

DESCRIPTION

AIRPLANE AND SYSTEMS

The Airplane	2-1
Airframe.....	2-1
Engine and Propeller.....	2-1
Landing Gear	2-2
Flight Controls	2-5
Fuel System	2-5
Electrical System	2-8
Vacuum System	2-11
Instrument Panel	2-11
Pitot-Static System.....	2-14
Heating and Ventilating System.....	2-14
Cabin Features	2-16
Baggage Area.....	2-16
Stall Warning	2-16
Finish	2-16
Air Conditioning.....	2-17
Piper External Power	2-18

BLANK PAGE

DESCRIPTION

AIRPLANE AND SYSTEMS

THE AIRPLANE

The Cherokee 140 is a single-engine, low wing monoplane of all metal construction. It is available in two versions, the Cherokee Cruiser and the Cherokee Flite Liner.

The Cherokee Cruiser, which is the standard model, has a two-place configuration with a third and fourth family seat offered as optional equipment. Economy, comfort and a wide range of options make the Cherokee Cruiser a versatile business or personal airplane.

The Cherokee Flite Liner is basically a standard model Cruiser with optional equipment installed that is tailored for flight instruction. This equipment includes instruments, radio and lights. The Cherokee Flight Liner also has its own distinctive exterior color scheme. The simplicity, stability and dual flight controls make it an especially good instructional airplane.

AIRFRAME

The basic airframe is of aluminum alloy construction. The extremities - wing tips, cowling, tail surfaces - are of durable fiberglass.

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

The wing airfoil section is a laminar flow type, NACA65₂-415 with the maximum thickness about 40% aft of the leading edge. This permits the main spar carry-through structure to be located under the rear seat, providing unobstructed cabin floor space ahead of the rear seat.

ENGINE AND PROPELLER

The Lycoming O-320-E3D engine installed in the Cherokee PA-28-140 is rated at 150 horsepower at 2700 rpm. This engine has a compression ratio of 7 to 1 and requires 80/87 minimum octane fuel. The engine is equipped with direct drive or optional geared drive starter, a 60 ampere alternator, dual magnetos, vacuum pump drive, diaphragm type fuel pump and a float carburetor.

Exhaust gases are carried through a system constructed of heavy gauge stainless steel which incorporates heater shrouds to provide cabin heat, defrosting, and carburetor deicing.

CHEROKEE CRUISER

The propeller used on the PA-28-140 is a Sensenich M74DM fixed-pitch aluminum alloy unit. Its diameter is 74 inches with a standard pitch of 58 inches. All performance figures are based on the standard 58 inch pitch propeller.

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

The throttle quadrant is in the lower center of the instrument panel and contains the throttle and mixture control. A friction lock on the right side of the quadrant prevents creeping of the controls. To the right of the quadrant is the carburetor heat control that provides maximum carburetor heat when fully ON. Air passes through a highly efficient dry type filter when the carburetor heat is OFF.

The Flite Liner incorporates a throttle detent adjusted to the 60% power location for the throttle control. When the throttle is set in this detent, the tachometer needle will match the white radial decal indicating 2265 RPM on the glass of the tachometer at 3500 feet altitude. The arcs of this decal represent 60% power at sea level (2180 RPM) and 7000 feet (2345 RPM). Thus an economical 60% power setting can be easily obtained up to 7000 feet altitude.

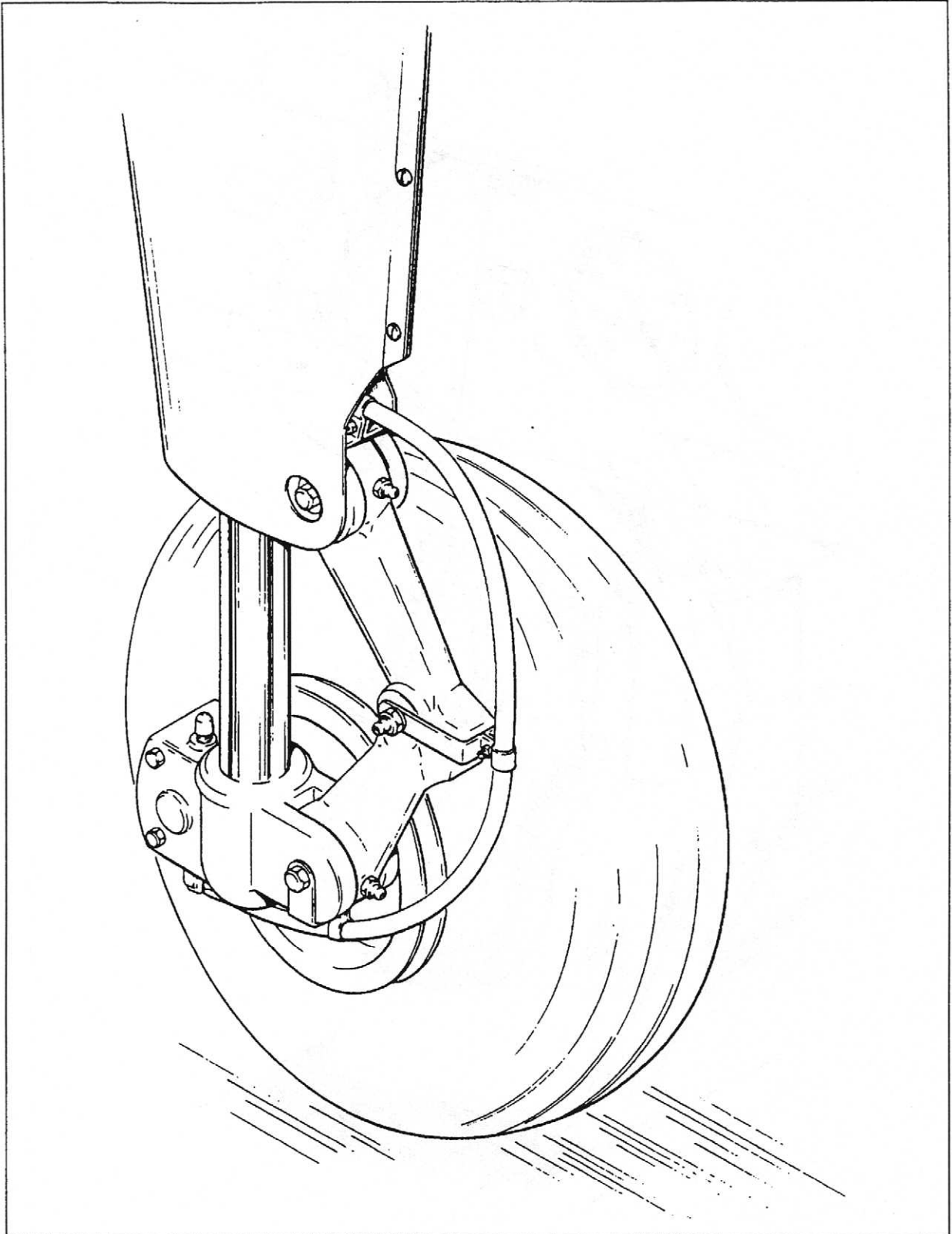
LANDING GEAR

The three landing gears use Cleveland 6.00 x 6 wheels, the main wheels are being provided with brake drums and Cleveland single disc hydraulic brake assemblies. The nose wheel and the main gear all use 6.00 x 6 four ply tires with tubes.

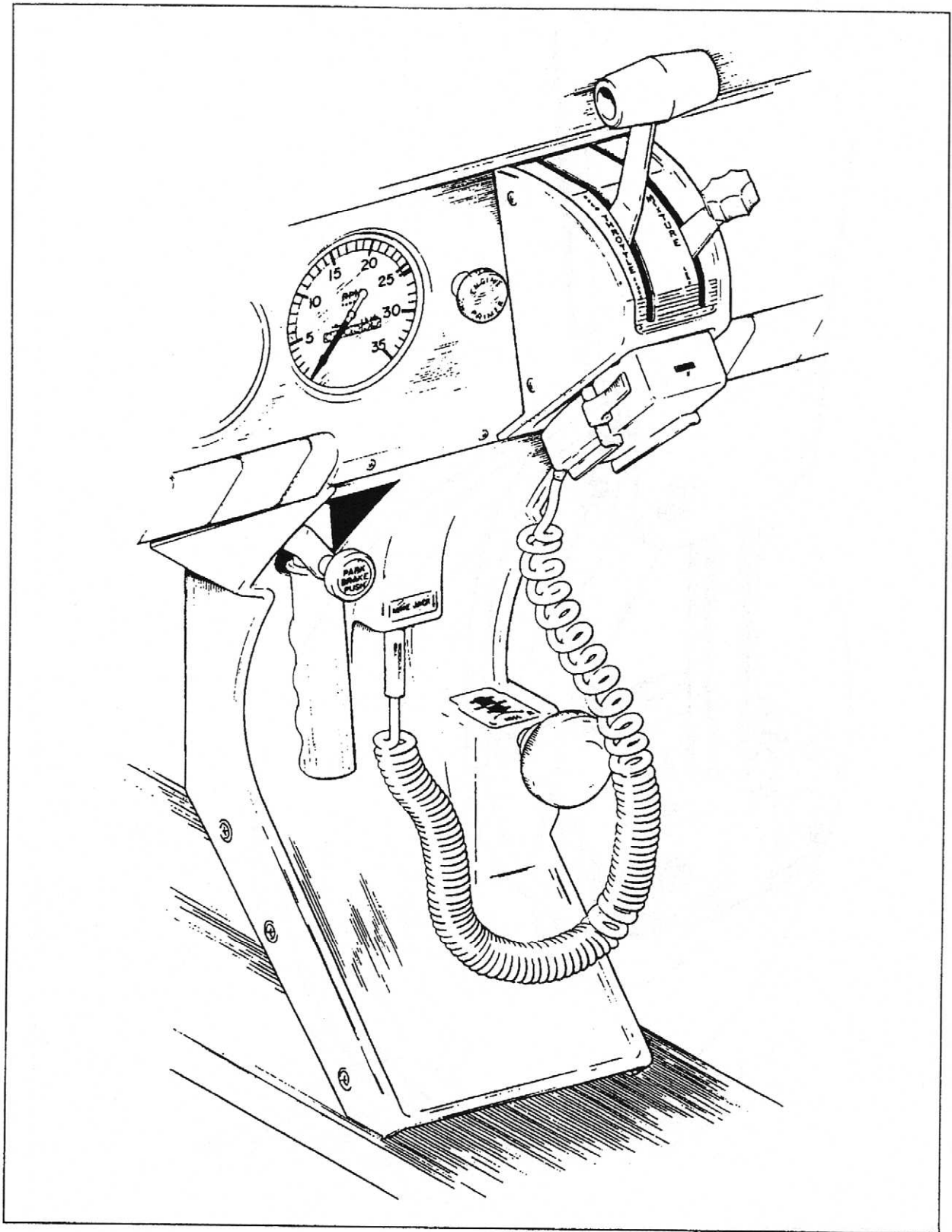
The nose gear is steerable through a 60° arc by use of the rudder pedals and brake. A spring device is incorporated in the rudder pedal torque tube assembly to aid in rudder centering and to provide rudder trim. The nose gear steering mechanism also incorporates a bungee device to provide lighter, smoother ground steering and to dampen bumps and shocks during taxiing. The nose gear also includes a shimmy dampener.

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

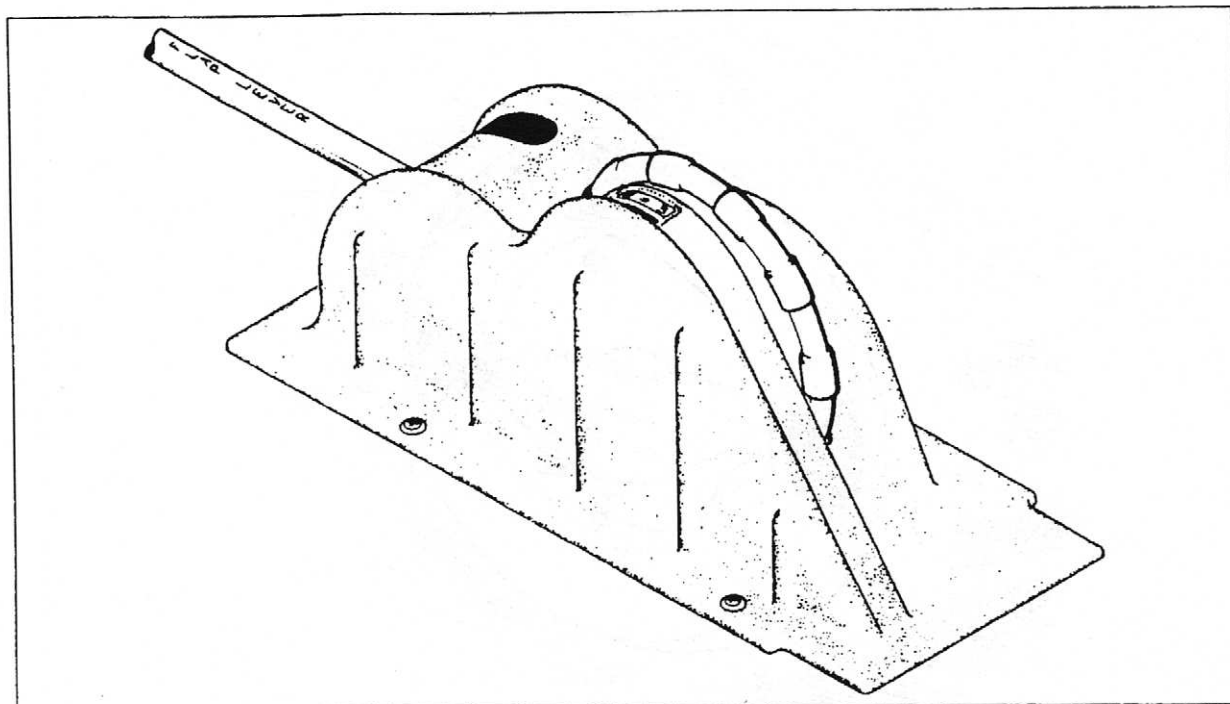
The brakes are actuated by a hand lever and a master cylinder which is located below and near the center of the instrument panel. The toe brakes and the hand lever have their own brake cylinders, but they share a common reservoir. The parking brake is incorporated in the lever brake and is operated by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



Main Wheel Assembly



Throttle Quadrant and Console



Console

FLIGHT CONTROLS

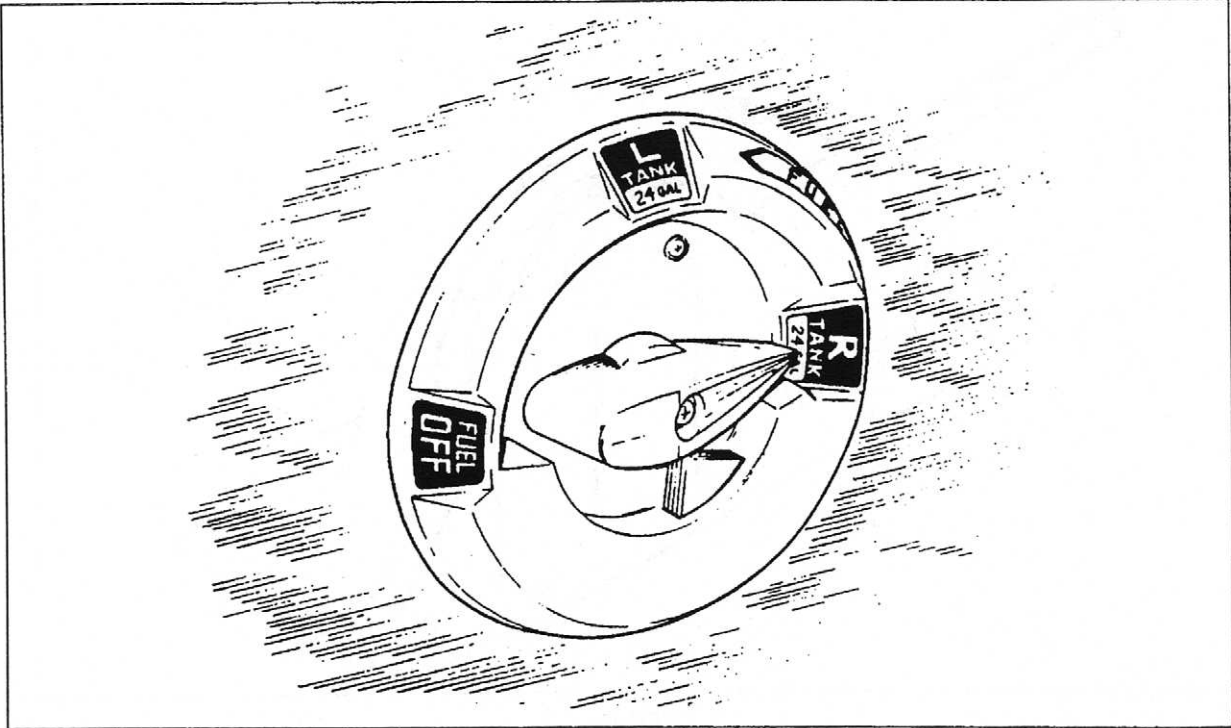
Dual controls are provided as standard equipment with a cable system used between the controls and the surfaces. The **horizontal tail** is of the all-movable slab type, with an anti-servo tab acting as a longitudinal trim tab. It is actuated by a control wheel on the floor between the front seats. The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

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

FUEL SYSTEM

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

The fuel 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 into the ON position.



Fuel Selector

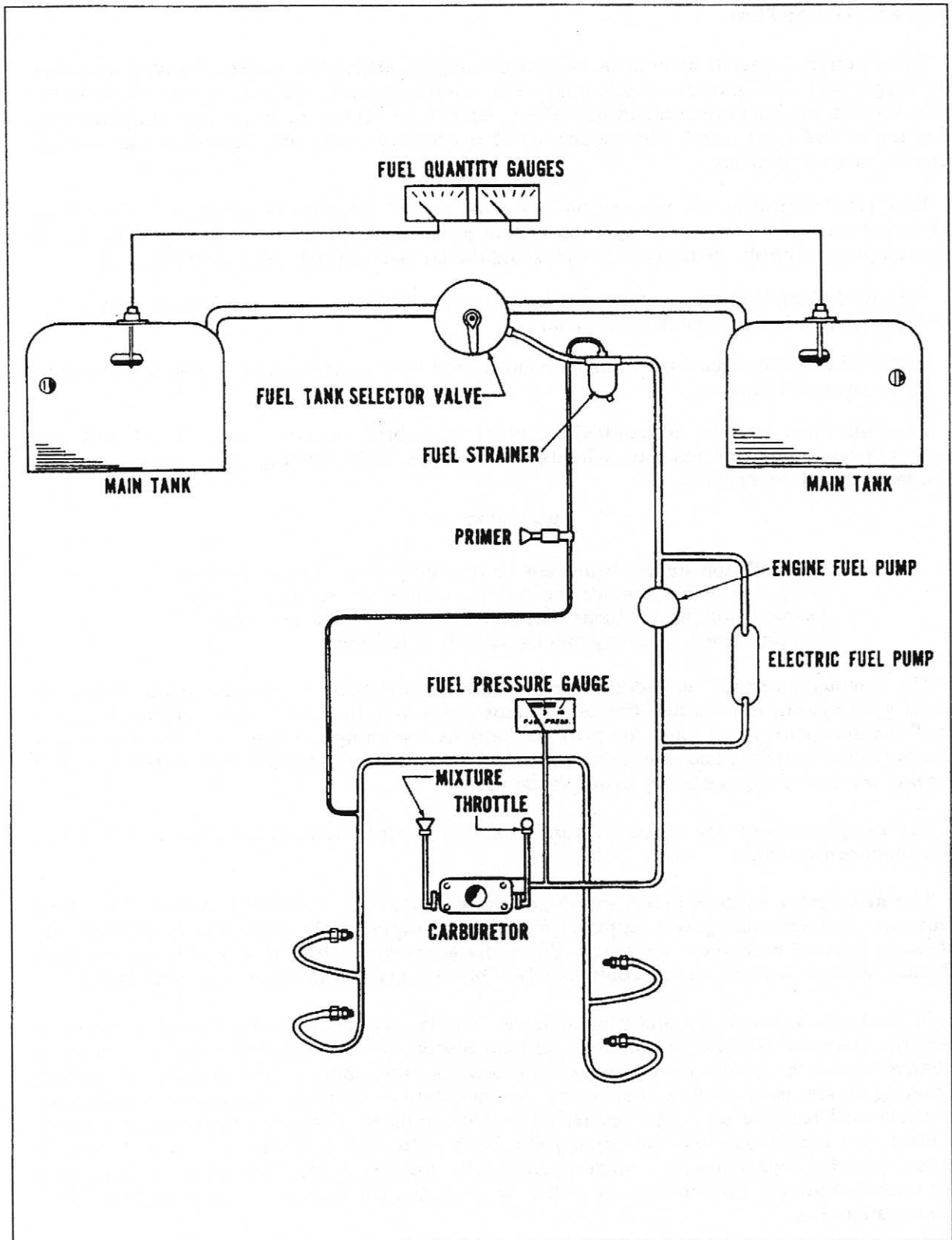
To obtain the standard fuel quantity of 36 gallons, fill the tanks to the bottom of the filler neck indicator. To obtain the standard plus the reserve quantity, a total of 50 U.S. gallons, fill the tanks to the top of the filler neck.

An auxiliary electric fuel pump is provided for use in case of failure of the engine driven pump. The electric pump should be on for all takeoffs and landings and when switching tanks.

The fuel strainer is equipped with a quick drain and is located on the front lower left corner of the fire wall. This strainer should be drained during preflight to check for water or sediment and proper fuel (a special bottle is furnished for this operation). To drain the lines from the tanks, the tank selector valve must be switched to each tank in turn, with the electric pump on, and the gascolator drain valve opened. Each tank has an individual quick drain located at the bottom, inboard, rear corner.

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

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



Fuel System Schematic

ELECTRICAL SYSTEM

The **electrical system** includes a 14-volt 60 ampere alternator, battery, voltage regulator, overvoltage relay, and master switch relay. The 12-volt battery and master switch relay are located beneath the baggage compartment floor. Access for service or inspection is obtained by raising the hinged floor panel. The regulator and overvoltage relay are located on 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 right side of the switch panel controls the navigation lights and the intensity of the instrument panel light.

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

Optional electrical accessories include navigation lights, anti-collision light, landing light, and instrument panel lighting.

The Flite Liner includes as standard electrical accessories: starter, electric fuel pump, stall warning indicator, ammeter, navigation lights, anti-collision light, landing light, instrument panel lights, and annunciator panel*.

WARNING

Anti-collision lights should not be operating when flying through cloud, fog or haze, since the reflected light can produce spatial disorientation. Strobe lights should not be used in close proximity to the ground such as during taxiing, takeoff or landing.

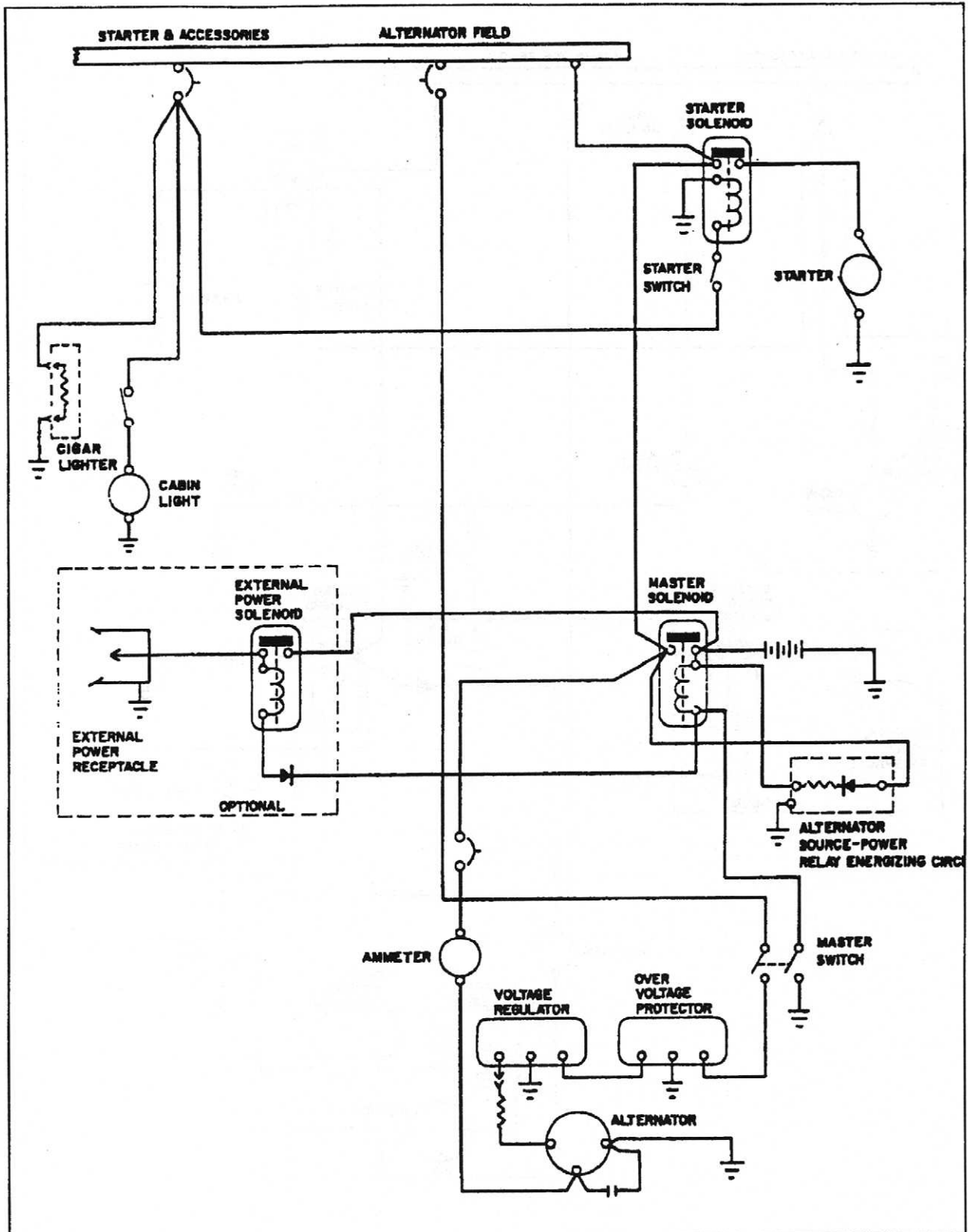
The annunciator panel* includes alternator and low oil pressure indicator lights. When the optional gyro system is installed, the annunciator panel also includes a low vacuum indicator light. The annunciator panel lights are provided only as a warning to the pilot that a system may not be operating properly,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

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

The **alternator system** offers many advantages over the generator system. The main advantage is full electrical power output at much lower engine RPM which results in improved radio and electrical equipment operation. Since the alternator output is available all the time, the battery will be charging almost continuously. This will make cold weather starting easier.

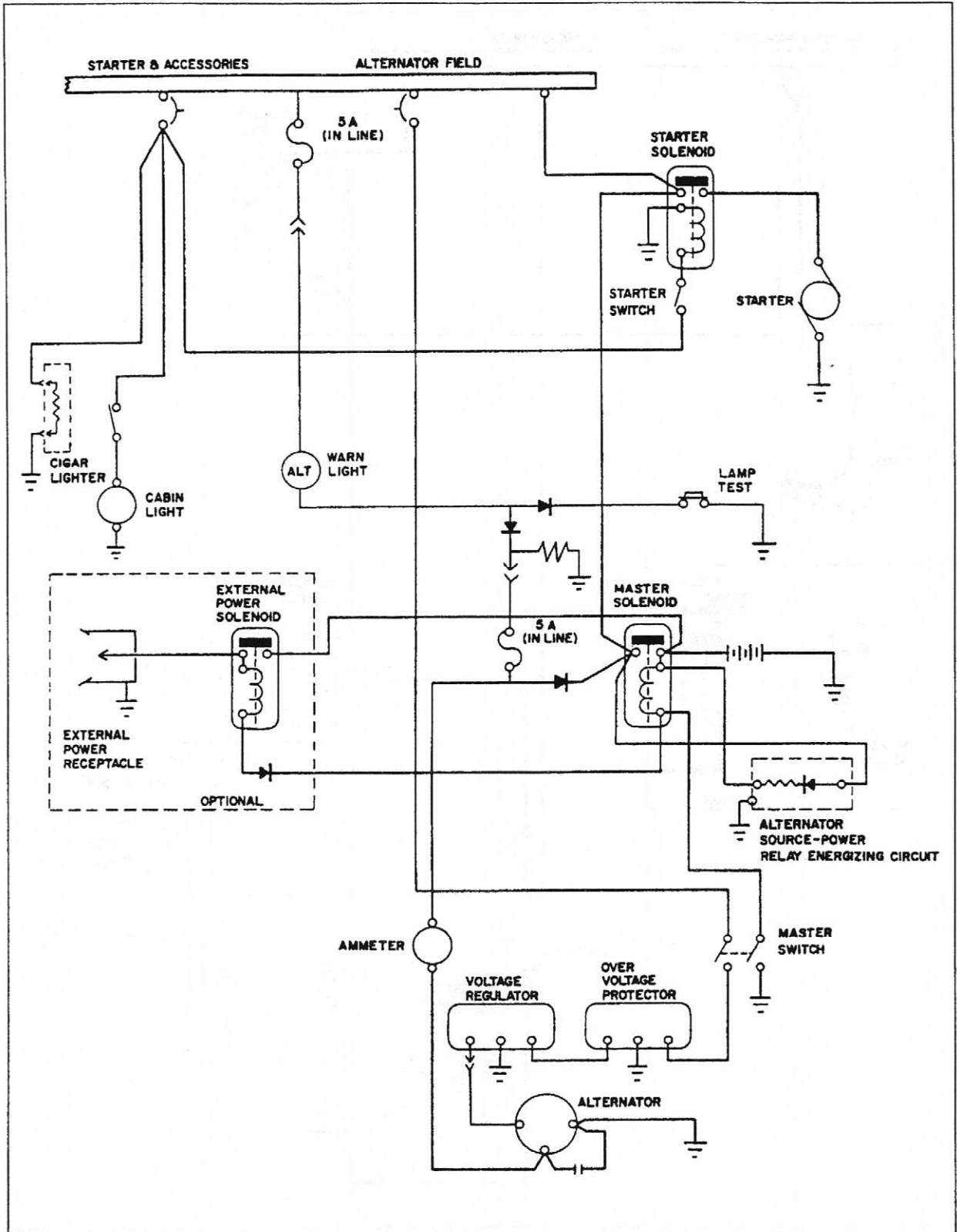
In generator systems, the ammeter indicates battery discharge. In the Cherokee electrical system the ammeter displays in amperes the load placed on the alternator. With all electrical equipment except the master switch in the OFF position, the ammeter will indicate the amount of charging current demanded by the battery. As each item of electrical equipment is turned on, the current will increase to a total appearing on the ammeter. This total includes the battery. The maximum continuous load for night flight with radios on is about 30 amperes. This 30 ampere value plus approximately 2 amperes for a fully charged battery will appear continuously under these conditions. Do not take off with a fully discharged battery as 3 volts are needed to excite the alternator.

*Serial nos. 7525001 and up

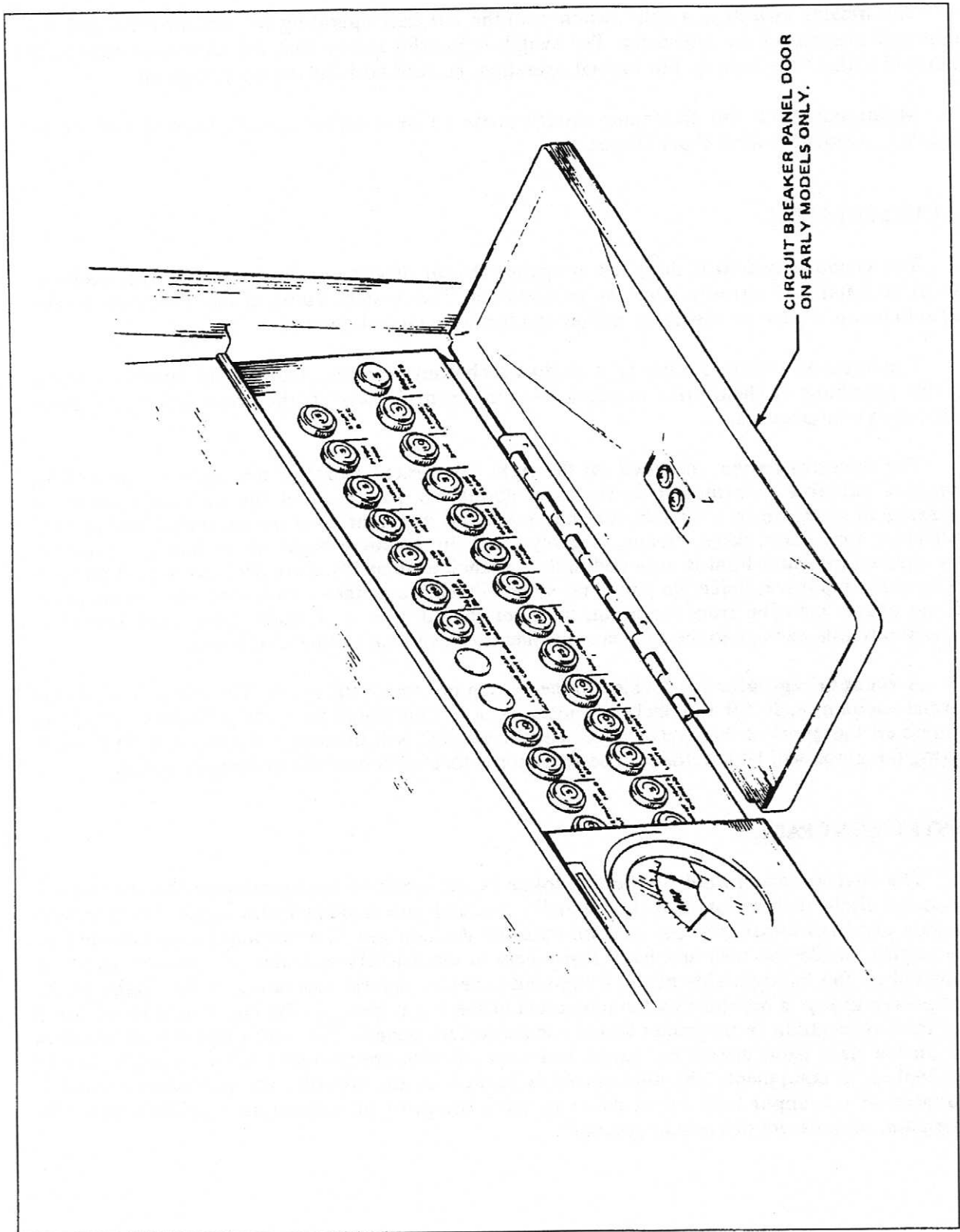


Alternator and Starter Schematic (Ser. nos. 7425001 through 7425454)

CHEROKEE CRUISER



Alternator and Starter Schematic (Ser. nos. 7525001 and up)



CIRCUIT BREAKER PANEL DOOR
ON EARLY MODELS ONLY.

Circuit Breaker Panel

CHEROKEE CRUISER

The **master switch** is a split switch with the left half operating the master relay and the right half energizing the alternator. The switch is interlocked so that the alternator cannot be operated without the battery. For normal operation, be sure both halves are turned on.

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

VACUUM SYSTEM

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

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

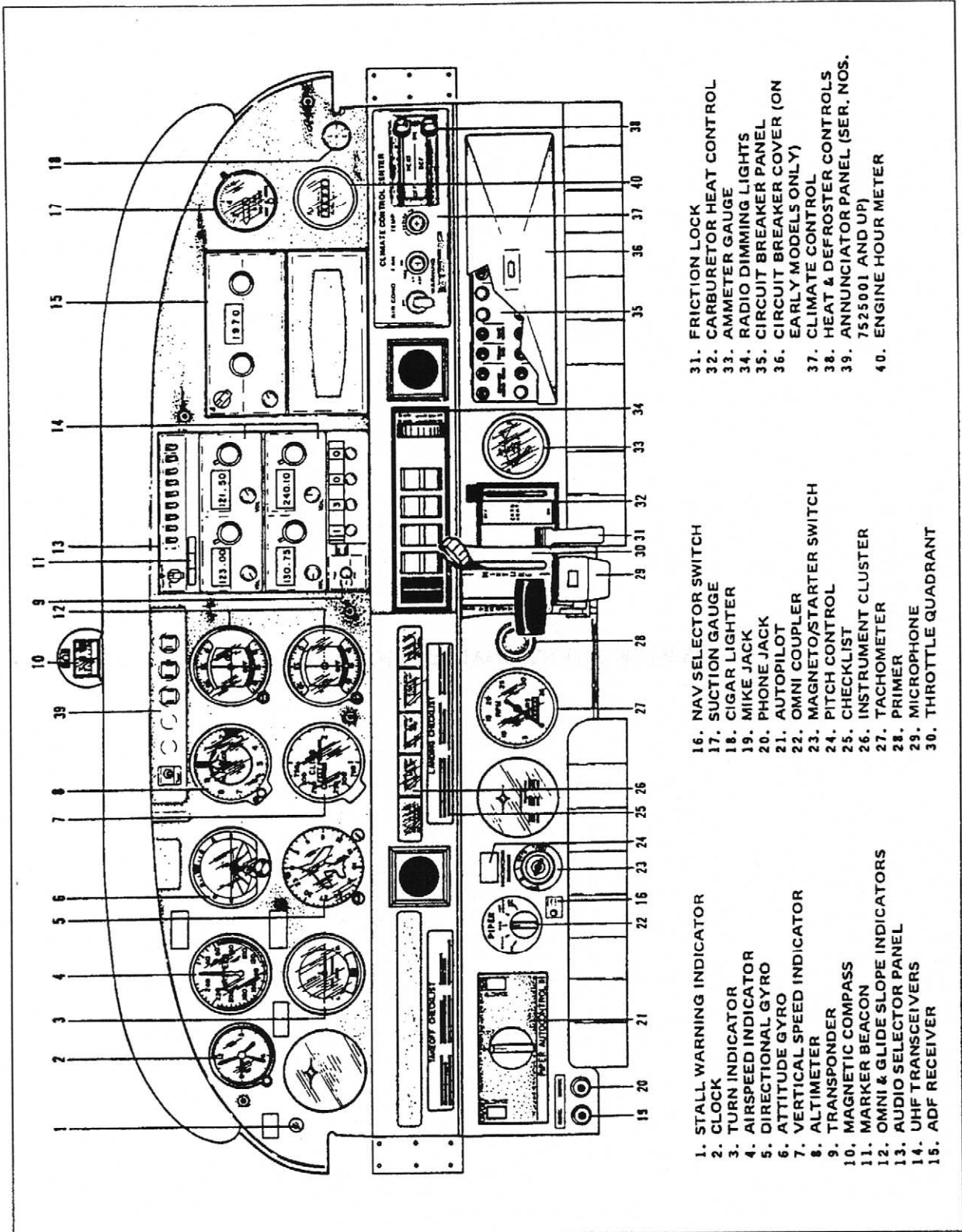
The **vacuum gauge**, mounted on the right instrument panel to the right of the radios, provides valuable information to the pilot about the operation of the vacuum system. A decrease in pressure in a system that has remained constant over an extended period may indicate a dirty filter, dirty screens,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

A **vacuum regulator** is provided in the system to protect the gyros. The valve is set so the normal vacuum reads $5.0 \pm .1$ 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

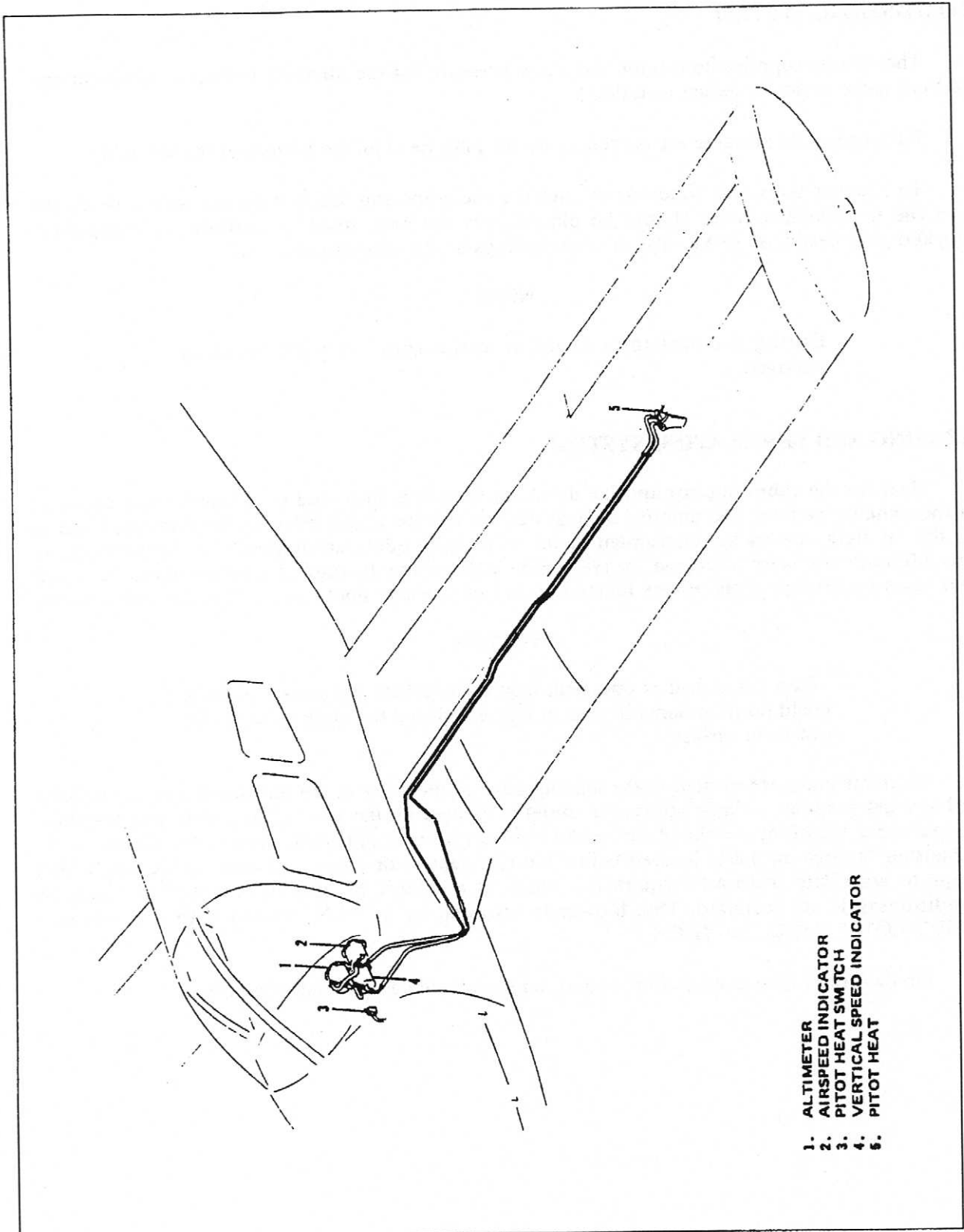
The **instrument panel** of the Cherokee is designed to accommodate the customary advanced flight instruments and the normally required power plant instruments. The artificial horizon and directional gyro are vacuum operated through use of a vacuum pump installed on the engine, while the turn and bank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

*Serial nos. 7525001 and up



Instrument Panel

THIS PAGE INTENTIONALLY LEFT BLANK



Pitot-Static System

CHEROKEE CRUISER

PITOT-STATIC SYSTEM

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

Pitot and static pressure are picked up by the pitot head on the bottom of the left wing.

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

NOTE

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

HEATING AND VENTILATING SYSTEM

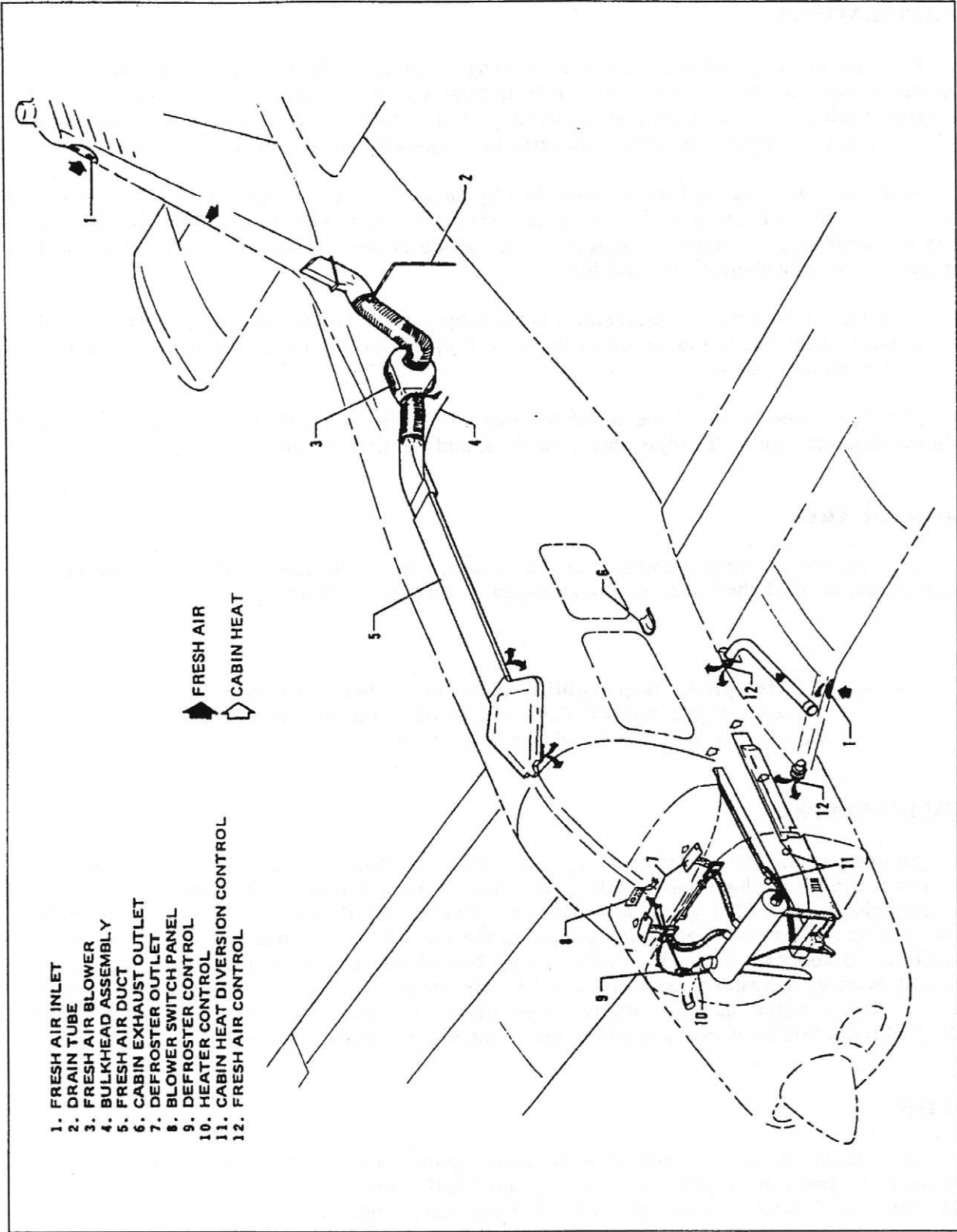
Heat for the cabin interior and the defroster system is provided by a heater muff attached to the exhaust system. The amount of heat desired can be regulated with the controls located on the far right side of the instrument panel. If unusual odors are noticed, the heat should be shut off and the system inspected for leaks. The airflow may be regulated between the front and rear seats by the use of the levers located on top of the heat ducts next to the control console.

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 edge of the wing at the intersection of the tapered and straight sections. A large adjustable outlet is located on the side of the cabin near the floor at each seat location; overhead air outlets are offered as optional equipment. Cabin air is exhausted through an outlet located below the rear seat floor panel. A cabin air blower, which helps to distribute fresh air through the cabin, is available as optional equipment when air conditioning is not installed. This blower is operated by a "FAN" switch with 4 positions - OFF, "LOW," "MED," or "HIGH."

On the Flite Liner, overhead air outlets are not offered as optional equipment.



Heating and Ventilating System

CHEROKEE CRUISER

CABIN FEATURES

For ease of entry and exit and pilot-passenger comfort, the front seats recline and are adjustable fore and aft. A family seat installation which provides two additional seats is available. Each family seat is capable of carrying a full size adult, which gives the Cherokee 140 4-place capability. Optional headrests and vertically adjustable front seats are also available.

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

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

The Flite Liner has all of the above features, except there is only one radio installed, and optional headrests, vertically adjustable front seats, and family seats are not available.

BAGGAGE AREA

A 22 cubic foot luggage compartment is located behind the seats in the two-place model and is accessible from the cabin. Maximum baggage capacity is 200 pounds.

NOTE

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

STALL WARNING

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

FINISH

All exterior surfaces are primed with etching primer and finished with a durable acrylic lacquer in a variety of tasteful colors to suit individual owners. To keep a new look, economy size "Touch-Up" spray paint cans are available from Piper Dealers.

AIR CONDITIONING*

The air conditioning system is a recirculating air system. The major items include; evaporator, condenser, compressor, blower, switches and temperature controls.

The evaporator is located behind the left rear side of the baggage compartment. This cools the air that is used for air conditioning.

The condenser is mounted on a retractable scoop located on the bottom of the fuselage and to the rear of the baggage compartment area. The scoop extends when the air conditioner is "ON" and retracts to a flush position when the system is "OFF."

The compressor is mounted on the forward right underside of the engine. It has an electric clutch which automatically engages or disengages the compressor to the belt drive system of the compressor.

An electrical blower is mounted on the aft side of the rear cabin panel. Air from the baggage area is drawn through the evaporator by the blower and distributed through an overhead duct to individual outlets located adjacent to each occupant.

The switches and temperature control are located on the lower right side of the instrument panel in the climate control center panel. The temperature control regulates the temperature of the cabin. Turn the control clockwise for increased cooling, counterclockwise for decreased cooling.

Located inboard of the temperature control is the fan speed switch and the air conditioning "ON-OFF" switch. The fan can be operated independently of the air conditioning. However, it must be on for air conditioner operation. Turning either switch off will disengage the compressor clutch and retract the condenser door. Cooling air should be felt within one minute after the air conditioner is turned on.

NOTE

If the system is not operating in 5 minutes, turn the system "OFF" until the fault is corrected.

The "FAN" switch allows operation of the fan with the air conditioner turned "OFF" to aid cabin air circulation if desired. A "LOW," "MED" or "HIGH" flow of air can be selected to the air conditioner outlets located in the overhead duct. The outlets can be adjusted or turned off by each occupant to regulate individual cooling effect.

The "DOOR OPEN" indicator light is located to the left of the radio stack in front of the pilot. The light illuminates whenever the condenser door is open and remains on until the door is closed.

A circuit breaker located on the circuit breaker panel protects the air conditioning electrical system.

*Optional equipment

CHEROKEE CRUISER

Whenever the throttle is in the full throttle position, it actuates a micro switch which disengages the compressor and retracts the scoop. This is done to obtain maximum power and maximum rate of climb. The fan continues to operate and the air will remain cool for approximately one minute. When the throttle is retarded approximately 1/4 inch, the clutch will engage and the scoop will extend, again supplying cool, dry air.

PIPER EXTERNAL POWER*

An optional starting installation known as Piper External Power (PEP) is accessible through a receptacle located on the right side of the fuselage aft of the wing. An external battery can be connected to the socket, thus allowing the operator to crank the engine without having to gain access to the airplane's battery. This installation is not available on the Flite Liner.

*Optional equipment