ARCHER III
PA-28-181

SN 2843823, 2881001 AND UP

With Garmin G1000 System

PILOT'S OPERATING HANDBOOK

AND

FAA APPROVED AIRPLANE FLIGHT MANUAL

AIRPLANE SERIAL NO. 2881550

AIRPLANE REGIST. NO. N232TF

PA-28-181
REPORT: VB-2749 FAA APPROVED BY:

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PIPER AIRCRAFT, INC.
VERO BEACH, FLORIDA

DATE OF APPROVAL:
DECEMBER 22, 2017

FAA APPROVED IN NORMAL AND UTILITY CATEGORIES BASED ON CAR 3. THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY CAR 3 AND CONSTITUTES THE APPROVED AIRPLANE FLIGHT MANUAL AND MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.

THIS FLIGHT MANUAL IS EASA APPROVED. THIS APPROVAL IS VALID FOR THE AFM/POH VB-2749.

Piper

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Issued: December 22, 2017

APPLICABILITY

Application of this handbook is limited to the specific Piper PA-28-181 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

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

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 certified 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

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 black vertical line next to the page number indicates that an entire page has been changed or added.

Black vertical 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, 1-1 through 1-14, 2-1 through 2-18, 3-1 through 3-42, 4-1 through 4-26, 5-1 through 5-34, 6-1 through 6-12, 7-1 through 7-66, 8-1 through 8-20, 9-1 through 9-54, 10-1 through 10-2.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS

Current Revisions to the PA-28-181 ARCHER III Pilot's Operating Handbook, REPORT: VB-2749 issued December 22, 2017.

Revision Number and Code	Revised Pages	Description of Revisions	FAA Approval Signature and Date
Rev. 1 (PR180507)	ii	Updated copyright.	
	v	Added Rev. 1 to TOC.	
	3-ii	Revised T.O.C.	
	3-3	Revised Para. 3.1.	
	3-6	Revised Para. 3.1.	
	3-24	Revised Para. 3.5e.	
	3-30	Revised Para. 3.5e.	
	3-34	Revised Para. 3.5e.	
	4-22	Revised Para. 4.5n.	
	4-26	Revised Para. 4.13.	
	7-8	Revised Para. 7.15.	
	7-40	Revised Para. 7.15.	
	7-41	Revised Para. 7.15.	
	7-53	Revised Para. 7.23.	
	7-54	Revised Figure 7-9.	
	7-55	Revised Figure 7-9.	
	9-i	Revised T.O.C.	
	9-9 thru 9-18	Added Supplement 2. Added pages 9-11 thru 9-18.	
	9-19, -20	Revised Supplement 3.	
	9-48, -49	Revised Supplement 6, Figure 7-9.	Eric A Wright May 7, 2018
Rev. 2 (PR180731)	i	Added EASA approval.	
	v, vi	Added Rev. 2 to TOC.	
	1-7, -8	Revised Para. 1.21.	
	1-8a thru 1-8j	Added pages for table.	
	1-12	Revised Para. 1.23 (e).	
	2-8	Revised Para. 2.25.	
	2-8a, 2-8b	Added pages for Para. 2.25.	
	2-9, -10	Revised Para. 2.25.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (continued)

Revision Number and Code	Revised Pages	Description of Revisions	FAA Approval Signature and Date
Rev. 2 (cont.)	2-12a, 2-12b	Added pages for Para. 2.25.	
	2-13	Revised Para. 2.25.	
	3-32	Revised Para. 3.5e.	
	3-41	Revised Para. 3.5k.	
	7-26 thru 7-31	Revised TAWS-B alerts and for table additions.	
	9-32	Revised Supplement 6.	
	9-45, -46	Revised Supplement 6.	
	9-47, -50	Revised Supplement 6.	Eric A. Wright
	9-53	Revised Supplement 7.	July 31, 2018
Rev. 3 (PR190109)	ii	Updated copyright.	
	vi	Added Rev. 3 to TOC.	
	4-i	Revised T.O.C.	
	4-14	Revised Para. 4.5f.	
	4-22	Revised Para. 4.5o.	
	4-26	Revised Para. 4.13. Added Para. 4.15.	Eric A. Wright
	9-41	Revised Para. 4.5d.	January 9, 2019
Rev. 4 (PR190617)	vi	Added Rev. 4 to TOC.	
	vi-a, vi-b	Added pages to TOC.	
	1-i	Revised T.O.C.	
	1-5	Revised Para. 1.5.	
	1-6	Revised Para. 1.11.	
	1-7	Relocate Paras. 1.17, 1.19.	
	1-12	Revised Para. 1.23.	
	2-3	Revised Para. 2.7.	
	2-7	Revised Para. 2.25b.	
	2-8, -8a -8b	Revised Para. 2.25d.	
	2-9	Revised Para. 2.25f.	
	3-ii	Revised T.O.C.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (continued)

Revision Number and Code	Revised Pages	Description of Revisions	FAA Approval Signature and Date
Rev. 4 (cont.)	5-3	Revised Para. 5.5a.	
	5-7	Revised Para. 5.5e.	
	7-2	Revised Para. 7.7.	
	7-8	Revised Para. 7.15.	
	7-9, -10	Revised Para. 7.15.	
	7-28	Revised TAWS-B Note.	
	7-29, -30	Revised TAWS-B.	
	7-39	Revised Autopilot.	
	8-12	Revised Para. 8.15.	Eric A. Wright
	8-13	Revised Para. 8.19.	June 17, 2019
Rev. 5 (PR190829)	vi-a	Added Rev. 5 to TOC.	
	3-20	Revised Para. 3.5d.	
	3-25, -26	Revised Para. 3.5d.	
	4-9	Revised Para. 4.5c.	
	4-13	Revised Para. 4.5e.	
	4-16	Revised Para. 4.5h.	
	7-36	Revised Databases.	
	7-37	Revised Databases.	
	7-42	Revised ESP.	
	7-50	Revised Para. 7.21 typo.	
	7-53	Revised Figure 7-8.	
	9-i	Revised T.O.C.	
	9-38	Revised Para. 4.5c.	
	9-43	Revised Para. 4.5h.	
	9-55, 9-56	Added Supplement 8. Added pages 9-55 thru 9-56.	Eric A. Wright August 29, 2019
Rev. 6 (PR200327)	ii	Updated copyright.	
	vi-a, vi-b	Added Rev. 6 to L of R.	
	1-5	Revised Para. 1.5.	
	1-6	Revised Para. 1.11.	
	2-i	Revised T.O.C.	
	2-3	Revised Para. 2.7.	
	2-8b	Revised Para. 2.25.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (continued)

Revision Number and Code	Revised Pages	Description of Revisions	FAA Approval Signature and Date
Rev. 6 (cont.)	2-11	Revised Para. 2.25.	
	2-14, -15	Revised Para. 2.29.	
	3-18	Revised Para. 3.5d.	
	4-23	Revised Para. 4.5p.	
	7-45 thru 7-46	Revised Para. 7.17. Added pages 7-45a & 7-45b	
	7-53	Revised Para. 7.23.	
	7-54, -55	Revised Figure 7-9.	
	7-58	Revised Para. 7.25.	
	7-59	Revised Figure 7-11.	
	8-13	Revised Para. 8.19.	
	9-i	Revised T.O.C.	
	9-47 thru 9-49	Revised Supplement 6.	
	9-55	Revised Supplement 8.	
	9-57 thru 9-64	Added Supplement 9. Added pages 9-57 thru 9-64.	Eric A. Wright March 27, 2020
Rev. 7 (PR200715)	i	Revised EASA approval.	
	vi-b	Added Rev. 7 to L of R.	
	1-8 thru 1-8i	Revised Para. 1.21. Column header typo PNB to PBN.	
	2-4	Revised Para. 2.11.	
	2-7	Revised Para. 2.25b.	
	2-15	Added Para. 2.29 Note.	
	3-11, -12	Revised Para. 3.5b.	
	3-40	Revised Para. 3.5j.	
	4-9	Revised Para. 4.5c.	
	4-15	Revised Para. 4.5g.	
	4-16	Revised Para. 4.5h.	
	4-20	Revised Para. 4.5m.	
	5-33	Revised Figure 5-43.	
	9-i	Revised T.O.C.	
	9-65 thru 9-74	Added Supplements 10 & 11. Added pages 9-65 thru 9-74.	Scott Edwards
	10-2	Revised Para. 10.3.	July 15, 2020

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (continued)

Revision Number and Code	Revised Pages	Description of Revisions	FAA Approval Signature and Date
Rev. 8 (PR210309)	i	Revised EASA approval.	
	ii	Updated copyright.	
	vi-c, vi-d	Added pages to L of R. Added Rev. 8 to L of R.	
	1-6	Revised Para. 1.11.	
	2-15	Removed Para. 2.29 Note.	
	4-10 thru 4-12	Revised Para. 4.5d.	
	7-2	Revised Para. 7.7.	
	8-13	Revised Para. 8.19.	Mitchell Cannon
	9-37 thru 9-40	Relocate and revised Para. 4.5d.	Mitchell R. Cannon March 9, 2021

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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 F.A.R./C.A.R. It also contains supplemental data supplied by the airplane manufacturer.

This handbook is not designed as a substitute for adequate and competent flight instruction, knowledge of current airworthiness directives, applicable federal air 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.

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.

Although the arrangement of this handbook is intended to increase its in-flight capabilities, it should not be used solely as an occasional operating reference. The pilot should study the entire handbook to familiarize himself with the limitations, performance, procedures and operational handling characteristics of the airplane before flight.

The handbook has been divided into numbered sections, each provided with a "finger-tip" tab divider for quick reference. The limitations and emergency procedures have been placed ahead of the normal procedures, performance and other sections to provide easier access to information that may be required in flight. The "Emergency Procedures" Section has been furnished with a red tab divider to present an instant reference to the section. 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.

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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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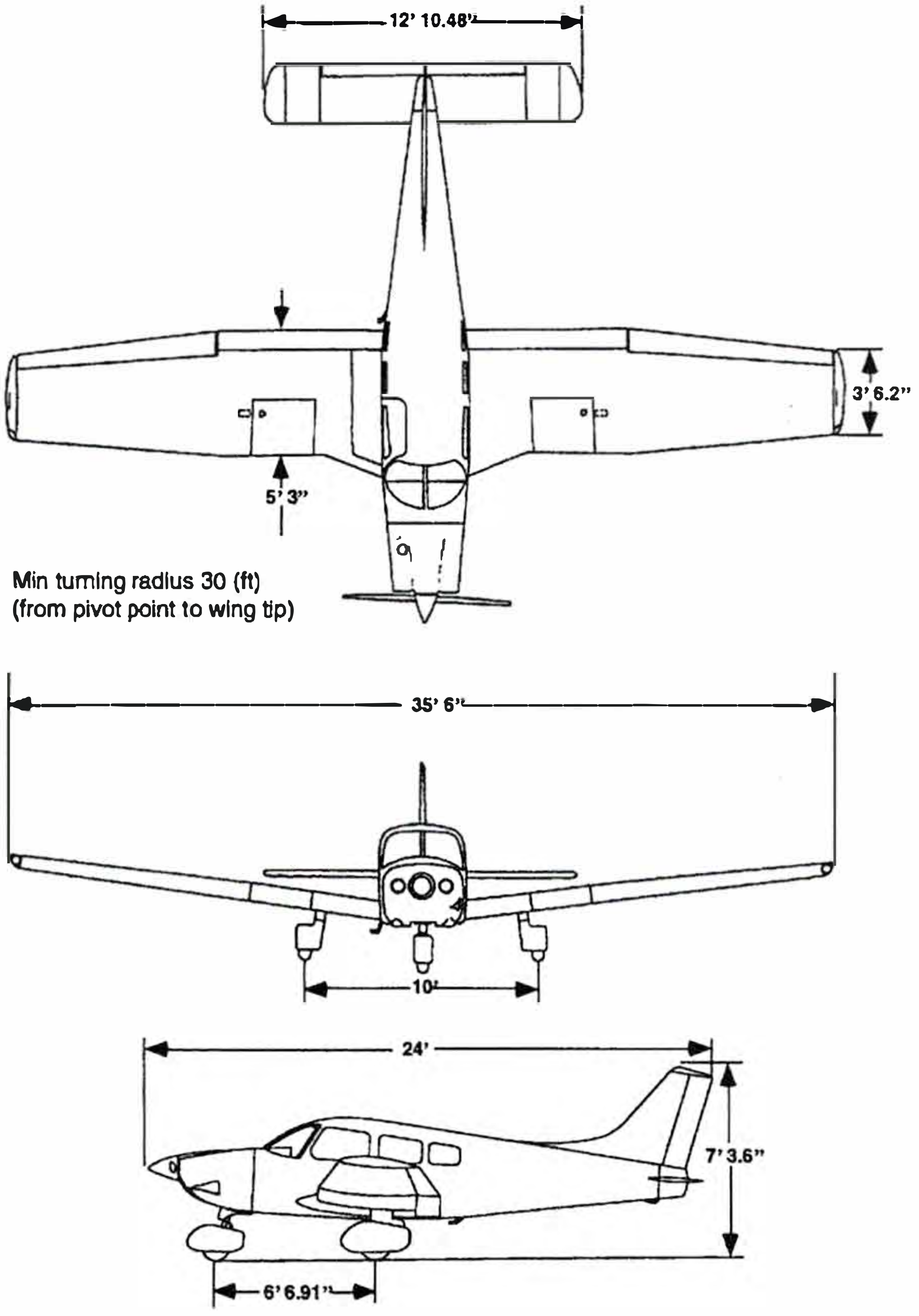

THREE VIEW
Figure 1-1

1.5 ENGINE

(a) Number of Engines	1
(b) Engine Manufacturer	Lycoming
(c) Engine Model Number	
(1) Fuel Injected	IO-360-B4A
(d) Takeoff Power (BHP)	180
(e) Takeoff Power Engine Speed (RPM)	2700
(f) Bore (inches)	5.125
(g) Stroke (inches)	4.375
(h) Displacement (cubic inches)	361.0
(i) Compression Ratio	8.5:1
(j) Engine Type	Four Cylinder, Direct Drive, Horizontally Opposed with Fuel Injection

1.7 PROPELLER

(a) Number of Propellers	1
(b) Propeller Manufacturer	Sensenich
(c) Model	76EM8S14-0-62
(d) Number of Blades	2
(e) Propeller Diameter (inches)	
(1) Maximum	76
(2) Minimum	76
(f) Propeller Type	Fixed Pitch

1.9 FUEL

AVGAS ONLY

(a) Fuel Capacity (U.S. gal.) (total)	50
(b) Usable Fuel (U.S. gal.) (total)	48
(c) Fuel	
(1) Minimum Octane	100 Green or 100LL Blue Aviation Grade

1.11 OIL

(a)	Oil Capacity (U.S. quarts)	8
(b)	Oil Specification	Refer to latest revision of Lycoming Service Instruction 1014.
(c)	Oil Viscosity per Average Ambient Temperature for Starting	Refer to latest revision of Lycoming Service Instruction 1014.

1.13 MAXIMUM WEIGHTS

		Normal	Utility
(a)	Maximum Ramp Weight (lbs.)	2558	2138
(b)	Maximum Takeoff Weight (lbs.)	2550	2130
(c)	Maximum Landing Weight (lbs.)	2550	2130
(d)	Maximum Weights in Baggage Compartment (lbs.)	200	0

1.15 STANDARD AIRPLANE WEIGHTS

Refer to Figure 6-5 for the Standard Empty Weight and the Useful Load.

1.17 BAGGAGE SPACE

(a) Compartment Volume (cubic feet)	24
(b) Entry Width (inches)	22
(c) Entry Height (inches)	20

1.19 SPECIFIC LOADINGS

(a) Wing Loading (lbs. per sq. ft.)	15.0
(b) Power Loading (lbs. per hp)	14.2

1.21 G1000 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, TSO-C146d Class 3 approved Garmin GDU Display Units (1050 and 1054), and two Garmin-approved GA36 GPS/SBAS antennas (one is a GA37 if optional GDL 69 is installed), and GPS software version 5.1 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 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 PBN/	
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. 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.
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. 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 PBN/	
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. 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.

1.21 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 PBN/	
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 PBN/	
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 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 PBN/	
P-RNAV (Europe)	GNSS receiver is required for takeoff in P-RNAV airspace. Must have GNSS/ SBAS capability and availability or GNSS RAIM/FDE availability must be verified prior to flight. This does not constitute an operational approval.	FAA AC 20-138D. FAA AC 90-96A CHG 1. JAA TGL10 Rev 1.	R	D2	ICAO flight plan code for P-RNAV no longer exists. P-RNAV utilizes RNAV 1 flight plan codes.
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.	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 PBN/	
RNP 1 (continued)	Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	(continued)	(cont.)	(cont.)	(continued)
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. 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 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 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 PBN/	
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. 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. This aircraft is not authorized to perform Barometric Based Vertical Guidance (baro-VNAV) approches in the EASA airspace system.	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 PBN/	
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 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 PBN/	
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 PBN/	
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 G1000 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.
TAS	True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility.
V_O	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 FAR23 Amendment 45.

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 (continued)

V_{NE}/M_{NE}	Never Exceed Speed or Mach Number is the speed limit that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
V_{SO}	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.
V_X	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

(b) Meteorological Terminology

ISA	International Standard Atmosphere in which: The air is a dry perfect gas; The temperature at sea level is 15° Celsius (59° Fahrenheit); The pressure at sea level is 29.92 inches Hg (1013.2 mb); The temperature gradient from sea level to the altitude at which the temperature is -56.5°C (-69.7°F) is -0.00198C (-0.003564°F) per foot and zero above that altitude.
OAT	Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (continued)

Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013.2 millibars).
Pressure Altitude	Altitude measured from standard sea-level pressure (29.92 in. Hg) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero.
Station Pressure	Actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

(c) Power Terminology

Maximum Continuous Power	Maximum power permissible continuously during flight.
Takeoff Power	Maximum power permissible for takeoff.

(d) Engine Instruments

EGT	Exhaust Gas Temperature
FFLOW	Fuel Flow
RPM	Propeller Speed

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (continued)

(e) Avionics System Abbreviations/Terminology

1	Refers to pilot's side (ADAHRS1, ADC1, GPS1)
2	Refers to co-pilot's side (ADAHRS2, ADC2, GPS2)
ADAHRS	Air Data, Attitude and Heading Reference System
AFCS	Automatic Flight Control System
CAS	Crew Alerting System
EBD	Evolution Backup Display (Aspen standby instrument)
EIS	Engine Indication System
ESP	Electronic Stability and Protection
FDE	Fault Detection and Exclusion
FOB	Fuel On Board
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
GMU	Garmin Magnetometer Unit
GPS	Global Positioning System
GSU	Garmin ADAHRS
GTX	Garmin Transponder
MFD	Multi-Function Display
PFD	Primary Flight Display
PFT	Preflight Test
SBAS	Satellite-Based Augmentation System
TAWS	Terrain Awareness and Warning System
USP	Underspeed Protection

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (continued)

(f) Airplane Performance and Flight Planning Terminology

Accelerate-Stop Distance	The distance required to accelerate an airplane to a specified speed and, assuming failure of an 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 (Demo. X-Wind)	The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests.
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.

(g) Weight and Balance Terminology

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. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.

1.23 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY (continued)

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 the landing touchdown.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes weight of start, taxi and run up fuel.)
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.
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	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Usable Fuel	Fuel available for flight planning.
Useful Load	Difference between takeoff weight, or ramp weight is applicable, and basic empty weight.

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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.

This airplane must be operated as a normal or utility category airplane in compliance with the operating limitations stated in the form of placards and markings and those given in this section and this complete handbook.

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
Never Exceed Speed (V_{NE}) - Do not exceed this speed in any operation.	154	148
Maximum Structural Cruising Speed (V_{NO}) - Do not exceed this speed except in smooth air and then only with caution.	125	121

2.3 AIRSPEED LIMITATIONS (continued)

CAUTION

Maneuvering speed decreases at lighter weight as the effects of aerodynamic forces become more pronounced. Linear interpolation may be used for intermediate gross weights. Maneuvering speed should not be exceeded while operating in rough air.

SPEED	KIAS	KCAS
Maximum Operating Maneuvering Speed (Vo) - Do not make full or abrupt control movements above this speed.		
At 2550 lbs. G.W.	113	111
At 1917 lbs. G.W.	98	96
Maximum Flaps Extended Speed (VFE) - Do not exceed this speed with the flaps extended.	102	100

2.5 AIRSPEED INDICATOR MARKINGS (PFD AND STANDBY AIRSPEED INDICATOR)

MARKING	KIAS
Red Line (Never Exceed)	154
Yellow Band (Caution Range - Smooth Air Only)	125 to 154
Green Band (Normal Operating Range)	50 to 125
White Band (Flap Down)	45 to 102

2.7 POWERPLANT LIMITATIONS

(a) Number of Engines	1
(b) Engine Manufacturer	Lycoming
(c) Engine Model No.	
(1) Fuel Injected	IO-360-B4A
(d) Engine Operating Limits	
(1) Rated Horsepower (BHP)	180
(2) Max. Propeller Speed (RPM)	2700
(3) Max. Oil Temperature	245°F
(4) Oil Pressure	
Minimum (red line)	25 PSI
Maximum (red line)	115 PSI
(5) Fuel (AVGAS ONLY) (minimum grade)	100 or 100LL Aviation Grade
(6) Number of Propellers	1
(7) Propeller Manufacturer	Sensenich
(8) Propeller Model	76EM8S14-0-62
(9) Propeller Diameter (Inches)	
Minimum	76
Maximum	76
(10) Propeller Tolerance @ ISA Conditions (static RPM at maximum permissible throttle setting at sea level)	Not above 2340 RPM Not below 2240 RPM

2.9 POWERPLANT INSTRUMENT MARKINGS

(a) Tachometer	
Green Arc (Normal Operating Range)	500 to 2700 RPM
Red Line (Maximum)	2700 RPM
(b) Oil Temperature	
Green Band (Normal Operating Range)	75° to 245°F
Red Line (Maximum)	245°F
(c) Oil Pressure	
Green Band (Normal Operating Range)	55 PSI to 95 PSI
Yellow Band (Caution Range) (Idle)	25 PSI to 55 PSI
Yellow Band (Ground Warm-Up)	95 PSI to 115 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	115 PSI

2.11 SYSTEMS LIMITATIONS

(a) Alternator	70 AMPS
(b) Emergency Battery	
Minimum	23.3 VOLTS

2.13 WEIGHT LIMITS

	Normal	Utility
(a) Maximum Ramp (lbs.)	2558	2138
(b) Maximum Weight (lbs.)	2550	2130
(c) Maximum Baggage (lbs.)	200	0

2.15 CENTER OF GRAVITY LIMITS

(a) Normal Category

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
2550	88.6	93.0
2050 (and less)	82.0	93.0

(b) Utility Category

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
2130	83.0	93.0
2050 (and less)	82.0	93.0

NOTE

Straight line variation between points given.

The datum used is 78.4 inches ahead of the wing leading edge at the inboard intersection of the straight and tapered section.

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.

2.17 MANEUVER LIMITS

(a) Normal Category - All acrobatic maneuvers including spins prohibited.
(b) Utility Category - Approved maneuvers for bank angles exceeding 60°.

	Entry Speed
Steep Turns	113 KIAS
Lazy Eights	113 KIAS
Chandelles	113 KIAS

2.19 FLIGHT LOAD FACTORS

	Normal	Utility
(a) Positive Load Factor (Maximum)	3.8 G	4.4 G
(b) Negative Load Factor (Maximum)	-1.5 G	-1.7 G

No inverted maneuvers approved

2.21 TYPES OF OPERATION

The airplane is approved for the following operations when equipped in accordance with FAR 91 or FAR 135.

(a) Day V.F.R.
(b) Night V.F.R.
(c) Day I.F.R.
(d) Night I.F.R.
(e) Non Icing
(f) The person operating this aircraft must wear a headset while in flight.

2.23 FUEL LIMITATIONS

(a) Total Capacity — 50 U.S. GAL.

(b) Unusable Fuel — 2 U.S. GAL.
The unusable fuel for this airplane has been determined as 1.0 gallon in each wing in critical flight attitudes.

(c) Usable Fuel — 48 U.S. GAL.
The usable fuel in this airplane has been determined as 24.0 gallons in each wing.

2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS

(a) Cockpit Reference & Pilot's Guide

The Garmin G1000 Cockpit Reference Guide P/N 190-02131-02 (latest appropriate revision) must be immediately available to the flight crew.

Garmin also provides a detailed G1000 Pilot's Guide P/N 190-02130-02 (latest appropriate revision). This reference material is not required to be on board the aircraft but does contain a more in depth description of all the functions and capabilities of the G1000 avionics system.

(b) System Software Requirements.

The G1000 must utilize system software 3080.00 or later approved software versions.

2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(c) Databases

(1) 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 or each waypoint must be verified for accuracy with current approach chart data.

(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.

2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(d) Flight Planning (continued)

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 shall 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.

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.

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2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(e) Enroute

Whenever possible, RNP and RNAV routes including Standard Instrument Departures (SIDs) and Obstacle Departure Procedures (ODPs), Standard Terminal Arrival (STAR), and enroute RNAV "Q" and RNAV "T" routes should be loaded into the flight plan from the database in their entirety, rather than loading 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

(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.

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. GPS SBAS corrections should be selected OFF when operating outside of GPS SBAS system coverage. Barometric vertical guidance (baro-VNAV) may be used for LNAV/VNAV approaches in the absence of SBAS coverage.

NOTE

This aircraft is not authorized to perform barometric vertical guidance (baro-VNAV) approaches in the EASA airspace system.

2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(f) Approaches (continued)

(1) Vertical Guidance (continued)
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, LOG-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.

2.25 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.

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. Coverage of the obstacle database includes the United States, Canada, and Europe.

NOTE

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

2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(i) Datalink Weather Display

XM weather data is provided by an optional GDL 69 interface. 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.

(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 or 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.

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.

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.

2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

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

For EASA aircraft (aircraft in compliance with EASA type design TCDS IM.A.234) no EFB airworthiness approval has been obtained. 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 2.25(l).

2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(m) Flight Stream 510 (For EASA aircraft only - aircraft in compliance with EASA type design TCDS IM.A.234)

(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.

2.25 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(n) Minimum fully functional equipment required for flight operations:

Equipment	Number Installed	VFR	IFR
PFD	1	0 [1]	1
MFD	1	0 [2]	1
GIA	2	2	2
ADAHRS	1	0	1
Magnetometer	1	0	1
Standby Instrument - Attitude	1	0	1
Standby Instrument - Airspeed	1	0 [3]	1
Standby Instrument - Altimeter	1	0 [3]	1
Standby Instrument - Heading	1	0 [3]	1

(1) If the PFD is inoperative during DAY or NIGHT VFR, the MFD must be operative.

(2) If the MFD is inoperative, the PFD must be operative for ALL flight operations.

(3) If this standby instrument parameter is inoperative, the equivalent parameter on the PFD must be operative.

NOTE

Flight in IMC should not be conducted if system alerts are present for any equipment required for IFR operations (see table above).

2.27 GFC 700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

1. The autopilot must be disengaged during takeoff and landing.
2. Autopilot 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 - 75 KIAS
   b. Other than approach - 70 KIAS
4. Autopilot maximum approved operating speed - 140 KIAS
5. Maximum fuel imbalance during autopilot operations - 10 gal.
6. Maximum autopilot engagement limits:
   a. With enhanced AFCS features
      Pitch UP: 50°
      Pitch DOWN: 50°
      Roll: +/-75°
   b. Without enhanced AFCS features
      Pitch UP: 16°
      Pitch DOWN: 17°
      Roll: +/-30°
7. Autopilot approved for Category I precision approaches and non-precision approaches only.

2.29 STANDBY INSTRUMENT LIMITATIONS

NOTE

See Section 2.25 (m) for approved VFR and IFR operations when the standby instrument has an invalid or failed function.

1. Aspen Standby Instrument
   a. 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.
   b. Use of the EBD for IFR operations within 750 nautical miles of the magnetic North or South Pole, is NOT AUTHORIZED.

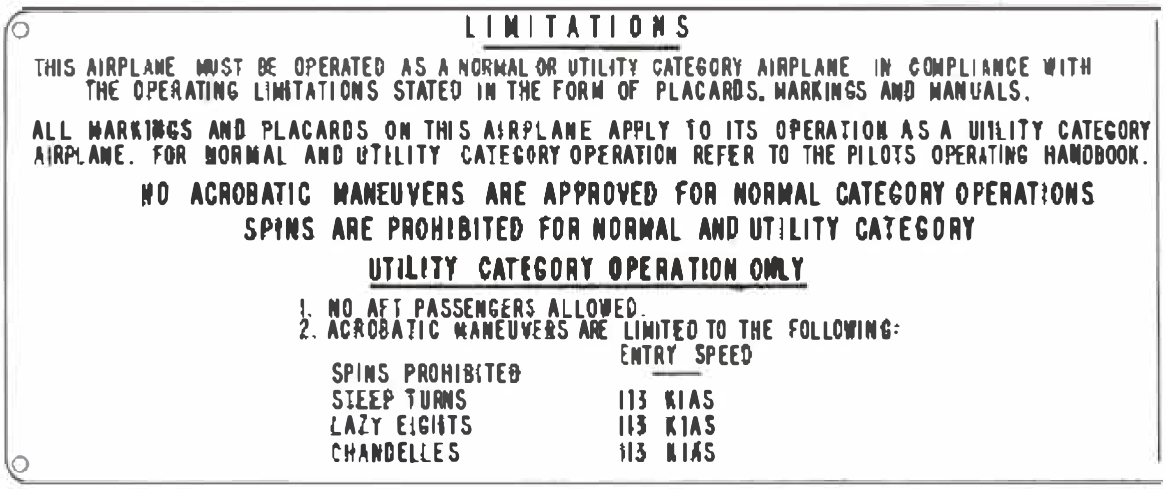
2.29 STANDBY INSTRUMENT LIMITATIONS (continued)

2. Garmin G5 Standby Instrument
   The G5 must utilize the following or later FAA approved software versions:

Component	Software Version
G5 Standby Instrument	6.40

2.31 PLACARDS

In full view of the pilot:



2.31 PLACARDS (continued)

In full view of the pilot:

V_o 113 AT 2550 LBS
V_o 98 AT 1917 LBS
DEMO X-WIND 17 KTS

NOTE

Demonstrated crosswind values are NOT limitations.

On the cockpit overhead panel:

On lower left portion of instrument panel:

ALTERNATE STATIC SOURCE - PULL AFT TO OPEN
ALL CABIN VENTS AND STORM WINDOW MUST BE CLOSED. HEATER AND DEFROSTER MUST BE ON. OPEN FOR STATIC SYSTEM DRAIN

In full view of the pilot, in the area of the air conditioner control panel when the air conditioner is installed:

WARNING
AIR CONDITIONER MUST BE OFF
TO ENSURE NORMAL TAKEOFF
CLIMB PERFORMANCE

2.31 PLACARDS (continued)

In full view of the pilot:

WARNING
TURN OFF STROBE
LIGHTS WHEN IN
CLOSE PROXIMITY
TO GROUND OR
DURING FLIGHT
THROUGH CLOUD,
FOG OR HAZE.

Adjacent to upper door latch:

ENGAGE LATCH
BEFORE FLIGHT

On inside of the baggage compartment door or
information split into two placards on aft baggage compartment bulkhead:

BAGGAGE MAX 200 LBS.

UTILITY CATEGORY OPERATION
NO BAGGAGE OR AFT PASSENGERS ALLOWED
NORMAL CATEGORY OPERATION
SEE PILOT'S OPERATING HANDBOOK
WEIGHT AND BALANCE SECTION FOR BAGGAGE
AND AFT PASSENGER LIMITATIONS.

Above right side aft passenger arm rest:

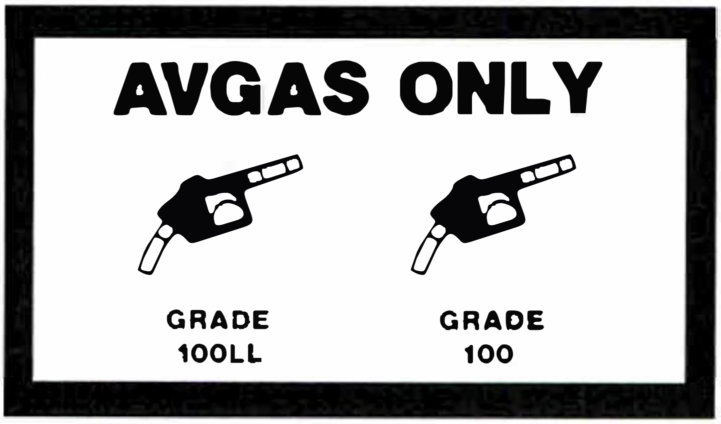
PILOTS, PASSENGERS, AND BAGGAGE AREAS
MAXIMUM ALLOWABLE COMBINED WEIGHT
774 POUNDS (NORMAL CATEGORY)
354 POUNDS (UTILITY CATEGORY)
LOAD IN ACCORDANCE WITH
APPROVED WEIGHT AND BALANCE DATA

2.31 PLACARDS (continued)

On the right side of the fuselage aft of the wing:

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

Adjacent to the filler caps:



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EMERGENCY PROCEDURES

SECTION 3

EMERGENCY PROCEDURES

3.1 GENERAL

This section provides the recommended procedures for coping with various emergency or critical situations. All of the emergency procedures required by the FAA are presented, along with those procedures that are necessary for operation of the airplane.

Emergency procedures associated with optional systems and equipment 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 given 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 coping with 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 Garmin G1000 Cockpit Reference Guide for the Piper PA-28-181 Archer, Garmin p/n 190-02131-02 Rev. A or later appropriate revision, and the Garmin G1000 Pilot's Guide for the Piper PA-28-181 Archer, Garmin p/n 190-02130-02 Rev. A or later appropriate revision, contain detailed descriptions of the annunciator system (CAS and Non-CAS) and all warnings, cautions and advisories.

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.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Warning Messages – Red

CAS Event	CAS Message	Checklist Page	Cause
CAS Warnings with Text Messages			
Alternator Failure	ALTR FAIL	3-18	Alternator is turned ON and has failed, as determined by voltage regulator.
CO Level High	CO LVL HIGH	3-41	CO level greater than 200 parts per million (PPM).
Fuel Quantity Low	R FUEL QTY L FUEL QTY	3-17	L FUEL QTY or R FUEL QTY less than or equal to 3 gals.
Starter Engaged	START ENGD	3-38	Engine starter engaged for more than 30-seconds.
Underspeed Protection	USP ACTIVE	3-34	Autopilot is engaged and the airspeed has fallen below the USP threshold or stall warning has activated.

CAS Event	CAS Message	Checklist Page	Cause
CAS Warnings with EIS Indications			
Propeller Overspeed	-	N/A	Propeller RPM is in the warning range.
Oil Temperature Exceedance	-	3-15	Oil Temperature greater than 245°F.
Oil Pressure Exceedance	-	3-14	Oil Pressure less than 25 PSI or greater than 115 PSI.
Total Fuel Quantity Low	-	N/A	Total fuel quantity less than or equal to 6 gals.
Battery Voltage	-	N/A	Primary battery voltage less than: 24V when RPM less than 1100, 25V when RPM greater than 1100 or greater than 32V.
Alternator Amperage Exceedance	-	N/A	Alternator amperage is in the warning range
Emergency Battery Voltage	-	3-21	Emergency battery voltage is less than 20V or greater than 32V.

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			
CO Level High	CO LVL HIGH	3-41	CO level greater than or equal to 50 but less than 200 parts per million (PPM).
Fuel Quantity Low	L FUEL QTY R FUEL QTY	N/A	L FUEL QTY or R FUEL QTY less than or equal to 5 gals.
Pitot Heat Failure	PITOT HEAT FAIL	3-38	Pitot heat is selected ON and is inoperative.
Pitot Heat OFF	PITOT HEAT OFF	N/A	Pitot heat is selected OFF (double chime is suppressed).

CAS Event	CAS Message	Checklist Page	Cause
CAS Cautions with EIS Indications			
Oil Pressure	-	3-14	Oil Pressure pressure between 26 PSI and 55 PSI when RPM greater than 1100.
Total Fuel Quantity Low	-	N/A	Total fuel quantity less than or equal to 10 gals.
Emergency Battery Voltage	-	N/A	Emergency battery voltage greater than 20V and less than 23.3V.

3.1 GENERAL (continued)

Crew Alerting System (CAS) Messages (continued)

Advisory Messages – White

CAS Event	CAS Message	Checklist Page	Cause
CAS Advisories with Text Messages			
Avionics Fan Fail	AV FAN FAIL	3-31	One or more of the external avionics cooling fans have failed.
Emergency Battery in use	EMERG BATT ON	3-20	Emergency power in use.
Fuel Imbalance	FUEL IMBAL	N/A	Left and right tank fuel quantities differ by 10 gals.
MFD Fan Fail	MFD FAN FAIL	3-31	The external cooling fan for MFD has failed.
PFD Cooling Fan Fail	PFD FAN FAIL	3-31	PFD cooling fan has failed.

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 or tone) may accompany PFD annunciations and alerts and no pilot action is required to acknowledge PFD annunciations and alerts. See Garmin G1000 Pilot's Guide for the Piper PA28-181 Archer G1000 for additional information.

Miscellaneous Annunciations

Annunciation	Checklist Page	Condition
MAXSPD	3-34	Aircraft actual or projected airspeed exceeds maximum autopilot speed of 140 KIAS when the autopilot is engaged.
MINSPD	3-34	Airspeed is below the minimum approved autopilot operating airspeeds with autopilot or flight director engaged. See Section 2 - Limitations.

3.1 GENERAL (continued)

PFD Annunciations and Alerts (continued)

Aural Alerts

Aural alerts are provided to alert the crew and call for their attention:

- Master Warning - Repeating triple chime.
- Master Caution - Non-repeating double chime.
- Advisory - Non-repeating single chime.
- Airspeed greater than V_{NE} - "Airspeed....Airspeed" voice alert.
- Terrain cautions/warnings voice alerts.
- Traffic System voice alerts.
- Stall Warning - "Stall...Stall" voice alert.
- "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.
- "Vertical Track" voice alert when aircraft is one minute from VNAV Top of Descent.
- "Timer Expired" voice alert when countdown timer reaches zero.

If autopilot installed:

- Autopilot disconnect tone.
- "AIRSPEED" voice alert when in a low airspeed condition.
- "Engaging Autopilot" voice alert when the autopilot automatically engages in LVL mode.

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 mission is to be terminated, the emergency is such that an immediate landing at the nearest suitable airfield may not be necessary.

3.3 AIRSPEEDS FOR SAFE OPERATION

Stall Speeds
2550 lbs (0° Flaps) .... 50 KIAS
2550 lbs (Full Flaps) .... 45 KIAS
Maximum Operating Maneuvering Speeds
2550 lbs .... 113 KIAS
1917 lbs .... 98 KIAS
Never Exceed Speed .... 154 KIAS
Power Off Glide Speed
2550 lbs (0° Flaps) .... 76 KIAS

3.5 EMERGENCY PROCEDURES CHECK LIST

3.5a Fire

Engine Fire During Start

START Switch .... CONTINUE to CRANK ENGINE
MIXTURE .... IDLE CUT-OFF
THROTTLE .... OPEN
FUEL PUMP .... OFF
FUEL Selector .... OFF

Abandon if fire continues.

Engine fires during start are usually the result of overpriming.

If a fire is present before the engine has started, move the mixture control to idle cut-off, open the throttle and continue to crank the engine. This is an attempt to draw the fire back into the engine.

If the engine has started, continue operating to try to pull the fire into the engine.

In either case, if fire continues more than a few seconds, move the fuel selector to OFF and mixture to idle cut-off and evacuate the airplane.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5a Fire (continued)

Engine Fire in Flight
FUEL Selector .... OFF
THROTTLE .... CLOSED
MIXTURE .... IDLE CUT-OFF
FUEL PUMP .... OFF
HEAT/DEF (Defroster) .... OFF
If fire persists:
Airspeed .... INCREASE in attempt to blow out fire
Proceed with POWER OFF LANDING procedure.

The possibility of a fire in flight is extremely remote. It is essential that the source of the fire be promptly identified through character of the smoke, smell, heat in the cabin, instrument readings, or other indications since the action to be taken differs somewhat in each case.

Pilot judgment and a thorough understanding of the aircraft's systems is critical in determining what action to take during this emergency.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5a Fire (continued)

Electrical Fire In Flight	
EMERG BATT Switch	VERIFY ARM
BATT MASTR Switch	OFF
ALTR Switch	OFF
Vents	OPEN
HEAT/DEF (Defroster)	OFF
Fire	EXTINGUISH
Emergency Descent (If needed)	TO A SAFE ALTITUDE CONSISTENT WITH TERRAIN
Land as soon as possible.	

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5b Engine Power Loss

Engine Power Loss During Takeoff

If sufficient runway remains for a complete stop:

Airspeed .... MAINTAIN SAFE AIRSPEED
Landing .... LAND and STOP STRAIGHT AHEAD
Brakes .... AS REQUIRED

If insufficient runway remains:

Airspeed .... MAINTAIN SAFE AIRSPEED
Flaps .... AS REQUIRED

NOTE

Make only shallow turns to avoid obstructions.

If sufficient altitude has been gained to attempt a restart:

Airspeed .... MAINTAIN 76 KIAS
FUEL Selector .... SWITCH to tank containing fuel
FUEL PUMP .... Check ON
MIXTURE .... RICH
ALT AIR .... OPEN

If power is not regained, proceed with power-off landing.

Proper action following a loss of power, depends on circumstances. If the situation allows, flaps are normally fully extended for touchdown. If power loss was caused by fuel exhaustion, power will not be regained after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5b Engine Power Loss (continued)

Engine Power Loss In Flight

Airspeed .... MAINTAIN 76 KIAS
FUEL Selector........ SWITCH to tank containing fuel
FUEL PUMP .... ON
MIXTURE........ RICH
ALT AIR .... OPEN
LEFT/RIGHT MAG Switches........ Turn OFF then ON one at a time

When power is restored:

ALT AIR .... CLOSE
FUEL PUMP........ OFF

Land as soon as practical and investigate cause of power loss.

If power is not restored prepare for power-off landing.

Complete engine power loss is usually caused by fuel flow interruption, attempt to restore power by turning the fuel pump ON and selecting the other fuel tank. Move the throttle and mixture control levers to different settings. This may restore power if the problem is too rich or too lean a mixture or if there is a partial fuel system restriction. Water in the fuel could take some time to be consumed, so allowing the engine to windmill may restore power. If engine failure was caused by fuel exhaustion, power will not be restored after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds. If power is still not restored, select Alternate Air OPEN, and turn the left and right magneto switches OFF then ON one at a time.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5b Engine Power Loss (continued)

Power Off Landing	
Airspeed	MAINTAIN 76 KIAS
Air Conditioning (if installed)	OFF
Landing Pattern	ESTABLISH 1000 FT ABOVE FIELD AT DOWNWIND POSITION
When committed to landing:	
Airspeed	66 KIAS
Flaps	AS DESIRED
THROTTLE	CLOSE
MIXTURE	IDLE CUT-OFF
LEFT/RIGHT MAG Switches	OFF
BATT MASTR Switch	OFF
ALTR Switch	OFF
FUEL Selector	OFF
Seat belts and shoulder harnesses	TIGHTEN

If power loss occurs at altitude, trim the aircraft for best gliding angle 76 KIAS, turn air condition off (if installed) and look for a suitable field. If measures taken to restore power are not effective, and if time permits, check your charts for airports in the immediate vicinity. If possible, notify the FAA by radio of your difficulty and intentions. If another pilot or passenger is aboard, let them help. When you have located a suitable field, establish a spiral pattern around this field. Try to be at 1000 feet above the field at the downwind position, to make a normal landing approach. When the field can easily be reached, slow to 66 KIAS with flaps down for the shortest landing. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these. Touchdown should normally be made at the lowest possible airspeed.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5c Engine Indicating System (EIS)

Oil Pressure

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

Low Oil Pressure:

THROTTLE .... MINIMUM REQUIRED

If accompanied by high oil temperature, ***land as soon as possible***.

If accompanied by normal oil temperature, ***land as soon as practical***.

High Oil Pressure:

THROTTLE .... MINIMUM REQUIRED

Land as soon as practical.

NOTE

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

Loss of oil pressure may be either partial or complete. A partial loss of oil pressure usually indicates a malfunction in the oil pressure regulating system, and a landing should be made as soon as possible to investigate and prevent engine damage.

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty indication. In either case, proceed toward the nearest airport, and be prepared for a forced landing. If the problem is not an indication malfunction, the engine may stop suddenly. Maintain altitude until a power off landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss. Depending on the circumstances, it may be advisable to make an off airport landing while power is still available, particularly if other indications of actual oil pressure loss, such as sudden increases in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stoppage occurs, proceed with Power Off Landing.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5c Engine Indicating System (EIS) (continued)

Oil Temperature

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

THROTTLE .... MINIMUM REQUIRED
MIXTURE.. FULL RICH
Airspeed .... INCREASE if practical

Land as soon as possible **and investigate the problem. Prepare for power off Landing.**

NOTE

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

An abnormally high oil temperature indication may be caused by a low oil level, an obstruction in the oil cooler, damaged or improper baffle seals, a faulty indication, or other causes. Land as soon as possible at an appropriate airport and have the cause investigated. Monitor the oil pressure gauge for an accompanying loss of pressure.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5c Engine Indicating System (EIS) (continued)

Loss of Fuel Flow

CAUTION

If normal engine operation and fuel flow is not immediately re-established, or if the engine quits, the electric fuel pump should be turned off. The lack of fuel flow indication could indicate a leak in the fuel system, or fuel exhaustion. Land at the nearest suitable airport as soon as possible and have the cause investigated.

If caused by fuel depletion in one tank:

FUEL PUMP Switch....................ON
FUEL Selector....................SELECT OTHER TANK (FULLEST)
FUEL PUMP Switch....................OFF

If caused by engine driven fuel pump failure:

THROTTLE....................CLOSE
FUEL PUMP Switch....................ON
THROTTLE....................RE-ESTABLISH (as required)
MIXTURE....................RE-ESTABLISH (as required)

The most probable cause of loss of fuel flow is either fuel depletion in the fuel tank selected or failure of the engine driven fuel pump. If loss of fuel flow occurs, turn ON the electric fuel pump and check that the fuel selector is on a tank containing usable fuel. After power is regained, turn the electric fuel pump OFF.

If loss of fuel flow is due to failure of the engine driven fuel pump turn ON the electric fuel pump as it will supply sufficient fuel flow to run the engine.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5c Engine Indicating System (EIS) (continued)

Fuel Quantity Low

Indication: Master Warning, Triple Chime, L FUEL QTY / R FUEL QTY

WARNING

Avoid unusual attitudes such as prolonged slips towards the low quantity tank as this will decrease the time remaining prior to fuel starvation.

If one tank has low fuel quantity:

FUEL Selector...ON FULLEST TANK

Land as soon as practical.

If both tanks have low fuel quantity:

FUEL Selector... ALTERNATE TANKS TO MAINTAIN FUEL SUPPLY TO ENGINE

Land as soon as possible.

The L FUEL QTY or R FUEL QTY warning CAS messages alert the pilot of low fuel quantity in each fuel tank individually, not necessarily low total fuel quantity. If the total fuel quantity is less than or equal to 6 GAL, the gauge title and the total fuel quantity digital value will flash red. No CAS messages accompany total fuel quantity low.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5d Electrical Failures

NOTE

The pilot should only reset a tripped circuit breaker if the system/component is considered essential for safety of flight. Prior to resetting the circuit breaker, wait at least one minute and verify there is no smoke or burning smell. If the circuit breaker opens a second time, leave the circuit breaker out. Have a maintenance inspection performed prior to resetting the circuit breaker. Do not reset any non-essential circuit breakers in flight.

Alternator Failure

Indication: Master Warning, Triple Chime ALTR FAIL

CAUTION

The ALTR circuit breaker should not be opened manually when the alternator is functioning properly.

Verify Failure....................................CHECK ALTR AMPS Indication
ALTR Switch...OFF
ALTR Circuit Breaker (Row 1, Col. 13)......................RESET If Tripped
ALTR FIELD Circuit Breaker (Row 2, Col. 13) ....RESET
ALTR Switch...ON

If alternator still failed:

ALTR Switch...OFF
Electrical Power Remaining...30 minutes or less
Electrical Load ....SHED in less than 3 minutes
NON ESS BUS Circuit Breaker (Row 1, Col. 1)........................PULL
LIGHTING BUS Circuit Breaker (Row 1, Col. 2)......................PULL
AVION MASTER Switch...OFF

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5d Electrical Failures (continued)

To ensure 30-minutes of battery life:

Battery Discharge .... -13 Amps Maximum
Pitot Heat.. 14 Minutes Usage Maximum
Com Radio .... 3 Mins Usage Maximum
Fuel Pump .... 2 Mins Usage Maximum

Land as soon as possible.

Turning the ALTR switch OFF, reseting the ALTR FIELD circuit breaker and then turning the ALTR back ON, will reset the overvoltage relay. If the trouble was caused by a momentary overvoltage condition (30.5 volts or higher) this procedure should return the ammeter to a normal reading.

If alternator does not reset, the battery will become the primary source of electrical power. The only electrical bus that remains powered in this load shed configuration is the ESSENTIAL BUS. All electrical items on the remaining buses will be inoperative (See Figure 7-11), including the AVIONICS dimmer. Display backlighting, therefore, is produced by the photocell in each display. As battery power is depleted, there may be a point where the system voltage reduces to a level that is insufficient to support the required electrical load. In this occurrence, the emergency battery should activate automatically. If the emergency battery does not activate automatically, the BATT MASTR and ALTR switches should be turned OFF, thereby allowing the emergency battery to be the only remaining source of electrical power. Refer to **Complete Electrical Failure** checklist if EMER BATT ON advisory illuminates.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5d Electrical Failures (continued)

Complete Electrical Failure

Indication: Single Chime, EMERG BATT ON

NOTE

The VOLTS indication on the EIS window automatically changes to the emergency bus voltage (E VOLTS) when operating exclusively on the emergency bus.

NOTE

Cooling air for PFD, GIA1 and the transponder will be lost when operating exclusively on the emergency bus as indicated by the PFD FAN FAIL and AV FAN FAIL advisory CAS messages.

EMERG BATT Switch .... Verify ARM
Standby Flight Instrument .... Verify OPERATIONAL
Aircraft Control .... Use PFD and Standby Instrument
BATT MASTR Switch .... OFF
ALTR Switch .... OFF

Prior to landing:

Landing Light .... INOPERATIVE

Approximately 30 minutes of electrical power is available.

Land as soon as possible.

List of operative equipment while on the emergency bus:

- PFD (reversionary mode)
- Engine Instruments (except oil pressure)
- COM1
- NAV1
- Standby Instrument
- Audio Panel
- Avionics Lighting/Dimming

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5d Electrical Failures (continued)

Emergency Battery Voltage
Indication: Master Warning, Triple Chime, Flashing Red E VOLTS Indication
WARNING Complete electrical failure is imminent.
Land as soon as possible.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures

PFD Failure

Indication: PFD display goes blank.

Standby Instrument .... Verify OPERATIONAL
Aircraft Control.. Use Standby Instrument
DISPLAY BACKUP button on audio panel .... PUSH (button extended)
Aircraft Control.................................. Use MFD and Standby Instrument
COM2.. ACTIVATE and TUNE as necessary
NAV2 .... ACTIVATE and TUNE as necessary
COM2/MIC .... SELECT on Audio Panel
DME.................................. SELECT NAV2 in DME TUNING Window

Exit and avoid IFR conditions as soon as practical.

NOTE

If the PFD fails, the MFD will remain in normal mode. Pushing the DISPLAY BACKUP button on the audio panel allows the MFD to display ADAHRS information but lose the EIS page and certain map functions. The following features will become inoperative if there is a complete loss of PFD functionality:

- Autopilot
- COM1 (yellow x'd but 121.5 MHz remains available)
- NAV1
- GPS1
- Traffic

NOTE

If PFD failure occurs while operating on NAV1 DME, the NAV1 DME information will continue to be available. If the pilot subsequently selects NAV2 DME, NAV1 DME cannot be reselected.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

Attitude, heading, airspeed and altitude indications are available on the standby instrument and on the MFD after the DISPLAY BACKUP button is pressed. It is the pilot's responsibility to compare these parameters to verify accuracy.

GPS and VOR2 navigation as well as flight planning are available via the inset map on the MFD. Weather products (if installed) that were displayed on the MFD prior to the PFD failure will still be presented on the inset map on the MFD in reversionary mode.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

MFD Failure

Indication: MFD display goes blank.

NOTE

PFD should automatically revert to the reversionary mode display.

DISPLAY BACKUP on audio panel .... PUSH (button extended)

Exit and avoid IFR conditions as soon as practical.

NOTE

The following features will become inoperative if there is a complete loss of MFD functionality:

- COM2 (yellow x'd but 121.5 MHz remains available)
- NAV2
- GPS2
- GDL 69 SXM (Garmin Datalink - XM)
- DME
- ADF
- ESP

NOTE

If the GFC700 autopilot was engaged prior to MFD failure, it will remain engaged in its current lateral and vertical modes. The modes cannot be changed and if the autopilot is disengaged, it cannot be re-engaged.

Although the PFD should automatically go to reversionary mode display after an MFD failure, pressing the DISPLAY BACKUP button ensures that the PFD reverts. Without automatic or manual reversion of the PFD display, all engine parameters on the EIS window would be lost.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

ADAHRS Failures

ADAHRS Total Failure

On Ground:

Indication: **Sky/Ground presentation removed, course pointer straight up, yellow-x's and amber text on all air data, attitude and heading indicators.**

System Messages (Messages Softkey)....................................CONSIDER
ADAHRS Circuit Breaker (Row 2, Col. 8)....................................RESET

If ADAHRS data still invalid:

Avoid flight in IFR conditions.

NOTE

For partial ADAHRS failures, a yellow-x and amber text will appear over the affected parameter(s).

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

ADAHRS Failures (continued)

ADAHRS Total Failure

In Flight:

Indication: **Sky/Ground presentation removed, course pointer straight up, yellow-x's and amber text on all air data, attitude and heading indicators.**

Standby Instrument ....VERIFY NO FAILURE INDICATIONS
Attitude and Heading ....Use Standby Instrument

NOTE

The following features will become inoperative if there is a complete loss of ADAHRS functionality:

- Autopilot (including ESP)
- TAS

NOTE

For partial ADAHRS failures, a yellow-x and amber text will appear over the affected parameter(s).

Course ....Set using CRS knob on PFD
System Messages (Messages Softkey)....................................CONSIDER
ADAHRS Circuit Breaker (Row 2, Col. 8).....................................RESET

If ADAHRS data still invalid:

Avoid flight in IFR conditions

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

Erroneous or Loss of Engine and Fuel Displays

Indication: Yellow-x over affected engine parameter or fuel display

NOTE

Erroneous indications may be determined by comparing a display with other system information.

1. Set power based on throttle lever position, engine sound and speed.
2. Monitor other indications to determine the health of the engine.
3. Use known power settings from POH 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 indications for any of the following are invalid:

- All Engine Parameters
- VOLTS
- ALTR AMPS
- BATT AMPS
- FUEL QTY

GEA circuit breaker (Row 2, Col. 3)..RESET

If all GEA parameters are still unavailable, *land as soon as practical.*

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

Erroneous or Loss of Warning/Caution CAS Messages

Indication: Yellow-x is shown over the CAS message window or CAS message present when not expected or CAS message not present when expected.

1. If a yellow-x is placed over the CAS message window, monitor engine and airframe indications.

NOTE

See Section 3.1 of this handbook for a list of CAS Warning, Caution and Advisory messages that may be inoperative.

2. If a CAS message appears that is not expected, treat it as if the condition exists.
3. If an abnormal condition exists but the CAS system has not been activated, use other available information to confirm the condition exists. If it cannot be determined that the condition does not exist, treat the situation as if the condition does exist and take appropriate action.

NOTE

CAS messages are inhibited for many parameters on the EIS Display of the MFD. The Master Warning and Master Caution indications and associated chimes are still activated whenever any indicated parameter enters the red or amber bands.

If a yellow-x appears over the CAS message window, *land has soon as practical*.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

COM1 and COM2 Failure
Indication: Inability to communicate/receive on COM1 and COM2.
NOTE
If power is lost to the audio panel a fail-safe communications path becomes available between the pilot's headset/microphone and COM1.
AUDIO MKR circuit breaker (Row 2, Col. 9)....................................PULL
Exit and avoid IFR conditions as soon as practical.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

Dual GPS Failure

Indication: Amber "DR" annunciation on HSI, Amber "DR" superimposed over airplane symbol on moving map.

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

If no alternate navigation sources are available:

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

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

WARNING

Information normally derived from GPS turns amber and becomes more inaccurate over time. Amber CDI disappears after 20 minutes.

WARNING

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

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5e Avionics System Failures (continued)

Loss of Integrity (LOI) Mode - Active when GPS integrity is insufficient for the current phase of flight.

Navigation .... Crosscheck / use other navigation sources as required.

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 know position.

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

TAWS and TAS are inoperative.

Avionics Cooling Fan Failures

Indication: CAS Advisory, Single Chime, AV FAN FAIL **and/or** PFD FAN FAIL **and/or** MFD FAN FAIL

If failure occurs on ground:

Do not fly until issue is resolved.

If failure occurs 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 effected equipment.

3.5e Avionics System Failures (continued)

Autopilot or ESP Malfunctions

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

WARNING

Do not press the LVL switch 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 be inoperative following an autopilot failure.

Control Wheel .... GRASP FIRMLY
Attitude Indicators .... CROSSCHECK
A/P DISC Switch .... DEPRESS and HOLD
Pitch Trim .... RETRIM as necessary
AUTOPILOT Circuit Breaker (Row 3, Col. 2) .... PULL
Autopilot .... DO NOT RE-ENGAGE

Automatic Autopilot Disconnect

Indication: **Flashing red and white A/P on PFD and aural disconnect tone**

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

NOTE

The autopilot disconnect may be accompanied by a red boxed PTCH (pitch), ROLL, or PTRM annunciation on the PFD, indicating the axis which has failed. The autopilot cannot be re-engaged with any of these annunciations present.

3.5e Avionics System Failures (continued)

Electric PitchTrim Failure

Indication: Red boxed PTRM 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.

Autopilot .... DISCONNECT

Electric Pitch Trim Runaway

Indication: An unexpected pitch deviation from the desired flight path and red PTRM annunciation

NOTE

After the autopilot is disengaged, it can not be re-engaged until the electric pitch trim system regains functionality.

Control Wheel .... GRASP FIRMLY
Attitude Indicators .... CROSSCHECK
A/P DISC Switch .... DEPRESS and HOLD
PITCH TRIM Circuit Breaker (Row 3, Col. 1) .... PULL
Pitch Trim .... RETRIM MANUALLY

3.5e Avionics System Failures (continued)

Autopilot Overspeed Recovery

Indication: MAXSPD **annunciation at the top of the PFD airspeed tape**

This autopilot mode is active whenever the aircraft actual or projected airspeed exceeds the maximum approved autopilot operating speed of 140 KIAS.

THROTTLE .... REDUCE POWER as required
Autopilot Pitch Reference .... RESET to slow the aircraft
Autopilot .... DISCONNECT if required

NOTE

Overspeed recovery mode provides a pitch up command (to a maximum level flight altitude) to decelerate the airplane below the maximum approved autopilot operating speed. The autopilot must be engaged for it to follow the pitch-up commands of the flight director. Overspeed recovery is not active in altitude hold (ALT), glideslope (GS) or glidepath (GP) modes. The speed reference cannot be adjusted while in overspeed recovery mode.

Autopilot Underspeed Recovery

Indication: MINSPD **annunciation at the top of the PFD airspeed tape and** USP ACTIVE **annunciation on PFD**

This autopilot mode is active whenever the autopilot is engaged and the airspeed has decreased below a minimum threshold.

THROTTLE .... INCREASE POWER as required
Flaps Position .... CONSIDER

3.5e Avionics System Failures (continued)

Autopilot Out-Of-Trim

Indication: Amber, ← AIL, AIL →, ↑ELE, or ↓ ELE 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 AIL → or ← AIL annunciation .... Verify SLIP/SKID INDICATOR centered.
If ↑ ELE or ↓ ELE annunciation .... Suspect elevator trim issue
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.

3.5e Avionics System Failures (continued)

Abnormal Flight Director Mode Transitions

Indication: Flashing lateral or vertical mode annunciations on PFD

NOTE

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

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

Autopilot Mode Controls..........SELECT ANOTHER LATERAL MODE

If on an instrument approach:
Autopilot ....DISCONNECT (if coupled) and continue manually or execute missed approach

Autopilot Preflight Test Failure

Indication: Red Boxed PFT on PFD

AUTOPILOT Circuit Breaker (Row 3, Col. 2)................................PULL
PITCH TRIM Circuit Breaker (Row 3, Col. 1)................................PULL
AUTOPILOT and PITCH TRIM Circuit Breakers ....RESET simultaneously

NOTE

When the AUTOPILOT circuit breaker is pulled, the red PFT annunciation will be removed and the autopilot will be unavailable. One attempt at resetting the circuit breakers is allowed.

3.5e Avionics System Failures (continued)

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.)

3.5f Pitot Heat Failure

Pitot Heat Failure
Indication: Master Caution, Double Chime, PITOT HEAT FAIL
PITOT HEAT Switch .... OFF
PITOT HEAT Circuit Breaker (Row 2, Col. 2) .... RESET
PITOT HEAT Switch .... ON
If Pitot Heat still inoperative:
Exit and Avoid Instrument Meteorological Conditions.

3.5g Starter Engaged

Starter Engaged
Indication: Master Warning, Triple Chime, START ENGD
If on the ground:
THROTTLE .... REDUCE
ENG START Circuit Breaker (Row 1, Col. 10) .... PULL
ENGINE .... SHUTDOWN
If in flight:
THROTTLE .... REDUCE
ENG START Circuit Breaker (Row 1, Col. 10) .... PULL
Land as soon as possible.

3.5h Spin Recovery

Spin Recovery	
Rudder	FULL OPPOSITE TO DIRECTION OF ROTATION
Control wheel	FULL FORWARD while NEUTRALIZING AILERONS
THROTTLE	IDLE
Rudder	NEUTRAL (when rotation stops)
Control wheel	SMOOTH BACK PRESSURE to recovery from dive

Intentional spins are prohibited in this airplane.

3.5i Open Door

Open Door	
To close the door in flight:	
Airspeed	REDUCE to less than 87 KIAS.
Cabin vents	CLOSE
Storm window	OPEN
Upper latch (if open)	CLOSE Latch
Side latch (if open)	PULL on Armrest While Closing Latch
If Both Latches Open	CLOSE Side Then Top Latch

If both upper and side latches are open, the door will trail slightly open and airspeeds will be reduced slightly.

3.5j Engine Roughness

Engine Roughness

ALT AIR .... OPEN

If roughness continues after one minute:

MIXTURE... Adjust for Maximum Smoothness
ALT AIR .... CLOSE
FUEL PUMP .... ON
Fuel Selector .... SWITCH TANKS
Engine Indicators .... .CHECK
LEFT/RIGHT MAG Switches................ Individually Select OFF and ON

If operation is satisfactory on either MAG, continue on that magneto at reduced power and full RICH mixture to nearest airport.

Prepare for power-off landing.

NOTE

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

Engine roughness may be caused by blockage in the injector nozzles, induction system icing, or ignition problems.

Adjust the mixture for maximum smoothness. The engine will run rough if the mixture is too rich or too lean. Move the alternate air to OPEN and then turn ON the electric fuel pump. Switch the fuel selector to another tank to see if fuel contamination is the problem.

Check the engine gauges for abnormal readings. If any gauge readings are abnormal proceed accordingly.

3.5k Carbon Monoxide CAS Indications

CO Detector Warning
Indication: Master Warning, Triple Chime, CO LVL HIGH
If the CO Detector Warning or Caution activates in flight:
Press the CO RST softkey (on the engine page) to reset the CO Detector.
If the Warning or Caution continues:
Shut off the heater, air conditioning or any other opening to the engine compartment.
Open a fresh air source immediately.
Don't smoke.
Land as soon as possible.

Be sure the source of the contamination is corrected before further flight.

NOTE

The Amber MFD alert will remain until the CO level drops below 50 parts per million (PPM) by volume of carbon monoxide concentration. Do not recycle the unit through the circuit breaker. A three-minute delay is required for the CO sensor to stabilize after each power-up.

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SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This section describes the recommended procedures for conducting normal operations for the Archer III. All of the required (FAA regulations) procedures necessary for 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 procedures associated with those optional systems and equipment which require handbook supplements are provided by Section 9 Supplements.

4.3 AIRSPEEDS FOR SAFE OPERATIONS

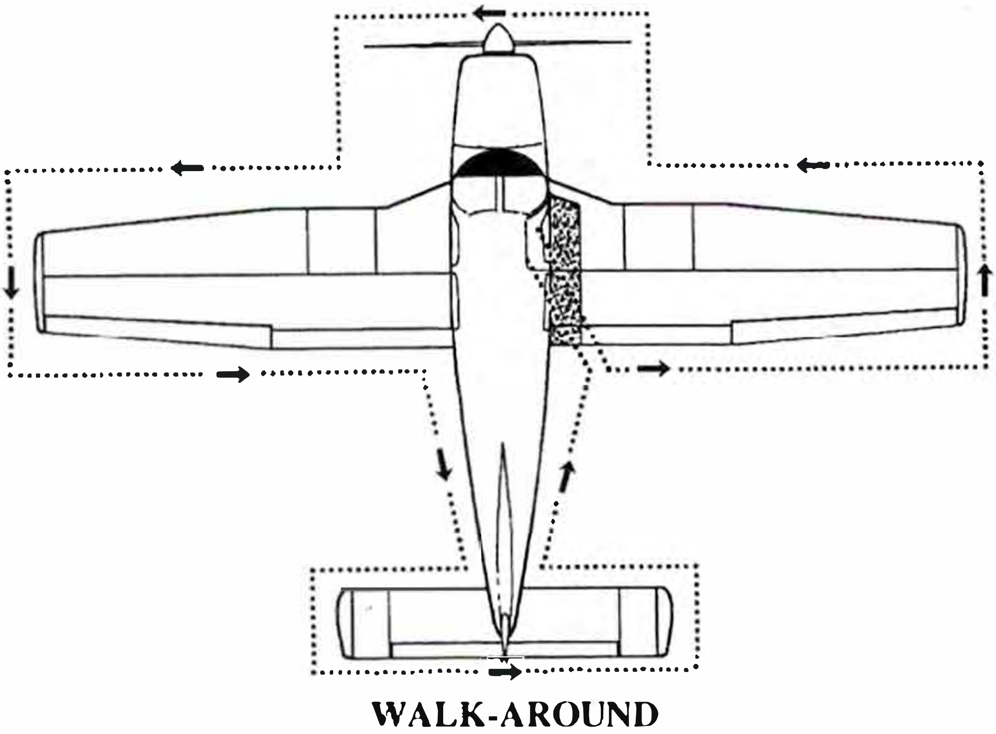
The following airspeeds are significant to the safe operation of the airplane. They are for standard airplanes flown at gross weight under standard conditions at sea level.

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

(a)	Best Rate of Climb Speed	76 KIAS
(b)	Best Angle of Climb Speed	64 KIAS
(c)	Maximum Operating Maneuvering Speed Vo	113 KIAS (at 2550 lbs.) See Airspeed Limitations, Section 2.3
(d)	Maximum Flap Speed	102 KIAS
(e)	Landing Final Approach Speed (Flaps 40)	66 KIAS
(f)	Maximum Demonstrated Crosswind Velocity	17 KTS

4.5 NORMAL PROCEDURES CHECKLIST

4.5a Preflight Checklists



WALK-AROUND
Figure 4-1

4.5 NORMAL PROCEDURES CHECKLIST (continued)

4.5a Preflight Checklists (continued)

CAUTION

The flap position should be noted before boarding the airplane. The flaps must be placed in the UP position before they will lock and support weight on the step.

NOTE

Normal gear strut extension (exposed area) corresponds to that for the airplane under a normal static load (empty weight of the airplane plus full fuel and oil).

COCKPIT

Control Wheel .... RELEASE RESTRAINTS
PARK BRAKE .... SET
All Instrument Panel and Overhead Switches .... OFF
MIXTURE .... IDLE CUT-OFF
LEFT/RIGHT MAG Switches .... OFF
BATT MASTR Switch .... ON
Interior Lighting (Night Flight) .... VERIFY OPERATION
PITOT HEAT Switch .... ON
PITOT HEAT OFF CAS Message .... EXTINGUISHED

4.5a Preflight Checklists (continued)

COCKPIT (continued)

FUEL QTY Indications... CHECK QUANTITY & IMBALANCE
Exterior Lighting Switches .... ON
Exterior Lighting... VERIFY OPERATION

CAUTION

Care should be taken when checking the heated pitot head. The unit becomes very hot. Ground operation should be limited to three minutes to avoid damaging the heater elements.

Pitot/Static Head ....CHECK - WARM
Stall Warning Horn .... CHECK
All Lighting Switches .... OFF
PITOT HEAT Switch .... OFF
PITOT HEAT OFF CAS Message .... ILLUMINATED
BATT MASTR Switch .... OFF
Flaps ....EXTEND
Primary Flight Controls ....PROPER OPERATION
Stabilator and Rudder Trim .... NEUTRAL
Pitot and Static Systems.. DRAIN
Windows ....CHECK CLEAN
Required Papers and POH .... VERIFY ON BOARD

NOTE

Secure and adjust all unused seat belts and shoulder harness to prevent control interference or passenger injury during flight in turbulent air.

Tow Bar and Baggage........................... STOW PROPERLY & SECURE
Baggage Door .... CLOSE & SECURE

4.5a Preflight Checklists (continued)

RIGHT WING

Surface Condition .... CLEAR OF ICE, FROST, SNOW
Flap and Hinges ....NO DAMAGE or INTERFERENCE
Aileron and Hinges .... NO DAMAGE or INTERFERENCE
Static Wicks ....CHECK and SECURE
Wing Tip and Lights .... CHECK
Fuel Tank ....CHECK SUPPLY VISUALLY and SECURE CAP
Fuel Tank Vent ....CLEAR

CAUTION

When draining any amount of fuel, care should be taken to ensure that no fire hazard exists before starting engine.

Fuel Tank Sumps ....DRAIN AND CHECK FOR WATER, SEDIMENT AND PROPER FUEL
Tie Down and Chock ....REMOVE
Main Gear Strut.. PROPER INFLATION (4.5 ± .25 in.)
Tire .... CHECK
Brake block and disc .... CHECK
Fresh Air Inlet...CLEAR

NOSE SECTION

General Condition .... CHECK
Cowling .... SECURE
Windshield .... CLEAN
Oil .... CHECK QUANTITY
Dipstick ....PROPERLY SEATED and SECURE
Oil Filler Door.. SECURE
Propeller and Spinner..CHECK
Air Inlets ....CLEAR

4.5a Preflight Checklists (continued)

NOSE SECTION (continued)

Chock .... REMOVE
Nose Gear Strut .... PROPER INFLATION
(3.25 ± .25 in.)

Tire .... CHECK

CAUTION

When draining any amount of fuel, care should be taken to ensure that no fire hazard exists before starting engine.

Fuel Strainer .... DRAIN

Check the general condition of the nose section; look for oil or fluid leakage and that the cowling is secure. The propeller and spinner should be checked for detrimental nicks, cracks, or other defects. Check the tire for cuts, wear, and proper inflation.

LEFT WING

Surface Condition .... CLEAR OF ICE, FROST, SNOW
Fresh Air Inlet .... CLEAR
Main Gear Strut .... PROPER INFLATION
(4.5 ± .25 in.)
Tire .... CHECK
Brake Block and Disc .... CHECK

CAUTION

When draining any amount of fuel, care should be taken to ensure that no fire hazard exists before starting engine.

Fuel Tank Sump .... DRAIN AND CHECK FOR
WATER, SEDIMENT AND PROPER FUEL
Fuel Tank Vent .... CLEAR

4.5a Preflight Checklists (continued)

LEFT WING (continued)

Tie Down and Chock .... REMOVE
Fuel Tank .... CHECK SUPPLY VISUALLY
and SECURE CAP
Pitot/Static Head .... REMOVE COVER - HOLES CLEAR
OAT Probe .... CHECK
Wing Tip and Lights .... CHECK
Aileron and Hinges .... NO DAMAGE or INTERFERENCE
Flap and Hinges .... NO DAMAGE or INTERFERENCE
Static Wicks .... CHECK SECURE

FUSELAGE

Antennas .... CHECK
Empennage .... CLEAR OF ICE, FROST, SNOW
Stabilator and Trim Tab .... NO DAMAGE or INTERFERENCE
Rudder .... NO DAMAGE or INTERFERENCE
Static Wicks .... CHECK SECURE
Tie Down .... REMOVE

4.5b Engine Start

ENGINE START - GENERAL

WARNING

The START ENGD warning CAS message will illuminate after 30 seconds of continuous engine cranking. If the CAS message illuminates after the engine is running, stop the engine and determine the cause.

CAUTION

Do not attempt flight if there is no indication of alternator output.

CAUTION

If a positive oil pressure is not indicated within 30 seconds following an engine start, stop the engine and determine the trouble. In cold weather it will take a few seconds longer to get a positive oil pressure indication.

NOTE

If engine does not start within 10 seconds, prime and repeat starting procedure. Starter manufacturer recommends starter cranking periods be limited to 10 seconds with a 2 minute rest period between cranking periods. Maximum of 5 start periods allowed. If start is not achieved on fifth attempt allow starter to cool for 30 minutes before attempting additional starts.

4.5c Before Starting Engine Checklists

BEFORE STARTING ENGINE

Flaps .... RETRACT
Passengers .... BOARD
Door .... CLOSED and SECURE
Seats .... ADJUSTED and LOCKED IN POSITION
Seat Belts and Harness .... FASTEN/ADJUST
CHECK INERTIA REEL
FUEL Selector .... DESIRED TANK
PARK BRAKE .... SET
Circuit Breakers .... CHECK IN
ALT AIR .... CLOSE
ALTERNATE STATIC SOURCE .... OFF
All Electrical Switches .... OFF
DAY/NIGHT Switch (if installed) .... SET
BATT MASTR .... OFF
AVION MASTER .... OFF

NOTE

The EMERG BATT may remain ON after checking for proper bus operation, thereby allowing the displays to remain active prior to engine start. Avoid delays between this check and engine starting to preserve emergency battery power.

EMERG BATT Switch .... ARM

Verify operation of:

- PFD with no red-x's on:
  - Attitude
  - Airspeed
  - Altitude
  - Vertical Speed
- Audio Panel
- Com 1
- Nav 1
- Engine Indications (except oil pressure)
- Standby Flight Instruments

4.5c Before Starting Engine Checklists (continued)

BEFORE STARTING ENGINE (continued)

E VOLTS Indication ....23.3 VOLTS (Minimum)
FUEL QTY Indications..............................CHECK QUANTITY AND IMBALANCE

If the E VOLTS indication is less than 23.3 VOLTS, the voltage can be checked again at the end of the GROUND CHECK checklist (after being charged by the primary electrical system) or can be conditioning charged by ground personnel prior to further checks. E VOLTS indication must not be less than 23.3 volts prior to flight.

Proceed to the appropriate ENGINE START checklist.

4.5d Engine Start Checklists

NORMAL START - COLD ENGINE (oil temperature below 140°F)

THROTTLE ....1/2 IN. OPEN
BATT MASTR Switch ....ON
ALTR Switch ....ON
LEFT/RIGHT MAG Switches ....ON
FUEL PUMP..ON
FIN STROBE Switch..ON
MIXTURE..............................PRIME 3-5 seconds then IDLE CUT-OFF
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
Propeller..CLEAR
START Switch..ENGAGE
MIXTURE (when engine starts)..ADVANCE
THROTTLE ....ADJUST
Oil Pressure.. CHECK

4.5d Engine Start Checklists (continued)

NORMAL START - HOT ENGINE (oil temperature 140°F or above)

THROTTLE .... 1/2 IN. OPEN
BATT MASTR Switch .... ON
ALTR Switch .... ON
LEFT/RIGHT MAG Switches .... ON
FUEL PUMP .... ON
MIXTURE .... IDLE CUT-OFF
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
Propeller .... CLEAR
START Switch .... PRESS
MIXTURE (when engine starts) .... ADVANCE
THROTTLE .... ADJUST
Oil Pressure .... CHECK

ENGINE START - FLOODED

THROTTLE .... OPEN FULL
BATT MASTR Switch .... ON
ALTR Switch .... ON
LEFT/RIGHT MAG Switches .... ON
FUEL PUMP .... OFF
MIXTURE .... IDLE CUT-OFF
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
Propeller .... CLEAR
START Switch .... PRESS
MIXTURE (when engine starts) .... ADVANCE
THROTTLE .... RETARD
Oil Pressure .... CHECK

4.5d Engine Start Checklists (continued)

ENGINE START - USING EXTERNAL POWER SOURCE

NOTE

The EMERG BATT switch may remain ON while using external power. The emergency bus does not receive power from the external power source due to a relay in the circuit.

BATT MASTR Switch .... OFF
ALTR Switch .... OFF
LEFT/RIGHT MAG Switches .... ON
EMERG BATT Switch .... Verify ARM
All Electrical Equipment .... OFF
External Power .... APPLY
THROTTLE .... 1/2 IN. OPEN
FUEL PUMP .... ON
FIN STROBE Switch .... ON
MIXTURE .... PRIME 3-5 seconds then IDLE CUT-OFF
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
Propeller .... CLEAR
START Switch .... PRESS
MIXTURE (when engine starts) .... ADVANCE
THROTTLE .... ADJUST
Oil Pressure .... CHECK
BATT MASTR Switch .... ON
THROTTLE .... LOWEST POSSIBLE RPM
External Power .... DISCONNECT
ALTR Switch .... ON - Check Ammeter Indication

NOTE

DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

4.5e Before Taxiing Checklist

WARM-UP

THROTTLE .... 800 to 1200 RPM

Avoid prolonged idling at low RPM, as this practice may result in fouled spark plugs.

BEFORE TAXIING

AVION MASTER Switch .... ON
EMERG BATT Switch .... VERIFY ARM
Multi-Function Display (MFD) .... VERIFY DATABASE CURRENCY
MFD Aux-Weight Planning .... ENTER WEIGHTS AS REQUIRED
Fuel Totalizer (weight) .... FOB SYNC or ENTER MANUALLY
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
System Messages (Messages Softkey) .... CONSIDER
Lights .... AS REQUIRED
Heater and Defroster .... AS DESIRED
TAWS and TRAFFIC (if installed) .... TEST
COM/NAV Radios & AVIONICS .... CHECK & SET
Annunciator Test .... TEST
Autopilot .... Verify Preflight Self-Test (PFT) completed and disconnect tone heard
Standby Flight Instrument .... VERIFY ON with NO RED-X's or FAILURE ANNUNCIATIONS
Altimeter/Standby Altimeter .... SET
Passenger Briefing .... COMPLETE
PARK BRAKE .... RELEASE

4.5f Taxiing Checklist

TAXIING

Taxi area	CLEAR
PARK BRAKE	RELEASED
Throttle	APPLY SLOWLY
Brakes	CHECK
Steering	CHECK

NOTE

During taxi, if the VOLTS indication decreases into the warning range, increase engine RPM (if possible) to retain adequate battery charging.

NOTE

During extended periods of engine idle at high ambient temperatures, fuel flow to the engine can be interrupted by the formation of fuel vapor bubbles in the fuel line resulting in rough idle operation. To correct this condion, see section 4.15.

Before attempting to taxi the airplane, ascertain that the propeller back blast and taxi areas are clear. Power should be applied slowly to start the taxi roll. Observe wing clearances when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane. Avoid holes and ruts when taxiing over uneven ground. Do not operate the engine at high RPM when taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

4.5g Ground Check Checklist

GROUND CHECK

PARK BRAKE .... SET
THROTTLE .... 2000 RPM
LEFT/RIGHT MAG Check .... MAX. DROP 175 RPM
MAX. DIFF. 50 RPM
Oil Temperature .... CHECK
Oil Pressure .... CHECK
VOLTS Indication .... CHECK BUS (28 +/- 1 VOLT)
ALTR AMPS Indication .... CHECK NORMAL
ALT AIR .... APPROX. 40 RPM DROP
FUEL PUMP .... OFF
Verify Engine Operation
THROTTLE .... RETARD

If E VOLTS indication less than 23.3 VOLTS during BEFORE STARTING ENGINE Checklist:

EMERG BATT Switch .... Verify ARM
AVION MASTER Switch .... OFF
ALTR Switch .... OFF
BATT MASTR Switch .... OFF
E VOLTS Indication .... 23.3 VOLTS MINIMUM

If E VOLTS less than 23.3 VOLTS, determine cause and correct the issue prior to flight.

If E VOLTS Greater Than or Equal to 23.3 VOLTS:

BATT MASTR Switch .... ON
ALTR Switch .... ON
AVION MASTER Switch .... ON

Operation on one magneto should not exceed 10 seconds.

Avoid prolonged ground operation with ALT AIR "OPEN" as the air is unfiltered.

4.5h Before Takeoff Checklist

BEFORE TAKEOFF

BATT MASTR Switch .... VERIFY ON
ALTR Switch .... VERIFY ON
FUEL PUMP .... ON
LEFT/RIGHT MAG Switches .... VERIFY ON
Flight Instruments .... CHECK
Standby Flight Instruments .... CHECK
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
System Messages (Messages Softkey) .... CONSIDER
FUEL Selector .... PROPER TANK
Engine Indications .... CHECK
ALT AIR .... CLOSE
MIXTURE .... SET
Seat Backs .... ERECT
Seats .... ADJUSTED AND LOCKED IN POSITION
Belts/Harness .... FASTENED/CHECK
Empty Seats .... SEAT BELTS SECURELY FASTENED
Flaps .... SET
Stabilator and Rudder Trims .... SET
Controls .... FREE AND CORRECT
Door .... LATCHED
Air Conditioner (if installed) .... OFF

NOTE

TAS aural alerts will be muted when GPS altitude is lower than ~ 400 FT AGL.

Takeoff should not be attempted with ice, snow, or frost on the wings. To achieve the takeoff performance specified in Section 5, it is necessary to set maximum power prior to brake release. Takeoff distances shown in Section 5 will be increased by uphill runway gradient, soft, wet, rough or grassy runway surface, or poor pilot technique. As power is applied at the start of the takeoff, monitor the engine instruments to verify that the engine is operating properly and the airspeed indicator to confirm that it is functioning. Full throttle should also be achieved without engine backfiring, skipping, faltering or a reduction in engine oil pressure.

4.5i Takeoff Checklist

TAKEOFF

NORMAL TECHNIQUE

Flaps .... Up
Trim .... SET
Brakes .... APPLY & HOLD
THROTTLE .... FULL POWER
Brakes .... RELEASE
Rotation Airspeed .... 60 KIAS
SMOOTHLY ROTATE TO CLIMB ATTITUDE

See Flaps Up Takeoff ground roll and Flaps Up Takeoff Performance charts in Section 5 for ground roll/takeoff distances and applicable gross weight vs rotation speed information. The rotation airspeed shown is applicable for the airplane at maximum gross weight.

When the available runway length is well in excess of that required and obstacle clearance is no factor, a rolling takeoff technique (no brakes prior to application of power) may be used.

SHORT FIELD, OBSTACLE CLEARANCE

Flaps .... 25° (second notch)
Trim .... Slightly Aft of Neutral
Brakes .... APPLY & HOLD
THROTTLE .... FULL POWER
Brakes .... RELEASE
Rotation Airspeed .... 55 KIAS
ROTATE TO CLIMB ATTITUDE
Obstacle Clearance Airspeed .... 60 KIAS
Initial Climb Airspeed (Flaps 0°) .... 64 KIAS
Flaps .... RETRACT SLOWLY
After Obstacles Cleared & Safe Altitude
Airpseed .... 76 KIAS

For departure from short runways with adjacent obstructions, a short field takeoff technique with flaps set to 25° should be used. See 25° Flaps Takeoff ground roll and 25° Flaps Takeoff Performance charts in Section 5 for ground roll/takeoff distances and applicable gross weight vs airspeed information. The rotation and 50 ft. obstacle clearance airspeeds shown are applicable for the airplane at maximum gross weight.

4.5j Climb Checklist

CLIMB

Best rate (flaps up) .... 76 KIAS
Best angle (flaps up) .... 64 KIAS
Enroute .... 87 KIAS
FUEL PUMP .... OFF at desired altitude

For climbing enroute, a speed of 87 KIAS is recommended. This will produce better forward speed and increased visibility over the nose during the climb.

4.5k Cruise Checklist

CRUISING

Power .... SET PER POWER TABLE
MIXTURE .... ADJUST

The cruising speed of the ARCHER III is determined by many factors, including power setting, altitude, temperature, loading and equipment installed in the airplane. The normal maximum cruising power is 75% of the rated horsepower of the engine. Airspeeds which may be obtained at various altitudes and power settings can be determined from the performance graphs provided in Section 5.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation above 5000 ft. altitude and at pilot's discretion at lower altitudes when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the full RICH position for all operations under 5000 feet. To lean the mixture, pull the mixture control aft.

Best economy mixture is obtained by moving the mixture control aft until peak EGT is reached. Best power mixture is obtained by leaning to peak EGT and then enrichening until the EGT is 100°F rich of the peak value. Under some conditions of altitude and throttle position, the engine may exhibit roughness before peak EGT is reached. If this occurs, the EGT corresponding to the onset of engine roughness should be used as the peak reference value.

4.5k Cruise Checklist (continued)

CRUISING (continued)

The electric fuel pump should be turned ON before switching tanks, and should be left ON for a short period thereafter. In order to keep the airplane in best lateral trim during cruising flight the fuel should be used alternately from each tank. Do not run tanks completely dry in flight. The electric fuel pump should be normally OFF so that any malfunction of the engine driven fuel pump is immediately apparent. If signs of fuel starvation should occur at any time during flight, fuel exhaustion should be suspected, at which time the fuel selector should be immediately positioned to the other tank and the electric fuel pump switched to the ON position.

4.5l Descent Checklist

DESCENT

Normal Descent:

THROTTLE .... 2500 RPM
Airspeed .... 122 KIAS
MIXTURE .... RICH

Power Off Descent:

THROTTLE .... CLOSED
Airspeed .... AS REQUIRED
MIXTURE .... AS REQUIRED
Power .... VERIFY WITH THROTTLE EVERY 30 SECONDS

4.5m Approach and Landing Checklist

APPROACH AND LANDING

NOTE

The HSI will auto slew during CDI transitions to LOC, LOC BC, LDA, or SDF approaches if an approach is activated in the G1000 system. The pilot should always double check the inbound course pointer prior to initiating a VHF NAV approach.

COM/NAV Radios & Avionics..CHECK & SET
Altimeter/Standby Altimeter.. SET
Seat Backs.. ERECT
Seat Belts, Harnesses .... FASTEN/ADJUSTED
Armrests ....STOWED
FUEL PUMP ....ON
FUEL Selector.. PROPER TANK
FLAPS.. SET (102 KIAS max.)
ALT AIR .... AS REQUIRED
MIXTURE...FULL RICH
AIR COND Switch (if installed) .... OFF
Landing Light .... AS REQUIRED
PARK BRAKE ....Verify OFF
Toe Brakes ....DEPRESS TO CHECK
Autopilot .... DISCONNECT
(Above 200 FT AGL)

4.5m Approach and Landing Checklist (continued)

APPROACH AND LANDING (continued)

Initial Approach Speed .... 75 KIAS
Final Approach Speed (Flaps 40°) .... 66 KIAS
Touchdown..MAIN WHEELS
then GENTLY LOWER NOSE
Braking.. AS REQUIRED

NOTE

TAS aural alerts will be muted when GPS altitude is lower than ~ 400 FT AGL.

Check to ensure the fuel selector is on the proper (normally fullest) tank and that the seat backs are erect, with the seats adjusted and locked in position. The seat belts and shoulder harness should be fastened and adjusted and the inertia reel checked.

The mixture control should be kept in full RICH position to ensure maximum acceleration if it should be necessary to open the throttle again. Alternate air should be closed unless there is an indication of induction system icing, since the use of alternate air causes a reduction in power which may be critical in case of a go-around. Full throttle operation with alternate air open can cause detonation.

The amount of flap used during landings and the speed of the aircraft at contact with the runway should be varied according to the landing surface and conditions of wind and airplane loading. It is generally good practice to contact the ground at the minimum possible safe speed consistent with existing conditions.

Normally, the best technique for short and slow landings is to use full flap and enough power to maintain the desired airspeed and approach flight path. Reduce the speed during the flareout and contact the ground close to the stalling speed. After ground contact hold the nose wheel off as long as possible. As the airplane slows down, gently lower the nose and apply the brakes. Braking is most effective when flaps are raised and back pressure is applied to the control wheel, putting most of the aircraft weight on the main wheels. In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds with partial or no flaps.

4.5n Go-Around Checklist

GO-AROUND

MIXTURE...FULL RICH
THROTTLE...FULL OPEN
Control Wheel.......................................BACK PRESSURE TO OBTAIN
POSITIVE CLIMB ATTITUDE
FLAPS..RETRACT INCREMENTALLY

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.

4.5o After Landing Checklist

AFTER LANDING

Clear of runway.

FLAPS...RETRACT
Air Conditioner (if installed).......................................AS DESIRED
FUEL PUMP...OFF
STROBE LIGHTS Switch.......................................AS REQUIRED
LANDG LIGHT Switch.......................................AS REQUIRED

NOTE

During extended periods of engine idle at high ambient temperatures, fuel flow to the engine can be interrupted by the formation of fuel vapor bubbles in the fuel line resulting in rough idle operation. To correct this condion, see section 4.15.

4.5p Stopping Engine Checklist

STOPPING ENGINE

CAUTION

The flaps must be placed in the up position for the flap stop to support weight. Passengers should be cautioned accordingly.

PARK BRAKE .... SET
FLAPS .... RETRACT
FUEL PUMP .... OFF
EMERG BATT Switch .... OFF
AVION MASTER .... OFF
Air Conditioner (if installed) .... OFF
Electrical Switches .... OFF
ALTR Switch .... OFF
THROTTLE .... CLOSED
MIXTURE .... IDLE CUT-OFF
LEFT/RIGHT MAG Switches .... OFF
Interior Lights (at night) .... OFF
Exterior Lights .... OFF
BATT MASTR Switch .... OFF
STANDBY INSTRUMENT .... VERIFY SHUTDOWN

NOTE

In case the standby instrument remains "ON" due to improper shutdown, the unit switches to internal battery and depletes it. To turn off the Aspen EBD, press the "SHUT DOWN" command from Main Menu page 6 or hold the red "REV" button for 20 seconds. To turn off the Garmin G5, press and hold the power button for five seconds.

4.5q Mooring Checklist

MOORING

PARK BRAKE .... AS REQUIRED
Flaps .... VERIFY RETRACTED
Control wheel .... SECURED WITH BELTS
Wheel chocks .... IN PLACE
Tie downs .... SECURE

If necessary, the airplane should be moved on the ground with the aid of the nose wheel tow bar provided with each airplane and then secure the tow bar on the aft bulkhead of the baggage compartment. The aileron and stabilator controls should be secured by looping the safety belt through the control wheel and pulling it snug. The flaps are locked when in the UP position and should be left retracted. Tie downs can be secured to rings provided under each wing and to the tail skid. The rudder is held in position by its connections to the nose wheel steering and normally does not have to be secured.

4.7 STALLS

The stall characteristics of the ARCHER III are conventional. An approaching stall is indicated by a stall warning aural annunciation (Stall....Stall.....Stall) which is activated between five and ten knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall.

The gross weight stalling speed of the ARCHER III with power off and full flaps is 45 KIAS. With the flaps up this speed is increased 5 KTS. Loss of altitude during stalls varies from 100 to 350 feet, depending on configuration and power.

CAUTION

The stall warning system is inoperative with the BATT MASTR switch OFF.

During preflight, the stall warning system should be checked by turning the BATT MASTR switch ON, lifting the detector and checking to determine if the Stall aural annunciation is actuated. The BATT MASTR switch should be turned OFF after the check is complete.

4.9 TURBULENT AIR OPERATION

In keeping with good operating practice used in all aircraft, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to the maximum operating maneuvering speed (Vo) 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. (See Subsection 2.3)

4.11 WEIGHT AND BALANCE

It is the responsibility of the owner and pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight.

For weight and balance data, refer to Section 6 (Weight and

4.13 NOISE LEVEL

(a) 14 CFR Part 36, Appendix G for aircraft with the standard exhaust system, the noise level is 73.1 dB(A). For aircraft with the optional exhaust system, the noise level is 71.9 dB(A).

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.

(b) ICAO Annex 16, Volume I, Chapter 10 for aircraft with the standard exhaust system, the noise level is 77.7 dB(A). For aircraft with the optional exhaust system, the noise level is 75.3 dB(A).

4.15 RECOMMENDED PROCEDURES FOR ELIMINATION OF FUEL VAPOR

Fuel vapor can occur in the fuel system during ground operations when high ambient temperatures are present. The symptoms of fuel vapor can include:

(a) Fluctuation of idle speed and fuel flow
(b) Poor engine response to throttle movement
(c) Engine will not operate when throttle is closed
(d) High RPM drop (greater than 175 RPM) during mag check

If one or more symptoms of vapor in the fuel system occur during ground operation, do the following:

(a) Advance the throttle to an engine speed of 1800 to 2000 RPM. Continue at this power setting for ~ 1-2 minutes or until smooth engine operation. Make sure oil temperature stays within limits.
(b) Retard throttle to idle and check for smooth operation.
(c) During taxi, lean mixture and operate at as high a power setting (1200 RPM max) as practical.
(d) Prior to takeoff, set the mixture to the full rich position (for high elevation fields, mixture leaning could be necessary for smooth engine operation).
(e) Prior to initiation of takeoff roll, set full throttle and verify smooth engine operation.

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SECTION 5
PERFORMANCE

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SECTION 5

PERFORMANCE

5.1 GENERAL

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

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

5.3 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 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.

Effects of conditions not considered on the charts must be evaluated by the pilot, such as the effect of soft or grass runway surface on takeoff and landing performance, or the effect of winds aloft on cruise and range performance. Endurance can be grossly affected by improper leaning procedures, and inflight fuel flow and quantity checks are recommended.

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

The information provided by paragraph 5.5 (Flight Planning Example) outlines a detailed flight plan using the 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.

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5.5 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 certified at the factory has been entered in Figure 6-5. If any alterations to the airplane have been made effecting weight and balance, reference to the aircraft logbook and Weight and Balance Record (Figure 6-7) should be made to determine the current basic empty weight of the airplane.

Make use of the Weight and Balance Loading Form (Figure 6-11) and the C.G. Range and Weight graph (Figure 6-15) to determine the total weight of the airplane and the center of gravity position.

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) Empty Weight	1412 lbs.
(2) Occupants (2 x 170 lbs.)	340 lbs.
(3) Baggage and Cargo	360 lbs.
(4) Fuel (6 lb./gal. x 48)	288 lbs.
(5) Takeoff Weight	2400 lbs.
(6) Landing Weight (a)(5) minus (g)(1), (2400 lbs. minus 160.2 lbs.)	2240 lbs.

The takeoff weight is below the maximum of 2550 lbs. and the weight and balance calculations have determined that the C.G. position is within the approved limits.

5.5 FLIGHT PLANNING EXAMPLE (continued)

(b) Takeoff and Landing

After determining the aircraft loading, all aspects of takeoff and landing must be considered.

Conditions of 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 Performance graph (Figure 5-7 or 5-9) to determine the barrier distance or (Figure 5-11 or 5-13) to determine the length of runway necessary for the takeoff.

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 example flight have fallen well below the available runway lengths.

	Departure Airport	Destination Airport
(1) Pressure Altitude	2000 ft.	2500 ft.
(2) Temperature	23°C	21°C
(3) Wind Component (Headwind)	8 Kt.	5 Kt.
(4) Runway Length Available	7000 ft.	4500 ft.
(5) Runway Required	1073 ft.*	820 ft.**

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 5-11 or 5-13
**reference Figure 5-43

(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 Time, Distance and Fuel to Climb graph (Figure 5-17). After the time, distance and fuel for the cruise pressure altitude and outside air temperature values have been established, apply the existing conditions at the departure field to the graph (Figure 5-17). Now, subtract the values obtained from the graph for the field of departure condi- tions from those for the cruise pressure altitude.

The remaining values are the true fuel, distance and time 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	6000 ft.
(2) Cruise OAT	15°C
(3) Time to Climb (12 min. minus 3 min.)	9 min.*
(4) Distance to Climb (17 naut. miles minus 5 naut. miles)	12 naut. miles*
(5) Fuel to Climb (4 gal. minus 2 gal.)	2 gal. *

*reference Figure 5-17

5.5 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 time, distance and fuel for descent (Figure 5-37). 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 time, distance and fuel values from the graph (Figure 5-37).

Now, subtract the values obtained from the field conditions from the values obtained from the cruise conditions to find the true time, distance and fuel values needed for the flight plan.

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

(1) Time to Descend	
(16 min. minus 6 min.)	10 min.*
(2) Distance to Descend	
(33 naut. miles minus 13 naut. miles)	20 naut. miles*
(3) Fuel to Descend	
(3.2 gal. minus 1.3 gal.)	1.9 gal. *

*reference Figure 5-31

(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 engine Operator's Manual when selecting the cruise power setting. The established pressure altitude and temperature values and the selected cruise power should now be utilized to determine the true airspeed from the appropriate Speed Power graph (Figure 5-21, 5-23, 5-25 and 5-27).

Calculate the cruise fuel flow for the cruise power setting from the information provided by the engine Operator's Manual.

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 flow by the cruise time.

The cruise calculations established for the cruise segment of the flight planning example are as follows:

(1) Total Distance	314 naut. miles
(2) Cruise Distance (e)(1) minus (c)(4) minus (d)(2), (314 nm minus 12 nm minus 20 nm)	282 naut. miles
(3) Cruise Power	65%
(4) Cruise Speed	117 Kts.*
(5) Cruise Fuel Consumption	9.5 gal./hr.
(6) Cruise Time (e)(2) divided by (e)(4), (282 nm divided by 117 kts)	2.4 hrs.
(7) Cruise Fuel (e)(5) multiplied by (e)(6), (9.5 gal./hr multiplied by 2.4 hrs)	22.8 gal.

*reference Figure 5-23

5.5 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 following flight time is required for the flight planning example.

(1) Total Flight Time
(c)(3) plus (d)(1) plus (e)(6),
(.15 hr plus .17 hr plus 2.4 hrs) 2.7 hrs

(g) Total Fuel Required

Determine the total fuel required by adding the fuel to climb, the fuel to descend and the cruise fuel. When the total fuel (in gallons) is determined, multiply this value by 6 lb./gal. to determine the total fuel weight used for the flight.

The total fuel calculations for the example flight plan are shown below.

(1) Total Fuel Required
(c)(5) plus (d)(3) plus (e)(7),
(2 gal. plus 1.9 gal. plus 22.8 gal.) 26.7 gal.
(26.7 gal. multiplied by 6 lb./gal.) 160.2 lbs

5.7 PERFORMANCE GRAPHS

LIST OF FIGURES

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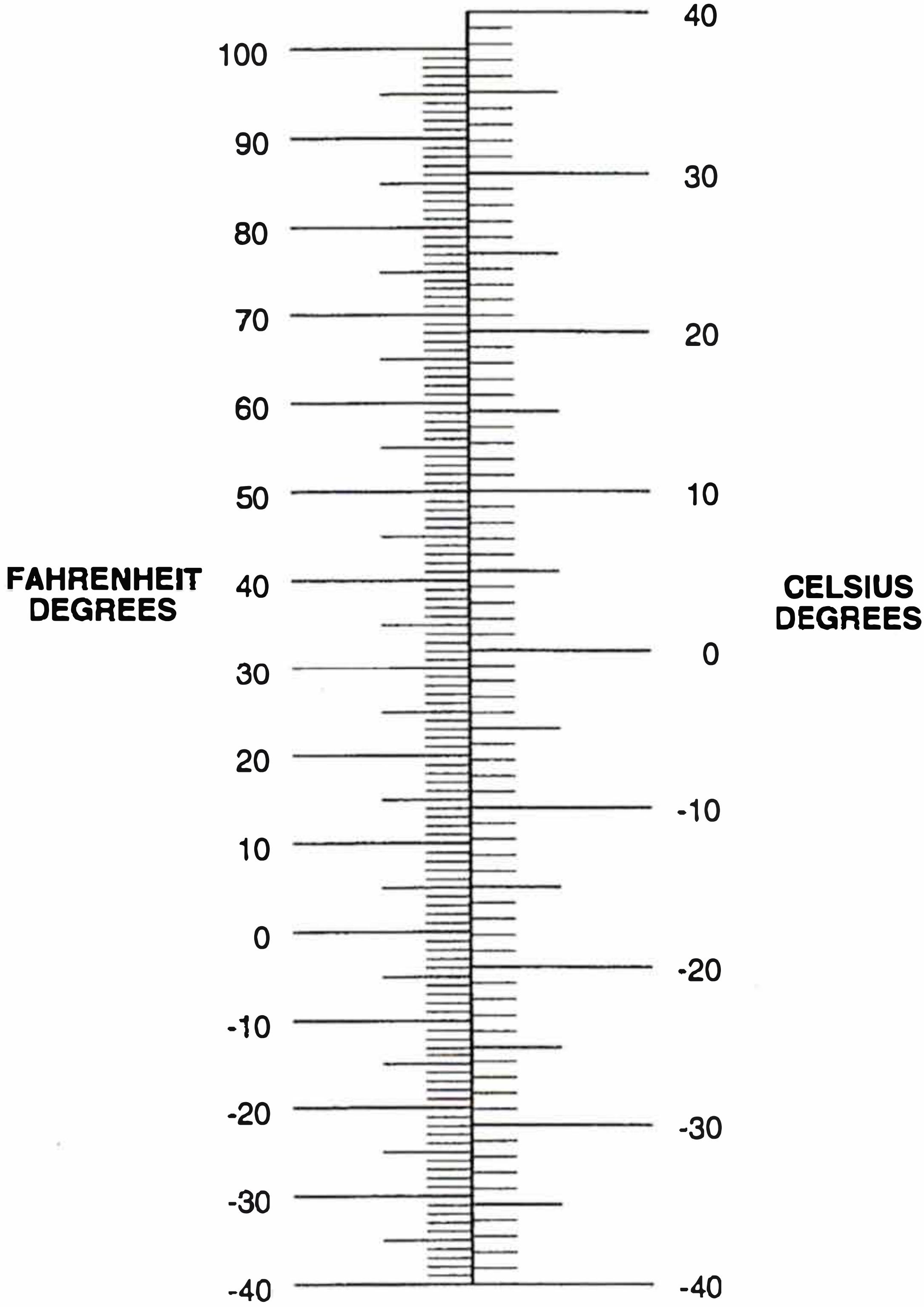
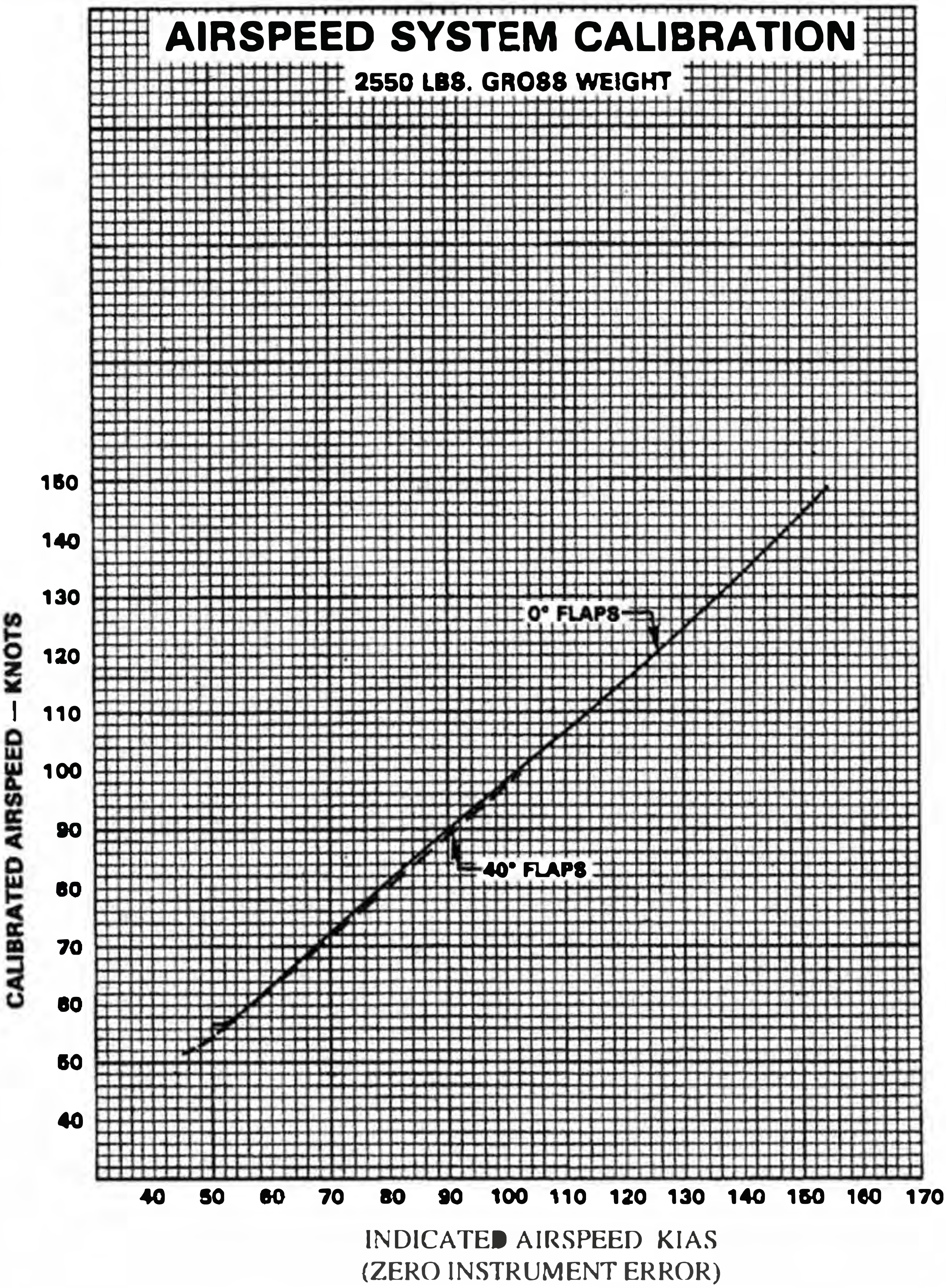
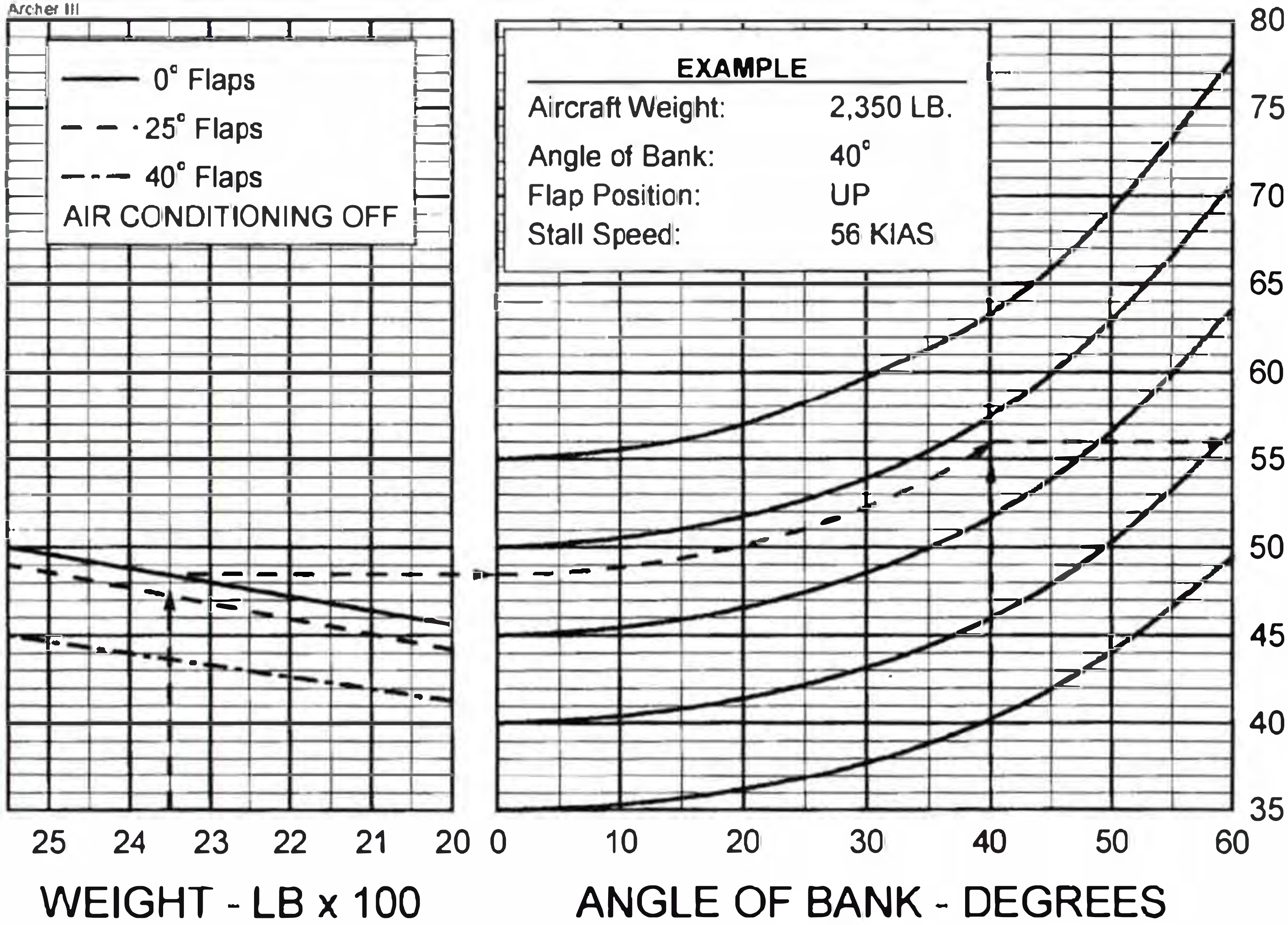


TEMPERATURE CONVERSION
Figure 5-1



AIRSPEED SYSTEM CALIBRATION
Figure 5-3

POWER OFF STALL SPEED



STALL SPEEDS
Figure 5-5

FLAPS UP TAKEOFF PERFORMANCE

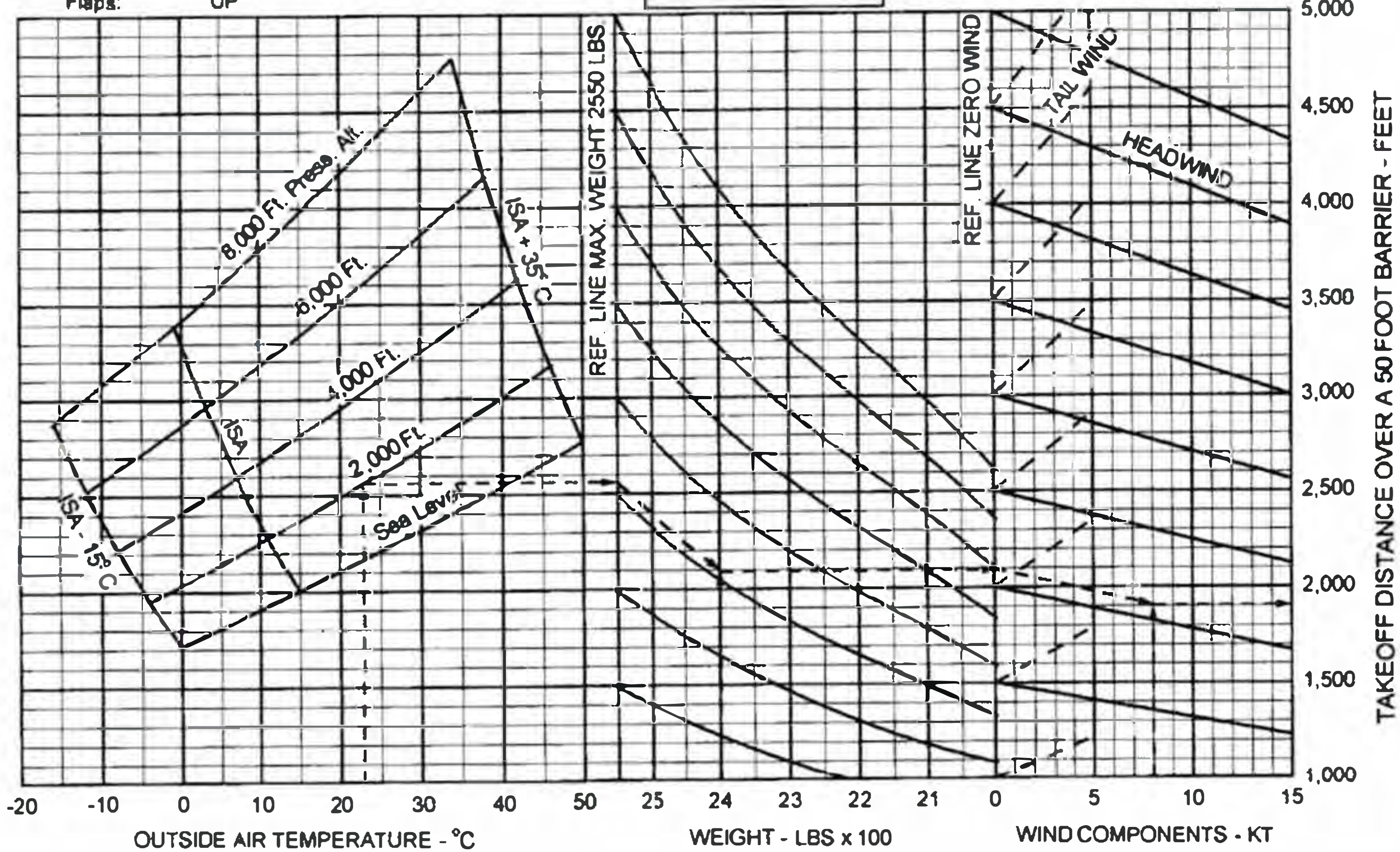
ASSOCIATED CONDITIONS:

Power: FULL THROTTLE BEFORE BRAKE RELEASE
Air Conditioner: OFF
Runway: PAVED, LEVEL, & DRY
Airspeed: REFER TO TABLE AT RIGHT
Propeller: SENSENICH 76EM8S14-0-62
Flaps: UP

TAKEOFF SPEEDS		KIAS
WT	LIFTOFF	50 FT
2,550	60	65
2,450	58	64
2,350	57	63
2,250	56	61

EXAMPLE:

Depart Airport Pressure Alt: 2,000 Ft.
Temperature: 23° C
Gross Weight: 2,400 Lb.
Headwind: 8 Kt.
Takeoff Distance: 1907 Ft.



FLAPS UP TAKEOFF PERFORMANCE
Figure 5-7

FLAPS 25° TAKEOFF PERFORMANCE

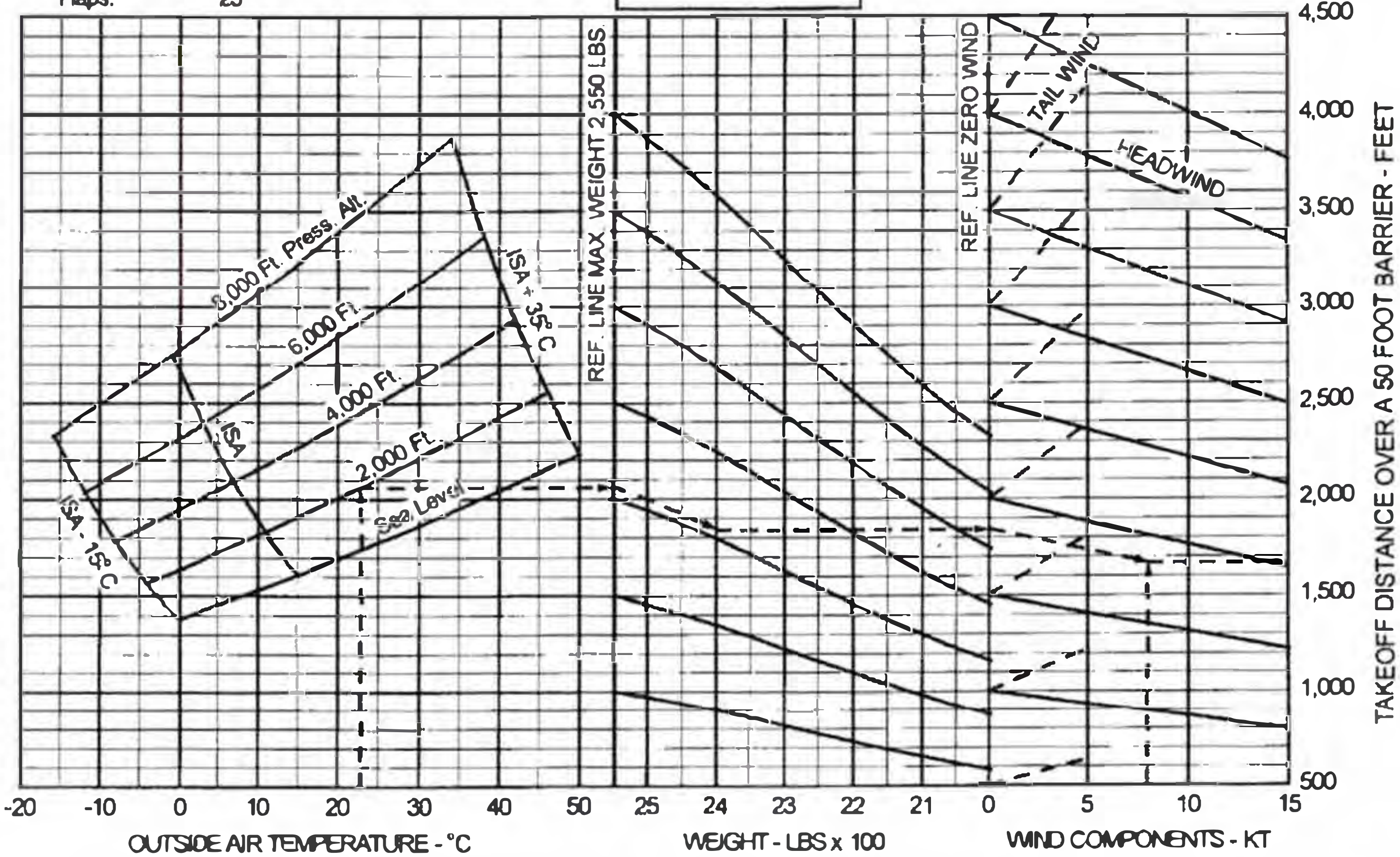
ASSOCIATED CONDITIONS

Power: FULL THROTTLE BEFORE BRAKE RELEASE
Air Conditioner: OFF
Runway: PAVED, LEVEL, & DRY
Airspeed: REFER TO TABLE AT RIGHT
Propeller: SENSENICH 76EM8S14-0-62
Flaps: 25°

TAKEOFF SPEEDS		KIAS
WT	LIFTOFF	50 FT
2,550	55	60
2,450	55	58
2,350	53	56
2,250	50	54

EXAMPLE

Depart Airport Pressure Alt:	2,000 Ft.
Temperature:	23° C
Gross Weight:	2,400 Lb.
Headwind:	8 Kt.
Takeoff Distance:	1674 Ft.



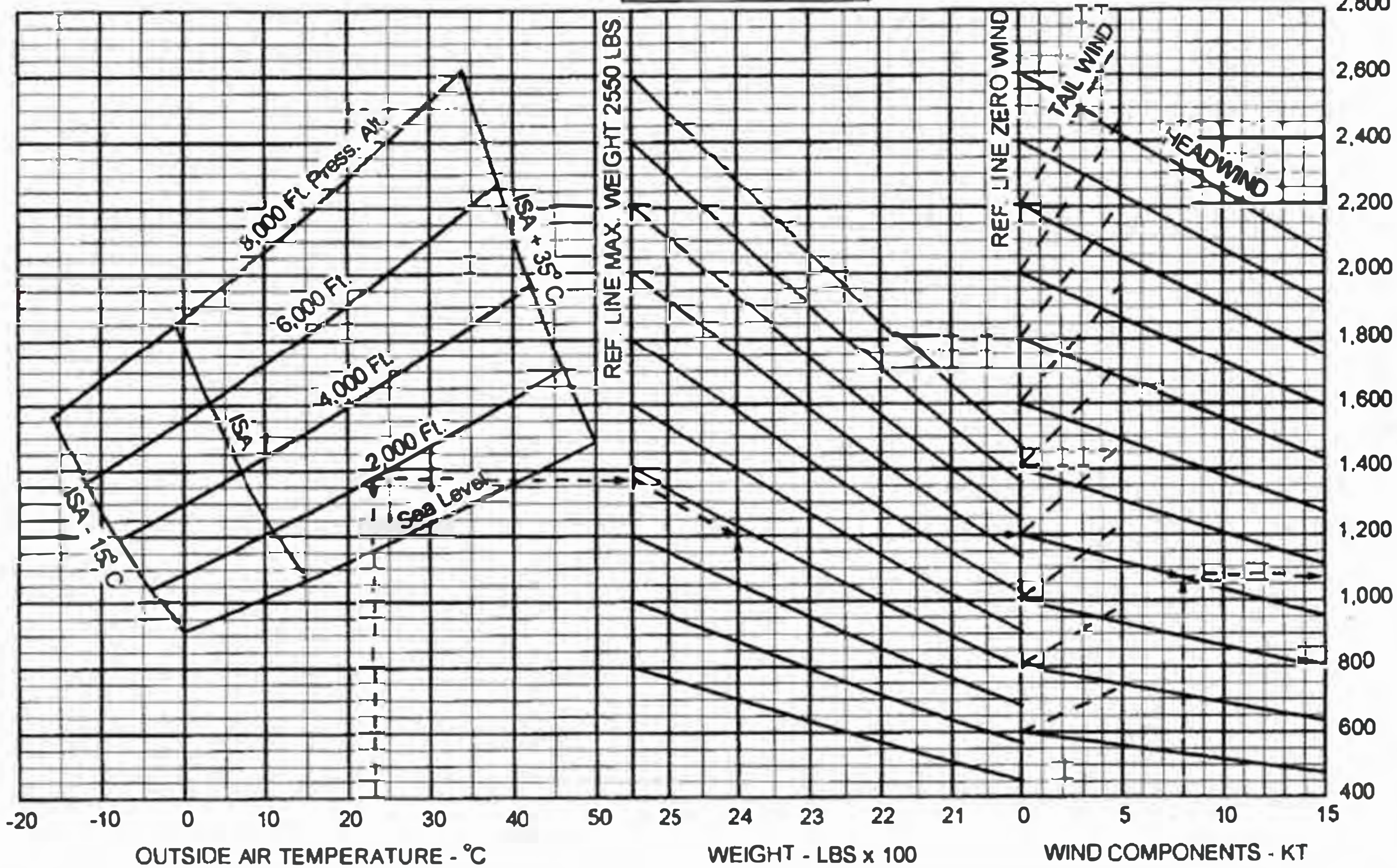
25° FLAPS TAKEOFF PERFORMANCE
Figure 5-9

FLAPS UP TAKEOFF GROUND ROLL

ASSOCIATED CONDITIONS:
Power: FULL THROTTLE BEFORE BRAKE RELEASE
Air Conditioner: OFF
Runway: PAVED, LEVEL, & DRY
Airspeed: REFER TO TABLE AT RIGHT
Propeller: SENSENICH 76EM8S14-0-62
Flaps: UP

TAKEOFF SPEEDS WT	KIAS LIFTOFF
2,550	60
2,450	58
2,350	57
2,250	56

EXAMPLE:
Depart Airport Pressure Alt: 2,000 Ft.
Temperature: 23° C
Gross Weight: 2,400 Lb.
Headwind: 8 Kt.
Takeoff Ground Roll: 1073 Ft.



FLAPS UP TAKEOFF GROUND ROLL
Figure 5-11

FLAPS 25° TAKEOFF GROUND ROLL

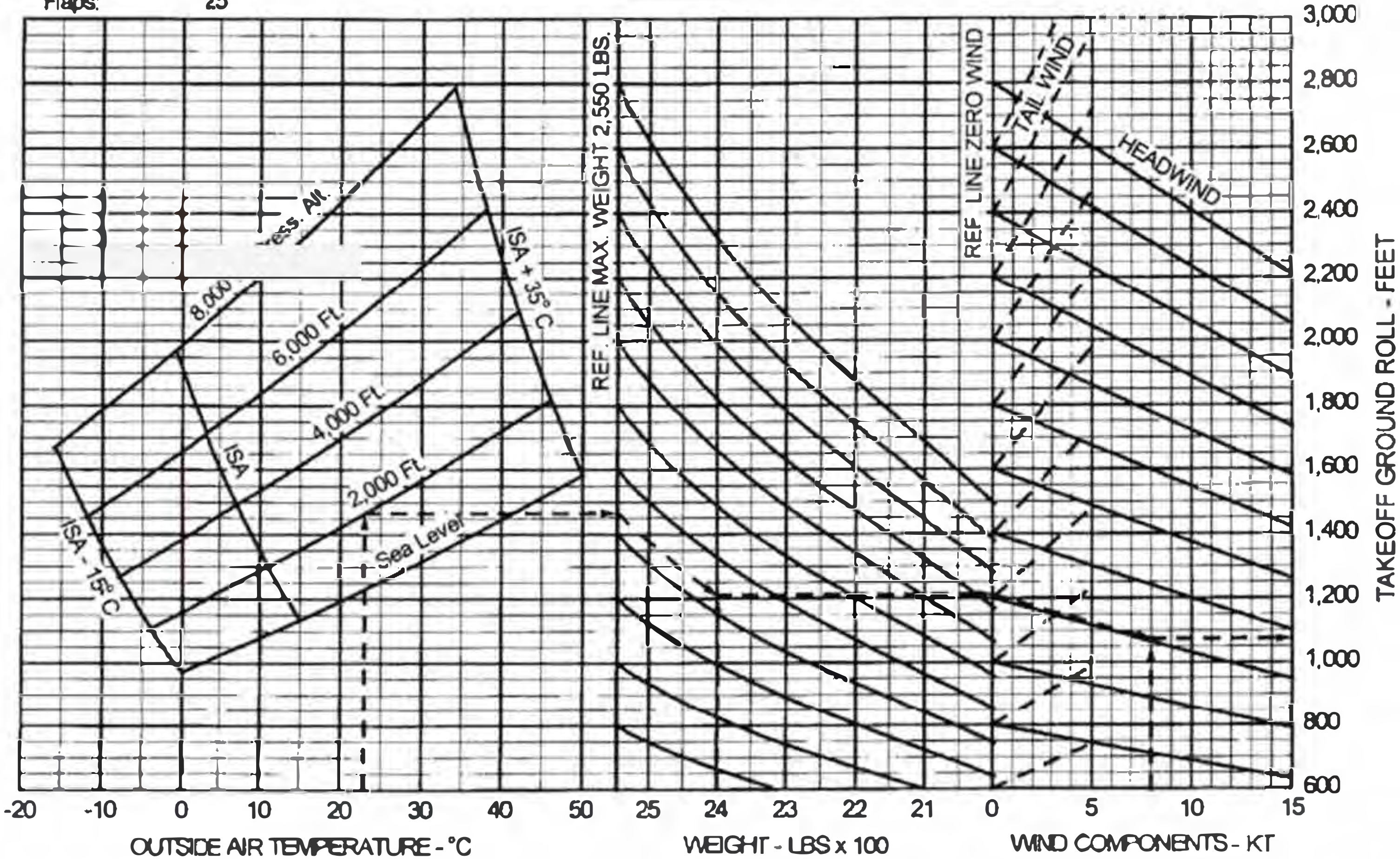
ASSOCIATED CONDITIONS

Power: FULL THROTTLE BEFORE BRAKE RELEASE
Air Conditioner: OFF
Runway: PAVED, LEVEL, & DRY
Airspeed: REFER TO TABLE AT RIGHT
Propeller: SENSENICH 76EM8S14-0-62
Flaps: 25°

TAKEOFF SPEEDS WT	KIAS LIFTOFF
2,550	55
2,450	55
2,350	53
2,250	50

EXAMPLE

Depart Airport Pressure Alt: 2,000 Ft.
Temperature: 23° C
Gross Weight 2,400 Lb.
Headwind: 8 Kt.
Takeoff Ground Roll: 1,071 Ft.

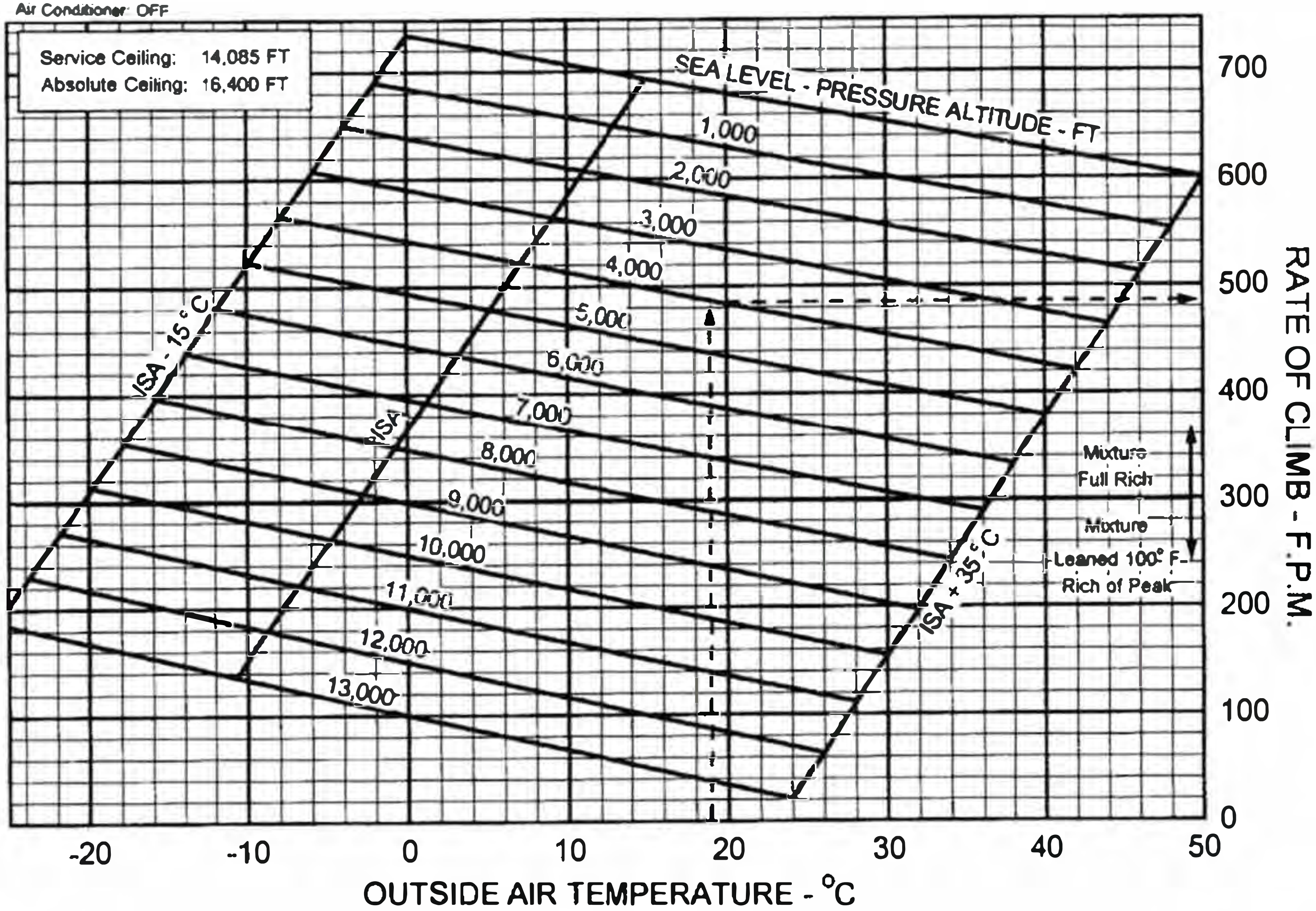


25° FLAPS TAKEOFF GROUND ROLL
Figure 5-13

CLIMB PERFORMANCE

ASSOCIATED CONDITIONS:
Gross Weight: 2550 LBS
Power: FULL THROTTLE
Airspeed: 76 KIAS
Flaps: UP
Air Conditioner: OFF

EXAMPLE:
Climb Pressure Alt.: 4000 Ft
Temperature: 19° C
Rate of Climb: 487 Ft/Min.



CLIMB PERFORMANCE
Figure 5-15

TIME, FUEL, DISTANCE TO CLIMB

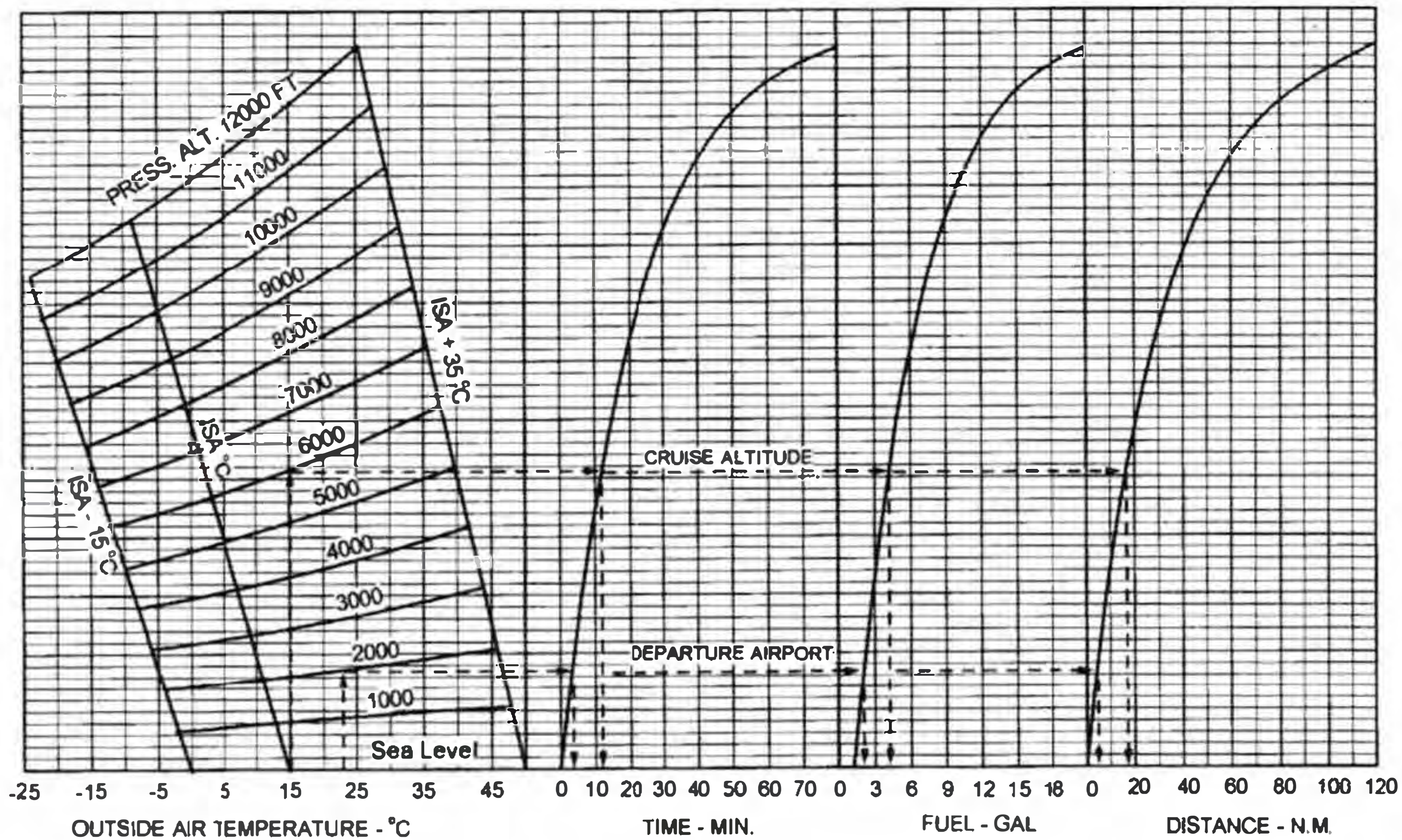
ASSOCIATED CONDITIONS

Gross Weight: 2550 LB Flaps: UP
Power: FULL THROTTLE Airspeed: 76 KIAS

NOTE: This chart includes fuel allowance for start, taxi, & takeoff

EXAMPLE

Depart Airport Press Alt.: 2000 FT. Temperature: 23 °C
Cruise Press Alt.: 6000 FT. Cruise OAT: 15 °C
Time to Climb: 12 min. minus 3 min. = 9 min
Fuel to Climb: 4 gal. minus 2 gal = 2 gal
Distance to Climb: 17 n.m. minus 5 n.m. = 12 n.m.



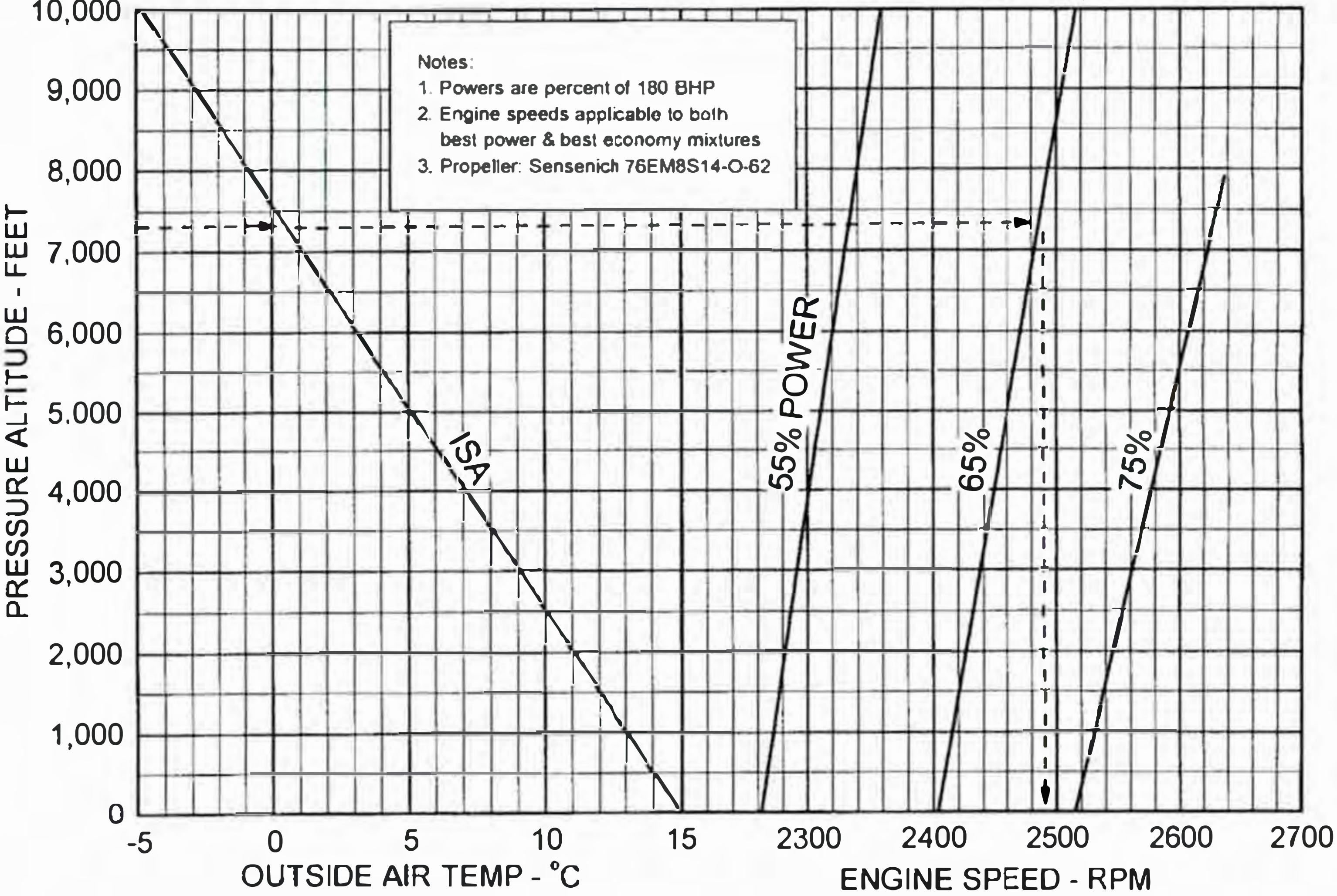
TIME, DISTANCE AND FUEL TO CLIMB
Figure 5-17

ENGINE PERFORMANCE

POWER VERSUS RPM @ ISA

EXAMPLE:

Pressure Altitude:	7,375 Ft.
Temperature:	ISA
65% Power Eng. Speed:	2487 RPM



ENGINE PERFORMANCE
Figure 5-19

Engine / Cruise Performance for Non-ISA OAT*
RPM for Constant 55% Power
Fuel Flow: Best Economy Mixture, 8.2 GPH

Pressure Altitude Feet	Indicated Outside Air Temperature °C	°C	°F	Engine Speed RPM	True Air Speed Knots **
Sea Level	ISA-15	0	32	2245	105
	ISA	15	59	2265	
	ISA +10	25	77	2275	
	ISA +20	35	95	2285	
	ISA +30	45	113	2295	106
2000	ISA -15	-4	25	2265	106
	ISA	11	52	2280	
	ISA +10	21	70	2295	
	ISA +20	31	88	2305	
	ISA +30	41	106	2315	107
4000	ISA -15	-8	18	2285	106
	ISA	7	45	2300	
	ISA +10	17	63	2315	
	ISA +20	27	81	2325	
	ISA +30	37	99	2335	108
6000	ISA -15	-12	10	2305	107
	ISA	3	37	2320	
	ISA +10	13	55	2330	
	ISA +20	23	73	2345	
	ISA +30	33	91	2355	108
8000	ISA -15	-16	3	2320	107
	ISA	-1	30	2340	
	ISA +10	9	48	2350	
	ISA +17.5	16.5	62	2360	108
9000	ISA -15	-18	0	2330	107
	ISA	-3	27	2350	
	ISA +8.5	5.5	42	2360	108
10000	ISA - 15	-20	-4	2340	107
	ISA	-5	23	2360	108

NOTE: * Aircraft weight 2550 Lbs., Wheel pants and strut fairings installed
** Subtract 3 KTAS if wheel pants are removed.

ENGINE/CRUISE PERFORMANCE (55%)
Figure 5-21

Engine / Cruise Performance for Non-ISA OAT*
RPM for Constant 65% Power
Fuel Flow: Best Economy Mixture, 9.5 GPH

Pressure Altitude Feet	Indicated Outside Air Temperature °C	°C	°F	Engine Speed RPM	True Air Speed Knots **
Sea Level	ISA-15	0	32	2385	113
	ISA	15	59	2405	
	ISA +10	25	77	2415	
	ISA +20	35	95	2430	
	ISA +30	45	113	2440	116
2000	ISA -15	-4	25	2405	114
	ISA	11	52	2425	
	ISA +10	21	70	2440	
	ISA +20	31	88	2450	
	ISA +30	41	106	2465	117
4000	ISA -15	-8	18	2430	115
	ISA	7	45	2450	
	ISA +10	17	63	2460	
	ISA +20	27	81	2475	
	ISA +30	37	99	2485	118
6000	ISA -15	-12	10	2450	116
	ISA	3	37	2470	
	ISA +10	13	55	2485	
	ISA +20	23	73	2495	
	ISA +30	33	91	2510	119
8000	ISA -15	-16	3	2475	117
	ISA	-1	30	2495	
	ISA +10	9	48	2505	
	ISA +17.5	16.5	62	2515	119
9000	ISA -15	-18	0	2485	117
	ISA	-3	27	2505	
	ISA +8.5	5.5	42	2515	119
10000	ISA -15	-20	-4	2495	118
	ISA	-5	23	2515	119

NOTE: * Aircraft weight 2550 Lbs., Wheel pants and strut fairings installed
** Subtract 3 KTAS if wheel pants are removed.

ENGINE/CRUISE PERFORMANCE (65%)
Figure 5-23

Engine / Cruise Performance for Non-ISA OAT*
RPM for Constant 75% Power
Fuel Flow: Best Economy Mixture, 11.0 GPH

Pressure Altitude Feet	Indicated Outside Air Temperature °C	°C	°F	Engine Speed RPM	True Air Speed Knots **
Sea Level	ISA-15	0	32	2485	119
	ISA	15	59	2515	
	ISA +10	25	77	2535	
	ISA +20	35	95	2550	
	ISA +30	45	113	2565	124
2000	ISA -15	-4	25	2520	121
	ISA	11	52	2545	
	ISA +10	21	70	2565	
	ISA +20	31	88	2580	
	ISA +30	41	106	2600	126
3000	ISA -15	-6	21	2535	122
	ISA	9	48	2560	
	ISA +10	19	66	2580	
	ISA +20	29	84	2595	
	ISA +30	39	102	2615	127
4000	ISA -15	-8	18	2550	123
	ISA	7	45	2575	
	ISA +10	17	63	2595	
	ISA +20	27	81	2610	
	ISA +30	37	99	2630	128
5000	ISA -15	-10	14	2565	124
	ISA	5	41	2590	
	ISA +10	15	59	2610	
	ISA +20	25	77	2625	
	ISA +25	30	86	2635	128
6000	ISA -15	-12	10	2580	125
	ISA	3	37	2605	
	ISA +10	13	55	2625	
	ISA +15	18	64	2635	128
7000	ISA -15	-14	6.8	2595	126
	ISA	1	34	2625	
	ISA +7.5	8.5	47	2635	128

NOTE: * Aircraft weight 2550 Lbs., Wheel pants and strut fairings installed
** Subtract 3 KTAS if wheel pants are removed.

ENGINE/CRUISE PERFORMANCE (75%)
Figure 5-25

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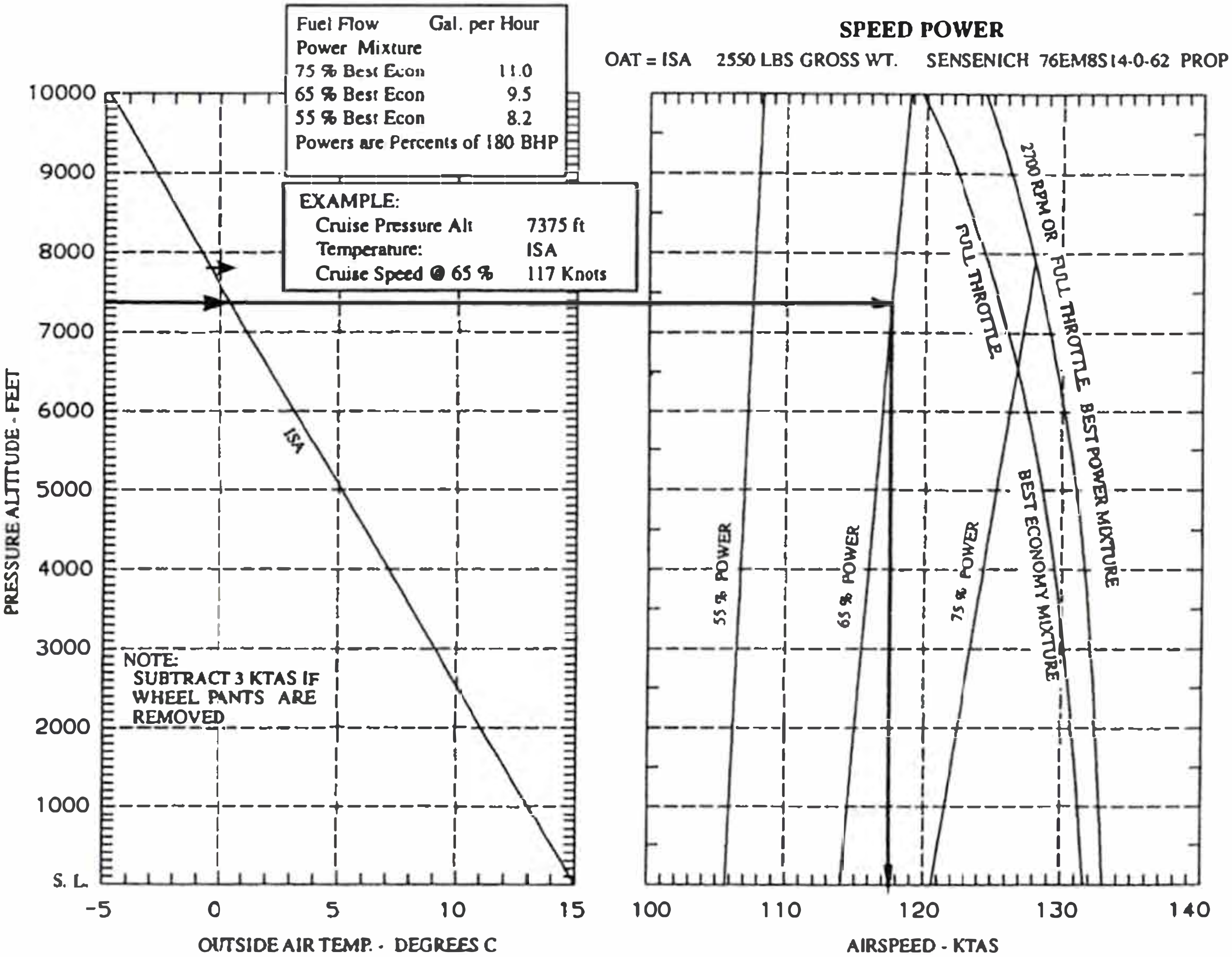
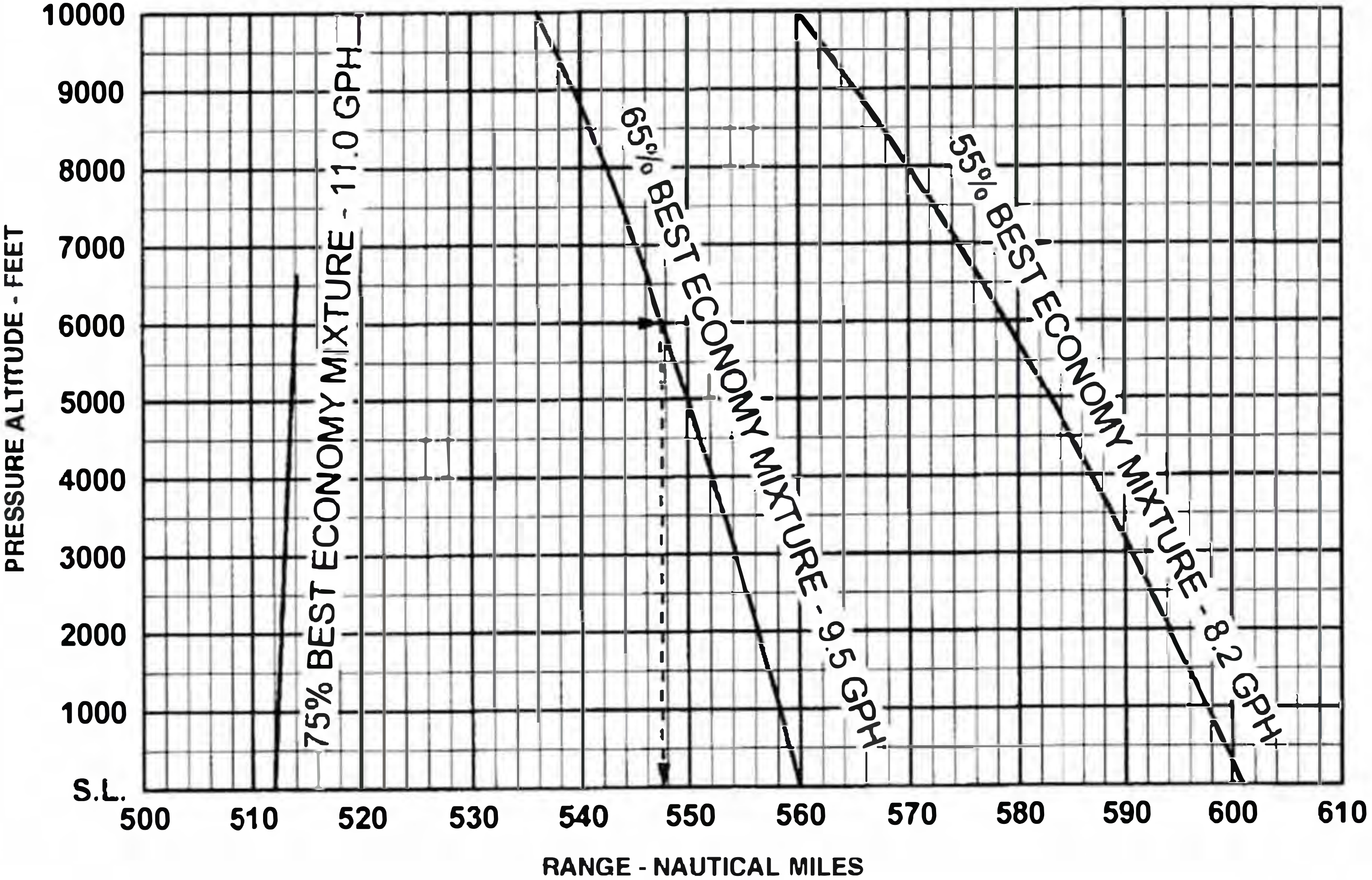


SPEED POWER
Figure 5-27

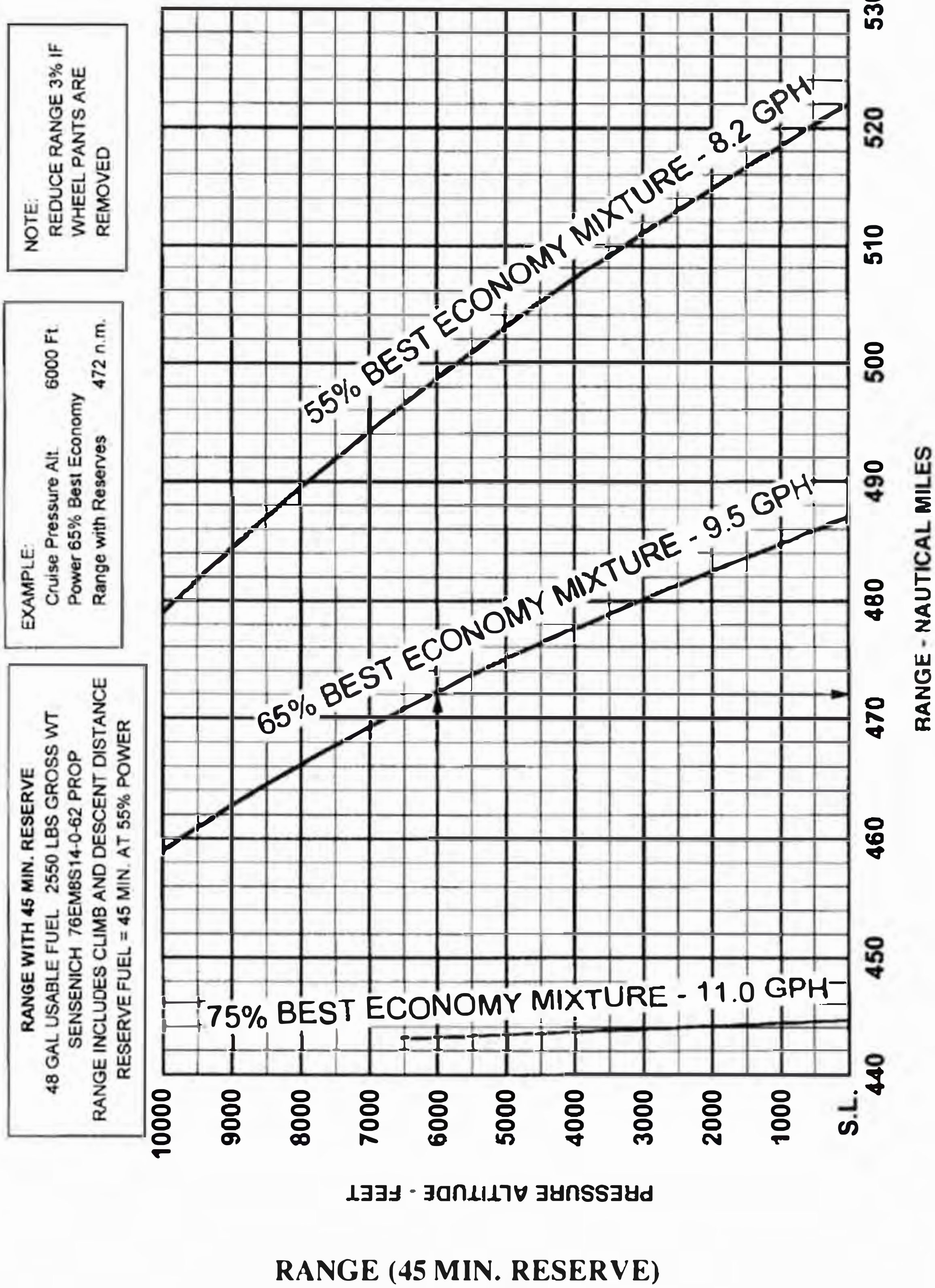
RANGE WITHOUT 45 MIN. RESERVE
48 GAL USABLE FUEL 2550 LBS GROSS WT.
SENSENICH 76EM8S14-0-62 PROP
RANGE INCLUDES CLIMB AND DESCENT DISTANCE

EXAMPLE:
Cruise Pressure Alt. 6000 Ft.
Power 65% Best Economy
Range with No Reserves 547 n.m.

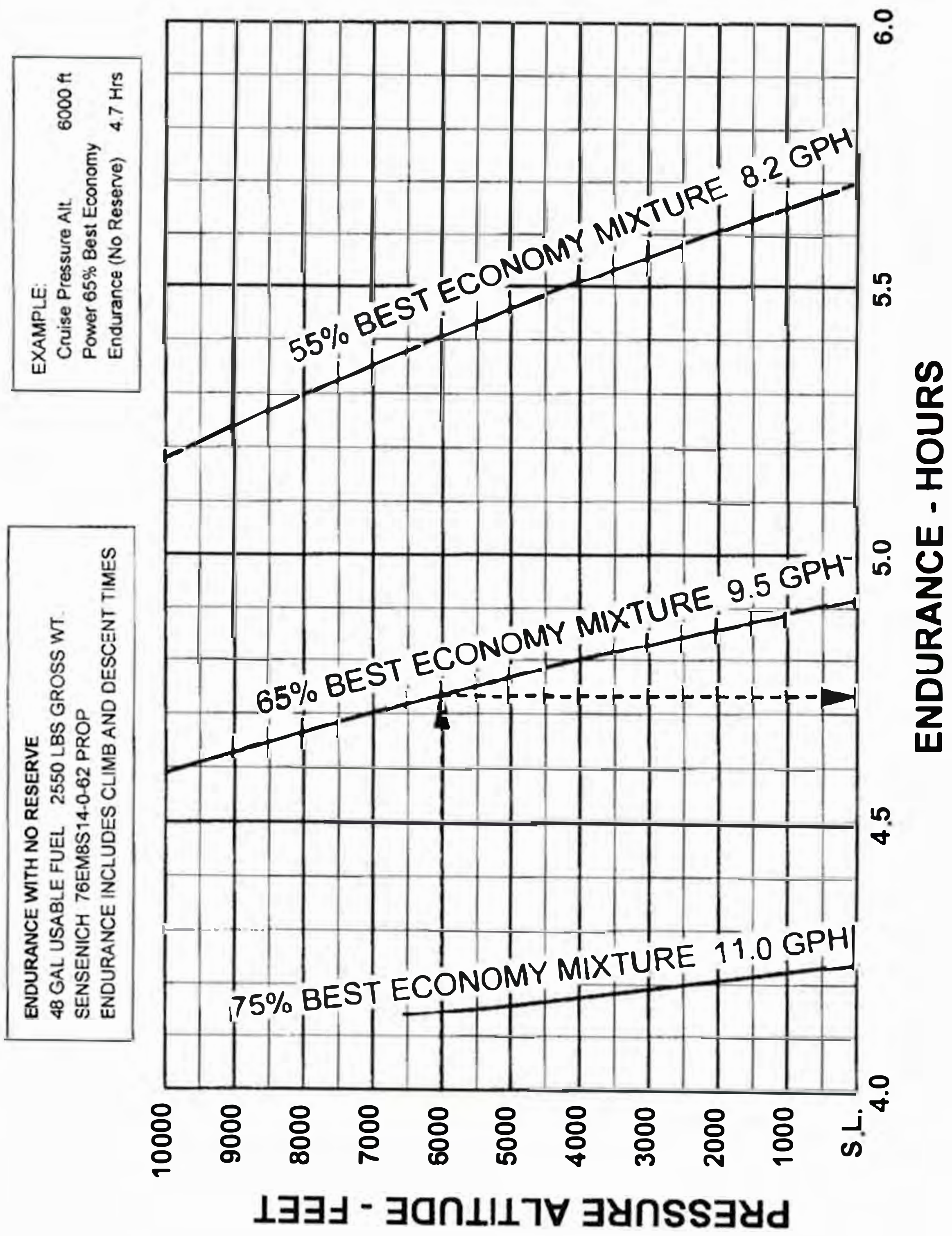
NOTE:
REDUCE RANGE 3% IF WHEEL PANTS ARE REMOVED



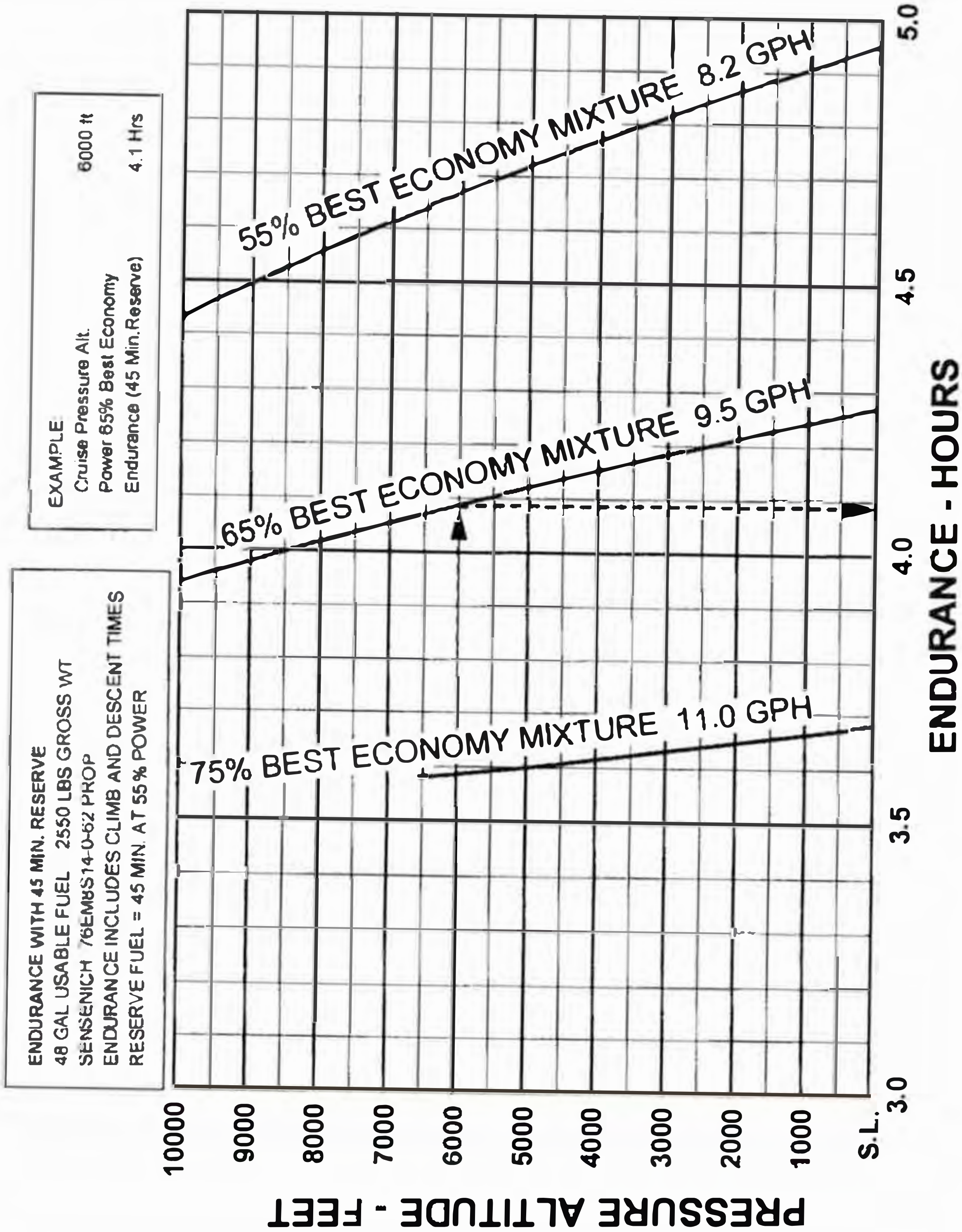
RANGE (NO RESERVE)
Figure 5-29



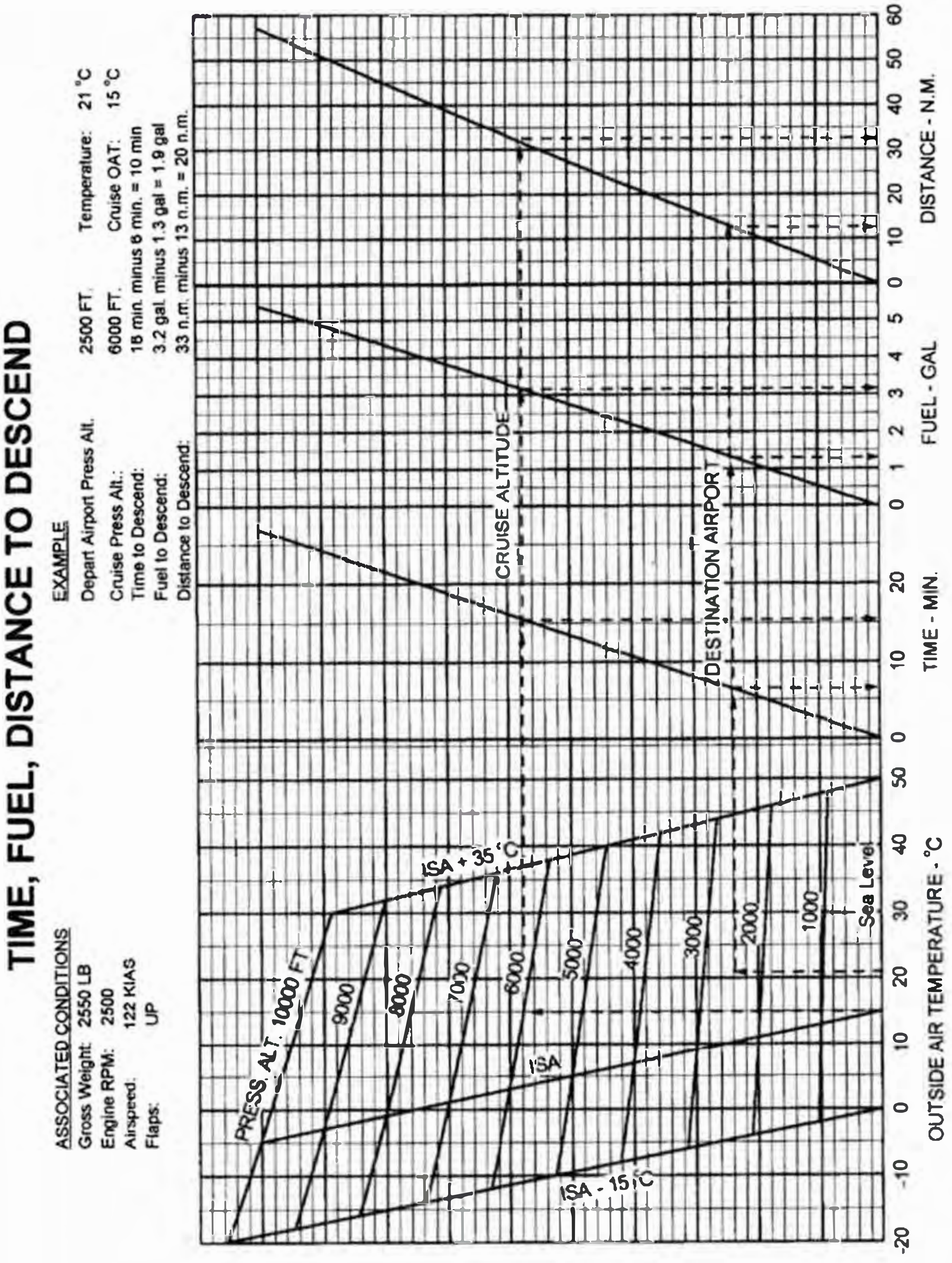
RANGE (45 MIN. RESERVE)
Figure 5-31



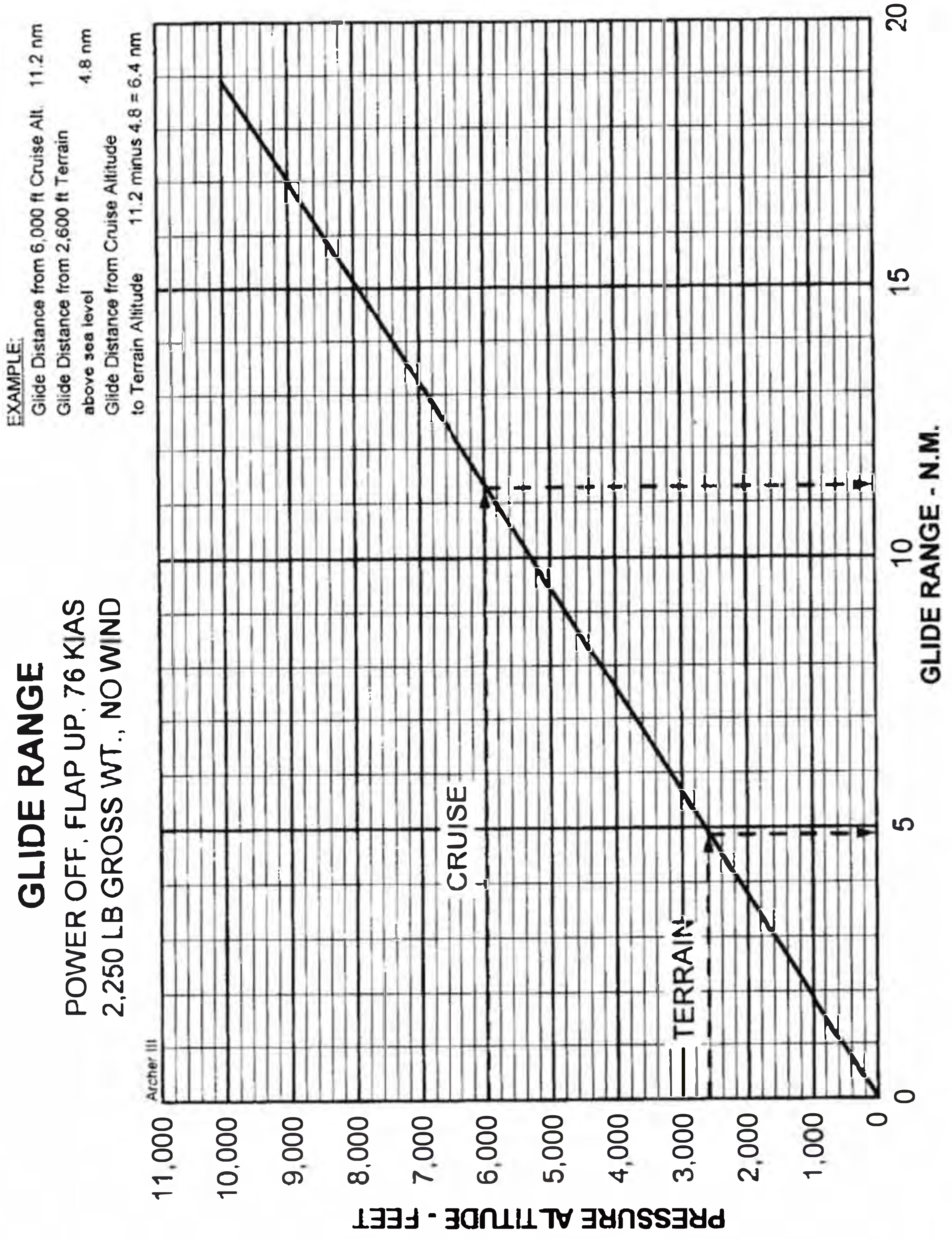
ENDURANCE (NO RESERVE)
Figure 5-33



ENDURANCE (45 MIN. RESERVE)
Figure 5-35



TIME, DISTANCE AND FUEL TO DESCEND
Figure 5-37



GLIDE RANGE
Figure 5-39

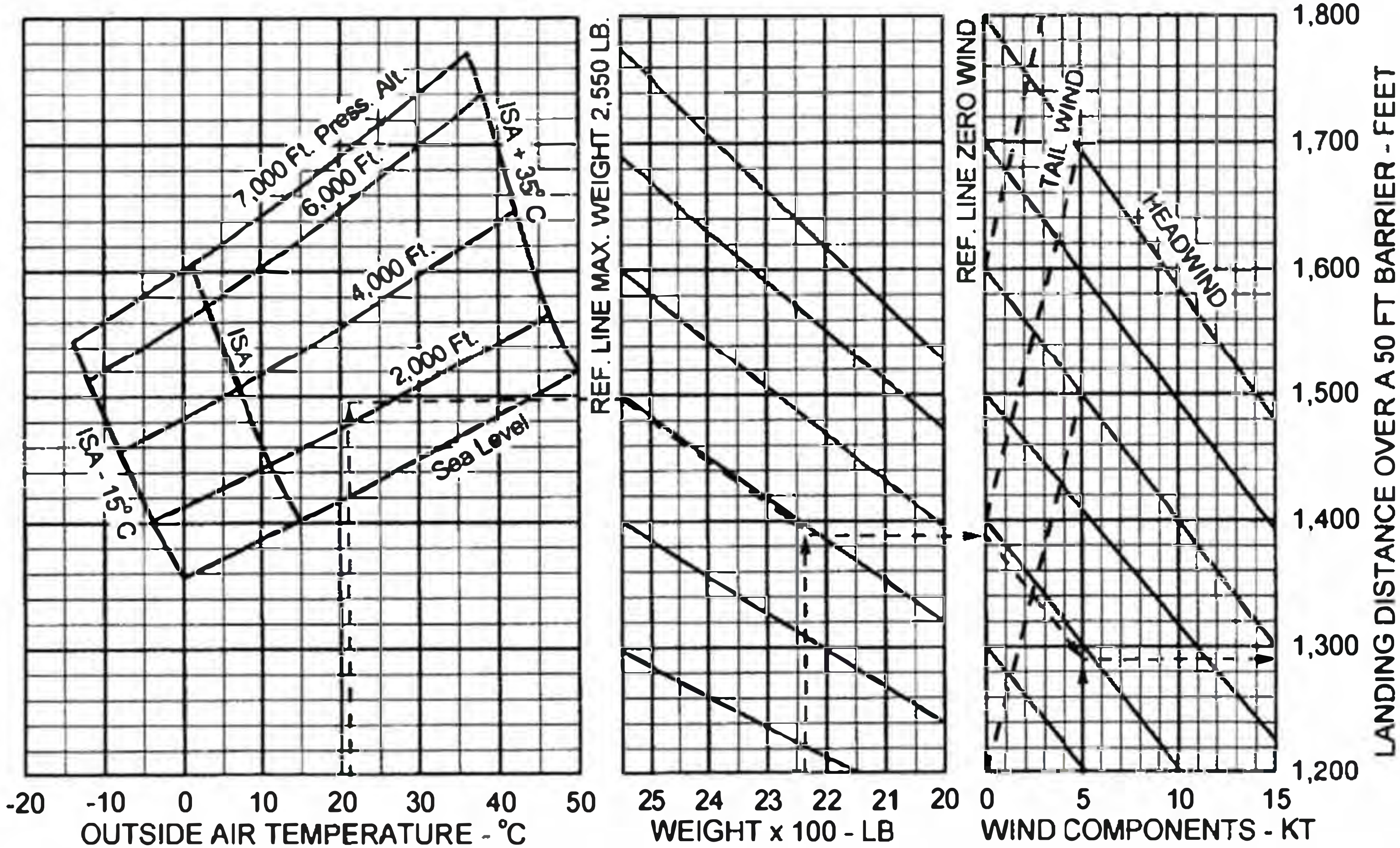
LANDING PERFORMANCE

ASSOCIATED CONDITIONS

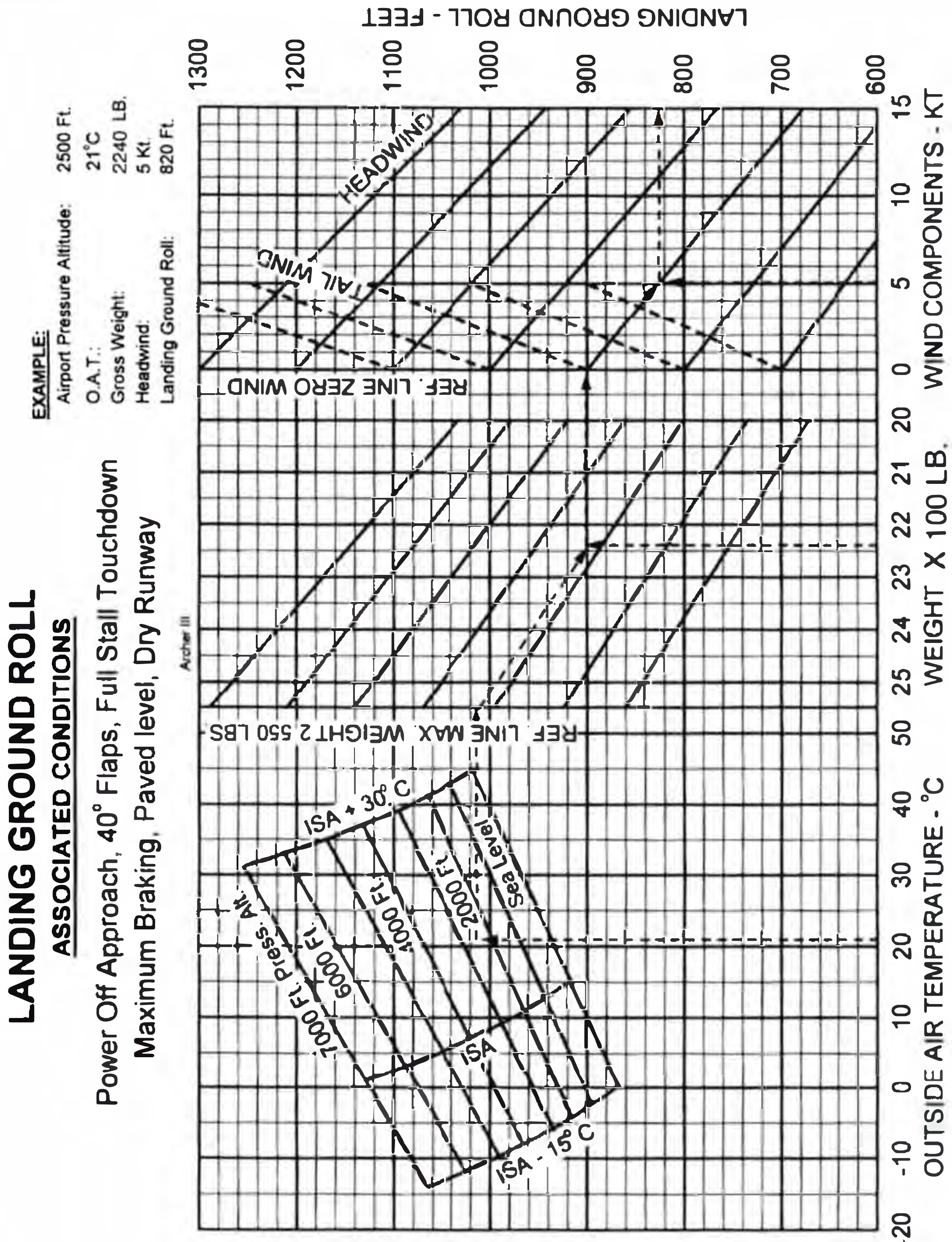
Power Off Approach, 40° Flaps, 66 KIAS, Full Stall
Touchdown, Maximum Braking, Paved, Level, Dry Runway

EXAMPLE:

Airport Pressure Altitude:	2,500 FT.
O.A.T.:	21°C
Gross Weight:	2,240 LB.
Headwind:	5 KT.
Landing Distance:	1,290 FT.



LANDING PERFORMANCE
Figure 5-41



LANDING GROUND ROLL
Figure 5-43

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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 the performance and flying characteristics which are designed into the airplane, it must be flown with the weight and center of gravity (C.G.) position within the approved operating range (envelope). Although the airplane offers flexibility of loading, it cannot be flown with the maximum number of adult passengers, full fuel tanks and maximum baggage. With the flexibility comes responsibility. The pilot must ensure that the airplane is loaded within the loading envelope before he makes a takeoff.

Misloading carries consequences for any aircraft. An overloaded airplane will not take off, climb or cruise as well as a properly loaded one. The heavier the airplane is loaded, the less climb performance it will have.

Center of gravity is a determining factor in flight characteristics. If the C.G. is too far forward in any airplane, it may be difficult to rotate for takeoff or landing. If the C.G. is too far aft, the airplane may rotate prematurely on takeoff or tend to pitch up during climb. Longitudinal stability will be reduced. This can lead to inadvertent stalls and even spins; and spin recovery becomes more difficult as the center of gravity moves aft of the approved limit.

A properly loaded airplane, however, will perform as intended. Before the airplane is certified, 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 easily determine the weight and C.G. position for the loaded airplane by computing the total weight and moment and then determining whether they are within the approved envelope.

6.1 GENERAL (continued)

The basic empty weight and C.G. location are recorded in the Weight and Balance Data Form (Figure 6-5) and the Weight and Balance Record (Figure 6-7). The current values should always be used. Whenever new equipment is added or any modification work is done, the mechanic responsible for the work is required to compute a new basic empty weight and C.G. position and to write these in the Aircraft Log Book and the Weight and Balance Record. The owner should make sure that it is done.

A weight and balance calculation is necessary in determining how much fuel or baggage can be boarded so as to keep within allowable limits. Check calculations prior to adding fuel to ensure against improper loading.

The following pages are forms used in weighing an airplane in production and in computing basic empty weight, C.G. position, and useful load. Note that the useful load includes usable fuel, baggage, cargo and passengers. Following this is the method for computing takeoff weight and C.G.

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 by 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) Be certain that all items checked in the airplane equipment list are installed in the proper location in the airplane.

  (2) Remove excessive dirt, grease, moisture, 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. Operate engine on each tank until all undrainable fuel is used and engine stops. Then add the unusable fuel (2.0 gallons total, 1.0 gallons each wing).

6.3 AIRPLANE WEIGHING PROCEDURE (continued)

CAUTION

Whenever the fuel system is completely drained and fuel is replenished it will be necessary to run the engine for a minimum of 3 minutes at 1000 RPM on each tank to ensure no air exists in the fuel supply lines.

(4) Fill with oil to full capacity.

(5) Place pilot and copilot seats in fourth (4th) notch, aft of forward position. Put flaps in the fully retracted position and all control surfaces in the neutral position. Tow bar should be in the proper location and all entrance and baggage doors closed.

(6) Weigh the airplane inside a closed building to prevent errors in scale readings due to wind.

(b) Leveling

(1) With airplane on scales, block main gear oleo pistons in the fully extended position.

(2) Level airplane (refer to Figure 6-3) deflating nose wheel tire, to center bubble on level.

(c) Weighing - Airplane Basic Empty Weight

(1) 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)

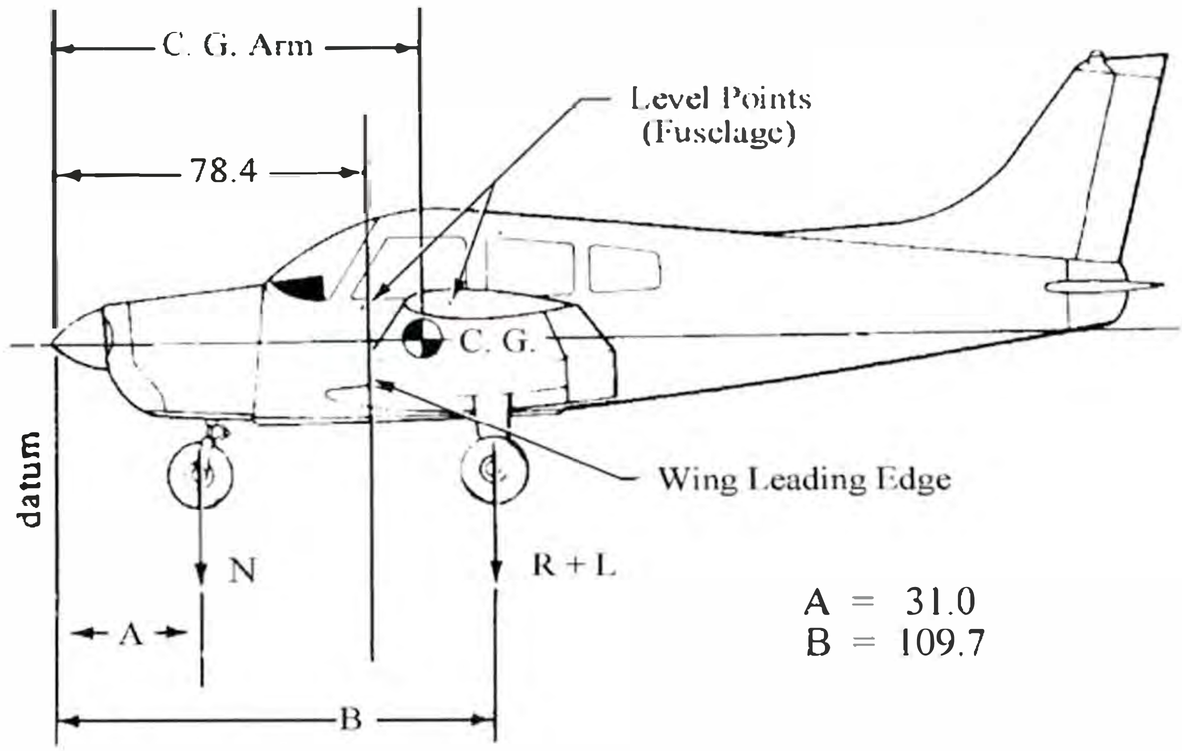
(d) Basic Empty Weight Center of Gravity

(1) The following geometry applies to the PA-28-181 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:

$$\text{C.G. Arm} = \frac{N\,(A) + (R + L)\,(B)}{T} \quad \text{inches}$$

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 certified 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 certified 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.

MODEL PA-28-181 ARCHER III

Airplane Serial Number 2881550

Registration Number N232TE

Date 06/09/2022

AIRPLANE BASIC EMPTY WEIGHT

Item	Weight (Lbs)	x	C.G. Arm (Inches Aft of Datum)	=	Moment (In-Lbs)
Standard Empty Weight* Actual ~~Computed~~	1637.7		88.4348		144827.0
Optional Equipment	93.5		98.1829		9180.1
Basic Empty Weight	1731.2		88.9613		154007.1

*The standard empty weight includes full oil capacity and 2.0 gallons of unusable fuel.

AIRPLANE USEFUL LOAD

(Ramp Weight) - (Basic Empty Weight) = Useful Load

Normal Category (2558 lbs) - (1731.2 lbs) = 826.8 lbs.

Utility Category (2138 lbs) - (1731.2 lbs) = 406.8 lbs.

THIS BASIC EMPTY WEIGHT, C.G. AND USEFUL LOAD ARE FOR THE AIRPLANE AS CERTIFIED AT THE FACTORY. REFER TO APPROPRIATE AIRCRAFT RECORD WHEN ALTERATIONS HAVE BEEN MADE.

WEIGHT AND BALANCE DATA FORM
Figure 6-5

PA-28-181		Serial Number 2881550		Registration Number N232TF			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
06/09/2022		As licensed					1731.2	

WEIGHT AND BALANCE RECORD
Figure 6-7

PA-28-181		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

WEIGHT AND BALANCE RECORD (cont)

Figure 6-7 (cont)

6.7 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

(a) Add the weight of all items to be loaded to the basic empty weight.
(b) Use the Loading Graph (Figure 6-13) to determine the moment of all items to be carried in the airplane.
(c) Add the moment of all items to be loaded to the basic empty weight moment.
(d) Divide the total moment by the total weight to determine the C.G. location.
(e) By using the figures of item (a) and item (d) (above), locate a point on the C.G. range and weight graph (Figure 6-15). If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	1590.0	87.5	139125
Pilot and Front Passenger	340.0	80.5	27370
Passengers (Rear Seats)*	340.0	118.1	40154
Fuel (48 Gallon Maximum)	288.0	95.0	27360
Baggage (200 Lbs. Maximum)*		142.8	
Ramp Weight (2558 Lbs. Normal, 2138 Lbs. Utility Maximum)	2558	91.5	234009
Fuel Allowance For Engine Start, Taxi and Run Up	-8	95.0	-760
Takeoff Weight (2550 Lbs. Normal, 2130 Lbs. Utility Maximum)	2550.0	91.5	233249

The center of gravity (C.G.) of this sample loading problem is at 91.5 inches aft of the datum line. Locate this point (91.5) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

IT IS THE RESPONSIBILITY OF THE PILOT AND AIRCRAFT OWNER TO ENSURE THAT THE AIRPLANE IS LOADED PROPERLY.

*Utility Category Operation - No baggage or rear passengers allowed.

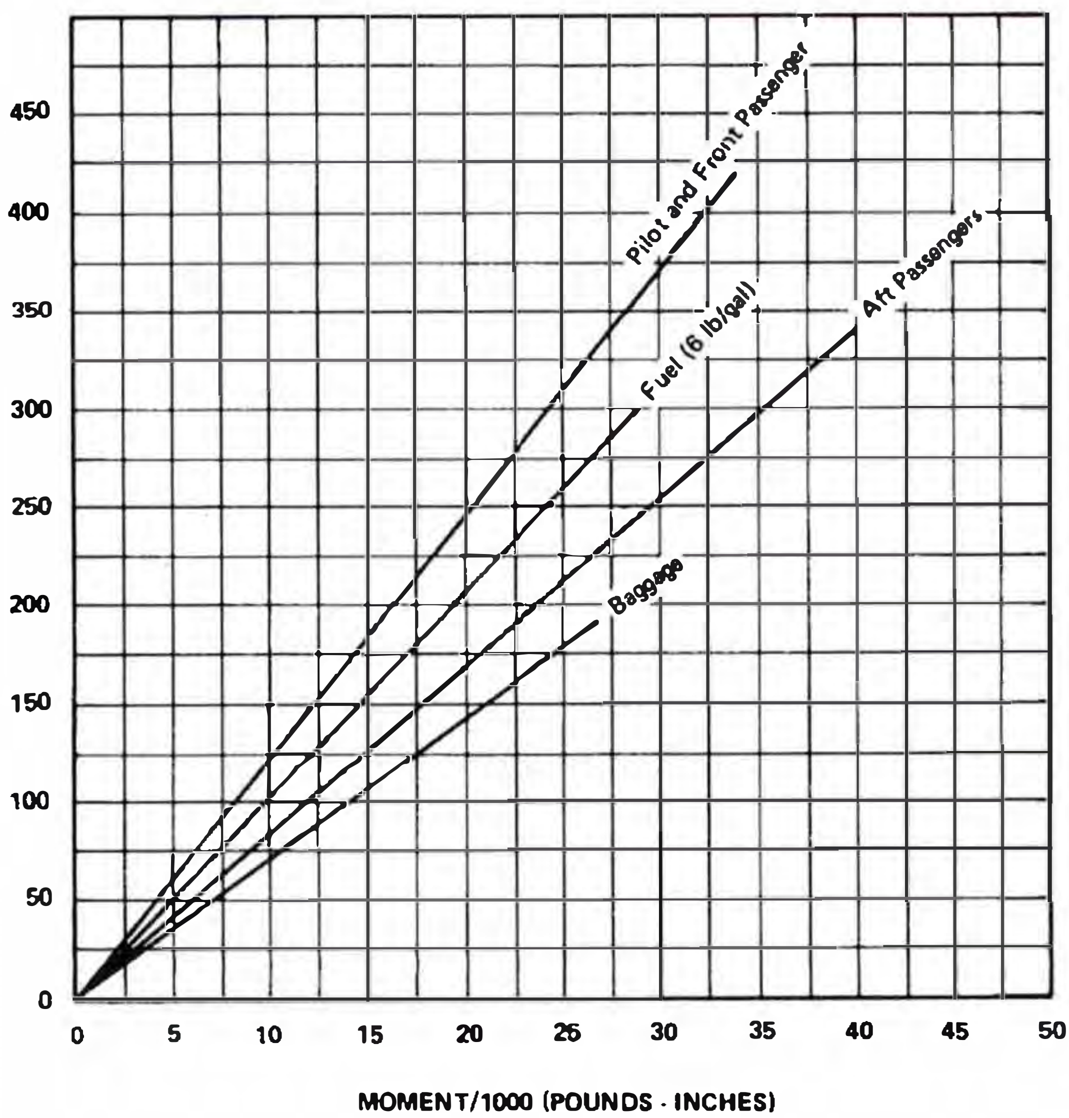
SAMPLE LOADING PROBLEM (NORMAL CATEGORY)
Figure 6-9

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger		80.5	
Passengers (Rear Seats)*		118.1	
Fuel (48 Gallon Maximum)		95.0	
Baggage (200 Lbs. Maximum)*		142.8	
Ramp Weight (2558 Lbs. Normal, 2138 Lbs. Utility Maximum)			
Fuel Allowance For Engine Start, Taxi and Run Up	-8	95.0	-760
Takeoff Weight (2550 Lbs. Normal, 2130 Lbs. Utility Maximum)			

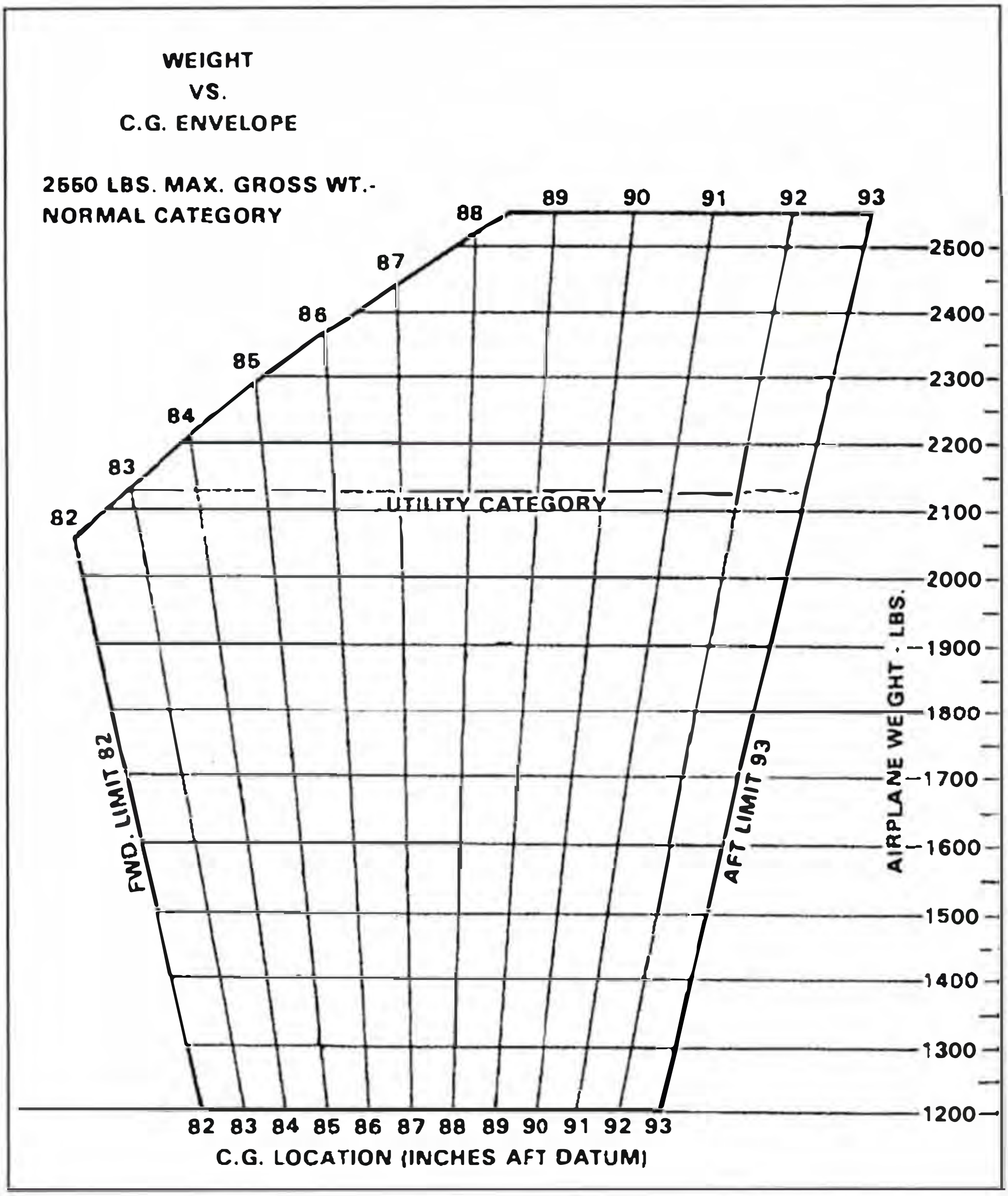
Totals must be within approved weight and C.G. limits. It is the responsibility of the airplane owner and the pilot to ensure that the airplane is loaded properly. The Basic Empty Weight C.G. is noted on the Weight and Balance Data Form (Figure 6-5). If the airplane has been altered, refer to the Weight and Balance Record for this information.

*Utility Category Operation - No baggage or rear passengers allowed.

WEIGHT AND BALANCE LOADING FORM
Figure 6-11



LOADING GRAPH
Figure 6-13



C.G. RANGE AND WEIGHT
Figure 6-15

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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

7.1 THE AIRPLANE

The PA-28-181 ARCHER III is a single-engine, low-wing monoplane of all metal construction. It has four-place seating, two hundred pound baggage capacity, and a 180 horsepower engine.

7.3 AIRFRAME

The basic airframe, except for a tubular steel engine mount, steel landing gear struts, and other miscellaneous steel parts, is of aluminum alloy construction. The wing tips, the cowling, the tail surfaces - are of fiberglass or ABS thermoplastic. Aerobatics are prohibited in this airplane since the structure is not designed for aerobatic loads.

The semi-tapered wings have a laminar flow type NACA 652-415 airfoil. The wings are attached to each side of the fuselage by insertion of the butt ends of the respective main spars into a spar box carry-through which is an integral part of the fuselage structure, providing, in effect, a continuous main spar with splices at each side of the fuselage. There are also fore and aft attachments at the rear spar and at an auxiliary front spar.

7.5 ENGINE AND PROPELLER

The ARCHER III is powered by a four-cylinder, direct drive, horizontally opposed fuel injected engine rated at 180 horsepower at 2700 rpm. It is furnished with a starter, 70 ampere 28-volt alternator, shielded ignition wires, a fuel pump, and a dry, automotive type induction air filter.

The exhaust system is made entirely from stainless steel and is equipped with a single dual muffler. A heater shroud around the muffler is provided to supply heat for the cabin and windshield defrosting.

The fixed-pitch propeller is made from a one-piece alloy forging.

7.7 INDUCTION SYSTEM

The induction system incorporates an Avstar RSA-5AD1 type fuel injector. The injector is based on the principle of differential pressure, which balances air pressure against fuel pressure. The regulated fuel pressure established by the servo valve when applied across a fuel control (jetting system) makes the fuel flow proportional to airflow. Fuel pressure regulation by the servo valve causes a minimal drop in fuel pressure throughout the metering system. Metering pressure is maintained above most vapor forming conditions while fuel inlet pressure is low enough to allow use of a diaphragm pump. The servo system feature also checks vapor lock and associated starting problems.

The fuel injection servo meters fuel flow proportionally with airflow and maintains the mixture as manually set for all engine speeds. The fuel flow divider receives metered fuel and distributes fuel to each cylinder fuel nozzle.

The induction airbox assembly contains a valve that can open and allow airflow into the engine in the event of blockage of the primary induction air source. The air provided through the alternate air source is heated, which will also provide induction system icing protection. As this alternate air source is not filtered, the primary air source should always be used for takeoff.

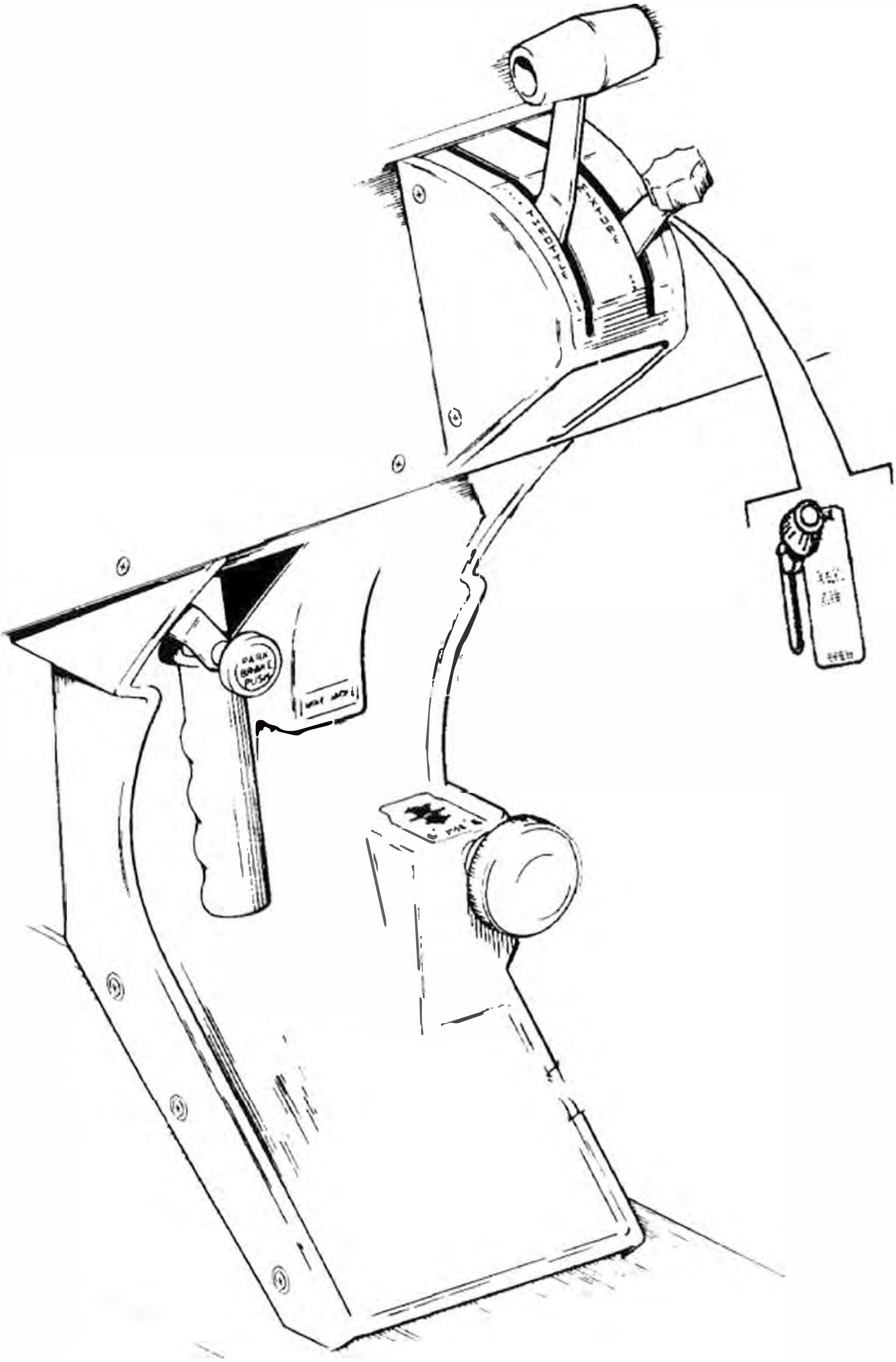
Control of the alternate air valve is through a lever located to the right of the engine control lever quadrant.

The pilot should read and follow the procedures recommended in the engine Operator's Manual for this engine, in order to obtain maximum engine efficiency and time between engine overhauls.

7.9 ENGINE CONTROLS

Engine controls consist of a throttle control and a mixture control lever. These controls are located on the control quadrant on the lower center of the instrument panel (Figure 7-1) accessible by the pilot and the copilot. The control cables are teflon-lined to reduce friction and binding.

The throttle lever is used to adjust engine RPM. The mixture control lever is used to adjust the air to fuel ratio. The engine is shut down by the placing the mixture control lever in the full lean position. See Section 4 of this handbook for proper leaning procedure.



CONTROL QUADRANT AND CONSOLE
Figure 7-1

7.9 ENGINE CONTROLS (continued)

The friction on the throttle and mixture controls can be adjusted by using the friction adjustment lever on the right side of the control quadrant.

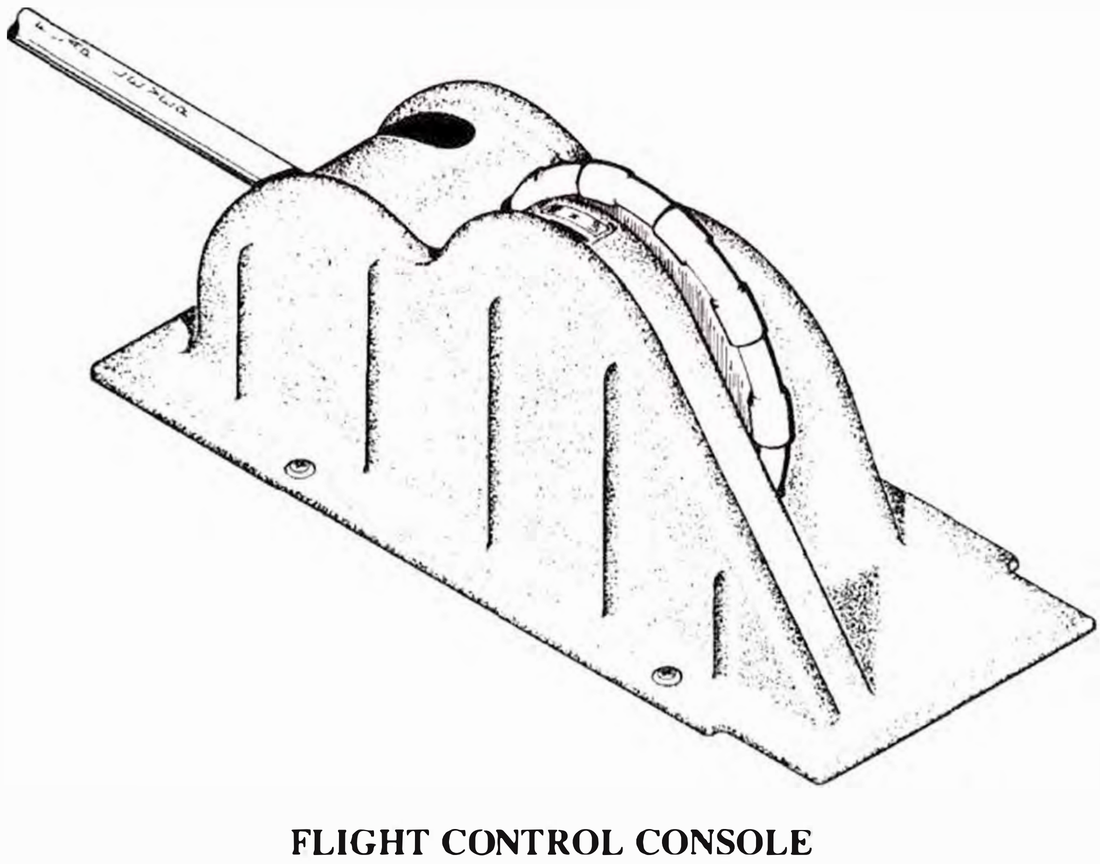
An alternate air control is located on the instrument panel right of the control quadrant. The control displays two positions: Open (down), Closed (up).

7.11 FLIGHT CONTROLS

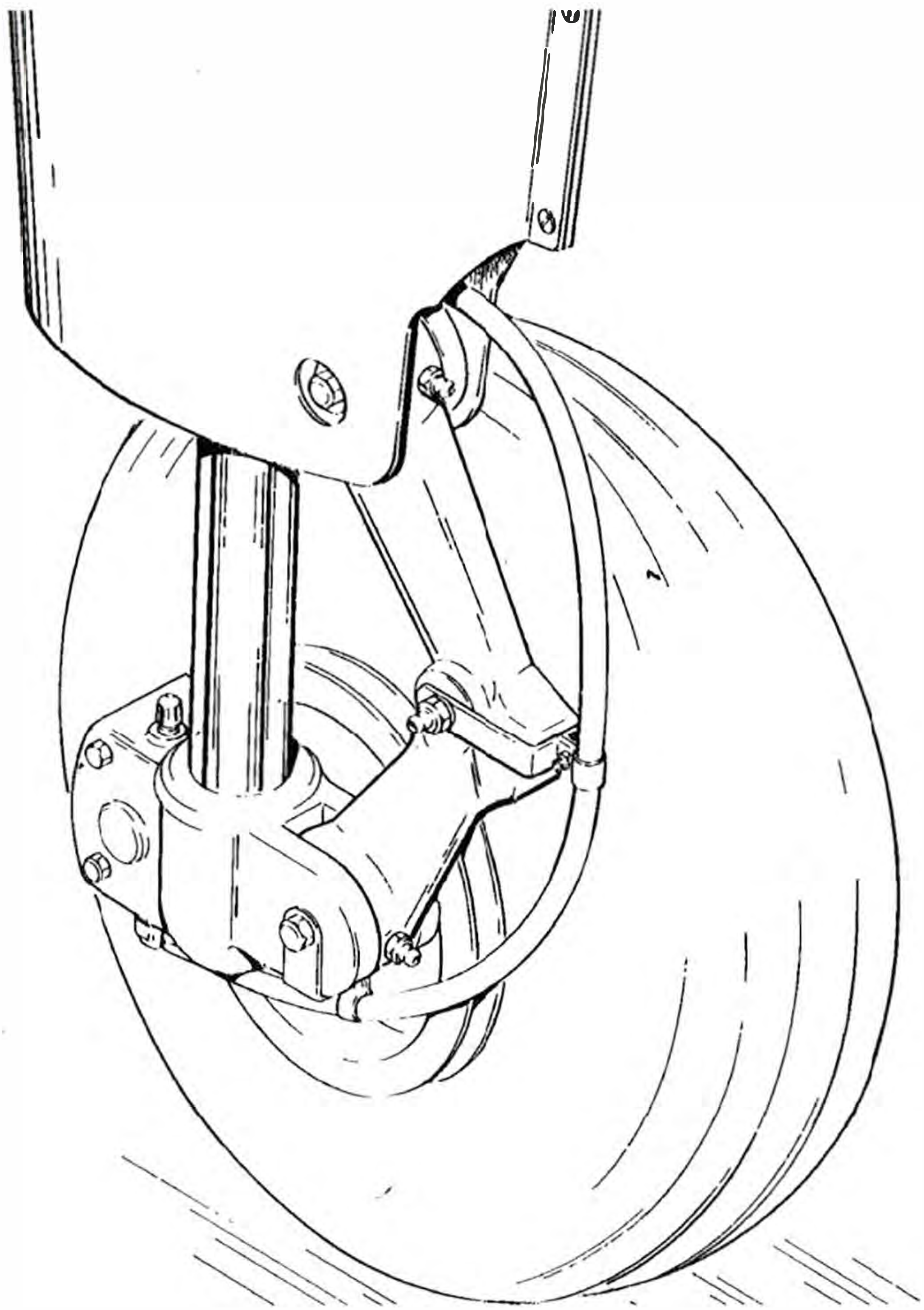
Dual controls are provided as standard equipment, with a cable system used between the controls and the surfaces. The horizontal tail (stabilator) is of the all-movable slab type with a trim tab mounted on the trailing edge of the stabilator to reduce the control system forces. This tab is actuated by a control wheel on the floor between the front seats (Figure 7-2).

A rudder trim adjustment is mounted on the right side of the pedestal below the throttle quadrant and permits directional trim as needed in flight (refer to Figure 7-1).

The flaps are manually operated and spring-loaded to return to the up position. A past-center lock incorporated in the actuating linkage holds the flap when it is in the up position so that it may be used as a step on the right side. The flap will only support a step load in the full up position. The flaps have three extended positions, 10, 25 and 40 degrees.



FLIGHT CONTROL CONSOLE
Figure 7-2



MAIN WHEEL ASSEMBLY
Figure 7-3
(Wheel fairing removed for clarity.)

7.13 LANDING GEAR

Three landing gear use Parker 6.00 x 6 wheels. Each main gear are equipped with a single hydraulically operated external caliper & disc brake assembly. All three wheels use 6.00 x 6, four-ply rating, Type III tires with tubes.

A spring device is incorporated in the rudder pedal torque tube assembly to provide rudder trim. By using the rudder pedals and brakes, the nose gear is steerable through a 20 degree arc each side of center. A shimmy dampener is also included in the nose gear.

The three struts are of the air-oil type, with a normal extension of 3.25 inches for the nose gear and 4.50 inches for the main gear.

The brake system consists of dual toe brakes attached to the rudder pedals and a hand brake lever located below, behind, and to the left of the throttle quadrant. The toe and hand brakes have their own master brake cylinders, but they share a common reservoir. The brake fluid reservoir is installed on the top left front face of the firewall. The parking brake is incorporated in to the hand lever master cylinder and is actuated by pulling back on the brake lever, depressing the knob attached to the left side of the handle, and releasing the hand brake lever. To release the parking brake, pull back on the hand brake lever to disengage the catch mechanism and allow the handle to swing forward (refer to Figure 7-1).

7.15 GARMIN G1000 AVIONICS SYSTEM

NOTE

The latest appropriate revision of the Garmin G1000 Cockpit Reference Guide for the Piper PA-28-181 Archer (Garmin P/N 190-02131-02), and the Garmin G1000 Pilot's Guide for the Piper PA-28-181 Archer (Garmin P/N 190-02130-02), contain operational information and detailed descriptions of the Garmin G1000 avionics system, the annunciator system (CAS and Non-CAS) and all warnings, cautions and advisories.

The Garmin G1000 Integrated Avionics System consists of a Primary Flight Display (PFD), Multi-Function Display (MFD), Audio Panel, Air Data / Attitude and Heading Reference System (ADAHRS), and the sensors and computers to process flight and engine information for display to the pilot. The system contains dual GPS SBAS receivers, dual VOR/ILS receivers, dual VHF communications transceivers, a transponder, and an integrated crew alerting system (CAS) to alert the pilot via status /advisory messages, caution messages and warning messages. The G1000 system also 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 ADF, DME, Class B TAWS, Automatic Dependent Surveillance-Broadcast (ADS-B out), Traffic Advisory System (TAS), Jeppesen ChartView, System 55X autopilot, Synthetic Vision, AOPA Facilities Directory, and the Garmin Datalink (GDL) for XM weather.

7.15 GARMIN G1000 AVIONICS SYSTEM (continued)

Primary Flight Display

The Primary Flight Display (PFD) 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 is presented in the lower left corner of the PFD. The measured value of OAT is adjusted for probe recovery factor and ram air effects to indicate static air temperature.

The primary function of the PFD is to provide attitude and heading data from the Air Data Attitude and Heading Reference System, and navigation and alerting information. The PFD may also be used for flight planning and increased situational awareness via the Synthetic Vision and Pathways.

The following controls are available on the PFD (clockwise from top right):

- Communications frequency volume and squelch knob
- Communications frequency transfer button
- Communications frequency set knobs
- Altimeter (BARO) setting knob (large knob)
- Course knob (small knob)
- Map range knob and cursor control
- FMS control buttons and knob
- Flight planning buttons
- PFD softkey buttons
- Altitude reference set knob
- Heading bug control
- Navigation frequency set knobs
- Navigation frequency transfer button
- 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

Primary Flight Display (continued)

real-time to obtain the user's position, velocity, and time. These GPS SBAS receivers are certified under TSO C146a and therefore is qualified as a primary navigation system. The PFD also displays autopilot status and mode annunciation, at the top, center of the display.

Air Data Attitude and Heading Reference System (ADAHRS)

The Air Data Attitude and Heading Reference System (ADAHRS) combines functions of the Air Data Computer (ADC) and the Attitude and Heading Reference System (AHRS).

Attitude and Heading Reference System (AHRS)

The AHRS part of the ADAHRS 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 determined invalid by the internal monitors, a red-x is displayed over the invalid parameter. If the AHRS becomes invalid, a red-x and amber ATTITUDE FAIL will be displayed on the attitude 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 part of the ADAHRS 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 determined invalid by the internal monitors, a red-x is displayed over the invalid parameter. If the ADC becomes invalid, a red-x and amber AIRSPEED FAIL, ALTITUDE FAIL, and VERTICAL SPEED FAIL will be displayed on the appropriate display.

Primary Flight Display (continued)

Reversionary Mode - PFD

The PFD will automatically be displayed in a composite format (Reversionary mode) for emergency use if the MFD display fails. The DISPLAY BACKUP button on the audio panel should also be pressed. In the composite mode, the PFD will display the engine parameters typically reserved for the MFD, including the full crew alerting system and autopilot annunciations. Limited map functions are available via the inset map.

Synthetic Vision System (SVS) - Optional

The Synthetic Vision System (SVS) is a visual enhancement to the G1000. Terrain-SVS is displayed on the PFD as a forward-looking depiction of the topography immediately in front of the aircraft. The depicted imagery is derived from the aircraft attitude, heading, GPS three-dimensional position, and a database of terrain, obstacles, and other relevant features. The following SVS enhancements appear on the PFD:

- Pathways
- Flight Path Marker
- Horizon Heading Marks
- Traffic Display
- Airport Signs
- Runway Display
- Terrain Alerting
- Obstacle Alerting
- Water
- Zero-Pitch Line

Optional Terrain Awareness and Warning System - Class B (TAWS-B) or standard Terrain-SVS information is integrated within SVS to provide visual and audible alerts of terrain threats relative to the projected flight path. In addition to the standard TAWS or Terrain-SVS alerts, Terrain-SVS offers a three-dimensional view of terrain and obstacles. Terrain and/or obstacles that pose a threat to the aircraft in flight are shaded yellow or red. SVS is activated from the PFD using the softkey located along the bottom edge of the display. Pressing the softkeys turn the related function on or off. SVS functions are displayed on three levels of softkeys. The PFD softkey leads into the PFD function softkeys, including synthetic vision. Pressing the SYN VIS soft key enables synthetic vision and displays the PATHWAY, SYN TERR, HRZN HDG, and APTSIGNS softkeys. The BACK softkey returns to the previous level of softkeys. The SYN TERR softkey must be active (grey with black characters) before any other SVS feature may be activated.

Multi-Function Display

The Multi-Function Display (MFD) is located in the center of the instrument panel. The primary functions of the MFD include the display of:

- Engine parameters
- Aircraft system parameters
- Dedicated map pages for:
- Navigation Map
- Traffic Map
- Weather Datalink
- TAWS-B

In addition to map functions, the MFD incorporates features for waypoint information, auxiliary information, flight plan information, and nearest information. These features are selected by use of the large FMS knob on the MFD. The selection options disappear after 10-seconds of inactivity and reappear by activating the large FMS knob.

Along the left side of the MFD is an Engine Indicating System (EIS) window that displays engine parameters, electrical system parameters, and fuel quantity. The Engine Indicating System (EIS) window is displayed at all times, regardless of the page selection.

The MFD also incorporates a dedicated Engine Indicating System (EIS) page as shown in Figure 7-4. Some of the parameters that normally appear in the EIS window now appear in different locations on the EIS page.

Multi-Function Display (continued)

EIS PAGE (TYPICAL)
Figure 7-4

Multi-Function 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. 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 a parameter whose indication appears on the Engine Indicating System (EIS) strip of the MFD, a CAS Warning text message will not be present and that parameter's indication will flash until the condition is removed.

Multi-Function 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 non-repeating double aural 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. If the Caution was initiated by a parameter whose indication appears on the Engine Indicating System (EIS) strip of the MFD, a CAS Caution text message will not be present and that parameter's indication will remain steady amber until the condition is removed. The Master Caution indicator and non-repeating double aural chime will accompany these cautions.

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.

Multi-Function Display (continued)

Crew Alerting System (CAS) Messages (continued)

Reversionary Mode - MFD

Should the PFD become inoperative, the MFD can be selected into reversionary mode by pressing the red DISPLAY BACKUP on the audio panel. The MFD will then show typical PFD information, including the horizon with airplane symbol, rotating compass card with heading and course deviation, the pilot selectable data fields, transponder information and G1000 system messages. Autopilot annunciations will not be available on the MFD in the reversionary mode configuration. 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 Garmin Datalink.

Navigation

See Section 1.21 for navigation system equipment approvals and Section 2.25 for navigation system limitations.

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 OPERATE 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.

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°.

Multi-Function Display (continued)

Traffic Information Service (TIS) (continued)

Traffic Map Page (Continued)

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”.
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.

Multi-Function Display (continued)

Traffic Information Service (TIS) (continued)

TIS Alerts (continued)

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.

NOTE

If the G1000 system is configured to use the optional Traffic Advisory System (TAS), TIS will not be available for use.

Traffic Advisory System (TAS) – Optional

The optional Garmin GTS 800 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 800 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 800 automatically enters STANDBY Mode and no traffic depictions or alerts will be given. The GTS 800 must be in OPERATE Mode for traffic to be displayed and for traffic advisories (TA) 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 when GPS altitude is less than 400 Ft above ground level (AGL).

Multi-Function Display (continued)

Traffic Advisory System (TAS) – Optional (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 GTS 800 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 12 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 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)

Multi-Function Display (continued)

Traffic Advisory System (TAS) – Optional (continued)

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 not considered a TA threat.
3. 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", along with additional voice information about the bearing, relative altitude, and approximate distance from the intruder that triggered the TA. For example, the voice alert "Traffic, 11 o'clock, high, three miles" would indicate that the traffic is in front of and slightly to the left of the own aircraft, above own altitude, and approximately three nautical miles away. A TA will be displayed for a minimum of 8 seconds, even if the condition(s) that triggered the TA are no longer present.
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.

Multi-Function Display (continued)

Terrain Proximity (continued)

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 "No GPS Position" text will be displayed at the center of the Terrain Proximity Page and on the PFD inset map if terrain is selected. If there is not a valid terrain/obstacle database, the system will not display the yellow and red colors associated with the offending obstacles and terrain.

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.

Multi-Function Display (continued)

Terrain Proximity (continued)

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 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).

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.

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS -B) – 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-B) is an optional feature used to increase situational awareness and aid in reducing controlled flight into terrain (CFIT). TAWS-B 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-B satisfies TSO-C151b Class B certification requirements whereas the more limited Terrain Proximity does not.

TAWS-B 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.

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. WireAware obstacle database coverage exists mainly in the United States; with limited coverage in portions of Canada and Mexico. The height of the wire obstacles is commonly estimated and should not be relied upon for maneuvering decisions.

TAWS-B uses information provided from the GPS receiver to provide a horizontal position and altitude. GPS altitude, derived from satellite measurements, is converted to the height above geodetic sea level (GSL), which is the height above mean sea level (MSL) calculated geometrically. GPS position and GSL altitude is used to generate TAWS-B terrain and obstacle alerts. GSL altitude accuracy is affected by satellite geometry, but is not subject to variations in pressure and temperature that normally affect pressure altitude sensors. GSL altitude does not require local altimeter settings to determine MSL altitude.

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS-B) – Optional (continued)

System Status:

During G1000 power-up, TAWS-B conducts a self-test of its aural and visual annunciations. The system test can also be manually initiated by selecting the TAWS-B 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 initiated automatically or manually. TAWS-B System Testing is disabled when ground speed exceeds 30 knots.

TAWS-B requires the following to operate properly:

- A valid terrain/obstacle/airport terrain database
- A valid 3-D GPS position solution

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-B 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-B:

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-B Page, select the MAP softkey (select INSET softkey for the PFD inset map) on the Navigation Map Page and then select the TERRAI Nsoftkey. When TAWS-B is selected on maps other than the TAWS-B Page, an icon to indicate the feature is enabled for display and a legend for TAWS-B terrain colors is shown.

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS-B) – Optional (continued)

Operation of TAWS-B (continued)

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 TAWS-B 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 then pushing the knob in the desired direction until it is over the obstacle of interest.

To inhibit the aural and visual Premature Descent Alert (PDA) and Forward Looking Terrain Awareness (FLTA) alerts (RTC, ITI, ROC, IOI, RLC, and ILI), press the INHIBIT softkey on the TAWS-B 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 is inhibited, a TAWS INH alert annunciation is displayed on the TAWS-B page of the MFD and at the upper left corner of the altitude tape on the PFD.

NOTE

If the TAWS system has failed or the TAWS alerts are inhibited manually when the Final Approach Fix is the active waypoint on 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.

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS-B) – Optional (continued)

TAWS-B Page:

The TAWS-B 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 base map. Aviation data (airports, VORs, and other NAVAIDs) can be displayed for reference. If an obstacle and the projected flight path of the aircraft intersect, the display automatically zooms in to the closest potential point of impact on the TAWS-B Page.

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.

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-B Alerts:

Alerts are issued when flight conditions meet parameters that are set within TAWS-B software algorithms. TAWS-B 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-B 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-B 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-B Page)

Refer to the Cockpit Reference Guide for a list of TAWS-B Alerts.

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Table 7-1

Multi-Function Display (continued)

Terrain Awareness and Warning System (TAWS-B) – Optional (continued)

TAWS-B Alerts (continued)

Response Technique – WARNING:

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 target pitch attitude of 15°.
3. Adjust pitch attitude to ensure terrain clearance, while respecting stall 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 obstacle clearance is assured.
   - Only vertical maneuvers are recommended unless operating in VMC or the pilot determines, after using all available information and instruments, that a turn, in addition to the vertical escape maneuver, is the safest course of action.
   - Pilots are authorized to deviate from their current air traffic control (ATC) clearance to the extent necessary to comply with a TAWS warning.

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.

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional

SiriusXM Weather services is provided through the optional GDL 69eA, a remote-mounted data-link satellite receiver. SiriusXM Satellite Weather services, available by subscription, have coded IDs unique to the installed GDL 69eA. These coded ID's must be provided to activate service. These IDs are located on the label on the back of the Data Link Receiver and on the SiriusXM Information Page on the MFD. SiriusXM uses the coded ID to send an activation signal that allows the G1000 system to display weather data provided through the GDL 69eA.

NOTE

Pulling the XM circuit breaker will disable the Garmin Datalink (GDL), which include SiriusXM weather.

SiriusXM Weather:

Received graphical weather information and associated text is displayed on the Multi Function Display (MFD) and the Primary Flight Display (PFD) Inset Map. SiriusXM 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 SiriusXM Weather data is the Weather Data Link Page in the Map Page Group. This is the only G1000 map display capable of showing information for all available SiriusXM weather products.

Selecting the products for display on the Weather Data Link Page is made by pressing the softkey associated with that product. The label for the product is shown in capital letters in the Weather Products column in Table 7-2. When a weather product is selected for display, the corresponding softkey label changes to gray to indicate the product is enabled. Unavailable weather products have subdued softkey labels (softkeys are disabled from selection).

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional (continued)

SiriusXM 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

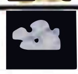
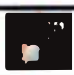
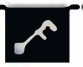
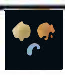
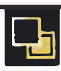
When a weather product is active on the Weather Data Link Page or the Navigation Map Page, the age of the data is displayed on the screen. The product age shown on the display is the elapsed time (in minutes) since the weather data provider compiled the weather product. This age can be significantly different (newer) than the actual age of the weather contained within the weather product. Weather products are broadcast at specific intervals.

If for any reason, a weather product is not refreshed within the Broadcast Rate intervals, the system removes the expired data from the display and shows dashes instead of the product age. This ensures that the displayed data is consistent with what is currently being broadcast by SiriusXM weather service. If more than half of the expiration time has elapsed, the color of the product age changes to yellow. If the data for a weather product is not available, the system displays "N/A" instead of product age next to the weather product symbol.

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional (continued)

SirusXM Satellite Weather (continued)

Weather Product	Symbol	Expiration Time (minutes)	Broadcast Rate (minutes)
NEXRAD		30	5 (U.S.) 10 (Canada)
Cloud Top (CLD TOP)		60	15
Echo Top (ECHO TOP)		30	7.5
SirusXM Lightning (XM LTNG)		30	5
Cell Movement (CELL MOV)		30	5
SIGMETs/AIRMETs (SIG/AIR)		60	12
METARs		90	12
City Forecast (CITY)		60	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
Icing Potential (CP and SLD) (ICING)		90	22
Pilot Weather Report (PIREPs)		90	12
Air Report (AIREPs)		90	12
Turbulence (TURB)		180	12
No Radar Coverage (RADAR CVRG)	No product image	30	5
TFRs	No product image	60	12
TAFs	No product image	60	12

Weather Product Symbols, Expiration Times and Broadcast Rates
Table 7-2

Multi-Function Display (continued)

Garmin Datalink (GDL) – Optional (continued)

SirusXM Satellite Weather (continued)

Table 7-2 shows the weather product symbols, the expiration time and the broadcast rate. The broadcast rate represents the interval at which SiriusXM weather service transmits new signals that may or may not contain updated weather products. It does not represent the rate at which weather information is updated or new data is received by the Data Link Receiver. Weather data are refreshed at intervals defined and controlled by XM Satellite Radio and their data vendors.

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.

Data Logger:

An optional GDL 59 may be installed to provide a Wi-Fi transceiver for transmitting data collected from the G1000 for trend monitoring and maintenance planning. The stored data logs can include engine trend and exceedance data, system maintenance data, and crew advisory system (CAS) messages. The system can store up to two gigabytes of data. Post flight reports can be sent wirelessly to a Wi-Fi hotspot through the GDL 59's Wi-Fi transceiver either manually via the MFD or configured for automatic upload.

Databases

The G1000 utilizes several databases. Database titles display in yellow if they have expired or are in question. Database cycle information is displayed at power up on the MFD screen, but more detailed information is available on the AUX pages. Internal database validation prevents incorrect data from being displayed.

The upper Secure Digital (SD) data card slot is typically vacant as it is used for software maintenance and navigational database updates. The lower data card slot should contain a data card with the system's terrain/obstacle information and optional data such as Safe Taxi, Flight Charts and JeppView electronic charts.

Safe Taxi Database

The Garmin Safe Taxi database contains detailed airport diagrams for selected airports. These diagrams aid in following ground control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals and services. This database is updated on a 56-day cycle and has no expiration date.

Terrain Database

The terrain databases are updated periodically and have no expiration date. Coverage of the terrain database is all longitudes and latitudes.

Obstacle Database

The obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. 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. Coverage of the obstacle database includes the United States and Europe. This database is updated on a 56-day cycle and has no expiration date.

Navigation Database

Navigation database coverage options include the Americas, International, or Worldwide. This database is updated on a 28-day cycle.

Databases (continued)

FliteCharts Database

The Garmin FliteCharts database contains procedure charts for the coverage area purchased. This database is updated on a 28-day cycle. If not updated within 180 days of the expiration date, FliteCharts will no longer function.

JeppView Database

The Jeppesen JeppView electronic charts database contains procedure charts for the coverage area purchased. An own-ship position icon will be displayed on these charts. This database is updated on a 14-day cycle. If not updated within 70 days of the expiration date, JeppView will no longer function.

NOTE

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

Autopilot (Optional)

AUTOPILOT CONTROLS

Controls for selecting lateral and vertical flight director modes and for engaging/ disengaging autopilot and flight director, are located on the MFD bezel. 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.

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 in 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.

Autopilot (Optional) (continued)

AUTOPILOT OPERATION

When the AVION MASTER 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, 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.

If the information required to compute a flight director mode becomes invalid or unavailable, the flight director automatically reverts to the default mode for that axis. A flashing yellow mode annunciation and annunciator light indicate loss of sensor (ADC) or navigation data (VOR, LOC, GPS, VNV, SBAS) required to compute commands. If the loss occurs in the lateral axis, the system defaults to ROL mode and rolls wings level. If the loss occurs in the pitch axis, the system defaults to PIT mode and maintains the current pitch attitude. The flashing annunciation stops when the affected mode key is pressed, another mode for the axis is selected, or after 10 seconds, if no action is taken.

Autopilot (Optional) (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 PITCH TRIM 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
- Total ADC failure
- Inability to compute default flight director modes

After any autopilot disengagement, the aural disconnect alert can be canceled by pressing the A/P DISC switch or manual electric pitch trim switches

AUTOPILOT FEATURES

Overspeed Recovery Mode

Overspeed Recovery attempts to prevent the aircraft from exceeding the maximum approved autopilot operating speed by providing a flight director pitch up command whenever the airspeed trend vector exceeds 140 KIAS. 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

Autopilot (Optional) (continued)

AUTOPILOT FEATURES (continued)

Overspeed Recovery Mode (continued)

is not active in ALT or GS modes and the airspeed reference (FLC) cannot be adjusted while in Overspeed Recovery mode.

Takeoff Mode (Optional)

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 (Optional)

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 Go-Around checklist (Section 4).

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. When in USP mode, the flight director modes remain unchanged, and the pitch mode annunciation turns white. In all cases, the pilot should take action to exit the underspeed condition by increasing engine power and decreasing drag as appropriate.

Autopilot (Optional) (continued)

AUTOPILOT FEATURES (continued)

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 may be activated at anytime with the autopilot engaged or disengaged. Activation is indicated by green LVL and LVL for lateral and vertical modes respectively. Level mode should not be relied upon if the autopilot is operating in any failure condition.

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. 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. If ESP has failed, an ESP FAIL system message will be displayed under the Messages softkey on the PFD.

Autopilot (Optional) (continued)

AUTOPILOT FEATURES (continued)

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.

Audio Panel

The audio panel contains traditional transmitter and receiver selectors, as well as an integral intercom and marker beacon system. The marker beacon lights appear on the PFD and the marker beacon audio can be heard over the headsets or cockpit speaker. In addition, a clearance recorder records the last 2½ minutes of received audio. Lights above the audio panel selection buttons indicate which selections are active. If a failure of COM1 and COM2 occurs, a fail-safe communications path is available between the pilot's headset/microphone and COM1. The fail-safe communications path is activated by pulling the AUDIO MKR circuit breaker located on the circuit breaker panel.

The PILOT knob located towards the bottom of the audio panel allows switching between volume and squelch control as indicated by illumination of VOL or SQ. Turn the knob to adjust intercom volume or squelch. The MAN SQ key must be selected to allow squelch adjustment.

The red DISPLAY BACKUP button at the bottom of the audio panel allows manual selection of the reversionary display mode.

GTX 335R Transponder (Extended Squitter)

The GTX 335R Transponder provides Mode A, C, and S altitude and position reporting information for the G1000 system as well as TIS-A and ADS-B OUT (1090 ES). It includes the following features:

- ADS-B Out, TIS traffic display output and aural alerting.
- Level-2 data link capability which is used to exchange information between aircraft and ATC facilities.
- Surveillance identifier capability which is required in Europe.
- Flight Identification reporting which reports the aircraft identification as either the aircraft registration or an assigned flight plan number.
- Altitude reporting as provided by the aircraft air data system.
- Airborne status determination which reports Ground or Flight mode.
- Transponder capability reporting which communicates Mode A, Mode C, and Mode S capability.
- Mode S Enhanced Surveillance (EHS) requirements.
- Acquisition squitter which is a 24-bit identification address transmitted periodically to enable ground stations and aircraft equipped with a Traffic Avoidance System (TAS) to recognize similarly equipped aircraft.

The Hazard Avoidance Section provides more details on traffic avoidance systems.

GTX 345R Transponder (Option)

In addition to the capabilities of the GTX 335R transponder, the GTX 345R provides Automatic Dependent Surveillance-Broadcast (ADS-B) IN (1090) (UAT, TIS-B, and FIS-B) capability. The unit receives and displays ADS-B transmissions from other ADS-B OUT equipped aircraft, ADS-R, and TIS-B information from ground stations.

- ADS-BOut, Dual-band ADS-B In traffic display output and aural alerting
- Integration with TAS traffic systems
- FIS-B weather and Oight information display output
- Connect PED interface to traffic, weather, and AHRS, via Bluetooth
- Altitude deviation alerting
- Timers: count up, count down, Oight, trip
- Static (Outside) air temperature display
- Density and pressure altitude display
- Internal GPS (Optional)

GTX 345R Transponder (Option) (continued)

Traffic information will be displayed as a combination of two systems:

- ADS-B traffic information from other ADS-B equipped aircraft
- GTS 800 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 800 system will display all other transponder equipped aircraft.

ADS-B transmission defaults to enabled at each power cycle. To enable/disable the transmission of the ADS-B information, press the ADS-B TX Softkey under the PFD XPDR menu. Do not disable ADS-B transmission unless requested by ATC. If either the GTX 335R or 345R fails, a yellow "x" will be displayed in the XPDR field.

7.17 STANDBY INSTRUMENT

The aircraft may be equipped with either an Aspen standby instrument or Garmin G5 standby instrument. Both instruments are fully digital, independent flight instrument displays which provide attitude, barometric altitude, airspeed, heading, vertical speed, slip/skid and turn rate indications. The purpose of these standby flight instruments 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 standby instruments are located to the left of the PFD in direct view of the pilot. During normal operation, power is provided by the essential bus. During an alternator failure, the standby instrument will continue to operate on the essential bus until the primary battery is depleted. The standby instrument will then operate on the emergency battery/bus for 30 minutes permitting the pilot to find a suitable landing location.

7.17 STANDBY INSTRUMENT (continued)

Aspen Standby Instrument

In the event of a complete electrical failure of the alternator, primary and emergency batteries; the Aspen standby instrument will revert to its internal battery allowing approximately 30 additional minutes of operation. In this occurrence the Aspen standby instrument will illuminate an "ON BAT" annunciation and display an estimated battery charge state. For a detailed system description of the Aspen standby unit, refer to Aspen Evolution Backup Display (EBD) Pilot's Guide P/N 091-00027-001, Revision A, or later appropriate revision.

Garmin G5 Standby Instrument

In the event of a complete electrical failure of the alternator, primary and emergency batteries; the Garmin G5 standby instrument will revert to its internal battery allowing approximately four hours of additional operation. In this occurrence the Garmin G5 standby instrument will display a battery status indicator showing battery endurance in hours and minutes.

Garmin Standby Instrument Operation

The Garmin G5 standby instrument will power on with the application of aircraft power. The display will automatically power down when aircraft power is removed during aircraft shutdown. If there is a desire to power down the G5 standby unit without removing aircraft power, press and hold the power button.

The Garmin G5 standby knob performs the following functions:

Press	Press to access the Menu.
	From the Menu, press to select the desired menu item.
	Press to accept the displayed value when editing numeric data or selecting from a list.
Turn	From the Menu, turn the knob to move the cursor to the desired menu item.
	Turn to select the desired value when editing numeric data or selecting from a list.
	Turn to adjust the baro setting.

7.17 STANDBY INSTRUMENT (continued)

Backlight Intensity Adjustment:

The Garmin G5 powers up in the Auto adjustment mode.

To adjust the backlighting:

To select Manual mode from Auto mode:

1. While the unit is turned on, press the Power button.
2. Turn the knob to manually adjust the backlight intensity.
3. Press the knob to close the backlight page.

To select Auto mode from Manual mode:

1. While the unit is turned on, press the Power button.
2. Press the Power button again to select Auto.
3. Press the knob to close the backlight page.

System Messages

The Garmin standby has the capability of displaying system messages to the crew along the bottom of the display. A system message is indicated through a white ! indication on the G5.

Messages can be displayed by pressing the Garmin G5 standby knob, and selecting the Message menu item.

7.17 STANDBY INSTRUMENT (continued):

Refer to Garmin G5 Electronic Flight Instrument Pilot's Guide for Certified Aircraft, part number 190-01112-12 Rev D (or later approved revisions), for a list of system messages and description of the Garmin G5 standby flight instrument. This reference material is not required to be on board the aircraft but does contain a more in depth description of all the functions and capabilities of the Garmin G5 standby instrument.

NOTE

The standby instrument must be checked for proper operation prior to flight. IFR flight is prohibited when any component of the standby instrument is inoperative.

7.19 FUEL SYSTEM

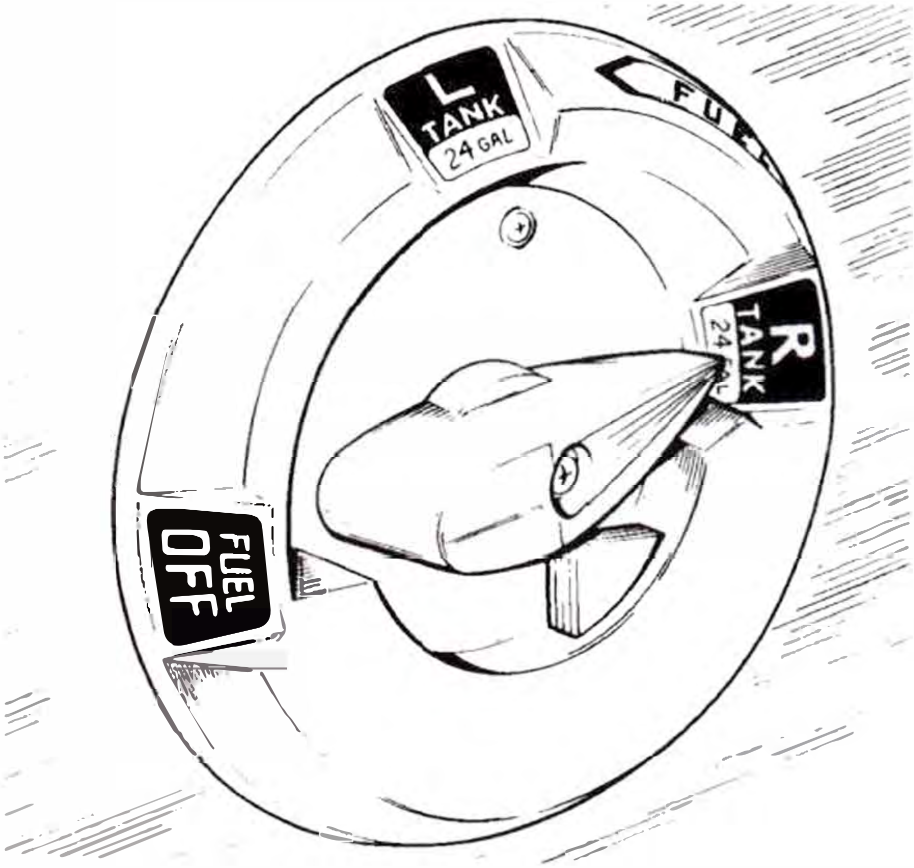
Two twenty-five gallon (24 gallons usable) fuel tanks are secured as the leading edge of each wing by screws and nut plates. Each tank contains an indicator tab in the filler neck to determine fuel status. 17 gallons of usable fuel is measured at the bottom of each indicator tab.

The minimum fuel grade is 100 or 100LL. There is one float type fuel sensor in each wing. The signal corresponding to the position of the floats is sent to the Garmin Engine Airframe (GEA) interface unit where it is converted into fuel quantity. The fuel quantity information is then sent to the MFD for display.

After power-up of the avionics system, the Fuel On Board (FOB) should be synchronized with the corresponding fuel quantity sensed in each tank. This can be done by pressing the FOB SYNC softkey on the MFD's AUX-WEIGHT PLANNING page. The gallons remaining will be set to the current fuel quantity in the tanks and the gallons used will be set to zero as shown in the FUEL CALC window of the ENGINE page of the MFD. Pressing FOB SYNC softkey is required to make calculated parameters such as range, endurance, fuel over destination (FOD) and the fuel range ring accurate.

The fuel selector control contains three positions: "OFF", "L" (left tank), and "R" (right tank). To turn the fuel off, rotate selector handle counter-clockwise to the "OFF" position while depressing the button. Rotate the selector handle clockwise to either "L" or "R" positions to permit fuel flow. The button will release automatically preventing accidental selection of the fuel to the off position.

7.19 FUEL SYSTEM (continued)

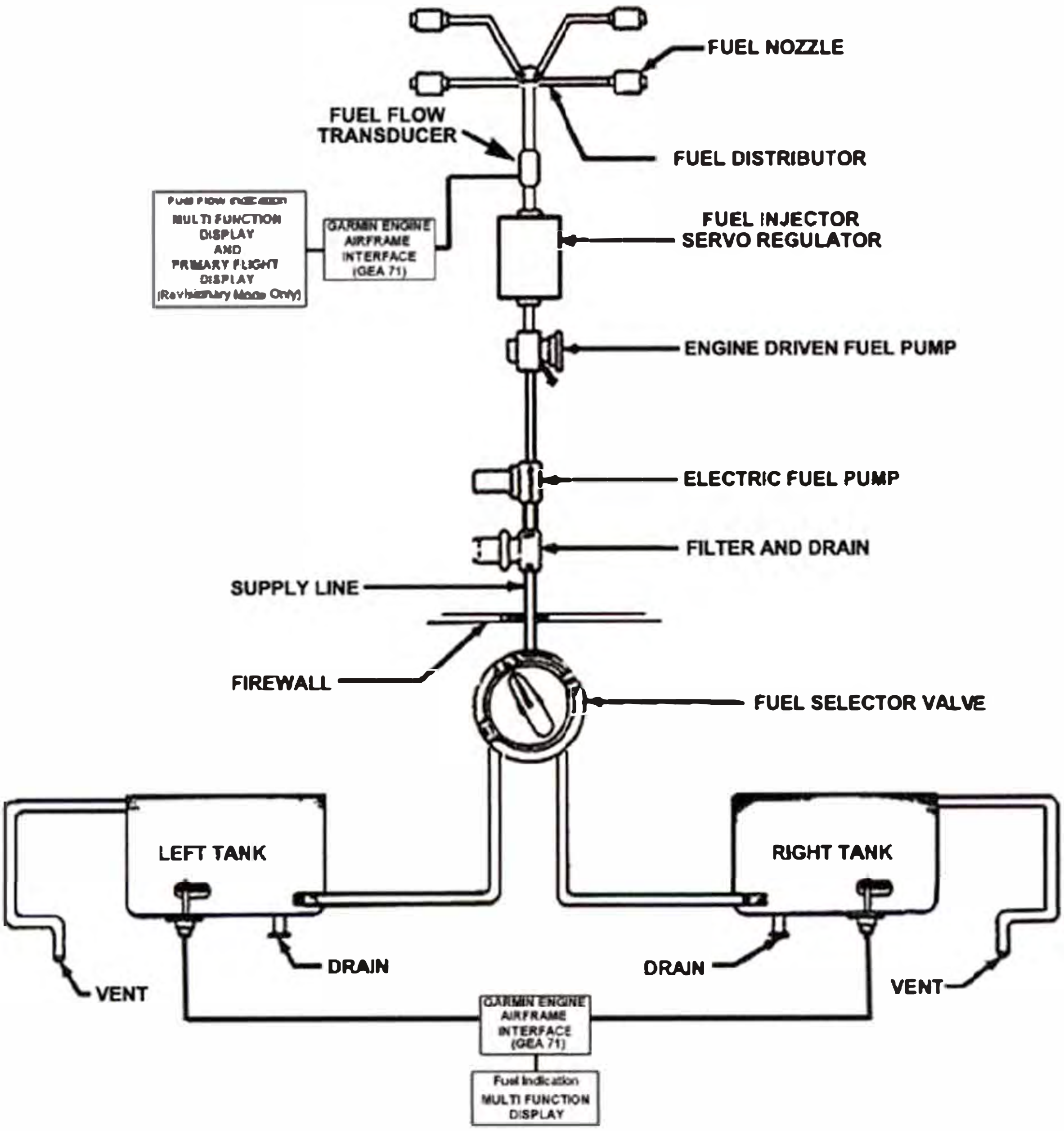


FUEL SELECTOR
Figure 7-5

An auxiliary electric fuel pump is provided in case of failure of the engine driven pump. The electric pump should be on for all takeoffs and landings, and when switching tanks. The pump switch is located in the switch panel above the throttle quadrant.

The fuel drain is provided at the lowest, inboard corner of each wing tank. An engine fuel strainer is accessible through the exterior, lower, left nose section. Each fuel drain and strainer should be opened and the fuel checked for contamination prior to the first flight of the day or after each refueling. Refer to paragraph 8.21c for fuel draining procedure.

7.19 FUEL SYSTEM (continued)



FUEL SYSTEM SCHEMATIC
- Fuel Injected Engine -
Figure 7-6

7.21 ELECTRICAL SYSTEM

The 28 volt electrical system includes a 24 volt primary battery, a 70 ampere 28 volt alternator, a single external power connector and an isolated 24 volt emergency battery. The electrical system is capable of supplying sufficient current to all the required equipment for day/night IFR and day/night VFR operations.

Primary battery

The primary battery provides for electric power to the equipment when the engine is not running and for engine starting. When energized by the battery master switch the primary battery supplies electrical power to the starter, as well as all items on the Essential Bus, Non-Essential Bus and Lighting Bus. If it becomes necessary to charge the battery by an external source, it should be removed from the airplane prior to charging. The primary battery is mounted on a shelf in the aft fuselage area.

Alternator

The alternator is belt driven directly from the engine. Once the engine is running and the ALTR switch is activated, the alternator becomes the primary source of electrical power for the aircraft. The primary battery provides stored electrical power to back up the alternator. During normal operations, the battery is charged by the alternator.

Voltage regulator

A solid state voltage regulator is located just forward of the instrument panel on the left side of the aircraft. The voltage regulator is designed to regulate the electrical system bus voltage to 28 volts and to prevent damage to the electrical and avionics equipment by removing the alternator from the circuit if its output exceeds 32 volts. In this situation an ALTR FAIL warning CAS message will illuminate.

Emergency Battery

The emergency battery provides electrical power to the emergency bus in the unlikely event of a complete electrical failure. With the EMERG BATT switch in the ARM position, power is applied to the emergency bus automatically if electrical power is removed from the primary electrical system. Functions available via the emergency bus include all standby instrument functions, PFD functions (nav/com #1 only), and the audio panel. The emergency battery is sized to provide a minimum duration of 30 minutes of electrical power to the emergency bus equipment.

7.21 ELECTRICAL SYSTEM (continued)

CAUTION

30-minutes of power from the emergency battery is only available if its voltage is greater than 23.3 volts prior to flight. Ensure that a minimum of 23.3 volts is available prior to flight.

The emergency battery is isolated from the emergency bus equipment via a relay, which is controlled from the cockpit by the EMERG BATT switch. The emergency battery is also isolated from the electrical power generating system via a diode in the circuit. This diode will allow the generating system to charge the emergency battery during normal operations but prevents discharge of the emergency battery when operating with the alternator off. The emergency battery is mounted on a shelf in the aft fuselage area just forward of the primary battery.

Switches

All powerplant, electrical power, exterior lights, and avionics master switches are grouped in an overhead switch panel as shown in Figure 7-10. The circuit breaker panel is located on the lower right side of the instrument panel (Figure 7-9). Each breaker is clearly marked to show which circuit it protects.

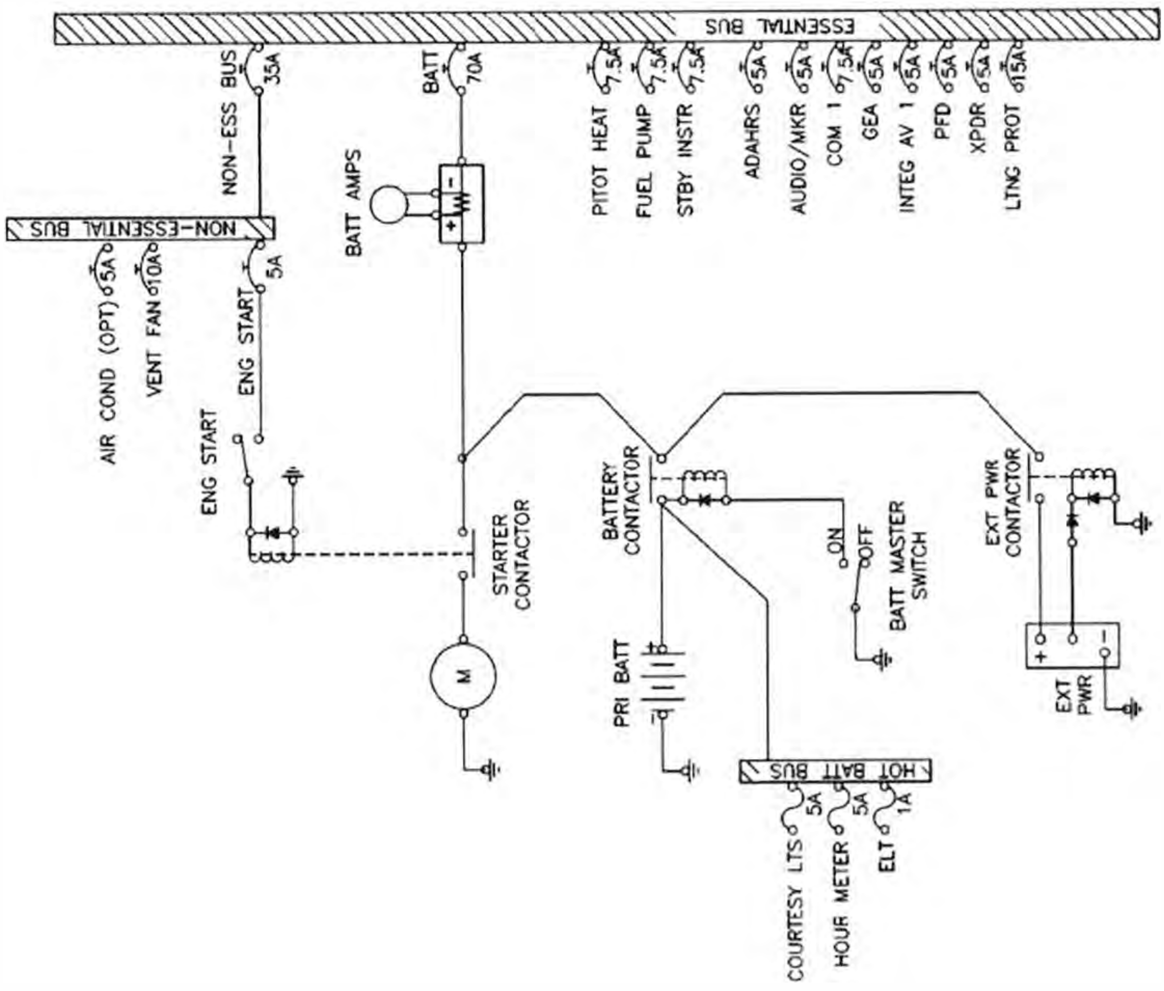
Standard electrical accessories include the starter, electrical fuel pump, the stall warning lift detector, navigational lights, anti-collision lights, landing lights, and cabin dome lights. The autopilot (optional), pitot heat, ventilation fan, and air-conditioning (optional) switches are located in the middle of the instrument panel, just below the G1000 audio panel.

Two lights mounted in the overhead panel provide cabin flood lighting for night flying. The lights are controlled by rheostat switches located in the overhead panel. A map light window in each lens is actuated by an adjacent switch. A wing tip landing light system consists of two lights (one in each wing tip) and is operated by a rocker type switch mounted in the overhead switch panel. Light intensity for the back-lit switches, instrument panel lights, and the avionics are controlled by three rotary control located on the instrument panel just below the electrical accessory switches.

WARNING

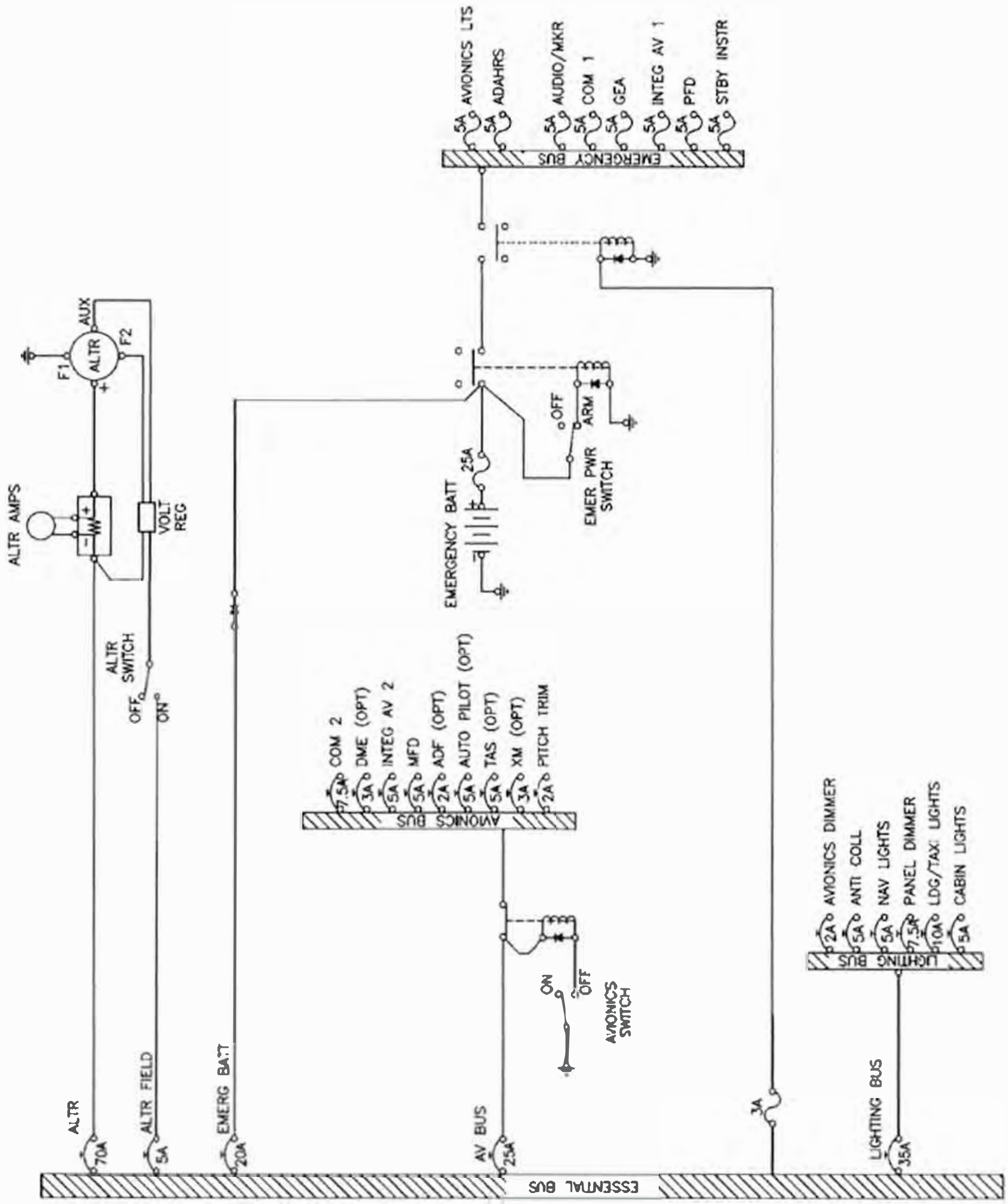
Anti-collision (strobe) lights should not be operating when flying through cloud, fog or haze, since the reflected light can produce spatial disorientation. Strobe lights should not be used in close proximity to the ground such as during taxi, takeoff or landing.

7.21 ELECTRICAL SYSTEM (continued)



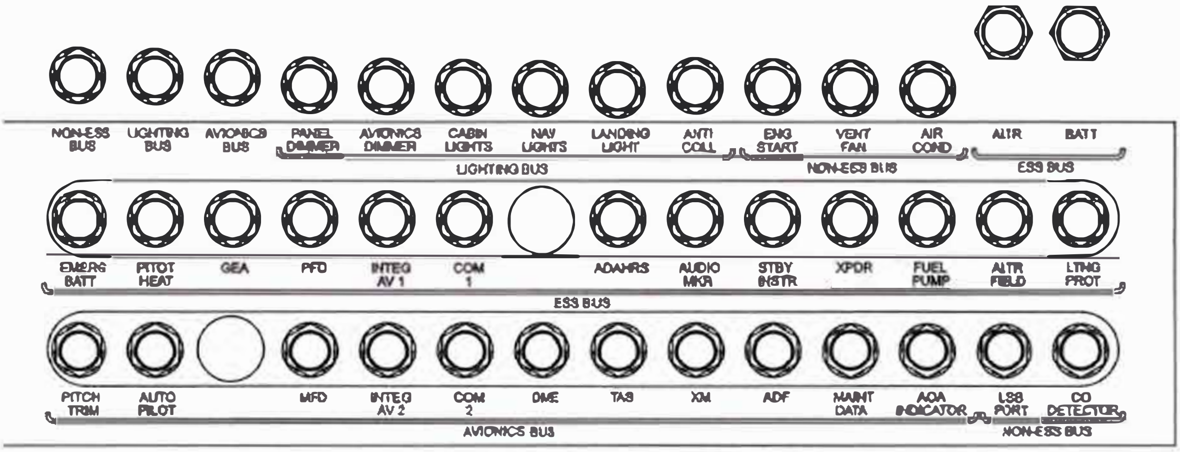
ALTERNATOR AND STARTER SCHEMATIC
Figure 7-7
Sheet 1 of 2

7.21 ELECTRICAL SYSTEM (continued)



ALTERNATOR AND STARTER SCHEMATIC
Figure 7-7
Sheet 2 of 2

7.21 ELECTRICAL SYSTEM (continued)

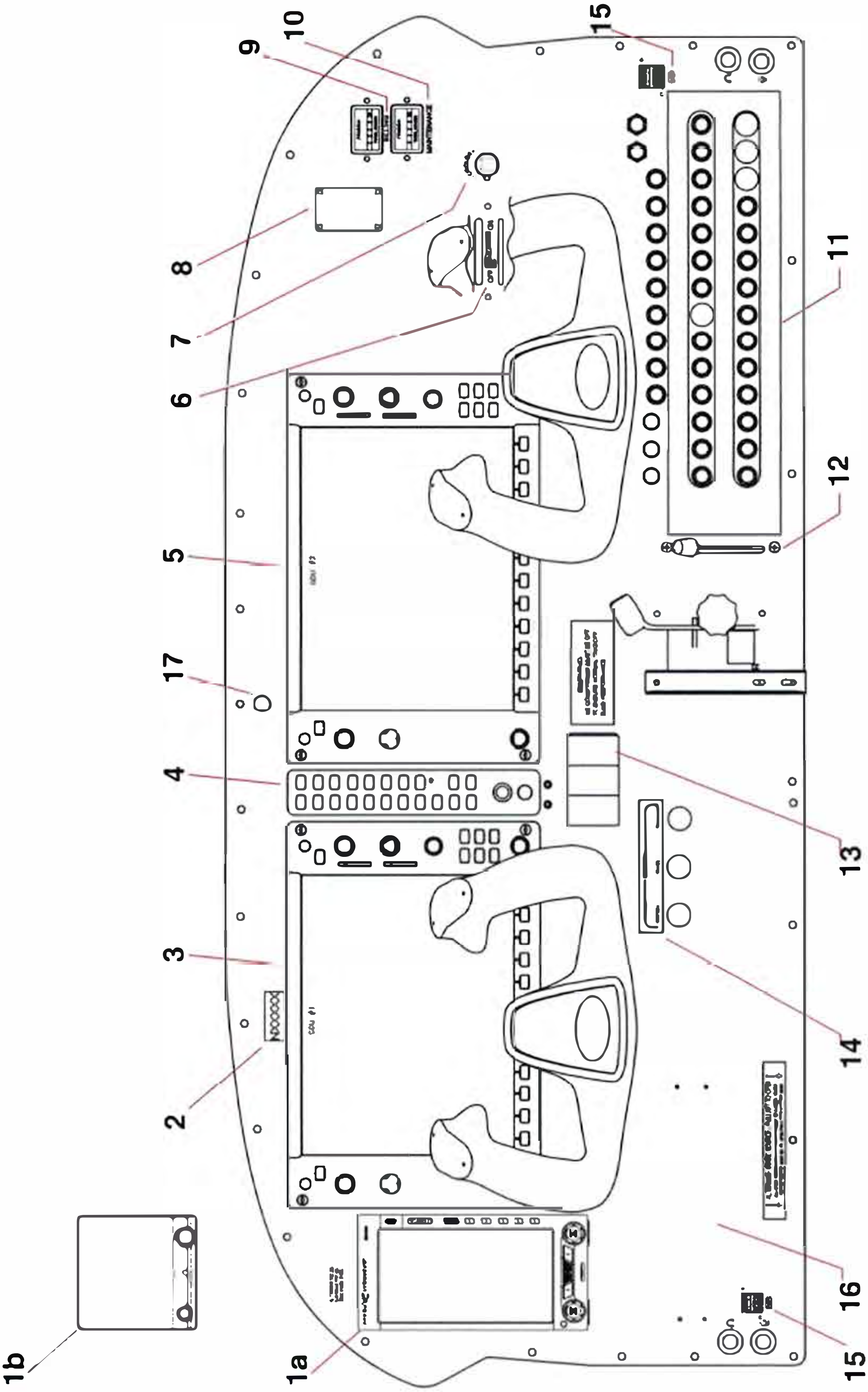


CIRCUIT BREAKER PANEL
(circuit breaker labels may vary depending on
optional equipment installed)
Figure 7-8

7.23 INSTRUMENT PANEL

The instrument panel is designed to accommodate the Garmin G1000 system, the standby instrument, required switches, and remaining avionics/ options (See Figure 7-9 and Figure 7-10 for location of each item/details).

Optimum cockpit lighting for night flying is achieved by using a combination of the dimmer switches on the instrument panel, the overhead flood lights, and the lighting controls on the standby instrument. The dimmer switches consist of three rheostats labeled SWITCH, PANEL, and AVIONICS. The SWITCH dimmer controls the backlighting of the overhead switches, instrument panel switches, circuit breaker placards, autopilot buttons, ADF buttons, and all backlit placards along the lower portion of the instrument panel. The PANEL dimmer controls the intensity of the LED light strip located under the glareshield. The AVIONICS dimmer controls the lighting intensity of the PFD, MFD, and audio panel. Turning the AVIONICS dimmer switch to the full counterclockwise position allows the Garmin displays to operate in photocell lighting mode, whereby their lighting intensity varies with ambient light received by their sensors. The domelights on the cockpit ceiling are controlled by the rotary switch located adjacent to each light. A white map light in each dome light is available by opening a small slider switch on each dome light cover.



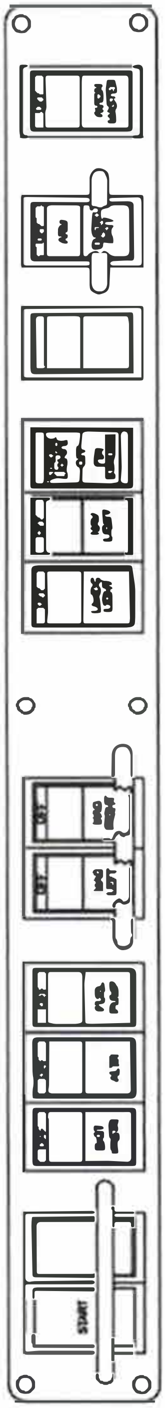
Note - See next page for itemized list of components /switches.

INSTRUMENT PANEL
Figure 7-9

1. Standby instrument
    a) Aspen EBD-1000
    b) Garmin G5
2. Plate - Aircraft Registration Number
3. PFD
4. Audio panel
5. MFD
6. Cabin heater temp / wnd shield defroster
7. Air conditioning temp. controller
8. ELT switch
9. HOBSS meter - Billing (optional)
10. HOBSS meter - Maintenance (optional)
11. Circuit breakers
12. Alternate Air
13. Electrical accessories (L to R)
    a) Flight director / autopilot switch (option)
    b) Pitot heat
    c) Ventilation fan
    d) Air conditioner (option)
14. Dimmer rheostats (L to R)
    a) Switches
    b) Panel
    c) Avionics
15. USB
16. ADF (option)
17. Level Mode (LVL) Switch (optional)

Figure 7-9 (continued)

7.23 INSTRUMENT PANEL (continued)



Overhead switches: (left to right)

Engine Starter
Reserved
Battery Master
Alternator
Fuel Pump
Left Magneto
Right Magneto
Landing Light
Nav Light
Strobe Lights/Fin Strobe
Reserved
Emergency Battery
Avionics Master

OVERHEAD SWITCH PANEL
Figure 7-10

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7.25 PITOT-STATIC SYSTEM

Dynamic and static pressures are both supplied by a single pitot head installed on the bottom of the left wing. Independent pressure lines plumbed from the pitot mast through the wing and fuselage connect to the Garmin air data computer and the standby instrument (Figure 7-11) located on the instrument panel.

An alternate static source is standard equipment. The control valve is located below the left side of the instrument panel. When the valve is set in the alternate position, the altimeter, vertical speed indicator and airspeed indicator on the PFD and the standby instrument will be using cabin air for static pressure. The storm window and cabin vents must be closed and the cabin heater and defroster must be on during alternate static source operation. The altimeter error is less than 50 feet unless otherwise placarded.

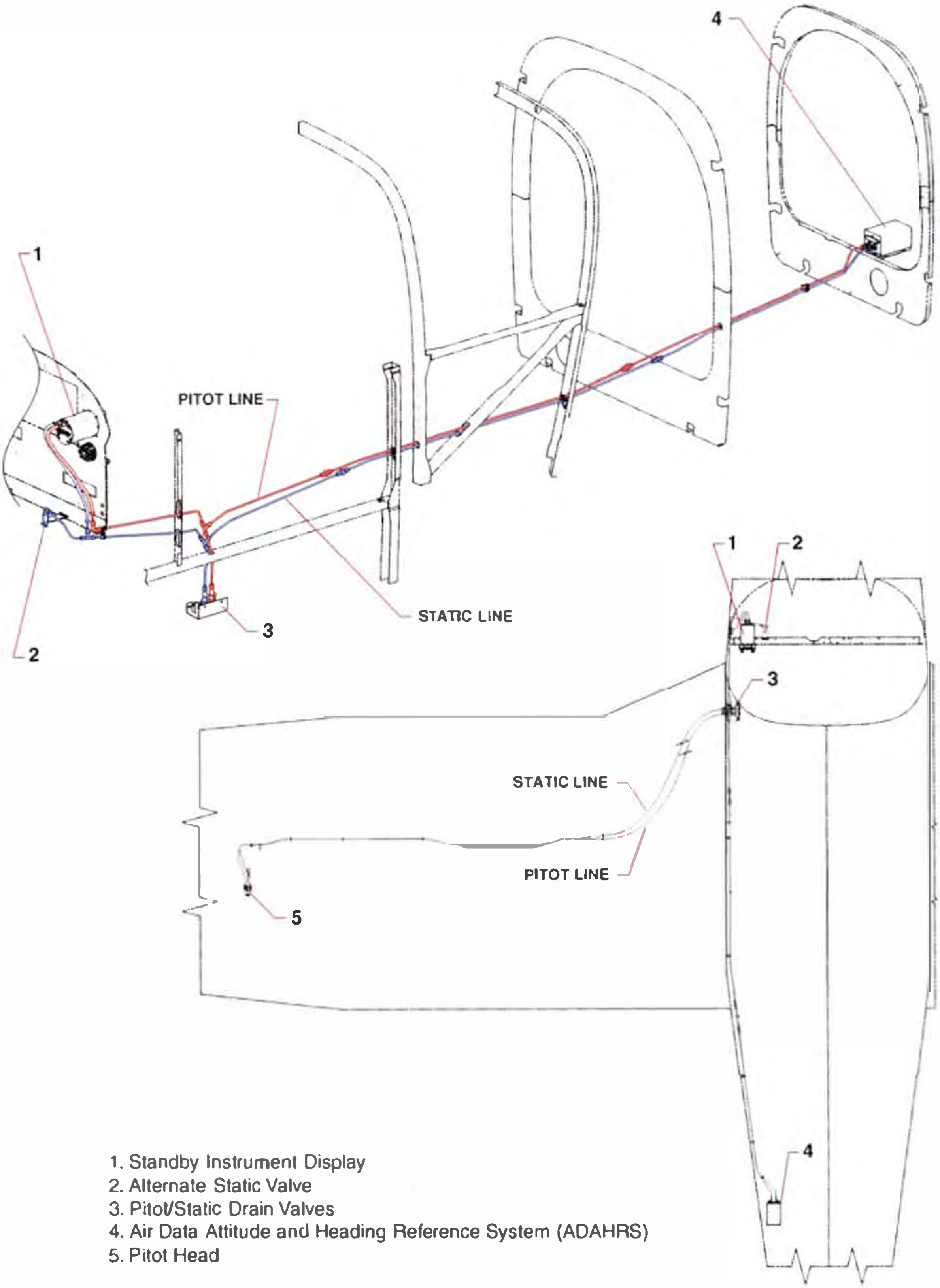
Both the pitot and static lines can be drained through separate drain valves located on the left lower side of the fuselage interior.

A heated pitot head, which alleviates problems with icing and heavy rain, is standard equipment. The switch for the heated pitot head is located on the instrument panel above and to the left of the throttle quadrant.

To prevent bugs and water from entering the pitot and static pressure holes, a cover should be placed over the pitot head on the ground when the aircraft is parked. A partially or completely blocked pitot head will give erratic or zero readings on the instruments.

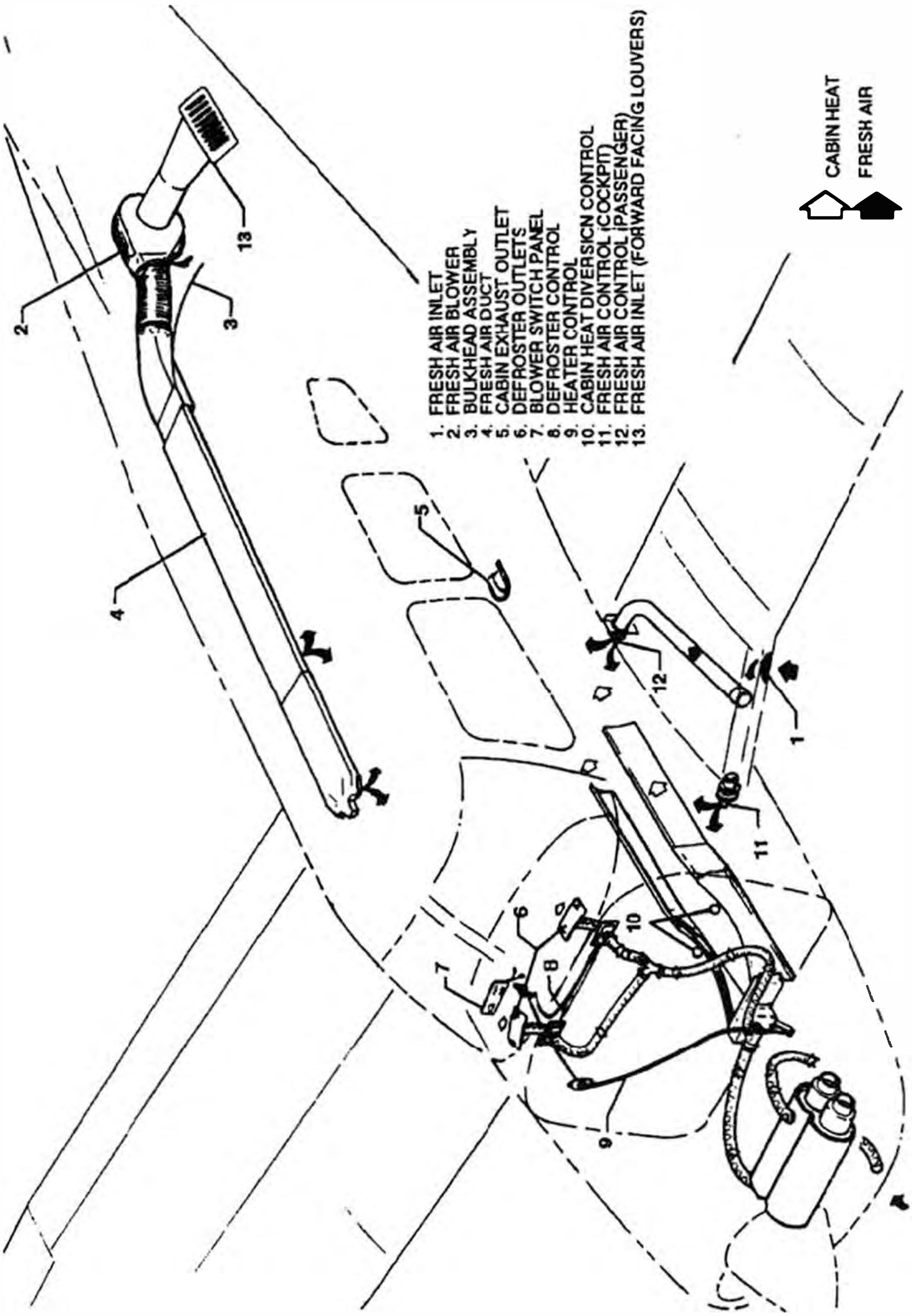
NOTE

During the preflight, check to make sure the pitot cover is removed.



1. Standby Instrument Display
2. Alternate Static Valve
3. Pitot/Static Drain Valves
4. Air Data Attitude and Heading Reference System (ADAHRS)
5. Pitot Head

PITOT-STATIC SYSTEM
Figure 7-11



HEATING AND VENTILATING SYSTEM
Figure 7-12

7.27 HEATING AND VENTILATING SYSTEM

Heat for the cabin interior and the defroster system is provided by a heater muff attached to the exhaust system (Figure 7-12). The amount of heat desired can be regulated with the controls located on the far right side of the instrument panel.

The air flow can be regulated between the front and rear seats by levers located on top of the heat ducts next to the console.

Fresh air inlets are located in the inboard portion of the leading edge of the wing near and in the aft portion of the fuselage. Adjustable outlets are located on the side of the cabin near the floor and overhead on the ceiling at each seat location. Air is exhausted through an outlet under the rear seat. A cabin air blower, incorporated in the ventilating system, is also available as optional equipment. An optional overhead ventilating system with a cabin air blower is available on models without air conditioning. This blower is operated by a FAN switch with 3 positions - "OFF," "LOW," "HIGH."

CAUTION

When cabin heat is operated, heat duct surface becomes hot. This could result in burns if arms or legs are placed too close to heat duct outlets or surface.

7.29 CABIN FEATURES

The Archer has four bucket style seats with adjustable backrests and headrests. For occupant comfort and easy of entry, the pilot and co-pilot seats are adjustable horizontally and vertically. The horizontal adjustment bar is located just below the seat pan. Vertical adjustment is accomplished through a knob under the forward right hand corner of the seat pan. To recline pilot and co-pilot seats; lean backrest forward, then release the lever on the lower, right hand, outer hinge, and re-adjust backrest to desired reclined comfort setting. These seats also contain adjustable lumbar support and arm rest for added comfort.

The rear passenger seats have an adjustable backrest. Lean backrest forward, then release the lever on the lower, right hand, outer hinge, and readjust backrest to desired reclined comfort setting. The rear seat installation may be removed to provide room for bulky items. Rear seat installations incorporate leg retainers with latching mechanisms which must be released before the seats can be removed. Releasing the retainers is accomplished by depressing the plunger behind each rear leg.

7.29 CABIN FEATURES (continued)

CAUTION

Ensure all occupied seat backrests are in their full upright position for all taxi, take-off and landing operations.

A cabin interior includes a pilot storm window, two sun visors, two map pockets, and pockets on the backs of each front seat.

Each seat is equipped with a three point restraint system consisting of an adjustable lap belt with an adjustable inertial reel-type shoulder harness. A check of the inertia reel mechanism can be made by pulling sharply on the shoulder strap and checking that the reel will lock in place under sudden stress. This locking feature prevents the strap from extending and holds the occupant in place. Under normal movement the strap will extend and retract as required.

7.31 BAGGAGE AREA

A 24 cubic foot baggage area, located behind the rear seats, is accessible either from the cabin or through an outside baggage door on the right side of the aircraft. Maximum capacity is 200 pounds. Tie-down straps are provided and should be used at all times.

NOTE

It is the pilot's responsibility to be sure when the baggage is loaded that the aircraft C.G. falls within the allowable C.G. Range (refer to Section 6 - Weight and Balance).

7.33 STALL WARNING

An approaching stall is indicated by a stall warning aural alert which is activated between five and ten knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall. Stall speeds are shown on the Stall Speed graph in Section 5. The stall warning aural alert is activated by a lift detector on the leading edge of the left wing. Whenever the stall warning system is activated, a STALL...STALL aural alert is heard through the cockpit speaker and through the headsets. During preflight, the stall warning system should be check by turning the BATT MSTR switch on, lifting the detector and check to determine if the system is active.

7.35 FINISH

All exterior surfaces are primed with etching primer and finished with a polyurethane finish.

7.37 EXTERNAL POWER

An external power installation is accessible through a receptacle located on the right side of the fuselage aft of the wing. An external battery can be connected to the socket, thus allowing the operator to crank the engine without having to gain access to the airplane's battery.

7.39 EMERGENCY LOCATOR TRANSMITTER

The Emergency Locator Transmitter (ELT), is located in the aft portion of the fuselage just below the stabilator leading edge and is accessible through a plate on the right side of the fuselage. This plate is attached with slotted-head nylon screws for ease of removal; these screws may be readily removed with a variety of common items such as a dime, a key, a knife blade, etc. If there are no tools available in an emergency the screw heads may be broken off by any means.

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 or if the accumulated test time exceeds one hour, or if the unit has been inadvertently activated for an undetermined time period.

7.39 EMERGENCY LOCATOR TRANSMITTER (continued)

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 the tests must be made at any other time, the tests 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. Moving the switch to ON will activate the transmitter. A warning light located above the remote switch will alert you when ever the ELT is activated.

The Artex ELT 1000 (406 MHz) is equipped with a warning buzzer. This warning buzzer, which receives power from the ELT itself, is mounted in the tailcone. Whenever the ELT is activated the buzzer "beeps" periodically. The time between pulses lengthens after 12 hours. The objective is to hear the buzzer from outside the aircraft while the engine is not running.

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.

7.39 EMERGENCY LOCATOR TRANSMITTER (continued)

ARTEX ELT 1000 OPERATION (continued)

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 the unit has not been activated. Check by selecting 121.50 MHz on an operating receiver. If a downward sweeping audio tone is heard the ELT may have been activated. Set the remote switch to ON. If there is no change in the volume of the signal, your airplane's ELT is probably transmitting. Setting the remote switch back to ARM/OFF will automatically reset the ELT and should stop the signal being received on 121.50 MHz.

7.41 FLAP POSITION SENSOR (OPTIONAL)

An optional flap position sensor installation is available.

The flap position sensor provides flap position input to the central maintenance computer (optional) or GFC 700 (optional). The central maintenance computer provides datalogging capabilities for monitoring various parameters. The GFC 700 utilizes the flap position sensor input to enhance pitch trim response. The flap position input is not displayed to the pilot.

The flap position input consists of four (4) switches mounted on a bracket over the flap tube. The switches are activated as the flaps are raised and lowered by a cam mounted to the flap torque tube.

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SECTION 8
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 ARCHER III. For complete maintenance instructions, refer to the PA-28-181 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 ensure 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 authorized Piper Service Center or Piper's Customer Service 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 authorized 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 for the PA-28-181 (see the latest revision of the PA-28-181 Maintenance and Inspection Manuals). The PA-28-181 Inspection Manual contains appropriate forms, and all inspection procedures should be complied with by a properly trained, knowledgeable, and qualified mechanic at a Piper Authorized Service Center or a reputable repair shop. Piper cannot accept responsibility for the continued airworthiness of any aircraft not maintained to these standards, and/or not brought into compliance with applicable Service Bulletins issued by Piper, instructions issued by the engine, propeller, or accessory manufacturers, or Airworthiness Directives issued by the FAA.

A programmed Inspection, approved by the Federal Aviation Administration (FAA), is also available to the owner. This involves routine and detailed inspections to allow maximum utilization of the airplane. Maintenance inspection costs are reduced, and the maximum standard of continued airworthiness is maintained. Complete details are available from Piper.

In addition, but in conjunction with the above, the FAA requires periodic inspections on all aircraft to keep the Airworthiness Certificate in effect. The owner is responsible for assuring compliance with these inspection requirements and for maintaining proper documentation in logbooks and/or maintenance records.

8.3 AIRPLANE INSPECTION PERIODS (continued)

A spectrographic analysis of the engine oil is available from several sources. This inspection, if performed properly, provides a good check of the internal condition of the engine. To be accurate, induction air filters must be cleaned or changed regularly, and oil samples must be taken and sent in at regular intervals.

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 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 require a Supplemental Type Certificate.

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.

(3) Aircraft Radio Station License if transmitters are installed.

(b) To be carried in the aircraft at all times:

(1) Pilot's Operating Handbook.

(2) Weight and Balance data plus a copy of the latest Repair and Alteration Form FAA-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.

8.9 GROUND HANDLING

(a) Towing

The airplane may be moved on the ground by the use of the nose wheel steering bar that is stowed below the forward ledge of the baggage compartment or by power equipment that will not damage or excessively strain the nose gear steering assembly. Towing lugs are incorporated as part of the nose gear fork.

CAUTION

When towing with power equipment, do not turn the nose gear beyond its steering radius 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 attached to both main gear struts as high up on the tubes as possible. Lines should be long enough to clear the nose and/or tail by not less than fifteen feet, and a qualified person should ride in the pilot's seat to maintain control by use of the brakes.

(b) Taxiing

When it is ascertained that the propeller back 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) While taxiing, make slight turns to ascertain the effectiveness of the steering.

(3) Observe wing clearance when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.

8.9 GROUND HANDLING (continued)

(b) Taxiing (continued)

(4) When taxiing over uneven ground, avoid holes and ruts.

(5) 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.

(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) Set the parking brake by pulling back on the brake lever and depressing the knob on the handle. To release the parking brake, pull back on the handle until the catch disengages; then allow the handle to swing forward.

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 stabilator controls should be secured with the front seat belt and chocks used to properly block the wheels.

8.9 GROUND HANDLING (continued)

(d) Mooring

The airplane should be moored for immovability, security and protection. The following procedures should be used for the proper mooring of the airplane:

(1) Head the airplane into the wind if possible.

(2) Retract the flaps.

(3) Immobilize the ailerons and stabilator by looping the seat belt through the control wheel and pulling it snug.

(4) Block the wheels.

(5) Secure tie-down ropes to the wing tie-down rings and to the tail skid 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.

NOTE

Additional preparations for high winds include using tie-down ropes from the landing gear forks and securing the rudder.

(6) Install a pitot head cover if available. Be sure to remove the pitot head cover before flight.

(7) Cabin and baggage doors should be locked when the airplane is unattended.

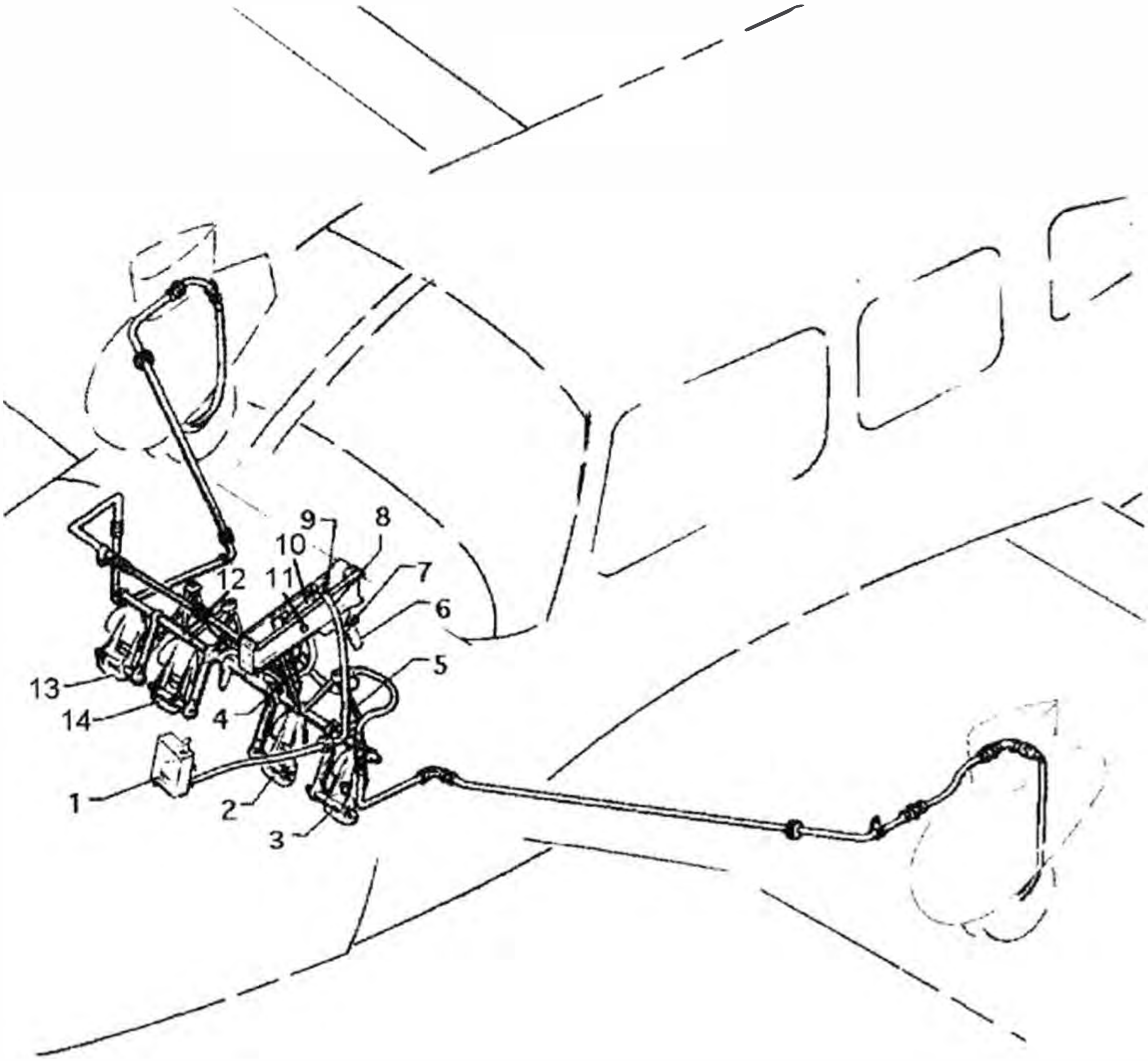
8.11 ENGINE AIR FILTER

Inspect inlet for foreign particles and obstructions. Engine Air Filter should be removed and inspected or replaced at intervals as outlined in the aircraft Maintenance Manual. Operations in severe environments may require more frequent attention.

8.13 BRAKE SERVICE

The brake system is filled with MIL-PRF-5606 (petroleum base) hydraulic brake fluid. The fluid level should be checked periodically or at every 50-hour inspection and replenished when necessary. The brake reservoir is located on the fire wall in the engine compartment.

No adjustment of the brake clearances is necessary. If after extended service brake blocks become excessively worn, they should be replaced with new segments.



1. BRAKE RESERVOIR
2. RIGHT BRAKE AND RUDDER PEDAL
3. LEFT BRAKE AND RUDDER PEDAL
4. RIGHT BRAKE CYLINDER
5. LEFT BRAKE CYLINDER
6. BRAKE HANDLE
7. HANDLE RELEASE BUTTON
8. LINE, INLET
9. CLEVIS PIN
10. MASTER CYLINDER ASSEMBLY
11. BOLT ASSEMBLY
12. TORQUE TUBE
13. COPILOT'S RIGHT BRAKE AND RUDDER PEDAL
14. COPILOT'S LEFT BRAKE AND RUDDER PEDAL

BRAKE SYSTEM
Figure 8-1

8.15 LANDING GEAR SERVICE

The three landing gears use Cleveland Aircraft Products 6.00 x 6, four-ply rating, type III tires with tubes. (Refer to paragraph 8.23).

Landing gear oleos on the ARCHER III should be serviced according to the instructions on the units. The main oleos should be extended under normal static load until 4.50 ± 0.50 inches of oleo piston tube is exposed, and the nose gear should show 3.25 ± 0.25 inches. Should the strut exposure be below that required, refer to Maintenance Manual for servicing instructions.

8.17 PROPELLER SERVICE

The spinner and backing plate should be frequently cleaned and inspected for cracks. Before each flight the propeller should be inspected for nicks, scratches, and corrosion. If found, they should be repaired as soon as possible by a rated mechanic, since a nick or scratch causes an area of increased stress which can lead to serious cracks or the loss of a propeller tip. The back face of the blades should be painted when necessary with flat black paint to retard glare. To prevent corrosion, the surface should be cleaned and waxed periodically.

8.19 OIL REQUIREMENTS

The oil capacity of the engine is 8 quarts and the minimum safe quantity is 2 quarts. It is recommended that the oil be drained and renewed, and the screen cleaned, every 25 hours. However, if the full flow (cartridge type) oil filter is used, the oil and filter should be drained and renewed every 50 hours of operation. The interval between oil and oil filter change is not to exceed four (4) months.

NOTE

Refer to the latest revision of Lycoming Service Instruction 1014 (Lubricating Oil Recommendations) for further information.

8.21 FUEL SYSTEM

(a) Servicing Fuel System

At every 50 hour inspection, the fuel screens in the strainer, and at the fuel injection servo inlet must be cleaned.

(b) Fuel Requirements (AVGAS ONLY)

The minimum aviation grade fuel for the PA-28-181 is 100 or 100LL. Since the use of lower grades can cause serious engine damage in a short period of time, the engine warranty is invalidated by the use of lower octanes.

8.21 FUEL SYSTEM (continued)

(c) Filling Fuel Tanks

Observe all required precautions for handling gasoline. Fill the fuel tanks through the filler located on the forward slope of the wing. Each wing holds a maximum of 25 U.S. gallons. When using less than the standard 50 gallon capacity, fuel should be distributed equally between each tank. There is approximately 17 gallons in the fuel tank when fuel level is even with bottom of filler neck indicator..

(d) Draining Fuel Strainer, Sumps and Lines

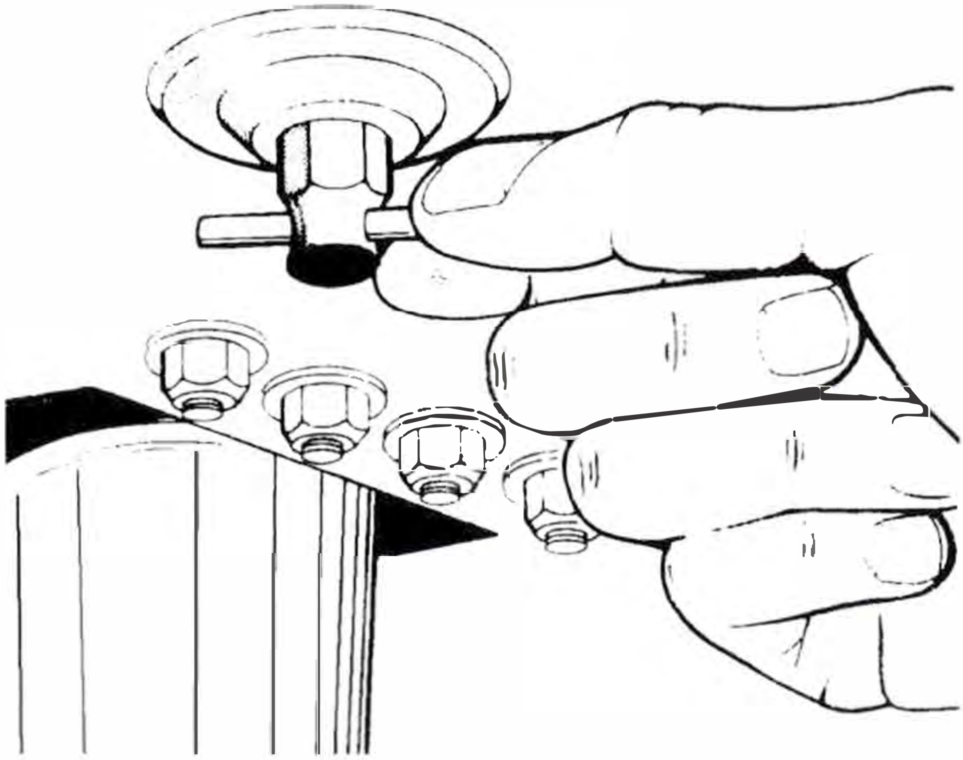
The fuel tank sumps and strainer should be drained daily prior to the first flight and after refueling to avoid the accumulation of contaminant's such as water or sediment. Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer is equipped with a quick drain located on the front lower corner of the fire wall. Each of the fuel tank sumps should be drained first. Then the fuel strainer should be drained twice, once with the fuel selector valve on each tank. Each time fuel is drained, sufficient fuel should be allowed to flow to ensure removal of contaminant's. This fuel should be collected in a suitable container, examined for contaminant's, and then discarded.

CAUTION

When draining any amount of fuel, care should be taken to ensure that no fire hazard exists before starting the engine.

Each quick drain should be checked after closing it to make sure it has closed completely and is not leaking.

8.21 FUEL SYSTEM (continued)



FUEL DRAIN
Figure 8-3

(e) Draining Fuel System

The bulk of the fuel may be drained from the system by opening the valve at the inboard end of each fuel tank. Push up on the arms of the drain valve and turn counterclockwise to hold the drain open. The remaining fuel in the system may be drained through the filter bowl. Any individual tank may be drained by closing the selector valve and then draining the desired tank.

CAUTION

Whenever the fuel system is completely drained and fuel is replenished it will be necessary to run the engine for a minimum of three minutes at 1000 RPM on each tank to ensure that no air exists in the fuel supply lines.

8.23 TIRE INFLATION

For maximum service from the tires, keep them inflated to the proper pressures - 18 psi for the nose gear and 24 psi for the main gear. 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.

8.25 BATTERY SERVICE

Access to the 24-volt battery is through an access panel at the right rear side of the baggage compartment. Refer to Maintenance Manual for Battery Servicing Instructions.

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8.27 CLEANING

(a) Cleaning Landing Gear

Before cleaning the landing gear, place a plastic cover or similar material over the wheel and brake assembly.

(1) Place a pan under the gear to catch waste.
(2) Spray or brush the gear area with solvent or a mixture of solvent and degreaser, as desired. Where heavy grease and dirt deposits have collected, it may be necessary to brush areas that were sprayed, in order to clean them.
(3) Allow the solvent to remain on the gear from five to ten minutes. 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.

(b) 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 solution could cause damage. To wash the airplane, use the following procedure:

(1) Flush away loose dirt with water.
(2) Apply cleaning solution with a soft cloth, a sponge or 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.

8.27 CLEANING (continued)

(c) Cleaning Windshield and Windows

(1) Remove dirt, mud and other loose particles from exterior surfaces with clean water.
(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 severe scratch or mar in plastic can be removed by rubbing out the scratch with jeweler's rouge. Smooth both sides and apply wax.

(d) Cleaning Headliner, Side Panels and Seats

(1) Clean headliner, side panels, and seats with a stiff bristle brush, and vacuum where necessary.
(2) Soiled upholstery, except leather, may be cleaned with a good upholstery cleaner suitable for the material. Carefully follow the manufacturer's instructions. Avoid soaking or harsh rubbing.

CAUTION

Solvent cleaners require adequate ventilation.

(3) Leather should be cleaned with saddle soap or a mild hand soap and water.

8.27 CLEANING (continued)

(e) Cleaning Carpets

To clean carpets, first remove loose dirt with a whisk broom or vacuum. For soiled spots and stubborn stains use a non-flammable dry cleaning fluid. Floor carpets may be removed and cleaned like any household carpet.

8.29 COLD WEATHER OPERATION

For cold weather operation a winterization plate is installed on the inlet opening of the oil cooler duct on the left rear engine baffle. This plate should be installed whenever the ambient temperature reaches 50°F or less or whenever oil temperature cannot be maintained at or above 140°F during continuous operation. The plate should be removed and stored in the cockpit when the ambient temperature exceeds 50°F.

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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 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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SUPPLEMENT 1

AIR CONDITIONING INSTALLATION

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the optional air conditioning system is installed in accordance with Piper Drawing 99575-13. 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.

This supplement has been FAA Approved as a permanent part of this handbook and must remain in this handbook at all times when the optional air conditioning system is installed.

FAA APPROVED:
Eric A. Wright
ODA-510620-CE
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Vero Beach, Florida

DATE OF APPROVAL: December 22, 2017

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the airplane when the optional air conditioning system is installed. The information contained within this supplement is to be used ``as described'' in conjunction with the complete handbook.

SECTION 2 - LIMITATIONS

(a) To ensure maximum climb performance the air conditioner must be turned OFF manually prior to takeoff to disengage the compressor and retract the condenser door. Also the air conditioner must be turned OFF manually before the landing approach in preparation for a possible go-around.

(b) Placards
In full view of the pilot, in the area of the air conditioner controls when the air conditioner is installed:

WARNING

AIR CONDITIONER MUST BE OFF TO ENSURE NORMAL TAKEOFF CLIMB PERFORMANCE.

SECTION 3 - EMERGENCY PROCEDURES

3.1 GENERAL

Crew Alerting System (CAS) Messages

The following CAS messages are specific to this POH supplement.

Caution Messages - Amber

CAS Event	CAS Message	Checklist Page	Cause
Non-hidden CAS Messages			
Air Conditioning Door Open	AC DOOR OPEN	9-5	Air conditioning condenser door is open during an in-flight engine failure condition.

Advisory Messages – White

CAS Event	CAS Message	Checklist Page	Cause
Non-hidden CAS Messages			
Air Conditioning Door Open	AC DOOR OPEN	N/A	Air conditioning condenser door is open

3.5 EMERGENCY PROCEDURES CHECK LIST

Air Conditioning Door Open

Indication: Master Caution, Double Chime, AC DOOR OPEN

CAUTION

Air conditioner should be turned off during engine failure situations.

AIR COND Switch .... OFF

To achieve performance figures stated in Section 5 of this Pilot Operating Handbook, the air conditioning system must be turned OFF during takeoff, landing, and engine failure situations.

SECTION 4 - NORMAL PROCEDURES

Prior to takeoff, the air conditioner should be checked for proper operation as follows:

(a) Check aircraft battery switch ON.
(b) Turn the air conditioner control switch to ON and the fan switch to one of the operating positions - the AC DOOR OPEN Advisory CAS message will activate, thereby indicating proper air conditioner condenser door actuation.
(c) Turn the air conditioner control switch to OFF - the AC DOOR OPEN Advisory CAS message extinguishes, thereby indicating the air conditioner door is in the retracted position.
(d) If the AC DOOR OPEN CAS Advisory does not respond as specified above, an air conditioner system malfunction is indicated and further investigation should be conducted prior to flight.

The above operational check may be performed during flight if an inflight failure is suspected.

SECTION 5 - PERFORMANCE

Operation of the air conditioner will cause slight decreases in cruise speed and range. Power from the engine is required to run the compressor, and the condenser door, when extended, causes a slight increase in drag. When the air conditioner is turned off there is normally no measurable difference in climb, cruise or range performance of the airplane.

NOTE

To ensure maximum climb performance the air conditioner must be turned off manually before takeoff to disengage the compressor and retract the condenser door. Also the air conditioner must be turned off manually before the landing approach in preparation for a possible go-around.

Although the cruise speed and range are only slightly affected by the air conditioner operation, these changes should be considered in preflight planning. To be conservative, the following figures assume that the compressor is operating continuously while the airplane is airborne. This will be the case only in extremely hot weather.

(a) The decrease in true airspeed is approximately 4 KTS at all power settings.
(b) The decrease in range may be as much as 32 nautical miles for the 48 gallon capacity.

The climb performance is not compromised measurably with the air conditioner operating since the compressor is declutched and the condenser door is retracted, both automatically, when a full throttle position is selected. When the full throttle position is not used or in the event of a malfunction which would cause the compressor to operate and the condenser door to be extended, a decrease in rate of climb of as much as 100 fpm can be expected. Should a malfunction occur which prevents condenser door retraction when the compressor is turned off, a decrease in rate of climb of as much as 50 fpm can be expected.

SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook.

SECTION 7 - DESCRIPTION AND OPERATION

The air conditioning system is a recirculating air system. The major items include: evaporator, condenser, compressor, blower, switches and temperature controls.

The evaporator is located behind the left rear side of the baggage compartment. This cools the air that is used for air conditioning.

The condenser is mounted on a retractable scoop located on the bottom of the fuselage and to the rear of the baggage compartment area. The scoop extends when the air conditioner is ON and retracts to a flush position when the system is OFF.

The compressor is mounted on the forward right underside of the engine. It has an electric clutch which automatically engages or disengages the compressor to the belt drive system of the compressor.

An electrical blower is mounted on the aft side of the rear cabin panel. Air from the baggage area is drawn through the evaporator by the blower and distributed through an overhead duct to individual outlets located adjacent to each occupant.

The switches are located to the left of the the throttle quadrant and the temperature control is located on the right side of the instrument panel. The temperature control regulates the desired temperature of the cabin. Turn the control clockwise for increased cooling, counterclockwise for decreased cooling.

Located to the left of the the throttle quadrant is the fan speed switch and the air conditioning ON-OFF switch. The fan can be operated independently of the air conditioning. However, it must be on for air conditioner operation. Turning either switch off will disengage the compressor clutch and retract the condenser door. Cooling air should be felt within one minute after the air conditioner is turned on.

NOTE

If the system is not operating in 5 minutes, turn the system OFF until the fault is corrected.

The FAN switch allows operation of the fan with the air conditioner turned OFF to aid cabin air circulation if desired. A LOW or HIGH flow of air can be selected to the air conditioner outlets located in the overhead duct. The outlets can be adjusted or turned off by each occupant to regulate individual cooling effect.

SECTION 7 - DESCRIPTION AND OPERATION (continued)

An "AC DOOR OPEN" CAS advisory alert will appear on the PFD whenever the condenser door is open and remains on until the door is closed. The "AC DOOR OPEN" CAS advisory will turn to a CAS caution if the condenser door is open during engine out situations.

A circuit breaker located on the circuit breaker panel protects the air conditioning electrical system.

Whenever the throttle is in the full throttle position, it actuates a micro switch which disengages the compressor and retracts the condenser door. This is done to obtain maximum power and maximum rate of climb. The fan continues to operate and the air will remain cool for approximately one minute. When the throttle is retarded approximately 1/4 inch, the clutch will engage and the condenser door will extend, again supplying cool, dry air.

PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 2
FOR
BENDIX/KING KR-87 DIGITAL ADF
WITH GARMIN PFD INDICATOR

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Bendix/King KR-87 Digital ADF with the Garmin Primary Flight Display (PFD) Indicator 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.

FAA APPROVED: ____________________
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DATE OF APPROVAL: May 7, 2018

SECTION 1 - GENERAL

The Bendix/King Digital ADF is a panel mounted, digitally tuned, automatic direction finder. It is designed to provide continuous 1 kHz digital tuning in the frequency range of 200 kHz to 1799 kHz and eliminates the need for mechanical band switching. The system comprises a receiver, a built-in electronic timer, a bearing indicator on the Garmin PFD and a KA-44B combined loop and sense antenna.

The Bendix/King Digital ADF can be used for position plotting and homing procedures, and for aural reception of amplitude modulated (AM) signals.

The "flip-flop" frequency display allows switching between pre-selected "STANDBY" and "ACTIVE" frequencies by pressing the frequency transfer button. Both preselected frequencies are stored in a non-volatile memory circuit (no battery power required) and displayed in self-dimming gas discharge numerics. The active frequency is continuously displayed in the left window, while the right window will display either the standby frequency or the selected readout from the built-in timer.

The built-in electronic timer has two separate and independent timing functions: (1) An automatic flight timer that starts whenever the unit is turned on. This timer functions up to 59 hours and 59 minutes. (2) An elapsed timer which will count up or down for up to 59 minutes and 59 seconds. When a preset time interval has been programmed and the countdown reaches :00, the display will flash for 15 seconds. Since both the flight timer and elapsed timer operate independently, it is possible to monitor either one without disrupting the other. The pushbutton controls are internally lighted.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

To Operate as an Automatic Direction Finder:

1. OFF/VOL Control - ON.
2. Frequency Selector Knobs - SELECT desired frequency in the standby frequency display.
3. FRQ Button - PRESS to move the desired frequency from the standby to the active position.
4. ADF Button (on ADF receiver) - PRESS to activate ADF mode.
5. ADF Button (on audio panel) - PRESS to activate ADF audio through headset.
6. SPKR Button (on audio panel) - PRESS to activate ADF audio through cockpit speaker.
7. OFF/VOL Control - SET to desired volume level.
8. ADF Bearing - Display ADF bearing on PFD by selecting the PFD soft-key, then pressing the BRG1 or BRG2 softkey until "ADF" is displayed in the appropriate Bearing 1 or Bearing 2 Information Window and the bearing pointer is displayed on the HSI.

ADF Test (Pre-flight or In-flight):

1. ADF Button - SELECT ANT mode and note pointer moves towards the 90° position and then disappears.
2. ADF Button - SELECT ADF mode and note the pointer moves without hesitation to the station bearing. Excessive pointer sluggishness, wavering or reversals indicate a signal that is too weak or a system malfunction.

SECTION 4 - NORMAL PROCEDURES (continued)

NOTE

The Standby Frequency which is in memory while Flight Time or Elapsed Time modes are being displayed may be called back by pressing the FRQ button, then transferred to active use by pressing the FRQ button again.

To Operate Elapsed Time Timer-Count Down Mode:

1. OFF/VOL Control - ON.
2. FLT/ET Mode Button - PRESS (once or twice) until ET is annunciated.
3. SET/RST Button - PRESS until the ET annunciation begins to flash.
4. FREQUENCY SELECTOR KNOBS - SET desired time in the elapsed time display. The small knob is pulled out to tune the 1's. The small knob is pushed in to tune the 10's. The outer knob tunes minutes up to 59 minutes.

NOTE

Selector knobs remain in the time set mode for 15 seconds after the last entry or until the SET/RST, FLT/ET, or FRQ button is pressed.

5. SET/RST Button - PRESS to start countdown. When the timer reaches 0, it will start to count up as display flashes for 15 seconds.

NOTE

While FLT or ET are displayed, the active frequency on the left side of the window may be changed, by using the frequency selector knobs, without any effect on the stored standby frequency or the other modes.

SECTION 4 - NORMAL PROCEDURES (continued)

ADF Operation NOTES:

Erroneous ADF Bearing Due to Radio Frequency Phenomena:

In the U.S., the FCC, which assigns AM radio frequencies, occasionally will assign the same frequency to more than one station in an area. Certain conditions, such as Night Effect, may cause signals from such stations to overlap. This should be taken into consideration when using AM broadcast station for navigation.

Sunspots and atmospheric phenomena may occasionally distort reception so that signals from two stations on the same frequency will overlap. For this reason, it is always wise to make positive identification of the station being tuned, by switching the function selector to ANT and listening for station call letters.

Electrical Storms:

In the vicinity of electrical storms, an ADF indicator pointer tends to swing from the station tuned toward the center of the storm.

Night Effect:

This is a disturbance particularly strong just after sunset and just after dawn. An ADF indicator pointer may swing erratically at these times. If possible, tune to the most powerful station at the lowest frequency. If this is not possible, take the average of pointer oscillations to determine relative station bearing.

Mountain Effect:

Radio waves reflecting from the surface of mountains may cause the pointer to fluctuate or show an erroneous bearing. This should be taken into account when taking bearings over mountainous terrain.

Coastal Refraction:

Radio waves may be refracted when passing from land to sea or when moving parallel to the coastline. This also should be taken into account.

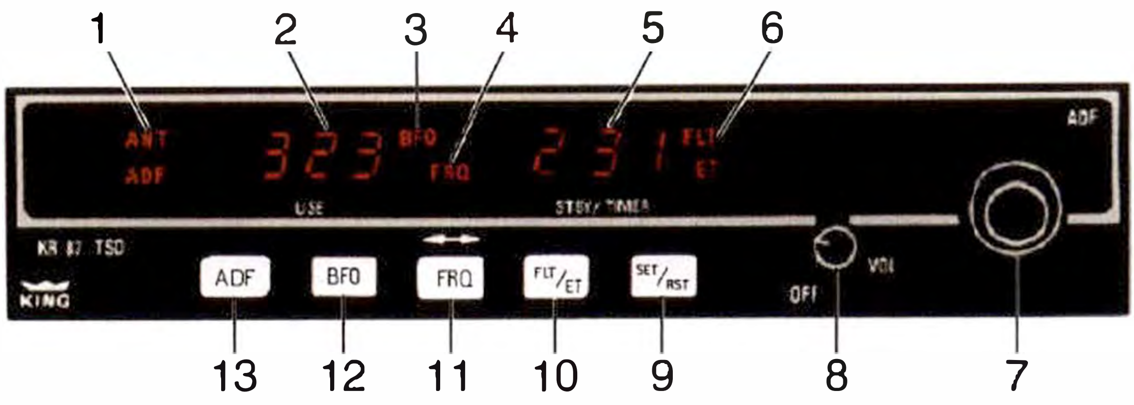
SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook and Airplane Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION



KR-87 Digital ADF

ADF Displays on Garmin PFD

Digital ADF Operating Controls and PFD Indicator
Figure 1

SECTION 7 - DESCRIPTION AND OPERATION (continued)

Legend - Figure 1

1. Mode Annunciation - Antenna (ANT) is selected by the "out" position of the ADF button. This mode improves the aural reception and is usually used for station identification. The bearing pointer is deactivated and will move towards the 90° relative position and then disappear. Automatic Direction Finder (ADF) mode is selected by the depressed position of the ADF button. This mode activates the bearing pointer. The bearing pointer will point in the direction of the station relative to the aircraft heading.
2. Active Frequency Display - The frequency to which the ADF is tuned is displayed here. The active ADF frequency can be changed directly when either of the timer functions are selected.
3. Beat Frequency Oscillator (BFO) - The BFO mode, activated and annunciated when the "BFO" button is depressed, permits the carrier wave and associated morse code identifier broadcast on the carrier wave to be heard.

NOTE

CW signals (Morse Code) are unmodulated and no audio will be heard without use of BFO. This type of signal is not used in the United States air navigation. It is used in some foreign countries and marine beacons.

4. Standby Frequency Annunciation (FRQ) - When FRQ is displayed, the STANDBY frequency is displayed in the right hand display. The STANDBY frequency is selected using the frequency select knobs. The selected STANDBY frequency is put into the ACTIVE frequency window by pressing the frequency transfer button.
5. Standby Frequency Display - Either the standby frequency, the flight timer, or the elapsed time is displayed in this position. The flight timer and elapsed timer are displayed replacing the standby frequency which goes into "blind" memory to be called back at any time by depressing the FRQ button. Flight time or elapsed time are displayed and annunciated alternatively by depressing the FLT/ET button.

SECTION 7 - DESCRIPTION AND OPERATION (continued)

Legend - Figure 1 (continued)

6. Timer Mode Annunciation - Either the elapsed time (ET) or flight time (FLT) mode is annunciated here.
7. Frequency Selector Knobs - Selects the standby frequency when FRQ is displayed and directly selects the active frequency whenever either of the timer functions is selected. The frequency selector knobs may be rotated either clockwise or counterclockwise. The small knob is pulled out to tune the 1's. The small knob is pushed in to tune the 10's. The outer knob tunes the 100's with rollover into the 1000's. These knobs are also used to set the desired time when the elapsed timer is used in the countdown mode.
8. Off/Volume Control (OFF/VOL) - Controls primary power and audio output level. Clockwise rotation from OFF position applies primary power to receiver; further clockwise rotation increases audio level. Audio muting causes the audio output to be muted unless the receiver is locked on a valid station.
9. Set/Reset Button (SET/RST) - The set/reset button, when pressed, resets the elapsed timer whether it is being displayed or not.
10. Flight Time/Elapsed Time Mode Selector Button (FLT/ET) - The Flight Timer/Elapsed Time mode selector button, when pressed, alternatively selects either Flight Timer mode or Elapsed Timer mode.
11. Frequency Transfer Button (FRQ) - The FRQ transfer button, when pressed, exchanges the active and standby frequencies. The new frequency becomes active and the former active frequency goes into standby.
12. BFO Button - The BFO button selects the BFO mode when in the depressed position (see Note under item 3).
13. ADF Button - The ADF button selects either the ANT mode or the ADF mode. The ANT mode is selected with the ADF button in the out position. The ADF mode is selected with the ADF button in the depressed position.
14. Bearing Pointer (on PFD) - The cyan arrow indicates magnetic bearing to the station in degrees.

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PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 3
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.

FAA APPROVED: ______________________
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ODA-510620-CE
Piper Aircraft, Inc.
Vero Beach, Florida

DATE OF APPROVAL: December 22, 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.

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 DME button on audio panel (audio ID will always come through the headset and will come through the cockpit speaker if SPKR is selected on the audio panel).
3. Select PFD softkey, then DME softkey to display DME Information window.
4. Select DME softkey on PFD to display DME TUNING Window.
5. Select NAV1, NAV2 or HOLD mode from DME TUNING window.

SECTION 5 - PERFORMANCE

No change.

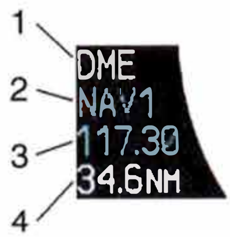
SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook and Airplane Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION

DME Display on Garmin PFD
Figure 1

Legend - Figure 1



1. DME Information Window
2. DME MODE ANNUNCIATOR
   Displays the DME operating mode; NAV 1 or 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 or the frequency being held (HOLD) that was previously selected.
4. 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 controls.

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 (HOLD) DME operation.

NOTE

In the HOLD mode, the frequency being held remains in the DME Information Window and does not update when NAV1 or NAV2 frequencies are being updated.

NOTE

If NAV1 or NAV2 are yellow-x'd on the PFD, the associated DME indication will be valid if it was the active DME when the NAV failure occurred. Switching to the DME associated with the failed NAV will not be possible.

PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 4
FOR
APPAREO VISION 1000 UNIT

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the optional Appareo Vision 1000 unit is installed in accordance with Piper Drawing 107420. 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. This supplement has been FAA Approved as a permanent part of this handbook and must remain in this handbook at all times when the optional Appareo Vision 1000 unit is installed.

FAA APPROVED:
Eric A. Wright
ODA-510620-CE
Piper Aircraft, Inc.
Vero Beach, Florida

DATE OF APPROVAL: December 22, 2017

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the optional Appareo Vision 1000 unit is installed. The information contained within this supplement is to be used "as described" in conjunction with the complete handbook.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

OPERATION

This system does not require flight crew interface during aircraft operation. The flight crew need only ensure that an Appareo SD card is in the Vision 1000 prior to flight operations.

NOTE

During low light operations, quality of images may be reduced.

To insert memory card:

1. Open access door on Vision 1000
2. Ensure proper orientation of SD memory card and Insert, push in to secure
3. Check status of LED (see table below)
4. Close Vision 1000 access door

To remove memory card:

1. Open access door on Vision 1000
2. Push on SD memory card to release and remove
3. Close Vision 1000 access door

SECTION 4 - NORMAL PROCEDURES (continued)

Status Indicators:

Table 1: LED Status		
Item	LED Status	Configuration
1	Red	Fault detected: Refer to ICA
2	Blue	Booting
3	Green	Operating
4	Yellow	SD card not inserted: insert SD card and verify Green LED SD card not formatted correctly: format SD to NTSF, verify Green LED GPS lock not received: Allow 15 minutes to clear, if problem persists contact Appareo
5	NO LED	Not functioning: Refer to ICA

SECTION 5- PERFORMANCE

No change.

SECTION 6- WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook.

SECTION 7- DESCRIPTION AND OPERATION

The Vision 1000 system is a data gathering system utilizing global positioning, image capturing, flight attitude acquisition, and ambient audio recording. It will record the aircraft's airframe attitudes, rates, accelerations, GPS position, and record cockpit audio and images.

The Vision 1000 system is protected via an in-line fuse located behind the instrument panel. Power may be removed from the Vision 1000 system by selecting AVION MASTER OFF or unplugging the cannon plug on the camera.

PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 5
FOR
FLIGHTCOM MODEL 403 INTERCOM

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the optional Flightcom model 403 intercom is installed in accordance with Piper Drawing 107421. 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. This supplement has been FAA Approved as a permanent part of this handbook and must remain in this handbook at all times when the optional model 403 unit is installed.

FAA APPROVED:

Eric A. Wright
ODA–510620–CE
Piper Aircraft, Inc.
Vero Beach, Florida

DATE OF APPROVAL: December 22, 2017

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the optional Flightcom model 403 intercom is installed. The information contained within this supplement is to be used in conjunction with the complete handbook.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

Intercom Failsafe Feature

In the event of a power supply interruption to the intercom, the integral failsafe mode in the intercom will provide the pilot's and copilot's headsets with normal ICS and aircraft radio operation. When using a stereo headset set the headset switch to Mono. Using headsets with a stereo headphone plug but without a Mono setting will cause only one earphone to be active.

The Flightcom model 403 intercom does not have a dedicated circuit breaker but is protected via an in-line fuse located behind the instrument panel.

SECTION 4 - NORMAL PROCEDURES

Adjusting the Intercom and Headsets

To adjust the intercom and headsets:

1. Plug headsets into the co-pilot and passenger jacks in the aircraft.

NOTE

Using stereo headphones without a Mono setting will cause only one earphone to be active.

2. Turn on the aircraft BATT MASTR switch to turn on the intercom.
3. Set the intercom Volume control knob to the 11 o'clock position.
4. Set the intercom Squelch control knob to the 3 o'clock position.
5. Turn up each headset volume to 1/2 the available volume control.
6. Position the headset boom microphone 1/8" from your lips to the side of your mouth.

SECTION 4 - NORMAL PROCEDURES (continued)

Adjusting the Intercom and Headsets (continued)

NOTE

Noise canceling microphones will not operate correctly if they are more than 1/8" from the mouth.

7. While speaking loudly, adjust the ICS volume controls on the Garmin audio panel to set the pilot and copilot volumes to a comfortable level. The Flightcom 403 ICS volume should then be adjusted to set passenger ICS volumes.

Adjusting the Squelch Control

To adjust the squelch control:

1. While no one is talking, turn the intercom Squelch control knob as far clockwise as possible while still blocking background noise.
2. Re-adjust the setting in flight to compensate for different noise levels.

NOTE

If you set the squelch too high by turning the Squelch control knob counterclockwise, your voice will be cut out unless you talk very loudly; if you set the squelch too low by turning the Squelch control knob clockwise, the background noise will be heard occasionally. The intercom will not interfere with normal use of the radio and will allow passengers to hear the aircraft radio and sidetone.

Radio Transmission

To transmit on the radio as the co-pilot and/or passengers, push the PTT switch associated with your headset plug-in panel. Only the person whose push-to-talk switch is depressed will be heard over the radio. No other intercom conversations will be transmitted over the radio at that time.

NOTE

If your push-to-talk switch fails, you can use the existing handheld microphone to talk on the radio while listening over the intercom.

SECTION 4 - NORMAL PROCEDURES (continued)

Isolate Switch

For normal intercom and transmit operations, place the Isolate switch in the ICS position. To isolate the passengers from transmitting and receiving radio communications, place the Flightcom 403 Isolate switch in the Isolate position. Placing the Isolate switch in this position will allow continued use of the intercom between copilot and passengers. Isolation of the the pilot ICS and radio transmission/reception will be controlled through use of the Garmin audio panel ICS isolation intercom controls.

SECTION 5- PERFORMANCE

No change.

SECTION 6- WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook.

SECTION 7- DESCRIPTION AND OPERATION

See Flightcom Model 403 Panel-Mount Intercom Installation/Operation Manual for a complete description of the Flightcom model 403 system (www.Flightcom.net).

The Flightcom 403 panel-mount intercom is installed in the aircraft to provide radio communication capability to the aft seat passengers. The Flightcom 403 system is interfaced with the copilot and both aft passenger headset plug-in panels. The aft seat passengers may transmit on the radio by pressing the press to talk (PPT) switch on their associated headset plug-in panel. Pilot radio transmissions will have priority over the passengers. The pilot is not effected by the configuration of the Flightcom 403 system and is independently controlled by the Garmin GMA 1360 audio panel. Isolation of the ICS and radio transmissions is performed using a combination of Garmin GMA 1360 audio panel and Flightcom 403 system isolation switches . See section 4 of this supplement for normal operating procedures.

SUPPLEMENT 6

CARBURETED O-360 ENGINE INSTALLATION

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Carbureted O-360 Engine is installed in accordance with Piper Drawing 109002-001. 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.

This supplement has been FAA Approved as a permanent part of this handbook and must remain in this handbook at all times when the Carbureted O-360 Engine is installed.

FAA APPROVED:
Eric A. Wright
ODA-510620-CE
Piper Aircraft, Inc.
Vero Beach, Florida

DATE OF APPROVAL: December 22, 2017

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the Carbureted O-360 Engine is installed. The information contained within this supplement is to be used "as described" in conjunction with the complete handbook.

1.5 ENGINES

(c) Engine Model Number
Carbureted O-360-A4M

(j) Engine Type Four Cylinder, Direct Drive, Horizontally Opposed, Air Cooled

SECTION 2 - LIMITATIONS

2.7 POWERPLANT LIMITATIONS

(c) Engine Model No.
Carbureted O-360-A4M

SECTION 3 - EMERGENCY PROCEDURES

3.5 EMERGENCY PROCEDURES CHECK LIST

NOTE

Only those Emergency Procedures that are specific to a Carbureted engine, are provided in this supplement. Refer to Pilot Operating Handbook Section 3 for all Emergency Procedures.

3.5b Engine Power Loss

Engine Power Loss During Takeoff

If sufficient runway remains for a complete stop:

Airspeed .... MAINTAIN SAFE AIRSPEED
Landing .... LAND and STOP STRAIGHT AHEAD
Brakes .... as required

If insufficient runway remains:

Airspeed .... MAINTAIN SAFE AIRSPEED
Flaps .... AS REQUIRED

NOTE

Make only shallow turns to avoid obstructions.

If sufficient altitude has been gained to attempt a restart:

Airspeed .... MAINTAIN 76 KIAS
FUEL Selector .... SWITCH to tank containing fuel
FUEL PUMP .... Check ON
MIXTURE .... RICH
CARB HEAT .... ON

If power is not regained, proceed with power-off landing.

Proper action following a loss of power, depends on circumstances. If the situation allows, flaps are normally fully extended for touchdown. If power loss was caused by fuel exhaustion, power will not be regained after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5b Engine Power Loss (continued)

Engine Power Loss In Flight

Airspeed	MAINTAIN 76 KIAS
FUEL Selector	SWITCH to tank containing fuel
FUEL PUMP	ON
MIXTURE	RICH
CARB HEAT	ON
LEFT/RIGHT MAG Switches	Turn OFF then ON one at a time

When power is restored:

CARB HEAT	OFF
FUEL PUMP	OFF

Land as soon as practical and investigate cause of power loss.

If power is not restored prepare for power-off landing.

Complete engine power loss is usually caused by fuel flow interruption, attempt to restore power by turning the fuel pump ON and selecting the other fuel tank. Move the throttle and mixture control levers to different settings. This may restore power if the problem is too rich or too lean a mixture or if there is a partial fuel system restriction. Water in the fuel could take some time to be consumed, so allowing the engine to windmill may restore power. If engine failure was caused by fuel exhaustion, power will not be restored after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds. If power is still not restored, select Carburetor Heat ON, and turn the left and right magneto switches OFF then ON one at a time

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5j Carburetor Icing

Carburetor Icing	
CARB HEAT	ON
MIXTURE	Adjust for Maximum Smoothness

Under certain moist atmospheric conditions at temperatures of -5°C to 20°C, it is possible for ice to form in the induction system. This is due to the high air velocity through the carburetor venturi and the absorption of heat from this air by vaporization of the fuel. To avoid this, carburetor preheat is provided to replace the heat lost by vaporization. Carburetor heat should be full on when carburetor ice is encountered.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5k Engine Roughness

ENGINE ROUGHNESS

NOTE

Partial carburetor heat may be worse than no heat at all, since it may melt part of the ice, which will refreeze in the intake system. When using carburetor heat, always use full ON, and when ice is removed return the control to the full OFF position.

CARB HEAT .... ON

If roughness continues after one minute:

CARB HEAT .... OFF
MIXTURE .... Adjust for Maximum Smoothness
FUEL PUMP .... ON
Fuel Selector .... SWITCH TANKS
Engine Indicators .... CHECK
LEFT/RIGHT MAG Switches .... Individually Select OFF and ON

.If operation is satisfactory on either MAG, continue on that magneto at reduced power and full RICH mixture to nearest airport.

Prepare for power-off landing.

NOTE

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

Engine roughness due to carburetor icing is indicated by a drop in RPM, and may be accompanied by a slight loss of airspeed or altitude. If too much ice is allowed to accumulate, restoration of full power may not be possible; therefore, prompt action is required. Upon completion of this checklist, if roughness persists, prepare for a precautionary landing at pilot's discretion.

SECTION 4 - NORMAL PROCEDURES

NOTE

Only those Normal Procedures that are specific to a Carbureted engine, are provided in this supplement. Refer to Pilot Operating Handbook Section 4 for all Normal Procedures.

4.5c Before Starting Engine Checklists

BEFORE STARTING ENGINE

Flaps .... RETRACT
Passengers .... BOARD
Door .... CLOSED and SECURE
Seats .... ADJUSTED and LOCKED IN POSITION
Seat Belts and Harness .... FASTEN/ADJUST
CHECK INERTIA REEL
FUEL Selector .... DESIRED TANK
PARK BRAKE .... SET
Circuit Breakers .... CHECK IN
CARB HEAT .... OFF
ALTERNATE STATIC SOURCE .... OFF
All Electrical Switches .... OFF
BATT MASTR .... OFF
AVION MASTER .... OFF

NOTE

The EMERG BATT may remain ON after checking for proper bus operation, thereby allowing the displays to remain active prior to engine start. Avoid delays between this check and engine starting to preserve emergency battery power.

EMERG BATT Switch .... ARM

4.5c Before Starting Engine Checklists (continued)

E VOLTS Indication .... 23.3 VOLTS (Minimum)
Verify operation of:
- PFD with no red-x's on:
  - Attitude
  - Airspeed
  - Altitude
  - Vertical Speed
- Audio Panel
- COM1
- NAV1
- Engine Indications (except oil pressure)
- Standby Flight Instruments

If the E VOLTS indication is less than 23.3 VOLTS, the voltage should be checked again at the end of the GROUND CHECK checklist (after being charged for some time by the primary electrical system). If E VOLTS is still less than 23.3 volts, determine the cause and correct the issue prior to flight.

4.5d Engine Start Checklists

NORMAL START - COLD ENGINE

THROTTLE .... 1/4 IN. OPEN
BATT MASTR Switch .... ON
ALTR Switch .... ON
LEFT MAG Switch .... ON
FUEL PUMP .... ON
FIN STROBE Switch .... ON
MIXTURE .... FULL RICH
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
Propeller .... CLEAR
START Switch .... ENGAGE
THROTTLE .... ADJUST
RIGHT MAG Switch .... ON
Oil Pressure .... CHECK

NOTE

If engine does not start within 10 seconds, prime and repeat starting procedure.

4.5d Engine Start Checklists (continued)

NORMAL START - HOT ENGINE

THROTTLE	1/2 IN. OPEN
BATT MASTR Switch	ON
ALTR Switch	ON
LEFT MAG Switch	ON
FUEL PUMP	ON
MIXTURE	FULL RICH
CAS Messages	CONSIDER ANY ILLUMINATED
PFD Annunciations	CONSIDER ANY ILLUMINATED
Propeller	CLEAR
START Switch	PRESS
THROTTLE	ADJUST
RIGHT MAG Switch	ON
Oil Pressure	CHECK

NOTE

If engine does not start shortly following starter engagement, continue cranking and move the mixture to idle cut-off.

In high-ambient temperature environments, especially when attempting to restart the engine after shutting down with engine oil temperature near or exceeding 200°F, fuel vapor may form in the carburetor causing excessive fuel delivered to the intake resulting in increased chance of engine fire. To minimize this, it is recommended the aircraft be parked pointed into the wind with the oil filler door open and the engine allowed to cool down significantly prior to restart. Operations in very high temperature environments may result in increased chance of engine fire during restart unless the engine fuel system is allowed time to cool down significantly. In extremely hot temperatures this may take 30-60 minutes or longer until the oil temperature has reached approximately 150°F. Even then, be ready to clear the engine of excessive fuel using the flooded start procedure and at the first indication of fire or smoke, immediately execute the Engine Fire During Start emergency procedure.

4.5d Engine Start Checklists (continued)

ENGINE START - FLOODED

CAUTION

If engine does not start and/or any indication of fire or smoke is present, immediately execute the emergency procedure for Engine Fire During Start.

THROTTLE .... OPEN FULL
BATT MASTR Switch .... ON
ALTR Switch .... ON
LEFT MAG Switch .... ON
FUEL PUMP .... OFF
MIXTURE .... IDLE CUT-OFF
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
Propeller .... CLEAR
START Switch .... PRESS
MIXTURE .... ADVANCE
THROTTLE .... RETARD
RIGHT MAG Switch .... ON
Oil Pressure .... CHECK

4.5d Engine Start Checklists (continued)

ENGINE START - USING EXTERNAL POWER SOURCE

NOTE

The EMERG BATT switch may remain ON while using external power. The emergency bus does not receive power from the external power source due to a relay in the circuit.

BATT MASTR Switch	OFF
ALTR Switch	OFF
LEFT MAG Switch	ON
EMERG BATT Switch	VERIFY ARM
All Electrical Equipment	OFF
External Power	APPLY
THROTTLE	1/4 in. OPEN
FUEL PUMP	ON
MIXTURE	FULL RICH
CAS Messages	CONSIDER ANY ILLUMINATED
PFD Annunciations	CONSIDER ANY ILLUMINATED
Propeller	CLEAR
START Switch	PRESS
RIGHT MAG Switch	ON
Oil Pressure	CHECK
BATT MASTR Switch	ON
THROTTLE	LOWEST POSSIBLE RPM
External Power	DISCONNECT
ALTR Switch	ON - Check Ammeter Indication

NOTE

DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

NOTE

During extended periods of engine idle at high ambient temperatures, fuel flow to the engine can be interrupted by the formation of fuel vapor bubbles in the fuel line resulting in rough idle operation. To correct this condion, see section 4.15.

4.5g Ground Check Checklist

GROUND CHECK

PARK BRAKE .... SET
THROTTLE .... 2000 RPM
LEFT/RIGHT MAG Check .... MAX. DROP 175 RPM
MAX. DIFF. 50 RPM
Oil Temperature .... CHECK
Oil Pressure .... CHECK
VOLTS Indication .... CHECK BUS (28 +/- 1 VOLT)
ALTR AMPS Indication .... CHECK NORMAL
CARB HEAT .... APPROX. 75 RPM DROP
FUEL PUMP .... OFF
Verify Engine Operation
THROTTLE .... RETARD

If E VOLTS indication less than 23.3 VOLTS during BEFORE STARTING ENGINE Checklist:

EMERG BATT Switch .... Verify ARM
AVION MASTER Switch .... OFF
ALTR Switch .... OFF
BATT MASTR Switch .... OFF
E VOLTS Indication .... 23.3 VOLTS MINIMUM

If E VOLTS less than 23.3 VOLTS, determine cause of low voltage prior to flight.

If E VOLTS Greater Than or Equal to 23.3 VOLTS:

BATT MASTR Switch .... ON
ALTR Switch .... ON
AVION MASTER Switch .... ON

Operation on one magneto should not exceed 10 seconds. Avoid prolonged ground operation with CARB HEAT "ON" as the air is unfiltered.

4.5h Before Takeoff Checklist

BEFORE TAKEOFF

BATT MASTR Switch .... VERIFY ON
ALTR Switch .... VERIFY ON
FUEL PUMP .... ON
LEFT/RIGHT MAG Switches .... VERIFY ON
Flight Instruments .... CHECK
Standby Flight Instruments .... CHECK
CAS Messages .... CONSIDER ANY ILLUMINATED
PFD Annunciations .... CONSIDER ANY ILLUMINATED
System Messages (Messages Softkey) .... CONSIDER
FUEL Selector .... PROPER TANK
Engine Indications .... CHECK
CARB HEAT .... OFF
MIXTURE .... SET
Seat Backs .... ERECT
Seats .... ADJUSTED AND LOCKED IN POSITION
Belts/Harness .... FASTENED/CHECK
Empty Seats .... SEAT BELTS SECURELY FASTENED
Flaps .... SET
Stabilator and Rudder Trims .... SET
Controls .... FREE AND CORRECT
Door .... LATCHED
Air Conditioner (if installed) .... OFF

NOTE

TAS aural alerts will be muted when GPS altitude is lower than ~ 400 FT AGL.

Takeoff should not be attempted with ice, snow, or frost on the wings. To achieve the takeoff performance specified in Section 5, it is necessary to set maximum power prior to brake release. Takeoff distances shown in Section 5 will be increased by uphill runway gradient, soft, wet, rough or grassy runway surface, or poor pilot technique. As power is applied at the start of the takeoff, monitor at the engine instruments to verify that the engine is operating properly and the airspeed indicator to confirm that it is functioning. Full throttle should also be achieved without engine backfiring, skipping, faltering or a reduction in engine oil pressure.

4.5l Descent Checklist

DESCENT

Normal Descent:

THROTTLE .... 2500 RPM
Airspeed .... 122 KIAS
MIXTURE .... RICH
CARB HEAT .... ON IF REQUIRED

Power Off Descent:

CARB HEAT .... ON IF REQUIRED
THROTTLE .... CLOSED
Airspeed .... AS REQUIRED
MIXTURE .... AS REQUIRED
Power .... VERIFY WITH THROTTLE EVERY 30 SECONDS

If a prolonged power off descent is to be made, apply full carburetor heat prior to power reduction if carburetor icing conditions are suspected. Throttle should be retarded and mixture control leaned as required. Power response should be verified approximately every 30 seconds by partially opening and then closing the throttle (clearing the engine). When leveling off enrichen mixture, set power as required and select carburetor heat off unless carburetor icing conditions are suspected.

4.5m Approach and Landing Checklist

APPROACH AND LANDING

Carburetor heat should not be applied unless there is an indication of carburetor icing, since the use of carburetor heat causes a reduction in power which may be critical in case of a go-around. Full throttle operation with carburetor heat on can cause detonation.

SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

No change.

SECTION 7 - DESCRIPTION AND OPERATION

7.5 ENGINE AND PROPELLER

The ARCHER III is powered by a four cylinder, direct drive, horizontally opposed engine rated at 180 horsepower at 2700 rpm. It is furnished with a starter, a 70 ampere, 28 volt alternator, a shielded ignition, a fuel pump, and a dry, automotive type carburetor air filter.

7.7 INDUCTION SYSTEM

Not applicable.

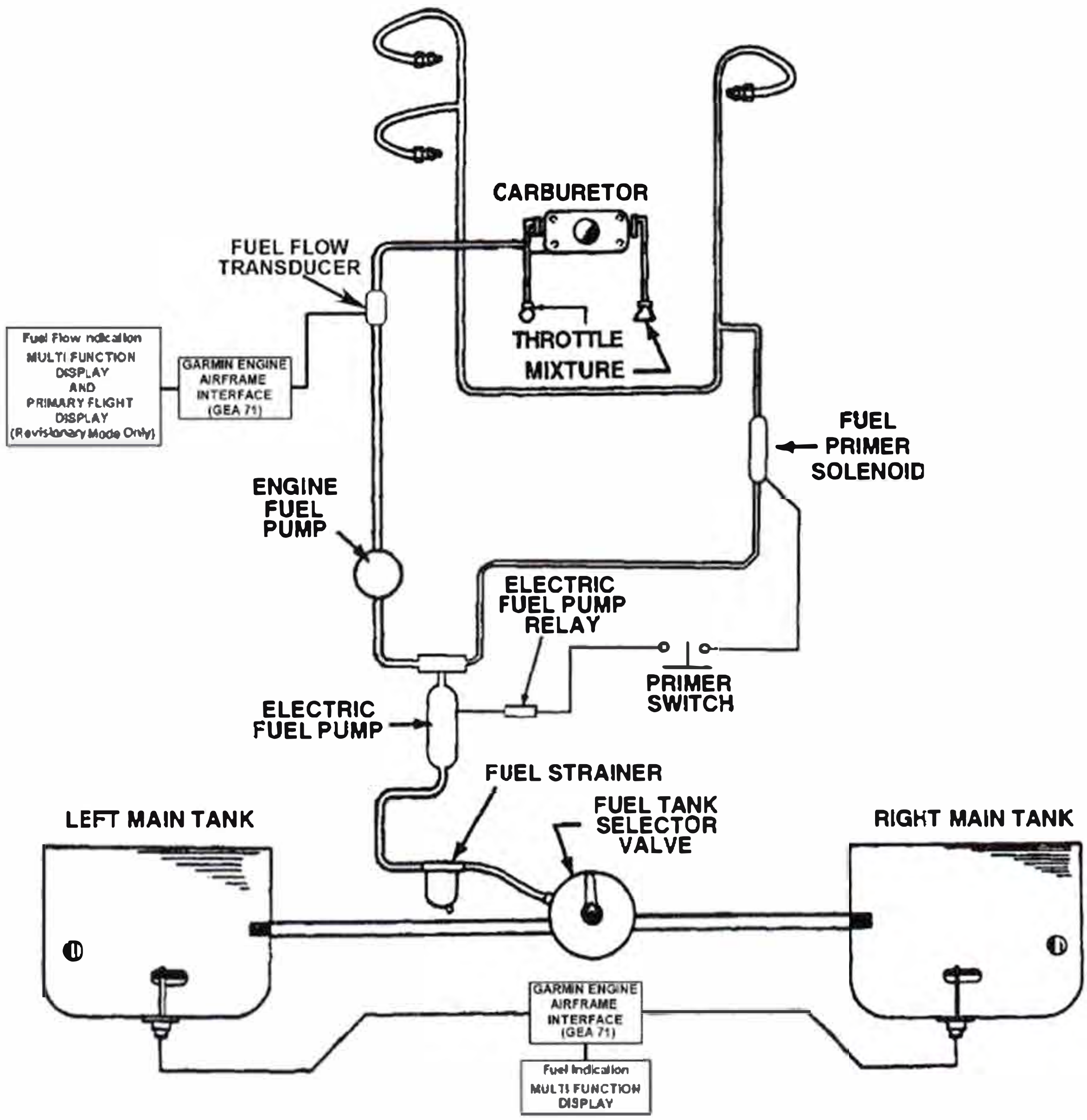
7.9 ENGINE CONTROLS

A carburetor heat control is located on the instrument panel right of the control quadrant. The control displays two positions: ON (down), OFF (up).

7.19 FUEL SYSTEM

An electric engine priming system is provided to facilitate starting. The primer switch is located right of the starter switch in the overhead switch panel (see Fig. 7-10).

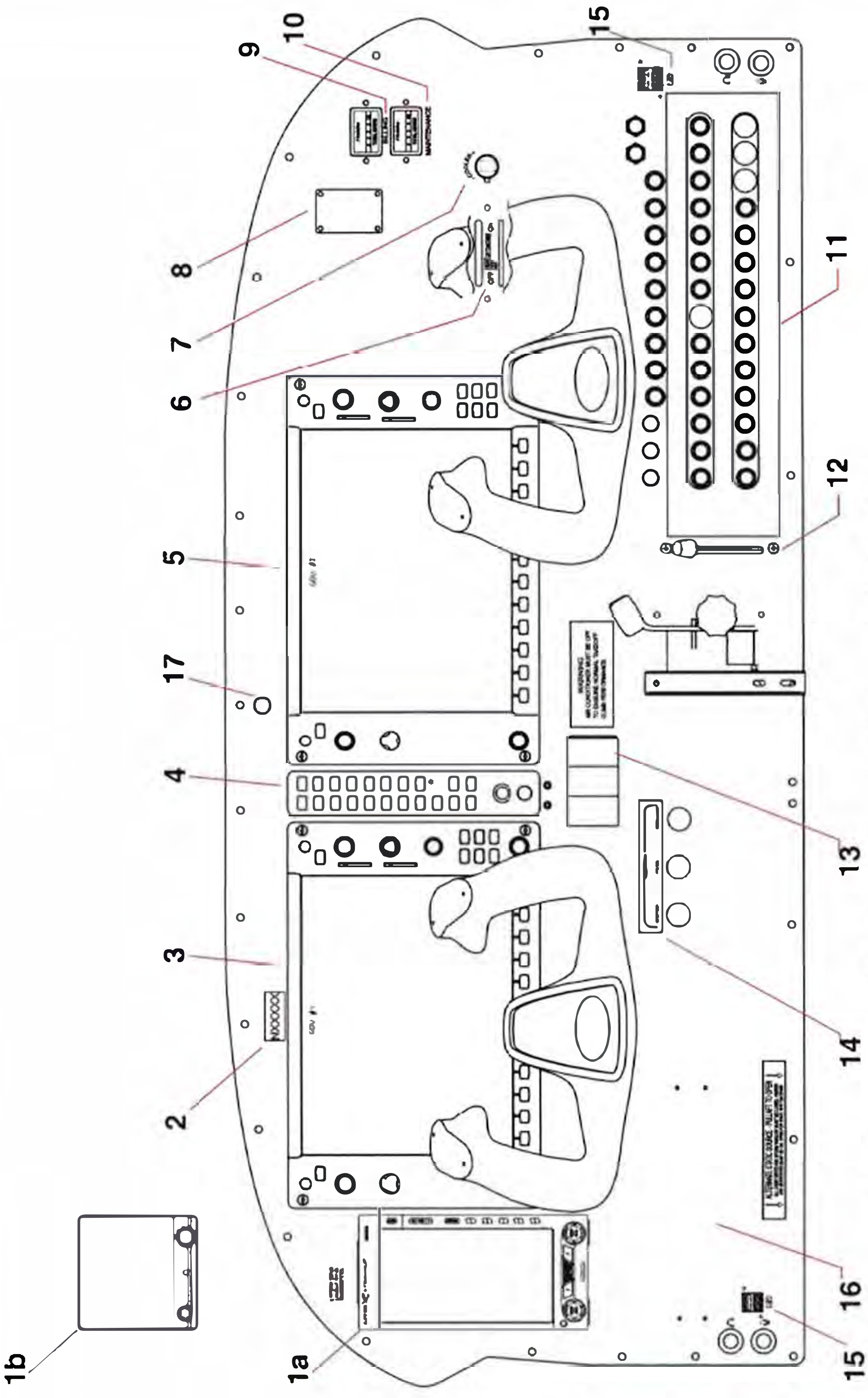
7.19 FUEL SYSTEM (continued)



FUEL SYSTEM SCHEMATIC
- Carbureted Engine -
Figure 7-6

7.23 INSTRUMENT PANEL

The instrument panel is designed to accommodate the Garmin G1000 system, the standby instrument, required switches, and remaining avionics/ options (See Figures 7-9 and 7-10 for location of each item/details).



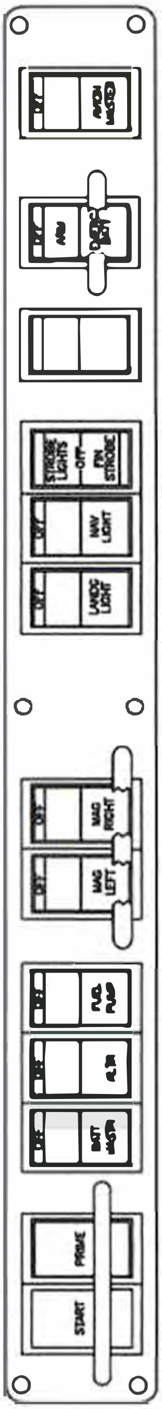
Note - See next page for itemized list of components /switches.

INSTRUMENT PANEL
Figure 7-9

1. Standby instrument
    a) Aspen EBD-1000
    b) Garmin G5
2. Plate - Aircraft Registration Number
3. PFD
4. Audio panel
5. MFD
6. Cabin heater temp / wnd shield defroster
7. Air conditioning temp. controller
8. ELT switch
9. HOBSS meter - Billing (optional)
10. HOBSS meter - Maintenance (optional)
11. Circuit breakers
12. Carb heat
13. Electrical accessories (L to R)
    a) Flight director / autopilot switch (option)
    b) Pitot heat
    c) Ventilation fan
    d) Air conditioner (option)
14. Dimmer rheostats (L to R)
    a) Switches
    b) Panel
    c) Avionics
15. USB
16. ADF (option)
17. Level Mode (LVL) Switch (optional)

Figure 7-9 (continued)

7.23 INSTRUMENT PANEL (continued)



Overhead switches: (left to right)

- Engine Starter
- Engine Primer (Carbureted Engine Only)
- Battery Master
- Alternator
- Fuel Pump
- Left Magneto
- Right Magneto
- Landing Light
- Nav Light
- Strobe Lights/Fin Strobe
- Reserved
- Emergency Battery
- Avionics Master

OVERHEAD SWITCH PANEL
Figure 7-10

SECTION 8 - HANDLING, SERVICING, AND MAINTENANCE

8.21 FUEL SYSTEM

(a) Servicing Fuel System

At every 50 hour inspection, the fuel screens in the strainer, in the electric fuel pump, and at the carburetor inlet must be cleaned.

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PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 7
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 operation of this system. AMSAFE will be responsible to supply and revise the operational supplement. It is permitted to include the AMSAFE Inflatable Seat Restraints supplement in this location of the Pilot's Operating Handbook unless otherwise stated by AMSAFE. The information contained in the AMSAFE Inflatable Seat Restraints supplement may supersede or supplement the information in the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual with respect to the operation of the AMSAFE Inflatable Seat Restraints system. For limitations, procedures and performance information not contained in the AMSAFE supplement, consult the basic 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. 8 FOR CONTINENTAL AEROSPACE TECHNOLOGIES DIESEL ENGINE (TAE 125-02-114) INSTALLATION (FAA STC SA03303AT) (EASA STC 10014364)

The FAA approved operational supplement for the Continental Aerospace Technologies diesel engine (TAE 125-02-114) installation, installed in accordance with STC SA03303AT, is required for operation of this engine. Continental Aerospace Technologies will be responsible to supply and revise this operational supplement. It is permitted to include the Continental Aerospace Technologies diesel engine (TAE 125-02-114) supplement in this location of the Pilot's Operating Handbook unless otherwise stated by Continental Aerospace Technologies. The information contained in the Continental Aerospace Technologies diesel engine (TAE 125-02-114) supplement may supersede or supplement the information in the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual with respect to the operation of this engine. For limitations, procedures and performance information not contained in the Continental Aerospace Technologies diesel engine (TAE 125-02-114) supplement, consult the basic 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. 9
FOR

SAFE FLIGHT ANGLE OF ATTACK SYSTEM

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Safe Flight Angle of Attack (AoA) system 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.

FAA APPROVED: ______________________
ERIC A. WRIGHT
ODA-510620-CE
PIPER AIRCRAFT, INC.
VERO BEACH, FLORIDA

DATE OF APPROVAL: March 27, 2020

SECTION 1 - GENERAL

The Safe Flight Angle of Attack (AoA) Indexer, referred to as the "AoA Indicator" or simply "display" in this supplement, is a system that receives and displays angle of attack information from the lift transducer vane installed in the right wing of the aircraft.

SECTION 2 - LIMITATIONS

1. The angle of attack system provides advisory information only and does not replace the aircraft's primary stall warning system.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

4.5e BEFORE TAXIING

AVION MASTER Switch...ON
AoA Indicator.. VERIFY SELF TEST
AoA Indication..lights illuminated (not blank)

NOTE

If AoA indications are suspected to not be accurate, discontinue use of the AoA Indicator.

NOTE

If the AoA Indicator screen turns off after the power-on self-test, check that the AOA INDICATOR circuit breaker is pushed in.

4.5i BEFORE TAKEOFF

AoA Reference Marker ....SET (if desired)

SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the licensed weight and balance data in Section 6 of the Pilot's Operating Handbook and Airplane Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

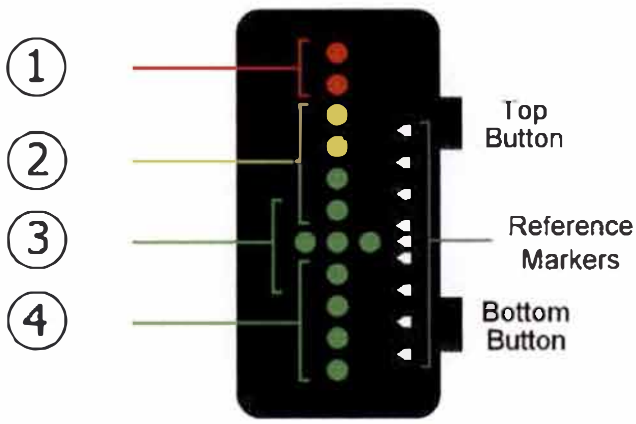
NOTE

The AoA Indicator provides advisory information only and does not replace the aircraft's primary stall warning system.

The Safe Flight AoA Indicating system receives and displays Angle of Attack (AoA) information from the lift transducer on the leading edge of the right wing. The position of the lift transducer vane on the wing's leading edge is converted to AoA within the indicator computer on the glareshield. Indication of angle of attack can serve as a reliable aid for low airspeed awareness. The AoA system is completely independent of the existing stall warning system.

SYSTEM DESCRIPTION

The AoA Indicator consists of a series of red, yellow and green lights, a reference marker, and two buttons on the right side as shown in Figure 7-1 below.



AoA Indicator
Figure 7-1

SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS (continued)

The lights on the display shown in Figure 7-1 are a general representation of angle of attack.

1. Stall is imminent or stall is occurring.
2. Approaching stall, such as stall warning.
3. Aircraft is operating at an angle of attack which provides adequate stall margin.
4. Aircraft is operating at a relatively low angle of attack.

The reference marker is a white triangle along the right side of the display which can be set by the pilot as a target angle of attack during specific phases of flight. Experience with various flight conditions will allow the reference marker to be set at the optimum locations.

The two buttons on the right side of the display perform multiple functions. When the upper button is pressed quickly, it raises the reference marker towards the high AoA side and when the lower button is pressed quickly, it lowers the reference marker towards the low AoA side. Immediately after either button is pressed, all lights on the display will momentarily illuminate giving the pilot awareness of where the reference marker is being set. Holding the top button for four seconds mutes or unmutes the audio. Holding the bottom button for two seconds dims or brightens the display.

Circuit protection for the Safe Flight AoA system is provided by the AOA INDICATOR circuit breaker located on the bottom right of the instrument panel, Row 3, Col. 12.

SYSTEM USAGE

After turning on the AVION MASTER switch in the BEFORE TAXIING checklist, the pilot should verify that the AoA system self-test has successfully completed. During the self-test all indicator lights will illuminate for approximately five seconds, followed by a set of lights that corresponds to the current lift transducer vane position. An audio warning will also sound for the duration of the self-test. There is no specific lighting expectation during ground operations, however, two red flashing lights at the top of the display or one green light at the bottom of the display could indicate a jammed lift transducer vane. If the red LED on the high side of the display is blinking slowly, the system must not be used until a system calibration has been completed. Refer to Section 8 of this supplement for further instructions.

SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS (continued)

NOTE

If AoA indications are suspected to not be accurate, discontinue use of the AoA Indicator.

The reference marker can be set to a target angle of attack for the desired phase of flight. During the takeoff roll, as airflow increases over the wing, the AoA indication will change to a representative in-flight condition. See Figure 7-1 for representative AoA indications.

Power is removed from the AoA Indicator when the AVION MASTER switch is turned off.

SECTION 8 - AIRPLANE HANDLING, SERVICING, AND MAINTENANCE

The Safe Flight AoA indicating system is not field repairable. If the operation of the system is in doubt, apply power to the system and verify that the power-on self-test has completed properly. If the power-on self-test is unsuccessful, hold the top and bottom buttons on the AoA Indicator for two seconds while power is applied. The display will illuminate all reference marker segments and then will illuminate a particular light segment on the display. Note which light segments illuminated, as this will aid in diagnosing the problem. When contacting support, have the following information available:

1. Unit part number
2. Unit serial number
3. Unit software revision
4. Fault code (which LEDs illuminated on the display)

The part number, serial number, and software revision can be found on the nameplate on the lower surface of the AoA Indicator. Detaching the unit is not necessary as the values can be seen with the aid of a mirror or by taking a picture with a slim camera.

SECTION 10 - OPERATING TIPS

No change.

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PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 10
FOR

SECOND OIL COOLER

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when a second oil cooler system 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.

FAA APPROVED: Scott Edwards

SCOTT EDWARDS
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PIPER AIRCRAFT, INC.
VERO BEACH, FLORIDA

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SECTION 1 - GENERAL

An optional second oil cooler is intended to increase the operational flexibility of the aircraft in extreme high temperature environments.

1.11 OIL

(a) Oil Capacity (U.S. quarts) 9

NOTE

With the addition of the second oil cooler and associated hoses, the total capacity of the oil system will be approximately 9 quarts. However, approximately 1 quart of oil will remain in the system after engine shutdown and not drain into the engine oil sump. Continue to use the 8 quart marking on the oil dipstick as the maximum capacity indication and the 2 quart marking as the minimum capacity indication.

SECTION 2 - LIMITATIONS

The addition of a second oil cooler significantly increases the capability of the engine oil system to reject heat. As a result, the cylinder heads, rather than the engine oil, could become the critical limiting engine component for cooling at high outside air temperatures. This requires the addition of a 500°F cylinder head temperature limitation and the display of cylinder head temperatures on the ENGINE page of the G1000 NXi system. CAS messages have been added to alert the pilot should cylinder head temperatures approach (CAUTION) or exceed (WARNING) this limit.

2.7 POWERPLANT LIMITATIONS

(d) Engine Operating Limits

(11) Cylinder Head Temperature 500°F

2.9 POWERPLANT INSTRUMENT MARKINGS

(d) Cylinder Head

Green Band (Normal Operating Range)	Up to 490°F
Yellow Band (Caution Range)	490°F to 500°F
Red Band (Maximum)	Above 500°F

SECTION 3 - EMERGENCY PROCEDURES

3.1 GENERAL

Crew Alerting System (CAS) Messages

Warning Messages – Red

CAS Event	CAS Message	Checklist Page	Cause
CAS Warnings with Text Messages			
Cylinder head temperature exceedance	CYL HD TEMP	9-68	Cylinder head temperature on at least one cylinder head is greater than 500°F

Caution Messages - Amber

CAS Event	CAS Message	Checklist Page	Cause
CAS Cautions with Text Messages			
Cylinder head temperature approaching limit	CYL HD TEMP	9-68	Cylinder head temperature on at least one cylinder head exceeds 490°F but all cylinder head temperatures are less than or equal to 500°F

3.5 EMERGENCY PROCEDURES CHECKLIST

3.51 Cylinder Head Temperature

Cylinder Head Temperature

Indication: Master Caution, Double Chime, CYL HD TEMP

ENGINE PAGE .... SELECT
Cylinder Head Temperatures .... MONITOR
THROTTLE .... Consider REDUCING
MIXTURE .... Consider ENRICHENING
Airspeed .... Consider INCREASING

If cylinder head temperatures continue to rise:

Indication: Master Warning, Triple Chime, CYL HD TEMP

THROTTLE .... MINIMUM REQUIRED
MIXTURE .... RICH
Airspeed .... INCREASE if practical
Cylinder Head Temperatures .... MONITOR

If cylinder head temperatures remain in the warning range:

Land as soon as possible. Prepare for a POWER OFF LANDING

SECTION 4 - NORMAL PROCEDURES

No change.

SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook and Airplane Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION

7.5 ENGINE AND PROPELLER

A second oil cooler, identical to the primary oil cooler, is attached to the forward side of the firewall on the right side of the engine. It is plumbed in series with the primary oil cooler. Air for the heat exchanger is drawn from a duct on the right side of the engine cowling (not present on the standard aircraft) and exhausted out the bottom of the cowling.

SECTION 8 - AIRPLANE HANDLING, SERVICING, AND MAINTENANCE

8.19 OIL REQUIREMENTS

NOTE

With the addition of the second oil cooler and associated hoses, the total capacity of the oil system will be approximately 9 quarts. However, approximately 1 quart of oil will remain in the system after engine shutdown and not drain into the engine oil sump. Continue to use the 8 quart marking on the oil dipstick as the maximum capacity indication and the 2 quart marking as the minimum capacity indication.

8.29 COLD WEATHER OPERATION

An additional winterization plate is provided to restrict airflow over the second oil cooler during cold weather operations. It should be installed and removed in accordance with the existing instructions for utilizing the winterization plate on the standard airplane.

PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 11
FOR

FUEL RETURN SYSTEM

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Fuel Return system 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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SECTION 1 - GENERAL

No change.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

No change.

SECTION 5 - PERFORMANCE

No change.

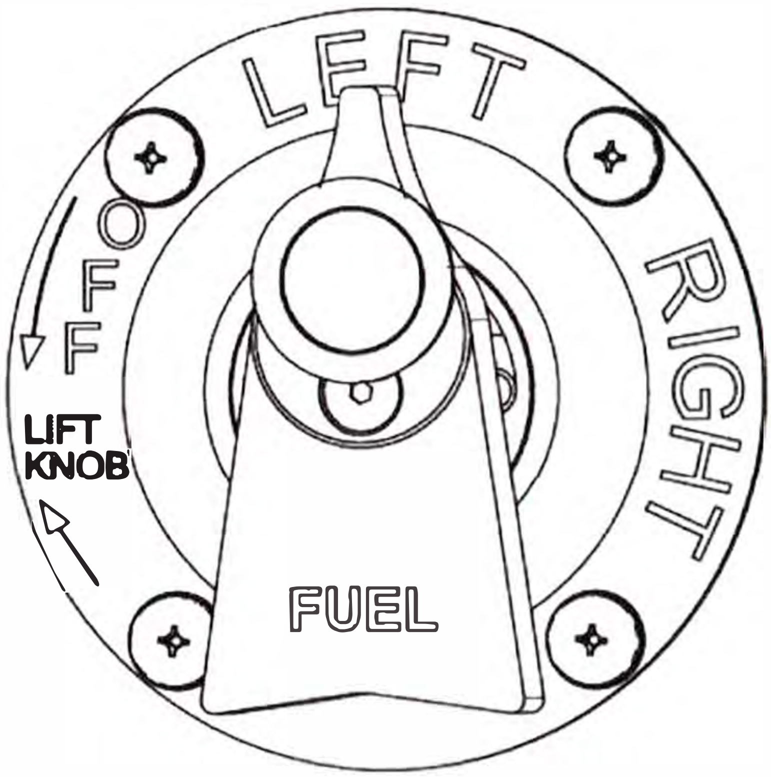
SECTION 6 - WEIGHT AND BALANCE

No change.

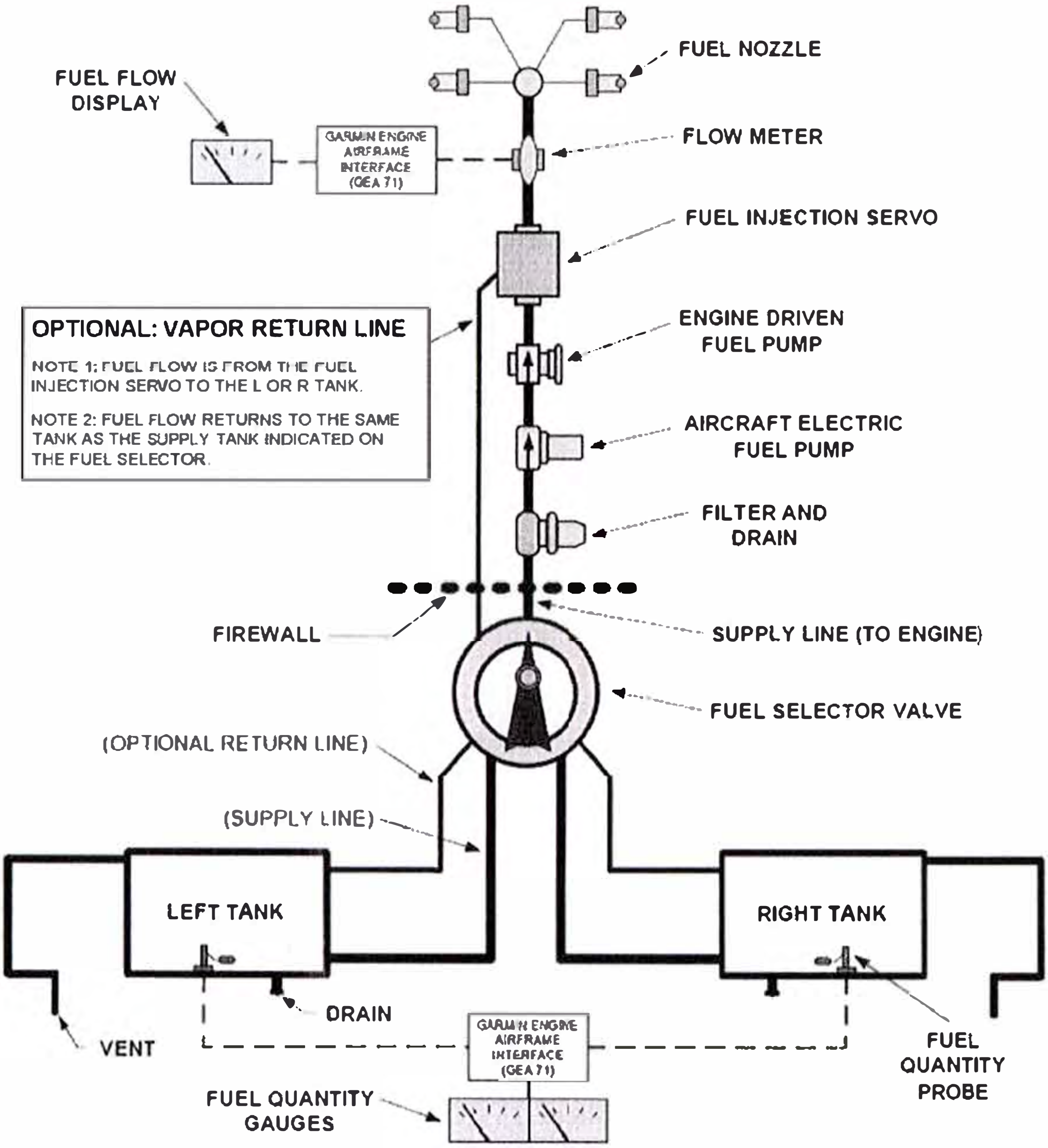
SECTION 7 - DESCRIPTION AND OPERATION

7.19 FUEL SYSTEM

The fuel system is modified by the addition of a fuel return system, including a different fuel selector valve. Unused excess fuel is returned from the fuel injector servo to the fuel tank that it was drawn from through a dedicated fuel return line that passes back through the fuel selector valve and, from there, into the fuel tank that is selected to feed fuel to the engine. This fuel selector valve controls both the fuel feed and fuel return selection with a single control. Unlike the standard fuel selector valve, the fuel selector valve installed as part of the fuel return system (Figure 7-5b) requires the pilot to pull out on a plunger to move the fuel selector into or out of the OFF position. See Figure 7-6b for a diagram of the modified fuel system.



FUEL SELECTOR
Figure 7-5b



FUEL SYSTEM SCHEMATIC
- Fuel Injected Engine - Vapor Return Line -
Figure 7-6b

SECTION 8 - AIRPLANE HANDLING, SERVICING, AND MAINTENANCE

No change.

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SECTION 10

OPERATING TIPS

10.1 GENERAL

This section provides operating tips of particular value in the operation of Archer III.

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) The best speed for takeoff is about 57 KIAS under normal conditions. Trying to pull the airplane off the ground at too low an airspeed decreases the controllability of the airplane in the event of engine failure.

(c) Flaps may be lowered at airspeeds up to 102 KIAS. To reduce flap operating loads, it is desirable to have the airplane at a slower speed before extending the flaps. The flap step will not support weight if the flaps are in any extended position. The flaps must be placed in the "UP" position before they will lock and support weight on the step.

(d) The pilot should only reset a tripped circuit breaker if the system/ component is considered essential for safety of flight. Prior to resetting the circuit breaker, wait at least one minute and verify there is no smoke or burning smell. If the circuit breaker opens a second time, leave the circuit breaker out. Have a maintenance inspection performed prior to resetting the circuit breaker. Do not reset any nonessential circuit breakers in flight.

(e) 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.

10.3 OPERATING TIPS (continued)

(f) Anti-collision lights should not be operating when flying through cloud, fog or haze, since reflected light can produce spacial disorientation. Strobe lights should not be used in close proximity to the ground such as during taxiing, takeoff or landing.

(g) The rudder pedals are suspended from a torque tube which extends across the fuselage. The pilot should become familiar with the proper positioning of their feet on the rudder pedals so as to avoid interference with the torque tube when moving the rudder pedals or operating the toe brakes.

(h) 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.

(i) Prolonged slips or skids which result in excess of 2000 ft. 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 tank being used is not full.

(j) Hand starting of the engine is not recommended, however, should hand starting of the engine be required, only experienced personnel should attempt this procedure.

The left magneto should be switched ON and the right magneto should be switched OFF during the starting procedure to reduce the probability of "kick back". Switch the right magneto ON after the engine has started.