CHEROKEE 235

PA-28-235

Owner's Handbook

Piper Aircraft Corporation, Vero Beach, Florida
U.S. A.

NOTICE

THIS HANDBOOK IS NOT DESIGNED, NOR CAN ANY HANDBOOK SERVE, AS A SUBSTITUTE FOR ADEQUATE AND COMPETENT FLIGHT INSTRUCTION, OR KNOWLEDGE OF THE CURRENT AIRWORTHINESS DIRECTIVES, THE APPLICABLE FEDERAL AIR REGULATIONS, AND ADVISORY CIRCULARS. IT IS NOT INTENDED TO BE A GUIDE OF BASIC FLIGHT INSTRUCTION, NOR A TRAINING MANUAL.

THE HANDBOOK IS DESIGNED:

1. TO HELP YOU OPERATE YOUR CHEROKEE WITH SAFETY AND CONFIDENCE.
2. TO MORE FULLY ACQUAINT YOU WITH THE BASIC PERFORMANCE AND HANDLING CHARACTERISTICS OF THE AIRPLANE.
3. TO MORE FULLY EXPLAIN YOUR CHEROKEE'S OPERATION THAN IS PERMISSIBLE TO SET FORTH IN THE AIRPLANE FLIGHT MANUAL.

IF THERE IS ANY INCONSISTENCY BETWEEN THIS HANDBOOK AND THE AIRPLANE FLIGHT MANUAL APPROVED BY THE F.A.A., THE FLIGHT MANUAL SHALL GOVERN.

Revised text and illustrations shall be indicated by a black vertical line in the margin opposite the change.

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SECTION I

SPECIFICATION FEATURES

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SPECIFICATION FEATURES:

POWER PLANT	PA-28-235 (Fixed Pitch)	PA-28-235 (Const. Speed)
Engine - Lycoming	O-540-B4B5	O-540-B4B5
Rated Horsepower	235	235
Rated Speed (rpm)	2575	2575
Bore (inches)	5.125	5.125
Stroke (inches)	4.375	4.375
Displacement (cubic inches)	541.5	541.5
Compression Ratio	7.2:1	7.2:1
Dry Weight (pounds)	395	395
Oil Sump Capacity (qts)	12	12
Propeller	1P235PFA80	HC-C2YK-1

PERFORMANCE		
Take-off Run (ft.) (flaps up)	935	810
Take-off Distance Over 50 ft. Obstacle (ft.) (flaps up)	1510	1350
Take-off Run (ft.) (flaps 25°)	800	750
Take-off Distance Over 50 ft. Obstacle (ft.) (flaps 25°)	1360	1220
Best Rate of Climb Speed (mph)	100	100
Rate of Climb (ft. per min.)	825	900
Service Ceiling (ft.)	14,500	16,500
Absolute Ceiling	16,500	18,500
Top Speed (mph)	166	164
Cruising Speed (75% power, sea level mph)	146	145
Optimum Cruising Speed (75% power, 7000 ft., mph)	156	154
Fuel Consumption (gal. per hr. 75%)	14.0	14.0
Cruising Range (75% power, sea level, mi.)	875	870

SPECIFICATION FEATURES: (cont)

PERFORMANCE	PA-28-235 (Fixed Pitch)	PA-28-235 (Const. Speed)
Cruising Range (75% power, 7000 ft.) (mi.)	935	923
Optimum Cruising Range (55% power, 10,000 ft.)	1130	1105
Stalling Speed (flaps down, mph)	60	60
Stalling Speed (flaps up, mph)	70	70
Landing Roll (flaps down, ft.)	680	680
Landing Distance Over 50 ft. Obstacle (ft.)	1300	1300

Performance figures are for standard airplanes flown at gross weight under standard conditions at sea level, or stated altitude. Any deviation from Standard equipment may result in changes in performance.

WEIGHTS	(Fixed Pitch)	(Const. Speed)
Gross Weight (lbs)	2900	2900
Empty Weight (Standard) (lbs)	1410	1440
USEFUL LOAD (Standard) (lbs)	1490	1460
Empty Weight (AutoFlight) (lbs)	1470	1500
USEFUL LOAD (AutoFlight) (lbs)	1430	1400

FUEL AND OIL

Fuel Capacity (main tank) (gal)	50
Fuel Capacity (auxiliary tanks) (gal)	34
Oil Capacity (qts)	12

Fuel Aviation Grade (Minimum Octane)	87/87
(Specified Octane)	80/87
(Alternate Fuels)	Refer to Fuel Requirements, Page 31.

SPECIFICATION FEATURES: (cont)

BAGGAGE

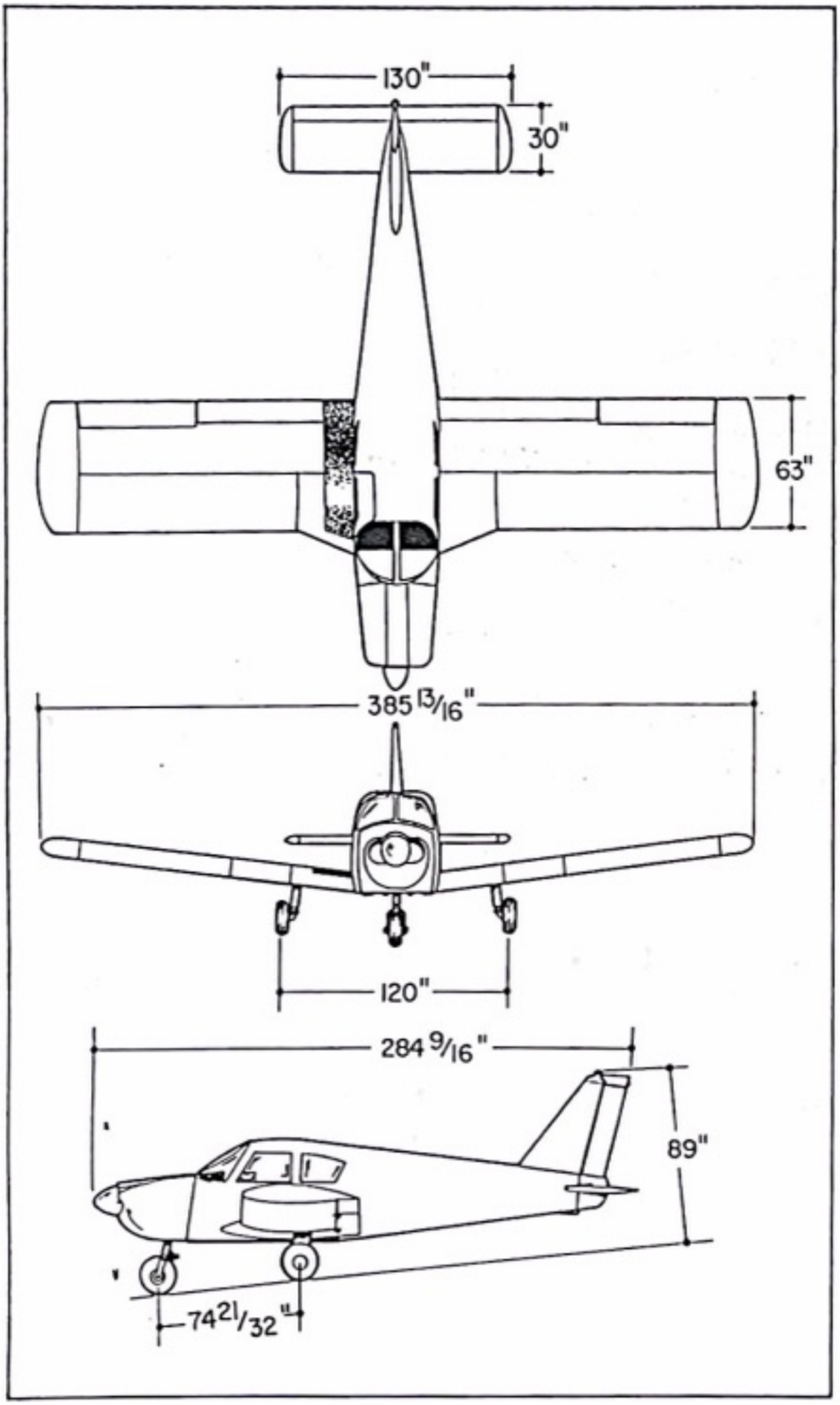
Maximum Baggage (lbs)	200
Baggage Space (cubic ft.)	19
Baggage Door Size (in)	20 x 22

DIMENSIONS

Wing Span (ft.)	32.0
Wing Area (sq. ft.)	170
Wing Loading (lbs. per sq. ft.)	17.0
Length (ft.)	23.5
Height (ft.)	7.1
Power Loading (lbs. per HP)	12.4

LANDING GEAR

Wheel Base (ft.)		6.2
Wheel Tread (ft.)		10.0
Tire Pressure (lbs)	Nose	28-30
	Main	35-40


130"
30"
63"
385 13/16"
120"
284 9/16"
89"
74 21/32"

SECTION II

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SECTION II

DESIGN INFORMATION

ENGINE AND PROPELLER

The Lycoming O-540-B 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 fuel. Refer to Fuel and Oil Requirements on page 30 when using alternate fuels. The engine is equipped with a geared starter, a 35 ampere alternator, dual magnetos, vacuum pump drive, a diaphram-type fuel pump and a float carburetor.

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

The propeller used on the PA-28-235 is either the McCauley 1P235PFA80 fixed pitch aluminum alloy unit or the Hartzell HC-C2YK-1/8468A-4 constant speed propeller.

The McCauley propeller is 80 inches in diameter, with a standard pitch of 69 inches, although propellers with a pitch from 66 inches to 71 inches may be installed for special purposes. All performance figures are based on the standard 69 inch 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.

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 is of the push-pull type and is located in the lower center of the instrument panel. A knurled friction lock is provided to prevent creeping of the throttle from any desired position. The

mixture control, located in the lower right hand side of the instrument panel, is a push-pull control like the throttle. The full rich position is obtained when the control is full forward, while the full aft position provides an idle cut-off for stopping the engine. Intermediate positions are used for leaning the mixture at altitudes above sea-level. The carburetor heat control, located to the left of the throttle, provides maximum carburetor heat when pulled to its full aft position. With carburetor heat off, all engine air passes through a high-efficiency dry-type filter. Therefore, prolonged ground operation with carburetor heat "ON" should be avoided, particularly on unimproved fields as the air is not filtered.

STRUCTURES

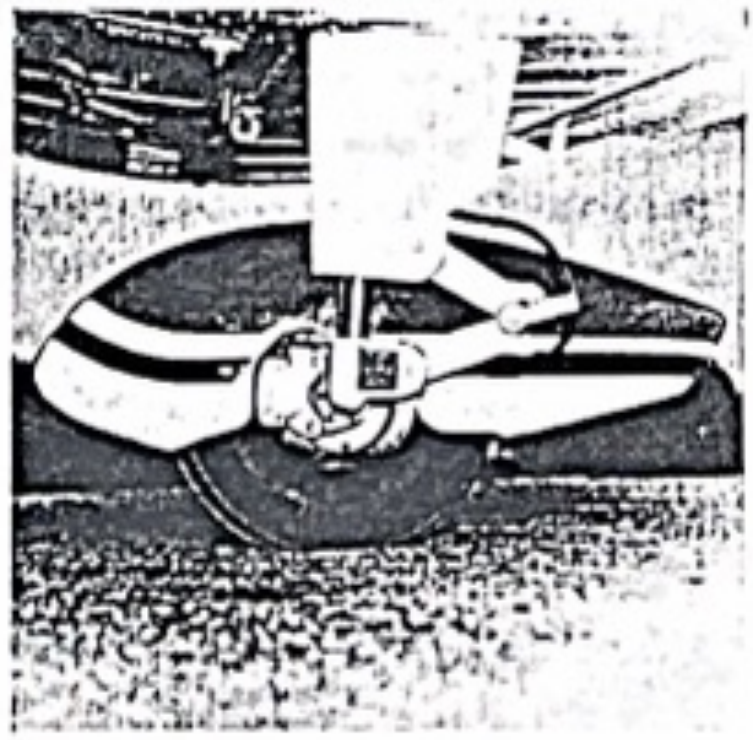
All structures are of aluminum alloy construction and are designed to ultimate load factors well in excess of normal requirements. All exterior surfaces are primed with etching primer and painted with acrylic enamel.

The wings are attached to each side of the fuselage by inserting 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.

LANDING GEAR

The three landing gears use a Cleveland 600 x 6 wheel, the main wheels being provided with brake drums and Cleveland single disc hydraulic brake assemblies. The nose wheel carries a 600 x 6 four ply tire with tubes while the main gear uses 600 x 6 six ply tires.



The nose gear is steerable through a 30 degree arc each side of netural by use of the rudder pedals. A spring device is incorporated in the rudder pedal torque tube assembly to aid in rudder centering and to provide rudder trim. The nose gear steering mechanism also incorporates a hydraulic shimmy dampener.

The three struts are of the air-oil type, with the normal extension being 3-1/2 inches for the nose gear and 2 inches for the main gear when aircraft is loaded to 2900 pounds.

The brakes are actuated by a hand lever and master cylinder, which is located below and behind the left center of the instrument sub-panel. The brake-fluid reservoir is installed on the top, left, front face of the firewall. The parking brake is incorporated in the master cylinder and is actuated by pulling back on the brake lever, depressing the knob attached to the left side of the handle, and then releasing the brake lever. To release the parking brake, pull back on the brake lever to disengage the catch mechanism and allow the handle to swing forward.

CONTROL SYSTEM

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 on the cabin ceiling. 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 also reduces the amount of coordin-

ation 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 is 84 gallons, all of which is usable except for approximately one pint in each of the four tanks. The two main inboard tanks, which hold 25 gallons each, are attached to the wing structure with screws and nutplates and may be easily removed for service or inspection. The tip tanks are constructed of resin-impregnated fiberglass and hold 17 gallons each.

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. For all operations the tip tanks should be used last. When using less than the standard 84 gallon capacity of the tanks, it is recommended the tip tanks be filled first and then regulate the fuel load by varying the amount of fuel in the inboard tanks.

Strainer Drain Lever

The fuel system should be drained daily prior to first flight and after refueling to avoid the accumulation of water or sediment. Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer 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 fuel sump drain outlet for water and sediment and dispose of the contents.

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.

Dual electric fuel pumps are 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.

CAUTION

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

ELECTRICAL SYSTEM

The Cherokee is equipped with the Piper F.T.P. (Full Time Power) Electrical System. Its 12 volt alternator provides electrical power at all engine speeds and results in improved performance for radio and electrical equipment and longer battery life.

In addition to the alternator, the electrical system includes a 25 ampere-hour battery, a voltage regulator and a master switch relay. The battery and relay are mounted immediately aft of the baggage compartment. Access for service or inspection is obtained through a removable panel adjacent to the baggage door. The battery box is designed to accommodate a larger capacity battery for extreme cold weather operation.

Electrical switches, fuses and fuse spares are located on the lower left side of the instrument panel.

Standard electrical accessories, in addition to those already listed, include a starter,

Electrical Switches

stall warning indicator, cigar lighter and ammeter. Navigation lights, anti-collision light, landing light, instrument lighting and a cabin dome light are offered as optional accessories.

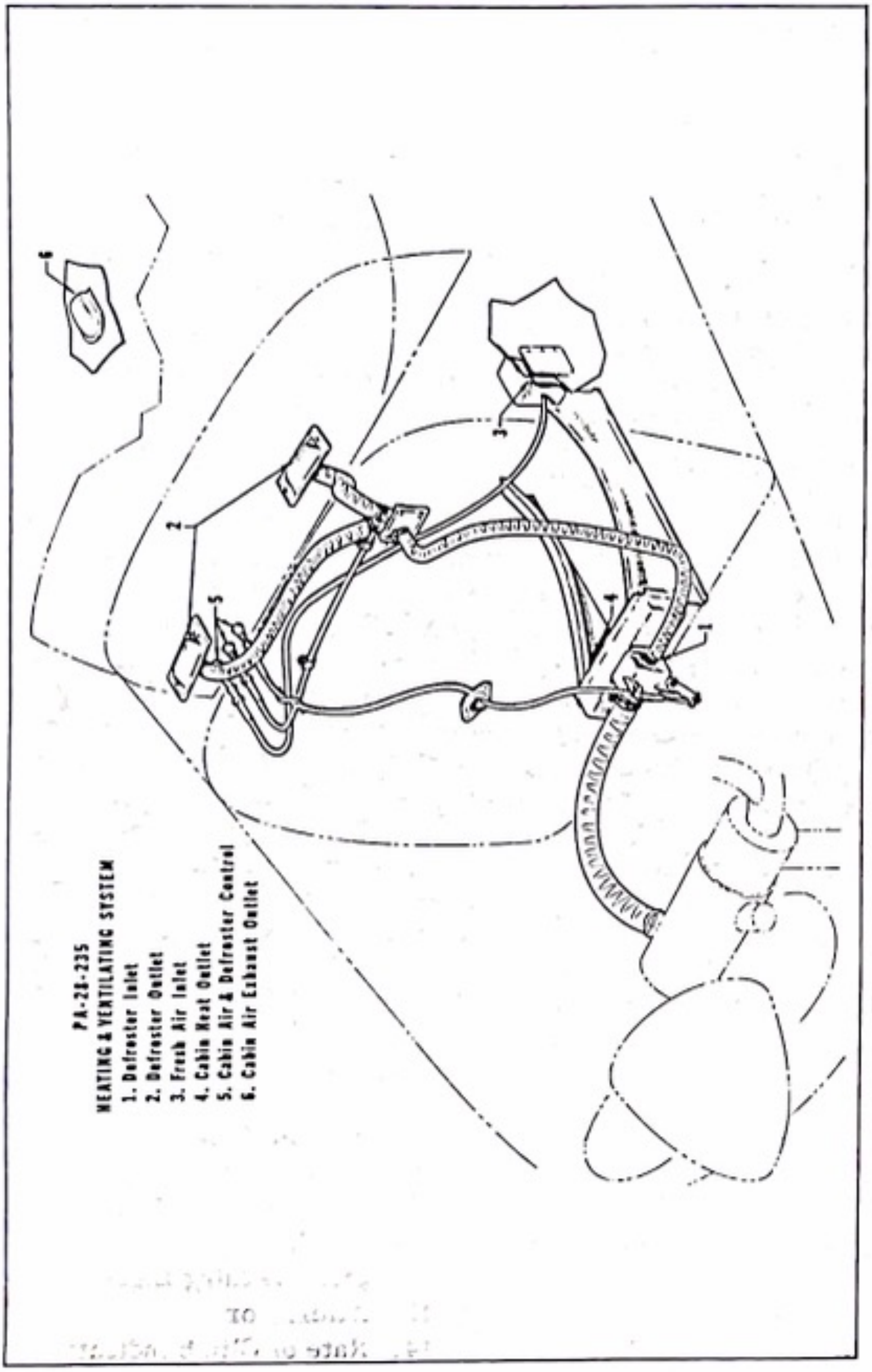
Circuit provisions are made to handle optional communications and navigational equipment.

In conventional generator systems, the ammeter indicates battery discharge. In the Piper Full Time Power electrical system, the ammeter displays the load in amperes placed on the system at any given time. With all electrical equipment except the master switch in the "OFF" position, the ammeter will indicate the amount of charging current demanded by the battery. This amount will vary and depends on the percentage of full charge on the battery at the time. When the battery becomes charged, the current displayed on the ammeter will reduce to a minimum value of about two amperes. As each unit of electrical equipment is switched on the amount of current it draws will be shown on the ammeter. The maximum continuous load for night flight with all equipment on is approximately thirty amperes. This thirty amperes plus approximately two amperes for the fully charged battery will appear continuously under these flight conditions.

Because of the mechanical simplicity of the alternator, maintenance should prove to be a minor factor as compared to previous systems. Should service be required, contact your local Piper dealer.

HEATING AND VENTILATING SYSTEM

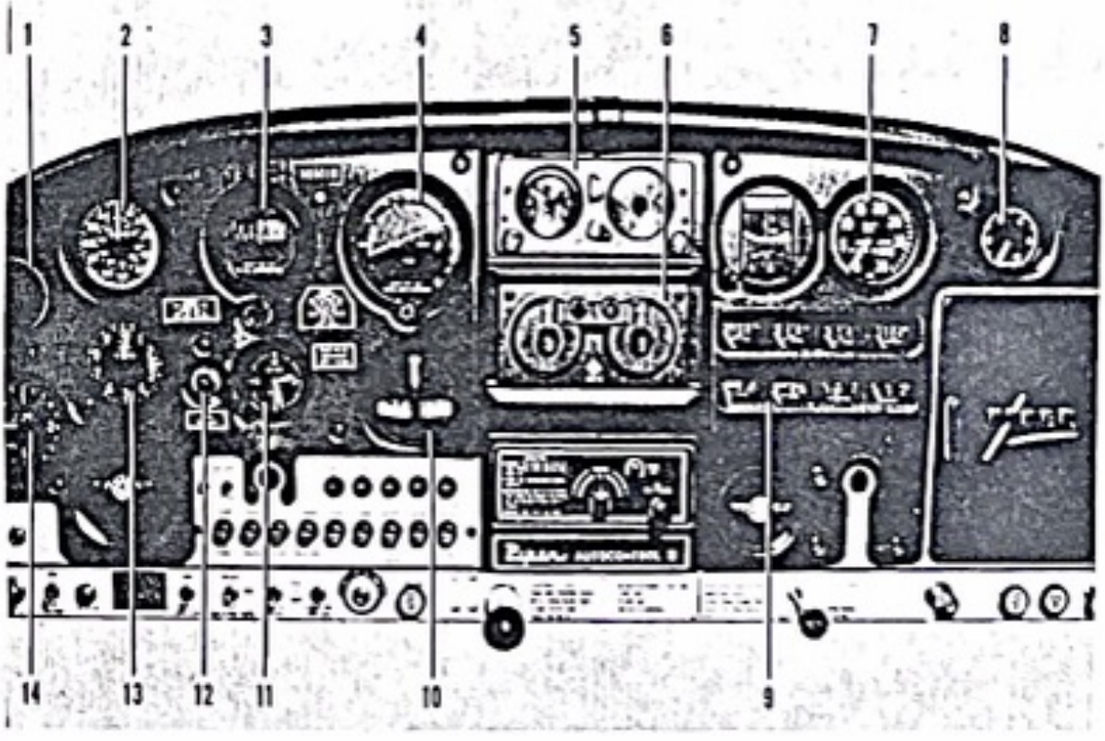
Heat for the cabin interior and the defroster system is provided by a heater muff attached to the exhaust system. Controls for these systems are located on the lower right hand side of the instrument panel. A third control in this area regulates a large fresh air vent located on the left hand side of the cabin near the pilot's feet. In addition, four side vents are provided, one at each seat location. They may be independently regulated as desired by the seat occupant.


PA-28-235
HEATING & VENTILATING SYSTEM
1. Defroster Inlet
2. Defroster Outlet
3. Fresh Air Inlet
4. Cabin Heat Outlet
5. Cabin Air & Defroster Control
6. Cabin Air Exhaust Outlet

CABIN FEATURES

The instrument panel of the Cherokee is designed to accommodate the customary advanced flight instruments and all the normally required power plant instruments. The Artificial Horizon, Directional Gyro and the Turn and Bank instruments are vacuum operated through use of a vacuum pump installed on the engine. A natural separation of the flight group and the power group is provided by placing the communications and radio navigational equipment in the center of the panel.

The front seats are adjustable fore and aft for pilot comfort and ease of entry and exit.



1. Compass
2. Airspeed Indicator
3. Directional Gyro Indicator
4. Gyro Horizon Indicator
5. Radio ADF
6. Radio VHF
7. Tachometer
8. Vacuum Gauge
9. Instrument Cluster
10. Turn and Bank Indicator
11. Clock
12. Stall Warning Light
13. Alternator
14. Rate of Climb Indicator

SECTION III

OPERATING INSTRUCTIONS

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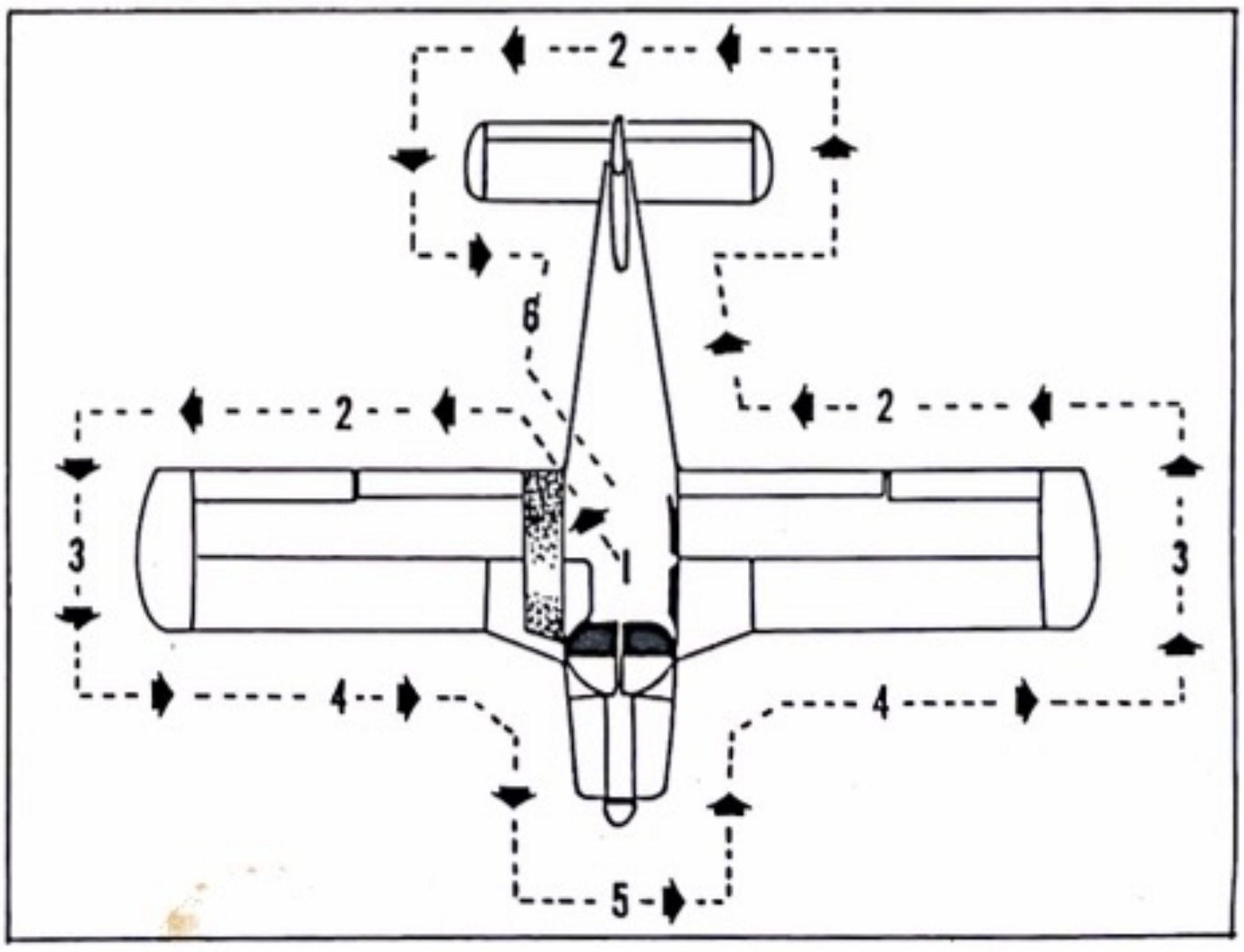
SECTION III

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 in the illustration below:

1. a. Master switch "ON."
   b. Check fuel quantity indicators (four tanks).
   c. Depress sump drain knob for four or five seconds to drain possible accumulation of water and sediment.
   d. Master switch and ignition "OFF."
2. a. Check for external damage, operational interference



In cold weather (below 40 degrees F.) prime the engine with one to three full strokes of the priming pump. If extremely cold, starting will be aided by pulling the propeller through by hand (switch "OFF") four to five revolutions. If the temperature is above 40 degrees the engine may be primed by three or four short quick strokes of the throttle.

After priming, turn the electric master switch on, engage the starter and allow the engine to turn approximately one full revolution, then turn the ignition switch to the "Left" magneto position.

When the engine is firing evenly, turn the magneto switch to the "Both" position and advance the throttle to 800 RPM. Check the oil pressure gauge for a pressure indication. If oil pressure is not indicated within thirty seconds, stop the engine and determine the trouble.

If the engine fails to start at the first attempt, another attempt should be made without priming. If this fails, it is possible that the engine is overprimed. Turn the magneto switch off, open the throttle slowly, and rotate the engine approximately ten revolutions with the starter. Reprime the engine with one half the amount used in the initial attempt, turn the magneto switch to "Left," and repeat the starting procedure. If the engine again fails to start, refer to the "Lycoming Operating Handbook, Section VII, Engine Troubles."

WARM-UP

The engine on the Cherokee is air pressure cooled and depends on the forward speed of the airplane to provide an adequate air flow for proper cooling; therefore, particular care is necessary when operating the engine on the ground. To prevent overheating and possible damage to the engine, it is recommended that the following precautions be observed:

1. Head the airplane into the wind.
2. Avoid prolonged idling at low RPM's, as this practice may result in fouled spark plugs.
3. Limit ground running time to four minutes in cold weather (below 70 degrees), and to two minutes in warm weather.

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.

c. Check navigation lights.

4. a. Visually check fuel supply, secure caps.

b. Drain fuel tank sumps.

c. Check that fuel system vents are open.

d. Check landing gear shock struts for proper inflation.

e. Check tires for cuts, wear and proper inflation.

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, 8 quarts minimum. (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.

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.

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.

STARTING ENGINE

After completion of the preflight inspection:

1. Lock the wheel brakes.

2. Set the carburetor heat control in the full "COLD" position.

3. Set propeller control in full "increase RPM."

4. Select the desired tank with the fuel valve.

5. Move the mixture to the full "RICH" position.

6. Open the throttle 1/8 to 1/4 inch.

7. Turn the electric fuel pump "ON."

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.
   c. Check navigation lights.
4. a. Visually check fuel supply, secure caps.
   b. Drain fuel tank sumps.
   c. Check that fuel system vents are open.
   d. Check landing gear shock struts for proper inflation.
   e. Check tires for cuts, wear and proper inflation.
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, 8 quarts minimum. (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.
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.
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.

STARTING ENGINE

After completion of the preflight inspection:

1. Lock the wheel brakes.
2. Set the carburetor heat control in the full "COLD" position.
3. Set propeller control in full "increase RPM."
4. Select the desired tank with the fuel valve.
5. Move the mixture to the full "RICH" position.
6. Open the throttle 1/8 to 1/4 inch.
7. Turn the electric fuel pump "ON."

In cold weather (below 40 degrees F.) prime the engine with one to three full strokes of the priming pump. If extremely cold, starting will be aided by pulling the propeller through by hand (switch "OFF") four to five revolutions. If the temperature is above 40 degrees the engine may be primed by three or four short quick strokes of the throttle.

After priming, turn the electric master switch on, engage the starter and allow the engine to turn approximately one full revolution, then turn the ignition switch to the "Left" magneto position.

When the engine is firing evenly, turn the magneto switch to the "Both" position and advance the throttle to 800 RPM. Check the oil pressure gauge for a pressure indication. If oil pressure is not indicated within thirty seconds, stop the engine and determine the trouble.

If the engine fails to start at the first attempt, another attempt should be made without priming. If this fails, it is possible that the engine is overprimed. Turn the magneto switch off, open the throttle slowly, and rotate the engine approximately ten revolutions with the starter. Reprime the engine with one half the amount used in the initial attempt, turn the magneto switch to "Left," and repeat the starting procedure. If the engine again fails to start, refer to the "Lycoming Operating Handbook, Section VII, Engine Troubles."

WARM-UP

The engine on the Cherokee is air pressure cooled and depends on the forward speed of the airplane to provide an adequate air flow for proper cooling; therefore, particular care is necessary when operating the engine on the ground. To prevent overheating and possible damage to the engine, it is recommended that the following precautions be observed:

1. Head the airplane into the wind.
2. Avoid prolonged idling at low RPM's, as this practice may result in fouled spark plugs.
3. Limit ground running time to four minutes in cold weather (below 70 degrees), and to two minutes in warm weather.

The engine is warm enough for take-off when the throttle may be opened fully without engine backfiring or skipping.

GROUND CHECK

The magnetos should be checked at 1800 RPM on airplanes with a fixed pitch propeller or at 2150 RPM with propeller set at high RPM on airplanes with a constant speed propeller. Drop off on either magneto should not exceed 125 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 take-off.

The propeller control should be moved through its complete range to check for proper operation, and then placed in full "increase RPM" for take-off. To obtain maximum RPM with the vernier control, push the control forward while depressing the button, and then rotate the vernier control clockwise until it contacts the stop.

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

Carburetor heat should also be checked prior to take-off to be sure that the control is operating properly and to clear any ice which may have formed during taxiing.

TAKE-OFF

Just before take-off the following items should be checked:

1. Controls free
2. Flaps "UP"
3. Tab set
4. Propeller set
5. Mixture "RICH"
6. Carburetor heat "OFF"
7. Fuel on proper tank
8. Electric fuel pump "ON"
9. Engine gauges normal
10. Door latched
11. Altimeter set

The take-off technique is conventional for the Cherokee. The tab should be set slightly aft of netural, with the exact

setting determined by the loading of the aircraft. Allow the airplane to accelerate to 55 to 65 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 take-off. After take-off let the aircraft accelerate to the desired climb speed by lowering the nose slightly.

Take-offs are normally made with flaps up, to simplify operating procedure. However, for short field take-offs, and for take-offs 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. For climbing enroute a speed of 115 miles per hour is recommended. This will produce better forward speed and increased visibility over the nose during the climb.

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 is turned on 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 60 miles per hour. With the flaps up this speed is increased 10 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 "Section IV" of this handbook.

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.

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.

In order to keep the airplane in best lateral trim during cruising flight, the fuel should be used alternately from each main tank and, when they are exhausted, from each tip tank. It is recommended that one main tank be used for one hour after take-off; 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.

APPROACH AND LANDING

Before landing check list:

1. Mixture "RICH"
2. Propeller set
3. Carburetor heat "OFF" (unless icing conditions exist)
4. Electric fuel pump "ON"

5. Fuel selector on proper tank
6. Flaps as desired (under 115 M.P.H.)

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 (55 to 65 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 cross-winds, it may be desirable to approach the ground at higher than normal speeds with partial or no flaps.

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 tight. 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

For weight and balance data see the Airplane Flight Manual and Weight and Balance form supplied with each airplane. This form gives the exact weight of each individual airplane as manufactured and the permissible center of gravity conditions.

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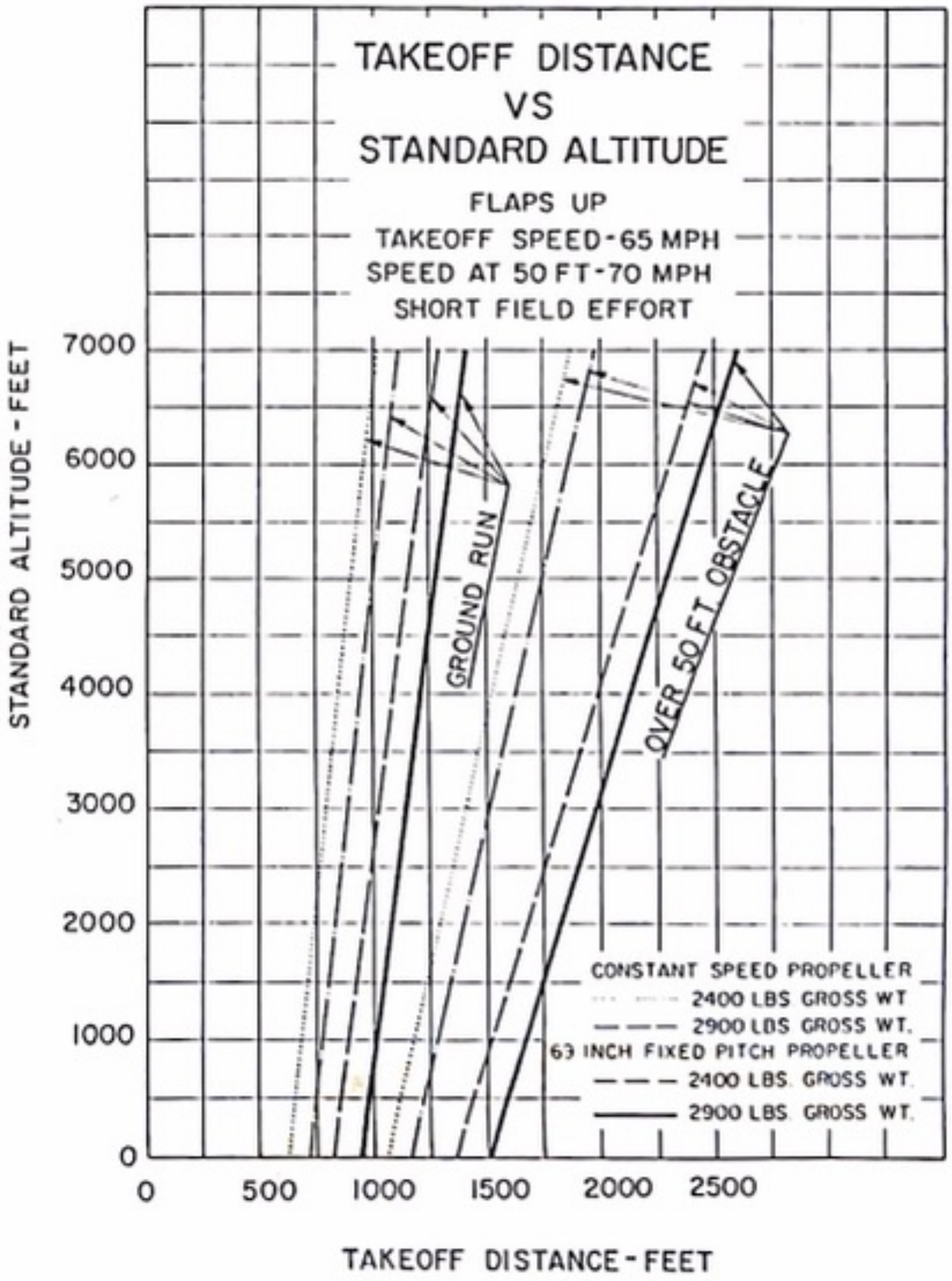

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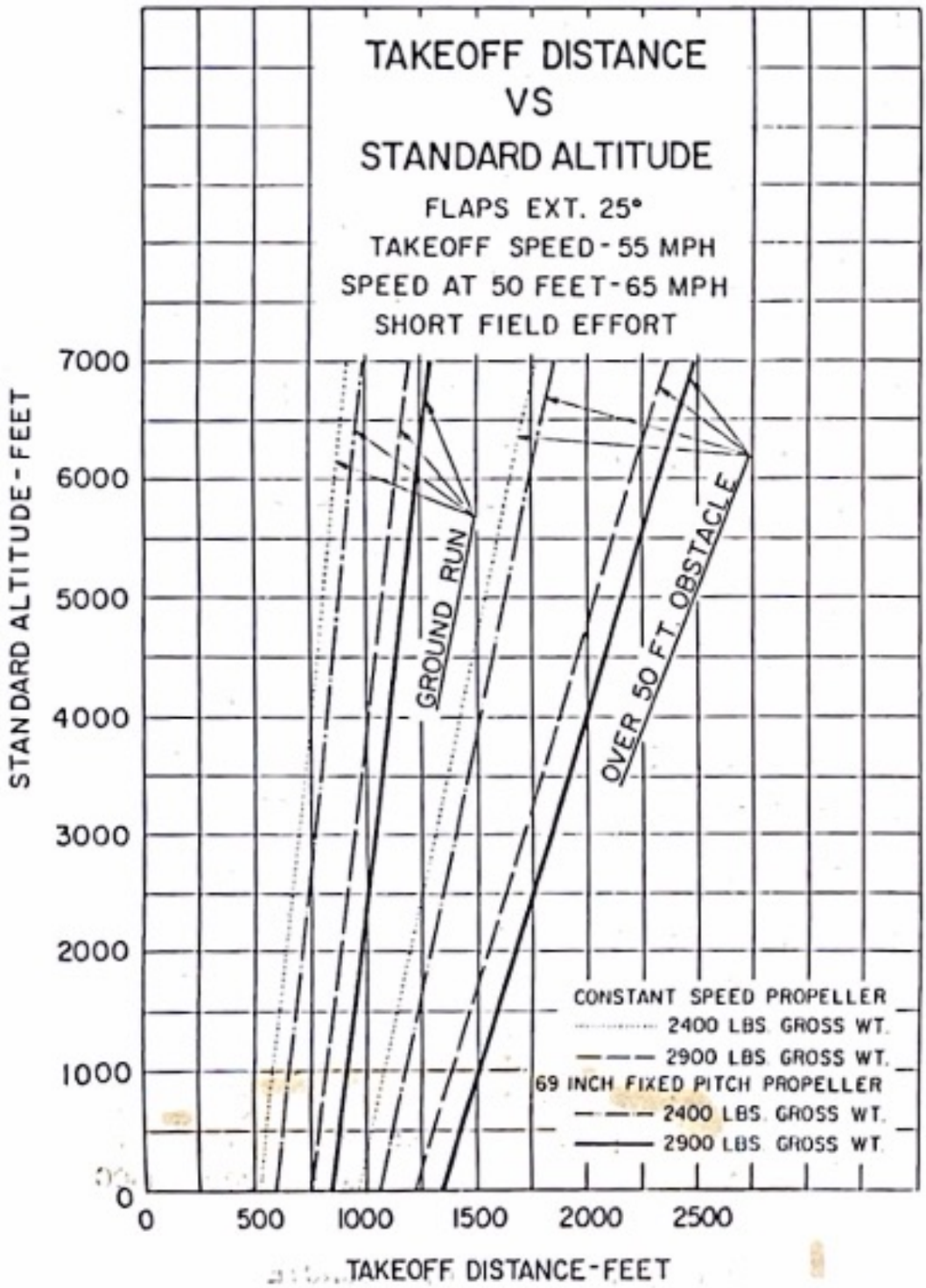

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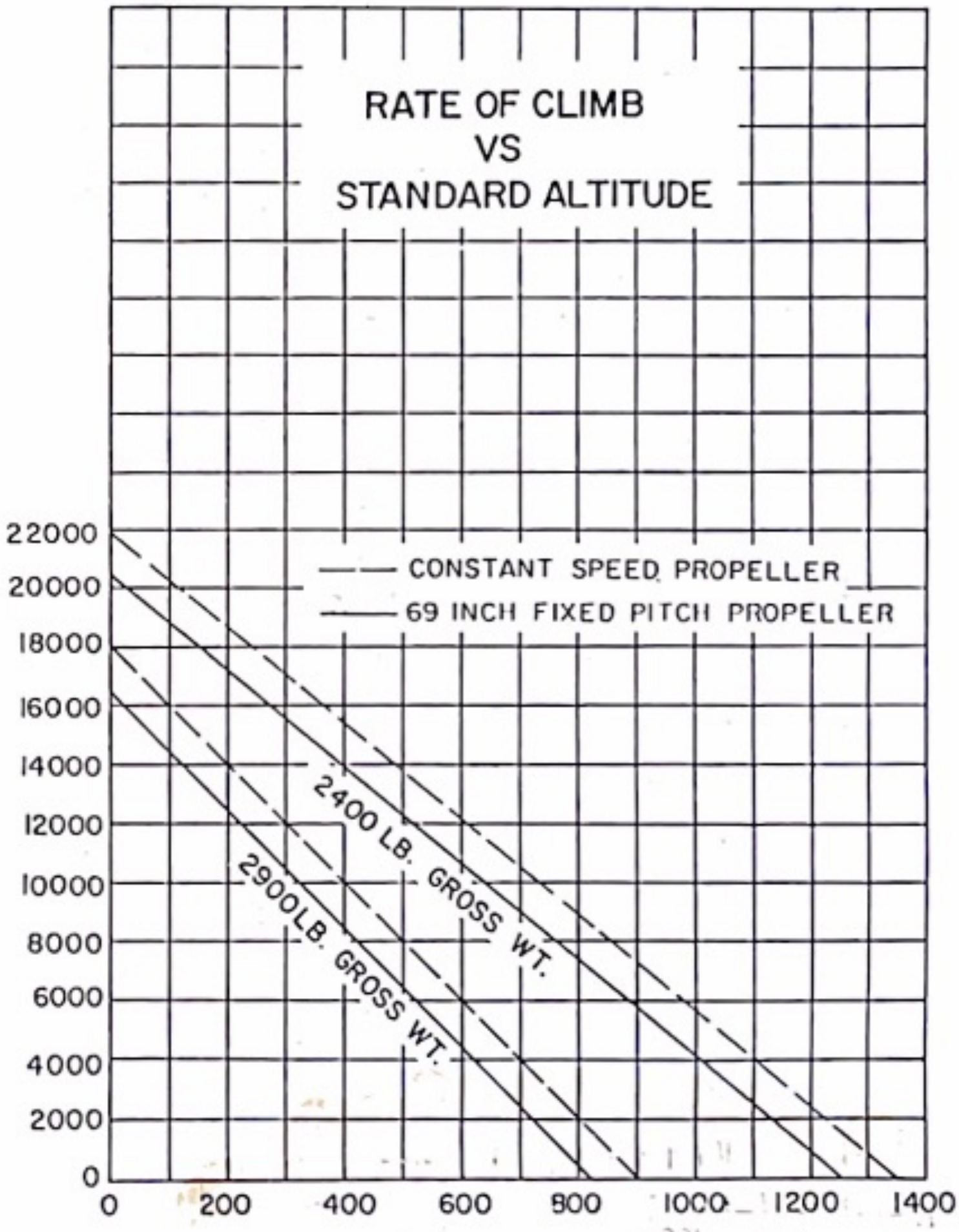

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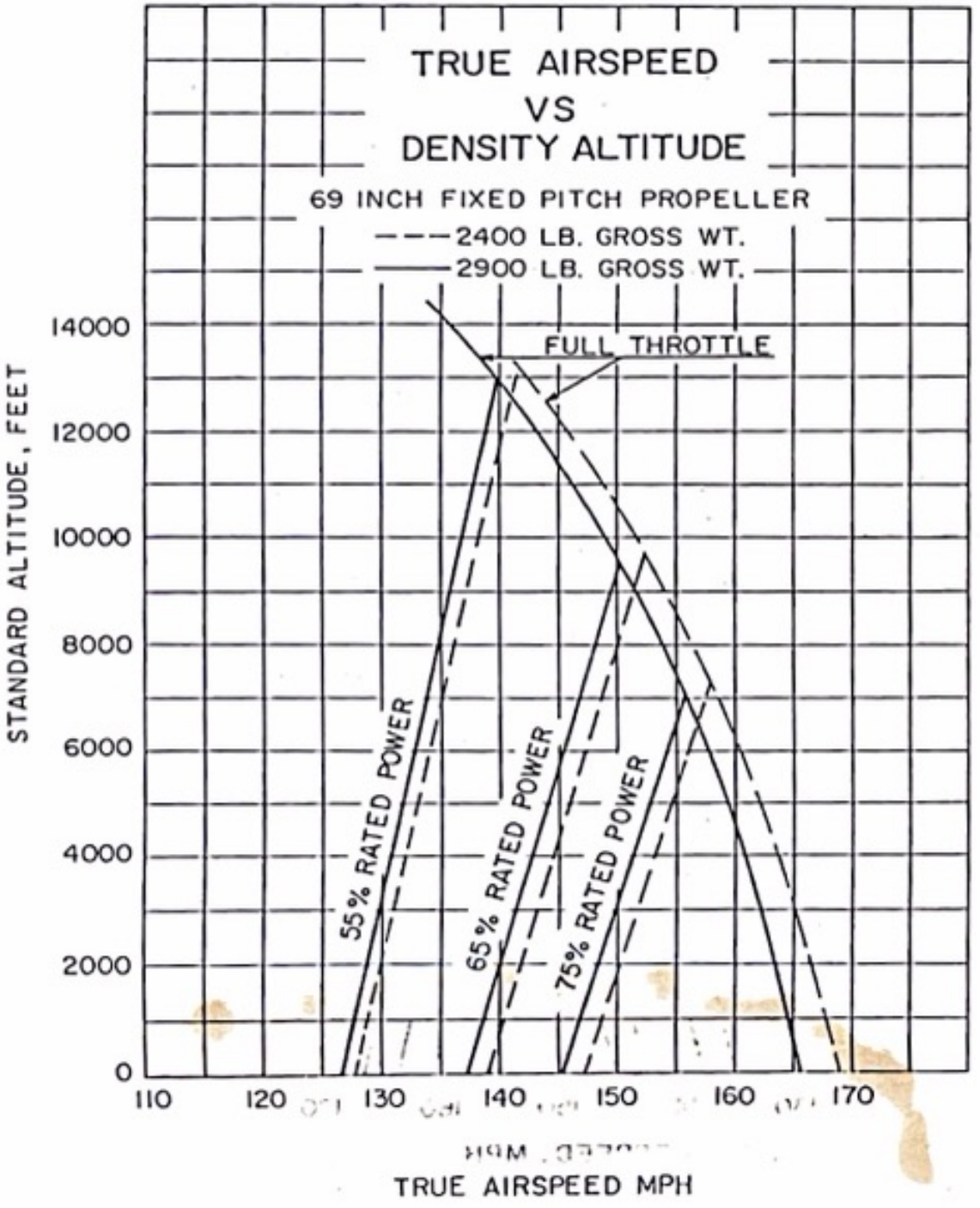

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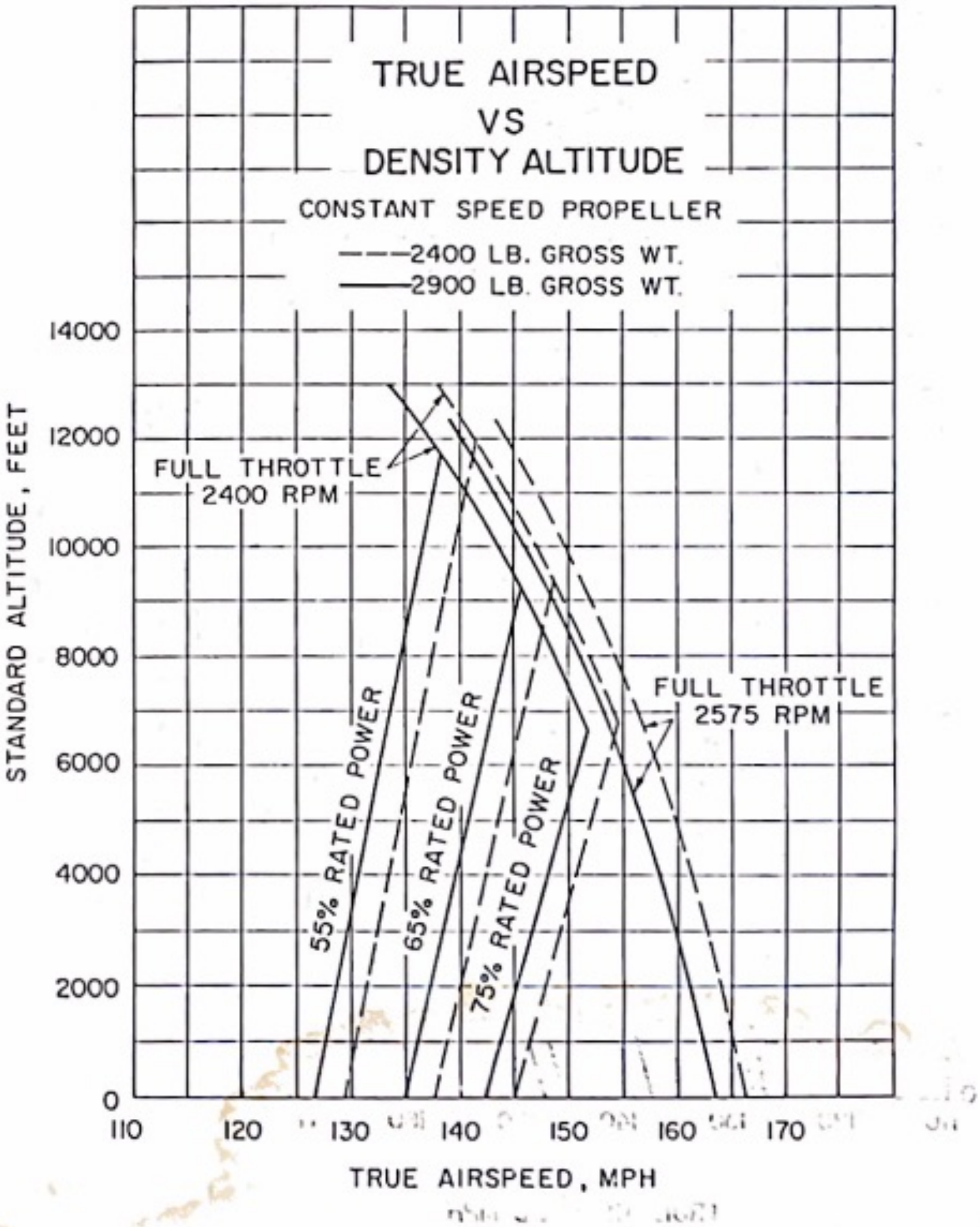

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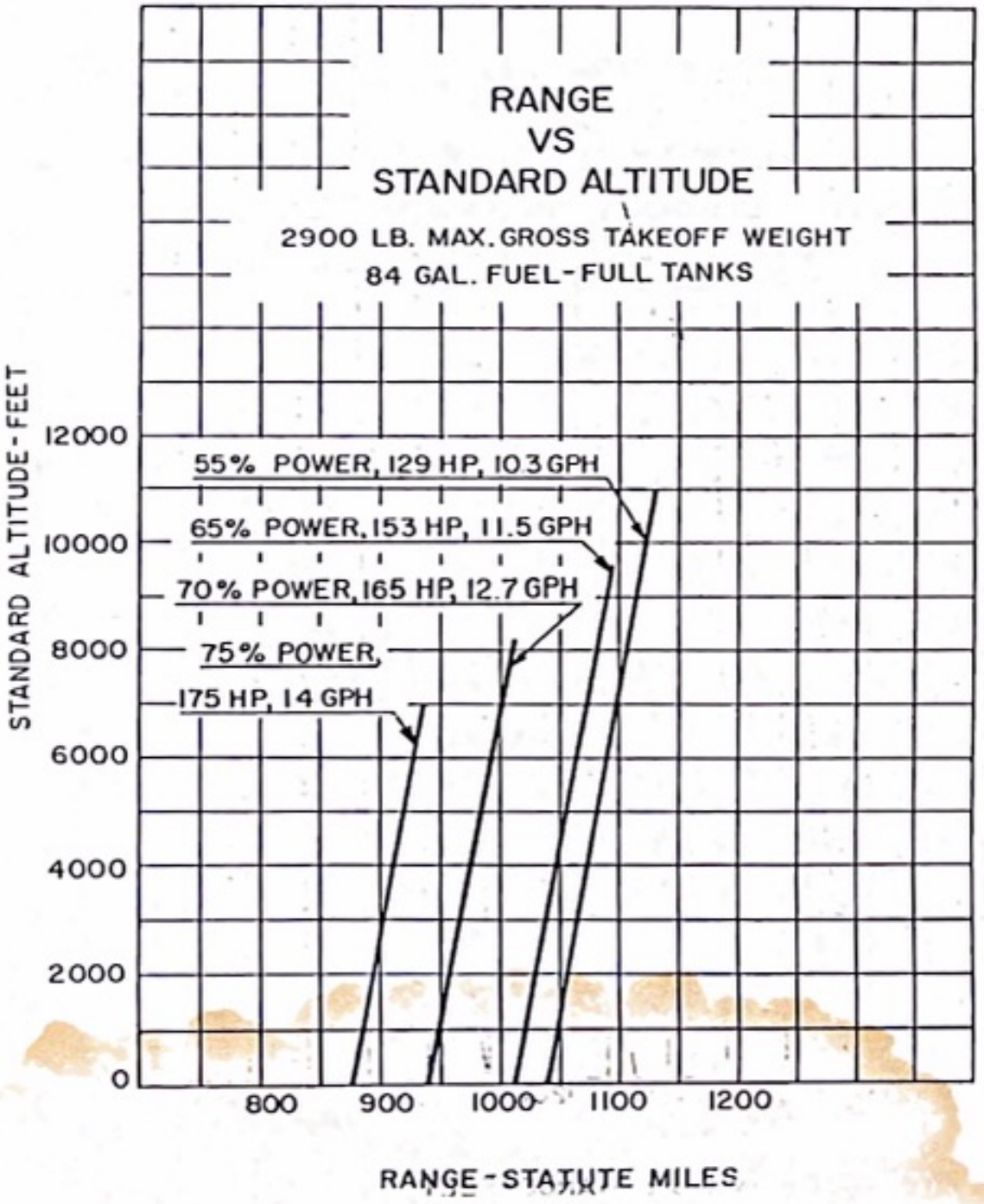

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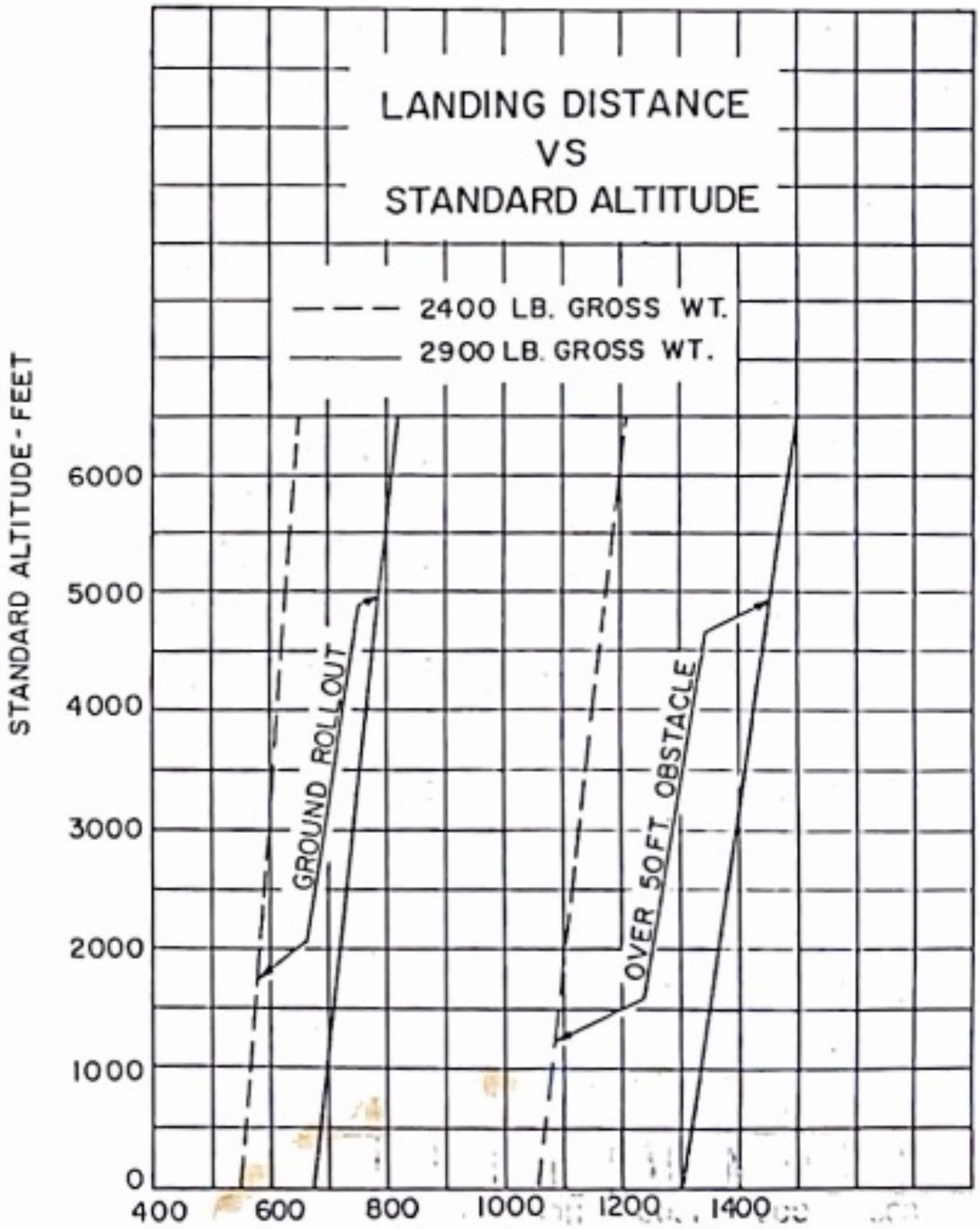

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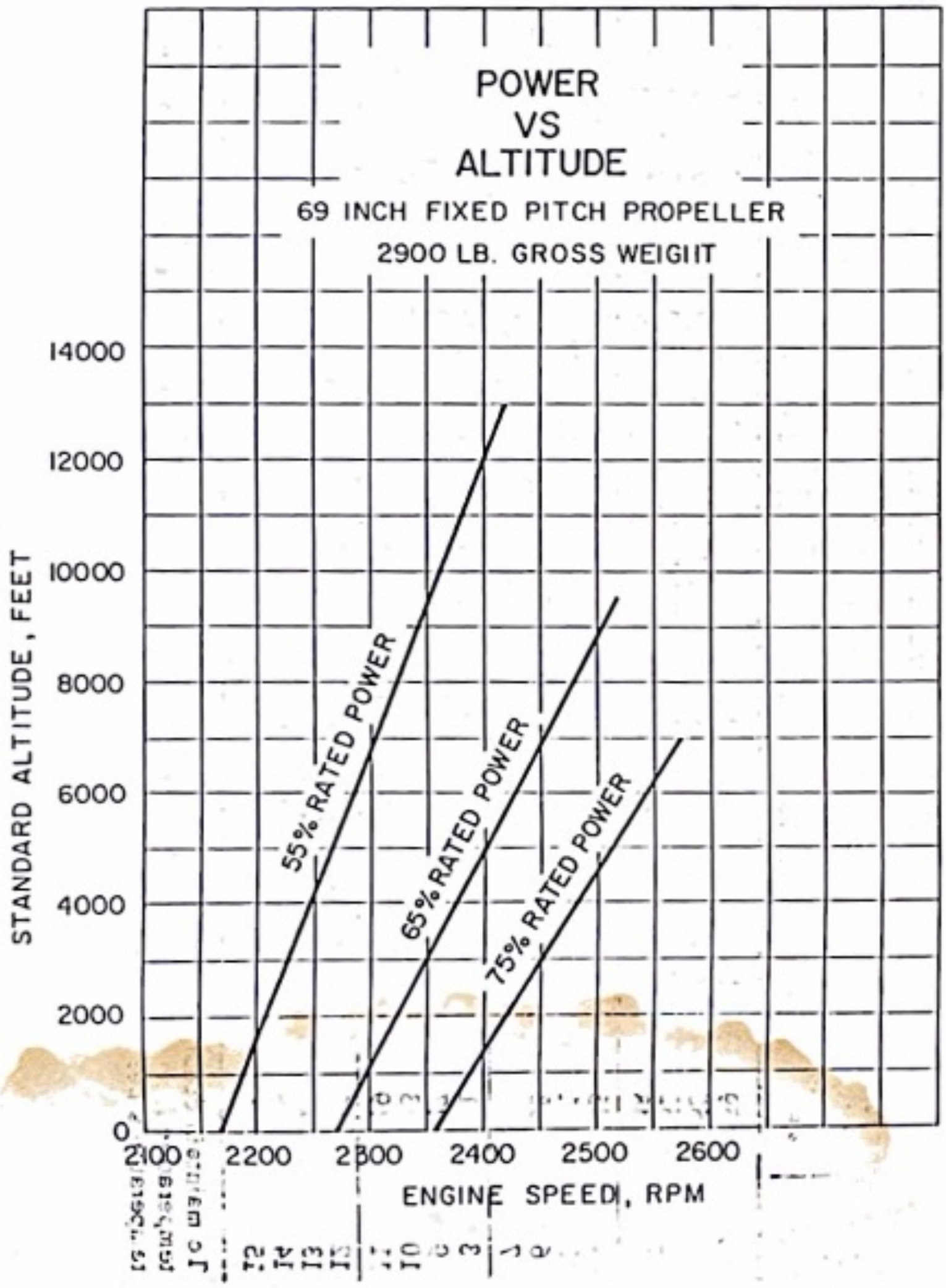

Power Setting Table · Lycoming Model O-540-B, 235 HP Engine

Press. Alt 1000 Feet	Std Alt Temp °F	129 HP – 55% Rated RPM AND MAN. PRESS. 2100	2200	2300	2400	153 HP – 65% Rated RPM AND MAN. PRESS. 2100	2200	2300	2400	176 HP – 75% Rated RPM AND MAN. PRESS. 2100	2200	2300	2400	Press. Alt 1000 Feet
SL	59	20.6	20.1	19.6	19.2	23.2	22.6	22.0	21.5	25.7	25.0	24.4	23.7	SL
1	55	20.3	19.8	19.3	18.9	22.9	22.3	21.7	21.2	25.4	24.7	24.1	23.4	1
2	52	20.1	19.6	19.1	18.7	22.7	22.1	21.5	21.0	25.2	24.5	23.8	23.1	2
3	48	19.8	19.3	18.8	18.4	22.4	21.8	21.2	20.7	24.9	24.2	23.5	22.8	3
4	45	19.6	19.1	18.6	18.2	22.2	21.6	21.0	20.5	24.7	24.0	23.3	22.5	4
5	41	19.3	18.8	18.3	17.9	21.9	21.3	20.7	20.2	–	23.7	23.0	22.3	5
6	38	19.1	18.6	18.1	17.7	21.7	21.1	20.5	19.9	–	–	22.7	22.0	6
7	34	18.8	18.3	17.8	17.4	21.4	20.8	20.2	19.7	–	–	–	21.6	7
8	31	18.6	18.1	17.6	17.2	21.2	20.6	20.0	19.4					8
9	27	18.4	17.9	17.4	17.0	–	20.4	19.8	19.2					9
10	23	18.2	17.7	17.2	16.8	–	–	19.6	19.0					10
11	19	18.0	17.5	17.0	16.6									11
12	16	17.8	17.3	16.8	16.4									12
13	12	–	17.1	16.6	16.2									13
14	9	–	–	16.4	16.1									14
15	5	–	–	–	15.9									15

To maintain constant power, correct manifold pressure approximately 0.18" Hg for each 10° F variation in carburetor air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; subtract for temperatures below standard.

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SECTION V

GENERAL MAINTENANCE

TIRE INFLATION

For maximum service from the tires on the Cherokee, keep the tires inflated to the proper pressure of 35 to 40 pounds for the main gear and 28 to 30 pounds for the nose wheel. Interchange the tires on the main wheels, if necessary, 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 at all possible. Out of balance wheels can cause extreme vibration on take-off. In the installation of new components, it may be necessary to rebalance the wheel with the tires mounted.

BATTERY SERVICE

Access to the 12 volt battery is through the right rear baggage compartment panel. The stainless steel box has a plastic drain tube which is normally closed off with a clamp and which should be opened occasionally to drain off any accumulation of liquid. The battery should be checked for proper fluid level but must not be filled above the baffle plates. A hydrometer check should be performed to determine the percent of charge present in the battery.

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

BRAKE SERVICE

The brake system is filled with Univis No. 40 (petroleum

base) hydraulic brake fluid. This should be checked at every 100 hour inspection and replenished when necessary by filling the brake reservoir on the firewall to the indicated level. If the system as a whole has to be refilled with fluid, this should be done by filling with the fluid under pressure from the brake end of the system. This will eliminate air from the system as it is being filled.

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

LANDING GEAR SERVICE

Main wheels are easily removed by taking off the hub cap, axle nut, and the two bolts holding the brake segment in place, after which the wheel slips easily from the axle.

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

Landing gear oleos on the Cherokee should be serviced according to the instructions on the units. In order to obtain the correct static extension on the main gear struts it is necessary to jack the airplane up until the struts are clear of the surfaces and fully extended. Using a strut pump, add air until a pressure of 300 pounds is obtained. To add oil to the struts, release the air pressure in the strut, remove the valve core and add oil through this opening with the strut fully extended. After the strut is full, compress it to full compression allowing excess air and oil to escape. With the strut still compressed reinsert the valve stem and pump up the strut as above. With the empty airplane resting on its wheels the main gear struts should have a visible extension of about 4-1/2 inches. With the airplane loaded to 2900 pounds gross weight the main gear strut should extend about 2 inches.

The nose strut is serviced with oil the same as the main struts, but in filling with air this strut may be left with the wheel on the ground, attaching the strut pump, and adding air

FUEL SYSTEM SCHEMATIC
PA 28-235
LEFT TIP TANK
LEFT MAIN TANK
ELECTRIC FUEL PUMP
ENGINE FUEL PUMP
FUEL QUANTITY GAUGES
FUEL SYSTEM DRAIN LEVER
PRIMER
FUEL PRESSURE GAUGE
MIXTURE
THROTTLE
CARBURETOR
FUEL TANK SELECTOR VALVE
RIGHT MAIN TANK
FUEL SELECTOR CONTROL
RIGHT TIP TANK

until a strut extension of 3-1/2 inches is obtained.

In jacking the Cherokee for landing gear or other service, a jack kit (available through the Piper Aircraft Service Department) should be used. This kit consists of two hydraulic jacks and a tail stand. At least 350 pounds of ballast should be placed on the base of the tail stand before jacking up the aircraft. The hydraulic jacks should be placed under the jack points on the bottom of the wing and the airplane jacked up until the tail skid is at the right height to attach the tail stand. After attaching the tail stand, and adding the ballast, the jacking may be continued until the aircraft is at the height desired.

FUEL AND OIL REQUIREMENTS

Aviation grade 80/87 Octane (minimum) fuel must be used in the Cherokee. The use of lower grades can cause serious engine damage in a very short period of time, and is considered of such importance that the engine warranty is invalidated by such use.

Whenever 80/87 is not available, the lowest lead 100 grade should be used. (See Fuel Grade Comparison Chart, on page 31.) 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.

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

FUEL GRADE COMPARISON CHART

Previous Commercial Fuel Grades (ASTM-D910)			Current Commercial Fuel Grades (ASTM-D910-75)			Current Military Fuel Grades (MIL-G-5572E) Amendment No. 3		
Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.	Grade	Color	Max. TEL ml/U.S. gal.
80/87	red	0.5	80	red	0.5	80/87	red	0.5
91/98	blue	2.0	*100LL	blue	2.0	none	none	none
100/130	green	3.0	100	green	**3.0	100/130	green	**3.0
115/145	purple	4.6	none	none	none	115/145	purple	4.6

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

**- Commercial fuel grade 100 and grade 100/130 (both of which are colored green) having TEL content of up to 4 ml/U.S. gallon are approved for use in all engines certificated for use with grade 100/130 fuel.

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 the oil be changed every 50 hours or sooner under unfavorable conditions. The following grades are recommended for the specified temperatures:

Temperatures above 40°F ..... S.A.E. 50
Temperatures between 10° and 40°F..... S.A.E. 30
Temperatures below 10°F ..... S.A.E. 20

CARE OF AIR FILTER

The carburetor 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.

The filter manufacturer recommends that the filter be tapped gently to remove dirt particles. Do not blow out with compressed air.

CARE OF WINDSHIELD AND WINDOWS

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

1. Flush with clean water and dislodge excess dirt, mud, etc., with your hand.

2. Wash with mild soap and water. Use a soft cloth or sponge, do not rub.

3. Remove oil, grease or sealing compounds with a soft cloth and kerosene.

4. After cleaning, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth.

5. A severe scratch or mar may be removed by using jeweler's rouge to rub out the scratch, smoothing, and then applying wax.

SERIAL NUMBER PLATE

The serial number plate is located near the stabilator on the left side of the airplane. Refer to this number for service or warranty matters.

LEVELING AND RIGGING

Leveling the Cherokee for purposes of weighing or rigging is accomplished as follows:

1. Partially withdraw two machine screws located immediately below the left front side window. These screws are leveling points and the airplane is longitudinally level when a level placed on the heads of these screws indicates level.

2. To put the airplane in a longitudinally level position on scales, first block the main gear oleos in the fully extended position, then deflate the nose wheel tire until the proper attitude is obtained. For rigging only, the airplane may be placed on jacks for leveling.

3. To level the airplane laterally, place a level across the baggage compartment floor along the rear bulkhead.

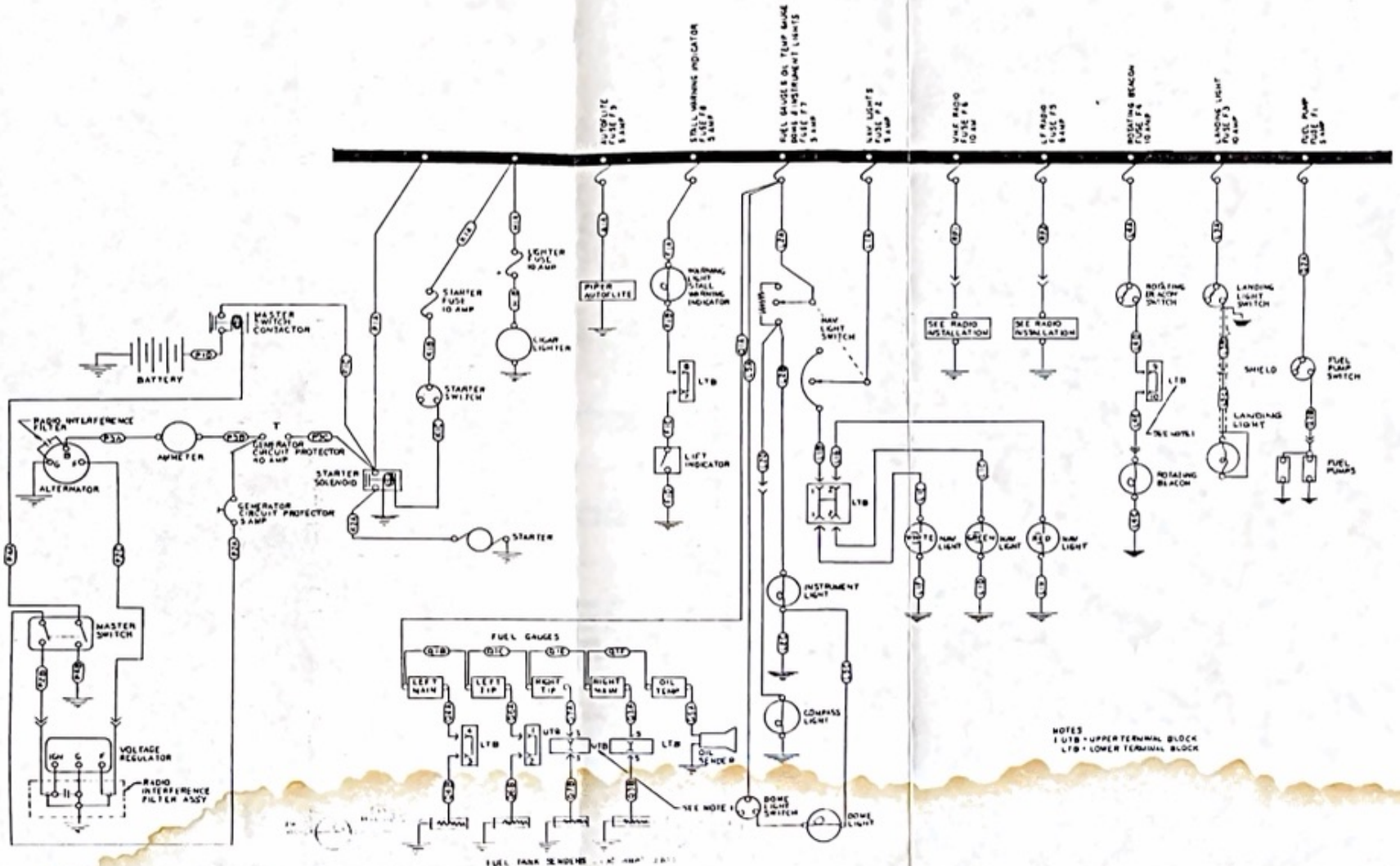
Rigging: Although the fixed flight surfaces on the Cherokee cannot be adjusted for rigging purposes, it may be necessary upon occasion to check the position of these surfaces. The movable surfaces all have adjustable stops, as well as adjustable turnbuckles on the cables or push-pull tubes, so that their range of travel can be altered. The positions and angular travels of the various surfaces are as follows:

1. Wings: 7^{o} dihedral, 2^{o} washout.
2. Stabilator Travel: 18^{o} up, 2^{o} down, tolerance $+/-1^{o}$.
3. Fin should be vertical, and in line with center of fuselage.
4. Ailerons travel: 30^{o} up, 15^{o} down, tolerance $+/-2^{o}$.
5. Flaps Travel: 10^{o}, 25^{o}, 40^{o}, tolerance $+/-2^{o}$.
6. Rudder Travel: 27^{o} right and left, tolerance $+/-2^{o}$.
7. Stabilator Tab Travel: 3^{o} up, 12^{o} down, tolerance $+/-1^{o}$.

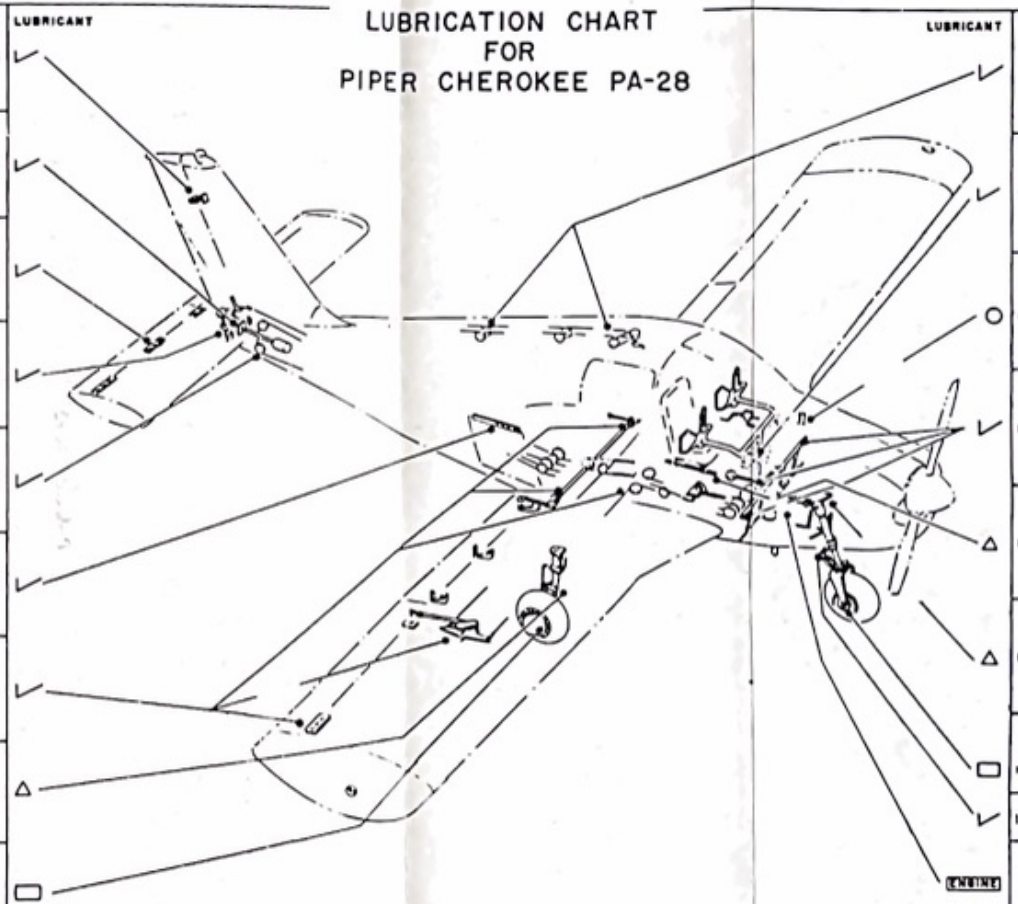
Cable tensions for the various controls are as follows:

Rudder: 40+/-5#	Stabilator: 40+/-5#
Ailerons: 40+/-5#	Stabilator Trim: 5+/-1#

For purposes of changing the lateral trim, a fixed tab is provided on the left aileron which may be adjusted as necessary. For extreme cases of wing heaviness, either of the flaps may be adjusted up or down from the zero positions.


AUTOFLITE FUSE F5 5 AMP
STALL WARNING INDICATOR FUSE F6 5 AMP
FUEL GAUGES OIL TEMP GAGE AND INSTRUMENT LIGHTS FUSE F7 5 AMP
NAV LIGHTS FUSE F2 5 AMP
VHF RADIO FUSE F6 10 AMP
LF RADIO FUSE F3 8 AMP
ROTATING BEACON FUSE F4 10 AMP
LANDING LIGHT FUSE F5 10 AMP
FUEL PUMP FUSE F1 5 AMP
LIGHTER FUSE 10 AMP
STARTER FUSE 10 AMP
PIPER AUTOFLITE
WARNING LIGHT STALL WARNING INDICATOR
NAV LIGHT SWITCH
SEE RADIO INSTALLATION
SEE RADIO INSTALLATION
ROTATING BEACON SWITCH
LANDING LIGHT SWITCH
FUEL PUMP SWITCH
SHIELD
LANDING LIGHT
ROTATING BEACON
FUEL PUMPS
LTB
LIFT INDICATOR
LIGHTER
STARTER SWITCH
STARTER
MASTER SWITCH CONTACTOR
BATTERY
RADIO INTERFERENCE FILTER
AMMETER
GENERATOR CIRCUIT PROTECTOR 40 AMP
ALTERNATOR
STARTER SOLENOID
GENERATOR CIRCUIT PROTECTOR 5 AMP
MASTER SWITCH
VOLTAGE REGULATOR
IGN
G
F
RADIO INTERFERENCE FILTER ASSY
FUEL GAUGES
LEFT MAIN
LEFT TIP
RIGHT TIP
RIGHT MAIN
OIL TEMP
UTB
LTB
OIL SENDER
SEE NOTE 1
DOME LIGHT SWITCH
DOME LIGHT
INSTRUMENT LIGHT
COMPASS LIGHT
RED NAV LIGHT
GREEN NAV LIGHT
WHITE NAV LIGHT
NOTES
1 UTB = UPPER TERMINAL BLOCK
LTB = LOWER TERMINAL BLOCK

LUBRICATION CHART FOR PIPER CHEROKEE PA-28



HOURS	LUBRICANT
RUDDER HINGES AND HORN 100	
STABILATOR HINGES 100	
STABILATOR TRIM TAB 100	
STABILATOR ADJUSTMENT MECHANISM 100	
STABILATOR CONTROL PULLEYS 100	
BAGGAGE DOOR AND MAIN DOOR HINGES 100	
AILERON AND FLAP TORQUE TUBE, PULLEYS, BELLCRANK, LEFT AND RIGHT 100	
MAIN LANDING GEAR GREASE FITTINGS LEFT AND RIGHT, 4 EACH 100	
MAIN WHEEL BEARINGS LEFT AND RIGHT 100	

LUBRICANT	HOURS
	STABILATOR TRIM 250 PULLEYS (SEE CAUTION 4)
	100 CONTROL COLUMN
	50 BRAKE RESERVOIR MAINTAIN FLUID LEVEL INDICATED ON THE SIDE OF RESERVOIR
	100 RUDDER ADJUSTMENT MECHANISM AND RUDDER ASSEMBLY
	100 FRONT SEAT ADJUSTMENT
	100 NOSE WHEEL STEERING
	100 NOSE WHEEL BEARING
	100 NOSE WHEEL SCISSORS
ENGINE	ENGINE OIL TANK 50 DRAIN AND REFILL 12 QTS.

NOTES

1. FUEL SYSTEM - THE FOLLOWING POINTS REQUIRE REGULAR SERVICING - FUEL PUMP STRAINER, CARBURETOR SCREEN, FILTER BOWL, QUICK DRAIN UNIT.
2. LANDING GEAR STRUTS - FOLLOW INSTRUCTION PLACARD ON OLEO STRUT.
3. MISCELLANEOUS - DURING ROUTINE MAINTENANCE CHECKS, APPLY LUBRICATION TO MISCELLANEOUS LINKAGES.
4. BATTERY - CHECK BATTERY FLUID LEVEL & BATTERY CONDITION EVERY 25 HOURS.

LEGEND

✓	MIL-L-7870 OIL-GENERAL PURPOSE LOW TEMP. LUBRICATION.
△	MIL-L-7711 GREASE-LUBRICATION GENERAL PURPOSE AIRCRAFT.
□	MIL-L-3545 GREASE-LUBRICATION HIGH TEMP.
○	MIL-O-6082 HYDRAULIC FLUID (RED).
ENGINE	SAE 50 ABOVE 40 AIR TEMP. *
	SAE 30 BETWEEN 10°& 40° AIR TEMP. *
	SAE 10 BELOW 10° AIR TEMP. *

CAUTIONS

1. DO NOT USE A HYDRAULIC FLUID WITH A CASTOR OIL OR ESTER BASE.
2. DO NOT OVER-LUBRICATE PEDESTAL CONTROLS.
3. DO NOT APPLY LUBRICANT TO RUBBER PARTS.
4. UNDER NO CIRCUMSTANCES SHOULD THE TRIM CABLES FROM THE COCKPIT TO THE REAR OF THE FUSELAGE BE LUBRICATED - AS THIS MAY CAUSE SLIPPAGE.
5. REMOVE ALL EXCESS GREASE FROM GREASE FITTINGS
* NON-DETERGENT. SEE LYCOMING SERVICE INSTRUCTIONS NO. 1014 FOR USE OF DETERGENT OIL.

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