PA-46-500TP
M500 NXi

INFORMATION MANUAL

SN4697626, 631 & UP
Manual PN 767-103

VB 2748

WARNING

This Information Manual may be used for general information purposes only.

This Information Manual is not kept current. It must not be used as a substitute for the official FAA approved Pilot's Operating Handbook required for operation of the airplane.

Piper®

M500

PA-46-500TP

SN 4697626, 4697631 AND UP
with Garmin G1000 and GFC 700 Systems

INFORMATION MANUAL

Dick Rochfort, ATP, CFII
Fly Safely
RWR
Pilot Training
Train Often
Master Instructor

MANUAL PART NUMBER 767-103

Published by
TECHNICAL PUBLICATIONS
Piper Aircraft, Inc.
Issued: December 19, 2017
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APPLICABILITY

Application of this handbook is limited to the specific Piper PA-46-500TP model airplane designated by serial number and registration number on the face of the title page of this handbook.

This handbook cannot be used for operational purposes unless kept in a current status.

WARNING

EXTREME CARE MUST BE EXERCISED TO LIMIT THE USE OF THIS HANDBOOK TO APPLICABLE AIRCRAFT. THIS HANDBOOK IS VALID FOR USE WITH THE AIRPLANE IDENTIFIED ON THE FACE OF THE TITLE PAGE. SUBSEQUENT REVISIONS SUPPLIED BY PIPER MUST BE PROPERLY INSERTED.

WARNING

INSPECTION, MAINTENANCE AND PARTS REQUIREMENTS FOR ALL NON-PIPER APPROVED STC INSTALLATIONS ARE NOT INCLUDED IN THIS HANDBOOK. WHEN A NON-PIPER APPROVED STC INSTALLATION IS INCORPORATED ON THE AIRPLANE, THOSE PORTIONS OF THE AIRPLANE AFFECTED BY THE INSTALLATION MUST BE INSPECTED IN ACCORDANCE WITH THE INSPECTION PROGRAM PUBLISHED BY THE OWNER OF THE STC. SINCE NON-PIPER APPROVED STC INSTALLATIONS MAY CHANGE SYSTEMS INTERFACE, OPERATING CHARACTERISTICS AND COMPONENT LOADS OR STRESSES ON ADJACENT STRUCTURES, PIPER PROVIDED INSPECTION CRITERIA MAY NOT BE VALID FOR AIRPLANES WITH NON-PIPER APPROVED STC INSTALLATIONS.

REVISIONS

The information compiled in the Pilot's Operating Handbook, with the exception of the equipment list, will be kept current by revisions distributed to the airplane owners. The equipment list was current at the time the airplane was licensed by the manufacturer and thereafter must be maintained by the owner.

Revision material will consist of information necessary to update the text of the present handbook and/or to add information to cover added airplane equipment.

I. Revisions

Revisions will be distributed whenever necessary as complete page replacements or additions and shall be inserted into the handbook in accordance with the instructions given below:

1. Revision pages will replace only pages with the same page number.
2. Insert all additional pages in proper numerical order within each section.
3. Insert page numbers followed by a small letter in direct sequence with the same common numbered page.

II. Identification of Revised Material

Each handbook page is dated at the bottom of the page showing the date of original issue and the date of the latest revision. Revised text and illustrations are indicated by a black vertical line located along the outside margin of each revised page opposite the revised, added, or deleted information. A vertical line next to the page number indicates that an entire page has been changed or added.

Vertical black lines indicate current revisions only. Correction of typographical or grammatical errors or the physical relocation of information on a page will not be indicated by a symbol.

ORIGINAL PAGES ISSUED

The original pages issued for this handbook prior to revision are given below:

Title, ii through viii, 1-i, 1-ii, 1-1 through 1-18, 2-i, 2-ii, 2-1 through 2-36, 3-i to 3-iv, 3-1 through 3-84, 4-i, 4-ii, 4-1 through 4-36, 5-i, 5-ii, 5-1 through 5-162, 6-i, 6-ii, 6-1 through 6-64, 7-i, 7-ii, 7-1 through 7-80, 8-i, 8-ii, 8-1 through 8-34, 9-i, 9-ii, 9-1 through 9-66, and 10-i, 10-ii, 10-1 through 10-2.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS

Current Revisions to the PA–46–500TP M500 Pilot's Operating Handbook, Report VB–2748 issued December 19, 2017.

Revision Number and Code	Revised Pages	Description of Revisions	FAA Approved Signature and Date
Rev. 1 (PR180403)	ii	Updated copyright.	
	v	Added Rev. 1 to L of R.	
	2-i	Revised T of C.	
	2-7	Revised Para. 2.13.	
	2-8	Relocated text to page 2-8.	
	4-9	Revised Para. 4.5b.	
	4-10	Revised Para. 4.5c.	
	4-12	Revised Para. 4.5c.	
	4-13	Revised Para. 4.5c.	
	4-15	Revised Para. 4.5e.	
	7-6	Revised Para. 7.7.	
	7-6a, -6b	Added pages. Added Fig. 7-1 Woodward FCU Condition Lever.	
	7-47, -48	Revised Figure numbers.	
	7-50	Revised Figure number.	
	7-55, -56	Revised Para. 7.23.	
	7-57 thru -70	Revised Figure numbers. Revised Fig. 7-11.	Eric A. Wright
	7-74	Revised Figure numbers.	April 3, 2018
Rev. 2 (PR190221)	ii	Updated copyright.	
	v	Added Rev. 2 to L of R.	
	1-7, -8	Revised Para. 1.21.	
	1-8a thru 1-8j	Added pages for table.	
	2-10	Revised Para. 2.27.	
	2-13, -14	Revised Para. 2.51.	
	2-15	Revised Para. 2.51.	
	2-17, -20	Revised Para. 2.51.	
	2-20a, 2-20b	Added pages for Para. 2.51. Added Flight Stream 510.	
	3-iii	Revised T of C.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (continued)

Revision Number and Code	Revised Pages	Description of Revisions	FAA Approved Signature and Date
Rev. 2 (cont.)	3-56	Revised Para. 3.41l.	
	4-21	Revised Para. 4.5i Note.	
	4-29	Revised Para. 4.5p Note.	
	4-34	Revised Para. 4.11.	
	7-6a	Revised Para. 7.7.	
	7-6b	Revised Figure 7.1.	
	7-6c, -6d	Added pages -6c and -6d. Added Figure 7.2.	
	7-19 thru 7-20	Relocated text to page 7-20 and page 7-20a.	
	7-20a, -20b	Added pages.	
	7-21	Relocated text to page 7-20a and added WireAware.	
	7-24 thru 7-25	Revised TAWS-B alerts and make table additions.	
	7-37	Revised Audio Panel text.	
	9-63	Revised Supplement 5.	Eric A. Wright
	9-65	Revised Supplement 6.	February 21, 2019
Rev. 3 (PR190402)	i	Added EASA approval.	
	vi	Added Rev. 3 to L of R.	
	2-13, -14	Revised Para. 2.51.	
	2-15	Revised Para. 2.51.	
	2-17, -18	Revised Para. 2.51.	
	4-7	Revised Para. 4.5a.	
	5-40	Revised Figure 5.29.	
	5-106	Revised Figure 5.163.	
	7-8, -9	Revised Para. 7.9.	
	7-21	Revised WireAware text.	
	7-24	Revised TAWS note.	
	7-41, -42	Revised Para. 7.11.	
	8-31, -32	Revised Para. 8.37.	Eric A. Wright
	9-56	Revised Supplement 4.	April 2, 2019

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TABLE OF CONTENTS

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GENERAL

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SECTION 1

GENERAL

1.1 INTRODUCTION

This Pilot's Operating Handbook is designed for maximum utilization as an operating guide for the pilot. It includes the material required to be furnished to the pilot by the Federal Aviation Regulations and additional information provided by the manufacturer and constitutes the FAA Approved Airplane Flight Manual.

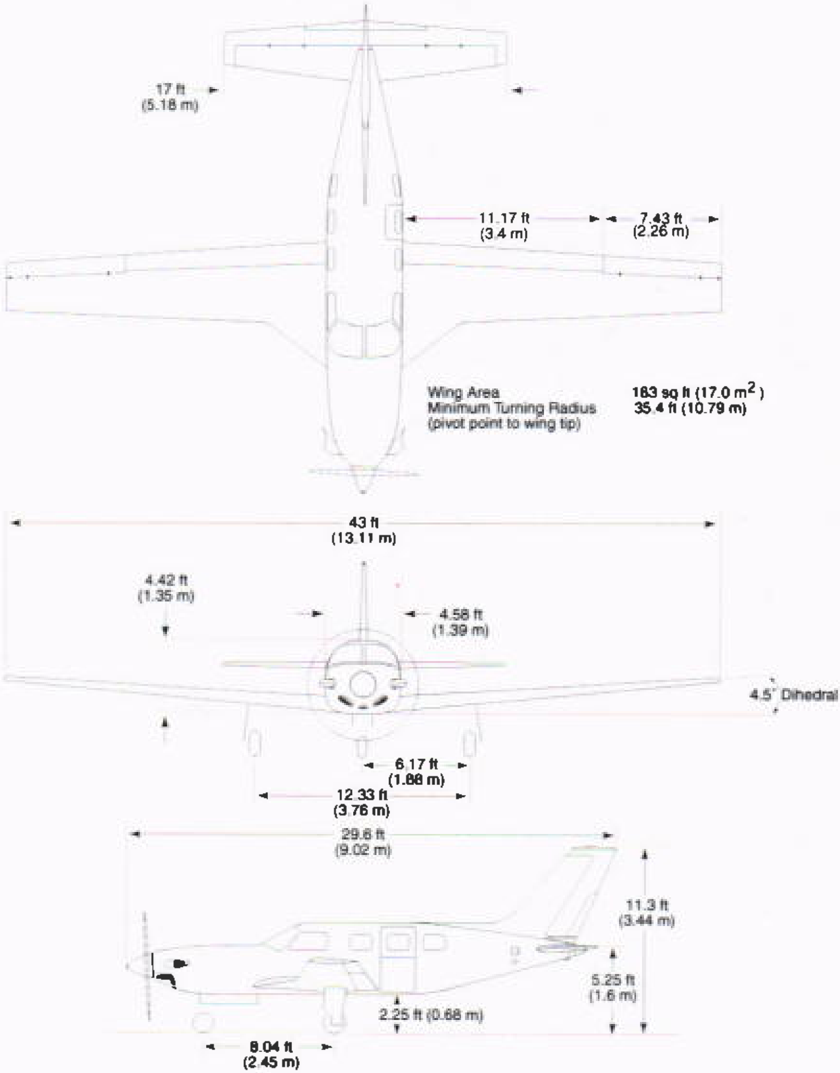
This handbook is not designed as a substitute for adequate and competent flight instruction, knowledge of current Airworthiness Directives, applicable Federal Aviation Regulations or Advisory Circulars. It is not intended to be a guide for basic flight instruction or a training manual and should not be used for operational purposes unless kept in a current status. The pilot should study the entire handbook to familiarize himself with the limitations, performance, procedures and operational handling characteristics of the airplane before flight.

Assurance that the airplane is in an airworthy condition is the responsibility of the owner. The pilot in command is responsible for determining that the airplane is safe for flight. The pilot is also responsible for remaining within the operating limitations as outlined by instrument markings, placards, and this handbook.

The handbook has been divided into numbered sections each provided with a finger-tip tab divider for quick reference. Provisions for expansion of the handbook have been made by the deliberate omission of certain paragraph numbers, figure numbers, item numbers and pages noted as being intentionally left blank.

NOTE

In countries other than the United States of America, FAA operating rules may not apply. Operators must ensure that the aircraft is operated in accordance with national operating rules.



THREE VIEW
Figure 1-1

1.3 NOTATIONS

WARNING

Operating procedures or techniques which may result in personal injury or loss of life if not carefully followed or a hazard which may require immediate crew recognition and corrective action.

CAUTION

Operating procedures or techniques which may result in damage to equipment if not carefully followed or the need for immediate crew awareness and possible need for future corrective action.

NOTE

Supplemental information or highlights considered of sufficient significance to require emphasizing.

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1.5 ENGINE

Number of Engines	1
Engine Manufacturer	Pratt & Whitney Canada
Engine Model Number	PT6A-42A

Engine Type

This airplane incorporates a free shaft turboprop engine with 3 axial and 1 centrifugal compressor stages, an annular combustion chamber, and a 3 stage turbine where one stage drives the compressor and a dual stage powers the propeller.

Horsepower Rating and Engine Speed

Takeoff Power	500 shp
Maximum Continuous	500 shp
Compressor Turbine Speed (Ng)	38,100 rpm (101.7%)
Propeller Speed (Np)	2,000 rpm

1.7 PROPELLER

Number of Propellers	1
Propeller Manufacturer	Hartzell
Blade Model	E8501B-3.5
Number of Blades	4
Hub Model	HC-E4N-3Q
Propeller Diameter	Maximum 82.5 in. (209.5 cm) Minimum 81.5 in. (207 cm)

Propeller Type

The propeller assembly consists of a hub unit and four metal blades, and is a hydraulically actuated, constant speed, full feathering and reversible type.

1.9 FUEL

JET FUEL ONLY	
Fuel Capacity	1160 lb/173 U.S. gal. (526.1 kg/654.8 liter)
Unusable Fuel	20 lb/3 U.S. gal. (9.0 kg/11.3 liter)
Fuel	
Fuel, Aviation	Jet A, Jet A-1
Anti-Icing Additive	Refer to latest revision of Pratt & Whitney Service Bulletin 3044 for anti-icing additive conforming to MIL-DTL-85470

1.11 OIL

Oil Capacity	12 qt (11.35 liter)
Oil Specification	Refer to Section 8 for Oil Specifications

1.13 MAXIMUM WEIGHTS

Maximum Ramp Weight	5134 lb (2328.7 kg)
Maximum Takeoff Weight	5092 lb (2309.7 kg)
Maximum Landing Weight	4850 lb (2199.9 kg)
Maximum Weights in Baggage Compartment	100 lb (45.3 kg)
Maximum Zero Fuel Weight	4850 lb (2199.9 kg)

1.15 CABIN AND ENTRY DIMENSIONS

Cabin Width (max.)	49.5 in. (125.7 cm)
Cabin Length (Instrument panel to rear bulkhead)	148 in. (375.9 cm)
Cabin Height (max.)	47 in. (119.4 cm)
Entry Width	24 in. (60.9 cm)
Entry Height	46 in. (116.8 cm)

1.17 BAGGAGE SPACE AFT CABIN

Compartment Volume	20 cu. ft. (0.56 m3)
Entry Dimensions	24 x 46 in. (60.9 x 116.8 cm)

1.19 SPECIFIC LOADING

Wing Loading at 5092 lb (2309.7 kg)	27.8 lb/ft2 (135.9 kg/m2)
Power Loading @ MCP	10.2 lb/SHP (4.62 kg/SHP)

1.21 GARMIN GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS

The Garmin G1000 Integrated Avionics GNSS long range navigation system installed in this airplane is a GPS system with a Satellite Based Augmentation System (SBAS) comprised of two TSO-C145d Class 3 approved Garmin GIA 64Ws, three TSO-C146d Class 3 approved Garmin GDU Display Units (1050(2) and 1250A(1)), Garmin-approved GPS/SBAS antennas (GA35), and GPS software version 7.0 or later approved version. The Garmin GNSS navigation system in this aircraft is installed in accordance with AC 20-138D. When all the equipment is operative, the Garmin G1000 system has two independent GNSS long-range navigation systems. Failure of any of the above equipment or the posting of 'BOTH ON GPS1' or 'BOTH ON GPS2' annunciators indicate only one operational GNSS system.

The Garmin G1000 Integrated Avionics GNSS navigation system as installed in this airplane complies with the requirements of AC 20-138D and has airworthiness approval for navigation using GPS and GPS/SBAS (within the coverage of a Satellite Based Augmentation System complying with ICAO Annex 10) for IFR en-route, terminal area, non-precision approach, and approach procedures with vertical guidance operations.

The Garmin G1000 Integrated Avionics GNSS navigation system as installed in this airplane complies with the equipment, performance, and functional requirements established for the following navigation specifications.

1.21 GARMIN GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNAV 10 RNP 10 Oceanic and Remote Areas of Operation (Class II Navigation)	GNSS FDE/RAIM availability must be verified prior to flight. Maximum predicted FDE/RAIM unavailability is 34 minutes. 1 Two GNSS systems required to be operational. (one GNSS system for those routes requiring only one long range navigation system). No time limit using GNSS as the primary navigation sensor. Part 91, Part 91 subpart K, 121, 125, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-105A. FAA AC 91-70B. EASA AMC 20-12.	R	A1	The GPS equipment as installed complies with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace without reliance on other long-range navigation systems, when used in conjunction with the G1000 WFDE Prediction program. 1
B-RNAV / RNAV 5 (Europe)	Must have GNSS/ SBAS capability and availability or GNSS RAIM/FDE availability must be verified prior to flight. Maximum predicted RAIM/ FDE unavailability is 5 minutes. 1 This does not constitute an operational approval.	FAA AC 20-138D. FAA AC 90-96A CHG 1. EASA AMC 20-4A.	R	B2	

1.21 G1000 GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNP 4 Oceanic and Remote Areas of Operation (Class II Navigation)	GNSS FDE/RAIM availability must be verified prior to flight. Maximum predicted FDE/RAIM unavailability is 25 minutes. 1 Two operational long-range nav systems required, (or one navigation system and one GNSS sensor for those routes requiring only one long-range navigation sensor). No time limit using GNSS as the primary navigation sensor. Part 91, Part 91 subpart K, 121, 125, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-105A. FAA AC 91-70B.	R	L1	The GPS equipment as installed complies with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace without reliance on other long-range navigation systems, when used in conjunction with the G1000 WFDE Prediction program. 1

1.21 GARMIN GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNAV 2	Must have GNSS/ SBAS capability and availability or GNSS RAIM/FDE availability must be verified prior to flight. Maximum predicted RAIM/ FDE unavailability is 5 minutes. [1] The GNSS RNAV system is installed and meets the performance and functional requirements of AC 90-100A CHG 2. In accordance with AC 90-100A, CHG 2, Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-100A CHG 2 are authorized to fly RNAV 2 procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-100A CHG 2.	R	C2	Includes RNAV Q and T routes.

1.21 G1000 GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNAV 1	Must have GNSS/ SBAS capability and availability or GNSS RAIM/FDE availability must be verified prior to flight. Maximum predicted RAIM/ FDE unavailability is 5 minutes. 1 The GNSS RNAV system is installed and meets the performance and functional requirements of AC 90-100A CHG 2. In accordance with AC 90-100A, CHG 2. Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-100A CHG 2 are authorized to fly RNAV 1 procedures. Part 91 subpart K. 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-100A CHG 2.	R	D2	Includes RNAV terminal departure and arrival procedures.

1.21 GARMIN GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNP 1	Procedures containing Radius-to-Fix (RF) legs are not authorized. Must have GNSS/ SBAS capability and availability or GNSS RAIM/FDE availability must be verified prior to flight. Maximum predicted RAIM/ FDE unavailability is 5 minutes. 1 In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP 1 procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-105A.	R	O2	Includes RNP terminal departure and arrival procedures.

1.21 G1000 GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNP APCH LNAV minima	Procedures containing Radius-to-Fix (RF) legs are not authorized. Must have GNSS/ SBAS capability and availability or GNSS RAIM/FDE availability must be verified prior to flight. Maximum predicted RAIM/ FDE unavailability is 5 minutes. All instrument approach procedures that are retrieved from the current navigation database are authorized. In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP APCH LNAV minima procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-105A. EASA AMC 20-27A.	R	S1	Includes non-precision approaches based on conventional navigation aids with "or GPS" in the title and area navigation approaches titled "GPS", "RNAV (GPS)", and "RNAV (GNSS)".

1.21 GARMIN GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNP APCH LNAV/ VNAV minima	Procedures containing Radius-to-Fix (RF) legs are not authorized. Must have GNSS/ SBAS capability and availability or GNSS RAIM/FDE availability must be verified prior to flight. Maximum predicted RAIM/ FDE unavailability is 5 minutes. 1 All instrument approach procedures that are retrieved from the current navigation database are authorized. In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP APCH LNAV/VNAV minima procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-105A. EASA AMC 20-27A with CM-AS-002.	R	S2	Includes area navigation approaches titled "RNAV (GPS)" and "RNAV (GNSS)." Vertical guidance is based on GPS/SBAS when within SBAS coverage and by baro-VNAV when outside SBAS coverage, or when SBAS has been pilot disabled for approaches with 'WAAS VNAV NA'. The aircraft complies with the criteria of AMC 20-27 for RNP approaches to LNAV/ VNAV minima, with the exception that VNAV is based on SBAS/GNSS geometric altitude when SBAS/GNSS is available and authorized

1.21 G1000 GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNP APCH LP minima	Procedures containing Radius-to-Fix (RF) Legs are not authorized. All instrument approach procedures that are retrieved from the current navigation database are authorized. In accordance with AC 90-107, Part 91 operators (except subpart K), following the operational considerations and training guidance in AC 90-107 are authorized to fly RNP APCH LP minima procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-107.	N/A	N/A	Includes area navigation approaches titled "RNAV (GPS)" and "RNAV (GNSS)". GNSS/SBAS capability and availability is required for LP procedures.

1.21 GARMIN GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
RNP APCH LPV minima	Procedures containing Radius-to-Fix (RF) Legs are not authorized. All instrument approach procedures that are retrieved from the current navigation database are authorized. In accordance with AC 90-107, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-107 are authorized to fly RNP APCH LPV minima procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D. FAA AC 90-107. EASA AMC 20-28.	B	N/A	Includes area navigation approaches titled "RNAV (GPS)" and "RNAV (GNSS)." GNSS/SBAS capability and availability is required for LPV procedures.
RNP AR APCH					Not Authorized.

1.21 G1000 GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

Navigation Specification	Operational Requirements/ Authorizations	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PNB/	
Advanced RNP See Notes for specific Advanced RNP functions.	This does not constitute an operational approval.	FAA AC 20-138D.	N/A	N/A	RNAV Holding: Supported. RF Legs: Not supported. Parallel Offsets: Supported. Higher Continuity: Supported when both GIA 64 GPS/SBAS receivers are operating and providing GPS navigation guidance. Scalable RNP: Not supported. Fixed Radius Transitions (FRT): Not supported. Time of Arrival Control (TOAC): Not supported.

1.21 GARMIN GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS (continued)

1. FDE/RAIM availability worldwide can be determined via the following:
   - Using the Garmin RAIM/Fault Detection and Exclusion Prediction Tool available on the Garmin website fly.garmin.com.

Also, within the United States:
- Via the FAA's RAIM Service Availability Prediction Tool (SAPT) website: http://sapt.faa.gov.
- Contacting a Flight Service Station (not DUATS) to obtain non-precision approach RAIM.

Also, within Europe:
- Europe's AUGER GPS RAIM Prediction Tool at http://augur.ecacnav.com/augur/app/home.

Verification of FDE/RAIM availability is not necessary if SBAS coverage is confirmed to be available along the entire route of flight.

Garmin International holds an FAA Type 2 Letter of Acceptance (LOA) in accordance with AC 20-153A for database integrity, quality, and database management practices for the Navigation database. Flight crews and operators can view the LOA status at FlyGarmin.com then select" Type 2 LOA Status".

Navigation information is referenced to the WGS-84 reference system.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

The following definitions are of symbols, abbreviations and terminology used throughout the handbook and those which may be of added operational significance to the pilot.

(a) General Airspeed Terminology and Symbols

CAS	Calibrated Airspeed means the indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in "Knots".
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed is the speed of an aircraft as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
KIAS	Indicated Airspeed expressed in "Knots".
M	Mach Number is the ratio of true airspeed to the speed of sound.
TAS	True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility.
V_{FE}	Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(a) General Airspeed Terminology and Symbols (Continued)

V_{LE}	Maximum Landing Gear Extended Speed is the maximum speed at which an aircraft can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{MO}	Maximum Operating Speed is the speed limit that may not be exceeded at any time. V is expressed in knots.
V_O	Maximum Operating Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane. **NOTE** **V_o is defined in accordance with FAR 23 Amendment 45**
V_R	Rotation Speed used for takeoff.
V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
V_{SO}	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration at maximum gross weight.
V_{S1}	Speed or the minimum steady flight speed obtained in a specific configuration.
V_X	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(b) Meteorological Terminology

ISA	International Standard Atmosphere in which: (1) The air is a dry perfect gas; (2) The temperature at sea level is 15° Celsius (59° Fahrenheit); (3) The pressure at sea level is 29.92 in. Hg (1013.2 mb).
OAT	Outside Air Temperature is the free air static temperature obtained either from inflight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.
Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 29.92 in. Hg (1013.2 mb).
Pressure Altitude (P.A.)	Altitude measured from standard sea-level pressure of 29.92 in. Hg (1013.2 mb) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero.
Station Pressure	Actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(c) Power Terminology

Cruise Climb Power	The power recommended to operate the airplane in a cruise climb (a continuous, gradual climb) profile.
Flight Idle Power	The power required to run an engine, in flight, at the lowest speed that will ensure satisfactory engine and systems operation and airplane handling characteristics.
Maximum Continuous Power	The maximum power approved for continuous use.
Maximum Climb Power	The maximum power approved for climb.
Maximum Cruise Power	The maximum power approved for cruise.
Reverse Thrust	The thrust of the propeller directed opposite the usual direction, thereby producing a braking action.
Takeoff Power	The maximum power permissible for takeoff (limited to 5 minutes).
Zero Thrust	The absence of appreciable thrust.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(d) Engine Controls and Instruments

Beta Range	On turbine powered aircraft using fully reversing propellers, this is the range of propeller blade angle movement not controlled by a governor and the propeller control lever. In this range, the blade pitch angle is scheduled by power lever movement and the constant propeller speed mechanism is blocked out.
Constant Speed Range	The engine operating range where the propeller is out of Beta range and operating at a constant rpm.
Gas Generator RPM (Ng)	Indicates the percent of gas generator rpm based on a figure of 101.7% at 38,100 rpm.
ITT Gauge	A temperature measuring system that senses gas temperature in the turbine section of the engine.
Manual Override (MOR)	The device that controls engine power in case of a pneumatic failure in the engine control systems. It can also control engine power in case of a power control linkage failure.
Propeller Feather	This is a propeller pitch condition which produces minimum drag in a flight condition.
Propeller Governor	The device that keeps propeller rpm constant by increasing or decreasing propeller pitch through a pitch change mechanism in the propeller hub.
Propeller RPM (Np)	Indicates propeller speed in rpm.
Py Pressure	P3 pressure (between the engine compressor and the combustor) This pressure is used as a reference for torque limiting and to provide smooth engine acceleration.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(d) Engine Controls and Instruments (Continued)

Tachometer	An instrument that indicates rotational speed. Gas generator tachometers measure speed as a percentage of the nominal maximum speed of the turbines (Ng), while propeller tachometers measure actual propeller rpm. (Np)
Torquemeter	An indicating system that displays the output torque available on the propeller shaft. Torque is shown in foot-pounds.
Torque Limiter	A device which monitors torque pressure and adjusts the Py air pressure to the Fuel Control Unit to prevent an overtorque condition.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(e) Avionics System Abbreviations/Terminology

1	Refers to pilot's side (AHRS1, ADC1, GPS1)
2	Refers to co-pilot's side (AHRS2, ADC2, GPS2)
ADC	Air Data Computer
AFCS	Automatic Flight Control System
AHRS	Attitude and Heading Reference System
EIS	Engine Indication System
FDE	Fault Detection and Exclusion
GCU	Garmin MFD/PFD Control Unit
GDL	Garmin Datalink
GDU	Garmin Display Unit
GEA	Garmin Engine/Airframe Processing Unit
GFC	Garmin Flight Control System
GIA	Garmin Integrated Avionics Unit
GMA	Garmin Audio Panel
GMC	Garmin AFCS Mode Controller
GMU	Garmin Magnetometer Unit
GPS	Global Positioning System
GSA	Garmin AFCS Servo Actuator
GSM	Garmin Servo Mount
GTP	Garmin Temperature Probe (OAT)
GTX	Garmin Transponder
GWX	Garmin Weather Radar
MFD	Multi-Function Display
PFD	Primary Flight Display
SBAS	Satellite-Based Augmentation System
TAWS	Terrain Awareness and Warning System
WAAS	Wide Area Augmentation System

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(f) Airplane Performance and Flight Planning Terminology

Accelerate - Stop Distance	The distance required to accelerate an airplane to a specified speed and, experiencing failure of the engine at the instant that speed is attained, to bring the airplane to a stop.
Climb Gradient	The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.
Demonstrated Crosswind velocity	The velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was demonstrated during certification tests.
MEA	Minimum Enroute IFR Altitude.
Route Segment	A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(g) Weight and Balance Terminology

A.O.D.	Aft of Datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Center of Gravity (C.G.)	The point at which an airplane would balance if suspended. The C.G.'s distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The center of gravity limitations within which the airplane must be operated at a given weight.
Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Basic Empty Weight	Standard empty weight plus optional equipment.
Maximum Landing Weight	Maximum weight approved for touchdown when landing.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes the weight of fuel for start, taxi and run up.)
Maximum Takeoff Weight	Maximum Weight approved for the start of the takeoff run.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (Cont)

(g) Weight and Balance Terminology (Continued)

Moment	The product of the weight of an item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
Payload	Weight of occupants, cargo and baggage.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Unusable Fuel	The quantity of fuel at which the first evidence of malfunctioning occurs under the most adverse fuel feed condition occurring under each intended operation and flight maneuver involving that tank.
Usable Fuel	Fuel available for flight planning.
Useful Load	Difference between takeoff weight, or ramp weight if applicable, and basic empty weight.

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SECTION 2

LIMITATIONS

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SECTION 2

LIMITATIONS

SECTION 2

LIMITATIONS

2.1 GENERAL

This section provides the FAA Approved operating limitations, instrument markings, color coding and basic placards necessary for operation of the airplane and its systems.

Limitations associated with those optional systems and equipment which require handbook supplements can be found in Section 9 (Supplements).

2.3 AIRSPEED LIMITATIONS

SPEED	KIAS	KCAS
Maximum Operating Speed (V_{MO}) Do not exceed this speed in any operation.	188	187
Maximum Operating Maneuvering Speed - (V_O) Do not make full or abrupt control movements above this speed.	127	126
Maximum Flaps Extended Speed (V_{FE}) - Do not exceed this speed at the given flap setting.		
10°	168	167
20°	135	132
36°	118	115
Maximum Landing Gear Extended Speed (V_{LE}) Do not exceed this speed with the landing gear extended.	168	167
Maximum Landing Gear Operating Speed (V_{LO}) - Do not operate the landing gear above this speed.		
Extension	168	167
Retraction	129	128

2.5 AIRSPEED INDICATOR MARKINGS

(Garmin PFD)

MARKING	KIAS	SIGNIFICANCE
Red Line	188 KTS	Maximum Operating Limit (V_{MO}).
White Arc	69 to 118 KTS	Maximum Operating Speed with full flaps extended (V_{FE}).
Green Arc	79 to 188 KTS	Normal operating speed.
Red Line	69 KTS	Stalling speed with landing gear and flaps extended ($V_{SO)}$ at maximum weight.

(Standby Airspeed Indicator)

MARKING	KIAS	SIGNIFICANCE
Red Radial	188 KTS	Maximum Operating Limit (V_{MO})
White Arc	69 to 118 KTS	Maximum Operating Speed with full flaps extended (V_{FE}).
Green Arc	79 to 188 KTS	Normal Operating Speed

2.7 POWERPLANT LIMITATIONS

WARNING

Positioning the power lever aft of the flight idle stop in flight is prohibited. Such positioning may cause loss of airplane control or may result in an engine overspeed condition and consequent loss of engine power.

Engine

Number of Engines	1
Engine Manufacturer	Pratt & Whitney Canada
Engine Model No.	PT6A-42A

The limits presented in the Table 2-1 shall be observed. The limitations presented do not necessarily occur simultaneously. Refer to the Pratt & Whitney Engine Maintenance Manual for specific action should any of the limits be exceeded.

Table 2-1

OPERATING CONDITION (2)	SHP	TORQUE ft-lb (1)	MAX ITT °C	Ng %	Np RPM (11)	OIL PRESS PSI (7)	OIL TEMP °C
Take Off (3)	500	1313	800	101.7	2000	100 - 135	0 - 99
Max Continuous	500	1313	770	101.7	2000	100 - 135	0 - 99
Min. Idle			750 (8)	63 - 65		60 min.	-40 - 99
Starting			1000 (4)			0-200 (13)	-40 min(6)
Transient			850 (12) 880 (4)	104.1 (5)	2205 (9)	40 - 200	99 - 104 (10)
Max Reverse		310 - 390	770		1880	100 - 135	0 - 99

See Notes next page.

2.7 POWERPLANT LIMITATIONS (continued)

NOTES:

(1) Torque limit applies within range of 1600 to 2000 rpm prop shaft, below 1600 rpm torque is limited to 1100 ft. lb.

(2) Engine inlet condition limit for engine operation:
   (a) temperature 46°C (115°F);
   (b) altitude: sea level to 30,000 ft. (temperature lapse rate of 2.0°C (3.7°F) per 1,000 ft. assumed).

(3) This value is time limited to 5 minutes.

(4) This value is time-limited to 5 seconds.

(5) This value is time-limited to 10 seconds.

(6) Limited by oil temperature.

(7) Normal oil pressure with gas generator speed above 72% speed. With engine torque below 1313 ft. lb., minimum oil pressure is 85 psig at normal oil temperature (60 to 70°C). Under emergency conditions to complete a flight, a lower oil pressure limit of 60 psig is permissible at reduced power level, not exceeding 1100 ft. lb.

(8) Applies over range 63 - 65% Ng.

(9) May be employed in an emergency condition, at all ratings, to complete a flight.

(10) Time limited to 10 minutes at any condition.

(11) In flight in the absence of a minimum 40 psig oil pressure, continuous steady state propeller rotation must be prevented by propeller feathering. On the ground, with the engine shutdown, continuous propeller rotation must be prevented.

(12) This value is time limited to 20 seconds.

(13) During extremely cold starts (less than 0°F / -17.7°C), oil pressure may reach 200 psig.

2.7 POWERPLANT LIMITATIONS (continued)

Fuel Limitations

Approved Aviation Fuels .... JET A, JET A-1

Anti-Icing Additive

Anti-icing additive per MIL-DTL-85470 is required for use in the above fuels in the amount by volume of .15% maximum. See Section 8 for blending and handling procedures.

Total Capacity ....1160 lb/173 U.S. gal. (526.1 kg/654.8 liter)

Unusable Fuel.......................................20 lb/3 U.S. gal.(9.07 kg/11.3 liter)

The unusable fuel for this airplane has been determined as 10 lb/1.5 U.S. gal. (4.5 kg/5.6 liter) in each wing in critical flight attitudes.

Usable Fuel.............................1140 lb/170 U.S. gal. (517.1 kg/643.5 liter)

The usable fuel in this airplane has been determined as 570 lb/85 U.S. gal. (258.5 kg/321.7 liter) in each wing.

Total usable fuel in each wing may be reduced by 13 lb/2 U.S.gal. (5.89 kg/7.5 liter) if the engine driven fuel boost pump fails.

Fuel quantity indication is not accurate in uncoordinated flight.

Fuel Imbalance

The maximum allowable fuel imbalance in this airplane is 125 lb (56.6 kg).

NOTE

To ensure balanced fuel condition and avoid adverse effects on fuel quantity indication, minimize or avoid uncoordinated flight.

2.7 POWERPLANT LIMITATIONS (continued)

Oil Limitations

Oil Grade or Specification

Refer to the latest revision of Pratt & Whitney Canada, Service Bulletin 3001 for approved oils. (Refer to Section 8 for Oil Specifications.)

CAUTION

Do not mix brands or types of oils.

Total Oil System Capacity .... 12 U.S. qt (11.35 liter)
Oil Tank Capacity .... 9.2 U.S. qt (8.7 liter)

Propeller Limitations

Propeller Manufacturer	Hartzell
Propeller Model Number	HC-E4N-3Q
Number of Propellers	1
Number of Propeller Blades	4
Propeller Diameter	
Maximum	82.5 in. (209.5 cm)
Minimum	81.5 in. (207 cm)
Propeller Operating Limits	
Maximum Normal Operation	2000 RPM
Maximum Reverse	1900 RPM
Minimum Operation During Ground Operation	1200 RPM

CAUTION

Propeller operation below 1180 RPM is prohibited.

Blade Angles at Propeller Station 30 at Hydraulic Low Pitch Stop.	
Low Pitch Stop Min./Max.	18.9°/19.1°
Feather Min./Max.	84°/85°
Reverse Min./Max.	-9.5°/-10.5°

2.9 STARTER LIMITATIONS

Use of the starter is limited to 30 seconds ON, one minute OFF, 30 seconds ON, one minute OFF, 30 seconds ON, 30 minutes OFF before a fourth start may be attempted.

2.11 GENERATOR/ALTERNATOR LIMITATIONS

Generator/Alternator	Max. Continuous Load (amps)
Starter/Generator	170
Alternator Ground Operation	120
Alternator In Flight	130

2.13 CONTROL LEVER OPERATION

(a) POWER LEVER CONTROL

Power lever operation aft of the flight idle detent is not permitted:

1. When the engine is shut down.
2. During flight.

WARNING

Positioning the power lever aft of the flight idle stop in flight is prohibited. Such positioning may cause loss of airplane control or may result in an engine overspeed condition and consequent loss of engine power.

(b) CONDITION LEVER CONTROL (for condition levers with COLD START position)

CAUTION

Do not use the COLD START position for engine starting when the oil temperature is greater than 0°C as this could result in an over-temperature condition.

1. The COLD START position should only be used during engine starting on the ground when the oil temperature is 0°C (32°F) and below.
2. The COLD START position should not be used during in-flight engine starting.

2.15 CHIP DETECTOR

Takeoff is not approved with CHIP DETECT annunciator illuminated.

2.17 POWERPLANT INSTRUMENT MARKINGS

The powerplant instrument markings are presented in Table 2-2.

Table 2-2

Instrument	Red Line	Yellow Arc	Green Arc	Yellow Arc	Red Line
Propeller Speed (N_p)	2040		1200 - 2000		1190
Engine Speed (N_g)	101.8		0 - 101.7		
Fuel Flow - PPH Flow - KPH			0 - 600 0 - 272		
Oil Pressure - PSI	201	136 - 200	100 - 135	60 - 99 (1) 85 - 99 (2)	59 (1) 84 (2)
Oil Temp. °C	100		0 - 99	-40 - -1	-41
ITT - °C	805 1005 (3)	775 - 800	0 - 770		
Torque Ft - Lb	1313		0 - 1313		

(1) When torque is below 1100 ft. lb.
(2) When torque is greater than or equal to 1100 ft. lb.
(3) ITT red line while the engine is OFF and during engine START is 1005. Red line changes to 805 after engine START.

2.19 WEIGHT LIMITS

Maximum Ramp Weight	5134 lb (2328.7 kg)
Maximum Takeoff Weight	5092 lb (2309.7 kg)
Maximum Landing Weight	4850 lb (2199.9 kg)
Maximum Zero Fuel Weight	4850 lb (2199.9 kg)
Maximum Weight in Baggage Compartment	100 lb (45.3 kg)

NOTE

It is the responsibility of the airplane owner and the pilot to ensure that the airplane is properly loaded. See Section 6 (Weight and Balance) for proper loading instructions.

2.21 CENTER OF GRAVITY LIMITS

Weight	Forward Limit Distance Aft of Datum	Rearward Limit Distance Aft of Datum
5134 lb (2328.7 kg)	141.13 in. (358.47 cm)	147.10 in. (373.63 cm)
5092 lb (2309.7 kg)	140.97 in. (358.06 cm)	147.10 in. (373.63 cm)
4100 lb (1859.7 kg)	137.23 in. (348.50 cm)	147.10 in. (373.63 cm)
3508 lb (1591.1 kg)	135.00 in. (342.90 cm)	143.67 in. (364.90 cm)
3000 lb (1360.7 kg)	135.00 in. (342.90 cm)	140.75 in. (357.49 cm)

NOTE

Straight line variation between points indicated. The datum is located 100.0 in. (254 cm) ahead of the forward pressure bulkhead.

2.23 MANEUVER LIMITS

This is a Normal Category airplane. No acrobatic maneuvers including spins approved.

2.25 FLIGHT LOAD FACTOR LIMITS

Positive Load Factor (Maximum)	
Flaps Up	3.7 g
Flaps Down	2.0 g
Negative Load Factor (Maximum)	-1.48 g

NOTE

No inverted maneuvers approved.

2.27 RUNWAY SURFACE

Takeoff and landing operations are limited to paved runways unless the following applies:

Aircraft equipped with the 102460-036 engine mount (serial numbers 4697241, 4697245 and up, or those aircraft which have incorporated Piper Aircraft Service Bulletin 1154C) may operate on hard dry/wet grass or hard dry dirt surfaces.

When operating on unpaved surfaces, the following limitations apply:

- Use of reverse thrust is prohibited.
- Takeoffs are limited to flap settings of 20° only.
- Use of aft elevator control is required during taxi, takeoff, and landing.
- Takeoff rotation speeds and landing touchdown speeds are limited to a maximum of 85 KIAS.
- Operations limited to short grass. Reference paragraph 8.13 for more information.

2.29 FLIGHT CREW LIMITS

The minimum required flight crew is one pilot in the left seat.

2.31 OUTSIDE AIR TEMPERATURE (OAT - Free Air Static Temperature) LIMITS

	Starting	In-flight
Minimum	-34°C	-54°C
Maximum	+46°C	+46°C

2.33 FUEL TEMPERATURE LIMITS

Minimum Limit

Fuel Type	Starting	In-flight
Jet A	-34°C	-34°C
Jet A-1	-34°C	-41°C

Maximum Limit

Fuel Type	Starting	In-flight
Jet A	+50°C	+50°C
Jet A-1	+50°C	+50°C

2.33 FUEL TEMPERATURE LIMITS (continued)

NOTE

When a mixture of Jet A and Jet A-1 is present in the fuel tanks, the Jet A minimum fuel temperature limit of -34°C must be observed.

2.35 RADAR LIMITATIONS

Do not operate the radar during refueling operations or within 15 feet of trucks or containers accommodating flammables or explosives. Do not allow personnel within 15 feet of area being scanned by antenna when system is transmitting. Radar images beyond approximately 130nm should not be relied upon.

2.37 OPERATING ALTITUDE LIMITATIONS

Flight above 30,000 feet pressure altitude is not approved. Flight up to and including 30,000 feet is approved if equipped with avionics in accordance with FAR 91.

2.39 OXYGEN

A minimum of 800 psi is required for pressurized flight above 25,000 feet.

2.41 CABIN PRESSURIZATION LIMITS

(a) Maximum cabin differential pressure of 5.6 psi.
(b) Pressurized landing not approved.

2.43 MAXIMUM SEATING CONFIGURATION

The maximum seating capacity is 6 (six) persons.

2.45 SMOKING

Smoking is not permitted in the aircraft.

2.47 ICING (Reference Section 9, Supplements, for M500 Aircraft Flight Into Known Icing (FIKI)

2.49 VORTEX GENERATORS

If a total of more than 5 (five) vortex generators are damaged or missing, the aircraft is not airworthy.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS

(a) Cockpit Reference Guide & Pilot's Guide
The latest appropriate revision of the Garmin G1000 Cockpit Reference Guide P/N 190-02381-00 must be immediately available to the flight crew.

Garmin also provides a detailed G1000 Pilot's Guide P/N 190-02380-00. The Pilot's Guide is not required to be on board the aircraft, but the latest appropriate revision should be used to obtain a more in depth description of all the functions and capabilities of the G1000 avionics system.

(b) System Software Requirements
The Garmin G1000 must utilize the following or later FAA approved component software versions:

Component	Identification	Software Version
PFD	Primary Flight Display	20.80
MFD	Multifunction Flight Display	20.80
GMA	Audio Panel	4.21C
AHRS	Attitude and Heading Reference System	2.03
ADC	Air Data Computer	2.03
GIA	Integrated Avionics Unit	2.02
GEA	Engine Airframe Interface Unit	2.10
GPS	Global Positioning System	7.0
GMU	Magnetometer Unit	2.05
GSA	Servo Actuator	3.41

The database version is displayed on the MFD power-up page immediately after system power-up and must be acknowledged. The remaining system software versions can be verified on the AUX group sub-page 8, "AUX SYSTEM STATUS".

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(c) Database

Navigation Database

GPS/SBAS based IFR enroute, oceanic and terminal navigation predicated upon the Garmin G1000 GPS Receiver is prohibited unless the pilot uses a valid, compatible, and current Navigation database or verifies each selected waypoint for accuracy by reference to current data.

Instrument approach navigation predicated upon the Garmin G1000 GPS Receiver must be accomplished in accordance with approved instrument approach procedures that are retrieved from the G1000 Navigation database. The G1000 Navigation database must incorporate the current update cycle and the approach must be retrievable by its procedure name.

TAWS / TERRAIN Database

- Terrain database covers all longitudes and latitudes.
- Obstacle database coverage includes United States, Canada, and Europe.

WireAware Database

- WireAware database coverage includes the United States and portions of Canada and Mexico.

NOTE

Database coverage areas may change over time. Reference the database status page to determine which regions are currently loaded to the system.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(d) Flight Planning

In areas where GPS SBAS coverage is not available, the pilot must verify RAIM availability. See Section 1.21 for available FDE/RAIM prediction programs.

For operations within the U.S. National Airspace System on RNP and RNAV procedures when GPS SBAS signals are not available, the availability of GPS RAIM shall be confirmed for the intended route of flight. In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended route of flight, the flight should be delayed, canceled, or re-routed on a track where RAIM requirements can be met.

For operations within European B-RNAV/RNAV-5 and P-RNAV airspace, if more than one satellite is scheduled to be out of service, then the availability of RAIM/FDE shall be confirmed for the intended flight (route and time). In the event of a predicted continuous loss of RAIM/ FDE of more than five minutes for any part of the intended flight, the flight should be delayed, canceled, or rerouted on a track where RAIM/ FDE requirements can be met.

For operations where the route requires oceanic/remote area (Class II) navigation, the aircraft's operator or flight crew must determine that RAIM/FDE will be available along the intended route of flight. If RAIM/FDE will be unavailable for more than 34 minutes for RNP-10 airspace or 25 minutes for RNP-4 airspace, then the operation must be rescheduled when RAIM/FDE is available.

Both Garmin GPS navigation receivers must be operating and providing GPS navigation guidance to their respective PFD for operations requiring RNP-4 and RNP-10 performance. One navigation system and one GNSS sensor for those routes requiring only one long-range navigation sensor.

When RAIM is required for GPS integrity (GPS SBAS not available) during instrument meteorological conditions (IMC), other non-GPS navigation equipment appropriate to the operation, must be available.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(d) Flight Planning (continued)

When GPS SBAS is available, alternate airport flight planning must be based on the straight-in or circling minimums associated with the following approaches:

(1) The RNAV (GPS) LNAV,
(2) GPS approach procedure or conventional approach procedure with "or GPS" in the title.
(3) Instrument approach procedure that is not GPS–based and is anticipated to be operational and available at the estimated time of arrival.

Upon arrival at the alternate, if the SBAS navigation equipment indicates LNAV/VNAV, or LPV service is available, then the associated vertical guidance and minimums may be used.

When GPS SBAS is not available, alternate airport flight planning must be based on the straight-in or circling minimums associated with the following approaches:

(1) The RNAV (GPS) LNAV,
(2) LNAV/VNAV (based on barometric vertical navigation, baro-VNAV),
(3) Instrument approach procedure that is not GPS–based and is anticipated to be operational and available at the estimated time of arrival.

Filing a GPS-based instrument approach at either the destination or alternate airport is acceptable, but not at both locations. The GPS receiver must have fault detection and exclusion (FDE) capability and the pilot must perform a preflight RAIM prediction at the airport where the RNAV (GPS) approach will be flown.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(e) Enroute

RNP and RNAV routes including Standard Instrument Departures (SIDs) and Obstacle Departure Procedures (ODPs) and Standard Terminal Arrival (STAR) must be loaded into the flight plan from the current database in their entirety, rather than loading route waypoints from the database into the flight plan individually. Whenever possible, RNAV "Q" and RNAV "T" routes should be extracted from the database in their entirety, rather than loading RNAV route waypoints from the database into the flight plan individually. Selecting and inserting individual named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted. Manual entry of waypoints using latitude/longitude or place/bearing is prohibited.

Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

(f) Approaches

"GPS", "or GPS", and "RNAV (GPS)" instrument approaches using the Garmin navigation systems are prohibited unless the flight crew verifies and uses the current Navigation database. GPS based instrument approaches must be flown in accordance with an approved instrument approach procedure that is loaded from the Navigation database.

Not all published Instrument Approach Procedures (IAP) are in the Navigation database. Flight crew planning on flying an RNAV instrument approach must ensure that the Navigation database contains the planned RNAV Instrument Approach Procedure and that approach procedure must be loaded from the Navigation database into the FMS flight plan by its name.

(1) Vertical Guidance
Advisory vertical guidance deviation information is only an aid to help pilots comply with altitude restrictions. When using advisory vertical guidance, the pilot must use the primary barometric altimeter to ensure compliance with all altitude restrictions, particularly during instrument approach operations.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(f) Approaches (continued)

(1) Vertical Guidance (continued)

When GPS SBAS corrections are unavailable or if operating outside of GPS SBAS coverage, instrument approaches utilizing the GPS receiver will be conducted in the approach mode and Fault Detection and Exclusion mode. Loss of Integrity annunciations must not be displayed at the Final Approach Fix. Vertical guidance from GPS will not be available if GPS SBAS corrections are unavailable or if operating outside of GPS SBAS coverage. When outside or on the fringe of the SBAS coverage area, it may be desirable, although not recommended, to disable SBAS. Barometric vertical guidance (Baro-VNAV) may be used for LNAV/VNAV approaches in the absence of SBAS coverage.

IFR non-precision approach with vertical guidance approval using the GPS/SBAS sensor is limited to published approaches within the U.S. and EASA Airspace Systems. Approaches to airports in other airspace are not approved unless authorized by the appropriate governing authority.

(2) GPS Approaches

See Section 1, paragraph 1.21. for approved GPS operations/ approaches.

(3) Non GPS Approaches

The navigation equipment required to perform instrument approach procedures is indicated by the title of the procedure and notes on the IAP chart. Use of the Garmin GPS/SBAS receivers to provide navigation guidance during the final approach segment of an ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for "or GPS" navigation is prohibited. When using the Garmin VOR/LOC/GS receivers to fly the final approach segment, VOR/LOC/GS navigation data must be selected and presented on the CDI of the pilot flying.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(g) Attitude and Heading Reference System (AHRS)

(1) AHRS Operational Area

Operation in the following regions is not authorized due to unsuitability of the magnetic fields near the Earth's poles:

- North of 72° North latitude at all longitudes
- South of 70° South latitude at all longitudes
- North of 65° North latitude between longitude 75° W and 120° W. (Northern Canada)
- North of 70° North latitude between longitude 70° W and 128° W. (Northern Canada)
- North of 70° North latitude between longitude 85° E and 114° E. (Northern Russia)
- South of 55° South latitude between longitude 120° E and 165° E. (Region south of Australia and New Zealand)

Loss of the G1000 heading and attitude may occur near the poles, but this will not affect the GPS track. See Section 2.55 for Standby Attitude Indicator Limitations.

NOTE

In dual GPS installations, only one GPS needs to be available for IFR operations.

(h) Terrain and Obstacle Display

The G1000 terrain and obstacle information appears on the MFD display as red and yellow tiles or towers, and is depicted for advisory information only. Aircraft maneuvers and navigation must not be predicted upon the use of the terrain display.

Obstacles 200 feet and higher are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(i) Datalink Weather Display

Datalink weather is provided by optional XM or Iriduim weather services. The weather information display on the MFD is limited to supplemental use only and may not be used in lieu of an official weather data source.

WARNING

Do not use data-linked weather as the sole means for negotiating a path through a thunderstorm area (tactical maneuvering). Avoid any thunderstorm identified as severe or giving an intense radar echo by at least 20 miles. This is especially true under the anvil of a large cumulonimbus.

(j) Traffic Display

Traffic shown on the display may or may not have traffic alerting available. The display of traffic is an aid to visual acquisition and may not be utilized for aircraft maneuvering.

(k) Synthetic Vision System (SVS)

Use of the Synthetic Vision System display elements alone for aircraft control without reference to the G1000 primary flight instruments or the aircraft standby instrument is prohibited.

Use of the Synthetic Vision system alone for navigation, or obstacle/ terrain avoidance is prohibited.

(l) ChartView, FliteCharts, and SafeTaxi®

The G1000 Integrated Avionics System as installed in this aircraft supports approval of AC 120-76C Hardware Class 3, Software Type B Electronic Flight Bag (EFB) electronic aeronautical chart applications when using current FliteChart or ChartView data.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(l) ChartView, FliteCharts, and SafeTaxi® (continued)

For operations under 14 CFR Part 91, it is suggested that a secondary or back up source of aeronautical information necessary for the flight be available to the pilot in the aircraft. The secondary or backup information may be either traditional paper-based material or displayed electronically. If the source of aeronautical information is in electronic format, operators must determine non-interference with the G1000 system and existing aircraft systems for all flight phases.

Airworthiness approval has not been obtained for the use of EFB in EASA airspace. Geo-referenced data (airplane symbol) presented on moving maps and electronic approach charts must be used for situational awareness only. Paper charts or other EASA approved electronically displayed information must be used as the primary source of aeronautical information. If the source of aeronautical information is electronically displayed, operators must determine noninterference with the G1000 system and existing aircraft systems for all flight phases. For EASA aircraft this limitation supersedes the second paragraph of chapter 2.51(l).

Do not use SafeTaxi®, ChartView, or FliteCharts functions as the basis for ground maneuvering. SafeTaxi®, ChartView, and FliteCharts functions have not been qualified to be used as an Airport Moving Map Display (AMMD). They are intended to improve pilot situational awareness during ground operations and should only be used by the flight crew to orient themselves on the airport surface.

2.51 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(m) Flight Stream 510 (For aircraft operating in EASA airspace)

(1) Data Received by Personal Electronic Devices (PED)
The PED is not approved as the sole source of information to base tactical or strategic decision making and is not approved to replace the information provided by the G1000 GIFD system. The Flight Stream 510 interface and data provided to a portable electronic device is not approved to replace any required or installed aircraft display equipment, including navigation or traffic/weather display equipment. The data presented on the PED may not have the required integrity to be used as the sole source of information to base tactical or strategic decision making.

(2) Flight Plan Transfer
Use of the Flight Stream 510 for flight plan importing during critical phases of flight by the pilot flying is prohibited.

(3) Electronic Flight Bag (EFB)
Use of the Flight Stream 510 interface and data for the purpose of Electronic Flight Bag (EFB) applications is not approved. Use of any device as an EFB may require separate approvals.

(n) Approach Operation Limitations

(1) All TAWS caution and warning aural alerts must be followed immediately upon receipt. Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with terrain/obstacle warnings from the TAWS per FAR 91.223.

(2) When operating single pilot - BARO SYNCH must be ON. When operating two pilot - BARO SYNCH must be OFF.

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2.53 GFC 700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

1. The autopilot and yaw damper must be disengaged during takeoff and landing.
2. Autopilot and yaw damper minimum engagement heights:
   a) 400 feet AGL during takeoff and subsequent climb operations.
   b) 1000 feet AGL during cruise and descent operations.
   c) 200 feet AGL during approach operations.
3. Autopilot minimum approved operating speed:
   a) On approach - 100 KIAS
   b) Other than approach - 90 KIAS
4. Autopilot and yaw damper maximum approved operating speed - 188 KIAS
5. Maximum fuel imbalance during autopilot operations - 125 lb.
6. Maximum autopilot engagement limits:
   a) With Enhanced AFCS Features (optional)
      Pitch UP: 50°
      Pitch DOWN: 50°
      Roll: +/-75°
   b) Without Enhanced AFCS Features
      Pitch UP: 25°
      Pitch DOWN: 20°
      Roll: +/-45°
7. Autopilot approved for Category 1 precision approaches and non-precision approaches only.
8. A pilot with the seat belt fastened must occupy the left pilot's seat during all autopilot operations.

2.55 ASPEN STANDBY INSTRUMENT LIMITATIONS

1. The Aspen Evolution Backup Display (EBD) Pilot's Guide P/N 091-00027-001 Revision A, or later appropriate revision, must be immediately available to the flight crew.
2. The unit's internal battery must checked for proper charge prior to operations in IFR conditions. If the charge level is less than 80%, flight in IFR conditions is prohibited.
3. Use of the EBD for IFR operations within 750 nautical miles of the magnetic North or South Pole is NOT AUTHORIZED.

NOTE

See Section 2.57 Kinds of Operation Equipment List for approved Types of Operations when the EBD has an invalid or failed function.

2.57 KINDS OF OPERATION EQUIPMENT LIST

This airplane may be operated in day or night VFR and day or night IFR when the appropriate equipment is installed and operable.

The following equipment list identifies the systems and equipment upon which type certification for each kind of operation was predicated and must be installed and operable for the particular kind of operation indicated.

NOTE

The following system and equipment list does not include specific flight instruments and communication/navigation equipment required by the FAR Part 91 operating requirements.

System	Number Required	Types of Operation and Remarks (DAY, NIGHT, VFR, IFR and ICING Conditions)
1. **Garmin G1000 System Equipment**		
GDU 1050 Primary Flight Display	1 (#1unit) 2	DAY, NIGHT, VFR IFR, ICING
GDU 1250A Multi-function Display	1	IFR, ICING
GCU 476 MFD/PFD Control Unit (Keypad)	1	IFR, ICING
GIA 64 Integrated Avionics Unit	2	DAY, NIGHT, VFR, IFR, ICING
GEA 71B Engine Airframe Interface	1	DAY, NIGHT, VFR, IFR, ICING
GRS 79 Attitude and Heading Reference System (AHRS)	1 2	DAY, NIGHT, VFR IFR, ICING
GDC 72 Air Data Computer (ADC)	1 2	DAY, NIGHT, VFR IFR, ICING

2.57 KINDS OF OPERATION EQUIPMENT LIST (Continued)

System	Number Required	Types of Operation and Remarks (DAY, NIGHT, VFR, IFR and ICING Conditions)
1. **Garmin G1000 System Equipment (continued)**		
GMU 44 Magnetometer	2	DAY, NIGHT, VFR, IFR, ICING
GMA 350C Audio Panel	1	IFR, ICING
AV1 FAN FAIL AV2 FAN FAIL AV3 FAN FAIL MFD FAN FAIL PFD1 FAN FAIL PFD2 FAN FAIL CAS Messages	6	DAY, NIGHT, IFR, VFR, ICING
2. **Flight Instrumentation**		
Standby Attitude Indicator	1	IFR, ICING
Standby Airspeed Indicator	1	IFR, ICING
Standby Altimeter	1	IFR, ICING
Standby Heading Indicator	1	IFR, ICING
Outside Air Temperature (OAT) Indicator	1	DAY, NIGHT, VFR, IFR, ICING
Clock	1	IFR, ICING

2.57 KINDS OF OPERATION EQUIPMENT LIST (Continued)

System	Number Required	Types of Operation and Remarks (DAY, NIGHT, VFR, IFR and ICING Conditions)
3. **Engine Instrumentation**		
Torquemeter	1	DAY, NIGHT, VFR, IFR, ICING
Propeller Tachometer (Np)	1	DAY, NIGHT, VFR, IFR, ICING
Interstage Turbine Temperature (ITT)	1	DAY, NIGHT, VFR, IFR, ICING
Gas Generator Tachometer (Ng)	1	DAY, NIGHT, VFR, IFR, ICING
Oil Pressure	1	DAY, NIGHT, VFR, IFR, ICING
Oil Temperature	1	DAY, NIGHT, VFR, IFR, ICING
4. **Miscellaneous Instrumentation**		
Fuel Quantity Indicating System	2	DAY, NIGHT, VFR, IFR, ICING
Fuel Temperature Indicator	1	DAY, NIGHT, VFR, IFR, ICING
DC Voltmeter	1	DAY, NIGHT, VFR, IFR, ICING
DC Ammeter (Generator)	1	DAY, NIGHT, VFR, IFR, ICING
DC Ammeter (Alternator)	1	ICING
5. **Equipment/ Furnishings**		
Safety Restraint Each Occupant	AR	DAY, NIGHT, VFR, IFR, ICING

2.57 KINDS OF OPERATION EQUIPMENT LIST (Continued)

System	Number Required	Types of Operation and Remarks (DAY, NIGHT, VFR, IFR and ICING Conditions)
6. **Engine**		
Starter Generator	1	DAY, NIGHT, VFR, IFR, ICING
Alternator	1	ICING
FUEL PRESS LOW CAS Message	1	DAY, NIGHT, VFR, IFR, ICING
L FUEL PUMP ON / R FUEL PUMP ON CAS Messages*	2	DAY, NIGHT, VFR, IFR, ICING
Firewall Fuel Shutoff Valve	1	DAY, NIGHT, VFR, IFR, ICING
7. **Flight Controls**		
Flap Position Indicator	1	DAY, NIGHT, VFR, IFR, ICING
Elevator Trim Position Indicator	1	DAY, NIGHT, VFR, IFR, ICING
Rudder Trim Position Indicator	1	DAY, NIGHT, VFR, IFR, ICING
8. **Ice Protection**		
Pneumatic Deice System (Wing and Empennage Protection)*	1	ICING
Wing Ice Detection Light	1	ICING
Electrothermal Propeller Deice Boots*	1 per Blade	ICING

* Part of Crew Alerting System (CAS) and lighted switch in overhead switch panel.

2.57 KINDS OF OPERATION EQUIPMENT LIST (Continued)

System	Number Required	Types of Operation and Remarks (DAY, NIGHT, VFR, IFR and ICING Conditions)
8. **Ice Protection (cont)**		
Heated Windshield*	1	DAY, NIGHT, VFR, IFR, ICING
Heated Stall Warning Vane*	1	ICING
Heated Pitot Head*	1 (pilot) 2	DAY, NIGHT, VFR IFR, ICING
Alternate Static Source	1	ICING
WDSHLD OVRTMP-CAS Message	1	ICING
Vacuum Ejector	1	DAY, NIGHT, VFR, IFR, ICING
SURF DE-ICE System*	1	ICING
SURF DEICE FAIL CAS Message	1	ICING
STALL HEAT FAIL CAS Message	1	ICING
9. **Landing Gear**		
Hydraulic Pump	1	DAY, NIGHT, VFR, IFR, ICING
HYDR PUMP ON CAS Message	1	DAY, NIGHT, VFR, IFR, ICING
Landing Gear Down Position Indications	3	DAY, NIGHT, VFR, IFR, ICING

* Part of Crew Alerting System (CAS) and lighted switch in overhead switch panel.

2.57 KINDS OF OPERATION EQUIPMENT LIST (Continued)

System	Number Required	Types of Operation and Remarks (DAY, NIGHT, VFR, IFR and ICING Conditions)
10. **Pneumatic / Vacuum**		
Vacuum Indication	1	IFR, ICING
11. **Lights - External**		
Landing Light	1	NIGHT
Position Lights a. Left Wing - Red and White	1 ea.	NIGHT
b. Right Wing - Green and White	1 ea.	NIGHT
Anti-Collision (Strobe) Lights	2	DAY, NIGHT, VFR, IFR, ICING
Taxi/Rec Lights	2	NIGHT
12. **Lights - Cockpit**		
Instrument Panel Switch Lights	AR	NIGHT
Instrument Lights	AR	NIGHT
Dome Lights	1 (pilot)	NIGHT

2.57 KINDS OF OPERATION EQUIPMENT LIST (Continued)

System	Number Required	Types of Operation and Remarks (DAY, NIGHT, VFR, IFR and ICING Conditions)
13. **Pressurization**		
Cabin Altimeter	1	DAY, NIGHT, VFR, IFR, ICING
Cabin Differential Pressure Indicator	1	DAY, NIGHT, VFR, IFR, ICING
Cabin Vertical Speed Indicator	1	DAY, NIGHT, VFR, IFR, ICING
Outflow Valve	2	DAY, NIGHT, VFR, IFR, ICING
CABIN ALT 10K CAS Message (Amber)	1	DAY, NIGHT, VFR, IFR, ICING
CABIN ALT 12K CAS Message (Red)	1	DAY, NIGHT, VFR, IFR, ICING
14. **Miscellaneous System**		
Stall Warning System	1	DAY, NIGHT, VFR, IFR, ICING
STALL WARN FAIL CAS Message	1	DAY, NIGHT, VFR, IFR, ICING
FIRE DET/ANN TEST System	1	DAY, NIGHT, VFR, IFR, ICING

2.59 PLACARDS

THIS AIRCRAFT MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.
NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED.
THIS AIRCRAFT APPROVED FOR V.F.R., I.F.R., DAY AND NIGHT ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH THE AIRPLANE FLIGHT MANUAL.

WARNING
TURN OFF STROBE LIGHTS WHEN IN CLOSE PROXIMITY TO GROUND OR DURING FLIGHT THROUGH CLOUD, FOG OR HAZE.
PRESSURIZED LANDING NOT APPROVED.

If equipped with Stormscope:

STORMSCOPE NOT TO BE USED FOR
THUNDERSTORM AREA PENETRATION

EMERGENCY GEAR EXTENSION
PULL TO RELEASE. SEE A.F.M.
BEFORE RE-ENGAGEMENT.

ALTERNATE STATIC SOURCE
(LOCATED PILOT'S SIDE BELOW PANEL)
UP - ALTERNATE
DOWN - PRIMARY
(SEE POH SECTION 5 FOR ALTERNATE
STATIC SYSTEM CORRECTION)

2.59 PLACARDS (Continued)

On the copilot's side panel:

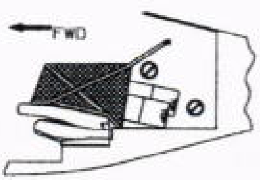
EMERGENCY OXYGEN
IN DRAWER UNDER SEAT
(AISLE ACCESS)

PULL MASK OUT OF DRAWER FULLY
AT FULL EXTENSION, PULL CORD
MAXIMUM DURATION - - - - - - 15 MINS
SEE POH
NO SMOKING WHILE IN USE

STANDARD CARGO NET INSTALLED

MAX BAGGAGE THIS COMPARTMENT
100 LBS / 45.3 KG

GOLF CARGO NET INSTALLED



NO BAGGAGE PERMISSIBLE
IN THESE AREAS WHEN THE
GOLF NET IS IN USE

MAX GOLF CLUB LOAD
105 LBS / 47.6 KG

MAX ADDITIONAL BAGGAGE
BEHIND LEFT SEAT
50 LBS / 22.6 KG

2.59 PLACARDS (Continued)

On the handle of the upper cabin door (inside aircraft):

OPEN PULL LATCH
ROTATE HANDLE UP

CLOSE ROTATE HANDLE DOWN
ENSURE PIN WINDOWS GREEN

On the upper edge of the cabin lower door:

OPEN ⟷ CLOSE ENSURE PIN
WINDOWS GREEN

Over the emergency exit handle:

EMERGENCY EXIT
REMOVE GLASS
PULL DOOR IN - LIFT UP

On inside of aft fuselage stowage door:

MAXIMUM WEIGHT THIS
COMPARTMENT 4 LBS (1.8 KG)

On the inside radar pod stowage door:

MAX WEIGHT 5 LBS (2.2 KG)

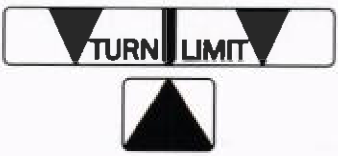
2.59 PLACARDS (Continued)

Around wing fuel caps:

On the inboard section of the left flap:

NO
STEP

On the nose gear strut:



BRAKE FLUID
RESERVOIR
SERVICE USING
MIL-PRF-5606 OR EQUIVALENT

2.59 PLACARDS (Continued)

Inside the external power receptacle door:

STARTING PROCEDURE
FOR EXTERNAL POWER

MASTER SWITCH AND
RADIOS MUST BE OFF

SEE AIRPLANE FLIGHT
MANUAL FOR
DETAILED INSTRUCTIONS

Outside the external power receptacle door:

EXTERNAL POWER
28 VOLTS D.C.
TURN MASTER SWITCH
AND ALL EQUIP. OFF
BEFORE INSERTING
PLUG

2.59 PLACARDS (Continued)

TIRE AND STRUT
SERVICE INSTRUCTIONS

INFLATE NOSE GEAR TIRE PER THE FOLLOWING:
8 PLY TIRE - 70 PSI
10 PLY TIRE - 88 PSI
SEE MAINTENANCE MANUAL FOR STRUT SERVICING INSTRUCTIONS. NORMAL STRUT EXTENSION IS APPROX 2.70 INCHES (6.86 CM) WITH AIRCRAFT ON A LEVEL SURFACE AND AT EMPTY WEIGHT WITH FULL FUEL AND OIL.

TIRE AND STRUT
SERVICE INSTRUCTIONS

INFLATE MAIN GEAR TIRE TO 55 PSI AIR PRESSURE. SEE MAINTENANCE MANUAL FOR STRUT SERVICING INSTRUCTIONS. NORMAL STRUT EXTENSION IS APPROX 2.40 INCHES (6.10 CM) WITH AIRCRAFT ON A LEVEL SURFACE AND AT EMPTY WEIGHT WITH FULL FUEL AND OIL.

2.59 PLACARDS (Continued)

On the backside of the oil filler door:

ENGINE OIL
SPECIFICATION

DO NOT MIX DIFFERENT
BRANDS OF OIL.
OIL TANK CAPACITY:
9.2 QTS / 8.7 L.
DO NOT OVERFILL.
FILL WITH APPROVED
OIL TO MAXIMUM MARK
ON DIP STICK.
SEE LATEST REVISION
OF PRATT & WHITNEY
CANADA ENGINE SERVICE
BULLETIN SB 3001 FOR
LIST OF APPROVED
LUBRICATING OILS.

2.59 PLACARDS (Continued)

On the pyramid cabinet behind the copilot's seat:

OXYGEN ONLY NO STOWAGE
PILOT OXYGEN OFF ON

FIRE EXTINGUISHER IN DRAWER

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EMERGENCY PROCEDURES

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SECTION 3

EMERGENCY PROCEDURES

SECTION 3

EMERGENCY PROCEDURES

3.1 GENERAL

This section provides the recommended procedures for handling various emergency or critical situations. All emergency procedures required by the FAA are presented, along with those necessary for operation of the airplane. Emergency procedures associated with optional systems and equipment which require handbook supplements are presented in Section 9, Supplements. Checklists within this section are divided into two distinct parts.

1. The Emergency Procedures Checklists, depicted within boxes, describe action sequences that should be followed during critical situations.
2. When applicable, amplified procedures are provided immediately below the relevant Emergency Procedures Checklist, to enhance the pilot's understanding of the procedure.

Pilots must familiarize themselves with the procedures in this section and must be prepared to take the appropriate action should an emergency situation arise. The procedures are offered as a course of action for handling the particular situation or condition described. They are not a substitute for sound judgement and common sense.

Most basic emergency procedures are a normal part of pilot training. The information presented in this section is not intended to replace this training. In order to remain proficient, pilots should periodically review standard emergency procedures.

NOTE

The latest appropriate revision of the Garmin G1000 Cockpit Reference Guide for the Piper PA-46-500TP (Garmin P/N 190-02381-00), and the Garmin G1000 Pilot's Guide for the Piper PA-46-500TP (Garmin P/N 190-02380-00), contain detailed descriptions of the annunciator system, including all CAS messages, PFD and MFD annunciations, and aural alerts.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages

The following tables show the color and significance of the Warning, Caution and Advisory messages which may appear on the Garmin G1000 displays.

Warning Messages - Red

CAS Event	CAS Message	Checklist Page	Cause
	CAS Warnings with Text Messages		
Alternator Failure	ALTERNATOR FAIL	3-38 3-39	Alternator switch selected ON and alternator control unit detects a failure of the alternator.
Bleed Over Temperature	BLEED OVERTEMP	3-74	Temperature in the bleed air ducts is 350°F or above.
Cabin Altitude 12K	CABIN ALT 12K	3-73	Cabin altitude is 12,000 feet or above.
Landing Gear Position Unsafe	CHECK GEAR	3-34	Landing gear is not down and locked when aircraft is less than 400 ft AGL with engine torque less than 300 ft-lb (mutable aural) or flaps greater than 10° (non-mutable aural). Landing gear is selected UP while on the ground.
Door Ajar	DOOR AJAR	3-83	Cabin door is not properly closed and latched with engine running.
Engine Fire	ENGINE FIRE	3-27	Overtemperature condition in the engine compartment due to fire.
Flap Failure	FLAP FAIL	3-36	Wing flap system failure due to an overcurrent condition in the flap motor/actuator circuit
Fuel Imbalance	FUEL IMBALANCE	3-70	Fuel quantity imbalance greater than 125 pounds.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Warning Messages - Red (continued)

CAS Event	CAS Message	Checklist Page	Cause
CAS Warnings with Text Messages (continued)			
Fuel Pressure Low	FUEL PRESS LOW	3-67	Fuel pressure is below 10 psig.
Fuel Quantity	FUEL QTY	3-69	Total FUEL QTY is equal to or less than 100 pounds.
Landing Gear Failure	GEAR SYS	3-35	Landing gear system malfunction while on the ground.
Generator Failure	GENERATOR FAIL	3-37 3-39	Generator selected ON and no output.
Hydraulic Pump On	HYDR PUMP ON	3-34	Landing gear hydraulic pump is operating while the aircraft is on the ground.
Pitot Heat Failure	PITOT HT FAIL	3-78, Sect. 9 Supp. 1	Both left and right pitot heat have failed.
Propeller Heat Failure	PROP HEAT FAIL	3-79, Sect. 9 Supp. 1	A fault has developed in the propeller heat system in flight.
Surface De-Ice Failure	SURF DEICE FAIL	3-80, Sect. 9 Supp. 1	Surface de-ice system has failed in flight.
Aircraft not configured properly for takeoff	T/O CONFIG	3-15	Engine torque greater then 800 ft-lb. Flaps greater than 30°. Rudder trim less than 1° right or greater than 4° right.
Underspeed Protection	USP ACTIVE	3-61	Airspeed has fallen below the threshold for USP to activate.
Windshield Over Temperature	WDSHLD OVRTMP	3-80, Sect. 9 Supp. 1	Windshield temperature exceeds 170°F or the windshield temperature sensor has failed.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Warning Messages - Red (continued)

CAS Event	CAS Message	Checklist Page	Cause
CAS Warnings with EIS Indications			
Alternator Amperage	---	N/A	Alternator producing 130 amperes or greater.
Cabin Differential Pressure	---	3-65	Cabin differential pressure is equal to or greater than 5.8 psi OR greater than 5.6 psi for more than 30 seconds.
Fuel Quantity	---	N/A	Left or right fuel quantity less than 50 pounds.
Generator Amperage	---	N/A	Generator producing 170 amperes or greater.
Inter-Turbine Temperature	---	N/A	Inter-turbine temperature is equal to or greater than 800°C OR equal to or greater than 1000°C if in START mode OR equal to or greater than 750°C if Ng is between 63% and 64%.
Landing Gear Failure	---	3-35	Malfunction of associated landing gear (L, N, R)
NG Overspeed	---	N/A	Gas generator speed is equal to or greater than 101.7%.
Oil Pressure	---	3-21	**For engine torque greater than or equal to 1100 foot-pounds** and oil pressure that is either less than or equal to 85 psi or greater than 200 psi. OR **For engine torque less than 1100 foot-pounds** and oil pressure that is either less than or equal to 60 psi or greater than 200 psi.
Oil Temperature	---	3-20	Oil temperature is equal to or less than -40°C or equal to or greater than 99°C.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Warning Messages - Red (continued)

CAS Event	CAS Message	Checklist Page	Cause
CAS Warnings with EIS Indications			
Propeller Speed	---	3-26	Propeller speed is less than 1175 rpm or equal to or greater than 2040 rpm for more than 2 seconds.
Torque	---	N/A	Engine torque is 1330 foot-pounds or greater.
Voltage	---	N/A	**Generator is OFF, alternator is OFF and aircraft is on the ground** and main bus voltage is less than 24V or equal to or greater than 32V **OR generator is ON, alternator is ON or aircraft is in the air** and main bus voltage is less than 25V or equal to or greater than 32V. Anytime when operating exclusively on the EMER bus and the voltage is less than 24 V.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Caution Messages - Amber

CAS Event	CAS Message	Checklist Page	Cause
CAS Cautions with Text Messages			
BETA	BETA	3-23	Power lever is selected below flight idle position and propeller blade angle is below low pitch stop in flight.
Cabin Altitude 10K	CABIN ALT 10K	3-73	Cabin altitude is 10,000 feet or above.
Landing Gear Position Unsafe	CHECK GEAR	3-34	Landing gear is not down and locked when aircraft is greater than 400 ft AGL with engine torque less than 300 ft-lb (mutable aural) or flaps greater than 10° (non-mutable aural).
Chip Detection	CHIP DETECT	3-22	Existence of ferrous metal particles in the engine oil system.
Pressurization System Failure	CPCS FAIL	3-71	The CPCS internal test has failed anytime or CPCS communications have failed while on ground.
Pressurization System Fault	CPCS FAULT	3-72	CPCS communications have failed while in flight.
Feather	FEATHER	3-23	With engine operating, indicates a failure in the propeller feathering electrical system. An uncommanded propeller feathering could occur if additional electrical failures occur in the system.
Fire Detection Failure	FIRE DTECT FAIL	3-23	Failure of the engine fire detection system.
Fuel Filter	FUEL FILTER	3-68	Fuel filter contamination level is approaching the bypass mode and requires maintenance.
Fuel Imbalance	FUEL IMBALANCE	3-70	Fuel quantity imbalance greater than 40 pounds.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Caution Messages - Amber (continued)

CAS Event	CAS Message	Checklist Page	Cause
CAS Cautions with Text Messages			
Fuel Quantity	FUEL QTY	3-69	Total FUEL QTY is greater than 100 pounds and equal to or less than 180 pounds.
Landing Gear Failure	GEAR SYS	3-35	Landing gear system malfunction while in flight.
Hydraulic Pump On	HYDR PUMP ON	3-34	Landing gear hydraulic pump has been operating for more than 15 seconds in flight.
Left Pitot Heat Failure	L PITOT HT FAIL	3-77, Sect. 9 Supp. 1	Left pitot heat has failed.
Right Pitot Heat Failure	R PITOT HT FAIL	3-77, Sect. 9 Supp. 1	Right pitot heat has failed.
Oxygen	OXYGEN	3-83	One or more of the passenger oxygen generators are activated while in flight.
Pitot Heat Off	PITOT HEAT OFF	3-78, Sect. 9 Supp. 1	Pitot heat has not been selected ON (no chime accompanies this CAS message).
Propeller Heat Failure	PROP HEAT FAIL	3-79, Sect. 9 Supp. 1	A fault has developed in the propeller heat system while the aircraft is on the ground.
Stall Warning System Failure	STALL WARN FAIL	3-82, Sect. 9 Supp. 1	The lift computer and/or lift transducer has failed.
Stall Warning Heat Failure	STALL HEAT FAIL	3-82, Sect. 9 Supp. 1	Stall Warning Heat has failed.
Starter Engaged	START ENGAGED	3-22	The starter contactor is closed and power is being applied to the starter/generator. (Ng greater than 56% for 10 seconds.)
Surface DeIce Failure	SURF DEICE FAIL	3-80, Sect.9 Supp. 1	Surface de-ice system has failed while the aircraft is on the ground.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Caution Messages - Amber (continued)

CAS Event	CAS Message	Checklist Page	Cause
CAS Cautions with EIS Indications			
Fuel Quantity	---	N/A	Left or right fuel quantity between 50 and 90 pounds.
Inter-turbine Temperature	---	N/A	ITT in the caution ranges.
Landing Gear Failure	---	3-35	Malfunction of associated landing gear (L, N, R).
Oil Temperature	---	N/A	Oil temperature in the caution range

Advisory Messages - White

CAS Event	CAS Message	Checklist Page	Cause
CAS Advisories with Text Messages			
Alternator switch OFF	ALTERNATOR OFF	N/A	The alternator switch is selected OFF.
Avionics 1 Fan Failure	AV1 FAN FAIL	3-67	The Avionics 1 cooling fan has failed
Avionics 2 Fan Failure	AV2 FAN FAIL	3-67	The Avionics 2 cooling fan has failed
Avionics 3 Fan Failure	AV3 FAN FAIL	3-67	The Avionics 3 cooling fan has failed
Beta	BETA	N/A	Propeller is in Beta range while the aircraft is on the ground.
Door Ajar	DOOR AJAR	3-83	Cabin door is not properly closed and latched while the aircraft is on the ground with the engine not running.
Emergency Bleed On	EMER BLEED ON	3-74	Emergency bleed system has been activated either automatically at a cabin altitude in excess of 12,000 feet, or by the pilot.
Generator switch OFF	GENERATOR OFF	N/A	The generator switch is selected OFF.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Advisory Messages - White (continued)

CAS Event	CAS Message	Checklist Page	Cause
CAS Advisories with Text Messages (continued)			
Feather	FEATHER	N/A	Propeller is in feather position while the aircraft is on the ground.
Left Fuel Pump On	L FUEL PUMP ON	N/A	Left fuel pump is operating and delivering 4.5 psig minimum.
Right Fuel Pump On	R FUEL PUMP ON	N/A	Right fuel pump is operating and delivering 4.5 psig minimum.
Fuel Temperature	FUEL TEMP	3-68	Fuel temperature is equal to or less than -34°C.
Ignition On	IGNITION ON	N/A	Ignition switch is selected to MAN and power is applied to the engine ignition unit, or when Auto mode is selected and engine torque is between 275 to 375 foot-pounds.
MFD Fan Failure	MFD FAN FAIL	3-67	The MFD cooling fan has failed.
Oxygen	OXYGEN	3-83	One or more of the passenger oxygen generators are activated while the aircraft is on the ground.
PFD1 Fan Failure	PFD1 FAN FAIL	3-67	The PFD 1 cooling fan has failed.
PFD2 Fan Failure	PFD2 FAN FAIL	3-67	The PFD 2 cooling fan has failed.
Stall Heat is inhibited	STALL HT INHIB	N/A	Stall heat is inhibited when OAT is greater than 5°C.
Starter Engaged	START ENGAGED	N/A	The starter is engaged normally.
Aircraft not configured properly for takeoff	T/O CONFIG	3-15	Flaps greater than 30°. Rudder trim less than 1° right or greater than 4° right. Ignition not on. Fuel pumps not in manual. Autopilot or Yaw Damper on.

3.1 GENERAL (continued)

PFD Annunciations and Alerts

The Garmin G1000 System produces a number of PFD annunciations and alerts in addition to the Crew Alerting System (CAS). PFD annunciations and alerts are not accompanied by Master Warning or Master Caution Indications and are displayed in dedicated areas of the PFD or MFD. Various aural alerts (voice, horn or tone) may accompany PFD annunciations and alerts and no pilot action is required to acknowledge them.

Comparator Annunciations

Comparator Text	Condition
ALT	White annunciation when altitude data is not available from one or both ADCs, or amber annunciation when the difference between ADC1 and ADC2 altitude exceeds 200 feet.
IAS	White annunciation when airspeed data is not available from one or both ADCs, or amber annunciation when the difference between ADC1 and ADC2 airspeed exceeds 7 knots.
HDG	White annunciation when heading data is not available from one or both AHRS, or amber annunciation when the difference between AHRS1 and AHRS2 heading exceeds 6 degrees.
PIT	White annunciation when pitch data is not available from one or both AHRS, or amber annunciation when the difference between AHRS1 and AHRS2 pitch exceeds 5 degrees.
ROL	White annunciation when roll data is not available from one or both AHRS, or amber annunciation when the difference between AHRS1 and AHRS2 roll exceeds 6 degrees.

3.1 GENERAL (continued)

PFD Annunciations and Alerts (continued)

Reversionary Sensor Annunciations

Reversionary Sensor Window Text	Condition
BOTH ON ADC1	Both PFD's are displaying data from the number 1 Air Data Computer.
BOTH ON ADC2	Both PFD's are displaying data from the number 2 Air Data Computer.
BOTH ON AHRS1	Both PFD's are displaying data from the number 1 Attitude and Heading Reference System.
BOTH ON AHRS2	Both PFD's are displaying data from the number 2 Attitude and Heading Reference System.
BOTH ON GPS1	Both PFD's are displaying data from the number 1 GPS Receiver.
BOTH ON GPS2	Both PFD's are displaying data from the number 2 GPS Receiver.
USING ADC1	PFD2 is displaying data from the number 1 Air Data Computer.
USING ADC2	PFD1 is displaying data from the number 2 Air Data Computer.
USING AHRS1	PFD2 is displaying data from the number 1 Attitude and Heading Reference System.
USING AHRS2	PFD1 is displaying data from the number 2 Attitude and Heading Reference System.

3.1 GENERAL (continued)

PFD Annunciations and Alerts (continued)

Miscellaneous Annunciations

Annunciation	Checklist Page	Condition
MAXSPD	3-56	Aircraft actual or projected airspeed exceeds V_{MO}.
MINSPD	3-56	Airspeed is below the minimum commandable airspeed.
TRIM	N/A	Pitch trim servo is operating.

Aural Alerts

The G1000 system generates the following aural alerts:

- Master Warning - Repeating triple chime.
- Master Caution - Non-repeating double chime.
- Advisory - Non-repeating single chime.
- "Airspeed....Airspeed" voice alert when airspeed exceeds V_{MO}.
- "AIRSPEED" voice alert when in a low airspeed condition (if optional AFCS enhanced features are installed).
- "Stall...Stall" voice alert during stall warning.
- "CHECK GEAR" voice alert in flight when engine torque is less than 300 ft-lb and the landing gear are not down and locked.
- "CHECK GEAR" voice alert in flight when flaps are extended to 20° or 36° and the landing gear are not down and locked.
- "CHECK GEAR" voice alert when the landing gear selector is in the UP position while on the ground.
- "Engaging Autopilot" voice alert when the autopilot automatically engages in LVL mode (if optional AFCS enhanced features are installed).

3.1 GENERAL (continued)

PFD Annunciations and Alerts (continued)

Aural Alerts (continued)

- "Five-hundred" voice alert when aircraft descends within 500 feet above the terrain or runway threshold.
- "Minimums..Minimums" voice alert when the aircraft reaches MDA/DH if set by the pilot.
- Autopilot disconnect tone (also used for autopilot preflight test).
- Terrain caution and warning voice alerts.
- Traffic System voice alerts.

System Messages:

The G1000 system generates several system messages. The messages activate automatically and appear in the Messages window on the lower right of the PFD. The Message softkey whill flash when a new system message is present and depressing that softkey will access/hide the Messages window. The softkey changes from Message to Messages after the softkey is pressed.

Overriding Considerations

In all emergencies, the overriding consideration must be to:

- Maintain airplane control.
- Analyze the situation.
- Take proper action.

NOTE

If after resetting a circuit breaker, it trips open again, do not attempt to reset it.

3.1 GENERAL (continued)

PFD Annunciations and Alerts (continued)

Terminology

Many emergencies require some urgency in landing the aircraft. The degree of urgency varies with the emergency; therefore the terms "land as soon as possible" and "land as soon as practical" are employed. These terms are defined as follows:

Land as soon as possible

A landing should be accomplished at the nearest suitable airfield considering the severity of the emergency, weather conditions, field facilities, and ambient lighting.

Land as soon as practical

Emergency conditions are less urgent, and although the flight should be terminated, the emergency is such that an immediate landing at the nearest suitable airfield may not be necessary.

3.3 AIRSPEEDS FOR EMERGENCY OPERATIONS

STALL SPEEDS
5092 lbs (Gear UP, Flaps 0°) .... 79 KIAS
5092 lbs (Gear DOWN, Flaps 36°) .... 69 KIAS

OPERATING MANEUVERING SPEED .... 127 KIAS

BEST GLIDE (Propeller Feathered)
5092 lbs (Gear UP, Flaps 0°) .... 108 KIAS

3.5 TAKEOFF CONFIGURATION ERROR

Takeoff Configuration Error

Indication: T/O CONFIG

Flaps .... SET (0° to 20°)
Rudder Trim .... SET 2° to 3° RT
FUEL PUMPS Switch .... MAN
IGNITION Switch .... MAN
Autopilot .... DISENGAGED
Yaw Damper .... DISENGAGED

Indication: Master Warning, Triple Chime, T/O CONFIG

CAUTION

Takeoff distances may be longer than published.

FLAPS .... SET (0° to 20°)
Rudder Trim .... SET 2° to 3° RT

The T/O CONFIG advisory CAS message will remain illuminated until the BEFORE TAKEOFF checklist is completed.

3.7 REJECTED TAKEOFF

Rejected Takeoff	
POWER Lever	IDLE
Braking	AS REQUIRED
Reverse	AS REQUIRED
If insufficient runway remains for a safe stop:	
CONDITION Lever	CUT-OFF/FEATHER
BATTERY Switch	OFF
Firewall FUEL SHUTOFF Valve	LIFT COVER - PULL OFF
Maneuver as necessary to avoid obstacles.	
After the aircraft has stopped - EVACUATE.	

3.9 ENGINE FAILURE

3.9a Engine Failure Before Rotation	
Engine failure before rotation:	
POWER Lever	IDLE
Braking	AS REQUIRED
Stop straight ahead.	
If insufficient runway remains for a safe stop:	
CONDITION Lever	CUT-OFF/FEATHER
BATTERY Switch	OFF
Firewall FUEL SHUTOFF Valve	LIFT COVER - PULL OFF
Maneuver as necessary to avoid obstacles.	
After the aircraft has stopped - EVACUATE.	

3.9 ENGINE FAILURE (continued)

3.9b Engine Failure Immediately After Takeoff

If sufficient runway remains for a normal landing, land straight ahead. If area ahead is rough, or if it is necessary to clear obstructions, maintain a safe airspeed and make only a shallow turn if necessary to avoid obstructions.

Airspeed .... 100 KIAS
Landing Gear .... DOWN
POWER Lever .... IDLE
CONDITION Lever .... CUT-OFF/FEATHER

When landing gear is down and time permits:

Flaps .... DOWN 36°
Airspeed .... 85 KIAS
BATTERY Switch .... OFF
Firewall FUEL SHUTOFF Valve .... LIFT COVER - PULL OFF

After the aircraft has stopped - EVACUATE.

3.9c Engine Failure in Flight

Oxygen .... AS REQUIRED
MIC SEL Switch .... MSK
Airspeed .... 108 KIAS
POWER Lever .... IDLE
CONDITION Lever .... CUT-OFF/FEATHER
Propeller .... VERIFY FEATHERED

CAUTION

The battery switch must be ON to feather the propeller.

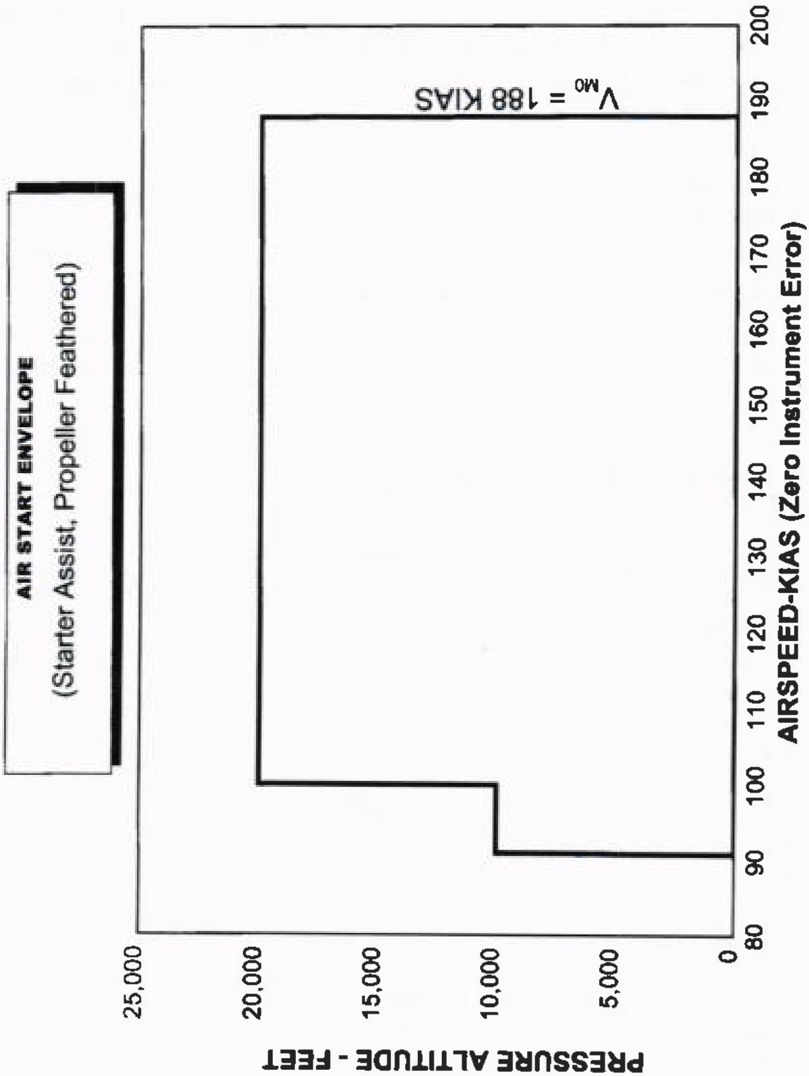
Remaining Fuel .... CHECK
Air Start .... Refer to Air Start procedure in this section

If above the airstart envelope (Figure 3-1), descend into the envelope and make an airstart per this section. Use oxygen as required. Perform a normal descent or emergency descent as appropriate.

If engine air start is not successful, proceed with the power off landing procedure per Section 3.27.

3.9 ENGINE FAILURE (continued)

Air Start Envelope



Air Start Envelope
Figure 3-1

3.9 ENGINE FAILURE (continued)

3.9d Air Start - Starter Assist

Oxygen .... AS REQUIRED
MIC SEL Switch .... MSK
Autopilot .... DISENGAGE
CONDITION Lever .... CUT-OFF/FEATHER
Altitude & Airspeed .... WITHIN THE AIR START ENVELOPE
POWER Lever .... IDLE
GEN Switch .... OFF
ALT Switch .... OFF
Electrical Load .... REDUCE
ECS CABIN COMFORT Switch .... OFF
BLEED AIR Lever .... PULL OUT (closed)
EMERGENCY PRESSURE Circuit Breaker .... PULL
(Located on pilot's aft circuit breaker panel, row B, position 6)
FUEL PUMPS Switch .... MAN
IGNITION Switch .... MAN

CAUTION

To obtain an AUTO air start, the START MODE MAN/STOP switch must __not__ be selected. If the switch is selected to MAN (switch light illuminated), the PUSH START switch must be held ON to keep the starter engaged during the start.

START MODE Switch .... AUTO
PUSH START Switch .... ENGAGE (Verify START ENGAGED message Illuminated)
CONDITION Lever (Ng min. 13%) .... RUN
ITT and Ng .... MONITOR

3.9 ENGINE FAILURE (continued)

After Engine Relight - Ng ≥ 63%:

GEN Switch .... ON
ALT Switch .... ON
FUEL PUMPS Switch .... AUTO
IGNITION Switch .... AUTO
EMERGENCY PRESSURE Circuit Breaker .... RESET
(Located on the pilot's aft circuit breaker panel, row B, position 6)
BLEED AIR Lever .... PUSH IN (open)
ECS CABIN COMFORT Switch .... NORM
Electrical Equipment .... AS REQUIRED

3.11 ENGINE SYSTEM

3.11a Oil Temperature

Indication: Master Warning, Triple Chime, Flashing Red Oil Temperature Indication

POWER Lever .... REDUCE POWER

If temperature remains high, continue flight at reduced power and *land as soon as possible.*

NOTE

If possible, always retain glide capability to the selected landing area in case of total engine failure.

3.11 ENGINE SYSTEM (continued)

3.11b Oil Pressure

Indication: Master Warning, Triple Chime, Flashing Red Oil Pressure Indication

Engine Torque at or above 1100 ft - lb:

Low Oil Pressure, Below 85 PSI

Power.. REDUCE TO A MAX. OF 1100 FT - LB OF TORQUE

Land as soon as practical.

High Oil Pressure, Above 200 PSI

Land as soon as practical.

Engine Torque below 1100 ft - lb:

Low Oil Pressure, Below 60 PSI

Power........................ REDUCE TO MINIMUM TORQUE REQUIRED TO COMPLETE FLIGHT

Land as soon as possible.

High Oil Pressure, Above 200 PSI

Land as soon as possible.

NOTE

If possible, always retain glide capability to the selected landing area in case of total engine failure.

3.11 ENGINE SYSTEM (continued)

3.11c Chip Detector

Indication: Master Caution , Double Chime, CHIP DETECT

After Engine Start:

Return to parking area and shutdown engine.

In Flight:

Oil Temperature .... MONITOR
Oil Pressure .... MONITOR

Land as soon as practical.

Inspect Engine Before Next Flight

NOTE

If possible, always retain glide capability to the selected landing area in case of total engine failure.

3.11d Starter Engaged

Indication: Master Caution, Double Chime, START ENGAGED **remains illuminated after engine start**

On Ground:

MAN/STOP Switch .... PUSH
CONDITION Lever .... CUT-OFF/FEATHER
BATTERY Switch .... OFF

In Flight:

MAN/STOP Switch .... PUSH

GEN Switch .... VERIFY ON

If generator is not on, *land as soon as possible.*

3.11 ENGINE SYSTEM (continued)

3.11e Fire Detect Fail

Indication: Master Caution, Double Chime, FIRE DTECT FAIL

FIRE DETECT Circuit Breaker .... RESET
(Located on the pilot's forward circuit breaker panel, row D, position 6)

Inspect and Repair Prior to Next Flight.

3.11f Feather

Indication: Master Caution, Double Chime, FEATHER

On Ground After Engine Start:

Shut down and investigate cause.

In Flight:

Land as soon as practical and investigate cause.

3.11g Beta

In Flight:

Indication: Master Caution, Double Chime, BETA

POWER Lever .... VERIFY FLIGHT IDLE POSITION
OR FORWARD OF FLIGHT IDLE

3.13 FUEL CONTROL UNIT MALFUNCTION OR POWER LEVER CONTROL LOSS (MANUAL OVERRIDE OPERATION)

Fuel Control Unit Malfunction or Power Lever Control Loss (Manual Override Operation)

WARNING

The manual override system is an emergency system and must only be used in the event of FUEL CONTROL UNIT MALFUNCTION OR POWER LEVER CONTROL LOSS.

CAUTION

The manual override lever is not to be used on the ground for taxiing. During ground operations, it may not be possible to recover low Ng with the manual override lever.

The pilot must ensure that the MANUAL OVERRIDE LEVER is in the OFF (full aft) position prior to start otherwise an over-temperature condition may result.

Utilize slow and smooth movement of the MANUAL OVERRIDE LEVER to avoid engine surges and/or exceeding ITT, Ng, or torque limits. Rapid movement of the MOR lever can cause compressor surges and excessive ITT (over temperature) conditions.

3.13 FUEL CONTROL UNIT MALFUNCTION OR POWER LEVER CONTROL LOSS (MANUAL OVERRIDE OPERATION) (cont.)

↓

Indication: **Power lever movement does not change Ng. or uncommanded engine power reduction.**

POWER Lever .... FLIGHT IDLE
MANUAL OVRD Lever .... PULL UPWARDS AND MOVE FORWARD SLOWLY TO ACHIEVE REQUIRED ENGINE POWER

CAUTION

Reverse will not be available for landing.

Land as soon as possible.

After landing:

CONDITION Lever .... CUT-OFF / FEATHER

If power is excessive when using manual override:

Reduce airspeed to below 168 KIAS by increasing pitch attitude.
Landing Gear .... EXTEND BELOW 168 KIAS
FLAPS 10° .... BELOW 168 KIAS

Land as soon as possible.

When landing is assured:

CONDITION Lever .... CUT-OFF / FEATHER

3.15 PROPELLER SPEED

Propeller Speed

Indication: Master Warning, Triple Chime, Flashing Red Propeller Speed Indication

For Prop RPM less than 1200:

POWER Lever....................INCREASE POWER

For Prop RPM greater than or equal to 2040 for more than 2 seconds:

POWER Lever....................REDUCE POWER
Airspeed....................REDUCE

Land as soon as practical.

For Prop RPM greater than or equal to 2080 continuously:

POWER Lever....................REDUCE AS NECESSARY
Airspeed....................REDUCE TO LOWEST PRACTICAL

Land as soon as possible.

NOTE

If possible, maintain altitude as necessary in order to retain glide capability to the selected airport in case of total engine failure.

Should heavy vibration or uncontrolled propeller speed occur, be prepared to shut down the engine.

CONDITION Lever....................CUT-OFF/FEATHER

Conduct a Normal Descent, Section 4.5n, or Emergency Descent, Paragraph 3.21, as appropriate and Power Off Landing, Paragraph 3.25.

3.17 ENGINE FIRE

On Ground (During engine start or taxi)

Indication: Master Warning, Triple Chime, ENGINE FIRE, Visual Verification

POWER Lever	IDLE
CONDITION Lever	CUT-OFF/FEATHER
Brakes	AS REQUIRED
Firewall FUEL SHUTOFF Valve	LIFT COVER - PULL OFF
BLEED AIR Lever	PULL OUT (closed)
ECS CABIN COMFORT Switch	OFF
FUEL PUMPS Switch	OFF
IGNITION Switch	OFF
Radio	EMERGENCY CALL
BATTERY Switch	OFF
Aircraft	EVACUATE
Fire	EXTINGUISH

In Flight

Indication: Master Warning, Triple Chime, ENGINE FIRE ,Visual Verification

Engine Power	REDUCE TO MINIMUM ACCEPTABLE ACCORDING TO FLIGHT SITUATION
Oxygen	AS REQUIRED (all aircraft occupants)
MIC SEL Switch	MSK

Confirm that fire exists then:

CONDITION Lever	CUT-OFF/FEATHER
Firewall FUEL SHUTOFF Valve	LIFT COVER - PULL OFF
ECS CABIN COMFORT Switch	OFF
BLEED AIR Lever	PULL OUT (closed)

Conduct a Normal Descent, Section 4.5n, or Emergency Descent, Section 3.21, as appropriate and Power Off Landing, Section 3.27.

CAUTION

If pressurized, this procedure will result in an immediate loss of pressurization and cabin altitude will rise at an uncontrolled rate.

3.19 ELECTRICAL FIRE, SMOKE OR FUMES

Electrical Fire, Smoke or Fumes

If source is known:

Oxygen.......................................CREW (100%) AND PASSENGERS DON MASKS
MIC SEL Switch ....MSK
Fire (if necessary).......................................EXTINGUISH
Faulty Circuits ....ISOLATE
Smoke Evacuation (if necessary) ....EXECUTE CHECKLIST (per para. 3.19)

Land as soon as possible.

If source is unknown:

Oxygen.......................................CREW (100%) AND PASSENGERS DON MASKS
MIC SEL Switch ....MSK
Fire (if necessary).......................................EXTINGUISH
Smoke Evacuation (if necessary) ....EXECUTE CHECKLIST (per para. 3.19)
GEN Switch ....OFF
ALT Switch ....OFF
Autopilot ....DISENGAGE
Standby Instrument..........................VERIFY NO FAILURE INDICATIONS
Attitude and Heading..........................Use Standby Instrument
EMER Switch ....ON
BATTERY Switch..OFF
Emergency Descent .... ACCOMPLISH PER PARA. 3.21 TO A SAFE ALTITUDE CONSISTENT WITH TERRAIN

Land as soon as possible.

(Perform Emergency Landing Gear Extension procedure and 0° Flap Landing)

↓

↓

If smoke or fire still persists:

All Tie Bus Breakers .... PULL

Land as soon as possible.

(Perform Emergency Landing Gear Extension procedure and 0° Flap Landing)

CAUTION

The airplane may still be pressurized on the ground. Exercise extreme caution when operating cabin door.

3.21 SMOKE EVACUATION

Cockpit / Cabin Fire

CAUTION

If pressurized, the following procedure will result in an immediate loss of pressurization and the cabin altitude will rise at an uncontrollable rate.

Oxygen Mask .... ON (100%)
MIC SEL Switch .... MSK
Passengers .... DON OXYGEN MASKS
CABIN PRESSURE DUMP Switch .... DUMP
ECS CABIN COMFORT Switch .... OFF
BLEED AIR Lever .... PULL OUT (closed)
EMERGENCY PRESSURE Circuit Breaker .... PULL
(Located on the pilot's aft circuit breaker panel, row B, position 6)
AIR COND and Blower Fan Switches .... OFF
VENT FAN Switch .... ON
Emergency Descent .... Accomplish per Paragraph 3.21 to a Safe Altitude Consistent with Terrain

Land as soon as possible.

NOTE

If fumes/smoke dissipate, land as soon as possible to investigate problem. If fumes/smoke persist, refer to Fire in Flight procedure, Paragraph 3.15.

3.23 EMERGENCY DESCENT - MAXIMUM RATE

Emergency Descent - Maximum Rate

Autopilot... OFF
POWER Lever.. IDLE
Landing Gear.. Below 168 KIAS, DOWN
Windshield DEFROST... PULL OUT
WINDSHLD HT Switch.. DEFOG

NOTE

Windshield Heat ANTI ICE may be used for additional defrosting.

Smooth air

Airspeed after Landing Gear is Fully Extended .... 168 KIAS

Rough air

Airspeed.. 127 KIAS

3.25 DESCENT - MAXIMUM RANGE AFTER ENGINE FAILURE

Descent - Maximum Range After Engine Failure

NOTE

Refer to Section 5, Performance, Figure 5-123 or Figure 5-257 (metric) for glide distance.

Oxygen Masks .... ON
MIC SEL Switch .... MSK
POWER Lever .... IDLE
CONDITION Lever .... CUT-OFF/FEATHER
Propeller .... VERIFY FEATHERED
Landing Gear / Flaps .... UP

CAUTION

If landing gear and / or flaps are extended, glide distance will be severely reduced. Retracting the landing gear and flaps will reduce battery endurance significantly.

Airspeed .... 108 KIAS
Electrical Load .... REDUCE (Monitor Battery Voltage)

CAUTION

If the propeller does not feather, the glide distance will be reduced.

NOTE

It may be required to adjust the rate of descent of the aircraft in order to achieve a cabin altitude of 12,500 feet before the oxygen supply is exhausted.

3.27 POWER OFF LANDING (ENGINE CUTOFF/FEATHER)

Power Off Landing (Engine Cutoff/Feather)

Best Gliding Airspeed is 108 KIAS

POWER Lever .... IDLE
CONDITION Lever .... CUT-OFF/FEATHER
Propeller .... VERIFY FEATHERED
FUEL PUMPS Switch .... OFF
IGNITION Switch .... OFF
Firewall FUEL SHUTOFF Valve .... LIFT COVER - PULL OFF
Electrical Load .... REDUCE
ECS CABIN COMFORT Switch .... OFF
CABIN PRESSURE DUMP Switch .... DUMP
Seats and Seat Backs .... UPRIGHT & LOCKED IN POSITION
Seat Belts and Harness .... FASTEN / TIGHT
CHECK INERTIA REEL
Passengers .... BRIEF

Locate suitable field
Establish spiral pattern. If sufficient altitude is available, maintain 108 KIAS with flaps 10° in the pattern.

Assure 1000 feet above field at downwind position for landing approach.

NOTE

For ditching or other off-airport landings, inhibit the Terrain Awareness and Warning System by selecting INHIBIT on the MFD Map-TAWS page.

When committed to landing:

Landing Gear .... DOWN; 3 GREEN
Flaps .... AS REQUIRED

If landing site is not suitable for gear down landing:

Landing Gear .... MAINTAIN UP

↓

↓

NOTE

Landing gear extension requires 8 seconds minimum.

Flaps .... FULL DOWN
Final Approach Speed .... 85 KIAS

After Touchdown:

BATTERY Switch .... OFF
After the aircraft has stopped .... EVACUATE

3.29 LANDING WITH PRIMARY CONTROL FAILED

Landing With Primary Longitudinal Control Failed

Passengers .... BRIEF
Landing Gear .... DOWN, 3 GREEN
Final Approach Speed .... TRIM TO MAINTAIN 110 KIAS

- **Select the longest runway available and make a flat, no flap approach, minimizing the use of elevator trim.**
- **Set power (approximately 300 FT-LB torque) to maintain airspeed and 300 to 500 ft./min. rate of descent.**
- **Use elevator trim to adjust pitch.**
- **When positioned over the runway, flare the airplane with elevator trim and slowly reduce power to idle, reverse and brakes as required.**

3.31 HYDRAULIC SYSTEM MALFUNCTION

Hydraulic System Malfunction

On Ground:

Indication: Master Warning , Triple Chime, HYDR PUMP ON

LANDING GEAR Selector .... Verify DOWN

The illumination of the HYDR PUMP ON annunciator while operating on the ground would require maintenance to investigate the cause prior to any flight operations.

In Flight:

Indication: Master Caution , Double Chime, HYDR PUMP ON

HYDRAULIC PUMP POWER Circuit Breaker .... PULL
(Located on pilot's forward circuit breaker panel, row C, position 4)

Land as soon as practical and investigate the cause.

Prior to landing, the HYDRAULIC PUMP POWER circuit breaker must be reset to extend the landing gear. If the pump continues to run after the gear is locked down, pull the HYDRAULIC PUMP POWER circuit breaker. If the gear fails to extend, refer to the **Emergency Landing Gear Extension procedure 3.33.**

3.33 LANDING GEAR POSITION UNSAFE

Landing Gear Position Unsafe

Indication: Master Warning, CHECK GEAR Aural Alert,
CHECK GEAR

LANDING GEAR Selector .... DOWN
LANDING GEAR Indications .... 3 GREEN

Indication: Master Caution, CHECK GEAR Aural Alert,
CHECK GEAR

LANDING GEAR Selector .... DOWN (if desired)
LANDING GEAR Indications .... 3 GREEN

3.35 LANDING GEAR MALFUNCTIONS

3.35a Landing Gear Failure

Indication: Master Warning, Triple Chime, GEAR SYS

LANDING GEAR Selector....................Verify DOWN

Resolve issue prior to flight.

Indication: Master Caution, Double Chime, GEAR SYS

HYDRAULIC PUMP POWER Circuit Breaker....................Verify IN
(Located on pilot's forward circuit breaker panel, row C, position 4)
BATTERY Switch....................Verify ON
GEN Switch....................Verify ON
ALT Switch....................Verify ON
LANDING GEAR Selector....................CYCLE
If issue not resolved....................Perform Emergency Landing Gear Extension (Section 3.33)

3.35b Emergency Landing Gear Extension

Indication: One or more of the green gear indications not illuminated.

Airspeed....................100 KIAS
HYDRAULIC PUMP POWER Circuit Breaker (25 amp)....................PULL
(Located on the pilot's forward circuit breaker panel, row C, position 4)
LANDING GEAR Selector....................DOWN
Emergency Gear Extension Control....................PULL

If 3 green gear indications are still not present:

Yaw the aircraft left and right to lock the main landing gear.

Reduce airspeed to minimum safe speed to improve nose gear locking.

If 3 green gear indications are present:

Land.

If not successful, refer to Gear Up Landing (Section 3.33).

3.35 LANDING GEAR MALFUNCTIONS (continued)

3.35c Gear Up Landing

ECS CABIN COMFORT Switch .... OFF
Cabin Pressure DUMP Switch .... DUMP
Passengers .... BRIEF
Seats and Seat Backs .... UPRIGHT & LOCKED IN POSITION
Seat Belts and Harness .... FASTEN / TIGHT
CHECK INERTIA REEL
Flaps .... FULL DOWN
Final Approach Speed .... 85 KIAS

When Runway is Assured:

POWER Lever .... IDLE
CONDITION Lever .... CUT-OFF/FEATHER
Firewall FUEL SHUTOFF Valve .... LIFT COVER - PULL OFF

After Touchdown:

BATTERY Switch .... OFF
After the aircraft has stopped .... EVACUATE

3.37 FLAP SYSTEM MALFUNCTIONS

3.37a Flap System Malfunction

Indication: Master Warning, Triple Chime, FLAP FAIL

FLAP WARN Circuit Breaker .... PULL AND RESET
VERIFY NORMAL
FLAP OPERATION
(Located on the pilot's forward circuit breaker panel, row B, position 4)

If FLAP FAIL **remains present:**

FLAP MOTOR Circuit Breaker .... PULL
(Located on the pilot's forward circuit breaker panel, row B, position 3)

Refer to Landing Without Flaps (Section 3.35).

3.37 FLAP SYSTEM MALFUNCTIONS (continued)

3.37b Landing Without Flaps

Proceed as for normal approach.

Landing Gear .... DOWN, 3 GREEN
Final Approach Speed .... 100 KIAS
Landing .... NORMAL
Braking .... AS REQUIRED
Reverse .... AS REQUIRED

NOTE

Reverse is not available during a Complete Electrical Failure.

3.39 ELECTRICAL SYSTEM MALFUNCTIONS

3.39a Generator Failure

Indication: Master Warning, Triple Chime, GENERATOR FAIL, Zero generator amps indication.

Electrical Load .... REDUCE UNTIL TOTAL LOAD IS BELOW 130 AMPS & VOLTS ANNUNCIATOR IS EXTINGUISHED
AIR COND Switch .... OFF
GEN Switch .... OFF then ON

If generator fails to reset:

GEN Switch .... OFF
GENERATOR CONTROL Circuit Breaker .... RESET
(Located on the lower left instrument panel.)
GEN Switch .... ON

If circuit breaker opens again or annunciator stays illuminated with zero amps indicated:

GEN Switch .... OFF
GENERATOR CONTROL Circuit Breaker .... PULL/DO NOT RESET
Land as soon as practical.

3.39 ELECTRICAL SYSTEM MALFUNCTIONS (continued)

3.39b Alternator Failure

Indication: Master Warning, Triple Chime, ALTERNATOR FAIL , Zero alternator amps indication.

ALT Switch .... OFF then ON

If alternator fails to reset:

ALT Switch .... OFF
ALTERNATOR FIELD Circuit Breaker .... RESET
(Located on pilot's forward circuit breaker panel, row D, position 7)
ALT Switch .... ON

If circuit breaker opens again or annunciator stays illuminated with zero amps indicated:

ALT Switch .... OFF
ALTERNATOR FIELD Circuit Breaker .... PULL/DO NOT RESET
(Located on pilot's forward circuit breaker panel, row D, position 7)

If generator has assumed the load, limit load to under 200 amps and continue flight while avoiding icing conditions. Repair alternator as soon as possible.

3.39 ELECTRICAL SYSTEM MALFUNCTIONS (continued)

3.39c Dual Failure - Both Generator and Alternator Fail

Indication: Master Warning, Triple Chime, ALTERNATOR FAIL and GENERATOR FAIL , Zero amps indication on both ammeters.

NOTE

Any time total tie bus voltage is below 25 Vdc while the aircraft is in the air, the VOLTS message will illuminate.

GEN Switch .... OFF
ALT Switch .... OFF
GENERATOR CONTROL Circuit Breaker .... RESET
(Located on the lower left instrument panel.)
ALTERNATOR FIELD Circuit Breaker .... RESET
(Located on pilot's forward circuit breaker panel, row D, position 7)
GEN Switch (after OFF at least one second) .... ON
ALT Switch (after OFF at least one second) .... ON

If only the generator resets:

ALT Switch .... OFF

Continue flight while avoiding icing conditions.

NOTE

The generator can supply sufficient amperage to run all the required electrical systems.

If only the alternator resets:

GEN Switch .... OFF
Electrical Load .... MAINTAIN LESS THAN 130 AMPS

Ammeter .... MONITOR

Land as soon as practical.

3.39 ELECTRICAL SYSTEM MALFUNCTIONS (continued)

If neither the generator nor alternator resets:

GEN Switch .... OFF
ALT Switch .... OFF
EMER Switch .... Verify OFF
BATTERY Switch .... Verify ON
Electrical Load .... REDUCE TO MINIMUM
(per load-shed procedures shown)

NOTE

To have 30-minutes of battery power remaining after failure of the alternator and generator, the load shedding procedure shown below must be completed within 5-minutes. It is advised to start the load shedding procedure as soon as conditions permit. Items that are not shown, such as standby attitude indicator, are allowed to run continuously and still meet the 30-minute requirement.

Load-shed procedure (for 30-minutes of battery life):

VFR/DAY/NIGHT Conditions:

NOTE

Turning off the AVIONICS switch removes power from all equipment on Avionics Bus 1 and Avionics Bus 2, some of which may be desired. Power must be removed as soon as conditions allow, and within 5-minutes of the alternator and generator failure, to have 30-minutes of battery life from the time of failure.

CAUTION

Caution should be exercised when deactivating certain items. Any items that remain ON or are not activated as shown may reduce the battery life to less than 30-minutes.

3.39 ELECTRICAL SYSTEM MALFUNCTIONS (continued)

AIR COND Switch .... OFF
AVIONICS Switch .... OFF
FUEL PUMPS Switch .... AUTO
IGNITION Switch .... AUTO
VENT FAN .... OFF
WINDSHLD HT Switch .... OFF
PITOT HEAT Switch .... OFF (unless in rain)
PROP HEAT Switch .... OFF
STALL HEAT Switch .... OFF
SURF DE-ICE Switch .... OFF
TAXI/REC LT .... OFF
LANDING LIGHT .... OFF
NAV LIGHT .... OFF
STROBE LIGHT .... OFF
ICE LIGHT .... OFF
COM 1 Transmit .... 2-minutes in CRUISE
1-minute at LANDING

If desired equipment has been deactivated:

NOTE

With the AVIONICS switch turned ON, 30-minutes of battery life from the time of failure will not be available.

Circuit breakers of non-desired equipment .... PULL
AVIONICS Switch .... ON

3.39 ELECTRICAL SYSTEM MALFUNCTIONS (continued)

ICING Conditions:

NOTE

Exit and avoid icing conditions as soon as possible, as electrical equipment needed for flight in icing conditions, other than that shown below, will reduce the life of the battery to less than 30-minutes.

NOTE

Turning off the AVIONICS switch removes power from all equipment on Avionics Bus 1 and Avionics Bus 2, some of which may be desired. Power must be removed as soon as conditions allow, and within 5-minutes of the alternator and generator failure, to have 30-minutes of battery life from the time of failure.

CAUTION

Caution should be exercised when deactivating certain items. Any items that remain ON or are not activated as shown may reduce the battery life to less than 30-minutes.

AIR COND Switch .... OFF
AVIONICS Switch .... OFF
FUEL PUMPS Switch .... AUTO
IGNITION Switch .... AUTO
VENT FAN .... OFF
WINDSHLD HT Switch .... OFF
PITOT HEAT Switch .... ON
PROP HEAT Switch .... OFF
STALL HEAT Switch .... OFF
SURF DE-ICE Switch .... OFF (except 1 cycle in CRUISE, 1 cycle at LANDING)

3.39 ELECTRICAL SYSTEM MALFUNCTIONS (continued)

TAXI/REC LT .... OFF
LANDING LIGHT .... OFF
NAV LIGHT .... OFF
STROBE LIGHT .... OFF
ICE LIGHT .... OFF
(ON 1 minute in CRUISE, 1 minute at LANDING)
COM 1 Transmit .... 2-minutes in CRUISE
1-minute at LANDING

If desired equipment has been deactivated:

NOTE

With the AVIONICS switch turned ON, 30-minutes of battery life from the time of failure will not be available.

Circuit breakers of non-desired equipment .... PULL
AVIONICS Switch .... ON

LANDING Conditions:

NOTE

If the landing is performed at a time that is approximately 30-minutes after the alternator and generator failure, activation of the following equipment may cause a complete electrical system failure. Be prepared to execute the appropriate emergency procedure.

FUEL PUMPS Switch .... 5-Minutes Usage
IGNITION Switch .... AS REQUIRED
LANDING LIGHT .... 5-Minutes Usage

3.39 ELECTRICAL SYSTEM MALFUNCTIONS (continued)

↓

Prepare for landing with an inoperative landing light.

Flaps .... AS REQUIRED

Refer to FLAP SYSTEM MALFUNCTION checklist, Section 3.35 or LANDING WITHOUT FLAPS checklist, Section 3.35

LANDING GEAR .... AS REQUIRED

Refer to EMERGENCY LANDING GEAR EXTENSION checklist, Section 3.33.

3.39d Complete Electrical Failure

Indication: PFDs, MFD and all equipment, excluding the Standby Instrument, will be unpowered.

NOTE

AHRS1 can take up to 45-seconds to realign after power is established on the emergency bus.

Standby Flight Instrument .... Verify OPERATIONAL
Aircraft Control .... Use Standby Instrument
EMER Switch .... ON
BATTERY Switch .... OFF
GEN Switch .... OFF
ALT Switch .... OFF
AVIONICS Switch .... OFF
CABIN PRESSURE DUMP Switch (prior to landing) .... DUMP

↓

3.39 ELECTRICAL SYSTEM MALFUNCTIONS (continued)

NOTE

Turning ON the EMER switch will activate the #1 PFD in Reversionary mode with AHRS 1 data, ADC 1 data, a subset of engine parameters, #1 Comm/Nav/GPS, Audio Panel, Landing Gear Position Indications, internal lighting for the standby instruments.

NOTE

When in the PFD reversionary format, the right lower inset window must be removed to view OAT information.

Land as soon as possible.

NOTE

With a complete electrical failure, emergency landing gear extension and landing without flaps will be required. Refer to Emergency Landing Gear Extension (Section 3.33) and Landing Without Flaps (Section 3.35).

CAUTION

Torque indication will not be available, therefore engine power should be set using throttle lever position, engine sound, airspeed, and the remaining powerplant indications.

CAUTION

During operations on the emergency bus, BETA and reverse are not available.

3.41 AVIONICS SYSTEMS

NOTE

The latest appropriate revision of the Garmin G1000 Cockpit Reference Guide for the Piper PA-46-500TP (Garmin P/N 190-02381-00), and the Garmin G1000 Pilot's Guide for the Piper PA-46-500TP (Garmin P/N 190-02380-00), contain operational information and detailed descriptions of the Garmin G1000 avionics system.

NOTE

Images on the PFD and MFD displays may appear distorted when wearing polarized sunglasses.

3.41a PFD1 Failure

Indication: PFD1 Display goes blank.

DISPLAY BACKUP button above pilot's PFD .... PUSH
XFR button on autopilot .... SELECT to PFD2

Exit and avoid IFR and icing conditions as soon as practical.

NOTE

If the pilot's PFD fails, the MFD and the copilot's PFD will remain in normal mode. Pushing the DISPLAY BACKUP button above pilot's PFD allows the MFD to display AHRS and ADC information but lose certain map functions such as radar. The following features will become inoperative if there is a complete loss of PFD1:

- Traffic System

NOTE

When in the PFD reversionary format, the right lower inset window must be removed to view OAT information.

3.41 AVIONICS SYSTEMS (continued)

3.41b MFD Failure

Indication: MFD Display goes blank.

DISPLAY BACKUP button above pilot's PFD .... PUSH

Exit and avoid IFR and icing conditions as soon as practical.

NOTE

The pilot's PFD and co-pilot's PFD will revert to a reversionary mode display. The following features will become inoperative if there is a complete loss of MFD functionality:

- GDL 69 (Garmin Datalink - XM)
- GWX (Garmin Radar)
- ESP FAIL

NOTE

When in the PFD reversionary format, the right lower inset window must be removed to view OAT information.

3.41c PFD2 Failure

Indication: PFD2 Display goes blank.

XFR button on autopilot .... SELECT to PFD1

Exit and avoid IFR and icing conditions as soon as practical.

NOTE

If the copilot's PFD fails, the MFD and pilot's PFD will remain in normal display format.

3.41 AVIONICS SYSTEMS (continued)

ATTITUDE AND HEADING REFERENCE SYSTEM (AHRS) FAILURES

3.41d AHRS1 Total Failure

On Ground:

Indication: HDG, PIT, ROL white annunciations on PFD.

System Messages (ALERTS Softkey) ....CONSIDER
AHRS 1 Circuit Breaker .... RESET
(Located on pilot's aft circuit breaker panel, row C, position 6)

If AHRS1 data still invalid:

AHRS 2 SENSOR Softkey ....SELECT
Avoid flight in IFR and icing conditions.

In Flight:

Indication: HDG, PIT, ROL white annunciations and BOTH ON AHRS2 amber annunciation on PFD.

System Messages (ALERTS Softkey) ....CONSIDER
AHRS 1 Circuit Breaker ....RESET
(Located on pilot's aft circuit breaker panel, row C, position 6)

If AHRS1 data still invalid:

AHRS 2 data ....CROSSCHECK with STANDBY INSTRUMENT
Exit and avoid IFR and icing conditions as soon as practical.

NOTE

If AHRS 1 is invalid, the Level Mode (LVL), Electronic Stability Protection (ESP), and autopilot will not be available.

NOTE

For partial AHRS failures, the system will not autorevert to the good AHRS but a red "X" will appear over the affected parameter(s).

3.41 AVIONICS SYSTEMS (continued)

ATTITUDE AND HEADING REFERENCE SYSTEM (AHRS) FAILURES (continued)

3.41e AHRS2 Total Failure

On Ground:

Indication: HDG, PIT, ROL white annunciations on PFD.

System Messages (MSG Softkey)..CONSIDER
AHRS 2 Circuit Breaker .... RESET
(Located on copilot's aft circuit breaker panel, row A, position 3)

If AHRS2 data still invalid:

AHRS 1 SENSOR softkey ....SELECT
Avoid flight in IFR and icing conditions.

In Flight:

Indication: HDG, PIT, ROL white annunciations and BOTH ON AHRS1 amber annunciation on PFD.

System Messages (MSG Softkey)..CONSIDER
AHRS 2 Circuit Breaker ....RESET
(Located on the copilot's aft circuit breaker panel, row A, position 3)

If AHRS2 data still invalid:

AHRS 1 data ....CROSSCHECK with STANDBY INSTRUMENT

Exit and avoid IFR and icing conditions as soon as practical.

NOTE

If AHRS 2 is invalid, the Level Mode (LVL), Electronic Stability Protection (ESP), and autopilot will not be available.

NOTE

For partial AHRS failures, the system will not autorevert to the good AHRS but a red "X" will appear over the affected parameter(s).

3.41 AVIONICS SYSTEMS (continued)

ATTITUDE AND HEADING REFERENCE SYSTEM (AHRS) FAILURES (continued)

3.41f AHRS1 and AHRS2 Total Failure

Indication: (Ground and Flight): HDG, PIT, ROL white annunciations and red "X" on all AHRS parameters.

Standby Instrument .... Verify NO FAILURE INDICATIONS
Attitude and Heading .... Use Standby Instrument
Course .... Set using digital window
System Messages (MSG Softkey) .... CONSIDER

If all AHRS data are invalid
and time allows .... RESET both AHRS Circuit Breakers

Land as soon as practical.

NOTE

For partial AHRS failures, a red "X" will appear over the affected parameter(s).

3.41 AVIONICS SYSTEMS (continued)

AIR DATA COMPUTER (ADC) FAILURES

3.41g ADC1 Total Failure

On Ground:

Indication: ALT, IAS white annunciations on PFD.

System Messages (MSG Softkey)..CONSIDER
ADC 1 Circuit Breaker .... RESET
(Located on pilot's aft circuit breaker panel, row C, position 5)

If ADC1 data still invalid:

ADC 2 SENSOR softkey ....SELECT
Avoid flight in IFR and icing conditions.

In Flight:

Indication: ALT, IAS white annunciations and BOTH ON ADC 2 amber annunciation on PFD.

System Messages (MSG Softkey)..CONSIDER
ADC 1 Circuit Breaker .... RESET
(Located on pilot's aft circuit breaker panel, row C, position 5)

If ADC1 data still invalid:

ADC 2 data...CROSSCHECK with STANDBY
AIRSPEED & ALTITUDE

Exit and avoid IFR and icing conditions as soon as practical.

NOTE

For partial ADC failures, the system will not autorevert to the good ADC but a red "X" will appear over the affected parameter(s).

3.41 AVIONICS SYSTEMS (continued)

AIR DATA COMPUTER (ADC) FAILURES (continued)

3.41h ADC2 Total Failure

On Ground:

Indication: ALT, IAS white annunciations on PFD.

System Messages (MSG Softkey)..CONSIDER
ADC 2 Circuit Breaker .... RESET
(Located on pilot's aft circuit breaker panel, row A, position 4)

If ADC2 data still invalid:
ADC 1 SENSOR softkey ....SELECT

Avoid flight in IFR and icing conditions.

In Flight:

Indication: ALT, IAS white annunciations and BOTH ON ADC 1 amber annunciation on PFD.

System Messages (MSG Softkey)..CONSIDER
ADC 2 Circuit Breaker .... RESET
(Located on pilot's aft circuit breaker panel, row A, position 4)

If ADC2 data still invalid:
ADC 1 data...CROSSCHECK with STANDBY AIRSPEED & ALTITUDE

Exit and avoid IFR and icing conditions as soon as practical.

NOTE

For partial ADC failures, the system will not autorevert to the good ADC but a red "X" will appear over the affected parameter(s).

3.41 AVIONICS SYSTEMS (continued)

AIR DATA COMPUTER (ADC) FAILURES (continued)

3.41i ADC1 and ADC2 Failure

Indication (Ground and Flight): ALT, IAS white annunciations and red "X" on all ADC parameters.

System Messages (MSG Softkey)...CONSIDER
Standby Instrument .... VERIFY NO FAILURE INDICATIONS
Airspeed and Altitude ....use Standby Instrument

If all ADC data is still invalid
and time allows .... RESET ADC 1 and ADC 2 circuit breakers

Land as soon as practical.

NOTE

For partial ADC failures, the system will not autorevert to the good ADC but a red "X" will appear over the affected parameter.

3.41 AVIONICS SYSTEMS (continued)

3.41j Erroneous or Loss of Engine and Fuel Displays

Indication: Amber "X" on affected engine parameter or fuel display as erroneous indications.

NOTE

Erroneous information may be identified by indications which do not agree with other system information. Erroneous indications may be determined by comparing a display with other displays and other system information.

1. Set power based on throttle lever position, engine sound and airspeed.
2. Monitor other indications to determine the health of the engine.
3. Use known power settings and power setting tables for approximate fuel flow values.
4. Use other system information, such as annunciator messages, fuel totalizer quantity and flow, to safely complete the flight.

If ALL engine parameters are invalid and time allows:

GEA circuit breaker .... RESET

(Located on pilot's aft circuit breaker panel, row C, position 1)

3.41 AVIONICS SYSTEMS (continued)

3.41k Erroneous or Loss of Warning/Caution CAS Messages

Indication: Displayed information shows an abnormal or emergency situation without the associated CAS message present.

NOTE

Loss of a CAS message may be indicated when engine or fuel displays show an abnormal or emergency situation and the CAS message is not present. An erroneous CAS message may be identified when a CAS message appears which does not agree with other displays or system information.

1. If a CAS message appears, treat it as if the condition exists.
2. If a display indicates an abnormal condition but no CAS message is present, use other system information, such as engine displays, fuel totalizer quantity and flow, to determine if the condition exists. If it cannot be determined that the condition does not exist, treat the situation as if the condition exists.

3.41 AVIONICS SYSTEMS (continued)

3.411 Autopilot or ESP Malfunction

Indication: An unexpected roll or pitch deviation from the desired flight path, possible flight director commands deviations from desired aircraft attitudes and possible autopilot disconnect with red AFCS annunciation, amber or red AP annunciation on PFD.

WARNING

Do not press the LVL switch (if installed) if an autopilot or pitch trim malfunction is suspected.

NOTE

Autopilot malfunctions also include AFCS enhanced features such as Underspeed Protection, Level Mode, and Coupled Go-Around.

NOTE

Electronic Stability Protection (ESP) will not be available following an autopilot failure.

Control Wheel .... GRASP FIRMLY
Attitude Indicators .... CROSSCHECK
AP Disconnect/Trim Interrupt Switch .... DEPRESS and HOLD
Pitch Trim .... RETRIM if necessary
AUTOPILOT Circuit Breaker .... PULL
(Located on pilot's forward circuit breaker panel, row D, position 2)
Autopilot .... DO NOT RE-ENGAGE

ISSUED: December 19, 2017
REVISED: February 21, 2019

3.41 AVIONICS SYSTEMS (continued)

3.41m Automatic Autopilot Disconnect

Indication: Flashing red and white AP annunciation on PFD and aural alert

A/P DISC Switch ....DEPRESS and RELEASE
(cancels disconnect tone, and disconnects Autopilot and Yaw Damper)
Pitch Trim .... RETRIM manually if necessary

NOTE

The autopilot disconnect may be accompanied by a red boxed AFCS, PTRM, PTCH (pitch) or ROL (roll) annunciation on the PFD, indicating the axis which has failed. The autopilot cannot be re-engaged with any of these annunciations present. Level Mode (LVL) and Electronic Stability Protection (ESP) will not be available following an autopilot failure.

NOTE

Yaw Damper disengagement is indicated by a 5 second flashing amber "YD".

3.41 AVIONICS SYSTEMS (continued)

3.41n Electric Trim Failure

Indication: Red boxed PTRM annunciation on PFD

NOTE

Loss of the electric pitch trim servo will not cause the autopilot to disconnect. Monitor pitch attitude for unusual behavior. Be alert to possible autopilot out-of-trim conditions (see AUTOPILOT OUT OF TRIM procedure this section) and expect residual control forces upon disconnect. The autopilot will not re-engage after disconnect with failed pitch trim. Level Mode (LVL) and Electronic Stability Protection (ESP) will not be available if the autopilot cannot be engaged.

Autopilot.. DISCONNECT

3.41 AVIONICS SYSTEMS (continued)

3.41o Electric Pitch Trim Runaway

Indication: White TRIM annunciation on PFD followed by pitch deviation from desired flight path and red boxed PTRM annunciation.

WARNING

Do not press the LVL switch (if installed) if an autopilot or pitch trim malfunction is suspected.

NOTE

After the autopilot is disengaged, it can not be re-engaged until the electric pitch trim system regains functionality. Level Mode (LVL) and Electronic Stability Protection (ESP) will not be available if the autopilot cannot be engaged.

Control Wheel .... GRASP FIRMLY
Attitude Indicators.. CROSSCHECK
AP DISC Switch .... DEPRESS and HOLD
PITCH TRIM Circuit Breaker ....PULL
(Located on pilot's forward circuit breaker panel, row D, position 1)
Pitch Trim.. RETRIM MANUALLY

3.41 AVIONICS SYSTEMS (continued)

3.41p Autopilot Overspeed Recovery

Indication: MAXSPD annunciation above airspeed tape.

This submode becomes active when the autopilot is attempting to prevent the aircraft from exceeding V_{MO}. This may occur at indicated airspeeds well below V_{MO}, if airspeed is increasing at a high rate. It remains active until the airspeed is reduced and V_{MO} exceedance is no longer a factor.

POWER Lever..REDUCE POWER as required
Autopilot..DISCONNECT if required

The pilot may elect to fly the aircraft and reduce airspeed.

NOTE

Overspeed recovery mode provides a pitch up command to decelerate the airplane below VMO. Overspeed recovery is not active in altitude hold (ALT) mode unless Enhanced Stability Protection is installed.The speed reference cannot be adjusted while in overspeed recovery mode.

3.41 AVIONICS SYSTEMS (continued)

3.41q Autopilot Underspeed Recovery

Indication: MINSPD annunciation above airspeed tape, "AIRSPEED" Aural Alert, USP ACTIVE

WARNING

When Underspeed Protection is active, the autopilot is actively lowering the nose of the aircraft to avoid a stall. If Underspeed Protection activates on approach, consider performing a go-around.

NOTE

Underspeed Protection is active whenever the autopilot is engaged and the airspeed has fallen below a minimum threshold or stall warning has activated.

POWER Lever....................................INCREASE POWER as required
FLAPS Position...CONSIDER
LANDING GEAR Position..CONSIDER

3.41 AVIONICS SYSTEMS (continued)

3.41r Loss of Navigation Information

Indication: Amber VOR, VAPP, GPS, BC, LOC or GS flashing on PFD

NOTE

If a navigation signal is lost while the autopilot is tracking it, the autopilot will roll the aircraft wings level and default to roll mode (ROL).

Autopilot.................................. SELECT ANOTHER LATERAL MODE
Nav Source ....SELECT A VALID NAV SOURCE
Autopilot..SELECT NAV
If on an instrument approach at the time the navigation signal is lost:
Missed Approach... EXECUTE
(A second approach may be attempted using other navaids.)

3.41 AVIONICS SYSTEMS (continued)

3.41s Autopilot Out-Of-Trim

Indication: Amber RUD➔, ←RUD, ←AIL, AIL➔, ↑ELE, or ↓ELE annunciation on PFD

CAUTION

Do not attempt to overpower the autopilot in the event of a mistrim. The autopilot servos will oppose pilot input and will trim opposite the direction of pilot input (pitch axis only). This could lead to a significant out-of-trim condition. Disconnect the autopilot using the A/P DISC / TRIM INTER switch if manual control is desired.

If **RUD➔** or **←RUD** annunciation .... adjust rudder trim.

If **↑ELE** or **↓ELE** annunciation .... adjust pitch trim in direction of arrow.

NOTE

For aileron mistrims, ensure the slip/skid indicator is centered and observe the 125 pound maximum fuel imbalance limitation.

NOTE

Sustained elevator mistrims indicate a possible problem with the electric pitch trim system.

Control Wheel ....GRASP FIRMLY with both hands

CAUTION

Be prepared to apply a sustained control force in the direction of the annunciation arrow. For example, an arrow pointing to the right with AIL annunciation indicates that sustained right wing down control wheel force will be required upon autopilot disconnect.

AP DISC Switch .... DEPRESS
Affected trim system .... RETRIM
Autopilot...RE-ENGAGE if available

If the mistrim indication re-occurs, disconnect the autopilot for the remainder of the flight or until the offending condition is resolved.

3.41 AVIONICS SYSTEMS (continued)

3.41t Abnormal Flight Director Mode Transitions

Indication: Flashing lateral or vertical mode annunciations on PFD

NOTE

After 10 seconds, the new mode will be annunciated in green. Upon loss of a selected mode, the system will revert to the default mode for the affected axis, either ROL or PIT.

Loss of selected vertical mode (FLC, VS, ALT, GS)

Autopilot Mode Controls ......SELECT ANOTHER VERTICAL MODE

If on an instrument approach:

Autopilot.. DISCONNECT (if coupled) and continue manually or execute missed approach

Loss of selected lateral mode (HDG, NAV, LOC, APP, BC)

Autopilot Mode Controls .... SELECT ANOTHER LATERAL MODE

If on an instrument approach:

Autopilot.. DISCONNECT (if coupled) and continue manually or execute missed approach

3.41u Failure of the Preflight Test

Indication: Red Boxed PFT annunciation on PFD

AUTOPILOT Circuit Breaker..PULL
(Located on pilot's forward circuit breaker panel, row D, position 2)

NOTE

When the autopilot circuit breaker is pulled, the red PFT annunciation will be removed and the autopilot will be unavailable. Do not reset the circuit breaker unless the airplane is on the ground. Level Mode (LVL) and Electronic Stability Protection (ESP) will not be available if the autopilot cannot be engaged.

3.41 AVIONICS SYSTEMS (continued)

3.41v Loss of Cabin Altitude Display

Indication: Cabin Altitude Display on the MFD is Red X'd

Monitor cabin differential pressure for indications of pressurization system malfunction or loss of cabin pressure.

If an emergency descent is necessary, refer to paragraph 3.21, Emergency Descent - Maximum Rate.

3.41w Loss of Cabin Altitude Display and Cabin Differential Pressure Display

Indication: Cabin Altitude Display and Cabin Differential Pressure Display on the MFD are Red X'd

Descend to an altitude below which supplemental oxygen use would not be required in the event of a loss of cabin pressure.

If an emergency descent is necessary, refer to paragraph 3.21, Emergency Descent - Maximum Rate.

3.41x Dual GPS Failure

Navigation .... Use alternate source of navigation (ILS, LOC, VOR, DME)

If no alternate navigation sources are available:

Dead Reckoning (DR) Mode - Active when the airplane is greater than 30 NM from the destination airport.

Navigation .... Use the airplane symbol and magenta course line on the MAP display.

↓

3.41 AVIONICS SYSTEMS (continued)

WARNING

Information normally derived from GPS turns amber. Information will become more inaccurate over time. After 20 minutes, all information is removed from the display.

NOTE

TAWS is inoperative.

NOTE

DR mode uses heading, airspeed and last known GPS position to estimate the airplanes current position.

All maps with an airplane symbol show a ghosted airplane and a DR label.

Traffic Information System (TIS) is not dependent on GPS information. The position of displayed traffic relative to the airplane symbol on the map is still accurate.

Loss of Integrity (LOI) mode - Active when the airplane is within 30 NM of the destination airport (as calculated from the previous GPS or DR position).

Navigation .... Fly towards known VMC. Use ATC or other information sources as possible.

NOTE

All information derived from GPS or DR is removed from the displays.

The airplane symbol is removed from all maps. The map will remain centered at the last known position.

"NO GPS POSITION" is shown in the center of the map.

TAWS and TIS are inoperative.

3.41 AVIONICS SYSTEMS (continued)

3.41y Avionics Cooling Fan Failures

Indication: Single Chime, AV1 FAN FAIL / AV2 FAN FAIL / AV3 FAN FAIL
MFD FAN FAIL / PFD1 FAN FAIL / PFD2 FAN FAIL

On Ground:

Do not fly until issue is resolved.

In Flight:

Fix issue prior to next flight.

When any of these CAS messages illuminate, it is possible to exceed the manufacturer's specified temperature limits for the affected equipment. The PFD and MFD displays may automatically dim if excessive temperatures are detected.

3.43 FUEL SYSTEM

3.43a Fuel Pressure

Indication: Master Warning, Triple Chime, FUEL PRESS LOW

Power .... REDUCE
FUEL PUMPS Switch .... MAN
Fuel Quantity and Balance .... MONITOR

If fuel pressure annunciator remains illuminated, ***land as soon as possible.***

If fuel pressure annunciator extinguishes, ***land as soon as practical.***

3.43 FUEL SYSTEM (continued)

3.43b Fuel Filter

Indication: Master Caution, Double Chime, FUEL FILTER

Land as soon as practical. Contaminated fuel or clogged filter is possible.

Inspect filter after landing and repair prior to next flight.

CAUTION

Maximum fuel imbalance is 125 pounds.

3.43c Fuel Temperature

Indication: FUEL TEMP (Fuel temperature less than minimum fuel temperature limit of -34°C).

On Ground:
Do not start engine when fuel temperature is below -34°C.

In Flight (Jet A: -34°C, Jet A-1: -41°C):
Maintain fuel within fuel temperature limitations by changing altitude into warmer ambient OAT conditions.

Indication: Fuel temperature greater than maximum fuel temperature limit (+50°C).

On Ground:
Do not start engine when fuel temperature is above +50°C.

In Flight:
FUEL PUMPS Switch.. MAN
Land as soon as practical.

Indication: Fuel temperature indicator blank/malfunctions.

Continue flight assuming OAT is equal to fuel temperature and maintain fuel temperatures within limits using OAT.

3.43 FUEL SYSTEM (continued)

3.43d Fuel Quantity

Indication: Master Warning, Triple Chime, FUEL QTY ,
Red fuel quantity low indication.

Land as soon as possible. Monitor fuel quantity. Reduce power/fuel flow if possible. Total fuel quantity (left and right tanks) is less than or equal to 100 pounds.

Indication: Master Caution, Double Chime, FUEL QTY ,
Amber fuel quantity low indication.

Land as soon as practical. Monitor fuel quantity. Reduce power/fuel flow if possible. Total fuel quantity (left and right tanks) is less than or equal to 180 pounds.

3.43 FUEL SYSTEM (continued)

3.43e Fuel Imbalance

Indication: Master Warning, Triple Chime, FUEL IMBALANCE , Red fuel imbalance indication.

FUEL PUMPS Switch .... MAN
If either white "L FUEL PUMP ON" or "R FUEL PUMP ON" message is **NOT** illuminated, turn the FUEL PUMPS Switch to OFF.

A red warning FUEL IMBALANCE message is displayed when the indicated imbalance has reached 125 pounds. Therefore, regardless of fuel quantity indication, ***land as soon as possible.***

Indication: Master Caution, Double Chime, FUEL IMBALANCE , Amber fuel imbalance indication.

FUEL PUMPS Switch .... Verify AUTO
Fuel Pump .... Verify white L or R FUEL PUMP ON (High Fuel Side) message on MFD
Fuel Quantity .... MONITOR

NOTE

When Right and Left Fuel Quantity varies by more than 40 pounds, the amber FUEL IMBALANCE message will illuminate and the fuel pump from the high fuel side will turn on. Fuel pump activation is indicated by illumination of the white L or R FUEL PUMP ON message.

NOTE

When the FUEL PUMPS switch is in the MAN position, the white L and R FUEL PUMP ON messages are illuminated, indicating operation of the L and R fuel pumps.

3.45 PRESSURIZATION / ENVIRONMENTAL SYSTEM MALFUNCTIONS

3.45a Cabin Pressurization System Failure

Indication: **Master Caution, Double Chime,** CPCS FAIL

On Ground:

BLEED AIR Lever .... AS DESIRED
ECS CABIN COMFORT Switch .... AS DESIRED
CABIN PRESSURE DUMP Switch .... DUMP

NOTE

When a CPCS FAIL caution CAS message occurs on the ground, both outflow valves remain open and the flight must be conducted unpressurized. The BLEED AIR lever and ECS CABIN COMFORT switch may be used to attain a desirable temperature in the cabin.

In Flight:

Oxygen Mask .... ON
MIC SEL Switch .... MSK
Cabin Altitude .... MONITOR
Cabin Differential Pressure .... MONITOR

Descend as soon as practical.

Prior to landing:

CABIN PRESSURE DUMP Switch .... DUMP

CAUTION

When a CPCS FAIL caution CAS message appears in flight, the CPCS controller stops regulating cabin pressure. Cabin pressure changes are now related to aircraft altitude and the aircraft is still protected from exceeding maximum differential pressure.

3.45 PRESSURIZATION / ENVIRONMENTAL SYSTEM MALFUNCTIONS (continued)

3.45b Cabin Pressurization System Fault

Indication: **Master Caution, Double Chime,** CPCS FAULT

Cabin Altitude .... MONITOR
Cabin Differential Pressure .... MONITOR

Prior to landing:
CABIN PRESSURE DUMP Switch .... DUMP

NOTE

When a CPCS FAULT caution CAS message occurs the CPCS uses its internal sensors in lieu of the Garmin G1000 system. The landing field elevation and squat switch information may not be available, so the cabin must be depressurized prior to landing.

3.45 PRESSURIZATION / ENVIRONMENTAL SYSTEM MALFUNCTIONS (continued)

3.45c Fire / Smoke or Fumes in Cabin

If source is known:

Oxygen Mask .... ON
MIC SEL Switch .... MSK

Extinguish fire using the hand held fire extinguisher located in the bottom drawer of the cabinet located behind the copilot's seat.

If source is not known:

Oxygen Mask .... ON
MIC SEL Switch .... MSK
ECS CABIN COMFORT Switch .... OFF
BLEED AIR Lever .... PULL OUT (Closed)
CABIN PRESSURE DUMP Switch .... DUMP
Cabin Fan Switch (as required) .... LO or HI

3.45d Cabin Altitude Above 10,000 feet

Indication: **Master Caution, Double Chime, CABIN ALT 10K, Amber cabin altitude indication.**

Cabin Altitude .... MONITOR

3.45e Cabin Altitude Above 12,000 feet

Indication: **Master Warning, Triple Chime. CABIN ALT 12K, Red cabin altitude indication.**

Oxygen Mask .... ON
MIC SEL Switch .... MSK
ECS CABIN COMFORT Switch .... Verify NORM or HIGH
BLEED AIR Lever .... Verify IN (open)

If cabin altitude exceeds 14,000 feet:

Emergency Descent .... ACCOMPLISH PER SECTION 3.21

Descend as soon as practical.

3.45 PRESSURIZATION / ENVIRONMENTAL SYSTEM MALFUNCTIONS (continued)

3.45f Emergency Pressurization

Indication: Single Chime, EMER BLEED ON

Automatic Operation:

Oxygen Mask .... ON
MIC SEL Switch .... MSK
ECS CABIN COMFORT Switch .... Verify NORM or HIGH
Activation at 12,000 +/- 500 feet cabin altitude.

NOTE

Emergency pressurization will activate as the cabin altitude approaches 12,000 feet and will deactivate as the cabin altitude approaches 11,000 feet. This cycling can be eliminated by rotating the ECS CABIN COMFORT switch to the EMER position.

Manual Operation:

ECS CABIN COMFORT Switch .... EMER
Cabin Altitude .... MONITOR

Descend as soon as practical.

3.45g Bleed Overtemperature

Indication: **Master Warning, Triple Chime,** BLEED OVERTEMP

POWER Lever .... REDUCE
Climate Control .... SELECT LOWER TEMPERATURE

If message remains illuminated:

Oxygen Mask .... ON
MIC SEL Switch .... MSK
ECS CABIN COMFORT Switch .... OFF
BLEED AIR Lever .... PULL OUT (closed)

Descend and land as soon as practical.

3.45 PRESSURIZATION / ENVIRONMENTAL SYSTEM MALFUNCTIONS (continued)

3.45h Overpressurization

Indication: **Master Warning, Triple Chime, Red cabin differential pressure indication.**

If cabin differential pressure is above 5.8 psi (or 5.6 psi for greater than 30 sec.):

Oxygen Mask .... ON
MIC SEL Switch .... MSK
ECS CABIN COMFORT Switch .... OFF
BLEED AIR Lever .... PULL OUT (closed)

If overpressurization continues:

CABIN PRESSURE DUMP Switch .... DUMP
Emergency Descent .... ACCOMPLISH PER SECTION 3.21

3.45i Rapid or Explosive Decompression

Oxygen Mask .... ON
MIC SEL Switch .... MSK

If increase in cabin altitude is explosive:

Emergency Descent .... ACCOMPLISH PER SECTION 3.21

If increase in cabin altitude is rapid and cabin altitude has not exceeded 14,000 feet (time permitting):

ECS CABIN COMFORT Switch .... HIGH

If cabin altitude exceeds 14,000 feet:

Emergency Descent .... ACCOMPLISH PER SECTION 3.21

3.47 USE OF OVER WING EMERGENCY EXIT

Use of Over Wing Emergency Exit
Exit .... LOCATE (second window from front on right side)
NOTE The cabin must be depressurized before attempting to open the emergency exit.
Plexiglas Cover .... REMOVE Handle .... PULL Emergency Exit Window .... PULL IN

3.49 ANTI-ICE / DE-ICE SYSTEM MALFUNCTIONS

3.49a Left Pitot Heat Failure

Indication: **Master Caution, Double Chime,** L PITOT HT FAIL

NOTE

Failure of the L Pitot Heat could cause erroneous indications of pilot's airspeed and standby airspeed. Airspeeds on each PFD should be compared for accuracy.

L PITOT HEAT Circuit Breaker .... RESET
(Located on the pilot's aft circuit breaker panel, row A, position 2)

If amber IAS annunciation on PFD:

ADC2 .... SELECT

***Exit and avoid IFR and icing conditions* and consider terminating flight early due to possible loss of airspeed redundancy.**

3.49b Right Pitot Heat Failure

Indication: **Master Caution, Double Chime,** R PITOT HT FAIL

NOTE

Failure of the R Pitot Heat could cause erroneous indications of copilot's airspeed. Airspeeds on each PFD should be compared for accuracy.

R PITOT HEAT Circuit Breaker .... RESET
(Located on the pilot's aft circuit breaker panel, row A, position 3)

If amber IAS annunciation on PFD:

ADC1 .... SELECT

3.49 ANTI-ICE/DE-ICE SYSTEM MALFUNCTIONS (continued)

3.49c Both Left and Right Pitot Heat Failure

Indication: Master Warning, Triple Chime, PITOT HT FAIL

NOTE

Failure of both left and right pitot heaters could cause erroneous pilot, copilot and/or standby airspeed indications. Monitor pilot and copilot airspeeds. In the event of complete loss of airspeed, maintain safe airspeed by use of throttle, engine settings and airframe sensory cues.

L PITOT HEAT Circuit Breaker .... RESET
(Located on pilot's aft circuit breaker panel, row A, position 2)

R PITOT HEAT Circuit Breaker .... RESET
(Located on pilot's aft circuit breaker panel, row A, position 3)

If either circuit breaker opens again, do not reset.

***Exit and avoid IFR and icing conditions* and consider terminating flight early due to possible loss of airspeed redundancy.**

3.49d Pitot Heat Off

Indication: Master Caution Indication; PITOT HEAT OFF

PITOT HEAT Switch .... Select ON

3.49 ANTI-ICE/DE-ICE SYSTEM MALFUNCTIONS (continued)

3.49e Prop Heat Failure

In Flight:

Indication: Master Warning, Triple Chime, PROP HEAT FAIL

PROP HEAT Circuit Breaker ....CHECK IN
(Located on the pilot's aft circuit breaker panel, row A, position 4)

If PROP HEAT Circuit Breaker was closed (not out):
PROP HEAT Switch ....Cycle OFF then ON

If message remains illuminated, Exit and Avoid icing conditions.

On Ground:

Indication: Amber Caution, Double Chime, PROP HEAT FAIL

Flight in icing conditions is prohibited.

3.49 ANTI-ICE/DE-ICE SYSTEM MALFUNCTIONS (continued)

3.49f Windshield Over Temp

Indication: Master Warning, Triple Chime, WDSHLD OVRTMP

NOTE

During high ambient temperature conditions when switching windshield heat from ANTI ICE to DEFOG, the red WDSHLD OVRTMP message may illuminate and remain illuminated until the windshield surface temperature cools to the DEFOG heat temperature range.

WINDSHLD HT Switch .... OFF

If WDSHLD OVRTMP message extinguishes:

WINDSHLD HT Switch .... DEFOG

If WDSHLD OVRTMP message remains illuminated:

WINDSHLD HT Switch .... OFF

WINDSHIELD HEAT Circuit Breakers (2) .... PULL

(Located on pilot's aft circuit breaker panel, row A, positions 7, 8)

***Exit and avoid IFR and icing conditions* and conditions where windshield heat may be necessary.**

3.49g Surface De-ice Failure

In Flight:

Indication: Master Warning, Triple Chime, SURF DEICE FAIL

SURFACE DE-ICE Circuit Breaker .... RESET

(Located on the pilot's aft circuit breaker panel, row A, position 6)

If message remains illuminated, *Exit and Avoid icing conditions*.

On Ground:

Indication: Master Caution, Double Chime, SURF DEICE FAIL

Flight in icing conditions is prohibited.

3.49 ANTI-ICE/DE-ICE SYSTEM MALFUNCTIONS (continued)

3.49h Vacuum System Failure

Indication: Master Caution, Double Chime, Amber vacuum indication.

Vacuum gauge..CHECK

Monitor vacuum gauge. Low vacuum may lead to improper operation of the wing and empennage deice boot.

If vacuum indication remains amber, *Exit and Avoid icing conditions*.

CAUTION

If de-ice boot are not fully deflated, stall speeds will be increased by approximately 5 KIAS.

3.49 ANTI-ICE/DE-ICE SYSTEM MALFUNCTIONS (continued)

3.49i Stall Warning Fail

Indication: Master Caution, Double Chime, STALL WARN FAIL

STALL WARN Circuit Breaker .... RESET

(Located on pilot's forward circuit breaker panel, row C, position 5)

NOTE

Underspeed Protection (USP) is inoperative when Stall Warning is inoperative

Avoid low airspeeds and monitor approach speeds closely.

If message remains illuminated, *Exit and Avoid icing conditions*.

3.49j Stall Heat Fail

Indication: Master Caution, Double Chime, STALL HEAT FAIL

STALL HEAT Switch.. RESET

If message remains illuminated:

STALL HEAT Circuit Breaker... RESET

(Located on pilot's aft circuit breaker panel, row A, position 5)

Avoid low airspeeds and monitor approach speeds closely.

Monitor wing and empennage deice boots.

3.51 DOOR AJAR

Door Ajar
On Ground:
Indication: Single Chime, DOOR AJAR
Door Latching ....CHECK AND VERIFY 4 GREEN INDICATORS
In Flight:
Indication: **Master Warning, Triple Chime,** DOOR AJAR
Ensure all occupants are seated with seat belts on. Remain clear of the door. Reduce cabin pressurization. Reduce airspeed. ***Land as soon as practical.***

3.53 OXYGEN

Oxygen
In Flight:
Indication: Master Caution, Double Chime, OXYGEN
Indicates one or more of the passenger oxygen cannisters is in use or is expended. Descend to altitude where supplemental oxygen is not required.
On Ground:
Indication: Single Chime, OXYGEN
Indicates one or more of the passenger oxygen cannisters is in use or is expended. If the oxygen system is not working properly, have the condition corrected before flight where oxygen may be required in the event of a cabin depressurization.

3.55 SPIN RECOVERY

Spin Recovery	
Rudder	FULL OPPOSITE TO DIRECTION OF ROTATION
Control Wheel	FULL FORWARD WHILE NEUTRALIZING AILERONS
POWER Lever	CLOSED
Rudder (when rotation stops)	NEUTRAL
Control Wheel	AS REQUIRED TO SMOOTHLY REGAIN LEVEL FLIGHT ATTITUDE

3.57 ICING (Reference Section 9, Supplements, for Meridian Aircraft Flight Into Known Icing (FIKI)

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SECTION 4

NORMAL PROCEDURES

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SECTION 4

NORMAL PROCEDURES

SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This section provides the normal operating procedures for the PA-46-500TP, M500 airplane. All normal operating procedures required by FAA regulation, as well as those deemed necessary for normal operation of the airplane are presented.

This section provides checklists for all normal operating procedures, using a simple action - reaction format, with little emphasis on system operation. These checklists should be used during normal ground and flight operations.

When appropriate, additional information is provided immediately below the checklist, providing more detailed information related to that procedure. In order to operate the airplane in a safe and efficient manner, pilots should familiarize themselves with the both the checklist and amplified procedures.

Normal operating procedures associated with optional systems and equipment which require handbook supplements are presented in Section 9, Supplements.

4.3 AIRSPEEDS FOR SAFE OPERATION

The following airspeeds are significant to the safe operation of the airplane. They are for standard airplanes flown at maximum weight under standard sea level conditions.

Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of the engine, airplane and equipment, atmospheric conditions and piloting technique.

Best Rate of Climb Speed (V_y) .... 125 KIAS
Best Angle of Climb Speed (V_x) .... 95 KIAS
Maximum Operating Maneuvering Speed (V_O) .... 127 KIAS

Landing Final Approach Speed (Full Flaps) .... 85 KIAS
Maximum Demonstrated Crosswind Velocity .... 17 KTS
Maximum Flaps Extended Speed
- 10° .... 168 KIAS
- 20° .... 135 KIAS
- Full Flaps (36°) .... 118 KIAS

Airspeeds for Autopilot Operation .... 90 - 188 KIAS
Minimum Airspeed for Autopilot Coupled Approach .... 100 KIAS

4.5 NORMAL PROCEDURES CHECKLIST

The airplane should be given a thorough preflight and walk-around check. The preflight should include a check of the airplane's operational status, computation of weight and C.G. limits, takeoff and landing distances, and in-flight performance. A weather briefing should be obtained for the intended flight path, and any other factors relating to a safe flight should be checked before takeoff.

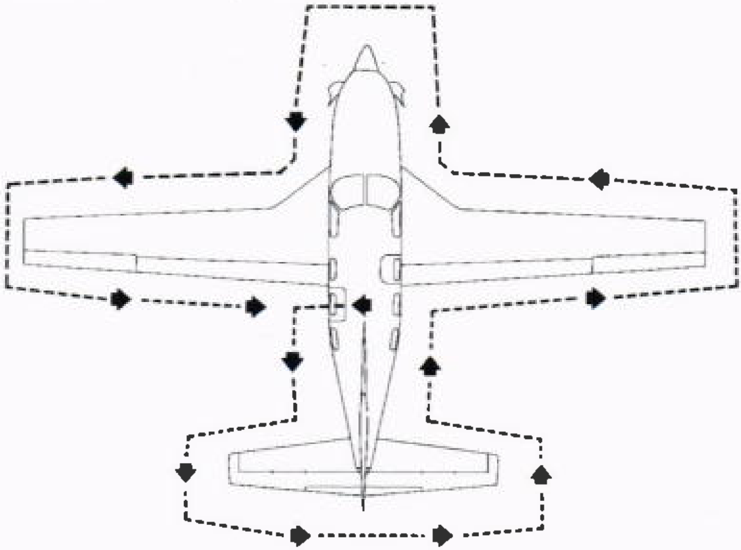
4.5a Preflight Checklist

COCKPIT

Empty Seats....................................SEAT BELTS SNUGLY FASTENED
Windows....................................CHECK CLEAN
Required Papers....................................CHECK ON BOARD
All Switches....................................OFF
Control Wheel....................................RELEASE RESTRAINTS
Primary Flight Controls....................................PROPER OPERATION
Parking Brake....................................SET
LANDING GEAR Selector....................................DOWN
BATTERY Switch....................................ON
Landing Gear Indicator Lights....................................THREE GREEN
Flaps....................................EXTEND
Pilot's Emergency Oxygen System....................................ON/Verify Charge 800 psi Minimum/Check Mask and Microphone
Exterior Lighting Switches....................................ON, CHECK OPERATION, OFF
Interior Cabin Lighting....................................ON and CHECK
All Lighting Switches....................................OFF
BATTERY Switch....................................OFF
Baggage....................................STOW and SECURE

To check the pilot's emergency oxygen system, depress and hold the reset test button on the mask while depressing the press-to-test button on the stowage box. Visually verify that the test indicator located on the stowage box and auditory cues signify oxygen flow. Also verify the mask microphone operation by monitoring the ship speaker system during the oxygen system test. The mask microphone, intercom, and ship speaker must be activated prior to testing. The mask does not have to be removed from the stowage box for preflight testing.

4.5a Preflight Checklist (continued)



WALK-AROUND
Figure 4-1

EMPENNAGE

Primary and Pressurization Static Ports ....CLEAR
Left Alternate Static Port ....CLEAR
Storage Compartment Door .... CLOSE / SECURE
EPU Access Door...CLOSED
Antennas (Upper and Lower)...CHECK
Surface Condition .... CLEAR OF ICE, FROST, SNOW
Deice Boots (Stabilizer and Rudder) ....CHECK
Elevator and Elevator Trim Tab ....CHECK
Vortex Generators ....CHECK

CAUTION

During the preflight inspection, if a total of more than 5 vortex generators are damaged or missing, the aircraft is not airworthy.

4.5a Preflight Checklist (continued)

EMPENNAGE (continued)

Rudder .... CHECK
Rudder Trim Tab .... CHECK
Static Wicks (11) .... CHECK
Tie Down .... REMOVE
Right Alternate Static Port .... CLEAR

RIGHT WING

Surface Condition .... CLEAR OF ICE, FROST, SNOW
Flap and Hinges .... CHECK
Aileron and Hinges .... CHECK
Static Wicks (3) .... CHECK
Wing Tip and Lights .... CHECK
Fuel Tank Vent .... CLEAR
Fuel Tank and Filler Cap ....CHECK supply visually - SECURE CAP
Deice Boot .... CHECK
Stall Strips .... CHECK
Vortex Generators .... CHECK

CAUTION

During the preflight inspection, if a total of more than 5 vortex generators are damaged or missing, the aircraft is not airworthy.

Radar Pod and Storage Door .... CHECK / SECURE
OAT Probes .... CHECK
Pitot Head .... REMOVE COVER and CHECK for OBSTRUCTIONS
Tie Down and Chock .... REMOVE
Main Gear Strut........... PROPER INFLATION - approx. 2.4 in. (6.1 cm)
Gear Door .... CHECK
Tire .... CHECK
Brake Block and Disc .... CHECK

4.5a Preflight Checklist (continued)

NOSE SECTION

General Condition and Cowling Fasteners .... CHECK
Right Cowl Door .... OPEN - CHECK GENERAL CONDITION - SECURE DOOR
Air Outlet and Exhaust Covers .... REMOVE
Generator / Alternator Cooling Air Inlet .... CLEAR
Exhaust Stacks .... CHECK
Forward Upper Cowling .... HORIZONTAL LATCH SLOTS ALIGNED and PINS EXTENDED
Fuel Sumps (2) .... DRAIN and CHECK for water, sediment and proper fuel See Figure 8-5
Air Inlets .... CLEAR
Propeller Spinner .... CHECK
Propeller .... CHECK for nicks and general condition, ROTATE PROPELLER - listen for noise, check for binding
Landing Light .... CHECK
Chock .... REMOVE
Nose Gear Strut .... PROPER INFLATION - approx. 2.7 in. (6.8 cm)
Nose Tire .... CHECK
Gear Doors .... CHECK
Fuel Sumps (3) .... DRAIN and CHECK for water, sediment and proper fuel See Figure 8-5
Forward Upper Cowling .... HORIZONTAL LATCH SLOTS ALIGNED and PINS EXTENDED
Left Cowl Door .... OPEN and CHECK OIL LEVEL
Oil Filler Cap .... VERIFY FULLY CLOSED
Alternator and Air Cond Compressor Belts .... CHECK FOR TENSION and EXCESSIVE WEAR
Brake Fluid Reservoir Cap .... VERIFY CLOSED - LOCKING TAB DOWN
Left Cowl Door .... CLOSED and SECURE

4.5a Preflight Checklist (continued)

LEFT WING

Surface Condition .... CLEAR OF ICE, FROST, SNOW
Ice Light .... CHECK
Main Gear Strut........... PROPER INFLATION - approx. 2.4 in. (6.1 cm)
Gear Door .... CHECK
Tire .... CHECK
Brake Block and Disc .... CHECK
Tie Down and Chock .... REMOVE
Pitot Head .... CHECK
Deice Boot .... CHECK
Stall Strips .... CHECK
Vortex Generators .... CHECK

CAUTION

During the preflight inspection, if a total of more than 5 vortex generators are damaged or missing, the aircraft is not airworthy.

Stall Warning Vane .... CHECK
Fuel Tank and Filler Cap ....CHECK supply visually - SECURE CAP
Fuel Tank Vent .... CLEAR
Wing Tip and Lights .... CHECK
Static Wicks (3) .... CHECK
Aileron and Hinges .... CHECK
Flap and Hinges .... CHECK

4.5b Before Starting Engine Checklist

BEFORE STARTING ENGINE

Passengers .... BOARD
Door .... CLOSE and LATCH

WARNING

Do not initiate any flight if all four door pin indicators are not green and/or the DOOR AJAR message is illuminated.

Door Pins .... ALL INDICATORS GREEN
Seats .... ADJUSTED and LOCKED in position
Seat Belts and Harness .... FASTEN / ADJUST
(snug on empty seats)
- CHECK inertia reel

All Electrical Switches .... OFF
DAY/NIGHT Switch .... Verify proper setting
Cabin Climate Controls .... OFF

NOTE

If any circuit breaker is not IN, investigate the cause prior to re-setting.

Circuit Breakers .... CHECK
ECS CABIN COMFORT Switch .... OFF
PARK BRAKE .... PULL ON
BLEED AIR Lever .... PULL OFF (closed)
MANUAL OVRD Lever (MOR) .... OFF (Full aft and locked in place)
POWER Lever .... IDLE
CONDITION Lever .... CUT-OFF/FEATHER
Firewall FUEL SHUTOFF Valve .... IN (open) and COVER CLOSED
EMER Switch .... ON
Verify operation of the pilot's PFD
with 3-Green Landing Gear Indications,
No. 1 Nav/Com, Audio Panel, and Standby Instrument
EMER Switch .... OFF

4.5b Before Starting Engine Checklist (continued)

BEFORE STARTING ENGINE (continued)

CAUTION

Whenever system voltage permits, the aircraft should be started using battery power only, especially when the ambient temperature is below 0°C (32°F). This procedure warms the battery and improves its re-charging acceptance.

External Power ....Apply as required
BATTERY Switch .... ON (OFF, if external power applied)
FLAPS ....RETRACT
MIC SEL (BOM/MSK) Switch .... BOM (Boom)
Alternate Static Source ....CHECK PRIMARY/DOWN POSITION
Pitot and Static Drains (3 pilot side, 2 copilot side)...........PUSH to drain
Fuel Gauges............................... CHECK QUANTITY & IMBALANCE

NOTE

When in the PFD start/reversionary format, the right lower inset window must be removed to view OAT information.

OAT.. VERIFY WITHIN LIMITS
Fuel Temperature .... VERIFY WITHIN LIMITS
Oil Temperature ....CHECK

[illegible]

Allow the G1000 avionics to initialize and display CAS messages prior to performing the FIRE DET/ ANN TEST.

FIRE DET/ANN TEST Switch....................................PRESS and HOLD
Verify ENGINE FIRE CAS message and BOM/MSK and DUMP switch lights illuminate
Master Warning Softkey ....PRESS to ACKNOWLEDGE
Verify ENGINE FIRE CAS message stops flashing and triple chime is silenced
CAS Messages.................................. CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
Proceed with appropriate Engine Start Checklist.

The oil temperature should be checked prior to engine start on installations where the condition lever has a COLD START position. The cold start procedure is required on those installations when oil temperature is 0°C and below.

4.5c Engine Start Checklist

ENGINE START - USING AIRPLANE BATTERY

BATTERY Voltage..CHECK 24 – 26 VOLTS

CAUTION

Observe starter limitations (Section 2.9.)

CAUTION

Allow G1000 avionics to initialize and display CAS messages prior to initiating an engine Auto Start sequence. Starting the engine prior to display of G1000 CAS messages will result in disruption of the auto start sequence possibly resulting in an engine overtemp condition.

CAUTION

For warm weather operation, engine starts may be attempted with a battery voltage of 23.5 volts minimum. Observe the engine start ITT limitation, Ng minimum speed of 13% and ensure combustion occurs within 10 seconds after moving the condition lever to run. Failure to observe these limitations can result in damage to the engine.

FUEL PUMPS Switch .... MAN
L and R FUEL PUMP ON CAS Messages .... ILLUMINATED
IGNITION Switch... MAN
IGNITION ON CAS Message .... ILLUMINATED
Prop Area..CLEAR
START MODE Switch ....AUTO (Light in Switch Extinguished)
PUSH START Switch.. LIFT COVER/PUSH
Oil Pressure ....CHECK RISING
Ng (min. 13%)..STABILIZED

For condition levers with a COLD START position and oil temperature is less than or equal to 0°C:

CONDITION Lever ....COLD START (HOLD)
CONDITION Lever (at 50% Ng minimum)...................................... RUN

For all other conditions:

CONDITION Lever .... RUN
ITT ....MAX. 1000°C LIMITED TO 5 SEC.

ISSUED: December 19, 2017
REVISED: April 3, 2018

4.5c Engine Start Checklist (continued)

ENGINE START - USING AIRPLANE BATTERY (continued)

If combustion is not initiated within 10 sec. of moving Condition Lever to Run then:

a. CONDITION Lever ....CUT-OFF/FEATHER
b. START MODE Switch ....PUSH MAN/STOP
c. Allow minimum of 30 seconds fuel draining period, then refer to DRY MOTORING RUN (4.5 d)

Starter @ 56% Ng .... Verify START ENGAGED CAS message extinguished (If not - PUSH START MODE MAN/STOP SWITCH)
Ng ....STABLE at or above 63%
Np .... VERIFY 1200 RPM MINIMUM
GEN Switch...........................ON/CHECK POSITIVE AMPS/28 VOLTS
ALT Switch...ON
FUEL PUMPS Switch...AUTO
IGNITION Switch... OFF
Oil Pressure ....CHECK (Min. 60 PSI)

ENGINE START (MANUAL MODE) - USING AIRPLANE BATTERY

BATTERY Voltage...CHECK 24 – 26 VOLTS

CAUTION

Observe starter limitations (Section 2.9.)

CAUTION

For warm weather operation, engine starts may be attempted with a battery voltage of 23.5 volts minimum. Observe the engine start ITT limitation. Ng minimum speed of 13% and ensure combustion occurs within 10 seconds after moving the condition lever to run. Failure to observe these limitations can result in damage to the engine.

4.5c Engine Start Checklist (continued)

ENGINE START (MANUAL MODE) - USING AIRPLANE BATTERY (continued)

NOTE

To allow the PFD to maintain maximum brightness during engine starting with high levels of ambient light present, run the AVIONICS dimmer to its minimum setting (photocell mode).

FUEL PUMPS Switch .... MAN
L and R FUEL PUMP ON CAS Messages .... ILLUMINATED
IGNITION Switch .... MAN
IGNITION ON CAS Message .... ILLUMINATED
Prop Area .... CLEAR
START MODE Switch .... MAN (Light in Switch Illuminated)
PUSH START Switch .... LIFT COVER/PRESS & HOLD
Oil Pressure .... CHECK RISING
Ng (min. 13%) .... STABILIZED

For condition levers with a COLD START position and oil temperature is less than or equal to 0°C:

CONDITION Lever .... COLD START (HOLD)
CONDITION Lever (at 50% Ng minimum) .... RUN

For all other conditions:

CONDITION Lever .... RUN

ITT .... MAX. 1000°C LIMITED TO 5 SEC.

If combustion is not initiated within 10 sec. of moving Condition Lever to Run then:

a. CONDITION Lever .... CUT-OFF/FEATHER
b. START MODE Switch .... RELEASE
c. Allow minimum of 30 seconds fuel draining period, then refer to DRY MOTORING RUN (4.5 d)

PUSH START Switch @ 56% Ng .... RELEASE and verify START ENGAGED CAS message extinguished
Ng .... STABLE at or above 63%
Np .... VERIFY 1200 RPM MINIMUM
GEN Switch .... ON/CHECK POSITIVE AMPS/28 VOLTS
ALT Switch .... ON
FUEL PUMPS Switch .... AUTO
IGNITION Switch .... OFF
Oil Pressure .... CHECK (Min. 60 PSI)

4.5c Engine Start Checklist (continued)

ENGINE START - USING EXTERNAL POWER

BATTERY Switch .... Verify OFF
External Power Unit .... CONNECT

CAUTION

Observe starter limitations (Section 2.9.)

CAUTION

Allow G1000 avionics to initialize and display CAS messages prior to initiating an engine Auto Start sequence. Starting the engine prior to display of G1000 CAS messages will result in disruption of the auto start sequence possibly resulting in an engine overtemp condition.

NOTE

For engine starting, the external power source must be capable of providing 24 to 29 Volts and 1200 Amps.

Voltmeter .... CHECK STABLE 24 to 29 VOLTS
FUEL PUMPS Switch .... MAN
L and R FUEL PUMP ON CAS Messages .... ILLUMINATED
IGNITION Switch .... MAN
IGNITION ON CAS Message .... ILLUMINATED
Prop Area .... CLEAR
START MODE Switch .... AUTO (Light in Switch Extinguished)
PUSH START Switch .... LIFT COVER/PUSH
Oil Pressure .... CHECK RISING
Ng (min. 13%) .... STABILIZED

For condition levers with a COLD START position and oil temperature is less than or equal to 0°C:

CONDITION Lever .... COLD START (HOLD)
CONDITION Lever (at 50% Ng minimum) .... RUN

For all other conditions:

CONDITION Lever .... RUN

ITT .... MAX. 1000°C LIMITED TO 5 SEC.

4.5c Engine Start Checklist (continued)

ENGINE START - USING EXTERNAL POWER (continued)

If combustion is not initiated within 10 sec. of moving Condition Lever to Run then:

a. CONDITION Lever .... CUT-OFF/FEATHER
b. START MODE Switch .... PUSH MAN/STOP
c. Allow minimum of 30 seconds fuel draining period, then refer to DRY MOTORING RUN (4.5 d)

Starter @ 56% Ng .... Verify START ENGAGED
CAS message extinguished (If not - PUSH START MODE MAN/STOP SWITCH)
Ng .... STABLE at or above 63%
Np .... VERIFY 1200 RPM MINIMUM
FUEL PUMPS Switch .... AUTO
IGNITION Switch .... OFF
Oil Pressure .... CHECK (Min. 60 PSI)
BATTERY Switch .... ON
External Power Unit .... DISCONNECT
GEN Switch .... ON/CHECK POSITIVE AMPS/28 VOLTS
ALT Switch .... ON

4.5d ENGINE DRY MOTORING RUN

Allow minimum of 30 seconds fuel draining period, then:
POWER Lever .... IDLE
CONDITION Lever .... CUT-OFF/FEATHER
FUEL PUMPS Switch .... MAN
IGNITION Switch .... OFF
BATTERY Switch .... ON
START MODE Switch .... MAN (Switch Light Illuminated)
PUSH START Switch .... PUSH and HOLD (15 SEC.)
PUSH START Switch .... RELEASE

4.5e BEFORE TAXIING

CAUTION

Isolated reports of no engine response to power lever movement have occurred during low engine power (Ng idle speed below 63%) and high engine accessory load operations in hot environments. If Ng is below 63% at the completion of the BEFORE TAXIING checklist, shutdown the engine and resolve the issue. The manual override lever is not to be used on the ground for taxiing or takeoff.

AVIONICS Switch...ON
Multi-Function Display (MFD).......VERIFY DATABASE CURRENCY
MFD ENTER KEY ....Press ~8 seconds after splash screen appears

NOTE

Failure to wait 8 seconds for splash screen acknowledgment may prevent FOB SYNC button from appearing. If this occurs, input fuel on-board manually.

MFD - Weight and Fuel Planning ....ENTER WEIGHTS AS REQUIRED
Fuel Totalizer (Weight)................FOB SYNC or ENTER MANUALLY
CAS Messages.................................CONSIDER ANY ILLUMINATED
Autopilot...Verify Preflight Self-Test (PFT) completed and Disconnect Tone heard
PITOT HEAT Switch...................................ON, CHECK OPERATION (PITOT HEAT OFF CAS Message extinguished. Monitor volt/ammeter.)
PITOT HEAT Switch...OFF
TAXI/REC LT Switch .... AS REQUIRED
NAV and STROBE LIGHT Switches .... AS REQUIRED
Cabin Climate Controls .... AS REQUIRED
Radios/Avionics ....CHECK/SELF-TEST
Flaps ....VERIFY RETRACTED
Elevator Trim .... SET IN TAKEOFF RANGE
Rudder Trim ....SET 2° to 3° RT
BLEED AIR Lever... PUSH IN (on)
Cabin Pressure DUMP Switch.................................VERIFY POSITION

4.5e BEFORE TAXIING (continued)

ECS CABIN COMFORT Switch ....NORM

NOTE

Maximum cooling on the ground may be achieved by operating with the BLEED AIR lever in the OUT (closed) position and the ECS CABIN COMFORT control selected OFF.

DEST ELV (in TMR/REF window) ....SET

CAUTION

Adjust headset volume to hear the STALL WARN TEST at an acceptable level. This will ensure all aural alerts and tones will be audible through the headset.

STALL WARN TEST Switch ....PRESS TO TEST

WARNING

If the internal battery of the EBD standby instrument is less than 80%, IFR flight is prohibited.

Standby Flight Instrument........................VERIFY ON with no red "X"s or failure annunciations and acceptable charge level
Altimeter/Standby Altimeter ....SET
TRAFFIC (if installed).. TEST as required
PARK BRAKE... RELEASE

To check the standby instrument's internal battery charge level, press the MENU key, rotate the MODE/SYNC knob to the POWER SETTINGS page, then press BATTERY line select key. BAT LEVEL IN --.-- will be displayed for a short period of time as internal battery capacity is being measured. This could take up to 10 minutes if the ambient temperature is below 0°C. Once the capacity is measured the ON BAT XX% REM annunciation will be displayed. After checking the battery charge level, the EXT PWR softkey must be pressed to reestablish power from the aircraft electrical system. Press the MENU key to return to the normal display. To test the traffic system (if installed), the ADS-B softkey on the Traffic Map page must be selected off.

4.5f TAXIING

Taxi Area .... CLEAR
POWER Lever .... ADVANCE SLOWLY
Brakes .... CHECK
Steering .... CHECK
Flight Instruments .... CHECK

WARNING

Propeller operation below 1200 rpm is prohibited.

NOTE

BETA range (aft of IDLE detent) may be used during taxi to control taxi speed and reduce wear on brakes.

When taxiing on unpaved surfaces:

Elevator .... full aft position
POWER Lever .... ADVANCE SLOWLY

CAUTION

Maintain slow taxi speeds (3-5 knots) when taxiing over large bumps or transitions between paved and unpaved surfaces.

CAUTION

Use of reverse is prohibited on unpaved surfaces.

4.5g ENGINE RUN UP

PARK BRAKE..SET
POWER Lever.. 1900 RPM
OVERSPEED GOV TEST Switch .... LIFT COVER/PUSH and HOLD
NP .... OBSERVE APPROX. 60 RPM DROP
Overspeed Governor Test Switch .... RELEASE
Np ....RETURN TO 1900 RPM
POWER Lever...IDLE
REVERSE LOCK OUT Switch...............PUSH and HOLD (Min. 5 sec.)
POWER Lever.....................LIFT and RETARD TOWARDS REVERSE
Beta and Prop Reverse .... NOT ATTAINABLE
REVERSE LOCK OUT Switch.........RELEASE, POWER LEVER CAN BE MOVED TOWARDS REVERSE
POWER Lever...IDLE
GEN Switch.................................... OFF (verify alternator picks up load)
GEN Switch...ON
Quadrant FRICTION Lock ....SET

NOTE

Refer to Section 9, Supplements, for M500 Aircraft Flight Into Known Icing (FIKI), prior to any flight operations (takeoff, cruise, landing, etc.) in icing conditions.

When the alternator and generator are powering the electrical system independently, the current provided by the generator is slightly greater than the alternator current due to the battery charging at the higher voltage set point of the generator.

4.5h BEFORE TAKEOFF

Seat Backs .... ERECT
Seats.................................... ADJUSTED & LOCKED IN POSITION
Armrests .... STOWED
Belts/Harness .... FASTENED / ADJUSTED
GEN Switch.. ON
ALT Switch.. ON
BLEED AIR Lever.. IN (open)
ECS CABIN COMFORT Switch .... NORM
Fuel Temperature .... CHECK WITHIN LIMITS
FUEL PUMPS Switch.. MAN
IGNITION Switch .... MAN
PITOT HEAT Switch... O N
Additional Ice Protection Equipment.................. AS REQUIRED
(Per Section 9, Supplement 1)
TAXI/REC LT Switch .... AS REQUIRED
LANDING LIGHT Switch .... AS REQUIRED
NAV LIGHT Switch....................................... AS REQUIRED
STROBE LIGHT Switch .... ON
Flight Instruments .... CHECK (Primary and Standby)
CAS messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
System Messages (MSG Softkey)............................CONSIDER
Engine Instruments... CHECK
Radios / Avionics .... SET AS REQUIRED
Flaps .... SET (0° - 20°)
Elevator Trim .... SET IN TAKEOFF RANGE
Rudder Trim .... SET 2° to 3° RT
Flight Controls .... FREE & PROPER TRAVEL
TO/GA.. PRESS (if desired)

NOTE

Refer to Section 9, Supplements, for M500 Aircraft Flight Into Known Icing (FIKI), prior to any flight operations (takeoff, cruise, landing, etc.) in icing conditions.

4.5h BEFORE TAKEOFF (continued)

NOTE

The transponder will automatically switch from STBY or GND mode to ALT mode once airborne. If this automatic transition fails, manually select transponder to ALT mode.

4.5i TAKEOFF

WARNING

Positioning the POWER Lever aft of the flight idle stop in flight is prohibited. Such positioning may cause loss of airplane control or may result in an engine overspeed condition and consequent loss of engine power.

NOTE

Increasing airspeed will cause torque to increase.

NOTE

Demonstrated crosswind component is 17 knots.

NORMAL TAKEOFF (0° FLAPS)

Brakes .... APPLY
POWER Lever .... SET TO TAKEOFF
Brakes .... RELEASE
Engine Instruments .... MONITOR
Rotation and Liftoff (V_R) .... 85 KIAS
Obstacle Clearance Speed .... 100 KIAS

After liftoff and positive rate of climb:

Landing Gear .... UP

4.5i TAKEOFF (continued)

SHORT FIELD TAKEOFF PERFORMANCE (20° FLAPS)

Flaps .... 20°
Brakes .... APPLY
POWER Lever .... SET TO TAKEOFF (MCP)
Brakes .... RELEASE
Engine Instruments .... MONITOR
Rotation and Liftoff (V_R) .... 85 KIAS
Obstacle Clearance Speed .... 95 KIAS

After liftoff and positive rate of climb:

Flaps .... RETRACT
Landing Gear .... UP

UNPAVED FIELD TAKEOFF PERFORMANCE (20° FLAPS)

CAUTION

During operations on wet grass, pilots need to pay special attention to aircraft directional control and crosswinds due to reduced traction.

CAUTION

Takeoff rotation speeds greater than 85 KIAS are prohibited.

NOTE

When taking off on unpaved surfaces, too much aft elevator control or early rotation may result in stall warning activation.

NOTE

During unpaved field operations, it is important to maintain the aircraft in accordance with maintenance manual specifications or aircraft damage may result. See paragraph 8.13 for additional information.

4.5i TAKEOFF (continued)

UNPAVED FIELD TAKEOFF PERFORMANCE (20° FLAPS) (continued)

If the takeoff surface has no loose debris/rocks which could cause propeller damage, the following procedure may be used.

Maximum Power Prior to Brake Release Procedure

Elevator .... Neutral Position
Flaps .... 20°
Brakes .... APPLY
POWER Lever .... SET TO TAKEOFF (MCP)
Brakes .... RELEASE
Engine Instruments .... MONITOR
Elevator .... Position to minimize nose gear load
Rotation and Liftoff (V_R) .... 85 KIAS
Obstacle Clearance Speed .... 95 KIAS

After liftoff and positive rate of climb:

Flaps .... RETRACT
Landing Gear .... UP

If the takeoff surface has loose debris or rocks which could cause propeller damage, the following procedure may be used.

Rolling Takeoff Procedure

Brakes .... APPLY
Elevator .... Neutral Position
Flaps .... 20°
Brakes .... RELEASE
POWER Lever .... Slowly advance from idle to TAKEOFF (MCP) within ~ 15 seconds
Engine Instruments .... MONITOR
Elevator .... Position to minimize nose gear load without lifting nose gear off the ground
Rotation and Liftoff (V_R) .... 85 KIAS
Obstacle Clearance Speed .... 95 KIAS

4.5i TAKEOFF (continued)

UNPAVED FIELD TAKEOFF PERFORMANCE (20° FLAPS) (continued)

Rolling Takeoff Procedure (continued)

After liftoff and positive rate of climb:

Flaps .... RETRACT
Landing Gear .... UP

In order to gain proficiency, pilots should practice the unpaved field takeoff technique on a paved runway prior to operation on unpaved surfaces to get a feel for elevator back pressure required and power application rate for rolling takeoffs.

4.5j MAXIMUM CONTINUOUS POWER CLIMB

POWER Lever .... MCP
FUEL PUMPS Switch .... AUTO
IGNITION Switch .... AUTO
LANDING LIGHT Switch .... OFF
TAXI/REC LT Switch .... AS REQUIRED
Ice Protection Equipment .... AS REQUIRED

Engine Instruments
a. Torque .... MONITOR (1313 FT-LB MAX.)
b. ITT .... MONITOR (770°C MAX.)
c. Ng .... MONITOR (101.7% MAX.)

Climb Speed (best rate) .... 125 KIAS
Transponder .... Verify ALT mode

NOTE

Ignition may be operated continuously and can be used for takeoff, landing, or flight into precipitation. There is no time limitation, although continuous operation will reduce component life.

4.5k CRUISE CLIMB

Climb Power..SET MCP
Ice Protection Equipment..AS REQUIRED
Engine Instruments
- a. Torque ....MONITOR (1313 FT-LB MAX.)
- b. ITT..MONITOR (770°C MAX.)
- c. Ng..MONITOR (101.7% MAX.)

Cruise Climb Speed..140 KIAS (to 20,000 FT)
125 KIAS (20,000 FT to 30,000 FT)
Altimeters..CHECK
Transponder..Verify ALT mode

4.5l CRUISE

Cruise Power..SET PER POWER TABLES IN SECTION 5
Engine / Fuel Indications..MONITOR
Fuel Temperature / OAT..MONITOR
Cabin Climate Controls..AS DESIRED

The cruising speed is a result many factors including power setting, altitude, temperature, loading, and equipment installed on the airplane. Also, weather conditions should be continuously monitored, with special attention to conditions which could lead to icing.

4.5m FLIGHT IN ICING CONDITIONS

Reference Section 9, Supplements, for M500 Aircraft Flight Into Known Icing (FIKI).

4.5n DESCENT

CAUTION

Isolated reports of no engine response to power lever movement have occurred during low engine power (Ng idle speed below 63%) and high engine accessory load operations in hot environments. The possibility of encountering this condition (referred to as "engine roll back") may be minimized by turning air conditioning and bleed air off before final landing approach. During flight operations, if an engine roll back is detected, immediately perform the FUEL CONTROL UNIT MALFUNCTION OR POWER LEVER CONTROL LOSS (Manual Override Operation) procedure in Section 3. Pilots should review this procedure in advance and be prepared to execute if required.

Windshield DEFROST.................................. PULL ON (IF REQUIRED)
WINDSHLD Heat Switch.................................DEFOG (IF REQUIRED)
Ice Protection Equipment .... AS REQUIRED
POWER Lever..SET TO DESIRED TORQUE
Altimeter & Standby Altimeter...CHECK
DEST ELV (in TMR/REF window)..CHECK
Cabin Climate Controls .... AS REQUIRED

4.5o BEFORE LANDING

APPROACH CHECK

CAUTION

Although the minimum approved operating speed with the autopilot coupled is 90 KIAS, coupled approaches below 100 KIAS, particularly in gusty conditions, can create high pilot workloads. The minimum speed for autopilot coupled approaches is 100 KIAS.

Altimeter & Standby Altimeter....................SET
FUEL PUMPS Switch....................MAN
IGNITION Switch....................MAN
LANDING LIGHT Switch....................ON
Fuel Quantity and Balance....................CHECK
Seats....................ADJUSTED & LOCKED IN POSITION
Armrests....................STOWED
Belts/Harness....................FASTEN & ADJUSTED
Landing Gear....................DOWN (below 168 KIAS)
Flaps....................SET (10° @ 168 KIAS max.)

During the approach to landing, the CHECK GEAR aural alert may sound. The mutable CHECK GEAR is triggered when the gear is not down and locked and engine torque is less than 300 ft-lb. The nonmutable CHECK GEAR is triggered when the landing gear is not down and locked and flaps are extended to the 20° or 36° positions. The severity of the CHECK GEAR CAS message is determined by proximity to the ground. A Caution message is triggered when above ~400 feet AGL, and a Warning is triggered below ~400 feet AGL. See Section 7 for additional details.

4.5o BEFORE LANDING (continued)

LANDING CHECK

Gear Position Indications .... 3 GREEN
Brakes .... CHECK

WARNING

After pumping several times, if one or both toe brakes are inoperative, DO NOT attempt landing on a short field.

Flaps .... SET (36° @ 118 KIAS max.)
Airspeed .... 85 KIAS

NOTE

Landing distance performance was established by maintaining a power-on (280 ft. lb. torque), stabilized 3° approach at 85 KIAS, and reducing power to idle during the landing flare.

Autopilot .... DISENGAGE
Yaw Damper (prior to landing) .... DISENGAGE
TAS .... AS REQUIRED

4.5p LANDING

CAUTION

In crosswind conditions, the nosewheel will not be aligned with the runway as the wheel touches down because of rudder input. To prevent swerving in the direction of nosewheel offset, which could result in the aircraft departing the side of the runway, the rudder must be promptly centered just as the nosewheel touches down.

NOTE

A BETA caution CAS message may be posted during landing if beta is selected when only the left main or nose gear squat switches are sensed on ground and GPS groundspeed is greater than 30 knots. After both squat switches are sensed on ground or GPS groundspeed is less than 30 knots, a BETA advisory CAS message will be posted when re-entering beta.

NORMAL TECHNIQUE

POWER Lever.....IDLE

Touch Down Main Wheels First, Then Gently Lower Nose

Brakes.....MODERATE or as required
POWER Lever.....BETA or as required

NOTE

Landing distance was determined by selecting beta immediately after touchdown (all three landing gear) and applying moderate braking.

SHORT FIELD TECHNIQUE

POWER Lever.....IDLE

Touch Down Main Wheels First, Then Gently Lower Nose

Reverse (After Touchdown).....MAXIMUM
Brakes.....MODERATE
POWER Lever.....IDLE (before aircraft stops)

4.5p LANDING (continued)

UNPAVED FIELD TECHNIQUE

CAUTION

During operations on wet grass, pilots need to pay special attention to aircraft directional control and crosswinds due to reduced traction.

CAUTION

Touchdown speeds greater than 85 KIAS are prohibited. Use of reverse is prohibited on unpaved surfaces.

NOTE

During unpaved field operations, it is important to maintain the aircraft in accordance with maintenance manual specifications or aircraft damage may result. See paragraph 8.13 for additional information.

POWER Lever....................IDLE

Touch Down Main Wheels First, Then Gently Lower Nose

POWER Lever....................BETA
Elevator....................Full Aft Position
Brakes....................MODERATE
POWER Lever....................IDLE (before aircraft stops)

4.5q BALKED LANDING (Go-Around)

POWER Lever.. SET TAKEOFF TORQUE
Climb Airspeed .... 85 KIAS
Flaps (after climb established
and obstacle has been cleared).................................... RETRACT TO 20°
Climb Airspeed ....ACCELERATE TO 100 KIAS
Flaps .... RETRACT TO 0°
Landing Gear..RETRACT

If the aircraft is equipped with optional Underspeed Protection (USP) and an autopilot coupled go-around is desired, press the TO/GA button on the throttle handle, followed immediately by the checklist shown above. Refer to Section 7 for additional details on the autopilot coupled go-around and Underspeed Protection (USP).

4.5r AFTER LANDING

FUEL PUMPS Switch....................AUTO
IGNITION Switch....................OFF
PITOT HEAT Switch....................OFF
Additional Ice Protection Equipment....................OFF
Landing / Taxi Lights....................AS REQUIRED
Strobe Light....................AS REQUIRED
WX Radar....................STBY
Flaps ....RETRACT
Transponder....................AS REQUIRED

4.5s SHUTDOWN

WARNING

If there is evidence of fire within the engine after shutdown, proceed immediately with the Dry Motoring Run Procedure, Section 4, Paragraph 4.5d.

CAUTION

When the CONDITION lever is selected to CUT-OFF/FEATHER, the propeller should quickly stop (20 to 30 seconds) in the feather position and a white FEATHER message should be displayed on the PFD. If the propeller continues to windmill for an extended period or an amber FEATHER caution CAS message appears on the PFD, a feathering system failure has occurred. Investigate and correct the problem prior to the next flight.

PARK BRAKE ....SET
ECS CABIN COMFORT Switch ....OFF
POWER Lever....................IDLE
Cabin Climate Controls ....OFF
FUEL PUMPS Switch....................OFF
AVIONICS Switch....................OFF

4.5s SHUTDOWN (continued)

GEN Switch .... OFF
ALT Switch .... OFF

NOTE

Allow ITT to stabilize at least two minutes at idle.

CONDITION Lever .... CUT-OFF/FEATHER
"FEATHER" CAS Message .... CHECK ON
BLEED AIR Lever .... OUT (closed)
Exterior Lighting Switches .... OFF
BATTERY Switch .... OFF
Standby Instrument .... VERIFY SHUTDOWN
Flight Controls .... SECURED
Oxygen System .... OFF
Wheel Chocks .... AS REQUIRED
Tie Downs .... AS REQUIRED
Air Inlets, Exhaust and Pitot Covers .... INSTALL

NOTE

In case the Aspen EBD standby instrument remains "ON" due to improper shutdown, the EBD switches to internal battery and depletes it. To turn off the EBD, press the "SHUT DOWN" command from Main Menu page 6 or hold the red "REV" button for 20 seconds.

4.7 STALLS

The stall characteristics of the M500 are conventional. An approaching stall is indicated by a "STALL...STALL" aural alert which is activated at least 5 knots above the actual stall. Mild airframe buffeting and pitching may also precede the stall.

The stalling speed at maximum gross weight with power off, landing gear extended, and full flaps is 69 KIAS. With the landing gear retracted and flaps up, stall speed is increased to 79 KIAS. Loss of altitude during stalls can be as great as 900 feet, depending on configuration and power. When conducting stalls intentionally, Electronic Stability Protection may be disabled from the MFD/ AUX/System Setup Page

NOTE

The stall warning system is inoperative with the BATTERY and GEN and ALT switches OFF.

During preflight, the stall warning system should be checked by turning the BATTERY switch ON and pressing the STALL WARN TEST switch to determine that the stall warning system is functional.

4.9 TURBULENT AIR OPERATION

In keeping with good operating practice, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to maneuvering speed to reduce the structural loads caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or of distractions caused by the conditions (refer to Section 2, Paragraph 2.3 for maneuvering speeds).

4.11 NOISE LEVEL

The corrected noise level of this aircraft is 76.8 dB(A) as measured per ICAO Annex 16, Volume I, Part II, Chapter 10, and 14 CFR Part 36, Appendix G, Amendment 36-22.

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

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, Noise Standards - Aircraft Type and Airworthiness Certification. This aircraft model is in compliance with all 14 CFR Part 36 noise standards applicable to this type.

4.13 RESERVED

4.15 HIGH ALTITUDE OPERATION

During high altitude operations above approximately 28,500 ft. MSL, the cabin altitude will exceed 10,000 ft. MSL and an amber CABIN ALT 10K caution message will be displayed. This is an indication for the pilot to:

- Be vigilant about monitoring the cabin altitude.
- Check the BLEED AIR lever is pushed IN and the ECS rotary switch is set to NORM.
- Check the CAB PRES/DUMP switch is OFF.
- Check the pilot's emergency oxygen system charge (1850 psig).

If the cabin altitude rises above 12,000 ft. MSL, a red CABIN ALT 12K message will illuminate, and the emergency pressurization system will activate, indicating the pilot should:

- Don the pilot's emergency oxygen mask and ensure that oxygen is flowing.
- Descend to an altitude where the red CABIN ALT 12K message extinguishes.

  AND
- Make an emergency descent if required.

CAUTION

A fully charged (1850 psig) pilot supplemental demand flow oxygen system contains a supply (approximately 30 minutes) of oxygen for the pilot to breath in the "normal" setting for a duration in excess of that required for an emergency descent. The minimum duration of oxygen required for an emergency descent to an appropriate altitude for unpressurized flight is indicated on the oxygen gauge by a yellow arc.

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TABLE OF CONTENTS

SECTION 5

PERFORMANCE

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SECTION 5

PERFORMANCE

5.1 GENERAL

All of the required (FAA regulations) and complementary performance information is provided by this section.

True airspeed may vary ±1% due to tolerances in power, airspeed and temperature indications.

Performance information associated with those optional systems and equipment which require handbook supplements is provided by Section 9 (Supplements).

Performance is predicated on NORMAL ECS setting. Setting ECS to HI, while maintaining a constant power, will increase fuel flow by approximately 9 pph, or, if ITT is maintained at the temperature limit, power will be reduced by 8%.

While some performance charts show information below -54°C, performance information presented in this chapter is valid for the range from +50°C (122°F) to -54°C (-65°F) only.

5.3 AIRCRAFT CONFIGURATION

Performance depicted in Section 5 is applicable to aircraft equipped with a weather radar pod, main landing gear fairings, 2 communications antennas, 2 GPS antennas, 1 dual purpose navigation antenna, 1 radar altitude antenna, 2 transponder antennas, 1 marker beacon antenna, 1 stormscope antenna, 1 ADF antenna, 1 DME antenna and 1 AM/FM radio antenna.

5.5 INTRODUCTION - PERFORMANCE AND FLIGHT PLANNING

The performance information presented in this section is based on measured Flight Test Data corrected to I.C.A.O. standard day conditions, or non parametric coefficients, and analytically expanded for the various parameters of weight, altitude, temperature, etc.

The performance charts are unfactored and do not make any allowance for varying degrees of pilot proficiency or mechanical deterioration of the aircraft. This performance, however, can be duplicated by following the stated procedures in a properly maintained airplane.

5.5 INTRODUCTION - PERFORMANCE AND FLIGHT PLANNING (continued)

Effects of conditions not considered on the charts must be evaluated by the pilot, such as the effect of winds aloft on cruise and range performance.

REMEMBER! To get chart performance, follow the chart procedures.

The information provided by paragraph 5.7 (Flight Planning Example) outlines a detailed flight plan using performance charts in this section. Each chart includes its own example to show how it is used.

WARNING

Performance information derived by extrapolation beyond the limits shown on the charts should not be used for flight planning purposes.

5.7 FLIGHT PLANNING EXAMPLE

(a) Aircraft Loading

The first step in planning the flight is to calculate the airplane weight and center of gravity by utilizing the information provided by Section 6 (Weight and Balance) of this handbook.

The basic empty weight for the airplane as licensed at the factory has been entered in Figures 6-5 and 6-39. If any alterations to the airplane have been made affecting weight and balance, reference to the aircraft logbook and Weight and Balance Record (Figures 6-7 and 6-41) should be made to determine the current basic empty weight of the airplane.

Make use of the Weight and Balance Loading Forms (Section 6) and the C.G. Range and Weight graph (Figures 6-33 and 6-69) to determine the total weight of the airplane and the center of gravity position.

5.7 FLIGHT PLANNING EXAMPLE (continued)

(a) Aircraft Loading (continued)

After proper utilization of the information provided, the following weights have been determined for consideration in the flight planning example.

The landing weight cannot be determined until the weight of the fuel to be used has been established. Refer to item (g) (1).

(1)	Basic Empty Weight	3380 lb (1533.1 kg)
(2)	Occupants	520 lb (235.8 kg)
(3)	Baggage and Cargo	80 lb (36.3 kg)
	Total Zero Fuel Weight {(1) + (2) + (3)}	3980 lb (1805.3 kg)
(4)	Fuel (6.7 lb/gal. x 135) (3.041 kg/gal x 135)	904.5 lb (410.3 kg)
(5)	Ramp Weight	4884.5 lb (2215.6 kg)
(6)	Start, Taxi and Runup Weight	-43.0 lb (-19.33 kg)
(7)	Takeoff Weight	4841.5 lb (2196.2 kg)
(8)	Landing Weight (a)(5) minus (g)(1). (4884.5 lb minus 225 lb) (2215.6 kg minus 102.1 kg)	4659.5 lb (2113.5 kg)

The total zero fuel weight is below the maximum of 4850 lbs (2063.8 kg).

The takeoff weight is below the maximum of 5092 lbs (2309.7 kg) and the weight and balance calculations have determined the C.G. position within the approved limits. Refer to Figures 6-9 and 6-43.

5.7 FLIGHT PLANNING EXAMPLE (continued)

(b) Takeoff and Landing

Now that the aircraft loading has been determined, all aspects of the takeoff and landing must be considered.

All of the existing conditions at the departure and destination airport must be acquired, evaluated and maintained throughout the flight.

Apply the departure airport conditions and takeoff weight to the appropriate Takeoff Ground Roll and Takeoff Distance (Figures 5-41, 5-43, 5-45 and 5-47) (for Metric units see Figures 5-175, 5-177, 5-179 and 5-181) to determine the length of runway necessary for the takeoff and/or obstacle clearance.

The landing distance calculations are performed in the same manner using the existing conditions at the destination airport and, when established, the landing weight.

The conditions and calculations for the example flight are listed below. The takeoff and landing distances required for the flight have fallen well below the available runway lengths.

5.7 FLIGHT PLANNING EXAMPLE (continued)

(b) Takeoff and Landing (continued)

		Departure Airport	Destination Airport
(1)	Pressure Altitude	1000 ft	3500 ft
(2)	Temperature	29°C	25°C
(3)	Wind Component (Headwind)	10 KTS	5 KTS
(4)	Runway Length Available	3400 ft (1036.3 meters)	5000 ft (1524 meters)
(5)	Runway Gradient	2% up	2% up
(6)	Takeoff and Landing Distance Required:		
	Paved, Dry Surface	2488 ft* (758 meters)	2205 ft** (672 meters)
	Dry Grass Surface (factor 1.2)	2986 ft* (910 meters)	2646 ft. ** (807 meters)
	For Rolling Takeoffs (add 450 Ft)	3436 ft* (1047 meters)	

NOTE

The remainder of the performance charts used in this flight plan example assume a no wind condition. The effect of winds aloft must be considered by the pilot when computing climb, cruise and descent performance.

* reference Figure 5-47 (Figure 5-181 for metric)
** reference Figure 5-131 (Figure 5-265 for metric)

5.7 FLIGHT PLANNING EXAMPLE (continued)

(c) Climb

The next step in the flight plan is to determine the necessary climb segment components.

The desired cruise pressure altitude and corresponding cruise outside air temperature values are the first variables to be considered in determining the climb components from the Fuel, Time, and Distance to Climb graph (Figures 5-55, 5-57 and 5-59) (for Metric units see Figures 5-189, 5-191 and 5-193). After the fuel, time, and distance for the cruise pressure altitude and outside air temperature values have been established, apply the existing conditions at the departure field to graph (Figures 5-55, 5-57 and 5-59) (for Metric units see Figures 5-189, 5-191 and 5-193). Now, subtract the values obtained from the graph for the field of departure conditions from those for the cruise pressure altitude.

The remaining values are the true fuel, time, and distance components for the climb segment of the flight plan corrected for field pressure altitude and temperature.

The following values were determined from the above instructions in the flight planning example.

(1) Cruise Pressure Altitude	25000 ft
(2) Cruise OAT	-20° C
(3) Fuel to Climb (includes Start, Taxi and Takeoff) (152 lb. minus 48 lb.) (69 kg minus 21.8 kg)	104 lb.* (47.2 kg)*
(4) Time to Climb (20 min. minus 0.7 min.)	19.3 min.**
(5) Distance to Climb (54 nautical miles minus 1.3 nautical miles)	52.7 nautical miles***

* reference Figure 5-57 (Figure 5-191 for metric)
** reference Figure 5-55 (Figure 5-189 for metric)
***reference Figure 5-59 (Figure 5-193 for metric)

5.7 FLIGHT PLANNING EXAMPLE (continued)

(d) Descent

The descent data will be determined prior to the cruise data to provide the descent distance for establishing the total cruise distance.

Utilizing the cruise pressure altitude and OAT, determine the basic fuel, time, and distance for descent (Figures 5-115, 5-117 and 5-119) (for Metric units see Figures 5-249, 5-251 and 5-253). These figures must be adjusted for the field pressure altitude and temperature at the destination airport. To find the necessary adjustment values, use the existing pressure altitude and temperature conditions at the destination airport as variables to find the fuel, time, and distance values from the graph (Figures 5-115, 5-117 and 5-119) (for Metric units see Figures 5-249, 5-251 and 5-253). Now, subtract the values obtained from the field conditions from the values obtained from the cruise conditions to find the true fuel, time and distance values needed for the descent segment of the flight plan.

The values obtained by proper utilization of the graphs for the descent segment of the example are shown below.

(1) Fuel to Descend (50.1 lb. minus 10.7 lb.) (22.7 kg minus 4.9 kg)	39.4 lb.* (17.8 kg)*
(2) Time to Descend (16.6 min. minus 2.6 min.)	14 min.**
(3) Distance to Descend (60.2 nautical miles minus 8.2 nautical miles)	52 nautical miles***

* reference Figure 5-117 (Figure 5-251 for metric)
** reference Figure 5-115 (Figure 5-249 for metric)
***reference Figure 5-119 (Figure 5-253 for metric)

5.7 FLIGHT PLANNING EXAMPLE (continued)

(e) Cruise

Using the total distance to be traveled during the flight, subtract the previously calculated distance to climb and distance to descend to establish the total cruise distance. Refer to the appropriate Power Setting Table (refer to Figure 5-70) (for Metric units see Figure 5-204) when selecting the cruise power setting. The established pressure altitude and temperature values and the selected cruise power should now be used to determine the true airspeed from the Power Setting tables (Figure 5-70) (for Metric units see Figure 5-204). Interpolation may be required if altitude and/or temperature falls between cardinal values on power tables.

Calculate the cruise fuel consumption for the cruise power setting from the information provided by the Power Setting Table (refer to Figure 5-70) (for Metric units refer to Figure 5-204).

The cruise time is found by dividing the cruise distance by the cruise speed and the cruise fuel is found by multiplying the cruise fuel consumption by the cruise time.

5.7 FLIGHT PLANNING EXAMPLE (continued)

(e) Cruise (continued)

The cruise calculations established for the cruise segment of the flight planning example are as follows:

(1) Total Distance	188 nautical miles
(2) Cruise Distance (e)(1) minus (c)(5) minus (d)(3), (188 nautical miles minus 52.6 nautical miles minus 52 nautical miles)	83.4 nautical miles
(3) Cruise Torque	1174 FT.-LB. maximum speed cruise
(4) Cruise Speed	258 KTS TAS*
(5) Cruise Fuel Consumption	255 pph* (115.7 kg/hr)*
(6) Cruise Time (e)(2) divided by (e)(4), (83.4 nautical miles divided by 259 KTS)	0.32 hrs
(7) Cruise Fuel (e)(5) multiplied by (e)(6) (255 pph multiplied by 0.32 hrs) (115.7 kg/hr multiplied by 0.32 hrs)	81.6 lb. (37.02 kg)

*reference Figure 5-70 (Figure 5-204 for metric)

5.7 FLIGHT PLANNING EXAMPLE (continued)

(f) Total Flight Time

The total flight time is determined by adding the time to climb, the time to descend and the cruise time. Remember! The time values taken from the climb and descent graphs are in minutes and must be converted to hours before adding them to the cruise time.

The flight time required for the flight planning example is shown below:

(1) Total Flight Time (c)(4) plus (d)(2) plus (e)(6), (0.32 hrs plus 0.23 hrs plus 0.32 hrs) (19.3 min. plus 14 min. plus 19.2 min.)	0.87 hrs

(g) Total Fuel Required

Determine the total fuel required by adding the fuel to climb (includes fuel to start, taxi and runup), the fuel to descend, and the cruise fuel. When the total fuel (in pounds) (kilograms) is determined, divide this value by 6.7 lb/gal. (.80 kg/L) to determine the total fuel in gallons (liters) used for the flight.

The total fuel calculations for the example flight plan are shown below.

(1) Total Fuel Required (c)(3) plus (d)(1) plus (e)(7),	
(15.5 gal. plus 5.9 gal. plus 12.2 gal.)	33.6 gal./225.1 lb.
(58.7 L plus 22.3 L plus 46.2L)	127.2 L (102.1 kg)

5.9 PERFORMANCE GRAPHS

LIST OF FIGURES

5.9 PERFORMANCE GRAPHS (continued)

LIST OF FIGURES (continued)

5.9 PERFORMANCE GRAPHS (continued)

LIST OF FIGURES (continued)

5.9 PERFORMANCE GRAPHS (continued)

LIST OF FIGURES (continued)

Figure No.		Page No.

5.9 PERFORMANCE GRAPHS (continued)

LIST OF FIGURES (continued)

METRIC

5.9 PERFORMANCE GRAPHS (continued)

LIST OF FIGURES (continued)

METRIC (continued)

5.9 PERFORMANCE GRAPHS (continued)

LIST OF FIGURES (continued)

METRIC (continued)

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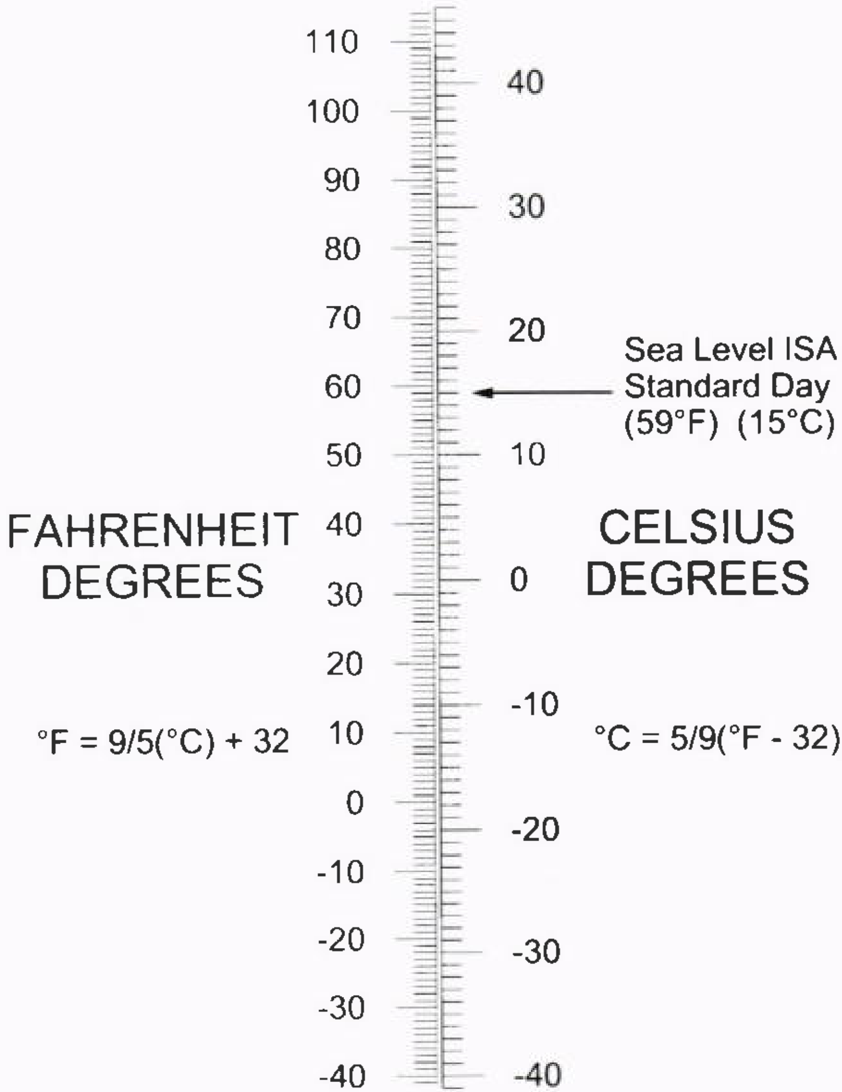
CONVERSION TABLE

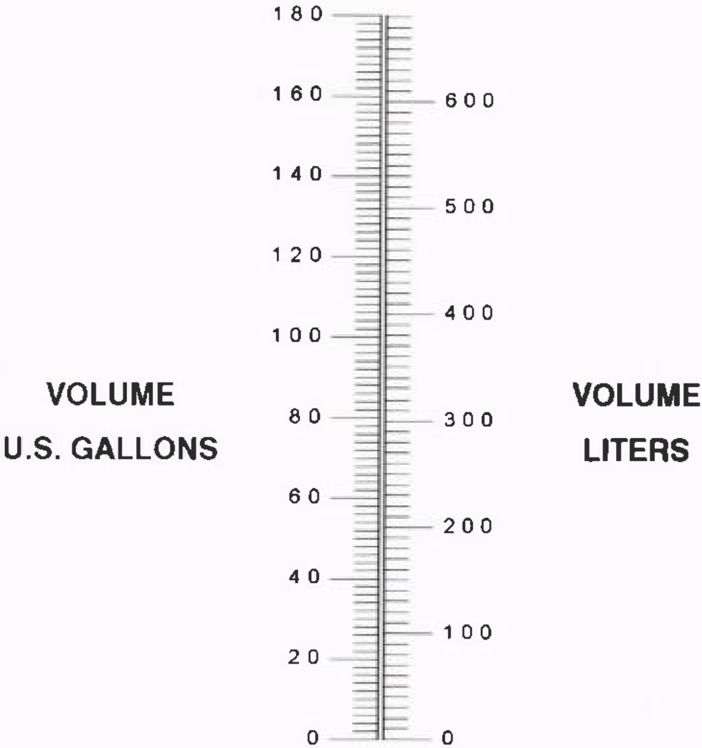
MULTIPLY	BY	TO OBTAIN
Feet	0.3048	Meters
Meters	3.2808	Feet
Gallons	3.7854	Liters
Liters	0.2642	Gallons
Pounds	0.4536	Kilograms
Kilograms	2.2046	Pounds
Inches of Mercury	33.8639	Millibars
Millibars	0.02953	Inches of Mercury

Example: 50 feet = 50 x 0.3048 meters = 15.24 meters
100 liters = 100 x 0.2642 gallons = 26.42 gallons

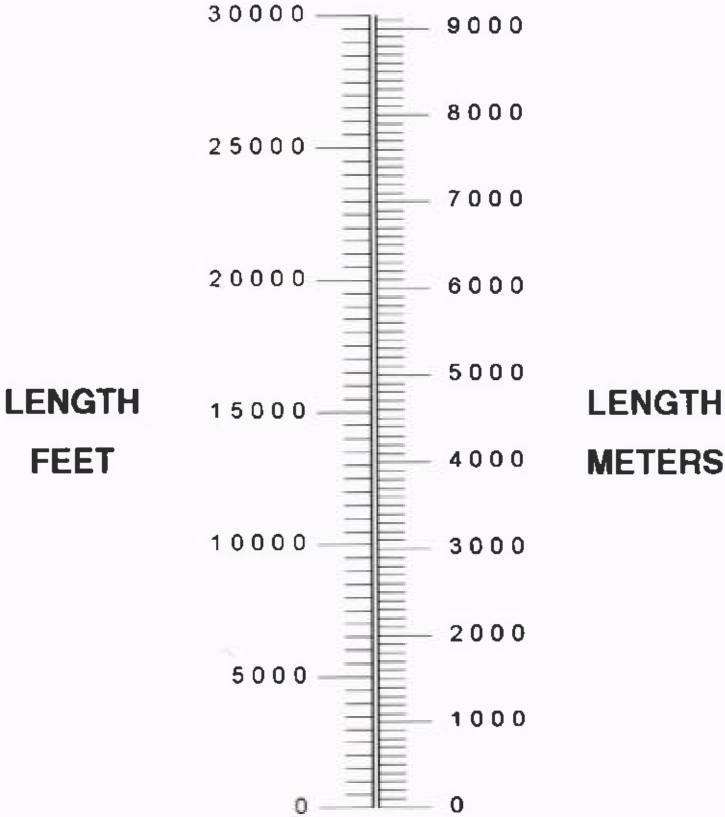
Conversion Table
Figure 5-1



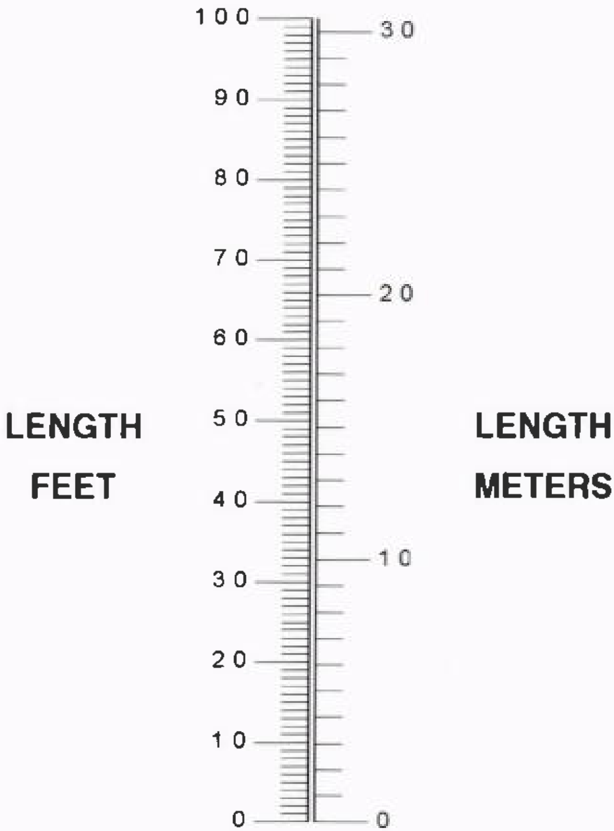
Temperature Conversion
Figure 5-2



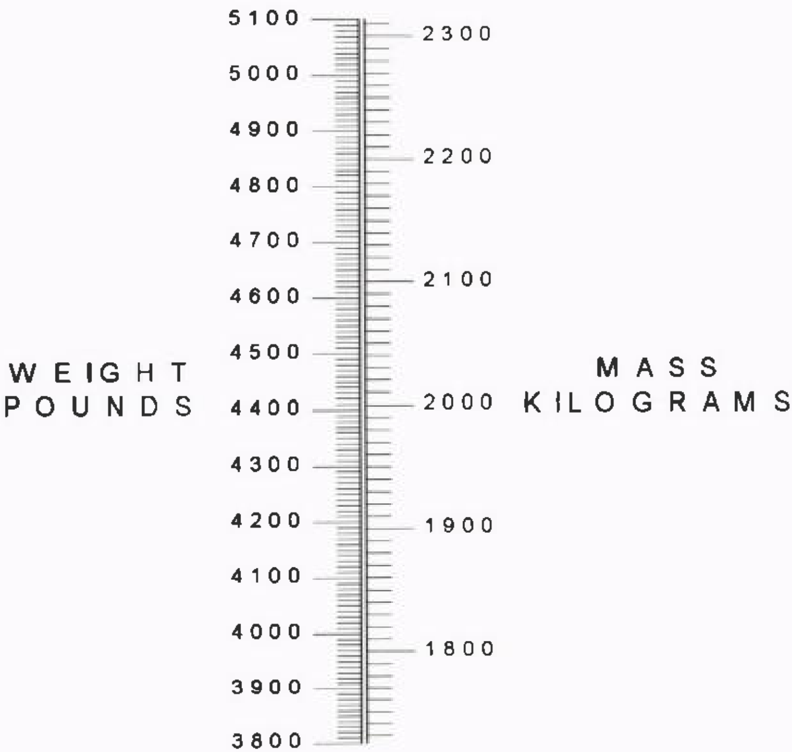
Volume Conversion
Figure 5-3



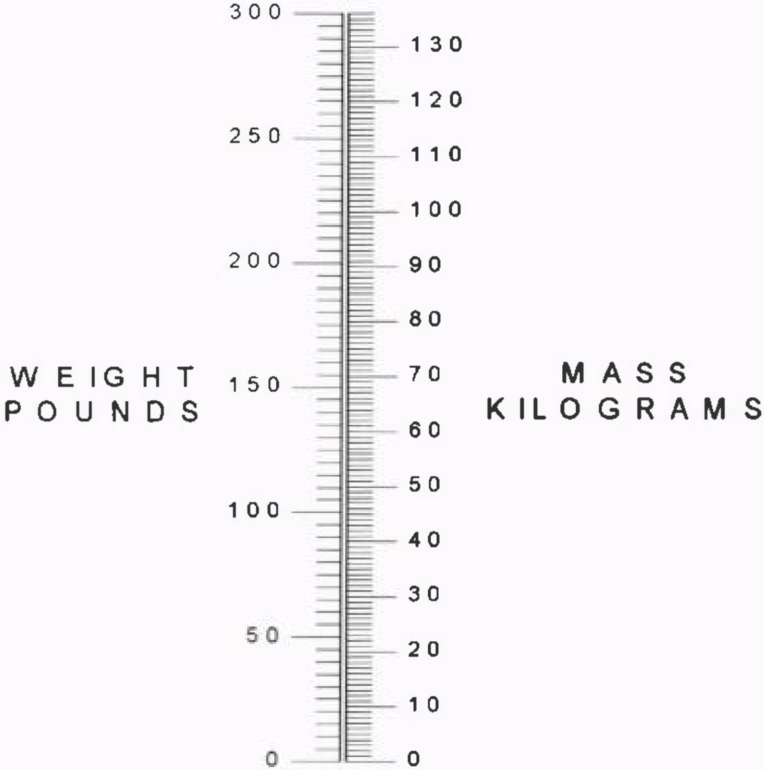
Feet to Meters Conversion (0 to 30,000 feet)
Figure 5-4



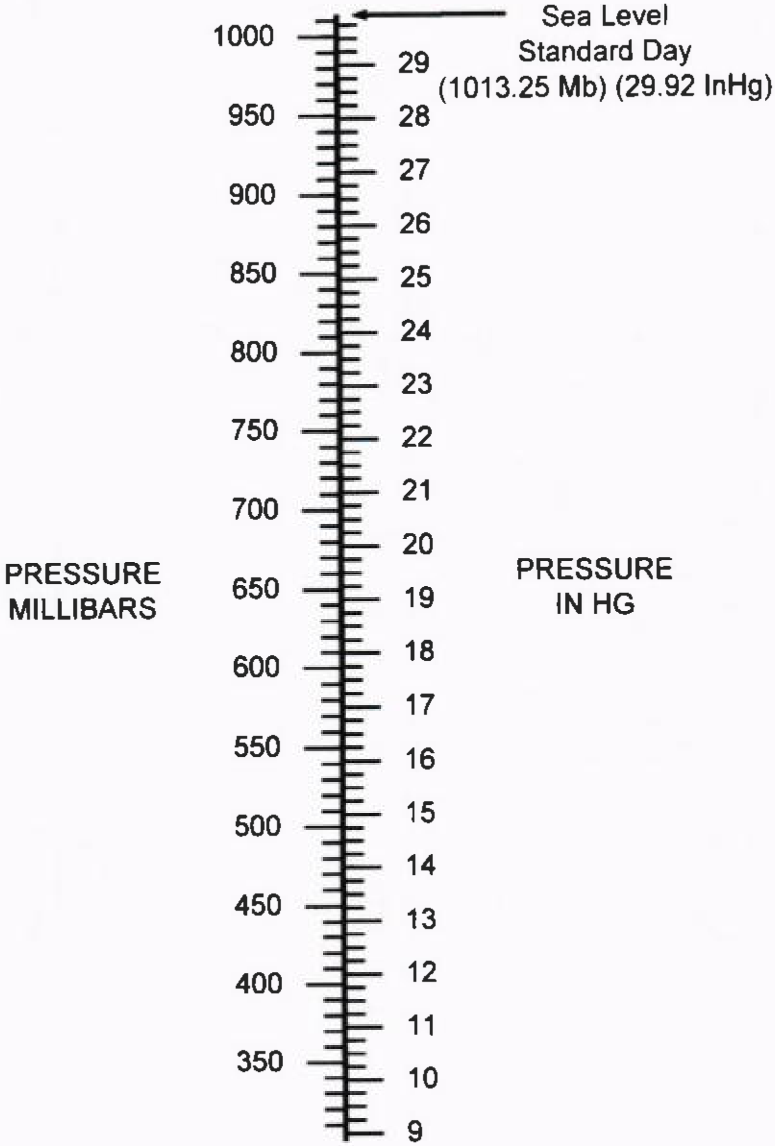
Feet to Meters Conversion (0 to 100 feet)
Figure 5-5



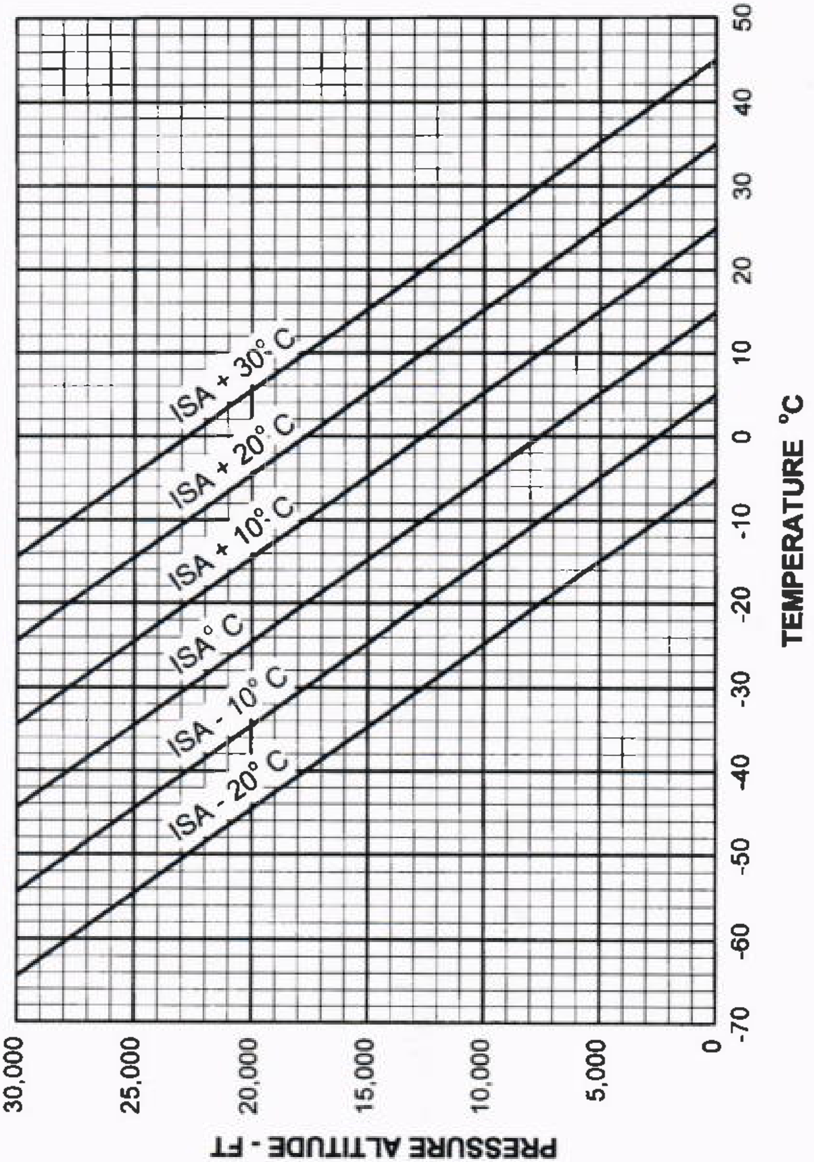
Pounds to Kilograms Conversion (3,800 to 5,100 pounds)
Figure 5-6



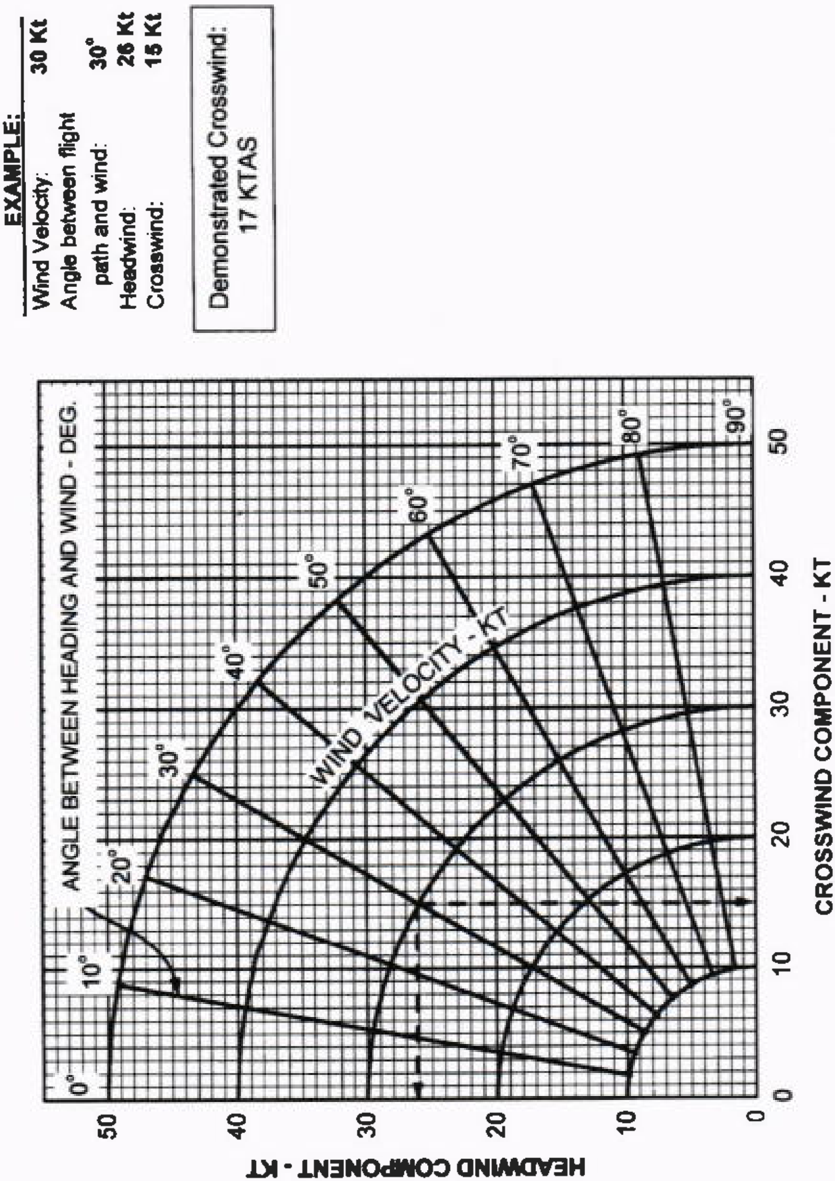
Pounds to Kilograms Conversion (0 to 300 pounds)
Figure 5-7



Inches of Mercury to Millibars Conversion
Figure 5-8



ISA Temperature Conversion
Figure 5-9



Wind Components
Figure 5-10

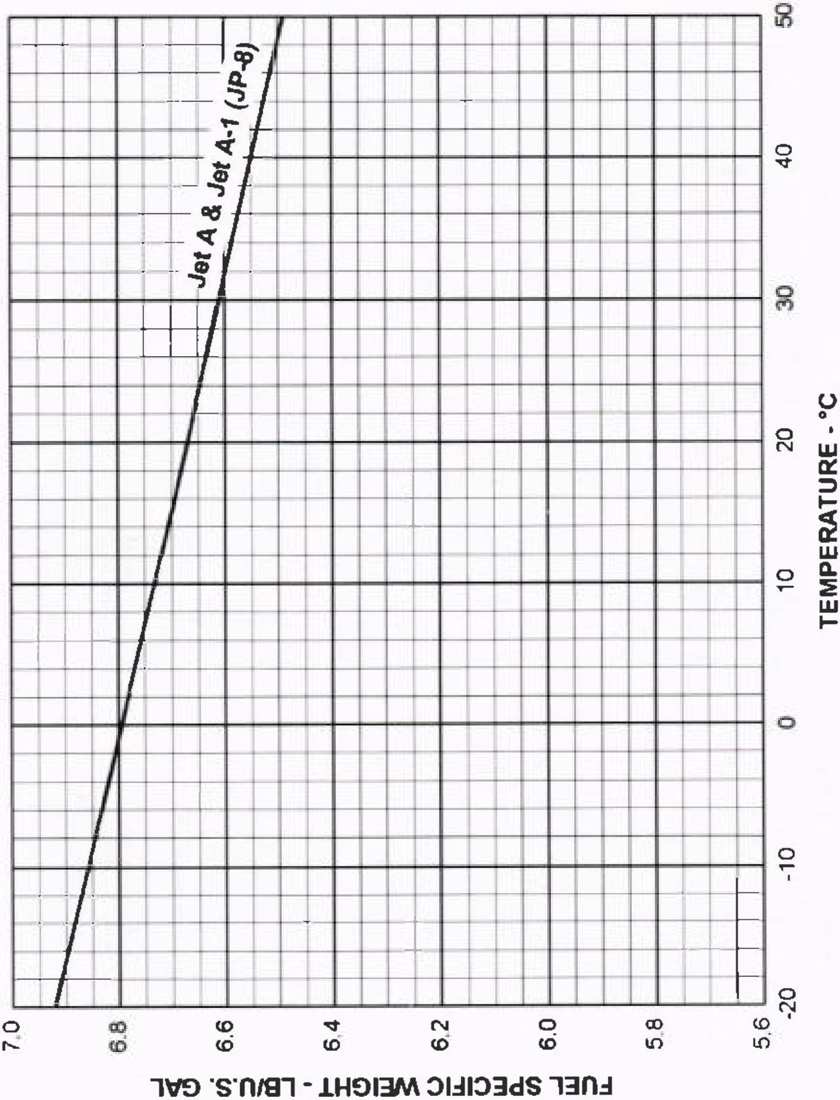
CORRECTION CARD
ALTERNATE
STATIC SOURCE

PRIMARY	ALTERNATE
ALTITUDE	
1,000	930
2,000	1,930
3,000	2,930
4,000	3,930
5,000	4,930
6,000	5,930
7,000	6,930
8,000	7,930
9,000	8,930
10,000	9,930
11,000	10,930
12,000	11,930
13,000	12,930

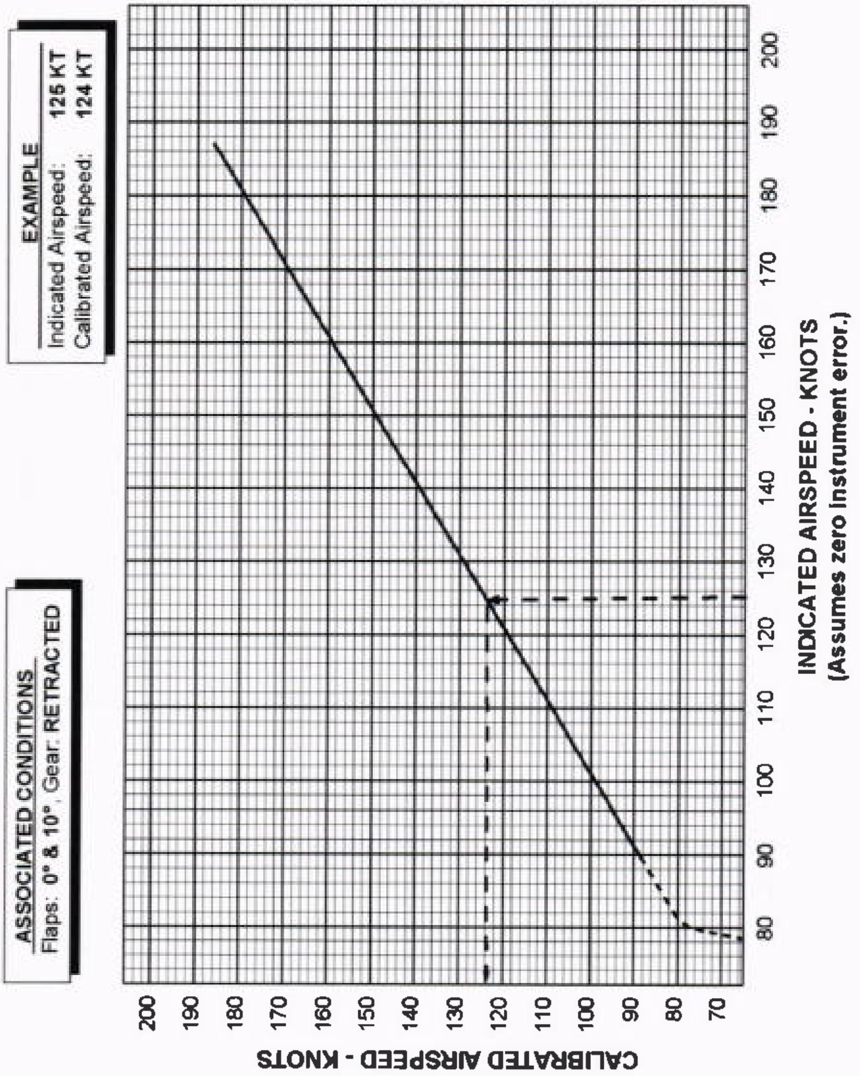
AIRSPEED

125	CLIMB	122
175	CRUISE	172
85	APPROACH	83

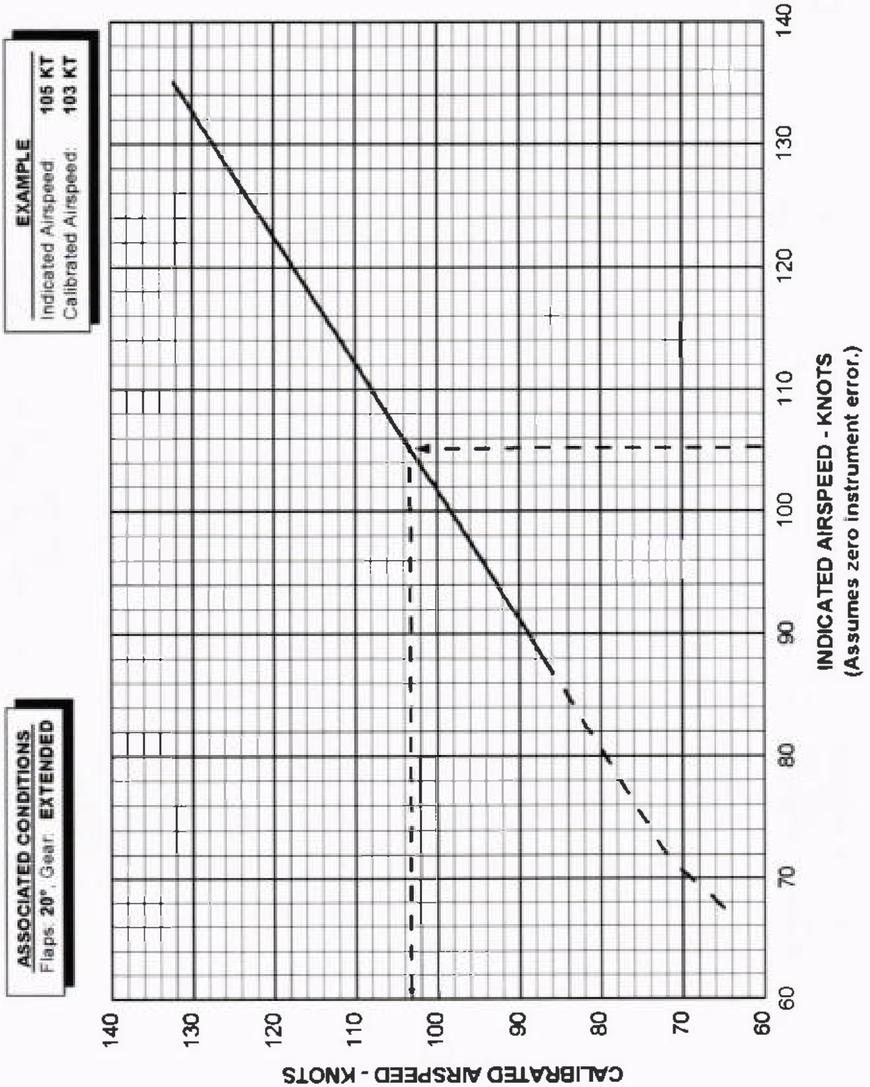
Alternate Static System Correction
Figure 5-11



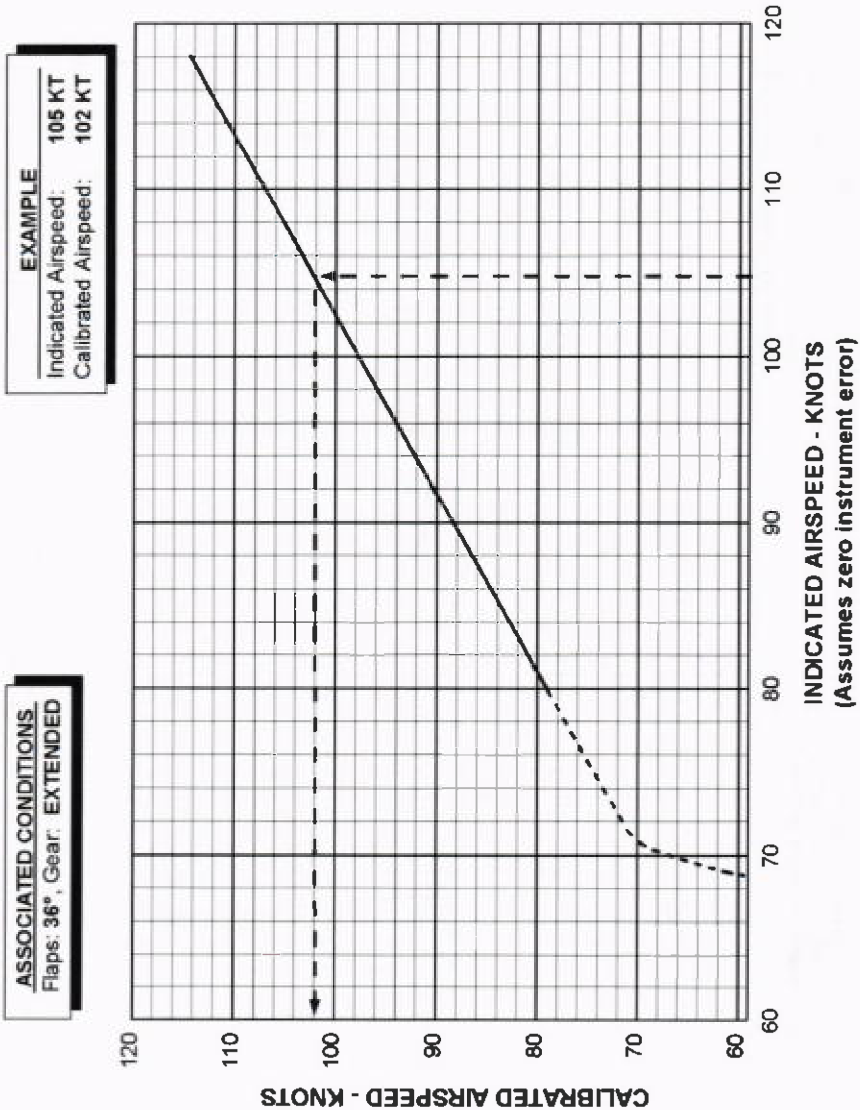
Aviation Fuel Specific Weight
Figure 5-12



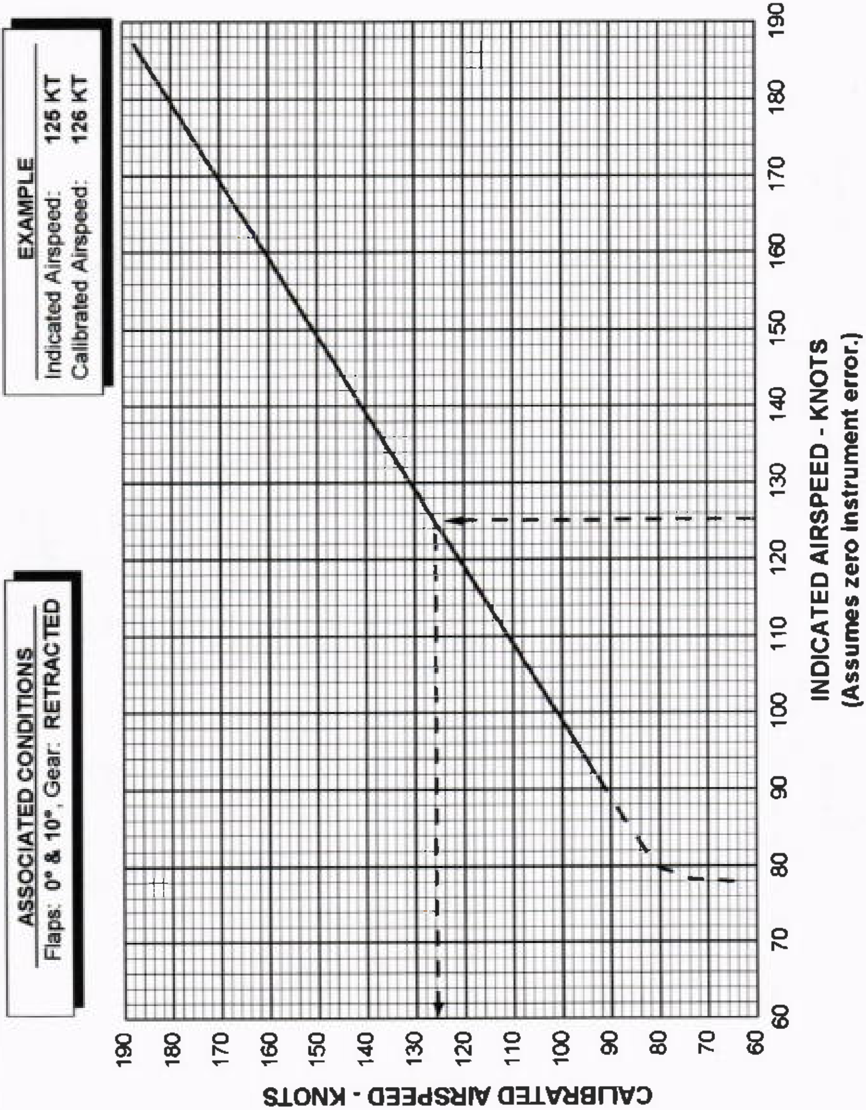
Airspeed Calibration
Primary Static (Flaps 0° and 10°)
Figure 5-13



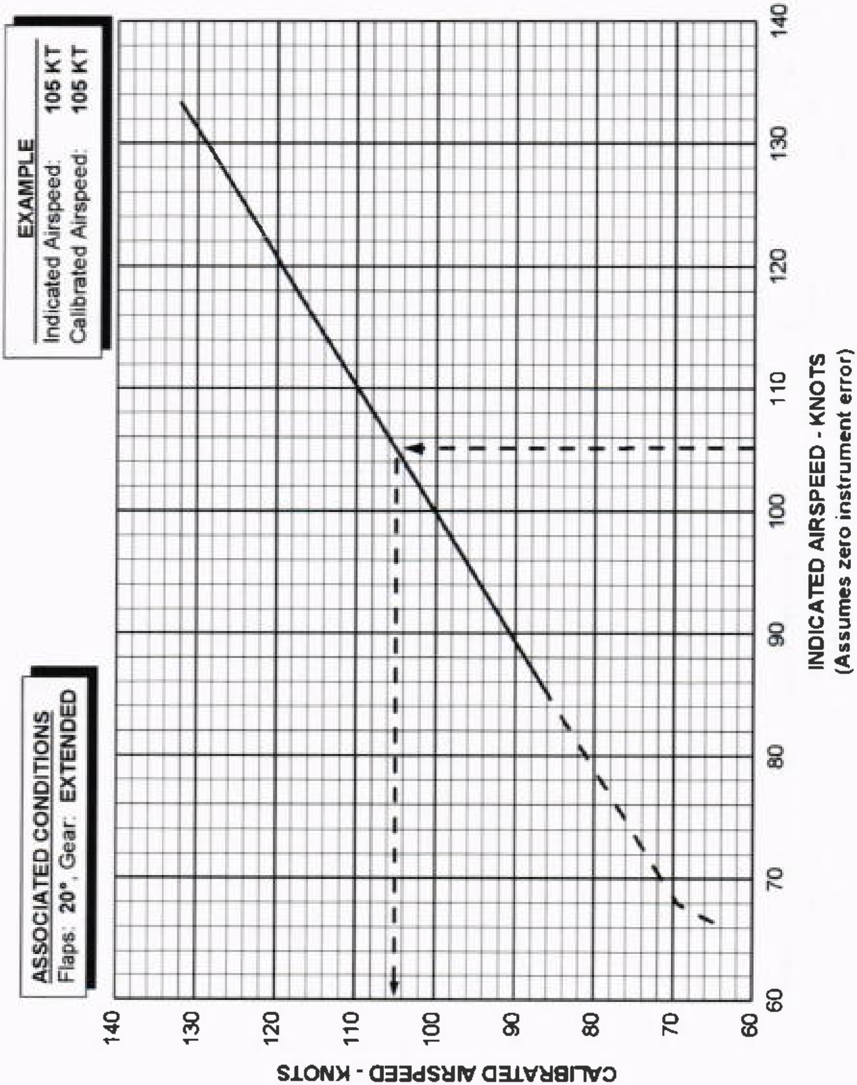
Airspeed Calibration
Primary Static (Flaps 20°, Gear DOWN)
Figure 5-15



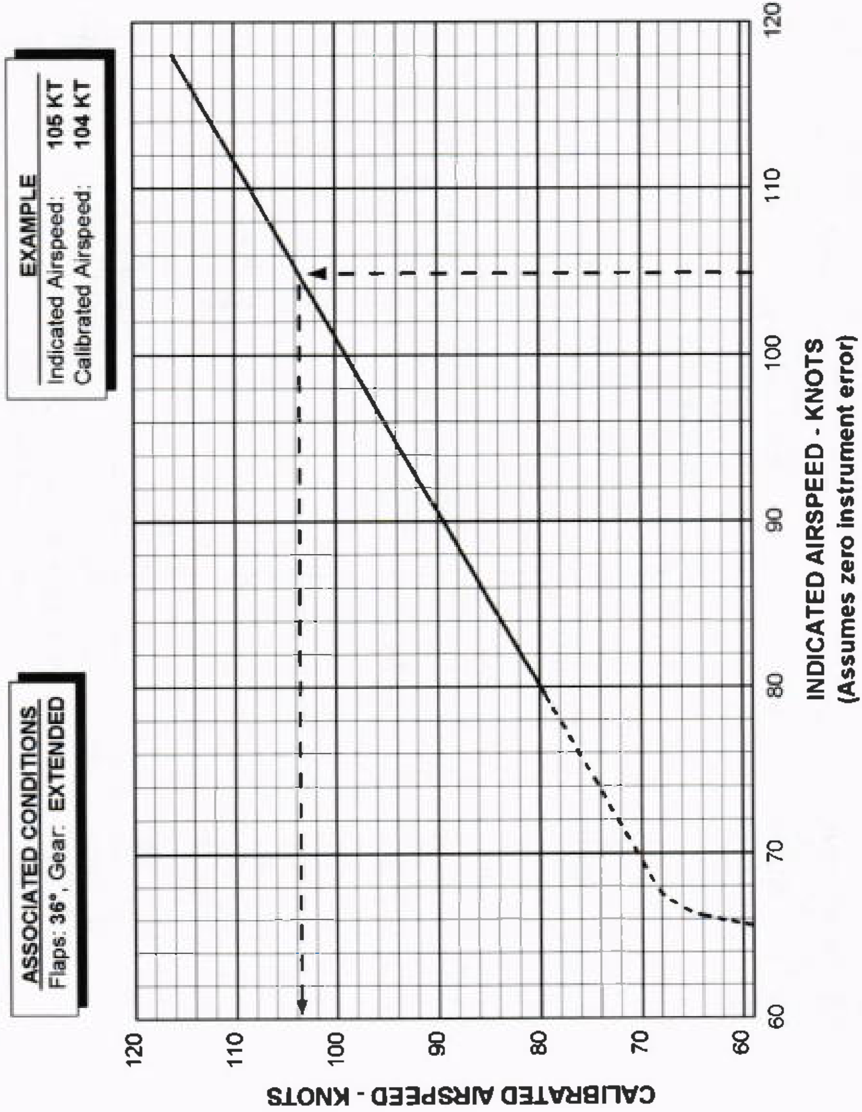
Airspeed Calibration
Primary Static (Flaps 36°, Gear DOWN)
Figure 5-17



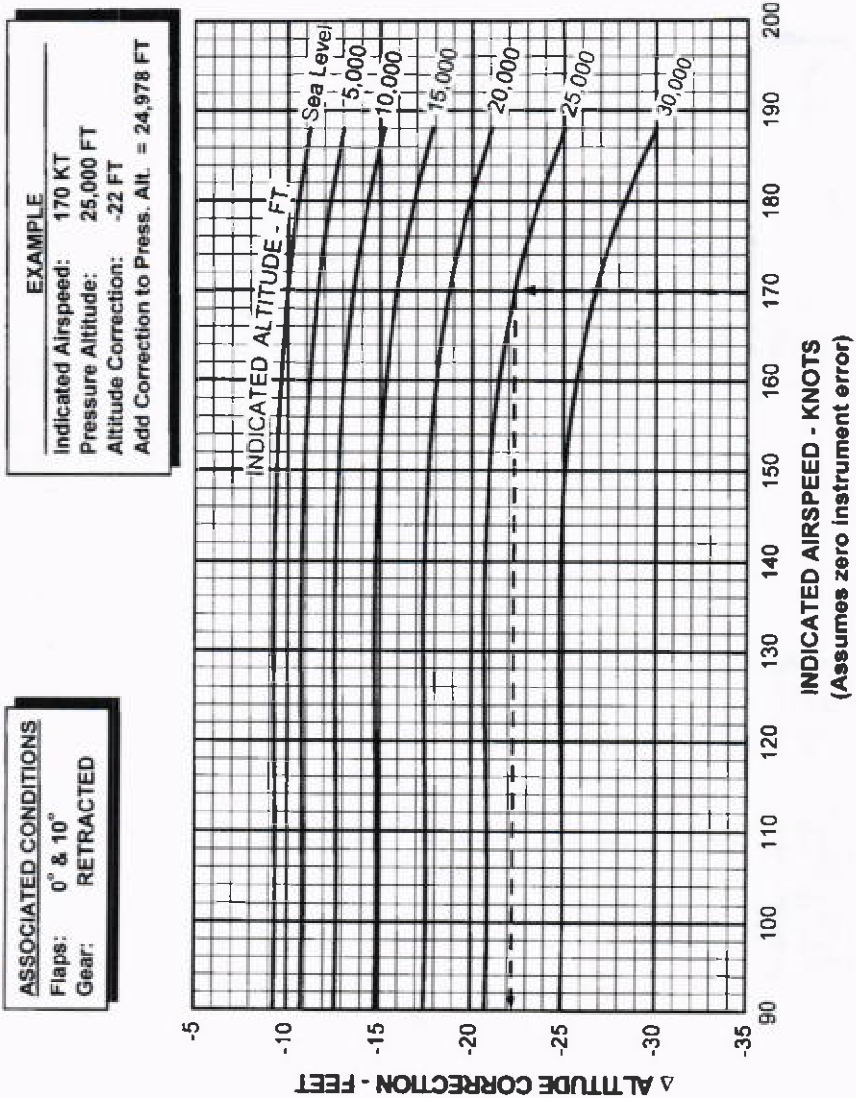
Airspeed Calibration
Alternate Static (Flaps 0° and 10°)
Figure 5-19



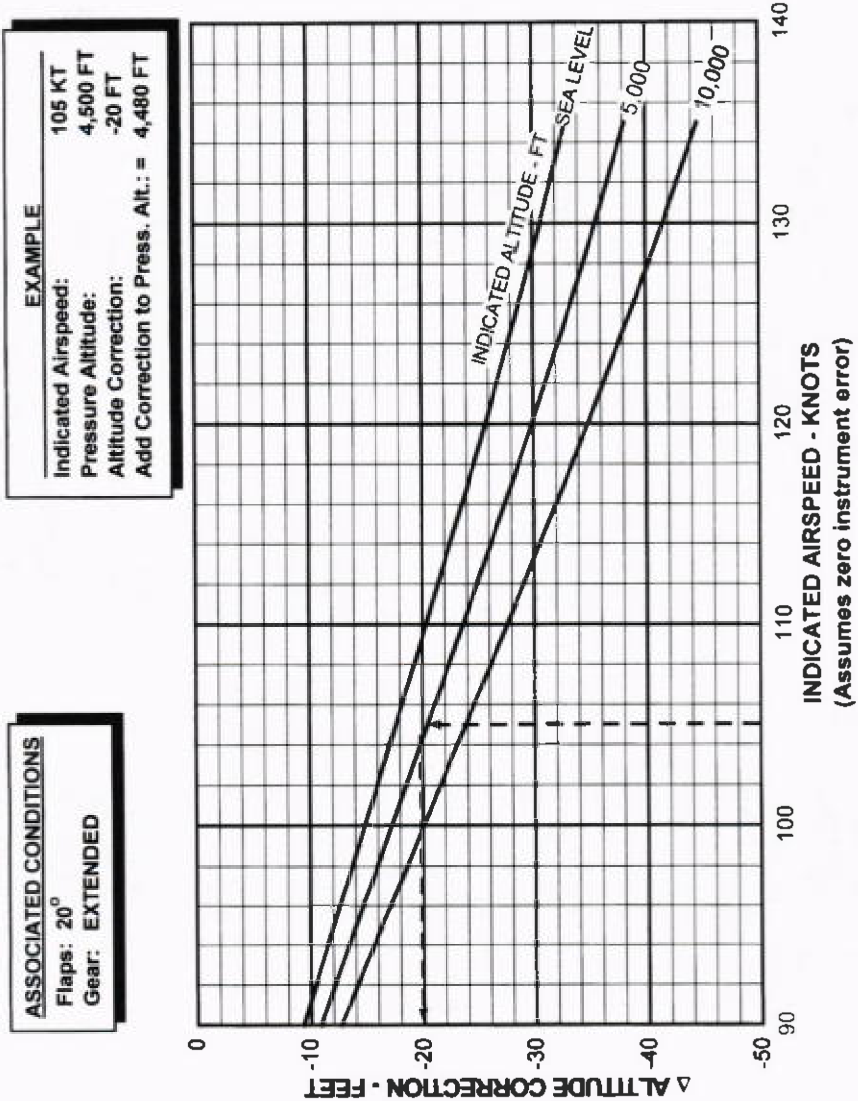
Airspeed Calibration
Alternate Static (Flaps 20°, Gear DOWN)
Figure 5-21



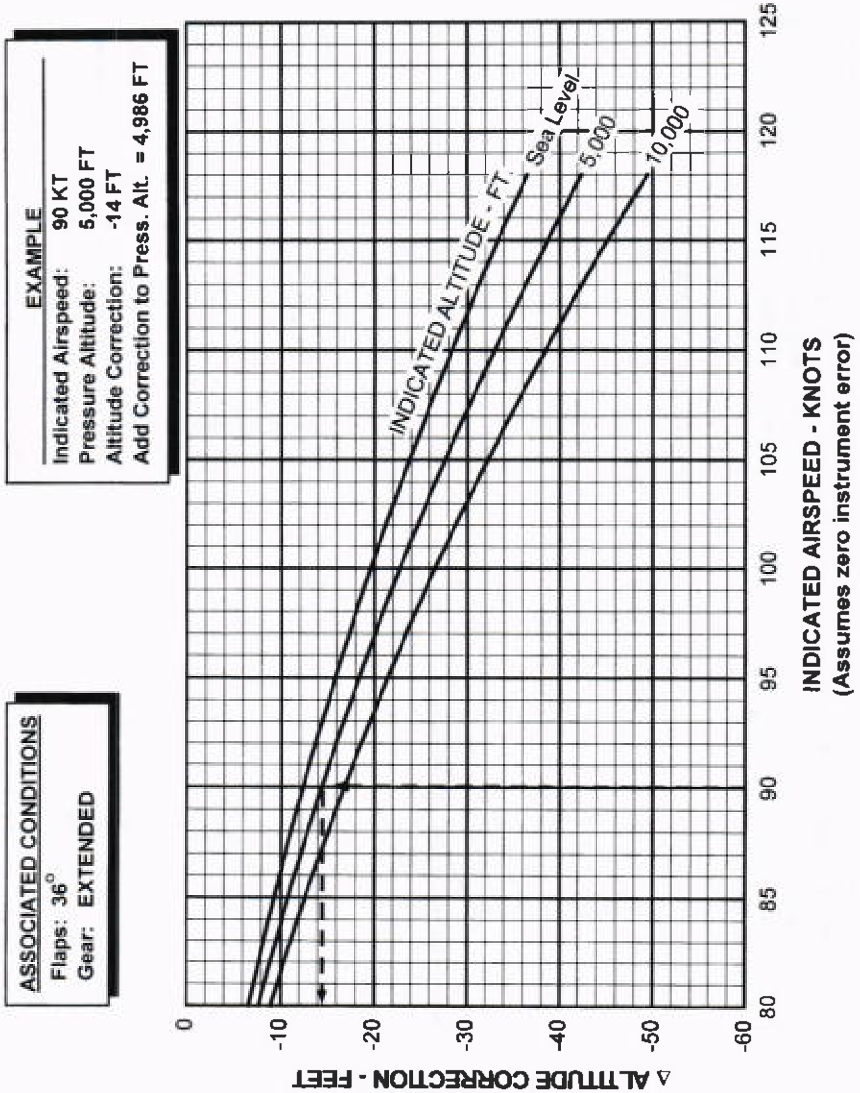
Airspeed Calibration
Alternate Static (Flaps 36°, Gear DOWN)
Figure 5-23



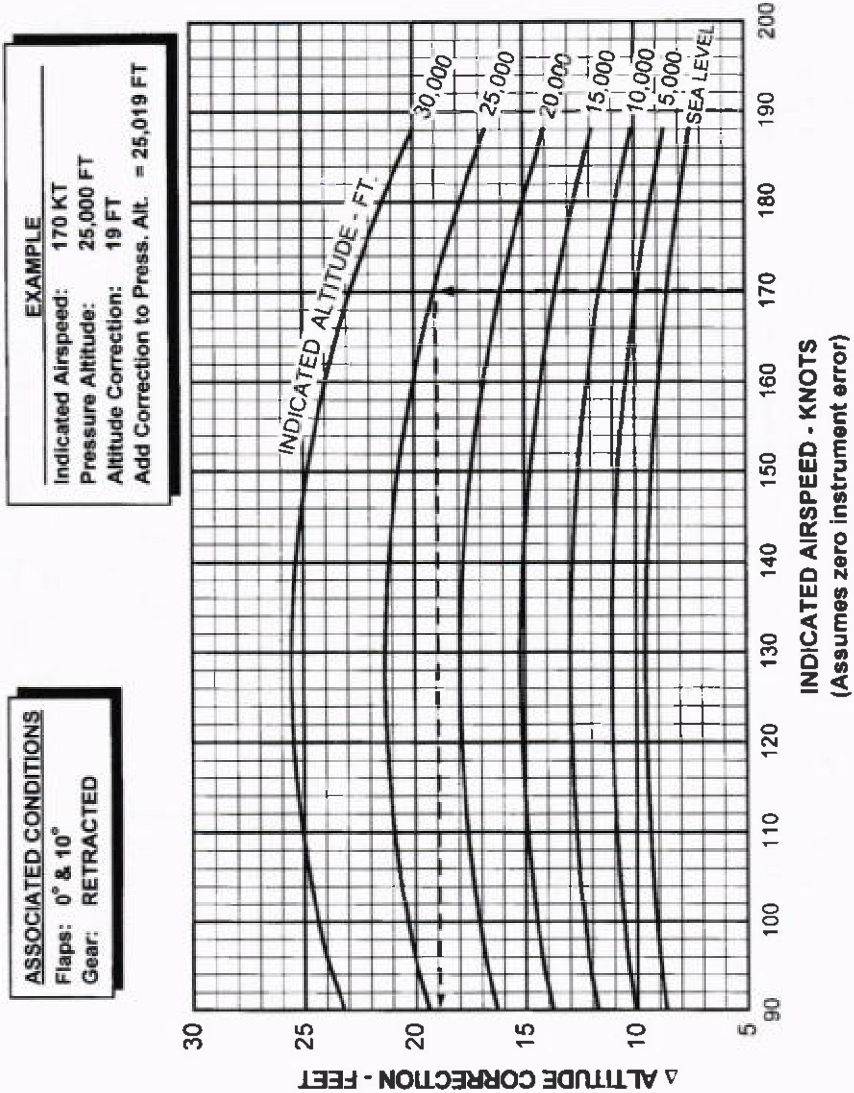
Altitude Calibration
Primary Static (Flaps 0° and 10°)
Figure 5-25



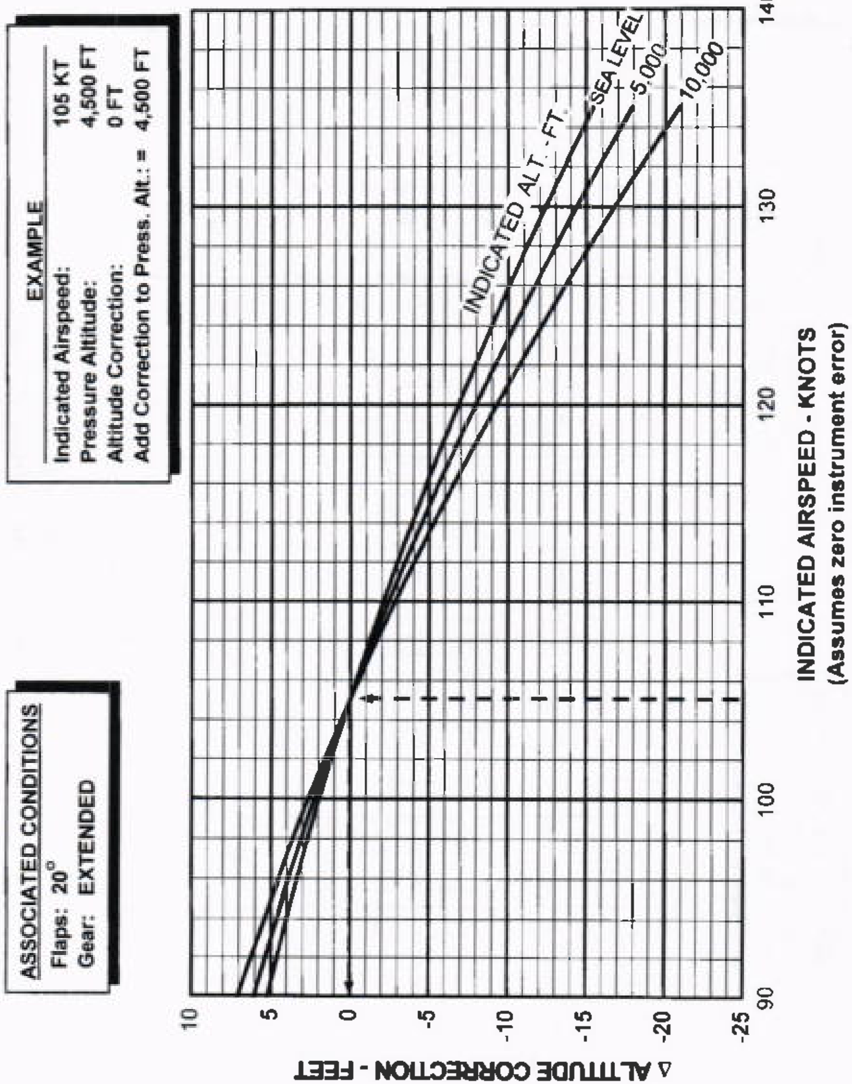
Altitude Calibration
Primary Static (Flaps 20°, Gear DOWN)
Figure 5-27



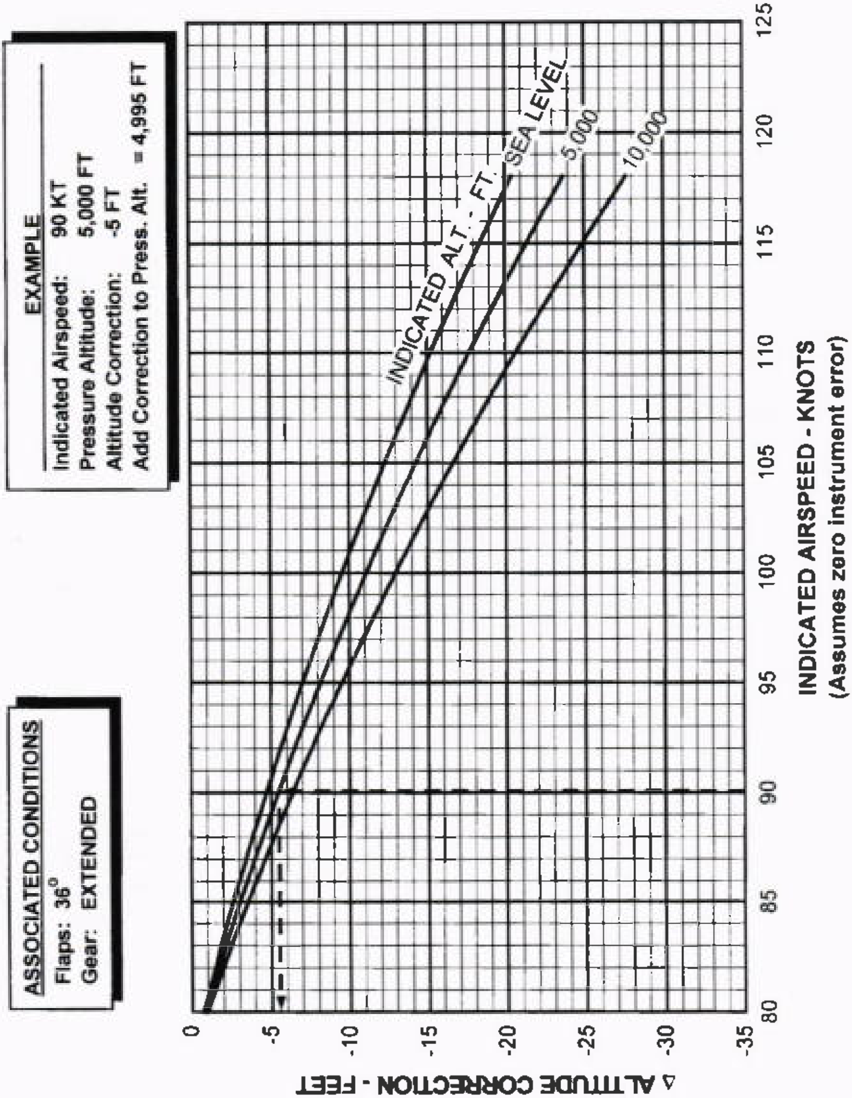
Altitude Calibration
Primary Static (Flaps 36°, Gear DOWN)
Figure 5-29



Altitude Calibration
Alternate Static (Flaps 0° and 10°)
Figure 5-31



Altitude Calibration
Alternate Static (Flaps 20°, Gear DOWN)
Figure 5-33



Altitude Calibration
Alternate Static (Flaps 36°, Gear DOWN)
Figure 5-35

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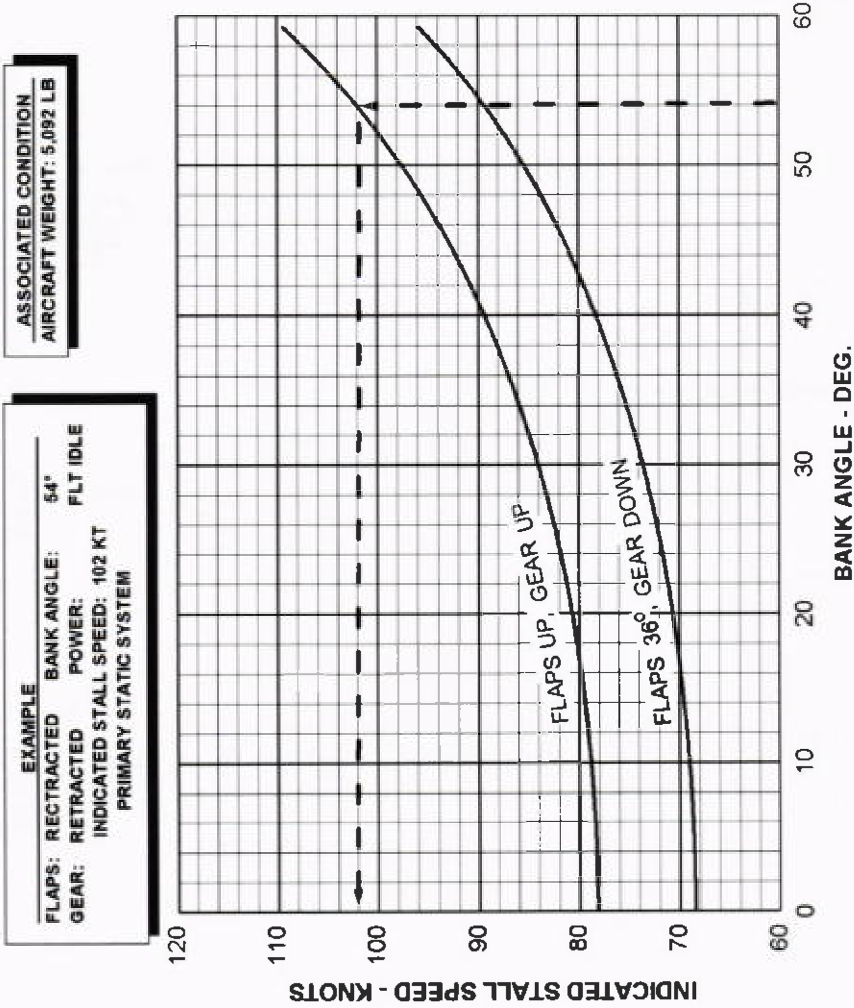
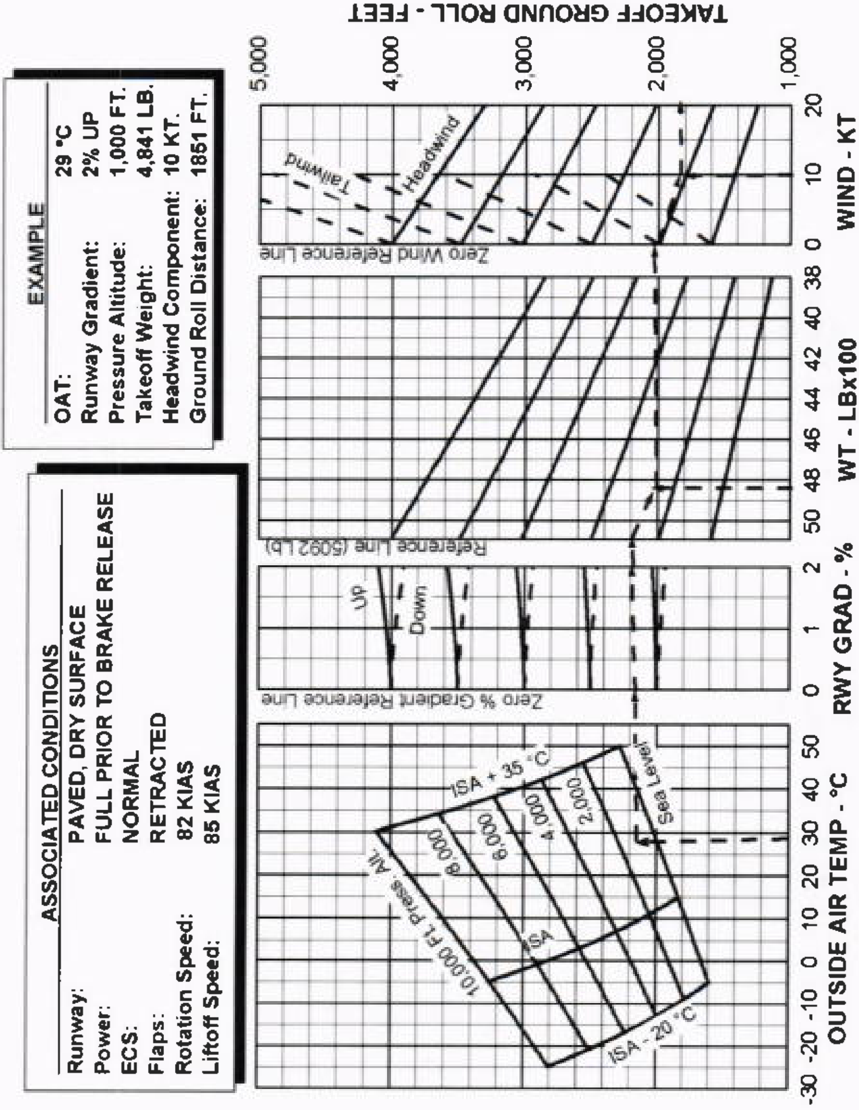
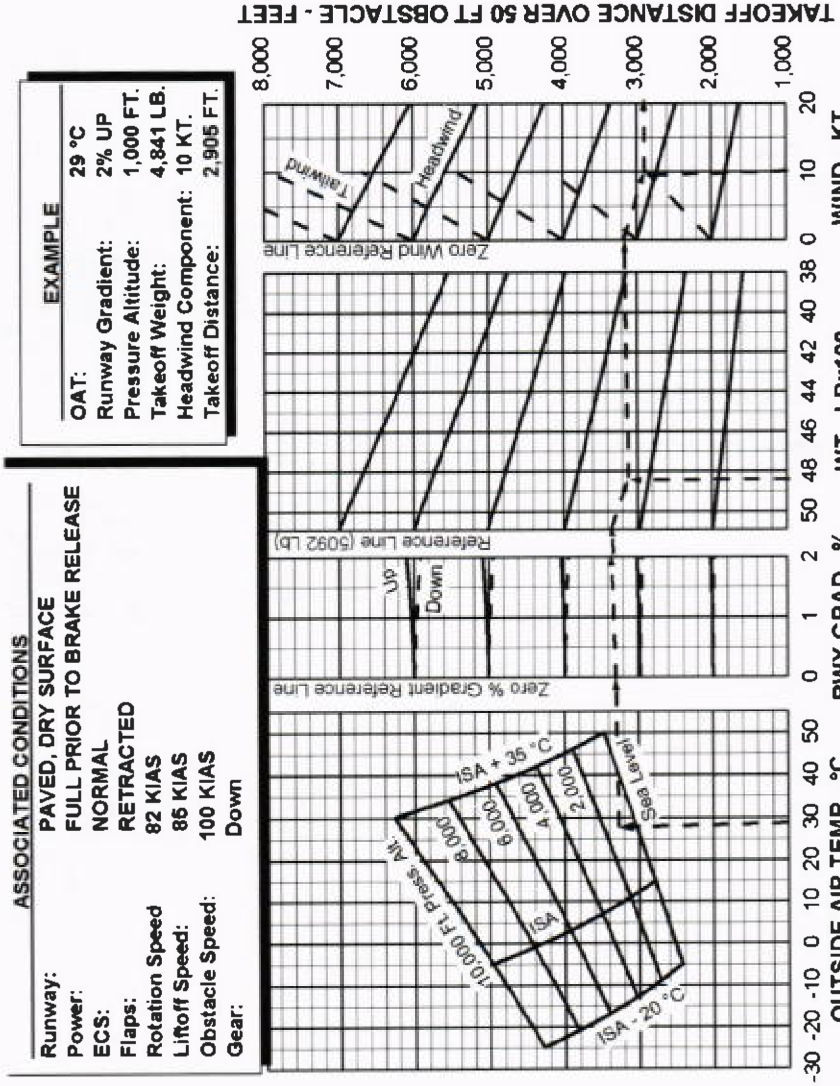


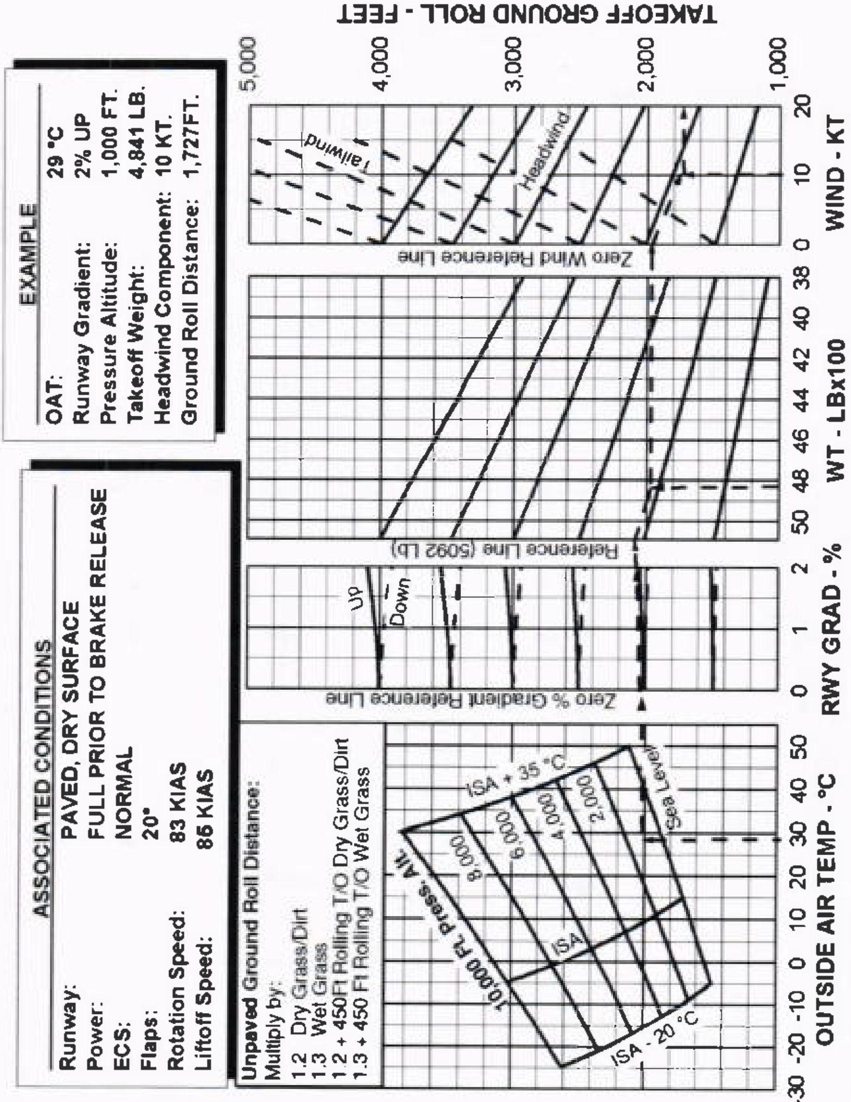
Angle of Bank vs. Stall Speed
Figure 5-39



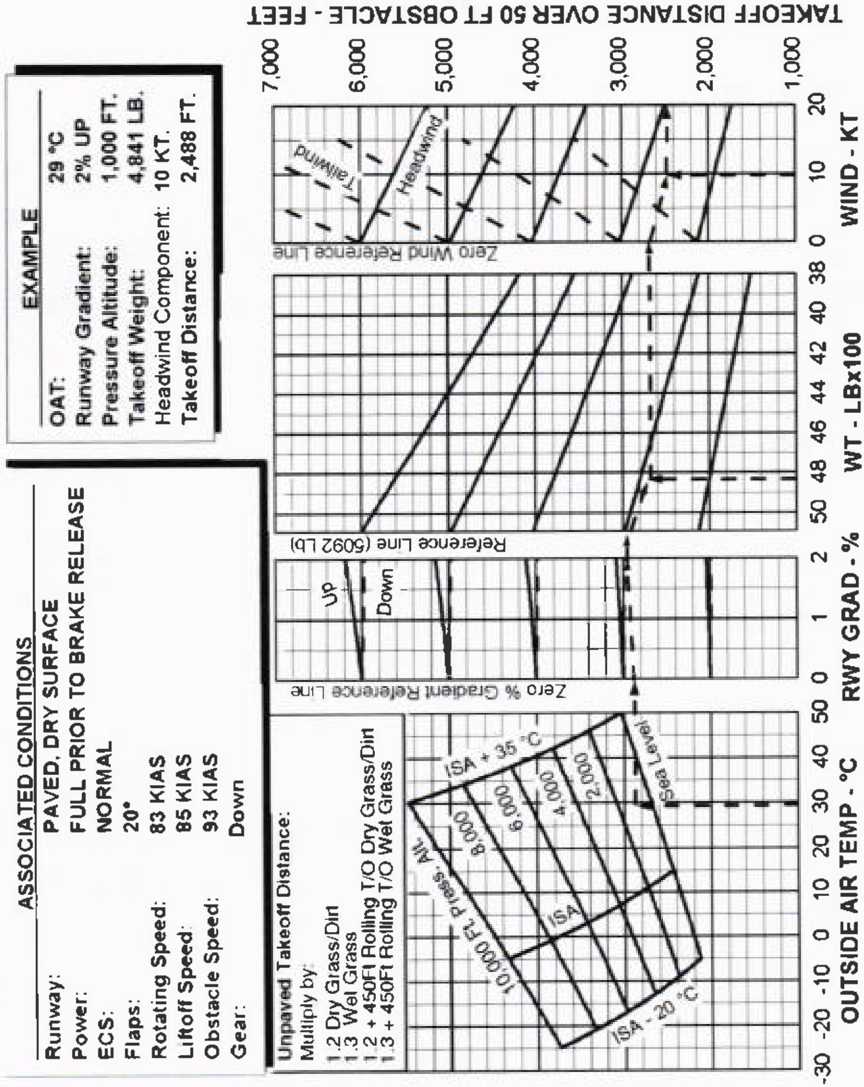
Normal Takeoff Ground Roll, 0° Flaps
Figure 5-41



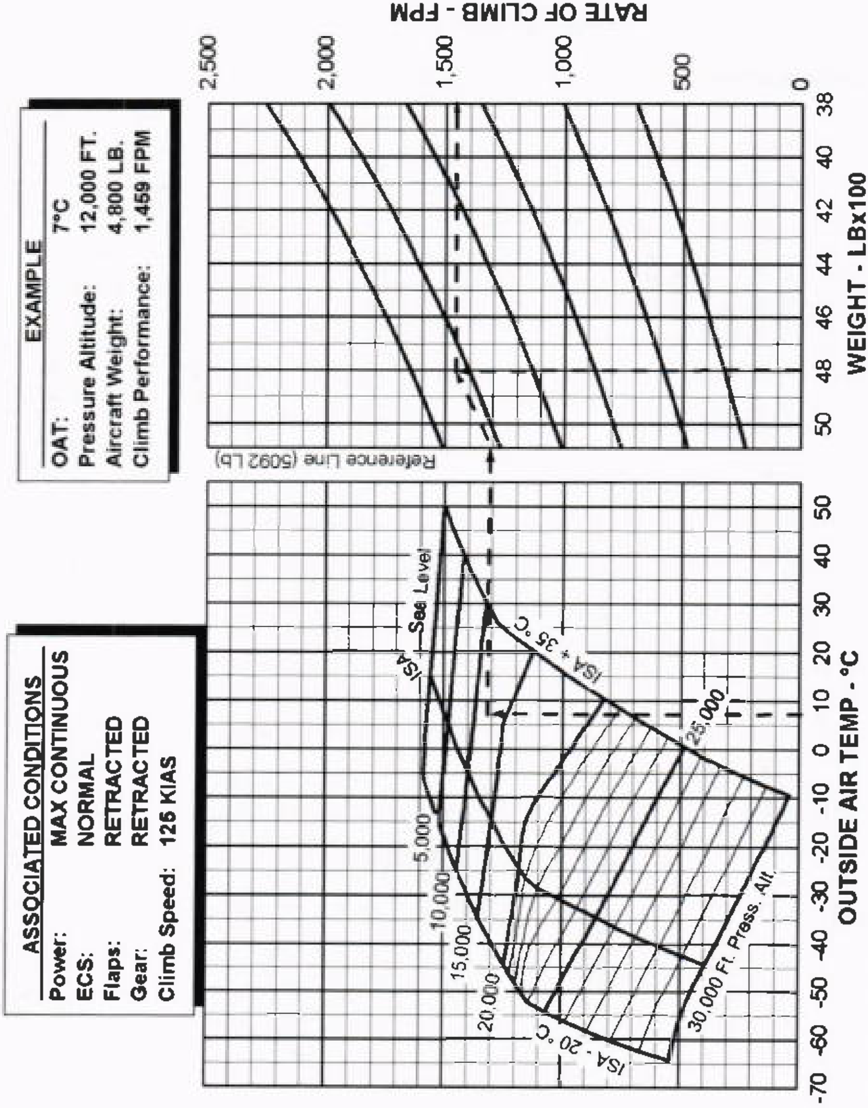
Normal Takeoff Performance over 50 ft. Obstacle, 0° Flaps
Figure 5-43



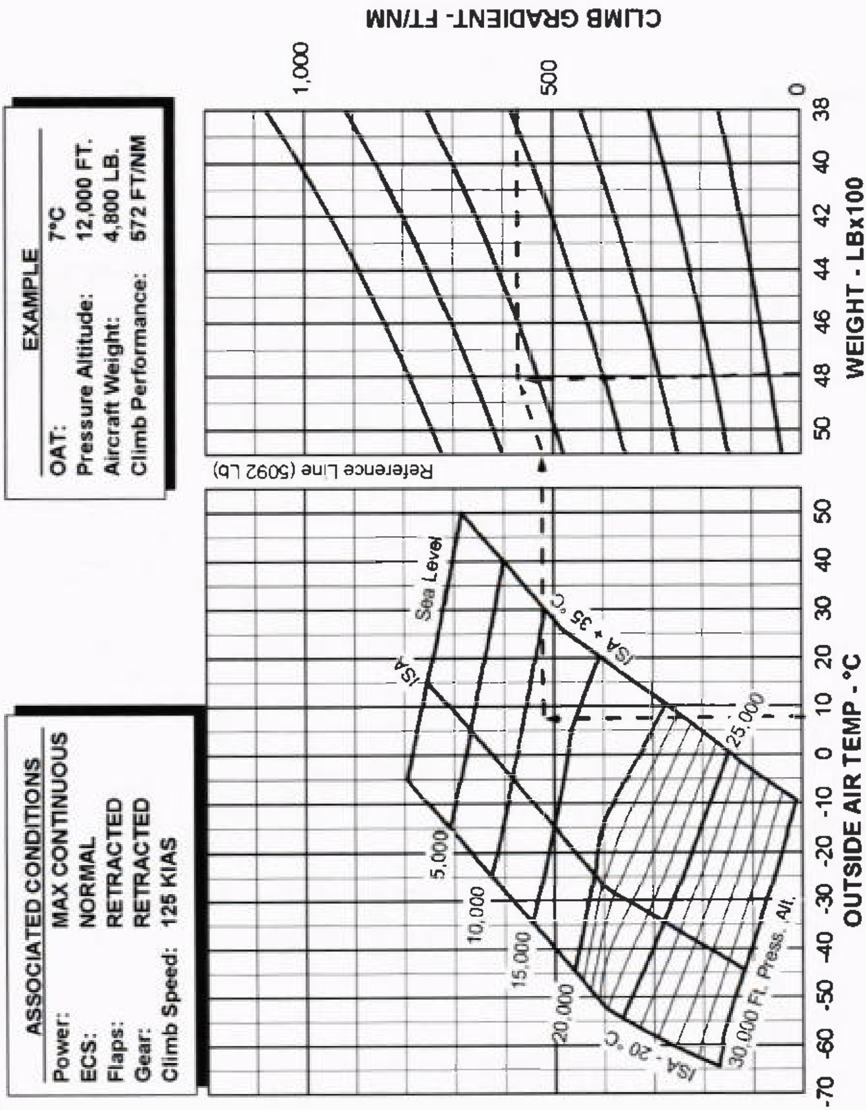
Maximum Effort Takeoff Ground Roll, 20° Flaps
Figure 5-45



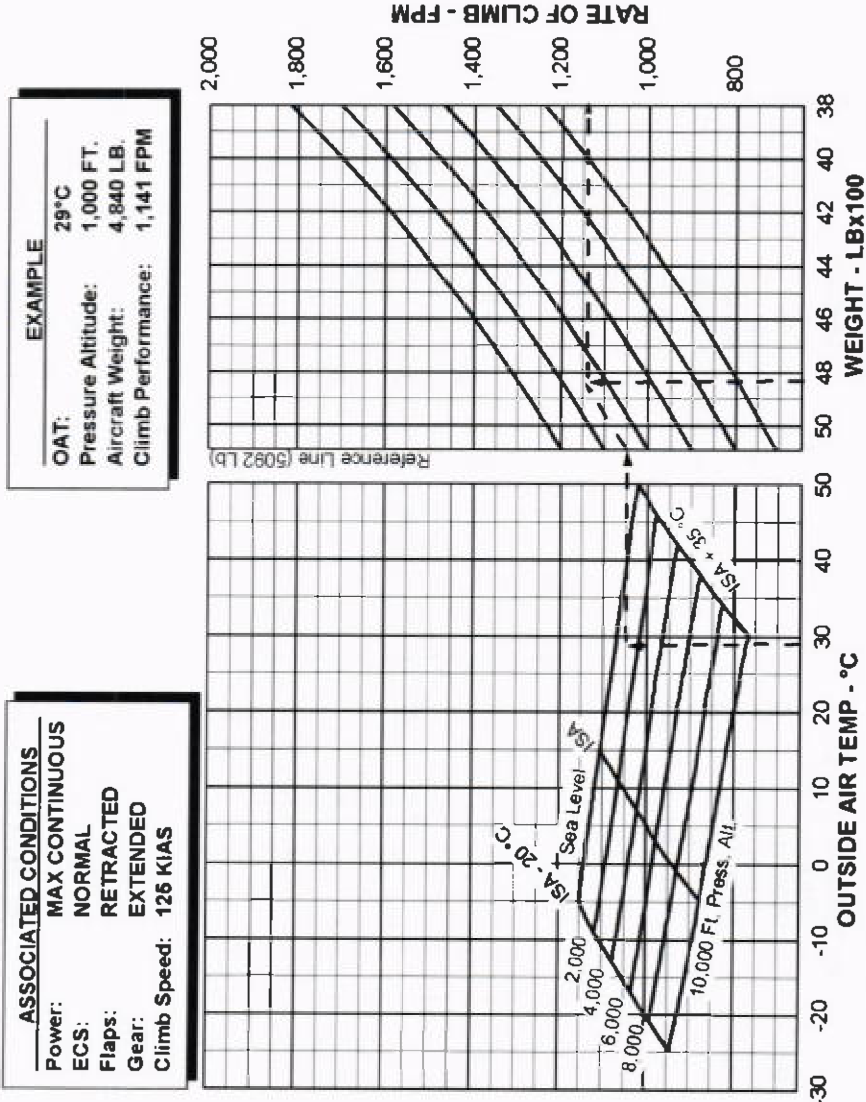
Maximum Effort Takeoff Performance over 50 ft. Obstacle,
20° Flaps
Figure 5-47



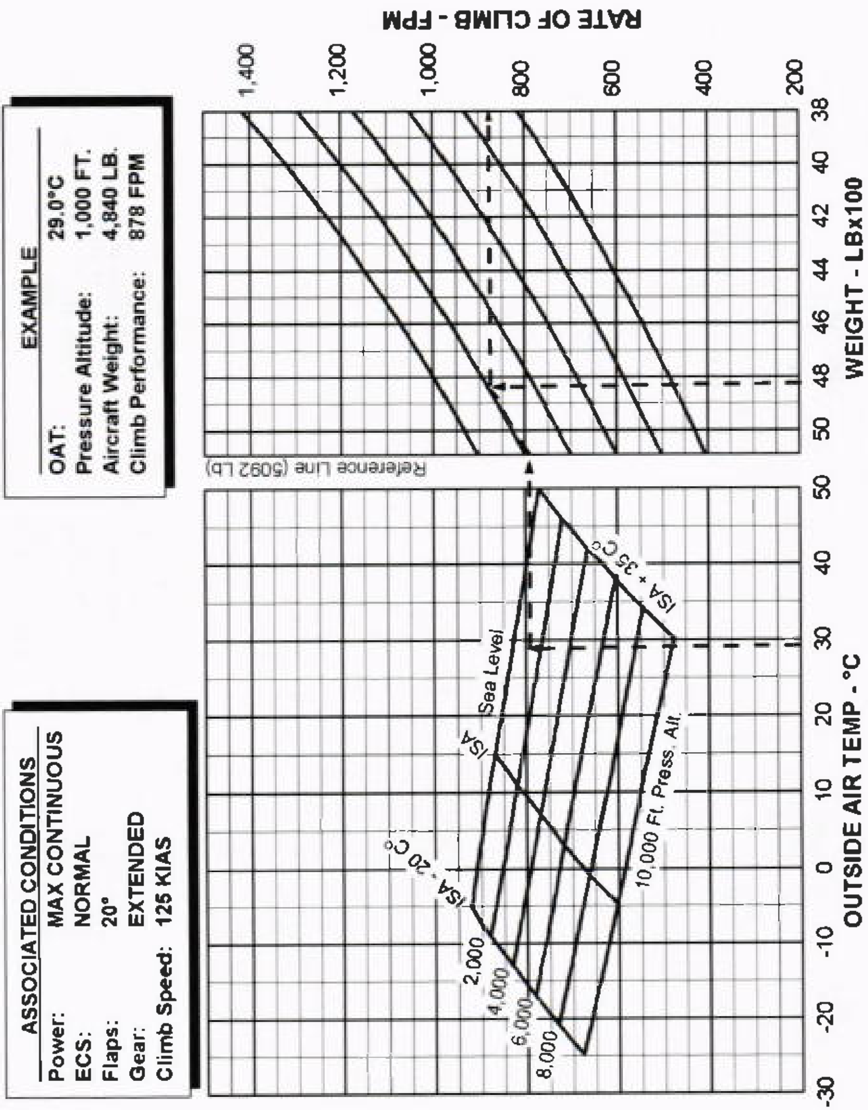
Enroute Climb Performance
Figure 5-49



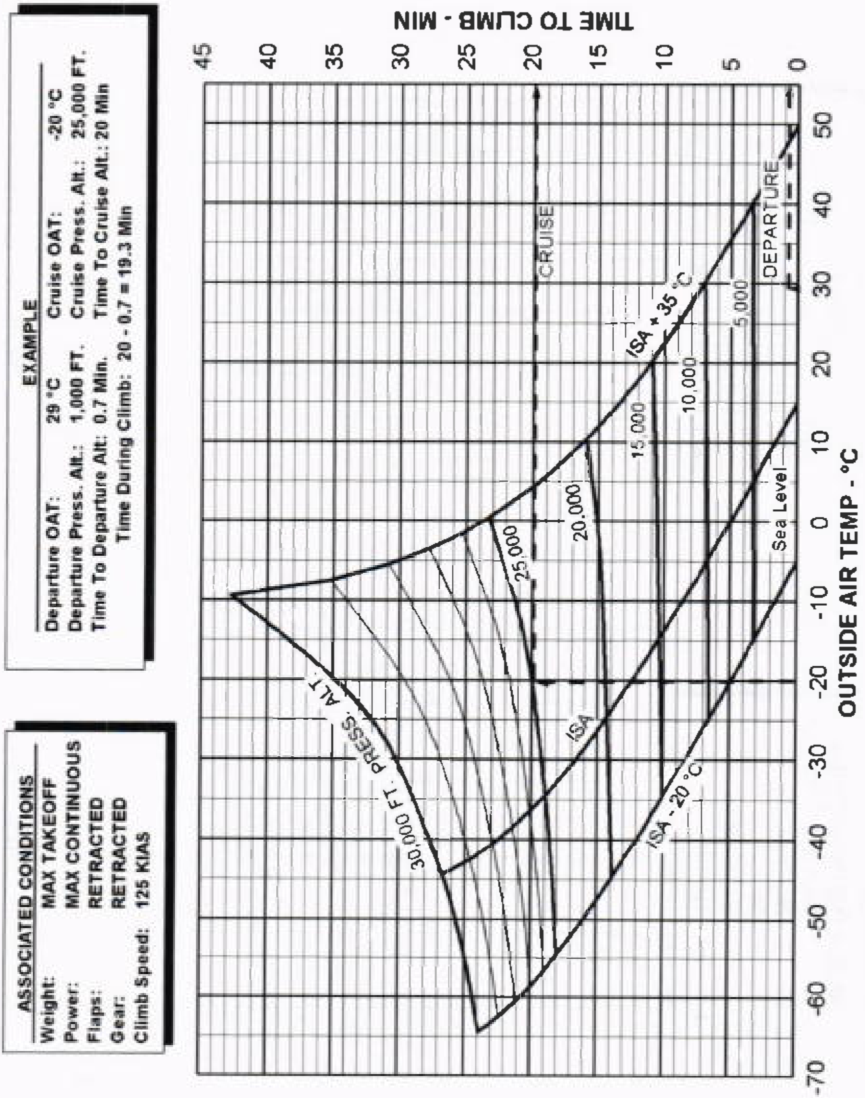
Enroute Climb Gradient
Figure 5-51



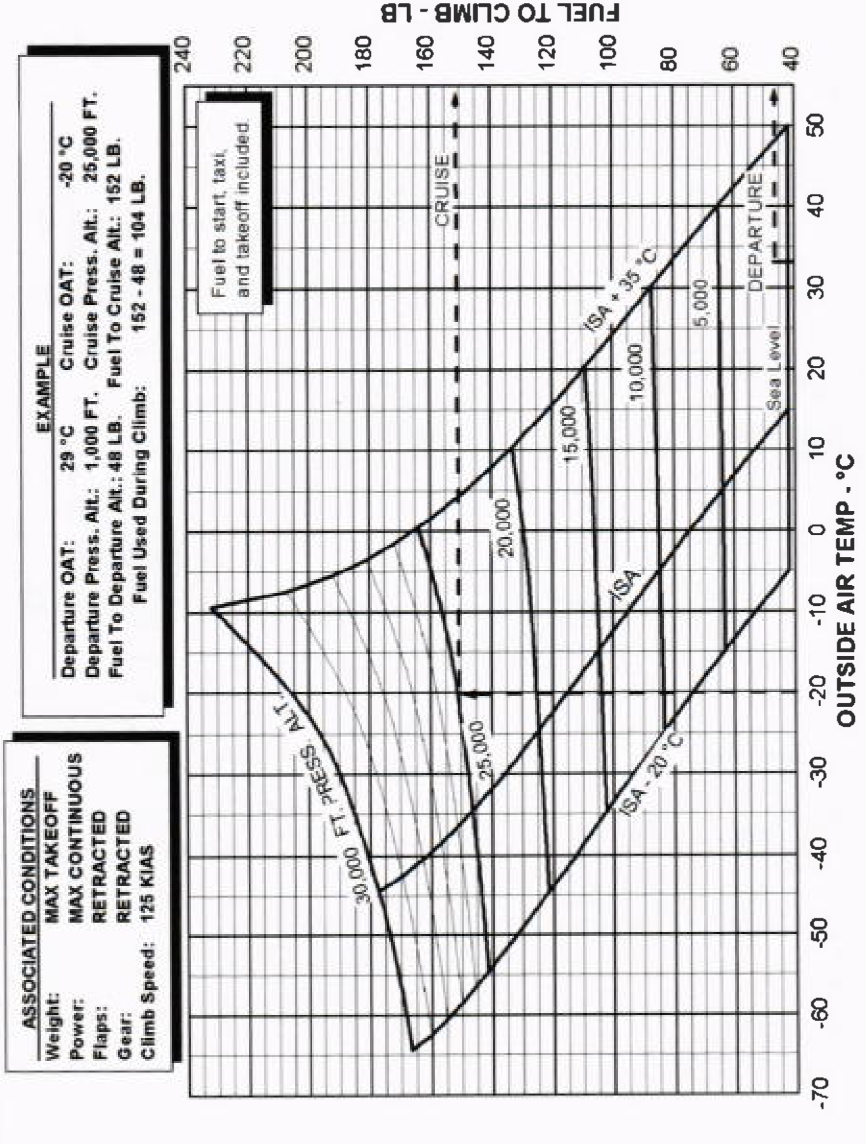
Takeoff Climb Performance, 0° Flaps
Figure 5-53



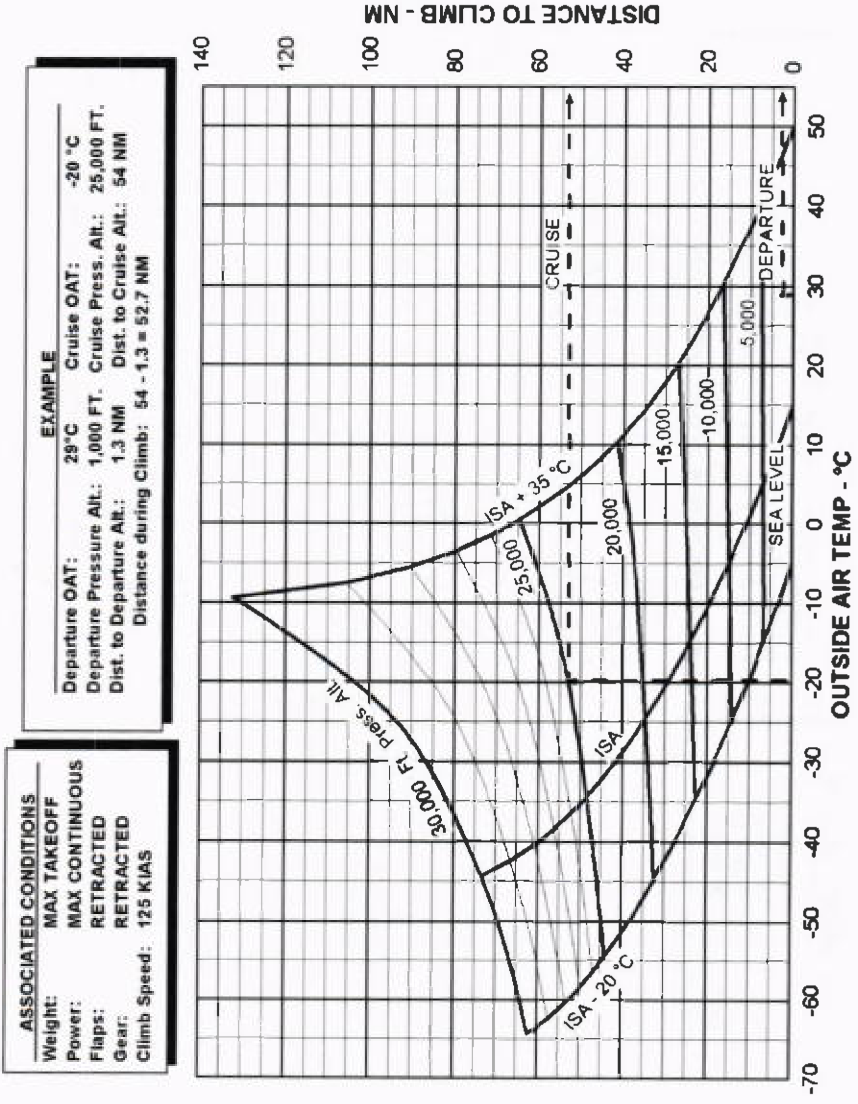
Takeoff Climb Performance, 20° Flaps
Figure 5-54



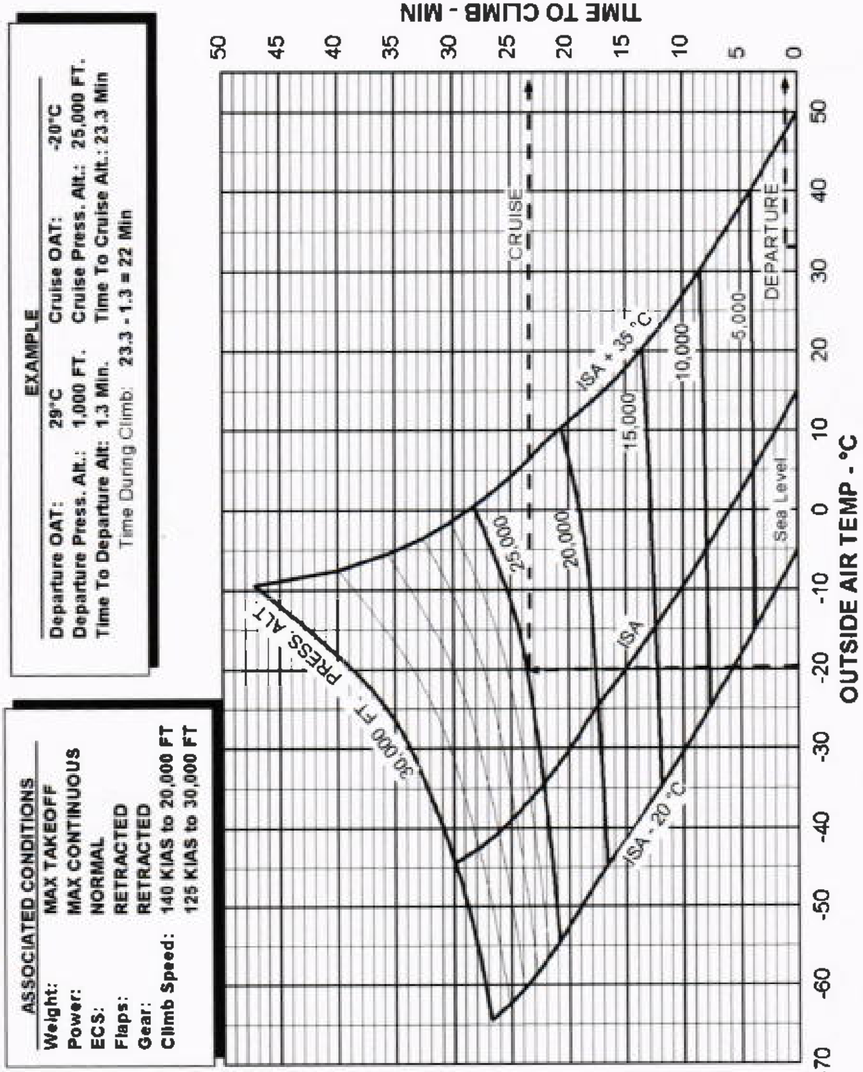
Maximum Climb Time
Figure 5-55



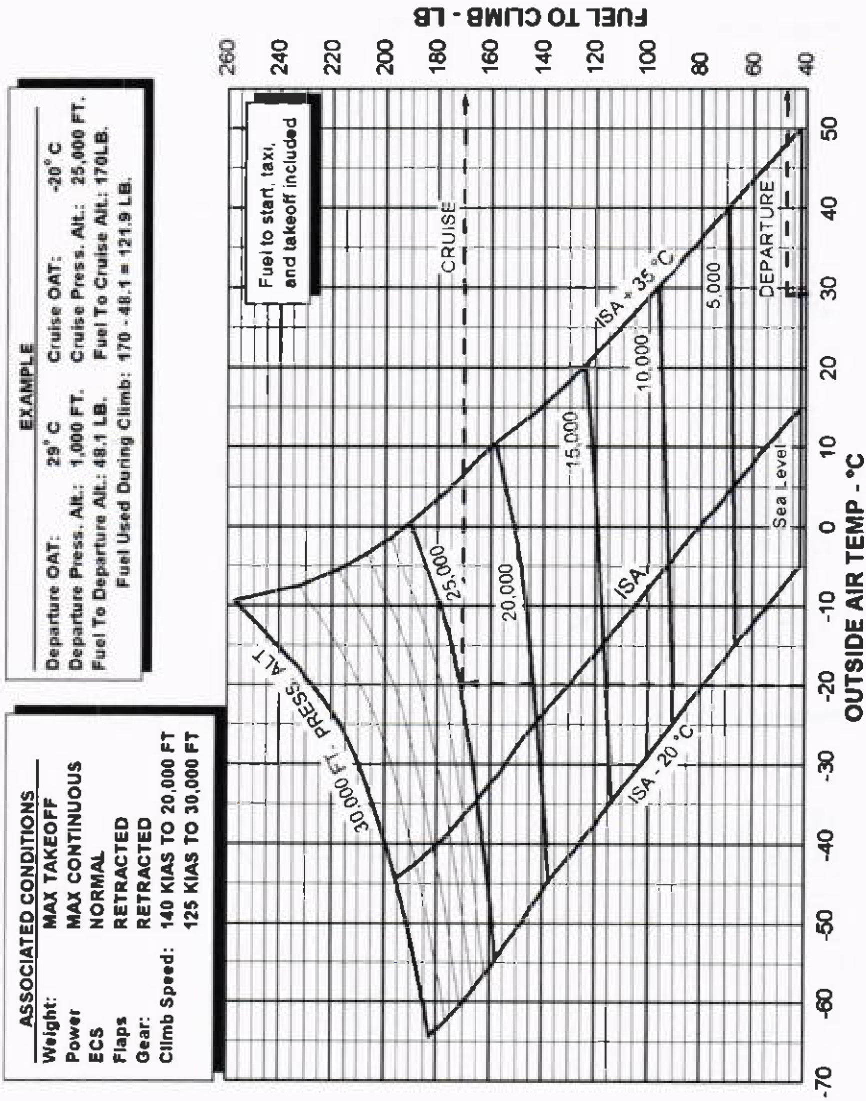
Maximum Climb Fuel
Figure 5-57



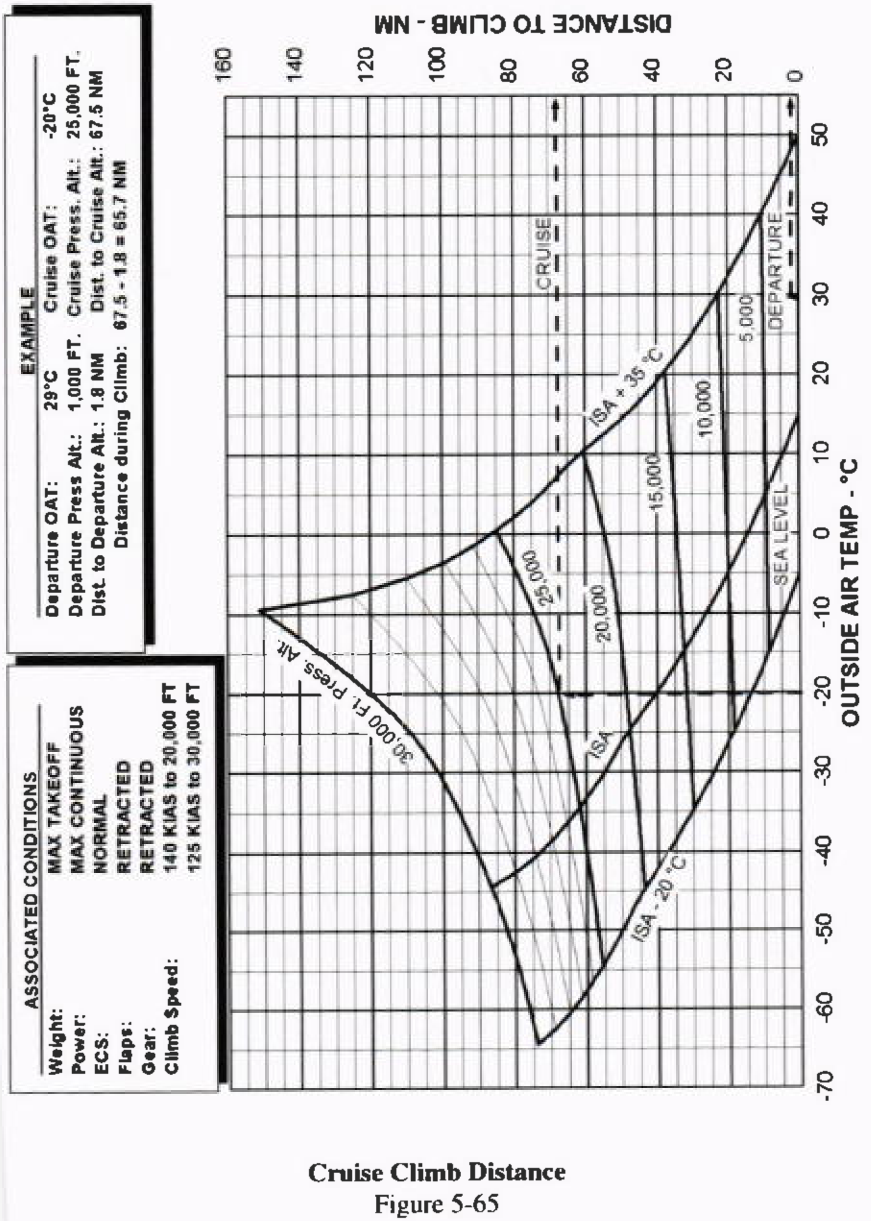
Maximum Climb Distance
Figure 5-59



Cruise Climb Time
Figure 5-61



Cruise Climb Fuel
Figure 5-63



Cruise Climb Distance
Figure 5-65

MAXIMUM SPEED CRUISE, POWER SETTING GUIDE

ALTITUDE (FT)	OAT (°C)															
	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24
15000											1154	1159	1164	1169	1173	1178
16000										1173	1178	1184	1189	1194	1199	1204
17000									1194	1199	1205	1210	1215	1220	1225	1230
18000								1215	1220	1226	1231	1236	1241	1247	1253	1257
19000							1236	1241	1246	1252	1257	1262	1268	1274	1280	1285
20000						1257	1263	1270	1274	1280	1286	1292	1299	1303	1309	1313
21000					1281	1287	1293	1300	1306	1311	1311	1312	1312	1313	1313	1313
22000				1303	1305	1308	1309	1312	1313	1313	1313	1313	1313	1313	1311	1310
23000			1313	1313	1313	1313	1313	1313	1313	1313	1313	1313	1310	1302	1294	1285
24000		1313	1313	1313	1313	1313	1312	1307	1301	1298	1293	1287	1276	1262	1254	1234
25000	1312	1309	1306	1303	1300	1295	1285	1276	1267	1257	1248	1237	1227	1217	1207	1197
26000	1290	1279	1272	1263	1254	1245	1234	1227	1218	1208	1199	1187	1181	1171	1162	1152
27000	1239	1230	1221	1213	1204	1196	1187	1179	1170	1161	1152	1143	1135	1126	1116	1107
28000	1188	1179	1173	1163	1155	1147	1138	1132	1121	1112	1104	1096	1089	1078	1069	1060
29000	1131	1123	1115	1107	1099	1091	1083	1074	1066	1058	1049	1041	1032	1023	1014	1005
30000	1077	1068	1060	1053	1045	1040	1029	1021	1012	1004	997	987	978	970	961	955

Maximum Speed Cruise, Power Setting Guide
Figure 5-66
(Sht 1 of 4)

MAXIMUM SPEED CRUISE, POWER SETTING GUIDE

OAT (ºC)

ALTITUDE (FT)	-22	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6
15000	1183	1188	1190	1192	1195	1197	1201	1202	1204	1206	1209	1211	1214	1216	1218	1221
16000	1209	1213	1216	1218	1221	1223	1225	1227	1230	1233	1235	1237	1239	1242	1245	1247
17000	1234	1239	1241	1244	1247	1249	1252	1254	1257	1260	1262	1265	1267	1270	1273	1276
18000	1262	1268	1271	1274	1276	1280	1282	1285	1288	1291	1295	1296	1298	1300	1301	1304
19000	1291	1293	1296	1298	1300	1303	1305	1307	1310	1312	1313	1313	1313	1313	1313	1313
20000	1313	1313	1313	1313	1313	1313	1313	1313	1313	1312	1312	1311	1311	1311	1311	1310
21000	1313	1313	1313	1313	1313	1311	1308	1306	1303	1300	1297	1294	1291	1288	1286	1280
22000	1309	1307	1306	1303	1298	1292	1287	1279	1276	1271	1265	1260	1252	1248	1241	1235
23000	1277	1267	1262	1256	1251	1245	1240	1234	1229	1223	1218	1212	1206	1200	1194	1188
24000	1233	1222	1216	1208	1206	1200	1195	1189	1181	1178	1173	1167	1162	1154	1151	1145
25000	1187	1176	1171	1166	1160	1155	1147	1144	1139	1134	1129	1124	1119	1114	1109	1103
26000	1139	1132	1127	1122	1114	1112	1107	1102	1098	1091	1088	1084	1079	1074	1067	1065
27000	1097	1088	1083	1078	1074	1069	1065	1060	1056	1051	1047	1042	1039	1033	1029	1024
28000	1051	1044	1037	1032	1028	1023	1021	1014	1010	1005	1001	998	992	987	983	978
29000	996	987	983	978	974	969	965	961	956	952	947	943	938	934	932	
30000	944	935	933	927	922	918	914	911	905	901	896	892	890			

Maximum Speed Cruise, Power Setting Guide
Figure 5-66
(Sht 2 of 4)

MAXIMUM SPEED CRUISE, POWER SETTING GUIDE

ALTITUDE (FT)	OAT (°C) -5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
15000	1224	1225	1228	1230	1232	1235	1237	1240	1242	1244	1248	1249	1252	1254	1256	1259
16000	1249	1252	1254	1258	1260	1262	1265	1268	1271	1272	1274	1275	1277	1279	1280	1281
17000	1279	1282	1285	1288	1291	1293	1296	1296	1294	1291	1291	1289	1287	1285	1283	1282
18000	1305	1307	1309	1311	1313	1310	1306	1301	1297	1291	1288	1284	1279	1275	1269	1266
19000	1313	1313	1313	1310	1304	1298	1292	1287	1281	1275	1269	1263	1258	1252	1246	1240
20000	1310	1305	1298	1291	1284	1273	1269	1262	1255	1247	1237	1233	1226	1218	1211	1201
21000	1273	1266	1259	1251	1244	1267	1230	1223	1216	1209	1201	1194	1187	1180		
22000	1228	1218	1214	1207	1201	1194	1184	1180	1174	1167	1160	1150				
23000	1181	1175	1169	1163	1157	1151	1145	1139	1133	1127						
24000	1140	1134	1126	1123	1118	1112	1107	1098								
25000	1098	1093	1088	1083	1078	1071										
26000	1060	1056	1051	1044												
27000	1020	1015														
28000																
29000																
30000																

Maximum Speed Cruise, Power Setting Guide
Figure 5-66
(Sht 3 of 4)

MAXIMUM SPEED CRUISE, POWER SETTING GUIDE

ALTITUDE (FT)	OAT (°C) 11	12	13	14	15	16	17	18	19	20	22	24	26	28	30
15000	1261	1264	1266	1269	1271	1274	1276	1278	1281	1285					
16000	1283	1284	1286	1287	1289	1290	1292	1294							
17000	1280	1278	1276	1274	1273	1271									
18000	1262	1257	1253	1247											
19000	1235	1229													
20000															
21000															
22000															
23000															
24000															
25000															
26000															
27000															
28000															
29000															
30000															

Maximum Speed Cruise, Power Setting Guide
Figure 5-66
(Sht 4 of 4)

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5	943	350	177
2000	-9	964	337	182
4000	-13	985	324	187
6000	-17	1011	313	193
8000	-21	1037	302	199
10000	-25	1066	293	205
12000	-29	1098	285	211
14000	-33	1134	280	218
16000	-37	1171	279	225
18000	-41	1213	279	233
20000	-45	1255	281	241
22000	-49	1302	285	249
24000	-53	1313	282	255
26000	**-57**	**1301**	278	**259**
28000	**-60**	**1214**	258	**258**
30000	**-64**	**1112**	237	**255**

ISA - 15 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	0	949	351	178
2000	-4	970	339	184
4000	-8	993	326	189
6000	-12	1019	314	195
8000	-16	1046	304	201
10000	-20	1077	295	207
12000	-24	1109	287	214
14000	-28	1146	283	221
16000	-32	1184	282	228
18000	-36	1226	282	235
20000	-40	1270	283	243
22000	-44	1308	286	251
24000	-48	1313	282	256
26000	-52	1279	273	259
28000	**-55**	**1194**	254	**258**
30000	**-59**	**1094**	233	**255**

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA -20, ISA -15)
Figure 5-67

ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5	956	353	180
2000	1	977	340	185
4000	-3	1000	327	191
6000	-7	1027	316	197
8000	-11	1056	306	203
10000	-15	1088	297	209
12000	-19	1121	289	216
14000	-23	1158	285	223
16000	-27	1197	284	230
18000	-31	1239	284	238
20000	-35	1285	286	246
22000	-39	1313	287	253
24000	-43	1313	282	258
26000	-47	1256	268	259
28000	-50	1173	250	258
30000	-54	1077	230	256
ISA - 5 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	10	962	355	182
2000	6	985	342	187
4000	2	1008	329	193
6000	-2	1036	318	198
8000	-6	1065	308	205
10000	-10	1096	299	211
12000	-14	1132	291	218
14000	-18	1170	288	225
16000	-22	1209	287	232
18000	-26	1253	287	240
20000	-30	1299	288	248
22000	-34	1313	287	254
24000	-38	1301	280	259
26000	-42	1234	264	259
28000	-45	1153	246	258
30000	-49	1058	226	255

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA -10, ISA -5)
Figure 5-68

ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15	969	355	183
2000	11	993	344	189
4000	7	1016	331	194
6000	3	1045	320	200
8000	-1	1074	310	207
10000	-5	1106	301	213
12000	-9	1142	293	220
14000	-13	1182	290	227
16000	-17	1221	289	235
18000	-21	1266	289	243
20000	-25	1313	291	251
22000	-29	1313	287	256
24000	-33	1289	278	260
26000	-37	1211	260	259
28000	-40	1132	242	258
30000	-44	1040	222	255
ISA + 5 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	20	976	358	185
2000	16	999	345	190
4000	12	1024	333	196
6000	8	1053	322	202
8000	4	1083	312	208
10000	0	1116	303	215
12000	-4	1153	296	222
14000	-8	1192	292	229
16000	-12	1233	291	237
18000	-16	1280	292	245
20000	-20	1313	291	252
22000	-24	1310	286	257
24000	-28	1262	273	259
26000	-32	1187	255	259
28000	-35	1111	238	258
30000	-39	1018	218	255

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA, ISA +5)
Figure 5-69

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25	983	360	186
2000	21	1006	347	192
4000	17	1032	335	198
6000	13	1061	324	204
8000	9	1092	314	210
10000	5	1127	305	217
12000	1	1163	298	224
14000	-3	1203	294	231
16000	-7	1245	294	239
18000	-11	1295	295	248
20000	-15	1313	292	254
22000	-19	1306	286	259
24000	-23	1235	268	259
26000	-27	1164	251	259
28000	-30	1089	234	258
30000	-34	997	214	254

ISA + 15 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	30	989	361	188
2000	26	1014	349	194
4000	22	1040	337	199
6000	18	1070	326	206
8000	14	1102	316	212
10000	10	1137	307	219
12000	6	1175	301	226
14000	2	1214	297	234
16000	-2	1258	296	241
18000	-6	1304	297	250
20000	-10	1311	291	255
22000	-14	1279	280	258
24000	-18	1208	263	258
26000	-22	1139	246	258
28000	-25	1067	230	257
30000	-29	976	210	254

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA +10, ISA +15)
Figure 5-70

ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35	996	363	189
2000	31	1021	351	195
4000	27	1048	339	201
6000	23	1079	328	208
8000	19	1111	318	214
10000	15	1148	310	221
12000	11	1187	303	228
14000	7	1226	299	236
16000	3	1271	299	244
18000	-1	1313	299	252
20000	-5	1310	292	257
22000	-9	1252	275	258
24000	-13	1181	258	258
26000	-17	1114	242	257
28000	-20	1044	226	256
30000	-24	955	207	253
ISA + 25 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	40	1002	364	191
2000	36	1028	352	197
4000	32	1056	340	203
6000	28	1088	330	209
8000	24	1120	320	216
10000	20	1157	312	223
12000	16	1197	305	230
14000	12	1239	302	238
16000	8	1279	301	245
18000	4	1291	295	251
20000	0	1273	285	255
22000	-4	1218	269	257
24000	-8	1154	253	257
26000	-12	1091	238	257
28000	-15	1021	221	256
30000	-19	933	202	252

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA +20, ISA +25)
Figure 5-71

ISA + 30 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	45	1009	366	192
2000	41	1035	354	198
4000	37	1064	342	204
6000	33	1097	332	211
8000	29	1130	322	218
10000	25	1167	314	225
12000	21	1208	308	232
14000	17	1251	304	240
16000	13	1286	302	247
18000	9	1269	292	251
20000	5	1237	279	254
22000	1	1184	264	255
24000	-3	1126	248	256
26000	-7	1067	234	256
28000	-10	998	217	255
30000	-14	911	199	251
ISA + 35 (°C)				
Altitude (FT)	**OAT (°C)**	**Torque (FT-LB)**	**Fuel Flow (PPH)***	**TAS (KT)**
0	50	1017	368	194
2000	46	1042	356	200
4000	42	1071	344	206
6000	38	1105	334	213
8000	34	1140	325	219
10000	30	1177	317	227
12000	26	1218	310	234
14000	22	1263	307	242
16000	18	1294	304	249
18000	14	1247	289	251
20000	10	1201	274	253
22000	6	1150	258	254
24000	2	1098	244	255
26000	-2	1044	229	255
28000	-5	976	213	254
30000	-9	890	195	250

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA +30, ISA +35)
Figure 5-73

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ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5	500	292	129
5000	-15		252	138
10000	-25		213	147
15000	-35		185	155
20000	-45		161	164
25000	-55		143	171
30000	-64		129	178

ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5	500	292	131
5000	-5		252	140
10000	-15		214	149
15000	-25		185	157
20000	-35		161	166
25000	-45		143	173
30000	-54		129	180

ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15	500	292	133
5000	5		253	142
10000	-5		215	151
15000	-15		185	159
20000	-25		162	167
25000	-35		143	175
30000	-44		129	182

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Low Power Cruise, 500 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-75

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25		293	136
5000	15		254	144
10000	5		215	153
15000	-5	500	185	161
20000	-15		162	169
25000	-25		143	177
30000	-34		130	183
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35		293	137
5000	25		254	146
10000	15		216	155
15000	5	500	186	163
20000	-5		162	171
25000	-15		143	178
30000	-24		130	184
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	50		294	141
5000	40		255	149
10000	30		217	157
15000	20	500	187	165
20000	10		164	173
25000	0		145	180
30000	-9		131	185

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Low Power Cruise, 500 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-77

ISA -20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5	600	306	144
5000	-15		264	153
10000	-25		227	162
15000	-35		197	170
20000	-45		175	179
25000	-55		157	188
30000	-64		145	197
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5	600	306	146
5000	-5		265	155
10000	-15		227	164
15000	-25		198	173
20000	-35		175	182
25000	-45		157	191
30000	-54		145	199
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15	600	307	148
5000	5		266	157
10000	-5		227	166
15000	-15		199	175
20000	-25		176	184
25000	-35		158	193
30000	-44		145	202

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 600 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-79

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25	600	308	150
5000	15		267	159
10000	5		228	168
15000	-5		199	177
20000	-15		176	186
25000	-25		158	195
30000	-34		145	204

ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35	600	308	152
5000	25		268	161
10000	15		228	170
15000	5		200	179
20000	-5		177	188
25000	-15		159	197
30000	-24		146	205

ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	50	600	309	156
5000	40		269	164
10000	30		230	173
15000	20		201	182
20000	10		178	191
25000	0		159	200
30000	-9		146	208

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 600 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-81

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5	700	318	156
5000	-15		277	165
10000	-25		240	174
15000	-35		211	183
20000	-45		189	192
25000	-55		172	202
30000	-64		161	212
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5	700	319	158
5000	-5		278	167
10000	-15		240	176
15000	-25		212	185
20000	-35		190	195
25000	-45		172	205
30000	-54		161	215
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15	700	320	160
5000	5		278	169
10000	-5		241	178
15000	-15		212	187
20000	-25		190	197
25000	-35		172	207
30000	-44		161	217

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 700 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-83

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25		321	162
5000	15		279	171
10000	5		242	180
15000	-5	700	213	190
20000	-15		191	199
25000	-25		173	210
30000	-34		162	220
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35		322	164
5000	25		280	173
10000	15		243	182
15000	5	700	214	192
20000	-5		191	202
25000	-15		174	212
30000	-24		162	222
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	50		324	167
5000	40		282	176
10000	30		244	185
15000	20	700	215	195
20000	10		192	205
25000	0		175	215
30000	-9		163	225

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 700 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-85

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5	800	331	165
5000	-15		291	174
10000	-25		254	184
15000	-35		225	193
20000	-45		204	203
25000	-55		188	214
30000	-64		178	225

ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5	800	332	168
5000	-5		292	177
10000	-15		255	186
15000	-25		226	196
20000	-35		204	206
25000	-45		188	217
30000	-54		178	228

ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15	800	333	170
5000	5		293	179
10000	-5		255	188
15000	-15		227	198
20000	-25		205	209
25000	-35		189	219
30000	-44		178	230

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 800 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-87

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25	800	334	172
5000	15		294	181
10000	5		256	191
15000	-5		228	201
20000	-15		205	211
25000	-25		189	222
30000	-34		178	233
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35	800	335	174
5000	25		295	183
10000	15		257	193
15000	5		228	203
20000	-5		206	213
25000	-15		190	224
30000	-24		179	235
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	50	800	337	177
5000	40		296	186
10000	30		259	196
15000	20		230	206
20000	10		208	217
25000	0		191	228
30000	-9		179	239

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 800 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-89

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5	900	344	174
5000	-15		305	183
10000	-25		268	193
15000	-35		241	203
20000	-45		220	213
25000	-55		205	224
30000	-64		196	236
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5	900	345	176
5000	-5		306	185
10000	-15		269	195
15000	-25		241	205
20000	-35		220	216
25000	-45		205	227
30000	-54		196	239
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15	900	346	178
5000	5		307	188
10000	-5		270	198
15000	-15		242	208
20000	-25		220	219
25000	-35		206	230
30000	-44		196	242

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 900 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-91

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25		348	180
5000	15		308	190
10000	5		271	200
15000	-5	900	243	210
20000	-15		221	221
25000	-25		206	233
30000	-34		196	245
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35		349	182
5000	25		309	192
10000	15		272	202
15000	5	900	243	213
20000	-5		222	224
25000	-15		207	235
30000	-24		196	247
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	50		351	185
5000	40		311	195
10000	30		274	205
15000	20	900	245	216
20000	10		223	227
25000	0		207	239
30000	-		197	251

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 900 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-93

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5		-	-
5000	-15		319	191
10000	-25		283	201
15000	-35	1000	255	211
20000	-45		236	222
25000	-55		222	233
30000	-64		215	246
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5		360	184
5000	-5		320	193
10000	-15		284	203
15000	-25	1000	256	214
20000	-35		237	225
25000	-45		222	237
30000	-54		215	249
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15		361	186
5000	5		321	196
10000	-5		285	206
15000	-15	1000	257	216
20000	-25		237	228
25000	-35		223	240
30000	-44		214	252

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1000 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-95

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25	1000	362	188
5000	15		323	198
10000	5		286	208
15000	-5		258	219
20000	-15		238	230
25000	-25		223	242
30000	-34		215	255
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35	1000	364	190
5000	25		324	200
10000	15		287	210
15000	5		259	221
20000	-5		239	233
25000	-15		223	245
30000	-24		212	258
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	50	1000	366	193
5000	40		327	203
10000	30		288	214
15000	20		261	225
20000	10		239	237
25000	0		224	249
30000	-9		199	262

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1000 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-97

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5		-	-
5000	-15		-	-
10000	-25		298	208
15000	-35	1100	271	219
20000	-45		253	230
25000	-55		241	242
30000	-64		234	255

ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5		-	-
5000	-5		-	-
10000	-15		299	211
15000	-25	1100	271	221
20000	-35		254	233
25000	-45		241	245
30000	-54		234	258

ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15		-	-
5000	5		-	-
10000	-5		300	213
15000	-15	1100	273	224
20000	-25		254	236
25000	-35		241	248
30000	-44		229	261

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1100 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-99

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25		-	-
5000	15		-	-
10000	5		301	216
15000	-5	1100	274	227
20000	-15		255	239
25000	-25		241	251
30000	-34		221	264
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35		-	-
5000	25		339	207
10000	15		302	218
15000	5	1100	275	229
20000	-5		256	241
25000	-15		241	254
30000	-24		-	-
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	50		-	-
5000	40		341	211
10000	30		304	222
15000	20	1100	276	233
20000	10		256	245
25000	0		238	258
30000	-9		-	-

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1100 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-101

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	-5	1200	-	-
5000	-15		-	-
10000	-25		-	-
15000	-35		-	-
20000	-45		270	237
25000	-55		259	250
30000	-64		-	-
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	5	1200	-	-
5000	-5		-	-
10000	-15		-	-
15000	-25		289	229
20000	-35		271	240
25000	-45		259	253
30000	-54		239	266
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	15	1200	-	-
5000	5		-	-
10000	-5		-	-
15000	-15		290	231
20000	-25		271	243
25000	-35		259	256
30000	-44		-	-

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1200 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-103

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	25	1200	-	-
5000	15		-	-
10000	5		-	-
15000	-5		290	234
20000	-15		272	246
25000	-25		260	259
30000	-34		-	-
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	35	1200	-	-
5000	25		-	-
10000	15		-	-
15000	5		291	237
20000	-5		272	249
25000	-15		254	262
30000	-24		-	-
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (PPH)*	TAS (KT)
0	50	1200	-	-
5000	40		-	-
10000	30		321	229
15000	20		292	241
20000	10		273	253
25000	0		238	267
30000	-9		-	-

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1200 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-105

MAXIMUM SPEED CRUISE

Altitude	Cruise Nautical Miles / 100 Lbs. Fuel					
FT	ISA - 20° C	ISA - 10° C	ISA	ISA + 10° C	ISA + 20° C	ISA + 35° C
0	50.6	51.0	51.5	51.7	52.1	52.7
5000	59.7	60.2	60.6	60.9	61.1	61.7
10000	70.0	70.4	70.8	71.1	71.3	71.6
15000	79.4	79.3	79.7	79.7	80.3	80.1
20000	85.8	86.0	86.3	87.0	88.0	92.3
25000	91.1	93.5	96.7	99.6	103.2	107.6
30000	107.8	111.3	114.9	118.7	122.2	128.2

INTERMEDIATE POWER CRUISE - 1000 FT-LB

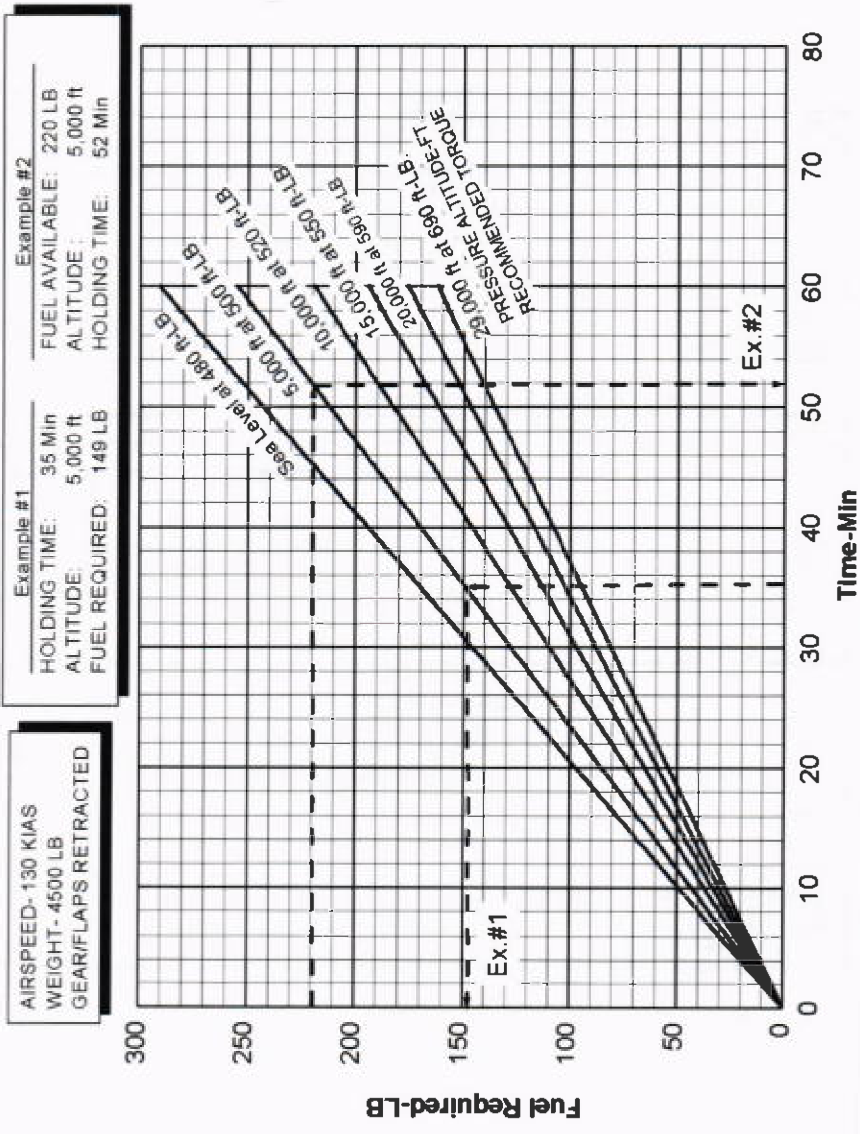
Altitude	Cruise Nautical Miles / 100 Lbs. Fuel					
FT	ISA - 20° C	ISA - 10° C	ISA	ISA + 10° C	ISA + 20° C	ISA + 35° C
0	-	51.1	51.5	51.9	52.3	52.9
5000	59.8	60.4	60.9	61.3	61.7	62.3
10000	70.9	71.6	72.2	72.8	73.4	74.2
15000	82.6	83.5	84.3	84.9	85.5	86.3
20000	93.9	94.9	95.9	96.9	97.7	98.9
25000	104.9	106.4	107.6	108.6	109.7	111.1
30000	114.4	116.1	117.6	118.9	121.9	131.8

LOW POWER CRUISE-500 FT-LB

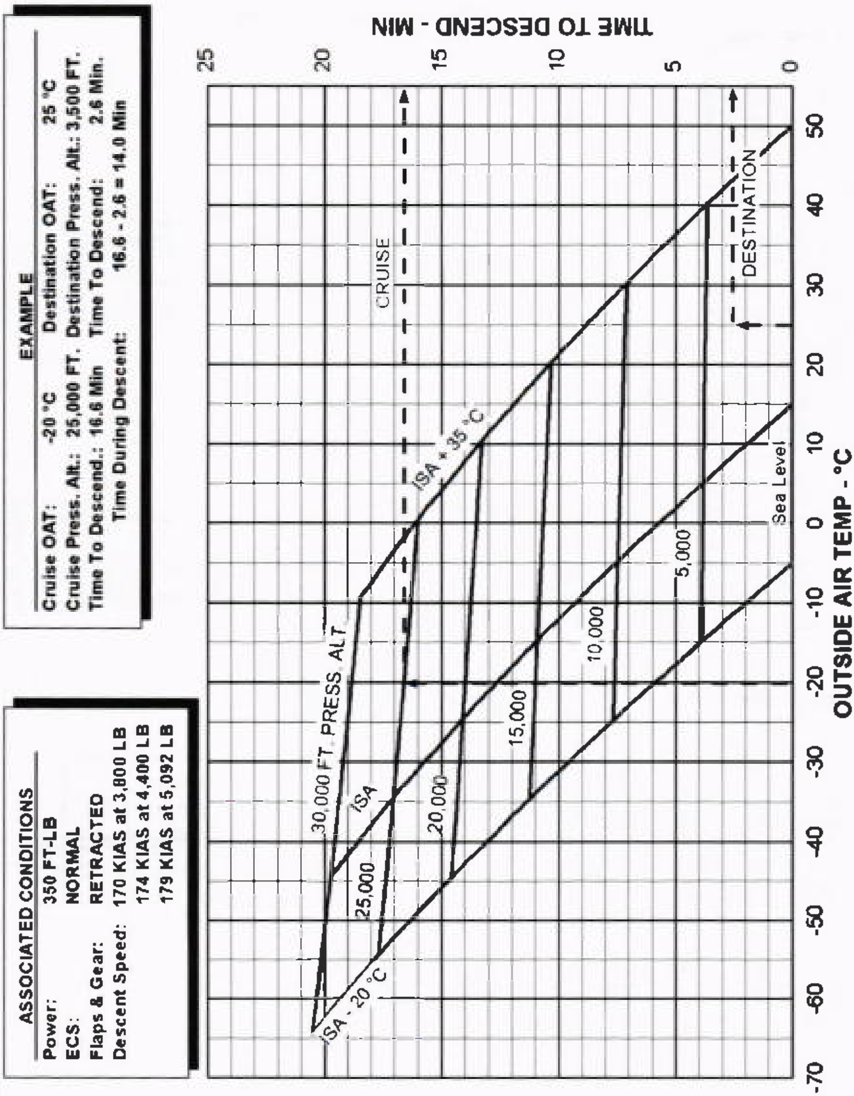
Altitude	Cruise Nautical Miles / 100 Lbs. Fuel					
FT	ISA - 20° C	ISA - 10° C	ISA	ISA + 10° C	ISA + 20° C	ISA + 35° C
0	44.3	44.9	45.6	46.4	46.9	47.9
5000	54.9	55.6	56.3	56.8	57.4	58.3
10000	68.9	69.7	70.4	71.0	71.6	72.5
15000	84.1	85.1	86.1	87.0	87.7	88.5
20000	101.8	102.8	103.6	104.3	105.4	105.9
25000	119.9	121.2	122.3	123.1	124.2	124.5
30000	138.5	139.4	140.3	140.9	141.2	141.6

Note:
ECS: NORMAL
Shaded areas are beyond aircraft OAT limit. See paragraph 2.28.
Does not include 45 minute reserve, 26 gal. (174.2 Lb).
To obtain 45 minute reserve endurance set power to Low Power Cruise @ 5,000'.

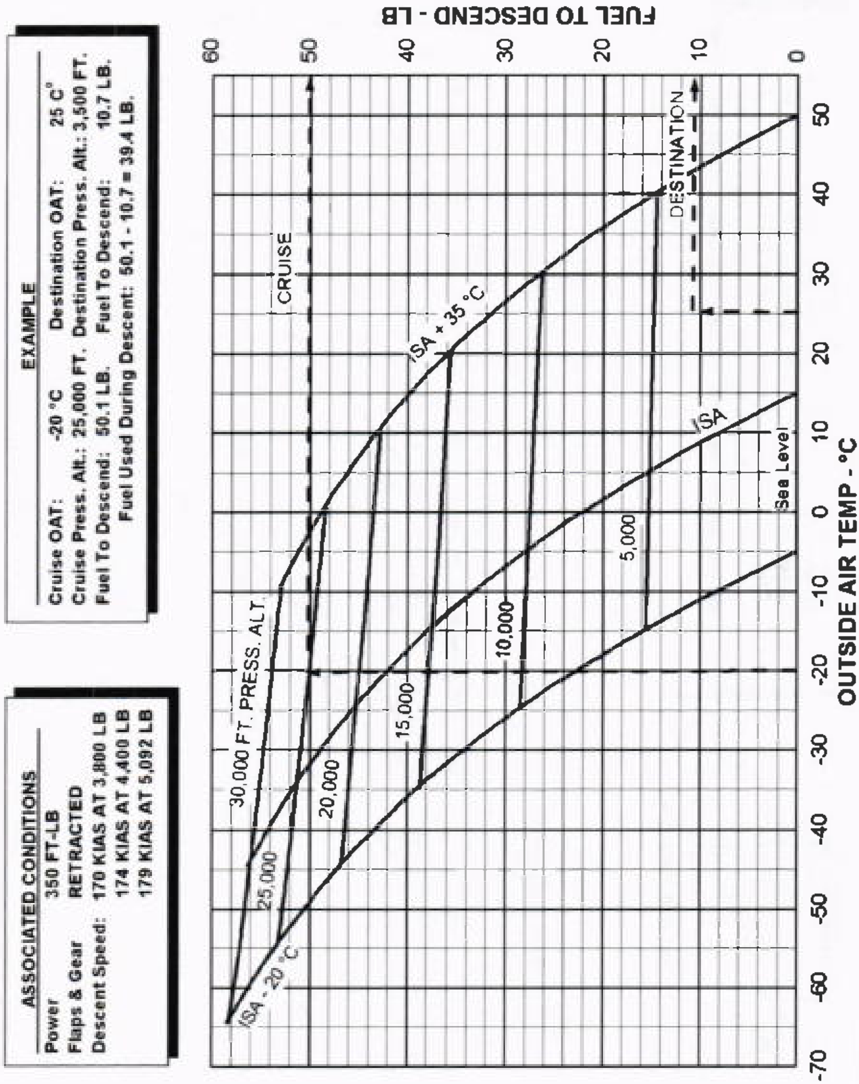
Specific Air Range
Figure 5-111



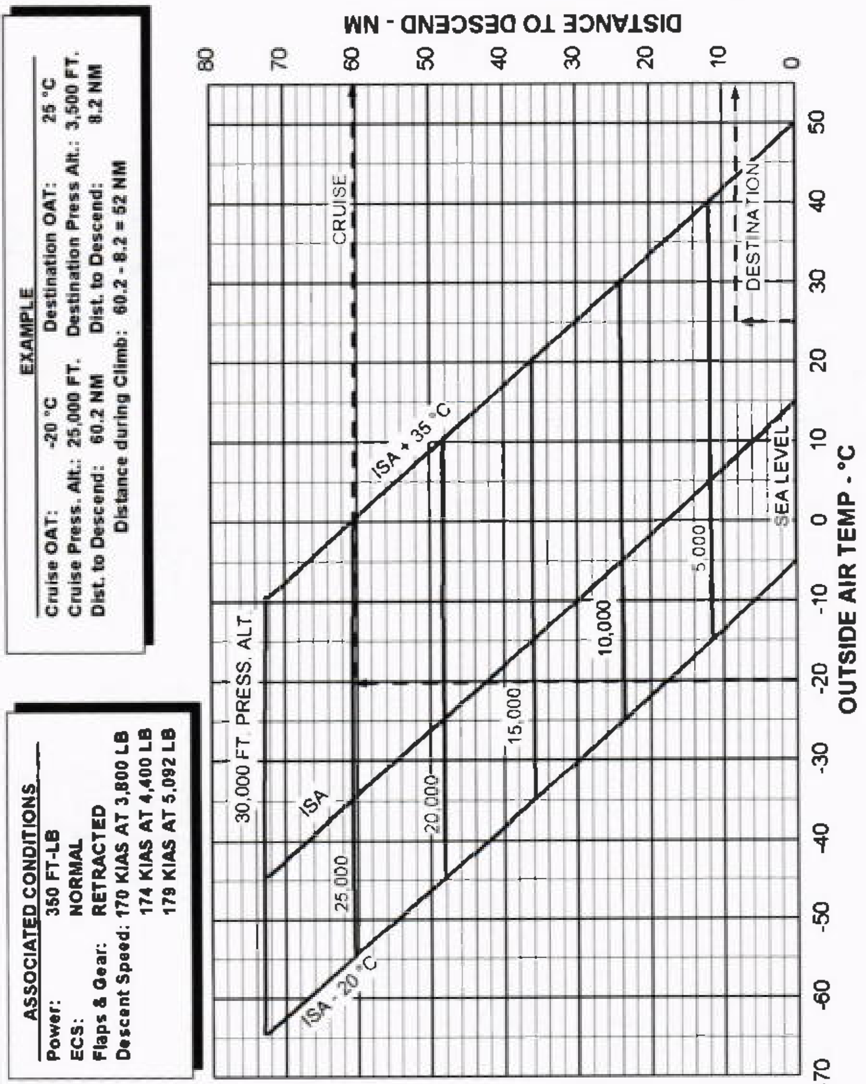
Holding Time vs. Fuel On Board
Figure 5-113



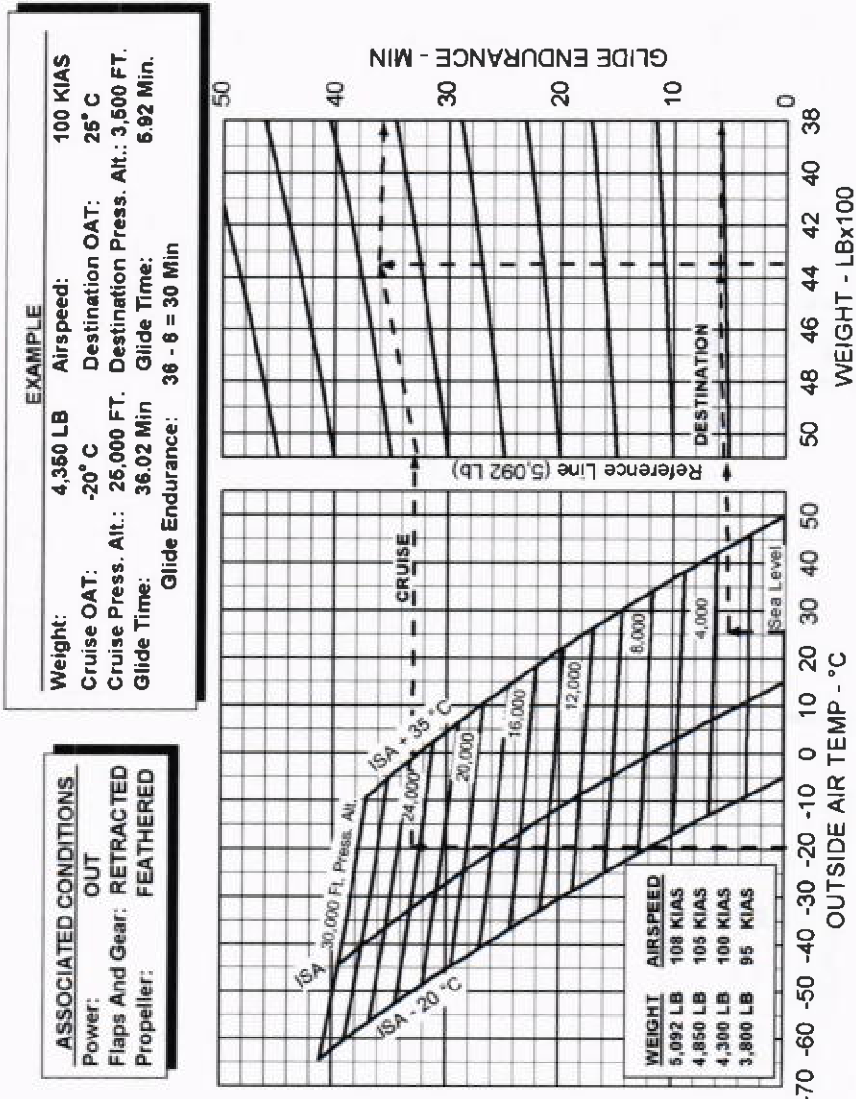
Time to Descend
Figure 5-115



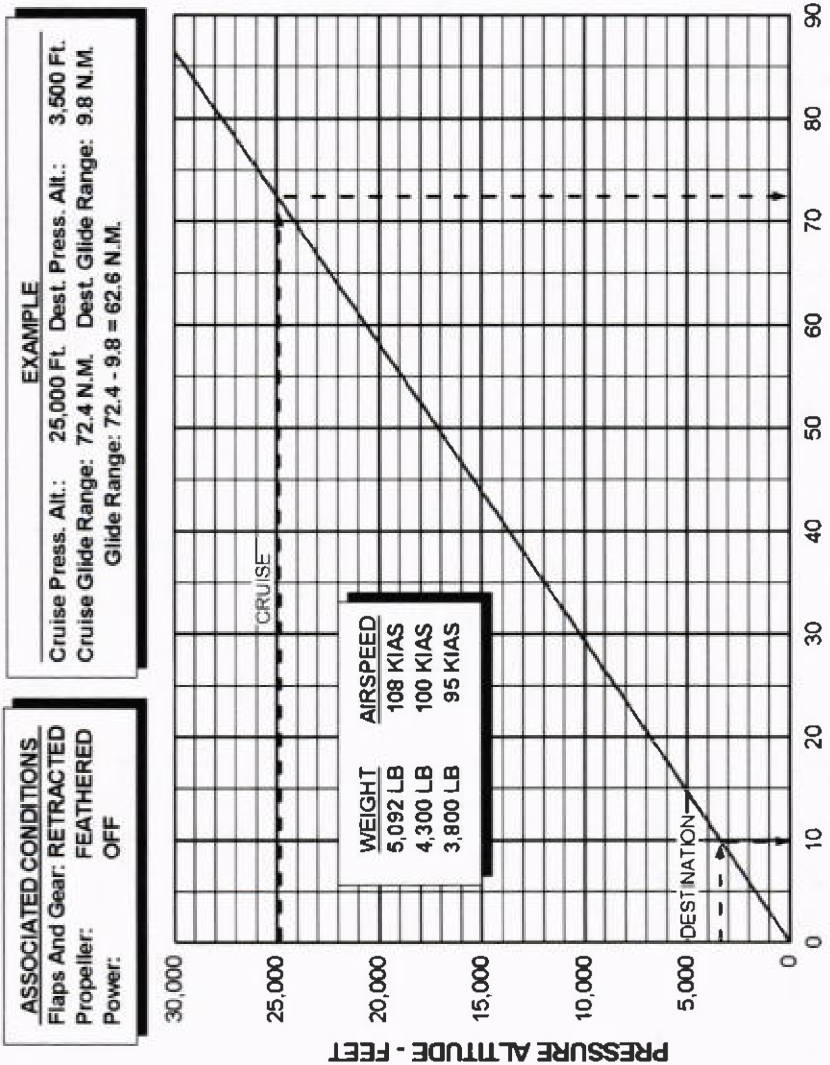
Fuel to Descend
Figure 5-117



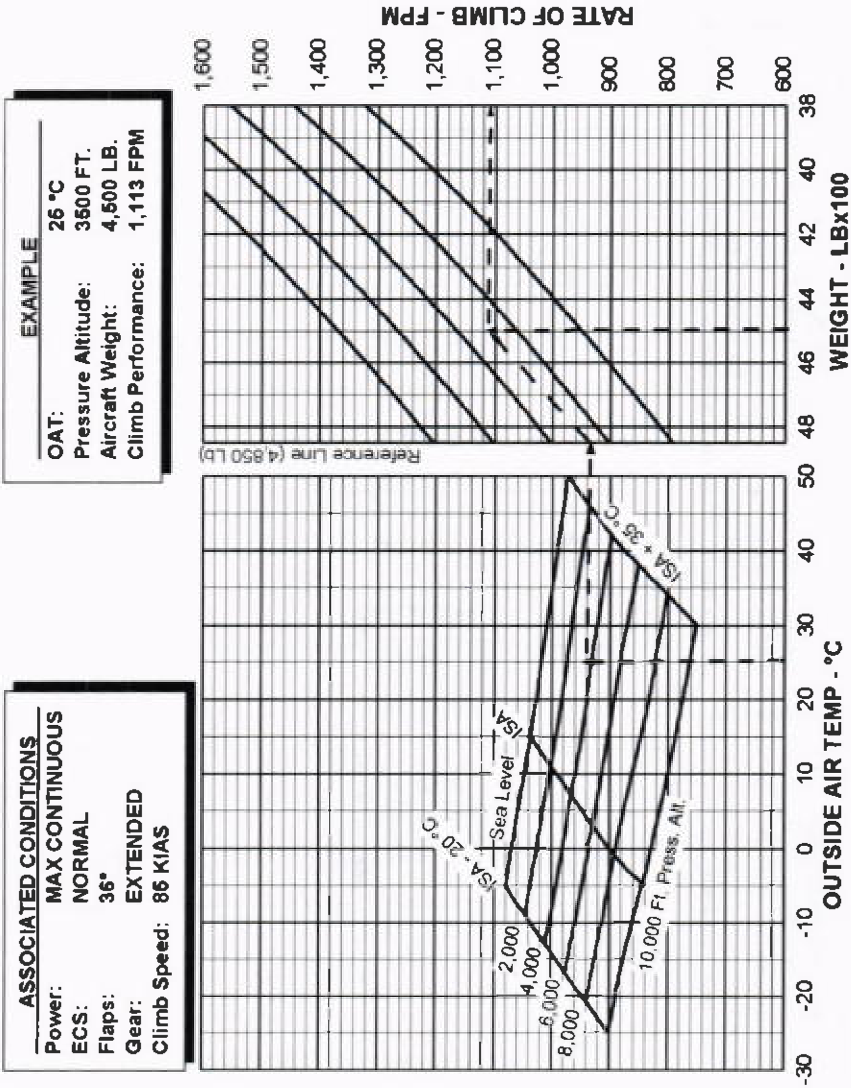
Distance to Descend
Figure 5-119



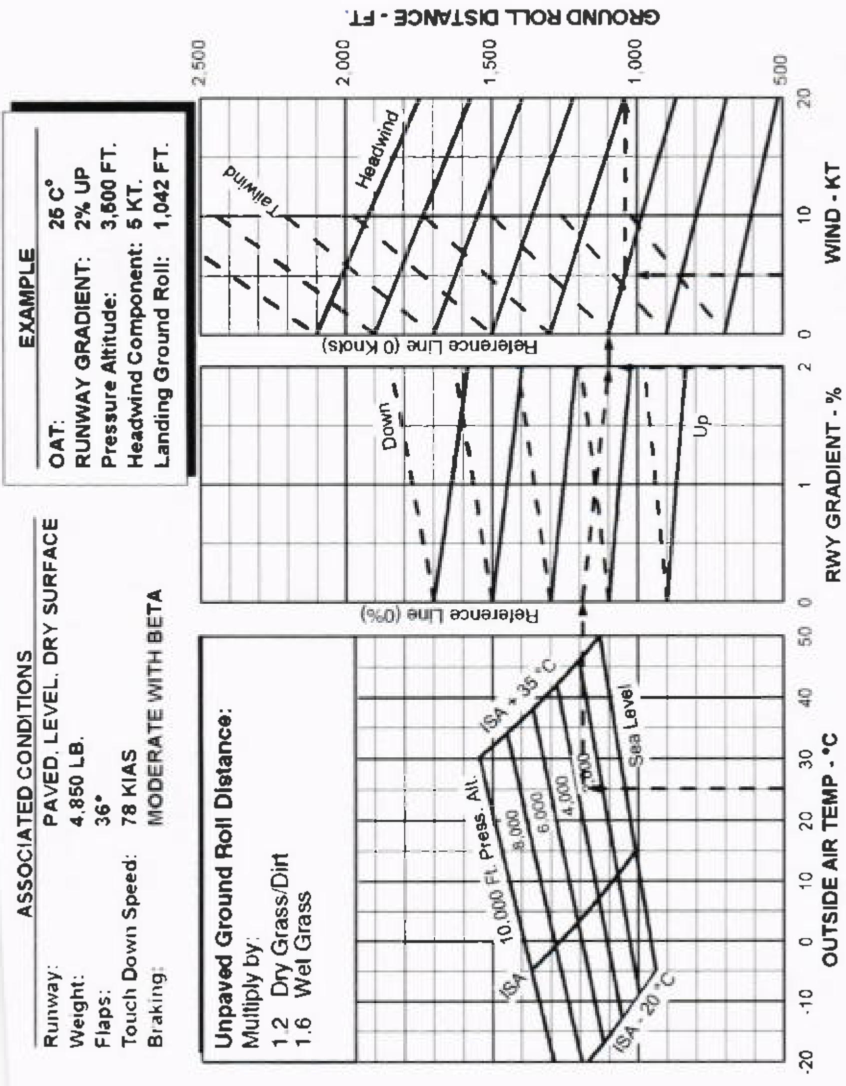
Glide Endurance
Figure 5-121



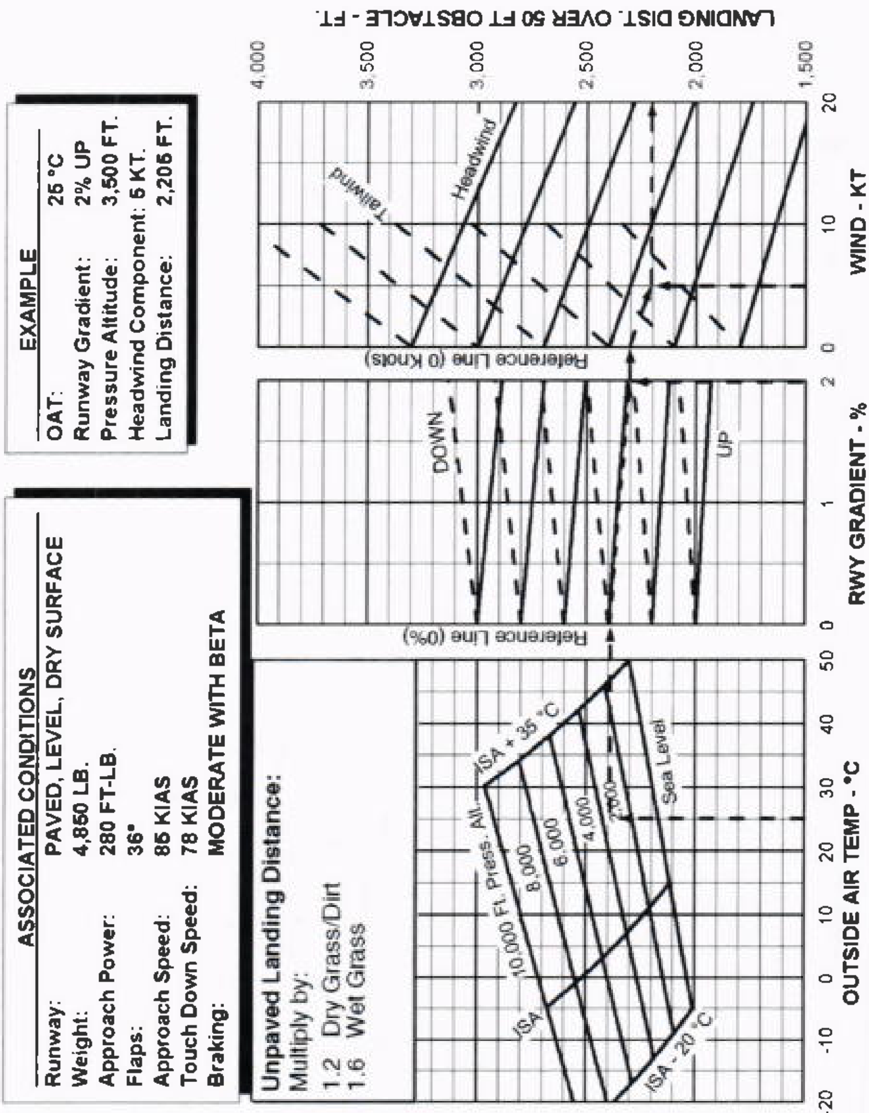
Glide Distance
Figure 5-123



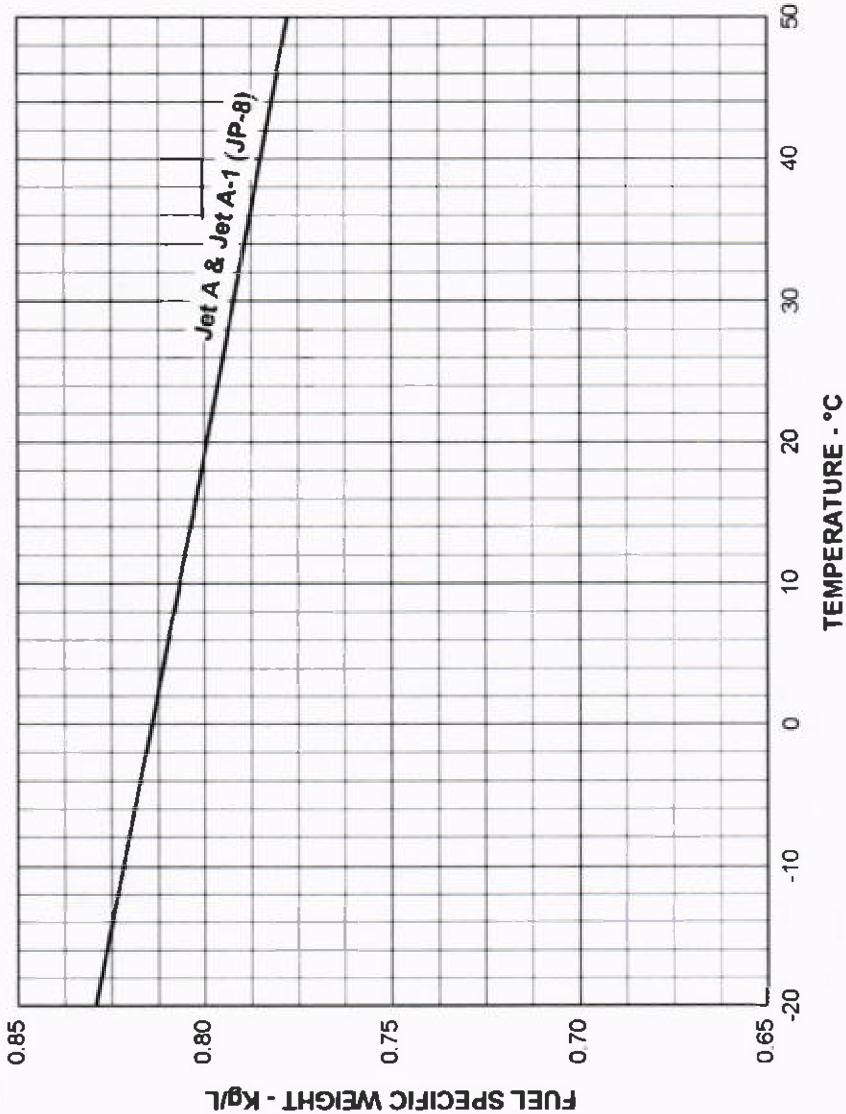
Balked Landing Climb Performance
Figure 5-125



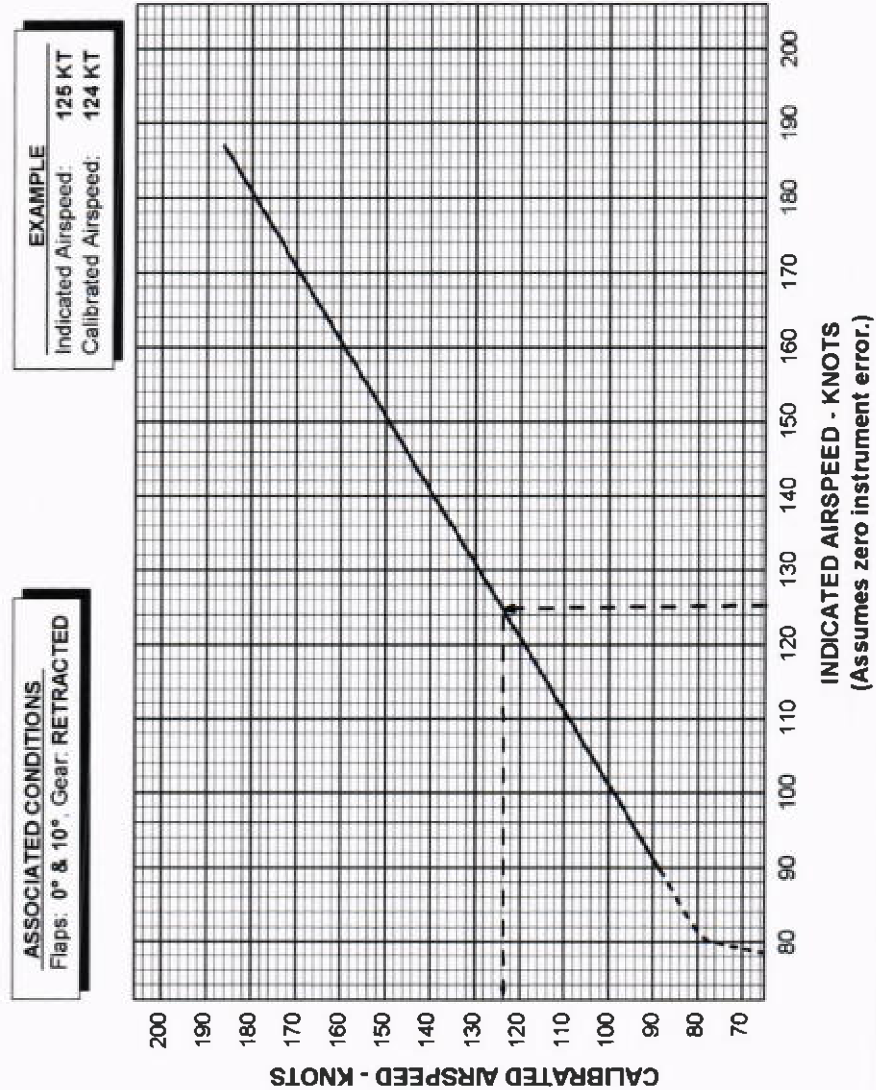
Landing Ground Roll, Flaps 36°, without Reverse
Figure 5-129



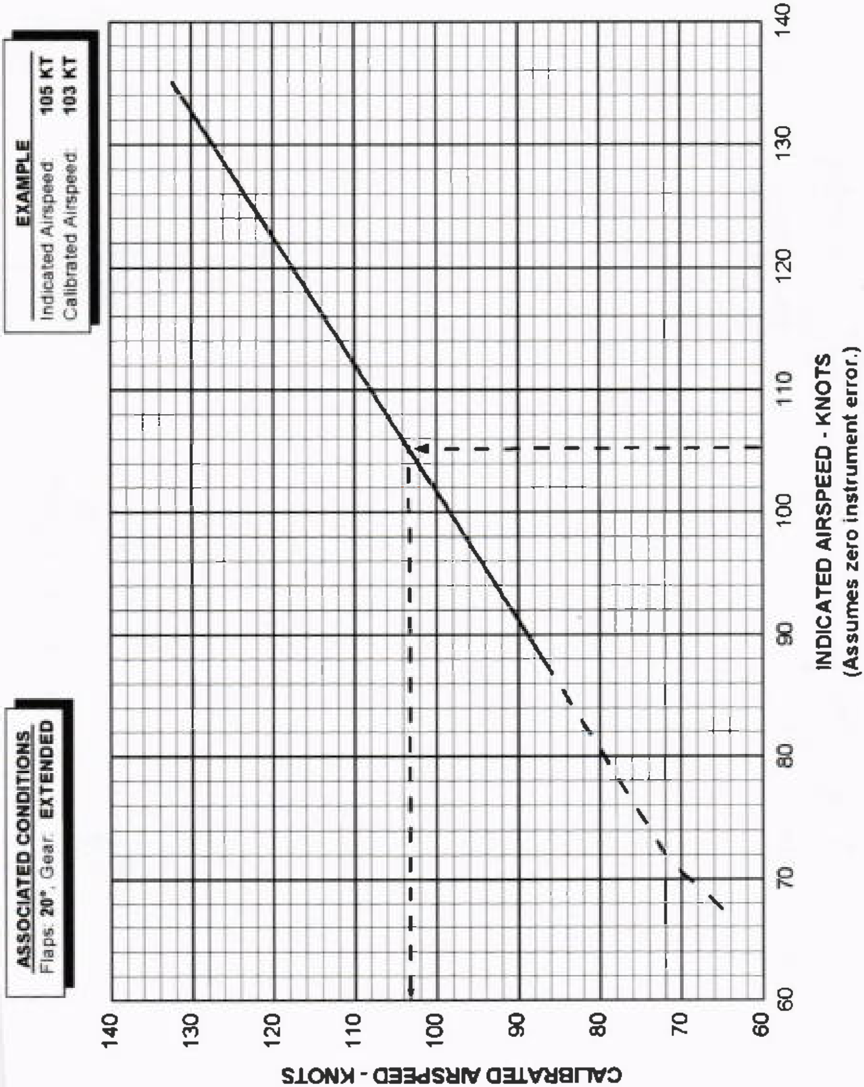
Landing Distance, Flaps 36°, without Reverse
Figure 5-131



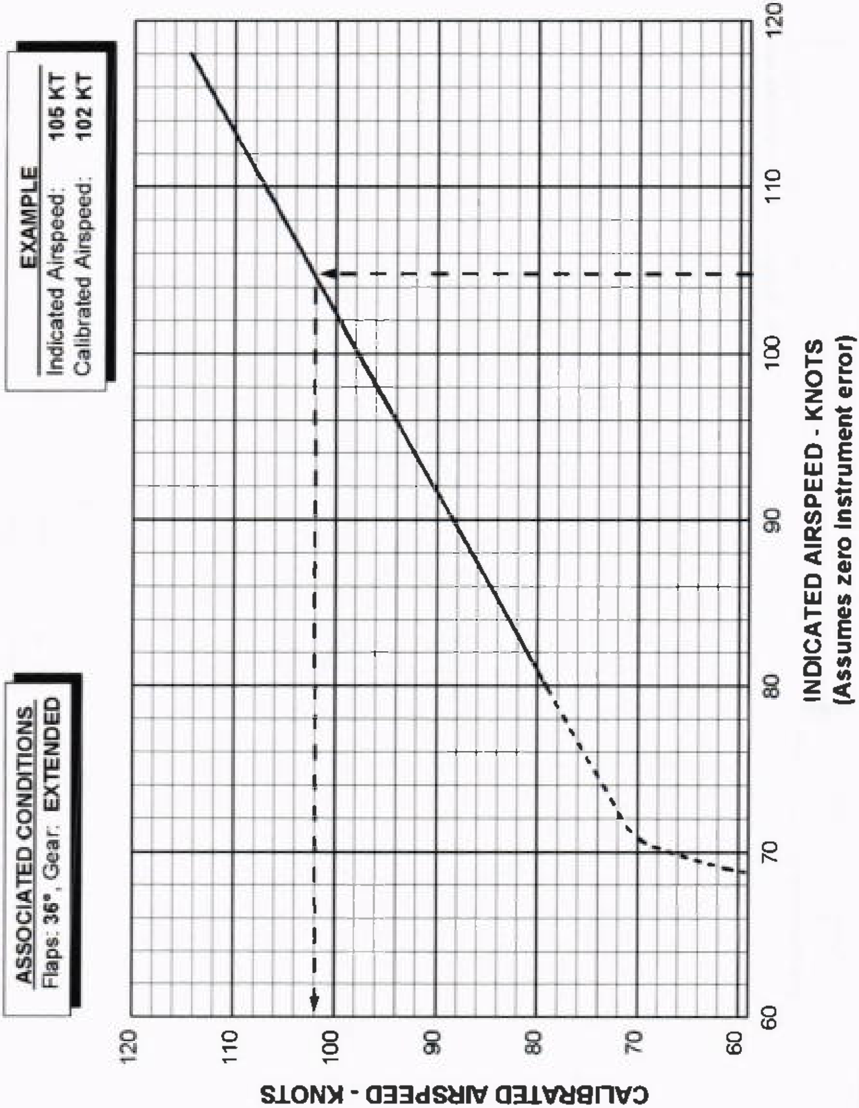
Aviation Fuel Specific Weight
Figure 5-145



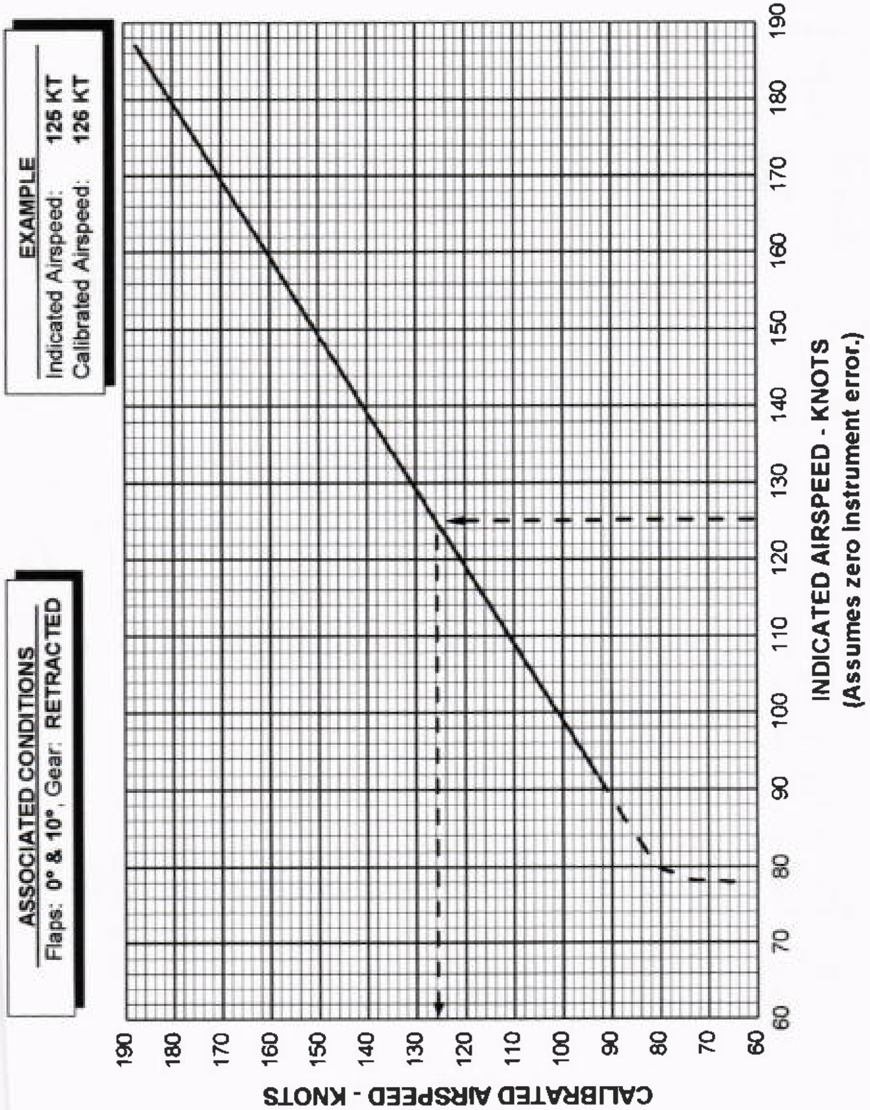
Airspeed Calibration
Primary Static (Flaps 0° and 10°)
Figure 5-147



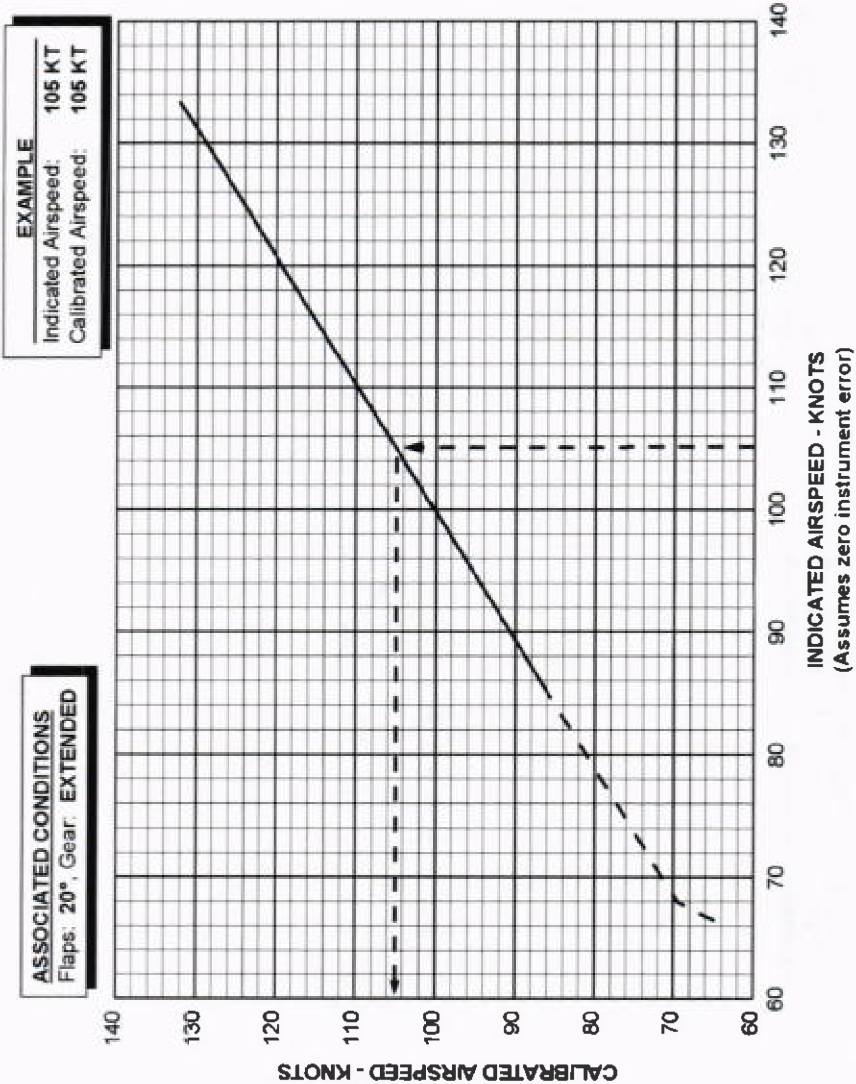
Airspeed Calibration
Primary Static (Flaps 20°, Gear DOWN)
Figure 5-149



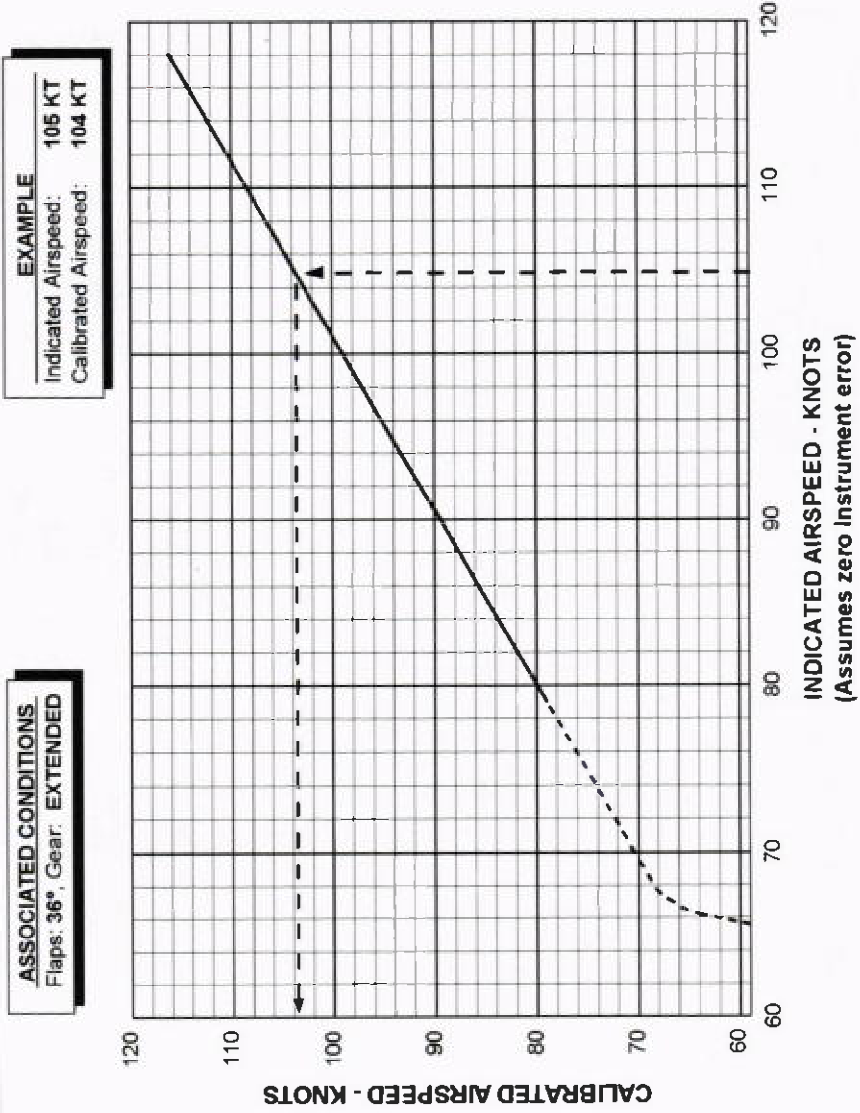
Airspeed Calibration
Primary Static (Flaps 36°, Gear DOWN)
Figure 5-151



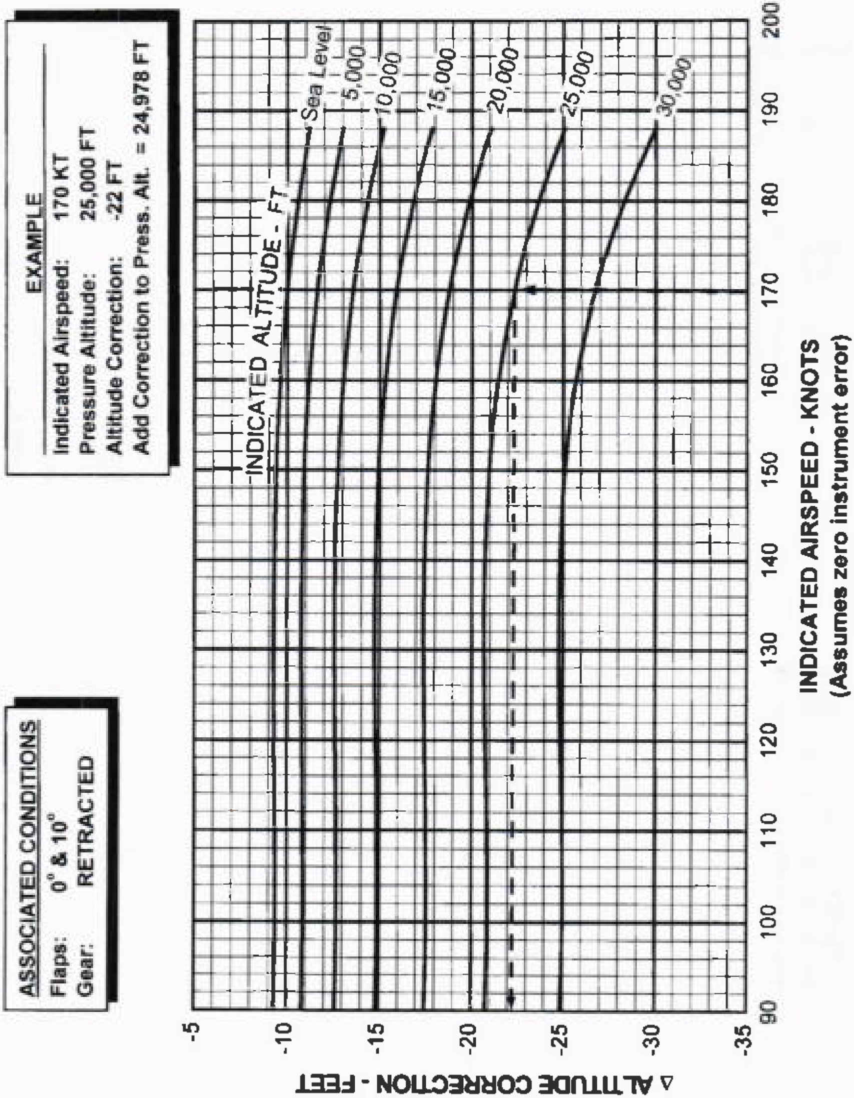
Airspeed Calibration
Alternate Static (Flaps 0° and 10°)
Figure 5-153



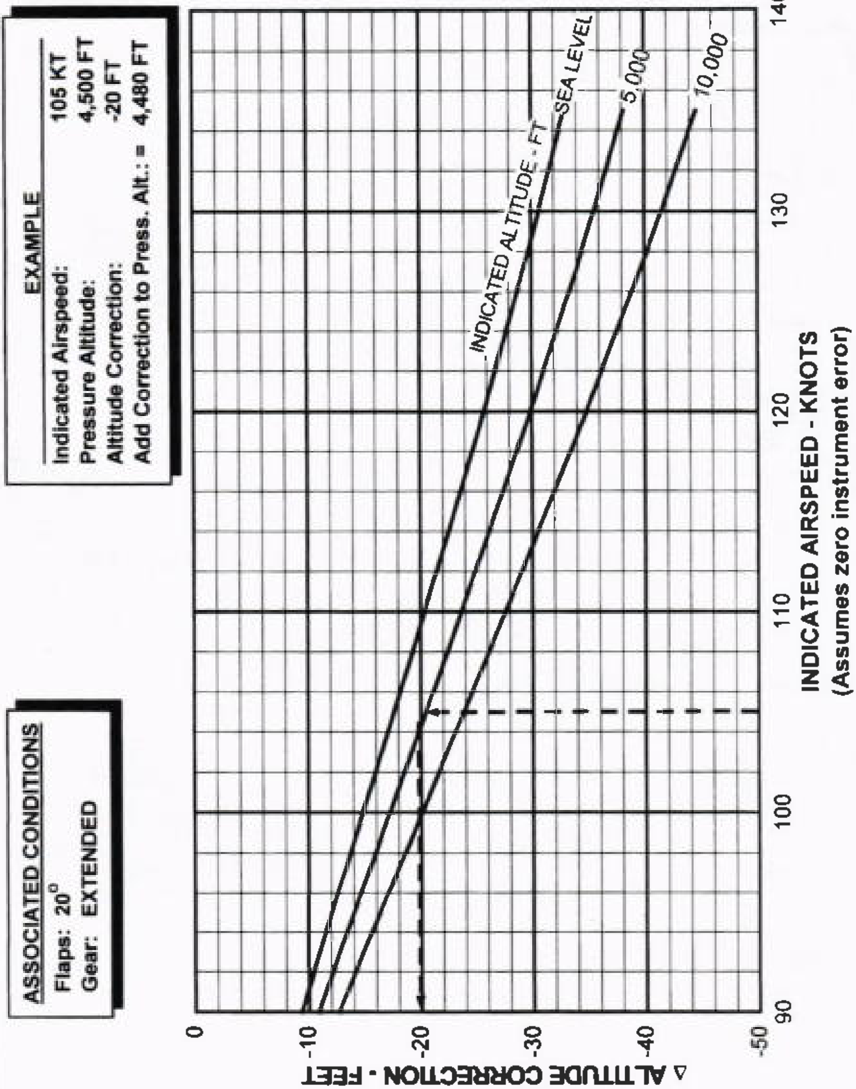
Airspeed Calibration
Alternate Static (Flaps 20°, Gear DOWN)
Figure 5-155



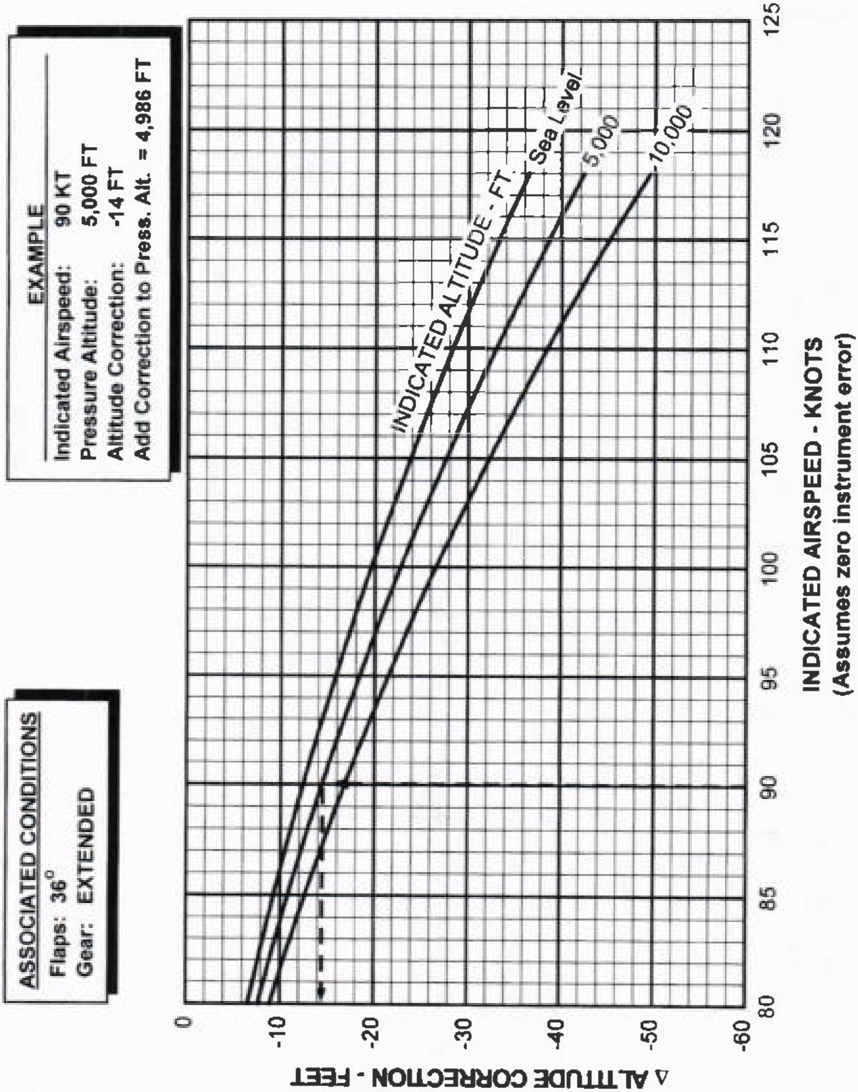
Airspeed Calibration
Alternate Static (Flaps 36°, Gear DOWN)
Figure 5-157



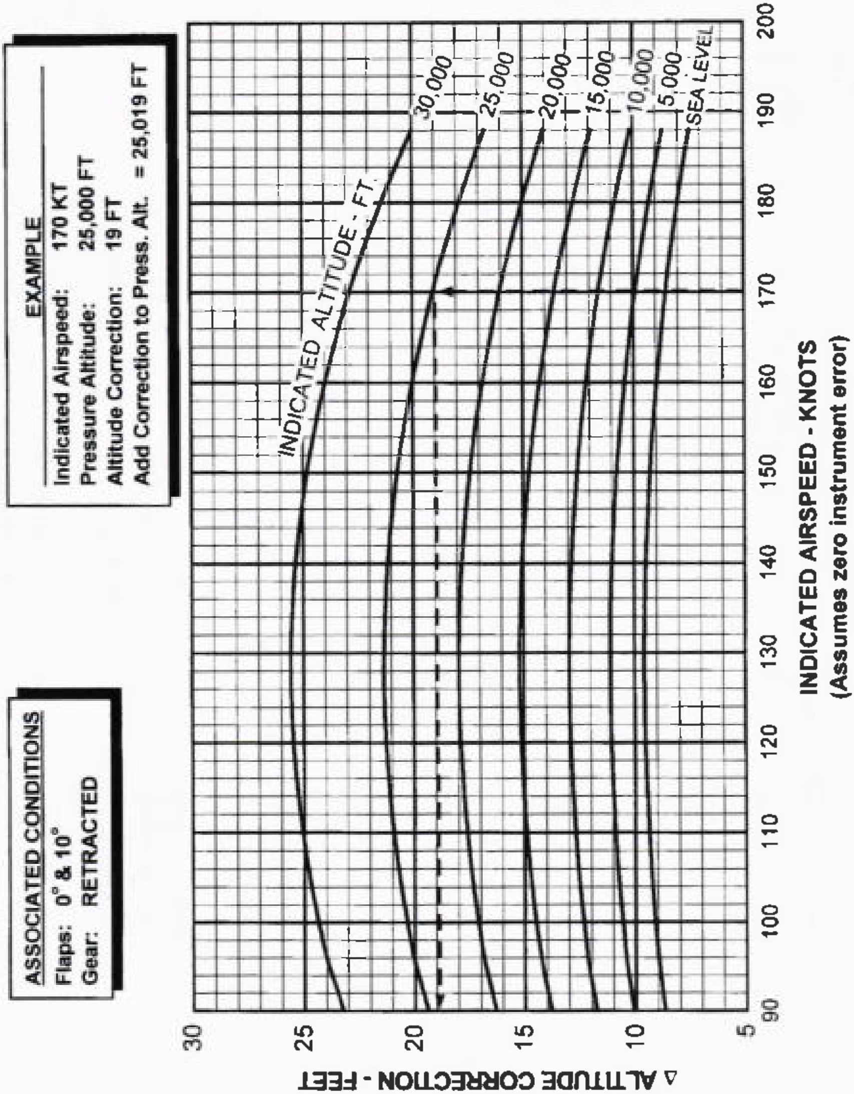
Altitude Calibration
Primary Static (Flaps 0° and 10°)
Figure 5-159



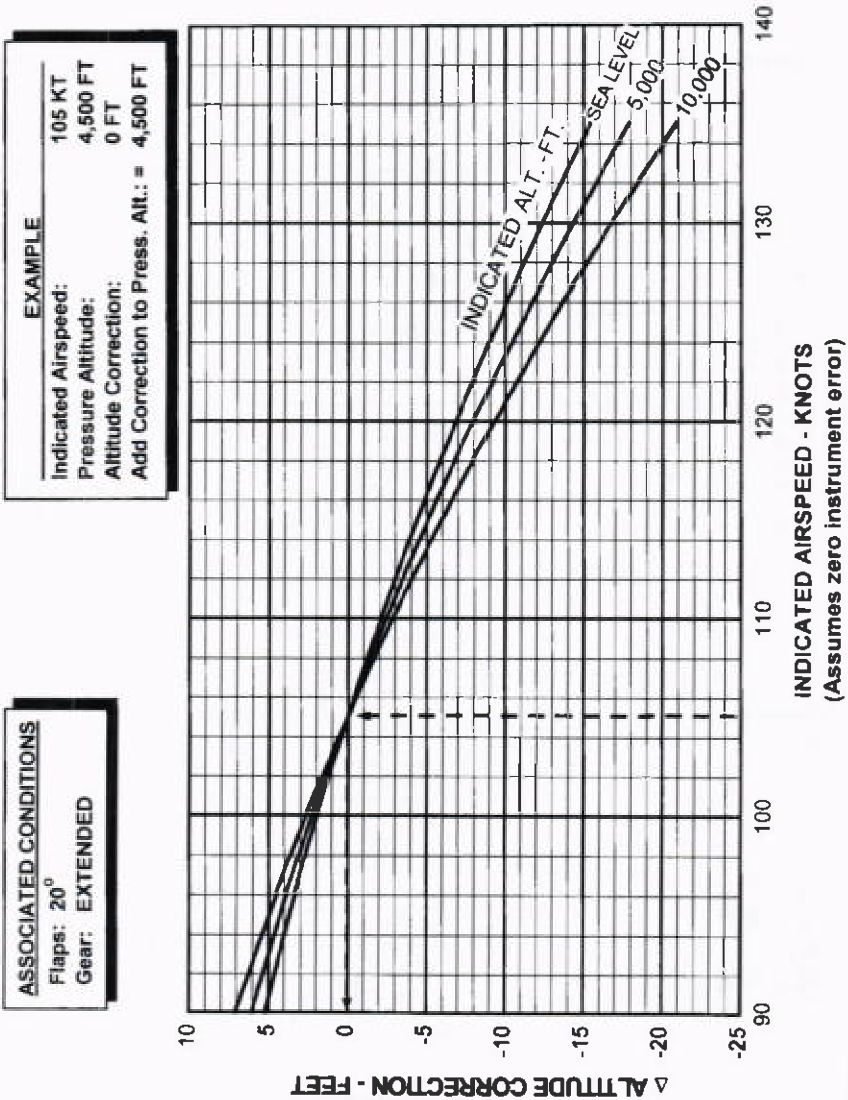
Altitude Calibration
Primary Static (Flaps 20°, Gear DOWN)
Figure 5-161



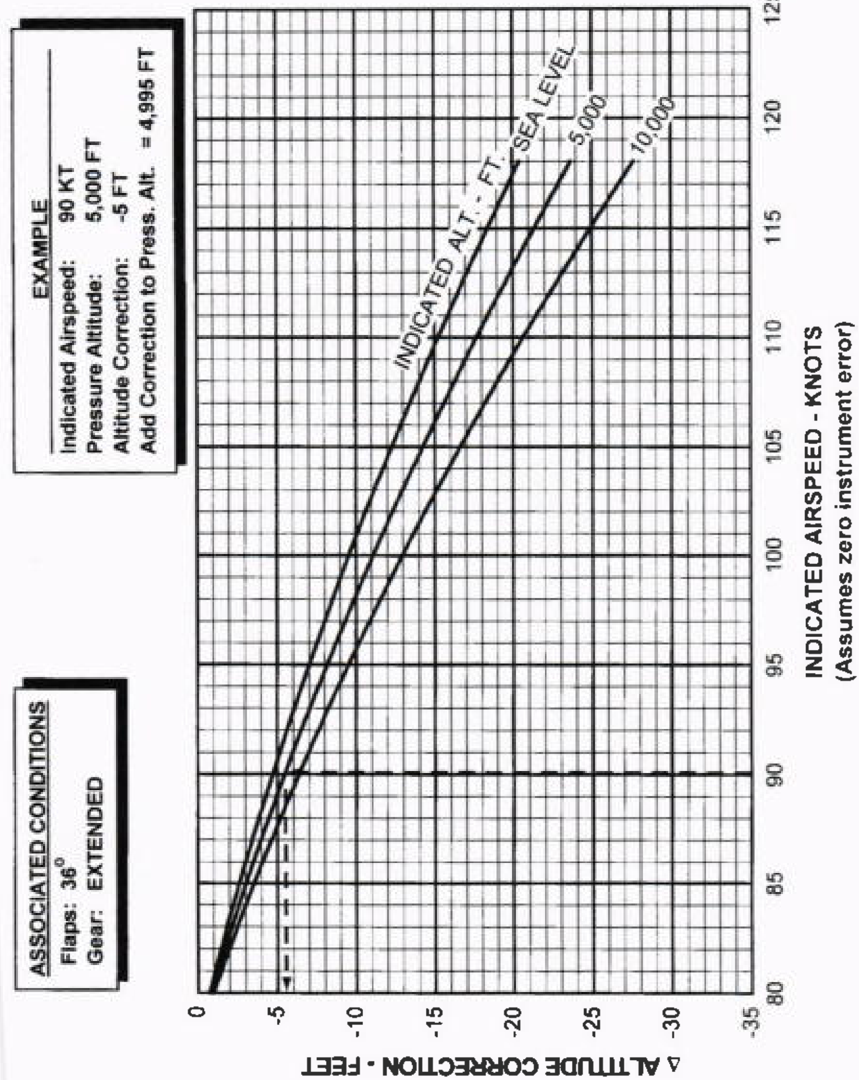
Altitude Calibration
Primary Static (Flaps 36°, Gear DOWN)
Figure 5-163



Altitude Calibration
Alternate Static (Flaps 0° and 10°)
Figure 5-165



Altitude Calibration
Alternate Static (Flaps 20°, Gear DOWN)
Figure 5-167



Altitude Calibration
Alternate Static (Flaps 36°, Gear DOWN)
Figure 5-169

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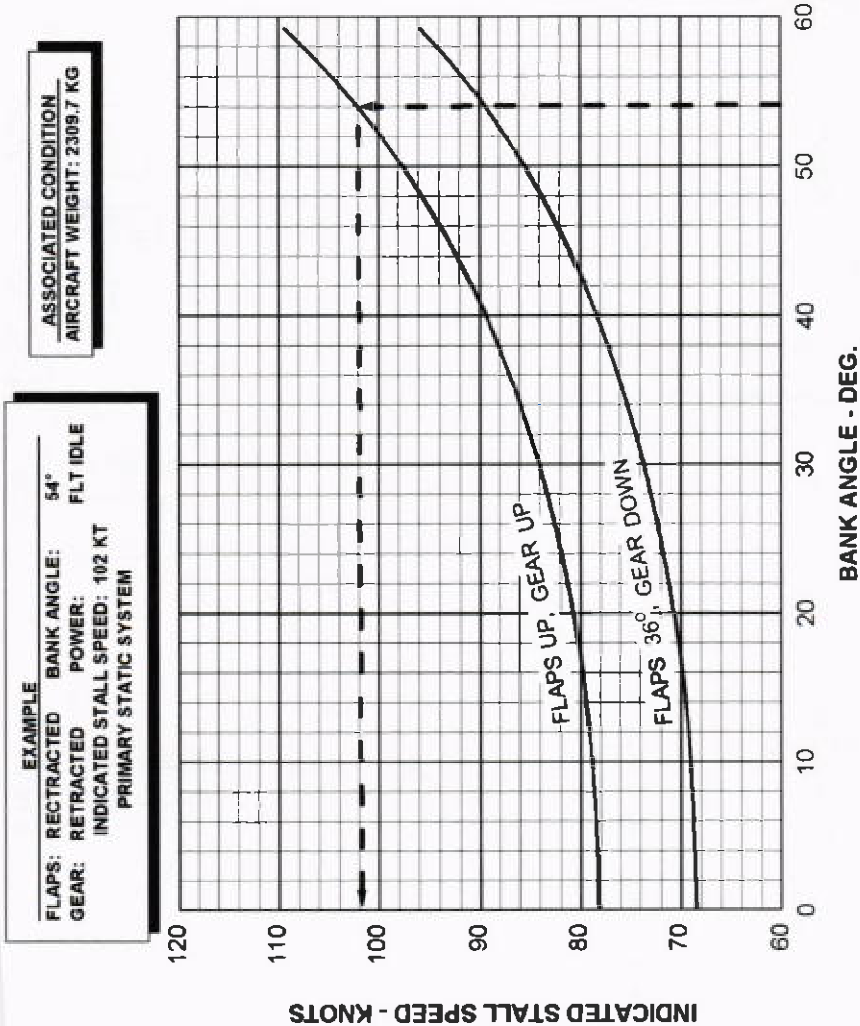
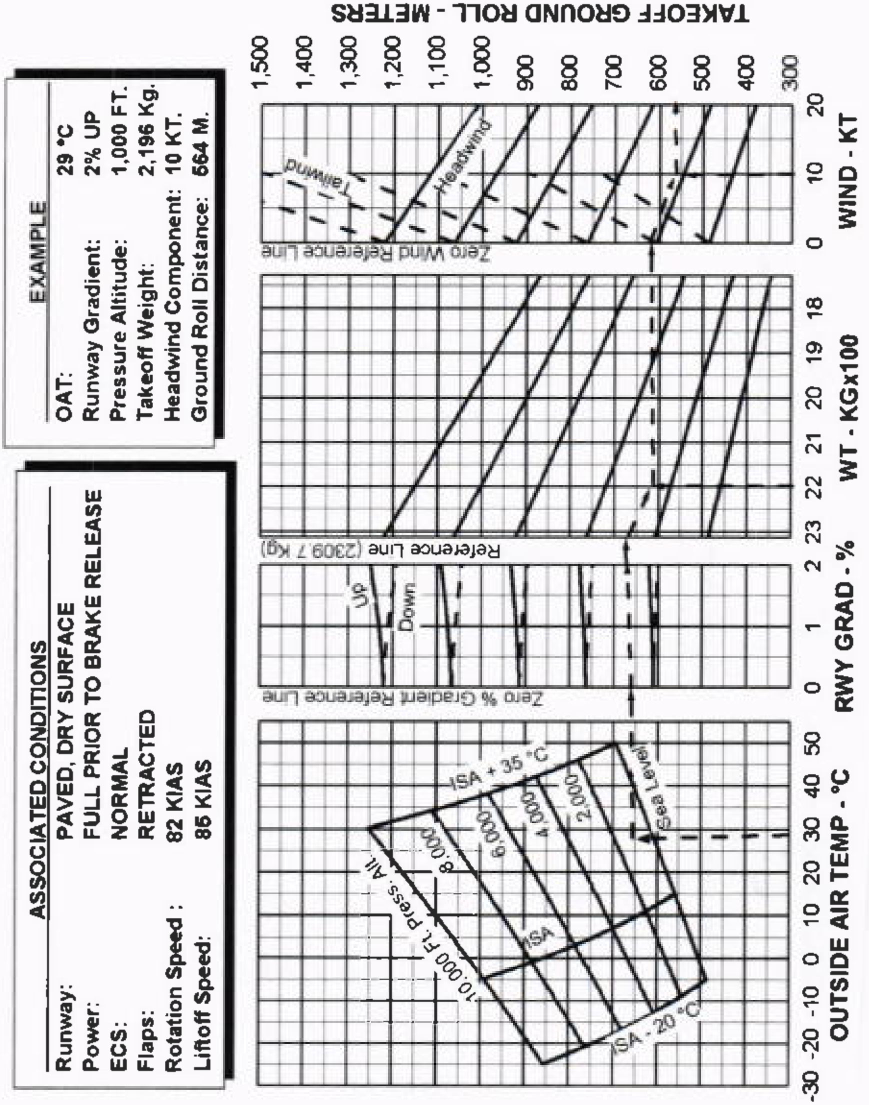
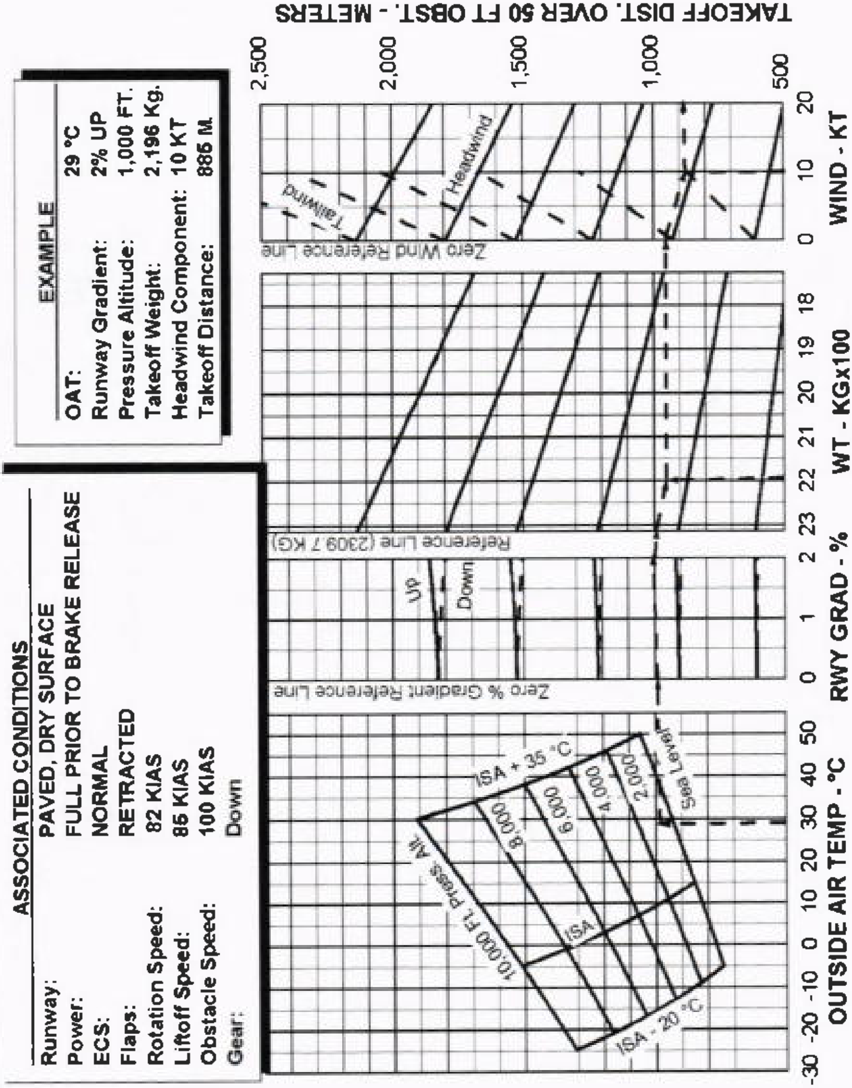


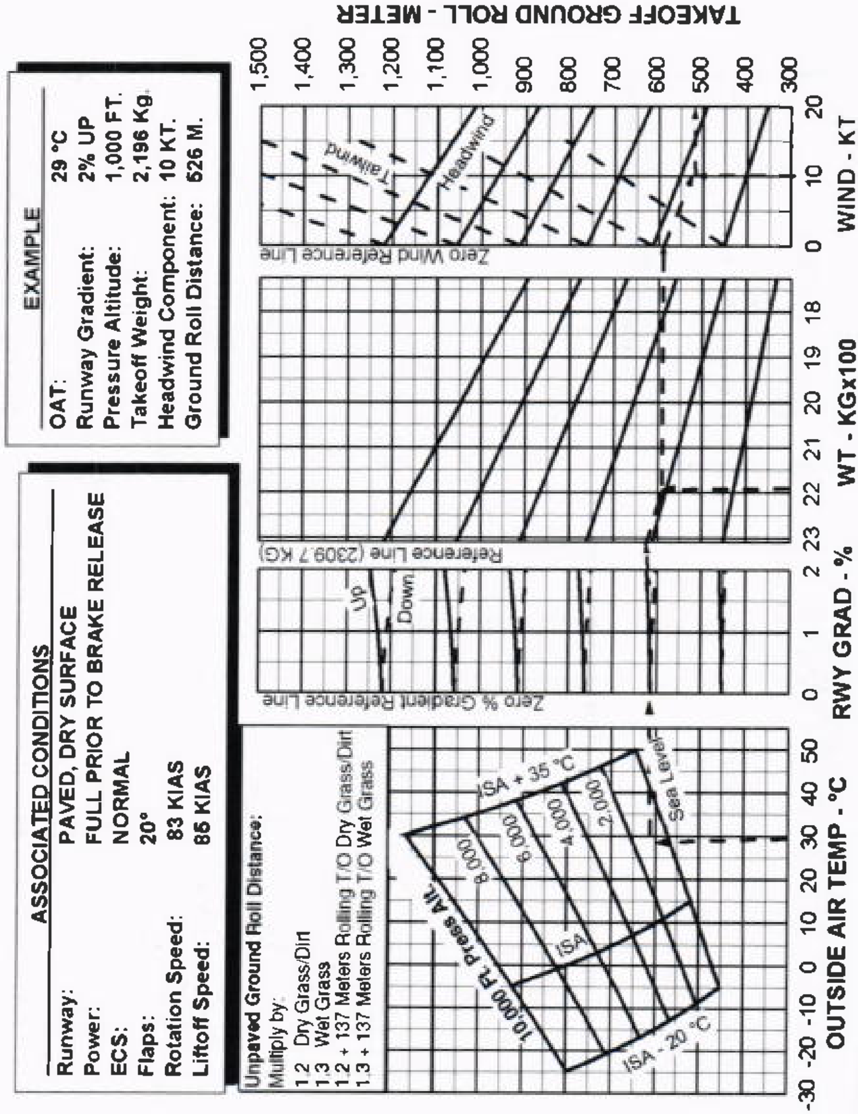
Angle of Bank vs. Stall Speed
Figure 5-173



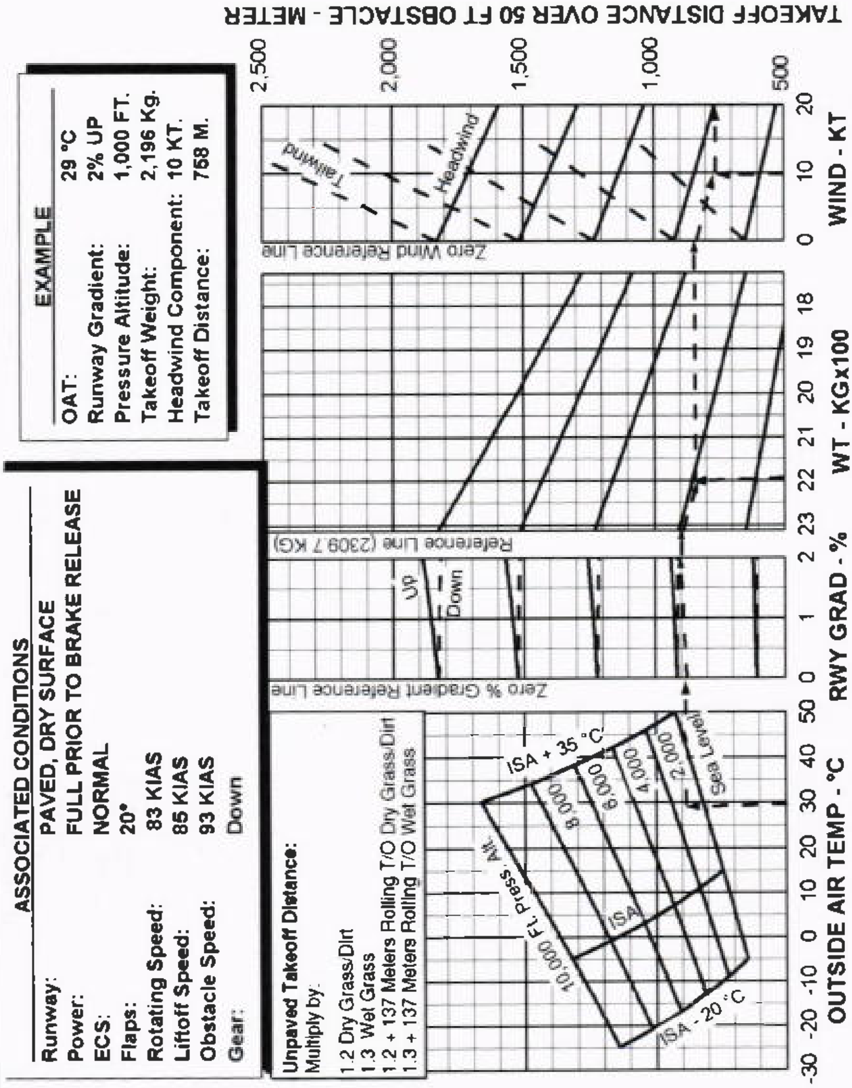
Normal Takeoff Ground Roll, 0° Flaps
Figure 5-175



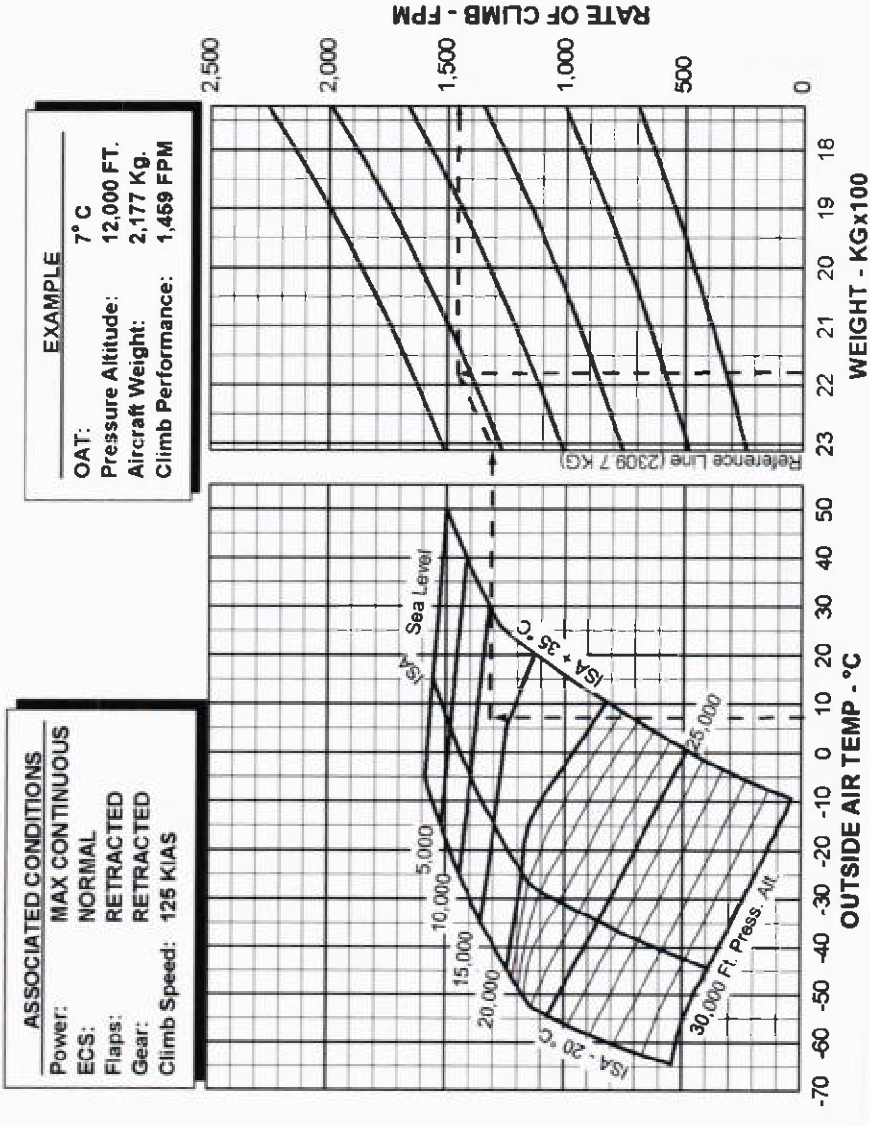
Normal Takeoff Performance over 50 ft. Obstacle, 0° Flaps
Figure 5-177



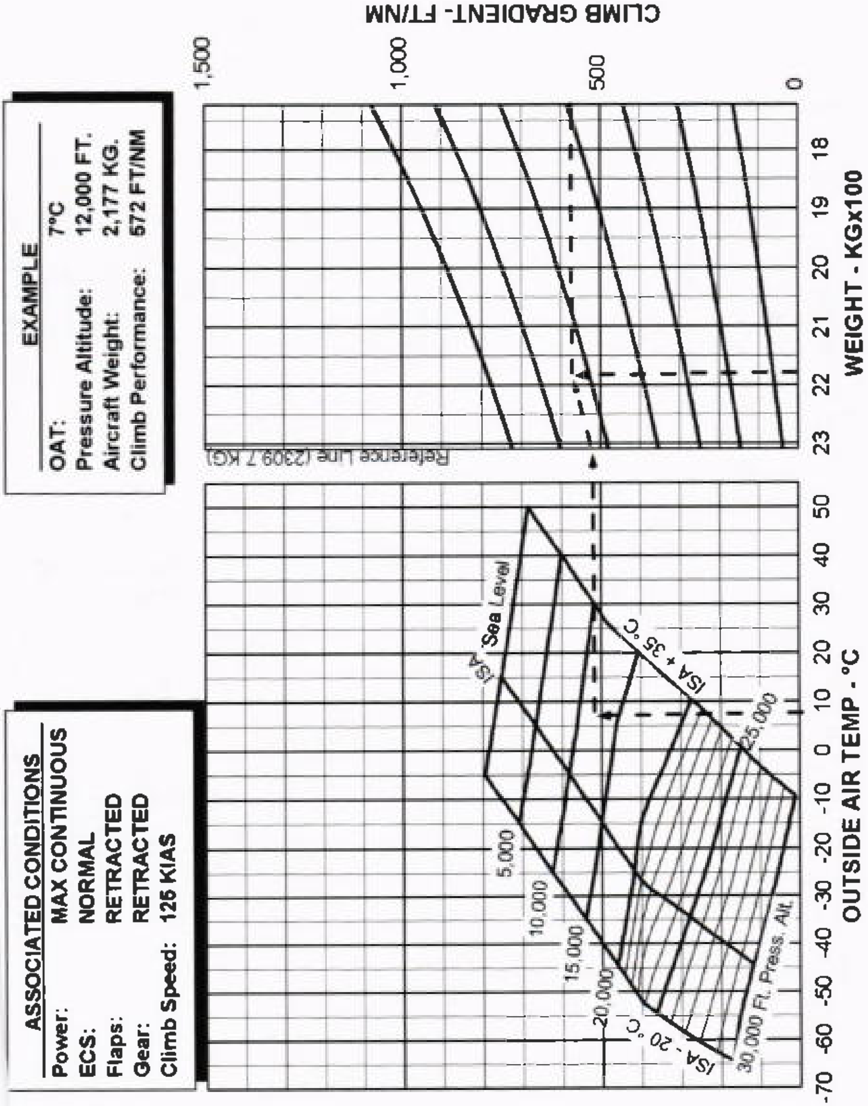
Maximum Effort Takeoff Ground Roll, 20° Flaps
Figure 5-179



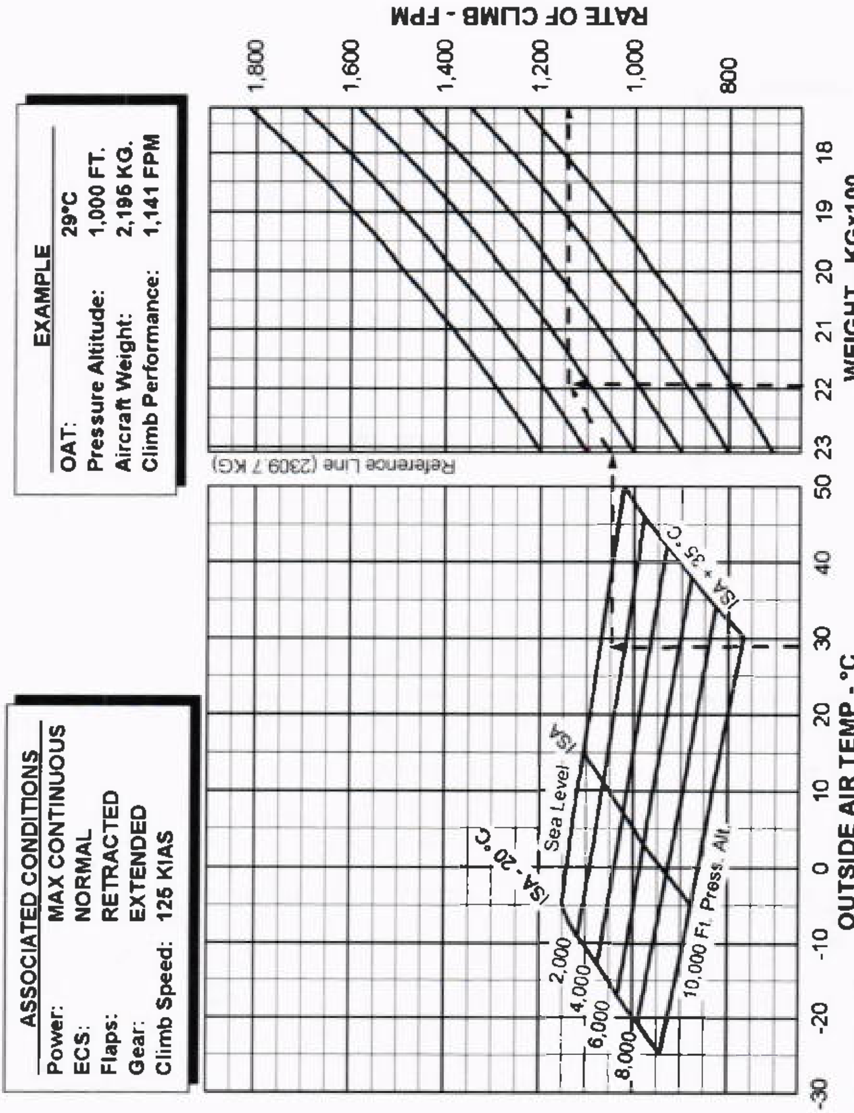
Maximum Effort Takeoff Performance over 50 ft. Obstacle,
20° Flaps
Figure 5-181



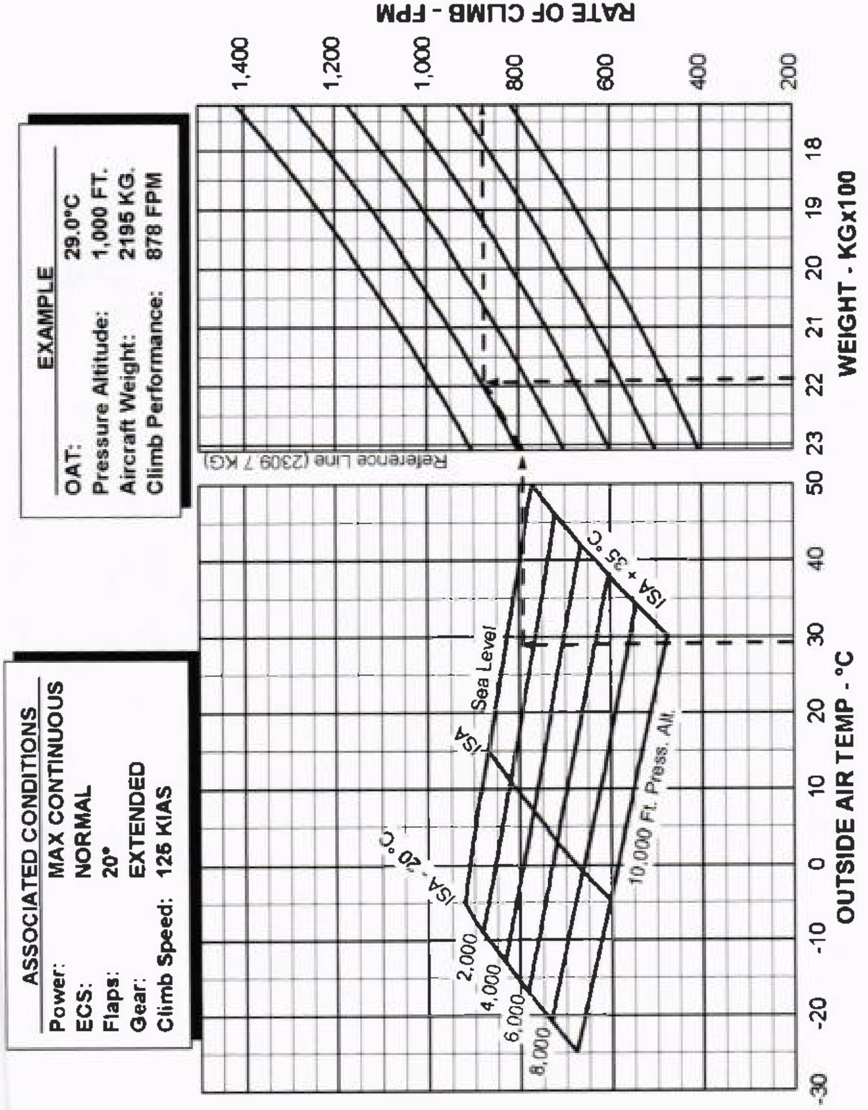
Enroute Climb Performance
Figure 5-183



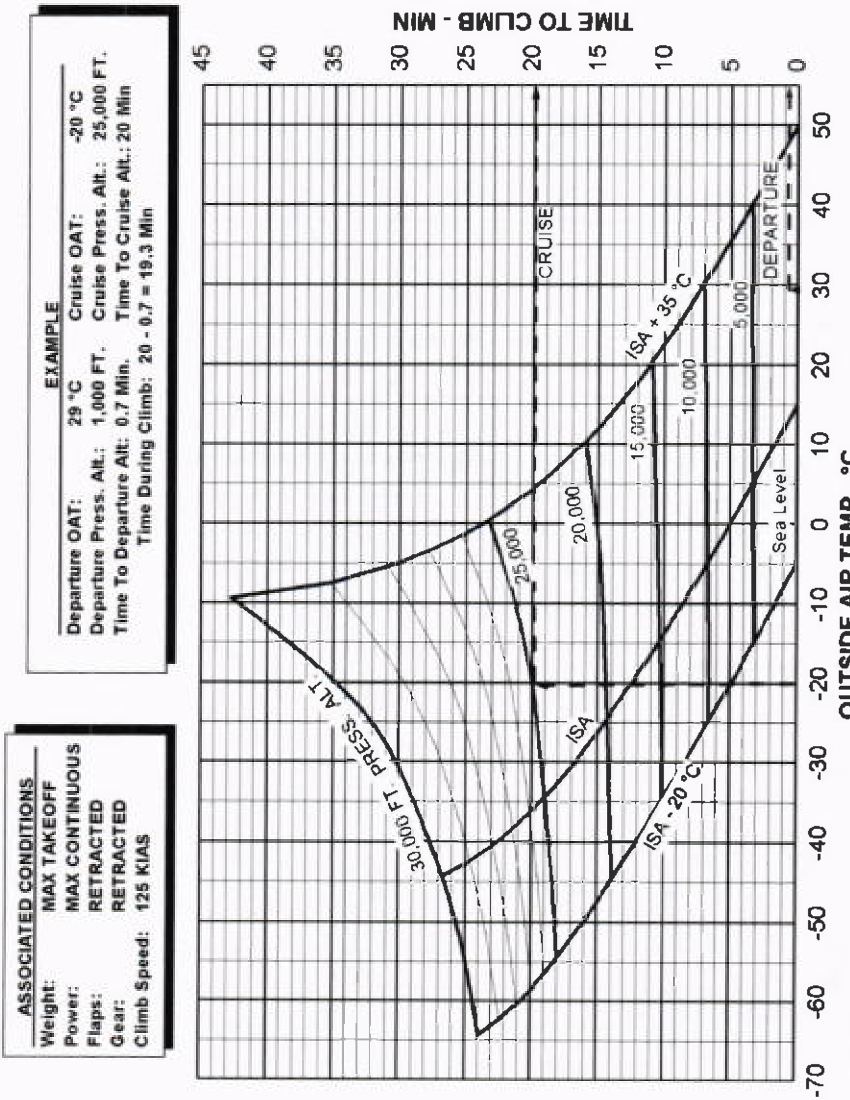
Enroute Climb Gradient
Figure 5-185



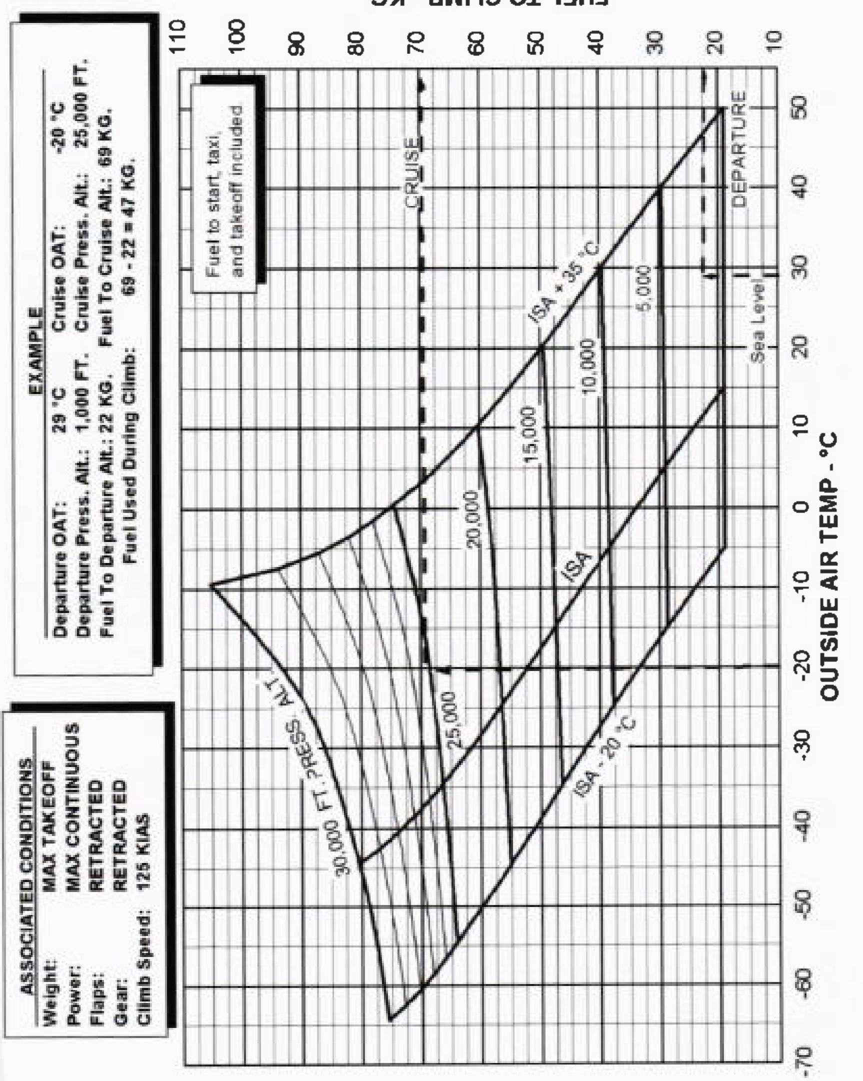
Takeoff Climb Performance, 0° Flaps
Figure 5-187



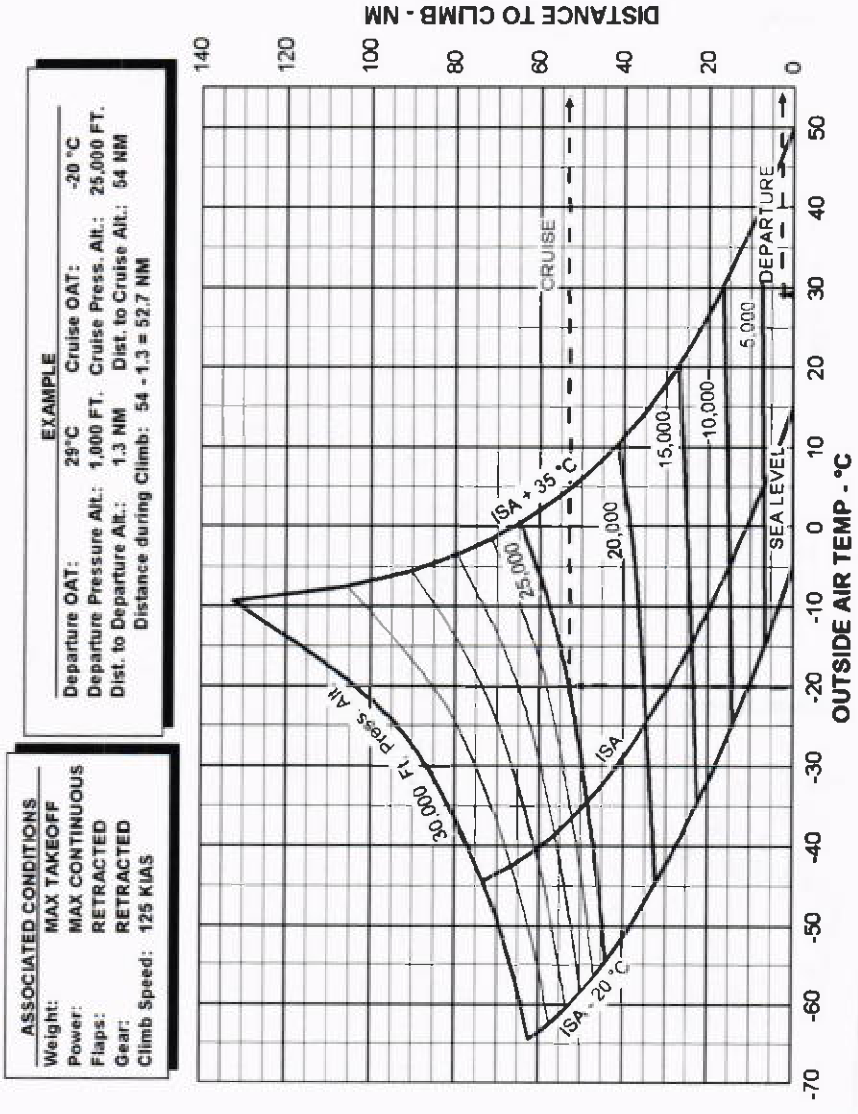
Takeoff Climb Performance, 20° Flaps
Figure 5-188



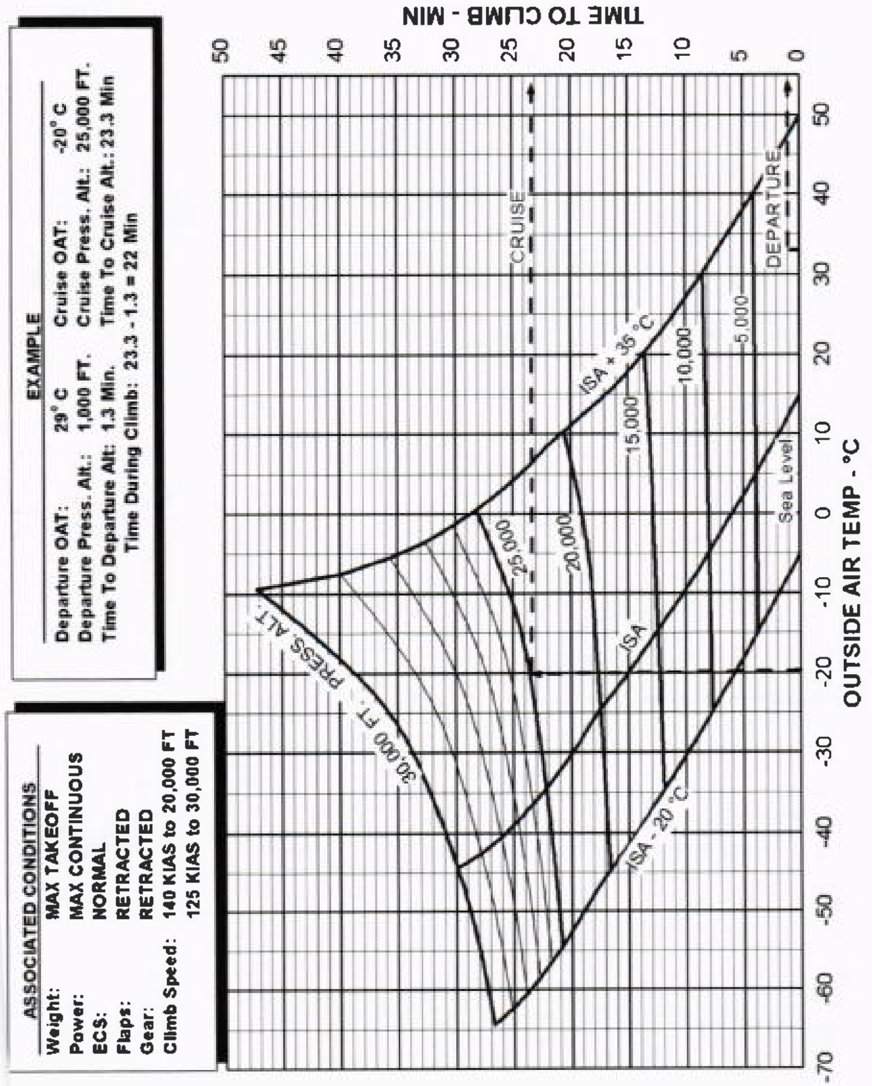
Maximum Climb Time
Figure 5-189



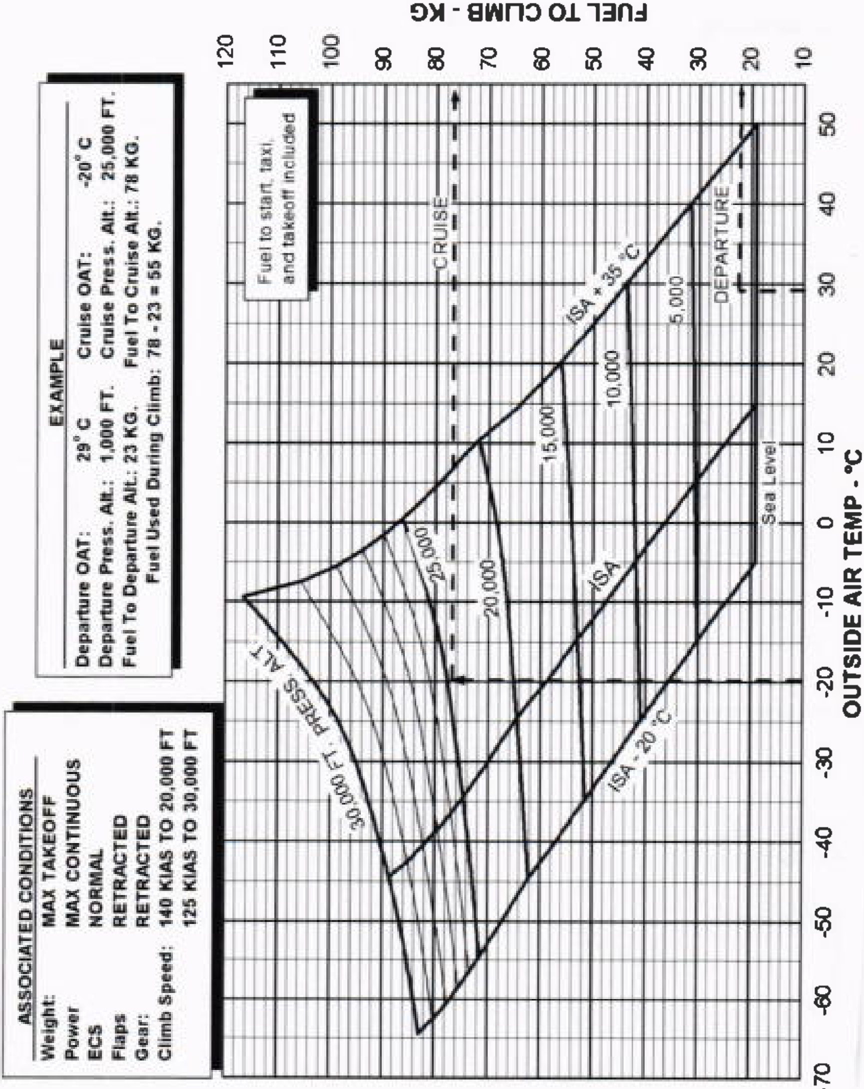
Maximum Climb Fuel
Figure 5-191



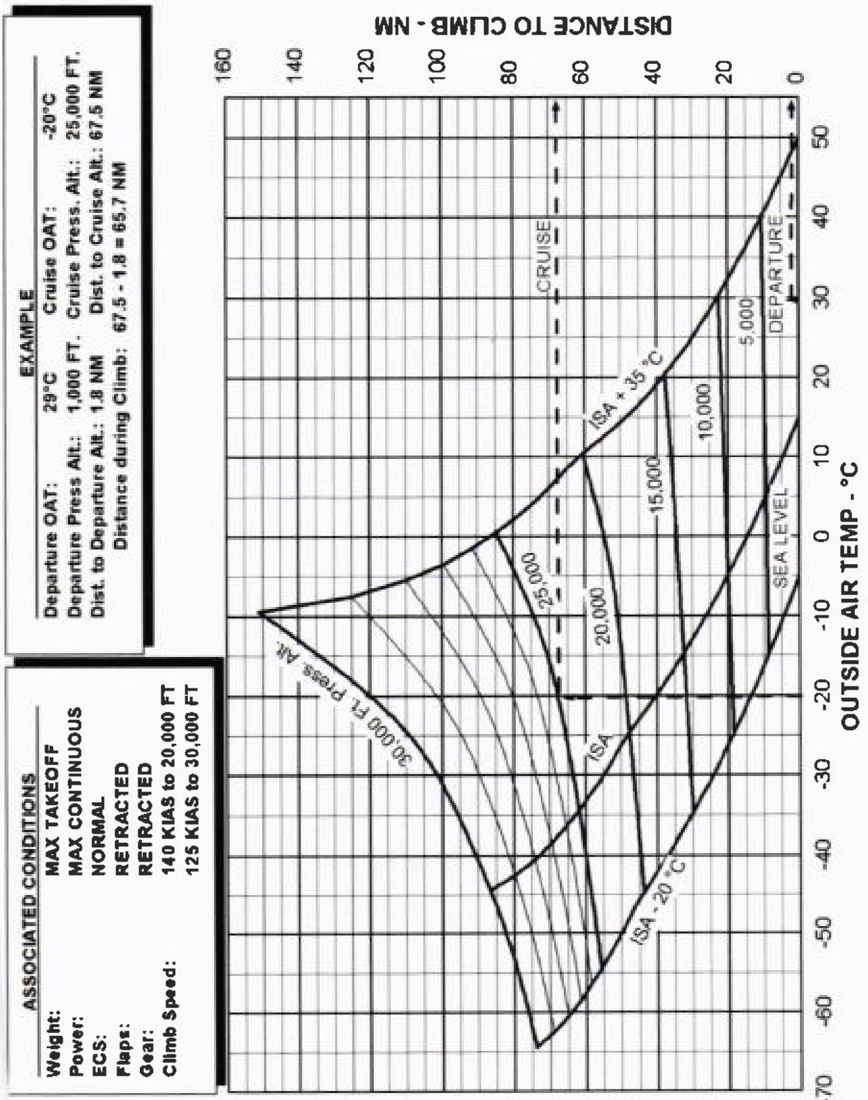
Maximum Climb Distance
Figure 5-193



Cruise Climb Time
Figure 5-195



Cruise Climb Fuel
Figure 5-197



Cruise Climb Distance
Figure 5-199

MAXIMUM SPEED CRUISE, POWER SETTING GUIDE

ALTITUDE (FT)	OAT (°C)															
	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24
15000											1154	1159	1164	1169	1173	1178
16000										1173	1178	1184	1189	1194	1199	1204
17000									1194	1199	1205	1210	1215	1220	1225	1230
18000								1215	1220	1226	1231	1236	1241	1247	1253	1257
19000							1236	1241	1246	1252	1257	1262	1268	1274	1280	1285
20000						1257	1263	1270	1274	1280	1286	1292	1299	1303	1309	1313
21000					1281	1287	1293	1300	1306	1311	1311	1312	1312	1313	1313	1313
22000				1303	1305	1308	1309	1312	1313	1313	1313	1313	1313	1313	1311	1310
23000			1313	1313	1313	1313	1313	1313	1313	1313	1313	1313	1310	1302	1294	1285
24000		1313	1313	1313	1313	1313	1312	1307	1301	1298	1293	1287	1276	1262	1254	1234
25000	1312	1309	1306	1303	1300	1295	1285	1276	1267	1257	1248	1237	1227	1217	1207	1197
26000	1290	1279	1272	1263	1254	1245	1234	1227	1218	1208	1199	1187	1181	1171	1162	1152
27000	1239	1230	1221	1213	1204	1196	1187	1179	1170	1161	1152	1143	1135	1126	1116	1107
28000	1188	1179	1173	1163	1155	1147	1138	1132	1121	1112	1104	1096	1089	1078	1069	1060
29000	1131	1123	1115	1107	1099	1091	1083	1074	1066	1058	1049	1041	1032	1023	1014	1005
30000	1077	1068	1060	1053	1045	1040	1029	1021	1012	1004	997	987	978	970	961	955

Maximum Speed Cruise, Power Setting Guide
Figure 5-200
(Sht 1 of 4)

MAXIMUM SPEED CRUISE, POWER SETTING GUIDE

ALTITUDE (FT)	OAT (°C) -22	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6
15000	1183	1188	1190	1192	1195	1197	1201	1202	1204	1206	1209	1211	1214	1216	1218	1221
16000	1209	1213	1216	1218	1221	1223	1225	1227	1230	1233	1235	1237	1239	1242	1245	1247
17000	1234	1239	1241	1244	1247	1249	1252	1254	1257	1260	1262	1265	1267	1270	1273	1276
18000	1262	1268	1271	1274	1276	1280	1282	1285	1288	1291	1295	1296	1298	1300	1301	1304
19000	1291	1293	1296	1298	1300	1303	1305	1307	1310	1312	1313	1313	1313	1313	1313	1313
20000	1313	1313	1313	1313	1313	1313	1313	1313	1313	1312	1312	1311	1311	1311	1311	1310
21000	1313	1313	1313	1313	1313	1311	1308	1306	1303	1300	1297	1294	1291	1288	1286	1280
22000	1309	1307	1306	1303	1298	1292	1287	1279	1276	1271	1265	1260	1252	1248	1241	1235
23000	1277	1267	1262	1256	1251	1245	1240	1234	1229	1223	1218	1212	1206	1200	1194	1188
24000	1233	1222	1216	1208	1206	1200	1195	1189	1181	1178	1173	1167	1162	1154	1151	1145
25000	1187	1176	1171	1166	1160	1155	1147	1144	1139	1134	1129	1124	1119	1114	1109	1103
26000	1139	1132	1127	1122	1114	1112	1107	1102	1098	1091	1088	1084	1079	1074	1067	1065
27000	1097	1088	1083	1078	1074	1069	1065	1060	1056	1051	1047	1042	1039	1033	1029	1024
28000	1051	1044	1037	1032	1028	1023	1021	1014	1010	1005	1001	998	992	987	983	978
29000	996	987	983	978	974	969	965	961	956	952	947	943	938	934	932	
30000	944	935	933	927	922	918	914	911	905	901	896	892	890			

Maximum Speed Cruise, Power Setting Guide
Figure 5-200
(Sht 2 of 4)

MAXIMUM SPEED CRUISE, POWER SETTING GUIDE

ALTITUDE (FT)	OAT (°C) -5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
15000	1224	1225	1228	1230	1232	1235	1237	1240	1242	1244	1248	1249	1252	1254	1256	1259
16000	1249	1252	1254	1258	1260	1262	1265	1268	1271	1272	1274	1275	1277	1279	1280	1281
17000	1279	1282	1285	1288	1291	1293	1296	1296	1294	1292	1291	1289	1287	1285	1283	1282
18000	1305	1307	1309	1311	1313	1310	1306	1301	1297	1291	1288	1284	1279	1275	1269	1266
19000	1313	1313	1313	1310	1304	1298	1292	1287	1281	1275	1269	1263	1258	1252	1246	1240
20000	1310	1305	1298	1291	1284	1273	1269	1262	1255	1247	1237	1233	1226	1218	1211	1201
21000	1273	1266	1259	1251	1244	1267	1230	1223	1216	1209	1201	1194	1187	1180		
22000	1228	1218	1214	1207	1201	1194	1184	1180	1174	1167	1160	1150				
23000	1181	1175	1169	1163	1157	1151	1145	1139	1133	1127						
24000	1140	1134	1126	1123	1118	1112	1107	1098								
25000	1098	1093	1088	1083	1078	1071										
26000	1060	1056	1051	1044												
27000	1020	1015														
28000																
29000																
30000																

Maximum Speed Cruise, Power Setting Guide
Figure 5-200
(Sht 3 of 4)

MAXIMUM SPEED CRUISE, POWER SETTING GUIDE

ALTITUDE (FT)	OAT (°C)														
	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30
15000	1261	1264	1266	1269	1271	1274	1276	1278	1281	1285					
16000	1283	1284	1286	1287	1289	1290	1292	1294							
17000	1280	1278	1276	1274	1273	1271									
18000	1262	1257	1253	1247											
19000	1235	1229													
20000															
21000															
22000															
23000															
24000															
25000															
26000															
27000															
28000															
29000															
30000															

Maximum Speed Cruise, Power Setting Guide
Figure 5-200
(Sht 4 of 4)

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5	943	159	177
2000	-9	964	153	182
4000	-13	985	147	187
6000	-17	1011	142	193
8000	-21	1037	137	199
10000	-25	1066	133	205
12000	-29	1098	129	211
14000	-33	1134	127	218
16000	-37	1171	127	225
18000	-41	1213	127	233
20000	-45	1255	128	241
22000	-49	1302	129	249
24000	-53	1313	128	255
26000	-57	1301	126	259
28000	-60	1214	117	258
30000	-64	1112	107	255
ISA - 15 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	0	949	159	178
2000	-4	970	154	184
4000	-8	993	148	189
6000	-12	1019	143	195
8000	-16	1046	138	201
10000	-20	1077	134	207
12000	-24	1109	130	214
14000	-28	1146	128	221
16000	-32	1184	128	228
18000	-36	1226	128	235
20000	-40	1270	128	243
22000	-44	1308	130	251
24000	-48	1313	128	256
26000	-52	1279	124	259
28000	-55	1194	115	258
30000	-59	1094	106	255

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA -20, ISA -15)
Figure 5-201

ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5	956	160	180
2000	1	977	154	185
4000	-3	1000	149	191
6000	-7	1027	143	197
8000	-11	1056	139	203
10000	-15	1088	135	209
12000	-19	1121	131	216
14000	-23	1158	129	223
16000	-27	1197	129	230
18000	-31	1239	129	238
20000	-35	1285	130	246
22000	-39	1313	130	253
24000	-43	1313	128	258
26000	-47	1256	122	259
28000	-50	1173	113	258
30000	-54	1077	104	256
ISA - 5 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	10	962	161	182
2000	6	985	155	187
4000	2	1008	149	193
6000	-2	1036	144	198
8000	-6	1065	140	205
10000	-10	1096	135	211
12000	-14	1132	132	218
14000	-18	1170	130	225
16000	-22	1209	130	232
18000	-26	1253	130	240
20000	-30	1299	131	248
22000	-34	1313	130	254
24000	-38	1301	127	259
26000	-42	1234	120	259
28000	-45	1153	111	258
30000	-49	1058	102	255

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA -10, ISA -5)
Figure 5-202

ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15	969	161	183
2000	11	993	156	189
4000	7	1016	150	194
6000	3	1045	145	200
8000	-1	1074	141	207
10000	-5	1106	137	213
12000	-9	1142	133	220
14000	-13	1182	132	227
16000	-17	1221	131	235
18000	-21	1266	131	243
20000	-25	1313	132	251
22000	-29	1313	130	256
24000	-33	1289	126	260
26000	-37	1211	118	259
28000	-40	1132	110	258
30000	-44	1040	101	255
ISA + 5 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	20	976	162	185
2000	16	999	157	190
4000	12	1024	151	196
6000	8	1053	146	202
8000	4	1083	141	208
10000	0	1116	137	215
12000	-4	1153	134	222
14000	-8	1192	133	229
16000	-12	1233	132	237
18000	-16	1280	132	245
20000	-20	1313	132	252
22000	-24	1310	130	257
24000	-28	1262	124	259
26000	-32	1187	116	259
28000	-35	1111	108	258
30000	-39	1018	99	255

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA, ISA +5)
Figure 5-203

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25	983	163	186
2000	21	1006	157	192
4000	17	1032	152	198
6000	13	1061	147	204
8000	9	1092	142	210
10000	5	1127	138	217
12000	1	1163	135	224
14000	-3	1203	134	231
16000	-7	1245	133	239
18000	-11	1295	134	248
20000	-15	1313	132	254
22000	-19	1306	130	259
24000	-23	1235	122	259
26000	-27	1164	114	259
28000	-30	1089	106	258
30000	-34	997	97	254
ISA + 15 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	30	989	164	188
2000	26	1014	158	194
4000	22	1040	153	199
6000	18	1070	148	206
8000	14	1102	143	212
10000	10	1137	139	219
12000	6	1175	136	226
14000	2	1214	135	234
16000	-2	1258	134	241
18000	-6	1304	135	250
20000	-10	1311	132	255
22000	-14	1279	127	258
24000	-18	1208	119	258
26000	-22	1139	112	258
28000	-25	1067	104	257
30000	-29	976	95	254

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA+10, ISA +15)
Figure 5-204

ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35	996	165	189
2000	31	1021	159	195
4000	27	1048	154	201
6000	23	1079	149	208
8000	19	1111	144	214
10000	15	1148	141	221
12000	11	1187	137	228
14000	7	1226	136	236
16000	3	1271	136	244
18000	-1	1313	135	252
20000	-5	1310	132	257
22000	-9	1252	125	258
24000	-13	1181	117	258
26000	-17	1114	110	257
28000	-20	1044	102	256
30000	-24	955	94	253
ISA + 25 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	40	1002	165	191
2000	36	1028	160	197
4000	32	1056	154	203
6000	28	1088	150	209
8000	24	1120	145	216
10000	20	1157	141	223
12000	16	1197	139	230
14000	12	1239	137	238
16000	8	1279	136	245
18000	4	1291	134	251
20000	0	1273	129	255
22000	-4	1218	122	257
24000	-8	1154	115	257
26000	-12	1091	108	257
28000	-15	1021	100	256
30000	-19	933	92	252

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA +20, ISA +25)
Figure 5-205

ISA + 30 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	45	1009	166	192
2000	41	1035	161	198
4000	37	1064	155	204
6000	33	1097	151	211
8000	29	1130	146	218
10000	25	1167	142	225
12000	21	1208	140	232
14000	17	1251	138	240
16000	13	1286	137	247
18000	9	1269	133	251
20000	5	1237	127	254
22000	1	1184	120	255
24000	-3	1126	113	256
26000	-7	1067	106	256
28000	-10	998	99	255
30000	-14	911	90	251
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50	1017	167	194
2000	46	1042	162	200
4000	42	1071	156	206
6000	38	1105	151	213
8000	34	1140	147	219
10000	30	1177	144	227
12000	26	1218	141	234
14000	22	1263	139	242
16000	18	1294	138	249
18000	14	1247	131	251
20000	10	1201	124	253
22000	6	1150	117	254
24000	2	1098	110	255
26000	-2	1044	104	255
28000	-5	976	97	254
30000	-9	890	89	250

NOTE: Shaded areas are beyond aircraft OAT limit.
See paragraph 2.28.

* ECS: NORMAL

Maximum Speed Cruise
(ISA +30, ISA +35)
Figure 5-207

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ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5	500	132.2	129
5000	-15		114.2	138
10000	-25		96.8	147
15000	-35		83.8	155
20000	-45		72.8	164
25000	-55		64.8	171
30000	-64		58.4	178

ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5	500	132.4	131
5000	-5		114.5	140
10000	-15		97.0	149
15000	-25		83.8	157
20000	-35		73.0	166
25000	-45		64.8	173
30000	-54		58.6	180

ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15	500	132.6	133
5000	5		114.8	142
10000	-5		97.3	151
15000	-15		83.9	159
20000	-25		73.3	167
25000	-35		64.9	175
30000	-44		58.7	182

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Low Power Cruise, 500 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-209

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25	500	132.8	136
5000	15		115.2	144
10000	5		97.6	153
15000	-5		84.0	161
20000	-15		73.5	169
25000	-25		65.1	177
30000	-34		58.9	183
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35	500	133.1	137
5000	25		115.4	146
10000	15		97.9	155
15000	5		84.3	163
20000	-5		73.5	171
25000	-15		65.1	178
30000	-24		59.1	184
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50	500	133.5	141
5000	40		115.7	149
10000	30		98.4	157
15000	20		84.7	165
20000	10		74.2	173
25000	0		65.7	180
30000	-9		59.4	185

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Low Power Cruise, 500 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-211

ISA -20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5	600	138.6	144
5000	-15		119.9	153
10000	-25		102.8	162
15000	-35		89.5	170
20000	-45		79.4	179
25000	-55		71.1	188
30000	-64		65.6	197
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5	600	139.0	146
5000	-5		120.2	155
10000	-15		102.9	164
15000	-25		89.7	173
20000	-35		79.5	182
25000	-45		71.3	191
30000	-54		65.6	199
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15	600	139.4	148
5000	5		120.6	157
10000	-5		103.0	166
15000	-15		90.1	175
20000	-25		79.6	184
25000	-35		71.5	193
30000	-44		65.6	202

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 600 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-213

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25	600	139.7	150
5000	15		121.0	159
10000	5		103.2	168
15000	-5		90.4	177
20000	-15		79.8	186
25000	-25		71.7	195
30000	-34		65.8	204
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35	600	139.9	152
5000	25		121.4	161
10000	15		103.6	170
15000	5		90.7	179
20000	-5		80.1	188
25000	-15		71.9	197
30000	-24		66.0	205
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50	600	140.3	156
5000	40		122.0	164
10000	30		104.3	173
15000	20		91.2	182
20000	10		80.6	191
25000	0		72.3	200
30000	-9		66.3	208

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 600 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-215

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5	700	144.4	156
5000	-15		125.8	165
10000	-25		108.7	174
15000	-35		95.9	183
20000	-45		85.8	192
25000	-55		78.1	202
30000	-64		72.8	212
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5	700	144.9	158
5000	-5		125.9	167
10000	-15		109.1	176
15000	-25		96.0	185
20000	-35		86.0	195
25000	-45		78.1	205
30000	-54		73.0	215
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15	700	145.3	160
5000	5		126.2	169
10000	-5		109.5	178
15000	-15		96.3	187
20000	-25		86.3	197
25000	-35		78.1	207
30000	-44		73.1	217

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 700 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-217

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25	700	145.8	162
5000	15		126.5	171
10000	5		109.9	180
15000	-5		96.6	190
20000	-15		86.6	199
25000	-25		78.4	210
30000	-34		73.3	220

ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35	700	146.3	164
5000	25		127.1	173
10000	15		110.3	182
15000	5		97.0	192
20000	-5		86.8	202
25000	-15		78.7	212
30000	-24		73.5	222

ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50	700	147.0	167
5000	40		128.0	176
10000	30		110.9	185
15000	20		97.7	195
20000	10		87.2	205
25000	0		79.2	215
30000	-9		73.8	225

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 700 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-219

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5		150.0	165
5000	-15		131.8	174
10000	-25		115.1	184
15000	-35	800	102.2	193
20000	-45		92.5	203
25000	-55		85.3	214
30000	-64		80.7	225

ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5		150.4	168
5000	-5		132.3	177
10000	-15		115.4	186
15000	-25	800	102.6	196
20000	-35		92.7	206
25000	-45		85.5	217
30000	-54		80.8	228

ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15		150.8	170
5000	5		132.7	179
10000	-5		115.8	188
15000	-15	800	103.0	198
20000	-25		92.9	209
25000	-35		85.7	219
30000	-44		80.8	230

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 800 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-221

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25		151.4	172
5000	15		133.3	181
10000	5		116.2	191
15000	-5	800	103.3	201
20000	-15		93.1	211
25000	-25		85.9	222
30000	-34		80.9	233

ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35		151.9	174
5000	25		133.7	183
10000	15		116.7	193
15000	5	800	103.6	203
20000	-5		93.6	213
25000	-15		86.1	224
30000	-24		81.0	235

ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50		153.1	177
5000	40		134.4	186
10000	30		117.5	196
15000	20	800	104.2	206
20000	10		94.2	217
25000	0		86.5	228
30000	-9		81.2	239

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 800 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-223

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5	900	156.0	174
5000	-15		138.3	183
10000	-25		121.5	193
15000	-35		109.1	203
20000	-45		99.6	213
25000	-55		92.9	224
30000	-64		89.1	236
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5	900	156.4	176
5000	-5		138.8	185
10000	-15		121.8	195
15000	-25		109.4	205
20000	-35		99.6	216
25000	-45		93.1	227
30000	-54		89.1	239
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15	900	157.0	178
5000	5		139.3	188
10000	-5		122.3	198
15000	-15		109.7	208
20000	-25		99.9	219
25000	-35		93.3	230
30000	-44		89.0	242

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 900 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-225

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25	900	157.7	180
5000	15		139.8	190
10000	5		122.7	200
15000	-5		110.0	210
20000	-15		100.3	221
25000	-25		93.5	233
30000	-34		89.1	245
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35	900	158.3	182
5000	25		140.3	192
10000	15		123.3	202
15000	5		110.4	213
20000	-5		100.7	224
25000	-15		93.8	235
30000	-24		89.1	247
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50	900	159.4	185
5000	40		141.3	195
10000	30		124.2	205
15000	20		111.1	216
20000	10		101.2	227
25000	0		94.1	239
30000	-		89.2	251

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 900 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-227

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5		-	-
5000	-15		144.6	191
10000	-25		128.4	201
15000	-35	1000	115.8	211
20000	-45		107.1	222
25000	-55		100.9	233
30000	-64		97.4	246

ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5		163.2	184
5000	-5		145.1	193
10000	-15		128.8	203
15000	-25	1000	116.1	214
20000	-35		107.4	225
25000	-45		100.9	237
30000	-54		97.3	249

ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15		163.8	186
5000	5		145.7	196
10000	-5		129.2	206
15000	-15	1000	116.4	216
20000	-25		107.7	228
25000	-35		101.0	240
30000	-44		97.2	252

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1000 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-229

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25		164.3	188
5000	15		146.4	198
10000	5		129.7	208
15000	-5	1000	116.9	219
20000	-15		107.8	230
25000	-25		101.2	242
30000	-34		97.3	255
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35		165.0	190
5000	25		147.1	200
10000	15		130.1	210
15000	5	1000	117.5	221
20000	-5		108.2	233
25000	-15		101.3	245
30000	-24		96.0	258
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50		165.9	193
5000	40		148.1	203
10000	30		130.8	214
15000	20	1000	118.2	225
20000	10		108.6	237
25000	0		101.7	249
30000	-9		90.2	262

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1000 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-231

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5	1100	-	-
5000	-15		-	-
10000	-25		135.4	208
15000	-35		122.9	219
20000	-45		114.9	230
25000	-55		109.3	242
30000	-64		106.3	255
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5	1100	-	-
5000	-5		-	-
10000	-15		135.7	211
15000	-25		123.1	221
20000	-35		115.2	233
25000	-45		109.3	245
30000	-54		106.3	258
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15	1100	-	-
5000	5		-	-
10000	-5		136.1	213
15000	-15		123.6	224
20000	-25		115.4	236
25000	-35		109.3	248
30000	-44		103.8	261

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1100 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-233

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25		-	-
5000	15		-	-
10000	5		136.5	216
15000	-5	1100	124.1	227
20000	-15		115.7	239
25000	-25		109.2	251
30000	-34		100.0	264
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35		-	-
5000	25		153.7	207
10000	15		137.1	218
15000	5	1100	124.6	229
20000	-5		115.9	241
25000	-15		109.3	254
30000	-24		-	-
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50		-	-
5000	40		154.8	211
10000	30		138.0	222
15000	20	1100	125.3	233
20000	10		116.3	245
25000	0		107.9	258
30000	-9		-	-

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1100 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-235

ISA - 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	-5	1200	-	-
5000	-15		-	-
10000	-25		-	-
15000	-35		-	-
20000	-45		122.7	237
25000	-55		117.6	250
30000	-64		-	-
ISA - 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	5	1200	-	-
5000	-5		-	-
10000	-15		-	-
15000	-25		131.0	229
20000	-35		122.9	240
25000	-45		117.5	253
30000	-54		108.2	266
ISA (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	15	1200	-	-
5000	5		-	-
10000	-5		-	-
15000	-15		131.3	231
20000	-25		123.1	243
25000	-35		117.6	256
30000	-44		-	-

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1200 FT-LB
(ISA, ISA -10, ISA -20)
Figure 5-237

ISA + 10 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	25	1200	-	-
5000	15		-	-
10000	5		-	-
15000	-5		131.6	234
20000	-15		123.3	246
25000	-25		117.7	259
30000	-34		-	-
ISA + 20 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	35	1200	-	-
5000	25		-	-
10000	15		-	-
15000	5		132.0	237
20000	-5		123.5	249
25000	-15		115.3	262
30000	-24		-	-
ISA + 35 (°C)				
Altitude (FT)	OAT (°C)	Torque (FT-LB)	Fuel Flow (Kg/Hr)*	TAS (KT)
0	50	1200	-	-
5000	40		-	-
10000	30		145.4	229
15000	20		132.5	241
20000	10		123.9	253
25000	0		108.1	267
30000	-9		-	-

NOTE: Shaded areas are beyond aircraft OAT limit
See paragraph 2.28

* ECS: NORMAL

Intermediate Cruise Power, 1200 FT-LB
(ISA +10, ISA +20, ISA +35)
Figure 5-239

MAXIMUM SPEED CRUISE

Altitude	Cruise Nautical Miles / 100 Kg. Fuel					
FT	ISA - 20° C	ISA - 10° C	ISA	ISA + 10° C	ISA + 20° C	ISA + 35° C
0	111.6	112.4	113.6	113.9	114.8	116.2
5000	131.7	132.8	133.6	134.3	134.7	135.9
10000	154.2	155.1	156.0	156.9	157.2	157.9
15000	175.0	174.8	175.6	175.6	177.0	176.7
20000	189.1	189.6	190.2	191.8	194.0	203.6
25000	200.9	206.2	213.1	219.6	227.5	237.2
30000	237.6	245.4	253.2	261.7	269.5	282.6

INTERMEDIATE POWER CRUISE - 1000 FT-LB

Altitude	Cruise Nautical Miles / 100 Kg. Fuel					
FT	ISA - 20° C	ISA - 10° C	ISA	ISA + 10° C	ISA + 20° C	ISA + 35° C
0	-	112.6	113.5	114.5	115.3	116.6
5000	131.9	133.2	134.3	135.1	136.0	137.2
10000	156.2	157.8	159.2	160.5	161.7	163.5
15000	182.1	184.1	185.9	187.2	188.4	190.3
20000	207.0	209.3	211.5	213.5	215.3	218.0
25000	231.3	234.5	237.2	239.5	241.9	245.0
30000	252.2	255.8	259.2	262.1	268.7	290.6

LOW POWER CRUISE - 500 FT-LB

Altitude	Cruise Nautical Miles / 100 Kg. Fuel					
FT	ISA - 20° C	ISA - 10° C	ISA	ISA + 10° C	ISA + 20° C	ISA + 35° C
0	97.6	99.1	100.6	102.2	103.3	105.7
5000	121.1	122.6	124.1	125.3	126.6	128.6
10000	151.8	153.6	155.2	156.6	158.0	159.8
15000	185.5	187.7	189.9	191.9	193.4	195.2
20000	224.5	226.6	228.3	229.9	232.4	233.4
25000	264.4	267.3	269.7	271.4	273.8	274.4
30000	305.2	307.4	309.3	310.7	311.4	312.3

Note:

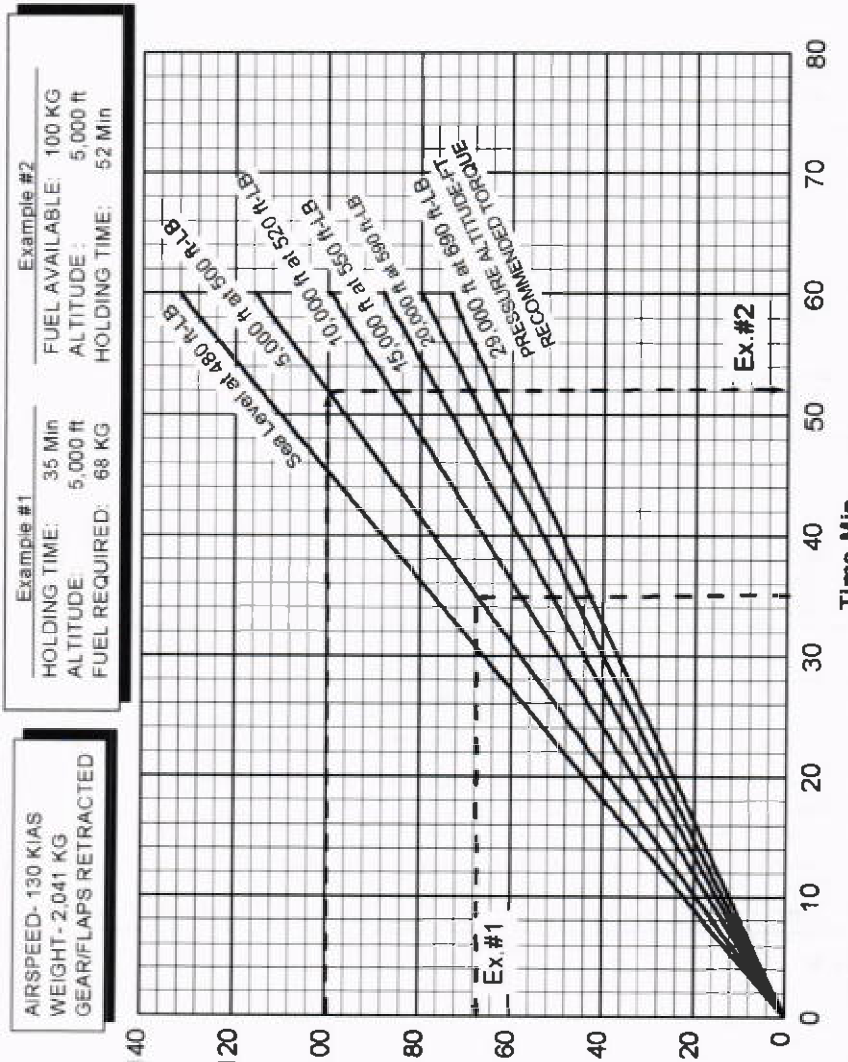
ECS: NORMAL

Shaded areas are beyond aircraft OAT limit. See paragraph 2.28.

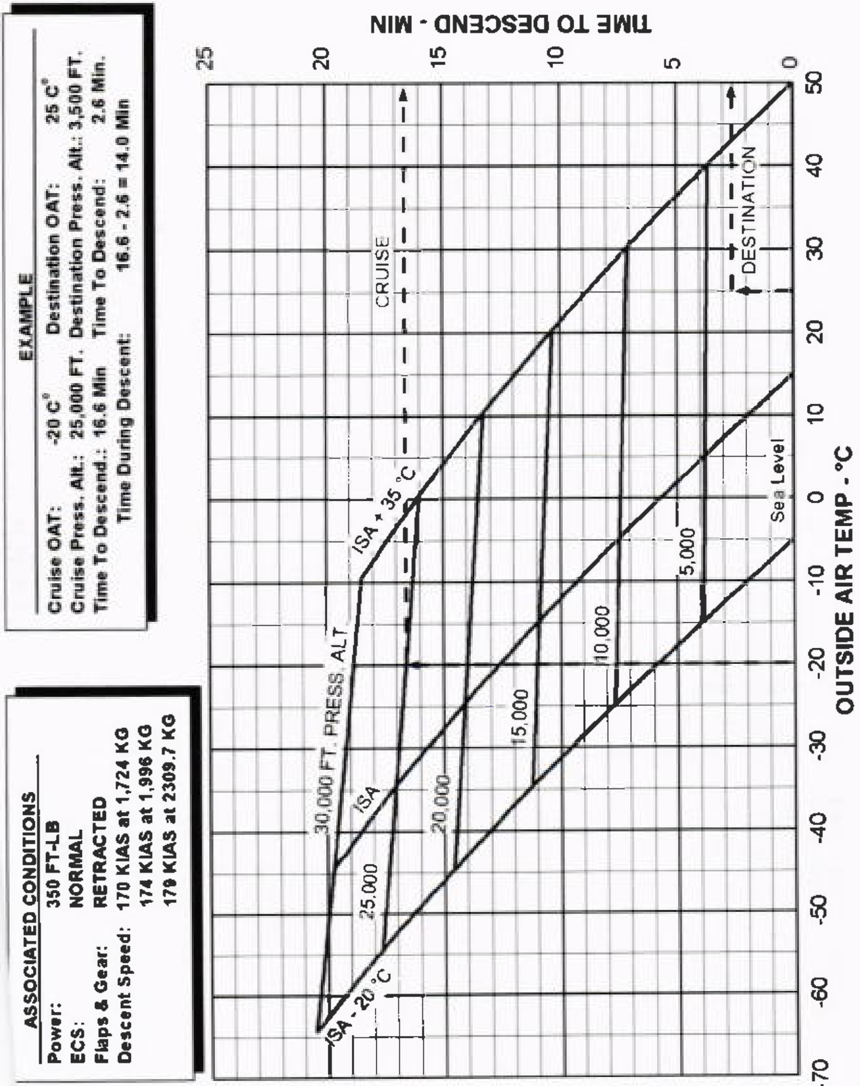
Does not include 45 minute reserve. 26 gal. (174.2 Lb).

To obtain 45 minute reserve endurance set power to Low Power Cruise @ 5,000'.

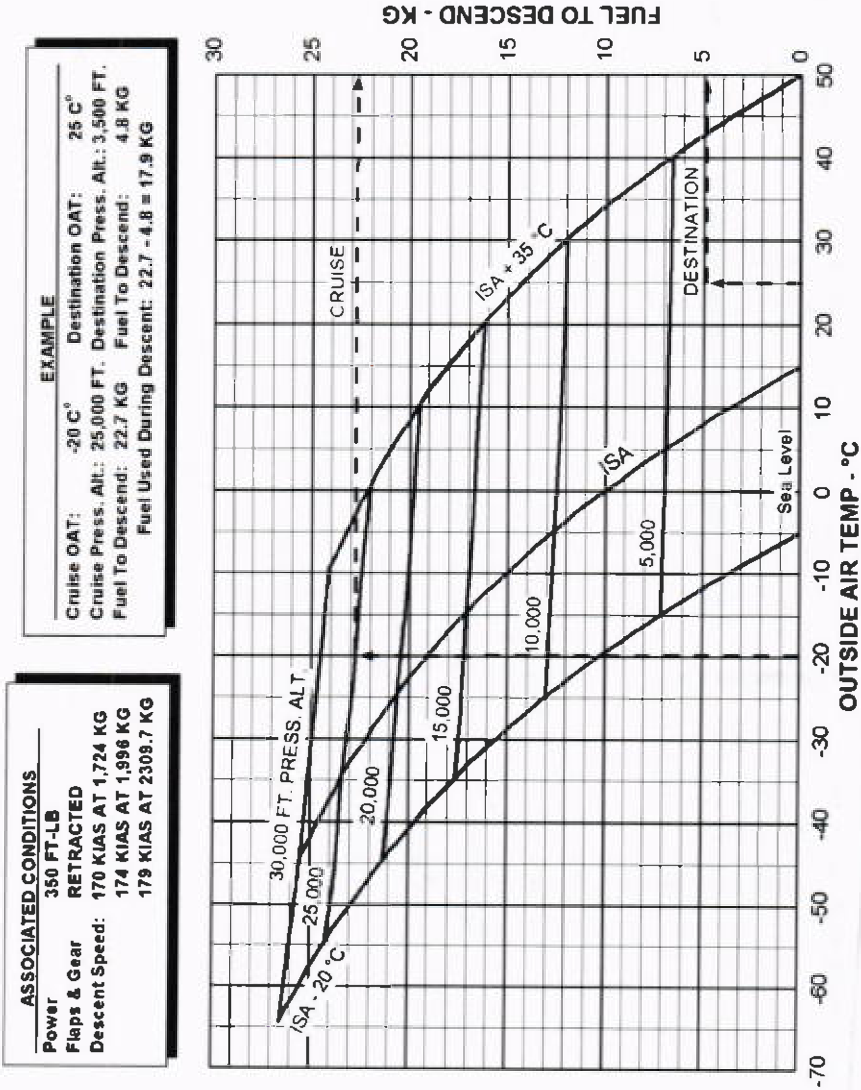
Specific Air Range
Figure 5-245



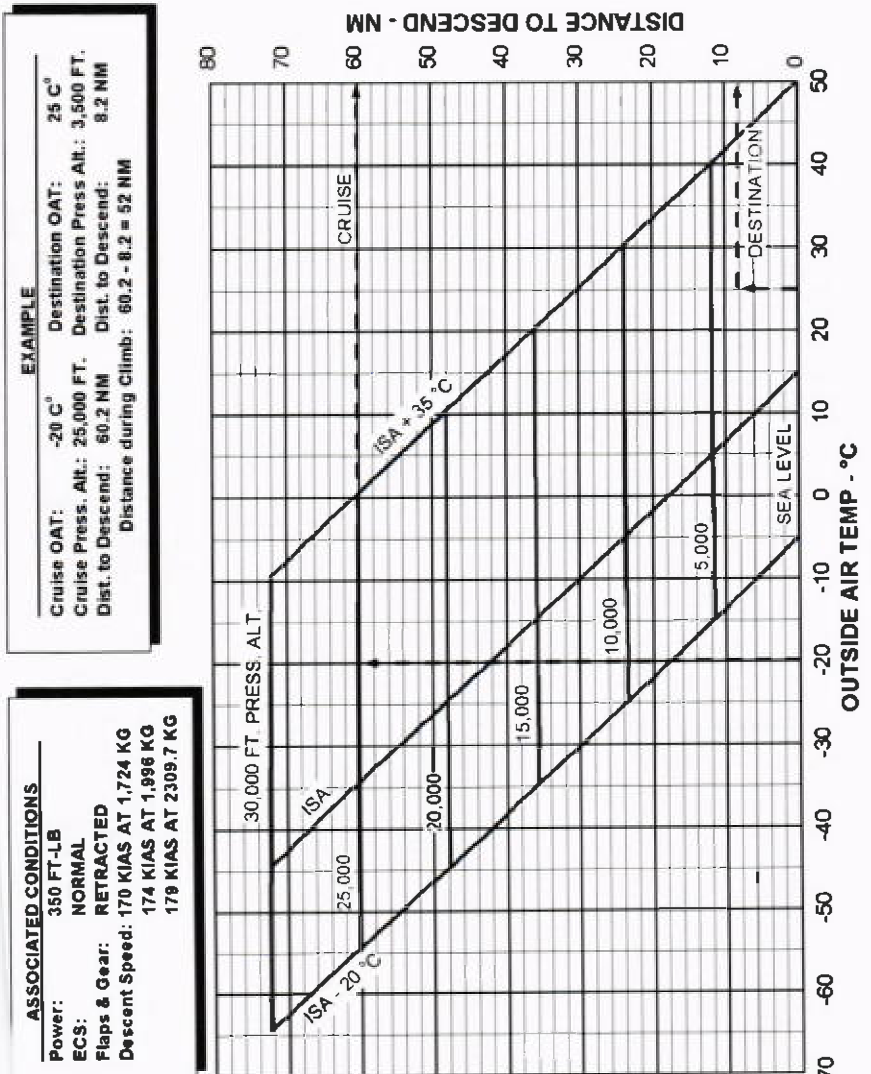
Holding Time vs. Fuel On Board
Figure 5-247



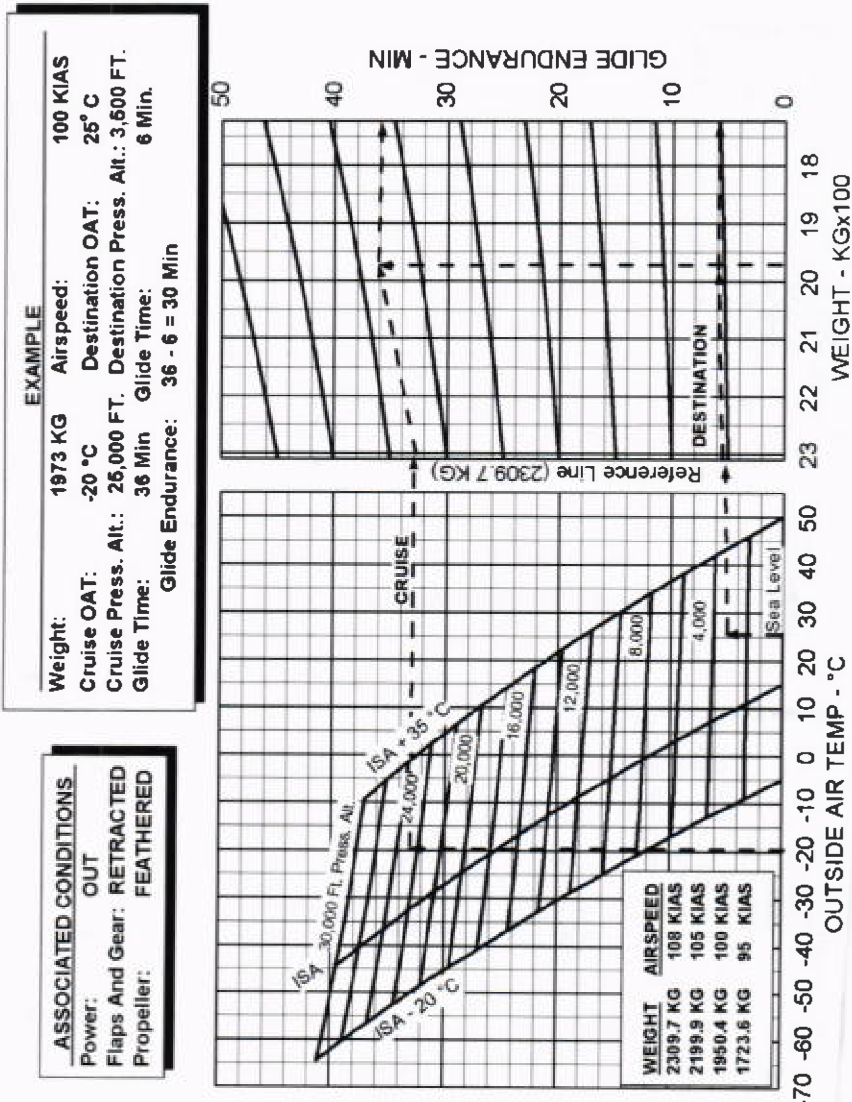
Time to Descend
Figure 5-249



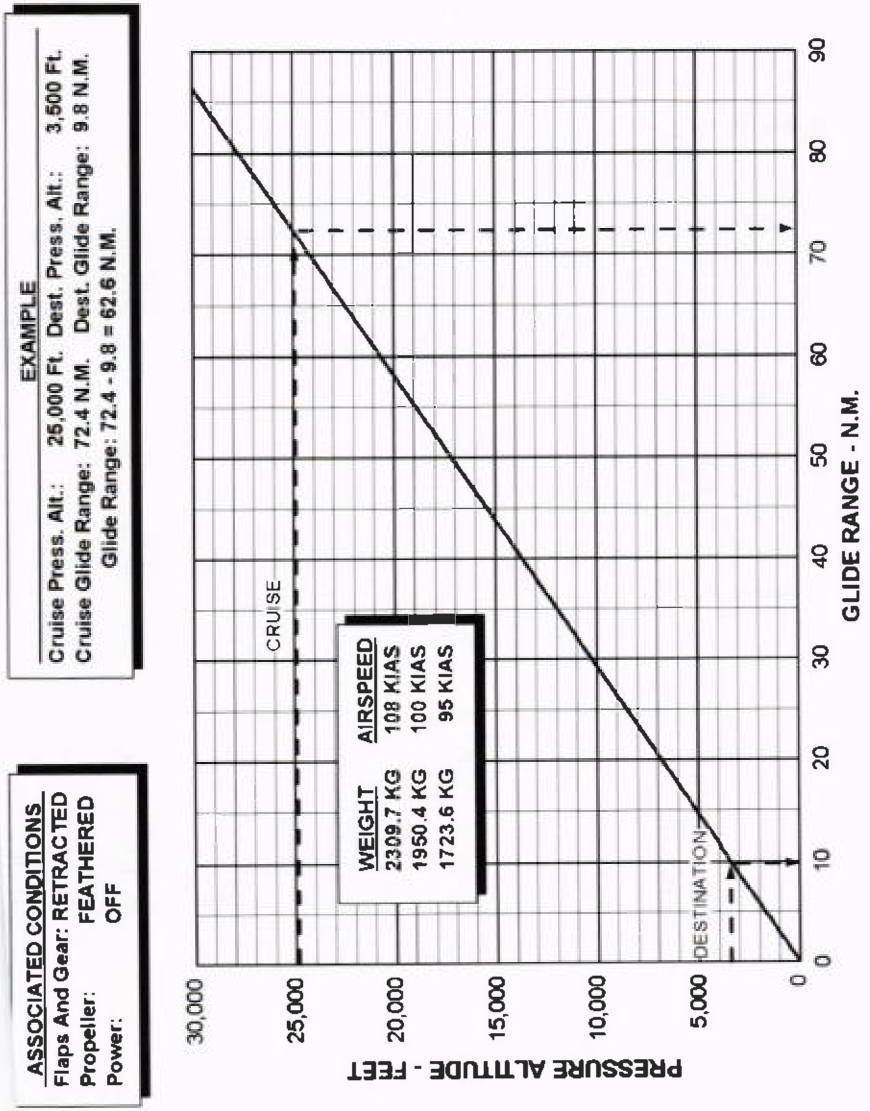
Fuel to Descend
Figure 5-251



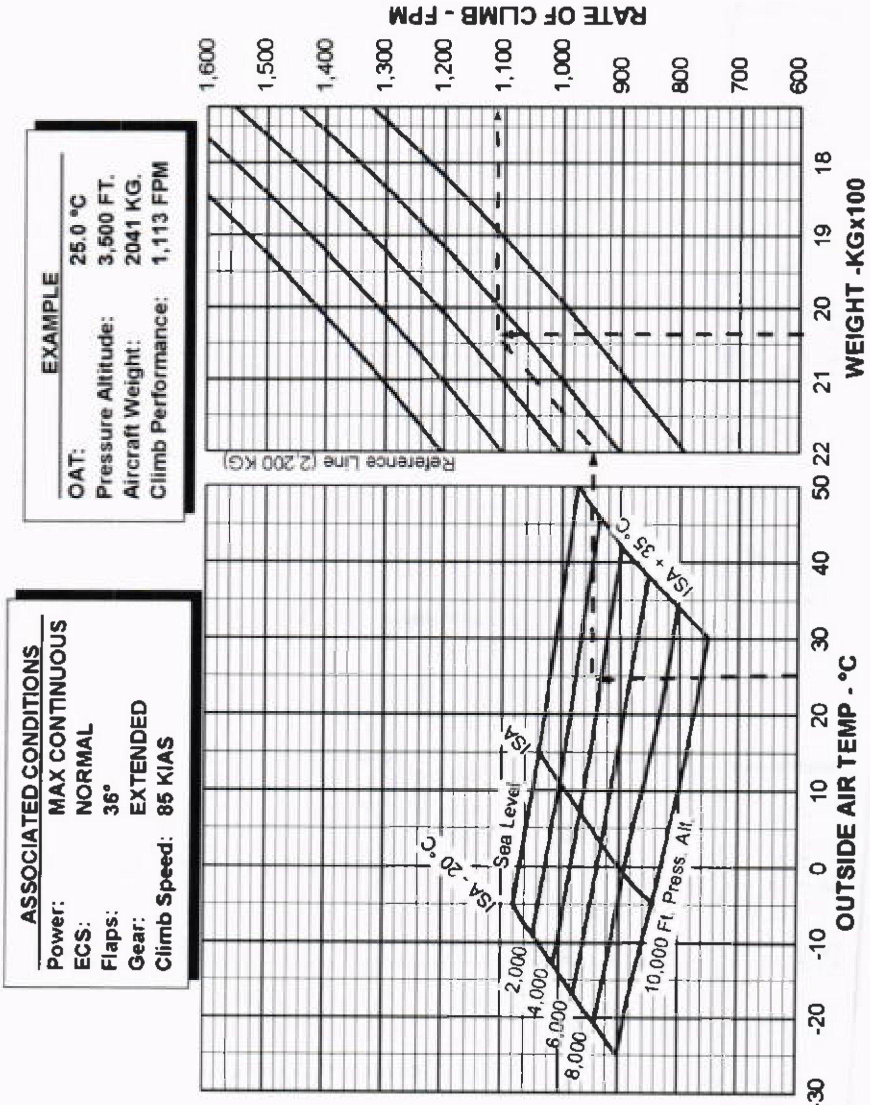
Distance to Descend
Figure 5-253



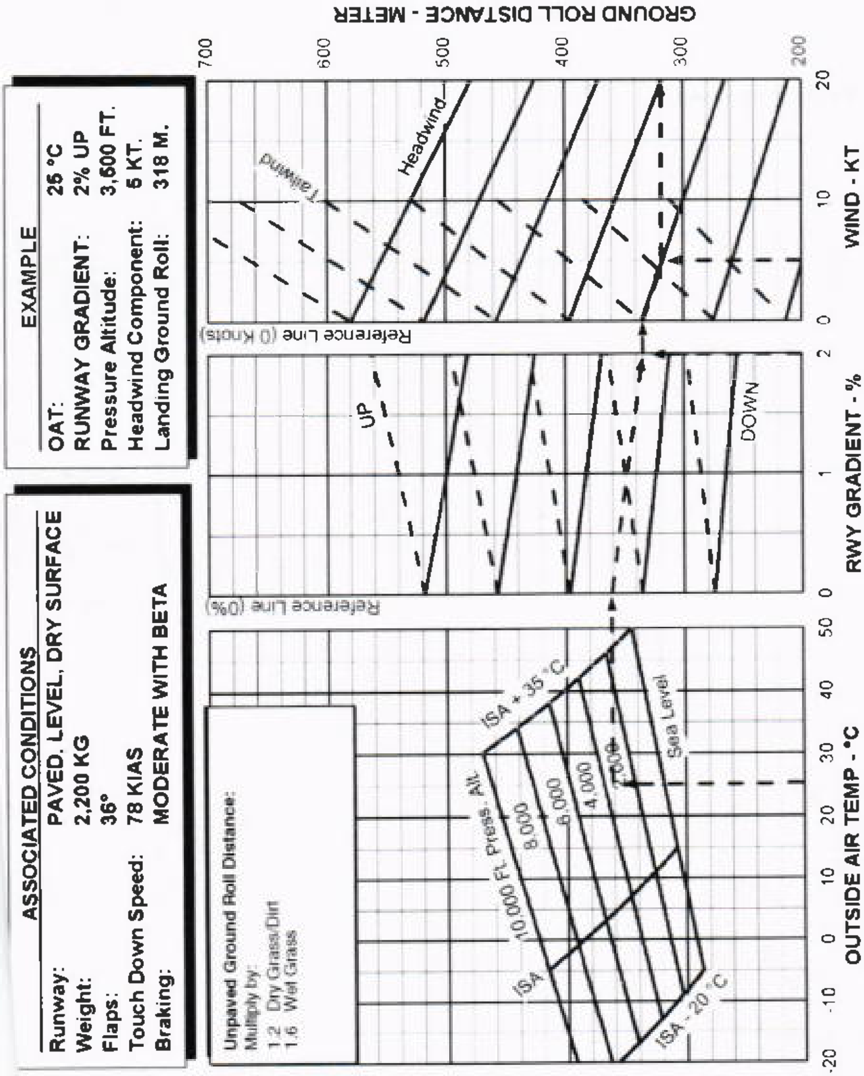
Glide Endurance
Figure 5-255



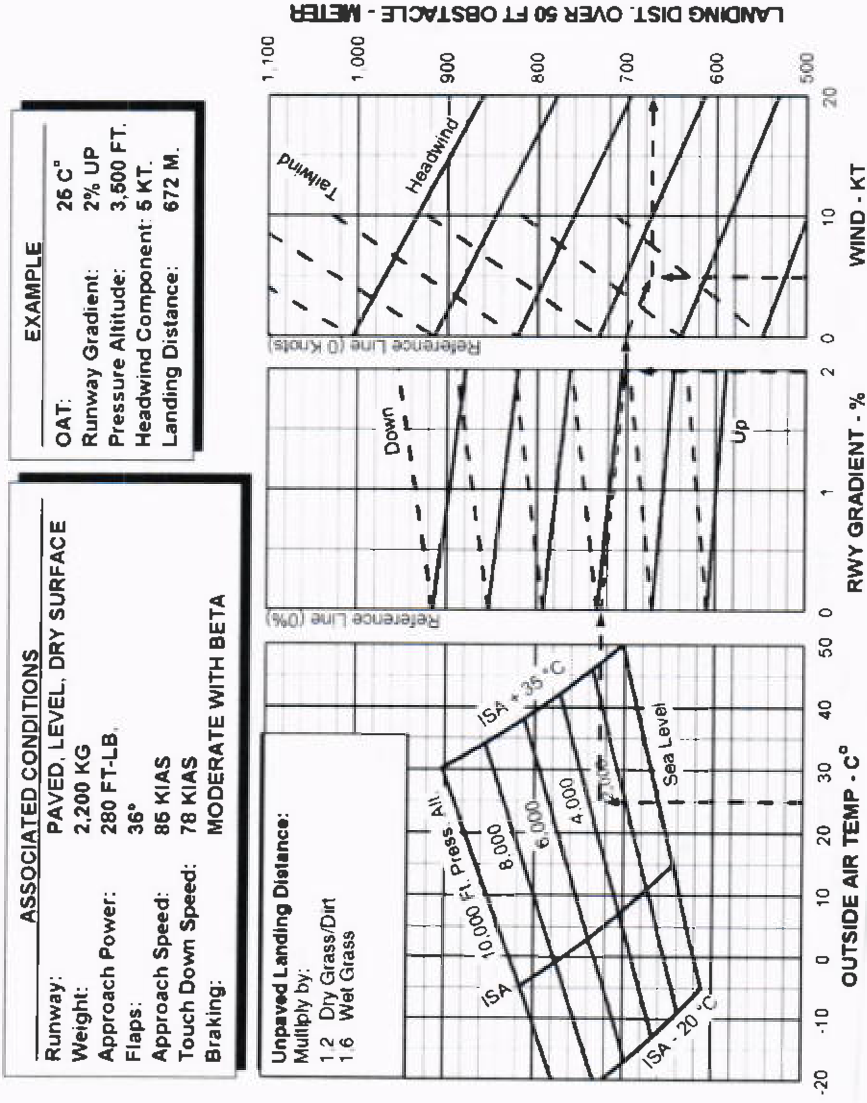
Glide Distance
Figure 5-257



Balked Landing Climb Performance
Figure 5-259



Landing Ground Roll, Flaps 36°, without Reverse
Figure 5-263



Landing Distance, Flaps 36°, without Reverse
Figure 5-265

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SECTION 6

WEIGHT AND BALANCE

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SECTION 6

WEIGHT AND BALANCE

6.1 GENERAL

In order to achieve design performance and flying characteristics, the airplane must be operated and flown within the approved weight vs. center of gravity (C.G.) envelope. (Refer to Figure 6-33.) The airplane offers flexibility of loading, however, it cannot be flown with the maximum number of passengers, full fuel tanks and maximum baggage.

Before the airplane is licensed, a basic empty weight and C.G. location is computed (basic empty weight consists of the standard empty weight of the airplane plus the optional equipment). Using the basic empty weight and C.G. location, the pilot can determine the weight and C.G. position for the loaded airplane. It is the responsibility of the pilot in command to ensure that the airplane is loaded within approved weight vs. C.G. envelope limits prior to each flight.

The basic empty weight and C.G. location is recorded in the Weight and Balance Data Form (Figure 6-5) and the Weight and Balance Record (Figure 6-7). If modification work is performed or new equipment is added to the airplane, a revised basic empty weight and C.G. must be computed and recorded in the Weight and Balance Data Form and the Weight and Balance Record. The current values for weight and C.G. should be used to calculate the quantity of fuel, baggage, and passengers that can be boarded so as to remain within the approved weight and C.G. limitations.

The following pages contain procedures and forms used when weighing an airplane and computing basic empty weight, C.G. position, and useful load. Note that the useful load includes usable fuel, baggage, cargo and passengers.

6.3 AIRPLANE WEIGHING PROCEDURE

At the time of licensing, Piper provides each airplane with the basic empty weight and center of gravity location. This data is supplied in the Weight and Balance Data Form (Figure 6-5).

The removal or addition of equipment or airplane modifications can affect the basic empty weight and center of gravity. The following is a weighing procedure to determine this basic empty weight and center of gravity location:

(a) Preparation

(1) Verify that all items checked in the airplane equipment list are installed in the proper location in the airplane.

(2) Remove excessive dirt, grease, moisture, and foreign items such as rags and tools, from the airplane before weighing.

(3) Defuel airplane. Then open all fuel drains until all remaining fuel is drained. Then add the unusable fuel, 20 pounds (3 gallons total, 1.5 gallons each wing).

(4) Fill oil to full capacity.

(5) Place pilot seat in fifth (5th) notch and copilot seat in sixth (6th) notch, aft of forward position. Put flaps in the fully retracted position and all control surfaces in the neutral position. All entrance and baggage doors should be closed.

(6) Weigh the airplane inside a closed building to prevent errors in scale readings due to wind.

6.3 AIRPLANE WEIGHING PROCEDURE (continued)

(b) Leveling

(1) With the airplane on scales, insert a 6.0 inch spacer on each of the main gear struts and a 5.5 inch spacer on the nose gear strut, or a similar set of spacers that produce a half-inch lower strut extension on the nose strut.

(2) Level airplane (refer to Figure 6-3) deflating (or inflating as required) nose wheel tire, to center bubble on level.

(c) Weighing - Airplane Basic Empty Weight

With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading. (Refer to Figure 6-1.)

Scale Position and Symbol		Scale Reading	Tare	Net Weight
Nose Wheel	(N)			
Right Main Wheel	(R)			
Left Main Wheel	(L)			
Basic Empty Weight, as Weighed	(T)			

WEIGHING FORM
Figure 6-1

6.3 AIRPLANE WEIGHING PROCEDURE (continued)

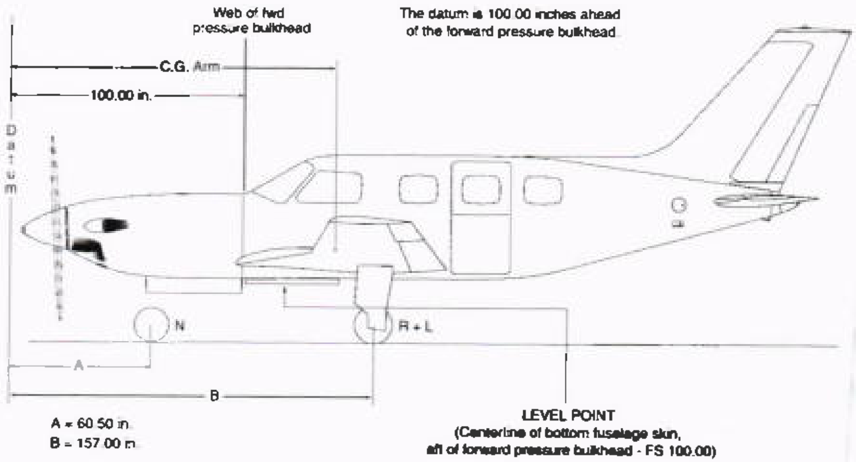
(d) Basic Empty Weight Center of Gravity

(1) The following geometry applies to the airplane when it is level. Refer to Leveling paragraph 6.3 (b).

(2) The basic empty weight center of gravity (as weighed including optional equipment, full oil and unusable fuel) can be determined by the following formula:

$$\text{C.G. Arm} = \frac{(N)(A) + (R + L)(B)}{T} \text{ inches}$$

Where: $T = N + R + L$



LEVELING DIAGRAM
Figure 6-3

6.5 WEIGHT AND BALANCE DATA AND RECORD

The Basic Empty Weight, Center of Gravity Location and Useful Load listed in Figure 6-5 are for the airplane as licensed at the factory. These figures apply only to the specific airplane serial number and registration number shown.

The basic empty weight of the airplane as licensed at the factory has been entered in the Weight and Balance Record (Figure 6-7). This form is provided to present the current status of the airplane basic empty weight and a complete history of previous modifications. Any change to the permanently installed equipment or modification which affects weight or moment must be entered in the Weight and Balance Record.

6.5 WEIGHT AND BALANCE DATA AND RECORD (continued)

MODEL PA-46-500TP

Airplane Serial Number________________________

Registration Number __________________________

Date ____

AIRPLANE BASIC EMPTY WEIGHT

Item	Weight x (Lbs)	C.G. Arm (Inches Aft of Datum)	= Moment (In-Lbs)
Standard Empty Weight* Actual / Computed			
Optional Equipment			
Basic Empty Weight			

* The standard empty weight includes full oil capacity and 3.0 gallons of unusable fuel.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

(Ramp Weight) - (Basic Empty Weight) = Useful Load

(5134 lbs) - (lbs) =   lbs.

THIS BASIC EMPTY WEIGHT, C.G. AND USEFUL LOAD ARE FOR THE AIRPLANE AS LICENSED AT THE FACTORY. REFER TO APPROPRIATE AIRCRAFT RECORD WHEN ALTERATIONS HAVE BEEN MADE.

WEIGHT AND BALANCE DATA FORM
Figure 6-5

PA-46-500TP		Serial Number		Registration Number			Page Number	
Date	Item No.	Description of Article or Modification	Added (+) Removed (-)	Weight Change			Running Basic Empty Weight	
				Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Moment /100
		As licensed						

WEIGHT AND BALANCE RECORD

Figure 6-7

PA-46-500TP		Serial Number		Registration Number				Page Number	
				Weight Change				Running Basic Empty Weight	
Date	Item No.	Description of Article or Modification	Added (+) Removed (-)	Wt. (Lb.)	Arm (In.)	Moment /100		Wt. (Lb.)	Moment /100

WEIGHT AND BALANCE RECORD (continued)
Figure 6-7 (continued)

6.7 GENERAL LOADING RECOMMENDATIONS

For all airplane configurations, it is the responsibility of the pilot in command to make sure that the airplane always remains within the allowable weight vs. center of gravity limits while in flight.

The following general loading recommendation is intended only as a guide. The charts, graphs, tables and instructions should be checked to assure that the airplane is within the allowable weight vs. center of gravity envelope.

(a) Pilot Only
Load rear baggage compartment first. Investigation is required to determine the amount of fuel. Fuel load may be limited by forward envelope.

(b) 2 Occupants - Pilot and Passenger in Front
Load rear baggage compartment first. Investigation is required to determine the amount of fuel. Fuel load may be limited by forward envelope.

(c) 3 Occupants - 2 in front, 1 in rear
Investigation is required to determine the amount of fuel. Fuel load may be limited by forward envelope.

(d) 4 Occupants - 2 in front, 2 in rear
With 4 occupants, aft passengers' weight, fuel and baggage may be limited by envelope. Investigation is required to determine optimum fuel and baggage load.

(e) 5 Occupants - 2 in front, 1 in middle, 2 in rear
With 5 occupants, aft passengers' weight, fuel and baggage may be limited by envelope.Investigation is required to determine optimum fuel and baggage load.

(f) 6 Occupants - 2 in front, 2 in middle, 2 in rear
With 6 occupants, aft passengers weight, fuel and baggage may be limited by envelope. Investigation is required to determine optimum fuel and baggage load.

WARNING

Do not attempt to fly this airplane under any conditions when it is loaded outside the limits of the approved weight and center of gravity envelope.

6.7 GENERAL LOADING RECOMMENDATIONS (continued)

NOTE

With configuration loadings falling near the envelope limits, it is important to check anticipated landing loadings since fuel burn could result in a final loading outside of the approved weight vs. C.G. envelope.

NOTE

For all airplane configurations, it is the responsibility of the pilot in command to make sure that the airplane always remains within the allowable weight vs. center of gravity envelope while in flight.

NOTE

Always load the fuel equally between the right and left tanks.

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

(a) Record the airplane basic empty weight and moment from the Weight and Balance Data form or from the latest superseding form (Weight and Balance Record) onto the Weight and Balance computation form (figure 6-13).

(b) Record the weight and corresponding moment of each item using the loading tables (figures 6-19 through 6-29).

(c) Add the weight and moment of all items to the basic empty weight and moment to determine the zero fuel weight and moment.

(d) Divide the zero fuel weight moment by the zero fuel weight to determine the zero fuel weight arm (C.G.).

(e) Check the zero fuel weight and C.G. by locating the weight and arm on the Center of Gravity Limits graph (figure 6-33). Approved points are located within the C.G. envelope. This then meets the weight and balance requirements.

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

(f) Use the loading table for fuel (figure 6-27) to determine the moment for the fuel being loaded. Record the weight and moment of the fuel in the Weight and Balance Computation Form.

(g) Total the zero fuel weight and moment with the fuel loading weight and moment to obtain ramp weight.

(h) Divide the ramp weight moment by the ramp weight to determine the ramp weight arm (C.G.). Check the ramp weight and C.G. by locating the weight and arm on the Center of Gravity Limits graph (figure 6-33). Approved points are located within the C.G envelope. This then meets the weight and balance requirements.

(i) Subtract the weight and moment of the fuel allowance for engine start, taxi, and runup to determine takeoff weight and moment. A standard 42.61 pound fuel allowance for taxi and runup is assumed. The moment for the fuel allowance is determined by the difference in moments of the total fuel loaded and the fuel remaining on board after taxi and runup. Enter the fuel allowance weight and moment in the Weight and Balance Computation form.

(j) Divide the takeoff weight moment by the takeoff weight to determine the takeoff weight arm (C.G.). Check the takeoff weight and C.G. by locating the weight and arm on the Center of Gravity Limits graph (figure 6-33). Approved points are located within the C.G. envelope. This then meets the weight and balance requirements.

(k) Determine the estimated weight of the fuel to be used during the flight to the appropriate destination. The weight and moment for this fuel is determined by the difference of the total fuel remaining after the fuel allowance is removed and the fuel remaining after reaching destination. Use the loading table for fuel (figure 6-27) to determine the moments. Enter the weight and moment of the fuel used during the flight in the Weight and Balance Computation form.

(l) Subtract the weight and moment of the fuel used during the flight to determine landing weight and moment. Divide the landing weight moment by the landing weight to determine the landing weight arm (C.G.). Check the landing weight and C.G. by locating the weight and arm on the Center of Gravity Limits graph (figure 6-33). Approved points are located within the C.G. envelope. This then meets the weight and balance requirements.

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

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6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT(cont)

	Weight (pounds)	Arm Aft of Datum (inches)	Moment (inch-pounds)
Basic Empty Weight	3380.0	136.01	459713.8
Pilot (Seat 1)	170.0	135.50	23035.0
Copilot (Seat 2)	170.0	136.70	23239.0
Center Passenger L/H (Seat 3)	180.0	177.00	31860.0
Center Passenger R/H (Seat 4)		177.00	
Rear Passenger L/H (Seat 5)		218.75	
Rear Passenger R/H (Seat 6)		218.75	
Radar pod stowage compartment (max. 5 pounds-soft items only)		157.48	
Aft Golf Baggage net (105 lbs. max. -3 bags)-optional		222.31	
Aft Baggage (100 lbs. max.) (50 lbs. maximum with golf bag)	80.0	248.23	19858.4
Aft oil stowage compartment (maximum - 5 pounds)		286.50	
Zero Fuel Weight (maximum - 4850 pounds)	3980.0	140.13	557706.2
Fuel (170 gals. maximum)[1] @ 6.70 pounds per gallon	904.5	148.36	134188.7
Maximum Ramp Weight (5134 pounds)	4884.5	141.65	691894.9
Fuel allowance for Engine Start, Taxi and Run up[2]	-42.61	149.89	-6386.63
Maximum Takeoff Weight (5092 pounds)	4841.89	141.58	685508.27

Locate the arm (Center of Gravity, C.G.) of the takeoff weight on the Center of Gravity Limits graph (figure 6-33). If this point falls within the Weight/C.G. envelope, the loading is acceptable for takeoff.

Example of Weight and Balance Computation Form
Standard Configuration (Sample Loading)
Figure 6-9

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT(cont)

Weight Calculation	**Weight (pounds)**
Total Fuel	904.50
Fuel allowance for Engine Start, Taxi and Run up	-42.61
Fuel Remaining on board	**861.89**
Moment Calculation	**Moment (inch-pounds)**
Total Fuel	134188.66
Fuel Remaining on board	-127802.03
Fuel allowance for Engine Start, Taxi and Run up	**6386.63**

Notes:

1. Use the fuel loading table (figure 6-27) to determine the moment for the amount of fuel being loaded for the flight. If fuel is to be added to existing fuel, determine the total fuel weight and use the fuel loading table to determine the fuel moment. (Arm = Moment/Weight).
2. A standard 42.61 pound fuel allowance for taxi and runup is assumed. The moment for the fuel allowance is determined by the difference in moments of the total fuel loaded and the fuel remaining on board after taxi and runup. See example, figure 6-11.

Example of Moment Calculation for Fuel Allowance
Standard Configuration (Sample Loading)
Figure 6-11

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT(cont)

The moment for the fuel burned during the mission is determined by the difference in moments of the takeoff fuel loaded and the fuel remaining on board after landing. See example below.

Weight Calculation	Weight (pounds)
Takeoff Fuel	861.89
Mission Fuel used (Fuel burned during Climb, Cruise and Descent)	-633.3
Post Mission Fuel (Fuel remaining at Landing)	228.64
Moment Calculation	**Moment (inch-pounds)**
Takeoff Fuel	127802.03
Mission Fuel used (Fuel burned during Climb, Cruise and Descent)	-33122.14
Post Mission Fuel (Fuel remaining at Landing)	94679.89

Item	Weight (pounds)	Arm Aft of Datum (inches)	Moment (inch-pounds)
Maximum Takeoff Weight (5092 pounds)	4841.89	141.54	685304.23
Minus Estimated Fuel Burn-off (Climb & Cruise) @ 6.70 pounds per gallon	-633.3	149.51	-94679.89
Maximum Landing Weight (4850 pounds)	4208.59	140.34	590624.34

Locate the arm (Center of Gravity, C.G.) of the landing weight on the Center of Gravity Limits graph (figure 6-33). If this point falls within the Weight/C.G. envelope, the loading is acceptable for landing.

IT IS THE SOLE RESPONSIBILITY OF THE PILOT IN COMMAND TO ENSURE THAT THE AIRPLANE IS LOADED PROPERLY AT ALL TIMES.

Example of Moment Calculation for Fuel Burned During the Mission

Figure 6-12

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

	Weight (pounds)	Arm Aft of Datum (inches)	Moment (inch-pounds)
Basic Empty Weight			
Pilot (Seat 1)		135.50	
Copilot (Seat 2)		136.70	
Center Passenger L/H (Seat 3)		177.00	
Center Passenger R/H (Seat 4)		177.00	
Rear Passenger L/H (Seat 5)		218.75	
Rear Passenger R/H (Seat 6)		218.75	
Radar pod stowage compartment (maximum 5 pounds-soft items only)		157.48	
Aft Golf Baggage net (105 lbs. maximum - 3 bags)-optional		222.31	
Aft Baggage (100 lbs. max. (50 lbs. maximum with golf bag net option))		248.23	
Aft oil stowage compartment (maximum - 5 pounds)		286.50	
Zero Fuel Weight (maximum - 4850 pounds)			
Fuel (170 gals. maximum)[1] @ 6.70 pounds per gallon			
Maximum Ramp Weight (5134 pounds)			
Fuel allowance for Engine Start, Taxi and Run up[2]	-42.61		
Maximum Takeoff Weight (5092 pounds)			

Locate the arm (Center of Gravity, C.G.) of the takeoff weight on the Center of Gravity Limits graph (figure 6-33). If this point falls within the Weight/C.G. envelope, the loading is acceptable for takeoff.

Refer to page 6-17a for Notes 1 and 2.

Weight and Balance Computation Form
Standard Configuration (Normal Category)
Figure 6-13A

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

	Weight (pounds)	Arm Aft of Datum (inches)	Moment (inch-pounds)
Basic Empty Weight			
Pilot (Seat 1)		135.50	
Copilot (Seat 2)		136.70	
Stowage Area #1 (Maximum 5 pounds) (see Figure 6-31)		158.45	
Stowage Area #2 (Maximum 5 pounds) (see Figure 6-31)		158.45	
Stowage Area #3 (Maximum 5 pounds) (see Figure 6-31)		158.45	
Stowage Area #4 (Maximum 5 pounds) (see Figure 6-31)		171.25	
Ice Chest drawer (Maximum 20 pounds) (see Figure 6-31)		183.85	
Center Passenger R/H (Seat 4)		177.00	
Rear Passenger L/H (Seat 5)		218.75	
Rear Passenger R/H (Seat 6)		218.75	
Radar pod stowage compartment (maximum 5 pounds-soft items only)		157.48	
Aft Golf Baggage net (105 lbs. maximum -3 bags)-optional		222.31	
Aft Baggage (100 lbs. max. (50 lbs. maximum with golf bag net option))		248.23	
Aft oil stowage compartment (maximum - 5 pounds)		286.50	
Zero Fuel Weight (maximum - 4850 pounds)			
Fuel (170 gals. maximum)[1] @ 6.70 pounds per gallon			
Maximum Ramp Weight (5134 pounds)			
Fuel allowance for Engine Start, Taxi and Run up[2]	-42.61		
Maximum Takeoff Weight (5092 pounds)			

Locate the arm (Center of Gravity, C.G.) of the takeoff weight on the Center of Gravity Limits graph (figure 6-33). If this point falls within the Weight/C.G. envelope, the loading is acceptable for takeoff.

Refer to page 6-17a for Notes 1 and 2.

Weight and Balance Computation Form
Executive/Entertainment Configuration (Normal Category)
Figure 6-13B

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Notes:

1. Use the fuel loading table (figure 6-27) to determine the moment for the amount of fuel being loaded for the flight. If fuel is to be added to existing fuel, determine the total fuel weight and use the fuel loading table to determine the fuel moment. (Arm = Moment/Weight).

2. A standard 42.61 pound fuel allowance for taxi and runup is assumed. The moment for the fuel allowance is determined by the difference in moments of the total fuel loaded and the fuel remaining on board after taxi and runup.

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6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Weight Calculation	Weight (pounds)
Total Fuel	
Fuel allowance for Engine Start, Taxi and Run up*	
Fuel Remaining on board	
Moment Calculation	**Moment (inch-pounds)**
Total Fuel	
Fuel Remaining on board	
Fuel allowance for Engine Start, Taxi and Run up	

Notes:

1. Use the fuel loading table (figure 6-27) to determine the moment for the amount of fuel being loaded for the flight. If fuel is to be added to existing fuel, determine the total fuel weight and use the fuel loading table to determine the fuel moment. (Arm = Moment/Weight).
2. A standard 42.61 pound fuel allowance for taxi and runup is assumed. The moment for the fuel allowance is determined by the difference in moments of the total fuel loaded and the fuel remaining on board after taxi and runup. See example, figure 6-11.

Moment Calculation for Fuel Allowance
Figure 6-14

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

The moment for the fuel burned during the mission is determined by the difference in moments of the takeoff fuel loaded and the fuel remaining on board after landing. See example below.

Weight Calculation	Weight (pounds)
Takeoff Fuel	
Mission Fuel used (Fuel burned during Climb, Cruise and Descent)	
Post Mission Fuel (Fuel remaining at Landing)	
Moment Calculation	Moment (inch-pounds)
Takeoff Fuel	
Mission Fuel used (Fuel burned during Climb, Cruise and Descent)	
Post Mission Fuel (Fuel remaining at Landing)	

Item	Weight (pounds)	Arm Aft of Datum (inches)	Moment (inch-pounds)
Maximum Takeoff Weight (5092 pounds)			
Minus Estimated Fuel Burn-off (Climb & Cruise) @ 6.70 pounds per gallon			
Maximum Landing Weight (4850 pounds)			

Locate the arm (Center of Gravity, C.G.) of the landing weight on the Center of Gravity Limits graph (figure 6-33). If this point falls within the Weight/C.G. envelope, the loading is acceptable for landing.

IT IS THE SOLE RESPONSIBILITY OF THE PILOT IN COMMAND TO ENSURE THAT THE AIRPLANE IS LOADED PROPERLY AT ALL TIMES.

Moment Calculation for Fuel Burned During the Mission
Figure 6-15

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

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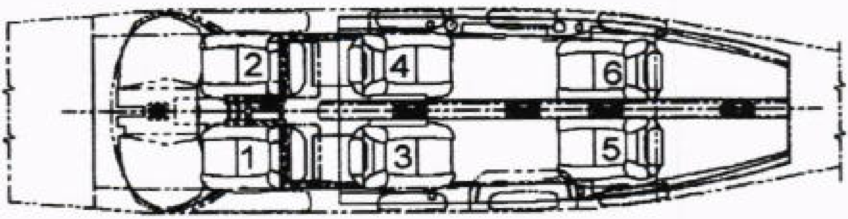
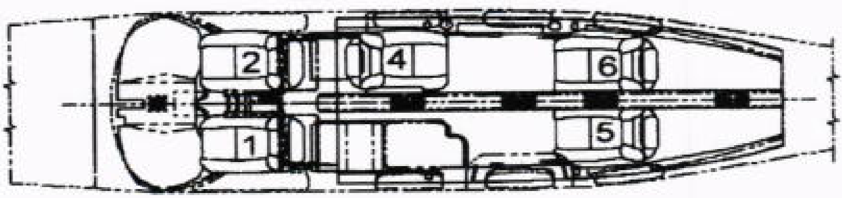
6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Standard Configuration



Executive/Entertainment Configuration



Seating Configurations
Figure 6-17

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

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6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Weight	Pilot	Copilot (Seat 2)	Seat 3	Seat 4	Seat 5	Seat 6
(pounds)	Arm FS 135.5	Arm FS 136.7	Arm FS 177.0	Arm FS 177.0	Arm FS 218.75	Arm FS 218.75
	Moment (inch - Pounds)					
20	2710.0	2734.0	3540.0	3540.0	4375.0	4375.0
30	4065.0	4101.0	5310.0	5310.0	6562.5	6562.5
40	5420.0	5468.0	7080.0	7080.0	8750.0	8750.0
50	6775.0	6835.0	8850.0	8850.0	10937.5	10937.5
60	8130.0	8202.0	10620.0	10620.0	13125.0	13125.0
70	9485.0	9569.0	12390.0	12390.0	15312.5	15312.5
80	10840.0	10936.0	14160.0	14160.0	17500.0	17500.0
90	12195.0	12303.0	15930.0	15930.0	19687.5	19687.5
100	13550.0	13670.0	17700.0	17700.0	21875.0	21875.0
110	14905.0	15037.0	19470.0	19470.0	24062.5	24062.5
120	16260.0	16404.0	21240.0	21240.0	26250.0	26250.0
130	17615.0	17771.0	23010.0	23010.0	28437.5	28437.5
140	18970.0	19138.0	24780.0	24780.0	30625.0	30625.0
150	20325.0	20505.0	26550.0	26550.0	32812.5	32812.5
160	21680.0	21872.0	28320.0	28320.0	35000.0	35000.0
170	23035.0	23239.0	30090.0	30090.0	37187.5	37187.5

Loading Table
Occupants (Standard Configuration)
Figure 6-19

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Weight	Pilot	Copilot (Seat 2)	Seat 4	Seat 5	Seat 6
(pounds)	Arm FS 135.5	Arm FS 136.7	Arm FS 177.0	Arm FS 218.75	Arm FS 218.75
	Moment (inch - Pounds)				
20	2710.0	2734.0	3540.0	4375.0	4375.0
30	4065.0	4101.0	5310.0	6562.5	6562.5
40	5420.0	5468.0	7080.0	8750.0	8750.0
50	6775.0	6835.0	8850.0	10937.5	10937.5
60	8130.0	8202.0	10620.0	13125.0	13125.0
70	9485.0	9569.0	12390.0	15312.5	15312.80
80	10840.0	10936.0	14160.0	17500.0	17500.0
90	12195.0	12303.0	15930.0	19687.5	19687.5
100	13550.0	13670.0	17700.0	21875.0	21875.0
110	14905.0	15037.0	19470.0	24062.5	24062.5
120	16260.0	16404.0	21240.0	26250.0	26250.0
130	17615.0	17771.0	23010.0	28437.5	28437.5
140	18970.0	19138.0	24780.0	30625.0	30625.0
150	20325.0	20505.0	26550.0	32812.5	32812.5
160	21680.0	21872.0	28320.0	35000.0	35000.0
170	23035.0	23239.0	30090.0	37187.5	37187.5

Loading Table
Occupants (Executive/Entertainment Configuration)
Figure 6-21

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Standard Baggage net configuration	
Weight	**Standard baggage**
(pounds)	**Arm FS 248.23**
	Moment (inch -pounds)
10	2482.3
20	4964.6
30	7446.9
40	9929.2
50	12411.5
60	14893.8
70	17376.1
80	19858.4
90	22340.7
100	24823.0

Loading Table
Standard Baggage
Figure 6-23

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Golf baggage net configuration		
Weight	**Golf baggage location**	**Aft location**
(pounds)	**Arm FS 222.31**	**Arm FS 248.23**
	Moment (inch -pounds)	**Moment (inch -pounds)**
10.0	2223.1	2482.3
20.0	4446.2	4964.6
30.0	6669.3	7446.9
40.0	8892.4	9929.2
50.0	11115.5	12411.5
60.0	13338.6	
70.0	15561.7	
80.0	17784.8	
90.0	20007.9	
100.0	22231.0	
105.0	23342.6	

Loading Table
Golf Baggage - Optional
Figure 6-25

Golf Baggage Loading Configuration
Figure 6-26

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Gallons (unusable fuel not included)	Fuel Weight (pounds)	Fuel Moment Arm Varies (inch pounds)
20	134.00	19144.68
25	167.50	24079.93
30	201.00	29030.69
35	234.50	33990.65
40	268.00	38957.46
45	301.50	43930.87
50	335.00	48911.41
55	368.50	53899.63
60	402.00	58895.65
65	435.50	63899.05
70	469.00	68908.87
75	502.50	73923.83
80	536.00	78942.46
85	569.50	83963.42
90	603.00	88985.58
95	636.50	94008.15
100	670.00	99030.76
105	703.50	104053.34
110	737.00	109076.01
115	770.50	114098.96
120	804.00	119122.17
125	837.50	124145.36
130	871.00	129167.84
135	904.50	134188.66
140	938.00	139206.95
145	971.50	144222.62
150	1005.00	149237.50
155	1038.50	154257.05
160	1072.00	159292.80
165	1105.50	164365.64
170	1139.00	169510.07

Three (3) gallons of unusable fuel (20.10 pounds, 2901.84 inch pounds) included n basic empty weight. The above weights are based on a fuel specific gravity f 0.02899 pounds per cubic inch at 59 degrees F for Jet A and Jet A-1, which ields a fuel density of 6.7 pounds per gallon.

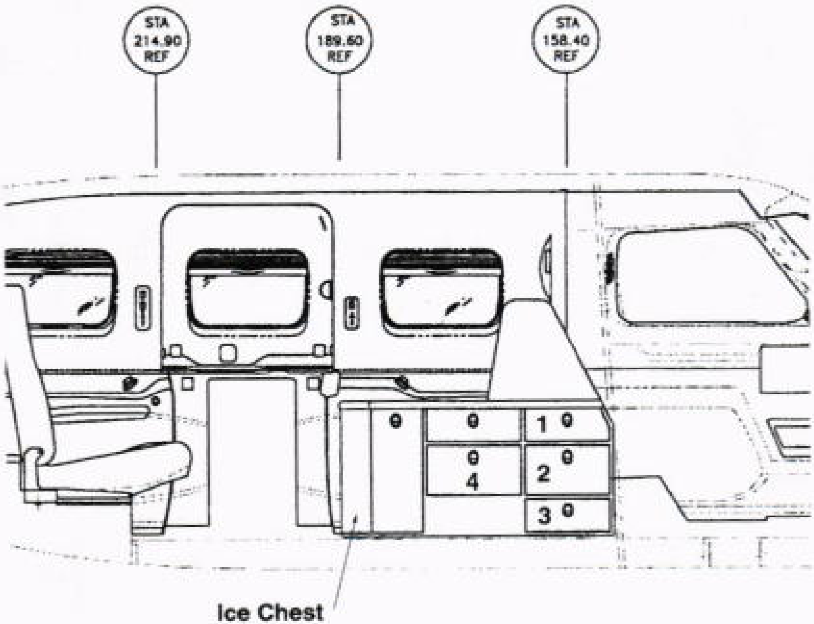
Loading Table
Fuel
Figure 6-27

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)

Weight (pounds)	Stowage area 1-3 Arm FS 158.45 Moment (inch - pounds)	Stowage area 4 Arm FS 171.25 Moment (inch - pounds)	Ice chest Arm FS 183.85 Moment (inch - pounds)
1	158.5	171.3	183.9
2	316.9	342.5	367.7
3	475.4	513.8	551.6
4	633.8	685.0	735.4
5	792.3	856.3	919.3
6			1103.1
7			1287.0
8			1470.8
9			1654.7
10			1838.5
11			2022.4
12			2206.2
13			2390.1
14			2573.9
15			2757.8
16			2941.6
17			3125.5
18			3309.3
19			3493.2
20			3677.0

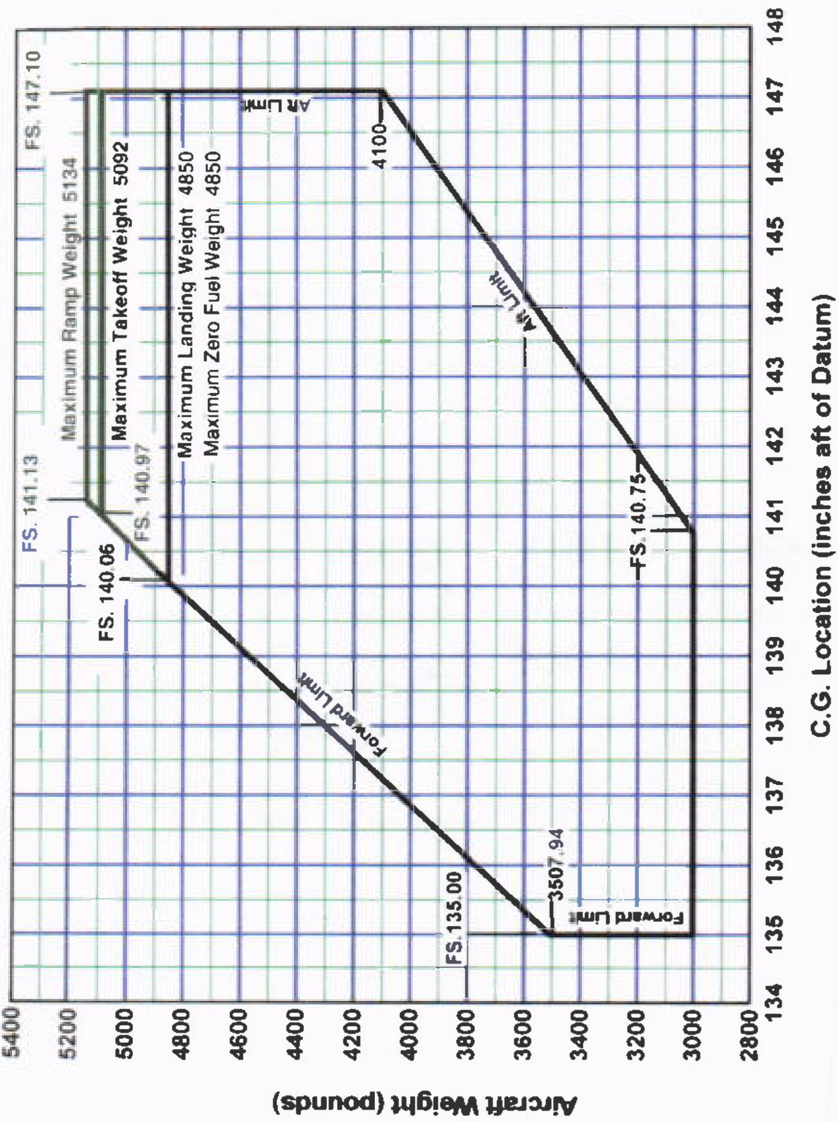
Loading Table
Executive/Entertainment Stowage Compartment
Figure 6-29

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)



Stowage Configuration
Figure 6-31

6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT (cont)



Center of Gravity Limits Graph
Figure 6-33

SECTION 6 - METRIC
WEIGHT AND BALANCE

6.1 General - Metric

In order to achieve design performance and flying characteristics, the airplane must be operated and flown within the approved weight vs. center of gravity (C.G.) envelope. (Refer to Figure 6-69.) The airplane offers flexibility of loading, however, it cannot be flown with the maximum number of passengers, full fuel tanks and maximum baggage.

Before the airplane is licensed, a basic empty weight and C.G. location is computed (basic empty weight consists of the standard empty weight of the airplane plus the optional equipment). Using the basic empty weight and C.G. location, the pilot can determine the weight and C.G. position for the loaded airplane. It is the responsibility of the pilot in command to ensure that the airplane is loaded within approved weight vs. C.G. envelope limits prior to each flight.

The basic empty weight and C.G. location is recorded in the Weight and Balance Data Form (Figure 6-39) and the Weight and Balance Record (Figure 6-41). If modification work is performed or new equipment is added to the airplane, a revised basic empty weight and C.G. must be computed and recorded in the Weight and Balance Data Form and the Weight and Balance Record. The current values for weight and C.G. should be used to calculate the quantity of fuel, baggage, and passengers that can be boarded so as to remain within the approved weight and C.G. limitations.

The following pages contain procedures and forms used when weighing an airplane and computing basic empty weight, C.G. position, and useful load. Note that the useful load includes usable fuel, baggage, cargo and passengers.

6.3 Airplane Weighing Procedure - Metric

At the time of licensing, Piper provides each airplane with the basic empty weight and center of gravity location. This data is supplied in the Weight and Balance Data Form (Figure 6-39).

The removal or addition of equipment or airplane modifications can affect the basic empty weight and center of gravity. The following is a weighing procedure to determine this basic empty weight and center of gravity location:

(a) Preparation

(1) Verify that all items checked in the airplane equipment list are installed in the proper location in the airplane.

(2) Remove excessive dirt, grease, moisture, and foreign items such as rags and tools, from the airplane before weighing.

(3) Defuel airplane. Then open all fuel drains until all remaining fuel is drained. Then add the unusable fuel, 5.6 liters in each wing.

(4) Fill oil to full capacity.

(5) Place pilot seat in fifth (5th) notch and copilot seat in sixth (6th) notch, aft of forward position. Put flaps in the fully retracted position and all control surfaces in the neutral position. All entrance and baggage doors should be closed.

(6) Weigh the airplane inside a closed building to prevent errors in scale readings due to wind.

6.3 Airplane Weighing Procedure - Metric (continued)

(b) Leveling

(1) With the airplane on scales, insert an 15.25 centimeter spacer on each of the main gear struts and a 13.98 centimeter spacer on the nose gear strut.

(2) Level airplane (refer to Figure 6-37) deflating (or inflating as required) nose wheel tire, to center bubble on level.

(c) Weighing - Airplane Basic Empty Weight

With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading. (Refer to Figure 6-35.)

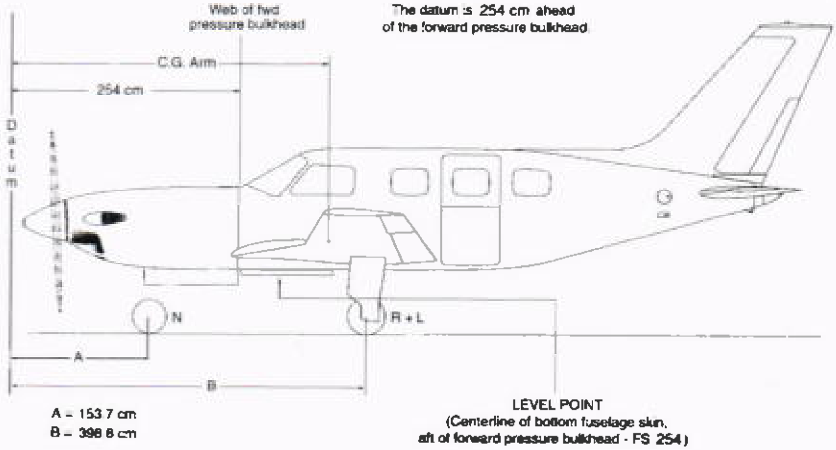
Scale Position and Symbol		Scale Reading	Tare	Net Weight
Nose Wheel	(N)			
Right Main Wheel	(R)			
Left Main Wheel	(L)			
Basic Empty Weight, as Weighed	(T)			

Weighing Form
Figure 6-35

6.3 Airplane Weighing Procedure - Metric (continued)

(d) Basic Empty Weight Center of Gravity

(1) The following geometry applies to the airplane when it is level. Refer to Leveling, paragraph 6.3 (b).



Leveling Diagram
Figure 6-37

6.3 Airplane Weighing Procedure - Metric (continued)

(d) Basic Empty Weight Center of Gravity

(2) The basic empty weight center of gravity (as weighed including optional equipment, full oil and unusable fuel) can be determined by the following formula:

$$\text{C.G. Arm} = \frac{(N)\,(A) + (R + L)\,(B)}{T} \text{ centimeters}$$

$$\text{Where: } T = N + R + L$$

6.5 Weight and Balance Data and Record - Metric

The Basic Empty Weight, Center of Gravity Location and Useful Load listed in Figure 6-39 are for the airplane as licensed at the factory. These figures apply only to the specific airplane serial number and registration number shown.

The basic empty weight of the airplane as licensed at the factory has been entered in the Weight and Balance Record (Figure 6-41). This form is provided to present the current status of the airplane basic empty weight and a complete history of previous modifications. Any change to the permanently installed equipment or modification which affects weight or moment must be entered in the Weight and Balance Record.

6.5 Weight and Balance Data and Record - Metric (continued)

MODEL PA-46-500TP

Airplane Serial Number________________________

Registration Number __________________________

Date ____

AIRPLANE BASIC EMPTY WEIGHT

Item	Weight x (kg)	C.G. Arm (cm Aft of Datum)	= Moment (cm-kg)
Standard Empty Weight* Actual / Computed			
Optional Equipment			
Basic Empty Weight			

*The standard empty weight includes full oil capacity and 11.4 liters of unusable fuel.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

(Ramp Weight) - (Basic Empty Weight) = Useful Load

(2328.7 kg) - (kg) =   kg

THIS BASIC EMPTY WEIGHT, C.G. AND USEFUL LOAD ARE FOR THE AIRPLANE AS LICENSED AT THE FACTORY. REFER TO APPROPRIATE AIRCRAFT RECORD WHEN ALTERATIONS HAVE BEEN MADE.

Weight and Balance Data Form
Figure 6-39

6.5 Weight and Balance Data and Record - Metric (continued)

PA-46-500TP		Serial Number		Registration Number			Page Number	
Date	Item No.	Description of Article or Modification	Added (+) Removed (-)	Weight Change			Running Basic Empty Weight	
				Wt. (kg)	Arm (cm)	Moment /100	Wt. (kg)	Moment /100
		As licensed						

Weight and Balance Record
Figure 6-41

6.5 Weight and Balance Data and Record - Metric (continued)

PA-46-500TP		Serial Number		Registration Number			Page Number	
Date	Item No.	Description of Article or Modification	Added (+) Removed (-)	Weight Change			Running Basic Empty Weight	
				Wt. (kg)	Arm (cm)	Moment /100	Wt. (kg)	Moment /100

Weight and Balance Record
Figure 6-41 (continued)

6.7 General Loading Recommendations - Metric

For all airplane configurations, it is the responsibility of the pilot in command to make sure that the airplane always remains within the allowable weight vs. center of gravity limits while in flight.

The following general loading recommendation is intended only as a guide. The charts, graphs, tables and instructions should be checked to assure that the airplane is within the allowable weight vs. center of gravity envelope.

(a) Pilot Only
Load rear baggage compartment first. Investigation is required to determine the amount of fuel. Fuel load may be limited by forward envelope.

(b) 2 Occupants - Pilot and Passenger in Front
Load rear baggage compartment first. Investigation is required to determine the amount of fuel. Fuel load may be limited by forward envelope.

(c) 3 Occupants - 2 in front, 1 in rear
Investigation is required to determine the amount of fuel. Fuel load may be limited by forward envelope.

(d) 4 Occupants - 2 in front, 2 in rear
With 4 occupants, aft passengers' weight, fuel and baggage may be limited by envelope. Investigation is required to determine optimum fuel and baggage load.

(e) 5 Occupants - 2 in front, 1 in middle, 2 in rear
With 5 occupants, aft passengers' weight, fuel and baggage may be limited by envelope.Investigation is required to determine optimum fuel and baggage load.

(f) 6 Occupants - 2 in front, 2 in middle, 2 in rear
With 6 occupants, aft passengers weight, fuel and baggage may be limited by envelope. Investigation is required to determine optimum fuel and baggage load.

WARNING

Do not attempt to fly this airplane under any conditions when it is loaded outside the limits of the approved weight and center of gravity envelope.

6.7 General Loading Recommendations - Metric (continued)

NOTE

With configuration loadings falling near the envelope limits, it is important to check anticipated landing loadings since fuel burn could result in a final loading outside of the approved weight vs. C.G. envelope.

NOTE

For all airplane configurations, it is the responsibility of the pilot in command to make sure that the airplane always remains within the allowable weight vs. center of gravity envelope while in flight.

NOTE

Always load the fuel equally between the right and left tanks.

6.9 Weight and Balance Determination for Flight - Metric

(a) Record the airplane basic empty weight and moment from the Weight and Balance Data form or from the latest superseding form (Weight and Balance Record) onto the Weight and Balance computation form (figure 6-47).

(b) Record the weight and corresponding moment of each item using the loading tables (figures 6-53 through 6-65).

(c) Add the weight and moment of all items to the basic empty weight and moment to determine the zero fuel weight and moment.

(d) Divide the zero fuel weight moment by the zero fuel weight tc determine the zero fuel weight arm (C.G.).

(e) Check the zero fuel weight and C.G. by locating the weight and arn on the Center of Gravity Limits graph (figure 6-69). Approved point are located within the C.G. envelope. This then meets the weight an balance requirements.

6.9 Weight and Balance Determination for Flight - Metric (cont)

(f) Use the loading table for fuel (figure 6-63) to determine the moment for the fuel being loaded. Record the weight and moment of the fuel in the Weight and Balance Computation Form.

(g) Total the zero fuel weight and moment with the fuel loading weight and moment to obtain ramp weight.

(h) Divide the ramp weight moment by the ramp weight to determine the ramp weight arm (C.G.). Check the ramp weight and C.G. by locating the weight and arm on the Center of Gravity Limits graph (figure 6-69). Approved points are located within the C.G envelope. This then meets the weight and balance requirements.

(i) Subtract the weight and moment of the fuel allowance for engine start, taxi, and runup to determine takeoff weight and moment. A standard 19.33 kilogram fuel allowance for taxi and runup is assumed. The moment for the fuel allowance is determined by the difference in moments of the total fuel loaded and the fuel remaining on board after taxi and runup. Enter the fuel allowance weight and moment in the Weight and Balance Computation form.

(j) Divide the takeoff weight moment by the takeoff weight to determine the takeoff weight arm (C.G.). Check the takeoff weight and C.G. by locating the weight and arm on the Center of Gravity Limits graph (figure 6-69). Approved points are located within the C.G. envelope. This then meets the weight and balance requirements.

(k) Determine the estimated weight of the fuel to be used during the flight to the appropriate destination. The weight and moment for this fuel is determined by the difference of the total fuel remaining after the fuel allowance is removed and the fuel remaining after reaching destination. Use the loading table for fuel (figure 6-63) to determine the moments. Enter the weight and moment of the fuel used during the flight in the Weight and Balance Computation form.

(l) Subtract the weight and moment of the fuel used during the flight to determine landing weight and moment. Divide the landing weight moment by the landing weight to determine the landing weight arm (C.G.). Check the landing weight and C.G. by locating the weight and arm on the Center of Gravity Limits graph (figure 6-69). Approved points are located within the C.G. envelope. This then meets the weight and balance requirements.

6.9 Weight and Balance Determination for Flight - Metric (cont)

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6.9 Weight and Balance Determination for Flight - Metric (cont)

	Weight (kilograms)	Arm Aft of Datum (centimeter)	Moment (centimeter-kilograms)
Basic Empty Weight	1533.1	345.47	529644.8
Pilot (Seat 1)	77.1	344.17	26539.1
Copilot (Seat 2)	77.1	347.22	26770.66
Center Passenger L/H (Seat 3)	81.6	449.58	36706.5
Center Passenger R/H (Seat 4)		449.58	
Rear Passenger L/H (Seat 5)		555.63	
Rear Passenger R/H (Seat 6)		555.63	
Radar pod stowage compartment (max. 2.2 kilograms-soft items only)		399.99	
Aft Golf Baggage net (47.6 kilograms max. -3 bags)-optional		564.67	
Aft Baggage (45.3 kilograms max.) (22.6 kilograms max. with golf bag)	36.3	630.50	22879.2
Aft oil stowage compartment (maximum - 2.2 kilograms)		727.71	
Zero Fuel Weight (maximum - 2199.9 kilograms)	1805.2	355.94	642540.26
Fuel (643.45 litres maximum)[1] @ 0.80 kilograms per litre	410.3	376.83	154601.3
Maximum Ramp Weight (2328.7 kilograms)	2215.5	359.80	797141.56
Fuel allowance for Engine Start, Taxi and Run up[2]	-19.33	380.71	-7358.2
Maximum Takeoff Weight (2309.7 kilograms)	2196.17	359.62	789783.36

Locate the arm (Center of Gravity, C.G.) of the takeoff weight on the Center of Gravity Limits graph (figure 6-69). If this point falls within the Weight/C.G. envelope, the loading is acceptable for takeoff.

Example of Weight and Balance Computation
Standard Configuration (Sample Loading)
Figure 6-43

6.9 Weight and Balance Determination for Flight - Metric (cont)

Weight Calculation	Weight (kilograms)
Total Fuel	410.27
Fuel allowance for Engine Start, Taxi and Run up*	-19.33
Fuel Remaining on board	390.94
Moment Calculation	Moment (centimeter-kilograms)
Total Fuel	154601.3
Fuel Remaining on board	-147243.1
Fuel allowance for Engine Start, Taxi and Run up	7358.2

Notes:

1. Use the fuel loading table (figure 6-63) to determine the moment for the amount of fuel being loaded for the flight. If fuel is to be added to existing fuel, determine the total fuel weight and use the fuel loading table to determine the fuel moment. (Arm = Moment/Weight).
2. A standard 19.33 kilograms fuel allowance for taxi and runup is assumed. The moment for the fuel allowance is determined by the difference in moments of the total fuel loaded and the fuel remaining on board after taxi and runup. See example, figure 6-45.

Example of Moment Calculation for Fuel Allowance
Standard Configuration (Sample Loading)
Figure 6-45

6.9 Weight and Balance Determination for Flight - Metric (cont)

The moment for the fuel burned during the mission is determined by the difference in moments of the takeoff fuel loaded and the fuel remaining on board after landing. See example below.

Weight Calculation	Weight (kilograms)
Takeoff Fuel	**390.94**
Mission Fuel used (Fuel burned during Climb, Cruise and Descent)	**-287.2**
Post Mission Fuel (Fuel remaining at Landing)	**103.74**
Moment Calculation	Moment (centimeter-kilograms)
Takeoff Fuel	**147243.10**
Mission Fuel used (Fuel burned during Climb, Cruise and Descent)	**-38160.6**
Post Mission Fuel (Fuel remaining at Landing)	**109082.5**

Maximum Takeoff Weight (2309.7 kilograms)	2196.17	359.50	789551.75
Minus Estimated Fuel Burn-off (Climb & Cruise) @ 0.80 kilograms per litre	-287.2	379.76	-109082.5
Maximum Landing Weight (2199.91 kilograms)	1909.00	356.45	680469.28

Locate the arm (Center of Gravity, C.G.) of the landing weight on the Center of Gravity Limits graph (figure 6-69). If this point falls within the Weight/C.G. envelope, the loading is acceptable for landing.

IT IS THE SOLE RESPONSIBILITY OF THE PILOT IN COMMAND TO ENSURE THAT THE AIRPLANE IS LOADED PROPERLY AT ALL TIMES.

Example of Moment Calculation for Fuel Burned During the Mission
Figure 6-46

6.9 Weight and Balance Determination for Flight - Metric (cont)

	Weight (kilograms)	Arm Aft of Datum (centimeter)	Moment (centimeter-kilograms)
Basic Empty Weight		345.47	
Pilot (Seat 1)		344.17	
Copilot (Seat 2)		347.22	
Center Passenger L/H (Seat 3)		449.58	
Center Passenger R/H (Seat 4)		449.58	
Rear Passenger L/H (Seat 5)		555.63	
Rear Passenger R/H (Seat 6)		555.63	
Radar pod stowage compartment (maximum 2.27 kilograms-soft items only)		399.99	
Aft Golf Baggage net (47.63 kilograms max. - 3 bags)-optional		564.67	
Aft Baggage (45.36 kilograms max. (22.68 kilograms max. with golf bag net option))		630.50	
Aft oil stowage compartment (max. - 2.27 kilograms)			
Zero Fuel Weight (maximum - 2199.9 kilograms)			
Fuel (643.45 litres max.)[1] @ 0.80 kilograms per litre			
Maximum Ramp Weight (2328.7 kilograms)			
Fuel allowance for Engine Start, Taxi and Run up[2]	-19.33		
Maximum Takeoff Weight (2309.7 kilograms)			

Locate the arm (Center of Gravity, C.G.) of the takeoff weight on the Center of Gravity Limits graph (figure 6-69). If this point falls within the Weight/C.G. envelope, the loading is acceptable for takeoff.

Refer to page 6-47a for Notes 1 and 2.

Weight and Balance Computation Form
Standard Configuration (Normal Category)
Figure 6-47A

6.9 Weight and Balance Determination for Flight - Metric (cont)

	Weight (kilograms)	Arm Aft of Datum (icentimeters)	Moment (centimeters-kilograms)
Basic Empty Weight			
Pilot (Seat 1)		344.17	
Copilot (Seat 2)		347.22	
Stowage Area #1 (Maximum 2.27 kilograms) (see Figure 6-67)		402.46	
Stowage Area #2 (Maximum 2.27 kilograms) (see Figure 6-67)		402.46	
Stowage Area #3 (Maximum 2.27 kilograms) (see Figure 6-67)		402.46	
Stowage Area #4 (Maximum 2.27 kilograms) (see Figure 6-67)		434.98	
Ice Chest drawer (Maximum 9.07 kilograms) (see Figure 6-67)		466.98	
Center Passenger R/H (Seat 4)		449.58	
Rear Passenger L/H (Seat 5)		555.63	
Rear Passenger R/H (Seat 6)		555.63	
Radar pod stowage compartment (max. 2.2 kilograms-soft items only)		399.99	
Aft Golf Baggage net (47.6 kilograms maximum -3 bags)-optional		564.67	
Aft Baggage (45.3 kilograms max. (22.6 kilograms max. with golf bag))		630.50	
Aft oil stowage compartment (maximum - 2.2 kilograms)		727.71	
Zero Fuel Weight (maximum - 2199.9 kilograms)			
Fuel (643.45 litres maximum)[1] @ 0.80 kilograms per litre			
Maximum Ramp Weight (2328.7 kilograms)			
Fuel allowance for Engine Start, Taxi and Run up[2]	-19.33		
Maximum Takeoff Weight (2309.7 kilograms)			

Locate the arm (Center of Gravity, C.G.) of the takeoff weight on the Center of Gravity Limits graph (figure 6-69). If this point falls within the Weight/C.G. envelope, the loading is acceptable for takeoff.

Refer to page 6-47a for Notes 1 and 2.

Weight and Balance Computation Form
Executive/Entertainment Configuration (Normal Category)
Figure 6-47B

6.9 Weight and Balance Determination for Flight - Metric (cont)

Notes:

1. Use the fuel loading table (figure 6-63) to determine the moment for the amount of fuel being loaded for the flight. If fuel is to be added to existing fuel, determine the total fuel weight and use the fuel loading table to determine the fuel moment. (Arm = Moment/Weight).
2. A standard 19.33 kilograms fuel allowance for taxi and runup is assumed. The moment for the fuel allowance is determined by the difference in moments of the total fuel loaded and the fuel remaining on board after taxi and runup.

6.9 Weight and Balance Determination for Flight - Metric (cont)

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6.9 Weight and Balance Determination for Flight - Metric (cont)

Locate the arm (Center of Gravity, C.G.) of the landing weight on the Center of Gravity Limits graph (figure 6-69). If this point falls within the Weight/C.G. envelope, the loading is acceptable for landing.

Weight Calculation	Weight (kilograms)
Total Fuel	
Fuel allowance for Engine Start, Taxi and Run up*	
Fuel Remaining on board	
Moment Calculation	Moment (centimeter-kilograms)
Total Fuel	
Fuel Remaining on board	
Fuel allowance for Engine Start, Taxi and Run up	

Notes:

1. Use the fuel loading table (figure 6-63) to determine the moment for the amount of fuel being loaded for the flight. If fuel is to be added to existing fuel, determine the total fuel weight and use the fuel loading table to determine the fuel moment. (Arm = Moment/Weight).
2. A standard 19.33 kilograms fuel allowance for taxi and runup is assumed. The moment for the fuel allowance is determined by the difference in moments of the total fuel loaded and the fuel remaining on board after taxi and runup. See example, figure 6-45.

Moment Calculation for Fuel Allowance
Figure 6-48

6.9 Weight and Balance Determination for Flight - Metric (cont)

Weight Calculation	Weight (kilograms)
Takeoff Fuel	
Mission Fuel used (Fuel burned during Climb, Cruise and Descent)	
Post Mission Fuel (Fuel remaining at Landing)	
Moment Calculation	**Moment (centimeter-kilograms)**
Takeoff Fuel	
Mission Fuel used (Fuel burned during Climb, Cruise and Descent)	
Post Mission Fuel (Fuel remaining at Landing)	

Maximum Takeoff Weight (2309.7 kilograms)			
Minus Estimated Fuel Burn-off (Climb & Cruise) @ 0.80 kilograms per litre			
Maximum Landing Weight (2199.91 kilograms)			

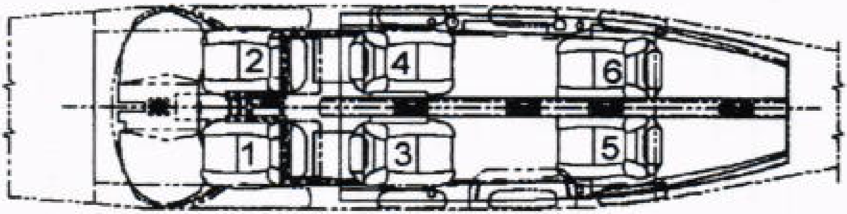
Locate the arm (Center of Gravity, C.G.) of the landing weight on the Center of Gravity Limits graph (figure 6-69). If this point falls within the Weight/C.G. envelope, the loading is acceptable for landing.

IT IS THE SOLE RESPONSIBILITY OF THE PILOT IN COMMAND TO ENSURE THAT THE AIRPLANE IS LOADED PROPERLY AT ALL TIMES.

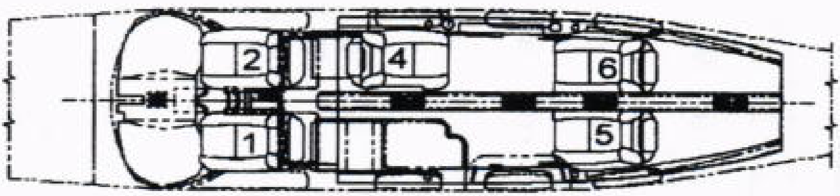
Moment Calculation for Fuel Burned During the Mission
Figure 6-49

6.9 Weight and Balance Determination for Flight - Metric (cont)

Standard Configuration



Executive/Entertainment Configuration



Seating Configurations
Figure 6-51

6.9 Weight and Balance Determination for Flight - Metric (cont)

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6.9 Weight and Balance Determination for Flight - Metric (cont)

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6.9 Weight and Balance Determination for Flight - Metric (cont)

Weight	Pilot	Copilot (Seat 2) (Folding)	Seat 3	Seat 4	Seat 5	Seat 6
(kilograms)	Arm FS 344.17	Arm FS 347.22	Arm FS 449.48	Arm FS 449.48	Arm FS 555.63	Arm FS 555.63
	Moment (centimeters-kilograms)					
9.1	3122.2	3159.7	4078.5	4078.5	5040.5	5040.5
13.6	4683.4	4722.2	6117.7	6117.7	7560.8	7560.8
18.1	6244.5	6284.7	8157.0	8157.0	10081.0	10081.0
22.7	7805.6	7881.9	10196.2	10196.2	12601.3	12601.3
27.2	9366.7	9444.4	12235.5	12235.5	15121.6	15121.6
31.8	10927.8	11041.6	14274.7	14274.7	17641.8	17641.8
36.3	12489.0	12604.1	16314.0	16314.0	20162.1	20162.1
40.8	14050.1	14166.6	18353.2	18353.2	22682.3	22682.3
45.4	15611.2	15763.8	20392.5	20392.5	25202.6	25202.6
49.9	17172.3	17326.3	22431.7	22431.7	27722.9	27722.9
54.4	18733.4	18888.8	24471.0	24471.0	30243.1	30243.1
59.0	20294.6	20486.0	26510.2	26510.2	32763.4	32763.4
63.5	21855.7	22048.5	28549.5	28549.5	35283.6	35283.6
68.0	23416.8	23611.0	30588.7	30588.7	37803.9	37803.9
72.6	24977.9	25208.2	32628.0	32628.0	40324.2	40324.2
77.1	26539.1	26770.7	34667.2	34667.2	42844.4	42844.4

Loading Table
Occupants (Standard Configuration)
Figure 6-53

6.9 Weight and Balance Determination for Flight - Metric (cont)

Weight	Pilot	Copilot (Seat 2) (Folding)	Seat 4	Seat 5	Seat 6
(kilograms)	Arm FS 344.17	Arm FS 347.22	Arm FS 449.48	Arm FS 555.63	Arm FS 555.63
	Moment (inch - Pounds)				
9.1	3122.2	3159.7	4078.5	5040.5	5040.5
13.6	4683.4	4722.2	6117.7	7560.8	7560.8
18.1	6244.5	6284.7	8157.0	10081.0	10081.0
22.7	7805.6	7881.9	10196.2	12601.3	12601.3
27.2	9366.7	9444.4	12235.5	15121.6	15121.6
31.8	10927.8	11041.6	14274.7	17641.8	17641.8
36.3	12489.0	12604.1	16314.0	20162.1	20162.1
40.8	14050.1	14166.6	18353.2	22682.3	22682.3
45.4	15611.2	15763.8	20392.5	25202.6	25202.6
49.9	17172.3	17326.3	22431.7	27722.9	27722.9
54.4	18733.4	18888.8	24471.0	30243.1	30243.1
59.0	20294.6	20486.0	26510.2	32763.4	32763.4
63.5	21855.7	22048.5	28549.5	35283.6	35283.6
68.0	23416.8	23611.0	30588.7	37803.9	37803.9
72.6	24977.9	25208.2	32628.0	40324.2	40324.2
77.1	26539.1	26770.7	34667.2	42844.4	42844.4

Loading Table
Occupants (Executive/Entertainment Configuration)
Figure 6-55

6.9 Weight and Balance Determination for Flight - Metric (cont)

Weight (kilograms)	Standard baggage Arm FS 630.50 Moment (centimeter-kilograms)
4.5	2859.9
9.1	5719.8
13.6	8579.7
18.1	11439.6
22.7	14299.5
27.2	17159.4
31.8	20019.3
36.3	22879.2
40.8	25739.1
45.4	28599.0

Loading Table
Standard Baggage
Figure 6-57

6.9 Weight and Balance Determination for Flight - Metric (cont)

Weight	Golf baggage location	Aft location
(kilograms)	Arm FS 564.67	Arm FS 630.50
	Moment (centimeter-kilograms)	Moment (centimeter-kilograms)
4.5	2561.3	2859.9
9.1	5122.5	5719.8
13.6	7683.8	8579.7
18.1	10245.1	11439.6
22.7	12806.4	14299.5
27.2	15367.6	
31.8	17928.9	
36.3	20490.2	
40.8	23051.5	
45.4	25612.7	
47.6	26893.4	

Loading Table
Golf Baggage - Optional
Figure 6-59

Golf Baggage Loading Configuration
Figure 6-61

6.9 Weight and Balance Determination for Flight - Metric (cont)

Litres (unusable fuel not included)	Fuel Weight (kilograms)	Fuel Moment Arm Varies (centimeter - kilograms)
75.7	60.8	22056.9
94.6	76.0	27742.9
113.6	91.2	33446.8
132.5	106.4	39161.3
151.4	121.6	44883.6
170.3	136.8	50613.6
189.3	152.0	56351.7
208.2	167.1	62098.8
227.1	182.3	67854.8
246.0	197.5	73619.3
265.0	212.7	79391.2
283.9	227.9	85169.0
302.8	243.1	90951.1
321.7	258.3	96735.8
340.7	273.5	102521.9
359.6	288.7	108308.5
378.5	303.9	114095.2
397.4	319.1	119881.8
416.4	334.3	125668.5
435.3	349.5	131455.5
454.2	364.7	137242.9
473.1	379.9	143030.2
492.1	395.1	148816.7
511.0	410.3	154601.3
529.9	425.5	160382.9
548.8	440.7	166161.6
567.8	455.9	171939.3
586.7	471.1	177722.4
605.6	486.2	183524.2
624.5	501.4	189368.7
643.45	516.6	195295.7

1.3 litres of unusable fuel (9.12 kilograms, 3343.26 centimeters-kilograms) ıcluded in basic empty weight. The above weights are based on a fuel specific ·avity of 802.6732 kilograms per cubic meters at 15 degrees C for Jet A and Jet -1, which yields a fuel density of 0.8027 kilograms per litre.

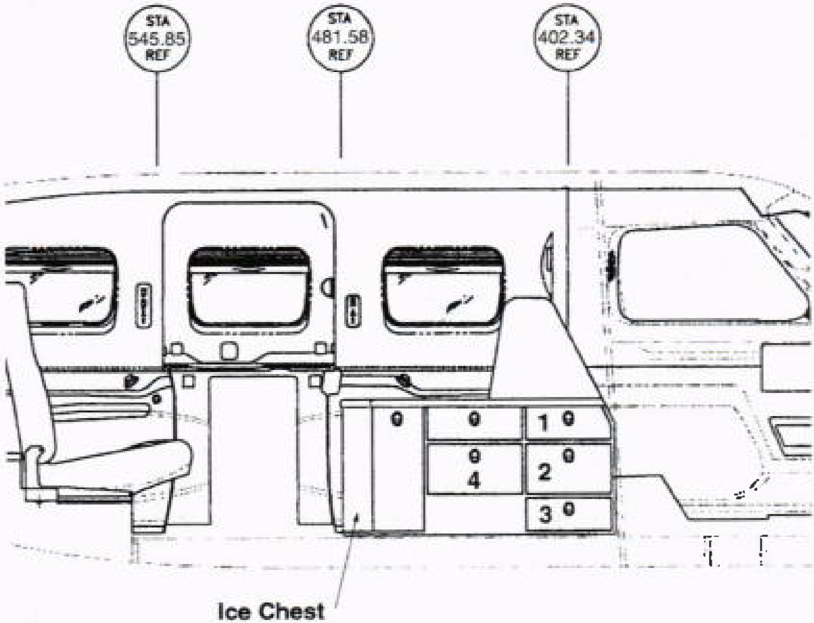
Loading Table
Fuel
Figure 6-63

6.9 Weight and Balance Determination for Flight - Metric (cont)

Weight (kilograms)	Stowage area 1-3 Arm FS 402.463	Stowage area 4 Arm FS 434.975	Ice chest Arm FS 466.979
	Moment (centimeters - kilograms)		
0.5	182.6	197.3	211.8
0.9	365.1	394.6	423.6
1.4	547.7	591.9	635.5
1.8	730.2	789.2	847.3
2.3	912.8	986.5	1059.1
2.7			1270.9
3.2			1482.7
3.6			1694.5
4.1			1906.4
4.5			2118.2
5.0			2330.0
5.4			2541.8
5.9			2753.6
6.4			2965.4
6.8			3177.3
7.3			3389.1
7.7			3600.9
8.2			3812.7
8.6			4024.5
9.1			4236.3

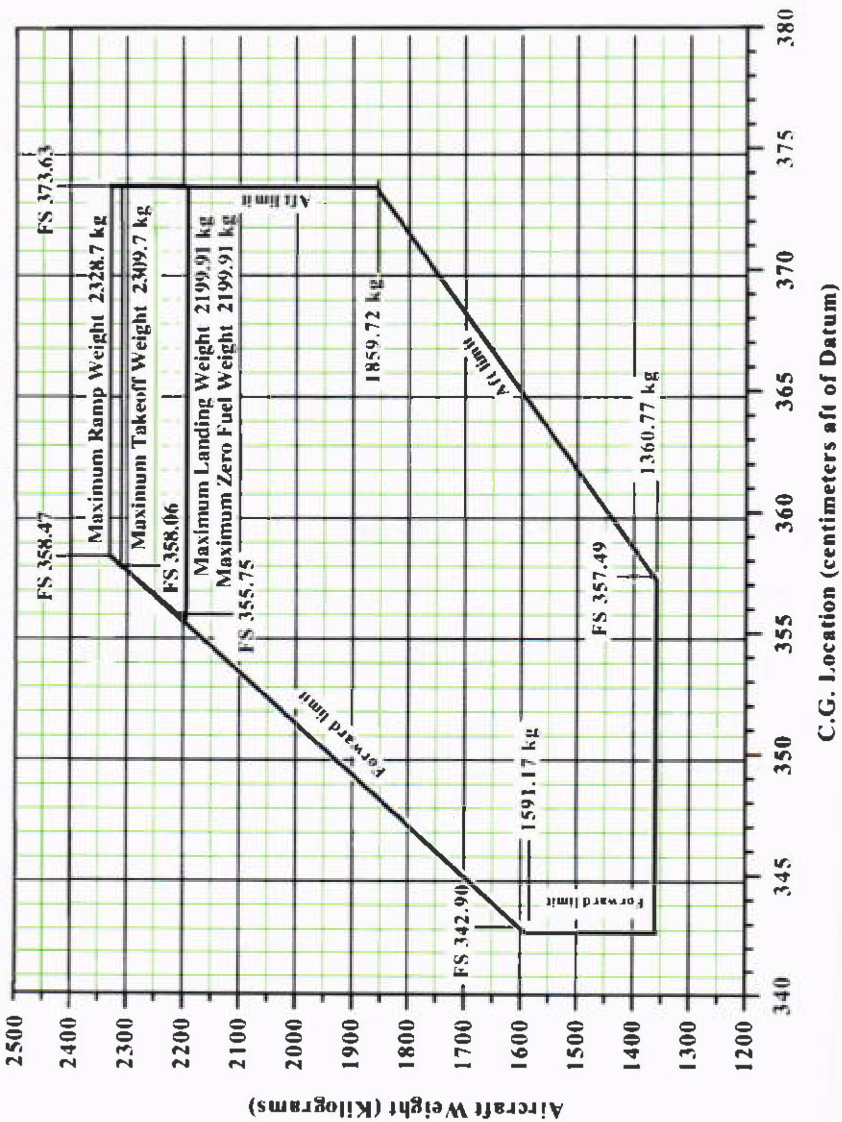
Loading Table
Executive/Entertainment Stowage Compartment
Figure 6-65

6.9 Weight and Balance Determination for Flight - Metric (cont)



Stowage Configuration
Figure 6-67

6.9 Weight and Balance Determination for Flight - Metric (cont)



Center of Gravity Limits Graph
Figure 6-69

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DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

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SECTION 7

DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

SECTION 7

DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

7.1 THE AIRPLANE

The PA-46-500TP M500 is a single engine, all metal, retractable landing gear, low wing, turbo-propeller airplane. It has a pressurized cabin with seating for six occupants and a luggage compartment located behind the aft cabin seats.

7.3 THE AIRFRAME

The primary airframe is of aluminum alloy construction, with a steel combination engine mount - nose gear support structure. The nose cowl is made of aluminum and fiberglass.

The fuselage is an all metal, semi-monocoque structure with flush riveted skin. The skin has internally bonded doublers and is butt jointed at all seams not in the airflow direction. There are two basic fuselage sections: the pressurized cabin section and the tail cone section. The cabin section is sealed to maintain pressurization.

The seating arrangement includes two crew seats and four passenger seats. The forward passenger seats face aft, and all passenger seats have adjustable backs with built-in headrests. An inside baggage area is provided aft of the rear passenger seats.

Cabin access is through the main cabin door, located on the left side, aft of the wing. The main door is a horizontally split door with retractable steps in the lower half. The upper half is held open by a gas spring. A plug type, inward releasing, emergency egress door is located on the right side adjacent to the aft facing seat.

Windows include a two-piece windshield, pilot and copilot windows, a storm window in the pilot's window, and three passenger windows on each side.

7.3 THE AIRFRAME (continued)

The wing is a three section structure. The center section built-up main spar extends through the lower fuselage and outboard of each main landing gear. This section has two forward spars and a rear spar which are pin jointed at the fuselage sides. The main landing gear retracts inward into recesses located aft of the main spar. The outboard section of each wing, to within approximately 18 in. (46 cm) of the tip, is a sealed integral fuel cell. Portions of the wing structure are adhesively bonded, and skins are butt jointed and flush riveted for a smooth airfoil surface.

The all-metal flaps are electrically actuated through a mechanical linkage. The flaps extend aft and down on three tracks and have four preselect positions (up, 10°, 20°, and 36°).

The all-metal ailerons are mass balanced and operated by a cable system mounted on the aft wing spar.

The empennage is of conventional fin and rudder, stabilizer and elevator design with aerodynamic and mass balanced control surfaces. Surfaces are all-metal construction. The single-piece elevator assembly incorporates a center-mounted anti-servo trim tab. The rudder trim tab is operated by an electrically driven actuator.

Various access panels on the fuselage, wings and empennage are removable for service or inspection purposes.

Electrical bonding is provided to ensure good electrical continuity between components. Lightning strike protection is provided in accordance with presently accepted practices. Anti-static wicks are provided on trailing edges of ailerons, elevator and rudder to discharge static electricity that might cause avionics interference.

7.5 ENGINE AND PROPELLER

Engine

The M500 is powered by a Pratt & Whitney PT6A-42A turbo-propeller engine, with a flat rated power of 500 shp and maximum propeller speed of 2000 RPM. This engine is a reverse flow, free turbine arrangement. Accessories include a starter/generator and a belt driven alternator and air conditioning compressor.

Engine intake air is provided through dual, symmetric air inlets located on the forward portion of the cowling at the four and eight o'clock positions. The inlets are of fixed geometry such that no moving ice vanes or doors are utilized. The inlets are designed such that the dynamics of icing conditions do not allow the inlet to ice closed. Both inlets supply air to an inertial separator, which in turn supplies a common engine inlet plenum and intake screen.

The inertial separator functions by preventing foreign objects from making an abrupt turn into the plenum and instead exit through the bypass outlet. As air enters through the intake screen, it is ducted into a three-stage axial and single-stage centrifugal compressor driven by a single-stage reaction turbine. A dual turbine, counter-rotating with the first, drives the propeller through a two-stage reduction gear box. Exhaust is provided through dual exhaust stacks located on either side of the engine just behind the propeller.

A single annular combustion chamber, containing 14 removable fuel nozzles and two igniter plugs, comprises the combustion system. Seven of the fuel nozzles are used for starting; the remaining nozzles activate as the engine accelerates. A hydropneumatic fuel control schedules fuel flow to maintain engine power.

The ignition system consists of one exciter box, two ignition leads and two park igniters. Both igniters are engaged simultaneously. DC power is delivered o the exciter box from the essential bus through an ignition mode selector witch in the overhead switch panel and a torque pressure switch. When in the utomatic ignition mode, the ignition system will activate when the torque is ss than or equal to approximately 275 ft. lbs., and deactivate when the torque greater than or equal to approximately 375 ft. lbs. Continuous ignition, at any rque setting, is provided in the manual ignition mode.

7.5 ENGINE AND PROPELLER (continued)

Engine (continued)

The engine incorporates an integral oil lubrication system with an oil tank of approximately 12 quarts (11.35 liters) total capacity including propeller, integral engine oil system, and oil cooler. The oil tank is an integral part of the compressor inlet case in front of the accessory gearbox and contains a filler neck with calibrated dipstick. The filler neck incorporates a ball check valve to ensure oil does not migrate out of the filler neck in the event the dipstick is not properly secured. In addition, an oil level sight glass is provided to indicate the oil level in the gearbox without having to remove the dipstick. Adequate oil level for engine operation is indicated by an oil level within the green area of the sight glass.

Engine instruments are displayed on the MFD in normal and reversionary modes and on the PFD in reversionary mode only.

Fire detection is provided by a heat sensitive fire cable, which passes a current at approximately 540° F (282.2° C). This current alerts the fire detection computer, which then activates the red ENGINE FIRE message on the CAS display with repeating aural chime. When switched to test mode, an electrical current is passed to the fire detection computer, which should sense the current and illuminate the red ENGINE FIRE message with repeating aural chime.

7.5 ENGINE AND PROPELLER (continued)

Propeller

The propeller is a Hartzell model number HC-E4N-3Q/E8501K-3.5, 82.5 inch diameter, four blade, metal, constant speed unit with reversing and full feathering capabilities. Each propeller blade incorporates an electric deice boot.

The propeller governor pressurizes and regulates the flow of the propeller gearbox oil to a piston in the propeller dome. The piston is linked by a sliding rod and fork arrangement to the propeller blades. Governor oil pressure against the piston works to decrease propeller blade pitch. Centrifugal twisting moments on the propeller blades work to decrease propeller blade pitch and increase rpm. Governing of the interaction of these and other forces to maintain a constant rpm is provided by the propeller governor.

The propeller governor maintains a constant propeller speed and is not pilot controlled, but rather fixed at a maximum propeller speed of 2000 RPM. Propeller feather is selected by moving the condition lever to the cutoff position. Beta and reverse blade angles are controlled by power lever movement. Movement of the power lever into the beta and reverse range of operation is only possible on the ground via a squat switch controlled solenoid. An additional overspeed governor is also provided to protect against propeller and power turbine overspeed.

Propeller feathering is controlled electrically by switches in the throttle quadrant and a torque sensing switch. The battery switch must be ON to feather the propeller.

7.7 ENGINE CONTROLS

The engine is controlled by power, condition, and manual override (MOR) levers, located on the control quadrant of the lower central instrument panel. The power lever is used to actuate the engine fuel control unit as well as propeller beta and reverse settings. The power lever is connected through linkage to the fuel control unit at the rear of the engine, and controls engine power through the full range from maximum takeoff power back to idle and further aft to the beta detent and the reverse detent. When the power lever is at the idle stop, the gas generator (Ng) is at idle and the propeller (Np) is at minimum pitch. A lifting action is required to raise the power lever over the idle detent to the beta and reverse detents. When the power lever is selected to the beta position, the gas generator is at idle and the propeller blade pitch is controlled by the power lever from idle thrust back through a zero or a no thrust condition. The beta position may be used after landing during ground roll and to control taxi speed. Further lifting and aft movement of the power lever to the reverse detent increases engine power and provides negative thrust (reverse).

WARNING

To prevent damage to the control linkage, do not move the power lever aft of the idle stop when the engine is not operating.

WARNING

Positioning the power lever aft of the flight idle stop in flight is prohibited. Such positioning may cause loss of airplane control or may result in an engine overspeed condition and consequent loss of engine power.

The CHECK GEAR aural alert is activated by an idle power setting or flap extension beyond 10 degrees combined with the landing gear not in a down and locked position. The aural alert will continue to sound until the gear is down and locked, the power setting is increased, or the flaps are retracted to less than 10 degrees. This is a safety feature to warn the pilot of an inadvertent gear-up landing.

On engines equipped with a Honeywell fuel control unit, the condition lever controls the RUN and CUT-OFF functions as well as propeller FEATHER. The full forward position sets the run fuel flow, and full aft position cuts off fuel flow and feathers the propeller.

7.7 ENGINE CONTROLS (continued)

CAUTION

Do not use the COLD START position for engine starting when the oil temperature is greater than 0°C as this could result in an over-temperature condition.

Engines equipped with a Woodward fuel control unit, as evidenced by a COLD START position on the condition lever placard, require fuel enrichment during cold weather starting when the engine oil temperature is at or below 0°C. Fuel enrichment is controlled by placing the condition lever full forward into the COLD START position and holding it there until Ng increases to a minimum of 50%, after which it is moved to the RUN position. Placement of the condition lever in the COLD START position requires movement of the control knob with forward pressure while lifting slightly from the RUN position (Figure 7-2). It is recommended the operator familiarize themselves with this feature prior to engine start by placing the condition lever into the COLD START position before application of battery power. Return the condition lever to the CUT-OFF/FEATHER position prior to start.

CAUTION

Do not force the condition lever into the COLD START position. Use of excessive force may cause damage to the condition lever.

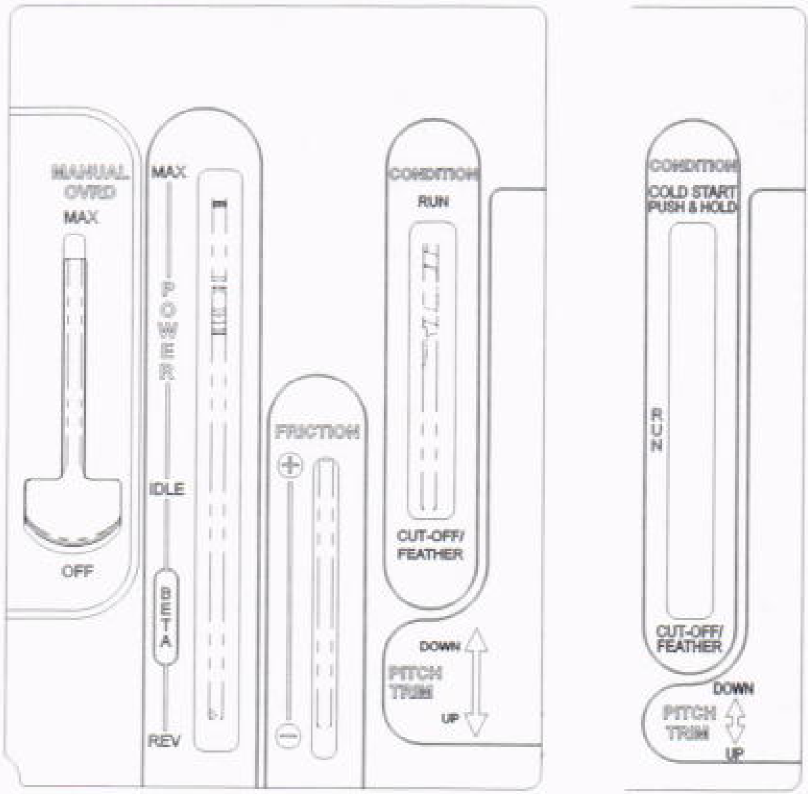
The RUN position is used for engine starting when the oil temperature is greater than 0°C and for all normal ground and flight operations. A detent at the RUN position prevents inadvertent movement to the COLD START or CUT-OFF/FEATHER positions. The full aft CUT-OFF/FEATHER position is used to cut off fuel flow to the engine and simultaneously feather the propeller.

Images of both engine control quadrants are shown in Figure 7-1.

7.7 ENGINE CONTROLS (continued)

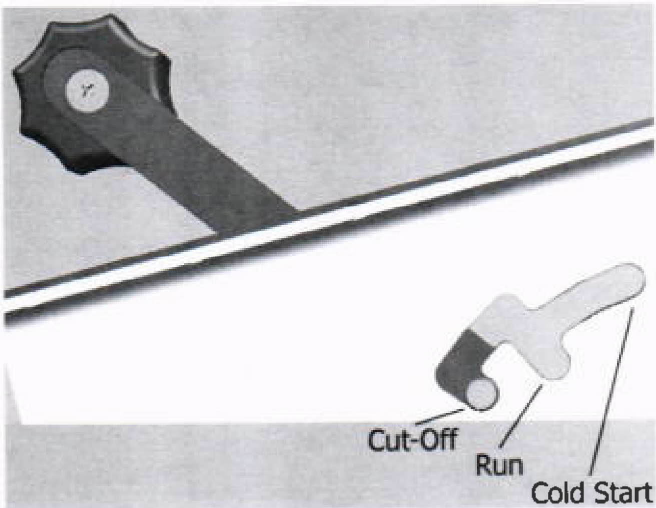
For Engines Equipped with the Honeywell Fuel Control Units

Condition Lever for Engines Equipped with the Woodward Fuel Control Units (Cold Start Functionality)



Engine Control Quadrants
Figure 7-1

7.7 ENGINE CONTROLS (continued)



Condition Lever - Woodward FCU
Figure 7-2

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7.7 ENGINE CONTROLS (continued)

The MOR is an emergency device that may allow the crew to regain power and continue safe flight and landing following fuel control unit (FCU) malfunction or power lever control loss. The MOR is used to control fuel flow to the engine in the event a pneumatic malfunction occurs in the engine fuel control unit. A malfunction of the pneumatic signal (Py) input to the FCU will result in the fuel flow decreasing to minimum idle (approximately 48% Ng at sea level and increasing with altitude). Additional effects of a Py malfunction are loss of the torque/Ng limiting functions and, Nf governor operation (reverse is not available).

The manual override (MOR) lever is located in the center console to the left of the power lever. To operate the MOR, lift up on the lever and slowly move it forward to take up the dead-band until the engine responds. If possible, allow engine to stabilize before advancing further. Monitor gas generator speed (Ng), ITT, and torque. Rapid movement of the MOR lever can cause compressor surges and excessive ITT (over temperature) conditions.

The friction adjustment lever, located in the middle of the control quadrant, may be adjusted to increase or decrease the friction holding the power lever.

7.9 GARMIN G1000 AVIONICS SYSTEM

NOTE

The latest appropriate revision of the Garmin G1000 Cockpit Reference Guide for the Piper PA-46-500TP (Garmin P/N 190-02381-00), and the Garmin G1000 Pilot's Guide for the Piper PA-46-500TP (Garmin P/N 190-02380-00), contain operational information and detailed descriptions of the Garmin G1000 avionics system.

The Garmin G1000 Integrated Avionics System consists of dual Primary Flight Displays (PFD), a Multi-Function Display (MFD), an Audio Panel, dual Attitude and Heading Reference Systems (AHRS), dual Air Data Computers (ADC), and the sensors and computers to process flight and engine information for display to the pilot. The system contains dual GPS WAAS (SBAS) receivers, dual VOR/ILS receivers, dual VHF communications transceivers, dual transponders, and an integrated crew alerting system (CAS) to alert the pilot of status annunciations, caution annunciations and warning annunciations. The G1000 system provides system messages which alert the pilot to abnormalities associated with the G1000 system. The G1000 system also has a terrain proximity system, Traffic Information Service (TIS) and FliteCharts. Optional avionics equipment include DME, Class B TAWS, Traffic Advisory System (TAS), SurfaceWatch, Stormscope, Jeppesen ChartView, weather radar, Synthetic Vision, AOPA Facilities Directory, Iridium Worldwide Weather Services, Iridium Voice Calls and SMS Text, and the Garmin Datalink (GDL) for XM weather and music.

Primary Flight Display

The Primary Flight Display (PFD) typically displays airspeed, attitude, altitude, and heading information in a traditional format. Slip information is shown as a trapezoid under the bank pointer. One width of the trapezoid is equal to a one ball width slip. Rate of turn information is shown on the scale above the rotating compass card; a standard rate turn is accomplished when the turn rate trend vector stops at the second tick mark (standard rate tick mark). OAT information i presented in the lower left corner of the PFD (lower right corner in reversionar mode). The measured value of OAT is adjusted for probe recovery factor and ra air effects to indicate static air temperature.

The primary function of the PFD's is to provide attitude and heading da from the Attitude and Heading Reference System, air data from the Air Da Computer, and navigation and alerting information. The PFDs may also be us for flight planning.

Primary Flight Display (continued)

The following controls are available on the PFD (clockwise from top right):

- Communications frequency volume and squelch knob
- Communications frequency set knobs
- Communications frequency transfer button
- Altimeter setting knob (BARO)
- Course knob
- Map range knob and cursor control
- FMS control buttons and knob
- PFD softkey buttons, including master warning/caution acknowledgement
- Altitude reference set knob
- Heading bug control
- Navigation frequency transfer button
- Navigation frequency set knobs
- Navigation frequency volume and Identifier knob

The primary function of the VHF Communication portion of the G1000 is to enable external radio communication. The primary function of the VOR/ILS Receiver portion of the equipment is to receive VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS and SBAS satellites and process this information in real-time to obtain the user's position, velocity, and time. This GPS SBAS is certified under TSO C146a and therefore is qualified as a primary navigation system. The PFD also displays all autopilot annunciations, including mode annunciations at the top, center of the display and system and preflight test status annunciations near the top of the altitude tape.

Attitude and Heading Reference System (AHRS)

The AHRS uses GPS, rate sensors, air data, and magnetic variation to provide pitch and roll attitude, sideslip and heading to the display system. The AHRS incorporates internal monitors to determine validity of its parameters. If a parameter is suspect but still within tolerance of the internal monitors, the appropriate amber annunciation will be posted and the pilot, considering similar parameters for comparison, must determine the suspect parameter. If the parameter is determined invalid by the internal monitors, a red-X is displayed over the invalid parameter. If the entire AHRS becomes invalid while in flight, the G1000 system will automatically select the other AHRS, as indicated by a

Primary Flight Display (continued)

Attitude and Heading Reference System (AHRS) (continued)

BOTH ON AHRS1 or BOTH ON AHRS2 annunciation, depending on which AHRS is functioning, and post the appropriate parameter name in white. In this situation, the autopilot will become inoperative. If the AHRS becomes valid again, the pilot must manually re-select that AHRS if desired. Selection of which AHRS should be used or is being used is made via the PFD OPT then SENSORS softkeys on the PFD. If both AHRS become invalid, a red-X will be displayed on the attitude indicator and a red-X will be displayed on the heading display. The course pointer on the HSI will indicate straight up and the course may be set using the digital window.The AHRS will align while the aircraft is in motion, but will align quicker if the wings are kept level during the alignment process.

Air Data Computer (ADC)

The ADC provides airspeed, altitude, vertical speed, and air temperature to the display system. In addition to the primary displays, this information is used by the FMS and Traffic systems.

The ADC incorporates internal monitors to determine validity of its parameters. If a parameter is suspect but still within tolerance of the internal monitors, the appropriate parameter amber annunciation will be posted and the pilot, considering similar parameters for comparison, must determine the suspect parameter. If the parameter is determined invalid by the internal monitors, a red-X is displayed over the invalid parameter and the appropriate parameter names are annunciated in white. If the entire ADC becomes invalid while in flight, the G1000 system will automatically select the other ADC, as indicated by a BOTH ON ADC1 or BOTH ON ADC2 annunciation, depending on which ADC is functioning, and post the appropriate parameter name in white. If the ADC becomes valid again the pilot must manually re-select that ADC if desired via the SENSOR softke on the PFD. If both ADC's become invalid, a red-X will be displayed on th appropriate parameters.

Primary Flight Display (continued)

Crew Alerting System (CAS) Messages

The Crew Alerting System (CAS) consists of a Master Warning and Caution softkey on the lower right side of the PFD operating in conjunction with CAS text messages. CAS text messages appear in the lower right area of the PFD during normal and reversionary mode operations. CAS messages are posted in order of priority with warnings appearing above cautions and cautions appearing above advisories. The CAS message window is capable of displaying a total of 12 CAS messages in both normal and reversionary display modes. Should the total CAS message count exceed 12, the oldest of the lowest priority messages can only be seen by scrolling through the list. Scrolling through caution and advisory CAS messages is possible via the CAS ↑ or CAS ↓ softkeys. Warning CAS messages are not scrollable. The severity of CAS messages are categorized as Warning, Caution and Advisory as follows:

Red Warning Messages

Warning messages consist of a flashing red Master WARNING softkey and a flashing (inversely red on white) CAS Warning text message located in the lower right area of the PFD. Warnings are accompanied by a continuous triple chime, which can be silenced by pressing (acknowledging) the Master WARNING softkey on the PFD. When acknowledged, the Master WARNING softkey will extinguish, the CAS Warning text message will stop flashing and will revert to normal (red on black) annunciation, and the aural chime will silence. CAS Warning text messages will persist until the initiating condition is removed. If the warning was initiated by an engine parameter, that parameter's indication will continue to flash until the condition is removed.

Primary Flight Display (continued)

Crew Alerting System (CAS) Messages (continued)

Amber Caution Messages

Caution messages consist of a flashing amber Master CAUTION softkey, and a flashing (inversely black on amber) CAS Caution text message located in the lower right area of the PFD. Cautions are accompanied by a double chime. Caution messages can be acknowledged by pressing the Master CAUTION softkey on the PFD. When acknowledged, the Master CAUTION softkey will extinguish and the CAS Caution text message will revert to a normal (amber on black) annunciation. CAS Caution text messages will persist until the initiating condition is removed.

White Advisory Messages

Advisory messages consist of a white text message located in the lower right area of the PFD. Advisory messages are accompanied by a single chime when the chime is not a nuisance. Advisory messages are not acknowledgeable. CAS Advisory Messages persist until the initiating condition is removed.

Reversionary Mode

The PFDs will automatically be displayed in a composite format (Reversionary mode) for emergency use if the MFD display fails. The DISPLAY BACKUP button on the instrument panel should also be pressed. In the composite mode, the PFD will display the engine parameters typically reserved for the MFD, but only limited map functions are available via the inset map.

NOTE

When in the PFD reversionary format, the right lower inset window must be removed to view OAT information.

Multi-Function Display (continued)

Crew Alerting System (CAS) Messages (continued)

Multi-Function Display

The Multi-Function Display (MFD) is the primary display for engine parameters, map information (including dedicated map pages for navigation, traffic, weather radar, stormscope, weather datalink and TAWS), waypoint information, nearest functions, charts, flight plan information, and approach procedures.

NOTE

> Depending on system software version and optional systems installed, not all annunciator system (CAS and Non-CAS) messages listed in this handbook are applicable.

Reversionary Mode

Should the PFD in front of the pilot become inoperative, the MFD can be selected into reversionary mode by pressing either of the DISPLAY BACKUP buttons on the instrument panel. The MFD will then show typical PFD information, including the pilot selectable data fields, autopilot annunciations, transponder information, CAS messages and G1000 system messages. Information retained from the MFD will also be available, including engine parameters, flight planning information with DTK and DIS fields, and an inset map with all features except radar.

Multi-Function Display (continued)

Traffic Information Service (TIS)

NOTE

If the G1000 system is configured to use the optional Traffic Advisory System (TAS), TIS will not be available for use.

Traffic Information Service (TIS) provides a graphic display of traffic advisory information to the pilot. The G1000 system performs an automatic test of the TIS system upon power-up. If the TIS power-up test is passed, it will enter STANDBY mode while on the ground. If the TIS power-up test is failed, a failure annunciation will be indicated in the center of the Traffic Map page. The traffic mode of operation is indicated in the upper-left corner of the Traffic Map page. The TIS will automatically switch to OPERATING mode once the aircraft is airborne and provide a voice or tone audio output and a graphic display of traffic.

TIS uses the Mode S transponder for the traffic data link and is available only when the aircraft is within the service volume of a TIS-capable, ground based, terminal radar site. Updates are available to the pilot in 5-second intervals. Aircraft without a transponder are invisible to TIS and aircraft without altitude reporting capability are shown without altitude separation data or climb/descent indication.

Multi-Function Display (continued)

Traffic Information Service (TIS) (continued)

Traffic Map Page

The Traffic Map page, located in the Map Group on the MFD, is selectable from 2 nm to 12 nm. The G1000 system can display up to eight traffic targets within a 7.5 nm radius, from 3000 feet below to 3500 feet above the requesting aircraft. The altitude difference between the requesting aircraft and other aircraft is displayed above/below the traffic symbol in hundreds of feet. If the traffic target is above the requesting aircraft, the altitude separation text appears above the traffic symbol; if below, the altitude separation text appears below the traffic symbol. An altitude trend up/down arrow is displayed to the right of the traffic target symbol when the relative climb or descent speeds are greater than 500 ft/min in either direction. TIS also provides a vector line showing the direction in which the traffic is moving, to the nearest 45°.

Traffic is overlaid on the following pages:

* Navigation Map Page
* Traffic Map Page
* Trip Planning Page
* Nearest Pages
* Active Flight Plan Page
* PFD Inset Map

TIS Alerts

Traffic is displayed according to TCAS symbology using four different symbols:

1. Non-Threat Traffic – An open white diamond with black center that indicates traffic is beyond a 5 nm range and greater than ±1200 feet from the requesting aircraft.
2. Traffic Advisory (TA) – A solid yellow circle that indicates that traffic has met the criteria for a traffic advisory and is considered to be potentially hazardous. A yellow TRAFFIC annunciation is displayed at the top left of the attitude indicator on the PFD and an alert is heard in the cockpit, advising "Traffic".

Multi-Function Display (continued)

Traffic Information Service (TIS) (continued)

TIS Alerts (continued)

3. Traffic Advisory Off Scale - On the Traffic Map page a half TA symbol indicating a traffic advisory (TA), which is detected but is outside the range of the map will be displayed at the edge of the scale on the azimuth of the detected traffic. On the map page the off-scale traffic advisory is provided in a text box located on the lower left corner of the map.

Traffic information for which TIS is unable to determine the bearing (non-bearing traffic) is displayed in the center of the Traffic Map Page or in a banner at the lower left corner of map pages other than the Traffic Map Page on which traffic can be displayed.

TIS customization options are available to the pilot by depressing the MENU key while on the Navigation Map Page, and then selecting "Map Setup" then "Traffic" Group. TIS traffic may also be displayed on the Navigation Map page by selecting the MAP softkey and then selecting the TRAFFIC softkey.

Multi-Function Display (continued)

Traffic Advisory System (TAS) – Optional

NOTE

If the G1000 system is configured to use the optional Traffic Advisory System (TAS), TIS will not be available for use.

The optional Garmin GTS 825 is a Traffic Advisory System (TAS). It enhances flight crew situational awareness by displaying traffic information from transponder-equipped aircraft. The system also provides visual and aural traffic alerts including voice announcements to assist in visually acquiring traffic.

The GTS 825 provides a system test mode to verify the TAS system is operating normally. The test takes ten seconds to complete. When the system test is initiated, a test pattern of traffic symbols appears on the Traffic Map Page. If the system test passes, the system announces, "TAS System Test Passed" otherwise the system announces, "TAS System Test Failed." When the system test is complete, the traffic system enters Standby Mode.

After power-up, the GTS 825 automatically enters STANDBY Mode and no traffic depictions or alerts will be given. The GTS 825 must be in OPERATE Mode for traffic to be displayed and for TA's to be issued. The pilot can manually change the system between STANDBY mode and OPERATE mode at any time via softkeys on the Traffic Map page. If the pilot does not manually select a mode of operation, the system will automatically transition from STANDBY to OPERATE 8-seconds after becoming airborne and transition from OPERATE to STANDBY 24-seconds after landing. TAS aural alerts will be muted during all gear down operations.

Traffic Map Page

The Traffic Map page, located in the Map Group on the MFD, is selectable from 2 nm to 40 nm. The GTS 825 is capable of tracking up to 45 intruding aircraft equipped with Mode A or C transponders, and up to 30 intruding aircraft equipped with Mode S transponders. A maximum of 30 aircraft with the highest threat potential can be displayed simultaneously over a range of 2 nm to 22 nm at altitudes of 10,000 feet below to 10,000 feet above the requesting aircraft. No TAS surveillance is provided for aircraft without operating transponders. The altitude difference between the requesting aircraft and other aircraft is displayed above/below the traffic symbol in hundreds of feet. If the traffic target is above the requesting aircraft, the altitude separation text is preceded by a "+" symbol and appears above the

Multi-Function Display (continued)

Traffic Advisory System (TAS) – Optional (continued)

Traffic Map Page (continued)

traffic symbol; if below, the altitude separation text is preceded by a "-" symbol and appears below the traffic symbol. An altitude trend up/down arrow is displayed to the right of the traffic target symbol when the relative climb or descent speeds are greater than 500 ft/min in either direction.
Traffic is overlaid on the following pages:

- Navigation Map Page
- Traffic Map Page
- Trip Planning Page
- Nearest Pages
- Active Flight Plan Page
- PFD Inset Map
- PFD Forward Looking Depiction Area
  (when SVS is selected ON)

TAS Alerts:

Traffic is displayed according to TCAS symbology using four different symbols.

1. Non-Threat Traffic – An open white diamond with black center that indicates traffic is beyond a 6 nm range and greater than ±1200 feet from the requesting aircraft.
2. Proximity Advisory (PA) - A solid white diamond indicating that the intruding aircraft is within ± 1,200 feet and 6 nm range, but is still no considered a TA threat.
3. Traffic Advisory (TA) – A solid yellow circle that indicates that traffic ha met the criteria for a traffic advisory and is considered to be potentiall hazardous. A yellow TRAFFIC annunciation is displayed at the top le of the attitude indicator on the PFD and an alert is heard in the cockpi advising "Traffic", along with additional voice information about tl bearing, relative altitude, and approximate distance from the intruder th triggered the TA. For example, the voice alert "Traffic, 11 o'clock, hig three miles" would indicate that the traffic is in front of and slightly the left of the own aircraft, above own altitude, and approximately thr nautical miles away. A TA will be displayed for a minimum of 8 secon even if the condition(s) that triggered the TA are no longer present.

Multi-Function Display (continued)

Traffic Advisory System (TAS) – Optional (continued)

TAS Alerts: (continued)

4. Traffic Advisory Off Scale – On the Traffic Map page a half TA symbol indicating a traffic advisory (TA), which is detected but is outside the range of the map will be displayed at the edge of the scale on the azimuth of the detected traffic. On the map page the off-scale traffic advisory is provided in a text box located on the lower left corner of the map.

Traffic information for which TAS is unable to determine the bearing (non-bearing traffic) is displayed in the center of the Traffic Map Page or in a banner at the lower left corner of maps other than the Traffic Map Page on which traffic can be displayed.

TAS customization options are available to the pilot by depressing the MENU key while on the Navigation Map Page, and then selecting "Map Setup" then "Traffic" Group. TAS traffic may also be displayed on the Navigation Map by selecting the MAP softkey and then selecting TRAFFIC softkey.

Multi-Function Display (continued)

Terrain Proximity

NOTE

If the G1000 system is configured to use the optional Terrain Awareness and Warning System (TAWS), Terrain Proximity will not be available for use.

G1000 Terrain Proximity is a terrain awareness system that increases situational awareness and aids in preventing controlled flight into terrain (CFIT). It is similar to the Terrain Awareness and Warning System (TAWS) but does not comply with TSO-C151b certification standards. Terrain Proximity does not provide warning annunciations or voice alerts but it does provide color indications on map displays when terrain and obstacles are within a certain altitude threshold from the aircraft. Although the terrain and obstacle color map displays are the same, TAWS uses a more extensive database and more sophisticated algorithms to assess aircraft distance from terrain and obstacles. The terrain and obstacles database may not contain all obstructions, so the information provided should be used as an aid to situational awareness and should never be used to navigate or maneuver around terrain.

GPS altitude, which is derived from satellite position and therefore may differ from baro-corrected altitude read from the altimeter, is converted to mean sea level (MSL)-based altitude (GPS-MSL altitude) and is used in conjunction with GPS position to calculate and predict the aircraft's flight path in relation to the surrounding terrain and obstacles, whose altitudes are also referenced to MSL.

System Status:

Terrain Proximity requires the following components to operate properly:

* valid 3-D GPS position
* valid terrain/obstacle database

If Terrain Proximity does not have a valid 3-D GPS position a yellow "N GPS Position" text will be displayed at the center of the Terrain Proximi Page and on the PFD inset map if terrain is selected. If there is not a val terrain/obstacle database, the system will not display the yellow and red c ors associated with the offending obstacles and terrain.

Multi-Function Display (continued)

Terrain Proximity (continued)

Operation of Terrain Proximity:

Terrain is displayed on the following pages:

* Navigation Map Page
* Terrain Proximity Page
* Trip Planning Page
* Flight Plan Page
* PFD Inset Map

To display terrain data on maps other than the Terrain Proximity page, select the MAP softkey (select INSET softkey for the PFD inset map) on the Navigation Map Page and then select the TERRAIN softkey. When Terrain Proximity is selected on maps other than the Terrain Proximity Page, an icon to indicate the feature is enabled for display and a legend for Terrain Proximity colors are shown.

Terrain customization options are available by pressing the MENU key while on the Navigation Map Page, and then selecting "Map Setup" then "Map" group. Options selected on the Navigation Map page will be used on other map pages (less the Terrain Proximity Page itself) that display terrain information. Additional information about obstacles can be displayed by panning over the display on the map. The panning feature is enabled by depressing the RANGE knob on the keypad then pushing the knob in the desired direction until it is over the obstacle of interest. There is no inhibit function associated with Terrain Proximity, as there are no aural or visual alerts to inhibit.

Terrain Proximity Page:

The Terrain Proximity Page is specialized to show terrain and obstacle data in relation to the aircraft's current altitude, without clutter from the basemap. Aviation data (airports, VORs, and other NAVAIDs) can be displayed for reference.

Aircraft orientation on this map is always heading up unless there is no valid heading. Two views are available relative to the position of the aircraft: the 360° default display and the radar-like ARC (120°) display. Map range is adjustable with the RANGE Knob from 1 to 200 nm, as indicated by the map range rings (or arcs).

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Multi-Function Display (continued)

Terrain Proximity (continued)

Operation of Terrain Proximity:

The Terrain Proximity Page is located in the Map Page Group on the MFD.

On all pages that display terrain data, obstacles and terrain are depicted with the following colors:

* Red - above or within 100 feet below the aircraft altitude.
* Yellow - between 100 feet and 1000 feet below the aircraft altitude.
* Black - more than 1000 feet below the aircraft altitude.

Terrain Proximity Alerts:

Terrain Proximity does not provide warning annunciations or voice alerts associated with obstacles or terrain.

WireAware:

For additional safety, the terrain system incorporates Garmin's WireAware™ wire obstacle information. The system shows wire obstacles such as power lines on maps as well as the Synthetic Vision display. For the Terrain-SVT and TAWS-B only, this system can also issue cautions or warnings for potential impact with wire obstacles.

WireAware database information includes Hazardous Obstacle Transmission (HOT) power lines which are typically high voltage transmission lines depicted on VFR Sectional charts, and are considered of special interest to fixed-wing pilots. These include power lines which may span rivers, valleys, canyons, or be in close proximity to airports.

WireAware database coverage is mostly limited to tall transmission lines and their associated support structures. It does not typically have information for the smaller utility poles or lines. The height of the wire obstacles is commonly estimated and should not be relied upon for maneuvering decisions.

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS) – Optional

NOTE

If the G1000 system is configured to use the optional Terrain Awareness and Warning System (TAWS), Terrain Proximity will not be available for use.

The Terrain Awareness and Warning System (TAWS) is an optional feature used to increase situational awareness and aid in reducing controlled flight into terrain (CFIT). TAWS provides visual and aural cautions and warning alerts when terrain and obstacles are within a given altitude threshold from the aircraft. The displayed alerts and warnings are advisory in nature only. TAWS satisfies TSO-C151b Class B certification requirements whereas the more limited Terrain Proximity does not.

TAWS uses terrain and obstacle information supplied by government sources. Terrain information is based on terrain elevation information in a database that may contain inaccuracies. Individual obstructions may be shown if available in the database. The data undergoes verification by Garmin to confirm accuracy of the content, per TSO-C151b standards, however, the displayed information should never be understood as being all-inclusive and data may be inaccurate.

GPS altitude, which is derived from satellite position and therefore may differ from baro-corrected altitude read from the altimeter, is converted to mean sea level (MSL)-based altitude (GPS-MSL altitude) and is used in conjunction with GPS position to calculate and predict the aircraft's flight path in relation to the surrounding terrain and obstacles, whose altitudes are also referenced to MSL.

System Status:

During G1000 power-up, TAWS conducts a self-test of its aural and visua annunciations. The system test can also be manually initiated by selectin the TAWS Page then depress the MENU key, then select the "Test TAWS option. An aural alert "TAWS System Test OK" or "TAWS System Failure is issued at test completion, regardless of whether the test was initiate automatically or manually. TAWS System Testing is disabled when groun speed exceeds 30 knots.

TAWS requires the following to operate properly:

* A valid terrain/obstacle/airport terrain database
* A valid 3-D GPS position solution

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS) – Optional (continued)

System Status (continued)

If a valid 3-D GPS position solution and vertical accuracy requirements are not attained or the aircraft is out of the database coverage area, a TAWS N/A annunciation will appear on the TAWS Page and the aural annunciation "TAWS Not Available" is heard. When the GPS signal is re-established and the aircraft is within the database coverage area, the aural message "TAWS Available" is heard.

Operation of TAWS:

Terrain is displayed on the following pages:

* Navigation Map Page
* TAWS Page
* Trip Planning Page
* Flight Plan Page
* PFD Inset Map

To display terrain data on maps other than the TAWS Page, select the MAP softkey (select INSET softkey for the PFD inset map) on the Navigation Map Page and then select the TERRAIN softkey. When TAWS is selected on maps other than the TAWS Page, an icon to indicate the feature is enabled for display and a legend for TAWS terrain colors is shown.

Terrain customization options are available by depressing the MENU key while on the Navigation Map Page, and then selecting "Map Setup" then "Map" group. Options selected on the Navigation Map page will be used on other map pages (less the TAWS Page itself) that display terrain information. Additional information about obstacles can be displayed by panning over the display on the map. The panning feature is enabled by depressing the RANGE knob on the keypad then pushing the knob in the desired direction until it is over the obstacle of interest.

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS) – Optional (continued)

Operation of TAWS (continued)

To inhibit the aural and visual Premature Descent Alert (PDA) and Forward Looking Terrain Awareness (FLTA) alerts (RTC, ITI, RLC, ILI, ROC and IOI), press the INHIBIT softkey on the TAWS Page or depress the MENU key then select "Inhibit TAWS" or "Enable TAWS" depending on the current state. In either case, inhibiting and enabling TAWS alerts depends on the status of the INHIBIT softkey, as the INHIBIT softkey performs both functions. Use caution when inhibiting TAWS as the system should be enabled when appropriate. Once TAWS in inhibited a TAWS INHB alert annunciation is displayed on the MFD and PFD.

NOTE

If TAWS alerts are inhibited when the Final Approach Fix is the active waypoint during a GPS SBAS approach, a LOW ALT annunciation may appear on the PFD next to the altimeter if the current aircraft altitude is at least 164 feet below the prescribed altitude at the Final Approach Fix.

TAWS Page:

The TAWS Page is located in the Map Page Group on the MFD.

The TAWS Page is specialized to show terrain, obstacle, and potential impact point data in relation to the aircraft's current altitude, without clutter from the basemap. Aviation data (airports, VORs, and other NAVAIDs) car be displayed for reference. If an obstacle and the projected flight path of th aircraft intersect, the display automatically zooms in to the closest potentia point of impact on the TAWS Page.

Aircraft orientation on this map is always heading up unless there is no vali heading. Two views are available relative to the position of the aircraft; th 360° default display and the radar-like ARC (120°) display. Map range adjustable with the RANGE Knob from 1 to 200 nm, as indicated by the ma range rings or arcs.

Alert Type	PFD/MFD Alert Annunciation	MFD Pop-Up Alert	Aural Message	*Response Technique
Excessive Descent Rate Warning (EDR)	PULL-UP	PULL-UP	"Pull Up"	WARNING
Reduced Required Terrain Clearance Warning (RTC)	PULL-UP	TERRAIN - PULL-UP	"Terrain, Terrain; Pull Up, Pull Up"	WARNING
Imminent Terrain Impact Warning (ITI)	PULL-UP	TERRAIN AHEAD - PULL-UP	"Terrain Ahead, Pull Up; Terrain Ahead, Pull Up"	WARNING
Reduced Required Line Clearance Warning (RLC)	PULL-UP	WARNING - WIRE	"Wire, Wire; Pull Up, Pull Up"	WARNING
Imminent Line Impact Warning (ILI)	PULL-UP	WIRE AHEAD - PULL-UP	"Wire Ahead; Pull Up, Pull Up"	WARNING
Reduced Required Obstacle Clearance Warning (ROC)	PULL-UP	OBSTACLE - PULL-UP	"Obstacle, Obstacle; Pull Up, Pull Up"	WARNING
Imminent Obstacle Impact Warning (IOI)	PULL-UP	OBSTACLE AHEAD - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up"	WARNING
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION - TERRAIN	"Caution, Terrain; Caution, Terrain"	CAUTION
Imminent Terrain Impact Caution (ITI)	TERRAIN	TERRAIN AHEAD	"Terrain Ahead; Terrain Ahead"	CAUTION
Reduced Required Line Clearance Caution (RLC)	TERRAIN	CAUTION - WIRE	"Caution, Wire; Caution, Wire"	CAUTION
Imminent Line Impact Caution (ILI)	TERRAIN	WIRE AHEAD	"Wire Ahead; Wire Ahead"	CAUTION
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION - OBSTACLE	"Caution, Obstacle; Caution, Obstacle"	CAUTION
Imminent Obstacle Impact Caution (IOI)	TERRAIN	OBSTACLE AHEAD	"Obstacle Ahead; Obstacle Ahead"	CAUTION
Premature Descent Alert Caution (PDA)	TERRAIN	TOO LOW - TERRAIN	"Too Low, Terrain"	CAUTION
Altitude Callout "500"	None	None	"Five-Hundred"	N/A
xcessive Descent ate Caution (EDR)	TERRAIN	SINK RATE	"Sink Rate"	CAUTION
egative Climb Rate Caution (NCR)	TERRAIN	DON'T SINK	"Don't Sink"	CAUTION

See associated Response Techniques checklists on pages 7-26 and 7-27.

TAWS Alert Types
Table 1

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS) – Optional (continued)

TAWS Page (continued)

On all pages that display terrain data, the obstacles and terrain are depicted with the following colors:

* Red - above or within 100 feet below the aircraft altitude.
* Yellow - between 100 feet and 1000 feet below the aircraft altitude.
* Black - more than 1000 feet below the aircraft altitude.

TAWS Alerts:

Alerts are issued when flight conditions meet parameters that are set within TAWS software algorithms. TAWS alerts typically employ a CAUTION or a WARNING alert severity level, or both. When an alert is issued, visual annunciations are displayed on the PFD and MFD and aural alerts are simultaneously issued. The TAWS Alert Annunciation is shown at the upper left of the Altimeter tape on the PFD and below the Terrain Legend on the MFD. If the TAWS Page is not displayed at the time, a pop-up alert appears on the MFD. To acknowledge the pop-up alert:

- Press the CLR Key (returns to the currently viewed page), or
- Press the ENT Key (accesses the TAWS Page)

TAWS alerts types are shown in Table 1 on page 7-25.

<u>Response Technique - WARNING</u>:

1. Level the wings while simultaneously adding maximum power.
2. Smoothly pitch up at a rate of 2° to 3° per second towards an initial targe pitch attitude of 15°.
3. Adjust pitch attitude to ensure terrain clearance, while respecting stal warning. If the flaps are extended, retract flaps to the up position.
4. Continue climb at best angle of climb speed (V_X) until terrain or obstacl clearance is assured.
   * Only vertical maneuvers are recommended unless operating in VM or the pilot determines, after using all available information and instr ments, that a turn, in addition to the vertical escape maneuver, is t safest course of action.
   * Pilots are authorized to deviate from their current air traffic cont (ATC) clearance to the extent necessary to comply with a TAWS wa ing.

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS) – Optional (continued)

TAWS Alerts (continued)

Response Technique - CAUTION:

1. Take positive corrective action until the alert ceases.
2. Based on analysis of all available instruments and information:
   * Stop descending or.
   * Initiate a climb and/or.
   * Turn as necessary.

Weather Radar

The Weather Radar installation consists of a Receiver/Transmitter unit in a tear-drop shaped pod mounted beneath the right wing just outboard of the wing jack point.

The Garmin GWX 68 Airborne Color Weather Radar is a four-color digital pulsed radar with 6.5 kilowatts of output power. It combines excellent range and adjustable scanning profiles with a high-definition target display. The pulse width is four microseconds (μs) on all ranges except the 2.5 nm range. At close range, the GWX 68 uses a one μs pulse width to reduce the targets from smearing together.

The Piper PA-46-500TP M500 uses a 10-inch phased array antenna that is fully stabilized to accommodate 30° of pitch and roll.

To focus radar scanning on specific areas, Sector Scanning offers pilot-adjustable horizontal scan angles of 20°, 40°, 60°, or 90°. A vertical scanning function helps to analyze storm tops, gradients, and cell buildup activity at various altitudes.

Radar features include:

* Extended Sensitivity Time Constant (STC) logic that automatically correlates distance of the return echo with intensity, so cells do not suddenly appear to get larger as they get closer.
* WATCH® (Weather Attenuated Color Highlight) helps identify possible shadowing effects of short-range cell activity, identifying areas where radar return signals are weakened or attenuated by intense precipitation (or large areas of lesser precipitation) and may not fully reflect the weather behind a storm.
* Weather Alert that looks ahead for intense cell activity in the 80-320 nm range, even if these ranges are not being monitored.

Multi-Function Display (continued)

Weather Radar (continued)

Operation of Radar:

NOTE

Pulling the XM circuit breaker will render the radar inoperative.

NOTE

Radar images beyond approximately 130 nm should not be relied upon.

NOTE

During radar operation, with the range settings reduced to 20 NM or less, there may be a radar image on the left side of the radar display that is a radar reflection of the propeller and or forward aircraft fuselage. This erroneous radar return can be identified by its failure to update position during aircraft heading changes. If observed, this radar return is not a valid part of the actual radar image and should be disregarded. See image below for example.

Multi-Function Display (continued)

Weather Radar (continued)

***Operation of Radar:* (continued)**

Weather Mode:

To activate the radar's Weather mode while on the ground, proceed to the Map Page Group on the MFD, rotate the small FMS knob to the Weather Radar Page, select the MODE softkey, and then select the STANDBY mode softkey. After the system goes through a 60-second warm-up period (countdown is displayed on the screen) the radar will enter STANDBY mode. To begin radar transmitting, select the WEATHER mode softkey. A pop-up menu will appear alerting the pilot that the radar is being activated on the ground and safety precautions should be exercised.

To activate the radar while in flight, proceed to the Map Page Group on the MFD, rotate the small FMS knob to the Weather Radar Page, select the MODE softkey, and then select the WEATHER mode softkey. After the system goes through a 60-second warm-up period (countdown is displayed on the screen) the radar will begin transmitting.

When the weather radar system is in either the Weather or Ground Map mode, the system automatically switches to Standby mode upon landing.

Ground Map Mode:

To activate the radar's Ground Map mode, proceed to the Map Page Group on the MFD, rotate the small FMS knob to the Weather Radar Page, select the MODE softkey, and then select the GROUND softkey. Select the BACK softkey, then activate the cursor by pressing the small FMS knob, rotate the large FMS knob to place the cursor in the TILT field, then turn the small FMS knob to adjust the antenna tilt angle to display ground returns at the desired distance.

When the weather radar system is in either the Weather or Ground Map mode, the system automatically switches to Standby mode upon landing.

Multi-Function Display (continued)

Weather Radar (continued)

Weather Radar Page:

Weather Display:

When evaluating various target returns on the weather radar display, the colors denote precipitation intensity and rates shown in the following table.

Weather Mode Color	Intensity	Approximate Precipitation Rate (inches/hour)
Black	< 23 dBZ	< .01
Green	23 dBZ to < 32 dBZ	.01 to 0.1
Yellow	32 dBZ to < 41 dBZ	0.1 to 0.5
Red	41 dBZ to < 50 dBZ	0.5 to 2
Magenta	50 dBZ and greater	> 2

Precipitation Intensity and Rates
Table 2

Updrafts and downdrafts in thunderstorms carry water through the cloud therefore the more severe the drafts, the greater the number and size of the precipitation droplets. With this in mind, the following interpretations can be made from what is displayed on the weather radar.

Avoid these areas by an extra wide margin.

* In areas where the displayed target intensity is red or magenta (indica ing large amounts of precipitation), the turbulence is considered sever
* Areas that show steep color gradients (intense color changes) over th bands or short distances suggest irregular rainfall rate and strong turb lence.
* Areas that show red or magenta are associated with hail or turbulen as well as heavy precipitation. Vertical scanning and antenna tilt ma agement may be necessary to identify areas of maximum intensity.

Multi-Function Display (continued)

Weather Radar (continued)

Weather Radar Page (continued)

Proper use of the weather radar is critical for detecting various types of weather phenomena (thunderstorms, squall lines, tornadoes, hail, etc.).

Ground Map Display:

When evaluating various intensities of ground target returns, the colors shown in the table below should be used.

Ground Map Mode Color	Intensity
Black	0 dB
Light Blue	> 0 dB to < 9 dB
Yellow	9 dB to < 18 dB
Magenta	18 dB to < 27 dB
Blue	27 dB and greater

Ground Target Return Intensities
Table 3

A secondary use of the weather radar system is for the presentation of terrain. This can be a useful tool for verifying aircraft position. A picture of the ground is represented much like a topographical map that can be used as a supplement to the Navigation Map on the MFD.

Ground Map mode uses a different gain range than Weather mode. Different colors are also used to represent the intensity levels. The displayed intensity of ground target returns is defined in the table shown above. The type and orientation of the target in relation to the aircraft affects the intensity displayed. Use of the GAIN and TILT controls helps improve contrast so that specific ground targets can be recognized more easily.

Proper use of the weather radar is critical for detecting various types/features of terrain.

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional

XM Satellite Weather and XM Satellite Radio® entertainment services is provided through the optional GDL 69A, a remote-mounted data-link satellite receiver. XM Satellite Radio and XM Satellite Weather services, available by subscription, each have coded IDs unique to the installed GDL 69A. These coded ID's must be provided to XM Satellite Radio to activate service. These IDs are located on the label on the back of the Data Link Receiver and on the XM Information Page on the MFD and in the XM Satellite Radio Activation Instructions included with the unit (available at www.garmin.com, P/N 190-00355-04). Once activated, XM Satellite Radio uses the coded IDs to send an activation signal that allows the G1000 to display weather data and/or entertainment programming provided through the GDL 69A.

NOTE

Pulling the XM circuit breaker will disable the radar as well as the expected GDL69A functions (XM weather and XM radio).

XM Satellite Weather:

Received graphical weather information and associated text is displayed on the Multi Function Display (MFD) and the Primary Flight Display (PFD) Inset Map. XM satellite weather operates in the S-band frequency range and provides continuous reception capabilities at any altitude throughout North America.

The primary map for viewing XM Weather data is the Weather Data Linl Page in the Map Page Group. This is the only G1000 map display capabl of showing information for all available XM weather products.

Selecting the products for display on the Weather Data Link Page is made b pressing the softkey associated with that product. The label for the product shown in capital letters in the Weather Products column in the table belo When a weather product is selected for display, the corresponding softk label changes to gray to indicate the product is enabled. Unavailable weath products have subdued softkey labels (softkeys are disabled from selectio

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional (continued)

XM Satellite Weather (continued)

NOTE

Echo Tops and Cloud Tops are not selectable at the same time due to their color similarities.

The following pages can display various portions of XM Weather data:

* Navigation Map
* Weather Datalink Page (able to display all XM Weather data)
* Weather Information Page
* AUX - Trip Planning Page
* Nearest Pages
* Flight Plan Pages
* PFD Inset Map

When a weather product is active on the Weather Data Link Page or the Navigation Map Page, the age of the data is displayed on the screen. The age of the product is based on the time difference between when the data was assembled on the ground and the current GPS time. Weather products are refreshed at specific intervals.

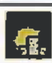
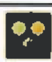
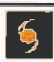
If for any reason, a weather product is not refreshed within the 30, 60, or 90-minute Expiration Time intervals, the data is considered expired and is removed from the display. This ensures that the displayed data is consistent with what is currently being broadcast by XM Satellite Radio services. If more than half of the expiration time has elapsed, the color of the product age displayed changes to yellow.

"Table 4" shows the weather product symbols, the expiration time and the refresh rate. The refresh rate represents the interval at which XM Satellite Radio broadcasts new signals that may or may not contain new weather data. It does not represent the rate at which weather data is updated or new content is received by the Data Link Receiver. Weather data are refreshed at intervals defined and controlled by XM Satellite Radio and their data vendors.

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional (continued)

XM Satellite Weather (continued)

Weather Product	Symbol	Expiration Time (minutes)	Refresh Rate (minutes)
NEXRAD		30	5
Cloud Top (CLD TOP)		60	15
Echo Top (ECHO TOP)		30	7.5
XM Lightning (LTNG)		30	5
Cell Movement (CELL MOV)		30	1.25
SIGMETs/AIRMETs (SIG/AIR)		60	12
METARs		90	12
City Forecast (CITY)		90	12
Surface Analysis (SFC)		60	12
Freezing Levels (FRZ LVL)		60	12
Winds Aloft (WIND)		60	12
County Warnings (COUNTY)		60	5
Cyclone Warnings (CYCLONE)		60	12
Radar Coverage	No product image	30	5
TFRs	No product image	60	12
TAFs	No product image	60	12

Weather Product Symbols, Expiration Times and Refresh Rates
Table 4

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional (continued)

XM Satellite Weather (continued)

Customizing the Weather Data Link Page is possible by selecting Weather Data Link Page from the Map Group, press the MENU key, select Weather Setup option from the Page Menu and press the ENT key. Turn the large FMS knob to scroll to a weather product of interest then rotate the small FMS knob to scroll through the options for each product (ON/OFF, range settings, etc.). Press the ENT key to select the option then press the FMS knob or the CLR key to return to the Weather Data Link Page with the changed settings.

Customizing Weather Data Link options is also available on the Navigation Map page. Proceed to the Navigation Map page, depress the MENU key, highlight the Map Setup option and press the ENT key, turn the small FMS knob to highlight the Weather group, turn the large FMS knob to highlight and move between the product selections. When an item is highlighted, turn the small FMS knob to select the option and press the ENT key. Press the FMS knob or the CLR key to return to the Navigation Map Page with the changed settings.

XM Radio Entertainment:

The optional XM Radio entertainment feature of the GDL 69A Data Link Receiver is available for the pilot's and passengers' enjoyment. XM Satellite Radio offers a variety of radio programming over long distances without having to constantly search for new stations. The GDL 69A can receive the S-band, XM Satellite Radio® entertainment services at any altitude throughout the Continental U.S. Based on signals from satellites, coverage far exceeds land-based transmissions.

Entertainment audio is not available on the GDL 69 Data Link Receiver as it is on the GDL 69A Data Link Receiver.

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional (continued)

XM Radio Entertainment: **(continued)**

XM Radio is never muted for the cabin passengers unless a stereo input to the stereo input jack is installed. XM Radio is automatically muted for the front seat crewmembers during the following conditions:

- Aircraft radio reception
- Push-to-talk switch activation
- Stall warning activation
- Gear warning activation
- Marker beacon audio activity
- Master caution and master warning chimes
- Audible system messages

The XM Radio Page provides information and control of the audio entertainment features of the XM Satellite Radio. To get to the XM Radio Page, proceed to the AUX Page Group on the MFD, turn the small FMS knob to the AUX-XM Information Page and select the RADIO softkey.

Keypad

Control for the MFD, and if desired, the PFD, is performed by the MFD/PFD control unit (keypad) located aft of the throttle quadrant. Alpha-numeric keys are provided for easy entry of flight plan information, waypoint information and frequency information. A range knob is provided to select ranges on the MFD or PFD, if desired.

Audio Panel

The GMA 350C audio panel provides the traditional functions of microphone and receiver audio selection. The audio panel also includes an intercom system (ICS), a marker beacon receiver, a COM clearance recorder, a passenger address (PA) system, manual squelch control, and telephone and music inputs (front panel jack or Bluetooth device) and controls. The MAN SQ key can be used to individually control the squelch at the pilot, copilot and passenger locations.

Push buttons keys control audio selection. When a key is selected, a triangular annunciator above the key is illuminated. Annunciator brightness is controlled by an internal photocell and key brightness is controlled by the PANEL dimmer in the overhead switch panel.

Split-com mode is available by pressing both MIC keys simultaneously. The respective COM1/MIC1 or COM2/MIC2 annunciators are illuminated indicating Split-COM operation. The pilot defaults to COM1 and the copilot defaults to COM2. Split-COM operation is canceled by pressing either of the selected MIC keys.

If the GMA 350C fails or if power is not applied to the unit, a fail-safe circuit connects the pilot's headset and microphone directly to the COM1 transceiver. The speaker will not function during fail-safe operations.

Fhe GMA 350C incorporates voice recognition (not approved for operations n EASA airspace) which allows the pilot to control specific functions on the ;MA 350C using spoken commands. To activate voice recognition, push and old the Push-to-Command (PTC) button on the control yoke while speaking command. When the Push-to-Command button is released, the GMA 350C ill respond. If a command is correctly interpreted by the GMA 350C, a ›sitive acknowledgement chime will be played, and the pilot should verify at the correct button selection is indicated by the triangular annunciator lights. lternatively, some commands will be acknowledged by a voice response from : GMA 350C. If the desired modes are not indicated by annunciator lights or voice response, the pilot should repeat the command by using the Push-to- mmand button, or by manually using the front panel controls of the GMA)C.

GTX 335 Transponder

The GTX 335 transponder provides Extended Squitter Version 2 Automatic Dependent Surveillance-Broadcast (ADS-B) which meets the TSO C166b mandate for 2020. ADS-B Out information consisting of altitude, position, velocity, and heading are automatically transmitted to other aircraft and ground stations.

A GTX 335 without an accompanying GTS 825 or GTX 345 also provides the following functions:

- Reception of TIS-A traffic data from a ground station
- Provide TIS-A traffic alerting to the pilot via interfaced display and audio output.

The combined installation of GTX 335 and GTS 825 adds the following capabilities:

- ADS-B In: receives altitude, position, velocity, and heading information from aircraft and ground stations.

Traffic information will be displayed as a combination of two systems:

- ADS-B traffic information from other ADS-B equipped aircraft
- GTS 825 Traffic Advisory System (TAS)

NOTE

ADS-B traffic information will be available on the normal G1000 traffic display maps/pages. In the absence of ADS-B traffic information, the GTS 825 system will display all other transponder equipped aircraft.

ADS-B transmission defaults to enabled at each power cycle. To enable/disab the transmission of the ADS-B information, press the ADS-B TX Softk under the PFD XPDR menu. Do not disable ADS-B transmission unle requested by ATC. If the GTX 335 fails, a yellow "x" will be displayed in t XPDR field.

GTX 345 Transponder - Optional

In addition to the functionality of the GTX 335, the GTX345 transponder performs the following additional functions:

- Reception of ADS-B In data on 1090 MHz
- ADS-B (Data directly from another transmitting aircraft)
- ADS-R (Rebroadcast of ADS-B data from a ground station)
- Reception of ADS-B In data on UAT (978 MHz)
- ADS-B (Data directly from another transmitting aircraft)
- ADS-R (Rebroadcast of ADS-B data from a ground station)
- TIS-B (Broadcast of secondary surveillance radar) (SSR) derived traffic information from a ground station.
- FIS-B (Broadcast of aviation data from a ground station)
- Provide ADS-B traffic information and alerting to the pilot via an interfaced display
- Correlation and consolidation of traffic data from multiple traffic sources
- Aural and visual traffic alerting
- Provide FIS-B data to the pilot via an interfaced display

GTX 33DES (Diversity Extended Squitter) Transponder - Optional

The GTX 33DES transponder is equipped with two antennas, one on the top of the fuselage and the other on the bottom, which provides additional signal coverage. The GTX 33DES is offered as an option for the number 1 transponder in a dual transponder installation.

7.11 GFC700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

AUTOPILOT CONTROLS

Controls for selecting lateral and vertical flight director modes and for engaging/ disengaging autopilot, yaw damper and flight director, are located on the GMC 710 autopilot controller located above the MFD. The SPD key on the GMC 710 is deactivated and, if pressed, will display a system message indicating that it is disabled. Additional autopilot related functions are controlled by the following:

A/P DISC / TRIM INTER Switch – Autopilot Disconnect and Trim Interrupt switch located on the control wheel. Depressing this red switch interrupts the electric pitch trim and disconnects the autopilot and yaw damper.

Electric Pitch Trim Switch – Split switch located on the control wheel. Commands nose up or nose down pitch trim when both halves of the switch are operated simultaneously.

CWS Switch – Control Wheel Steering switch located on the control wheel. While this switch is depressed, the autopilot servos are disconnected, allowing the pilot to fly the airplane manually.

TO/GA Switch – Optional Takeoff/Go-Around switch located on the throttle lever. Depressing this switch commands the flight director to an initial takeoff or go-around pitch attitude.

LVL Switch - Optional Level mode switch located on the instrument panel above the MFD. Depressing this blue switch activates the autopilot Level Mode, which engages the autopilot and commands the airplane to wings level and zero vertical speed.

7.11 GFC700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS) (continued)

AUTOPILOT OPERATION

When the AVIONICS switch is selected ON, the GFC700 automatically conducts a self-test, as indicated by a white boxed PFT on the PFD. Successful completion of this self-test is indicated by extinguishing the PFT with no AP failure indications and an autopilot "warble" tone (the same tone as autopilot disconnect). If the GFC700 preflight test is not completed successfully, a red PFT annunciation will be displayed on the PFD and the autopilot and electric pitch trim will not function.

Selected autopilot modes are displayed on the AFCS Status Box at the top of the PFD. Lateral modes are displayed on the left, autopilot status is in the middle, and vertical modes are on the right. All active modes are shown in green and armed modes are white.

Pressing the AP key activates the autopilot and flight director in the default ROL and PIT modes. Pressing the FD key activates only the flight director in default ROL and PIT modes. Pressing any key associated with a valid lateral or vertical mode activates that mode and the default mode in the opposing axis. For example, pressing the ALT key activates the flight director in ALT hold mode with the default lateral (ROL) mode. Re-selection of any valid lateral or vertical mode toggles between the selected mode and the default mode for that axis.

f the information required to compute a flight director mode becomes invalid r unavailable, the flight director automatically reverts to the default mode for hat axis. A flashing yellow mode annunciation and annunciator light indicate ss of sensor (ADC) or navigation data (VOR, LOC, GPS, VNV, SBAS) quired to compute commands. If the loss occurs in the lateral axis, the system efaults to ROL mode and rolls wings level. If the loss occurs in the pitch axis, e system defaults to PIT mode and maintains the current pitch attitude. The ashing annunciation stops when the affected mode key is pressed, another ode for the axis is selected, or after 10 seconds, if no action is taken.

7.11 GFC700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS) (continued)

Autopilot Disengagement Methods:

The autopilot can be disengaged manually by the following "normal" methods which are indicated by a yellow flashing AP annunciation:

- Pressing the A/P DISC / TRIM INTER switch on the control wheel
- Activation of either half or both halves of the manual electric pitch trim switch on the control wheel
- Pressing the AP key on the MFD
- Pressing the TO/GA switch on the throttle (if optional Underspeed Protection not installed)

The autopilot can be disengaged manually by the following "abnormal" methods which are indicated by a red flashing AP annunciation:

- Pulling the AUTOPILOT or GMC circuit breaker
- Activation of the stall warning system (if optional Underspeed Protection not installed)

The autopilot can be momentarily disengaged by pressing and holding the CWS switch on the control wheel.

The autopilot will disengage automatically under the following conditions which are indicated by a red flashing AP annunciation:

- Internal autopilot system failure
- Total AHRS failure
- Inability to compute default flight director modes

NOTE

The yaw damper will disengage automatically below 100 ft AGL (GPS altitude).

After any autopilot disengagement, the aural disconnect alert can be cancele by pressing the A/P DISC switch or manual electric pitch trim switches

7.11 GFC700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS) (continued)

AUTOPILOT FEATURES

Overspeed Recovery Mode

Overspeed Recovery attempts to prevent the aircraft from exceeding Vmo by providing a flight director pitch up command whenever the airspeed trend vector exceeds Vmo. If flying manually, the pilot may follow the pitch up commands, or if engaged, the autopilot will follow the command. The pitch up command will not exceed that for level flight; to decelerate more rapidly the pilot should reduce engine power. When Overspeed Recovery is active, an amber MAXSPD is displayed above the airspeed tape. Overspeed Recovery is not active in ALT mode unless Electronic Stability Protection is installed.

Takeoff Mode

Takeoff Mode allows the pilot to manually follow the flight director command bars after takeoff rotation. Takeoff Mode is activated by pressing the TO/GA switch on the throttle lever while on the ground. Whenever Takeoff Mode is active, "TO" will be displayed as the lateral and vertical modes in the AFCS status box.

Go-Around Mode

Go-Around Mode allows the pilot to manually follow the flight director command bars during a go-around maneuver. Go-Around Mode is activated by pressing the TO/GA switch on the throttle lever while in flight. Whenever Go-Around Mode is active, "GA" will be displayed as the lateral and vertical modes in the AFCS status box. Autopilot coupled Go-Around is available as an optional feature. During a coupled go-around the autopilot remains engaged and the pilot must add power and reduce drag according to the BALKED LANDING (Go-Around) checklist in Section 4.

7.11 GFC700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS) (continued)

AUTOPILOT FEATURES (continued)

Underspeed Protection (Optional)

Underspeed Protection (USP) is a flight director function that provides low speed awareness and prevents the airplane from stalling. The autopilot must be engaged for USP to function. An AIRSPEED aural alert and an amber MINSPD annunciation activates to indicate a low airspeed condition. If airspeed continues to decrease, a USP ACTIVE CAS warning is triggered and the airplane pitches down. If the flight director is in a non-altitude critical mode (VS, VNAV, PIT, LVL or FLC) the airplane pitches down to maintain airspeed above the stall warning speed. If the flight director is in an altitude critical mode (ALT, GP, GS, TO or GA) the airplane may decelerate to stall warning. After stall warning the airplane rolls wings level and pitches down to achieve and maintain a speed approximately two knots above stall warning deactivation. When USP is active, the flight director modes remain unchanged, but the pitch mode annunciation turns white and the roll mode annunciation turns white in altitude critical mode.. In all cases, the pilot should take action to exit the underspeed condition by increasing engine power and decreasing drag as appropriate.

Level Mode (Optional)

Level Mode commands the airplane to wings level and zero vertical speed. It is activated by pressing the blue switch (labeled LVL) at the top center of the instrument panel. Level Mode should only be activated when the autopilot is disengaged but should not be used if the autopilot is operating in any failure condition. Level Mode will activate automatically if Electronic Stability Protection is engaged for more than 10 seconds in any 20 second interval. Activation is indicated by green LVL and LVL for lateral and vertical mode respectively.

WARNING

Do not press the LVL switch (if installed) if an autopilot or pitch trim malfunction is suspected.

7.11 GFC700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS) (continued)

AUTOPILOT FEATURES (continued)

Electronic Stability and Protection (Optional)

Electronic Stability and Protection (ESP) provides a control force feedback to deter the pilot from operating outside a defined envelope. ESP functions only when the autopilot is operable, but is disengaged. As the aircraft approaches the defined operating limits, the autopilot servos automatically engage to nudge the aircraft back to the nominal operating envelope. The pilot can easily overpower the restoring tendency, and may interrupt ESP with the AP disconnect or CWS switches. If the pilot operates in the ESP envelope for an extended period of time, the autopilot will automatically engage in LVL mode. At any time (usually for training reasons), the ESP function may be disabled from the AUX – SYSTEM SETTINGS page on the MFD. When disabled in this manner, ESP OFF is displayed. ESP will automatically re-enable after each electrical power cycle.

Expanded Engagement Envelope (Optional)

Expanded engagement envelope allows autopilot engagement up to the pitch and roll attitudes shown in the autopilot limitations of Section 2. If the autopilot is engaged at a pitch or roll attitude within the expanded engagement envelope but beyond the maximum autopilot command limits, the airplane will be pitched or rolled to the maximum autopilot command limits.

7.13 STANDBY INSTRUMENTS

NOTE

> If electrical power is removed from the Aspen EBD standby instrument prior to completion of its self-test, the unit will remain ON and deplete its internal battery. If this occurs, turn the BATT MASTR switch ON and wait for the self-test to be completed or press the red REV button on the unit to turn it OFF.

The Aspen Evolution Backup Display (EBD) is a fully digital, independent flight instrument display which provides attitude, barometric altitude, airspeed, heading, vertical speed, slip/skid and turn rate indications. The purpose of this flight instrument is to provide a reference to crosscheck the G1000 system information for system reliability and to display basic flight information during a G1000 system failure.

The EBD is located to the left of the PFD in direct view of the pilot. During normal operation, power is provided by the forward main bus. If the alternator and generator are inoperative, the EBD will continue to operate on the forward main bus until the battery voltage is below that required by the standby instrument. The EBD will then operate on its internal battery for 30 minutes, permitting the pilot to find a suitable landing location. If this occurs the EBD will illuminate an "ON BAT" annunciation and display an estimated battery charge state.

In flight (indicated airspeed valid and ≥30 knots):

The standby display will immediately revert to its internal batter following a complete electrical failure (loss of generator, alternator primary battery, and emergency bus) providing approximately 3 additional minutes of operation. If this occurs the EBD will illuminate a "ON BAT" annunciation and display an estimated battery charge stat

On the ground (indicated airspeed invalid or <30 knots):

The standby display will power up and power down with the application removal of external power. A "POWERING DOWN" message is presented duri the power down sequence. Pressing any key on the EBD while the 5-seco "POWERING DOWN" warning is displayed keeps the display operating usi the internal battery. If the 5-second shutdown warning has occurred and no k on the EBD is pressed, the shutdown sequence will continue. If normal powe subsequently applied, the EBD will re-initialize in approximately 30 secon

7.15 HYDRAULIC SYSTEM

The hydraulic system provides the power to retract and extend the landing gear. (See Figure 7-3.)

The electric motor driven hydraulic pump assembly is located aft of the rear baggage compartment and is accessible through the baggage compartment aft close-out panel. The pump assembly has an integral reservoir with filler plug, sight gauge and vent. The pump assembly incorporates pressure switches, bypass relief valves, and thermal relief valves in both the UP and DOWN sides. A shuttle valve is also incorporated to allow for unequal volumes of hydraulic fluid displaced during UP and DOWN gear actuation. Normal system operating pressure is controlled by the pressure switches. Maximum system operating pressure is limited by the bypass relief valves, and maximum system holding or trapped pressure is limited by the thermal relief valves.

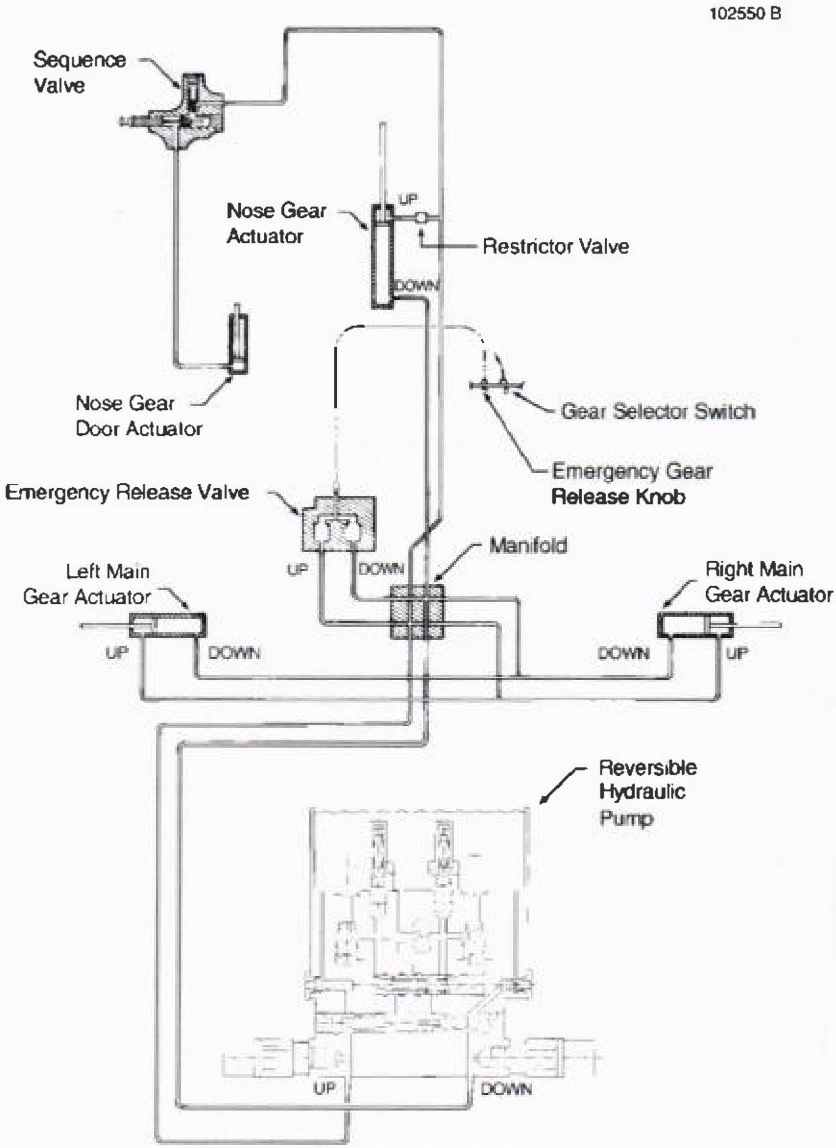
NOTE

Occasional cycling of the hydraulic pump during climb and initial cruise can occur due to variations in the system pressure caused by ambient temperature changes.

The motor which drives the hydraulic pump is reversible and runs in one direction to supply gear UP pressure and in the opposite direction to supply gear DOWN pressure. The direction in which the pump runs is controlled electrically by the position of the landing gear selector switch on the instrument panel.

Other major components of the hydraulic system are the three gear actuators nd the emergency gear extension valve. Operation of these components is overed in the landing gear section.

7.15 HYDRAULIC SYSTEM (continued)



Hydraulic System
Figure 7-3

7.17 LANDING GEAR

The aircraft is equipped with hydraulically operated, fully retractable, tricycle landing gear.

Locking-type actuators are used for main and nose gears. The actuator assembly provides mechanical gear-down locking at the fully extended position and is hydraulically unlocked. The actuator also acts as the gear brace in the extended position.

The main gear retracts inboard into the wing root area. A mechanically linked door covers the strut assembly.

Hydraulic pressure for gear operation is furnished by an electrically driven hydraulic pump. Landing gear operation is controlled by a two position landing gear selector switch with a wheel shaped knob located to the left of the engine power control quadrant. The landing gear selector switch must be pulled outward to release it from a detent in the DOWN position prior to moving it to the UP position. In addition, there is a squat switch on the left main gear which prevents operation of the gear UP electrical circuit when the aircraft weight is on the gear. If the landing gear selector is placed in the UP position with the aircraft weight on the gear, a HYDR PUMP ON warning CAS message along with a CHECK GEAR aural alert and warning CAS message are immediately activated.

The landing gear is held in the UP position by hydraulic pressure which is trapped in the system UP lines by a check valve in the pump assembly. When ormal pump operation is stopped by the pressure switch, a check valve in the ump assembly closes to trap fluid pressure in the UP side of the system.

The landing gear is held in the DOWN position by spring loaded mechanical cking mechanisms built into each of the three actuating cylinders. The gear own indications are displayed when each mechanism is in the LOCKED sition. With the hydraulic pump and system operating normally, hydraulic essure is also trapped in the DOWN side of the system. This DOWN pressure not required to mechanically lock the cylinders and is not available if the draulic pump is inoperative.

7.17 LANDING GEAR (continued)

Landing Gear Indications

Landing gear indications on the MFD can be any of the following:

- gear down: solid green circle
- gear up: hollow white circle
- gear in transit: crosshatched square
- abnormal/unknown gear position: solid red circle

Landing Gear Indications
Figure 7-5

CAUTION

When flying in extreme cold where the aircraft has been cold-soaked for an extended period of time, the gear may not indicate down and locked for 10 to 15 seconds after normal gear extension.

The landing gear selector position is monitored. When the landing ge selector disagrees with the position of the landing gear, a GEAR SYS CA message is displayed (warning if on the ground and caution if in flight). the position of the landing gear are unknown by the system, the landing ge indications on the MFD become solid red circles and a Master Warning Master Caution is activated (warning if on the ground and caution if in flight

Gear Position Unsafe

Should the throttle be placed at low torque settings and/or the flaps extended while the gear is retracted, a CHECK GEAR CAS message alerts the pilot that the gear is retracted.

The CHECK GEAR CAS message is activated under the following conditions:

(a) The gear is not down and locked down and the torque is below 300 ft-lb.
(b) The landing gear selector switch is in the UP position when the airplane is on the ground.
(c) The gear is not down and locked and wing flaps are extended to the 20° or 36° positions.

The CHECK GEAR CAS message is a Caution in flight above approximately 400 feet AGL and becomes a Warning when below approximately 400 feet AGL. The CHECK GEAR caution or warning message created by low power settings can be silenced by increasing power, extending the landing gear, or by pressing the master caution or master warning softkey. The CHECK GEAR caution or warning created by flap extension can only be silenced by retracting the flaps to the 0° or 10° positions or extending the landing gear.

7.17 LANDING GEAR (continued)

Emergency Extension

The EMERGENCY GEAR EXTENSION system allows the landing gear to free fall, with spring assist on the nose gear, into the extended position where the mechanical locks engage. Emergency gear extension is accomplished by moving the guard across the emergency gear extension knob to the side and pulling the emergency gear extension knob aft. A manually actuated valve relieves the pressure in the UP side and bypasses fluid to the DOWN side of the system. The additional fluid required for DOWN operation comes directly from the reservoir. Emergency gear extension must not be attempted at airspeeds in excess of 100 KIAS. If a gear system malfunction has been indicated and the EMERGENCY GEAR EXTENSION system used, it is recommended that the EMERGENCY GEAR EXTENSION control and the HYDRAULIC PUMP circuit breaker be left in the pulled position until the aircraft is safely on jacks. See the Maintenance Manual for proper landing gear system check-out procedures. If the aircraft is being used for training purposes or a pilot check-out flight the EMERGENCY GEAR EXTENSION control and HYDRAULIC PUMP POWER circuit breaker must be reset in order for hydraulic pressure to be generated in the UP side of the system and the gear retracted.

CAUTION

When flying in extreme cold where the aircraft has been cold soaked, it may take several minutes for all three gear to indicate down and locked following an EMERGENCY EXTENSION "FREE FALL".

7.19 BRAKE SYSTEM

The brake system is designed to meet all normal braking needs. Two single-disc, double puck brake assemblies, one on each main gear, are actuated by toe brake pedals mounted on both the pilot's and copilot's rudder pedals. A brake system reservoir, independent of the hydraulic system reservoir, is located on the firewall. Brake fluid should be maintained at the level marked on the reservoir. For further information see BRAKE SERVICE in Section 8 of this handbook.

The parking brake knob is located below the pilot's control column. To set the parking brake, first depress and hold the toe brake pedals and then pull the parking brake knob. To release the parking brake, first depress and hold the toe brake pedals and then push in on the parking brake knob.

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7.21 FLIGHT CONTROL SYSTEM

The primary flight controls are conventional and are operated by dual control wheels and rudder pedals. The control wheel operates the ailerons and elevator. The rudder pedals actuate the rudder and nose wheel steering. The toe brakes, which are an integral part of the pedals, operate the wheel brakes. The ailerons and rudder are interconnected through a rudder/aileron spring system, which is activated only when controls are out of harmony. In normal coordinated flight, the system is inactive. All flight control systems are operated by closed circuit cable systems.

The elevator trim control is located on the pedestal and the rudder trim control is located on the instrument panel below the autopilot. Aileron trim is provided by a fixed, ground-adjustable tab on the right aileron. The elevator trim control wheel is located on the right side of the pedestal. The trim wheel is rotated forward for nose-down trim and aft for nose-up trim. Rudder trim is achieved by a trim tab driven by an electro-mechanical linear actuator. The rudder trim is activated by depressing a rocker switch, located on the instrument panel below the autopilot. The switch is marked with L and R, corresponding to nose left or nose right. Trim indications, in degrees, are located on the MFD. The green arc indicates the normal takeoff range.

The wing flaps are electrically controlled by a flap selector lever mounted on the instrument panel immediately to the right of the control pedestal. The flap position indicator is located on the MFD. The flaps may be set to one of four positions: up (0°), 10°, 20°, and full down (36°). Each position is detented on the flap selector panel. The flaps will automatically move to the selected position which can be confirmed by referring to the position indicator. The flaps may b extended to 10° at airspeeds below 168 KIAS, 20° below 135 KIAS, and 36 flap extension is limited to airspeeds below 118 KIAS. When extending the flap with the landing gear retracted, prior to the flaps reaching the 20° position, th CHECK GEAR aural alert will sound. If a red FLAP FAIL message display on the MFD, it is indicative of a flap system malfunction in which case the fl protection circuit automatically removes power from the electric flap mot Resetting the FLAP WARN circuit breaker will restore normal operating pow to the flap motor. If, after resetting, and operation of the flaps, the messa displays again, then a system malfunction is indicated and the flap motor circ breaker should be pulled.

7.23 FUEL SYSTEM

The fuel system consists of two main, inboard, and header wing tanks, two header tank boost pumps, supply and vapor return fuel lines, and four sump drains. Fuel is drawn from both wings simultaneously, with float valves and switches employed to prevent air ingestion. The two header tank and two fuel return sump drains are located on the lower aft left and right sides of the cowling (See Figure 8-5). The filter sump drain is located adjacent to the left header sump drain. Upon engine shutdown, the fuel remaining in the fuel manifold drains into an EPA fuel purge system. This system utilizes accumulated engine bleed air to force the residual fuel into the burner upon shutdown. A slight and momentary increase in ITT and the possible presence of smoke in the exhaust is normal as the residual fuel is consumed. The fuel shut-off valve is located on the center pedestal under a red protective cover and is pulled for the closed position. A fuel temperature indicator, shown on the MFD, displays the fuel temperature sensed by a fuel temperature probe, located in the right inboard fuel tank. During operations where the fuel temperature indicator is below -23°C (-10°F), the fuel return solenoid valve downstream of the high pressure gear driven pump opens and returns unused fuel from the fuel control unit to the outboard left and right fuel tanks. This returning of warmed fuel to the fuel tanks slows the cooling process of the fuel, which allows the aircraft to operate at temperatures as cold as -54°C (-65°F) for a longer period of time.

NOTE

Fuel pump activation is more likely to occur while warm fuel is being returned to the tanks due to the increased likelihood of fuel tank imbalance.

The return fuel solenoid valve will be energized open when the following onditions are met:

- The valve will always be open during an engine start, regardless of the other conditions. On aircraft with Woodward FCU equipped engines (condition lever has COLD START position), the fuel solenoid valve remains closed for engine starts.
- When the fuel temperature indicator is below -23°C (-10°F) AND the total fuel quantity is more than 100 lbs.

7.23 FUEL SYSTEM (continued)

The return fuel solenoid valve will be de-energized (closed) when the following conditions are met:

- Fuel temperature indicator is above -23°C (-10°F) and the engine is not in a start cycle.
- Total fuel quantity is less than 100 lbs. and the engine is not in a start cycle.

NOTE

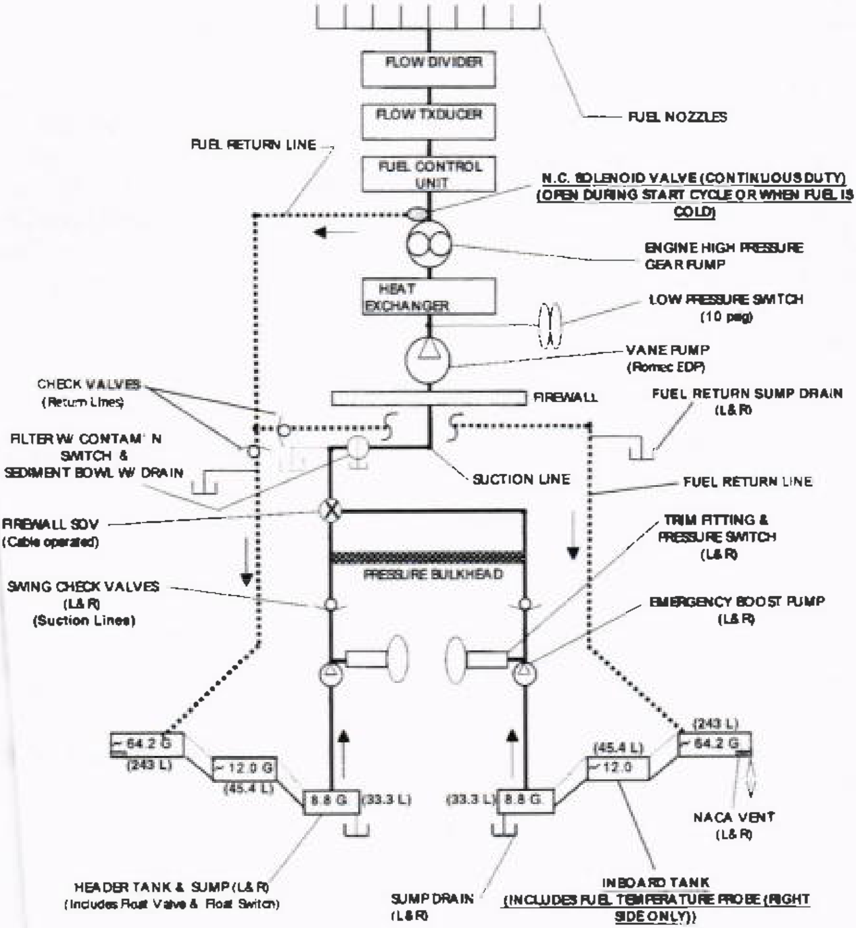
On aircraft with Woodward FCU equipped engines (condition lever has COLD START position), the fuel solenoid valve remains closed for engine starts.

An inline electric boost pump is located in each wing root just forward of the header tanks. Control of these pumps is through a three-position switch located on the left overhead panel with selections: MAN, OFF, and AUTO. The pumps operate in unison to provide emergency back up for the engine driven pump, boost pressure for starting, and vapor suppression at high altitudes. In the AUTO position, a pressure switch activates both pumps automatically when the fuel pressure from the engine driven pump drops below 9 psig, and remains activated until the pressure increases to 12 psig. During this period, a warning CAS message FUEL PRESS LOW and advisory CAS messages L FUEL PUMP ON and R FUEL PUMP ON will illuminate. As pressure increases to 12 psig the pumps are turned off and all three CAS messages extinguish. This boost pump cycling prompts the pilot to select the MAN mode to provide continuous fue pressure. In the AUTO mode the pumps are also controlled automatically, bu separately, by the Garmin Primary Flight Display (PFD). The Garmin system provides a secondary means to control fuel balance. To provide proper fue balance, a discrete signal from the PFD activates the boost pump on the "heavy side once a 25-pound imbalance is reached. The system should automatical correct itself.

If the system does not correct itself and the imbalance increases to pounds, a FUEL PUMP ON advisory CAS message will illuminate on the hea wing side along with a FUEL IMBALANCE caution CAS message.

If the imbalance continues to increase to 125 pounds, a FUEL IMBALAN warning CAS message will illuminate indicating that the maximum allowa fuel imbalance has been reached and the pilot should land as soon as possibl

7.23 FUEL SYSTEM (continued)



Fuel System Schematic
Figure 7-7

7.25 ELECTRICAL SYSTEM

Power for the 28 Vdc negative ground dual fed split bus electrical system is supplied by a direct driven 200 ampere generator and a belt driven 135 ampere alternator. The generator and the alternator are located on the aft end of the engine. Although the units do not operate in true parallel fashion, both units are kept running at the same time. The generator is considered the primary current source and the alternator is the back-up. The units that control the generator and the alternator are adjusted such that the generator furnishes all of the load and the alternator is the backup. In the event that the generator should fail or be turned off for any reason, the alternator picks up the entire load. A single 24 Vdc lead acid battery of 38 ampere hour capacity, is located in the battery compartment in the right side of the nose of the aircraft just forward of the wing leading edge. The battery provides power for engine starting and also acts as an emergency source of electrical power in the event the generator and the alternator should both fail.

Electrical switches are located as follows.

- An overhead switch panel (Figure 7-13) located above the upper edge of the wind shield.
- Avionics and systems switches located on the instrument panel. (Figure 7-19)
- Environmental control panel installed in the instrument panel. (Figure 7-19)

A battery bus, located in the engine compartment, provides a source of power for the courtesy lights. Because the battery bus is connected directly to the battery, power is available for these functions even when the Battery switch is OFF. The battery bus contains fuses to protect these circuits.

The Emergency (EMER) bus can be activated by depressing the EMER switch on the overhead switch panel.

NOTE

In the event of a total electrical failure and to operate exclusively on the emergency bus, the battery master switch must be OFF and the EMER switch ON.

7.25 ELECTRICAL SYSTEM (continued)

NOTE

The displayed voltage "EVOLTS" will be that of the emergency bus when the EMER switch is turned ON and the battery, alternator and generator switches are turned OFF, otherwise the displayed voltage will be that of the TIE BUS.

The EMER bus is tied directly to the battery via a relay. The EMER bus provides power to #1 PFD, #1 Comm/Nav/GPS, Audio Panel, #1 AHRS, #1 ADC, Landing Gear Position Indications, Internal Lighting for the Standby Instruments. The following parameters on PFD 1 will display invalid while operating exclusively on the EMER bus: Fuel Quantity, Torque, Oil Pressure, Vacuum, Cabin Altitude, Cabin Rate and Cabin Differential Pressure. Rudder trim and flaps will not function but the indications will correspond to the values that were present when the power failed and BETA and REVERSE will not be available. The emergency bus is intended to provide emergency power to systems required to land the aircraft in the event of a total electrical failure.

When the Battery switch, located on the overhead switch panel, is turned ON, the battery contactor closes, enabling current to flow from the battery to both the start contactor and the tie bus located on the lower left section of the pilots instrument panel (Figures 7-9 and 7-19). Should the airplane's battery be depleted, a receptacle (located behind a small access door on the left side of the aft fuselage) permits using an external 24 Vdc power source for engine start. With the Battery switch OFF, connecting an appropriate external source completes a circuit that closes the external power contactor, permitting current to flow to the starter generator and the tie bus. Whether using the airplanes battery, or external power, tie bus overcurrent protection is provided by the 150 ampere battery circuit breaker.

NOTE

The red VOLTS message will illuminate with repeating chime any time the main bus voltage falls below 24 Volts (if the generator is OFF, alternator is OFF and aircraft is on the ground) or 25 Volts (if the generator is ON, alternator is ON, or aircraft is in the air) or any time the EMER bus voltage drops below 24 Volts. Check the voltmeter for correct voltage.

7.25 ELECTRICAL SYSTEM (continued)

The generator and the alternator each have their own independent ON-OFF switch located on the overhead switch panel. Each system also has it's own solid state voltage regulator which regulates field voltage to their respective device. When selected ON, the output of the generator and the alternator is fed through individual shunts to the tie bus. The alternator is tied to the bus by a 150 ampere circuit breaker. The generator is tied to the bus by a line contactor which is controlled by the generator control unit (GCU). Should an overvoltage or field ground fault condition occur in the alternator system, it's voltage regulator will turn off the output to the alternator field. Once the fault has been cleared the alternator system may be turned back on by turning the alternator switch on the overhead switch panel OFF and then back ON. Should an overvoltage or ground fault condition occur in the generator system the GCU will open the line contactor and place itself in the tripped mode. Once the fault has been cleared the generator can be put back on line by resetting the GENERATOR CONTROL circuit breaker (on the lower left hand instrument panel, Figures 7-9 and 7-19) and turning the generator switch on the overhead switch panel OFF and then back ON.

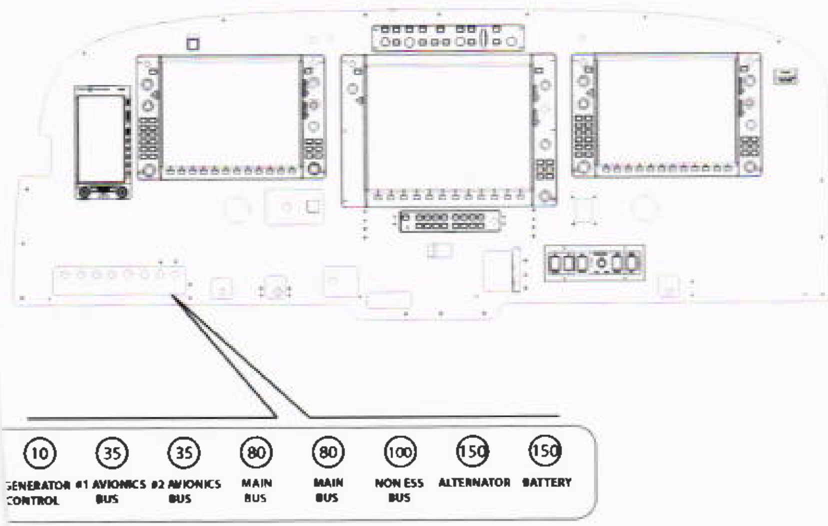
The engine start system has an Auto and a Manual mode. Auto mode is considered the normal mode. In Auto mode, momentarily depressing the PUSH START switch will engage the starter. The starter will automatically disengage at 56% Ng. To disengage the starter or to abort a start in AUTO mode, place the MAN/STOP switch (green indicator light in switch illuminated) to the manual position. When in manual mode, the starter will engage only while the PUSH START switch is depressed.

A main electrical bus with associated circuit breakers is located on th pilot's forward and aft side panels (Figure 7-15). The Non-Essential Bus an #2 Avionics Bus are located on the co-pilot's forward side panel and the # Avionics Bus is located on the co-pilot's aft side panel (Figure 7-17). The tw avionics busses are interconnected via a 25 ampere bus tie circuit breaker.

7.25 ELECTRICAL SYSTEM (continued)

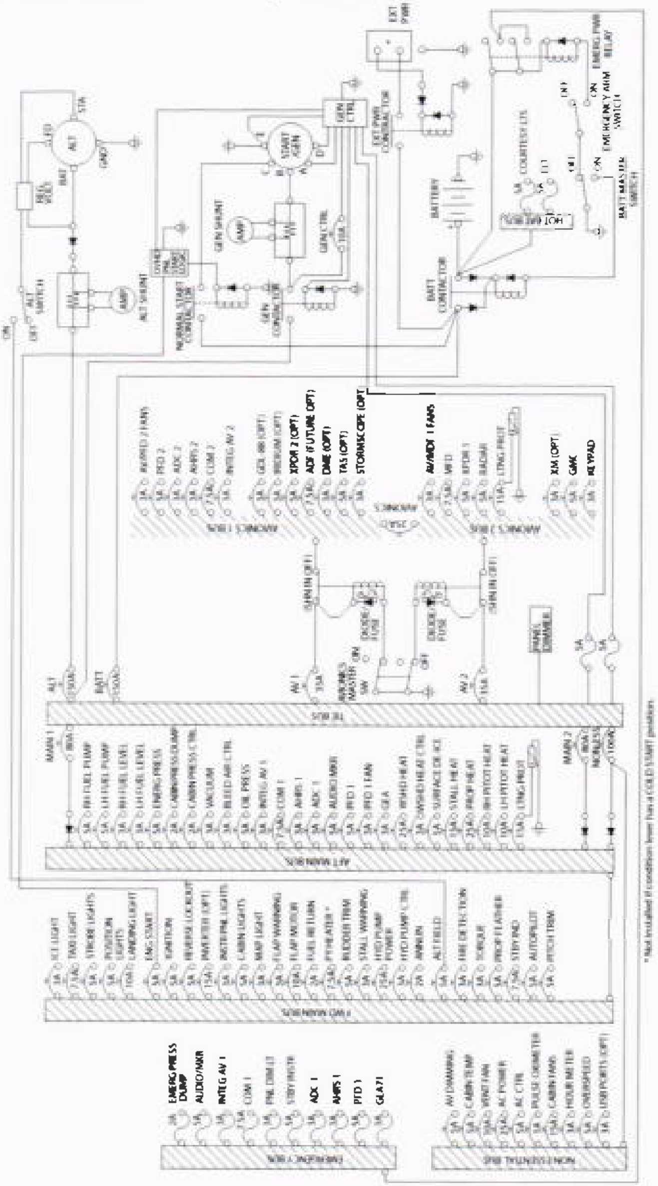
Current is fed to the main bus by three conductors. Three in line diodes provide isolation in the event of a ground fault in one of the feeder lines. The three feeders are protected by two 80 amp and one 100 amp circuit breakers (Figure 7-9). The non-essential bus is also fed by the 100 amp circuit breaker.

The two avionics busses are fed through independent contactors (Figure 7-9). The feeders to the contactors are protected by 35 ampere circuit breakers. When the AVIONICS switch on the overhead switch panel is depressed, both avionics contactors close allowing current to flow to both avionics busses. Should the need arise, either avionics bus can be isolated by pulling the avionics bus BUS TIE circuit breaker and the appropriate tie bus avionics circuit breaker.



Tie Bus Circuit Breakers
Figure 7-9

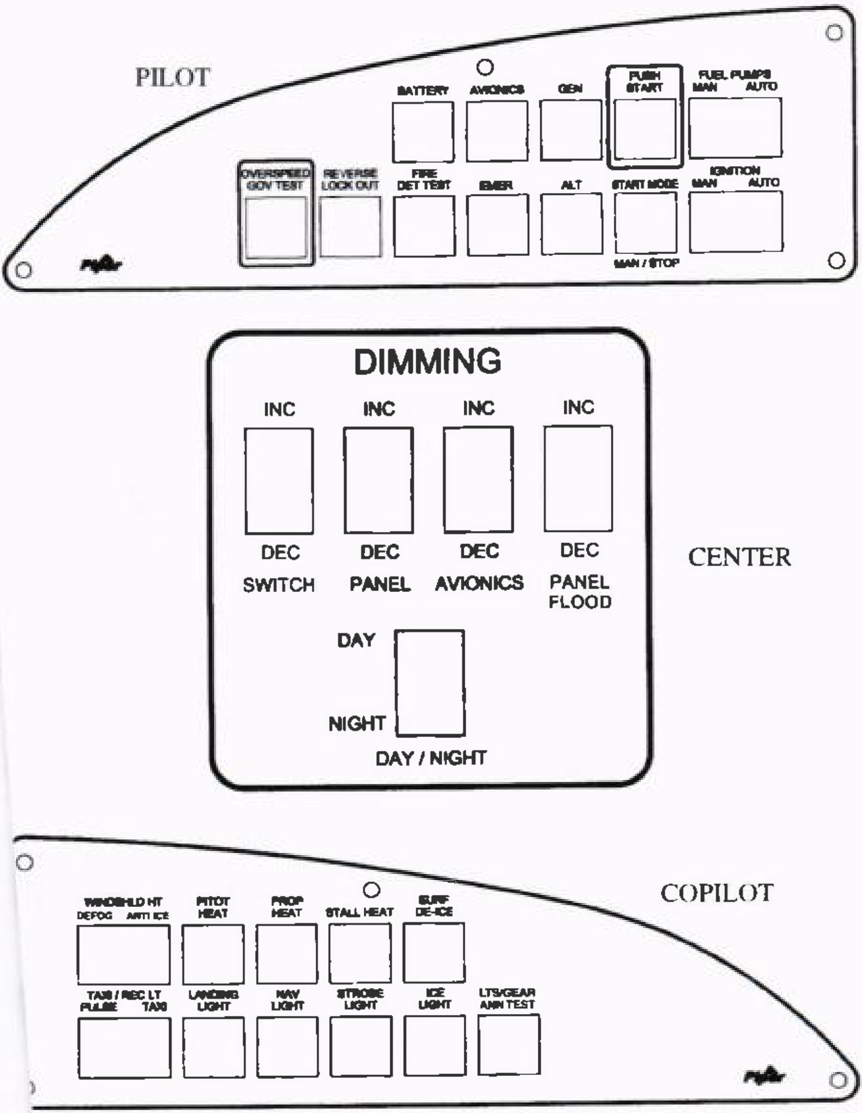
7.25 ELECTRICAL SYSTEM (continued)



Electrical Power Distribution System

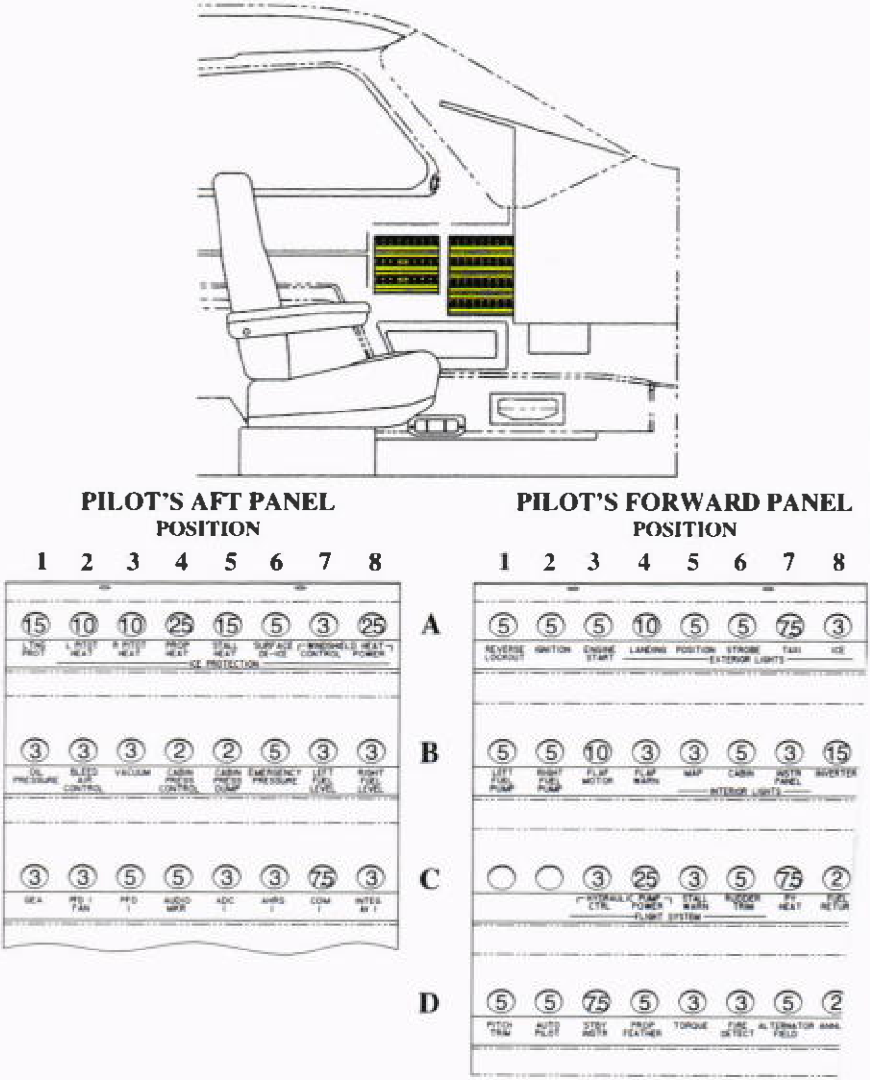
Figure 7-11

7.25 ELECTRICAL SYSTEM (continued)



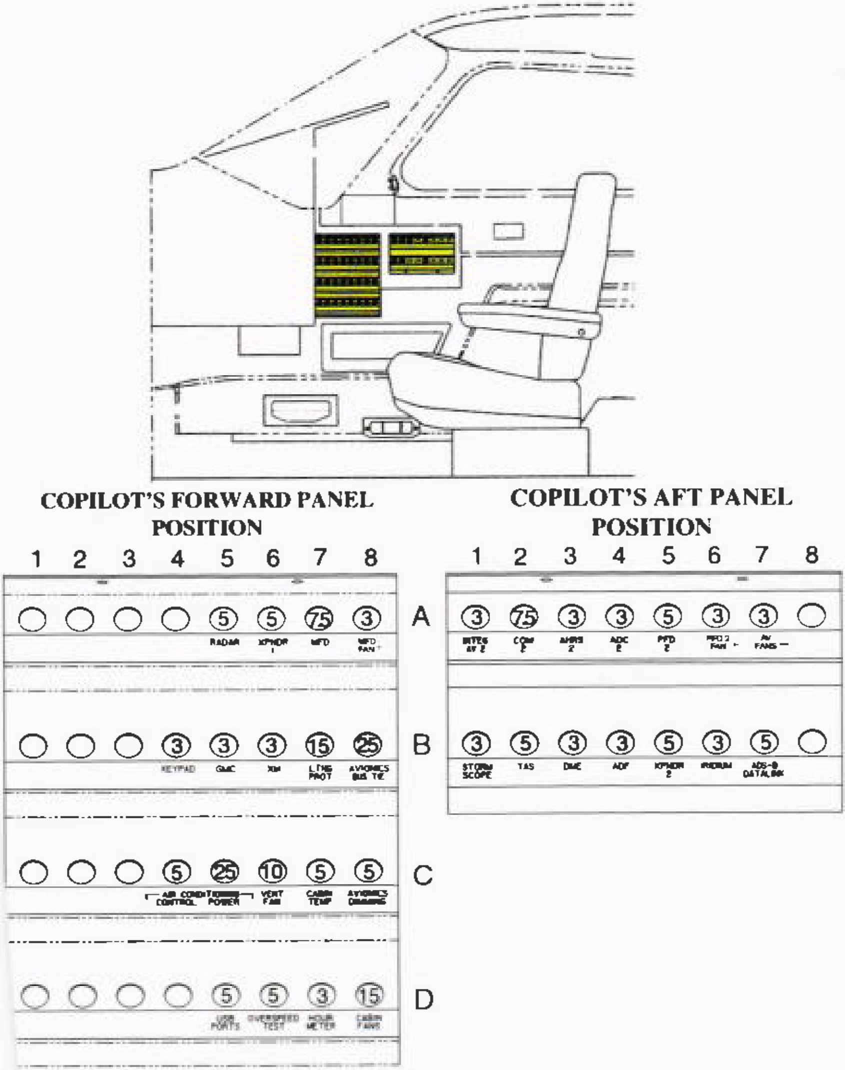
Overhead Switch Panel
Figure 7-13

7.25 ELECTRICAL SYSTEM (continued)



Circuit Breaker Panel - Pilot's Side, Typical
Figure 7-15

7.25 ELECTRICAL SYSTEM (continued)



Circuit Breaker Panel - Copilot's Side, Typical
Figure 7-17

7.27 INSTRUMENT PANEL

The instrument panel has been designed to incorporate the Garmin G1000 Integrated Cockpit. All Communication and Navigation Systems, Flight Instruments, Engine Instruments, and System Annunciations have been integrated into a custom design package specifically for the PA-46-500TP.

All the high current tie bus input and feeder circuit breakers are located on the lower left section of the instrument panel.

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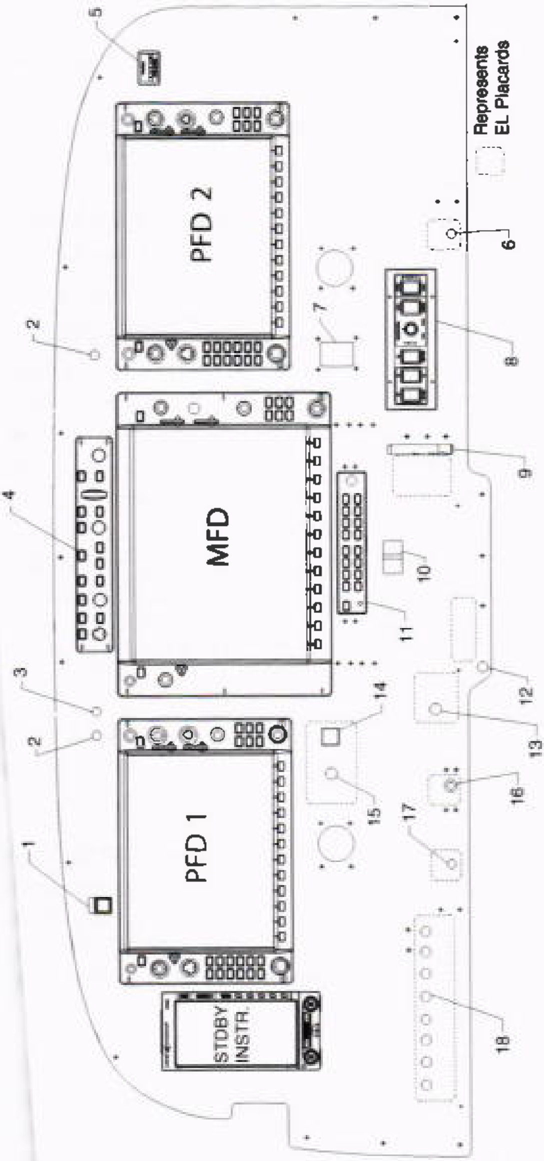

1. Mic/Mask Select Switch
2. Display Backup Switch
3. Level Mode (LVL) Switch
4. Autopilot Controller
5. Hour Meter
6. Defrost Switch
7. ELT Switch
8. Environmental Control System Panel
9. Flaps Position Selector
10. Rudder Trim Switch
11. Audio Panel
12. Emergency Landing Gear Extension
13. Landing Gear Selector
14. Cabin Pressure Dump Switch
15. ECS Cabin Comfort Control
16. Bleed Air Shutoff Lever
17. Parking Brake
18. Circuit Breakers

Instrument Panel, Typical
Figure 7-19

7.29 PITOT STATIC SYSTEM

Pitot pressure for the airspeed indicators is sensed by heated pitot heads installed on the bottom of the left and right wings and is carried through lines within the wing and fuselage to the two air data computers mounted behind the instrument panel. Static pressure for the two air data computers and standby altimeter and airspeed indicators is sensed by static source ports on the underside of the fuselage. Static pressure for the pressurization system outflow valve is sensed by a separate static port located on the aft bottom of the aircraft in close proximity to the static ports.

An alternate static source control valve is located below the instrument panel to the left of the pilot. For normal operation, the lever remains down. To select alternate static source, place the lever in the up position. When the alternate static source is selected the airspeed and altimeter and vertical speed indicator are vented to alternate static ports on the aft sides of the fuselage. During alternate static source operation, these instruments may give slightly different readings. The pilot can determine the effects of the alternate static source on instrument readings by switching from standard to alternate sources at different airspeeds. Corrections for each operating mode are shown in Section 5, Performance.

If one or more of the pitot static instruments malfunction, the system should be checked for dirt, leaks or moisture.

The holes in the sensors for pitot and static pressure must be fully open anc free from blockage. Blocked sensor holes will give erratic or zero readings oı the instruments.

Both the pitot and static systems can be drained through separate drai valves located on both the right and left lower side panel next to the crew seat: Three drains exist on the pilot's side. The forward valve is the pilot's static drai the center valve is the alternate static drain and the aft valve is the pilot's pit drain. Two drains exist on the copilot's side. The forward valve is the copilot static drain and the aft valve is the copilot's pitot drain.

The heated pitot heads, which alleviate problems with icing and hea rain, are standard equipment. The switch for pitot heat is located on the ri overhead switch panel. Static source ports have been demonstrated to be n icing; however, in the event that icing does occur, selecting the alternate st source will alleviate the problem.

7.31 ENVIRONMENTAL SYSTEM

The environmental system consists of:

(a) An engine bleed air and conditioning system.

(b) The ventilating air system.

(c) An air conditioning system.

(d) The cabin air distribution system.

(e) The pressurization and control system.

Compressor bleed air from the P3 engine port supplies air for heating the cabin during flight and ground operations and for pressurization. The bleed air is first routed through a mass flow controller that mixes ambient and bleed air. then the air flow is split between a heat exchanger and muffler. The amount of air flowing through each component is dependent on the cabin air temperature setting. The air then flows into the cabin through the lower left and right cabin side panel ducts, and through the windshield defroster, when selected by pulling the defoster knob located below the right control column. Conditioned bleed air entering the cabin will always be warmer than the outside air and typically warmer than the cabin air.

Cabin ventilating air during ground or unpressurized flight operation is provided by a blower through the lower left and right cabin side panel ducts. The ›lower is activated by the VENT/FAN switch.

Cabin air conditioning is provided by a vapor cycle system. The compressor ; belt driven by the engine dual drive.

The condenser and its cooling air fan are located in the tailcone immediately ‘t of the rear pressure bulkhead. Cooling air from outside the tailcone is drawn to the cooling air duct through a flush opening in the skin, routed across the ›ndenser coil, and discharged overboard through the tailcone exit opening.

Two recirculation blowers and evaporator assemblies are located aft of each ır seat below the rear baggage compartment floor. The recirculation blowers ıw air into each evaporator coil through grills in the floor structure behind the r seats and discharges it into the upper left and right cabin side panel ducts. justable eyeball outlets are located at each seat location in the airplane.

7.31 ENVIRONMENTAL SYSTEM (continued)

The AIR COND and blower LO & HI switches, located as part of the environmental switch panel in the center of the instrument panel, are used to control the air conditioning system.

When the AIR COND switch is selected ON, the compressor belt drive is electrically clutched, the condenser blower motor relay is closed, and both recirculation blowers are activated. The recirculation blowers can be operated independently of the air conditioner by selecting the blower HI or LO on. In either situation, the blower switches are used only to select a HI or LO recirculation blower motor speed. Overcurrent protection is provided by the 15 amp CABIN FANS, 5 amp AIR CONDITIONING CONTROL, and 25 amp AIR CONDITIONING POWER circuit breakers in the copilot's forward circuit breaker panel.

The HFC-134A portion of the system incorporates a receiver dryer, a sight gauge, suction and discharge service valves, and 265 psi high pressure and 40 psi low pressure switches. Should the compressor discharge pressure increase above 265 psi, or decrease below 40 psi, the applicable pressure switch will open, disengaging the freon compressor clutch.

Refer to paragraph 7.33, BLEED AIR, CONDITIONING AND PRESSURIZATION SYSTEM, for a more complete description of the pressurization system and use of related controls and switches.

Cabin Climate Control Panel Operation

a Cabin Climate Control Panel Controls and Switches

Cabin climate controls and switches are located just to the right of th flap selector handle in the cabin comfort control panel. (Refer to Sectio 7, Figure 7-19.)

The cabin climate system controls and switches from left to right c the panel are:

- AIR COND / ON switch
- HI / LO blower switch
- VENT FAN / ON switch
- CLIMATE CONTROL - AUTO / COOL / WARM rotary swit
- AUTO / MANUAL mode switch
- MANUAL WARM / COOL switch

7.31 ENVIRONMENTAL SYSTEM (continued)

b Auto Temp Operation

Set the ECS CABIN COMFORT switch to the NORM position.

Under normal conditions, temperature will be maintained automatically. For automatic operation, set the mode switch to AUTO. Set the temperature control to the desired temperature. Set the blower fan switch to either HI or LO as desired.

c Manual Temp Operation

NOTE

Maximum heat can be obtained in the manual mode by positioning the ECS CABIN COMFORT switch to HIGH. This position should only be used on the ground with ambient temperature less than 20°F (-7°C). Should the BLEED OVERTEMP warning CAS message illuminate, manually decrease the temperature by pulsing the WARM/ COOL switch to the cool position.

For maximum air conditioning, hold the manual WARM/COOL switch to the cool position for 45 seconds. The switch may be pulsed to the WARM position to control the cabin temperature desired.

To meet POH performance figures, the ECS CABIN COMFORT switch must be in the NORM position.

d Maximum Cabin Cooling

On Ground:

On the ground, maximum cabin cooling may be obtained by placing the bleed air lever OUT (closed) position, the ECS CABIN COMFORT switch switch OFF, Air Conditioner ON and the blower fan to HI.

In Flight:

Unpressurized flights can be conducted with the bleed air lever pulled OUT (closed) and the ECS CABIN COMFORT switch OFF. This will provide maximum ventilation. Set the blower fan to HI or LO as desired and turn the vent fan ON.

7.33 BLEED AIR, CONDITIONING AND PRESSURIZATION SYSTEM

Air for cabin pressure is obtained from the P3 engine bleed port. Bleed air is routed through the mass flow and temperature controllers. The mass flow controller meters the amount of mass flow to the cabin through an actuator controlled, ambient and bleed air, mixing ejector. The amount of mass flow is controlled by a four position rotary switch located to the right of the left control column. The available settings are OFF, NORM, HIGH, and EMER.

The temperature controller sets the percentage of bleed air that will flow through the cooling heat exchanger versus the percentage that will flow through the acoustic muffler. The amount of air through each device determines the mixed cabin supply air temperature. The temperature controls are located on the instrument panel to the lower-left of the co-pilot's control column and have two modes of operation, automatic and manual. Cabin temperature is controlled by a relative temperature knob when in automatic mode and an increase/decrease rocker switch when in manual mode. The automatic temperature mode relies on the cabin temperature sensor, located behind the pilot in a side close out panel, for temperature regulation. The manual temperature mode directly controls the amount of air flowing through the cooling heat exchanger and acoustic muffler. Refer to Section 7.31 for cabin climate control operation.

Cabin pressure is controlled by two electromechanical outflow valves located on the aft pressure bulkhead. These valves provide identical functions ol maintaining a desired pressurization schedule during all phases of flight withou exceeding the maximum differential pressure of 5.5 +/-0.1 psi. If the cabir pressure control system develops a communications fault during flight, a CPC FAULT caution CAS message is posted. With that communication lost, th landing field elevation and weight on wheels sensors are lost, thereby allowin the possibility of landing with the aircraft still pressurized. It is the pilot' responsibility to verify that the cabin is fully depressurized prior to landin If the cabin pressure control system develops a communications failure on tl ground, a CPCS FAIL caution CAS message is posted. The outflow valves w remain open and the cabin will not pressurize. If a CPCS FAIL caution C message is experienced during flight, the outflow valves will remain in their l commanded position, allowing the system to continue to operate in a degrad mode.

Cabin pressurization system controls and switches are located on the lo left instrument panel while the pressurization system displays are incorpora into the MFD, or PFD in Reversionary mode.

7.33 BLEED AIR, CONDITIONING AND PRESSURIZATION SYSTEM (continued)

The cabin pressurization system controls, switches, and displays are as follows:

(a) BLEED AIR lever
(b) ECS CABIN COMFORT switch (OFF NORM HIGH EMER)
(c) CABIN PRESSURE / DUMP switch
(d) Cabin Altitude, Differential Pressure, and Rate of Climb EIS indications
(e) Destination Field Elevation (DEST ELV) in TMR/REF window on PFD

The only action required by the pilot during normal operation is to input the destination airport elevation by selecting the TMR/REF softkey on either PFD and entering the destination airport elevation in the DEST ELV field. If a new destination elevation is not entered, the last value entered will be used, which could result in the airplane landing while still pressurized.

Should cabin pressure altitude exceed 10000 feet, an amber CABIN ALT 10K caution CAS message will alert the pilot. If the cabin altitude exceeds 12,000 feet (as sensed by the GAE-43 or standalone pressure switch), the emergency bleed air solenoid is automatically opened and an EMER BLEED ON advisory CAS message and CABIN ALT 12K warning CAS message will replace the CABIN ALT 10K caution CAS message. Each outflow valve ncorporates a cabin altitude limiter that will close the valve when the cabin ltitude reaches 14,300+\- 300 feet. The cabin pressurization system provides the neans by which smoke and impurities are vented from the cabin.

The CABIN PRESSURE DUMP switch, when set to DUMP, electrically pens a solenoid valve in the controller, which opens both outflow valves and pidly dumps cabin pressure to ambient pressure.

For unpressurized flight set the CABIN PRESSURE DUMP switch to UMP, pull the bleed air lever (closed) and set the ECS CABIN COMFORT itch to OFF. If warmer temperatures are desired in the cabin, use the bleed air er and ECS CABIN COMFORT switch as required.

7.35 EMERGENCY OXYGEN SYSTEM

The pilot diluter demand emergency oxygen system consists of a quick donning mask, stowage box, pressure gauge, and oxygen bottle with pressure regulator and shutoff valve assembly. The complete system is contained within a cabinet located behind the copilot seat. Figure 7-21 shows the pilot emergency oxygen system as installed within the cabin.

Emergency Oxygen System Installation
Figure 7-21

7.35 EMERGENCY OXYGEN SYSTEM (continued)

The oxygen system is activated by a lever located above the stowage box and slightly recessed within the cabinet. A placard on the cabinet clearly marks the ON and OFF positions. The system pressure gauge is located on top of the cabinet and is illuminated by a post light. The pressure gauge incorporates a yellow arc from 0 to 800 psi. The minimum safe charge for pressurized operation above 25,000 feet is 800 psi or above. The quick donning mask stowage box incorporates a test indicator and is located in the upper left corner of the stowage box face. A press-to-test button is also located in the lower left corner of the stowage box face. The controls on the mask itself consist of a switch to select between diluted/normal (N) flow and non-diluted flow (100%), as well as an additional emergency pressure breather switch. Integral to the mask supply line and adjacent to the mask is a secondary flow indicator.

To remove the mask from the stowage box, pull on the inflation control valve (red handles) protruding from the face of the stowage box. Once removed, depressing the inflation control valve inflates the harness and allows it to be placed over the head. After the harness is completely over the head, releasing the inflation control valve will firmly hold the mask in place. To achieve optimum fit, simply reinflate the harness by depressing the inflation control valve and adjusting the mask as needed. The MIC SELECT switch, located ıbove the pilot's PFD, when in the mask position activates the mask microphone. ontinued oxygen system operation can be verified by the pressure gauge, ocated on top of the cabinet, and two flow indicators, one located on the face of he stowage box and the other integral to the oxygen mask supply line.

With the system charged to 800 psi or higher and the mask set to normal (N), ie pilot oxygen system will provide adequate oxygen for an emergency descent om 30,000 feet to 10,000 feet. The 15 minute descent profile used to define the inimum safe oxygen charge includes a one-minute dwell time at 30,000 feet, a 000 fpm descent to 10,000 feet, followed by a 10 minute hold at 10,000 feet. ith the system fully charged to 1800 psi and the mask set to normal (N), the ygen system will provide oxygen to the pilot for approximately 25 minutes at ,000 feet.

NOTE

Pilot oxygen system pressure must be above the yellow arc, or greater than 800 psi, during pressurized flight above 25,000 feet.

7.35 EMERGENCY OXYGEN SYSTEM (continued)

The emergency oxygen system for all occupants other than the pilot consists of three two-man oxygen generators and six masks. The system consists of two major assemblies, the copilot and cabin passenger assemblies. The oxygen generators provide sufficient oxygen flow for six people for a 15 minute period. Once an oxygen generator is activated, it will continue to produce oxygen until depleted, as no shutoff provisions are provided. Each generator has two oxygen masks connected, either of which is capable of activating the generator.

The copilot assembly is located under the copilot seat and contains two masks and one two-man oxygen generator mounted on a sliding tray. The tray slides out into the aisle between the pilot and copilot seat, exposing the two masks. Each mask is connected to the oxygen generator via a clear plastic oxygen delivery tube and lanyard. Pulling either of the masks, and thus the lanyard, activates the oxygen generator and delivers oxygen to both masks simultaneously. The additional mask can be used by the pilot in the event of a failed pilot demand oxygen system. The generator has two over-pressure relief valves to prevent excessive pressure should a malfunction in the system occur.

The cabin passenger assembly is located in a drawer beneath the right rear-facing passenger seat. Four masks and two two-man oxygen generators are accessed by sliding the drawer out in the aft direction. The two inboard masks are connected to the first oxygen generator, while the two outboard masks are connected to the second generator. Any of the four masks will reach any of the four passengers. Activation and operation of the passenger oxygen generators i identical to the copilot assembly.

Placards are provided on the side panels outboard of the copilot's seat an the right aft-facing seat; the placards state the location and operation of th copilot and passenger emergency oxygen system, and that smoking is prohibite

An OXYGEN message is provided to inform the crew whenever either the three oxygen generators has been activated. The message is displayed as white advisory while on the ground but as an amber caution while in flight a is activated by a microswitch on each generator. The message will continue illuminate until the used generator is replaced with a full one.

7.37 VACUUM SYSTEM

Vacuum for the system is provided by an ejector, driven by pressure regulated, precooled engine bleed air. Also, included is a vacuum regulator and a low vacuum switch.

Vacuum is used for pneumatic deice boot hold down. Vacuum level indication, displayed on the MFD, is for general vacuum system health monitoring, and is for reference only. Transient decreases in vacuum during pneumatic boot operation can be expected. Any sustained decrease in system vacuum may indicate a sticking or maladjusted vacuum regulator, a leak in the system, or a failure of the ejector. An amber vacuum indication indicates that vacuum level has dropped below 2.0 In. Hg., which is considered an excessively low value.

7.39 STALL WARNING SYSTEM

The stall warning system consists of a lift transducer located in the leading edge of the left wing and a lift computer to power regulators, a signal processor, control circuitry and a push-to-test switch. The lift transducer protrudes into the air stream and during flight is positioned by local airflow velocity and direction. A continuous stall warning "STALL...STALL" aural alert will sound prior to the actual stall.

Activation of the STALL WARN TEST switch during ground operation will produce an aural "STALL...STALL" stall warning aural alert, verifying proper stall warning operation. If the autopilot were to be engaged during the stall warning test, it will disengage once the STALL WARN TEST switch is depressed. The amber STALL WARN FAIL caution message indicates that the lift computer and/or lift transducer has failed.

7.41 EMERGENCY LOCATOR TRANSMITTER

The Emergency Locator Transmitter (ELT) operates on self-contained batteries and is located in the aft fuselage section. It is accessible through a cover on the bottom right side of the fuselage.

A battery replacement date is marked on the transmitter. To comply with FAA regulations, the battery must be replaced on or before this date. The battery must also be replaced if the transmitter has been used in an emergency situation, if the accumulated test time exceeds one hour, or if the unit has been inadvertently activated for an undetermined time period.

NOTE

If for any reason a test transmission is necessary, the test transmission should be conducted only in the first five minutes of any hour and limited to three audio sweeps. If a test must be made at any other time, the test should be coordinated with the nearest FAA tower or flight service station.

ARTEX ELT 1000 OPERATION

There is a three position switch (placarded ON ARM/OFF, and TEST) on the ELT unit. The switch is set to ARM/OFF when the ELT is installed at the factory, and it should remain in that position whenever the unit is installed in the airplane.

A remote switch (placarded ON ARM/OFF, and TEST) is located on the copilot's instrument panel to allow the transmitter to be armed or turned on from inside the cabin. The switch is normally in ARM /OFF position. Movin the switch to ON will activate the transmitter. A warning light located above th remote switch will alert you whenever the ELT is activated.

The Artex ELT 1000 (406 MHz) is equipped with a warning buzzer. Th warning buzzer, which receives power from the ELT itself, is mounted in tl tailcone. Whenever the ELT is activated the buzzer "beeps" periodically. T time between pulses lengthens after 12 hours. The objective is to hear the buz from outside the aircraft while the engine is not running.

7.41 EMERGENCY LOCATOR TRANSMITTER (continued)

ARTEX ELT 1000 OPERATION (continued)

Should the ELT be activated inadvertently it can be reset by either positioning the cockpit remote switch or the local ELT box switch to ON then immediately switching it to the ARM position. The ELT cannot be reset if either the cockpit remote switch or the ELT local switch is in the ON position.

The transmitter can be activated manually at any time by placing either the remote switch or the ELT switch to the ON position.

NOTE

A monthly functional check is recommended to verify operational status of the ELT. Prior to testing, the aircraft must be located to receive GPS signals with avionics on. Within the first 5 minutes after the hour, select the cockpit remote switch to the test position for ~ 1 second and then return to the ARM/OFF position. The remote switch LED light and buzzer should then activate for ~ 2 seconds. If the 2 second LED light and buzzer indication is not received, refer to the ARTEX ELT 1000 maintenance manual.

The ARTEX ELT 1000 should be checked during postflight to make certain he unit has not been activated. Check by selecting 121.50 MHz on an operating eceiver. If a downward sweeping audio tone is heard the ELT may have been ctivated. Set the remote switch to ON. If there is no change in the volume of the gnal, your airplane's ELT is probably transmitting. Setting the remote switch ack to ARM/OFF will automatically reset the ELT and should stop the signal ing received on 121.50 MHz.

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AIRPLANE HANDLING, SERVICING, AND MAINTENANCE

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SECTION 8

AIRPLANE HANDLING, SERVICING, AND MAINTENANCE

8.1 GENERAL

This section provides guidelines relating to the handling, servicing, and maintenance of the M500. For complete maintenance instructions, refer to the PA-46-500TP Maintenance Manual.

WARNING

Inspection, maintenance and parts requirements for all non-PIPER approved STC installations are not included in this handbook. When a non-PIPER approved STC installation is incorporated on the airplane, those portions of the airplane affected by the installation must be inspected in accordance with the inspection program published by the owner of the STC. Since non-PIPER approved STC installations may change systems interface, operating characteristics and component loads or stresses on adjacent structures, PIPER provided inspection criteria may not be valid for airplanes with non-PIPER approved STC installations.

WARNING

Modifications must be approved in writing by PIPER prior to installation. Any and all other installations, whatsoever, of any kind will void this warranty in it's entirety.

8.1 GENERAL (continued)

WARNING

Use only genuine PIPER parts or PIPER approved parts obtained from PIPER approved sources, in connection with the maintenance and repair of PIPER airplanes.

Genuine PIPER parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in PIPER airplane applications. Parts purchased from sources other than PIPER, even though identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Additionally, reworked or salvaged parts or those parts obtained from non-PIPER approved sources, may have service histories which are unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or may have other hidden damage not discernible through routine visual or nondestructive testing. This may render the part, component or structural assembly, even though originally manufactured by PIPER, unsuitable and unsafe for airplane use.

PIPER expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-PIPER approved parts.

8.1 GENERAL (continued)

Every owner should stay in close contact with an approved Piper Service Center or Piper's Customer Services Department to obtain the latest information pertaining to their airplane, and to avail themselves of Piper's support systems.

Piper takes a continuing interest in having owners get the most efficient use from their airplane and keeping it in the best mechanical condition. Consequently, Piper, from time to time, issues service releases including Service Bulletins, Service Letters, Service Spares Letters, and others relating to the airplane.

Piper Service Bulletins are of special importance and Piper considers compliance mandatory. These are available on the Piper.com website. Depending on the nature of the release, material and labor allowances may apply. This information is provided to all approved Piper Service Centers.

Service Letters deal with product improvements and servicing techniques pertaining to the airplane. They are available on the Piper.com website.. Owners should give careful attention to Service Letter information.

Service Spares Letters offer improved parts, kits, and optional equipment which were not available originally, and which may be of interest to the owner.

Maintenance manuals, parts catalogs, and revisions to both, are available from Piper Service Centers.

Any correspondence regarding the airplane should include the airplane model and serial number to ensure proper response.

8.3 AIRPLANE INSPECTION PERIODS

WARNING

All inspection intervals, replacement time limits, overhaul time limits, the method of inspection, life limits, cycle limits, etc., recommended by PIPER are solely based on the use of new, remanufactured or overhauled PIPER approved parts. If parts are designed, manufactured, remanufactured, overhauled and/or approved by entities other than PIPER, then the data in PIPER'S maintenance/service manuals and parts catalogs are no longer applicable and the purchaser is warned not to rely on such data for non-PIPER parts. All inspection intervals, replacement time limits, overhaul time limits, the method of inspection, life limits, cycle limits, etc., for such non-PIPER parts must be obtained from the manufacturer and/or seller of such non-PIPER parts.

Piper has developed inspection items and required inspection intervals fo the PA-46-500TP. The PA-46-500TP Progressive Inspection Manual contain appropriate forms, and all inspection procedures should be complied with by properly trained, knowledgeable, and qualified mechanic at an authorized Pipe Service Center or a reputable repair shop. Piper cannot accept responsibility fo the continued airworthiness of any aircraft not maintained to these standard and/or not brought into compliance with applicable Service Bulletins issued b Piper, instructions issued by the engine, propeller, or accessory manufacture or Airworthiness Directives issued by the FAA.

In addition, but in conjunction with the above, the FAA requires perio inspections on all aircraft to keep the Airworthiness Certificate in effect. T owner is responsible for assuring compliance with these inspection requireme and for maintaining proper documentation in logbooks and/or maintena records.

8.5 PREVENTIVE MAINTENANCE

The holder of a pilot certificate issued under Federal Aviation Regulations (FAR) Part 61 may perform certain preventive maintenance as defined in the FARs. This maintenance may be performed only on an aircraft which the pilot owns and operates, and which is not used in air carrier or air taxi/commercial operations service.

All other aircraft maintenance must be accomplished by a person or facility appropriately certificated by the Federal Aviation Administration (FAA) to perform that work.

Anytime maintenance is accomplished, an entry must be made in the appropriate aircraft maintenance records. The entry shall include:

(a) The date the work was accomplished.
(b) Description of the work.
(c) Number of hours on the aircraft.
(d) The certificate number of pilot performing the work.
(e) Signature of the individual doing the work.

8.7 AIRPLANE ALTERATIONS

If the owner desires to have his aircraft modified, he must obtain FAA approval for the alteration. Major alterations accomplished in accordance with Advisory Circular 43.13-2, when performed by an A & P mechanic, may be approved by the local FAA office. Major alterations to the basic airframe or systems not covered by AC 43.13-2 may require a Supplemental Type Certificate.

8.9 AIRPLANE FILE

The owner or pilot is required to ascertain that the following aircraft papers are in order and in the aircraft.

(a) To be displayed in the aircraft at all times:
  (1) Aircraft Airworthiness Certificate Form FAA-8100-2.
  (2) Aircraft Registration Certificate Form FAA-8050-3.

(b) To be carried in the aircraft at all times:
  (1) Pilot's Operating Handbook and FAA approved Airplane Flight Manual.
  (2) Weight and Balance data plus a copy of the latest Repair and Alteration FAA Form -337, if applicable.
  (3) Aircraft equipment list.

Although the aircraft and engine logbooks are not required to be in the aircraft, they should be made available upon request. Logbooks should be complete and up to date. Good records will reduce maintenance cost by giving the mechanic information about what has or has not been accomplished.

8.11 GROUND HANDLING

(a) Towing

The airplane may be moved on the ground by power equipmen that will not damage or excessively strain the nose gear steerin assembly.

CAUTION

When towing with power equipment, do not turn the nose gear beyond its steering limit in either direction, as this will result in damage to the nose gear and steering mechanism.

CAUTION

Do not tow the airplane when the controls are secured.

In the event towing lines are necessary, ropes should be attacl to both main gear struts as high up on the tubes as possible. Li should be long enough to clear the nose and/or tail by not less t fifteen feet, and a qualified person should ride in the pilot's sea maintain control by use of the brakes.

8.11 GROUND HANDLING (continued)

(b) Taxiing

CAUTION

Do not operate engine above ground idle with cabin doors open.

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Engine starting and shut-down procedures as well as taxi techniques should be covered. When it is ascertained that the propeller blast and taxi areas are clear, power should be applied to start the taxi roll, and the following checks should be performed:

(1) Taxi a few feet forward and apply the brakes to determine their effectiveness.

(2) Propeller thrust may be modulated from full forward to full reverse by selection of the reversing range. A lock-out feature allows reverse pitch to function only during ground operations.

(3) While taxiing, make slight turns to ascertain the effectiveness of the steering.

(4) Observe wing clearance when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.

(5) When taxiing over uneven ground, avoid holes and ruts.

(6) Do not operate the engine at high rpm when running up or taxiing over ground containing loose stones, gravel, or any loose material that may cause damage to the propeller blades.

(7) When the airplane is stopped on the taxiway or runway and brake freeze-up occurs, actuate the brakes several times using maximum pressure. To reduce the possibility of brake freeze-up during taxi operation in severe weather conditions, one or two taxi slow downs (from 25 to 5 knots) may be made using light brake pressure, which will assist moisture evaporation within the brake.

(8) Minimize ground operation in Beta/Reverse and monitor engine oil temperature.

8.11 GROUND HANDLING (continued)

(c) Parking

When parking the airplane, be sure that it is sufficiently protected from adverse weather conditions and that it presents no danger to other aircraft. When parking the airplane for any length of time or overnight, it is suggested that it be moored securely.

(1) To park the airplane, head it into the wind if possible.

(2) The parking brake knob is located just below the left control column. To set the parking brake, first depress and hold the toe brakes and then pull out on the parking brake knob. To release the parking brake, first depress the brake pedals and then push in on the parking brake knob.

CAUTION

Care should be taken when setting brakes that are overheated or during cold weather when accumulated moisture may freeze a brake.

(3) Aileron and elevator controls should be secured with the front seat belt and chocks should be used to properly block the wheels.

(d) Mooring

The airplane should be moored for immovability, security an protection. The following procedures should be used for the prope mooring of the airplane:

(1) Head the airplane into the wind if possible.

(2) Retract the flaps.

(3) Immobilize the ailerons and elevator by looping the seat b through the control wheel and pulling it snug.

(4) Place chocks both fore and aft of the main wheels.

8.11 GROUND HANDLING (continued)

(d) Mooring (continued)

(5) Secure tiedown ropes to main landing gear and tail tiedown at approximately 45 degree angles to the ground. When using rope of non-synthetic material, leave sufficient slack to avoid damage to the airplane should the ropes contract.

CAUTION

Use bowline knots, square knots or locked slip knots. Do not use plain slip knots.

NOTE

Additional preparations for high winds include using tiedown ropes from the nose landing gear and securing the rudder.

(6) Install pitot head covers if available. Be sure to remove the pitot head covers before flight.

(7) The cabin door should be locked when the airplane is unattended.

(8) For overnight or in blowing snow or dust, install engine inlet covers and dust covers on the air inlet cooling duct on top of the cowling and on the exhaust stacks. Attach propeller restrainers to prevent windmilling.

8.13 UNPAVED FIELD OPERATIONS

Prior to operating on unpaved fields, it is important that the pilot make sure that the aircraft has been maintained in accordance with maintenance manual specifications. Failure to operate the aircraft within these specifications may result in damage to the aircraft. The following items should be verified prior to unpaved field operations:

1. Tires must be in good condition and maintained/inflated per Section 8.27 requirements.

2. Landing gear should be maintained at proper landing gear strut extensions (See Section 8.19). Landing gear struts should be kept clean using a soft clean cloth. Landing gear seals will experience increased wear rate during unpaved field operations and require replacement at more frequent intervals.

3. Inspect runway condition, if possible, prior to taxi, takeoff, or landing operations. The unpaved runway should be a hard grass or dirt surface of reasonable smoothness. Operations on grass fields are limited to short grass of length and density typical of picture below.

8.13 UNPAVED FIELD OPERATIONS (continued)

Following unpaved field operations, preflight inspections should pay special attention to the following areas for possible damage/debris:

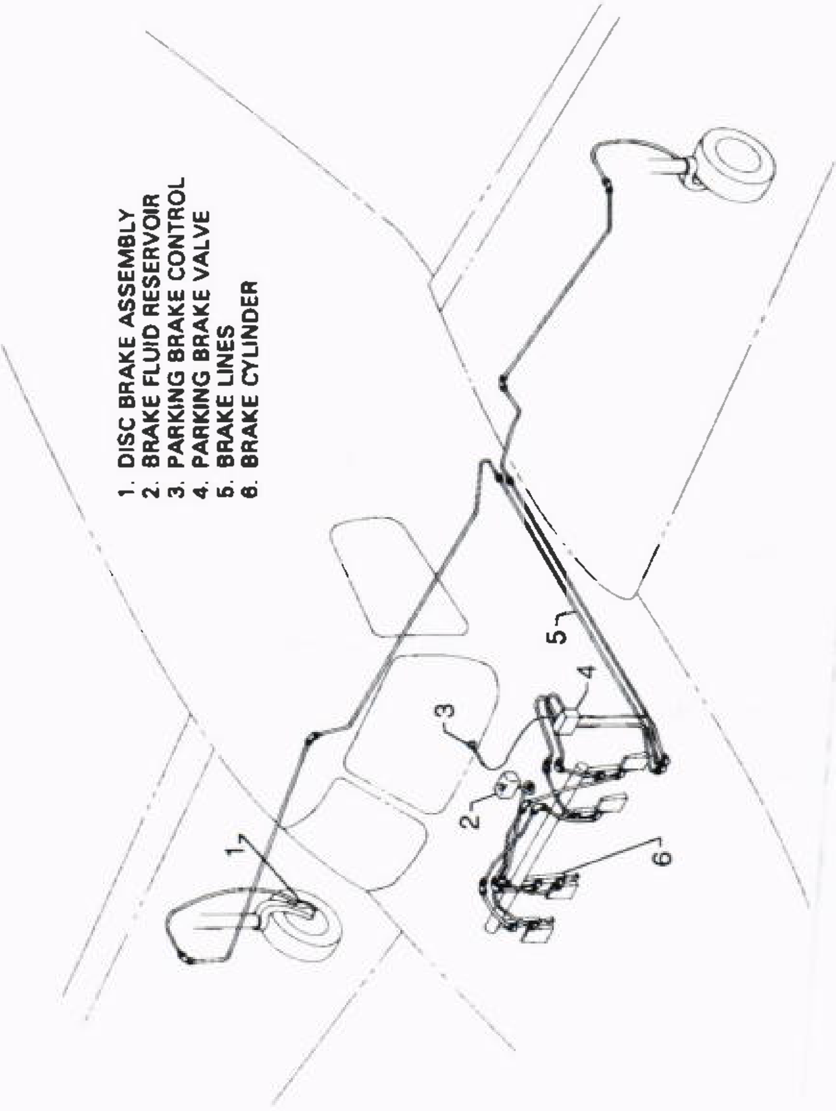
- Propeller
- Engine Air Inlets
- Oil Cooler Inlet
- Landing Gear
- Oleo Strut
- Wheels
- Tires
- Wheel Wells
- Brakes
- Flaps, Lower Fuselage and Wing.

For maintenance requirements, see Maintenance Manual, Operation from Soft or Unusual Terrain, Section 5-30-00.

8.15 BRAKE SERVICE

The brake system is filled with MIL-PRF-5606 (petroleum base) ıydraulic fluid. The fluid level should be checked periodically (at least every)0 days) or at every 100 hour inspection, and replenished when necessary. 'he brake fluid reservoir is located on the left side of the firewall. If the ntire system must be refilled, fill with fluid under pressure from the brake end f the system. This will eliminate air from the system.

No adjustment of the brake clearances is necessary. If, after extended rvice, brake blocks become excessively worn they should be replaced with w segments.



BRAKE SYSTEM
Figure 8-1

8.17 HYDRAULIC SYSTEM SERVICE

The hydraulic system reservoir is an integral part of the electric hydraulic pump assembly. It is located aft of the aft cabin baggage compartment and is accessible through the baggage compartment aft closeout panel. The fluid level should be checked periodically (at least every 90 days) or at every 100 hour inspection, and replenished when necessary. Consult maintenance manual for instructions on hydraulic system reservoir servicing.

8.19 LANDING GEAR SERVICE

The main landing gear uses 6.00 x 6 wheels with 6.00 x 6, eight-ply rating tires and tubes. (Refer to paragraph 8.27.)

The nose wheel uses a 5.00 x 5 wheel with a 5.00 x 5 eight-ply rating, type 'II tire and tube. (Refer to paragraph 8.27.)

Wheels are removed by taking off the hub cap, cotter pin, axle nut, and ·olts holding the brake segment in place. Mark tire and wheel for reinstallation; ıen dismount by deflating the tire, removing the through-bolts from the wheel ıd separating the wheel halves.

Landing gear oleos should be serviced according to the instructions in the aintenance manual. The main oleos should be extended under normal static ad (no one on board with full fuel/oil) until 2.4 +/- 0.25 inches of oleo piston ɔe is exposed, and the nose gear should show 2.7 +/- 0.25 inches.

8.19 LANDING GEAR SERVICE (continued)

In jacking the aircraft for landing gear or other service, two hydraulic jacks and a tail stand should be used. At least 400 pounds of ballast should be placed on the base of the tail stand before the airplane is jacked up. The hydraulic jacks should be placed under the jack points on the bottom of the wing and the airplane jacked up until the tail skid is at the right height to attach the tail stand. After the tail stand is attached and the ballast added, jacking may be continued until the airplane is at the height desired.

The steering rods from the rudder pedals to the transverse bellcrank in the nose wheel tunnel are factory adjusted and should be readjusted only in accordance with the applicable rigging specification. Nose wheel alignment is accomplished by adjusting the rod end(s) on the steering bungee assembly in such a way that the nose wheel is in line with the fore and aft axis of the plane when the rudder pedals are centered. Alignment of the nose wheel can be checked by pushing the airplane back and forth with the rudder two degrees to the right to determine that the plane follows a straight line. The turning arc of the nose wheel is 30° +/- 1° in either direction and is limited by stops at the trunnion forging or the forward steering contact arm mounted on the engine mount.

NOTE

The rudder is set to neutral with the rudder pedals neutralized and the nose wheel centered.

8.21 PROPELLER SERVICE

The spinner and backing plate should be cleaned and inspected for crack frequently. Before each flight the propeller should be inspected for nick scratches, and corrosion. Significant damage must be repaired by a qualifi mechanic prior to flight. Nicks or scratches cause an area of increased stre which can lead to serious cracks or the loss of a propeller tip. The back face the blades should be painted when necessary with flat black paint to retard gla To prevent corrosion, the surface should be cleaned and waxed periodically.

8.23 OIL REQUIREMENTS

Oil conforming to Pratt & Whitney Canada Service Bulletin 3001 and all revisions or supplements thereto, must be used. The oils listed below comply with the engine manufacturers specification PWA521 and have a viscosity Type II rating. These oils are fully approved for use in Pratt & Whitney Canada, Inc. commercially operated engines. When adding oil, service the engine with the type and brand which is currently being used in the engine. Refer to the airplane and engine maintenance records for this information. Should oils of different viscosities or brands be inadvertently mixed, the oil system servicing instructions in the Pratt & Whitney Maintenance Manual, p/n 3013242, shall be carried out.

Exxon Turbo Oil 2380
Aero Shell Turbine Oil 500
Aero Shell Turbine Oil 560 (Third generation lubricant)
Royco Turbine Oil 500
Royco Turbine Oil 560 (Third generation lubricant)
Mobil Jet Oil II
Mobil Jet Oil 254 (Third generation lubricant)
Castrol 5000
Turbonycoil 525-2A

CAUTION

Do not mix brands or types of oils.

When changing from an existing lubricant formulation to a "third generation" lubricant formulation (see list above), the engine manufacturer strongly recommends that such a change should only be made when an engine is new or freshly overhauled. For additional information on the use of third generation oils, refer to the engine manufacturer's pertinent oil service bulletins.

8.23 OIL REQUIREMENTS (continued)

TOTAL OIL CAPACITY

12 U.S quarts (11.4 L) (including oil in filter, cooler and hoses)

DRAIN AND REFILL QUANTITY

Approximately 9.2 U.S. quarts (8.7L).

OIL QUANTITY OPERATING RANGE

NOTE

Oil quantity operating range may be verified either by the dipstick method or by the visual sight glass method. Either method is acceptable for oil quantity preflight operations.

Dipstick Method

Fill to within 1½ quarts of MAX HOT or MAX COLD (as appropriate) on dipstick. Quart markings indicate U.S. quarts low if oil is hot. For example, a dipstick reading of 3 indicates the system is within 2 quarts of MAX, if the oil is cold, and within 3 quarts of MAX if the oil hot. It is recommended the oil level be checked either within 10 minutes after engine shutdown while the oi is hot (MAX HOT marking) or prior to the first flight of the day while the oil i cold (MAX COLD marking). If more than 10 minutes has elapsed since engin shutdown, and engine oil is still warm, perform an engine dry motoring ru (Section 4.15) before checking oil level.

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.

8.23 OIL REQUIREMENTS (continued)

OIL QUANTITY OPERATING RANGE (continued)

Sight Glass Method

Engine oil quantity may be determined by using the visual sight glass located on the aft, left corner of the engine. Oil quantity (whether hot or cold) indicated in the green area of the sight glass is adequate for flight operations.

OIL DRAIN PERIOD

Pratt & Whitney Canada experience, over an extended period of time, has indicated that regular oil changes are no longer necessary for the PT6A-42 engine. However, operators should be aware of the danger of oil contamination from extraneous matter such as hydraulic fluid, sand, etc. which would require the oil system to be drained, flushed and replenished with new oil of an approved brand.

8.25 FUEL SYSTEM

(a) Servicing Fuel System

At every 100 hour inspection or after an extended downtime, the fuel filter strainer must be cleaned. The fuel filter strainer is located under the aft nose section on the left side.

(b) Fuel Requirements (Jet A, Jet A-1)

NOTE

For approved additives, refer to Pratt & Whitney Service Bulletin 3044.

The operation of the aircraft is approved only with an anti-icing additive in the fuel. If pre-blended fuel is not used, then an anti-icing additive must be added to the fuel when refueling. The anti-icing additive must meet the specification MIL-DTL-85470, must be uniformly blended with the fuel while refueling, and must not exceed 0.15% by volume. *One and one half liquid* ounces per ten gallons of fuel would fall within this range. A blender supplied by the additive manufacturer should be used. Except for the information contained in this section, the manufacturer's mixing or blending instructions should be carefully followed.

CAUTION

Assure that the additive is directed into the flowing fuel stream. The additive flow should start after and stop before the fuel flow. Do not permit the concentrated additive to come in contact with the aircraft painted surfaces or the interior surfaces of the fuel tanks.

Some fuels have anti-icing additives pre-blended in the fuel at the refinery, so no further blending should be performed.

Fuel additive can not be used as a substitute for preflight draining of the fuel system drains.

8.25 FUEL SYSTEM (continued)

(c) Filling Fuel Tanks

WARNING

Do not operate any avionics or aircraft electrical equipment during refueling. Do not allow open flame or smoking in the vicinity of the airplane while refueling.

During all refueling operations, fire fighting equipment must be available. Two ground wires from different points on the airplane to separate approved grounding stakes shall be used.

Observe all safety precautions required when handling fuel. Fill the fuel tanks through the filler located on the forward slope of the wing. Each wing holds 570 pounds (85 U.S gallons) of usable fuel. When using less than the standard 570 pounds capacity, fuel should be distributed equally between each side.

CAUTION

Fuel imbalance must not exceed 125 pounds prior to takeoff.

NOTE

Aircraft should be refueled in a wing level condition. At times this will require alternate filling of left and right tanks until the full condition is reached.

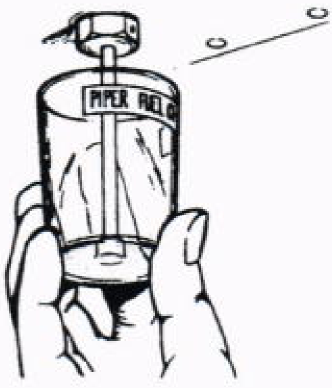
8.25 FUEL SYSTEM (continued)

(d) Draining Fuel Strainer, Sumps and Lines

The fuel tank sumps, fuel return sumps, and fuel filter should be drained before the first flight of the day and after refueling. The fuel tank sumps and fuel return sumps, which represent the lowest points in the system, are located in the left/right header tanks and behind the firewall at the left/right wing roots respectively. Each fuel system sump drains via flush mounted valves located on the left and right aft bottom portion of the engine cowling. (Refer to Figure 8-5 and 8-7.) The fuel filter drain is located on the lower left side of the cowling a few inches forward of the left sump drain. Sumps and filter should be drained until sufficient fuel has flowed to ensure the removal of any contaminants. (The first fuel sample cup full will only drain fuel from the lines; more than one cup sampling must be taken to assure fuel sample is from the fuel tanks). When draining filter and sumps, use the end of the rod to push in the valve, catching fuel in the cup. (Refer to Figure 8-3.) Always inspect fuel for contaminants, water and fuel grade (color). Assure that valves have sealed after draining.

NOTE

Sump drains will lock open if valve is pushed in and turned. Continue turning to release lock.



FUEL TANK DRAIN
Figure 8-3

8.25 FUEL SYSTEM (continued)

(e) Emptying Fuel System (See Figure 8-5.)

CAUTION

When draining any amount of fuel, care should be taken to ensure that no fire hazard exists before starting the engine.

CAUTION

Whenever the fuel system is completely drained and fuel is replenished, it will be necessary to purge the fuel system and the fuel control, per the Pratt & Whitney Engine Maintenance Manual, to insure that no air exists in the fuel supply lines.

For draining a large volume of fuel, a quick evacuation outlet is incorporated into the fuel system and is located adjacent to the fuel filter. Fuel can be drained from this outlet by gravity or by using the airplane's boost pumps. Using the airplane's boost pumps provides a means of draining the left and right sides separately.

Draining fuel using gravity is accomplished as follows:

(1) Remove the filter access door.
(2) Close the firewall shutoff valve.
(3) Remove the cap and connect a 1/2 inch hose to the quick evacuation outlet.
(4) Place the other end of the hose in a suitable container. (Be sure the container is large enough to hold the amount of fuel to be drained.)
(5) Open the firewall shutoff valve and allow the fuel to flow into the container.
(6) To stop the fuel flow, close the firewall shutoff valve.
(7) Install the cap on the quick evacuation outlet, and safety wire.

8.25 FUEL SYSTEM (continued)

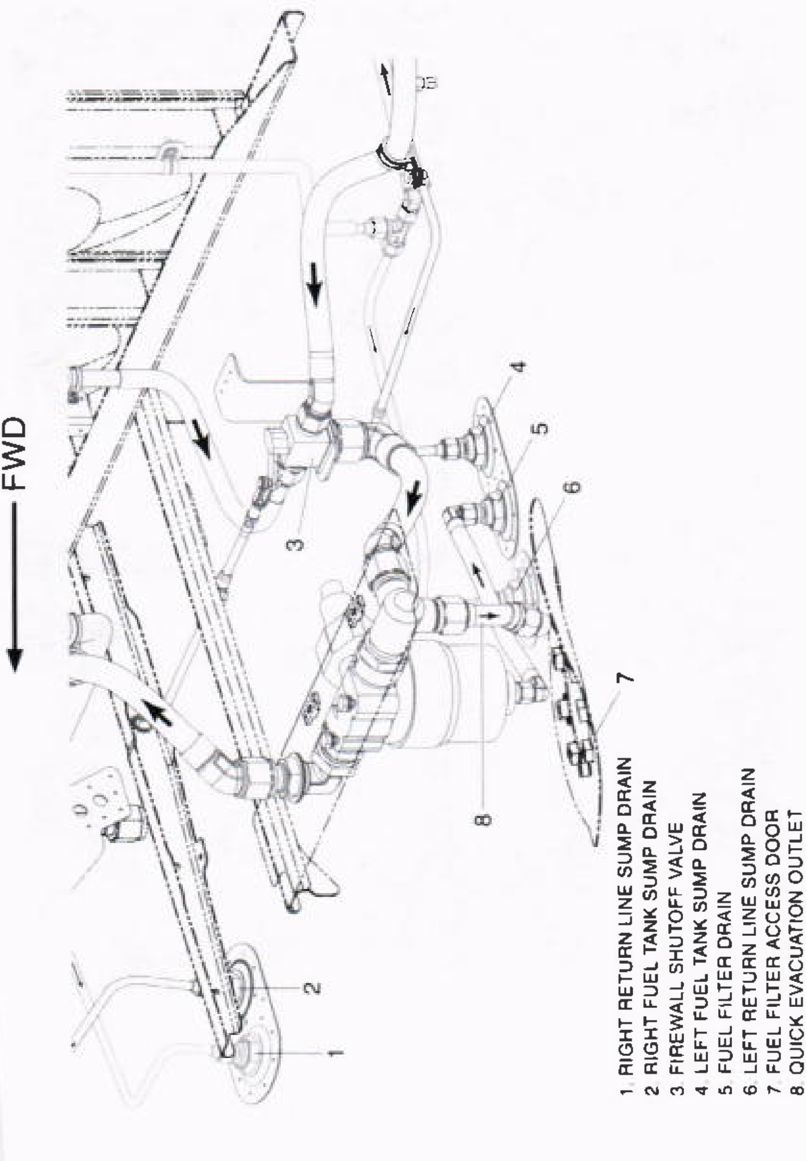
(e) Emptying Fuel System (continued)

Draining fuel using the airplane's boost pumps is accomplished as follows:

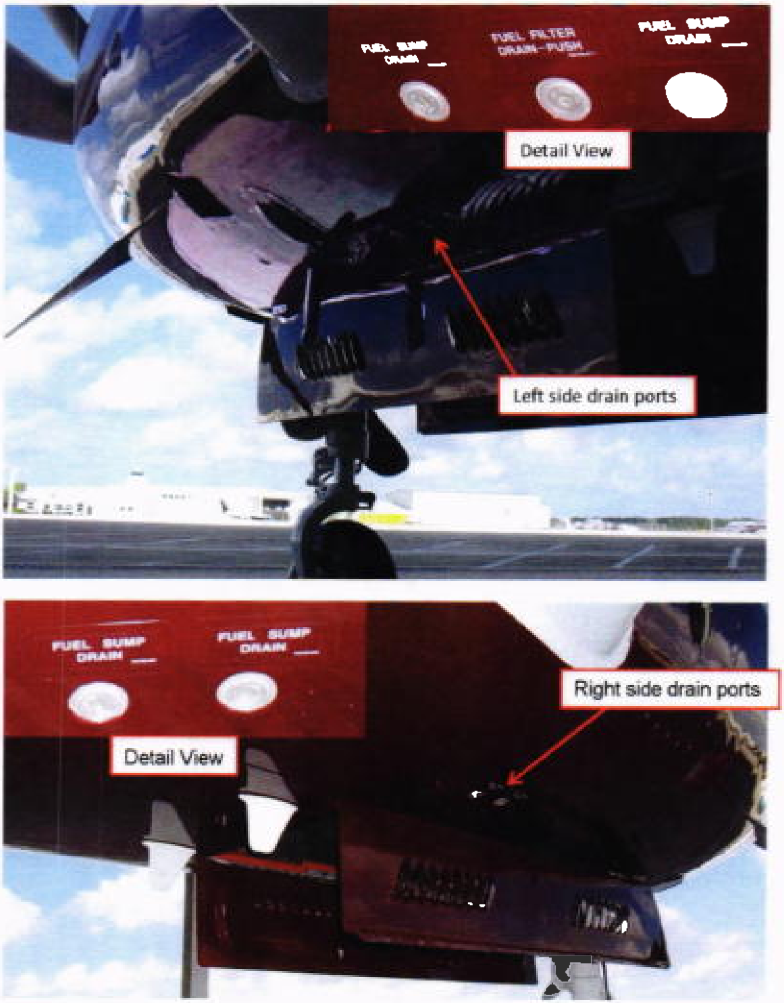
(1) Remove the filter access door.
(2) Close the firewall shutoff valve.
(3) Remove the cap and connect a 1/2 inch hose to the quick evacuation outlet.
(4) Place the other end of the hose in a suitable container. (Be sure the container is large enough to hold the amount of fuel to be drained.)
(5) Open the firewall shutoff valve.
(6) Turn the boost pump switch to MAN. (To stop fuel flow, move the switch to OFF and close the firewall shutoff valve.)
(7) If fuel is to be drained from only one side, follow the procedure above except pull the circuit breaker for the pump that is not required.
(8) Install the cap on the quick evacuation outlet, and safety wire.

NOTE

The boost pumps are disabled at approximately 2.5 gallons per side. Most of the remaining fuel can be drained by gravity from the quick evacuation outlet, but the final small amount must be drained from the sump drains.



FUEL SYSTEM SUMP DRAIN PLUMBING
Figure 8-5



FUEL SYSTEM SUMP DRAINS
Figure 8-7

8.27 TIRE INFLATION

For maximum service, keep tires inflated to the proper pressure: nose tire should be 88 psi or 70 psi or 50 psi, depending on type of tire installed (see placard on nose wheel strut to verify correct psi) and main tires should be 55 psi. All wheels and tires are balanced before original installation, and the relationship of tire, tube, and wheel should be maintained upon reinstallation. Unbalanced wheels can cause extreme vibration in the landing gear; therefore, in the installation of new components, it may be necessary to rebalance the wheels with the tires mounted. When checking tire pressure, examine the tires for wear, cuts, bruises, and slippage.

8.29 BATTERY SERVICE

Access to the 24-volt battery is through the battery access panel located on the aft right side of the engine compartment. Remove the access panel by removing the screws securing the panel to the fuselage. Release the retainers (one on each side near the bottom of the battery) by loosening the top screw on each retainer enough to pivot the retainer out of the way and allow the battery to be pulled out.

The battery is maintenance free and requires no maintenance of the liquid evel and recombines the gases formed on charge within the battery to reform vater. The battery may be used in any attitude without danger of leakage or pilling of electrolyte.

Inspect the battery for general condition (at least every 30 days). If evidence f leakage is present, the battery must be replaced.

31 EMERGENCY OXYGEN SYSTEM

The emergency oxygen system must be serviced if used. The canister nerators must be replaced with new units to restore the emergency system to a able condition. The pilot's quick-donning oxygen mask system also must be viced if used or if it shows indications of low pressure. Refer to the PA-46-)TP Maintenance Manual for oxygen system maintenance and inspection uirements.

8.33 LUBRICATION

For lubricating instructions, a chart showing lubrication points and types of lubricants to be used, and lubrication methods, refer to the PA-46-500TP Maintenance Manual.

8.35 CLEANING

(a) Cleaning Engine Compartment

(1) Place a large pan under the engine to catch waste.

(2) See engine maintenance manual for engine external cleaning requirements.

(3) Lubricate the controls, bearing surfaces, etc., in accordance with the Lubrication Chart in the PA-46-500TP Maintenance Manual.

(4) Assure that all engine exhaust deposits and stains are removed frequently from bottom of aircraft around exhaust outlets. *Accumulation of exhaust deposits left even over short periods of time will cause corrosion.*

(b) Cleaning Landing Gear

Before cleaning the landing gear, place a plastic cover or similar material over the wheel and brake assembly.

CAUTION

Do not brush the micro switches.

(1) Place a pan under the gear to catch waste.

(2) Spray or brush the gear area with solvent or a mixture of solve and degreaser, as desired. Where heavy grease and dirt deposi have collected, it may be necessary to brush areas that we sprayed, in order to clean them.

(3) Allow the solvent to remain on the gear from five to ten minut Then rinse the gear with additional solvent and allow to dry.

(4) Remove the cover from the wheel and remove the catch pan.

(5) Lubricate the gear in accordance with the Lubrication Chart.

8.35 CLEANING (continued)

(c) Cleaning Exterior Surfaces

The airplane should be washed with a mild soap and water. Harsh abrasives or alkaline soaps or detergents could make scratches on painted or plastic surfaces or could cause corrosion of metal. Cover areas where cleaning solutions could cause damage. To wash the airplane, use the following procedure:

CAUTION

Do not direct any stream of water or cleaning solutions at the openings in the pitot head, static ports, alternate static ports or fuselage belly drains.

(1) Flush away loose dirt with water.

(2) Apply cleaning solution with a soft cloth, a sponge or a soft bristle brush.

(3) To remove exhaust stains, allow the solution to remain on the surface longer.

(4) To remove stubborn oil and grease, use a cloth dampened with naphtha.

(5) Rinse all surfaces thoroughly.

(6) Any good automotive wax may be used to preserve painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing. A heavier coating of wax on the leading surfaces will reduce the abrasion problems in these areas.

(d) Cleaning Windshield and Windows

CAUTION

Use only mild soap and water when cleaning the heated windshield. Use of ANY other cleaning agent or material may cause distortion or damage to windshield coatings.

(1) Remove dirt, mud and other loose particles from exterior surfaces with clean water.

8.35 CLEANING (continued)

(d) Cleaning Windshield and Windows (continued)

(2) Wash with mild soap and warm water or with aircraft plastic cleaner. Use a soft cloth or sponge in a straight back and forth motion. Do not rub harshly.

(3) Remove oil and grease with a cloth moistened with kerosene.

CAUTION

Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or window cleaning sprays.

(4) After cleaning plastic surfaces, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth. Do not use a circular motion.

(5) A minor scratch or mar in plastic can be removed by rubbing out the scratch with jeweler's rouge. Smooth both sides and apply wax. Deep scratches may lead to failure when pressurized.

(6) If a deep scratch or crack is found in any of the windshields or windows, do not pressurize cabin until serviced at authorized repair station.

(e) Cleaning Headliner, Side Panels and Seats

(1) For normal soiling and smudges, simply use the dry cleaning pa provided. This pad contains an exclusive grit- free powder wit unusual power to absorb dirt.

Squeeze and twist the pad so the powder sifts through the mesh and adheres to the cloth. Then rub the soiled part in any directio as hard as necessary to clean.

Even though the pad eventually becomes soiled, this soil will r transfer back to the headliner.

8.35 CLEANING (continued)

(2) For simple stains (e.g. coffee, cola) clean headliner with a sponge and a common household suds detergent (e.g. Tide). Dirty grease stains should be first spot cleaned with a lighter fluid containing Naphtha to remove the solvent soluble matter. Any stain residue should then be shampooed with a household upholstery cleaner (e.g. Carbona upholstery and rug shampoo).

With proper care, your headliner will provide years of excellent appearance and durability.

CAUTION

Solvent cleaners require adequate ventilation.

(3) Leather should be cleaned with saddle soap or a mild hand soap and water.

(f) Cleaning Carpets

To clean carpets, first remove loose dirt with a whisk broom or vacuum. For soiled spots and stubborn stains use a noninflammable dry cleaning fluid. Floor carpets may be cleaned like any household carpet.

(g) Cleaning Oxygen Equipment

(1) Clean the mask assemblies with a suitable oil-free disinfectant.

(2) Wipe dirt and foreign particles from the unit with a clean, dry, lint-free cloth.

(h) Cleaning Surface Deicing Equipment

The deicers should be cleaned when the aircraft is washed using a mild soap and water solution.

In cold weather, wash the boots with the airplane inside a warm hangar if possible. If the cleaning is to be done outdoors, heat the soap and water solution before taking it out to the airplane. If difficulty is encountered with the water freezing on boots, direct a blast of warm air along the region being cleaned using a portable ground heater.

8.35 CLEANING (continued)

Petroleum products are injurious to rubber and their use as cleaning agents should be avoided. Limited use of Mineral Spirits or non-leaded (NOT LOW LEAD) gasoline is not harmful in cleaning the deicers, if the cloth is dampened (not dripping) with solvent, and a dry cloth is used to wipe the deicer before the solvent has time to soak into the rubber.

With the deicer boots properly cleaned, a coating of Agemaster No. 1 should be applied to the boots, as described in the PA-46-500TP Maintenance Manual. This treatment helps protect the neoprene deice boots from ozone attack, aging and weathering.

Icex may be applied to all of the boots if icing conditions are anticipated. Any boots treated with Agemaster should be allowed to dry before application of Icex. For specific instructions refer to the PA-46-500TP Maintenance Manual.

(i) Cleaning Executive Table

The executive table is hydro dipped and should be cleaned only as follows:

Dry: Wipe surface with a Micro Fiber cloth to remove dust o debris.

Wet: Use a mild soap and water solution or Windex with a Micr Fiber cloth.

8.37 CLEANING AND MAINTENANCE OF RELIEF TUBE SYSTEM

When the aircraft is equipped with a relief tube system, the corrosive effects of urine or other liquids poured through the system are extreme and require much attention to the cleanliness of this system both inside and outside of the aircraft. From the interior standpoint, the funnel tube assembly, rubber hose and surrounding sheet metal should be cleaned at termination of flight when the system has been used. Likewise, attention to the exterior of the aircraft is equally as important and must be cleaned as described below.

NOTE

The corrosive affects of urine on painted and unpainted surfaces cannot be understated. Corrosion may appear in surrounding areas if allowed to go uncleaned for one day.

(a) Interior

After each use of the relief tube, the area surrounding the relief tube should be examined for spillage and cleaned according to the cleaning procedures listed in paragraphs 8.35(e) and (f) above. Clean area inside the box and access door, funnel and tube using mild soap and water. After cleaning, assure that no soapy residue remains by flushing with clean water. Dry system thoroughly.

CAUTION

Should spillage extending into the fuselage be evident, maintenance actions must occur which include removing panels to access the floor structure to neutralize urine spillage in the aircraft structure.

Prepare to flush the relief tube assembly by placing a container underneath the relief tube outlet. Flush tube by pouring a solution of baking soda (10%) and water through the tube, flushing out the entire system. Flush again with at least 1/2 gallon of clear water. (Shop air, at low pressure, may be blown through the relief tube system to dry the system.)

8.37 CLEANING AND MAINTENANCE OF RELIEF TUBE SYSTEM (continued)

(b) Exterior

Exterior bottom painted surfaces of the aircraft must be cleaned from the firewall to the tip of the tail including the bottom of the tail surfaces, at termination of each flight when the relief tube system has been used. Cleaning should occur in accordance with paragraph 8.35(c) with the following exception: After completion of washing, a solution of baking soda (10%) and water should be applied to the entire area and allowed to remain for a few minutes. The area then must be thoroughly rinsed with clean water. The area should be thoroughly dried and observed for paint chips and corrosion, with touch up as necessary.

8.39 CLEANING GARMIN PFD AND MFD DISPLAYS

The Garmin Primary Flight Display (PFD) and Multi-Function Display (MFD) use a lens coated with a special anti-reflective coating that is very sensitive to skin oils, waxes and abrasive cleaners.

CAUTION

Cleaners containing ammonia will harm the anti-reflective coating. It is very important to clean the display lenses using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings.

8.41 CLEANING AND MAINTENANCE OF THE PT6A COMPRESSOR AND COMPRESSOR TURBINE

Cleaning of the compressor and turbine sections is required to enhance the durability of the engine by reducing the onset of sulphidation attacks on the turbine blades and preventing salt deposits from damaging the compressor section. Reference Piper Service Letter No. 1110 dated March 28, 2008 for additional maintenance information pertaining to the importance of conducting compressor and turbine blade washes.

Sulphidation occurs at engine operating temperatures with sodium and sulphur present. Most aviation turbine fuels contain sulphur in sufficient amounts for sulphidation to occur. Common sources of sodium are seawater, atmospheric pollutants and volcanic discharges. Initially, sulphidation attacks the oxide protective coating of the turbine blade and, as the oxidation accelerates, blister scale begins to form. The important point to remember is that sulphidation is a hot-corrosion phenomenon and therefore turbine blades are most susceptible to it.

Compressor blades are also affected by salt deposits; however, the corrosion node does not require high temperatures. Extended exposure to wet deposits of alt can lead to rust and pitting which affect aerodynamic efficiency and fatigue ife. If not addressed, corrosion will progress to the point where compressor omponents will need to be replaced.

Magnesium components such as the compressor inlet case and the reduction earbox housing are also susceptible to corrosion should the protective epoxy int become chipped, scratched or eroded.

CAUTION

If a turbine wash is to be performed in conjunction with a compressor wash, ensure that the compressor is washed first.

(a) Perform compressor and turbine wash in accordance with Engine Maintenance Manual (EMM) section 71-00-00.

(b) Recommended wash schedule is found in the EMM Table "Wash Schedule Recommendation".

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SECTION 9

SUPPLEMENTS

9.1 GENERAL

This section provides information in the form of supplements which are necessary for efficient operation of the airplane when it is equipped with one or more of the various optional systems and equipment not approved with the standard airplane.

All of the supplements provided in this section are FAA Approved and consecutively numbered as a permanent part of this handbook. The information contained in each supplement applies only when the related equipment is installed in the airplane.

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PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 1
FOR
M500 AIRCRAFT
FLIGHT INTO KNOWN ICING (FIKI)

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when operating the Piper PA-46-500TP M500 airplane into known icing conditions. The information contained in this document supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only n those areas listed herein. For limitations, procedures, performance and oading information not contained in this supplement, consult the Pilot's)perating Handbook and FAA Approved Airplane Flight Manual.

'AA APPROVED:

ERIC A. WRIGHT
ODA-510620-CE
PIPER AIRCRAFT, INC.
VERO BEACH, FLORIDA

ATE OF APPROVAL: December 19, 2017

SECTION 1 - GENERAL

This supplement provides information necessary for the operation of the Piper M500 aircraft for flight into known icing conditions.

Icing conditions can exist when:

- The outside air temperature (OAT) is 5°C or colder, and visible moisture in any form such as clouds, fog or mist, rain, snow, sleet and ice crystals are present.
- During ground operations when operating on contaminated ramps, taxiways or runways where surface snow, ice, standing water or slush are present.
- There are visible signs of ice accretion on the aircraft.

The M500 ice protection system was designed and tested for operation in light to moderate meteorological conditions defined in FAR 25, Appendix C, for continuous maximum and intermittent maximum icing conditions. The ice protection system was not designed or tested for flight in freezing rain, freezing drizzle or supercooled liquid water and ice crystals, or conditions defined as severe. Flight in these conditions is prohibited and must be avoided.

The ice protection system was not designed to remove ice, snow or fros accumulations from a parked airplane. Ice, snow or frost must b completely removed during preflight to ensure a safe takeoff and subsequen flight. Procedures for ice, snow or frost removal, such as a heated hangar anc or approved deicing fluids, must be used to ensure that **ALL** ice, snow, or fro: is **COMPLETELY** removed from the wings, tail, control surfaces, windshiel propeller, engine intakes, fuel vents and pitot-static ports, prior to flight.

Some icing conditions not defined in FAR Part 25, Appendix C have t potential of producing hazardous ice accumulations, which may exceed t capabilities of the airplane's ice protection equipment. See section titled Visi Cues for Supercooled Large Droplet (SLD) Conditions in this supplement.

Flight into icing conditions which are outside the FAR defined condition prohibited, and pilots are advised to be prepared to divert the flight promptly, changing course or altitude, if hazardous ice accumulations occur.

SECTION 1 - GENERAL (continued)

VISUAL CUES FOR SUPERCOOLED LARGE DROPLETS (SLD) CONDITIONS

Should supercooled large droplets (SLD) be present, most aircraft with unpowered controls and pneumatic boots should request a route or altitude change to exit the conditions.

The cues listed as follows are indicative of SLD conditions:

- Ice may become visible on the upper or lower surface of the wing, aft of the active part of the deicing boots. Pilots should look for irregular or jagged lines of ice or for pieces of ice shedding off the airplane. During night operations, adequate illumination should be used to observe all areas.
- The aft limit of ice accumulation on a propeller spinner that is not heated will reveal ice extending beyond normal limits.
- Unheated portions of side windows may begin to accumulate granular dispersed ice crystals or a translucent or opaque coating over the entire window. This icing may be accompanied by other ice patterns on the windows, such as ridges. These patterns may occur from within a few seconds to half a minute after exposure to SLD conditions.
- Ice coverage may become unusually extensive, with visible ice fingers or feathers on parts of the airframe that normally would not be covered by ice.
- The aircraft's performance may degrade. Pilots should remain vigilant when icing conditions are present, and any alteration of the aircraft's performance should be monitored closely as a sign of icing on the airplane.

SECTION 1 - GENERAL (continued)

ICING DEFINITIONS

Residual Ice - Ice that remains attached to the de-ice boot at the conclusion of that boot inflation cycle.

Intercycle Ice - The quantity of ice that accumulates on the wing horizontal stabilizer and vertical tail de-ice boots between de-ice boot cycles.

Failure Ice - The quantity of ice accumulated on the wing horizontal stabilizer and vertical tail de-ice boots if the pneumatic surface de-ice system fails.

Light Icing - The rate of accumulation may create a problem if flight is prolonged in this environment. Occasional use of de-icing/anti-icing equipment removes/prevents accumulation.

Moderate Icing - The rate of accumulation is such that even short encounters become potentially hazardous and use of de-icing/anti-icing equipment or flight diversion is necessary.

Severe Icing - The rate of accumulation is such that de-icing/anti-icing equipment fails to reduce or control the hazard. Immediate flight diversion is necessary.

Rime Ice - A rough, milky, opaque ice formed by the instantaneous freezing o small, supercooled water droplets.

Mixed Ice - Simultaneous appearance of rime and clear ice or an ice formatic that has the characteristics of both rime and clear ice.

Clear Ice - A glossy, clear, or translucent ice formed by the relatively slc freezing of large supercooled water droplets. The terms "clear" and "glaz have been used for essentially the same type of ice accretion, although soı reserve "clear" for thinner accretions which lack horns and conform to ı airfoil.

SECTION 2 - LIMITATIONS

REQUIRED EQUIPMENT

The Piper M500 airplane is approved for flight into light to moderate icing conditions as defined by FAR Part 25, Appendix C, only if the following required ice protection systems and equipment are installed and functioning properly.

1. Surface De-ice System
2. Propeller Anti-ice System
3. Windshield Heat Anti-ice System
4. Pitot Heat Anti-ice System
5. Stall Heat Anti-ice System
6. Wing Inspection Light (Ice Light)

NOTE

The Generator and Alternator must be installed and functioning properly for flight into known icing conditions.

ENVIRONMENTAL CONDITIONS

nadvertent operation in freezing rain, freezing drizzle, or conditions defined s severe may be detected by heavy ice accumulation on the airframe and vindshield, ice accumulation in areas not normally observed to collect ice, r when ice forms on the upper surface of the wing, aft of the surface de-ice oot. If these conditions are encountered, the pilot should take immediate ction to exit these conditions by changing altitude or course.

ikeoff is prohibited with the following forms of contamination:

With frost adhering to the following areas:

1. Wing leading edge
2. Wing upper surface
3. Windshield

With ice, snow or slush adhering to the following areas:

. Wing leading edge and upper wing surface
. Flight control surfaces
. Top of fuselage
. Windshield
All static ports
Upper surface of engine cowling forward of windshield

SECTION 2 - LIMITATIONS (continued)

ENVIRONMENTAL CONDITIONS (continued)

A visual and tactile (hand on surface) check of the wing leading edge and wing upper surface must be performed to ensure the wing is free from frost, ice, snow, or slush when the outside air temperature is less than 10°C (50°F) or if it cannot be determined, wing fuel temperature is below 0°C (32°F) and

1. there is visible moisture present (rain, drizzle, sleet, snow, fog, etc.); or
2. water is present on the wing upper surface; or
3. the difference between the dew point and the outside temperature is 3°C (5°F) or less; or
4. the atmospheric conditions have been conducive to frost formation.

MINIMUM SPEED IN ICING CONDITIONS

Minimum speed during flight in icing conditions with the flaps up is 130 KIAS.

FLAP SETTINGS FOR OPERATION IN ICING CONDITIONS

Flaps must be up when holding in icing conditions. Maximum flap extension with **ANY** ice accumulation on the airframe is limited to **20°**.

MINIMUM TORQUE REQUIRED FOR PROPER SURFACE DE-ICE SYSTEM OPERATION

During flight, engine torque must be maintained at the following settings t assure proper surface de-ice system operation.

- Above 25,000 feet - engine torque must be 350 ft. lb. or greater
- At or below 25,000 feet - engine torque must be 250 ft. lb. or greater

WINDSHIELD HEAT

Ground operation with windshield heat selected to ANTI ICE or DEFOG limited to 20 seconds duration.

SECTION 2 - LIMITATIONS (continued)

AUTOPILOT

Autopilot operation during icing conditions may mask cues that indicate adverse changes in aircraft handling characteristics. Autopilot operation is prohibited if any of the following conditions in icing flight are experienced:

- Severe icing conditions (reference SECTION 1 - GENERAL).
- Elevator bridging is encountered.
- Frequent autopilot trim wheel movement during straight and level flight.
- Conditions developed which cause pitch, roll or yaw servo to provide a sustained force as indicated by ELE, AIL or RUD alert annunciations in the AFCS system status field on the PFD and/or pilot qualitative evaluations.

NOTE

The autopilot must be disconnected periodically to evaluate the above mentioned conditions.

CAUTION

During flight in icing conditions, ice will form on the unprotected leading edge of the elevator, and possibly form a bridge of ice, or ice cap, between the stabilizer and the elevator. This condition may be detected and verified by visual observation, by increased elevator pitch control forces, or frequent autopilot trim annunciations during straight and level flight. If ice bridging is detected or suspected, disconnect the autopilot and pulse the aircraft elevator pitch control to dislodge the ice bridge. Elapsed time between conducting elevator checks will vary, depending upon the amount and type of ice accretion. Usually 8 to 10 minutes between elevator pulsing cycles is considered sufficient.

SECTION 2 - LIMITATIONS (continued)

SURFACE DE-ICE SYSTEM

Operation of the surface de-ice system is prohibited in temperatures below -40°C. Such operation may result in damage to the surface de-ice boots.

OAT PROBES

At the highest Mach number shown in the performance charts of this POH and with a fully iced over OAT probe, which assumes the measured total temperature equals static temperature, the maximum indicated temperature error calculated is 7°C less than actual.

PLACARDS

THIS AIRCRAFT MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS. NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED. THIS AIRCRAFT APPROVED FOR V.F.R., I.F.R., DAY AND NIGHT ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH THE AIRPLANE FLIGHT MANUAL.

WARNING

TURN OFF STROBE LIGHTS WHEN IN CLOSE PROXIMITY TO GROUND OR DURING FLIGHT THROUGH CLOUD, FOG OR HAZE.

PRESSURIZED LANDING NOT APPROVED.

ICE PROTECTION SYSTEM ANNUNCIATORS

NOTE

During high ambient temperature conditions when switching windshield heat from ANTI ICE to DEFOG, the red WDSHLD OVRTMP annunciator may illuminate and remain illuminated until the windshield surface temperature cools to the DEFOG heat temperature range.

SECTION 3 - EMERGENCY PROCEDURES

ICE PROTECTION SYSTEM ANNUNCIATORS (continued)

NOTE

For a complete list of items that are required to be operational for flight in icing conditions, see Kinds of Operation Equipment List in Section 2.

NOTE

Depending on system software version and optional systems installed, not all annunciator system (CAS and Non-CAS) messages listed in this handbook are applicable.

Warning Messages - Red - Triple Chime

L PITOT HT FAIL	Both left and right pitot heat have failed.
R PITOT HT FAIL	Both left and right pitot heat have failed.
PROP HEAT FAIL	A fault has developed in the propeller heat system in flight.
SURF DEICE FAIL	Surface de-ice system has failed in flight.
WDSHLD OVRTMP	Windshield temperature exceeds 170°F or the windshield temperature sensor has failed.

Caution Messages - Amber - Double Chime

PITOT HT FAIL	Left pitot heat has failed.
PITOT HT FAIL	Right pitot heat has failed.
ITOT HEAT OFF	Pitot heat has not been selected ON (no chime accompanies this CAS message).
ROP HEAT FAIL	A fault has developed in the propeller heat system while the aircraft is on the ground.
TALL HEAT FAIL	Stall warning heat has failed.
ALL WARN FAIL	The lift computer and/or lift transducer has failed.
JRF DEICE FAIL	Surface de-ice system has failed while the aircraft is on the ground.

Advisory Messages - White - Single or No Aural Chime

ALL HT INHIB	Stall Heat is selected ON but is not providing heat when OAT is greater than 5°C.

SECTION 3 - EMERGENCY PROCEDURES (continued)

ICE PROTECTION SYSTEM ANNUNCIATORS (continued)

Left Pitot Heat Failure

Indication: **Master Caution, Double Chime,** L PITOT HT FAIL

NOTE

Failure of the L Pitot Heat could cause erroneous indications of pilot's airspeed and standby airspeed. Airspeeds on each PFD should be compared for accuracy.

L PITOT HEAT Circuit Breaker ....RESET
(Located on the pilot's aft circuit breaker panel, row A, position 2)

If amber IAS annunciation on PFD:
ADC2 ....SELECT

***Exit and avoid IFR and icing conditions* and consider terminating flight early due to possible loss of airspeed redundancy.**

Right Pitot Heat Failure

Indication: **Master Caution, Double Chime,** R PITOT HT FAIL

NOTE

Failure of the R Pitot Heat could cause erroneous indications of copilot's airspeed. Airspeeds on each PFD should be compared for accuracy.

R PITOT HEAT Circuit Breaker ....RESE'
(Located on the pilot's aft circuit breaker panel, row A, position 3)

If amber IAS annunciation on PFD:
ADC1 ....SELEC

SECTION 3 - EMERGENCY PROCEDURES (continued)

ICE PROTECTION SYSTEM ANNUNCIATORS (continued)

Both Left and Right Pitot Heat Failure

Indication: **Master Warning, Triple Chime,** PITOT HT FAIL

NOTE

Failure of both left and right pitot heaters could cause erroneous pilot, copilot and/or standby airspeed indications. Monitor pilot and copilot airspeeds. In the event of complete loss of airspeed, maintain safe airspeed by use of throttle, engine settings and airframe sensory cues.

L PITOT HEAT Circuit Breaker .... RESET
(Located on the pilot's aft circuit breaker panel, row A, position 2)

R PITOT HEAT Circuit Breaker .... RESET
(Located on the pilot's aft circuit breaker panel, row A, position 3)

If either circuit breaker opens again, do not reset.

***Exit and avoid IFR and icing conditions* and consider terminating flight early due to possible loss of airspeed redundancy.**

Pitot Heat Off

Indication: **Master Caution Indication;** PITOT HEAT OFF

PITOT HEAT Switch .... Select ON

Prop Heat Failure

In Flight:

Indication: **Master Warning, Triple Chime,** PROP HEAT FAIL

PROP HEAT Circuit Breaker .... CHECK IN
(Located on the pilot's aft circuit breaker panel, row A, position 4)

If PROP HEAT Circuit Breaker was closed (not out):
PROP HEAT Switch .... Cycle OFF then ON

If message remains illuminated, Exit and Avoid icing conditions.

On Ground:

Indication: **Amber Caution, Double Chime,** PROP HEAT FAIL

Flight in icing conditions is prohibited.

SECTION 3 - EMERGENCY PROCEDURES (continued)

ICE PROTECTION SYSTEM ANNUNCIATORS (continued)

Windshield Over Temp

Indication: Master Warning, Triple Chime, WDSHLD OVRTMP

NOTE

During high ambient temperature conditions when switching windshield heat from ANTI ICE to DEFOG, the red WDSHLD OVRTMP message may illuminate and remain illuminated until the windshield surface temperature cools to the DEFOG heat temperature range.

WINDSHLD HT Switch .... OFF

If WDSHLD OVRTMP message extinguishes:

WINDSHLD HT Switch .... DEFOG

If WDSHLD OVRTMP message remains illuminated:

WINDSHLD HT Switch .... OFF
WINDSHIELD HEAT Circuit Breakers (2) ....PULL
(Located on the pilot's aft circuit breaker panel, row A, positions 7, 8)

***Exit and avoid IFR and icing conditions* and conditions where windshield heat may be necessary.**

Surface De-ice Failure

In Flight:

Indication: Master Warning, Triple Chime, SURF DEICE FAIL

SURFACE DE-ICE Circuit Breaker .... RESET
(Located on the pilot's aft circuit breaker panel, row A, position 6)

If message remains illuminated, *Exit and Avoid icing conditions*.

On Ground:

Indication: Master Caution, Double Chime, SURF DEICE FAIL

Flight in icing conditions is prohibited.

SECTION 3 - EMERGENCY PROCEDURES (continued)

ICE PROTECTION SYSTEM ANNUNCIATORS (continued)

Vacuum System Failure

Indication: Master Caution, Double Chime, Amber vacuum indication.

Vacuum gauge .... CHECK

Monitor vacuum gauge. Low vacuum may lead to improper operation of the wing and empennage deice boot.

If vacuum indication remains amber, Exit and Avoid icing conditions.

CAUTION

If de-ice boot are not fully deflated, stall speeds will be increased by approximately 5 KIAS.

Stall Warning Fail

Indication: Master Caution, Double Chime, STALL WARN FAIL

STALL WARN Circuit Breaker .... RESET
(Located on the pilot's forward circuit breaker panel, row C, position 5)

Avoid low airspeeds and monitor approach speeds closely.

If message remains illuminated, *Exit and Avoid icing conditions*.

Stall Heat Fail

Indication: Master Caution, Double Chime, STALL HEAT FAIL

STALL HEAT Switch .... RESET

If message remains illuminated:

STALL HEAT Circuit Breaker .... RESET
(Located on pilot's aft circuit breaker panel, row A, position 5)

Avoid low airspeeds and monitor approach speeds closely.

Monitor wing and empennage deice boots.

SECTION 3 - EMERGENCY PROCEDURES (continued)

Landing Without Flaps

Proceed as for normal approach. Landing distance may be calculated by increasing the flap 20° landing distance by 16%. Landing ground roll may be calculated by increasing the flap 20° landing ground roll by 13%.

Landing Gear..DOWN, 3 GREEN
Final Approach Speed.. 110 KIAS
Landing .... NORMAL
Braking.. AS REQUIRED
Reverse.. AS REQUIRED

SECTION 4 - NORMAL PROCEDURES

The Piper PA-46-500TP is approved for flight into known icing conditions as defined in Section 1, GENERAL. Operating in icing conditions of Continuous Maximum and Intermittent Maximum as defined in FAR 25, Appendix C has been substantiated; however, there is no correlation between these conditions and forecasts of reported "Light, Moderate and Severe" conditions. **Flight into severe icing is not approved.**

Icing conditions can exist in any clouds when the temperature is below freezing; therefore it is necessary to closely monitor outside air temperature when flying in clouds or precipitation. Clouds which are dark and have sharply defined edges usually have high water content and should be avoided whenever possible. **Freezing rain and freezing drizzle mus always be avoided.**

Pneumatic boots must be cleaned regularly for proper operation in icin The exterior surfaces of the aircraft should be checked prior to flight. **Do n attempt flight with frost, ice or snow adhering to the exterior surfaces the aircraft or landing gear.**

Prior to dispatch into forecast icing conditions all ice protecti equipment must be functionally checked for proper operation.

SECTION 4 - NORMAL PROCEDURES (continued)

ENGINE RUNUP

1. WINDSHLD HT Switch ....Select ANTI ICE position, Verify increased amps/ Select DEFOG position, Verify increased amps
2. WINDSHLD HT Switch .... OFF

CAUTION

To avoid possible windshield distortion or overheat during ground operations or during testing, DO NOT position the WINDSHLD HT switch to ANTI ICE or DEFOG for more than 20 seconds

3. PITOT HEAT ....Select ON - Verify increased amps and amber PITOT HEAT OFF annunciator extinguished
4. PITOT HEAT .... OFF

PROP HEAT..Select ON - Verify increased amps for approximately 1-minute and no PROP HEAT FAIL caution message

PROP HEAT.. OFF

STALL HEAT ....ON Verify increased amps, or Verify STALL HT INHIB message (if OAT > 5°C) and absence of STALL HEAT FAIL message.

STALL HEAT .... OFF

SECTION 4 - NORMAL PROCEDURES (continued)

ENGINE RUNUP (continued)

9. SURFACE DE-ICE .... CHECK
    a) POWER LEVER - Increase to 250 ft. lb. torque
    b) SURF DE-ICE Switch - Select ON (Verify green light in SURF DE-ICE switch illuminated and no SURF DEICE FAIL caution CAS message or amber vacuum indications during each de-ice boot inflation cycle. Visually verify wings and horizontal stabilizer de-ice boot inflation and deflation.)
    c) POWER LEVER - IDLE
    d) SURF DE-ICE Switch - OFF

SECTION 4 - NORMAL PROCEDURES (continued)

FLIGHT INTO KNOWN ICING CONDITIONS

The Piper M500 is approved for flight into known icing conditions as defined in SECTION 1, GENERAL.

WARNING

Flight in icing conditions is prohibited if there is known failure of any of the ice protection systems or if the generator or alternator are failed or are inoperative.

WARNING

Maximum flap extension with ANY ice accumulation on the airframe is limited to 20°.

NOTE

Flight in known icing conditions is approved only if the required ice protection systems and equipment are installed and functioning properly. They are:
SURFACE DE-ICE SYSTEM
PROPELLER HEAT ANTI-ICE SYSTEM
WINDSHIELD HEAT ANTI-ICE SYSTEM
PITOT HEAT ANTI-ICE SYSTEM
STALL HEAT ANTI-ICE SYSTEM
WING INSPECTION LIGHT (ICE LIGHT)

SECTION 4 - NORMAL PROCEDURES (continued)

FLIGHT INTO KNOWN ICING CONDITIONS (continued)

PRIOR to entering icing conditions, the following ice protection systems **MUST** be activated.

1. SURF DE-ICE .... SELECT ON
2. STALL HEAT .... SELECT ON
3. PITOT HEAT .... VERIFY ON
4. PROP HEAT .... SELECT ON
5. WINDSHLD HT .... SELECT ANTI ICE
6. Wing Inspection Light (ICE LIGHT)........................... AS REQUIRED
7. IGNITION .... MAN
8. Windshield Defog (DEFROST) .... PULL ON
9. ECS CABIN COMFORT .... HIGH

During Icing Conditions:

10. Wing Leading Edge .... MONITOR for continual shedding of ice
11. EIS Indications and CAS Window .... MONITOR for correct function of ice protection systems (no system failures)

WARNING

If any of the aircraft ice protection systems fail during flight in icing conditions, exit and avoid icing conditions.

SECTION 4 - NORMAL PROCEDURES (continued)

FLIGHT INTO KNOWN ICING CONDITIONS (continued)

After departure from icing conditions with remaining residual and intercycle airframe ice:

1. SURF DE-ICE .... MAINTAIN ON
2. STALL HEAT .... MAINTAIN ON
3. PROP HEAT .... MAINTAIN ON
4. PITOT HEAT .... MAINTAIN ON
5. WINDSHLD HT .... DE-FOG or ANTI ICE as required
6. IGNITION .... AUTO
7. Flaps.. DO NOT EXTEND BEYOND 20°

After removal of residual and intercycle airframe ice:

1. SURF DE-ICE .... OFF
2. STALL HEAT .... OFF
3. PROP HEAT .... OFF
4. PITOT HEAT .... MAINTAIN ON
5. WINDSHLD HT .... DE-FOG or ANTI ICE as required

SECTION 4 - NORMAL PROCEDURES (continued)

BEFORE LANDING

APPROACH CHECK

Altimeter and Standby Altimeter .... SET
Pressurization .... SET
Fuel Pump .... MAN
Ignition .... MAN
Fuel Quantity .... CHECK
Seats .... ADJUSTED & LOCKED IN POSITION
Armrests .... STOWED
Belts/Harness .... FASTENED & ADJUSTED
Landing Gear .... DOWN (below 168 KIAS)
Flaps .... SET (10° @ 168 KIAS max.)

LANDING CHECK

Landing Gear .... 3 GREEN LIGHTS
Brakes .... CHECK
Flaps .... SET (20° @ 135 KIAS max.)
Airspeed .... 100 KIAS

NOTE

Landing distance performance was established by maintaining a power on (370 ft. lb. torque), stabilized 3° approach at 100 KIAS, and reducing power to idle during the flare.

Autopilot .... DISENGAGE
Yaw Damper (prior to landing) .... DISENGAGE

BALKED LANDING (Go-Around)

Power Lever .... SET TAKEOFF TORQU
Climb Airspeed .... 100 KIA
After climb established:
Climb Airspeed .... ACCELERATE TO 110 KIA
Flaps .... RETRACT TO
Landing Gear .... RETRAC
Airspeed .... ACCELERATE TO 125 KIAS (V

AFTER LANDING

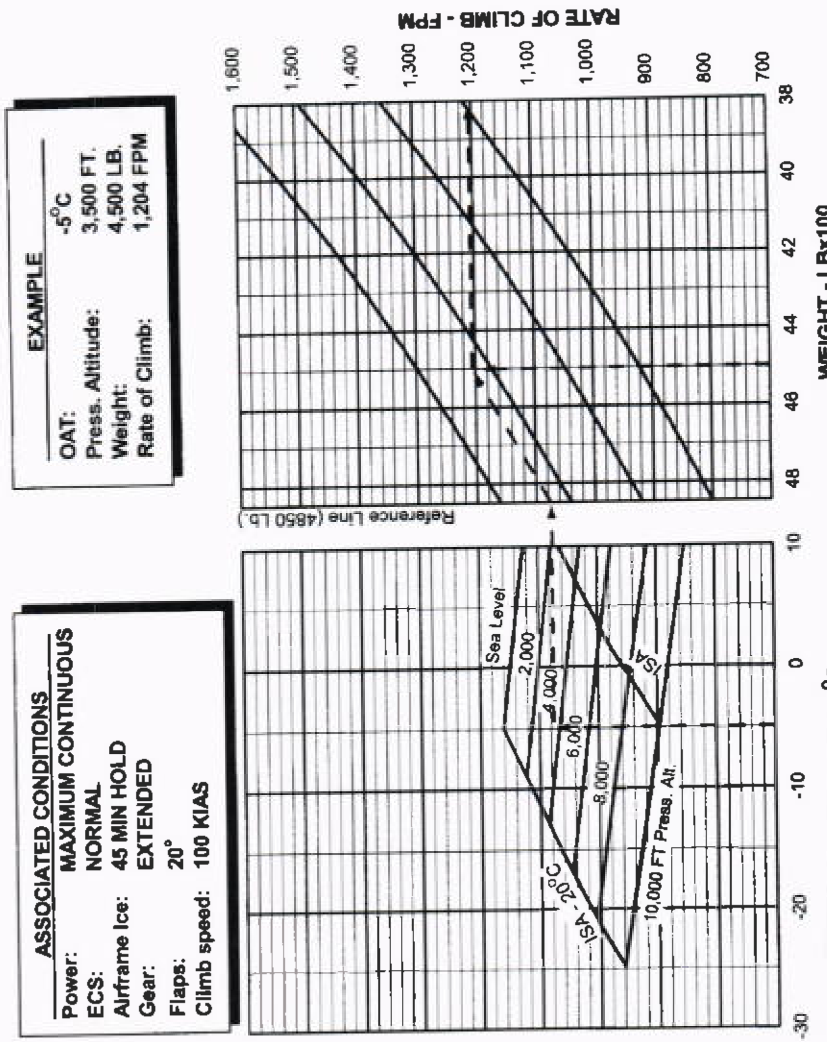
FUEL PUMPS Switch....................AUTO
IGNITION Switch....................OFF
PITOT HEAT Switch....................OFF
Additional Ice Protection Equipment....................OFF
Landing /Taxi Lights....................AS REQUIRED
Strobe Light....................AS REQUIRED
WX Radar....................STBY
Flaps....................RETRACT
Transponder....................AS REQUIRED

SECTION 5 - PERFORMANCE

The performance charts in this supplement are based on an airplane with ice on the unprotected surfaces that would have accumulated during a 45 minute hold in icing conditions, in addition to, intercycle ice on the de-ice boots while they are operating in the 60 second cycle mode. It is assumed that the flaps and landing gear are retracted while executing the 45 minute hold. Intercycle ice is the ice on the de-ice boots just prior to de-ice boot inflation.

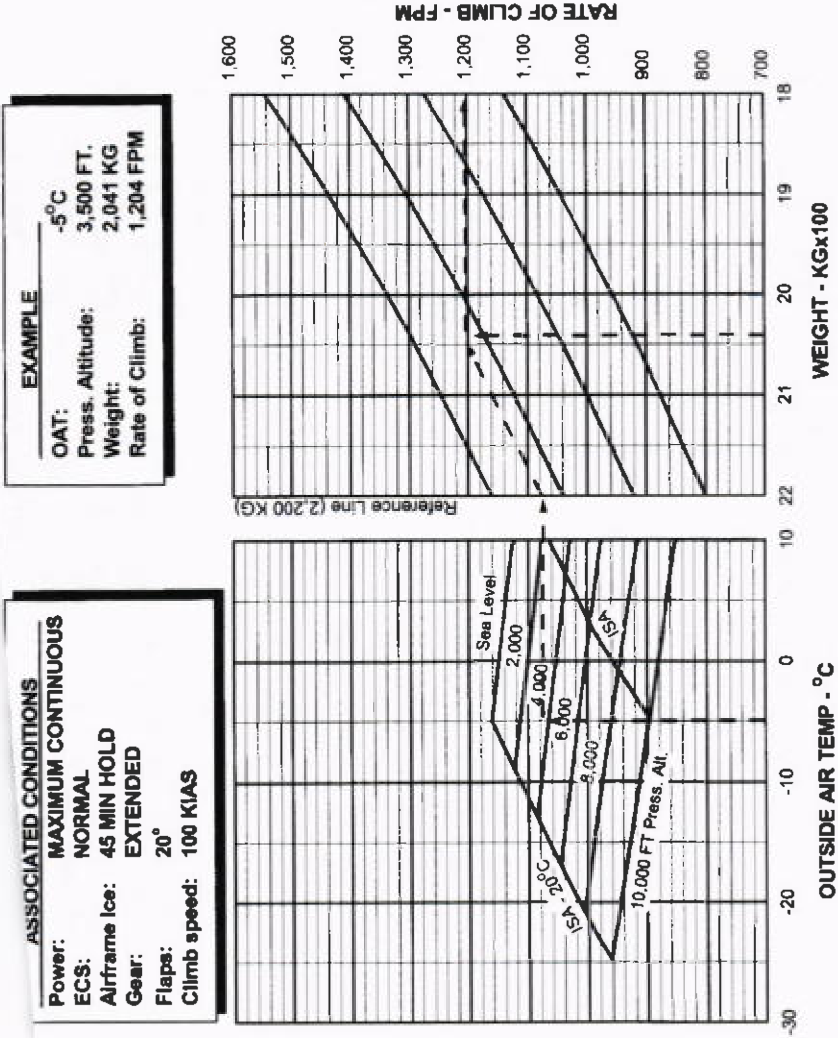
Be sure to review flap extension and airspeed limitations in SECTION 2, LIMITATIONS and de-ice equipment operation in SECTION 4, NORMAL PROCEDURES of this supplement when ice is on the airframe.

SECTION 5 - PERFORMANCE (continued)



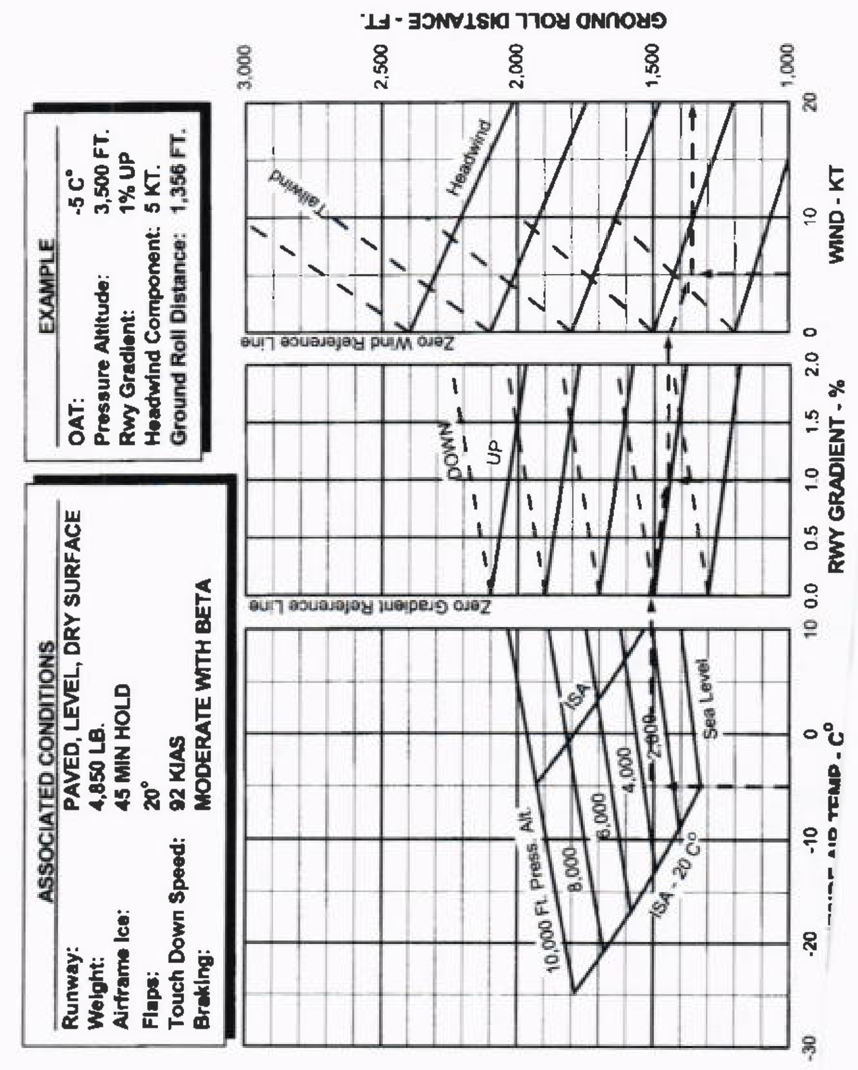
Balked Landing Climb Performance
Figure 1

SECTION 5 - PERFORMANCE (continued)



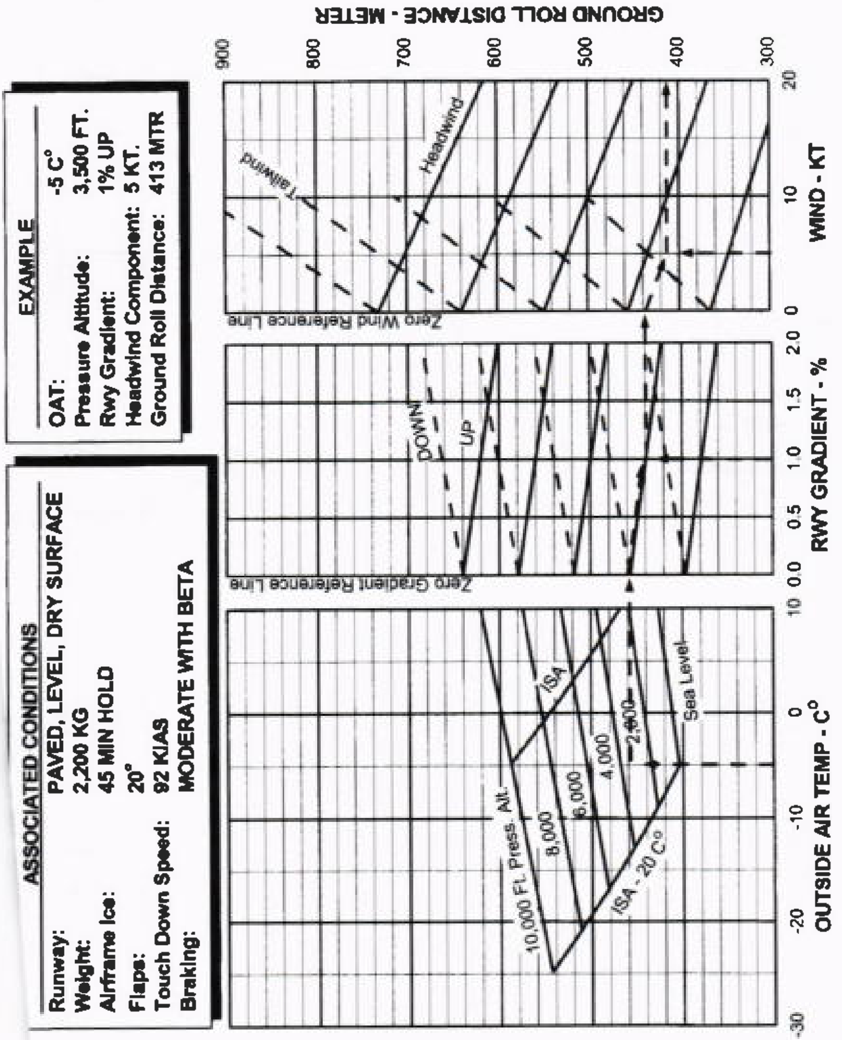
Balked Landing Climb Performance (Metric)
Figure 2

SECTION 5 - PERFORMANCE (continued)



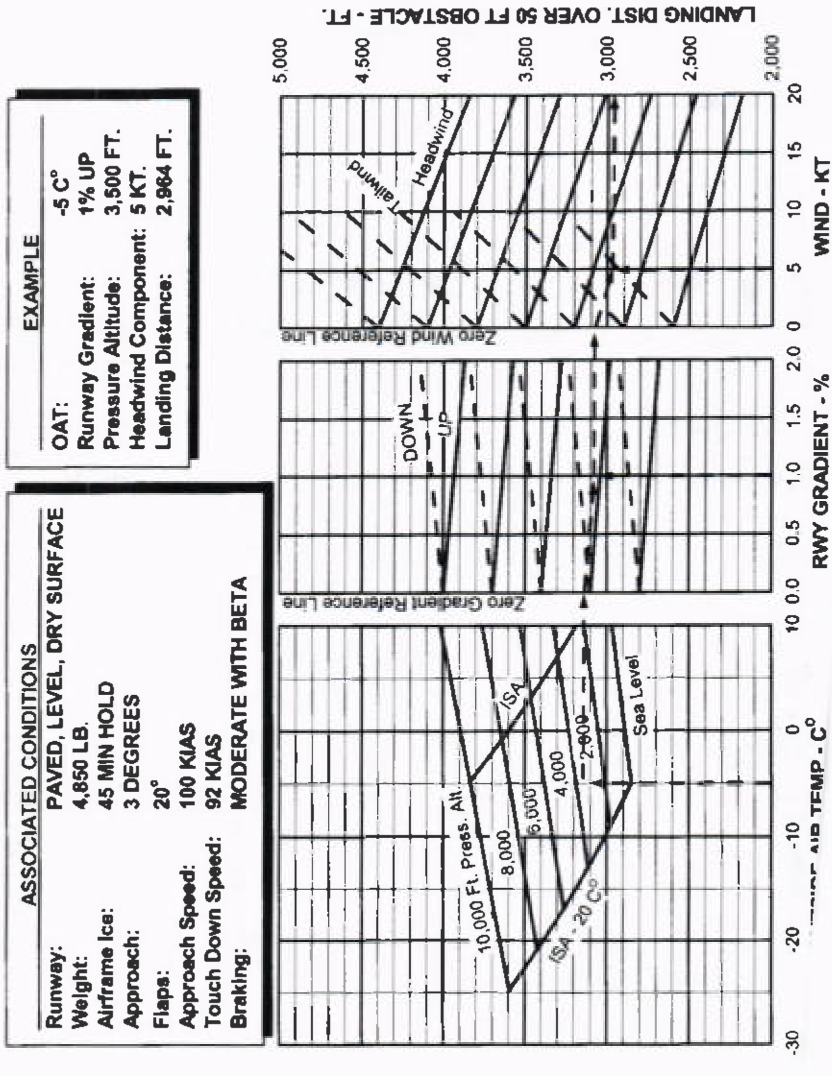
Landing Ground Roll, Flaps 20°, without Reverse
Figure 3

SECTION 5 - PERFORMANCE (continued)



Landing Ground Roll, Flaps 20°, without Reverse (Metric)
Figure 4

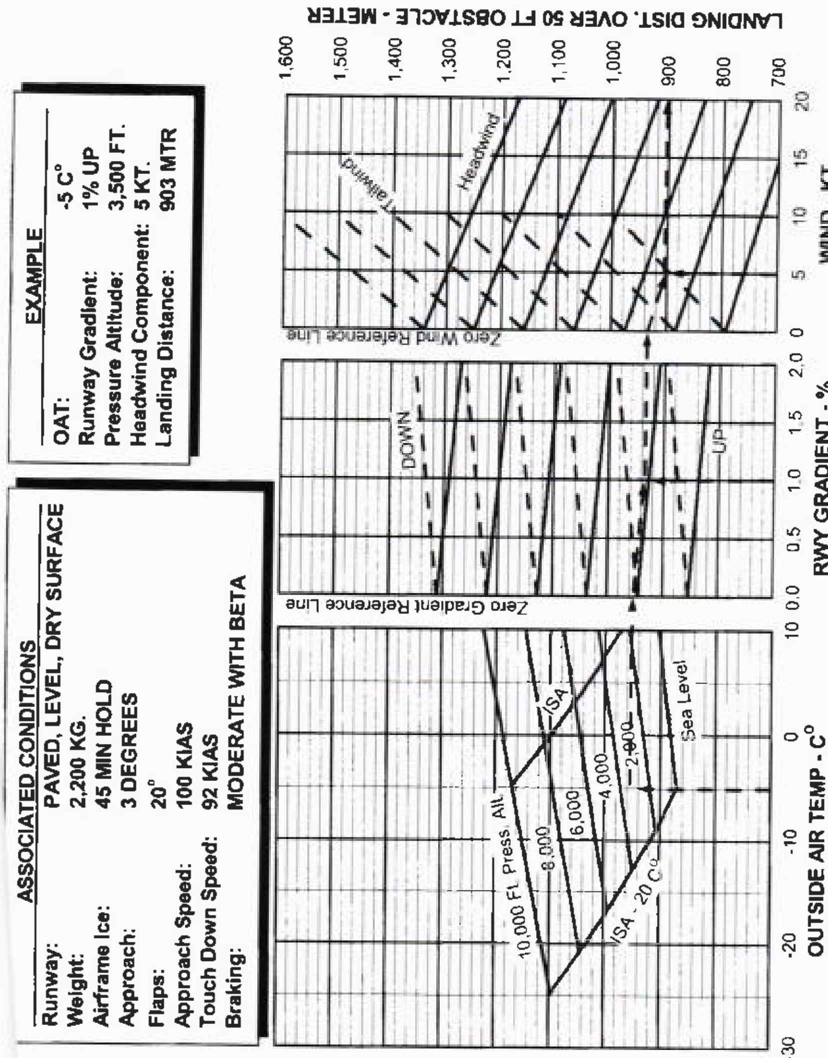
SECTION 5 - PERFORMANCE (continued)



Landing Distance, Flaps 20°, without Reverse

Figure 5

SECTION 5 - PERFORMANCE (continued)



Landing Distance, Flaps 20°, without Reverse (Metric)
Figure 6

SECTION 6 - WEIGHT AND BALANCE

No change.

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SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

PNEUMATIC DE-ICE SYSTEM

The Piper M500 utilizes BF Goodrich pneumatic de-ice boots to displace ice from the leading edges of the wing, vertical and horizontal stabilizer. The de-ice boots are fabricated from neoprene containing built in span wise inflation tubes. The system consists of the wing, vertical and horizontal stabilizer de-ice boots, pressure regulator, ejector, pressure switches, de-icer flow valves, vacuum regulator, timer, check valve and a water separator. The timer allows continuous operation of the pneumatic de-ice system without additional input from the pilot once the system is selected on. The de-ice boots are inflated by engine bleed air and held down during flight by vacuum supplied by a single fixed orifice ejector.

Operation of the pneumatic de-ice system is controlled by an alternate action push-button switch, labeled SURF DE-ICE, on the overhead switch panel. When the switch is engaged, power is supplied to the de-ice timer which hen shuttles the empennage de-icer flow valve to supply precooled bleed air ressure to the empennage boots for six seconds. At the end of six seconds the mpennage de-icer flow valve returns to the vacuum (normal) position and the ottom wing de-icer flow valve is shuttled to the pressure side. After a second seconds the bottom wing deicer flow valve is shuttled back to the vacuum de and the process is repeated for the upper wing boots. This complete cycle repeated every 60 seconds or until the surface deice switch is disengaged. ie timer monitors system voltage, increasing and decreasing boot pressure, d cycle advance. Should any failure in operation be detected, a SURF DEICE IL warning CAS message will illuminate.

cuit protection for the surface de-ice system is provided by a SURFACE -ICE circuit breaker (located on the pilot's aft circuit breaker panel, Row A, ition 6).

SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS (continued)

HEATED PROPELLER

The propeller de-ice system consists of dual element heater boots bonded to the inner 1/3 portion of each propeller blade, slip ring assemblies connected to the propeller hub to distribute power to the propeller blade heating elements, a modular brush assembly which transfers electrical power to the rotating slip rings, and an electronic control module (timer) to cycle power to the heaters. In flight, when the PROP HEAT switch is selected ON, the electronic control module directs power through the modular brush assembly and slip ring to the outer 4 propeller blade heating elements for approximately 90 seconds. The electronic control module then switches power to the inner 4 propeller blade heating elements for approximately 90 seconds. This cycle will continue as long as the PROP HEAT switch is in the ON position and the airplane is airborne.

During Ground operations with the PROP HEAT switch engaged, power is sent to the outer 4 propeller blade heating elements for 30 seconds and then power is directed to the inner 4 propeller blade heating elements for the next 30 seconds. After one minute, the electronic control module will remove power to the boots and the system will remain OFF as long as airplane remains on the ground, unless the operator manually selects the PROP HEAT switch ON, again, or until the airplane leaves the ground.

A PROP HEAT FAIL warning CAS message will illuminate if:

1. An over current (greater than 30 amps).
2. An under current (less than 18.0 amps).
3. A loss of power when the PROP HEAT is selected ON.
4. 28 Vdc applied when the PROP HEAT switch is not engaged.

In the over current scenario, the timer will de-energize the propeller he and illuminate the PROP HEAT FAIL warning CAS message. In the un current scenario, the timer will maintain the propeller heat on and illumir thePROP HEAT FAIL warning CAS message.

SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS (continued)

HEATED WINDSHIELD

The left-side windshield in the cockpit is heated by current from the aircraft electrical system. Windshield heat is controlled by a 3 position rocker switch located in the overhead switch panel and labeled WINDSHLD HT DEFOG - ANTI ICE. Circuit protection for the heated windshield is provided by the WINDSHIELD HEAT CONTROL and POWER circuit breakers in the pilot's aft circuit breaker panel (Row A, Position 7 and 8).

NOTE

The right cockpit windshield is not heated, therefore during icing conditions visibility through the right windshield may be impaired or completely eliminated.

CAUTION

To avoid possible windshield distortion or overheat during ground operations, or during testing, do not position the WINDSHLD HT switch to ANTI ICE or DEFOG for more than 20 seconds.

VINDSHLD HT should be selected to the ANTI ICE position prior to ntering suspected icing conditions. Sudden penetration into icing conditions, ith the windshield heat OFF, will greatly reduce its effectiveness to prevent eliminate windshield ice.

n over-temperature sensor is included as an integral part of the heated indshield. A system failure causing an over-temperature condition (above '0°F / 77°C) will illuminate the red Windshield Overtemperature CAS essage (WDSHLD OVRTMP) located on the MFD.

NOTE

During high ambient temperature conditions when switching windshield heat from ANTI ICE to DEFOG the red Windshield Overtemperature annunciator (WDSHLD OVRTMP) may illuminate and remain illuminated until the windshield surface temperature cools to the DEFOG heat temperature range.

SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS (continued)

HEATED PITOT

A pitot heat anti-ice system is installed to assure proper airspeed indications in the event icing conditions are encountered. The system is designed to prevent ice formation rather than remove it, once formed. During normal operations pitot heat should be selected ON and the amber PITOT HEAT OFF CAUTION CAS MESSAGE extinguished before take-off.

One heated pitot head is installed on the underside of each wing. Pitot heat is controlled by a single PITOT HEAT switch located in the overhead switch panel and protected by L PITOT HEAT and R PITOT HEAT circuit breakers located in the pilot's aft circuit breaker panel (Row A Position 2 and 3).

CAUTION

Care should be taken when an operational check of the heated pitot head is being performed on the ground. The unit becomes very hot. Ground operation should be limited to three minutes to avoid damaging the heating elements.

HEATED STALL WARNING

A heated stall warning vane is installed in the leading edge of the left wing. is controlled by a STALL HEAT switch located in the overhead switch pan and is protected by a STALL HEAT circuit breaker located in the pilot's ε circuit breaker panel (Row A Position 5). To prevent damage during grour operation, the stall warning has an in-line resistor activated by the main ge squat switch which limits the ground electrical load to approximately percent of the in-flight load. If stall warning heat is activated at an OAT grea than 5°C, the system will not provide heat and a STALL HT INHIB advis CAS message will be present.

SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS (continued)

ICE LIGHT (Wing Inspection Light)

An ice detection light is installed on the left side of the forward fuselage, and when selected ON, will illuminate the left wing leading edge. The ice detection light is controlled by the ICE LIGHT switch located in the overhead switch panel. Circuit protection is provided by an ICE circuit breaker located in the EXTERIOR LIGHTS section of the pilot's forward circuit breaker panel (Row A Position 8).

ALTERNATE STATIC SOURCE

An alternate static source control valve is located on the sidewall below the ower left corner of the instrument panel. For normal operation, the control 'alve lever should be in the down position. To select the alternate static source, he control valve lever should be placed in the up position. When alternate tatic source and ADC 1 are selected, the pilot's airspeed, altimeter and ertical speed indicators, and the standby airspeed and altimeter, are vented the alternate static buttons located on the right and left side of the AFT selage. During operation with the alternate static source selected, the rspeed, altimeter, and vertical speed indicator will give slightly different adings than normal. Charts depicting airspeed and altitude position error librations using alternate static source are provided in the Pilots Operating ndbook and FAA Approved Airplane Flight Manual, Section 5, Performance.

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PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 2
FOR
BENDIX/KING KN-63 DME

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Bendix/King KN-63 DME is installed per the Equipment List. The information contained herein supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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VERO BEACH, FLORIDA

TE OF APPROVAL: December 19, 2017

SECTION 1 - GENERAL

The Bendix/King KN-63 DME supplies continuous slant range distance information from a fixed ground station to an aircraft in flight.

The equipment consists of a Garmin Primary Flight Display (PFD) which contains all the operating controls and displays, and a remotely mounted KN-63 Receiver-Transmitter. The Garmin PFD displays displays the Nav radio (1 and 2) which is receiving the DME signal, the Nav frequency and the distance to the DME station in nautical miles.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

DME Operation

1. NAV 1 and NAV 2 VHF Navigation Receivers - ON; TUNE FREQUENCY to VOR/DME or VORTAC station frequencies, as required.

   NOTE

   When the VORTAC or VOR/DME frequency is selected, the appropriate DME frequency is automatically channeled.

2. DME IDENTIFICATION - select the AUX button on audio panel (audi ID will always come through the headset and will come through th cockpit speaker if SPKR is selected on the audio panel).
3. Select PFD softkey, then DME softkey to display DME Informati window.
4. Select ADF/DME softkey on PFD to display ADF/DME TUNIN Window.
5. Select NAV1, NAV2 or HOLD from the DME MODE field in the fr ADF/DME TUNING window.

SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the licensed weight balance data in Section 6 of the Pilot's Operating Handbook and Airp Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION

DME Display on Garmin PFD
Figure 1

egend - Figure 1

1. DME Information Window

2. DME MODE ANNUNCIATOR
   Displays the DME operating mode; NAV 1; NAV 2; or HOLD as selected in the DME TUNING window.

3. FREQUENCY
   Displays the frequency of the VOR/DME or VORTAC selected on the associated navigation radio.

. DISTANCE DISPLAY (NM)
   DME distance to VOR/DME or VORTAC displayed in .1 nautical mile increments up to 99.9 NM, then in increments of one nautical mile to up to 389 NM.

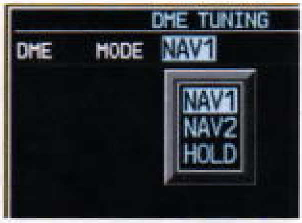
SECTION 7 - DESCRIPTION AND OPERATION (continued)

Legend - Figure 1 (continued)

5. DME TUNING Window (NAV1, NAV2, HOLD)
   Allows access to the DME operating mode as follows:

   NAV 1 Selects DME operation with No. 1 VHF navigation set; enables channel selection by NAV 1 frequency selector controls.

5



   NAV 2 Selects DME operation with No. 2 VHF navigation set; enables channel selection by NAV 2 frequency selector switches.

   HOLD Selects DME memory circuit; DME remains channeled to station which was last channeled when HOLD was selected and will continue to display information relative to this channel. Allows both the NAV 1 and NAV 2 navigation receivers to be set to new operational frequencies without affecting the previously selected DME operation.

NOTE

In the HOLD mode there is no annunciation of the NAV 1 / Nav 2 radio which is being used, but the frequency tuned via that radio remains on the display. Additionally, an annunciator labeled HOLD illuminates on the DME display to flag the pilot that the DME is in the HOLD mode.

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 3 FOR WX-500 STORMSCOPE - OPTIONAL

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the WX-500 Stormscope is installed per the Equipment List. The information contained herein supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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TE OF APPROVAL: December 19, 2017

SECTION 1 - GENERAL

This supplement provides information necessary for the operation of the aircraft with the L3 WX-500 Stormscope.

WARNING

Never use your Stormscope system to attempt to penetrate a thunderstorm. The FAA Advisory Circular, Subject: Thunderstorms, and the Aeronautical Information Manual (AIM) recommend that a pilot "avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo.

NOTE

There are several atmospheric phenomena other than nearby thunderstorms that can cause isolated discharge points in the strike display mode. However, clusters of two or more discharge points in the strike display mode do indicate thunderstorm activity if these points reappear after the screen has been cleared. Avoid the clusters and you will avoid the thunderstorms. In the cell display mode, even a single discharge point may represent thunderstorm activity and should be avoided.

NOTE

When active, the engine igniters can create false indications of lightning by the L-3 StormScope. If false strike indications are suspected, the location and range of the false strikes can be determined by deactivating the ignition system (if safe to do so), clearing the strike display, and then observing strikes after activating and deactivating the ignition system.

NOTE

L-3 STORMSCOPE® WX-500 Lightning and GDL 69/69A XM® Satellite Weather Lightning are mutually exclusive products.

SECTION 2 - LIMITATIONS

The L-3 WX-500 Stormscope Weather Mapping Sensor Users Guide, p/n 002-11503-002, Rev. K. dated 10-Jan-2008 or later appropriate revision, must be immediately available to the flight crew whenever weather avoidance is predicated on the use of this system.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

See the latest appropriate revision of the Garmin G1000 Cockpit Reference Guide for the Piper PA-46-500TP (Garmin P/N 190-01842-00), and/or the Garmin G1000 Pilot's Guide for the Piper PA-46-500TP (Garmin P/N 190-01843-00), for system description and operational information.

SECTION 5 - PERFORMANCE

No change.

ECTION 6 - WEIGHT AND BALANCE

actory installed optional equipment is included in the licensed empty weight id balance data in Section 6 of the Pilot's Operating Handbook.

CTION 7 – DESCRIPTION AND OPERATION

e the latest appropriate revision of the Garmin G1000 Cockpit Reference iide for the Piper PA-46-500TP (Garmin P/N 190-01842-00), and/or the rmin G1000 Pilot's Guide for the Piper PA-46-500TP (Garmin P/N 190-343-00), for system description and operational information.

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PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 4 FOR ADDITION OF SYNTHETIC VISION AND PATHWAY TO THE GARMIN G1000 SOFTWARE SUITE

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Synthetic Vision Sub System (SVS) for the Garmin G1000 is installed per the Equipment List. The information contained herein supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas isted herein. For limitations, procedures and performance information not ontained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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TE OF APPROVAL: December 19, 2017

SECTION 1 - GENERAL

This supplement describes the Synthetic Vision Sub System (SVS) that is an optional part of the Garmin G1000 Integrated Avionics System. This information supplements the information presented in the Pilot Operating Handbook. For additional information, consult the latest appropriate revision of the Garmin G1000 Pilot's Guide for the Piper PA-46-500TP (Garmin P/N 190-01843-00).

The purpose of the SVS is to assist the pilot in maintaining situational awareness with regard to the terrain and traffic surrounding the aircraft and the navigational situation relative to the programmed flight plan. A typical SVS display is shown in Figure 1.

Typical SVS Display
Figure 1

SVS provides additional features on the G1000 primary flight displays with
following information:

- **Synthetic Terrain**; an artificial, database derived, three dimensio view of the terrain ahead of the aircraft within a field of view approximately 30 degrees left and 35 degrees right of the airc heading.
- **Obstacles**; obstacles such as towers, including buildings over AGL that are within the depicted synthetic terrain field of view.
- **Flight Path Marker (FPM)**; A green circular barbed symbol sho the current lateral and vertical path of the aircraft. The FPM is al displayed when synthetic terrain is selected for display.

SECTION 1 - GENERAL (Continued)

- **Pathway**; a pilot selectable three dimensional representation of the programmed flight plan path that can be selected for display alone or with the flight director anytime synthetic terrain is selected for display.
- **Traffic**; a display on the PFD indicating the position of other aircraft detected by the Traffic Alerting System (TAS).
- **Horizon Line**; a white line indicating the true horizon is always displayed on the SVS display.
- **Horizon Heading**; a pilot selectable display of heading marks displayed just above the horizon line on the PFD.
- **Airport Signs**; pilot selectable "signposts" displayed on the synthetic terrain display indicating the position of nearby airports that are in the G1000 database.
- **Runway Highlight**; a highlighted presentation of the location and orientation of the runway(s) at the destination airport.

The synthetic terrain depiction displays an area approximating the view from the pilot's eye position when looking directly ahead out the windshield in front of the pilot. Terrain features outside this field of view are not shown on the lisplay.

'he synthetic terrain display is intended to aid the pilot's awareness of the errain and obstacles in front of the airplane. It may not provide either the ccuracy or fidelity, or both, on which to solely base decisions and plan aneuvers to avoid terrain or obstacles. The synthetic vision elements are not tended to be used for primary aircraft control in place of the primary flight struments

ie Pathway presentation is intended only to aid the pilot's awareness of the ogrammed flight path location relative to the airplane's current position. No tical Pathway information is presented along the climb path but Pathway xes may be displayed along the course at the selected target altitude.

CTION 2 - LIMITATIONS

. Use of the SVS display elements alone for aircraft control without reference to the G1000 primary flight instruments or the aircraft standby instruments is prohibited.

Use of the SVS alone for navigation, or obstacle or terrain avoidance is prohibited.

SECTION 2 - LIMITATIONS (Continued)

3. Use of the SVS traffic display alone to avoid other aircraft is prohibited.

SECTION 3 - EMERGENCY PROCEDURES

SVS Displays information inconsistent with G1000 primary flight instrumentation.

On the PFD:

PFD Softkey .... PRESS
SYN VIS Softkey .... PRESS
SYN TERR Softkey .... PRESS
SVS is removed from both PFD displays .... VERIFY
Use G1000 primary displays for navigation and aircraft control.

If G1000 operation in display backup mode is required

Select display backup mode on the G1000 system.

NOTE

When display backup mode is selected, the MFD will initially present a non SVS (blue sky over solid brown ground) display. SVS will be presented on the backup display within 20 seconds if it was enabled on the PFD when display backup was selected.

SECTION 4 - NORMAL PROCEDURES

Turn Synthetic Vision on/off:

On either PFD:

PFD Softkey .... PRESS
SYN VIS Softkey .... PRESS
SYN TERR Softkey .... PRESS as desirec

The SVS will cycle on or off with each press of the SYN TERR Softl The Flight Path Marker, Traffic, Horizon Line and Runaway Highli are displayed anytime SYN TERR is selected for display.

SECTION 4 - NORMAL PROCEDURES (Continued)

The SVS display may be turned on or off from either the pilot or copilot PFD displays. Turning SVS on or off from either display will simultaneously make the same change on the other PFD. The system will not permit display of SVS on one PFD and non-SVS on the other PFD.

Turn Pathways on/off:

On either PFD:

PFD Softkey .... PRESS
SYN VIS Softkey .... PRESS
PATHWAY Softkey .... PRESS as desired

The Pathway display will cycle on or off with each press of the PATHWAY Softkey. The Pathway can be displayed separately or in conjunction with the flight director and may be independently selected on each PFD.

NOTE

If displayed, the Pathway may be quickly turned off by pressing the PFD softkey at the bottom of the PFD followed by two presses of the far left PFD soft key (SYN VIS and PATHWAY).

'urn Horizon Heading on/off:

On the PFD:

PFD Softkey .... PRESS
SYN VIS Softkey .... PRESS
HRZN HDG Softkey .... PRESS as desired

e horizon heading display will cycle on or off with each press of the HRZN)G Softkey and may be independently selected on each PFD.

rn Airport Signs on/off:

On the PFD:

PFD Softkey .... PRESS
SYN VIS Softkey .... PRESS
APTSIGNS Softkey .... PRESS as desired

airport signposts display will cycle on or off with each press of the SIGNS softkey and may be independently selected on each PFD.

SECTION 4 - NORMAL PROCEDURES (Continued)

USE OF PATHWAY

If Synthetic Terrain is displayed on the PFD, the Pathway may be used to assist the pilot's awareness of the programmed lateral and vertical (descending) navigation path. The following sections describe the basic use of the Pathway in various flight segments.

Departure

Prior to departure, load and activate the desired flight plan into the G1000 FMS, set the initial altitude on the G1000 altitude selector and select GPS on the HSI display just as you would without the SVS.

The programmed flight path will be displayed as a series of magenta boxes along the path at the flight plan altitude subject to the following conditions:

- If the first segment of the flight plan is a heading to altitude leg, the Pathway will not be displayed along the climb path for that segment. The first Pathway segment displayed will be the first GPS course leg.
- The Pathway must be within the SVS field of view of 30 degrees left anc 35 degrees right. If the programmed path is outside that field of view the Pathway will not be visible on the display until the aircraft has turne(toward the course.
- The Pathway will be displayed at either the altitude selected on th G1000 selector OR the altitude published for the procedure (e.g. SIE WHICHEVER IS HIGHER.

After departure, the primary aircraft control must be by reference to the prima aircraft instruments. The SVS and Pathway displays should be used to aid awareness of the terrain and programmed flight path.

Prior to intercepting the programmed course, the Pathway will be display as a series of magenta "boxes" with pointers at each corner that point in direction of the programmed course. The Pathway boxes will not be displa on portions of the course line that would lead the pilot to intercept the cours the wrong direction.

As the aircraft approaches the center of the programmed course and altitude, number of Pathway boxes will decrease to a minimum of four.

SECTION 4 - NORMAL PROCEDURES (Continued)

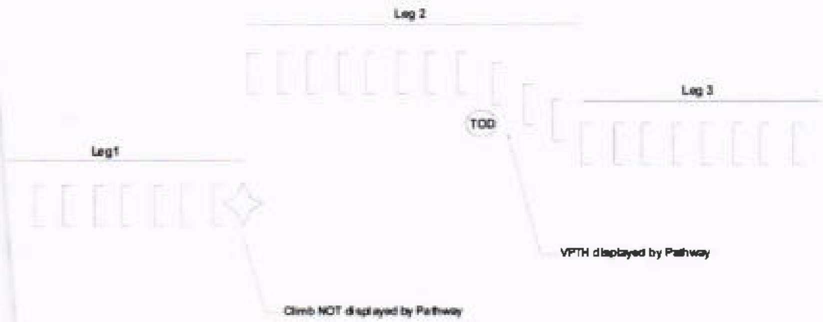
Enroute

When enroute, the Pathway will be displayed along the lateral path defined by the programmed flight plan, at the altitude selected on the G1000 altitude selector.

Flight plan changes in altitude that require a climb will be indicated by the Pathway being displayed as a level path at the altitude entered for the current flight plan leg. Because the G1000 system does not have information available concerning aircraft performance, climb profiles are not displayed by the Pathway.

If the programmed flight plan includes one or more defined VNAV descent segments, the descent path(s) will be displayed by the Pathway as prompted by the G1000 FMS.

If the flight plan includes a significant change in course at a waypoint, the Pathway boxes toward the currently active waypoint will be magenta in color. The boxes defining the next flight plan segment may be visible, but will be displayed in a white color.



Enroute Pathway Altitude Display
Figure 2

SECTION 4 - NORMAL PROCEDURES (Continued)

Approach

During approach, the SVS and Pathway displays should only be used to maintain awareness with regard to the surrounding terrain and the programmed flight path. Primary aircraft control must be accomplished by reference to the primary flight instruments and, if desired, the flight director.

GPS Approach

During a GPS approach, the lateral path and altitude will be displayed by the Pathway in magenta along each segment including the path required to track course reversals that are part of the approach procedure (such as a holding pattern). Approach descent segments will be displayed by the Pathway as published in the approach procedure.

If Vectors-To-Final is selected as the approach transition, the Pathway will display the final approach course inbound to the Missed Approach Point (MAP). The Pathway will be shown level at the altitude set in the G1000 altitude selector, or the Final Approach Fix (FAF) crossing altitude (whichever is higher), up to the point along the final approach course where that altitude intercepts the extended VPTH or GP. If the altitude selector indicates an altitude below the airplane's current altitude, the Pathway will appear below the airplane altitude and the pilot must use normal descent techniques to intercept the VPTH or GP. If the altitude selector is left at an altitude above th current airplane altitude, the airplane will intercept the final approach course below the extended VPTH or GP, such that the Pathway will be displayed above the airplane until the aircraft intercepts the VPTH or GP. From the VPTH or GP intercept point, the Pathway will be shown inbound to the MAF along the published lateral and vertical descent path.

ILS Approach

During an ILS approach, the initial approach segments will be displayed by Pathway in magenta at the procedure segment altitudes if they are being flo by reference to a GPS path. When the G1000 system switches to the localiz inbound to the final approach fix, the Pathway will be displayed along the localizer inbound path and glideslope in green.

SECTION 4 - NORMAL PROCEDURES (Continued)

ILS Approach (Continued)

If Vectors-To-Final is selected as the approach transition, the Pathway will display the final approach course inbound to the Missed Approach Point (MAP). The Pathway will be shown level at the altitude set in the G1000 altitude selector, or the Final Approach Fix (FAF) crossing altitude (whichever is higher), up to the point along the final approach course where that altitude intercepts the extended GS. If the altitude selector indicates an altitude below the airplane's current altitude, the Pathway will appear below the airplane altitude and the pilot must use normal descent techniques to intercept the GS. If the altitude selector is left at an altitude above the current airplane altitude, the airplane will intercept the final approach course below the extended GS, such that the Pathway will be displayed above the airplane until the aircraft intercepts the GS. From the GS intercept point, the Pathway will be shown inbound to the MAP along the published localizer and glideslope.

VOR, LOC BC, or other Approach

Approach segments for a VOR, LOC BC, ADF or other approach that are approved to be flown by reference to GPS will be displayed by the Pathway in magenta color. Approach segments that are defined by other than a GPS or ILS, such as heading legs or VOR defined final approach course, will not be displayed by the Pathway.

issed Approach

hen the missed approach is selected on the G1000 FMS, the Pathway to the issed Approach Holding Point will be displayed just as described for the parture segment.

e pilot must assure that the aircraft path will, at all times, comply with the uirements of the published missed approach procedure.

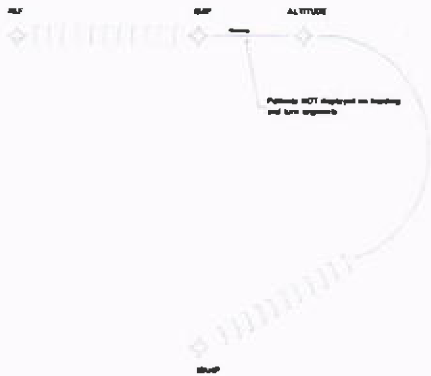
ne initial missed approach leg is a heading to altitude leg or a leg defined by er than a GPS course, the Pathway will not be displayed for that segment.

e course to the Missed Approach Holding Point is out of the SVS field of during the initial missed approach climb, the Pathway will not be visible ne PFD until the aircraft is turned toward the course.

SECTION 4 - NORMAL PROCEDURES (Continued)

Missed approach

The Pathway will be displayed at the published missed approach altitude OR the altitude set on the G1000 altitude selector WHICHEVER IS HIGHER. If the G1000 altitude selector is set to MDA on the final approach segment and not reset during the initial missed approach, the Pathway will still be displayed at the published missed approach altitude.



Missed Approach Pathway Display
Figure 3

SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

No change.

SECTION 7 - DESCRIPTION AND OPERATION

Synthetic Terrain Display
Figure 4

;eneral

'he SVS is dependent upon terrain data provided by the underlying G1000 ,stem. If, for some reason, the terrain data is not available from the G1000, l of the components of the SVS will be unavailable. The flight path marker, ›rizon heading, and airport signs are all sub components of the Synthetic ›rrain display and are only available when Synthetic Terrain is enabled. ıose features are selected or deselected using the PFD softkeys on the SYN S menu and are independently selectable on each PFD.

SECTION 7 - DESCRIPTION AND OPERATION (Continued)

Synthetic Terrain

The synthetic (3D) terrain display on the PFD provides a perspective view of the terrain ahead of the aircraft showing ground features up to 30 degrees left and 35 degrees right of the airplane heading. The terrain display is derived from the same terrain data contained in the G1000 system that is optionally used to display terrain on the MFD map display. The terrain data has a resolution of approximately 0.15 degrees of latitude and longitude at the current position; this means that the terrain elevation contours in the database are stored broken down into squares of 0.15 degrees of latitude and longitude on each side. That data is processed and smoothed by the G1000 system to provide the synthetic terrain display. In some instances, terrain features such as lakes in mountainous areas may be presented by the SVS as if the lake water extends somewhat up the mountainside. This is due to the limitations of the terrain database resolution but is not significant for the approved uses of SVS.

The SVS terrain display will show land contours, large water features, anc towers/obstacles over 200 ft AGL (including buildings), that are included in th G1000 obstacle database. In order to provide a clean, uncluttered PFD display cultural features on the ground such as roads, highways, railroad tracks, citie and political boundaries (state / county lines) are not displayed on the PFI even if those features are selected for display on the MFD. The colors use to display the terrain elevation contours are similar to those used on the MF map. The terrain display also includes a north-south, east west grid to assist orientation relative to the terrain.

The terrain display is intended to serve as an awareness tool only. It m not provide either the accuracy or fidelity, or both, on which to solely ba decisions and plan maneuvers to avoid terrain or obstacles. Navigation m not be predicated solely upon the use of the TAWS, Terrain or Obstacle d displayed by the SVS.

SECTION 7 - DESCRIPTION AND OPERATION (Continued)

NOTE

The area of coverage may be modified, as additional terrain data sources become available.

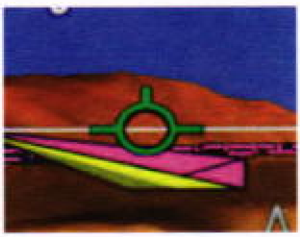
Obstacle and Terrain Alerts and Warnings

Obstacles and terrain displayed on the SVS may be highlighted if an alert or warning is generated by the G1000 Terrain or TAWS. If an obstacle alert is presented for an obstacle that is in the SVS field of view, the obstacle symbol on the PFD will turn yellow in color. If an obstacle warning is generated by the G1000 system, the obstacle symbol on the PFD will turn red.

If the G1000 Terrain or TAWS generates a terrain alert or warning, the terrain feature displayed on the PFD will be colored yellow for an alert or red for a warning for as long as the alert remains valid.

Because the area monitored by the Terrain or TAWS can be wider than the field of view that can be displayed by the SVS, it is possible to receive an obstacle or terrain audible alert for an obstacle or terrain that is not shown on the SVS display. In those cases, the object generating the alert will be left or right of the aircraft. Refer to the other displays in the aircraft to determine the cause of the message.

Flight Path Marker



Flight Path Marker (FPM)
Figure 5

SECTION 7 - DESCRIPTION AND OPERATION (Continued)

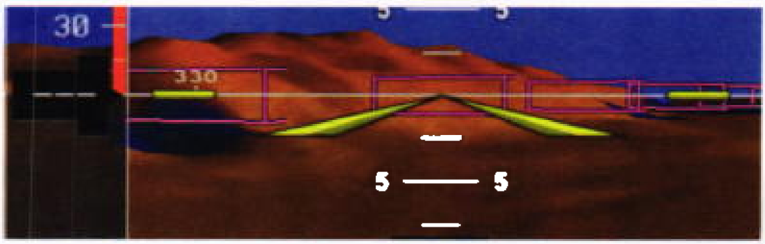
Flight Path Marker (continued)

The SVS display includes a green circular barbed symbol called the Flight Path Marker (FPM) that represents the current path of the airplane relative to the terrain display. The FPM is always displayed when synthetic terrain is displayed and the aircraft ground speed exceeds 30 kt. The FPM indicates the current lateral and vertical path of the airplane as determined by the GPS sensor. If the FPM is above the horizon line, the airplane is climbing, and similarly if the FPM is below the horizon line, the airplane is descending. If the airplane is flying in a crosswind, the FPM will be offset from the center of the display. In that case, the center of the PFD airplane reference symbol indicates the airplane heading and the FPM indicates the direction that the airplane is actually moving, taking into account the crosswind.

The FPM indicates the current path of the airplane but does not predict the future path. If aircraft attitude, power setting, airspeed, crosswind, etc. are changed, the FPM will move to indicate the new path resulting from those changes.

If the FPM is below the terrain or obstacle displayed behind it on the PFD, the current aircraft path will not clear that terrain or obstacle. If the FPM is above the terrain or obstacle, the aircraft will clear the terrain or obstacle IF THE CURRENT AIRCRAFT CONFIGURATION IS MAINTAINED AND THE AIRCRAFT PERFORMANCE WILL PERMIT YOU TO MAINTAIN THE CURRENT VERTICAL (CLIMB) GRADIENT UNTIL PAST THE TERRAIN OR OBSTACLE.

Pathway



Pathway Display on PFD
Figure 6

SECTION 7 - DESCRIPTION AND OPERATION (Continued)

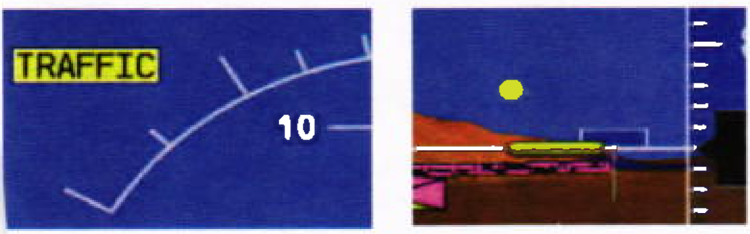
Pathway (continued)

If PATHWAY is enabled on the SYN VIS menu of the PFD and a defined GPS navigation path has been entered on the G1000, the SVS system will display a Pathway, sometimes called a "highway in the sky" or HITS. The Pathway is a perspective representation of the programmed flight path. When the aircraft is well off course, the Pathway will be displayed as a number of boxes floating in the sky along the programmed lateral and vertical path. As the aircraft intercepts the programmed flight path, the number of boxes displayed will be reduced to a minimum of four to avoid cluttering the PFD display. The Pathway is only displayed for navigation paths that are fully defined by the sensor in use. Because a fully defined lateral and vertical path through space is not defined by them, a Pathway is not displayed for heading legs, VOR, LOC only, BC or ADF segments. When the Pathway is displayed, the color of the boxes indicates the sensor generating the path. If the GPS sensor is in use, the boxes will be magenta colored. If the LOC sensor is defining the path in use, the boxes will be green.

The Pathway boxes are ± 100 ft in vertical dimension and approximately ± 380 ft horizontally from the center of the box. The Pathway presentation s intended only to aid the pilot in awareness of the programmed flight path ocation relative to the airplane's current position. The Pathway is not intended r use as a primary reference in tracking the navigation path.

a GPS based descent profile has been programmed either on the G1000 flight an page or as part of an approach or STAR, the descent will be displayed by e Pathway. Climb paths are never displayed by the Pathway. If a profile quires a climb, the Pathway will be displayed as a level segment at the higher the altitude defined by the programmed path or the G1000 altitude selector.

affic



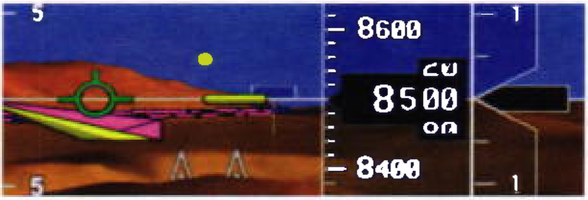
Traffic Displays on PFD
Figure 7

SECTION 7 - DESCRIPTION AND OPERATION (Continued)

Traffic (continued)

If traffic that is within the SVS field of view is detected by the G1000 system, a symbol will be displayed on the PFD indicating the direction and relative altitude of the traffic. Additionally, the traffic symbol enlarges as the traffic moves closer to the host aircraft. The traffic will be displayed as a white diamond unless it generates a traffic alert. Traffic that causes an alert will be displayed as a solid yellow circle accompanied by a yellow TRAFFIC annunciator to the top right of the airspeed display tape. The traffic symbol enlarges as the traffic moves closer to the host aircraft.

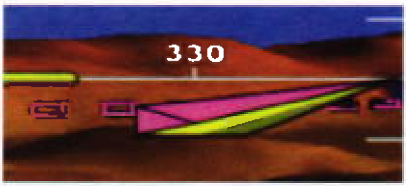
Horizon line



SVS Display on PFD showing True Horizon
Figure 8

The SVS display includes an always-visible white horizon line that represen the true horizon. Terrain will be presented behind the horizon line, and terra shown above the horizon line is above the current aircraft altitude. Terrain th is shown below the horizon line is below the aircraft altitude.

Horizon Heading



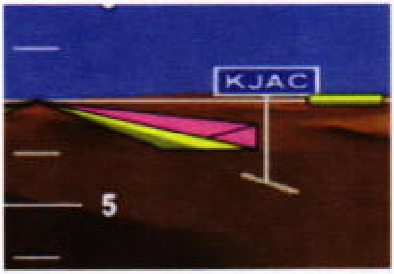
Heading Scale Display on PFD
Horizon Line
Figure 9

SECTION 7 - DESCRIPTION AND OPERATION (Continued)

Horizon Heading (continued)

A heading scale may be displayed on the PFD horizon line, if selected by the pilot. The heading marks are spaced in even 30 degree increments and are presented just above the horizon line with tic marks that intersect the horizon line. The horizon heading will correspond to that presented by the HSI. Because the horizon heading is only displayed in 30 degree increments, it should only be used for general heading awareness and not be used to establish the aircraft heading.

Airport Signs and runway highlight



"Sign Post" on SVS Display on PFD
Figure 10

APTSIGNS is selected, a "signpost" along with a representation of the nways will be plotted on the SVS display for nearby airports that are ntained in the G1000 airport database. The signpost will become visible ıen you are within approximately 15 nm of the airport. The text identifier the airport will be displayed inside the airport sign when the aircraft reaches ›roximately 8 nm from the airport. Once the aircraft reaches approximately nm from the airport, the airport sign will be removed but the runways sentation will remain. If an approach to a specific runway has been loaded activated, that runway will be highlighted on the SVS display.

en on an approach, the highlight for the approach runway will be ›iderably larger than "normal" to assist in visually acquiring the runway. oversized highlight will automatically shrink around the runway depiction ıat the runway is proportionally displayed when the aircraft is within oximately ½ nm of the threshold. Runway highlighting is displayed even if SIGNS are turned off.

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PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 5
FOR

HARTZELL 5D3-N338A1/78D01B PROPELLER
(FAA STC SA04045CH)
(EASA STC 10061493)

The FAA approved operational supplement for the Hartzell 5D3-N338A1/78D01B propeller, installed in accordance with STC SA04045CH, s required for operation of this system. Hartzell will be responsible to supply ınd revise the operational supplement. It is permitted to include the Hartzell D3-N338A1/78D01B propeller supplement in this location of the Pilot's)perating Handbook unless otherwise stated by Hartzell. The information ontained in the Hartzell 5D3-N338A1/78D01B propeller supplement may ıpersede or supplement the information in the basic Pilot's Operating Handbook ıd FAA Approved Airplane Flight Manual with respect to the operation of the artzell 5D3-N338A1/78D01B propeller system. For limitations, procedures and rformance information not contained in the Hartzell supplement, consult the sic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 6
FOR

AMSAFE INFLATABLE SEAT RESTRAINTS
(FAA STC SA02276AK)
(EASA STC 10031010)

The FAA approved operational supplement for the AMSAFE Inflatable Seat Restraints, installed in accordance with STC SA02276AK, is required for ›peration of this system. AMSAFE will be responsible to supply and revise he operational supplement. It is permitted to include the AMSAFE Inflatable ;eat Restraints supplement in this location of the Pilot's Operating Handbook nless otherwise stated by AMSAFE. The information contained in the .MSAFE Inflatable Seat Restraints supplement may supersede or supplement ıe information in the basic Pilot's Operating Handbook and FAA Approved irplane Flight Manual with respect to the operation of the AMSAFE Inflatable :at Restraints system. For limitations, procedures and performance information ›t contained in the AMSAFE supplement, consult the basic Pilot's Operating ındbook and FAA Approved Airplane Flight Manual.

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TABLE OF CONTENTS

SECTION 10

OPERATING TIPS

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SECTION 10
OPERATING TIPS

10.1 GENERAL

This section provides operating tips of particular value in the operation of the M500.

10.3 OPERATING TIPS

(a) Learn to trim for takeoff so that only a very light back pressure on the control wheel is required to lift the airplane off the ground.

(b) On takeoff, do not retract the gear prematurely. The airplane may settle and make contact with the ground because of lack of flying speed, atmospheric conditions, or rolling terrain.

(c) To slow the airplane while taxiing and to save the brakes, it is permissible to move the prop into beta and reverse.

(d) To reduce flap operating loads, it is desirable to have the airplane at a speed slower than the maximum allowable before extending the flaps.

(e) Before attempting to reset any circuit breaker, allow a two to five minute cooling off period.

(f) Before starting the engine, check that all radio switches, light switches and the pitot heat switch are in the off position so as not to create an overloaded condition when the starter is engaged.

(g) Anti-collision lights should not be operating when flying through cloud, fog or haze, since reflected light can produce spatial disorientation. Strobe lights should not be used in close proximity to the ground, such as during taxiing, takeoff or landing.

10.3 OPERATING TIPS (continued)

(h) In extreme turbulence, reduce power setting to obtain design operating speed. (See Section 2 Limitations for correct speeds).

(i) In an effort to avoid accidents, pilots should obtain and study the safety related information made available in FAA publications, such as regulations, advisory circulars, Aviation News, AIM and safety aids.

(j) Prolonged slips or skids which result in excess of 2000 feet of altitude loss or other radical or extreme maneuvers which could cause uncovering of the fuel outlet must be avoided as fuel flow interruption may occur when the tank being used is not full.

(k) In order to prevent propeller strikes while taxiing on rough terrain or crossing over rises, the airplane should be taxied slowly with minimum power and rises should be crossed at an acute angle. Tires and struts should be properly inflated.

(l) Pilots who fly above 10,000 feet should be aware of the need fo special physiological training. Appropriate training is available for small fee at approximately twenty-three Air Force Bases throughou the United States. The training is free at the NASA Center i Houston and at the FAA Aeronautical Center in Oklahoma.

Forms to be completed (Physiological Training Application ar Agreement) for application for the training course may be obtained l writing to the following address:

Chief of Physiological Training, AAC-143
FAA Aeronautical Center
P.O. Box 25082
Oklahoma City, Oklahoma 73125

It is recommended that all pilots who plan to fly above 10,000 receive physiological training and then take refresher training every or three years.

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