PILOT'S OPERATING HANDBOOK

PIPER CHEROKEE ARROW III

FAA APPROVED IN NORMAL CATEGORY BASED ON CAR 3 AND FAR PART 21, SUBPART J. THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY CAR 3 AND FAR PART 21, SUBPART J AND CONSTITUTES THE APPROVED AIRPLANE FLIGHT MANUAL AND MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.

AIRPLANE SERIAL NO. 28R-7837292

AIRPLANE REGISTRATION NO. N36777

PA-28R-201
REPORT: VB-870

FAA APPROVED BY: Ward Evans

WARD EVANS
D.O.A. NO. SO-1
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

DATE OF APPROVAL: DECEMBER 21, 1976

HANDBOOK PART NO. 761 635

PIPER

WARNING

EXTREME CARE MUST BE EXERCISED TO LIMIT THE USE OF THIS MANUAL TO APPLICABLE AIRCRAFT. THIS MANUAL REVISED AS INDICATED BELOW OR SUBSEQUENTLY REVISED IS VALID FOR USE WITH THE AIRPLANE IDENTIFIED ON THE FACE OF THE TITLE PAGE WHEN OFFICIALLY APPROVED. SUBSEQUENT REVISIONS SUPPLIED BY PIPER AIRCRAFT CORPORATION MUST BE PROPERLY INSERTED.

MODEL PA-28R-201, CHEROKEE ARROW III

PILOT'S OPERATING HANDBOOK, REPORT: VB-870 REVISION 2

PIPER AIRCRAFT CORPORATION
APPROVAL SIGNATURE AND STAMP J. Wrable

Published by
PUBLICATIONS DEPARTMENT
Piper Aircraft Corporation
Issued: December 21, 1976

BFGoodrich FlightSystems Incorporated

WARRANTY REGISTRATION

Registered Owner or Company Name			Installing Agency		
Name: LINDA LITWIN			Name: AEROTRONIC SVS INC		
Address: 11509 BEDFORD SHIRE AVE			Address: 7970R AIRPARK DR.		
City: POTOMAC	State: MD	Zip: 20854	City: GAITHERSBURG	State: MD	Zip: 20879
Chief Pilot:			Installation Date: AUG 23, 1995		
Telephone:			Aircraft Make: PIPER	Model: PA-28R-201	
Aircraft Serial Number: 28R-7837292			Registration Number: N36777		

Equipment Installed			
Part Number	Serial Number	Part Number	Serial Number
78-8060-5960-2	JNP08504015		
78-8060-5970-1	JNA07503993		

002-10056-001 Rev 02 (10/7/93)

COMPLETE WITH COMPUTER PRINTER, TYPEWRITER OR PRESS HARD WITH FINE BALL POINT PEN.

WARRANTY APPLICATION

MANUFACTURER Bendix King

REGISTERED OWNER INFORMATION

NAME: Linda LiTwin

ADDRESS: 11509 Bedfordshire Ave

CITY / STATE / POSTAL CODE: Potomac, Md. 20854

COUNTRY: USA

OPERATOR IF OTHER THAN OWNER:

CONTACT: PHONE [ ] FAX [ ]

INSTALLING AGENCY

NAME: AeroTronic Services Inc

LOCATION (CITY / STATE / CODE): Gaithersburg, Md. 20879

ACCOUNT NUMBER or DEALER CODE: 2804

WORK ORDER / REFERENCE: 56648

SELLING AGENCY IF OTHER THAN INSTALLER:

AIRCRAFT INFORMATION

MANUFACTURER	MODEL	SERIAL NUMBER	REGISTRATION
Piper	PA-28R-201	28R-7837292	N36777
WARRANTY START DATE D / M / Y	**AIRCRAFT HOURS**	**INSTALLATION DATE D / M / Y**	**AIRCRAFT HOURS**
12/15/94		12/15/94	

RETROFIT [ ] DEMO [ ] SPARE [ ] FIXED-BACKUP-RESERVE [ ] PORTABLE-INDEPENDENT-BACKUP [ ]

AVIONICS EQUIPMENT

MODEL NO.	PART NO.	SERIAL NO.	MODEL NO.	PART NO.	SERIAL NO.
KMA-24	066-01055-0003	101779			
KX-155	069-01024-0092	22767			
KI-209	066-03056-0001	67012			

FOR FACTORY USE ONLY

APPLICABILITY

The aircraft serial number eligibility bracket for application of this handbook is 28R-7737001 through 28R-7837317. The specific application of this handbook is limited to the Piper PA-28R-201 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.

REVISIONS

The information compiled in the Pilot's Operating Handbook will be kept current by revisions distributed to the airplane owners.

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. Page numbers followed by a small letter shall be inserted in direct sequence with the same common numbered page.

II. Identification of Revised Material

Revised text and illustrations shall be indicated by a black vertical line along the outside margin of the page, opposite revised, added or deleted material. A line along the outside margin of the page opposite the page number will indicate that an entire page was added.

Black lines will indicate only current revisions with changes and additions to or deletions of existing text and illustrations. Changes in capitalization, spelling, punctuation or the physical location of material on a page will not be identified by symbols.

ORIGINAL PAGES ISSUED

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

Title, ii through v, 1-1 through 1-14, 2-1 through 2-8, 3-1 through 3-14, 4-1 through 4-18, 5-1 through 5-32, 6-1 through 6-56, 7-1 through 7-28, 8-1 through 8-16, 9-1 through 9-14, 10-1 through 10-2.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS

Current Revisions to the PA-28R-201 Cherokee Arrow III Pilot's Operating Handbook, REPORT: VB-870 issued December 21, 1976.

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 1 - 761 635 (PR770314)	1-3	Added Hartzell prop to item 1.5, Propellers.	
	1-6	Corrected item 1.19 (b).	
	2-2	Added Hartzell prop. and (m) to item 2.7, Power Plant Limitations.	
	2-8	Added McCauley restriction to RPM limitation placard.	
	3-12	Revised item 3.27, Emergency Landing Gear Extension.	
	6-4	Revised Figure 6-3, Leveling Diagram.	
	6-17	Added items 1.a., 2.a. and 2.b.	
	6-19	Revised item 5 Cert. Basis.	
	6-53	Added 79591-2 Seat to item 287; added 79591-3 Seat to item 289.	Ward Evans
	7-3	Revised item 7.5, Engine and Propeller.	Ward Evans
	7-28	Revised Note.	March 14, 1977
Rev. 2 - 761 635 (PR770714)	1-11, 1-12, 1-13, 1-14	Revised para. 1.21, Conversion Factors.	
	3-3	Revised airspeeds under Engine Power Loss In Flight and Power Off Landing.	
	3-8	Revised airspeed under para. 3.11, Engine Power Loss In Flight.	
	3-9	Revised airspeeds under para. 3.13, Power Off Landing.	
	4-4	Revised RPM under Warm-Up.	
	4-5	Revised airspeed under Short Field, Obstacle Clearance and Soft Field Takeoff procedures.	
	4-13	Revised para. 4.23, Takeoff.	
	6-45	Added new item 213; revised item nos.; relocated item to pg. 6-46.	
	6-46	Added item from pg. 6-45; revised item nos.; added new items; relocated items to pg. 6-47.	
	6-47	Added items from pg. 6-46; added new items; relocated items to pg. 6-48.	
	6-48	Added items from pg. 6-47; added new items.	
	6-49	Revised item nos.; added new items; revised item 271.	
	6-53	Revised item nos.; revised items 327 and 331.	
	6-54	Revised item nos.; added new items; relocated item to pg. 6-55;revised item 353.	
	6-55	Added item 361 from pg. 6-54.	
	7-18	Revised para. 7.21 Pitot-Static System.	
	7-27	Revised para. 7.37, Piper External Power.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 2 - 761 635 (PR770714) (cont)	9-7	Revised Section 1, second para.; revised Section 3; revised Section 4, Preflight item (c).	
	9-8	Revised Section 4, Inflight items (a), (b) and (c).	
	9-9	Revised Section 1, second para.; revised Section 3 item (a) (1).	
	9-10	Revised Section 4, Inflight item (b).	Ward Evans
	9-11	Revised Section 4, Inflight items (d) (1), (2) and (3).	Ward Evans July 14, 1977
Rev. 3 - 761 635 (PR781219)	1-4	Revised para. 1.13 and added footnote.	
	1-6	Revised spelling.	
	1-12	Revised ft.-lb. and kg conversions.	
	1-13	Revised spelling.	
	4-9	Revised items 4.13 (a), (b) and (c).	
	6-1	Revised para. 6.1 info.	
	6-37	Revised item 125.	
	6-44	Revised item 201.	
	6-53	Corrected revised date.	
	6-55	Revised item 361.	
	7-7	Revised para. 7.11 info.	
	7-17	Revised para. 7.17 info.	
	7-18	Revised para. 7.21 info.	
	7-25	Added caution to para. 7.29.	
	7-27	Revised para. 7.39 info.	Ward Evans
	8-i	Revised para. 8.27.	Ward Evans Dec. 19, 1978
	8-13	Revised para. 8.27.	
Rev. 4 - 761 635 (PR790320)	2-3	Deleted item under 2.9 (c).	
	3-4	Revised item.	
	6-1	Revised para. 6.1 info.	
	7-4	Revised para. 7.9 info.	
	7-6	Revised para. 7.11 info.	
	7-15	Changed Note to Warning and revised.	Ward Evans
	8-9	Revised item No. 7 on Fig. 8-1.	Ward Evans March 20, 1979
	8-13	Revised para. 8.27 info.	
Rev. 5 - 761 635 (PR810413)	ii	Revised Warning.	
	iii	Changed serial no. effectivities.	
	2-1	Revised para. 2.1 info.	
	3-1	Revised para. 3.1 info.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 5 - 761 635 (PR810413) (cont)	3-13	Corrected heading.	
	3-14	Corrected heading.	
	4-1	Revised para. 4.1 info.	
	6-3	Added Caution notice to para. 6.3 (a) (3).	Ward Evans
	6-55	Corrected item 361.	Ward Evans
	7-15	Revised Warning.	April 13, 1981
Rev. 6 - 761 635 (PR840313)	v	Revised Table of Contents.	
	1-3	Revised para. 1.7.	
	1-6	Revised para. 1.19 (b).	
	3-1	Revised para. 3.1.	
	4-3, 4-4, 4-5	Revised para. 4.5.	
	4-7	Revised para. 4.9.	
	4-8	Revised para. 4.11.	
	4-11	Revised para. 4.17 and 4.19.	
	4-16	Revised para. 4.33.	
	5-1	Added Warning.	
	6-1	Revised para. 6.1.	
	6-3	Revised para. 6.3.	
	6-6	Revised para. 6.5.	
	6-7	Revised Fig. 6-5.	
	6-9, 6-10	Revised Fig. 6-7 and 6-7 (cont).	
	7-3	Revised para. 7.5.	
	7-14	Revised para. 7.15.	
	7-25	Revised para. 7.33.	
	8-3	Revised para. 8.3.	
	8-4	Revised para. 8.5.	
	8-6	Revised para. 8.9 (b).	
	8-11, 8-12	Revised para. 8.21 (b) and (d).	
	10-i	Revised Table of Contents.	Ward Evans
	10-1, 10-2	Revised Titles, para. 10.1 and 10.3.	Ward Evans March 13, 1984

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 7 - 761 635 (PR870131) (cont)	4-5	Revised para. 4.5.	
	4-12	Revised para. 4.21.	
	4-13	Revised para. 4.25.	
	4-17	Revised para. 4.39.	
	7-5	Revised fig. 7-1.	
	7-6	Revised fig. 7-3.	
		Revised para. 7.11.	
	7-7	Revised para. 7.11.	D.H.Trompler
	7-8	Revised fig. 7-5.	D.H.Trompler
	7-9	Revised fig. 7-7.	5/7/87
	7-10	Revised fig. 7-9.	Date
Rev. 8 - 761-635 (PR890320)	1-i	Revised Table of Contents.	
	1-3	Relocated para. 1.9 to pg. 1-4.	
	1-4	Revised para. 1.9.	
	3-i	Revised Table of Contents.	
	3-1	Revised para. 3.1.	
	4-i thru 4-ii	Revised Table of Contents.	
	8-1	Revised para. 8.1.	
	8-3	Revised para. 8.3.	
	8-10 thru 8-11	Revised para. 8.19.	D.H.Trompler
			D.H.Trompler
			May 1, 1989
	9-9	Revised SECTION 3,(a).	Date
Rev. 9 - 761 635 (PR050124)	iii	Added Warning.	
	iv-c	Added Rev. 9 to L of R.	
	3-4	Revised para. 3.3.	
	3-12	Revised para. 3.27.	
	8-1	Revised para. 8.1.	
	8-2	Moved info. from page 8-1.	Linda J. Dicken
	8-3	Revised para. 8.3.	Jan. 24, 2005
Rev. 10 - 761 635 (PR091103)	iv-c	Added Rev. 10 to L of R.	
	4-10	Added Note.	
	8-1 thru 8-2	Revised para. 8.1	Albert J. Mill
			Nov. 3, 2009
Rev. 11 - 761-635 (PR100511)	iv-c	Added Rev. 11 to L of R.	
	2-2	Revised Para. 2.7	
	2-3	Revised Para. 2.9.	
	4-10	Revised Note.	Wayne E. Gaulzetti
			May 11, 2010

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 12 - 761-635 (PR111213)	ii iv-d 2-3	Added copyright Added Rev. 12 to L of R. Revised Para. 2.9.	 Wayne E. Gaulzetti December 13, 2011

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 7 - 761 635 (PR870131) (cont)	4-5	Revised para. 4.5.	
	4-12	Revised para. 4.21.	
	4-13	Revised para. 4.25.	
	4-17	Revised para. 4.39.	
	7-5	Revised fig. 7-1.	
	7-6	Revised fig. 7-3.	
		Revised para. 7.11.	D.H.Trompler
	7-7	Revised para. 7.11.	5/7/87
	7-8	Revised fig. 7-5.	Date
	7-9	Revised fig. 7-7.	
	7-10	Revised fig. 7-9.	
Rev. 8 - 761-635 (PR890320)	1-i	Revised Table of Contents.	
	1-3	Relocated para. 1.9 to pg. 1-4.	
	1-4	Revised para. 1.9.	
	3-i	Revised Table of Contents.	
	3-1	Revised para. 3.1.	
	4-i thru 4-ii	Revised Table of Contents.	
	8-1	Revised para. 8.1.	
	8-3	Revised para. 8.3.	D.H.Trompler
	8-10 thru 8-11	Revised para. 8.19.	May 1, 1989
	9-9	Revised SECTION 3,(a).	Date
Rev. 9 - 761 635 (PR050124)	iii	Added Warning.	
	iv-c	Added Rev. 9 to L of R.	
	3-4	Revised para. 3.3.	
	3-12	Revised para. 3.27.	Linda J. Dicken
	8-1	Revised para. 8.1.	Jan. 24, 2005
	8-2	Moved info. from page 8-1.	
	8-3	Revised para. 8.3.	
Rev. 10 - 761 635 (PR091103)	iv-c	Added Rev. 10 to L of R.	
	4-10	Added Note.	Albert J. Mill
	8-1 thru 8-2	Revised para. 8.1	Nov. 3, 2009
Rev. 11 - 761-635 (PR100511)	iv-c	Added Rev. 11 to L of R.	
	2-2	Revised Para. 2.7	Wayne E. Gaulzetti
	2-3	Revised Para. 2.9.	May 11, 2010
	4-10	Revised Note.	

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 12 - 761-635 (PR111213)	ii iv-d 2-3	Added copyright Added Rev. 12 to L of R. Revised Para. 2.9.	Wayne E. Gaulzetti December 13, 2011
Rev. 13 - 761-635 (PR120207)	ii iv-d 3-5 4-14	Revised copyright. Added Rev. 13 to L of R. Added Engine Roughness to Para. 3.3. Revised Para. 4.27.	Albert J. Mill February 7, 2012
Rev. 14 - 761-635 (PR121130)	iv-d 4-5 4-6 4-12 4-15 7-6 7-7	Added Rev. 14 to L of R. Revised Para. 4.5. Revised Para. 4.5. Revised Para. 4.21. Revised Para. 4.29. Revised Para. 7.11. Revised Para. 7.11.	Eric A. Wright November 30, 2012

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SECTION 1

GENERAL

SECTION 1

GENERAL

1.1 INTRODUCTION

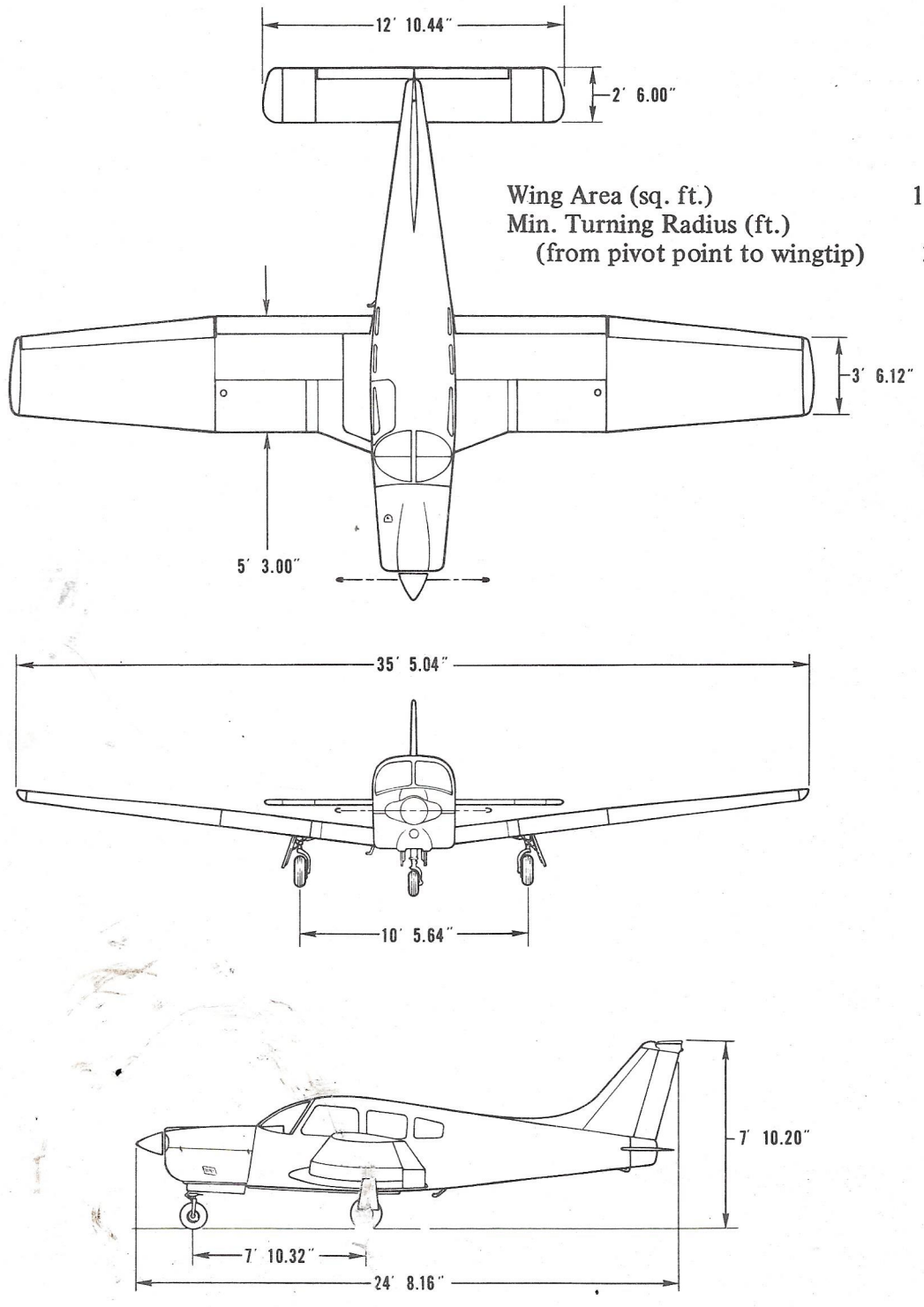
This Pilot's Operating Handbook is designed for maximum utilization as an operating guide for the pilot. It includes the material required to be furnished to the pilot by C.A.R. 3 and FAR Part 21 Subpart J. It also contains supplemental data supplied by the airplane manufacturer.

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 (arabic) 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.



THREE VIEW

Figure 1-1

1.3 ENGINES

(a)	Number of Engines	1
(b)	Engine Manufacturer	Lycoming
(c)	Engine Model Number	IO-360-C1C6
(d)	Rated Horsepower	200
(e)	Rated Speed (rpm)	2700
(f)	Bore (inches)	5.125
(g)	Stroke (inches)	4.375
(h)	Displacement (cubic inches)	361.0
(i)	Compression Ratio	8.7:1
(j)	Engine Type	Four Cylinder, Direct Drive, Horizontally Opposed, Air Cooled

1.5 PROPELLERS

(a)	Number of Propllers			1
(b)	Propeller Manufacturer	McCauley	or	Hartzell
(c)	Blade Model	90DHA-16		F7666A-2R
(d)	Number of Blades	2		2
(e)	Hub Model	B2D34C213		HC-C2YK-1( )F/
(f)	Propeller Diameter (inches)			
	(1) Maximum	74		74
	(2) Minimum	73		72
(g)	Propeller Type			Constant Speed, Hydraulically Actuated

1.7 FUEL

AVGAS ONLY

(a)	Fuel Capacity (U.S. gal) (total)	77
(b)	Usable Fuel (U.S. gal) (total)	72
(c)	Fuel Grade, Aviation	
	(1) Minimum Octane	Grade 100
	(2) Specified Octane	100 Green or 100LL Blue
	(3) Alternate Fuels	100/130 Green Refer to Fuel Requirements - Section 8.21 (b).

1.9 OIL

(a)	Oil Capacity (U.S. quarts)	8
(b)	Oil Specification	Refer to latest issue of Lycoming Service Instruction 1014.

(c) Oil Viscosity per Average Ambient Temp. for Starting

	SINGLE	MULTI
(1) Above 60°F	50	40 or 50
(2) 30°F to 90°F	40	40
(3) 0°F to 70°F	30	40 or 20W-30
(4) Below 10°F	20	20W-30

1.11 MAXIMUM WEIGHTS

(a)	Maximum Takeoff Weight (lbs)	2750
(b)	Maximum Landing Weight (lbs)	2750
(c)	Maximum Weight in Baggage Compartment	200

1.13 STANDARD AIRPLANE WEIGHTS*

(a)	Standard Empty Weight (lbs): Weight of a standard airplane including unusable fuel, full operating fluids and full oil.	1622
(b)	Maximum Useful Load (lbs): The difference between the Maximum Takeoff Weight and the Standard Empty Weight.	1128

1.15 BAGGAGE SPACE

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

1.17 SPECIFIC LOADINGS

(a)	Wing Loading (lbs per sq ft)	16.18
(b)	Power Loading (lbs per hp)	13.75

*These values are approximate and vary from one aircraft to another. Refer to Figure 6-5 for the Standard Empty Weight value and the Useful Load value to be used for C.G. calculations for the aircraft specified.

1.19 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

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

(a) General Airspeed Terminology and Symbols

CAS	Calibrated Airspeed means the indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in "Knots."
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed is the speed of an aircraft as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
KIAS	Indicated Airspeed expressed in "Knots."
M	Mach Number is the ratio of true airspeed to the speed of sound.
TAS	True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressability.
V_A	Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.
V_{FE}	Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
V_{LE}	Maximum Landing Gear Extended Speed is the maximum speed at which an aircraft can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{NE}/M_{NE}	Never Exceed Speed or Mach Number is the speed limit that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.

(c) Power Terminology

Takeoff Power	Maximum power permissible for takeoff.
Maximum Continuous Power	Maximum power permissible continuously during flight.
Maximum Climb Power	Maximum power permissible during climb.
Maximum Cruise Power	Maximum power permissible during cruise.

(d) Engine Instruments

EGT Gauge	Exhaust Gas Temperature Gauge

(e) Airplane Performance and Flight Planning Terminology

Climb Gradient	The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.
Demonstrated Crosswind Velocity	The 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.
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.
MEA	Minimum en route IFR altitude.
Route Segment	A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

(f) Weight and Balance Terminology

Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
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.)
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.
Usable Fuel	Fuel available for flight planning.
Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between takeoff weight, or ramp weight if applicable, and basic empty weight.
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 Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.

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1.21 CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
acres	0.4047	ha
	43560	sq. ft.
	0.0015625	sq. mi.
atmospheres (atm)	76	cm Hg
	29.92	in. Hg
	1.0133	bar
	1.033	kg/cm^2
	14.70	lb./sq. in.
	2116	lb./sq. ft.
bars (bar)	0.98692	atm.
	14.503768	lb./sq. in.
British Thermal Unit (BTU)	0.2519958	kg-cal
centimeters (cm)	0.3937	in.
	0.032808	ft.
centimeters of mercury at 0°C (cm Hg)	0.01316	atm
	0.3937	in. Hg
	0.1934	lb./sq. in.
	27.85	lb./sq. ft.
	135.95	kg/m^2
centimeters per second (cm/sec.)	0.032808	ft./sec.
	1.9685	ft./min.
	0.02237	mph
cubic centimeters (cm^3)	0.03381	fl. oz.
	0.06102	cu. in.
	3.531×10^{-5}	cu. ft.
	0.001	l
	2.642×10^{-4}	U.S. gal.
cubic feet (cu.ft.)	28317	cm^3
	0.028317	m^3
	1728	cu. in.
	0.037037	cu. yd.
	7.481	U.S. gal.
	28.32	l
cubic feet per minute (cu. ft./min.)	0.472	l/sec.
	0.028317	m^3/min.

MULTIPLY	BY	TO OBTAIN
cubic inches (cu. in.)	16.39	cm^3
	1.639×10^{-5}	m^3
	5.787×10^{-4}	cu. ft.
	0.5541	fl. oz.
	0.01639	l
	4.329×10^{-3}	U.S. gal.
	0.01732	U.S. qt.
cubic meters (m^3)	61024	cu. in.
	1.308	cu. yd.
	35.3147	cu. ft.
	264.2	U.S. gal.
cubic meters per minute (m^3/min.)	35.3147	cu. ft./min.
cubic yards (cu. yd.)	27	cu. ft.
	0.7646	m^3
	202	U.S. gal.
degrees (arc)	0.01745	radians
degrees per second (deg./sec.)	0.01745	radians/sec.
drams, fluid (dr. fl.)	0.125	fl. oz.
drams, avdp. (dr. avdp.)	0.0625	oz. avdp.
feet (ft.)	30.48	cm
	0.3048	m
	12	in.
	0.33333	yd.
	0.0606061	rod
	1.894×10^{-4}	mi.
	1.645×10^{-4}	NM
feet per minute (ft./min.)	0.01136	mph
	0.01829	km/hr.
	0.508	cm/sec.
	0.00508	m/sec.

MULTIPLY	BY	TO OBTAIN
feet per second (ft./sec.)	0.6818	mph
	1.097	km/hr.
	30.48	cm/sec.
	0.5921	kts.
foot-pounds (ft.-lb.)	0.138255	m-kg
	3.24×10^{-4}	kg-cal
foot-pounds per minute (ft.-lb./min.)	3.030×10^{-5}	hp
foot-pounds per second (ft.-lb./sec.)	1.818×10^{-5}	hp
gallons, Imperial (Imperial gal.)	277.4	cu. in.
	1.201	U.S. gal.
	4.546	l
gallons, U.S. dry (U.S. gal. dry)	268.8	cu. in.
	1.556×10^{-1}	cu. ft.
	1.164	U.S. gal.
	4.405	l
gallons, U.S. liquid (U.S. gal.)	231	cu. in.
	0.1337	cu. ft.
	4.951×10^{-3}	cu. yd.
	3785.4	cm^3
	3.785×10^{-3}	m^3
	3.785	l
	0.83268	Imperial gal.
	128	fl. oz.
gallons per acre (gal./acre)	9.353	l/ha
grams (g)	0.001	kg
	0.3527	oz. avdp.
	2.205×10^{-3}	lb.
grams per centimeter (g/cm)	0.1	kg/m
	6.721×10^{-2}	lb./ft.
	5.601×10^{-3}	lb./in.
grams per cubic centimeter (g/cm^3)	1000	kg/m^3
	0.03613	lb./cu. in.
	62.43	lb./cu. ft.

MULTIPLY	BY	TO OBTAIN
hectares (ha)	2.471	acres
	107639	sq. ft.
	10000	m^2
horsepower (hp)	33000	ft.-lb./min.
	550	ft.-lb./sec.
	76.04	m-kg/sec.
	1.014	metric hp
horsepower, metric	75	m-kg/sec.
	0.9863	hp
inches (in.)	25.40	mm
	2.540	cm
	0.0254	m
	0.08333	ft.
	0.027777	yd.
inches of mercury at 0 °C (in. Hg)	0.033421	atm
	0.4912	lb./sq. in.
	70.73	lb./sq. ft.
	345.3	kg/m^2
	2.540	cm Hg
	25.40	mm Hg
inch-pounds (in.-lb.)	0.011521	m-kg
kilograms (kg)	2.204622	lb.
	35.27	oz. avdp.
	1000	g
kilogram-calories (kg-cal)	3.9683	BTU
	3087	ft.-lb.
	426.9	m-kg
kilograms per cubic meter (kg/m^3)	0.06243	lb./cu. ft.
	0.001	g/cm^3
kilograms per hectare (kg/ha)	0.892	lb./acre
kilograms per square centimeter (kg/cm^2)	0.9678	atm
	28.96	in. Hg
	14.22	lb./sq. in.
	2048	lb./sq. ft.

MULTIPLY	BY	TO OBTAIN
kilograms per square meter (kg/m^2)	2.896×10^{-3}	in. Hg
	1.422×10^{-3}	lb./sq. in.
	0.2048	lb./sq. ft.
kilometers (km)	1×10^{-5}	cm
	3280.8	ft.
	0.6214	mi.
	0.53996	NM
kilometers per hour (km/hr.)	0.9113	ft./sec.
	58.68	ft./min.
	0.53996	kt
	0.6214	mph
	0.27778	m/sec.
	16.67	m/min.
knots (kt)	1	nautical mph
	1.689	ft./sec.
	1.1516	statute mph
	1.852	km/hr.
	51.48	m/sec.
liters (l)	1000	cm^3
	61.02	cu. in.
	0.03531	cu. ft.
	33.814	fl. oz.
	0.264172	U.S. gal.
	0.2200	Imperial gal.
	1.05669	qt.
liters per hectare (l/ha)	13.69	fl. oz./acre
	0.107	gal./acre
liters per second (l/sec.)	2.12	cu. ft./min.
meters (m)	39.37	in.
	3.280840	ft.
	1.0936	yd.
	0.198838	rod
	6.214×10^{-4}	mi.
	5.3996×10^{-4}	NM
meter-kilogram (m-kg)	7.23301	ft.-lb.
	86.798	in.-lb.

MULTIPLY	BY	TO OBTAIN
meters per minute (m/min.)	0.06	km/hr.
meters per second (m/sec.)	3.280840	ft./sec.
	196.8504	ft./min.
	2.237	mph
	3.6	km/hr.
microns	3.937×10^{-5}	in.
miles, statute (mi.)	5280	ft.
	1.6093	km
	1609.3	m
	0.8684	NM
miles per hour (mph)	44.7041	cm/sec.
	4.470×10^{-1}	m/sec.
	1.467	ft./sec.
	88	ft./min.
	1.6093	km/hr.
	0.8684	kt
miles per hour square (m/hr. sq.)	2.151	ft./sec. sq.
millibars	2.953×10^{-2}	in. Hg
millimeters (mm)	0.03937	in.
millimeters of mercury at 0°C (mm Hg)	0.03937	in. Hg
nautical miles (NM)	6080	ft.
	1.1516	statute mi.
	1852	m
	1.852	km
ounces, avdp. (oz. avdp.)	28.35	g
	16	dr. avdp.
ounces, fluid (fl. oz.)	8	dr. fl.
	29.57	cm^3
	1.805	cu. in.
	0.0296	l
	0.0078	U.S. gal.

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SECTION 2

LIMITATIONS

SECTION 2

LIMITATIONS

2.1 GENERAL

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

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

2.3 AIRSPEED LIMITATIONS

SPEED	KIAS	KCAS
Never Exceed Speed (V_{NE}) - Do not exceed this speed in any operation.	183	186
Maximum Structural Cruising Speed (V_{NO}) - Do not exceed this speed except in smooth air and then only with caution.	146	148
Design Maneuvering Speed (V_A) - Do not make full or abrupt control movements above this speed.		
At 2750 LBS. G.W.	118	120
At 1865 LBS. G.W.	96	96

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.

Maximum Flaps Extended Speed (V_{FE}) - Do not exceed this speed with the flaps extended.	103	103
Maximum Landing Gear Extension Speed - Do not exceed this speed when extending the landing gear.	129	130
Maximum Landing Gear Retraction Speed - Do not exceed this speed when retracting the landing gear.	107	107
Maximum Landing Gear Extended Speed (V_{LE}) - Do not exceed this speed with the landing gear extended.	129	130

2.5 AIRSPEED INDICATOR MARKINGS

MARKING	KIAS
Red Radial Line (Never Exceed)	183
Yellow Arc (Caution Range - Smooth Air Only)	146 to 183
Green Arc (Normal Operating Range)	60 to 146
White Arc (Flap Down)	55 to 103

2.7 POWER PLANT LIMITATIONS

(a)	Number of Engines		1
(b)	Engine Manufacturer		Lycoming
(c)	Engine Model No.		IO-360-C1C6
(d)	Engine Operating Limits		
	(1) Maximum Horsepower		200
	(2) Maximum Rotation Speed (RPM)		2700
	(3) Maximum Oil Temperature		245° F
(e)	Oil Pressure		
	Minimum (red line)		25 PSI
	Maximum (red line)		90 PSI
(f)	Fuel Pressure		
	Minimum (red line)		14 PSI
	Maximum (red line)		45 PSI
(g)	Fuel Grade (minimum octane)		Aviation Grade 100
(h)	Number of Propellers		1
(i)	Propeller Manufacturer	McCauley	or Hartzell
(j)	Propeller Hub and Blade Model	B2D34C213/90DHA-16	HC-C2YK-1( )F/F7666A-2R
(k)	Propeller Diameter		
	Minimum	73 IN.	72 IN.
	Maximum	74 IN.	74 IN.
(l)	Blade Angle Limits		
	Low Pitch Stop	12.5° ± 0.2°	14.0° ± 0.2°
	High Pitch Stop	29.8° ± 0.5°	29.0° ± 2.0°
(m)	RPM Restriction (McCauley Prop Only)		Avoid continuous operation between 1500 and 1950 RPM below 15" manifold pressure

2.9 POWER PLANT INSTRUMENT MARKINGS

(a) Tachometer	
Green Arc (Normal Operating Range)	500 to 2700 RPM
Red Line (Maximum Continuous Power)	2700 RPM
(b) Oil Temperature	
Green Arc (Normal Operating Range)	75 to 245°F
Red Line (Maximum)	245°F
(c) Oil Pressure	
Green Arc (Normal Operating Range)	60 PSI to 90 PSI
Yellow Arc (Caution Range) (Idle)	25 PSI to 60 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	100 PSI
(d) Fuel Pressure	
Green Arc (Normal Operating Range)	14 PSI to 45 PSI
Red Line (Minimum)	14 PSI
Red Line (Maximum)	45 PSI

2.11 POWER PLANT INSTRUMENT MARKINGS

(a) Maximum Weight	2750 LBS
(b) Maximum Baggage	200 LBS

NOTE

Refer to Section 5 (Performance) for maximum weight as limited by performance.

2.13 CENTER OF GRAVITY LIMITS

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
2750	88.9	91.5
2375 & below	82	91.5

NOTES

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 insure that the airplane is properly loaded. See Section 6 (Weight and Balance) for proper loading instructions.

2.15 MANEUVER LIMITS

No acrobatic maneuvers including spins approved.

2.17 FLIGHT LOAD FACTORS

(a) Positive Load Factor (Maximum) — 3.8 G
(b) Negative Load Factor (Maximum) — No inverted maneuvers approved

2.19 TYPES OF OPERATIONS

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

2.21 FUEL LIMITATIONS

(a)	Total Capacity	77 U.S. GAL
(b)	Unusable Fuel The unusable fuel for this airplane has been determined as 2.5 gallons in each wing in critical flight attitudes.	5 U.S. GAL
(c)	Usable Fuel The usable fuel in this airplane has been determined as 36.0 gallons in each wing tank.	72 U.S. GAL
(d)	Fuel remaining when the quantity indicators read zero cannot be used safely in flight.	

2.23 PLACARDS

In full view of the pilot:

"THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS."

"THIS AIRCRAFT APPROVED FOR NIGHT I.F.R. NON-ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135."

In full view of the pilot, the following takeoff and landing check lists will be installed:

TAKEOFF CHECK LIST

Fuel on Proper Tank	Mixture - Set	Flaps - Set
Electric Fuel Pump - On	Propeller - Set	Trim Tab - Set
Engine Gauges - Checked	Fasten Belts/Harness	Controls - Free
Alternate Air - Closed		Doors - Latched
Seat Backs Erect		Air Conditioner - Off

LANDING CHECK LIST

Fuel on Proper Tank	Electric Fuel Pump - On	Gear Down (129 KIAS Max)
Seat Backs Erect	Mixture - Rich	Flaps - Set (103 KIAS Max)
Fasten Belts/Harness	Propeller - Set	Air Conditioner - Off

The "AIR CONDITIONER OFF" item in the above takeoff and landing check lists is mandatory for air conditioned aircraft only.

On the instrument panel in full view of the pilot:

"NO ACROBATIC MANEUVERS, INCLUDING SPINS APPROVED."

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On the instrument panel in full view of the pilot:

"MANEUVERING SPEED
118 KIAS AT 2750
LBS. (SEE P.O.H.)"

On the instrument panel in full view of the pilot:

"DEMONSTRATED CROSSWIND COMPONENT 17 KTS"

On instrument panel in full view of the pilot:

"GEAR DOWN	129 KIAS (MAX)"
"GEAR UP	107 KIAS (MAX)"
"EXTENDED	129 KIAS (MAX)"

Near emergency gear lever:

"EMERGENCY DOWN"

"OVERRIDE ENGAGED AUTO-EXT-OFF
LOCK PIN ON SIDE
TO ENGAGE OVERRIDE:
PULL LEVER FULL UP, PUSH LOCK PIN
TO RELEASE OVERRIDE:
PULL LEVER FULL UP & RELEASE"

Near gear selector switch:

"GEAR UP	107 KIAS MAX"
"DOWN	129 KIAS MAX"

Adjacent to upper door latch (front and rear doors):

"ENGAGE LATCH BEFORE FLIGHT"

On the instrument panel 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."

In full view of pilot and over the fuel quantity gauges:

"FUEL REMAINING WHEN QUANTITY INDICATOR READS ZERO CANNOT BE USED SAFELY IN FLIGHT."

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

"WARNING – AIR CONDITIONER MUST BE OFF TO INSURE NORMAL TAKEOFF CLIMB PERFORMANCE."

On inside of baggage compartment door:

"BAGGAGE MAXIMUM 200 LBS. SEE WEIGHT AND BALANCE DATA FOR BAGGAGE BETWEEN 150 LBS. AND 200 LBS."

Adjacent to fuel tank filler caps:

"FUEL – 100/130 AVIATION GRADE MIN. – USABLE CAPACITY 36 GAL."

"USABLE CAPACITY TO BOTTOM OF FILLER NECK INDICATOR 25 GAL."

On the instrument panel in full view of the pilot when McCauley propeller is installed:

"AVOID CONTINUOUS OPERATION BETWEEN 1500 AND 1950 RPM BELOW 15" MANIFOLD PRESSURE."

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SECTION 3

EMERGENCY PROCEDURES

SECTION 3

EMERGENCY PROCEDURES

3.1 GENERAL

The recommended procedures for coping with various types of emergencies and critical situations are provided by this section. All of the required (FAA regulations) emergency procedures and those necessary for operation of the airplane as determined by the operating and design features of the airplane are presented.

Emergency procedures associated with those optional systems and equipment which require handbook supplements are provided in Section 9 (Supplements).

The first portion of this section consists of an abbreviated emergency checklist which supplies an action sequence for critical situations with little emphasis on the operation of systems.

The remainder of the section is devoted to amplified emergency procedures containing additional information to provide the pilot with a more complete understanding of the procedures.

These procedures are suggested as the best course of action for coping with the particular condition described, but are not a substitute for sound judgment and common sense. Pilots should familiarize themselves with the procedures given in this section and be prepared to take appropriate action should an emergency arise.

Most basic emergency procedures, such as power off landings, are a normal part of pilot training. Although these emergencies are discussed here, this information is not intended to replace such training, but only to provide a source of reference and review, and to provide information on procedures which are not the same for all aircraft. It is suggested that the pilot review standard emergency procedures periodically to remain proficient in them.

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Precise Flight, Inc.
63120 Powell Butte Road
Bend, OR 97701

PRECISE FLIGHT, INC.
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

TO

AIRCRAFT MODEL PA-28R-201

STC # SA2167NM and SE1779NM

FAA APPROVED PILOT'S OPERATING HANDBOOK

P/N _____ **S/N** _____

The information in this document is FAA approved material; which, together with the FAA approved section of this basic Pilot's Operating Handbook, is applicable and must be carried in the basic handbook when the airplane is modified by the installation of a PRECISE FLIGHT STANDBY VACUUM SYSTEM as specified in the Supplemental Type Certificate Number listed above.

The information in this document supersedes the basic handbook only where covered in items contained in this supplement. For limitations, procedures, and performance not contained in this supplement, consult the basic handbook.

FAA APPROVED: Lester H. Beuer
for Assistant Manager, Seattle Aircraft
Certification Office

Date: May 23, 1989

PRECISE FLIGHT, INC.
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

TO

AIRCRAFT MODEL PA-28R-201

STC # SA2167NM and SE1779NM

SYSTEM DESCRIPTION
The Precise Standby Vacuum System may be installed to provide a temporary system in case of primary vacuum pump failure. The Standby Vacuum System operates on a differential beween manifold pressure and ambient atmospheric pressure and is directed through a shuttle valve system to drive your flight instruments.

I. OPERATING LIMITATIONS
1. The Standby Vacuum System is for emergency or standby use only and not for dispatch purposes.
2. Vacuum powered and/or Vacuum gyro directed auto pilot operation may be unreliable when the SVS is sole source of vacuum. Vacuum powered or vacuum gyro directed auto pilot should be OFF when operating with failed primary vacuum system.
3. The SVS is not designed to operate pneumatic de-ice systems. DO NOT operate this type de-ice system when operating with a failed primary vacuum system.
4. Above 10,000 feet pressure altitude, engine power settings may have to be significantly reduced to provide adequate vacuum power for proper gyro instrument operation.
5. The following placards are required to be in full view of pilot:

Placard to be located on the push/pull control cable knob:

Placard to be located around the LED bulb for the pump inoperative warning light:

Placard to be placed in front and in full view of the pilot:

[STANDBY VACUUM SYSTEM EQUIPPED: FOR OPERATING INSTRUCTIONS AND LIMITATIONS SEE SUPPLEMENT IN OWNER'S MANUAL OR PILOT'S OPERATING HANDBOOK]

FAA APPROVED
Date: May 23, 1989

PRECISE FLIGHT, INC.
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

TO

AIRCRAFT MODEL PA-28R-201

STC # SA2167NM and SE1779NM

I. OPERATING LIMITATIONS (CONT.)

One of the following placards must be placed in full view of the pilot near the instrument vacuum indicator after appropriate entries have been made:

Approximate Standby Vacuum Available - Altitude - Power Chart for Aircraft with C.S. Prop. - Max. Cont. RPM

PRESS ALT.	RPM	MAN. PRESS.	SVS VACUUM IN. HG. MIN.
2000	Max. cont.		
4000	Max. cont.		
6000	Max. cont.		
8000	Max. cont.		
10000	Max. cont.		

Approximate Standby Vacuum Available — Altitude — Power Chart for Aircraft with Fixed Pitch Prop.

PRESS ALT.	RPM	SVS VACUUM IN. HG. MIN.
2000		
4000		
6000		
8000		
10000		

FAA APPROVED
Date: May 23, 1989

PRECISE FLIGHT INC.
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

TO

AIRCRAFT MODEL PA-28R-201

STC # SA2167NM and SE1779NM

II. EMERGENCY PROCEDURES

1. In the event of (warning light) primary vacuum system failure, pull the standby vacuum knob out (ON) and reduce throttle setting as required to maintain adequate vacuum power (suction gauge reading in green arc). If necessary descend to a lower altitude to obtain a larger differential between atmospheric pressure and engine manifold pressure. Vacuum power must be closely monitored by checking vacuum gauge frequently.
2. CONTINUED IFR FLIGHT IS NOT RECOMMENDED AND IMMEDIATE ACTION SHOULD BE TAKEN TOWARD VFR CONDITION OR LANDING.
3. If descent is impracticable:
   a. Periodically reduce power as required to "spool up" the gyros.
   b. Reapply power as required while comparing vacuum driven gyros against the turn and bank, turn coordinator, VSI, and other flight instruments.
   c. When an obvious discrepancy is noted between the vacuum driven instrument and the other flight instrument REPEAT the above "spool up" procedure as needed.

III. NORMAL PROCEDURES

1. Before starting engine push standby vacuum knob ON/OFF.
2. During run-up, idle engine at low speed, momentarily pull standby vacuum knob out (ON) and check vacuum gauge. Normally, the vacuum reading will be slightly higher. After checking system push vacuum system control knob in (OFF).
3. Regularly check vacuum gauge for proper vacuum system operation.
4. After landing turn Standby Vacuum System OFF.

IV. PERFORMANCE

No Change.

FAA APPROVED
Date: May 23, 1989

3.3 EMERGENCY PROCEDURES CHECK LIST

ENGINE FIRE DURING START

Starter . . . . . crank engine
Mixture . . . . . idle cut-off
Throttle . . . . . open
Electric fuel pump . . . . . OFF
Fuel selector . . . . . OFF
Abandon if fire continues

ENGINE POWER LOSS DURING TAKEOFF

If sufficient runway remains for a normal landing, leave gear down and land straight ahead.

If area ahead is rough, or if it is necessary to clear obstructions:
Gear selector switch . . . . . UP
Emergency gear lever . . . . locked in OVERRIDE ENGAGED position

If sufficient altitude has been gained to attempt a restart:
Maintain safe airspeed
Fuel selector . . . . . switch to tank containing fuel
Electric fuel pump . . . . . check ON
Mixture . . . . . check RICH
Alternate air . . . . . OPEN
Emergency gear lever . . . . . as required
If power is not regained, proceed with power off landing.

ENGINE POWER LOSS IN FLIGHT

Fuel selector . . . . . switch to tank containing fuel
Electric fuel pump . . . . . ON
Mixture . . . . . RICH
Alternate air . . . . . OPEN
Engine gauges . . . . . check for indication of cause of power loss
If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

When power is restored:
Alternate air . . . . . CLOSED
Electric fuel pump . . . . . OFF
If power is not restored prepare for power off landing.
Trim for 79 KIAS

POWER OFF LANDING

Trim for 79 KIAS.
Locate suitable field.
Establish spiral pattern.
1000 ft. above field at downwind position for normal landing approach.
When field can easily be reached slow to 72 KIAS for shortest landing.

If a gear up landing is necessary, lock emergency lever in OVERRIDE ENGAGED position - due to gear free fall at speeds below 95 KIAS.

Touchdowns should normally be made at lowest possible airspeed with full flaps.

When committed to landing:
Ignition . . . . . OFF
Master switch . . . . . OFF
Fuel selector . . . . . OFF
Mixture . . . . . idle cut-off
Seat belt and harness . . . . . tight

FIRE IN FLIGHT

Source of fire . . . . . check

Electrical fire (smoke in cabin):
Master switch . . . . . OFF
Vents . . . . . open
Cabin heat . . . . . OFF
Land as soon as practicable.

Engine fire:
Fuel selector . . . . . OFF
Throttle . . . . . CLOSED
Mixture . . . . . idle cut-off
Electric fuel pump . . . . . check OFF
Heater and defroster . . . . . OFF
Proceed with power off landing procedure.

LOSS OF OIL PRESSURE

Land as soon as possible and investigate cause.
Prepare for power off landing.

LOSS OF FUEL PRESSURE

Electric fuel pump . . . . . .ON
Fuel selector . . . . . check on full tank

HIGH OIL TEMPERATURE

Land at nearest airport and investigate the problem.
Prepare for power off landing.

ALTERNATOR FAILURE

Verify failure
Reduce electrical load as much as possible.
Alternator circuit breakers . . . . . check
Alt switch . . . . . OFF (for 1 second), then on
If no output:
Alt switch . . . . . .OFF

Reduce electrical load and land as soon as practical.

If battery is fully discharged, the gear will have to be lowered using the emergency gear extension procedure. Position lights will not illuminate.

PROPELLER OVERSPEED

Throttle . . . . . retard
Oil pressure . . . . . check
Prop control . . . . . full DECREASE rpm, then set if any control available
Airspeed . . . . . .reduce
Throttle . . . . . as required to remain below 2700 rpm

EMERGENCY LANDING GEAR EXTENSION

Prior to emergency extension procedure:
Master switch . . . . . check ON
Circuit breakers . . . . . check
Panel lights . . . . . off (in daytime)
Gear indicator bulbs . . . . . check

If landing gear does not check down and locked:
Airspeed . . . . . .below 87 KIAS

Landing gear selector . . . . . DOWN
Emergency gear lever . . . OVERRIDE ENGAGED (while fishtailing airplane)

If landing gear does not check down and locked:
Emergency gear lever . . . . EMERGENCY DOWN (while fishtailing airplane)

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

SPIN RECOVERY

Rudder . . . . . .full opposite to direction of rotation
Control wheel . . . . . .full forward
Ailerons . . . . . neutral
Throttle . . . . . idle
Rudder . . . . . neutral (when rotation stops)
Wing flaps . . . . . up (if extended)
Control wheel . . . . . .as required to smoothly regain level flight altitude

OPEN DOOR

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

To close the door in flight:
Slow airplane to 87 KIAS
Cabin vents . . . . . .close
Storm window . . . . . .open

If upper latch is open . . . . . .latch
If side latch is open . . . . . pull on armrest while moving latch handle to latched position

If both latches are open . . . . . .latch side latch then top latch

ENGINE ROUGHNESS

Mixture .....ADJUST for maximum smoothness
Alternate Air .....OPEN
Electric Fuel Pump .....ON
Fuel Selector .....SWITCH TANKS
Engine Gauges .....CHECK
Magneto Switch .....L then R then BOTH

If operation is satisfactory on either magneto, proceed on that magneto at reduced power, with full RICH mixture, to a landing at the first available airport.

If roughness persists, prepare for a precautionary landing.

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3.5 AMPLIFIED EMERGENCY PROCEDURES (GENERAL)

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action and probable cause of an emergency situation.

3.7 ENGINE FIRE DURING START

Engine fires during start are usually the result of overpriming. The first attempt to extinguish the fire is to try to start the engine and draw the excess fuel back into the induction system.

If a fire is present before the engine has started, move the mixture control to idle cut-off, open the throttle and 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 (above), if fire continues more than a few seconds, the fire should be extinguished by the best available external means.

The fuel selector valves should be "OFF" and the mixture at idle cut-off if an external fire extinguishing method is to be used.

3.9 ENGINE POWER LOSS DURING TAKEOFF

The proper action to be taken if loss of power occurs during takeoff will depend on the circumstances of the particular situation.

If sufficient runway remains to complete a normal landing, leave the landing gear down and land straight ahead.

If the area ahead is rough, or if it is necessary to clear obstructions, move the gear selector switch to the "UP" position and lock the emergency gear lever in the "OVERRIDE ENGAGED" position.

If sufficient altitude has been gained to attempt a restart, maintain a safe airspeed and switch the fuel selector to another tank containing fuel. Check the electric fuel pump to insure that it is "ON" and that the mixture is "RICH." The alternate air should be "OPEN." Use the emergency gear lever as required.

The landing gear will extend automatically when engine power fails at speeds below approximately 95 KIAS. The glide distance with the landing gear extended is roughly halved. If the situation dictates, the landing gear can be retained in the retracted position by locking the lever in the "OVERRIDE ENGAGED" position.

If engine failure 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.

If power is not regained, proceed with the Power Off Landing procedure (refer to the emergency check list and paragraph 3.13).

3.11 ENGINE POWER LOSS IN FLIGHT

Complete engine power loss is usually caused by fuel flow interruption and power will be restored shortly after fuel flow is restored. If power loss occurs at a low altitude, the first step is to prepare for an emergency landing (refer to paragraph 3.13). An airspeed of at least 79 KIAS should be maintained.

If altitude permits, switch the fuel selector to another tank containing fuel and turn the electric fuel pump "ON." Move the mixture control to "RICH" and the alternate air to "OPEN." Check the engine gauges for an indication of the cause of the power loss. If no fuel pressure is indicated, check the tank selector position to be sure it is on a tank containing fuel.

When power is restored move the alternate air to the "CLOSED" position and turn "OFF" the electric fuel pump.

If the preceding steps do not restore power, prepare for an emergency landing.

If time permits, turn the ignition switch to "L" then to "R" then back to "BOTH." 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. Try other fuel tanks. Water in the fuel could take some time to be used up, and allowing the engine to windmill may restore power. If power is due to water, fuel pressure indications will be normal.

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 not regained, proceed with the Power Off Landing procedure (refer to the emergency check list and paragraph 3.13).

3.13 POWER OFF LANDING

If loss of power occurs at altitude, trim the aircraft for best gliding angle (79 KIAS, Air Cond. off) 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; it may be possible to land at one if you have sufficient altitude. At best gliding angle, with the engine windmilling, and the propeller control in full "DECREASE rpm," the aircraft will travel approximately 1.6 miles for each thousand feet of altitude. If possible, notify the FAA by radio of your difficulty and intentions. If another pilot or passenger is aboard, let him 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 72 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.

Whether to attempt a landing with gear up or down depends on many factors. If the field chosen is obviously smooth and firm, and long enough to bring the plane to a stop, the gear should be down. If there are stumps or rocks or other large obstacles in the field, the gear in the down position will better protect the occupants of the aircraft. If, however, the field is suspected to be excessively soft or short, or when landing in water of any depth, a wheels-up landing will normally be safer and do less damage to the airplane.

Don't forget that at airspeeds below approximately 95 KIAS the gear will free fall, and will take six to eight seconds to be down and locked. If a gear up landing is desired, it will be necessary to lock the override lever in the "OVERRIDE ENGAGED" position before the airspeed drops to 105 KIAS to prevent the landing gear from inadvertently free falling.

Touchdown should normally be made at the lowest possible airspeed.

(a) Gear Down Landing

When committed to a gear down emergency landing, close the throttle control and shut "OFF" the master and ignition switches. Flaps may be used as desired. Turn the fuel selector valve to "OFF" and move the mixture to idle cut-off. The seat belts and shoulder harness (if installed) should be tightened. Touchdown should be normally made at the lowest possible airspeed.

Always remember that the automatic gear mechanism will extend the gear below approximately 95 KIAS with power off. Be prepared to lock the emergency gear lever in the "OVERRIDE ENGAGED" position before the airspeed drops to 105 KIAS to prevent the landing gear from inadvertently free falling, unless gear extension is desired.

NOTE

If the master switch is "OFF," the gear cannot be retracted.

(b) Gear Up Landing

If a gear up landing is necessary, lock the emergency gear lever in the "OVERRIDE ENGAGED" position to prevent the gear from inadvertently extending at airspeeds below 105 KIAS.

Touchdowns should normally be made at the lowest possible airspeed with full flaps.

When committed to landing, turn "OFF" the ignition and master switch. The fuel selector should be "OFF" and the mixture at idle cut-off.

Tighten the seat belts and shoulder harness (if installed).

3.15 FIRE IN FLIGHT

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

Check for the source of the fire first.

If an electrical fire is indicated (smoke in the cabin), the master switch should be turned "OFF." The cabin vents should be opened and the cabin heat turned "OFF." A landing should be made as soon as possible.

If an engine fire is present, switch the fuel selector to "OFF" and close the throttle. The mixture should be at idle cut-off. Turn the electric fuel pump "OFF." In all cases, the heater and defroster should be "OFF." If radio communication is not required select master switch "OFF." If the terrain permits, a landing should be made immediately.

NOTE

The possibility of an engine fire in flight is extremely remote. The procedure given is general and pilot judgment should be the determining factor for action in such an emergency.

3.17 LOSS OF OIL PRESSURE

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 the cause and prevent engine damage.

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty gauge. In either case, proceed toward the nearest airport, and be prepared for a forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. Maintain altitude until such time as a dead stick 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.

3.19 LOSS OF FUEL PRESSURE

If loss of fuel pressure occurs, turn "ON" the electric fuel pump and check that the fuel selector is on a full tank.

If the problem is not an empty tank, land as soon as practical and have the engine-driven fuel pump and fuel system checked.

3.21 HIGH OIL TEMPERATURE

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 defective gauge, or other causes. Land as soon as practical at an appropriate airport and have the cause investigated.

A steady, rapid rise in oil temperature is a sign of trouble. Land at the nearest airport and let a mechanic investigate the problem. Watch the oil pressure gauge for an accompanying loss of pressure.

3.23 ALTERNATOR FAILURE

Loss of alternator output is detected through zero reading on the ammeter. Before executing the following procedure, insure that the reading is zero and not merely low by actuating an electrically powered device, such as the landing light. If no increase in the ammeter reading is noted, alternator failure can be assumed.

The electrical load should be reduced as much as possible. Check the alternator circuit breakers for a popped circuit.

The next step is to attempt to reset the overvoltage relay. This is accomplished by moving the "ALT" switch to "OFF" for one second and then to "ON." If the trouble was caused by a momentary overvoltage condition (16.5 volts and up) this procedure should return the ammeter to a normal reading.

If the ammeter continues to indicate "O" output, or if the alternator will not remain reset, turn off the "ALT" switch, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

3.25 PROPELLER OVERSPEED

Propeller overspeed is caused by a malfunction in the propeller governor or low oil pressure which allows the propeller blades to rotate to full low pitch.

If propeller overspeed should occur, retard the throttle and check the oil pressure. The propeller control should be moved to full "DECREASE rpm" and then set if any control is available. Airspeed should be reduced and throttle used to maintain 2700 RPM.

3.27 EMERGENCY LANDING GEAR EXTENSION

Prior to proceeding with an emergency gear extension check to insure that the master switch is "ON" and that the circuit breakers have not opened. If it is daytime, the panel lights should be turned off. Check the landing gear indicators for faulty bulbs.

If the landing gear does not check down and locked, reduce the airspeed to below 87 KIAS. Move the landing gear selector to the "DOWN" position. Place the emergency gear lever in the "OVERRIDE ENGAGED" position and fishtail the airplane.

If the landing gear still does not check down and locked move the emergency gear lever to the "EMERGENCY DOWN" position while fishtailing the airplane.

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

3.29 SPIN RECOVERY

Intentional spins are prohibited in this airplane. If a spin is inadvertently entered, immediately apply opposite rudder, control wheel full forward while neutralizing ailerons then throttle to idle.

When the rotation stops, neutralize the rudder, retract the flaps if extended, and ease back on the control wheel as required to smoothly regain a level flight attitude.

3.31 OPEN DOOR

The cabin door on the Cherokee is double latched, so the chances of its springing open in flight at both the top and side are remote. However, should you forget the upper latch, or not fully engage the side latch, the door may spring partially open. This will usually happen at takeoff or soon afterward. A partially open door will not affect normal flight characteristics, and a normal landing can be made with the door open.

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

To close the door in flight, slow the airplane to 87 KIAS, close the cabin vents and open the storm window. If the top latch is open, latch it. If the side latch is open, pull on the armrest while moving the latch handle to the latched position. If both latches are open, close the side latch then the top latch.

3.33 ENGINE ROUGHNESS

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

First 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.

The magneto switch should then be moved to "L" then "R," then back to "BOTH." If operation is satisfactory on either magneto, proceed on that magneto at reduced power with full "RICH" mixture to a landing at the first available airport.

If roughness persists, prepare for a precautionary landing at pilot's discretion.

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SECTION 4

NORMAL PROCEDURES

SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This section clearly describes the recommended procedures for the conduct of normal operations for the Cherokee Arrow III. All of the required (FAA regulations) procedures and those necessary for operation of the airplane as determined by the operating and design features of the airplane are presented.

Normal procedures associated with those optional systems and equipment which require handbook supplements are provided by Section 9 (Supplements).

These procedures are provided to present a source of reference and review and to supply information on procedures which are not the same for all aircraft. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane.

The first portion of this section consists of a short form check list which supplies an action sequence for normal operations with little emphasis on the operation of the systems.

The remainder of the section is devoted to amplified normal procedures which provide detailed information and explanations of the procedures and how to perform them. This portion of the section is not intended for use as an in-flight reference due to the lengthly explanations. The short form check list should be used for this purpose.

4.3 AIRSPEEDS FOR SAFE OPERATIONS

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

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

(a)	Best Rate of Climb Speed	
	gear up, flaps up	90 KIAS
	gear down, flaps up	78 KIAS
(b)	Best Angle of Climb Speed	
	gear up, flaps up	78 KIAS
	gear down, flaps up	72 KIAS
(c)	Turbulent Air Operating Speed (See Subsection 2.3)	118 KIAS
(d)	Maximum Flap Speed	103 KIAS
(e)	Landing Final Approach Speed (Flaps 40°)	75 KIAS
(f)	Maximum Demonstrated Crosswind Velocity	17 KTS

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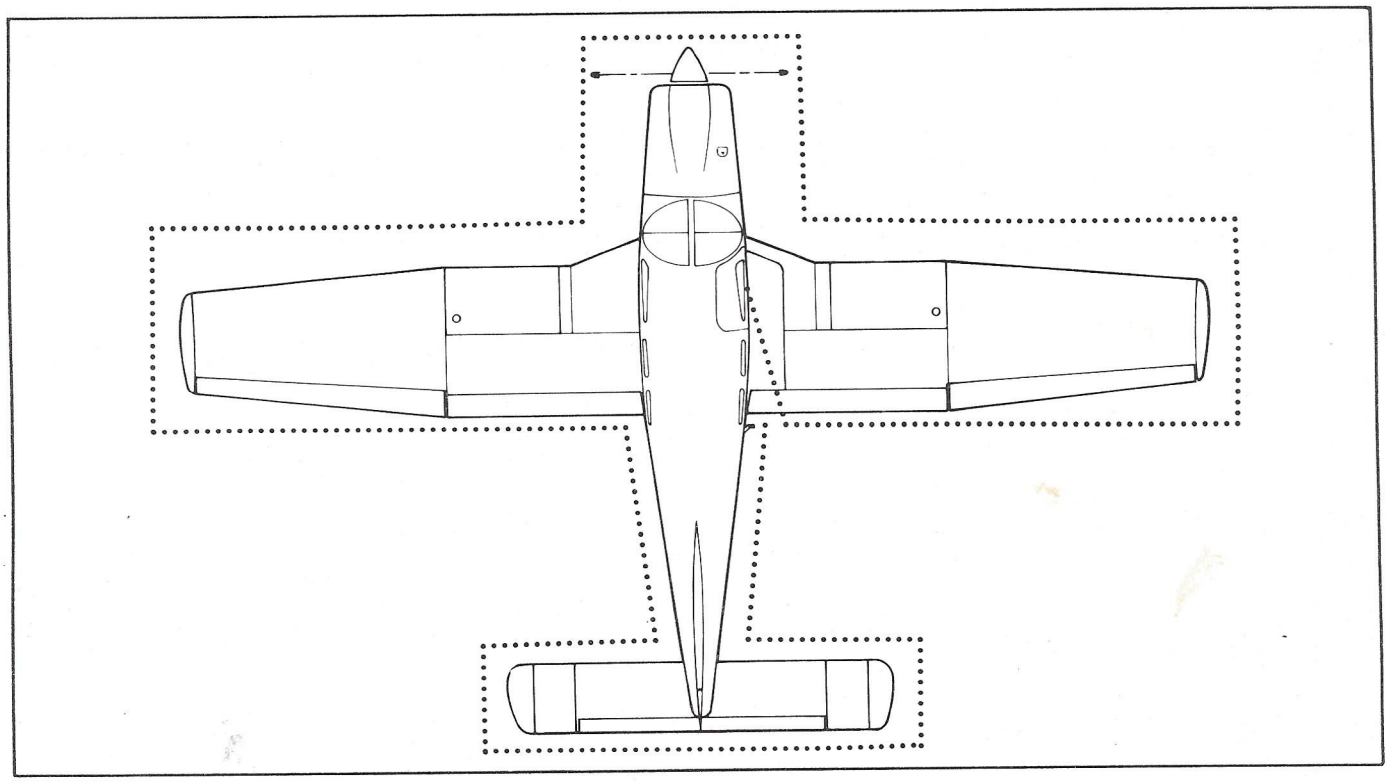

WALK-AROUND

Figure 4-1

4.5 NORMAL PROCEDURES CHECKLIST

PREFLIGHT CHECK

Control wheel ..... release belts
Master switch ..... ON
Fuel quantity gauges ..... check
Master switch ..... OFF
Ignition ..... OFF
Exterior ..... check for damage
Control surfaces ..... check for interference - free of ice, snow, frost
Hinges ..... check for interference
Wings ..... free of ice, snow, frost
Stall warning ..... check
Navigation lights ..... check
Fuel tanks ..... check supply visually - secure caps
Fuel tank sumps ..... drain, check for water, sediment and proper fuel
Fuel vents ..... open
Main gear struts ..... proper inflation (2.5 ± .25 in.)
Tires ..... check
Brake blocks ..... check
Fuselage static vents ..... clear
Pitot head ..... remove cover - holes clear
Windshield ..... clean
Propeller and spinner ..... check
Engine baffle seals ..... check
Fuel and oil ..... check for leaks
Oil ..... check level
Dipstick ..... properly seated
Cowling ..... secure
Inspection covers ..... secure
Nose wheel tire ..... check
Nose gear strut ..... proper inflation (2.75 ± .25 in.)
Air inlets ..... clear
Alternator belt ..... check tension
Tow bar and control locks ..... stow
Baggage ..... stowed properly - secure
Baggage door ..... close and secure

Fuel strainer . . . . . .drain
Primary flight controls . . . . . .proper operation
Cabin doors . . . . . close and secure
Required papers . . . . . on board
Seat belts and harness . . . . . fastened - check inertia reel

BEFORE STARTING ENGINE

Parking brake . . . . . set
Propeller . . . . . full INCREASE rpm
Fuel selector . . . . . desired tank

STARTING ENGINE WHEN COLD

Throttle . . . . . .1/2" open
Master switch . . . . . .ON
Electric fuel pump . . . . . .ON
Mixture . . . . . .prime - then idle cut-off
Starter . . . . . .engage
Mixture . . . . . .full RICH
Throttle . . . . . adjust
Oil pressure . . . . . check

STARTING ENGINE WHEN HOT

Throttle . . . . . .1/2" open
Master switch . . . . . .ON
Electric fuel pump . . . . . .ON
Mixture . . . . . idle cut-off
Starter . . . . . .engage
Mixture . . . . . advance
Throttle . . . . . adjust
Oil pressure . . . . . check

STARTING ENGINE WHEN FLOODED

Throttle . . . . . open full
Master switch . . . . . .ON
Electric fuel pump . . . . . .OFF
Mixture . . . . . idle cut-off
Starter . . . . . .engage
Mixture . . . . . advance
Throttle . . . . . retard
Oil pressure . . . . . check

STARTING WITH EXTERNAL POWER SOURCE

Master switch . . . . . .OFF
All electrical equipment . . . . . .OFF
Terminals . . . . . connect
External power plug . . . . . .insert in fuselage
Proceed with normal start
Throttle . . . . . .lowest possible RPM
External power plug . . . . . disconnect from fuselage
Master switch . . . . . ON-check ammeter
Oil pressure . . . . . check

WARM-UP

Throttle . . . . . 1400 to 1500 RPM

TAXIING

Parking brake . . . . . release
Chocks . . . . . removed
Taxi area . . . . . clear
Throttle . . . . . apply slowly
Prop . . . . . high RPM
Brakes . . . . . check
Steering . . . . . check

GROUND CHECK

Parking brake . . . . . set
Propeller . . . . . full INCREASE
Throttle . . . . . 2000 RPM
Magnetos . . . . . max. drop 175 RPM - max. diff. 50 RPM
Vacuum . . . . . 4.8" Hg. to 5.1" Hg.
Oil temp . . . . . check
Oil pressure . . . . . check
Air conditioner . . . . . check
Annunciator panel . . . . . press-to-test
Propeller . . . . . exercise - then full INCREASE
Alternate air . . . . . check
Engine is warm for takeoff when throttle can be opened without engine faltering.
Electric fuel pump . . . . . OFF
Fuel pressure . . . . . check
Throttle . . . . . retard

BEFORE TAKEOFF

Master switch ..... ON
Flight instruments ..... check
Fuel selector ..... proper tank
Electric fuel pump ..... ON
Engine gauges ..... check
Alternate air ..... CLOSED
Seat backs ..... erect
Mixture ..... set
Prop ..... set
Belts/harness ..... .fastened
Empty seats ..... seat belts snugly fastened
Flaps ..... set
Trim tab ..... set
Emergency Gear Extension Lever .....UP POSITION

NOTE

For aircraft equipped with the backup gear extender, the Emergency Gear Extension Lever should be in the normal/ disengaged position.

Controls ..... free
Doors ..... latched
Air conditioner ..... OFF
Parking brake ..... released

TAKEOFF

NORMAL

Flaps ..... set
Tab ..... set
Accelerate to 65 to 75 KIAS
Control wheel.. ..... back pressure to rotate to climb attitude

SHORT FIELD. OBSTACLE CLEARANCE

Flaps ..... 25° (second notch)
Accelerate to 50 to 60 KIAS depending on aircraft weight
Control wheel ..... back pressure to rotate to climb attitude
After breaking ground, accelerate to 55 to 65 KIAS depending on aircraft weight

SHORT FIELD. OBSTACLE CLEARANCE (cont.)

Gear (OVERRIDE ENGAGED on aircraft equipped I with the backup gear extender) ..... UP
Accelerate to best flaps up angle of climb speed - 78 KIAS. slowly retract the flaps and climb past the obstacle.
Accelerate to best flaps up rate of climb speed - 90 KIAS

SOFT FIELD

Flaps .....25° (second notch)
Accelerate to 50 to 60 KIAS depending on aircraft weight.
Control Wheel ..... hack pressure to rotate to climb attitude
After breaking ground, accelerate to 55 to 65 KIAS depending on aircraft weight.
Gear (OVERRIDE ENGAGED on aircraft equipped with the backup gear extender) ..... UP
Accelerate to best flaps up rate of climb speed - 90 KIAS.
Flaps .....retract slowly

CLIMB

Best rate (2750 lb) (gear up)
(flaps up) ..... 90 KIAS
Best rate (2750 lb) (gear down)
(flaps up) ..... 78 KIAS
Best angle (2750 lb) (gear up)
(flaps up) ..... 78 KIAS
Best angle (2750 lb) (gear down)
(flaps up) ..... 72 KIAS
En route ..... 104 KIAS
Electric fuel pump ..... OFF at desired altitude

CRUISING

Reference performance charts, Avco-Lycoming Operator's Manual and power setting table.
Normal max power 759c
Power ..... set per power table
Mixture ..... adjust

APPROACH AND LANDING

Fuel selector ..... proper tank
Seat backs ..... erect
Belts/harness ..... fasten
Electric fuel pump ..... ON
Mixture ..... set
Propeller ..... set
Emergency Gear Extension Lever .....UP
POSITION

NOTE

For aircraft equipped with the backup gear extender, the Emergency Gear Extension Lever should be in the normal/ disengaged position.

Gear ..... down - 129 KIAS max
Flaps ..... set - 103 KIAS max
Air conditioner ..... OFF
Trim to 75 KIAS

STOPPING ENGINE

Flaps ..... retract
Electric fuel pump ..... OFF
Air conditioner ..... OFF
Radio's ..... OFF
Propeller ..... full INCREASE
Throttle ..... full aft
Mixture ..... .idle cut-off
Magnetos ..... OFF
Master switch ..... OFF

PARKING

Parking brake . .....set
Control wheel ..... secured with belts
Flaps ..... full up
Wheel chocks ..... in place
Tie downs ..... secure

4.7 AMPLIFIED NORMAL PROCEDURES (GENERAL)

The following paragraphs are provided to supply detailed information and explanations of the normal procedures necessary for the safe operation of the airplane.

4.9 PREFLIGHT CHECK

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

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.

Upon entering the cockpit, release the seat belts securing the control wheel. Turn "ON" the master switch and check the fuel quantity gauges for sufficient fuel. After the fuel quantity check is made turn the master switch "OFF" and check that the ignition switch is "OFF."

To begin the exterior walk-around, check for external damage and operational interference of the control surfaces or hinges. Insure that the wings and control surfaces are free of snow, ice, frost or any other foreign materials.

An operational check of the stall warning system and exterior lights should now be made. Turn the master switch and appropriate light switches "ON." Lift the stall detector on the leading edge of the left wing while checking to determine that the warning horn is actuated, and check that navigation and anti-collision lights are illuminated. To check the optional heated pitot head, be sure to first remove any protective cover that might have been installed. With the heated pitot switch "ON" the pitot head should be found hot to touch. The master switch should be returned to the "OFF" position after these checks are complete.

A visual check of the fuel tank quantity should be performed. Remove the filler cap from each tank and visually check the supply and color. Be sure to secure the caps properly after the check is complete.

The fuel system tank sumps and strainer should be drained daily prior to the first flight and after refueling to avoid the accumulation of water or sediment. Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer is located on the left forward side of the fire wall.

Drain each tank through its individual quick drain located at the lower inboard rear corner of the tank, making sure that enough fuel has been drained to insure that all water and sediment is removed. Verify that proper fuel is in the tank.

CAUTION

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

Check all of the fuel tank vents to make sure they are open.

Next, complete a check of the landing gear. Check the main gear shock struts for proper inflation. There should be 2.5 ± .25 inches of strut exposure under a normal static load. The nose gear should be checked for 2.75 ± .25 inches of strut exposure. Check all tires for cuts and wear and insure proper inflation. Make a visual check of the brake blocks for wear or damage.

Remove the cover from the pitot head on the underside of the left wing. Check the pitot head to make sure the holes are open and clear of obstructions. Check static vent holes on both sides of aft fuselage to make sure the holes are open and clear of obstructions.

Don't forget to clean and check the windshield.

The propeller and spinner should be checked for defects or nicks.

Lift the cowling and check for any obvious fuel or oil leaks. Check the oil level. Make sure that the dipstick has properly seated after checking. Secure the cowling and check the inspection covers.

Check the air inlets for foreign matter and the alternator belt for proper tension.

Stow the tow bar and check the baggage for proper storage and security. The baggage compartment doors should be closed and secure.

Upon entering the aircraft, ascertain that all primary flight controls operate properly. Close and secure the fore and aft cabin doors and check that all the required papers are in order and in the airplane.

Fasten the seat belts and shoulder harness and check the function of the inertia reel by pulling sharply on the strap. Fasten seat belts on empty seats.

4.11 BEFORE STARTING ENGINE

Before starting the engine the parking brake should be set "ON" and the propeller lever moved to the full "INCREASE" rpm position. The fuel selector should then be moved to the desired tank.

4.13 STARTING ENGINE

(a) Starting Engine When Cold

Open the throttle lever approximately 1/2 inch. Turn "ON" the master switch and the electric fuel pump. Move the mixture control to full "RICH" until an indication is noted on the fuel flow meter. The engine is now primed.

Move the mixture control to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture control to full "RICH" and move the throttle to the desired setting.

If the engine does not fire within five to ten seconds, disengage the starter and reprime.

(b) Starting Engine When Hot

Open the throttle approximately 1/2 inch. Turn "ON" the master switch and the electric fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture and move the throttle to the desired setting.

(c) Starting Engine When Flooded

The throttle lever should be full "OPEN." Turn "ON" the master switch and turn "OFF" the emergency fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture and retard the throttle.

(d) Starting Engine With External Power Source

An optional feature called the Piper External Power (PEP) allows the operator to use an external battery to crank the engine without having to gain access to the airplane's battery.

Turn the master switch OFF and turn all electrical equipment OFF. Connect the RED lead of the PEP kit jumper cable to the POSITIVE (+) terminal of an external 12-volt battery and the BLACK lead to the NEGATIVE (-) terminal. Insert the plug of the jumper cable into the socket located on the fuselage. Note that when the plug is inserted, the electrical system is ON. Proceed with the normal starting technique.

After the engine has started, reduce power to the lowest possible RPM, to reduce sparking, and disconnect the jumper cable from the aircraft. Turn the master switch ON and check the alternator ammeter for an indication of output. DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

NOTE

For all normal operations using the PEP jumper cables, the master switch should be OFF, but it is possible to use the ship's battery in parallel by turning the master switch ON. This will give longer cranking capabilities, but will not increase the amperage.

CAUTION

Care should be exercised because if the ship's battery has been depleted, the external power supply can be reduced to the level of the ship's battery. This can be tested by turning the master switch ON momentarily while the starter is engaged. If cranking speed increases, the ship's battery is at a higher level than the external power supply.

When the engine is firing evenly, advance the throttle to 800 RPM. If oil pressure is not indicated within thirty seconds, stop the engine and determine the trouble. In cold weather it will take a few seconds longer to get an oil pressure indication. If the engine has failed to start, refer to the Lycoming Operating Handbook, Engine Troubles and Their Remedies.

Starter manufacturers recommend that cranking periods be limited to thirty seconds with a two minute rest between cranking periods. Longer cranking periods will shorten the life of the starter.

4.15 WARM-UP

Warm-up the engine at 1400 to 1500 RPM. Avoid prolonged idling at low RPM, as this practice may result in fouled spark plugs.

Takeoff may be made as soon as the ground check is completed, provided that the throttle may be opened fully without backfiring or skipping, and without a reduction in engine oil pressure.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones. gravel or any loose material that may cause damage to the propeller blades.

4.17 TAXIING

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Ascertain that the propeller back blast and taxi areas are clear.

After releasing the parking brake, power should be applied slowly to start the taxi roll. Taxi a few feet forward and apply the brakes to determine their effectiveness. Taxi with the propeller set in low pitch, high RPM setting. While taxiing. make slight turns to ascertain the effectiveness of the steering.

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 running up or taxiing over ground containing loose stones. gravel or any loose material that may cause damage to the propeller blades.

4.19 GROUND CHECK

Set the parking brake.

The magnetos should be checked at 2000 RPM with the propeller set at high RPM. Drop off on either magneto should not exceed 175 RPM and the difference between the magnetos should not exceed 50 RPM. Operation on one magneto should not exceed I 0 seconds.

Check the vacuum gauge: the indicator should read 4.8" Hg to 5.1" Hg at 2000 RPM.

Check the annunciator panel lights with the press-to-test button. Also check the air conditioner and the alternate air.

Release the parking brake.

4.23 TAKEOFF

The propeller control should be moved through its complete range to check for proper operation and then placed in full "INCREASE" rpm for takeoff. To obtain maximum rpm, push the pedestal mounted control fully forward on the instrument panel. Do not allow a drop of more than 500 RPM during this check. In cold weather the propeller control should be cycled from high to low RPM at least three times before takeoff to make sure that warm engine oil has circulated.

The electric fuel pump should be turned "OFF" after starting or during warm-up to make sure that the engine driven pump is operating. Prior to takeoff the electric pump should be turned ON again to prevent loss of power during takeoff should the engine driven pump fail. Check both oil temperature and oil pressure. The temperature may be low for some time if the engine is being run for the first time of the day. The engine is wann enough for takeoff when the throttle can be opened without the engine faltering.

4.21 BEFORE TAKEOFF

All aspects of each particular takeoff should be considered prior to executing the takeoff procedure.

After takeoff on aircraft equipped with the backup gear extender, if the gear selector switch is placed in the gear up position before reaching the airspeed at which the system no longer commands gear down*, the gear will not retract. For obstacle clearance on takeoff and for takeoffs from high altitude airports, the landing gear can be retracted after lift-off at the pilot's discretion by placing the gear selector switch in the "UP"' position and then locking the emergency gear lever in the "OVERRIDE ENGAGED" position. If desired, the "OVERRIDE ENGAGED'' position can be selected and locked before takeoff, and the gear will then retract as soon as the gear selector switch is placed in the "UP" position. Care should always be taken not to retract the gear prematurely. or the aircraft could settle back onto the runway. If the override lock is used for takeoff. it should be disengaged as soon as sufficient airspeed and terrain clearance are obtained, to return the gear system to normal operation. For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the backup gear extender system were not installed.

After all aspects of the takeoff are considered, a pretakeoff check procedure must be performed.

Turn "ON" the master switch and check and set all of the flight instruments as required. Check the fuel selector to make sure it is on the proper tank (fullest). Turn "ON" the electric fuel pump and check the engine gauges. The alternate air should be in the "CLOSED" position.

All seat backs should be erect.

The mixture and propeller control levers should be set and the seat belts and shoulder harness fastened. Fasten the seat belts snugly around the empty seats.

Exercise and set the flaps and trim tab. The Emergency Gear Extension Lever should be in the up position to permit normal gear operation. If the Emergency Gear Extension Lever is not in the fully up position prior to gear retraction, the landing gear may not retract when the landing gear switch is selected up. For aircraft equipped with the backup gear extender, the Emergency Gear Extension Lever should be in the normal/disengaged position to permit normal gear retraction. Ensure proper flight control movement and response.

All doors should be properly secured and latched. On air conditioned models, the air conditioner must be "OFF" to ensure normal takeoff performance.

*Approximately 75 KIAS at sea level to approximately 88 KIAS at 10,000 ft with a straight line variation between.

4.23 TAKEOFF

The normal takeoff technique is conventional for the Cherokee Arrow III. The tab should be set slightly aft of neutral, with the exact setting determined by the loading of the airplane. Allow the airplane to accelerate to 65 to 75 KIAS depending on the weight of the aircraft and ease back on the control wheel to rotate to climb attitude.

The procedure used for a short field takeoff with an obstacle or a soft field takeoff differs slightly from the normal technique. The flaps should be lowered to 25° (second notch). Allow the aircraft to accelerate to 50 to 60 KIAS depending on the aircraft weight and rotate the aircraft to climb attitude. After breaking ground accelerate to 55 to 65 KIAS, depending on aircraft weight and select gear up*. Continue to climb while accelerating to the flaps up rate of climb speed, 90 KIAS if no obstacle is present or to the best flaps up angle of climb speed, 78 KIAS if obstacle clearance is a consideration. Retract the flaps slowly, one notch at a time, while climbing out.

4.25 CLIMB

The best rate of climb at gross weight will be obtained at 90 KIAS. The best angle of climb may be obtained at 78 KIAS. at lighter than gross weight these speeds are reduced somewhat**. For climbing enroute, a speed of 104 KIAS is recommended. This will produce better forward speed and increased visibility over the nose during the climb.

When reaching the desired altitude, the electric fuel pump may be turned off.

NOTE

On aircraft equipped with the back up gear extender, during climbs at best angle of climb speed at any altitude and best rate of climb speed above approximately 15,000 feet density altitude it may be necessary to select "OVERRIDE ENGAGED" to prevent the landing gear from extending automatically during the climb. This altitude decreases with reduced climb power and increases with increased climb speed.

*If desired, on aircraft equipped with the backup gear extender the "OVERRIDE ENGAGED" position can be selected and locked before takeoff, and the gear will then retract as soon as the gear selector switch is placed in the up position. In this case care should be taken not to retract the gear prematurely, or the aircraft could settle back onto the runway. If the override lock is used for takeoff, it should be disengaged as soon as sufficient terrain clearance is obtained, to return the gear system to normal operation.

**To obtain the performance presented in the Performance Section of this handbook, full power (full throttle and 2700 RPM) must be used.

4.27 CRUISING

The cruising speed of the Cherokee Arrow III is determined by many factors, including power setting, altitude, temperature, loading and equipment installed in the airplane.

The normal maximum cruising poser is 75% of the rated horsepower of the engine. When selecting cruising RPM below 2400, limiting manifold pressure for continuous operation, as specified by the appropriate "Avco-Lycoming Operator's Manual," should be observed.

To obtain the desired power, set the manifold pressure and ROM according to the power setting table in this manual.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation 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.

To lean the mixture, disengage the lock and pull the mixture control until the engine becomes rough, indicating that the lean mixture limit has been reached in the leaner cylinders. Then enrich the mixture by pushing the control towards the instrument panel until engine operation becomes smooth. The fuel flow meter will give a close approximation of the fuel being consumed. The low side of the power setting, as shown on the fuel flow meter, indicates best economy for that percent of power while the high side indicates best power.

If the airplane is equipped with the optional exhaust gas temperature (EGT) gauge, a more accurate means of leaning is available to the pilot. For this procedure, refer to the "Avco-Lycoming Operator's Manual."

The pilot should monitor weather conditions while flying and should be alert to conditions which might lead to icing. If icing conditions are encountered or induction system icing is suspected (uncommanded loss in manifold pressure or engine roughness), place the alternate air control in the ON position.

In order to keep the airplane in best lateral trim during cruise flight, the fuel should be used alternately from each tank at one hour intervals.

Always remember that the electric fuel pump should be turned "ON" before switching tanks, and should be left on for a short period thereafter. To preclude making a hasty selection, and to provide continuity of flow, the selector should be changed to another tank before fuel is exhausted from the tank in use. 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 a full tank and the electric fuel pump switched to the "ON" position.

4.29 APPROACH AND LANDING

Check to insure the fuel selector is on the proper (fullest) tank and that the seat backs are erect. The seat belts and shoulder harness should be fastened and the inertia reel checked.

Turn ''ON" the electric fuel pump and turn "OFF" the air conditioner. The mixture should be set in the full "RICH'' position. Set the propeller at full "INCREASE" rpm to facilitate ample power for an emergency go-around.

Prior to landing gear operation, the Emergency gear Extension Lever should be in the up position to permit normal gear extension or retraction in the event of a go-around. For aircraft equipped with the backup gear extender, the Emergency Gear Extension Lever should be in the normal/disengaged position. The landing gear may be extended at speeds below 129 KIAS. The airplane should be trimmed to a final approach speed of about 75 KIAS with flaps extended. The flaps can be lowered at speeds up to 103 KIAS, if desired.

The mixture control should be kept in full "RICH" position to insure maximum acceleration if it should be necessary to open the throttle again.

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. Mixture should be full "RICH," fuel on the fullest tank, and electric fuel pump "ON." 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.

4.31 STOPPING ENGINE

At the pilot's discretion, the flaps should be raised and the electric fuel pump turned "OFF."

NOTE

The flaps must be placed in the "UP" position for the flap step to support weight. Passengers should be cautioned accordingly.

The air conditioner and radios should be turned "OFF," the propeller set in the full "INCREASE" position, and the engine stopped by disengaging the mixture control lock and pulling the mixture control back to idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping. Then the magneto and master switches must be turned "OFF."

4.33 PARKING

If necessary, the airplane should be moved on the ground with the aid of the nose wheel tow bar provided with each airplane and secured behind the rear seats. 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.

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

CAUTION

Care should be taken when setting brakes that are overheated or during cold weather when accumulated moisture may freeze a brake.

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.

4.35 STALLS

The stall characteristics of the Cherokee Arrow III are conventional. An approaching stall is indicated by a stall warning horn 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 Cherokee Arrow III with power off and full flaps is 55 KIAS. With the flaps up this speed is increased 5 KTS. Loss of altitude during stalls can be as great as 400 feet. depending on configuration and power.

NOTE

The stall warning system is inoperative with the master switch "OFF.''

During preflight, the stall warning system should be checked by turning the master switch "ON:· lifting the detector and checking to determine if the horn is actuated. The master switch should be returned to the "OFF" position after the check is complete.

4.37 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 maneuvering speed to reduce the structural loads caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or of distractions caused by the conditions.

4.39 LANDING GEAR

This airplane is equipped with an airspeed - power sensing system (back-up gear extender) which extends the landing gear under low airspeed - power conditions* even though the pilot may not have selected gear down. This system will also prevent retraction of the landing gear by normal means when the airspeed - power values are below a predetermined minimum. To override this system or to hold the emergency gear lever in the "OVERRIDE ENGAGED" position without maintaining manual pressure on the emergency gear lever, pull the lever full up and push the lock pin in. To release the override, pull lever up and then release.

For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the back-up gear extender system were not installed.

The pilot should become familiar with the function and significance of the landing gear position indicators and warning lights.

The red gear warning light on the instrument panel and the horn operate simultaneously in flight when the throttle is reduced to where the manifold pressure is approximately 14 inches of mercury or below, and the gear selector switch is not in the "DOWN" position. This warning will also occur during flight when the back-up gear extended system has lowered the landing gear and the gear selector switch is not in the "DOWN" position and the manifold pressure is reduced below approximately 14 inches of mercury.

The red gear warning light on the instrument panel and the horn will also operate simultaneously on the ground when the master switch is "ON" and the gear selector switch is in the "UP" position and the throttle is in the retarded position.

The three green lights on the instrument panel operate individually as each associated gear is locked in the extended position.

WARNING

Panel lights' dimmer switch must be off to obtain gear lights full intensity during daytime flying. When aircraft is operated at night and panel lights' dimmer switch is turned on, gear lights will automatically dim.

The yellow "Auto Ext. OFF" light immediately below the gear selector switch flashes whenever the emergency gear lever is in the "OVERRIDE ENGAGED" position.

4.41 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).

*Approximately 95 KIAS at any altitude, power off.

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SECTION 5

PERFORMANCE

SECTION 5

PERFORMANCE

5.1 GENERAL

All of the required (FAA regulations) and complementary performance information applicable to the Cherokee Arrow 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 INTRODUCTION TO 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 our 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 delivered from 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 we have found the following weights for consideration in our flight planning example.

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

(1)	Basic Empty Weight	1890 lbs.
(2)	Occupants (2 x 170 lbs.)	340 lbs.
(3)	Baggage and Cargo	70 lbs.
(4)	Fuel (6 lb. x 50 gal.)	300 lbs.
(5)	Takeoff Weight	2600 lbs.
(6)	Landing Weight (a)(5) minus (g)(1), (2600 lbs. minus 62 lbs.)	2538 lbs.

Our takeoff weight is below the maximum of 2750 lbs. and our weight and balance calculations have determined our C.G. position within the approved limits.

(b) Takeoff and Landing

Now that we have determined our aircraft loading, we must consider all aspects of our takeoff and landing.

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

Apply the departure airport conditions and takeoff weight to the appropriate Takeoff Performance and Takeoff Ground Roll graph (Figures 5-5, 5-7, 5-9 and 5-11) to determine the length of runway necessary for the takeoff and/or the barrier distance.

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

		Departure Airport	Destination Airport
(1)	Pressure Altitude	1900 ft.	1900 ft.
(2)	Temperature	20°C	20°C
(3)	Wind Component	4 KTS (Headwind)	2 KTS (Headwind)
(4)	Runway Length Available	3000 ft.	4600 ft.
(5)	Runway Required	2550 ft.*	1490 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.

(c) Climb

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

The desired cruise pressure altitude and corresponding cruise outside air temperature values are the first variables to be considered in determining the climb components from the Fuel, Time and Distance to Climb graph (Figure 5-17). After the fuel, time and distance for the cruise pressure altitude and outside air temperature values have been established, apply the existing conditions at the departure field to the graph (Figure 5-17). Now, subtract the values obtained from the graph for the field of departure conditions from those for the cruise pressure altitude.

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

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

(1)	Cruise Pressure Altitude	6000 ft.
(2)	Cruise OAT	10°C
(3)	Fuel to Climb (2 gal. minus 1 gal.)	2 gal.***
(4)	Time to Climb (10 min. minus 3.5 min.)	6.5 min.***
(5)	Distance to Climb (17 nautical miles minus 6 nautical miles)	11 nautical miles***

*reference Figure 5-9
**reference Figure 5-35
***reference Figure 5-17

(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 we determine the basic fuel, time and distance for descent (Figure 5-31). These figures must be adjusted for the field pressure altitude and temperature at the destination airport. To find the necessary adjustment values, use the existing pressure altitude and temperature conditions at the destination airport as variables to find the fuel, time and distance values from the graph (Figure 5-31). Now, subtract the values obtained from the field conditions from the values obtained from the cruise conditions to find the true fuel, time and distance values needed for the flight plan.

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

(1)	Fuel to Descend (1.0 gal. minus 0.5 gal.)	0.5 gal.*
(2)	Time to Descend (7 min. minus 3 min.)	4 min.*
(3)	Distance to Descend (18 nautical miles minus 8 nautical miles)	10 nautical miles*

(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 Avco Lycoming Operator's Manual and the Power Setting Table (Figure 5-19) 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 or 5-23).

Calculate the cruise fuel flow for the cruise power setting from the information provided by the Avco Lycoming 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 our flight planning example are as follows:

(1)	Total Distance	130 nautical miles
(2)	Cruise Distance (e)(1) minus (c)(4) minus (d)(2), (130 nautical miles minus 11 nautical miles minus 10 nautical miles)	109 nautical miles
(3)	Cruise Power (Economy cruise)	65% rated power
(4)	Cruise Speed	129 KTS TAS**
(5)	Cruise Fuel Consumption	9.2 GPH
(6)	Cruise Time (e)(2) divided by (e)(4), (109 nautical miles divided by 129 KTS)	.85 hrs. (51 min.)
(7)	Cruise Fuel (e)(5) multiplied by (e)(6), (9.2 GPH multiplied by .85 hrs.)	7.8 gal.

*reference Figure 5-31
**reference Figure 5-21

(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 our flight planning example.

(1) Total Flight Time

(c)(3) plus (d)(1) plus (e)(6),	(.11 hrs. plus .07 hrs. plus .85 hrs.)	1.03 hrs.
	(6.5 min. plus 4 min. plus 51 min.)	61.5 min.

(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 our example flight plan are shown below.

(1) Total Fuel Required

(c)(5) plus (d)(3) plus (e)(7),	(2 gal. plus 0.5 gal. plus 7.8 gal.)	10.3 gal.
	(10.3 gal. multiplied by 6 lb/gal.)	62 lbs.

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5.7 PERFORMANCE GRAPHS

LIST OF FIGURES

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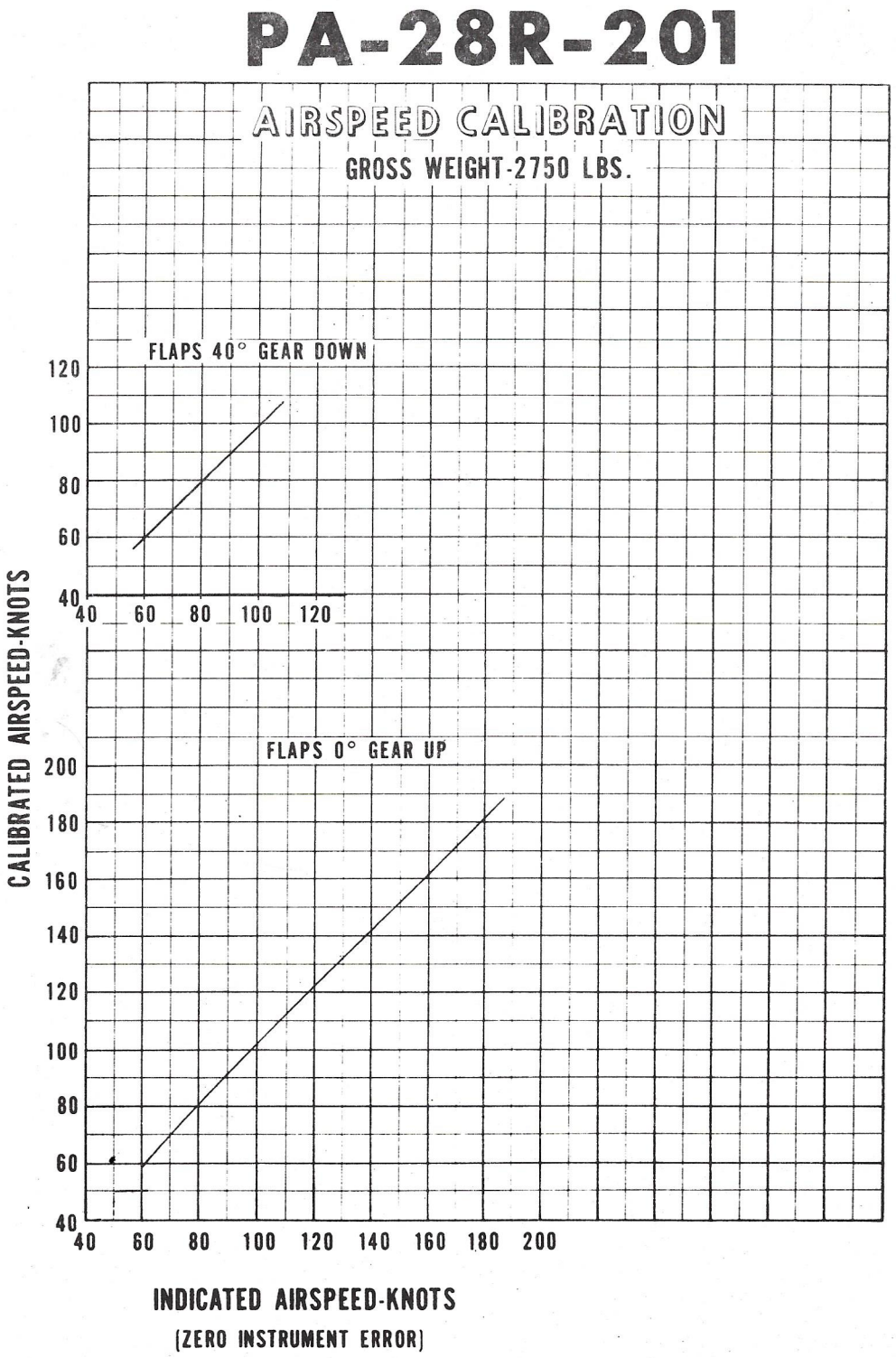
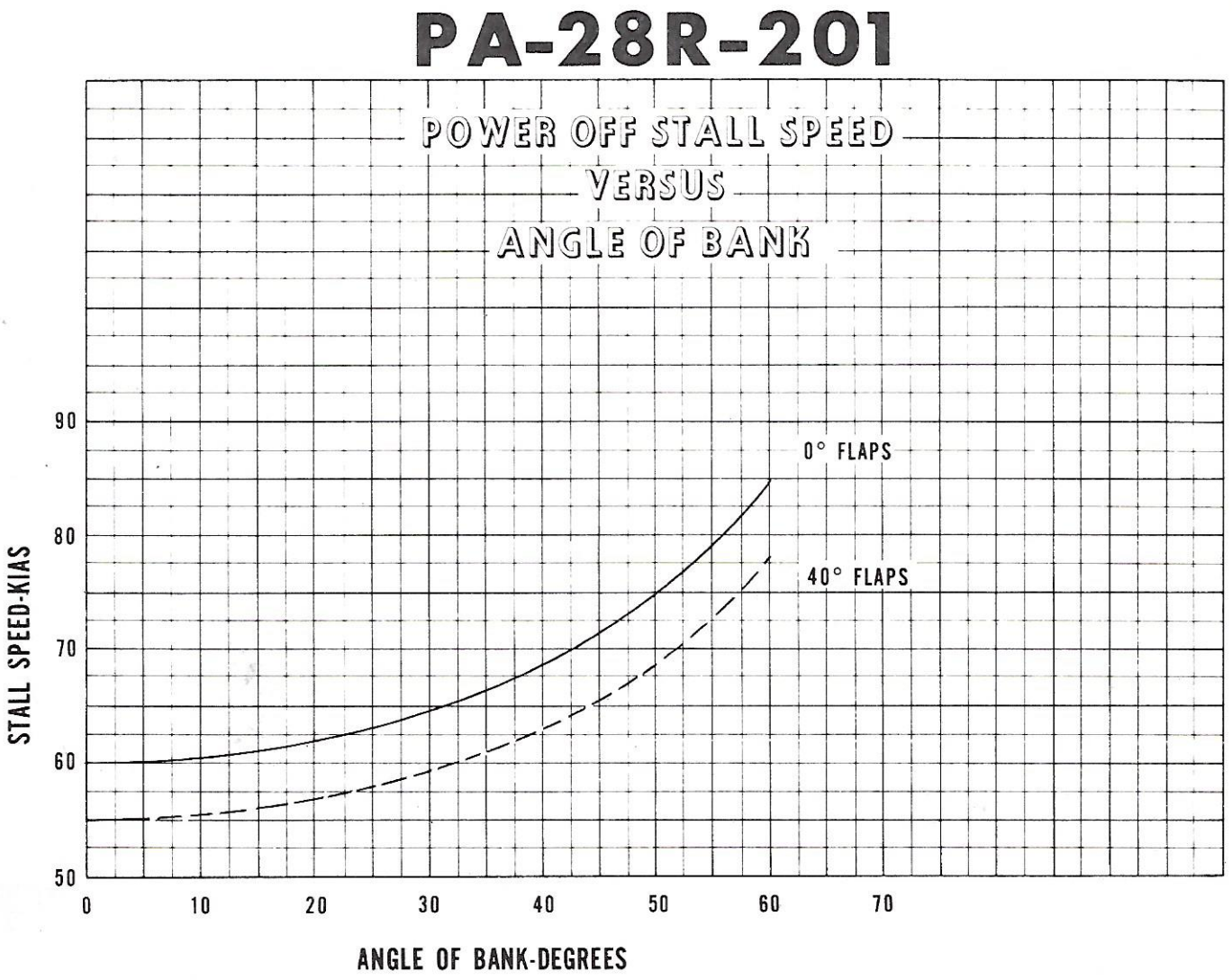


AIRSPEED CALIBRATION

Figure 5-1



POWER OFF STALL SPEED VERSUS ANGLE OF BANK

Figure 5-3

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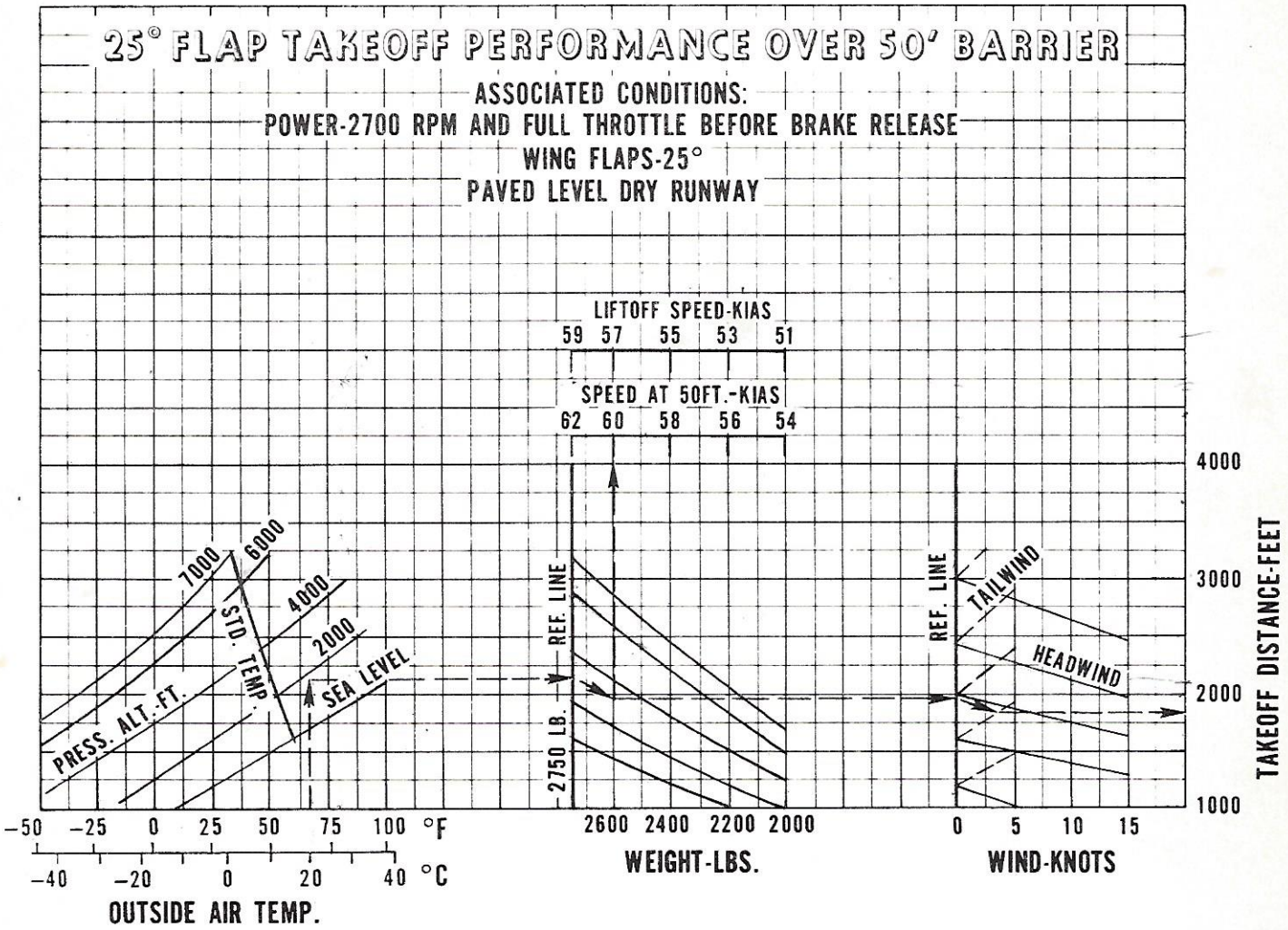
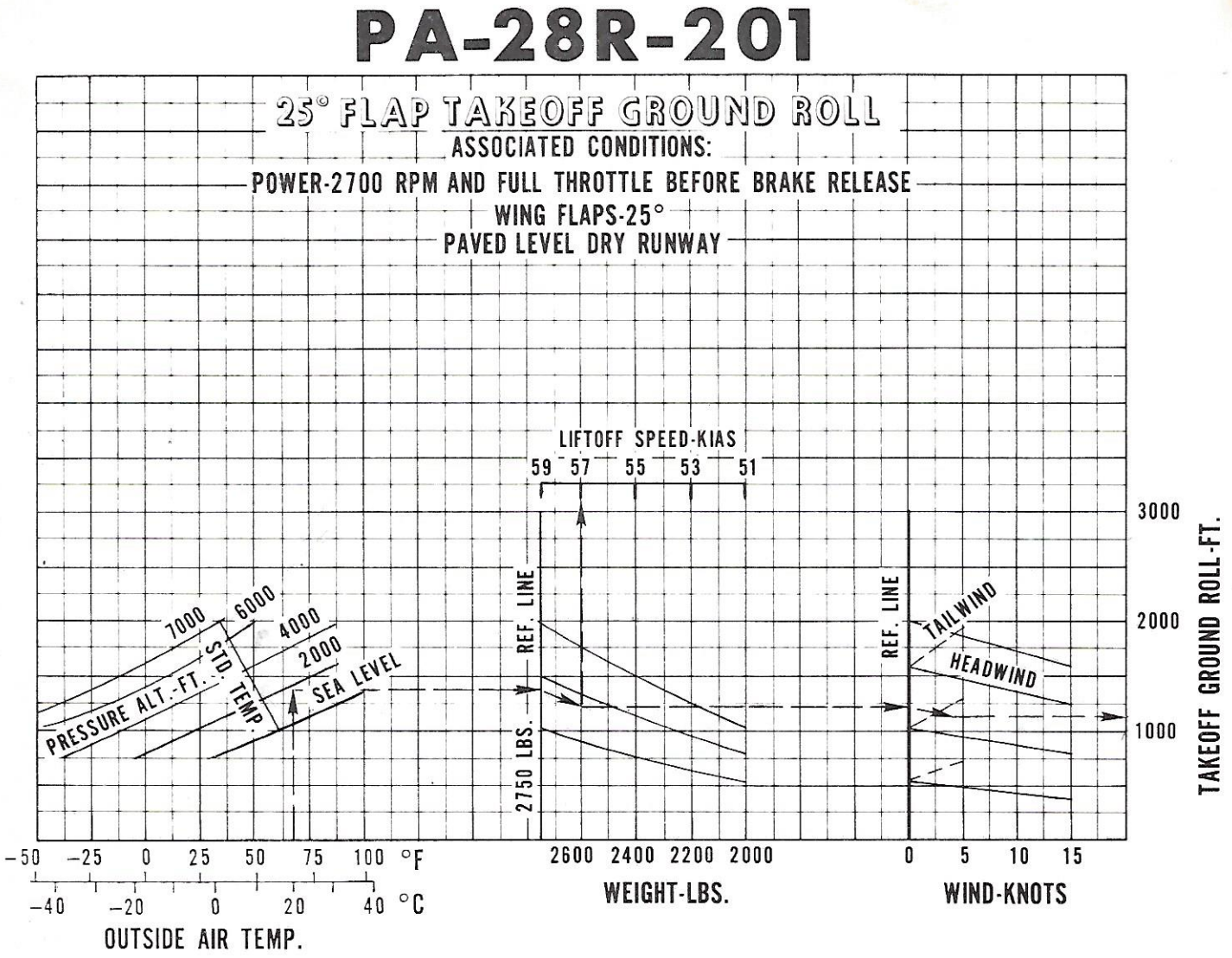


Example:

Pressure altitude: 1900 ft.
Outside air temperature: 20°C
Weight: 2600 lbs.
Surface wind: 4 kts. (headwind)
Liftoff speed: 57 KIAS
Speed at 50 ft.: 60 KIAS
Takeoff distance: 1850 ft.

25° FLAP TAKEOFF PERFORMANCE OVER 50 FOOT BARRIER

Figure 5-5

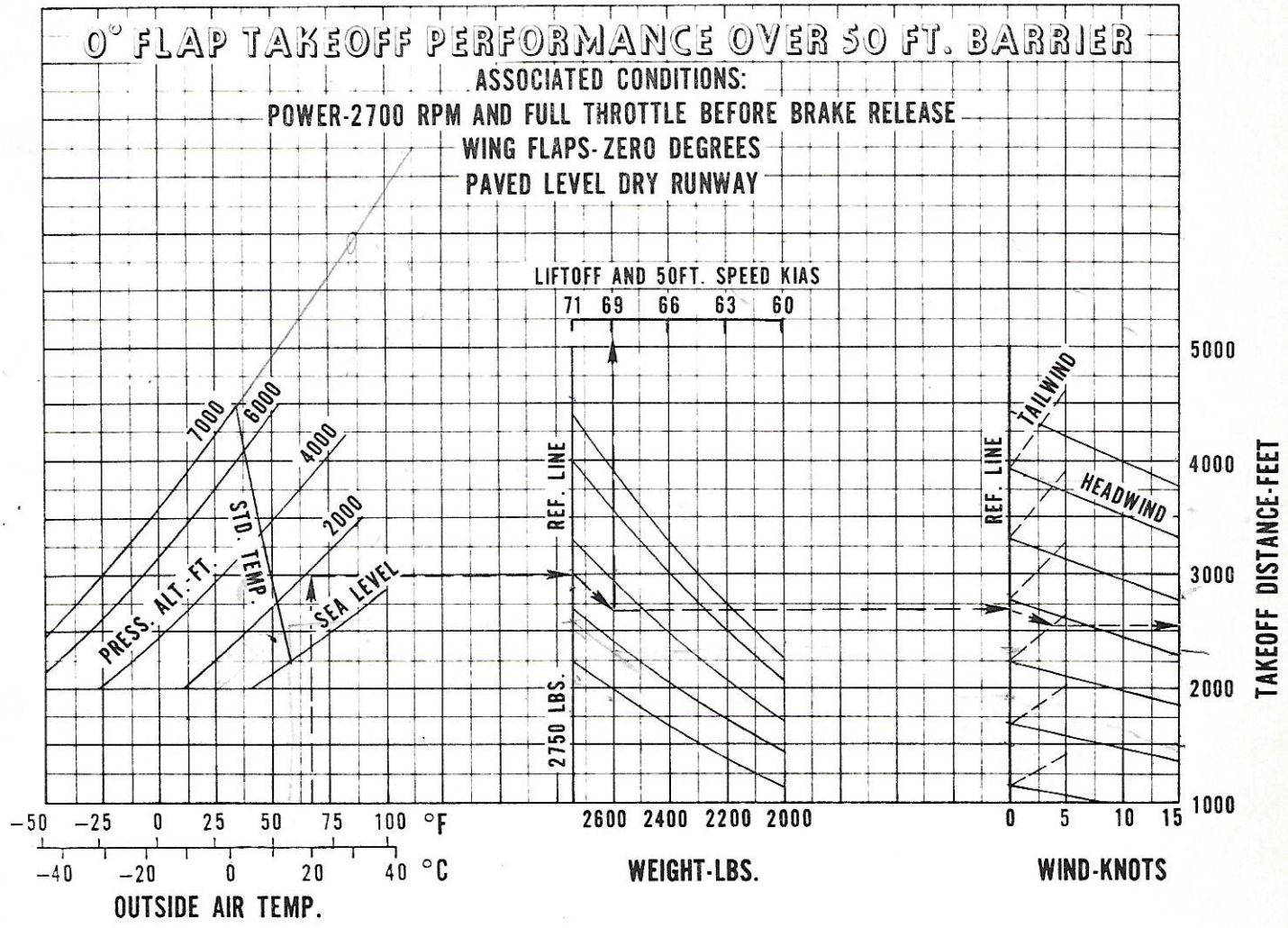


Example:
Pressure altitude: 1900 ft.
Outside air temperature: 20°C
Weight: 2600 lbs.
Surface wind: 4 kts. (headwind)
Liftoff speed: 57 KIAS
Takeoff ground roll: 1125 ft.

25° FLAP TAKEOFF GROUND ROLL

Figure 5-7

PA-28R-201

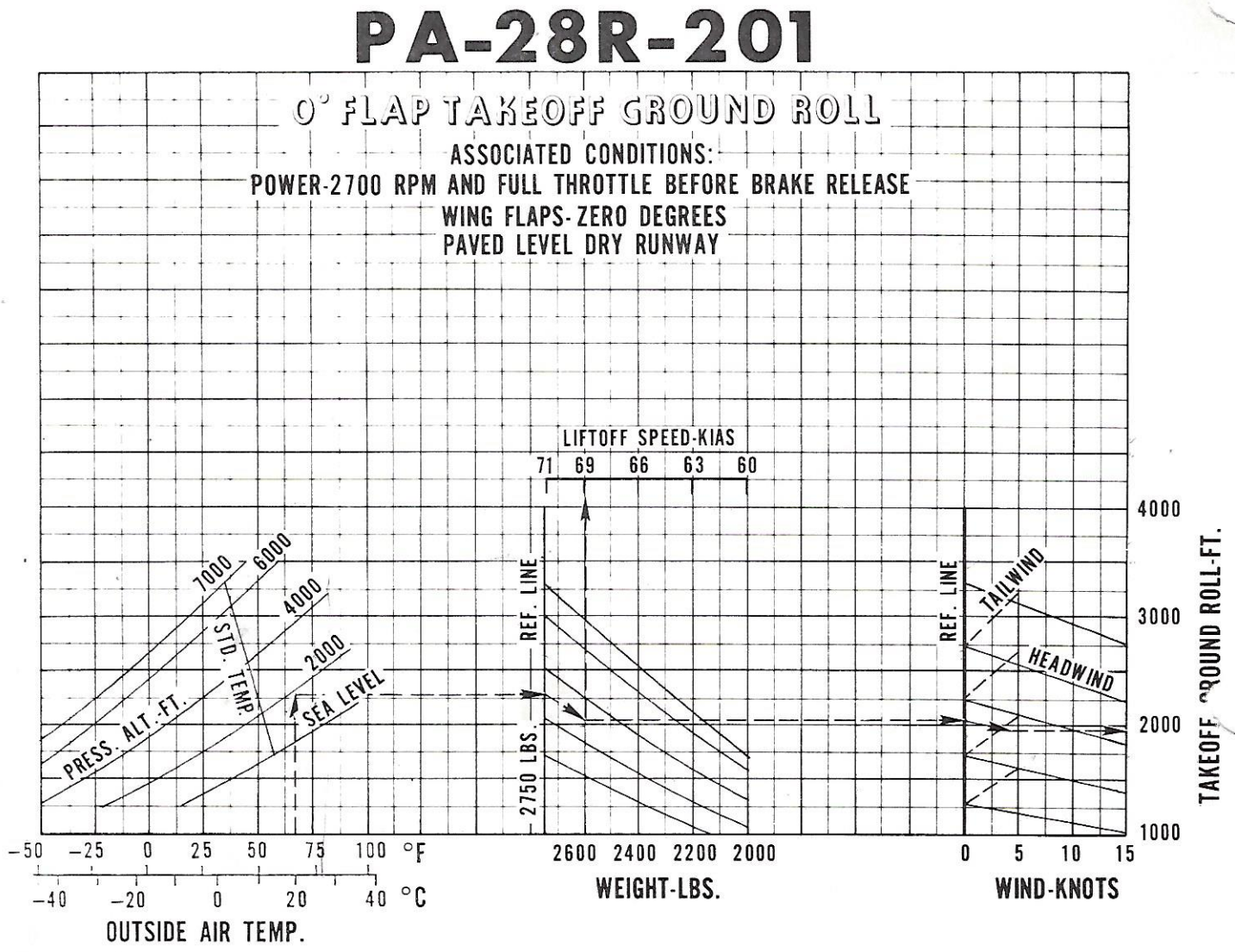


Example:

Pressure altitude: 1900 ft.
Outside air temperature: 20°C
Weight: 2600 lbs.
Surface wind: 4 kts. (headwind)
Liftoff speed: 69 KIAS
Speed at 50 ft.: 69 KIAS
Takeoff distance: 2550 ft.

0° FLAP TAKEOFF DISTANCE OVER 50 FOOT BARRIER

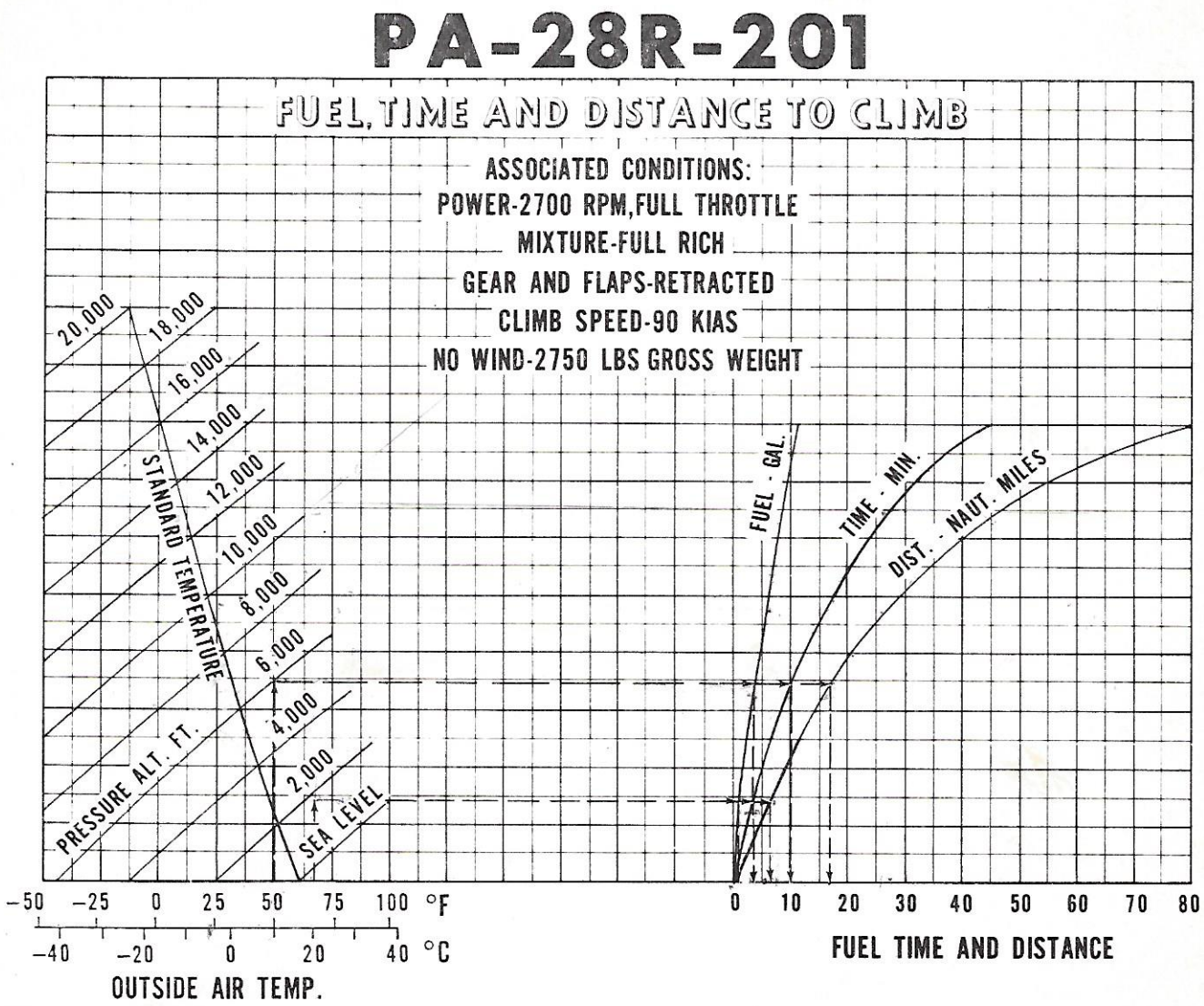
Figure 5-9



Example:
Pressure altitude: 1900 ft.
Outside air temperature: 20°C
Weight: 2600 lbs.
Suface wind: 4 kts. (headwind)
Liftoff speed: 66 KIAS
Takeoff ground roll: 1950 ft.

0° FLAP TAKEOFF GROUND ROLL

Figure 5-11



Example:

Departure pressure altitude: 1900 ft.
Departure outside air temperature: 20 °C
Cruise pressure altitude: 6000 ft.
Cruise outside air temperature: 10 °C
Fuel to climb: 3 gal. minus 1 gal. = 2 gal.
Time to climb: 10 min. minus 3.5 min. = 6.5 min.
Distance to climb: 17 naut. mi. minus 6 naut. mi. = 11 naut. mi.

FUEL, TIME AND DISTANCE TO CLIMB

Figure 5-17

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Power Setting Table - Lycoming Model IO-360-C Series, 200 HP Engine

Press. Alt Feet	Std. Alt Temp °F	110 HP – 55% Rated RPM AND MAN. PRESS. 2100	2400	130 HP – 65% Rated RPM AND MAN. PRESS. 2100	2400	150 HP – 75% Rated RPM AND MAN. PRESS. 2400	Press. Alt Feet
SL	59	22.9	20.4	25.9	22.9	25.5	SL
1,000	55	22.7	20.2	25.6	22.7	25.2	1,000
2,000	52	22.4	20.0	25.4	22.5	25.0	2,000
3,000	48	22.2	19.8	25.1	22.2	24.7	3,000
4,000	45	21.9	19.5	24.8	22.0	24.4	4,000
5,000	41	21.7	19.3	FT	21.7	FT	5,000
6,000	38	21.4	19.1	--	21.5	--	6,000
7,000	34	21.2	18.9	--	21.3	--	7,000
8,000	31	21.0	18.7	--	21.0		8,000
9,000	27	FT	18.5	--	FT		9,000
10,000	23	--	18.3				10,000
11,000	19	--	18.1				11,000
12,000	16	--	17.8				12,000
13,000	12	--	17.6				13,000
14,000	9	--	FT				14,000

To maintain constant power, correct manifold pressure approximately 0.16" Hg for each 10°F variation in inlet air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; subtract for temperatures below standard.

Full throttle manifold pressure values may not be obtainable when atmospheric conditions are non-standard.

POWER SETTING TABLE
Figure 5-19

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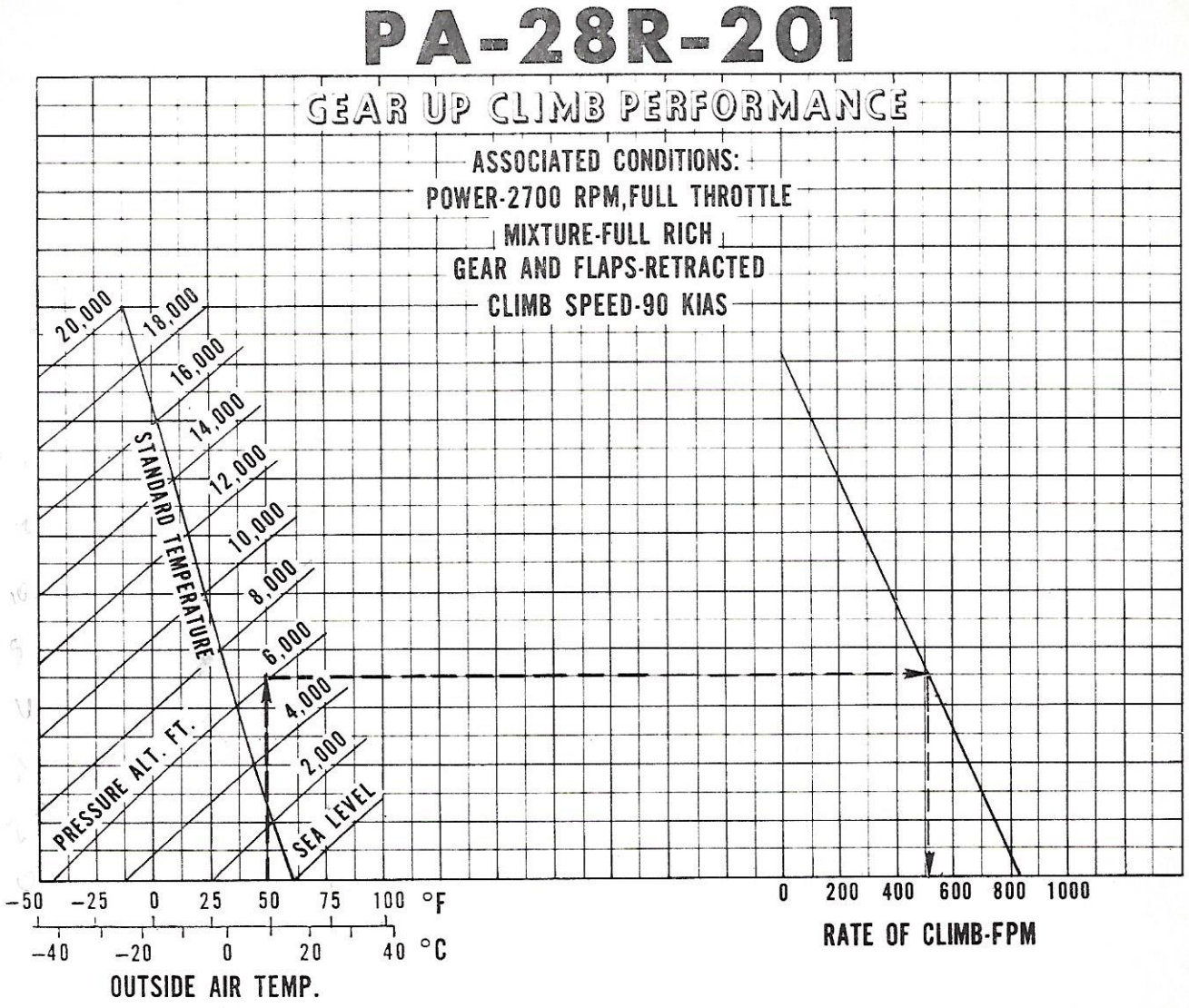
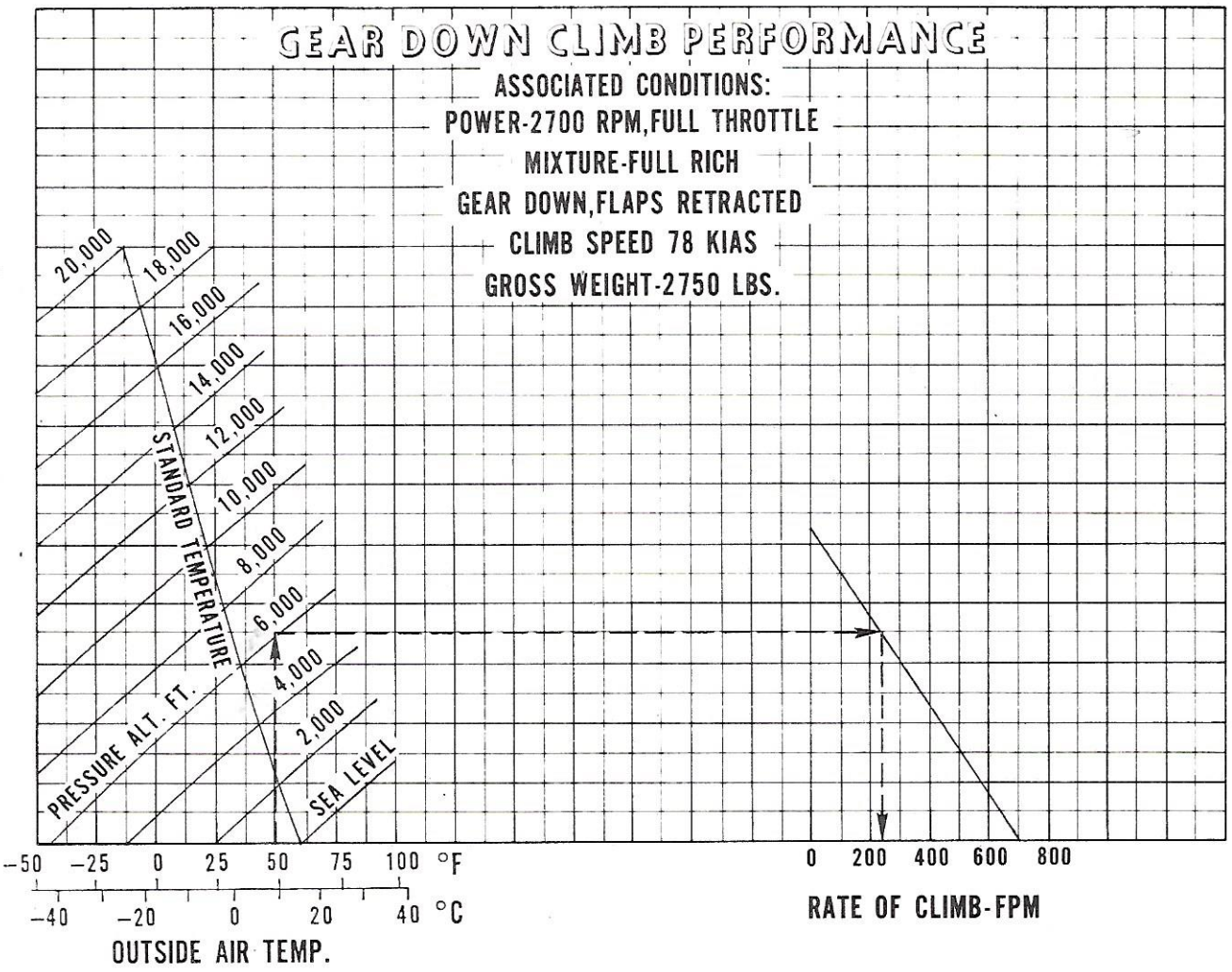


Example:
Climb pressure altitude: 6000 ft.
Outside air temperature: 10°C
Weight: 2750 lbs.
Rate of climb: 510 F.P.M.

GEAR UP CLIMB PERFORMANCE

Figure 5-13

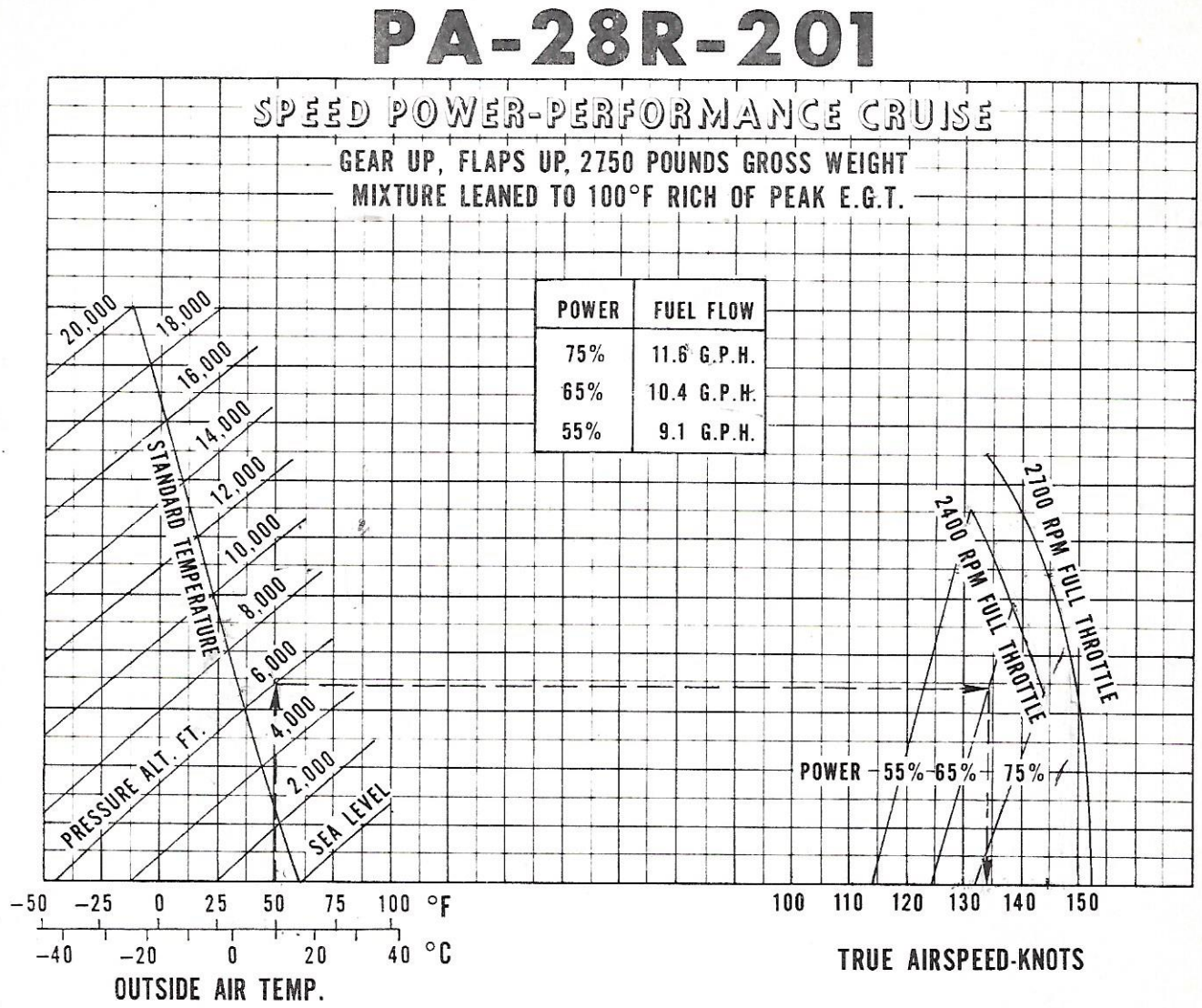
PA-28R-201



Example:
Climb pressure altitude: 6000 ft.
Outside air temperature: 10°C
Rate of climb: 240 F.P.M.

GEAR DOWN CLIMB PERFORMANCE

Figure 5-15

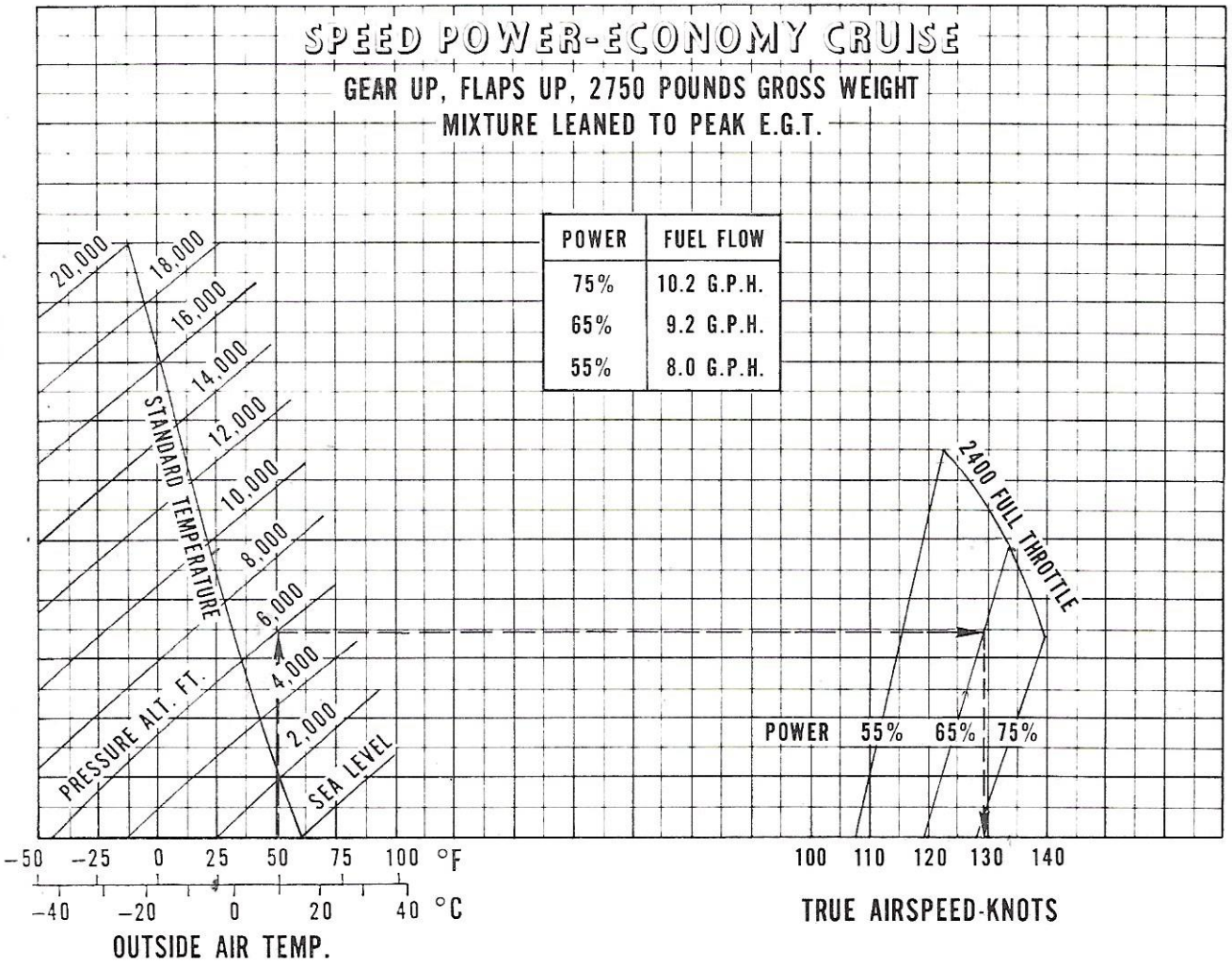


Example:
Cruise pressure altitude: 6000 ft.
Cruise outside air temperature: 10° C
Power: 65%
Cruise speed: 134 kts.

SPEED POWER - PERFORMANCE CRUISE

Figure 5-21

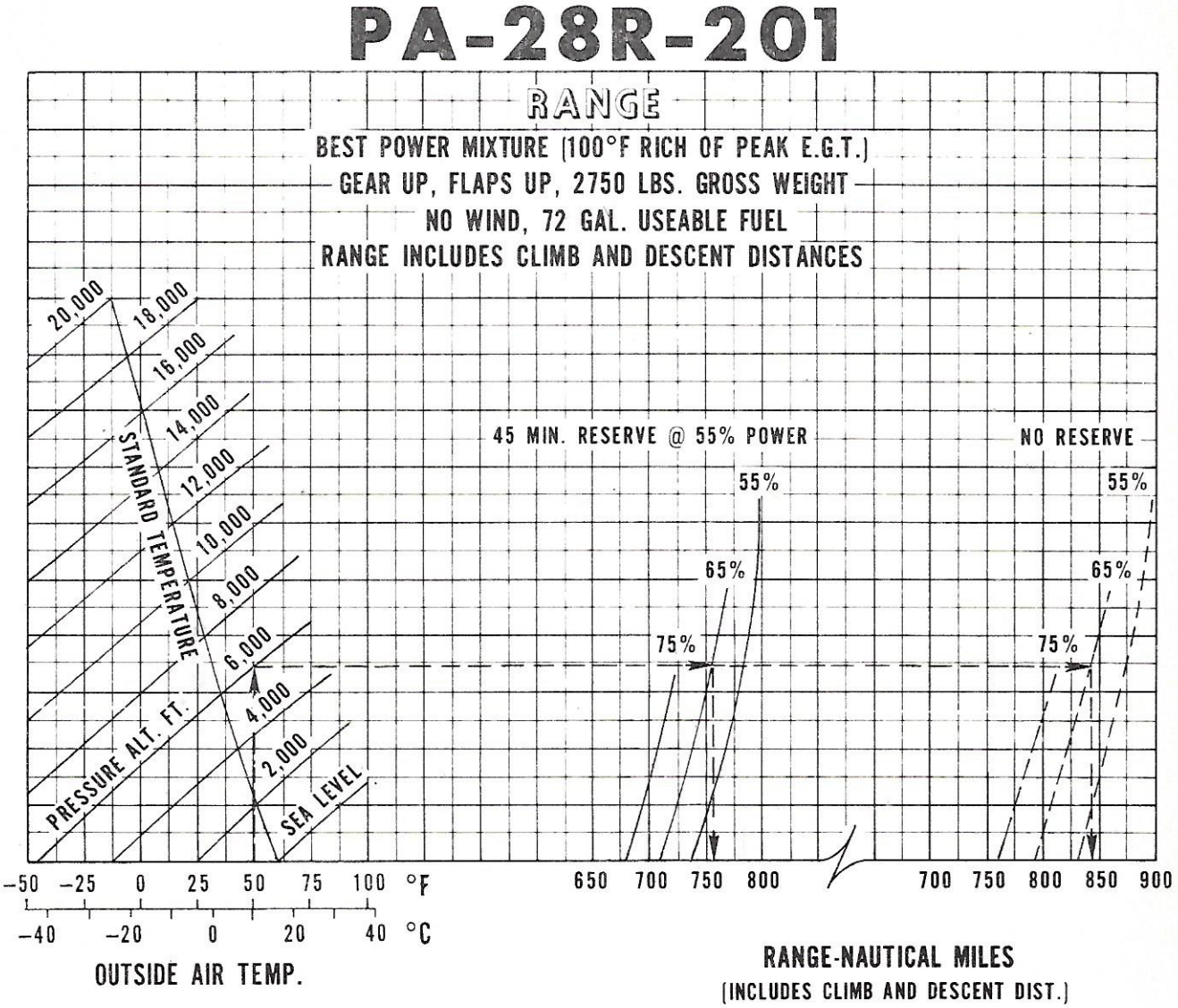
PA-28R-201



Example:
Cruise pressure altitude: 6000 ft.
Cruise outside air temperature: 10°C
Power: 65%
Cruise speed: 129 kts.

SPEED POWER - ECONOMY CRUISE

Figure 5-23

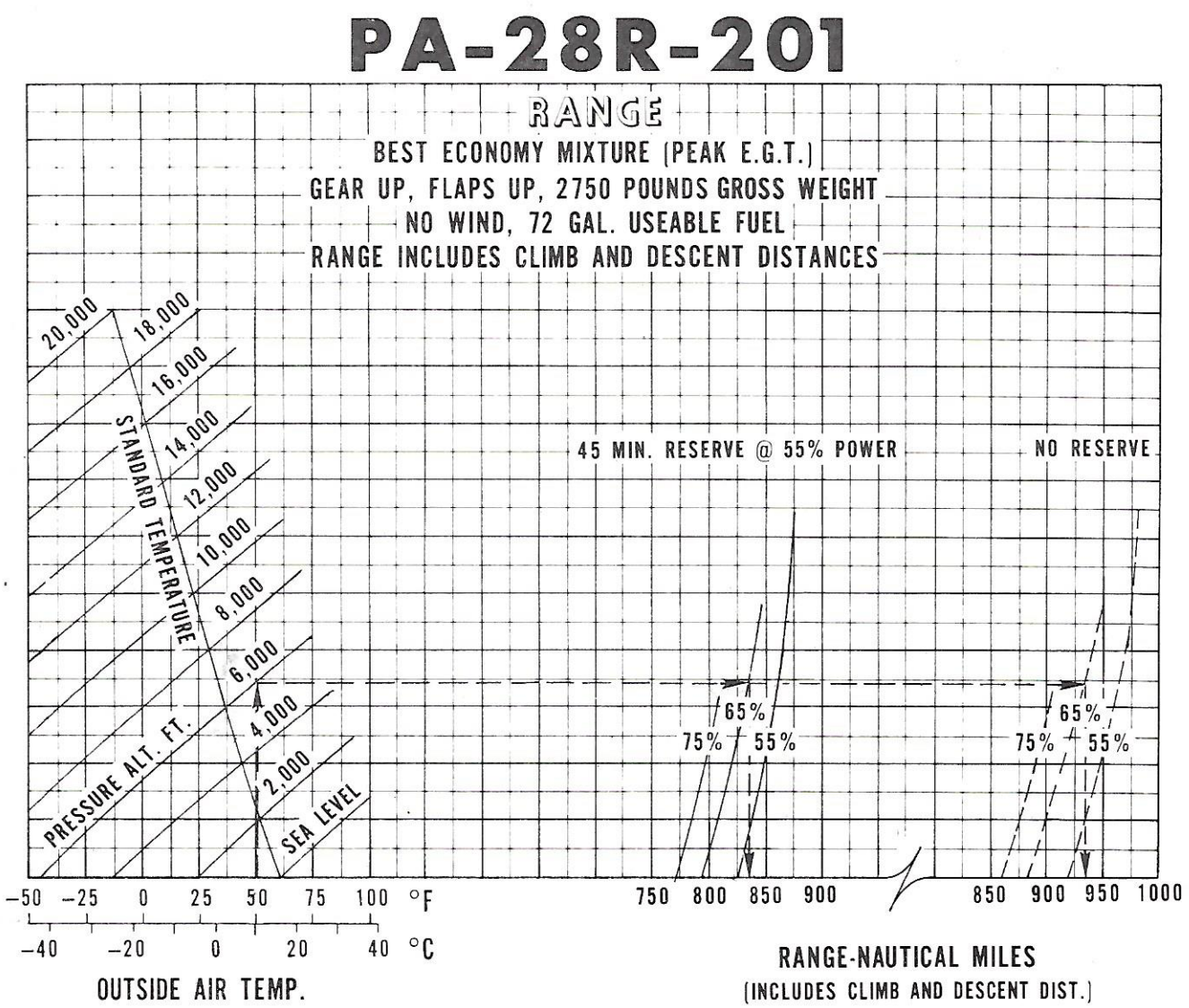


Example:

Cruise pressure altitude: 6000 ft.
Cruise outside air temperature: 10°C
Power: 65%
Range: 755 naut. mi. with reserve
840 naut. mi. without reserve

RANGE - BEST POWER

Figure 5-25

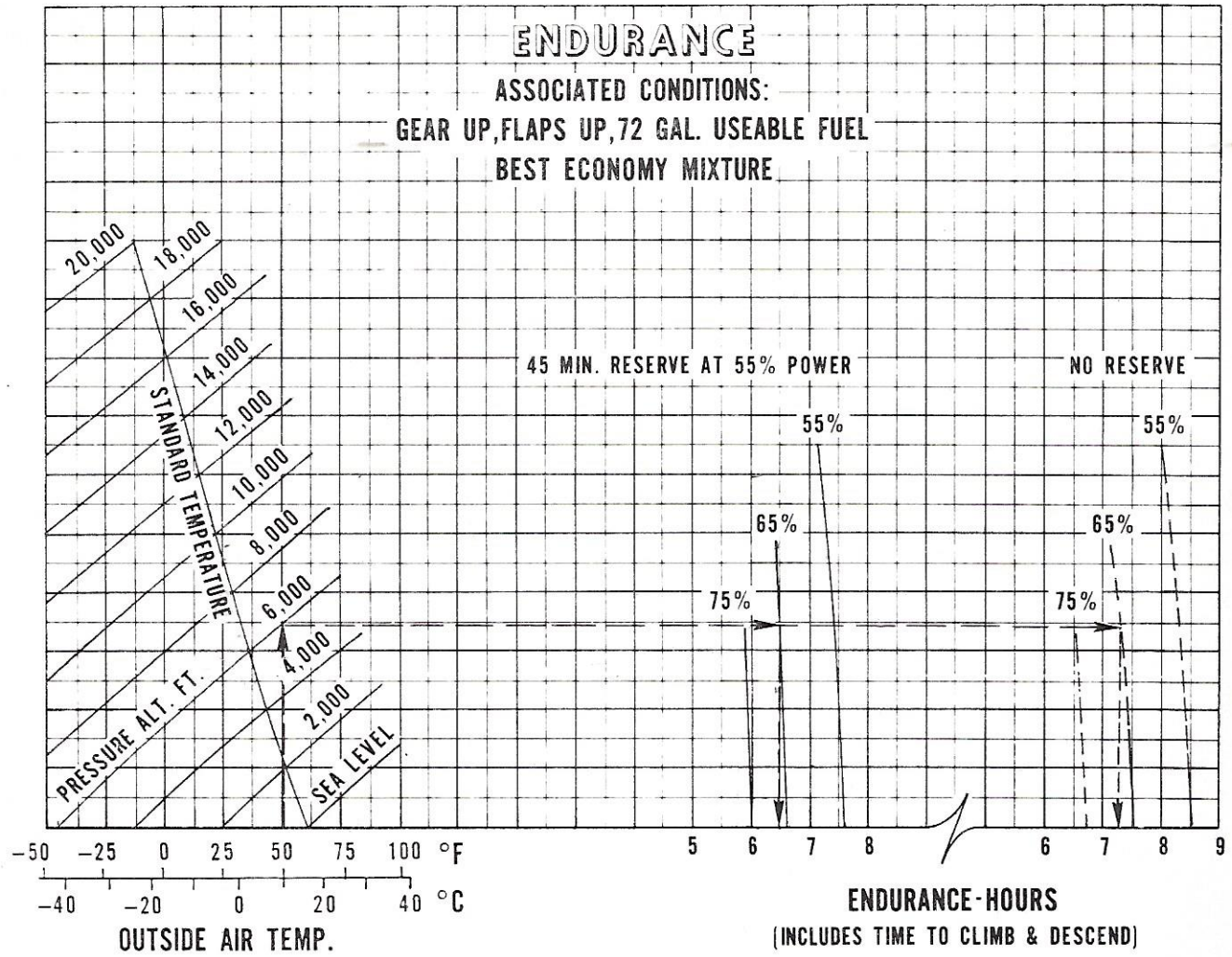


Example:
Cruise pressure altitude: 6000 ft.
Cruise outside air temperature: 10°C
Power: 65%
Range: 835 naut. mi. with reserve
935 naut. mi. without reserve

RANGE - BEST ECONOMY

Figure 5-27

PA-28R-201

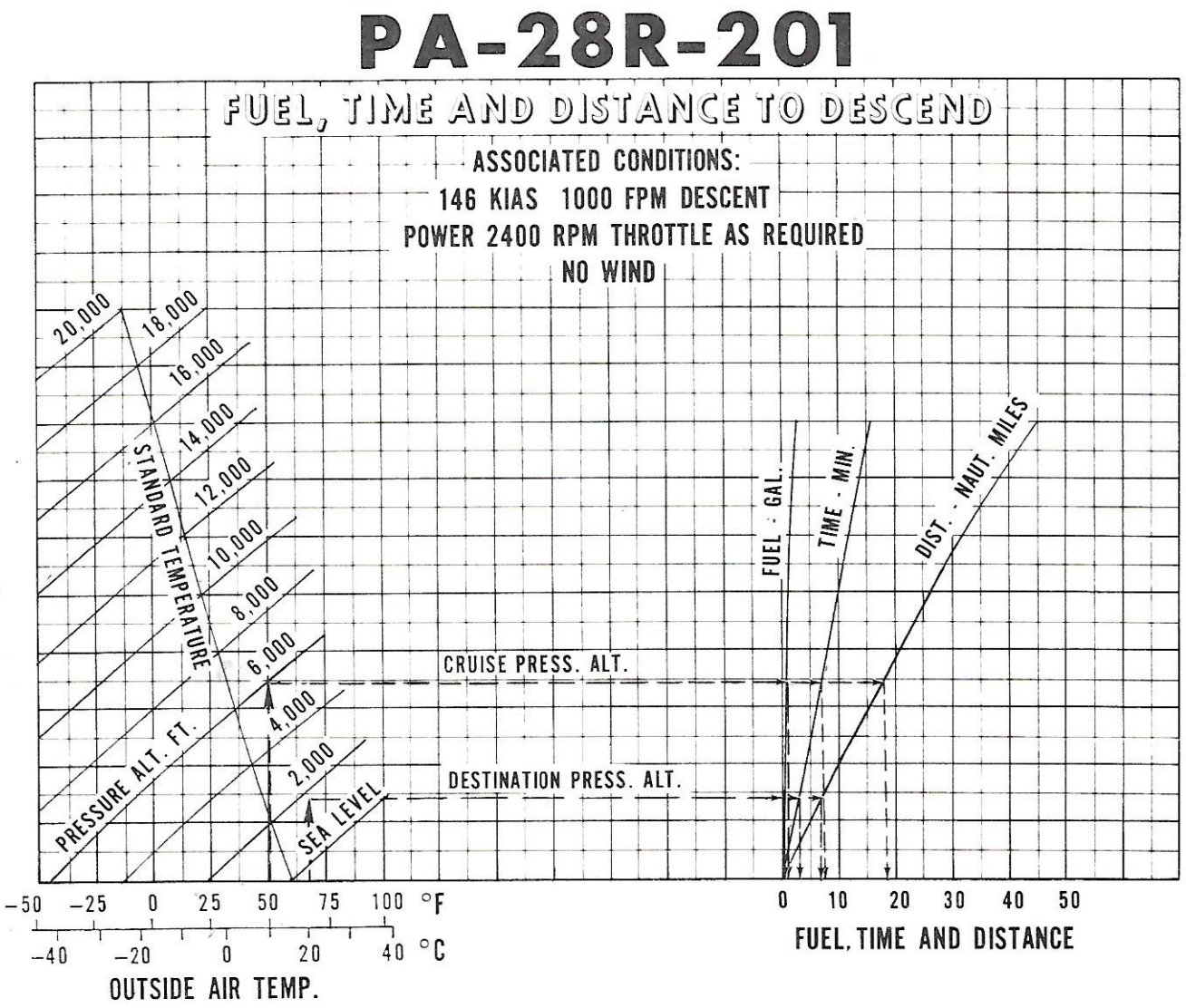


Example:

Cruise pressure altitude: 6000 ft.
Cruise outside air temperature: 10°C
Power: 65%
Endurance: 6.5 hours with reserve
7.2 hours without reserve

ENDURANCE

Figure 5-29

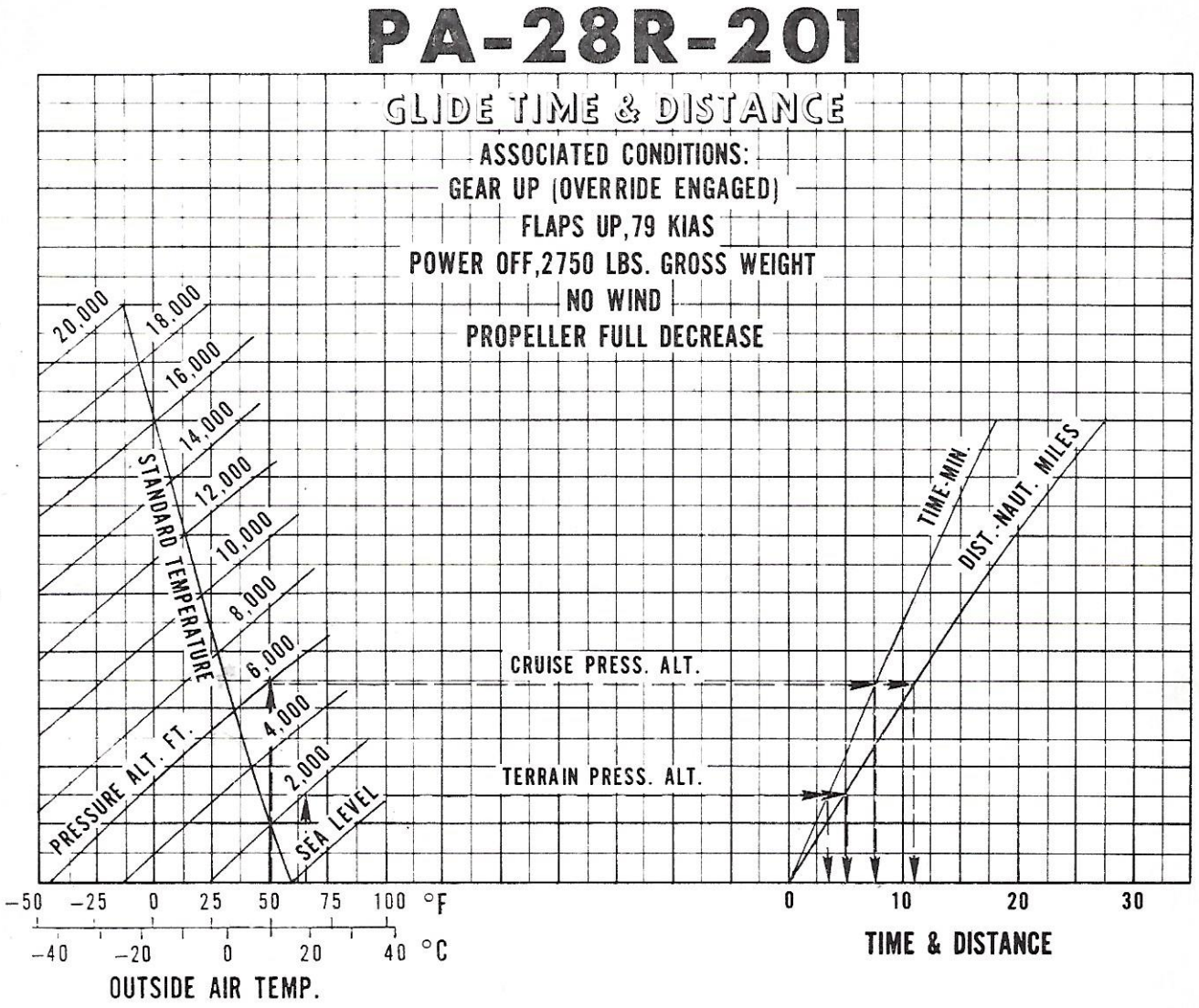


Example:

Cruise pressure altitude: 6000 ft.
Cruise outside air temperature: 10°C
Destination pressure altitude: 1900 ft.
Destination outside air temperature: 20°C
Fuel to descend: 1.0 gal. minus .5 gal. = .5 gal.
Time to descend: 7 min. minus 3 min. = 4 min.
Distance to descend: 18 naut. mi. minus 8 naut. mi. = 10 naut. mi.

FUEL, TIME AND DISTANCE TO DESCEND

Figure 5-31

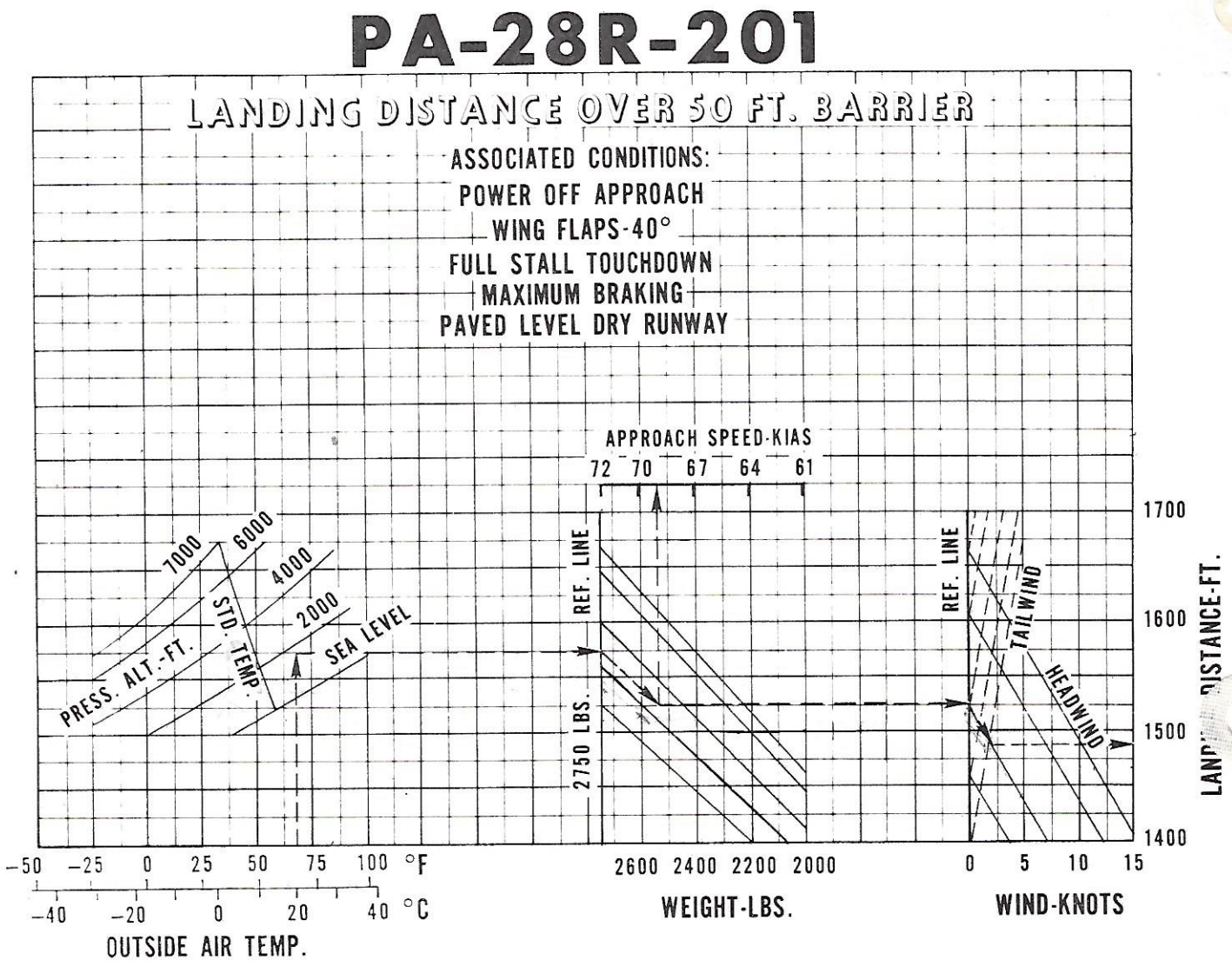


Example:

Cruise pressure altitude: 6000 ft.
Cruise outside air temperature: 10°C
Terrain pressure altitude: 2000 ft.
Terrain outside air temperature: 20°C
Glide time: 7.5 min. minus 3.5 min. = 4 min.
Glide distance: 11 naut. mi. minus 5 naut. mi. = 6 naut. mi.

GLIDE TIME AND DISTANCE

Figure 5-33

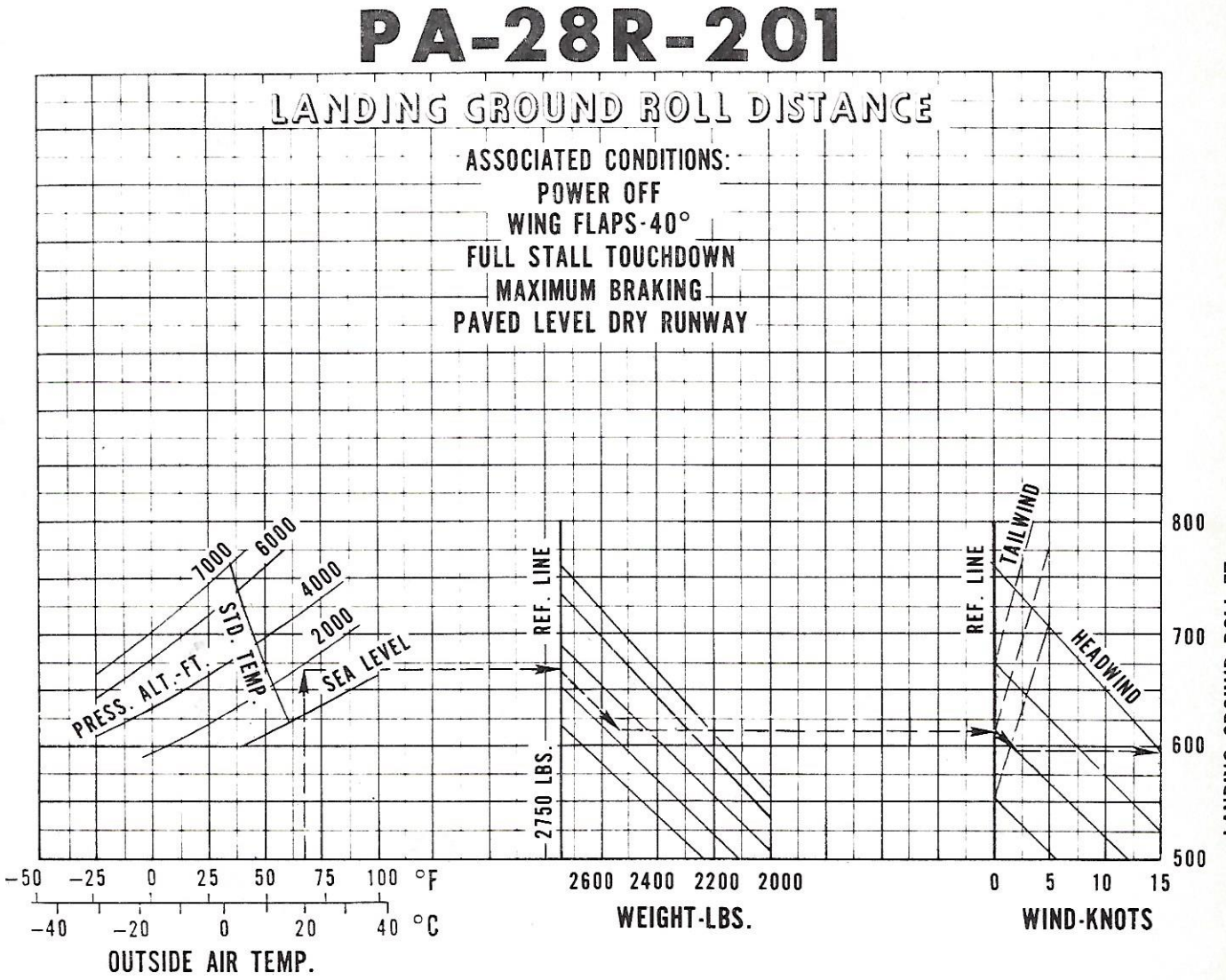


Example:

Destination pressure altitude: 1900 ft.
Outside air temperature: 20°C
Landing weight: 2538 lbs.
Surface wind: 2 kts. (headwind)
Approach speed: 69 KIAS
Landing distance: 1490 ft.

LANDING DISTANCE OVER 50 FOOT BARRIER

Figure 5-35



Example:

Destination pressure altitude: 1900 ft.
Outside air temperature: 20°C
Landing weight: 2538 lbs.
Surface wind: 2 kts. (headwind)
Landing ground roll: 595 ft.

LANDING GROUND ROLL DISTANCE

Figure 5-37

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	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger			
Passengers (Rear Seats)			
Fuel (72 Gallon Maximum)		95.0	
Baggage			
Moment due to Retraction of Landing Gear			819
Total Loaded Airplane			

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

WEIGHT AND BALANCE LOADING FORM

Figure 6-11

SECTION 6

WEIGHT AND BALANCE

6.1 GENERAL

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

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

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

A properly loaded airplane, however, will perform as intended. Before the airplane is licensed, a basic empty weight and C.G. location is computed (basic empty weight consists of the standard empty weight of the airplane plus the optional equipment). Using the basic empty weight and C.G. location, the pilot can easily determine the weight and C.G. position for the loaded airplane by computing the total weight and moment and then determining whether they are within the approved envelope.

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

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

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

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6.3 AIRPLANE WEIGHING PROCEDURE

At the time of licensing, Piper Aircraft Corporation provides each airplane with the basic empty weight and center of gravity location. This data is supplied by Figure 6-5.

The removal or addition of equipment or airplane modifications can affect the basic empty weight and center of gravity. The following is a weighing procedure to determine this basic empty weight and center of gravity location:

(a) Preparation

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

(2) Remove excessive dirt, grease, moisture, foreign items such as rags and tools from the airplane before weighing.

(3) Defuel airplane. Then open all fuel drains until all remaining fuel is drained. Operate engine on each tank until all undrainable fuel is used and engine stops. Then add the unusable fuel (5.0 gallons total, 2.5 gallons each wing).

CAUTION

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

(4) Fill with oil to full capacity.

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

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

(b) Leveling

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

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

(c) Weighing - Airplane Basic Empty Weight

(1) With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading.

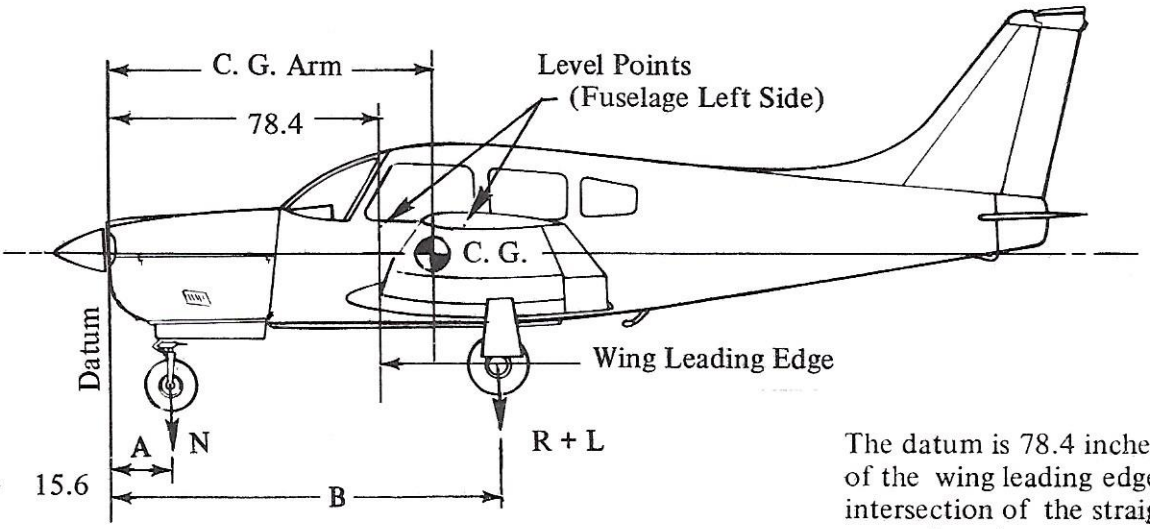
Scale Position and Symbol	Scale Reading	Tare	Net Weight
Nose Wheel (N)			
Right Main Wheel (R)			
Left Main Wheel (L)			
Basic Empty Weight, as Weighed (T)	— —	— —	

WEIGHING FORM

Figure 6-1

(d) Basic Empty Weight Center of Gravity

(1) The following geometry applies to the PA-28R-201 airplane when it is level. Refer to Leveling paragraph 6.3 (b).



A = 15.6

B = 109.7

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

LEVELING DIAGRAM

Figure 6-3

(2) The basic empty weight center of gravity (as weighed including optional equipment, full oil and unusable fuel) can be determined by the following formula:

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

Where: $T = N + R + L$

6.5 WEIGHT AND BALANCE DATA AND RECORD

The Basic Empty Weight, Center of Gravity Location and Useful Load listed in Figure 6-5 are for the airplane as licensed at the factory. These figures apply only to the specific airplane serial number and registration number shown.

The basic empty weight of the airplane as licensed at the factory has been entered in the Weight and Balance Record (Figure 6-7). This form is provided to present the current status of the airplane basic empty weight and a complete history of previous modifications. Any change to the permanently installed equipment or modification which affects weight or moment must be entered in the Weight and Balance Record.

WEIGHT AND BALANCE REVISION

MAKE: Piper
MODEL: PA28R-201
SERIAL# : 28R-7837292
REGISTRATION: N36777

EQUIPMENT CHANGE

Computing New C.G.			
Item, Make and Model *	**Weight**	**Arm**	**Moment**
Previous information from W&B dated	1752.95	83.52	146406.38
EQUIPMENT ADDED			
Sky-Tec 149NL starter	9.40	-0.12	-1.13
EQUIPMENT REMOVED			
Electro-System starter MZ4206	-18.00	-0.12	2.16
NEW TOTALS	1744.35	83.93	146407.41

* ITEM NUMBERS WHEN LISTED IN THE PERTINENT AIRCRAFT SPECIFICATION MAY BE USED IN LIEU OF "ITEM, MAKE, AND MODEL"

Gross Weight: 2750
New empty weight: 1744.35
New Center of gravity: 83.93
Moment: 146407.41
Useful load: 1005.65

Prepared By A&P 2204376644 **Date** 6/4/2010

EQUIPMENT CHANGE - WEIGHT & BALANCE

WESTAIR AVIATION CRS: LI1R297K

203 AIRPORT DRIVE WESTMINSTER, MD 21157

REG. NO.	MODEL	Serial No.
N36777	PA28R-201	28R-7837292

Items: (Description / P/N / S/N)	Weight Pounds	Arm Inches	Moments Inch/Pounds
Previous Aircraft Empty Weight:	1758.1	83.59	146962.8
REMOVED NARCO NAV 121	-3.1	58.4	-181.04
REMOVED NARCO ADF 141	-6	91.2	-547.2
REMOVED VP 17 SENSE ANT.	-0.5	147.5	-73.75
REMOVED NARCO COM 120	-4.3	57.4	-246.82
INSTALLED GNS 430W S/N 23120245	6.5	54.5	354.25
INSTALLED GI 106A CDI S/N F08-11174	2	58	116
INSTALLED GA35 GPS ANT. S/N 40101	0.25	91	22.75
Totals	1752.95		146406.99

A. Old Empty Weight	1758.1	Pounds
B. Old Empty CG	83.59	Inches
C. Old Empty Weight CG Moment	146962.8	Inch/Pounds
D. Max Gross Weight	2,750	Pounds
E. Old Useful Load	991.9	Pounds

A. New Empty Weight	1752.95	Pounds
B. New Empty CG	83.52035	Inches
C. New Empty Weight CG Moment	146407	Inch/Pounds
D. Max Gross Weight	2,750	Pounds
E. New Useful Load	997.05	Pounds

This new weight & balance information superseads all previous weight and balance data.
For aircraft loading, see instructions in Weight & Balance Section of Aircraft Flight Manual.

FAA Form 337 Completed?	N N
Equipment List Amended?	Y N

By: [signature] **Date:** 7/25/2008

Notes:

This form may also be used for Metric CG calculations.
For Metric, change Pounds to Kilograms and Inches to Meters.

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Additional Equipment List and CG Range and Weight and Balance Data

Registration Number	N36777
Aircraft Serial Number	28R-7837292
Aircraft Model	Piper PA-28R-201
Date	7/13/2007
Work Order Number	FDK-07-07849

Previous condition dated	6/22/2006		1760.00	83.67	147259.20
Items Removed	**P/N**	**S/N**	**Weight**	**Arm**	**Moment**
ELT Pointer	3000	329851	1.90	156.00	-296.40
					0.00
					0.00
					0.00
Items Installed					
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
New calculations			**1758.10**	**83.59**	**146962.80**

Superseded 7/25/08

New Empty Weight	1758.10
New Empty C.G.	83.59
Usefull Load (Normal)	2750.00
(Utility)	
Gross Weight (Normal)	
(Utility)	

It is the responsibility of the pilot and the aircraft owner to ensure that the airplane is loaded properly. Refer to loading graphs and C.G. range and weights graph if applicable to this aircraft. See aircraft weight and balance data.

This is a temporary change while ELT is out for service

Inspector

301.662.8156 w
301.662.3101 f
www.encorefbo.com
330 Aviation Way
Frederick, MD 21701

Frederick Aviation, Inc.
330 Aviation Way Municipal Airport
Frederick, Maryland 21701

Frederick Aviation Inc. - Repair Station LC1R291K

Additional Equipment List and C.G. Range and Weight and Balance Data

Registration Number **N36777**
Aircraft Serial Number 28R-7837292

Date June 22, 2006

Work order number 1006617

Previous Calculations: By Congressional Air, 10/26/99	1758.50	83.66	147113.60

Item	P/N	S/N	Weight	Arm	Moment
Items Removed					
Narco AT-150 Transponder		14162	-3.00	57.300	-171.90
Items Installed					
Garmin GTX-327 Transponder	011-00490-00	83724725	3.03	59.300	179.68
Halon Fire Extinguisher & Bracket	RTA400	V-175585	1.47	97.000	142.59
New Calculations:			1760.00	83.67	147263.97

New Aircraft Empty Weight **1760.00**

Aircraft Empty Weight C.G. **83.67**

Aircraft Useful Load (Normal) **990.00**

(Utility)

Aircraft Gross Weight **2750**

****

It is the responsibility of the pilot and the aircraft owner to insure that the airplane is loaded properly. Refer to loading graphs and C.G. range and weights graph if applicable to this aircraft. See aircraft weight and balance data.

****

Technician Jon B. Randolph Inspector

Congressional Air Charters, Inc.
7940 Airpark Road
Gaithersburg, MD 20879

Tel: 301-840-0880
Fax: 301-926-2340

AIRCRAFT: Owner Linda Litwin Address 3803 Legation St. NW
Washington D.C.
20015

Make PA28R-201

Model Arrow III

Serial # 28R-7837292

N Number N36777

Date 10/26/99

PREVIOUS: Empty Weight 1740.9

Useful Load 1009.1

Empty Weight C.G. 84.52

NEW WEIGHT AND BALANCE DATA

ITEM:		WEIGHT	ARM	MOMENT
Previous		1740.9	84.52	147148.8
Removed	McCauley two Blade propeller and spinner assy.	53.7	-2.0	-107.4
Installed	New 3 Blade McCauley propeller and spinner assy.	71.3 lb.	-2.0	-142.6

Superseded 6/12/06

REVISED/NEW:

EMPTY WEIGHT	1758.5
USEFUL LOAD	991.5
EMPTY WEIGHT C.G.	83.66

Signature Richard W. Wilkinson III A&P 2135082 70

PULLES AVIATION INC.
10501 Observation Road, Manassas Regional Airport, Manassas, VA 20110-2004 (703) 361-2171

Revised Weight & Balance Data

Certified Repair Station # IBIR931E

Aircraft Model: PA28R-201

Aircraft Serial No: 28R-7837292

Registration No: N 36777

DATE: 6/19/97

Computed From Weight & Balance Data Dated: 8-23-95

The following equipment changes made per 337 dated: _____

	Weight	Arm	Moment
Aircraft Empty Weight:	1740.7	84.78	147576.6
Removed E.L.T.	-1.7	236.2	402
Installed E.L.T.	1.9	156	296.4
Totals:	1740.9	84.52	147148.8

Aircraft Approved Gross Weight Normal: 2750

Aircraft Approved Gross Weight Utility: _____

Aircraft New Emply Weight: 1740.9

Aircraft New Empty Weight C.G.: 84.52

Aircraft New Useful Load (Normal): 1009.1

Aircraft New Useful Load (Utility): _____

Computed By: CHARLIE SCHOENDUBY Charlie Schoenduby

It is the responsibility of the airplane owner and the pilot to insure that the aircaft is loaded properly and is within C. G. range.

C:\DOC\MAINT\MASTERS\REVISED W\AD C

August 8, 1996

Superceded - See new W&B dated 10/26/99

WEIGHT & BALANCE

REVISION

AIRCRAFT NUMBER:N36777
DATE: 08/23/95

ITEMS

	WEIGHT	ARM	MOMENT
EQUIPMENT INSTALLED:			
WX-900	2	61	122
ANTENNA	1.5	173	259.5
EQUIPMENT REMOVED:			
DME-190	5.9	60.9	359.31
TOTAL:	-2.4	-9.245834	22.19
OLD EMPTY WEIGHT	1743.1	84.65054	147554.4
ITEMS FROM ABOVE	-2.4	-9.245834	22.19
NEW EMPTY WEIGHT	1740.7	84.78003	147576.6

EMPTY WEIGHT	GROSS WEIGHT	USEFUL LOAD
1740.7	2750	1009.3

Superceded 6/19/97

COMPUTED BY AEROTRONIC SERVICES INC.,MONT. AIRPARK
GAITHERSBURG,MD. CRS-CC1R055K

SIGNED

AEROTRONIC'S
AVIONICS SALES AND SERVICE
F.A.A. CERTIFIED REPAIR STATION NO. CCIR055K

MONTGOMERY COUNTY AIRPARK
7940-R AIRPARK DRIVE
GAITHERSBURG, MARYLAND 20879
PHONE: 301-948-2510
FAX: 301-948-2511

WEIGHT & BALANCE

REVISION

AIRCRAFT NUMBER:N36777
DATE: 12/15/94

	ITEMS		
	WEIGHT	ARM	MOMENT
EQUIPMENT INSTALLED:			
KMA-24	1.7	58	98.60001
KX-155/GS	5.3	56	296.8
KI-209	1.2	58	69.60001
EQUIPMENT REMOVED:			
CP-136M	2.2	55	121
NAV-122	5.1	58.4	297.84
COM-120	4.8	56.9	273.12
TOTAL:	-3.9	58.19487	-226.96
OLD EMPTY WEIGHT	1747	84.58999	147781.3
ITEMS FROM ABOVE	-3.9	58.19487	-226.96
NEW EMPTY WEIGHT	1743.1	84.65054	147554.4

EMPTY WEIGHT	GROSS WEIGHT	USEFUL LOAD
1743.1	2750	1006.9

Superceded 03/23/95

COMPUTED BY AEROTRONIC SERVICES INC.,MONT. AIRPARK
GAITHERSBURG,MD. CRS-CC1R055K

SIGNED K Sullivan

AEROTRONIC'S
AVIONICS SALES AND SERVICE
F.A.A. CERTIFIED REPAIR STATION NO. CCIR055K

MONTGOMERY COUNTY AIRPARK
7940-R AIRPARK DRIVE
GAITHERSBURG, MARYLAND 20879
PHONE: 301-948-2510
FAX: 301-948-2511

REVISED WEIGHT AND BALANCE DATA

DATE March 4, 1991

AIRCRAFT:

OWNER Maurice B. Teitelbaum
ADDRESS 1583 Snug Harbor Road, Shady Side, MD 20764

MAKE Piper
MODEL PA-28R-201

SERIAL NUMBER 28R-7837292
N NUMBER N36777

PREVIOUS:

EMPTY WEIGHT 1738.0
USEFUL LOAD 1012.0
EMPTY WEIGHT C.G. 84.37

NEW WEIGHT AND BALANCE DATA

ITEM:	WEIGHT	ARM	MOMENT
PREVIOUS:	1738.0	84.37	146637.4
INSTALLED:			
Knots 2U Aileron, Flap and Stabilator Gap Seal Kit	3.3	133.0	438.90
	.3	308.0	92.40
Knots 2U Falp Hinge Fairing Kit	1.4	133.0	186.20
RMD Wing Tip Lighting	4.0	106.6	426.40
TOTALS	1747.0	84.59	147781.30

Superseded 12/15/92

REVISED/NEW:

EMPTY WEIGHT 1747.0
USEFUL LOAD 1003.0
EMPTY WEIGHT C.G. 84.59

U.S Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in a civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act 1958)

1. Aircraft	Make: PIPER	Model: PA 28R-201
	Serial No.: 28R-7837292	Nationality and Registration Mark: N36777
2. Owner	Name *(As shown on registration certificate)*: LITWIN LINDA J.	Address *(As shown on registration certificate)*: 11509 BEDFORDSHIRE AVE. POTOMAC MD. 20854-2011

3. For FAA Use Only

4. Unit Identification				**5. Type**	
Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	~~~~~~~~~~~~~~~~~~~~*(As described in item 1 above)*~~~~~~~~~~~~~~~~~~~~				X
POWERPLANT					
PROPELLER					
APPLIANCE	Type				
	Manufacturer				

6. Conformity Statement

A. Agency's Name and Address	B. Kind of Agency	C. Certificate No.
WESTAIR AVIATION 203 AIRPORT DRIVE,HANGAR #4 WESTMINSTER, MD 21157	☐ U.S. Certificated Mechanic ☐ Foreign Certificated Mechanic ☒ Certificated Repair Station ☐ Manufacturer	CRS LI1R297K

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date	Signature of Authorized Individual
JULY 25,2008	DAVID WOJNAROWSKI

7. Approval for Return to Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY							
	FAA Flt Standards Inspector		Manufacturer		Inspection Authorization	Other *(Specify)*	
	FAA Designee	X	Repair Station		Person Approved by Transport Canada Airworthiness Group		

Date of Approval or Rejection	Certificate or Designation No.	Signature of Authorized Individual
7/25/08	LI1R297K	

FAA Form 337 (12-88)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

PIPER PA28R-201 S/N 28R-7837292

1. REMOVED EXISTING NARCO NAV 121,KING KY-197 COM,NARCO ADF 141 ADF SYSTEM. ALSO REMOVED NORTHSTAR M1 LORAN SYSTEM INSTALLED BY PERSONS UNKNOWN,AND INSTALLED NEW GARMIN GNS 430W GPS NAV/COM SYSTEM AND A GARMIN GI 106A C.D.I. INSTALLED EQUIPMENT IN SPACE IN PANEL PROVIDED BY PIPER.

2.GARMIN GNS 430W SYSTEM IS WIRED TO DEDICATED GARMIN GI106A C.D.I. AND ALSO, TO EXISTING CENTURY II AUTOPILOT FOR LATERAL GUIDANCE WHEN A/P IS ENGAGED IN THE NAV1 MODE.MOUNTED GARMIN GA35 WAAS ANTENNA ON TOP OF FUSELAGE@ F.S.#91 WITH DOUBLER PLATE. ALL EQUIPMENT IS WIRED TO EXISTING A/C AVIONICS BUS VIA KLIXON 7277 SERIES CIRCUIT BREAKERS.

3. THE GARMIN GNS 430W IS STC#SA01933LA APPROVED MODEL LIST IS INCLUSIVE OF THIS AIRCRAFT.

4. INSTALLED EQUIPMENT AS PER MANUFACTURERS INSTALLATION MANUALS GARMIN GNS 430W P/N190-00356-02 REV.E,, AND AC 43-13-1B CHANGE 1- CHAPTER 11,SECTIONS 2,3,7,CHAPTER 13,CHAPTER 15,SECTION 2,AND AC43-13-2BCHANGE 1 CHAPTER 2 SECTIONS 21,22,23,24,25,26,AND 27. ALSO CHAPTER 3 SECTION 36.

5. GARMIN GNS430 W FAA APPROVED FLIGHT MANUAL SUPPLEMENT P/N 190-00356-03 REV. A,HAS BEEN INSTALLED IN PILOT OPERATING HANDBOOK.

6. SYSTEMS CERTIFICATIONS TESTED WITH GROUND TEST EQUIPMENT AND VERIFIED TO BE OPERATING PROPERLY AND SAFELY.

7. WEIGHT AND BALANCE AND EQUIPMENT LIST HAVE BEEN REVISED TO INDICATE CHANGE.

8. CONTINUED AIRWORTHINESS FOR THE GARMIN GNS430W/GI106A, IS AS FOLLOWS, OTHER THAN PERIODIC FUNCTION CHECKS CONTINUED AIRWORTHINESS FOR THIS EQUIPMENT IS ON A CONDITIONAL BASIS AS PER THE MANUFACTURERS MAINTENANCE MANUALS LISTED ABOVE. CONTINUED AIRWORTHINESS FOR THE GARMIN GNS 430W AS PER GARMIN INSTRUCTIONS FOR CONTINUED AIRWORTHINESS MANUAL P/N 190-00356-65 REV.A IS AS FOLLOWS:

SERVICING INFORMATION: NONE

PERIODIC MAINTENANCE:THE 430W UNIT IS DESIGNED TO DETECT INTERNAL FAILURE,A THOROUGH SELF TEST IS EXECUTED AUTOMATICALLY UPON POWER UP AND BUILT IN TEST IS CONTINUOUSLY EXECUTED. DETECTED ERRORS ARE INDICATED ON THE EQUIPMENT VIA FAILURE ANNUNCIATIONS AND MAINTENANCE IS ON-CONDITION. OPERATION OF THE 430W UNITS IS NOT PERMITTED UNLESS AN INSPECTION AS DESCRIBED BELOW HAS BEEN COPLETED WITHIN THE PRECEDING 12 CALENDER MONTHS:

A. CONDUCT A VISUAL INSPECTION OF THE 430W UNIT AND ITS WIRING HARNESS TO ENSURE INSTALLATION INTEGRITY.

B.INSPECT ALL KNOBS/BUTTONS FOR LEGIBILITY.

C.INSPECT THE UNIT FOR SECURITY OF ATTATCHMENT.

D.INSPECT CONDITION OF WIRING,ROUTING,AND ATTATCHMENT/CLAMPING.

E.BATTERY REPLACEMENT:THE GARMIN GNS 430W UNIT HAS AN INTERNAL BATTERY THAT WILL LAST ABOUT TEN YEARS,REGULAR PLANNED REPLACEMENT IS NOT NECESSARY. THE GNS 430W UNIT WILL DISPLAY A LOW BATTERY WARNING WHEN REPLACEMENT IS NECESSARY,THE BATTERY SHOULD BE REPLACED WITH 1-2 MONTHS WHEN WARNING BECOMES PRESENT,THE UNIT WILL REMAIN FULLY FUNCTIONAL WITH THE WARNING PRESENT OR WITH A FULLY DISCHARGED BATTERY HOWEVER LONGER ACQUSITION TIMES MAY EXIST. THE BATTERY SHOULD BE REPLACED BY A GARMIN FACTORY REPAIR FACILITY.

GARMIN GNS 430W P/N 010-00412-01 S/N 23120245

GARMIN GI 106A P/N 013-00049-00 S/N F08-11174

GARMIN GA35 WAAS 013-00235-00 S/N 40101

----------END----------

☐ Additional Sheets Are Attached

U.S.GPO:1989-0-663-171

U.S Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only

Office Identification
AEA-FSDO-07

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in a civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act 1958)

1. Aircraft	Make: PIPER	Model: PA 28R-201
	Serial No.: 28R-7837292	Nationality and Registration Mark: N36777
2. Owner	Name *(As shown on registration certificate)*: LITWIN LINDA J.	Address *(As shown on registration certificate)*: 11509 BEDFORDSHIRE AVE. POTOMAC MD. 20854-2011

3. For FAA Use Only

~~The alteration or repair identified herein complies with~~ the applicable airworthiness requirements and is approved for use only on the above described aircraft, subject to conformity inspection by a person in §43.7."

07/28/08 — Date

Signature of FAA Inspector, AEA-FSDO-07

4. Unit Identification				**5. Type**	
Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	~~~~~~~~~~~~~~~~~~~~*(As described in item 1 above)*~~~~~~~~~~~~~~~~~~~~				X
POWERPLANT					
PROPELLER					
APPLIANCE	Type / Manufacturer				

6. Conformity Statement

A. Agency's Name and Address	B. Kind of Agency	C. Certificate No.
WESTAIR AVIATION 203 AIRPORT DRIVE,HANGAR #4 WESTMINSTER, MD 21157	☐ U.S. Certificated Mechanic ☐ Foreign Certificated Mechanic ☒ Certificated Repair Station ☐ Manufacturer	CRS LI1R297K

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date	Signature of Authorized Individual
AUGUST 4, 2008	DAVID WOJNAROWSKI

7. Approval for Return to Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY						
	☐	FAA Flt Standards Inspector	☐	Manufacturer	Inspection Authorization	Other *(Specify)*
	☐	FAA Designee	☐	Repair Station	Person Approved by Transport Canada Airworthiness Group	

Date of Approval or Rejection	Certificate or Designation No.	Signature of Authorized Individual
8/5/2008	CRS#LI1R297K	

FAA Form 337 (12-88)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

PIPER PA28R-201 S/N 28R-7837292

1.INSTALLATION OF GARMIN POWER CABLE P/N 010-10513-00 FOR PORTABLE GARMIN GPS 396.

2. WIRED TO EXISTING A/C BUS VIA 2 AMP IN-LINE FUSE SUUPPLIED WITH CABLE P/N 010-10513-00.

3.INSTALLATION WAS COMPLETED IAW AC43-13-1B CHG.1,CHAPTER 11,SECTIONS 2,3,7,CHAPTER 15,SECTION 2.

4.WEIGHT AND BALANCE CHANGE NOT NECESSARY FOR THIS INSTALLATION.

5.INSTRUCTIONS FOR CONTINUED AIRWORTHINESS:

ON-CONDITION-THERE ARE NO ADDITIONAL INSTRUCTIONS FOR CONTINUED AIRWORTHINESS.

END

☐ Additional Sheets Are Attached

U.S.GPO:1989-0-663-171

US Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in a civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

1. Aircraft	Make: Piper	Model: PA-28R-201
	Serial No.: 28R-7837292	Nationality and Registration Mark: N36777
2. Owner	Name *(As shown on registration certificate)*: Litwin,Linda J.	Address *(As shown on registration certificate)*: 3803 Legation St.NW Washington,DC 20015

3. For FAA Use Only

4. Unit Identification				**5. Type**	
Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	*(As described in Item 1 above)*				XX
POWERPLANT					
PROPELLER					
APPLIANCE	Type / Manufacturer				

6. Conformity Statement

A. Agency's Name and Address	B. Kind of Agency	C. Certificate No.
Aerotronic Services Inc. 7940R Airpark drive Gaithersburg,MD. 20879	☐ U.S. Certificated Mechanic ☐ Foreign Certificated Mechanic ☒ Certificated Repair Station ☐ Manufacturer	CC1R055K

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date	Signature of Authorized Individual
August 23,1995	Donald G Wood

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY						
	☐ FAA Flt. Standards Inspector		☐ Manufacturer		☐ Inspection Authorization	Other *(Specify)*
	☐ FAA Designee	XX	☐ Repair Station		☐ Person Approved by Transport Canada Airworthiness Group	

Date of Approval or Rejection	Certificate or Designation No.	Signature of Authorized Individual
08/23/95	CC1R055K	Donald G Wood

FAA Form 337 (12-88)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

1. Removed a Narco DME-190 and installed a BF Goodrich WX-900 Stormscope in space in panel provided by Piper.

2. Installed as per BFG installation manual#78-8060-6104-6,rev 1 and AC-43.13.1A chapter 11,sections;2,3,7,chapter 13,chapter 15, section 2. AC-43.13.2A chapter 2,sections;21,22,23,27,chapter 3,section 36.

3. Systems certification checked with ground test equipment and verified to be operating properly.

4. Total electrical load does not exceed 80% of the maximum rated generator capacity.

5. Weight and Balance and Equipment List revised to indicate change.

**********END**********
*

☐ Additional Sheets Are Attached

★U.S.GPO:1989-0-663-171

US Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in a civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

1. Aircraft	Make: Piper	Model: PA-28R-201
	Serial No.: 28R-7837292	Nationality and Registration Mark: N36777
2. Owner	Name *(As shown on registration certificate)*: Litwin,Linda J.	Address *(As shown on registration certificate)*: 3803 Legation St. NW Washington,DC 20015

3. For FAA Use Only

4. Unit Identification / **5. Type**

Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	*(As described in Item 1 above)*				XX
POWERPLANT					
PROPELLER					
APPLIANCE	Type / Manufacturer				

6. Conformity Statement

A. Agency's Name and Address	B. Kind of Agency	C. Certificate No.
Aerotronic Services Inc. 7940R Airpark Drive Gaithersburg,MD. 20879	U.S. Certificated Mechanic Foreign Certificated Mechanic XX Certificated Repair Station Manufacturer	CC1R055K

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date	Signature of Authorized Individual
Dec.15,1994	Ronald G Wood

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY						
	FAA Flt. Standards Inspector		Manufacturer		Inspection Authorization	Other *(Specify)*
	FAA Designee	X	Repair Station		Person Approved by Transport Canada Airworthiness Group	

Date of Approval or Rejection	Certificate or Designation No.	Signature of Authorized Individual
12/15/94	CC1R055K	Ronald G Wood

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

1. Removed Narco; CP-136,NAV-122,COM-120 and installed King; KMA-24, KX-155/GS,KI-209 in space in panel provided by Piper.

2. Installed as per King install manuals;006-5179-05 rev5,006-0180-01 rev 1,006-0140-00 and AC-43.13.1A chapter 11,sections;2,3,7, chapter 13,chapter 15,section 2. AC-43.13.2A chapter 2,sections; 21,22,23,27.

3. Systems certification checked with ground test equipment and verified to be operating properly.

4. Total electrical load does not exceed 80% of the maximum rated generator capacity.

5. Weight and Balance and Equipment List revised to indicate change.

**********END**********

☐ Additional Sheets Are Attached

★U.S.GPO:1989-0-663-171

US Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in a civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

1. Aircraft	Make: Piper	Model: PA-28R-201
	Serial No.: 28R-7837292	Nationality and Registration Mark: N36777
2. Owner	Name *(As shown on registration certificate)*: Maurice B. Teitelbaum	Address *(As shown on registration certificate)*: 1583 Snug Harbor Road Shady Side, MD 20764

3. For FAA Use Only

4. Unit Identification / **5. Type**

Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	*(As described in Item 1 above)*				X
POWERPLANT	Lycoming	IO360-C1C6	L-19348-51A		X
PROPELLER					
APPLIANCE	Type				
	Manufacturer				

6. Conformity Statement

A. Agency's Name and Address	B. Kind of Agency		C. Certificate No.
JRA Executive Air, Inc. Route 12 Box 52 Hagerstown, MD 21740		U.S. Certificated Mechanic	JZRR651K
		Foreign Certificated Mechanic	
	X	Certificated Repair Station	
		Manufacturer	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date	Signature of Authorized Individual
3/4/91	James R Adkins

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY							
	FAA Flt. Standards Inspector		Manufacturer		Inspection Authorization	Other *(Specify)*
	FAA Designee	X	Repair Station		Person Approved by Transport Canada Airworthiness Group	

Date of Approval or Rejection	Certificate or Designation No.	Signature of Authorized Individual
3/4/91	JZRR651K	James R Adkins

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

1. Installed Knots 2U, Inc. Aileron, Flap and Sabilator Gap Seals Kit, STC SA640GL and Installed Knots 2U, Inc. Flap Hinge Fairing STC SA1194GL.

2. Installed STCSA640GL in accordance with manufacturer's instructions and drawing numbers 64001, 60902, WARP. Installed STC 1194GL in accordance with manufacturer's instructions and drawing 2832FH2.

3. All work was accomplished in accordance with AC43:13 1A Chapter 5.

4. Installed RMD Aircraft Lighting, Inc. STC# SA2356NM. Kit number RMD-00160-PA was installed in accordance with manfacturer's instructions and drawings 6016-PA, 6026-PA, and 6036-PA.

5. All work for the RMD kit was accomplished in accordance with AC43:13 1A.

6. Removed steel line and installed new fitting and Aeroquip line AE366-3162-G-360 in accordance with AC43.13 and Lycoming SI1435. Checked engine for leaks. Checks OK.

7. Weight & Blance has been revised to show change.

***** THE END *****

☐ Additional Sheets Are Attached

★U.S.GPO:1989-0-663-171

United States of America
Department of Transportation Federal Aviation Administration

Supplemental Type Certificate

Number SA1194GL

This certificate, issued to: Knots 2U, Inc.
1941 Highland Avenue
Wilmette, IL 60091

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations. (See Type Certificate Data Sheet 2A13 for complete certification basis).

Original Product—Type Certificate Number: 2A13
Make: Piper Aircraft Corporation
Model: PA-28-140, PA-28-150, PA-28-160, PA-28-180, PA-28-235, PA-28R-180, PA-28R-200, PA-28-151, PA-28-161, PA-28-181, PA-28-201T, PA-28-236, PA-28R-201, PA-28R-201T, PA-28RT-201, PA-28RT-201T

Description of Type Design Change:

Install fairings over flap hinges in accordance with Knots 2U, Inc. Flap Hinge Fairing Installation Manual, issued 4/15/87, or later FAA approved revisions.

Limitations and Conditions:

The installer must determine the compatibility of this modification with previously approved modifications.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: April 29, 1987
Date issued:
Date of issuance: June 26, 1987
Date amended:

By direction of the Administrator

W. F. Horn (Signature)
Manager, Chicago Aircraft Certification Office,
ACE-115C, Central Region, FAA
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA Form 8110-2 (10-68)

United States of America

Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number SA640GL

This certificate, issued to Knots 2U, Inc.
P. O. Box 589
Harbor Springs, MI 49740

certifies that the change in the type design for the following product with the limitations and conditions thereto as specified hereon meets the airworthiness requirements of Part 3 *of the* Civil Air *Regulations.* (See Type Certificate Data Sheet No. 2A13 for complete certification basis).

Original Product — Type Certificate Number: 2A13

Make: Piper

Model: PA-28-151, PA-28-181, PA-28-161, PA-28R-201, PA-28R-201T, PA-28-236, PA-28RT-201, PA-28RT-201T, PA-28-201T

Description of Type Design Change:

Installation of Aileron, Flap, and Stabilator Gap Seals in accordance with the Knots 2U, Inc. PA-28 Taper Wing Models Gap Seals Installation Manual, second issue, dated May 5, 1984, revised May 30, 1990, or later FAA approved revisions.

Limitations and Conditions: 1. Any or all combinations of the above items are approved. 2. Aileron Gap Seals may be installed on the PA-28-151 only with Serial Numbers 28-7615001 and up. 3. This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any of thos other previously approved modifications will introduce no adverse effect upon the airworthiness of that aircraft.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: July 21, 1982

Date of issuance: August 6, 1982

Date reissued:

Date amended: August 10, 1982; November 21, 1984; October 11, 1990

By direction of the Administrator

Charles L. Smalley
(Signature)

for Donald P. Michal, Manager
Chicago Aircraft Certification Office

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

FAA Form 8110-2 (10-68)

This certificate may be transferred in accordance with FAR 21.47.

United States of America

Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number SA2356NM

This certificate issued to R.M.D. Aircraft Lighting, Inc.

certifies that the change in the type design for the following product with the limitations and conditions thereto as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations.

Original Product — Type Certificate Number:	2A13	A350
Make:	Piper	Piper
Model:	PA-28 Series (See Installation Sheet for Details)	PA-32-301, 301T PA-32R-301, 301T

Description of Type Design Change:

Installation of R.M.D. Aircraft Lighting, Inc. Landing/Recognition Lights Kit in accordance with R.M.D. Aircraft Lighting, Inc. Installation Instructions and Drawing List No. RMD-00160-PA, dated December 20, 1983, or later FAA approved revision.

NOTE: This installation kit includes a fiberglass wing tip, 100 watt light and a clear plastic lens in each wing tip.

Limitations and Conditions: Approval of this change in type design applies to the above model aircraft only. This approval should not be extended to aircraft of this model on which other previously approved modifications are incorporated unless it is determined that the relationship between this change and any of those other previously approved modifications, including changes in type design, will introduce no adverse effect upon the airworthiness of that aircraft. A copy of this Certificate, dated March 6, 1984, or later FAA approved revision, must be maintained as part of the permanent records for the modified aircraft.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: January 13, 1984

Date of issuance: March 6, 1984

Date reissued:

Date amended:

By direction of the Administrator

(Signature)

Manager, Seattle Aircraft Certification Office

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

FAA Form 8110-2 (10-60)

This certificate may be transferred in accordance with FAR 21.47.

FAA Approved Model List (AML)

Number STC: SA01933LA

Installation of Garmin Model 400W / 500W Series GPS-WASS Navigation System

Issued Date: November 6, 2006

Revision: "Original"

Aircraft Make and Model Designation	Type Certificate Number	Certification Basis	Required Approved Data & Added Model Specific Limitations	AML Revision Date
Adam Aircaft				
A500	A00009DE	FAR 23	005-C0221-00 005-C0221-01	
Aermacchi S.p.A (Siai Marchetti)				
S.205-18/F, S.205-18/R, S.205-20/F, S.205-20/R S.205-22/R, S.208, S.208A	A9EU	FAR 23	005-C0221-00 005-C0221-01	
F.260, F.260B, F.260C, F.260D, F.260E, F.260F	A10EU	CAR 3	005-C0221-00 005-C0221-01	
S.211A	A86EU	FAR 23	005-C0221-00 005-C0221-01	
Aero Commander (Dynac Aerospace Corp)				
10, 10A, 100, 100A, 100-180	1A21	CAR 3	005-C0221-00 005-C0221-01	
Aeronautica Macchi S.p.A (Macchi)				
AL 60, AL 60-B, AL 60-F5, AL 60-C5	7A12	CAR 3	005-C0221-00 005-C0221-01	
AM-3	A19EU	FAR 23	005-C0221-00 005-C0221-01	
Aerostar Aircraft Corp. (Piper Aerostar)				
PA-60-600, PA-60-601 (Aerostar 601), PA-60-601P Aerostar 601P), PA-60-602P (Aerostar 602P), PA-60-700P (Aerostar 700P)	A17WE	FAR 23	005-C0221-00 005-C0221-01	
360, 400	A11WE	FAR 23	005-C0221-00 005-C0221-01	
American Champion				
402	A3CE	CAR 3	005-C0221-00 005-C0221-01	
7GCA, 7GCB, 7KC, 7GCBA, 7GCAA, 7GCBC, 7KCAB	A-759	CAR 4a	005-C0221-00 005-C0221-01	
8KCAB, 8GCBC	A21CE	FAR 23	005-C0221-00 005-C0221-01	
Aviat (Sky International)				
A-1, A-1A, A-1B	A22NM	FAR 23	005-C0221-00 005-C0221-01	
S-1S, S-1T, S-2, S-2A, S-2S, S-2B, S-2C	A8SO	FAR 23	005-C0221-00 005-C0221-01	

Aircraft Make and Model Designation	Type Certificate Number	Certification Basis	Required Approved Data & Added Model Specific Limitations	AML Revision Date
ZLIN Z-242L, Z-143L	A76EU	FAR 23	005-C0221-00 005-C0221-01	
Navion Aircraft Company, Ltd. (Navion)				
Navion, Navion A, Navion B, Navion D, Navion E, Navion F, Navion G, Navion H	A-782	CAR 3	005-C0221-00 005-C0221-01	
North American (Rockwell International)				
BC-1A, AT-6, AT-6A, AT-6B, AT-6C, AT-6D, AT-6F, SNJ-7, T-6G	A-2-575	CAR 4a	005-C0221-00 005-C0221-01	
NA-260	1A18	CAR 3	005-C0221-00 005-C0221-01	
OMF (Ostmeck. Flugzeugbau GmbH)				
OMF-100-160	A46CE	FAR 23	005-C0221-00 005-C0221-01	
Partenavia (Vulcanair S.p.A.)				
P68, P68B, P68C, P68C-TC, P68 "Observer," P68 "Observer 2," P68 TC "Observer", AP68TP 300 "Spartacus", AP68TP 600 "Viator", VA300	A31EU	FAR 23	005-C0221-00 005-C0221-01	
Piaggio (Piaggio Aero Industries S.p.A)				
P-180	A59EU	FAR 23	005-C0221-00 005-C0221-01	
Pilatus Aircraft Limited				
PC-12, PC-12/45 PC-12/47	A78EU	FAR 23	005-C0221-00 005-C0221-01	
PC-6, PC-6-H1, PC-6-H2, PC-6/350, PC-6/350-H1, PC-6/350-H2, PC-6/A, PC-6/A-H1, PC-6/A-H2, PC-6/B-H2, PC-6/B1-H2, PC-6/B2-H2, PC-6/B2-H4, PC-6/C-H2, PC-6/C1-H2	7A15	CAR 3	005-C0221-00 005-C0221-01	
PC-7	A50EU	FAR 23	005-C0221-00 005-C0221-01	
Piper (New Piper)				
PA-12, PA-12S	A-780	CAR 3	005-C0221-00 005-C0221-01	
PA-18, PA-18S, PA-18-105, PA-18S-105, PA-18A, PA-18-125, PA-18S-125, PA-18AS-125, PA-18-135, PA-18A-135, PA-18S-135, PA-18AS-135, PA-18-150, PA-18A-150, PA-18S-150, PA-18AS-150, PA-19, PA19S	1A2	CAR 3	005-C0221-00 005-C0221-01	
PA-20, PA-20S, PA-20-115, PA-20S-115, PA-20-135, PA-20S-135	1A4	CAR 3	005-C0221-00 005-C0221-01	
PA-22, PA-22-108, PA-22-135, PA-22S-135, PA-22-150, PA-22S-150, PA-22-160, PA-22S-160	1A6	CAR 3	005-C0221-00 005-C0221-01	
PA-23, PA-23-160, PA-23-235, PA-23-250, PA-E23-250	1A10	CAR 3	005-C0221-00 005-C0221-01	
PA-24, PA-24-250, PA-24-260, PA-24-400	1A15	CAR 3	005-C0221-00 005-C0221-01	
PA-28-140, PA-28-150, PA-28-151, PA-28-160, PA-28-161, PA-28-180, PA-28-235, PA-28S-160, PA-28R-180, PA-28S-180, PA-28-181, PA-28R-200, PA-28R-201, PA-28R-201T, PA-28RT-201, PA-28RT-201T, PA-28-201T, PA-28-236	2A13	CAR 3	005-C0221-00 005-C0221-01	

400W Series

Instructions for Continued Airworthiness

Document Number 190-00356-65 Rev. A

Garmin Ltd. Or its subsidiaries
c/o Garmin International, Inc.
1200 E. 151st Street
Olathe, Kansas 66062 USA

Record of Revision

Rev.	Date	Description of Change
1	10-19-06	Initial Release
A	11-03-06	Revision for STC Issuance

1. INTRODUCTION

1.1 PURPOSE

This document is designed for use by the installing agency of the Garmin Model 400W Series GPS/WAAS Nav/Com as Instructions for Continued Airworthiness in response to Federal Aviation regulation (FAR) Part 23.1529, and Part 23 Appendix G. The ICA includes information required by the operator to adequately maintain the Garmin Models 400W series installed under Approved Model List (AML) STC SA01933LA.

1.2 Scope

This document identifies the Instruction for Continued Airworthiness for the modification of the aircraft for installation of the Garmin Models 400W series GPS/WAAS Nav/Com installed under Approved Model List (AML) STC SA01933LA.

1.3 Document Control

This document shall be released, archived, and controlled in accordance with the Garmin document control system. When this document is revised, refer to Section 2.15 for information on how to gain FAA acceptance or approval and how to notify customers of changes.

1.4 Airworthiness Limitations Section

There are no additional Airworthiness Limitations as defined in 14 CFR § 23, Appendix G. G23.4 that result from this modification. The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

1.5 Permission to Use Certain Documents

Permission is granted to any corporation or person applying for approval of a Garmin Model 400W Series to use and reference appropriate STC documents to accomplish the Instructions for Continued Airworthiness and show compliance with STC engineering data. This permission does not construe suitability of the documents. It is the responsibility of the applicant to determine the suitability of the documents for the ICA.

1.6 Definitions

The following terminology is used within this document:

1) **AC:** Advisory Circular
2) **ACO:** Aircraft Certification Office
3) **AEG:** Aircraft Evaluation Group
4) **CFR:** Code of Federal Regulations
5) **DER:** Designated Engineering Representative
6) **FAA:** Federal Aviation Administration

7) **IAW:** In Accordance With
8) **ICA:** Instructions for Continued Airworthiness
9) **MFD:** Multi-Function Display unit
10) **PMI:** Primary Manufacturing Inspector
11) **POI:** Primary Operations Inspector
12) **STC:** Supplemental Type Certificate
13) **TC:** Type Certification or Type Certificate
14) **TSO:** Technical Standard Order

2. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

2.1 Introduction

Content, Scope, Purpose and Arrangement:	This document identifies the Instructions for Continued Airworthiness for the modification of the aircraft by installation of the Garmin Models 400W Series GPS/WAAS Nav/Com.
Applicability:	Applies to aircraft altered by installation of the Garmin Model 400W Series GPS/WAAS Nav/Com.
Definition of Abbreviations:	See Section 1.6
Precautions:	None
Units of measurement:	None
Referenced publications: *(or later FAA approved revisions)*	190-00356-02 Rev. A *400W Series Installation Manual* 005-C0221-00 Rev. A *400W Series STC Master Data List*
Retention:	This document, or the information contained within, will be included in the aircraft's permanent records.

2.2 Description of Alteration

The Garmin Model 400W Series GPS/WAAS Nav/Com unit is a 6 ¼ inch wide panel mounted unit with all the interface connections behind the instrument panel. Installation of the Garmin Model 400W Series GPS/WAAS Nav/Com system interfaces, specific for the aircraft installation, is documented in the GNS 400W Series Post-Installation Checkout Log that is retained as part of the aircraft's permanent records. The 400W Series units combine a large number of easily acceptable controls to use the color multi-function display, Nav and Com transceiver, GPS/WAAS navigator in a single unit.

2.3 Control, Operating Information

See the 400W Series Installation Manual, listed under the reference documentation in paragraph 2.1 of this document, for system operation and self-test information.

2.4 Servicing Information

None. In the event of system failure, return the unit to the manufacturer or an approved Garmin repair station.

2.5 Periodic Maintenance Instructions

The 400W Series units are designed to detect internal failure. A thorough self-test is executed automatically upon application of power to the units, and built-in test is continuously executed. Detected errors are indicated on the equipment via failure annunciations and maintenance is on-condition.

Operation of the 400W Series unit is not permitted unless an inspection as described in this section has been completed within the preceding 12 calendar months. Conduct a visual inspection on the 400W series unit and its wire harness to insure installation integrity:

1. Inspect the unit for security of attachment.
2. Inspect all knobs and buttons for legibility.
3. Inspect condition of wiring, routing and attachment/clamping.

2.5.1 Cleaning the Front Panel

The front bezel, keypad, and display can be cleaned with a soft cotton cloth dampened with clean water. DO NOT use any chemical-cleaning agents. Care should be taken to avoid scratching the surface of the display.

2.5.2 Display Backlight

The display backlight lamp is rated by the manufacturer as having a usable life of 20,000 hours. This life may be more or less than the rated time depending on the operating conditions of the 400W series unit. Over time, the backlight lamp may dim and the display may not perform as well in direct sunlight conditions. The user must determine by observation when the display brightness is not suitable for its intended use. Contact the Garmin factory repair station when the backlight lamp requires service.

2.5.3 Battery Replacement

The 400W series has an internal keep-alive battery that will last about 10 years. The battery is used for GPS system information. Regular planned replacement is not necessary. The 400W series will display a 'low battery' message when replacement is required. Once the low battery message is displayed, the battery should be replaced within 1 to 2 months.

If the battery is not replaced and becomes totally discharged, the 400W series unit will remain fully operational, but the GPS signal acquisition time may be increased. This acquisition time can be reduced by entering a new seed position each time the unit is powered on. There is no loss of function or accuracy of the 400W series unit with a dead battery.

The battery must be replaced by the Garmin factory repair station or factory authorized repair station.

2.6 Troubleshooting Information

If error indications are displayed on the 400W series unit, consult the Troubleshooting section contained in the 400W Series Installation Manual, listed under reference documentation in paragraph 2.1 of this

document. The '400W Series Post-Installation Checkout Log' in the aircraft permanent records includes the configuration information for the installation. (See Section 5 in the 400W Series Installation Manual for a sample Log).

2.7 Removal and Replacement Information

If the 400W series unit is removed and reinstalled, verify that the 400W series unit power-up self-test sequence is successfully completed and no failure messages are annunciated.

If the 400W series unit is removed for repair and reinstalled, or if the 400W unit is removed and replaced with a different 400W series unit, then follow 'Post Installation Configuration & Checkout Procedures' procedures contained in the 400W Series Installation Manual listed in paragraph 2.1 of this document, and verify the 400W unit power-up self-test sequence is successfully completed and no failure messages are annunciated.

If any work has been done on the aircraft that could affect the system wiring, antenna cable, or any interconnected equipment, verify the 400W series unit power-up self-test sequence is successfully completed and no failure messages are annunciated.

To remove the 400W series unit from the mounting rack, insert a 3/32-inch hex drive tool into the access hole at the bottom of the unit face. Rotate the hex tool counterclockwise until the unit is forced out about 3/8 inches and can be freely pulled from the rack.

The 400W unit is installed in the rack by sliding it straight in until it stops, about 1 inch short of the final position. Insert the hex drive tool into the access hole at the bottom of the unit face. Rotate the hex tool clockwise while pressing on the left side of the bezel until the unit is firmly seated in the rack.

Note: There are no special handling requirements for the 400W series units.

2.8 Diagrams

Refer to the 400W Series Installation Manual (listed under reference documentation in section 2.1 of this document) for drawings applicable to this installation. Point to point wiring diagrams are in Appendix H of the 400W Series Installation Manual. Refer to the GNS 400W Series Post-Installation Checkout Log retained in the aircraft permanent for a list of the interfaced equipment. The antenna cables are routed between the 400W series unit and the antenna with disconnects at each unit. The antenna cable typically is routed behind interior panels in the fuselage.

2.9 Special Inspection Requirements

None, N/A.

2.10 Application of Protective Treatments

None, N/A.

2.11 Data Relative to Structural Fasteners

None, N/A.

2.12 Special Tools

No special tools are required for system checkout. See 400W Series Installation Manual listed in reference documentation in section 2.1 of this document.

2.13 Additional Instructions

None

2.14 Overhaul Period

The system does not require overhaul at a specific time period. Power on self-test and continuous BIT will monitor the health of the 400W series unit. If the unit indicates an internal failure, the unit may be removed and replaced. See troubleshooting section contained in the 400W Series Installation Manual, listed under reference documentation in paragraph 2.1 of this document.

2.15 ICA Revision and Distribution

To revise this ICA, a letter must be submitted to the ACO along with the revised ICA. The ACO will obtain AEG acceptance, and approve any revision to the Airworthiness Limitations Section 1.4. After FAA acceptance/approval, Garmin will release the revised ICA for customer use, and provide any required notification of the revision.

The latest revision of this document will be available on the Garmin website (www.garmin.com). A Garmin Service Bulletin, describing ICA revision, will be sent to dealers if revision is determined to be significant.

2.16 Assistance

Flight Standards Inspectors or the certificate holder's PMI have the required resources to respond to questions regarding this ICA. In addition, the customer may refer questions regarding this equipment and its installation to the manufacturer, Garmin. Garmin customer assistance may be contacted during normal business hours via telephone 913-397-8200 or email from the Garmin web site at www.garmin.com.

2.17 Implementation and Record Keeping

Modification of an aircraft by this Supplemental Type Certificate obligates the aircraft operator to include the maintenance information provided by this document in the operator's aircraft maintenance manual and/or the operator's aircraft scheduled maintenance program.

WEIGHT & BALANCE
REVISION

Aircraft Number: N 36777
PA28R 7837292

Date: 8-1-90

ITEMS

	WEIGHT	ARM	MOMENT
Installed:			
Precise Flight SVS. III	2.0	48.6	97.2
	3-491		
TOTAL	2.0	48.6	97.2

WEIGHT & BALANCE DATA

	WEIGHT	ARM	MOMENT
OLD EMPTY WEIGHT	1736.0	84.41	146540.2
ITEMS FROM ABOVE	2.0	48.6	97.2
NEW EMPTY WEIGHT	1738.0	84.37	14663 7.4

EMPTY WEIGHT	GROSS WEIGHT	USEFUL LOAD
1738.0	2750	1012.0

Computed by: Richard Brown For Maryland Airlines
CRS BUMR 650C

MODEL PA-28R-201 CHEROKEE ARROW III

Airplane Serial Number _____

Registration Number _____

Date _____

AIRPLANE BASIC EMPTY WEIGHT

Item	Weight (Lbs)	x	C. G. Arm (Inches Aft of Datum)	=	Moment (In-Lbs)
Standard Empty Weight* [redacted] Computed	1756.8		85.2		149707.4
Optional Equipment					
Basic Empty Weight					

*The standard empty weight includes full oil capacity and 5.0 gallons of unusable fuel.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

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

(2750 lbs) - (1756.8 lbs) = 793.2 lbs.

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

WEIGHT AND BALANCE DATA FORM

Figure 6-5

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MODEL PA-28R-201 CHEROKEE ARROW III

Airplane Serial Number 28R-7837292

Registration Number N36777

Date 6-23-78

AIRPLANE BASIC EMPTY WEIGHT

Item	Weight (Lbs)	x	C. G. Arm (Inches Aft of Datum)	=	Moment (In-Lbs)
Standard Empty Weight* ~~Actual~~ Computed	1593.0		83.3		132655
Optional Equipment	107.6		118.2		12713
Basic Empty Weight	~~1700.6~~ ~~1735.2~~ 1741.1 (1751.6)		~~85.5~~ ~~85.49~~ 85.38		~~145368~~ ~~148312~~ 148671 (149401) 7/9/78 9/5/78 1/5/79

*The standard empty weight includes full oil capacity and 5.0 gallons of unusable fuel.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

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

(2750 lbs) - (~~1700.6~~ lbs) ~~1049.4~~ lbs. SUPERCEEDED
~~1735.2~~ = ~~1014.8~~ ←
~~1741.1~~ ~~1008.9~~ LBS — 9/5/78 — Superceeded 2/4/79
(1751.6) = 998.4 LBS 1-5-79

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

SUPERSEDED
DATE 9-6-88
OZARK A/C RADIO CO

WEIGHT AND BALANCE DATA FORM

Figure 6-5

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OZARK AIRCRAFT RADIO COMPANY

F A A REPAIR STATION No. 3329

SUPPLEMENT WEIGHT & BALANCE DATA
& EQUIPMENT LIST

AIRCRAFT TYPE PA-28R-201 No. N36777 DATE 9-6-88

	WEIGHT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT (2-4-79)	1751.6	85.3	149407.3
INSTALL			
DAVID CLARK ISO-COM	1.0	59.0	59.0
	1752.6	85.3	149466.3

SUPERCEDED 12/07/89 SEE PAGE 6-1 DTD MARCH 13, 1984

NEW AIRCRAFT EMPTY WEIGHT 1752.6 LBS.

NEW EMPTY WEIGHT C.G. 85.3 INCHES AFT DATUM

NEW USEFUL LOAD (NORMAL) CAT. 997.4 LBS.

OZARK AIRCRAFT RADIO CO.
APPROVED REPAIR STATION NO. 3329
Date 9-6-88
Authorized Signature R Arndt

PREPARD BY: Robert Arndt

DATE SEPT 6, 1988

PA-28R-201	Serial Number	Registration Number	Page Number 7

Date	Item No. In	Item No. Out	Description of Article or Modification	Weight Change Added (+) Wt. (Lb.)	Added (+) Arm (In.)	Added (+) Moment /100	Removed (-) Wt. (Lb.)	Removed (-) Arm (In.)	Removed (-) Moment /100	Running Basic Empty Weight Wt. (Lb.)	Running Basic Empty Weight Moment /100
6/3/78			As Delivered							1700.6	145368
7/9/78	x	X	CP136 Audio Panel	2.2	55.0	121				2.3	121
7/9/78	x	X	Dual Com 130 Transceivers	8.6	57.4	494				8.6	494
7/9/78	x	X	KNI 133 VHF Receiver	5.1	99.4	507				5.1	507
7/9/78	x		KNV 132 VHF Receiver	3.1	58.4	181				3.1	181
7/9/78	x		ADF 74A ADF System	6.0	91.3	547				6.0	547
7/9/78	x		AT150 Transponder	3.0	57.3	173				3.0	173
7/9/78	x		AE500 Blind Encoder	1.0	51.5	53				1.0	53
7/9/78	x		VIR30 ADF Sense Ant.	0.5	142.5	59				0.5	59
7/9/78	x		VEP30 Nav. Antenna	1.4	195.7	274				1.4	274
7/9/78	x		AD11 #1 Com Antenna	1.4	144.3	303				1.4	303
7/9/78	x		AD11 #2 Com Antenna	1.5	170.7	256				1.5	256
7/9/78	x		Speaker (Cabin)	0.8	99.0	79				0.8	79
7/9/78										1735.2	148312
9/5/78	x	X	DME 190	5.9	60.9	359				5.9	359
9/5/78										1741.1	148671
										1747.1	149073

Superseded 2/14/79

WEIGHT AND BALANCE RECORD (cont)

Figure 6-7 (cont)

WEIGHT AND BALANCE RECORD (cont)

PA-28R-201	Serial Number	Registration Number	Page Number

Item No.	Date	Description of Article or Modification	Weight Change Added (+)			Weight Change Removed (-)			Running Basic Empty Weight	
	In Out		Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Moment /100
	9-5-78	~~A/C Delivered~~							1741.1	148671
1	1-5-79 X	Attitude Gyro 52D66	2.7	59.0	159.3					
1	1-5-79 X	Course Sel. D.G. 52D54	2.9	59.0	171.1					
1	1-5-79 X	Console - Amp. 1C385	1.12	59.0	66.1					
1	1-5-79 X	Roll Servo 1C363-1-430R	2.3	109.0	250.7					
1	1-5-79 X	Cables	.5	59.5	29.8					
1	1-5-79 X	Radio Coupler	1.0	59.3	59.3					
	1-5-79	NEW TOTALS							1751.6	149407.3
	9-6-85 Y	DAVID CLARK 150 CORP	SEE SUPPLEMENTAL THA DATE						1752.6	149466.3

Figure 6-7 (cont)

PA-28R-201			Serial Number	Registration Number					Page Number		
Date	Item No.		Description of Article or Modification	Weight Change						Running Basic Empty Weight	
				Added (+)			Removed (-)				
	In	Out		Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Moment /100
			As Licensed								

WEIGHT AND BALANCE RECORD

Figure 6-7

PA-28R-201	Serial Number	Registration Number	Page Number

Date	Item No. In	Item No. Out	Description of Article or Modification	Weight Change Added (+) Wt. (Lb.)	Weight Change Added (+) Arm (In.)	Weight Change Added (+) Moment /100	Weight Change Removed (-) Wt. (Lb.)	Weight Change Removed (-) Arm (In.)	Weight Change Removed (-) Moment /100	Running Basic Empty Weight Wt. (Lb.)	Running Basic Empty Weight Moment /100

WEIGHT AND BALANCE RECORD (cont)

Figure 6-7 (cont)

6.7 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

(a) Add the weight of all items to be loaded to the basic empty weight.

(b) Use the Loading Graph (Figure 6-13) to determine the moment of all items to be carried in the airplane.

(c) Add the moment of all items to be loaded to the basic empty weight moment.

(d) Divide the total moment by the total weight to determine the C.G. location.

(e) By using the figures of item (a) and item (d) (above), locate a point on the C.G. range and weight graph (Figure 6-15). If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	1747.0	84.59	147781.3
Pilot and Front Passenger	340.0	80.5	27,370
Passengers (Rear Seats)	340.0	118.1	40,154
Fuel (72 Gallon Maximum) 62 gal	369.4	95.0	35093
Baggage		142.8	
Moment due to Retraction of Landing Gear			819
Total Loaded Airplane	2750	90.5	248804

The center of gravity (C.G.) of this sample loading problem is at 90.5 inches aft of the datum line. Locate this point (90.5) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

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

SAMPLE LOADING PROBLEM (NORMAL CATEGORY)

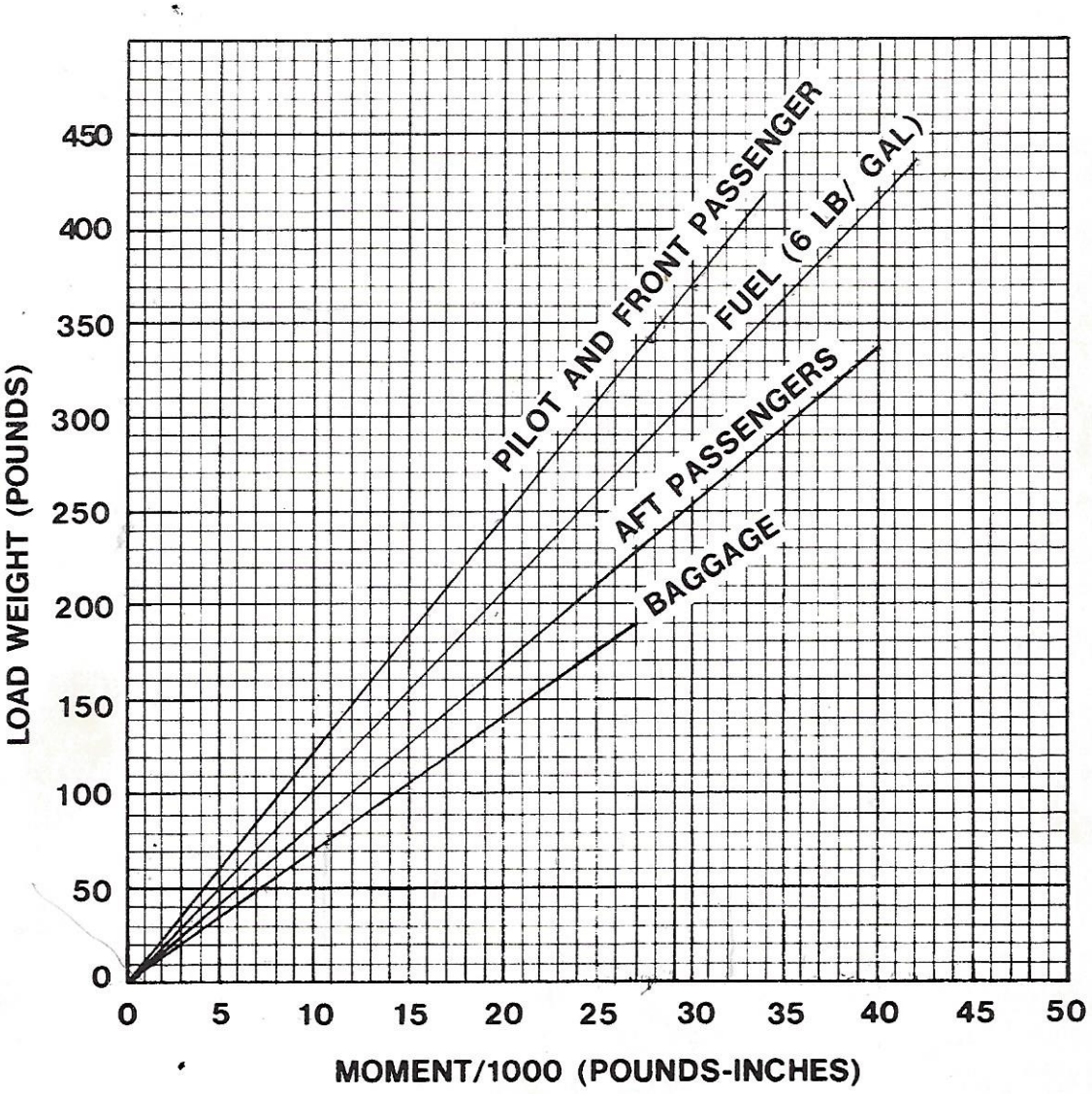
Figure 6-9

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	1751.6	84.8	148,671
Pilot and Front Passenger		80.5	
Passengers (Rear Seats)		118.1	
Fuel (72 Gallon Maximum)		95.0	
Baggage		142.8	
Moment due to Retraction of Landing Gear			819
Total Loaded Airplane			

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

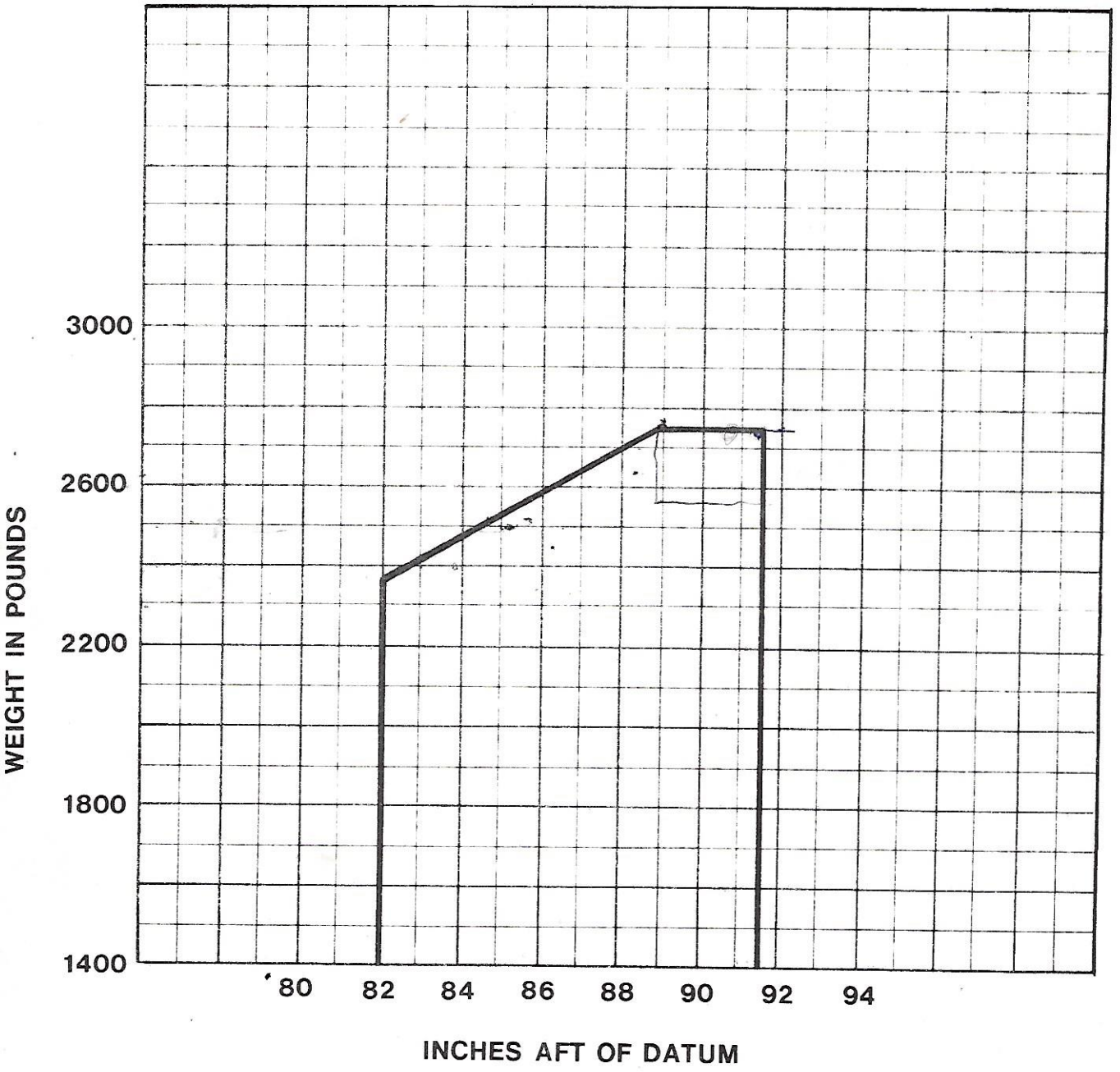
WEIGHT AND BALANCE LOADING FORM

Figure 6-11



LOADING GRAPH

Figure 6-13



Moment due to retracting landing gear = +819 in. lbs.

C. G. RANGE AND WEIGHT

Figure 6-15

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6.9 EQUIPMENT LIST

The following is a list of equipment which may be installed in the PA-28R-201. It consists of those items used for defining the configuration of an airplane when the basic empty weight is established at the time of delivery. Only those standard items which are alternate standard items and those required to be listed by the certificating authority (FAA) are presented. Items marked with an "X" are those items which were installed on the airplane described below as delivered by the manufacturer.

PIPER AIRCRAFT CORPORATION — PA-28R-201 CHEROKEE ARROW III

SERIAL NO. 28R-7837292 REGISTRATION NO. N36777 DATE: 6-23-78

(a) Propeller and Propeller Accessories

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
	add propeller McCauley B3D36C424/74SA (including spinner 6012-4)	X	71.3	-2.0	-142.6
1	a. Propeller, McCauley B2D34C213/90DHA-16 Removed Cert. Basis - TC P7EA	X Removed	49.0	-1.9	-93
	b. Propeller, Hartzell HC-C2YK-1( )F/ F7666A-2R Cert. Basis - TC P920	———	55.0	-1.9	-105
2	a. Spinner and Attachment Plate Installation PAC Dwg. 35828-2 (For McCauley Prop.) Cert. Basis - TC 2A13 Removed	X Removed	4.7	-2.2	-10
	b. Spinner and Attachment Plate Installation PAC Dwg. 99374 (For Hartzell Prop.) Cert. Basis - TC 2A13	———	5.0	-2.2	-11
3	Propeller Governor Hartzell Model F-2-7 ( ) Cert. Basis - TC P7EA				

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(b) Engine and Engine Accessories

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
5	Lycoming Model IO-360-C1C6 Cert. Basis - TC 1E1O				

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(c) Landing Gear and Brakes

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
11	Two Main Wheel Assemblies a. Cleveland Aircraft Products Wheel Assy. No. 40-86 Brake Assy. No. 30-55 Cert. Basis - TSO C26a				
	b. 6.00-6 Type III 6 Ply Rating Tires with Regular Tubes Cert. Basis - TSO C62				
13	Nose Wheel Assembly a. Cleveland Aircraft Products Wheel Assy. No. 40-77 Cert. Basis - TSO C26a	_____	2.6	15.5	40
	b. McCauley Industrial Corp. Wheel Assy. No. D-30500 Cert. Basis - TSO C26b	X _____	3.6	15.5	56
	c. 5.00-5 Type III 4 Ply Rating Tire with Regular Tube Cert. Basis - TSO C62				

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(d) Electrical Equipment

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)

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(e) Instruments

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
21	Altimeter, Piper PS50008-50-2 Cert. Basis - TSO C10b				
23	Airspeed Indicator Piper PS50049-32S Cert. Basis - TSO C2b				
25	Manifold Pressure and Fuel Flow Indicator Piper PS50031-6 Cert. Basis - TSO C45, C47				
27	Compass Cert. Basis - TSO C7c				

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(f) Miscellaneous

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
33	Front Seat Belts (2) Piper PS50039-4-2A Cert. Basis - TSO C22f				
35	Rear Seat Belts (2) Piper PS50039-4-3A Cert. Basis - TSO C22f				

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(g) Engine and Engine Accessories
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)

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(h) Propeller and Propeller Accessories (Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)

(i) Landing Gear and Brakes
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)

(j) Electrical Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
79	Instrument Panel Lights Cert. Basis - TC 2A13	X _____	0.3	62.8	19
81	Instrument Light, Grimes 15-0083-7 Cert. Basis - TC 2A13	X _____	0.1	99.0	10
83	Cabin Light Cert. Basis - TC 2A13	X _____	0.3	99.0	30
85	Landing Light, G.E. Model 4509 Cert. Basis - TC 2A13	X _____	0.5	10.0	5
87	Navigation Lights (Wing) (2) Grimes Model A1285 (Red) and Green) Cert. Basis - TC 2A13	_____	0.4	106.6	43
89	Navigation Light (Rear) (1), Grimes Model A2064 (White) Cert. Basis - TC 2A13	X _____	0.2	281.0	56
91	Rotating Beacon Cert. Basis - TC 2A13	X _____	1.5	263.4	395
93	Anti-Collision Lights (Wing Tip) (Whelen) Cert. Basis - STC SA615EA	X _____	5.7	157.9	900
95	Heated Pitot Head, Cert. Basis - TC 2A13	X _____	0.4	100.0	40
97	Piper Pitch Trim Piper Dwg. 67496-3 Cert. Basis - TC 2A13	_____	4.3	155.3	668
99	Battery 12V 35 A.H. Rebat R35 (Wt. 27.2 lbs.) Cert. Basis - TC 2A13	X _____	*5.3	168.0	890

*Weight and moment difference between standard and optional equipment.

(j) Electrical Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
101	Auxiliary Power Receptacle, Piper Dwg. 65647 Cert. Basis - TC 2A13	X _____	2.7	178.5	482
103	External Power Cable, Piper Dwg. 62355-2 Cert. Basis - TC 2A13	X _____	4.6	142.8	657
105	Lighter, 200462, 12 Volt Universal Cert. Basis - TC 2A13	X _____	0.2	62.9	13

(k) Instruments
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
113	Vacuum System Installation Cert. Basis - TC 2A13	_____	4.5	37.1	167
115	Attitude Gyro, Piper Dwg. 99002-3, -4 or -8 Cert. Basis - TSO C4c	_____	2.2	59.4	131
117	Directional Gyro, Piper Dwg. 99003-3, -4 or -7 Cert. Basis - TSO C5c	_____	2.6	59.7	155
119	NSD-360 Gyro Cert. Basis - TSO C6c, C9c, C52c	_____	4.1	59.0	241
121	Tru-Speed Indicator, Piper PS50049-32T Cert. Basis - TSO C2b	_____	(same as standard equipment)		
123	Altimeter, Piper PS50008-4 or -5 Cert. Basis - TSO C10b	_____	(same as standard equipment)		
125	Encoding Altimeter, Piper PS50008-6 or -7 Cert. Basis - TSO C10b, C88	_____	*0.9	60.3	54
127	Vertical Speed Piper Dwg. 99010-5 Cert. Basis - TSO C8b	_____	1.0	60.9	61
129	Alternate Static Source Cert. Basis - TC 2A13	_____	0.4	61.0	24
131	Turn and Slip Indicator, Piper PS50030-2 or -3 Cert. Basis - TSO C3b	_____	2.6	59.7	155
133	Exhaust Gas Temperature, Piper Dwg. 69190-0 Cert. Basis - TC 2A13	_____	0.7	55.4	39

*Weight and moment difference between standard and optional equipment.

(k) Instruments
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
135	MK 10 Radar Altimeter Piper Dwg. 37693-2 Cert. Bais - TC 2A13	_____	5.4	156.3	844
137	Engine Hour Meter Piper Dwg. 79548-0 Cert. Basis - TC 2A13	X	0.3	61.2	18
139	Clock Cert. Basis - TC 2A13	X	0.4	62.4	25
141	Air Temperature Gauge, Piper Dwg. 79316 Cert. Basis - TC 2A13	X	0.2	72.6	15
142	Graphic Engine Monitor (Insight Inst. Corp) Removed & original EGT.	X			

(l) Autopilots
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
147	AutoFlite II Cert. Basis - STC SA3162SW-D	———	5.6	91.8	514
149	~~AutoControl IIIB~~ Edo-Aire Mitchell E-11B SA 3196 SW-D Cert. Basis - ~~STC SA3161SW-D~~	✓	9.6	77.6	745
	a. Directional Gyro # 52D54	✓	2.9	59.0	171
	b. Omni Coupler 1C-388	✓	1.0	59.3	59

(m) Radic Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
161	Collins VHF-251 Comm Transceiver				
	a. Single	_____	3.4	56.9	193
	b. Dual	_____	6.8	56.9	387
	Cert. Basis - TSO C37b, C38b				
163	Collins VIR-351 Nav Receiver				
	a. Single	_____	2.7	57.4	155
	b. Dual	_____	5.4	57.4	310
	Cert. Basis - TSO C40a, C36c				
165	Collins IND-350 VOR/LOC Indicator				
	a. Single	_____	1.0	60.2	60
	b. Dual	_____	2.0	60.2	120
	Cert. Basis - TSO C40a, C36c				
167	Collins IND-351 VOR/LOC/ GS Indicator				
	Cert. Basis - TSO C40a, C36c	_____	1.3	60.2	78
169	Collins GLS-350 Glide Slope Receiver				
	Cert. Basis - TSO C34c	_____	2.0	181.8	364
171	Collins RCR-650 ADF Receiver and Antenna and IND-650 Indicator				
	Cert. Basis - TSO C41c	_____	6.6	104.8	692
173	Collins AMR-350 Audio/Marker Panel				
	Cert. Basis - TSO C35d, C50b	_____	*3.3	110.0	363

*Weight includes antenna and cable.

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
175	Collins TDR-950 Transponder Cert. Basis - TSO C74c	_____	2.8	63.2	177

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
177	King KX 170 ( ) VHF Comm/Nav				
	a. Transceiver, Single	_____	7.5	56.6	425
	b. Transceiver, Dual	_____	15.0	56.6	849
	Cert. Basis - TC 2A13				
179	King KX 175 ( ) VHF				
	a. Transceiver,	_____	9.4	56.6	532
	b. King KN 73 Glide Slope Receiver,	_____	3.2	184.3	590
	c. King KN 77 VOR/LOC Converter,	_____	3.6	183.6	661
	d. King KNI 520 VOR/ILS Indicator	_____	2.8	60.5	169
	Cert. Basis - TSO C3bc, C37b, C38b, C40a				
181	King KX 175 ( ) VHF				
	a. Transceiver (2nd),	_____	8.6	56.6	487
	b. King KN 77 VOR/LOC Converter,	_____	4.2	183.6	771
	c. King KNI 520 VOR/ILS Indicator	_____	2.8	60.5	169
	Cert. Basis - TSO C36c, C37b, C38b, C40a				
183	King KI 201 ( ) VOR/ LOC Ind.				
	a. Single	_____	2.5	59.6	149
	b. Dual	_____	5.0	59.9	300
	Cert. Basis - TC 2A13				
185	King KI 213 VOR/LOC/GS Indicator				
	Cert. Basis - TC 2A13	_____	2.5	60.4	151
187	King KI 214 ( ) VOR/ LOC/GS Ind.				
	Cert. Basis - TC 2A13	_____	3.3	59.9	198
189	King KN 74 R-Nav				
	Cert. Basis - TC 2A13	_____	4.7	56.6	266

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
191	King KN 61 DME Cert. Basis - TC 2A13	_____	12.5	179.0	2237
193	King KN 65A DME Cert. Basis - TSO C66a	_____	13.0	174.9	2274
195	King KR 85 Digital ADF	_____	8.6	85.2	733
	a. Audio Amplifier	_____	0.8	51.0	41
	Cert. Basis - TSO C41b				
197	King KR 86 ADF				
	a. First	_____	6.7	91.6	614
	b. Second	_____	9.7	107.0	1038
	c. Audio Amplifier	_____	0.8	51.0	41
	Cert. Basis - TC 2A13				
199	King KMA 20 ( ) Audio Panel Cert. Basis - TSO C35c, C50b	_____	*3.7	70.8	262
201	King KT 76( )/78( ) Transponder Cert. Basis - TSO C74b	_____	*3.1	58.1	180
	King KMA-24	X	1.7	58	
	King KX-155/GS	X	5.3	56	
	King KI-209	X	1.2	58	
	BFG WX-900	X	2.0	61	
	BFG WX-900 ANT	X	1.5	173	

*Weight includes antenna and cable.

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
203	Narco Comm 10A VHF Transceiver Cert. Basis - TC 2A13	_____	3.9	57.4	224
205	Narco Comm 11A VHF Transceiver				
	a. Single	_____	3.6	57.4	207
	b. Dual	_____	7.1	57.4	408
	Cert. Basis - TC 2A13				
207	Narco Comm 11B VHF Transceiver				
	a. Single	_____	3.9	57.4	224
	b. Dual	_____	7.8	57.4	448
	Cert. Basis - TC 2A13				
209	Narco Comm 111 VHF Transceiver				
	a. Single	_____	3.0	57.4	172
	b. Dual	_____	6.0	57.4	344
	Cert. Basis - TSO C37b, C38b				
211	Narco Comm 111B VHF Transceiver				
	a. Single	_____	3.9	57.4	224
	b. Dual	_____	7.8	57.4	448
	Cert. Basis - TSO C37b, C38b				
213	Narco Comm 120 VHF Transceiver	X			
	a. Single	_____	4.8	56.9	273
	b. Dual	(X)	8.6	57.4	494
	Cert. Basis - TSO C37b, C38b	Removed one 12/15/94			
215	Narco Nav 10 VHF Receiver Cert. Basis - TC 2A13	_____	1.9	58.6	111
217	Narco Nav 11 VHF Receiver				
	a. Single	_____	2.8	58.6	164
	b. Dual	_____	5.6	58.6	328
	Cert. Basis - TC 2A13				
219	Narco Nav 12 VHF Receiver Cert. Basis - TC 2A13	_____	3.4	58.6	199

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
239	Narco ID 124 VOR/LOC/GS Indicator				
	a. Single	____	1.2	60.5	73
	b. Dual	____	2.4	60.5	145
	Cert. Basis - TSO C34c, C35d, C36c, C40c				
241	Narco OC-110 Converter and Mount				
	Cert. Basis - TSO C36c, C40a	____	2.1	185.5	390
243	Narco UGR-2A Glide Slope				
	a. Single	____	4.2	154.0	647
	b. Dual	____	8.4	220.0	1848
	Cert. Basis - TSO C34b				
245	Narco UGR-3 Glide Slope				
	Cert. Basis - TC 2A13	____	4.2	154.0	647
247	Narco MBT-12-R, Marker Beacon				
	Cert. Basis - TC 2A13	____	3.1	69.1	214
249	Narco CP-125 Audio Selector Panel				
	Cert. Basis - TC 2A13	____	2.2	55.0	121
251	Narco CP-136 Audio Selector Panel				
	Cert. Basis - TSO C50b	X	2.2	55.0	121
		Removed 12/15/94			
253	Narco CP-135M Audio Selector Panel				
	Cert. Basis - TSO C50b, C35d	____	* 3.7	114.3	423
255	Narco CLC-60A R-Nav	____	9.6	140.1	1345
	a. Narco SA-11 Adapter	____	0.7	174.0	122
	Cert. Basis - TC 2A13				

*Weight includes marker antenna and cable.

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
~~257~~	~~Narco DME-190~~ Removed 3/23/95 Cert. Basis - TC 2A13	(X)	* 5.9	60.9	359
259	Narco DME-190 TSO Cert. Basis - TSO C66a		* 5.9	60.9	359
261	Narco DME-195 Receiver and Indicator Cert. Basis - TSO C66a		*13.2	154.5	2039
263	Narco ADF-140 a. Single b. Dual Cert. Basis - TSO C41c		6.0 **17.9	91.2 107.6	547 1926
265	Narco ADF-141 a. Single b. Dual Cert. Basis - TSO C41c	X	6.0 **17.9	91.2 107.6	547 1926
267	Narco AT50A Transponder Cert. Basis - TSO C74b a. Narco AR-500 Altitude Encoder Cert. Basis - TSO C88		* 3.0 1.0	57.3 51.5	172 52
269	Narco AT150 Transponder Cert. Basis - TSO C74c a. Narco AR500 Altitude Encoder Cert. Basis - TSO C88	X X	* 3.0 1.0	57.3 51.5	172 52

*Weight includes antenna and cable.
**Weight includes dual antenna and cable.

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
271	Antenna and Cable				
	a. Nav Receiving	X	1.4	195.7	274
	b. 1 VHF Comm		0.7	125.7	88
	c. *2 VHF Comm		0.8	147.5	118
	d. Glide Slope (Single)		0.9	122.2	110
	e. Glide Slope (Dual)		2.8	154.0	431
	f. Single ADF Sense		0.4	147.5	59
	Cert. Basis - TC 2A13				
273	Anti Static Antenna and Cable				
	a. *1 VHF Comm	X	1.4	144.3	202
	b. *2 VHF Comm	X	1.5	170.7	256
	c. Single ADF Sense	X	0.5	147.5	74
	Cert. Basis - TC 2A13				
275	Emergency Locator Transmitter	X	1.7	236.2	402
	a. Antenna and Coax	X	0.2	224.4	45
	b. Shelf and Access Hole	X	0.3	235.4	71
	Cert. Basis - TC 2A13				
277	Microphone				
	a. Piper Dwg. 68856-10		0.3	64.9	19
	b. Piper Dwg. 68856-11		0.6	69.9	42
	c. Piper Dwg. 68856-12		0.3	64.9	19
	Cert. Basis - TC 2A13				
279	Boom Microphone - Headset Piper Dwg. 37921-2				
	Cert. Basis - TC 2A13		0.3	80.5	24
281	Cabin Speaker Piper Dwg. 63239-2				
	Cert. Basis - TC 2A13	X	0.8	99.0	79
283	Headset, Piper Dwg. 68856-10				
	Cert. Basis - TC 2A13		0.5	60.0	30

(m) Radio Equipment
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)

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(n) Miscellaneous
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
323	Zinc Chromate Finish Cert. Basis - TC 2A13	____	5.0	158.0	790
325	Stainless Steel Control Cables Cert. Basis - TC 2A13	____	–	–	–
327	Air Conditioner, Cert. Basis - TC 2A13	____	69.8	105.7	7378
329	Overhead Vent System Piper Dwg. 76304-11 Cert. Basis - TC 2A13	____	6.4	159.6	1022
331	Overhead Vent System with Ground Ventilating Blower Piper Dwg. 76304-12 Cert. Basis - TC 2A13	X	14.9	172.2	2566
333	Assist Step, Piper Dwg. 65384 Cert. Basis - TC 2A13	X	1.8	156.0	281
335	Super cabin Sound Proofing, Piper Dwg. 79601-4 Cert. Basis - TC 2A13	X	18.1	86.8	1571
337	Adjustable Front Seat (Left), Piper Dwg. 79591-0 or 79591-2 Cert. Basis - TC 2A13	X	*6.6	80.3	530
339	Adjustable Front Seat (Right), Piper Dwg. 79591-1 or 79591-3 Cert. Basis - TC 2A13	X	*6.6	79.6	525

*Weight and moment difference between standard and optional equipment.

(n) Miscellaneous
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
341	Headrests (2) Front, Piper Dwg. 79337-18 Cert. Basis - TC 2A13	____	2.2	94.5	208
343	Headrests (2) Rear, Piper Dwg. 79337-18 Cert. Basis - TC 2A13	____	2.2	132.1	291
345	Oversize Headrests (2) Front Cert. Basis - TC 2A13	X	3.2	94.5	302
347	Oversize Headrests (2) Rear Cert. Basis - TC 2A13	X	3.2	132.1	423
349	Inertia Safety Belts (Rear) (2) 0.8 lbs. each, Piper PS50039-4-14 Cert. Basis - TC 2A13	____	1.6	140.3	224
351	Assist Strap, Piper Dwg. 79455 Cert. Basis - TC 2A13	____	0.2	109.5	22
353	Curtain and Rod Instl. Piper Dwg 79721-3 Cert. Basis - TC 2A13	____	1.2	129.2	155
355	Curtain and Rod Instl. Piper Dwg. 67955-2 Cert. Basis - TC 2A13	X	4.2	124.0	521
357	Deluxe Carpeting Cert. Basis - TC 2A13	____	*-1.8	101.9	-183
359	Luxurious Interior Piper Dwg. 67952-3 Cert. Basis - TC 2A13	X	17.0	101.9	1732

*Weight and moment difference between standard and optional equipment.

(n) Miscellaneous
(Optional Equipment) (cont)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
361	Fire Extinguisher				
	a. Piper Dwg. 76167-2 (Scott 42211-00)	_____	4.6	71.0	327
	b. Piper Dwg. 37872-2 (Graviner HA1014-01)	_____	5.6	57.9	324
	Cert. Basis - TC 2A13				
	TOTAL OPTIONAL EQUIPMENT		107.6	118.2	12713

EXTERIOR FINISH

Base Color JUNEAU WHITE

Trim Color ROYAL BLUE
INDIAN SILVER

Accent Color ROYAL BLUE

Registration No. Color BLACK

Type Finish LACQUER

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United States of America

Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number SA3196SW-D

This certificate, issued to

Mitchell Industries, Inc. dba
EDO-AIRE MITCHELL
P.O. Box 610
Mineral Wells, Texas 76067

certifies that the change in the type design for the following product with the limitations and conditions thereof as specified hereon meets the airworthiness requirements of Part 3 *of the* Civil Air Regulations.

Original Product — Type Certificate Number: 2A13

Make: PIPER

Model: PA-28R-201 and PA-28R-201T

Description of Type Design Change:

Installation of Mitchell Automatic Flight System Model AK653 consisting of Century II B Autopilot with Optional Radio Coupler according to Bulletin No. 780, dated 3-14-77 and Master Drawing List No. 87A900, dated 3-14-77

Limitations and Conditions:

FAA/DAS Approved Pilot's Operating Handbook Supplement, P/N 68S495, dated 4-6-77, for Piper Models PA-28R-201 and PA-28R-201T

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: 3-15-77

Date of issuance: 4-6-77

Date reissued:

Date amended:

By direction of the Administrator

Harold W. Holdeman

(Signature)

HAROLD W. HOLDEMAN
DAS STAFF COORDINATOR, DAS 2 SW

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA Form 8110-2 (10-68)

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY

OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE: Piper	MODEL: PA-28R-201
	SERIAL NO.: 28R-7837292	NATIONALITY AND REGISTRATION MARK: N36777
2. OWNER	NAME (*As shown on registration certificate*): Dierker, Michael D. Dierker, Jill L.	ADDRESS (*As shown on registration certificate*): 3304 Apple Drive St. Charles, Missouri 63301

3. FOR FAA USE ONLY

4. UNIT IDENTIFICATION / **5. TYPE**

UNIT	MAKE	MODEL	SERIAL NO.	5. TYPE: REPAIR	5. TYPE: ALTERATION
AIRFRAME	◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ (*As described in item 1 above*) ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆				X
POWERPLANT					
PROPELLER					
APPLIANCE	TYPE MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS	B. KIND OF AGENCY	C. CERTIFICATE NO.
Curtis A. Richards Five Julie Lane St. Peters, Missouri 63376	X U.S. CERTIFICATED MECHANIC FOREIGN CERTIFICATED MECHANIC CERTIFICATED REPAIR STATION MANUFACTURER	A&P 1980397

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE	SIGNATURE OF AUTHORIZED INDIVIDUAL
May 2, 1989	Curtis A. Richards

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

BY						
	FAA FLT. STANDARDS INSPECTOR		MANUFACTURER	X	INSPECTION AUTHORIZATION	OTHER (*Specify*)
	FAA DESIGNEE		REPAIR STATION		CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	

DATE OF APPROVAL OR REJECTION	CERTIFICATE OR DESIGNATION NO.	SIGNATURE OF AUTHORIZED INDIVIDUAL
May 2, 1989	IA 1980397	Curtis A. Richards

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. **DESCRIPTION OF WORK ACCOMPLISHED** *(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

Removed previous installed Brackett Air Filter Assembly, P/N BA-105, that was installed in accordance with STC-SA693CE and FAA Form 337 dated 7-28-88. Installed original equipment paper air filter in accordance with Piper PA28R Service Manual and Parts Catalog.

----------END----------

☐ ADDITIONAL SHEETS ARE ATTACHED

U.S. GOVERNMENT PRINTING OFFICE : 1967 OF—272-085

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY
OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE: Piper	MODEL: PA-28R-201
	SERIAL NO.: 28R-7837292	NATIONALITY AND REGISTRATION MARK: N36777
2. OWNER	NAME (As shown on registration certificate): Dierker, Mike Dierker, Jill L	ADDRESS (As shown on registration certificate): 3304 Apple drive St. Charles, Mo. 63301

3. FOR FAA USE ONLY

4. UNIT IDENTIFICATION / **5. TYPE**

UNIT	MAKE	MODEL	SERIAL NO.	5. REPAIR	5. ALTERATION
AIRFRAME	◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ (As described in item 1 above) ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆				X
POWERPLANT					
PROPELLER					
APPLIANCE	TYPE MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS	B. KIND OF AGENCY	C. CERTIFICATE NO.
Ozark Aircraft Radio PO Box 267 Chesterfield, Mo. 63006	( ) U.S. CERTIFICATED MECHANIC ( ) FOREIGN CERTIFICATED MECHANIC (X) CERTIFICATED REPAIR STATION ( ) MANUFACTURER	3329

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE	SIGNATURE OF AUTHORIZED INDIVIDUAL
September 6, 1988	Robert Arata

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is [X] APPROVED [ ] REJECTED

BY							OTHER (Specify)
	( )	FAA FLT. STANDARDS INSPECTOR	( )	MANUFACTURER	( )	INSPECTION AUTHORIZATION	
	( )	FAA DESIGNEE	(X)	REPAIR STATION	( )	CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	

DATE OF APPROVAL OR REJECTION	CERTIFICATE OR DESIGNATION NO.	SIGNATURE OF AUTHORIZED INDIVIDUAL
9/6/88	3329	Robert Arata

FAA Form 337 (7-67) (8320)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. DESCRIPTION OF WORK ACCOMPLISHED *(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

1) Installed David Clark Iso-Com in an adapter plate made of .050 2024 T3 alclad aluminum mounted in the instrument panel radio racks provided by the aircraft manufacturer. (station 59.0)

2) The above unit was installed per AC 43.13-2A chapter 2 and AC 43.13-1A chapter 11.

3) Aircraft weight and balance and equipment list updated and placed in the aircraft records.

----------end----------

☐ ADDITIONAL SHEETS ARE ATTACHED

☆U.S. GOVERNMENT PRINTING OF FICE: 1986-659-121/40260

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY

OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE: Piper	MODEL: PA28R-201
	SERIAL NO.: 28R-7837292	NATIONALITY AND REGISTRATION MARK: N36777
2. OWNER	NAME (As shown on registration certificate): Arizona Aero Inc.	ADDRESS (As shown on registration certificate): Post Office Box 20944 Phoenix, Arizona 85036

3. FOR FAA USE ONLY

4. UNIT IDENTIFICATION

UNIT	MAKE	MODEL	SERIAL NO.	5. TYPE: REPAIR	5. TYPE: ALTERATION
AIRFRAME	◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ (As described in item 1 above) ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆				X
WERPLANT					
PROPELLER					
APPLIANCE	TYPE				
	MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS	B. KIND OF AGENCY	C. CERTIFICATE NO.
Arizona Piper Sales and Services 2630 Sky Harbor Boulevard Phoenix, Arizona 85034	U.S. CERTIFICATED MECHANIC	462-42
	FOREIGN CERTIFICATED MECHANIC	
	X CERTIFICATED REPAIR STATION	
	MANUFACTURER	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE	SIGNATURE OF AUTHORIZED INDIVIDUAL
07-19-78	[signature]

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☒ APPROVED ☐ REJECTED

	FAA FLT. STANDARDS INSPECTOR		MANUFACTURER		INSPECTION AUTHORIZATION
	FAA DESIGNEE	X	REPAIR STATION		CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT

OTHER (Specify)

DATE OF APPROVAL OR REJECTION	CERTIFICATE OR DESIGNATION NO.	SIGNATURE OF AUTHORIZED INDIVIDUAL
07-19-78	462-42	[signature]

FAA Form 337 (7-67) (8320)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

DESCRIPTION OF WORK ACCOMPLISHED *(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

Installed Narco Centerline Package Consisting of:

1 ea.	CP136 Audio Panel
2 ea.	Com 120 Transceivers
1 ea.	Nav 122 VOR/ILS/MKR Receiver
1 ea.	Nav121 VOR/LOC Receiver
1 ea.	ADF 141 ADF System
1 ea.	AT150 Transponder
1 ea.	AR500 Blind Encoder
1 ea.	VP17 ADF Sense Antenna
1 ea.	VRP37 Nav. Antenna
2 ea.	AD11 Com Antennas
1ea.	VRP48 Nav. Ant. Coupler
1 ea.	Speaker
1 ea.	M700B Microphone

Antennas installed on doublers provided by aircraft manufacturer.
Radios installed in panel space provided by aircraft manufacturer.
Installation was performed in accordance with manufacturer's specifications and AC 43.13-2, Chapter 2.
Static system checked per FAR 91.170.
Transponder checked per FAR 91.177 using MEC720A Ramp Tester to 24,000 feet.
Updated equipment list, revised weight and balance, and log book entry completed July 19, 1978.
Determined electrical load does not exceed 100 percent of alternator capacity.

END

☐ ADDITIONAL SHEETS ARE ATTACHED

★1975-G.P.O.-1703-M/673-200/175

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY

OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE: Piper	MODEL: Cherokee Arrow III
	SERIAL NO.: 22R-7837292	NATIONALITY AND REGISTRATION MARK: N36777
2. OWNER	NAME *(As shown on registration certificate)*: Piper Aircraft Corp.	ADDRESS *(As shown on registration certificate)*: Vero Beach, Florida 32960

3. FOR FAA USE ONLY

4. UNIT IDENTIFICATION

UNIT	MAKE	MODEL	SERIAL NO.	5. TYPE: REPAIR	5. TYPE: ALTERATION
AIRFRAME	(As described in item 1 above)				
POWERPLANT					
PROPELLER					
APPLIANCE	TYPE / MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS	B. KIND OF AGENCY	C. CERTIFICATE NO.
Hawkes Avionics, Inc. 2630 Sky Harbor Blvd. Phoenix, Az. 85034	U.S. CERTIFICATED MECHANIC FOREIGN CERTIFICATED MECHANIC XXX CERTIFICATED REPAIR STATION MANUFACTURER	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE	SIGNATURE OF AUTHORIZED INDIVIDUAL
2-5-79	

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is [XX] APPROVED [ ] REJECTED

BY							OTHER *(Specify)*
	[ ]	FAA FLT. STANDARDS INSPECTOR	[ ]	MANUFACTURER	[ ]	INSPECTION AUTHORIZATION	
	[ ]	FAA DESIGNEE	XXX	REPAIR STATION	[ ]	CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	

DATE OF APPROVAL OR REJECTION	CERTIFICATE OR DESIGNATION NO.	SIGNATURE OF AUTHORIZED INDIVIDUAL
2-5-79		

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. DESCRIPTION OF WORK ACCOMPLISHED *(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

Installed Edo-Aire Mitchell Autopilot C-11B.
All work performed in accordance with the requirment of the FAA Reg. and advisory circular 43-13 1&2 and manufacturer's procedures manual AK653 STC#SA31965W-D

WEIGHT AND BALANCE INFORMATION

	ITEM	WEIGHT	ARM	MOMENT
Add:	Attitaude Gyro 52D66	2.7	59.0	159.3
	Course Sel. D.G. 52D54	2.9	59.0	171.1
	Console-Amp 1C385	1.1	59.0	66.1
	Roll Servo 1C363-1-430R	2.3	109.0	250.7
	Cables	.5	59.5	29.8
	Radio Coupler	1.0	59.3	59.3

☐ **ADDITIONAL SHEETS ARE ATTACHED**

☆U.S. Government Printing Office 1976—771-980/65

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY

OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE: Piper	MODEL: PA-28R-201
	SERIAL NO.: 28R-7837292	NATIONALITY AND REGISTRATION MARK: N-36777
2. OWNER	NAME (As shown on registration certificate): Lindquist Investment Company	ADDRESS (As shown on registration certificate): 3909 South Airport Road, Ogden, Utah 84405

3. FOR FAA USE ONLY

4. UNIT IDENTIFICATION / 5. TYPE

UNIT	MAKE	MODEL	SERIAL NO.	5. TYPE: REPAIR	5. TYPE: ALTERATION
AIRFRAME	~~~~~~~~~~ (As described in item 1 above) ~~~~~~~~~~				XX
POWERPLANT					
PROPELLER					
APPLIANCE	TYPE / MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS	B. KIND OF AGENCY		C. CERTIFICATE NO.
Sunwest Aviation 3909 South Airport Road Ogden, Utah 84405		U.S. CERTIFICATED MECHANIC	CRS-4548
		FOREIGN CERTIFICATED MECHANIC	
	XX	CERTIFICATED REPAIR STATION	
		MANUFACTURER	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE	SIGNATURE OF AUTHORIZED INDIVIDUAL
7-28-88	Les DeNaught

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is [XX] APPROVED [ ] REJECTED

BY							OTHER (Specify)
		FAA FLT. STANDARDS INSPECTOR		MANUFACTURER		INSPECTION AUTHORIZATION	
		FAA DESIGNEE	XX	REPAIR STATION		CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	

DATE OF APPROVAL OR REJECTION	CERTIFICATE OR DESIGNATION NO.	SIGNATURE OF AUTHORIZED INDIVIDUAL
7/28/88	CRS-4548	Les DeNaught

FAA Form 337 (7-67) (8320)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. DESCRIPTION OF WORK ACCOMPLISHED *(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

1. Inspected previous installed Brackett air filter assembly P/N BA-105 by persons unknown. This filter is a direct replacement part and approved for this model aircraft under STC-SA693CE. Aircraft records are revised to show this alteration.

END

☐ ADDITIONAL SHEETS ARE ATTACHED

☆ U.S. GPO: 1981 - 775-332/47

U.S. Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No.2120-0020

For FAA Use Only

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C.1421). Failure to report can result in a civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act 1958)

1. Aircraft	Make: Piper	Model: PA-28R-201
	Serial No.: 28R-7837292	Nationality and Registration Mark: N36777
2. Owner	Name (As shown on registration certifcate): Litwin Linda J.	Address (As shown on registration certificate): 3803 Legation St. N.W. Washington, DC 20015

3. For FAA Use Only

4. Unit Identification / **5. Type**

Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	~~~~~~~~~~~~~~~~~~~~ *(As described in item 1 above)* ~~~~~~~~~~~~~~~~~~~~				X
POWERPLANT					
PROPELLER					
APPLIANCE	Type / Manufacturer				

6. Conformity Statement

A. Agency's Name and Address	B. Kind of Agency		C. Certificate No.
Richard W. Wilkinson III 6042 Old Bohn Rd Mt. Airy Md 21771	X	U.S. Certified Mechanic	AP213508270
		Foreign Certified Mechanic	
		Certified Repair Station	
		Manufacturer	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Date	Signature of Authorized Individual
10/26/99	Richard W. Wilkinson III

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is [X] APPROVED [ ] REJECTED

BY							Other
		FAA Flt Standards		Manufacturer	X	Inspection Authorization	
		FAA Designee		Repair Station		Person Approved by Transport Canada Airworthiness Group	

Date of Approval or Rejection	Certificte or Designation No.	Signature of Authorized Individual
10/26/99	213508270IA	Richard W. Wilkinson III

FAA Form 337 (12-88)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

Replace existing two blade Propeller with new McCauley three blade propeller model B3D36C424/74SA in accordance with McCauley Technical report No. 805, dated Sept 17, 1993 and McCauley drawing No. D-60133, dated Oct, 21 1993 according to McCauley STC SA129CH.
FAA approved supplement added to the pilots operating handbook: McCauley technical report No. 804 dated Nov, 9 1993 according to McCauley STC SA129CH.
Weight and Balance and equiptment list data updated to include this new alteration.
**********End**********

☐ Additional Sheets Are Attached

U.S.GPO:1989-0-663-171

TABLE OF CONTENTS

SECTION 7

DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

SECTION 7

DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

7.1 THE AIRPLANE

The Cherokee Arrow III is a single engine, retractable landing gear, all metal airplane. It has seating for up to four occupants and has a 200 pound luggage compartment.

7.3 AIRFRAME

With the exception of the steel engine mount, the landing gear, miscellaneous steel parts, the cowling, and the lightweight plastic extremities (tips of wings, tail fin, rudder and stabilator), the basic airframe is of aluminum alloy. Aerobatics are prohibited in this airplane since the structure is not designed for aerobatic loads.

The fuselage is a semi-monocoque structure with a passenger door on the forward right hand side and a cargo door on the aft right hand side.

The wing is of a semitapered design and employs a laminar flow NACA 65_2-415 airfoil section. The main spar is located at approximately 40% of the chord aft of the leading edge. The wings are attached to the fuselage by the insertion of the butt ends of the spar into a spar box carry-through, which is an integral part of the fuselage structure. The bolting of the spar ends into the spar box carry-through structure, which is located under the aft seats, provides in effect a continuous main spar. The wings are also attached fore and aft of the main spar by an auxiliary front spar and a rear spar. The rear spar, in addition to taking torque and drag loads, provides a mount for flaps and ailerons. The four-position wing flaps are mechanically controlled by a handle located between the front seats. When fully retracted, the right flap locks into place to provide a step for cabin entry. Each wing contains one fuel tank.

A vertical stabilizer, an all-movable horizontal stabilator, and a rudder make up the empennage. The stabilator incorporates an anti-servo tab which improves longitudinal stability and provides longitudinal trim. This tab moves in the same direction as the stabilator, but with increased travel.

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7.5 ENGINE AND PROPELLER

The Cherokee Arrow III incorporates a Lycoming IO-360-C1C6 four-cylinder, direct drive, horizontally opposed fuel injected engine rated at 200 horsepower at 2700 RPM. It is furnished with a starter, 60 ampere 14-volt alternator, shielded ignition, vacuum pump drive, fuel pump, propeller governor and a dry automotive type induction air filter. A recommended overhaul period is based on Lycoming service experience. Since Lycoming from time to time revises the recommended overhaul period, the owner should check the latest Lycoming Service Instruction Number 1009 at his Piper dealer for the latest recommended overhaul period and for any additional information.

The aircraft is equipped with a constant speed, controllable pitch propeller. The propeller control is located on the power quadrant between the throttle and mixture controls. A mixture control lock is provided to prevent activation of the mixture control instead of the pitch control.

The exhaust system is a crossover type, which reduces back pressure and improves performance. It is constructed entirely of stainless steel and is equipped with dual mufflers. Cabin heat and windshield defrosting are provided by a heater shroud around the muffler.

An oil cooler is located on the forward lower right side of the firewall, with the air inlet for the cooler located on the right side of the bottom cowling. A winterization plate is provided to restrict air during winter operation. (See Winterization in Handling and Servicing.)

7.7 INDUCTION SYSTEM

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

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

The fuel flow portion of the manifold fuel flow gauge is connected to the flow divider and monitors fuel pressure. This instrument converts fuel pressure to an indication of fuel flow in gallons per hour and percentage of rated horsepower.

The alternate air source of the induction system contains a door that functions automatically or manually. If the primary source is obstructed, the door will open automatically. It may be opened manually by moving the selector on the right side of the quadrant. The primary source should always be used for take-off.

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

7.9 ENGINE CONTROLS

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

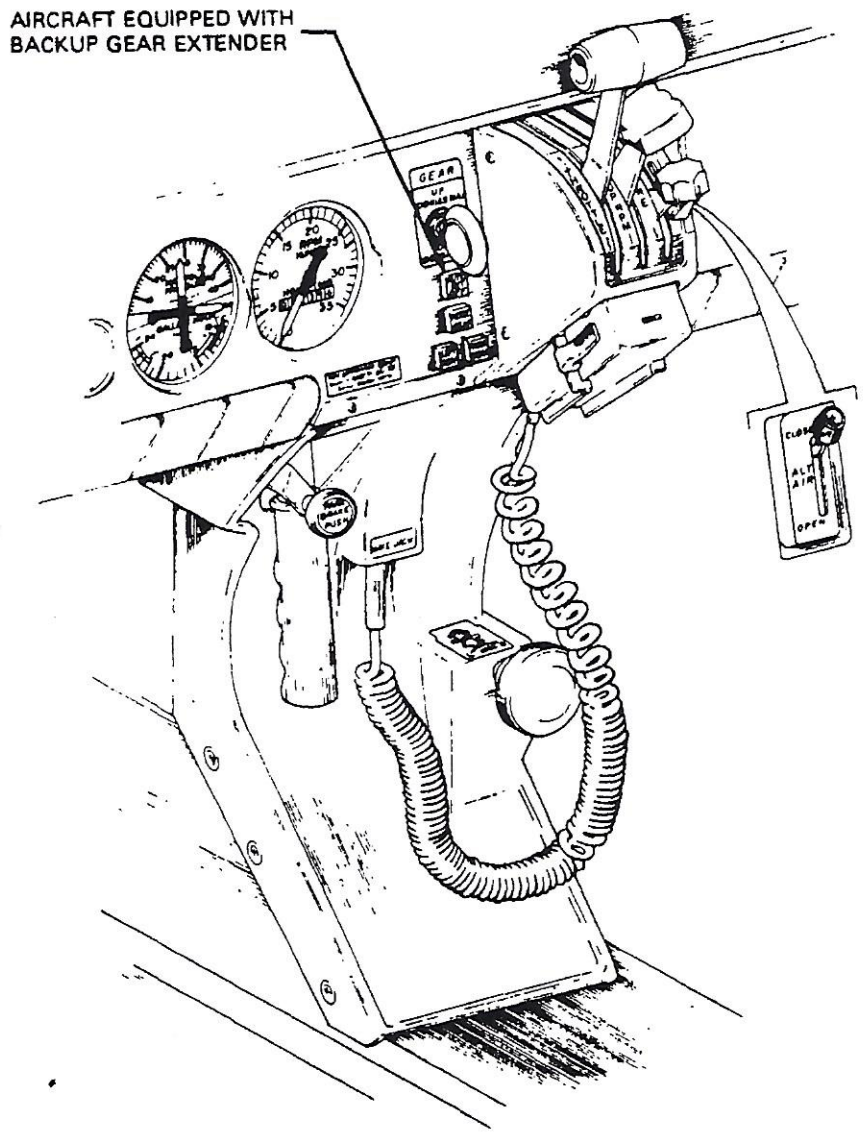
The throttle lever is used to adjust the manifold pressure. It incorporates a gear up warning horn switch which is activated during the last portion of travel of the throttle lever to the low power position. If the landing gear is not locked down, the horn will sound until the gear is down and locked or until the power setting is increased. This is a safety feature to prevent an inadvertent gear up landing.

The propeller control lever is used to adjust the propeller speed from high RPM to low RPM.

The mixture control lever is used to adjust the air to fuel ratio. The engine is shut down by the placing of the mixture control lever in the full lean position. In addition, the mixture control has a lock to prevent activation of the mixture control instead of the pitch control. For information on the leaning procedure, see the Avco-Lycoming Operator's Manual.

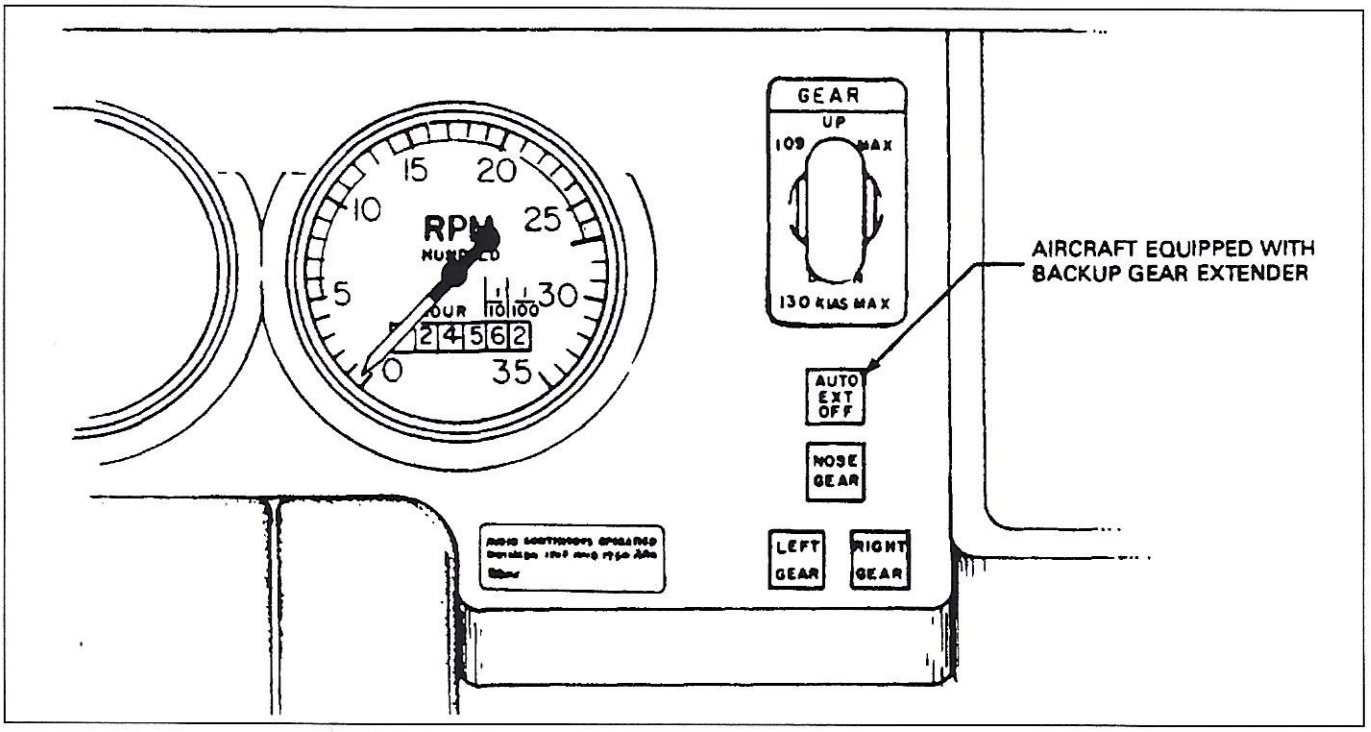
The friction adjustment lever on the right side of the control quadrant may be adjusted to increase or decrease the friction holding the throttle, propeller, and mixture controls in a selected position.

The alternate air control is located to the right of the control quadrant. When the alternate air lever is in the up, or closed, position the engine is operating on filtered air; when the lever is in the down, or open, position the engine is operating on unfiltered, heated air (refer to Figure 7-1).



CONTROL QUADRANT AND CONSOLE

Figure 7-1



LANDING GEAR SELECTOR

Figure 7-3

7.11 LANDING GEAR

The Cherokee Arrow III is equipped with a retractable tricycle landing gear, which is hydraulically actuated by an electrically powered reversible pump. The pump is controlled by a selector switch on the instrument panel to the left of the control quadrant (figure 7-3). The landing gear is retracted or extended in about seven seconds.

Some aircraft have a backup gear extender system which incorporate a pressure sensing device that lowers the gear regardless of gear selector position, depending upon airspeed and engine power (propeller slipstream). Gear extension is designed to occur, even if the selector is in the up position, at airspeeds below approximately 95 KIAS with power off. The extension speeds will vary from approximately 75 KTS to approximately 95 KIAS depending on power settings and altitude. The device also prevents the gear from retracting at airspeeds below approximately 75 KTS with full power, though the selector switch may be in the up position. This speed increases with reduced power and/or increased altitude. Manual override of the device is provided by an emergency gear lever located between the front seats to the left of the flap handle (refer to figure 7-9). The sensing device operation is controlled by differential air pressure across a flexible diaphragm which is mechanically linked to a hydraulic valve and an electrical switch which actuates the pump motor. A high pressure and static air source for actuating the diaphragm is provided in a mast mounted on the left side of the fuselage above the wing. Any obstruction of the holes in this mast will cause the gear to extend. An optional heated mast is available to alleviate obstruction in icing conditions. The optional heated mast is turned on whenever the "PITOT HEAT" is turned on.

WARNING

Avoid ejecting objects out of the pilot storm window which could possible enter or obstruct the holes in the mast.

The emergency gear lever, when placed in the raised position, can be used to override the system, and gear position is then controlled by the selector switch regardless of airspeed/power combinations. The emergency gear lever is provided with a locking device which may be used to lock the override lever in the up position. The lock is located on the left side panel of the console below the level of the manual override lever. To lock the override lever in the up position, raise the override lever to the full up position and push the lock pin in. A yellow warning light located below the gear selector switch (figure 7-3) flashed to warn the pilot that the automatic gear lowering system is disabled. The lock is spring-loaded to the off position to aid disengagement. To disengage the lock raise the override lever and release. The lever will return to its normal position and the yellow flashing light will extinguish. The lever must also be locked in the raised (up) position when gear-up stalls are practiced.

The emergency gear lever, when used for emergency extension of the gear, manually releases hydraulic pressure to permit the gear to free-fall with spring assistance on the nose gear. The lever must be held in the downward position for emergency extension. During normal landing gear operation, aircraft equipped with the backup gear extender should have the Emergency Gear Extension Lever in the normal/disengaged position to permit proper gear operation. If the Emergency Gear Extension Lever is not in the normal/disengaged position, the landing gear may not extend or retract during automatic or manual gear operation. For aircraft not equipped with the backup gear extender, the Emergency Gear Extension Lever should be in the up position to permit normal gear operation.

Gear down and locked positions are indicated by three green lights located below.· the selector, and a red "Warning Gear Unsafe" light is located at the top of the panel. An all lights out condition indicates the gear is up. The landing gear should not be retracted above a speed of 107 KIAS and should not be extended above a speed of 129 KIAS.

The main landing gear uses 6.00 x 6 wheels. The main gear incorporate brake drums and single disc hydraulic brake assemblies. The nose wheel carries a 5.00 x 5 four ply tire and the main gear use 6.00 x 6 six ply tires. All three tires are tube type.

A micro switch in the throttle quadrant activates a warning horn and red "Warning Gear Unsafe" light under the following conditions:

(a) Gear up and power reduced below approximately 14 inches of manifold pressure.

(b) On aircraft equipped with the backup gear extender, if the system has extended the landing gear and the gear extender is "UP," with the power reduced below approximately 14 inches of manifold pressure.

(c) Gear selector switch "UP" while on the ground and throttle in retarded position.

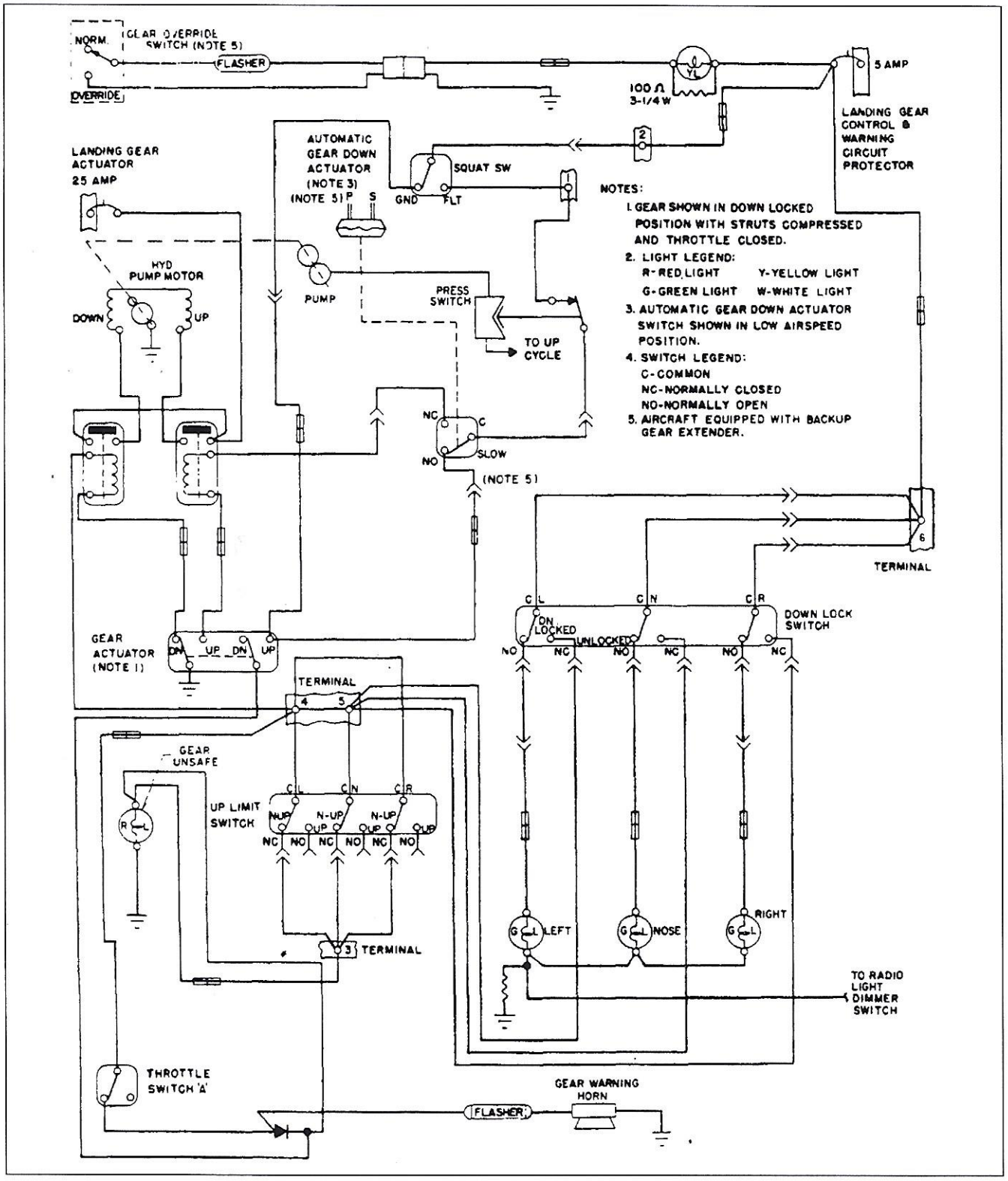
On aircraft which are NOT equipped with the backup gear extender, an additional switch is installed which activates the warning horn and light and flaps are extended beyond the approach position (1 0°) and the landing gear are not down and locked.

The gear warning horn emits a 90 Hz beeping sound in contrast to the stall warning horn which emits a continuous sound.

The nose gear is steerable through a 30 degree arc each side of center through the use of the rudder pedals. As the nose wheel retracts, the steering linkage disengages to reduce rudder pedal loads in flight. The nose wheel is equipped with a hydraulic shimmy dampener to reduce nose wheel shimmy. A bungee assembly is also included to reduce ground steering effort and to dampen shocks and bumps during taxiing.

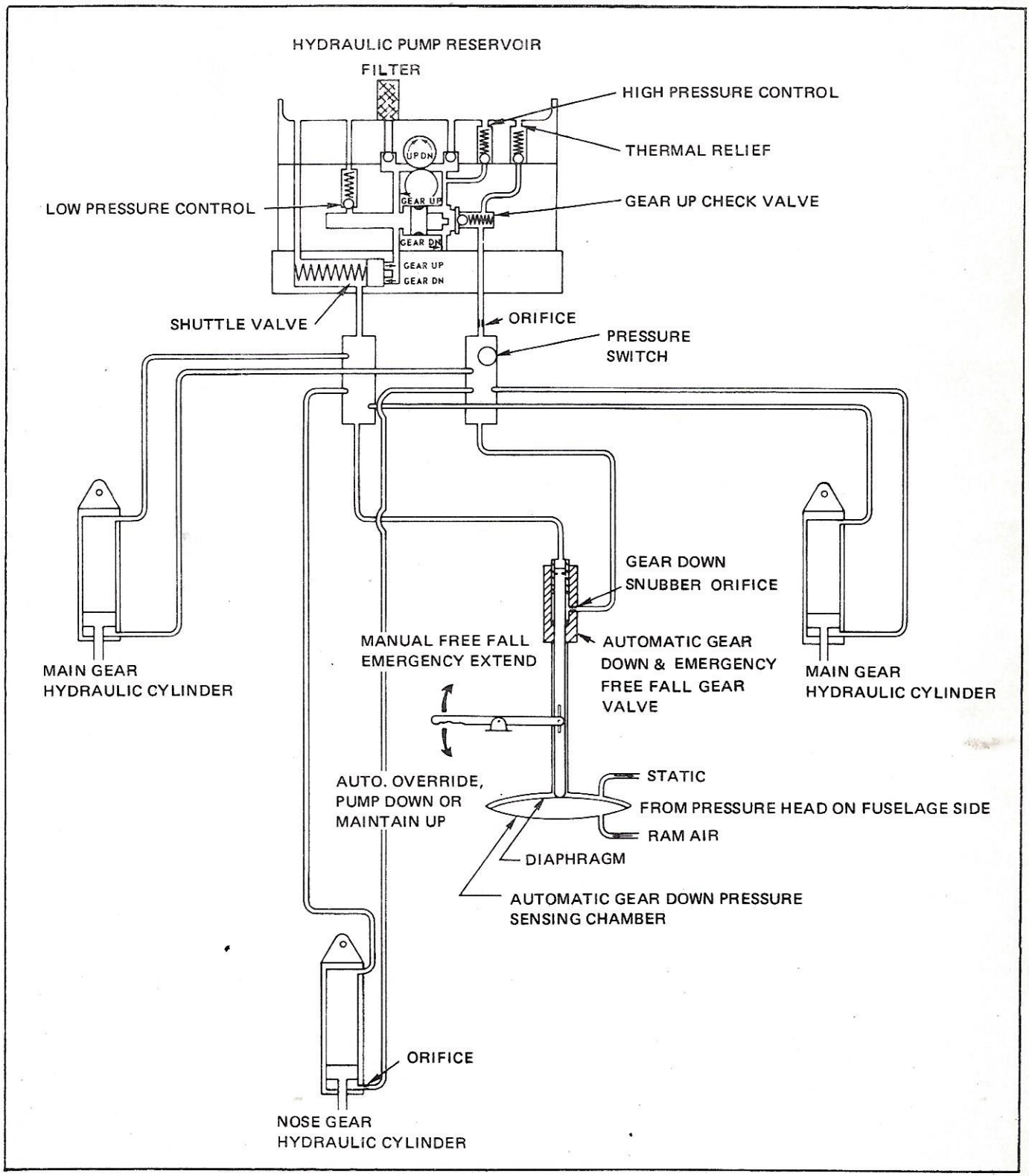
The oleo strust are of the air-oil type, with normal extension being 2.75 +1- 0.25 inches for the nose gear and 2.5 +1- 0.25 inches for the main gear under normal static load (empty weight of airplane plus full fuel and oil).

The standard brake system includes toe brakes on the left and right set of rudder pedals and a hand brake located below and near the center of the instrument panel. The toe brakes and the hand brake have individual brake cylinders, but all cylinders use a common reservoir. The parking brake is incorporated in the lever brake and is operated by pulling back on the lever and depressing the knob attached to the top of the handle. To release the parking brake, pull back on the brake lever; then allow the handle to swing forward.



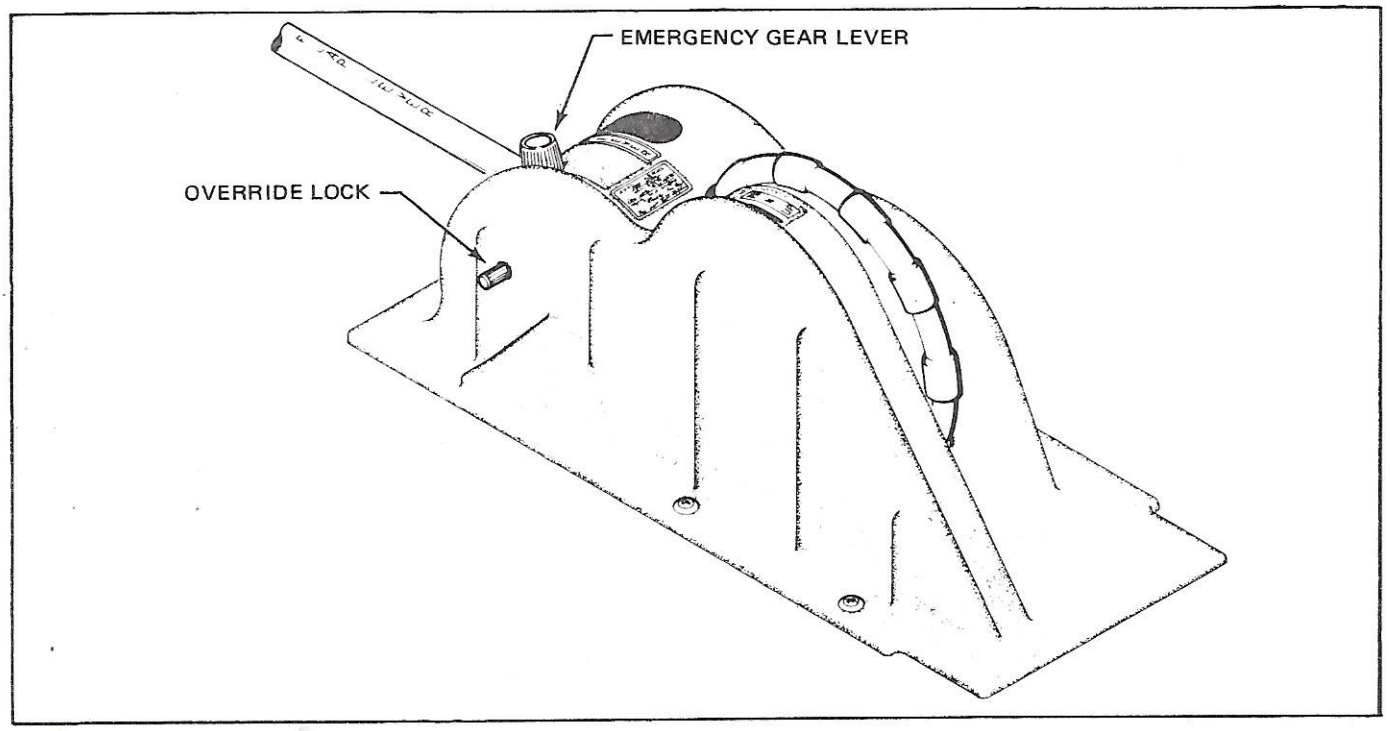
LANDING GEAR ELECTRICAL SCHEMATIC

Figure 7-5



LANDING GEAR HYDRAULIC SCHEMATIC

Figure 7-7



FLIGHT CONTROL CONSOLE

Figure 7-9

7.13 FLIGHT CONTROLS

Dual flight controls are provided as standard equipment. A cable system provides actuation of the control surfaces when the flight controls are moved in their respective directions.

The horizontal surface (stabilator) is of the flying tail design with a trim tab/servo mounted on the trailing edge. This tab serves the dual function of providing trim control and pitch control forces. The trim function is controlled by a trim control wheel located on the control console between the two front seats (Figure 7-9). Rotating the wheel forward gives nose down trim and rotation aft gives nose up trim.

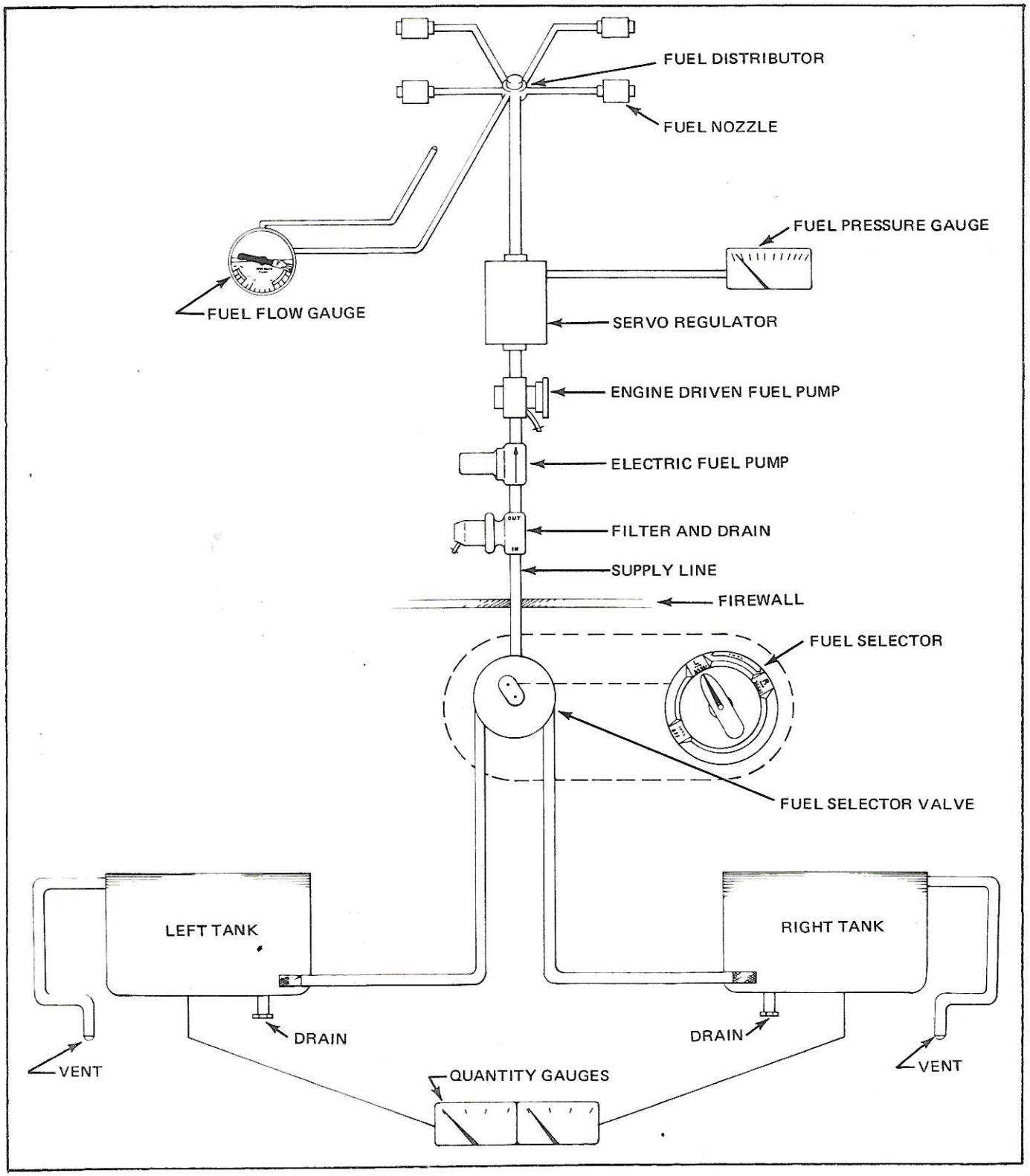
The rudder is conventional in design and incorporates a rudder trim. The trim mechanism is a spring-loaded recentering device. The trim control is located on the right side of the pedestal below the throttle quadrant. Turning the trim control clockwise gives nose right trim and counterclockwise rotation gives nose left trim.

Manually controlled flaps are provided. They are extended by a control cable and are spring-loaded to the retracted (up) position. The control is located between the two front seats on the control console. To extend the flaps pull the handle up to the desired flap setting of 10, 25 or 40 degrees. To retract, depress the button on the end of the handle and lower the control.

When extending or retracting flaps, there is a pitch change in the aircraft. This pitch change can be corrected either by stabilator trim or increased control wheel force. When the flaps are in the retracted position the right flap, provided with a over-center lock mechanism, acts as a step.

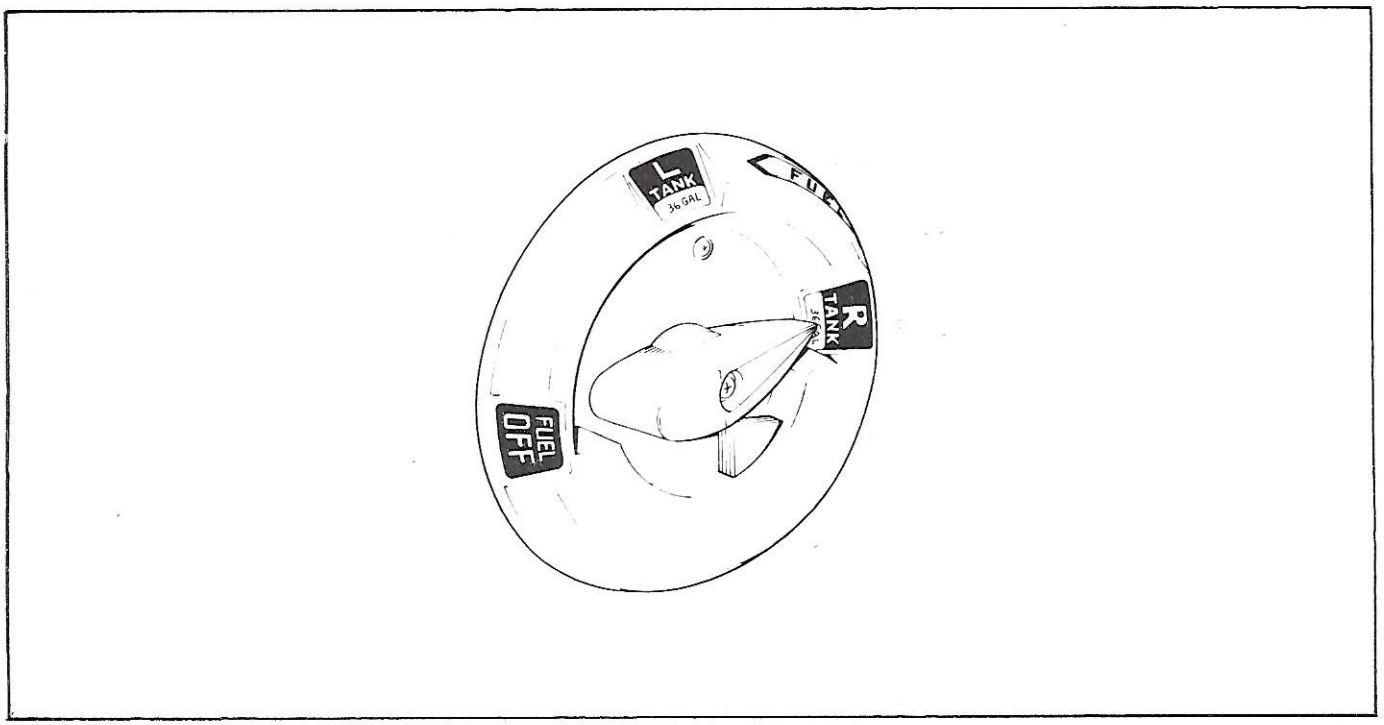
NOTE

The right flap will support a load only in the fully retracted (up) position. When loading and unloading passengers make sure the flaps are in the retracted (up) position.



FUEL SYSTEM SCHEMATIC

Figure 7-11



FUEL SELECTOR

Figure 7-13

7.15 FUEL SYSTEM

The fuel system incorporates two fuel tanks, one in each wing. Each has a capacity of 38.5 U.S. gallons, giving a total of 77 gallons, of which 72 gallons is usable. The tanks are attached to the leading edges of the wings and are an integral part of the wing structure. The fuel tanks are vented individually through vent tubes which protrude below the bottom of the wings at the rear outboard corner of each tank. The vents should be checked periodically for obstructions which might block the free passage of air.

Normally, fuel is supplied to the engine through an engine-driven fuel pump. An auxiliary electric fuel pump serves as a back-up feature. The electric fuel pump is controlled by a rocker switch on the switch panel above the throttle quadrant. The electric fuel pump should be ON when switching fuel tanks and during takeoffs and landings.

The fuel tank selector (Figure 7-13), which allows the pilot to select the tank supplying fuel to the engine, is located on the left sidewall of the cockpit, below the instrument panel. It has three positions: OFF, LEFT TANK and RIGHT TANK. The arrow on the handle of the selector points to the tank which is supplying fuel to the engine. The valve also incorporates a safety latch which prevents inadvertently selecting the "OFF" position.

Fuel quantity and pressure are indicated on gauges on the instrument panel. There is a separate fuel quantity gauge for each tank.

Each fuel tank has an individual quick drain located at the bottom inboard rear corner (see Figure 8-3). These drains are opened by insertion of the probe in the fuel sampler container into the drain. The fuel strainer incorporates a drain which protrudes from the cowling at the lower left front corner of the firewall. All three drains should be drained before flights and the drained fuel checked for water, sediment and proper fuel.

CAUTION

When draining fuel, care should be exercised to ensure that no fire hazard exists before starting the engine.

7.17 ELECTRICAL SYSTEM

The electrical system is very simple and functional. All switches are grouped in a switch panel above the power quadrant. On the lower right side of the instrument panel is the circuit breaker panel, with each breaker clearly marked to show what circuit it protects. Also, circuit provisions are made to handle a complete complement of communication and navigational equipment.

Standard electrical accessories include alternator, starter, electric fuel pump, stall warning indicator, ammeter, and annunciator panel.

The annunciator panel includes alternator and low oil pressure indicator lights. When the optional gyro system is installed, the annunciator panel also includes a low vacuum indicator light. The annunciator panel lights are provided only as a warning to the pilot that a system may not be operating properly, and that he should check and monitor the applicable system gauge to determine when or if any necessary action is required.

Optional electrical accessories include navigation, anti-collision, landing, instrument and cabin dome lights. Navigation and radio lights are controlled by a rheostat switch on the left side of the switch panel. The instrument panel lights are controlled by a rheostat switch on the right side of the panel.

WARNING

When optional panel lights are installed, rheostat switch must be off to obtain gear lights full intensity during daytime flying. When aircraft is operated at night and panel light rheostat switch is turned on, gear lights will automatically dim.

The anti-collision and landing lights are controlled by rocker switches on the switch panel. Circuits will handle a full complement of communications and navigational equipment.

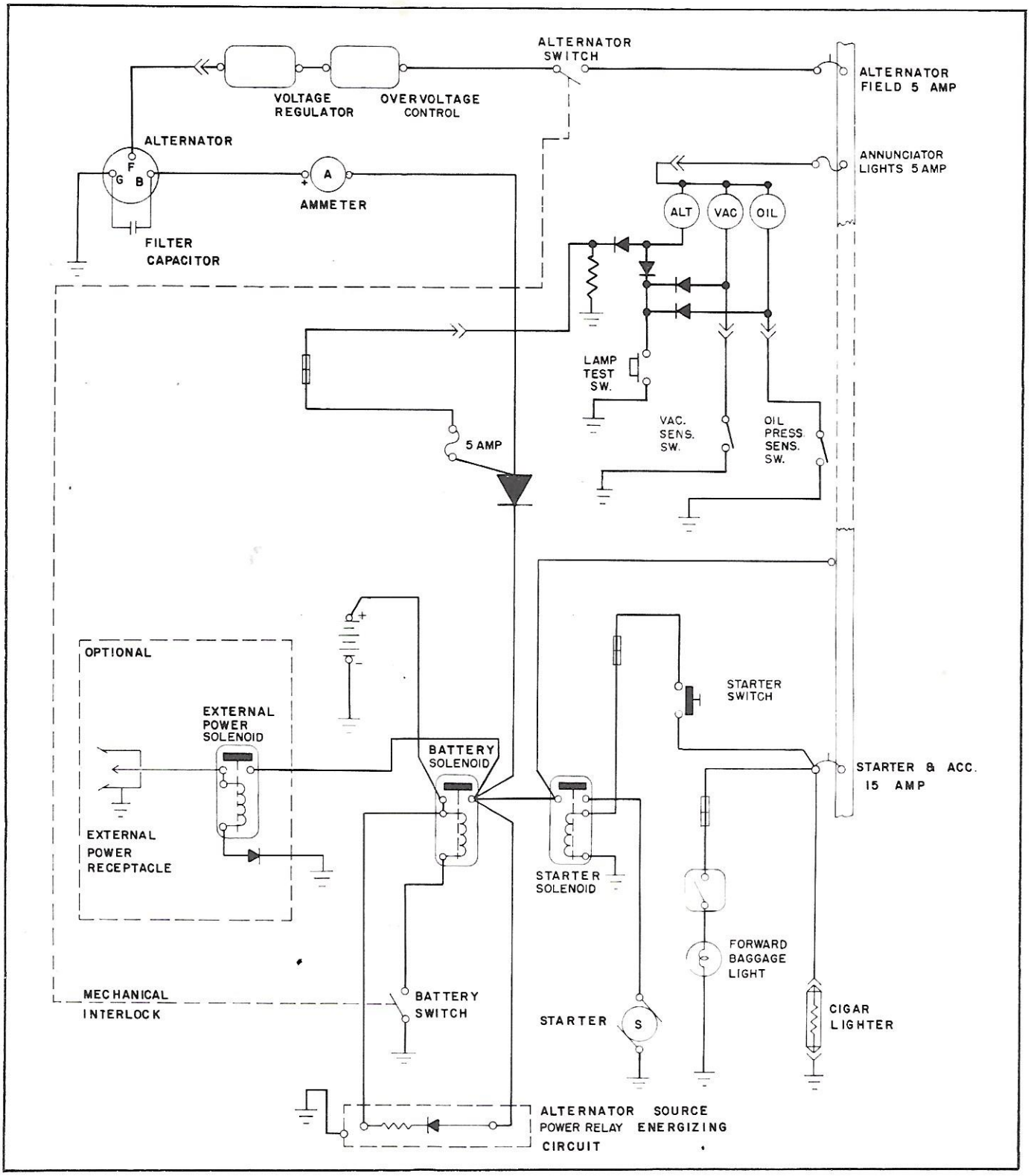
WARNING

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

The master switch, also located in the switch panel, is a split rocker switch. One side of the switch is the battery side ("BAT") and the other is the alternator side ("ALT"). Henceforth, "master switch," used in this manual, shall mean both "BAT" and "ALT" switches. The "ALT" switch is provided for an emergency and its function is covered under "Alternator Failure" in the Emergency section of the handbook.

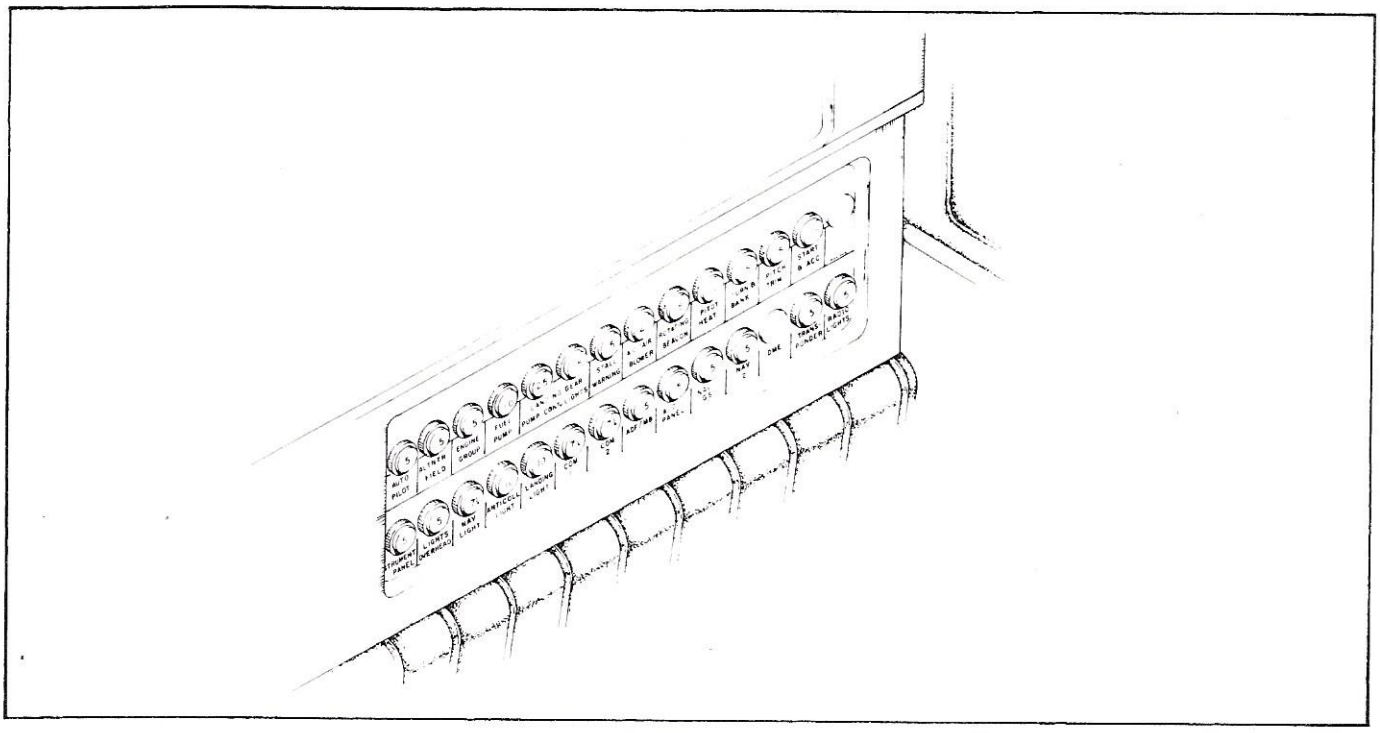
The primary electrical power source is a 14-volt, 60 amp alternator, which is protected by a voltage regulator and an overvoltage relay. The alternator provides full electrical power output even at low engine RPM. This provides improved radio and electrical equipment operation and increases battery life by reducing battery load.

Secondary power is provided by a 12-volt, 25 ampere hour battery.



ALTERNATOR AND STARTER SCHEMATIC

Figure 7-15



CIRCUIT BREAKER PANEL

Figure 7-17

The ammeter as installed does not show battery discharge; rather it shows the electrical load placed on the system. With all the electrical equipment off, and the master switch on, the ammeter will indicate the charging rate of the battery. As each electrical unit is switched on, the ammeter will indicate the total ampere draw of all the units including the battery. For example, the average continuous load for night flying with radios on is about 30 amperes. The 30 ampere value plus 2 amperes for charging the battery will then show on the ammeter, indicating the alternator is functioning properly.

Solenoids, provided in the battery and starter circuits, are used to control high current drain functions remotely from the cabin.

The master switch is a split switch with the left half operating the master relay and the right half energizing the alternator. This switch is interlocked so that the alternator cannot be operated without the battery. For normal operation, be sure that both halves are turned on.

WARNING

When optional panel lights are installed, radio dimming switch must be off to obtain gear lights full intensity during daytime flying. When aircraft is operated at night and panel light radio dimming switch is turned on, gear lights will automatically dim.

7.19 VACUUM SYSTEM

The vacuum system is designed to operate the air driven gyro instruments. This includes the directional and attitude gyros when installed. The system consists of an engine driven vacuum pump, a vacuum regulator, a filter and the necessary plumbing.

The vacuum pump is a dry type pump which eliminates the need for an air/oil separator and its plumbing. A shear drive protects the engine from damage. If the drive shears the gyros will become inoperative.

The vacuum gauge, mounted on the right instrument panel to the right of the radios, (refer to Figure 7-21) provides valuable information to the pilot about the operation of the vacuum system. A decrease in pressure in a system that has remained constant over an extended period, may indicate a dirty filter, dirty screens, possibly a sticking vacuum regulator or leak in system (a low vacuum indicator light is provided in the annunciator panel). Zero pressure would indicate a sheared pump drive, defective pump, possibly a defective gauge or collapsed line. In the event of any gauge variation from the norm, the pilot should have a mechanic check the system to prevent possible damage to the system components or eventual failure of the system.

A vacuum regulator is provided in the system to protect the gyros. The valve is set so the normal vacuum reads 4.8 to 5.2 inches of mercury, a setting which provides sufficient vacuum to operate all the gyros at their rated RPM. Higher settings will damage the gyros and with a low setting the gyros will be unreliable. The regulator is located behind the instrument panel.

7.21 PITOT-STATIC SYSTEM

The system supplies both pitot and static pressure for the airspeed indicator, altimeter and vertical speed indicator (when installed).

Pitot pressure is picked up by the pitot head on the underside of the left wing. An optional heated pitot head, which alleviates problems with icing or heavy rain, is available. The switch for pitot heat is located on the switch panel.

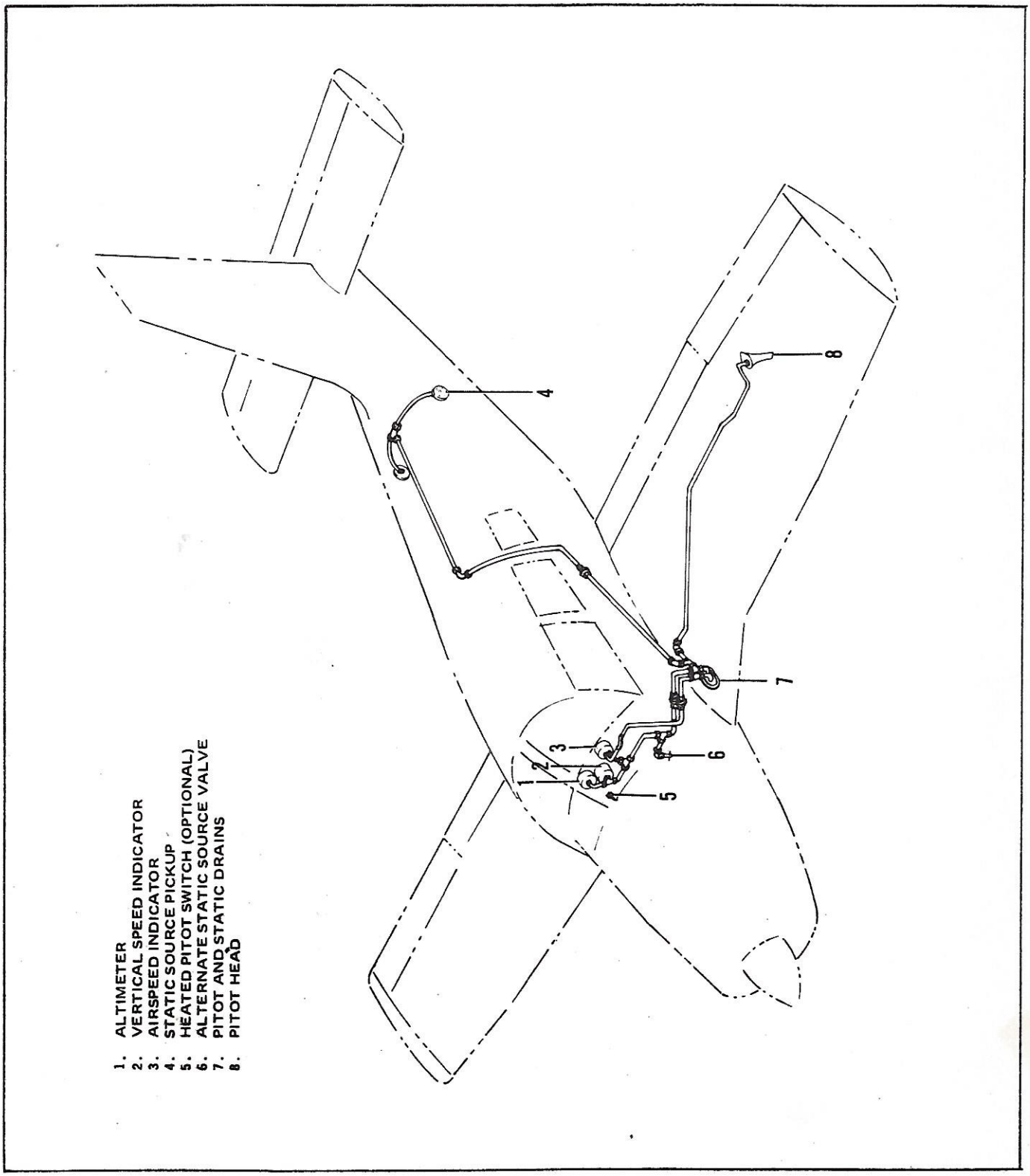
Static pressure is sensed by static buttons on each side of the aft fuselage. Push-button type pitot and static drains are located on the lower left sidewall of the cockpit.

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

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

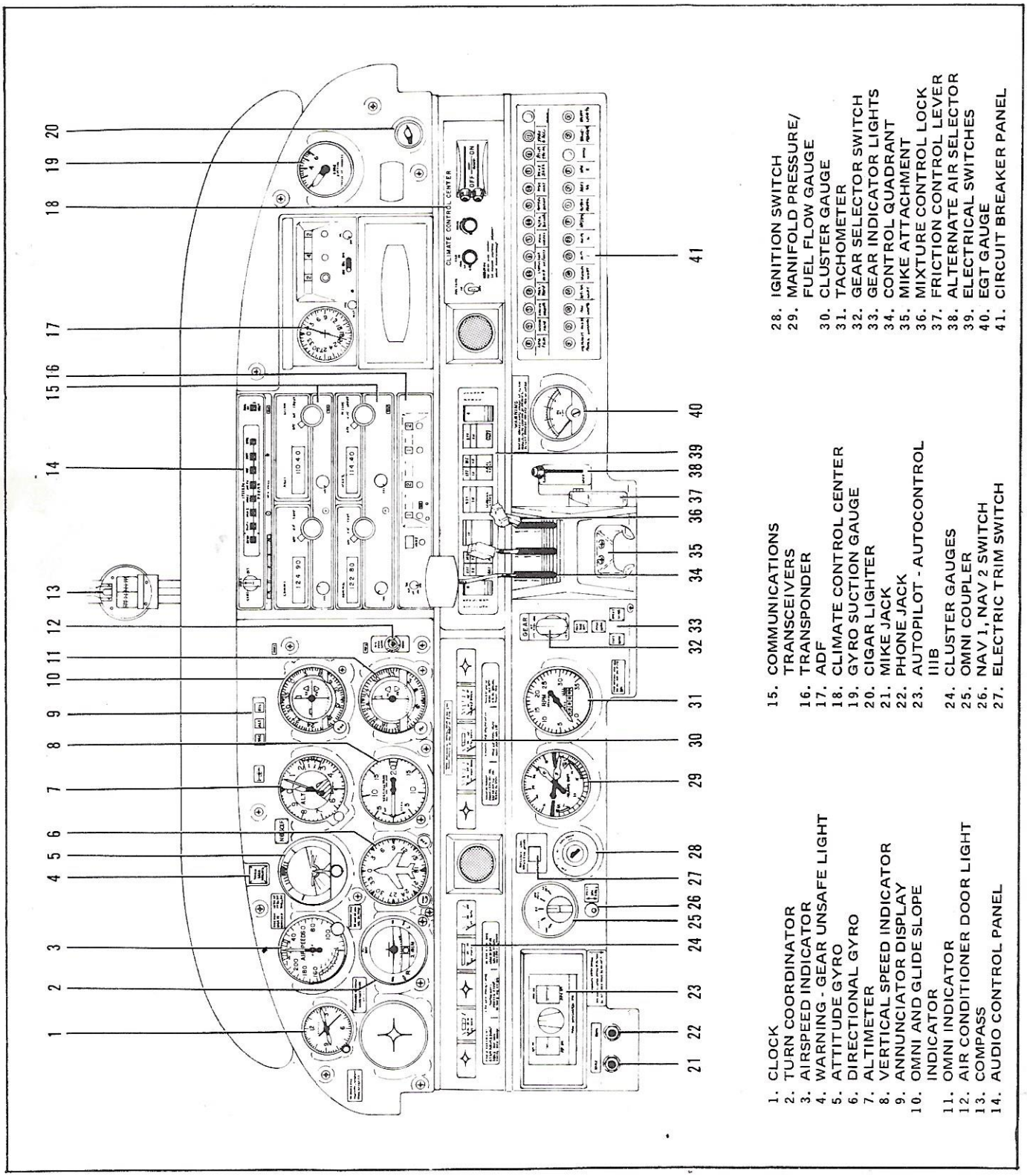
NOTE

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



PITOT-STATIC SYSTEM

Figure 7-19



INSTRUMENT PANEL

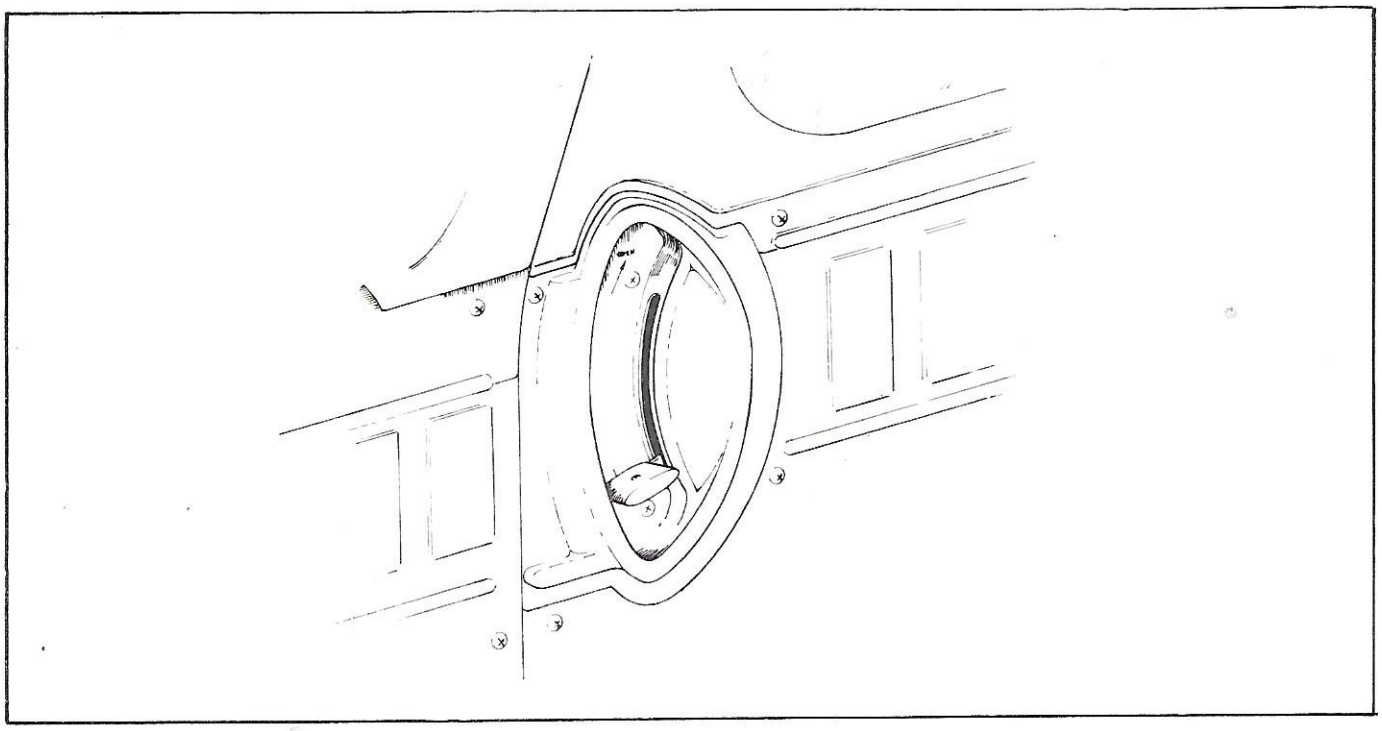
Figure 7-21

7.23 INSTRUMENT PANEL

The instrument panel of the Cherokee Arrow III is designed to accommodate the customary advanced flight instruments and the normally required power plant instruments. The artificial horizon and directional gyro are vacuum operated and are located in the center of the left hand instrument panel. The vacuum gauge is located on the right hand instrument panel. The turn indicator, on the left side, is electrically operated.

The radios are located in the center section of the panel, and the circuit breakers are in the lower right corner of the panel.

An annunciator panel is mounted in the upper instrument panel to warn the pilot of a possible malfunction in the alternator, oil pressure, or vacuum systems.



CABIN DOOR LATCH

Figure 7-23

7.25 CABIN FEATURES

The interior has been designed for passenger comfort and safety. All seat backs have three positions: normal, intermediate and recline. The adjustment lever is located at the base of the seat back on the outboard side of the seat. The front seats adjust fore and aft for ease of entry and occupant comfort. An armrest is located on the side panels adjacent to the front seat. The rear seats are easily removed to provide room for bulky items. Some rear seat installations incorporate leg retainers with latching mechanisms which must be released before the rear seats can be removed. Releasing the retainers is accomplished on early models by turning the latching mechanisms 90° with a coin or screwdriver. Releasing the retainers is accomplished on later models by depressing the plunger behind each rear leg. Optional headrests are available.

A single strap shoulder harness controlled by an inertia reel, located above the side window, protects each front seat occupant. Optional shoulder straps for the rear occupants are available. The shoulder strap is routed over the shoulder adjacent to the window and attached to the lap belt in the general area of the occupant's inboard hip. A check of the inertia reel mechanism can be made by pulling sharply on the strap and checking that the reel will lock in place under sudden stress; this locking feature prevents the strap from extending and holds the occupant in place. Under normal movement the strap will extend and retract as required. Shoulder harnesses should be routinely worn during take-off, landing and whenever an inflight emergency situation occurs.

Additional features include pilot storm window, two sun visors, ashtrays for each occupant, map pockets located on the side panels below the instrument panel, miscellaneous pockets on the rear of the front seat backs, armrests for the front occupants, cabin or baggage door locks and ignition lock.

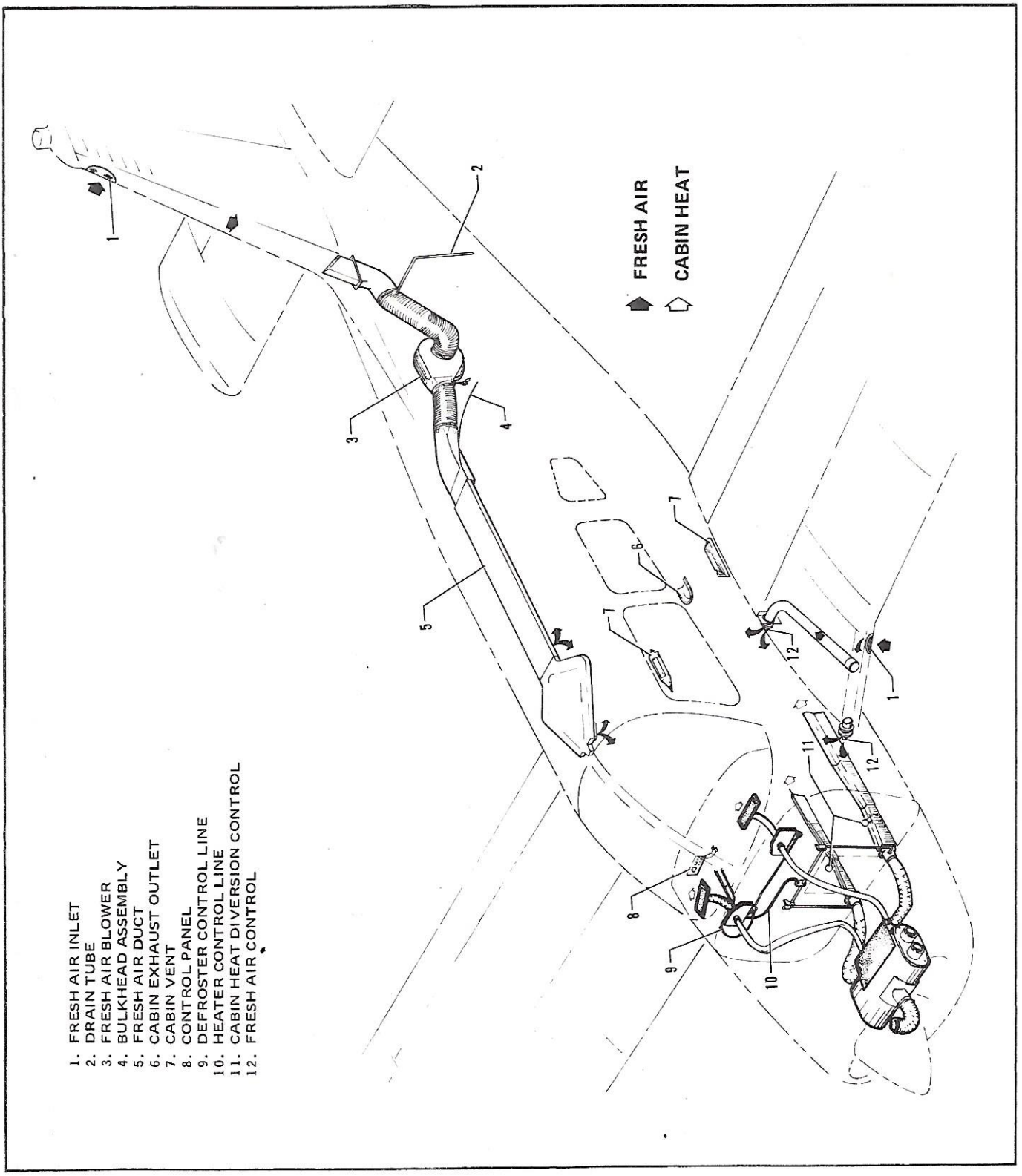
The cabin door is double latched. To close the cabin door, hold the door closed with the armrest while moving the side door latch to the "LATCHED" position. Then engage the top latch. Both latches must be secured before flight.

7.27 BAGGAGE AREA

The airplane has a 24 cubic foot aft baggage compartment located behind the rear seats and accessible through the cargo door on the aft side of the fuselage or from inside the cabin. Maximum capacity is 200 pounds. Tie down straps are provided and should be used at all times.

NOTE

It is the pilot's responsibility to be sure when the baggage is loaded that the airplane's C.G. falls within the allowable C.G. range. (Refer to Weight and Balance Section.)



HEATING, VENTILATING AND DEFROSTING SYSTEM

Figure 7-25

7.29 HEATING AND VENTILATING SYSTEM

The heating system is designed to provide maximum comfort for the occupants during winter and cool weather flights. The system includes a heat shroud, heat ducts, defroster outlets, heat and defroster controls.

CAUTION

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

An opening in the front of the lower cowl admits ram air to the heater shroud and then the air is ducted to the heater shut-offs on the right and left side of the firewall. When the shut-offs are opened the heated air then enters the heat ducts located along each side of the center console. Outlets in the heat duct are located at each seat location. Airflow to the rear seats can be regulated by controls in the heat ducts located between the front seats. The temperature of the cabin is regulated by the heater control located on the right side of the instrument panel.

Defrosting is accomplished by heat outlets located on the right and left side of the cowl cover. Heated air is ducted directly to defroster shut-off valves at the firewall, then to the defroster outlets. The airflow is regulated by a defroster control located below the heat control.

To aid air distribution, the cabin air is exhausted overboard by an outlet located on the bottom of the fuselage. Cabin exhaust outlets are located below and outboard of the rear seats. The above features are removed when air conditioning is installed.

Optional individual overhead fresh air outlets supply fresh air from an air inlet located on the tip of the vertical fin. The air is directed to a plenum chamber at the base of the fin, then ducted to the individual outlets. For individual comfort, the amount and direction of air can be regulated to control the amount of air and direction of desired airflow. An optional blower is available which forces outside air through the overhead vents for ground use. The blower is operated by a "FAN" switch with 4 positions - "OFF," "LOW," "MED," or "HIGH."

7.31 STALL WARNING

An approaching stall is indicated by a stall warning horn which is activated between five and ten knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall. Stall speeds are shown on graphs in the Performance Section. The stall warning horn emits a continuous sound. The landing gear warning horn is different in that it emits a 90 cycle per minute beeping sound. The stall warning horn is activated by a lift detector installed on the leading edge of the left wing. During preflight, the stall warning system should be checked by turning the master switch "ON," lifting the detector and checking to determine if the horn is actuated.

7.33 FINISH

All exterior surfaces are primed with etching primer and finished with acrylic lacquer.

7.35 AIR CONDITIONING*

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

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

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

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

Air from the baggage area is drawn through the evaporator by the blower and distributed through an overhead duct to individual outlets located adjacent to each occupant.

The switches and temperature control are located on the lower right side of the instrument panel in the climate control center panel. The temperature control regulates the temperature of the cabin. Turning the control clockwise increases cooling; counterclockwise decreases cooling.

The fan speed switch and the air conditioning ON-OFF switch are inboard of the temperature control. The fan can be operated independently of the air conditioning; however, the fan must be on for air conditioner operation. Turning either switch off will disengage the compressor clutch and retract the condenser door. Cooling air should be felt within one minute after the air conditioner is turned on.

NOTE

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

The fan switch allows operation of the fan with the air conditioner turned OFF to aid in cabin air circulation. "LOW," "MED" or "HIGH" can be selected to direct a flow of air through the air conditioner outlets in the overhead duct. These outlets can be adjusted or turned off individually.

The condenser door light is located to the right of the engine instrument cluster in front of the pilot. The door light illuminates when the door is open and is off when the door is closed.

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

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

*Optional equipment

7.37 PIPER EXTERNAL POWER*

An optional starting installation known as Piper External Power (PEP) is accessible through a receptacle located on the right side of the fuselage aft of the baggage compartment door. An external battery can be connected to the socket, thus allowing the operator to crank the engine without having to gain access to the airplane's battery.

7.39 EMERGENCY LOCATOR TRANSMITTER*

The Emergency Locator Transmitter (ELT) when installed, is located in the aft portion of the fuselage just below the stabilator leading edge and is accessible through a plate on the right side of the fuselage. This plate is attached with three slotted-head nylon screws for ease of removal; these screws may be readily removed with a variety of common items such as a dime, a key, a knife blade, etc. If there are no tools available in an emergency the screw heads may be broken off by any means. The ELT is an emergency locator transmitter which meets the requirements of FAR 91.52. The unit operates on a self-contained battery.

The battery has a useful life of 10 years. However, to comply with FAA regulations it must be replaced after 5 years of shelf life or service life. The battery should also be replaced if the transmitter has been used in an emergency situation or if accumulated test time exceeds one hour. The replacement date is marked on the transmitter label.

On the unit itself is a three position selector switch placarded "OFF," "ARM" and "ON." The "ARM" position is provided to set the unit to the automatic position so that it will transmit only after impact and will continue to transmit until the battery is drained to depletion or until the switch is manually moved to the "OFF" position. The "ARM" position is selected when the transmitter is installed at the factory and the switch should remain in that position whenever the unit is installed in the airplane. The "ON" position is provided so the unit can be used as a portable transmitter or in the event the automatic feature was not triggered by impact or to periodically test the function of the transmitter.

Select the "OFF" position when changing the battery, when rearming the unit if it has been activated for any reason, or to discontinue transmission.

NOTE

If the switch has been placed in the "ON" position for any reason, the "OFF" position has to be selected before selecting "ARM." If "ARM" is selected directly from the "ON" position, the unit will continue to transmit in the "ARM" position.

A pilot's remote switch, located on the left side panel, is provided to allow the transmitter to be controlled from inside the cabin. The pilot's remote switch is placarded "ON, AUTO/ARM and OFF/RESET." The switch is normally left in the "AUTO/ARM" position. To turn the transmitter off, move the switch momentarily to the "OFF/RESET" position. The aircraft master switch must be "ON" to turn the transmitter "OFF." To actuate the transmitter for tests or other reasons, move the switch upward to the "ON" position and leave it in that position as long as transmission is desired.

*Optional equipment

The unit is equipped with a portable antenna to allow the locator to be removed from the airplane in case of an emergency and used as a portable signal transmitter.

The locator should be checked during the ground check to make certain the unit has not been accidentally activated. Check by tuning a radio receiver to 121.5 MHz. If there is an oscillating sound, the locator may have been activated and should be turned off immediately. Reset to the "ARM" position and check again to insure against outside interference.

NOTE

If for any reason a test transmission is necessary, the test transmission should be conducted only in the first five minutes of any hour and limited to three audio sweeps. If tests must be made at any other time, the tests should be coordinated with the nearest FAA tower or flight service station.

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AIRPLANE HANDLING, SERVICING AND MAINTENANCE

SECTION 8

AIRPLANE HANDLING, SERVICING AND MAINTENANCE

8.1 GENERAL

This section provides general guidelines relating to the handling, servicing and maintenance of the Cherokee Arrow III.

Every owner should stay in close contact with his Piper dealer or distributor and Authorized Piper Service Center to obtain the latest information pertaining to his aircraft and to avail himself of the Piper Aircraft Service Back-up.

Piper Aircraft Corporation takes a continuing interest in having the owner get the most efficient use from his aircraft and keeping it in the best mechanical condition. Consequently, Piper Aircraft from time to time issues Service Bulletins, Service Letters and Service Spares Letters relating to the aircraft.

Service Bulletins are of special importance and should be complied with promptly. These are sent to the latest registered owners, distributors and dealers. Depending on the nature of the bulletin, material and labor allowances may apply, and will be addressed in the body of the Bulletin.

Service Letters deal with product improvements and service hints pertaining to the aircraft. They are sent to dealers, distributors and occasionally (at the factory's discretion) to latest registered owners, so they can properly service the aircraft and keep it up to date with the latest changes. Owners should give careful attention to the Service Letter information.

Service Spares Letters offer improved parts, kits and optional equipment which were not available originally and which may be of interest to the owner.

If an owner is not having his aircraft serviced by an Authorized Piper Service Center, he should periodically check with a Piper dealer or distributor to find out the latest information to keep his aircraft up to date.

Piper Aircraft Corporation has a Subscription Service for the Service Bulletins, Service Letters and Service Spares Letters. This service is offered to interested persons such as owners, pilots and mechanics at a nominal fee, and may be obtained through Piper dealers and distributors.

A service manual, parts catalog, and revisions to both, are available from your Piper dealer or distributor. Any correspondence regarding the airplane should include the airplane model and serial number to insure proper response.

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8.3 AIRPLANE INSPECTION PERIODS

The Federal Aviation Administration (FAA) occasionally publishes Airworthiness Directives (ADs) that apply to specific groups of aircraft. They are mandatory changes and are to be complied with within a time limit set by the FAA. When an AD is issued, it is sent by the FAA to the latest registered owner of the affected aircraft and also to subscribers of their service. The owner should periodically check with his Piper dealer or A & P mechanic to see whether he has the latest issued AD against his aircraft.

The Owner Service Agreement which the owner receives upon delivery of the aircraft should be kept in the aircraft at all times. This identifies him to authorized Piper dealers and entitles the owner to receive service in accordance with the regular service agreement terms. This agreement also entitles the transient owner full warranty by any Piper dealer in the world.

One hundred hour inspections are required by law if the aircraft is used commercially. Otherwise this inspection is left to the discretion of the owner. This inspection is a complete check of the aircraft and its systems, and should be accomplished by a Piper Authorized Service Center or by a qualified aircraft and power plant mechanic who owns or works for a reputable repair shop. The inspection is listed, in detail, in the inspection report of the appropriate Service Manual.

An annual inspection is required once a year to keep the Airworthiness Certificate in effect. It is the same as a 100-hour inspection except that it must be signed by an Inspection Authorized (IA) mechanic or a General Aviation District Office (GADO) representative. This inspection is required whether the aircraft is operated commercially or for pleasure.

A Progressive Maintenance program is approved by the FAA and is available to the owner. It involves routine and detailed inspections at 50-hour intervals. The purpose of the program is to allow maximum utilization of the aircraft, to reduce maintenance inspection cost and to maintain a maximum standard of continuous airworthiness. Complete details are available from Piper dealers.

A spectographic analysis of the oil is available from several sources. This system, if used intelligently, provides a good check of the internal condition of the engine. For this system to be accurate, oil samples must be sent in at regular intervals, and induction air filters must be cleaned or changed regularly.

8.5 PREVENTIVE MAINTENANCE

The holder of a Pilot Certificate issued under FAR Part 61 may perform certain preventive maintenance described in FAR Part 43. This maintenance may be performed only on an aircraft which the pilot owns or operates and which is not used to carry persons or property for hire, except as provided by applicable FAR's. Although such maintenance is allowed by law, each individual should make a self analysis as to whether he has the ability to perform the work.

All other maintenance required on the airplane should be accomplished by appropriately licensed personnel.

If the above work is accomplished, an entry must be made in the appropriate logbook. The entry should contain:

(a) The date the work was accomplished.
(b) Description of the work.
(c) Number of hours on the aircraft.
(d) The certificate number of pilot performing the work.
(e) Signature of the individual doing the work.

SECTION 8. =MAINTENANCE MANUAL=

ART A. INSPECTION

1. There are no special tools required to maintain the fairings. Any tools needed are basic hand tools.

2. Daily inspection at preflight to check security of Flap Hinge Fairing to aircraft attachment. Check for binding during flap operation. Also, check for cracks in the Flap Hinge Fairing.

3. Remove Flap Hinge Fairing, during annual or 100 hour inspections, to inspect flap hinge.

ART B. MAINTENANCE

1. Keep slot of Hinge Fairing clear of obstructions. If the aircraft is painted and paint stripper is used the fairings must not be permitted to contact the stripper. Removing the fairings during stripping may be the simplest way to protect them from damage.

ART C. CRACKING OR DEFECTS

1. If any cracks are found on Flap Hinge Fairing, stop drill the crack.

2. If any crack exceeds 1/2 inch in length; or, if a crack runs from an attachment hole to the outer edge of the flange on the Flap Hinge Fairing, the Fairing must be replaced.

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CERTIFICATION OFFICE
CENTRAL REGION

KNOTS 2U, INC.

=SECTION 8.0 GAP SEAL MAINTENANCE MANUAL=

PART A. INSPECTION

1. Daily inspection at preflight to ensure there is no bending of the controls, bent gap seals, abrading of rivets or control surfaces, or broken parts.
2. When aircraft has been stored outside during snow or freezing conditions, a careful inspection should be made of areas behind and under the seals for ice accumulations. If ice is found, which cannot be removed by careful brushing with seal held slightly away from control surface, the aircraft should be deiced or defrosted.
3. 100 hour inspections are suggested to check for abrading of the control surfaces and/or rivet heads, wear of the gap seals, and peeling of the Teflon coating. Check for loose rivets and/or other gap seal attachment hardware.

PART B. MAINTENANCE

1. There are no special tools required to maintain the seals. Any tools needed are basic hand tools.
2. Maintenance of the gap seals is to keep the seal surface clean of oil and dirt and the edge of the seal touching the control surface smoothly. If the gap seal appears to be abrading the control surface 3M 5490 Teflon tape, or equivalent, may be applied to gap seal to act as a wear surface. The Teflon tape should be applied before further flight to prevent control wear.
3. If upon installation, or through wear, there is a warp in the seal, or it lies unevenly, you may drill a #40 size hole and cut the seal to the hole in a direction 90 degrees to the trailing edge of the seal. Drill the hole in the center of the warp, 1/2 inch from the trailing edge of the surface to which the seal is attached. The cut in the seal should be trimmed to give a slot 1/16th inch wide, with parallel edges. The slots should be no closer than 6 inches, to each other, or the end of the seal. Refer to detail on next page.
4. When washing aircraft, care should be taken to brush along the length of the seal rather than perpendicular to, or across the seal.
5. When aircraft is painted care should be taken to prevent paint, paint remover or solvents from contacting the Teflon. If Teflon is damaged, use the maintenance procedures with 3M 5490 tape, or equivalent.

PART C. BALANCING

1. If any change is done to the horizontal stabilator; if Teflon tape is added, if slots are cut to relieve warping, or if the seals are painted, the stabilator must be re-balanced.

PART D. CRACKING, DEFECTS, LOOSE RIVETS

1. If cracks are found in a gap seal, stop drill the crack. If there are more than 3 cracks in a gap seal, the seal must be replaced.
2. If the Teflon peels 3M 5490 Teflon tape, or equivalent, may be applied.
3. If there are excessive bends or kinks in the seal, and the air flow over the control surface is disturbed, the seal must be replaced.
4. If seal rivets become loose you may drill the rivets and replace with the next size rivet.

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8.7 AIRPLANE ALTERATIONS

If the owner desires to have his aircraft modified, he must obtain FAA approval for the alteration. Major alterations accomplished in accordance with Advisory Circular 43.13-2, when performed by an A & P mechanic, may be approved by the local FAA office. Major alterations to the basic airframe or systems not covered by AC 43.13-2 require a Supplemental Type Certificate.

The owner or pilot is required to ascertain that the following Aircraft Papers are in order and in the aircraft.

(a) To be displayed in the aircraft at all times:
  (1) Aircraft Airworthiness Certificate Form FAA-8100-2.
  (2) Aircraft Registration Certificate Form FAA-8050-3.
  (3) Aircraft Radio Station License if transmitters are installed.

(b) To be carried in the aircraft at all times:
  (1) Pilot's Operating Handbook.
  (2) Weight and Balance data plus a copy of the latest Repair and Alteration Form FAA-337, if applicable.
  (3) Aircraft equipment list.

Although the aircraft and engine logbooks are not required to be in the aircraft, they should be made available upon request. Logbooks should be complete and up to date. Good records will reduce maintenance cost by giving the mechanic information about what has or has not been accomplished.

8.9 GROUND HANDLING

(a) Towing

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

CAUTION

When towing with power equipment, do not turn the nose gear beyond its steering radius in either direction, as this will result in damage to the nose gear and steering mechanism.

CAUTION

Do not tow the airplane when the controls are secured.

In the event towing lines are necessary, ropes should be attached to both main gear struts as high up on the tubes as possible. Lines should be long enough to clear the nose and/or tail by not less than fifteen feet, and a qualified person should ride in the pilot's seat to maintain control by use of the brakes.

(b) Taxiing

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Engine starting and shut-down procedures as well as taxi techniques should be covered. When it is ascertained that the propeller back blast, the taxi areas are clear and the parking brake has been released, power should be applied to start the taxi roll, and the following checks should be performed:

(1) Taxi a few feet forward and apply the brakes to determine their effectiveness.
(2) Taxi with the propeller set in low pitch, high RPM setting.
(3) While taxiing, make slight turns to ascertain the effectiveness of the steering.
(4) Observe wing clearance when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.
(5) When taxiing over uneven ground, avoid holes and ruts.
(6) Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel, or any loose material that may cause damage to the propeller blades.

(c) Parking

When parking the airplane, be sure that it is sufficiently protected from adverse weather conditions and that it presents no danger to other aircraft. When parking the airplane for any length of time or overnight, it is suggested that it be moored securely.

(1) To park the airplane, head it into the wind if possible.
(2) Set the parking brake by pulling back on the brake lever and depressing the knob on the handle. To release the parking brake, pull back on the handle until the catch disengages; then allow the handle to swing forward.

CAUTION

Care should be taken when setting brakes that are overheated or during cold weather when accumulated moisture may freeze a brake.

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

(d) Mooring

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

(1) Head the airplane into the wind if possible.
(2) Retract the flaps.
(3) Immobilize the ailerons and stabilator by looping the seat belt through the control wheel and pulling it snug.
(4) Block the wheels.
(5) Secure tie-down ropes to the wing tie-down rings and to the tail skid at approximately 45 degree angles to the ground. When using rope of non-synthetic material, leave sufficient slack to avoid damage to the airplane should the ropes contract.

CAUTION

Use bowline knots, square knots or locked slip knots. Do not use plain slip knots.

NOTE

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

(6) Install a pitot head cover if available. Be sure to remove the pitot head cover before flight.
(7) Cabin and baggage doors should be locked when the airplane is unattended.

8.11 ENGINE AIR FILTER

(a) Removing Engine Air Filter

(1) Remove top cowl.
(2) Remove the wing nuts securing the filter. Remove the filter.

(b) Cleaning Engine Air Filter

The induction air filter must be cleaned at least once every 50 hours, and more often, even daily, when operating in dusty conditions. Extra filters are inexpensive, and a spare should be kept on hand for use as a rapid replacement.

To clean the filter:
(1) Tap the filter gently to remove dirt particles, being careful not to damage the filter. DO NOT wash the filter in any liquid. DO NOT attempt to blow out dirt with compressed air.
(2) If the filter is excessively dirty or shows any damage, replace it immediately.
(3) Wipe the filter housing with a clean cloth soaked in unleaded gasoline. When the housing is clean and dry, install the filter.

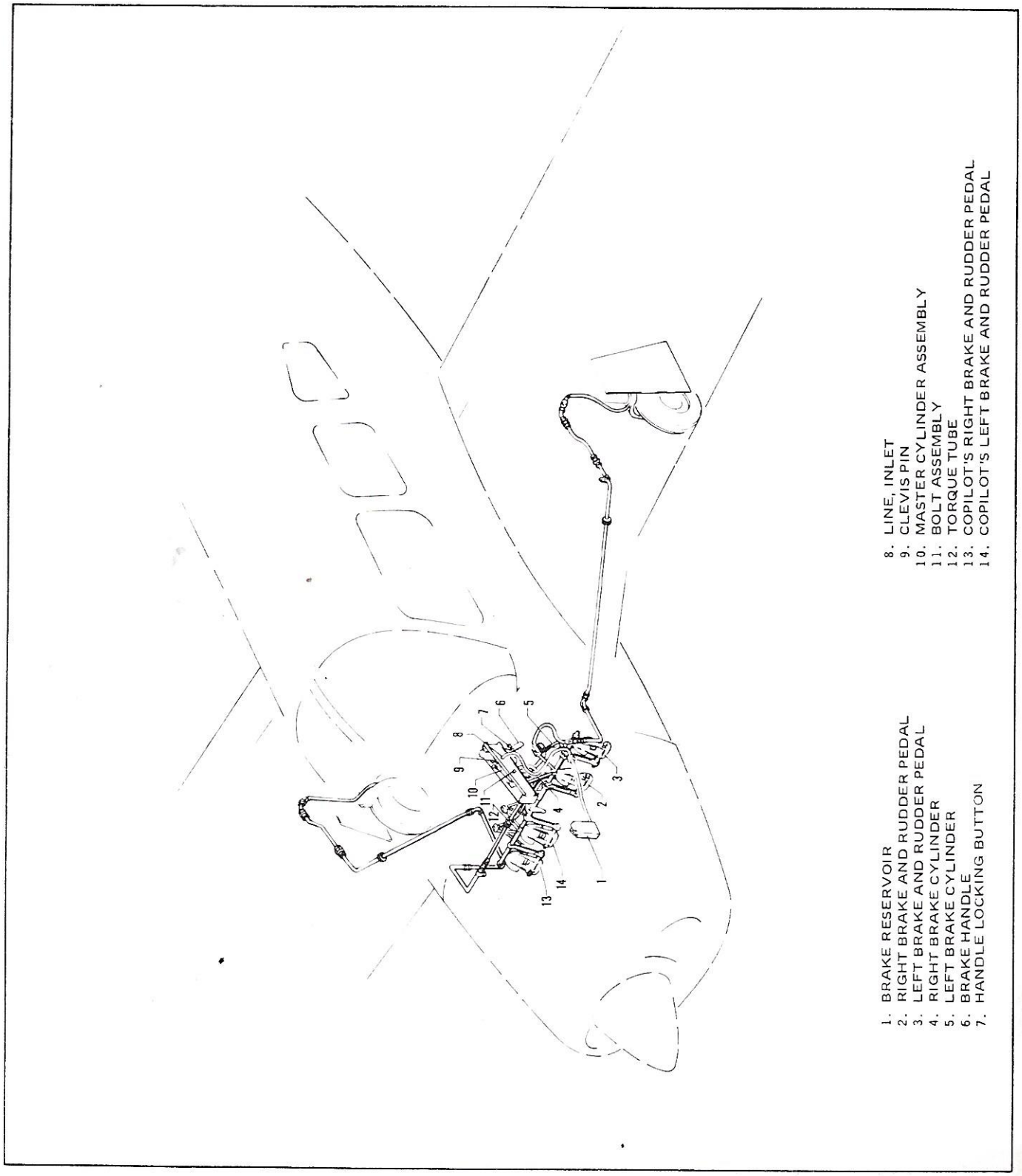
(c) Installation Of Engine Air Filter

After cleaning or when replacing the filter, install the filter in the reverse order of removal.

8.13 BRAKE SERVICE

The brake system is filled with MIL-H-5606 (petroleum base) hydraulic brake fluid. The fluid level should be checked periodically or at every 100 hour inspection and replenished when necessary. The brake reservoir is located on the left side of the fire wall in the engine compartment. If the entire system must be refilled, fill with fluid under pressure from the brake end of the system. This will eliminate air from the system.

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



BRAKE SYSTEM

Figure 8-1

8.15 LANDING GEAR SERVICE

The main landing gear uses 6.00 x 6 wheels with 6.00 x 6, six-ply rating tires and tubes. The nose wheel uses a 5.00 x 5 wheel with a 5.00 x 5 four-ply rating, type III tire and tube. (Refer to paragraph 8.23.)

Wheels are removed by taking off the hub cap, cotter pin, axle nut, and the two bolts holding the brake segment in place. Mark tire and wheel for reinstallation; then dismount by deflating the tire, removing the three through-bolts from the wheel and separating the wheel halves.

Landing gear oleos on the Cherokee Arrow III should be serviced according to the instructions on the units. The main oleos should be extended under normal static load until 2.5 ± .25 inches of oleo piston tube is exposed, and the nose gear should show 2.75 ± .25 inches. To add air to the oleo struts, attach a strut pump to the valve assembly near the top of the oleo strut housing and pump the oleo to the desired position. To add oil, jack the aircraft, release the air pressure in the strut, remove the valve core and add oil through this opening with the strut extended. After the strut is full, compress it slowly and fully to allow excess air and oil to escape. With the strut still compressed reinsert the valve stem and pump up the strut as above.

In jacking the aircraft for landing gear or other service, two hydraulic jacks and a tail stand should be used. At least 250 pounds of ballast should be placed on the base of the tail stand before the airplane is jacked up. The hydraulic jacks should be placed under the jack points on the bottom of the wing and the airplane jacked up until the tail skid is at the right height to attach the tail stand. After the tail stand is attached and the ballast added, jacking may be continued until the airplane is at the height desired.

The steering arms from the rudder pedals to the nose wheel are adjusted at the rudder pedals or at the nose wheel by turning the threaded rod end bearings in or out. Adjustment is normally accomplished at the forward end of the rods and should be done in such a way that the nose wheel is in line with the fore and aft axis of the plane when the rudder pedals and rudder are centered. Alignment of the nose wheel can be checked by pushing the airplane back and forth with the rudder centered to determine that the plane follows a perfectly straight line. The turning arc of the nose wheel is 30° ± 2° in either direction and is factory adjusted at stops on the bottom of the forging. The steering arm stops should be carefully adjusted so that the nose wheel reaches its full travel just after the rudder hits its stops. This guarantees that the rudder will be allowed to move through its full travel.

8.17 PROPELLER SERVICE

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

8.19 OIL REQUIREMENTS

The oil capacity of the Lycoming IO-360 series engine is 8 quarts, and the minimum safe quantity is 2 quarts. It is recommended that the oil be changed every 50 hours and sooner under unfavorable operating conditions. The following grades are recommended for the specified temperatures:

Average Ambient Air Temperature For Starting	Single Viscosity Grade	Multi-Viscosity Grades
Above 60°F	SAE 50	SAE 40 or SAE 50
30° to 90°F	SAE 40	SAE 40
0° to 70°F	SAE 30	SAE 40 or 20W-30
Below 10°F	SAE 20	SAE 20W-30

8.21 FUEL SYSTEM

(a) Servicing Fuel System

At every 50 hour inspection, the fuel screens in the strainer and in the injector must be cleaned. The screen in the injector is located in the housing where the fuel line connects to the injector. The fuel strainer is located under the floor panel and is accessible for cleaning through an access plate on the underside of the fuselage. After cleaning, a small amount of grease applied to the gasket will facilitate reassembly.

(b) Fuel Requirements (AVGAS ONLY)

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

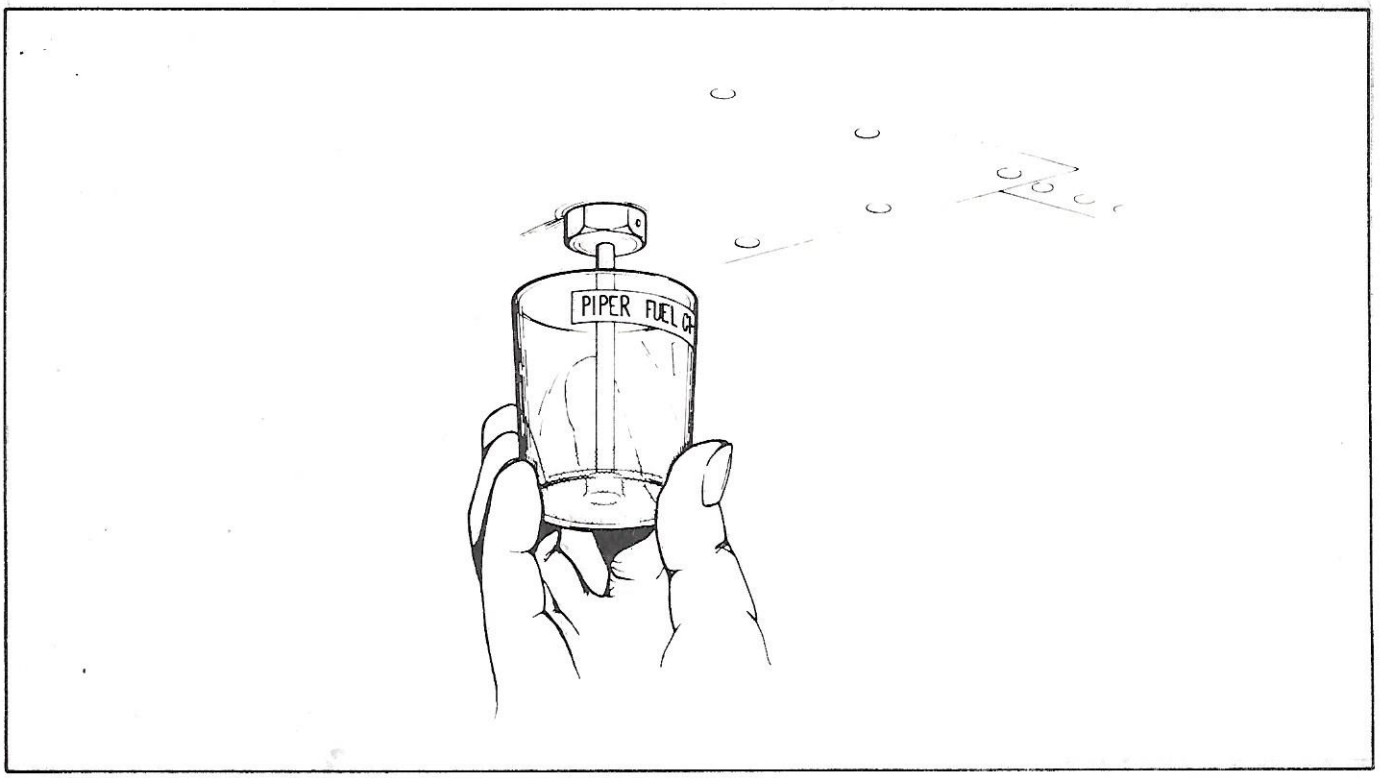
Whenever 100 or 100LL grade fuel is not available, commercial grade 100/130 should be used. Refer to the latest issue of Lycoming Service Instruction No. 1070 for additional information.

A summary of the current grades as well as the previous fuel designations is shown in the following chart:

FUEL GRADE COMPARISON CHART

Previous Commercial Fuel Grades (ASTM-D910)			Current Commercial Fuel Grades (ASTM-D910-75)			Current Military Fuel Grades (MIL-G-5572E) Amendment No. 3		
Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.
80/87	red	0.5	80	red	0.5	80/87	red	0.5
91/98	blue	2.0	*100LL	blue	2.0	none	none	none
100/130	green	3.0	100	green	**3.0	100/130	green	**3.0
115/145	purple	4.6	none	none	none	115/145	purple	4.6

* - Grade 100LL fuel in some over seas countries is currently colored green and designated as "100L."
**- Commercial fuel grade 100 and grade 100/130 (both of which are colored green) having TEL content of up to 4 ml/U.S. gallon are approved for use in all engines certificated for use with grade 100/130 fuel.



FUEL DRAIN
Figure 8-3

(c) Filling Fuel Tanks

Observe all safety precautions required when handling gasoline. Fill the fuel tanks through the filler located on the forward slope of the wing. Each wing holds a maximum of 38.5 U.S. gallons. When using less than the standard 77 gallon capacity, fuel should be distributed equally between each side.

(d) Draining Fuel Valves and Lines

The fuel strainer, located on the lower left side of the firewall, is provided with a quick drain which should be drained before the first flight of the day or after refueling, to check for proper fuel and fuel contamination (such as water, sediment, etc.). If contamination is found, fuel should be drained until the contamination stops. If contamination persists after draining fuel for a minute or improper fuel is observed, contact a mechanic to check the fuel system.

Each fuel tank is provided with a fuel quick drain. Each tank should be checked in accordance with the above procedure.

(e) Draining Fuel System

The bulk of the fuel may be drained from the fuel cells by the use of a siphon hose placed in the cell or tank through the filler neck. The remainder of the fuel may be drained by opening all the drain valves.

CAUTION

When draining fuel, be sure that no fire hazard exists before starting the engine.

8.23 TIRE INFLATION

For maximum service from the tires, keep them inflated to the proper pressure of 27 psi for nose tire and 30 psi for main tires. Interchange the tires periodically for even wear. All wheels and tires are balanced before original installation, and the relationship of tire, tube and wheel should be maintained upon reinstallation. In the installation of new components, it may be necessary to rebalance the wheels with the tires mounted. Unbalanced wheels can cause extreme vibration in the landing gear.

8.25 BATTERY SERVICE

Access to the 12-volt 25-ampere-hour battery is gained through the baggage compartment. It is located just aft of the baggage compartment. The battery container has a plastic drain tube which is normally closed off. This tube should be drained periodically to remove battery acid which may have collected in the tube.

The battery fluid level must not be brought above the baffle plates. It should be checked every 30 days to determine that the fluid level is proper and the connections are tight and free of corrosion.

If the battery is not properly charged, recharge it starting with a rate of four amperes and finishing with a rate of two amperes. The battery should be removed from the airplane for charging, and quick charges are not recommended.

The external power receptacle, if installed, is located on the right side of the fuselage aft of the baggage compartment door.

Refer to the Cherokee Arrow III Service Manual for battery servicing procedure.

8.27 COLD WEATHER OPERATION

For cold weather operation a winterization kit is installed on the inlet opening of the oil cooler plenum chamber. This kit should be installed whenever the ambient temperature is 50° F or less. When the kit is not being used, it can be stowed on a bracket provided for this purpose on the top side of the oil cooler plenum chamber.

It is recommended that an optional Engine Breather Tube Winterization Kit be installed for cold weather operation. This kit is available through your Piper Dealer Distributor.

8.29 CLEANING

(a) Cleaning Engine Compartment

Before cleaning the engine compartment, place a strip of tape on the magneto vents to prevent any solvent from entering these units.

(1) Place a large pan under the engine to catch waste.
(2) With the engine cowling removed, spray or brush the engine with solvent or a mixture of solvent and degreaser. In order to remove especially heavy dirt and grease deposits, it may be necessary to brush areas that were sprayed.

CAUTION

Do not spray solvent into the alternator, vacuum pump, starter, or air intakes.

(3) Allow the solvent to remain on the engine from five to ten minutes. Then rinse the engine clean with additional solvent and allow it to dry.

CAUTION

Do not operate the engine until excess solvent has evaporated or otherwise been removed.

(4) Remove the protective tape from the magnetos.
(5) Lubricate the controls, bearing surfaces, etc., in accordance with the Lubrication Chart.

(b) Cleaning Landing Gear

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

(1) Place a pan under the gear to catch waste.
(2) Spray or brush the gear area with solvent or a mixture of solvent and degreaser, as desired. Where heavy grease and dirt deposits have collected, it may be necessary to brush areas that were sprayed, in order to clean them.
(3) Allow the solvent to remain on the gear from five to ten minutes. Then rinse the gear with additional solvent and allow to dry.
(4) Remove the cover from the wheel and remove the catch pan.
(5) Lubricate the gear in accordance with the Lubrication Chart.
(6) Caution: Do not brush the micro switches.

(c) Cleaning Exterior Surfaces

The airplane should be washed with a mild soap and water. Harsh abrasives or alkaline soaps or detergents could make scratches on painted or plastic surfaces or could cause corrosion of metal. Cover areas where cleaning solution could cause damage. To wash the airplane, use the following procedure:

(1) Flush away loose dirt with water.
(2) Apply cleaning solution with a soft cloth, a sponge or a soft bristle brush.
(3) To remove exhaust stains, allow the solution to remain on the surface longer.
(4) To remove stubborn oil and grease, use a cloth dampened with naphtha.
(5) Rinse all surfaces thoroughly.
(6) Any good automotive wax may be used to preserve painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing. A heavier coating of wax on the leading surfaces will reduce the abrasion problems in these areas.

(d) Cleaning Windshield and Windows

(1) Remove dirt, mud and other loose particles from exterior surfaces with clean water.
(2) Wash with mild soap and warm water or with aircraft plastic cleaner. Use a soft cloth or sponge in a straight back and forth motion. Do not rub harshly.
(3) Remove oil and grease with a cloth moistened with kerosene.

CAUTION

Do not use gasoline, alcohol, benzene, carbon tetrachoride, thinner, acetone, or window cleaning sprays.

(4) After cleaning plastic surfaces, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth. Do not use a circular motion.
(5) A severe scratch or mar in plastic can be removed by rubbing out the scratch with jeweler's rouge. Smooth both sides and apply wax.

(e) Cleaning Headliner, Side Panels and Seats

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

CAUTION

Solvent cleaners require adequate ventilation.

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

(f) Cleaning Carpets

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

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SECTION 9

SUPPLEMENTS

EDO-AIRE MITCHELL
P. O. Box 610
Mineral Wells, Texas 76067

FAA/DAS APPROVED
PILOT'S OPERATING HANDBOOK SUPPLEMENT
FOR
EDO-AIRE MITCHELL CENTURY IIB AUTOPILOT, MODEL AK653
WHEN INSTALLED IN
PIPER MODELS PA-28R-201 & PA-28R-201T

Reg. No. N36777
Ser. No. 28R-7837292

SECTION 1

GENERAL

This supplement must be used in conjunction with the applicable FAA Approved Pilot's Operating Handbook when Edo-Aire Mitchell Century IIB Autopilot Model AK653 is installed in accordance with STC SA3196SW-D. The information contained herein supplements the information of the basic Pilot's Operating Handbook; for limitations, procedures and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

SECTION 2

LIMITATIONS

1. Autopilot use prohibited above 175 KTS IAS. (Autopilot Vmo)
2. Autopilot must be OFF for take-off and landing.

SECTION 3

EMERGENCY PROCEDURES

1. In an emergency the autopilot can be disconnected by:
   a. Pushing the roll ON-OFF rocker switch - OFF.
   b. Pulling the autopilot circuit breaker.
2. The autopilot can be overpowered at either control wheel.
3. An autopilot runaway, with a 3 second delay in the initiation of recovery while operating in climb, cruise or descending flight, could result in a 58° bank and 190' altitude loss. Maximum altitude loss measured at 175 KTS IAS in a descent.
4. An autopilot runaway, with a 1 second delay in the initiation of recovery, during an approach operation, coupled or uncoupled, could result in 18° bank and 20' altitude loss.
5. Emergency Operation With Optional NSD 360 and NSD 360A (HSI) - Slaved and/or Non-Slaved:

   NSD 360

   a. Appearance of HDG Flag:
      1. Check air supply gauge (vac or pressure) for adequate air supply (4 in. Hg. min.).
      2. Check compass circuit breaker.
      3. Observe display for proper operation.
   b. To disable heading card - pull circuit breaker and use magnetic compass for directional data.

      NOTE: If heading card is not operational, autopilot should not be used.

c. With card disabled:
   1. VOR and Glide Slope displays are still functional; use card set to rotate card to aircraft heading for correct picture.
   2. Localizer - left-right information still useable. Flag information is disabled - compare needle with No. 2 indicator for valid left-right needle operation.

d. Slaving Failure - (i.e. failure to self-correct for gyro drift):
   1. Check gyro slaving switch is set to No. 1 position.
   2. Check for HDG Flag.
   3. Check compass circuit breaker.
   4. Reset heading card while observing slaving meter.
   5. Select slaving amplifier No. 2 (gyro slaving switch is set to No. 2 position).
   6. Reset heading card while checking slaving meter.
   7. Switch to free gyro and periodically set card as unslaved gyro.

NSD 360A (Instrument with red-white striped NAV-HDG Flags)

a. The emergency procedures for the NSD 360A remain identical to those listed for the NSD 360 (above), except that the presence of the NAV Flag on a localizer frequency invalidates the NAV left-right information. Useable navigation data will be indicated in both VOR and Localizer modes by the absence of the NAV Flag, whether the card is disabled or not.

b. In the localizer mode the "TO-FROM" arrows may remain out of view, depending upon the design of the NAV converter used in the installation.

SECTION 4

NORMAL PROCEDURES

Refer to Century IIB Operator's Manual, P/N 68S75, dated 6-1-72 and DG 360/A and NSD 360/A Pilot's Handbook, P/N 68S85, dated 4-1-74, revised 5-1-76.

SECTION 5

PERFORMANCE

No change.

APPROVED _____
James L. Irwin

EDO-AIRE MITCHELL
DAS 2 SW
DATE: 4-6-77
P/N 68S495

SECTION 9

SUPPLEMENTS

9.1 GENERAL

This section provides information in the form of Supplements which are necessary for efficient operation of the airplane when equipped with one or more of the various optional systems and equipment not provided with the standard airplane.

All of the Supplements provided by this section are "FAA Approved" and consecutively numbered as a permanent part of this Handbook. The information contained in each Supplement applies only when the related equipment is installed in the airplane.

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SUPPLEMENT 1

AIR CONDITIONING INSTALLATION

SECTION 1 - GENERAL

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

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

SECTION 2 - LIMITATIONS

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

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

"WARNING - AIR CONDITIONER MUST BE OFF TO INSURE NORMAL TAKEOFF CLIMB PERFORMANCE."

In full view of the pilot, to the right of the engine gauges (condenser door light):

"AIR COND DOOR
OPEN"

SECTION 3 - EMERGENCY PROCEDURES

No changes to the basic Emergency Procedures provided by Section 3 of this Pilot's Operating Handbook are necessary for this supplement.

SECTION 4 - NORMAL PROCEDURES

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

(a) Check aircraft master switch "ON."

(b) Turn the air conditioner control switch to "ON" and the fan switch to one of the operating positions - the "AIR COND DOOR OPEN" warning light will turn on, thereby indicating proper air conditioner condenser door actuation.

(c) Turn the air conditioner control switch to "OFF" - the "AIR COND DOOR OPEN" warning light will go out, thereby indicating the air conditioner condenser door is in the up position.

(d) If the "AIR COND DOOR OPEN" light does not respond as specified above, an air conditioner system or indicator bulb malfunction is indicated and further investigation should be conducted prior to flight.

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

The condenser door light is located to the right of the engine instrument cluster in front of the pilot. The door light illuminates when the door is open and is off when the door is closed.

SECTION 5 - PERFORMANCE

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

NOTE

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

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

(a) The decrease in true airspeed is approximately 6 KTS at all power settings.
(b) The decrease in range may be as much as 40 nautical miles for the 72 gallon usable fuel capacity.

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

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SUPPLEMENT 2

AUTOFLITE II AUTOPILOT INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the optional AutoFlite II Autopilot is installed. The information contained within this supplement is to be used in conjunction with the complete handbook.

This supplement has been "FAA Approved" as a permanent part of this handbook based on EDO-AIRE Mitchell STC SA3162SW-D and must remain in this handbook at all times when the optional AutoFlite II Autopilot is installed.

SECTION 2 - LIMITATIONS

(a) Autopilot operation prohibited above 175 KIAS. (Autopilot Vmo)
(b) Autopilot must be "OFF" for takeoff and landing.

SECTION 3 - EMERGENCY PROCEDURES

(a) In case of malfunction, depress disconnect switch on pilot's control wheel, or overpower autopilot at either control wheel.
(b) AutoFlite II master switch - OFF.
(c) In climb, cruise or descent configuration a malfunction with a 3 second delay in recovery initiation may result in 50° bank and 190 foot altitude loss. Maximum altitude loss measured at 175 KIAS in a descent.
(d) In approach configuration, coupled or uncoupled, a malfunction with a 1 second delay in recovery initiation may result in 18° bank and 20 foot altitude loss.

SECTION 4 - NORMAL PROCEDURES

AUTOFLITE II PREFLIGHT INSPECTION

(a) AutoFlite II master switch - ON.
(b) Rotate turn command knob to left and right. Aircraft control wheels should rotate in corresponding directions.
(c) With AutoFlite II on, rotate aircraft control wheel to left and right. Only light forces should be required to override roll servo clutch.
(d) AutoFlite II master switch - OFF - rotate control wheel left and right to assure disengagement.

AUTOFLITE II IN-FLIGHT PROCEDURE

(a) Engagement
  (1) Check turn command knob in center detent position.
  (2) AutoFlite II master switch - ON.

(b) Disengagement
  (1) AutoFlite II master switch - OFF.

(c) Heading Changes
  (1) Move trim knob on instrument for drift correction from a constant heading.
  (2) Move turn command knob for left or right banked turns. Rotation of knob to stop will yield an appropriate bank angle to obtain an approximate standard rate turn. Intermediate settings may be used for lesser turn rates.

(d) OMNI Tracker
  (1) Turn command knob - move to center detent position and push IN to engage tracker. Aircraft will track desired radial established on NAV 1 (or as selected, if equipped with a NAV selector switch).

NOTE

Tracker must be engaged within 10° of being "on course," i.e. VOR course needle centered and aircraft heading within 10° of VOR course.

  (2) Trim knob - push IN for high sensitivity. Use high sensitivity position for localizer tracking and as desired for OMNI tracking.

(e) Maintain directional trim during all autopilot operations.

PERFORMANCE

No changes to the basic performance provided by Section 5 of this Pilot's Operating Handbook are necessary for this supplement.

SUPPLEMENT 3

AUTOCONTROL IIIB AUTOPILOT INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the optional Piper AutoControl IIIB Autopilot is installed. The information contained within this supplement is to be used in conjunction with the complete handbook.

This supplement has been "FAA Approved" as a permanent part of this handbook based on EDO-AIRE Mitchell STC SA3161SW-D and must remain in this handbook at all times when the optional Piper AutoControl IIIB Autopilot is installed.

SECTION 2 - LIMITATIONS

(a) Autopilot operation prohibited above 175 KIAS. (Autopilot Vmo)
(b) Autopilot must be OFF for takeoff and landing.

SECTION 3 - EMERGENCY PROCEDURES

(a) In an emergency the AutoControl IIIB can be disconnected by:
  (1) Pushing the A/P ON-OFF rocker switch - "OFF."
  (2) Pulling the autopilot circuit breaker.
(b) The autopilot can be overpowered at either control wheel.
(c) An autopilot runaway, with a 3 second delay in the initiation of recovery while operating in climb, cruise or descending flight, could result in a 58° bank and 190 foot altitude loss. Maximum altitude loss measured at 175 KIAS in a descent.
(d) An autopilot runaway, with a 1 second delay in the initiation of recovery, during an approach operation, coupled or uncoupled, could result in 18° bank and 20 foot altitude loss.
(e) Emergency operation with optional NSD 360 and NSD 360A (HSI) - Slaved and/or Non-Slaved:

NSD 360

(1) Appearance of HDG Flag:
  a. Check air supply gauge (vac or pressure) for adequate air supply (4 in. Hg. min.).
  b. Check compass circuit breaker.
  c. Observe display for proper operation.
(2) To disable heading card - pull circuit breaker and use magnetic compass for directional data.

NOTE

If heading card is not operational, autopilot should not be used.

(3) With card disabled:
   a. VOR and Glide Slope displays are still functional; use card set to rotate card to aircraft heading for correct picture.
   b. Localizer - left-right information still usable. Flag information is disabled - compare needle with No. 2 indicator for valid left-right needle operation.

(4) Slaving Failure - (i.e. failure to self-correct for gyro drift):
   a. Check gyro slaving switch is set to No. 1 position.
   b. Check for HDG Flag.
   c. Check compass circuit breaker.
   d. Reset heading card while observing slaving meter.
   e. Select slaving amplifier No. 2 (gyro slaving switch is set to No. 2 position).
   f. Reset heading card while checking slaving meter.
   g. Switch to free gyro and periodically set card as unslaved gyro.

NSD 360A (Instrument with red-white striped NAV-HDG Flags)

(1) The emergency procedures for the NSD 360A remain identical to those listed for the NSD 360 (above), except that the presence of the NAV Flag on a localizer frequency invalidates the NAV left-right information. Usable navigation data will be indicated in both VOR and Localizer modes by the absence of the NAV Flag, whether the card is disabled or not.

(2) In the localizer mode the "TO-FROM" arrows may remain out of view, depending upon the design of the NAV converter used in the installation.

SECTION 4 - NORMAL PROCEDURES

PREFLIGHT

(a) AUTOPILOT
   (1) Place radio coupler in HDG mode (if installed) and place the A/P "ON-OFF" switch to the "ON" position to engage roll section. Rotate roll command knob left and right and observe that control wheel describes a corresponding left and right turn, then center knob.
   (2) Set proper D.G. heading on D.G. and turn HDG bug to aircraft heading. Engage HDG mode rocker switch and rotate HDG bug right and left. Aircraft control wheel should turn same direction as bug. Grasp control wheel and manually override servo, both directions.

(b) RADIO COUPLER - (OPTIONAL)
   (1) Tune and identify VOR or VOT station. Position radio coupler to OMNI mode. Engage autopilot "ON" and HDG switches. Set HDG bug to aircraft heading and rotate OBS to cause OMNI indicator needle to swing left and right slowly. Observe that control wheel rotates in direction of needle movement.
   (2) Disengage A/P "ON-OFF" switch. Reset radio coupler control to HDG.

IN-FLIGHT

(a) Trim airplane (ball centered).

(b) Check air pressure or vacuum to ascertain that the directional gyro and attitude gyro are receiving sufficient air.

(c) Roll Section:

(1) To engage, center roll knob, push A/P "ON-OFF" switch to "ON" position. To turn, rotate console roll knob in desired direction. (Maximum angle of bank should not exceed 30°.)

(2) For heading mode, set directional gyro with magnetic compass. Push directional gyro HDG knob in, rotate bug to aircraft heading. Push console heading rocker (HDG) switch to "ON" position. To select a new aircraft heading, push D.G. heading knob "IN" and rotate, in desired direction of turn, to the desired heading.

(d) Radio Coupling VOR-ILS with H.S.I. (Horizontal Situation Indicator) Type Instrument Display - (Optional)

(1) VOR Navigation

a. Tune and identify VOR station. Select desired course by rotating CRS knob of H.S.I.

b. Select OMNI mode on radio coupler.

c. Select HDG mode on autopilot console to engage coupler. Aircraft will turn to a 45° intercept angle to intercept the selected VOR course. Intercept angle magnitude depends on radio needle off course magnitude, 100% needle deflection will result in 45° intercept with the intercept angle diminishing as the needle offset diminishes.

d. NAV mode - NAV mode provides reduced VOR sensitivity for tracking weak, or noisy VOR signals. NAV mode should be selected after the aircraft is established on course.

(2) ILS-LOC Front Course

a. Set inbound, front, localizer course on H.S.I.

b. Select LOC-Normal on radio coupler to intercept and track inbound on localizer. Select LOC-REV to intercept and track outbound to the procedure turn area.

c. Select HDG mode on autopilot console to engage coupler.

(3) ILS - Back Course

a. Set inbound, front localizer course on H.S.I.

b. Select LOC-REV on radio coupler to intercept and track inbound on the back localizer course. Select LOC-NORM to intercept and track outbound on the back course to the procedure turn area.

c. Select HDG mode on autopilot console to engage coupler.

(e) Radio Coupling - VOR-ILS with standard directional gyro. (Optional)

Radio coupler operation in conjunction with a standard directional gyro and VOR-LOC display differs from operation with an integrated display (H.S.I.) only in one respect. The HDG bug is used as the radio course datum and therefore must be set to match the desired VOR course as selected on the OBS.

(1) For VOR intercepts and tracking:

Select the desired VOR course and set the HDG bug to the same heading. Select OMNI mode on the coupler and HDG mode on the autopilot console.

(2) For ILS Front Course intercepts and tracking:

Tune the localizer frequency and place the HDG bug on the inbound, front course heading. Select LOC-NORM mode on the coupler and HDG mode on the autopilot console.

(3) For LOC Back Course intercepts and tracking:

Tune the localizer frequency and place the HDG bug on the inbound course heading to the airport. Select LOC-REV mode with coupler and HDG mode on the autopilot console.

SECTION 5 - PERFORMANCE

No changes to the basic performance provided by Section 5 of the Pilot's Operating Handbook are necessary for this supplement.

SUPPLEMENT 4

PIPER ELECTRIC PITCH TRIM

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the optional Piper Electric Pitch Trim is installed. The information contained within this supplement is to be used in conjunction with the complete handbook.

This supplement has been "FAA Approved" as a permanent part of this handbook and must remain in this handbook at all times when the optional Piper Electric Pitch Trim is installed.

SECTION 2 - LIMITATIONS

No changes of the basic limitations provided by Section 2 of this Pilot's Operating Handbook are necessary for this supplement.

SECTION 3 - EMERGENCY PROCEDURES

(a) In case of malfunction, PRESS disconnect switch located above the ignition switch.
(b) In case of malfunction, overpower the electric trim at either control wheel.
(c) Maximum altitude change with a 4 second delay in recovery initiation is 500 feet and occurs in the power approach and cruise configurations, and results in a 20° pitch change.

SECTION 4 - NORMAL PROCEDURES

The electric trim system may be turned ON or OFF by a switch located above the ignition switch. The pitch trim may be changed when the electric trim system is turned on either by moving the manual pitch trim control wheel or by operating the trim control switch on the pilot's control yoke.

SECTION 5 - PERFORMANCE

No changes to the basic performance provided by Section 5 of this Pilot's Operating Handbook are necessary for this supplement.

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FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT OR SUPPLEMENTAL FLIGHT MANUAL FOR

AIRCRAFT MODEL: _____

SERIAL NUMBER: _____

REGISTRATION NUMBER: _____

This supplement must be attached to the FAA approved Airplane Flight Manual, when the Precise Flight Standby Vacuum has been installed in accordance with STC(s).
SA2160NM, SA2161NM, SA2162NM, SA2164NM, SA2167NM, SA2168NM, SA2683NM - Aircraft
&
SE1779NM - Lycoming Engine
or
SE1780NM - Continental Engine

The information contained in this document supplements or supersedes the basic manual only in those areas listed. For Limitations, Procedures, and Performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED: _____
Manager,
Special Certification Branch
Seattle Aircraft Certification Office

DATE OF APPROVAL: Feb. 4, 2000

SYSTEM DESCRIPTION

A Precise Flight Standby Vacuum System may be installed to provide a temporary vacuum system in the event of a primary vacuum failure. The Standby Vacuum System operates on the differential between the intake manifold and ambient air pressure and is directed through a shuttle valve system to drive your flight instruments.

CAUTION: The use of the Standby Vacuum System requires a degree of Pilot skill and proficiency that is best maintained through practice. It is recommended, upon recurrent IFR training, in VFR conditions, in the presence of a CFI, that the aircraft be flown at the RPM and or Manifold Pressure settings found on the required placard and entered in this AFMS. This procedure will familiarize the pilot with limitations of using engine manifold vacuum for instrument power and maintaining level flight.

I. OPERATING LIMITATIONS

A. INSTRUCTIONS

1. The Standby Vacuum System is for emergency or standby use only and not for dispatch purposes.
2. Vacuum powered and/or Vacuum gyro directed autopilot operation may be unreliable when the Standby Vacuum System is the sole source of vacuum. Vacuum powered or vacuum gyro directed autopilot should be OFF when operating with a failed primary vacuum system.
3. The Supplemental Vacuum System is not designed to operate pneumatic de-ice systems. DO NOT operate a pneumatic de-ice system when operating with a failed primary vacuum system.
4. Above 10,000 ft. pressure altitude, engine power settings may have to be significantly reduced to provide adequate vacuum power for proper gyro instrument operation.
5. The following placards are required to be in full view of pilot:

I. OPERATING LIMITATIONS (CONT.)

B. PLACARDS

Placard to be located on the push/pull control cable

Placard to be located around the LED for the pump inop warning light.

Placard to be placed in front and in full view of the pilot.

STANDBY VACUUM SYSTEM EQUIPPED: FOR OPERATING INSTRUCTIONS AND LIMITATIONS SEE SUPPLEMENT IN OWNERS MANUAL OR PILOTS OPERATING HANDBOOK

I. OPERATING LIMITATIONS (CONT.)

B. PLACARDS

One of the following placards must be placed in full view of the pilot near the instrument vacuum indicator after appropriate entries have been made.

Approximate Standby Vacuum Available - Altitude - Power Chart for aircraft with Constant Speed Propeller - Maximum Continuous RPM.

PRESS ALT. (FT.)	RPM	MAN. PRESSURE	SVS VACUUM IN. HG MIN.
2000	Max. Cont.		
4000	Max. Cont.		
6000	Max. Cont.		
8000	Max. Cont.		
10,000	Max. Cont.		

Approximate Standby Vacuum Available - Altitude - Power Chart for aircraft with a Fixed Pitch Propeller

PRESS ALT. (FT.)	RPM	SVS VACUUM IN. HG MIN.
2000		
4000		
6000		
8000		
10,000		

II. OPERATING PROCEDURES

A. NORMAL PROCEDURES

1. GROUND CHECK

a. Cycle the Standby Vacuum Control Knob **OUT - ON -** , and return Control Knob **IN - OFF -** position.

2. BEFORE TAKEOFF

a. Idle Engine at low speed, momentarily pull the standby vacuum knob **OUT - ON -** and check vacuum gauge. Normally, the vacuum reading will be slightly higher. After checking system push Standby Vacuum System knob **IN - OFF -**. Check that vacuum gauge has returned to the previous reading.

3. ENROUTE

a. Regularly check vacuum gauge and monitor warning light for proper vacuum system operation.

B. EMERGENCY PROCEDURES

1. PRIMARY VACUUM FAILURE WARNING LIGHT ILLUMINATES

a. Pull the Standby Vacuum System knob **OUT -ON-** and adjust throttle setting as required to maintain adequate vacuum for the primary instruments - Suction Gauge Reading in the Green Arc - If necessary descend to a lower altitude to obtain a larger differential between manifold and ambient pressure. Vacuum power must be closely monitored by checking the vacuum gauge frequently.

b. The SVS is not designed for continued IFR flight. Immediate steps should be taken to return to VFR conditions or to land. If this is not possible, IFR flight should be continued only as long as necessary to return to VFR conditions or land the airplane.

WARNING: FAILURE OF THE VACUUM SYSTEM STILL CONSTITUTES AN EMERGENCY SITUATION REGARDLESS OF THE INSTALLATION OF THE SVS. IT MAY NOT BE POSSIBLE TO MAINTAIN A SAFE ALTITUDE AND MAKE USE OF THE SVS. IN SUCH A SITUATION THE AIRPLANE MUST BE FLOWN USING NON-VACUUM POWERED INSTRUMENTS.

B. EMERGENCY PROCEDURES (CONT.)

c. If descent is impractical:

- Periodically and temporarily reduce power as required to provide adequate vacuum to the aircraft primary instruments.
- Reapply power as required, while comparing vacuum driven gyros against the Turn and Bank Indicator, Turn Coordinator, VSI and/or other flight instruments.
- When an obvious discrepancy is noted between the vacuum driven instruments and other flight instrumentation. Periodically and temporarily reduce power as required to provide adequate vacuum to the aircraft primary instruments.

III. PERFORMANCE

NO CHANGE

- - END - -

Insight Instrument Corp.
Box 194 Ellicott Station
Buffalo, New York 14205

FAA Approved
Airplane Flight Manual Supplement No. 1
For
Single and Twin Engine Powered Small Airplanes (4 or 6 cylinder engines only) as Listed on Master Eligibility List of STC SA157NE.

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the Insight Instrument Corp. Graphic Engine Monitor System is installed in accordance with Supplemental Type Certificate (STC) SA157NE. On aircraft which require an Airplane Flight Manual, the AFMS must be attached. The information contained herein supplements the information of the basic AFM; for limitations, procedures and performance information not contained in this Supplement, consult the basic Airplane Flight Manual.

FAA Approved: Norman J. Klimm
Manager, New York Aircraft
Certification Office

Date: June 14, 1983

Revised: May 6, 1985

Insight Instrument Corp.
Box 194 Ellicott Station
Buffalo, New York 14205

Airplane Flight Manual Supplement No. 1
(For Aircraft Applicability List, see Master Eligibility List of STC SA157NE)

I. Limitations: The Graphic Engine Monitor instrument does not replace any existing aircraft cylinder head temperature (CHT) indicator, exhaust gas temperature (EGT) indicator or turbine inlet temperature TIT indicator.

II. Procedures:

a. Description: The Graphic Engine Monitor (GEM) Model 602 displays electronic bar graph readings of exhaust gas temperature. All temperature information is presented as vertical columns (one per cylinder) while CHT is indicated by a non-illuminated "black" bar in the field of orange bars. (One bar represents 25°F.) Actual CHT values are determined by comparing the black bar to the scale along the right edge of the gauge.

b. The Graphic Engine Monitor Model 603 performs identically to the Model GEM-602 except that it incorporates a digital numeric readout of turbocharger TIT in addition to existing digital bar graph displays of CHT and EGT. The turbocharger numeric display shows TIT in tens of degrees Fahrenheit (Rdg x10).

The Graphic Engine Monitor has two modes of operation.
(a) Lean Mode
(b) Monitor Mode

The Lean Mode is identified by the "EGT" annunciator blinking. It may be entered at any time by holding the Reset Button for two seconds until the "EGT" annunciator blinks. Lean Mode is used to adjust the mixture for cruise and identify the leanest cylinder. The instrument then enters the Monitor Mode.

FAA Approved: June 14, 1983

Revised: May 6, 1985

Insight Instrument Corp.
Box 194 Ellicott Station
Buffalo, New York 14205

Airplane Flight Manual Supplement No. 1
(For Aircraft Applicability List, see Master
Eligibility List of STC SA157NE)

b. Normal Procedure:

Cruise Leaning Procedure Using Insight GEM

1. Establish cruise power setting. If "EGT" annunciator is not blinking, hold reset switch until it does blink.

2. Lean mixture slowly until one column blinks. Stop leaning when column starts blinking. The blinking identifies that cylinder as the leanest and that it has just gone past peak EGT. Push the reset switch briefly to stop the blinking. The instrument then enters the monitor mode.

3. Enrichen until the leanest cylinder's EGT drops one bar (25°F). This sets the mixture to peak EGT for "best economy" setting. To select the best power setting, the mixture should be enrichened further to drop the EGT 3 to 4 bars (75-100°F). If best power is selected, the reset switch should be pushed briefly to trigger the storage of normal temperature for monitor mode.

FAA Approved: June 14, 1983

Revised: May 6, 1985

Insight Instrument Corp.
Box 194 Ellicott Station
Buffalo, New York 14205

Airplane Flight Manual Supplement No. 1
(See Title Page (page 1) For
Aircraft Applicability List)

REVISION LOG PAGE

Rev. No.	Description	Pages Affected	Approval
1	Change to multiple approval	All	for W.G. Bray Raymond J. Borowski Mgr. N.Y. Aircraft Certification Office August 30, 1983
2	Add additional aircraft models	All	for N.J. Glenn Raymond J. Borowski Mgr. N.Y. Aircraft Certification Office October 13, 1983
3	Add GEM-603 with a numeric digital TIT readout and additional aircraft models	All	for N.J. Glenn Raymond J. Borowski Mgr., N.Y. Aircraft Certification Office May 6, 1985

FAA Approved: June 14, 1983

GARMIN Ltd. or its subsidiaries
c/o Garmin International
1200 E. 151st Street, Olathe, KS 66062 USA

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT
or
SUPPLEMENTAL AIRPLANE FLIGHT MANUAL
for
GARMIN 400W SERIES GPS-WAAS NAVIGATION SYSTEM
as installed in

Piper PA-28R-201
Make and Model Airplane

Reg. No. N36777 S/N 28R-7837292

This document serves as an Airplane Flight Manual Supplement or as a Supplemental Airplane Flight Manual when the aircraft is equipped with the Garmin 400W Series unit. This document must be carried in the airplane at all times when the Garmin 400W Series unit is installed in accordance with STC SA01933LA-D.

The information contained herein supplements or supersedes the information made available to the operator by the manufacturer in the form of clearly stated placards, markings, or manuals or in the form of an FAA approved Airplane Flight Manual, only in those areas listed herein. For limitations, procedures and performance information not contained in this document, consult the basic placards, markings, or manuals or the basic FAA approved Airplane Flight Manual.

FAA Approved By: David G Armstrong

David G Armstrong
ODA STC Unit Administrator
Garmin International, Inc.
ODA-240087-CE

Date: 7/31/09

GARMIN Ltd. or its subsidiaries
c/o Garmin International
1200 E. 151st Street, Olathe, KS 66062 USA

AIRPLANE FLIGHT MANUAL SUPPLEMENT
or SUPPLEMENTAL AIRPLANE FLIGHT MANUAL
for a Garmin 400W Series Navigation System

LOG OF REVISIONS				
Rev. No.	Page No.	Date	Description	FAA Approved
A Original	All	11-20-07	Complete Supplement	Seyed-Youssef Hashemi Mgr. Flt. Test Br., ANM-160L FAA, Los Angeles ACO Transport Airplane Directorate Date Nov. 20, 2007
B	All	7/31/09	Added '-D' to STC number, added LP approach type	[signature] ODA STC Unit Administrator ODA-240087-CE Garmin International, Inc.

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AIRPLANE FLIGHT MANUAL SUPPLEMENT
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for a Garmin 400W Series Navigation System

Section 1. GENERAL

1.1 Garmin 400W Series GPS/WAAS Nav Com

The Garmin 400W Series GPS/WAAS Navigator is a panel-mounted product that contains a GPS/WAAS receiver for GPS approved primary navigation, under TSO C146a (plus optional VHF Com and VHF Nav radios) in an integrated unit with a moving map and color display. The 400W Series unit features a graphical display which may also be used to depict traffic, weather, or terrain data.

The navigation functions are operated by dedicated keys and graphical menus which are controlled by the buttons and the dual concentric rotary knob along the bottom and right side of the display.

Optional VHF Com and VHF Nav radio functions are controlled via dedicated buttons and knobs on the left side of the display and adjacent to frequencies they are controlling.

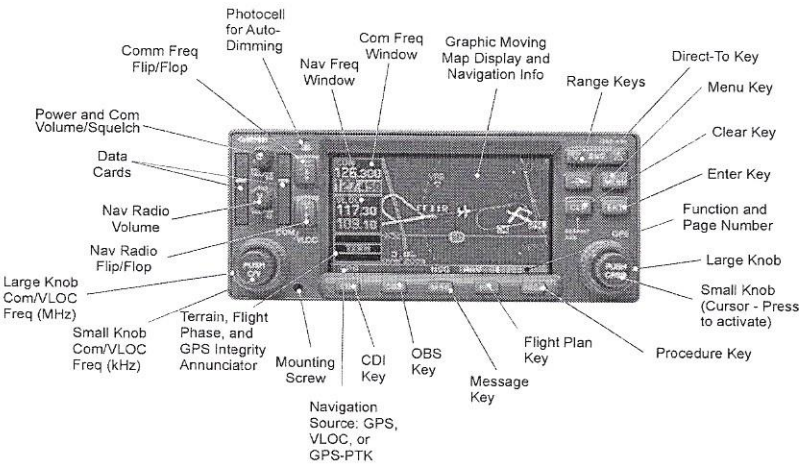

Figure 1 - 400W Series Control and Display Layout

1.2 Operation

GPS/WAAS TSO-C146a Class 3 Operation: The Garmin 400W Series unit, when installed in accordance with STC SA01933LA-D, uses GPS and WAAS (within the coverage of a Space-Based Augmentation System complying with ICAO Annex 10) for enroute, terminal area, non-precision approach operations (including "GPS", "or GPS", "RNAV", "LNAV", and "LP" approaches), and approach procedures with vertical guidance (including "LNAV/VNAV" and "LPV").

Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. GPS navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.

1.3 Class II Oceanic, Remote, and other Operations:

The Garmin 400W Series, as installed, has been found to comply with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace, when used in conjunction with WAAS Garmin Prediction Program part number 006-A0154-03. Oceanic operations are supported when the 400W Series unit annunciates OCN. This provides an alarm limit of four NMI and a mask angle of five degrees. The 400W series unit also has the ability to predict RAIM availability at any waypoint in the database or if WAAS corrections are expected to be absent or disabled. This AFMS does not constitute an operational approval for Oceanic or Remote area operations. Additional equipment installations or operational approvals may be required.

a) Oceanic navigation requires an additional approved long range oceanic and/or remote area navigation system with independent display, sensors, antenna, and power source. (It may be a second 400W/500W Series unit.)
b) Redundant VHF Com and VHF Nav systems may be required for other than U.S. 14 CFR Part 91 operations. Check foreign regulation requirements as applicable. (It may be a second 400W/500W Series unit.)
c) Operations approval *may* be granted for the use of the 400W Series unit RAIM prediction function in lieu of the Prediction Program for operators requiring this capability. Refer to your appropriate civil aviation authorities for these authorizations.

Section 2. LIMITATIONS

2.1 Pilot's Guide

The GARMIN 400W Series Pilot's Guide, part number and revision listed below (or later applicable revisions), must be immediately available for the flight crew whenever navigation is predicated on the use of the 400W Series unit.

- 400W Series Pilot's Guide & Reference P/N 190-00356-00 Rev E
- 400W/500W Series Optional Displays P/N 190-00356-30 Rev F
- 400W/500W Series Display Interfaces P/N 190-00356-31 Rev B

This AFM supplement does not grant approval for IFR operations to aircraft limited to VFR operations. Additional aircraft systems may be required for IFR operational approval. Systems limited to VFR shall be placarded in close proximity to the 400W Series unit
"**GPS LIMITED TO VFR USE ONLY**".

2.2 System Software:

The system must utilize the Main and GPS software versions listed below (or later FAA approved versions). The software versions are displayed on the self-test page immediately after turn-on for approximately 5 seconds or they can be accessed in the AUX pages.

Subsequent software versions may support different functions. Check the 400W Series Pilot's Guide for further information.

Table 1 - Approved Software Versions

Software Item	**Approved Software Version** *(or later FAA approved versions for this STC)*	
	SW version	As displayed on unit
Main SW Version	3.30	3.30
GPS SW Version	3.2	3.2

2.3 Navigation Database

The 400W Series unit database card must be installed. (IAW the TSO deviations granted to Garmin for the 400W unit, navigation database cards may not be marked with the part number. The software automatically precludes invalid databases for use by the 400W)

a) IFR enroute and terminal navigation is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.

b) GPS instrument approaches using the 400W Series units are prohibited, unless the 400W Series unit's approach data is verified by the pilot or crew to be current. Instrument approaches must be accomplished in accordance with an approved instrument approach procedure that is loaded from the 400W Series unit database.

c) Installations with dual 400W/500W Series units will only crossfill between units when they contain the same database cycle. Updating of each database must be accomplished on the ground prior to flight.

2.4 Terrain Database

The 400W Series unit supports Terrain and requires a Terrain database card to be installed in order for the feature to operate. The table below lists compatible database cards for the 400W series. Each of the data base cards contains the following data:

a) The Terrain Database has an area of coverage from North 75° Latitude to South 60° Latitude in all longitudes.

b) The Airport Terrain Database has an area of coverage that includes the United States, Canada, Mexico, Latin America, and South America.

c) The Obstacle Database has an area of coverage that includes the United States, and is updated as frequently as every 56 days.

NOTE: The area of coverage may be modified as additional terrain data sources become available.

Table 2 – Approved Terrain Database Cards

Part Number	Description
010-10201-20	Data Card, TAWS / Terrain, 128MB
010-10201-21	Data Card, TAWS / Terrain, 256MB

2.5 Navigation

No navigation is authorized north of 89° (degrees) north latitude or south of 89° (degrees) south latitude.

2.6 Approaches

a) During GPS approaches, the pilot must verify the 400W Series unit is operating in the approach mode. (LNAV, LNAV+V, L/VNAV, LP, or LPV)

b) When conducting approaches referenced to true North, the heading selection on the AUX pages must be adjusted to TRUE.

c) Accomplishment of an ILS, LOC, LOC-BC, LDA, SDF, MLS, VOR approach, or any other type of approach not approved for GPS overlay, is not authorized with GPS navigation guidance.

d) Use of the GNS 430W VOR/LOC/GS receiver to fly approaches not approved for GPS requires VOR/LOC/GS navigation data to be present on the external indicator (i.e. proper CDI source selection).

e) For aircraft with remote source selection annunciation or remote GPS navigation annunciations installed, conducting IFR approaches is prohibited if the remote annunciation is found to be inoperative during pre-flight. (This limitation does not prohibit the conduct of an IFR approach if the required remote annunciation fails during flight. The indications provided on the 400W Series unit display may be used as a backup).

f) Except in emergency conditions, IFR approaches are prohibited whenever any physical or visual obstruction (such as a throw-over yoke) restricts pilot view or access to the 400W Series unit or the affected CDI.

2.7 Autopilot Coupling

IFR installations of a Garmin 400W Series unit allow the operator to fly all phases of flight based on the navigation information presented to the pilot; however, not all modes may be coupled to the autopilot. All autopilots may be coupled in Oceanic (OCN), Enroute (ENR), and Terminal (TERM) modes; however, the FAA requires that vertical coupling of an autopilot for approaches be demonstrated to meet their intended function and provide safe and proper operation to published minimums. This installation is limited to:

☑ No limitations for autopilot coupling.

☐ Lateral GPS coupling (LNAV only). For 430W units: The GS of an ILS (VLOC) may be coupled to the autopilot without any limitations.

This limitation may be removed after an FAA Flight Test demonstration. Contact Garmin International, Tech Support for additional information.

2.8 Terrain Display

Terrain refers to the display of terrain information. Pilots are NOT authorized to deviate from their current ATC clearance to comply with terrain/obstacle alerts. Terrain unit alerts are advisory only and are not equivalent to warnings provided by TAWS. Navigation must not be predicated upon the use of the terrain display.

The terrain display is intended to serve as a situational awareness tool only. By itself, it may not provide either the accuracy or the fidelity on which to base decisions and plan maneuvers to avoid terrain or obstacles.

2.9 VNAV

VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee Step-Down Fix altitude protection, or arrival at approach minimums in a normal position to land.

2.10 Weather Display

If an optional weather receiver is interfaced to the 400W Series unit, the weather information displayed is limited to supplemental use only and may not be used in lieu of an official weather data source.

2.11 Traffic Display

Traffic may be displayed on the 400W Series unit when connected to an approved optional TCAS, TAS, or TIS traffic device. These systems are capable of providing traffic monitoring and alerting to the pilot. 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. Display of this traffic data and related operations are described in the 400W Series unit Pilot's Guide.

Section 3. EMERGENCY PROCEDURES

3.1 Emergency Procedures

No change.

3.2 Abnormal Procedures

a) If the Garmin 400W Series unit GPS navigation information is not available, or is invalid, utilize other remaining operational navigation equipment installed in the airplane as appropriate. If the 400W Series unit loses GPS position and reverts to Dead Reckoning mode (indicated by the annunciation of "DR" in the lower left of the display), the moving map will continue to be displayed. Aircraft position will be based upon the last valid GPS position and estimated by Dead Reckoning methods. Changes in airspeed or winds aloft can affect the estimated position substantially. Dead Reckoning is only available in Enroute mode; Terminal and Approach modes do not support DR.

b) If a "Loss of Integrity" (INTEG) message is displayed during:
   - Enroute/Terminal: continue to navigate using GPS equipment and periodically cross-check the GPS guidance to other approved means of navigation.
   - GPS Approach: GPS approaches are not authorized under INTEG - Execute missed approach or revert to alternate navigation.

c) During a GPS LPV precision approach or GPS LNAV/VNAV approach, the 400W Series unit will downgrade the approach if the Vertical alarm limits are exceeded. This will cause the vertical guidance to flag as unavailable. The procedure may be continued using the LNAV only minimums.

d) During a GPS LP approach, the 400W Series may downgrade the approach prior to the Final Approach Fix if alarm limits are exceeded. If this occurs, a message will be displayed advising the pilot to use LNAV minimums. If alarm limits are exceeded after the Final Approach Fix, the 400W Series unit will flag the lateral guidance and generate a system message "ABORT APPROACH loss of navigation". Immediately upon viewing the message the unit will revert to Terminal alarm limits. If the position integrity is within these limits lateral guidance will be restored

and the GPS may be used to execute the missed approach, otherwise alternate means of navigation should be utilized.

e) During any GPS approach in which precision and non-precision alarm limits are exceeded, the 400W Series unit will flag the lateral guidance and generate a system message "ABORT APPROACH loss of navigation". Immediately upon viewing the message the unit will revert to Terminal alarm limits. If the position integrity is within these limits lateral guidance will be restored and the GPS may be used to execute the missed approach, otherwise alternate means of navigation should be utilized.

Section 4. NORMAL PROCEDURES

Refer to the 400W Series unit Pilot's Guide defined in paragraph 2.1 on page 6 of this document for normal operating procedures. This includes all GPS operations, VHF COM and NAV, and Multi-Function Display information. For information on TIS traffic, or data linked weather see the Pilot's Guide addendum for optional displays. For information on active traffic sensor or Stormscope operation and displays see the Pilot's Guide addendum for display interfaces.

Although intuitive and user friendly the 400W Series unit requires a reasonable degree of familiarity to prevent operations without becoming too engrossed at the expense of basic instrument flying in IMC and basic see-and-avoid in VMC. Pilot workload will be higher for pilots with limited familiarity in using the unit in an IFR environment, particularly without the autopilot engaged. Garmin provides excellent training tools with the Pilot's Guide and PC based simulator. Pilots should take full advantage of these training tools to enhance system familiarization. Use of an autopilot is strongly encouraged when using the 400W Series unit in IMC conditions

4.1 Approaches with Vertical Guidance

The 400W Series unit supports three types of GPS approaches with vertical guidance: LPV approaches, LNAV/VNAV (annunciated as L/VNAV) approaches, and LNAV approaches with advisory vertical guidance (annunciated as LNAV+V). For LNAV approaches with advisory vertical guidance, the 400W Series will annunciate LNAV+V indicating vertical guidance is available. LNAV minimums will be controlling in this case.

NOTE:

If flying an LPV or LNAV/VNAV approach, be prepared to fly the LNAV only approach prior to reaching the final approach fix (FAF). If the GPS integrity is not within vertical approach limits, the system will flag the vertical guidance. This may be annunciated by a downgrade to LNAV message.

For additional information on approaches with vertical guidance refer to the 400W Series unit Pilot's Guide.

4.2 Approaches without Vertical Guidance

The 400W Series unit supports Localizer Performance approaches (annunciated as LP). Published LP minimums will be controlling in this case.

> ***NOTE:***
> If flying an LP approach, be prepared to fly the LNAV only approach prior to reaching the final approach fix (FAF). If the GPS integrity is not within LP approach limits, the system will notify the pilot by a downgrade to LNAV message.

For additional information on LP approaches refer to the 400W Series unit Pilot's Guide.

4.3 Autopilot Operation

The Garmin 400W Series may be coupled to an optional autopilot if installed in the aircraft when operating as prescribed in the LIMITATIONS section of this manual. For lateral guidance, some installations may utilize GPSS or GPS Roll Steering in lieu of the analog deviation information. If an HSI is used with GPSS engaged, the pilot should rotate the course pointer as prompted on the 400W Series unit to prevent loss of situational awareness and to prevent the aircraft from turning inappropriately if the autopilot is switched from digital (GPSS) to analog mode. For autopilot operational instructions, refer to the FAA approved Flight Manual or Flight Manual Supplement for the autopilot.

4.4 Coupling the Autopilot during approaches

The Garmin 400W Series supports analog and digital (GPSS) control interfaces to an optionally installed autopilot. Some autopilots revert to ROLL mode (wings level) and/or flag a NAV failure if the digital data becomes unavailable or is inhibited. The CDI selection of VLOC should inhibit the digital control interface. When switching between GPS and VLOC the pilot should be aware that the autopilot may need to be re-engaged into APR or NAV mode after changing the CDI source.

Autopilot coupling to GPS vertical guidance requires that the autopilot be engaged in an analog APR mode identical to coupling to an ILS. Some autopilots may revert to ROLL mode when the navigation outputs of the 400W Series unit sequence to the final approach fix. In these installations

the unit will be configured to PROMPT the pilot to "Enable the autopilot approach outputs" in order to prevent the autopilot from entering ROLL mode without the pilot being aware of the transition.

☐ This installation prompts the pilot and requires the pilot to enable the A/P outputs just prior to engaging the autopilot in APR mode.

☐ This installation supports a seamless transition from digital (GPSS) to analog guidance for the autopilot. To capture the vertical guidance, the pilot may engage the autopilot in APR mode at any time when the GPS Glide Slope (VDI) becomes valid (displayed without a FLAG).

☑ This installation interfaces to the autopilot in analog mode only. To capture the vertical guidance, the pilot may engage the autopilot in APR mode at any time when the GPS Glide Slope (VDI) becomes valid.

☐ The autopilot does not support any vertical capture or tracking in this installation.

Analog only autopilots should use APR mode for coupling to LNAV approaches. Autopilots which support digital roll steering commands (GPSS) may utilize NAV mode and take advantage of the digital tracking during LNAV only approaches.

4.5 WFDE Prediction Program

The Garmin WAAS Fault Detection and Exclusion (WFDE) Prediction Program is required for Remote/Oceanic operations.

The Prediction Program should be used in conjunction with the Garmin 400W/500W Simulator. After entering the intended route of flight in the Simulator flight plan the pilot selects the FDE Prediction Program under the Options menu of the Simulator program.

For detailed information refer to the WFDE prediction program instructions (190-00643-01). The availability of FDE is only required for Oceanic or Remote operations.

Section 5. PERFORMANCE

No change.

Section 6. WEIGHT AND BALANCE

See current weight and balance data.

Section 7. SYSTEM DESCRIPTIONS

See Garmin 400W Series unit Pilot's Guide for a complete description of the 400W Series unit.

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SECTION 10

OPERATING TIPS

SECTION 10

OPERATING TIPS

10.1 GENERAL

This section provides operating tips of particular value in the operation of the Cherokee Arrow III.

10.3 OPERATING TIPS

(a) Learn to trim for takeoff so that only a very light back pressure on the control wheel is required to lift the airplane off the ground.

(b) The best speed for takeoff is about 70 KIAS under normal conditions. Trying to pull the airplane off the ground at too low an airspeed decreases the controllability of the airplane in the event of engine failure.

(c) Flaps may be lowered at airspeeds up to 103 KIAS. To reduce flap operating loads, it is desirable to have the airplane at a slower speed before extending the flaps. The flap step will not support weight if the flaps are in any extended position. The flaps must be placed in the "UP" position before they will lock and support weight on the step.

(d) Before attempting to reset any circuit breaker, allow a two to five minute cooling off period.

(e) Before starting the engine, check that all radio switches, light switches and the pitot heat switch are in the off position so as not to create an overloaded condition when the starter is engaged.

(f) Strobe lights should not be operating when flying through overcast and clouds, since reflected light can produce spacial disorientation. Do not operate strobe lights in close proximity to ground.

(g) The rudder pedals are suspended from a torque tube which extends across the fuselage. The pilot should become familiar with the proper positioning of his feet on the rudder pedals so as to avoid interference with the torque tube when moving the rudder pedals or operating the toe brakes.

(h) In an effort to avoid accidents, pilots should obtain and study the safety related information made available in FAA publications such as regulations, advisory circulars, Aviation News, AIM and safety aids.

(i) The shape of the wing fuel tanks is such that in certain maneuvers the fuel may move away from the tank outlet. If the outlet is uncovered, the fuel flow will be interrupted and a temporary loss of power may result. Pilots can prevent inadvertent uncovering of the outlet by avoiding maneuvers which could result in uncovering the outlet.

Extreme running turning takeoffs should be avoided as fuel flow interruption may occur.

Prolonged slips or skids which result in excess of 2000 ft. of altitude loss, or other radical or extreme maneuvers which could cause uncovering of the fuel outlet must be avoided as fuel flow interruption may occur when tank being used is not full.

PREPARED BY	McCAULEY ACCESSORY DIVISION CESSNA AIRCRAFT COMPANY	
CHECKED BY		
APPROVED BY	REPORT TR 804	

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR THE

PIPER ARROW MODELS PA-28R-180,
PA-28R-200 (S/N 28R-35001 and UP),
PA-28R-201 and PA-28RT-201

Reg. No. N36777

Ser. No. 28R-7837292

STC No. SA129CH

GENERAL

The information in this supplement is FAA approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the McCauley B3D36C424/74SA-0 propeller model is installed in accordance with McCauley STC approved data. The information contained herein supplements or supersedes the basic flight manual only in those areas listed. For limitations, procedures and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

FAA Approved: Charles B. Bonnen, Acting Manager
Systems and Flight Test Branch
Chicago Aircraft Certification Office

DATE: Nov 09 1993
REVISED: AUG 2 3 1995

LOG OF REVISIONS

Revision Number	Revised Pages	Description of Revision	Date	FAA Approval
A	3	See ECN 9894	04/12/94	[signature]
B	1+2 ,3	Add aircraft models to title page; see ECN 10224	01/26/95	[signature]
C	1,3	Add PA-28R-180 aircraft model; See ECN 10414	AUG 2 3 1995	[signature]

NOTE: All changes are indicated by black vertical line along the right margin.

McCAULEY ACCESSORY DIVISION
CESSNA AIRCRAFT COMPANY
FAA APPROVED STC # SA129CH

I. Limitations

Propeller: McCauley Constant Speed
B3D36C424/74SA-0

Blade Angles: At 30" station, low: 9.7°, high 33.8° (PA-28R-200, PA-28R-201, PA-28RT-201)
8.7°, high 33.8° (PA-28R-180)

Diameter: 74 inches maximum
72 inches minimum repair

Spinner: McCauley D-6012 or D-6012-1

Placard: On the instrument panel, between tachometer and manifold pressure gauges:

**"Avoid continuous operation
below 15" M.P. setting
between 1650 and 2200 RPM
when above 85 KIAS (100 MPH)."**

Power Plant Instrument Markings:

Tachometer on PA-28RT-201 (S/N 28R-7918001 through 28R-7918267), PA-28R-180, PA-28R-200 and PA-28R-201:

Green Arc - Normal	500 to 1650 RPM
Yellow Arc - Caution	1650 to 2200 RPM
Green Arc - Normal	2200 to 2700 RPM
Red Radial - Maximum	2700 RPM

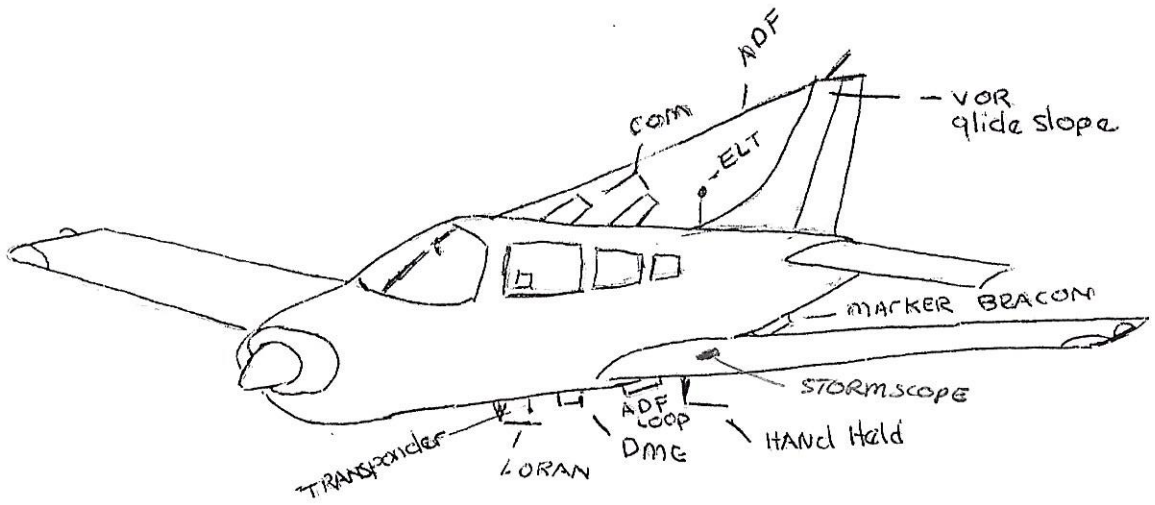
Tachometer on PA-28RT-201 (S/N 28R-8018001 and UP):

Green Arc - Normal	500 to 1650 RPM
Yellow Arc - Caution	1650 to 2200 RPM
Green Arc - Normal	2200 to 2650 RPM
Red Radial - Maximum	2650 RPM

II. Procedures
No Change

III. Performance
No Change

Equipment List/Weight and Balance Record
Equipment List/Weight and Balance Record revised by STC installer for removal of existing propeller and addition of McCauley propeller.


ADF
COM
VOR
glide slope
ELT
MARKER BEACON
STORMSCOPE
ADF
LOOP
TRANSponder
LORAN
DME
HAND Held

N36777

SUPPLEMENTARY WEIGHT & BALANCE

DATE 9 DEC-89

AIRCRAFT TYPE PA28R 201

REGISTRATION N 36777

SERIAL NO. 28R 7837292

ITEM	WEIGHT	ARM	MOMENT
LEFT MAIN WHEEL	816.0	109.7	89515.2
RIGHT MAIN WHEEL	818.0	109.7	89734.6
NOSE WHEEL	534.0	15.6	8330.4
AS WEIGHED, FULL FUEL & OIL	2168.0	86.5	187580.2
LESS USABLE FUEL (72.0 GAL)	432.0	95.0	41040
AIRCRAFT BASIC EMPTY WT.	1736.0	84.41	146540.2

Superceded 8-1-90

NEW EMPTY WEIGHT 1736.0 LBS.

NEW EMPTY WEIGHT MOMENT 146540.2

NEW C. G. 84.4 INCHES AFT OF DATUM LINE

NEW USEFUL LOAD 1014.0 LBS.

SCALE CALIB. DATE SEPT. 88

9 DEC. 89 Jack Davey 1108005IA

REVISED WEIGHT AND BALANCE DATA

DATE March 4, 1991

AIRCRAFT:

OWNER Maurice B. Teitelbaum
ADDRESS 1583 Snug Harbor Road, Shady Side, MD 20764
MAKE Piper
MODEL PA-28R-201
SERIAL NUMBER 28R-7837292
N NUMBER N36777

PREVIOUS:

EMPTY WEIGHT 1738.0
USEFUL LOAD 1012.0
EMPTY WEIGHT C.G. 84.37

NEW WEIGHT AND BALANCE DATA

ITEM:	WEIGHT	ARM	MOMENT
PREVIOUS:	1738.0	84.37	146637.4
INSTALLED:			
Knots 2U Aileron, Flap and Stabilator Gap Seal Kit	3.3	133.0	438.90
	.3	308.0	92.40
Knots 2U Falp Hinge Fairing Kit	1.4	133.0	186.20
RMD Wing Tip Lighting	4.0	106.6	426.40
TOTALS	1747.0	84.59	147781.30

REVISED/NEW:

EMPTY WEIGHT 1747.0
USEFUL LOAD 1003.0
EMPTY WEIGHT C.G. 84.59

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
Budget Bureau No. 04-R060.1

FOR FAA USE ONLY
OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE: PIPER	MODEL: PA-28R-201
	SERIAL NO.: 28R-7837292	NATIONALITY AND REGISTRATION MARK: N36777
2. OWNER	NAME (As shown on registration certificate): MAURICE B. TELTELBAUM	ADDRESS (As shown on registration certificate): 1583 Snug Harbor Road Shady Side, MD 20764

3. FOR FAA USE ONLY

4. UNIT IDENTIFICATION

UNIT	MAKE	MODEL	SERIAL NO.	5. TYPE REPAIR	5. TYPE ALTERATION
AIRFRAME	◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ (As described in item 1 above) ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆				XX
POWERPLANT					
PROPELLER					
APPLIANCE	TYPE				
	MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS	B. KIND OF AGENCY	C. CERTIFICATE NO.
MARYLAND AIRLINES #9 AIRPORT CIRCLE EASTON, MD 21601	[ ] U.S. CERTIFICATED MECHANIC [ ] FOREIGN CERTIFICATED MECHANIC [X] CERTIFICATED REPAIR STATION [ ] MANUFACTURER	BVMR650C

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE	SIGNATURE OF AUTHORIZED INDIVIDUAL
02-09-90	Robert V. Hudson

7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is [X] APPROVED [ ] REJECTED

BY						OTHER (Specify)
	[ ]	FAA FLT. STANDARDS INSPECTOR	[ ]	MANUFACTURER	[ ] INSPECTION AUTHORIZATION	
	[ ]	FAA DESIGNEE	[X]	REPAIR STATION	[ ] CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	

DATE OF APPROVAL OR REJECTION	CERTIFICATE OR DESIGNATION NO.	SIGNATURE OF AUTHORIZED INDIVIDUAL
	BVMR650C	ROBERT V. HUDSON

FAA Form 337 (7-67)

(8320)

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. Any alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. DESCRIPTION OF WORK ACCOMPLISHED *(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

Removed orginal EGT gage and probe. Installed GEM 602. (Graphic engine monitor.) In accordance with STC SA157NE. and drawing 8258 version 2.1

Aircraft equipment list revised.

Weight and balance change was neglegiable.

☐ ADDITIONAL SHEETS ARE ATTACHED

☆U.S. GOVERNMENT PRINTING OFFICE: 1986-659-121/40260

NOTE

Pilot's Operating Handbook Revision Only

This Is Not A Complete Handbook

REPORT: VB-870
Rev. 9 - 761-635 (PR050124) Dated January 24, 2005

This revision shall be inserted into the current PA-28R-201 Cherokee Arrow III Pilot's Operating Handbook, REPORT: VB-870, issued December 21, 1976.

APPLICABILITY

The aircraft serial number eligibility bracket for application of this handbook is 28R-7737001 through 28R-7837317. The specific application of this handbook is limited to the Piper PA-28R-201 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

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 will be kept current by revisions distributed to the airplane owners.

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. Page numbers followed by a small letter shall be inserted in direct sequence with the same common numbered page.

II. Identification of Revised Material

Revised text and illustrations shall be indicated by a black vertical line along the outside margin of the page, opposite revised, added or deleted material. A line along the outside margin of the page opposite the page number will indicate that an entire page was added.

Black lines will indicate only current revisions with changes and additions to or deletions of existing text and illustrations. Changes in capitalization, spelling, punctuation or the physical location of material on a page will not be identified by symbols.

ORIGINAL PAGES ISSUED

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

Title, ii through v, 1-1 through 1-14, 2-1 through 2-8, 3-1 through 3-14, 4-1 through 4-18, 5-1 through 5-32, 6-1 through 6-56, 7-1 through 7-28, 8-1 through 8-16, 9-1 through 9-14, 10-1 through 10-2.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS

Current Revisions to the PA-28R-201 Cherokee Arrow III Pilot's Operating Handbook, REPORT: VB-870 issued December 21, 1976.

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 1 - 761 635 (PR770314)	1-3	Added Hartzell prop to item 1.5, Propellers.	Ward Evans Ward Evans March 14, 1977
	1-6	Corrected item 1.19 (b).	
	2-2	Added Hartzell prop. and (m) to item 2.7, Power Plant Limitations.	
	2-8	Added McCauley restriction to RPM limitation placard.	
	3-12	Revised item 3.27, Emergency Landing Gear Extension.	
	6-4	Revised Figure 6-3, Leveling Diagram.	
	6-17	Added items 1.a., 2.a. and 2.b.	
	6-19	Revised item 5 Cert. Basis.	
	6-53	Added 79591-2 Seat to item 287; added 79591-3 Seat to item 289.	
	7-3	Revised item 7.5, Engine and Propeller.	
	7-28	Revised Note.	
Rev. 2 - 761 635 (PR770714)	1-11, 1-12, 1-13, 1-14	Revised para. 1.21, Conversion Factors.	
	3-3	Revised airspeeds under Engine Power Loss In Flight and Power Off Landing.	
	3-8	Revised airspeed under para. 3.11, Engine Power Loss In Flight.	
	3-9	Revised airspeeds under para. 3.13, Power Off Landing.	
	4-4	Revised RPM under Warm-Up.	
	4-5	Revised airspeed under Short Field, Obstacle Clearance and Soft Field Takeoff procedures.	
	4-13	Revised para. 4.23, Takeoff.	
	6-45	Added new item 213; revised item nos.; relocated item to pg. 6-46.	
	6-46	Added item from pg. 6-45; revised item nos.; added new items; relocated items to pg. 6-47.	
	6-47	Added items from pg. 6-46; added new items; relocated items to pg. 6-48.	
	6-48	Added items from pg. 6-47; added new items.	
	6-49	Revised item nos.; added new items; revised item 271.	
	6-53	Revised item nos.; revised items 327 and 331.	
	6-54	Revised item nos.; added new items; relocated item to pg. 6-55;revised item 353.	
	6-55	Added item 361 from pg. 6-54.	
	7-18	Revised para. 7.21 Pitot-Static System.	
	7-27	Revised para. 7.37, Piper External Power.	

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 7 - 761 635 (PR870131) (cont)	4-5	Revised para. 4.5.	
	4-12	Revised para. 4.21.	
	4-13	Revised para. 4.25.	
	4-17	Revised para. 4.39.	
	7-5	Revised fig. 7-1.	
	7-6	Revised fig. 7-3.	
		Revised para. 7.11.	
	7-7	Revised para. 7.11.	D.H.Trompler
	7-8	Revised fig. 7-5.	5/7/87
	7-9	Revised fig. 7-7.	Date
	7-10	Revised fig. 7-9.	
Rev. 8 - 761-635 (PR890320)	1-i	Revised Table of Contents.	
	1-3	Relocated para. 1.9 to pg. 1-4.	
	1-4	Revised para. 1.9.	
	3-i	Revised Table of Contents.	
	3-1	Revised para. 3.1.	
	4-i thru 4-ii	Revised Table of Contents.	
	8-1	Revised para. 8.1.	
	8-3	Revised para. 8.3.	D.H.Trompler
	8-10 thru 8-11	Revised para. 8.19.	May 1, 1989
	9-9	Revised SECTION 3,(a).	Date
Rev. 9 - 761 635 (PR050124)	iii	Added Warning.	
	iv-c	Added Rev. 9 to L of R.	
	3-4	Revised para. 3.3.	
	3-12	Revised para. 3.27.	
	8-1	Revised para. 8.1.	Linda J. Dicken
	8-2	Moved info. from page 8-1.	Jan. 24, 2005
	8-3	Revised para. 8.3.	

3.3 EMERGENCY PROCEDURES CHECK LIST

ENGINE FIRE DURING START

Starter .....crank engine
Mixture .....idle cut-off
Throttle .....open
Electric fuel pump .....OFF
Fuel selector .....OFF
Abandon if fire continues

ENGINE POWER LOSS DURING TAKEOFF

If sufficient runway remains for a normal landing, leave gear down and land straight ahead.

If area ahead is rough, or if it is necessary to clear obstructions:
Gear selector switch .....UP
Emergency gear lever (on aircraft equipped with backup gear extender) .....locked in OVERRIDE ENGAGED position

If sufficient altitude has been gained to attempt a restart:
Maintain safe airspeed
Fuel selector .....switch to tank containing fuel
Electric fuel pump .....check ON
Mixture .....check RICH
Alternate air .....OPEN
Emergency gear lever .....as required
If power is not regained, proceed with power off landing.

ENGINE POWER LOSS IN FLIGHT

Fuel selector .....switch to tank containing fuel
Electric fuel pump .....ON
Mixture .....RICH
Alternate air .....OPEN
Engine gauges .....check for indication of cause of power loss
If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

When power is restored:
Alternate air .....CLOSED
Electric fuel pump .....OFF
If power is not restored, prepare for power off landing.
Trim for 79 KIAS

POWER OFF LANDING

On aircraft equipped with the backup gear extender, lock the emergency gear lever in the "OVERRIDE ENGAGED" position before the airspeed drops below 105 KIAS to prevent the landing gear from free-falling.
Trim for 79 KIAS.
Locate suitable field.
Establish spiral pattern.
1000 ft above field at downwind position for normal landing approach.
When field can easily be reached, slow to 72 KIAS for shortest landing.

Touchdowns should normally be made at lowest possible airspeed with full flaps.

When committed to landing:
Ignition .....OFF
Master switch .....OFF
Fuel selector .....OFF
Mixture .....idle cut-off
Seat belt and harness .....tight

FIRE IN FLIGHT

Source of fire .....check

Electrical fire (smoke in cabin):
Master switch .....OFF
Vents .....open
Cabin heat .....OFF
Land as soon as practicable.

Engine fire:
Fuel selector .....OFF
Throttle .....CLOSED
Mixture .....idle cut-off
Electric fuel pump .....check OFF
Heater and defroster .....OFF
Proceed with power off landing procedure.

LOSS OF OIL PRESSURE

Land as soon as possible and investigate cause.
Prepare for power off landing.

LOSS OF FUEL PRESSURE

Electric fuel pump .....ON
Fuel selector .....check on full tank

HIGH OIL TEMPERATURE

Land at nearest airport and investigate the problem.
Prepare for power off landing.

ALTERNATOR FAILURE

Verify failure.
Reduce electrical load as much as possible.
Alternator circuit breakers .....check
Alt switch .....OFF (for 1 second), then on

If no output:
Alt switch .....OFF

Reduce electrical load and land as soon as practical.

If battery is fully discharged, the gear will have to be lowered using the emergency gear extension procedure. Position lights will not illuminate.

PROPELLER OVERSPEED

Throttle .....retard
Oil pressure .....check
Prop control .....full DECREASE rpm, then set if any control available
Airspeed .....reduced
Throttle .....as required to remain below 2700 rpm

EMERGENCY LANDING GEAR EXTENSION

Prior to emergency extension procedure:
Master switch .....check ON
Circuit breakers .....check
Panel lights .....off (in daytime)
Gear indicator bulbs .....check

If landing gear does not check down and locked:
Airspeed .....below 87 KIAS
Landing gear selector .....DOWN
Emergency gear lever (on aircraft equipped with backup gear extender) .....OVERRIDE ENGAGED (while fishtailing airplane)

If gear has still failed to lock down, move and ***hold*** the emergency gear lever down to the Emergency Down position.

If gear has still failed to lock down, yaw the airplane abruptly from side to side with the rudder.

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

SPIN RECOVERY

Rudder .....full opposite to direction of rotation
Control wheel .....full forward
Ailerons .....neutral
Throttle .....idle
Rudder .....neutral (when rotation stops)
Wing flaps .....up (if extended)
Control wheel .....as required to smoothly regain level flight attitude

OPEN DOOR

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

To close the door in flight:
Slow airplane to 87 KIAS.
Cabin vents .....close
Storm window .....open

If upper latch is open .....latch
If side latch is open .....pull on armrest while moving latch handle to latched position

If both latches are open .....latch side latch, then top latch

3.17 LOSS OF OIL PRESSURE

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 the cause and prevent engine damage.

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty gauge. In either case, proceed toward the nearest airport, and be prepared for a forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. Maintain altitude until such time as a dead stick 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.

3.19 LOSS OF FUEL PRESSURE

If loss of fuel pressure occurs, turn "ON" the electric fuel pump and check that the fuel selector is on a full tank.

If the problem is not an empty tank, land as soon as practical and have the engine-driven fuel pump and fuel system checked.

3.21 HIGH OIL TEMPERATURE

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 defective gauge, or other causes. Land as soon as practical at an appropriate airport and have the cause investigated.

A steady, rapid rise in oil temperature is a sign of trouble. Land at the nearest airport and let a mechanic investigate the problem. Watch the oil pressure gauge for an accompanying loss of pressure.

3.23 ALTERNATOR FAILURE

Loss of alternator output is detected through zero reading on the ammeter. Before executing the following procedure, ensure that the reading is zero and not merely low by actuating an electrically powered device, such as the landing light. If no increase in the ammeter reading is noted, alternator failure can be assumed.

The electrical load should be reduced as much as possible. Check the alternator circuit breakers for a popped circuit.

The next step is to attempt to reset the overvoltage relay. This is accomplished by moving the "ALT" switch to "OFF" for one second and then to ON. If the trouble was caused by a momentary overvoltage condition (16.5 volts and up) this procedure should return the ammeter to a normal reading.

If the ammeter continues to indicate "0" output, or if the alternator will not remain reset, turn off the "ALT" switch, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

3.25 PROPELLER OVERSPEED

Propeller overspeed is caused by a malfunction in the propeller governor or low oil pressure which allows the propeller blades to rotate to full low pitch.

If propeller overspeed should occur, retard the throttle and check the oil pressure. The propeller control should be moved to full "DECREASE rpm" and then set if any control is available. Airspeed should be reduced and throttle used to maintain 2700 RPM.

3.27 EMERGENCY LANDING GEAR EXTENSION

Prior to proceeding with an emergency gear extension, check to ensure that the master switch is "ON" and that the circuit breakers have not opened. If it is daytime, the panel lights should be turned off. Check the landing gear indicators for faulty bulbs.

NOTE

Refer to paragraph 4.39 for differences when emergency extension procedure is performed for training purposes.

If the landing gear does not check down and locked, reduce the airspeed to below 87 KIAS. Move the landing gear selector to the "DOWN" position. On aircraft equipped with the backup gear extender, place the emergency gear lever in the "OVERRIDE ENGAGED" position and fishtail the airplane.

If the gear has still failed to lock down, move and ***hold*** the emergency gear lever down to the EMERGENCY DOWN position.

If the gear has still failed to lock down, yaw the airplane abruptly from side to side with the rudder.

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

SECTION 8

AIRPLANE HANDLING, SERVICING AND MAINTENANCE

8.1 GENERAL

This section provides general guidelines relating to the handling, servicing and maintenance of the Cherokee Arrow III.

WARNING

Inspection, maintenance and parts requirements for all non-PIPER approved STC installations are not included in this handbook. When a non-PIPER approved STC installation is incorporated on the airplane, those portions of the airplane affected by the installation must be inspected in accordance with the inspection program published by the owner of the STC. Since non-PIPER approved STC installations may change systems interface, operating characteristics and component loads or stresses on adjacent structures, PIPER provided inspection criteria may not be valid for airplanes with non-PIPER approved STC installations.

WARNING

Modifications must be approved in writing by PIPER prior to installation. Any and all other installations, whatsoever, of any kind will void this warranty in it's entirety.

WARNING

Use only genuine PIPER parts or PIPER approved parts obtained from PIPER approved sources, in connection with the maintenance and repair of PIPER airplanes.

Genuine PIPER parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in PIPER airplane applications. Parts purchased from sources other than PIPER, even though identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Additionally, reworked or salvaged parts or those parts obtained from non-PIPER approved sources, may have service histories which are unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or may have other hidden damage not discernible through routine visual or nondestructive testing. This may render the part, component or structural assembly, even though originally manufactured by PIPER, unsuitable and unsafe for airplane use.

PIPER expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-PIPER approved parts.

8.1 GENERAL (continued)

Every owner should stay in close contact with an authorized Piper Service Center or Piper's Customer Services Department to obtain the latest information pertaining to their airplane, and to avail themselves of Piper's support systems.

Piper takes a continuing interest in having owners get the most efficient use from their airplane and keeping it in the best mechanical condition. Consequently, Piper, from time to time, issues service releases including Service Bulletins, Service Letters, Service Spares Letters, and others relating to the airplane.

Service Bulletins are of special importance and Piper considers compliance mandatory. These are sent directly to the latest FAA-registered owners in the United States (U.S.) and Piper Service Centers worldwide. Depending on the nature of the release, material and labor allowances may apply. This information is provided to all authorized Piper Service Centers.

Service Letters deal with product improvements and servicing techniques pertaining to the airplane. They are sent to Piper Service Centers and, if necessary, to the latest FAA-registered owners in the U.S. Owners should give careful attention to Service Letter information.

Service Spares Letters offer improved parts, kits, and optional equipment which were not available originally, and which may be of interest to the owner.

Piper offers a subscription service for Service Bulletins, Service Letters, and Service Spares Letters. This service is available to interested persons such as owners, pilots, and mechanics at a nominal fee, and may be obtained through an authorized Piper Service Center or Piper's Customer Services Department.

Maintenance manuals, parts catalogs, and revisions to both, are available from Piper Service Centers or Piper's Customer Services Department.

Any correspondence regarding the airplane should include the airplane model and serial number to insure proper response.

8.3 AIRPLANE INSPECTION PERIODS

WARNING

All inspection intervals, replacement time limits, overhaul time limits, the method of inspection, life limits, cycle limits, etc., recommended by PIPER are solely based on the use of new, remanufactured or overhauled PIPER approved parts. If parts are designed, manufactured, remanufactured, overhauled and/or approved by entities other than PIPER, then the data in PIPER'S maintenance/service manuals and parts catalogs are no longer applicable and the purchaser is warned not to rely on such data for non-PIPER parts. All inspection intervals, replacement time limits, overhaul time limits, the method of inspection, life limits, cycle limits, etc., for such non-PIPER parts must be obtained from the manufacturer and/or seller of such non-PIPER parts.

Piper has developed inspection items and required inspection intervals for the PA-28R-201 (see the latest revision of the PA-28R-201 Service and Inspection Manuals). The PA-28R-201 Inspection Manual contains appropriate forms, and all inspection procedures should be complied with by a properly trained, knowledgeable, and qualified mechanic at a Piper Authorized Service Center or a reputable repair shop. Piper cannot accept responsibility for the continued airworthiness of any aircraft not maintained to these standards, and/or not brought into compliance with applicable Service Bulletins issued by Piper, instructions issued by the engine, propeller, or accessory manufacturers, or Airworthiness Directives issued by the FAA.

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

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

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

8.5 PREVENTIVE MAINTENANCE

The holder of a Pilot Certificate issued under FAR Part 61 may perform certain preventive maintenance described in FAR Part 43. This maintenance may be performed only on an aircraft which the pilot owns or operates and which is not used to carry persons or property for hire, except as provided by applicable FAR's. Although such maintenance is allowed by law, each individual should make a self analysis as to whether he has the ability to perform the work.

All other maintenance required on the airplane should be accomplished by appropriately licensed personnel.

If the above work is accomplished, an entry must be made in the appropriate logbook. The entry should contain:

(a) The date the work was accomplished.
(b) Description of the work.
(c) Number of hours on the aircraft.
(d) The certificate number of pilot performing the work.
(e) Signature of the individual doing the work.

Horizon Instruments, Inc. Model P-1000 Supplemental Type Certificate & Airplane Flight Manual Supplement

Note: Federal Air Regulations require these documents to be placed in, and remain present in the aircraft at all times.
It is permissible to make a backup copy for the aircraft owner, and a reference copy for the installer's records.

All copies must include the STC Permission Statement.

United States Of America

Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

Number SA5842NM

This Certificate issued to Horizon Instruments, Inc.
600 S. Jefferson St., Unit C
Placentia, CA 92870

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 *of the Civil Air Regulations.* Including Amendment 3-7, and FAR 23, Amendment 23-41

Original Product Type Certificate Number: 2A13

Make: Piper Aircraft Corp.

Model: PA28-140, -150, -151, -160, -161, -180, -181, -235, -236, 201T, R-180, R-200, R-201, R-201T, RT-201, RT201T, S-160

Description of Type Design Change: Installation of an Engine Electronic Digital Tachometer, Horizon Model P-1000, P/N P100070- (Applicability Table on continuation sheet) in Piper Aircraft PA-28-140, -150, -151, -160, -161, 180, -181, -235, -236, 201T, R-180, R-200, R-201, R-201T, RT-201, RT201T, and S-160 series aircraft, in accordance with Horizon Instruments, Inc. Master Drawing List No. P100070, Rev. N/C, dated June 22, 1992, and/or later FAA approved revision.

Horizon Airplane Flight Manual Supplement No. 1, Rev. N/C, September 14, 1992, or later approved revision is required.

Limitations and Conditions: The installation should not be incorporated in any aircraft unless it is determined that the interrelationship between this installation and any previously approved configuration will not introduce any adverse effect upon the airworthiness of the aircraft. The approval of this modification applies to the above noted airplane model series only. A copy of this STC must be included in the permanent records of the modified aircraft. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: July 30, 1992

Date of issuance: September 30, 1992

Date reissued: January 14, 2002

Date amended: January 6, 1993

By direction of the Administrator

(Signature)

Manager, Technical & Administrative Support
Staff, Los Angeles Aircraft Certification Office
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Regional Office of the transfer of this Supplemental type certificate.

The FAA will reissue the certificate in the name of the transferee and forward it to him.

TRANSFER ENDORSEMENT

Transfer the ownership of the Supplemental Type Certificate Number_____

to *(Name of transferee)*_____

*(Address of transfer)*_____
(Number and street)

_____
(City, State, and Zip code)

from *(Name of grantor)* *(Print or type)*_____

(Address of grantor) _____
(Number and street)

_____
(City, State, and Zip code)

Extent of Authority (if licensing agreement):_____

_____

_____

_____

Date of Transfer:_____

Signature of grantor *(In ink)*:_____

United States Of America

Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)

Number SA5842NM

Applicability Table

Aircraft Model	Serial Number Range	Horizon Tachometer Part Number
PA-28-140	28-20002 – UP	P100070-408
PA-28-150	28-03, 28-1 - UP	P100070-408
PA-28-151	28-7415001 -UP	P100070-408
PA-28-160	28-03, 28-1 - UP	P100070-408
PA28S-160	28-03, 28-1 - UP	P100070-408
PA-28-161	28-7716001 - UP	P100070-408
PA-28-180	28-671 – 28-1760 28-1571, 28-1573, 28-1761 - UP	P100070-408 or P100070-402 P100070-408
PA-28R-180	28R30002 – UP	P100070-401
PA-28-181	28-7690001 - UP	P100070-408, P100070-403
PA-28-235	28-10003 – 28-11393 28-7110001 – UP	P100070-603
PA-28-236	28-7911001 - UP	P100070-602, P100070-407
PA-28R-200	28R30482, 28R–35001 - UP	P100070-406 P100070-407
PA-28R-180	28-30005 - UP	
PA-28-201t	28-7921001 – UP	P100070-609
PA-28R-201	28R-7737002 - UP	P100070-408
PA-28R-201T	28R-7703001 - UP	
PA-28RT-201	28R-7918001 – 28R-7918267	P100070-408, P100070-403
PA-28RT-201T	28R-7931001	P100070-609, P100070-603

- END -

Horizon Instruments, Inc.
600 South Jefferson Street, Unit C
Placentia, CA 92870
Phone (714) 524-1919 Fax (714) 524-5937
Supplement Number: 1

FAA-Approved
Airplane Flight Manual Supplement
For
The New Piper Aircraft, Inc. (Piper Aircraft Corporation)
PA28-140, PA28-150, PA28-151, PA28-160, PA28-161, PA28-180, PA28-235, PA28-236, PA28R-180, PA28-181, PA28R-200, PA28-201, PA28-201T, PA28RT-201, and PA28RT-201T Aircraft

Ref: Type Certificate: 2A13

Airplane Reg. No. N36777 Airplane S/N 28R-7837197

This supplement must be attached to the applicable FAA Approved Airplane Flight Manual when the airplane is modified by the installation of a Horizon Instruments Inc.'s Model P-1000 Electronic Engine Digital Tachometer in accordance with STC SA5842NM.

The information contained in this document supplements or supersedes the basic manual only in those areas listed. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED: Patrick Power

Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration
Los Angeles Aircraft Certification Office
Transport Airplane Directorate

Date: 10-19-05

Original Approval Date: September 14, 1992

Revision Number	Pages Attached	Description	FAA Approved
--	1-8	Original Issue	Donald Armstrong Mgr: Flight Test Branch, ANM-160L FAA, Los Angeles, ACO Transport Airplane Directorate Date: 9/14/1992
A	1-8	Addition of -403, -602, -603, -608, and -406 Tachometers, revision of headers and footers	Donald Armstrong Mgr: Flight Test Branch, ANM-160L FAA, Los Angeles, ACO Transport Airplane Directorate Date: 1/04/1993
B	1-7	Minor text and font changes and new address listed. Added table of contents. Added new part number due to AD 2002-09-08 listing new restricted range marking. Refer to Tachometer Part Number P100-070-463-00 for further details.	Thomas A. Envart Manager, Propulsion Branch ANM-140L FAA, Los Angeles ACO Transport Airplane Directorate Date: 5/02/2003
1	1-7	Reissue of complete supplement for Horizon Instruments, Inc. address change and several minor editorial revisions	Patrick Power Manager, Flight. Test Branch FAA, Los Angeles ACO Transport Airplane Directorate Date: 10-14-05

Section I. General: No Change

Section II. Limitations:

This table lists each engines operating range by the lowest RPM within the operating range. Ranges are listed in order from the highest (engine Red-line) on the left side of the table to the lowest on the right side. Note that an RPM range with no colored marking is denoted as a black, or "BLK", range.

RPM ARC PLACARDING

Tachometer Part Number	Top Arc		Arc 2		Arc 3		Arc 4		CYL
	RPM	COLOR	RPM	COLOR	RPM	COLOR	RPM	COLOR	
P100-070-401	2700	RED	2699 2200	GRN	2199 2000	RED	1999 500	GRN	4
P100-070-402	2700	RED	2699 2350	GRN	2349 2150	YEL	2149 500	GRN	4
P100-070-403	2700	RED	2699 2650	YEL	2649 500	GRN	----	----	4
P100-070-463⊇	2700	RED	2699 2350	GRN	2349 2000	RED	2099 500	GRN	4
P100-070-407	2700	RED	2699 1950	GRN	1949 1500	YEL	1499 500	GRN	4
P100-070-408	2700	RED	2699 500	GRN	----	----	----	----	4
P100-070-602	2400	RED	2399 500	GRN	----	----	----	----	6
P100-070-603	2575	RED	2574 500	GRN	----	----	----	----	6
P100-070-608	2700	RED	2699 500	GRN	----	----	----	----	6
P100-070-609	2575	RED	2575 2200	GRN	2199 2000	YEL	1999 500	GRN	6

⊇ Note: Due to AD 2002-09-08, Amendment 39-12741, Docket No. 2000-NE-08-AD which supersedes AD 77-12-06R2, Amendment 39-3097; all Piper PA28R-200 aircraft models have a new restricted range marking on the tachometer. The engine tachometer face or bezel is to be remarked with a red arc for a restricted engine speed range between 2000 and 2350 rpm as per AD 2002-09-08. Refer to "Instruments Panel Modifications" (c) (1) & (c) (3).

PLACARDS

The face of the P-1000 tachometer is placarded with the Engine RPM Operating Range information that normally appears on the face of a mechanical tachometer. This includes the RED (restricted), YELLOW (cautionary or transient) and GREEN (normal) operation RPM ranges.

A placard is provided to label the newly installed circuit breaker for operation with the P-1000 tachometer. This placard is placed on the circuit breaker panel. Refer to Figure 1.

Tachometer

Figure 1, Circuit Breaker Placard

Section III. Emergency Procedures: No Change

Section IV. Normal Procedures:

The operation of the P-1000 Electronic Digital Engine Tachometer is straightforward. After power is supplied to the Tachometer, the engine is started, self-tests are performed, and the default display of engine RPM appears on the display. The default display is insured by the use of internal timers that will restore the display to the current RPM even in the event that one of the panel buttons becomes stuck or defective.

Internally, independent tachometers watch the pulses received from each magneto. Each tachometer is accurate to less than 1 RPM and can be individually enabled/disabled via buttons on the face of the Tachometer. Refer to items K and I on page 5 of 7.

Engine operating ranges are indicated on the large green, yellow, and red LEDs (**L**ight **E**mitting **D**iode). See page 7, items D, E, and F. Three small LED magneto system *alert* indicator lights are located within the **"Status"** area on the upper left corner of the Tachometer face. See items A, B, and C on page 7, figure 2.. The left and right red LED *alert* indicator lights, when illuminated, indicate, because of a loss of the ignition signal to the Tachometer, a possible malfunction of the respective left or right magneto ignition system.

While performing a magneto check during engine run-up, the red *alert* indicator lights will illuminate, thus identifying the grounding of the respective right or left magneto systems.

IGNITION SWITCH POSITION	TACHOMETER MAGNETO ALERT INDICATOR LIGHTS	
	LEFT STATUS LED	RIGHT STATUS LED
Both OFF	ON	ON
Left ON, Right OFF	OFF	ON
Right ON, Left OFF	ON	OFF
Both ON	OFF	OFF

Between the left and right red magneto ignition system *alert* indicators is a yellow **"RPM Synchronization"** indicator. This small yellow indicator is illuminated when there is a difference of more than 80 RPM between the right and left tachometers. This indicator also may flicker during extreme RPM excursions of the engine.

There are three panel buttons (see items J, K, and I on page 7, figure 2). Each button has two modes of operation:

- Press-and-hold,
- Press-and-release.

Press-and-hold button operations instruct the Tachometer to perform a *specific operation* when a button is pressed and held for more than 2/3 of a second. Press-and-hold button operations are placarded on the face of the Tachometer above each button.

Similarly, press-and-release button operation instructs the Tachometer to perform a specific operation when a button is pressed and released in less than 2/3 of a second. Press-and-release button operations are placarded on the face of the Tachometer below each button.

PRESS AND HOLD OPERATIONS

The left button, K, upon depression, will cause the Tachometer to display the non-fractional portion (0000.) of the current accumulated engine hours. When the button is released, the fractional part of the engine hours (.00) is displayed for a short period of time. The clock is started whenever the engine RPM exceeds 800 RPM and is recorded in real hours.

The right button, I, upon depression, will cause the Tachometer to display the current contents of the RPM **trap**. This trap records the highest engine RPM achieved before the button was pressed. The middle button, J, upon depression, clears the RPM trap and the RPM trap is zeroed. When the button is released, the trap will record the current engine RPM.

PRESS AND RELEASE OPERATIONS

During normal operation, the Tachometer presents the average of the left and right internal tachometers on the display. However, a mechanism exists to **mask** either tachometer from the display, leaving the remaining tachometer to display its RPM.

The regular flashing of the right or left signal loss status indicator LEDs indicates a masked tachometer. This feature is handy when attempting to determine magneto/ignition problems.

Quickly pressing and releasing the left button, K, causes the Tachometer to mask or un-mask the left internal tachometer.

Quickly pressing and releasing the right button, I, causes the Tachometer to mask or un-mask the right internal tachometer.

An internal interlock prevents masking both internal tachometers at the same

time, therefore preventing total loss of RPM indication.

If the tachometer is masked, pressing the button will un-mask it and allow its RPM to show on the display; and conversely, if the tachometer is un-masked, pressing the button will mask it from the display.

Quickly pressing and releasing the center button, J, causes the Tachometer to alternately dim or brighten the LED indicators.

The LED indicators, see items A thru F, are bright enough to overcome daylight washout conditions. However, during night operations the large green, yellow, and small red and yellow LEDS are **dim-able.** The large red LED still operates at full intensity to maximize the possibility of gaining pilot attention during excursion into restricted RPM ranges.

Section V. Performance: No Change

Section VI. Weight & Balance and Equipment List: Negligible Change

Section VII. System Description

The Horizon Instruments' Model P-1000 Electronic Digital Engine Tachometer is an electronic replacement for an existing mechanical cable-driven tachometer.

The Tachometer differs from a mechanical tachometer in the following areas:

The Tachometer is fully electronic and uses timing information from the primary leads ("P-Leads") of both the left-hand and right-hand magneto ignition systems, operating the P-1000's internal left and right tachometers, to determine engine rpm instead of a rotating cable driving a magnetic slip-clutch analog type display.

The Tachometer uses super bright LED indicators to indicate normal range engine operation (Green LED), cautionary range operation (Yellow LED), and do-not-exceed or restricted range RPM (Red LED) as substitutes for the ranges normally painted on the tachometer dial.

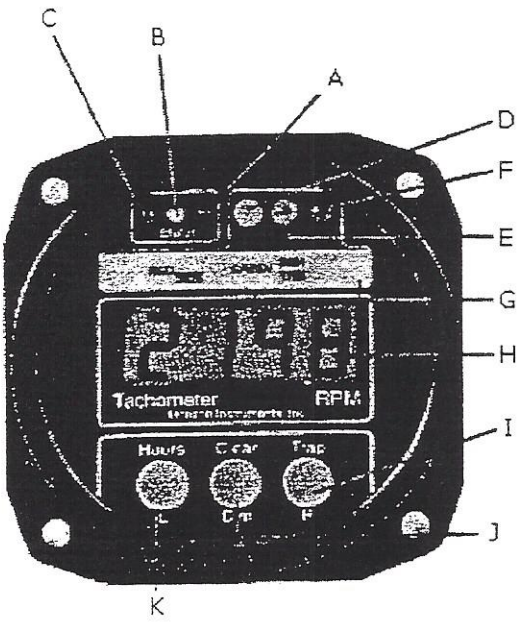
The primary display consists of four 1/2" high characters on a backlit Liquid Crystal Display (LCD), easily and clearly visible in daylight and night flying.

Diagnostic features available include: *alert* indication of loss of magneto signal, indication that both magnetos are reporting different RPM, and the ability to mask RPM from either magneto.

Magneto test, via the ignition switch, is indicated by the illumination of the grounded magneto system's *alert* light and the display of the amount of RPM that the engine has slowed. This is indicated as a negative number on the display (number is preceded by a leading hyphen or minus sign).

LED indicators are dim-able (except the restricted or red-light indicator) to reduce pilot annoyance during night flying.

A specific engine hour is preset at the factory to accommodate Tachometer changes on non-zero-time engines. Only Horizon Instruments, Inc may change engine time.



A) Right Magneto Signal Loss Indicator

B) RPM Sync Loss Indicator

C) Left Magneto Signal Loss Indicator

D) Normal Operating Green RPM Arc Indicator

E) Cautionary Yellow RPM Arc Indicator

F) Restricted Red RPM Arc Indicator

G) Placard Area

H) 4 Digit LCD Display

I) Right switch for Overspeed Trap display and right tachometer enable/disable.

J) Middle switch for Overspeed Trap Clear and LED dimming.

K) Left switch for engine hour's display and left tachometer enable/disable.

Figure 2, P-1000 Features

Section VIII. Additional Information

For additional information about the operation and installation, refer to Horizon Instruments, Inc. Document Number P103050 Horizon Instruments, Inc. Model P-1000 Installation & Instruction Manual.

A dataplate with all pertinent operational and configuration information is attached to the exterior of the P-1000.