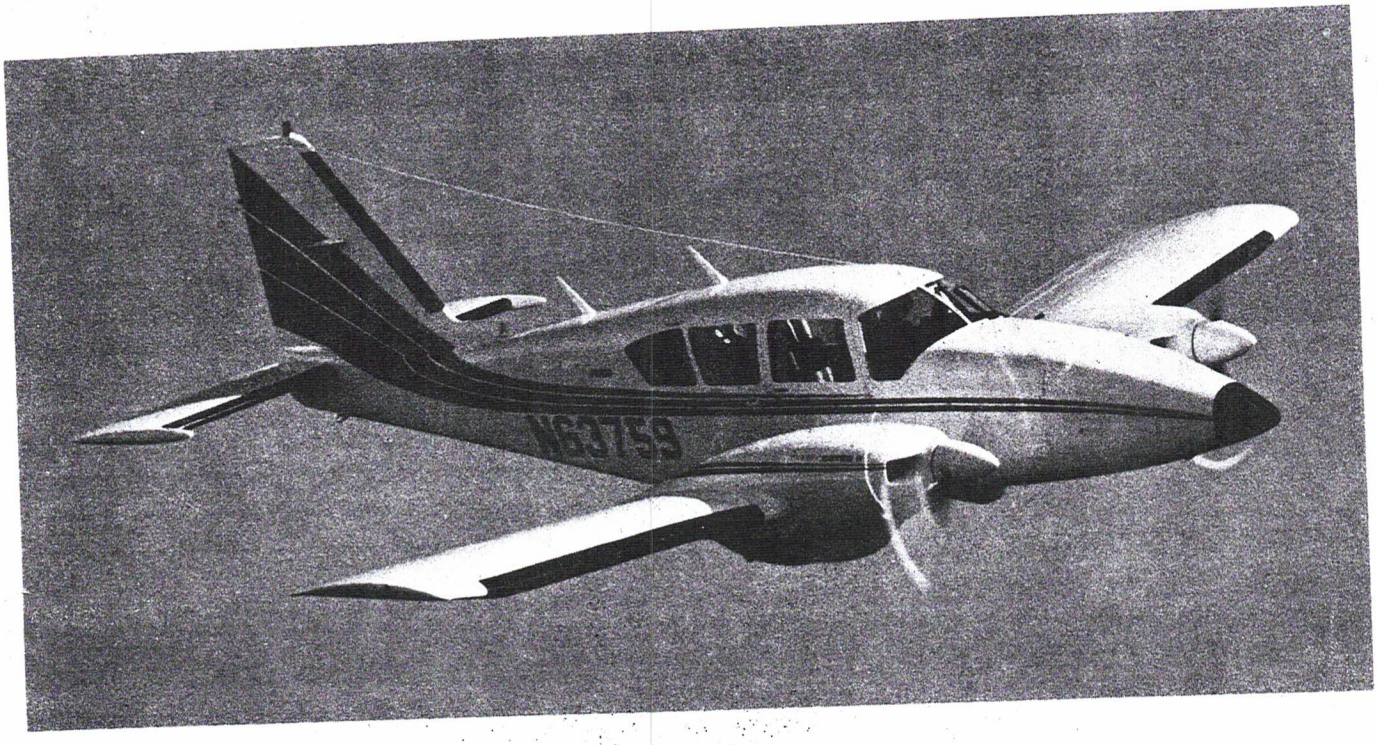
PILOT'S OPERATING HANDBOOK

PIPER AZTEC F



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

25/23

AIRPLANE SERIAL NO. 27-7954050

AIRPLANE REGISTRATION NO. ~~C-GRKR~~ N3237C

RE-Reg - AS
NOV 83

PA-23-250 (SIX PLACE)
REPORT: 1948

FAA APPROVED BY: Paul E Everly

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HANDBOOK ISSUE DATE: OCTOBER 1, 1975
AIRPLANE APPROVAL DATE: JANUARY 20, 1975

PIPER

HANDBOOK PART NO. 761 594

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 11 - 761 594 (PR790810) (cont)	6-43	Revised item 223.	
	6-45	Added item 252.	
	6-49	Changed item 311 to 310. Added item 311, Moved items 317 and 319 to pg. 6-50.	
	6-50	Added item 316. Relocated 317 and 319 from pg. 6-49. Moved items 327 and 329 to pg. 6-50a.	
	6-50a	Revised item 327. Relocated items 327 and 329 From pg. 6-50.	
	6-52	Added items 385 and 387.	
	6-53	Changed 409 to 407. Added items 403, 405, and 407. Moved items 414, 415 and 416 to pg. 6-54.	
	6-54	Changed item 421 to 420. Added item 421. Relocated items 414, 415 and 416 from pg. 6-53. Moved items 228, 229, 230 and 231 to pg. 6-55.	
	6-55	Relocated items 228, 229, 230 and 231 from pg. 6-54. Moved items 444 and 449 to pg. 6-56.	
	6-56	Relocated items 444 and 449 From pg. 6-55. Changed item 457 to 458; 458 to 459; 459 to 460; 460 to 461; 461 to 462; and 462 to 463. Added items 454 and 457. Revised item 455 and 463. Moved item 467 to pg. 6-57.	
	6-57	Relocated item 467 from pg. 6-56. Relocated items 482 and 483 from pg. 6-58.	
	6-58	Changed item 487 to 486 and 489 to 490. Revised items 482, 483 and 488. Added items 487 and 489.	
	7-13	Revised para. 7-25.	
	7-14	Revised Fig. 7-9.	
	7-20	Revised Warning.	
	8-2	Revised para. 8.3	
	9-8	Changed para. j to k. Added para. j. Moved Section 4 to pg. 9-9.	
	9-9	Relocated Section 4 from pg. 9-8.	
	9-65	Revised Section 1 and Abbreviations.	
	9-66	Revised Section 2 and Section 3.	
	9-67	Revised para. c,d,and e. Moved caution to pg. 9-68.	
	9-68	Relocated caution from pg.9-67. Change para c to d; d to e, and e to f, added para. c. Revised para. b, and d. Change para. f to g and g to h Moved para e, f and g to pg. 9-69.	
	9-69	Relocated para. e,f and g from pg. 9-68. Moved part of para. h to pg. 9-70.	
	9-70	Relocated Part of para. h from pg. 9-69. Change para. h to i. Move part of para. i to pg. 9-71	
	9-71	Relocated para.i. Revised Note. Revised sub-para. (4). Moved sub-para. (7), (8) and (9) to pg. 9-72.	

APPLICABILITY

Application of this handbook is limited to the specific Piper PA-23-250 (Six Place) 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 revison are given below:

Title, ii through v, 1-1 through 1-14, 2-1 through 2-10, 3-1 through 3-16, 4-1 through 4-18, 5-1 through 5-60, 6-1 through 6-62, 7-1 through 7-40, 8-1 through 8-14, 9-1 through 9-34, and 10-1 through 10-2.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 2 - 761 594 (PR760126) (cont)	5-14	Revised Example for Wind Components graph.	
	5-34, 5-35, 5-36, 5-37, 5-42, 5-43, 5-44, 5-45	Added "Knots" label to Cruise Performance Tables.	
	5-56	Revised Example for Time, Distance, and Fuel to Descend Graph.	
	6-1	Revised Para. 6.1 (General).	
	6-4	Deleted stations from Fig. 6-3 (Leveling Diagram).	
	6-5	Revised formula in Item (2).	
	6-12	Added Item (f) to Para. 6.9.	
	6-13	Revised Fig. 6-11 (Sample Loading Problem); deleted Outboard Fuel Table.	
	6-14	Revised Fig. 6-13 (Work Sheet); deleted Outboard Fuel Table.	
	6-20	Added NOTE to Para. 6.13 (Instruction For Using Plotter).	
	6-35	Deleted Item 145.	
	6-37	Added Item 175.	
	6-47	Revised Item 281.	
	6-49	Revised Items 313 and 323.	
	6-51	Revised Item 363.	
	6-52	Revised Items 379, 391, and 393; added Item 392.	
	6-53	Revised Items 413, 415, and 431.	
	6-54	Deleted Item 441; revised Items 443, 447, and 449.	
	6-55	Revised Items 457 and 459.	
	6-56	Revised Items 479, 491, and 501; added Items 484 and 485.	
	6-57	Deleted Item 511; revised Items 521 and 525.	
	6-58	Revised Items 537 and 557.	
	7-1	Revised Para. 7.3 (Airframe).	
	7-5	Revised Para. 7.13 (Fuel Injection).	
	7-7	Revised Para. 7.15 (Engine Controls).	
	7-23	Revised Para. 7.31 (Pitot-Static System).	
	7-30	Revised callouts nos. 1 and 7 on Fig. 7-29.	
	7-33	Added information to Para. 7.47 (Oxygen System).	
	8-10	Revised Para. 8.23 (Oil Requirements); revised Item (c) of Para. 8.25 (Fuel System).	Paul E. Everly Jan. 26, 1976
	9-7	Revised Item (h).	
	10-2	Revised Safety Tip (o); added Safety Tip (r).	P E Everly

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 3 - 761 594 (PR760917) (cont)	6-55	Revised item 455; added items 461, 463, 464 and 465 (Encoding Altimeters).	
	6-56	Added item 481 (KI-226); revised items 483 and 484; added item 487 (ADF/RMI).	
	6-61	Revised item 603.	
	7-9	Revised Para. 7.17 (Landing Gear).	
	7-15	Added Nomenclature to illustration (Fuel Controls).	
	7-20	Revised Para. 7.29 (Gyro Vacuum System).	
	7-33	Revised Para. 7.47 (Oxygen System).	
	7-34	Added Figure 7-32 (Oxygen Duration Chart).	
	7-35	Revised Para. 7.51 (Cabin Features).	
	7-36	Added nomenclature to illustration (Cabin Door Latches).	
	7-38, 7-39	Revised Para. 7.61 (ELT).	
	8-5	Revised item 8.9 (c) (2).	
	8-6	Revised item 8.9 (d) (4).	
	8-10	Revised Para. 8.23 (Oil Recom. Table); revised item 8.25 (a); relocated item 8.25 (c) to page 8-11.	
	8-11	Added item 8.25 (c) from page 8-10; revised item 8.25 (d).	
	9-i	Added Supplements 8 and 9.	
	9-3	Revised Section 1 - General.	
	9-4	Added item (f), Section 4.	
	9-5	Revised Section 1 and Section 2 item a. - Note.	
	9-6	Revised EGT Green Arc.	
	9-7	Added Best Single Engine Angle of Climb Speed to item (f), Section 2.	
	9-11, 9-17, 9-23, 9-31, 9-35	Revised Section 1 - General.	
	9-39 thru 9-46	Added pages (FCS-810 AFCS Without Flight Director).	
	9-47 thru 9-52	Added pages (FCS-810 AFCS With Flight Director).	
	10-1	Revised items (h) and (k).	Paul E. Everly Sept. 17, 1976 P E Everly
Rev. 4 - 761 594 (PR761119)	4-17	Deleted item 4.39 (c) (3) - Crossfeed Operation During Single Engine Operation. 1	Paul E. Everly Nov. 19, 1976

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 5 - 761 594 (PR770411) (cont)	9-50 10-3	Added info to Section 4 (d). Added tip (s).	R.L. Taylor April 11, 1977 R L Taylor
Rev. 6 - 761 594 (PR770826)	1-11, 1-12, 1-13, 1-14 5-52 6-35 6-48 9-i 9-53 thru 9-64	Revised para. 1.21, Conversion Factors. Added key to Figure 5-79. Added item 145. Added items 301, 303 and 305. Added AltiMatic X Supplement. Added pages (added Supplement 10, Altimatic X)	Paul E. Everly August 26, 1977 P E Everly
Rev. 7 - 761 594 (PR771202)	1-4 3-i 3-3 3-4 3-5 3-6 3-7 3-9 3-10 3-11 3-12 3-14 4-i 4-6 4-7 4-8	Revised footnote. Revised pg. no. Revised Note under Engine Securing Procedures; revised Engine Failure During Takeoff procedure. Revised Note under Single Engine Landing; added footnote. Revised Single Engine Go-Around procedure; added footnote; relocated Emergency Gear Extension to pg. 3-6. Added info. form page 3-5; relocated Going Into Crossfeed to pg. 3-7. Added Going Into Crossfeed from pg. 3-6. Revised and added Note to Engine Securing Procedure; relocated Engine Failure During Takeoff (between 64 KIAS and 83 KIAS) to pg. 3-10. Added info. from pg. 3-9; relocated info. from Engine Failure During Flight (Below 64 KIAS) to pg. 3-11. Added info. from pg. 3-10; revised Single Engine Landing info. Revised Single Engine Go-Around Procedure; added footnote. Revised Extending Gear With CO_2 procedure. Revised pg. no. Added info. to Before Starting Engines and Starting Engines; relocated Pre-Taxi and during Taxi to pg. 4-7. Added info. from pg. 4-6. Added info. to Shut Down.	

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 8 - 761 594 (PR780601) (cont)	3-12	Added kit no. to ser. no. effectivity.	
	3-14	Added kit no. to ser. no. effectivity.	
	4-i	Added para. 4.41 and 4.43.	
	4-2	Revised para. 4.3 (f) and (k)	
	4-10	Revised para. 4.11.	
	4-16	Revised para. 4.35.	
	4-18	Added para. 4.41 and 4.43.	
	4-19	Added new page.	
	6-1	Revised para. 6.1.	
	6-27	Added footnote.	
	6-39	Added item 193.	
	6-53	Added new item 419; relocated item 431 to pg. 6-54.	
	6-54	Added item 431 from 6-53; added new item 435.	
	7-10	Revised para. 7.21.	
	7-11	Revised Fig. 7-7.	
	7-12	Revised Fig. 7-8.	
	7-24	Revised Fig. 7-23.	
	7-26	Added info. to para. 7.35.	
	9-23, 9-24 9-25, 9-26 9-27, 9-28 9-29	Completely revised Supplement 5.	Paul E. Everly June 1, 1978 P E Everly
Rev. 9 -761549 (PR780904)	1-6	Corrected spelling.	
	1-12	Revised ft-lb and kg conversions.	
	1-13	Revised spelling.	
	5-25,5-26	Revised Associated Conditions	
	6-47	Revised item 294.	
	6-48	Revised items 301, 303 and 305; added items 307 and 309.	
	6-49	Revised items 311, 313, 315, 317 and 319; revised and relocated item 321 to pg. 6-50; revised item no.	
	6-50	Added items 327 and 329.	
	6-50a	Added pg. (added item 331)	
	6-50b	Added pg.	
	6-51	Added item 364.	
	6-52	Revised item nos.; added items 394 and 395; relocated items 399 and 401 to pg. 6-53.	
	6-53	Added items 396, 397 and 398; added items 399 and 401 from pg. 6-52; revised item nos; relocated items to pg. 6-54.	

Revision Number and Code	Revised Pages	Description of Revision	FAA Approved Signature and Date
Rev. 12 - 761 594 (PR800515) (cont)	6-53	Added item 402.	
	6-56	Item 463 changed dwg. no.	
	6-57	Added new item 467; renumbered items 467 thru 471 to 468 thru 472 successively; renumbered old item 477 to 478; added new item 477; moved items 482 and 483 to pg. 6-58.	
	6-58	Relocated items 482 and 483; moved items 493 and 495 to pg. 6-59.	
	6-59	Added items 497 and 511; relocated items 493 and 495.	
	6-60	Moved item 527 to pg. 6-61.	
	6-61	Relocated item 527 from pg. 6-60; items 603 and 613 changed dwg. no.	
	7-12a	Added foot note.	
	9-66	Revised Sec. 2 (e).	
	9-68	Revised Sec. 4 (e).	PE Everly
	9-74	Revised Sec. 2 (e).	Paul E. Everly
	9-78	Revised Sec. 3 (h) (2) and (4).	May 15, 1980
	10-2	Revised para. (r).	
Rev. 13 - 761 594 (PR801010)	1-4	Revised para. 1.13.	
	4-17	Revised note.	
	6-49	Revised items 310 and 311; added item 314. Moved item 315 to pg. 6-50.	
	6-50	Relocated item 315 from pg. 6-49; Moved item 325 to pg. 6-50a.	
	6-50a	Relocated item 325 from pg. 6-50.	
	6-50b	Corrected spelling.	
	6-51	Added item 353.	
	6-52	Revised item 387.	
	6-53	Revised item 405; Renumbered item.	
	6-54	Renumbered items; revised item 420; added new item 421.	
	6-56	Revised items 463 and 465.	
	6-57	Revised items 467, 468, 469 and 470; added item 476.	
	7-i	Changed page no.; added para. 7.63.	
	7-24	Revised fig. 7-23.	
	7-27	Revised para. 7.39 and added caution, moved info. to pg. 7-29.	
	7-29	Relocated info. from pg. 7-27, moved para. 7.43 to pg. 7-31.	PE Everly
	7-31	Relocated para. 7.43 from pg. 7-29.	Paul E. Everly
	7-40	Added para. 7.63.	Oct. 10, 1980
	9-i	Added Supplement 13.	
	9-83, 9-92	Added Supplement 13 (KFC-200 with Flight Director).	

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SECTION 1

GENERAL

SECTION 1

GENERAL

1.1 INTRODUCTION

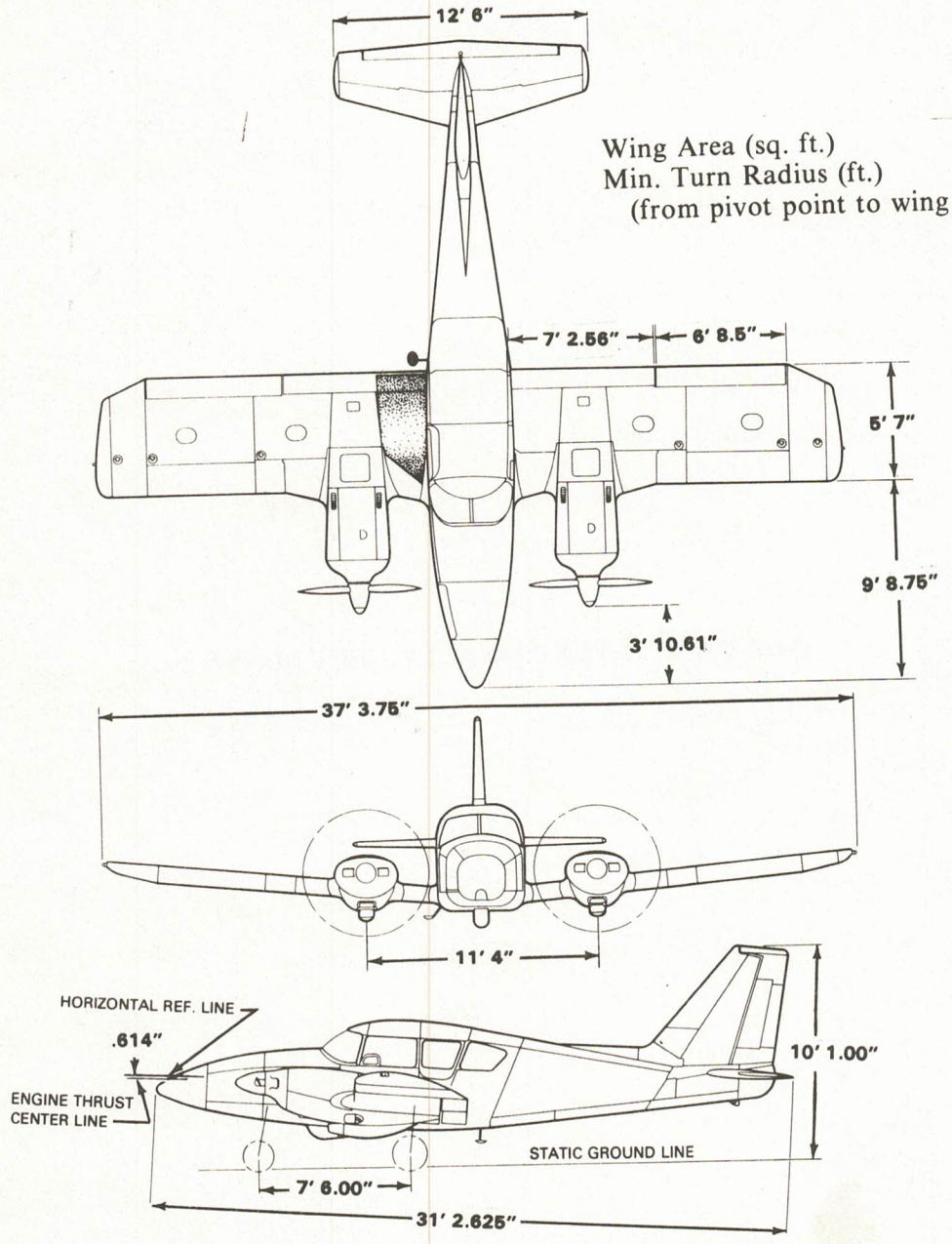
This Pilot's Operating Handbook is designed for maximum utilization as an operating guide for the pilot. It includes the material required to be furnished to the pilot by C.A.R. 3 and FAR Part 21, Subpart J. It also contains supplemental data supplied by the airplane manufacturer.

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 left blank intentionally.



THREE VIEW (SERIAL NUMBERS 27-8054001 AND UP)

Figure 1-1a

1.3 ENGINES

	NORMALLY ASPIRATED	TURBOCHARGED**
(a) Number of Engines	2	2
(b) Engine Manufacturer	Lycoming	Lycoming
(c) Engine Model Number	IO-540-C4B5	TIO-540-C1A
(d) Rated Horsepower	250	250
(e) Rated Speed (rpm)	2575	2575
(f) Bore (inches)	5.125	5.125
(g) Stroke (inches)	4.375	4.375
(h) Displacement (cubic inches)	541.5	541.5
(i) Compression Ratio	8.5:1	7.2:1
(j) Engine Type	Six Cylinder, Direct Drive, Horizontally Opposed, Air Cooled	

1.5 PROPELLERS

(a) Number of Propellers	2
(b) Propeller Manufacturer	Hartzell
(c) Blade Model	8465-7R
(d) Number of Blades	2
(e) Hub Model	HC-E2YR-2
(f) Propeller Diameter (inches)	
(1) Maximum	77
(2) Minimum	76
(g) Propeller Type	Constant Speed, Hydraulically Actuated

1.7 FUEL

(a) Fuel Capacity (U.S. gal) (total)	
(1) Without optional tip tanks	144
(2) With optional tip tanks	184
(b) Usable Fuel (U.S. gal) (total)	
(1) Without optional tip tanks	137
(2) With optional tip tanks	177

	NORMALLY ASPIRATED	TURBOCHARGED**
(c) Fuel Grade, Aviation		
(1) Minimum Octane	91/96 - Blue	100/130 - Green
(2) Specified Octane	91/96 - Blue 100LL - Blue 100/130- Green 100 - Green	100/130 - Green 100 - Green 100LL - Blue
(3) Alternate Fuels*	100/130 - Green 115/145 - Purple	115/145 - Purple

Refer to Lycoming Service Instruction 1070, Revision J or later.

*Alternate Fuels refers to military grade with 4.6 ml of TEL. See Section 8.25 concerning use of alternate fuel grades.
**Optional equipment.

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 compressibility.
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_{MCA}	Air Minimum Control Speed is the minimum flight speed at which the airplane is directionally controllable as determined in accordance with Federal Aviation Regulations. Airplane certification conditions include one engine becoming inoperative and windmilling; not more than a 5° bank towards the operative engine; takeoff power on operative engine; landing gear up; flaps in takeoff position; and most rearward C.G.
V_{NE}/M_{NE}	Never Exceed Speed or Mach Number is the speed limit that may not be exceeded at any time.

(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.

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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
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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LIMITATIONS

SECTION 2

LIMITATIONS

2.1 GENERAL

This section provides the "FAA Approved" operating limitations, instrument markings, color coding and basic placards necessary for the safe operation of the normally aspirated PA-23-250 (Six Place) Aztec F 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	CAS KNOTS	IAS KNOTS
Never Exceed Speed (V_{NE}) - Do not exceed this speed in any operation	216	221
Maximum Structural Cruising Speed (V_{NO}) - Do not exceed this speed except in smooth air and then only with caution.	172	175
Design Maneuvering Speed (V_A) - Do not make full or abrupt control movements above this speed.	129	131
Maximum Flaps Extended Speed (V_{FE}) - Do not exceed this speed with a given flap setting.		
Flaps extended speeds	60 to 108	55 to 108
Full flap	108	108
Half flap	122	123
Quarter flap	139	141
Maximum Gear Extended Speed (V_{LE}) - Do not exceed this speed with landing gear extended.	130	132
Maximum Landing Gear Operating Speed (V_{LO}) - Do not extend or retract landing gear above this speed.	130	132
Air Minimum Control Speed (V_{MCA}) - Lowest airspeed at which airplane is controllable with one engine operating and no flaps.	70	64

2.9 POWER PLANT INSTRUMENT MARKINGS

(a) Tachometer	
Green Arc (Normal Operating Range)	500 RPM to 2575 RPM
Red Line (Maximum)	2575 RPM
(b) Fuel Flow	
Green Arc (Normal Operating Range)	0 GPH to 26 GPH
Red Line (Maximum at Sea Level)	26 GPH (7.8 PSI)
(c) Cylinder Head Temperature	
Green Arc (Normal Range)	200° F to 500° F
Red Line (Maximum)	500°F
(d) Oil Temperature	
Green Arc (Normal Operating Range)	120°F to 245° F
Yellow Arc (Caution)	60°F to 120° F
Red Line (Maximum)	245° F
(e) Oil Pressure	
Green Arc (Normal Operating Range)	60 PSI to 90 PSI
Yellow Arc (Caution)	25 PSI to 60 PSI and 90 PSI to 100 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	100 PSI

2.11 WEIGHT LIMITS

(a) Maximum Takeoff Weight	5200 LBS
(b) Maximum Landing Weight	4940 LBS
(c) Maximum Weights in Baggage Compartments	
Forward	150 LBS
Aft	150 LBS
(d) Maximum Zero Fuel Weight	4400 LBS

2.13 CENTER OF GRAVITY LIMITS

Weight Pounds	Forward Limit Inches Aft of Datum	Aft Limit Inches Aft of Datum
5200	99.0	100.5
5000	97.0	100.5
3540	87.6	100.5

NOTES

Straight line variation between the points given.

Datum is 80 inches ahead of the wing leading edge outboard of the tapered sections.

2.19 TYPES OF OPERATION LIMITS

The Federal Aviation Regulations make the operator of an aircraft responsible for insuring that sufficient and proper instruments and equipment are installed, operating, and calibrated for the type of flight being undertaken. These regulations (for example, see FAR 91.3(a), 91.25, 91.33, 91.97, 91.170 and 91.209) also specify the minimum instruments and equipment which must be available for the various types of flight such as VFR, IFR, night, commercial, air taxi, high altitude, icing and so on. It is recommended that pilots of this aircraft make themselves familiar with these regulations in order to avoid violating them. While the regulations list minimum instruments and equipment, experienced pilots realize that the minimum practical instruments and equipment depends on the pilot's capability, weather, terrain, the flight plan, facilities to be used, whether flight is during daylight or night, at high or low altitude, for hire or not, in icing conditions or not, and so on. Pilots are cautioned to consider all factors in determining whether they have all the required equipment for making a particular flight.

When properly equipped this airplane may be flown day or night, VFR or IFR.

The certificating regulations of the FAA for this airplane require the manufacturer to specify in the Aircraft Flight Manual the types of operation for which the airplane is equipped.

The equipment installed in this aircraft has been substantiated to 24,000 feet.

When this airplane was delivered it contained the properly installed equipment listed in the Weight and Balance Section of this manual and, therefore, was satisfactory for the types of operation indicated below by an asterisk.

(a) ✓ Day VFR

(b) ✓ Night VFR

(c) ✓ Day and night IFR when adequate communication and navigation radio has been installed in an FAA approved manner.

(d) ✓ Flight in icing conditions.

Operators are warned that if any of the equipment listed as having been installed at time of delivery is changed, not operating, or not properly maintained and calibrated, the airplane may not be properly equipped for all the conditions noted above. It is the responsibility of the pilot to determine whether the lack of a piece of equipment limits the conditions under which he may fly the airplane.

AIRCRAFT

N3237C
REGISTRATION NO.

27-7954050
SERIAL NO.

(b) Night VFR
- (1) All equipment required for Day VFR
- (2) Position lights
- (3) Anti-collision lights
- (4) Alternator - each engine
- (5) Instrument lights
- (6) Landing light, if for hire

(c) Day and Night IFR
- (1) All equipment required for Night VFR
- (2) Two-way radio for communication
- (3) Suitable and adequate navigation radio equipment
- (4) Gyroscopic rate of turn indicator
- (5) Bank indicator
- (6) Clock with sweep second hand
- (7) Sensitive altimeter adjustable for barometric pressure
- (8) Starter and electric power generator - each engine
- (9) Gyroscopic bank and pitch indicator
- (10) Gyroscopic direction indicator
- (11) Free air temperature indicator

NOTE

This aircraft is not approved for continuous flight in icing conditions unless all required icing equipment is installed and operable. (See Section 9, Supplement 6, for required icing equipment.)

2.29 PLACARDS

On the instrument panel in full view of the pilot:

"THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE AIRPLANE FLIGHT MANUAL. ACROBATIC MANEUVERS (INCLUDING SPINS) PROHIBITED."

On the instrument panel:

"MINIMUM SINGLE ENGINE CONTROL SPEED 64 KIAS"
"MAXIMUM SPEED FOR LANDING GEAR OPERATION 132 KIAS"
"DESIGN MANEUVERING SPEED 131 KIAS"

Under both center windows:

"LATCH SEATS FOR TAKEOFF AND LANDING"

On firing ring cover of emergency landing gear extender under left front seat:
(serial numbers 27-7654001 through 27-7954121):

"EMERGENCY GEAR EXTENDER. PLACE GEAR SELECTOR TO DOWN POSITION LIFT COVER, PULL RING"

On forward baggage compartment door:

CAUTION

BE CERTAIN BAGGAGE DOORS
ARE PROPERLY CLOSED AND
LOCKED PRIOR TO FLIGHT

MAX. FLOOR LOAD
100 LBS. PER SQ. FOOT
TOTAL COMPARTMENT CAPACITY
150 LBS.

BAGGAGE/CARGO MUST BE LOADED
WITHIN THE WEIGHT AND BALANCE LIMITS
OF THIS AIRCRAFT

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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 in this section. All of the required (FAA regulations) emergency procedures and those necessary for the safe 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 check list which supplies an action sequence for critical situations with little emphasis on the operation of systems.

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

These procedures are suggested as a 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.

3.3 EMERGENCY CHECK LIST

SPEEDS

Air Minimum Control . . . . . 64 KIAS
Best Single Engine Angle of Climb . . . . 83 KIAS
Best Single Engine Rate of Climb . . . . . 88 KIAS
Maneuvering . . . . . 131 KIAS
Never Exceed . . . . . 221 KIAS

ENGINE INOPERATIVE PROCEDURES

ENGINE SECURING PROCEDURE
(FEATHERING PROCEDURE)

Throttle . . . . . close
Propeller . . . . . FEATHER (1000 RPM min.)
Mixture . . . . . IDLE CUT-OFF
Cowl flaps . . . . . Close
Magneto switch . . . . . OFF
Electric fuel pump . . . . . OFF
Fuel selector . . . . . OFF (detent)
Alternator switch . . . . . OFF
Prop. Sync. . . . . OFF
Electrical load . . . . . reduced
Crossfeed . . . . . considered

NOTE

(Serial numbers 27-7654001 thru 27-7854050 when Piper Kit No. 763 836 is not installed)

Hydraulic pump on left engine only. Use hand pump to actuate gear and flaps when left engine is out. Gear can be extended with hand pump or by CO_2*.

ENGINE FAILURE DURING TAKEOFF
(Below 64 KIAS)

If sufficient runway remains for a safe stop:
Throttles . . . . . CLOSE immediately
Brakes . . . . . as required
Stop straight ahead.

If insufficient runway remains for a safe stop:
Throttles . . . . . close immediately
Mixture . . . . . retard fully aft
Master switch . . . . . OFF
Fuel selectors . . . . . OFF
Magneto switches . . . . . OFF
Maintain directional control and maneuver to avoid obstacles.

*CO_2 system installed on aircraft serial numbers 27-7654001 through 27-7954121 only.

ENGINE FAILURE DURING TAKEOFF
(Between 64 KIAS and 83 KIAS)

Decide whether to abort or continue
If abort . . . . . follow above procedures
If continue . . . . . accelerate inground effect (near ground) to 83 KIAS and follow below procedures

WARNING

Certain combinations of aircraft weight, configuration, ambient conditions and speeds will not permit positive climb.

ENGINE FAILURE DURING TAKEOFF
(83 KIAS or above)

Airspeed . . . . . 83 KIAS minimum
Directional control . . . . . maintain
Power . . . . . maximum
Gear . . . . . RETRACT (Serial numbers 27-7654001 thru 27-7854050, when Piper Kit No. 763 836 is not installed, if left engine failed, gear must be raised with hand pump)
Flaps . . . . . insure UP
Prop. (inop. eng.) . . . . . FEATHER
Cowl flap (inop. eng.) . . . . . CLOSE
Airspeed . . . . . when clear of obstacles accelerate to 88 KIAS
Trim . . . . . bank 5° toward oper. eng.
Cowl flap (operative eng.) . . . . CLOSE (as much as possible)
Climb . . . . . straight ahead (avoiding obstacles and attain sufficient altitude to execute single engine landing procedure
Inop. engine . . . . . complete Engine Securing Procedure
Land as soon as practical at nearest suitable airport.

ENGINE FAILURE DURING CLIMB

Airspeed . . . . . maintain 88 KIAS
Directional control . . . . . maintain
Inop. engine . . . . . identify and verify
Inop. engine . . . . . complete Engine Securing Procedure
Land as soon as practical at nearest suitable airport.

SINGLE ENGINE GO-AROUND

Avoid if possible.

On aircraft with serial numbers 27-7654001 thru 27-7854050 when Piper Kit No. 763 836 is not installed, do not attempt if gear or flaps are extended and left propeller is feathered. With left engine inoperative gear and flaps must be retracted with hand pump.*

Airspeed . . . . . hold 88 KIAS
Power . . . . . max. on operating engine
Flaps . . . . . retract
Landing gear . . . . . retract
Cowl flaps and trim . . . . . as required

AIR START (UNFEATHERING PROCEDURE)

Fuel selector . . . . . ON
Throttle . . . . . open 1/2 inch
Mixture . . . . . RICH
Elect. fuel pump . . . . . prime then OFF
Propeller . . . . . forward
Magnetos . . . . . ON
Starter . . . . . engage until prop unfeathers
Propeller . . . . . pull back to low RPM position as propeller speed accelerates through 1000 RPM
Throttle . . . . . reduced power till warm; 2000 RPM max.
Engine instruments . . . . . check
Alternator . . . . . ON

OVERSPEEDING PROPELLERS

Throttle . . . . . retard
Airspeed . . . . . reduce
Throttle . . . . . add slowly after RPM is under control
Airspeed . . . . . maintain below airspeed at which overspeed occurred (select lower RPM if higher airspeed required)
Descend at 2200 RPM
Land with prop set at 2400 RPM

NOTE

Prop will not feather while overspeeding; therefore while in the overspeed condition do not select feather position and do not shut down engine. Propeller will feather normally if not overspeeding.

ENGINE ROUGHNESS

Electric fuel pumps . . . . . ON
Engine instruments . . . . . scan for cause
Mixture . . . . . adjust as required
Alternate air . . . . . OPEN
Cowl flaps . . . . . adjust for proper CHT
Fuel . . . . . switch tanks if fuel in second tank
Magnetos . . . . . check

ENGINE OVERHEAT

Cowl flaps . . . . . OPEN
Mixture . . . . . richen
Power . . . . . reduce
Airspeed . . . . . increase (if altitude permits)

LOSS OF OIL PRESSURE

Engine . . . . . secure per Engine Securing Procedure

ROUGH AIR OPERATION

Slow to maneuvering speed or slightly less (5200 lbs. 131 KTS)
Fly attitude and avoid abrupt maneuvers
Seat belt and shoulder harness - tighten.

*Serial numbers 27-7654001 thru 27-7854050 when Piper Kit No. 763 836 is not installed are equipped with a single hydraulic pump on the left engine only.

GOING INTO CROSSFEED

(To use fuel from opposite side during single engine operation)

Fuel Selector
(inop. engine side) . . . . . (inbd or outbd) ON
Electric fuel pump
(inop. side) . . . . . .ON
Crossfeed valve . . . . . .ON
Electric fuel pump
(operative side) . . . . . .OFF
Fuel selector
(operative side) . . . . . .OFF

COMING OUT OF CROSSFEED

When one engine is inoperative

Fuel selector
(operative engine side) . . . . . .ON
Electric fuel pump
(operative side) . . . . . .ON
Electric fuel pump
(inop. side) . . . . . .OFF
Crossfeed valve . . . . . .OFF
Fuel selector
(inop. side) . . . . . .OFF
Fuel pump (operative
side) . . . . . as required

ONE ALTERNATOR INOPERATIVE LIGHT ON

Reduce electrical load to minimum required
Turn OFF same side of master switch
Reset tripped circuit breakers
Master switch (both sides) ON
If light goes out, reinstate electrical load.
If light stays on, turn same side of master switch OFF and continue with reduced electrical load.

BOTH ALTERNATOR INOPERATIVE LIGHTS ON

Repeat above procedure for each alternator.

If both lights fail to go off:
a. Master switch . . . . . both sides ON
b. Alternator circuit
breaker switches . . . . . .OFF
c. Terminate flight as
soon as possible

NOTE
Since battery is furnishing all the current, keep the load low.

DOOR OPEN IN FLIGHT

Airspeed . . . . . slow to reduce buffeting
Land at nearest airport

SPIN RECOVERY

Throttles . . . . . .retard both to idle
Rudder . . . . . .full opposite to spin until rotation stops
Control wheel . . . . . .neutral; then full forward if necessary
Ailerons . . . . . neutral
Smoothly recover from dive when spin stops.

NOTE
Inasmuch as FAA Regulations do not require spin demonstrations of airplanes of this weight, no spin tests have been conducted. The recovery technique is based on the best available information.

AIRFRAME VIBRATION

Reduce airspeed till vibration stops
Handle controls smoothly and gently
Land and investigate cause

GEAR UP LANDING

Normal check list . . . . . complete (except for gear selector)
Gear selector . . . . . .UP
Make normal approach with power
Close throttles before touchdown
Turn OFF master and magneto switches
Turn OFF fuel valves
Touch down at minimum speed
(If time permits, use starter to position props parallel with wings.)

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 INOPERATIVE PROCEDURES

ENGINE SECURING PROCEDURE (FEATHERING PROCEDURE)

The engine securing procedure should always be accomplished in a sequential order according to the nature of the engine failure (ie., practice, engine failure during takeoff, engine failure during climb, etc.).

Begin the securing procedure by closing the throttle of the inoperative engine and moving its propeller control to "FEATHER" (fully aft) before the propeller speed drops below 1000 rpm. The inoperative engine mixture control should be moved fully aft to the "IDLE CUT-OFF" position. "CLOSE" its cowl flaps to reduce drag. Turn "OFF" the magneto switches, the electric fuel pump switch, the fuel selector and the alternator switch of the inoperative engine. The propeller synchrophaser (if installed) should be OFF. Complete the procedure by reducing the electrical load and considering the use of the fuel crossfeed if the fuel quantity dictates.

NOTE

On aircraft with serial numbers 27-7654001 through 27-7854050 when Piper Kit No. 763 836 is not installed only one hydraulic pump supplies pressure for the system. This pump is installed on the left engine. When the left engine is secured, the flaps must be actuated by the hand pump and operation of the gear is limited to the hand pump or CO_2 system.

ENGINE FAILURE DURING TAKEOFF (Below 64 KIAS)

A preflight determination of runway length and computation of accelerate/stop distance will aid in determining the best course of action in the event of an engine failure during takeoff. If engine failure occurs while sufficient runway remains for a deceleration and a safe stop, cut power immediately and stop straight ahead.

If an engine failure occurs before an airspeed of 64 KIAS is attained, and there is not adequate runway remaining for deceleration and a stop, immediately retard the throttle and mixture levers fully aft. Turn OFF the master switch, the fuel selectors, and the magneto switches. During these procedures, maintain directional control and maneuver to avoid obstacles if necessary.

After an airspeed above 64 KIAS has been established, an engine restart attempt may be made if altitude permits. If the restart has failed, or altitude does not permit, the engine should be secured. Move the propeller control of the inoperative engine to FEATHER and complete the "Engine Securing Procedure." Adjust the trim to 5°of bank toward the operating engine. The cowl flap on the operative engine should be adjusted as required to maintain engine temperature within allowable limits.

ENGINE FAILURE DURING FLIGHT (Above 64 KIAS)

If an engine fails at an airspeed above 64 KIAS during flight, begin corrective response by identifying the inoperative engine. The operative engine should be adjusted as required after the loss of power has been verified. Once the inoperative engine has been identified and the operating engine adjusted properly, an engine restart may be attempted if altitude permits.

Prior to securing the inoperative engine, check to make sure the fuel flow to the engine is sufficient. If the fuel flow is deficient, turn ON the electric fuel pump. Check the fuel quantity on the inoperative engine side and switch the fuel selector to the other tank if a sufficient supply is indicated. Check the oil pressure and oil temperature and insure that the magneto switches are ON.

If the engine fails to start it should be secured using the "Engine Securing Procedure."

After the inoperative engine has been secured, the operative engine can be adjusted. Power should be maintained as required and the mixture control should be adjusted for power. Check the fuel supply and turn ON the electric fuel pump if necessary. The cowl flaps on the operative engine should be adjusted as required to maintain engine temperatures within allowable limits. Trim 5° toward the operating engine. The electrical load should be decreased to a required minimum. Land as soon as practical at the nearest suitable airport.

SINGLE ENGINE LANDING

If a single-engine landing is necessary, a check should be performed to determine whether or not the hydraulic pump(s) is functioning for normal gear extension. This check is accomplished by placing the landing gear control in the "UP" position with the gear retracted. If the hydraulic pump is functioning, pressure will return the control to the neutral position. This check should be performed before entering the traffic pattern so that there will be time to pump the gear down with the hand pump or to employ the emergency CO_2* gear extension system if necessary.

The "Engine Securing Procedure" should be complete on the inoperative engine. Fasten the seat belts and shoulder harnesses and select the FAN position of the heater switch. The operative engine electric fuel pump should be ON and the mixture RICH. Advance the propeller control (operative engine) full forward. Check to ensure that the fuel supply is sufficient. The cowl flaps on the operative engine should be adjusted as required. Insure that the fuel selector is ON and that the fuel crossfeed valve is OFF.

Maintain an airspeed of 98 KIAS or above and an altitude higher than normal until a landing is assured. When a landing is assured, extend the gear and flaps. On aircraft with serial numbers 27-7654001 through 27-7854050 when Piper Kit No. 763 836 is not installed and the left engine is inoperative the flaps must be lowered with the emergency hand pump and the gear must be extended with the emergency hand pump or CO_2* system. Slowly retard the power on the operative engine and flare out the airplane for a normal landing. Trim as necessary as power is reduced. The airplane will tend to yaw toward the operative engine.

*CO_2 system installed on aircraft serial numbers 27-7654001 through 27-7954121 only.

3.11 ENGINE ROUGHNESS

If an engine falters or runs erratically, the cause may be fuel flow interruption, fuel contamination, icing or air starvation, or ignition problems. If roughness occurs, turn the electric fuel pumps "ON." Scan the engine instruments to see if the cause can be determined. Adjust the mixture controls for maximum smoothness; if the mixture is too rich or too lean, engine roughness may result. Open the alternate air control; a blocked induction system can cause roughness. If cylinder head temperatures are too high or too low, adjust the cowl flaps as required.

If the problem is in the fuel system, selecting another tank containing fuel may remedy the situation. A check of the magnetos will determine if they are operating properly.

3.13 ENGINE OVERHEAT

If engine temperatures become excessive, open the cowl flaps. Enriching the mixture and reducing power will also reduce engine temperature. If a more rapid reduction of engine temperature is desired, increase the airspeed by establishing a shallow dive.

3.15 LOSS OF OIL PRESSURE

Loss of oil pressure could be caused by a faulty pump, oil exhaustion, or a leak. A loss of oil pressure indication could be the result of a faulty gauge. In any event, continued operation of the engine could result in a serious emergency situation or severe engine damage.

Complete the "Engine Securing Procedure" (paragraph 3.7) on the faulty engine.

3.17 ROUGH AIR OPERATION

In conditions of extreme turbulence, slow the airplane to maneuvering speed or slightly less. Maneuvering speed will decrease with the weight of the airplane - e.g., 131 KIAS at 5200 lbs., 112 KIAS at 3600 lbs. A reduction in speed will ease the stress to which the airplane is subjected by turbulence. Fly attitude and avoid abrupt maneuvers. Fasten seat belts and shoulder harnesses as a precaution against buffeting and lurching. When flying in extreme turbulence or strong vertical currents and using the autopilot, the altitude-hold mode should not be used.

3.19 EMERGENCY GEAR EXTENSION

EXTENDING GEAR WITH HAND PUMP

To extend the landing gear manually with the hand pump, move the gear selector to the "DOWN" position. Pull the hand hydraulic pump handle fully aft and pump until three green gear indicator lights illuminate and the gear selector handle returns to neutral.

3.27 CABIN FIRE

In the event of a fire in the cabin, close all vents and turn the heater "OFF." Extinguish the fire with the fire extinguisher if it is installed. If a fire extinguisher is not available, use any means available to smother or douse the fire. When the fire is out, ventilate the cabin to clear smoke and fumes.

3.29 ELECTRICAL FIRE

The first step in coping with an electrical fire is to turn the master switch "OFF." During night flight, be sure a flashlight is in hand before turning "OFF" the master switch. Check for open circuit breakers; then pull all circuit breakers. Turn "OFF" all electrical switches, avionics switches, and the heater. Close all ventilators. If a fire extinguisher is available, apply it to the fire.

When the fire is out, turn the master switch "ON" and open the ventilators. Electrical switches and circuit breakers may be turned back "ON," one at a time, for the individual units required for flight. Faulty units should remain "OFF."

NOTE

The stall warning system will not function with the electrical system completely shut down or inoperative.

3.31 EMERGENCY DESCENT

If a situation such as loss of oxygen at high altitude occurs and an emergency descent is necessary, slowly retard the throttles to idle. Place the propeller controls forward, and establish a shallow dive at a speed of 175 KIAS (131 KIAS in rough air). Close the cowl flaps to maintain engine temperatures during the dive.

3.33 GOING INTO CROSSFEED

Crossfeed operation should be employed only when it is necessary to use fuel from the opposite side to extend range during single engine operation. To activate the crossfeed system, turn "ON" the fuel selector of the tank to be used on the inoperative engine side. Turn "ON" the electric fuel pump of the inoperative engine, and turn "ON" the crossfeed valve. Turn "OFF" the electric fuel pump of the operating engine, and turn "OFF" the fuel selector on the operating engine side. The electric fuel pump for the tank not in use on the operating engine side must be "OFF" to prevent the heating of trapped fuel and possible subsequent vapor lock upon coming out of crossfeed.

3.35 COMING OUT OF CROSSFEED

To return to normal operation during single engine flight when the crossfeed has been in use, first turn "ON" the fuel selector on the operating side. Turn "ON" the electric fuel pump of the operating engine, and turn "OFF" the electric fuel pump of the inoperative eingine. Turn the crossfeed "OFF." Then turn "OFF" the fuel selector on the inoperative engine side. When the electric fuel pump of the operating engine is no longer required to ensure fuel pressure, it may be turned "OFF."

3.47 GEAR UP LANDING

In such situations as an emergency landing on water or extremely soft surfaces, or a complete landing gear failure, a gear up landing may be unavoidable. When a gear up landing is necessary, make a normal approach with power. Be sure seat belts and shoulder harnesses of all occupants are securely fastened.

Complete the normal landing check list except for the landing gear selector. The landing gear selector handle should be "UP." If time permits, feather the propellers and use the starters to rotate the propellers to a horizontal position. Close the throttles and turn "OFF" the master switch and the magneto switches. Turn "OFF" the fuel valves. Touch down at lowest possible airspeed.

3.49 EMERGENCY EXIT

In an emergency, the airplane may be vacated through the emergency exit window, the middle window on the left side of the airplane. The window should not be removed except in an emergency. To open the emergency exit, first remove the plastic handle guard and turn the handle. The window may then be pushed outward away from the fuselage by applying a steady, sustained pressure on the bottom sill.

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NORMAL PROCEDURES

SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This section describes the recommended procedures for the conduct of normal operations for Aztec F airplanes with normally aspirated engines. All of the required (FAA regulations) procedures and those necessary for the safe 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 presented in Section 9 (Supplements).

These procedures are provided as 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 is a short form check list which supplies an action sequence for normal procedures 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 in flight.

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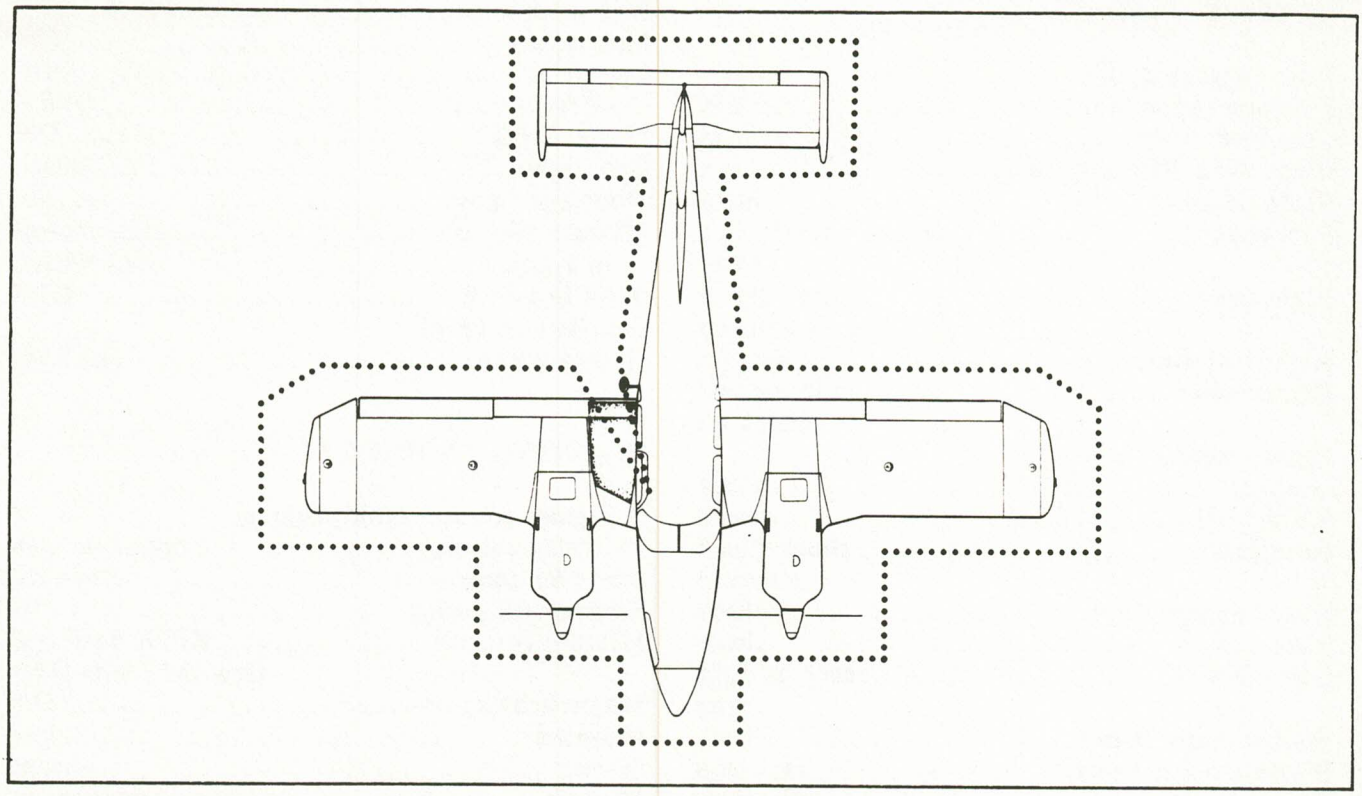

WALK - AROUND

Figure 4-1

4.5 NORMAL PROCEDURES CHECK LIST

PREPARATION

Airplane status . . . . . airworthy, papers on board
Baggage . . . . . weighed, stowed, tied
Weight and C.G. . . . . within envelope
Charts and navigational equipment . . . . . on board
Mike and headset . . . . . on board
Performance . . . . . .computed and safe

PREFLIGHT INSPECTION

INSIDE CABIN

Avionic equipment . . . . . .OFF
Fuel selectors . . . . . both ON
Gear selector . . . . . DOWN
Master switch . . . . . .ON
Gear lights . . . . . 3 green
Fuel quantity . . . . . adequate
Elect. fuel pumps . . . . . .check, then OFF
Cowl flaps . . . . . .OPEN
Alternator inop. lights . . . . . .checked
Master switch . . . . . .OFF
Wing flaps . . . . . check by hand pump
Magneto switches . . . . . .OFF
Mixtures . . . . . idle cut-off
Trim . . . . . neutral
Oxygen . . . . . .OFF, quant. checked, masks on board
Controls . . . . . .free and checked
Crossfeed . . . . . drained
Emergency exit . . . . . .secure
Parking brakes . . . . . set

PRE-TAXI AND DURING TAXI

Lights ..... as required
Radios ..... checked
Autopilot ..... ON, checked then disengaged
D/G and A/H ..... set
Altimeter ..... set and checked
Crossfeed ..... check and OFF
Engine-driven hydraulic pump (single pump) ..... check
Parking brake ..... OFF
Brakes ..... check
Flight instruments ..... check while moving

ENGINE RUN-UP

WARNING

No braking will occur if aircraft brakes are applied while parking brake handle is pulled and held.

Parking brakes ..... set
Cabin heater ..... check
Engine temperature ..... warm
Mixtures ..... full RICH
Propellers ..... full high rpm
Propellers synchrophaser ..... manual
Engine gauges ..... check
Throttles ..... set at 1500 rpm
Feathering ..... check (500 max. rpm drop)
Throttles ..... set at 2000 rpm
Propeller controls ..... exercise (300 max. rpm drop)
Magnetos ..... check
(1) Max. drop - 175 rpm
(2) Diff. left to right - 50 rpm
Engine instruments ..... check
Alternators ..... check
Vacuum ..... check
Throttles ..... check idle, (500 rpm minimum) set 1000 rpm

BEFORE TAKEOFF

Seats and seat belts ..... secure
Shoulder harnesses ..... secure
Avionics ..... checked and set
Fuel selector ..... ON, crossfeed OFF
Engine gauges ..... checked
Alternators ..... ON and checked
Autopilot ..... checked and OFF
Gyros, clock, altimeter ..... set
Cowl flaps ..... OPEN
Mixtures and propellers ..... full forward
Quadrant friction ..... set
Flight controls ..... set
Trim ..... set (pitch and yaw)
Wing flaps ..... (check visually) set to 0
Door ..... locked
Icing equipment ..... checked - as required
Electric fuel pump ..... ON

TAKEOFF

Brakes ..... off
Throttles ..... full forward
Power and airspeed ..... check
Rotate ..... at 64 KIAS min.
Landing gear ..... retract
Accelerate to climb speed

CLIMB

Power ..... set
Engine instruments ..... monitor
Cowl flaps ..... as required
Fuel pumps ..... OFF
Best rate of climb airspeed ..... approx. 100 KIAS at sea level

CRUISE

Power ..... set
Cowl flaps ..... as required
Mixture ..... lean
Oxygen (above 10,000 ft.) .... ON (No Smoking)
Engine gauges ..... monitor

DESCENT

Mixtures ..... Enrich with descent
Power ..... set
Defroster ..... ON (if required)
Oxygen (below 10,000 ft.) ..... OFF

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.

NOTE

This airplane is certified as a normal category airplane and must be operated in compliance with the FAA Approved Pilot's Operating Handbook. Acrobatic maneuvers (including spins) are prohibited. Maintain at least 5000 feet of terrain clearance when practicing stalls.

Avoid abrupt maneuvers. Maneuvers at speeds and weights in excess of the maneuvering speeds and loadings listed in Section 2 (Limitations), may subject the airplane to load factors beyond those for which it is certified.

4.9 PREFLIGHT CHECK

The airplane should be given a thorough preflight and walk-around check. The preflight should include a determination of the airplane's operational status, a check that necessary papers and charts are on board and in order, and a computation of weight and C.G. limits, takeoff distance and in-flight performance. Baggage should be weighed, stowed and tied down. Passengers should be briefed on the use of seat belts and shoulder harnesses, the emergency exit, oxygen, and ventilation controls, advised when smoking is prohibited, and cautioned against handling or interfering with controls, equipment, door handles, etc. A weather briefing for the intended flight path should be obtained, and any other factors relating to a safe flight should be checked before takeoff.

Upon entering the cockpit, release the seat belt securing the control wheel. After insuring that avoinics equipment is "OFF", both fuel selectors are "ON" and the landing gear selector handle is in the "DOWN" position, the master switch should be turned "ON." The three green gear down lights should illuminate. Check that the alternator "INOP" lights are on. Place the fuel selector in each tank position to check the fuel gauges. Drain the crossfeed and check the operation of the electric fuel pumps; then turn the electric fuel pumps "OFF." After completing these checks, turn the master switch "OFF." Open the cowl flaps. The operation of wing flaps may be checked with the emergency hydraulic hand pump. Before leaving the cockpit for the walk-around, check that magnetos are "OFF," the mixture control is in idle cut-off, and trim controls are set to neutral. Check that the emergency exit is secure and ensure that the parking brake is set "ON."

During the walk-around inspection, the security of the rear baggage door should be checked first. Proceeding rearward and around the airplane, check the wings, control surfaces, and hinges for external damage and operational interference. The wings and all control surfaces should be free of ice, snow, frost, or other foreign materials. Check the condition of the fuselage, windows, antennas, and cables. If the airplane has been moored, tie-down ropes and wheel chocks should be removed.

At the wings, fuel filler caps should be removed and the fuel supply and fuel color checked visually. Fuel caps should be tightly sealed and properly secured, and fuel cell vents should be free of obstructions.

4.13 STARTING ENGINES

(a) Starting Engines When Cold

With the master switch "ON" and the electric fuel pump "ON," open the throttle control one inch and place the propeller control forward. Engines are primed by advancing the mixture control to the "RICH" position until fuel flow is indicated on the fuel flow meter, then pulling back to idle cut-off.

After ensuring that the propellers are clear, turn the magneto switches "ON," and engage the starter. As the engine fires, advance the mixture control. This procedure may then be repeated for the second engine.

If an engine does not fire within 5 to 10 seconds, disengage the starter and reprime.

(b) Starting Engines When Hot

If the engines are hot, the priming steps should be omitted. Fuel pumps should remain "OFF," and the mixture control should remain in idle cut-off until the engine fires.

(c) Starting Engines When Flooded

If an engine is flooded, the master switch and the magneto switches should be "ON," the electric fuel pump "OFF," the throttle fully open, and the mixture control in idle cut-off. When the starter is engaged and the engine fires, the throttle control should be retarded and the mixture control advanced.

When an engine is firing evenly, check the oil pressure gauge, the vacuum gauge, and the alternator output. The landing gear selector handle (dual pumps) should return to neutral. Turn the electric fuel pumps "OFF." If no oil pressure is indicated within 30 seconds (slightly longer in temperatures of 10° F or below) the engine should be stopped until the trouble is determined.

It is recommended 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 starters.

4.15 PRE-TAXI AND DURING TAXI

Before taxiing, lights and radios may be turned on as required. If an autopilot is installed, it may be turned "ON" and checked and then turned "OFF." Gyro instruments and altimeters should be set. The engine-driven hydraulic pump (single pump system) can be checked by placing the gear selector in the "DOWN" position with the gear extended and the left engine running. If the hydraulic pump is functioning, the selector will return to the neutral position. The parking brake must be released before taxiing.

While taxiing, apply the brakes to ascertain their effectiveness. Making slight turns allows the rudder operation and the nose wheel steering to be checked. While the airplane is moving, check the operation of the flight instruments.

To ensure that the emergency locator transmitter has not been accidentally activated, a check should be made by tuning a radio receiver to 121.5 MHz. An oscillating sound indicates that the locator may have been activated.

Before takeoff, make a final check of the engine gauges. All indicators should read within the green arcs. Recheck the alternator output and the gyro vacuum gauge. Gyros and altimeters should be set, and the clock should be set and wound. Check that the cowl flaps are open. Mixture and propeller controls should be full forward. The slightly rich setting at takeoff power aids in engine cooling. To prevent creeping of the controls, the friction lock should be tightened. Flight controls should be operating properly. Stabilator and rudder trim tabs should be set for takeoff. Wing flaps should be set at 0° and visually checked. Be sure that the cabin door is securely closed, latched, and locked and that the auxiliary latch is engaged. To insure constant fuel flow during takeoff, turn "ON" both electric fuel pumps. Do not take off with ice or frost on the wings, as ice and frost will radically change the flight characteristics of the airplane. If icing conditions are anticipated during or soon after takeoff, icing equipment should be checked and on. Boots should not be operated during takeoff or landing.

4.21 TAKEOFF

Advance the throttles to approximately 15 inches MAP prior to brake release, then advance fully forward. Position the control wheel near neutral. Monitor power and airspeed, and direction. If the airplane is properly trimmed, a light back pressure on the control wheel will allow the airplane to lift from the runway. On takeoff, the airplane should be kept on the runway surface until Vmc (64 KIAS) is reached. After Vmc is reached, the airplane should be accelerated as rapidly as possible to the best climb speed. During normal conditions, landing gear should be retracted when a gear down landing on the runway is no longer possible.

4.23 CLIMB

If there are no obstacles to be cleared, after reaching Vmc accelerate as quickly as possible to the best rate of climb speed. If there are obstacles to be cleared, maintain the best angle of climb speed. The applicable speed should be maintained until all obstacles are cleared and the airplane attains an altitude of at least 400 feet above ground level. During climb, monitor engine instruments and adjust cowl flaps as required to maintain cylinder head temperatures below 500°F.

When the airplane reaches an altitude of 500 feet above ground level, the electric fuel pumps should be turned "OFF," one at a time. As each pump is turned "OFF" check the fuel flow to ensure that the engine-driven fuel pumps are operating. Climb at the best rate of climb airspeed to the desired altitude.

4.25 CRUISE

During cruise, power settings should be made in accordance with the information given in Section 5 (Performance). To INCREASE power first enrich mixture, then increase RPM; then increase manifold pressure. To DECREASE power, first decrease manifold pressure; then decrease RPM; then lean mixture as allowable.

Cowl flaps should be positioned as required to maintain allowable cylinder head and oil temperatures.

During climbs, the servo regulator of the fuel injection system senses changes in altitude and automatically leans the mixture. For complete approved leaning procedures refer to the appropriate Lycoming Operator's Manual and the latest issue of Lycoming Service Instruction 1094. To improve economy, the mixture may be leaned manually with the mixture control. Detailed information on cruise settings and cruise performance is presented in Section 5 (Performance) and in the applicable Lycoming engine manual.

If the heater has been in operation, turn the heater control switch to "FAN" to allow the unit time to cool down. If a propeller synchrophaser is installed, place the switch in the "MAN" or off position.

Prior to landing and early in the roll out, check the operation of the brakes.

4.31 GO-AROUND

If a go-around is necessary, place the propeller controls in full increase RPM and the throttle controls full forward. Retract the wing flaps in steps and retract the landing gear. Adjust the cowl flaps as necessary for engine cooling.

4.33 AFTER LANDING

After touching down on the runway, maximum braking may be achieved by retracting wing flaps and pulling back on the control wheel as brakes are applied. If there is no need for maximum braking, the safest practice is to retract the flaps after the airplane has been maneuvered off the runway. It is possible that a pilot would inadvertently reach for the landing gear selector instead of the wing flap control while there is still enough lift on the wings to keep the full weight of the airplane off the wheels and thus prevent the actuation of the landing gear safety mechanism and allow the gear to retract during the ground roll. In the event a landing must be made without wheel brakes, the airplane should be flown to contact the ground at the slowest possible speed and landed short on the longest available runway.

When the landing is completed and while taxiing, the toe brakes may be tested. Spongy brake pedal action is often an indication that brake fluid needs replenished. Retract the wing flaps and open the cowl flaps. Turn electric fuel pumps "OFF." Place the propeller controls full forward.

If the heater has been in operation, check that the heater control switch is in the "FAN" position. The heater should never be turned "OFF" unless it has had time to cool down. Trim tabs should be set to neutral.

CAUTION

The alternator circuit breaker switches should not be opened manually when the alternators are functioning normally.

NOTE

If an external auxiliary power unit is used for starting, the master switch and all avionics switches should be turned OFF until both engines are running. Reduce engine power to idle before removing the external power unit. Turn ON the master switch and needed avionics switches after the external power unit has been disconnected. Short term use of external power with the master switch ON and all avionic switches OFF is permissible if the aircraft battery power is required to augment the external power source for starting engines.

(b) Circuit Breakers

All circuit breakers are grouped in the lower right corner of the instrument panel. To reset a circuit breaker, push in on the reset button.

(c) Fuel Management

(1) Normal Operation Takeoff and Landing
   a. Main fuel valves - "ON" (inboard or outboard)
   b. Electric fuel pumps - "ON"
   c. Crossfeed valve - "OFF"

(2) Normal Operation Cruising
   a. Main fuel valves - "ON" (inboard or outboard)
   b. Electric fuel pumps - "OFF"

(d) Strobe Anti-Collision Lights

The white wing tip anti-collision strobe lights are controlled by an on-off switch located in the lower left control panel.

V_{SSE} is a minimum speed selected by the manufacturer for intentionally rendering one engine inoperative in flight for pilot training.

V_{SSE} for the PA-23-250 F is 80 KIAS.

V_{MCA} DEMONSTRATION

(a)	Landing Gear	UP
(b)	Flaps	UP
(c)	Airspeed	at or above 80 KIAS (V_{SSE})
(d)	Propeller Controls	HIGH RPM
(e)	Thottle (Simulated Inoperative Engine)	IDLE
(f)	Throttle (Other Engine)	MAX ALLOWABLE
(g)	Airspeed	reduce approximately 1 knot per second until either V_{MCA} or STALL WARNING is obtained

CAUTIONS

Use rudder to maintain directional control (heading and ailerons to maintain 5° bank towards the operative engine (lateral attitude). At the first sign of either V_{MCA} or stall warning (which may be evidenced by: Inability to maintain heading or lateral attitude, aerodynamic stall buffet, or stall warning horn) immediately initiate recovery; reduce power to idle on the operative engine, and immediately lower the nose to regain V_{SSE}.

One engine inoperative stalls are not recommended.

Under no circumstances should an attempt be made to fly at a speed below V_{MCA} with only one engine operating.

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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 Aztec F is provided in this section.

The performance information presented in this section applies to both the normally aspirated and the optional turbocharged Aztec F models, and any performance variations between these two models will be notated.

5.3 INTRODUCTION TO PERFORMANCE AND FLIGHT PLANNING

The performance information 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 airplane. This performance can, however, be duplicated by following the stated procedures in a properly maintained airplane.

Effects of conditions not considered on the charts, such as the effect of a soft or grass runway surface on takeoff and landing performance, or the effect of winds aloft on cruise and range performance, must be evaluated by the pilot. 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 in item 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.

5.5 FLIGHT PLANNING EXAMPLE

The following Flight Planning Example illustrates the correct utilization of pertinent data presented in this section of the manual.

(a) Associated Conditions

Certain basic information must be gathered when planning a flight. This information includes departure and destination airport conditions, en route conditions, and basic aircraft conditions. Such factors as weather, the status of the runway, the distance of the flight, the number of passengers, etc., must be determined. Assume, for example, the following conditions:

(1) Departure Airport Conditions

Outside Air Temperature	17°C
Pressure Altitude	2000 ft.
Wind and Direction	15 kts at 360°
Runway Slope	+1.0%
Runway Direction	300°

(2) Cruise Conditions

Outside Air Temperature	-5°C
Pressure Altitude	10,000 ft.
En route Distance	500 naut. mi.
Power Setting	2400 RPM at 30 in. Hg.
Mixture Setting	Best Economy

(3) Destination Airport Conditions

Outside Air Temperature	20°C
Pressure Altitude	2000 ft.
Wind and Direction	10 kts at 330°
Runway Slope	+1.0%
Runway Direction	270°

(4) Aircraft Configuration

Basic Weight	3445 lbs.
Fuel Tanks (total)	144 gal.
Engines	Lyc. TIO-540-C1A
Occupants	4 at 170 lbs. each
Baggage	120 lbs.

(b) Aircraft Loading

The airplane weight and center of gravity may be determined by utilizing the information given in 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 6-7. If any alterations to the airplane affecting weight and balance have been made, reference to the aircraft logbook and Weight and Balance Record (Figure 6-9) should be made to determine the current basic empty weight of the airplane.

NOTE

The effect of winds aloft must be considered by the pilot when computing climb, cruise, and descent performance.

(e) Descent

Entering the cruise and destination airport conditions into the Time, Distance and Fuel to Descend graph (Figure 5-87) yields the following:

(1) Time to Descend 10 - 2 = 8 minutes
(2) Distance to Descend 22.5 - 4.5 = 18 naut. miles
(3) Fuel to Descend 2.7 - 0.5 = 2.2 gallons

(f) Cruise

Subtracting the previously calculated distance to climb and distance to descend figures from the total en route distance yields the total cruise distance. For example:

Cruise Distance = En route Distance - Climb Distance - Descent Distance
= 500 - 10.5 - 18.0
= 471.5 naut. miles

From the Cruise Performance Tables (Figure 5-63) for Intermediate Cruise (2400 RPM at 30 in. Hg.), Best Economy Mixture, the cruise airspeeds are 179 kts. at 5200 lbs. and 182 kts. at 4800 lbs. Extrapolating these values for 5068 lbs. (preliminary cruise weight), the cruise speed is 180 kts.

From the same table, Fuel Flow is 29.3 gallons/hour.

Cruise time and fuel may be calculated by the following formula:

Cruise Time = Cruise Distance/Cruise Speed
= 471.5/180
= 2.619 hours or 157.2 minutes

Cruise Fuel = Fuel Flow x Cruise Time
= 29.3 x 2.619
= 76.7 gallons

The above data can be used to calculate an average cruise weight in the following manner:

$$\text{Average Cruise Weight} = \text{Takeoff Weight} - 6 \times \left(\text{Taxi Fuel} + \text{Climb Fuel} + \frac{\text{Cruise Fuel}}{2}\right)$$

$$= 5068 - 6 \times \left(4.0 + 4.5 + \frac{76.7}{2}\right)$$

$$= 4782 \text{ lb.}$$

From the Cruise Performance Table (Figure 5-63), the cruise speed is now 182 kts. for 4782 lbs. Applying the above cruise time and cruise fuel formula results in the following figures:

Cruise Time = 471.5/182
= 2.591 hours or 155.4 minutes

Cruise Fuel = 29.3 x 2.591
= 75.9 gallons

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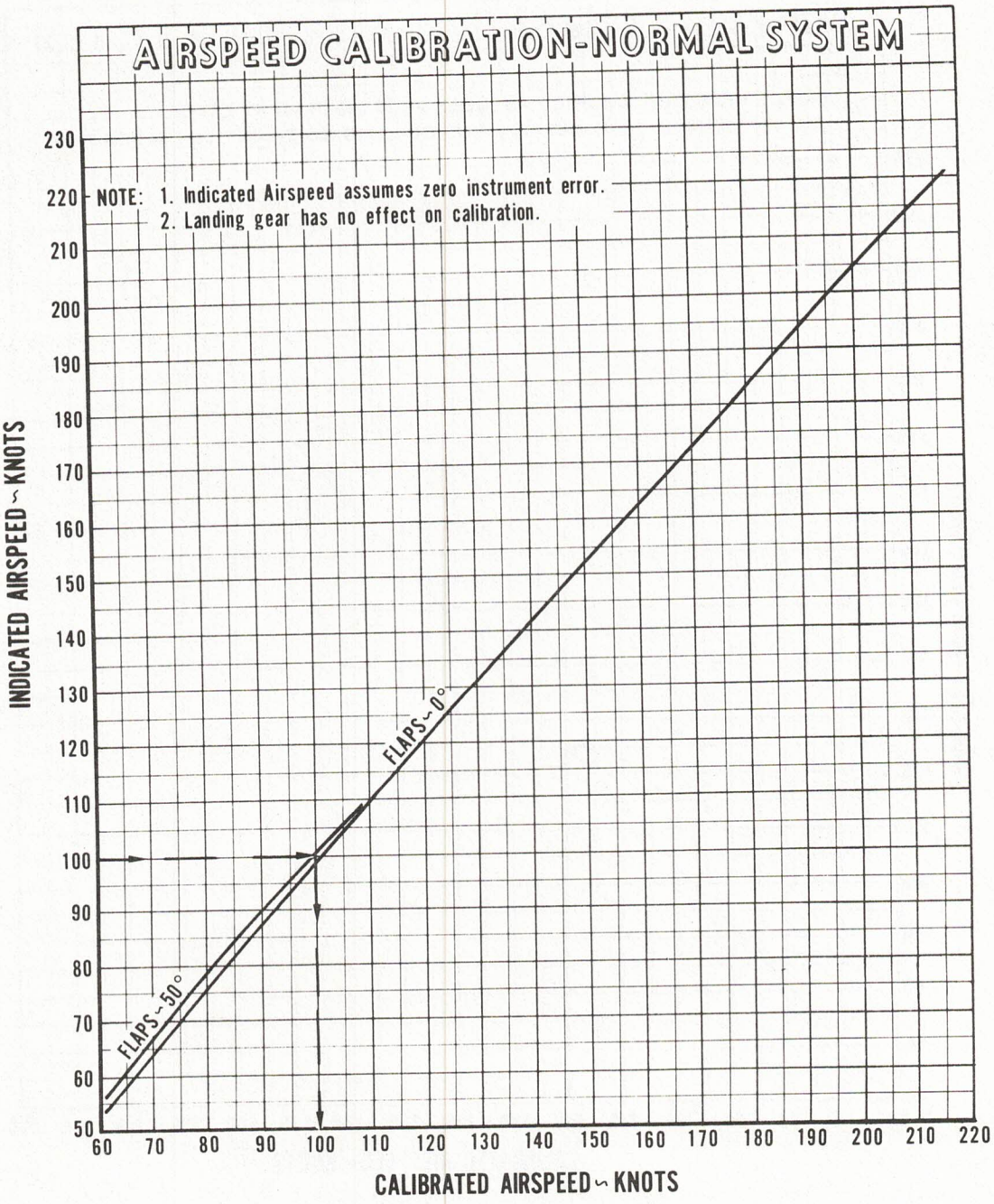
5.7 PERFORMANCE GRAPHS

LIST OF FIGURES

PA-23-250 AZTEC F



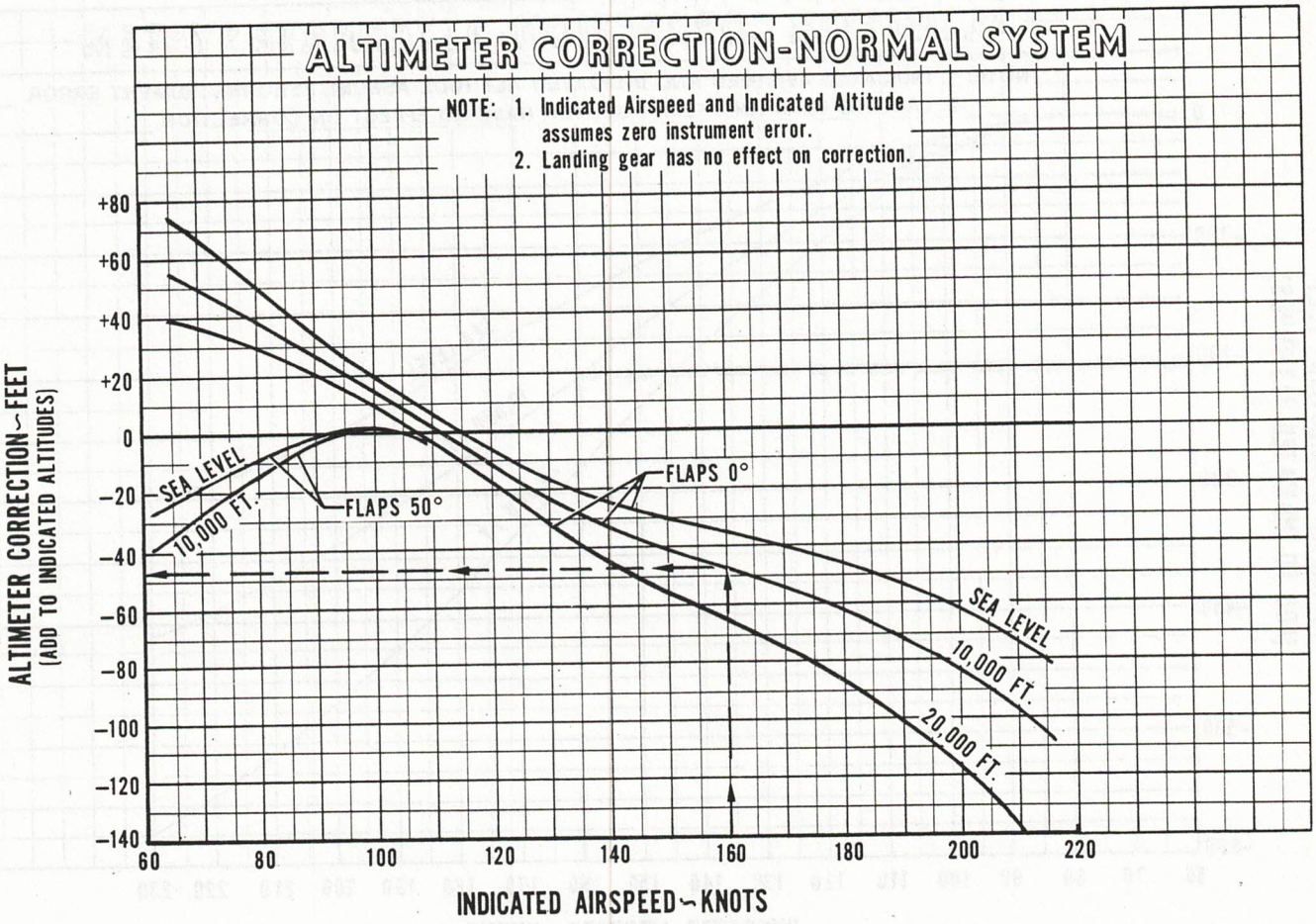
Example:

Indicated airspeed	=	100 kts.
Flaps	=	50°
Calibrated airspeed	=	100 kts.

AIRSPEED CALIBRATION - NORMAL SYSTEM

Figure 5-1

PA-23-250 AZTEC F



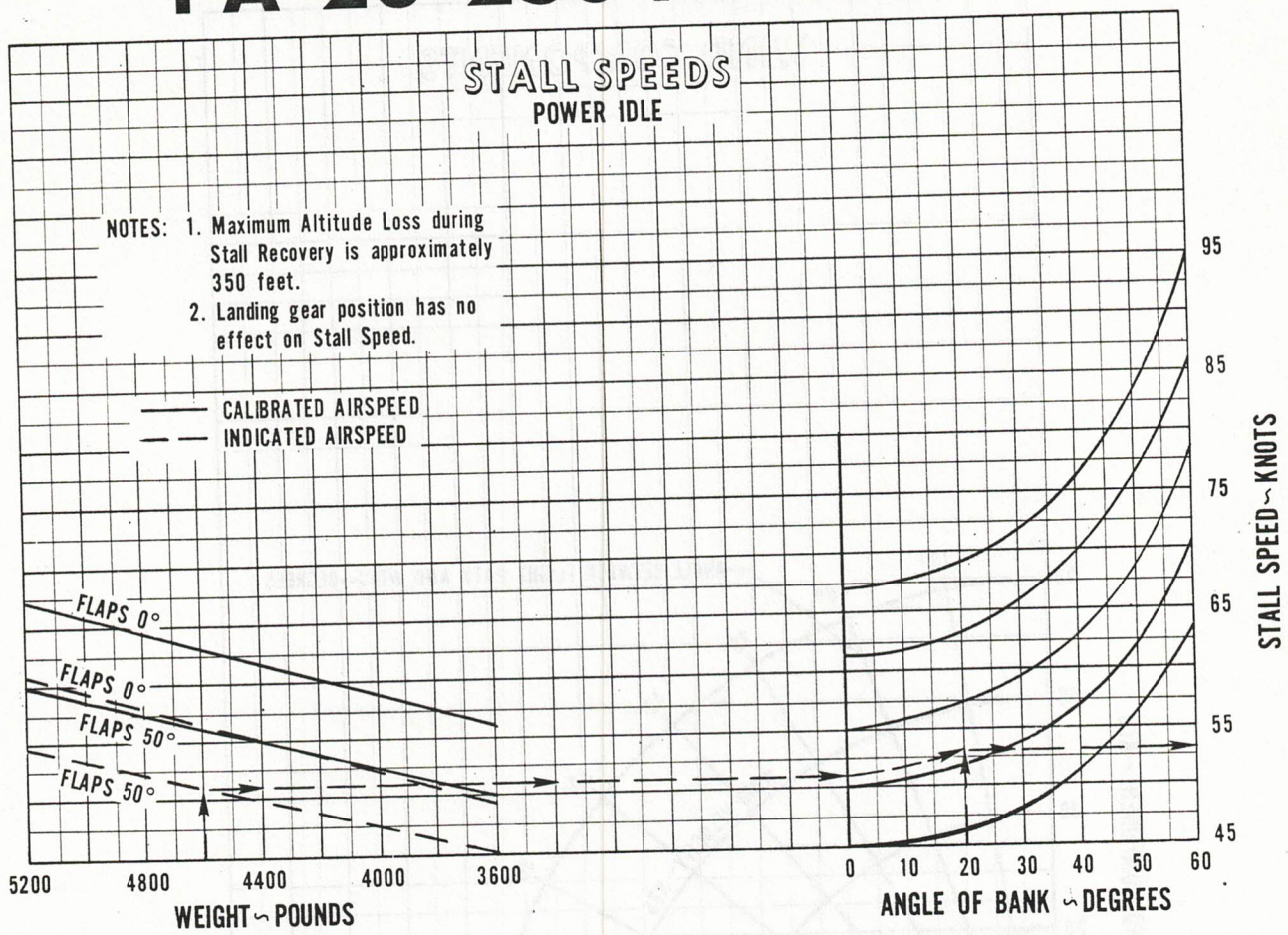
Example:

IAS	=	160 kts.
Altitude	=	10,000 ft.
Altimeter correction	=	-47 ft.
Calibrated altitude	=	9953 ft.

ALTIMETER CORRECTION - NORMAL SYSTEM

Figure 5-3

PA-23-250 AZTEC F



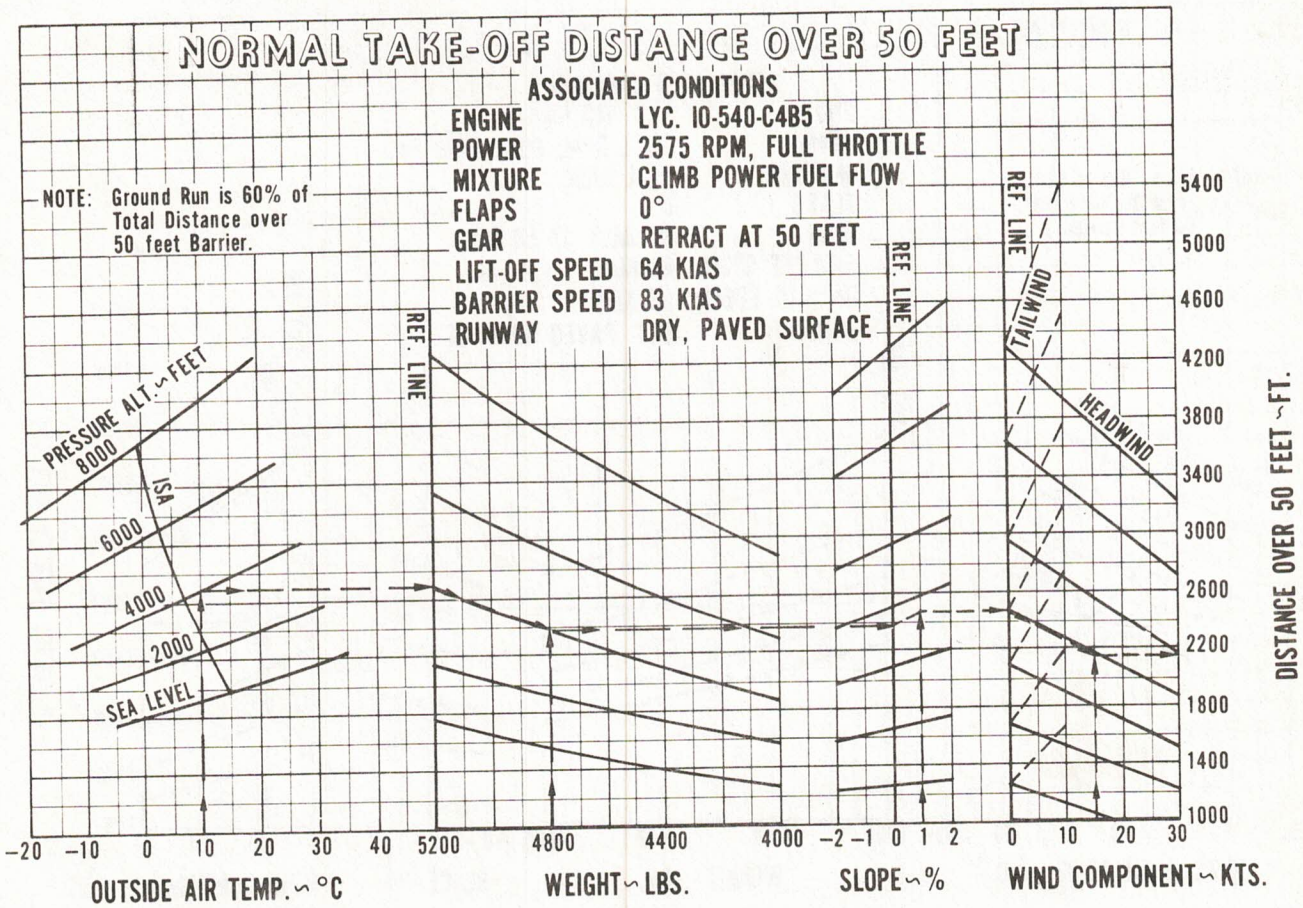
Example:

Weight	= 4600 lbs.
Flaps	= 50°
Angle of bank	= 20°
Stall speed	= 53 KIAS

STALL SPEEDS

Figure 5-5

PA-23-250 AZTEC F



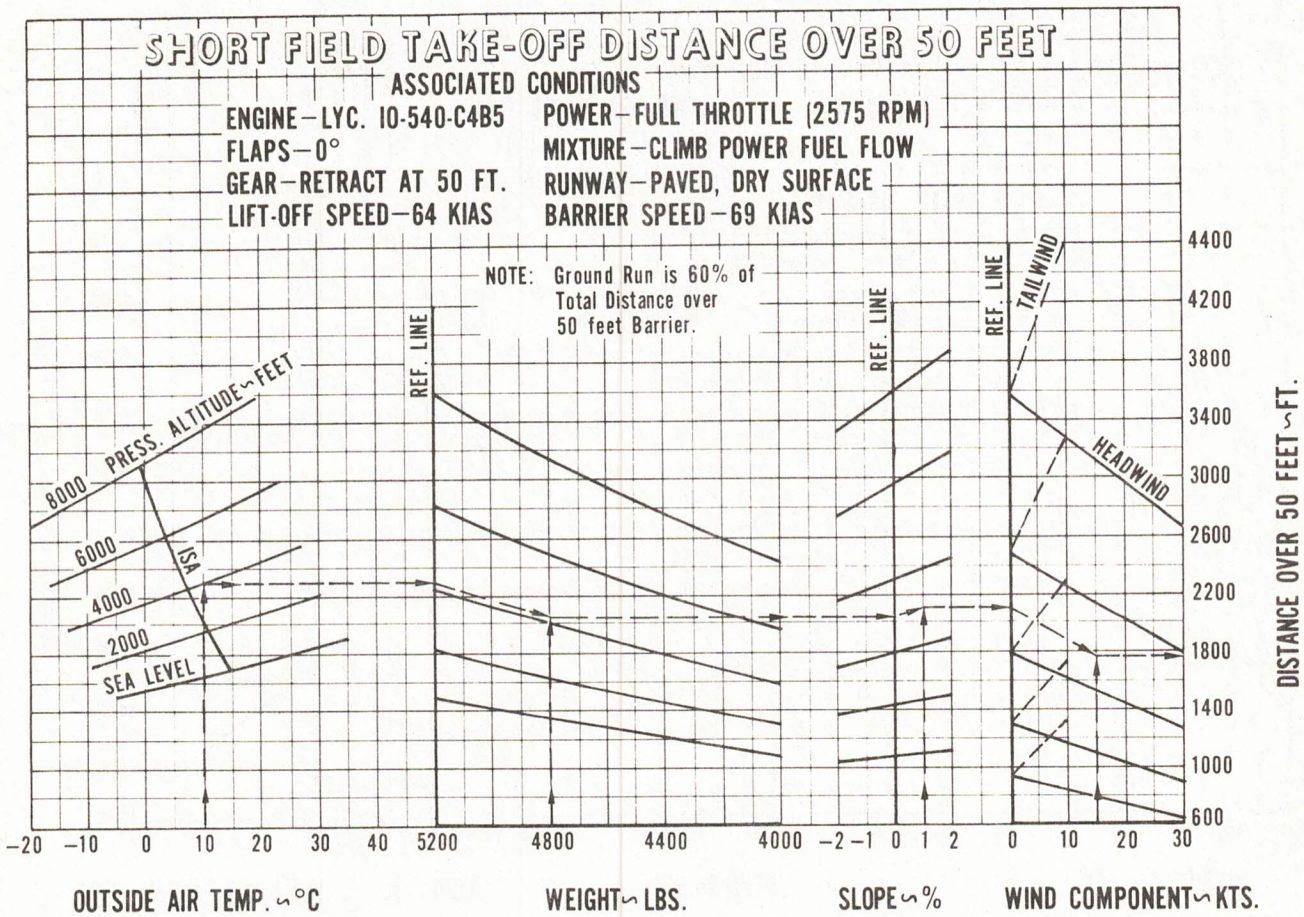
Example:

OAT	=	10° C
Pressure altitude	=	4000 ft.
Slope	=	+1.0%
Weight	=	4800 lbs.
Wind	=	15 kts.
Total distance	=	2140 ft.
Ground run	=	1180 ft.

NORMAL TAKEOFF DISTANCE OVER 50 FEET

Figure 5-9

PA-23-250 AZTEC F



Example:

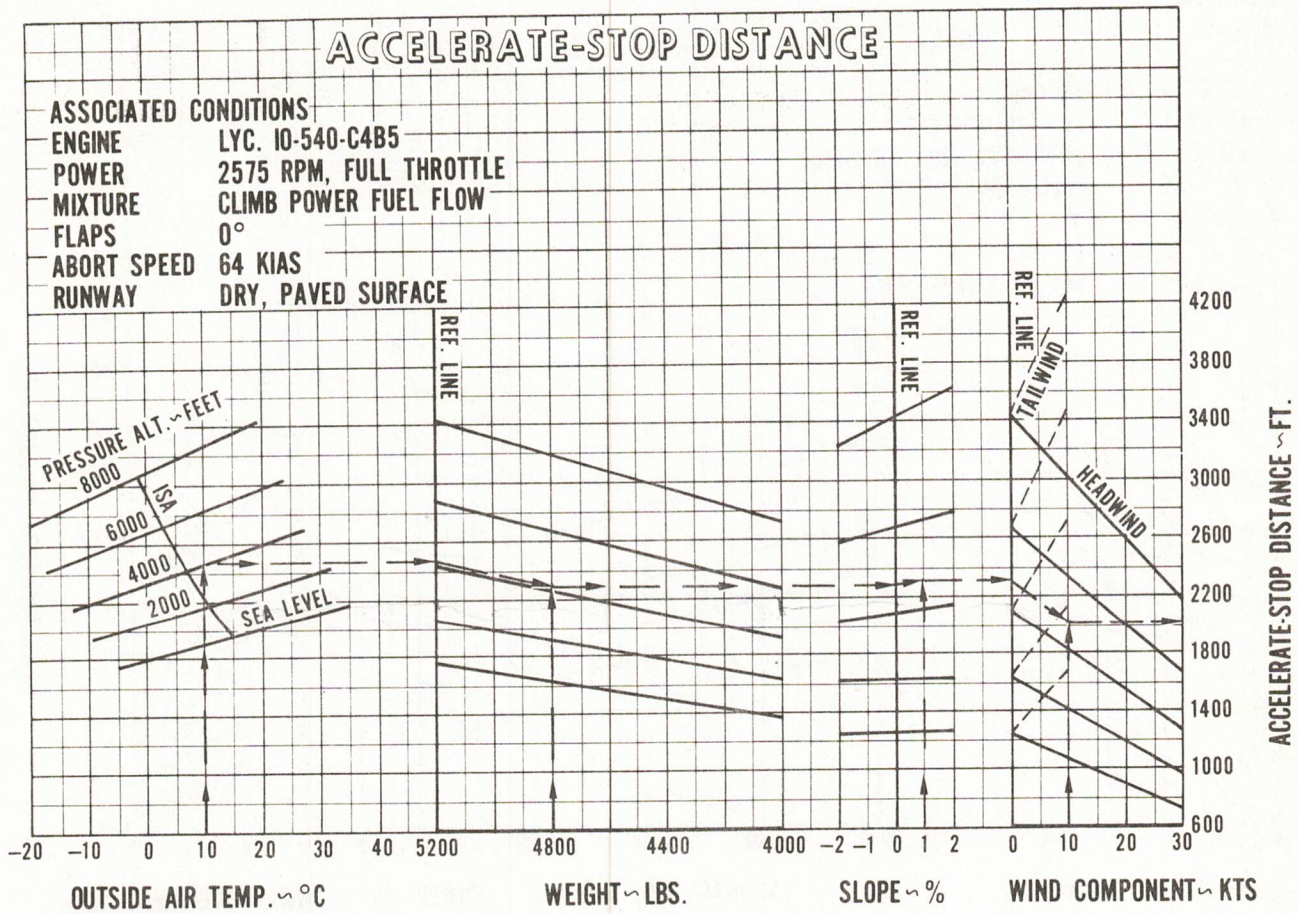
OAT	=	10° C
Pressure altitude	=	4000 ft.
Slope	=	+1.0%
Weight	=	4800 lbs.
Wind	=	15 kts.
Total distance	=	1760 ft.
Ground run	=	1060 ft.

65:20

SHORT FIELD TAKEOFF DISTANCE OVER 50 FEET

Figure 5-13

PA-23-250 AZTEC F

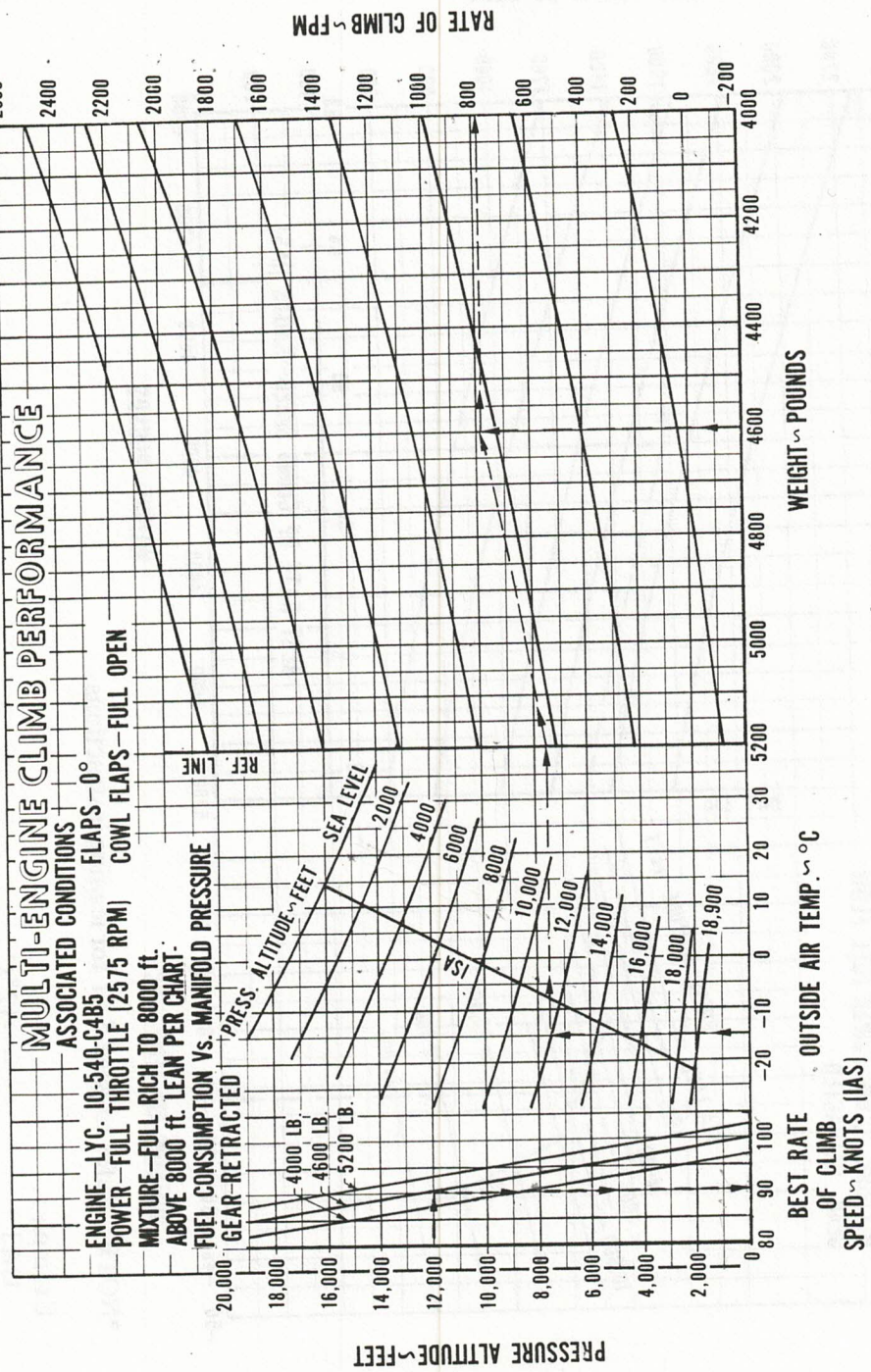


Example:

OAT	= 10° C
Pressure altitude	= 4000 ft.
Slope	= +1.0%
Weight	= 4800 lbs.
Wind	= 10 kts.
Accelerate - stop distance	= 2020 ft.

ACCELERATE - STOP DISTANCE

Figure 5-17

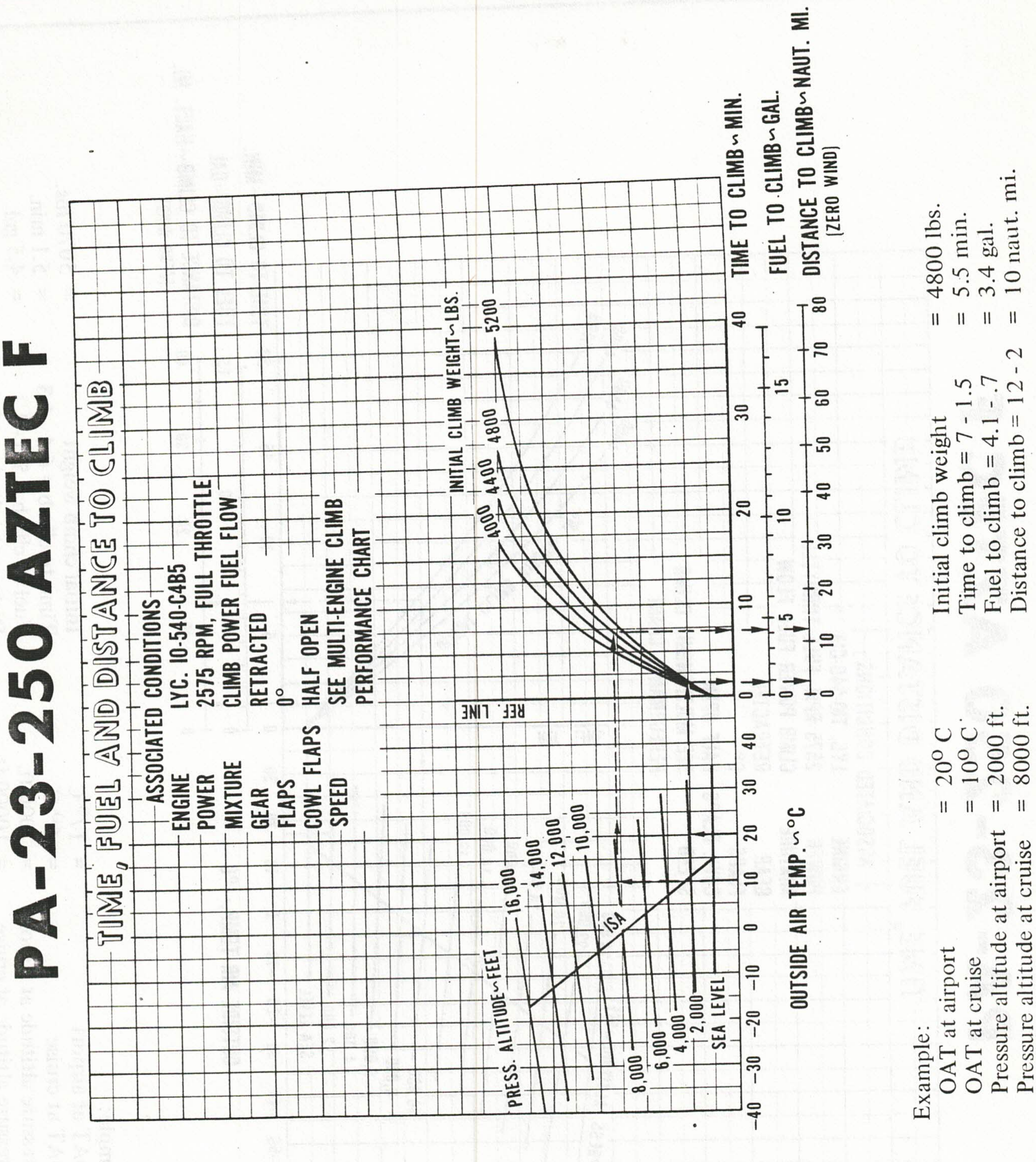


Example:

OAT	= -15° C
Pressure altitude	= 12000 ft.
Weight	= 4600 lbs.
Rate of climb	= 780 FPM
Climb speed	= 90 KIAS

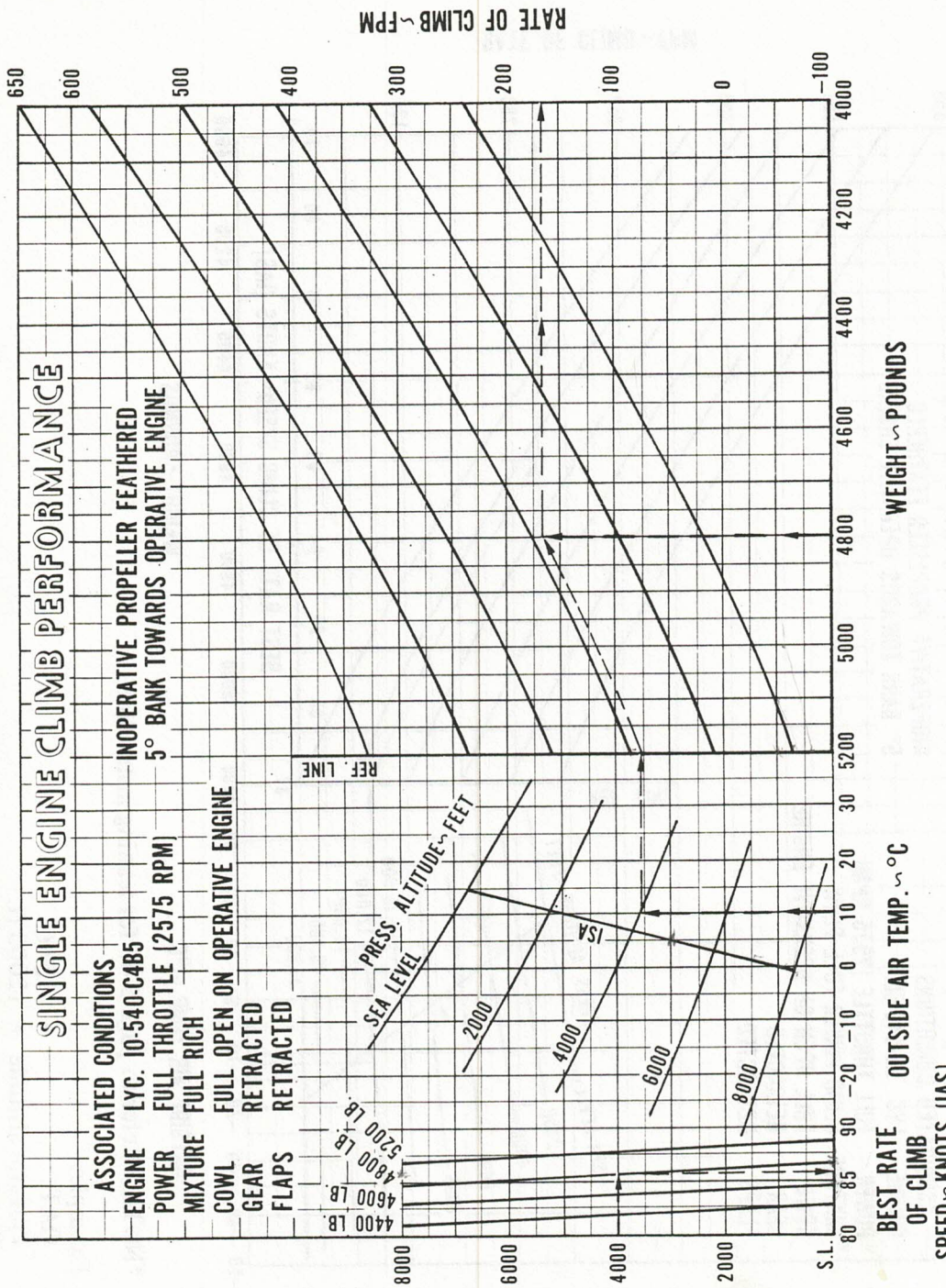
MULTI-ENGINE CLIMB PERFORMANCE

Figure 5-21



TIME, FUEL AND DISTANCE TO CLIMB

Figure 5-25



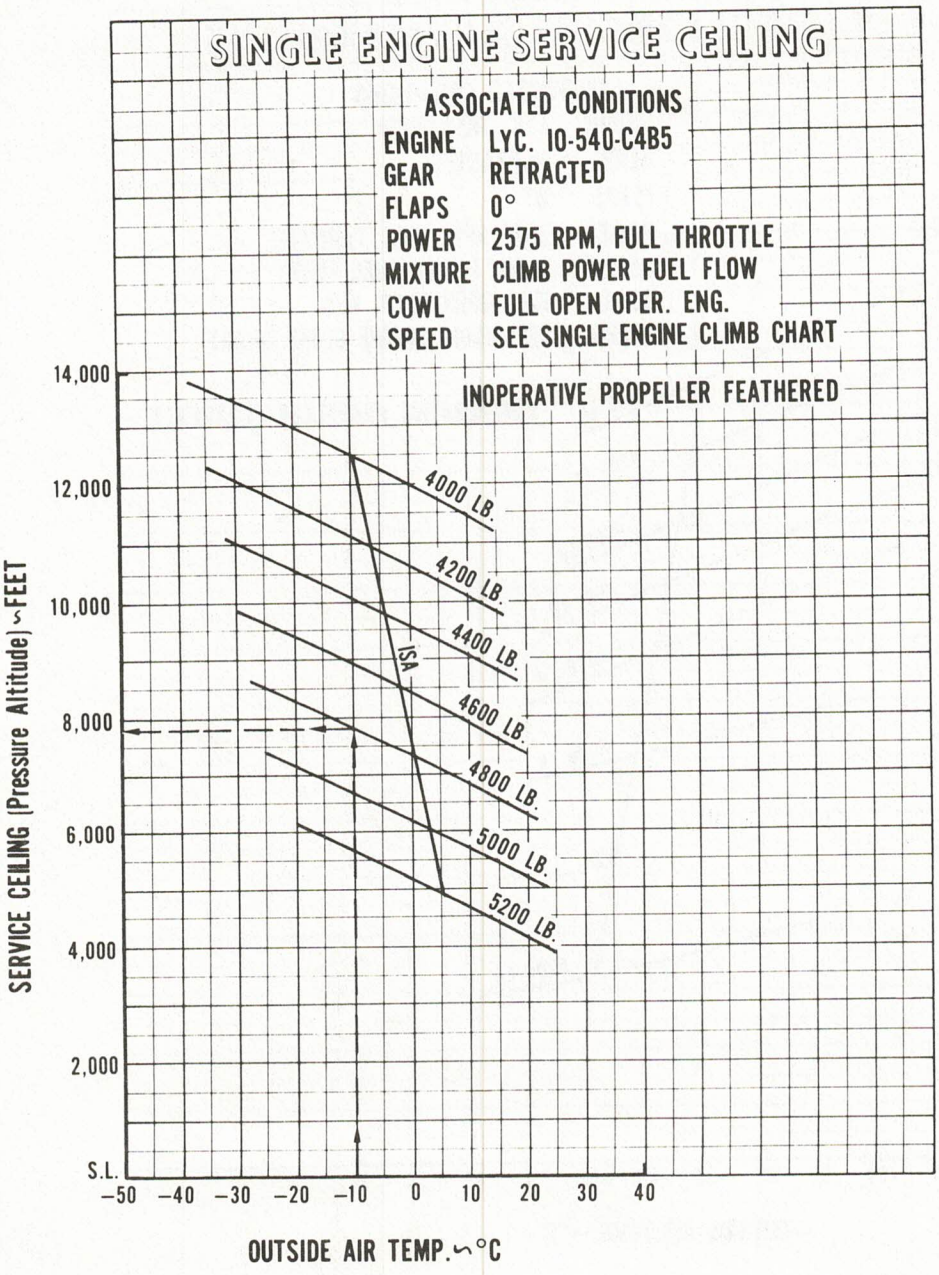
Example:

OAT	= 10° C	Rate of climb	= 165 FPM
Pressure altitude	= 4000 ft.	Climb speed	= 86 KIAS
Weight	= 4800 lbs.		

SINGLE ENGINE CLIMB PERFORMANCE

Figure 5-29

PA-23-250 AZTEC F



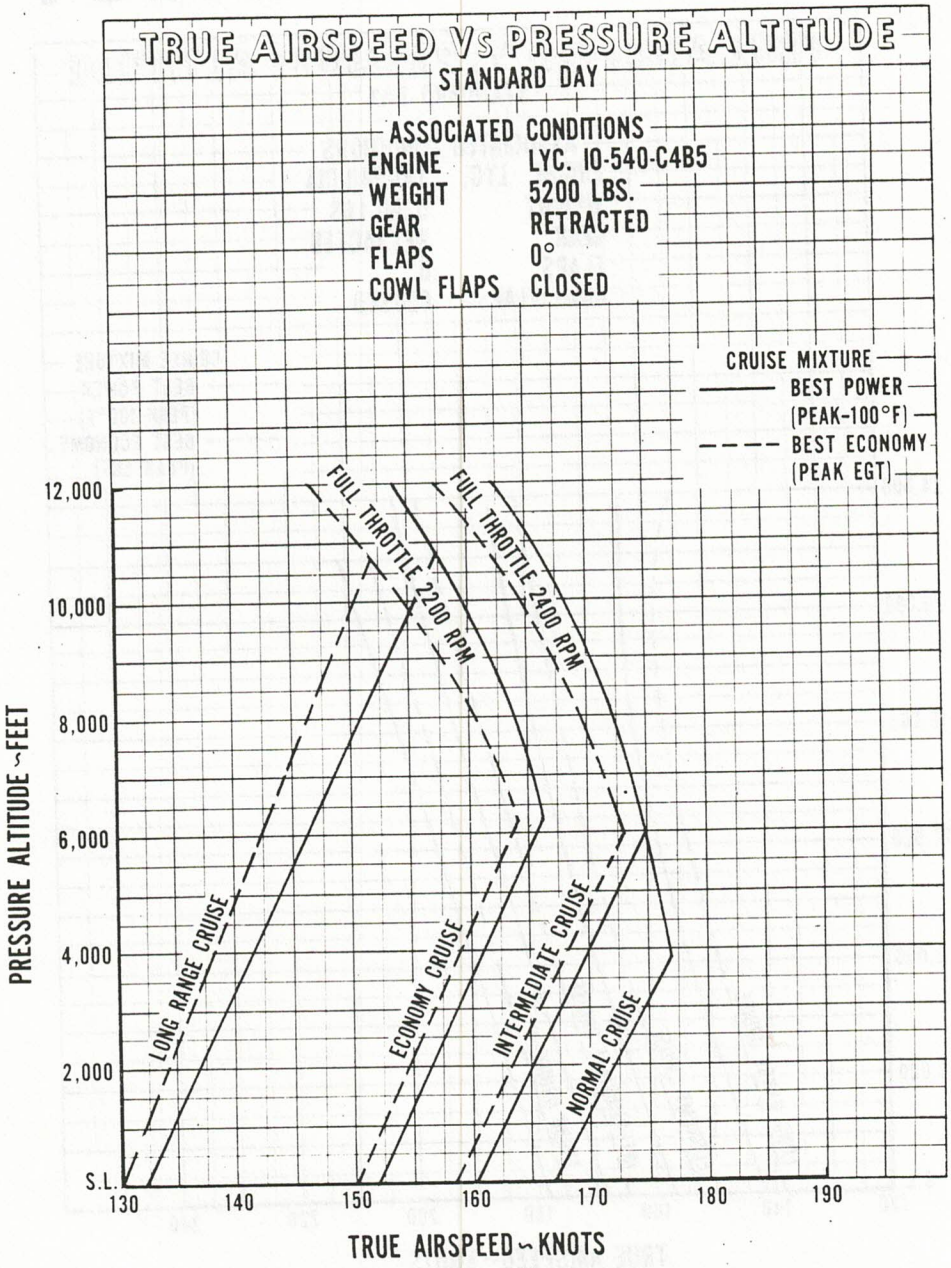
Example:

OAT	=	-10° C
Weight	=	4800 lbs.
Service ceiling	=	7800 ft.

SINGLE ENGINE SERVICE CEILING

Figure 5-33

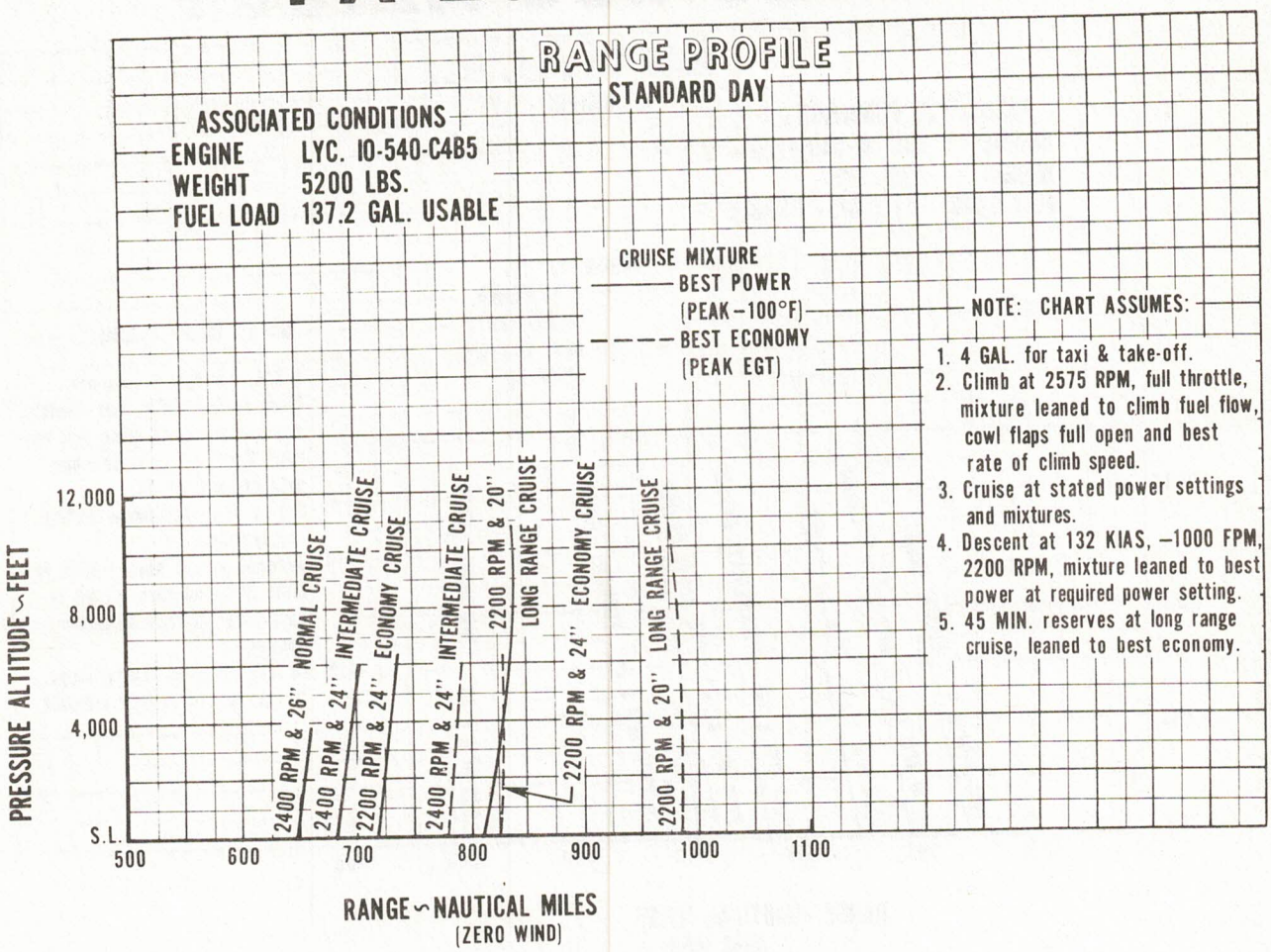
PA-23-250 AZTEC F



TRUE AIRSPEED VS. PRESSURE ALTITUDE

Figure 5-37

PA-23-250 AZTEC F



RANGE PROFILE

Figure 5-41

PA-23-250 AZTEC F

POWER SETTING TABLE - CRUISE SETTINGS

LYCOMING IO-540-C4B5

Normal Cruise		Intermediate Cruise		Economy Cruise		Long Range Cruise	
RPM	MP	RPM	MP	RPM	MP	RPM	MP
2400	26.0	2200	26.0	2200	24.0	2100	21.0
		2300	25.0	2300	23.2	2200	20.0
		2400	24.0	2400	22.4	2300	19.3

1. To maintain constant power, correct manifold pressure approximately 0.3 IN. HG. for each 10° C variation in induction air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; subtract for temperatures below standard.
2. To determine fuel consumption for these power settings refer to the Fuel Consumption Chart.
3. When using Hartzell Propeller HC-E2YR-2RB/8465-7R with IO-540-C4B5 engine, DO NOT EXCEED 27" MANIFOLD PRESSURE BELOW 2300 RPM OR 25" BELOW 2000 RPM.

POWER SETTING TABLE - CRUISE SETTINGS

Figure 5-45

PA-23-250 AZTEC F
CRUISE PERFORMANCE

INTERMEDIATE CRUISE - 2400 RPM - 24 IN. HG.* - LYC IO-540-C4B5

	Pressure Altitude Feet	OAT °C	Fuel Flow GPH B.P./B.E.	5200 Lb. Best Power (Knots)	5200 Lb. Best Economy (Knots)	4800 Lb. Best Power (Knots)	4800 Lb. Best Economy (Knots)	4200 Lb. Best Power (Knots)	4200 Lb. Best Economy (Knots)
ISA + 20°C	SL	35.0	28.6/24.9	163	161	165	163	167	165
	2000	31.0	29.0/25.3	168	166	170	168	172	170
	4000	27.1	29.4/25.7	173	171	175	173	177	175
	6000	23.1	29.8/26.1	178	176	180	178	182	180
ISA	SL	15.0	28.6/24.9	160	158	162	160	164	162
	2000	11.0	29.0/25.3	165	163	167	165	169	167
	4000	7.1	29.4/25.7	170	168	172	170	174	172
	6000	3.1	29.8/26.1	175	173	177	175	179	177
ISA - 20°C	SL	- 5.0	28.6/24.9	156	155	158	157	160	159
	2000	- 9.0	29.0/25.3	161	160	163	162	165	164
	4000	-13.9	29.4/25.7	165	164	167	166	168	167
	6000	-16.9	29.8/26.1	170	169	173	171	175	173

*Correct manifold pressure approximately 0.3 IN. HG. for each 10°C variation in induction air temperature from standard altitude temperature. Add manifold pressure above standard; subtract for temperatures below standard.

CRUISE PERFORMANCE - INTERMEDIATE CRUISE

Figure 5-49

PA-23-250 AZTEC F
CRUISE PERFORMANCE

LONG RANGE CRUISE - 2200 RPM - 20 IN. HG.* - LYC IO-540-C4B5

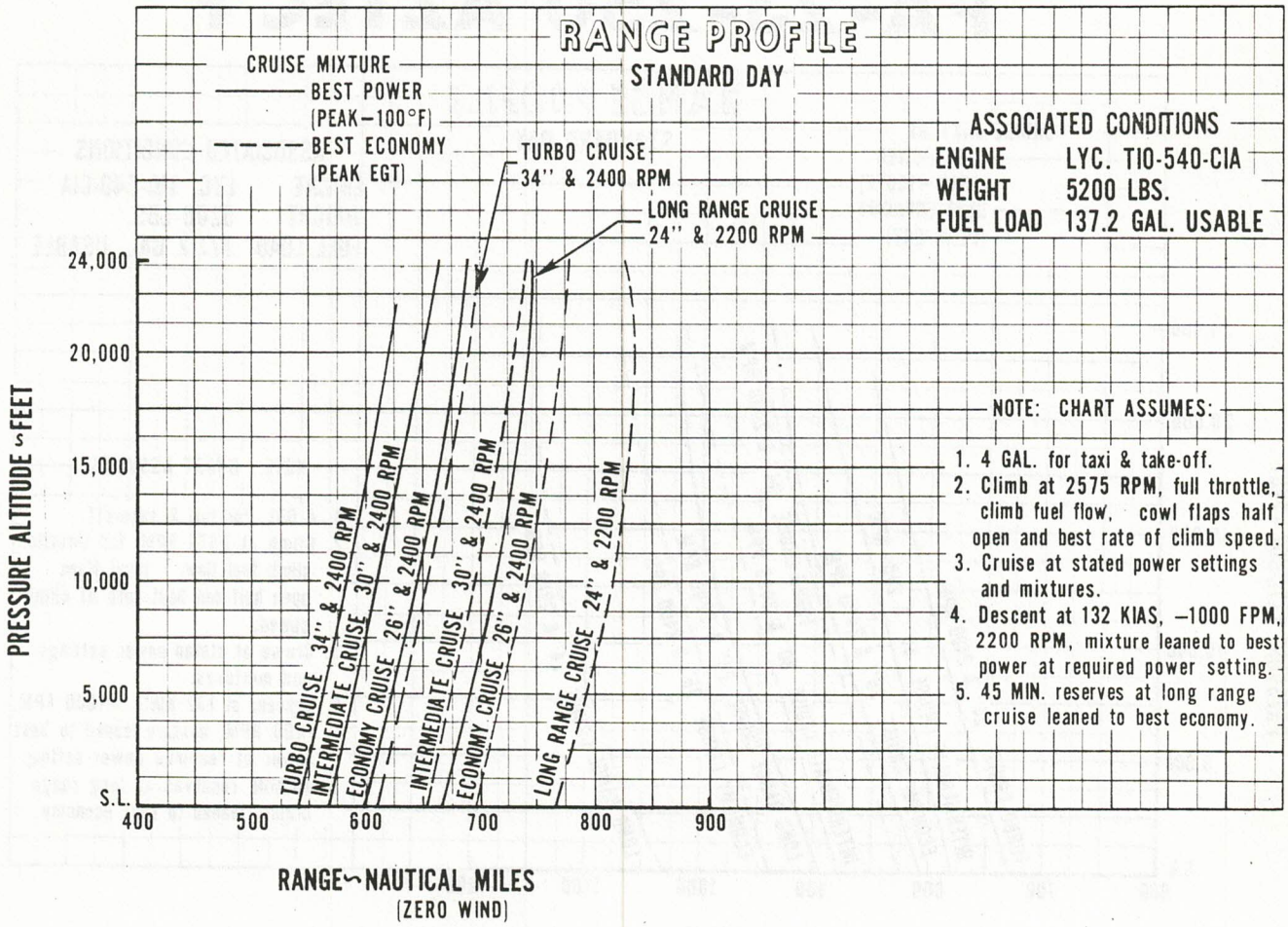
	Pressure Altitude Feet	OAT °C	Fuel Flow GPH B.P./B.E.	5200 Lb. Best Power (Knots)	5200 Lb. Best Economy (Knots)	4800 Lb. Best Power (Knots)	4800 Lb. Best Economy (Knots)	4200 Lb. Best Power (Knots)	4200 Lb. Best Economy (Knots)
ISA + 20°C	SL	35.0	20.2/16.4	133	131	138	136	143	141
	2000	31.0	20.6/16.8	138	136	143	141	148	147
	4000	27.1	21.0/17.2	143	141	148	146	153	151
	6000	22.5	21.6/17.6	149	145	154	150	159	155
	8000	19.2	21.8/18.0	153	149	158	154	163	159
	10800	13.4	22.4/18.6	160	153	165	158	170	163
ISA	SL	15.0	20.2/16.4	132	130	136	134	140	139
	2000	11.0	20.6/16.8	137	134	141	138	145	143
	4000	7.1	21.0/17.2	141	138	145	142	150	148
	6000	2.5	21.6/17.6	146	142	150	147	155	152
	8000	- 0.8	21.8/18.0	151	146	155	152	160	157
	10800	- 6.6	22.4/18.6	157	152	162	158	166	163
ISA - 20°C	SL	- 5.0	20.2/16.4	129	128	133	132	137	136
	2000	- 9.0	20.6/16.8	134	132	138	136	142	140
	4000	-13.9	21.0/17.2	139	137	143	141	147	145
	6000	-17.5	21.6/17.6	144	141	148	145	152	149
	8000	-20.8	21.8/18.0	149	145	153	149	157	154
	10800	-26.6	22.4/18.6	155	151	159	155	163	160

*Correct manifold pressure approximately 0.3 IN. HG. for each 10°C variation in induction air temperature from standard altitude temperature. Add manifold pressure above standard; subtract for temperatures below standard.

CRUISE PERFORMANCE - LONG RANGE CRUISE

Figure 5-53

PA-23-250 AZTEC F



RANGE PROFILE (TURBO)

Figure 5-55

PA-23-250 AZTEC F

POWER SETTING TABLE - CRUISE SETTINGS

LYCOMING TIO-540-C1A

Turbo Cruise		Intermediate Cruise		Economy Cruise		Long Range Cruise	
RPM	MP	RPM	MP	RPM	MP	RPM	MP
2400	34.0	2300	31.0	2200	28.0	2100	25.0
		2400	30.0	2300	27.0	2200	24.0
		2500	29.0	2400	26.0	2300	23.0

1. To maintain constant power, correct manifold pressure approximately 0.3 IN. HG. for each 10°C variation in induction air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; subtract for temperatures below standard. Do not exceed 34.0 IN. M.P. at 2400 RPM with mixture strength less than full rich.

2. To determine fuel consumption for these power settings refer to the Fuel Consumption Chart.

3. Do not exceed 39.5" Hg. up to 18,500 feet. Above 18,500 feet the following manifold limits must be observed:

ALTITUDE	M.P.
20,000 Ft.	37.0"
22,000 Ft.	34.0"
24,000 Ft.	31.0"

POWER SETTING TABLE - CRUISE SETTINGS (TURBO)

Figure 5-59

PA-23-250 AZTEC F
CRUISE PERFORMANCE

INTERMEDIATE CRUISE - 2400 RPM - 30 IN. HG.* - LYC TIO-540-C1A ENG.

	Pressure Altitude Feet	OAT °C	Fuel Flow GPH B.P./B.E.	5200 Lb. Best Power (Knots)	5200 Lb. Best Economy (Knots)	4800 Lb. Best Power (Knots)	4800 Lb. Best Economy (Knots)	4200 Lb. Best Power (Knots)	4200 Lb. Best Economy (Knots)
ISA + 20°C	SL	35.0	34.2/29.3	171	168	173	171	176	173
	5000	25.1	34.2/29.3	178	175	181	178	184	181
	10000	15.2	34.2/29.3	186	182	189	186	192	189
	15000	5.3	34.2/29.3	193	189	197	193	201	197
	20000	- 4.6	34.2/29.3	201	196	205	201	210	206
	24000	-12.6	34.2/29.3	206	200	211	206	217	213
ISA	SL	15.0	34.2/29.3	168	165	170	167	172	169
	5000	5.1	34.2/29.3	176	172	178	174	180	177
	10000	- 4.8	34.2/29.3	183	179	186	182	188	185
	15000	-14.7	34.2/29.3	190	186	193	189	196	193
	20000	-24.6	34.2/29.3	197	193	201	197	205	201
	24000	-32.5	34.2/29.3	202	198	208	203	212	208
ISA - 20°C	SL	- 5.0	34.2/29.3	164	161	166	163	168	165
	5000	-14.9	34.2/29.3	171	167	173	170	176	172
	10000	-24.8	34.2/29.3	178	174	181	177	184	180
	15000	-34.7	34.2/29.3	185	181	189	185	192	188
	20000	-44.6	34.2/29.3	193	188	196	192	200	196
	24000	-52.5	34.2/29.3	199	193	203	198	207	203

*Correct manifold pressure approximately 0.3 IN. HG. for each 10°C variation in induction air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; subtract for temperatures below standard. Do not exceed 34.0 IN. M.P. at 2400 RPM with mixture strength less than full rich.

CRUISE PERFORMANCE - INTERMEDIATE CRUISE (TURBO)

Figure 5-63

PA-23-250 AZTEC F
CRUISE PERFORMANCE

LONG RANGE CRUISE - 2200 RPM - 24 IN. HG.* - LYC TIO-540-C1A ENG.

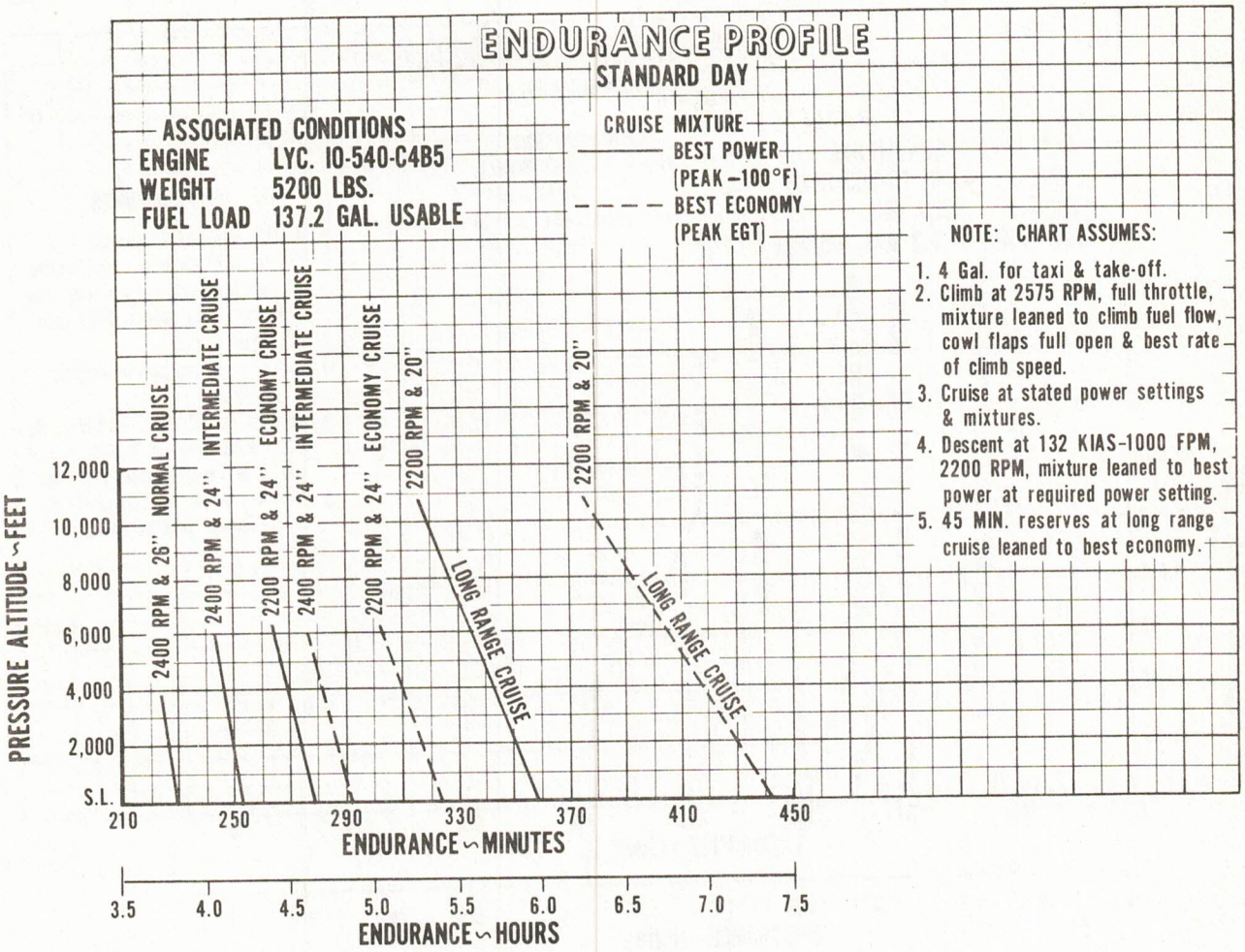
	Pressure Altitude Feet	OAT °C	Fuel Flow GPH B.P./B.E.	5200 Lb. Best Power (Knots)	5200 Lb. Best Economy (Knots)	4800 Lb. Best Power (Knots)	4800 Lb. Best Economy (Knots)	4200 Lb. Best Power (Knots)	4200 Lb. Best Economy (Knots)
ISA + 20°C	SL	35.0	25.0/21.2	144	140	147	144	150	147
	5000	25.1	25.0/21.2	152	148	155	152	159	156
	10000	15.2	25.0/21.2	158	154	163	159	168	164
	15000	5.3	25.0/21.2	163	158	169	165	175	172
	20000	- 4.6	25.0/21.2	165	158	174	168	183	178
	24000	-12.6	25.0/21.2	164	153	175	169	186	182
ISA	SL	15.0	25.0/21.2	142	138	145	141	148	145
	5000	5.1	25.0/21.2	149	145	153	149	157	153
	10000	- 4.8	25.0/21.2	156	151	160	156	165	161
	15000	-14.7	25.0/21.2	161	156	166	162	172	169
	20000	-24.6	25.0/21.2	164	158	171	165	179	174
	24000	-32.5	25.0/21.2	164	158	174	167	183	177
ISA - 20°C	SL	- 5.0	25.0/21.2	140	136	143	139	145	142
	5000	-14.9	25.0/21.2	146	143	150	146	154	150
	10000	-24.8	25.0/21.2	153	149	157	153	161	158
	15000	-34.7	25.0/21.2	158	154	163	159	168	164
	20000	-44.6	25.0/21.2	163	158	169	165	175	171
	24000	-52.5	25.0/21.2	163	156	172	165	180	173

*Correct manifold pressure approximately 0.3 IN. HG. for each 10°C variation in induction air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; subtract for temperatures below standard. Do not exceed 34.0 IN. M.P. at 2400 RPM with mixture strength less than full rich.

CRUISE PERFORMANCE - LONG RANGE CRUISE (TURBO)

Figure 5-67

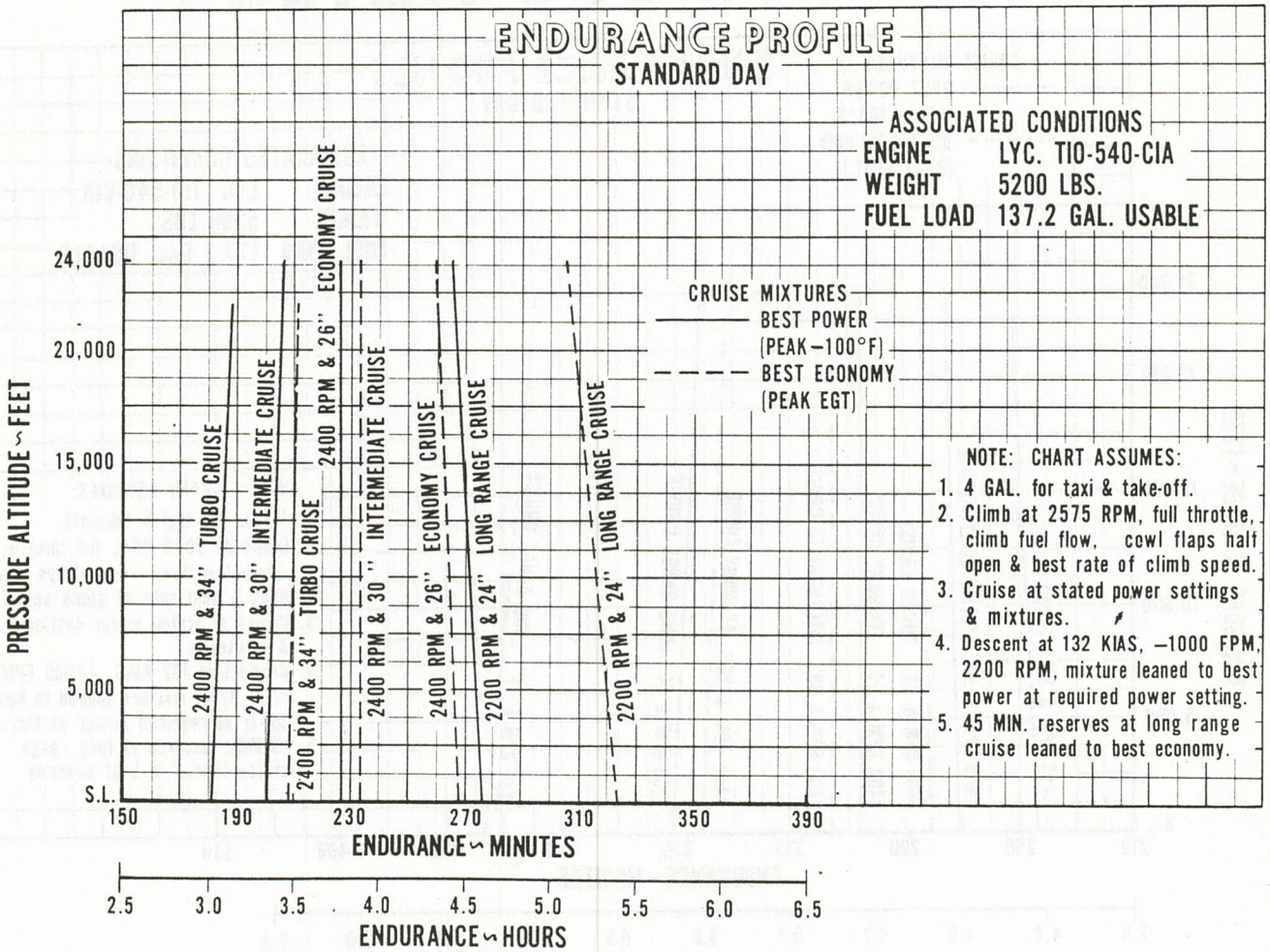
PA-23-250 AZTEC F



ENDURANCE PROFILE

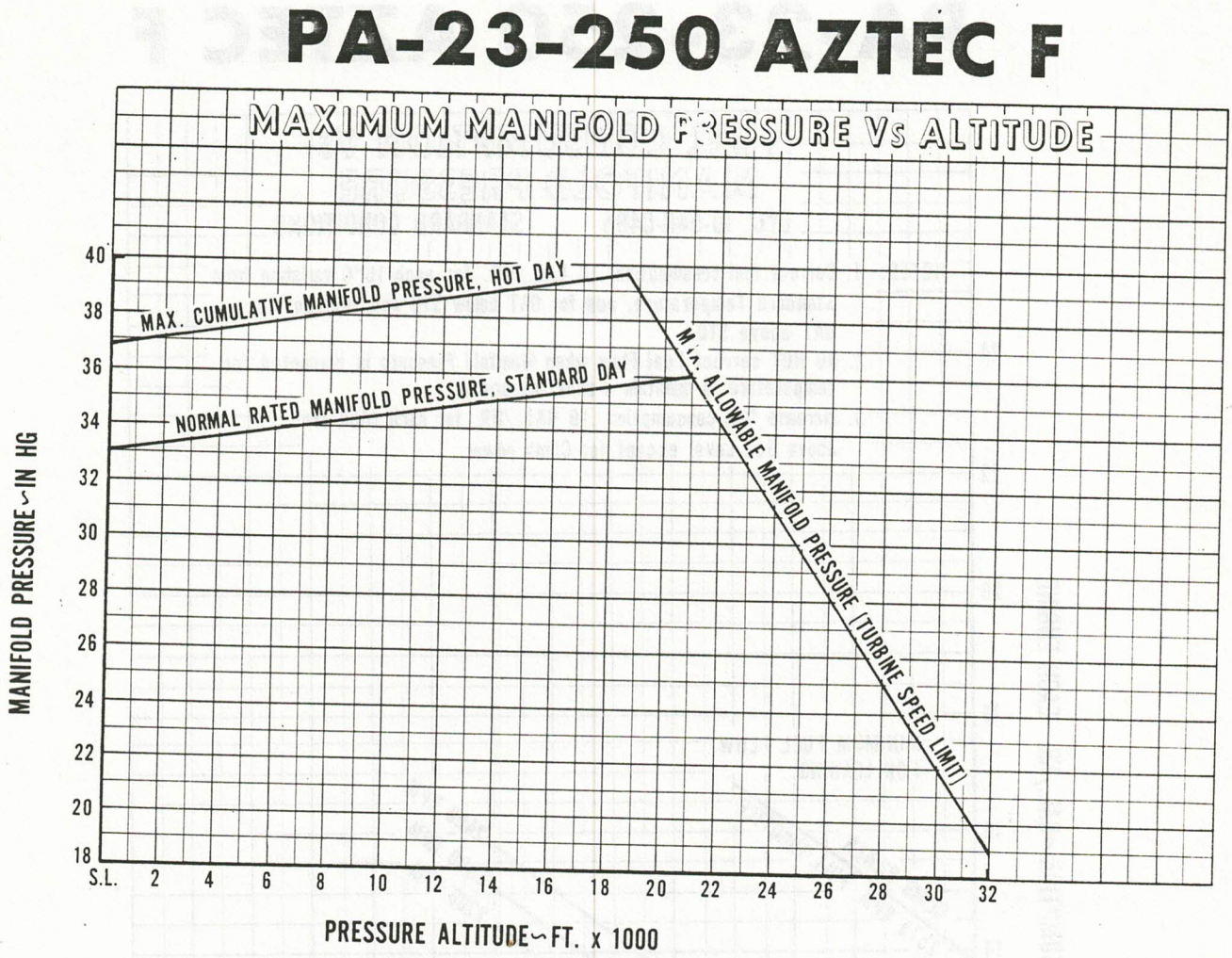
Figure 5-69

PA-23-250 AZTEC F



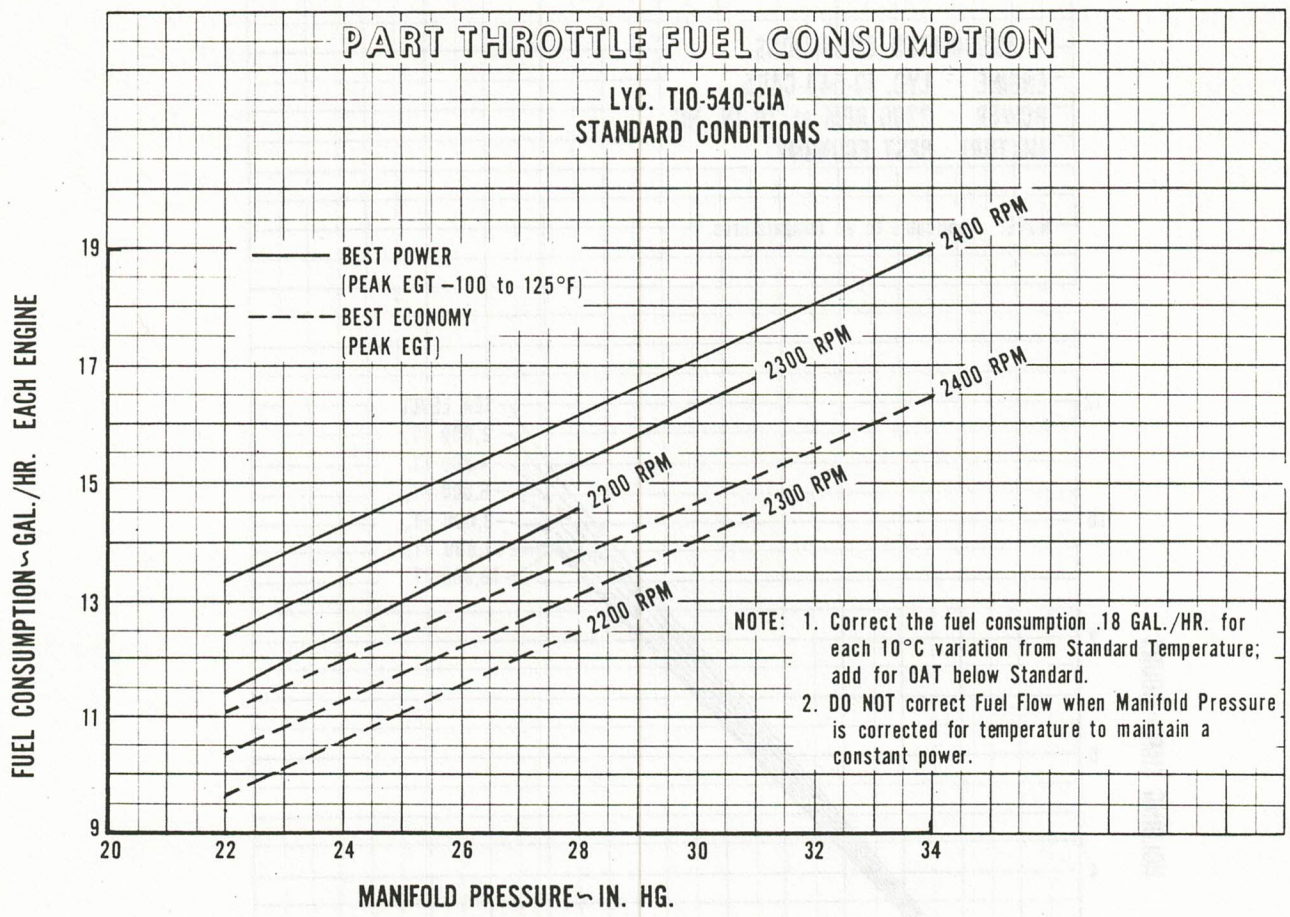
ENDURANCE PROFILE (TURBO)

Figure 5-73



MAXIMUM MANIFOLD PRESSURE VS. ALTITUDE (TURBO)
Figure 5-77

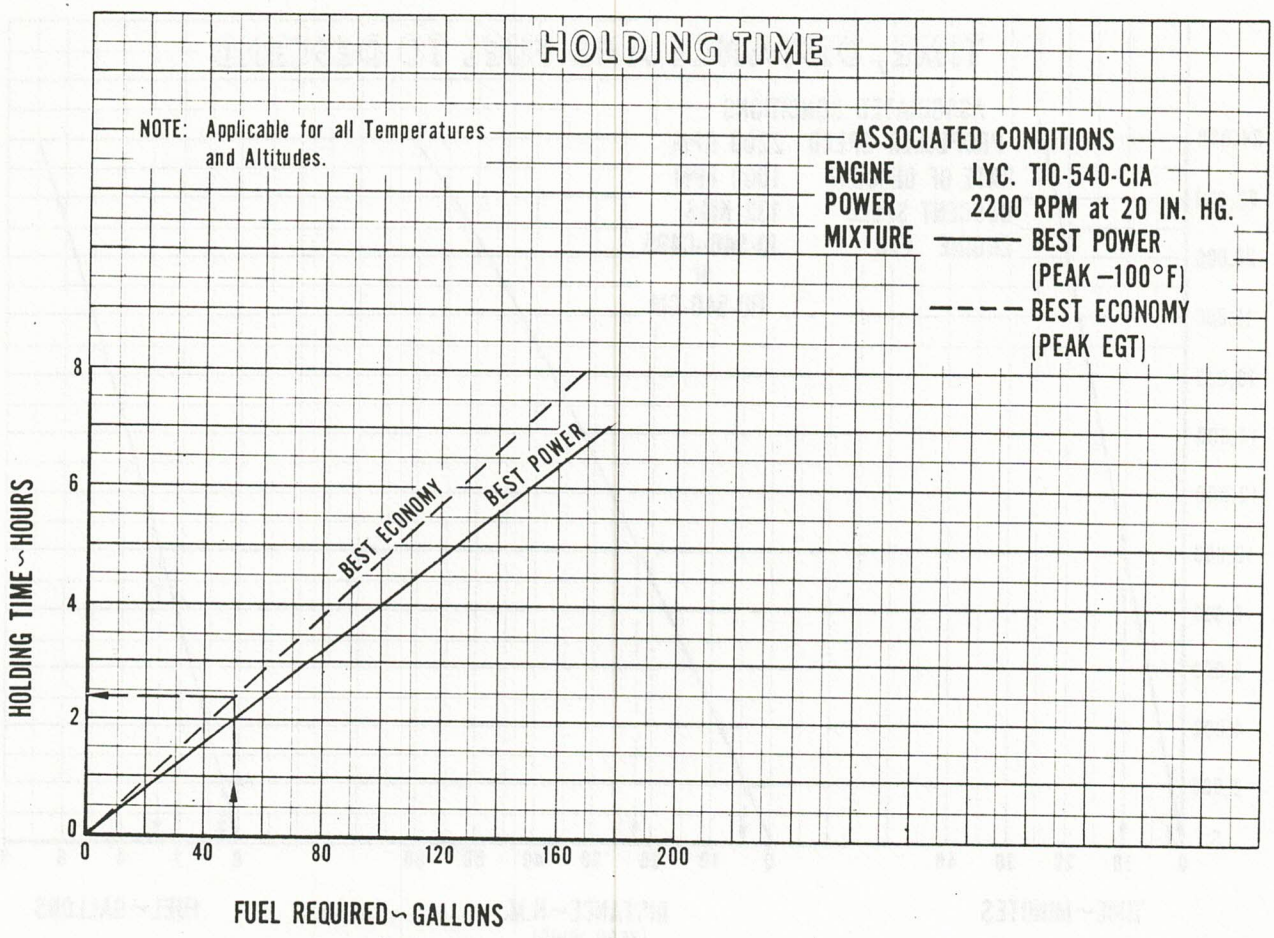
PA-23-250 AZTEC F



PART THROTTLE FUEL CONSUMPTION (TURBO)

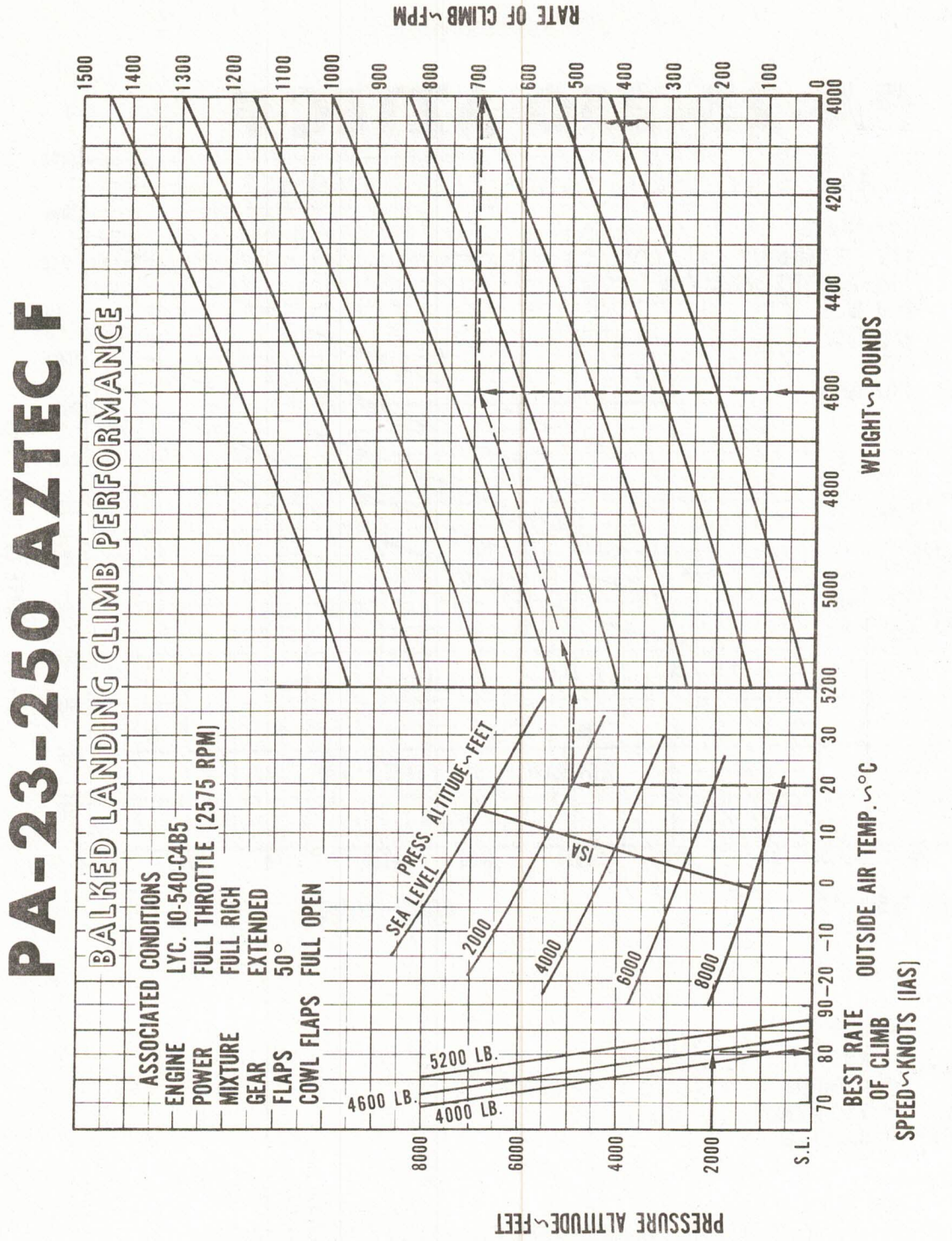
Figure 5-81

PA-23-250 AZTEC F



Example:
Fuel available = 50 gal.
Mixture Best economy
Holding time = 2.4 hours

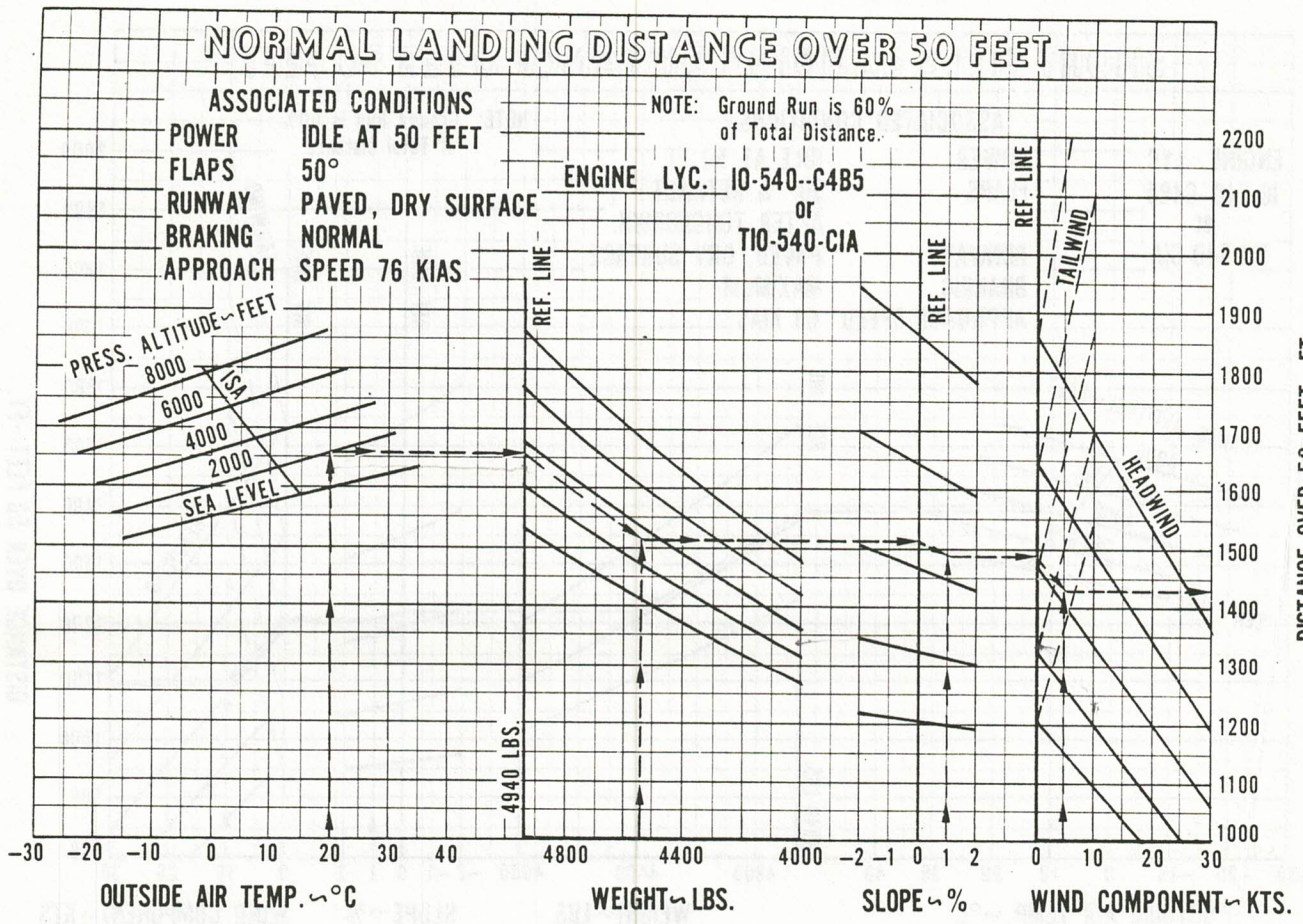
HOLDING TIME (TURBO)
Figure 5-85



BALKED LANDING CLIMB PERFORMANCE

Figure 5-89

PA-23-250 AZTEC F



Example:

OAT	=	20° C
Pressure altitude	=	2000 ft.
Weight	=	4540 lbs.
Wind	=	5 kts.
Slope	=	+1.0%
Ground roll	=	860 ft.
Total distance	=	1430 ft.

NORMAL LANDING DISTANCE OVER 50 FEET

Figure 5-93

TABLE OF CONTENTS

SECTION 6

WEIGHT AND BALANCE

SECTION 6

WEIGHT AND BALANCE

6.1 GENERAL

In order to achieve the performance and flying characteristics which are designed into the airplane, it must be flown with the weight and center of gravity (C.G.) position within the approved operating range (envelope). Although the airplane offers flexibility of loading, it cannot be flown with the maximum number of adult passengers, full fuel tanks and maximum baggage. With the flexibility comes responsibility. The pilot must insure that the airplane is loaded within the loading envelope before 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. This airplane is designed to provide performance within the flight envelope. Before the airplane is delivered, it is weighed, and 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 6-7) and the Weight and Balance Record (Figure 6-9). 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 overloading.

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

6.3 AIRPLANE WEIGHING PROCEDURES

At the time of delivery, Piper Aircraft Corporation provides each airplane with the basic empty weight and center of gravity location. This data is supplied by Figure 6-7.

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.

(4) Fill to full capacity with oil and operating fluids.

(5) Place pilot and copilot seats in a center position on the seat tracks. 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.

(2) C.G. Arm of airplane as weighed =

$$(80 + 34.5) - \frac{(90)\ (N)}{T} =$$

Inches Aft of Datum

(e) Basic Empty Weight

Item	Weight (Lbs)	x	Arm (Inches Aft of Datum)	=	Moment (In-Lbs)
Weight (as Weighed)					
Unusable Fuel (6.8 gal.)	41		113		4633
Basic Empty Weight					

BASIC EMPTY WEIGHT

Figure 6-5

MODEL PA-23-250 AZTEC F

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*					
Optional Equipment (if applicable)					
Basic Empty Weight					

*The standard empty weight includes full oil capacity, full operating fluids and 6.8 gallons of unusable fuel.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

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

(5200 lbs) - (lbs) = lbs.

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

WEIGHT AND BALANCE DATA FORM

Figure 6-7

PA-23-250 (Six Place)	Serial Number	Registration Number	Page Number

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
			As Delivered								

WEIGHT AND BALANCE RECORD

Figure 6-9

6.7 GENERAL LOADING RECOMMENDATIONS

Load occupants from front to rear progressively and observe zero fuel weight limitations.

(a) Pilot Only

Load rear baggage compartment to capacity first.

(b) 2 Occupants - Pilot and passenger in front.

Load rear baggage compartment to capacity first. Baggage in nose limited by envelope with full fuel.

(c) 3 Occupants - 2 in front, 1 in middle.

Load rear baggage compartment to capacity first. Baggage in nose limited by envelope with full fuel.

(d) 4 Occupants - 2 in front, 2 in middle.

Load rear baggage compartment to capacity first. Baggage in nose limited by envelope with full fuel.

(e) 5 Occupants - 2 in front, 2 in middle, 1 in rear.

Forward and rearward baggage limited by envelope with full fuel. With 2 full tanks of fuel, load rear baggage compartment first.

(f) 5 Occupants - 1 in front, 2 in middle, 2 in rear.

Permitted only with special loading investigation.

(g) 6 Occupants - 2 in front, 2 in middle, 2 in rear.

6 occupants permitted only with limited fuel or baggage. Load forward baggage compartment to capacity first.

NOTE

These general loading recommendations suggest normal proper loading procedures. The charts, graphs, instructions, and plotter should be checked to assure that the airplane is within the allowable weight vs. center of gravity envelope.

ITEM	WT. LBS.	ARM-IN.	MOMENT
Basic Airplane	3090	90.9	280881
Revised Airplane			
Pilot's Seat	170	89	15130
Copilot's Seat	170	89	15130
Seat No. 3	170	126	21420
Seat No. 4	170	126	21420
Seat No. 5		157	
Seat No. 6		157	
Fuel 68.4 Gal. Inbrd.	410	113	46330
Fuel 60 Gal. Otbrd. *	360	See Table (Fig. 6-15)	40680
Fwd. Baggage	150	10	1500
Rwd. Baggage	150	183	27450
Total Wt.	4840	Total Moment	469941

C.G. Location for Takeoff 97.1

*Example assumes standard outboard tanks without optional tip tanks installed.

SAMPLE LOADING PROBLEM

Figure 6-11

OCCUPANTS

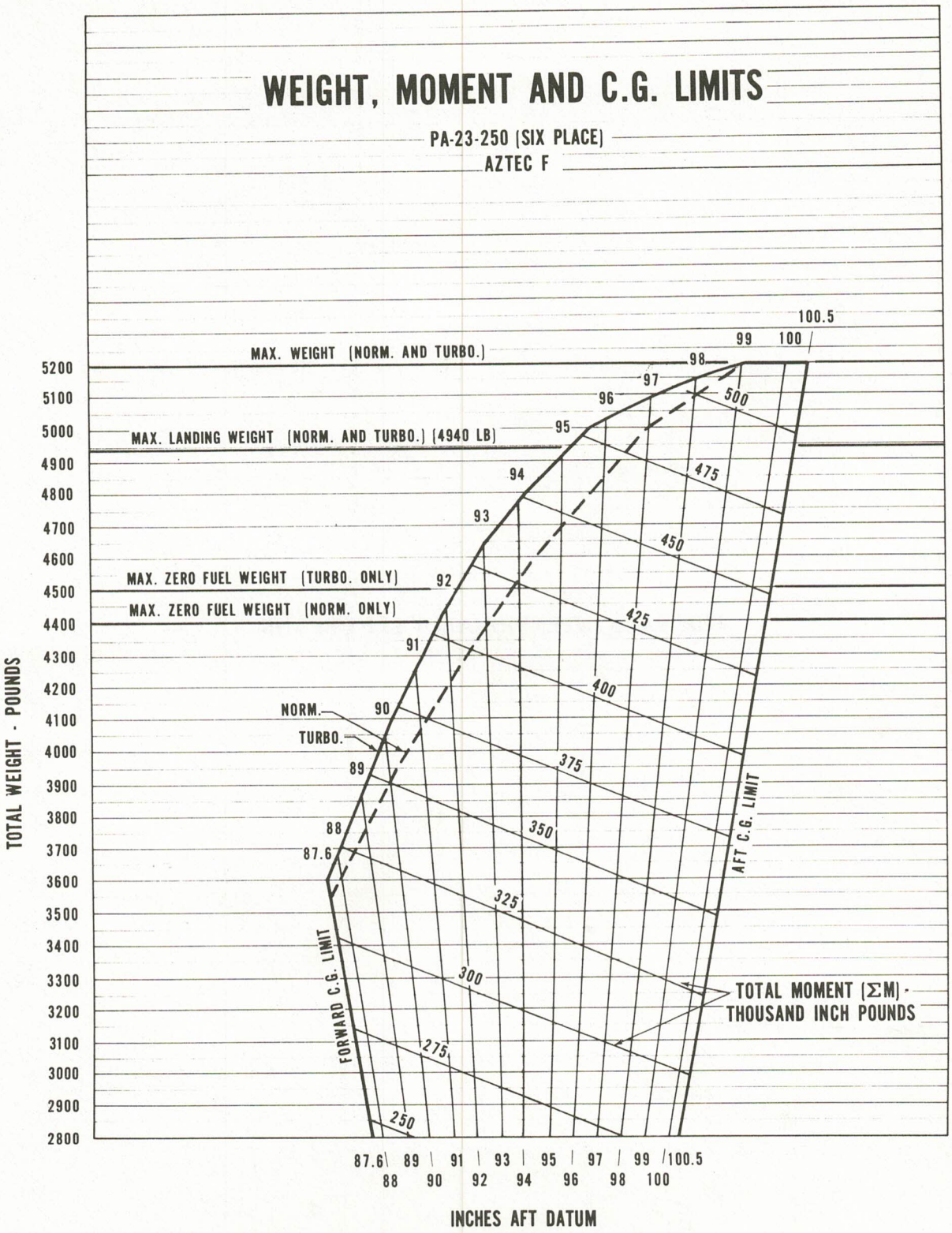
Weight	Pilot Copilot Arm 89	Center Seat Arm 126	Aft Seat Arm 157
	Moment/100		
120	107	151	188
130	116	164	204
140	125	176	220
150	134	189	236
160	142	202	251
170	151	214	267
180	160	227	283
190	169	239	298
200	178	252	314

BAGGAGE

Weight Lbs.	Forward Arm = 10	Rear Arm =183
	Moment/100	
10	1	18.3
20	2	36.6
30	3	54.9
40	4	73.2
50	5	91.5
60	6	109.8
70	7	128.1
80	8	146.4
90	9	164.7
100	10	183.0
110	11	201.3
120	12	219.6
130	13	237.9
140	14	256.2
150	15	274.5

LOADING CHART

Figure 6-15



WEIGHT, MOMENT AND C. G. LIMITS

Figure 6-17

6.11 WEIGHT AND BALANCE VISUAL PLOTTER

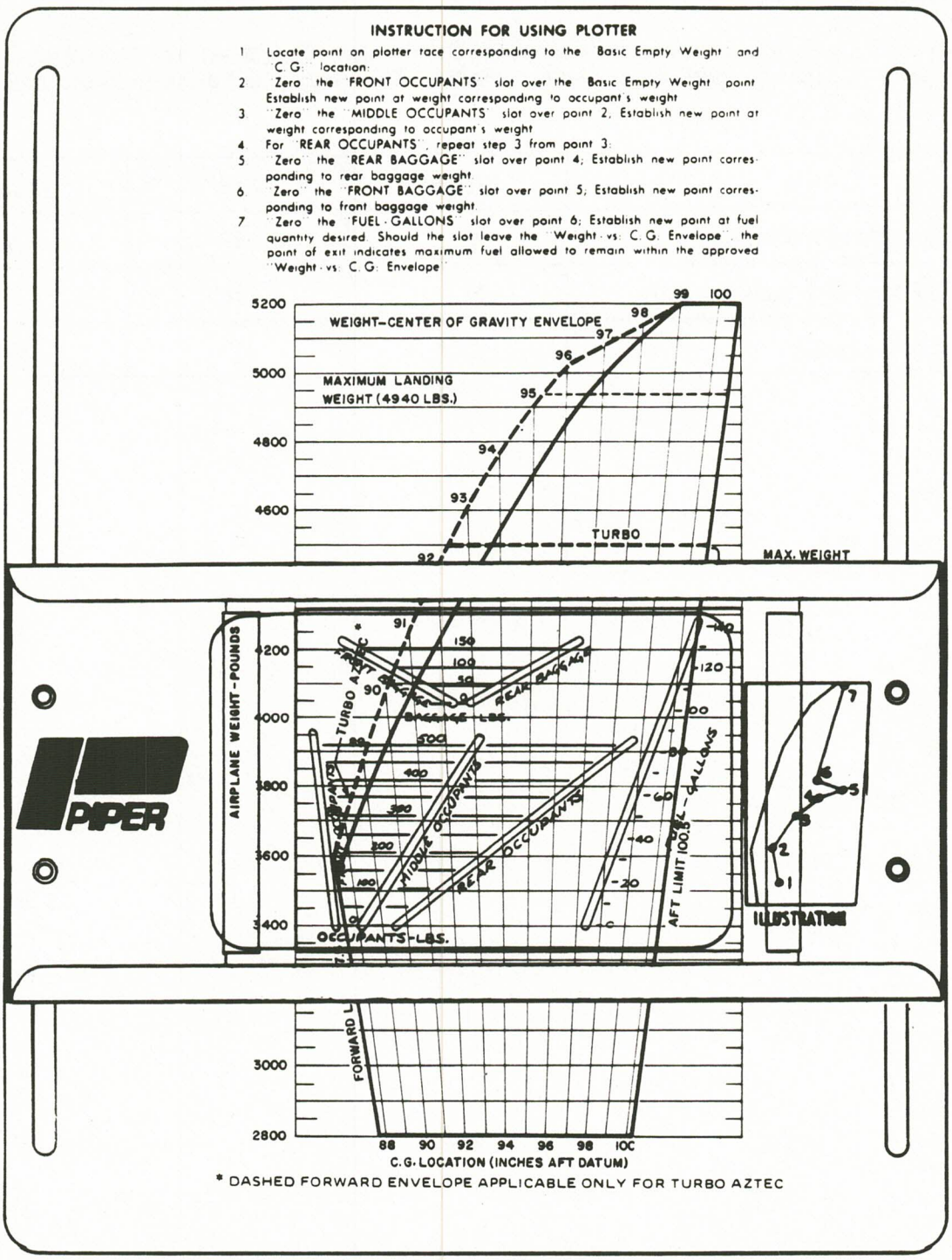
The Weight and Balance Visual Plotter (Figure 6-19) furnished with the airplane will enable the pilot to graphically determine whether or not his proposed loading will fall within the allowable envelope. It will also allow him to easily determine the necessary adjustments to make if his first proposed loading is not within this envelope.

When plotting successive points, the pilot is graphically adding weights and corresponding moments. As the weight increases, through the addition of various items of disposable load, the pilot will see the shift in the center of gravity.

Going clockwise around the envelope, the heavy lines represent allowable weight at the forward C.G. limit (87.6 in.), the maximum allowable weight as the C.G. shifts rearward, the maximum weight with no fuel, the gross weight (5200 lbs.), and the maximum rearward C.G. limit (100.5 in.).

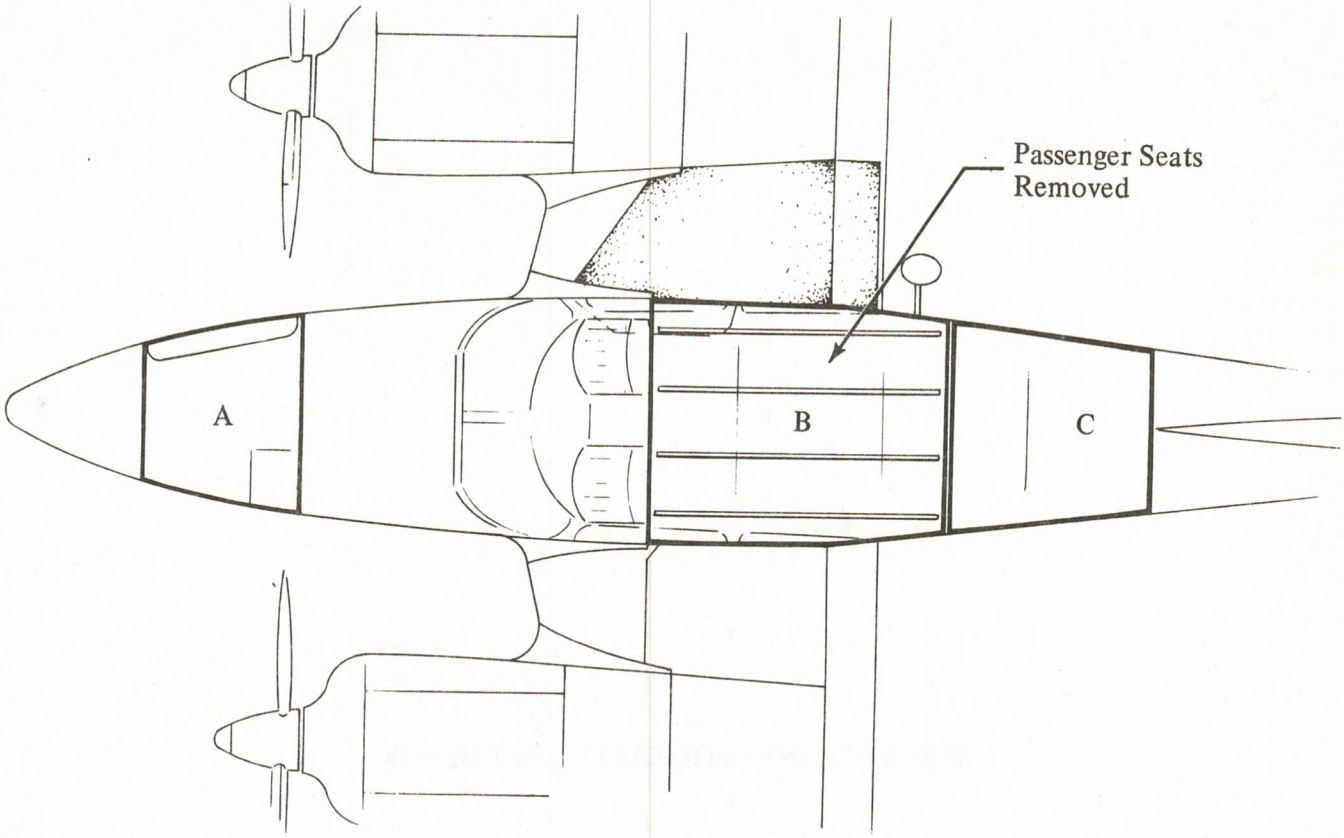
Before arranging his load, the pilot should consult the General Loading Recommendations.

IT IS THE RESPONSIBILITY OF THE OWNER AND PILOT TO ASCERTAIN THAT THE AIRPLANE ALWAYS REMAINS WITHIN THE ALLOWABLE WEIGHT VS. CENTER OF GRAVITY ENVELOPE WHILE IN FLIGHT.



WEIGHT AND BALANCE VISUAL PLOTTER

Figure 6-19



MAXIMUM CAPACITY

Area	Floor Load Lbs/Sq. Ft.	Allowable Lbs.
A	100	150
B	43	820
C	100	*150 (Including 20 lbs. on shelf)

*105 lbs. max. if oxygen is installed.

MAXIMUM TIE DOWN CAPACITY

Per Tie Down Ring	95 Lbs.
Per Track	190 Lbs.
Rear Seat Belt Fittings	85 Lbs. Per Fitting

Cargo must be loaded within the weight and balance limits of this aircraft.

CARGO LOADING
Figure 6-21

6.17 EQUIPMENT LIST

The following is a list of equipment which may be installed in the PA-23-250 (Six Place). It consists of those items used for defining the configuration of an airplane when the basic empty weight is established at the time of licensing. Items marked with an "X" are those items which were installed on the airplane described below as licensed by the manufacturer.

PIPER AIRCRAFT CORPORATION PA-23-250 (SIX PLACE), AZTEC F

SERIAL NO. _____ REGISTRATION NO. _____ DATE: _____

(a) Propeller and Propeller Accessories

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
1	Two Propeller Installations: Hartzell HC-E2YR-2RBSF with F8465-7R Blades Per PAC Dwg. 31470-2	_____	60.3 ea.	24.0	1447
3	Two Hydraulic Governors: Hartzell F-6-28 Per PAC Dwg. 31470-2	_____	6.0 ea.	37.0	222
5	Two Propeller Spinners: Spinner Per PAC Dwg. 23818, Cap Per PAC Dwg. 23819-4 and Bulkhead Adapter	_____	4.0 ea.	24.0	96

(b) Engine and Engine Accessories

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
17	Two Engines - Lycoming 10-540-C4B5	_____	405.8 ea.	50.6	20550
19	Two Fuel Pumps - Electric Auxiliary (28 V) Per PAC Dwg. 33959-2	_____	3.0 ea.	90.0	270
21	Two Fuel Pumps - Engine** Driven A.C. No. 6440296	_____	1.7 ea.	66.0	112
23	Two Oil Coolers - Harrison Model AP09AU06-04	_____	3.0 ea.	66.0	198
	or Harrison Model AP16AN05	_____	3.7 ea.	70.0	259
25	Two Vacuum Pumps - Airborne Mechanisms Model 211CC	_____	1.8 ea.	66.0	119
27	Two Starters - Prestolite** Model MHB-4001 (28V)	_____	18.0 ea.	40.0	720
29	One Hydraulic Pump - Eastern Industries Model 1233 HNG, Type 284	_____	2.0 ea.	68.5	137
31	Two Induction Air Filters Per PAC Dwg. 32198	_____	5.0 ea.	74.0	370
33	Two Oil Filters - AC Full Flow No. 5578941	_____	2.5 ea.	67.0	168
35	Two Hydraulic Pumps - Eastern Industries Model 1233 HNG, Type 311*	_____	2.0 ea.	68.5	137

*Serial numbers 27-7654001 thru 27-7854050 when Piper Kit No. 763 836 is installed and serial numbers 27-7854051 and up.
**Included in engine weight.

(c) Landing Gear and Brakes

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
55	Two Main Wheel and Brake Assemblies, 6.00 - 6 Type III:				
	a. Cleveland Wheel Assembly Model 40-131, Brake Assembly Model 30-96	_____	15.0 ea.	114.5	1718
	b. Two Main 8-Ply Rating Nylon Tires, 7.00 - 6, Type III with Regular Tubes	_____	13.0 ea.	114.5	1489
57	One Nose Wheel:				
	a. Cleveland Nose Wheel Assembly 40-76 (B)	_____	3.8	24.5	93
	b. One Nose Wheel 4-Ply Rating Tire, 6.00 - 6, Type III with Regular Tube	_____	9.0	24.5	228

(d) Electrical Equipment

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
71	Landing Light, G.E. Model 4553 (28 V)	_____	2.0	-18.5	-37
73	Two 70 Amp (28 V) Alternators* Prestolite with Brackets	_____	13.0 ea.	37.0	481
75	One Gill 12-GCAB-9, 17 Amp Hour (24 V) Battery	_____	28.0	33.0	924
77	28 V Electrical System Instl. Per PAC Dwg. 33650-2	_____	Neglect Weight Change		
79	Taxi Light Assy. Per PAC Dwg. 30503	_____	2.0	25.0	50
81	Stall Warning Lift Detector, Safe Flight Model C-52207-4 (28 V)	_____	Neglect Weight Change		
83	Alternator Relays and Filter Per PAC Dwgs. 33196-3, 24710-5	_____	4.9	53.2	261

*Incl. in Engine Weight

(e) Instruments

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
91	a. One Turn and Bank Per PAC Dwg. 32737-6 (Mitchell)	_____	1.5	68.3	103
	or				
	b. Per PAC Dwg. 41711 (Brittain)	_____	1.5	67.8	102
93	One Rate of Climb Per PAC Dwg. 41706 or PAC Dwg. 41706-2	_____	1.0	68.8	69
95	Altimeter Per Piper PS50008-2	_____	1.3	68.6	89
97	Airspeed Indicator Per PAC Dwg. 17419-31	_____	.6	69.6	42
99	Manifold Pressure Gauge Per PAC Dwg. 19697-3	_____	1.0	69.3	69
101	Ammeter Assy. Per PAC Dwg. 23857	_____	.2	69.8	14
103	Dual Tachometer Per PAC Dwg. 25700-3	_____	.7	68.5	48
105	One Attitude Gyro Indicator Per PAC Dwg. 99002-2, 99002-3, 99002-4, or 99002-7	_____	2.0	67.3	135
107	One Directional Gyro Indicator Per PAC Dwg. 99003-2, 99003-3, 99003-4, or 99003-6	_____	2.9	67.7	196
109	Dual Fuel Flow Gauge Per PAC Dwg. 32734	_____	2.0	80.0	160
111	Hobbs Engine Hour Meter Per PAC Dwg. 51006	_____	.4	72.0	29

(f) Miscellaneous

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
137	D.O.A. EA-1 Approved Pilot's Operating Handbook Report: 1948	X			
139	Combustion Heater Kit Assy. Per PAC Dwg. 33639-3	X	26.0	29.0	754
141	Heated Pitot Tube Assy. Per PAC Dwg. 19024-3	X	1.0	129.0	129
143	Emergency Gear Extender* (CO_2 Bottle)	X	2.0	89.0	178
145	Ballast Weight Installed Per Piper Dwg. 32330		—	306.0	—

*Serial numbers 27-7654001 through 27-7954121.

(g) Engine and Engine Accessories (Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (lb-In.)
161	Lycoming Turbocharger System Per PAC Dwg. 32330-8	____	Use actual Weight and Arm		
163	Two Fuel Pumps — Engine* Driven Lear Siegler RG-17980	____	1.3 ea.	66.0	86
165	Two Oil Coolers - Harrison Model AP13AU06-03	____	3.9 ea.	70.0	273
	Two Vacuum Pumps:				
167	Two Airborne Mechanisms Model 431CC7	____	5.5 ea.	66.3	365
169	Two Airborne Mechanisms Model 441CC	X	3.0 ea.	66.3	199
171	Two Induction Air Filters Per PAC Dwg. 26874	____	1.0 ea.	66.0	66
173	Tip Tank Installation Per PAC Dwg. 33826-2 and 33826-3	X	13.7	106.7	1462
175	External Fuel Gauges Per PAC Dwg. 15769-2	X	1.0	102.0	102

*Included in Engine Wt.

(h) Propeller and Propeller Accessories (Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
187	Two Propeller Installations: Hartzell HC-E2YR-2RBSF with F8465-7R Blades Per PAC Dwg. 32330-5	_____	60.3 ea.	24.0	1447
189	Two Hydraulic Governors: One Hartzell F-8-28 and One Hartzell F-6-28	_____	6.0 ea.	37.0	222
191	Propeller Synchrophaser Per PAC Dwg. 33249-2	_____	7.5	61.9	464
193	Propeller Synchrophaser Instl. (Hartzell) Per PAC Dwg. 28475-2	_____	8.0	61.4	491

(i) Landing Gear and Brakes
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment Lb-In.)
201	Dual Toe Brakes Per PAC Dwg. 30940	_____	8.0	49.0	392
203	One Nose Wheel: a. Cleveland Nose Wheel Assembly 40-76 (B)	_____	3.8	24.5	93
	b. One Nose Wheel 6-Ply Rating Tire, 6.00 - 6, Type III with Regular Tube	_____	9.3	24.5	228

(j) Electrical Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
211	One Gill PS12-24 25 Amp Hour (24 V) Battery	X	44.0	33.0	1452
213	Whelen Red Anti-Collision (Strobe) Light Per PAC Dwg. 32940-3		5.1	237.6	1212
214	Emergency Locator Transmitter Per PAC Dwg. 28481-2	X	4.2	254.2	1068
215	Emergency Locator System (PAL) Per PAC Dwg. 33542		2.0	258.0	516
216	Emergency Locator Transmitter Per PAC Dwg. 28326-2		2.0	258.0	516
217	Heated Windshield Panel Per PAC Dwg. 31640-3	X	2.5	59.0	148
219	Electric Propeller Deicing Equipment (28 V) Per PAC Dwg. 32740-2	X	12.9	42.7	551
221	External Power Receptacle Per PAC Dwg. 28381-3	X	7.0	11.0	77
223	Wing Inspection Light Per PAC Dwg. 15754-2 or 28543-2	X	.3	97.8	29

(k) Instruments
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
243	a. One Turn and Bank Per PAC Dwg. 32737-5 (Mitchell)	____	1.5	68.3	103
	or				
	b. Per PAC Dwg. 41711 (Brittain)	____	1.5	67.8	102
245	One Rate of Climb Per PAC Dwg. 41706 or 41706-2	____	1.0	68.8	69
247	Altimeter Per Piper PS50008-2	X	1.3	68.6	89
249	Airspeed Indicator Per PAC Dwg. 17419-31	____	.6	69.6	42
251	One Attitude Gyro Per PAC Dwg. 99002-2, 99002-3, 99002-4, or 99002-7	____	2.0	67.3	135
252	HSI Instl. Per PAC Dwg. 09593-3	____	Neglect Weight Change		
253	One Directional Gyro Per PAC Dwg. 99003-2, 99003-3, 99003-4, or 99003-6	____	2.9	67.7	196
255	Dual Fuel Flow Gauge Per PAC Dwg. 32858-2	____	1.5	80.0	120
257	One Exhaust Gas Temperature Gauge Per PAC Dwg. 32649 or 33596-2 or 33596-3	X	2.0	80.0	160
259	One Millibar Altimeter (Pilot) Per PAC Dwg. 25717-2	____	1.3	68.6	89
261	One Millibar Altimeter (Copilot) Per PAC Dwg. 25717-4	____	1.3	68.6	89
263	One True Airspeed Indicator (Pilot) Per PAC Dwg. 32771-4	X	.6	69.6	42
265	One True Airspeed Indicator (Copilot) Per PAC Dwg. 32771-5	X	.6	69.6	42

(l) Autopilots
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
281	Piper AutoControl IIIB Per PAC Dwg. 15710-2	_____	9.1	82.5	751
283	Piper AltiMatic IIIC Per PAC Dwg. 15600-2	_____	22.2	110.1	2444
285	Piper AltiMatic IIIC with H.S.I. and G.S. Coupler Per PAC Dwg. 15600-3	_____	24.4	107.3	2618
287	Piper AltiMatic IIIC with H.S.I., Gyro Slaving and G.S. Coupler Per PAC Dwg. 15600-4	_____	27.2	110.9	3017
289	Piper AltiMatic V F/D-1 (28 V) Per PAC Dwg. 33100-8, 33100-11, 33100-17, 33100-19, or 33100-22	_____	42.2	84.6	3570
291	Piper AltiMatic V-1 Per PAC Dwg. 33106-3 (28 V)	_____	37.3	91.4	3409
293	Glide Slope Coupler Instl. Per PAC Dwg. 15632-2 or -3	_____	2.3	57.8	133
294	Glide Slope Coupler Instl. Per PAC Dwg. 15988-2	_____	2.3	57.8	133
295	Electric Stabilator Trim Instl. Per PAC Dwg. 32765-3	_____	3.9	165.0	644
297	FCS-810 AFCS (without F/D) (28 V) Per PAC Dwg. 33106-3 Cert. Basis - STC SA429SO	_____	42.7	84.8	3621
299	FCS-810 AFCS (with F/D) (28V) Per PAC Dwg. 28400-2, -3, -4, -5 or -6 Cert. Basis - STC SA429SO	_____	37.8	91.5	3459

(m) Radio Equipment
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
310	KTS-2-23 Avionics Instl. (Includes all standard group components. Does not include standard features) Per				
	PAC Dwg. 15765-2 or	_____	66.9	65.6	4389
	PAC Dwg. 15906-2 or	_____	67.9	65.6	4454
	PAC Dwg. 09311-2 or	_____	65.2	66.2	4316
	PAC Dwg. 09871-2 or	_____	57.8	68.4	3954
	PAC Dwg. 09892-2 or	_____	44.3	79.0	3500
	PAC Dwgs. 09311-2 and 09278-6 (less transponder) or	_____	61.5	66.4	4084
	PAC Dwgs. 09311-2 and 09278-7 (less DME) or	_____	53.7	71.2	3823
	PAC Dwgs. 09311-2, 09278-6 and 09278-7 (less transponder and DME)	_____	50.0	71.9	3595
311	KTS-3-23 Avionics Instl. (Includes all standard group components. Does not include standard features) Per				
	PAC Dwg. 09496-2 or	_____	59.7	68.4	4083
	PAC Dwg. 09981-2 or	_____	48.6	74.9	3640
	PAC Dwgs. 09496-2 and 09555-7 (less DME) or	_____	53.9	70.8	3816
	PAC Dwgs. 09496-2 and 09555-6 (less transponder) or	_____	55.5	69.2	3841
	PAC Dwgs. 09496-2, 09555-7 and 09555-6 (less DME and transponder)	_____	49.7	71.9	3573
313	KTS-4-23 (I) Avionics Instl. (Includes all standard group components. Does not include standard features) Per				
	PAC Dwg. 33940-2 or	_____	101.1	70.1	7087
	PAC Dwg. 15907-2	_____	102.1	70.1	7157
314	KS-1-23 Avionics Instl. (Includes all standard group components. Does not include standard features) Per				
	PAC Dwg. 33929-2 or	_____	44.4	77.4	3437
	PAC Dwg. 15905-2 or	_____	45.4	77.4	3514
	PAC Dwg. 09310-2	_____	43.4	76.7	3328

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

Item No.	Item	Mark if Inst.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
325	CTM-1-23 Avionics Instl. (Includes all standard group components. Does not include standard features) Per				
	PAC Dwg. 15908-2 or	_____	57.5	67.6	3887
	PAC Dwg. 09312-2 or	_____	46.5	73.1	3399
	PAC Dwg. 09544-2	_____	46.5	73.1	3399
327	CTM-2-23 Avionics Instl. (Includes all standard group components. Does not include standard features) Per				
	PAC Dwg. 09545-2 or	_____	55.2	69.0	3809
	PAC Dwg. 08026-2 or	_____	55.2	69.0	3809
	PAC Dwgs. 09313-2 and 09282-6 (less DME) or	_____	48.6	73.2	3558
	PAC Dwgs. 09545-2 and 09577-6 (less transponder) or	_____	46.8	73.4	3435
	PAC Dwgs. 09545-2 and 09577-7 (less transponder) or	_____	53.2	69.0	3671
	PAC Dwgs. 09545-2, 09577-6 and 09577-7 (less DME and transponder)	_____	44.8	73.4	3288
329	NC-1-23 Avionics Instl. (Includes all standard group components. Does not include standard features) Per				
	PAC Dwg. 09314-2	_____	33.7	84.9	2861
331	NC-2-23 Avionics Instl. (Includes all standard group components. Does not include standard features) Per				
	PAC Dwg. 09315-2 or	_____	44.6	74.4	3318
	PAC Dwgs. 09315-2 and 09317-2 (less DME) or	_____	35.5	83.1	2950
	PAC Dwgs. 09315-2 and 09317-3 (less transponder) or	_____	42.1	74.9	3153
	PAC Dwgs. 09315-2, 09317-2 and 09317-3 (less transponder and DME)	_____	33.0	84.4	2785

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

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
335	Nav/Comm 1 Instl. (Narco) Per PAC Dwg. 33559-3	_____	11.8	52.8	623
337	Nav/Comm 1 Instl. (Narco) Per PAC Dwg. 33559-6	_____	12.1	53.4	646
339	Nav/Comm 1 Instl. (Narco) Per PAC Dwg. 33582-3	_____	14.3	74.4	1064
341	Nav/Comm 1 Instl. (King) Per PAC Dwg. 33398-3	_____	13.6	74.5	1013
343	Nav/Comm 1 Instl. (King) Per PAC Dwg. 33878-2	_____	16.6	62.3	1034
345	Nav/Comm 1 Instl. (King) Per PAC Dwg. 33878-3	_____	16.6	61.5	1021
347	Nav/Programmer Installation (Bendix) Per PAC Dwg. 09648-3	_____	7.6	64.4	489
349	Comm 1 Instl. (Narco) Per PAC Dwg. 33912-3 or -5	_____	5.2	61.7	321
353	Nav 2 Instl. KN-53 (King) with Glide Slope Rec. per PAC Dwg. 09979-2		Neglect Weight Change		
355	Nav 1 Instl. (Narco) Per PAC Dwg. 33592-4	_____	6.4	83.7	536
357	Nav 1 Instl. (Narco) Per PAC Dwg. 33593-4	_____	6.4	83.7	536
363	HF Comm Instl. (ABS-130) Per PAC Dwg. 15575-2	_____	25.4	81.0	2057
364	HF Comm Instl. (ABS-130) Per PAC Dwg. 09273-2	_____	25.4	81.0	2057

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

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
394	Dual ADF Instl. (KR-85) Per PAC Dwg. 09278-8	_____	22.9	74.6	1708
395	Dual ADF/RMI (KR-85 and KI-226) Per PAC Dwg. 09278-11	_____	26.7	67.2	1794
396	Dual ADF/RMI (KR85 and KI-226 Per PAC Dwg. 09278-12	_____	26.7	67.2	1794
397	Dual ADF Instl. (RCR-650) Per PAC Dwg. 09282-7	_____	12.2	76.6	935
398	Dual ADF Instl. (RCR-650 with RMI) Per PAC Dwg. 09282-8 or 09577-8	_____	12.2	76.6	935
399	Transponder Instl. (KT-76) Per PAC Dwg. 33397-3 or 15975-2	_____	3.7	61.5	228
401	Transponder Instl. (AT-50A) Per PAC Dwg. 33578-3	_____	4.8	48.2	231
402	DME Installation (Bendix) Per PAC Dwg. 09648-10	_____	Neglect Weight Change		
403	DME Instl. (IND-450) Per PAC Dwg. 09563-3	_____	8.4	44.6	375
405	DME Instl. (IND-451) Per PAC Dwg. 09577-9 or 08054-2	_____	Neglect Weight Change		
407	DME Instl. (King) Per PAC Dwg. 33598-3	_____	10.6	42.6	452
409	DME Instl. (KN-62) Per PAC Dwg. 09593-4	_____	3.3	64.4	213
411	DME Instl. (Narco) Per PAC Dwg. 33882-2	_____	6.1	63.7	389
412	DME Instl. (King) Per PAC Dwg. 15755-2, -3, -4, -5 or 15973-2, -3, -4, -5	_____	9.0	34.8	313

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

Item No.	Item	Mark if Inst.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
428	R-Nav Instl. (KN-74) Per PAC Dwg. 15976-7	_____	3.8	81.8	311
429	R-Nav Instl. (KN-74) Per PAC Dwg. 15976-8	_____	13.6	51.0	694
430	R-Nav Instl. (KN-74) Per PAC Dwgs. 09276-6 and 09278-3	_____	3.0	72.9	219
431	R-Nav Instl (KN-74) Per PAC Dwg. 09276-5	_____	3.7	61.5	228
432	R-Nav Inst.. (KN-74) Per PAC Dwg. 09281-4	_____	3.0	72.9	219
433	R-Nav Instl. (KN-74) Per PAC Dwg. 09282-3	_____	3.0	72.9	219
434	R-Nav Instl. (CLC-60A) Per PAC Dwg. 33974-2 or -3	_____	15.3	46.8	716
435	R-Nav Instl. (CLC-60) Per PAC Dwg. 33974-4	_____	15.3	46.8	716
436	R-NAV Instl. (King) per PAC Dwg. CA-23-1-710	_____	*5.7	55.7	318
437	Audio Panel and Marker Beacon Instl. Per PAC Dwg. 33577-3	_____	3.5	37.8	132
439	Audio Panel and Marker Beacon Instl. Per PAC Dwg. 33864-3	_____	5.0	41.7	209
443	Audio Amplifier and Marker Beacon Instl. Per PAC Dwg. 15770-2 or -3	_____	4.2	50.5	212

*Weight does not include DME

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

Item No.	Item	Mark if Inst.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
467	Radar Instl. (RDR-150 Color) Per PAC Dwg. 09619-2 or 09619-2	_____	26.3	24.8	652
468	Radar Instl. (RDR-150 Color) Per PAC Dwg. 09299-2 or 09620-2	_____	27.9	16.7	466
469	Radar Instl. (RDR-160) Per PAC Dwg. 09308-2 or 09621-2	_____	17.5	13.8	241
470	Radar Instl. (Primus 20B) Per PAC Dwg. 09302-2 or 09334-3	_____	28.4	13.5	383
471	Radiotelephone Instl. (KT-96) Per PAC Dwg. 09334-2	_____	6.2	68.4	424
472	Copilot Mike and Headset Instl. Per PAC Dwg. 33589 or PAC Dwg. 33953-2	_____	1.2	72.5	87
473	Pilot Mike and Headset Instl. Per PAC Dwg. 33587 or PAC Dwg. 33911-2	_____	1.2	81.3	98
475	Boom Mike Instl. Per PAC Dwg. 32946	_____	1.6	81.0	130
476	RMI Instl. (KI-229) Per PAC Dwg. 09881-2	_____	8.1	43.7	354
477	RMI Installation (KI-226) Per PAC Dwg. 09648-4 or 09648-7	_____	7.3	46.1	337
478	VOR/LOC Antenna Instl. Per PAC Dwg. 33902-2	_____	1.6	296.8	475
479	RMI Instl. (KI-226) Per PAC Dwg. 28292-2	_____	6.8	42.4	288
480	RMI Instl. (KI-226) Per PAC Dwg. 33620-5 or 15977-3	_____	7.3	41.0	299
481	RMI Instl. (KI-226) Per PAC Dwg. 33620-3 or 15977-2	_____	13.2	60.9	804

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

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
493	Circuit Protector Instl. Per PAC Dwg. 33967-2, -3 or -4	_____	.3	70.3	21
495	Circuit Protector Instl. Per PAC Dwg. 33937-2 or PAC Dwg. 33936-2	_____	1.0	70.3	70
497	Power Inverter Installation (P-20) Per PAC Dwg. 09648-8	_____	4.3	34.7	149.2
501	Center Instrument Panel Cover Instl. Per PAC Dwg. 33881-2 or 15802-2 or 33934-2 or 15766-2 or 33955-2 or 15776-2	_____	Neglect Weight Change		
503	Custom Instrument Panel (Left) Per PAC Dwg. 33915-2	_____	Neglect Weight Change		
509	Trim Cover Per PAC Dwg. 80417-5	_____	.2	70.8	14
511	Interface Unit Installation Per PAC Dwg. 09648-11	_____	Neglect Weight Change		
513	HF Support Cover Per PAC Dwg. 33939-2	_____	Neglect	70.8	
519	Radio Support Brackets Instl. Per PAC Dwg. 33891-2	_____	1.0	61.3	61
521	Radio Support Brackets Instl. Per PAC Dwg. 15760-2	_____	.7	66.3	46
523	Radio Support Brackets Instl. Per PAC Dwg. 33933-2	_____	.7	64.8	45
525	Radio Support Brackets Instl. Per PAC Dwg. 15757-2	_____	.7	68.5	48

(n) Miscellaneous
(Optional Equipment)

Item No.	Item	Mark if Instl.	Weight (Pounds)	Arm (In.) Aft Datum	Moment (Lb-In.)
601	Curtain Instl. Per PAC Dwg. 33831-2	X	3.0	120.0	360
603	Pneumatic Deicing Equipment Per PAC Dwg. 15585-3	X	*24.2	136.4	3303
605	Propeller Ice Shield Per PAC Dwg. 33498	X	2.8	24.4	68
607	Heated Pitot Tube Assy. Per PAC Dwg. 19024-3	X	1.0	129.0	129
609	Fire Extinguisher Per PAC Dwg. 34985	X	5.0	101.0	505
611	Oxygen System Per PAC Dwg. 33835-2		48.0	161.0	7728
613	Alternate Static Source Per PAC Dwg. 32655-3	X	Neglect Weight Change		
615	Radome Installation Per PAC Dwg. 33321, 33350 or 33350-2		.5	-13.8	-7
617	Shoulder Harness Instl. (Center Seats with Inertia Reels) Per PAC Dwg. 32896-5		2.4	136.0	326
619	Shoulder Harness Instl. (Rear Seats with Inertia Reels) Per PAC Dwg. 33681-2		4.0	158.0	632

*Weight does not include weight of pumps.

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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 Aztec F is a twin-engine, retractable landing gear, all metal airplane which is designed to combine multi-engine power, performance, and safety with smooth, easy handling characteristics and operational adaptability.

The Aztec F has comfortable six-place seating and two separate one hundred fifty pound luggage compartments. All seats are removable to accommodate a variety of passenger and cargo combinations, and a wide range of options permits the airplane to be custom suited to individual navigation and transportation needs. As with any aircraft, the Aztec F requires proper loading; however, the weight and balance calculator provided with the airplane makes the determination of acceptable fuel and payload combinations easy and uncomplicated.

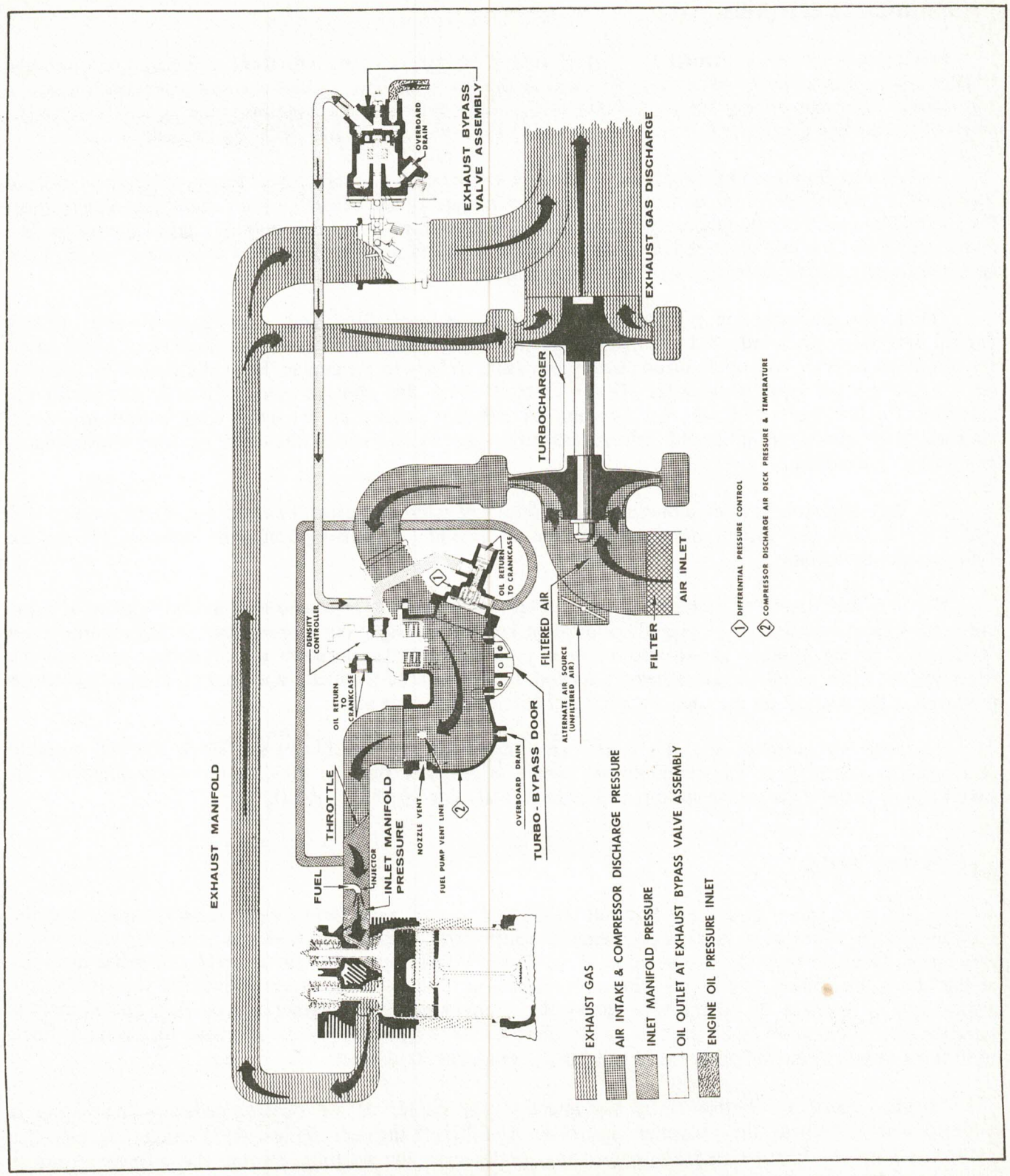
7.3 AIRFRAME

The fuselage of the Aztec F is composed of four basic units: the nose section, which is made of sheet metal and fiberglass, the cabin section and the tail cone, which are made of sheet metal, and the tubular steel structure which extends from the nose wheel to the tail cone. The tubular steel unit strengthens the center section of the airplane, where heavier loads are imposed. The extremeties (nose cone, engine cowling nose bowls, wing tips) are constructed of dent resistant reinforced fiberglass. The Aztec F is not designed for aerobatic flying; therefore, aerobatics in this airplane are prohibited.

Access to the cabin is through the cockpit door on the right side of the fuselage. The forward baggage compartment door is located on the right side of the nose section, and the aft baggage compartment door is on the right side of the fuselage, aft of the rear window.

Except for the second window on the left side, which is the emergency exit window, all windows are double pane. A storm window located in the forward lower section of the pilot's side window opens downward and in when unlatched.

The wing is of a conventional design and employs a USA 35B modified airfoil section. The wing spar ends are bolted together, providing, in effect, a continuous main spar. The wings are also attached to the tubular steel structural unit by auxiliary front and rear spars fore and aft of the main spar. The dent resistant fiberglass wing tips are detachable for service.



TURBOCHARGER SYSTEM SCHEMATIC

Figure 7-1

A propeller synchrophaser installation is available as optional equipment. Its function is to maintain both propellers at the same RPM and at a preselected phase angle. This eliminates the propeller "beat" effect and minimizes vibration. When the synchrophaser is installed, the left engine is established as the master engine, and the right engine is equipped with a slave governor which automatically maintains its RPM with the left engine RPM. When the propeller synchrophaser is installed, a two-position switch is located on the lower left side of the instrument panel. It is labeled "MAN." for manual or standby and "Prop. Sync." for propeller synchrophaser.

During taxiing, takeoff and landing, the propeller synchrophaser switch should be in the "MAN." position. During cruise, propellers should be synchronized manually to within approximately 10 RPM and the switch placed in the "Prop. Sync." position. Normally, propeller synchrophasing will take place within a few seconds, but occasionally it may take up to a full minute. When the power setting is to be changed, the synchrophaser switch should be set to "MAN." for 30 seconds before the power setting is adjusted; then the synchrophaser switch may be returned to the "Prop. Sync." position. If the propeller RPM differential exceeds 50 RPM, the switch should be placed on "MAN." for 30 to 40 seconds; then the propellers can be re-synchronized and the switch returned to "Prop. Sync." Pulling the circuit breaker completely deactivates the propeller synchrophaser system. If the master switch is turned "OFF" or if there is an electrical system failure, the slave engine will return to the controlled selected RPM plus approximately 25 RPM (out of synchronization) regardless of the position of the synchrophaser switch.

7.13 FUEL INJECTION

The Bendix RSA-5 fuel injection system measures the rate at which air is consumed by the engine and regulates fuel flow proportionally. Fuel pressure regulation by means of a servo valve causes a minimal drop in fuel pressure throughout the system. The servo regulator includes the airflow sensing system, which contains a throttle valve and venturi. The differential pressure between the entrance and the throat of the venturi is the measurement of air entering the engine. These pressures are applied across an air diaphragm in the regulator. Changes in power change the airflow to the engine, thus, by metering airflow, the fuel injection system can regulate fuel flow.

Metering pressure is maintained above vapor forming conditions, while fuel inlet pressure is low enough to allow the use of a diaphragm pump. Vapor lock and associated problems of starting are thus eliminated.

Fuel is distributed to the cylinders by a ported fuel flow divider mounted on top of the engine. The divider contains a spring-loaded positive shut off valve. At each cylinder is a continuous flow air bleed nozzle with provisions to eliminate the adverse effects of low manifold pressure while idling. Since fuel metering occurs at the regulating unit rather than at the nozzles, more uniform cylinder head temperatures result, and a longer engine life is possible.

7.15 ENGINE CONTROLS

Engine controls include a throttle, a propeller control, and a mixture control for each engine. These controls are located on a control pedestal in the center of the cockpit below the instrument panel, where they are accessible to both pilot and copilot.

The throttle levers, on the far left of the control pedestal, are used to adjust manifold pressure. The throttle levers adjust from fully open in the top position, through the idle position, to fully closed at the bottom of their travel. The throttle controls incorporate switches which activate a gear up warning horn and light if the gear is up during the last portion of travel of either of the throttle controls to the low power position. If the gear is not locked down, the warning light will illuminate and 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 controls are located in the center of the control pedestal. They are used to adjust the propeller speed from increase RPM at the top of their travel, through decrease RPM, to the feathered position at the bottom of their travel. A governor maintains a constant propeller speed once the propeller control is set.

The mixture controls at the far right of the control pedestal adjust the air to fuel ratio. The full rich position is at the top position and the full lean position is toward the bottom. The mixture controls are used to shut down the engines in the full bottom or idle-cut-off position.

A friction adjustment knob on the right side of the control pedestal may be adjusted to increase or decrease the effort needed to move the control levers or to hold the controls in a selected position.

The manual alternate air controls are located on the control pedestal beneath the control lever quadrant. These controls serve as a back-up for the automatic system and also allow the pilot to manually select alternate engine induction air prior to entering icing conditions which may block the primary induction air source.

Cowl flap controls are located on the fuel control panel between the crew seats. Depending on the additonal engine cooling required, the cowl flap control levers can be locked in various intermediate settings between the fully open and fully closed positions.

7.17 LANDING GEAR

To increase cruise speed, climb and other performance, the Aztec F is equipped with hydraulically operated, fully retractable, tricycle landing gear. All three landing gear units on the Aztec F incorporate the same type air-oil strut, and many parts are directly interchangeable.

Main wheels are Cleveland Aircraft Products 6.00 x 6 units with disc type brakes with metallic lining. Main wheel tires are eight ply rated 7.00 x 6 tube type tires. The nose wheel is a 6.00 x 6 Cleveland unit fitted with a 6.00 x 6 tube type tire.

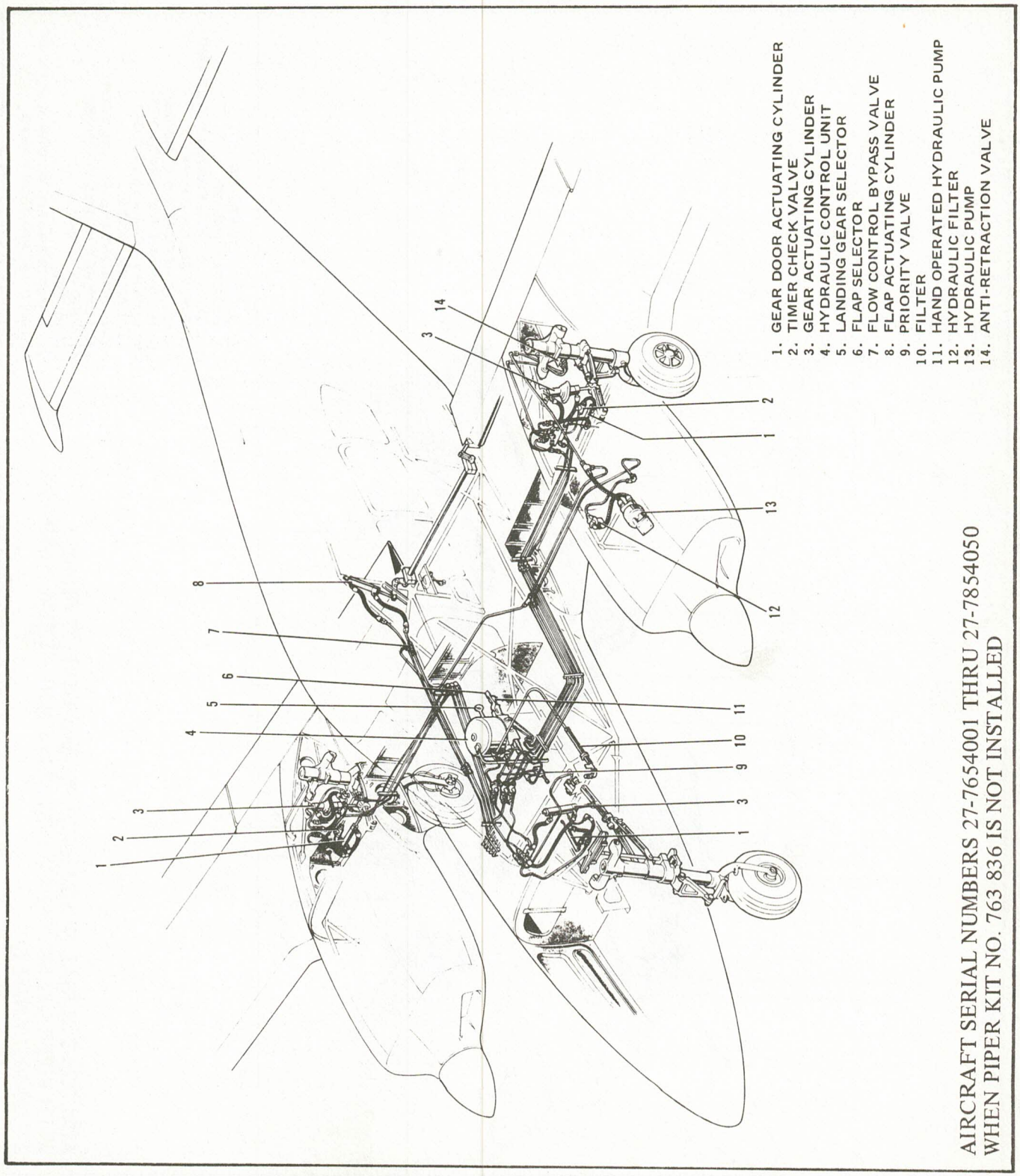
Through use of the rudder pedals, the nose gear is steerable through a 30 degree arc. As the nose gear retracts, the steering linkage becomes disconnected from the gear so that rudder pedal action with the gear retracted is not impeded by nose gear operation. When the airplane is being towed with power equipment, the nose gear should not be turned beyond its 30 degree arc, as damage to the nose gear and steering mechanism will result.

When the landing gear is retracted, the nose gear retracts aft into the nose section, and the main gear retract forward into the engine nacelles. Gear doors completely cover the gear when it is retracted.

The landing gear control knob is located on the control pedestal. The landing gear control knob is in the shape of a wheel to differentiate it from the flap control knob, which has an airfoil shape. To guard against inadvertent gear retraction while the airplane is on the ground, a mechanical latch, located just above the gear control lever, must be operated before the landing gear control lever can be moved upward. There is also an anti-retraction valve, located on the left main gear, which prevents the build-up of hydraulic pressure in the retraction system while the weight of the airplane is resting on its wheels. When the landing gear strut is extended, as in flight or when the airplane is raised on jacks, the anti-retraction valve closes, permitting normal operation.

The position of the landing gear is indicated by four lights located on the control pedestal. When the three green lights are on, all three legs of the gear are down and locked; when the amber light is on, the gear is fully retracted. When no light is on, the gear is in transit. Each gear indication light incorporates a press-to-test feature, and each may be dimmed or brightened individually by turning the light clockwise or counterclockwise.

A red light in the landing gear control knob flashes when the gear is up and either one of the throttle levers is pulled back. A gear warning horn will also sound when either throttle is pulled back beyond approximately twelve inches of manifold pressure. As a further indication of the position of the gear, visual confirmation can be made from the cockpit. The nose gear can be observed through a mirror on the inboard side of the left nacelle.



HYDRAULIC SYSTEM (SINGLE HYDRAULIC PUMP)

Figure 7-7

An additional back-up system * exists independent of the need for hydraulic fluid. The system is powered by a CO_2 cylinder, and emergency extension of the landing gear may be accomplished by this CO_2 system. The control for the CO_2 system is located beneath a small cover plate under the pilot's seat. When the control is pulled, the gear selector must be in the down position. Pulling the emergency gear extender ring releases CO_2 from a cylinder under the floor panel. The gas flows into the gear actuating cylinders, extending the landing gear. Note that this system may be used for gear extension only; it must never be used for gear retraction or operation of the flaps.

The landing gear position lights and the flap indicator, along with visual observation, should be used as primary indications of the positions of gear and flaps. Secondary indication that gear and flaps have reached their selected position is the return of the control lever to the off or neutral position.

The left main gear includes a by-pass valve which prevents the retraction of the landing gear while the airplane is on the ground. The weight of the airplane causes the valve to remain open while the strut is compressed, and all fluid by-passes directly from the pressure side of the system to the return side, preventing any build-up of hydraulic pressure in the retraction system. Note that this system is designed to prevent inadvertent retraction during aircraft start-up. The by-pass valve cannot be relied upon as the sole means of preventing retraction during high engine power on the ground or during taxi and takeoff operations. Be sure the gear handle is down before moving the aircraft.

7.23 FLIGHT CONTROL SYSTEM

Dual flight controls are installed in the Aztec F as standard equipment. The control wheels operate the ailerons and the stabilator. The rudder pedals control the rudder movement, and during ground operations also steer the nose wheel. The wheel brakes are applied by toe pressure on the top portion of the rudder pedals. These toe brakes are standard on the pilot's side. Ailerons, stabilator and rudder are cable controlled; wing flaps are hydraulically controlled. Stabilator and rudder trim are set with the control knobs located overhead.

The horizontal tail is an all-movable, slab type stabilator which incorporates an anti-servo tab along the trailing edge. The anti-servo tab, which moves in the same direction as the stabilator, but with increased travel, provides a more efficient control surface. The anti-servo tab also functions as a longitudinal trim tab for nose up or nose down correction.

The vertical tail is fitted with a rudder which incorporates a servo tab. The servo tab, which moves in a direction opposite to the travel of the rudder, lessons pedal forces necessary to move the rudder. The servo tab also functions as a rudder trim tab for nose right or nose left correction.

The knob portion of the trim control moves the rudder tab, and the crank portion moves the stabilator tab. Trim position is shown on the indicators in the overhead panel.

Wing flaps are adjustable from no flaps to 50 degrees of flap. Flap position is shown on the indicator located to the right of the flap control lever. Flaps may be set at any position between full extension and full retraction by manually returning the flap control to the neutral position when the flaps have reached the desired degree of travel. If the flap control is left in the up or the down position, the flaps will automatically extend or retract to their full travel and the lever will automatically return to the neutral position. For ease of entry or exit, the right flap may be used as a step, but only when it is fully retracted.

*Airplanes serial numbers 27-7654001 through 27-7954121 only.

7.25 FUEL SYSTEM

Fuel for the Aztec F is stored in four wing-mounted fuel tanks. Each of these tanks, which are flexible, bladder type fuel cells, holds thirty-six U.S. gallons of fuel. Two tanks are installed in each wing outboard of the engine nacelles. Fuel capacity can be increased by the addition of two optional twenty gallon bladder type fuel cells in the wing tips. A transfer tube connecting the optional tip tank and the outboard tank allows both tanks to function as one. Two fuel fillers are located on the top of each wing; the inboard filler is for the inboard tank, and the outboard filler is for the outboard tank and the optional tip tank when it is installed. Usable fuel is 34.3 U.S. gallons per tank. All twenty gallons of fuel in each optional wing tip tank is usable; thus, when this option is installed, each outboard tank can carry in effect 54.3 gallons of usable fuel. Fuel tank vents have flame suppressing and anti-icing provisions.

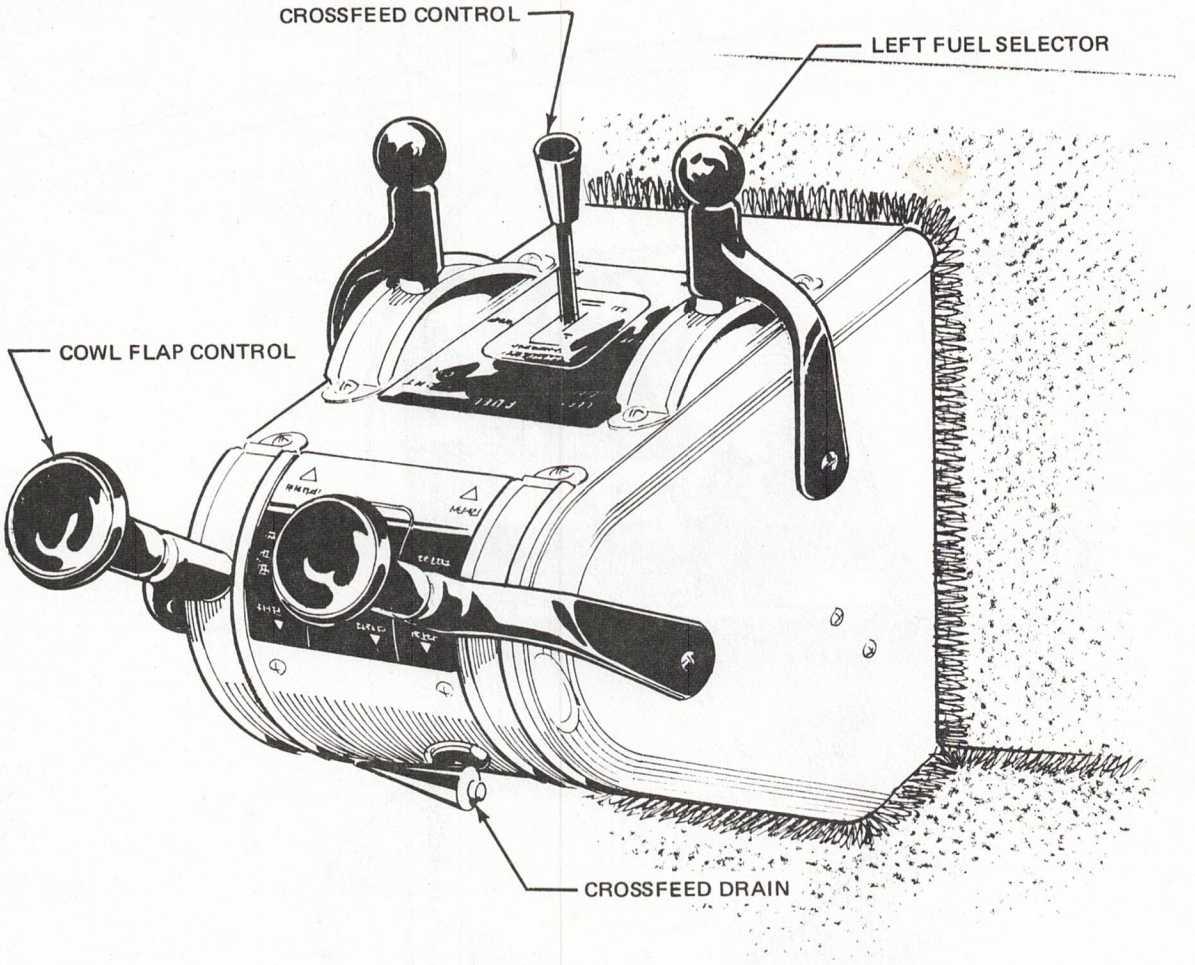
Fuel management controls are located on the control console between the crew seats. The two fuel selector and shutoff controls are used to select either the inboard or the outboard fuel tank on each side or to shut off the fuel flow on a side. Between the fuel selector controls is a crossfeed lever.

Electric fuel pump switches are located on the switch panel on the lower left instrument panel. The fuel quantity gauges are located furthest inboard on the engine gauge cluster at the top of the right instrument panel. Each fuel quantity gauge indicates the level of fuel in the tank selected on its respective side. A dual fuel flow gauge displays in gallons per hour the rate at which fuel is being supplied to each engine.

Each engine has an engine-driven fuel pump as a primary means of receiving fuel. During normal operation, both fuel selector valves are open and the crossfeed is off, and the engine-driven fuel pump on each engine is supplying fuel from a selected tank to the fuel injector on the same side. Each side of the system also has an auxiliary electric fuel pump which is used in the event of an engine-driven fuel pump failure and during takeoffs and landings to insure fuel flow during these critical times.

The two sides of the fuel system are connected by a crossfeed which allows fuel to be drawn from one side and sent to the engine on the other side to extend single-engine cruise range. Fuel can be supplied from any tank to either engine. The crossfeed is to be used only in emergency situations during single-engine operation. Crossfeed should not be used for takeoffs. If crossfeed is required, the fuel selector valve of the inoperative engine should be in either the inboard or the outboard position, and the electric fuel pump of the inoperative engine should be turned on; on the operative engine, the fuel selector should be in the shutoff position and the electric fuel pump should be turned off.

Before each flight, any possible accumulation of moisture or sediment in the fuel system should be drained from the low points in the system. Fuel drains are provided for each fuel tank, for each fuel strainer, and for the fuel crossfeed system. The fuel strainer drains and the fuel tank drains are located inside access doors on the underside of each nacelle, inboard of each main wheel well. The access doors are secured with quarter turn fasteners. During the preflight check, each fuel tank drain and each fuel strainer drain should be held open until any possible contaminants are removed. A fuel crossfeed drain valve control is mounted on the forward face of the fuel management control console. During preflight, this drain should be opened with the crossfeed control open and the left electric fuel pump on and off then the right electric fuel pump on and off. Close the crossfeed control. A check should then be made to insure that all drains are completely closed and that the access doors are secured. Since the fuel and vapors are extremely flammable, precautions should be taken to avoid fire hazards.



FUEL CONTROLS

Figure 7-11

7.27 ELECTRICAL SYSTEM

Electrical power for the Aztec F is supplied by a 28 volt, direct current, negative ground electrical system. The system includes a 24 volt battery enclosed in a stainless steel battery box, two 28 volt 70 ampere alternators, starters, voltage regulators and an ammeter.

The primary electrical source is the two alternators. Each alternator is controlled independently by its own voltage regulator. These voltage regulators are interconnected electrically to provide parallel output from their associated alternators within normal operating RPM ranges.

The 24 volt battery, located in the nose section of the airplane, is the secondary source of electrical power. It provides current for starting engines, for operation of electrical equipment when the engines are not running, and for electrical power to back up the alternators. The battery is normally kept charged by the alternators. If it becomes necessary to charge the battery, it should be removed from the airplane.

The master switch, located on the far left of the lower instrument panel, is a split rocker type switch which gives the pilot separate control over the right and the left alternator field circuits. Should one alternator field circuit become inoperative, its corresponding section of the master switch can be turned off, and if the electrical load is reduced, electrical power for flight will be sustained by the remaining alternator.

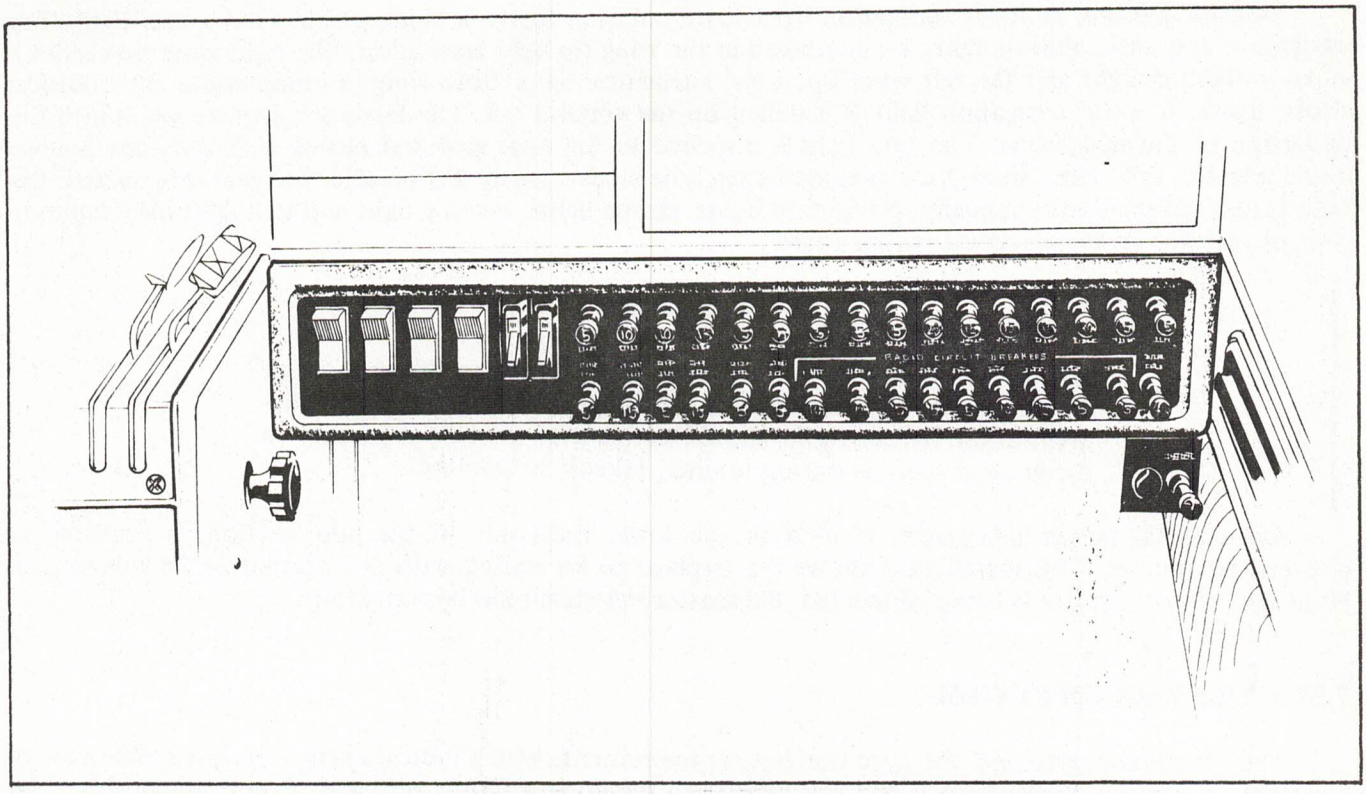
The electrical system can be monitored through the ammeter mounted on the far right of the instrument panel. The knob directly under the ammeter allows either alternator output lead or the battery to be switched onto the ammeter. When one of the alternators is not producing a voltage, its associated "Inop" warning light, below and to either side of the ammeter, will illuminate. When the master switch is turned on before the engines are started, these warning lights should illuminate. Failure to do so indicates a burnt out bulb. When the engines are operating at a high differential RPM, the alternator inoperative light for the slower engine may come on.

Electrical switches are located on both sides of the lower instrument panel. Electrical switches are of the rocker type and are internally lighted for night flight. All switches and circuit breakers are clearly labeled as to their function.

The electrical system and equipment are protected by the circuit breakers on a panel located at the far right of the lower instrument panel. Circuit breakers are of the press to reset type. If a circuit is overloaded, the breaker will pop, opening the circuit. Before a breaker is reset, the electrical load on the circuit should be reduced, and the breaker allowed to cool. Pressing in on the open breaker will reset the circuit. Continual circuit breaker popping indicates a need for corrective action. Pulling out manually on a reset button will trip a circuit breaker. The alternator circuit breakers, located just inboard of the circuit breaker panel, are of the toggle switch type and should never be turned off when the alternators are operating normally.

If both alternators fail in flight and the condition cannot be corrected, the airplane battery becomes the only source of electrical power. In this situation, all unnecessary electrical equipment should be turned off and the flight should be terminated as soon as possible.

The starter and magneto switches are on the left side panel. There are two magneto switches for each engine. The starter switch is of the momentary rocker type, which returns to the neutral or off position after a starter is activated.

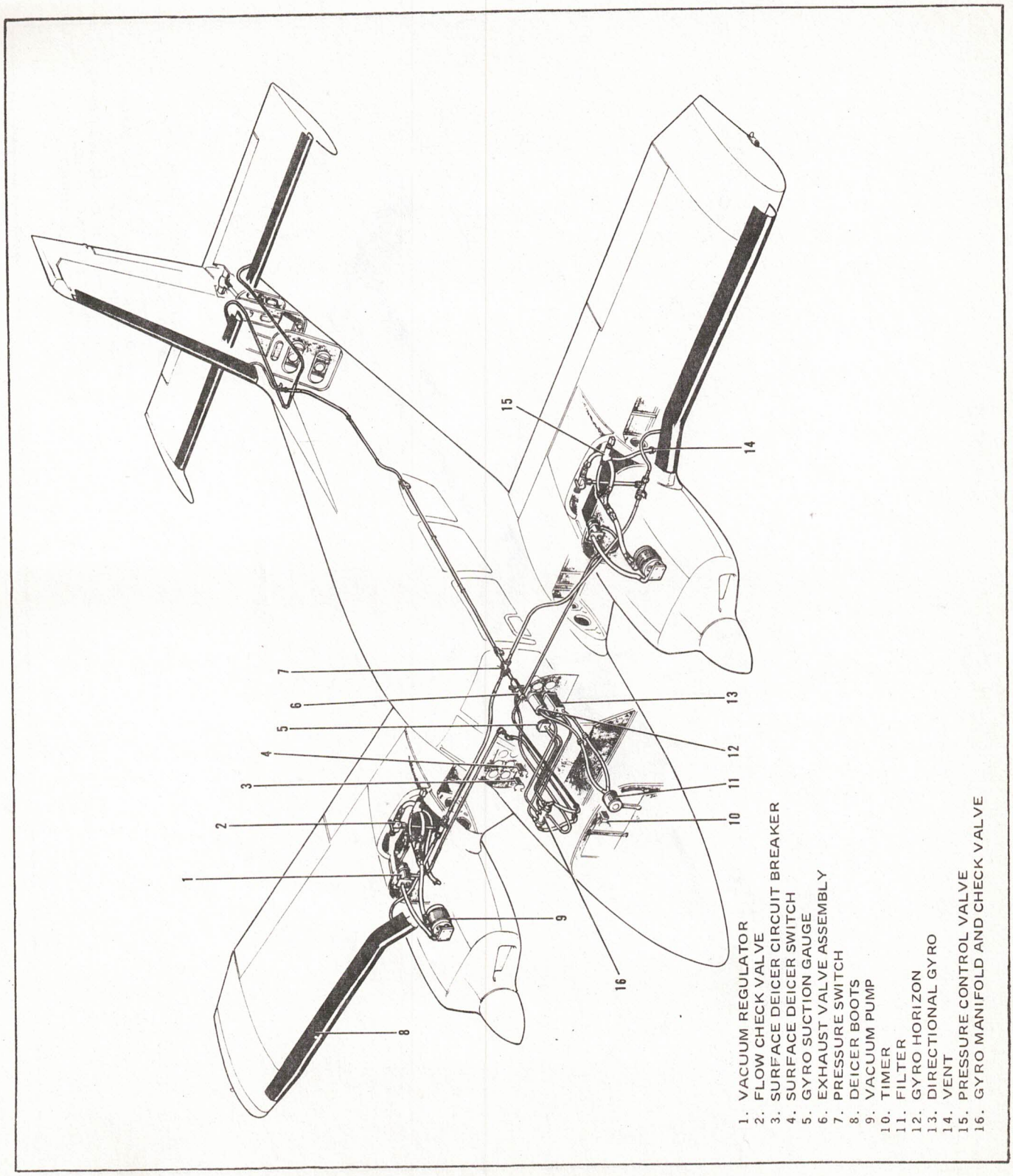


CIRCUIT BREAKER PANEL

Figure 7-17

Instrument panel lighting is furnished by individual post lights mounted on the panel adjacent to each instrument. These lights are turned on or off and brightened or dimmed with the rheostat switch located on the overhead panel. Back lighting for the electrical switches and the engine gauge cluster are also controlled with the overhead panel switch. The overhead panel also contains switches for the trim indicator lights, the avionics lights, and the dome light. Overhead, just aft of the windshield, on both the right and the left sides, are map lights. Each light is operated by a switch located adjacent to the unit. An overhead dome light is mounted in the center of the cabin ceiling, and reading lights are installed over each seat. Each of these units is controlled with a separate switch.

Overhead lights in both the forward and the aft baggage compartments illuminate and extinguish automatically with the opening and closing of the baggage doors. As the master switch need not be on for the operation of the baggage compartment courtesy lights, leaving either baggage compartment door open for extended periods is not recommended. If either the forward baggage compartment door or the main cabin door is not completely closed and latched and the master switch is on, a red "Door Ajar" warning light on the upper right instrument panel will illuminate.



PNEUMATIC SYSTEM

Figure 7-19

7.31 PITOT-STATIC SYSTEM

The airspeed indicator, the rate of climb indicator, and the altimeter are operated by the pitot-static system. The pitot-static pickup head is mounted to the underside of the left wing, outboard of the engine nacelle. Dynamic and static air pressure for the operation of the airspeed indicator are picked up by the pitot-static head and carried through lines to the instrument. A diaphragm within the airspeed instrument is vented to the pitot source, and the instrument case is vented to the static source. As the speed of the airplane changes, pitot air pressure expands the diaphragm proportionally, and the airspeed indication is based on the differential pressure between the pitot and the static air pressure. The instrument is calibrated in knots. Some of the operating ranges and limitations are marked on the face of the dial.

The rate of climb indicator measures the rate of change in static air pressure as the airplane ascends or descends. The pointer and dial indicate in feet per minute the rate at which the airplane is climbing or descending.

The altimeter indicates barometric altitude in feet above sea level when properly set-up. The long pointer on the dial scale is read in hundreds of feet; the middle pointer, in thousands of feet; and the short pointer, in ten thousands of feet. The instrument case is vented to the static air source, and as static air pressure increases or decreases, altitude is indicated on the dial. Altitude, shown on the dial, and barometric pressure, shown in the window in the indicator dial, can be set with the knob on the lower left corner of the instrument.

An optional pitot-static pickup system and the associated lines and instruments may be installed on the right side of the airplane when copilot instruments are installed. The pitot heat switch, located on the electrical switch panel to the right of the engine controls, should be turned on when ice or heavy rain threaten to block the pitot-static pickup head. An optional alternate static air source can be installed on the control pedestal, below the hydraulic hand pump. When the alternate static source valve is open, the pilot's airspeed, rate of climb, and altitude instruments will be operating on static air from within the fuselage. When the alternate static source is selected, instrument readings may vary from readings under normal pitot-static operation.

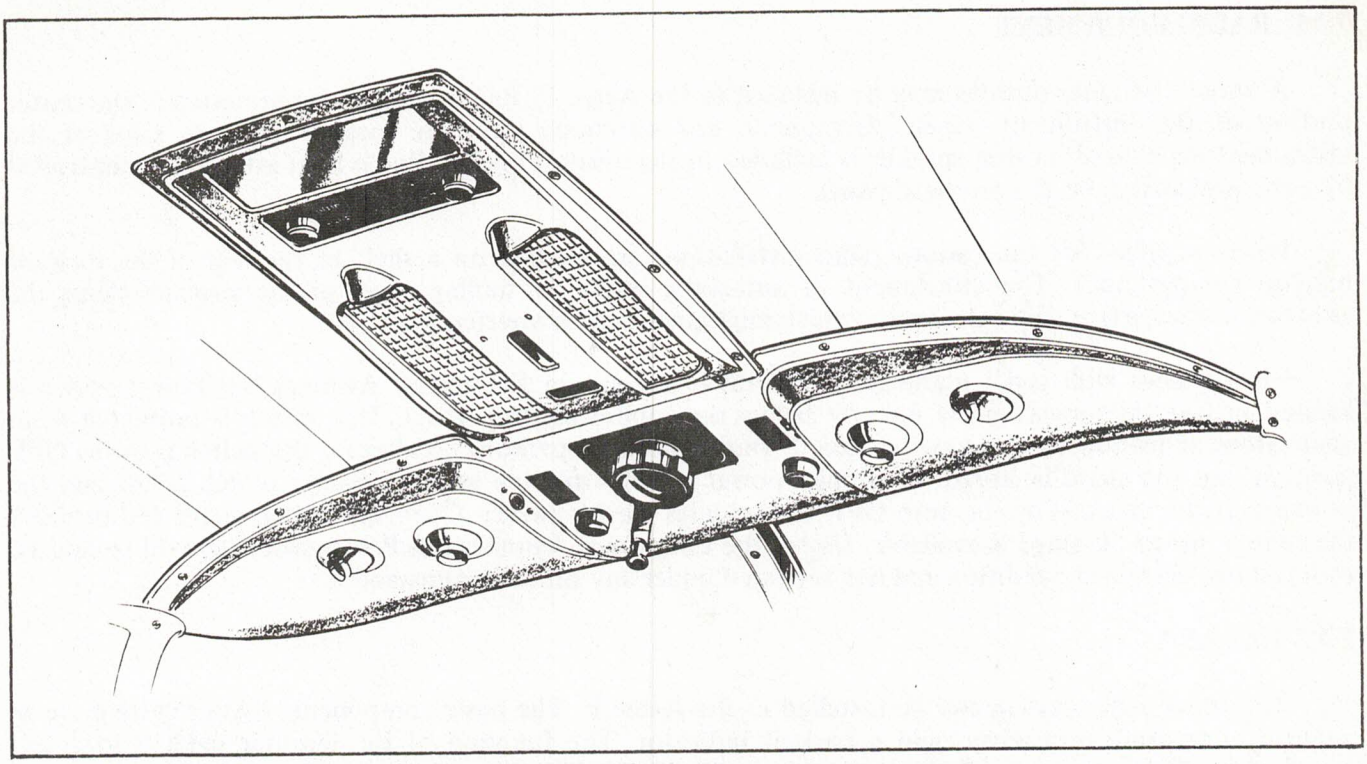
7.33 INSTRUMENT PANEL

The instrument panel of the Aztec F is designed to accommodate a full complement of advanced flight instruments, engine instruments, and navigational and communication equipment. All instruments, both standard and optional, are conveniently arranged for the most effective monitoring and operation.

The flight instrument group, situated directly in front of the pilot, includes the airspeed indicator, the altimeter, the rate of climb indicator, the turn and bank indicator, and the directional and attitude gyro instruments. Optional flight instruments, when installed either as additions or substitutions, are also mounted on the pilot's instrument panel. The copilot's instrument panel may include an optional installation of duplicate flight instruments.

The engine instrument group, located on the inboard side of the right instrument panel, includes a tachometer, fuel flow and manifold pressure gauges, and the exhaust gas temperature gauge. These are dual gauges which simultaneously monitor both engines.

An engine gauge cluster is mounted along the upper portion of the right instrument panel. Gauges in this cluster include fuel quantity gauges, one for each side of the fuel system, and oil pressure gauges, oil temperature gauges, and cylinder head temperature gauges for each engine.



OVERHEAD PANEL

Figure 7-25

Various warning lights and gauges are mounted on the instrument panel. A "Door Ajar" warning light and a glide slope engaged warning light, when this optional feature is installed, are located on the upper left of the instrument panel. The dual suction gauge which monitors the operation of the vacuum system is mounted on the left instrument panel, inboard of the control column. The ammeter and selector knob for monitoring the right or left alternator and the battery are located on the extreme right of the instrument panel.

The eight day clock is at the extreme left of the pilot's panel, and above it is an engine hour meter. Options such as autopilot controls, an avionics master switch, and a radar altimeter switch are mounted on the pilot's instrument panel below the flight instruments. The combustion heater switch is on the right instrument panel, above the circuit breaker panel.

Electrical switches controlling navigation and taxi lights, fuel pumps, pitot heat, deicers, and various other electrical functions, both standard and optional, are located on the sub-panel. The airplane master switch, the parking brake, and mike and earphone jacks are also located on the sub-panel. The section on the right side of the sub-panel holds the circuit breakers.

Radio and radar installations are mounted in the center of the instrument panel. The magnetic compass is attached to the windshield centerpost, above the instrument panel.

Illumination for night flight is provided by post lights on each instrument and by backlighting for the electrical switches, engine gauges, and avionics equipment. Post lights and backlights are turned on or off and brightened or dimmed with two separate rheostat switches mounted on the overhead panel above the crew seats.

7.39 HEATING, VENTILATING AND DEFROSTING

The Aztec F features two separate airflow systems for heating, ventilating, and defrosting. The first system inducts air through a scoop at the bottom of the nose section, aft of the landing light. The heating, ventilating and defrosting functions of this air are controlled by the five cabin air controls at the bottom of the control pedestal. The second system, for ventilation only, inducts fresh air through inlets in the fairing forward of the vertical tail and is controlled by two ventilation knobs on the forward cockpit ceiling and by individually adjustable outlets at each seat location. Cabin air is exhausted through the floor in the aft baggage compartment. A 35,000 B.T.U. Janitrol combustion heater installed in the nose section supplies heated air.

On aircraft with serial numbers 27-7654001 thru 27-8054059 the combustion heater uses gasoline from the left side of the fuel system when the crossfeed is off and from the selected tank when the crossfeed is on. Fuel consumed by the heater does not significantly affect the range of the airplane. The heater features an overheat lockout switch which automatically renders the heater inoperative if a malfunction causes excessively high heater temperature. This safety device has a reset button, which is mounted on the heater shroud and can be reached only through the access panel on the left side of the nose section. The combustion heater is controlled by a three-position cabin heat control switch on the far right of the instrument panel.

On aircraft with serial numbers 27-8154001 and up the combustion heater uses gasoline from the left side of the fuel system when the crossfeed is off and from the selected tank when the crossfeed is on. Fuel consumed by the heater does not significantly affect the range of the airplane. The combustion heater is controlled by a three-position cabin heat control on the far right of the instrument panel. An amber colored indicator/switch is located adjacent to the heater controls and is placarded HEAT-OV/TEMP - Push to RESET. The indicator and the switch are a single unit. In the event that over-temp. condition would occur, an automatic reset thermal switch loaded on the heater will trip a relay which in turn will remove electrical power from the heater and illuminate the HEAT OV/TEMP indicator light. The pilot will be able to reset the heater by pushing the reset switch after the heater has cooled sufficiently to allow the thermal switch to reset.

CAUTION

This switch should only be used one time per flight. Continuous tripping of the overheat switch indicates a failure in the heating system.

The five cabin air control knobs are operated by push-pull movement. The left knob regulates airflow through the bulkhead to the front seat; the second knob from the left regulates airflow through floor vents to the rear seats. This air, as well as defroster air, enters the nose scoop and passes through the combustion heater, and it may be either cool or heated, depending upon the position of the cabin heat control switch.

The center knob on the cabin air control panel regulates the combustion heater thermostat. As it is pulled out or pushed in, cabin heat increases or decreases respectively. This control functions only when the cabin heat control switch is turned on.

The second knob from the right controls airflow to the windshield through the defroster vents. Airflow to the windshield increases as the knob is pulled out. In the event of severe windshield fogging or icing, it may be necessary to drive more air to the defrosters by closing or partially closing the front and rear seat airflow controls.

The knob on the right of the cabin air control panel supplies cold outside air directly from the nose scoop to the front seat through a vent in the bulkhead, bypassing the heater. All five of these control knobs may be set at any intermediate position from fully open to fully closed.

The three position of the cabin heat control switch are "Heat," "Fan," and "Off." When the switch is off, all air entering the cabin will be cool outside air. The fan position activates the fan in the combustion heater without igniting the heater. This function allows cool air to be circulated through the cabin while the airplane is at rest on the ground. It is advisable to place the switch in the fan position for several minutes after the heater has been operating to allow the unit to cool down before its turned off. The heat position activates the combustion heater. When the switch is in the heat position, the combustion heater will ignite as required to maintain the temperature set on the thermostat. To warm the cabin before flight, the master switch and the left electric fuel pump may be turned on and the cabin heat control placed in the heat position. If should be noted, however, that prolonged operation in this manner will deplete the battery.

The two master controls for the overhead ventilating system are located just above the windshield. Turning a control knob counterclockwise regulates airflow to the respective side of the system. Ventilation at each seat may then be controlled individually with the adjustable fresh air outlets in the ceiling above each seat.

Cabin temperature and air circulation may be maintained within a comfortable range by using ventilation and heat controls in various combinations.

7.41 SURFACE DEICING SYSTEM*

The Aztec F may be equipped with optional ice protection devices which will enable it to be flown in light to moderate icing conditions.

The optional pneumatic surface deicers are installed on the leading edges of the wings, the stabilator, and the vertical tail. Air pressure for the inflation of the deicer boots is supplied by the engine-driven pneumatic pumps. During normal operation, when the surface deicer system is turned off, constant suction is applied to the deicer boots to provide smooth, streamlined surfaces on the leading edges.

The pneumatic deicers are controlled by a "momentary on" type switch labeled "Surface Deice." Once this switch on the electric switch panel is activated, the boots complete one inflation cycle. The switch must be reactuated for each additional cycle. This allows the pilot to manually select boot inflation in any time interval as required. After the inflation cycle is completed, the system timer automatically resets, preparing the system to begin another cycle when the control switch is reactuated. The deicers are most effective when operated with 1/4 to 1/2 inch of ice accumulation.

Depressing the surface deice switch activates the system cycle timer, which energizes the pneumatic pressure control valves, allowing pneumatic pump pressure to inflate all pneumatic deicer boots for 7.5 seconds. When the cycle is complete, deicer solenoid valves permit automatic overboard exhaustion of the pressurized air. Suction is then applied to the boots. A blue indicator light, located on the right side panel, illuminates when pressure in the deicer boots is in excess of 10 psi. During the inflation cycle, the light should illuminate, and when the cycle is complete, it should extinguish. Contrary operation of the indicator light may indicate a failure in the pneumatic deicer system. A press-to-test feature allows the bulb to be tested.

*Optional equipment

7.43 ELECTRIC PROPELLER DEICERS*

Optional electrothermal propeller deicer pads are bonded to the leading edges of the propeller blades. Each deicer pad has two separate heating elements, one for the inboard and one for the outboard half.

The propeller deicer system is controlled by an "on-off" type switch on the electric switch panel labeled "Prop Deice." When the switch is actuated, power is supplied to the system timer. Power from the timer is cycled in turn to brush assemblies which distribute power to modified starter ring gears incorporating slip rings. Current is then supplied from the slip rings directly to the propeller deicer pads. A propeller deicer ammeter mounted on the right side panel is connected in series between the switch and the timer to monitor the current through the system. When the propeller deicing system is on, the ammeter needle should be within the green arc on the face of the dial for a normal reading.

The heat of the deicer pads reduces the adhesion between the ice and the propeller. Centrifugal force and the blast of the airstream then cause the ice to be thrown from the propeller blades in very small pieces.

The system timer controls the heating sequence of the deicer pads in the following cycle:

(a) Outboard halves of propeller deicer pads on right engine (30 seconds).
(b) Inboard halves of propeller deicer pads on right engine (30 seconds).
(c) Outboard halves of propeller deicer pads on left engine (30 seconds).
(d) Inboard halves of propeller deicer pads on left engine (30 seconds).

When the system is turned on, heating may begin on any one of the above steps, depending upon the position of the timer switch when the system was turned off from previous use. Once activated, cycling will proceed in the above sequence and will continue until the system is turned off.

A preflight check of the propeller deicers can be accomplished by turning on the prop deice switch and feeling the pads for the proper heating sequence. During this static test, the system should be operated no longer than through two complete cycles.

7.45 HEATED WINDSHIELD PANEL*

An optional heated glass panel may be installed on the exterior of the pilot's windshield to allow visibility in icing conditions. When the switch on the electrical switch panel labeled "Windshield Heat" is turned on, electrical current is supplied to heating elements imbedded in the panel. Unless the airplane is in flight or there is an accumulation of ice on the panel, the unit should not be turned on for a period exceeding thirty seconds.

An operational check of the heated windshield panel may be performed by turning the windshield heat switch on for a period not exceeding thirty seconds and insuring that the panel is warm to the touch.

Prior to flight in conditions where ice might be encountered, it should be ascertained that the heated panel is securely attached and that the lead wire plug is firmly inserted in the socket provided. To facilitate windshield cleaning, the heated panel is hinged at the bottom.

*Optional equipment

7.47 OXYGEN SYSTEM*

An oxygen system to provide supplementary oxygen for the crew and passengers during high altitude flights (above 10,000 feet) is available in the Aztec F as optional equipment. The major components of the Scott oxygen system are a 115 cubic foot oxygen cylinder, an oxygen supply gauge, a flow control knob, a pressure regulator, and six plug-in receptacles.

The oxygen cylinder is mounted forward in the aft baggage compartment. When fully charged, the cylinder contains oxygen at a pressure of 1850 psi at 70°F. The oxygen supply gauge is mounted in the aft cabin bulkhead, above and to the center of the rear seat. The oxygen flow control knob, labeled "Pull-On" is mounted on the fuel management control console between the front seats. The pressure regulator is mounted directly on the oxygen cylinder. Once the oxygen flow control knob is on, each of the oxygen plug-in receptacles operates as an automatic on-off valve. The oxygen cylinder can be recharged through the access door aft of the rear window on the left side of the fuselage.

If high altitude flight is anticipated, it should be determined that the oxygen supply is adequate for the proposed flight and that the passengers are briefed (refer to Figure 7-32). When oxygen is required, the control knob should be pulled up to the on position, allowing oxygen to flow from the cylinder through the system. Connecting the constant flow mask fitting to a receptacle and turning it clockwise 90 degrees automatically releases oxygen flow to the mask through the on-off valve feature of the receptacle. The occupant then dons the mask and breathes normally for a sufficient supply of oxygen.

Each mask assembly oxygen line incorporates a flow indicator. When the red pellet in the indicator disappears, oxygen is flowing through the line normally. If the red indicator appears in any of the lines during a period when oxygen use is essential, the airplane should be lowered to a safe altitude immediately.

When not in use, masks may be stowed in the storage pockets behind the front and center seats. Always remove fittings from the oxygen receptacles and stow the masks when they are not in use. If the control knob is pulled on and the fitting is in the receptacle, oxygen will flow through the mask continuously. Masks may be damaged if they are not properly stowed.

The pilot and copilot masks, identified by a red band on the supply hose, supply 120 liters of oxygen per hour; the passenger masks, identified by a gold band on the supply hose, supply 90 liters of oxygen per hour. In some cases, depending upon mask options installed, the oxygen flow of passenger masks may vary.

CAUTION

Positively NO SMOKING while oxygen is being used by anyone in the airplane.

To stop the flow of oxygen through the system, the control knob should be pushed down to the off position. To bleed down low pressure lines, it is recommended that the mask assembly be left connected to the outlet for at least three minutes after the control knob is turned off.

To preclude the possibility of fire by spontaneous combustion, oil, grease, paint, hydraulic fluid, and other flammable material should be kept away from oxygen equipment.

After each use, permanent type oxygen masks should be cleaned, and disposable type oxygen masks should be replaced.

*Optional equipment

7.49 SEATS

Standard six-place seating in the Aztec F includes individual bucket seats for the crew and the two center passengers and a couch-type rear seat. All seats are removable to accommodate cargo loads. The bucket seats are removed by detaching the stop plates from the seat tracks and then sliding the seats forward or aft as required to disengage the seat supports from the tracks. The rear seat back is removed by pulling it forward and lifting it out; the seat portion is removed by pulling it forward to disengage the pins at the rear and then pushing it rearward to disengage the seat supports from the floorboards.

Both crew seats and both center seats are adjustable fore and aft. The front seat releases are horizontal bars under the seats, and the center seat releases are levers projecting from the center front of the seats, just below the cushions. All four bucket seat backs tilt forward for ease of entry and exit, and all four backs recline to three positions by use of the levers on the sides of the seats.

All seats are equipped with headrests and safety belts with shoulder harnesses. The four forward seat backs incorporate large storage pockets. The seats are comfortably cushioned with foam rubber and are upholstered in a choice of fabric, Naugahyde, or leather. Cleaning procedures should suit the upholstery material installed.

7.51 CABIN FEATURES

Cabin appointments are designed for maximum comfort and convenience. The cabin sound level is reduced by thick fiberglass insulation and double-paned windows. Sun visors over the windshield and curtains on the side windows provide crew and passengers with glare protection.

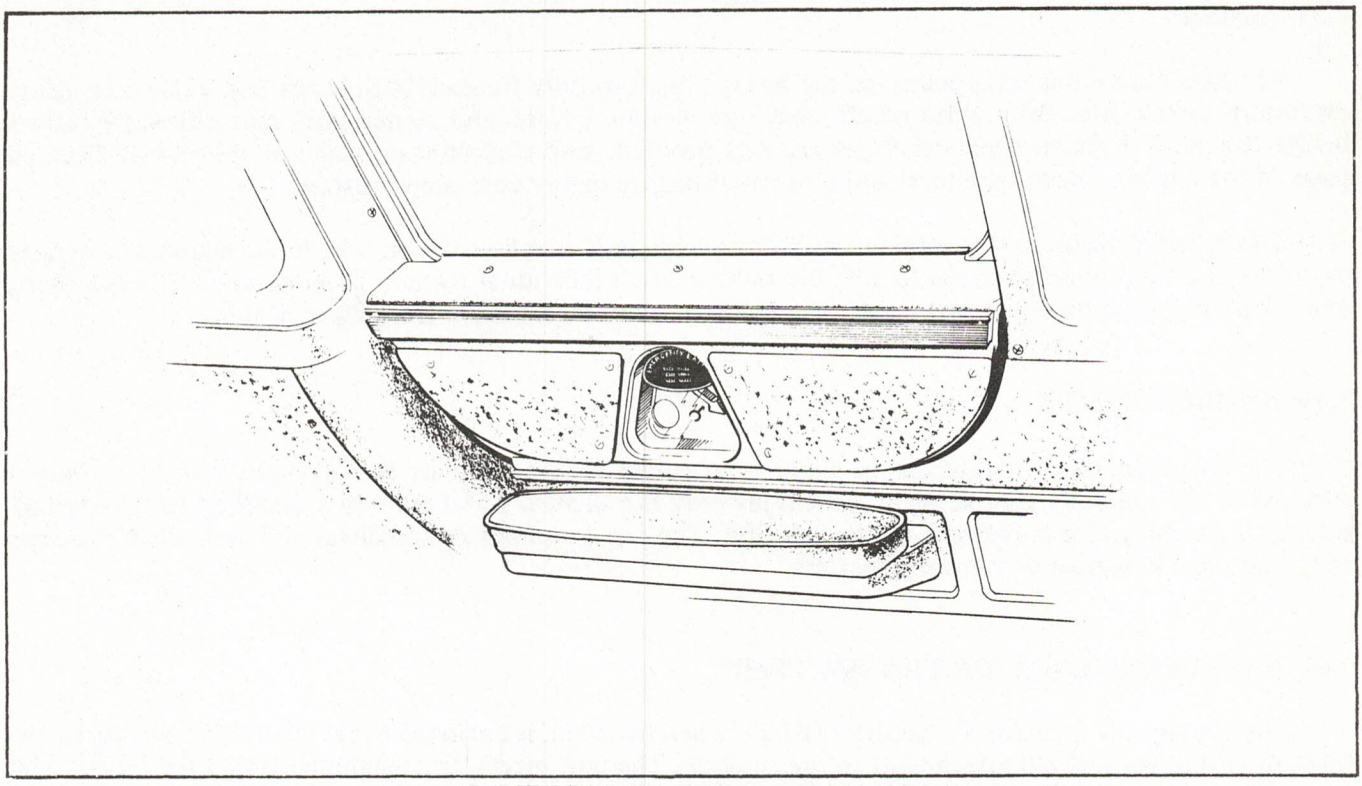
The pilot's side window incorporates a storm window which opens inward. A cigar lighter is installed on the pilot's instrument panel.

CAUTION

Do not use a cigar lighter receptacle as a power source for any devices other than the cigar lighter supplied with the airplane. Damage may result if any other devices are plugged into the cigar lighter receptacle.

There are two overhead map lights for the crew and each passenger seat is provided with a reading light. All six seat locations include armrests, ash trays, individual ventilation controls, and seat belts with shoulder harnesses. Removable armrests on the crew seats may be stowed in scabbards on the outboard foot wells when not in use.

Since shoulder harnesses are equipped with self-adjusting inertia reels, they will extend or retract with normal movement, allowing the seat occupant freedom of movement. Under a sharp forward force, the inertia reel will lock in place. This locking feature prevents the harness from extending and holds the seat occupant in place. Operation of the inertia reel can be checked by tugging sharply on the shoulder strap; the reel should lock, preventing the strap from extending. Shoulder harnesses should be routed over the shoulder nearest the window and secured when the lap belt is latched. Safety belts should be routinely worn during all takeoffs and landings and in emergency situations.



EMERGENCY EXIT WINDOW

Figure 7-35

NOTE

It is the pilot's responsibility to insure that the airplane is properly loaded and that the airplane C.G. falls within the allowable C.G. range.

7.55 STALL WARNING

An approaching stall is indicated by the sounding of a stall warning horn. A lift detector on the outboard left wing activates the horn, which has a completely different sound from that of the gear up warning horn.

NOTE

Passengers unfamiliar with the airplane may be startled by a warning horn unless they are advised of the function of the horns prior to takeoff.

GARRETT 627810-1 OPERATION

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 should be selected whenever the unit is 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, 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 below the hydraulic hand pump on the control pedestal allows the transmitter to be controlled from inside the cabin. The pilot's remote switch is placarded "ON (RESET)," "ARM." The "ARM" position should be selected for all normal flight operations. If activation occurs with the remote switch in the "ARM" position, the transmitter must be reset by selecting the "ON (RESET)" position for one second and returning the switch to "ARM."

CCC CIR 11 OPERATION

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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 Aztec F.

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 Piper dealers or distributors. Any correspondence regarding the airplane should include the airplane model and serial number to insure proper response.

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 in air carrier service. The following is a list of the maintenance which the pilot may perform:

(a) Repair or change tires and tubes.
(b) Service landing gear wheel bearings, such as cleaning, greasing or replacing.
(c) Service landing gear shock struts by adding air, oil or both.
(d) Replace defective safety wire and cotter keys.
(e) Lubrication not requiring disassembly other than removal of non-structural items such as cover plates, cowling or fairings.
(f) Replenish hydraulic fluid in the hydraulic reservoirs.
(g) Refinish the exterior or interior of the aircraft (excluding balanced control surfaces) when removal or disassembly of any primary structure or operating system is not required.
(h) Replace side windows and safety belts.
(i) Replace seats or seat parts with replacement parts approved for the aircraft.
(j) Replace bulbs, reflectors and lenses of position and landing lights.
(k) Replace cowling not requiring removal of the propeller.
(l) Replace, clean or set spark plug clearance.
(m) Replace any hose connection, except hydraulic connections, with approved replacement hoses.
(n) Remove the battery and check fluid level and specific gravity.

Although the above work is allowed by law, each individual should make a self analysis as to whether he has the ability to perform the work.

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.

8.9 GROUND HANDLING

(a) Towing

The airplane may be towed by use of the nose wheel tow bar stowed in the baggage area or with power equipment that will not damage or excessively strain the nose gear steering assembly.

CAUTION

When towing with power equipment, do not turn the nose gear beyond its turning radius in either direction, as this may result in damage to the nose gear and steering mechanism.

CAUTION

The nose wheel steering and rudder control systems are interconnected through the rudder pedals. Any effort to tow the airplane when the rudder control is secured may result in severe damage to the nose wheel steering mechanism and rudder control system.

(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 and taxiing techniques should be covered. When it is ascertained that the propeller back blast and taxi areas are clear, power should be applied to start the taxi roll, and the following procedures should be followed:

(1) Taxi with the propeller in the low pitch, high RPM setting.
(2) When taxiing on uneven ground, avoid holes and ruts.
(3) Observe wing clearances when taxiing near buildings or other stationary objects. If possible, station an observer outside to guide the airplane.
(4) Do not operate the engines at high RPM when running up or taxiing over ground containing loose stones, gravel, or any loose material that might cause damage to the propeller blades.
(5) Be sure that alternate air is not being used.
(6) After taxiing forward a few feet, apply the brakes to determine their effectiveness.
(7) While taxiing, make slight turns to ascertain the effectiveness of the steering.

(c) Parking

When parking the airplane, be sure that it is sufficiently protected against 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) When parking the airplane, head it into the wind if possible.
(2) Always chock the tires. When necessary, the parking brake can be set by applying pressure to the toe brakes at the top of the rudder pedals while pulling out on the parking brake handle just below the left control column. To release the parking brake, apply toe pressure to the pedals and push in on the parking brake handle.

CAUTION

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

8.11 SERVICING AIR FILTERS

Induction air filters should be cleaned and examined at least once every fifty hours. Filters should be replaced if the paper filter material is torn or ruptured, if the housing is damaged, or if the filter is excessively dirty. The usable life of an air filter should be restricted to one year or 500 hours, whichever comes first. Depending on the conditions in which the airplane is operated, filters may have to be cleaned or replaced at shorter intervals.

(a) Normally Aspirated Airplanes

(1) Remove the cover plate from the air cleaner box by turning the quick disconnect wing nut fasteners. Remove the filter from the box.
(2) Check the filter. If it is damaged or excessively dirty, replace it immediately.
(3) Clean the filter by tapping it against a hard surface to remove grit, sand and dirt, being careful not to damage the filter. Do not attempt to blow out dirt with compressed air.
(4) If the filter is found to be in good condition after cleaning, reinstall the filter.
(5) Before reinstalling the filter, examine the filter gasket. It should have no tears and should be securely in place.

(b) Turbocharged Airplanes

(1) Remove the two machine screws from the securing brackets on both sides of the filter box and remove the filter.
(2) Check the filter. If it is damaged or excessively dirty, replace it immediately.
(3) Clean the filter by one of the two following methods:
   a. Keeping the air nozzle at least one inch from the filter, direct a jet of air not exceeding 100 psi up and down the pleats on the clean air side of the filter. This method will remove grit, dust, and sand from the filter.
   b. If carbon, soot, or oil remain on the filter after completing the above procedure, soak the filter for 15 minutes in a good non-sudsing detergent; then swish it gently in the solution for about two minutes. Rinse the filter with a stream of water not exceeding 40 psi until the rinse water is clear. Dry the filter thoroughly before reinstalling, but do not use light bulbs or extreme heat for drying.
(4) Recheck the filter for damage, and if it is found to be clean and sound, reinstall the filter.
(5) Before reinstalling the filter, examine the filter gasket. It should have no tears and should be securely in place.

8.13 BRAKE SERVICE

The brake system incorporates a hydraulic fluid reservoir through which the brake system is serviced periodically. Fluid is drawn from the reservoir by the brake master cylinders to maintain the volume of fluid required for maximum braking efficiency. Spongy brake pedal action is often an indication that the brake fluid reservoir is running low on fluid.

The brake fluid reservoir should be filled to the level marked on the reservoir with MIL-H-5606 fluid. The reservoir, located in the left side of nose section, should be checked at every 100 hour inspection and the fluid replenished as necessary.

8.15 HYDRAULIC SYSTEM SERVICE

The hydraulic system for the landing gear and flaps is filled through a filler tube located inside the left nose access panel. Only petroleum base MIL-H-5606 hydraulic fluid should be used. To add fluid to the system, remove the cap from the filler neck and fill the system completely while holding the filler tube extension in a level position. Then turn the elbow on the filler tube down until the excess fluid has drained out.

8.17 LANDING GEAR SERVICE

The operation of the landing gear shock struts is standard for the air-oil type; hydraulic fluid passing through an orifice serves as the major shock absorber, while air compressed statically acts as a taxiing shock absorber. To provide proper oleo action, the main and nose gear struts must have approximately 3 inches of piston tube exposed under static loads. All major attachments and actuating bearings are equipped with grease fittings for the lubrication of bearing surfaces and require periodic lubrication.

Air and oil are added to a strut through the valve at the top of the unit. To add air to a strut, a strut pump should be attached to the air valve and pumped until three inches of strut piston is exposed with normal static weight on the gears. (Normal static weight is the empty weight of the airplane plus full fuel and oil.)

To add fluid to a strut, the airplane must be placed on jacks and a pan should be placed under the gear to catch spillage. All air must be released from the strut by depressing the valve core pin. When all air is released and the strut is fully extended, the air valve (filler plug) should be removed with the valve core intact. With the strut extended two inches from full compression, hydraulic fluid should be added through the filler opening. The strut should then be fully compressed, allowing excess fluid to overflow and expelling trapped air. With the strut compressed, the air valve may be reinstalled and the strut inflated with air.

8.19 TIRE SERVICE

Tires should be maintained at the proper pressures. Main wheel tires should be inflated to 46 psi and the nose wheel tire to 27 psi if it is four-ply rated or 32 psi if it is six-ply rated. Periodically, the tires should be visually checked for wear, cracks, cuts, bruises, or breaks.

To produce even wear, tires may be reversed on the wheels. All tires and wheels are balanced before installation, and the relationship of tire, tube and wheel should be maintained upon reinstallation. Out-of-balance wheels can cause extreme vibration of the landing gear during takeoffs and landings.

(c) Filling Fuel Cells

Observe all safety precautions required when handling gasoline. Fuel is put into the tank through the fillers on the top surface of the wings. The inboard fillers are for the thirty-six gallon inboard cells, and the outboard fillers are for the thirty-six gallon outboard cells and also for the optional twenty gallon tip tanks when they are installed. When using less than the standard 144 gallon capacity or the 184 gallon capacity with optional tip tanks, fuel should be distributed equally between each side. The placards at the fuel fillers specify the minimum octane fuel which may be used in the airplane.

(d) Draining Fuel Valves and Lines

During the preflight check, fuel valves and lines should be drained to insure that moisture and sediment are removed from the low points in the system. Fuel strainer and fuel line drains are located inside the access doors on the undersides of the nacelles, inboard of the main wheel wells. The three drains inside each access door - inboard and outboard tank and fuel strainer drains - are opened by pushing up on the easy drain valves. It is recommended that fuel be drained into a clear container so that the fuel can be examined for moisture and contaminants.

The fuel crossfeed system should be drained periodically. This is accomplished by opening the crossfeed line drain control located on the front of the fuel management panel between the front seats. With the crossfeed on, the left electric fuel pump and then the right electric fuel pump should be turned on and then off.

When the draining operations are completed, fuel drains should be checked from outside the airplane to ensure that they are completely closed.

CAUTION

When draining fuel, care should be taken to ensure that no fire hazard exists before starting the engines.

(e) Draining Fuel System

The bulk of the fuel may be drained from the system by pumping the fuel out of each tank through the filler opening with a remote fuel pump. Draining may be completed by opening the crossfeed line drain control. Inboard cells should be drained first; then fuel selectors should be moved to the outboard position, allowing the outboard cells to drain through the crossfeed line drain. For an alternate draining procedure, the fuel line quick drain valves and the fuel strainer drains may be opened, or the fuel strainer bowl may be removed, allowing the fuel to run out by gravity.

(b) Cleaning Landing Gear

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

(1) Place a pan under the gear to catch waste.
(2) Spray or brush the gear with solvent or a mixture of solvent and degreaser. To remove especially heavy dirt and grease deposits, it may be necessary to brush areas that were sprayed.
(3) Allow the solvent to remain on the gear from five to ten minutes. Then rinse the gear with additional solvent and allow it to dry.
(4) Remove the protective cover and the catch pan.
(5) Lubricate the gear in accordance with the Lubrication Chart in the PA-23-250 Service Manual.

(c) Cleaning Exterior Surfaces

The airplane should be washed with a mild soap and water solution. Harsh abrasives or alkaline soaps or detergents could scratch painted or plastic surfaces or corrode metal. Cover areas where a 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 stains, use a soft cloth dampened with naphtha.
(5) Rinse all surfaces thoroughly.
(6) Any good automotive wax may be used to protect and preserve painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing. A heavier coat of wax on leading surfaces will reduce the abrasion problems in these areas. Refer to item (h) when surface deicers are installed.

(d) Cleaning Windshield and Windows

CAUTION

Use only mild soap and water when cleaning the heated windshield. Use of ANY other cleaning agent or material may cause distortion or damage to windshield coatings.

(1) Remove dirt, mud, and other loose particles from exterior surfaces with clean water.
(2) Wash interior and exteriosr window surfaces 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 dampened with kerosene.

CAUTION

Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, other strong solvents, or window cleaning sprays. Do not use plastic cleaner on heated glass windshields.

(4) A severe scratch or mar in plastic can be removed by rubbing out the scratch with jeweler's rouge.
(5) When windows are clean, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth. Do not use a circular motion, Do not apply wax on the optional heated windshield.

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SUPPLEMENTS

9.1 GENERAL

This section provides information in the form of supplements which are necessary for efficient operation of the airplane when it is equipped with one or more of the various optional systems and equipment not approved with the standard airplane.

All of the supplements provided in this section are "FAA Approved" and consecutively numbered as a permanent part of this handbook. The information contained in each supplement applies only when the related equipment is installed in the airplane.

SUPPLEMENT 1

OXYGEN SYSTEM INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the airplane when the optional oxygen system is installed. The information in 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 the handbook at all times when the optional oxygen system is installed.

SECTION 2 - LIMITATIONS

(a) No smoking while the oxygen system is in use.

(b) Placards
At each oxygen outlet:

"NO SMOKING WITH OXYGEN IN USE"

At the oxygen control knob:

"PULL ON, PUSH OFF, OXYGEN"

On rear baggage door:

CAUTION

BE CERTAIN BAGGAGE DOORS
ARE PROPERLY CLOSED AND
LOCKED PRIOR TO FLIGHT

MAX. FLOOR LOAD
100 LBS. PER SQ. FOOT
TOTAL COMPARTMENT CAPACITY
105 LBS.
INCLUDES 20 LBS. ON SHELF

BAGGAGE/CARGO MUST BE LOADED
WITHIN THE WEIGHT AND BALANCE LIMITS
OF THIS AIRCRAFT

SECTION 3 - EMERGENCY PROCEDURES

In the event that during operation the red indicator appears in any of the flow indicators, check for oxygen quantity and assure proper engagement of the oxygen mask in the receptacle. If oxygen cannot be supplied, the aircraft should be lowered to a safe altitude immediately.

SUPPLEMENT 2

LYCOMING TURBOCHARGED ENGINES INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the PA-23-250 (Six Place) airplane when the optional Lycoming TIO-540-C1A turbocharged engines are installed. The information contained within this supplement is to be used in conjunction with the complete handbook.

NOTE

For Limitations, Procedures, and Performance information not contained in this supplement, consult the applicable sections of the basic portion of this Handbook.

This supplement has been "FAA Approved" as a permanent part of this handbook and must remain in the handbook at all times when the optional Lycoming turbocharged engines are installed.

SECTION 2 - LIMITATIONS

(a)	Engine	Lycoming Model No. TIO-540-C1A
	Horsepower	250
	Rotation Speed (RPM)	2575
	Max. Manifold Press. at or below 18,500 ft. mean sea level (in. Hg.)	39.5
	Max. Manifold Press. at 24,000 mean sea level (in. Hg.)	31.0

(Straight line variation between points given)

NOTE

This airplane and equipment has been substantiated to 24,000 ft.

(b)	Fuel Grade (minimum octane)	100/130 - Green
(c)	Propellers	Hartzell HC-E2YR-2 Series Constant Speed, Full Feathering
	Blade Model	8465-7R
	Pitch Settings at 30 in. Station	
	Feather	80°
	Low	15.2°

(f) Airspeed Limitations and Indicator Markings - Normal Category

	CAS Knots	IAS Knots
Never Exceed Speed	216	221
(Above 21,000 ft. reduce V_{NE} 4.3 Kts. per 1,000 ft.)		
Maximum Structural Cruising Speed	172	175
Design Maneuvering Speed	129	131
Flaps Extended Speeds	60 to 108	55 to 108
Full Flap	108	108
Half Flap	122	123
Quarter Flap	139	141
Maximum Gear Extended Speed	130	132
Minimum Control Speed (Single Engine)	70	64
Stall Speed		
Gear and Flaps Up	67	61
Gear and Flaps Down	60	55
Best Single Engine Angle of Climb Speed	87	83
Best Single Engine Rate of Climb Speed	90	87
Airspeed Indicator Markings (KIAS)		
Green Arc (Normal Operating Range)		61 to 175
Yellow Arc (Caution Range - Smooth Air)		175 to 221
White Arc (Flaps Extended Range)		55 to 108
Radial Red Line (Never Exceed - Smooth Air)		221
Radial Red Line (Minimum Control Speed - Single Engine)		64
Radial Blue Line (Best Single Engine Rate of Climb Speed)		87

(g) Flight Load Factors

Positive Load Factor (Maximum) at 5200 Lbs.	3.68 G
Negative Load Factor (Maximum) at 5200 Lbs.	-1.47 G

(No Inverted Maneuvers Approved)

(h) Maximum Weights

Maximum Gross Weight	5200 LBS
Maximum Takeoff Weight	5200 LBS
Maximum Landing Weight	4940 LBS
Maximum Zero Fuel Weight	4500 LBS

IT IS THE RESPONSIBILITY OF THE AIRPLANE OWNER AND THE PILOT TO ASSURE THAT THE AIRPLANE IS PROPERLY LOADED. SEE "WEIGHT AND BALANCE" SECTION FOR PROPER LOADING INSTRUCTIONS.

SECTION 3 - EMERGENCY PROCEDURES

Installation of the Lycoming turbocharged engines does not affect the basic Emergency Procedures presented in Section 3 of this Pilot's Operating Handbook.

SECTION 4 - NORMAL OPERATING PROCEDURES

The following instructions apply specifically to PA-23-250 (Six Place) airplanes with Lycoming TIO-540-C1A turbocharged engines installed. Refer to Normal Procedures presented in Section 4 of this Pilot's Operating Handbook for all other normal operating procedures.

(a) Under full throttle operations (such as takeoff and climb) the engines of this aircraft have been adjusted to provide 33.0 in. Hg. of manifold pressure at sea level and standard temperature. It is possible to have a reading higher (up to 39.5 inches of manifold pressure) or lower than 33.0 inches of manifold pressure when corresponding ambient temperatures are higher or lower than standard.

(b) The engines of this airplane are equipped with dynamic counterweight systems. Therefore, avoid rapid closing or opening of the throttle in order to prevent serious damage which could cause malfunction.

(c) When increasing power, increase engine speed prior to increasing manifold pressure. When decreasing power, decrease manifold pressure before decreasing engine speed.

(d) See Lycoming instructions for the approved leaning procedure.

SECTION 5 - PERFORMANCE

Section 5 of this Pilot's Operating Handbook presents information which shows the effect of the optional Lycoming turbocharged engines installation on the Performance of the airplane.

SUPPLEMENT 3

ALTIMATIC V-1 INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the airplane when the optional AltiMatic V-1 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 Bendix STC No. SA429SO and must remain in this handbook at all times when the optional AltiMatic V-1 is installed.

NOTE

The maximum altitude for operation of the autopilot has not been determined. The maximum altitude demonstrated during flight tests was 24,000 feet.

SECTION 2 - LIMITATIONS

(a) Autopilot OFF during takeoff and landing.
(b) Do not engage autopilot if airplane is out of trim.
(c) Maximum airspeed for autopilot operation is 213 kts. IAS.
(d) During autopilot operation, the pilot must be in his seat with the safety belt fastened.
(e) Do not manually override autopilot to produce or prevent pitch attitude changes or to increase bank angle.
(f) During autopilot operation, the wing flaps must be fully retracted.

SECTION 3 - EMERGENCY PROCEDURES

(a) AUTOPILOT
  (1) In the event a malfunction in the autopilot performance is detected, the pilot must immediately disengage the autopilot by momentarily pressing the autopilot release switch on the control wheel.
  (2) Maximum altitude loss during malfunction tests in the following flight configurations:
    a. Cruise, Climb, Descent 160 feet
    b. ILS Approach 100 feet

(b) PITCH TRIM
  (1) If trim warning light illuminates in flight, turn trim quick disconnect switch OFF and pull the pitch trim circuit breaker; have system inspection prior to operation.
  (2) If electric trim runs at any time without actuating the trim switch, turn the trim quick disconnect switch to OFF.
  (3) If the trim circuit breaker releases or the trim follow-up becomes inoperative during autopilot operation, disengage the autopilot and pull the trim circuit breaker.

Preflight

The following preflight shall be conducted prior to each flight and during flight as considered appropriate.

(1) Autopilot master switch - ON
(2) Trim warning light - OUT
(3) Manual trim crank freedom of movement - Check
(4) Actuate electric trim slide switch and observe proper direction of movement of manual trim crank - Check.
(5) Press the press-to-test button next to the trim warning light. Light should light while being pressed and trim should not run - Check.
(6) Push trim quick disconnect switch to OFF. Push trim switch to UP or DN. Trim should not run.

(i) AUTOMATIC ALTITUDE CONTROLLER

(1) Altitude control is automatically engaged when the pitch command disc is in the center detent position unless the altitude control disable switch on the front of the flight controller is pulled.
(2) Rotating the pitch command disc from detent position disengages altitude control and glide slope.
(3) When pitch command disc is in center detent position, ALT light on flight controller will light.

NOTE

The altitude controller attempts to maintain the aircraft at the selected altitude by changing the pitch attitude of the aircraft. The human pilot must then maintain power settings to assure a safe airspeed.

NOTE

If for any reason there is a deviation from the selected altitude of more than approximately 300 feet, the altitude controller will recycle to the new altitude.

(j) HEADING SELECTOR - The heading knob on the Directional Gyro may be used to select any heading prior to pushing the (HDG) heading engage button. When the heading engage button is pressed, the aircraft will turn to the selected heading in the direction which is less than 180°, and at a bank angle of no more than 25°, and HDG light on the heading button will light.

(k) OMNI BEARING SELECTOR

NOTE

There are two methods of intercepting a VOR.

(1) Variable intercept angle - With this method, the pilot may preselect any intercept angle desired.
   a. After identifying desired omni station, select desired omni course on the NAV indicator by rotating the OBS knob.

b. Position the heading bug and select the desired intercept angle by rotating the HDG knob on the heading indicator.
c. Simultaneously press HDG and APPR buttons on the controller. HDG and APPR buttons will light. Aircraft will turn toward the heading selected until the lateral deviation needle moves approximately one dot away from full deflection. At this time, the HDG button on the controller will go out and the aircraft will assume an automatic 45° intercept angle.

NOTE

If the NAV indicator is not equipped with a course datum synchro, the HDG bug must be reset to the same heading as the selected omni course when the HDG light goes out.

(2) Fixed intercept angle
a. Set course to the published inbound course by rotating the OBS knob on the NAV indicator.
b. Press the APPR button on the controller. APPR button light will come on and aircraft will turn left or right, depending upon the relation of the aircraft heading to that of the localizer inbound heading. Aircraft will automatically assume an intercept course of no more than 45° to the localizer. For the reason explained in Paragraph (k)(2)b., do not select APPR until the aircraft heading is less than 120° from the localizer inbound heading.

NOTE

If the NAV indicator is not equipped with a course datum synchro, the HDG bug must be reset to the same heading as the selected omni course.

(3) When the APPR button is pressed, Glide Slope is automatically armed and the aircraft will bracket the Glide Slope and begin a rate of descent commensurate with the Glide Slope angle and airspeed providing the following conditions are met:
a. Glide Slope Pointer on NAV Indicator is centered.
b. Pitch command disc is in center detent (altitude hold) position.
c. Aircraft is established on localizer beam at least 20 seconds prior to Glide Slope interception.
d. Auto GS disable knob is not pulled.

NOTE

This system is equipped with a manual Glide Slope button and can capture the Glide Slope automatically as outlined in Paragraph (l)(3) or manually by pressing the GS button when the Glide Slope Pointer centers, provided the aircraft is in altitude hold and APPR mode, and GS disable knob is not pulled.

(4) When the aircraft couples to the Glide Slope signal the GS light on the controller will light, and ALT light extinguishes.

SUPPLEMENT 4

ALTIMATIC V F/D-1 INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the airplane when the optional AltiMatic V F/D-1 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 Bendix STC No. SA429SO and must remain in this handbook at all times when the optional AltiMatic V F/D-1 is installed.

NOTE

The maximum altitude for operation of the autopilot has not been determined. The maximum altitude demonstrated during flight tests was 24,000 feet.

SECTION 2 - LIMITATIONS

(a) Autopilot OFF during takeoff and landing.
(b) Do not engage autopilot if airplane is out of trim.
(c) Maximum airspeed for autopilot operation is 213 kts. IAS.
(d) During Flight Director/Autopilot operation, the pilot must be in his seat with the safety belt fastened.
(e) Do not manually override autopilot to produce or prevent pitch attitude changes or to increase bank angle.
(f) During autopilot operation, the wing flaps must be fully retracted.

SECTION 3 - EMERGENCY PROCEDURES

(a) AUTOPILOT
  (1) In the event a malfunction in the autopilot performance is detected, the pilot must immediately disengage the autopilot by momentarily pressing the autopilot release switch on the control wheel.
  (2) Maximum altitude loss during malfunction tests in the following flight configurations:
    a. Cruise, Climb, Descent 160 feet
    b. ILS Approach 100 feet

(b) PITCH TRIM
  (1) If trim warning light illuminates in flight, turn trim quick disconnect switch OFF and pull the pitch trim circuit breaker; have system inspection prior to operation.
  (2) If electric trim runs at any time without actuating the trim switch, turn the trim quick disconnect switch to OFF.

The manual electric trim is obtained by actuating the electric trim switch on the pilot's control wheel in the desired direction. During normal autopilot operations, actuation of the trim switch in either direction disconnects autopilot and electric trim is immediately available. A system fault or malfunction will be indicated by the trim warning light, but trim will not run away (see Trim Emergency Procedures).

Preflight

The following preflight shall be conducted prior to each flight and during flight as considered appropriate.

(1) FD/AP master switch - ON
(2) Trim warning light - OUT
(3) Manual trim crank freedom of movement - Check
(4) Actuate electric trim slide switch and observe proper direction of movement of manual trim crank - Check.
(5) Press the press-to-test button next to the trim warning light. Light should light while being pressed and trim should not run - Check.

(j) AUTOMATIC ALTITUDE CONTROLLER

(1) Altitude control is automatically engaged when the pitch command disc is in the center detent position unless the altitude control disable switch on the front of the flight controller is pulled.
(2) Rotating the pitch command disc from detent position disengages altitude control and glide slope.
(3) When pitch command disc is in center detent position, ALT light on flight controller will light.

NOTE

The altitude controller attempts to maintain the aircraft at the selected altitude by changing the pitch attitude of the aircraft. The human pilot must then maintain power settings to assure a safe airspeed.

NOTE

If for any reason there is a deviation from the selected altitude of more than approximately 300 feet, the altitude controller will recycle to the new altitude.

(k) HEADING SELECTOR - The heading knob on the Horizontal Situation Display may be used to select any heading prior to pushing the (HDG) heading engage button. When the heading engage button is pressed, the command dots will command the direction and attitude to satisfy the heading command, the aircraft will turn to the selected heading in the direction which is less than 180°, and at a bank angle of no more than 25°, and HDG light on the heading button will light.

(l) OMNI BEARING SELECTOR - There are two methods of intercepting a VOR.

(1) Variable Intercept Angle - With this method, the pilot may preselect any intercept angle desired.
   a. After identifying desired OMNI station, select desired OMNI course on the Horizontal Situation Display by rotating the CRS knob on the HSD until the course arrow aligns with the desired OMNI course.

(2) When the APPR button is pressed, Glide Slope is automatically armed and the aircraft will bracket the Glide Slope and begin a rate of descent commensurate with the Glide Slope angle and airspeed providing the following conditions are met:
   a. Glide Slope Pointer on HSD is centered.
   b. Pitch command disc is in center detent (altitude hold) position.
   c. Aircraft is established on localizer beam at least 20 seconds prior to Glide Slope interception.
   d. Auto GS disable knob is not pulled.

NOTE

This system is equipped with a manual Glide Slope button and can capture the Glide Slope automatically as outlined in Paragraph (m)(2), or manually by pressing the GS button when the Glide Slope Pointer centers, providing the aircraft is in altitude hold and APPR mode, and GS disable knob is not pulled.

(3) When the aircraft couples to the Glide Slope signal the GS light on the controller will light and ALT light extinguishes.
(4) Glide Slope may be disengaged and altitude or attitude maintained while flying the localizer by pulling the Auto GS Disable knob, or pressing NAV button on the controller or rotating the pitch command disc out of detent until the aircraft has departed the Glide Slope by one dot.
(5) For a Back Course Localizer approach select the localizer front course inbound heading. Press REV button on controller. Both APPR and REV button lights will light indicating to the pilot that he is in both the localizer and reverse modes.
(6) Go-around button in the left throttle lever knob may be pressed anytime the pilot decides not to continue the approach to landing. Pressing the GA button will cause the aircraft to automatically assume a pitch attitude of approsimately eight degrees nose up (pilot must adjust power settings to maintain airspeed). Aircraft will continue to hold on to localizer. GA light on controller will light. If a missed approach heading is selected and HDG button pressed, aircraft will turn to selected heading, and remain in a pitch up attitude of approximately 8 degrees. Movement of the pitch command disc will disengage the GA mode. GA light will go out, aircraft will take up a wings-level attitude depending on position of pitch command disc.
(7) If the approach is carried to completion, the Automatic Pilot Release Switch must be momentarily pressed prior to landing, thus disconnecting the Automatic Pilot and returning the aircraft to manual control for completion of the landing.

SECTION 5 - PERFORMANCE

Installation of the AltiMatic V F/D-1 does not effect the basic Performance information presented by Section 5 of this handbook.

SUPPLEMENT 5

ALTIMATIC IIIC INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the airplane when the optional AltiMatic IIIC 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 AltiMatic IIIC is installed.

SECTION 2 - LIMITATIONS

(a) The maximum speed for autopilot operation is 190 kts. IAS. (Autopilot Vmo)
(b) Reduce autopilot Vmo 4.3 kts. IAS for each 1000' above 21,000'.
(c) Use of flaps not authorized during autopilot operation.
(d) Autopilot "OFF" during takeoff and landing.
(e) Placard PN 13A660 "Conduct Trim check prior to flight (see A F/M)" to be installed in clear view of pilot.

SECTION 3 - EMERGENCY PROCEDURES

AUTOPILOT EMERGENCY PROCEDURE

This aircraft is equipped with a Master Disconnect/Interrupt Switch on the pilot's control wheel. When the switch button is depressed it will disconnect the autopilot. When depressed and held it will interrupt all Electric Elevator Trim Operations. Trim operations will be restored when the switch is released. If an autopilot or trim emergency is encountered, do not attempt to determine which system is at fault. Immediately depress and hold the Master Disconnect/Interrupt button. Turn off autopilot and trim master switch and retrim aircraft, then release the interrupt switch.

NOTE

During examination of this supplement, the pilot is advised to locate and identify the autopilot controls, the trim master switch and circuit breakers for both systems.

(a) In the event of an autopilot malfunction the autopilot can be:
(1) Overpowered at either control wheel.

(c) With card disabled:
(1) NSD 360 - VOR and Glide Slope displays are still functional; use card set to rotate card to aircraft heading for correct picture. The Localizer left-right information is still usable, Flag information is disabled - compare needle with # 2 indicator for valid left-right needle operation.
(2) NSD 360A - VOR/Localizer and Glide Slope displays are still functional; use card set to rotate card to aircraft heading for correct picture.

(d) Salving Failure - (i.e. failure to self correct for gyro drift):
(1) Check gyro slaving switch is set to No. 1 position (if equipped with Slave No. 1 - No. 2 switch) or "Slaved" position when equipped with Slaved and Free Gyro Mode Switch.
(2) Check for HDG Flag.
(3) Check compass circuit breaker.
(4) Reset heading card while observing slaving meter.

NOTE

Dead slaving meter needle or a needle displaced fully one direction indicates a slaving system failure.

(5) Select slaving amplifier No. 2, if equipped. If not equipped, proceed with No. 7 below.
(6) Reset heading card while checking slaving meter. If proper slaving indication is not obtained.
(7) Switch to free gyro mode and periodically set card as an unslaved gyro.

NOTE

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 INSPECTION - AUTOPILOT

(a) Roll Section
(1) Place Radio Coupler in "Heading" mode and place roll rocker switch "ON" 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 Heading Bug to aircraft heading. Engage "Heading" mode rocker switch and rotate heading bug right and left. Aircraft control wheel should turn same direction as bug. Grasp control wheel and manually override servo, both directions.
(3) Disengage autopilot by depressing trim switch. Check aileron operation is free and autopilot is disconnected from controls.

(b) Pitch Section
(1) Engage "Roll" rocker switch.
(2) Center pitch command disc and engage "Pitch" rocker switch.
(3) Rotate pitch command disc up and then down and check control yoke moves same direction. Check to see that servo can be overridden by hand at control wheel.

AUTOPILOT IN-FLIGHT PROCEDURE

(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 ROLL rocker 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 to select desired heading. Push console heading rocker (HDG) to "ON" position. (Maximum angle to bank will be 20° with heading lock engaged.)

(d) Pitch Section (Roll section must be engaged prior to pitch section engagement).
(1) Center pitch trim indicator with the pitch command disc.
(2) Engage pitch rocker switch. To change attitude, rotate pitch command disc in the desired direction.

(e) Altitude Hold

Upon reaching desired or cruising altitude, engage altitude hold mode rocker switch. As long as Altitude Hold mode rocker is engaged, aircraft will maintain selected altitude. For maximum passenger comfort, rate of climb or descent should be reduced to approximately 500 FPM prior to altitude hold engagement.

NOTE

Prior to disengaging Altitude Hold mode, rotate Pitch Command to center.

(f) Radio Coupling VOR-ILS with H.S.I. 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 angle, diminishing as the needle off-set 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 the localizer. Select LOC-REV to intercept and track the localizer course outbound to procedure turn area.
c. Engage HDG mode on autopilot console to engage coupler.

c. Automatic Glide Slope capture will occur at Glide Slope intercept if the following conditions are met:
   1. Coupler in LOC-Normal mode.
   2. Altitude Hold mode engaged (Altitude Rocker on Console).
   3. Under Glide Slope for more than 20 seconds.
   4. Localizer radio frequency selected on NAV Receiver.

d. At Glide Slope Intercept immediately lower landing gear and reduce power to maintain 104 kts. IAS on final approach, Glide Slope capture is indicated by lighting of the green Glide Slope engage Annunciator Lamp and by a slight pitch down of the aircraft.

e. Monitor localizer and Glide Slope raw data throughout approach. Adjust power as necessary to maintain correct final approach airspeed. All power changes should be of small magnitude and smoothly applied for best tracking performance. Do not change aircraft configuration during approach while autopilot is engaged.

f. Conduct missed approach maneuver as described in (h) (1) e. above.

NOTE

Glide Slope Coupler will not automatically decouple from Glide Slope. Decoupling may be accomplished by any of the following means:

1. Disengage Altitude Mode.
2. Switch Radio Coupler to HDG Mode.
3. Disengage Autopilot.

SECTION 5 - PERFORMANCE

Installation of the AltiMatic IIIC does not effect the basic Performance information presented by Section 5 of this handbook.

SUPPLEMENT 6

ICING EQUIPMENT INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the airplane when the optional Icing Equipment 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 Icing Equipment is installed.

SECTION 2 - LIMITATIONS

The following items of equipment must be installed and operable to effectively cope with normally encountered icing conditions:

(a) B. F. Goodrich Wing and Tail Pneumatic Deicing Boots Installed per Piper Drawing No. 15585-2.

(b) B. F. Goodrich Electric Propeller Deicing Installed per B. F. Goodrich S.T.C. No. SA195EA, dated June 24, 1964, or FAA approved equivalent or Piper Drawing No. 32740-2. (Ref. Item 504 (c), Aircraft Specification No. 1A10.)

(c) Piper Antennas Installed per P.A.C. Dwg. 31628. No special operating instructions required.

(d) Piper Heated Glass Panel on Windshield Installed per P.A.C. Dwg. 31640-3. (Ref. Item 502 (c), Aircraft Specification No. 1A10.)

(e) Heated Pitot Head per P.A.C. Dwg. 19024-3. No special operating instructions required. (Ref. Item 601 (a), Aircraft Specification No. 1A10.

PLACARDS

(a) At switch:

W'SHIELD
HEAT

NOTE

When all items of equipment listed above are installed, the placard "Warning - This aircraft is not fully equipped for flight in icing conditions." IS NOT REQUIRED. When the heated panel is removed or any of the above listed installed equipment is inoperable (known before flight) the warning placard must be reinstalled.

(b) Pneumatic Deicing System

(1) Operating Procedures

Preflight Check

a. Check wing deice indicator (press-to-test).
b. Check source indicator for pump malfunction.
c. At approximately 2000 RPM, check the deicer operation. Actuate wing deice switch. In approximately three seconds the indicator light will glow, indicating inflation. Also check the deicer boots visually.

Normal Operation

a. Light Icing - Actuate pneumatic wing deice switch. Boots will complete one inflation cycle. Wing deice indicator will glow during the 7 1/2 second inflation period. Most effective deicing is obtained if a thickness of 1/4 to 1/2" of ice is collected before the deicers are operated.
b. Heavier Icing - The wing deice switch will permit the operator to manually cycle the system at any desired time interval, should icing conditions require.

NOTE

With both engines at 2000 RPM and all other system checks normal, a time between boot actuation and indicator light illumination exceeding 4 seconds indicates a leak in the system.

(2) Altitude Limitations on Deicer Boots

The deicer boots have been tested and approved for all altitudes up to and including 24,000 feet with the following limitations in icing conditions:

No. of Pneumatic Pumps	Engine Speed RPM	Altitude	Max. Altitude for Optimum Boot Effectiveness
2	2200	20,000 ft. and below	20,000 ft.
2	2575	Above 20,000 ft.	24,000 ft.
1	2575	All altitudes	15,000 ft.

SUPPLEMENT 7

AUTOCONTROL IIIB INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the airplane when the optional AutoControl IIIB 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 SA3022SW-D and must remain in this handbook at all times when the optional AutoControl IIIB is installed.

SECTION 2 - LIMITATIONS

(a) Autopilot use prohibited above 195 kts. IAS. (Autopilot Vmo)
(b) Reduce autopilot Vmo 4.3 kts. IAS for each 1000' above 21,000'.
(c) Autopilot "OFF" during takeoff and landing.

SECTION 3 - EMERGENCY PROCEDURES

(a) In an emergency the AutoControl IIIB can be disconnected by:
  (1) Pushing the roll 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 55° bank and 150' altitude loss.
(d) An autopilot runaway, with a 1 second delay in the initiation of recovery, during an approach operation, coupled or uncoupled, could result in a 15° bank and 30' altitude loss.
(e) In the event of engine failure, disconnect autopilot and retrim aircraft, conduct normal engine-out procedures and re-engage autopilot. Maintain aircraft yaw trim during all single engine operations.

EMERGENCY OPERATION WITH OPTIONAL HSI
(Slaved and/or Non-Slaved)

(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. 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 off set diminishes.

d. NAV mode - NAV mode provides reduced VOR sensitivity for tracking weak, or noisey 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 the 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 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 O.B.S.

(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

Installation of the AutoControl IIIB does not effect the basic Performance information presented by Section 5 of this handbook.

SUPPLEMENT 8

FCS-810 AFCS WITHOUT FLIGHT DIRECTOR INSTALLATION

SECTION 1 - GENERAL

This supplement supplies information necessary for the efficient operation of the airplane when the optional FCS-810 with the FC-823E Flight Controller is installed. The information contained within this supplement is to be used in conjunction with the complete handbook.

This supplement has been "DOA Approved" as a permanent part of this handbook based on Bendix STC No. SA429SO and must remain in this handbook at all times when the optional FCS-810 AFCS without Flight Director is installed.

NOTE

The maximum altitude for operation of the autopilot has not been determined. The maximum altitude demonstrated during flight tests was 24,000 feet.

SECTION 2 - LIMITATIONS

(a) Autopilot OFF during takeoff and landing.
(b) Do not engage autopilot if airplane is out of trim.
(c) Maximum airspeed for autopilot operation is 213 KTS. IAS.
(d) During autopilot operation, the pilot must be in his seat with the safety belt fastened.
(e) Do not manually override autopilot to produce or prevent pitch attitude changes or to increase bank angle.
(f) During autopilot operation, the wing flaps must be fully retracted.
(g) Do not engage the altitude hold mode with vertical speeds in excess of 1500 feet per minute.

SECTION 3 - EMERGENCY PROCEDURES

(a) Autopilot
  (1) In the event a malfunction in the autopilot performance is detected, the pilot must immediately disengage the autopilot by momentarily pressing the TRIM/AUTOPILOT DISCONNECT SWITCH. This switch is on the left side of the pilot's control wheel.
  (2) Maximum altitude loss during malfunction tests in the following flight configuration.

a.	Cruise, Climb, Descent	160 feet
b.	ILS Approach (with all engine operating)	100 feet
c.	ILS Approach (with one engine inoperative)	100 feet

IN-FLIGHT

NOTE

When engaging the autopilot, the pitch synchronizer will automatically stabilize the aircraft in the pitch attitude existing at the time of engagement.

(a) Engagement

(1) Manually adjust aircraft trim in WINGS-LEVEL attitude prior to engaging autopilot. Press the AP ENGAGE BUTTON which will light upon engagement. To climb, actuate the pitch rocker switch to UP. To descend, actuate the pitch rocker switch to DN.

(2) PITCH SYNC BUTTON - Pressing and holding the PITCH SYNC button, located on the pilot's wheel, disengages the pitch axis to allow the pilot to manually change the aircraft pitch attitude. The pitch trim indicator, when centered, indicates to the pilot that the autopilot has synchronized to the aircraft pitch attitude. While the PITCH SYNC button is depressed, manual electric trim may be actuated without disengaging the autopilot. When the PITCH SYNC button is released, the pitch axis will again engage, synchronized to the new pitch attitude. SYNC will cancel GS, ALT, or GA modes.

(b) Automatic Pitch Trim

Automatic pitch trim is provided whenever the autopilot is engaged. Any attempt to overpower the autopilot pitch axis will cause the pitch trim to oppose the applied force, resulting in an out-of-trim condition.

(c) Manual Electric Trim/AP Disengage

During normal AP operations, actuation of the trim switch in either direction disconnects AP and electric trim is immediately available. The electric trim system design is such that a single fault, other than a stuck switch will not cause a runaway trim. Other faults will be indicated by the trim warning light or by a pre-flight check. Illumination of the trim warning light indicates that a single fault has occurred, but trim will not run away. (See Emergency Pitch Trim Procedures.)

c Simultaneously press HDG and NAV buttons on the controller. HDG and NAV buttons will light. The aircraft will turn toward the heading selected until the lateral deviation needle moves approximately one dot away from full deflection. At this time, the HDG button light on the controller will go out and the aircraft will assume a normal 45° intercept angle.

NOTE

If the NAV indicator is not equipped with a course datum synchro, the heading bug must be reset to the same heading as the course select pointer when the HDG light goes out.

(2) Fixed Intercept Angle

a. After identifying the desired omni station, select desired omni course on the HSD or NAV indicator by rotating the CRS knob until the course select pointer aligns with the desired omni course.

b. Press the NAV button. Button light comes on. Aircraft will turn left or right, depending upon the relation of the aircraft heading to that of the selected omni bearing. If the omni bearing selected is less than 120° from the aircraft heading when the NAV mode is selected, the aircraft will turn toward the selected omni course. At angles of 120° or greater, the aircraft will turn away from the selected omni course and continue to turn through the larger angle until a proper intercept angle is established. In either case, the aircraft will assume an intercept course which will be no greater than 45° to the selected omni course.

NOTE

If the NAV indicator is not equipped with a course datum synchro, the heading bug must be set to the same heading as the course select pointer.

(g) Automatic Approach Coupler

NOTE

There are two methods of intercepting the localizer.

(1) Variable Intercept Angle - This method is recommended when being vectored toward the localizer, by approach control, with the HDG and APPR modes engaged.

a. Align course arrow with the published inbound course by rotating the CRS knob on the HSD or NAV indicator.

b. Position the heading bug to select the desired intercept angle by rotating the HDG knob on the HSD or DG.

d. Back Course Localizer

For a back course localizer approach, select the localizer front course inbound heading. Press REV button on controller. Both APPR and REV button lights will light, indicating to the pilot that he is in both the localizer and reverse modes.

e. Go-Around

Go-around switch may be pressed any time the pilot decides not to continue the approach to landing. Pressing the GA switch will cause the aircraft to automatically assume a pitch attitude of approximately eight degrees nose-up. (Pilot must adjust power settings to maintain airspeed.) Aircraft will continue to track localizer. GA light on controller will light. If a missed approach heading is selected and HDG button pressed, aircraft will turn to the selected heading, and remain in a pitch-up attitude of approximately eight degrees. Movement of the pitch rocker switch, pressing the pitch SYNC button, or ALT button will disengage the GA mode.

f. AP Release Switch

If the approach is carried to completion, the Trim/Autopilot Disconnect switch must be momentarily pressed prior to landing, thus disconnecting the automatic pilot and returning the aircraft to manual control for completion of the landing.

SECTION 5 - PERFORMANCE

Installation of the FCS-810 AFCS does not effect the basic Performance information presented by Section 5 of this handbook.