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cherokee *pathfinder*

PILOT'S OPERATING MANUAL

BY

PIPER

This manual is incomplete without an APPROPRIATE FAA APPROVED AIRPLANE FLIGHT MANUAL and an APPROPRIATE WEIGHT AND BALANCE REPORT.

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 outlined by the Airplane Flight Manual, instrument markings, and placards.

This Pilot's Operating Manual is not designed as a substitute for adequate and competent flight instruction, knowledge of the 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 for transition from single to multi-engine flying.

If an inconsistency of information exists between the Pilot's Operating Manual and the Airplane Flight Manual approved by the FAA, the Airplane Flight Manual shall be the authority.

A complete or partial replacement of this manual, Part No. 761 557, may be obtained only from Piper Customer Services.

Published by
PUBLICATIONS DEPARTMENT
Piper Aircraft Corporation
761 557
Issued: July 1973

REVISIONS

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

Revision material will consist of information necessary to update the text of the present manual and/or add information to cover added airplane equipment.

I. Revisions

Revisions will be distributed whenever necessary as complete page replacements or additions and shall be inserted into the manual in accordance with the instructions given below:

1. Revision pages will replace only pages with the same page number.
2. Insert all additional pages in proper numerical order within each section.
3. Page numbers followed by a small letter shall be inserted in direct sequence with the same common numbered page.

II. Identification of Revised Material

Revised text and illustrations shall be indicated by a black vertical line along the left hand margin of the page, opposite revised, added or deleted material. A line opposite the page number or section title and printing date, will indicate that the text or illustration was unchanged but material was relocated to a different page or that an entire page was added.

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

PILOT'S OPERATING MANUAL LOG OF REVISIONS

Current Revisions to the PA-28-235 Cherokee Pathfinder Pilot's Operating Manual, 761 557, issued July 10, 1973

Revision	Revised Pages	Description	Date

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 3 (cont)	9-i	Revised Performance Charts index.	
	9-2	Revised Takeoff Chart.	
	9-3	Revised Takeoff Chart.	
	9-4	Revised Climb Chart.	
	9-5	Revised Airspeed Chart.	
	9-6	Revised Range Chart.	
	9-7	Revised Stall Speed vs Weight Chart.	
	9-8	Revised Stall Speed vs Angle of Bank Chart.	
	9-9	Revised Glide Chart.	
	9-10	Revised Landing Chart.	
	10-11	**Revised Battery Service info.**	
Rev. 4 - 761 557 (PR750123)	2-17	**Revised Stall Warning info.**	Jan. 23, 1975
	W/B	**Added Rev. 4 to Report: VB-548.**	
Rev. 5 - 761 557 (PR750711)	1-2	Revised Empty Weight and Useful Load; deleted footnote.	July 11, 1975
	2-4	Revised Throttle Quadrant Console illustration.	
	2-13	Added callout.	
	2-15	Added Engine Hour Meter; revised callouts.	
	2-17	Revised Cabin Feature info.	
	A F/M	Added Rev. 3 to Report: VB-559.	
	W/B	Added Rev. 5 to Report: VB-548.	
	7-5	Added new item 12 and revised existing item nos. under Takeoff.	
	7-9	Revised ELT description info.	
	8-1	Revised and relocated item 8 (Fuel Warning Tip) to page 8-2.	
	8-2	Added revised item 8 (Fuel Warning Tip) from page 8-1; added item 11.	
Rev. 6 - 761 557 (PR751202)	2-1	Revised Airframe info.	Dec. 2, 1975
	A F/M	Added Rev. 4 to Report: VB-559.	
	W/B	Added Rev. 6 to Report: VB-548.	
	7-9	Revised ELT remote switch info; relocated material from page 7-10.	
	7-10	Added material relocated from page 7-9.	
	8-2	Revised item 8 (Fuel Warning tip).	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 7 - 761 557 (PR760423)	1-2	Revised Fuel Specifications info.	April 23, 1976
	AF/M	Added Rev. 5 to Report: VB-559.	
	7-5	Added Note.	
	7-6	Revised Cruising info.	
	7-7	Revised Approach and Landing, item 5.	
	8-2	Added items 12, 13, 14.	
	10-i	Revised page no. for Filling Fuel Tanks.	
	10-8	Revised Fuel Requirements info; relocated Filling Fuel Tanks to page 10-9.	
	10-9	Added Fuel Grade Comparison Chart and info from page 10-8; relocated info to page 10-10.	
	10-10	Added info from page 10-9; relocated info to page 10-11.	
	10-11	Added info from page 10-10.	
	10-14	Revised Special Instructions, item 7.	
Rev. 8 - 761 557 (PR770610)	W/B	Added Rev. 7 to Report: VB-548.	June 10, 1977
	4-3	Revised rpm limit in Prop. Overspeed item 5.	
	7-9, 7-10	Revised ELT info.	
Rev. 9 - 761 557 (PR790330)	2-11	Added Caution to Heat. and Vent. description.	March 30, 1979
	W/B	Added Rev. 8 to Report: VB-548.	
	7-9	Revised ELT info.	
Rev. 10 - 761 557 (PR800613)	iii	Revised serial no. applicability.	June 13, 1980
	AF/M	Added Rev. 6 to Report: VB-559.	
	W/B	Added Rev. 9 to Report: VB-548.	
		(NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	
Rev. 11 - 761 557 (PR840320)	1-2	Revised fuel and oil specifications.	March 20, 1984
	2-6	Revised para.	
	2-17	Revised para.	
	AF/M	Added Rev. 7 to Report: VB-559.	
	W/B	Added Rev. 10 to Report: VB-548.	

PILOT'S OPERATING MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description	Date
Rev. 11 (cont)	7-4	Added to text info.	
	9-i	Added Warning.	
	10-1	Added to text info.	
	10-8, 10-9	Added to text info.	
	10-11	Revised para.	
	10-12	Revised para.	
	10-13	Deleted text info.	
Rev. 12 - 761 557 (PR900616)	iv-c	Added Rev. 12 to 761 557 Log of Revisions.	June 16, 1990
	10-8	Revised Oil Requirements. Moved Fuel System to page 10-8a.	
	10-8a	Added page. Revised and moved Fuel System from page 10-8.	
	10-8b	Added page.	
	10-9	Revised Fuel Grade Comparison Chart.	
	10-11	Revised Handling and Servicing (Facts You Should Know).	
	10-13	Revised Required Service and Inspection Periods.	

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GENERAL SPECIFICATIONS

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PERFORMANCE

Published figures are for standard airplanes flown at gross weight under standard conditions at sea level, unless otherwise stated. Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of engine, airplane and equipment, atmospheric conditions and piloting technique. Each performance figure below is subject to the same conditions as on the corresponding performance chart from which it is taken in the Performance Charts Section.

Takeoff Ground Run, no flaps sea level (ft)	850
Takeoff Ground Run, 25° flaps, sea level (ft)	800
Takeoff Distance Over 50-ft Obstacle, no flaps, sea level (ft)	1410
Takeoff Distance Over 50-ft Obstacle, 25° flaps, sea level (ft)	1260
Best Rate of Climb Speed (mph)	100
Rate of Climb (ft per min)	800
Best Angle of Climb Speed, sea level (mph)	90
Max Speed sea level (mph)	161*
Max Speed Optimum Altitude, 6500 ft, 75% power (TAS) (mph)	153*
Service Ceiling (ft)	13,550
Absolute Ceiling (ft)	15,500
Cruise Speed at best power mixture (mph)	
65% power, 9,000 ft	146
55% power, 11,800 ft	138
Range at best power mixture (mi)**	
75% power, 6,500 ft	805
65% power, 9,000 ft	925
55% power, 11,800 ft	990
Cruise Speed at best economy mixture (mph)	
75% power, 6,500 ft	145
65% power, 9,000 ft	138
55% power, 11,800 ft	130
Range at best economy mixture (mi)**	
75% power, 6,500 ft	915
65% power, 9,000 ft	1040
55% power, 11,800 ft	1110
Stalling Speed, flaps down (CAS) (mph)	65
Stalling Speed, flaps up (CAS) (mph)	73
Landing Roll, flaps down, sea level (ft)	1040
Landing Roll Over 50-ft Obstacle, sea level (ft)	1740

*All speeds stated are with optional wheel fairings installed. Subtract 3 mph if wheel fairings are not installed.

**No reserve.

WEIGHTS

Gross Weight (lbs)	3000
Standard Empty Weight (lbs)	1565
Maximum Useful Load (lbs)	1435

POWER PLANT

Engine - Lycoming	O-540-B4B5
Rated Horsepower	235
Rated Speed (rpm)	2575
Bore (inches)	5.125
Stroke (inches)	4.375
Displacement (cubic inches)	541.5
Compression Ratio	7.2:1
Dry Weight (pounds)	395
Propeller - Hartzell	HC-C2YK-1( )F/F8468-4

FUEL

AVGAS ONLY

Usable Fuel Capacity (main tank) (U.S. gal)	48
Usable Fuel Capacity (auxiliary tanks) (U.S. gal)	34
Fuel, Aviation Grade	
Minimum Octane	80/87
Specified Octane	80/87
Alternate Fuels	Refer to Fuel Requirements, Section 10 - Page 10-8

OIL

Oil Capacity (U.S. qts)	12

BAGGAGE

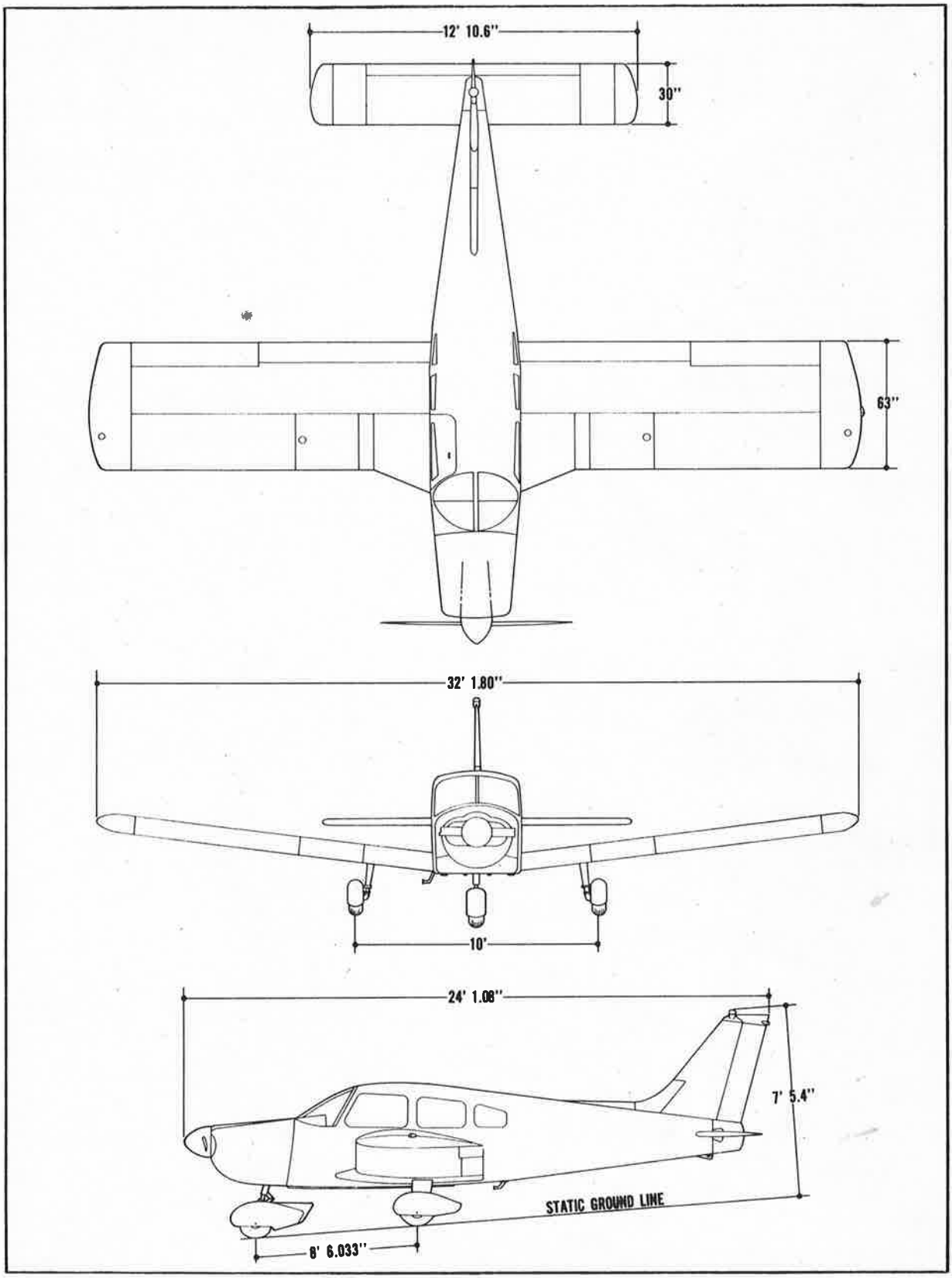
Maximum Baggage (lbs)	200
Baggage Space (cubic ft)	24
Baggage Door Size (in.)	20 x 22

DIMENSIONS

Wing Span (ft)	32.0
Wing Area (sq ft)	170
Wing Loading (lbs per sq ft)	17.6
Length (ft)	24.1
Height (ft)	7.5
Power Loading (lbs per hp)	12.8

LANDING GEAR

Wheel Base (ft)		6.6
Wheel Tread (ft)		10.0
Tire Pressure (lbs)	Nose	28-30
	Main	35-40


12' 10.6"
30"
63"
32' 1.80"
10'
24' 1.08"
7' 5.4"
STATIC GROUND LINE
8' 6.033"

DESCRIPTION
AIRPLANE AND SYSTEMS

DESCRIPTION

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THE AIRPLANE

The PA-28-235 Cherokee is a single-engine, low-wing monoplane of all metal construction. The airplane will comfortably seat four adult passengers. The Cherokee Pathfinder is designed and manufactured as a versatile airplane in the personal and business aviation fields.

AIRFRAME

Except for the tubular steel engine mount, steel gear struts, and some miscellaneous steel parts, all metal structures in the airplane are of **aluminum alloy construction.** The nose cowl, the wing tip tanks, and various other nonstructural components are fiberglass.

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

The **wing airfoil section** is a laminar flow type, NACA 65_2-415 with the maximum thickness about 40% aft of the leading edge. This permits the main spar carry-through structure to be located under the rear seat, providing unobstructed cabin floor space ahead of the rear seat.

ENGINE AND PROPELLER

The Lycoming O-540-B4B5 engine installed in the Cherokee PA-28-235 is rated at 235 horsepower at 2575 rpm. This engine has a compression ratio of 7.2 to 1 and requires 80/87 minimum octane aviation fuel. The engine is equipped with a geared starter, a 60 ampere alternator, dual magnetos, shielded ignition system, vacuum pump drive, a diaphragm-type fuel pump and a float carburetor.

Exhaust gases are carried through a heavy gauge stainless steel system which incorporates two heater shrouds, one for cabin heat and the other for carburetor deicing.

The **propeller** used on the PA-28-235 is a Hartzell HC-C2YK-1( )F/F8468-4 constant speed propeller. The Hartzell propeller is 80 inches in diameter, and is controlled by a Hartzell F-4-3 governor mounted on a pad on the forward end of the crankcase. This governor supplies oil to the propeller through the engine shaft. The governor is controlled by a cable from the cockpit.

The two-piece cowling on the Cherokee is designed to cool the engine in all normal flight conditions, including protracted climb, without the use of cowl flaps or cooling flanges.

The throttle quadrant, located in the lower center instrument panel, contains the throttle, mixture control, and the propeller governor control. A friction lock on the right side of the quadrant prevents creeping of the controls. In addition, the mixture control has a lock* to prevent activation of the mixture control instead of the pitch control. To the right of the quadrant is the carburetor heat control. Maximum carburetor heat is provided with the control in the "ON" position. Air passes through a high-efficiency dry-type filter when the carburetor heat is in the "OFF" position.

LANDING GEAR

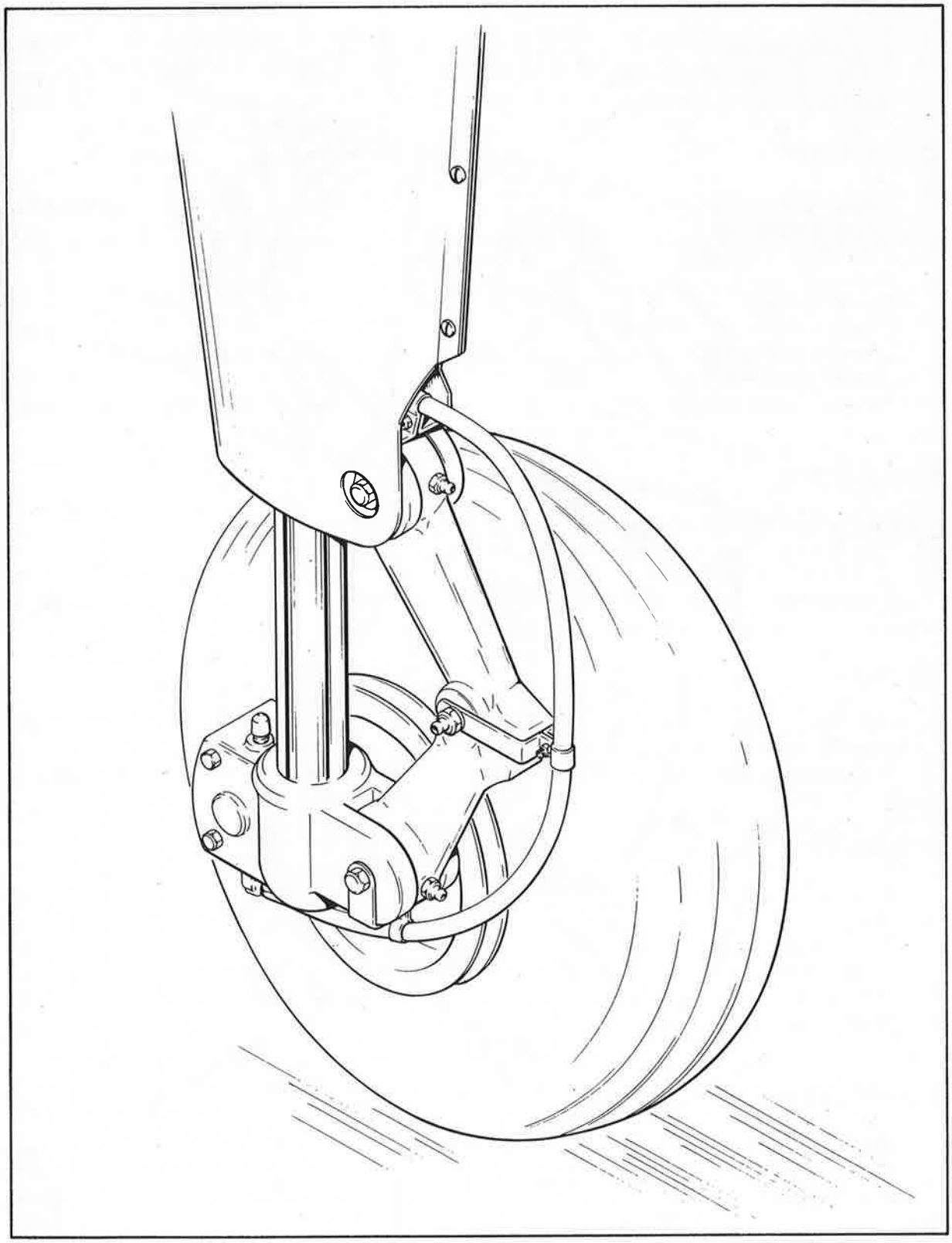
The landing gears use Cleveland 6.00 x 6 wheels, the main wheels being provided with brake drums and single disc hydraulic brakes. The nose wheel carries a 6.00 x 6 four ply rating tire with tubes, while the main gear uses 6.00 x 6 six ply rating tires.

By use of the rudder pedals and brakes the nose gear is steerable through a 30 degree arc each side of neutral. A spring device is incorporated in the rudder pedal torque tube assembly to provide rudder trim. A bungee in the nose gear steering mechanism reduces steering effort and dampens bumps and shocks during taxiing. A shimmy dampener is also included in the nose gear.

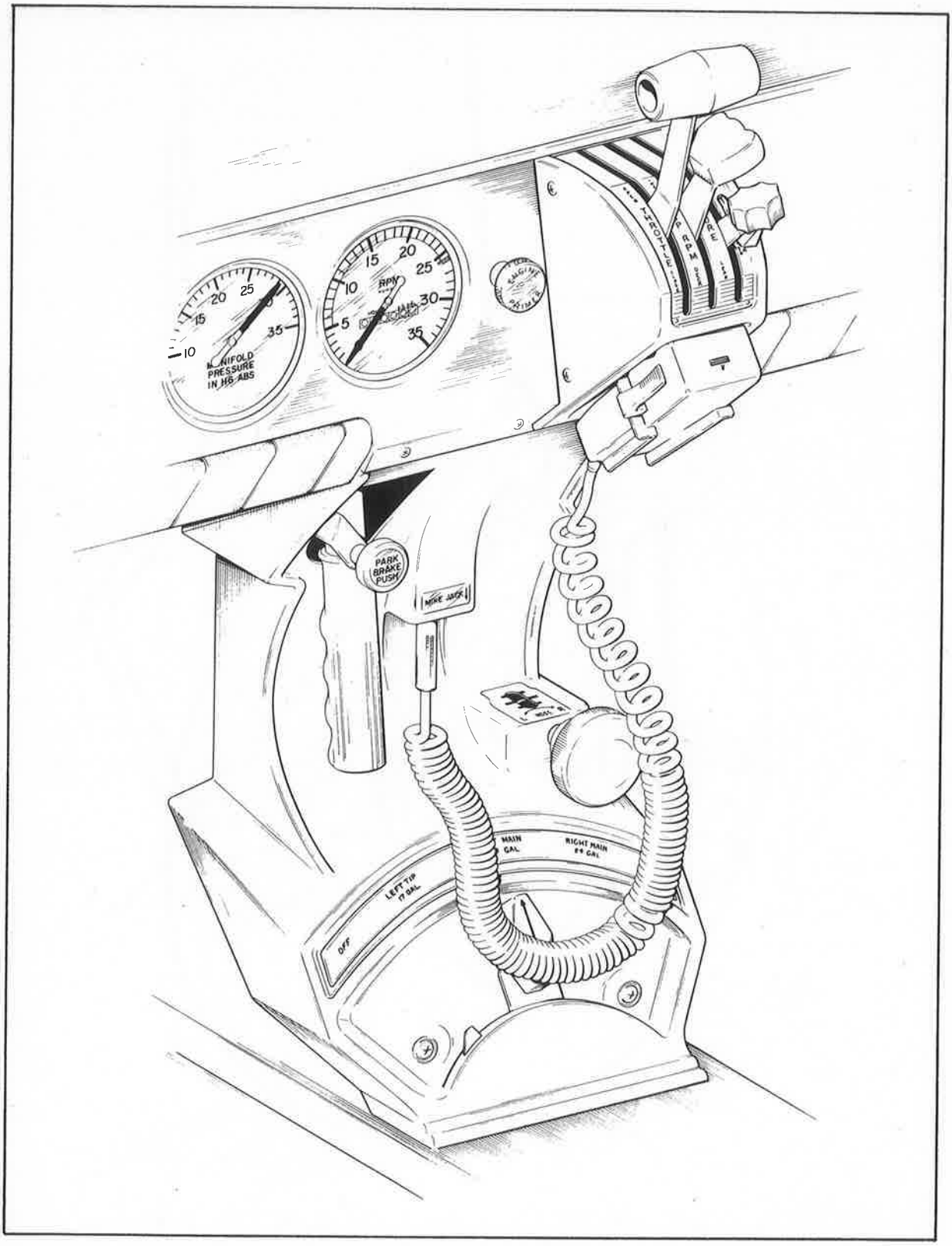
The oleo struts are of the air-oil type, with a normal extension of 3-1/4 inches for the nose gear and 4-1/2 inches for the main gear under normal static load (empty weight of airplane plus full fuel and oil).

The brakes are actuated by a hand lever and master cylinder, which is located below and near the center of the instrument panel. The toe brakes and the lever have their own brake cylinders, but they share a common reservoir. The parking brake is incorporated in the lever brake and is operated by pulling back on the lever and depressing the knob attached to the top of the handle. To release the parking brake, pull back on the brake lever to disengage the catch mechanism; then allow the handle to swing forward.

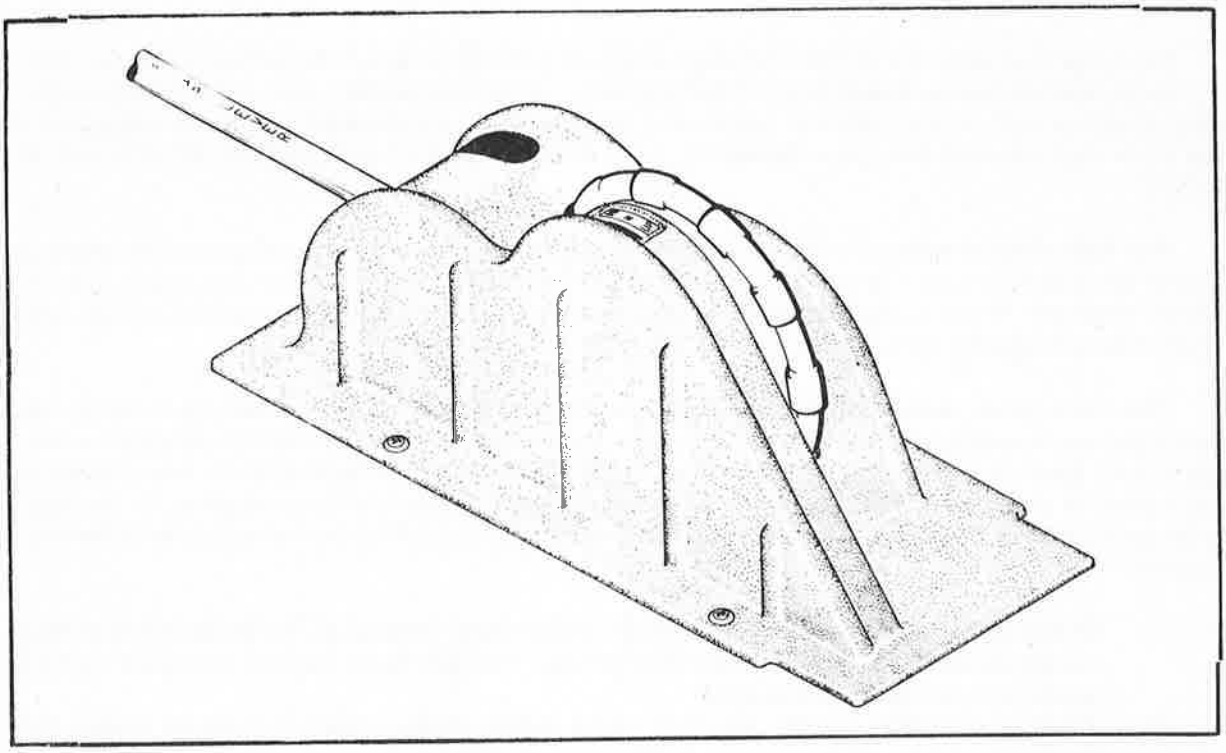
*Serial nos. 7510001 and up



Main Wheel Assembly



Throttle Quadrant and Console



Console

FLIGHT CONTROLS

Dual controls are provided as standard equipment, with a cable system used between the controls and the surfaces. The horizontal tail is of the all-movable slab type, **with an anti-servo** tab which also acts as a longitudinal trim tab, actuated by a control mounted on the control tunnel between the two front seats. The **stabilator** provides extra stability and controllability with less size, drag and weight than conventional tail surfaces. The **ailerons** are provided with a differential action which tends to eliminate adverse yaw in turning maneuvers and to reduce the amount of coordination required in normal turns.

The **flaps** are manually operated, balanced for light operating forces and spring-loaded to return to the up position. A past-center lock incorporated in the actuating linkage holds the flap when it is in the up position so that it may be used as a step on the right side. The flap will not support a step load except when in the full up position, so it must be completely retracted when used as a step. **The flaps have three extended positions, 10, 25 and 40 degrees.**

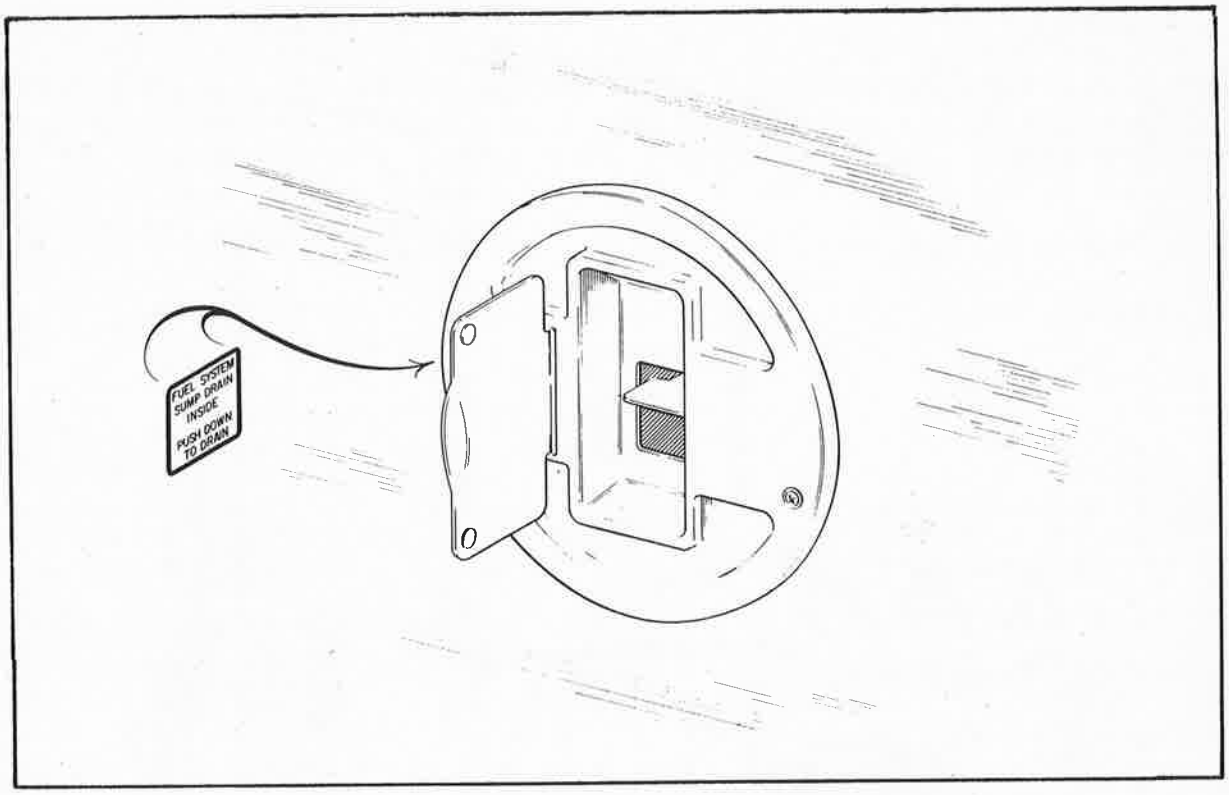
FUEL SYSTEM

Standard fuel capacity of the Cherokee 235 is 84 gallons, of which 82 gallons is usable. The two main inboard tanks, which hold 25 gallons each, 24 gallons usable each, are attached to the wing structure with screws and nut plates and may be easily removed for service or inspection. The resin-impregnated fiberglass **tip tanks** have a capacity of 17 gallons each, all of which is usable.

The **fuel selector control** is located below the center of the instrument panel on the sloping face of the control tunnel. It has five positions corresponding to each of the four tanks, plus an "OFF" position. When using less than the standard 84 gallon capacity of the tanks, fuel should be distributed equally between each side, filling the tip tanks first.

The fuel system should be drained daily prior to first flight and after refueling to avoid the accumulation of water, sediment and to check for proper fuel (a special bottle is furnished for this operation). Each fuel tank is equipped with an individual **quick drain** located at the lower inboard rear corner of the tank. The **fuel strainer** and a **system quick drain** valve are located in the fuselage at the lowest point of the fuel system. It is important that the fuel system be drained in the following manner:

1. Drain each tank through its individual quick drain located at the lower inboard rear corner of the tank, making sure that enough fuel has been drained to ensure that all water and sediment is removed.
2. Place a container under the fuel sump drain outlet, which is located under the fuselage.
3. Drain the fuel strainer by pressing down on the lever located on the right-hand side of the cabin below the forward edge of the rear seat. The fuel selector must be positioned in the following sequence: off position, left tip, left main, right main, and right tip while draining the strainer to ensure that the fuel lines between each tank outlet and fuel strainer are drained as well as the strainer. When the fuel tanks are full, it will take approximately 11 seconds to drain all the fuel in one of the lines between a tip tank and the fuel strainer and approximately six seconds to drain all the fuel in one of the lines from a main tank to the fuel strainer. When the fuel tanks are less than full, it will take a few seconds longer.
4. Examine the contents of the container placed under the quick drain and the fuel sump drain outlet for water, sediment and proper fuel. Then dispose of the contents.



Fuel Drain Lever

CAUTION

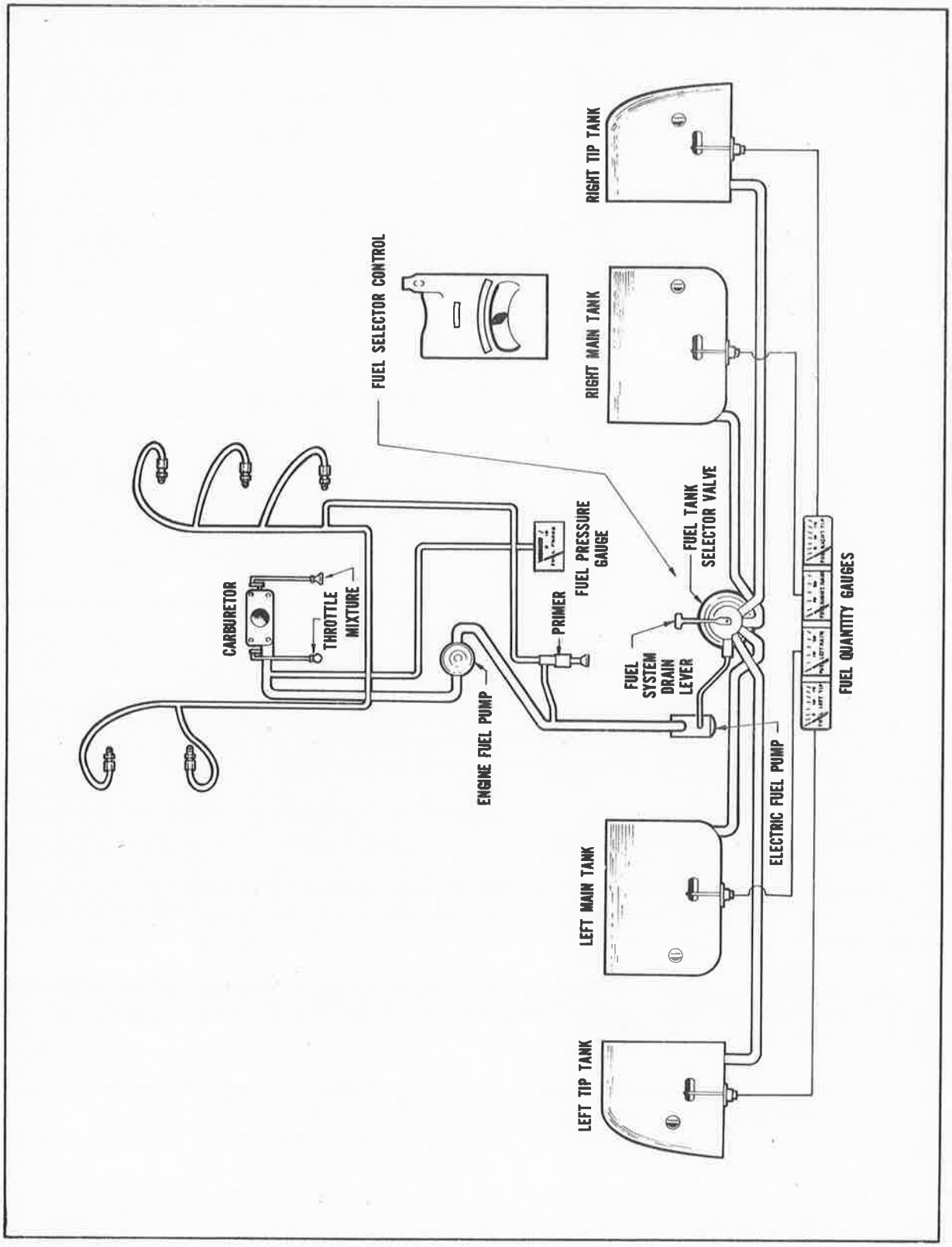
When draining any amount of fuel, care should be taken to ensure that no fire hazard exists before starting engine.

After using the underseat quick drain, it should be checked from outside to make sure it has closed completely and is not leaking.

Fuel quantity gauges for each of the four tanks are located in the engine gauge cluster on the left side of the instrument panel. A fuel pressure indicator is also incorporated in the engine gauge cluster.

An **electric fuel pump** is provided for use in case of failure of the engine driven pump. The electric pump operates from a single switch and independent circuit protector, and should be ON for all takeoffs and landings.

An optional **engine priming system** is available to facilitate starting. The primer pump is located to the immediate left of the throttle quadrant.



Fuel System Schematic

ELECTRICAL SYSTEM

The **electrical system** includes a 14-volt 60 amp alternator, voltage regulator, overvoltage relay, and master switch relay. The 12-volt battery is mounted in a stainless steel box immediately aft of the baggage compartment. The regulator and overvoltage relay are located on the forward left side of the fuselage behind the instrument panel.

Electrical switches are located on the right center instrument panel, and the circuit breakers are located on the lower right instrument panel. A rheostat switch on the left side of the switch panel controls the navigational lights and the radio lights. The similar switch on the right side controls and dims the panel lights.

Standard electrical accessories include starter, electric fuel pump, stall warning indicator, cigar lighter, and ammeter.

Optional electrical accessories includes navigation, anti-collision, landing, instrument and cabin dome lighting.

The words **"master switch"** used hereafter in this manual indicate both sides of the switch; battery side "BAT" and alternator side "ALT" are to be depressed simultaneously to OFF or ON as directed.

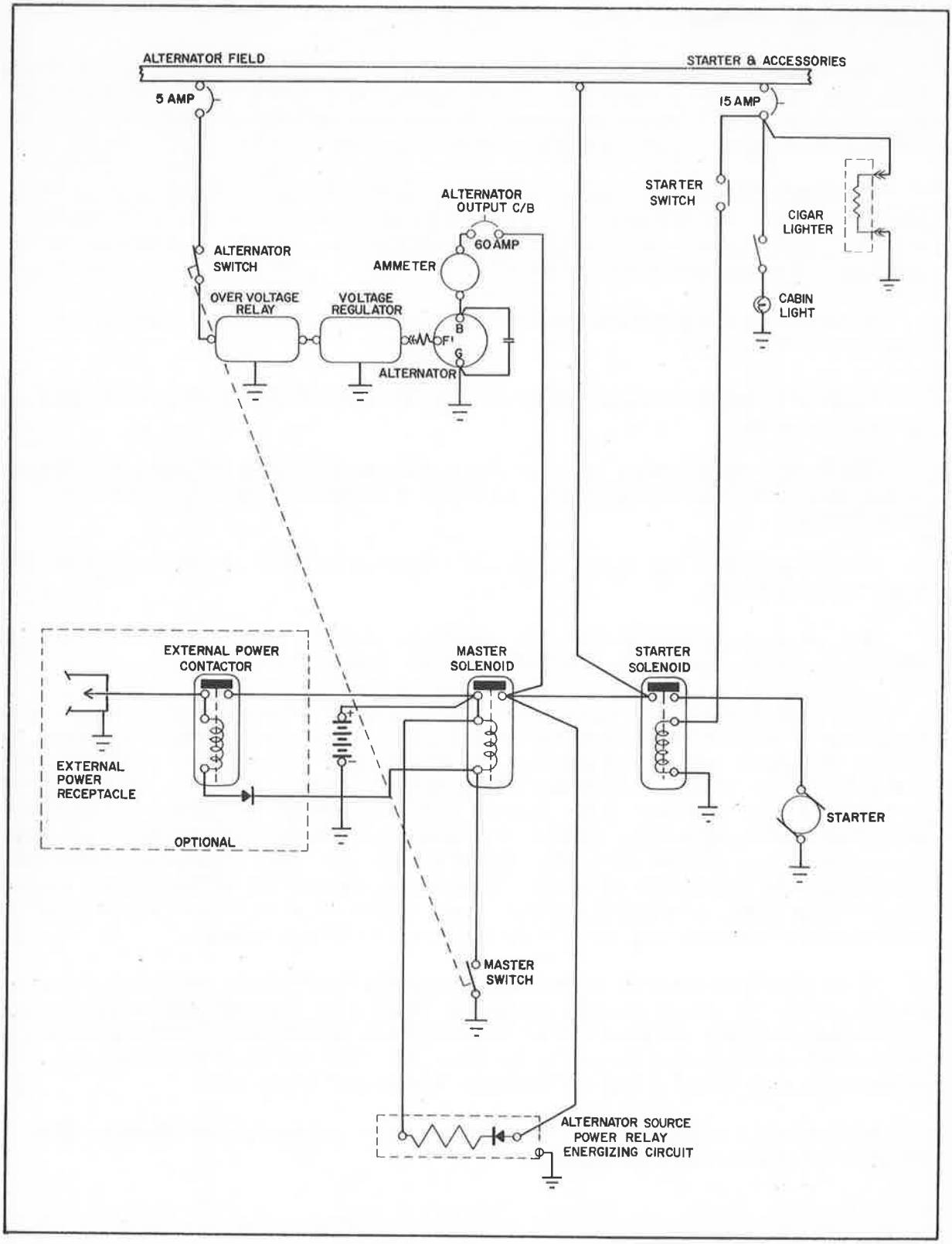
Circuit provisions are made to handle a full complement of communications and navigational equipment.

The **alternator system** offers many advantages over the generator system. The main advantage is full electrical power output at much lower engine RPM.

Unlike previous generator systems, the **ammeter** does not indicate battery discharge; rather it displays in amperes the load placed on the alternator. With all electrical equipment off (except the master switch), the ammeter will be indicating the amount of charging current demanded by the battery. As each item of electrical equipment is turned on, the current will increase to a total appearing on the ammeter. This total includes the battery. The maximum continuous load for night flight, with radios on, is about 30 amperes. This 30 ampere value, plus approximately two amperes for a fully charged battery, will appear continuously under these flight conditions. The amount of current shown on the ammeter will tell immediately whether the alternator system is operating normally, as the amount of current shown should equal the total amount of amperes being drawn by the equipment which is operating.

If no output is indicated on the ammeter, during flight, reduce the electrical load by turning off all unnecessary electrical equipment. Check both 5 ampere field breaker and 60 ampere output breaker and reset if open. If neither circuit breaker is open, turn off the "ALT" switch for 1 second to reset the overvoltage relay. If ammeter continues to indicate no output, maintain minimum electrical load and terminate flight as soon as practical.

Maintenance on the alternator should prove to be a minor factor. Should service be required, contact the local Piper Dealer.



Alternator - Starter Schematic

PITOT-STATIC SYSTEM

The system supplies both pitot and static pressure for the airspeed indicator, altimeter and vertical speed indicator (when installed).

Pitot and **static** pressure are picked up by the pitot head on the bottom of the left wing. An optional heated pitot head, which alleviates problems with icing or heavy rain, is available. The switch for pitot heat is located on the switch panel above the throttle quadrant.

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

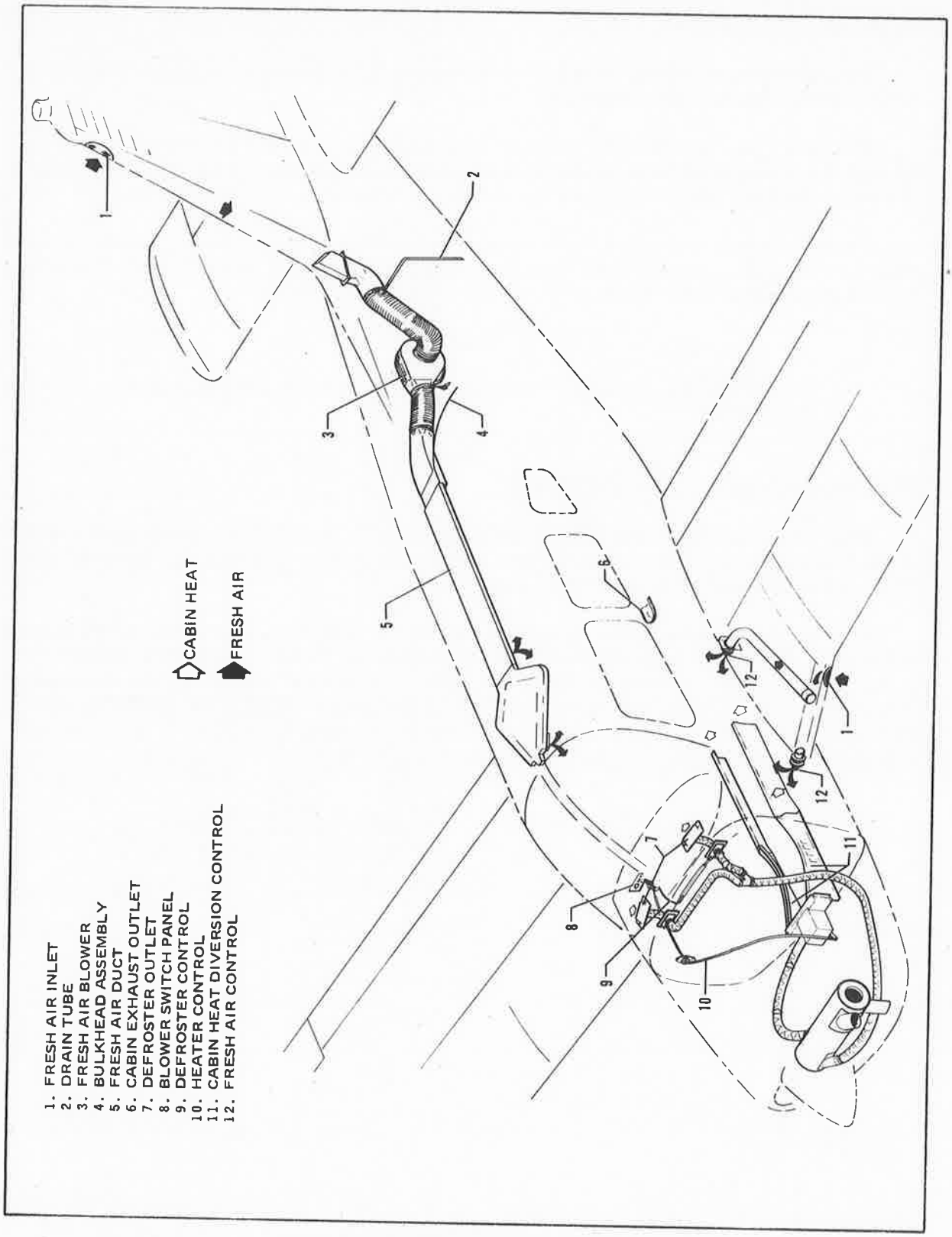
NOTE

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

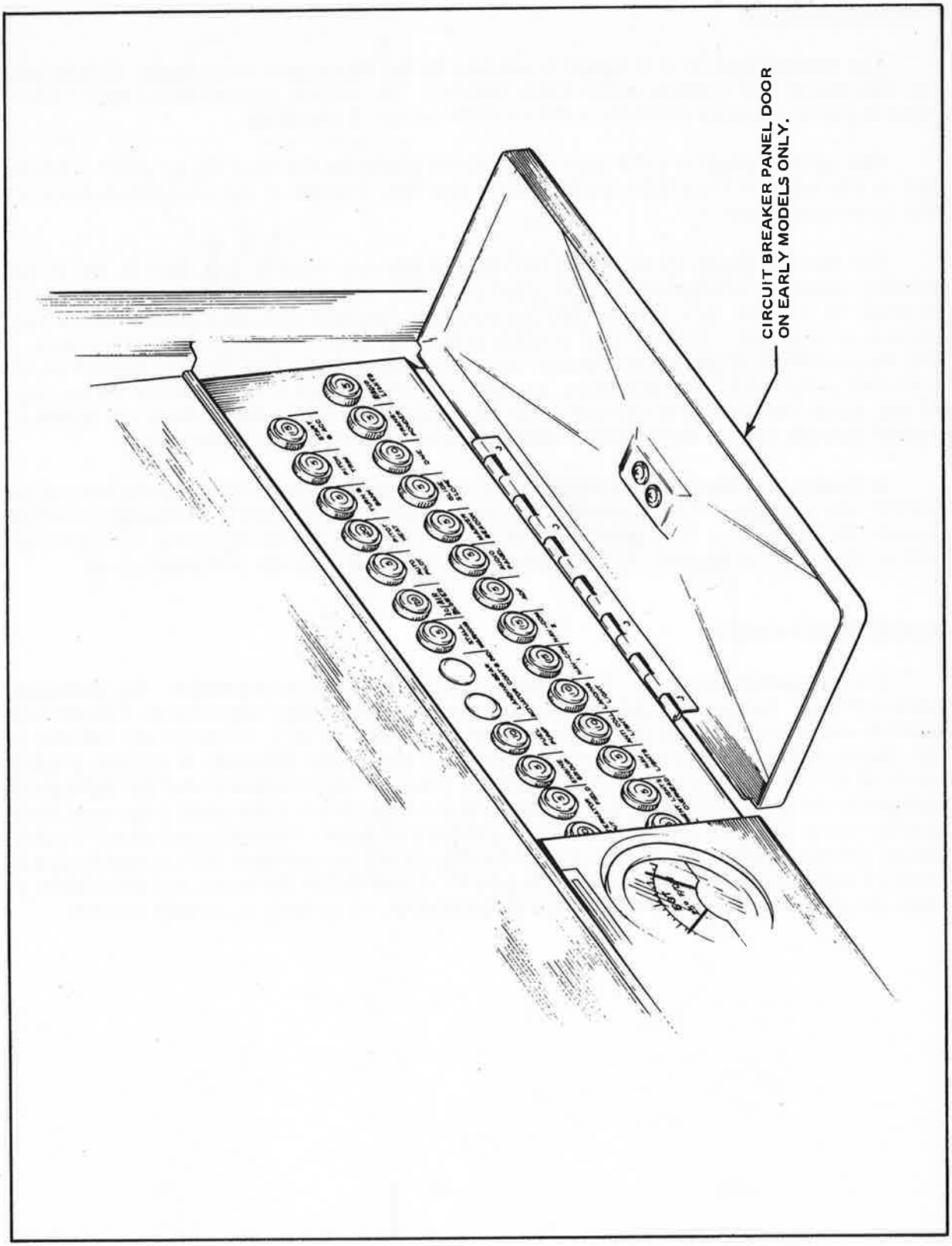
HEATING AND VENTILATING SYSTEM

Heat for the cabin interior and the defroster system is provided by a **heater muff** attached to the exhaust system. The amount of heat desired can be regulated with the controls located on the lower right side of the instrument panel.

Fresh **air inlets** are located in the leading edge of the wing at the intersection of the tapered and straight sections. A large adjustable outlet is located on the side of the cabin near the floor at each seat location; overhead air outlets are offered as optional equipment. Air is exhausted through an outlet under the rear seat. A **cabin air blower,** incorporated in the ventilating system, is also available as optional equipment. This blower is operated by a "FAN" switch with 4 positions - "OFF," "LOW," "MED," or "HIGH."



Heat, Defrost and Ventilating System



Circuit Breaker Panel

VACUUM SYSTEM

The vacuum system is designed to operate the air driven gyro instruments. This includes the directional and attitude gyros when installed. The system consists of an engine driven vacuum pump, a vacuum regulator, a filter and the necessary plumbing.

The **vacuum pump** is a dry type pump which eliminates the need for an air/oil separator and its plumbing. A shear drive protects the pump from damage. If the drive shears, the gyros will become inoperative.

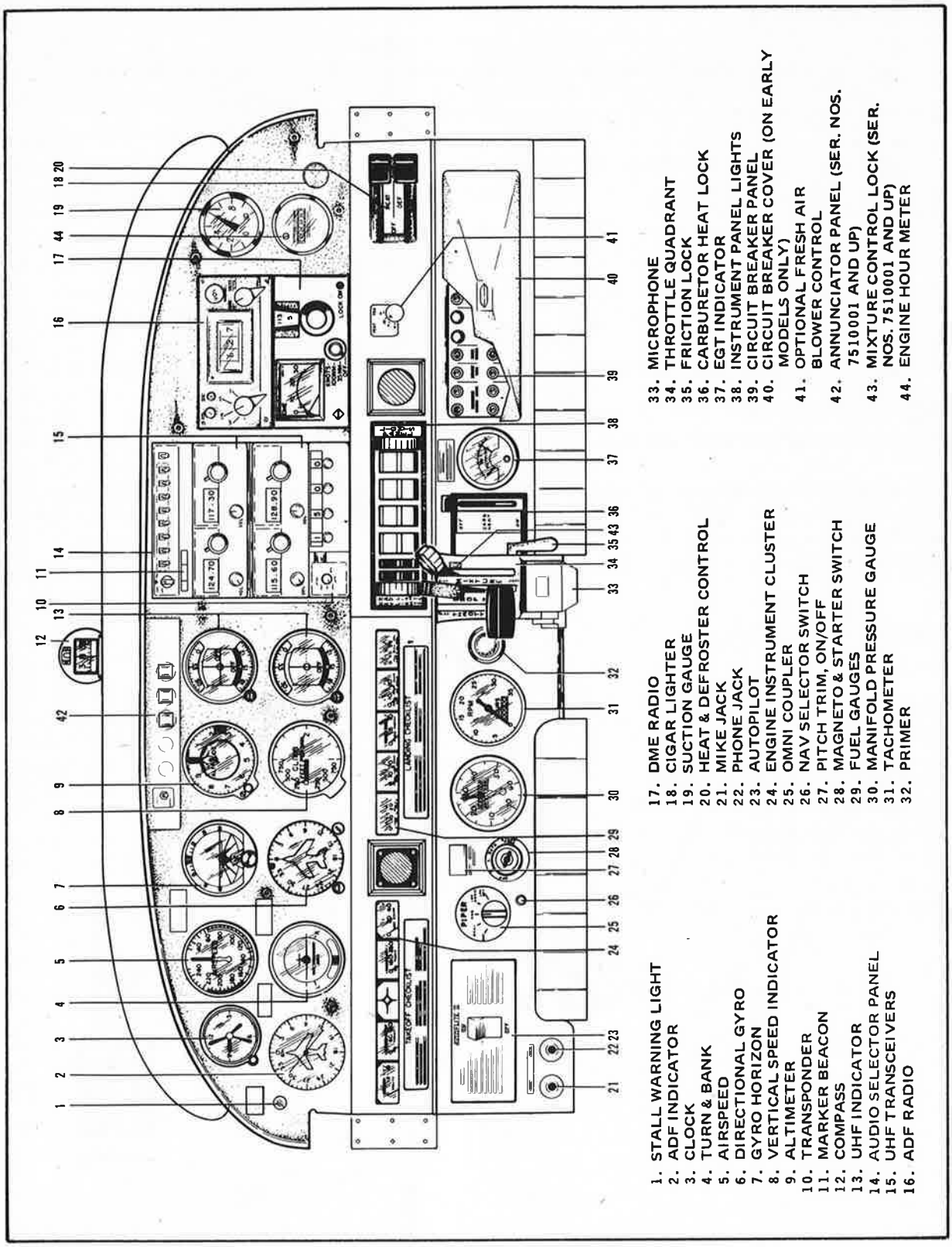
The **vacuum gauge**, mounted on the right instrument panel to the right of the radios, provides valuable information to the pilot about the operation of the vacuum system. A decrease in pressure in a system that has remained constant over an extended period may indicate a dirty filter, dirty screens, possibly a sticking vacuum regulator or leak in system (a low vacuum indicator light is provided in the annunciator panel*). Zero pressure would indicate a sheared pump drive, defective pump, possibly a defective gauge or collapsed line. In the event of any gauge variation from the norm, the pilot should have a mechanic check the system to prevent possible damage to the system components or eventual failure of the system.

A **vacuum regulator** is provided in the system to protect the gyros. The valve is set so the normal vacuum reads 5.0 ± .1 inches of mercury, a setting which provides sufficient vacuum to operate all the gyros at their rated RPM. Higher settings will damage the gyros and with a low setting the gyros will be unreliable. The regulator is located behind the instrument panel.

INSTRUMENT PANEL

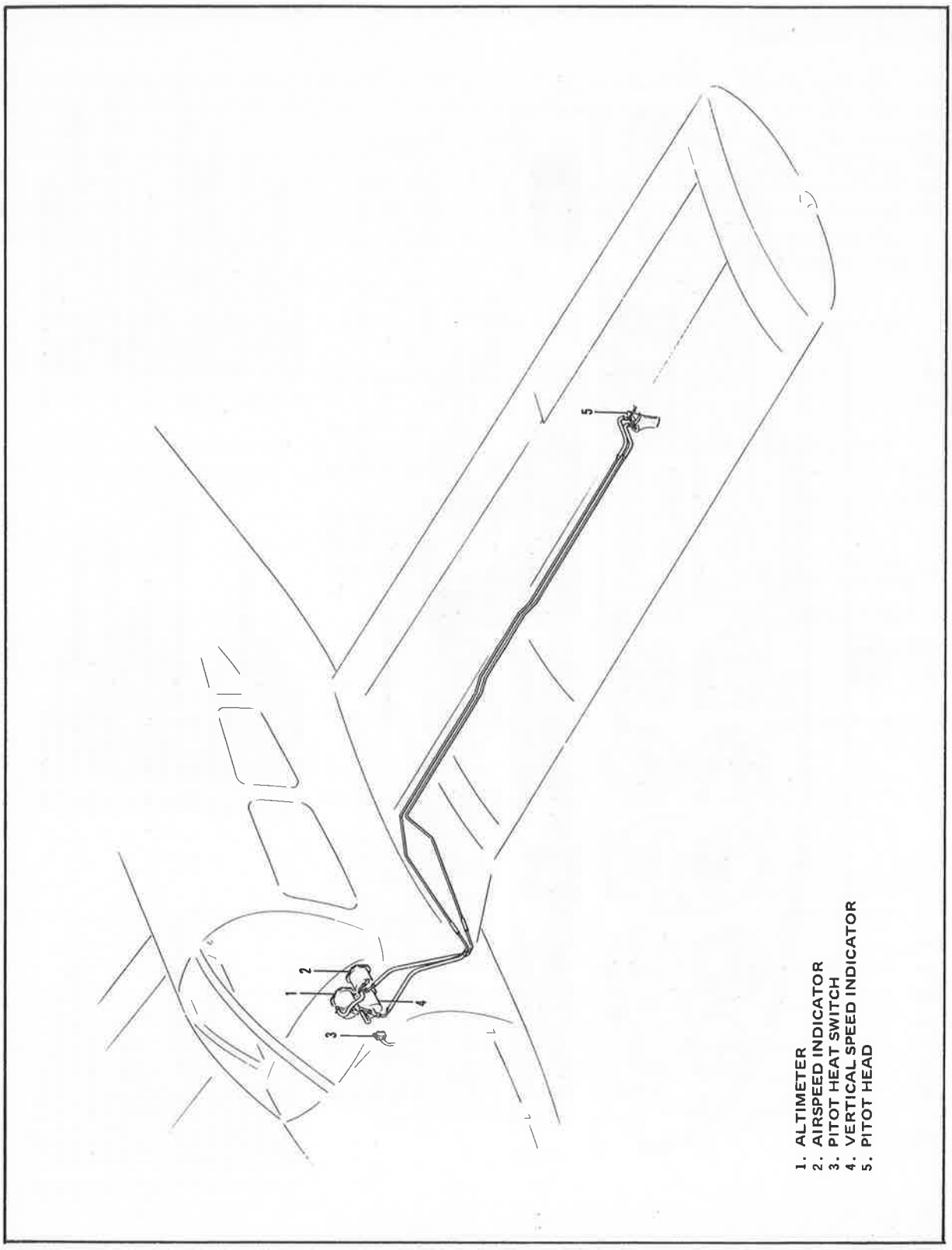
The **instrument panel** of the Cherokee is designed to accommodate the customary advanced flight instruments and the normally required power plant instruments. The artificial horizon and directional gyro are vacuum operated through use of a vacuum pump installed on the engine, while the turn and bank instrument is electrically operated. A vacuum gauge is mounted on the far right side of the instrument panel. A natural separation of the **flight group** and **power group** is provided by the placement of the flight group in the upper instrument panel and the power group in the center and lower instrument panels. The radios and circuit breakers are on the right hand instrument panel, and extra circuits are provided for a complete line of optional radio equipment. An annunciator panel* is mounted in the upper instrument panel to warn the pilot of a possible malfunction in the alternator, oil pressure, or vacuum systems.

*Serial nos. 7510001 and up



1. STALL WARNING LIGHT
2. ADF INDICATOR
3. CLOCK
4. TURN & BANK
5. AIRSPEED
6. DIRECTIONAL GYRO
7. GYRO HORIZON
8. VERTICAL SPEED INDICATOR
9. ALTIMETER
10. TRANSPONDER
11. MARKER BEACON
12. COMPASS
13. UHF INDICATOR
14. AUDIO SELECTOR PANEL
15. UHF TRANSCEIVERS
16. ADF RADIO
17. DME RADIO
18. CIGAR LIGHTER
19. SUCTION GAUGE
20. HEAT & DEFROSTER CONTROL
21. MIKE JACK
22. PHONE JACK
23. AUTOPILOT
24. ENGINE INSTRUMENT CLUSTER
25. OMNI COUPLER
26. NAV SELECTOR SWITCH
27. PITCH TRIM, ON/OFF
28. MAGNETO & STARTER SWITCH
29. FUEL GAUGES
30. MANIFOLD PRESSURE GAUGE
31. TACHOMETER
32. PRIMER
33. MICROPHONE
34. THROTTLE QUADRANT
35. FRICTION LOCK
36. CARBURETOR HEAT LOCK
37. EGT INDICATOR
38. INSTRUMENT PANEL LIGHTS
39. CIRCUIT BREAKER PANEL
40. CIRCUIT BREAKER COVER (ON EARLY MODELS ONLY)
41. OPTIONAL FRESH AIR BLOWER CONTROL
42. ANNUNCIATOR PANEL (SER. NOS. 7510001 AND UP)
43. MIXTURE CONTROL LOCK (SER. NOS. 7510001 AND UP)
44. ENGINE HOUR METER

Instrument Panel



Pitot - Static System

CABIN FEATURES

For ease of entry and exit and pilot-passenger comfort, the front seats are adjustable fore and aft. All seats recline and are available with optional headrests. Armrests are also provided for the front seats which can also be equipped with optional vertical adjustment. The rear seats are adjustable one inch fore and aft by raising the rear of the seat and placing pins in alternate sockets. The rear seats are easily removed to provide room for bulky items. Some rear seat installations incorporate leg retainers with latching mechanisms which must be released before the rear seats can be removed. Releasing the retainers is easily accomplished by turning the latching mechanisms 90° with a coin or screwdriver.

A single strap **shoulder harness** controlled by an **inertia reel** is standard equipment for the front seats, and is offered as an option for the rear seats. The shoulder strap is routed over the shoulder adjacent to the windows and attached to the lap belt in the general area of the person's inboard hip.

A check of the inertia reel mechanism is made by pulling sharply on the strap. The reel will lock in place under this test and prevent the strap from extending. Under normal movement the strap will extend and retract as required.

BAGGAGE AREA

A 24 cubic foot baggage area, located behind the rear seats, is accessible either from the cabin or through a large 20 x 22 inch outside baggage door on the right side of the aircraft. Maximum capacity is 200 pounds. Tie-down straps are provided and should be used at all times.

NOTE

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

STALL WARNING

An approaching stall is indicated by a stall warning indicator which is activated between five and ten miles per hour above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall. Stall speeds are shown on graphs in the Performance Charts Section. The stall warning indicator is a red warning light on the left side of the instrument panel on earlier models and a continuous sounding horn located behind the instrument panel on later models. The stall warning indicator is activated by a lift detector installed on the leading edge of the left wing. During preflight, the stall warning system should be checked by turning the master switch "ON," lifting the detector and checking to determine if the indicator is actuated.

FINISH

All exterior surfaces are primed with etching primer and finished with a durable acrylic lacquer in a variety of tasteful colors to suit individual owners.

PIPER EXTERNAL POWER*

An optional starting installation known as Piper External Power (PEP) is accessible through a receptacle located on the right side of the fuselage aft of the wing. An external battery can be connected to the socket, thus allowing the operator to crank the engine without having to gain access to the airplane's battery.

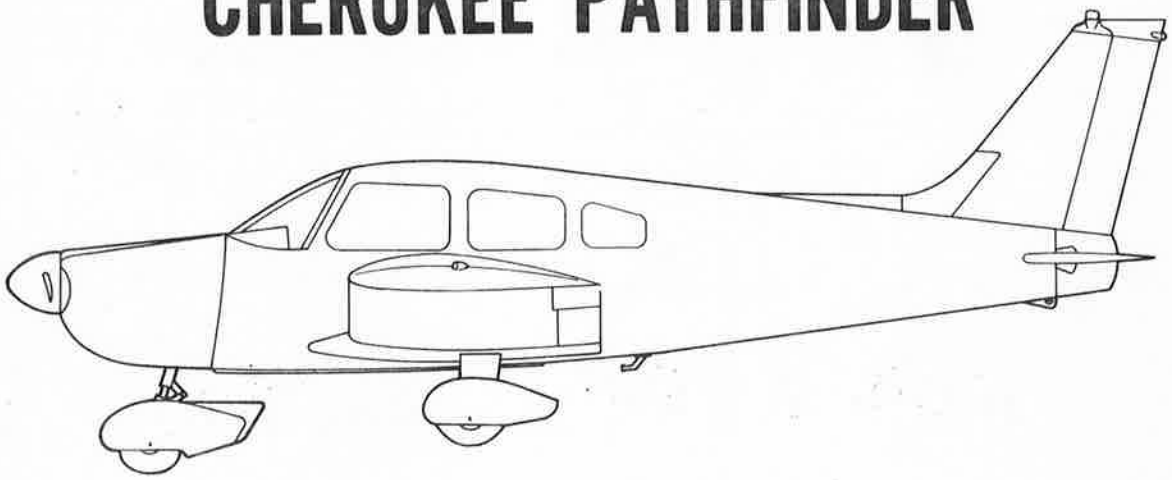
*Optional equipment

AIRPLANE FLIGHT MANUAL
F.A.A. APPROVED

AIRPLANE FLIGHT MANUAL

FOR

CHEROKEE PATHFINDER



NOTE

THIS MANUAL MUST BE KEPT IN THE AIRPLANE AT ALL TIMES

MANUFACTURER'S MODEL PA-28-235

MANUFACTURER'S SERIAL 28- 7410049

REGISTRATION - N 40801

FAA APPROVED BY: H. W. Barnhouse

H. W. BARNHOUSE
PIPER AIRCRAFT CORPORATION
D. O. A. No. SO–1
VERO BEACH, FLORIDA

DATE OF APPROVAL: MAY 14, 1973

APPROVAL BASIS: CAR 3

REPORT: VB-559
MODEL: PA-28-235

AIRPLANE FLIGHT MANUAL

TABLE OF CONTENTS

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AIRPLANE FLIGHT MANUAL LOG OF REVISIONS

Revision	Revised Pages	Description and Revision	FAA Approved Date
1	Title	Added PAC Approval Form. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	D. H. Trompler June 3, 1974
2	3-i	Added Item D. (Installation of Piper Auto-Control IIIB) to Supplements.	
	3-9	Added Item D. (Installation of Piper Auto-Control IIIB).	D. H. Trompler June 12, 1974
	3-15, 3-16, 3-17, 3-18	Added pages (AutoControl IIIB Supplement).	
3	3-9	Changed Section IV title (from Supplements) to Optional Equipment); revised NOTE; deleted item A. (AutoControl III); revised existing item letters.	
	3-11	Deleted item A. (AutoControl III).	
	3-12	Revised item letter (B to A); deleted with Pitch Trim Swith from title.	
	3-13	Revised item letter (C to B).	
	3-15	Revised item letter (D to C); added Auto Control III to item title.	Ward Evans Ward Evans July 11, 1975
	3-18	Removed IIIB designation from items c.1. and c.2.	
4	3-18	Revised item c. (1).	Ward Evans Ward Evans Dec. 2, 1975
5	3-1	Revised item b. Fuel.	Ward Evans Ward Evans April 23, 1976
6	Title	Added serial no. applicability. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	Ward Evans Ward Evans June 13, 1980

AIRPLANE FLIGHT MANUAL LOG OF REVISIONS (cont)

Revision	Revised Pages	Description and Revision	FAA Approved Date
7	3-1 3-5	Added to item B. Revised procedure.	Ward Evans Ward Evans March 20, 1984

REVISIONS

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

Revision material will consist of information necessary to update the text of the present manual and/or add information to cover added airplane equipment.

I. Revisions

Revisions will be distributed whenever necessary as complete page replacements or additions and shall be inserted into the manual in accordance with the instructions given below:

1. Revision pages will replace only pages with the same page number.
2. Insert all additional pages in proper numerical order within each section.
3. Page numbers followed by a small letter shall be inserted in direct sequence with the same common numbered page.

II. Identification of Revised Material

Revised text and illustrations shall be indicated by a black vertical line along the left hand margin of the page, opposite revised, added or deleted material. A line opposite the page number or section title and printing date, will indicate that the text or illustration was unchanged but material was relocated to a different page or that an entire page was added.

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

PILOT'S OPERATING MANUAL LOG OF REVISIONS

Current Revisions to the PA-28-235 Cherokee Pathfinder Pilot's Operating Manual, 761 557, issued July 10, 1973

Revision	Revised Pages	Description	Date
Rev. 1 - 761 557 (PR731109)	2-9 4-7 W/B 7-i 7-8 7-9 7-10 8-1	Revised Overvoltage Relay Reset Time. Revised Alternator Failure Item 3. Added Rev. 1 to Report: VB-548. Added Airspeed Data Added Airspeed Data; Relocated E.L.T. Added E.L.T. Added Page. Revised Item 6.	Nov. 9, 1973

SECTION I

LIMITATIONS

The following limitations must be observed in the operation of this airplane:

A. ENGINE
Lycoming O-540-B4B5

ENGINE LIMITS
For all operations 2575 RPM, 235 HP

B. FUEL (AVGAS ONLY)
80/87 minimum octane aviation fuel

C. PROPELLER
Hartzell HC-C2YK-1( )F/F8468A-4, pitch: high 27 degrees ± 2 degrees, low 13.5 degrees ± .2 degrees at 30" station, maximum diameter 80 inches, minimum diameter 80 inches.

D. POWER INSTRUMENTS

OIL TEMPERATURE	
Green Arc (Normal Operating Range)	75°F to 245°F
Red Line (Maximum)	245°F
OIL PRESSURE	
Green Arc (Normal Operating Range)	60 PSI to 90 PSI
Yellow Arc (Caution Range)	25 PSI to 60 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	90 PSI
FUEL PRESSURE	
Green Arc (Normal Operating Range)	.5 PSI to 8 PSI
Red Line (Minimum)	.5 PSI
Red Line (Maximum)	8 PSI
TACHOMETER	
Green Arc (Normal Operating Range)	500 to 2575 RPM
Red Line (Maximum Continuous Power)	2575 RPM

E. AIRSPEED LIMITATIONS AND AIRSPEED INSTRUMENT MARKINGS (Calibrated Airspeed)

NEVER EXCEED	197 MPH
MAXIMUM STRUCTURAL CRUISE	156 MPH
MANEUVERING	138 MPH
FLAPS EXTENDED	115 MPH
MAXIMUM POSITIVE LOAD FACTOR	3.8
MAXIMUM NEGATIVE LOAD FACTOR	No inverted maneuvers approved

AIRSPEED INSTRUMENT MARKINGS

Red Radial Line (Never Exceed)	197 MPH (171 KTS)
Yellow Arc (Caution Range) (Smooth Air Only)	156 MPH to 197 MPH (136 KTS to 171 KTS)
Green Arc (Normal Operating Range)	73 MPH to 156 MPH (62 KTS to 136 KTS)
White Arc (Flaps Down Range)	65 MPH to 115 MPH (57 KTS to 100 KTS)

F. MAXIMUM WEIGHT 3000 LBS

G. C. G. RANGE

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

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
3000	88.0	91.5
2500	82.0	91.5
1900	79.0	91.5

Straight line variation between points given.

NOTE

It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. See Weight and Balance Section for proper loading instructions.

H. MANEUVERS

No acrobatic maneuvers, including spins, approved.

I. PLACARDS
In full view of the pilot:

1 "THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS. NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED."

2 Adjacent to upper door latch:

"ENGAGE LATCH BEFORE FLIGHT."

3 On the inside of the baggage compartment door:

"MAXIMUM BAGGAGE 200 LBS"

4 On the instrument panel in full view of the pilot:

"ROUGH AIR OR MANEUVERING SPEED 138 MPH."

5 On the instrument panel in full view of the pilot when the AutoFlite II is installed:

"TURN AUTOFLITE ON. ADJUST TRIM KNOB FOR MINIMUM HEADING CHANGE. FOR HEADING CHANGE, PRESS DISENGAGE SWITCH ON CONTROL WHEEL, CHANGE HEADING, RELEASE SWITCH. ROTATE TURN KNOB FOR TURN COMMANDS. PUSH TURN KNOB IN TO ENGAGE TRACKER. PUSH TRIM KNOB IN FOR HI SENSITIVITY. LIMITATIONS AUTOFLITE OFF FOR TAKEOFF AND LANDING."

6 On the instrument panel in full view of the pilot when the supplementary white strobe lights are installed:

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

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SECTION II

PROCEDURES

1. The stall warning system is inoperative with the master switch off.

2. Electric fuel pump must be on for both landing and takeoff.

3. Except as noted above, all operating procedures for this airplane are normal.

4. Fuel System Preflight Procedure:

The fuel system should be drained daily prior to first flight and after refueling to avoid the accumulation of water, sediment and to check for proper fuel. (a special bottle is furnished for this operation.) Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer and a system quick drain valve are located in the fuselage at the lowest point of the fuel system. It is important that the fuel system be drained in the following manner:

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

b. Place a container under the fuel sump drain outlet, which is located under the fuselage.

c. Drain the fuel strainer by pressing down on the lever located on the right hand side of the cabin below the forward edge of the rear seat. The fuel selector must be positioned in the following sequence: off position, left tip, left main, right main, and right tip while draining the strainer to insure that the fuel lines between each tank outlet and fuel strainer are drained as well as the strainer. When the fuel tanks are full, it will take approximately 11 seconds to drain all the fuel in one of the lines between a tip tank and the fuel strainer and approximately six seconds to drain all the fuel in one of the lines from a main tank to the fuel strainer. When the fuel tanks are less than full, it will take a few seconds longer.

d. Examine the contents of the container placed under the quick drain and the fuel sump drain outlet for water, sediment and proper fuel. Then dispose of the contents.

CAUTION

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

After using the under-seat quick drain, it should be checked from outside to make sure it has closed completely and is not leaking.

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SECTION III

PERFORMANCE

All performance is given for a weight of 3000 pounds.

Loss of altitude during stalls can be as great as 350 feet, depending on configuration and power.

Stalling speed, in mph vs. angle of bank (Calibrated Airspeed):

Angle of Bank	0°	20°	40°	50°	60°
Flaps Up	73	75	83	91	103
Flaps Down	65	–	–	–	–

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SECTION IV

OPTIONAL EQUIPMENT

NOTE

THE INFORMATION CONTAINED IN THIS SECTION APPLIES WHEN THE RELATED EQUIPMENT IS INSTALLED IN THE AIRCRAFT.

A. Electric Pitch Trim Installation

B. AutoFlite II Installation

C. Installation of Piper AutoControl III and/or AutoControl IIIB

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A. ELECTRIC PITCH TRIM INSTALLATION

The following emergency information applies in case of electric pitch trim malfunction:

1. In case of malfunction, disengage electric pitch trim by pushing pitch trim switch on instrument panel to OFF position.

2. In an emergency, electric pitch trim may be overpowered using manual pitch trim.

3. In cruise configuration, malfunction results in 10° pitch change and 200 ft altitude variation.

4. In approach configuration, malfunction results in 5° pitch change and 50 ft altitude loss.

B. AUTOFLITE II INSTALLATION

1. LIMITATIONS

AutoFlite off for takeoff and landing.
AutoFlite use prohibited above 180 mph CAS.

2. PROCEDURES

a. Normal Operation

Refer to Manufacturer's Operation Manual.

b. Emergency Operation

(1) In case of malfunction, PRESS disconnect switch on pilot's control wheel.
(2) Rocker switch on instrument panel - OFF.
(3) Unit may be overpowered manually.
(4) In cruise configuration malfunction, 3 seconds delay results in 60° bank, and 190 ft altitude loss.
(5) In approach configuration malfunction, 1 second delay results in 15° bank and 40 ft altitude loss.

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C. INSTALLATION OF PIPER AUTOCONTROL III AND/OR AUTOCONTROL IIIB

1. LIMITATIONS
   a. Autopilot OFF during takeoff and landing.
   b. Autopilot use prohibited above 180 MPH CAS.

2. PROCEDURES
   a. PREFLIGHT
      (1) Roll Section
         (a) Place Radio Coupler in "Heading" mode and place A/P ON/OFF switch in the "ON" position to engage roll section. Rotate roll command knob Left and Right and observe control wheel describes a corresponding Left and Right turn, then center knob.
         (b) Set proper D.G. Heading on D.G. and turn Heading Indice to aircraft heading. Engage "Heading" mode switch and rotate Heading Indice right and left. Aircraft control wheel should turn same direction as Indice. While D.G. indice is set for a left turn, grasp control wheel and override the servo to the right. Repeat in opposite direction for right turn.
         (c) If VOR signal available check Omni mode on Radio Coupler by swinging Omni needle left and right slowly. Observe that control wheel rotates in direction of needle movement.
         (d) Disengage by placing the A/P ON/OFF switch to the "OFF" position.

   b. IN-FLIGHT
      (1) Trim airplane (ball centered).
      (2) Check air pressure or vacuum to ascertain that the Directional Gyro and Attitude Gyro are receiving sufficient air.
      (3) Roll Section
         (a) To engage, center Roll Command Knob, place the A/P ON/OFF switch to the "ON" position. To turn rotate roll command knob in desired direction. (Maximum angle of bank should not exceed 30°.)
         (b) For heading mode, set Directional Gyro with Magnetic Compass. Push directional gyro HDG knob in, rotate to aircraft heading. Place the console HDG ON/OFF switch to the "ON" position. To select a new aircraft heading, push D.G. heading knob IN and rotate, in desired direction of turn, to the desired heading.

NOTE

In HDG mode the maximum bank angles are limited to approximately 20° and single command, heading changes should be limited to 150°. (HDG Indice not more than 150° from actual aircraft heading.)

(4) VOR

(a) To Intercept:

1. Using OMNI Bearing Selector, dial desired course, inbound or outbound.
2. Set identical heading on Course Selector D.G.
3. After aircraft has stabilized, position coupler mode selector knob to OMNI mode. As aircraft nears selected radial, interception and crosswind correction will be automatically accomplished without further switching.

NOTE

If aircraft position is less than 45° from selected radial, aircraft will intercept before station. If position is more than 45°, interception will occur after station passage. As the aircraft nears the OMNI station, (1/2 mile) the zone of confusion will direct an "S" turn in alternate directions as the OMNI indicator needle swings. This alternate banking limited to the standard D.G. bank angle, is an indication of station passage.

(b) To select new course:

1. To select a new course or radial, rotate the HDG indice to the desired HDG (match course).
2. Rotate OBS to the new course. Aircraft will automatically turn to the intercept heading for the new course.

(c) To change stations:

1. If same course is desired, merely tune receiver to new station frequency.
2. If different course is desired, position coupler mode selector to HDG mode. Dial course selector D.G. to new course. Dial OBS to new course and position coupler mode selector to OMNI mode.

(5) VOR Approach

Track inbound to station as described in VOR navigation section. After station passage:

(a) Dial outbound course on Course Selector D.G., then dial same course on OBS.

(b) After established on outbound radial, position coupler mode selector to HDG mode and select outbound procedure turn heading. After 40 seconds to 1 minute select a turn in the desired direction with the Course Selector D.G. to the inbound procedure turn heading.

(c) Set OBS to inbound course.

(d) When aircraft heading is 45° to the inbound course, dial Course Selector D.G. to inbound course and position coupler mode selector to OMNI mode.

NOTE

For precise tracking over OMNI station, without "S" turn, position coupler mode selector to HDG mode just prior to station passage. If holding pattern is desired, position coupler mode selector to HDG mode at station passage inbound and select outbound heading in direction of turn. After elapsed time, dial inbound course on Course Selector D.G. When aircraft heading is 45° to radial, position coupler mode selector to OMNI mode.

(6) LOC Approach Only
   (a) To intercept dial ILS outbound course on Course Selector D.G. When stabilized, position coupler mode selector to LOC REV mode.
   (b) After interception and when beyond outer marker, position coupler mode selector to HDG mode and dial outbound procedure turn heading. After one minute, dial inbound procedure turn heading in direction of turn.
   (c) When aircraft heading is 45° to ILS inbound course dial inbound course on Course Selector D.G. and position coupler mode selector to LOC NORM mode.
   (d) At the missed approach point (M.A.P.), or when missed approach is elected, position coupler mode selector to HDG mode and execute missed approach procedure.

(7) LOC Approach - Back Course (Reverse)
   (a) To intercept dial ILS Back Course outbound heading on Course Selector D.G. When stabilized, position coupler mode selector to LOC NORM mode.
   (b) After interception and when beyond fix, position coupler mode selector to HDG and dial outbound procedure turn heading. After one minute, dial inbound procedure turn heading in direction of turn.
   (c) When heading 45° to inbound course, dial inbound course on Course Selector D.G. and position coupler mode selector to LOC REV mode.
   (d) Approximately 1/2 mile from runway, position coupler mode selector to HDG mode to prevent "S" turn over ILS station near runway threshold.
   (e) Missed approach - same as Front Course. (See (6) d)

c. EMERGENCY OPERATION

(1) In an emergency the AutoControl can be disconnected by:
   (a) Placing the A/P ON/OFF switch to the "OFF" position.
   (b) Pulling the Autopilot circuit breaker (aircraft with Serial Numbers 28-7610001 and up).

(2) The AutoControl can be overpowered at either control wheel.

(3) An Autopilot runaway, with a 3 second delay in the initiation of recovery, while operating in a climb, cruise or descending flight could result in a 60° bank and 190 foot altitude loss.

(4) An Autopilot runaway, with a 1 second delay in the initiation of recovery, during an approach operation, coupled or uncoupled, could result in a 15° bank and 40 foot altitude loss.

3. PERFORMANCE

No change.

EMERGENCY PROCEDURES

EMERGENCY PROCEDURES

EMERGENCY PROCEDURES

INTRODUCTION

This section contains procedures that are recommended if an emergency condition should occur during ground operation, takeoff, or in flight. These procedures are suggested as the best course of action for coping with the particular condition described, but are not a substitute for sound judgment and common sense. Since emergencies rarely happen in modern aircraft, their occurrence is usually unexpected, and the best corrective action may not always be obvious. 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.

ENGINE POWER LOSS DURING TAKEOFF

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

1. If sufficient runway remains for a normal landing, land straight ahead.
2. If insufficient runway remains, maintain a safe airspeed and make only a shallow turn if necessary to avoid obstructions. Use of flaps depends on circumstances. Normally, flaps should be fully extended for touchdown.
3. If you have gained sufficient altitude to attempt a restart, proceed as follows:
   a. MAINTAIN SAFE AIRSPEED
   b. FUEL SELECTOR - SWITCH TO ANOTHER TANK CONTAINING FUEL
   c. ELECTRIC FUEL PUMP - CHECK ON
   d. MIXTURE - CHECK RICH
   e. CARBURETOR HEAT - ON

NOTE

If engine failure was caused by fuel exhaustion, power will not be regained after tanks are switched until empty fuel lines are filled, which may require up to ten seconds.

If power is not regained, proceed with the POWER OFF LANDING procedure.

ENGINE POWER LOSS IN FLIGHT

Complete engine power loss is usually caused by fuel flow interruption, and power will be restored shortly after fuel flow is restored. If power loss occurs at low altitude, the first step is to prepare for an emergency landing (See POWER OFF LANDING). Maintain an airspeed of at least 95 MPH IAS, and if altitude permits, proceed as follows:

1. Fuel Selector - Switch to another tank containing fuel.
2. Electric Fuel Pump - On
3. Mixture - Rich
4. Carburetor Heat - On
5. Engine Gauges - Check for an indication of the cause of power loss.
6. Primer - Check Locked
7. If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

When power is restored:

8. Carburetor Heat - Off
9. Electric Fuel Pump - Off

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

If time permits:

1. Ignition Switch - "L" then "R" then back to "BOTH."
2. Throttle and Mixture - Different settings. (This may restore power if the problem is too rich or too lean a mixture, or if there is partial fuel system restriction.)
3. Try other fuel tanks. (Water in the fuel could take some time to be used up, and allowing the engine to windmill may restore power. If power loss is due to water, fuel pressure indications will be normal.)

NOTE

If engine failure was caused by fuel exhaustion, power will not be regained after tanks are switched until empty fuel lines are filled, which may require up to ten seconds.

If power is not restored, proceed with POWER OFF LANDING procedure.

POWER OFF LANDING

If loss of power occurs at altitude, trim the aircraft for best gliding angle, 95 MPH IAS, and look for a suitable field. If measures taken to restore power are not effective, and if time permits, check your charts for airports in the immediate vicinity; it may be possible to land at one if you have sufficient altitude. If possible, notify the FAA by radio of your difficulty and intentions. If another pilot or passenger is aboard, let them help.

When you have located a suitable field, establish a spiral pattern around this field. Try to be at 1000 feet above the field at the downwind position to make a normal approach. When the field can easily be reached, slow up to 85 MPH IAS for the shortest landing. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these.

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

When committed to landing:

1. Ignition - Off
2. Master Switch - Off
3. Fuel Selector - Off
4. Mixture - Idle Cut-Off
5. Seat Belt (and harness if available) - Tight

PROPELLER OVERSPEED

Propeller overspeed is caused by a malfunction in the propeller governor, or low oil pressure, which allows the propeller blades to rotate to full low pitch. If this should occur, proceed as follows:

1. THROTTLE - RETARD
2. OIL PRESSURE - CHECK
3. PROPELLER CONTROL - FULL DECREASE RPM, THEN SET IF ANY CONTROL IS AVAILABLE.
4. REDUCE AIRSPEED
5. THROTTLE - AS REQUIRED TO REMAIN BELOW 2575 RPM.

SPINS

Intentional spins are prohibited in this aircraft. If a spin is inadvertently entered, immediately use the following recovery procedures:

1. THROTTLE - IDLE
2. RUDDER - FULL OPPOSITE TO DIRECTION OF ROTATION
3. CONTROL WHEEL - FULL FORWARD
4. RUDDER - NEUTRAL (WHEN ROTATION STOPS)
5. CONTROL WHEEL - AS REQUIRED TO SMOOTHLY REGAIN LEVEL FLIGHT ATTITUDE

OPEN DOOR

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

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

To close the door in flight, proceed as follows:

1. Slow aircraft to 100 MPH IAS.
2. Cabin Vents - Close
3. Storm Window - Open
4. If upper latch is open - latch. If lower latch is open - open top latch, push door further open, and then close rapidly. Latch top latch.

A slip in the direction of the open door will assist in latching procedure.

FIRE

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

SOURCE OF FIRE - CHECK

1. Electrical Fire (Smoke in Cabin):
   a. Master Switch - Off
   b. Vents - Open
   c. Cabin Heat - Off
   d. Land as soon as possible.

2. Engine Fire (In Flight):
   a. Fuel Selector - Off
   b. Throttle - Closed
   c. Mixture - Idle Cut-Off
   d. Heater - Off (In all cases of fire)
   e. Defroster - Off (In all cases of fire)
   f. If terrain permits, land immediately.

NOTE

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

3. Engine Fire (During Start):
   Engine fires during start are usually the result of overpriming. The following procedure is designed to draw the excess fuel back into the induction system.
   a. If engine has not started:
      (1) Mixture - Idle Cut-Off
      (2) Throttle - Open
      (3) Turn engine with starter (This is an attempt to pull the fire into the engine.)
   b. If engine has already started and is running, continue operating to try pulling the fire into the engine.
   c. In either case stated in (a) and (b), if the fire continues longer than a few seconds, the fire should be extinguished by the best available external means.
   d. If external fire extinguishing is to be applied:
      (1) Fuel Selector Valves - Off
      (2) Mixture - Idle Cut-Off

LOSS OF OIL PRESSURE

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

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

Depending on the circumstances, it may be advisable to make an off airport landing while power is still available, particularly if other indications of actual oil pressure loss, such as sudden increases in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stoppage occurs, proceed to POWER OFF LANDING.

LOSS OF FUEL PRESSURE

1. Electric Boost Pump - On
2. Fuel Selector - Check on full tank

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

HIGH OIL TEMPERATURE

An abnormally high oil temperature indication may be caused by a low oil level, an obstruction in the oil cooler, damaged or improper baffle seals, a defective gauge, or other causes. Land as soon as practical at an appropriate airport and have the cause investigated.

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

ALTERNATOR FAILURE

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

1. Reduce Electrical Load.
2. Alternator Circuit Breakers - Check
3. "Alt" Switch - Off (for 1 second), then On

If the ammeter continues to indicate no output, or alternator will not stay reset, turn off "Alt" switch, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

ENGINE ROUGHNESS

Engine roughness is usually due to carburetor icing and may be accompanied by serious power loss. This power loss may be evidenced by a loss of manifold pressure, and may be accompanied by a slight loss of airspeed or altitude. If too much ice is allowed to accumulate, restoration of full power may not be possible; therefore, prompt action is required.

Turn carburetor heat on (See Note). RPM will decrease slightly and roughness will increase. Wait for a decrease in engine roughness indicating ice removal. If no change in approximately one minute, return the carburetor heat to COLD. If the engine is still rough, try steps below:

1. Mixture - Adjust for maximum smoothness. Engine will run rough if too rich or too lean.
2. Electric Fuel Pump - On
3. Fuel Selector - Change tanks to see if fuel contamination is the problem.
4. Engine Gauges - Check for abnormal readings. If any gauge readings are abnormal, proceed accordingly.
5. Magneto Switch - "L" then "R", then back to "BOTH." If operation is satisfactory on either magneto, proceed on that magneto at reduced power, with mixture full rich, to a landing at the first available airport.

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

NOTE

Partial carburetor heat may cause partial melting of ice which will refreeze in the intake system; therefore when using carburetor heat, always use full heat and when ice is removed return to the full cold position.

WEIGHT AND BALANCE

WEIGHT AND BALANCE

WEIGHT AND BALANCE

FOR

CHEROKEE PATHFINDER

28-7410049

N40801

MODEL - PA-28-235

ISSUED: MAY 14, 1973

REPORT: VB-548
MODEL: PA-28-235

INDEX - WEIGHT AND BALANCE

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WEIGHT AND BALANCE LOG OF REVISIONS

Revision	Revised Pages	Description and Revision	Approved Date
1	5-5	Revised Unusable Fuel.	Nov. 9, 1973
	5-12	Revised Oil Cooler Weight and Moment.	
	5-13	Revised Weight, Arm, Moment and added item (b) to Nose Wheel.	
	5-14	Revised Voltage Regulator and Battery Weight and Moment.	
	5-16	Removed Main Wheel Fairings and added Dual Toe Brakes.	
	5-17	Added PAC 79399-0, Vacuum Pump.	
	5-19	Revised Battery Weights and Moment.	
	5-26	Revised Microphones Weights, Arms and Moments; Revised Selector Panel and Marker Beacon Weights, Arms and Moments.	
	5-27	Revised Left and Right Adj. Seat Weights, Arms and Moments; Revised Nose and Main Wheel Fairings and Cabin Overhead Vent System Weights, Arms and Moments. Added "Cabin Overhead Vent System" and revised Weight and Moment for Ground Vent Blower.	
	5-28	Added Corrosive Resistant Kit.	N. Jennek
2	Title	Added PAC Approval Form. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	June 3, 1974
3	5-12	Added Oil Filters; added footnote.	June 12, 1974
	5-14	Added Annunciator Lights; added footnote.	
	5-16	Revised Part No., Weight, Arm and Moment of Inertia Safety Belts.	
	5-17	Added Oil Filter, Low Vacuum Annunciator Light and Vacuum Regulator No. 2H3-19; revised Vacuum Regulator No. 133A4 Weight and Moment; added footnotes.	
	5-21	Added Encoding Altimeter and footnote.	
	5-22	Added AutoControl IIIB; added footnotes.	
	5-23	Revised nomenclature (Narco Dual Comm Transceiver and King VHF Transceivers); added footnote.	

WEIGHT AND BALANCE LOG OF REVISIONS (cont)

Revision	Revised Pages	Description and Revision	Approved Date
3 (cont)	5-24	Added footnote.	
	5-25	Revised nomenclature (Bendix ADF, PM-1 Marker Beacon, and King Audio Panel); added footnote.	
	5-26	Revised nomenclature (Audio Selector Panel, Narco Selector Panel, Narco Comm 110 and Narco Nav 110); added footnote.	
	5-26a, 5-26b	Added pages (Items for ser. nos. 7510001 and up).	R. Hamlin
	5-27	Revised Part No., Weight and Moment of Inertia Safety Belts. Added Assist Strap.	Rickl
4	5-11	Added F-4-13 Governor and footnote.	Jan. 23, 1975
5	5-5	Revised C.G. equations	July 11, 1975
	5-15	Revised Stewart-Warner Engine Cluster Dwg. nos.	C Rickl.
	5-19	Revised Rotating Beacon; added 67496-3 Pitch Trim and footnote.	
	5-21	Added Engine Hour Meter (79548-0) and footnote.	
	5-23	Revised King KX-175 ( ) VHF Transceivers' (1st & 2nd) Indicators' weights and moments.	
	5-27	Added Left Adj. Seat (79591-0); added Right Adj. Seat (79591-1); added Overhead Vent System (76304-13); added Overhead Vent System with Ground Vent Blower (76304-14); relocated items to page 5-28.	
	5-28	Added items from page 5-28; added 79337-18 Front & Rear Headrest; added Stainless Steel Control Cables.	
6	5-21	Removed Piper Dwg. No. from Clock.	Dec. 2, 1975
	5-25	Relocated Piper Automatic Locator to page 5-26.	
	5-26	Added Piper Automatic Locator relocated from page 5-25; added Dwg. No. to existing PAL Transmitter and added second PAL Transmitter.	C Rickl.
	5-26a	Added King KN-61 DME; added King KN-65A DME.	

WEIGHT AND BALANCE LOG OF REVISIONS

Revision	Revised Pages	Description and Revision	Approved Date
7	5-26	Added 79761-4 transmitter.	June 10, 1977
8	5-1	Revised general Weight and Balance introductory info.	March 30, 1979
9	Title	Added serial no. applicability. (NOTE: AIRCRAFT DELIVERED WITH MANUALS PRIOR TO THIS REVISION DO NOT REQUIRE THIS REVISION.)	June 13, 1980
10	5-1 5-3 5-7 5-12	Revised text info. Revised text info. Revised text info. Added 20002A oil cooler.	March 20, 1984

WEIGHT AND BALANCE LOG OF REVISIONS (cont)

Revision	Revised Pages	Description and Revision	Approved Date

WEIGHT AND BALANCE

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

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

Center of gravity is a determining factor in flight characteristics. If the C.G. is too far forward in any airplane, it may be difficult to rotate for takeoff or landing. If the C.G. is too far aft, the airplane may rotate prematurely on takeoff or try 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 aircraft, however, will perform as intended. Before the airplane is licensed, a basic weight and C.G. location is computed. (Basic weight consists of the empty weight of the aircraft plus the unusable fuel and full oil capacity.) Using the basic 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 weight and C.G. location for a particular airplane are recorded in the weight and balance section of the Airplane Flight Manual. 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 weight and basic C.G. position and to write these in the aircraft log book. 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 the C.G. within allowable limits. If it is necessary to remove some of the fuel to stay within maximum allowable gross weight, the pilot should not hestitate to do so.

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

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WEIGHT AND BALANCE DATA

WEIGHING PROCEDURE

At the time of licensing, Piper Aircraft Corporation provides each airplane with the licensed empty weight and center of gravity location. This data is on Page 5-7.

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

1. PREPARATION

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

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

   c. 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.

   d. Drain all oil from the engine, by means of the oil drain, with the airplane in ground attitude. This will leave the undrainable oil still in the system. Engine oil temperature should be in the normal operating range before draining.

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

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

2. LEVELING

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

   b. **Level airplane (see diagram) deflating nose wheel tire, to center bubble on level.**

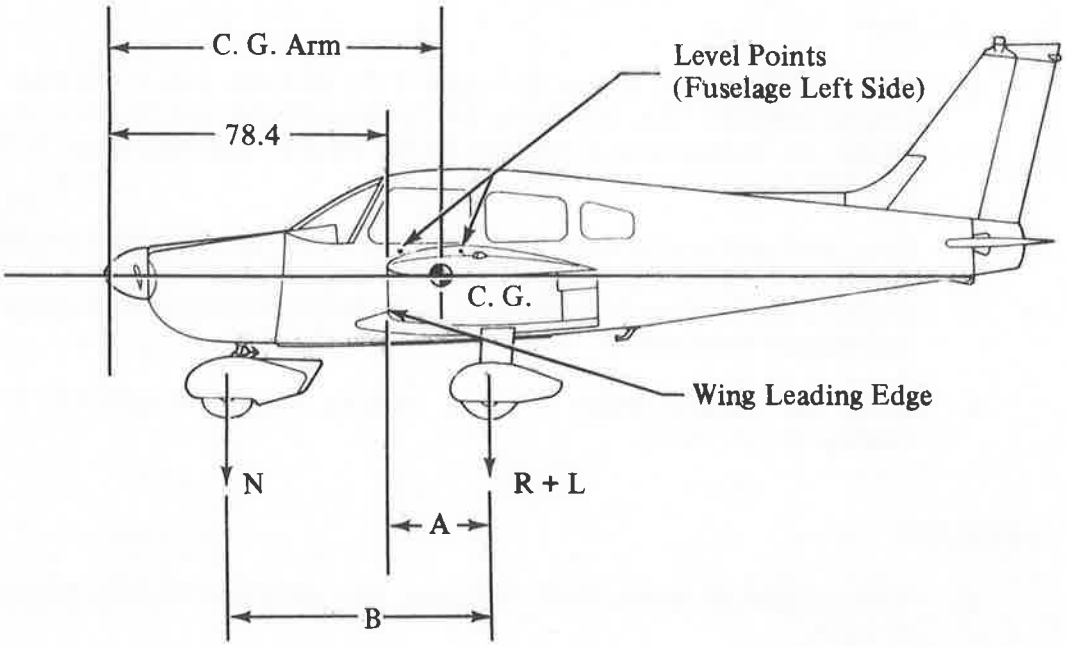
3. WEIGHING - AIRPLANE EMPTY WEIGHT

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

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

4. EMPTY WEIGHT CENTER OF GRAVITY

a. The following geometry applies to the PA-28-235 airplane when airplane is level (See Item 2).



A =

B =

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

b. Obtain measurement "A" by measuring from a plumb bob dropped from the wing leading edge, at the intersection of the straight and tapered section, horizontally and parallel to the airplane centerline, to the main wheel centerline.

c. Obtain measurement "B" by measuring the distance from the main wheel centerline, horizontally and parallel to the airplane centerline, to each side of the nose wheel axle. Then average the measurements.

d. The empty weight center of gravity (as weighed including optional equipment and undrainable oil) can be determined by the following formula:

$$\text{C.G. Arm} = 78.4 + A - \frac{B(N)}{T}$$

$$\text{C. G. Arm} = 78.4 + (\quad) - \frac{(\quad)(\quad)}{(\quad)} = \quad \text{inches}$$

5. LICENSED EMPTY WEIGHT AND EMPTY WEIGHT CENTER OF GRAVITY

	Weight	Arm	Moment
Empty Weight (as weighed)			
Unusable Fuel (15 pints)	+11.3	103.0	+1164
Licensed Empty Weight			

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WEIGHT AND BALANCE DATA

MODEL PA-28-235 CHEROKEE

Airplane Serial Number _____

Registration Number _____

Date _____

AIRPLANE EMPTY WEIGHT

Item	Weight (Lbs)	×	C. G. Arm (Inches Aft of Datum)	=	Moment (In-Lbs)
*Empty Weight (Actual / Computed)					
Unusable Fuel (15 pints)	11.3		103.0		1164
Standard Empty Weight					
Optional Equipment					
Licensed Empty Weight					

***Empty weight is defined as dry empty weight (including paint and hydraulic fluid) plus** 2.4 lbs undrainable engine oil.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

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

(3000 lbs) - (lbs) = lbs

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

C. G. RANGE AND WEIGHT INSTRUCTIONS

1. Add the weight of all items to be loaded to the licensed empty weight.
2. Use the loading graph to determine the moment of all items to be carried in the airplane.
3. Add the moment of all items to be loaded to the licensed empty weight moment.
4. Divide the total moment by the total weight to determine the C.G. location.
5. By using the figures of Item 1 and Item 4, locate a point on the C.G. range and weight graph. If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

SAMPLE LOADING PROBLEM (Normal Category)

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Licensed Empty Weight			
Oil (12 quarts)	22.5	29.1	655
Pilot and Front Passenger	340	80.5	27370
Passengers, Aft (Rear Seat)	340	118.1	40154
Fuel (82 Gal. Maximum)		95.0	
Baggage		142.8	
Total Loaded Airplane			

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

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

WEIGHT AND BALANCE DATA

MODEL PA-28-235 CHEROKEE

Airplane Serial Number 28-7410049

Registration Number N40801

Date 12-12-73

AIRPLANE EMPTY WEIGHT

Item	Weight (Lbs)	× C. G. Arm (Inches Aft of Datum)	= Moment (In-Lbs)
*Empty Weight ~~Actual~~ Computed	1553.0	81.5	126604
Unusable Fuel (15 pints)	11.3	103.0	1164
Standard Empty Weight	1564.3	81.7	127768
Optional Equipment	141.0 ~~127.3~~	106.1	13501
Licensed Empty Weight	1705.3 ~~1691.6~~	83.3 ~~83.45~~	142147 ~~141269~~

*Empty weight is defined as dry empty weight (including paint and hydraulic fluid) plus 2.4 lbs undrainable engine oil.

AIRPLANE USEFUL LOAD - NORMAL CATEGORY OPERATION

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

(3000 lbs) - (~~1691.6~~ 1705.3 lbs) = ~~1308.4~~ 1294.7 lbs

THIS LICENSED 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.

C. G. RANGE AND WEIGHT INSTRUCTIONS

1. Add the weight of all items to be loaded to the licensed empty weight.
2. Use the loading graph to determine the moment of all items to be carried in the airplane.
3. Add the moment of all items to be loaded to the licensed empty weight moment.
4. Divide the total moment by the total weight to determine the C.G. location.
5. By using the figures of Item 1 and Item 4, locate a point on the C.G. range and weight graph. If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

L.E.W. superceded!

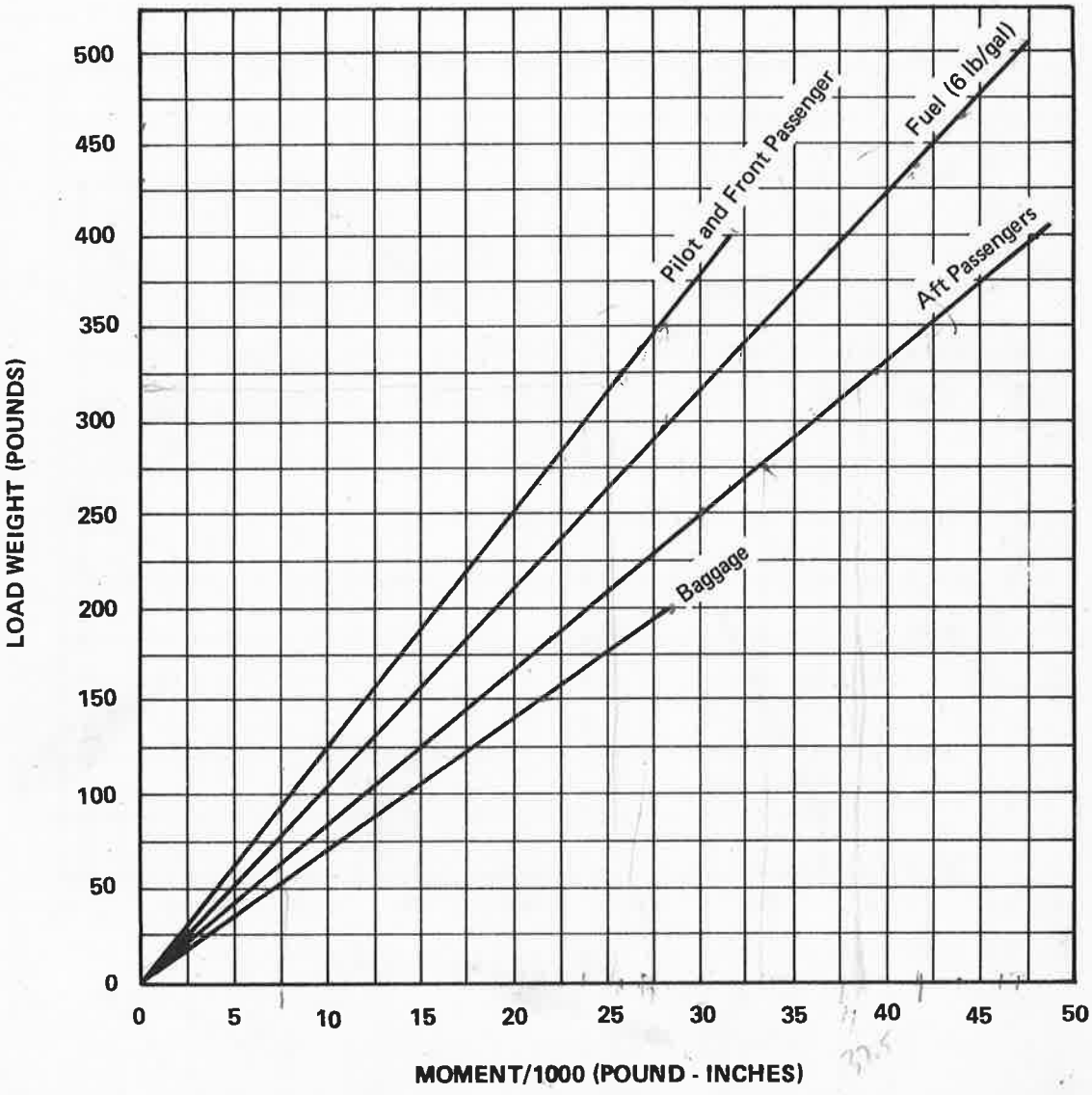
SAMPLE LOADING PROBLEM (Normal Category)

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Licensed Empty Weight	1705.3 ~~1691.6~~	83.3 ~~83.5~~	142147 ~~141269~~
Oil (12 quarts)	22.5	29.1	655
Pilot and Front Passenger	340	80.5	27370
Passengers, Aft (Rear Seat)	340	118.1	40154
Fuel (82 Gal. Maximum)	492.0	95.0	46740
Baggage	113.9	142.8	16265
Total Loaded Airplane	3000.0	90.8	272453

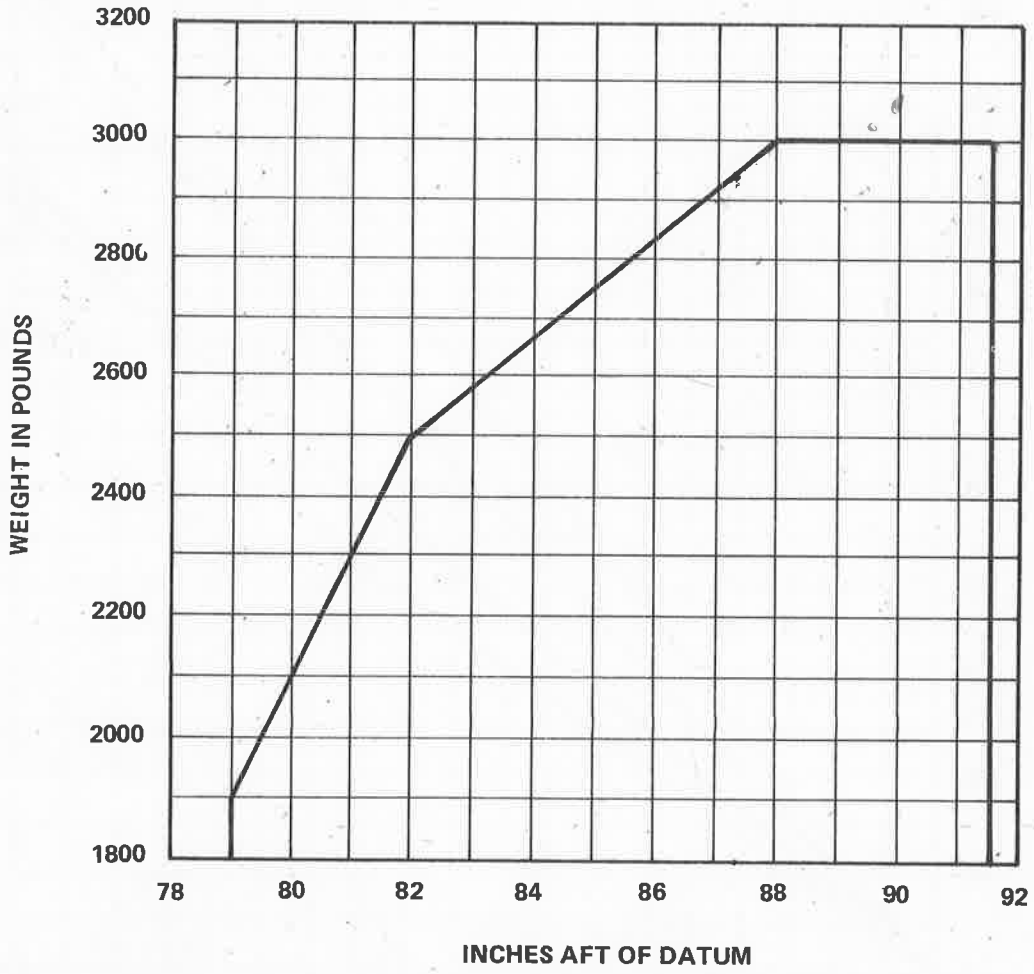
The center of gravity (C.G.) of this sample loading problem is at 90.8 inches aft of the datum line. Locate this point (90.8) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

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

LOADING GRAPH



C. G. RANGE AND WEIGHT



EQUIPMENT LIST

The following is a list of equipment which may be installed in the PA-28-235. Items marked with an "X" are items installed when the airplane was delivered by the manufacturer.

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	A. Propeller and Propeller Accessories				
_____	Spinner Installation Piper Dwg. 99374	5.0	.8	4	TC 2A13
_____	Governor Hartzell F-4-3 ( ) or F-4-13*	5.5	9.6	53	TC P920
_____	Propeller, Hartzell HC-C2YK-1( )F/F8468A-4 (Used with O-540-B4B5 Engine Only)	56	2.7	151	TC P920
_____	Governor Control Piper Dwg. 67639-4	1.5	56.8	85	TC 2A13

*Engines with serial numbers ending with "-A" require the F-4-13 governor. Other engines require the F-4-3 governor.

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
B.	Engine and Engine Accessories				
_____	Lycoming Model O-540-B4B5	383.8	23.4	8981	TC 295
_____	Air Filter - Fram Model * CA161PL or Purolator AFP-2	..9	15.1	14	TC 2A13
_____	Fuel Pump Engine Driven, Lycoming Dwg. 75246	1.6	44.8	72	TC 295
_____	Oil Cooler, Harrison* C8526250 or Niagara N.D.M. 20002A Piper Dwg. 18622	1.9	33.4	63	TC 2A13
_____	Alternator 60 Amp, Chrysler 2642997	12.5	14.0	175	TC 2A13
_____	Starter - Lycoming #76211 (Prestolite MZ4206)	* 18.0	14.5	261	TC 2A13
_____	Fuel Pump Auxiliary Piper Dwg. 65628-0	1.8	113.8	205	TC 2A13
_____	Oil Filter, Lycoming 75528 (AC *OF5578770)**	3.3	43.5	144	TC 2A13
_____	Oil Filter, Lycoming * LW-13743 (C hampion * CH-48110)**	2.8	43.5	122	TC 2A13

*Included in Engine Weight.
**Serial nos. 7510001 and up

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	C. Landing Gear and Brakes				
X	Two Main Wheel Assemblies 6.00-6	33.9	109.6	3715	TC 2A13
	(a) Cleveland Aircraft Products Wheel Assembly No. 40-86 Brake Assembly No. 30-55				
	(b) Two Main 6-Ply Rating Tires 6.00-6 with Regular Tubes				
X	One Nose Wheel 6.00-6	12.8	32.0	410	TC 2A13
	(a) Cleveland Aircraft Products Wheel Assembly No. 40-76B (Less Brake Drum)				
	(b) One Nose Wheel 4-Ply Rating Tire 6.00-6 with Regular Tube				

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	D. Electrical Equipment				
X	Stall Warning Device, Safe Flight Instrument Corporation No. C52207-4	.2	80.2	16	TC 2A13
X	Voltage Regulator, Wico Electric No. X-16300B	.9	51.9	47	TC 2A13
	Battery 12V, 25 A.H., Rebat Model S-25	21.9	168.0	3679	TC 2A13
X	Overvoltage Relay, Wico Electric No. 16799	.5	55.4	28	TC 2A13

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
E.	Instruments				
_____	Compass - Piper Dwg. 67462	.9	59.9	54	TC 2A13
_____	Airspeed Indicator, Piper Dwg. 63205-3 or -14	.6	61.8	37	TC 2A13
_____	Tachometer, Piper Dwg. 62177	.7	61.2	43	TC 2A13
_____	Altimeter, Piper PS50008-2 or -3	1.0	60.9	61	TC 2A13
_____	Engine Cluster, Stewart-Warner, Piper Dwg. 95241-11	.8	62.4	50	TC 2A13
_____	Engine Cluster, Stewart-Warner, Piper Dwg. 95241-15	.8	62.4	50	TC 2A13
_____	Manifold Pressure Gauge, Piper PS50031-3 or -4	.9	60.8	55	TC 2A13

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
F.	Miscellaneous				
_____	Forward Seat Belts (2) Piper PS50039-4-2A	1.5	81.9	123	TSO C22
_____	Inertia Safety Belts, Front (2), Piper PS50039-4-17	1.5	119.6	179	TC 2A13
_____	Rear Seat Belts (2) PS50039-4-3	1.4	123.0	172	TSO C22
_____	Flight Manual & Logs	2.6	95.1	247	TC 2A13
_____	Toe Brakes (Dual) Piper Dwg. 63473	11.0	49.6	546	TC 2A13
_____	Tow Bar, Piper Dwg. 99458	1.3	161.7	210	TC 2A13

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	G. Engine and Engine Accessories (Optional Equipment)				
X	Vacuum Pump, Airborne Mfg. Co., Model No. 200cc and Drive	5.0	40.0	200	TC 2A13
X	Oil Filter, Lycoming *75528 (AC*OF5578770)	3.3	43.5	144	TC 2A13
X	Vacuum Regulator, Airborne Mfg. Co., No. 133A4	.7	52.0	36	TC 2A13
X	Vacuum Filter, Piper Dwg. 66673	.3	52.0	16	TC 2A13
X	Vacuum Pump, Airborne Mfg. Co., Model 211cc and Drive, PAC 79399-0	3.2	40.0	128	TC 2A13

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	H. Landing Gear and Brakes (Optional Equipment)				
———	One Nose Wheel 6.00-6 6-Ply Rating Tube	12.5	30.4	380	TC 2A13
	(a) Cleveland Aircraft Products Wheel Assembly No. 38501 (Less Brake Drum)				

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	I. Electrical Equipment (Optional Equipment)				
_____	Rotating Beacon	1.5	263.4	395	TC 2A13
_____	Landing Light, G.E. Model 4509	.5	13.1	7	TC 2A13
_____	Navigation Lights (2) Grimes Model A1285 (Red and Green)	.4	106.6	43	TSO C30b
_____	Navigation Light (Rear) (1) Grimes Model 2064 (White)	.2	281.0	56	TSO C30b
_____	Battery 12V, 35 A.H. Rebat R-35 (Weight 27.2 lbs)	5.3	168.0	890	TC 2A13
_____	Cabin Light, Piper Dwg. 95229	.3	99.0	30	TC 2A13
_____	Cabin Speaker SB-15052 or 6EU 1937, Quincy Speaker Co., Oakton, Indiana	.8	99.0	79	TC 2A13
_____	Auxiliary Power Receptacle, Piper Dwg. 62225	2.7	178.5	482	TC 2A13
_____	External Power Cable Piper Dwg. 62355-2	4.6	142.8	657	TC 2A13
_____	Piper Pitch Trim Piper Dwg. 67496-2, -3*	4.3	155.3	668	TC 2A13
_____	Heated Pitot Head Piper Dwg. 65797-5	.4	263.4	105	TC 2A13
	Anti-Collision Lights Whelen Engineering Co. Piper Dwg. 99033-2 or -5				
_____	Power Supply Model HS No. A412A-14 (with Fin Light only)	2.3	198.0	455	TC 2A13

*Serial nos. 28-7510028 and up

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	I. Electrical Equipment (Optional Equipment) (cont)				
_____	Light, Fin Tip A470	.4	263.4	105	TC 2A13
_____	Cable, Fin Light A417-1/151	.4	230.7	92	TC 2A13
_____	Power Supply Model HD T3 No. A413 (with Fin and Wing Lights)	3.0	198.0	594	TC 2A13
_____	Lights, Wing Tip (2) (0.15 lbs each) No. 429 PR or PG	.3	106.6	32	TC 2A13
_____	Cable Wing Lights A417-1/388 & A417-1/326	2.0	115.6	231	TC 2A13

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	J. Instruments (Optional Equipment)				
_____	Suction Gauge, Piper Dwg. 99480-0 or -2	.5	62.2	31	TC 2A13
_____	Vertical Speed, Piper Dwg. 99010-2, -4 or -5	1.0	60.9	61	TC 2A13
_____	Vertical Speed, Piper Dwg. 99010-3	.5	62.2	31	TC 2A13
_____	Attitude Gyro, Piper Dwg. 99002-2, -3, -4 or -5	2.2	59.4	131	TC 2A13
_____	Directional Gyro, Piper Dwg. 99002-2, -3, -4 or -5	2.6	59.7	155	TC 2A13
_____	Air Temperature Gauge Piper Dwg. 99479-0 or -2	.2	72.6	15	TC 2A13
_____	Clock	.4	62.4	25	TC 2A13
_____	Tru-Speed Indicator, Piper Dwg. 62143-3 or -14	(same as Standard Equipment)			TC 2A13
_____	Turn and Slip Indicator, Piper PS50030-2 or -3	2.6	59.7	155	TC 2A13
_____	Exhaust Gas Temperature Gauge, Piper Dwg. 99026	.7	55.4	39	TC 2A13
_____	Encoding Altimeter Piper PS50008-6 or -7	* .9	60.3	54	TSO C10b C88
_____	Engine Hour Meter** Piper Dwg. 79548-0	.3	61.2	18	TC 2A13

*Weight and moment difference between standard and optional equipment.
**Serial nos. 28-7610001 and up.

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	K. Autopilots (Optional Equipment)				
	AutoControl III *				
_____	Roll Servo, *1C363-1-183R	2.5	122.2	306	STC SA1406SW
_____	Console *1C338 (thru S/N 9999)	1.2	60.1	72	STC SA1406SW
_____	Cables	.7	95.5	67	STC SA1406SW
_____	Attitude Gyro * 52D66	2.3	59.4	137	STC SA1406SW
_____	Directional Gyro * 52D54	3.2	59.0	189	STC SA1406SW
_____	Omni Coupler *1C388	.9	59.3	53	STC SA1406SW
	AutoFlite II				
_____	Roll Servo *1C363-1-183R	2.5	122.2	306	STC SA1157SW
_____	Cable	.7	93.4	65	STC SA1157SW
_____	Panel Unit * 52D75-3 or -4	2.4	64.4	185	STC SA1157SW
	AutoControl III B **				
_____	Roll Servo *1C363-1-183R	2.5	122.2	306	STC SA1406SW
_____	Console *1C338 (S/N 10000 & up)	1.0	60.1	60	STC SA1406SW
_____	Cables	.5	95.5	48	STC SA1406SW
_____	Attitude Gyro, *52D66	2.7	59.4	160	STC SA1406SW
_____	Directional Gyro, * 52D54	2.9	59.0	171	STC SA1406SW
_____	Omni Coupler, *1C388	1.0	59.3	59	STC SA1406SW

*Serial nos. 7410001 through 7410120
**Serial nos. 7510001 and up

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	L. Radio Equipment (Optional Equipment)				
	Narco Mark 16 (VHF Comm/Nav) *				
_____	Transceiver, Single	7.5	56.9	427	TC 2A13
_____	Transceiver, Dual	15.0	56.9	854	TC 2A13
_____	Narco VOA-50M Omni Converter *	2.1	59.9	126	TC 2A13
_____	Narco VOA-40(M) Omni Converter *	1.9	59.9	114	TC 2A13
_____	Narco VOA-40 Omni Converter *	1.9	59.9	114	TC 2A13
_____	Narco Comm 10A VHF Transceiver	3.9	57.4	224	TC 2A13
✓	Narco Comm 11A VHF Transceiver	3.6	57.4	207	TC 2A13
_____	Narco Dual Comm 11A VHF Transceiver	7.1	57.4	408	TC 2A13
_____	Narco Nav 10 VHF Receiver	1.9	58.6	111	TC 2A13
✓	Narco Nav 11 VHF Receiver	2.8	58.6	164	TC 2A13
✓	Narco Nav 12 VHF Receiver	3.4	58.6	199	TC 2A13
_____	Narco Dual Nav 11 VHF Receiver	5.6	58.6	328	TC 2A13
_____	King KX-175 ( ) VHF Transceiver	9.4	56.6	532	TC 2A13
_____	King KN-73 Glide Slope				
_____	Receiver	3.2	184.3	590	TC 2A13
_____	King KN-77 VOR/LOC				
_____	Converter	3.6	183.6	661	TC 2A13
_____	King KNI-520 VOR/ILS				
_____	Indicator	2.8	60.5	169	TC 2A13
	King KX-175 ( ) VHF Transceiver				
_____	(2nd)	8.6	56.6	487	TC 2A13
	King KN-77 VOR/LOC				
_____	Converter	4.6	183.6	771	TC 2A13
	King KNI-520 VOR/LOC				
_____	Indicator	2.8	60.5	169	TC 2A13

*Serial nos. 7410001 through 7410120

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	L. Radio Equipment (Optional Equipment) (cont)				
	King KX-170 ( ) (VHF Comm/Nav)				
_____	Transceiver, Single	7.5	56.6	425	TC 2A13
_____	Transceiver, Dual	15.0	56.6	849	TC 2A13
_____	King KI-201C ( ) VOR/LOC Ind.	2 .5	59.9	150	TC 2A13
_____	King Dual KI-201C ( ) VOR/LOC Ind.	5.0	59.9	300	TC 2A13
_____	King KI-214 ( ) VOR/LOC/GS Ind.	3.3	59.9	198	TC 2A13
_____	Nav Receiving Antenna	.5	265.0	133	TC 2A13
_____	Cable, Nav Antenna	.9	157.0	141	TC 2A13
✓	*1 VHF Comm Antenna	.3	157.8	47	TC 2A13
✓	Cable Antenna *1 VHF	.4	103.4	41	TC 2A13
✓	*2 VHF Comm Antenna	.3	192.8	58	TC 2A13
✓	Cable Antenna *2 VHF	.5	120.9	60	TC 2A13
_____	Anti Static Kit	—	—	—	TC 2A13
_____	*1 VHF Comm Antenna	1.0	160.8	161	TC 2A13
_____	Cable 1 VHF Comm Antenna	.4	103.4	41	TC 2A13
_____	*2 VHF Comm Antenna	1.0	195.8	196	TC 2A13
_____	Cable *2 VHF Comm Antenna	.5	120.9	60	TC 2A13
_____	Static Wicks	—	—	—	TC 2A13
	Narco ADF-31A *				
_____	Panel Unit	5.0	58.5	293	TC 2A13
_____	Sensor Unit	2.5	162.7	407	TC 2A13
_____	Sense Cable	2.3	105.6	243	TC 2A13
_____	Sense Antenna and Cable	.4	150.0	60	TC 2A13

*Serial nos. 7410001 through 7410120

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
L.	Radio Equipment (Optional Equipment) (cont)				
	Bendix ADF-T-12 C or D *				
_____	Receiver	3.5	59.4	208	TC 2A13
_____	Audio Amplifier	.8	52.4	42	TC 2A13
_____	Servo Indicator	1.7	60.9	104	TC 2A13
_____	Loop Antenna	1.3	160.8	209	TC 2A13
_____	Cable Interconnecting	2.3	108.0	248	TC 2A13
_____	Sense Antenna and Cable	.4	150.0	60	TC 2A13
	King KR-85 Digital ADF				
_____	Receiver	4.3	59.4	255	TC 2A13
_____	Servo Indicator	1.2	61.3	74	TC 2A13
_____	Loop Antenna	1.3	161.5	210	TC 2A13
_____	Loop Cable	1.8	108.0	194	TC 2A13
_____	Audio Amplifier	.8	51.0	41	TC 2A13
_____	Sense Antenna and Cable	.4	150.0	60	TC 2A13
	PM-1 Marker Beacon *				
_____	Receiver	1.1	121.3	133	TC 2A13
_____	Remote Unit	.3	128.4	39	TC 2A13
_____	Cable	.3	85.0	26	TC 2A13
	UGR-2A Glide Slope				
✓	Receiver	2.4	~~173.8~~	417	TC 2A13
_____	Cable	1.8	128.0	230	TC 2A13
_____	Antenna	.4	92.4	37	TC 2A13
_____	Cable Antenna	.5	145.0	73	TC 2A13
	Narco AT-50A Transponder				
✓	Panel Unit	** 3.0	57.3	172	TC 2A13
	King KT76/78 Transponder				
_____	Panel Unit	3.1	58.1	180	TC 2A13
_____	Antenna and Cable	—	—	—	TC 2A13
✓	King KMA-20 ( ) Audio Panel	2.8	60.2	169	TC 2A13
✓	Antenna	.5	116.3	58	TC 2A13
✓	Cable	.4	87.5	35	TC 2A13

*Serial nos. 7410001 through 7410120
**Weight includes Antenna and Cable.

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	L. Radio Equipment (Optional Equipment) (cont)				
	Piper Automatic Locator, Piper Dwg. 99890				
_____	Transmitter, Piper Dwg. 79265-0	1.7	236.2	402	TC 2A13
_____	Transmitter, Piper Dwg. 79265-6	1.3	236.2	307	TC 2A13
_____	Transmitter, Piper Dwg. 79761-4	1.7	236.2	402	TC 2A13
_____	Antenna and Coax	.2	224.4	45	TC 2A13
_____	Shelf and Access	.33	235.4	78	TC 2A13
	King KN60C DME				
_____	**Receiver**	**6.8**	**56.7**	**386**	**TC 2A13**
_____	**Antenna**	**.2**	**112.1**	**22**	**TC 2A13**
_____	**Cable Antenna**	**.3**	**85.6**	**26**	**TC 2A13**
	Audio Selector Panel,				
_____	Piper Dwg. 99395-0, -2 or -3 *	.7	61.3	43	TC 2A13
	Microphone, Piper Dwg.				
_____	**68856-10**	**.3**	**64.9**	**19**	**TC 2A13**
	Microphone (Dynamic)				
_____	Piper Dwg. 68856-12	.3	64.9	19	TC 2A13
	Headset, Piper Dwg.				
_____	68856-10	.5	60.0	30	TC 2A13
	Narco CP-25B/125 Selector				
_____	Panel *	1.2	55.0	66	TC 2A13
_____	**Narco MBT-12-R Marker Beacon**	3.1	69.1	214	TC 2A13
_____	Narco Comm 110 *	3.0	57.4	172	TC 2A13
_____	Narco Comm 111	3.0	57.4	172	TC 2A13
_____	Narco Nav 110 *	1.7	58.6	100	TC 2A13
_____	Narco Nav 111	2.5	58.6	147	TC 2A13
_____	Narco Nav 112	3.3	58.6	193	TC 2A13

*Serial nos. 7410001 through 7410120

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
L.	Radio Equipment (Optional Equipment) (cont)				
_____	King KI-213 VOR/LOC/GS Indicator *	2.5	60.4	151	TC 2A13
	King KR-86 ADF *				
_____	Receiver	3.9	59.4	232	TC 2A13
_____	Loop Antenna	1.5	161.5	242	TC 2A13
_____	Loop Cable	1.3	108.0	140	TC 2A13
_____	Audio Amplifier	0.8	51.0	41	TC 2A13
_____	Sense Antenna & Cable	0.4	150.0	60	TC 2A13
	King KR-86 ADF (2nd) *				
_____	Receiver	3.9	59.4	232	TC 2A13
_____	Loop Antenna	1.5	150.7	226	TC 2A13
_____	Loop Cable	1.3	105.0	137	TC 2A13
_____	Sense Antenna & Cable	3.0	147.5	443	TC 2A13
	King KN-65 DME *				
_____	Receiver	7.6	201.6	1532	TC 2A13
_____	Antenna	0.2	112.1	22	TC 2A13
_____	Cable, Antenna	0.3	157.1	47	TC 2A13
_____	Indicator	1.0	62.4	62	TC 2A13
	King KN-74 R-Nav *				
_____	Computer	3.7	57.6	213	TC 2A13
_____	Cable Assy.	1.0	53.0	53	TC 2A13
_____	Narco Comm 11B VHF Transceiver	3.9	57.4	224	TC 2A13
_____	Narco Dual Comm 11B VHF Transceiver *	7.8	57.4	448	TC 2A13
_____	Narco Dual Comm 111 VHF Transceiver *	6.0	57.4	344	TC 2A13
_____	Narco Comm 111B VHF Transceiver *	3.9	57.4	224	TC 2A13
_____	King KN-61 DME	12.5	179.0	2237	TC 2A13
_____	King KN-65A DME	13.0	174.9	2274	TSO C66a

*Serial nos. 7510001 and up

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	L. Radio Equipment (Optional Equipment) (cont)				
_____	Narco Dual Comm 111B VHF Transceiver *	7.8	57.4	448	TC 2A13
_____	Narco Nav 14 VHF Receiver*	2.5	57.4	144	TC 2A13
_____	Narco Nav 114 VHF Receiver *	2.5	57.4	144	TC 2A13
	Narco UGR-3 Glide Slope *				
_____	Receiver	2.4	173.8	417	TC 2A13
_____	Cable	1.8	128.0	230	TC 2A13
_____	Antenna	0.4	92.4	37	TC 2A13
_____	Cable, Antenna	0.5	145.0	73	TC 2A13
_____	Narco CP-125 Audio Selector Panel *	2.2	76.2	168	TC 2A13
	Narco ADF-140 *				
_____	Receiver	2.5	58.3	146	TC 2A13
_____	Servo Indicator	1.3	61.0	79	TC 2A13
_____	Loop Antenna	1.6	162.0	259	TC 2A13
_____	Cable, Loop	0.6	105.5	63	TC 2A13
_____	Sense Antenna and Cable	0.4	147.5	59	TC 2A13
	Narco Dual ADF-140*				
_____	Receivers	5.0	58.3	292	TC 2A13
_____	Dual Needle Indicator	3.5	61.0	214	TC 2A13
_____	Loop Antenna *1	1.6	162.0	259	TC 2A13
_____	Cable, Loop *1	0.6	105.5	63	TC 2A13
_____	Sense Antenna and Cable *1	0.4	143.8	58	TC 2A13
_____	Loop Antenna *2	1.6	150.0	240	TC 2A13
_____	Cable, Loop *2	0.6	93.5	56	TC 2A13
_____	Sense Antenna and Cable *2	3.0	143.8	431	TC 2A13
_____	Remote for Dual Ind.	2.0	185.5	371	TC 2A13
	Narco DME-190 *				
_____	Receiver	5.2	61.8	321	TC 2A13
_____	Antenna	0.3	113.9	34	TC 2A13
_____	Cable, Antenna	0.4	85.6	34	TC 2A13
_____	Microphone (Dynamic)* Piper Dwg. 68856-11	0.6	69.9	42	TC 2A13

*Serial nos. 7510001 and up

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
M.	Miscellaneous (Optional Equipment)				
_____	Fire Extinguisher, Scott #42211 Piper Dwg. 76167-2	4.6	71.0	327	TC 2A13
_____	Adjustable Seat (Left) Piper Dwg. 76340	* 6.6	80.7	533	TC 2A13
_____	(Left) Piper Dwg. 79591-0	* 6.6	80.3	530	TC 2A13
_____	Adjustable Seat (Right) Piper Dwg. 76340-1	* 6.8	80.0	544	TC 2A13
_____	(Right) Piper Dwg. 79591-1	* 6.6	79.6	525	TC 2A13
_____	Assist Step, Piper Dwg. 65384	1.8	156.0	281	TC 2A13
_____	Inertia Safety Belts (Rear) (2) PS50039-4-14	1.6	140.3	224	TC 2A13
_____	Lighter #200462 12V Universal	.2	67.9	14	TC 2A13
_____	Assist Strap and Coat Hook Piper Dwg. 62353-5	.2	109.5	22	TC 2A13
_____	Assist Strap, Piper Dwg. 79455	.2	109.5	22	TC 2A13
_____	Nose Wheel Fairing, Piper Dwg. 76417-0	3.6	37.2	134	TC 2A13
_____	Main Wheel Fairings, Piper Dwg. 65237	7.6	113.6	863	TC 2A13
_____	Cabin Overhead Vent System Piper Dwg. 76304-5	5.6	157.4	881	TC 2A13
_____	Cabin Overhead Vent System with Ground Ventilation Blower, Piper Dwg. 76304-6	13.2	170.4	2249	TC 2A13
_____	Cabin Overhead Vent System Piper Dwg. 76304-13	6.4	159.6	1022	TC 2A13
_____	Cabin Overhead Vent System with Ground Ventilation Blower, Piper Dwg. 76304-14	14.0	170.7	2390	TC 2A13

* Weight and Moment difference between standard and optional equipment.

Item	Item	Weight Lbs.	Arm Aft Datum	Moment	Cert. Basis
	M. Miscellaneous (Optional Equipment) (cont)				
_____	Super Cabin Sound Proofing, Piper Dwg. 79030-3	18.1	86.8	1571	TC 2A13
_____	Alternate Static Source Calibrated Alternate Static Source Placard Required: Yes_____ No_____	.4	61.0	24	TC 2A13
_____	Headrest (2) Front, Piper Dwg. 96806-17 or 79337-18	2.2	94.5	208	TC 2A13
_____	Headrest (2) Rear, Piper Dwg. 96806-17 or 79337-18	2.2	132.1	291	TC 2A13
_____	Zinc Chromate Finish	5.0	158.0	790	TC 2A13
_____	Corrosive Resistant Kit	3.0	106.0	318	TC 2A13
_____	Stainless Steel Control Cables	–	–	–	TC 2A13
X	TKM MX 11 Comm	4.0	57.4	230	
	TOTAL OPTIONAL EQUIPMENT	_____	_____	_____	

EXTERIOR FINISH

Base Color _____ Registration No. Color _____

Trim Color _____ Type Finish _____

Accent Color _____

APOLLO AIRWAYS INC.

404 WILLIAM MOFFETT ROAD • GOLETA, CALIFORNIA 93017 • 805 967-0443

ARS 417-30

DATE June 20, 1974

Computed Weight & Balance

Make Piper Model PA-28-235 A/C# N40801

The following installation performed in accordance with manufactures instructions and FAA requirements.

	Weight	CG ARM	Moments
Aircraft Empty Weight Before Installation	1691.6	83.3	141269
Equipment Installed:			
KING KMA-20 S/N 11281	2.8	60.2	169
NARCO UGR-3 S/N 50578	2.4	52.0	125
NARCO COM 11A S/N 32424	3.6	57.4	207
NARCO NAV 12 S/N 70J07	3.4	58.6	199
#2 Com Antenna	.5	120.9	60
3LMB Antenna	1.0	118.0	118
	13.7		878
	+1691.6		+141269
	1705.3		142147

Superceded Mar 4, 1976 Apollo Airways Inc ARS 417-30 ES

New Totals:

Maximum Gross Weight	3000lbs
Empty Weight	1705.3 lbs
Empty C.G.	83.3
Moment	142147
Useful Load	1294.7

Inspected by E. A. Walter

APOLLO AIRWAYS INC.

404 WILLIAM MOFFETT ROAD • GOLETA, CALIFORNIA 93017 • 805 967-0443

ARS 417-30

DATE March 4, 1976

Computed Weight & Balance

Make Piper Model PA-28-235 A/C# N40801

The following installation performed in accordance with manufactures instructions and FAA requirements.

	Weight	CG	Moments
Aircraft Empty Weight Before Installation	1705.3	83.3	142147.00
Equipment XXXXXXXX: Removed;			
Bendix ADF-T*12C	3.5	59.4	208.00
ADF Servo Indicator	1.7	60.9	104.00
ADF Loop Ant.	1.3	160.8	209.00
ADF Interconnecting Cable	2.3	108.0	248.00
	8.8		769.00
Equipment Installed;			
Narco ADF-140 With Mtg Tray	2.6	59.4	154.44
" ADF 101 Indicator	1.0	60.9	60.90
" ADF Loop Antenna	1.6	160.8	257.28
" ADF Loop Cable & Mtg Plate	.6	108.0	64.80
" DME-190 With Mtg Case	6.1	58.0	353.80
" DME Antenna	.5	116.0	58.00
	12.4		949.22
	1705.3		142147.00
	-8.8		-769.00
	1696.5		141378.00
	+12.4		+949.22
	1708.9		142327.22

New Totals:

Maximum Gross Weight	3000 lbs
Empty Weight	1708.9 lbs
Empty C.G.	83.28
Moment	142327.22
Useful Load	1291.1 lbs

Inspected by Thomas E. Smothermon

Thomas E. Smothermon Repairman #2247439

O.K. O.K.

LOADING INSTRUCTIONS

LOADING INSTRUCTIONS

THIS SECTION IS NOT APPLICABLE TO THIS AIRPLANE

OPERATING INSTRUCTIONS

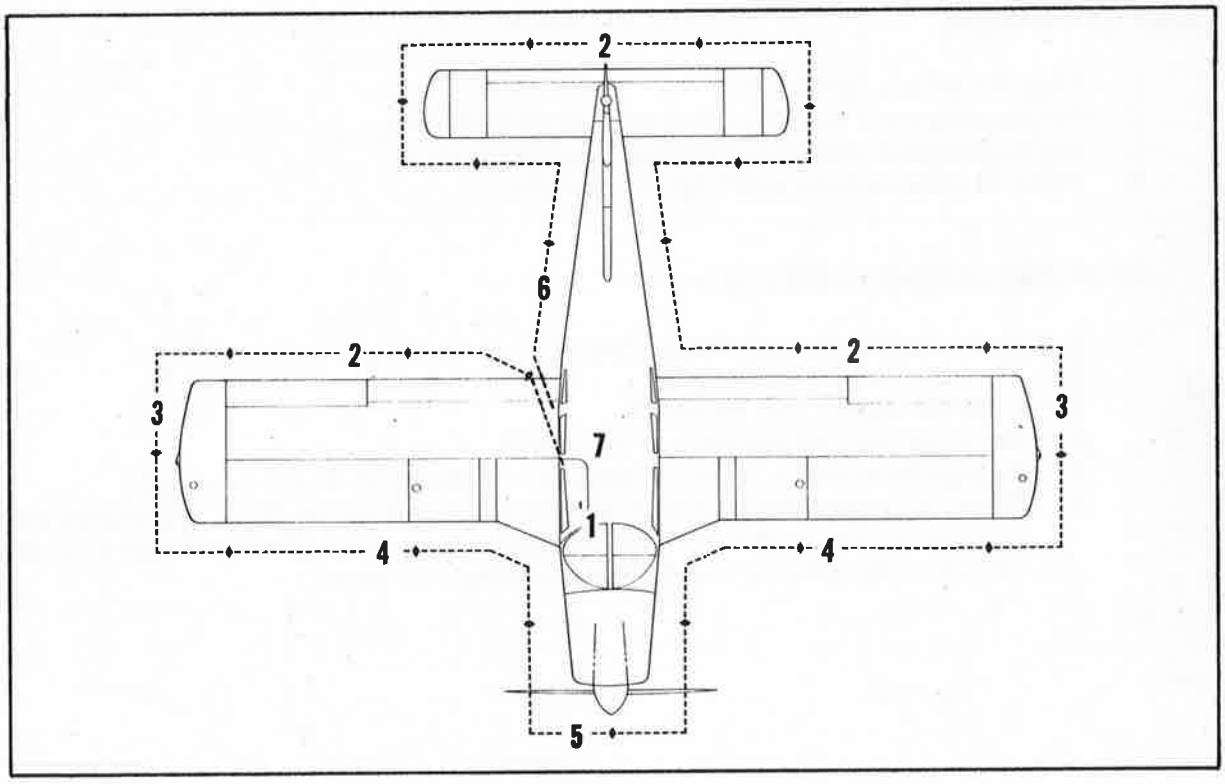
OPERATING INSTRUCTIONS

OPERATING INSTRUCTIONS

PREFLIGHT

The airplane should be given a thorough visual inspection prior to each flight. Particular attention should be given to the following items:

1. a. Release seat belt securing control wheel.
   b. Master switch "ON."
   c. Check fuel quantity indicators (four tanks).
   d. Master switch and ignition "OFF."
2. a. Check for external damage, operational interference of control surfaces or hinges.
   b. Insure that wings and control surfaces are free of snow, ice or frost.
3. a. Visually check fuel supply, secure caps.
   b. Drain fuel tank sumps (See Fuel System Section for procedure).
   c. Check fuel tank vents for obstructions.
   d. Check navigation lights.



4. a. Visually check fuel supply, secure caps.
   b. Drain fuel tank sumps (See Fuel System Section for procedure).
   c. Check that fuel system vents are open.
   d. Check landing gear shock struts for proper inflation (approximately 4-1/2 inches).
   e. Check tires for cuts, wear and proper inflation.
   f. Check brake blocks and discs for wear and damage.
5. a. Inspect windshield for cleanliness.
   b. Check the propeller and spinner for defects or nicks.
   c. Check for obvious fuel or oil leaks.
   d. Check oil level, 12 quarts maximum (Insure dipstick is properly seated.)
   e. Inspect cowling and inspection covers for security.
   f. Check nose wheel tire for inflation, wear.
   g. Check nose wheel shock strut for proper inflation (approximately 3-1/4 inches).
   h. Check air inlets for foreign matter.
   i. Check alternator belt tension.
6. a. Stow tow bar and control locks, if used.
   b. Check baggage for proper storage and security.
   c. Close and secure the baggage compartment door.
   d. Drain strainer sumps. (See fuel system for procedure.)
7. a. Upon entering aircraft ascertain that all primary flight controls operate properly.
   b. Close and secure the cabin door.
   c. Check that required papers are in order and in the aircraft.
   d. Secure seat belt and shoulder harness. Check function of inertia reel.

STARTING ENGINE

1. Lock the wheels (brakes on).
2. Set the carburetor heat control in the full OFF position.
3. Set the propeller control in full "increase RPM."
4. Select the desired tank with fuel selector valve.

STARTING ENGINE WHEN COLD

1. Open throttle approximately 1/4 inch.
2. Turn the master switch ON.
3. Turn the electric fuel pump ON.
4. Move the mixture control to FULL RICH.
5. Engage the starter by rotating magneto switch clockwise and pressing in.
6. When the engine fires, advance throttle to desired setting. If the engine does not fire within five to ten seconds, disengage starter and prime with one to three strokes of the priming pump. Repeat starting procedure.

STARTING ENGINE WHEN HOT

1. Open the throttle approximately 1/2 inch.
2. Turn the master switch ON.
3. Turn the electric fuel pump ON.
4. Put mixture control in IDLE CUT-OFF.
5. Engage the starter by rotating magneto switch clockwise and pressing in. When the engine fires, advance the mixture control and move the throttle to desired setting.

STARTING ENGINE WHEN FLOODED

1. Open the throttle full.
2. Turn the master switch ON.
3. Turn the electric fuel pump OFF.
4. Put mixture control in IDLE CUT-OFF.
5. Engage the starter by rotating magneto switch clockwise and pressing in. When the engine fires, advance the mixture control and retard the throttle.

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

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

STARTING ENGINE WITH EXTERNAL POWER SOURCE*

An optional feature known as Piper External Power (PEP) allows the operator to use an external battery to crank the engine without having to gain access to the aircraft battery.

The procedure is as follows:

1. Turn aircraft MASTER SWITCH to OFF.
2. Connect RED lead of PEP kit jumper cable to POSITIVE (+) terminal of external 12-volt battery and BLACK lead to NEGATIVE (-) terminal.
3. Insert plug of jumper cable into socket located on aircraft fuselage.
4. Turn aircraft MASTER SWITCH to ON and proceed with NORMAL engine starting technique.
5. After engine has been started, turn MASTER SWITCH to OFF and remove jumper cable plug from aircraft.
6. Turn aircraft MASTER SWITCH to ON and check alternator ammeter for indication of output. DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

*Optional Equipment

WARM-UP

As soon as the engine starts, the oil pressure should be checked. If no pressure is indicated within thirty seconds, stop the engine and determine the trouble. In cold weather it will take a few seconds longer to get an oil pressure indication. Warm-up the engine at 800 to 1200 RPM.

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

GROUND CHECK

The magnetos should be checked at 2000 RPM with propeller set at high RPM. Switch from both magnetos to only one and note the RPM loss; switch back to both and allow RPM to recover then switch to the other magneto and again note the RPM loss. Drop off on either magneto should not exceed 175 RPM and should be within 50 RPM of the other.

Check vacuum gauge, indicator should read 5.0" ± .1" Hg at 2000 RPM.

Check both the oil temperature and pressure. The temperature may be low for some time if the engine is being run for the first time of the day, but as long as the pressure is within limits, the engine is ready for takeoff.

Check the annunciator panel lights with the press-to-test button*.

The propeller control should be moved through its complete range to check for proper operation, and then placed in full "increase RPM" for takeoff. To obtain maximum RPM, push the pedestal mounted control fully toward the instrument panel.

In cold weather, the propeller control should be cycled at least three times, to assure that warm engine oil has circulated through the system.

Operation of the engine driven fuel pump should be checked while taxiing or during preflight engine run up by switching off the electric fuel pump and observing fuel pressure.

Carburetor heat should also be checked prior to takeoff to be sure that the control is operating properly and to clear any ice which may have formed during taxiing. Prolonged ground operation with carburetor heat ON should be avoided as the air is not filtered in this position.

Release the parking brake before taxiing.

*Serial nos. 7510001 and up

TAKEOFF

Just before takeoff the following items should be checked:

1. Fuel on proper tank
2. Electric fuel pump - on
3. Engine gauges - checked
4. Carburetor heat - off
5. Propeller - set
6. Mixture - set
7. Flaps - set
8. Trim tabs - set
9. Seat backs erect
10. Controls - free
11. Fasten belts/harness
12. Empty seats - seat belts snugly fastened
13. Door - latched

> NOTE
> Mixture full rich except a minimum amount of leaning is permitted for smooth engine operation when taking off at high elevation.

The takeoff technique is conventional for the Cherokee. The tab should be set slightly aft of neutral, with the exact setting determined by the loading of the aircraft. Allow the airplane to accelerate to 60 to 70 miles per hour, then ease back on the wheel enough to let the airplane fly itself off the ground. Premature raising of the nose, or raising it to an excessive angle, will result in a delayed takeoff. After takeoff let the aircraft accelerate to the desired climb speed by lowering the nose slightly.

Takeoffs are normally made with flaps up, to simplify operating procedure. However, for short field takeoffs, and for takeoffs under difficult conditions such as in deep grass or on a soft surface, distances can be reduced appreciably by lowering flaps to 25° (second notch).

CLIMB

The best rate of climb at gross weight will be obtained at 100 miles per hour. The best angle of climb may be obtained at 90 miles per hour. At lighter than gross weight these speeds are reduced somewhat. The recommended en route climb speed of 115 miles per hour provides increased visibility over the nose.

STALLS

The stall characteristics of the Cherokee are conventional. Visual stall warning is provided by a red light located on the left side of the instrument panel which illuminates automatically between 5 and 10 miles per hour above the stall speed. The gross weight stalling speed of the Cherokee with power off and full flaps is 65 miles per hour. With the flaps up this speed is 73 miles per hour.

Intentional spins are prohibited in this airplane. In the event that an inadvertent spin occurs, standard recovery technique should be used immediately.

CRUISING

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

The normal cruising power is 75% of the rated horsepower of the engine. True airspeeds, which may be obtained at various altitudes and power settings, can be determined from the charts in Performance Charts Section.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes, and reduces lead deposits when alternate fuels are used. The mixture should be leaned during cruising operation above 5000 feet altitude and at lower altitudes when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the FULL RICH position for all operations under 5000 feet. Always enrich the mixture before increasing power settings.

To lean the mixture to approximately the best power setting, disengage lock* and pull the mixture control back until the engine becomes rough, indicating that the lean mixture limit has been reached in the leaner cylinders. Next, enrich the mixture by pushing the control forward until engine operation becomes smooth. The best economy mixture can not be accurately set without an exhaust gas temperature gauge or equivalent.

If an optional exhaust gas temperature gauge is installed, best power mixture may be more accurately set by leaning to 125° F on the rich side of the peak temperature. Best economy fuel flow may be set by leaning to 50° F on the lean side of peak temperature. Should the current AVCO Lycoming procedures conflict with the above leaning methods, the Lycoming procedure should be followed.

When selecting cruising RPM below 2300, limiting manifold pressure for continuous operation, as specified by the Lycoming Operators Manual, should be observed.

The continuous use of carburetor heat during cruising flight decreases engine efficiency. Unless icing conditions in the carburetor are severe, do not cruise with the heat on. Apply full carburetor heat slowly and only for a few seconds at intervals determined by icing severity.

Fuel tank selection at low altitude is not recommended, since little recovery time is available in the event of an error in tank selection. When switching tanks, make sure that the selector drops into a detent and is lined up with the desired tank. The electric fuel pump should be turned on before switching tanks, and should be left on for a short period thereafter. To provide continuity of flow, the selector should be changed to another tank before fuel is exhausted from the tank in use.

During cruise, the electric fuel pump should be in the OFF position so that any malfunction of the engine driven fuel pump is immediately apparent. If signs of fuel starvation should occur at any time during flight, fuel exhaustion should be suspected, at which time the fuel selector should be immediately positioned to a full tank and the electric fuel pump switched to the ON position.

*Serial nos. 7510001 and up

In order to keep the airplane in best lateral trim during cruise flight, the fuel should be used alternately from each main tanks, and when they are nearly exhausted, from each tip tank. It is recommended that one main tank be used for one hour after takeoff; the other main tank used until nearly exhausted, then return to the first main tank. When nearly exhausted, turn to one tip tank and alternate at one-half hour intervals to maintain lateral trim. Turn electric fuel pump ON when switching tanks.

TURBULENT AIR OPERATION

In keeping with good operating practice used in all aircraft, it is recommended that when turbulent air is encountered or expected the airspeed be reduced to maneuvering speed to reduce the structural loads caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or distractions caused by the conditions.

APPROACH AND LANDING

Before landing check list:

1. Seat backs erect
2. Fasten belts/harness
3. Fuel - on proper tank
4. Electric fuel pump on
5. Mixture rich - full rich
6. Propeller set
7. Flaps set (115 MPH)

The airplane should be trimmed to an approach speed of about 90 miles per hour and flaps extended. The flaps can be lowered at speeds up to 115 miles per hour, if desired. The propeller should be set at full RPM or at a high cruising RPM to facilitate an emergency go-around if needed. Carburetor heat should not be applied unless there is an indication of carburetor icing, since the use of carburetor heat causes a reduction in power which may be critical in case of a go-around. Full throttle operation with heat on is likely to cause detonation.

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

Normally, the best technique for short and slow landings is to use full flap and enough power to maintain the desired airspeed and approach flight path. Mixture should be full rich, fuel on the fullest tank, carburetor heat off, and electric fuel pump on. Reduce the speed during the flareout and contact the ground close to the stalling speed (60 to 70 MPH). After ground contact hold the nose wheel off as long as possible. As the airplane slows down, drop the nose and apply the brakes. There will be less chance of skidding the tires if the flaps are retracted before applying the brakes. Braking is most effective when back pressure is applied to the control wheel, putting most of the aircraft weight on the main wheels. In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds with partial or no flaps.

STOPPING ENGINE

At the pilot's discretion, the flaps should be raised and the electric fuel pump turned off. After parking, the radios should be turned off, the propeller set in the full increase position, and the engine stopped by disengaging the mixture control lock* and pulling the mixture control out to idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping. Then the magneto and master switches must be turned off and the parking brake set.

AIRSPEED DATA

All airspeeds quoted in this manual are calibrated unless otherwise noted. Calibrated airspeed is indicated airspeed corrected for instrument and position errors. The following table gives the correlation between indicated airspeed and calibrated airspeed if zero instrument error is assumed. This calibration is valid only when flown at maximum gross weight in level flight.

AIRSPEED CORRECTION TABLE

Flaps 0°												
IAS - MPH	60	70	80	90	100	110	120	130	140	150	160	170
CAS - MPH	67	76	85	94	103	112	120	129	138	147	156	164

Flaps 40°							
IAS - MPH	60	70	80	90	100	110	120
CAS - MPH	64	73	82	91	100	109	118

MOORING

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

WEIGHT AND BALANCE

It is the responsibility of the owner and pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight. For weight and balance data see the Airplane Flight Manual and Weight and Balance form supplied with each airplane.

*Serial nos. 7510001 and up

EMERGENCY LOCATOR TRANSMITTER*

The Emergency Locator Transmitter (ELT) when installed, is located in the aft portion of the fuselage just below the stabilator leading edge and is accessible through a plate on the right side of the fuselage. (On aircraft manufactured prior to mid-1975, this plate is retained by three steel Phillips head screws. On aircraft manufactured from mid-1975 and on, this plate is attached with three slotted-head nylon screws for ease of removal; these screws may be readily removed with a variety of common items such as a dime, a key, a knife blade, etc. If there are no tools available in an emergency the screw heads may be broken off by any means.) The ELT is an emergency locator transmitter which meets the requirements of FAR 91.52. It is automatically activated by a longitudinal force of 5 g's and transmits a distress signal on both 121.5 MHz and 243.0 MHz for a period of from 48 hours in low temperature areas up to 100 hours in high temperature areas. The unit operates on a self-contained battery. The replacement date as required by FAA regulations is marked on the transmitter label.

The battery should also be replaced if the transmitter has been used in an emergency situation or if accumulated test time exceeds one hour. The unit is equipped with a portable antenna to allow the locator to be removed from the airplane in case of an emergency and used as a portable signal transmitter.

On the unit itself is a three position selector switch placarded "OFF," "ARM" and "ON." The "ARM" position is provided to set the unit to the automatic position so that it will transmit only after impact and will continue to transmit until the battery is drained to depletion or until the switch is manually moved to the "OFF" position. The "ARM" position is selected when the transmitter is installed at the factory and the switch should remain in that position whenever the unit is installed in the airplane. The "ON" position is provided so the unit can be used as a portable transmitter or in the event the automatic feature was not triggered by impact or to periodically test the function of the transmitter.

Select the "OFF" position when changing the battery, when rearming the unit if it has been activated for any reason, or to discontinue transmission.

NOTE

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

A pilot's remote switch, located on the left side panel, is provided to allow the transmitter to be controlled from inside the cabin.

1. On some models the pilot's remote switch has three positions and is placarded "ON," "AUTO/ARM," and "OFF/RESET." The switch is normally left in the "AUTO/ARM" position. To turn the transmitter off, move the switch momentarily to the "OFF/RESET" position. The aircraft master switch must be "ON" to turn the transmitter "OFF." To activate the transmitter for tests or other reasons, move the switch upward to the "ON" position and leave it in that position as long as transmission is desired.

***Optional equipment**

2. On other models the pilot's remote switch has two positions and is placarded "ON/RESET" and "ARM (NORMAL POSITION)." The switch is normally left in the down or "ARM" position. To turn the transmitter off, move the switch to the "ON/RESET" position for one second then return it to the "ARM" position. To activate the transmitter for tests or other reasons, move the switch upward to the "ON/RESET" position and leave it in that position as long as transmission is desired.

The locator should be checked during the ground check to make certain the unit has not been accidentally activated. Check by tuning a radio receiver to 121.5 MHz. If there is an oscillating sound, the locator may have been activated and should be turned off immediately. Reset to the "ARM" position and check again to insure against outside interference.

NOTE

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

OPERATING TIPS

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The following Operating Tips are of particular value in the operation of the Cherokee 235.

1. Learn to trim for takeoff so that only a very light back pressure on the wheel is required to lift the airplane off the ground.
2. The best speed for takeoff is about 65 MPH under normal conditions. Trying to pull the airplane off the ground at too low an airspeed decreases the controllability of the airplane in event of engine failure.
3. Flaps may be lowered at airspeeds up to 115 MPH. To reduce flap operating loads, it is desirable to have the airplane at a slower speed before extending the flaps.
4. Before attempting to reset any circuit breaker, allow a two to five minute cooling off period.
5. Before starting the engine, check that all radio switches, light switches and the pitot heat switch are in the off position to reduce the load on the battery when the starter is engaged.
6. The overvoltage relay is provided to protect the electronics equipment from a momentary overvoltage condition (approximately 16.5 volts and up), or a catastrophic regulator failure. In the event of a momentary condition, the relay will open and the ammeter will indicate "0" output from the alternator. The relay may be reset by switching the ALT switch to OFF for approximately one second and then returning the ALT switch to ON. If the condition persists after recycling the ALT switch, reduce the battery load to a minimum and terminate the flight as soon as practical. The ALT light on the annunciator panel* will illuminate if the alternator fails. Recycle the ALT switch and check the ALT FIELD circuit breaker. If the failure persists after this action, reduce electrical loads and land as soon as practical.
7. The vacuum gauge is provided to monitor the pressure available to assure the correct operating speed of the vacuum driven gyroscopic flight instruments. It also monitors the condition of the common air filter by measuring the flow of air through the filter.

   If the vacuum gauge does not register 5.0" ± .1" Hg at 2000 RPM, the following items should be checked before flight:

   a. Common air filter could be dirty or restricted.
   b. Vacuum lines could be collapsed or broken.
   c. Vacuum pump worn.
   d. Vacuum regulator, not adjusted correctly. The pressure, even though set correctly, can read lower under two conditions: (1) Very high altitude, above 12,000 feet, (2) Low engine RPM, usually on approach or during training maneuvers. This is normal and should not be considered a malfunction.

*Serial nos. 7510001 and up

8. The shape of the wing fuel tanks is such that in certain maneuvers the fuel may move away from the tank outlet. If the outlet is uncovered, the fuel flow will be interrupted and a temporary loss of power may result. Pilots can prevent inadvertent uncovering of the outlet by avoiding maneuvers which could result in uncovering the outlet.

   Extreme running turning takeoffs should be avoided as fuel flow interruption may occur.

   Prolonged slips or skids which result in excess of 2000 feet of altitude loss, or other radical or extreme maneuvers which could cause uncovering of the fuel outlet must be avoided as fuel flow interruption may occur when tank being used is not full.
9. 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 when taxiing in the vicinity of other aircraft.
10. The rudder pedals are suspended from a torque tube which extends across the fuselage. The pilot should become familiar with the proper positioning of his feet on the rudder pedals so as to avoid interference with the torque tube when moving the rudder pedals or operating the toe brakes.
11. In an effort to avoid accidents, pilots should obtain and study the safety related information made available in FAA publications such as regulations, advisory circulars, Aviations News, AIM and safety aids.
12. During letdown and low power flight operations, it may be necessary to lean because of excessively rich mixture. Always go to full rich prior to landing sequence.
13. When leaning, careful observation of the temperature instruments should be practiced.
14. When alternate fuels are used, the engine should be run up to 1200 RPM for one minute prior to shutdown to clean out any unburned fuel.

PERFORMANCE CHARTS

PERFORMANCE CHARTS

WARNING

Performance information derived by extrapolation beyond the limits shown on the charts should not be used for flight planning purposes.

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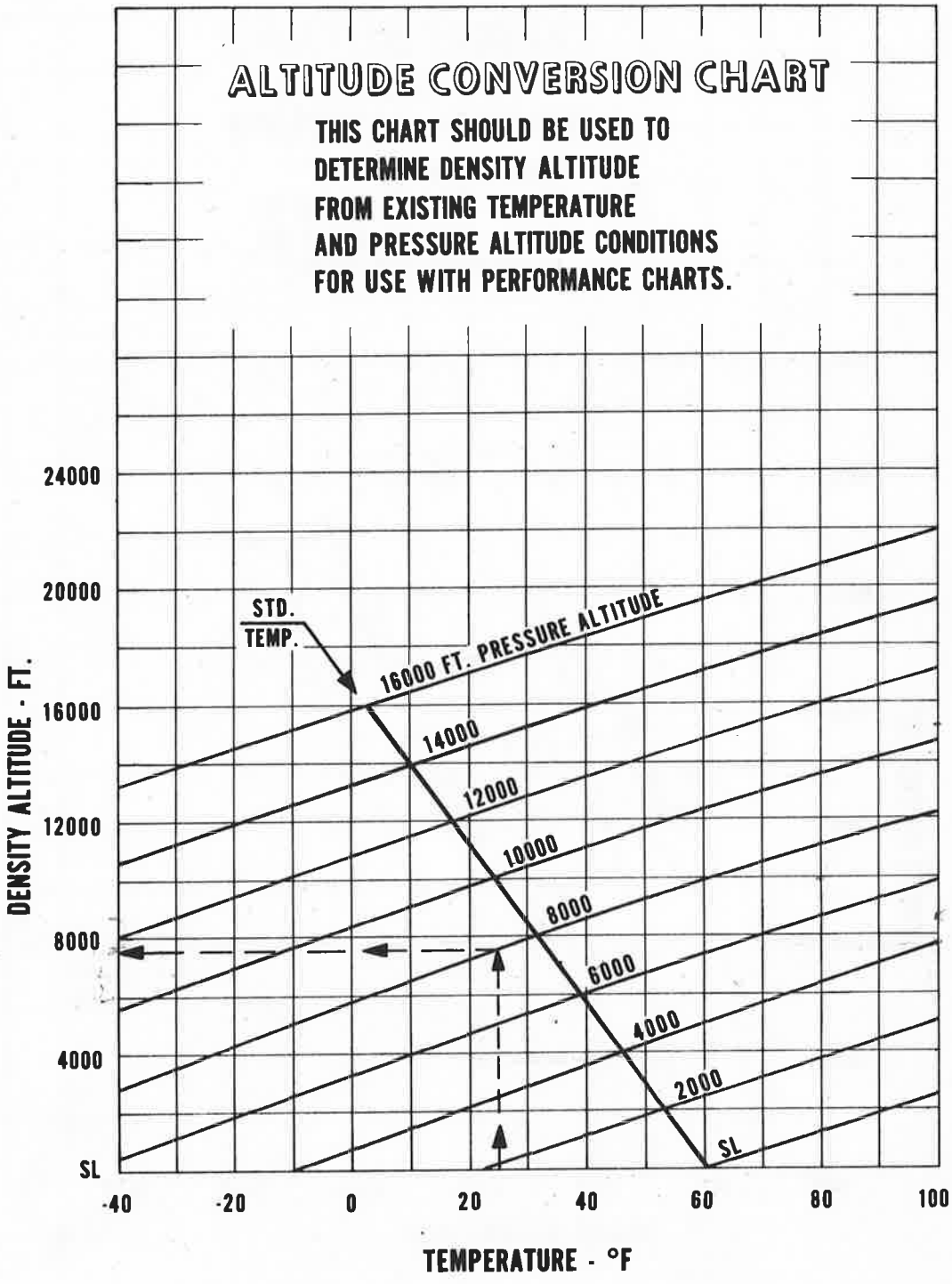
CHEROKEE



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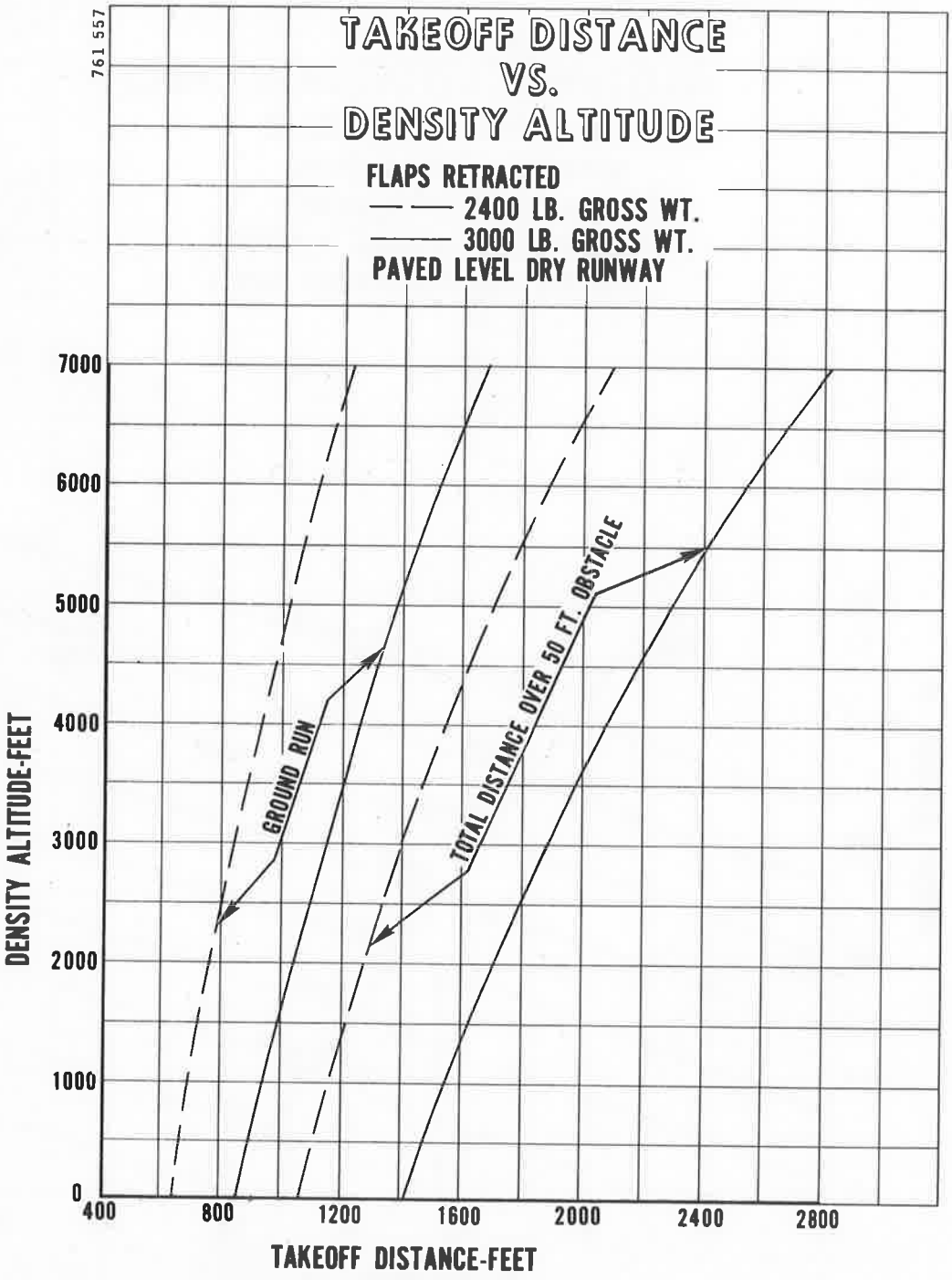

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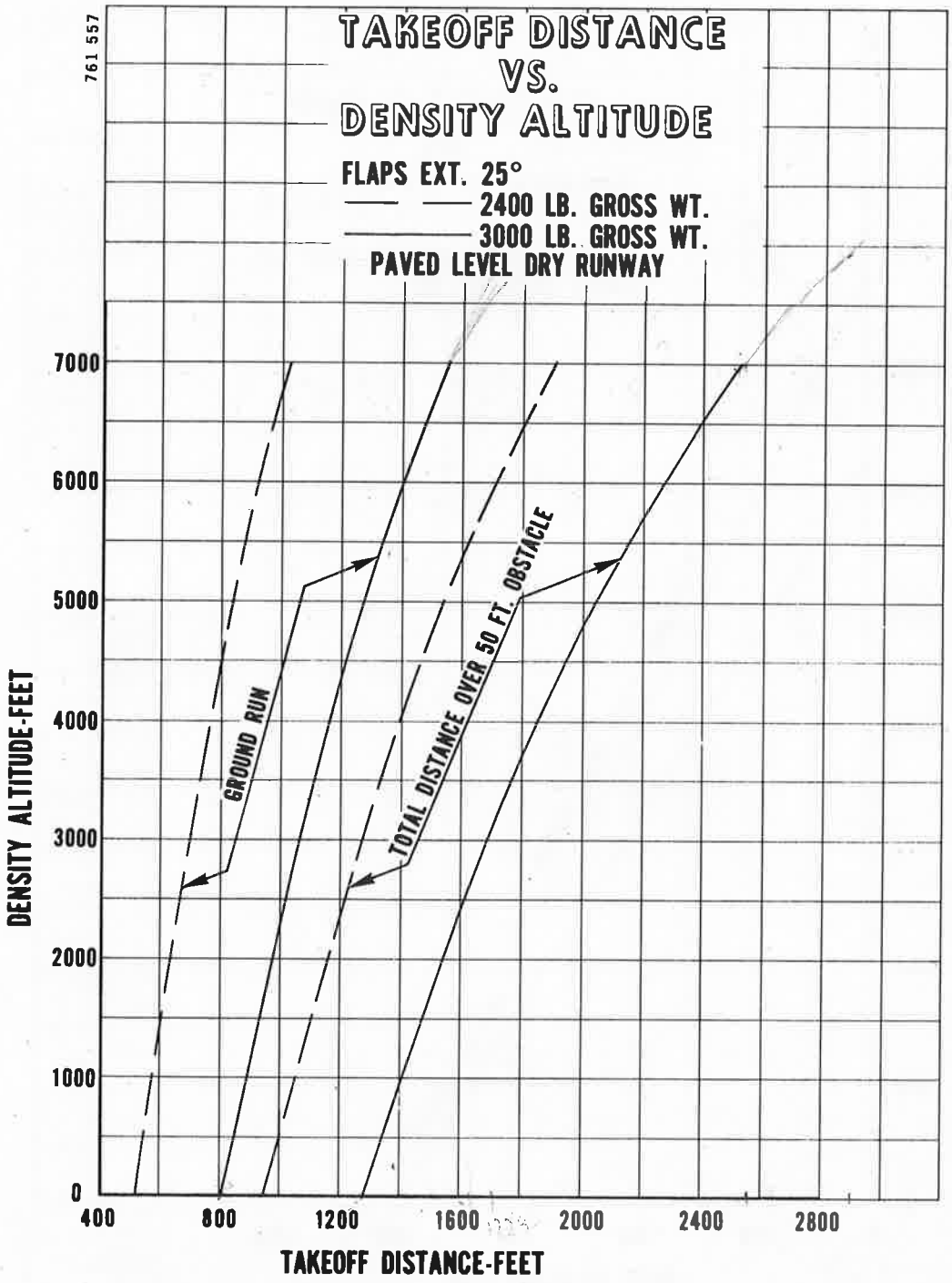

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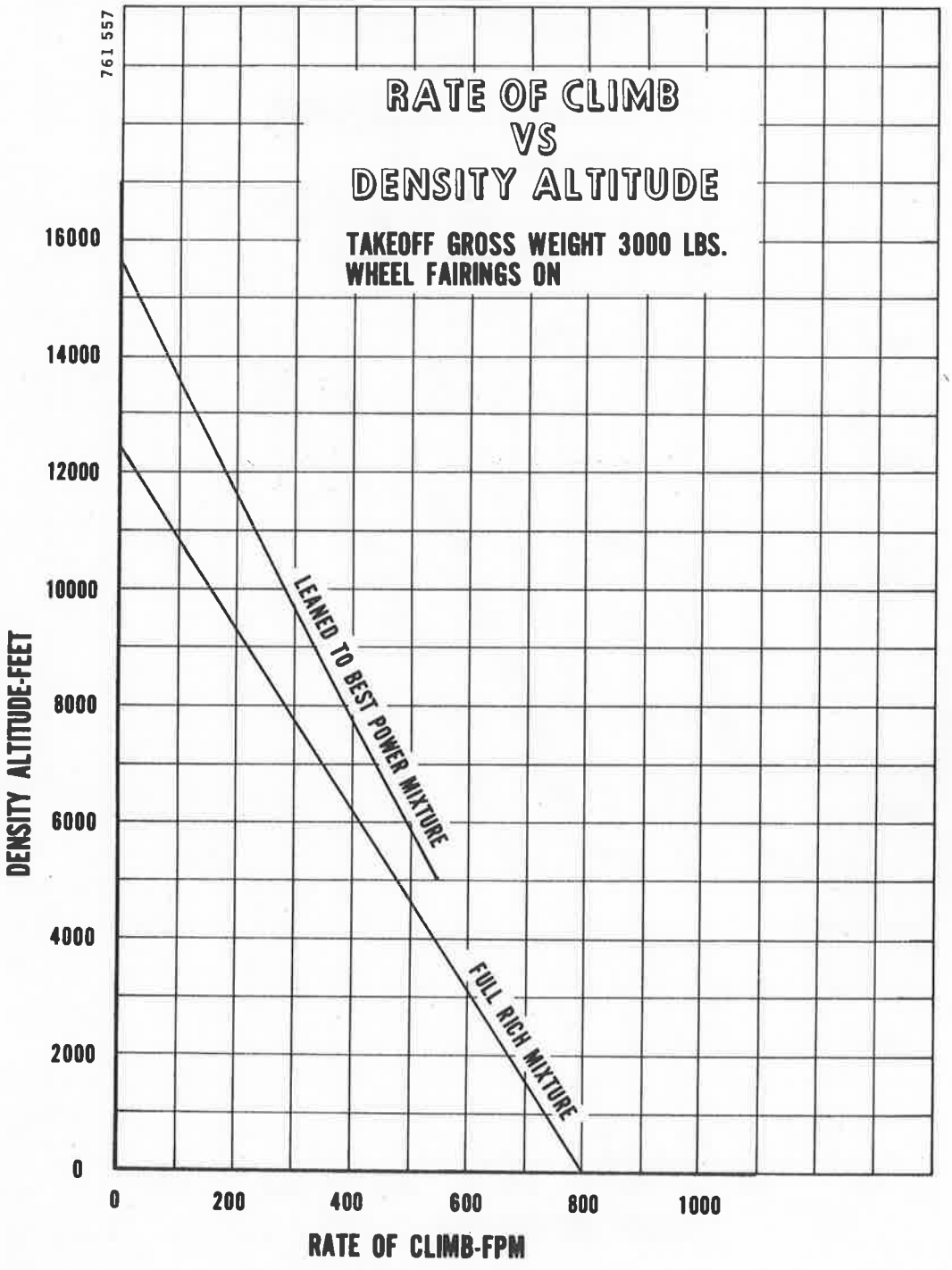

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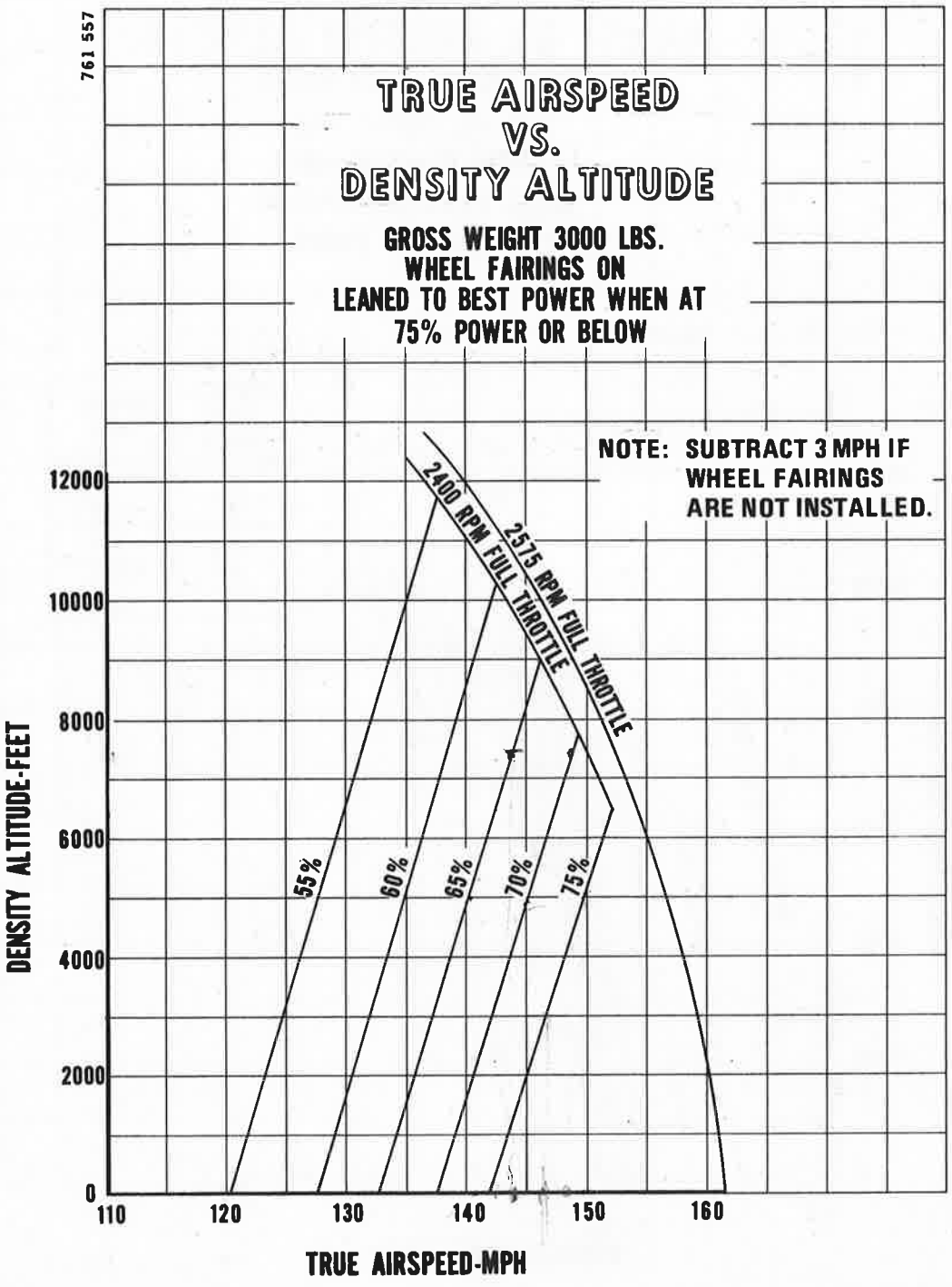

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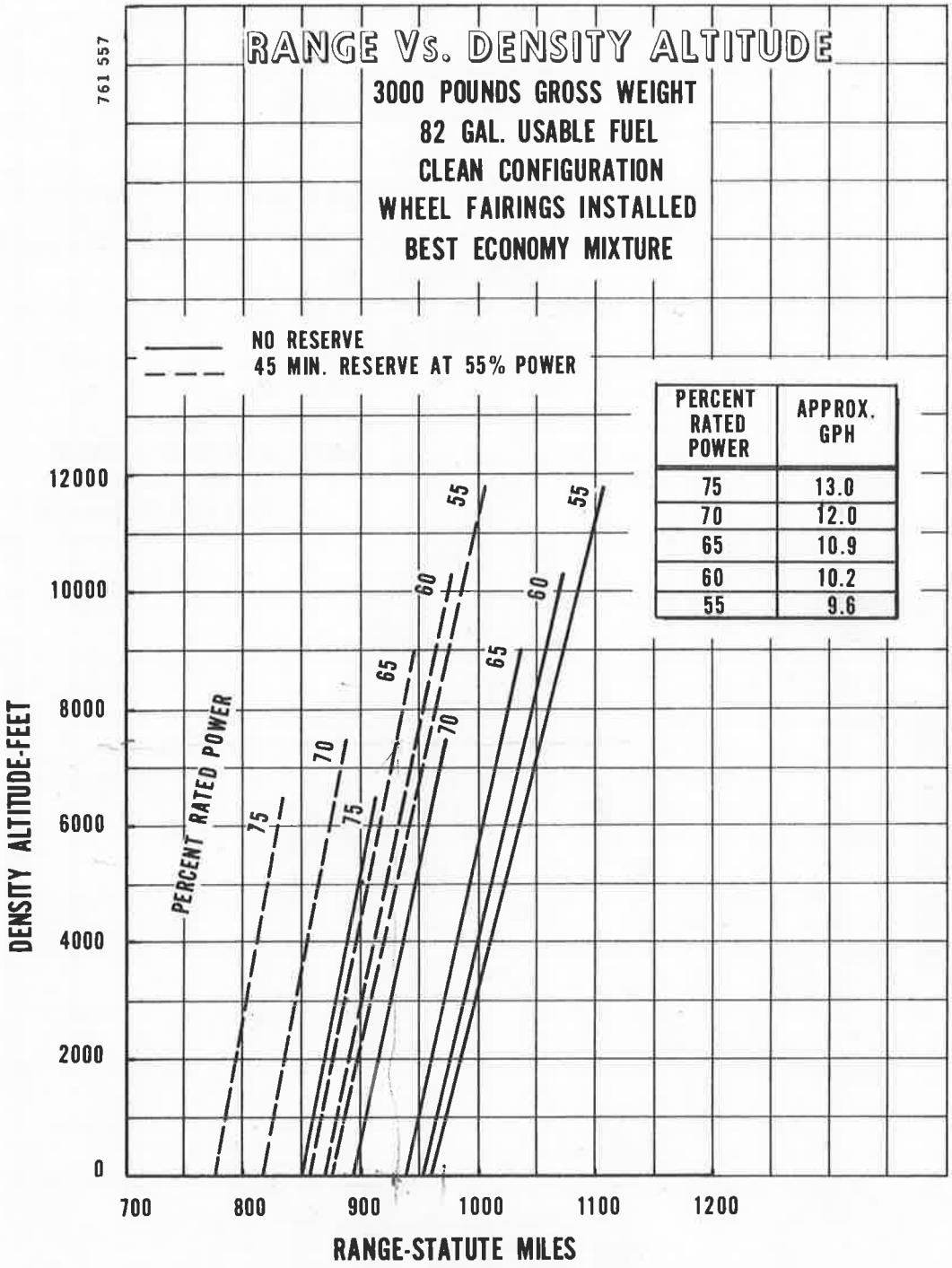

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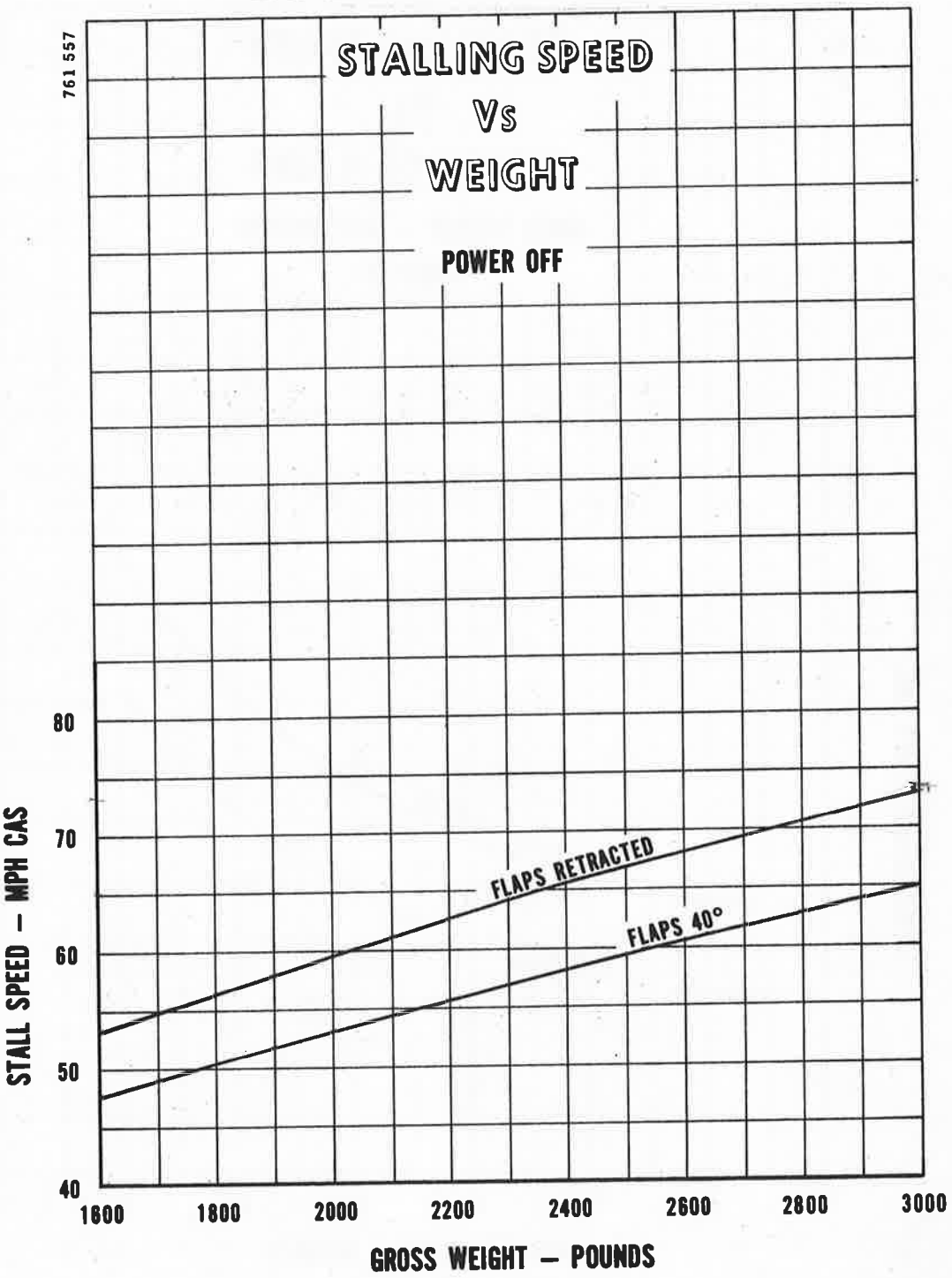

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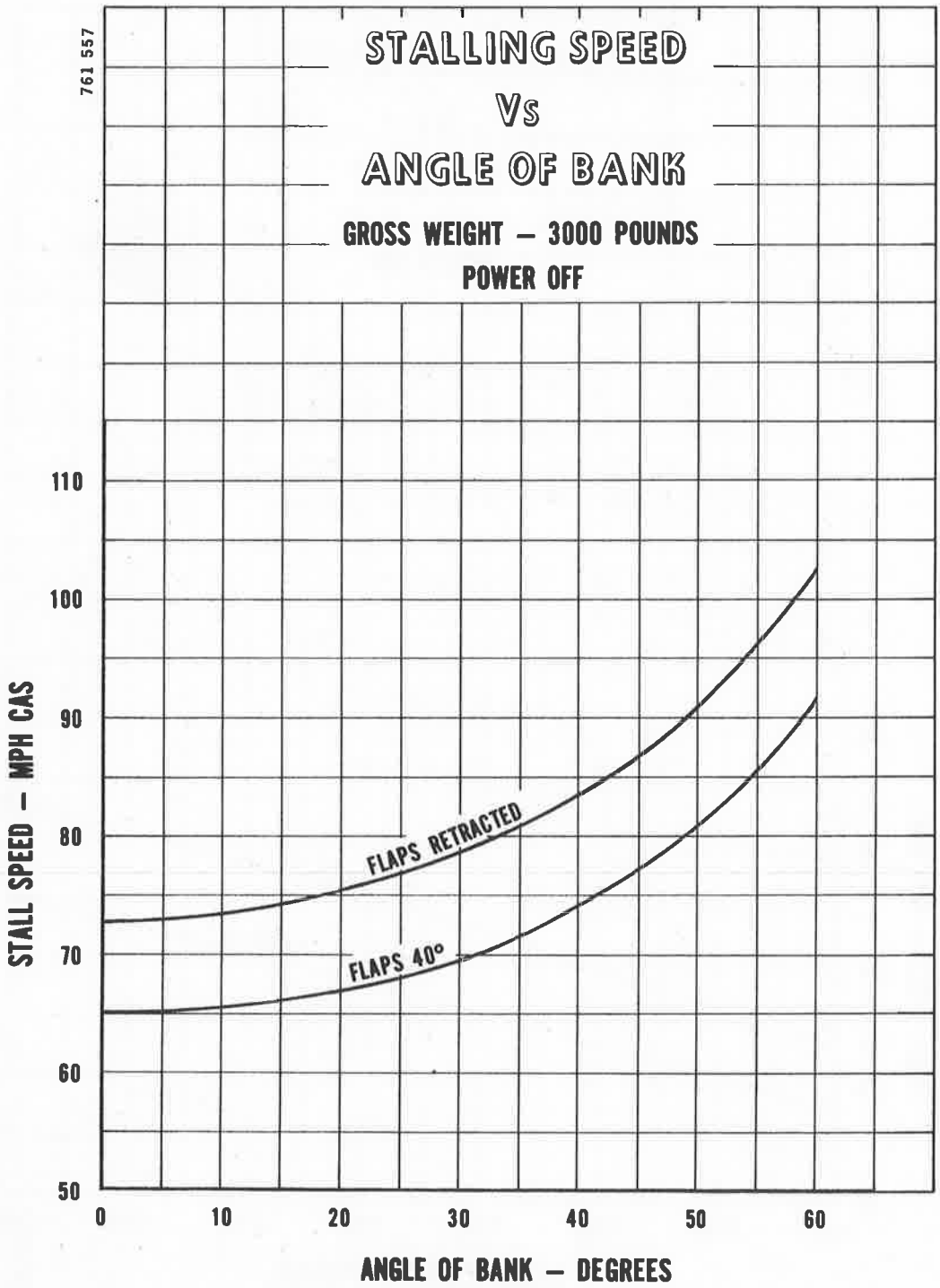

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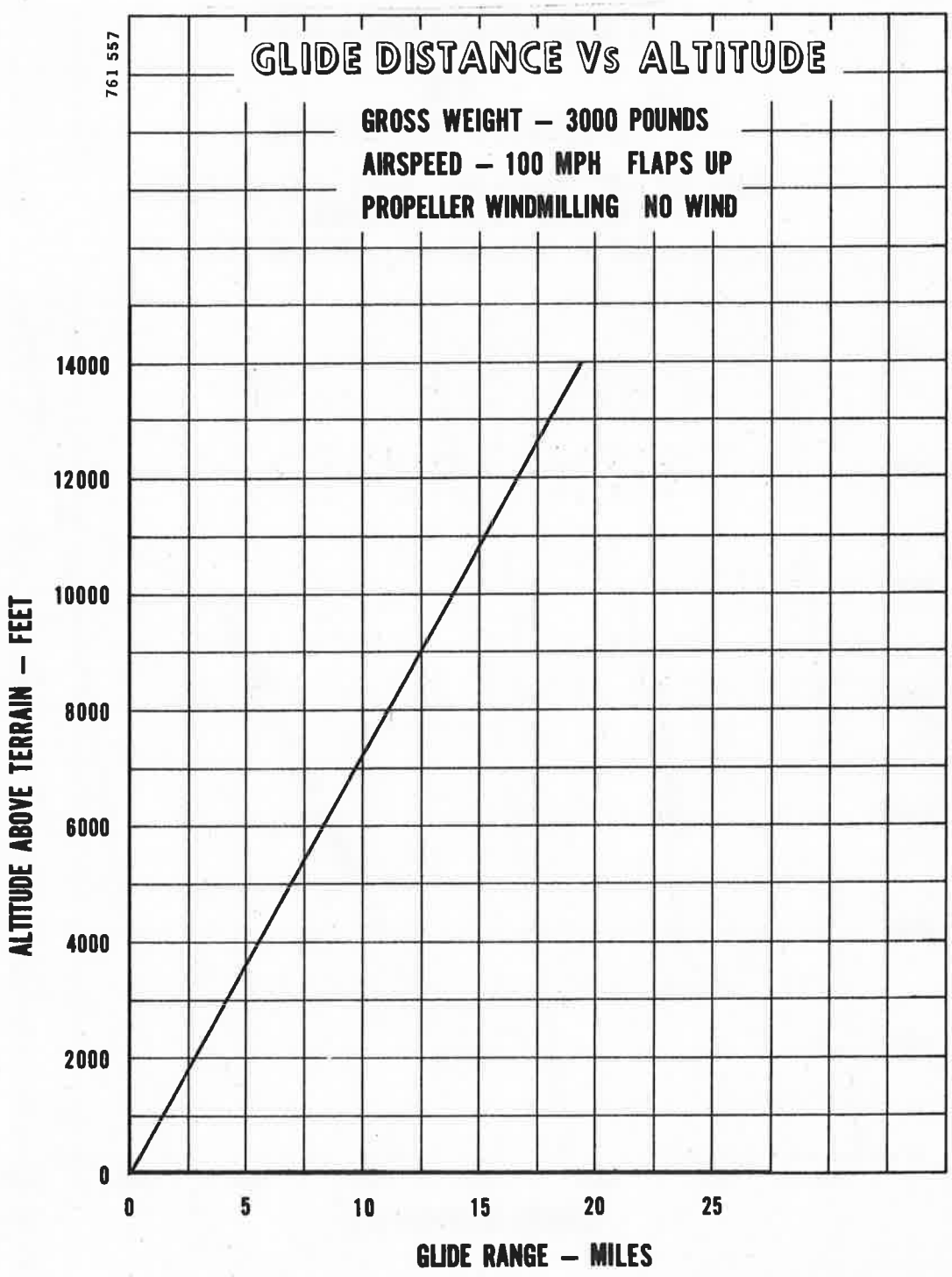

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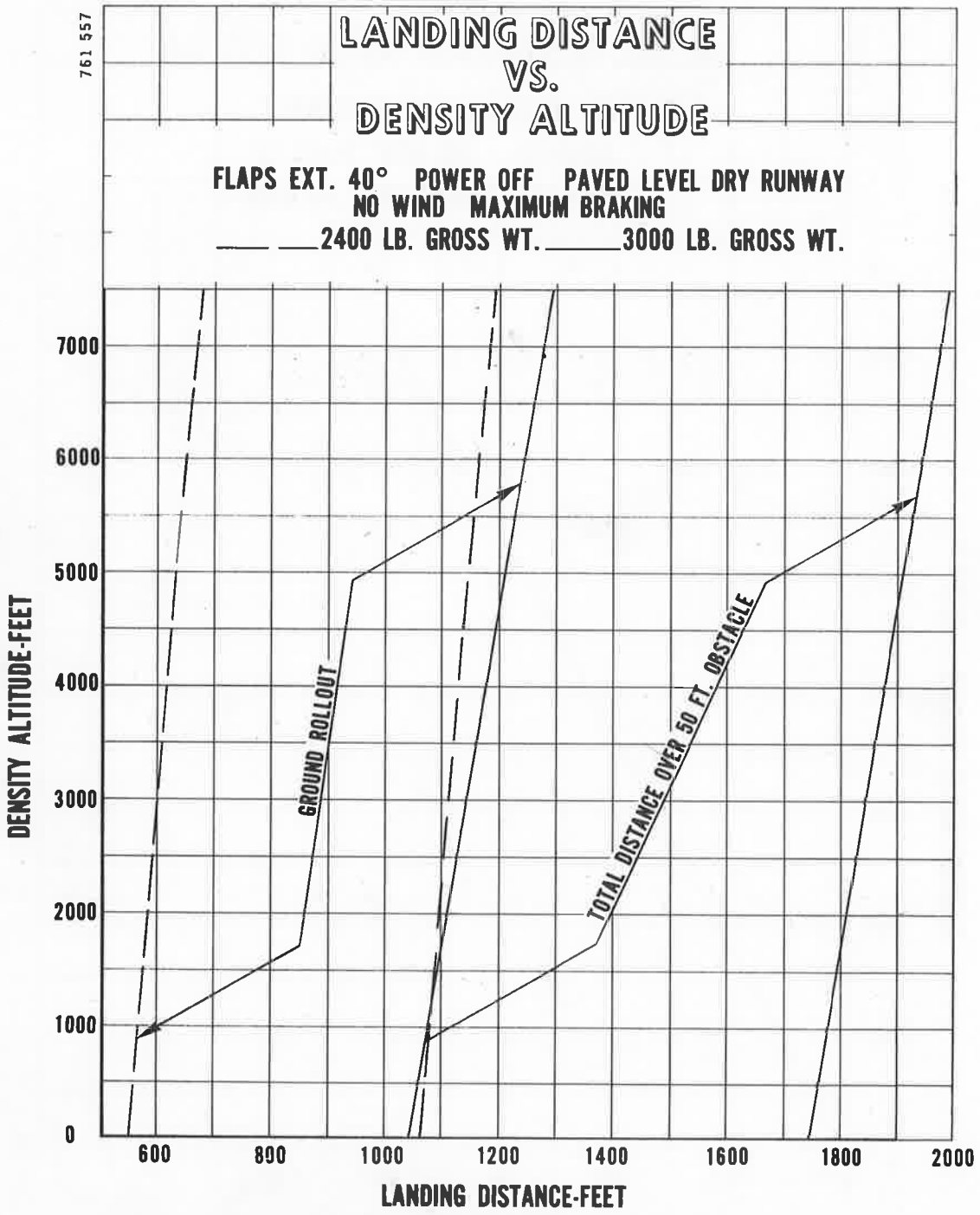

HANDLING AND SERVICING

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This section contains information on preventive maintenance. Refer to the PA-28 Service Manual for further maintenance procedures. Any complex repair or modification should be accomplished by a Piper Certified Service Center.

GROUND HANDLING

TOWING

The airplane may be moved by using the nose wheel steering bar provided, or power equipment that will not damage or cause excess strain to the nose gear assembly. The steering bar is stowed in the baggage compartment.

CAUTION

When towing with power equipment, do not turn nose gear more than 30 degrees in either direction, as this will result in damage to the nose gear and steering mechanism.

TAXIING

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Engine starting and shut-down procedures as well as taxi techniques should be covered. When it is ascertained that the propeller back blast and taxi areas are clear and that the parking brake is released, power should be applied to start the taxi roll, and the following checks should be performed:

a. Taxi forward a few feet and apply brakes to determine their effectiveness.
b. Taxi with propeller set in low pitch, high RPM setting.
c. While taxiing, make slight turns to ascertain the effectiveness of the steering.
d. Observe wing clearances when taxiing near buildings or other stationary objects. If possible, station a guide outside the airplane to observe.
e. When taxiing on uneven ground, look for holes and ruts.
f. Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, **gravel or any loose material that may cause damage to the propeller blades.**

PARKING

When parking the airplane, insure that it is sufficiently protected against adverse weather conditions and presents no danger to other aircraft. When parking the airplane for any length of time or overnight, it is recommended that it be moored securely.

a. To park the airplane, head it into the wind, if possible.
b. Set the parking brake. (Use wheel chocks if available.)

NOTE

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

MOORING

The airplane should be moored to insure its immovability, protection and security under varying weather conditions. The following procedure should be used for proper mooring of the airplane.

a. Head the airplane into the wind, if possible.
b. Lock the aileron and stabilator controls by looping the seat belt through the control wheel and pulling it snug.
c. Block the wheels.
d. Secure tie down ropes to the wing tie down rings and 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 or locked slip knots. Do not use a plain slip knot.

NOTE

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

e. Install a pitot head cover, if available.

CLEANING

CLEANING ENGINE COMPARTMENT

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

a. Place a large pan under the engine to catch waste.
b. With the engine cowling removed, spray or brush the engine with solvent or a mixture of solvent and degreaser, as desired. Where heavy grease and dirt deposits have collected, it may be necessary to brush areas that were sprayed in order to clean them.

CAUTION

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

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

CAUTION

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

d. Remove the protective covers from the magnetos.
e. Lubricate controls, bearing surfaces, etc., in accordance with the Lubrication Chart.

CLEANING LANDING GEAR

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

a. Place a pan under the gear to catch waste.
b. Spray or brush the gear area with solvent or a mixture of solvent and degreaser, as desired. Where heavy grease and dirt deposits have collected, it may be necessary to brush areas that were sprayed in order to clean them
c. Allow the solvent to remain on the gear from five to ten minutes. Then rinse the gear with additional solvent and allow to dry.
d. Remove the cover from the wheel and remove the catch pan.
e. Lubricate the gear in accordance with the Lubrication Chart.

CLEANING EXTERIOR SURFACES

The airplane should be washed with a mild soap and water. Harsh abrasive or alkaline soaps or detergents used on painted or plastic surfaces could make scratches or cause corrosion of metal surfaces. Cover areas where cleaning solution could cause damage. To wash the airplane, the following procedure may be used:

a. Flush away loose dirt with water.
b. Apply cleaning solution with a rag, sponge or soft bristle brush.
c. To remove stubborn oil and grease, use a cloth dampened with naphtha.
d. Where exhaust stains exist, allow solution to remain on the surface longer.
e. Any good automotive wax may be used to preserve the painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing. A heavier coating of wax on the leading surfaces will reduce the abrasion problems in these areas.

CLEANING WINDSHIELD AND WINDOWS

A certain amount of care is needed to keep the plexiglas windows clean and unmarred. The following procedure is recommended:

a. Remove dirt, mud, and other marks from exterior surface with clean water.
b. Wash with mild soap and warm water or an aircraft plastic cleaner. Use a soft cloth or sponge using a straight rubbing motion. Do not rub surface harshly.
c. Remove oil and grease with a cloth moistened with kerosene.

NOTE

Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or window cleaning sprays.

d. After cleaning plastic surfaces, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth. Do not use a circular motion.
e. A severe scratch or mar in plastic can be removed by using jeweler's rouge to rub out the scratch. Smooth both sides and apply wax.

CLEANING HEADLINER, SIDE PANELS AND SEATS

a. Clean headliner, side panels and seats with a stiff bristle brush, and vacuum where necessary.
b. Soiled upholstery, except leather, may be cleaned by using an approved foam upholstery cleaner. Carefully follow the manufacturer's instructions. Avoid soaking or harsh rubbing.

CAUTION

Solvent cleaners require adequate ventilation.

CLEANING CARPETS

Use a small whisk broom or vacuum cleaner to remove dirt. For soiled spots, use a noninflammable dry cleaning fluid.

POWER PLANT INDUCTION AIR FILTER

The air filter must be cleaned at least once every fifty hours. Under extremely adverse conditions of operation it may be necessary to clean the filter daily. Extra filters are inexpensive and a spare should be kept on hand and used as a rapid replacement.

REMOVAL OF INDUCTION AIR FILTER

a. Remove top cowl.
b. Remove the wing nuts on the filter cover.
c. Remove filter.

CLEANING INDUCTION AIR FILTER

a. Tap filter gently to remove dirt particles. Do not use compressed air or cleaning solvents.
b. Inspect filter. If paper element is torn or ruptured or gasket is damaged, the filter should be replaced. The usable life of the filter should be restricted to one year or 500 hours, whichever comes first.

INSTALLATION OF INDUCTION AIR FILTER

After cleaning or replacing the filter, install it in the reverse order of removal.

BRAKE SERVICE

The brake system is filled with MIL-H-5606 (petroleum base) hydraulic brake fluid. This should be checked at every 50 hour inspection and replenished when necessary by filling the brake reservoir on the fire wall to the indicated level. If the entire system has to be refilled, it should be done by filling from the brake end of the system with fluid under pressure. This will eliminate air from the system.

No adjustment of brake clearances is necessary on the Cherokee. If after extended service the brake blocks become worn excessively, they are easily replaced with new segments.

LANDING GEAR SERVICE

Main wheels are removed by taking off the wheel fairings, hub cap, axle nut, retainer pin, and the two bolts holding the brake segment in place. The wheel will slip easily from the axle.

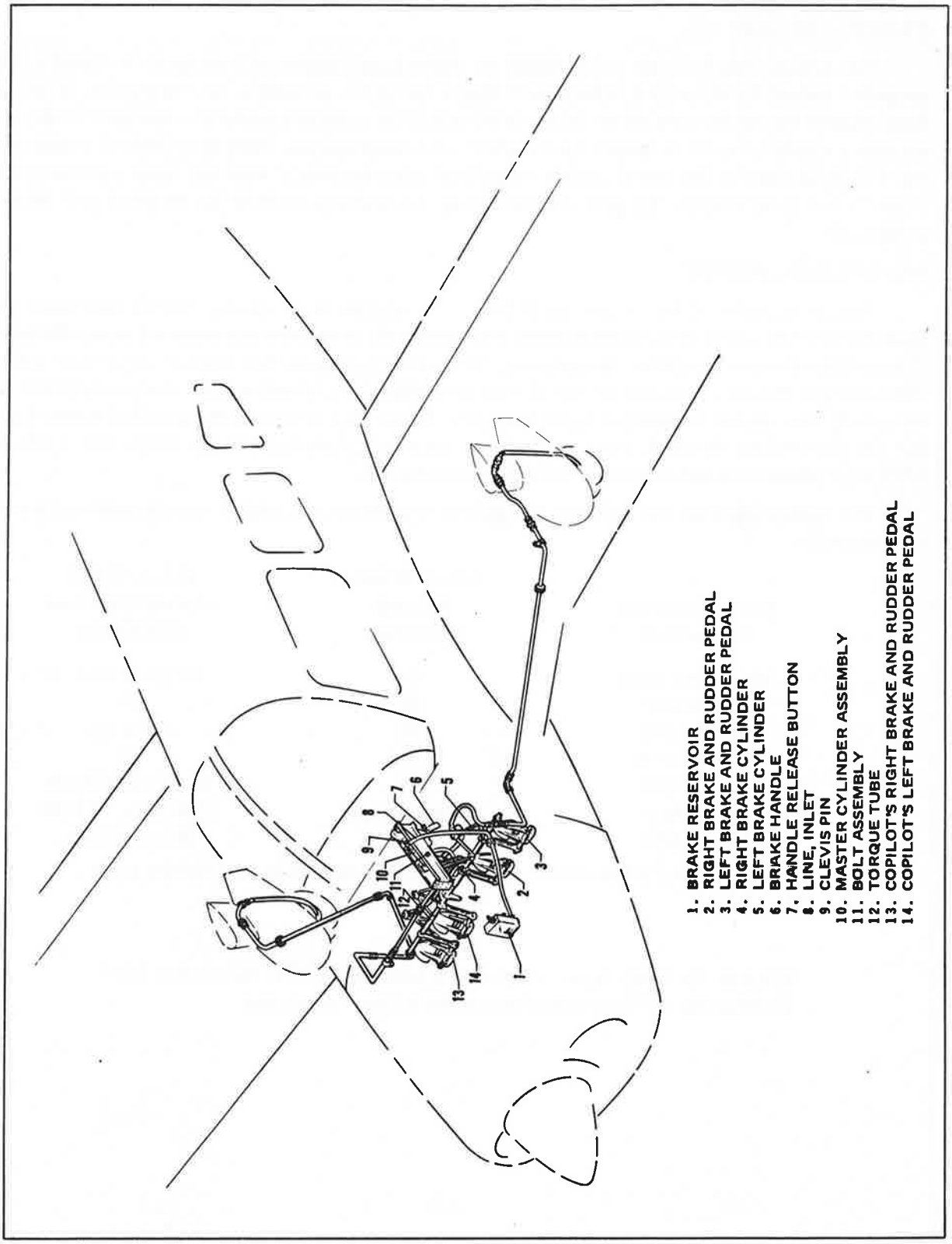
Tires are removed from the wheels by first deflating the tire, then removing the through bolts, and separating the wheel halves.

Landing gear oleo struts should be checked for proper strut exposures and fluid leaks. The required extensions for the strut when under normal static load (empty weight of airplane plus full fuel and oil) are 3-1/4 inches for the nose gear and 4-1/2 inches for the main gear. Should the strut exposure be below that required, it should be determined whether air or oil is required by first raising the airplane on jacks. Depress the valve core to allow air to escape from the strut housing chamber. Remove the filler plug and slowly raise the strut to full compression. If the strut has sufficient fluid, it will be visible up to the bottom of the filler plug hole and will then require only proper inflation.

Should fluid be below the bottom of the filler plug hole, oil should be added. Replace the plug with valve core removed; attach a clear plastic hose to the valve stem of the filler plug and submerge the other end in a container of hydraulic fluid (MIL-H-5606). Fully compress and extend the strut several times, thus drawing fluid from the container and expelling air from the strut chamber. To allow fluid to enter the bottom chamber of the main gear strut housing, the torque link assembly must be disconnected to let the strut be extended a minimum of 10 inches (the nose gear torque links need not be disconnected). Do not allow the strut to extend more than 12 inches. When air bubbles cease to flow through the hose, compress the strut fully and again check fluid level. Reinstall the valve core and filler plug, and the main gear torque links, if disconnected.

With fluid in the strut housing at the correct level, attach a strut pump to the air valve and with the airplane on the ground, inflate the oleo strut to the correct height.

In jacking the Cherokee for landing gear service, a jack kit (available through the Piper Dealers and Distributors) should be used. This kit consists of two hydraulic jacks and a tail stand. At least 425 pounds of ballast should be placed on the tail stand before jacking the aircraft. The jacks should be placed under the jack points on the wing and the airplane jacked up until the tail skid is at the right height to attach the tail stand. After attaching the tail stand and adding ballast, jacking may be continued until the aircraft is at the height desired.



Brake System

PROPELLER SERVICE

The spinner and backing plate should be cleaned and inspected frequently for cracks. The propeller should be inspected before each flight for nicks, scratches, and corrosion. If found, they should be taken care of as soon as possible by a rated mechanic, because nicks and scratches cause areas of increased stress which can cause serious damage or loss of a propeller tip. The back face of the blades should be painted when necessary with flat black paint to retard glare to the pilot's eyes. To prevent corrosion the surface should be cleaned and waxed periodically.

OIL REQUIREMENTS

The oil capacity of the Lycoming O-540 series engines is 12 quarts, and the minimum safe quantity is 2-3/4 quarts. It is recommended that engine oil be drained and renewed every 50 hours. The oil filter element should be changed every 50 hours of operation. The interval between oil and oil filter changes should not exceed a total of four (4) months. Under unfavorable dusty conditions, the oil and oil filter should be changed more frequently. Should fuel other than the specified octane rating for the power plant be used, refer to the latest issue of Lycoming Service Letter No. L185 for additional information and recommended service procedures.

The following seasonal aviation oil grades and seasonal ambient temperature ranges are recommended.

Average Ambient Temperature	MIL-L-6082B Mineral SAE Grade	MIL-L-22851 Ashless Dispersant SAE Grades
All Temperatures	--	15W-50 or 20W-50
Above 80°F	60	60
Above 60°F	50	40 or 50
30°F to 90°F	40	40
0°F to 70°F	30	30, 40 or 20W-40
0°F to 90°F	20W-50	20W-50 or 15W-50
Below 10°F	20	30 or 20W-30

When operating temperatures overlap indicated ranges, use the lighter grade oil.

NOTE

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

FUEL SYSTEM (AVGAS ONLY)

FUEL REQUIREMENTS

The minimum aviation grade fuel for the PA-28-235 is 80/87. Since the use of lower grades can cause serious engine damage in a short period of time, the engine warranty is invalidated by the use of lower octanes.

Whenever 80/87 is not available, the lowest lead 100 grade should be used. (See Fuel Grade Comparison Chart, Page 10-9.) Refer to the latest issue of Lycoming Service Instruction No. 1070 for additional information.

The continuous use, more than 25% of the operating time, of the higher leaded fuels can result in increased engine deposits, both in the combustion chamber and in the engine oil. It may require increased spark plug maintenance and more frequent oil changes. The frequency of spark plug maintenance and oil drain periods will be governed by the amount of lead per gallon and the type of operation. Operation at full rich mixture requires more frequent maintenance periods; therefore it is important to use proper approved mixture leaning procedures.

Reference the latest issue of Lycoming Service Letter No. L185 for care, operation and maintenance of the airplane when using the higher leaded fuel.

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A summary of the current grades as well as the previous fuel designations is shown in the following chart:

FUEL GRADE COMPARISON CHART

Previous Commercial Fuel Grades (ASTM-D910)			Current Commercial Fuel Grades (ASTM-D910-75)			Current Military Fuel Grades (MIL-G-5572F)		
Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal
80/87	red	0.5	80	red	0.5	80/87	red	0.5
91/96	blue	2.0	*100LL	blue	2.0	100/130	blue	2.0
100/130	green	3.0	100	green	**3.0	none	none	none
115/145	purple	4.6	none	none	none	115/145	purple	4.6

* - Grade 100LL fuel in some over seas countries is colored green and designated as "100L."

** -Commercial fuel grade 100 and grade 100/130 having TEL content of up to 4 ml/U.S. gallons are approved for use in all engines certificated for use with grade 100/130 fuel.

FILLING FUEL TANKS

Observe all required precautions for handling gasoline. Each main inboard tank holds a maximum of 25 gallons and each wing tip tank holds a maximum of 17 gallons. When using less than the standard 84 gallon capacity of the tanks, fuel should be distributed equally between each side, filling the wing tip tanks first.

DRAINING FUEL VALVES AND LINES

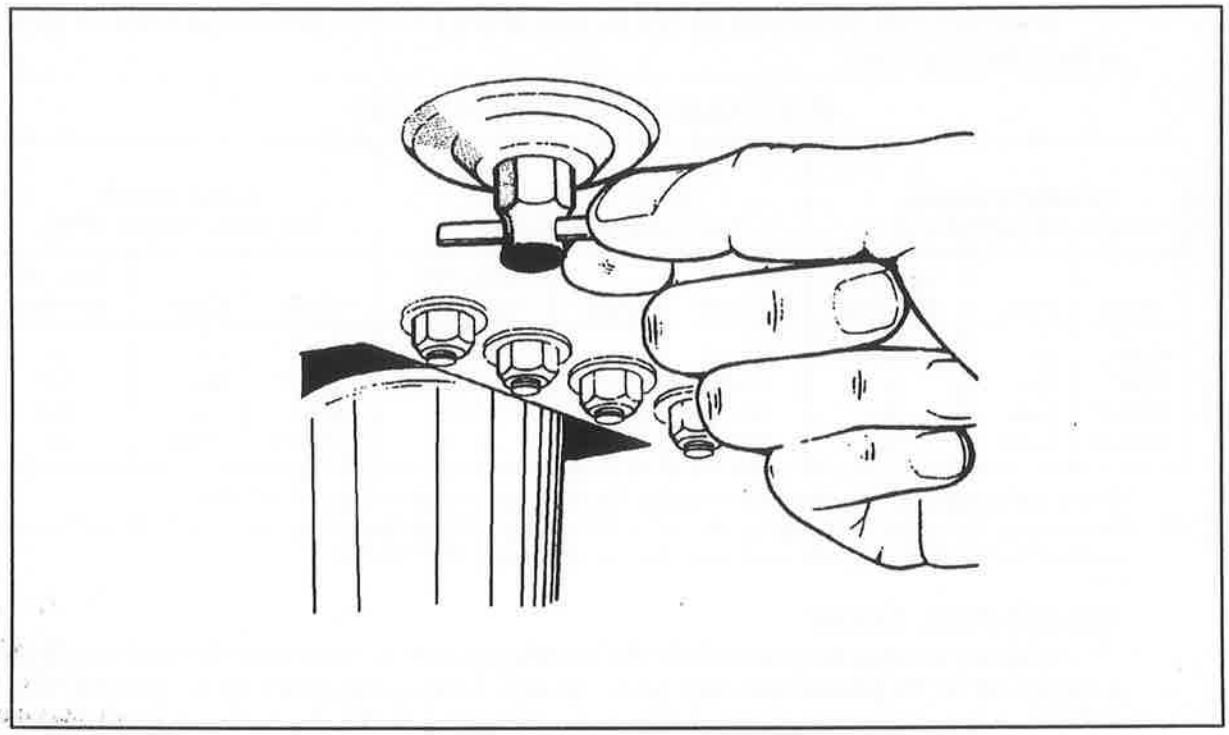
The fuel system should be drained daily prior to first flight and after refueling to avoid the accumulation of water or sediment and to check for proper fuel (a special bottle is furnished for this operation). Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer and a system quick drain valve are located in the fuselage at the lowest point of the fuel system. It is important that the fuel system be drained in the following manner:

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

b. Place a container under the fuel sump drain outlet, which is located under the fuselage.

c. Drain the fuel strainer by pressing down on the lever located on the right hand side of the cabin below the forward edge of the rear seat. The fuel selector must be positioned in the following sequence: off position, left tip, left main, right main, and right tip while draining the strainer to ensure that the fuel lines between each tank outlet and fuel strainer are drained as well as the strainer. When the fuel tanks are full, it will take approximately 11 seconds to drain all the fuel in one of the lines between a tip tank and the fuel strainer and approximately six seconds to drain all the fuel in one of the lines from a main tank to the fuel strainer. When the fuel tanks are less than full, it will take a few seconds longer.

d. Examine the contents of the container placed under the quick drain and the fuel sump drain outlet for water, sediment and proper fuel. Then dispose of the contents.



Fuel Drain

CAUTION

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

After using the underseat quick drain, it should be checked from outside to make sure it has closed completely and is not leaking.

Fuel quantity gauges for each of the four tanks are located in the engine gauge cluster on the left side of the instrument panel. A fuel pressure indicator is also incorporated in the engine gauge cluster.

An electric fuel pump is provided for use in case of failure of the engine driven pump. The electric pump operates from a single switch and independent circuit protector, and should be ON for all takeoffs and landings.

DRAINING FUEL SYSTEM

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

TIRE INFLATION

For maximum service from the Cherokee tires, keep the tires inflated to a pressure of 35 to 40 pounds for the main gear and 28 to 30 pounds for the nose gear. If necessary, interchange the tires on the main wheels to produce even wear. All wheels and tires are balanced before original installation, and the relationship of the tire, tube and wheel should be maintained if possible. Out of balance wheels can cause extreme vibration on takeoff. In the installation of new components, it may be necessary to rebalance the wheel with the tire mounted.

BATTERY SERVICE

Access to the 12-volt battery is through the right rear baggage compartment panel. The battery box has a plastic drain tube which should be opened occasionally to drain off any accumulation of liquid. Check the battery for proper fluid level. (do not fill above the baffle plates). Use only water - no acid. A hydrometer check shoul be performaed to determine the percent of charge in the battery.

If the battery is not up to charge, recharge starting at 4 amp rate and finishing with a 2 amp rate. Quick charges are not recommended.

FACTS YOU SHOULD KNOW

The Federal Aviation Administration (FAA) occasionally publishes **Airworthiness Directives (AD's)** that apply to specific groups of aircraft. They are mandatory changes and are to be complied with within a time limit set by the FAA. When an AD is issued, it is sent by the FAA to the latest registered owner of the affected aircraft and also to subscribers of their service. Owners should periodically check with their Piper Service Center or Piper's Customer Services Department to see whether they have the latest AD against their airplane. The owner is solely responsible for keeping up with ADs.

Piper Aircraft Corporation takes a **continuing interest** in having owners get the most efficient use from their airplane and keeping it in the best mechanical condition. Consequently, Piper Aircraft, from time to time, issues service releases including Service Bulletins, Service Letters, Service Spares Letters, and others relating to the airplane.

Piper Service Bulletins are of special importance and Piper considers compliance mandatory. These are sent directly to the latest FAA-registered owners in the United States (U.S.) and Piper Service Centers worldwide. Depending on the nature of the release, material and labor allowances may apply. This information is provided to all authorized Piper Service Centers.

Service Letters deal with product improvements and servicing techniques pertaining to the airplane. They are sent to Piper Service Centers and, if necessary, to the latest FAA-registered owners in the U.S. Owners should give careful attention to Service Letter information.

Service Spares Letters offer improved parts, kits, and optional equipment which were not available originally, and which may be of interest to the owner.

Piper Aircraft Corporation offers a **subscription service** for Service Bulletins, Service Letters, and Service Spares Letters. This service is available to interested persons such as owners, pilots, and mechanics at a nominal fee, and may be obtained through an authorized Piper Service Center or Piper's Customer Services Department.

Service manuals, parts catalogs, and revisions to both, are available from Piper Service Centers or Piper's Customer Services Department. Any correspondence regarding the airplane should include the airplane model and serial number to ensure proper response.

Pilot's Operating Manual supplements are distributed by the manufacturer as necessary. These revisions and additions should be studied and put into the operating manual to keep it up to date. This manual contains important information about the operation of the aircraft and should be kept with the aircraft at all times, even after resale. Every owner, to avail himself of the Piper Aircraft Service Back-Up, should stay in close contact with his Piper Dealer or distributor so that he can receive the latest information.

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 on the aircraft at all times:
   1. Aircraft Flight Manual.
   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. Log books 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.

PREVENTIVE MAINTENANCE

The holder of a Pilot Certificate issued under FAR Part 61 may perform certain preventive maintenance described in FAR Part 43. This maintenance may be performed only on an aircraft which the pilot owns or operates and which is not used to carry persons or property for hire, except as provided in applicable FAR's. Although such maintenance is allowed by law, each individual should make a self-analysis as to whether he has the ability to perform the work.

All other maintenance required on the airplane should be accomplished by appropriately licensed personnel.

If maintenance is accomplished, an entry must be made in the appropriate logbook. The entry should contain:

1. The date the work was accomplished.
2. Description of the work.
3. Number of hours on the aircraft.
4. The certificate number of pilot performing the work.
5. Signature of the individual doing the work.

REQUIRED SERVICE AND INSPECTION PERIODS

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.

Piper Aircraft Corporation has developed inspection items and required inspection intervals for the PA-28 (see PA-28 Service and Inspection Manuals). The PA-28 Inspection Manual contains appropriate forms, and all inspection procedures should be complied with by a properly trained, knowledgeable, and qualified mechanic at a Piper Authorized Service Center or a reputable repair shop. Piper Aircraft Corporation cannot accept responsibility for the continued airworthiness of any aircraft not maintained to these standards, and/or not brought into compliance with applicable Service Bulletins issued by Piper Aircraft Corporation, instructions issued by the engine, propeller, or accessory manufacturers, or Airworthiness Directives issued by the FAA.

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

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

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

TYPE OF LUBRICANT

IDENTIFICATION LETTER	LUBRICANT	SPECIFICATION	PREFERRED PRODUCT AND VENDOR
A	LUBRICATING OIL, GENERAL PURPOSE, LOW TEMP.	MIL-L-7870	
B	LUBRICATING OIL, AIRCRAFT RECIPROCATING ENGINE (PISTON) GRADE AS SPECIFIED SAE 50 ABOVE 60°F AIR TEMP. SAE 40 30° TO 90°F AIR TEMP. SAE 30 0° TO 70°F AIR TEMP. SAE 20 BELOW 10°F AIR TEMP.	MIL-L-6082	
C	HYDRAULIC FLUID, PETROLEUM BASE	MIL-H-5606	
D	GREASE, AIRCRAFT AND INSTRUMENT, GEAR AND ACTUATOR SCREW	MIL-G-23827	
E	GREASE, AIRCRAFT, HIGH TEMP.		TEXACO MARFAK ALL PURPOSE GREASE, MOBIL GREASE 77 (OR MOBILUX EP2), SHELL ALVANIA EP GREASE 2
F	FLUOROCARBON RELEASE AGENT DRY LUBRICANT	*MS-122	
G	PARKER "O" RING LUBRICANT		
H	AERO LUBRIPLATE		FISKE BROS. REFINING CO.
I	GREASE - LUBRICATION GEN. PURPOSE AIRCRAFT	MIL-G-7711	

SPECIAL INSTRUCTIONS

1. AIR FILTER - TO CLEAN FILTER, TAP GENTLY TO REMOVE DIRT PARTICLES. DO NOT BLOW OUT WITH COMPRESSED AIR OR USE OIL. REPLACE FILTER IF PUNCTURED OR DAMAGED.
2. BEARINGS AND BUSHINGS - CLEAN EXTERIOR WITH A DRY TYPE SOLVENT BEFORE LUBRICATING.
3. WHEEL BEARINGS - DISASSEMBLE AND CLEAN WITH A DRY TYPE SOLVENT. ASCERTAIN THAT GREASE IS PACKED BETWEEN THE BEARING ROLLER AND CONE. DO NOT PACK GREASE IN WHEEL HOUSING.
4. OLEO STRUTS AND BRAKE RESERVOIR - FILL PER INSTRUCTIONS ON UNIT OR CONTAINER, OR REFER TO SERVICE MANUAL, SECTION II.
5. PROPELLER - REMOVE ONE OF THE TWO GREASE FITTINGS FOR EACH BLADE. APPLY GREASE THROUGH FITTING UNTIL FRESH GREASE APPEARS AT HOLE OF REMOVED FITTING.
6. LUBRICATION POINTS - WIPE ALL LUBRICATION POINTS CLEAN OF OLD GREASE, OIL, DIRT, ETC. BEFORE LUBRICATING.
7. INTERVALS BETWEEN OIL CHANGES CAN BE INCREASED AS MUCH AS 100% ON ENGINES EQUIPPED WITH FULL FLOW (CARTRIDGE TYPE) OIL FILTERS - PROVIDED THE ELEMENT IS REPLACED EACH 50 HOURS OF OPERATION, AND THE SPECIFIED OCTANE FUEL IS USED. SHOULD FUEL OTHER THAN THE SPECIFIED OCTANE RATING FOR THE POWER PLANT BE USED, REFER TO LYCOMING SERVICE LETTER NO. L185A FOR ADDITIONAL INFORMATION AND RECOMMENDED SERVICE PROCEDURES.
8. FUEL SELECTOR VALVE - LUBRICATE AREA WHERE DETENT BALL MOVES ACROSS COVER PLATE.

SPECIAL INSTRUCTIONS (cont)

9. "O" RING, CONTROL SHAFT BUSHING - DISASSEMBLE "O" RING RETAINER PLATES FROM INSTRUMENT PANEL, LUBRICATE "O" RING AND REASSEMBLE.
10. AILERON HINGES WITH TEFLON SLEEVES SHOULD NOT BE LUBRICATED. AILERON HINGES WITHOUT TEFLON SLEEVES SHOULD FIRST BE CLEANED WITH A DRY TYPE SOLVENT THEN LUBRICATED WITH MIL-L-7870 LUBRICATING OIL.

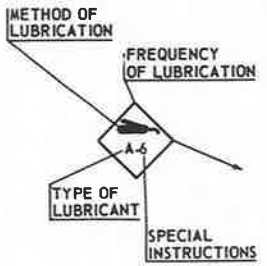
NOTES

1. PILOT AND PASSENGER SEATS - LUBRICATE TRACK ROLLERS AND STOP PINS AS REQUIRED. (TYPE OF LUBRICATN: "A")
2. WHEEL BEARINGS REQUIRE CLEANING AND REPACKING AFTER EXPOSURE TO AN ABNORMAL QUANTITY OF WATER.
3. SEE LYCOMING SERVICE INSTRUCTIONS NO. 1014 FOR USE OF DETERGENT OIL.

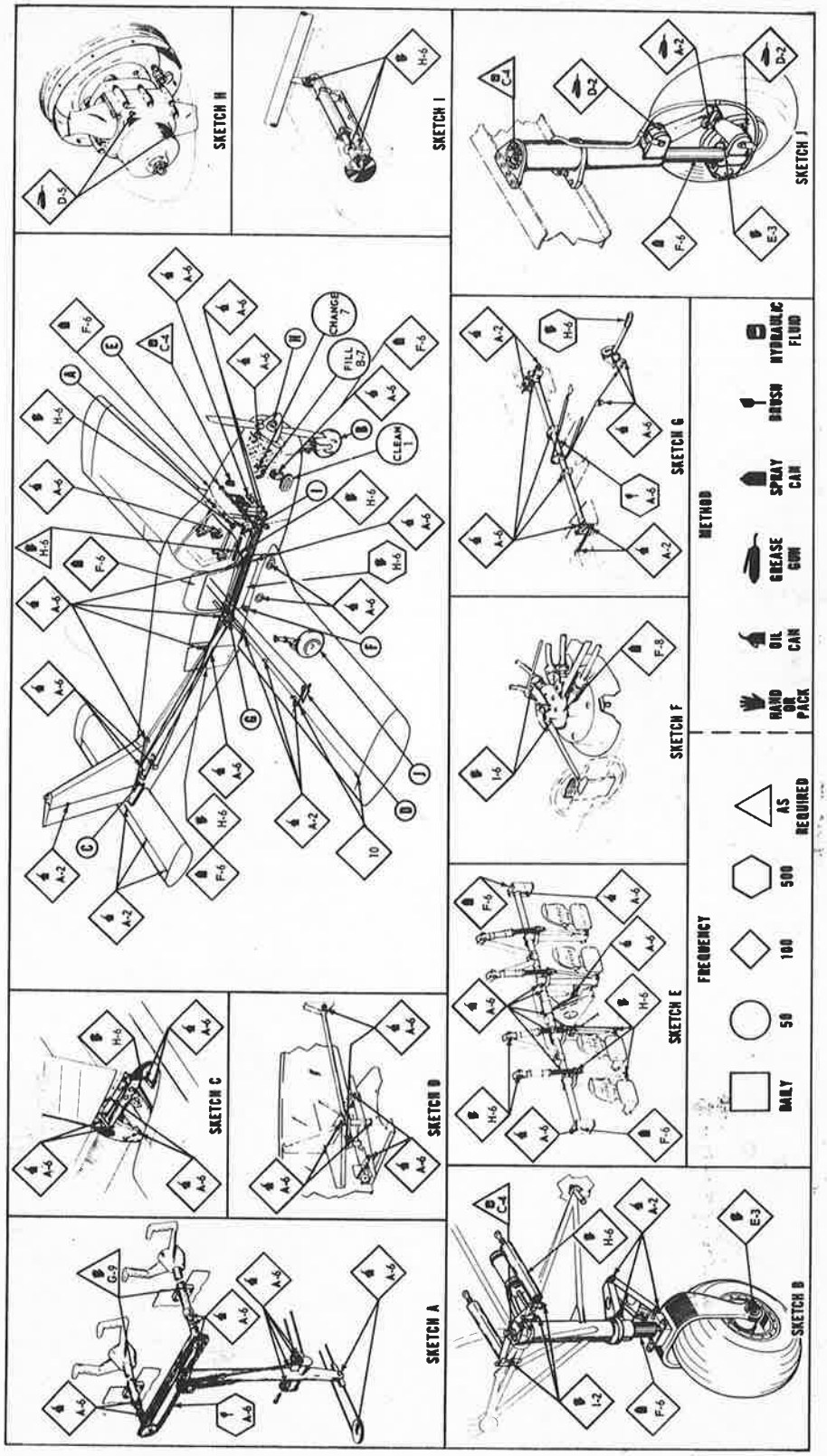
CAUTIONS

1. DO NOT USE HYDRAULIC FLUID WITH A CASTOR OIL OR ESTER BASE.
2. DO NOT OVER-LUBRICATE COCKPIT CONTROLS.
3. DO NOT APPLY LUBRICATE TO RUBBER PARTS.

EXAMPLE



Lubrication Nomenclature



Lubrication Chart