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. 2881142 **AIRPLANE REGIST. NO.** N28KU

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®

Published by
TECHNICAL PUBLICATIONS
Piper Aircraft, Inc.
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.	Eric A. Wright
	9-57 thru 9-64	Added Supplement 9. Added pages 9-57 thru 9-64.	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
Rev. 9 (PR220620)	ii	Updated copyright.	
	vi-c	Added Rev. 9 to L of R.	
	3-4, -5	Revised Para. 3.1.	
	3-20	Revised Para. 3.5d.	
	3-24	Revised Para. 3.5e.	
	3-34	Revised Para. 3.5e.	
	3-38	Revised Para. 3.5f.	
	4-3, -4	Revised Para. 4.5a.	
	5-33	Revised Chart for Fig. 5-43.	
	7-17	Revised Reversionary Mode MFD.	Mitchell R. Cannon
	7-32	Revised GDL - Optional.	Mitchell R. Cannon June 20, 2022
	7-36	Revised Databases.	
Rev. 10 (PR241010)	ii	Updated copyright.	
	vi-c	Added Rev. 10 to L of R.	Mitchell R Cannon
	3-10	Revised Para. 3.5a.	Mitchell R. Cannon
	7-i	Revised T.O.C.	October 10, 2024
	7-61 thru 7-64	Relocate text, revise Para. titles. Add Para. 7.32.	ODA Administrator, ODA-510620-CE, for Manager, Flight Test & Human Factors Branch, AIR-710 FAA
	8-i	Revised T.O.C.	
	8-16	Added Para. 8.26.	

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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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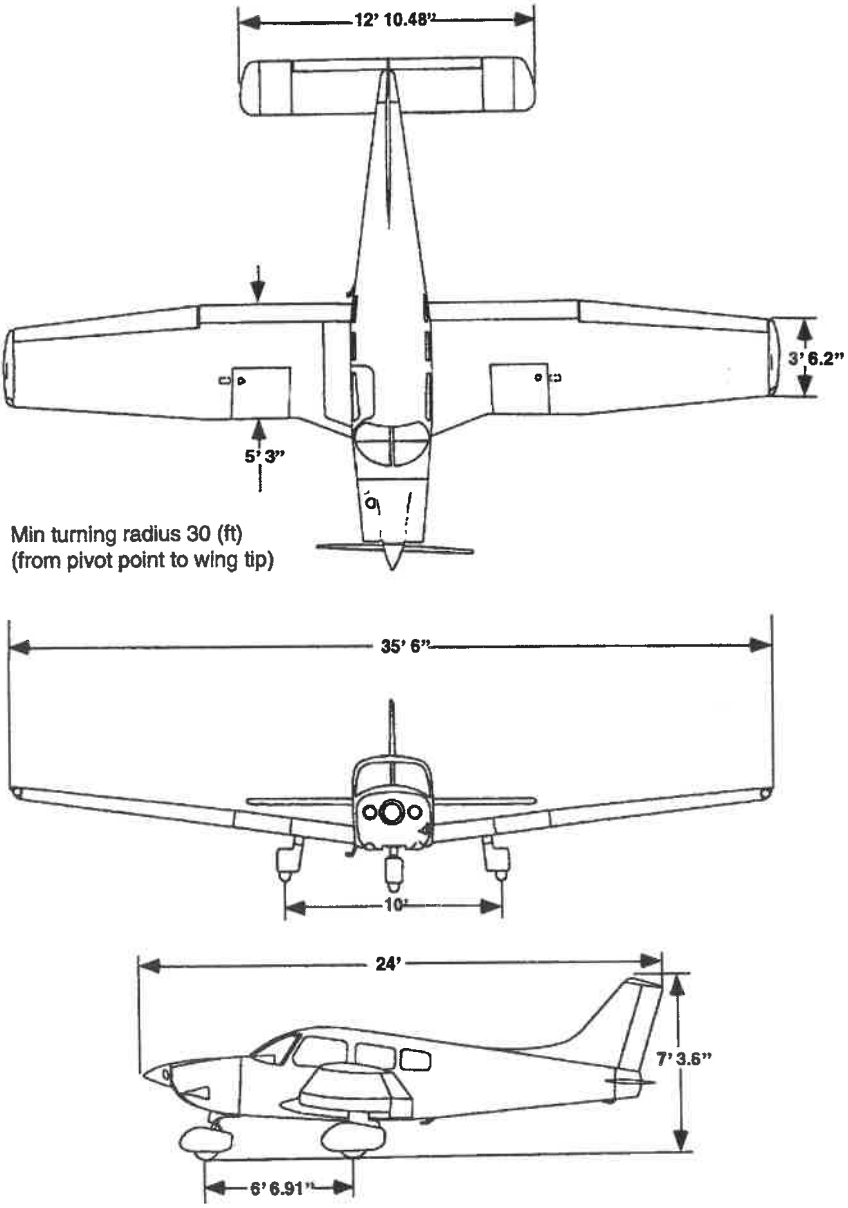

THREE VIEW
Figure 1-1

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

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

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

1.21 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. 1 All instrument approach procedures that are retrieved from the current navigation database are authorized. In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP APCH LNAV/VNAV minima procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval. 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)

VNE/MNE	Never Exceed Speed or Mach Number is the speed limit that may not be exceeded at any time.
VNO	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
VS	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
VSO	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.
VX	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
VY	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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LIMITATIONS

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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 (VNE) - Do not exceed this speed in any operation.	154	148
Maximum Structural Cruising Speed (VNO) - 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 The unusable fuel for this airplane has been determined as 1.0 gallon in each wing in critical flight attitudes.	2 U.S. GAL.
(c) Usable Fuel The usable fuel in this airplane has been determined as 24.0 gallons in each wing.	48 U.S. GAL.

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 1 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.

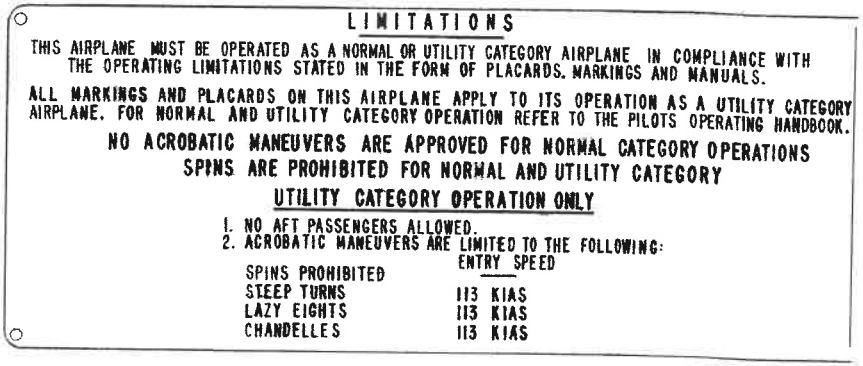
2.29 STANDBY INSTRUMENT LIMITATIONS (continued)

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_0 113 AT 2550 LBS
V_0 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.

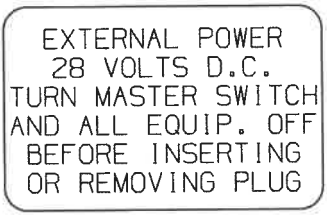
UTILITY CATEGORY OPERATION
NO BAGGAGE OR AFT PASSENGERS ALLOWED
NORMAL CATEGORY OPERATION
SEE PILOT'S OPERATING HANDBOOK
WEIGHT AND BALANCE SECTION FOR BAGGAGE
AND AFT PASSENGER LIMITATIONS.

Above right side aft passenger arm rest:

PILOTS, PASSENGERS, AND BAGGAGE AREAS
MAXIMUM ALLOWABLE COMBINED WEIGHT
POUNDS (NORMAL CATEGORY)
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:



Adjacent to the filler caps:

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SECTION 3

EMERGENCY PROCEDURES

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SECTION 3

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 VNE - "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	CLOSE
HEAT/DEF (Defroster)	OFF
Fire	EXTINGUISH
Vents	OPEN
Airspeed (if needed)	INCREASE to maximize ventilation airflow
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)

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
- 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

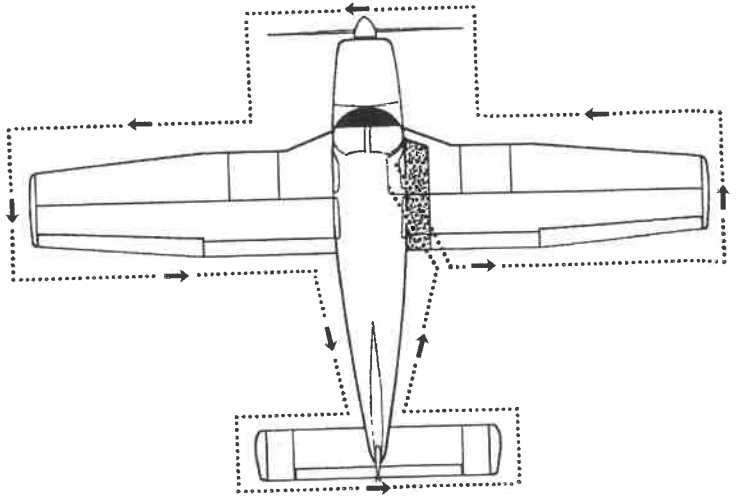
The following airspeeds are significant to the safe operation of the airplane. They are for standard airplanes flown at gross weight under standard conditions at sea level.

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 Balance).

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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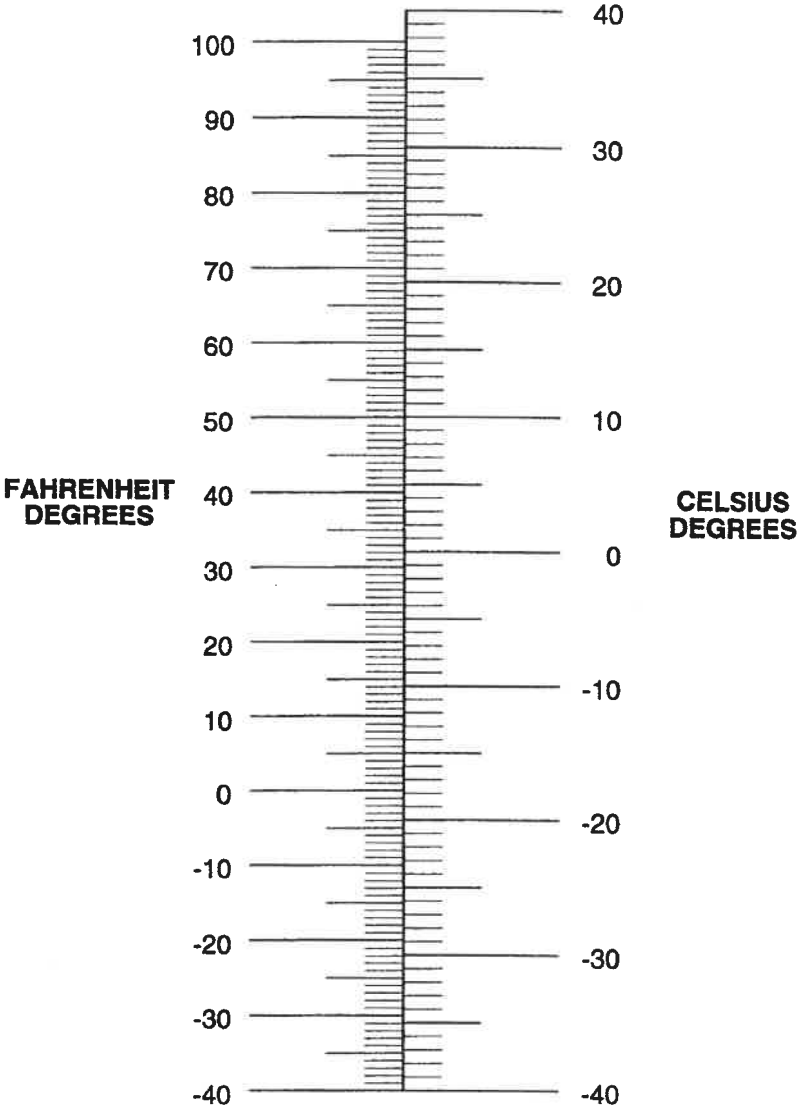
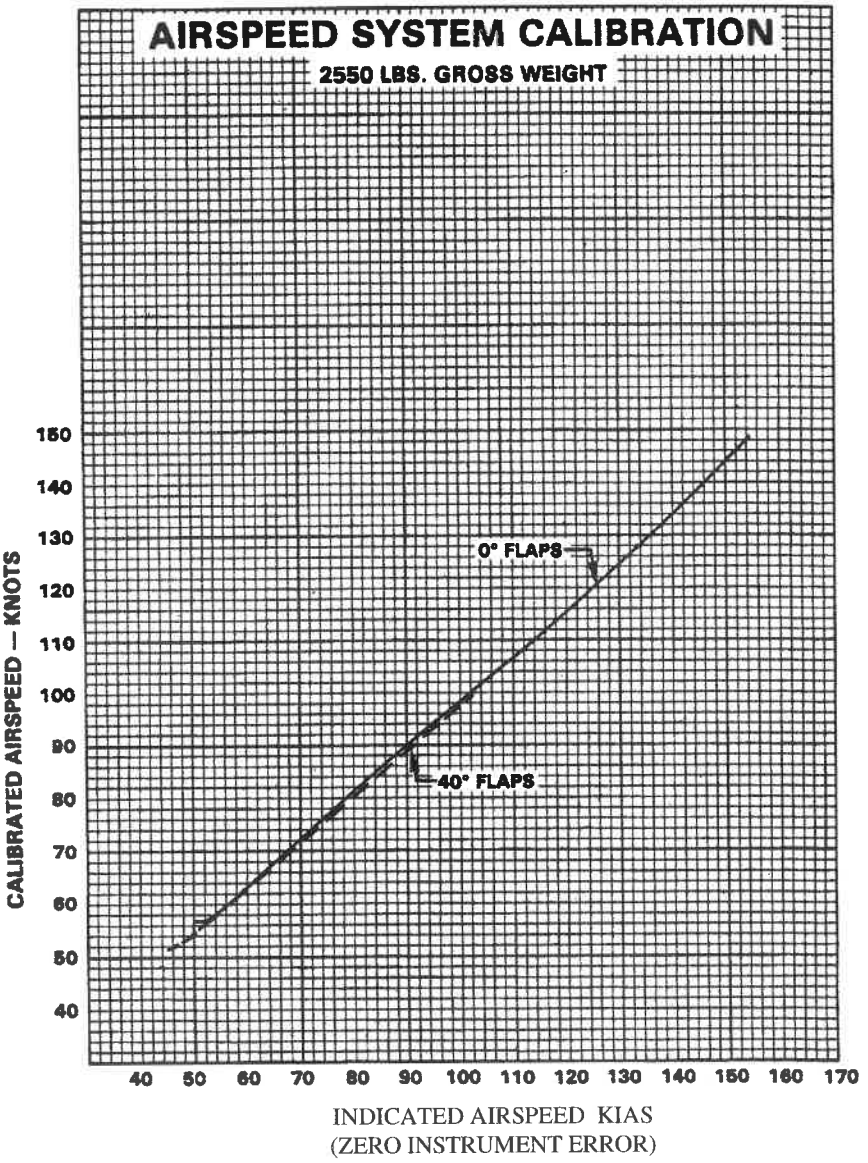
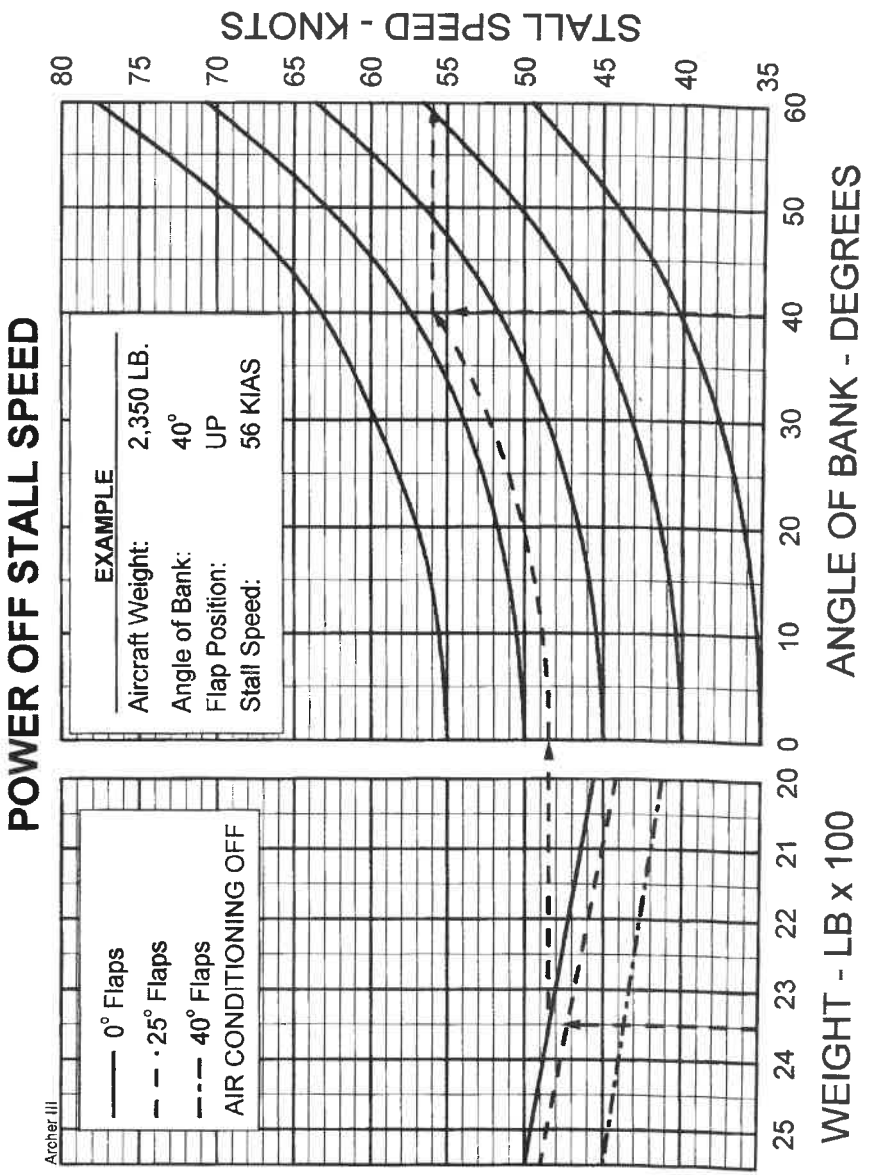


TEMPERATURE CONVERSION

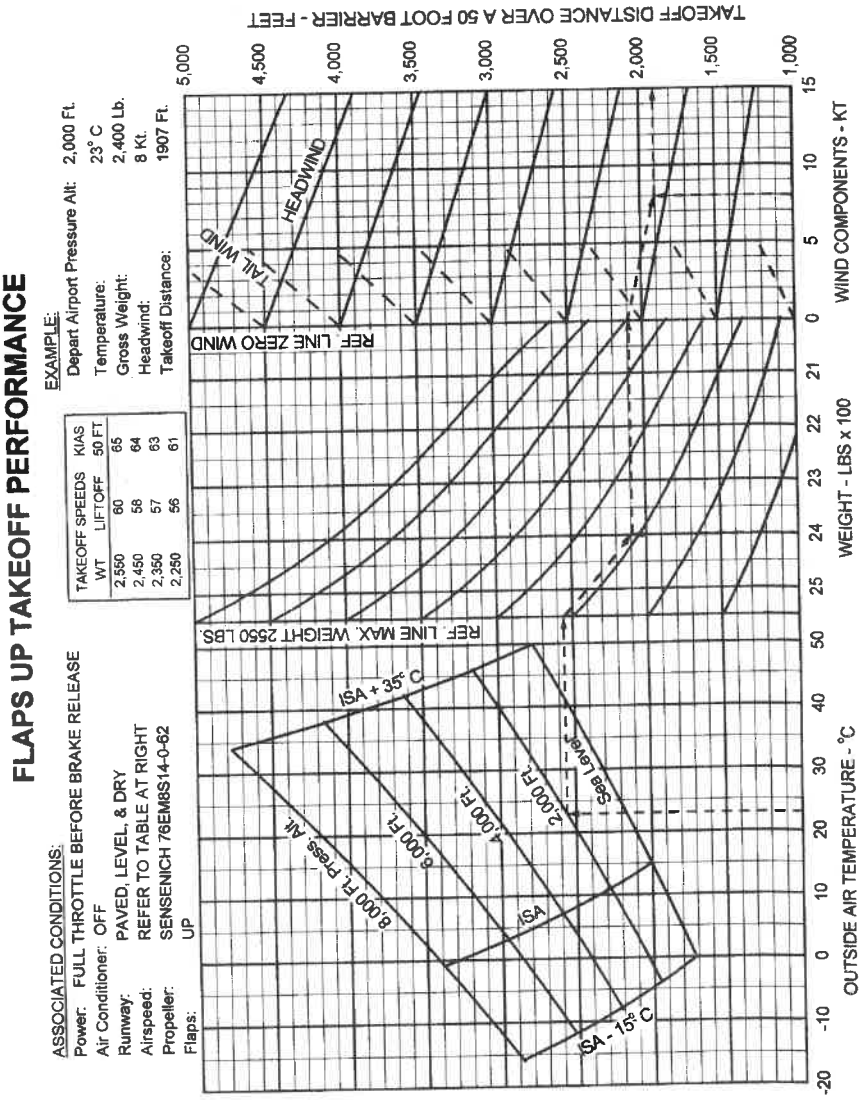
Figure 5-1



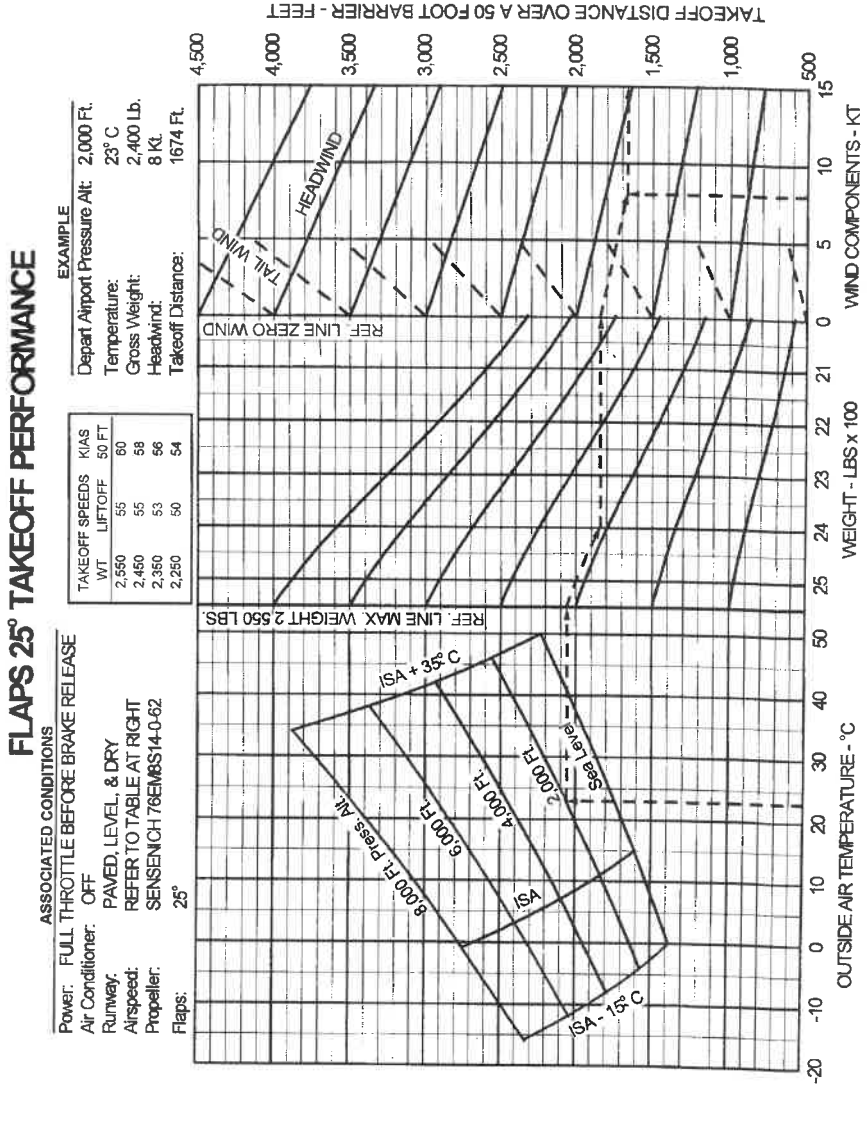
AIRSPEED SYSTEM CALIBRATION
Figure 5-3



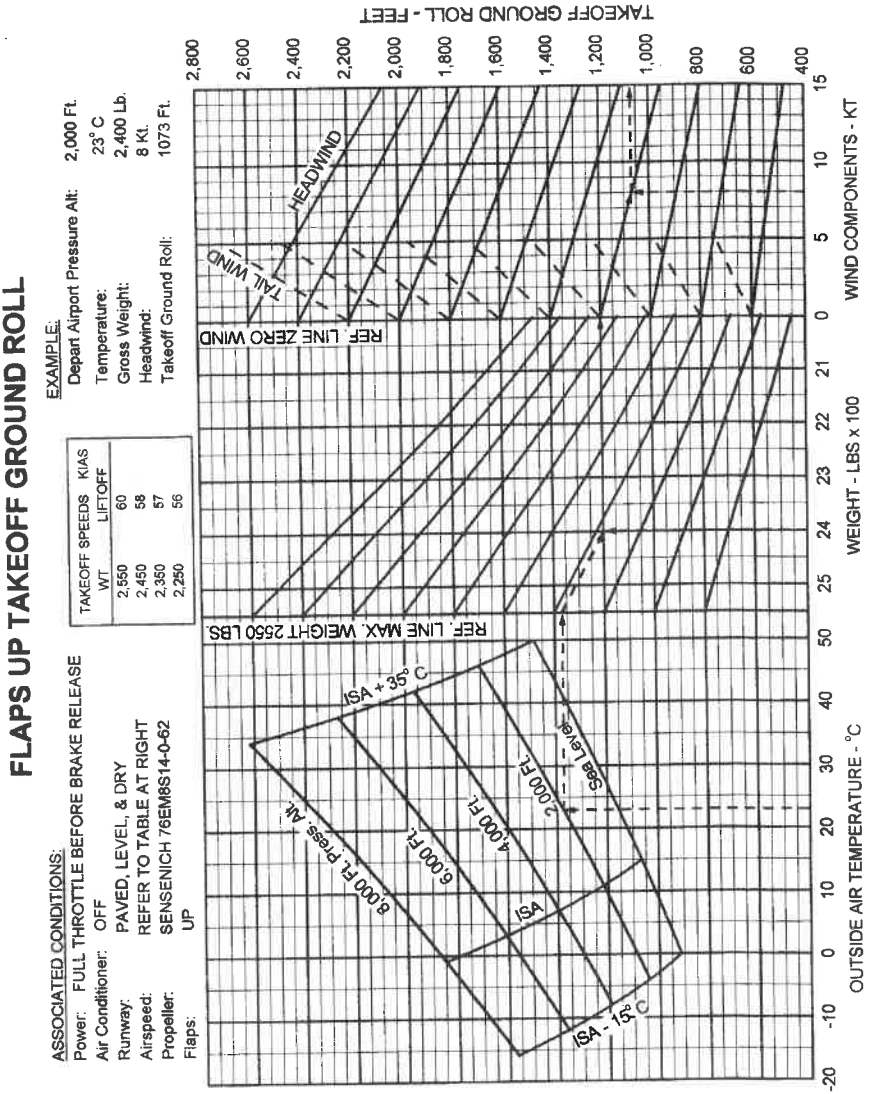
STALL SPEEDS
Figure 5-5



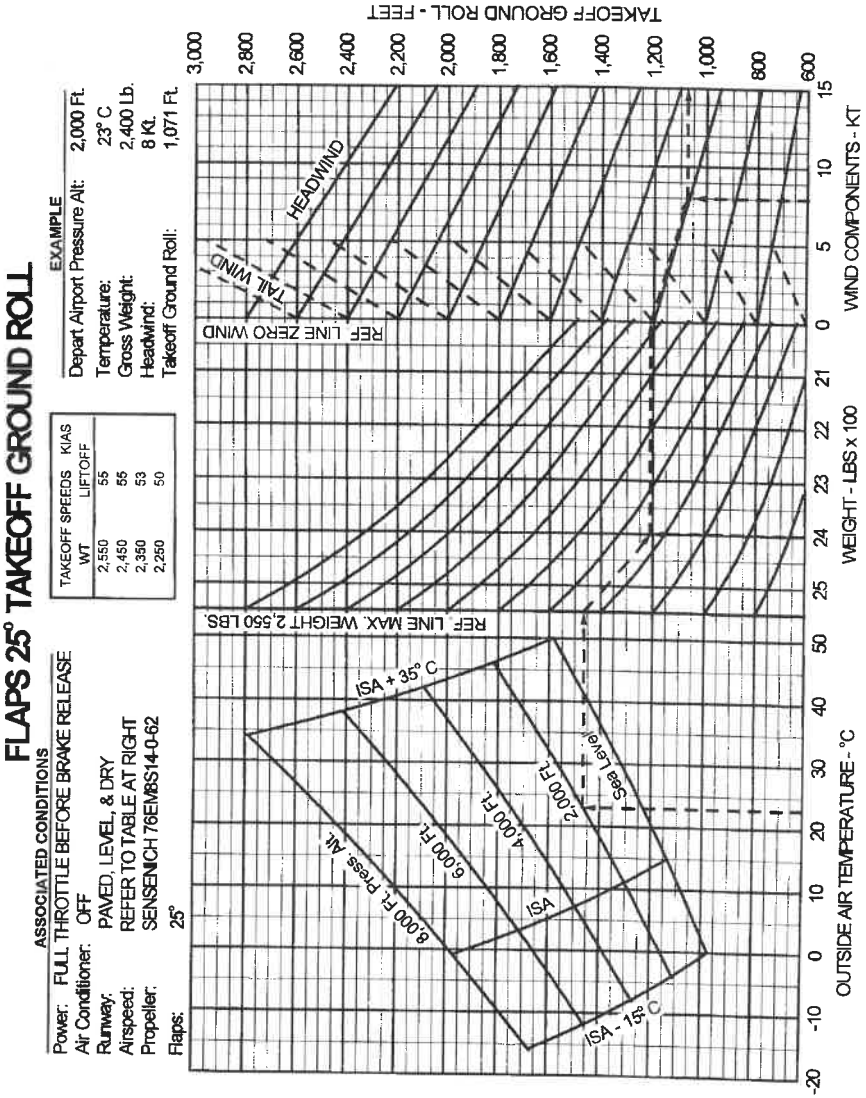
FLAPS UP TAKEOFF PERFORMANCE
Figure 5-7



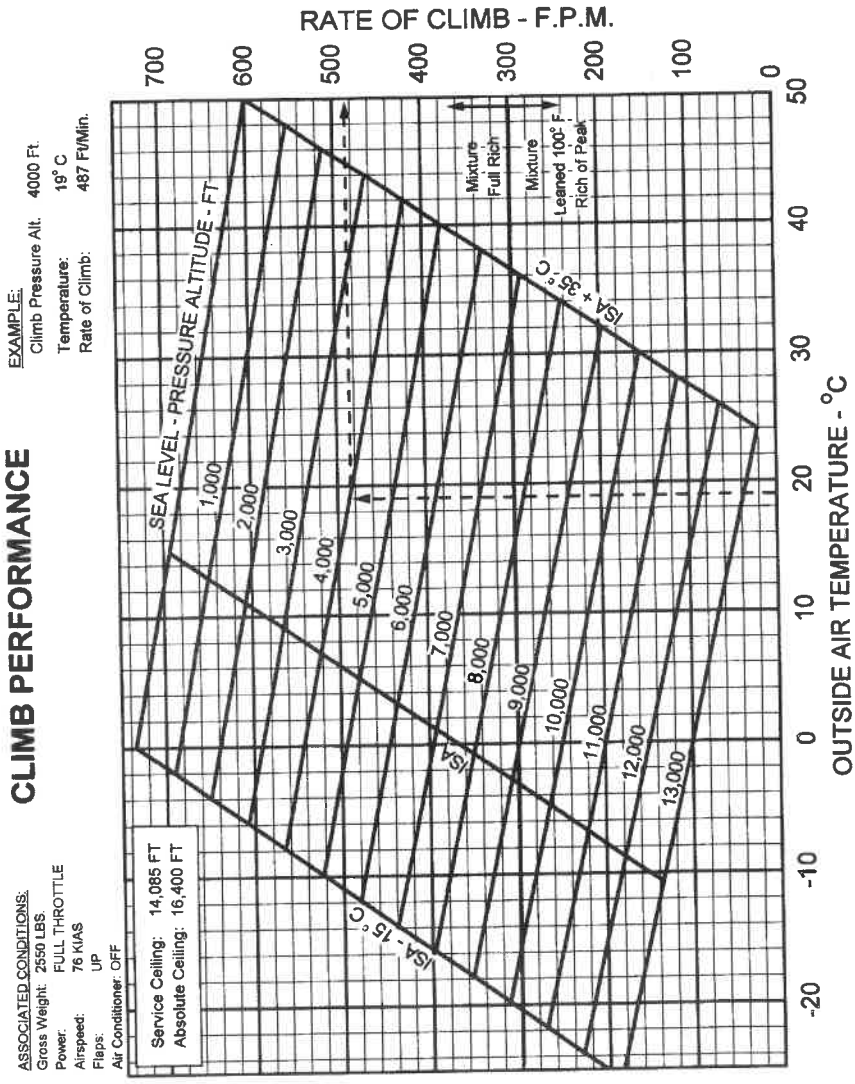
25° FLAPS TAKEOFF PERFORMANCE
Figure 5-9



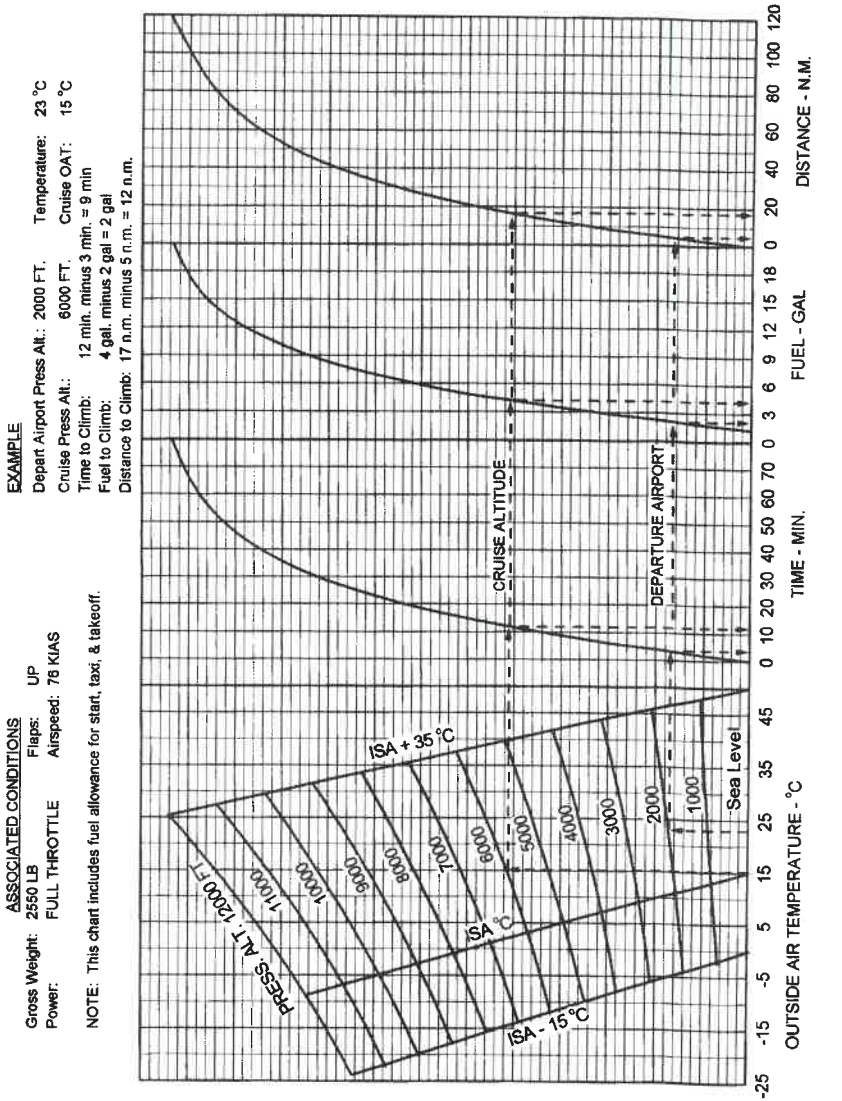
FLAPS UP TAKEOFF GROUND ROLL
Figure 5-11



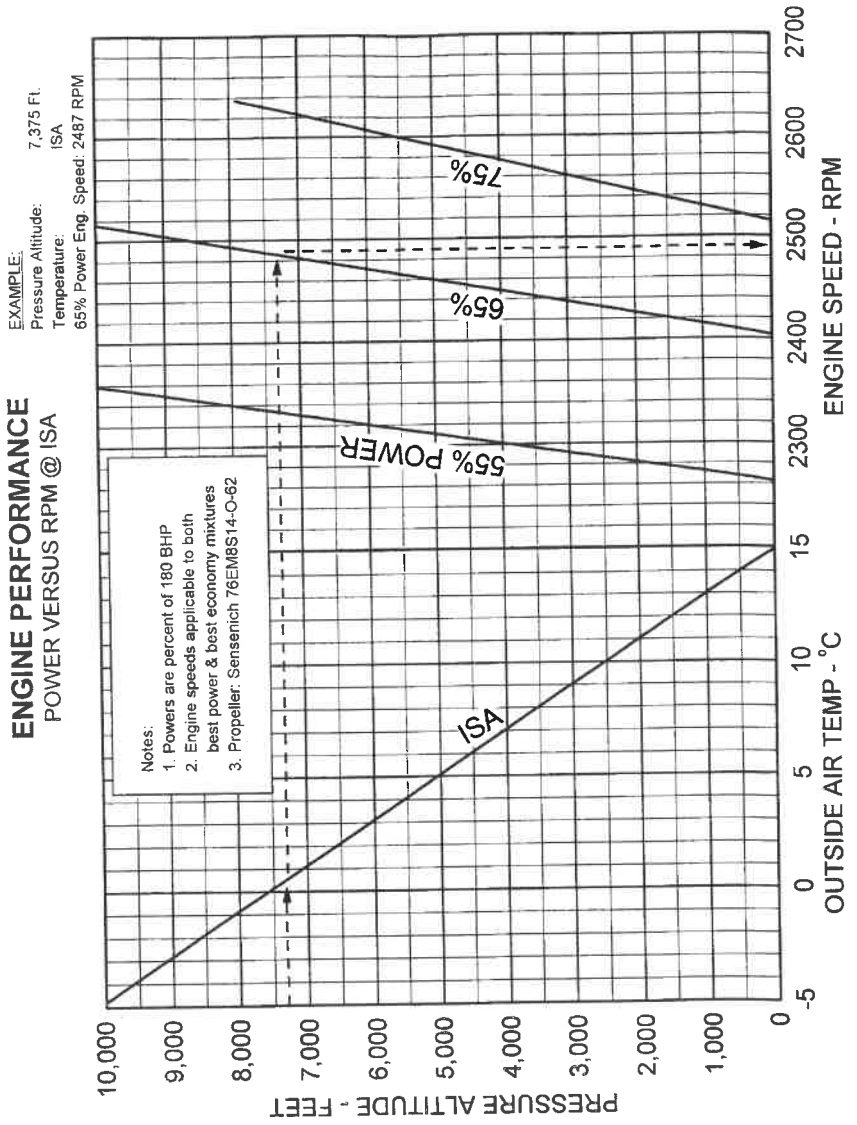
25° FLAPS TAKEOFF GROUND ROLL
Figure 5-13



CLIMB PERFORMANCE
Figure 5-15



TIME, DISTANCE AND FUEL TO CLIMB
Figure 5-17



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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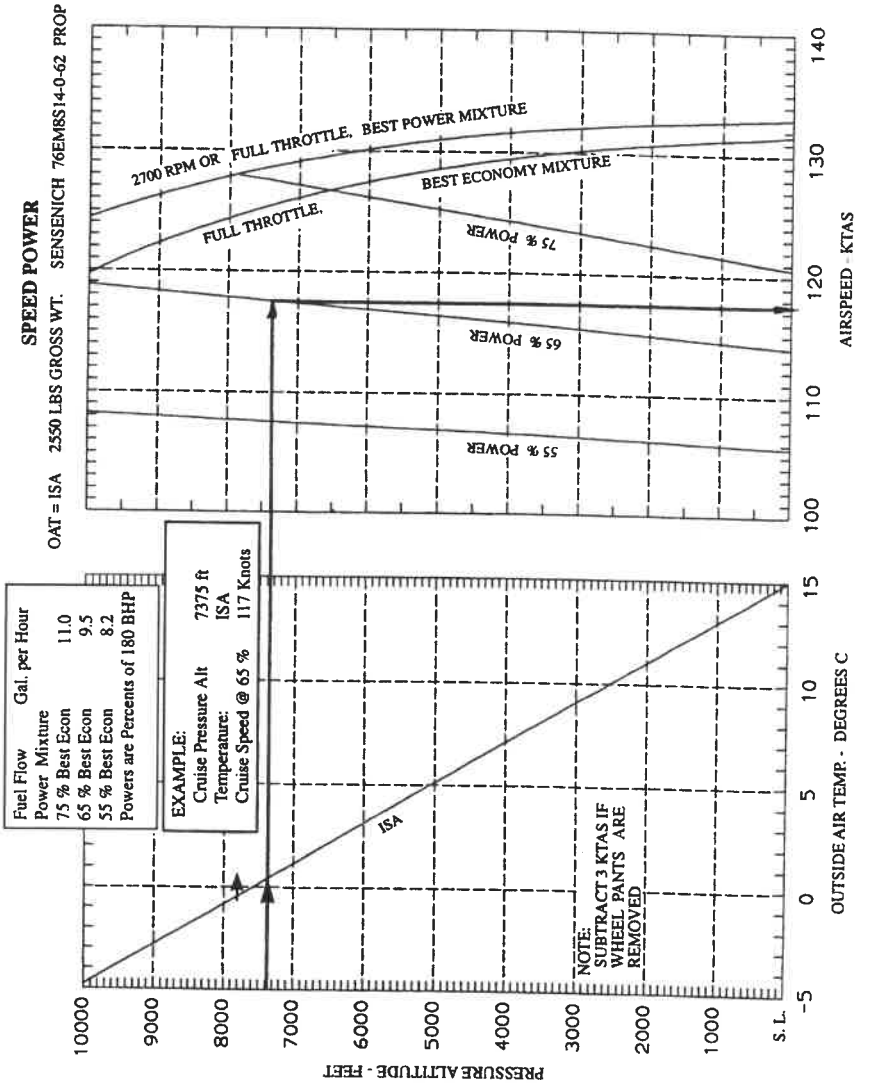
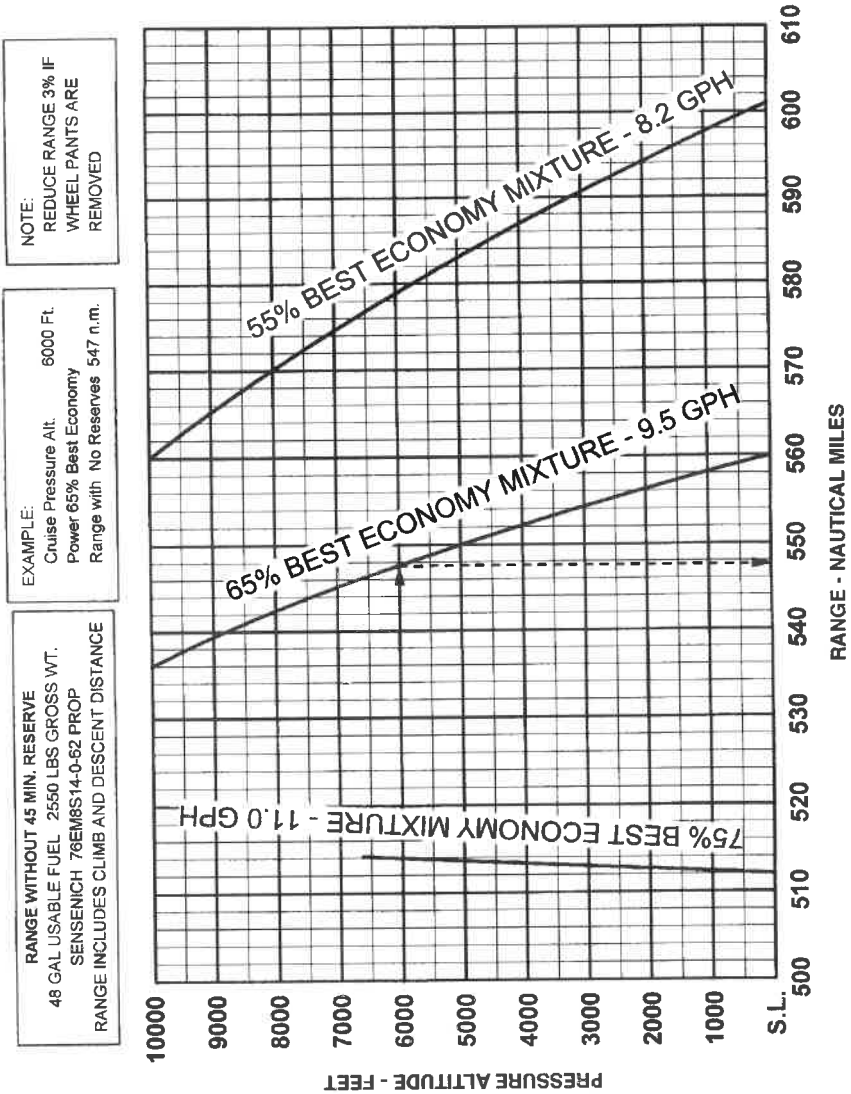
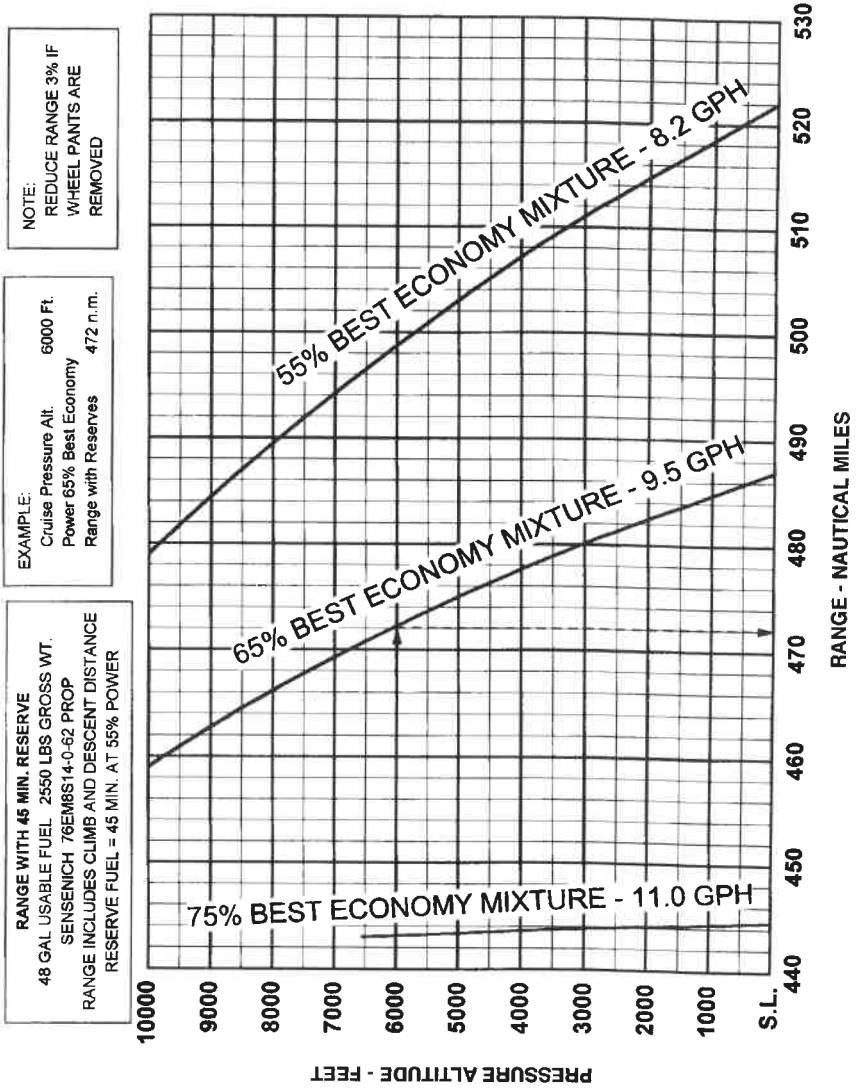


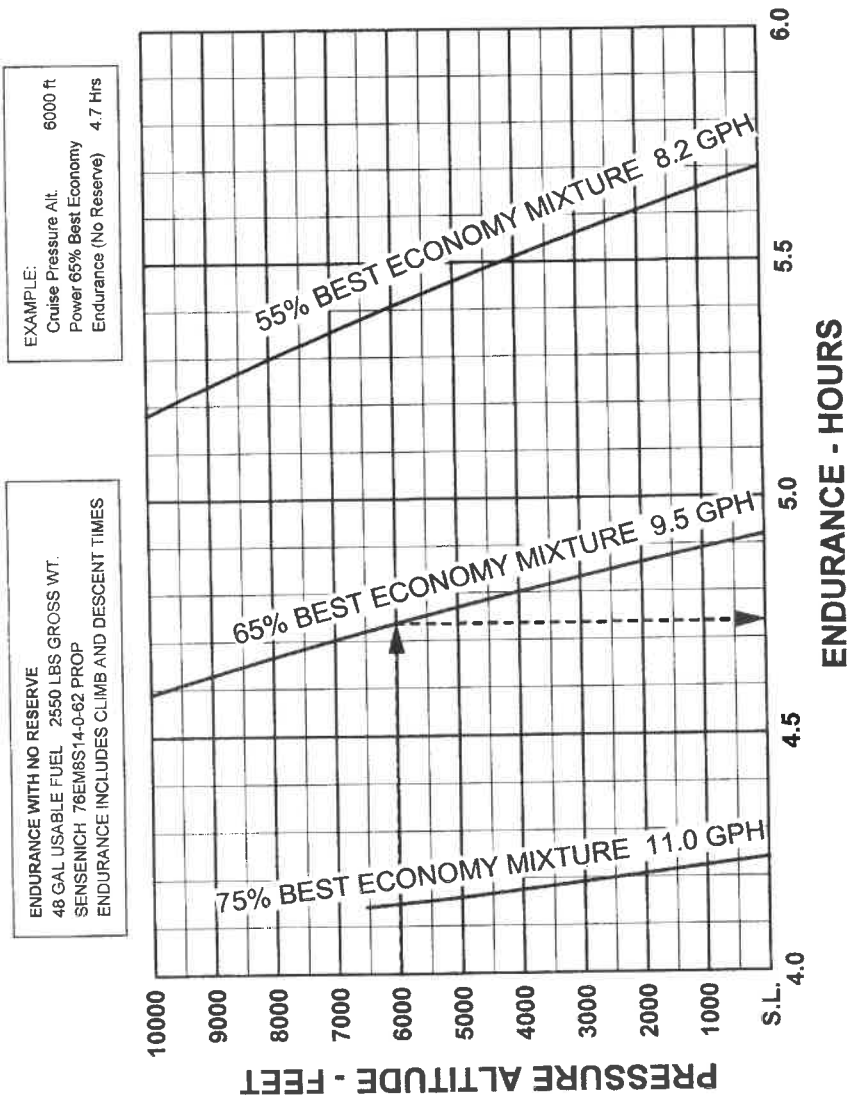
SPEED POWER
Figure 5-27



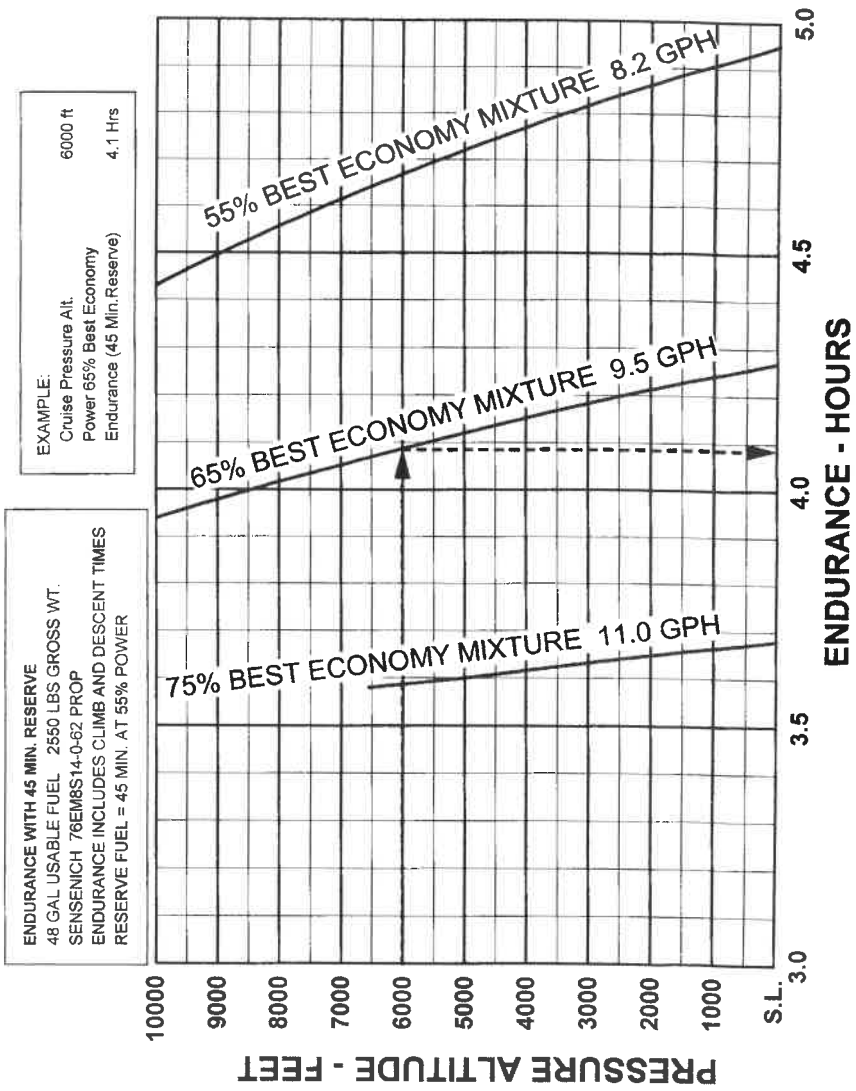
RANGE (NO RESERVE)
Figure 5-29



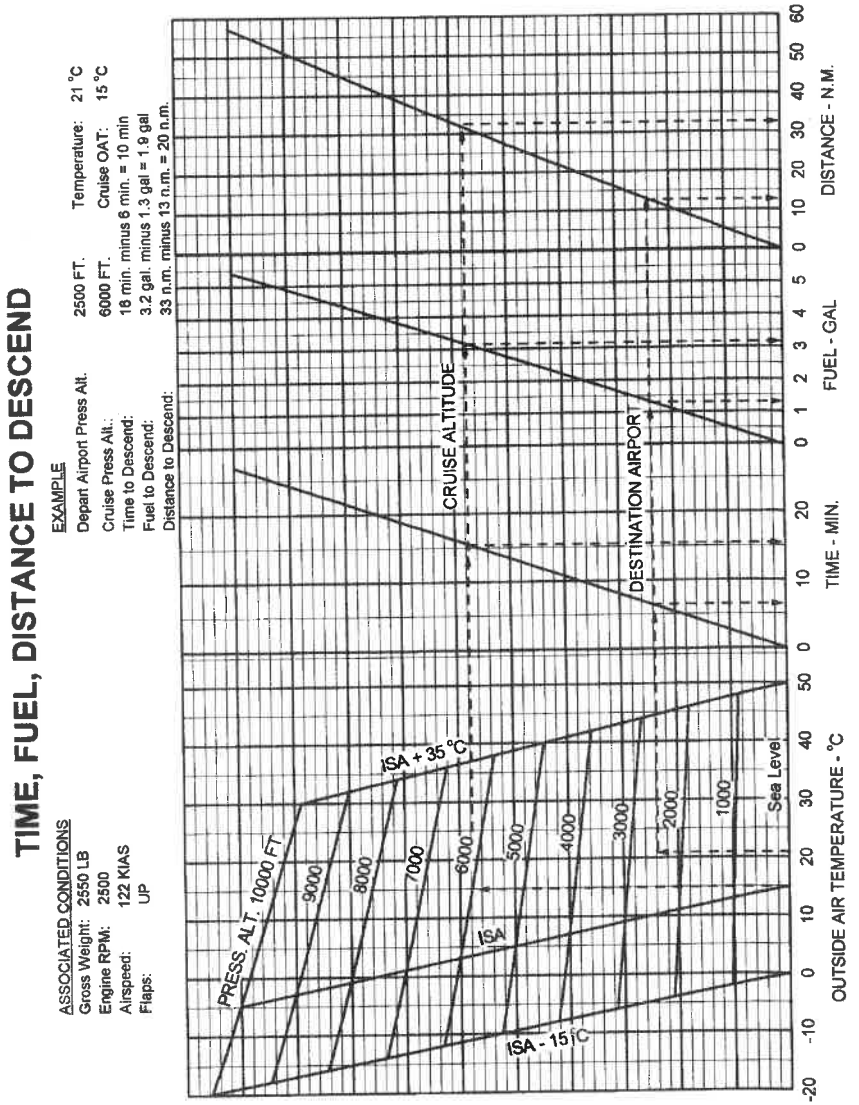
RANGE (45 MIN. RESERVE)
Figure 5-31



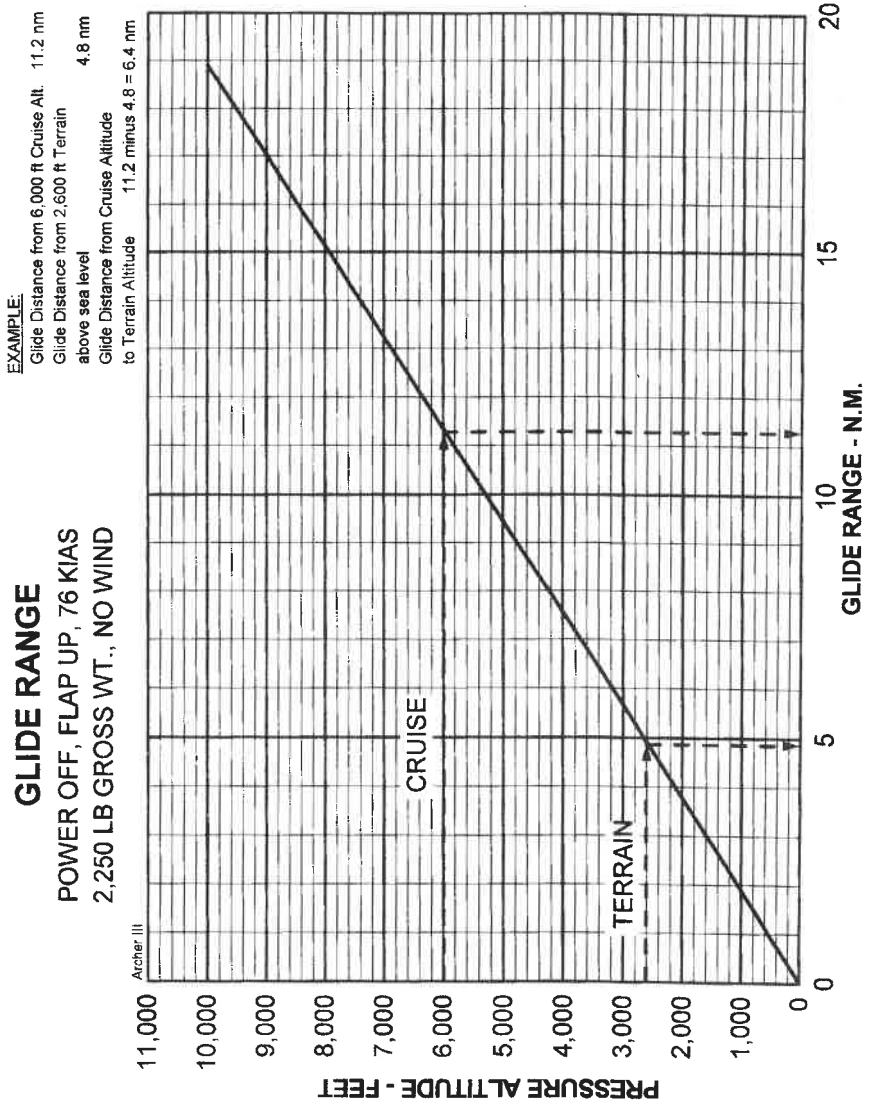
ENDURANCE (NO RESERVE)
Figure 5-33



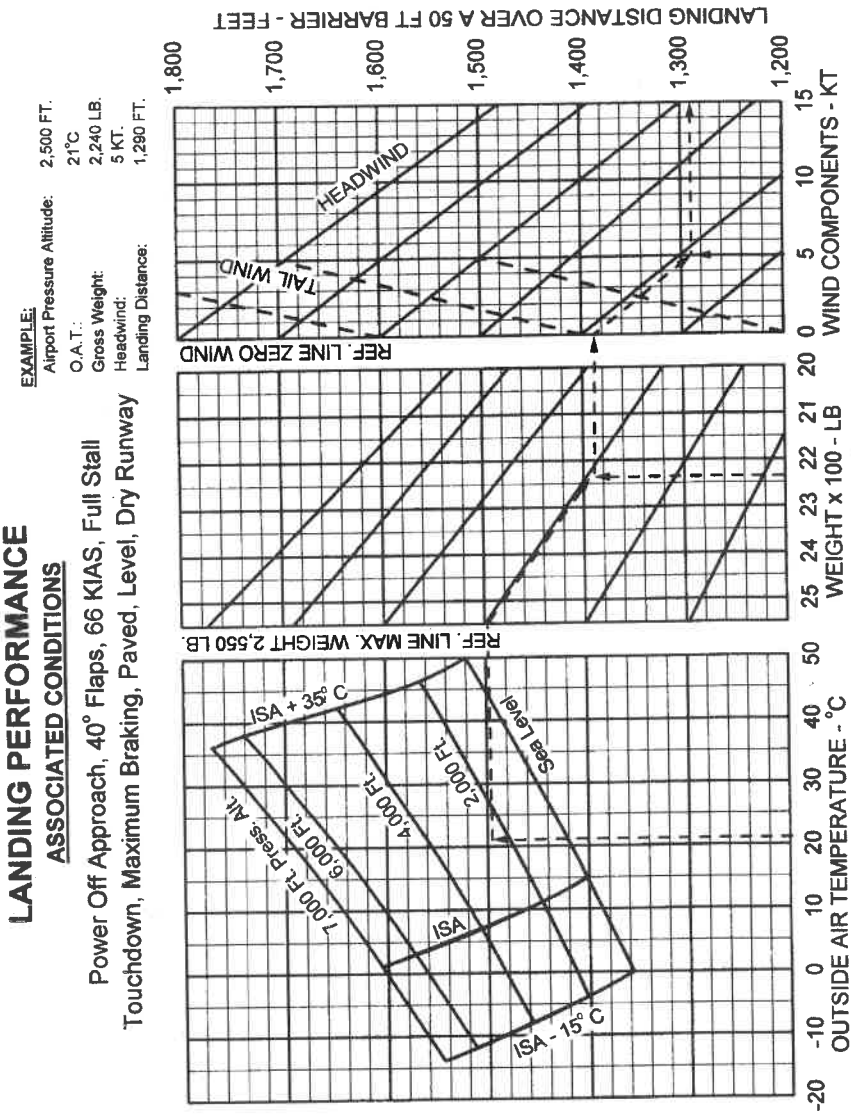
ENDURANCE (45 MIN. RESERVE)
Figure 5-35



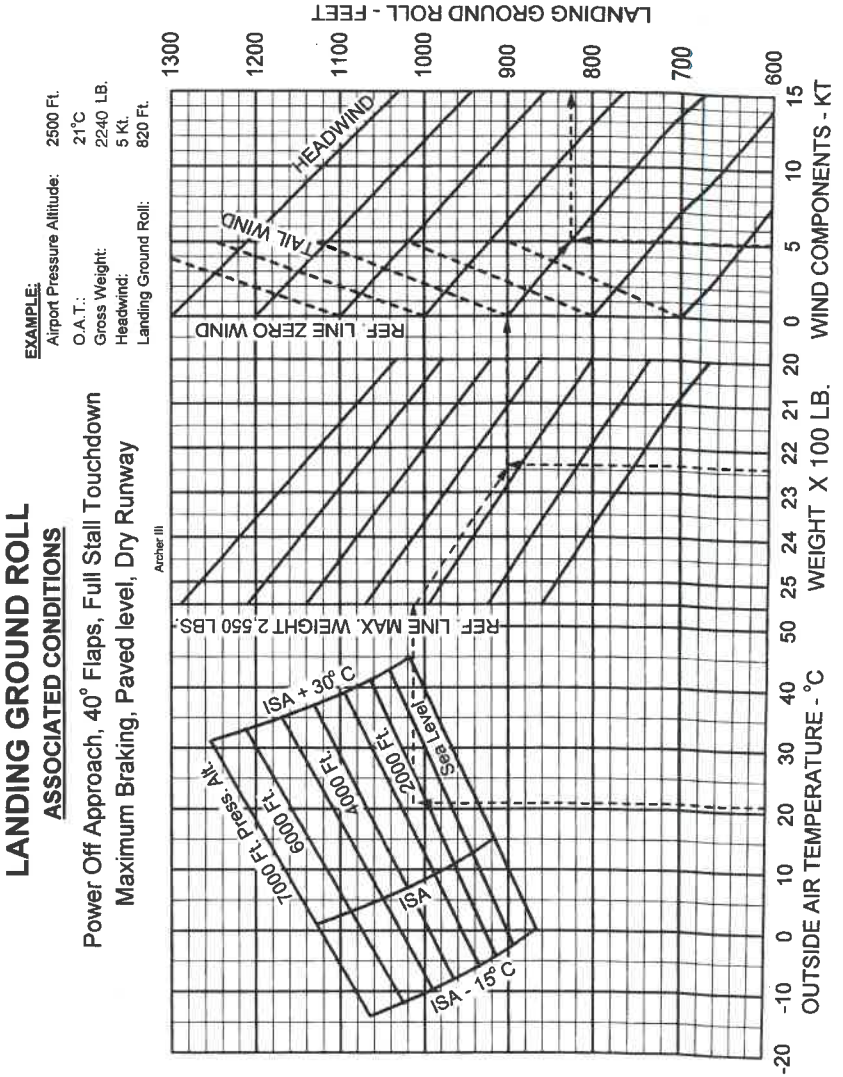
TIME, DISTANCE AND FUEL TO DESCEND
Figure 5-37



GLIDE RANGE
Figure 5-39



LANDING PERFORMANCE
Figure 5-41



LANDING GROUND ROLL
Figure 5-43

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