

SECTION II

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SECTION II

DESIGN INFORMATION

ENGINE AND PROPELLER

The Cherokee 180 "G" is powered by a Lycoming O-360-A4A four cylinder, direct drive, horizontally opposed engine rated at 180 HP at 2700 RPM. It is furnished with a starter, 60 ampere 12 volt alternator, shielded ignition, vacuum pump drive, fuel pump, and a dry, automotive type carburetor air filter.

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

The Sensenich 76EM8S5-0-60 fixed-pitch propeller is made from a one-piece alloy forging.

STRUCTURES

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

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

The wing airfoil section is a laminar flow type, 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.

LANDING GEAR

The three landing gears use a Cleveland 6.00 x 6 wheel, the main wheels being provided with Cleveland single disc hydraulic brake assemblies, No. 30-55. All wheels use 6.00 x 6 four ply tires with tubes.

The nose gear is steerable through a 44 degree arc by use of the rudder pedals. A spring device is incorporated in the rudder pedal torque tube assembly to aid in rudder centering and to provide rudder trim. The nose gear steering mechanism also incorporates a hydraulic shimmy dampener.

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

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

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

CONTROL SYSTEMS

Dual controls are provided as standard equipment with a cable system used between the controls and the surfaces. The horizontal tail is of the Flying Tail type (stabilator), with a trim tab mounted on the trailing edge of the stabilator to reduce the control system forces. This tab is actuated by a control wheel on the floor between the front seats. The stabilator provides extra stability and controllability with less size, drag and weight than conventional tail surfaces. The ailerons are provided with a differential action which tends to reduce adverse yaw in turning maneuvers, and which also reduces the amount of coordination required in normal turns. A rudder trim adjustment is mounted on the right side of the pedestal below the throttle quadrant and permits directional trim as needed in flight.

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

FUEL SYSTEM

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

The fuel selector control is located on the left side-panel, forward of the pilot's seat. If a modified selector valve cover has been installed, 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 into the ON position.

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

Each tank has an individual quick drain located at the bottom,

Standard accessories include a starter, electric fuel pump, stall warning indicator, cigar lighter, fuel gauge and ammeter. The navigation lights, anti-collision light, landing light, instrument lighting and cabin dome light are optional. Circuits will handle an entire complement of communications and navigational equipment.

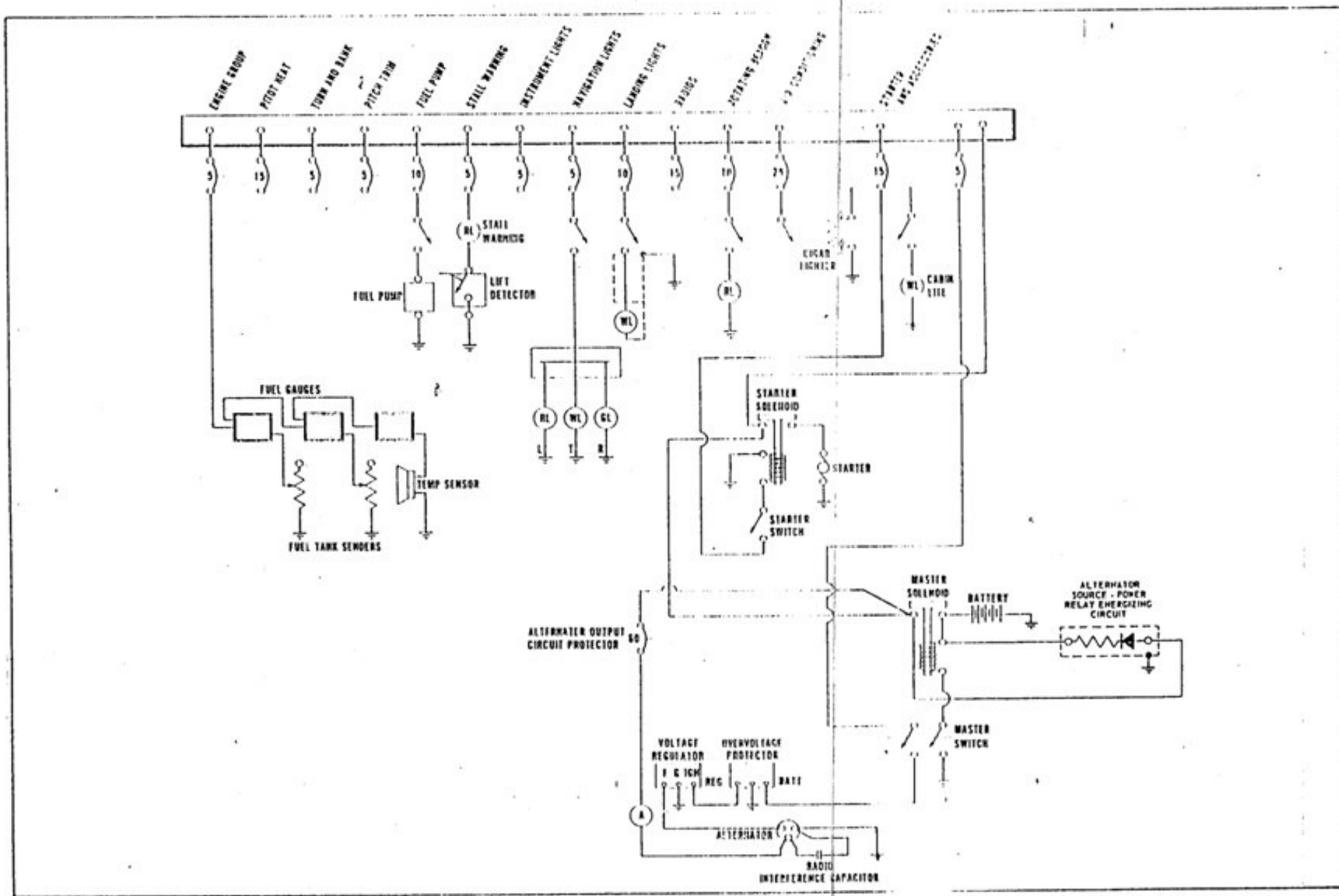
The alternator system offers many advantages over the generator system both in operation and maintenance. The main advantage is full electrical power output at lower engine RPM. This is a great improvement for radio and electrical equipment operation. Since the alternator output is available at all times, the battery will be charging for a greater percentage of use. This will make cold-morning starting easier.

The words "master switch" used hereafter in this manual indicate both sides of the switch, battery side "BAT" and alternator side "ALT" are to be depressed simultaneously to OFF or ON as directed.

Unlike previous generator-systems, the ammeter does not indicate battery discharge; rather it displays in amperes the load placed on the alternator. With all electrical equipment off (except master switch) the ammeter will be indicating the amount of charging current demanded by the battery. As each item of electrical equipment is turned on, the current will increase to a total appearing on the ammeter. This total includes the battery. The maximum continuous load for night flight, with radios on, is about 30 amperes. This 30 ampere value, plus approximately two amperes for a fully charged battery, will appear continuously under these flight conditions. The amount of current shown on the ammeter will tell immediately if the alternator system is operating normally, as the amount of current shown should equal the total amperage drawn by the equipment which is operating.

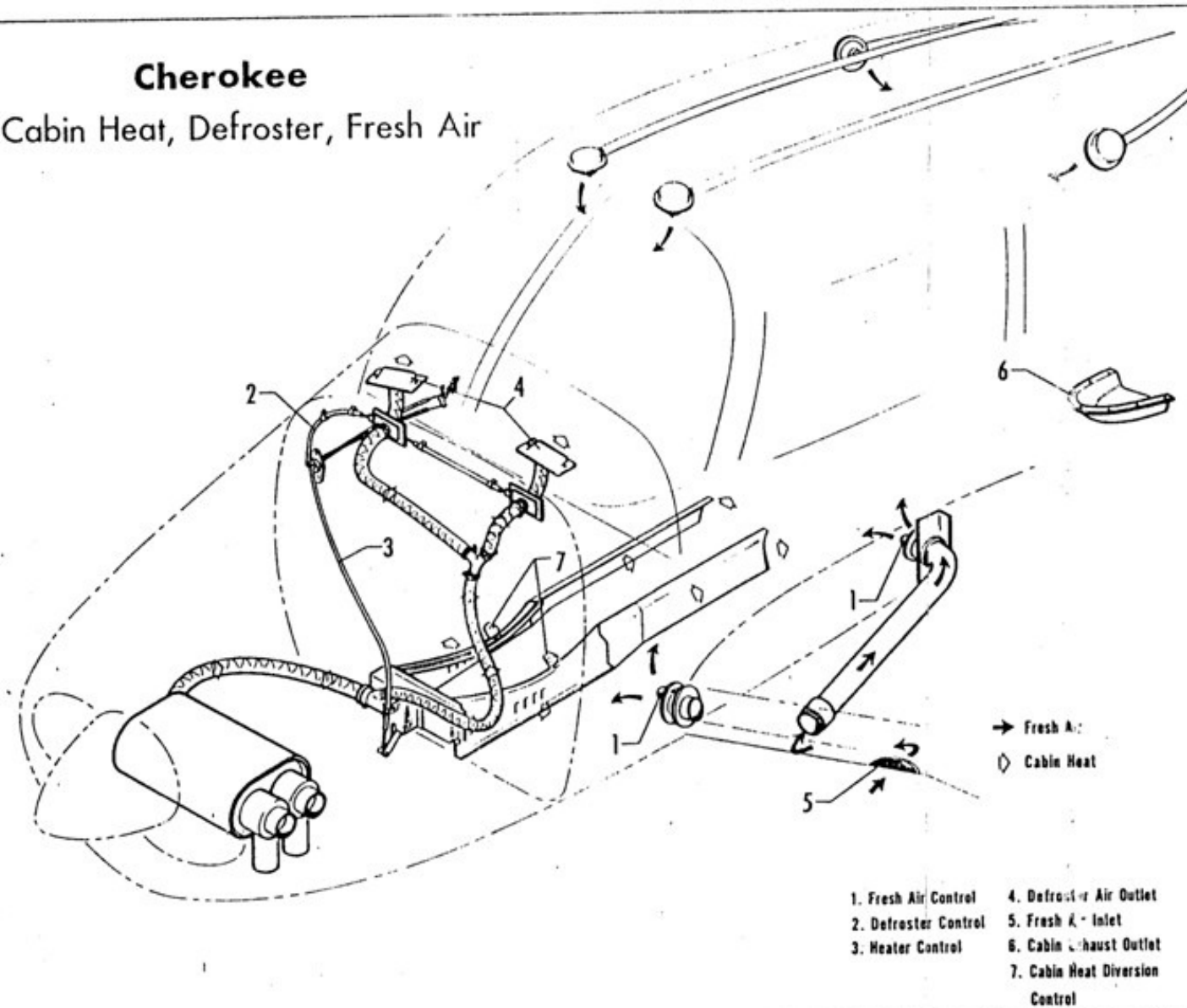
If no output is indicated on the ammeter during flight, reduce the electrical load by turning off all unnecessary electrical equipment. Check both 5 ampere field breaker and 60 ampere output breaker and reset if open. If neither circuit breaker is open, turn off the "ALT" switch for 30 seconds to reset the overvoltage relay. If ammeter continues to indicate no output, maintain minimum electrical load and terminate flight as soon as practical.

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



Cherokee

Cabin Heat, Defroster, Fresh Air



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.

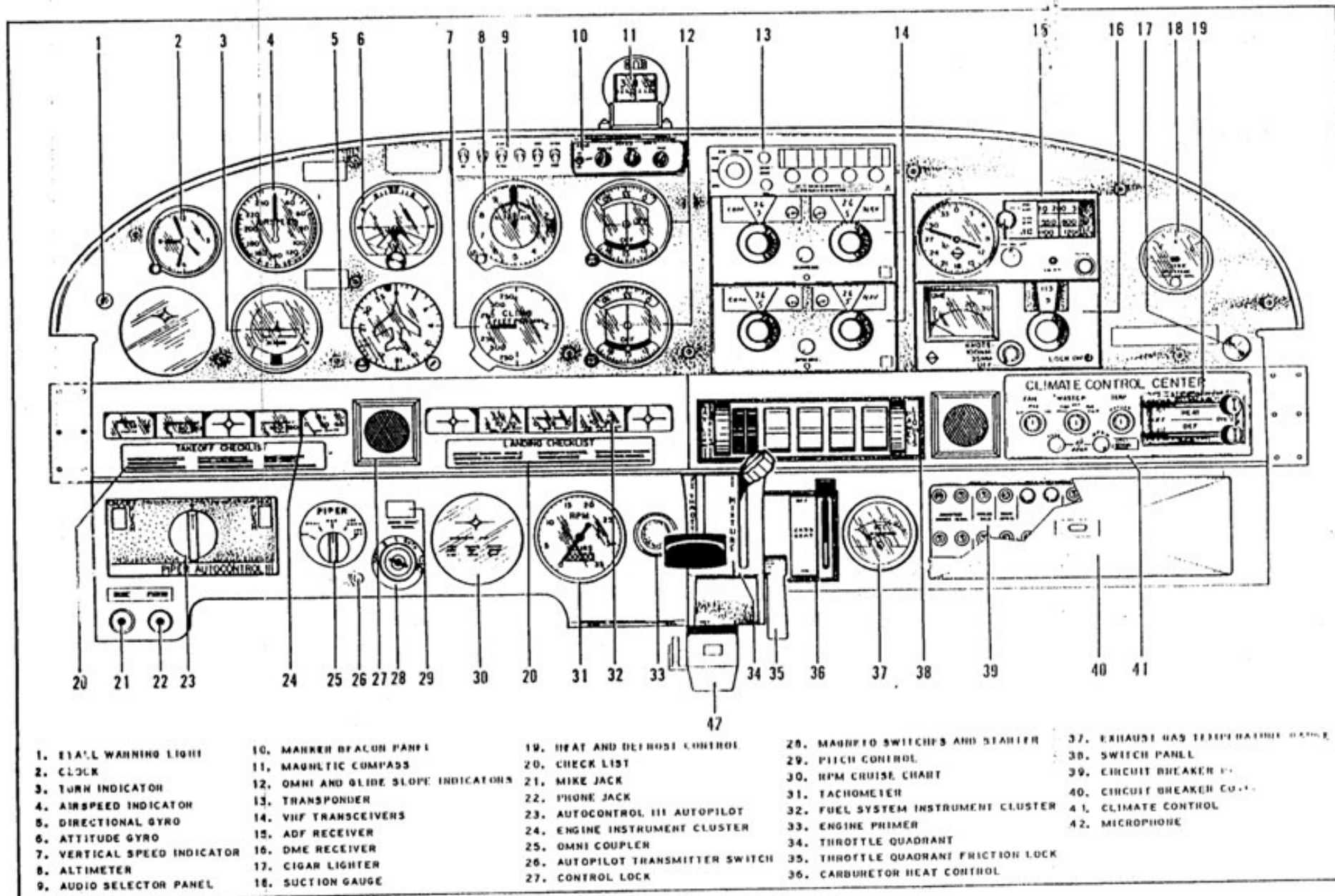
The air flow can be regulated between the front and rear seats by levers located on top of the heat ducts next to the console.

Fresh air inlets are located in the leading edge of the wing at the intersection of the tapered and straight sections. A large adjustable outlet is located on the side of the cabin near the floor at each seat location. Cabin air is exhausted through an outlet located below the rear seat.

CABIN FEATURES

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 the 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 circuit breakers located on the right hand instrument panel have extra circuits provided for a complete line of optional radio equipment. The microphone is located on the console cover, see illustration page 14, item 42.

The cabin interior includes a pilot storm window, two sun visors, ash trays, two map pockets, and pockets on the backs of each front seat. The front seats are adjustable fore and aft for pilot-passenger comfort and ease of entry and exit. Arm rests are also provided for the person's inboard hip.



1. STALL WARNING LIGHT
2. CLOCK
3. TURN INDICATOR
4. AIRSPEED INDICATOR
5. DIRECTIONAL GYRO
6. ATTITUDE GYRO
7. VERTICAL SPEED INDICATOR
8. ALTIMETER
9. AUDIO SELECTOR PANEL

10. MAHNER DEAFEN PANEL
11. MAGNETIC COMPASS
12. OMNI AND GLIDE SLOPE INDICATORS
13. TRANSPONDER
14. VHF TRANSCEIVERS
15. ADF RECEIVER
16. DME RECEIVER
17. CIGAR LIGHTER
18. SUCTION GAUGE

19. HEAT AND DEFROST CONTROL
20. CHECK LIST
21. MIKE JACK
22. PHONE JACK
23. AUTOCONTROL III AUTOPILOT
24. ENGINE INSTRUMENT CLUSTER
25. OMNI COUPLER
26. AUTOPILOT TRANSMITTER SWITCH
27. CONTROL LOCK

28. MAGNETO SWITCHES AND STARTER
29. PITCH CONTROL
30. RPM CRUISE CHART
31. TACHOMETER
32. FUEL SYSTEM INSTRUMENT CLUSTER
33. ENGINE PRIMER
34. THROTTLE QUADRANT
35. THROTTLE QUADRANT FRICTION LOCK
36. CARBURETOR HEAT CONTROL

37. EXHAUST GAS TEMPERATURE GAGE
38. SWITCH PANEL
39. CIRCUIT BREAKER
40. CIRCUIT BREAKER CO.
41. CLIMATE CONTROL
42. MICROPHONE

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. The shoulder strap is routed over the shoulder adjacent to the windows and attached to the lap belt in the general area of the person'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 24 cubic foot baggage area may be reached from the cabin or through a large 20 x 22 inch outside door.

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 desired temperature of the cabin. Turn the control clockwise for increased cooling, counterclockwise for decreased cooling.

Located inboard of the temperature control is the air conditioner master switch. The switch has three positions: "FAN ONLY," "OFF" and "AIR COND." When "AIR COND" is selected the compressor clutch engages, the condenser scoop opens and the fan is turned on. Cooling air should be felt within one minute.

*Optional Equipment

NOTE

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

The "FAN ONLY" position allows operation of the fan with the air conditioner turned "OFF" to aid cabin air circulation if desired.

The "FAN" switch allows selecting a "LOW," "MED" or "HIGH" flow of air to the air conditioner outlets located in the overhead duct. The outlets can be adjusted or turned off by each occupant to obtain individual cooling effect.

There are two indicator lights associated with the air conditioner. On early models both lights are located below the switch on the air conditioner panel. On the later version the "Door Open" indicator light is located on the left side of the instrument panel. The "FUSE" light illuminates to indicate failure of one or both of the fuses which protect the control circuits. The fuses are located behind the climate control center panel.

The "Door Open 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.

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.