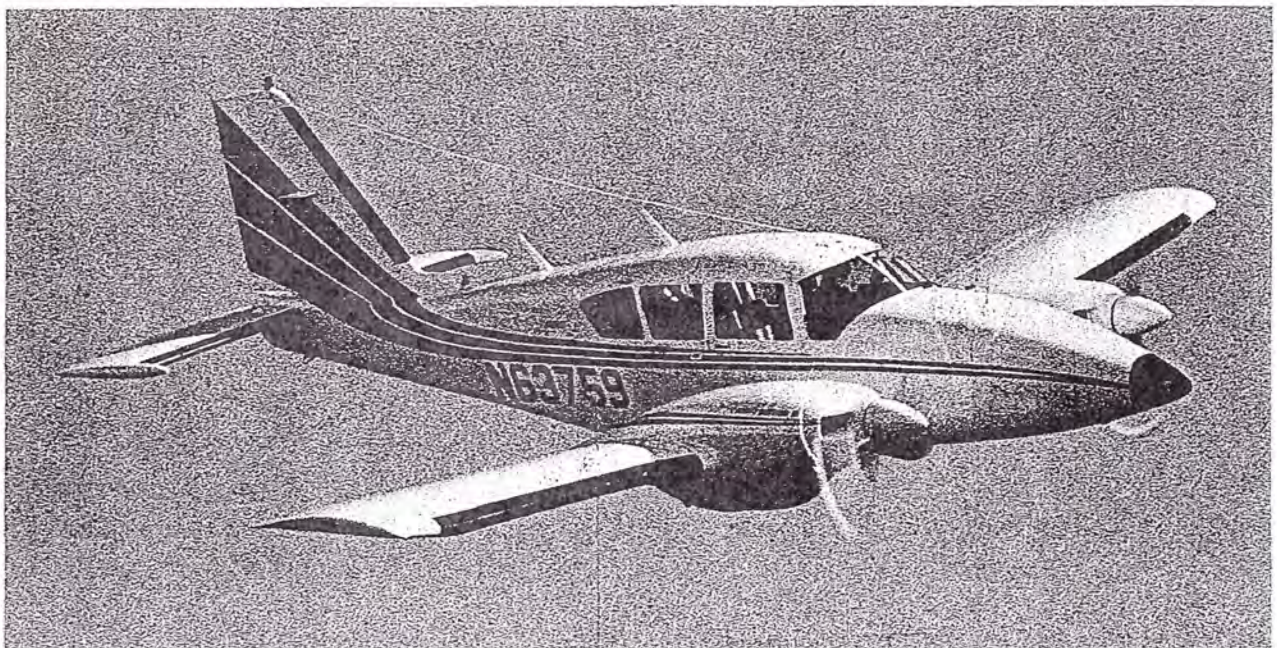
PILOT'S OPERATING HANDBOOK

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.

AIRPLANE SERIAL NO. 27-7954036

AIRPLANE REGISTRATION NO. C-GPQA

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

FAA APPROVED BY: Paul E. Everly

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HANDBOOK PART NO. 761 594

WARNING

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

MODEL PA-23-250 (SIX PLACE), AZTEC F

PILOT'S OPERATING HANDBOOK, REPORT: 1948 REVISION 10

PIPER AIRCRAFT CORPORATION
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GENERAL

SECTION 1

GENERAL

1.1 INTRODUCTION

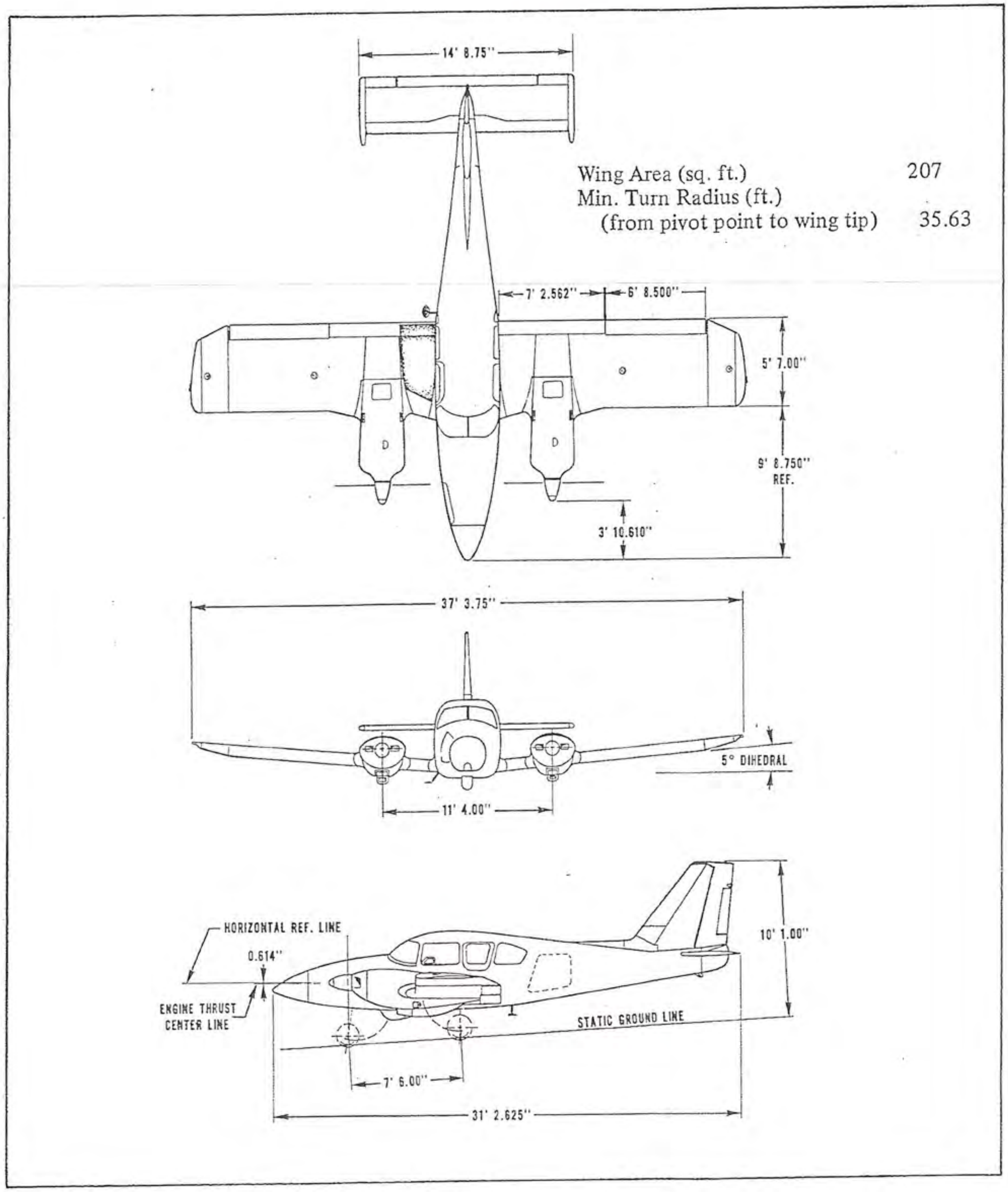
This Pilot's Operating Handbook is designed for maximum utilization as an operating guide for the pilot. It includes the material required to be furnished to the pilot by C.A.R. 3 and FAR Part 21, Subpart J. It also contains supplemental data supplied by the airplane manufacturer.

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

Figure 1-1

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

(c) Fuel Grade, Aviation	NORMALLY ASPIRATED	TURBOCHARGED**
(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.

1.9 OIL

(a) Oil Capacity (U.S. quarts)	12
(b) Oil Specification	Refer to latest issue of Lycoming Service Instruction 1014.
(c) Oil Viscosity	Refer to Section 8, paragraph 8.23

1.11 MAXIMUM WEIGHTS

	NORMALLY ASPIRATED	TURBOCHARGED*
(a) Maximum Takeoff Weight (lbs)	5200	5200
(b) Maximum Landing Weight (lbs)	4940	4940
(c) Maximum Zero Fuel Weight (lbs)	4400	4500
(d) Maximum Weights in Baggage Compartments (lbs)		
(1) Forward	150	150
(2) Aft	150	150
Aft with oxygen installed*	105	105

1.13 STANDARD AIRPLANE WEIGHTS**

	NORMALLY ASPIRATED	TURBOCHARGED
(a) Standard Empty Weight (lbs): Weight of a standard airplane including unusable fuel, full operating fluids and full oil.	3180	3319
(b) Maximum Useful Load (lbs). The difference between the Maximum Takeoff Weight and the Standard Empty Weight.	2020	1881

1.15 BAGGAGE SPACE

	FORWARD	AFT
(a) Compartment Volume (cubic feet)	17.4	23.0
(b) Entry Width (inches)	30.5	31.0
(c) Entry Height (inches)	19.5	30.0

1.17 SPECIFIC LOADINGS

(a) Wing Loading (lbs per sq ft)	25.1
(b) Power Loading (lbs per hp)	10.4

*Optional equipment

**These values are approximate and vary from one aircraft to another. Refer to Figure 6-7 for the Standard Empty Weight Value and the Useful Load Value to be used for C.G. calculations for the aircraft specified.

1.19 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

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

(a) General Airspeed Terminology and Symbols

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

V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
V_{SO}	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.
V_{SSE}	Intentional One Engine Inoperative Speed is a minimum speed selected by the manufacturer for intentionally rendering one engine inoperative in flight for pilot training.
V_X	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

(b) Meteorological Terminology

ISA	International Standard Atmosphere in which: The air is a dry perfect gas; The temperature at sea level is 15° Celsius (59° Fahrenheit); The pressure at sea level is 29.92 inches hg. (1013 mb); The temperature gradient from sea level to the altitude at which the temperature is -56.5° C (-69.7°F) is -0.00198°C (-0.003566°F) per foot and zero above that altitude.
OAT	Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.
Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013 millibars).
Pressure Altitude	Altitude measured from standard sea-level pressure (29.92 in. Hg) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero.
Station Pressure	Actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

(c) Power Terminology

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

(d) Engine Instruments

EGT Gauge	Exhaust Gas Temperature Gauge

(e) Airplane Performance and Flight Planning Terminology

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

(f) Weight and Balance Terminology

Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.

Moment	The product of the weight of an item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
Center of Gravity (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.
Usable Fuel	Fuel available for flight planning.
Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between takeoff weight, or ramp weight if applicable, and basic empty weight.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes weight of start, taxi and run up fuel.)
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.

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1.21 CONVERSION FACTORS

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

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

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

MULTIPLY	BY	TO OBTAIN
hectares (ha)	2.471	acres
	107639	sq. ft.
	10000	m^2
horsepower (hp)	33000	ft.-lb./min.
	550	ft.-lb./sec.
	76.04	m-kg/sec.
	1.014	metric hp
horsepower, metric	75	m-kg/sec.
	0.9863	hp
inches (in.)	25.40	mm
	2.540	cm
	0.0254	m
	0.08333	ft.
	0.027777	yd.
inches of mercury at 0°C (in. Hg)	0.033421	atm
	0.4912	lb./sq. in.
	70.73	lb./sq. ft.
	345.3	kg/m^2
	2.540	cm Hg
	25.40	mm Hg
inch-pounds (in.-lb.)	0.011521	m-kg
kilograms (kg)	2.204623	lb.
	35.27	oz. avdp.
	1000	g
kilogram-calories (kg-cal)	3.9682	BTU
	3087	ft.-lb.
	426.9	m-kg
kilograms per cubic meter (kg/m^3)	0.06243	lb./cu. ft.
	0.001	g/cm^3
kilograms per hectare (kg/ha)	0.892	lb./acre
kilograms per square centimeter (kg/cm^2)	0.9678	atm
	28.96	in. Hg
	14.22	lb./sq. in.
	2048	lb./sq. ft.

MULTIPLY	BY	TO OBTAIN
kilograms per square meter (kg/m^2)	2.896×10^{-3}	in. Hg
	1.422×10^{-3}	lb./sq. in.
	0.2048	lb./sq. ft.
kilometers (km)	1×10^{-5}	cm
	3280.8	ft.
	0.6214	mi.
	0.53996	NM
kilometers per hour (km/hr.)	0.9113	ft./sec.
	58.68	ft./min.
	0.53996	kt
	0.6214	mph
	0.27778	m/sec.
	16.67	m/min.
knots (kt)	1	nautical mph
	1.689	ft./sec.
	1.1516	statute mph
	1.852	km/hr.
	51.48	m/sec.
liters (1)	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.

MULTIPLY	BY	TO OBTAIN
ounces, fluid per acre (fl. oz./acre)	0.073	l/ha
pounds (lb.)	0.453592 453.6 3.108×10^{-2}	kg g slug
pounds per acre (lb./acre)	1.121	kg/ha
pounds per cubic foot (lb./cu. ft.)	16.02	kg/m^3
pounds per cubic inch (lb./cu. in.)	1728 27.68	lb./cu. ft. g/cm^3
pounds per square foot (lb./sq. ft.)	0.1414 4.88243 4.725×10^{-4}	in. Hg kg/m^2 atm
pounds per square inch (psi or lb./sq. in.)	5.1715 2.036 0.06804 0.0689476 703.1	cm Hg in. Hg atm bar kg/m^2
quart, U.S. (qt.)	0.94635 57.749	l cu. in.
radians	57.30 0.1592	deg. (arc) rev.
radians per second (radians/sec.)	57.30 0.1592 9.549	deg./sec. rev./sec. rpm
revolutions (rev.)	6.283	radians
revolutions per minute (rpm or rev./min.)	0.1047	radians/sec.
revolutions per second (rev./sec.)	6.283	radians/sec.

MULTIPLY	BY	TO OBTAIN
rod	16.5 5.5 5.029	ft. yd. m
slug	32.174	lb.
square centimeters (cm^2)	0.1550 0.001076	sq. in. sq. ft.
square feet (sq. ft.)	929 0.092903 144 0.1111 2.296×10^{-5}	cm^2 m^2 sq. in. sq. yd. acres
square inches (sq. in.)	6.4516 6.944×10^{-3}	cm^2 sq. ft.
square kilometers (km^2)	0.3861	sq. mi.
square meters (m^2)	10.76391 1.196 0.0001	sq. ft. sq. yd. ha
square miles (sq. mi.)	2.590 640	km^2 acres
square rods (sq. rods)	30.25	sq. yd.
square yards (sq. yd.)	0.8361 9 0.0330579	m^2 sq. ft. sq. rods
yards (yd.)	0.9144 3 36 0.181818	m ft. in. rod

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SECTION 2

LIMITATIONS

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LIMITATIONS

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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

Stall Speed	CAS KNOTS	IAS KNOTS
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	91	88

2.5 AIRSPEED INDICATOR MARKINGS

MARKING	IAS KNOTS
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 Rate of Climb Speed - Single Engine)	88

2.7 POWER PLANT LIMITATIONS

(a) Number of Engines	2
(b) Engine Manufacturer	Lycoming
(c) Engine Model Number	IO-540-C4B5
(d) Engine Operating Limits	
(1) Maximum Horsepower	250
(2) Maximum Rotational Speed (RPM)	2575
(3) Maximum Manifold Pressure (Inches of Mercury)	
Below 2300 RPM	27
Below 2000 RPM	25
(4) Maximum Cylinder Head Temperature	500°F
(5) Maximum Oil Temperature	245°F
(e) Oil Pressure	
Minimum (red line)	25 PSI
Maximum (red line)	100 PSI
(f) Fuel Flow	
Normal Operating Range (green arc)	0 to 26 GPH
Maximum at Sea Level (red line)	26 GPH (7.8 PSI)
(g) Fuel Grade (minimum octane)	91/96 - Blue
(h) Number of Propellers	2
(i) Propeller Manufacturer	Hartzell
(j) Propeller Hub Model	HC-E2YR-2
(k) Propeller Blade Model	8465-7R
(l) Propeller Diameter	
Maximum	77 IN.
Minimum	76 IN.
(m) Propeller Pitch Settings at 30 Inch Station	
Low Pitch Stop	14.5°
High Pitch Stop	80°

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.

2.15 MANEUVER LIMITS

All intentional acrobatic maneuvers (including spins) are prohibited. Avoid abrupt maneuvers.

2.17 FLIGHT LOAD FACTOR LIMITS

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

No Inverted Maneuvers Approved

NOTE

It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. Maximum allowable landing weight is 4940 lbs. Maximum allowable gross weight is 5200 lbs. See Section 6 (Weight and Balance) for proper loading instructions.

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

REGISTRATION NO.	SERIAL NO.
C-GPQA	27-7954036

Owners desiring to make changes or additions to the equipment must have these modifications done in an FAA-approved manner. All PA-23-250 (six place) aircraft are delivered equipped for day VFR flight.

The performance, handling qualities and structure of the airplane are approved for instrument flight.

If an owner of an airplane which is approved for VFR flight only desires to extend his operations to IFR, he should have radio equipment installed in accordance with Piper-approved drawings or other FAA-approved data (or data approved by the aviation agency of the country of registration). The owner should insure that the radio equipment is adequate for the ground facilities to be used, is of sufficiently high quality and reliability, is properly functioning, adjusted and calibrated, and that it is compatible with previously installed equipment before authorizing it to be flown under instrument conditions.

When the original equipment or FAA-approved equivalent equipment is installed as originally or in an FAA-approved manner, is functioning properly, and is calibrated in accordance with the Federal Aviation Regulations, and when adequate radio communications and navigation equipment is installed as indicated above, this airplane is approved for day and night VFR and IFR flight.

Pilots are also reminded that oxygen must be available to passengers and crew for flights to high cabin altitudes and that special electronic equipment is required for flight above specified altitudes.

Unless complete approved icing equipment is installed and operative, this airplane may not be flown in icing conditions.

FAR 135 places special requirements on air taxi and commercial operators.

In accordance with the FAR's, this airplane is not properly equipped for the condition of flight indicated if any of the equipment listed below is not properly installed, functioning, properly maintained and calibrated according to the FAR's. The pilot is responsible for assuring compliance with the latest ammendments to FAR 91 concerning required equipment.

(a) Day VFR
- (1) Airspeed indicator
- (2) Altimeter
- (3) Magnetic direction indicator
- (4) Tachometer - each engine
- (5) Oil pressure gauge - each engine
- (6) Oil temperature gauge - each engine
- (7) Manifold pressure indicator - each engine
- (8) Fuel gauges
- (9) Fuel flow indicator - each engine
- (10) Landing gear position indicators
- (11) Seat belts - each occupant
- (12) Flares and flotation gear over water, if for hire
- (13) Emergency locator transmitter (ELT)
- (14) Encoding altimeter for flight above 12,500 feet
- (15) Transponder for flight in controlled air space

(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.)

2.21 FUEL LIMITATIONS

(a) Usable fuel per tank	34.3 GAL.
(b) Unusable fuel per tank	1.7 GAL.

When the optional interconnected tip/outboard tanks are installed (per Piper Drawing 33826), the usable fuel is 34.3 gallons in the inboard tanks and 54.3 gallons in the outboard tanks.

2.23 COWL FLAPS LIMITATIONS

Cowl flaps are provided to allow manual control of engine temperatures. The cowl flaps should be open during ground operations and in climbs. In no case should the cylinder head temperature be allowed to exceed 500°F or the oil temperature to exceed 245°F. The cowl flaps must be fully open during climbs above 18,000 feet when an alternator is loaded to 60 amps or more.

2.25 WING FLAPS LIMITATIONS

Takeoff	0°
Landing	0° to 50°

2.27 CREW LIMITS

The minimum crew for operating this airplane is one pilot.

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:

"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

On rear 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.
INCLUDES 20 LBS. ON SHELF

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

NOTE

See oxygen system supplement for additional limitation if oxygen equipment installed.

On emergency exit, middle window left side:

"EMERGENCY EXIT RELEASE: REMOVE COVER, TURN HANDLE, PUSH DOOR"

On right sun visor, (Power Chart) (required on normally aspirated models only):

"DO NOT EXCEED 27" MANIFOLD PRESSURE BELOW 2300 RPM OR 25" BELOW 2000 RPM"

On left window moulding in full view of the pilot:

WARNING

TURN OFF STROBE LIGHTS WHEN TAXIING IN VICINITY OF OTHER AIRCRAFT, OR DURING FLIGHT THROUGH CLOUD, FOG OR HAZE.

STANDARD POSITION LIGHTS TO BE ON FOR ALL NIGHT OPERATIONS.

On cabin door panel, auxiliary latch:

ENGAGE LATCH BEFORE FLIGHT

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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.

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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.

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.

ENGINE FAILURE DURING FLIGHT
(Below 64 KIAS)

Rudder . . . . .apply towards operative engine
Throttles (both engines) . . . . .retard to stop turn
Pitch attitude . . . . .lower nose to accelerate above 64 KIAS
Operative eng. . . . . increase power as airspeed increases above 64 KIAS

If altitude permits, a restart may be attempted.

If restart fails or altitude does not permit:
Inop. eng. prop . . . . FEATHER
Trim . . . . .adjust 5° toward operative eng.
Inop. eng. . . . . .complete Engine Securing Procedure
Cowl flap (operative eng.) . . . . as required

ENGINE FAILURE DURING FLIGHT
(Above 64 KIAS)

Inop. eng. identify
Operative eng. . . . . adjust as required

Before securing inop. engine:
Fuel flow . . . . check (if deficient - electric fuel pump ON)
Fuel quantity . . . . check
Fuel selector (inop. eng.) . . . . .switch to other tank containing fuel
Oil pressure and temp. . . . . check
Magneto switches . . . . check

If engine does not start, complete Engine Securing Procedure.

Power (operative eng.) . . . . as required
Mixture (operative eng.) . . . . . . adjust for power
Fuel quantity (operative eng. tank) . . . . sufficient
Electric fuel pump (operative eng.) . . . . as required
Cowl flap (operative eng.) . . . . as required
Trim . . . . .adjust 5° toward operative eng.

Electrical load . . . . decrease to min. required

Land as soon as practical at nearest suitable airport.

SINGLE ENGINE LANDING

Inop. engine . . . . Engine Securing Procedure complete
Hydraulic pump . . . . check
Seat belts/harnesses . . . . .secure
Heater . . . . .FAN position
Electric fuel pump (operative eng.) . . . . .ON
Mixture (operative eng.) . . . . RICH
Propeller (operative eng.) . . . . . full FORWARD
Fuel quantity . . . . check
Cowl flap (operative eng.) . . . . as required
Fuel selector (operative eng.) . . . . .ON
Crossfeed . . . . .OFF
Airspeed . . . . maintain 98 KIAS min. until landing is assured
Altitude . . . . higher than normal until landing is assured

When landing is assured:

NOTE

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

If the 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.*

Gear . . . . DOWN
Flaps . . . . DOWN
Power . . . . retard slowly and flare airplane
Trim . . . . as power is reduced (airplane will yaw in direction of operative engine)

*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.

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.

EMERGENCY GEAR EXTENSION

EXTENDING GEAR WITH HAND PUMP

132 KIAS max. gear down speed.

Gear handle . . . . DOWN
Emergency hand pump . . . . .pull out and pump until 3 green lights and handle returns to neutral

EXTENDING GEAR WITH CO_2

132 KIAS max. gear down speed

Gear handle . . . . DOWN
Ring cover . . . . raise
Ring . . . . pull
Do not attempt to raise gear hydraulically.

MANUAL EXTENSION OF WING FLAPS

Flap control . . . . down
Emergency hand pump . . . . .pull out and pump

ENGINE FIRE ON GROUND (Engine start, taxi and takeoff with sufficient distance remaining to stop)

Fuel selector . . . . .OFF
Electrical fuel pump . . . . .OFF
Brakes . . . . as required
Throttle . . . . .open
Radio . . . . call for assistance
Mixture (if fire continues) . . . . . IDLE CUT-OFF
External fire extinguisher . . . . .use

NOTES

If fire continues, shut down both engines and evacuate.

If fire is on the ground, it may be possible to taxi away.

ENGINE FIRE IN FLIGHT

Mixture . . . . idle cut-off
Electric fuel pump . . . . .OFF
Fuel selector . . . . .OFF
Propeller . . . . feather
Good engine . . . . increase power
Drag . . . . .reduce (gear, flaps, cowl flaps)
Alternator . . . . .OFF
Magnetos . . . . .OFF
Electrical load .reduce
If fire persists, increase airspeed as much as possible in an attempt to blow out fire.

Loss of power procedures . . . . complete
Land at nearest suitable airport.

CABIN FIRE

Vents . . . . .closed
Heater . . . . .OFF
Fire extinguisher . . . . .use
(When fire is out ventilate the cabin)

ELECTRICAL FIRE

Flashlight (night) . . . . in hand
Master switch .OFF
Circuit breakers . . . . check, then pull all
Electrical switches . . . . all OFF
Avionics . . . . all OFF
Heater . . . . .OFF
Ventilators . . . . .close
Fire extinguisher . . . . .use
(when fire is out)
Master switch . . . . .ON
Ventilators . . . . .open
Switches and circuit breakers . . . . ON, one at a time

EMERGENCY DESCENT

Throttles . . . . retard slowly to idle.
Propellers . . . . controls forward
Dive at 172 knots . . . . . . (131 KTS in rough air)
Cowl flaps . . . . closed

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.)

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3.5 AMPLIFIED EMERGENCY PROCEDURES (GENERAL)

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

3.7 ENGINE 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.

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

If an engine fails during takeoff at an airspeed between 64 KIAS and 83 KIAS, and there is not sufficient runway remaining for deceleration, the pilot must decide whether to abort the takeoff following the above procedures or to continue takeoff and climb on a single engine. The pilot's decision must be based upon a personal judgement, taking into consideration such factors as remaining runway, obstacles, the type of terrain beyond the runway, density altitude, weight and loading, weather, other associated conditions, airplane condition, and the pilot's own proficiency and capability. If the decision is to continue the takeoff on a single engine, the airplane should be accelerated in ground effect (near the ground) to 83 KIAS, at which point the below procedures should be followed.

WARNING

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

ENGINE FAILURE DURING TAKEOFF (83 KIAS or above)

If engine failure occurs when the airspeed is above 83 KIAS, or if the airspeed is between 64 KIAS and 83 KIAS and the pilot has decided to continue takeoff, the first step before attempting climb is to reach and maintain a minimum airspeed of 83 KIAS. Since one engine will be inoperative and the other will be at maximum power, the airplane will want to turn in the direction of the inoperative engine. Rudder pedal force on the side of the operating engine will be necessary to maintain directional control. Once committed to takeoff, maintain maximum power and retract the landing gear. Once the faulty engine is identified and its power loss verified, its propeller should be feathered. Directional tendency will identify the faulty engine, and observing response to a retarded throttle will verify the loss of power. Be sure to maintain maximum power on the good engine. After feathering the propeller on the inoperative engine, close its cowl flap. When clear of obstacles accelerate to the best single-engine rate of climb speed (88 KIAS), trim as necessary, and close the cowl flap on the operating engine as much as possible without exceeding engine temperature limits. After a climb has been established, complete the "Engine Securing Procedures." Continue a straight ahead climb until sufficient altitude (minimum of 1000 feet above ground elevation) is reached to execute the normal single-engine landing procedure at the nearest suitable airport.

ENGINE FAILURE DURING CLIMB

If engine failure occurs during climb, a minimum airspeed of 88 KIAS should be maintained. Since one engine will be inoperative and the other will be at maximum power, the airplane will want to turn in the direction of the inoperative engine. Rudder pedal force on the side of the operating engine will be necessary to maintain directional control. After the faulty engine has been identified and power loss verified, complete the "Engine Securing Procedures." Continue a straight ahead climb until sufficient altitude (minimum of 1000 feet above ground elevation) is reached to execute the normal "Single Engine Landing" procedure at the nearest suitable airport.

ENGINE FAILURE DURING FLIGHT (Below 64 KIAS)

Should an engine fail during flight at an airspeed below 64 KIAS, apply rudder towards the operative engine to maintain directional control. The throttles should be retarded to stop the yaw force produced by the inoperative engine. Lower the nose of the aircraft to accelerate above 64 KIAS and increase the power on the operative engine as the airspeed exceeds 64 KIAS.

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.

SINGLE ENGINE GO-AROUND

A single engine go-around should be avoided if at all possible. On aircraft with serial numbers 27-7654001 through 27-7854050 when Piper Kit No. 763 836 is not installed, do not attempt a go-around if gear or flaps are extended and the left propeller is feathered.* A final approach speed of 88 KIAS will place the airplane in the best configuration should a go-around be necessary.

To execute a single engine go-around, advance mixture, throttle, and propeller controls fully forward for maximum power on the operating engine. Retract flaps and landing gear. Maintain the airspeed at or above 88 knots IAS. Set the trim and cowl flaps as required.

WARNINGS

A go-around should not be attempted after the airspeed is decreased below the best single engine angle of climb speed (83 KIAS).

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, operation of the landing gear and/or flaps is limited to the use of the hydraulic hand pump.*

AIR START (UNFEATHERING PROCEDURE)

When unfeathering a propeller, first turn "ON" the fuel selector of the inoperative engine side. Open the throttle 1/2 inch. If the engine has been inoperative long enough to cool down, prime the engine by moving its mixture control to full "RICH" and turning its electric fuel pump "ON" until the first indication of fuel flow on the gauge; then turn the electric fuel pump "OFF." Move the propeller control full forward and turn "ON" the magnetos. Engage the starter until the propeller is unfeathered. As the RPM passes 1000 coming out of feather, pull the propeller control back to the low RPM position to prevent excessive engine speed. Maintain the engine speed between 1800 and 2000 RPM, not exceeding 2000 RPM. This low power setting must be held until the engine is warmed up and oil pressure and temperature are stabilized within limits. Turn the alternator "ON."

3.9 OVERSPEEDING PROPELLER

If a propeller overspeed condition occurs, retard the throttle and reduce airspeed until the RPM is under control. When the RPM is under control, slowly advance the throttle. Maintain airspeed below that at which the overspeed condition occurred. If a higher airspeed is required for safe flight, select a suitable power setting with a lower RPM setting and higher manifold pressure.

If propeller overspeeding has occurred, descend at 2200 RPM and land with the propeller set at 2400 RPM.

NOTE

A propeller will not feather while overspeeding. Therefore, while in an overspeed condition, do not select the feather position and do not shut down the engine. The propeller will feather normally if not overspeeding.

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

EXTENDING GEAR WITH CO_2

Use the emergency CO_2 gear extension system only if the engine-driven and hand hydraulic pumps fail. The system may also be used on aircraft with serial numbers 27-7654001 through 27-7854050 when Piper Kit No. 763 836 is not installed, if rapid gear extension is required for an emergency landing when the left engine is inoperative. The maximum gear down speed is 132 KIAS.

To extend the gear with the emergency CO_2 system, first place the gear selector in the "DOWN" position. Raise the firing ring cover under the left front seat and pull the ring as far as possible. Do not then attempt to raise the gear hydraulically.

NOTE

Any time the gear has been extended by the CO_2 system, do not operate the gear or flap selector handles until the system has been repaired.

3.21 MANUAL EXTENSION OF WING FLAPS

To extend the wing flaps manually, place the flap selector control in the "DOWN" position. Pull the hand hydraulic pump handle fully aft and pump until the desired flap setting is obtained or until the flap selector control automatically returns to the neutral position.

3.23 ENGINE FIRE ON GROUND (Engine start, taxi and takeoff with sufficient distance remaining to stop)

The first step to extinguish the fire is to turn "OFF" the fuel selector and electric fuel pump. Brakes should be used as required. OPEN the throttle and use the radio to call for assistance.

If the fire continues, move the mixture control to IDLE CUT-OFF, shut down the engines and evacuate the airplane; the fire should be extinguished by external means.

If the fire is on the ground near the airplane, it may be possible to taxi to safety.

3.25 ENGINE FIRE IN FLIGHT

If an engine fire occurs in flight, place the mixture control of the involved engine in idle cut-off and turn "OFF" its electric fuel pump and fuel selector. Feather the propeller on the faulty engine. Increase power on the good engine, and reduce drag by ensuring that gear and wing flaps are retracted and cowl flaps on the feathered engine are closed. Turn "OFF" the alternator and magnetos of the feathered engine and reduce the electrical load on the remaining alternator. Complete the Engine Securing procedure and prepare for a landing at the nearest airport.

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."

3.37 ONE ALTERNATOR INOPERATIVE LIGHT ON

In the event of an alternator "INOP" indication, reduce the electrical load to the minimum necessary to sustain a safe flight. Turn "OFF" the side of the master switch corresponding to the side of the inoperative alternator. This will open the field circuit of the inoperative alternator. Reset any circuit breakers which have tripped. Return the master switch to the "ON" position, and, if the "INOP" light has extinguished, reinstate the electrical load. If the "INOP" light remains lit or if the alternator circuit breaker has tripped, return the corresponding side of the master switch to the "OFF" position and continue the flight with a reduced electrical load.

3.39 BOTH ALTERNATOR INOPERATIVE LIGHTS ON

If both alternator "INOP" lights come on simultaneously, repeat the above procedure individually for each alternator. Should both lights remain lit, turn "ON" both sides of the master switch, and turn "OFF" both alternator circuit breaker switches. Keep the electrical load reduced to a minimum and terminate the flight as soon as possible, since all electrical current is being supplied by the battery.

3.41 DOOR OPEN IN FLIGHT

If the cabin door is not securely safety latched with the handle pushed fully forward and locked and the auxiliary latch moved fully rearward to engage the latch pin before takeoff, the door could be inadvertently opened in flight. Should the door open in flight, immediately reduce airspeed to prevent serious buffeting, and land at the nearest airport.

3.43 SPIN RECOVERY

The FAA does not require spin demonstrations of airplanes of this weight; therefore, no spin tests have been conducted. The spin recovery technique is based on the best available information.

If a spin occurs, retard both throttle controls to idle. Apply full rudder opposite to the direction of the spin and place the control wheel forward of neutral, full forward if necessary to affect recovery. Leave ailerons neutral. Neutralize rudder when rotation stops. Smoothly recover from the dive when the spin is arrested.

3.45 AIRFRAME VIBRATION

In the event the airplane begins vibrating or handling characteristics become suddenly erratic without apparent reason, reduce airspeed until the vibration stops. Handle the controls smoothly and gently, avoiding sudden or abrupt maneuvers. Land at the nearest airport to investigate the cause of the vibration. Check that baggage and access doors are closed, that control surfaces are secure, and that no structural damage is present. Do not resume flight until the cause of the vibration is determined and corrected.

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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TABLE OF CONTENTS

SECTION 4

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.

4.3 AIRSPEEDS FOR SAFE OPERATIONS

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

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

	CAS KNOTS	IAS KNOTS
(a) Never Exceed Speed	216	221
(b) Maximum Structural Cruising Speed	172	175
(c) Design Maneuvering Speed	129	131
(d) Flaps Extended Speed	60 to 108	55 to 108
Full Flaps	108	108
Half Flaps	122	123
Quarter Flaps	139	141
(e) Maximum Gear Extended Speed	130	132
(f) Air Minimum Control Speed	70	64
(g) Stall Speed		
Gear Up, Flaps Up	67	61
Gear Down, Flaps Down	60	55
(h) Best Rate of Climb Airspeed	104	103
(i) Best Angle of Climb Airspeed	91	89
(j) Turbulent Air Operating Speed (5200 lbs)	129	131
(k) Intentional One Engine Inoperative Speed	83	80

The maximum demonstrated crosswind velocity for safe takeoff and landing is 12 knots.

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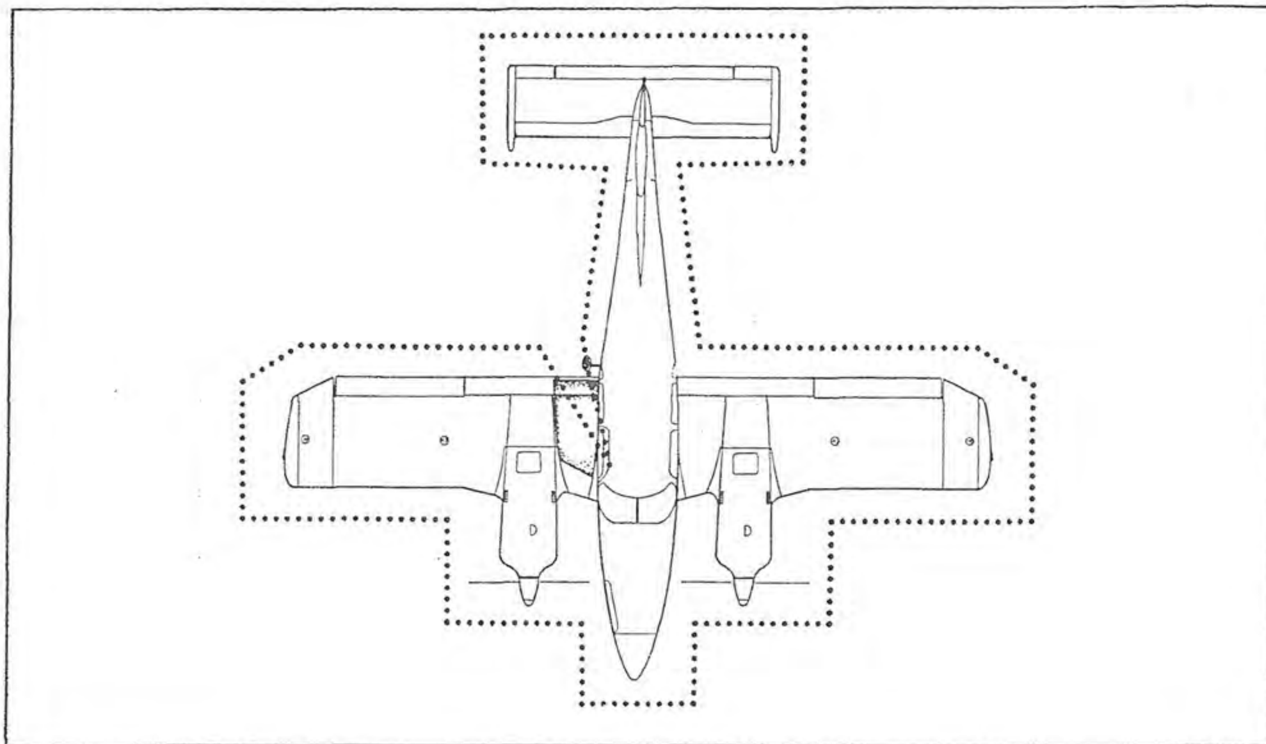

WALK - AROUND
Figure 4-1

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

OUTSIDE CABIN

Rear baggage door . . . . check
Fuselage and antennas . . . . check
Crossfeed drain . . . . no drip
Right wing, flap, aileron . . . . check
Right tie down . . . . .untied
Fuel caps . . . . check quantity and secure
Right gear . . . . check chock removed
Right fuel drains . . . . drain 3
Right engine . . . . examine and check oil
Right propeller and spinner . . . . check
Windshield . . . . check
Nose gear . . . . check chock removed
Nose baggage door . . . . check
Nose . . . . check
Left wing . . . . .check as right wing
Stall warning sensor . . . . check
Pitot tube and heater . . . . check, clean static ports
Empennage . . . . .check condition and freedom of movement
Tail tie down . . . . .untied
Night flight . . . . .check lights

BEFORE STARTING ENGINES

Entrance door . . . . .locked
Auxiliary latch . . . . engaged
Seats . . . . adjusted and locked
Seat belts and harnesses . . . . .fastened
Parking brake . . . . set
Circuit breakers . . . . check
Alternators . . . . .ON
Electrical switches . . . . as required
Fuel pumps . . . . OFF
Fuel valves . . . . .ON
Crossfeed . . . . OFF
Cowl flaps . . . . OPEN
Master switch . . . . .ON
Gear lights . . . . check
Door ajar lights .out
Mixture controls . . . . idle cut-off
Prop synch . . . . .MANUAL
AP/FD switch . . . . OFF
Gear handle (dual pump system) . . . . DOWN

STARTING ENGINES

If engines are hot, omit priming
Throttle controls . . . . open one inch
Propeller controls . . . . forward
Electric fuel pumps . . . . .ON
Mixture controls . . . . RICH until fuel flow ind., then OFF
Magneto switches .ON
Propellers . . . . .clear
Starter . . . . .engage
Mixture . . . . advance as engine fires
Oil pressure . . . . check
Vacuum . . . . check
Alternator . . . . .check output
Gear handle (dual pump system) . . . . returned to neutral
Repeat above for second engine
Electric fuel pumps . . . . OFF

FLOODED START

Master switch . . . . .ON
Magneto switches . . . . .ON
Electric fuel pump . . . . OFF
Throttle . . . . full open
Mixture . . . . .in idle cut-off
Starter . . . . .engage
Throttle . . . . retard as engine starts
Mixture control . . . . advance
Oil pressure . . . . check
Vacuum . . . . check
Alternator . . . . .check output

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

Parking brakes . . . . set
Cabin heater . . . . check
Engine temperature . . . . warm
Mixtures . . . . full RICH
Propellers . . . . full high rpm
Propeller synchrophaser . . . . manual
Engine gauges . . . . check
Throttles . . . . set at 1500 rpm
Feathering . . . . .check (500 max. rpm drop)
Throttles . . . . set at 2200 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 selectors . . . . 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 . . . . checked
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

BEFORE LANDING

Seats and seat belts . . . . secure
Shoulder harnesses . . . . secure
Fuel pumps . . . . .ON
Mixtures . . . . RICH
Propellers . . . . 2400 rpm min.
Fuel selectors . . . . ON - fullest cells
Crossfeed . . . . OFF
Cowl flaps . . . . as required
Landing gear (130
KTS max.) . . . . DOWN and locked
Wing flaps . . . . set
Heater . . . . FAN
Brakes . . . . checked
Prop synch. . . . . OFF

GO-AROUND

Propellers . . . . full increase RPM
Throttles . . . . .full forward
Wing flaps . . . . retract in steps
Landing gear . . . . .retract
Cowl flaps . . . . set for cooling

AFTER LANDING

Brakes . . . . test
Flaps . . . . .retract
Cowl flaps . . . . OPEN
Fuel pumps . . . . OFF
Propeller controls . . . . forward
Heater . . . . FAN
Trim . . . . neutral

SHUTDOWN

Parking brake . . . . set
Heater . . . . OFF
Avionics . . . . OFF
Magnetos . . . . check grounding
Mixture (1st eng.
started . . . . idle cut-off
Gear handle (dual
pump system) . . . . DOWN,
then returned
to neutral
Mixture (2nd eng.) . . . . idle cut-off
Magnetos . . . . OFF
Lights . . . . OFF
Master switch . . . . OFF
Controls . . . . .secure with seat belt

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 avionics equipment is "OFF" and both fuel selectors are "ON", 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 selectors in each tank position to check the fuel supply on 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 the 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.

In checking the landing gear, it should be ascertained that shock struts are properly inflated. Under a normal static load, 3 inches of piston should be exposed. Check the tires for cuts and wear and insure proper inflation.

Fuel strainers and drains should be opened to drain moisture and sediment. Three drains in the access door on the underside of each nacelle should be opened and drained until insured that all moisture and sediment is removed. Check to make sure that the crossfeed drain tube is protruding from the underside of the fuselage. If the crossfeed has been drained, visually check that fuel is not dripping from the drain.

CAUTION

In checking fuel tanks and draining fuel, care should be taken that no fire hazard exists before starting engines.

Through the access doors on the top of each engine nacelle, check the quantity and the condition of the oil. The dipstick/oil filler cap should be firmly seated. Openings and air intakes in the nacelles should be free of obstructions. Check propellers and spinners for detrimental nicks, scratches, or other damage. There should be no obvious fuel or oil leaks.

If a pitot cover has been installed, it should be removed before flight, and the holes in the pitot-static head checked for bugs, dirt, or other obstructions.

At the front of the airplane, the forward baggage door should be secure. The windshield should be clean and free from damage or distortion. All access and inspection covers should be securely in place.

When the pitot heat, stall warning sensor, or exterior lights are to be checked, the master switch must be turned "ON."

Upon re-entering the cabin, ascertain that all primary flight controls work properly. The cabin door should be closed and secured with both latches, and the seats should be adjusted for maximum visibility and comfort. All required papers should be in order and in the airplane. Seat belts and shoulder harnesses should be fastened, and the function of the inertia reels checked by pulling sharply on the strap.

4.11 BEFORE STARTING ENGINES

Before starting the engines, set the parking brake "ON" and open the cowl flaps. Circuit breakers should be checked and alternator circuit breaker switches should be turned "ON." Fuel selector levers should be set on the desired tanks; and the crossfeed should be turned "OFF." The electric fuel pumps should be off, and all other electrical switches set as required.

On aircraft equipped with two engine-driven hydraulic pumps, one installed on each engine, one pump should be checked during engine start and the other during engine shutdown. Move the landing gear selector handle to the "DOWN" position. If the hydraulic pump on the first engine to be started is functioning properly, the selector handle will return to neutral after the engine has started and pressure has built up in the system.

Aircraft with serial numbers 27-7654001 through 27-7854050 when Piper Kit No. 763 836 is not installed are equipped with one hydraulic pump on the left engine. A check of its pump can be performed during pre-taxi and taxi.

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.

Check the crossfeed occasionally after starting the first engine by following the procedures outlined in paragraph 4.39, section (c) (3) of this handbook.

It is best to apply power gradually to start the taxi roll. The pilot should observe wing clearance while taxiing and should avoid holes and ruts. If the ground contains loose stones, gravel, or other material that could damage propeller blades, do not operate the engines at high RPM.

4.17 ENGINE RUN-UP

During the engine run-up, the parking brake should be set "ON." The cowl flaps should be manually opened as necessary for engine cooling during ground operations. The autopilot should be "OFF." In cold weather, or if flight into cold weather is anticipated, the cabin heater and defroster must be tested before takeoff, as an inoperative heating system may allow the windshield to become frosted. Operating the heater controls and feeling for warm air at the outlets will confirm heater and defroster operation.

Engines should be warmed up at 1000 to 1400 RPM for 2 minutes in warm weather and 4 minutes in cold. Engines are sufficiently warm for takeoff when no faltering occurs with the throttles fully open and when safe ranges are indicated on the engine gauges. To prevent spark plug fouling, avoid prolonged idling at low RPM.

Set the mixture controls at full "RICH" and the propeller controls at full high RPM. If the airplane is equipped with the propeller synchrophaser installation, place the switch in the "MAN" or off position. With the throttles set at 1500 RPM, check propeller feathering; however, during this check, engine speed must not be allowed to drop below 1000 RPM or else excessive manifold pressure will occur. With the throttles set at 2200 RPM, exercise the propeller controls slowly to check propeller governor operation, without allowing the engine speed to drop more than 300 RPM.

With the engine running at 2200 RPM and the propellers at maximum RPM, check the magnetos. The maximum drop on each magneto should not exceed 175 RPM, and the differential drop between the magnetos should not exceed 50 RPM. Operation on one magneto should be limited to 10 seconds.

After checking engine gauges and instruments, alternators, and the vacuum gauge for safe readings, throttles should be pulled to idle speed. Engine speed should not fall below 500 RPM; the recommended idle speed is between 550 and 600 RPM. After checking idle, set the throttles at 1000 RPM.

4.19 BEFORE TAKEOFF

After checking that all occupants have their seat belts and shoulder harnesses securely and properly fastened, the pilot should begin final preparations for takeoff. Lights, pitot heat, and radios should be set as required. The autopilot, if installed, should be checked and off. Fuel selectors may be on either the inboard or the outboard tanks provided there is adequate fuel in the tank selected, and the crossfeed must be "OFF."

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.

Since a fuel injected engine takes an appreciable length of time to start after fuel starvation, fuel cells should not be emptied to depletion. If it is necessary to use all the fuel in a cell, carefully monitor the fuel flow meter, and change the fuel selector valve position at the first indication of a decrease in fuel flow.

At altitudes above 10,000 feet, the use of oxygen is recommended. When oxygen is in use no smoking is permitted.

4.27 DESCENT

With power set as desired, begin descent, enriching the mixture as the altitude decreases. Turning the defroster "ON" will preclude the possibility of sudden windshield fogging during descent. If oxygen has been in use, it may be turned "OFF" at altitudes below 10,000 feet.

4.29 BEFORE LANDING

When preparing to land the airplane, ensure that seats are locked in position and that seat belts and shoulder harnesses are securely fastened. Prior to landing, the electric fuel pumps should be "ON," fuel selectors should be on the fullest cells, and the crossfeed must be "OFF." Set the mixture control at full "RICH," and the propellers at a minimum of 2400 RPM. Cowl flaps should be used as required.

Before extending the landing gear, a check may be made to ensure that the gear warning horn is operating. Retard both throttles until the horn sounds. Flying the airplane with an inoperative horn is not permitted, since in an emergency landing, a single engine landing or any other situation when there is a distraction from landing procedures, inadvertently forgetting to extend the gear is a possibility.

At an indicated airspeed of 132 knots or less, landing gear should be extended and locked. To ascertain that the gear is down and locked on the base leg or final approach, check the three green gear down indicator lights on the control pedestal and check the external mirror to ensure that the nose gear is extended.

Depending on landing conditions, the wing flap setting varies. Following are the maximum airspeeds at which wing flaps may be set:

(a) 1/4 flap - 141 KIAS
(b) 1/2 flap - 123 KIAS
(c) Full flap - 108 KIAS

The degree of wing flap extension and touch down speed depends upon landing conditions. Normally full flap (50 degrees) should be used during the final approach and landing to reduce stall speed and to permit contact with the runway at slower speed. For short, slow landings under normal conditions, use full wing flaps, partial power, and hold the nose up as long as possible before and after contacting the ground with the main wheels.

In high winds and crosswinds, it is desirable to approach a landing at higher than normal speeds with half or completely retracted wing flaps. During a crosswind approach, hold a crabbed angle into the wind until ready to flare out for the landing. Then lower the wing that is into the wind, reduce crabbed angle, and use rudder to keep the wheels aligned to the runway.

During landings, contact the ground at the minimum speed consistent with landing conditions.

Avoid prolonged side slips with a fuel selector set on a fuel cell with a low fuel indication.

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.

4.35 SHUT DOWN

When completely stopped and in a parking spot, set the parking brake. If the heater has been used and has been allowed to cool down, turn it "OFF." Turn "OFF" radio and electric equipment.

Check the magnetos by turning each "OFF" then "ON." An RPM drop when a magneto is "OFF" indicates that the magneto and its switch are operative. On aircraft with dual hydraulic pumps the engine that was started first should be shut down first. Move its mixture control to idle cut-off. After the first engine is shut down, check the function of the hydraulic pump on the still operating engine by moving the landing gear selector handle to the "DOWN" position. If the pump is functioning properly the handle will return to neutral. After this check is complete shut down the second engine by placing its mixture control in idle cut-off. When the engines stop, turn magnetos, the master switch and light switches "OFF."

Depending upon the length of time the airplane is to be left unattended, moor it appropriately.

4.37 TURBULENT AIR OPERATION

In keeping with good operating practice for all aircraft, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to maneuvering speed or slightly less and that abrupt maneuvers be avoided.

4.39 SYSTEMS OPERATIONS AND CHECKS

(a) Alternator and Voltage Regulating System

Each alternator is controlled independently by its own voltage regulator. These regulators are interconnected electronically to provide paralleled outputs from their associated alternators under normal operating engine RPM ranges. An ammeter that can be switched into either alternator output lead is provided for system monitoring, along with alternator "INOP" warning lights that illuminate when their associated alternator is not producing a voltage.

In the event of an alternator "INOP" indication, the following steps should be taken:

(1) Reduce the electrical load to the minimum necessary for continued safe flight.
(2) Turn "OFF" one section of the master switch (left or right, as appropriate) to open the corresponding alternator field circuit. Reset all circuit breakers which may have tripped.
(3) Turn "ON" the section of the master switch which had been turned "OFF" in step (2) above, and if the "INOP" light goes out, reinstate the electrical load.
(4) If, after turning the section of the master switch back "ON," the "INOP" light remains lit and/or the alternator circuit breaker switch has tripped, turn the same section of the master switch "OFF" and continue flight with a reduced electrical load.
(5) In the event that both "INOP" lights come on simultaneously, repeat the above procedure for each alternator individually.
(6) If both alternators fail to return to normal operation, turn "ON" the master switch and turn "OFF" both alternator circuit breaker switches. Terminate flight as soon as possible.

CAUTION

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

NOTE

To prevent charging the installed aircraft battery, the master switch is normally left in the "OFF" position when external power is connected. Short term use of external power with the master switch "ON" is permissible if 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.

WARNING

Turn "OFF" strobe lights when taxiing in the vicinity of other aircraft or during flight through cloud, fog, or haze. Standard position lights are to be "ON" for all night operations.

(e) Landing Gear Down Lights

The three green lights on the throttle quadrant indicate when each of the landing gear is down and locked.

(f) Alternate Induction Air

When flying in wet, heavy snow or other conditions in which the induction air filters may become clogged, monitor the manifold pressure gauge. A decrease in manifold pressure may indicate a clogged filter. If the decrease is followed by a slight increase in manifold pressure, the automatic alternate induction air system is in operation, and the manifold pressure may be brought back to the desired level with the throttle control.

A continued drop in manifold pressure would indicate that the automatic induction air system were not working. In this case, actuate the manual alternate air control, which serves as a backup for the automatic system. An increase in manifold pressure indicates that the manual alternate induction air system is operating. Throttle controls may be advanced to gain additional manifold pressure.

4.41 V_{SSE} - INTENTIONAL ONE ENGINE INOPERATIVE SPEED

V_{SSE} is a speed selected by the aircraft manufacturer as a training aid for pilots in the handling of multi-engine aircraft. It is the minimum speed for intentionally rendering one engine inoperative in flight. This minimum speed provides the margin the manufacturer recommends for use when intentionally performing engine inoperative maneuvers during training in the particular airplane.

The intentional one engine inoperative speed, V_{SSE}, for the PA-23-250F is 80 KIAS.

4.43 V_{MCA} - AIR MINIMUM CONTROL SPEED

V_{MCA} is the minimum flight speed at which a twin-engine 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 toward the operative engine; landing gear up; flaps in takeoff position; and most rearward center of gravity.

V_{MCA} for the PA-23-250 F has been determined to be 64 KIAS.

The V_{MCA} demonstration which may be required for the FAA flight test for the multi-engine rating approaches an uncontrolled flight condition with power reduced on one engine. The demonstration and all intentional one engine operations should not be performed at an altitude of less than 5000 feet above the ground. The recommended procedure for V_{MCA} demonstration is to reduce the power to idle on the simulated inoperative engine at or above the intentional one engine inoperative speed, V_{SSE}, and slow down to approximately one knot per second until the FAA Required Demonstration Speed, V_{MCA}, or stall warning is obtained.

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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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.

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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.

Use the Weight and Balance Loading Chart (Figure 6-15) and the Weight, Moment and C.G. Limit graph (Figure 6-17) to determine the total weight of the airplane and the center of gravity position.

After proper utilization of the information provided, assume that the following weights have been determined for consideration in the Flight Planning Example:

(1) Basic Weight	3445 lbs.
(2) Occupants (4 at 170 lbs. each)	680 lbs.
(3) Baggage	120 lbs.
(4) Fuel (137.2 gal. at 6 lbs/gal)	823 lbs.
(5) Takeoff Weight (total of above)	5068 lbs.
(6) Landing Weight (takeoff weight minus Item (h), Total Fuel Required)	4548.4 lbs.

The landing weight cannot be determined until the weight of the fuel to be used has been established.

Takeoff weight is below the approved maximum of 5200 lbs. Determine that weight and balance calculations have shown the C.G. position to be within the approved limits.

(c) Takeoff Distance

After determining the aircraft loading, all aspects of takeoff must be considered. Conditions of the departure airport and takeoff weight should be applied to the appropriate Takeoff Distance graph to determine the length of runway necessary. Takeoff conditions for the Flight Planning Example are listed below:

(1) Wind	15 kts at 360°
(2) Angle between Flight Path and Wind	360°-300° = 60°
(3) Head Wind Component (from Wind Component Graph, Figure 5-7)	8 kts
(4) Outside Air Temperature	17° C
(5) Pressure Altitude	2000 ft.
(6) Runway Slope	+1.0%

Using the Normal Takeoff over 50 Feet graph for the Lyc. TIO-540-C1A engine (Figure 5-11) the takeoff distances are as follows:

Total Distance	2040 ft.
Ground Run (2040 x .6)	1225 ft.

(d) Climb

Entering the example conditions of the departure airport and the cruise altitude into the Time, Fuel and Distance to Climb graph for the Lyc. TIO-540-C1A engines (Figure 5-27) yields the following:

(1) Time to Climb	6.8 - 1.3 = 5.5 minutes
(2) Fuel to Climb	5.6 - 1.1 = 4.5 gallons
(3) Distance to Climb	12.5 - 2.0 = 10.5 naut. miles

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:

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

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

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

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

(g) Total Flight Time

The total flight time is determined by adding the time to climb, cruise time, and time to descend. The following flight time is required for this Flight Planning Example:

Total Flight Time = Time to Climb + Cruise Time + Time to Descend
= 7.5 + 155.4 + 8.0
= 170.9 minutes

(h) Total Fuel Required

Determine the total fuel required by adding fuel for taxi and takeoff, fuel to climb, cruise fuel, and fuel to descend. When the total fuel (in gallons) is determined, multiplying this value by 6 lbs/gal will give the total fuel weight to be used for the flight. Total fuel calculations for the Flight Planning Example are shown below:

Total Fuel Required = Fuel for taxi and takeoff + Fuel to Climb + Cruise Fuel + Fuel to Descend
= 4.0 + 4.5 + 75.9 + 2.2
= 86.6 gallons (519.6 lbs.)

(i) Landing Distance

Subtracting the total fuel required from the takeoff weight of the airplane gives the landing weight:

Landing Weight = Takeoff Weight - 6 x Total Fuel Required
= 5068 - 6 x 86.6
= 4548.4 lbs.

Destination airport conditions applied to the Wind Component graph (Figure 5-7) gives the following headwind component for the Flight Planning Example:

The angle between the flight path and wind is 330° - 270° or 60°.
Therefore, the Head Wind Component is 5 kts.

From the Normal Landing Distance over 50 Feet graph (Figure 5-93), with the destination airport conditions, the distances required for landing for the Flight Plan Example are as follows:

(1) Total Distance 1430 ft.
(2) Ground Roll 1430 X .6 = 860 ft.

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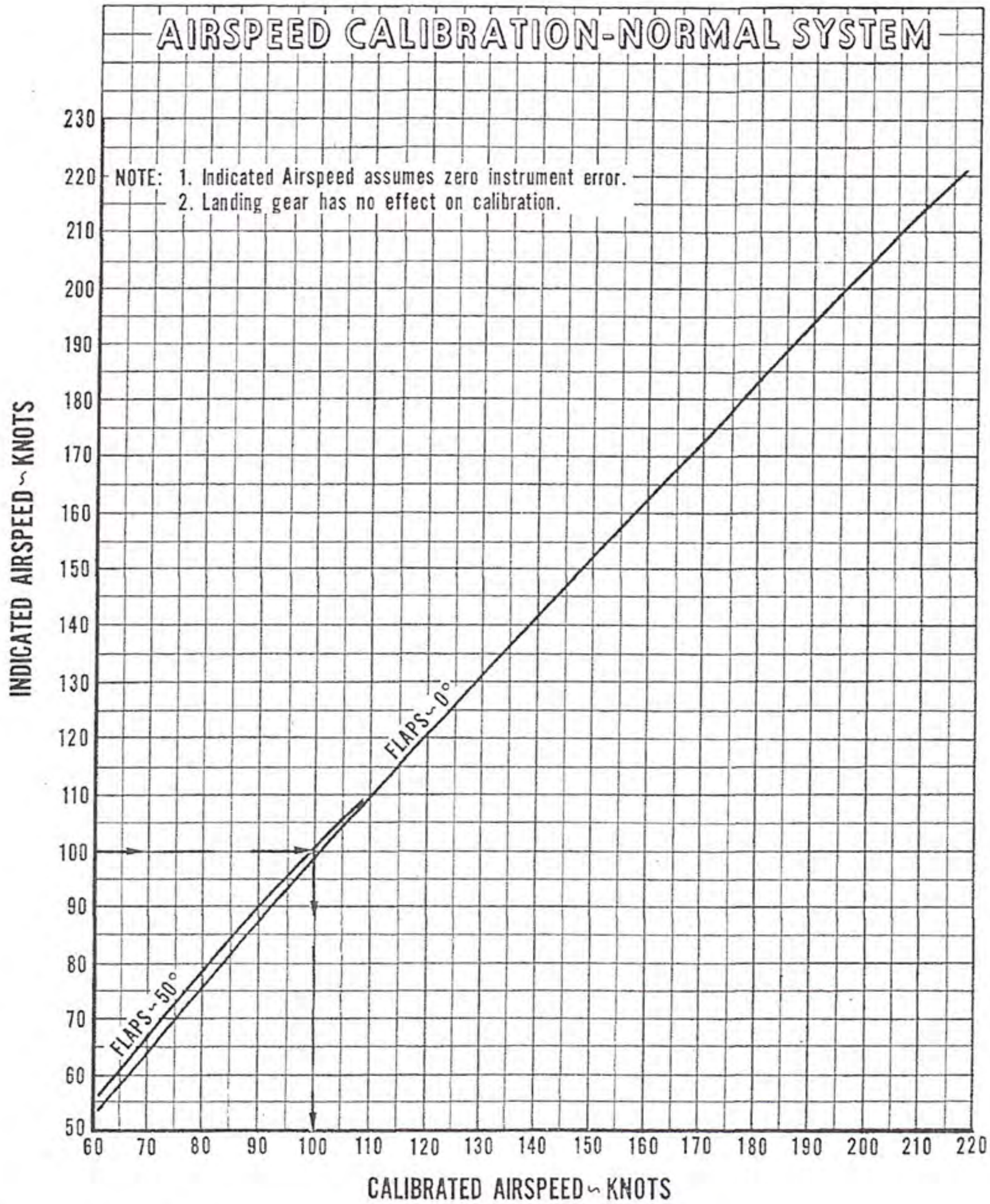
5.7 PERFORMANCE GRAPHS

LIST OF FIGURES

LIST OF FIGURES (cont)

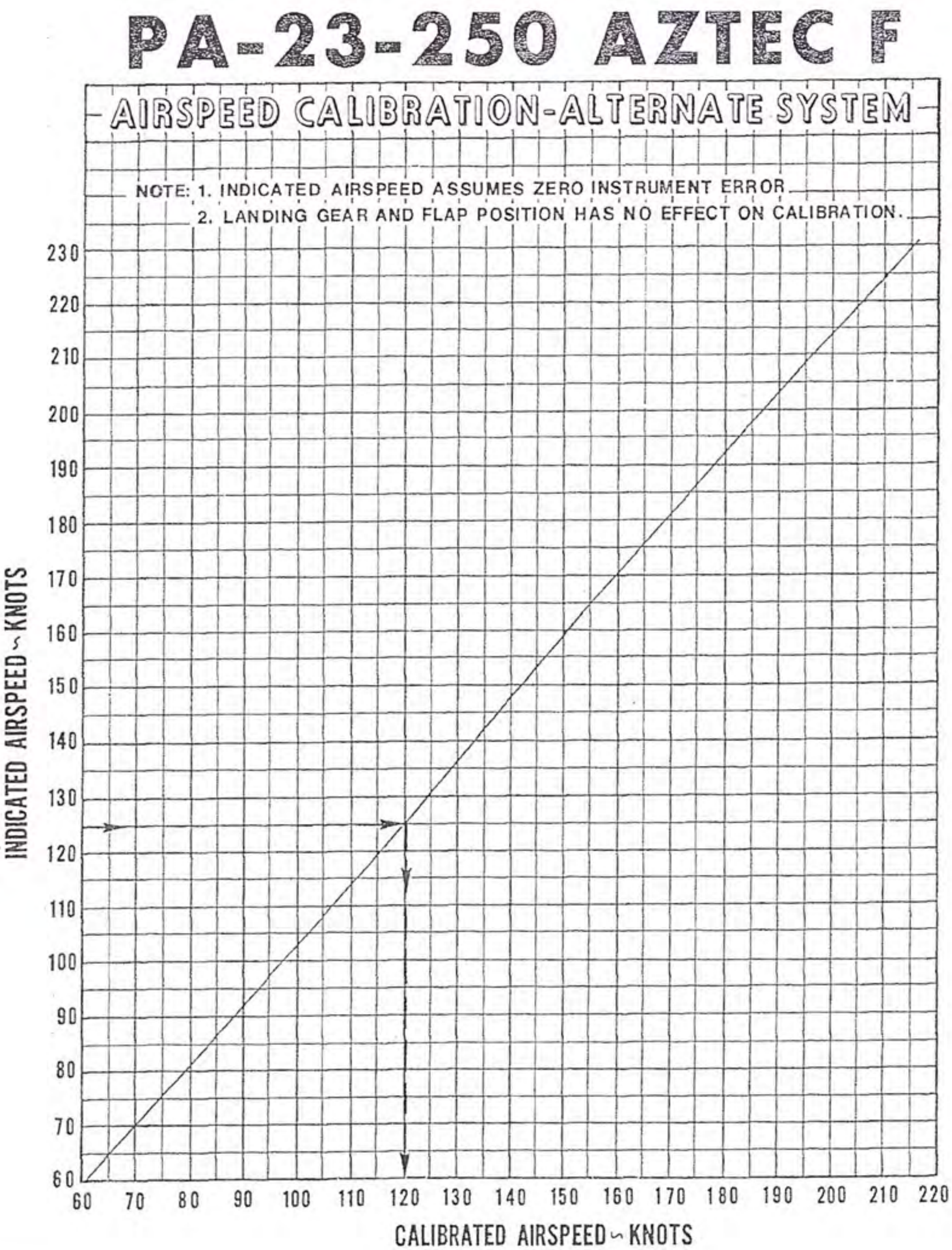
PA-23-250 AZTEC F



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

AIRSPEED CALIBRATION - NORMAL SYSTEM

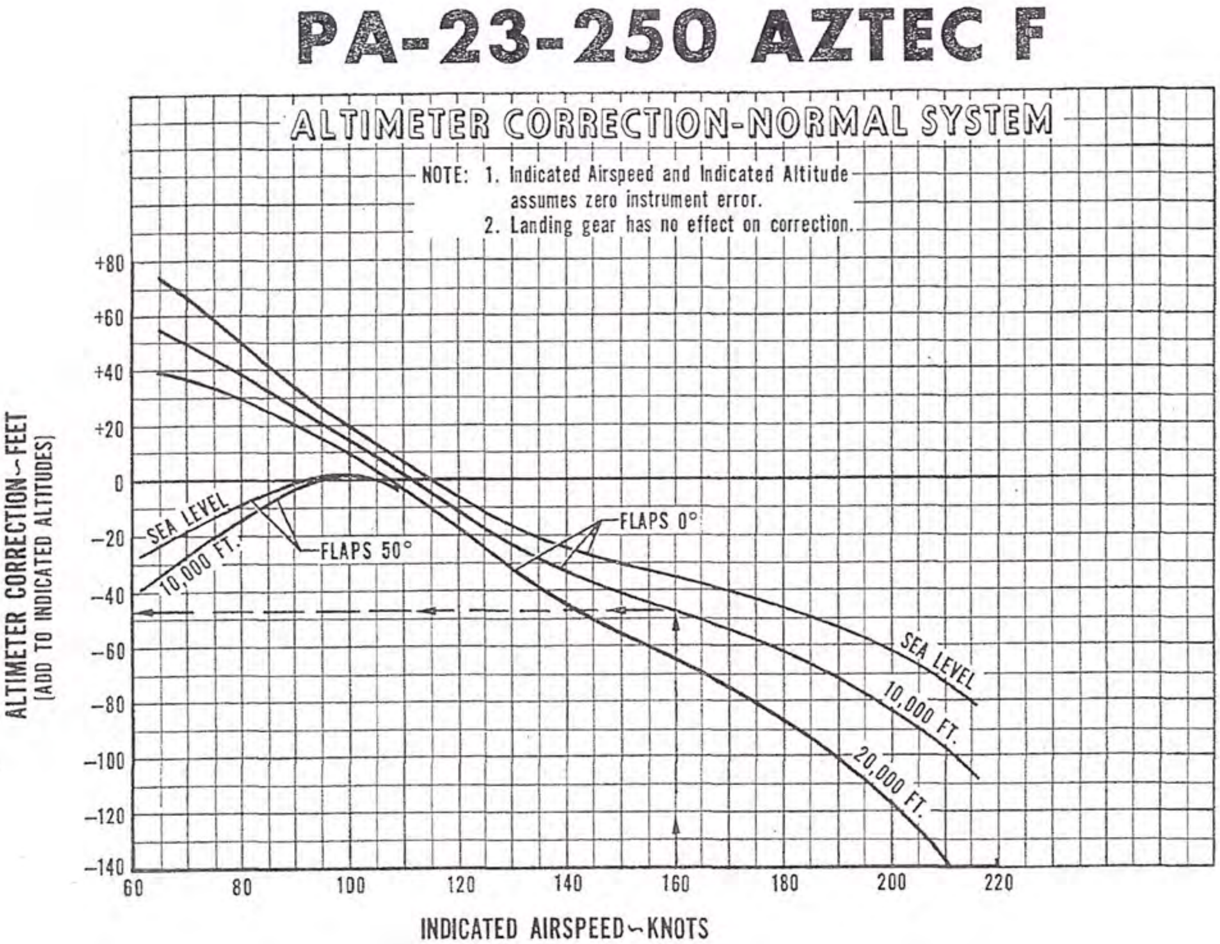
Figure 5-1



Example:
Indicated airspeed = 125 kts.
Calibrated airspeed = 120 kts.

AIRSPEED CALIBRATION - ALTERNATE SYSTEM

Figure 5-2

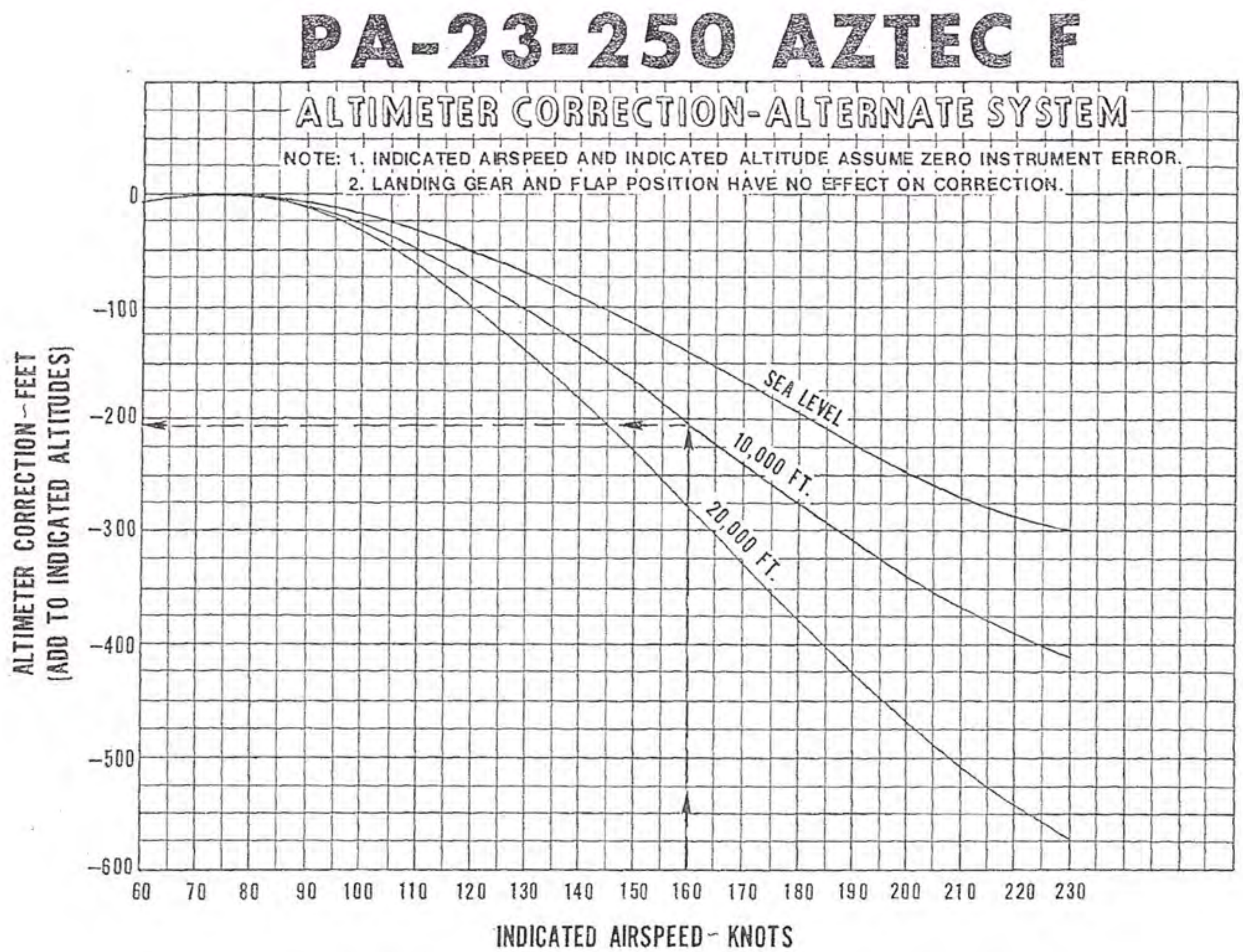


Example:

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

ALTIMETER CORRECTION - NORMAL SYSTEM

Figure 5-3

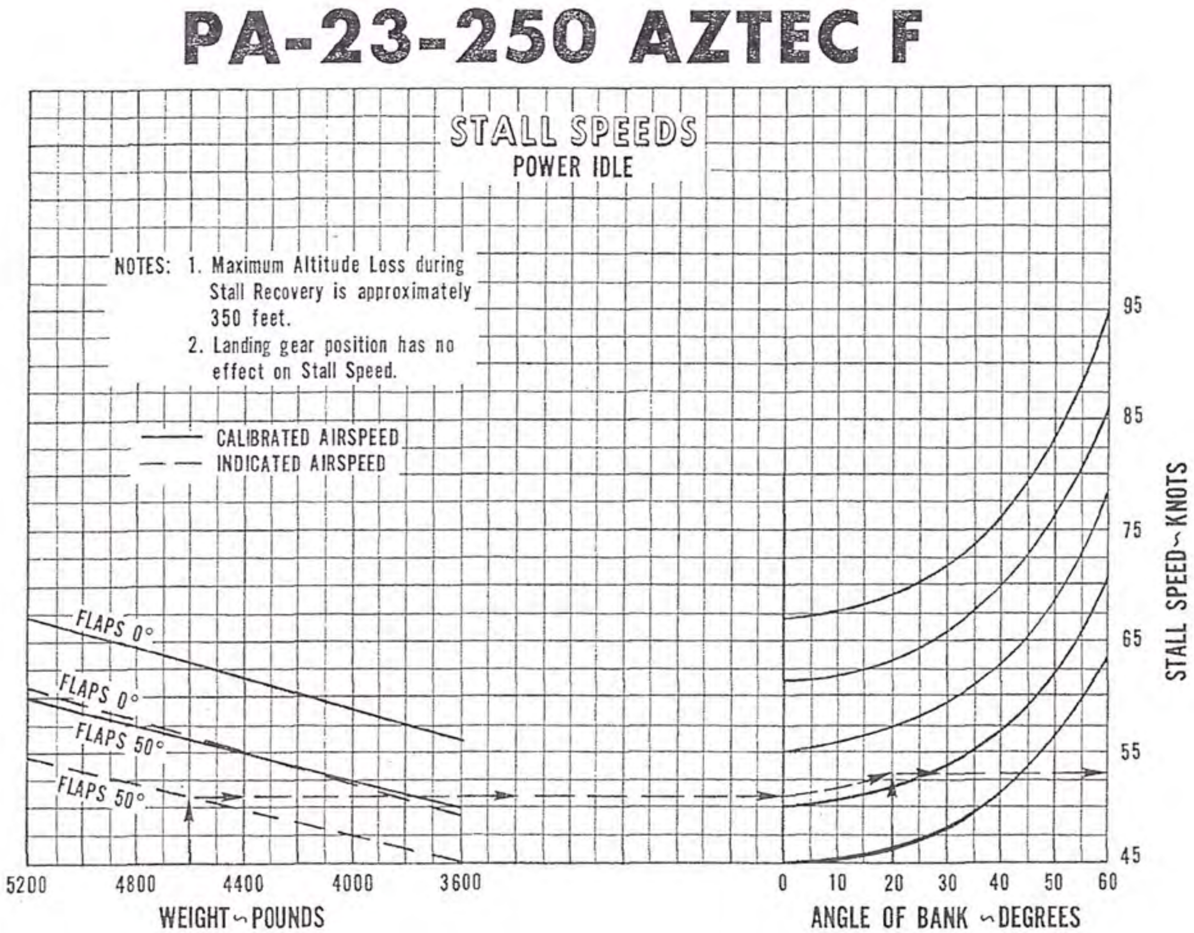


Example:

IAS	= 160 kts.
Altitude	= 10,000 ft.
Altimeter correction	= -205 ft.
Calibrated altitude	= 9,795 ft.

ALTIMETER CORRECTION - ALTERNATE SYSTEM

Figure 5-4



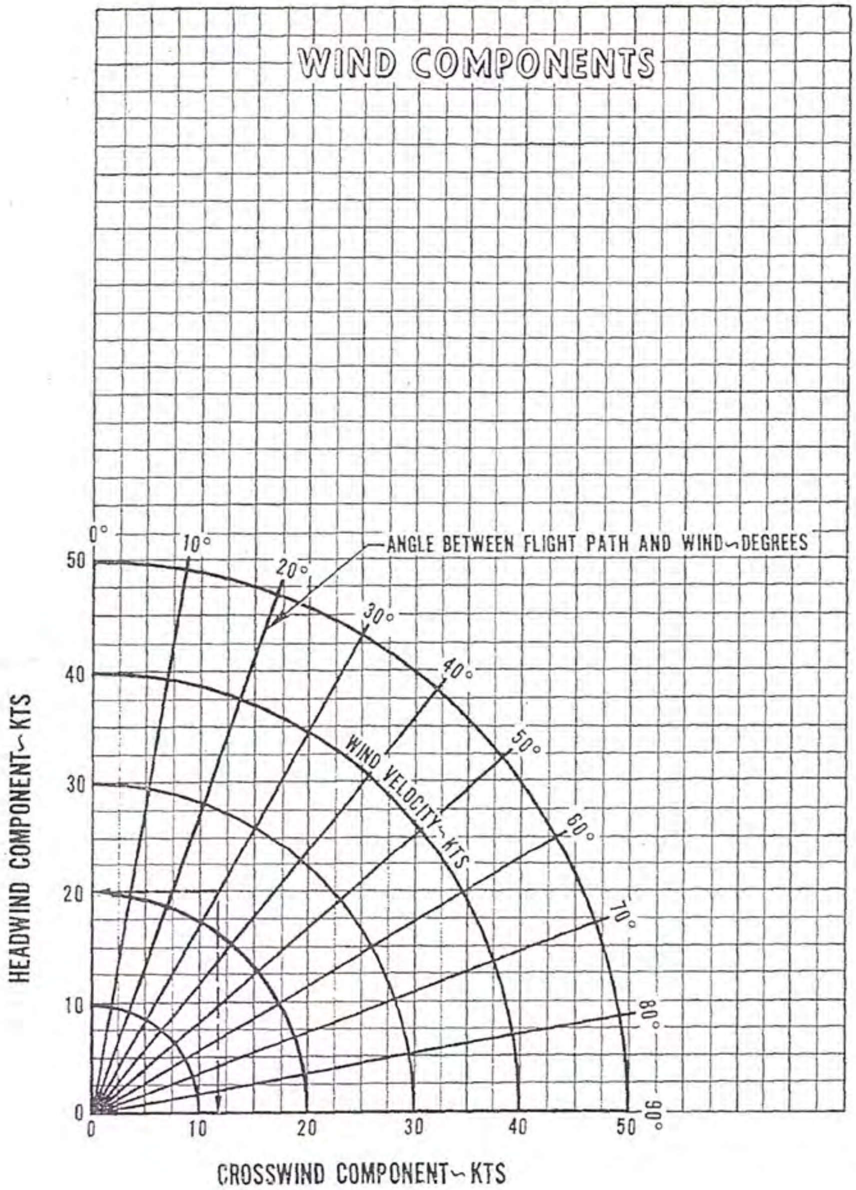
Example:

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

STALL SPEEDS

Figure 5-5

PA-23-250 AZTEC F

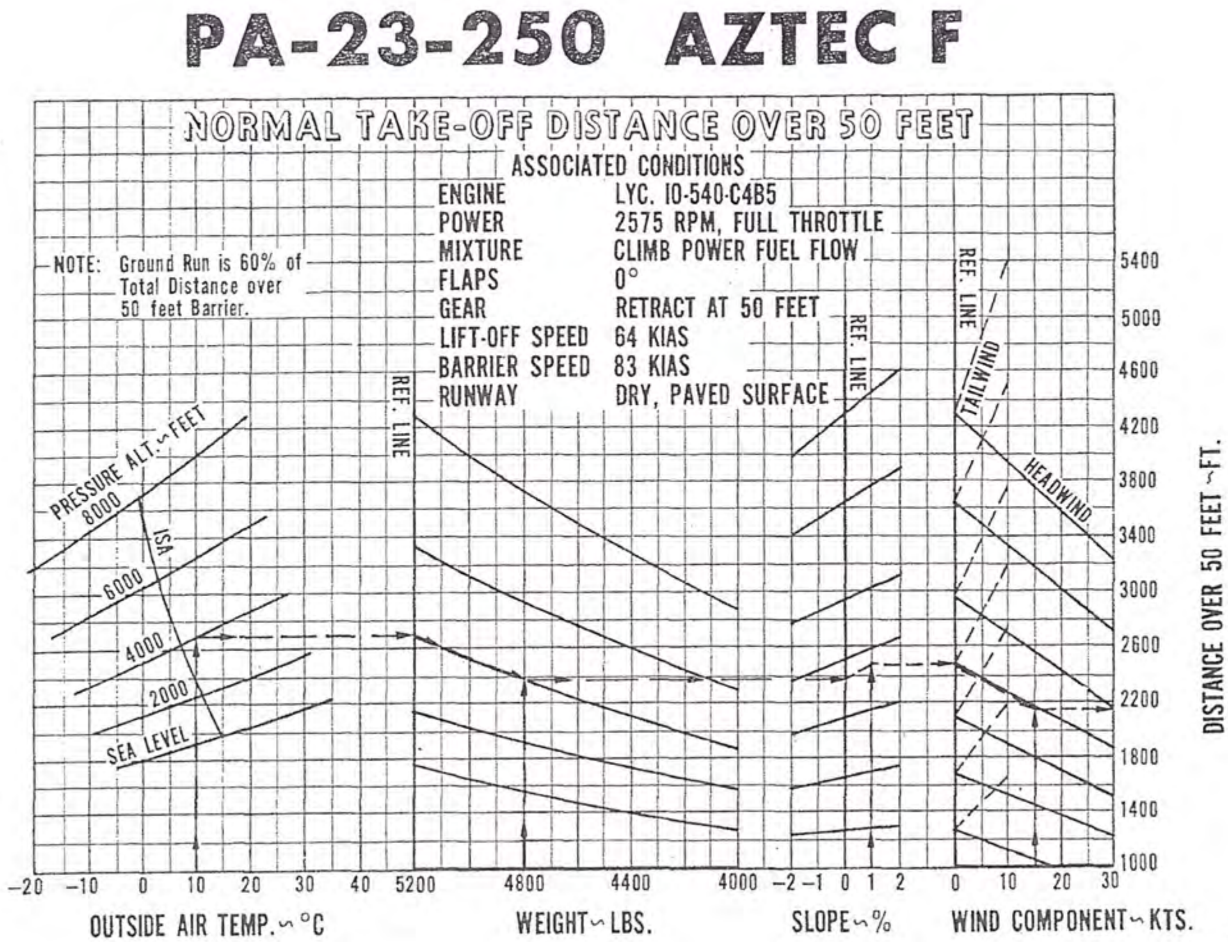


Example:

Wind Velocity	=	23 kts.
Angle between flight path and wind	=	30°
Headwind component	=	20 kts.
Crosswind component	=	12 kts.

WIND COMPONENTS

Figure 5-7



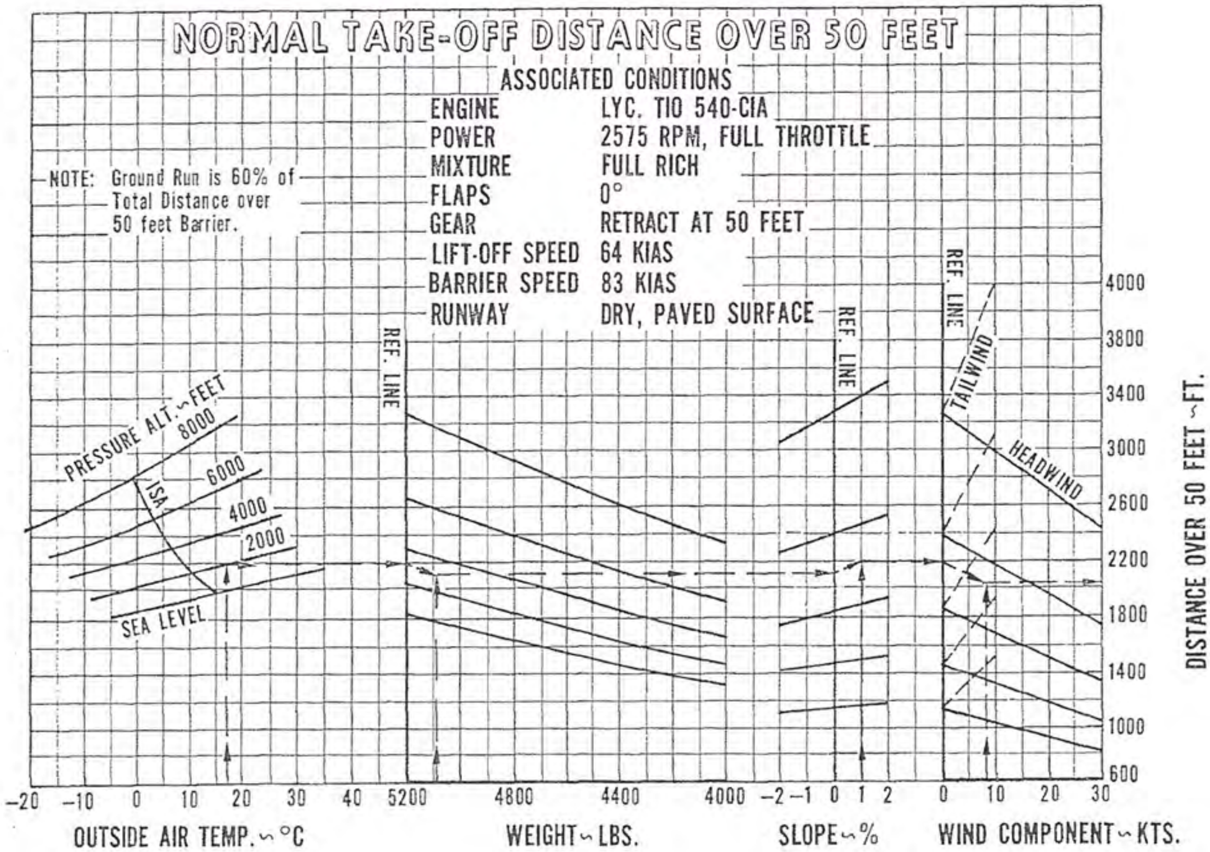
Example:

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

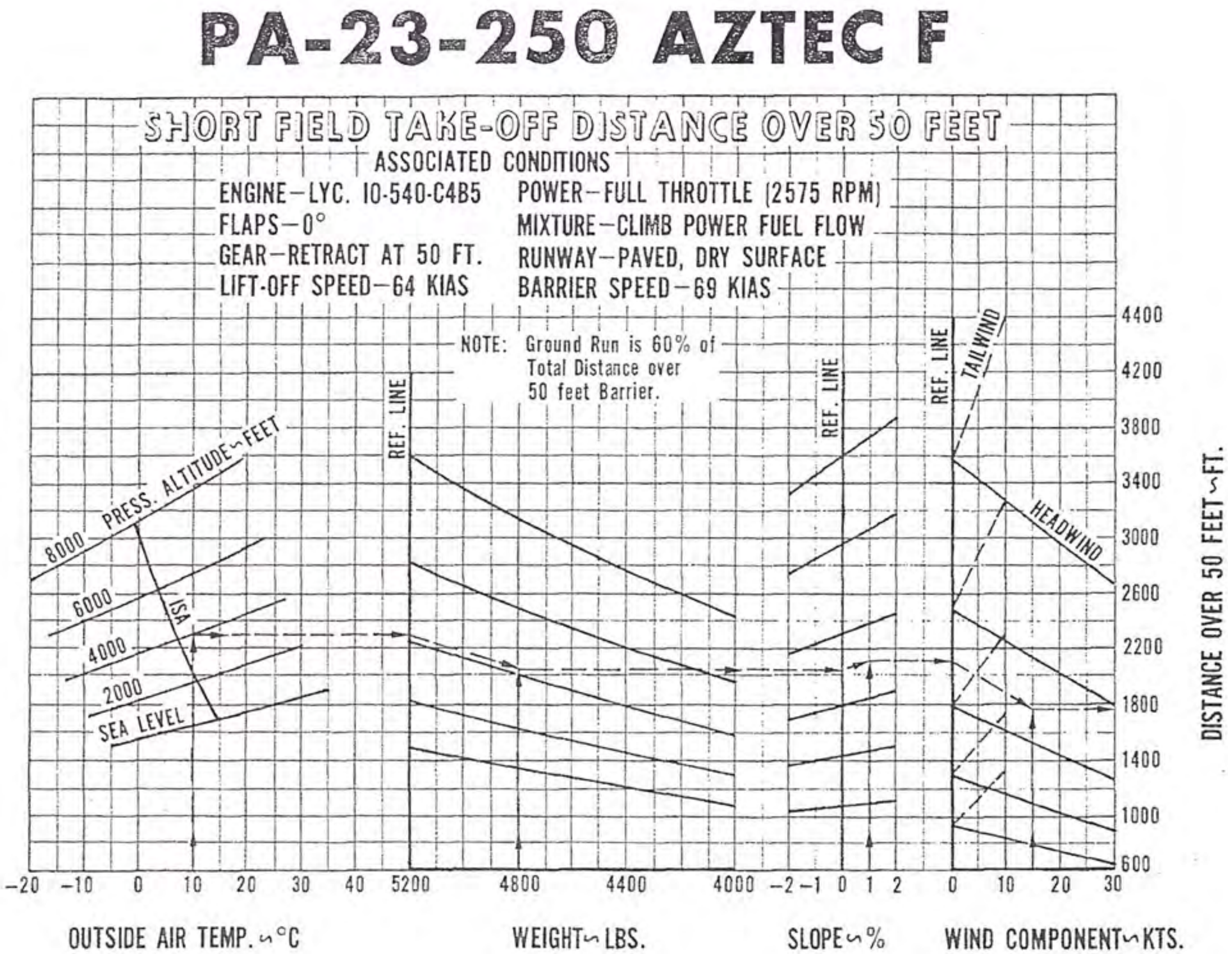


Example:

OAT	= 17° C
Pressure altitude	= 2000 ft.
Slope	= +1.0%
Weight	= 5070 lbs.
Wind	= 8 kts.
Total distance	= 2040 ft.
Ground run	= 1225 ft.

NORMAL TAKEOFF DISTANCE OVER 50 FEET (TURBO)

Figure 5-11

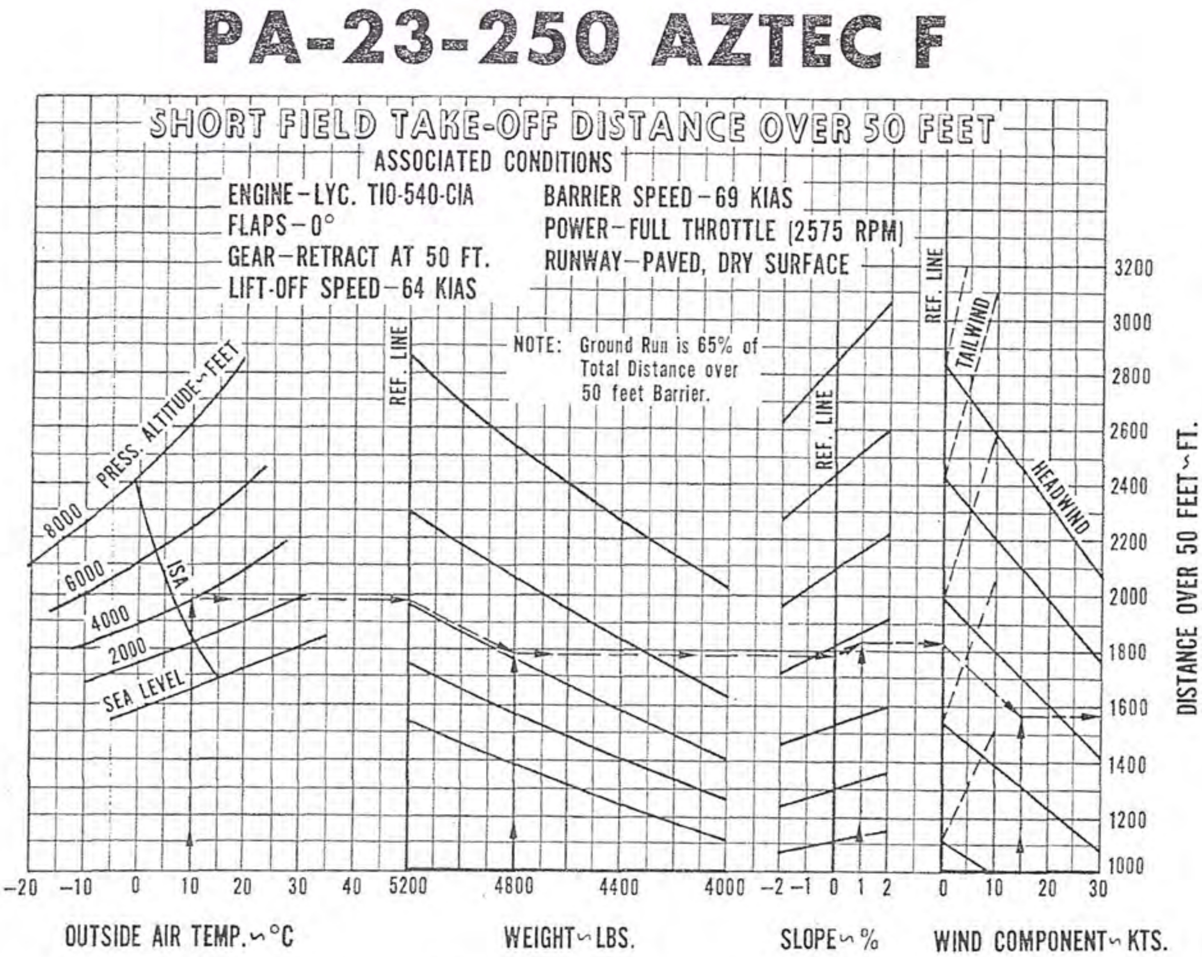


Example:

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

SHORT FIELD TAKEOFF DISTANCE OVER 50 FEET

Figure 5-13

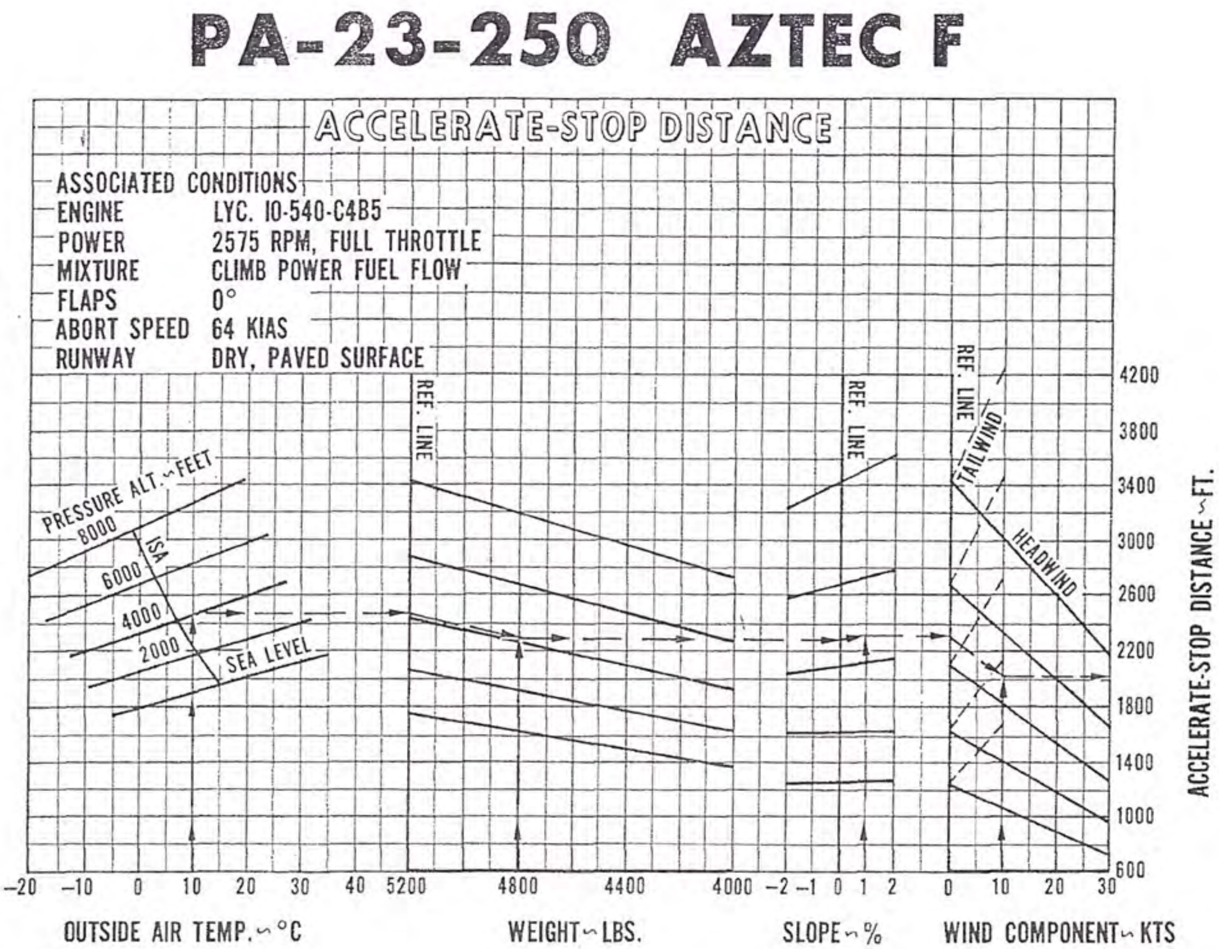


Example:

OAT	= 10° C
Pressure altitude	= 4000 ft.
Slope	= +1.0%
Weight	= 4800 lbs.
Wind	= 15 kts.
Total distance	= 1570 ft.
Ground run	= 1020 ft.

SHORT FIELD TAKEOFF DISTANCE OVER 50 FEET (TURBO)

Figure 5-15

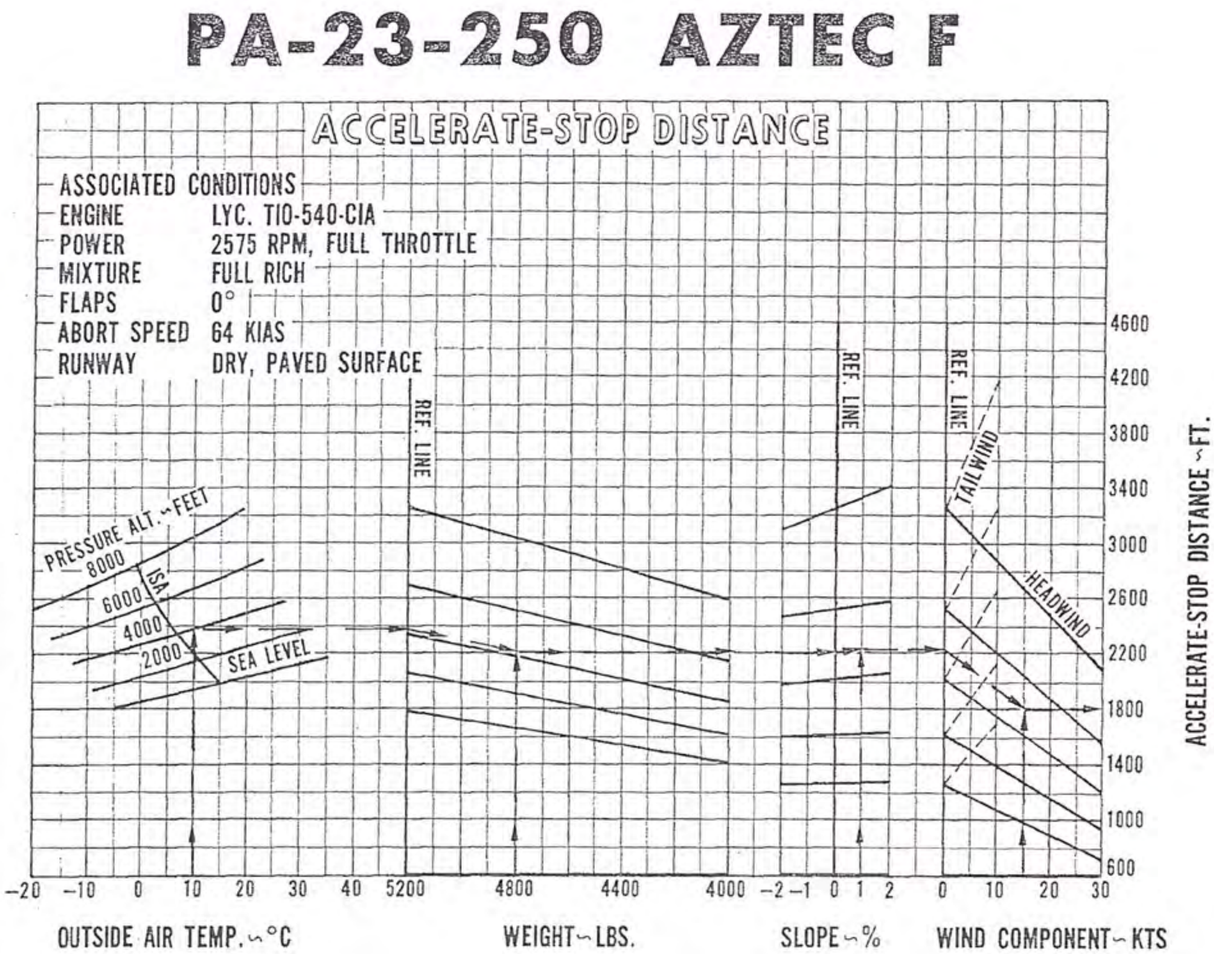


Example:

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

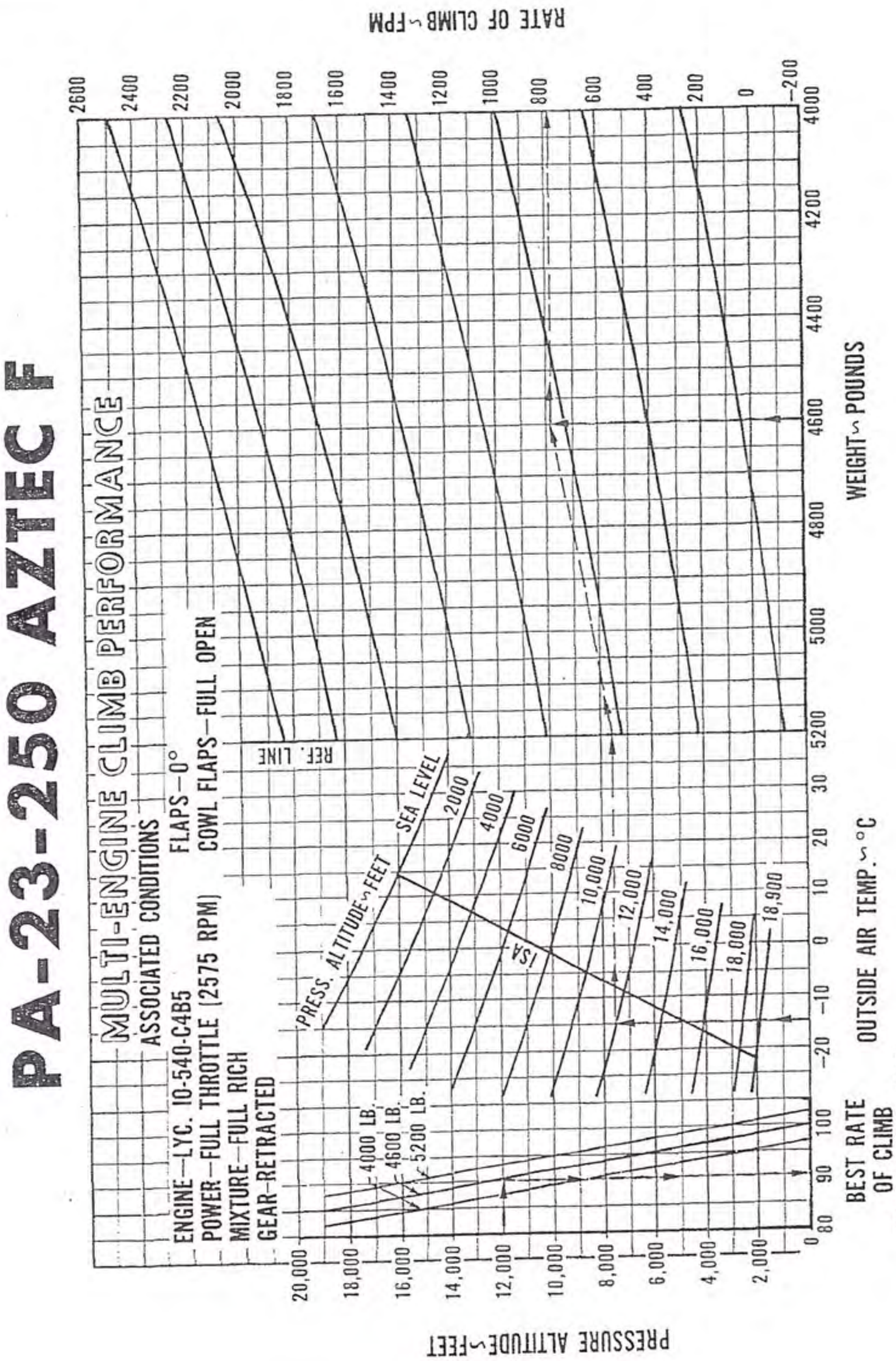


Example:

OAT	= 10° C
Pressure altitude	= 4000 ft.
Slope	= +1.0%
Weight	= 4800 lbs.
Wind	= 15 kts.
Accelerate - stop distance	= 1800 ft.

ACCELERATE - STOP DISTANCE (TURBO)

Figure 5-19

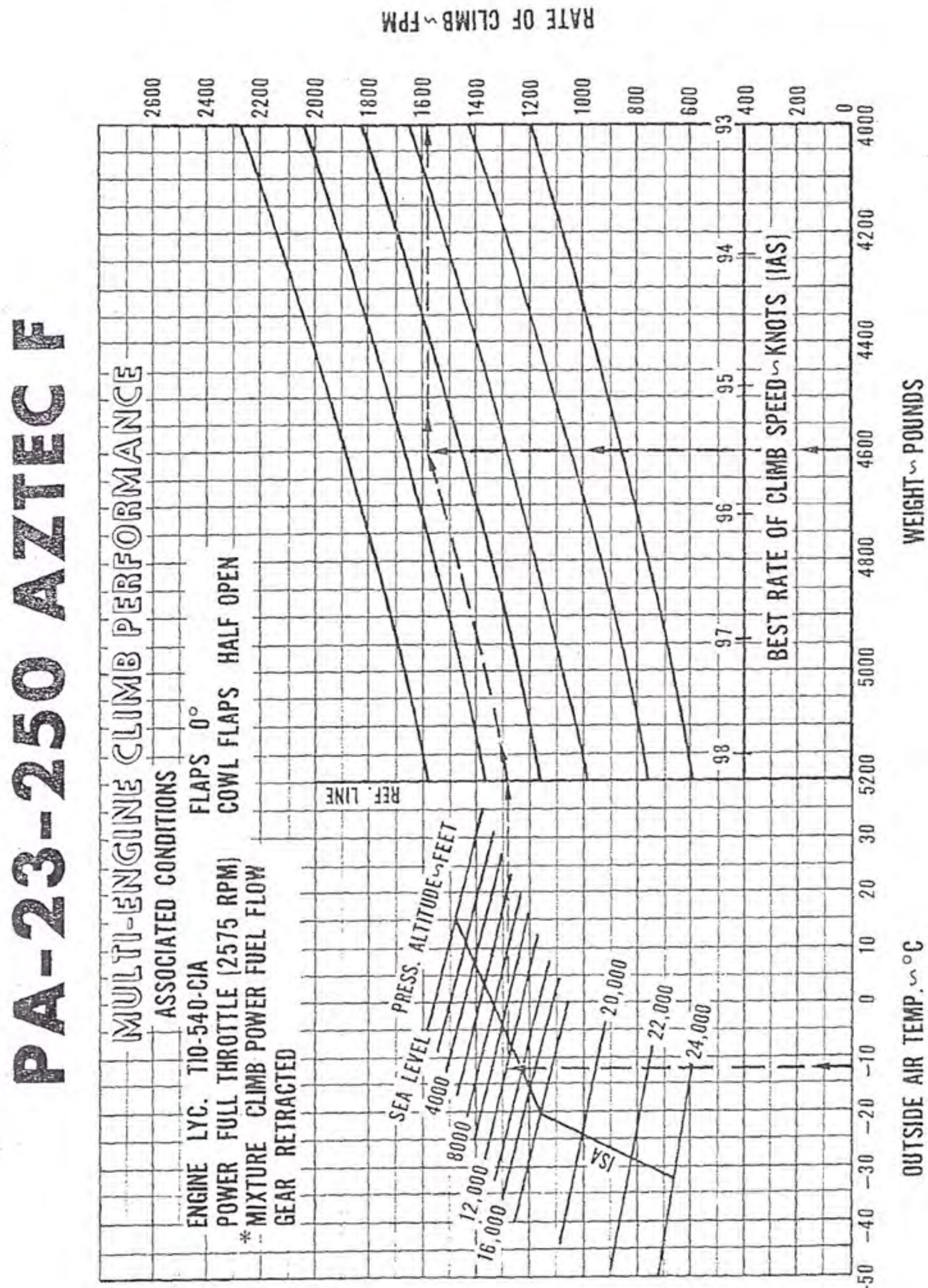


Example:

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



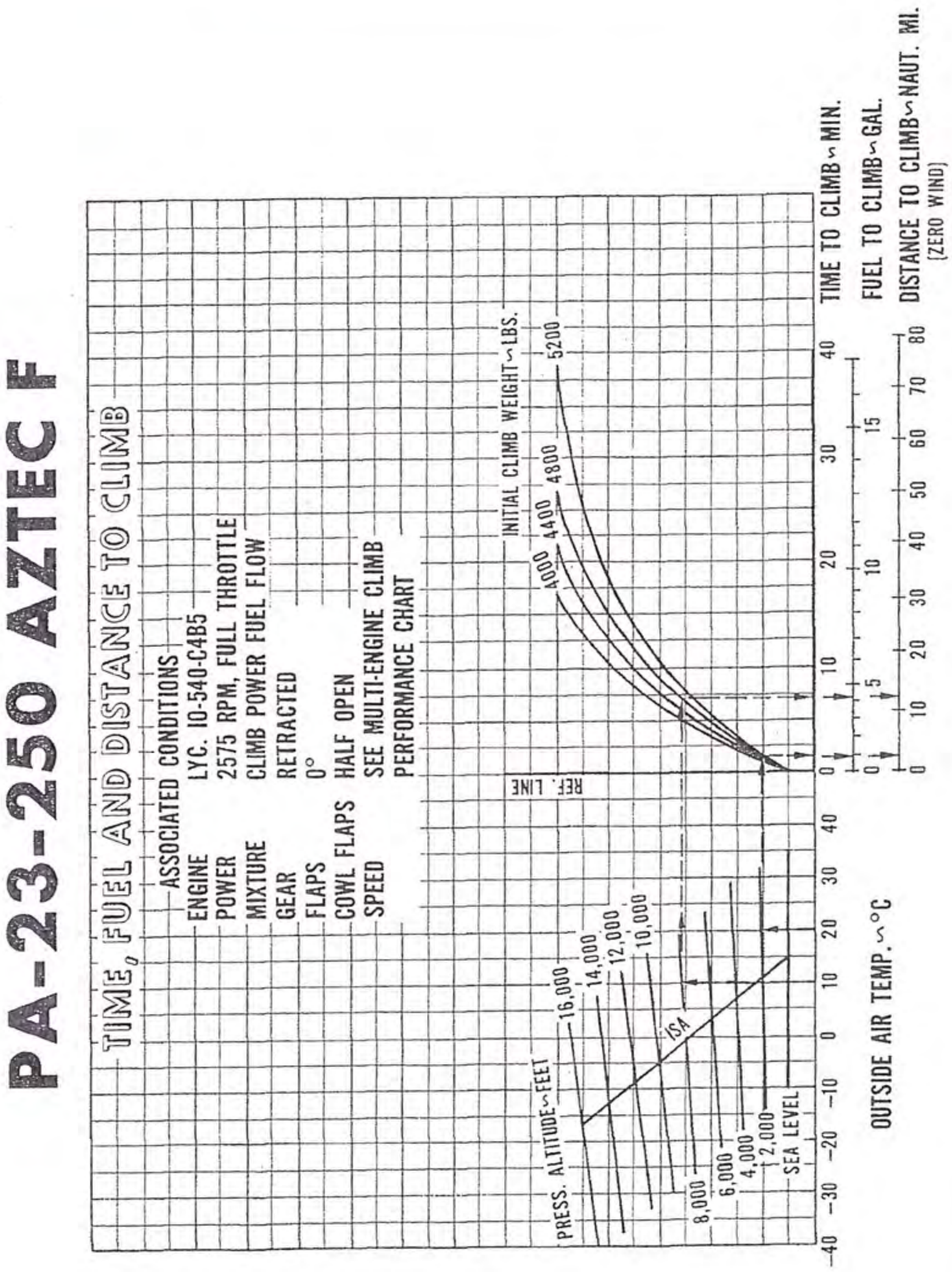
*NOTE: Refer to page 5-41 for leaning instructions.

Example:

OAT	= -12° C
Pressure altitude	= 12000 ft.
Weight	= 4600 lbs.
Rate of climb	= 1580 FPM
Climb speed	= 95.5 KIAS

MULTI-ENGINE CLIMB PERFORMANCE (TURBO)

Figure 5-23

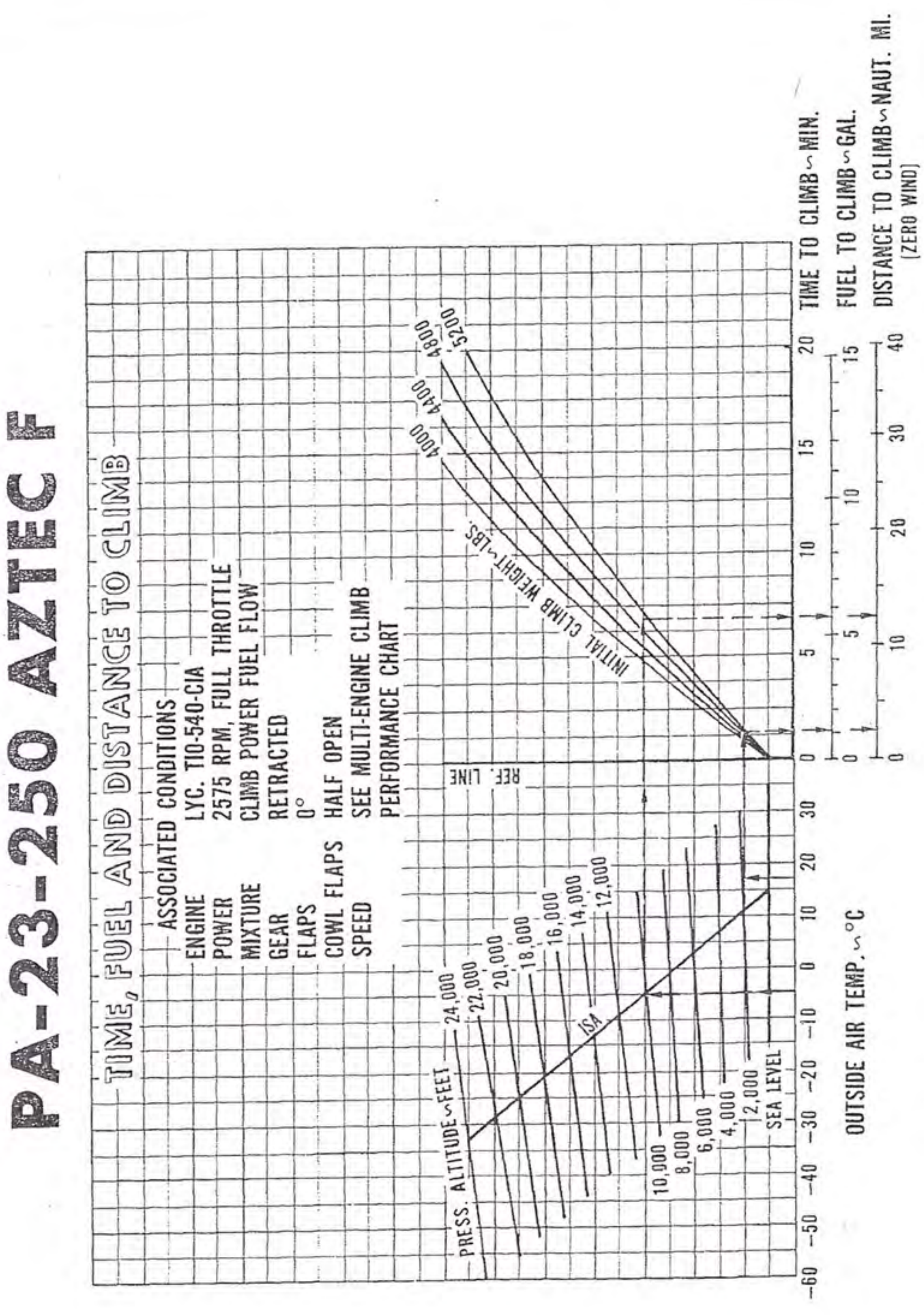


Example:

OAT at airport	= 20° C	Initial climb weight	= 4800 lbs.
OAT at cruise	= 10° C	Time to climb = 7 - 1.5	= 5.5 min.
Pressure altitude at airport	= 2000 ft.	Fuel to climb = 4.1 - .7	= 3.4 gal.
Pressure altitude at cruise	= 8000 ft.	Distance to climb = 12 - 2	= 10 naut. mi.

TIME, FUEL AND DISTANCE TO CLIMB

Figure 5-25

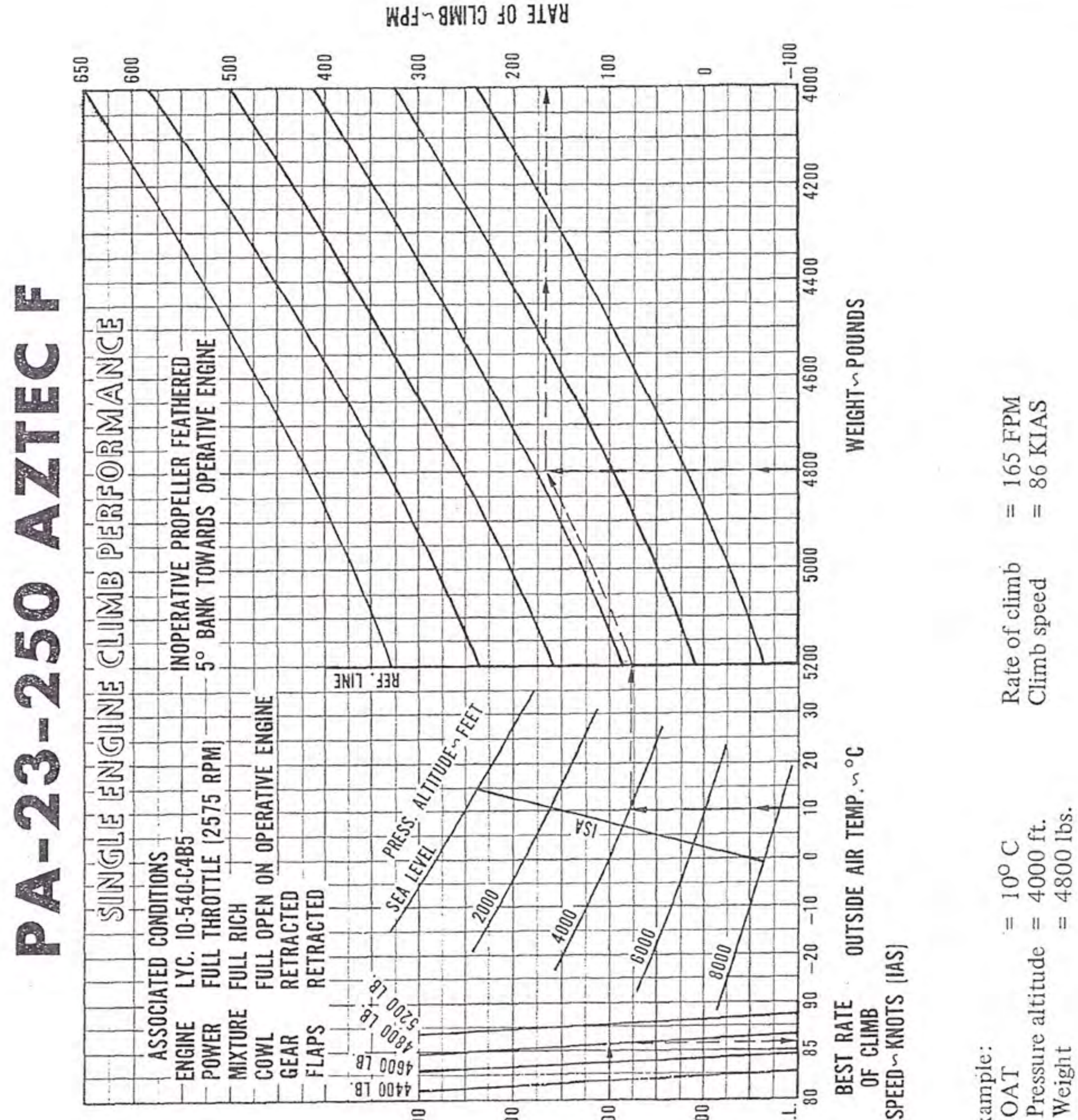


Example:

OAT at airport	= 17° C		Initial climb weight	= 5070 lbs.
OAT at cruise	= -5° C		Time to climb = 6.4 - 1.3	= 5.1 min.
Pressure altitude at airport	= 2000 ft.		Fuel to climb = 5.6 - 1.1	= 4.5 gal.
Pressure altitude at cruise	= 10000 ft.		Distance to climb = 12.5 - 2.5	= 10.0 naut. mi.

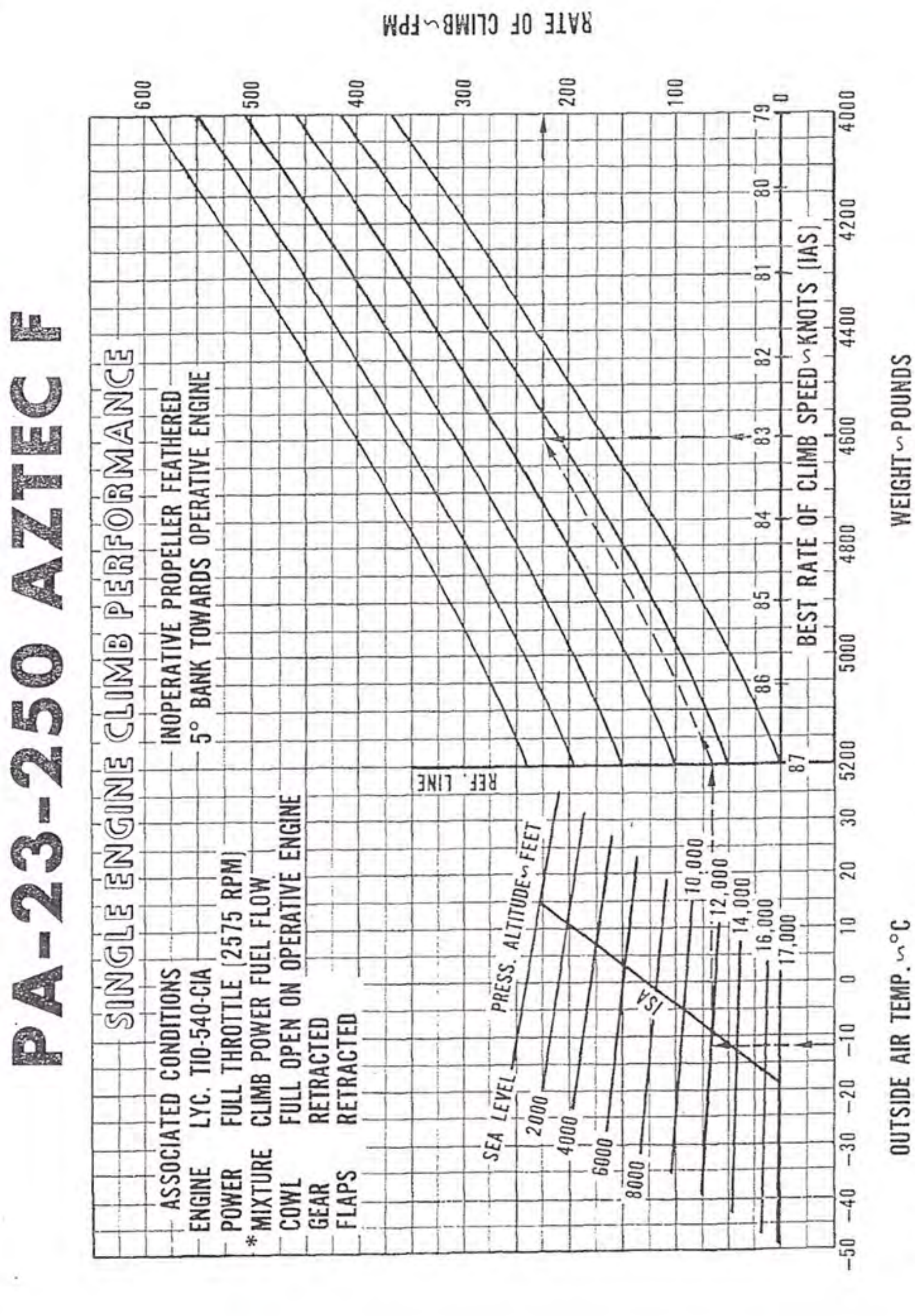
TIME, FUEL AND DISTANCE TO CLIMB (TURBO)

Figure 5-27



SINGLE ENGINE CLIMB PERFORMANCE

Figure 5-29

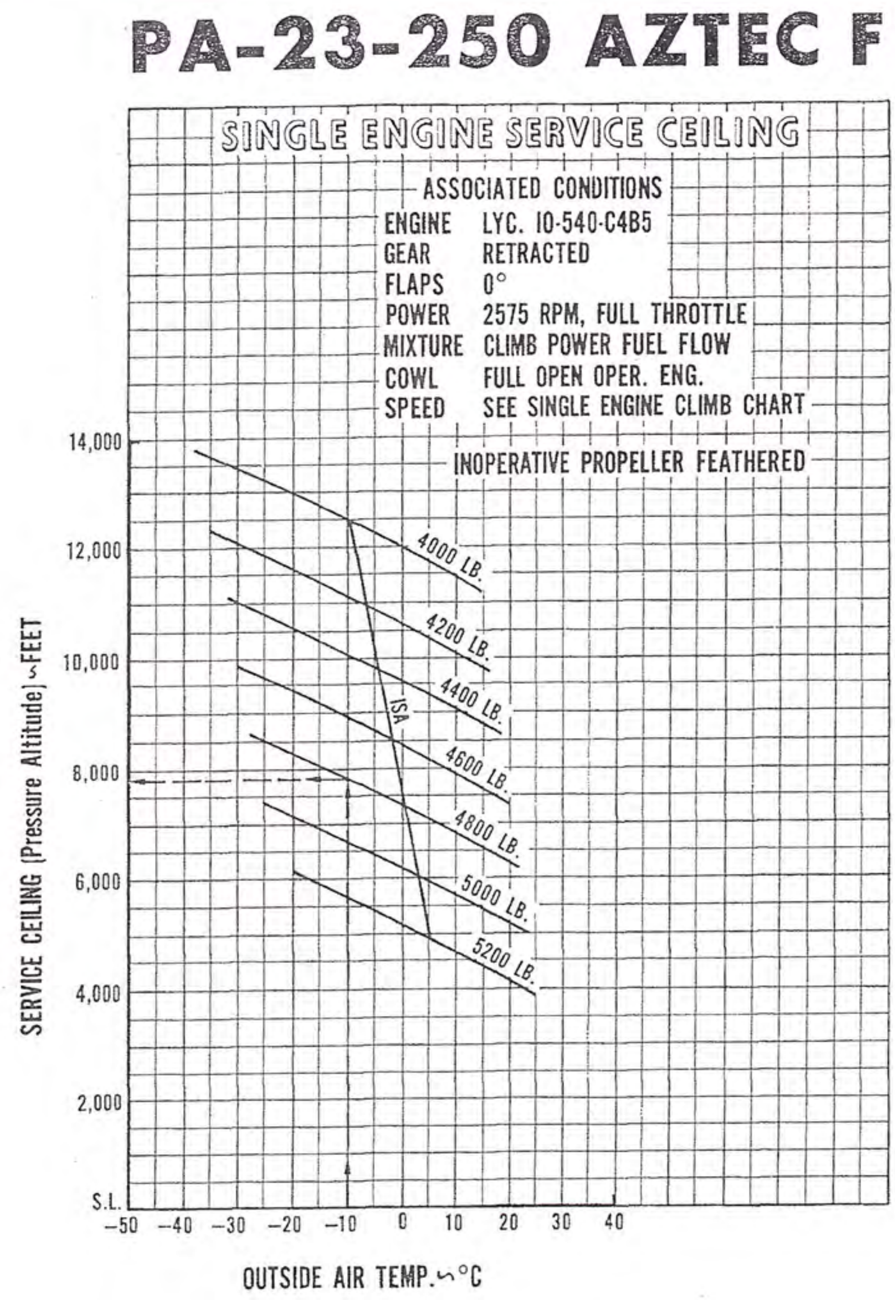


*NOTE: Refer to page 5-41 for leaning instructions.

Example:
OAT = -12° C
Pressure altitude = 12000 ft.
Weight = 4600 lbs.
Rate of climb = 225 FPM
Climb speed = 83 KIAS

SINGLE ENGINE CLIMB PERFORMANCE (TURBO)

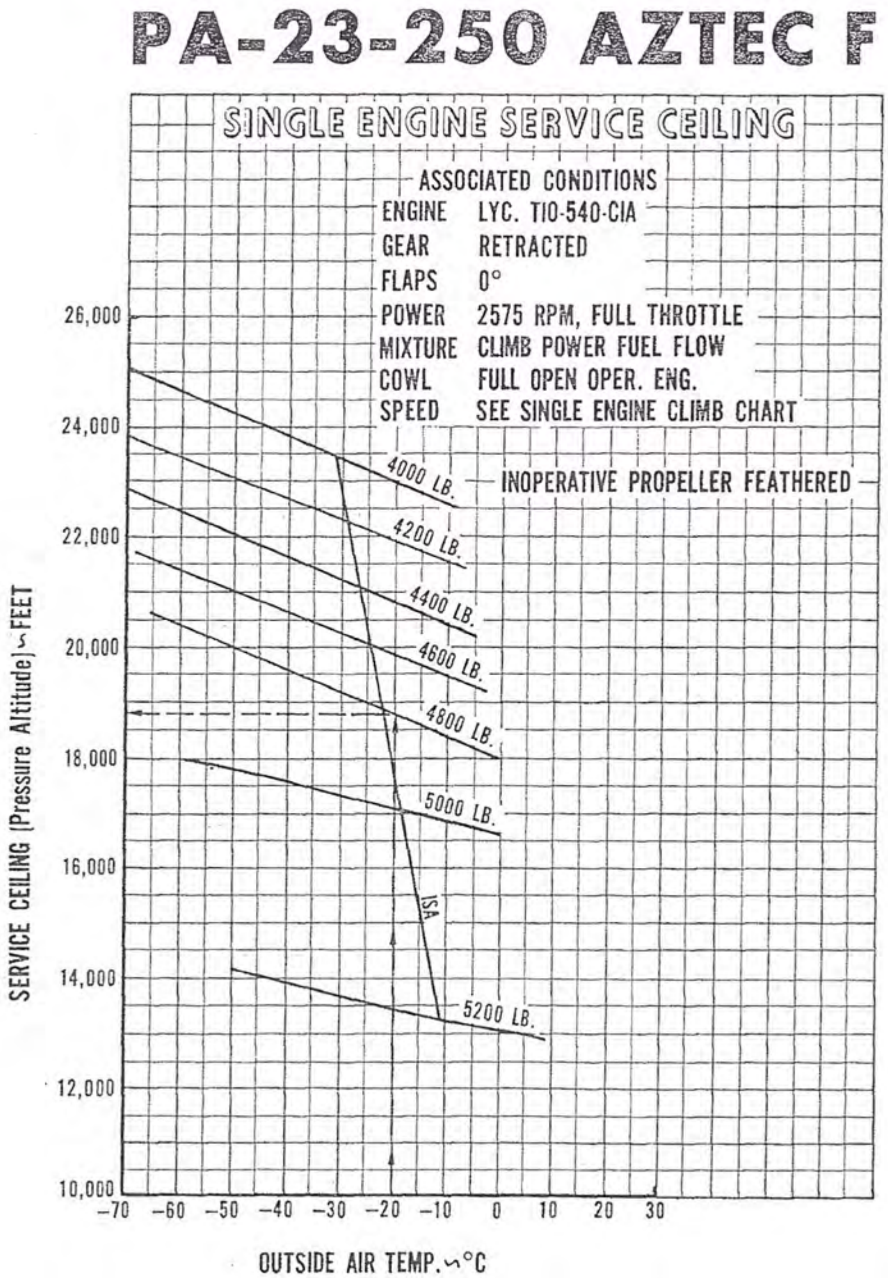
Figure 5-31



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

SINGLE ENGINE SERVICE CEILING

Figure 5-33

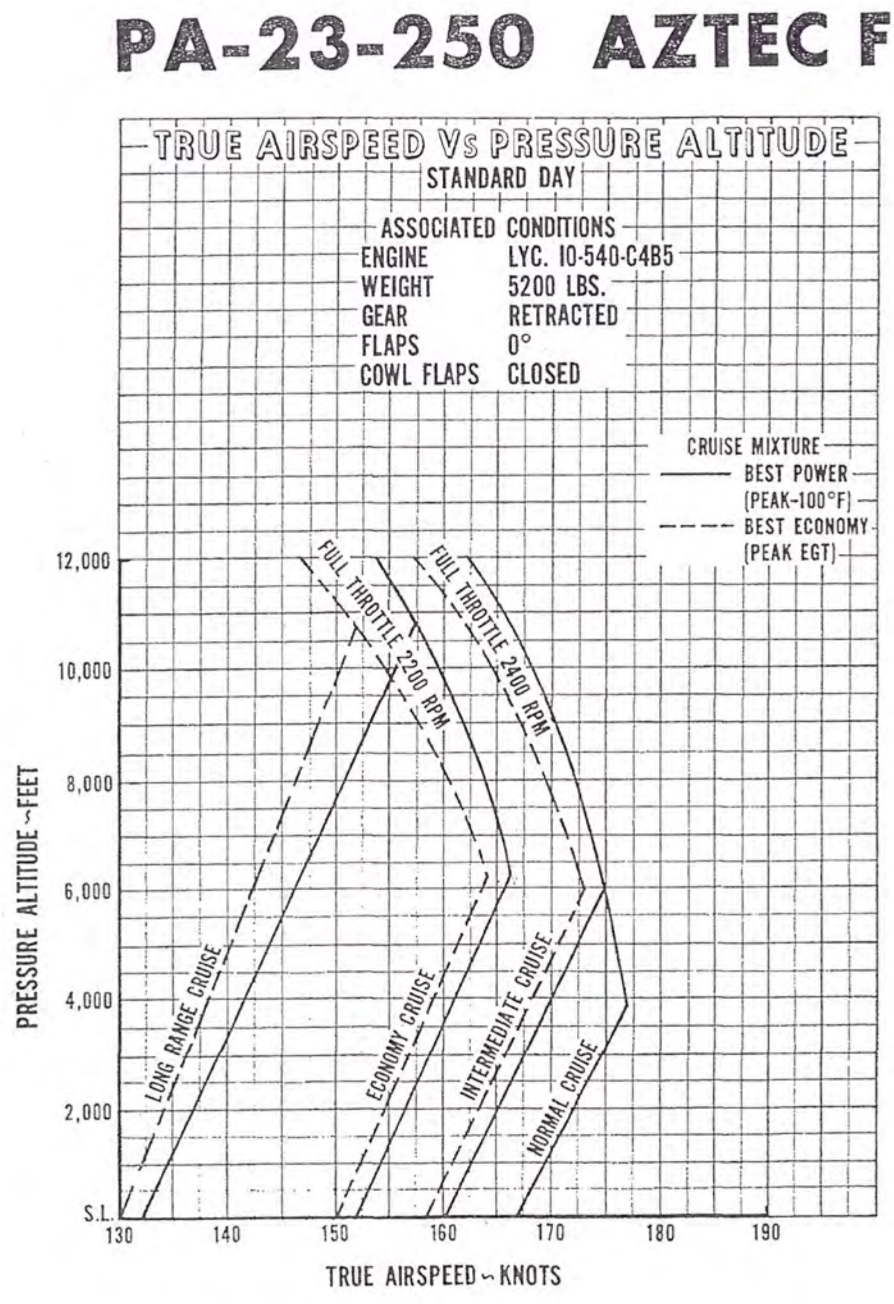


Example:

OAT	= -20° C
Weight	= 4800 lbs.
Service ceiling	= 18800 ft.

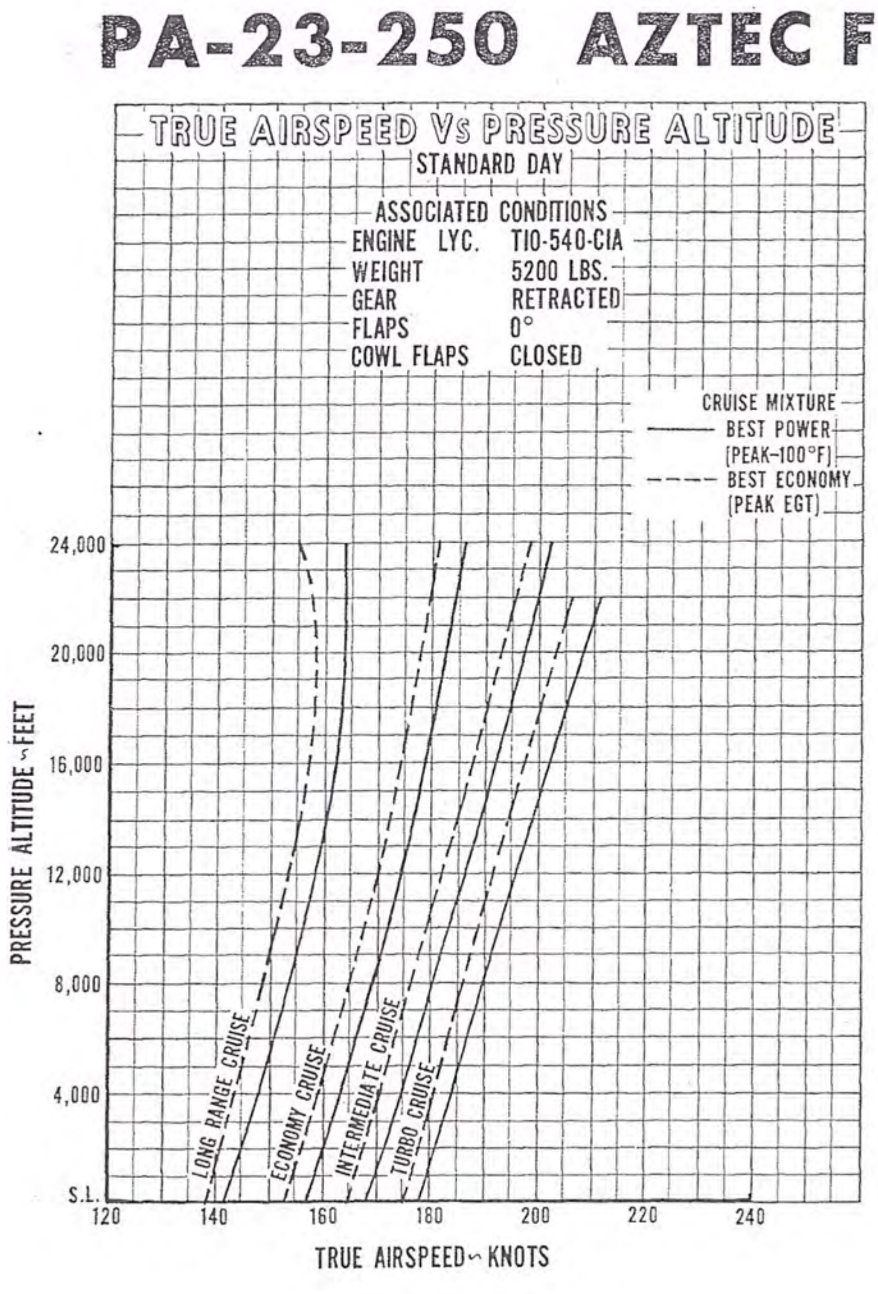
SINGLE ENGINE SERVICE CEILING (TURBO)

Figure 5-35



TRUE AIRSPEED VS. PRESSURE ALTITUDE

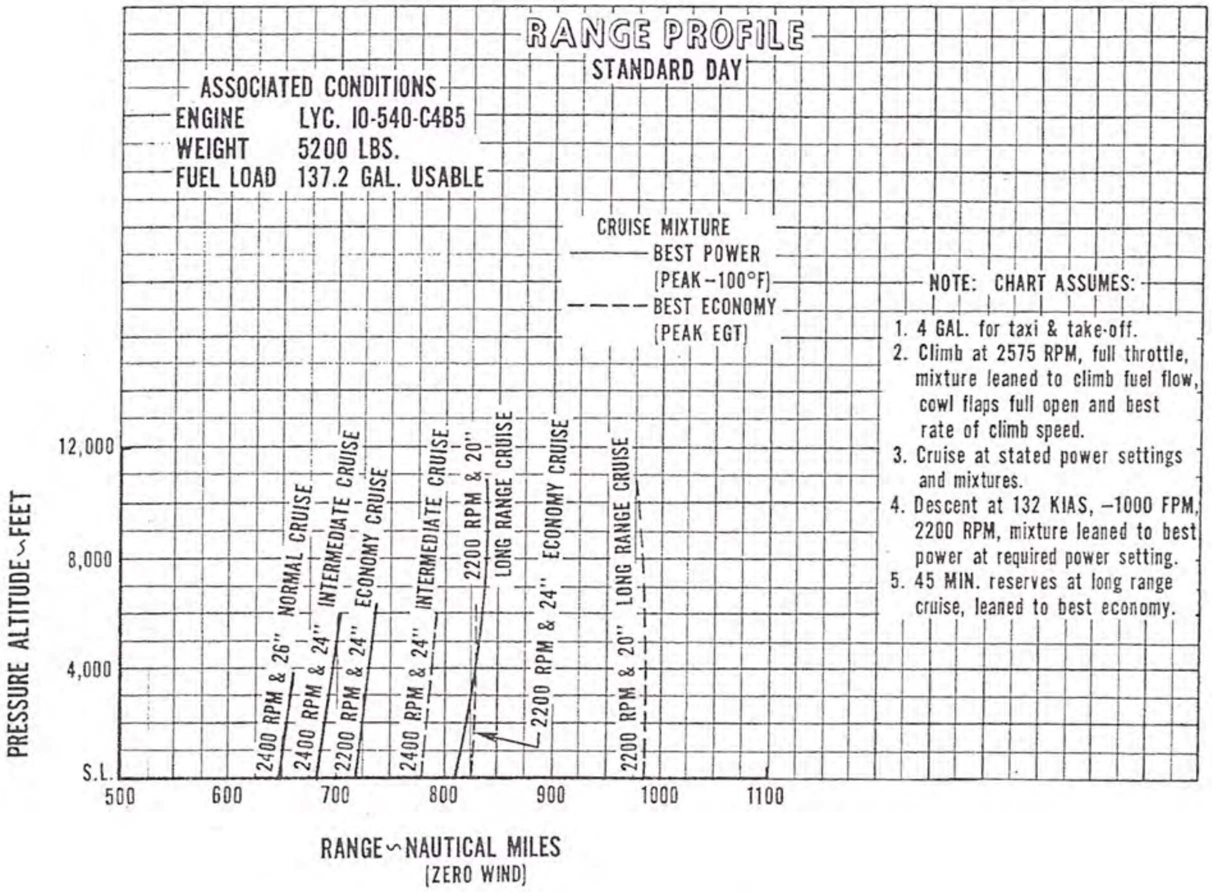
Figure 5-37



TRUE AIRSPEED VS. PRESSURE ALTITUDE (TURBO)

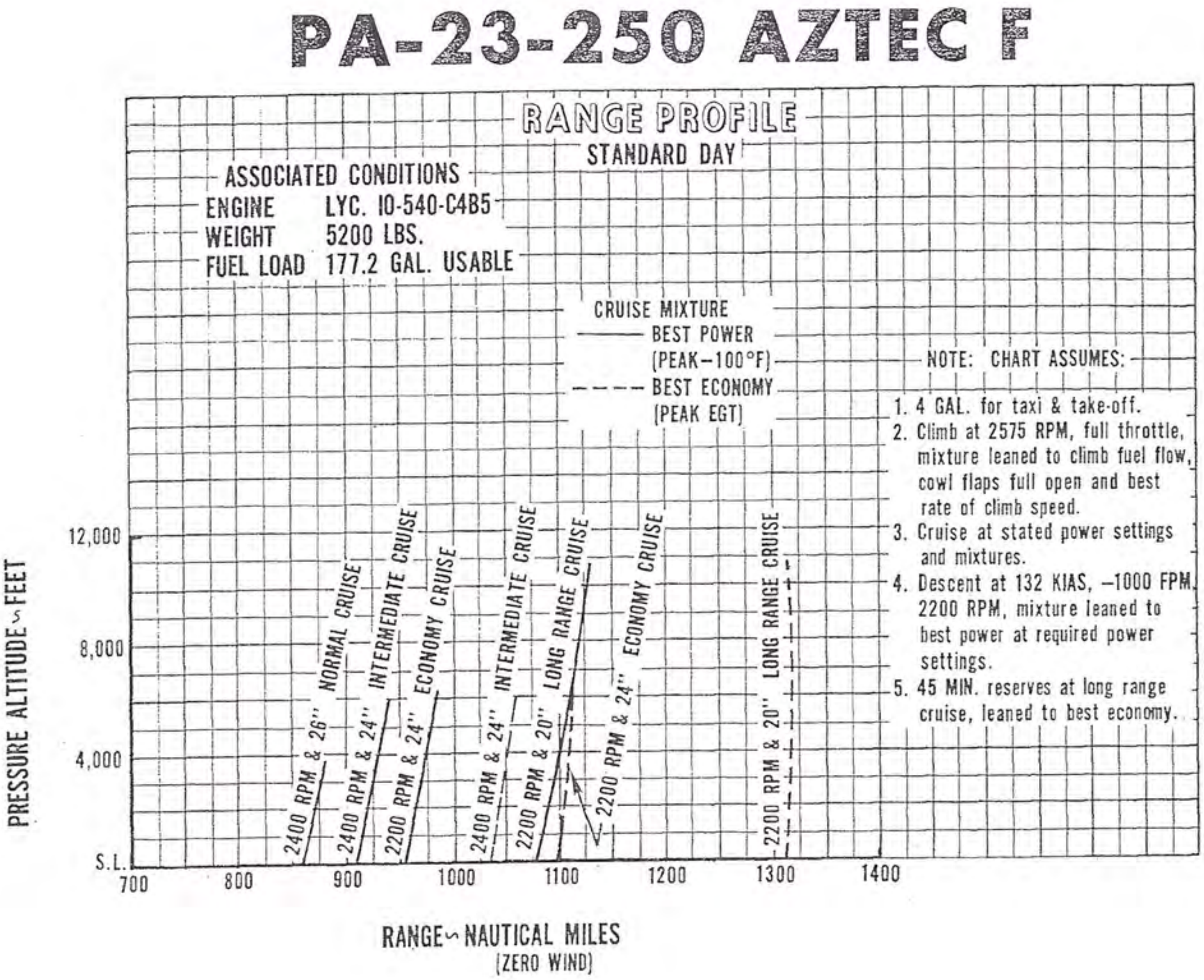
Figure 5-39

PA-23-250 AZTEC F



RANGE PROFILE

Figure 5-41



RANGE PROFILE (OPTIONAL TIP TANKS)

Figure 5-43

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

NORMAL CRUISE - 2400 RPM - 26 IN. HG.* - LYC IO-540-C4B5

	Pressure Altitude Feet	OAT °C	Fuel Flow GPH B.P./B.E.	5200 Lb.		4800 Lb.		4200 Lb.	
				Best Power (Knots)	Best Economy (Knots)	Best Power (Knots)	Best Economy (Knots)	Best Power (Knots)	Best Economy (Knots)
ISA + 20°C	SL	35.0	31.6/NA	170	Not Approved	172	Not Approved	174	Not Approved
	2000	31.0	32.1/NA	176	Not Approved	178	Not Approved	180	Not Approved
	3850	27.2	32.6/NA	181	Not Approved	183	Not Approved	185	Not Approved
ISA	SL	15.0	31.6/NA	167	Not Approved	169	Not Approved	171	Not Approved
	2000	11.0	32.1/NA	172	Not Approved	174	Not Approved	176	Not Approved
	3850	7.2	32.6/NA	177	Not Approved	179	Not Approved	181	Not Approved
ISA - 20°C	SL	- 5.0	31.6/NA	163	Not Approved	165	Not Approved	167	Not Approved
	2000	- 9.0	32.1/NA	168	Not Approved	170	Not Approved	172	Not Approved
	3850	-12.8	32.6/NA	173	Not Approved	175	Not Approved	177	Not Approved

*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 - NORMAL CRUISE

Figure 5-47

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

ECONOMY CRUISE - 2200 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	26.0/22.4	154	153	157	156	160	158
	2000	31.0	26.4/22.8	159	157	162	160	165	163
	4000	27.1	26.8/23.2	164	162	167	165	170	168
	6250	22.5	27.3/23.7	170	168	173	171	176	174
ISA	SL	15.0	26.0/22.4	152	150	154	153	157	156
	2000	11.0	26.4/22.8	156	155	159	157	161	160
	4000	7.1	26.8/23.2	161	159	164	162	167	165
	6250	2.5	27.3/23.7	166	164	170	167	172	170
ISA - 20°C	SL	- 5.0	26.0/22.4	149	147	151	149	153	152
	2000	- 9.0	26.4/22.8	153	152	156	154	158	157
	4000	-13.9	26.8/23.2	158	156	161	158	163	161
	6250	-17.5	27.3/23.7	163	161	166	164	169	167

*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 - ECONOMY CRUISE

Figure 5-51

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

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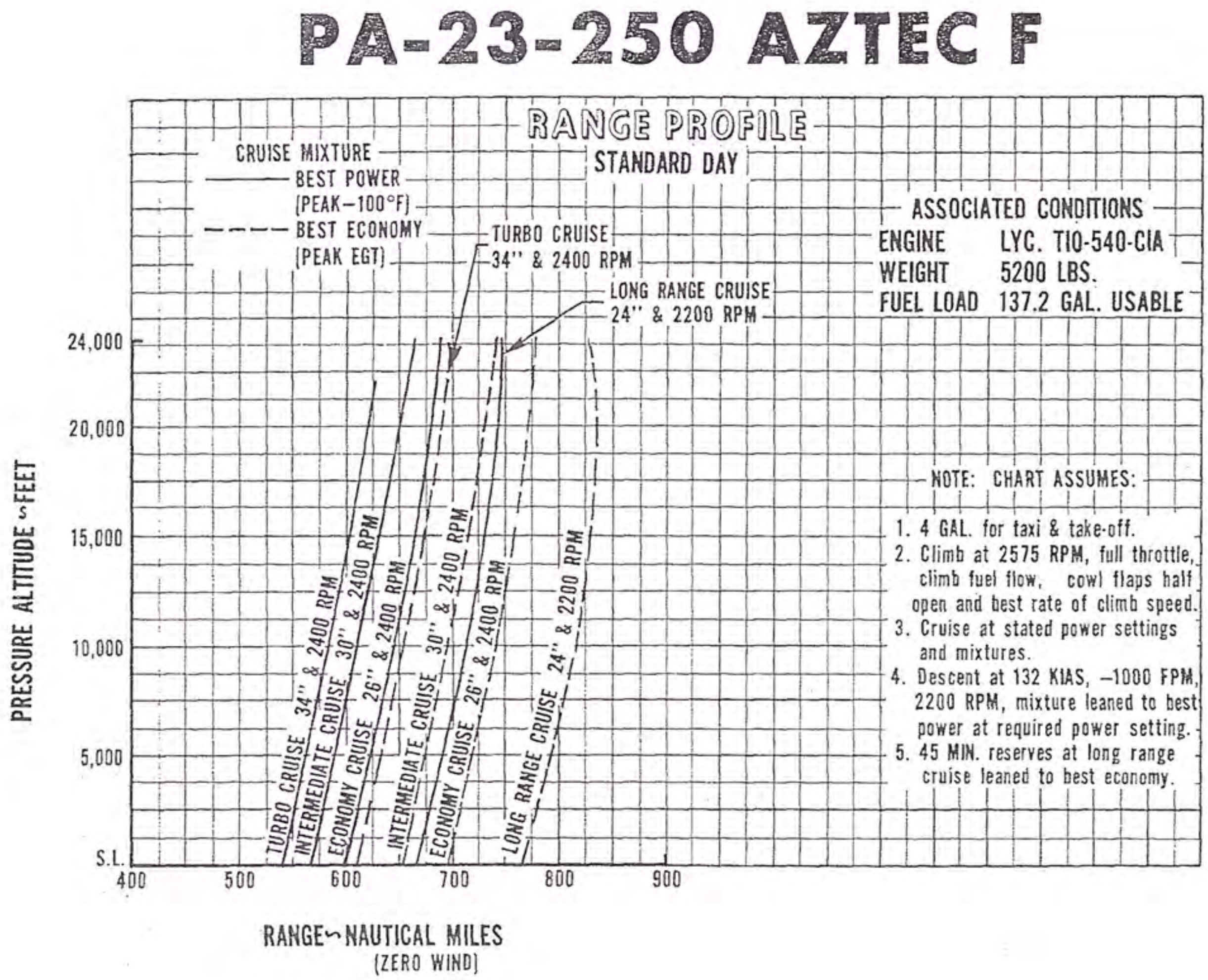
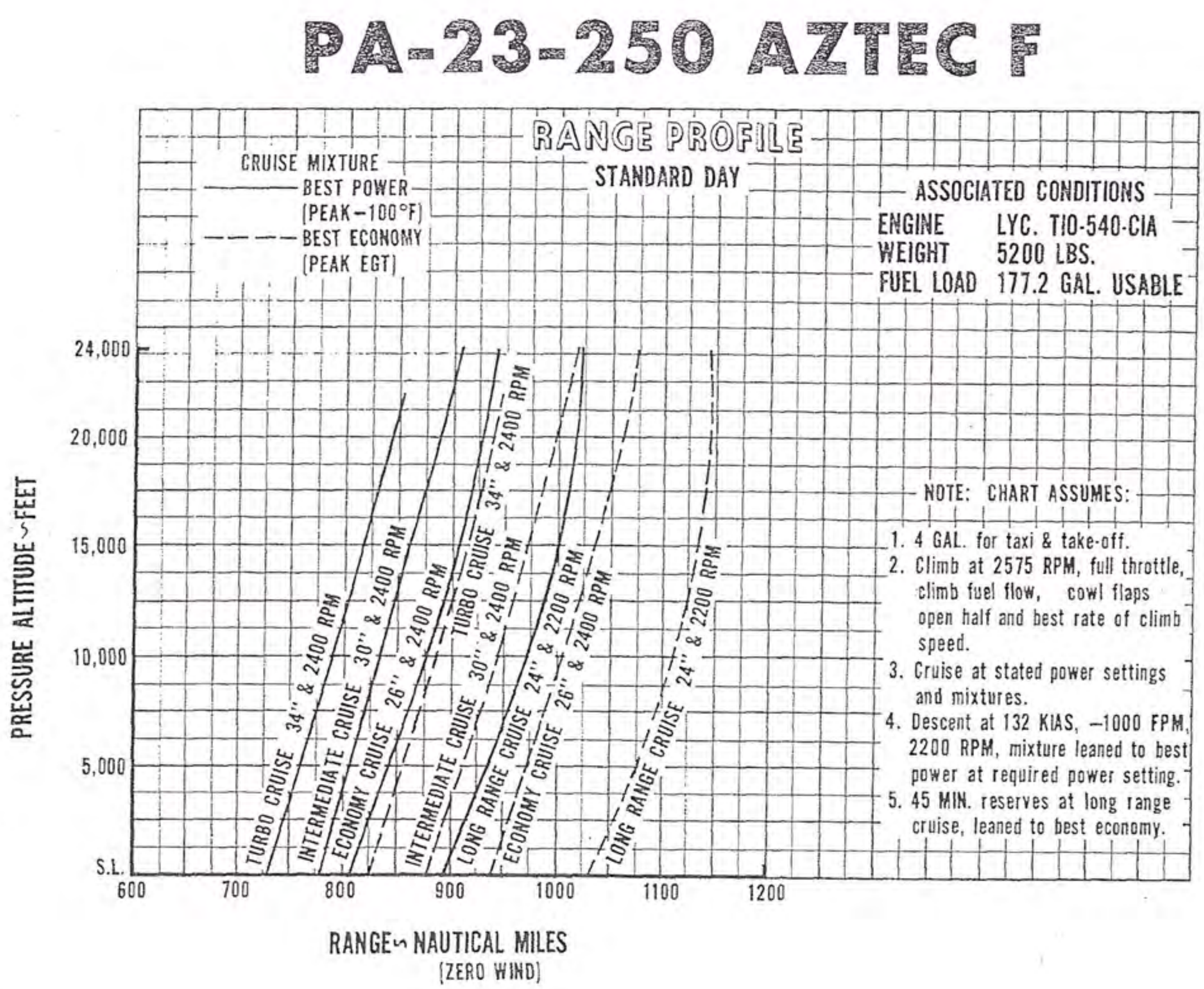


RANGE PROFILE (TURBO)

Figure 5-55



RANGE PROFILE (TURBO - OPTIONAL TIP TANKS)

Figure 5-57

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

TURBO CRUISE - 2400 RPM - 34 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	37.6/32.6	179	175	181	177	183	179
	5000	25.1	37.6/32.6	186	182	189	185	191	187
	10000	15.2	37.6/32.6	193	190	197	193	199	195
	15000	5.3	37.6/32.6	201	197	205	201	208	204
	20000	- 4.6	37.6/32.6	208	204	213	208	217	212
	22000	- 8.5	37.6/32.6	211	206	216	211	220	216
ISA	SL	15.0	38.0/33.0	178	175	180	176	182	178
	5000	5.1	38.0/33.0	185	182	187	184	190	186
	10000	- 4.8	38.0/33.0	193	189	195	192	198	195
	15000	-14.7	28.0/33.0	200	196	203	199	206	202
	20000	-24.6	38.0/33.0	208	203	211	207	215	211
	22000	-28.5	38.0/33.0	211	206	215	210	218	214
ISA - 20°C	SL	- 5.0	38.0/33.0	173	170	175	172	177	174
	5000	-14.9	38.0/33.0	181	177	183	180	185	182
	10000	-24.8	38.0/33.0	188	184	191	187	193	190
	15000	-34.7	38.0/33.0	196	192	199	195	202	198
	20000	-44.6	38.0/33.0	203	199	207	202	210	206
	22000	-48.5	38.0/33.0	206	202	210	206	213	209

*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 - TURBO CRUISE (TURBO)

Figure 5-61

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

ECONOMY CRUISE - 2400 RPM - 26 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	30.4/25.7	160	156	162	159	165	162
	5000	25.1	30.4/25.7	167	164	170	167	173	170
	10000	15.2	30.4/25.7	175	171	178	174	181	177
	15000	5.3	30.4/25.7	181	176	185	181	189	185
	20000	- 4.6	30.4/25.7	186	180	192	187	197	193
	24000	-12.6	30.4/25.7	188	182	196	191	204	199
ISA	SL	15.0	30.4/25.7	157	153	159	156	162	158
	5000	5.1	30.4/25.7	165	161	167	164	170	167
	10000	- 4.8	30.4/25.7	172	168	175	171	178	174
	15000	-14.7	30.4/25.7	178	173	182	177	186	182
	20000	-24.6	30.4/25.7	183	178	188	183	193	189
	24000	-32.5	30.4/25.7	186	181	193	188	199	195
ISA - 20°C	SL	- 5.0	30.4/25.7	153	150	155	152	157	155
	5000	-14.9	30.4/25.7	161	157	163	160	166	163
	10000	-24.8	30.4/25.7	168	164	171	168	174	171
	15000	-34.7	30.4/25.7	174	170	177	174	181	178
	20000	-44.6	30.4/25.7	180	175	184	181	189	186
	24000	-52.5	30.4/25.7	184	178	189	185	195	191

*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 - ECONOMY CRUISE (TURBO)

Figure 5-65

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

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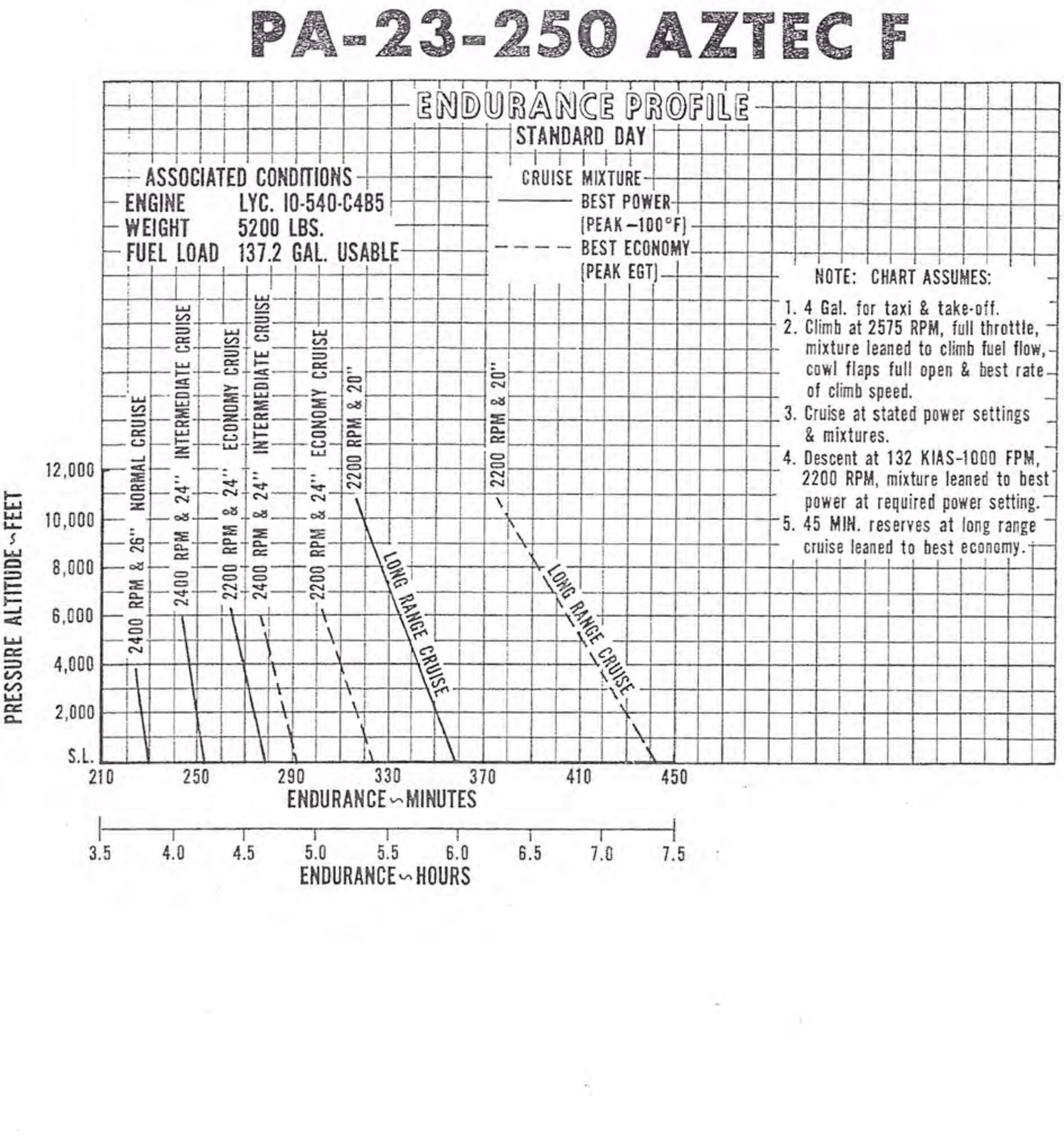
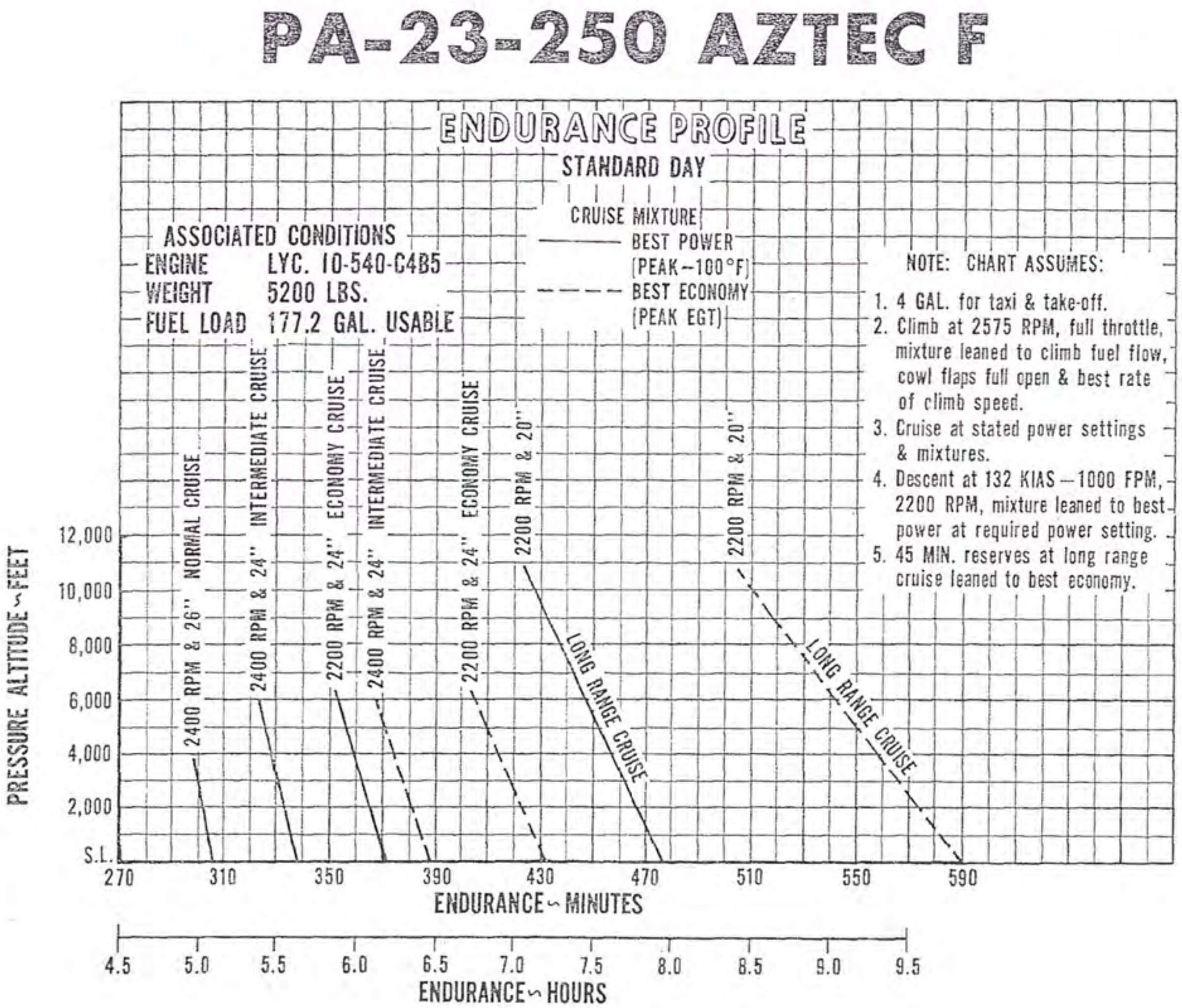


ENDURANCE PROFILE

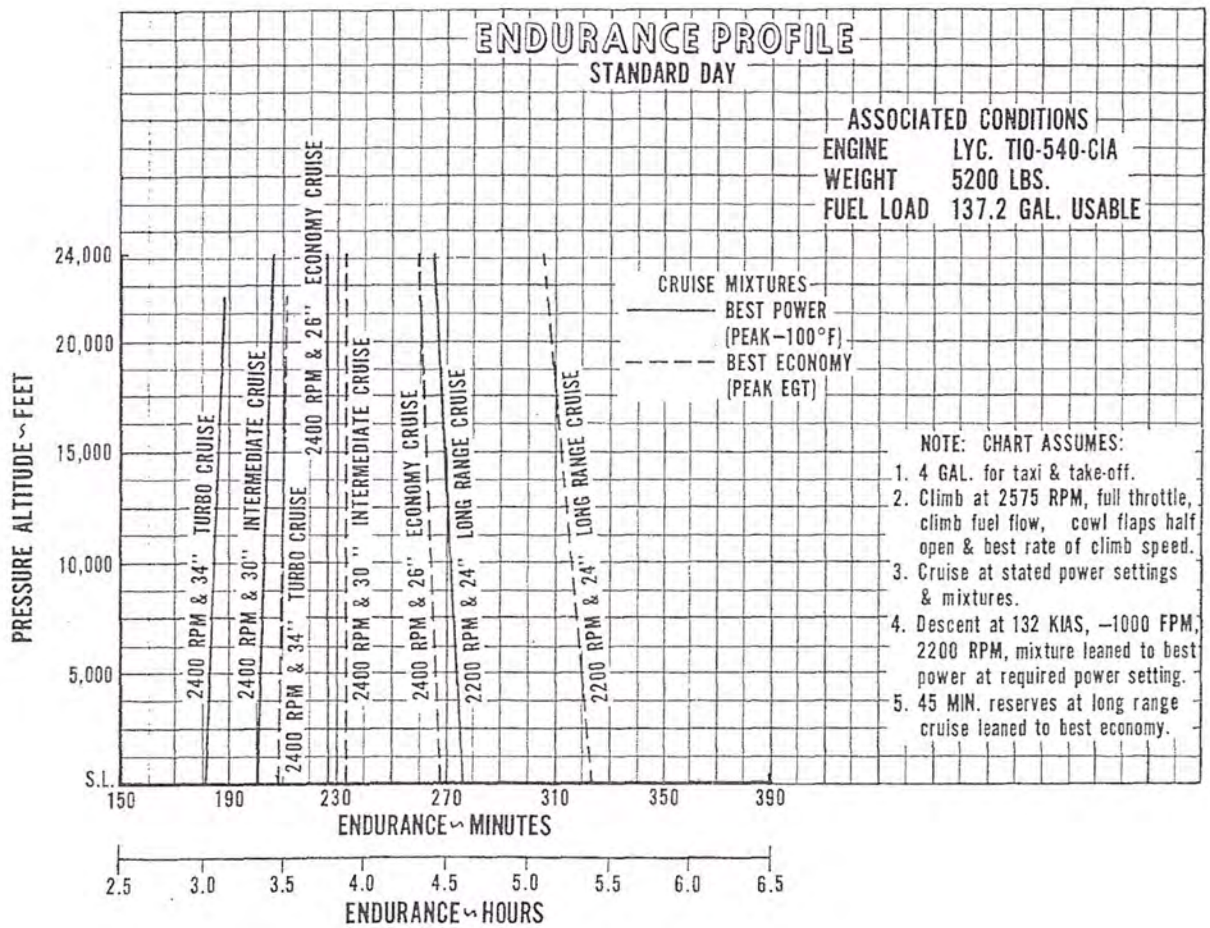
Figure 5-69



ENDURANCE PROFILE (OPTIONAL TIP TANKS)

Figure 5-71

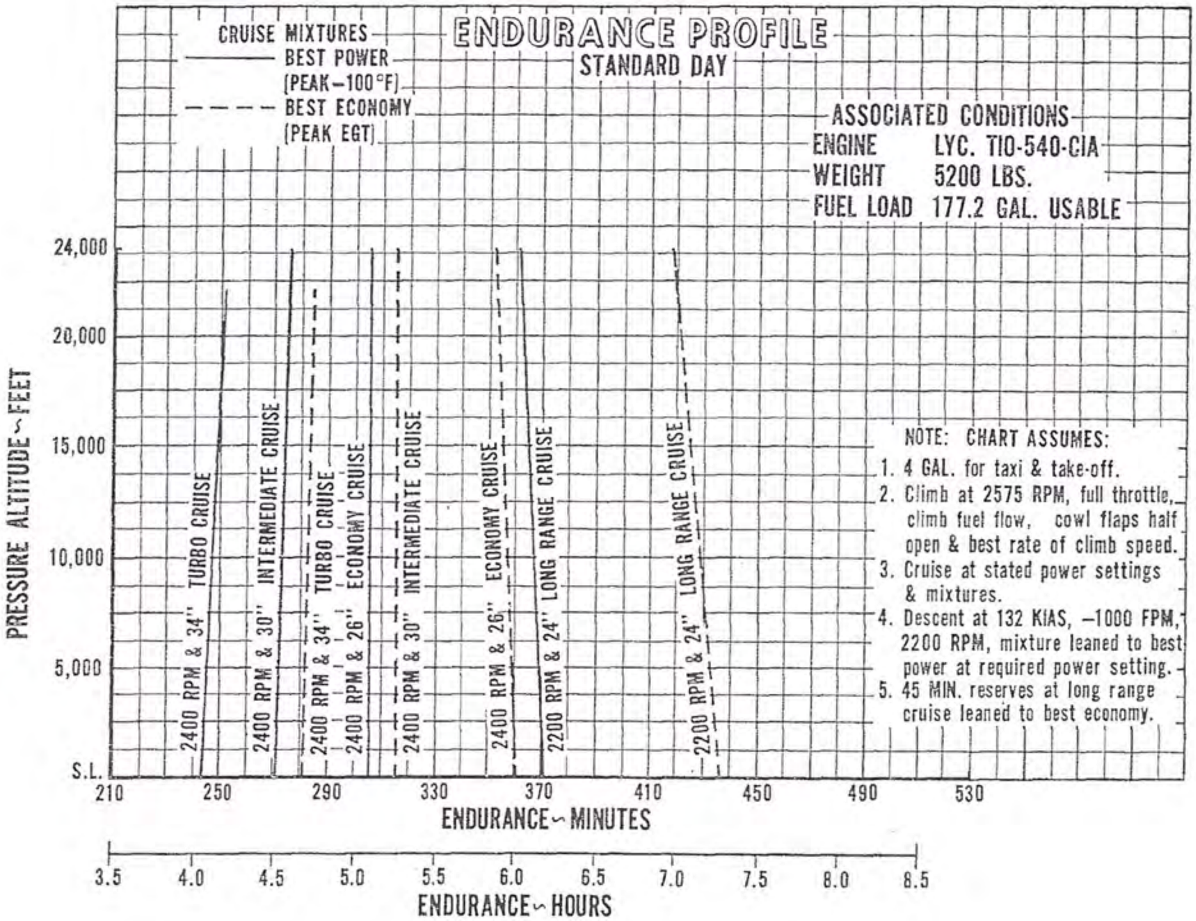
PA-23-250 AZTEC F



ENDURANCE PROFILE (TURBO)

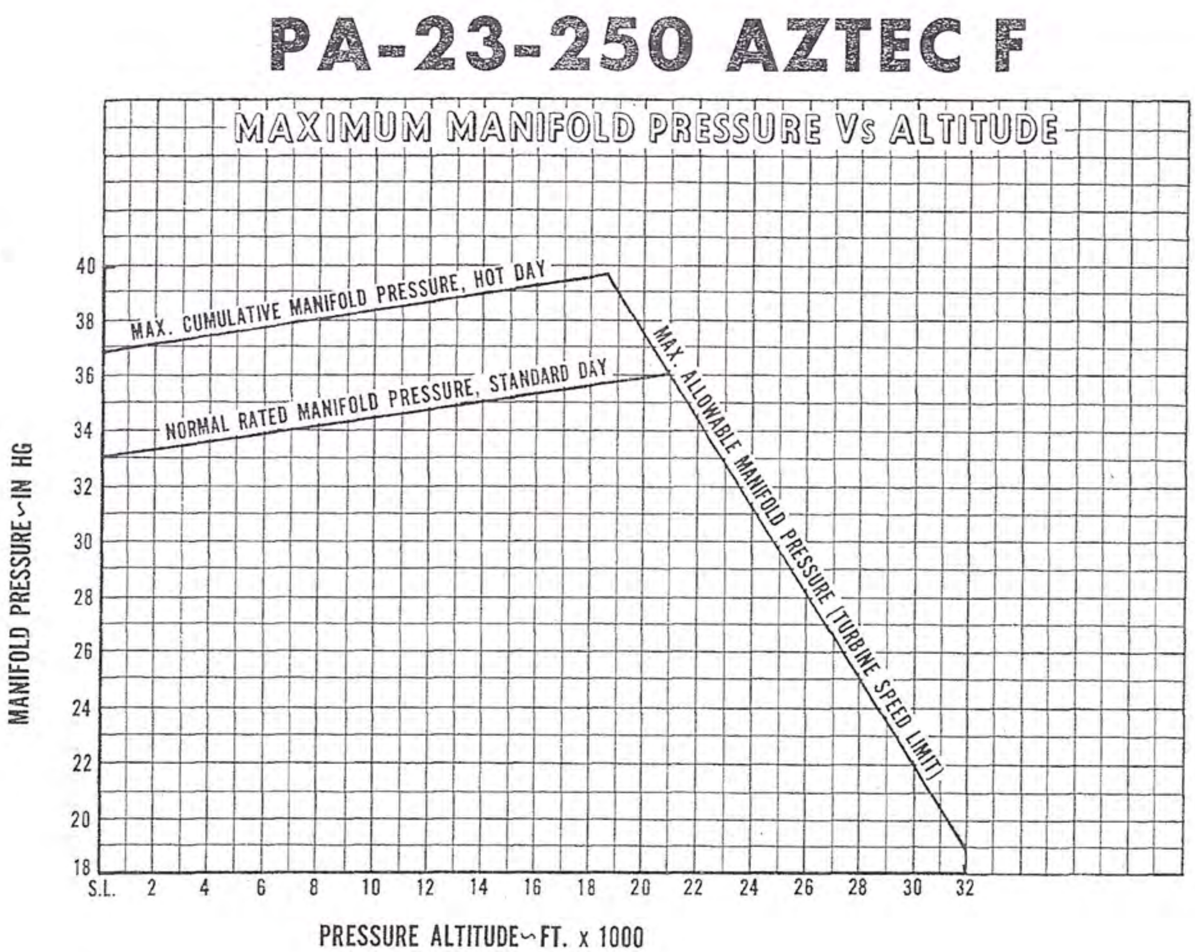
Figure 5-73

PA-23-250 AZTEC F



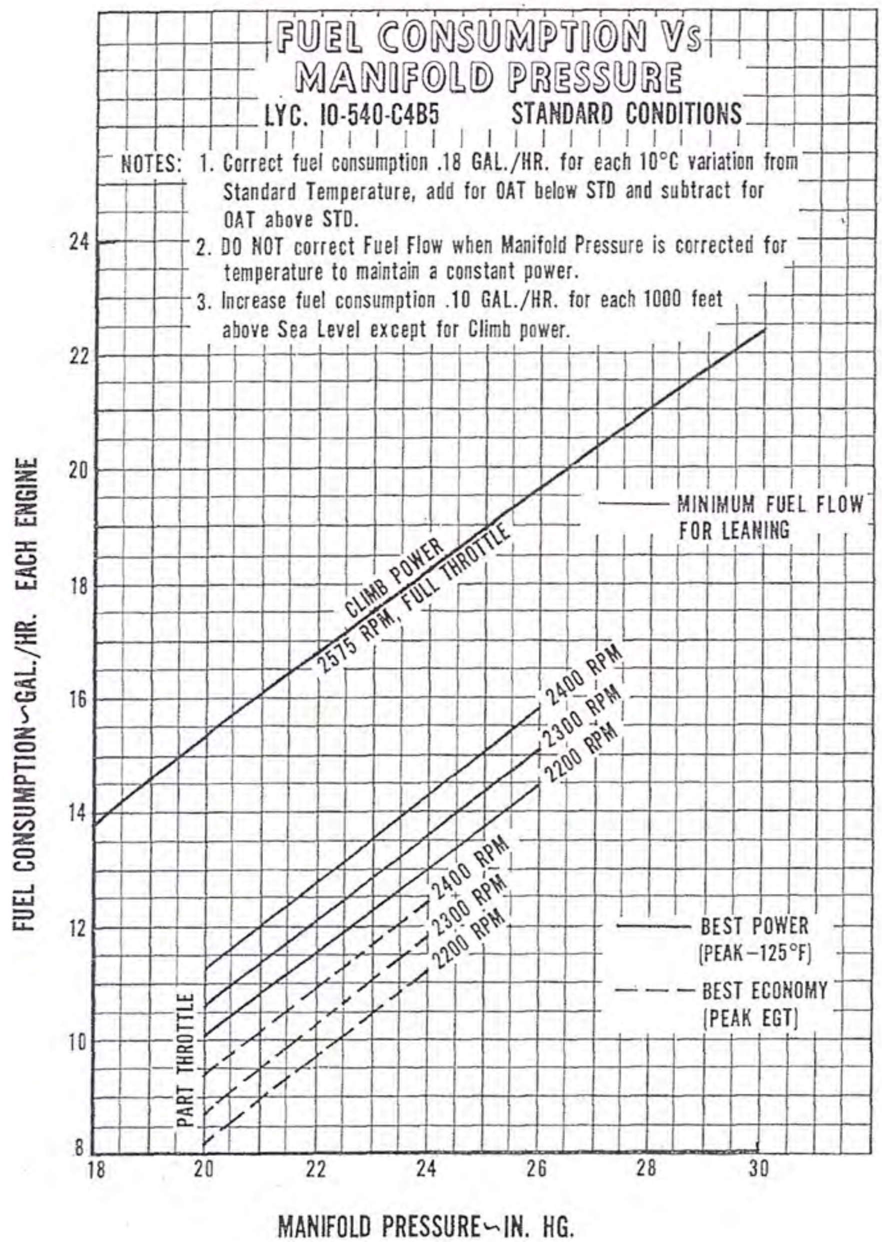
ENDURANCE PROFILE (TURBO - OPTIONAL TIP TANKS)

Figure 5-75



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

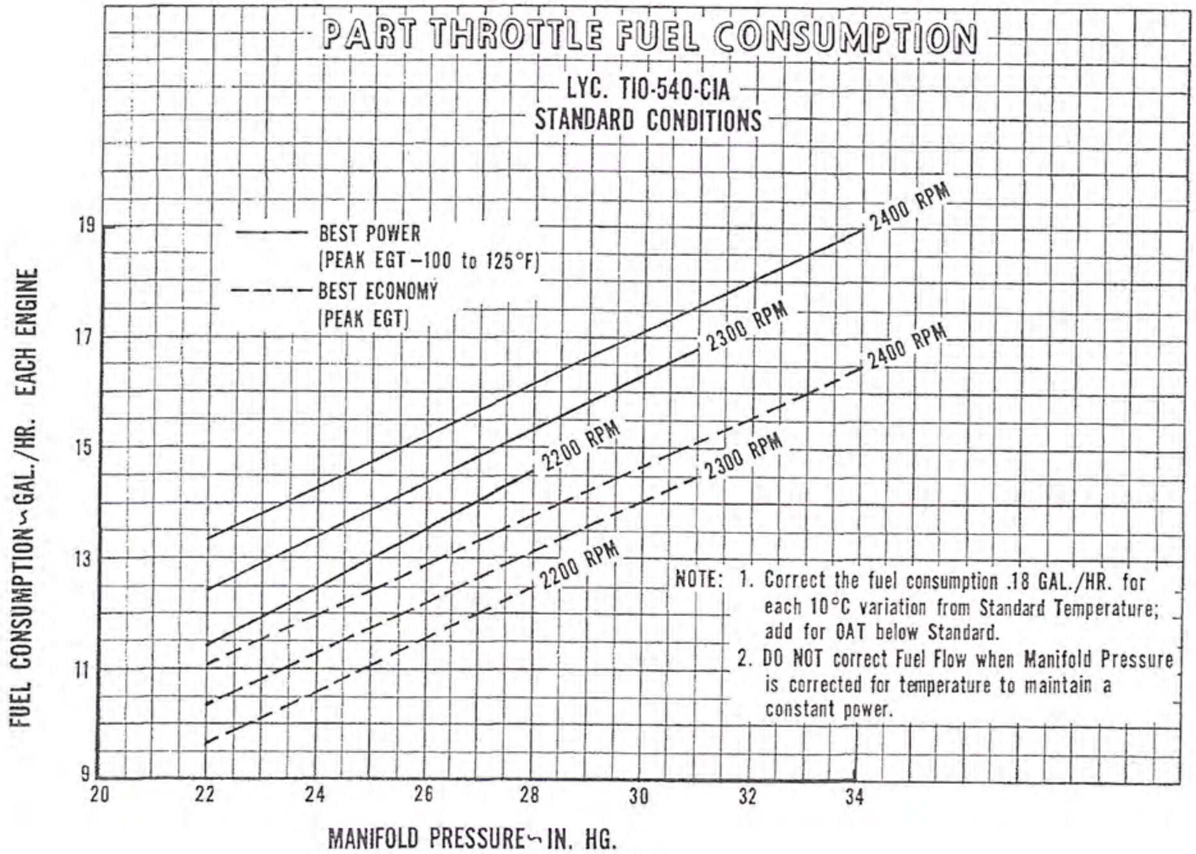
PA-23-250 AZTEC F



FUEL CONSUMPTION VS. MANIFOLD PRESSURE

Figure 5-79

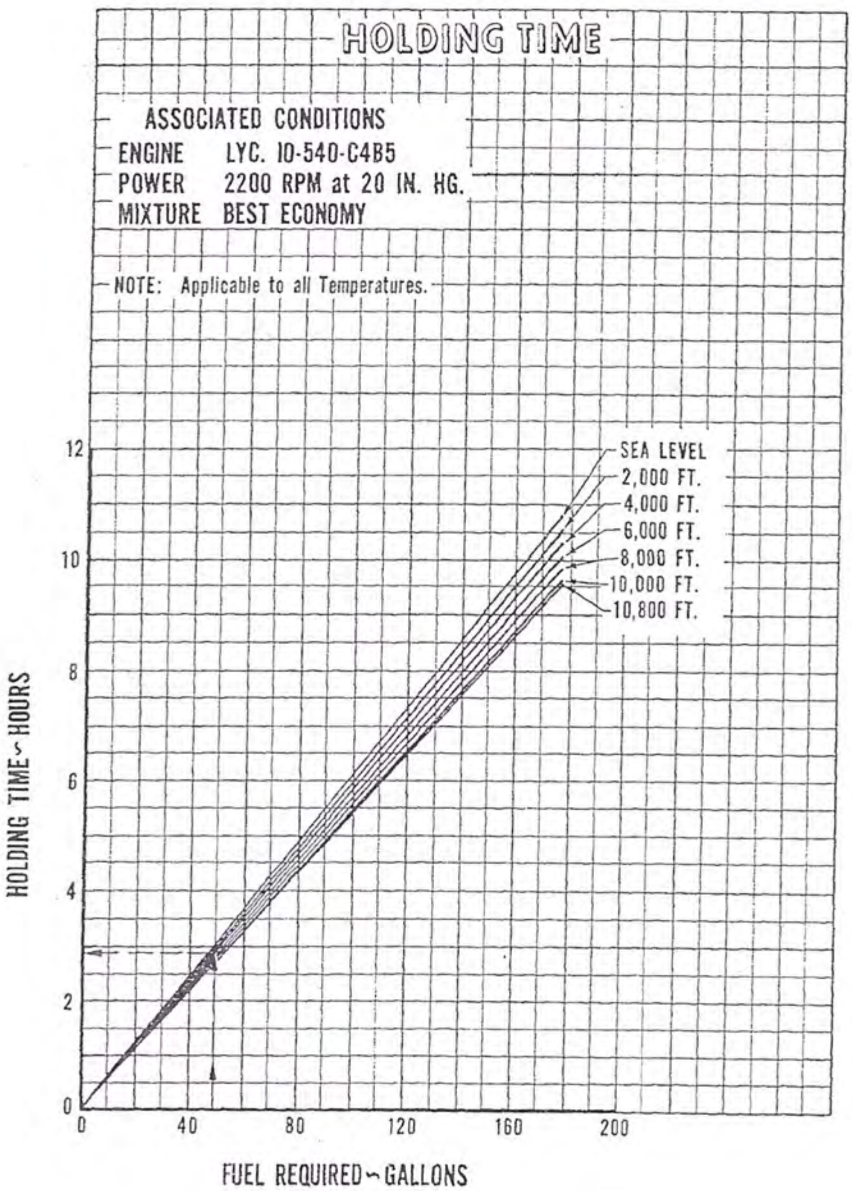
PA-23-250 AZTEC F



PART THROTTLE FUEL CONSUMPTION (TURBO)

Figure 5-81

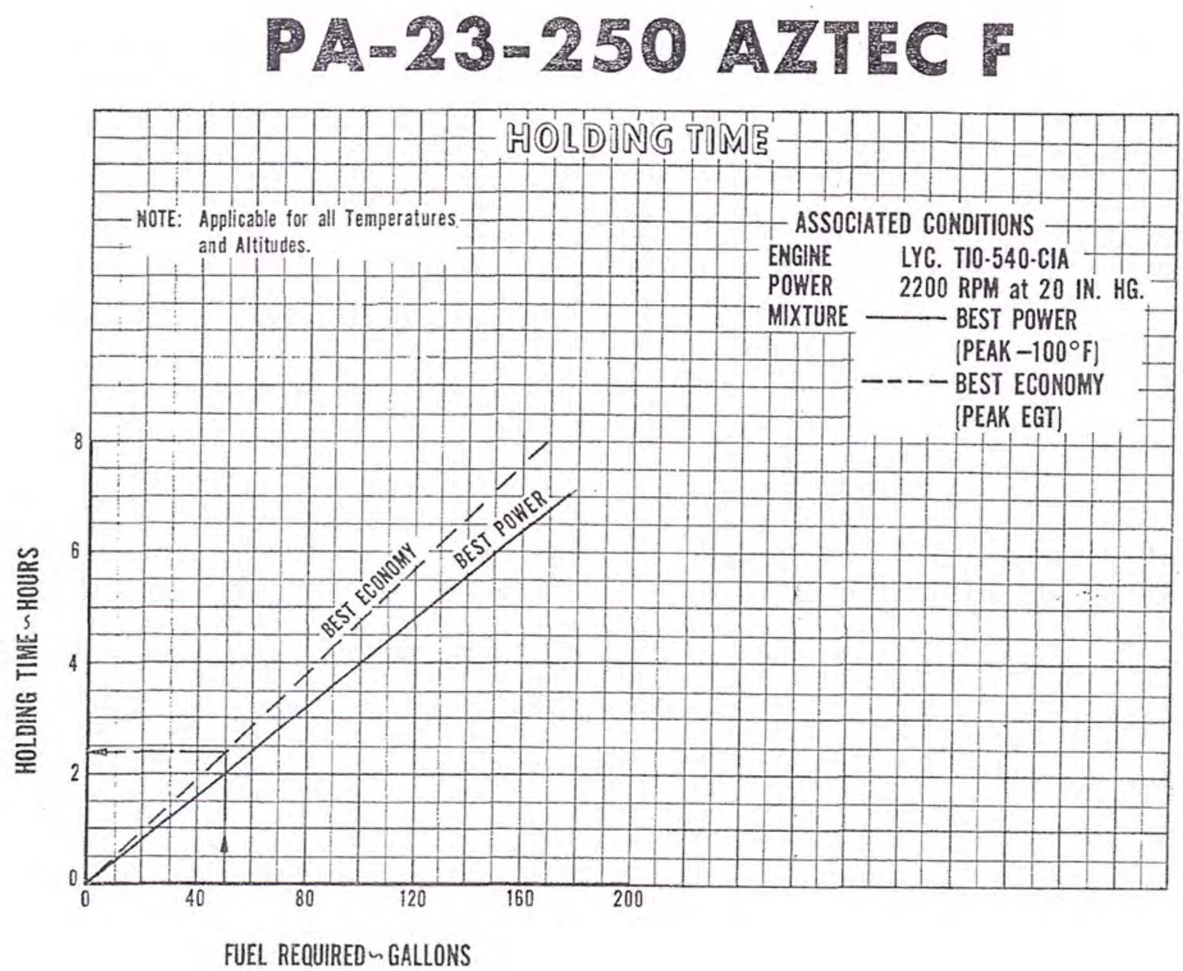
PA-23-250 AZTEC F



Example:
Fuel available = 50 gal.
Pressure altitude = 4000 ft.
Holding time = 2.9 hours

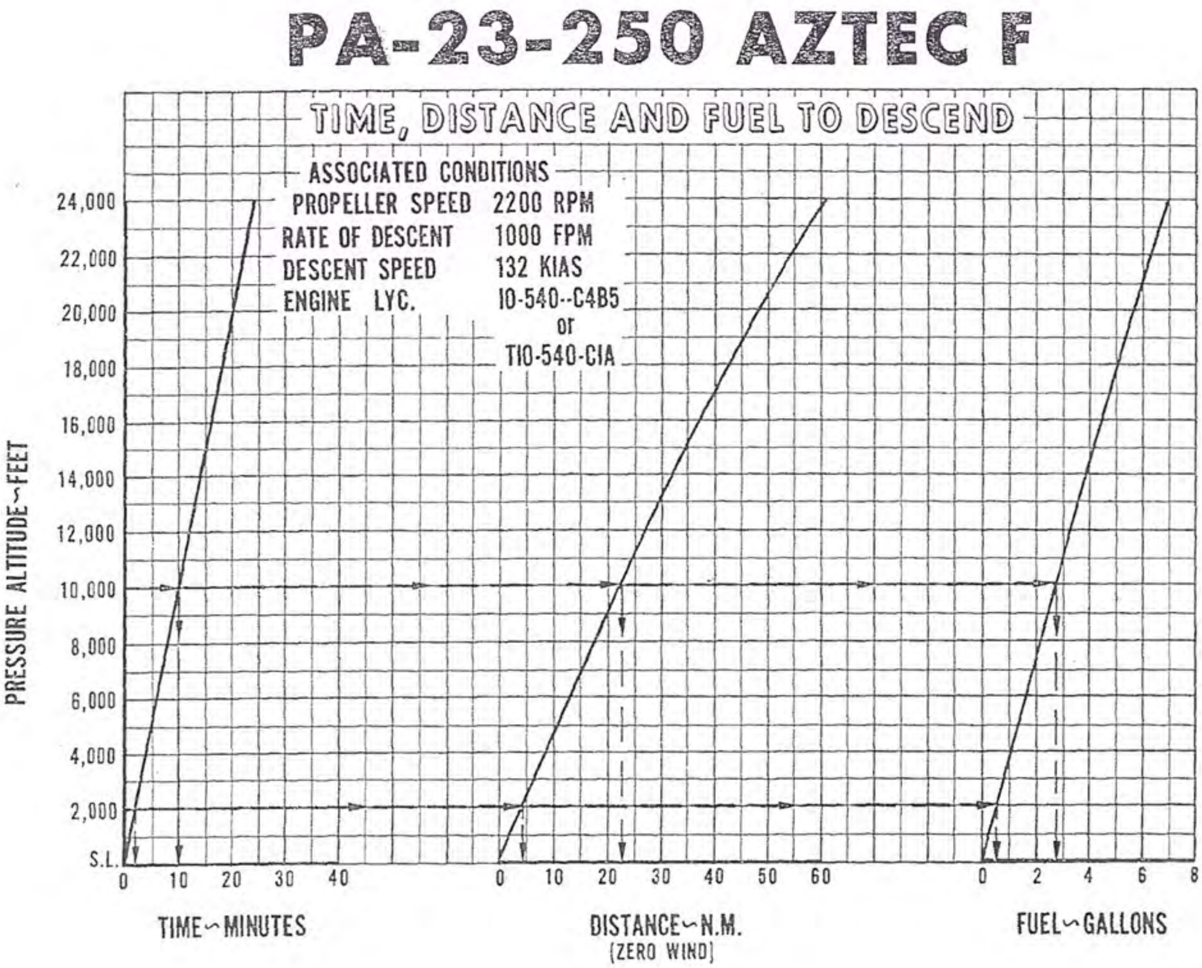
HOLDING TIME

Figure 5-83



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

HOLDING TIME (TURBO)
Figure 5-85

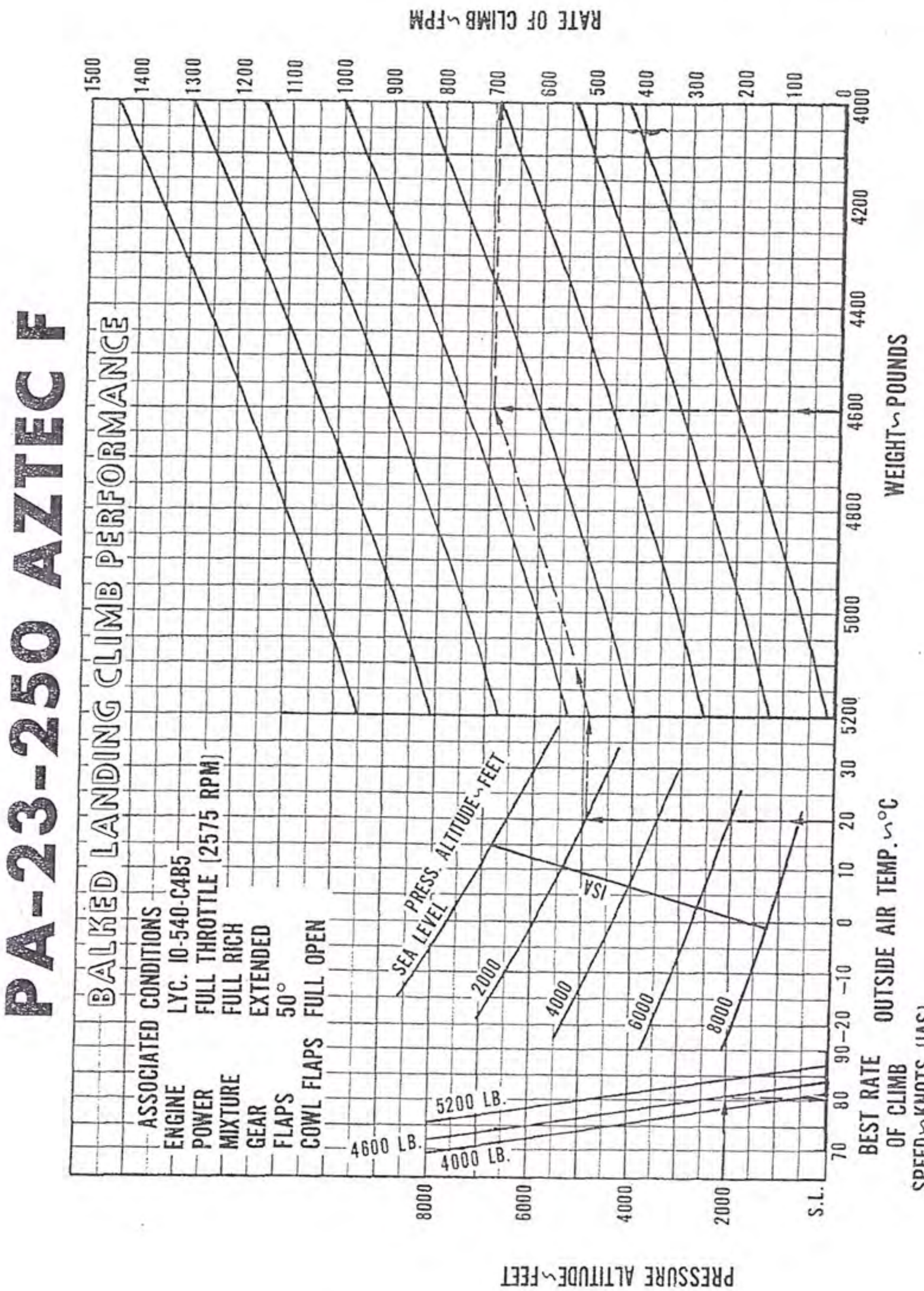


Example:

Airport altitude	= 2000 ft.
Cruise altitude	= 10000 ft.
Time to descend = 10 - 2	= 8 min.
Distance to descend = 22.5 - 4.5	= 18 naut. mi.
Fuel to descend = 2.7 - 0.5	= 2.2 gal.

TIME, FUEL AND DISTANCE TO DESCEND

Figure 5-87

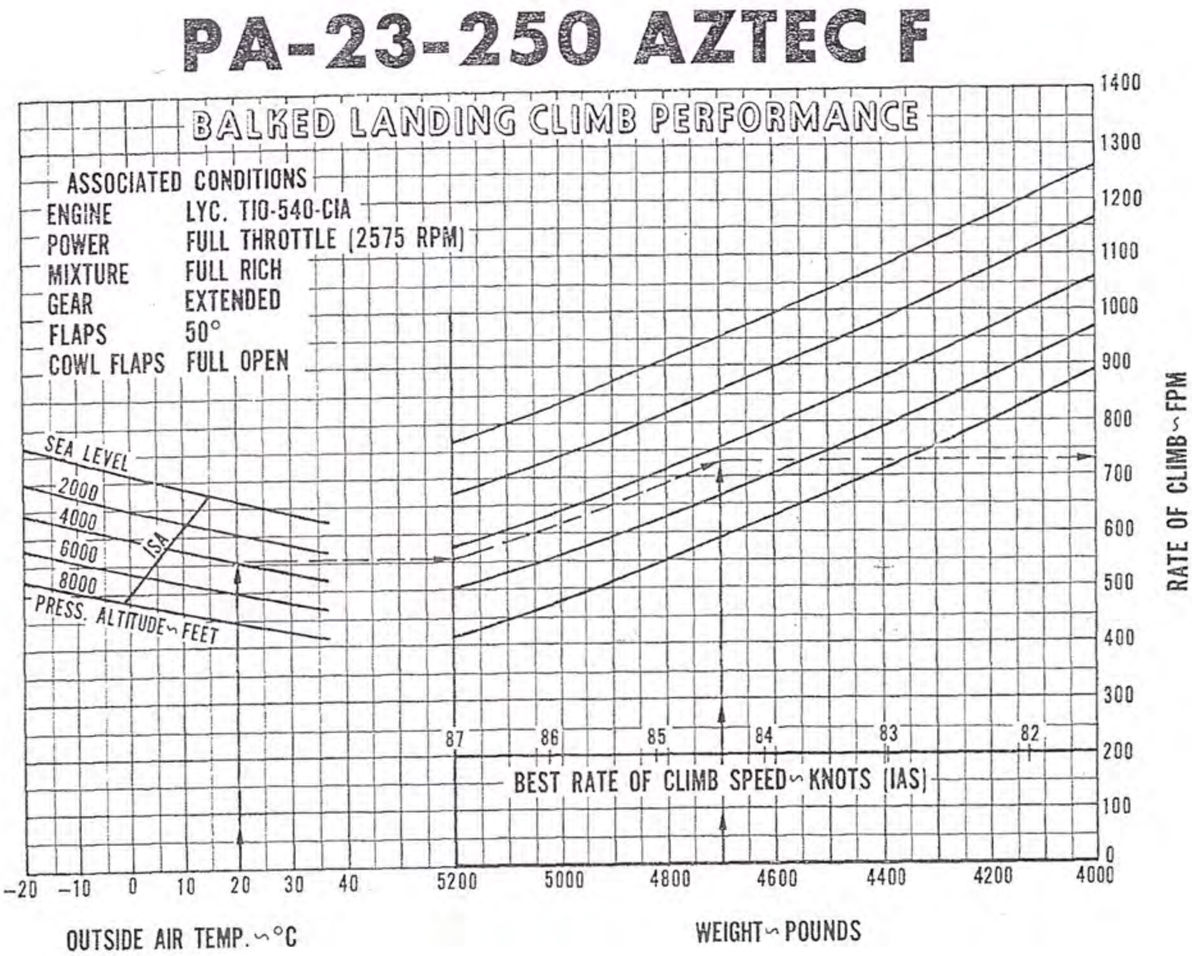


Example:
OAT = 20° C
Pressure altitude = 2000 ft.
Weight = 4600 lbs.

Rate of climb = 690 FPM
Climb speed = 80 KIAS

BALKED LANDING CLIMB PERFORMANCE

Figure 5-89



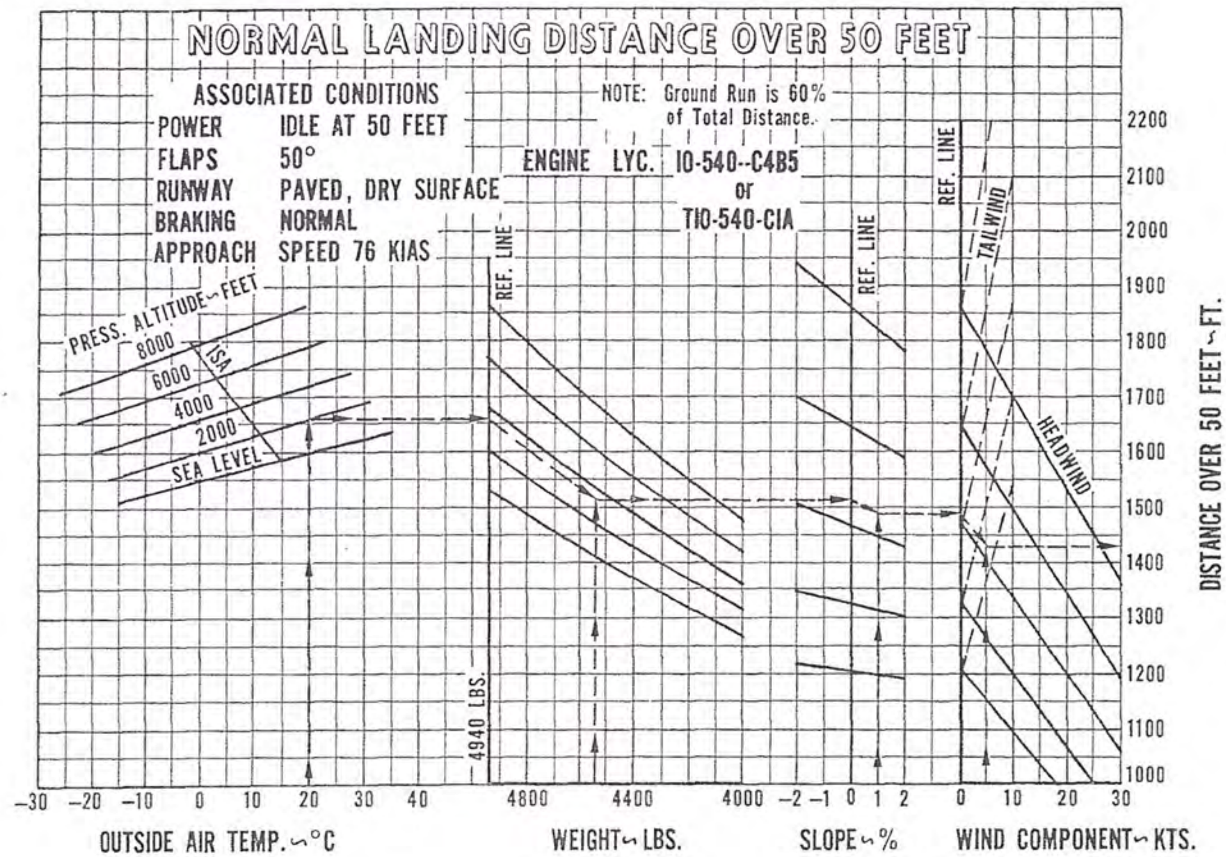
Example:

OAT	= 20° C
Pressure altitude	= 4000 ft.
Weight	= 4700 lbs.
Rate of climb	= 730 FPM
Climb speed	= 84 KIAS

BALKED LANDING CLIMB PERFORMANCE (TURBO)

Figure 5-91

PA-23-250 AZTEC F



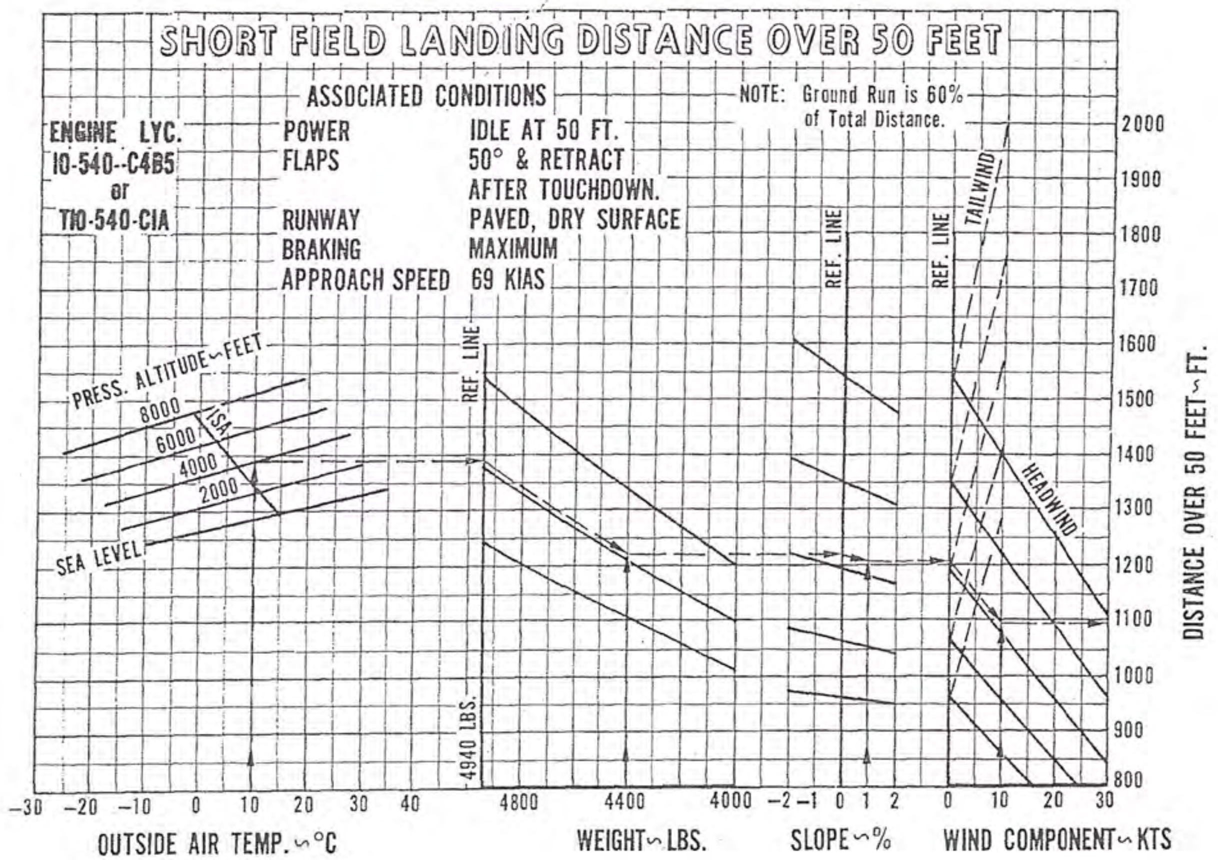
Example:

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

PA-23-250 AZTEC F



Example:

OAT	= 10° C
Pressure altitude	= 4000 ft.
Weight	= 4400 lbs.
Wind	= 10 kts.
Slope	= +1.0%
Ground run	= 655 ft.
Total distance	= 1090 ft.

SHORT FIELD LANDING DISTANCE OVER 50 FEET

Figure 5-95

SECTION 6

WEIGHT AND BALANCE

6.1 GENERAL

In order to achieve the performance, safety and good 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 a tremendous flexibility of loading, it cannot be flown with the maximum number of adult passengers, full fuel tanks and maximum baggage. With the flexibility comes responsibility. The pilot must ensure that the airplane is loaded within the loading envelope before 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 excellent 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 Aircraft Log Book, 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.

Reweighed October 31/87
by [illegible]

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by Skyservices Ltd

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.

Reweighed Oct 31/84
by Skyservices Limited

(c) Weighing Airplane

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

AIRPLANE AS WEIGHED
(Including full oil and operating fluids but no fuel)

Scale Position and Symbol		Scale Reading	Tare	Net Weight
Nose Wheel	(N)	910	NIL	910
Right Main Wheel	(R)	1780	NIL	1780
Left Main Wheel	(L)	1765	NIL	1765
Weight (as Weighed)	(T)			4455

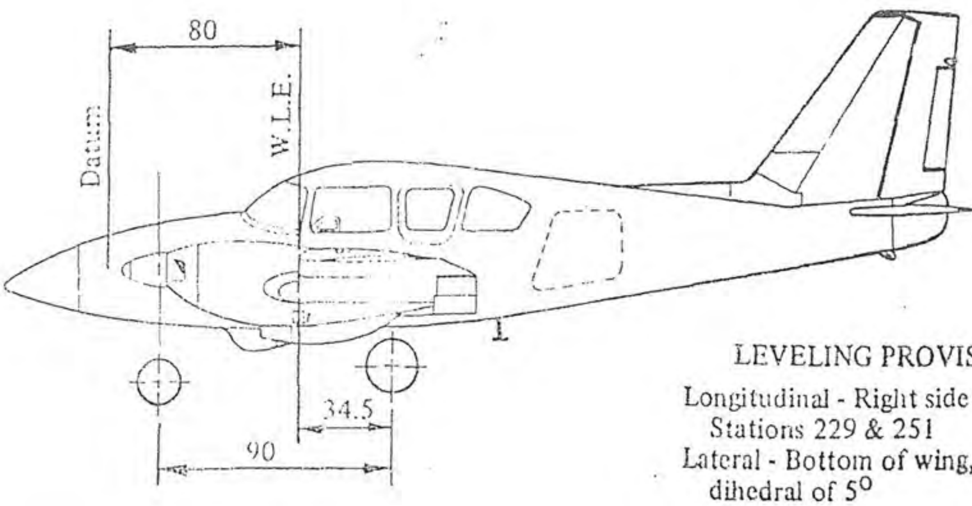
WEIGHING FORM

Figure 6-1

Certified Correct [signature]
DOA No. EA-1

(d) Center of Gravity

(1) The following geometry applies to the PA-23-250 (Six Place) airplane when it is level. Refer to Leveling paragraph 6.3 (b).



LEVELING PROVISIONS
Longitudinal - Right side of fuselage Stations 229 & 251
Lateral - Bottom of wing, spar has dihedral of 5°

LEVELING DIAGRAM

Figure 6-3

Reweighed by Skyservices Ltd.
October 31, 1984

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

$$(80 + 34.5) - \frac{(90 \times 910)}{4.455} = 96.1$$

Inches Aft of Datum

(e) Basic Empty Weight

Item		Weight (Lbs)	x Arm (Inches Aft of Datum)	= Moment (In-Lbs)
Weight (as Weighed)		4455	96.1	428125.5
Less Useable Fuel	Inboard	412	113.0	46556
	Outboard	652	108.3	70611.6
Basic Empty Weight		3391	91.7	310957.9

BASIC EMPTY WEIGHT

Figure 6-5

Aircraft re-weighed by Skyservices Limited, at Sault Ste. Marie, Ontario indoors, using Black and Decker Loadmeter.

I certify that this data has been prepared in accordance with the provisions of the Engineering and Inspection Manual, and, to the best of my knowledge, represents the true empty weight and centre of gravity of this aircraft.

Date: October 31, 1984

Signature: [signature]
Licence #: YZM 1215

Superceded By Ducey Avionics Jan 99

Reweighed by Skyservices Limited
October 31, 1984

TABLE OF CONTENTS

SECTION 6

WEIGHT AND BALANCE

6.5 WEIGHT AND BALANCE DATA AND RECORD

The Basic Empty Weight, Center of Gravity Location and Useful Load listed in Figure 6-7 are for the airplane as delivered from the factory. These figures apply only to the specific airplane serial number and registration number shown.

The basic empty weight of the airplane as delivered from the factory has been entered in the Weight and Balance Record (Figure 6-9). This form is provided to present the current status of the airplane basic empty weight and a complete history of previous modifications. Any change to the permanently installed equipment or modification which affects weight or moment must be entered in the Weight and Balance Record.

Reweighed by Skyservices Ltd.
Oct 31/84

MODEL PA-23-250 AZTEC F

Airplane Serial Number 27-7954036

Registration Number C-GPQA

Date October 31, 1984

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)	N/A		N/A		N/A.
Basic Empty Weight	3391		91.7		310957.9

*The standard empty weight includes full oil capacity, full operating fluids and 0.8 gallons of unusable fuel.

Superceded 8 Jan 99 Docs ...

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

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

(5200 lbs) - (3391 lbs) = 1809 lbs

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

WEIGHT AND BALANCE DATA FORM

Reweighed by Skyservices Ltd. Oct 31/84

Figure 6-7

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Reweighed by Skyservices Ltd.
Oct 31/84

PA-23-250 (Six Place)			Serial Number	Registration Number						Page Number		
Date	Item No.		Description of Article or Modification	Weight Change						Running Basic Empty Weight	
				Added (+)			Removed (-)				
	In	Out		Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Moment /100
			As Delivered								

WEIGHT AND BALANCE RECORD

Figure 6-9

Reweighed by Skyservice Ltd
Oct. 31/84

PA-23-250 (Six Place)			Serial Number 27-7954036	Registration Number C-GPQA					Page Number 1		
Date	Item No.		Description of Article or Modification	Weight Change						Running Basic Empty Weight	
				Added (+)			Removed (-)				
	In	Out		Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Moment /100
1/16/79			As Delivered							3386	3090.28
10/31/84			Re-weighted							3391	3109.58

WEIGHT AND BALANCE RECORD (cont)

Figure 6-9 (cont)

Reweighed by Skyservices HL
Oct 31/84

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.

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6.9 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

(a) Add the weight of all items to be loaded to the Basic Empty Weight.

(b) Use the Loading Chart (Figure 6-15) to determine the moment of all items to be carried in the airplane.

(c) Add the moment of all items to be loaded to the Basic Empty Weight moment.

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

(e) By using the figures of item (a) and item (d) (above), locate a point on the Weight, Moment and C.G. Limits graph (Figure 6-17). If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

(f) Location of the point on the Weight, Moment, and C.G. Limits graph indicates whether the airplane is slightly nose heavy or slightly tail heavy and can assist in setting pitch trim for takeoff.

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

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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

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ITEM	WT. LBS.	ARM-IN.	MOMENT
Basic Airplane			
Revised Airplane			
Pilot's Seat		89	
Copilot's Seat		89	
Seat No. 3		126	
Seat No. 4		126	
Seat No. 5		157	
Seat No. 6		157	
Fuel___Gal. Inbrd.		113	
Fuel___Gal. Otbrd.		See Table (Fig. 6-15)	
Fwd. Baggage		10	
Rwd. Baggage		183	
Total Wt.		Total Moment	

C.G. Location for Takeoff

WORK SHEET

Figure 6-13

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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

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FUEL

Gallons	Weight Lbs.	Inboard Tanks Arm = 113 In.	Outboard Tanks Without Optional Tip Tanks Arm = 113 In.
		Moment/100	
5	30	33.9	33.9
10	60	67.8	67.8
15	90	101.7	101.7
20	120	135.6	135.6
25	150	169.5	169.5
30	180	203.4	203.4
34.3	206	232.8	232.8

1.7 gal. unusable fuel per tank (10.2 lbs., 1153 in-lbs.) included in basic weight.

Gallons	Weight Lbs.	Outboard Tanks With Optional Tip Tanks (First 25 Gal. at 112.1 In., Remainder at 105.1 In.)
		Moment/100
5	30	33.6
10	60	67.3
15	90	100.9
20	120	134.5
25	150	168.2
30	180	199.7
35	210	231.2
40	240	262.7
45	270	294.3
50	300	325.8
54.3	326	353.1

1.7 gal. unusable fuel per tank (10.2 lbs., 1153 in-lbs.) included in basic weight.

LOADING CHART (cont)

Figure 6-15 (cont)

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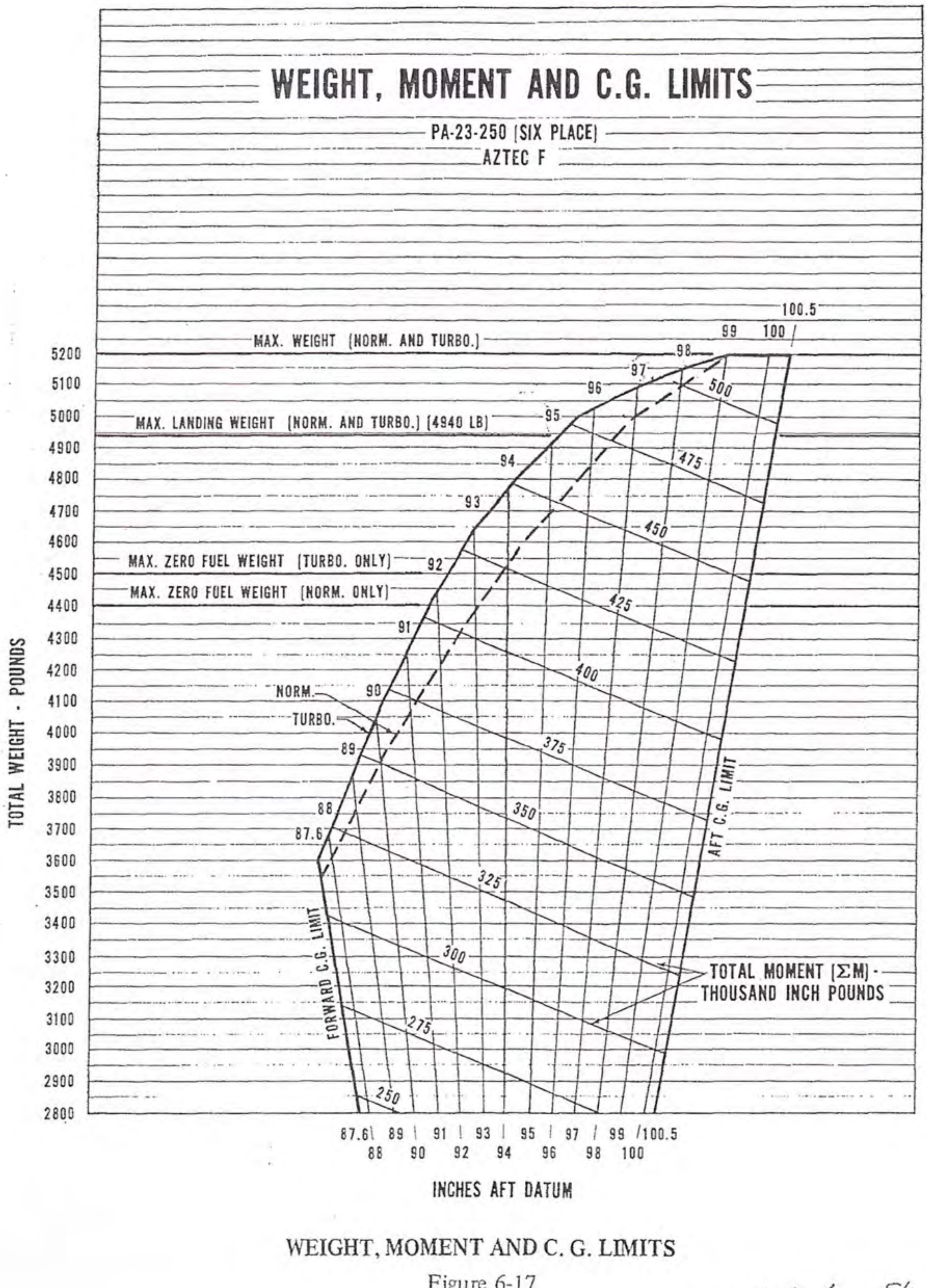

WEIGHT, MOMENT AND C. G. LIMITS

Figure 6-17

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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.

Four thirty-six gallon fuel tanks are mounted in the wings; two tanks are located outboard of each engine nacelle. Each wing also incorporates provisions for the addition of an optional twenty gallon wing tip fuel tank. These tanks are flexible, bladder type fuel cells.

The empennage is made up of a vertical stabilizer and rudder and an all-movable horizontal stabilator. All surfaces of the empennage are sheet metal with the exception of the durable thermoplastic tip of the rudder and the tips of the stabilator.

All six seats in the Aztec F are removable. The crew seats and center seats are individual bucket seats, and the rear seat is a couch type which will accommodate two people.

7.5 ENGINES (NORMALLY ASPIRATED)

The Lycoming IO-540-C4B5 six cylinder engines on the Aztec F are rated at 250 horsepower at 2575 RPM. These engines have a compression ratio of 8.5:1 and require 91/96 minimum octane aviation fuel.

Each air cooled engine is equipped with a geared starter, an alternator, a vacuum pump, a fuel injector, two magnetos, a shielded ignition system, a diaphragm fuel pump, a propeller governor and an oil thermostat. A hydraulic pump is mounted on the left engine.

The exhaust system is a crossover type with exhaust gases directed overboard at the bottom of the nacelles in the area of the outboard cowl flap.

For detailed information and instruction on the engines, refer to the Lycoming Operator's Manual supplied with the airplane.

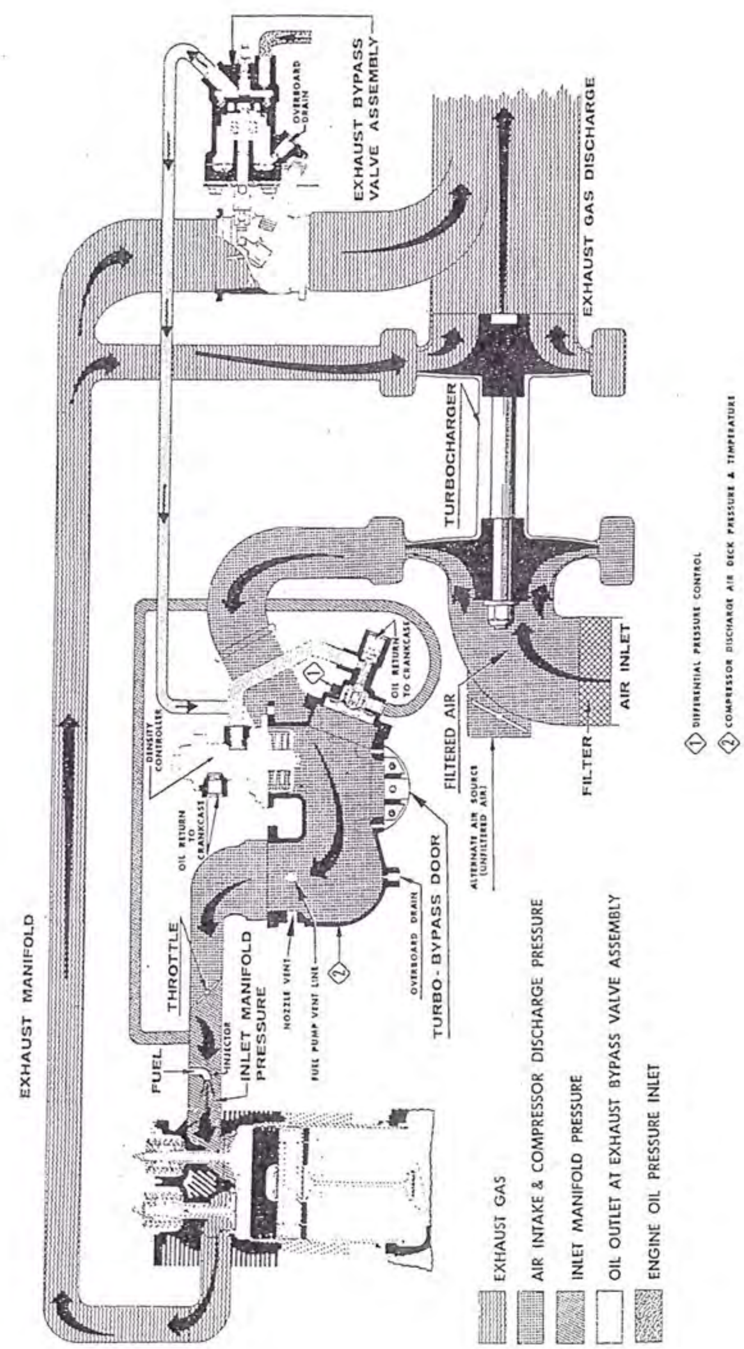
7.7 ENGINES (TURBOCHARGED)

The Aztec F can be equipped with Lycoming TIO-540-C1A turbocharged engines which are rated at 250 horsepower at 2575 RPM. Their compression ratio is 7.2:1 and they require 100/130 minimum octane aviation fuel.

The main difference between these engines and the normally aspirated engines is the Lycoming TEO659 turbochargers mounted as integral parts of each engine. The turbocharger increases power output and efficiency by supplying compressed air to the engine intake manifold. This allows operation at peak power at much higher altitudes than with normally aspirated engines. Exhaust gases supply the power to drive the turbochargers. The exhaust gases are ducted through a turbine wheel, which drives the compressor, supplying compressed air to the engine. Exhaust gas is then directed overboard at the bottom of the nacelles in the area of the outboard cowl flap.

The engines are equipped with bypass doors on the induction housings, and in the event of a turbocharger compressor failure the engine will automatically revert to normally aspirated air. Under these conditions approximately 85% of normal rated power or 212 HP will be available at sea level.

For detailed information and instruction on the engines, refer to the Lycoming Operator's Manual supplied with the airplane.



TURBOCHARGER SYSTEM SCHEMATIC

Figure 7-1

7.9 ENGINE ACCESSORIES

Engine mounts are constructed of steel tubing and incorporate vibration reducing Lord mounts. Engine cowls are cantilever structures, attached at the fire wall. The engines are easily accessible through side panels which are removable by unlatching the screw-type quick release fasteners located around the edges of the panels. The cowling nose bowl is split to allow its easy removal with the propeller intact.

An efficient aluminum oil cooler is mounted on a rear baffle of each engine. Engine oil may be drained through the quick oil drain valves located on the rear inboard corner of each engine crankcase. Access doors for the oil drains are on the inboard bottoms of the nacelles, forward of the leading edges of the wings. The combination oil filler and dipstick is accessible through a hinged door on the top of the engine nacelle. Both access doors are secured by single quarter-turn fasteners.

The engine air induction system consists of a dry type air filter and an alternate air door. During normal operation, air is inducted through the air filters. Should ice or other obstructions block an air filter, the alternate air door will open automatically to ensure airflow to the engine. Manual alternate air controls are located on the control pedestal. These controls allow the pilot to select alternate air should the automatic feature fail or should the airplane be entering known or expected icing conditions. Since alternate air is unfiltered, it should not be used during ground operations when dust or other contaminants might enter the system.

The fuel injection system reduces the possibility of icing and provides equal fuel distribution to all cylinders. A metering system measures the rate of engine air consumption and dispenses fuel to the cylinders proportionally.

The two cowl flaps for each engine are located on the underside of the nacelle, one inboard and one outboard. Their function is to provide additional cooling during ground operations, in high temperature conditions, during climbs, in situations when cylinder head temperature or oil temperature become excessive, or when an alternator is heavily loaded. Cowl flaps are manually operated by push-pull controls mounted in the cockpit on the fuel control panel between the crew seats.

The magneto switches and the starter are located on the left side panel. There are two magneto switches for each engine. The single starter switch is a rocker type. Depressing the forward side of the switch operates the right engine starter; depressing the aft side operates the left.

7.11 PROPELLERS

Propellers on the Aztec F are Hartzell HC-E2YR-2 series controllable pitch, constant speed and full feathering units. Governors, one on each engine, control the pitch of the blades by supplying engine oil at varying pressures through the propeller shaft. Increased oil pressure and back-up springs decrease the pitch of the blades. Decreased oil pressure allows compressed air in the cylinder dome to increase the pitch of the blades; and an absence of oil pressure allows the compressed air to feather a propeller. The automatic variations in pitch allow load torque to be matched to engine torque in response to changing flight conditions. A loss of engine oil pressure will cause a propeller to feather.

Propeller speed is controlled by the levers in the center of the control pedestal. Feathering is accomplished by moving the propeller control levers fully aft through the low RPM detent and into the feathering position. Feathering takes approximately three to ten seconds. Moving the propeller control forward and engaging the starter will unfeather a propeller.

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.

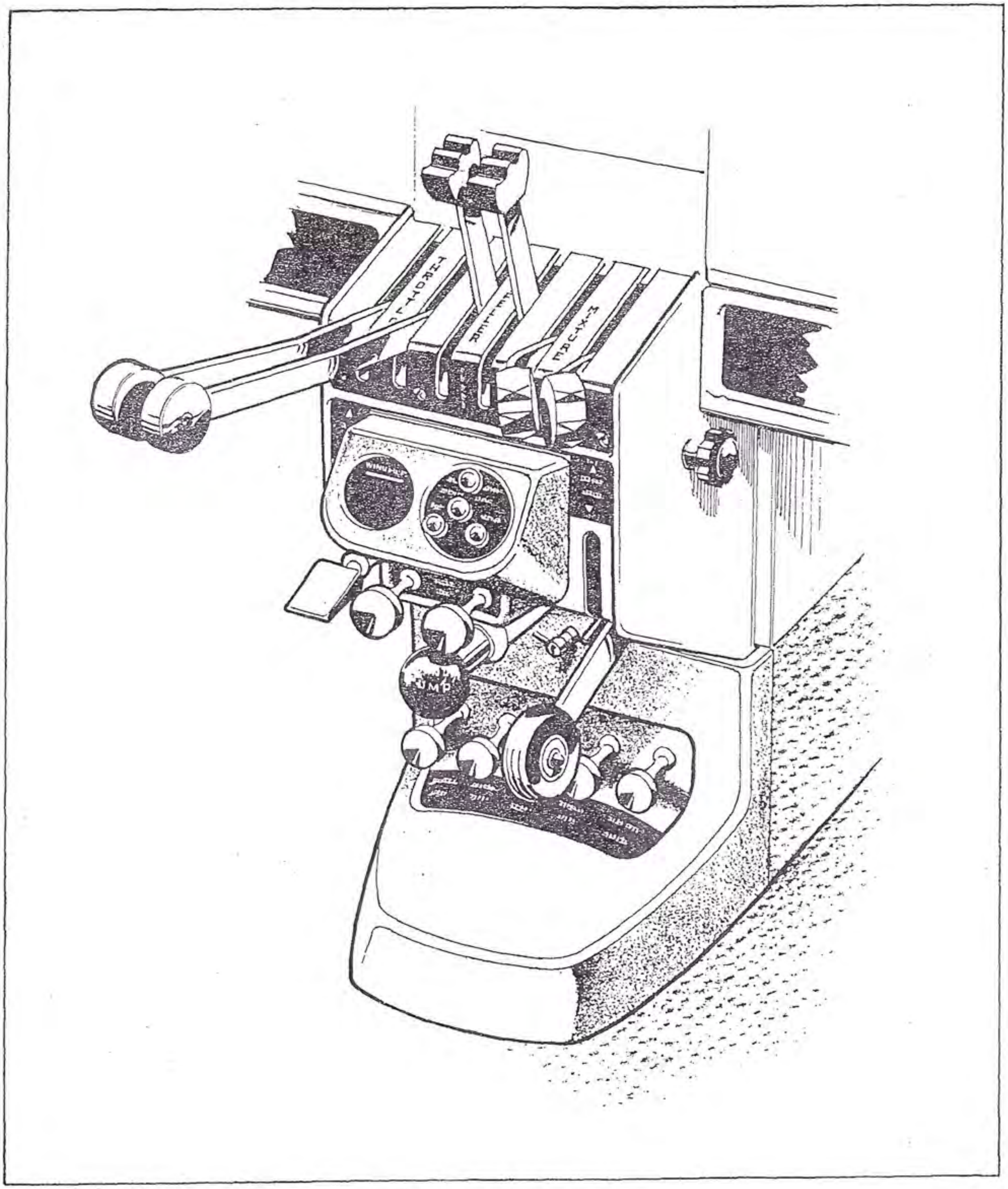
During taxiing, takeoff and landing, the propeller synchrophaser switch should be in the "MAN." position. During cruise, propellers should be synchronized manually to within approximately 10 RPM and the switch placed in the "Prop. Sync." position. Normally, propeller synchrophasing will take place within 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.



CONTROL PEDESTAL

Figure 7-3

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.

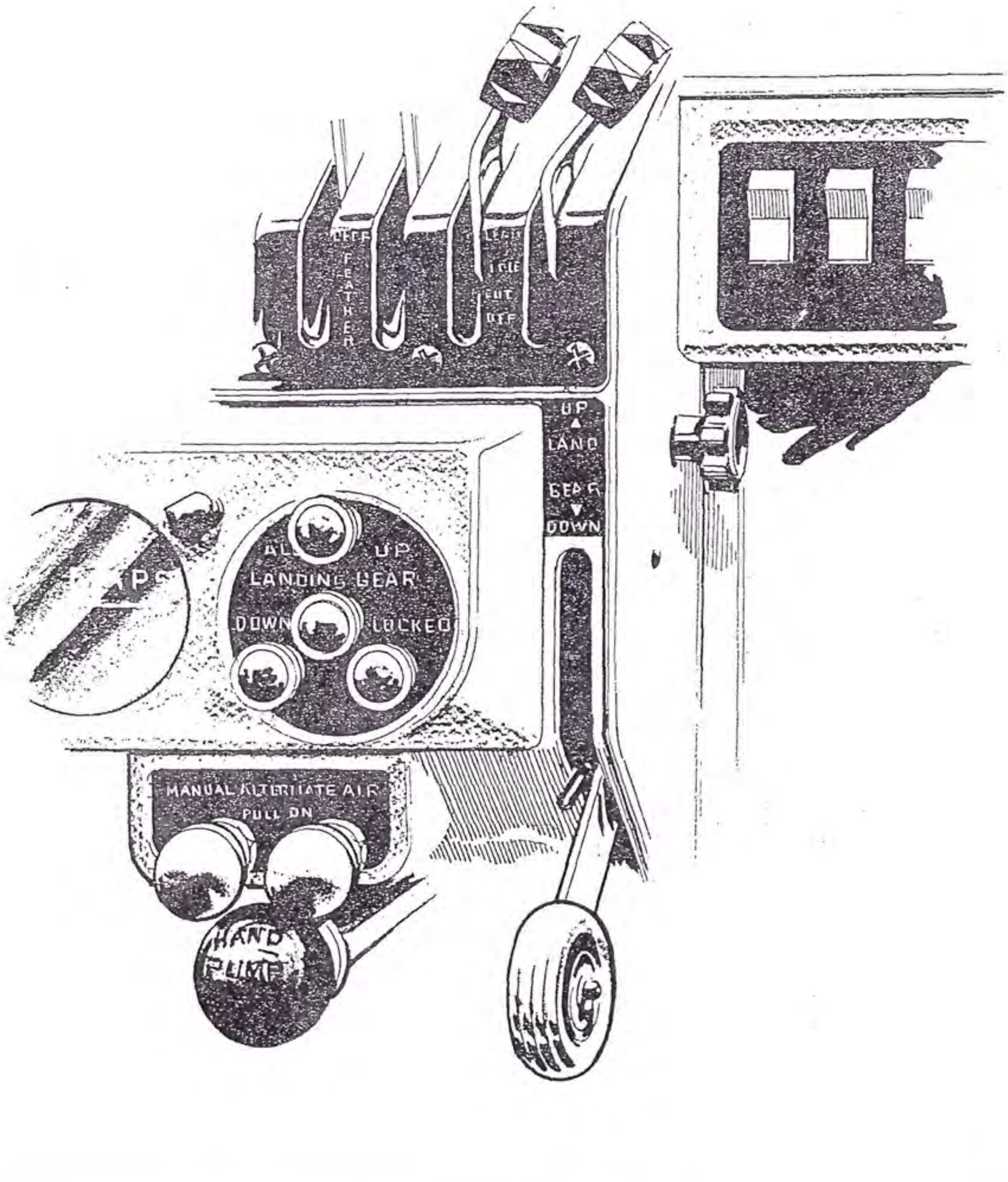
The propeller controls are located in the center of the control pedestal. They are used to adjust the propeller speed from increase RPM at the top of their travel, through decrease RPM, to the feathered position at the bottom of their travel. A governor maintains a constant propeller speed once the propeller 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.



LANDING GEAR SELECTOR

Figure 7-5

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.

7.19 BRAKE SYSTEM

Main gear brakes are actuated by toe brake pedals on the left set of rudder pedals. Toe brakes for the right side are available as optional equipment. The brakes are hydraulically actuated by individual master cylinders mounted on the rudder pedals. The brakes hydraulic system is completely independent of the hydraulic system for the landing gear and flaps. The master cylinders are accessible through the cockpit for servicing. Fluid for the master cylinders is supplied through flexible lines from a brake fluid reservoir which is mounted inside the left nose access panel. The brakes are self-adjusting, single-disc, double housing and double piston assemblies. Toe pressure against the upper part of the rudder pedals operates the brakes.

The parking brake is actuated by applying pressure to the toe brakes, while pulling out on the parking brake handle on the lower left side of the instrument panel. The parking brake is released when pressure is applied to the toe brakes while the parking brake handle is pushed in. The parking brake valves are installed ahead of the forward cabin bulkhead and may be serviced through the left nose access panel.

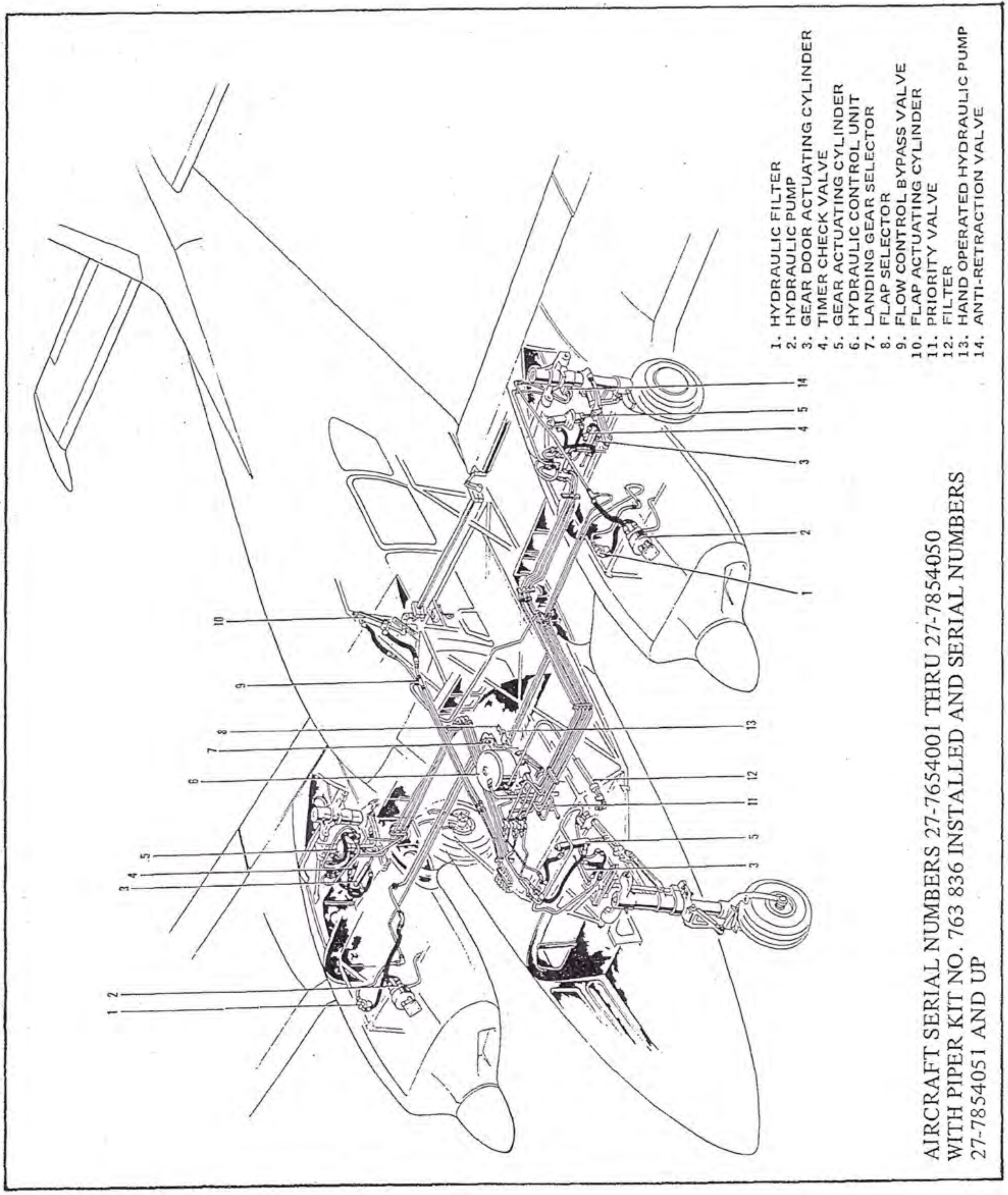
7.21 HYDRAULIC SYSTEM

The hydraulic system is used for the extension and retraction of both the landing gear and the flaps. The position of the flaps or the landing gear is controlled by the levers protruding through the face of the control pedestal. The hydraulic control unit which is also a hydraulic fluid reservoir is housed within the control pedestal. On aircraft with serial numbers 27-7654001 through 27-7854050 with Piper Kit No. 763 836 installed and serial numbers 27-7854051 and up, pressure for the hydraulic system is supplied to the control unit from two engine-driven pumps one mounted on each engine. Pressure for the system is supplied by one engine-driven hydraulic pump mounted on the left engine on aircraft with serial numbers 27-7654001 through 27-7854050 when Piper Kit No. 763 836 is not installed. Movement of the gear or flaps occurs when hydraulic pressure is routed into actuating cylinders directly connected to the gear or flaps. Landing gear doors are also operated by the hydraulic system.

The gear control knob is wheel-shaped, and the flap control knob is airfoil-shaped. When a selector lever is in the off or neutral position, hydraulic fluid flows through selector ports and circulates freely between the engine-driven pump(s) and the control unit. For extension or retraction of gear or flaps, the respective control lever is moved from the center position into the desired direction. When a control lever is placed in an up or down position, the selector ports hydraulic fluid into the proper actuating cylinder. Once a selected component reaches full extension or retraction, hydraulic pressure within the control unit forces the control lever back into a neutral or off position, allowing hydraulic fluid to resume free circulation between the pump(s) and the control unit. Flap travel can be stopped at any intermediate position if the control knob is manually returned to the neutral position. Although both gear and flap levers may be moved at the same time, the flaps will not extend until the gear system completes its operation; however, the flaps will "blow" up during the retraction cycle with the priority valve supplying the gear system.

When the gear or flaps have reached their selected position, the actuating cylinders and their associated lines are isolated from the hydraulic fluid supply. This feature, along with a system of check valves, insures the retention of sufficient fluid under pressure in the actuating cylinder to operate the landing gear in the event of a leak in the hydraulic system.

The emergency hydraulic hand pump, which is an integral part of the control unit. is used to obtain hydraulic pressure should the engine-driven pump(s) malfunction. Aircraft with serial numbers 27-7654001 through 27-7854050 when Piper Kit No. 763 836 is not installed must also use the hand pump to provide hydraulic pressure when the left engine is inoperative. To operate the hand pump, the handle should be pulled aft to its full extension and the gear or flap selector positioned as desired. Approximately fifty strokes are required to raise or lower the landing gear. At altitudes above 10.000 feet. the hand pump becomes increasingly inefficient.



HYDRAULIC SYSTEM (DUAL HYDRAULIC PUMP)

Figure 7-8

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.

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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.

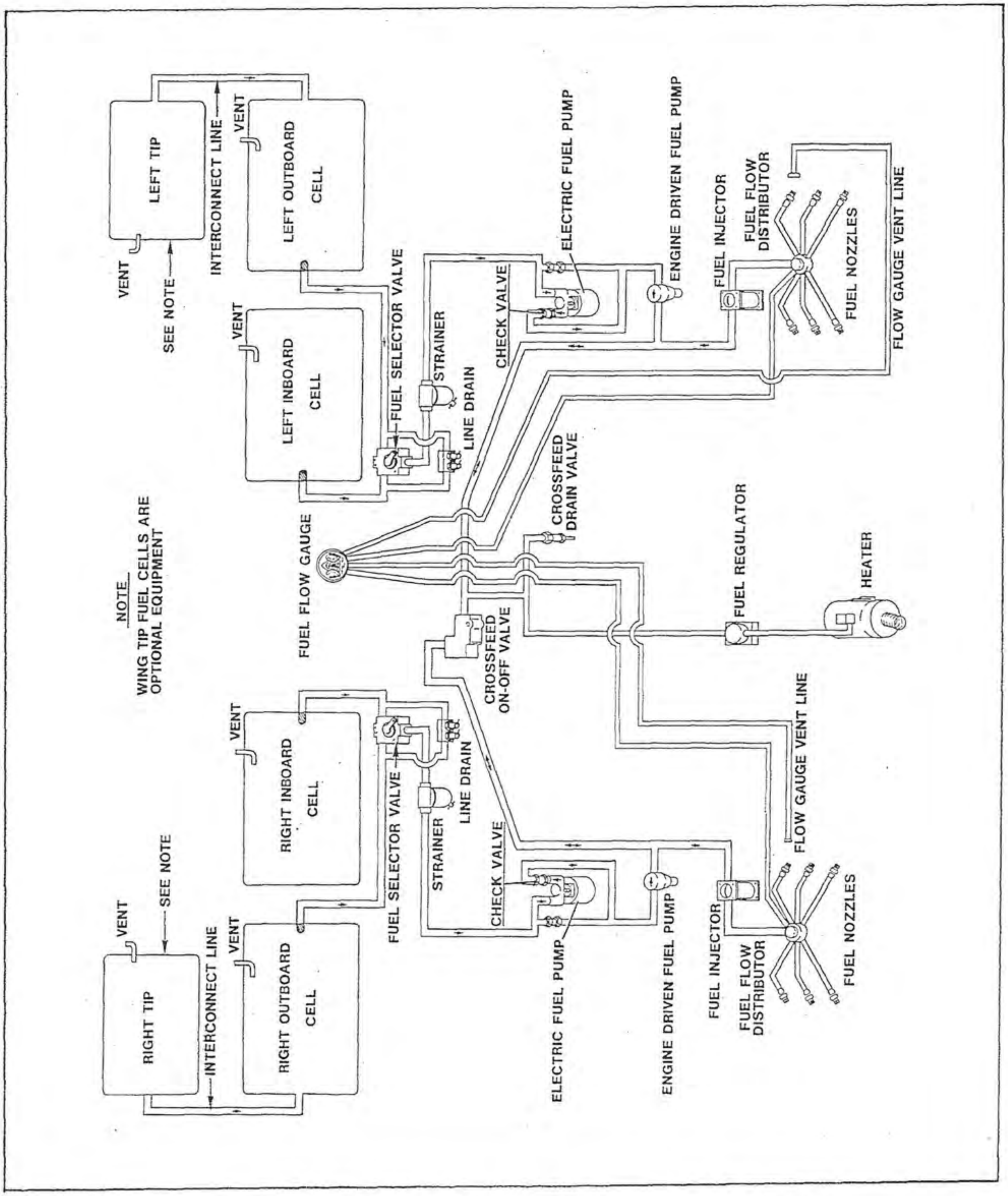
Fuel management controls are located on the control console between the crew seats. The two fuel selector and shutoff controls are used to select either the inboard or the outboard fuel tank on each side or to shut off the fuel flow on a side. Between the fuel selector controls is a crossfeed lever.

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.

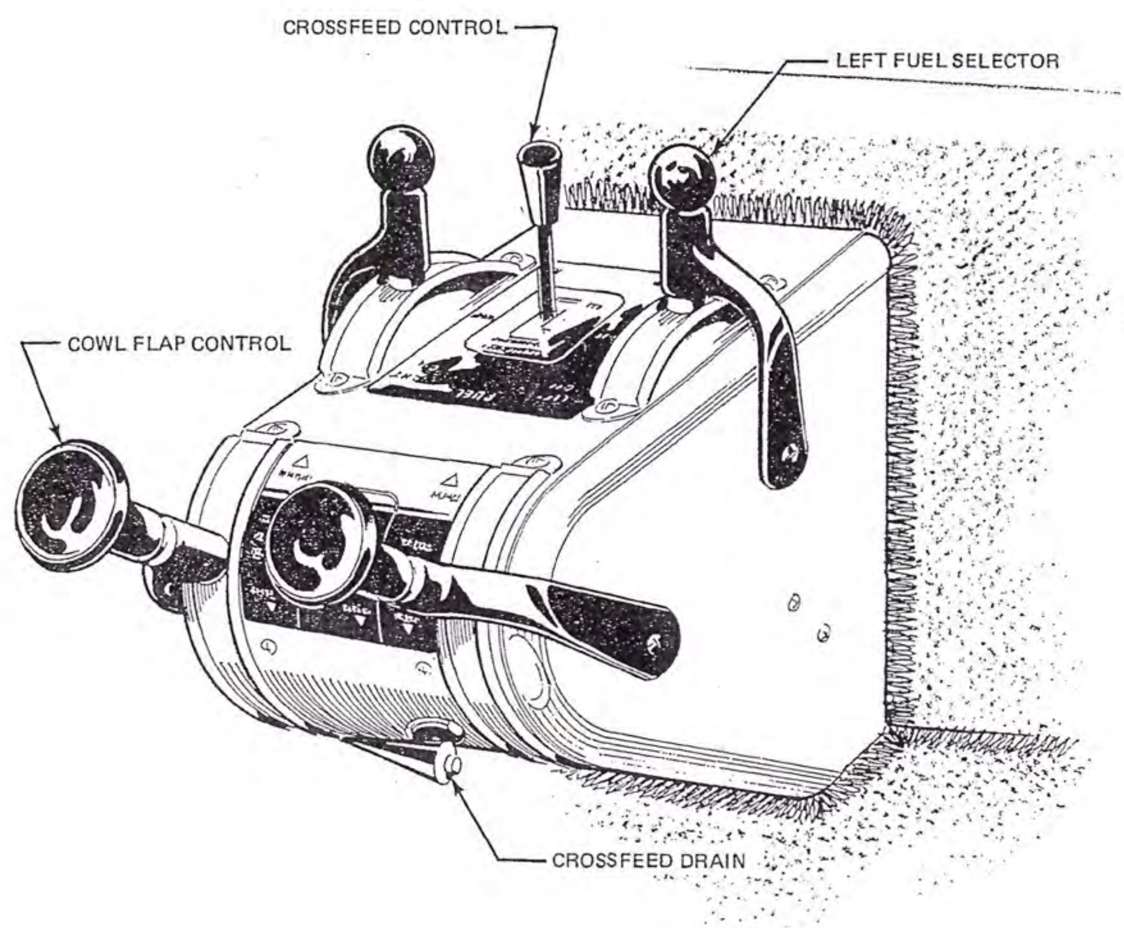
The two sides of the fuel system are connected by a crossfeed which allows fuel to be drawn from one side and sent to the engine on the other side to extend single-engine cruise range. Fuel can be supplied from any tank to either engine. The crossfeed is to be used only in emergency situations during 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. 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.



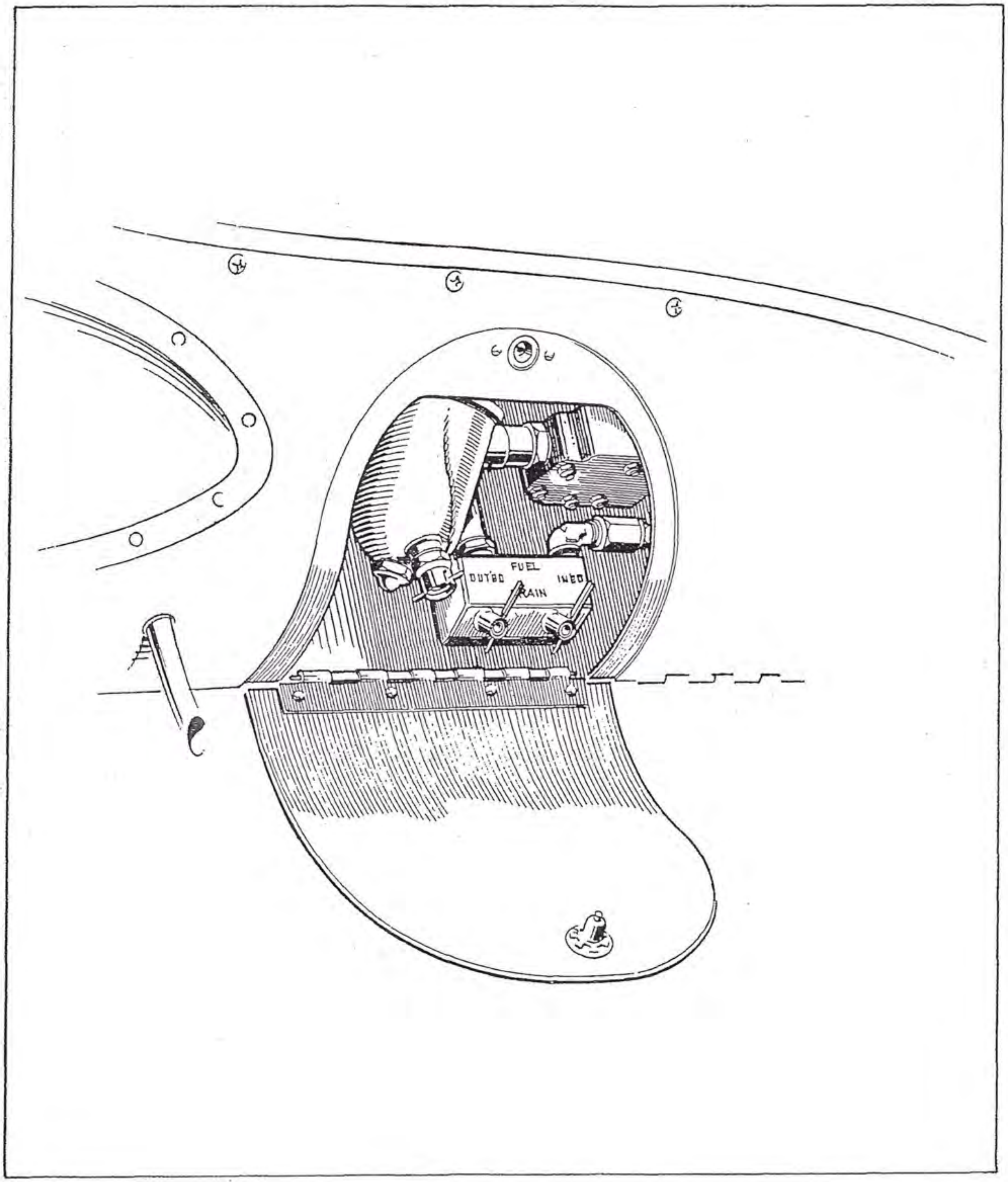
FUEL SYSTEM SCHEMATIC (NORMALLY ASPIRATED)

Figure 7-9



FUEL CONTROLS

Figure 7-11



FUEL DRAINS

Figure 7-13

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.

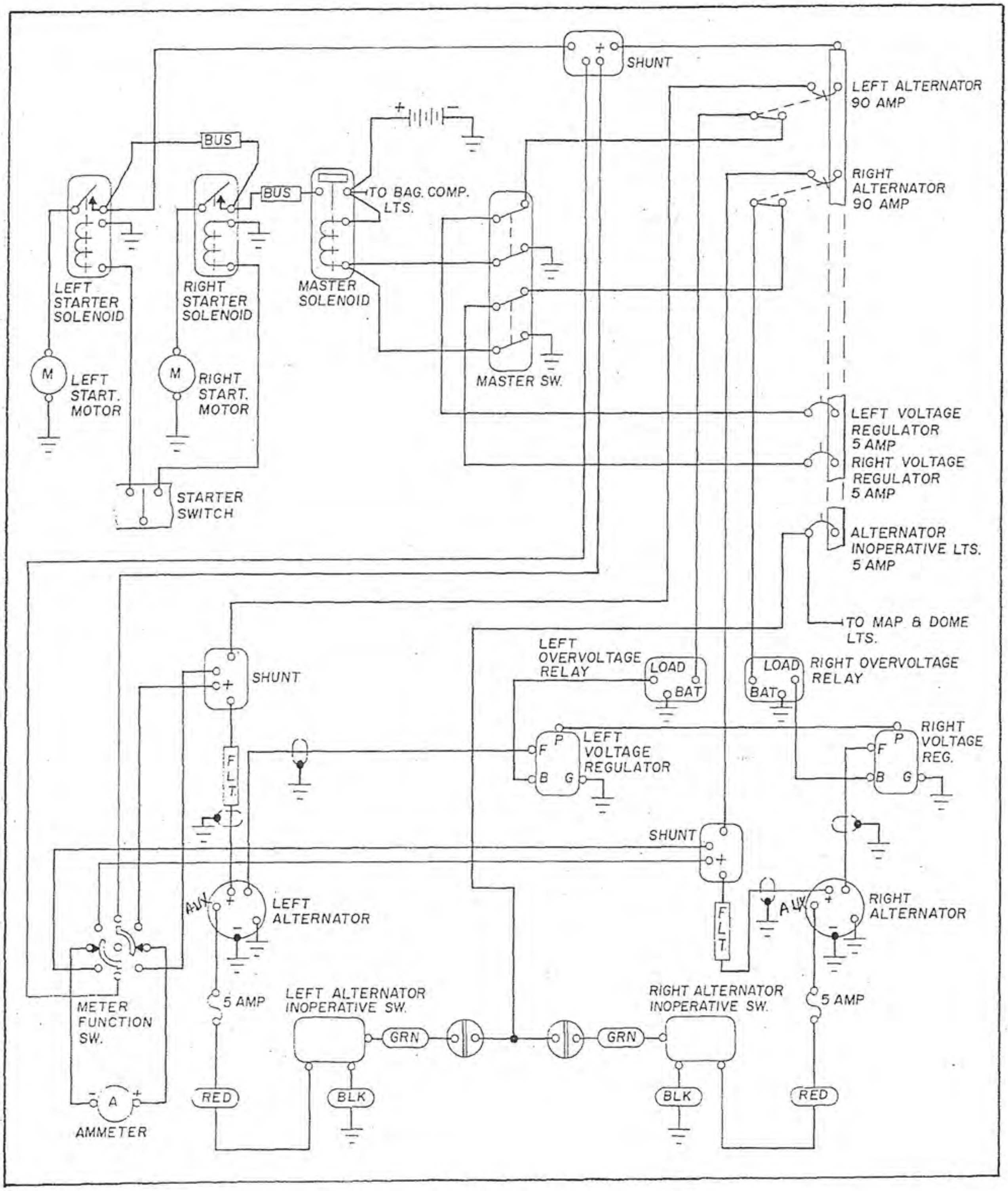
The electrical system can be monitored through the ammeter mounted on the far right of the instrument panel. The knob directly under the ammeter allows either alternator output lead or the battery to be switched onto the ammeter. When one of the alternators is not producing a voltage, its associated "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.

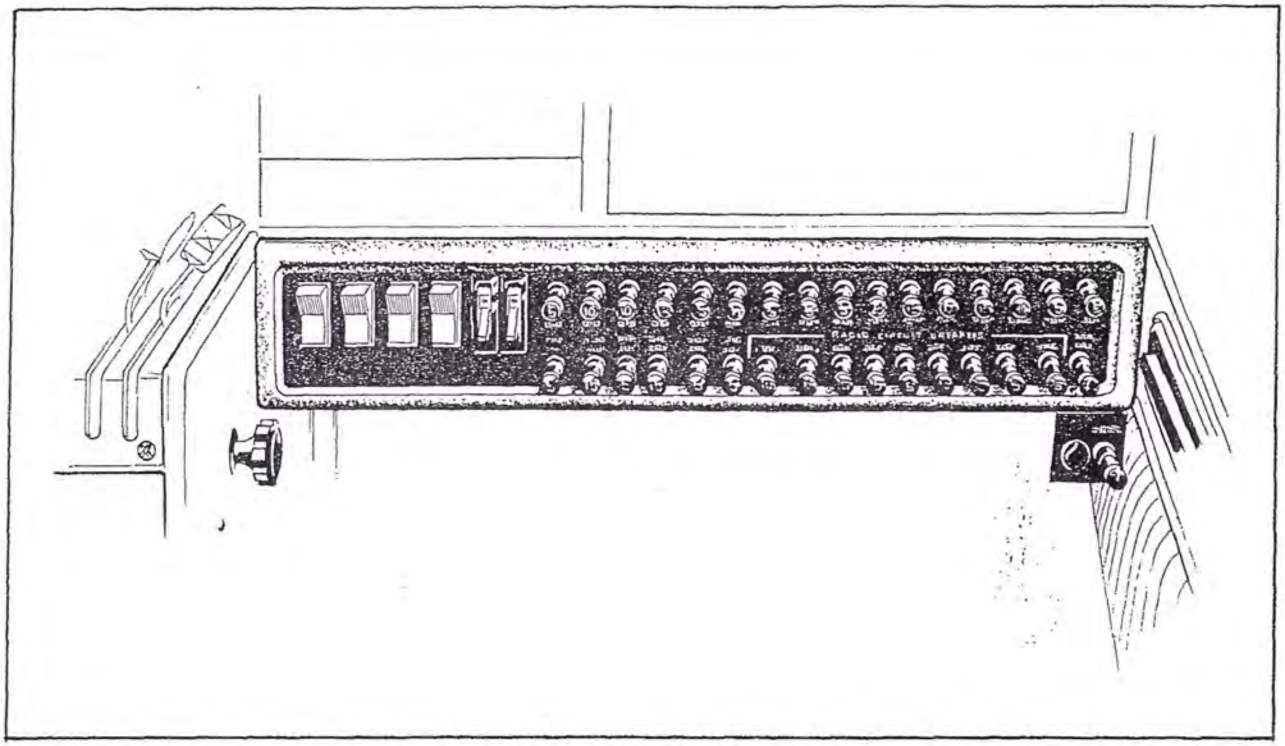
If both alternators fail in flight and the condition cannot be corrected, the airplane battery becomes the only source of electrical power. In this situation, all unnecessary electrical equipment should be turned off and the flight should be terminated as soon as possible.

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.



ALTERNATOR - STARTER SCHEMATIC

Figure 7-15



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.

Exterior lighting includes navigation lights, anti-collision lights, a landing light, and a taxi light. The navigation and anti-collision lights are combined in the wing tip light assemblies. The right wing tip carries a green navigation light and the left wing tip, a red navigation light. Both wing tips have white anti-collision strobe lights. A white navigation light is installed on the vertical tail. The landing light is recessed into the underside of the nose cone. The taxi light is attached to the nose gear and moves with the nose gear to illuminate the taxi path. Should the taxi light switch be inadvertently left on after the gear is retracted, the bulb is extinguished automatically. Navigation lights, strobe lights, landing light and taxi light have separate control switches on the electrical switch panel.

CAUTION

Anti-collision lights should not be operating when flying through overcast and clouds since reflected light can produce spacial disorientation. Do not operate strobe lights while taxiing in the vicinity of other aircraft.

An external power receptacle, located in the lower right side of the nose section, is available as optional equipment. This installation allows the airplane to be started with an external 24-28 volt source. While the external source is being connected, the master switch should be turned off.

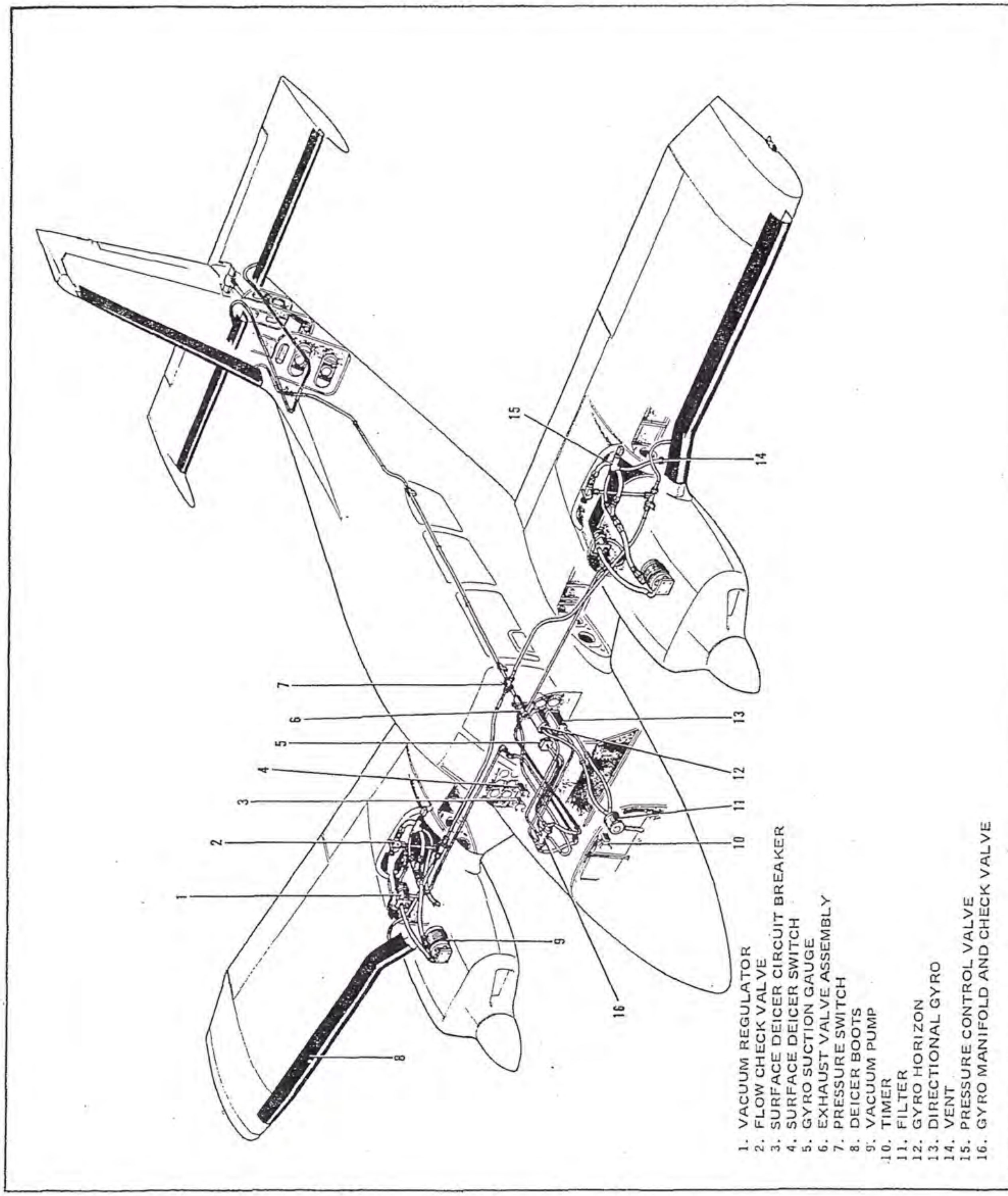
7.29 GYRO VACUUM SYSTEM

The directional gyro and the gyro horizon are instruments which indicate respectively airplane yaw to the right or left and airplane pitch and roll relative to the horizon. Both gyro instruments are air-driven by two engine mounted pneumatic pumps, one on each engine. Gyros mounted inside air tight cases are driven at high speed as vacuum from the pneumatic pumps lowers the pressure in the air tight cases and atmospheric air pressure enters to spin the gyros. Due to gyroscopic inertia, the axis of the gyro remains the same regardless of the position of the airplane. The gyro instruments indicate the position of the airplane relative to the stationary position of the rotating gyros.

The rotation of the directional gyro is stabilized in the vertical plane. When set to agree with the airplane's magnetic compass, the rotation of the directional gyro continues to point in the same direction, thus providing a positive indication on the instrument dial of any deviation of the nose of the airplane from a straight course. The gyro horizon operates on the same principal; however, the rotation of its gyro is stabilized in the horizontal plane. When the miniature adjustable airplane figure in the face of the instrument, representing the airplane, aligns with the horizontal bar across the instrument, representing the horizon, zero pitch and zero roll are indicated. A deviation in alignment represents the actual deviation of the horizontal attitude of the airplane from the true horizon.

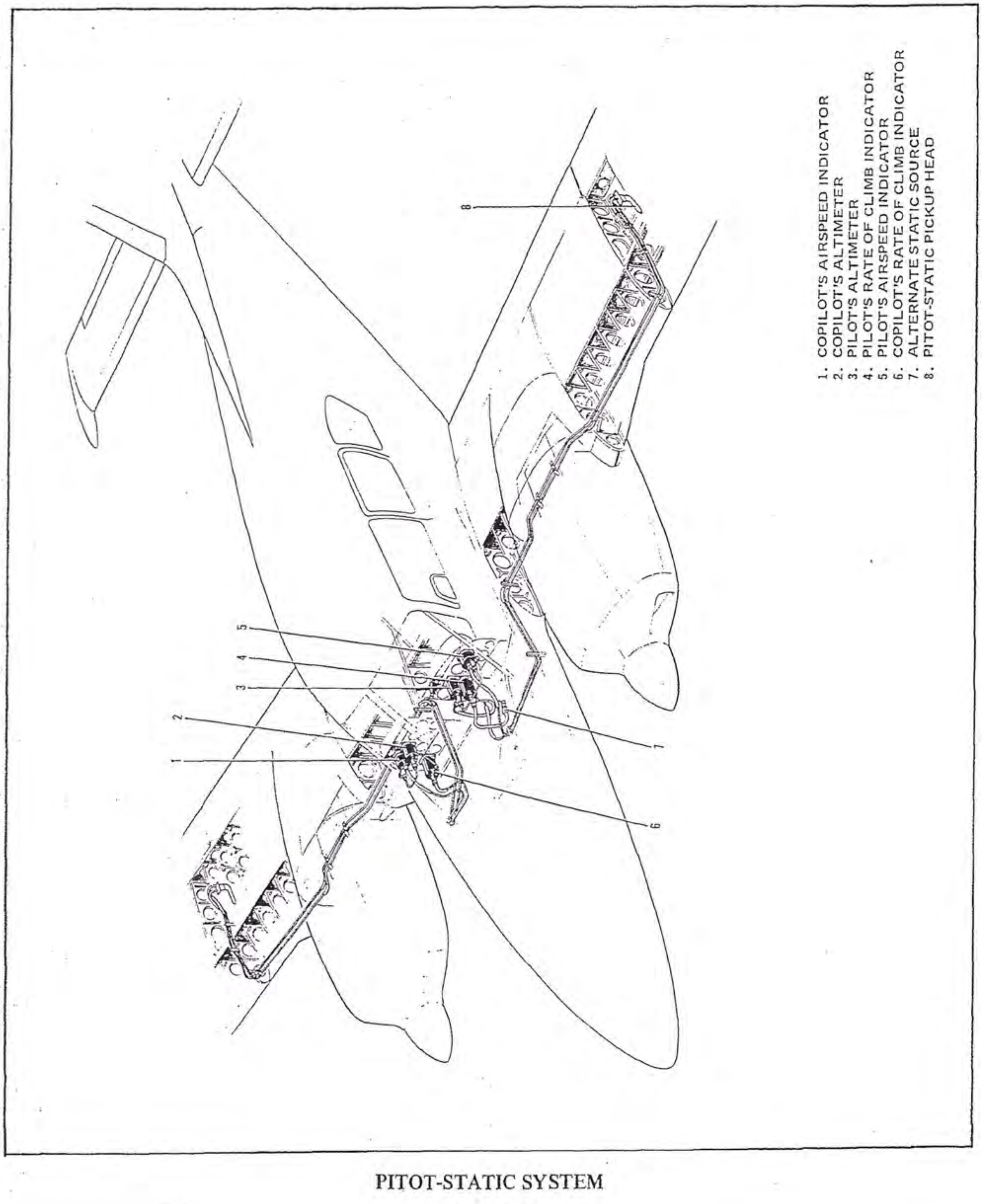
Air entering the gyro instruments is filtered. Either of the pneumatic pumps is capable of maintaining a vacuum sufficient to operate the system should the other pump fail. Optional copilot gyro instruments may be added to the system, and when optional pneumatic surface deicers are installed, they are operated through this pneumatic system.

A gyro suction gauge on the left instrument panel just inboard of the control column is calibrated in inches of mercury and indicates the amount of vacuum produced by the engine-driven pneumatic pumps. When the system is functioning properly, the gauge should indicate between 4.8 and 5.1 inches of mercury. Should either side of the system fail, a small red button will protrude from the corresponding side of the face of the vacuum gauge. The electrically operated turn coordinator may be used to verify proper function of the electrical gyros and as a standby in the event of a gyro instrument failure.



PNEUMATIC SYSTEM

Figure 7-19



PITOT-STATIC SYSTEM

Figure 7-21

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.

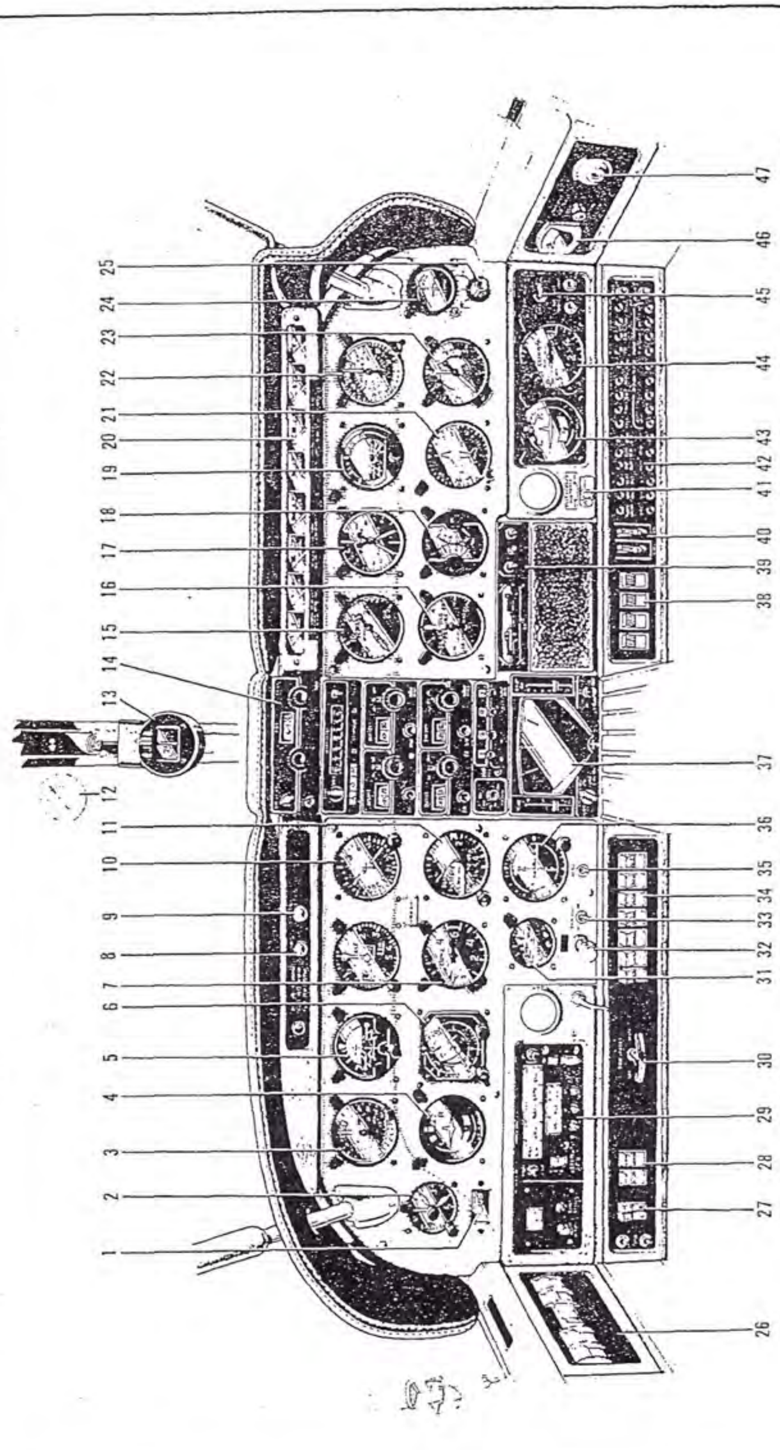
7.33 INSTRUMENT PANEL

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.

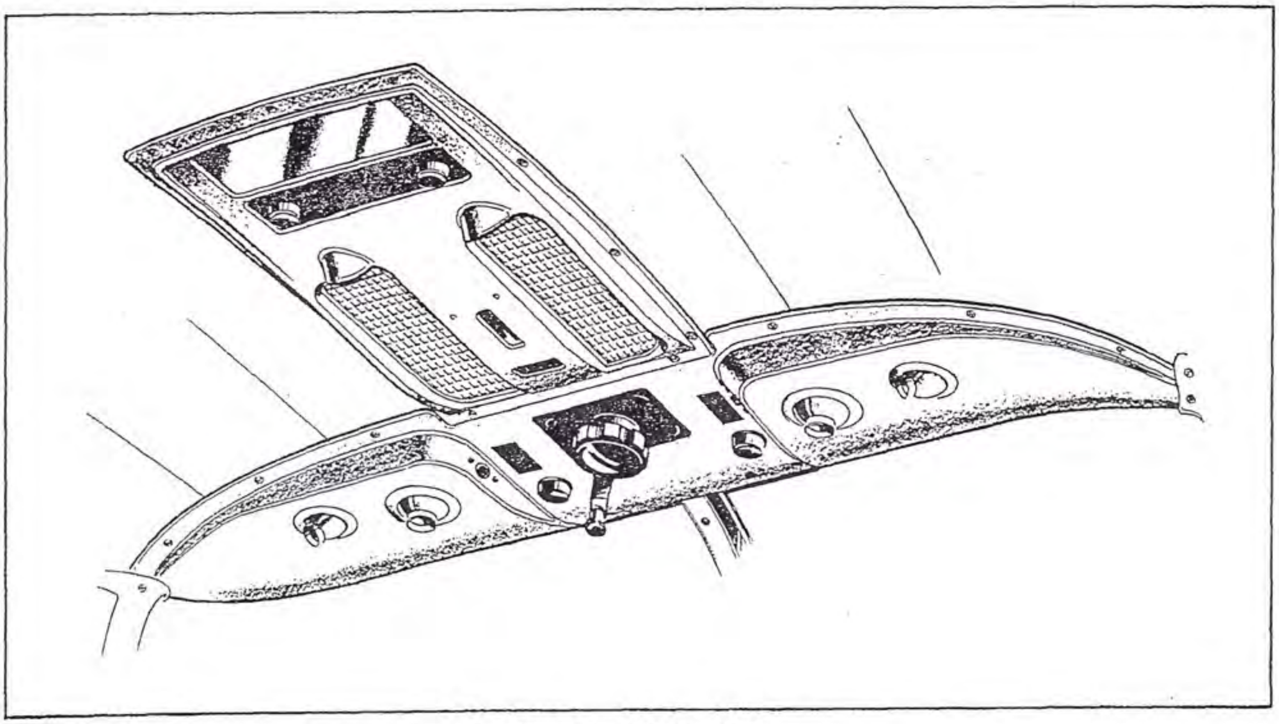
An engine gauge cluster is mounted along the upper portion of the right instrument panel. Gauges in this cluster include fuel quantity gauges, one for each side of the fuel system, and oil pressure gauges, oil temperature gauges, and cylinder head temperature gauges for each engine.



1. HOUR METER
2. CLOCK
3. AIRSPEED INDICATOR
4. TURN COORDINATOR
5. ATTITUDE GYRO
6. HORIZONTAL SITUATION INDICATOR
7. RATE OF CLIMB INDICATOR
8. GLIDE SLOPE ENGAGED LIGHT
9. DOOR AJAR LIGHT
10. ADF INDICATOR
11. RADAR ALTIMETER
12. OUTSIDE AIR TEMP. GAUGE
13. COMPASS
14. RADIO PANEL
15. TACHOMETER
16. MANIFOLD PRESS. GAUGE
17. FUEL FLOW GAUGE
18. EGT GAUGE
19. ATTITUDE GYRO
20. ENGINE GAUGES
21. DIRECTIONAL GYRO
22. AIRSPEED INDICATOR
23. ALTIMETER
24. AMMETER
25. ALTERNATOR OUTPUT SELECTOR SWITCH
26. STARTER AND MAGNETO SWITCHES
27. MASTER SWITCH
28. A/P NAV AND ELECTRIC TRIM SWITCHES
29. AUTOPILOT CONTROL PANEL
30. PARKING BRAKE
31. GYRO SUCTION GAUGE
32. CIGAR LIGHTER
33. RADAR ALTIMETER SWITCH
34. LEFT ELECTRICAL SWITCH PANEL
35. AVIONICS MASTER SWITCH
36. VOR/GLIDE SLOPE INDICATOR
37. RADAR
38. RIGHT ELECTRICAL SWITCH PANEL
39. DME
40. ALTERNATOR CIRCUIT BREAKER SWITCHES
41. EMERGENCY AVIONICS BUS POWER SWITCH
42. CIRCUIT BREAKER PANEL
43. TURN COORDINATOR
44. RATE OF CLIMB INDICATOR
45. HEATER SWITCH
46. PROP DE-ICE AMMETER
47. OXYGEN OUTLET

TYPICAL INSTRUMENT PANEL WITH OPTIONS

Figure 7-23



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.

7.35. RADIO EQUIPMENT

A variety of radio options may be installed in the Aztec F. Radio controls are mounted in the center portion of the instrument panel. Microphone and earphone jacks are located on both sides of the instrument panel, and a cabin speaker is included in the overhead panel. Radio light intensity is controlled by a rheostat switch on the overhead panel.

Power supplies for the various radio installations are located on a shelf at the rear of the forward baggage compartment. The attachment of anti-static wicks to trailing edges of the airplane clears the airplane of any surface static electricity which might cause radio interference.

On airplanes with serial numbers 27-7754094 and up, an Emergency Avionics Bus Power switch is located on the instrument panel directly below the copilot control wheel. This switch is protected from inadvertent activation by a red switch guard. During normal operating conditions, the switch is in the OFF position and the guard is closed. If avionics power is lost while the avionics master switch is ON and the avionics circuit breakers are in, turn OFF the avionics master switch. Open the switch guard and turn ON the switch, up to 50 amps is available. Use of the Emergency Avionics Bus Power switch should be limited to the above described condition and not activated under any other circumstances.

7.37 RADAR*

A weather radar system can be installed in the Aztec F. The basic components of this system are an antenna, a transmitter/receiver, and a cockpit indicator. The function of the weather radar is to detect weather conditions along the flight path and to visually display a continuous weather outline on a cockpit indicator mounted in the lower center segment of the instrument panel. Through interpretation of the advance weather information given on the display, the pilot can make an early decision on the most desirable weather avoidance course.

The operating and service manuals provided by the weather radar system manufacturer offer detailed information on the operation and adjustment of the system to its optimum efficiency.

NOTE

When operating weather avoidance radar systems inside of moderate to heavy precipitation, it is advisable to set the range scale of the radar to its lowest setting.

WARNING

Heating and radiation effects of radar can cause serious damage to the eyes and other tender organs of the body. Personnel should not be allowed within fifteen feet of the area being scanned by the antenna while the system is transmitting. Do not operate the radar during refueling or in the vicinity of trucks or containers accommodating explosives or flammables. Flashbulbs can be exploded by radar energy. Before operating, direct the nose of the airplane away from buildings, large metal structures or other aircraft within a distance of 100 yards to prevent the return of reflected energy to the system. Do not operate the radar while the airplane is in a hangar or other enclosure.

*Optional equipment

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.

The combustion heater uses gasoline from the left side of the fuel system when the crossfeed is off and from both sides 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. This insures that the malfunction causing the overheat condition is corrected before the heater can be reactivated. The combustion heater is controlled by a three-position cabin heat control switch on the far right of the instrument panel.

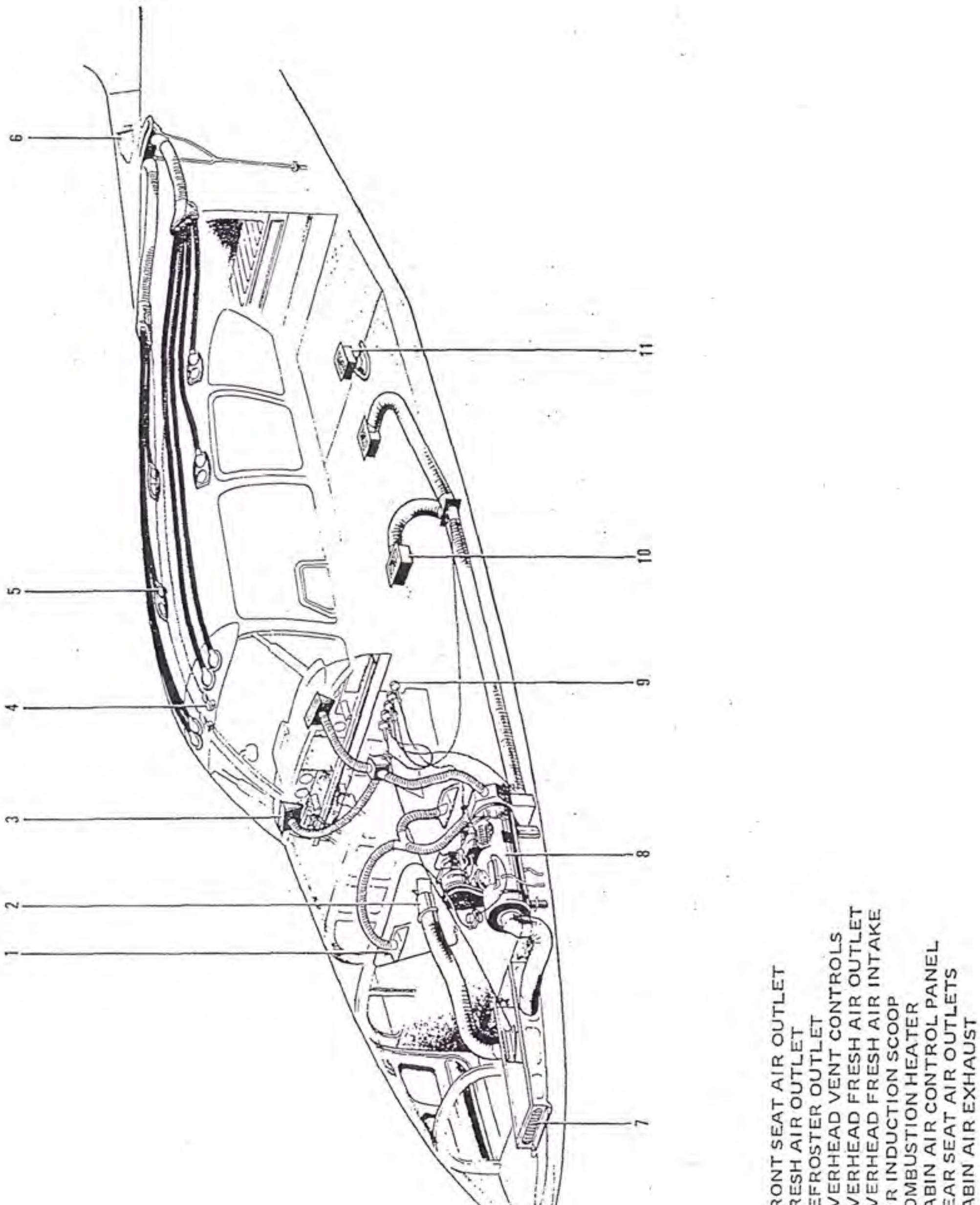
The five cabin air control knobs are operated by push-pull movement. The left knob regulates airflow through the bulkhead to the front seat; the second knob from the left regulates airflow through floor vents to the rear seats. This air, as well as defroster air, enters the nose scoop and passes through 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 positions 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 it is 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. It should be noted, however, that prolonged operation in this manner will deplete the battery.



HEATING, VENTILATING AND DEFROSTING SYSTEM

Figure 7-27

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.

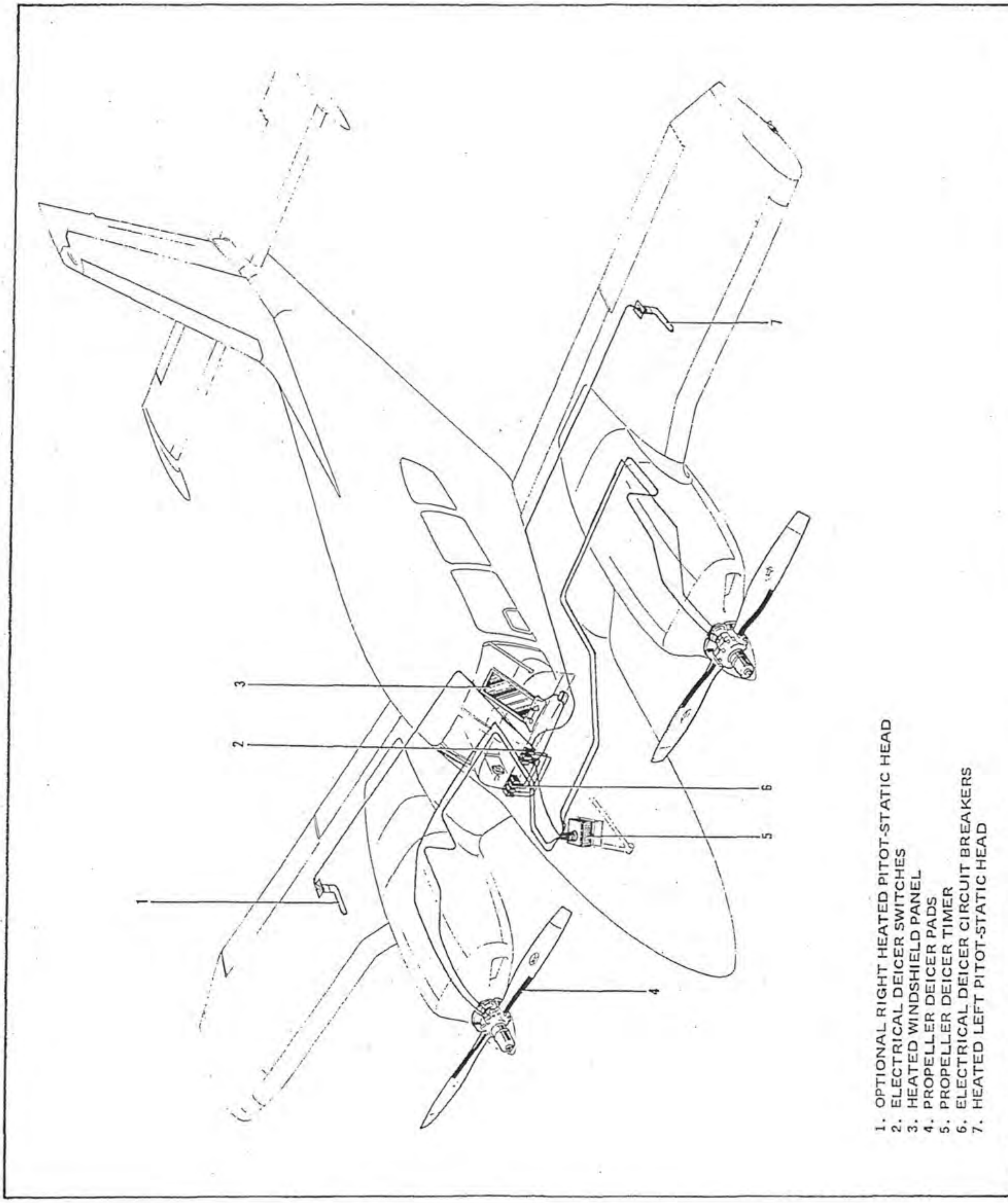
Depressing the surface deice switch activates the system cycle timer, which energizes the pneumatic pressure control valves, allowing pneumatic pump pressure to inflate all pneumatic deicer boots for 7.5 seconds. When the cycle is complete, deicer solenoid valves permit automatic overboard exhaustion 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.

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.

*Optional equipment



ELECTRICAL DEICING SYSTEM

Figure 7-29

AIRWORTHINESS DIRECTIVE

REGULATORY SUPPORT DIVISION
P.O. BOX 26460
OKLAHOMA CITY, OKLAHOMA 73125-0460

U.S. Department of Transportation
Federal Aviation Administration

The following Airworthiness Directive issued by the Federal Aviation Administration in accordance with the provisions of Federal Aviation Regulations, Part 39, applies to an aircraft model of which our records indicate you may be the registered owner. Airworthiness Directives affect aviation safety and are regulations which require immediate attention. You are cautioned that no person may operate an aircraft to which an Airworthiness Directive applies, except in accordance with the requirements of the Airworthiness Directive (reference FAR Subpart 39.3).

99-14-01 THE NEW PIPER AIRCRAFT, INC.: Amendment 39-11209; Docket No. 98-CE-77-AD; Supersedes AD 98-04-27, Amendment 39-10339.

Applicability: Models PA-23, PA-23-160, PA-23-235, PA-23-250, PA-E23-250, PA-30, PA-39, PA-40, PA-31, PA-31-300, PA-31-325, PA-31-350, PA-31P, PA-31T, PA-31T1, PA-31T2, PA-31P-350, PA-34-200, PA-34-200T, PA-34-220T, PA-42, PA-42-720, and PA-42-1000 airplanes, all serial numbers, certificated in any category.

NOTE 1: This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (d) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as follows, unless already accomplished:

1. **For all affected airplanes, except for Models PA-31P, PA-31T, PA-31T1, PA-31T2, and PA-31P-350 airplanes:** Within 30 days after March 13, 1997 (the effective date of AD 98-04-27).

2. **For all Models PA-31P, PA-31T, PA-31T1, PA-31T2, and PA-31P-350 airplanes:** Within the next 30 days after the effective date of this AD.

To minimize the potential hazards associated with operating the airplane in severe icing conditions by providing more clearly defined procedures and limitations associated with such conditions, accomplish the following:

(a) At the applicable compliance time presented in the **Compliance** section of this AD, accomplish the requirements of paragraphs (a)(1) and (a)(2) of this AD.

NOTE 2: Operators should initiate action to notify and ensure that flight crewmembers are apprised of this change.

(1) Revise the FAA-approved Airplane Flight Manual (AFM) by incorporating the following into the Limitations Section of the AFM. This may be accomplished by inserting a copy of this AD in the AFM.

"WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

- During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.
  - Unusually extensive ice accumulation on the airframe and windshield in areas not normally observed to collect ice.
  - Accumulation of ice on the upper surface of the wing, aft of the protected area.
  - Accumulation of ice on the engine nacelles and propeller spinners farther aft than normally observed.
- Since the autopilot, when installed and operating, may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

- All wing icing inspection lights must be operative prior to flight into known or forecast icing conditions at night. [NOTE: This supersedes any relief provided by the Master Minimum Equipment List (MMEL).]"

(2) Revise the FAA-approved AFM by incorporating the following into the Normal Procedures Section of the AFM. This may be accomplished by inserting a copy of this AD in the AFM.

"THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

- Visible rain at temperatures below 0 degrees Celsius ambient air temperature.
- Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT:

These procedures are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature. While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues specified in the Limitations Section of the AFM for identifying severe icing conditions are observed, accomplish the following:

- Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.
- Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.
- Do not engage the autopilot.
- If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.
- If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.
- Do not extend flaps when holding in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.
- If the flaps are extended, do not retract them until the airframe is clear of ice.
- Report these weather conditions to Air Traffic Control."

(b) Incorporating the AFM revisions, as required by this AD, may be performed by the owner/operator holding at least a private pilot certificate as authorized by section 43.7 of the Federal Aviation Regulations (14 CFR 43.7), and must be entered into the aircraft records showing compliance with this AD in accordance with section 43.9 of the Federal Aviation Regulations (14 CFR 43.9).

(c) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(d) An alternative method of compliance or adjustment of the compliance time that provides an equivalent level of safety may be approved by the Manager, Small Airplane Directorate, FAA, 1201 Walnut, suite 900, Kansas City, Missouri 64106. The request shall be forwarded through an appropriate FAA Maintenance Inspector, who may add comments and then send it to the Manager, Small Airplane Directorate.

NOTE 3: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Small Airplane Directorate.

(e) All persons affected by this directive may examine information related to this AD at the FAA, Central Region, Office of the Regional Counsel, Room 1558, 601 E. 12th Street, Kansas City, Missouri 64106.

(f) This amendment supersedes AD 98-04-27, Amendment 39-10339.

(g) This amendment becomes effective on August 17, 1999.

FOR FURTHER INFORMATION CONTACT:

Mr. John P. Dow, Sr., Aerospace Engineer, FAA, Small Airplane Directorate, 1201 Walnut, suite 900, Kansas City, Missouri 64106; telephone: (816) 426-6932; facsimile: (816) 426-2169.

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.

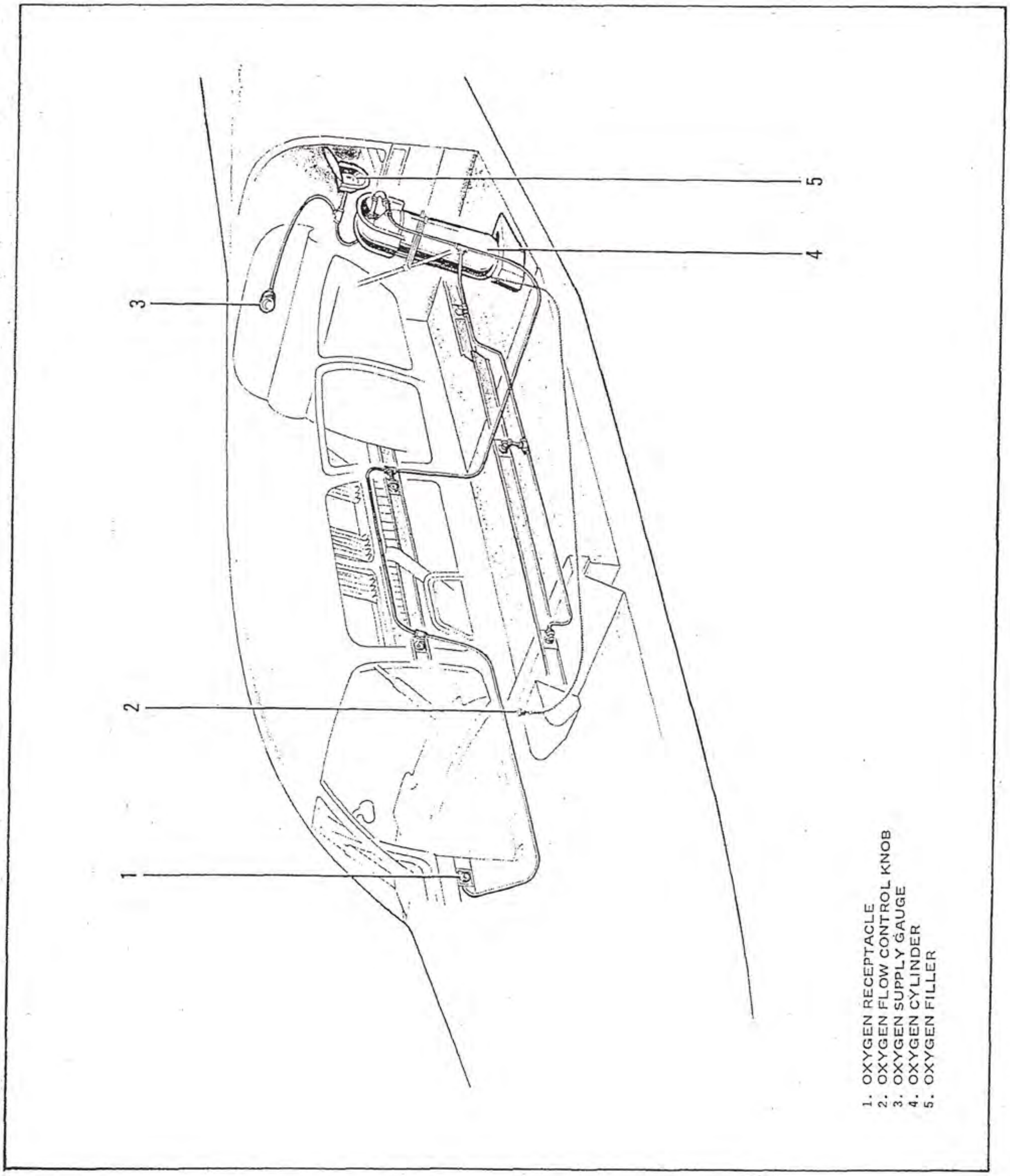
7.45 HEATED WINDSHIELD PANEL*

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



OXYGEN SYSTEM

Figure 7-31

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

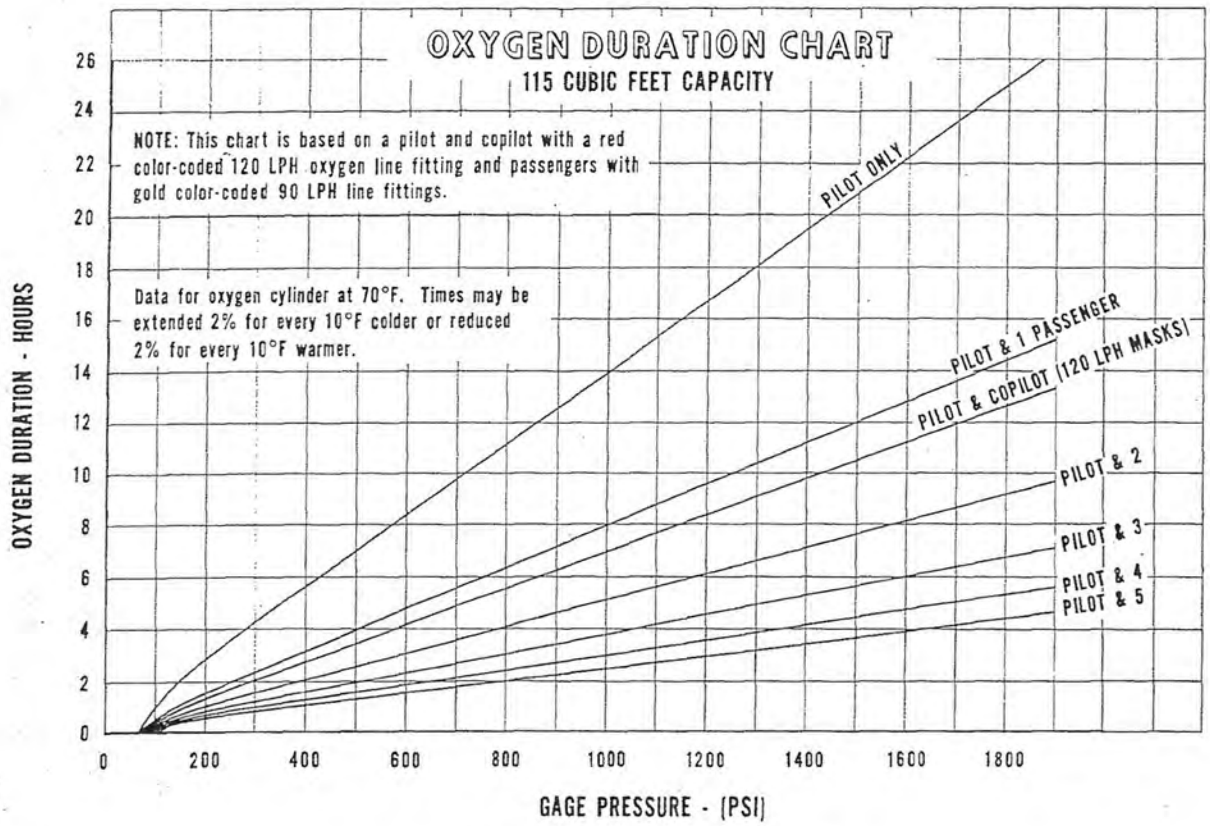
Positively NO SMOKING while oxygen is being used by anyone in the airplane.

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



OXYGEN DURATION CHART

Figure 7-32

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.

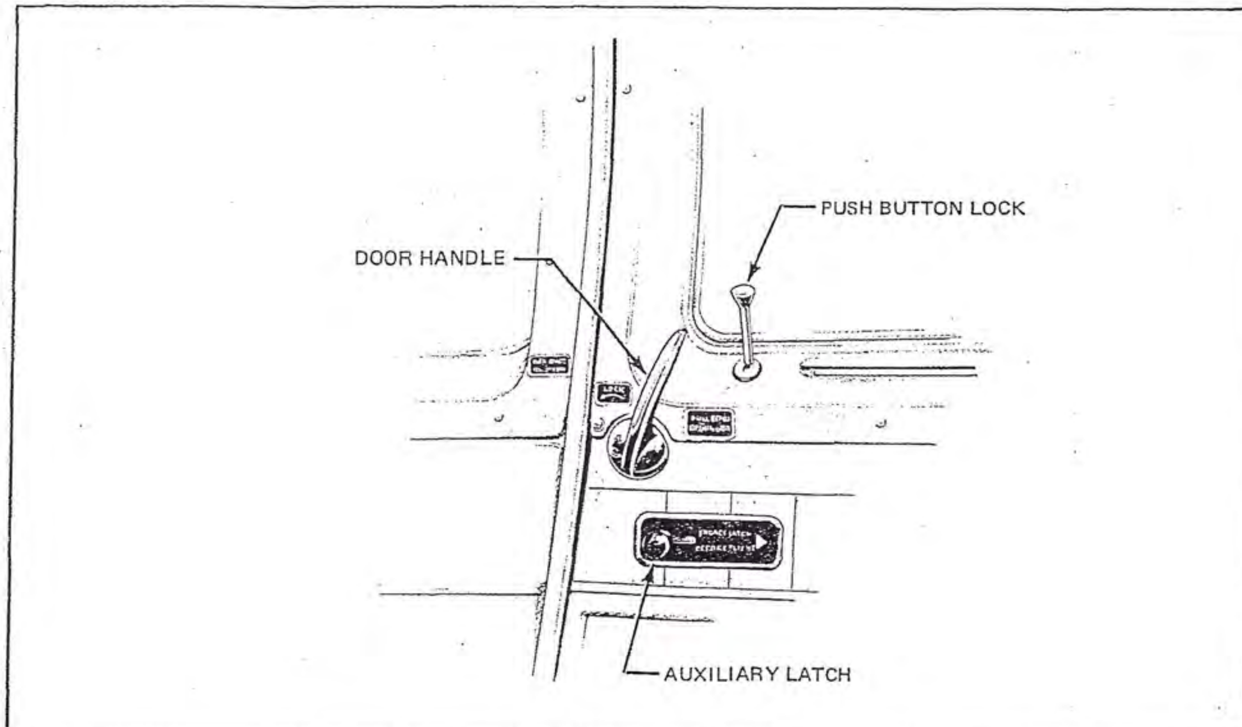
The pilot's side window incorporates a storm window which opens inward. A cigar lighter is installed on the pilot's instrument panel.

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.



CABIN DOOR LATCHES

Figure 7-33

Additional cabin features include assist straps, coat hangers, and individual oxygen outlets when the oxygen system is installed. The cabin door opens wide for ease of entry and exit. The inside door handle and the push-button inside lock should be engaged during flight. When both the handle and the button are properly positioned the door cannot be opened inadvertently. The auxiliary latch must be engaged during all flight operations. There is an anti-theft key lock on the outside of the cabin door.

An emergency exit window is installed in the left side of the fuselage, adjacent to the left center seat. The window is sealed when installed and should be used only in emergencies. The emergency exit is operated by removing the plastic handle guard and turning the handle. The window may then be pushed outward away from the fuselage with a steady sustained pressure on the bottom sill.

7.53 BAGGAGE COMPARTMENTS

There are two separate baggage compartments in the Aztec F, each with a capacity up to 150 pounds. The forward compartment, accessible through a 19.5 x 30.5 inch door in the right nose section, has a volume of 21.3 cubic inches. The aft baggage compartment, accessible through a 30 x 31 inch door aft of the right side windows, has a volume of 26.2 feet. Both baggage compartment doors are key locked. Baggage tie down straps furnished in both compartments should be used for safe and secure stowage of baggage. Both baggage doors are locked with the same key.

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

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

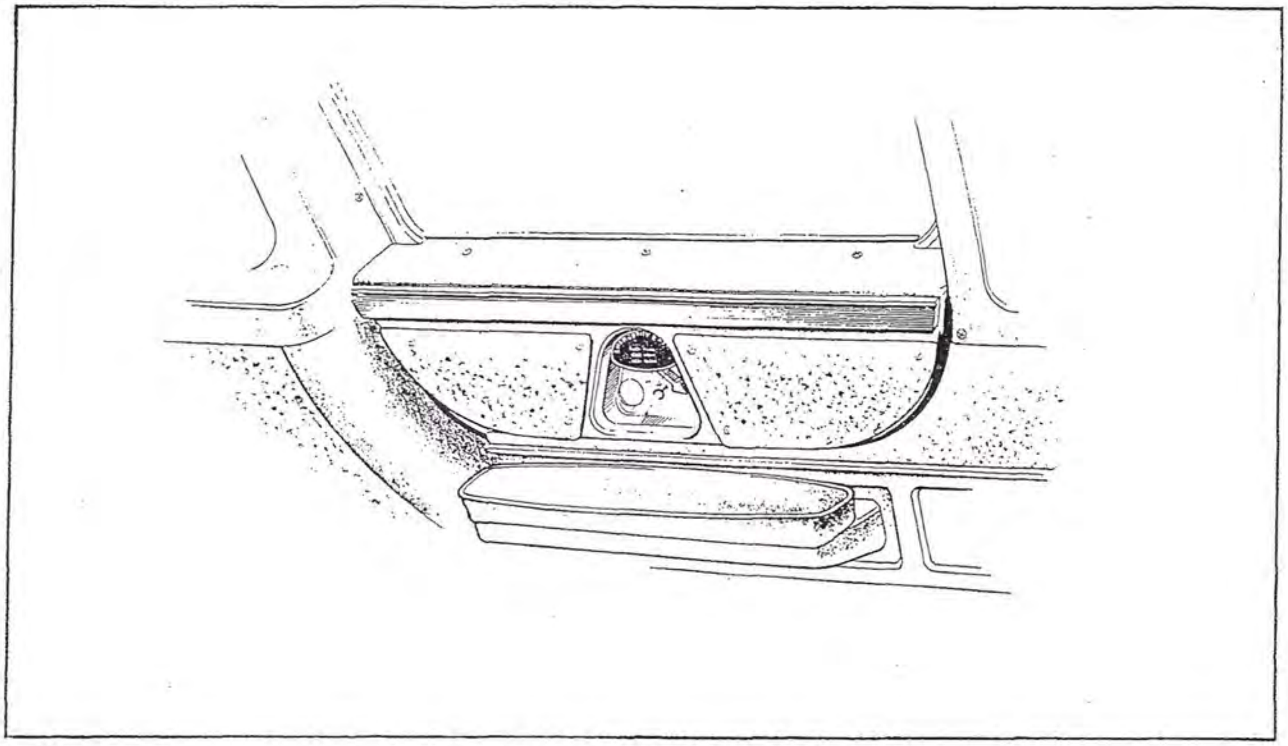
If the switch has been placed in the "ON" position for any reason, the "OFF" position has to be selected before selecting "ARM." If "ARM" is selected directly from the "ON" position, the unit will continue to transmit in the "ARM" position.

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," "ARM" (Normal Flight Position), "RESET." If the pilot's remote switch has been placed in the "ON" position for any reason, the momentary "RESET" position must be selected for 3 seconds before allowing it to return to the "ARM" position. If for any reason the impact switch becomes inadvertently activated, it may be reset by selecting the momentary "RESET" position for 3 seconds before allowing it to return to the "ARM" position.

NARCO ELT 10 OPERATION

On the unit is a switch placarded "ON," "OFF," and "ARM." The "ARM" position allows the unit to be set to the automatic mode so that it will transmit only after activation by 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. The "OFF" position should be selected while changing the battery or to discontinue transmission after the unit has been activated.

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," "ARM (Normal Flight Position)." 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. A button labeled "RESET" is located above the selector switch. To rearm the unit after it has been turned off or after it has been activated, the "RESET" button should be pressed in after the selector switch has been placed in the "ARM" position. This will end transmission and rearm the unit.



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.

7.57 FINISH

All sheet aluminum components of the Aztec F are carefully finished both inside and outside to insure maximum service life. Both sides of all pieces are alodine treated and coated with zinc chromate primer before assembly. Tubular steel structures are rust proofed, zinc chromate primed, and enameled. Thus, all parts of the airplane, both structural and non-structural,are highly corrosion resistant.

The external finish of the airplane is durable high gloss acrylic lacquer, which is available in a variety of colors and color combinations to suit the taste of each individual owner. To keep the airplane looking new, economy sized touch-up spray cans of matching colors are available from Piper dealers.

7.59 NUMBER PLATES

The manufacturer's identification plate is attached to the floor of the airplane, under the carpet forward of the copilot's seat. A plate identifying only the airplane serial number is attached to the fuselage skin to the right and just forward of the tail skid. The serial number should always be used when referring to the airplane in service or warranty matters.

7.61 EMERGENCY LOCATOR TRANSMITTER*

The Emergency Locator Transmitter (ELT), when installed, is enclosed under the removable dorsal fin forward of the vertical tail attachment to the fuselage. The unit meets the requirements of FAR 91.52. The transmitter operates on a self- contained battery.

A battery replacement date is marked on the transmitter label. To comply with FAA regulations, the battery must be replaced on or before this date. The battery must also be replaced if the transmitter had been used in an emergency situation or if the accumulated test time exceeds one hour, or if the unit has been inadvertently activated for an undetermined time period.

When installed in the airplane, the ELT transmits through the antenna mounted on the fuselage. The unit is also equipped with an integral portable antenna to allow the locator to be removed from the airplane in an emergency and used as a portable signal transmitter. Should it become necessary to remove the ELT from the airplane, be sure that the switch on the unit is in the "OFF" position before the transmitter is disconnected from the fuselage antenna. After the portable antenna is attached the unit may be turned "ON" as desired.

The locator should be checked during the preflight ground check to make sure that it has not been accidentally activated. Check by turning a radio receiver to 121.5 MHz. If there is an oscillating sound, the locator may have been activated and should be turned off immediately. Rearm the unit and then recheck.

NOTE

> If for any reason a test transmission is necessary, the test transmission should be conducted only in the first five minutes of any hour and limited to three audio sweeps. If tests must be made at any other time the tests should be coordinated with the nearest FAA tower or flight service station.

*Optional equipment

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SECTION 8

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.

8.3 AIRPLANE INSPECTION PERIODS

The Federal Aviation Administration (FAA) occasionally publishes Airworthiness Directives (ADs) that apply to specific groups of aircraft. They are mandatory changes and are to be complied with within a time limit set by the FAA. When an AD is issued, it is sent to the latest registered owner of the affected aircraft and also to subscribers of the service. The owner should periodically check with his Piper dealer or A & P mechanic to see whether he has the latest issued AD against his aircraft.

Piper Aircraft Corporation provides for the initial and first 50-hour inspection, at no charge to the owner. The Owner Service Agreement which the owner receives upon delivery of the aircraft should be kept in the aircraft at all times. This identifies him to authorized Piper dealers and entitles the owner to receive service in accordance with the regular service agreement terms. This agreement also entitles the transient owner full warranty by any Piper dealer in the world.

One hundred hour inspections are required by law if the aircraft is used commercially. Otherwise this inspection is left to the discretion of the owner. This inspection is a complete check of the aircraft and its systems, and should be accomplished by a Piper Authorized Service Center or by a qualified aircraft and power plant mechanic who owns or works for a reputable repair shop. The inspection is listed, in detail, in the inspection report of the appropriate Service Manual.

An annual inspection is required once a year to keep the Airworthiness Certificate in effect. It is the same as a 100-hour inspection except that it must be signed by an Inspection Authorized (IA) mechanic or a General Aviation District Office (GADO) representative. This inspection is required whether the aircraft is operated commercially or for pleasure.

A Progressive Maintenance program is approved by the FAA and is available to the owner. It involves routine and detailed inspections at 50-hour intervals. The purpose of the program is to allow maximum utilization of the aircraft, to reduce maintenance inspection cost and to maintain a maximum standard of continuous airworthiness. Complete details are available from Piper dealers.

A spectographic analysis of the oil is available from several sources. This system, if used intelligently, provides a good check of the internal condition of the engine. For this system to be accurate, oil samples must be sent in at regular intervals, and induction air filters must be cleaned or changed regularly.

8.5 PREVENTIVE MAINTENANCE

The holder of a Pilot Certificate issued under FAR Part 61 may perform certain preventive maintenance described in FAR Part 43. This maintenance may be performed only on an aircraft which the pilot owns or operates and which is not used 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.

8.7 AIRPLANE ALTERATIONS

If the owner desires to have his aircraft modified, he must obtain FAA approval for the alteration. Major alterations accomplished in accordance with Advisory Circular 43.13-2, when performed by an A & P mechanic, may be approved by the local FAA office. Major alterations to the basic airframe or systems not covered by AC 43.13-2 require a Supplemental Type Certificate.

The owner or pilot is required to ascertain that the following Aircraft Papers are in order and in the aircraft.

(a) To be displayed in the aircraft at all times:
  (1) Aircraft Airworthiness Certificate Form FAA-1362B.
  (2) Aircraft Registration Certificate Form FAA-500A.
  (3) Aircraft Radio Station License Form FCC-404A, if transmitters are installed.

(b) To be carried in the aircraft at all times:
  (1) Pilot's Operating Handbook.
  (2) Weight and Balance data plus a copy of the latest Repair and Alteration Form FAA-337, if applicable.
  (3) Aircraft equipment list.

Although the aircraft and engine logbooks are not required to be in the aircraft, they should be made available upon request. Logbooks should be complete and up to date. Good records will reduce maintenance cost by giving the mechanic information about what has or has not been accomplished.

8.9 GROUND HANDLING

(a) Towing

The airplane may be 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

Do not tow the airplane when the controls are secured.

(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.

(3) Aileron and stabilator controls may be secured with the front seat belts. Wheels should be blocked if chocks are available.

(d) Mooring

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

(1) Head the airplane into the wind if possible.
(2) Retract the flaps.
(3) Immobilize the ailerons and stabilator by looping the seat belt through the control wheel and pulling it snug.
(4) Chock the wheels.
(5) Secure tie-down ropes to the wing tie-down rings and the tail skid at approximately 45 degree angles to the ground. When using rope of non-synthetic material, leave sufficient slack to avoid damage to the airplane should the ropes contract.

CAUTION

Use bowline knots, square knots, or locked slip knots. Do not use plain slip knots.

NOTE

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

(6) Install pitot head cover(s) if available. Be sure to remove the pitot head cover(s) before flight.
(7) Cabin and baggage doors should be locked when the airplane is unattended.

(e) Jacking

The airplane is equipped with a jacking pad on each main spar just outboard of the engine nacelle. When the airplane is raised on jacks, the tail skid serves as a support position. To jack the airplane, proceed as follows:

(1) Place the jacks under the jack pads.
(2) Attach the tail support to the tail skid. Place approximately 250 pounds of ballast on the support to hold the tail down.

CAUTION

Be sure to apply sufficient tail support ballast; otherwise the airplane may tip forward and damage the nose section.

(3) Raise the jacks until all three wheels clear the floor.

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.

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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.

8.21 PROPELLER SERVICE

The propeller blades, spinners, and visible hub parts should be checked frequently for damage. If cracks, nicks, scratches, or corrosion is present, repairs should be made as soon as possible by a rated mechanic. A nick or a scratch may cause an area of increased stress which could lead to more serious propeller damage.

The coat of flat black paint on the back surface of the propeller blades helps to retard glare. To prevent corrosion, the surfaces of the propellers and spinners should be cleaned and waxed periodically.

8.23 OIL REQUIREMENTS

The oil capacity of a Lycoming IO-540 or TIO-540 series engine is 12 U.S. quarts. It is recommended that the engine oil and oil filter element be changed every 50 hours of operation, and more frequently under unfavorable operating conditions. The following oil grades are recommended for the specified temperature:

LUBRICATING OIL RECOMMENDATIONS
USE AVIATION ENGINE OIL FOR PISTON ENGINES

Outside Air Temperature	MIL-L-6082B Straight Mineral SAE Grades	(Reference Aviation Grades)	MIL-L-22851 Ashless Dispersant SAE Grades
Above 60°F	50	100	20W-40 or 50
30° to 90°F	40	80	20W-40
0° to 70°F	30	65	20W-40 or 20W-30
Below 10°F	20	–	20W-30

(Refer to the Lycoming S.I. 1014 latest revision when changing from straight mineral to ashless dispersant oil)

8.25 FUEL SYSTEM

(a) Fuel Requirements

The minimum octane aviation grade fuel to be used in the Aztec F is 91/96 in normally aspirated airplanes and 100/130 in turbocharged airplanes. The use of lower grades of fuel can cause serious engine damage in a short period of time and is considered of such importance that the engine warranty is invalidated by such use. Refer to paragraph 1.7, Fuel.

(b) Servicing Fuel System

At every 50 hour inspection, screens and bowls in the fuel filter units should be cleaned.

(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.

8.27 BATTERY SERVICE

The battery may be reached through the detachable access panel on the right side of the nose section. The battery is enclosed in a sealed stainless steel box, the lid of which is attached with wing nuts. The battery box has a plastic drain tube which is normally closed off with a clamp and which should be opened occasionally to drain off any accumulation of fluid. The battery should be checked for the proper fluid level. The battery must not be filled above the baffle plates and it must not be filled with acid - use water only.

Battery connections should be clean and tight. Seepage may be cleaned from the battery and box by flushing with a solution of soda and water with the drain open, then rinsing with clear water. The soda solution must not be allowed to enter the battery. The battery and box should then be dried and the drain clamp reinstalled.

A hydrometer check will determine the percent of charge present in the battery. The battery should be removed from the airplane for charging. To prevent accidental short circuiting or arcing when the battery is removed or installed, the ground cable should be removed first and installed last. Quick charges are not recommended. The 24 volt battery should be charged starting with a rate of 2 amperes and finishing with 1 ampere.

8.29 CLEANING

(a) Cleaning Engine Compartment

Before cleaning the engine compartment, place a strip of tape on the magneto vents to prevent any solvent from entering these units.

(1) Place a large pan under the engine to catch waste.
(2) With the engine cowling removed, spray or brush the engine with solvent or a mixture of solvent and degreaser. In order to remove especially heavy dirt and grease deposits, it may be necessary to brush areas that were sprayed.

CAUTION

Do not spray solvent into the alternator, vacuum pump, starter, or air intakes.

(3) Allow the solvent to remain on the engine from five to ten minutes. Then rinse the engine clean with additional solvent and allow it to dry.

CAUTION

Do not operate the engine until the solvent has evaporated or otherwise been removed.

(4) Remove the protective covers from the magnetos.
(5) Lubricate the controls, bearing surfaces, etc., in accordance with the Lubrication Chart in the PA-23-250 Service Manual.

(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

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

(e) Cleaning Headliner, Side Panels, and Seats

(1) Remove loose particles with a stiff bristle brush and a vacuum cleaner. Frequent vacuuming will prevent loose dirt from being worked into the fabric.
(2) Soiled upholstery, except leather, may be cleaned with a good upholstery cleaner suitable for the material. The manufacturer's instructions should be followed carefully. Avoid soaking or harsh rubbing.

CAUTION

Solvent cleaners require adequate ventilation.

(3) Leather should be cleaned with saddle soap or a mild hand soap and water solution. Avoid saturation and never use harsh cleaning solutions or detergents on leather.
(4) Plastic trim, the control wheels, and control knobs can be cleaned with a cloth dampened with soap and water.

(f) Cleaning Carpets

Loose dirt can be removed from carpets with a whisk broom or a vacuum cleaner. A nonflammable dry cleaning fluid may be used on soiled spots and stubborn stains. Floor carpets may be removed and cleaned like any household carpet.

(h) Cleaning Surface Deicing Equipment*

When the deicers are clean, a coating of B.F. Goodrich Icex should be applied. Icex is compounded to lower the strength of adhesion between ice and the rubber surface of the deicer boots.

The deicers should be cleaned when the aircraft is washed using a mild soap and water solution.

In cold weather, wash the boots with the airplane inside a warm hangar if possible. If the cleaning is to be done outdoors, heat the soap and water solution before taking it out to the airplane. If difficulty is encountered with the water freezing on the boots, direct a blast of warm air along the region being cleaned, using a portable type ground heater.

As an alternate cleaning solvent, use benzol or nonleaded gasoline. Moisten the cleaning cloth in the solvent, scrub lightly, and then, with a clean, dry cloth, wipe dry so that the cleaner does not have time to soak into the rubber. Petroleum products such as these are injurious to rubber, and therefore should be used sparingly if at all.

*Optional equipment