel to the primary atomizers for starting and initial acceleration. When additional fuel is required for acceleration, the flow divider routes fuel to the secondary atomizers. The primary atomizers' only solenoid is used to reset the flow divider opening point.

STARTING SYSTEM

Starting system consists of a starter/generator, a starter switch, start mode switch, single red line computer (SRL), and a function control module (FCM). The starter/generator functions as a motor for engine starting and is controlled by speed switches in the SRL computer.

The start mode switch selects the type of start between three modes: parallel/series, parallel, or motor. In the parallel/series mode, the engine begins the cranking mode with the two aircraft batteries in parallel (24 volts) up to 10% where the FCM switches the batteries into series mode (48 Volts) to help acceleration. At 60%, the SRL computer turns off the starter and ignition. The parallel mode is the same except that the batteries do not switch to series at 10%. The motor position allows motoring of the engine with the batteries in parallel and no ignition. Once the engine is running, the starter/generator operates as a generator to run the various electrical needs and provide battery charging.

CAUTION

WHEN AN AUXILIARY POWER UNIT IS USED, ENSURE THE UNIT IS NEGATIVELY GROUNDED AND REGULATED TO 28 VOLTS DC. DUE TO THE POSSIBILITY OF EXCESSIVELY HIGH CURRENT SURGE DURING ENGINE START, IT IS RECOMMENDED THAT THE MAXIMUM STARTING CURRENT FROM AN EXTERNAL POWER SOURCE BE LIMITED TO 1700 AMPERES.

IT IS RECOMMENDED THAT THE START MODE SWITCH BE IN THE PARALLEL POSITION FOR ALL STARTS USING EXTERNAL POWER DUE TO THE HIGH CURRENT. DAMAGE TO THE AIRCRAFT BATTERIES CAN OCCUR USING THE PARALLEL-SERIES MODE WITH EXTERNAL POWER.

NOTE

Refer to the Sections 2 & 4 for starting procedures and starter cycle limitations.

NOTE

Ground power unit starts are required if battery was left connected on an airplane parked longer than ten days and especially in cold weather (temperatures 0ºF and below).

ENGINE ACCESSORIES

FUEL PUMP

The engine-driven fuel pump is mounted on the right side of the accessory gearbox

TACHOMETER-GENERATOR

Engine rpm is indicated on a tachometer on the top, center of the instrument panel. The indicator is powered by a tach generator located on the accessory section of the gearbox and is independent of the aircraft electrical system. The analog/digital RPM gauge is DC powered and receives its signal from the tach generator just as the pure analog gauge.

STARTER/GENERATOR

This modification utilizes the Goodrich 23079-000-1 starter/generator. The generator is designed for 300 amps, but has been de-rated under some circumstances in this installation to 250 amps due to cooling limitations. For flight, the generator has a max continuous operating limit of 300 amps from sea level to FL180 and a max continuous operating limit of 250 amps from FL180 to FL250. For all ground operations, the generator is limited to 200 amps max continuous.

The starter/generator housing encloses all working components, and a terminal block is located on top of the housing to attach electrical leads. The starter/generator is mounted to the left side of the gearbox and drives the engine through the start mode through a splined shaft. A drive coupling shear section is incorporated in the starter/generator between the drive spline and armature to prevent damage to the engine gearbox should a failure occur. Cooling for the starter/generator is provided by an integral fan attached to the aft side of the armature. Supplemental cooling is provided by ram air from an intake on the left side of the top-forward cowling through a hose to the cooling duct mounted on the back of the starter/generator.

EXHAUST GAS TEMPERATURE SENSING SYSTEM

The exhaust gas temperature (EGT) sensing system is designed to provide the operator with an accurate indication of engine operating temperatures taken just aft of the third stage turbine wheel. Eight chromel-alumel probes are connected to an EGT compensator that modifies the EGT signal to ensure engine performance between overhauls. The signal is then sent to the single redline (SRL) controller where it is further modified to provide a corrected EGT to correspond to a 650ºC redline when the SRL system is operating. The signal then goes to the torque and temperature limiter (TTL) and then on to the EGT gage for the pilot to see. With the SRL system OFF, the pilot will be reading compensated EGT on the gauge and must reference the EGT table in section 2 for maximum operating limits, which are lower than the normal 650ºC redline when the SRL system is operating.

CAUTION

USING THE 650ºC REDLINE WITH THE SINGLE RED LINE (SRL) “OFF” OR INOPERATIVE WILL EXCEED MAXIMUM EGT LIMITS AND CAN CAUSE SERIOUS OVER-TEMPERATURE OF THE ENGINE. REFER TO TABLE 2-2 OF THE OPERATING LIMITATIONS FOR THE MAXIMUM TAKEOFF AND CONTINUOUS EGT UNDER THIS CONDITION.

PROPELLER GOVERNOR

The propeller governor assembly is mounted in the lower left-hand position at the rear of the reduction gear section. The propeller governor assembly provides a constant engine speed during the propeller-governing mode of operation. The gear driven propeller governor assembly is composed of an integral gear type pump, metering valve, and flyweight governor. Engine lubricating oil is internally directed to the propeller governor assembly oil pump inlet. The pressure pump boosts the oil pressure sufficiently to position the propeller blade angle in propeller governing mode. The oil flow is metered by the metering valve and controlled by flyweight governor action in response to engine speed change. The oil flow is metered so as to maintain pressure in the pitch control and propeller, setting the blade angle required to maintain the speed setting. The propeller governor contains a speed sensing monopole which furnishes the speed signal to the SRL controller. The propeller governor assembly speed setting shaft is connected to the underspeed governor shaft on the fuel control unit by mechanical linkage.

The propeller governor assembly provides for propeller-governing mode of operation at a choice of engine speed settings. Operator control of the cockpit speed lever determines the amount of preload on the governor speeder spring, which loads the flyweights. The hydraulic reset function acts to increase the governor set point during reverse operation to facilitate reverse mode transition. During the beta-mode of engine operation the propeller governor assembly is not governing and supplies high-pressure oil via the propeller pitch control to the engine propeller control components.

ENGINE MOUNT

The original engine truss has been completely replaced by a new mounting truss constructed of 4130 steel tubing and gussets. Four mounting pads with vibration isolators are being used to support the engine. The mounts consist of three main thrust mounts and a rear mount for lateral and vertical stability. Additional provisions have been made to support the nose landing gear strut. The modified engine truss is corrosion protected both internally and externally with linseed oil and primer/paint, respectively.

ENGINE FIRE DETECTION SYSTEM

No changes have been made to the engine fire detection system other than re-routing the detector loop to accommodate the Honeywell engine installation. For description and operation, refer to the Cessna POH/AFM, Section 7.

ENGINE GEAR REDUCTION SYSTEM

The engine gear reduction system is comprised of the nose cone assembly and the intermediate housing and gear assembly. The nose cone assembly is located on the forward end of the engine above the air inlet. It consists of the output housing, propeller shaft components and NTS system components. The propeller shaft, powered through the reduction gear system, transfers engine power to the aircraft propeller.

The intermediate housing and gear assembly is mounted on the forward side of the accessory drive housing. The intermediate housing and gear assembly is comprised of the gearbox housing, matched bearing and shaft set (high speed pinion), planetary gear assembly, propeller shaft main gear train and the gear case oil scavenge pump assembly. The high speed pinion gear shaft set is driven by the main shaft and, in turn, it drives the propeller shaft main gear train. The planetary gear assembly provides reduction gearing between the main gear train and the propeller shaft. The gear case oil scavenge pump assembly scavenges oil from the bottom of the gear case for recirculation by the oil pressure pump.

CHIP DETECTORS

The engine chip detector is located at the bottom of the engine gear reduction nose case just before the oil scavenge pickup point. The chip detector is electrically connected to an annunciator, labeled CHIP DETECTOR, on the instrument panel. The annunciator will illuminate when metal chips are present. Illumination of the CHIP DETECTOR annunciator necessitates the need for inspection of the engine for abnormal wear.

PROPELLER

The original 3-bladed propeller (106 inch McCauley 3GFR34C703/106GA-O or 100 inch Hartzell HC-B3MN3/M10083 propeller) has been replaced by a 4-bladed, 109.5 inch Hartzell HC-B4TN-5QL/LT10890NK (de-ice) propeller, or HC-B4TN-5NL/LT10890N (non de-ice) propeller, or HC-B4TN-5QL/LT10891NK (de-ice) propeller, or HC-B4TN-5NL/LT10891N (non de-ice) propeller. The new propeller is aluminum alloy and the hub is alloy steel, thus providing electrical bonding for transfer of any lightning currents or static build up. The propeller is hydraulically controlled, constant speed, full feathering, and reversible.

The propeller governor assembly provides for propeller-governing mode of operation at a choice of engine speed settings. Operator control of the cockpit speed lever determines the amount of preload on the governor speeder spring, which loads the flyweights. The hydraulic reset function acts to increase the governor set point during reverse operation to facilitate reverse mode transition. During the beta-mode of engine operation the propeller governor assembly is not governing and supplies high-pressure oil via the propeller pitch control to the engine propeller control components.

The propeller pitch control is composed of a ported sleeve, which is positioned by a cam. The control end of the beta tube (which also has oil-supply ports) rides inside the ported sleeve. The positioning cam-control shaft is connected to the main metering valve power-lever shaft by mechanical linkage. During propeller-governing mode, the propeller pitch control serves no basic function other than oil passage and housing for the beta tube. In beta-mode, (underspeed governing), the propeller pitch control provides for pilot control of propeller blade pitch angle. Operator control is accomplished by manually positioning the propeller pitch control cam. The beta tube oil supply holes are then aligned with the ported sleeve so that the pressure supplied to the propeller balances the propeller piston spring.

Additional drag protection is available in the event of a negative torque sensor (NTS) system malfunction. In the event of an engine failure, the pilot should move the power lever to the full forward position. This action positions the propeller pitch control follower sleeve to hold the propeller to the highest possible blade angle (resulting in the lowest drag) under the conditions of not having normal NTS protection. This redundant safety system is called the beta follow-up system.

The propeller oil-transfer (beta) tube extends aft from a threaded adjustable connection in the propeller dome, through the engine propeller shaft, and into the propeller pitch control. The tube portion, housed within the propeller pitch control ported sleeve has oil supply ports through which propeller governor discharge oil is supplied to the propeller dome. During beta-mode, the beta tube and the propeller pitch control jointly control the oil pressure to the propeller dome to position the blade pitch angle. While in propeller-governing mode, the beta tube performs no control function (due to the ported sleeve position) and serves only as an oil passage.

Propeller feathering is accomplished via the fuel SHUTOFF/FEATHER lever. Moving the lever aft to the SHUTOFF/FEATHER position mechanically closes the engine fuel valve and mechanically pulls the feathering valve. When the feathering valve is pulled, all oil pressure is dumped from the propeller hub and then the propeller spring drives the propeller blades to the feather position. The oil pressure is the only thing that prevents the propeller from going into feather, thus a failure of the engine will automatically result in the propeller bleeding down pressure and moving toward the feather position without actuation of the feathering valve.

FUEL SYSTEM

The wing and reservoir tanks as well as system capacity remain unchanged from the baseline Caravan configuration. The motive flow capability from the engine to the reservoir tank is not being utilized, because the TPE331-12JR engine does not have the capability to support motive flow. The return line has been capped at the firewall. The remaining components of the motive flow system have been retained although they are no longer utilized.

The fuel low pressure switch has been moved from the belly reservoir tank to the engine mount. The switch now uses inter-stage fuel pressure between the low and high pressure engine-driven pumps to determine when to activate the electric boost pump when operating in the NORM position. This allows the retention of the automatic boost pump activation in the event of low fuel pressure. The pressure switch is installed next to oil pressure switch on the engine mount. A fuel pressure gauge has been added as well and uses a pressure transducer mounted on the right side of the engine mount.

A new fuel line has been installed from the existing fuel filter housing just forward of the firewall to the inlet of the engine-driven low pressure fuel pump. Fuel is routed through the low and high pressure engine-driven pumps to the fuel control then on to the flow divider and fuel 10 duplex fuel nozzles in the combustion chamber. For more information on the flow of fuel at the engine, refer to the Engine Fuel System paragraph in this section.

AUXILIARY BOOST PUMP SWITCH

The auxiliary boost pump switch operates the same as the OEM Caravan, except that the fuel low pressure switch that operates the pump in the NORM position has been moved from the belly reservoir tank to the firewall. The switch now uses inter-stage fuel pressure between the low and high pressure engine-driven pumps to determine when to activate the electric boost pump. This allows the retention of the automatic boost pump activation in the event of low fuel pressure. The pressure switch is installed next to the oil pressure switch on the firewall.

FUEL FLOW INDICATORS

Early Modified Aircraft: The fuel flow indicator is the same system as that used in the unmodified aircraft, except that the indicator has been recalibrated and the face of the indicator has been re-screened to indicate up to 600 lbs/hr of fuel flow.

Later Modified Aircraft: The fuel flow indicator is a new microprocessor controlled gauge that uses a flow transmitter to indicate fuel flow rates from 0-600 lbs/hr with both an analog and digital readouts.

FUEL PRESSURE LOW WARNING ANNUNCIATOR

An amber fuel pressure low warning annunciator is located on the annunciator panel. The annunciator is labeled FUEL PRESSURE LOW, and will illuminate when the engine driven fuel pump inter-stage pressure drops below 4.75 psi.

FUEL PURGE KIT (EPA KIT)

To meet the requirements of 14 CFR Part 34, the TPE311-12JR incorporates a fuel purge system that burns excess/residual fuel off during the shut-down process to prevent fuel from spilling overboard. The process occurs automatically by filling a pressure vessel with P_3 engine air during normal engine operation via a high pressure check valve. During the shutdown, an electrically operated solenoid opens to release the high pressure P_3 air into the fuel system at the flow divider to force the residual fuel into the burner to be burned before the flame goes out. During ground runs, the engine must be operated with the speed lever max (or full forward) for a minimum of five seconds to charge the fuel purge system prior to shutdown.

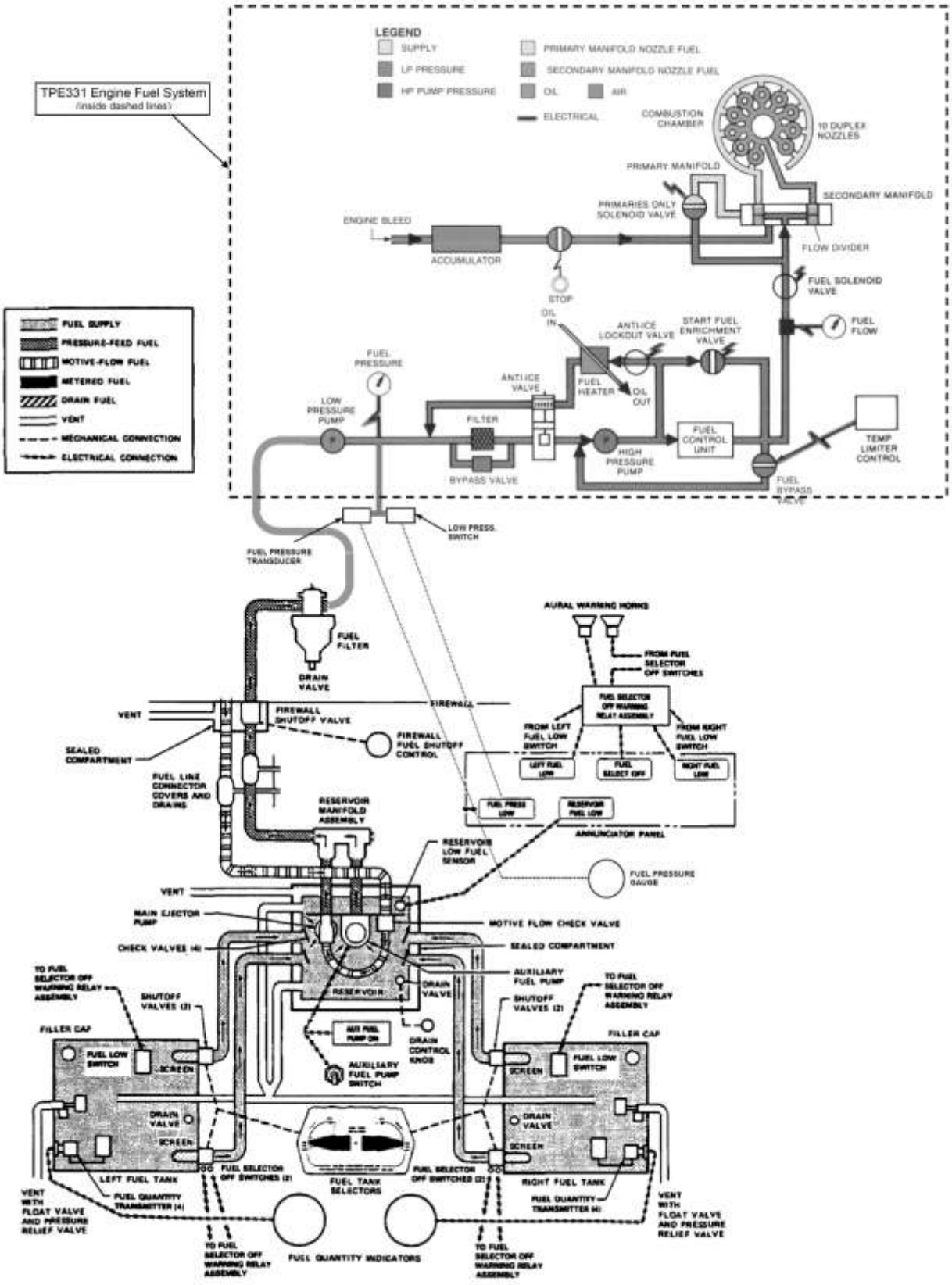

Figure 7-11, Modified Caravan Fuel System

ELECTRICAL SYSTEM

The airplane is equipped with a 28-volt, direct-current electrical system. The system utilizes two 24-volt sealed batteries located on the front side of the firewall, as a source of electrical energy. A 300 amp engine-driven starter generator is used to maintain the batteries state of charge. Power is supplied to most general electrical and all avionics circuits through two general buses, two avionics buses, and a battery bus. The battery bus is energized continuously for memory keep alive, clock, and cabin/courtesy lights 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 avionics switches are turned on.

The optional standby alternator, 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 MODULE

The generator control unit (GCM) is mounted in the electrical junction box mounted on the left, front side of the firewall. The unit provides the electrical control functions necessary for the operation of the starter-generator.

The starter-generator functions as a generator when the START/GEN switch is in the GEN position and the engine rpm is above 60%. The GCM 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 GCM) connects the generator output to the airplane bus. Any time the generator contactor is de-energized, or the generator is not operating, the GCM will illuminate the red GENERATOR OFF light on the annunciator panel.

FUNCTION CONTROL MODULE/ALTERNATOR CONTROL MODULE (PRE SSL SB 208-7)

The Function Control Module/Alternator Control Module (FCM/ACM)) serves two purposes. First, it controls engine starts based on the pilot's selection of either a pure parallel or parallel-series start. The parallel-series start function is designed to provide faster and cooler starts, while the pure parallel start is available in case the parallel-series start fails. Secondly, the FCM/ACM is an Alternator Control Unit for the standby alternator. It regulates the alternator based on load and generator output. With the baseline standby alternator installation, the alternator was in a standby mode waiting for the bus voltage to drop to a preset level. With the modified installation, the standby alternator is actually load sharing with the generator whenever the standby alternator switch is ON. The standby alternator now shares approximately 10-20% of the load the generator sees, but will assume its maximum rated capacity if the generator fails or drops off line. If the load exceeds 75 amps, aircraft loads will be reduced to the operating limits of the alternator in accordance with Section 9, Supplements.

FUNCTION CONTROL MODULE (POST SSL SB 208-7)

The Function Control Module (FCM) performs several functions. It controls the external power relay for the aircraft by checking that the external power is of the correct polarity and is less than 31 volts to prevent damage to the aircraft. It also controls the START annunciation during the start sequence when the start relay is powered. Finally, it controls the VOLTAGE LOW annunciation when the bus voltage drops below 24.5 volts.

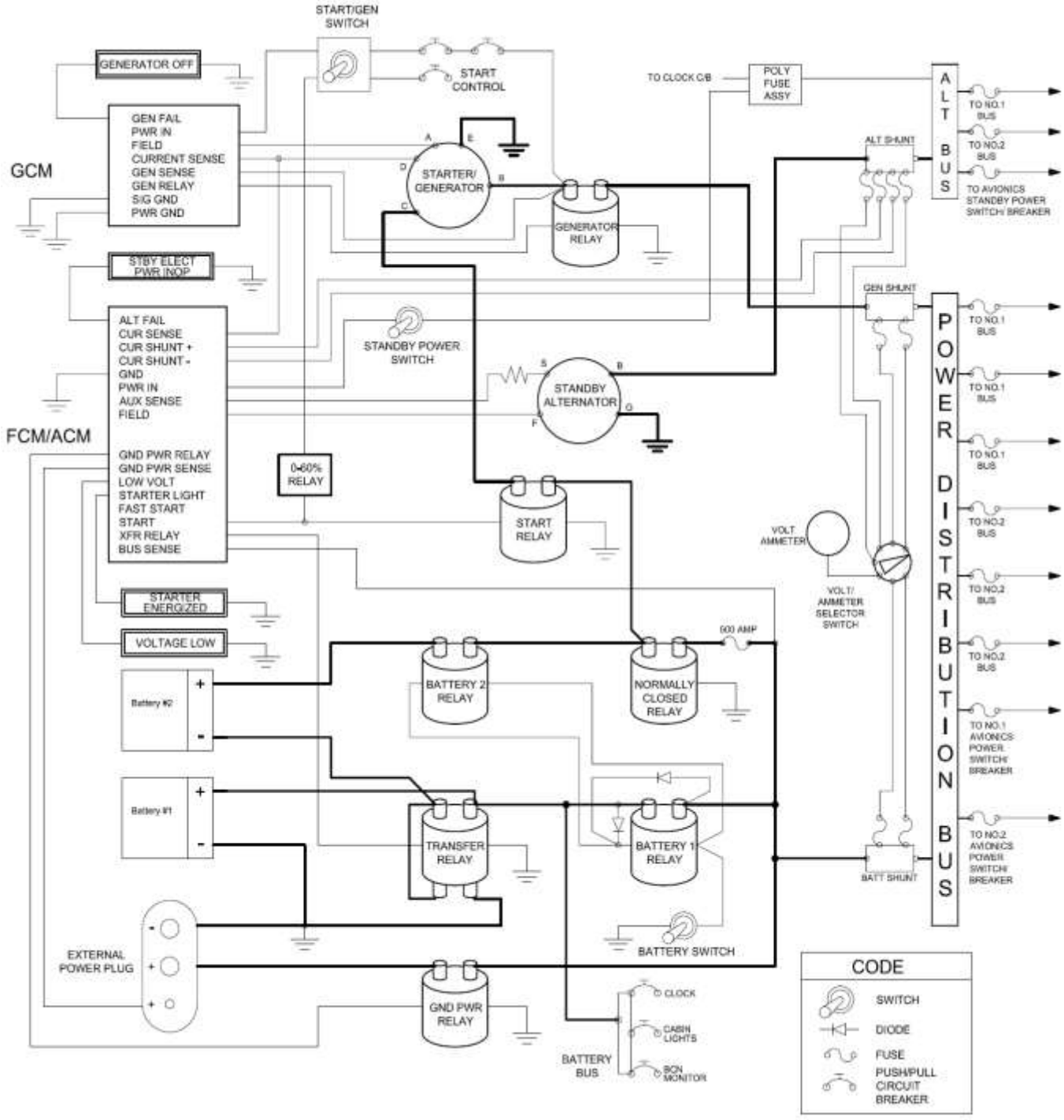

Figure 7-12, Typical Electrical System for PRE Supervan Systems SB 208-7

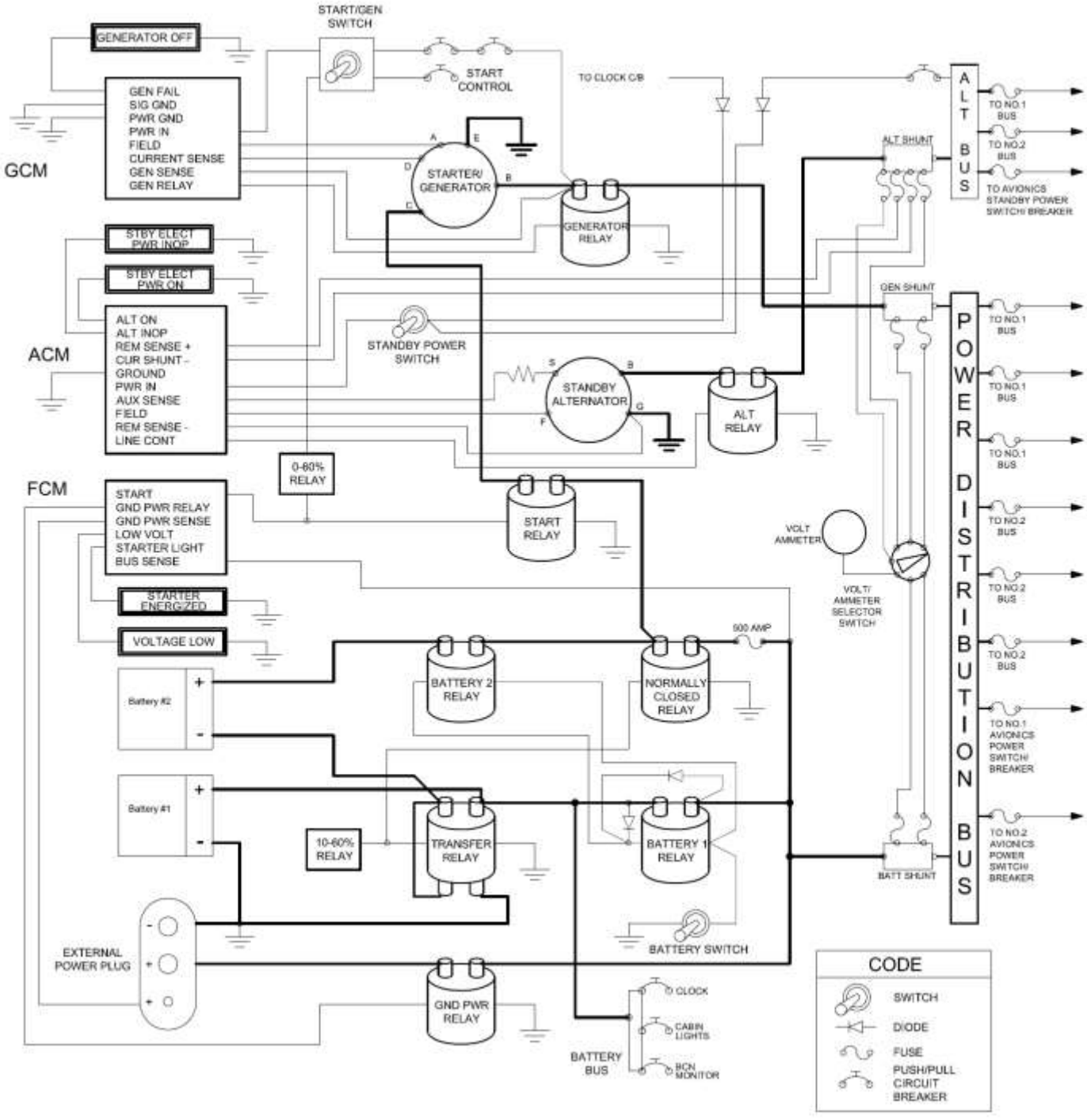

Figure 7-12A, Typical Electrical System for POST Supervan Systems SB 208-7

BATTERY SWITCH

The battery switch is a two-position toggle-type switch, labeled BATTERY, and is located on the start panel to the left of the pilot. 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.

IGNITION SWITCH

The ignition switch has three positions, AUTO, OFF, and CONT. In the AUTO position with the engine running, the ignition is armed in the event of an engine failure. The ignition is activated by the auto-ignition pressure switch thru the negative torque sensing (NTS) system. When a negative torque occurs, the NTS system trips, pressurizing the auto ignition pressure switch which actives the ignition. After approximately 30 seconds, the ignition will turn off and the auto ignition will be re-armed. In the OFF position, the ignition is not active, but can still be powered during the start. In the CONT position, the ignition is on continuously. The ignition is normally operated in the AUTO position, while the CONT position is normally reserved for air starts, or initial application of engine inlet anti-ice, and during encounters with heavy precipitation or heavy turbulence.

Figure 7-13, Start Panel

FUEL VALVE SWITCH

The fuel valve switch controls the engine fuel shutoff valve, fuel purge solenoid, the start fuel enrichment solenoid, and the 10-60% disable relay. The switch has three positions OFF, RUN, and ON/ENRICH. In the OFF position, the engine fuel shutoff valve is closed and the fuel purge solenoid is opened allowing high pressure P_3 air to purge the fuel manifold of remaining fuel. It also powers the 10-60% disable relay to prevent the engine fuel shutoff from being turned on. In the RUN position, the switch de-energizes the 10-60% disable relay and allows the fuel valve to be opened. In the momentary ON/ENRICH position, the engine fuel valve is opened and the start fuel enrichment solenoid is actuated allowing high pressure un-metered fuel to the engine during starting.

STARTER/GENERATOR SWITCH

The starter/generator switch controls engine starting and the generator. The switch has three positions START, OFF, and GEN. In the START position, it initiates the engine start based on the position of the Ground/Air switch and the Start Mode Switch. In the GEN position, power is supplied to the generator control unit (GCU). If the certain conditions are met, the GCU will close the generator contactor and provide field voltage.

GROUND/AIR SWITCH

The ground/air switch selects which mode the aircraft is operating in and determines whether to use the starter or the unfeathering pump to start the engine. The switch has two positions GND and AIR. In the GND position, the starter will be used to crank the engine when the start/gen switch is moved to the START position. In the AIR position, the propeller unfeathering pump will be used to windmill the engine when the start/gen switch is moved to the START position.

UNFEATHERING PUMP SWITCH

The unfeathering pump switch controls the propeller unfeathering pump separately from the starting system. The switch has two positions ON and OFF. The unfeathering pump is used to unfeather the propeller on the ground by moving the power lever to full reverse and turning the unfeathering pump switch ON (Refer to page 4-22). It is used for other maintenance functions as well.

START MODE SWITCH

The start mode switch selects the type of start between three modes: parallel/series, parallel, or motor. In the parallel/series mode, the engine begins the cranking mode with the two aircraft batteries in parallel (24 volts) up to 10% where the FCM switches the batteries into series mode (48 Volts) to help acceleration. At 60%, the SRL computer turns off the starter and ignition. The parallel mode is the same except that the batteries do not switch to series at 10%. The motor position allows motoring of the engine with the batteries in parallel and no ignition.

TORQUE/TEMPERATURE LIMITING (TTL) SWITCH

The torque/temperature limiting switch controls power to the torque/temperature limiter. The switch has two positions ON and OFF. In the ON position, the TTL system is active and limits the torque and temperature of the engine to preset values. The switch receives power from the single redline control unit (SRL) and can be disabled by the SRL power switch.

SINGLE REDLINE (SRL) POWER SWITCH

The single redline power switch controls the power to the single redline control unit (SRL). The switch has two positions ON and OFF. In the ON position, the SRL system is active and controls the engine start using internal speed switches. It also provides a single EGT redline of 650ºC when the engine is

operating above speeds of 80% rpm. In the OFF position, the SRL system is not active and manual mode starts must be accomplished and the maximum operating EGT table in the Limitations Section must be used for all operations. Additionally, the torque/temperature limiting system will be inoperative because it requires the SRL to be active to determine correct engine limiting.

TORQUE/TEMP LIMITER (TTL) TEST SWITCH

The TTL test switch is used to test the torque/temperature limiting system on the ground. The switch has three positions TORQUE, OFF, and TEMP and is a momentary switch outside of the center position. With the engine running and the speed lever high, the pilot should note a slight drop in EGT, RPM, and fuel flow when the switch is moved to the TORQUE and TEMP positions. Refer to the systems checks in the NORMALS section for detailed instructions

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

MAKE SURE 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

No changes from OEM installation.

ANNUNCIATOR LIGHTS

Five lights on the annunciator panel indicate the condition of the standard electrical system to the pilot. These lights are GENERATOR OFF, VOLTAGE LOW, STARTER ENERGIZED, IGNITION ON, and INVERTER INOP (if installed). These lights should be observed at all times during the 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.

CABIN HEATING, VENTILATING, AND DEFROSTING SYSTEM

The function of the modified heating system is identical to the baseline system, however, the mixing air valve forward of the firewall has been removed from the system. The baseline bleed-air heater components are retained and used with the TPE331 engine, except for the new heat exchanger, stainless steel flex lines, and fitting that connects the engine to the bleed valve. All temperature sensors, firewall shut-off means, and ducting aft of the firewall remain unchanged.

MIXING AIR PUSH-PULL CONTROL

The mixing air push-pull control cable has been removed from the system.

SECTION 8
AIRPLANE HANDLING, SERVICE & MAINTENANCE

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INTRODUCTION

For handling, service, and maintenance information not contained in this supplement, refer to the Cessna POH/AFM, Cessna 208 Maintenance Manual, or the Supervan Systems Ltd., Instructions for Continued Airworthiness (ICA) and Maintenance Manual Supplement, Report No. 9004-21.

AIRPLANE INSPECTION PERIODS

FAA REQUIRED INSPECTIONS

As required by the 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 non-compliance.

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.

ENGINE CONDITION TREND MONITORING

Honeywell Aerospace 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 torque, rpm, exhaust gas temperature (EGT), and fuel flow 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, correcting for ambient conditions are also incorporated into the trend monitoring process.

Additional information about both of these methods may be obtained from the following sources:

- Honeywell Authorized Service Center
- Honeywell Aerospace Inc.
  1944 East Sky Harbor Circle
  Phoenix, Arizona 85034
  (800) 601-3099
- Honeywell Maintenance Manual- TPE331-12JR (Report No. 72-01-40)

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.

SERVICING

This section provides instructions for the replenishment of fluids and scheduled and unscheduled servicing applicable to the engine. Personnel shall observe safety precautions pertaining to the individual servicing application.

OIL

Engine oil system servicing and intervals are defined in Honeywell Service Bulletin TPE331-72-0476. The oil system can be serviced on the starboard side of the engine. The oil tank filler cap contains an integrated dipstick for checking oil quantity (refer to the figure below). The dipstick contains two marks ADD and FULL. It takes approximately one U.S. quart to increase the quantity from the ADD to the FULL line. Total tank capacity is 6 U.S. quarts and total system capacity is 10 U.S. quarts.

CAUTION

THE OIL SYSTEM SHOULD ONLY BE SERVICED WITH THE SAME BRAND OF OIL BEING USED IN THE ENGINE. MIXING OF BRANDS OR TYPES CAN CAUSE DAMAGE TO THE ENGINE.

The oil tank drain is located at the bottom of the oil tank. The oil filter is located just below the fuel control.

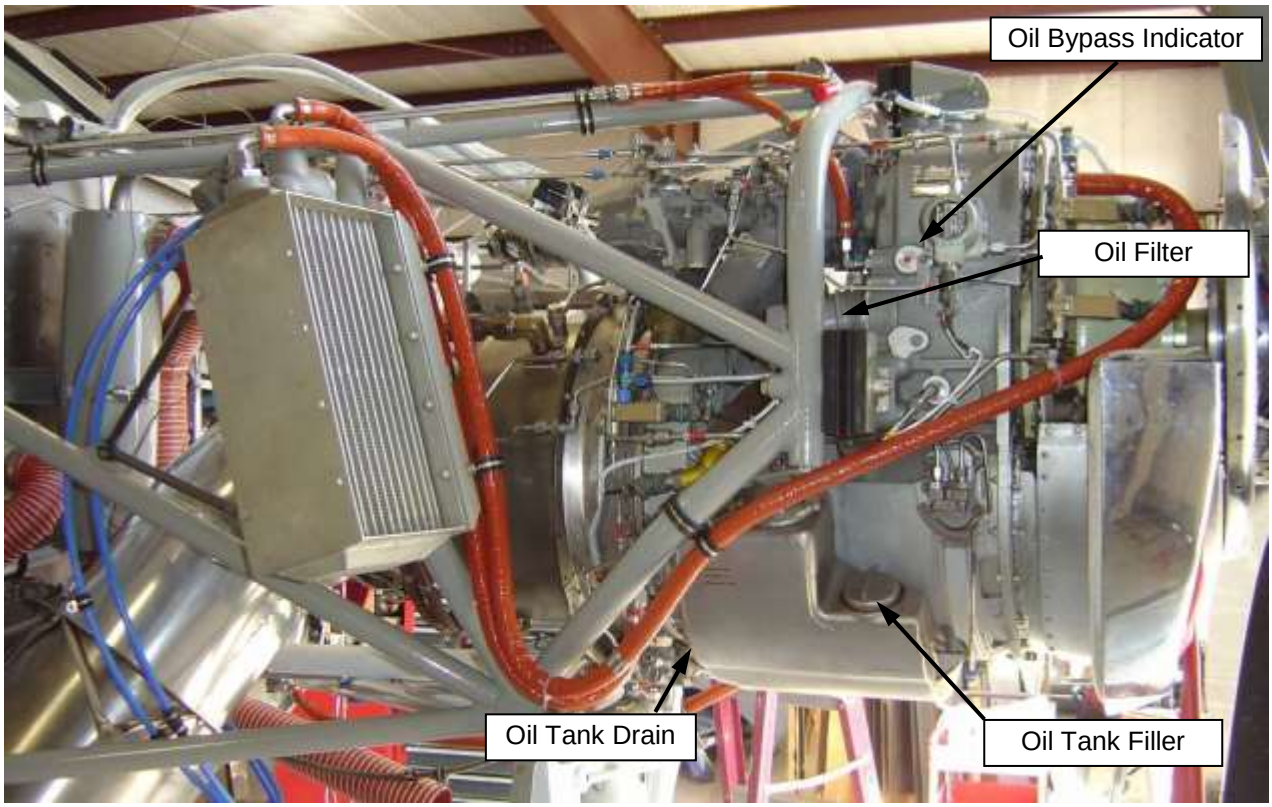

Figure 8-1, Oil System Servicing

1. Approved Lubricants

Type Oil	Mil-Specification	Brand Name
Type II Only	MIL-L-23699	Mobil Jet Oil II BP (Exxon) 2380 Turbo Oil Chevron Jet Engine Oil No. 5 Stauffer Jet II Cal Tech RPM Jet Engine Oil No. 5 Castrol 205 Castrol 5000 Aeroshell/Royco Turbine Oil 500 Aeroshell/Royco Turbine Oil 560 Mobil 254

Table 8-1, Approved Lubricants

Oil Grade (Specification):

Oil conforming to table 1-2 must be used.

Oil Quantity Operating Range:

Fill to within FULL or ADD (as appropriate) on dipstick. It takes approximately 1 U.S. quart from the ADD to FULL marks on the dipstick. To get an accurate reading, it is recommended that the level be checked with hot oil.

WARNING

ENSURE OIL FILLER CAP IS SECURELY INSTALLED. OPERATING THE ENGINE WITH THE FILLER CAP LOOSE WILL RESULT IN EXCESSIVE OIL LOSS AND EVENTUAL ENGINE STOPPAGE.

FUEL

1. General

The fuel capacity and general servicing of the aircraft has not changed from the standard Caravan. For details on capacities and servicing not included in this document, refer to the Cessna 208 Maintenance Manual, Chapter 12.00.00. The types of fuels and additives differ from the Pratt & Whitney installation and are shown below.

2. Approved Fuels

Fuel Type	Honeywell Specification	Class	Freeze Point, C	Equivalent Specification	Grade/ Type	Freeze Point, C	Additives		NATO Code
							Anti-icing	Anti-static	
Kerosene Aviation Turbine Fuel	EMS53111	A	-40	ASTM D1655	A	-40	Conditional	Conditional	----
	EMS51112	A-1	-46	ASTM D1655	A-1	-46	Conditional	Conditional	----
		JP-8	-50	MIL-T-83133D	JP-8	-50	Mandatory	Mandatory	F-34
Wide-Cut Aviation Turbine Fuel	EMS53113	A	-58	MIL-T-5624K	JP-4	-58	Mandatory	Mandatory	F-40
		B	-49	ASTM D1655	B	-48	Conditional	Conditional	----
High Flash Kerosene, Aviation Turbine Fuel	EMS53116	JP-5	-46	MIL-T-5624K	JP-5	-46	Mandatory	Mandatory	F-44
Gasoline Aviation Type	EMS53122 (Grade 100LL)			ASTM D910	80/87	-60	Without	Without	F-12
				ASTM D910	100/130	-60	Without	Without	F-18

Table 8-2, TPE331-12JR Approved Fuel Types

3. Alternate Emergency Fuels:

Aviation Fuel (All grades of military and commercial aviation gasoline).

CAUTION

AVIATION GASOLINE (ASTM D910, GRADE 80/87) IS RESTRICTED TO EMERGENCY USE AND SHALL NOT BE USED IN EXCESS OF 1000 GALLONS PER 100 HOURS OF OPERATION.

AVIATION GASOLINE (ASTM D910, GRADE 100/130 LOW LEAD OR GRADE 100LL PPS EMS53122) IS RESTRICTED TO EMERGENCY USE AND SHALL NOT BE USED IN EXCESS OF 250 GALLONS PER 100 HOURS OF OPERATION. TOTAL USAGE MUST BE LIMITED TO 7000 GALLONS DURING ANY 3000 HOUR PERIOD.

WHEN MIXING THE ABOVE AVIATION GASOLINES, USE THIS FORMULA TO SET PROPORTIONS OF EACH GRADE DURING ANY OVERHAUL PERIOD:

$$\frac{\text{AMOUNT OF GRADE 100LL OR 100/130 (GAL)}}{\text{7000 (GAL)}} + \frac{\text{AMOUNT OF GRADE 80/87 (GAL)}}{\text{30,000 (GAL)}} < 1$$

IF 25 PERCENT OR MORE AVGAS IS USED AT ANY TIME, ONE QUART OF AVIATION GRADE MINERAL OIL MUST BE ADDED TO THE MIXTURE PER 100 GALLONS OF AVGAS.

Whenever any of the above fuels or combinations of the above fuels is changed, make engine speed and power checks prior to flight. Refer to the Honeywell TPE331-12JR maintenance manual for fuel trim, which may be needed to restore speed settings and/or maximum power.

4. Approved Fuel Additives:

Fuels without icing inhibitors may have MIL-I-27686E Fuel System Icing Inhibitor, or an equivalent inhibitor, added, but not in excess of 0.15 percent by volume.

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 additives are approved for use:

a) Shell ASA3 (up to 300 conductivity units, but shall the additive should not exceed 1ppm)
b) If additional biocidal protection is desired, the following additive is permitted for use in certain conditions.
c) Sohio Biobor JF (270ppm maximum {20 ppm of elemental boron} may be used)

CLEANING AND CARE

PROPELLER CARE

Refer to Hartzell Propeller Owner's Manual No. 139 for instructions on propeller care.

ENGINE CARE

Refer to Honeywell TPE331-12JR Maintenance Manual (Report No. 72-01-40) for instructions on engine care.

SECTION 9
SUPPLEMENTS

TABLE OF CONTENTS **Page**

INTRODUCTION

This section consists of a series of supplements, each covering a single system which may be installed in the airplane. Each supplement contains a brief description, and when applicable, operating limitations, emergency and normal procedures, and performance.

Operators should refer to each supplement to ensure that all limitations and procedures appropriate for their airplane are observed.

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.

LIMITATIONS CONTAINED IN THE FOLLOWING SUPPLEMENTS ARE FAA APPROVED. OBSERVANCE OF THESE OPERATING LIMITATIONS IS REQUIRED BY FEDERAL AVIATION REGULATIONS.