PACER
OWNER'S HANDBOOK

OWNERS' HANDBOOK

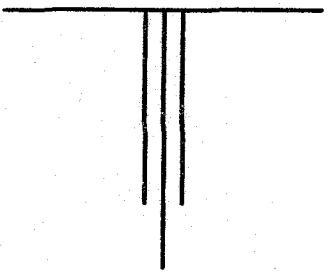
FOR

OPERATION AND MAINTENANCE

OF

THE PIPER PACER

MODEL PA-20 AIRPLANE



PIPER AIRCRAFT CORPORATION, LOCK HAVEN, PA

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 PACER 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 PACER'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 AIRPLANE FLIGHT MANUAL SHALL GOVERN.

Revised text and illustrations shall be indicated by a black vertical line in the margin opposite the change. A line opposite the page number will indicate that material was relocated.

Additional copies of this manual, Piper No. 752 395, may be obtained from your Piper Dealer.

Published by
PUBLICATIONS DEPARTMENT
Piper Aircraft Corporation
752 395
Issued: 1954
Revised: April 19, 1977

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MODEL PA-20 PIPER PACER

Figure 1

SECTION ONE

DETAILS OF YOUR AIRPLANE

There are three versions of the Piper Pacer designated by their respective approximate cruising speeds; the "115" equipped with the Lycoming 108 H. P. engine, dual wheel controls, 36 gallon fuel capacity in the wings, new Hydrasorb soft type landing gear, balanced elevators, and easily accessible engine compartment; the "125" with the Lycoming 125 H. P. engine, flaps for slower landings, complete soundproofing, and all the features of the "115"; and the "135" with 125 H. P. Lycoming engine plus a controllable pitch propeller. manifold pressure gauge, outside air temperature gauge, fairing kit together with all the features of the "125".

POWER PLANT:

The Piper Pacer "115" is equipped with a Lycoming Model O-235-C1 engine rated at 108 horsepower at 2600 R. P. M.

The Piper Pacer "125" and "135" are equipped with the Lycoming Model O-290-D engine rated at 125 H. P. at 2600 R. P. M.—See Figure 2.

PROPELLERS:

There are several propellers available for your Piper Pacer Airplane. The ones listed here are considered standard equipment.

Pacer "115"	*Pacer "125"*	*Pacer "135"*
Sensenich Fixed Pitch Wood 74FM Series	(Same as for "115")	Aeromatic with altitude control

LANDING GEAR:

Your airplane is equipped with the exclusive Piper Hydrasorb Landing Gear, a new and extremely efficient feature of the 1950 Piper Pacer Airplane.—See Figure 3.

It consists of right and left individually suspended gears, each having an automotive type shock absorber unit and shock cord assembly. This combination is coupled together to reduce landing shock to an absolute minimum and to assist in taxiing your airplane over rough and bumpy terrain.—See Figure 4.

A steerable full swivel tail wheel is standard equipment. Practically all directional ground control can be effected by using the rudder pedals to actuate the tail wheel, thus holding brake wear to a minimum.

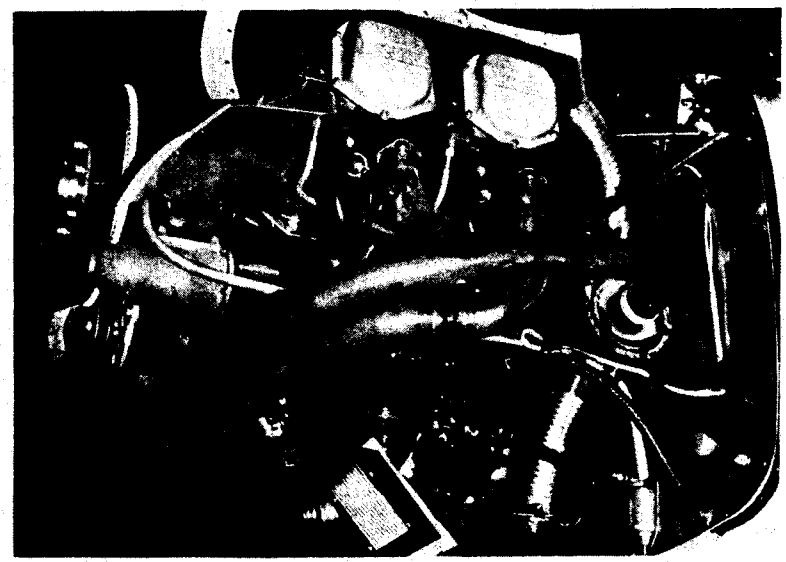


Figure 2

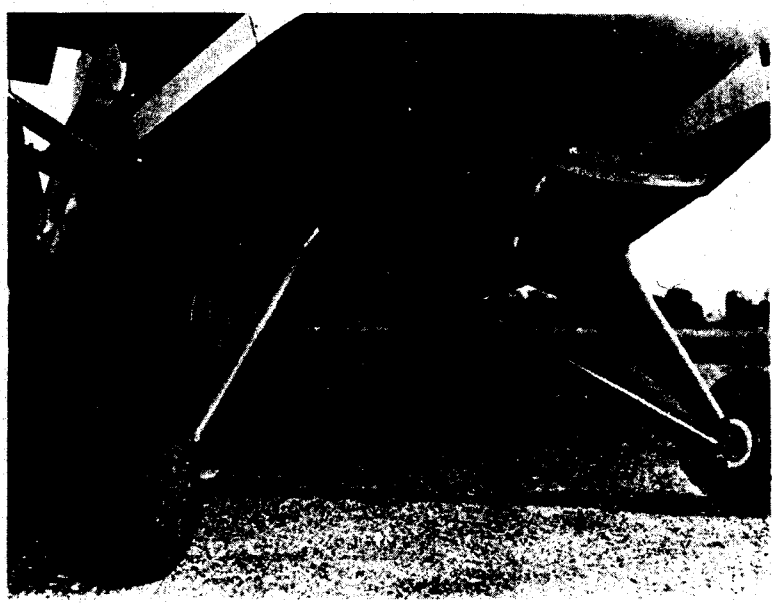


Figure 3

BRAKES:

The brakes of your Piper Pacer are of the hydraulic expander tube type.

The oil reservoirs are built into the master cylinders which are attached directly to the pilot control pedals. The right and left brakes are separate units and the reservoirs of each should be checked periodically. The parking brake is of the plunger lock type and is actuated by the control knob on the instrument panel.

WHEELS AND TIRES:

The wheel assemblies of your airplane are the Hayes D-3-13-A-1, and are equipped with 8:00x4 full balloon tires.—See Figure 3.

The tire, of the full swivel steerable tail wheel, is 6:00x2 in size and of the solid rubber type.

CONTROL SYSTEM:

Your airplane is equipped with dual controls. The Pacer "125" and "135" has dual brakes (optional equipment) and flaps. The flap control lever is located in the center of the cockpit in front of the front seat. The Pacer "115" has one set of brakes and no flaps, but both can be had as optional equipment.

The stabilizer adjustment crank is located in the ceiling of the cabin.

The control wheel gives you smooth, positive action of the ailerons and elevators.—See Figure 5 and 5A.

FUEL SYSTEM:

The Piper Pacer is equipped with two 18 gallon tanks, one in each wing. The fuel tank selector valve is located on the left side of the cockpit about one foot below the instrument panel. The tanks are drained individually and cannot be used simultaneously. Fuel in the right tank can be used "*only*" when the airplane is in level flight, and shall be considered as an auxiliary fuel supply since the outlet for the auxiliary fuel supply is located at the front of the tank and when the airplane is in climbing attitude, fuel will not flow to the engine.

The fuel strainer, located on the lower left side of the firewall in the engine compartment, should be checked for water or sediment

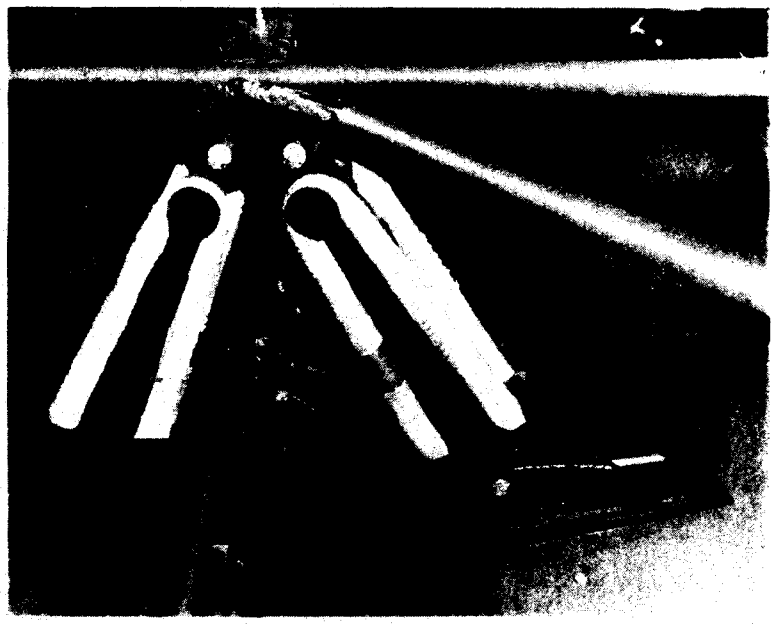


Figure 4

in the bowl at regular intervals. Fuel screens are provided at each tank fuel line outlet, in the fuel strainer and in the carburetor.

The fuel gauges for the wing tanks project below the wing fabric line under each tank. These gauges should be drained and cleaned occasionally so that the float indicator can always be readily seen.

The engine primer pump is located on the lower right hand side of the instrument panel. It takes fuel from the top of the fuel strainer and pumps it directly to the right cylinders of the engine. The primer should be locked in at all times, except when in use, to prevent malfunctioning of the engine.—See Figure 7.

ELECTRICAL SYSTEM:

A 12 volt 24 ampere hour reading battery is located under the right front seat. (See Section three—BATTERY SERVICE).

The master switch is located under front edge of left front seat. The master switch in the "down" position is off and when switched "up" is on.

The fuses for the master switch are located in the junction box which will be found under the left side of the front seat. The starter button is also located in the junction box and protrudes from the box in a downward direction to prevent inadvertent use by persons unfamiliar with the airplane. The starter switch can be operated whether the master switch is *ON* or *OFF*.

Circuit breakers are provided on the left side under the instrument panel for the generator, radio and lights. These units automatically break the electrical circuit if an overload is applied to the electrical system, preventing damage to any electrical unit. To reset circuit breakers, simply push in the buttons. Continual popping out of the circuit breaker buttons indicate trouble in the electrical system and should be investigated immediately.

A regulator is incorporated in the electrical system to maintain the proper voltage level in the battery. The regulator is located on the firewall in the engine compartment. An ammeter is located at the extreme left on the instrument panel and indicates amount of charge or discharge of your battery.

The position, compass, and panel lights (optional equipment) are operated by a rheostat switch located on the left hand side of the panel. The position lights are turned ON with the first movement of the knob; compass and panel lights intensity is regulated by further clockwise rotation of the rheostat knob.—See Figure 6.

FUSELAGE:

The fuselage frame of your airplane is constructed of steel tubing welded at the joints to form a rigid structure. A number of highly stressed members are of chromemolybdenum steel (4130). Other members are of 1025 steel.

Repairs to the fuselage can be in the manner approved by the Civil Aeronautics Authority Manual No. 18, and repair facilities for this type of construction are available throughout the world.

The fuselage is made corrosion resistant by first degreasing it, and then applying a coat of zinc chromate, followed by a coat of airplane dope. Sealer is sprayed on the fuselage wherever fabric comes in contact with the structure. If the airplane is to be used in salt water areas. the fuselage is metalized prior to applying the zinc chromate and dope.

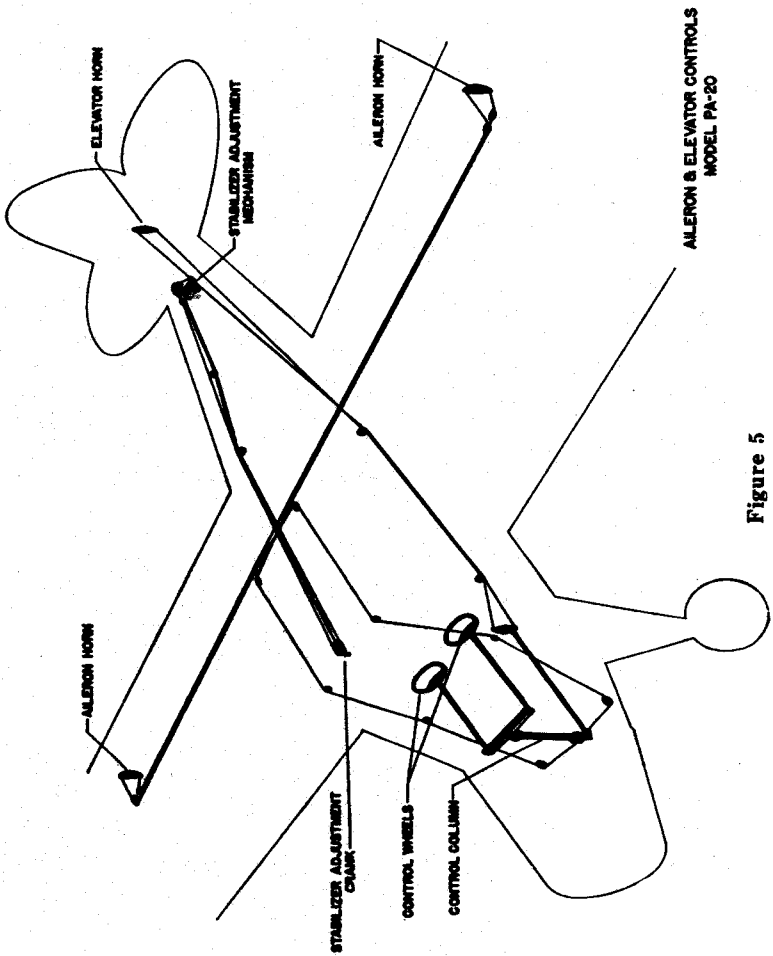

ELEVATOR HORN
STABILIZER ADJUSTMENT MECHANISM
AILERON HORN
AILERON HORN
STABILIZER ADJUSTMENT CHAIN
CONTROL WHEELS
CONTROL COLUMN
AILERON & ELEVATOR CONTROLS
MODEL PA-20

Figure 5

ENGINE MOUNT:

The engine mount is similar in construction to the fuselage. It is joined to the fuselage by aircraft bolts which should be checked frequently to see that they are snug. Do not draw too tight. (300 inch lbs. torque value).

WINGS:

The wings of your Piper Pacer have the same general type construction used in other Piper models. The spars are of extruded aluminum and require no maintenance. The drag bracing consists of aluminum tubular drag or compression struts bolted to the spars. The drag wires are tie rods made of high strength stainless steel, and should not be replaced with soft steel wire.

The wing ribs are constructed of aluminum drawn sections riveted together, and attached to the spars by self tapping sheet metal screws. There are 12 ribs in each wing.

Leading Edge: The wing leading edge is covered with aluminum alloy sheet which extends back to the front spar on the upper surface and approximately half way back to the front spar on the lower surface. Aluminum alloy channels between the sheet metal cover and the ribs add stiffness to the surface. Care should be taken in handling the leading edge to prevent denting the aluminum cover sheets.

Wing Tip Bow: The wing tip bow is a formed ash strip attached to the front and rear wing spars by steel fittings. This member is also secured to the aluminum leading edge and the trailing edge of the wing rib nearest to the tip. Rough handling of the airplane on the ground may damage the tip bow, so care should be taken when handling by means of the wing tips to apply force only at the juncture of the spars with the tip bow.

Aileron and Flap False Spar: The aileron false spar is of formed aluminum alloy attached to the wing ribs by means of self-tapping sheet metal screws. Inspect the false spar to check for looseness of the attaching screws. Be sure that all drain grommets in the wing trailing edge are kept open so that accumulations of moisture will drain out the wing.

Spar Fittings: The spar butt fittings are of aluminum alloy and the strut fittings are made of carbon steel channels with aluminum alloy filler blocks and are bolted to the spars with dural bolts. An occasional inspection to see that all nuts are drawn snug should

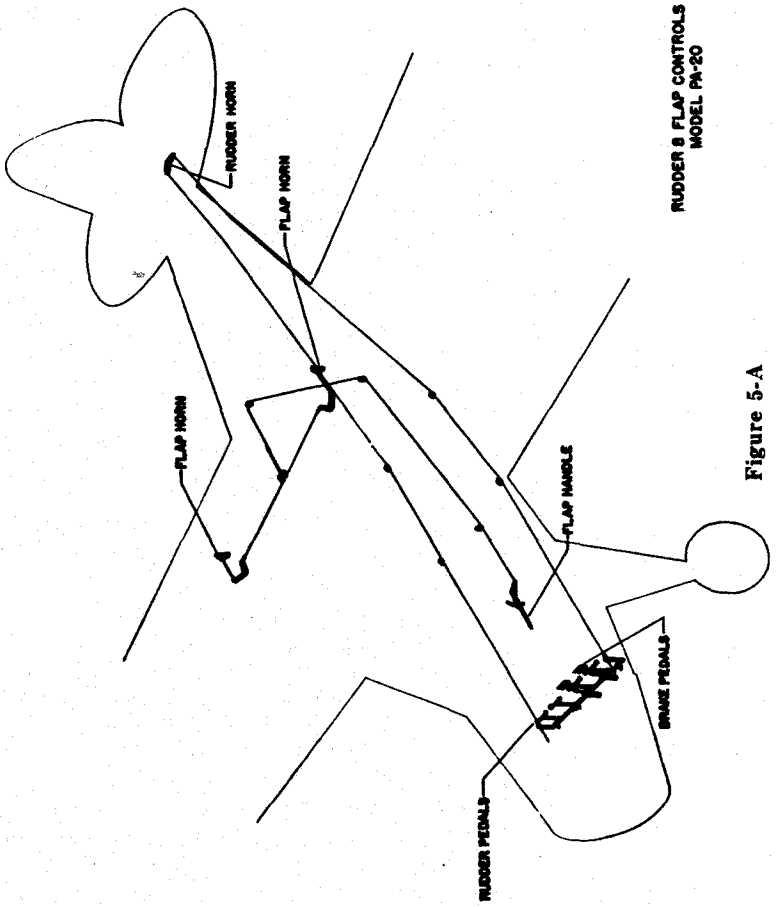

RUDDER & FLAP CONTROLS
MODEL PA-20
RUDDER HORN
FLAP HORN
FLAP HORN
FLAP HANDLE
BRAKE PEDALS
RUDDER PEDALS

Figure 5-A

be made. At this inspection period the bolts attaching the wing to the fuselage and the lift struts to the wing should be examined to see that they do not have excessive play and that all nuts are safetied, or the elastic stop nuts (if used) are in good shape.

Lift Struts: The lift struts are streamline tubes attached to the wing and fuselage by means of AN standard steel bolts. In inspecting the struts, check for nicks or dents.

In handling the airplane on the ground, care should be taken to prevent damage of the lift struts by pushing or lifting at the middle of the strut. Frequent inspections for corrosion of the struts should be made and if any corroded spots are found, these should be sanded down to the bare metal with fine sandpaper and metal primer should be applied. After the primer has dried, a finish coat of the desired color may be added.

The right wing is wired for a stall warning indicator, and both wings are wired for navigation lights. Landing lights can also be installed as optional equipment.

Flaps are optional equipment on the Pacer "115" but standard equipment on the "125" and "135".

EMPENNAGE:

The units which make up the Empennage are the Fin, Rudder, Stabilizers, and Elevators. These units are constructed of tubular steel with steel channel ribs. The hinges of these units have bronze bushing inserts and should be oiled with light oil occasionally. Streamline tie rods brace the stabilizers to the fin and fuselage. These rods should not be rigged tighter than necessary as high loads may be imposed on other parts of the tail surface. Do not use tie rods for lifting or handling your airplane.—See Figure 8.

COVERING:

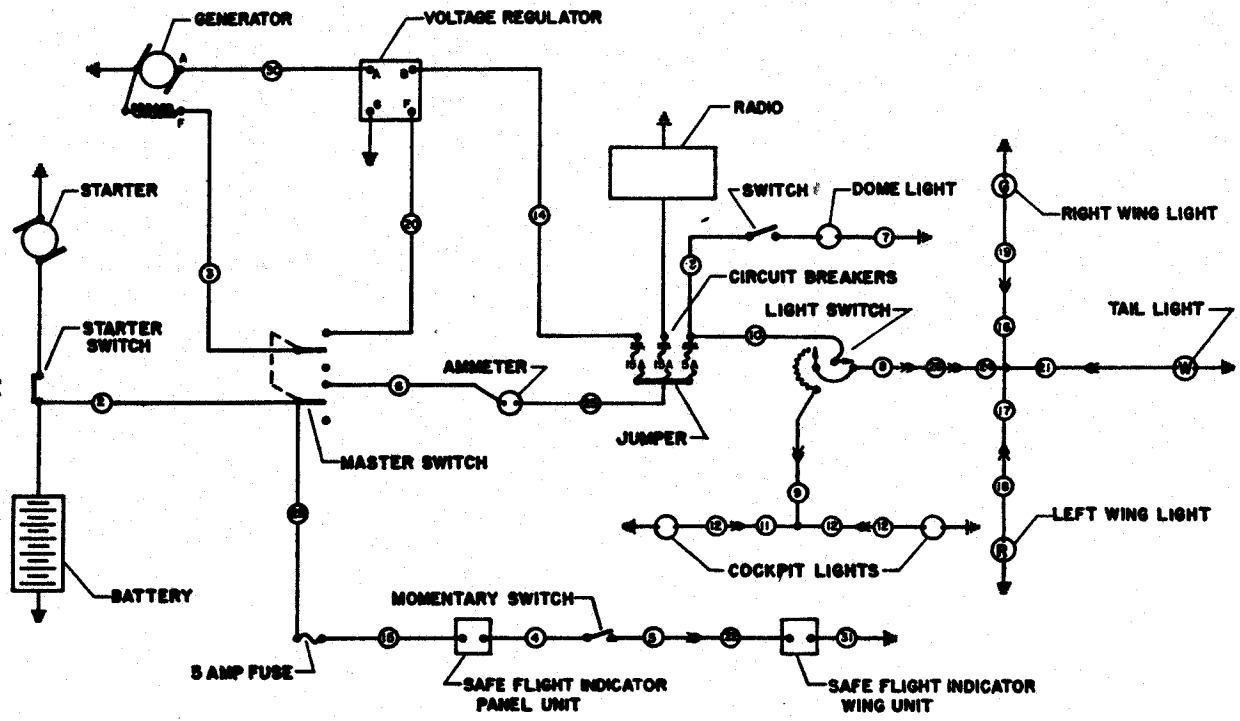
The covering of your airplane is of Grade A Fabric (SAE-AMS3806) predoped with Piper specified clear nitrate dope containing a fungicidal material. There are 12 coats of dope applied and the new method used will give years of trouble free service.

The standard colors of the Piper Models are as follows:

The Pacer 115—Lock Haven Yellow with Maroon Stripe.

The Pacer 125 and 135—Tucson Cream with Maroon Stripe.

For other color combinations, see Section 5 Optional Equipment.



ELECTRICAL SYSTEM DIAGRAM
MODEL PA-20

Figure 6

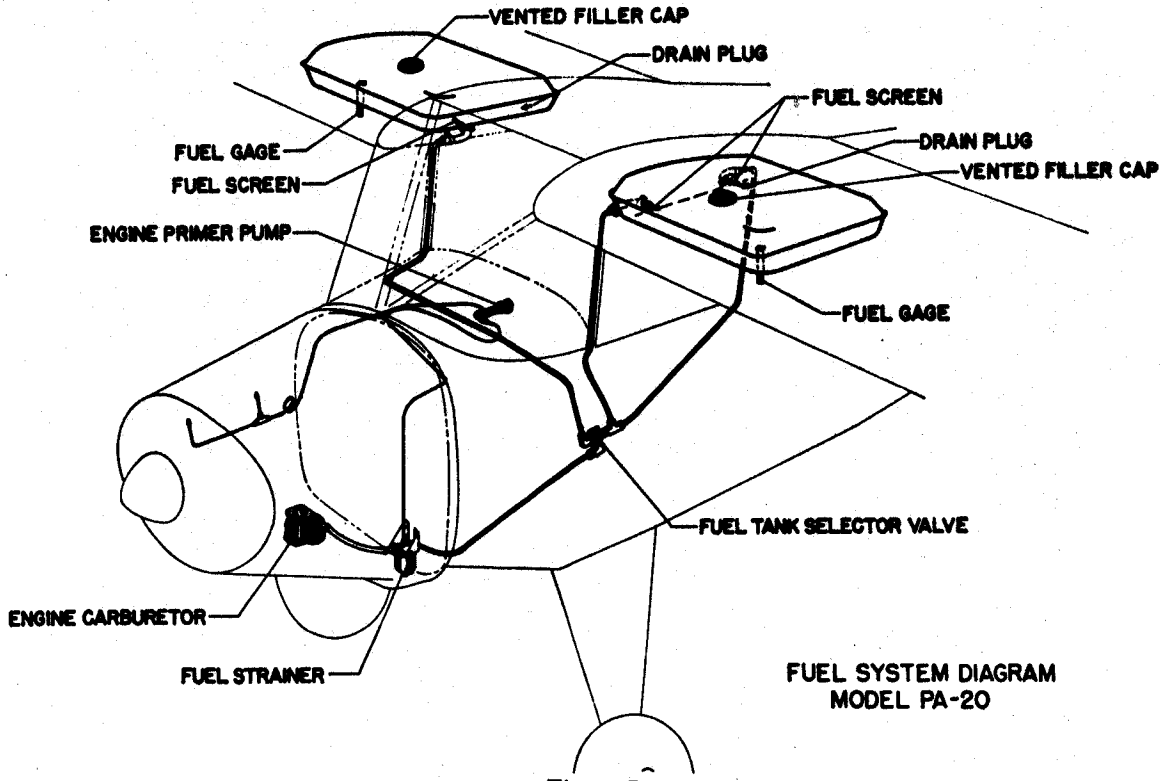

VENTED FILLER CAP
DRAIN PLUG
FUEL SCREEN
FUEL GAGE
FUEL SCREEN
ENGINE PRIMER PUMP
DRAIN PLUG
VENTED FILLER CAP
FUEL GAGE
FUEL TANK SELECTOR VALVE
ENGINE CARBURETOR
FUEL STRAINER
FUEL SYSTEM DIAGRAM
MODEL PA-20

Figure 7

INSTRUMENTS:

The instrument panel of your Piper Pacer is designed to accommodate either standard or primary instrument groups and other additional instruments which you may desire (See Section 5 Optional Equipment). The instruments listed here are considered standard, with the exception that in the Pacer 125-135 they will be the black face luminous type.—See Figure 9.

Ammeter	Compass
Tachometer	Altimeter
Airspeed	Oil Temperature and Pressure

COCKPIT AND ACCESSORIES:

The cockpit furnishings have been designed to achieve the utmost in comfort and ease of operation of all accessories.

The color scheme of a Beige Taupe Headlining and a pleasing combination of Sportsman Beige and Hickory Brown for the rest of the cockpit and instrument panel is standard for all three models.

The following items are standard equipment:

Floor Carpet—with scuff plates.
Adjustable Front Seat.
Sliding Windows—both sides ("125"-"135").
Seat Belts—front and rear.
Baggage Compartment with tie downs.
Cream Colored control knobs.
Sportsman-Beige Control wheels.
Cabin Heater—front seat.
Cool Air Ventilator.
Provisions for radio loop installation.

Note: See Optional Equipment for additional accessories.

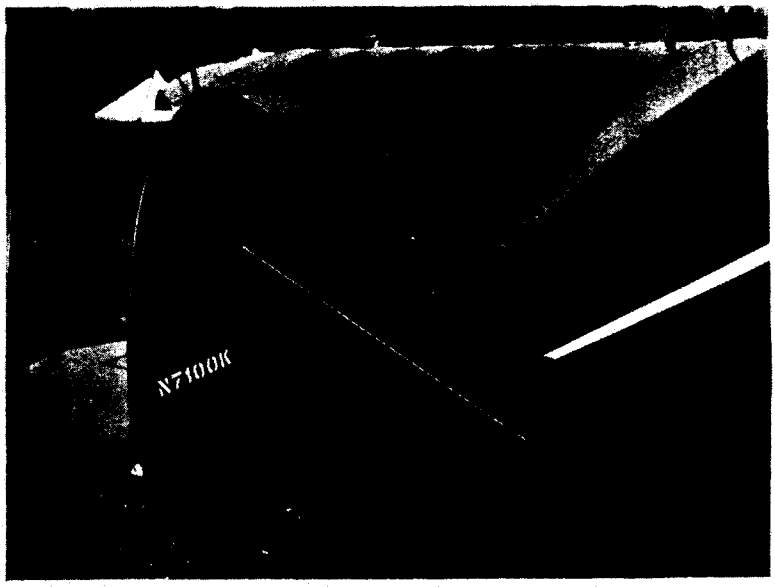


Figure 8

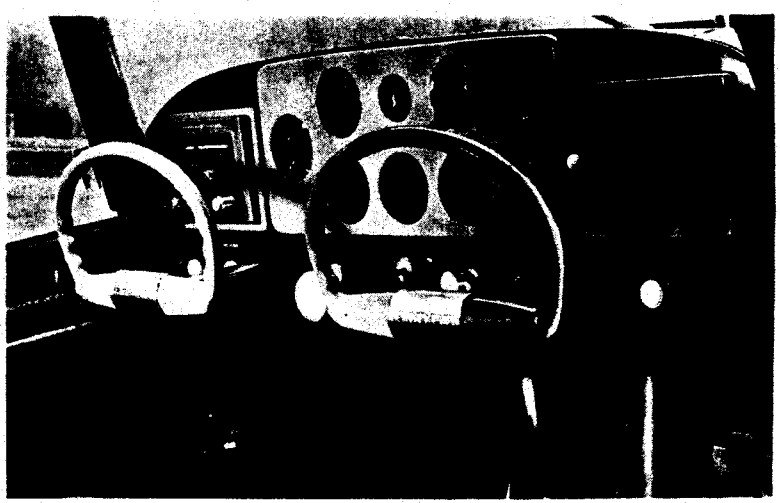


Figure 9

SECTION TWO

PERFORMANCE, SPECIFICATIONS, OPERATING PROCEDURES AND LIMITATIONS

PERFORMANCE:

All performance data given is for the following conditions:

(A) A maximum gross weight of 1750 lbs. for the PACER "115" and 1800 lbs. for the PACER "125" and "135".

(B) On level paved runways.

(C) In still air.

(D) With slowest-turning fixed-pitch wood propeller for which C. A. A. approval was obtained.

(E) Standard conditions as outlined by C. A. A. for test data.

In using the following data, allowance for actual conditions must be made.

PACER "115"

Take-Off Distance (In Feet)	*Alt. Ft.*	*Outside Air Temperature* 0°F	20°F	40°F	60°F	80°F	100°F
Distance required to take-off and climb 50 feet Full Throttle at 68 M. P. H. T.I.A.S.	S. L.	1530	1655	1770	1910	2055	2200
	3000	2220	2430	2645	2905	3140	3420
	5000	3010	3340	3715	4090	4535	5090
	7000	4430	5075	5720	6615	7675	8865

Landing Distance (In Feet)							
Distance required to land over 50 foot obstacle and stop. Approach at 68 M.P.H. T.I.A.S.	S. L.	1370	1395	1420	1440	1465	1490
	3000	1435	1460	1485	1510	1540	1565
	5000	1480	1510	1535	1565	1590	1620
	7000	1530	1565	1590	1625	1650	1680

Normal Rate of Climb

	S. L.	650	625	605	580	555	535
(In Ft. per minute)	3000	495	470	445	420	400	380
80 M.P.H. T.I.A.S.	5000	390	360	340	315	295	275
Climbing Speed	7000	285	260	240	210	190	170

Power-Off Stalling Speeds VS.							
Angle of Bank	*Angle*	10°	20°	30°	40°	50°	60°
M.P.H. T.I.A.S.	*Speed*	53	55	57	61	66	75

PACER "125"

Take-Off Distance (In Feet)

		Outside Air Temperature					
	Alt. Ft.	*0°F*	*20°F*	*40°F*	*60°F*	*80°F*	*100°F*
Distance required to take-	S. L.	1459	1566	1684	1788	1930	2046
off and climb 50 ft., full	3000	2034	2209	2386	2578	2777	2982
throttle at 66.3 M. P. H.	5000	2640	2878	3049	3418	3737	4075
T.I.A.S.	7000	3576	3945	4358	4872	5368	5970

Landing Distance (In Feet)

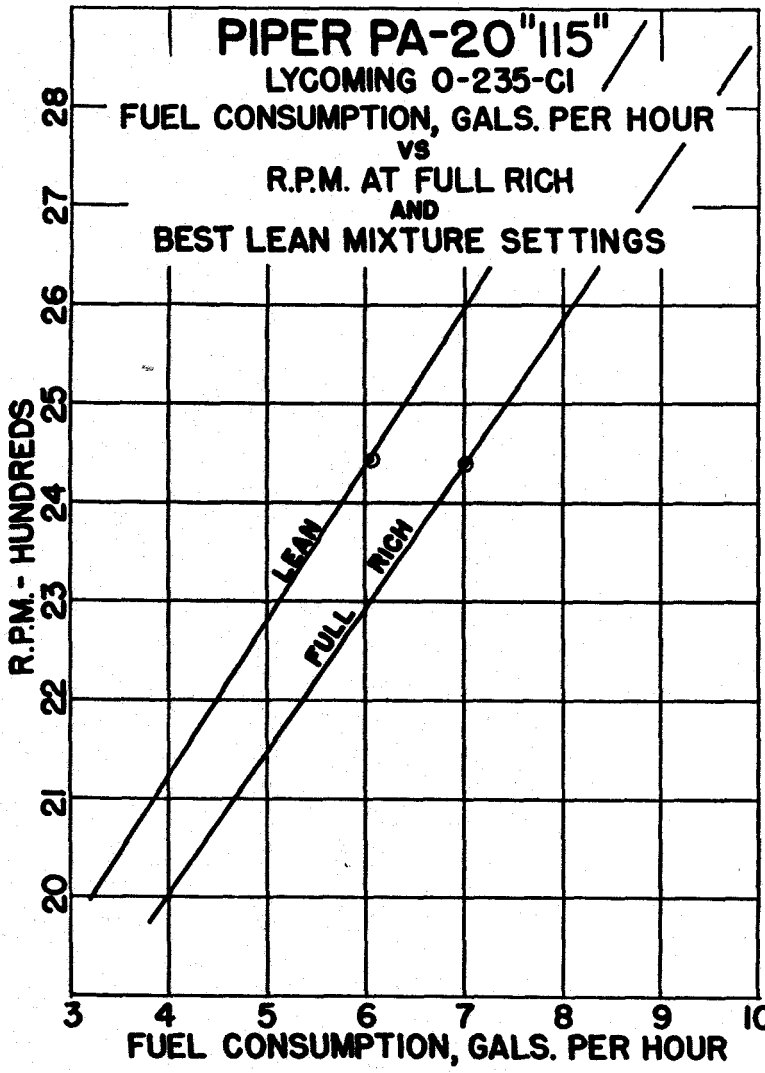
Distance required to land							
over 50 ft. obstacle and	S. L.	1131	1150	1169	1187	1207	1226
stop. Approach at 60.4 M.	3000	1183	1204	1223	1245	1265	1286
P.H. T.I.A.S. Flaps Down	5000	1220	1242	1264	1286	1308	1331
40°	7000	1259	1286	1307	1332	1357	1382

Normal Rate of Climb

	S. L.	895	863	835	820	780	757
(In Ft. Per Minute)	3000	710	680	655	625	600	575
87 M.P.H. T.I.A.S.	5000	586	558	530	505	477	458
Climbing Speed	7000	465	432	410	385	360	335

Power-Off Stalling Speeds VS.								
Angle of Bank	*Angle*	0°	10°	20°	30°	40°	50°	60°
M.P.H. T.I.A.S	*Speed*	58	58	59	60	62	71	81.5

NOTE: At the time of printing, the performance figures for the Pacer "135" were not available.


PIPER PA-20 "115"
LYCOMING O-235-C1
FUEL CONSUMPTION, GALS. PER HOUR
VS
R.P.M. AT FULL RICH
AND
BEST LEAN MIXTURE SETTINGS
R.P.M. - HUNDREDS
20
21
22
23
24
25
26
27
28
LEAN
RICH
FULL
3
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6
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10
FUEL CONSUMPTION, GALS. PER HOUR

Figure 10

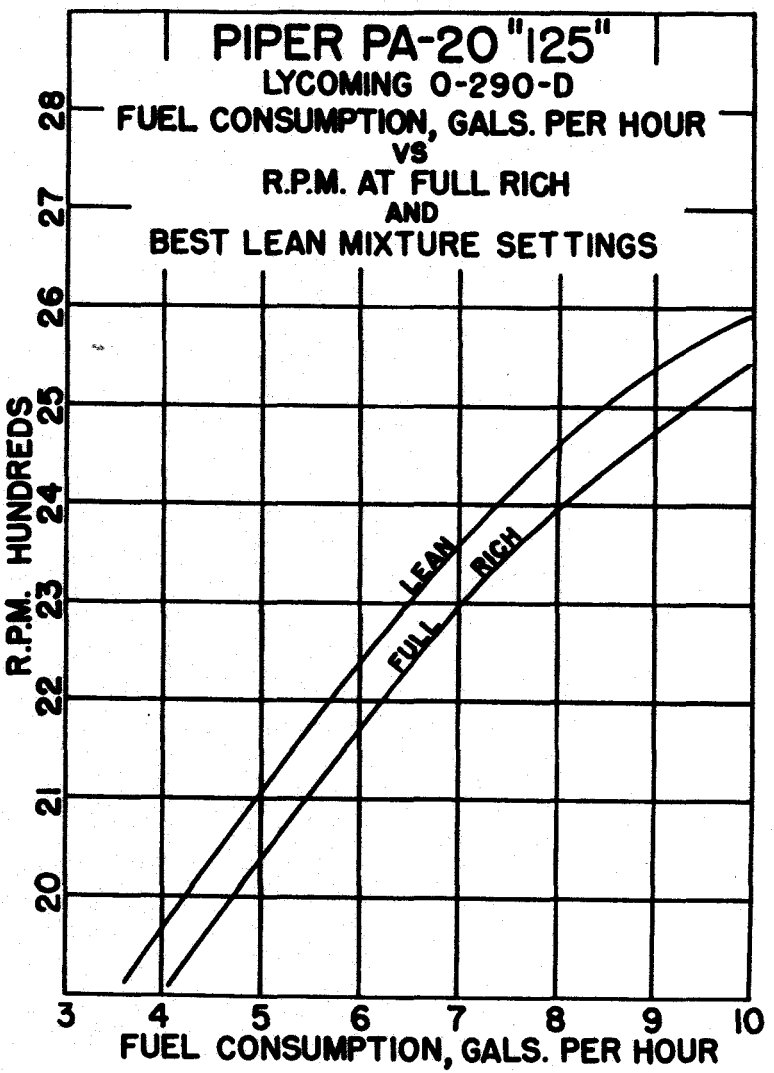
PIPER PA-20 "125"
LYCOMING O-290-D
FUEL CONSUMPTION, GALS. PER HOUR
VS
R.P.M. AT FULL RICH
AND
BEST LEAN MIXTURE SETTINGS
R.P.M. HUNDREDS
20
21
22
23
24
25
26
27
28
LEAN
FULL
RICH
3
4
5
6
7
8
9
10
FUEL CONSUMPTION, GALS. PER HOUR

Figure 11

CRUISING SPEED AND GAS CONSUMPTION

The performance cruising speed of the Piper Pacer "115" with Lycoming O-235-C1 engine is 112 M.P.H. at 2400 R.P.M. Gas consumption at this speed is 7 gallons per hour with full rich mixture and 6.2 gallons per hour at 2250 R.P.M. economy cruise.—See Figure 10.

The approximate cruising range of the Pacer "115" is 580 miles.

The service ceiling is 11,000 feet and the absolute ceiling is 13,500 feet.

The performance cruising speed of the Piper Pacer "125"—with Lycoming 0-290-D engine is 125 M.P.H. at 2400 R.P.M. Gas consumption at this speed is 7.7 G.P.H. full rich mixture.—See Figue 11.

The approximate cruising range of the Pacer "125" is 580 miles. The service ceiling is 12,500 feet and the absolute ceiling is 14,250 feet.

The performance cruising speed of the Piper Pacer "135" is obtained at 24" of manifold pressure and 2400 R.P.M.'s. This setting can be held to between 5000 and 6000 feet at which time the throttle setting will be full in, except for about ½" movement. This will produce approximately 75% sea-level power and the indicated speed of 120 to 125 M.P.H. (depending on temperature) will correct on an Airspeed Calculator to approximately 134 M.P.H. true speed. Cruising at higher altitude should be accomplished by full throttle (less approximately ½" throttle movement) and 2400 R.P.M.'s. The last half inch movement of the throttle should be used in take-off climb, but not used at cruising, thereby operating an economizer jet. The engine at full throttle for climb will cool better than if the throttle is pulled back slightly.

The approximate cruising range of the Pacer "135" is 580 miles at sea-level and slightly longer at altitude. The service ceiling of the "135" is 15,500 feet and the absolute ceiling is 17,500 feet.

To obtain minimum gasoline consumption at various altitudes in the Piper Pacer "135," use Altitude Power Chart Figure 12. Obtain actual horsepower under existing conditions and insert in following formula:

$$X = \text{Horsepower obtained.}$$

$$\frac{X \times .5}{6} = \text{Gallon per hour.}$$

Add approximately 1 to 2 gallons extra for trip for extra gasoline used in climb to altitude.

The maximum continuous engine speed for all operations of both engines is 2600 R.P.M.

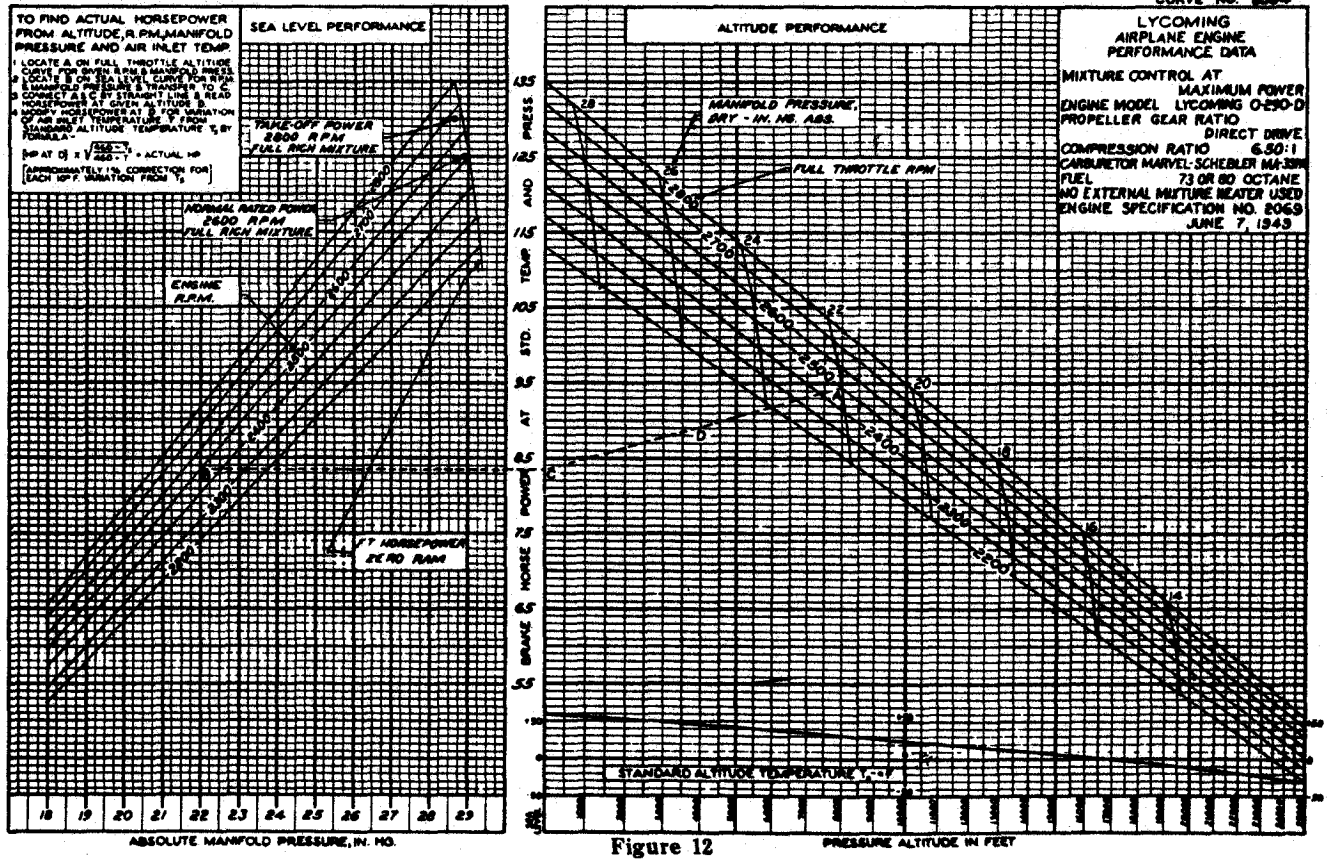
CURVE NO. 8584
LYCOMING
AIRPLANE ENGINE
PERFORMANCE DATA
MIXTURE CONTROL AT MAXIMUM POWER
ENGINE MODEL LYCOMING O-290-D
PROPELLER GEAR RATIO DIRECT DRIVE
COMPRESSION RATIO 6.50:1
CARBURETOR MARVEL-SCHEBLER MA-3SPA
FUEL 73 OR 80 OCTANE
NO EXTERNAL MIXTURE HEATER USED
ENGINE SPECIFICATION NO. 8069
JUNE 7, 1943
TO FIND ACTUAL HORSEPOWER FROM ALTITUDE, R.P.M., MANIFOLD PRESSURE AND AIR INLET TEMP.
SEA LEVEL PERFORMANCE
TAKE-OFF POWER 2800 R.P.M. FULL RICH MIXTURE
NORMAL RATED POWER 2600 R.P.M. FULL RICH MIXTURE
ENGINE R.P.M.
FT. HORSEPOWER ZERO R.P.M.
ABSOLUTE MANIFOLD PRESSURE, IN. HG.
ALTITUDE PERFORMANCE
MANIFOLD PRESSURE, DRY - IN. HG. ABS.
FULL THROTTLE R.P.M.
BRAKE HORSE POWER
STD. AT SEA LEVEL TEMP AND PRESS
STANDARD ALTITUDE TEMPERATURE T°-F
PRESSURE ALTITUDE IN FEET

Figure 12

SPECIFICATIONS

(1). WEIGHT AND BALANCE

All aircraft are designed for certain limit loads and balance conditions. These limits and specifications are as follows:

A weight and balance report and equipment list is furnished with each airplane. All the information on empty weight C.G. and allowable limit for your particular airplane, as equipped when it left the factory, is shown. Changes in the original equipment effecting weight empty C.G. are required by the C.A.A. to be recorded in the Weight and Balance Report.

(2). Your Piper Pacer is 20.1 feet in length and 74" high. The wing span is 29.3 feet and the wing area is 147.5 sq. feet. The wing chord is 63".

(3). FLIGHT LOAD FACTOR AND AIRPLANE LOADING

The maximum positive flight load factor is 3.8 G's. No inverted maneuvers are approved, as is the practice with all personal airplanes manufactured.

Airplane Loading: Maximum Weight (take-off and landing) 1800 lbs. for Pacer 125-135 and 1750 lbs. for Pacer 115.

C.G. Range Inches Aft Wing Leading Edge:

PACER 125-135	PACER 115
(7.5") to (24.0") at 1800 lbs.	(16.6") to (24.0") at 1750 lbs.
(12.0") to (24.0") at 1490 lbs.	(12.0") to (24.0") at 1490 lbs.
(11.5") to (24.0") at 1240 lbs.	(11.5") to (24.0") at 1240 lbs.

Straight line variation between points given.

Datum	Leading Edge of Wing
Maximum Baggage Allowed	50 pounds

NOTE: It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. (Weight and Balance Sheet).

OPERATING LIMITATIONS:

Your Piper Pacer licensed under C.A.A. Type Certificate Number 1A4 is authorized for day or night contact flight or instrument flight, depending upon the equipment you have installed. This airplane may not be hired for use on instrument flight or for a night flight of more than a 3 mile radius from airport, unless equipped with flares.

The Piper Pacer is designed in accordance with Civil Air Regulations for the normal category of maneuvers. In the normal category, no acrobatic maneuvers are approved.

AIRSPEED MARKINGS AND THEIR SIGNIFICANCE:

PACER "115"

(a) Radial RED line marks the never exceed speed which is maximum safe airspeed 140 M.P.H.

(b) YELLOW ARC on indicator denotes range of speed in which operations should be conducted with caution and only in smooth air 117 M.P.H.—140 M.P.H.

(c) GREEN ARC denotes normal operating speed range 52 M.P.H.-117 M.P.H.

PACER "125"-"135"

(a) Radial RED line marks the never exceed speed which is the maximum safe airspeed 158 M.P.H.

(b) YELLOW ARC on indicator denotes range of speed in which operations should be conducted with caution and only in smooth air 126 to 158 M.P.H.

(c) GREEN ARC denotes normal operating speed range 51 to 126 M.P.H.

(d) WHITE ARC denotes normal operating speed range with 40° flaps extended 46 to 80 M.P.H.

ENGINE OPERATING LIMITATIONS:

(a) Lycoming (0235-C1) Engine for Piper Pacer "115."
(Using 80/87 octane aviation fuel, see page 37 for alternate fuels). Rates horsepower 108 at 2600 R.P.M.
Propellers: Fixed pitch wood 74" maximum diameter 70.5" minimum diameter. Static limits maximum 2350 R.P.M. minimum 2100 R.P.M.
Power Instrument Markings: Oil Temperature: Unsafe if indicator exceeds RED line (240°F.). Yellow Arc: Caution (40°F. to 120°F.). Green Arc: Normal Operating Range (120°F. to 240°F.).
Oil Pressure: Unsafe if indicator exceeds *Red* Line (100 lbs.) or is below the RED line (25 lbs. minimum).
YELLOW arc: Caution (85 lbs. to 100 lbs.) or (25 lbs. to 65 lbs.).

GREEN arc: Normal Operating Range (65 lbs. to 85 lbs.).
Tachometer: RED line: Do not exceed rated engine speed. GREEN Arc: 2200 R.P.M. to 2450 R.P.M. normal operating range. YELLOW Arc: Caution 2450 R.P.M. to 2600 R.P.M.

(b) Lycoming (0-290-D) Engine for Piper Pacer "125"-"135." Rated horsepower 125 at 2600 R.P.M. (Using 80/87 octane aviation fuel, see page 37 for alternate fuels).
Propellers: Fixed pitch wood 74.0" Maximum Diameter 70.5" minimum diameter. Static limits maximum 2400 R.P.M. minimum 2200 R.P.M.
Power Instruments Markings: Oil temperature: Unsafe if indicator exceeds *Red* line (245°F.). Yellow Arc: Caution (40°F. to 120°F.). Green Arc: Normal Operating Range (120°F. to 245°F.).
Oil Pressure: Unsafe if indicator exceeds *Red* line (100 lbs.) or is below the *Red* line (25 lbs. minimum). Yellow Arc: Caution (85 lbs. to 100 lbs.) or (25 lbs. to 65 lbs.). *Green* Arc: Normal Operating Range (65 lbs. to 85 lbs.).
Tachometer: *Red* Line: Rated Engine Speed. *Green* Arc: 500 R.P.M. to 2600 R.P.M. Normal Operating Range.

FLIGHT PROCEDURE:

Your Piper Pacer is from the flight and operational standpoint, fully conventional. It has no unusual characteristics and all control functions and responses are normal in every way. The following procedures are recommended for efficient flight operation:

(1). Before entering the airplane:
Check the oil level.
Check the quantity of fuel in tanks.
Make visual inspection of airplane.
Be sure windshield is clean.

(2). Before starting the engine:
Adjust the seat as required.
Fasten safety belt.
Operate all controls for full range and freedom from binding. Set parking brake by depressing the brake pedals and pulling out parking brake control on instrument panel; release brake pedals. Release parking brake, depressing and releasing the brake pedals.

3. Starting the engine:
   Turn fuel valve of "left" tank to "on" position.
   Mixture Control – full rich.
   Carburetor Heat – OFF.
   Master Switch – ON.
   Radio – OFF.
   Throttle – 1/10 open.
   Prime 1 to 3 full strokes, unless engine is warm.
   Do not Pump Throttle when starting "125" or "135" Models.
   Check if propeller "All Clear".
   Engage starter and allow engine to turn one full turn before turning ignition switch to "on" position.
   As engine starts, release starter button promptly.
   Check oil pressure gauge for indicated pressure. If none is indicated within 1/2 minute, stop engine and determine trouble.
   Warm up engine at 800 to 1200 R.P.M.

4. Before Takeoff:
   Fuel "ON" – *left tank*.
   Parking Brake – OFF.
   Carburetor Heat – OFF – Check carburetor heat ON, to clear any ice accumulated during warm up, and OFF again to check pick up in R.P.M.
   Mixture Control – Full Rich, except a minimum amount of leaning is permitted for smooth engine operation at high elevation.
   Flaps UP – ("125" - "135").
   Stabilizer Trim Control in center or slightly advanced if loaded full.
   Check right and left magnetos at 1800 R.P.M.

5. Takeoff and Climb:
   Throttle full open.
   Airspeed – normal climb "115" – 80 M.P.H. "125" and "135" – 87 M.P.H.
   Trim Controls – As Required.
   Mixture – Full Rich.
   Carburetor Heat – OFF.

6. Cruise:
   R.P.M. – 2400 ("115") – 2400 ("125") – 2400 and 24" manifold pressure ("135").
   Mixture Control – Leaned 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. Always enrich the mixture before increasing power settings. Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes, and reduces lead deposits when the alternate fuels are used.
   Carburetor Heat – OFF (unless icing conditions prevail) then use carburetor heat full on for 30 seconds to one minute.
   Oil Temperature and Pressure Normal (120° to 240°) (65 to 85 lbs.) – ON "115" and (120° to 245°) (65 to 85 lbs.) – ON "125" – "135".
   Switch to fuel in right wing tank – *for level flight only*.

NOTE: A good procedure to follow when going on a cross country flight is to reduce your fuel by alternate use of both tanks. First, reduce the *left* tank to the ¾ mark, then the *right* tank to the ½ mark, then the *left* tank to the ¼ mark, and finally, the *right* tank to empty. The *left* tank is still ¼ full. By following this method, you will obtain the maximum efficiency of the two fuel tanks.

7. Approach and Landing:
   Fuel Valve – Switch to left tank.
   Mixture Control – Full rich.
   Carburetor Heat – *On* before throttle is closed.
   Lower Flaps – as required (Pacer "125" – "135").
   Clear Engine at intervals.
   Approach – not less than 68 M.P.H. ("115").
   Approach – not less than 60.4 M.P.H. with 40° flap ("125" – "135").

8. Stopping the Engine:
   R.P.M. – 1200 for one minute when using alternate fuels to clean out any unburned fuel.
   Radio – OFF.
   Mixture Control – move to full lean position.
   Ignition Switch – OFF when engine stops.
   Master Switch – OFF.
   Parking Brake – Set.

9. Carburetor Heat:
   Under certain atmospheric conditions, ice will form in the carburetor venturi. The temperatures at which this condition will occur may be from approximately 26° to 60° depending upon the amount of moisture present in the air. On a cloudy humid day icing will occur much quicker than on a clear day.
   Formation of ice can generally be noticed by a drop in the engine's normal R.P.M. or roughness of the engine operation. When this condition is encountered, apply full Carburetor Heat for approximately 30 seconds, or until a definite pick-up of R.P.M. is noted. It is not advisable to operate your engine with partial Carburetor Heat on, as this not only causes inefficient engine operation, but also under certain conditions may not prevent ice from being formed in the carburetor.

It is recommended that, prior to closing the throttle for an approach to landing or prolonged glide, Carburetor Heat be applied approximately 30 seconds so as to utilize the available heat from the manifold before it cools.

10. Cold Weather Starting:

Suggestions – Keep battery fully charged. Use lightest weight oil recommended by Engine Manufacturer. Install a (4) cylinder Priming Kit.

Procedure:

(a) Pull engine through serveral times by hand.

(b) Pump primer five or six times if engine is equipped with a two cylinder primer.

(c) Pump primer four full strokes if engine has a (4) cylinder priming system.

(d) Crack throttle (about 1/10 open).

(e) Push starter button, and after engine has made its second revolution, turn on ignition switch.

(f) Do not advance throttle until engine runs smoothly with throttle 1/10 open.

(g) If engine does not start after several tries, drain gascolator to remove water or ice, and repeat procedure.

NOTE: It may be necessary to use the Primer to keep the engine running, until it warms up.

NOTES

SECTION THREE

GROUND HANDLING AND GENERAL MAINTENANCE

PARKING AND MOORING INSTRUCTIONS:

(1). Head the airplane into the prevailing wind and set the parking brakes. Apply pressure to both brake pedals until the brakes are set. Pull out the brake control knob on the left side of instrument panel and hold out until foot pressure is released from brake pedals.

(2). Aileron and Elevator controls can be locked by pulling control wheel back and securing with seat belt. Rudder controls do not normally require locking since rudder is held by tail wheel springs.

(3). If high winds are anticipated, or airplane is to be parked unattended, it is recommended that the airplane be moored. To moor airplane, lower flaps, attach ropes to tail wheel leaf springs and to mooring rings (optional equipment) near each wing tip. Stake ropes to the ground leaving enough slack to allow for shrinkage of ropes due to moisture or rain. If your airplane is not equipped with mooring rings, tie the mooring ropes to the *outer end* of the front lift strut. If mooring stakes are not available and new ones are being driven, do not drive straight into the ground directly under the tie down point, but drive diagonally into the ground several feet away from the tie down point, so as to fix a 90° angle between the rope and the stake when tied.

If exceptionally high winds are expected, it is advantageous to dig two holes the depth of the tires and drop the wheels in them before mooring to lower the angle of attack.

CONVERSION OF CABIN FOR CARGO:

The rear seats are easily removed to permit the use of entire rear cabin for cargo. To remove rear seats, remove bottom cushion by raising rear of bottom cushion and pulling clips free from front of seat frame. Raise rear side of frame free from slot, slide frame forward, and remove left front leg from slot. Then, depress the covering with thumb and raise and remove right end of frame from slot and pull the frame through canvas hole. Raise seat back from

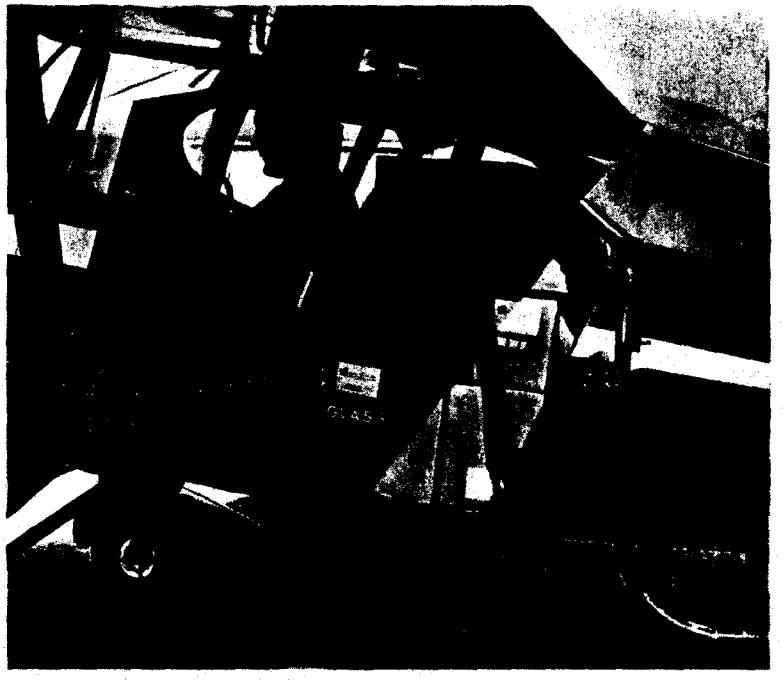

Figure 13

bottom and remove cord lacing from rear seat cross member. When loading rear section with cargo, distribute load over a reasonably large area to avoid damage to floor or fuselage members. It is suggested that a sheet of plywood or several light boards be placed on floor prior to loading heavy cargo.—See Figure 13.

LEVELING AND RIGGING PROCEDURE:

(1). Leveling: Place adjustable jacks or blocks under the axle extension so that the jacks or blocks do not touch the brake lines or connections. Raise each wheel by pushing up on the lift struts on one side and pulling down on the opposite side. All lifting or pulling pressure must be applied as near to the wing attachment points as possible so as to be sure that the lift struts will not be bowed. Raise the tail to approximate level flight position and support it on an adjustable jack or block.

To level the airplane laterally and longitudinally, remove lower left wing root fairing, drop a plumb bob on a string from the hole located on the side of the upper door frame member approximately 5¾ inches aft of the front door frame member, to the center punch mark located on the seat front tube just inside the door. Adjust the jacks or blocks until the plumb bob centers over the mark.

(2). Dihedral Angle: Stretch a length of string from wing tip to wing tip along the top of the wing at the front spar location. Measure down from the string to the top of the fuselage front wing hinge fittings a distance of 4⅞ inches. Adjust the front lift strut fork fittings in or out to produce this dimension.

To check for equal dihedral in each wing, use a 30 inch level held spanwise against the underside of the wing at the front spar location. Note the amount of off level on one wing and see if the other wing has the same amount of off level. Adjust the front lift strut forks in on one side and out on the other to get the same amount of off level in both wings. Check the 4⅞ inch dimension after this adjustment to see that it has not been effected by the equalizing adjustments.

(3). Wash Out: Place a 1⅜ inch block under the wing at the rear spar location at the outboard aileron rib. Place a 30 inch level chordwise across this block with the front end of the level at the front spar location. The bubble will center if the wing has the proper 2½ degree washout. Adjust the rear lift strut forks in or out to bring the bubble to center.

(4). Tail Assembly: Level the stabilizers at the rear spar with the airplane in level position. Adjustment is accomplished by the tightening and loosening of the tail brace wires. Take up as many turns as the opposite wires are let out, to keep the same tension on the wires. Do not scratch or mar the wires with pliers or wrenches as this may cause the wires to fracture. Plumb the rudder hinge line. Slight adjustments can be accomplished by firmly pushing against the fin rear spar in that direction required to bring the hinges in line. The streamline tail braces wires should be lined up with the air-stream or a whistley noise will result.

(5). Control Surface Travels:

Aileron	15° up	15° down
Elevator	24° up	12° down
Rudder	16° R	16° L
Stabilizer	1° up	6½° down
Flaps	40° down	

TIRE INFLATION:

For maximum tire service keep tires inflated to proper pressure. The proper tire pressure for your Piper Pacer is 20 lbs. for the "115," 22 lbs. for the "125-135."

BATTERY SERVICE:

The battery, a Reading S-24-12 volt, 24 ampere hour capacity, should be checked every two weeks, adding distilled water or charged as required. The battery is located under the front seat on the right side. Access to battery is accomplished by removing the stop bolt and sliding seat full forward, lift front edge and tilt back. *Do not fill battery above the baffle plate.* Be sure all connections are clean and tight. If battery is not up to proper charge, re-charge at once starting with a charging rate of 4 amps., and finishing with 2 amps. If a quick charge is desired for the battery, be sure master switch is off while charging.—See Figure 14.

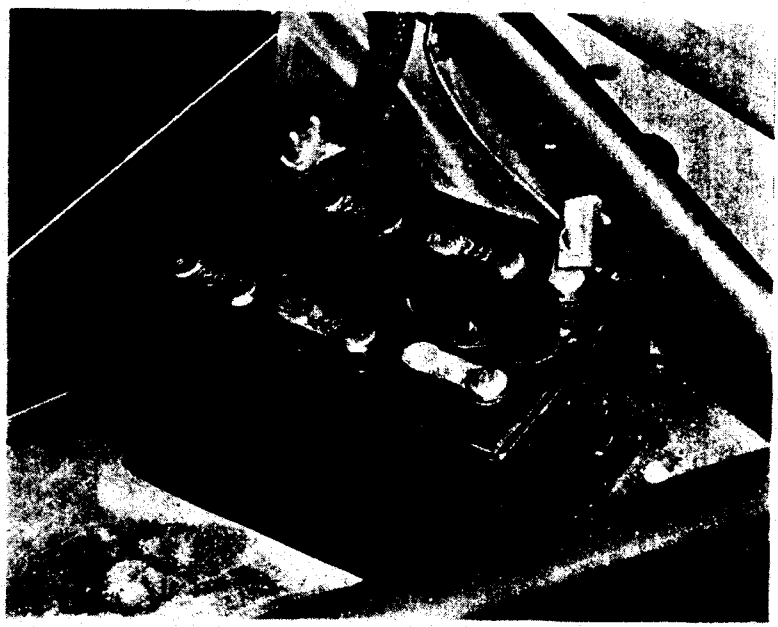

Figure 14

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 if necessary.

Do not use or mix mineral or vegetable base brake fluids when refilling system. When it is necessary to refill brake system, or when the brakes seem spongy, probably due to air in the lines, the following procedures are to be followed:

(a). To fill the brake system, remove filler plugs on right wheel brake master cylinders. Remove bleeder screw from tee on right wheel brake unit and attach line from brake fluid pressure can. Fill system until master cylinders are full. Repeat procedure for left wheel brake. If pressure can is not available, an open can with line attached may be used, providing can is held higher than master cylinders. When all master cylinders are full, replace filler plugs and bleeder screws. Check brakes for satisfactory operation.

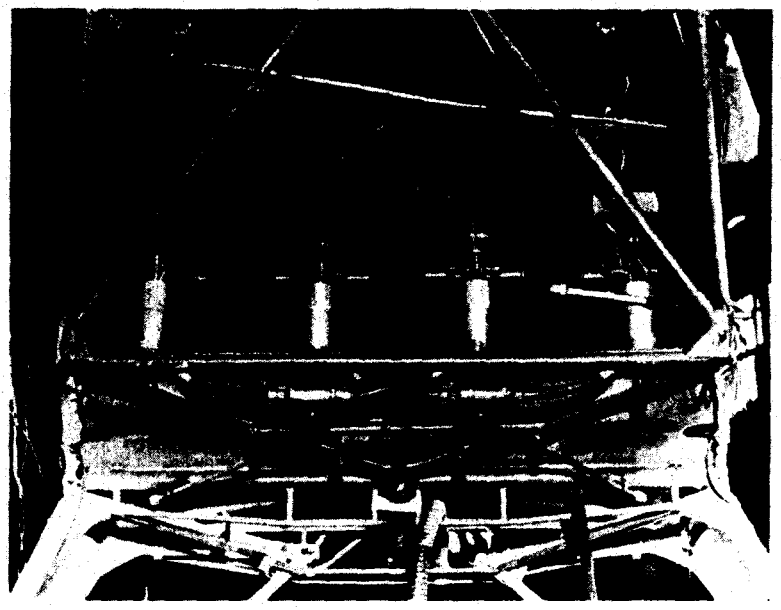

Figure 15

(b). Air in the brake lines causes faulty operation which can be corrected by bleeding the brake system as follows:

1. Check entire system for breaks or leaks.

2. Remove bleeder screw from particular brake unit and insert bleeder hose. Place free end in a clean receptacle.

3. Remove filler plug from master cylinders of the particular brake which is being bled.

4. Fill master cylinders with MIL-H-5606 hydraulic fluid and keep cylinders full during bleeding process.

5. Work the brake pedal rapidly to force fluid through bleeder hose into receptacle. Pinch hose shut during return of pedal to off position. Release pressure on hose, and push pedal on rapidly again. While fluid is flowing, restrict bleeder hose and allow brake pedal to return slowly to off position. Continue this process until no more air bubbles are observed coming through bleeder hose. The system is then properly bled.

6. Replace bleeder screw; check to see that master cylinders are full, and replace filler plugs. Check brakes for satisfactory operation.—See Figure 15.

FUEL REQUIREMENTS

The minimum aviation grade fuel for the PA-20 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, next page.) 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 over seas 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 fuel gauges in each tank should be cleaned occasionally so the indicator can always be seen. This operation should be performed after the tank has been emptied of fuel. To drain the gauge, hold the aluminum casing with a wrench so that it cannot twist; then unscrew the plug in the bottom of the gauge. If the casing twists the gauge glass may break.

OIL REQUIREMENTS

The oil capacity of the O-235 series engine is 6 quarts, 8 quarts for the O-290, and the minimum safe quantity is 2 quarts. It is recommended that the oil be changed every 50 hours and sooner under unfavorable operating conditions. 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 the latest issue of Lycoming Service Letter No. L185 and Lycoming Service Instruction No. 1014 for additional information and recommended service procedures. The following grades are recommended for the specified temperatures:

Temperatures above 60° F	SAE 50
Temperatures between 30° F to 90° F	SAE 40
Temperatures between 0° F to 70° F	SAE 30
Temperatures below 10° F	SAE 20

Either mineral oil or anti-dispersant oil may be used, but the two types of oil may never be mixed.

CARE OF WINDSHIELD AND WINDOWS:

The windshield and windows are made of Plexiglas and a certain amount of care is required to keep them clean and clear. The following procedure is suggested:

(a). Flush with clean water and remove excess dirt, mud, etc., with your hand.

(b). Wash with mild soap and warm water. Use a soft cloth or sponge. (Do not rub).

(c). Remove oil, grease or sealing compounds with a cloth soaked in kerosene.

NOTE: Do not use gasoline, alcohol, benzene, carbon tetrachloride, lacquer thinner, or window cleaning sprays.

(d). After cleaning, apply a thin coat of hard polishing wax. Rub lightly with soft dry cloth.

(e). A severe scratch or mar can be removed by using jewelers rouge to rub out scratch, smooth on both sides and apply wax.

SHOCK ABSORBER SERVICE:

The landing gear of your airplane is equipped with a shock absorber unit for each right and left gear. (Hydrasorb).

It is not necessary to remove the whole gear to repair or replace these units. Raise the airplane till wheels do not touch. Remove the bottom fairings around the unit. Tilt front seat back, as described in Battery Service, and remove top bolts from fuselage fitting and unit. The whole gear will then swing down and out so that shock absorber unit can be repaired, or replaced.

SECTION FOUR

INSPECTION INSTRUCTIONS

ENGINE SECTION:

ITEM 1—ENGINE OPERATION:

Run engine to minimum 120° oil temperature—check full throttle static R.P.M. both magnetos.
Check magnetos 75 R.P.M. drop at 1800.
Check carburetor heat 100 R.P.M. drop at full throttle.
Check ignition switch for operation.
Check idle R.P.M. 550-600 carburetor heat-off.
Oil Pressure (minimum idle 25. Normal 65-85). PA-20.
Master switch on check generator and voltage regulator for operation.
Battery fully charged will show very slight indication on Ammeter at full throttle.
Check idle cut-off at 800 R.P.M. Engine should cut off clean.

Lycoming 0-290-D **Maximum R.P.M. 2600**

Static R.P.M. Wood Fixed Pitch ---------- 2200-2400
Static R.P.M. Metal Fixed Pitch ---------- 2150-2450
Static R.P.M. Koppers Aeromatic ---------- 2550-2600

Lycoming 0-235-CI **Maximum R.P.M. 2600**

Static R.P.M. Wood Fixed Pitch ---------- 2100-2350
Static R.P.M. Metal Fixed Pitch ---------- 2150-2400

ITEM 2—ENGINE MOUNT AND ATTACHMENTS:

Check engine mount for damage and cracks at gussets or in corners.
Inspect protective finish on mount; sand and touch up bare areas.
Inspect rubber shock mounts for rubber deterioration and tension.
Engine mount bolts should be tightened to 60 to 80 inch pounds.
Check mount bolts for safety.

ITEM 3—COWLING AND BAFFLES:

Clean and inspect engine cowling for dents and cracks at hinges and reinforcement.
Check for tension adjustment on cowl doors at latch.
Tension prevents vibration and cowl cracking.
Check baffles for cracks and leather installation to prevent chafing.

ITEM 4—MAGNETOS, WIRING AND SHIELDING:

Check magneto for secure attachment.
Check breaker point housing for excessive oil.
Check points for gap and pitting. Gap setting .012".
Check plug wiring connections at magento and wire insulation for deterioration and chafing.
Check for grommets at baffles.

ITEM 5—OIL DRAIN AND SAFETY PLUG:

Drain oil and check for metal particles.
Remove, clean and check oil screen for metal particles, drain plug and inlet oil temperature housing.
Reinstall oil drain plug.
Change oil filter if installed and check flexible lines for deterioration.

ITEM 6—OIL RADIATOR:

Inspect oil radiator for evidence of leaks and chafing around baffles.
Check flexible lines for deterioration and chafing.
Check core for clear air passage and secure mounting.

ITEM 7—SPARK PLUG SERVICE:

Remove plugs, bomb blast and clean.
Plugs with badly burned electrodes should be replaced.
Reset gap to .025".
Reinstall using thread lubricant to prevent seizing and torque to 300 to 360 inch pounds or 30 foot pounds.

ITEM 8—STARTER:

Check starter motor for mounting security.
Check commutator for excessive wear and bridging.
Inspect wiring insulation for deterioration and connections.
Check ring gear for damaged teeth and nose cowl clearance.
Check starter shaft bushings for play.
Check brush retention and tension springs.

ITEM 9—GENERATOR AND WIRING:

Check generator mounting for security.
Check brush retention and condition of tension springs.
Replace worn brushes before there is any danger of brush failure.
Brush worn over 3/16 of an inch should be replaced.
Check generator drive belt for ¾" hand deflection.

ITEM 10—CARBURETOR AND HEATER:

Check carburetor for mounting security.
Inspect carburetor bowl for cracks, particularly at inlet.
Drain carburetor float chamber and check inlet finger screen-resafety.
Operate throttle in cockpit to be sure that throttle arm hits stops in open and closed positions without binding or sticking.
Check operation of mixture control for binding or sticking and full rich position.
Inspect carburetor air box for security and cracks—heater valve for full travel.
Check rubber intake hose connections for deterioration and clamp security.
Check intake system for leaks and cracks.
Clean air filter in kerosene and saturate with No. 10 oil and allow to drain before installation.

ITEM 11—FUEL LINES AND STRAINER:

Check fuel lines for leaks and hose deterioration.
Check hose supports for security and chafing.
Drain and clean fuel strainer and resafety.
Check for stains around fuel system indicating leaks.
Check all connections for tightness.

ITEM 12—EXHAUST STACK AND MUFFLER:

Check stack flanges for security, cracks and leaks.
Remove all heater and muffler shrouds and inspect for corrosion, cracks and leaks that might transfer gas to the cockpit, particularly through the cabin heater system.
Check tailpipe, muffler and stacks for security at all clamps and slip joints.
Check cabin heater box and control valve for operation.
Check cabin and carburetor heat flexible tubing for security and general condition.

ITEM 13—ENGINE CONTROLS AND FIREWALL:

Check firewall for open holes and gas leaks from engine compartment.
Check all controls for grommets and sealing putty.

PROPELLER SECTION

ITEM 14—PROPELLER:

Remove spinner and check for cracks or dents in spinner and back plate.
Check propeller for separated laminations, cracks, loose metal tipping and protective finish. Blades are to track with 1/16".
Wood propeller hub bolts are to torque from 140 to 150 inch pounds.
Metal propeller hub bolts are to torque from 350 to 375 inch pounds.

ITEM 15—PROPELLER OPERATION:

Check operation and limitations sheet No. 58 furnished with each Aeromatic Model F200-H Propeller for proper operation.
Comply with instructions furnished covering installation of Aeromatic Model F200-H Propeller with Hydro-actuated control

ITEM 16—GOVERNOR AND CONTROLS:

Governor and controls. Follow Propeller Manufacturer's instructions.

COCKPIT, PASSENGER AND CARGO SECTION

ITEM 17—SEATS:

Check rear seat canvas for adjustment and deterioration.
Check front seat fore and aft adjustment and lubricate track.
Check condition of safety belts and operation of buckles.

ITEM 18—WINDSHIELD:

Check weatherstripping for security in channels and for weather leaks.
Visual check for cracks, crazing, distortion and discoloration.

ITEM 19—POWER PLANT INSTRUMENTS:

Check power plant instruments for mounting security.
Check connections and plugs.
Check placards and limitation markings.

Lycoming 0-235-CI Series Engine:

Tach.:

Red Line	2600 R.P.M.
Yellow Arc	2450-2600 R.P.M.
Green Arc	2200-2450 R.P.M.

Oil Pressure:

Red Line	Minimum 25 lbs.	Maximum 100 lbs.
Yellow Arc	(25 lbs.—65 lbs.)	(85 lbs.—100 lbs.)
Green Arc	65 lbs.—85 lbs.	

Oil Temperature:

Red Line	240°
Yellow Arc	40°—120°
Green Arc	120°—240°

Lycoming 0-290-D Series Engine:

Tach.:

Red Line	2600 R.P.M.
Green Arc	500—2600 R.P.M.

Oil Pressure:

(Same as 0-235 Series Engine).

Oil Temperature:

Red Line	245°
Yellow Arc	40°—120°
Green Arc	120°—245°

ITEM 20—FLIGHT INSTRUMENTS:

Check flight instruments for mounting security.
Check connections and plugs.
Check placards and limitation markings.
Air Speed:

Red Line	158 M.P.H.
Yellow Arc	126-158 M.P.H.
Green Arc	51—126 M.P.H.
Flaps extended	
White Arc	46—80 M.P.H.

ITEM 21—SWITCHES, LIGHTS—FUSES:

Check Master Switch box for two placards to read—"Master Switch on, up and off, down." Also placard on box—"Safe Flight Indicator fuse inside box."
Check battery cable connections for security.
Check panel on left side to read, "Circuit Breakers under panel."
Check circuit breaker wire connectors for security and insulating sleeves.
Check position and landing light switches on panel for placards and operation—green, right wing—red, left wing and white, tail light.
Check cockpit lights for operation and rheostat for dimming action.
A circuit breaker will be used on all circuits except the Stall Warning Indicator.

ITEM 22—INTERIOR TRIM:

Check cockpit post fairings and all metal trim for security
Check control column boot and pulley covers for security.
Check floor mat for attachment.

ITEM 23—DOOR LATCH AND HINGES:

Check door hinge and rivets for looseness.
Check door latch plunger for complete extension to prevent doors opening while taxiing.
Check door for improper fit or damage resulting in air leaks.

ITEM 24—ENGINE CONTROLS:

Check mixture control for panel placard and operation for smoothness.
Check carburetor heat for panel placard and smoothness of operation.
Check throttle for smooth operation and operation of friction lock.
Check primer for operation and leaks behind the panel.
Check cabin heat for panel placard and full travel of heater butterfly valve.
Check rear seat heater and under floor tube for possible interference with controls and control cables.
Check ignition switch for panel and terminal security.
Check for placard—Off, Left, Right and Both.

ITEM 25—CONTROL COLUMN AND ATTACHMENTS:

Check under floor extension of control column.
Check column mounting bearings.
Check fork in connector tube for wear and play.
Check control column pulleys for wear and alignment.
Check turnbuckles for safety—maximum three (3) threads showing.
Check Universal Joints for excessive wear.
Check fiber guides forward of panel for wear, also shaft bearings in panel.

ITEM 26—RUDDER PEDALS AND LINKAGE:

Check rudder pedal assembly for play and travel freedom.
Lubricate hinges and torque tube bearings and check for safety.
Check rudder pedal return springs for attachment.

ITEM 27—FLAP CONTROLS:

Check flap handle for placard and condition of ratchet for two flap positions.
Check flap cable and pulley through inspection opening on under side of fuselage.
Remove rear baggage compartment cover and check flap pulleys at the top and bottom of fuselage.
Through the zipper opening in the top upholstering check the two flap cable pulleys and turnbuckles—maximum, three (3) threads showing.
Remove rear wing butt fairings and check cable fairleads.
Through wing inspection openings check the attachment of flap return springs.

ITEM 28—CABLES AND PULLEYS:

Check all cables for broken strands.
Remove butt fairings and check top deck aileron pulleys for wear and security.
Check aileron pulleys at both ends of panel.
Remove covers and check pulleys—front floorboards.

ITEM 29—FLIGHT CONTROL OPERATIONS:

Check aileron, rudder and elevator controls from cockpit for smooth operation.
Check wheel or stick for neutral position with controls surfaces streamlined.

ITEM 30—TRIM TAB CONTROLS:

Check stabilizer trim control for smooth operation.
Check indicator against stabilizer for proper position.

ITEM 31—FUEL SELECTOR VALVE:

Check fuel valve for smooth operation.
Check placard for "On" and "Off" positions and "Level Flight Only While on Right Tank."
Check valve for leaks.

LANDING GEAR

ITEM 32—SHOCK STRUTS:

Check large shock for deterioration and hydrasorb unit for operation. When worn out this sealed unit must be replaced.

ITEM 33—AXLES AND WHEELS:

Remove wheels, wash, check and relubricate bearings.
Check brake shoes for wear and drums for scoring.
Check brake expander tube for leaks.
Install wheel and axle nut only tight enough to remove end play.

ITEM 34—TIRES AND FAIRINGS:

Check tires for 20 pounds of air pressure.
Replace tires that have cord showing.
Check gear fairings for security and chafing.

ITEM 35—BRAKES AND OPERATION:

Check brake reservoirs for fluid and assembly for leaks.
Check operation and holding ability of parking brake.

ITEM 36—LANDING GEAR:

Hoist aircraft and check gear bushings, vee bushings are replaceable if worn.
Check for skin wrinkles indicative of inside damage.

ITEM 37—TAIL WHEEL:

Check tail wheel and spring assembly for looseness.
Check condition of tail spring pad.
Remove wheel, wash and repack bearing.

FUSELAGE

ITEM 38—FABRIC CONDITION:

Check condition of fabric with the eraser end of a pencil, particularly on top surfaces.
Check the finish for cracks or checks. Sand out and repaint all checks or cracks to preserve the fabrics.

ITEM 39—WING FITTINGS:

With wing root fairings removed inspect wing fittings with a flashlight and magnifying glass for minute cracks in the ears.
Check bolts to be sure there are no threads in bearing and bolts are properly safetied.
Check wing fitting holes for elongation by having some one pull up and down on the wing tips.

ITEM 40—LANDING GEAR FITTINGS:

Remove both landing gear fairings and inspect all fittings with flashlight and magnifying glass for signs of cracks or hole elongation.

ITEM 41—FUSELAGE STRUCTURE:

Through inspection openings and through the baggage compartment cover check the condition of all tubing for rust, damage and protective coating.
Check all wood stringers for damage and security.

ITEM 42—DEBRIS ACCUMULATION:

Check the bottom of the fuselage and fabric under floor boards for bolts, nuts and other objects that might jam controls or pulleys.
Check the rear of fuselage for open drain grommet.
If considerable dirt or oil exist on the fuselage bottom, use a non-caustic soap and wash out the dirt to prevent fabric rot.

ITEM 43—CONTROL CABLES AND PULLEYS:

Check for broken control cable strands by sliding a cloth over the cable in vicinity of fairleads.
Check upper and lower elevator turnbuckles for safety and maximum of three threads showing outside of barrel.
Check stabilizer control for slippage. Increase tension by tightening nut on idler pulley fork through inspection cover just forward of stabilizer leading edge on left side of fuselage.
Check bungee spring attachment at elevator horns and both pulleys at stabilizer yoke for wear and safety.
Check four rudder cable fairleads and cables for wear aft of baggage compartment.
Check four rudder pulleys on cockpit floor for wear and safety and check condition of pulley covers.

ITEM 44—FAIRINGS:

Check tail assembly fairings for cracks and missing metal screws.

WINGS, AILERONS AND FLAPS

ITEM 45—WING—FABRIC:

Check left and right wing fabric for holes, cracks or checks in the finish and open drain grommets at each rib bay trailing edge. (Fabric usually deteriorates on the upper surface of the wing or along the trailing edge.)
Install inspection grommets at drag wire fittings to inspect drag wires for tension and wing ribs and compression members for damage.

ITEM 46—STRUTS—LIFT:

Check right and left wing strut fittings for elongation by having some one lift up and down on the wing.
Check bolts for fitting attachment to the spar.
Check struts for dents or cracks, also sight down strut trailing edge to ascertain that struts are straight.
Check strut end forks and fork lock nut. The maximum number of threads allowed outside the strut end is fifteen.

ITEM 47—WING BOLTS:

Check strut attachment bolts to be sure there are no threads in bearing and bolts are properly safetied.

ITEM 48—AILERONS:

Check both ailerons for wrinkles which are possible signs of structural damage.
Check each rib bay for an open drain grommet.
Check condition of fabric and finish, refinishing any dope cracks, checks, or ringworm.

ITEM 49—AILERON HINGES:

Check aileron hinge legs for security at rear spar and false spar.
Check hinge pins for wear and safety. Worn or loose pins must be replaced.

ITEM 50—AILERON CONTROLS:

Remove inspection covers and check the two cables in each wing for interference and chafing.
Check the two pulleys in each wing for condition, wear and safety and lubricate pulley bearings.
Check wear and safety of the two fairleads in each wing.
15° up 15° down -/- 2°.
Stops are installed on center hinge and on control column.
Stop at aileron should engage first to allow for full travel of ailerons.
Check the four aileron horn bolts for wear, threads in bearing and safety.
Check the two turnbuckles in left wing and one turnbuckle and shackle connector in the right wing. Turnbuckles safetied and not more than three threads showing outside the barrel.
To locate broken strands at fairleads or pulleys slide a cloth over the cable, all cables with broken strands are to be replaced.

ITEM 51—FLAPS:

Check fabric condition of both flaps with a pencil eraser end for deterioration.
Check condition of finish for cracks, checks, or ringworm and refinish any that exist.
Any internal structural damage will cause wrinkles on the fabric surface.

ITEM 52—FLAP ATTACHMENTS:

Each flap has two hinges and two hinge legs that are riveted to the wing false spar and attached with a single bolt to the wing rear spar.
Lowering the flaps at over 80 M.P.H. can cause possible damage to these hinge legs so a careful inspection is recommended. Check stop in up position for streamline of flap.
Check the hinge pins for wear and installation of washers and safety.

ITEM 53—FLAP MECHANISM:

Check fafnir rod end bearings and push pull tube for clearance through hole drilled in the fafnir bearing rod to check minimum distance the push pull tube is screwed in the fafnir rod. Be sure lock nut is tight.

Ascertain through inspection that both flap return springs are secure and in good condition. Operate flaps and check springs to be sure they do not chafe, bind or interfere with other controls of adjacent structure.

Check travel:

Full Flap 40 -/- 2°.

Check bellcrank casting for cracks, particularly at the ears and for safety and security of the bracket.

ITEM 54—WING ROOT FAIRINGS:

Check left and right top wing root fairings for tension, adjustable through a hole at the trailing edge.

Check all metal screws for security and the fairing for cracks.

EMPENNAGE

ITEM 55—STABILIZER:

Check stabilizer fabric condition and drain grommets for restrictions.

Check stabilizer rear hanger tube and front link tube for hinging action.

Small holes are drilled in the fuselage tube and stabilizer link tube to drop oil in for lubrication. Lubrication of these tubes is very important and often neglected, resulting in the tubes freezing up.

Lift up and down on the stabilizer checking for excessive play in the stabilizer yoke screw. The nut on the bottom of the screw pulley will take up play if excessive.

Check stabilizer yoke casting for cracks and link tube ears for worn bolts and safety.

ITEM 56—FIN:

Inspect vertical fin for fabric condition and finish.

Check for wrinkles, dents and signs of internal damage.

ITEM 57—RUDDER:

Inspect fabric cover on the rudder for fabric and dope condition.

Check bottom of rudder for an open drain grommet.

Check rudder for alignment and possible internal damage usually indicated by a wrinkle in the fabric.

Inspect rudder hinge pins for wear and safety.

Check hinge bushings for play, these bushings are pressed in and should be replaced when worn.

Check rudder stops to ascertain full travel:

16° Right and 16° Left -/- 2°.

ITEM 58—ELEVATORS:

Check fabric condition and finish on the elevators.
Check for open drain grommets along the elevator trailing edge.
Sight one elevator against the other for alignment.
Check hinge pins and bushings for wear and replace any worn pins or bushings.
Check elevator cable horns for safety, worn bolts and clearance in travel.
Check elevator stops to ascertain full travel:
24° up—12° down -/- 2°.

ITEM 59—EXTERNAL BRACING:

Check empennage rigging wires for corrosion and cracks or nicks that might result in failure.
Check fittings for alingnment with the wire and bolts for safety.
Rigging wires should be taut with little hand deflection.
Check each wire to be sure there are no loose fork lock nuts.

ITEM 60—RUDDER AND ELEVATOR CONTROLS:

Check rudder and elevator horns for worn bolts and safety with no threads in bearing.
Check horns for alingnment with the cable and freedom of travel.
Check top and bottom cable turnbuckles for safety and a maximum of three threads showing outside the barrel.
Sight the cables through the fuselage for interference and chafing.

ITEM 61—ELECTRICAL SYSTEM:

Check wiring for chafing, clamping.
All terminals tight.
Bonding straps secure.
Landing lights—mounting and operation.
Navigation lights—mounting and operation.
Battery installation—terminals secure. Charged, acid spillage.
Radio installation for security and operation.
Safe Flight Indicator for operation.
Circuit breakers or fuses for security.

ITEM 62—FLOATS OR SKIDS:

Sight check rigging.
All brace wires tight and safetied.
Water ballast, if carried.
No leaks in floats. Structure OK.

ITEM 63—

All C. A. A. Mandatory Bulletins complied with.

NOTE: All the information in Inspection Instructions, along with a check list for 25-50 and 100 hour inspections can be obtained in special form from the Piper Aircraft Corporation.

SECTION FIVE

OPTIONAL EQUIPMENT

The following items are optional equipment. While they are not necessary to the safe, efficient operation of the airplane, they enable you to make your airplane distinctive, as well as providing you with the best available accessories to increase its use.

1. Navigation Lights.
2. Cockpit Panel Lights.
3. Landing Lights.
4. Stall Warning Indicator.
5. Tie Down Rings.
6. Upper and Lower Strut Fairings (STD on 135).
7. Inspection Covers (Additional).
8. Dual Brakes.
9. Cabin Heater—Rear Seat.
10. Instrument Panel Cover Plate for Primary Instrument Group.
11. Turn and Bank Indicator.
12. Venturi—Tube 2".
13. Rate of Climb Indicator (Sensitive).
14. Altimeter (Sensitive).
15. Manifold Pressure Gauge.
16. Clock.
17. Air Temperature Gauge.
18. Recording Tachometer.
19. Front and Rear Door Locks.
20. Wheel Fenders.
21. Skis—(Federal A-2000A).
22. "Maule" 8" Tail Wheel.
23. Quick Drain Fuel Strainer and Oil Quick-Drain.
24. Propeller Spinners.
25. Sensenich Metal Propeller (76AM-2 Series).
    Aeromatic Propeller with Altitude Control—"135" only.

26. Radios Available:
    (a) G. E. AK32 with 29b or 29c (3105 T. M.).
    (b) G. E. AK42 with 29a and 29b or 29c (VHF-T. M.).
    (c) Narco Omni Range.
27. Microphone and Headset.
28. Fixed Loop for Radio.
29. Antenna:
    (a) Whip.
    (b) Single Wire to Tail.
    (c) Vee Plus Single Wire to Tail.
30. Speaker—Radio.
31. Dome Light and Grill.
32. Coat Hook.
33. Headset—Hook.
34. Arm Rest.
35. Litter.
36. The following color combinations are available for the three Pacer Models:
    (a) Boston Maroon—Cream Stripe.
    (b) Miami Blue—Cream Stripe.
    (c) Sacramento Green—Cream Stripe.
    (d) Milwaukee Brown—Cream Stripe.
37. Four-cylinder Priming Kit.
38. A complete hand rubbed finish is also optional for the Pacer Models.