

**OWNERS
HANDBOOK**

Apache

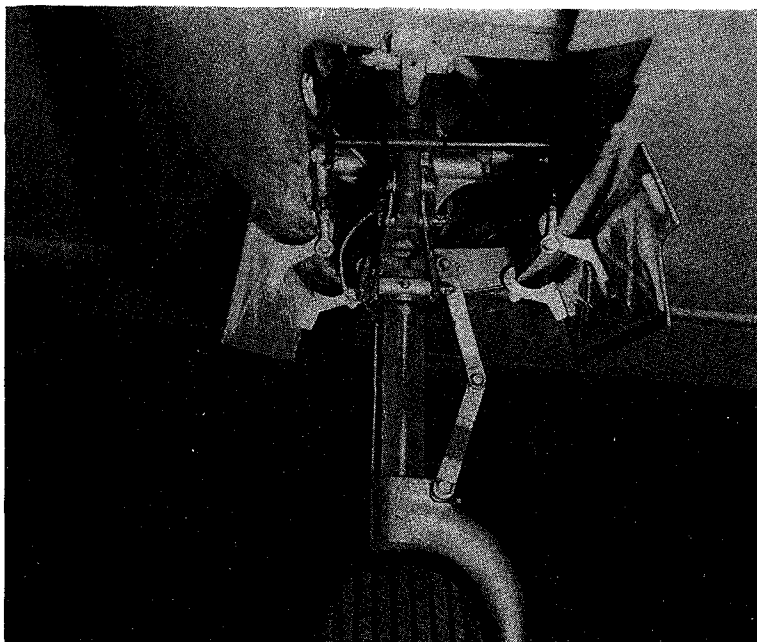
The word "Apache" is written in a large, white, stylized script font. Behind the text is a white silhouette of a helicopter, viewed from the side, with its main rotor blades extending upwards and its tail rotor extending to the right. The entire design is set against a solid black background.

while providing for excellent stability and performance characteristics.

The wings are attached to the tubular center section structure with fittings at the sides and in the center of this structure, and the main spars are bolted to each other with high strength butt fittings in the center of the fuselage, making in effect a continuous main spar. This arrangement combines high strength and light weight qualities, since heavy wing hinge fittings on the spars and fuselage are eliminated, as well as an elaborate carry-through structure through the center section of the fuselage.

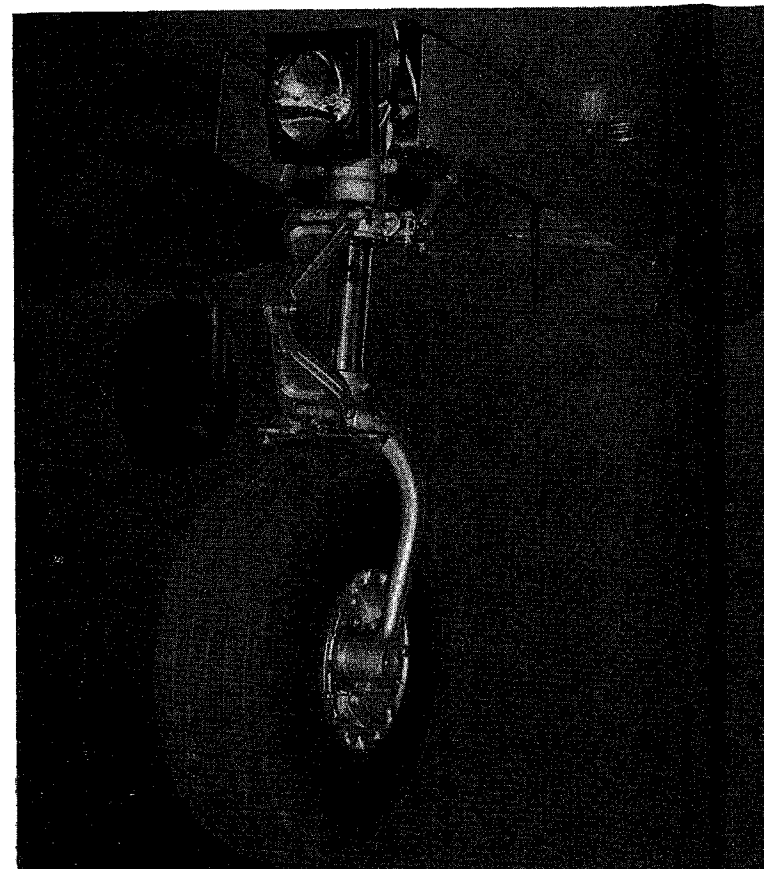
IV. Landing Gear:

All three landing gear units on the Apache incorporate the same soft acting air-oil oleo struts, and contain many directly interchangeable parts.



Main wheels are 600 x 6 Cleveland Aircraft Products units with disc type brakes and 700 x 6 tires. The nose wheel is a Cleveland 600 x 6 model fitted with a 600 x 6 tire and tube.

Main gear brakes are actuated by toe brake pedals on the left set of rudder pedals. Hydraulic brake cylinders located in front of the left rudder pedals are readily accessible in the cockpit for servicing. A brake fluid reservoir which is attached to the brake cylinders with flexible lines and provides a reserve of fluid for the brake system, is mounted inside the left nose access panel.

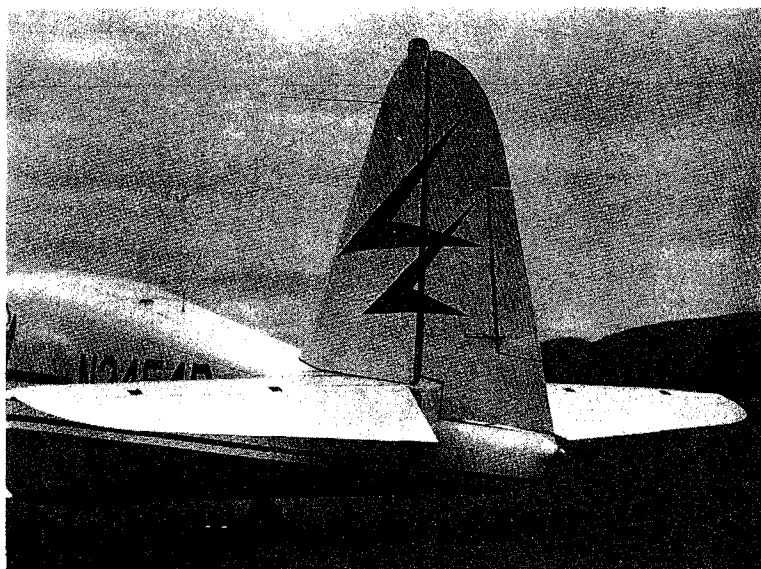


Parking brake valves, operated by a control on the upper left side of the instrument panel, are installed ahead of the forward cabin bulkhead and are also serviced through the left nose access panel.

The nose wheel is steerable through a 30 degree arc through use of the rudder pedals. As the nose gear retracts, the steering linkage becomes disconnected from the gear so that rudder pedal action with the gear retracted is not impeded by nose gear operation.

The position of the landing gear is indicated by four light bulbs located on the pedestal. When the green lights are on, all three legs of the gear are down and locked; when the amber light is on, the gear is entirely up, and when no light is on, the gear is in an intermediate position.

A red light in the landing gear control knob flashes when the gear is up and either one of the throttles is pulled back. When both throttles are closed beyond a given power setting, with wheels not down, the landing gear warning horn sounds.



To guard against inadvertant retraction of the landing gear on the ground, a mechanical latch, which must be operated before the landing gear control can be moved upward, is positioned just above the control lever. The control knob is in the shape of a wheel to differentiate it from the flap control knob which has an airfoil shape.

V. Hydraulic System:

The hydraulic system is used for the extension and retraction of both the landing gear and flaps. The operation of these units is accomplished by the landing gear and flap selector valve unit which is housed within the control pedestal under the engine controls. Pressure is supplied to the control unit from an engine driven pump mounted on the left engine.

To effect extension or retraction of the gear and flaps, the controls which protrude through the face of the pedestal are moved from the center "Off" in the desired direction. When the selected component is fully extended or retracted, hydraulic pressure within the selector valve unit forces the control back to a neutral or "Off" position, which allows the hydraulic fluid to circulate freely between the pump and the control unit. Also, it isolates the activating cylinders and associated lines from the hydraulic fluid supply. This prevents complete loss of fluid in the event of a leak in the lines between the selector valve and the component or at the actuating cylinders. The return of the control handle to the "Off" position is also a secondary indication that the components have reached full extension or retraction, however the landing gear position lights and the flap indicator should be used as a primary indication.

Gear retraction and extension will occur normally between 10 and 12 seconds. The flap operation requires about 4 seconds.

The emergency hydraulic pump, which is integral with the selector valve unit, is used to obtain hydraulic pressure in event of failure of the hydraulic pump or the left engine. To operate the emergency pump, the handle should be extended to its full length by pulling aft and positioning the control handle as desired. 30 to 40 pump strokes are required to raise or lower the landing gear.

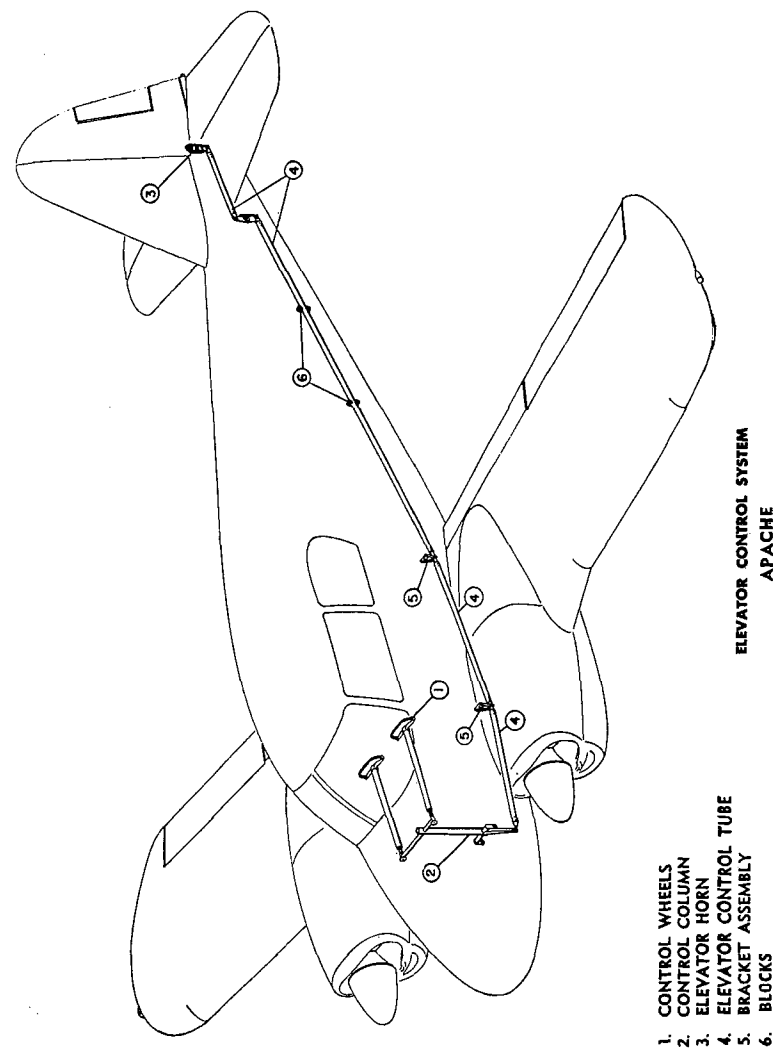
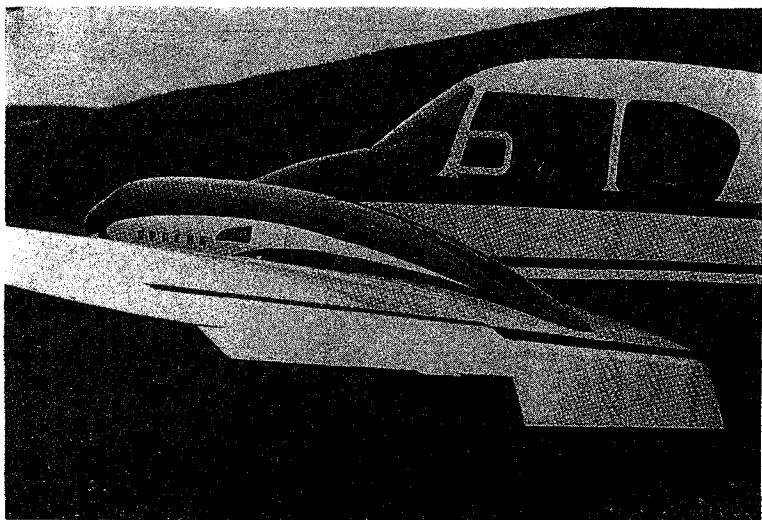
For emergency extension of the landing gear, if failure of the hydraulic system should occur due to line breakage or selector valve malfunction, an independent CO₂ system is available to extend the landing gear. (See Operating Instructions for details).

Included on the left main gear is an oleo actuated by-pass valve which makes it impossible to retract the landing gear while the weight of the airplane is on the gear. This valve is open when the oleo strut is compressed and by-passes all hydraulic fluid, on the pressure side of the system, to the return side, preventing any pressure build-up in the retraction system. When the oleo strut is extended as in flight, or when the aircraft is on jacks, the valve is closed, permitting the system to operate in the normal manner.

VI. Control System and Surfaces:

Dual wheel and rudder flight controls are provided in the Apache as standard equipment. All controls are light yet solid and effective in flight at all speeds down through the stalling speed. The nose wheel is steerable on the ground through the rudder pedals and the left set of pedals are equipped with toe brakes.

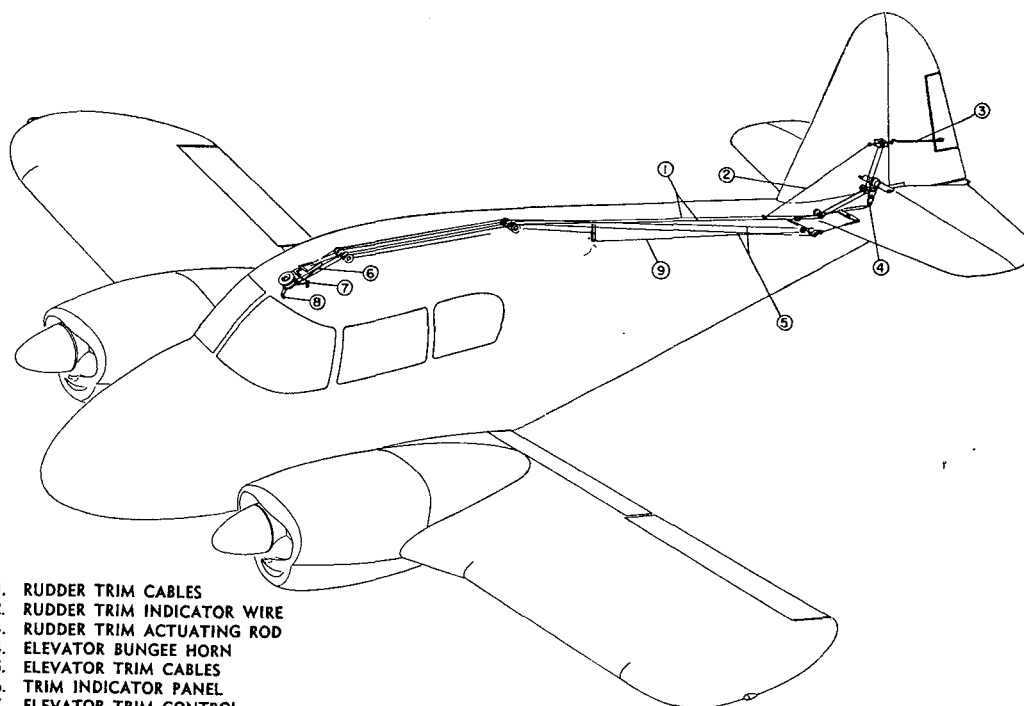
All control surfaces on the Apache are conventional sheet metal structures, fitted with cast hinges and needle bearings. The eleva-



1. CONTROL WHEELS
2. CONTROL COLUMN
3. ELEVATOR HORN
4. ELEVATOR CONTROL TUBE
5. BRACKET ASSEMBLY
6. BLOCKS

ELEVATOR CONTROL SYSTEM
APACHE

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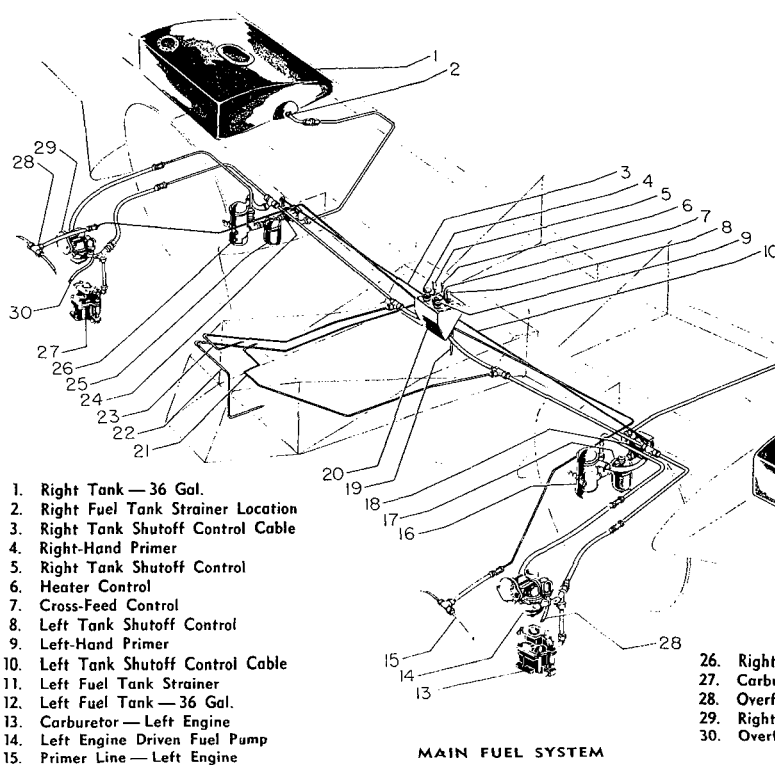


1. RUDDER TRIM CABLES
2. RUDDER TRIM INDICATOR WIRE
3. RUDDER TRIM ACTUATING ROD
4. ELEVATOR BUNGEE HORN
5. ELEVATOR TRIM CABLES
6. TRIM INDICATOR PANEL
7. ELEVATOR TRIM CONTROL
8. RUDDER TRIM CONTROL
9. ELEVATOR TRIM INDICATOR WIRE

ELEVATOR-RUDDER TRIM SYSTEM
APACHE



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1. Right Tank — 36 Gal.
2. Right Fuel Tank Strainer Location
3. Right Tank Shutoff Control Cable
4. Right-Hand Primer
5. Right Tank Shutoff Control
6. Heater Control
7. Cross-Feed Control
8. Left Tank Shutoff Control
9. Left-Hand Primer
10. Left Tank Shutoff Control Cable
11. Left Fuel Tank Strainer
12. Left Fuel Tank — 36 Gal.
13. Carburetor — Left Engine
14. Left Engine Driven Fuel Pump
15. Primer Line — Left Engine

MAIN FUEL SYSTEM

16. Left Electric Aux. Fuel Pump
17. Left Fuel Strainer
18. Left Tank Shutoff Valve
19. Fuel Drain Line
20. Fuel Drain Control
21. Left Fuel Pressure Line
22. Nose Heater Line
23. Right Fuel Pressure Line
24. Right Tank Shutoff Valve
25. Right Fuel Strainer

26. Right Electric Aux. Fuel Pump
27. Carburetor — Right Engine
28. Overflow — Left Engine Driven Fuel Pump
29. Right Engine Driven Fuel Pump
30. Overflow — Right Engine Driven Fuel Pump

tors are actuated by a tubular push-pull system, and the flaps by a hydraulic cylinder located in the right side of the cabin wall. Access to this cylinder is obtained by the removal of the upholstered interior panel immediately ahead of the baggage door.

The ailerons and rudder are connected by cables with the control wheel and rudder pedals. The rudder has a trim tab operated by a crank in the center of the forward cabin ceiling. Longitudinal trim is through bungee springs located back near the elevators and controlled by a larger crank adjacent to the rudder tab control.

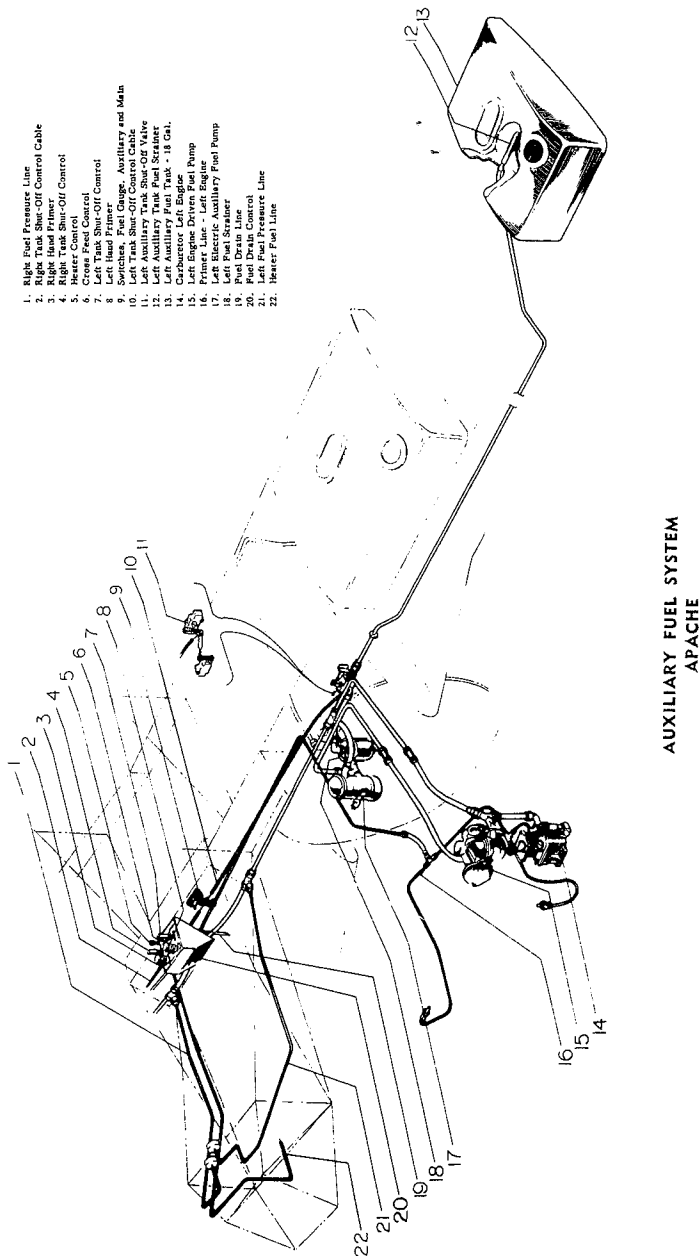
VII. Fuel System:

Two thirty-six gallon nylon and neoprene fuel cells located outboard of the engine provide fuel storage in the standard Apache. Auxiliary tanks holding eighteen gallons each are installed optionally in the outboard section of the wing. The tanks should be kept full of fuel during storage of the airplane to prevent accumulation of moisture, and to prevent deterioration of the rubber cells. For long term storage without fuel, the cells should be coated with light engine oil to keep the rubber from drying out.

The fuel system in the Apache is simple, but completely effective. Fuel can be pumped from any tank to both engines, through use of the four fuel pumps provided for this purpose.

For normal operation, fuel is pumped by the engine driven pumps from the tanks directly to the adjacent carburetors. The fuel valves can be left on at all times and the crossfeed left in the off position. Electric auxiliary fuel pumps are installed in by-pass fuel lines between the tanks and the engine driven pumps. The electric pumps can be used to provide pressure in the event of failure of the regular pumps. They are normally turned on to check their operation before starting the engines, and left on during take-off and landing, to preclude the possibility of fuel pressure loss due to pump failure at critical times.

If one of the engine driven pumps fails, the electric pump to that engine can be turned on to supply the fuel. However, if desired, the fuel can be pumped by the operating engine driven pump to the failed pump engine simply by turning on the crossfeed. The good pump will then be supplying both engines from its tank. If this tank runs low on fuel, fuel can be drawn from the opposite tank by turning on the electric pump on the failed pump side, leaving the crossfeed on, and turning the fuel valve on the empty tank off. Then the electric pump on the failed pump side will be supplying both engines from its tank.



Fuel can thus be used from one tank or the other, by shutting off one main valve and turning on the crossfeed, to balance fuel loads or for other purposes. For all normal operation, it is recommended that fuel be pumped directly from the tanks to their respective engines, with the crossfeed off.

The fuel valve controls and crossfeed control are located with the engine primer pumps in fuel control panel between the front seats. Two electric fuel gauges in the engine gauge cluster on the instrument panel indicate the fuel quantity in each tank. The electric fuel pump switches are on the lower left side of the instrument panel.

A crossfeed line drain valve control is mounted on the front face of the fuel control panel box. This valve should be opened occasionally, with the crossfeed on, to allow any water that might accumulate at that point to be drained out. The heater fuel control is also placed on the fuel control panel, so that fuel to the heater can be turned off if necessary.

The main fuel strainers are located in the inboard sides of the main wheel wells. They are fitted with quick drains and should be drained regularly through their small access ports. Fuel screens are provided at the tank outlets, in the carburetors and in the fuel pumps.

Idle cut-offs are incorporated in the mixture controls and should always be used to stop the engines.

VIII. Electrical System:

The master switch for the electrical system is located on the lower left side of the control pedestal, along with the heating and ventilating control panel. Other electrical switches and circuit breakers are grouped on the lower left side of the instrument panel.

The starter switch is located immediately above the audio selector switches on the extreme left side of the instrument panel. This switch is spring loaded and locks in the center "Off" position. To operate, pull out on the switch guard and hold to left or right as desired. After starting, release the switch and it will return to the off and locked position.

Automatic circuit breakers are provided for the lights, generators, radios, landing gear indicator system, Turn and Bank, fuel pumps and cabin heater. These units automatically break the electrical circuit if an overload is applied to the system, preventing damage to any electrical component. To reset the circuit breakers,

simply push in the buttons. Continual popping out of a circuit button indicates trouble in the electrical system and should be investigated immediately.

A 12-volt 33-ampere hour battery, enclosed in a sealed stainless steel battery box, is mounted in the nose section on the right side.

The position and panel lights are operated by a rheostat switch located with the other electrical switches. The position lights are turned on with the first movement of the knob; panel light intensity is increased by further rotation of the control. A dome light switch is incorporated in the light unit in the center of the cabin ceiling.

Generator switches are mounted on the lower right side of the pedestal. When dual 35 ampere generators are installed optionally or on the Super Custom Apache, a voltage regulator for each generator is attached to the adjacent firewall. A paralleling relay equally divides the total electrical load between generators. When one engine is stopped a reverse current relay automatically disconnects that generator from the circuit.

