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DESCRIPTION

AIRPLANE AND SYSTEMS

THE AIRPLANE

The Cherokee Warrior is a single-engine, fixed gear monoplane of all metal construction with low semi-tapered wings.

The fuselage provides a spacious, four-place interior with optional features to ensure individual comfort during short or extended cross-country flight.

The Cherokee Warrior can serve as a rental or cross-country airplane and also as a training and utility airplane. Performance and loading characteristics combine with economical operation to make the Warrior a versatile airplane in the business or personal aviation fields.

AIRFRAME

The **primary structure**, with the exception of the steel tube engine mount, steel landing gear struts and isolated areas, is of aluminum alloy construction. Tough fiberglass and thermoplastic are used extensively in the extremities - the wing tips, the engine cowling, etc. - and in nonstructural components throughout the airplane.

The **fuselage** is a conventional semi-monocoque structure. On the right side of the airplane is a large cabin door for ease of entrance and exit and a large baggage door to provide effortless loading into the 24 cubic foot compartment. Maintenance has been reduced to a minimum with advanced fuselage design.

The **wing** is a conventional semi-tapered design incorporating a laminar flow, NACA 65₂ 415, airfoil section. The cantilever wings are attached to each side of the fuselage by insertion of the butt ends of the main spars into a spar box carry-through which is an integral part of the fuselage structure. The spar box carry-through structure, located under the rear seat, provides in effect a continuous main spar with splices at each side of the fuselage. There are also fore and aft attachments at the rear and at an auxiliary front spar. This type of wing structure provides unobstructed cabin space for the rear passengers and allows for a lighter wing structure to improve the useful load of the airplane.

Both **ailerons** and **flaps** are of modern, all metal construction for smooth control of the aircraft. The ailerons are tapered to accommodate the semi-tapered wings. In the fully retracted position, the right flap locks to provide a step for cabin entry. The flaps have three extended positions: 10, 25, and 40 degrees.

A horizontal stabilator, vertical fin, and a rudder make up the empennage. They utilize a lightweight metal construction with fiberglass tips.

ENGINE AND PROPELLER

The PA-28-151 is powered by a Lycoming O-320-E3D four cylinder, direct drive, horizontally opposed engine rated at 150 HP at 2700 RPM. It is equipped with a starter, a 60 amp 14 volt alternator, a shielded ignition, dual magnetos, vacuum pump drive, a fuel pump, and a wetted polyurethane foam induction air filter. A recommended overhaul period of 2000 hours is based on Lycoming service experience. Operation beyond the recommended time is the decision of the operator. Since Lycoming from time to time revises the recommended overhaul period, the owner should check with his dealer for the latest overhaul period on his engine as well as any additional Lycoming Service Information.

The **engine compartment** is easily accessible for inspection through top-hinged side panels on either side of the engine cowlings. The engine cowlings are cantilever structures attached at the fire wall. The engine mounts are constructed of steel tubing, and dynafocal mounts are provided to reduce vibration.

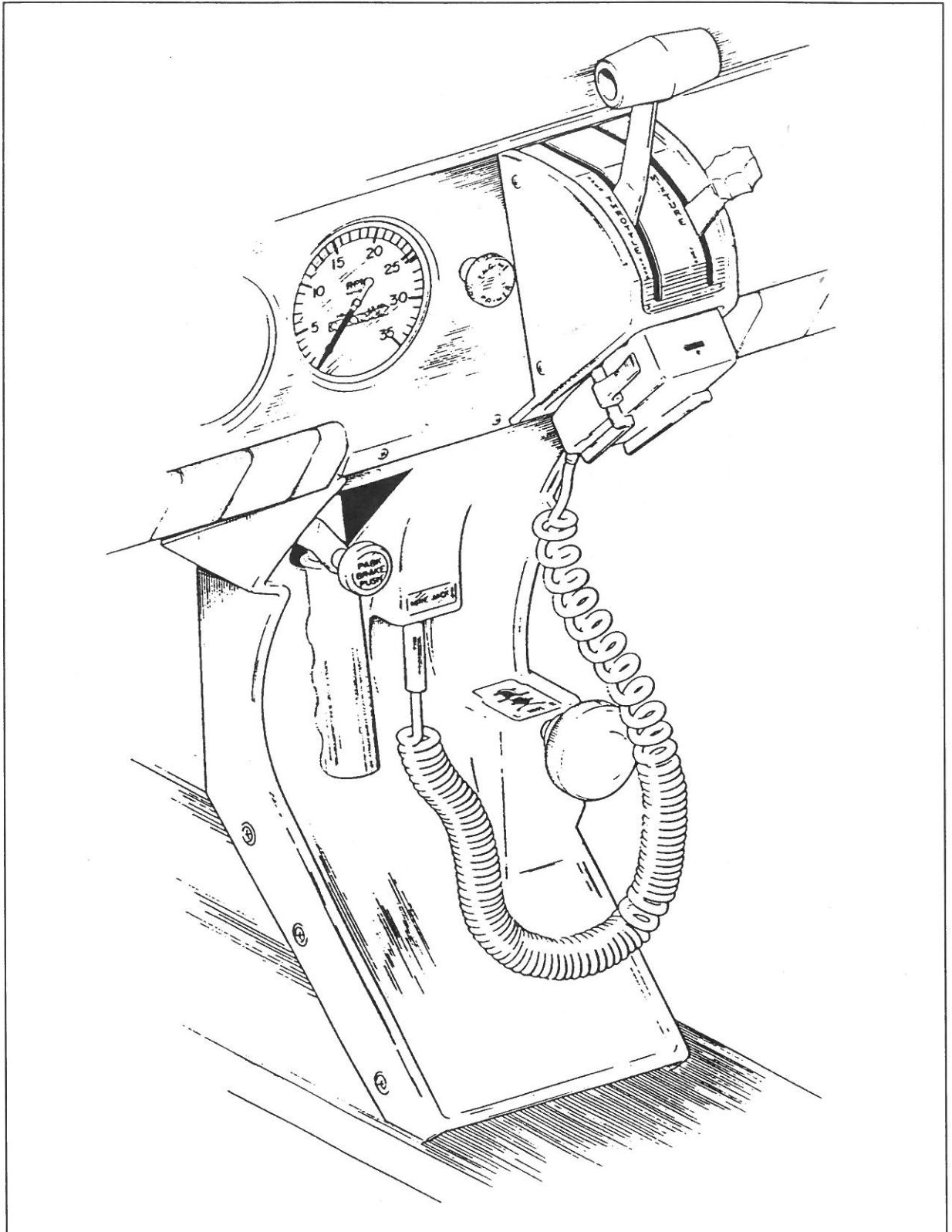
The **exhaust system** is constructed of stainless steel and incorporates a single muffler with heater shrouds to supply heated air for the cabin, the defroster system and the carburetor deicing system.

An **oil cooler** is located on the left rear of the engine mounted to the engine baffling. Engine cooling air, which is picked up in the nose section of the engine cowling and carried through the baffling, is utilized on the left side for the oil cooler. A **winterization plate** is provided to restrict air during winter operation. (See Winterization in Handling and Servicing.)

Engine air enters on either side of the propeller through openings in the nose cowling and is carried through the engine baffling around the engine and oil cooler. Air for the muffler shroud is also picked up from the nose cowling and carried through a large duct to the shroud. Carburetor induction air enters a chin scoop on the lower right cowling and is passed through a wetted polyurethane filter to the carburetor air box. Heated air enters the carburetor air box through a hose connected to the heater shroud.

A McCauley 1C160/EGM7653 or a Sensenich 74DM6-0-58 fixed pitch propeller is installed as standard equipment. The McCauley propeller has a diameter of 76 inches with a pitch of 53 inches and the Sensenich has a 74 inch diameter with a 58 inch pitch. The pitch of both propellers is determined at 75% of the diameter. Both propeller units are of an aluminum alloy construction.

The pilot should read and follow the procedures recommended in the Lycoming Operator's Manual for this engine in order to obtain maximum engine efficiency and time between engine overhauls.



Throttle Quadrant and Console

LANDING GEAR

The fixed gear PA-28-151 is equipped with is a Cleveland 5.00 x 5 wheel on the nose gear and a Cleveland 6.00 x 6 wheel on each main gear. Cleveland single disc hydraulic brake assemblies are provided on the main gear. The nose gear has a 5.00 x 5 four ply tire, while the main wheel assemblies have 6.00 x 6 four ply tires. At gross weight, the main gear tires require a pressure of 24 psi, and the nose gear tire requires a pressure of 30 psi.

The nose gear is steerable through a 30 degree arc each side of center by the use of the rudder pedals and toe brakes. A spring device is incorporated for rudder centering and to provide rudder trim. A bungee assembly on the nose gear steering mechanism reduces ground steering effort and dampens shocks and bumps during taxiing. The steering mechanism also incorporates a shimmy dampener.

The three struts are of the air-oil type with the normal static load extension being 3.25 inches for the nose gear and 4.50 inches for the main gear.

The brakes are actuated by toe brake pedals which are attached to the rudder pedals or by a hand lever and master cylinder located below and behind the center of the instrument sub panel. Hydraulic cylinders are located above each pedal and adjacent to the hand brake lever. The brake fluid reservoir is installed on the top left front face of the fire wall. The parking brake is incorporated in the master cylinder and is actuated by pulling back on the brake lever and depressing the knob attached to the left side of the handle. To release the parking brake, pull back on the brake lever to disengage the catch mechanism and allow the handle to swing forward.

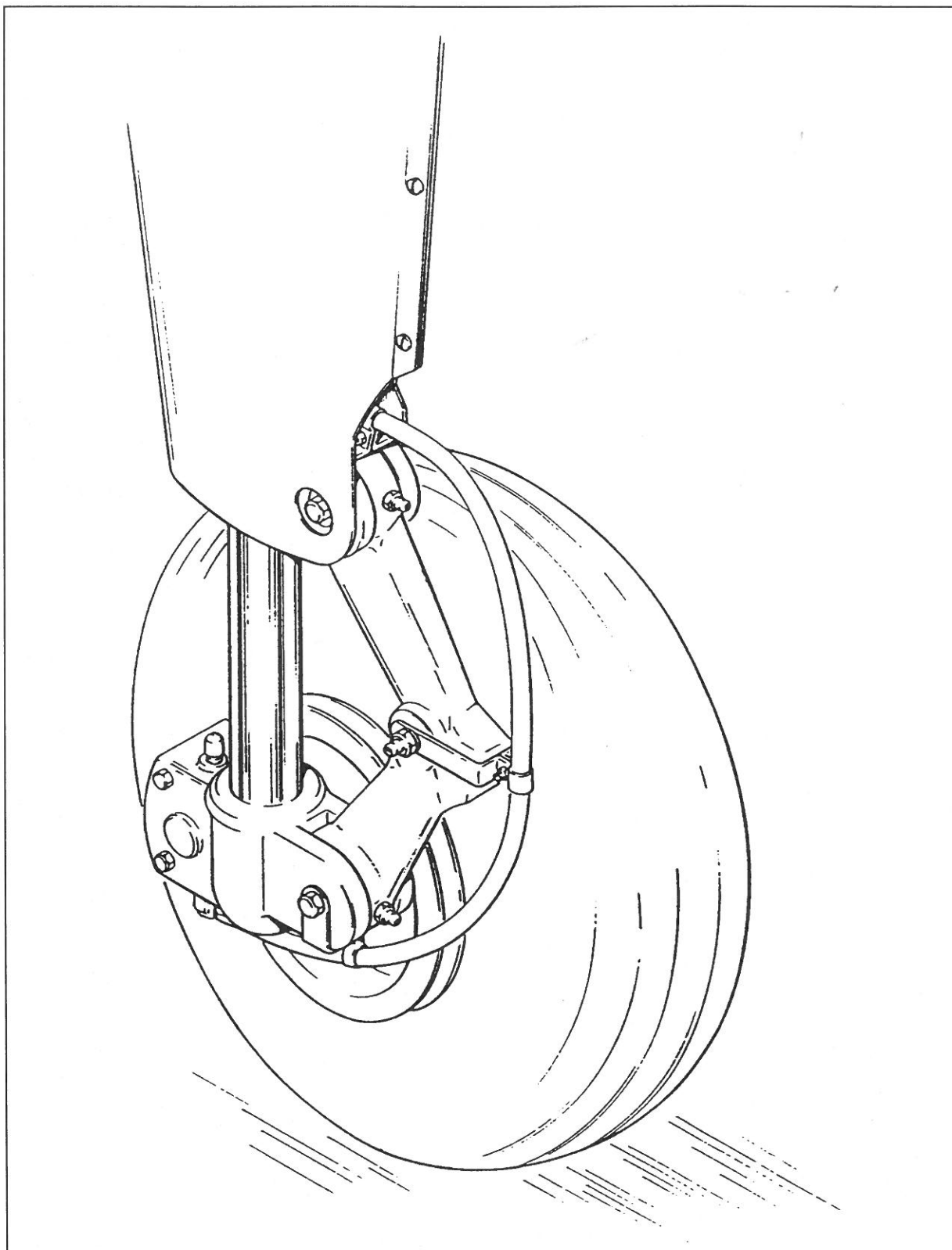
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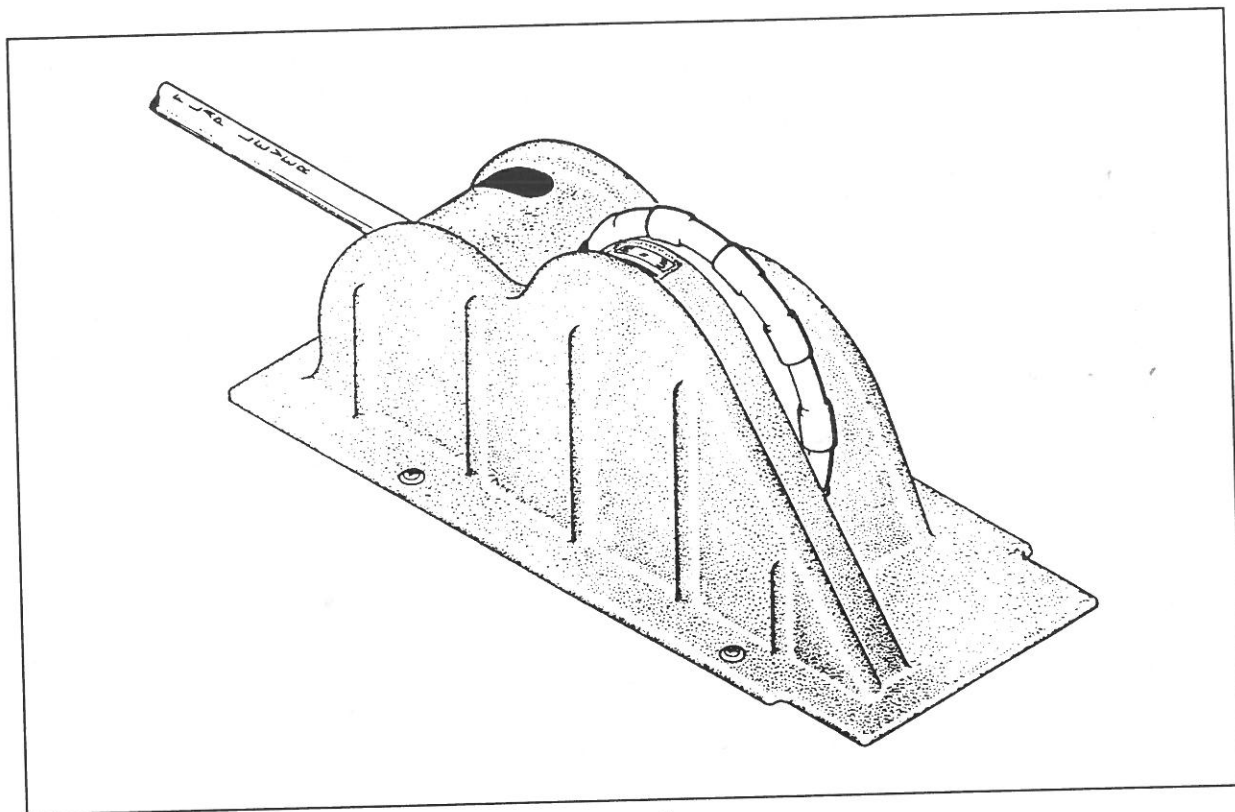
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Main Wheel Assembly



Console

FLIGHT CONTROLS

Dual flight controls are provided on the Warrior as standard equipment. The flight controls actuate the control surfaces through a cable system.

The horizontal surface (stabilator) is of the flying tail design with a trim tab mounted on the trailing edge. This tab serves the dual function of providing trim control and pitch control forces. The trim tab is actuated by a trim control wheel located on the control console between the front seats. Forward rotation of the wheel gives nose down trim and aft rotation gives nose up trim. The stabilator provides extra stability and controllability with less area, drag and weight than conventional tail surfaces.

The rudder is conventional in design and incorporates a rudder trim. The trim mechanism is a spring loaded recentering device. The trim control is located on the right side of the pedestal below the throttle quadrant. Turning the trim control clockwise gives nose right trim and counterclockwise rotation gives nose left trim.

Ailerons are provided with a differential deflection. This feature reduces adverse yaw in turning maneuvers, thus reducing the amount of coordination required. An aileron centering spring incorporated in the aileron control system on early models centers the aileron by returning the control wheel to neutral.

Manually controlled flaps are provided on the PA-28-151. The flaps are balanced for light operating forces and spring loaded to return to the retracted (up) position. A control handle, which is located between the two front seats on the control console, extends the flaps by the use of a control cable. To extend the flaps, the handle is pulled up to the desired flap setting of 10, 25 or 40 degrees. To retract, depress the button on the end of the handle and lower the control. When extending or retracting flaps, there is a pitch change in the airplane. This pitch change can be corrected either by stabilator trim or increased control wheel force. When the flaps are in the retracted (up) position the right flap, provided with an over-center lock mechanism, acts as a step.

NOTE

The right flap will support a load only in the fully retracted (up) position. When the flap is to be used as a step, make sure the flaps are in the retracted (up) position.

FUEL SYSTEM

Fuel is stored in two twenty-five gallon (24 gallons usable) fuel tanks, giving the airplane a total capacity of fifty U.S. gallons (48 gallons usable). The tanks are secured to the leading edge of each wing with screws and nut plates. This allows easy removal for service or inspection.

On serial numbers 7415001 through 7515449 each fuel tank has two outlets, one forward and one aft, to ensure an even fuel flow. Fuel is pumped from the tanks through the forward and aft tank outlets to fuel manifolds in the inboard section of either wing. Each manifold is a small collector with an inlet hose from each of the tank outlets, and an outlet hose to the fuel selector valve. On serial numbers 7615001 and up there is only one outlet on each tank and no fuel manifolds are used.

The fuel tank selector control is located on the left side panel forward of the pilot's seat. The button on the selector cover must be depressed and held while the handle is moved to the OFF position. The button releases automatically when the handle is moved back to the ON position.

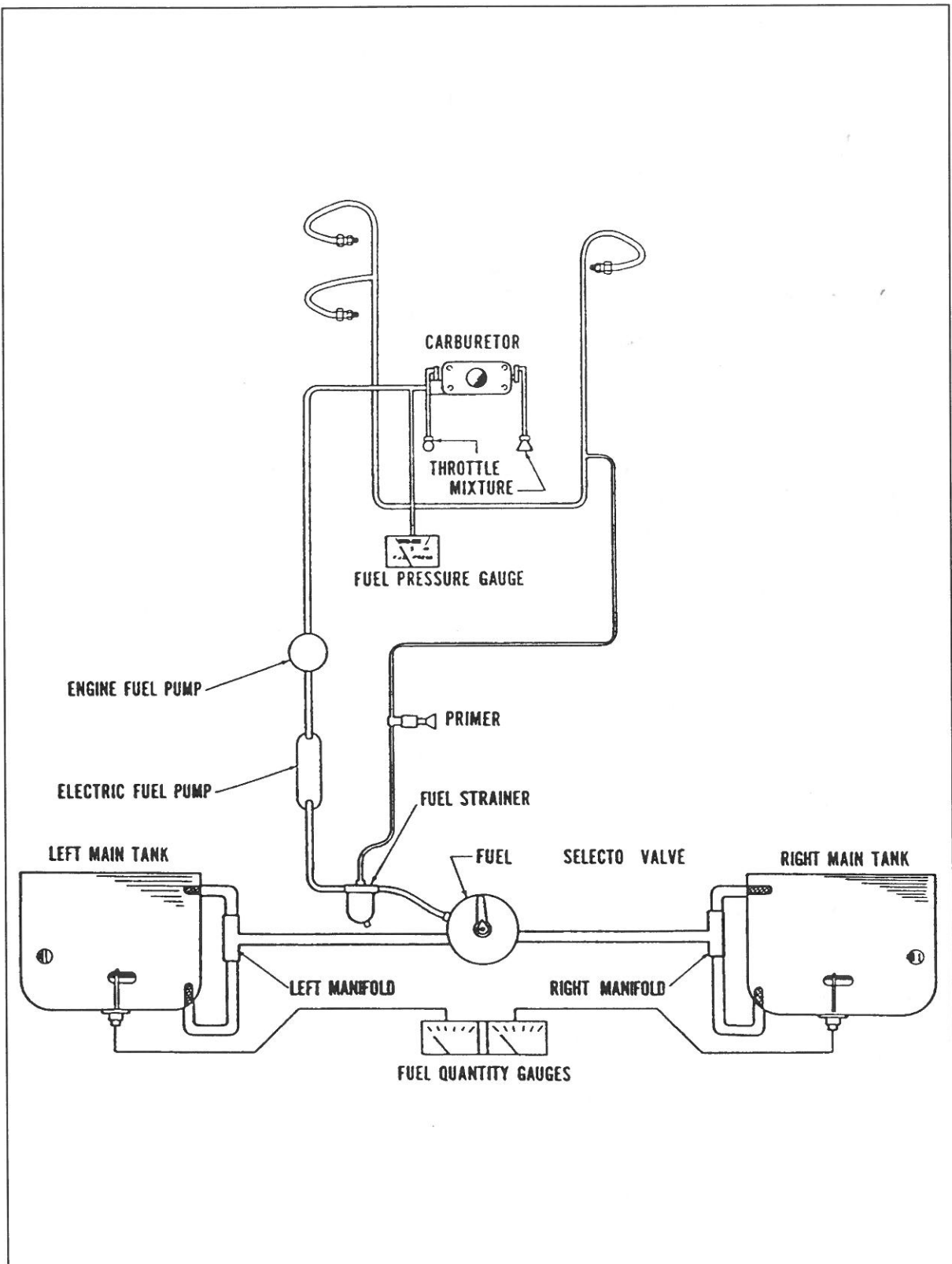
An auxiliary electric fuel pump is provided in case of the failure of the engine driven pump. The electric pump should be ON for all takeoffs and landings and when switching tanks. The fuel pump switch is located in the switch panel above the throttle quadrant.

The fuel drains should be opened daily prior to first flight to check for water or sediment. Each tank has an individual drain at the bottom, inboard rear corner, and each fuel manifold (on early models only) is equipped with a drain. The outlets are located on the underside of the wings.

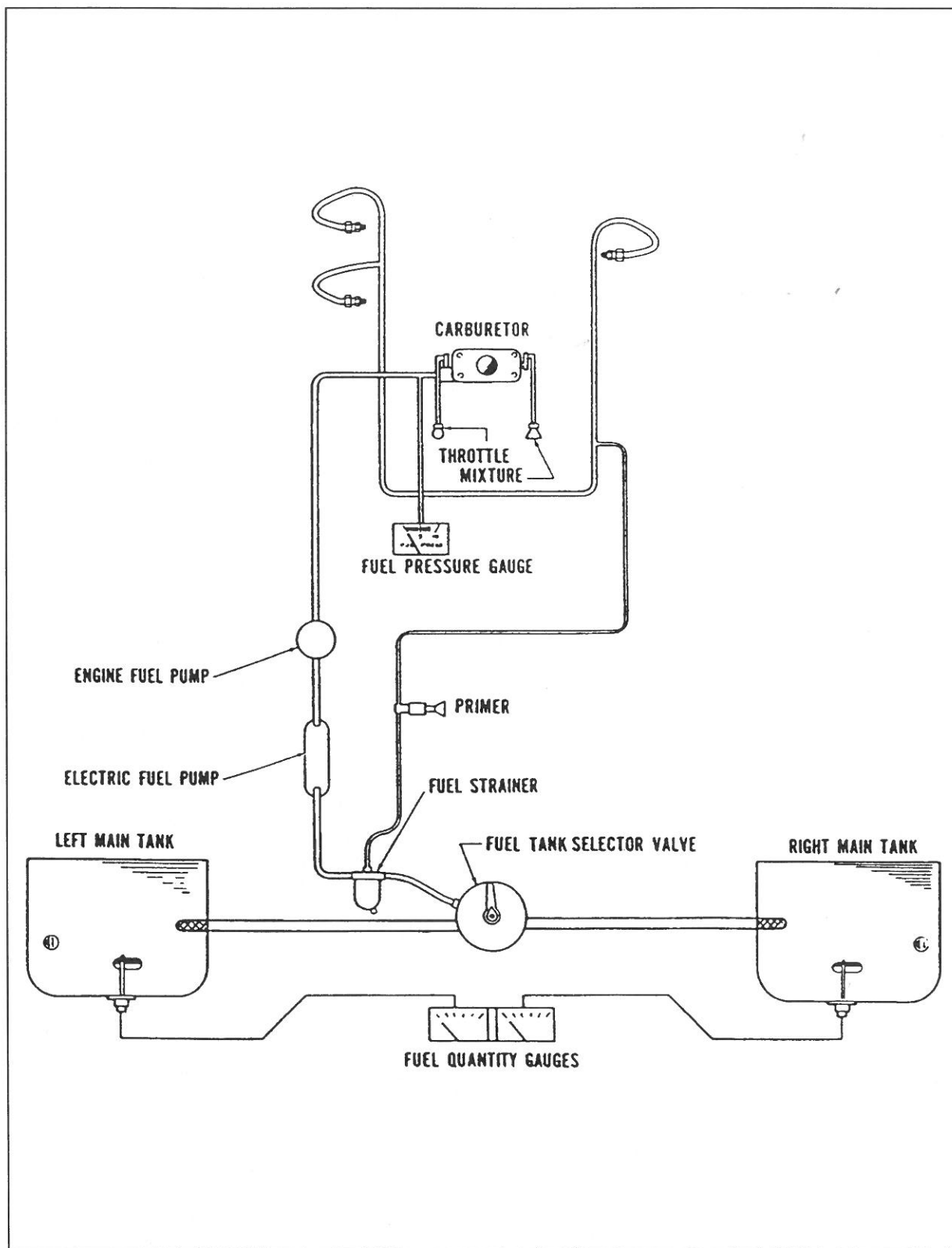
A gascolator, located on the lower left front of the fire wall, has a drain which is accessible from outside the nose section. The gascolator should also be drained before the first flight of the day. (See the Handling and Servicing Section for the complete fuel draining procedure.)

Fuel quantity and fuel pressure gauges are mounted in a gauge cluster located on the left side of the instrument panel to the right of the control wheel.

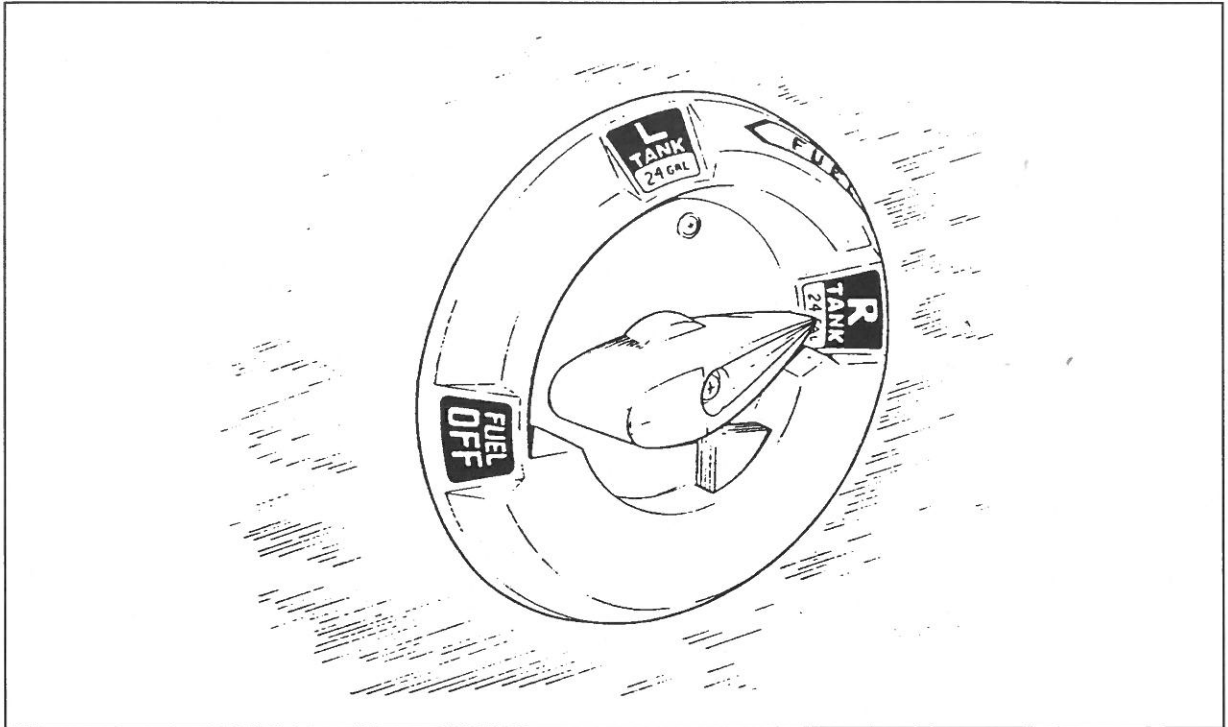
An optional engine priming system is available to facilitate starting. The primer pump is located to the immediate left of the throttle quadrant.



Fuel System Schematic (Ser. Nos. 7415001 through 7515449)



Fuel System Schematic (Ser. Nos. 7615001 and up)



Fuel Selector

ELECTRICAL SYSTEM

The Cherokee Warrior is equipped with a simple but highly efficient electrical system that can be easily operated.

The electrical system includes a 14 volt 60 ampere alternator, voltage regulator, overvoltage relay, battery contactor and a standard 12 volt 25 ampere hour or an optional 12 volt 35 ampere hour battery. The battery is mounted in a thermoplastic box located immediately aft of the main spar on the right side of the fuselage below the rear passengers seat. The voltage regulator and overvoltage relay are located on the forward left side of the fuselage behind the instrument panel.

Electrical switches are located on the right center instrument panel, and the circuit breakers are located on the lower right instrument panel. A rheostat switch on the left side of the switch panel controls the optional navigation lights and the radio lights. A similar switch on the right side of the switch panel controls and dims the optional panel lights. The master switch, anti-collision light, landing light and fuel pump are also located on the switch panel and are controlled by rocker type switches.

WARNING

Strobe lights should not be operating when flying through overcast and clouds since reflected light can produce spacial disorientation. Do not operate strobe lights in close proximity to ground, during takeoff and landing.

A hinged door protects and gives easy access to the circuit breaker panel. Each circuit breaker on the panel is of the push to reset type and is clearly marked as to its function and amperage. Circuit provisions have been included to handle a full complement of communication and navigational equipment.

Standard electrical accessories include a starter, an electric fuel pump, an audible stall warning indicator, fuel gauges, ammeter, and annunciator panel*.

The annunciator panel* includes alternator and low oil pressure indicator lights. When the optional gyro system is installed, the annunciator panel also includes a low vacuum indicator light. The annunciator panel lights are provided only as a warning to the pilot that a system may not be operating properly, and that he should check and monitor the applicable system gauge to determine when or if any necessary action is required.

The system also provides for such **optional electrical accessories** as additional lights and gauges, a heated pitot head, and communication and navigational equipment.

The master switch is a split rocker switch. One side of the switch is the battery side ("BAT") and the other is the alternator side ("ALT"). Henceforth, the words "**master switch**" used in this manual will mean both "BAT" and "ALT" switches and they are to be depressed simultaneously to OFF or ON as directed.

Primary electrical power is provided by the 14 volt 60 amp alternator. The alternator system offers many advantages over the generator system both in operation and maintenance. The main advantage is full electrical power output at lower engine RPM. This provides improved radio and electrical equipment operation and increased battery life by reducing battery load. This will make cold weather starting easier.

Secondary electrical power is provided by the standard or optional battery.

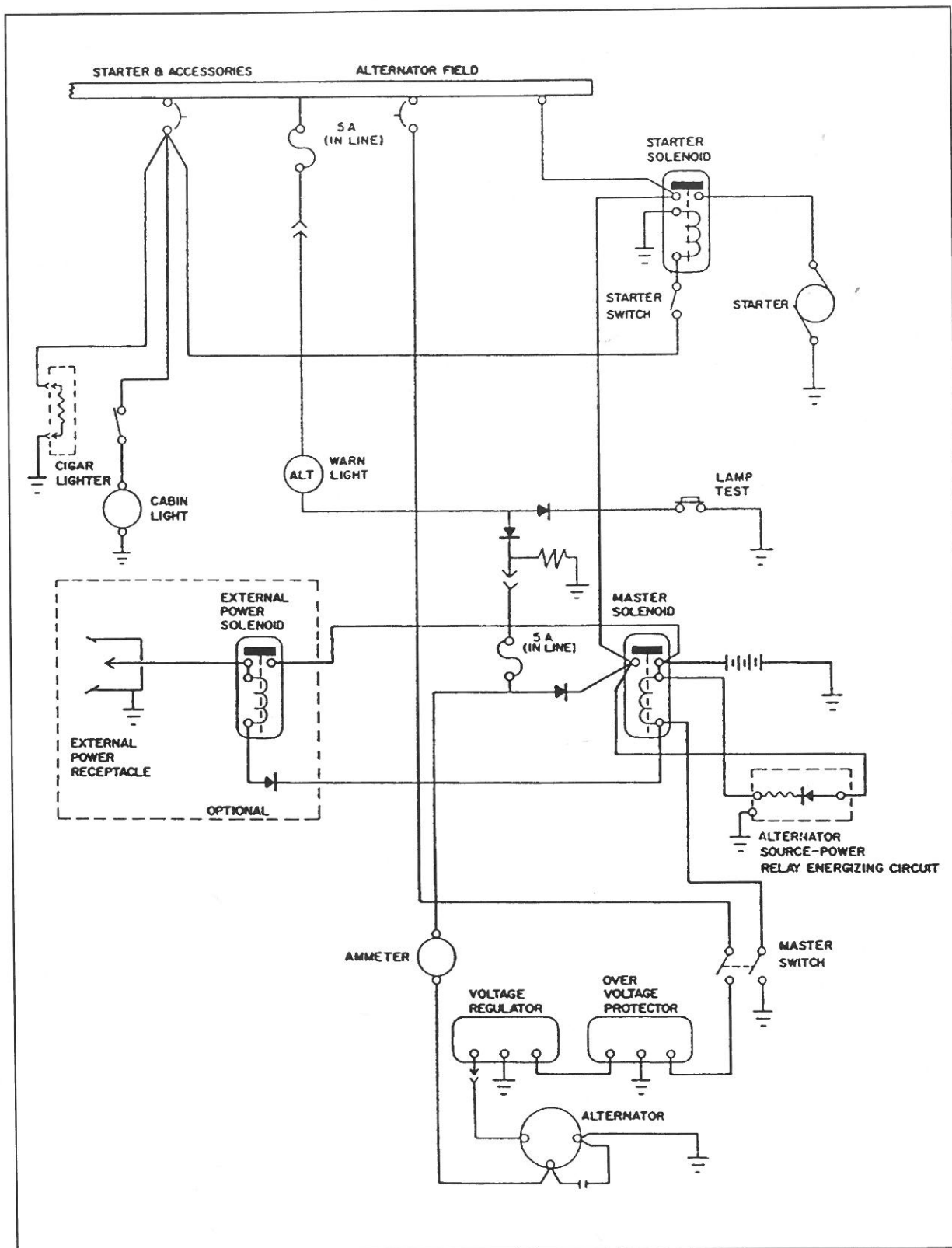
Unlike previous generator systems, the **ammeter** as installed does not show battery discharge; rather, it indicates the electrical load on the alternator in amperes. With all the electrical equipment off and the master switch on, the ammeter will indicate the charging rate of the battery. As each electrical unit is switched on, the ammeter will indicate the total ampere draw of all the units including the battery. For example, the maximum continuous load for night flight with radios on is about 30 amperes. This 30 ampere value plus approximately 2 amperes for a fully charged battery will appear continuously under these flight conditions. The amount of current shown on the ammeter will tell immediately if the alternator system is operating normally, as the amount of current shown should equal the total amperage drawn by the electrical equipment which is operating.

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

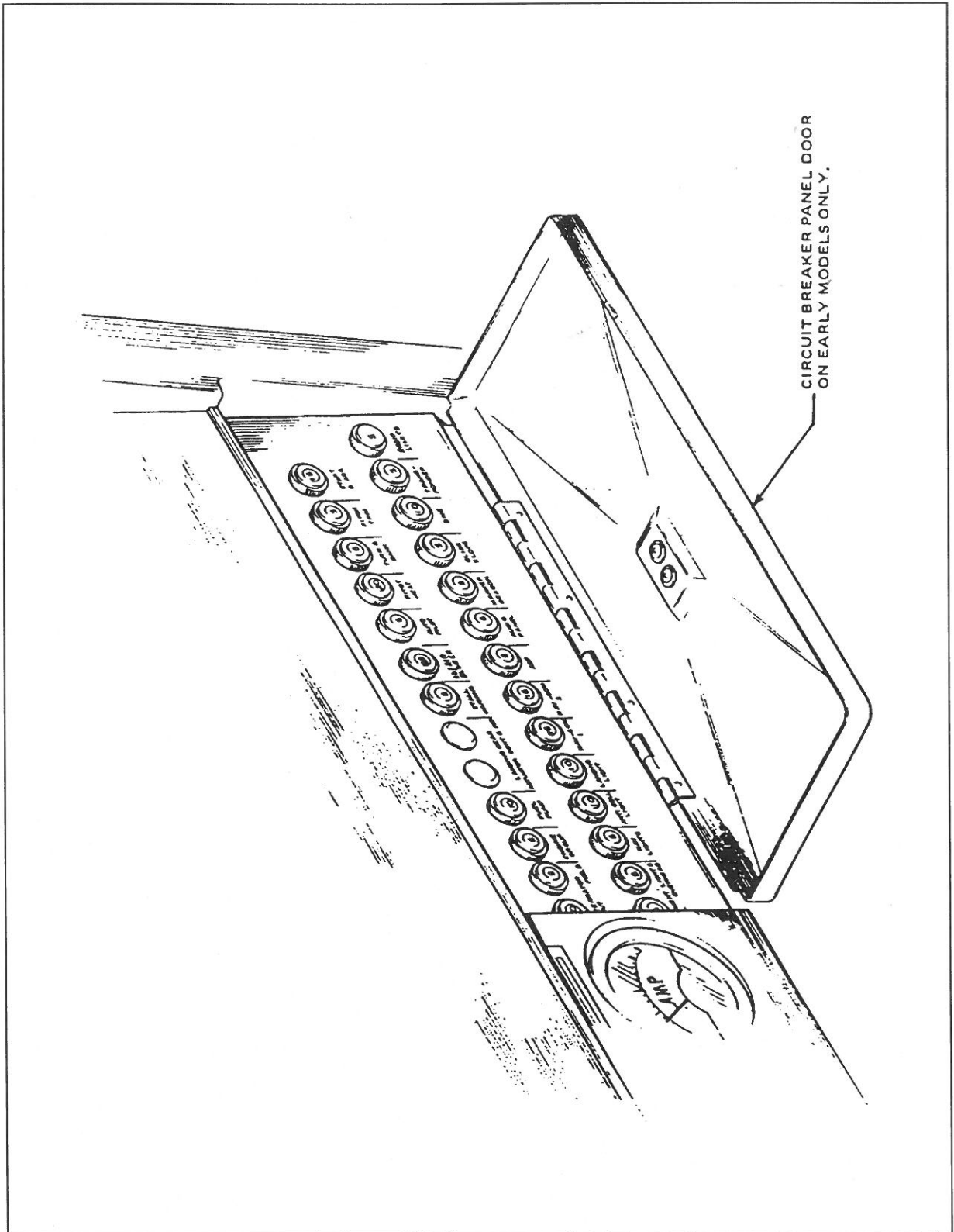
Maintenance on the alternator should prove to be a minor factor. Should service be required, contact the local Piper Dealer.

*Serial nos. 7515001 and up

AIRPLANE AND SYSTEMS
REVISED: JUNE 14, 1974



Alternator and Starter Schematic (Ser. Nos. 7515001 and up)



Circuit Breaker Panel

VACUUM SYSTEM*

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

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

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

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

INSTRUMENT PANEL

The instrument panel is designed to be functional and professional, accommodating complete instruments and avionics equipment for VFR and IFR flights. A wide range of optional instruments and avionics permit an equipment selection to suit individual needs.

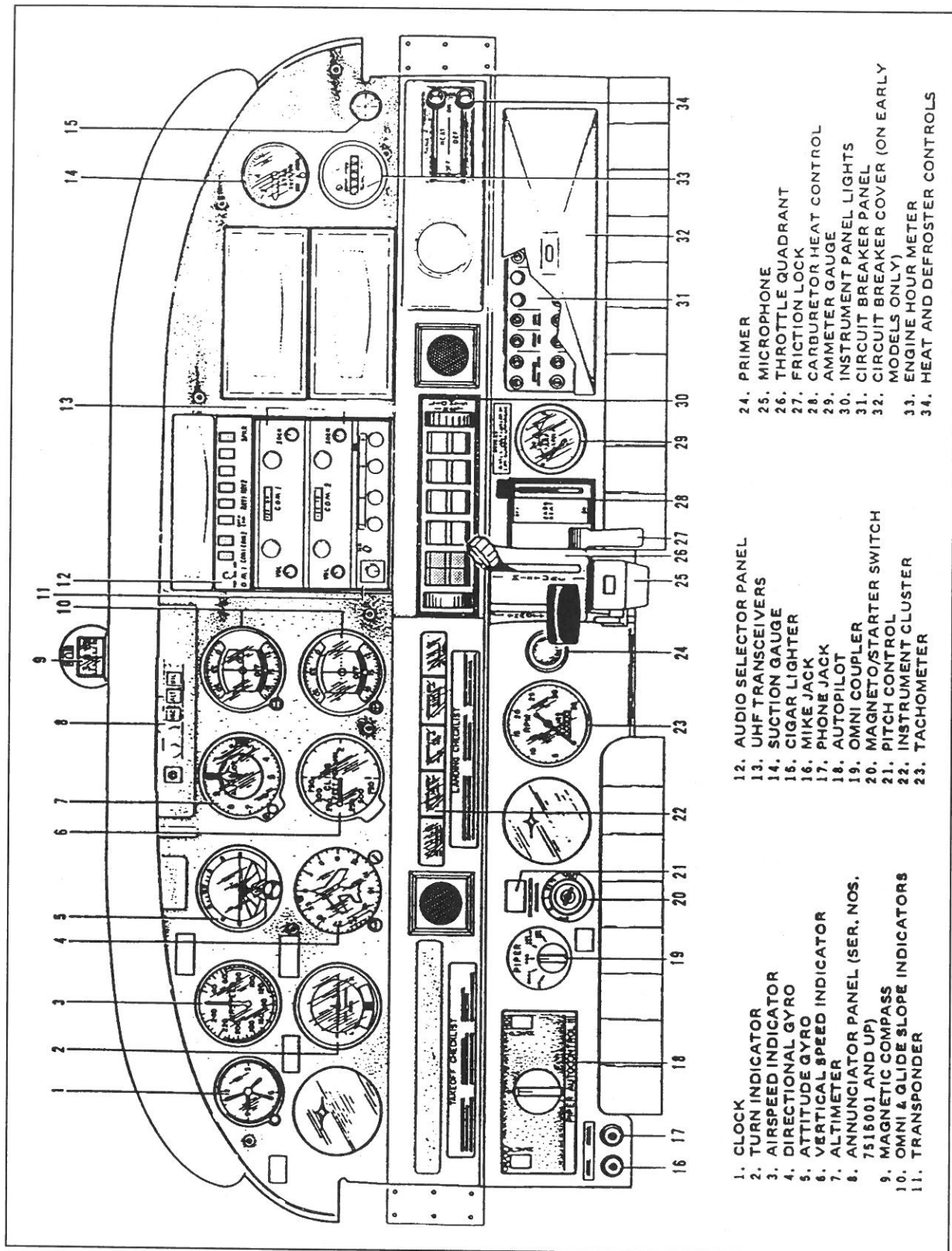
A natural separation of the flight group and power group is provided by placing the flight group in the upper instrument panel and the power group in the center and lower instrument panels. The radios and the circuit breakers are located on the upper and lower right panel respectively, and have circuits provided for a complete line of optional radio equipment. An engine cluster is located to the right of the pilot control wheel and includes a fuel pressure gauge, a right and left main fuel quantity gauge, an oil temperature gauge and an oil pressure gauge.

Standard instruments on the Warrior panel include a compass, an airspeed indicator, a tachometer, an altimeter, an ammeter, an engine cluster, and an annunciator panel**. The compass is mounted to the top of the instrument panel in clear view of the pilot. The annunciator panel is mounted in the upper instrument panel to warn the pilot of a possible malfunction in the alternator, oil pressure, or vacuum systems.

A complete line of instrument options available for the panel includes a suction gauge, vertical speed indicator, attitude gyro, directional gyro, clock, true-speed indicator and a turn and slip indicator or turn coordinator. The attitude gyro and directional gyro are vacuum operated through the use of a vacuum pump installed on the engine, while the turn and slip indicator is electrically operated. The vacuum suction gauge is on the far right of the instrument panel.

* Optional equipment

** Serial nos. 7515001 and up



Instrument Panel

PITOT-STATIC SYSTEM

The system supplies both pitot and static pressure for the airspeed indicator, altimeter, and the optional vertical speed indicator.

Pitot and static pressure are picked up by a pitot head installed on the bottom of the left wing and carried through pitot and static lines within the wing and fuselage to the gauges on the instrument panel.

A static valve, which is mounted to the knee guard below the instrument panel on the left side, provides an alternate static source for the system when opened.

Both the pitot and static lines can be drained through separate drain valves located on the left lower side of the fuselage interior.

A heated pitot head, which alleviates problems with icing and heavy rain, is available as optional equipment. The switch for the heated pitot head is located on the electrical switch panel to the left of the right control wheel.

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

NOTE

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

HEATING AND VENTILATING SYSTEM

Heat for the cabin interior and the defroster system is provided by a shroud attached to the muffler. The amount of heat can be regulated with the controls located on the far right side of the instrument panel.

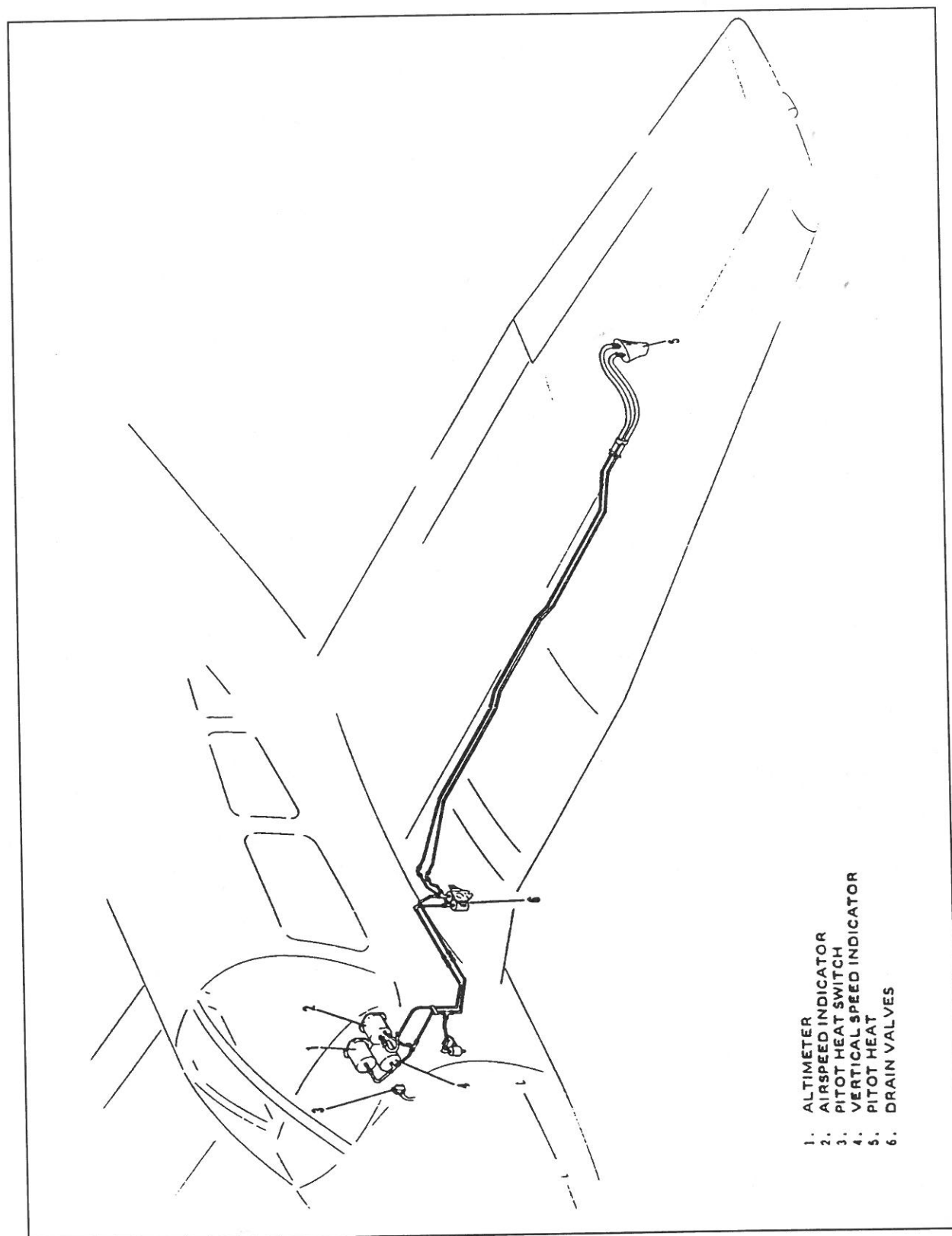
The airflow between front and rear seats can be regulated by the heat diversion controls located on either side of the console atop the heat ducts.

CAUTION

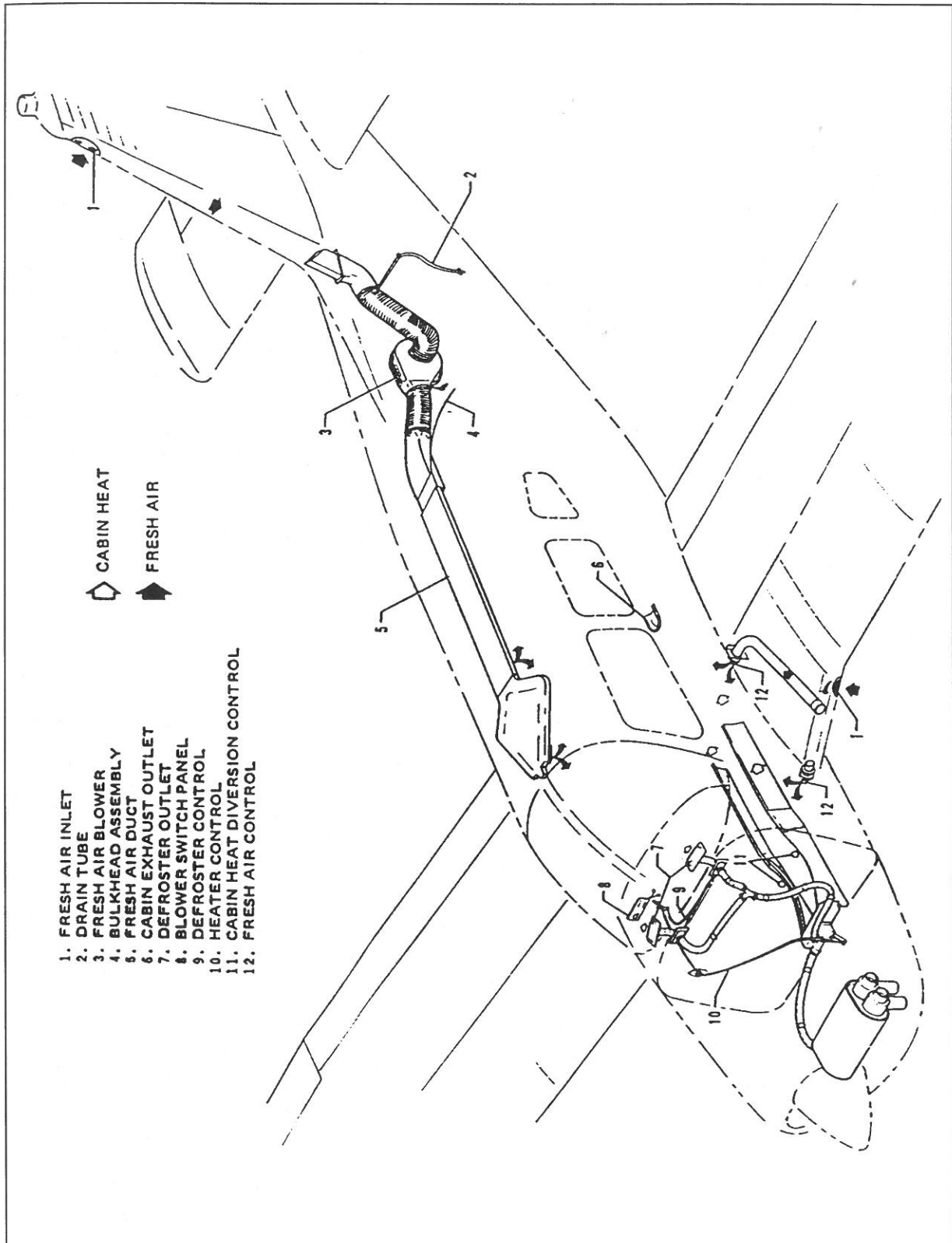
When cabin heat is operated, heat duct surface becomes hot. This could result in burns if arms or legs are placed too close to heat duct outlets or surface.

Fresh air inlets are located in the leading edges of the wings on the fin. At each front seat location there is a large adjustable fresh air outlet on the side of the cabin near the floor. Rear seat vents are optional. Cabin air is exhausted through an outlet located below the rear seat.

An optional overhead ventilating system with outlets over each seat is also available. An additional option to aid in fresh air circulation is a cabin air blower to force air through the overhead vent system. This blower is operated by a fan switch with four positions - "OFF," "LOW," "MED," and "HIGH." The switch is located on the right side of the instrument panel with the heater and defroster controls.



Pitot-Static System



Heating and Ventilating System

CABIN FEATURES

For ease of entry and exit and for pilot-passenger comfort, the front seats are adjustable fore and aft. The right front seat tilts forward to allow easy entry to the rear seats. The cabin interior includes a pilot storm window, ash trays and armrests on each front seat, two map pockets and pockets on the backs of the front seats.

The front seats can be equipped with optional headrests and optional push button vertical adjustment.

Seat belts are standard equipment for both front and rear seats. The shoulder straps controlled by inertia reels are standard equipment on the front seats and are offered as an option for the rear seats. The shoulder strap is routed over the shoulder adjacent to the window and attached to the seat belt in the general area of the occupants' inboard hip.

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

BAGGAGE AREA

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

NOTE

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

STALL WARNING

An approaching stall is indicated by an audible alarm located behind the instrument panel. The indicator activates at between five and ten miles per hour above stall speed.

FINISH

All exterior surfaces are primed with etching primer and finished with a durable acrylic lacquer which is available in a variety of colors and combinations. To keep the finish attractive, economy size spray cans of touch-up paint are available from Piper Dealers

PIPER EXTERNAL POWER*

An optional starting installation known as **Piper External Power (PEP)** is accessible through a receptacle located on the right side of the fuselage aft of the baggage door. An external battery can be connected to the socket, thus allowing the operator to crank the engine without having to gain access to the airplane's battery. Instructions on a placard located on the cover of the receptacle should be followed before using the external power. For instructions on the use of the PEP see; **STARTING WITH EXTERNAL POWER** under the Operating Instructions Section of this manual.

*Optional equipment