Owners Handbook
OY-BBW

Cherokee 180

CHEROKEE C

PA-28- 150-160-180

OY-BBW

Owner's Handbook

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

SPECIFICATION FEATURES:

POWER PLANT	PA-28-150	PA-28-160	PA-28-180
Engine - Lycoming	O-320-E2A	O-320-D2A	O-360-A3A
Rated Horsepower	150	160	180
Rated Speed	2700	2700	2700
Bore, inches	5.125	5.125	5.125
Stroke, inches	3.875	3.875	4.375
Displacement (cubic inches)	319.8	319.8	361.0
Compression Ratio	7:1	8.5:1	8.5:1
Dry Weight, pounds	272	278	285
Fuel Consumption (75% power, gph)	9	9	10
Oil Sump Capacity (qts)	8	8	8
Fuel Aviation Grade Octane	80	91/96	91/96
Propeller (Sensenich)	M74DMS	M74DMS	M76EMMS

PERFORMANCE

Take-off Run, ft. **	780	740	720
Best Rate of Climb Speed (MPH)	85	85	85
Rate of Climb (ft. per min.)	690	730	750
Service Ceiling (ft.)	14,900	15,800	16,400
Absolute Ceiling	17,400	18,400	19,000
Top Speed (MPH)	141 (144*)	143 (146*)	152
Cruising Speed (75% power, sea level MPH)	123 (124*)	125 (128*)	134
Optimum Cruising Speed (75% power, 7000 ft., MPH)	132 (135*)	134 (137*)	143

* Wheel fenders optional equipment on PA-28-150 and 160

** Max. effort, 25° flap

SPECIFICATION FEATURES: (cont.)

PERFORMANCE

Fuel Consumption (gal. per hr. 75%	9	9	10
Cruising Range (75% power, sea level, std. fuel)	4 hrs. (5.5#) 500 mi. (690#)	4 hrs. (5.5#) 510 mi. (705#)	5 hrs. 680 mi.
Cruising Range (75% power, 7000 ft., std. fuel)	4 hrs. (5.5#) 525 mi. (725#)	4 hrs. (5.5#) 535 mi. (735#)	5 hrs. 725 mi.
Optimum Cruising Range (55% power, 10,000 ft. std. fuel 7.2 gph)	5 hrs. (7.0#) 580 mi. (800#)	5 hrs. (7.0#) 590 mi. (815#)	6.8 hrs. 845 mi.
Stalling Speed (flaps down, MPH)	54	55	57
Landing Roll (flaps down, ft.)	535	550	600

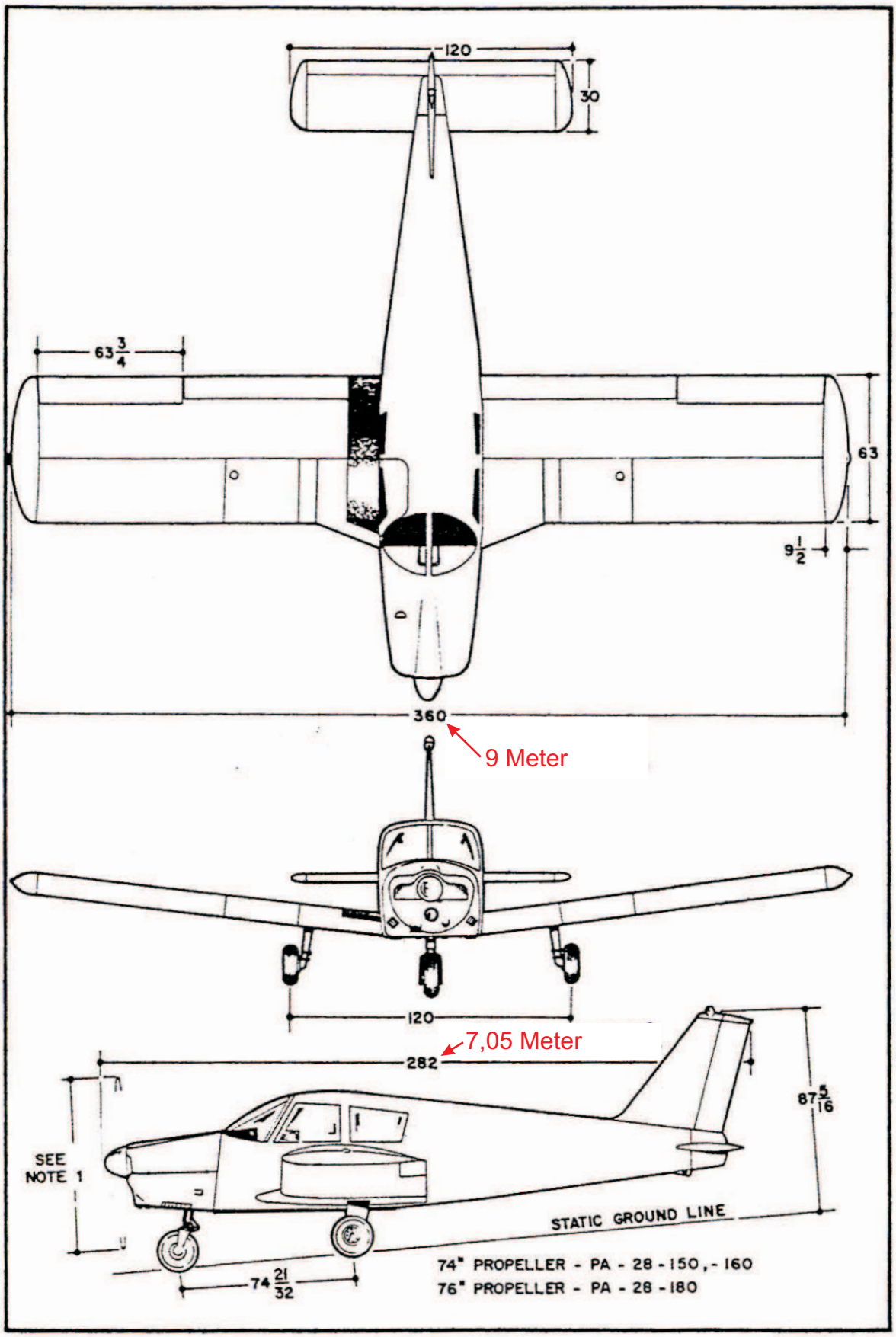
#50 gal. reserve fuel

Performance figures are for airplanes equipped for cross-country transportation flown at gross weight under standard conditions at sea level, or stated altitude. Any deviation of equipment may result in changes in performance.

WEIGHTS	PA-28-150	PA-28-160	PA-28-180
Gross Weight lbs.)	2150	2200	2400
Empty Weight (Standard) (lbs.)	1210	1215	1230
USEFUL LOAD (Standard) (lbs.)	940	985	1170
Empty Weight (AutoFlight) (lbs.)	1250	1255	1270

SPECIFICATION FEATURES (cont.)

WEIGHTS	PA-28-150	PA-28-160	PA-28-180
USEFUL LOAD (AutoFlight) (lbs.)	900	945	1130
FUEL AND OIL			
Fuel Capacity (Standard) (gal)	36	36	50
Fuel Capacity (with reserve) (gal)	50	50	
Oil Capacity (qts)	8	8	8
BAGGAGE			
Maximum Baggage (lbs)	200	200	200
Baggage Space (cubic ft)	17	17	17
Baggage Door Size (in)	20x22	20x22	20x22
DIMENSIONS			
Wing Span (ft)	30	30	30
Wing Area (sq. ft)	160	160	160
Wing Loading (lbs. per sq. ft)	13.4	13.8	15.0
Length (ft)	23.5	23.5	23.5
Height (ft)	7.3	7.3	7.3
Power Loading (lbs. per HP)	14.3	13.8	13.3
LANDING GEAR			
Wheel Base (ft)	6.2	6.2	6.2
Wheel Tread (ft)	10	10	10
Tire Pressure Nose	24	24	24
Main	24	24	24


120
30
63 3/4
63
9 1/2
360
9 Meter
120
7,05 Meter
282
87 5/16
SEE NOTE 1
STATIC GROUND LINE
74 21/32
74" PROPELLER - PA - 28 - 150, - 160
76" PROPELLER - PA - 28 - 180

SECTION II

DESIGN INFORMATION

SECTION II

DESIGN INFORMATION

ENGINE AND PROPELLER

The Cherokee is powered by a Lycoming engine of either 150, 160 or 180 H.P. (Refer to power plant specifications on page 1) Each engine is furnished with a starter, 35 ampere 12 volt alternator, voltage regulator, shielded ignition, vacuum pump drive, fuel pump and a dry, automotive type carburetor air filter.

The exhaust system is of the cross-over type to reduce back pressure and improve performance. It is made entirely from stainless steel and is equipped with dual mufflers. A heater shroud around the mufflers is provided to supply heat for both the cabin and carburetor de-icing.

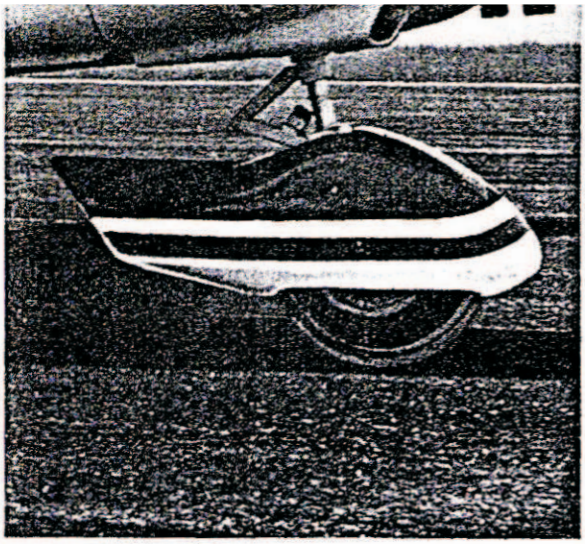
The Sensenich fixed-pitch propeller is made from a one-piece alloy forging. Refer to the Power Plant Specifications on page 1 for the model of propeller used with each engine.

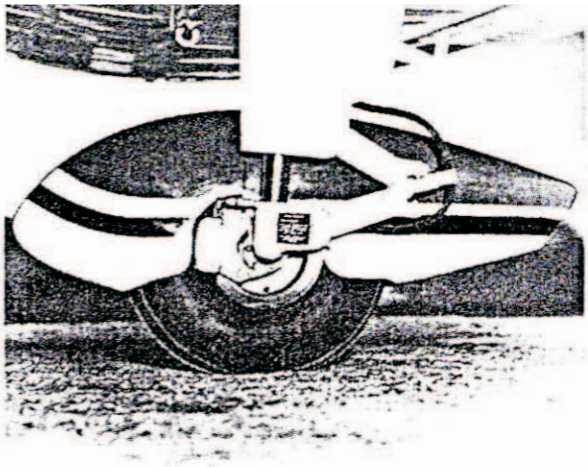
STRUCTURES

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 Cleveland single disc hydraulic brake assemblies, No. 30-55. All wheels use 600 x 6 four ply tires with tubes.

The nose gear is steerable through a 30 degree arc 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 oleo struts are of the air-oil type, with normal extension being 3.25 inches for the nose gear and 4.50 inches for the main gear under normal static load (empty weight of airplane plus full fuel and oil).

The standard brake system for the Cherokee consists of 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 handle and releasing the brake lever. To release the parking brake, pull back on the lever to disengage the catch mechanism and allow the handle to swing forward.

Optional toe brakes are available to supplement the standard hand lever and parking brake system.

CONTROL SYSTEMS

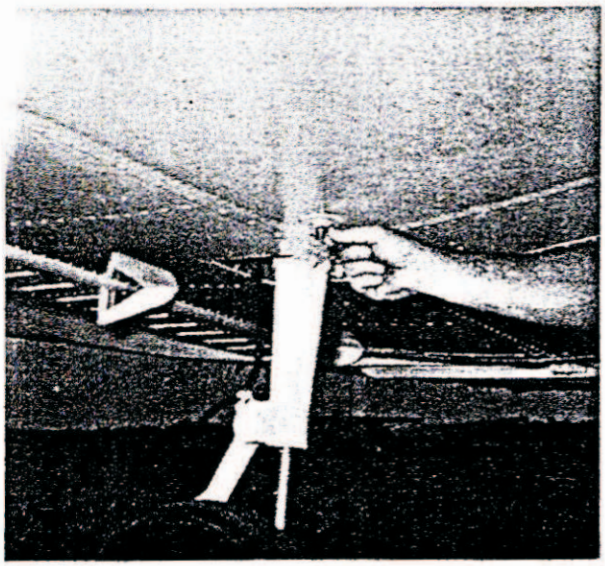
Dual controls are provided as standard equipment, with a cable system used between the controls and the surfaces. The horizontal tail is of the all movable slab type, with an anti-servo tab which also acts as a longitudinal trim tab, actuated by a control on the cabin ceiling. The stabilator provides 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 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

Fuel is stored in two twenty-five gallon tanks which are secured to the leading edge structure of each wing by screws and nut plates. This allows easy removal for service or inspection.

The standard quantity of fuel is 36 gallons for the Cherokee 150 and 160 and 50 gallons for the Cherokee 180. To obtain the standard quantity of 36 gallons of fuel on the 150 and 160 fill the tanks only to the bottom of the filler neck indicator, which extends some distance into the tanks. To fill to the standard plus

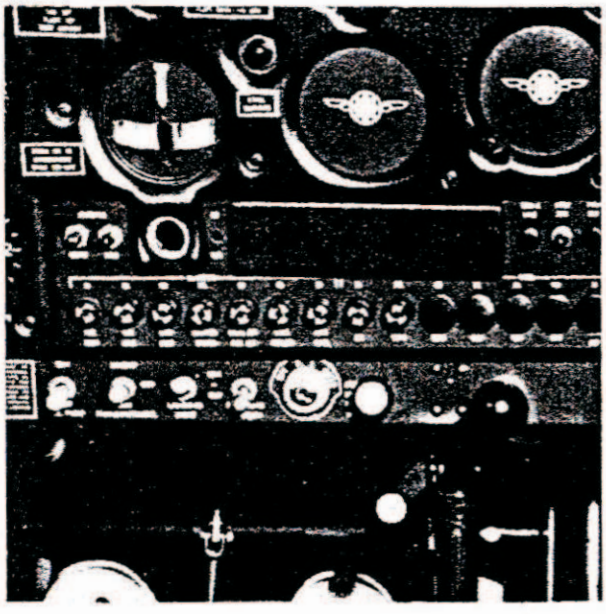


reserve quantity of 50 gallons the tanks are filled completely to the top. This system allows the fuel quantity to be varied conveniently according to the payload.

An auxiliary electric fuel pump is provided for use in case of failure of the engine driven pump. The electric pump should be on for all take-offs and landings.

The fuel strainer, which is equipped with a quick drain, is located on the front lower left corner of the firewall. This strainer should be drained regularly to check for water or sediment accumulation. To drain the lines from the tanks, the tank selector valve must be switched to each tank in turn, with the electric pump on, and the gascolator drain valve opened. Each tank has an individual quick drain located at the bottom, inboard, rear corner.

Fuel quantity and pressure are indicated on gauges located in the engine gauge cluster on the right side of the instrument panel.



ELECTRICAL SYSTEM

The electrical system includes a 12 volt alternator, battery, voltage regulator and master switch relay. The battery, regulator and relay are mounted in the battery compartment immediately aft of the baggage compartment. Access for service or inspection is conveniently obtained through a removable

panel at lower right corner of the compartment.

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

Standard electrical accessories include: Starter, Electric Fuel pump, Fuel Gauge, Stall Warning Indicator, Cigar Lighter and Ammeter.

Navigation Lights, Anti-Collision Light, Landing Light, Instrument Lighting and the Cabin Dome Light are offered as optional accessories.

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

Installed on the Cherokees is the F.T.P. (full time power) electrical system.

Derived from the system are many advantages both in operation and maintenance. The main advantage is, of course, full electrical power output regardless of engine R.P.M. This is a great improvement for radio and electrical equipment operation. Also because of the availability of generator output at all times, the battery will be charging for a greater percentage of use, which will greatly improve cold-morning starting.

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, re-

duce 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 master switch for 30 seconds to reset the overvoltage relay. If ammeter continues to indicate no output, maintain minimum electrical load and terminate flight as soon as practical.

HEATING AND VENTILATING SYSTEM

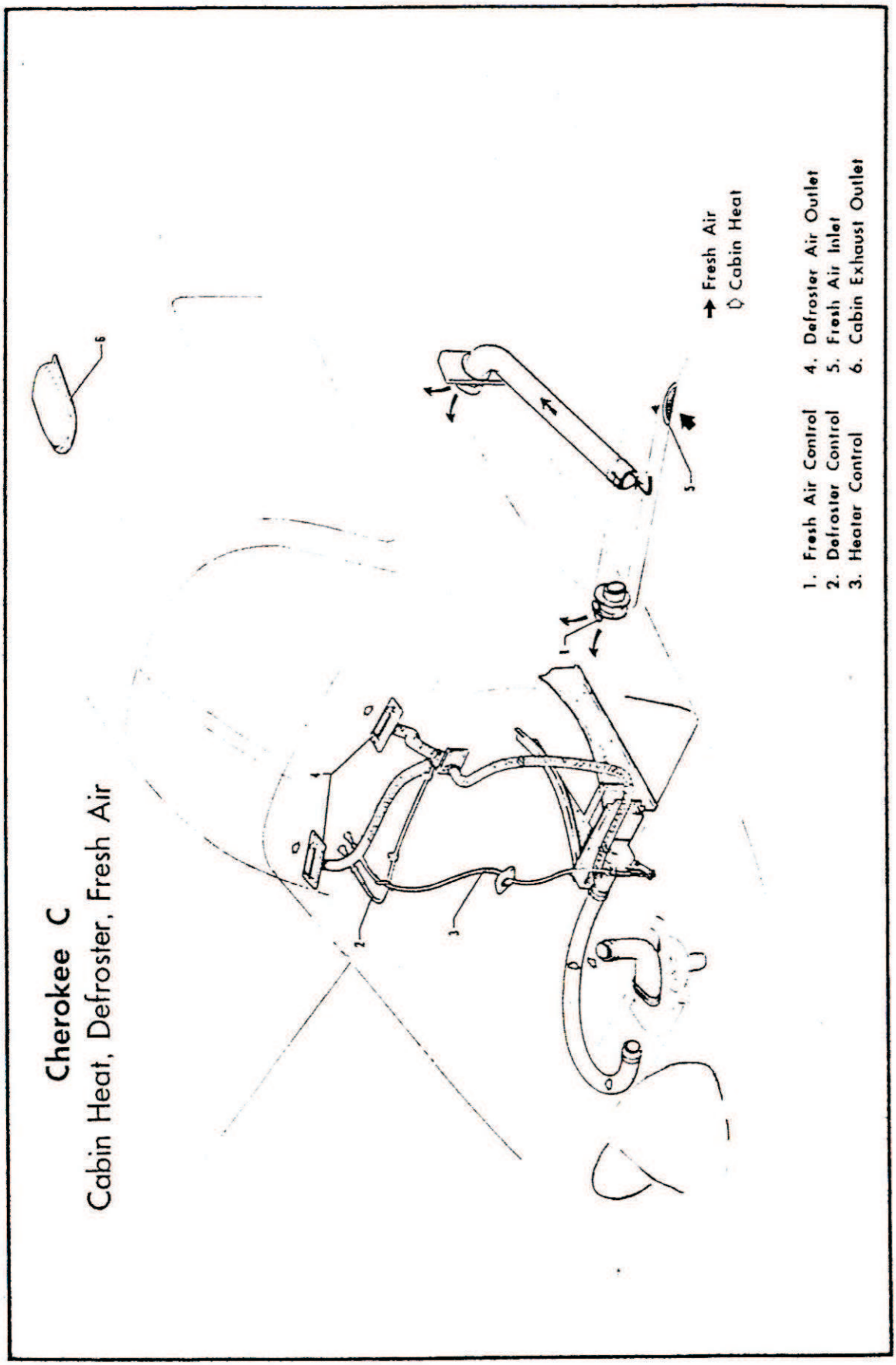
Heat for the cabin interior and the defroster system is provided by a heater muff attached to the exhaust system. The amount of heat desired can be regulated with the controls located on the lower right side of the instrument panel.

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

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 some Turn and Bank instruments are vacuum operated through use of a vacuum pump installed on the engine. Later C Model Cherokees are equipped with electric Turn and Bank instruments. 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.


Cherokee C
Cabin Heat, Defroster, Fresh Air
→ Fresh Air
◊ Cabin Heat
1. Fresh Air Control
2. Defroster Control
3. Heater Control
4. Defroster Air Outlet
5. Fresh Air Inlet
6. Cabin Exhaust Outlet

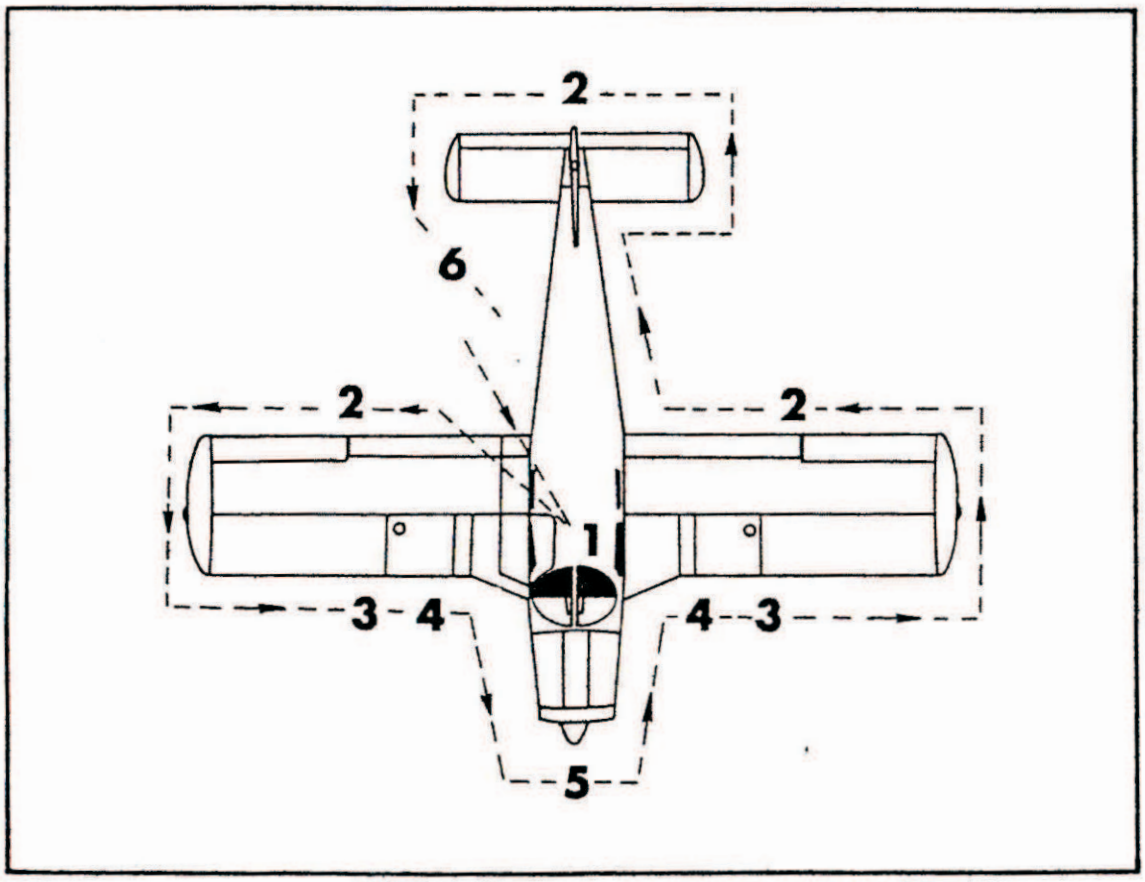
SECTION III

OPERATING INSTRUCTIONS

PREFLIGHT

Inspect the airplane as follows:

1. a. Master switch "ON".
   b. Check fuel quantity indicators (two tanks).
   c. Master switch and ignition "OFF".
2. a. Check for external damage or operational interference to the control surfaces, wings or fuselage.
   b. Check that there is no snow, ice or frost on the wings or control surfaces.
3. a. Check fuel supply visually and secure caps.
   b. Drain fuel tank sumps.
   c. Check to insure that the fuel system vents are open.



4. a. The landing gear shock struts are properly inflated. (Refer to Section V)

b. The tires are satisfactorily inflated and not excessively worn.

5. a. The cowling and inspection covers are secured.

b. The windshield is clean and free of defects.

c. The propeller is free of detrimental nicks.

d. There are no obvious fuel or oil leads.

e. The engine oil is at the proper level.

f. Drain the fuel strainer with the fuel selector valve in left or right tank position.

6. a. The tow-bar and control locks are detached and properly stowed.

7. a. Upon entering the airplane, ascertain that all controls operate properly.

b. Close and secure the cabin door.

c. Check that required papers are in order and in the airplane.

d. Fasten safety belts and shoulder harness. Check inertia reel.

STARTING

After completion of preflight inspection:

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

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.

Take-off may be made as soon as ground check is completed, providing that the throttle may be opened fully without back firing or skipping, and without reduction in engine oil pressure.

GROUND CHECK

With the engine running at 2000 RPM, switch from both magnetos to only one and note the RPM loss; switch to the other magneto and again note the RPM loss. Drop off on either magneto should not exceed 125 RPM.

Check vacuum gauge. Indicator should read 5" Hg ± .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 take-off.

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. Avoid prolonged ground operation with carburetor heat ON as the air is unfiltered.

TAKE-OFF

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

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

The take-off 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 50 to 60 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. To shorten take-off distance, flaps extended up to 25° may be used.

CLIMB

The best rate of climb at gross weight will be obtained at 85 miles per hour. The best angle of climb may be obtained at 74 miles per hour. At lighter than gross weight these speeds are reduced somewhat. For climbing enroute a speed of 100 miles per hour is recommended. This will produce better forward speed and increased visibility over the nose during the climb.

STALLS

The gross weight stalling speed of the Cherokee with power off and full flaps is 54 MPH on the 150, 55 MPH on the 160 and 57 MPH on the Cherokee 180. This speed is increased 9 miles per hour with the flaps up. Stall speeds at lower weights will be correspondingly less.

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 high altitudes. The mixture should be leaned during cruising operation at 75% power or less, but during climb only at altitudes above 5000 feet.

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 tank. It is recommended that one tank should be used for one hour after take-off, then the other tank used for two hours, then return to the first tank, which will have approximately one and one half hour of fuel remaining if the tanks were full plus reserve at take-off. The second tank will contain approximately one half hour of fuel.

APPROACH AND LANDING

Landing check list:

1. Fuel on proper tank
2. Mixture - rich
3. Elec. fuel pump on
4. Flaps - set
5. Fasten belts/harness

The airplane should be trimmed to an approach speed of about 85 miles per hour, with flaps up. The flaps can be lowered at speeds up to 115 miles per hour, if desired, and the approach speed reduced 3 MPH for each additional notch of flaps. 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 air-speed 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 (50 to 60 MPH). After ground contact hold the nose wheel off, as long as possible. As the air-plane 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 air-craft weight on the main wheels. In high wind conditions, par-ticularly in strong cross winds, it may be desirable to approach the ground at higher than normal speeds, with partial or no flaps.

GROUND HANDLING AND 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 lock-ed when in the full up position, and should be left retracted.

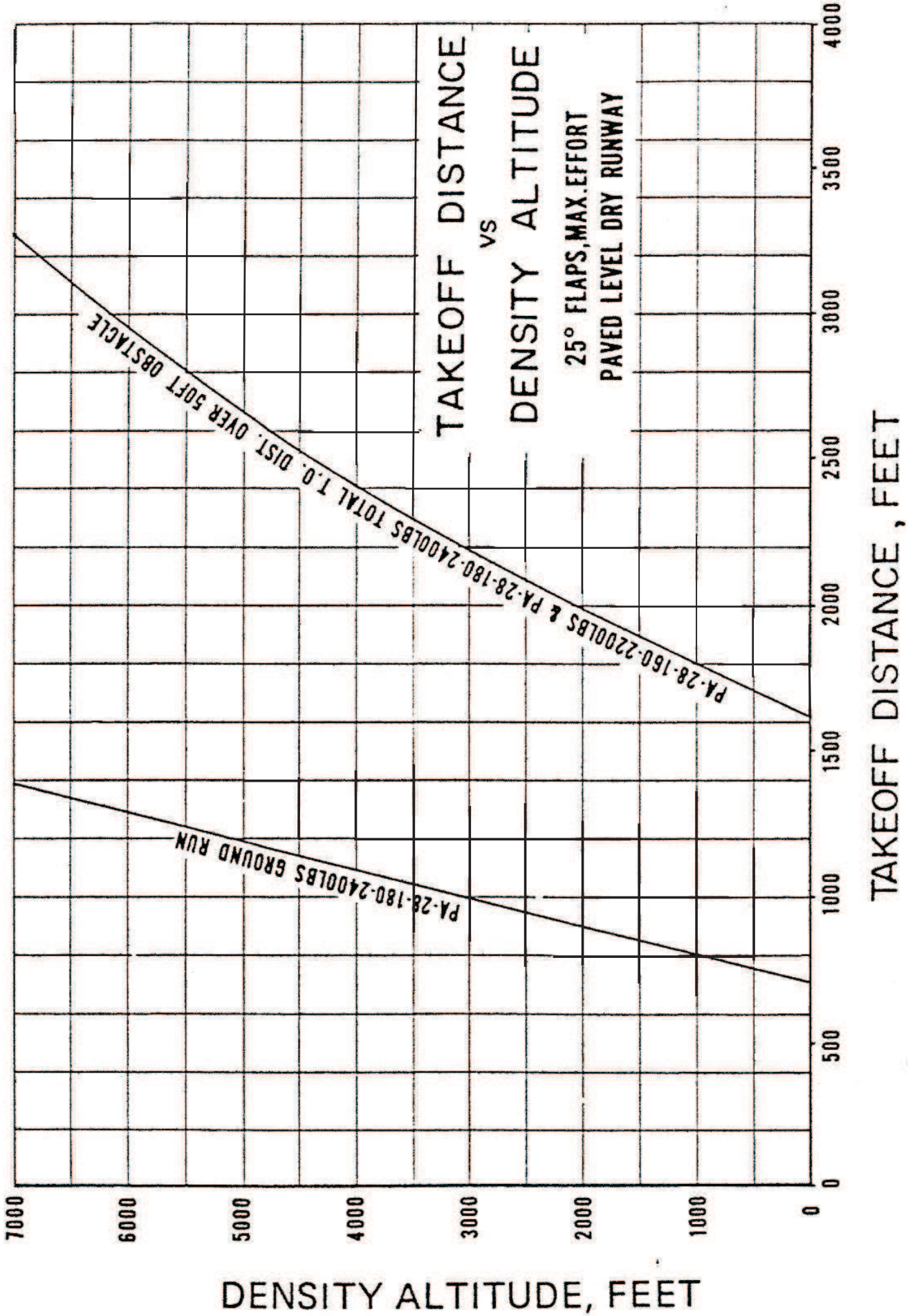
WEIGHT AND BALANCE

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.

SECTION IV

PERFORMANCE CHARTS

PIPER CHEROKEE C
PA-28-180



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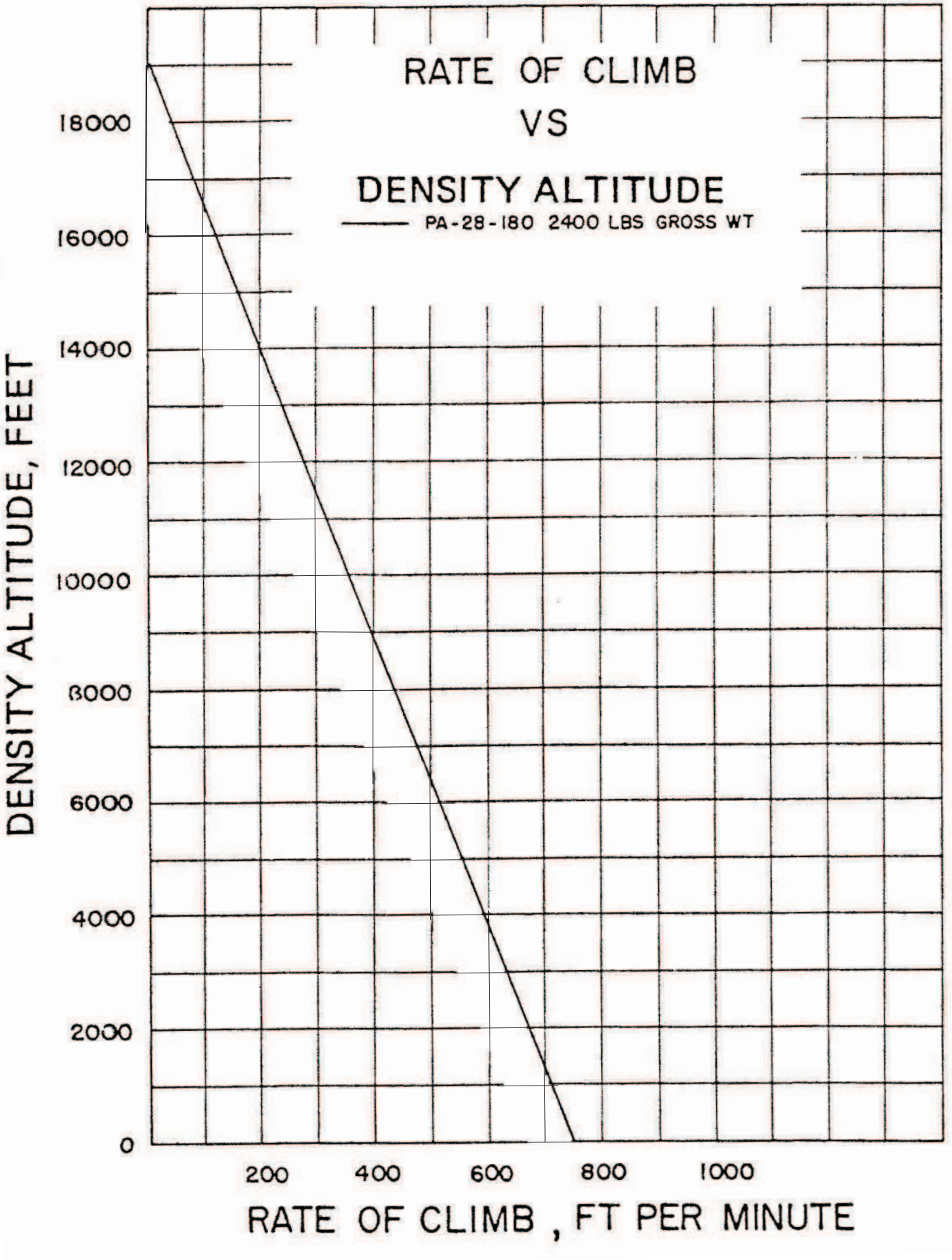

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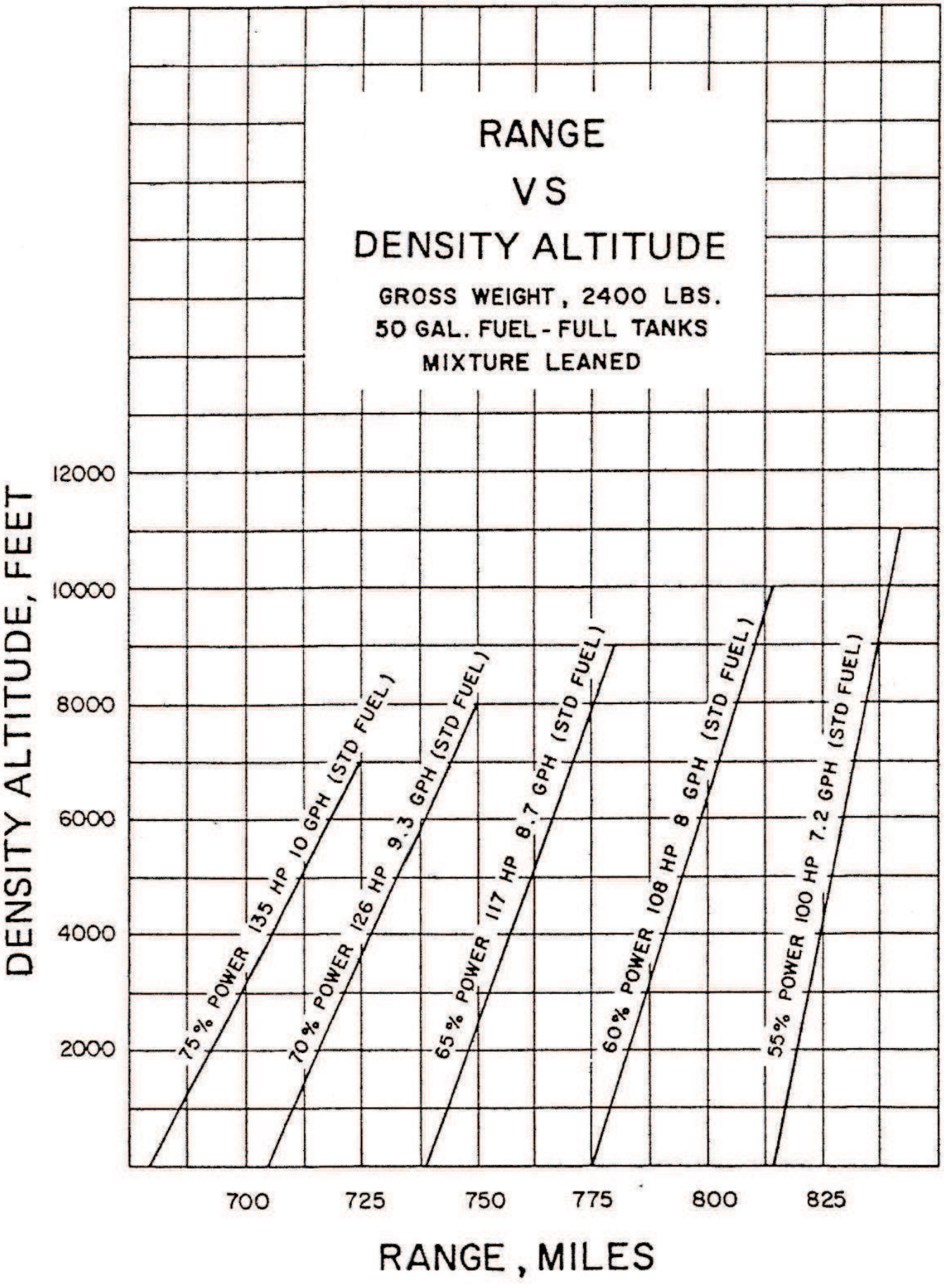

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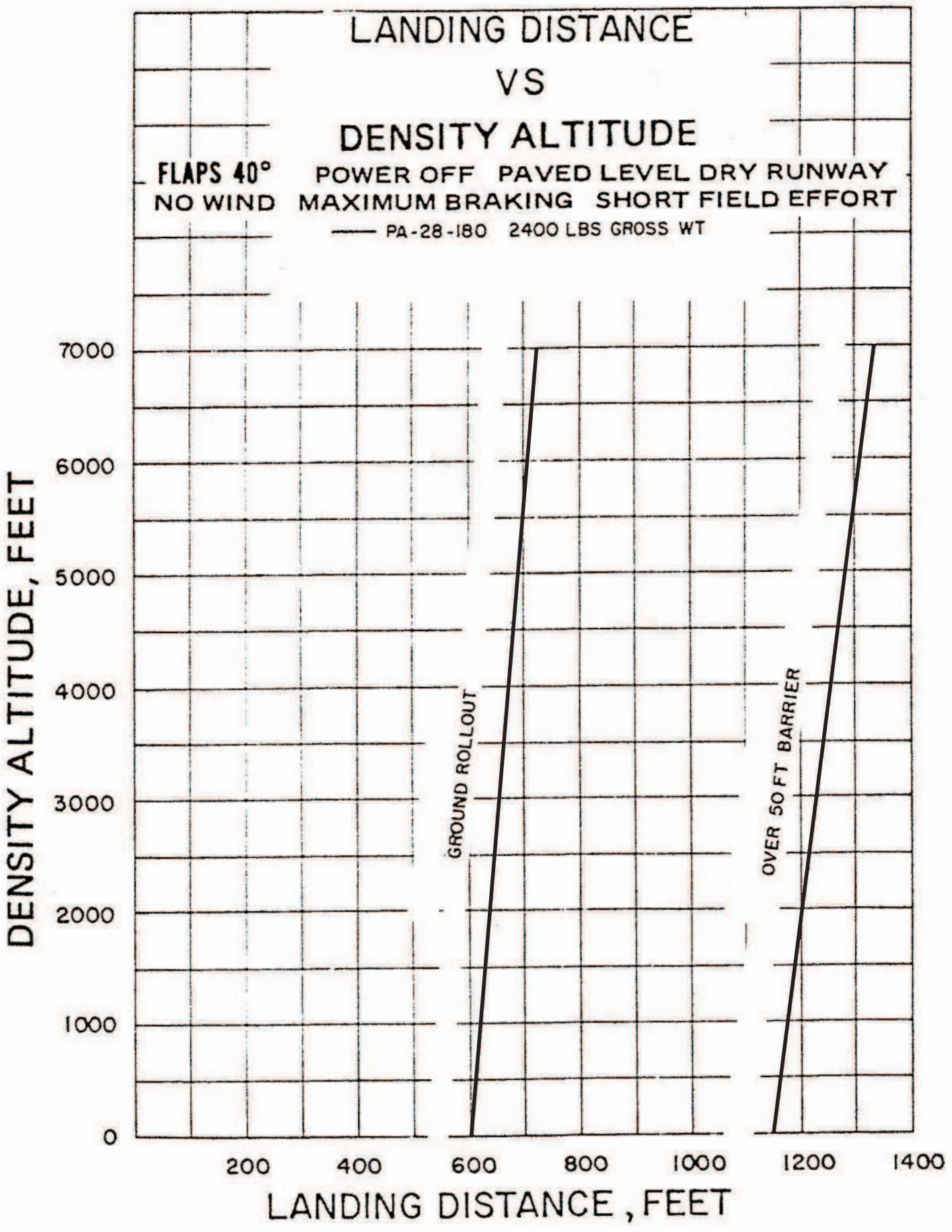

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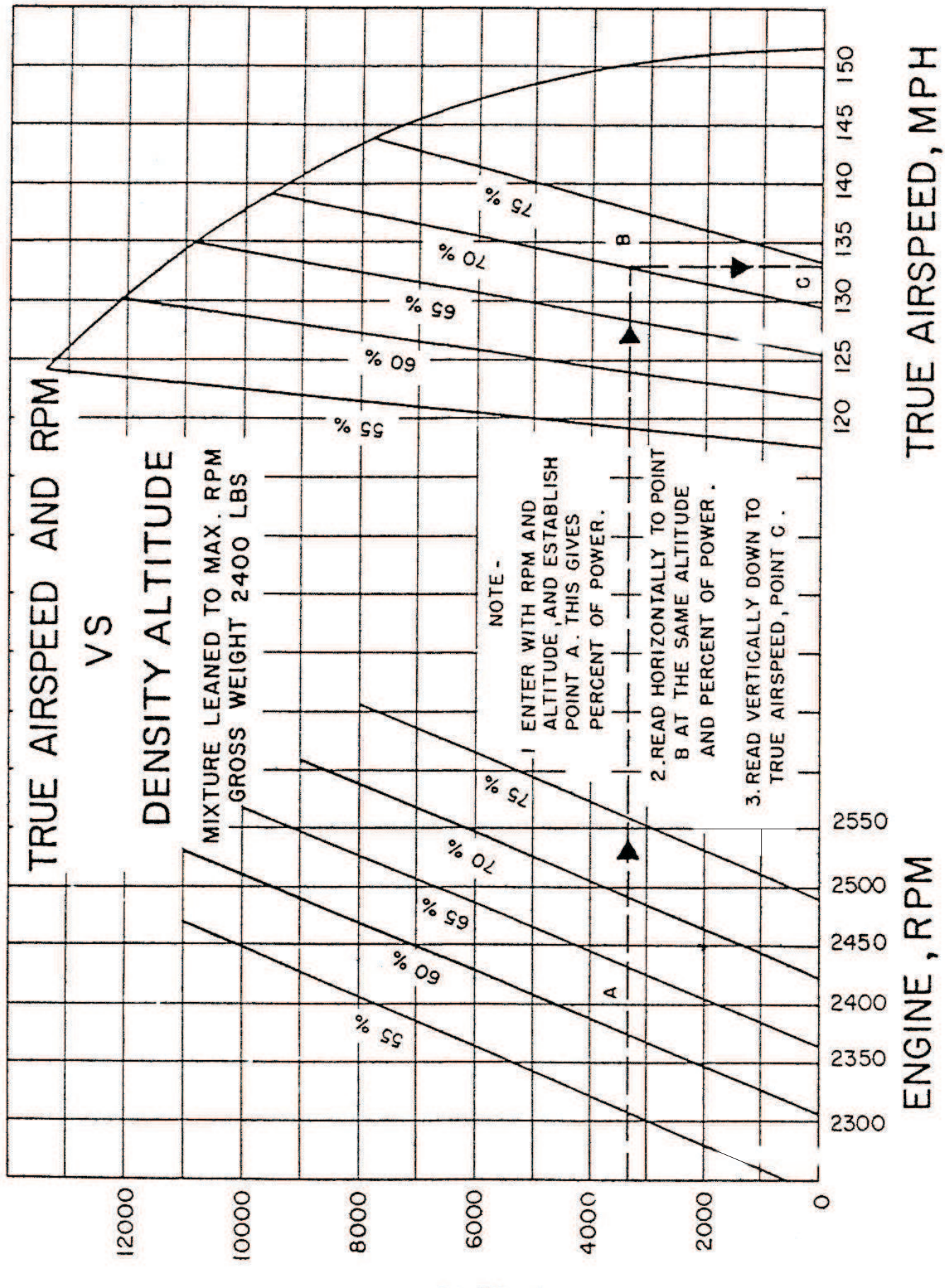

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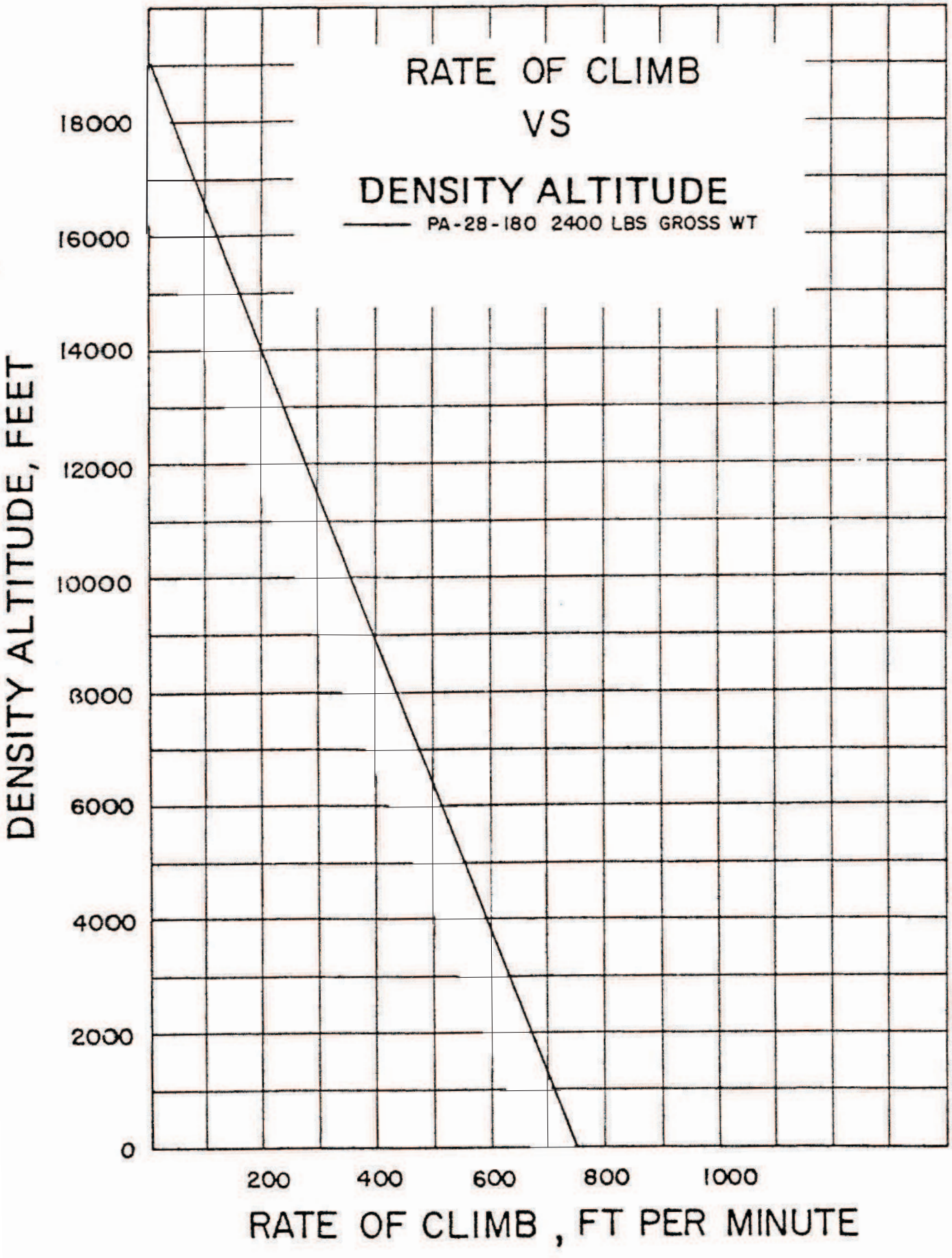

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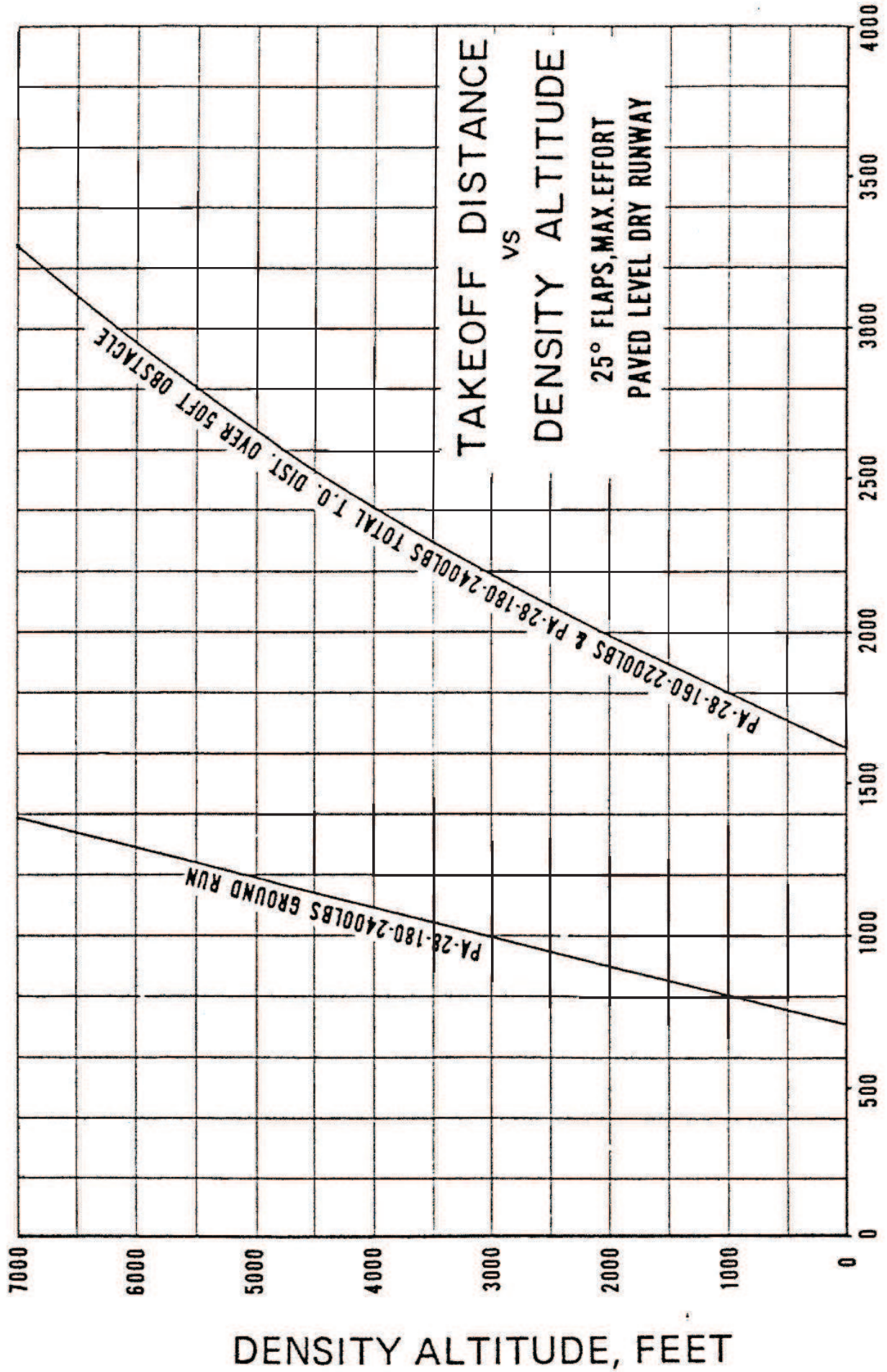

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